



April 10, 2023

Michelle Lloyd  
Materials Recovery and Waste Management Division  
Office of Resource Conservation and Recovery  
Office of Land and Emergency Management

RE: DTE Electric Company Comments on Proposed Decision: Proposed Denial of the CCR Part B Alternate Liner Demonstration Application, DTE Electric Belle River Power Plant Bottom Ash Ponds and Diversion Basin, China Township, Michigan  
Docket ID: EPA-HQ-OLEM-2021-0282; Sent via Regulations.gov and email

Dear Ms. Lloyd:

The DTE Electric Company (DTE) respectfully submits these comments to Docket EPA-HQ-OLEM-2021-0282 in response to the U.S. Environmental Protection Agency (EPA) Proposed Denial of the CCR Part B Alternate Liner Demonstration Applications for DTE Belle River Power Plant's Bottom Ash Basins and Diversion Basins (Proposed Decision). DTE appreciates EPA's commitment to move the needle on the Part B applications but strongly believes that the Applications should be approved based on the technical record and the attached comments. DTE has demonstrated through robust site characterization provided to the EPA and again provided in these comments, that the Bottom Ash Basins and Diversion Basin comply with the requirements of the CCR rule, are not impacting groundwater within the uppermost aquifer, and have the necessary site characteristics to be eligible to perform an Alternate Liner Demonstration.

DTE acknowledges the level of effort required to make well-informed reasoned decisions and appreciates EPA's time in reviewing the vast amount of data DTE has provided. DTE welcomes the opportunity to engage in discussions with the Agency regarding their review of this response and any other comments that are received in the docket.

Thank you for considering these comments. Should you have any questions, please do not hesitate to contact me ([shawn.patterson@dteenergy.com](mailto:shawn.patterson@dteenergy.com); 313-235-7720).

Sincerely,

A handwritten signature in black ink that reads "Shawn Patterson". The signature is fluid and cursive, with the first name "Shawn" being larger and more prominent than the last name "Patterson".

Shawn Patterson  
Vice President – DTE Environmental Management and Safety

Enclosure

cc: Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills



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**COMMENTS OF DTE ELECTRIC COMPANY ON EPA'S PROPOSED DENIAL OF THE CCR PART B ALTERNATE LINER DEMONSTRATION APPLICATIONS, DTE ELECTRIC, BELLE RIVER POWER PLANT, BOTTOM ASH BASINS AND DIVERSION BASIN, CHINA TWP, MICHIGAN**

Docket ID No. EPA-HQ-OLEM-2021-0282

## **I. Introduction**

DTE Electric Company (DTE Electric or DTE) is providing this response and comments on the U.S. Environmental Protection Agency's (EPA or Agency) proposed denial of the CCR Part B Alternate Liner Demonstration Applications for the DTE Electric Belle River Power Plant Bottom Ash Basins and Diversion Basin, China Township, Michigan (Proposed Decision), EPA Docket ID EPA-HQ-OLEM-2021-0282. This Proposed Decision comes more than two years after DTE's Applications for Alternate Liner Demonstrations for the Belle River Bottom Ash Basins and the Diversion Basin Coal Combustion Residuals (CCR) Units which were submitted to the Agency on November 30, 2020 (Applications).

DTE has carefully reviewed the Proposed Decision and it appears that EPA did not review all of the information available to them during the time of their review, most importantly the Preliminary Alternate Liner Demonstration reports (PALDs)<sup>1</sup> that were submitted to EPA on November 30, 2021. DTE has also identified many relevant facts about the facilities that were not considered or were misinterpreted. Lastly, the Proposed Decision goes beyond the standards for review of an application contained in the rule and EPA's guidance by (i) dismissing the certifications of the Qualified Professional Engineer which provides the basis for

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<sup>1</sup> Geosyntec. 2021. Preliminary Alternative Liner Demonstration, Bottom Ash Basins, Belle River Power Plant. Prepared for DTE Electric Company. November; Geosyntec. 2021. Preliminary Alternative Liner Demonstration, Diversion Basin Coal Combustion Residuals Unit, Monroe Power Plant. Prepared for DTE Electric Company. November.

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compliance with the regulations, and (ii) introducing review criteria that do not follow the prospective nature of the applications.

The Belle River Power Plant Bottom Ash Basins and Diversion Basin (BRPP BABs and DB) are existing surface impoundments underlain by a clay-rich, consistently present, glacially-compacted geologic barrier that serves as a natural liner system. DTE submitted the Applications under Part B<sup>2</sup> to pursue the opportunity to demonstrate that the natural hydrogeological conditions unique to this site meet the alternative liner requirements set forth in the rule that would allow continued operation of the unit.

The Proposed Decision overlooks the significance of the conceptual site models and the unique hydrogeological setting present at these facilities with an abundance of natural clay-rich soils. These soils have a  $2.1 \times 10^{-8}$  centimeters per second (cm/s) to  $2.9 \times 10^{-8}$  cm/s hydraulic conductivity based on the available dataset provided in the Applications. EPA acknowledges in the Part B Preamble (at 72509), natural soils are capable of achieving the required effective hydraulic conductivities lower than  $1 \times 10^{-8}$  cm/s and/or on a case-by-case basis may exhibit an adequate thickness of low-conductivity soil that supports having somewhat higher soil conductivities throughout the soil column. This range of hydraulic conductivity of the glacially-compacted natural clay liner system is well below the threshold to be considered for an ALD as presented in the Part B Preamble (at 72509) where EPA also states “Regardless, a conductivity of  $1 \times 10^{-7}$  cm/s for the lowermost soil component of the liner, whether in isolation or beneath a geomembrane component, remains the absolute floor for any unit to even be considered for an alternate liner demonstration.” Yet, the EPA is proposing to deny the Applications on the basis of having hydraulic conductivities that are too high to meet the performance standards required by Part B.

The Proposed Decision also ignores the significant amount of site-specific characterization data provided in the PALDs that further confirms the conceptual site model and demonstrates that the clay is laterally continuous and is at a minimum over 80 feet thick, and as much as 120 feet thick (a minimum of greater than 26 times the clay liner thickness modeled in the 2014

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<sup>2</sup> Hazardous and Solid Waste Management System: Disposal of CCR; A Holistic Approach to Closure Part B: Alternate Demonstration for Unlined Surface Impoundments in the Federal Register (85 FR 72506) (“Part B final rule”)

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risk assessment of EPA's Regulatory Impact Analysis<sup>3</sup>). Further, several data interpretations are taken out of context to speculate various instances of potential historic non-compliance which are used as reasons to deny the Applications.

EPA also inappropriately dismissed the certifications of the qualified professional engineer (QPE) in finding that certain elements of DTE's groundwater monitoring programs do not meet the requirements of the CCR rule<sup>4</sup>, even though the facilities' QPE certified compliance with the requirements of the CCR rule. The CCR rule does not permit EPA to summarily reject the compliance certifications of QPEs as part of the Agency's Part B reviews. The Agency has made clear, both in the preamble of the CCR rule and the plain language of the regulatory text, that a QPE certification under the CCR rule is the regulatory mechanism for demonstrating compliance with the applicable technical standards.

Lastly, EPA's procedural implementation of the rule created a paradox that effectively foreclosed the submission of an ALD due to the passage of regulatory deadlines during EPA's extended review period. The CCR Part B Rule required the Agency to issue a final decision on an application was within 60 days of receiving a complete application per § 257.71(d)(2)(iii). The Part B rule contemplates that once an owner/operator receives approval of its application, it would proceed to submit an alternative liner demonstration by November 30, 2021 (40 C.F.R. 257.7(d)(2)(i)). However, DTE did not receive the Proposed Decision until 786 days had passed – well beyond the deadline for filing an ALD. It is unclear, but EPA appears to have chosen to deny the Applications in part due to lack of data while ignoring the PALD on the basis that it was received prior to approval of DTE's Applications. But had DTE followed the procedure as contemplated by the rule, and had EPA approved the Applications, the Agency would have foreclosed the ability to submit an ALD because the deadline in 40 C.F.R. 257.7(d)(2)(i) had passed putting DTE in a situation where compliance could never legally be demonstrated.

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<sup>3</sup> U.S. EPA. 2014. "Regulatory Impact Analysis: EPA's 2015 RCRA Final Rule Regulating Coal Combustion Residual (CCR) Landfills and Surface Impoundments at Coal-Fired Electric Utility Power Plants." Prepared by the Office of Solid Waste and Emergency Response. Washington, DC. December.

<sup>4</sup> Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities in the Federal Register (80 FR 21301) ("CCR rule")

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These comments have been prepared to provide clarification and additional information to resolve EPA's comments and address uncertainties expressed by the Agency in the Proposed Decision. DTE anticipates that the additional information provided herein will be beneficial in improving the Agency's understanding of the site and trusts that the EPA reconsiders their Proposed Decision.

## **II. Background**

DTE Energy is a diversified energy company, headquartered in Detroit, Michigan, that is involved in the development and management of energy-related businesses and services nationwide. Our operating units include an electric utility (DTE Electric) and a natural gas utility (DTE Gas) which provide electric and/or gas services to residential, business, and industrial customers throughout Michigan. The DTE portfolio also includes non-utility energy businesses focused on power generation and industrial projects, natural gas pipelines, gathering and storage, and energy marketing and trading.

DTE Electric has enjoyed powering homes and businesses in Southeastern Michigan for well over a century. DTE Electric is the largest electric utility in Michigan and one of the largest in the nation, generating and distributing electricity to 2.3 million residential, commercial and industrial customers. With an 11,840 megawatt system capacity, DTE uses coal, nuclear fuel, natural gas, hydroelectric pumped storage and renewable sources to generate electrical output for the benefit of its customers. DTE Electric owns and operates approximately 31,000 miles of overhead distribution lines and 16,000 miles of underground distribution lines to a service territory that spans 7,600 square miles.

The BRPP is a 1,270 MW (summer rated capacity) baseload coal-fired power plant in St. Clair County, Michigan and has two units in total. DTE Electric is the majority owner of Belle River, owning 81.39% of the plant, with Michigan Public Power Agency (MPPA) owning the remainder.

The BABs are designed to manage sluiced bottom ash and have been in operation since the BRPP began operation in 1984. The BRPP BABs are two adjacent physical sedimentation basins that are slightly raised CCR surface impoundments referred to as the North and South BABs, located north of the BRPP. The BABs receive sluiced bottom ash and other process flow water from the power plant. Discharge water from each BAB flows over an

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outlet weir that gravity flows to a site storm water conveyance network of ditches and pipes, then flows into the DB. The North and South BABs are located north of the BRPP main building and run roughly east to west approximately 420 feet long by 120 feet wide and are approximately 0.88 and 0.87 acres, respectively (See Figure 2 in the BABs Application).

The DB is an incised CCR surface impoundment located west of the BRPP. Water flows into the DB from the North and South BABs through a network of pipes and ditches. The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit. The DB has an approximately 300-foot-long entrance channel that connects to the main portion of the basin that runs approximately north-south. The main portion of the DB is approximately 400 feet long by approximately 120 feet wide and the DB is approximately 1.55 acres (See Figure 2 in the DB Application).

In 2020, Michigan's solid waste statute was amended to align with the federal CCR rule, including a groundwater monitoring program. Amendments to the monitoring system were made to align with the State solid waste rules/statutes, and a new Solid Waste Operating License that applies to both the BABs and the DB was issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) that approved the current groundwater monitoring networks. DTE continues to operate and maintain the BRPP BABs and DB in accordance with their operating license and solid waste statutes/rules. Documents demonstrating DTE's compliance with applicable State solid waste rules and the CCR rule for the BRPP BABs and DB are posted on DTE's CCR rule compliance data and information website<sup>5</sup>, and/or in the facility operating records. This includes documents required to be certified by QPEs consistent with the self-implementing nature of the CCR rule.

#### **A. History of Conceptual Site Model:**

The BRPP BABs and DB were constructed in the early 1980s. Over the past 40 plus years, DTE has performed geologic studies and reviewed publicly available regional reports to characterize the site hydrogeological conditions, develop the conceptual site model, and

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<sup>5</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

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support demonstrations that DTE has made to state regulators and the EPA, regarding the site-specific geology and the appropriateness of the groundwater monitoring programs prepared consistent with applicable State and Federal regulations. Some noteworthy studies and key reports include:

- A 2007 report by Beth Apple and Howard Reeves and titled "Summary of Hydrogeologic Conditions by County for the State of Michigan", U.S Geological Survey Open-File Report 2007-1236. Information from this report was utilized by DTE to inform the development of the site conceptual model, and to support the development of the Applications.
- A 1976 report by Bechtel titled "Subsurface Investigation and Foundation Report", The Detroit Edison Company, Belle River Units 1 & 2 containing approximately 74 soil boring logs and fence diagrams, cross sections and soil properties measurements for work performed from 1973 to 1975 to provide soil data across the planned area of the BRPP in support of the design of the BRPP. This report predated any solid waste regulation of ash disposal facilities by the State of Michigan. Information from this report was utilized by DTE to inform the development of the site conceptual model, to support the development of the Part B Applications and was included in the Applications.
- A 2018 report by TRC titled "Natural Clay Liner Equivalency Evaluation Report" that used information from regional geologic reports and existing site data to assess whether the natural soils below 6 CCR surface impoundments two of which were the BABs and DB CCR units, are performing equivalently to a composite liner using recognized and generally accepted good engineering practices. The report concluded that the natural clay liners at each of the evaluated sites are more protective than a single composite liner system and meet the RCRA protectiveness standard "does not pose a reasonable probability of adverse effects on health or the environment." This report was included in the Applications.
- The 2021 BAB and DB PALDs, prepared by Geosyntec in accordance with § 257.71(d)(1)(ii), are the latest demonstrations executed by DTE that similarly conclude the natural clay liner present beneath the BABs and DB is one of the several types of natural soil liners described by EPA in the Part B Preamble that is naturally protective, as it has undergone glacial compaction and achieves a sufficiently and consistently low hydraulic conductivity that effectively controls leachate within the BRPP BABs and DB

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across the entire site. Thirty-four boring locations were investigated as part of these demonstrations, including a rigorous laboratory study was implemented, lasting nearly two years, and a robust mathematical model developed in accordance with the requirements of the Part B rule that further reduces any uncertainty in the heterogeneity of the natural clay liner present at the site. The PALDs are substantially complete demonstrations, but titled preliminary due to the long time it takes to conduct the ASTM D7100 laboratory testing, which is due to the significantly low-conductivity nature of the clay that can take up to well over a year to reach the termination criteria. Consistent with previous investigations and studies performed at the site, the PALDs conclude that the underlying natural clay liner is continuously present across the site and meets the protectiveness standard of RCRA Subtitle D, and more specifically there is no reasonable probability that water from the BABs or DB will cause releases to groundwater that will exceed the groundwater protection standards (GWPS) at the waste boundary over the projected active life of the unit. DTE submitted the PALDs to EPA on November 30, 2021, in accordance with § 257.71(d)(1)(ii), well in advance of the Proposed Decision, however, based on the Agency's comments, it does not appear that EPA reviewed the content of the demonstrations. The BAB and DB PALDs are included in this letter as Attachment A.

- The final ALDs prepared by Geosyntec were completed in 2023. Since the submittal of the PALDs in 2021, the analysis of the hydraulic conductivity compatibility samples required under § 257.71(d)(1)(ii)(B)(2) were terminated in December 2022, after running for almost two years, due to the very low hydraulic conductivity of the samples. To that end, DTE is providing the updated final ALDs as an attachment to this response and summarizing the information in this response to provide the additional technical details from the ALDs. The results from the final ALDs are also incorporated below in this response to further address the uncertainty and misunderstanding expressed by EPA in the Proposed Decision. Copies of the final ALDs are included in Attachment B of this letter.
- Finally, in 2022/2023 DTE performed a supplemental aquifer characterization investigation to further characterize the site conditions and aquifer properties using a combination of groundwater geochemical, stable isotope, and radiogenic isotope analysis. This characterization also included an in-depth analysis of existing site data



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collected through 2022 from the BABs and DB CCR units. The TRC "Additional Uppermost Aquifer Characterization Study" reports (Aquifer Characterization Studies) performed by TRC provide even more site-specific data that supports the conceptual site model for the site and further documents that the aquifer remains unaffected by the BAB and DB CCR management activities over the active life of the BABs and DB. The Aquifer Characterization Studies further substantiate site compliance and the efficacy of the Alternate Source Demonstration(s) at the BABs CCR unit and further demonstrates the protectiveness of the natural clay liner through a series of in-depth geochemical and isotopic data analysis, including general chemistry, ionic speciation, mineral saturation, stable and radiogenic isotopes in combination with advanced statistical analysis that affirmatively demonstrates that the uppermost aquifer is not in communication with the CCR unit water, groundwater geochemistry in the uppermost aquifer is reflective of the geogenic natural environmental conditions, and is therefore unaffected by the BRPP BABs and DB CCR units. The Aquifer Characterization Studies are included in Attachment C of this letter.

In summary, DTE has been monitoring and operating the BRPP BABs and DB for decades, and has amassed extensive subsurface data at the BRPP to evaluate the long-demonstrated effectiveness of clay underlying the BRPP BABs and DB. The significant amount of site characterization data substantiates that the aquifer remains unaffected by the CCR units and demonstrates the protectiveness of the glacially-compacted natural clay liner system. This wealth of information was provided to EPA in a timely fashion and, upon review, would suggest a different conclusion in this matter.

Since promulgation of the 2015 CCR rule, with active involvement and required certifications from QPEs, DTE evaluated siting and design requirements, confirmed that the unit is structurally sound, conformed to the operating criteria, established groundwater monitoring networks, statistical plans, as required by the self-implementing CCR rule. Many of these requirements enacted under the CCR rule were already being implemented in cooperation with state regulators as part of ongoing state program compliance.

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DTE continues to operate its CCR units in a manner that meets or exceeds all State and Federal requirements. DTE developed and manages a CCR program that is both protective of human health and the environment, and compliant with the requirements of the CCR rule as they are written, in the context of the unique site-specific conditions at BRPP.

### **III. Part B Purpose and Intent**

The Part B amendment to the CCR rule was developed to allow facilities with environmentally protective and impermeable hydrogeological characteristics to demonstrate that their existing naturally clay-lined systems perform as well as, or better than composite liner systems to ensure there is no reasonable probability of adverse effects to human health and the environment. The 2015 CCR rule was developed as a one-size-fits-all program that did not originally contemplate forced closure for units with naturally occurring conditions that are as protective as synthetically lined CCR surface impoundments. This changed with promulgation of the Part A rule as a result of the 2018 DC Circuit Court USWAG decision<sup>6</sup>. Consequent, this could have resulted in unnecessary closure or retrofitting of protective natural clay lined surface impoundments where there is no reasonable potential for migration of CCR constituents to groundwater due to the natural subsurface conditions. The Part B amendment offers a modification to the CCR rule to account for these uncommon and unique, yet protective, circumstances by including a procedure for facilities to request approval to operate an existing CCR surface impoundment with an alternate natural clay liner.

Additionally, the 2015 CCR rule was also designed to be self-implementing, requiring certification from qualified professional engineers (QPEs) and, in some cases, state regulatory agencies, in place of direct oversight from EPA. As a result, the groundwater monitoring requirements had to be universally applied to all facilities subject to the CCR rule, including establishment of monitoring programs for surface impoundments at facilities with unique hydrogeological conditions that do not necessarily meet the “one-size fits all” monitoring standards of the CCR rule, void of any dialogue with the EPA. While not common, several of these sites with natural clay liners may be otherwise eligible for a no-migration demonstration under other state-administered or federal RCRA programs. This is the case for the BRPP BABS and DB.

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<sup>6</sup> Util. Solid Waste Activities Grp. V. EPA, 901 F.3d 414 (D.C. Cir. 2018)

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The Part B amendment offers a modification to the CCR rule to account for these uncommon and unique, yet protective, circumstances by including a procedure for facilities to request approval to operate an existing CCR surface impoundment with an alternate natural clay liner. The Part B rule provides a means to allow sites under these special conditions to continue to operate while being protective of human health and the environment. EPA recognizes with the enactment of Part B that the potential exists for facilities to successfully demonstrate that naturally compacted clay can serve as a protective liner system under certain conditions. The purpose of the Part B application (step 1) is to provide the necessary site information under the rule to show the facility exhibits these unique circumstances. An approved Part B application affords the opportunity to make the robust alternate liner demonstration (ALD) (step 2) by performing a significant amount of field investigation and data analysis to confirm that the continued operation of the unlined surface impoundment presents no reasonable probability of adverse effects to human health or the environment within the operational life of the CCR unit.

### **IV. Groundwater Has Not Been Impacted by the BRPP BABs and DB**

DTE is confident that the BRPP BABs and DB groundwater monitoring programs appropriately consider the site-specific hydrogeologic conditions present at the site and accurately represents the quality of groundwater passing the downgradient boundary of the units. The data provided to EPA in the Applications met the requirements of the rule, and clearly show that the BRPP BABs and DB groundwater monitoring programs appropriately remain in detection monitoring. To align the groundwater monitoring programs with the conceptual site model, the basis of the groundwater monitoring programs hinge on the key premise that the uppermost aquifer have not been affected by operation of the BRPP BABs and DB. This approach is substantiated with data that is further discussed in these comments.

DTE implemented BABs and DB Aquifer Characterization Studies (Attachment C) to further characterize the site conditions (including separation of the uppermost aquifer from the BABs and DB) and aquifer properties using a combination of geochemical, stable isotope, and radiogenic isotope analysis, with additional in-depth analysis that provides even more site-specific data that supports the conceptual site model for the site and further upholds the underlying premise that the uppermost aquifer is not in communication with the BABs or

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the DB and remains unaffected by the CCR units and has remained as such over the active life of the BABs and DB. The Additional Aquifer Characterization Study reports (Aquifer Characterization Studies) further substantiate site compliance and the efficacy of the BABs Alternate Source Demonstrations and further demonstrate the protectiveness of the natural clay liner.

The Aquifer Characterization Studies demonstrate a distinct difference in chemical compositions between the groundwater underlying the unit, the pore water in contact with ash within the BABs and DB, and the surface water in the nearby surface water body (St. Clair River). Fundamentally, groundwater chemistry is influenced by the various minerals and gases that are available to react with the water as it travels through the subsurface – through pores and fractures in rock or sediment. Their mere presence in groundwater does not indicate that a release from a CCR unit has occurred. The results of the groundwater study demonstrate with additional site-specific and quantifiable evidence that the uppermost aquifer has not been impacted by the operation of the BABs and DB since operations began nearly 40 years ago, and that the source of the constituents observed in the uppermost aquifer are geogenic in nature.

The uppermost aquifer, as defined in 40 CFR §257.53, underlying the BABs CCR unit consists of saturated sand and the uppermost aquifer underlying the DB CCR unit consists of saturated silt present beneath thick laterally contiguous glacially-compacted natural clay liner system<sup>7</sup> that serves as a natural confining hydraulic barrier that isolates the underlying uppermost aquifer. The BABs and DB CCR units have a minimum of 82 feet and 120 feet, respectively of glacially-compacted natural clay liner systems separating the bottom of the BABs and DB from the uppermost aquifer. The overlying low-permeability clay that separates the BABs and DB from the uppermost aquifer has a hydraulic conductivity of  $4.4 \times 10^{-9}$  to  $2.1 \times 10^{-8}$  cm/s<sup>8</sup>, exceeding the requirements of the design criteria for the lower component of a composite liner. These hydrogeological characteristics align with the types of natural liners described in the Part B Preamble (at 72509) that EPA believes have the potential for facilities to successfully demonstrate that naturally compacted soil can be

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<sup>7</sup> The continental glaciers over Michigan were about one-mile thick. <https://www.noaa.gov/education/resource-collections/freshwater/great-lakes-ecoregion> dated February 1, 2019

<sup>8</sup> April 2023 BABs and DB final ALDs page 3-3

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protective, one of which has undergone glacial compaction, “whereby stress from the weight and flow of the glacier compressed the naturally occurring soil”. The lateral continuity, thickness, and consistently low permeability of the glacially-compacted natural clay liner system underlying the BABs and DB CCR units as demonstrated in the ALDs make these facilities well qualified for Part B demonstrations.

The PALDs, the final ALDs, and the Aquifer Characterization Studies provide additional detailed site information that further substantiates the conceptual site model at the site and the BRPP ASDs, and further verifies that the BABs and DB have not impacted groundwater.

The BABs and DB qualify for ALD Applications approval because continued compliance with the groundwater requirements set forth in §§ 257.93 through 257.94 is demonstrated, and the BABs and DB remain in detection monitoring in accordance with the provisions under § 257.71(d)(1)(i)(B)(2). Given the highly favorable hydrogeological conditions that occur naturally at the site, it is no surprise that groundwater monitoring data generated pursuant to the CCR rule shows that the BABs and DB are not impacting groundwater quality. As presented in the Applications, and discussed further below in this response, the facilities appropriately remain in detection monitoring in accordance with § 257.94 of the CCR rule, as discussed at length throughout this response.

## **V. The QPE’s Certification was Wrongly Dismissed**

The CCR rule is self-implementing in most states, including Michigan, and relies on QPE certification from qualified engineering practitioners to ensure compliance with the regulations. The aspects of the CCR program that require certifications are explicitly stated throughout the CCR rule. Certification of compliance is to be determined by a qualified professional utilizing site-specific data. For example, the design of the monitoring system relies on site-specific information and defers to PE certification for approval. Further, 40 C.F.R. § 257.91(f) requires “[t]he owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section.” That certification provides the means for compliance with 40 C.F.R. § 257.91(f).

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EPA inappropriately proposes to find that elements of DTE's groundwater monitoring program do not meet the requirements of the CCR rule, even though the facilities' QPE certified compliance with the requirements of the CCR rule. The CCR rule does not permit EPA to summarily reject the compliance certifications of QPEs as part of the Agency's Part B reviews. While it is possible that a technical disagreement between EPA and the QPE may result in future modifications to a facility's operations, this disagreement cannot be the basis for finding that an owner/operator is not in compliance with applicable CCR rules, when they have relied upon a QPE certification in accordance with the CCR rule. This is because reliance on a QPE certification is how, pursuant to the CCR rule, a facility is required to demonstrate compliance.

The Agency has made clear, both in the preamble of the CCR rule and the plain language of the regulatory text, that a QPE certification under the CCR rule is the regulatory mechanism for demonstrating compliance with the applicable technical standards. The Part B rule did not change this regulatory framework and there is no requirement that EPA independently review a facility's compliance. Rather, the rule clearly places the burden on the applicant to demonstrate compliance. DTE has made this demonstration by submitting certain documentation to EPA, including a certification stating that the facility is in compliance. If the rule required EPA to independently evaluate all technical materials, there would be no reason to require this compliance certification in the first instance. By submitting the required documentation, the regulatory presumption is that the facility is in compliance.

To be clear, DTE is not claiming that EPA does not have statutory authority to enforce the CCR rule. That authority was clearly granted to the Agency in 2016 with the passage of the Water Infrastructure Improvements for the Nation ("WIIN") Act. But the WIIN Act did not change the rule's framework for demonstrating compliance through QPE certifications. Nor are EPA's Part B reviews done pursuant to its enforcement authority under RCRA § 3008. In fact, EPA explicitly stated that the Part B compliance determinations are made solely for purposes of Part B demonstrations and are not relevant in any other context. Thus, until EPA successfully pursues enforcement against a facility under its § 3008 enforcement authority, a facility cannot be found in noncompliance when it has obtained the requisite compliance certification from a QPE.

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Again, while subsequent disagreement between EPA and the QPE may result in the facility possibly amending certain CCR compliance plans or documents, it cannot be the basis for finding a facility in noncompliance with the applicable standards without an adjudication made through the statutory enforcement process. And even if, for purposes of argument, EPA could overrule the compliance certification of a QPE, EPA must have a rational basis for doing so. EPA's obligation to engage in reasoned decision-making demands more than simply asserting, without pointing to any specific error by the QPE, that the facility is not in compliance with the CCR rule.

## **VI. The Part B Rule Contains Timelines for Implementation That Were Not Followed Depriving DTE of an Opportunity for Meaningful Consideration of Its Application and the Ability to Submit an ALD**

The CCR Part B Final Rule was published on November 12, 2020, and provided applicants only 18 days (November 30, 2020) to submit a completed application, for facilities to request approval to use an alternate liner for CCR surface impoundments per 40 C.F.R. § 257.71(d). 40 C.F.R. § 257.71(d)(2)(iii)(C) states that "EPA will publish a proposed decision on complete applications in a docket on *www.regulations.gov* for a 20-day comment period. After consideration of the comments, EPA will issue its decision on the application within sixty days of receiving a complete application." An applicant must submit its demonstration by November 30, 2021.

DTE submitted its Applications on time on November 30, 2020, and received notification that the Applications were administratively complete on January 11, 2022 – 6 weeks after the regulatory requirement for submission of an ALD. The letter did not extend the deadline for ALD submissions beyond the 2021 deadline, so unless an owner/operator preemptively submitted a demonstration without approval, EPA had foreclosed the opportunity to do so.

In an attempt to preserve its right to file the ALDs, DTE submitted an extension request on September 1, 2021, and an update to the extension request on September 1, 2022, under 40 C.F.R. § 257.71(d)(2)(ii)(A). EPA never responded to the extension requests, and therefore, the preliminary results of the demonstration were submitted to EPA on November 30, 2021, as required by 40 C.F.R. § 257.71(d)(2)(ii). In addition to fulfilling the

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requirements of the alternate liner demonstration under 40 C.F.R. § 257.71(d)(1)(ii), the PALDs included important information to support DTE's Applications, but for reasons unknown to DTE, the PALDs were not considered in the Proposed Decision.

In EPA's January 11, 2022, completeness determination letter, the Agency states that the Application contains sufficient information for the Agency to evaluate the merits of the Application. However, EPA has proposed to deny the Applications, in part on the basis that the Applications did not provide sufficient information, which is contradictory to the completeness determination. Additionally, 40 C.F.R. § 257.71(d)(2)(iii) states that "EPA will evaluate the application and may request additional information not required as part of the application as necessary to complete its review." Much of the information EPA suggests is missing is included in the PALDs and could have been referenced during EPA's extended review period. Moreover, DTE would have welcomed the opportunity to provide additional information.

DTE is providing an update to each of the PALDs (the final ALDs) through this comment package as Attachment B to emphasize the relevancy of the comprehensive site characterization in the Agency's final decision making. The final ALDs include updated analytical data from compatibility tests that were ran through December 2022, which were used to confirm that the model results in the PALDs are accurate. The final ALDs continue to demonstrate that there is no reasonable probability that water from the BABs or DB will cause an exceedance of the groundwater protection standards outside of the BABs or DB.

### **VII. Active Life of the Bottom Ash Basins and Diversion Basin**

In order for the BRPP to continue operation and provide electric service to Southeast Michigan, the BABs must continue to receive sluiced bottom ash until such time that the two generating units at the power plant are converted to natural gas power generation by 2026. These plans are currently under review by the Michigan Public Service Commission.

### **VIII. Demonstrated Compliance with the CCR rule**

DTE has prepared the following discussion to further highlight the hydrogeological characteristics that make these facilities uniquely qualified for Part B demonstrations. The information presented below demonstrates that compliance with the Part B Rule has been and



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continues to be met at the DB and BABs and is meant to provide additional clarification to help resolve any misinterpretations or uncertainties expressed by the Agency in the Proposed Decision to deny the Application.

### **A. Documentation of Groundwater Monitoring Network Compliance**

In the Proposed Decision, EPA alleges that the information required under 40 C.F.R. § 257.71(d)(1)(i)(B)(7) is not included in the BABs and DB Applications. The design and placement of the monitoring well networks are well-documented in the Applications and narratives are provided on pages 8 and 9 in the Applications that speak to the well network designs along with supporting information and reports detailing the established monitoring well networks in Appendix B. Additional supporting information regarding well locations, site geology (including the continuous presence of clay underlying the BABs and DB), and groundwater flow potential are provided in Figures 2 through 10 of the Applications. The information and narratives provided in the Applications along with the QPE certification of the well networks comply with 40 C.F.R. § 257.91 and demonstrate a thorough understanding of site hydrogeology and the potential for the impoundments to impact the groundwater flow.

The information provided in the Applications includes all of the information required under 40 C.F.R. § 257.71(d)(1)(i)(B)(7) as follows:

- Map(s) of groundwater monitoring well locations in relation to the CCR unit(s) that depict the elevation of the potentiometric surface and the direction(s) of groundwater flow across the site;
  - Provided in the Applications Figures 6-10 Groundwater Potentiometric Surface Maps from September 2017 through September 2019, and additionally in the 2017 through 2019 Annual Groundwater Monitoring Reports in Applications Appendix C, D, and E);
- Well construction diagrams and drilling logs for all groundwater monitoring wells;
  - Provided in Applications Appendix B – Groundwater Monitoring Systems Summary Reports;

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- Maps that characterize the direction of groundwater flow accounting for temporal variations;
  - Provided in the Applications Figures 6-10 Groundwater Potentiometric Surface Maps from September 2017 through September 2019, and additionally in the 2017 through 2019 Annual Groundwater Monitoring Reports in Applications Appendix C, D, and F); and
- Any other data and analyses the owner or operator of the CCR surface impoundment relied upon when determining the design and location of the groundwater monitoring network.
  - Key historical reports and other information relied upon to develop the monitoring networks are included in the Applications in the Appendices including Appendix K – Subsurface Investigation and Foundation Report, Belle River Units 1&2, Bechtel, 1976.

#### **1. Monitoring System Meets 40 C.F.R. § 257.91(a)(1)**

The BABs and DB monitoring systems meet the performance standard set forth in 40 C.F.R §257.91(a)(1)(ii). 40 C.F.R § 257.91(a)(1) does not explicitly require that all background concentrations be established in hydraulically upgradient wells. Similar to both the Subtitle C and Subtitle D RCRA regulations, the CCR Rule allows for a determination that background quality may include sampling of wells not hydraulically upgradient of the waste management area, but is not required. Specifically, 40 C.F.R § 257.91(a)(1)(ii) allows the determination of background using wells that are not hydraulically upgradient of the CCR management area that “provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells.” As such, 40 C.F.R § 257.91(a)(1)(ii) is inclusive of situations where intrawell analysis is appropriate and accounts for the use of downgradient wells to determine background. The reasoning that the background at the downgradient wells is more representative than the upgradient wells ties into the same reasoning that intrawell methods are appropriate at this site. This is largely related to the spatial variability observed throughout the well networks, in combination with the extremely long travel times for groundwater to flow across the base of the CCR units. A

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more thorough discussion of the reasoning is provided below on the intrawell discussion (see Section VIII.B.1.a).

EPA's states that "[t]he CCR regulations require development of a groundwater monitoring network that will identify the background level of contamination in the uppermost aquifer upgradient of a CCR unit, so that those levels can be compared with the contaminant levels in the wells downgradient of the CCR unit after the groundwater has flowed beneath it. See 2015 CCR rule preamble at 80 FR 21302, 21399-400."<sup>9</sup> While it is well understood that the purpose of detection monitoring is to assess background groundwater quality and use it to compare to groundwater quality after it has passed beneath the CCR unit, we cannot corroborate EPA's reference to the Preamble that implies all groundwater up- and downgradient is contaminated and that the purpose of monitoring is to compare the difference in contamination levels in up- and downgradient wells. Although that may be the case in some instances where there are other sources impacting groundwater quality prior to passing beneath the CCR unit, EPA's bias toward assuming that all groundwater being monitored is "contaminated" is grossly overstated. In contrast, the EPA's Unified Guidance states that "[u]nits under detection monitoring are initially presumed not to be contributing a release to the groundwater unless demonstrated otherwise."<sup>10</sup>

From the onset of monitoring at the BABs and DB, a myriad of data from historical site information, regional water quality, and more recent data collected as part of implementation of the CCR rule, indicates that the uppermost aquifer beneath these two units is unaffected by CCR operations. Therefore, the foundational premise of the detection monitoring program that the aquifer remains unaffected by the BAB and DB CCR management activities (i.e. the underlying clay is protective) has been met, and, as such, the well networks are designed to detect a potential future release per 40 C.F.R § 257.91. There is no mechanism for groundwater in the upgradient wells to be affected by a release from the CCR units through the clay. It would require travel times that far exceed the timeframe in which the impoundments have been in service for CCR-affected

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<sup>9</sup> Proposed Decision, p. 12-13.

<sup>10</sup> U.S. EPA. 2009. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance." EPA 530-R-09-007. Office of Resource Conservation and Recovery. Washington, DC. March. p. 2-10.

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water to get through at least 82 feet (BABs) or 120 feet (DB) of clay-rich soil as demonstrated in the Natural Clay Liner Equivalency Evaluation Report, DTE Electric and Consumers Energy Company Six Southeast Michigan Coal Combustion Residual Units, December 2018 (Liner Equivalency Report) (BABs and DB Applications Appendix A), BABs and DB PALDs (submitted to EPA November 30, 2021) (Attachment A), and the final ALDs (Attachment B).

In addition, in December 2022 water samples collected from the water within the BABs and DB and from the groundwater monitoring system wells for additional aquifer characterization, documented within the BABs and DB Aquifer Characterization Studies (Attachment C), provide additional data substantiating that the uppermost aquifer is unaffected by CCR operations and that groundwater at all monitoring wells are not in communication with the CCR in the BABs or the DB.

Specifically, they substantiate the site conceptual model developed for the site at the early stages of the monitoring program, affirm that the uppermost aquifer remains unaffected by the facility, and further demonstrate that the BABs and DB are not in hydraulic communication with the uppermost aquifer, as provided in the following additional lines of evidence:

- Groundwater geochemistry is reflective of the natural environmental conditions and is influenced by the interaction of aquifer materials with various minerals, gases, and dissolved-phase constituents that are available to react with the water as it travels through the subsurface, including the presence of Appendix III concentrations in groundwater;
- Trilinear Diagrams demonstrate that the BABs and DB geochemical composition is very different than the groundwater in the uppermost aquifer;
- Stable isotopes within uppermost aquifer groundwater are consistent across all wells within the monitoring systems and are significantly different than the isotopic signatures of the CCR-contact water in the BABs and DB;
- Tritium data clearly shows that the groundwater within the uppermost aquifer groundwater pre-dates the time that the BABs and DB entered service; and

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- Principle Component Analysis and Linear Discriminant Analysis of 2016 to 2022 Appendix III groundwater data for the BABs and DB demonstrated that the uppermost aquifer groundwater at the BABs and DB and their respective CCR units water are significantly different with a 95% confidence level. This is another line of evidence that the uppermost aquifer groundwater is not in communication with the BABs and DB CCR units water.

As such, there is a considerable amount of site characterization data that demonstrate these “background” wells have not been affected and that the groundwater samples collected from the monitoring systems are representative of natural background conditions.

## **2. Groundwater Monitoring System Designs are Adequate**

Regulation 40 C.F.R. § 257.91(b) requires that the monitoring system design be determined based on site-specific technical information. 40 C.F.R. §§ 257.91(b)(1) and (2) specify that the technical information must include thorough characterization of: aquifer thickness, groundwater flow rates and directions, seasonal fluctuations in groundwater flow; saturated and unsaturated geological units and fill materials overlying the uppermost aquifer; materials comprising the uppermost aquifer; and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thickness, stratigraphy, lithology, hydraulic conductivities, porosities, and effective porosities. The regulations do not prescribe the exact number, location, and depth of monitoring wells needed to achieve the general performance standard.

The Applications, PE certifications, and operating records include detailed technical information used to design the groundwater monitoring system including the key site-specific information (e.g. boring logs, well construction diagrams, water level data, groundwater flow direction, etc.) for the monitoring well network. The November 2021 preliminary ALDs, that have been in EPA’s possession since November 2021, further provide a voluminous amount of site characterization data, confirms the conceptual site model, and speaks to the adequate characterization of the site hydrogeology and heterogeneity.

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Per the rule, the design of the monitoring system relies on professional judgement based on site-specific technical information and defers to PE certification for approval. Specifically, 40 C.F.R. § 257.91(f) requires “[t]he owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section.” EPA’s Preamble discussion states: “[f]or the final rule, EPA has developed a groundwater monitoring program that is flexible and allows facilities to design a system that accounts for site-specific conditions within specific parameters. The final rule establishes an overall performance standard that the system must meet, lays out the minimum requirements of an effective system, and requires the owner or operator to design a system that achieves that overall performance standard based on a full characterization of site conditions.”<sup>11</sup> Nevertheless, working within these constraints the rule specifically allows the qualified PE to design a system that accounts for site conditions within the parameters of the minimum technical criteria, and EPA even added language to the regulation that expressly clarifies this. The Agency has made clear, both in the preamble of the CCR rule and the plain language of the regulatory text, that a QPE certification under the CCR rule is the regulatory mechanism for demonstrating compliance with the applicable technical standards.

The BABs groundwater monitoring system consists of a total of five monitoring wells distributed along the BABs perimeter (MW-16-01 through MW-16-04 and MW-16-09) except in the southeast portion of the BABs perimeter where no uppermost aquifer was encountered, that are representative of background hydraulically upgradient although given there is not a clear groundwater flow direction it is difficult to determine which wells are hydraulically upgradient. The DB groundwater monitoring system consists of a total of six monitoring wells distributed along the DB perimeter, including three upgradient wells (MW-16-06, MW-16-07 and MW-16-08) that are representative of background hydraulically upgradient from the DB, and three downgradient wells (MW-16-05, MW-16-10, and MW-16-11A).

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<sup>11</sup> Preamble at 21397-21398.

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This distribution of wells within each of these monitoring systems allows groundwater quality to be monitored around the perimeter of each of the CCR units, provides a comprehensive view of groundwater flow direction and rates (where present) across the footprint of the entire CCR unit, allows adequate collection of background data upgradient, downgradient, and side gradient of the CCR unit, and facilitates assessment of any spatial variability in groundwater geochemistry across the uppermost aquifer beneath the footprint of each unit. The monitoring wells located around the perimeter of the BABs and DB have been selected to serve as both background and downgradient monitoring wells using intrawell statistical methods (discussed in more detail below in Section VIII.B.1.a) and provide increased protection by having downgradient monitoring wells distributed around the perimeter of the BAB.<sup>12</sup>

In determining specific placement of wells, the areas immediately around the berms at the BAB and around the DB were limited due to very soft soils with a series of ditches, etc. that restricted access to install the monitoring wells and also ensure that the monitoring well locations could safely be accessed during monitoring. For the DB, monitoring wells needed to be located outside of the third-party railroad and associated right of way (referred to by EPA as a "roadway" in the Proposed Decision p. 16). This resulted in monitoring wells MW-16-05, MW-16-10, and MW-16-11/MW-16-11A being installed to the west of the railroad and its associated right of way. The safety considerations of working in the railway in combination with the time needed to procure access to drill in the rail right of way did not conform with the timing constraints of 40 C.F.R. § 257.90(b), therefore, wells were installed as close as feasible to the CCR unit. Recall the timeline to get the monitoring well networks installed and to begin background groundwater sampling was very tight to initiate detection monitoring by October 17, 2017.

In addition to physical barriers and safety considerations, the monitoring system design was developed using the site's hydrogeological considerations. Aquifer characteristics are one of the key considerations in designing a monitoring system, such as hydraulic conductivity, hydraulic gradient, groundwater flow direction, aquifer heterogeneity, etc.

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<sup>12</sup> Application, p. 8-9.

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Diversion Basin Aquifer Characteristics:

- As detailed in the Application,<sup>13</sup> the BRPP DB CCR Unit is underlain by more than 120 feet of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 135 to 145 feet below ground surface (bgs). In general, the BRPP DB CCR Unit is underlain by at least 120 feet of laterally extensive low hydraulic conductivity clay-rich deposits. The clay-rich till is then underlain by two to seven feet of silt between the till and the underlying shale bedrock (not an aquifer) confining unit (Application Figures 3-5). Although the encountered zone of saturation within the silt just above the bedrock interface did not yield significant groundwater, it was conservatively interpreted as the uppermost saturated zone (the uppermost aquifer). Although the hydraulic conductivity was low, it exhibited a much higher conductivity than the clay-rich soils between the bottom of the basin and the monitored zone. Additional data collected in the ALD confirmed the thickness of the clay is over 120 feet thick and the permeability ranges from  $4.4 \times 10^{-9}$  to  $2.1 \times 10^{-8}$  cm/s.<sup>14</sup> Horizontal groundwater flow potential is consistently to the west-northwest (Application Figures 6-10) with strong vertical upward gradients (Application Section 2.4). The silt aquifer represents a single hydrostratigraphic unit beneath the clay. Due to the strong upward gradients in combination with the laterally contiguous nature of the silt, it is appropriate to place the monitoring wells within the uppermost aquifer saturated silt, beneath the clay, to ensure detection of any potential leakage from the CCR unit. The consistency observed in the groundwater flow direction since monitoring began in 2016 ensures that groundwater is constantly flowing in the direction of the three downgradient monitoring wells installed along the west-northwestern perimeter of the DB and confirms that these monitoring wells are appropriately placed to intercept groundwater flowing beneath the DB.

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<sup>13</sup> Application, p. 3-5.

<sup>14</sup> April 2023 DB Final ALD, p. 3-3.



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Bottom Ash Basins Aquifer Characteristics:

— As detailed in the Application,<sup>15</sup> the BABs is underlain by more than 130 feet of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 135 to 145 feet below ground surface (bgs). In general, the BRPP BABs CCR unit is initially underlain by at least 90 to as much as 142 feet of laterally extensive low hydraulic conductivity clay-rich deposits. The depth to the top of the confined sand-rich uppermost aquifer encountered immediately beneath the clay confining unit varies up to 46 feet and rapidly thins to the south and east of the BABs and pinches out (e.g., is not present) to the southeast in the vicinity of SB-16-01. Consequently, the uppermost aquifer is not laterally contiguous across the entire site, nor is it contiguous across BRPP BABs CCR Unit, and not present beneath the southeastern corner of the BABs (Application Figures 3-5) The variability in the depth to the uppermost aquifer is a consequence of the heterogeneity of the glacial deposits and is driven by the lateral discontinuity of the sand outwash within the encapsulating fine-grained, silty clay till that confines the uppermost aquifer. The at least 82 feet thick, contiguous clay soil beneath the BABs serves as a natural confining hydraulic barrier that isolates the underlying aquifer across the entire site (Application Figures 3-5). Additional data collected in the ALD confirmed the thickness of the clay ranges is at least 82 feet thick beneath the BABs and the permeability ranges from  $4.4 \times 10^{-9}$  to  $2.1 \times 10^{-8}$  cm/s<sup>16</sup>.

A definitive groundwater flow direction is not evident around the BABs based on monitoring performed from 2016 through 2022. As such, it is not appropriate to infer horizontal flow direction or gradients across the BRPP BABs CCR unit.

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<sup>15</sup> Application, p. 3-6.

<sup>16</sup> April 2023 BABs Final ALD, p. 3-3

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Given the site hydrogeological conditions, additional upgradient wells would provide little value due to the extremely low horizontal flow rates observed in the uppermost aquifer beneath both the BABs and DB that would not represent groundwater that could even reach the area of the monitoring system within the timeframe of the monitoring programs. There is no observed flow direction at the BABs, however, there are upgradient wells established at the DB that further confirm background groundwater conditions at the site. Horizontal travel times demonstrate the impracticality of additional upgradient wells. Since there is no flow direction at BABs, flow rates are estimated using the gradients observed from the DB wells. Conservatively assuming the hydraulic gradient of 0.003 at the BABs with the hydraulic conductivity of the sand-rich uppermost aquifer (~0.5 feet/day) and a conservative low effective porosity of 0.2 for the sand (resulting in higher flow rates calculated) a conservative horizontal travel time of approximately 3 feet per year in the fine sand (BABs uppermost aquifer material) or approximately 0.6 feet per year (from DB 2017 to 2022 Annual Reports) in the silt (DB uppermost aquifer material). Add in a contingency factor of 10x and that is no more than 30 ft per year of potential migration within the BABs uppermost aquifer.

The other key consideration in determining the lateral and vertical placement of the monitoring well network are the physical and chemical characteristics of the potential contaminants of concern. The groundwater monitoring system is used to identify potential releases from the CCR unit by monitoring the Appendix III constituents (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids [TDS]) (§ 257.94). The Appendix III constituents are known leading indicators of releases and were selected as primary indicators in detection monitoring due to, among other qualities, their elevated concentrations (typically) in the CCR material being managed and their generally high mobility and low reactivity in the environment. These properties allow Appendix III constituents to travel readily through groundwater (transport is advection-dominated), remain detectable in the waste and groundwater, and provide early detection of potential leakage from the CCR unit being monitored. Based on these properties, Appendix III parameters can be expected to be fairly ubiquitous (not concentrated at a particular depth) and migrate throughout groundwater at approximately the rate of groundwater flow, therefore

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installation of the compliance wells in the downgradient direction of flow is appropriate. Groundwater is confined with hydraulic head levels well above the top of the uppermost aquifer, demonstrating significant upward flow potential, in addition, the Appendix III constituents are readily going to move with groundwater, therefore, screening at the depth of first saturation in the uppermost aquifer (as was done at the BABs CCR unit albeit at different elevations due the thickness of overlying clay across the unit varying somewhat) is ideal for early detection of groundwater influenced by potential leakage from the BABs.

Based on these two key considerations, the groundwater monitoring system clearly meets the performance standard of § 257.91(a) and accomplishes EPA's stated objective in the Proposed Decision<sup>17</sup> that says "[t]he objective of a groundwater monitoring system is to intercept groundwater to determine whether it has been contaminated by the CCR unit being monitored."

Further, not only has the network been certified by a QPE per the rule and meets the performance standards set forth in § 257.91(a), the monitoring system has been approved by the Michigan Department of Environment, Great Lakes and Energy (EGLE) for groundwater monitoring in compliance with the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended, Part 115 Solid Waste Management regulations.

### **B. The CCR Impoundments Properly Remain in Detection Monitoring**

DTE's Application successfully 1) documents that the groundwater monitoring systems at the BABs and DB meet all the requirements of 40 C.F.R. §§ 257.93 through 257.94, and 2) demonstrate that the BABs and DB appropriately remain in detection monitoring.

#### **1. Sampling and Analysis Program**

Statistical analysis is a principal component of the CCR rule groundwater monitoring program. As summarized in EPA's Unified Guidance,<sup>18</sup> the fundamental goals of the CCR

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<sup>17</sup> Proposed Decision, p. 13.

<sup>18</sup> U.S. EPA. 2009. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance." EPA 530-R-09-007. Office of Resource Conservation and Recovery. Washington, DC. March. p. 1-1.

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rule groundwater monitoring regulations are fairly straightforward. Regulated parties are to accurately characterize existing groundwater quality at their facility, assess whether a CCR release has occurred and, if so, determine whether measured levels meet the compliance standards. Using accepted statistical testing methods, evaluation of groundwater quality should have a high probability of leading to correct decisions about a facility's regulatory status. Essentially, this is accomplished through the framework provided in the CCR rule under with § 257.93 and § 257.94 that requires groundwater compliance monitoring be statistically compared to background groundwater quality through implementation of the detection monitoring program.

The following section provides additional discussion and clarification of information related to the statistical analysis program performed in accordance with § 257.93 in response to EPA's comments in the Proposed Decision (p. 23-34) that focus on that statistical methods portion of the sampling and analysis program under § 257.93(f) and (g).

### **a. Reliance on Intrawell Comparisons**

There are two general approaches, interwell and intrawell, that are used to perform data comparisons to background as presented in the EPA Unified Guidance and in the EPA Solid Waste Disposal Facility Criteria Technical Manual.<sup>19</sup> DTE considered both of these methods as part of the selection criteria. Interwell comparison methods compare background and compliance data collected from separate spatial locations within the groundwater monitoring system (e.g. upgradient versus downgradient). Whereas intrawell statistical limits compare historical background data (collected from each individual well) to current data from a single location. Both interwell and intrawell comparisons can be useful tools in groundwater monitoring and analysis, however, there are certain conditions that should be considered when selecting which method is appropriate, including site-specific hydrological factors and groundwater data behaviors that may influence the power of the test.<sup>20</sup>

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<sup>19</sup> U.S. EPA 1993. Solid Waste Disposal Facility Criteria Technical Manual. Solid Waste and Emergency Response. EPA530-R-93-017. November.

<sup>20</sup> Unified Guidance, p. 6-25 to 6-33.

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As discussed in the Applications, due to the slow horizontal travel velocities (conservatively on the order of 0.6 feet/year at the DB and, assuming some flow is taking place, 3 feet/year at the BABs), the presence of the underlying clay (which results in excessive vertical travel times, that if groundwater were capable of migrating vertically through the clay would take over 1,000 years to reach the uppermost aquifer), the strong upward vertical flow potential of the uppermost aquifer, in addition to the spatial variability observed in the uppermost aquifer dataset, an intrawell statistical program has been selected to perform detection monitoring at all five BABs monitoring wells and all six DB monitoring wells located around the perimeter of each CCR unit to comply with the requirements of 40 C.F.R. § 257.93. This selection is appropriate based on the site-specific hydrogeological considerations and evidence of significant spatial variability across the monitoring well networks attributed to natural conditions in the aquifer (i.e. the uppermost aquifer remains unaffected by CCR operations) that, consistent with the recommendations in the Unified Guidance<sup>21</sup>, warrants the use of intrawell testing because it is a more powerful and appropriate method for detection monitoring under the site conditions that exist at the BABs and DB CCR units. Further discussion below provides additional detail on how the assumptions of interwell are not met and thus support intrawell as a more appropriate and powerful test for the BABs and DB.

*i. Groundwater Velocity*

One of the assumptions in background-to-downgradient comparisons (i.e. interwell comparison) presented in the Unified Guidance, is that “[g]roundwater flow should also move at a sufficient velocity beneath the site, so that the same groundwater observed at upgradient well locations is subsequently monitored at downgradient wells in the course of an evaluation period (e.g., six months or a year). If groundwater flow is much slower, measurements from upgradient and downgradient wells may be more akin to samples from two separate aquifers. Extraneous factors may separately influence the downgradient and

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<sup>21</sup> Unified Guidance p. 8-1

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background populations, confusing the determination of whether or not a release has occurred.”<sup>22</sup>

Specifically at the BABs, there is approximately 545 ft horizontal distance between MW-16-02 and MW-16-04 across the CCR unit roughly south to north and approximately 725 ft horizontal distance from MW-16-01 to MW-16-09 west to east across the CCR unit. Based on multiple rounds of data collection (8 background monitoring events 2016-2017 and 11 semiannual monitoring events 2017-2022), there is no definitive groundwater flow direction at the BABs, therefore, assumptions are made regarding potential flow paths in order to demonstrate the extremely slow nature of groundwater flow beneath the BABs. Conservatively assuming the groundwater horizontal seepage velocity of ~3 feet/year, as presented above, this results in at least 180 years travel time from the upgradient to downgradient edge of the BABs. Even if a hypothetical groundwater velocity on the order of 10x higher than the average were to be assumed, groundwater flow would still be much slower than the 6-month evaluation period (on the order of 30 feet/year with at least 18 years travel time). The groundwater horizontal seepage velocity beneath the DB is even lower (~0.6 feet/year) therefore groundwater flow would be much slower than the 6-month evaluation period than it is for the BABs.

*ii. Definable Flow Path*

For interwell comparisons to be valid, there needs to be a definable flow pathway from upgradient to downgradient wells beneath the regulated unit.<sup>23</sup> There is no identifiable groundwater flow direction at the BABs, therefore, no definable flow path and the assumptions of the upgradient-downgradient comparison method cannot be met.

*iii. Spatial Variability*

The EPA’s Unified Guidance recommends the use of intrawell comparisons in situations where spatial variability is present – this is a reoccurring message

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<sup>22</sup> Unified Guidance, p. 6-29.

<sup>23</sup> Unified Guidance, p. 6-29.

that is reinforced in multiple chapters throughout the Unified Guidance, including an entire chapter dedicated to spatial variability and ways to identify it (see Chapter 13). Specifically, in reference to spatial variation across the well network, the Unified Guidance states: “If evident, the statistical approach would need to be modified so that distinct wells are treated as individual populations with statistical testing being conducted separately at each one (i.e., intrawell comparisons).”<sup>24</sup> The presence of significant spatial variability can invalidate the interwell method.

From the Unified Guidance Chapter 5,<sup>25</sup> “[i]f the spatial variation is ignored and data are pooled across wells with differing mean levels (and perhaps variances) to run an interwell parametric prediction limit or control chart test, the pooled standard deviation will tend to be substantially larger than expected. This will result in a higher critical limit for the test. Using pooled data with spatial variation will also tend to increase observed maximum values in background, leading to higher and less powerful non-parametric prediction limit tests. In either application, there will be a loss of statistical power for detecting concentration changes at individual compliance wells. Compliance wells with naturally higher mean levels will also be more frequently determined to exceed the limit than expected, while real increases at compliance wells with naturally lower means will go undetected more often.” This further demonstrates that significant spatial variability can reduce the power of the test by introducing higher variability in the background dataset and “exaggerating” the background limit.

EPA states in the Proposed Decision that “the Application does not consider the effect of the smaller background dataset that would result from reliance on downgradient compliance wells. When relying on upgradient wells to establish background concentrations, the data collected from each additional well can be pooled and used to increase the initial baseline sample size.”<sup>26</sup> However, EPA’s

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<sup>24</sup> Unified Guidance, p. 3-5.

<sup>25</sup> Unified Guidance, p. 5-8.

<sup>26</sup> Proposed Decision, p. 25.

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comment does not consider the effect of using an incorrect statistical model for detection monitoring. The goal of detection monitoring is to correctly discern whether a release has occurred from the CCR unit. Having a statistical method with theoretically high power that ignores the hydrogeological facts of the unit will not achieve that goal. As discussed multiple times throughout the Unified Guidance, spatial variability must be a consideration in determining an appropriate statistical test. In the case of the DB, there is significant spatial variability in concentrations within the three upgradient monitoring wells. When pooled, this would result in a similar scenario as described above with the tests having lower statistical power. Although sample size of the background dataset is indeed a consideration, a larger background does lead to more power, there are recognized limitations in sample size during the onset of a detection monitoring program that can be resolved by updating background as described in and advocated for by in the Unified Guidance [see Chapter 5].

Per the EPA's Unified Guidance, "the goal of groundwater analysis is not simply to identify significant concentration differences among monitoring wells at compliance point locations. It is also to determine why those differences exist."<sup>27</sup> Recognizing spatial variability and why it exists and assigning the appropriate statistical approach to account for the spatial variability is even more important than ensuring that normality assumptions are met. In order to apply intrawell analysis, the aquifer must remain unaffected by releases from the CCR unit. The Unified Guidance recognizes that the determination of whether an observed pattern of spatial variation is natural and not synthetic requires expert judgment and knowledge concerning site hydrogeology and geochemistry to provide more definitive answers.<sup>28</sup> As detailed in the Application, DTE has performed that analysis and has determined that the aquifer is unaffected by the operation of the CCR unit using multiple lines of evidence. DTE has further studied the uppermost aquifer and has provided

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<sup>27</sup> Unified Guidance, p. 13-2.

<sup>28</sup> Unified Guidance, p. 13-2.



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additional geochemical, stable isotopic, and radiogenic data that further confirm the uppermost aquifer is unaffected by CCR operations at the BABs and DB.

Further analysis of the spatial variability is also provided herein to further demonstrate that the assumptions of interwell are invalidated due to the spatial variability across the well network, and between the two upgradient background wells. Thus, here the use of intrawell methods is more appropriate and provides a more powerful statistical approach. Spatial variability was assessed on the dataset collected from all six monitoring wells at the DB, and all between August 2016 and April 2022 using box plots and analysis of variance (ANOVA) tests as recommended by the Unified Guidance (see Chapter 13). The results of the ANOVA test show significant variance is observed for boron, calcium, chloride, fluoride, sulfate and TDS across the entire well network. This is not unexpected. According to the Unified Guidance, indicator parameters are more likely to exhibit spatial variation.<sup>29</sup>

Box plots provide a visual display of the variability and illustrate the differences in mean concentration observed at each well. Examples for calcium, chloride, and sulfate for the DB are shown below.

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<sup>29</sup> Unified Guidance, p. 6-31.

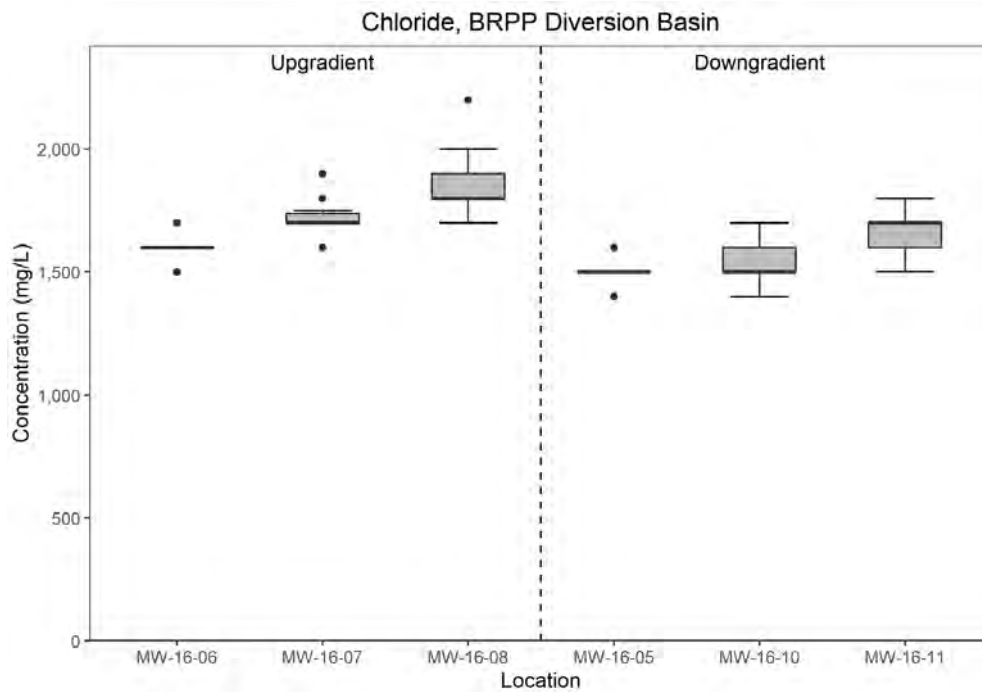
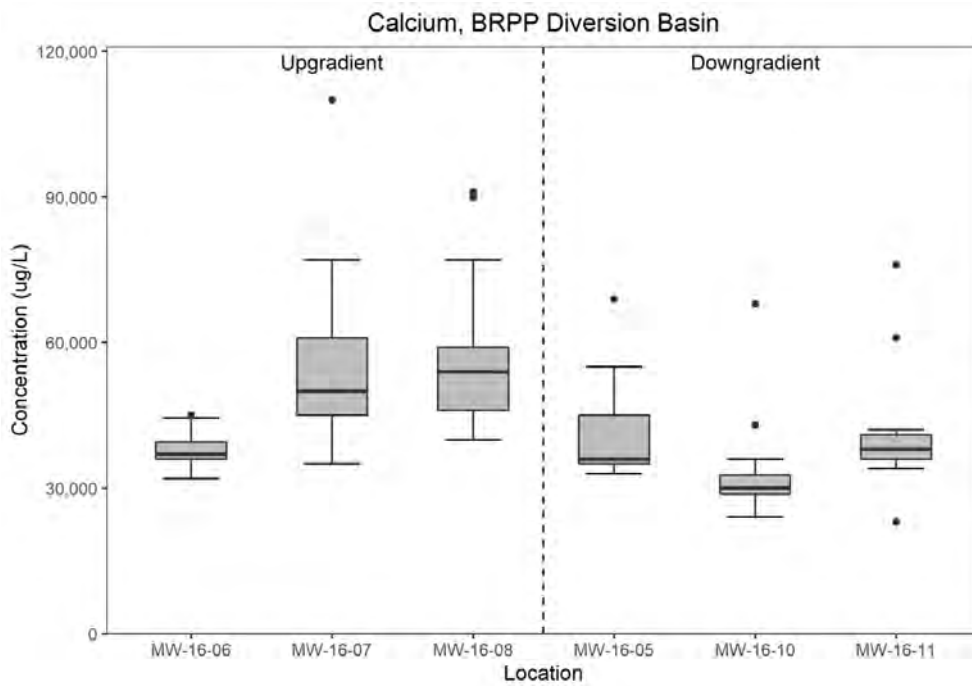
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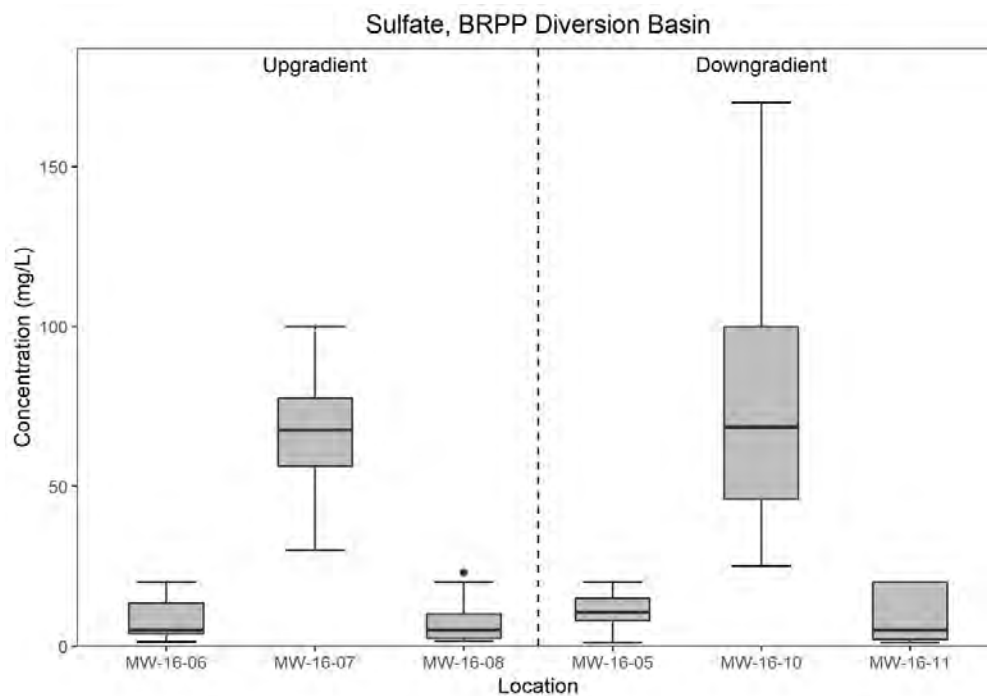
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As shown in the box plots, some concentrations in the background wells (i.e. calcium at MW-16-07 and MW-16-08) are much higher compared to the downgradient wells. That even when pooled, would result in a significantly higher concentration in the upgradient wells compared to the downgradient wells, lowering the sensitivity of the test and reducing the efficiency in detecting an increase in the downgradient wells.

Data populations were also compared using box plots to assess spatial variability between the three upgradient wells (MW-16-06, MW-16-07, and MW-16-08) for each of the Appendix III constituents. The results show evidence of significant difference between the three data populations, showing differences in mean concentrations and standard deviations within the background wells for boron, calcium, chloride, sulfate and TDS. Box plots for TDS and boron are provided below, illustrating the differences between the background wells. To further compare the upgradient and downgradient data populations t-tests were also between the pooled upgradient wells (MW-16-04 and MW-16-05) and the pooled downgradient wells (MW-16-01, MW-16-06, and MW-16-07). This

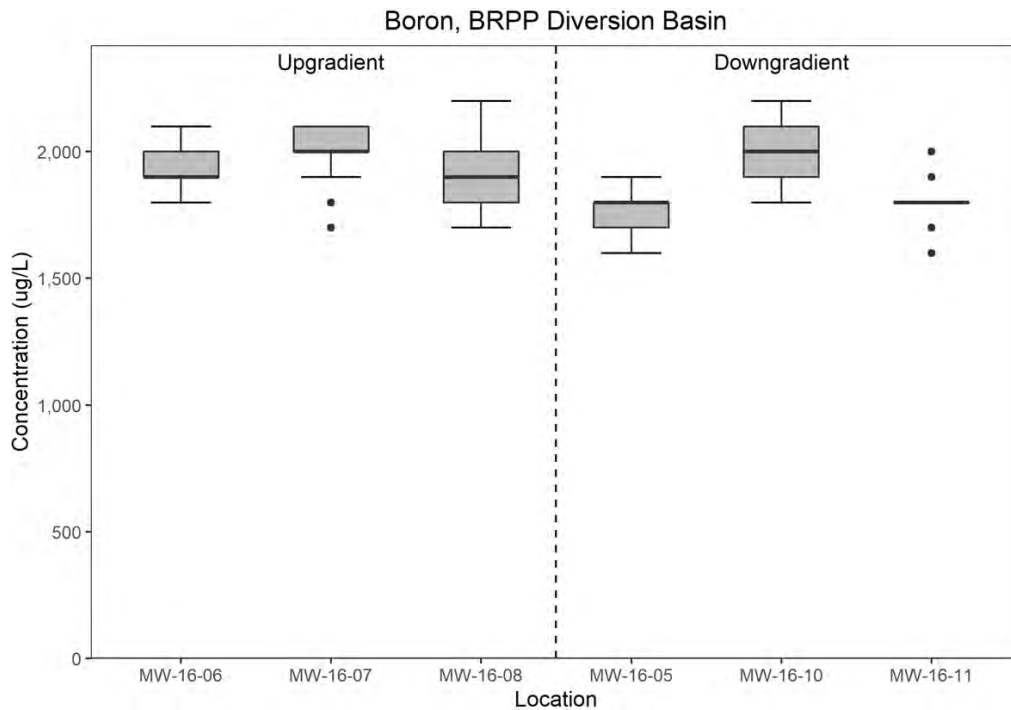
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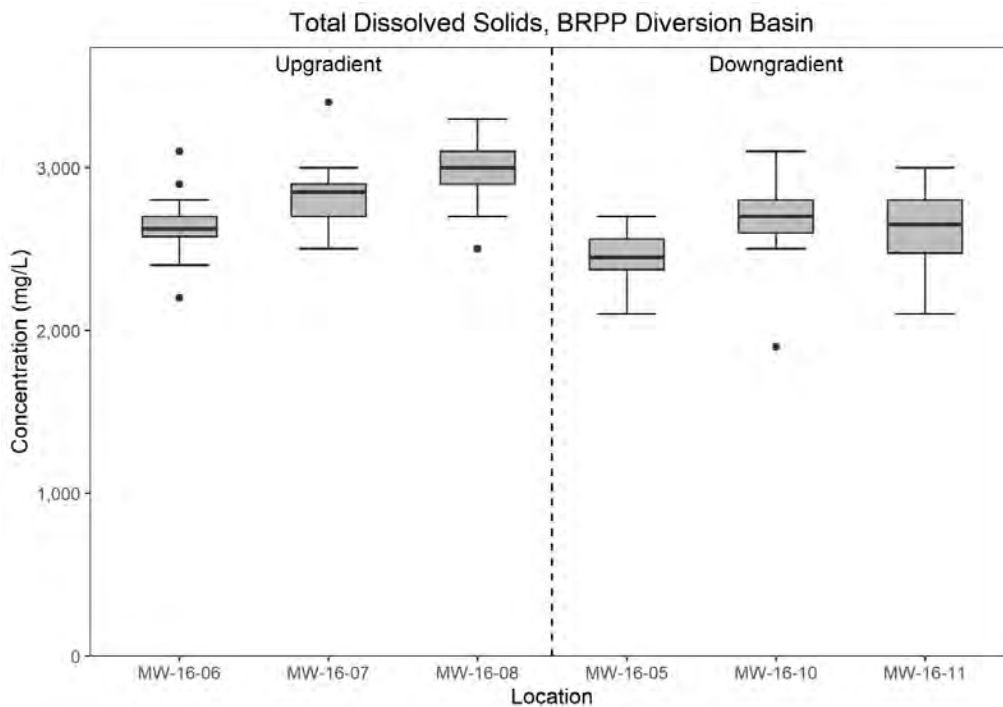
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resulted in significant differences between the upgradient and downgradient populations for boron, calcium, chloride, and TDS. Looking at the concentrations, the upgradient wells have higher concentrations of calcium and chloride, and lower concentrations of boron and sulfate when compared to the downgradient wells.





The dataset exhibits significant spatial variability across the well network for multiple Appendix III constituents that, as demonstrated through the Aquifer Characterization Study and the historical record for the site, is clearly the result of natural groundwater chemistry (not due to influence from the CCR unit). Due to the spatial variability and the aforementioned hydrogeological considerations, including the slow and insufficient groundwater velocity across the site, several key assumptions of interwell tests are not met, therefore, intrawell methods are appropriate at the BABs and DB.

**b. Use of Appropriate Statistical Distributions**

The CCR rule provides a framework for groundwater monitoring and defines the conditions under which statistical testing takes place. Specific statistical methods are identified in the CCR rule, just as they are in the RCRA regulations, but their application is not described in any detail. In order to implement a statistical analysis program, professionals must rely upon mathematical models and calculations, but just as importantly, professional experience and qualified decision making to navigate the complexities of applying statistics to groundwater data.

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The CCR rule itself accounts for this by requiring OPE certification as the regulatory mechanism for demonstrating compliance with the statistical method under § 257.93(f)(6).

Because a statistical model is at best an approximation of reality, all statistical tests and procedures require certain assumptions for the methods to be used correctly and for the results to be properly interpreted.<sup>30</sup> There are generally two types of statistical tests used in groundwater monitoring programs, parametric and non-parametric tests. Both of these statistical tests rely on the construction of a binary hypothesis test. The power of a binary hypothesis test is the probability that the test correctly rejects the null hypothesis when a specific alternative hypothesis is true. This probability represents the chances of a true positive detection conditioned on the actual existence of an effect. As a result, as the power of a test increases, the probability of wrongly failing to reject the null hypothesis (i.e. false negative) decreases.

Of these two statistical methods, parametric tests offer more statistical power and are preferred over non-parametric tests. However, most parametric test methods make a critical assumption that the underlying data follow a normal distribution, and if that underlying assumption is violated, it can impact the validity or accuracy of the test.<sup>31</sup> For this reason, it is important to check the normality of the dataset prior to selecting the appropriate statistical test. Non-parametric tests do not rely as heavily on the underlying data distribution; however, non-parametric tests require larger sample sizes than the parametric tests to ensure a similar level of statistical power.<sup>32</sup> So as long as the underlying distribution assumptions are met, parametric tests are preferred over non-parametric tests.

A statistical distribution is a mathematical model used to represent the shape and statistical characteristics of an unknown population (e.g., the concentrations of Appendix III constituents in groundwater upgradient of a CCR unit) that forms the

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<sup>30</sup> Unified Guidance at 10-1.

<sup>31</sup> Unified Guidance, p. 17-9.

<sup>32</sup> Unified Guidance, p. 17-9.

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basic building blocks of all statistical testing procedures.<sup>33</sup> A distribution in statistics is a function that shows the possible values for a variable and how often they occur. A normal distribution is typically bell-shaped. There are multiple techniques presented in both the EPA's Unified Guidance and EPA's ProUCL Technical Guide to assess data distributions and determine whether normality is observed in the dataset,<sup>34</sup> thus ensuring that the underlying assumption of normality are appropriately met under 40 C.F.R. § 257.93(g)(1). Despite there being many types of normality tests available, based on the information provided by the Agency, EPA's comments in the Proposed Decision rely solely on one particular normality test and exaggerate the effectiveness of the recommended Type I error rate for that specific normality test, which has no practical effect on compliance at the BABs or DB.

The methods used by DTE to determine the selected distributions were appropriate for the available monitoring data, as required by 40 C.F.R. § 257.93(g)(1) and were developed using the QPE-certified statistical analysis plan developed for the site. 40 C.F.R. § 257.93(g)(1) does not prescribe the exact distribution test to be used to assess normality in the dataset, nor does it expressly state the Type I error rate to be used in normality testing. Data distribution is a function that specifies all possible values for a variable and also quantifies the relative frequency (probability of how often they occur). The EPA's Proposed Decision relies exclusively on the Shapiro-Wilk test for normality, when in fact there are several methods available to determine appropriate distributions, many of which are described in the EPA's Unified Guidance. A combination of several methods is typically used to test the normality of the dataset as described in the Unified Guidance, such as graphical (i.e. visual) methods that explore possible patterns present in data sets and numerical (i.e. quantifiable) methods that are often supplementary to visual methods. DTE used multiple methods to test normality, including skewness tests,

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<sup>33</sup> Unified Guidance, p. 3-2.

<sup>34</sup> U.S. EPA. 2009. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance." EPA 530-R-09-007. Office of Resource Conservation and Recovery. Washington, DC. March, 2013. ProUCL Version 5.0.00 Technical Guide. Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. USEPA Office of Research and Development. Washington, D.C. EPA/600/R-07/041. September.

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probability plots, and Shapiro-Wilk tests to verify the distribution of the data as shown in Applications Appendix E and I.

EPA's selective references to the Unified Guidance are misleading. Using the multiple methods recommended by the EPA's Unified Guidance and allowable by § 257.93(g)(1) to test the distribution of the dataset does not necessarily include an associated Type I error rate. However, as stated above, § 257.93(g)(1) does not prescribe which distribution test must be used, nor does it require a correspondent Type I error rate, to assess normality in compliance with the CCR rule. Section 10.3 of the Unified Guidance states that "Assumptions of normality are most easily made with regard to naturally occurring and measurable inorganic parameters, especially under background conditions." These are the conditions applicable to Appendix III parameters. The EPA's ProUCL Version 5.0.00 Technical Guide notes that "goodness-of-fit (GOF) tests to determine data distribution (such as the Shapiro-Wilk test for normality) often fail if there are not enough observations (e.g., <20 observations), or if the data contain multiple populations, or if there is a high proportion of non-detects in the collected data set. Tests for normality lack statistical power for small sample sizes. In this context, a sample consisting of less than 20 observations may be considered a small sample. However, in practice, many times it may not be possible (due to resource constraints) to collect data sets of sizes greater than 10." This further supports that ***reliance solely on the formal Shapiro-Wilk test is not appropriate to verify normality, particularly at the onset of a new monitoring program*** where datasets are typically limited to less than 10 observations.

EPA's comments in the Proposed Decision contradict the recommendations in EPA's Unified Guidance and the EPA's ProUCL Technical Guide by over emphasizing ways to identify non-normal distributions, rather than performing a more thorough assessment that the data population is normally distributed (i.e., the null hypothesis is met). Particularly when taking into consideration the pitfalls of using only a goodness-of-fit test and incorrectly assigning non-normality using the limited background dataset available for Appendix III constituents at the onset of the monitoring program. The Unified Guidance, page 18-6, states that "When



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normality cannot be justified, a non-parametric prediction limit should be considered instead. A non-parametric limit assumes only that all the data come from the same, unusually unknown, continuous population. Non-parametric prediction limits generally require a much larger number of background observations in order to provide the same level of confidence as a comparable parametric limit. Consequently, the Unified Guidance recommends that a parametric model be fit to the data **if at all possible** [emphasis added]."

The Unified Guidance contemplates exploration of different distribution models (i.e. mathematical transformations of the raw measurements) to exhaust all options to identify normality in the underlying dataset before assigning a non-normal distribution. The original values can be transformed into a set of numbers that behaves as if drawn from a normal distribution. The transformed values can then be utilized in and analyzed with a normal-theory test (i.e., a procedure that assumes the input data are normal).<sup>35</sup> This is clearly laid out in the Unified Guidance example of fitting distributions using a Shapiro-Wilk test.<sup>36</sup> The Shapiro-Wilk test can be used to test normality for datasets with fewer than 50 observations ( $n \leq 50$ ). A significance level is selected to establish the critical point to compare against when running the statistical test for normality (i.e. assess whether the resulting test statistic is above or below the critical point based on the assigned significance level). The Unified Guidance generally recommends selecting a significance level of 0.01 for very small datasets ( $n < 10$ ), 0.05 for moderately sized datasets ( $10 \leq n < 20$ ), and 0.01 for larger data sets ( $n \geq 20$ ).<sup>37</sup> When the Shapiro-Wilk statistic exceeds the critical point, normality can be accepted as a reasonable model for the underlying population. However, if the Shapiro-Wilk test rejects normality at that significance level, additional testing is recommended by the Unified Guidance to see if another distribution model provides a better fit.<sup>38</sup> If the Shapiro-Wilk test shows significant evidence of nonnormality (i.e. does not meet the critical point), then "the data should be transformed using logarithms or

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<sup>35</sup> Unified Guidance, p. 3-8.

<sup>36</sup> Unified Guidance, p. 10-13 to 10-15.

<sup>37</sup> Unified Guidance, p. 10-14.

<sup>38</sup> Unified Guidance, p. 10-14.

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another transformation on the ladder of powers and re-checked using the Shapiro-Wilk test before proceeding with further statistical analysis.”<sup>39</sup> Although it is recognized that in some cases a non-parametric limit is appropriate, as demonstrated in the Unified Guidance, it is a last resort due to its lack of power compared to parametric tests.

DTE’s statistical analysis plans developed for the BABs and DB groundwater monitoring programs also contemplate these transformations in addition to procedures on treating non-detects and potential outliers in the dataset that, if present, can also have a profound effect on normality if not accounted for appropriately. There are several variables necessary to account for in verifying which data distribution assumptions are appropriate for the statistical tests to meet the performance standards outlined in §257.93(g).

It is well understood that statistical power is limited by the sample size and that sample size is limited at the onset of any new monitoring program. This concept is also supported by the EPA’s Unified Guidance that states, “very small individual well samples in the early stages of a monitoring program may make it difficult to utilize an intrawell method having both sufficient statistical power and meeting false positive design criteria.”<sup>40</sup> This is correctable with the addition of new sample data which is incorporated into the background dataset periodically to improve statistical power of the test over time, which is exactly what DTE has done. The statistical power of the tests was improved by updating the background prediction limits once additional observations were available, in accordance with the recommendations in the Unified Guidance (see Chapter 5). This was completed for the BABs and DB units in December 2021 and presented in the respective 2021 Annual Groundwater Monitoring Reports (available on DTE’s CCR rule compliance data and information website<sup>41</sup>), subsequent to submittal of the Application. The number of samples comprising the background set for each well/constituent pair

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<sup>39</sup> Unified Guidance, p. 10-14.

<sup>40</sup> Unified Guidance, p. 6-34.

<sup>41</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

increased from 8 to 16, except for two at the DB that had 15 results after removal of outliers, and one at the BABs with 15 after removal of outliers. Comparing the updated UPLs to the initial ones, 5 well/ constituent pairs moved from nonparametric to parametric, while 3 moved from parametric to nonparametric for the DB, and 1 well/ constituent pairs moved from nonparametric to parametric, while 6 moved from parametric to nonparametric for the BABs. While some of the updated prediction limit values changed, the magnitude of the changes were small.

**c. Effectiveness of Prediction Intervals**

40 C.F.R. § 257.93(f) allows for the use of multiple statistical methods and defers to the QPE to ensure that the selected method meets the minimum performance standards of 40 C.F.R. § 257.93(g) to ensure contamination can be detected. Prediction intervals are calculated based on background samples and are thus frequently used for detection monitoring programs, which is based on comparisons to background water quality. Per the Unified Guidance, prediction intervals provide well established testing strategies for simultaneously controlling false positive rates while maintaining adequate power to detect contamination during detection monitoring, they offer flexibility to accommodate a wide variety of groundwater monitoring networks, and are generally easy to construct and straightforward to interpret.<sup>42</sup> Although the rule itself does not require a minimum nominal false positive rate as specified in 40 C.F.R. § 257.93(g)(2), prediction intervals combined with a retesting strategy can result in sufficiently low Type I error rates and the ability to detect real contamination. From a practical standpoint, prediction limits were selected for the BABs and DB and have been demonstrated to adequately meet the performance standards in 40 C.F.R. § 257.93(g)(4) as discussed below.

Supporting analyses of the 2017 statistical calculations for the BABs and DB programs were provided to the Agency in the Application Appendix E (2017 Annual Groundwater Monitoring Report), which includes details on the statistical limit calculations at the onset of the monitoring program. Chemstat v6.2 statistical software is used to perform the statistical analysis; the associated output files that

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<sup>42</sup> Unified Guidance, p. 18-1 to 19-35

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show the detail of the background datasets, results of distribution tests, outlier testing, and statistical calculation methods are all included as attachments in the 2017 Annual Groundwater Monitoring Report. DTE also provided the Groundwater Statistical Evaluation Plan for each of the BABs and DB units that provides an overview of the methods and steps that were used to guide these calculations (Application Appendix I). Since 2017, statistical updates have been performed in December 2021 and reported in the respective 2021 Annual Groundwater Monitoring Reports (available to the Agency on DTE's CCR rule compliance data and information website<sup>43</sup> since early 2022). Additional detail is provided below to provide additional clarity and further justify the Type I error rate associated with the prediction intervals used at the BABs and DB and demonstrate the effectiveness of the selected approaches per 40 C.F.R. § 257.93(g)(4).

As discussed in Unified Guidance Chapters 18 and 19, the use of prediction limits requires management of the potential for high site-wide false positive rates (SWFPR), which can become very high in detection monitoring under the CCR rule with seven Appendix III parameters and at least three downgradient monitoring wells. The solution to managing the SWFPR (and the solution to §257.93(g)(4)) is to use a retesting strategy to control the SWFPR. This retesting procedure was contemplated from the onset of DTE's monitoring program as outlined in the BABs and DB Groundwater Statistical Evaluation Plans (Applications Appendix I) and implemented as described throughout the annual groundwater reports since 2017 (Applications Appendix C, D, and E, and CCR rule compliance data and information website<sup>44</sup>). For parametric prediction limits, k-multipliers are continuous statistical parameters that can be adjusted to match a desired false positive rate. As discussed by EPA in the Proposed Decision,<sup>45</sup> the Unified Guidance provides a set of tables that enable the estimation of the power provided by prediction limits with various resampling strategies. The series of tables were established with

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<sup>43</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

<sup>44</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

<sup>45</sup> Proposed Decision, p. 31-32.

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calculated k-multiplier values to meet a SWFPR of 10 percent, which exceeds the minimum of 5 percent established in §257.93(g)(2), under various testing scenarios (interwell or intrawell) with a given sample size and number of tests being run. Using the tables in Unified Guidance Appendix D.3 for intrawell prediction limits with a 1 of 2 resampling strategy, and semi-annual sampling with five wells (BABs) and six wells (DB) with seven constituents (interpolation between tables required), the initial prediction limits established with 8 sampling results fell marginally below the level having sufficient power compared to the EPA Reference Power Curve (ERPC) at 4 standard deviations (interpolated k-multiplier values of 2.74 for BABs and 2.83 for DB). A similar analysis using the 2021 updated prediction limits (16 observations) fell well within the region of the table exceeding the ERPC levels (interpolated values of 2.10 for BABs and 2.21 for DB). Further, back-calculation of the k-multiplier from the ChemStat data files results in an even lower value. For example, using the dataset specific to TDS in MW-16-07 for BAB and pH in MW-16-02 for DB, the actual k-multiplier values are 2.0 for the initial 8 sampling events and 1.8 for the updated dataset using 16 samples. These lower k-multiplier values are well within the range of values that meet the ERPC, and demonstrate that the aforementioned interpolations are conservative estimates and that the real power for these data sets are actually better than the interpolated general k-multiplier values indicate. Thus, further demonstrating adequate statistical power is achieved to ensure adequate detection of potential contamination and shows that the prediction intervals are in compliance with §257.93(g)(4).

As discussed above, lower statistical power at the onset of monitoring is expected due to the relatively small sample size and is recognized by the Unified Guidance as a challenge at the early stages of the monitoring program. The initial prediction intervals were established with the minimum eight sampling results because, at the onset of the 2015 CCR Rule, hydrogeological characterization and monitoring networks needed to be established, with at least eight baseline samples from each well, within the first two years of implementing the 2015 CCR Rule. This tight timeline to implement the program (including initial site characterization, establishment of monitoring networks prior to even beginning to collect baseline

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samples) inherently limited the number of baseline datapoints that could be collected and remain temporally independent. DTE has performed the recommended steps set forth in the Unified Guidance to make these improvements as soon as an appropriate number of additional observations were available. DTE completed the updates in 2021 as documented in the 2021 Annual Groundwater Monitoring Reports (available on DTE's CCR rule compliance data and information CCR website<sup>46</sup>).

### *i. Outlier Testing*

Outliers are data points in a dataset that are significantly different from other data points in the same dataset. In other words, they are values that are much higher or much lower than the rest of the data points in the dataset. Outliers can occur for a variety of reasons, such as errors in data collection, measurement errors, or unusual circumstances that are not representative of the normal behavior of the dataset. Outliers can have a significant impact on the analysis of the dataset because they can skew the results or make it difficult to draw accurate conclusions. Therefore, it is important to identify and deal with outliers appropriately when analyzing a dataset. Typically, outliers are removed from a dataset that occurred due to errors or unusual circumstances that are unlikely to occur again. However, in some cases, outliers may be valid data points that represent important information, and in these cases, they should be retained in the analysis. Identification of outliers is key component of statistical testing to ensure that data are representative of groundwater conditions since the presence of even one extreme outlier may cause an otherwise recognizable distribution from being correctly identified.<sup>47</sup>

For the BABs and DB programs, outliers were tested as described in the BABs and DB Groundwater Statistical Evaluation Plans (Application Appendix I) (which align with the recommendations set forth in the Unified Guidance) and

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<sup>46</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

<sup>47</sup> Unified Guidance, p. 10-2.

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details for specific handling of outliers are included in the documentation of the actual statistical limit calculations provided in Application Appendix E. As stated in the Groundwater Statistical Evaluation Plan (and per the Unified Guidance), data were reviewed graphically using tools such as time concentration trend plots, box and whisker plots and/or probability plots to illustrate and identify outliers, trends, or otherwise unusual observations at each monitoring location. This is accomplished prior to further in-depth review of the data sets to identify any obvious field or laboratory anomalies. Data points that are determined to be nonrepresentative will be 'flagged' for further detailed evaluation prior to removing from the background data or designating as an outlier. Further in-depth review would be a formal outlier test such as Dixon's Outlier Test. Like many steps throughout the monitoring program, there is need for professional judgement in the decision-making process to determine which outliers should be removed. The 2017 Annual Groundwater Monitoring Reports (Application Appendix E) each include a detailed Background Statistical Evaluation technical memorandum that provides a comprehensive, detailed narrative with backup calculations of how the prediction limits were developed. These memorandums provide detail that specifically explains the handling of outliers and demonstrates the step-wise approach and decision making process used to assess suspected outliers through time-concentration graphs, probability plots, and formal outlier testing with Dixon's test, and clearly demonstrates that DTE is taking appropriate steps to develop effective prediction limits that meet the performance standard of 40 C.F.R. § 257.93(g)(4).

In the Proposed Decision, EPA goes against its own guidance by using a statistical test to solely identify and remove outliers from the dataset. In the Unified Guidance, EPA clearly states "The Unified Guidance does not recommend that outliers be removed *solely* on a statistical basis."<sup>48</sup> Per the Unified Guidance, a statistical determination of one or more statistical outliers does not indicate *why* the measurements are discrepant from the rest of the data set. The outlier tests can provide supportive information, but generally a

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<sup>48</sup> Unified Guidance, p. 12-1.

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reasonable rationale needs to be identified for removal of suspect outlier values (usually limited to background data). As such, EPA's rationale for outlier removal in the Proposed Decision is flawed and provides several examples of how EPA is selectively identifying procedural inconsistencies using methods that conflict with their own guidance and the data provided to them in the Application, then they misrepresent their findings (many of which are in error) out of context from the bigger picture and in disregard from the full set of data they were provided. In addition to not following the correct methods and overstating the significance of several of their identified outliers, EPA's comments are fraught with error as detailed below.

In the Proposed Decision, EPA states, "Applying Dixon's test with ProUCL v5.1, EPA identified outliers in the reported intrawell background datasets with 99% confidence at MW-16-04 for total dissolved solids (1,100 mg/L), MW-16-05 for chloride (1,600 mg/L) and pH (9.1), MW-16-07 for total dissolved solids 3,440 mg/L), MW-16-09 for chloride (1,100 mg/L), and MW-16-10 for calcium (170 mg/L). Additional outliers were identified with 95% confidence at MW-16-02 for total dissolved solids (118 mg/L), MW-16-06 for calcium (45 mg/L), and MW-16-07 for calcium (110 mg/L)."<sup>49</sup> There are several missteps and errors in this statement as follows:

- o First, as discussed above, EPA is going against their own guidance by identifying outlier removal solely on a statistical basis. Formal testing for outliers should be done only if an observation seems particularly high or low compared to the rest of the dataset.<sup>50</sup>
- o Second, EPA applies various confidence levels, using both 99% and 95% to justify removal of outliers. The Unified Guidance cautions that removal of outliers should only take place under certain conditions, since a true elevated value may fit the pattern of a release or a change in historical background conditions.<sup>51</sup> By decreasing the confidence level to 95%, the

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<sup>49</sup> Proposed Decision, p. 33.

<sup>50</sup> Unified Guidance, p. 6-35.

<sup>51</sup> Unified Guidance, p. 6-35.



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chances of identifying a statistical outlier are also more likely. This is an example of how strictly sticking to a formal outlier test can end up eliminating data points that are only marginally greater than the bulk of the data.

- o Third, EPA has identified outliers that were in fact already identified and removed as outliers by DTE prior to calculating prediction limits as shown in the Application. This raises concerns with the adequacy of EPA's review and suggests that all of the information presented in the Application was not taken into consideration in the Proposed Decision. The MW-16-10 calcium concentration of 170 mg/L – measured June 2017 was removed as an outlier and the justification for doing so is documented in several places – see DB Application Appendix E, Background Statistical Evaluation Table 1, p. 343. As shown in the table, several outliers were removed from this dataset. The logic and methods for testing and removing these data points are clearly laid out in a series of tables, time-series plots and probability plots with annotations, along with a narrative in the memo that documents the details of the statistical limit calculations performed in 2017,<sup>52</sup> all of which are included in the Application.
- o Fourth, EPA did not consider all of the data provided in the Application. Upon review of EPA's Proposed Decision outlier comments, DTE determined that the noted pH of 9.1 SU from MW-16-05 from September 2017 was a typo in the report table (DB Application Appendix E, Table 2, p. 316). Field records, however, verify that the pH reading from September 13, 2017 is 7.9 SU and the detailed Chemstat output with the dataset used in the prediction limit calculation documents that the correct pH reading of 7.9 SU was used to calculate the prediction intervals (DB Application, p. 397). The Chemstat output also shows that the pH dataset for MW-16-05 was non-parametric, therefore, the highest datapoint of 8.47 SU was used to calculate the upper prediction limit (the resulting PL is 8.5 SU using the correct number of significant digits), not the value of 9.1. This also

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<sup>52</sup> Application at Appendix E, 2017 Annual Groundwater Monitoring Report.

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demonstrates that DTE is performing these statistical calculations based on appropriate methods and is not trying to inflate or misrepresent the prediction limits by disingenuously keeping “extreme” datapoints in the dataset.

- o Fifth, EPA is selectively focusing on high data points as outliers and ignoring the low ones. This is evidenced by the fact that all of the outliers pointed out by EPA that can be confirmed in DTE’s dataset represent maximum concentrations observed during background data collection (August 2016 through September 2017). For example, the MW-16-10 calcium concentration (170 mg/L) was a high datapoint that was removed as an outlier, there were also several extreme low data points (e.g. boron and chloride) at MW-16-10 that were identified by DTE as outliers and removed from the background dataset prior to calculating the predictions limits. It is important to assess both high and low outliers to ensure appropriate distribution assumptions are met and ensure data are representative of groundwater conditions and not due to a potential error in the data. Both high and low extreme datapoints can incorporate variability in the dataset that can impact the power of the test.
- o Sixth, several of the data points EPA listed as outliers that do not exist in DTE’s dataset:
  - MW-16-02, TDS 118 mg/L – lowest TDS at this well is 710 mg/L using data collected from August 2016 through October 2022
  - MW-16-07, TDS 3,440 mg/L – this does not match our dataset, 3,400 mg/L measured January 2017 is the historic max

These data points do not exist in the dataset for these wells. The detailed backup of the datasets used to calculate the 2017 prediction limits are in Appendix E of each of the Applications. EPA did not provide any detail to support their analyses nor did they specify which dataset was used to evaluate outliers, therefore, DTE cannot fully evaluate these discrepancies, however, DTE can conclude that the dataset EPA used to make this determination is incorrect.

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- Seventh, the EPA identified several maximum concentrations that do not constitute outliers, as follows:
  - MW-16-04, TDS 1,100 mg/L – measured January 2017 (reoccurrence in April 2021)
  - MW-16-05, chloride 1,600 mg/L – measured June 2017 (reoccurrence in October 2022)
  - MW-16-09, chloride 1,100 mg/L – measured November 2016
  - MW-16-06, calcium 45 mg/L – measured August 2016 (reoccurrence in April 2022)
  - MW-16-07, calcium 110 mg/L – measured August 2016

As established above, it is not recommended by the Unified Guidance to remove outliers solely based on statistical outlier testing. Again, several factors are used to appropriately identify outliers, starting with visual inspection of the dataset using tools such as time-series plots to first identify any extreme datapoints (both high and low), followed by additional tests such as probability plots and formal outlier tests. The maximum concentration in a dataset is not automatically designated as an outlier simply because it is higher than the other background data.

Groundwater concentrations often fluctuate over time due to seasonal or temporal changes and it is important to capture this variability in the dataset if it represents actual groundwater conditions. In order to be considered an outlier, the datapoint must be significantly high or low compared to the rest of the dataset. As shown on Appendix A Table 2 of each of the 2017 Annual Groundwater Monitoring Reports (DB Application p.316-321, BAB Application p. 328-332) and the Appendix C time-series plots (DB Application p. 347-353, BAB Application p. 347-354), these datapoints flagged by EPA are not “extreme” in comparison with the other data points, therefore, formal outlier testing is not warranted. The time-series plots also illustrate how concentrations in groundwater can vary at specific points in time consistently across the well network and show that these slightly higher occurrences are not

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isolated. Other factors are also used to evaluate potential outliers before justifying their removal, such as data quality review and reoccurrence of the concentrations in relation to other datapoints, including looking at sample duplicates and confirmatory results, if available. Based on the limited information provided in the Agency's analysis, EPA's selection of outliers does not take any of these considerations into account.

- Lastly, EPA is overstating the significance that these false outliers would make on the resulting prediction limits if removed (listed in the aforementioned seventh bullet point). Take the MW-16-04 TDS concentration of 1,100 mg/L for example. The sample mean of the background dataset with this data point included is 984 mg/L with a non-normal distribution (non-parametric limit is calculated). Removal of the datapoint results in a sample mean of 970 mg/L and would be normally distributed (parametric limit is calculated). The upper prediction limit with the maximum concentration removed would result in a marginal difference, changing from 1,100 mg/L to 1,000 mg/L. However, per the methods in the Unified Guidance, the data point should not be considered an outlier because it meets data quality objectives, and it is not "extreme".

Further, additional groundwater background data collected through April 2021 was presented in the 2021 Annual Groundwater Monitoring Report (available to the Agency on DTE's CCR rule compliance data and information website<sup>53</sup>) and data were reassessed for outliers as part of the 2021 prediction limit update process. With more samples, there are more data available to assess patterns and assess potential outliers. Similarly to what was done in 2017, a detailed technical memorandum is provided as Attachment C to each of the annual reports that details the methods and procedures used to update the prediction limits in 2021. Several potential outliers (high and low) were flagged and subsequently removed as noted in detail in the reports. None of the outliers that EPA flagged in the Proposed Decision were identified as outliers in DTE's

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<sup>53</sup> <https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html>

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2021 analysis, further confirming that the EPA's comments are in error. However, two outliers for calcium were identified using the aforementioned screening process during the 2021 prediction limit update, which provides an example of how outliers are treated and documented throughout the program. The data presented in Appendix C of the 2021 Annual Groundwater Monitoring Report demonstrates the step-wise approach and decision making process used to assess suspected outliers through time-concentration graphs, probability plots, and formal outlier testing with Dixon's test, and further demonstrates that DTE is taking appropriate steps to develop effective prediction limits, based on sound professional judgement and qualified experience, that meet the performance standard of 40 C.F.R. § 257.93(g)(4).

**d. Alternate Source Demonstration is Adequate**

As presented in the Application, the facility appropriately remains in detection monitoring in accordance with § 257.94 of the CCR rule. The BABs PALD, ALD and the Aquifer Characterization Study provide additional detailed site information that further substantiates the conceptual site model at the site and the BAB ASD, and further verifies that the BABs have not impacted groundwater.

Aside from being performed under direction of a QPE and having obtained the certification required by the rule, the ASD includes multiple lines of evidence that demonstrate the source is from something other than the CCR unit. Per the EPA's Unified Guidance, "the goal of groundwater analysis is not simply to identify significant concentration differences among monitoring wells at compliance point locations. It is also to determine why those differences exist."<sup>54</sup> Under RCRA (§258.54) and the CCR Rule (§257.94), the owner or operator may demonstrate that a source other than the [CCR unit] caused the statistically significant increase (SSI) over background levels for a constituent or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. These are often referred to as "alternate source demonstrations" or ASDs. These demonstrations have been an important consideration in solid waste

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<sup>54</sup> Unified Guidance. Chapter 13, p. 13-2.

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groundwater monitoring programs since RCRA was enacted decades ago in order to identify SSIs due to factors unrelated to the unit being monitored. This is especially relevant given that all of the constituents being monitored under the CCR Rule are naturally present in the environment, and in particular, the Appendix III constituents, are very commonly present at detectable concentrations in groundwater.

Fundamentally, groundwater chemistry is influenced by the interaction of aquifer materials in various minerals, gases, and groundwater constituents that are available to react with the water as it travels through the subsurface. Therefore, groundwater naturally has dissolved-phase constituents which can dissolve from the aquifer material (increasing their concentration in groundwater) or precipitate onto the aquifer material (decreasing their concentration in groundwater). Their mere presence in groundwater does not indicate that a release has occurred, nor does an increase in concentration necessarily indicate a release. There are many variables that contribute to natural differences that occur in groundwater quality. Oftentimes increases observed in detection monitoring are caused by natural changes in groundwater quality related to geo-environmental variations that occur throughout the aquifer and are attributable to geogenic sources. These changes can also occur seasonally due to natural processes and regional groundwater fluctuations such as flow rates, geochemistry, and water levels. As such, additional evaluation into the cause of an initial SSI is appropriate to be sure that the change is attributable the CCR unit.

DTE prepared an ASD in August 2019 for an initial SSI for sulfate at MW-16-04 (27 mg/L) and TDS at MW-16-01 (960 mg/L), marginally above their respective prediction limits (PLs) of 18 mg/L (sulfate) and 950 mg/L (TDS). The ASD was included in the 2019 Annual Groundwater Monitoring Report and submitted to the EPA within the Application (Appendix C). The ASD concluded that the two SSIs were attributable to natural variability, largely relying on the isolated occurrence and small magnitude of each increase, the lack of hydraulic connection between the CCR unit and the uppermost aquifer, and the relatively short timeframe at the

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start of the monitoring program that did not account for long-term temporal changes (i.e. small background dataset available to calculate the prediction limits).

EPA is proposing to find the information provided in the Application is insufficient to conclude that local subsurface geology would have prevented leakage from reaching groundwater within the operational life of the impoundment based on the theoretical groundwater flow rates used in the evaluation in addition to alleged inadequate data to demonstrate the continuity and consistency of the low permeability of the underlying clay, along with the irrelevance of the background timeline.<sup>55</sup> The significant amount of data provided to EPA in the Application and the multiple site characterization studies demonstrate that the impervious clay-rich soil beneath the BABs is laterally continuous, substantially thick, and hydraulically separates the CCR unit from the uppermost aquifer. These details are further enumerated below in Section VIII.D of this letter and further support the conclusions of the ASD.

The flow rate calculations used to assess groundwater flow rates are appropriate and are recommended by EPA's RCRA draft Technical Guidance (1992) and EPA's Solid Waste Technical Guidance (1993) and are in-line with industry standards and the principles of hydrogeology. The average linear velocity of groundwater flow is derived from Darcy's Law and is a function of hydraulic conductivity, hydraulic gradient, and effective porosity. As detailed in the CCR Rule, "Darcy's Law for gravity flow through porous media is directly proportional to the hydraulic gradient. The use of Darcy's Law to calculate fluid flow through porous media is a well-established and generally accepted engineering methodology."<sup>56</sup> The 1976 Bechtel Subsurface Investigation and Foundation Report, Belle River Units 1&2, (included as Appendix K in the Application) provided data that demonstrated that the clay-rich soil in the area of the BABs has a maximum hydraulic conductivity of  $3.0 \times 10^{-8}$  cm/s and the 2016 clay-rich soil in samples collected by TRC (included in Appendix A of the Application) had a hydraulic conductivity ranging from  $2.1 \times 10^{-8}$  to  $2.9 \times 10^{-8}$  cm/s. While groundwater has the ability to move horizontally through higher

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<sup>55</sup> Proposed Decision, p. 36.

<sup>56</sup> 2015 CCR Rule Preamble at 21372.

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permeability zones, it also has to pass vertically through the most restrictive low permeability material first. As discussed in more detail below, these higher permeable zones are not continuous.

The flow calculations presented in the ASD estimate that, due to the consistently low permeability of the clay and the considerable thickness of the clay, it would take over 1,300 years to travel through the clay, which is well over the less than 40 years of operation of the BABs CCR unit. The addition of more data collected in the ALD confirms the continuity of the clay, and further refines the thickness of the clay to 82 feet beneath the bottom of the BABs, with a hydraulic conductivity of no more than  $2.1 \times 10^{-8}$  cm/s, resulting in vertical travel times of well over 1,000 years (calculated to be approximately 1,300 years), which again is well over 40 years even if a much higher hydraulic conductivity was assumed.

EPA is also proposing “to find that the absence of additional SSIs identified within the same or other monitoring wells is insufficient evidence to conclude that a potential release has not occurred.”<sup>57</sup> DTE acknowledges that the absence of additional SSIs identified within the same or other monitoring wells *on its own* is not a sufficient line of evidence to conclude that a potential release has not occurred in the BABs CCR unit. However, it is a line of evidence to consider in conjunction with other lines of evidence that a release has not occurred. In addition, boron (well known as a very conservative constituent that can move at the rate of groundwater) would be expected to be the first constituent to be seen with a potential SSI in the monitoring well system and a potential boron SSI has not been identified to date.

EPA speculates for the BABs CCR unit that “observed differences among site wells may result from the wells being screened at markedly different depths.”<sup>58</sup> The wells within the BABs CCR unit are all screened within the top of the uppermost aquifer. As discussed above in Section VIII.A.2, groundwater is confined with hydraulic head levels well above the top of the uppermost aquifer, demonstrating

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<sup>57</sup> Proposed Decision, p. 36.

<sup>58</sup> Proposed Decision, p. 37.



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significant upward flow potential. In addition, the Appendix III constituents are readily going to move with groundwater, therefore, screening at the depth of first saturation in the uppermost aquifer as was done at the BABs CCR unit albeit at different elevations due to the thickness of overlying clay across the unit. This is also ideal for early detection of groundwater influenced by potential leakage from the BABs.

Moreover, the timeframe over which the background dataset was collected is sufficient evidence, and highly relevant, to conclude that a potential release has not occurred given the timeframes allowed in the CCR rule. The original proposed CCR rule allowed one year, extended to two years, to perform site characterization, complete the monitoring system design, collect background samples, and develop a statistical analysis program. We agree with EPA that even two years is a very limited and ambitious timeframe to perform the necessary activities, especially for sites with deep wells and difficult drilling conditions. Discussed in the 2015 CCR Rule: "After review of the comments received on this issue and careful reexamination of the actual requirements in the final rule, EPA agrees that a one-year timeframe is not feasible, and has decided to extend the timeframes for completing installation of the system, including background monitoring, to two years."<sup>59</sup> Therefore, as required by the CCR rule, DTE performed the necessary activities to comply with the rule and began detection monitoring at the BABs CCR unit within a two-year period.

As discussed above in detail in Section VIII.B.1.c, the predictive power of the statistics is typically limited due to the relatively small background datasets available at the beginning stages of a monitoring program. The baseline dataset used to develop the initial prediction limits in 2017 were limited by the tight timeframe in which these programs had to be established and limited the number of independent samples that could be collected prior to initiating the detection monitoring program. It is well recognized that statistical power is limited by the sample size and that sample size is limited at the onset of any new monitoring

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<sup>59</sup> Preamble at 21398.

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program. The initial PLs were the statistical limits available at the time of the TDS and sulfate SSIs. As detailed above, the statistical power is able to be improved over time as more samples are collected. Additional monitoring since 2017 has resulted in additional background data being collected and utilized to update the PLs in 2021 that account for these slight temporal variations in the dataset and improve the statistical power of the test.

Additionally, the sulfate concentrations observed at MW-16-01 and MW-16-04 are not attributable to the BABs CCR unit. The BABs Aquifer Characterization Study (Attachment C of this letter) includes a characterization of the uppermost aquifer water and the CCR contact water, that when compared, further demonstrate that the CCR unit water is not in hydraulic communication with the uppermost aquifer. There are stark contrasts in the geochemical condition of each of the two water groups (CCR contact water and the uppermost aquifer groundwater). For example, sulfate is 15 times more concentrated in the CCR unit water than the concentration in the uppermost aquifer groundwater. When two water masses become hydraulically connected, they tend to become more like each other chemically and physically. The Aquifer Characterization Study shows that the presence of sulfate in the uppermost aquifer is geogenic (i.e. originating from natural geochemical processes within the uppermost aquifer) based on a combination of lines of evidence including geochemistry, stable isotopes, age dating, and statistical analysis which demonstrate the CCR contact water is not mixing with the uppermost aquifer. Moreover, the mineral saturation analysis of groundwater in the uppermost aquifer concludes that "sulfate is expected to dissolve out of the uppermost aquifer material into the groundwater due to the substantial combined undersaturation of sulfate minerals."<sup>60</sup> Therefore, it is not unexpected that sulfate is present in groundwater in the BABs monitoring wells.

Further, the mean sulfate concentrations in groundwater at the BABs monitoring wells are lower than the mean concentrations observed in the upgradient DB

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<sup>60</sup> BABs Aquifer Characterization, Section 3.1.2.

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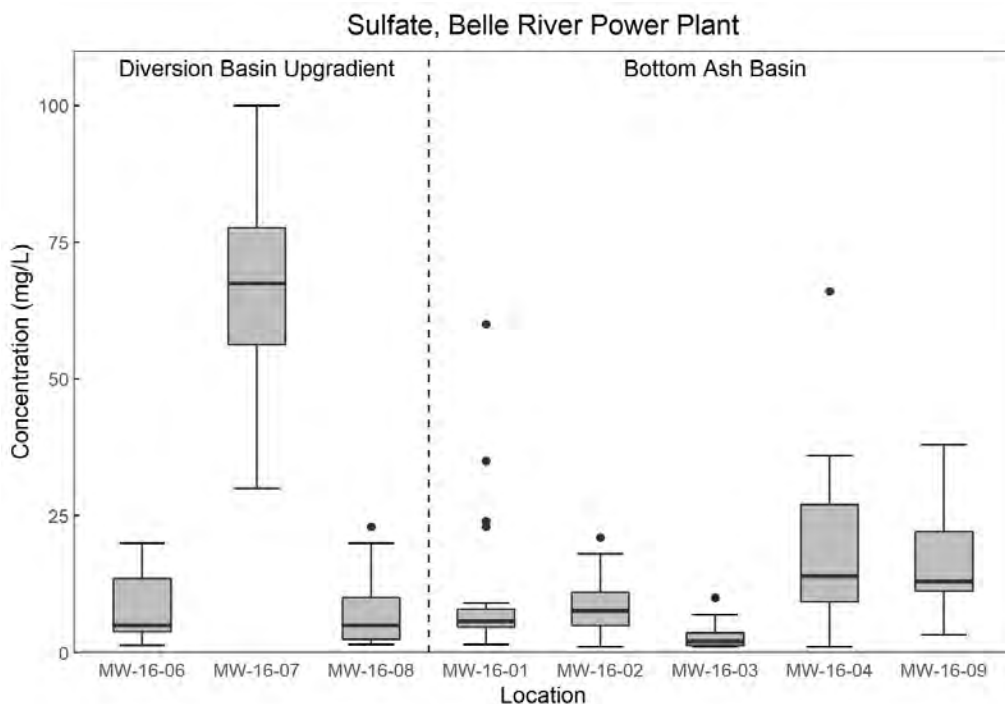
monitoring wells (i.e., MW-16-06, MW-16-07, and MW16-08) as shown in the table below.

Leftside Group	Mean Concentration		Mean C concentration	Rightside Group
DB Upgradient	27.87656	>	10.9	MW-16-01
DB Upgradient	27.87656	O	19.11905	MW-16-04
DB Upgradient	27.87656	>	11.64953	Bottom Ash Basin
MW-16-07	65.93182	>	10.9	MW-16-01
MW-16-07	65.93182	>	19.11905	MW-16-04

- O t-test does not indicate a statistically significant difference between groups
- < t-test indicates concentrations in the leftside group are significantly lower than the rightside group
- > t-test indicates concentrations in the leftside group are significantly higher than the rightside group

t-tests run using Welch's t-test methods at 98% two-tailed confidence

In addition, the BABs sulfate concentrations are well below the highest background concentrations observed in the DB upgradient wells, as shown in the box plot below. This provides further evidence that substantiates the natural occurrence of sulfate concentrations at the BABs wells as they are well below the site-wide upgradient maximum background concentrations observed at monitoring wells located at the BRPP site.



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Further, as discussed above, more than 80 feet of native low hydraulic conductivity clay separates the BABs from the uppermost aquifer. Therefore, it would take far longer than the time that the BABs have been active (over 1,000 years) for any potential leak to migrate to the uppermost aquifer. This is supported by the information included in the Application, in the PALD (Attachment A), in the final ALD (Attachment B) and in the Aquifer Characterization Study (Attachment C) that support that the low hydraulic conductivity soils are an effective glacially-compacted natural clay liner system and that the uppermost aquifer is not in communication with the BABs CCR unit and the uppermost aquifer has not been affected by CCR management at the facility.

#### **e. The Monitoring Status is Adequate**

The data provided to EPA in the Applications, and the additional clarifications in this letter and the documentation provided in the ALDs and Aquifer Characterization Studies, continue to confirm that the clay is laterally continuous across the base of the BABs and DB, the uppermost aquifer is hydraulically separated from the BABs and DB, and that the aquifer remains unaffected by CCR operations. DTE has unequivocally demonstrated that the BABs and DB remains in detection monitoring and that the presence of Appendix III parameters in groundwater in the uppermost aquifer are geogenic. It is also recognized, and has been further explained above, that significant spatial variability is observed for most of the Appendix III parameters. The presence and distribution of these Appendix III constituents are attributable to variations in natural conditions that influence groundwater chemistry across the uppermost aquifer, which contributes to the variability in concentrations such as chloride and boron from well to well. The Unified Guidance is very clear that interwell methods are invalidated due to significant spatial variability, in addition to extremely slow horizontal groundwater flow rates and/or lack of definable flow path that make it impossible to compare upgradient to downgradient concentrations for compliance. It has been demonstrated that the SSIs for TDS at MW-16-01 and sulfate at MW-16-04 that prompted the ASD performed in August 2019 are not indicative of release from the BABs to the uppermost aquifer. Additional characterization studies continue to demonstrate that the uppermost aquifer beneath the BABs is unaffected by CCR management at

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the facility. Further, there have been no SSIs recorded at the DB. Therefore, as clarified and further demonstrated above, the site data and compliance records show that the BABs and DB remains appropriately in detection monitoring.

EPA presented a hypothetical and erroneous statistical analysis in the Proposed Decision<sup>61</sup> that inaccurately alleges the DB is leaking. While EPA did not provide sufficient support for DTE to perform a comprehensive review, it appears that EPA's hypothetical statistical analyses are not valid in the context of the site-specific hydrogeological conditions that are observed at the BABs and DB. The details of these hydrogeological conditions and how they have shaped the monitoring network design and statistical analysis program are presented in detail in the Application and have been further clarified above throughout this letter. Although the EPA's analysis was misleading, no SSIs were identified, yet EPA goes on to speculate that sulfate at MW-16-10 is indicative of leakage from the DB, despite no SSIs being found.<sup>62</sup> This is another example of how EPA's review of the Applications selectively uses methods that conflict with their own guidance and the data provided to them in the Application. In this case, they generated misleading statistical analyses based on an exaggeration and misrepresentation of the data taken out of context that, even when those analyses indicate compliance was met (i.e., no SSIs compared to "background"), EPA somehow concluded that compliance was not met. In doing so, EPA has shown that it is not possible to comply with the standards of 40 C.F.R. §§ 257.93-257.94 and the Part B rule, in any scenario. DTE has demonstrated compliance with the CCR rule and has done so in good faith with qualified professional experience that aligns with industry standards. EPA's Proposed Decision contradicts their own statement that, "the determination will be prospective only; accordingly, for purposes of the ALD process, EPA is only interested in the state of a facility's current compliance rather than any instances of historic non-compliance."<sup>63</sup> As further demonstrated above, DTE's Applications provided the necessary information required under 40 C.F.R. §

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<sup>61</sup> Proposed Decision, p. 35.

<sup>62</sup> Proposed Decision, p. 40-41.

<sup>63</sup> Part B Preamble at 72514.

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257.71(d)(1)(i)(B)(2) that demonstrate compliance with of 40 C.F.R. §§ 257.93-257.94 and that both units appropriately remain in detection monitoring.

**C. Documentation of Unstable Areas is Sufficient Pursuant to 40 C.F.R § 257.64**

DTE previously documented that the BABs and DB are in stable area(s) and meet the requirements of 40 C.F.R. § 257.64 as described in the Appendix J of the Application and provides further clarification below in this section. Based on review of the Proposed Decision, there are conflicting statements from EPA regarding the documentation of unstable areas pursuant to 40 C.F.R § 257.64. In the Proposed Decision, EPA states: “The location restriction report refers to geotechnical explorations that identified more than 130 feet (for the DB) and 90 feet (for the BABs) thick clay with silt and sand lenses over soft to very hard shale bedrock, which can be confirmed by boring logs and cross-sections. The report does not sufficiently discuss the settling potential of the thick clays underlying the unit. ***However, because the impoundment is unlined, the differential settlement is unlikely to cause any major issues to the impoundment integrity*** [emphasis added]. Based on this review, EPA is proposing to conclude that the DB and BABs do not meet the location restriction in 40 C.F.R. § 257.64<sup>64</sup> for unstable areas. The bolded statement above suggests that EPA agrees with DTE’s conclusion that the impoundments are stable. There were separate reports prepared by TRC and included as Appendix J in the Applications that demonstrate that the BABs and the DB CCR units are not constructed in unstable areas and meet the location restriction criteria of 40 C.F.R. § 257.64. However, only one report is referenced by EPA in the above statement, so it is not entirely clear which report or which CCR unit requires more clarification.

Regardless, of this noted discrepancy, when determining whether an area is unstable, at a minimum the three factors discussed below must be considered pursuant to 40 C.F.R. § 257.64. As such, the following discussion is provided to document that the BABs and DB, underlain by a substantially thick laterally-continuous glacially-compacted clay, are in stable area(s) and meet the requirements of 40 C.F.R. § 257.64:

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<sup>64</sup> Proposed Decision, p. 44.

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- **On-site or local soil conditions that may result in significant differential**

**settling:** As the BABs and DB are incised, additional pressures have not been placed on the native soils. When soil is excavated for a foundation, there is a reduction of stress (load) at the founding level. However, with the reduced load, the founding soil does not “rebound”. When the new foundation load is applied, settlement will not occur unless more load is added than was removed. The additional foundation load could bring the founding level up to its original stress condition and if the additional foundation load is greater than the original stress condition, settlement could occur, whether differential or uniform. The DB and BABs were constructed by excavating approximately 12 ft of clay soil to reach the foundation bottom grade. With a typical soil unit weight of 120 pounds per cubic foot (pcf), this represents the reduction of stress/load of 1,200 pcf. The soil conditions at these foundation depths and below are uniform as shown in the boring logs included in Appendices B and K in the Applications and Appendices B through E in the PALDs and final ALDs. Therefore, even if sufficient load were applied to cause settlement, differential settlement will not occur because the soil conditions are consistent across the CCR units.

The native soils are made up of soft to medium stiff clays to a depth of approximately 40 feet followed by medium to very stiff clays with sand inclusions. Excavations would have occurred into the unconsolidated clays to construct the basin. Bottom ash material and leachate (or water) would produce less pressure (lower effective stress) than what was formerly naturally occurring above the in-situ soils at depth, therefore, significant settlement is not anticipated.

- **On-site or local geologic or geomorphologic features:** No evidence of karst features or unstable bedrock was observed in the multiple geotechnical and environmental investigations undertaken historically at this site, most recently in December 2020 (see November 2021 BABs and DB PALDs). Voids were not observed or logged in the geotechnical investigations or during well installation around the basins, and bedrock was not observed until a depth of ~140 ft bgs. Additionally, as shown below in the FEMA-developed seismic design map, there is a very low seismic hazard for the site given that the assigned earthquake hazard seismic design category is white (or

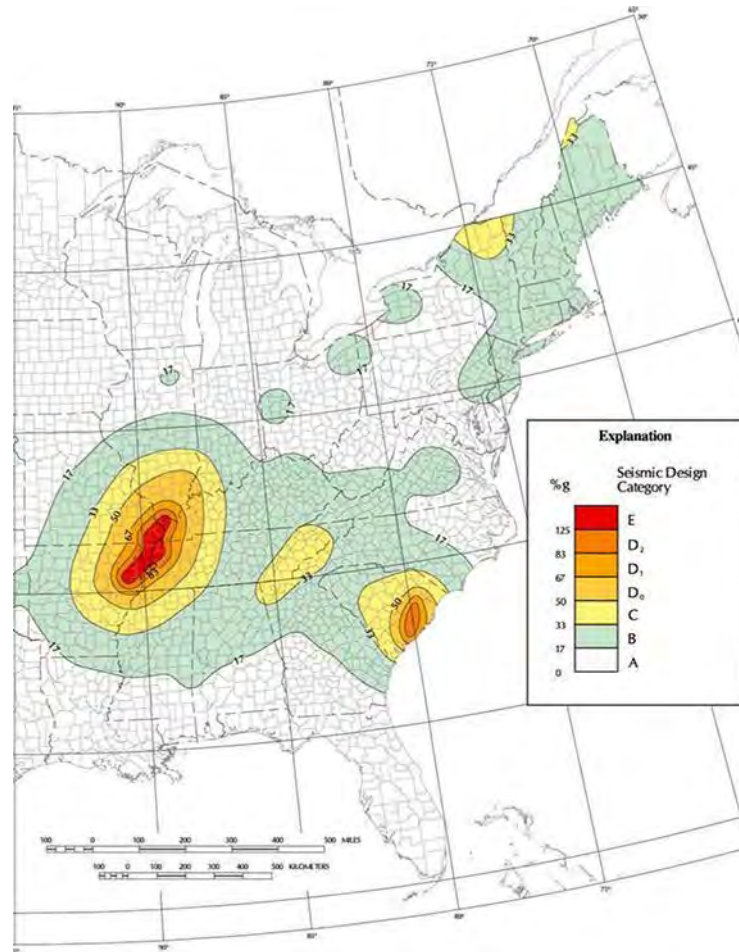
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“A”) which exhibits a “very small probability of experiencing damaging earthquake effects”.<sup>65</sup>



- **On-site or local human-made features or events (both surface and subsurface):**

No historical human-made features, structures, or events have taken place at the site that would suggest instability. The BABs and DB are relatively isolated on site with no significant structures located adjacent to the BABs or the DB that could alter the conditions of the basins.

<sup>65</sup> [https://www.fema.gov/sites/default/files/2020-07/fema\\_hazard\\_maps\\_eastern-map\\_graphic.jpg](https://www.fema.gov/sites/default/files/2020-07/fema_hazard_maps_eastern-map_graphic.jpg)



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The information provided in the Applications, and the above further clarifications, show that the BABs and DB are located in stable area(s) and meet the requirements of 40 C.F.R. § 257.64.

**D. DTE Has Provided Documentation of the Necessary Soil Characteristics and Engineering Quality to Perform the Demonstration**

The Application was prepared to meet the requirement of the Rule and was viewed as an application to get to the next step to perform the rigorous demonstration, assuming that, like a typical application process, there would be some back-and-forth communication and any questions EPA had from review of the application would be addressed through the demonstration. Several comments in the Proposed Decision refer to missing or inadequate information that prevented EPA from being able to make a determination (therefore used as a basis for denial). However, many of those items were part of step 2 of the Part B process (to be completed during the rigorous field testing in the demonstration) or were succinctly included in the application to satisfy EPA's request in the Part B Preamble to keep the applications concise.<sup>66</sup> The November 2020 PALDs (for both BAB and DB) were updated and finalized following the two-year compatibility testing and is included as the April 2022 ALD (for both BAB and DB) and included as Attachment B.

EPA stated in its Proposed Decision that DTE failed to demonstrate that the BABs and DB CCR units have a liner that is of good quality and in line with proven and accepted engineering practices, as required by 40 C.F.R. § 257.71(d)(1)(i)(C). 40 C.F.R. § 257.71(d)(1)(i)(C), states that "Documentation of the design specifications for any engineered liner components, as well as all data and analyses the owner or operator of the CCR surface impoundment relied on when determining that the materials are suitable for use and that the construction of the liner is of good quality and in-line with proven and accepted engineering practices."

A significant amount of data was collected on the physical properties of the soil before the BABs and DB were constructed and more was collected later as part of the monitoring well network installation that was referenced and included in the Application as Appendices A, B and K (including the Bechtel 1976 Subsurface Investigation and Foundation Report for Belle

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<sup>66</sup> Preamble at 72514.

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River Units 1&2, the TRC October 2017 Groundwater Monitoring Systems Summary Reports (BABs and DB) and the TRC December 2018 Natural Clay Liner Equivalency Evaluation Report). This included presenting that the glacially-compacted natural clay liner system is at least 80 feet thick and has a hydraulic conductivity ranging from  $2.1 \times 10^{-8}$  cm/s to  $2.9 \times 10^{-8}$  cm/s based on the dataset provided in the Applications. A significant amount of additional data was collected on the physical properties of the soil and was presented within the PALDs that were submitted to EPA on November 30, 2021 (Attachment A of this letter), more than a year before EPA rendered the Proposed Decision. The BABs and DB PALDs have been updated by Geosyntec to include additional hydraulic conductivity data from samples that were very slow in moving to termination criteria due to the low hydraulic conductivity and are attached as part of this comment package (Attachment B of this letter).

The BABs and DB preliminary PALDs and final ALDs demonstrate that the low permeability natural clay soils underlying the BRPP BABs and DB are consistently present across the units and have a thickness and sufficiently low hydraulic conductivity to prevent groundwater contamination throughout the active life of the unit<sup>67</sup>. Lab testing performed in accordance with the requirements of 40 C.F.R. § 257.71(d) had hydraulic conductivities ranging from  $4.4 \times 10^{-9}$  cm/s to  $2.1 \times 10^{-8}$  (similar to or lower than measured in previous testing). This range of hydraulic conductivity of the natural clay liner is well below the threshold to be considered for an ALD as EPA states, “[r]egardless, a conductivity of  $1 \times 10^{-7}$  cm/s for the lowermost soil component of the liner, whether in isolation or beneath a geomembrane component, remains the absolute floor for any unit to even be considered for an alternate liner demonstration.”<sup>68</sup>

In the Part B preamble, EPA recognizes that natural clay-rich soils are capable of achieving the required effective hydraulic conductivities lower than  $1 \times 10^{-8}$  cm/s and/or on a case-by-case basis may exhibit an adequate thickness of low-conductivity soil that supports having somewhat higher soil conductivities throughout or in a portion of the soil column. As stated in the Part B preamble, “EPA identified risks slightly above the relevant risk criteria only for lithium, one of the most mobile CCR constituents. Based on these model results,

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<sup>67</sup> BABs and DB November 2021 PALDs, Page 3-3

<sup>68</sup> Part B Preamble at 72509

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an effective hydraulic conductivity of  $1 \times 10^{-8}$  cm/s would be sufficient to reduce identified risks to below levels of concern on a national scale. However, **conditions present at individual facilities, such as the thickness of the low-conductivity soil** or the presence of a geomembrane liner, **might support somewhat higher soil conductivities on a case-by-case basis [emphasis added].**<sup>69</sup> In the case of the BRPP BABs and DB, the minimum clay thickness is at least 82 feet (below BABs) and 120 feet (below DB) of laterally contiguous clay, at least 26x the minimum design standard thickness of 3 feet for clay-lined units outlined in the 2015 CCR Rule.

Therefore, based on the above factors the BABs and DB CCR units have documentation of necessary soil characteristics and engineering quality to perform the ALDs and, in fact, with the ALDs already having been completed, meet the requirements of 40 C.F.R. § 257.71(d). This is based on the construction of the BABs and DB CCR units and surrounding site conditions, that there is no reasonable probability that continued operation of the BABs and DB surface impoundments will result in adverse effects to human health or the environment.

In addition to the comprehensive information provided in the Application and summarized above, the following additional lines of evidence generated as part of completing the ALD supports that the glacially-compacted natural clay liner system beneath the BABs and DB exceed the minimum standards of the Part B rule.

### **1. Good Quality Liner Materials and Construction**

The field investigations from the 1970s, 2016, and 2020 demonstrate that the subsurface lithology is consistent with low hydraulic conductivity clay-rich deposits with discontinuous sand seams at greater depths. Within the BABs and DB CCR units, the uppermost aquifer unit is present directly above the bedrock and appears to decrease in thickness and increase in silt content from west to east/southeast across the BABs and DB CCR units. A three-dimensional (3D) environmental visualization system (EVS) model using Earth Volumetric Studio software was used to visualize the significant amount of data (e.g. geology, geotechnical sample locations, monitoring well and well screen locations, and groundwater elevation surfaces) to visualize the extent of the

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<sup>69</sup> Preamble at 72509.

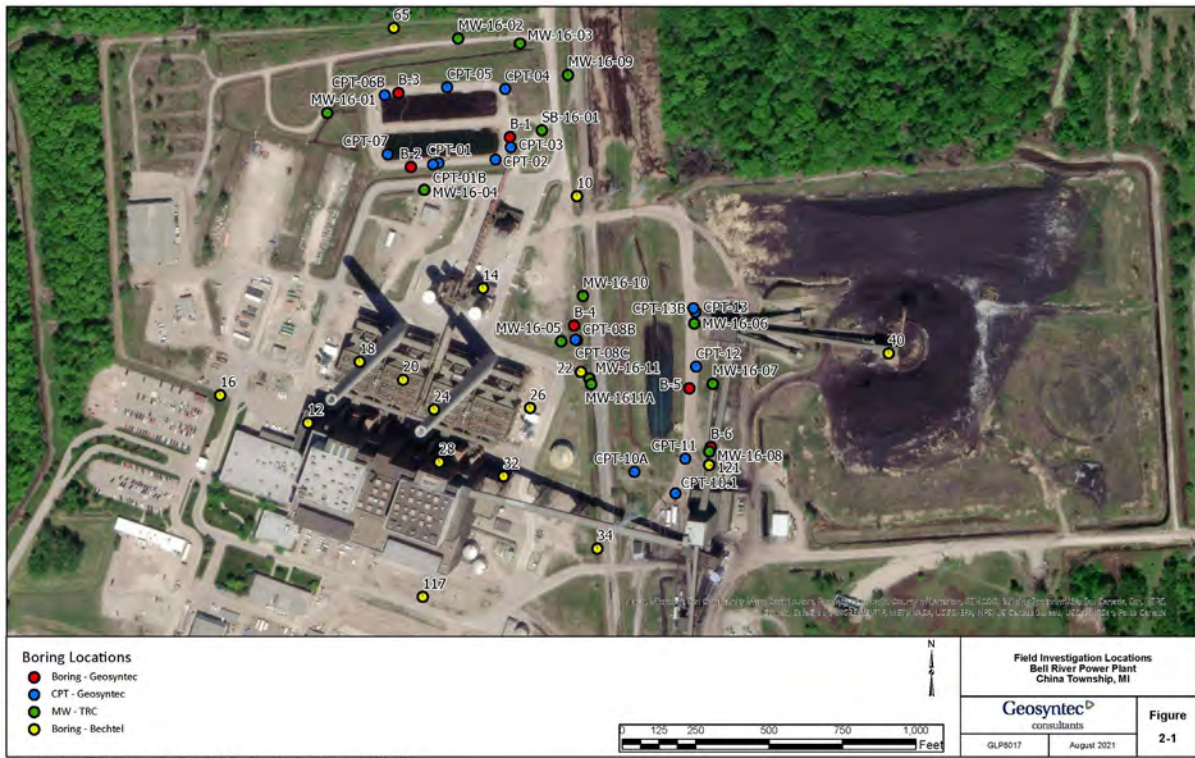
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ponded water along with the geology. Lithologic cross-sections were created from the EVS models and analyzed to determine the various changes in lithology across the site, visualize model inputs, and estimate thicknesses of geologic layers.



#### *i. BAB CCR Unit Summary:*

Specific to the BABs, an EVS model was created and analyzed to determine the various changes in lithology within the clay confining unit directly underlying the BABs and the characteristics of the uppermost aquifer which sits directly above the bedrock. Upon review of the transects, the lithology beneath the BABs consists of (from the ground surface down) clay, clay with sand, uppermost aquifer, and shale bedrock. These units are consistent with historical reports and the Application. Based on Cone Penetrometer Test (CPT) and geotechnical index testing during the 2020 ALD investigation, the lithology directly underlying the BABs consists of the following:

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- Clay – 50 to 60 ft thick directly beneath the BABs. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered an aquifer unit.
- Clay with sand – This unit was encountered at approximately 50 to 60 ft bgs. With increasing thickness from west to east. At the west end of the BABs, this unit is approximately 40 ft thick and increases in thickness to 80 ft thick at the eastern edge of the BABs. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 1-ft in thickness and have hydraulic conductivity values greater than  $1.0 \times 10^{-7}$  cm/s except for one location which is discussed in more detail below. The data supports that none of the sand seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.
- Uppermost Aquifer Unit – This unit was encountered at approximately 90 ft bgs in the west and increases in depth to 140 ft bgs in the east. The thickness of the unit corresponds to the overlying unit and thins from west to east and directly overlies the shale bedrock. The thickness changes from approximately 50 ft thick in the western edge of the BABs to 10 ft thick in the eastern/southeastern edge of the BABs. This sandy unit is saturated and considered the uppermost aquifer unit within the BABs CCR unit. There is a transition from sandy aquifer beneath the BABs CCR unit to a thin saturated silty aquifer south/southeast of the BABs. Specifically, this silty aquifer extends beneath the DB and both are considered the “uppermost aquifer unit” on the cross sections and within the EVS model.
- Shale bedrock – This unit was encountered at approximately 140-150 ft bgs.

During the 2020 ALD investigation, CPT borings were completed, and PPD tests were performed at CPT-01B, CPT-03, and CPT-06 to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around BABs for long-term

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breakthrough potential. Based on the review of the PPD Test data, values ranged between  $9.76 \times 10^{-9}$  cm/s and  $2.81 \times 10^{-6}$  cm/s. The CPT-derived highest hydraulic conductivity value of  $2.81 \times 10^{-6}$  cm/s was calculated at CPT-03 from a sand seam at 510 ft above mean sea level (AMSL) (approximately 80 ft bgs) within the clay with sand unit. PPD tests at CPT-03 directly above and below the sand seam indicated hydraulic conductivities less than  $1.0 \times 10^{-7}$  cm/s. Therefore, the (1) clay and clay with sand lithologies beneath the BABs have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with the 2018 Natural Clay Liner Equivalency Evaluation Report (Appendix A in the Application).

The EPA stated that the Application did not provide field data to demonstrate whether "...secondary porosity may be the primary driver of subsurface flow" and "...without field measurements to confirm reported laboratory measurements, there remains considerable uncertainty whether any existing or additional laboratory data collected in support of the demonstration is representative of actual liner performance."<sup>70</sup> However, it is the alternate liner demonstration (step 2), not the application (step 1) that is intended to prove the clay material can be considered suitable for use.<sup>71</sup> In addition, horizontal hydraulic conductivity was measured in over 28 pore pressure dissipation tests (PPDs) in the CPTs conducted for the alternate liner demonstration investigation and included in the PALD and final ALD. The results indicate that the horizontal hydraulic conductivities calculated from the PPDs exhibit similar results as vertical hydraulic conductivities, with consideration of secondary porosity, and is not a preferential transport mechanism.

Below the clay with sand is the uppermost aquifer unit that mainly consists of sand. This unit directly overlies the Bedford shale and decreases in thickness from west to south/southeast across the BABs. In the western portion of the BABs, the uppermost aquifer unit is approximately 50 ft thick (near MW-16-01) and thins to approximately 10 ft thick to the southeast. Beyond the BABs CCR

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<sup>70</sup> Proposed Decision, p. 49.

<sup>71</sup> See 40 C.F.R. § 257.71 (d)(1)(ii)(A).

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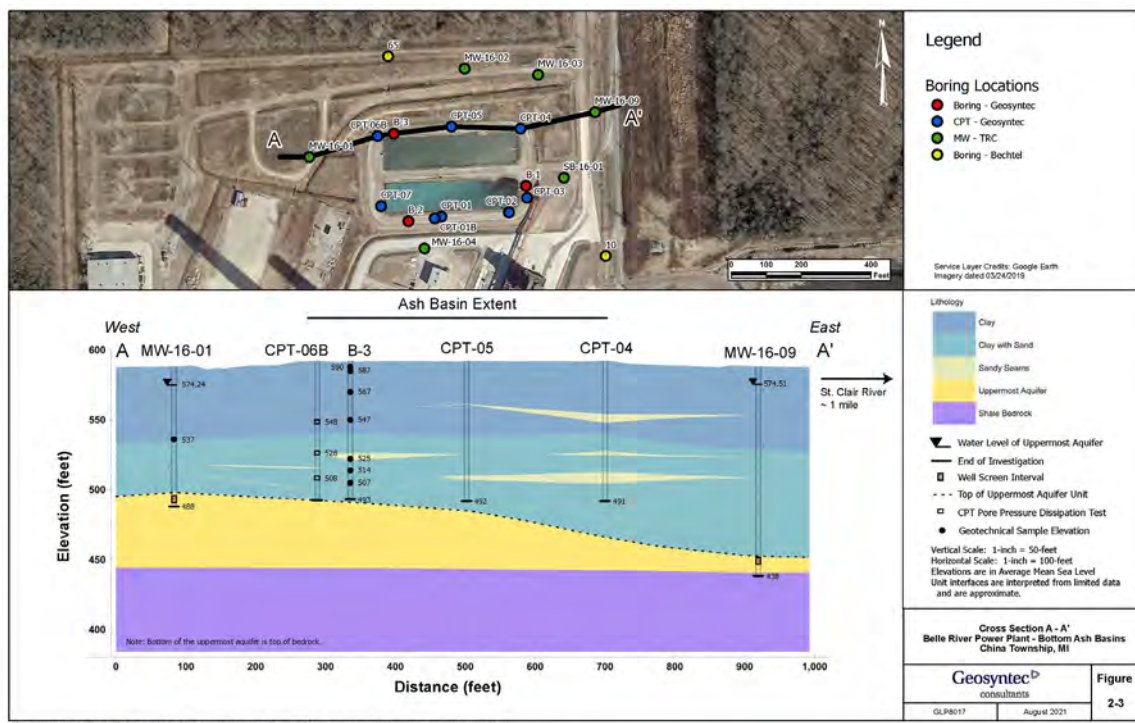
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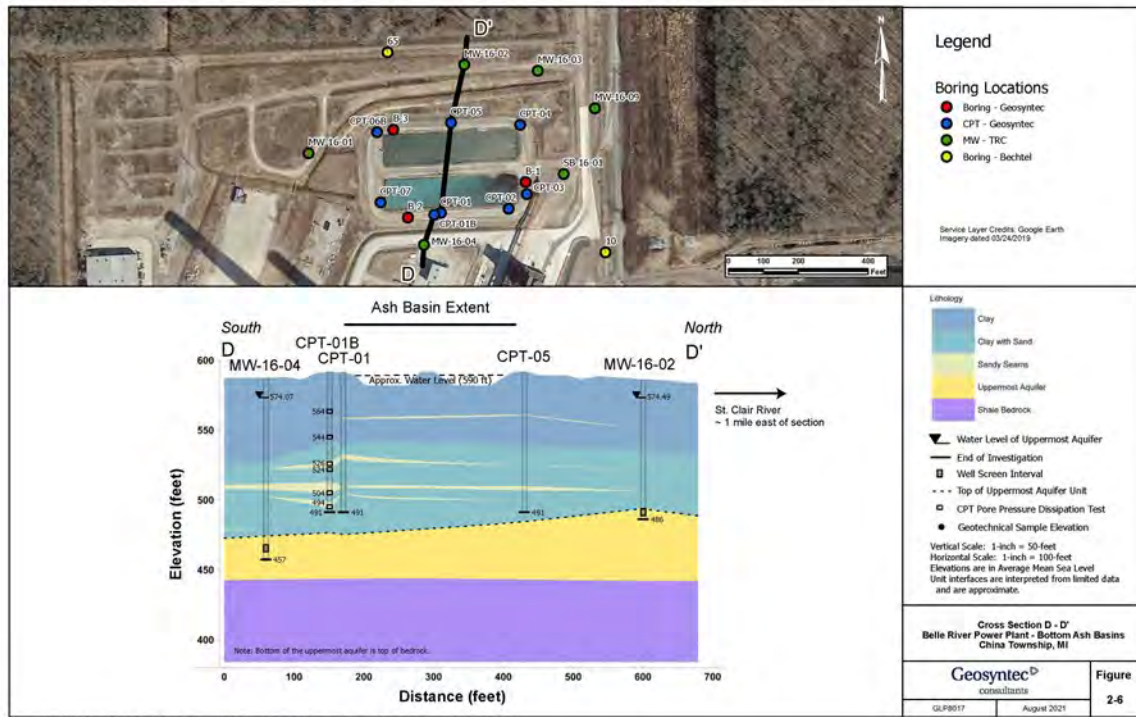
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unit, the EVS model predicts this unit extending to the DB with increasing fines/silts. The hydraulic head in the uppermost aquifer unit associated with the BABs is approximately 574 ft AMSL with an almost flat horizontal gradient.

The bottom of the BABs is at an elevation of approximately 580 ft and the bottom of the clay underlying the BABs is at an elevation of approximately 500 ft (western portion), thus more than 80 ft of low hydraulic conductivity clay-rich deposits (clay and clay with sand) separate the bottom of the BABs from the underlying uppermost aquifer unit. Cross-sections were created from the EVS model and analyzed to determine the various changes in lithology across the site, visualize model inputs, and estimate thicknesses of geologic layers, as shown below and in Attachments A and B.



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ii. DB CCR Unit Summary:

The lithology beneath the DB consists of (from the ground surface down) clay, clay with sand, uppermost aquifer unit, and shale bedrock. These units are consistent with historical reports and data presented in the Application. Based on CPT and geotechnical index testing during the 2020 ALD investigation, the lithology directly underlying the DB consists of the following:

- o Clay – 35 to 40 ft thick directly beneath the DB. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered an aquifer unit.
- o Clay with sand – This unit was encountered at approximately 35 to 40 ft bgs with a thickness of approximately 80 to 90 ft. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 2 ft in thickness and have hydraulic conductivity values less than  $1.0 \times 10^{-7}$  cm/s except for one location which is discussed in more detail below. The data supports that none of the sand



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seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.

- Uppermost Aquifer Unit –This unit was encountered at approximately 130 to 145 ft bgs. The thickness of the unit is relatively consistent at 3 to 5-ft thick and directly sits atop the bedrock. This silty unit is saturated and considered the uppermost aquifer unit within the DB. There is a transition from the silty aquifer beneath the DB to a thicker sandy aquifer beneath the BABs located to the north/northwest of the DB. Both are considered the “uppermost aquifer unit” on the cross sections and within the EVS model.
- Shale bedrock – This unit was encountered at approximately 135-150 ft bgs.

During the 2020 ALD investigation, CPT borings were conducted and PPD tests were performed at CPT-08B, CPT-08C, CPT-11, CPT-12 and CPT-13B to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around DB for long-term breakthrough potential. Based on the review of the PPD test data, values ranged between  $7.97 \times 10^{-9}$  cm/s and  $1.63 \times 10^{-6}$  cm/s around the DB. The CPT-derived highest hydraulic conductivity value of  $1.63 \times 10^{-6}$  cm/s was calculated at CPT-13B from an isolated sand seam at 490 feet above mean sea level (ft AMSL) (approximately 100 ft bgs) within the clay with sand unit. PPD tests at CPT-13 and CPT-12 located next to CPT-13B indicated hydraulic conductivities less than  $1.0 \times 10^{-7}$  cm/s. Therefore, the clay and clay with sand lithologies beneath the DB have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with the 2018 Natural Clay Liner Equivalency Evaluation Report (Appendix A in the Application).

Below the clay with sand is the uppermost aquifer unit that mainly consists of silt. This unit directly overlies the Bedford shale. Beyond the DB, the EVS model predicts this unit extending to the BABs with increasing sands. The

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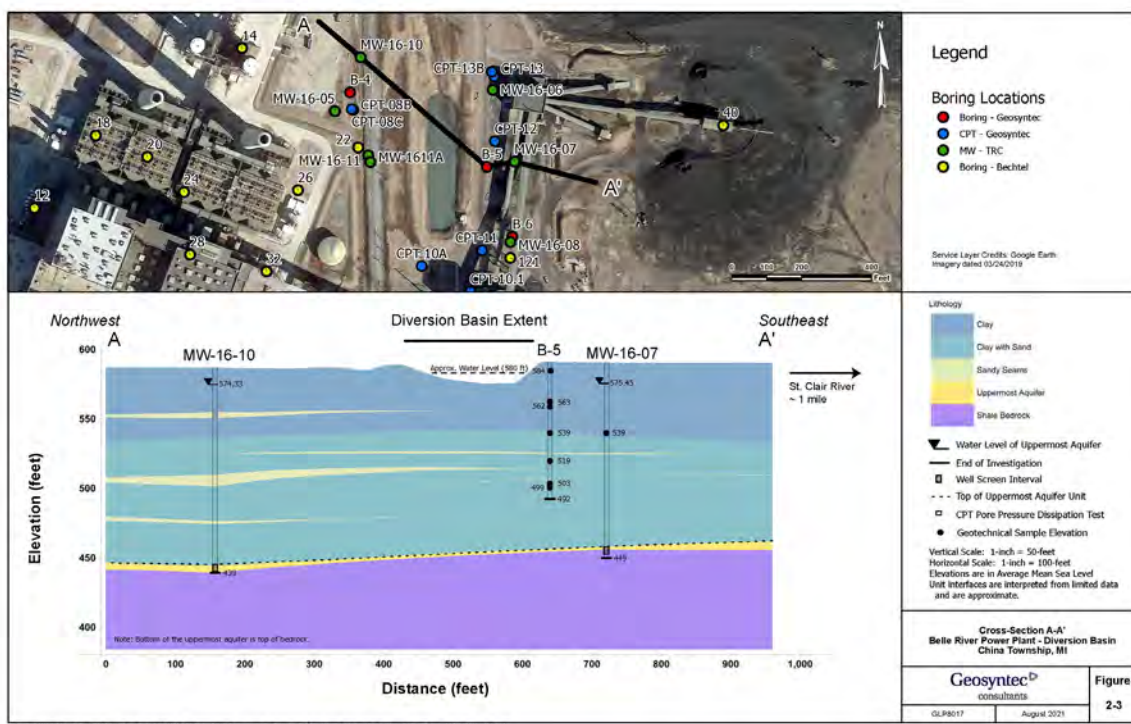
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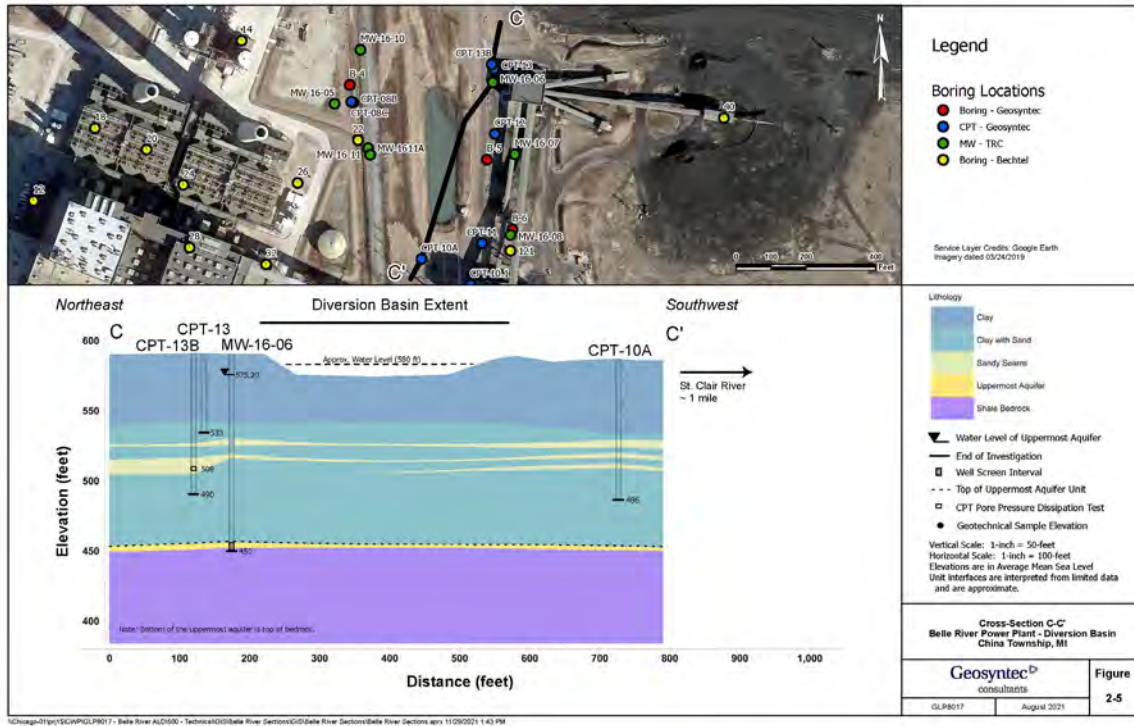
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hydraulic head in the uppermost aquifer unit associated with the DB is approximately 575 ft AMSL with a gradient to the west-northwest.

The bottom of the DB is at an elevation of approximately 576 ft AMSL and the bottom of the clay underlying the DB is at an elevation of approximately 450 ft AMSL, thus more than 120 ft of low hydraulic conductivity clay-rich deposits (clay and clay with sand) separate the bottom of the DB from the underlying uppermost aquifer unit. Cross-sections were created from the EVS model and analyzed to determine the various changes in lithology across the site, visualize model inputs, and estimate thicknesses of geologic layers, as shown below and in Attachments A and B:





## 2. Detailed Site Characterization Data Affirms the Conceptual Site Model

A host of data from three separate investigations was used to characterize the subsurface stratigraphy and soil characteristics for the BABs and DB CCR units. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, all of which are included in the Application. Data from the 2020 ALD Investigation performed by Geosyntec was used to supplement the data set. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. These investigations extend across the site and include the BABs and DB, which is approximately 400 ft southeast of the BABs. Considering the proximity of both CCR units, field investigation data is used for both the BABs and DB.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and PPDs tests at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Laboratory and

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field test results are provided in the PALD and final ALD for the 1970s, 2016, and 2020 laboratory studies, respectively.

Data from 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs were reviewed and cataloged in a database for input to the 3D EVS model as shown in the cross-sections shown above and in Attachment A and B. In total, over 500 datapoints were utilized to create the 3D EVS model.

Hydraulic conductivity compatibility testing was completed in general accordance with "*Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions*", ASTM D7100, using site-specific contact water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by EPA.

Hydraulic conductivity testing on 14 soil samples were completed using deionized water in accordance with "*Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter*", ASTM D5084, to establish baseline K measurements. Then, to further characterize the range of hydraulic conductivity values six of the samples exhibiting high and low K values were selected for compatibility testing in accordance with ASTM D7100 using site-specific water from the pond (a.k.a, "contact water"). The testing ran continuously by Excel Geotechnical Testing, Inc. located in Roswell, GA for approximately two years for each of the samples. The final hydraulic conductivities ranged from between  $4.4 \times 10^{-9}$  cm/s and  $2.1 \times 10^{-8}$  cm/s. The longevity of the testing program was driven by the termination criteria of ASTM D7100 as fully described in the final ALD. Because of the consistency of the hydraulic conductivity results over the length of test duration (over two years), the testing demonstrated the lack of impact of contact water on the clay samples. All data associated with the hydraulic testing is summarized in detail in the PALD and final ALD Reports.

As detailed in the PALD and final ALD reports, in accordance with the demonstration requirements defined in 40 CFR § 257.71(d)(1)(ii), a fate and transport model analysis was performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the BABs and DB CCR units exceeds the GWPS at the waste boundary throughout its active life. The model was run for the

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operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when operations started at the BABs and DB, to 2034, which is the end of the projected active life of the BABs and DB CCR units after which they will be closed by removal. The results of the model predict constituent of concern concentrations that are very low such that there is no reasonable probability that water from BABs and DB CCR units will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the solid waste boundary.

Therefore, as presented above, the BABs and DB CCR units have a liner that is of good quality and in line with proven and accepted engineering practices, as required by 40 C.F.R. § 257.71(d)(1)(i)(C). This is based on:

- The wealth of information provided in the Application and the additional supplemental information provided herein on the glacially-compacted natural clay liner system that demonstrate the performance of the soils underlying the BABs and DB meet the Part B requirements.
- Extensive and lengthy compatibility testing of the native clay materials will not degrade over time, further indicating its suitability as an alternate liner system.

The fate and transport modeling demonstrates that the water in the BABs and DB is not expected to reach the bedrock below the BABs and DB CCR units for more than 1,000 years, far beyond the active life of the BABs and DB CCR units of 55 years. Therefore, there is no reasonable probability that continued operation of the surface impoundment will result in adverse effects to human health or the environment even using elevated (conservative) Darcy velocities/hydraulic conductivities. Therefore, upon review of the multiple lines of evidence, the BABs and DB CCR units have a liner that is of good quality and in line with proven and accepted engineering practices, as required by 40 C.F.R. § 257.71(d)(1)(i)(C). These data were presented in the Applications and supplemented by the attached PALDs (Attachment A) and are documented in the attached final ALD Reports (Attachment B).

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## **IX. Closing**

DTE appreciates the opportunity to submit comments on the Proposed Decision and trusts that EPA will consider the science and the facts presented herein when making a final decision on the Applications. Data provided by DTE as part of the Application process, and subsequent data presented in the preliminary and final ALDs, as well as supplemental aquifer characterization clearly demonstrate that the BABs and DB CCR units have not impacted groundwater quality, the data demonstrate compliance with the CCR rule, and the natural soils underlying the site exceed the minimum requirements of the Part B rule. On this basis, DTE opposes the Proposed Decision, firmly stands behind its CCR compliance program and believes that EPA's proposed findings of noncompliance are in error and should be reconsidered in a full accounting of the record of evidence provided herein.

### **ATTACHMENTS:**

#### **Attachment A**

Geosyntec Consultants (Geosyntec). November 2021. Preliminary Alternative Liner Demonstration, Bottom Ash Basins, Belle River Power Plant, China Township, Michigan, Prepared for DTE Electric Company.

Geosyntec. November 2021. Preliminary Alternative Liner Demonstration, Diversion Basin, Belle River Power Plant, China Township, Michigan, Prepared for DTE Electric Company.

#### **Attachment B**

Geosyntec. April 2023. Final Alternative Liner Demonstration Bottom Ash Basins, Belle River Power Plant, China Township, Michigan Prepared for DTE Electric Company.

Geosyntec. April 2023. Final Alternative Liner Demonstration Bottom Ash Basins, Belle River Power Plant, China Township, Michigan Prepared for DTE Electric Company.

#### **Attachment C**

TRC. April 2023. Additional Aquifer Characterization Report – Belle River Power Plant Bottom Ash Basins CCR Unit, 4505 King Road, China Township, Michigan. Prepared for DTE Electric Company.

TRC. April 2023. Additional Aquifer Characterization Report – Belle River Power Plant Diversion Basin CCR Unit, 4505 King Road, China Township, Michigan. Prepared for DTE Electric Company.

**Attachment A**  
**Preliminary Alternative Liner**  
**Demonstration Reports**



November 30, 2021

Sent via email

Mr. Michael Regan, EPA Administrator  
United States Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Mail Code 50304-P  
Washington DC, 20460

RE: Preliminary Alternate Liner Demonstration  
DTE Electric Company Belle River Power Plant  
Bottom Ash Basins Coal Combustion Residuals Unit  
4505 King Road, China Township, Michigan

Dear Administrator Regan:

The DTE Electric Company (DTE Electric) is submitting the enclosed preliminary Alternate Liner Demonstration (ALD) to the U.S. Environmental Protection Agency (EPA) as a “place holder” and out of an abundance of caution to meet the November 30, 2021 date for submitting ALDs under the Part B rule.

As EPA has publicly acknowledged, the EPA has experienced unanticipated internal delays in reviewing and making decisions on the Part B applications that were submitted a year ago on November 30, 2020, and that this extended delay has practically eliminated the timeframe contemplated in the Part B rule for facilities to prepare their ALDs. Given this, EPA explains on their CCR Part B Implementation web page that they intend to “take actions to ensure that any facility approved to conduct a demonstration has the same amount of time anticipated by the current regulation to initiate and complete the demonstration after an approval.”

DTE Electric appreciates EPA’s commitment to take this corrective action and believes it is both necessary and appropriate. Regardless of the Agency’s internal delays DTE Electric proceeded expeditiously with the hydrogeological site characterization and laboratory study as detailed in the September 1, 2021 extension request due to analytical limitations. The extension request detailed the compatibility laboratory testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. EPA has not yet responded to the extension request.

The enclosed preliminary ALD prepared by Geosyntec using preliminary data, concludes that the low permeability natural clay soils underlying the Belle River Power Plant Bottom Ash Basins are consistently present across the basin and have sufficiently low hydraulic conductivity to prevent groundwater contamination at the solid waste boundary through the active life of the unit.



As allowed by the agency, electronic files were submitted to Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills via email. If you have any questions regarding this submittal, please contact me at 313.235.0153 or [christopher.scieszka@dteenergy.com](mailto:christopher.scieszka@dteenergy.com)

Sincerely,



Christopher Scieszka  
Project Manager, Environmental Management and Safety, DTE Energy

Enclosure

cc: Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills



*Prepared for*

**DTE Electric Company**  
One Energy Plaza  
Detroit, Michigan 48226

**PRELIMINARY ALTERNATE LINER  
DEMONSTRATION  
BOTTOM ASH BASINS**

**BELLE RIVER POWER PLANT  
East China Township, Michigan**

*Prepared by*

**Geosyntec**   
consultants

engineers | scientists | innovators

2100 Commonwealth Avenue, Suite 100  
Ann Arbor, Michigan 48105

GLP8017

November 2021

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## 1. INTRODUCTION

This report has been prepared to provide the Preliminary Alternate Liner Demonstration (ALD) of Belle River Power Plant Bottom Ash Basins (BABs), one of two coal combustion residuals (CCR) units at the site, in accordance with 40 CFR Part 257 as amended on November 20, 2020 (CCR Rule). **Figure 1-1** provides a site location.

This report concludes that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

### 1.1 Background

DTE Electric Company (DTE) submitted the Alternate Liner Demonstration Application for BABs to the United States Environmental Protection Agency (USEPA) on November 30, 2020 [1] in accordance with the CCR Rule. Soon after, DTE started the field and laboratory investigation studies to meet the requirements of the CCR Rule.

One of the requirements of the CCR rule is to conduct hydraulic conductivity testing using site-specific permeant liquid. The CCR Rule acknowledges that these tests may last long such that the operator of the CCR unit may need to submit an extension request for the laboratory testing program, and submit a preliminary ALD.

DTE submitted an extension request due to “analytical limitation” under a separate cover, dated September 1, 2021 [2]. The extension request detailed the compatibility testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. The EPA has not yet responded to the extension request.

### 1.2 Purpose

The purpose of this report is to provide ALD approach, analysis details, and present results based on available data in accordance with the CCR Rule. Although the Part B Rule does not require the submittal of a preliminary ALD by November 30, 2021 if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A), DTE is providing this preliminary ALD as a “place holder” and out of an abundance of caution and with confidence in the performance of the liner system to comply with the requirement to submit an ALD by November 30, 2021. A final ALD will be submitted in accordance with the schedule expected to be included in the forthcoming EPA decisions.

### 1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific water, and discussion of results.
- Section 4 – provides analysis approach, details, groundwater protection standards, and evaluation of results as to whether BABs meet the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification.
- Section 7 – provides references.

#### **1.4 Terms of Reference**

This report was prepared by Mike Coram C.P.G., Omer Bozok P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec.

## 2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

*§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*

*(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*

*(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*

*(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*

*(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*

*(i) Samples are advanced to a depth less than the top of the groundwater table or 20 ft beneath the bottom of the nearest water body, whichever is greater, and/or*

*(ii) Samples are spaced further apart than 200 ft around the impoundment perimeter;*

*(5) A narrative description of site geological history; and*

*(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*

*(i) The relative location of the impoundment with depth of ponded water noted;*

*(ii) Monitoring wells with screening depth noted;*

*(iii) Depiction of the location of other samples used in the development of the model;*

*(iv) The upper and lower limits of the uppermost aquifer across the site;*

*(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and*

*(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.*

## **2.1 Introduction**

This section provides information on site geology and hydrogeology, data used in site characterization, a summary of ALD-specific field and laboratory study, and a conceptual site model built using the Environmental Visualization System (EVS).

## **2.2 Site Geology**

The surficial topography of St. Clair County is characterized by a low-relief floodplain, stream terrace, and lakeshore deposits. The subsurface geology of the area is defined by glacial deposits, which range in thickness from 100 to 400 ft thick. These glacial sediments, including lacustrine, till, and sand and gravel outwash deposits, were deposited on the underlying bedrock. Throughout St. Clair County the underlying bedrock varies but is primarily fine-grained siliclastic rock, mostly shale with some sandstone [1].

The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Shallow regional groundwater flow would be expected to be to the east towards the St. Clair River. The BABs CCR Unit is located approximately one mile west of the St. Clair River.

### **2.2.1 Bottom Ash Basin Site-Specific Geology**

The geology of St. Clair County consists of approximately 100 to 400 ft of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces. The glacial material underlying the BABs appears to be glaciolacustrine clays with local sand lenses. The uppermost aquifer unit (sandy rich interval) appears to be deposits from glaciofluvial outwash deposited directly above the bedrock surface.

The BABs CCR Unit is underlain by more than 100 ft of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 140 to 150 ft below ground surface (bgs). In general, the BABs CCR unit is initially underlain by approximately 90 ft in the western portion of the BABs and 130 ft in the eastern portion of the BABs of laterally extensive low hydraulic conductivity clay-rich deposits. During Geosyntec's ALD investigation in December 2020, cone

penetration test (CPT) dissipation tests were performed to determine hydraulic conductivity of the underlying clay-rich deposits, the results of the dissipation tests are summarized in Section 2.5.1. The CPT data confirm that the underlying deposits are consistently low hydraulic conductivity units.

The uppermost aquifer unit is a confined, sand-rich interval (within the footprint of the BABs) that directly overlies the Bedford Shale. It is thicker in the western portion of the BABs and decreases to the southeast. From west to east/southeast the uppermost aquifer increases in fines from a sandy unit to a silty unit. For the purposes of this report, the saturated unit directly overlaying the Bedford Shale (sandy and silty) is considered the “uppermost aquifer unit”. It is further discussed in **Section 2.6**.

### **2.3 Uppermost Aquifer Field Testing and Hydrogeology**

TRC calculated the hydraulic conductivities within the CCR monitoring wells set within the upper portion of the uppermost aquifer using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 and 2021 by TRC. Test results are provided in **Appendix A** and included in the EVS model. The monitoring well logs and construction details are presented in **Appendix B**. As calculated by TRC, the hydraulic conductivity of the uppermost aquifer using wells at the BABs CCR Unit area is approximately 1.2 ft/day (4E-4 cm/s).

### **2.4 Summary of Data Used for Site Characterization**

A host of data from three separate investigations was used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, all of which are included in the initial ALD Application [1]. Data from the 2020 ALD Investigation performed by Geosyntec was used to augment the data set. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. **Figure 2-1** provides investigation locations.

Boring logs for the 1970s, 2016, and 2020 field investigations are provided in **Appendices C** through **E**, respectively. These investigations extend across the site and include BABs and Diversion Basin (DB), which is another CCR unit connected to BABs (~ 400 ft southeast of BABs). Considering the proximity of both CCR units, field investigation data is used for both CCR units.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and pore pressure dissipation tests (PPDs) at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and

number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices F through H** for the 1970s, 2016, and 2020 laboratory studies, respectively.

Considering the extent of existing field investigation data, it is Geosyntec's opinion that the data used in building this model is sufficient to capture the variability that may exist in soil conditions.

## **2.5 ALD-Specific Site Investigation Details**

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the embankment and native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to augment the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted generally at 200-ft intervals but adjusted in the field as necessary to avoid underground utility lines, overhead power lines, and access issues, as needed. Investigations extended down to 100 ft bgs to an elevation approximately 490 ft, which is lower than groundwater level, and 20 ft below the nearest water body that is St. Clair River with a bottom elevation of approximately 525 ft.

The following sections provide a summary of the fieldwork completed during the SI.

### **2.5.1 Cone Penetrometer Tests**

Eight CPTs were completed around the berms of the BABs in 200 ft intervals to characterize the BABs embankment and native soils. Similarly, seven CPTs were completed around DB. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or to approximately 100 ft bgs. Pore pressure dissipation tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted near the sonic borings and at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 16 dissipation tests were completed at CPTs advanced around BABs, and 12 dissipation tests were completed at CPTs advanced around DB. Hydraulic conductivity values were estimated to range between 9.76E-9 cm/s and 2.81E-6 cm/s around BABs, and range between 7.97E-9 cm/s and 1.63E-6 cm/s around DB. Hydraulic conductivity values are similar between soils underlying BABs and DB. Results are summarized in **Table 2-2**. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1]. CPT logs are provided in **Appendix I1**, and PPD tests are provided in **Appendix I2**.

### **2.5.2 Sonic Drilling**

In December 2020, six soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples

for characterization of native soils and the embankment. Soil samples were collected continuously in two to ten-foot sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS). Shelby tubes were collected from the BABs embankment soils, and native soils at approximately 20 ft intervals from each of the sonic borings in accordance with ASTM D1587<sup>1</sup>. The soil borings were advanced to depths of approximately 100 ft-bgs to within the first encountered uppermost aquifer and/or into the top of the underlying shale bedrock. Sonic drilling locations are provided in **Figure 2-1**. Boring logs are provided in **Appendix E**. Soil stratigraphy is discussed in Section 2.6.

### 2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. Fourteen soil samples were collected from six borings for hydraulic conductivity testing from depths between five ft and 90 ft to capture soil conditions ranging from soft to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 24 Moisture Content tests (ASTM D2216)
- 4 Specific Gravity tests (ASTM D854)
- 22 Grain Size Mechanical Sieve tests (ASTM D6913)
- 21 Atterberg Limits tests (ASTM D4318)

Note that these tests quantities are included in **Table 2-1**. Test results are provided in **Appendix H**.

## 2.6 Conceptual Site Model

An EVS model was developed for the site based on data collected during the field investigations from the 1970s, 2016, and 2020. The EVS model centralized all the data to develop a comprehensive Conceptual Site Model (CMS). Based on the EVS model, the overall CMS of the Site lithology is relatively consistent with a low hydraulic conductivity clay-rich deposits with non-interconnected sand seams at deeper depths. Within the BABs CCR unit, the uppermost

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<sup>1</sup> ASTM D1587 – Standard Practice for Thin-walled Tube Sampling for Fine-grained Soils.

aquifer unit sits directly above the bedrock and appears to thin and increase in silt from west to east/southeast across the BABs CCR unit.

Specific to the BABs CCR unit, Cross-sections (**Figures 2-2 through 2-7**) were created from the EVS model and analyzed to determine the various changes in lithology within the clay confining unit directly underlying the BABs and the characteristics of the upper aquifer unit which sits directly on the bedrock. Upon review of the transects, the lithology beneath the BABs consists of (from the ground surface down) (1) clay, (2) clay with sand, (3) uppermost aquifer unit, and (4) shale bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]. There were some discrepancies, in that the second clay unit was described as silty instead of sandy. Based on CPT and geotechnical index testing during Geosyntec's 2020 ALD investigation, the lower clay was re-interpreted as "clay with sand" mainly due to sand seams that were encountered. The clay within the "clay with sand" unit is relatively consistent stiff gray clay. Therefore, the lithology directly underlying the BABs consist of the following:

- (1) Clay – 50 to 60 ft thick directly beneath the BABs. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered aquifer unit.
- (2) Clay with sand – This unit was encountered at approximately 50 to 60 ft bgs. Increasing thickness from west to east. At the west end of the BABs, this unit is approximately 40 ft thick and increases in thickness to 80 ft thick at the eastern edge of the BABs. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 1 foot in thickness and have hydraulic conductivity values greater than  $1 \text{ E-7 cm/s}$  except for one location which is discussed in more detail below. The data supports that none of the sand seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.
- (3) Uppermost Aquifer Unit –This unit was encountered at approximately 90 ft bgs in the west and increases in depth to 140 ft bgs to the east. The thickness of the unit corresponds to the overlying unit and thins from west to east and directly sits atop the bedrock. The thickness changes from approximately 50 ft thick in the western edge of the BABs to ten ft thick in the eastern/southeastern edge of the BABs. This sandy unit is saturated and considered the uppermost aquifer unit within the BABs CCR unit. There is a transition from sandy aquifer beneath the BABs CCR unit to a thin saturated silty aquifer south/southeast of the BABs. Specifically, this silty aquifer extends beneath the DB and both are considered the "uppermost aquifer unit" on the cross sections and within the EVS model.



- (4) Shale bedrock – This unit was encountered at approximately 140-150 ft bgs.

During Geosyntec's 2020 investigation, CPT tests were conducted, and dissipation tests were completed at CPT-01B, CPT-03, and CPT-06 to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around BABs for long-term breakthrough potential and is further discussed in Section 3. Based on the review of the CPT dissipation data (as discussed in Section 2.5.1 and Section 3), values ranged from  $9.76\text{E-}9$  cm/s to  $2.81\text{E-}6$  cm/s. The CPT-derived highest hydraulic conductivity value of  $2.81\text{E-}6$  cm/s was calculated at CPT-03 from a sand seam at 510 ft AMSL (approximately 80 ft bgs) within the (2) clay with sand unit. Dissipation tests at CPT-03 directly above and below the sand seam indicated hydraulic conductivities less than  $1\text{E-}7$  cm/s. Therefore, the (1) clay and (2) clay with sand lithologies beneath the BABs have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

Below the clay with sand is the uppermost aquifer unit that mainly consists of sand. This unit directly overlies the Bedford shale and decreases in thickness from west to south/southeast across the BABs. In the western portion of the BABs, the uppermost aquifer unit is approximately 50 ft thick (near MW-16-01) and thins to approximately 10 ft thick to the southeast. Beyond the BABs CCR unit, the EVS model predicts this unit extending to the DB CCR unit with increasing fines/silts. The hydraulic head in the (3) uppermost aquifer unit associated with the BABs is approximately 574 ft AMSL (TRC 2018a) with an almost flat horizontal gradient.

The bottom of the BABs is at an elevation of approximately 580 ft and the bottom of the clay underlying the BABs is at an elevation of approximately 500 ft (western portion), thus more than 80 ft of low hydraulic conductivity clay-rich deposits ((1) clay and (2) clay with sand) separate the bottom of the BABs CCR unit from the underlying (3) uppermost aquifer unit.

### 3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

*§257.71(d)(ii)(B) Potential for infiltration. A characterization of the potential for infiltration through any soil-based liner components and/or naturally occurring soil that control release and transport of leachate. All samples collected in the field for measurement of saturated hydraulic conductivity must be sent to a certified laboratory for analysis under controlled conditions and analyzed using recognized and generally accepted methodology. Facilities must document how the selected method is designed to simulate on-site conditions. The owner or operator must also provide documentation of the following as part of this line of evidence:*

- (1) The location, number, depth, and spacing of samples relied upon is supported by the data collected in paragraph (d)(1)(ii)(A) of this section and is sufficient to capture the variability of saturated hydraulic conductivity for the soil-based liner components and/or naturally occurring soil;*
- (2) The liquid used to pre-hydrate the samples and measure long-term hydraulic conductivity reflects the pH and major ion composition of the CCR surface impoundment porewater;*
- (3) That samples intended to represent the hydraulic conductivity of naturally occurring soils (i.e., not mechanically compacted) are handled in a manner that will ensure the macrostructure of the soil is not disturbed during collection, transport, or analysis; and*
- (4) Any test for hydraulic conductivity relied upon includes, in addition to other relevant termination criteria specified by the method, criteria that equilibrium has been achieved between the inflow and outflow, within acceptable tolerance limits, for both electrical conductivity and pH.*

#### 3.1 Soil Sample and Site-Specific Water Details

##### 3.1.1 Soil Samples for Hydraulic Conductivity Testing

Fourteen soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs, earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in natural soils.

##### 3.1.2 Site-Specific Water Testing and Results

Site-specific CCR porewater samples were collected from both BABs and the DB for geochemical analyses to determine the representative composition of an “aggressive” solution for use in the

compatibility portion of the hydraulic conductivity testing. Due to the high turbidity of basin waters, samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific water samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All water samples were found to be slightly basic, with pH concentrations ranging from 7.87 to 9.01 SU. TDS concentrations of all three samples are similar, ranging from 200 to 300 mg/L. All three samples have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as “freshwater”. BABs and DB samples have similar major ion compositions, as illustrated on the Piper diagram in **Figure 3-1**. The anion composition is very similar for all three samples and consists of predominantly sulfate with some alkalinity and very little chloride. The cation composition is predominantly calcium and monovalent cations (potassium/sodium), with a smaller proportion of magnesium. The DB sample has a slightly higher relative percentage of calcium and lower monovalent cations compared to the BABs samples.

The analytical results are provided in **Appendix J** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist’s Workbench (GWB) v12.0.4. The GWB thermodynamic dataset ‘thermo.com.V8.R6\_.tdat’ was used for the calculations in order to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of milligrams per liter (mg/L) and the ionic strength of each sample was calculated in units of molality (m).

Both BABs samples contained similar ionic strength values (0.0088 and 0.0080 m) compared to the slightly higher ionic strength of the DB sample (0.0106 m). Thus, the DB sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

### **3.2 Hydraulic Conductivity Testing Procedure and Termination Criteria**

All 14 soil samples were tested for hydraulic conductivity,  $k$  using deionized water in accordance with ASTM D5084 [3] to establish a baseline  $k$  reading. Then, six of the samples exhibiting high and low  $k$  values were selected for compatibility testing in accordance with ASTM D7100 [4] using site-specific water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25. The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity determinations fall within  $\pm 25\%$  or better of the mean value for hydraulic conductivity,  $k \geq 3E-8$  cm/s or within  $\pm 50\%$  or better for  $k < 1E-8$  cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;
- At least 2 pore volumes (PV) of flow have passed through the sample; and
- pH and electrical conductivity of effluent, is within 10% of that for the influent with no significant increasing or decreasing trends

### 3.3 Hydraulic Conductivity Test Results and Assessment

Preliminary results are provided in **Appendix K** as of August 20, 2021 and summarized in **Table 3-2**. The table provides sample ID, the start date for testing, amount of flow passed through a sample for a given duration of time, hydraulic conductivity values, and projected date for completing 2 PV of flow.

In addition, a set of figures created for each sample providing insight into the progression of:

- PV of flow with time.
- hydraulic conductivity with time.
- hydraulic conductivity with PV;
- pH of inflow and outflow with time; and
- Electrical conductivity (EC) with time.

Progression of different parameters is provided from **Figure 3-2** through **3-31**.

Overall, the hydraulic conductivity,  $k$  value of samples range between  $8.2E-09$  and  $2.8E-08$  (cm/s). The amount of PV of flow that has passed through the samples ranges from 0.8 to 2.3. As of August 20, 2021, two of the samples have reached the 2 PV criteria. The remaining samples are projected to reach 2 PV March 2022; this is based on linear extrapolation between PV at known dates and assumes  $k$  stays relatively constant. Overall, the PV of flow is progressing linearly towards the 2 PV criteria. Hydraulic conductivity values are generally flat and can be considered steady.

pH values are provided in **Table 3-3**. In general, the average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.1 to 8.4. The pH of outflow is within 10 percent of inflow.

EC values are provided in **Table 3-4**. In general, the average EC of inflow ranges from 609 to 680, and the average EC of outflow ranges from 778 to 2146. The EC of outflow are not within the 10 percent of inflow; they are projected to meet the termination criterion by the end of December 2021. This date is based on the convergence of linear extrapolations of the data.

**Table 3-5** summarizes if the sample has reached the termination criterion for PV, pH, EC, and the approximate projected date for reaching the termination criteria. As summarized in the table, samples have not reached all the termination criteria; pH has achieved termination criterion, and two of the samples have reached the PV criterion; none of the samples have reached the EC criterion. Based on available data, Geosyntec expects the last sample to reach termination criteria by the end of March 23, 2022.

The results do not include inflow vs outflow data. The main reason is that the project team had decided to keep the inflow constant, which provides more stable gradient across the sample, more accurate estimation of  $k$ , faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion would be reached by the time other criteria is reached.

#### 4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

*§257.71(d)(ii) (C) Mathematical model to estimate the potential for releases. Owners or operators must incorporate the data collected for paragraphs (d)(1)(ii)(A) and (d)(1)(ii)(B) of this section into a mathematical model to calculate the potential groundwater concentrations that may result in downgradient wells as a result of the impoundment. Facilities must also, where available, incorporate the national-scale data on constituent concentrations and behavior provided by the existing risk record. Application of the model must account for the full range of site current and potential future conditions at and around the site to ensure that high-end groundwater concentrations have been effectively characterized. All the data and assumptions incorporated into the model must be documented and justified.*

*(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*

*(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*

*(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

##### 4.1 Introduction

A fate and transport model analysis have been performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the BABs exceeds the groundwater protection standards (GWPS) at the waste boundary throughout its active life.

The model considers flow of CCR pore water Constituents of Concern (COCs) migrating through the bottom of CCR unit down to the uppermost aquifer. The model does not consider additional migration of COCs horizontally to the waste management boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COCs; consequently, the model presents a conservative assessment. As discussed later in Section 4.6.1 the results of the model predicts COCs concentrations that are very low such that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

## 4.2 Groundwater Protection Standards

Groundwater samples from TRC's 2016 and 2017 sampling events were tested for Appendix IV COC and represent eight rounds of background groundwater data. The data were used to calculate site-specific background levels (Background) for Appendix IV COC. **Appendix L** provides the memorandum describing the statistical calculations.

To develop GWPS for the ALD assessment, the federal Maximum Contaminant Level (MCL), Regional Screening Levels, and Background (whichever is higher) were evaluated and the highest value was selected as the GWPS in accordance with the CCR Rule. Where MCL are not available Regional Screening Levels were used. GWPS are provided in **Table 4-1**.

## 4.3 Consideration of Background Groundwater Concentrations

The background has been considered and is a factor when determining if GWPS has been exceeded. At the BABs, naturally occurring background concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and peak groundwater background concentrations are further discussed in Section 4.6.1.

## 4.4 Leachate Quality Results

Porewater (i.e. leachate) quality samples from BABs and the DB were collected in December of 2020 and January of 2021; samples were analyzed for Appendix III and IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest leachate concentration was used as the established concentration of the constituent ( $C_o$ ) when calculating the predicted groundwater concentrations ( $PGC_i$ ), as discussed further in this Section. The leachate quality data is summarized in **Table 4-2**.

In addition to the site-specific leachate concentrations, 90<sup>th</sup> percentile concentrations from the 2014 EPA study [5] were considered in the analysis. This data is summarized in **Table 4-2**.

## 4.5 Fate and Transport Model

### 4.5.1 Analysis Model

A one-dimensional fate and transport model was designed to further understand the potential for contaminant transport from the CCR units to the uppermost aquifer. The model was developed with a contaminant transport process through the clay and clay with sand layers under the BABs. Contaminant transport processes are discussed in Section 4.5.2.1 below.

The modeling program POLLUTE [6] was selected for the one-dimensional fate and transport evaluation. The data input for POLLUTE acquires all the input parameters, performs calculations

for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

Model setup and inputs are discussed in detail in the following sections and are summarized via layers in **Figure 4-1**.

## 4.5.2 Proposed Mathematical and Associated Computer Model

### 4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the BABs for the various modeled layers include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [7]:

$$\textbf{Equation No. 1:} \quad n \frac{\delta c}{\delta t} = nD \frac{\delta^2 c}{\delta z^2} - V_{\alpha} \frac{\delta c}{\delta z} - \rho K_d \frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = Coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

K<sub>d</sub> = distribution coefficient

V<sub>α</sub> = Darcy Velocity in the vertical direction

ρ = dry density of soil

λ = decay constant of the contaminant species

t = time

POLLUTE utilizes the transport phenomena as governed by Equation No. 1

### 4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the leachate. The results from the model can thus be used as a prediction factor for estimating the future concentration of any constituent of concern in groundwater. Multiplying the output prediction factor by the initial leachate concentration provides the predicted



groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

$$\textit{Equation No. 2:} \quad \text{PGC}_t = \text{PF}_t * \text{C}_o$$

Where:

$\text{PGC}_t$  = predicted groundwater concentration after t years.

$\text{PF}_t$  = prediction factored after t years, which is the output of the model.

$\text{C}_o$  = established leachate concentration of the constituent of concern.

### 4.5.3 Fate and Transport Model Inputs

#### 4.5.3.1 *Initial Leachate or Source Concentration*

The initial leachate concentration input value used was one (1). This value is unitless because it represents unit leachate concentration of any given constituent. Therefore, the model results represent a fraction of the initial leachate concentration for any constituent.

#### 4.5.3.2 *Number of Layers and Layer Thickness*

Two layers were modeled at the site: the clay layer and the clay with sand layer. At the BABs, the clay layer has an average thickness of 40 ft; the clay with sand layer has an average thickness of 63 ft. The average thickness of each layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer, and averaging the difference over the extent of the footprint of the BABs; model documentation for the average thickness of each layer can be found in **Appendix M**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The clay layer was divided into 25 sublayers at the BABs. The clay with sand layer was divided into 40 sublayers at the BABs.

#### 4.5.3.3 *Modeling Period*

The model was run for the operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when CCR unit(s) operations started, to 2034, which is the end of the projected active life of BABs.

#### 4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters or they can be selected by the user. The default Talbot parameter were used in this demonstration [8].

#### 4.5.3.5 *Boundary Conditions*

POLLUTE allows the user to select between multiple upper and lower boundary conditions. The top boundary condition typically represents the bottom of CCR unit as a potential source. The top boundary can be specified as either zero flux, constant concentration, or finite mass. A constant concentration was assumed as it provides conservative model results since it assumes that the leachate quality will remain constant at the maximum measured values over time.

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used; thus, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the clay with sand layer and the underlying uppermost aquifer.

#### 4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model as a whole. The Darcy velocity was calculated for each basin using a vertical gradient and the vertical hydraulic conductivity of the clay with sand layer. For the BABs, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the normal water elevation as controlled by the outflow structure within the CCR surface impoundment. These parameters were chosen to produce a conservative value for the Darcy velocity. Darcy velocity value of 1.02E-3 m/year was calculated for the BABs as provided in **Appendix M**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing program vertical hydraulic conductivity data.

#### 4.5.3.7 *Hydrodynamic Dispersion Coefficient*

The vertical coefficient of hydrodynamic dispersion is a required input for each layer within the POLLUTE model. The hydrodynamic dispersion coefficient is calculated using Equation No. 3:

$$\text{Equation No. 3: } D = D^* + av$$

Where:

D = the hydrodynamic dispersion coefficient (m<sup>2</sup>/year);

- $D^*$  = the effective diffusion coefficient ( $m^2/year$ ).
- $a$  = the dispersivity (m);
- $v$  = the groundwater seepage velocity (m/year).

For this demonstration, the coefficient of hydrodynamic dispersion value ( $D$ ) of  $0.19 m^2/year$  was input into the model. This value was based on the effective diffusion coefficient ( $D^*$ ) for chloride ( $0.19 m^2/yr$ ), as calculated by Rowe et al. [9]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest, this it is a conservative constituent to model among the constituents of concern.

The second part of Equation 3,  $(av)$  is related to dispersion. Rowe et al. [9]. Discusses when the seepage velocity ( $1.02E-3 m/year$ ) is low (i.e., clay soils), diffusion will control the parameter hydrodynamic dispersion ( $D$ ) and dispersion is negligible.

#### 4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. The model shows good agreement between porosity values and geologic layers, with the overlying clay unit having lower porosities than the underlying clay with sand unit. An average of 46 percent porosity was used for the clay layer, while an average of 42 percent porosity was used for the clay with sand layer.

Based on empirical data provided by Sara (1994) [10], the laboratory porosity data was converted to effective porosities. An effective porosities values of 0.37 and 0.34 for the clay and clay with sand layers were utilized, respectively.

Density values from laboratory testing were also used to determine a suitable model input. The average dry density of  $1,500 kg/m^3$  (94.2 pcf) was assessed from the available data; this value was used in the POLLUTE model.

#### 4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of containments in the modeled layers, while degradation simulates the breakdown of contaminants over time. In this model, adsorption and degradation are assumed to be zero, which provides a more conservative model result.

## 4.6 Fate and Transport Analysis Results and Evaluation

### 4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. At the BABs, the baseline model calculated a  $PF_t$  of 2.66E-33. With both the  $C_o$  and  $PF_t$  established, the  $PGC_t$  (i.e. predicted concentration) was calculated and compared to the established GWPS for the BABs. As provided in **Table 4-2**, the predicted groundwater quality results, and the 90<sup>th</sup> percentile concentrations from the 2014 EPA study [5] are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in 2016-2017 groundwater sampling event and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Tables 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of BABs' active life.

The driving mechanism for the transport is chemical diffusion, because the advective flow would take more than a thousand years for a water molecule to travel from the bottom of BABs to upper most aquifer. **Appendix M** provides calculations for the time of travel.

The baseline model outputs for the BABs are included in **Appendix N**.

### 4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or  $PF_t$ , given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**. The resulting  $PF_t$  from each sensitivity analysis was compared to a threshold prediction value,  $PF_{\text{threshold}}$ . The  $PF_{\text{threshold}}$  value represents the  $PF_t$  at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the CCR unit; the threshold value is 0.2 for the northern BAB and 0.6 for the southern BAB.  $PF_{\text{threshold}}$  is calculated using the Equation No. 4:

$$\text{Equation No. 4: } PF_{\text{threshold}} = \min \left\{ \frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \dots, \frac{GWPS_i}{C_i}, \dots, \frac{GWPS_n}{C_n} \right\}$$

Where:

$PF_{\text{threshold}}$  = Threshold Prediction Factor

$GWPS_i$  = Groundwater Protection Standard for Constituent 'i'

$C_i$  = Maximum porewater concentration of the COC 'i'

#### 4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity changes. A Darcy velocity of 2.03E-3 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

#### 4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing (Rowe et al., 2004) [9], and thus a 25% increase and decrease is considered a satisfactory variation for sensitivity analysis.

#### 4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results.

#### 4.6.2.4 *Layer Thickness*

The isopach maps (**Appendix M**) were used to calculate the maximum and minimum thickness for the clay and clay with sand layers. Using those values as inputs, four additional models were run for each CCR unit to evaluate model sensitivities to layer thickness; in each model only one variable was changed.

#### 4.6.2.5 *Modeling Period*

The modeling period used was 55 years (the “baseline”). To further evaluate the impact of modeling runtime on the resultant PF<sub>t</sub>, one model was run with a modeling period of 85 years, to capture the post-closure care time period, though DTE intends to close the BABs by removal.

#### 4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5** using more conservative model input parameters resulted in PF<sub>t</sub> values ranging from 6.23E-38 to 1.30E-26. This demonstrates that the BABs will not impact groundwater quality assuming conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix N**.

### 4.6.3 Reliability of Computer Model

The computer-based transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications (Talbot, 1979 [8]; Rowe, 1987 [11]; Rowe and Booker, 1987 [12]; Rowe, 1988 [7]; and Rowe and Booker, 1989 [13]) lend to the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

### 4.6.4 Degree of Conservativeness in Model Results

Input parameters for the baseline models were based on site-specific data whenever possible. When not possible, input values were derived from an understanding of the site and relevant peer-reviewed literature. If a high degree of uncertainty was present, conservative input values were selected. A summary of the various conservative assumptions is listed below:

- The maximum measured leachate (i.e., porewater) concentration for each constituent was used for the fate and transport model prediction table;
- Constant leachate concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decrease leachate concentrations over time but to be conservative the model assumed constant leachate concentration over time;
- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays which would retard or slow down migration. To be conservative, the model assumed no adsorption would occur over time;
- Degradation of leachate (input values) through either biologic or chemical process was assumed not to occur during the modelling period. By assuming no degradation, the model overestimates the predicted groundwater quality over time; and
- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of FAB to the top of the uppermost aquifer; the analysis does not consider a 2-D flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

## 5. SUMMARY

This Preliminary ALD has been prepared to assess if the BABs CCR unit meets the ALD requirements per the CCR Rule. The data included comprehensive field and laboratory investigation data collected from the 1970s to 2020. The 2020 field and laboratory investigation studies were conducted specifically to augment data gaps and to address the CCR Rule requirements. The data were integrated into an EVS model to create a comprehensive CSM to understand the BABs lithology beneath the CCR unit and as a basis for the Fate and Transport analysis. The EVS model was relatively consistent with historic representations of the geology associated with the BABs CCR unit.

Site-specific water was collected from BABs and DB and tested to assess which one of the CCR units had the more aggressive water. Water from DB was deemed to be more aggressive and used for compatibility testing to estimate the impacts on the hydraulic conductivity of soil samples. The testing program is still underway. The most current results from the testing have been used in this ALD.

A comprehensive subsurface stratigraphy model was created using the augmented data set and processing it through the EVS. Following, Fate and Transport analysis was conducted to assess whether there is a reasonable probability that water from BABs may result from releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary.

The Fate and Transport analysis was conducted for the operating time period of 55 years (“baseline”), which captures the amount of time elapsed from the 1980s, when CCR unit operations started, to 2034, which is the end of the projected active life of BABs.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than a thousand years for a water molecule to travel from the bottom of BABs to upper most aquifer. Therefore, the analysis results indicate that, due to the low permeability nature of the in-situ unconsolidated materials, chemical diffusion is the dominant transport mechanism as opposed to advection or seepage velocity. Consequently, the current hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow. It is highly unlikely that running the samples until they achieve termination criteria would change the outcome of this study, and therefore, the tests do not need to extend until March 2022.

The Fate and Transport analysis was augmented with a sensitivity analysis to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The analysis results

show that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.



6. CERTIFICATION

**CCR Unit:** DTE Electric Company; Belle River Power Plant, Bottom Ash Basins (BABs)

I, Omer Bozok, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify in accordance with the CCR Rule, to the best of my knowledge, information, and belief, that the information contained in this plan has been prepared in accordance with the accepted practice of engineering and that the BABs meets the requirements of the Alternative Liner Demonstration per the CCR Rule.

Omer Bozok

Printed Name

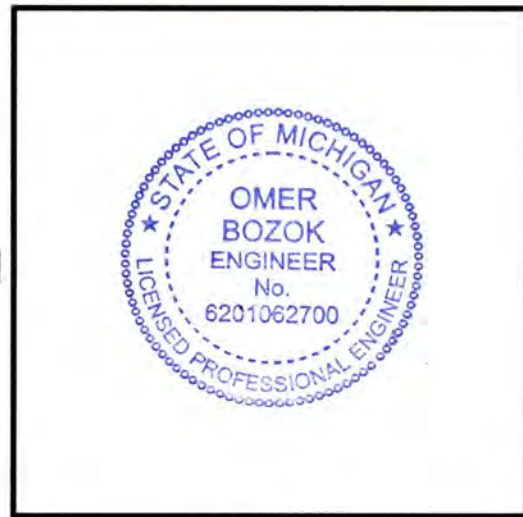


Signature

November 30, 2021

Date

6201062700      Michigan      June 4, 2024  
Registration Number   State      Expiration Date



*Affix Seal*

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# **TABLES**

**Table 2-1 – Field and Lab Testing Summary**

<b>Test</b>	<b>Current ASTM</b>	<b>Number Used in Characterization</b>
Pocket Penetrometer	WK27337	194
Slug Test	D4044	4
Grain Size Distribution	D6913	43
Atterberg Limits	D4318	72
Water Content	D2216	96
Unit Weight	D7263	64
Specific Gravity	D854	10
Hydraulic Conductivity	D5084/D7100	12/6
Cone Penetration Test	D3441	16

**Table 2-2 – Dissipation Tests Results**

<b>CPT ID</b>	<b>Lithology Unit</b>	<b>Hydraulic Conductivity (cm/s)</b>
CPT-01B	Clay	1.80E-08
CPT-01B	Clay	3.61E-08
CPT-01B	Seam 2	8.54E-08
CPT-01B	Seam2	5.78E-07
CPT-01B	Seam 3	2.05E-08
CPT-01B	Seam 4	2.57E-08
CPT-03	Clay	9.76E-09
CPT-03	Clay	2.48E-08
CPT-03	Clay with Sand	3.14E-08
CPT-03	Clay with Sand	1.97E-08
CPT-03	Seam 3	2.81E-06
CPT-03	Seam 3	5.19E-07
CPT-03	Clay with Sand	2.96E-08
CPT-06B	Clay	3.33E-08
CPT-06B	Clay with Sand	1.96E-08
CPT-06B	Clay with Sand	2.34E-08
CPT-08B	Clay	1.91E-08
CPT-08B	Clay 2	3.35E-08
CPT-08C	Seam 2	2.97E-08
CPT-08C	Clay with Sand 2	8.03E-08
CPT-08C	Clay with Sand 2	2.97E-08
CPT-11	Clay	1.97E-08
CPT-11	Clay	2.64E-08
CPT-11	Clay with Sand 2	4.68E-08
CPT-11	Clay with Sand 4	3.86E-08
CPT-11	Clay with Sand 4	2.76E-08
CPT-12	Clay	7.97E-09
CPT-13B	Seam 3	1.63E-06

**Table 3-1 – Ionic Strength of Filtered Porewater**

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	88	60	100
Antimony	mg/L	0.01 U	0.01 U	0.01 U
Arsenic	mg/L	0.0085	0.007	0.0093
Barium	mg/L	0.94	0.58	0.59
Beryllium	mg/L	0.004	0.00216	0.004
Boron	mg/L	0.38	0.83	1.29
Cadmium	mg/L	0.004 U	0.004 U	0.004 U
Calcium	mg/L	83	54	80
Chloride	mg/L	9.0	9.6	14
Chromium	mg/L	0.0087	0.0049	0.01
Cobalt	mg/L	0.01	0.00554	0.0052
Fluoride	mg/L	0.26	0.52	0.31
Iron	mg/L	0.16	1.05	0.34

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Lead	mg/L	0.006	0.0061	0.01
Lithium	mg/L	0.034	0.0174	0.031
Magnesium	mg/L	15.9	13.8	17.5
Manganese	mg/L	0.01	0.0145	0.0137
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	0.035	0.046	0.058
pH	SU	7.87	8.71	9.01
Potassium	mg/L	5.9	7.5	7.6
Selenium	mg/L	0.00582	0.0057	0.0061
Sodium	mg/L	55	86	115
Sulfate	mg/L	100	110	130
Thallium	mg/L	0.01	0.00117	0.00516
Total Dissolved Solids	mg/L	200	220	300
<b>Ionic Strength</b>	<b>molal (m)</b>	<b>0.0088</b>	<b>0.0080</b>	<b>0.0106</b>

Notes:U – Analyzed but not detected above the method detection limit. The method detection limit is shown.



**Table 3-2 – Hydraulic Conductivity Test Results Summary**

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection	Days to Target Pore Volume	Date of Target PV Reached
B1-ST-1 (7-9')	March 22, 2021	7	9.3E-09	0.04340		
	August 20, 2021	151	8.2E-09	0.82670	216	March 23, 2022
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-08	0.00000		
	August 20, 2021	151	1.2E-08	1.50420	50	October 8, 2021
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-08	0.00000		
	August 20, 2021	151	2.2E-08	1.86780	11	August 30, 2021
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-08	0.00000		
	August 20, 2021	151	1.9E-08	2.23830	Complete	August 6, 2021
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-08	0.00000		
	August 20, 2021	151	2.8E-08	2.28070	Complete	August 3, 2021
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-08	0.00000		
	August 20, 2021	151	1.5E-08	1.86670	11	August 30, 2021

**Table 3-3 – Summary of pH Results**

Sample ID	Parameter	pH Inflow	pH Outflow	Is pH of outflow within termination boundaries?
B1-ST-1 (7-9')	Min	8.2	8.1	Yes
	Max	8.6	8.6	
	Average	8.4	8.4	
B2-ST-1 (1-3')	Min	8.0	7.9	Yes
	Max	8.8	8.5	
	Average	8.4	8.2	
B2-ST-4 (47-49')	Min	8.0	8.0	Yes
	Max	8.6	8.4	
	Average	8.3	8.2	
B3-ST-5 (77-79')	Min	8.1	7.8	Yes
	Max	8.8	8.6	
	Average	8.3	8.1	
B4-ST-3 (47-49')	Min	7.7	7.8	Yes
	Max	8.7	8.7	
	Average	8.2	8.1	
B5-ST-5 (87-89')	Min	7.9	8.0	Yes
	Max	8.6	8.5	
	Average	8.4	8.2	

**Table 3-4 – Summary of Electrical Conductivity Results**

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)	Is EC of outflow within termination boundaries?	Approximate Projected Termination Date
B1-ST-1 (7-9')	Min	656	1230	No	November 12, 2021
	Max	660	1614		
	Average	657	1418		
B2-ST-1 (1-3')	Min	560	1764	No	December 23, 2021
	Max	782	3050		
	Average	645	2146		
B2-ST-4 (47-49')	Min	523	933	No	October 12, 2021
	Max	666	1313		
	Average	609	1087		
B3-ST-5 (77-79')	Min	611	816	No	September 12, 2021
	Max	735	1118		
	Average	680	946		
B4-ST-3 (47-49')	Min	518	597	No	September 1, 2021
	Max	730	930		
	Average	625	778		
B5-ST-5 (87-89')	Min	598	1040	No	September 5, 2021
	Max	760	2010		
	Average	678	1341		

**Table 3-5 – Sample Condition as it Relates to Termination Criteria**

Sample ID	Termination Criterion Reached				
	Pore Volumes Passed, PV	pH	Electrical Conductivity, EC	Approximate Projected Termination Date	Date Based On
B1-ST-1 (7-9')	No	Yes	No	March 23, 2022	PV
B2-ST-1 (1-3')	No	Yes	No	December 23, 2021	EC
B2-ST-4 (47-49')	No	Yes	No	October 12, 2021	EC
B3-ST-5 (77-79')	Yes	Yes	No	September 12, 2021	EC
B4-ST-3 (47-49')	Yes	Yes	No	September 1, 2021	EC
B5-ST-5 (87-89')	No	Yes	No	September 5, 2021	EC

**Table 4-1 – Groundwater Protection Criteria**

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>
Arsenic	mg/L	MCL	1.0E-02	5.0E-03	<b>1.0E-02</b>	5.0E-03	<b>1.0E-02</b>	5.0E-03	<b>1.0E-02</b>	7.0E-03	<b>1.0E-02</b>	7.2E-03	<b>1.0E-02</b>
Barium	mg/L	MCL	2.0E+00	3.0E-01	<b>2.0E+00</b>	3.3E-01	<b>2.0E+00</b>	3.1E-01	<b>2.0E+00</b>	4.4E-01	<b>2.0E+00</b>	3.3E-01	<b>2.0E+00</b>
Beryllium	mg/L	MCL	4.0E-03	2.8E-03	<b>4.0E-03</b>	2.8E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>
Chromium	mg/L	MCL	1.0E-01	1.3E-02	<b>1.0E-01</b>	1.9E-02	<b>1.0E-01</b>	2.0E-03	<b>1.0E-01</b>	2.7E-02	<b>1.0E-01</b>	2.5E-02	<b>1.0E-01</b>
Cobalt	mg/L	Background or RSL	6.0E-03	3.6E-03	<b>6.0E-03</b>	3.9E-03	<b>6.0E-03</b>	1.0E-03	<b>6.0E-03</b>	1.3E-02	<b>1.3E-02</b>	7.7E-03	<b>7.7E-03</b>
Fluoride	mg/L	MCL	4.0E+00	1.8E+00	<b>4.0E+00</b>	1.8E+00	<b>4.0E+00</b>	1.7E+00	<b>4.0E+00</b>	1.1E+00	<b>4.0E+00</b>	1.7E+00	<b>4.0E+00</b>
Lead	mg/L	RSL	1.5E-02	3.5E-03	<b>1.5E-02</b>	2.9E-03	<b>1.5E-02</b>	1.0E-03	<b>1.5E-02</b>	1.2E-02	<b>1.5E-02</b>	6.9E-03	<b>1.5E-02</b>
Lithium	mg/L	Background or RSL	4.0E-02	4.2E-02	<b>4.2E-02</b>	1.9E-02	<b>4.0E-02</b>	2.4E-02	<b>4.0E-02</b>	3.7E-02	<b>4.0E-02</b>	6.5E-02	<b>6.5E-02</b>
Mercury	mg/L	MCL	2.0E-03	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>
Molybdenum	mg/L	Background or RSL	1.0E-01	9.6E-02	<b>1.0E-01</b>	6.5E-02	<b>1.0E-01</b>	1.1E-01	<b>1.1E-01</b>	1.2E-01	<b>1.2E-01</b>	6.9E-02	<b>1.0E-01</b>
Radium-226/228	pCi/L	MCL	5.0E+00	1.3E+00	<b>5.0E+00</b>	4.0E+00	<b>5.0E+00</b>	3.0E+00	<b>5.0E+00</b>	1.2E+00	<b>5.0E+00</b>	2.7E+00	<b>5.0E+00</b>
Selenium	mg/L	MCL	5.0E-02	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>
Thallium	mg/L	MCL	2.0E-03	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-2 – Baseline Fate and Transport Results**

	Constituent	Units	Maximum Observed Concentration		90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer			Most Conservative GWPS	Outcome - Site (Pass/Fail)		Outcome - 90th Percentile
			BAB-North	BAB-South			BAB	BAB-North	BAB-South		90th Percentile	BAB-North	
<b>Appendix IV</b>	Antimony	mg/L	1.0E-02	1.0E-02	4.0E-02	2.66E-33	2.7E-35	2.7E-35	1.1E-34	6.0E-03	PASS	PASS	PASS
	Arsenic	mg/L	8.5E-03	7.0E-03	7.8E-01	2.66E-33	2.3E-35	1.9E-35	2.1E-33	1.0E-02	PASS	PASS	PASS
	Barium	mg/L	9.4E-01	5.8E-01	2.1E-01	2.66E-33	2.5E-33	1.5E-33	5.6E-34	2.0E+00	PASS	PASS	PASS
	Beryllium	mg/L	4.0E-03	2.2E-03	1.0E-03	2.66E-33	1.1E-35	5.7E-36	2.7E-36	4.0E-03	PASS	PASS	PASS
	Cadmium	mg/L	4.0E-03	4.0E-03	6.0E-02	2.66E-33	1.1E-35	1.1E-35	1.6E-34	5.0E-03	PASS	PASS	PASS
	Chromium	mg/L	8.7E-03	4.9E-03	2.0E-01	2.66E-33	2.3E-35	1.3E-35	5.3E-34	1.0E-01	PASS	PASS	PASS
	Cobalt	mg/L	1.0E-02	5.5E-03	5.0E-02	2.66E-33	2.7E-35	1.5E-35	1.3E-34	6.0E-03	PASS	PASS	PASS
	Fluoride	mg/L	2.6E-01	5.2E-01	2.1E+01	2.66E-33	6.9E-34	1.4E-33	5.7E-32	4.0E+00	PASS	PASS	PASS
	Lead	mg/L	6.0E-03	6.1E-03	1.0E-01	2.66E-33	1.6E-35	1.6E-35	2.7E-34	1.5E-02	PASS	PASS	PASS
	Lithium	mg/L	3.4E-02	1.7E-02	4.5E-01	2.66E-33	9.0E-35	4.6E-35	1.2E-33	4.0E-02	PASS	PASS	PASS
	Mercury	mg/L	4.0E-04	4.0E-04	7.0E-06	2.66E-33	1.1E-36	1.1E-36	1.9E-38	2.0E-03	PASS	PASS	PASS
	Molybdenum	mg/L	3.5E-02	4.6E-02	7.1E+00	2.66E-33	9.3E-35	1.2E-34	1.9E-32	1.0E-01	PASS	PASS	PASS
	Combined Radium	pCi/L	1.8E+00	6.7E-40	-	2.66E-33	4.7E-33	1.8E-72	-	5.0E+00	PASS	PASS	NA
	Selenium	mg/L	5.8E-03	5.7E-03	3.2E-01	2.66E-33	1.5E-35	1.5E-35	8.5E-34	5.0E-02	PASS	PASS	PASS
Thallium	mg/L	1.0E-02	1.2E-03	3.0E-03	2.66E-33	2.7E-35	3.1E-36	8.0E-36	2.0E-03	PASS	PASS	PASS	

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-01**  
**Background and Maximum Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-01				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	6.2E-42	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0	Pass
Beryllium	mg/L	MCL	2.8E-03	2.7E-42	2.8E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.0E-03	6.7E-42	1.0E-03	1.0E-01	Pass
Cobalt	mg/L	RSL	3.6E-03	3.5E-42	3.6E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.80	2.9E-40	1.8	4.0	Pass
Lead	mg/L	RSL	3.5E-03	6.7E-42	3.5E-03	1.5E-02	Pass
Lithium	mg/L	Background	2.3E-02	4.1E-41	2.3E-02	4.2E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	8.9E-02	2.0E-40	8.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	1.8E-03	1.2E-39	1.8E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-02**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-02				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.3E-01	8.4E-04	3.3E-01	2.0	Pass
Beryllium	mg/L	MCL	2.8E-03	8.0E-07	2.8E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.9E-02	3.1E-06	1.9E-02	1.0E-01	Pass
Cobalt	mg/L	RSL	3.9E-03	1.0E-06	3.9E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.30	9.6E-03	1.3E+00	4.0	Pass
Lead	mg/L	RSL	2.9E-03	2.1E-06	2.9E-03	1.5E-02	Pass
Lithium	mg/L	RSL	1.9E-02	1.4E-04	1.9E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	6.5E-02	3.8E-03	6.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.7E-03	7.6E-04	3.4E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter



**Table 4-3 - MW-16-03**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-03				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	8.4E-04	3.0E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	Pass
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.80	9.6E-03	1.8	4.0	Pass
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	Pass
Lithium	mg/L	RSL	1.9E-02	1.4E-04	1.9E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	Background	1.0E-01	3.8E-03	1.0E-01	1.1E-01	Pass
Radium-226/228	pCi/L	MCL	2.0E-03	7.6E-04	2.7E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-04**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-04				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.0E-03	4.4E-05	7.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	4.4E-01	8.4E-04	4.4E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.7E-02	3.1E-06	2.7E-02	1.0E-01	Pass
Cobalt	mg/L	Background	7.4E-03	1.0E-06	7.4E-03	1.3E-02	Pass
Fluoride	mg/L	MCL	1.80	9.6E-03	1.8	4.0	Pass
Lead	mg/L	RSL	7.1E-03	2.1E-06	7.1E-03	1.5E-02	Pass
Lithium	mg/L	RSL	3.7E-02	1.4E-04	3.7E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	Background	1.1E-01	3.8E-03	1.1E-01	1.2E-01	Pass
Radium-226/228	pCi/L	MCL	2.7E-03	7.6E-04	3.5E-03	5.0E-03	Pass
Selenium	mg/L	MCL	2.0E-03	3.4E-05	2.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-09**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-09				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.2E-03	4.4E-05	7.2E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.1E-01	8.4E-04	3.1E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.8E-02	3.1E-06	1.8E-02	1.0E-01	Pass
Cobalt	mg/L	Background	5.9E-03	1.0E-06	5.9E-03	7.7E-03	Pass
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6	4.0	Pass
Lead	mg/L	RSL	5.4E-03	2.1E-06	5.4E-03	1.5E-02	Pass
Lithium	mg/L	Background	5.5E-02	1.4E-04	5.5E-02	6.5E-02	Pass
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	6.5E-02	3.8E-03	6.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	3.2E-03	7.6E-04	4.0E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-4 – Sensitivity Analysis Model Inputs**

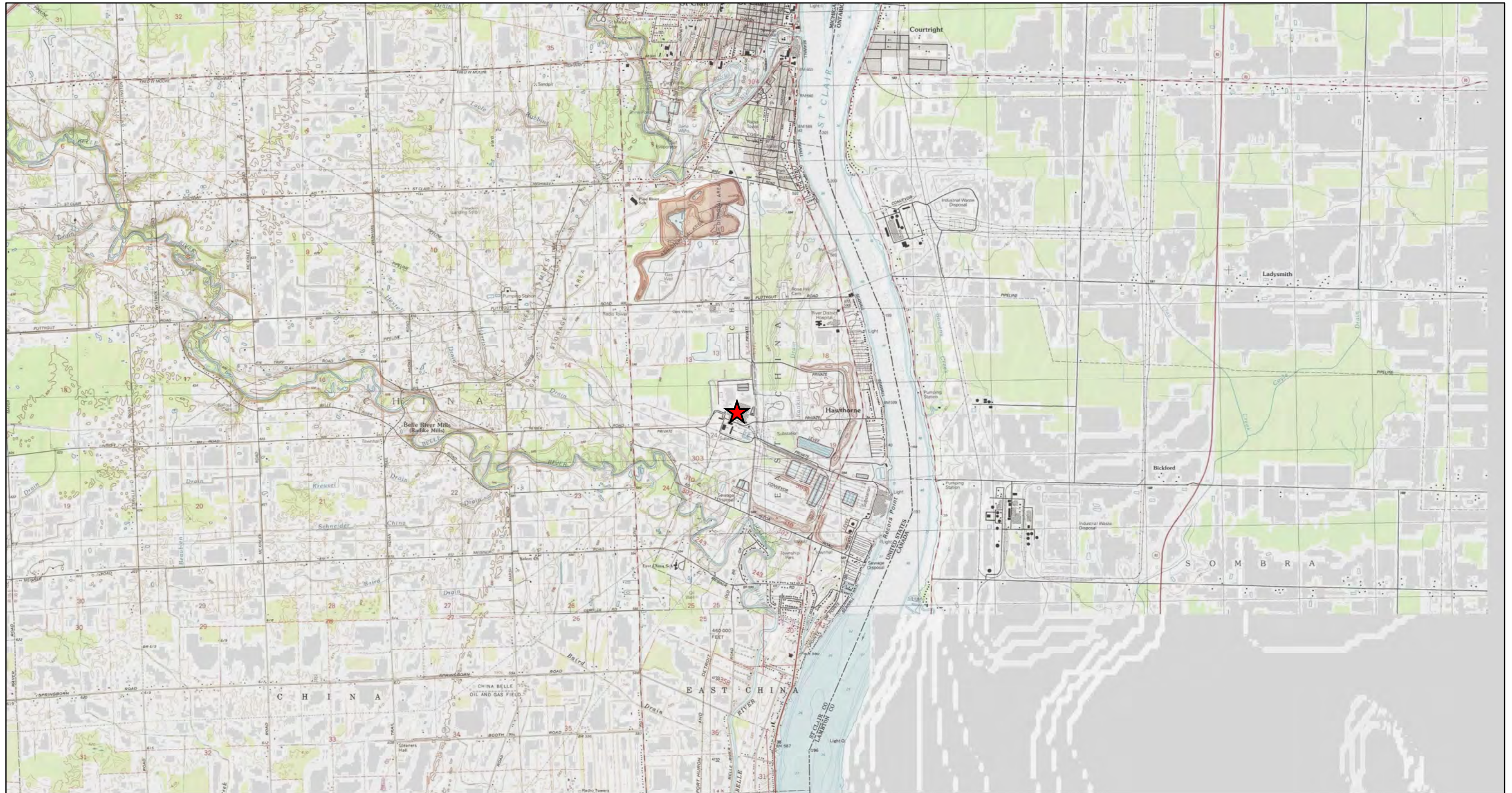
	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis
<i>Layer Properties</i>	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr)	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)
Clay	12.01	13.99	11.03	1.02E-03	2.03E-03	0.019	0.024	0.014	0.46	0.56	0.34	0.37	0.45	0.28	55	85
Clay with Sand	19.29	23.62	15.18	1.02E-03	2.03E-03	0.019	0.024	0.014	0.42	0.55	0.24	0.34	0.45	0.20	55	85

Dv = Vertical Darcy Velocity

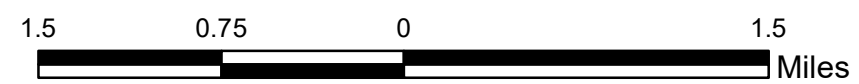
CoHD = Coefficient of Hydrodynamic Dispersion

**Table 4-5 – Sensitivity Analysis Results Prediction Factors**

<b>Bottom Ash Basins Sensitivity Analysis</b>			
<b>Model Name</b>	<b>Description</b>	<b>Prediction Factor</b>	<b>Pass?*</b>
BAB_Baseline	Baseline model for the Bottom Ash Basins.	2.66E-33	YES
BAB_ExtendedRun	Model runtime was extended from 55 years to 85 years.	1.30E-26	YES
BAB_Darcy	Darcy velocity was doubled.	2.52E-32	YES
BAB_CoHD_High	Coefficient of Hydrodynamic Dispersion was increased by 25%.	1.53E-30	YES
BAB_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	6.23E-38	YES
BAB_ClayPoro_High	Used the highest effective porosity in clay interval; derived from laboratory data in project database.	2.50E-33	YES
BAB_ClayPoro_Low	Used the lowest effective porosity in clay interval; derived from laboratory data in project database.	3.08E-33	YES
BAB_SandPoro_High	Used the highest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.67E-33	YES
BAB_SandPoro_Low	Used the lowest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.06E-32	YES
BAB_ClayThick	Used thickest clay interval seen in boring/well; derived from project database.	3.60E-35	YES
BAB_ClayThin	Used thinnest clay interval seen in boring/well; derived from project database.	1.92E-32	YES
BAB_SandThick	Used thickest clay with sand interval seen in boring/well; derived from project database.	1.48E-37	YES
BAB_SandThin	Used thinnest clay with sand interval seen in boring/well; derived from project database.	1.36E-29	YES
* Indicates value less than $PF_{\text{threshold}}$ , as discussed in Section 4.6.2.			



Legend  
 Site Location



Site Location  
 DTE Energy  
 Belle River Power Plant  
 4505 King Road  
 China Township, Michigan

**Geosyntec**  
 consultants

Figure  
**1-1**

Ann Arbor, Michigan

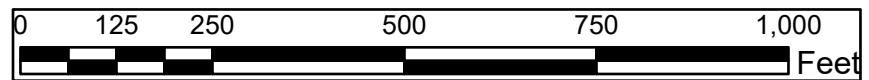
2021/08/09



Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



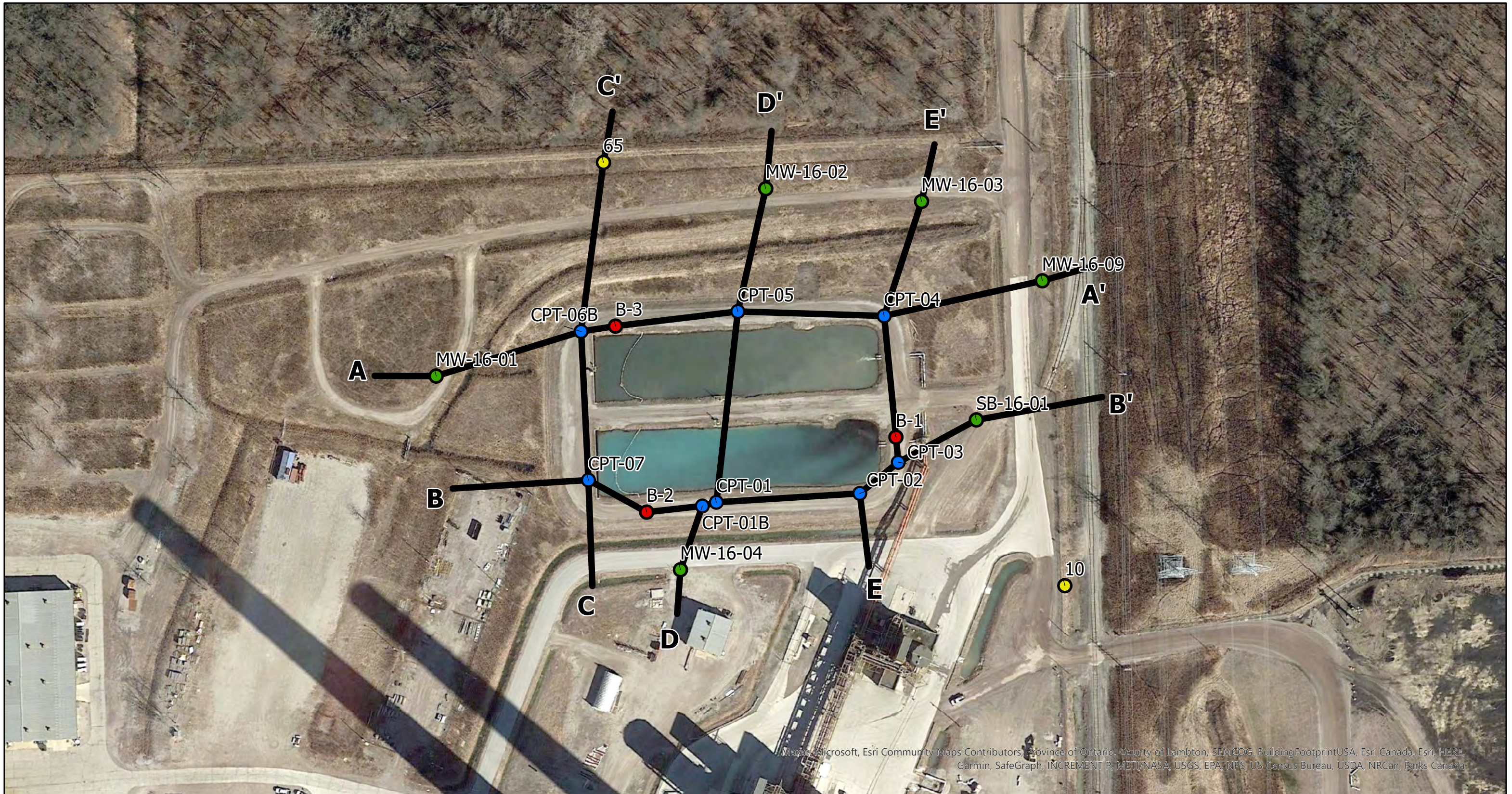
**Field Investigation Locations  
Bell River Power Plant  
China Township, MI**

**Geosyntec**  
consultants

GLP8017

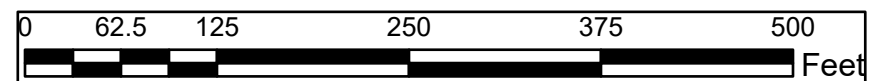
August 2021

**Figure  
2-1**



**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



**Cross Section Locations**  
**Bell River Power Plant - Bottom Ash Basins**  
**China Township, MI**

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**Figure**  
**2-2**

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August 2021





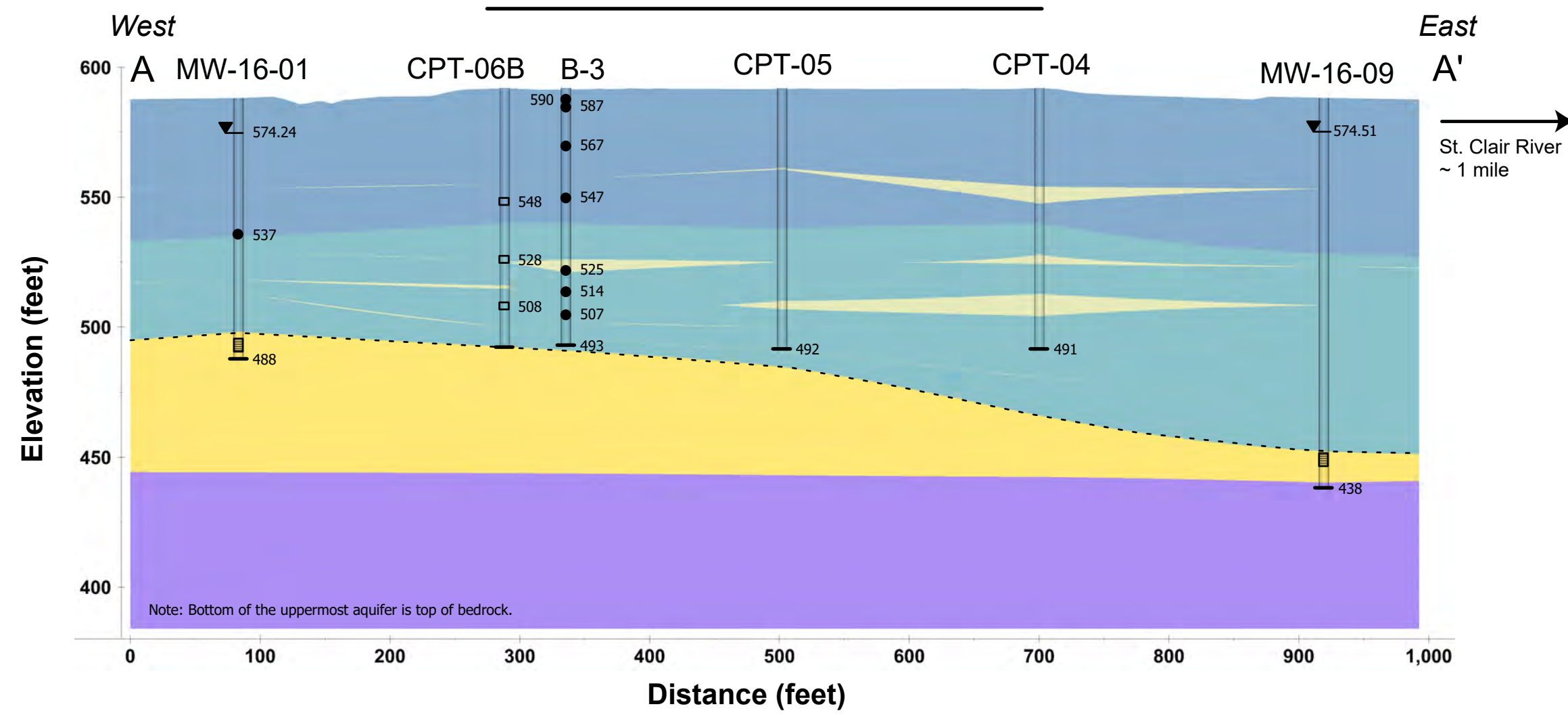
### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019

### Ash Basin Extent



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▤ Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section A - A'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**



**Figure**  
**2-3**

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August 2021

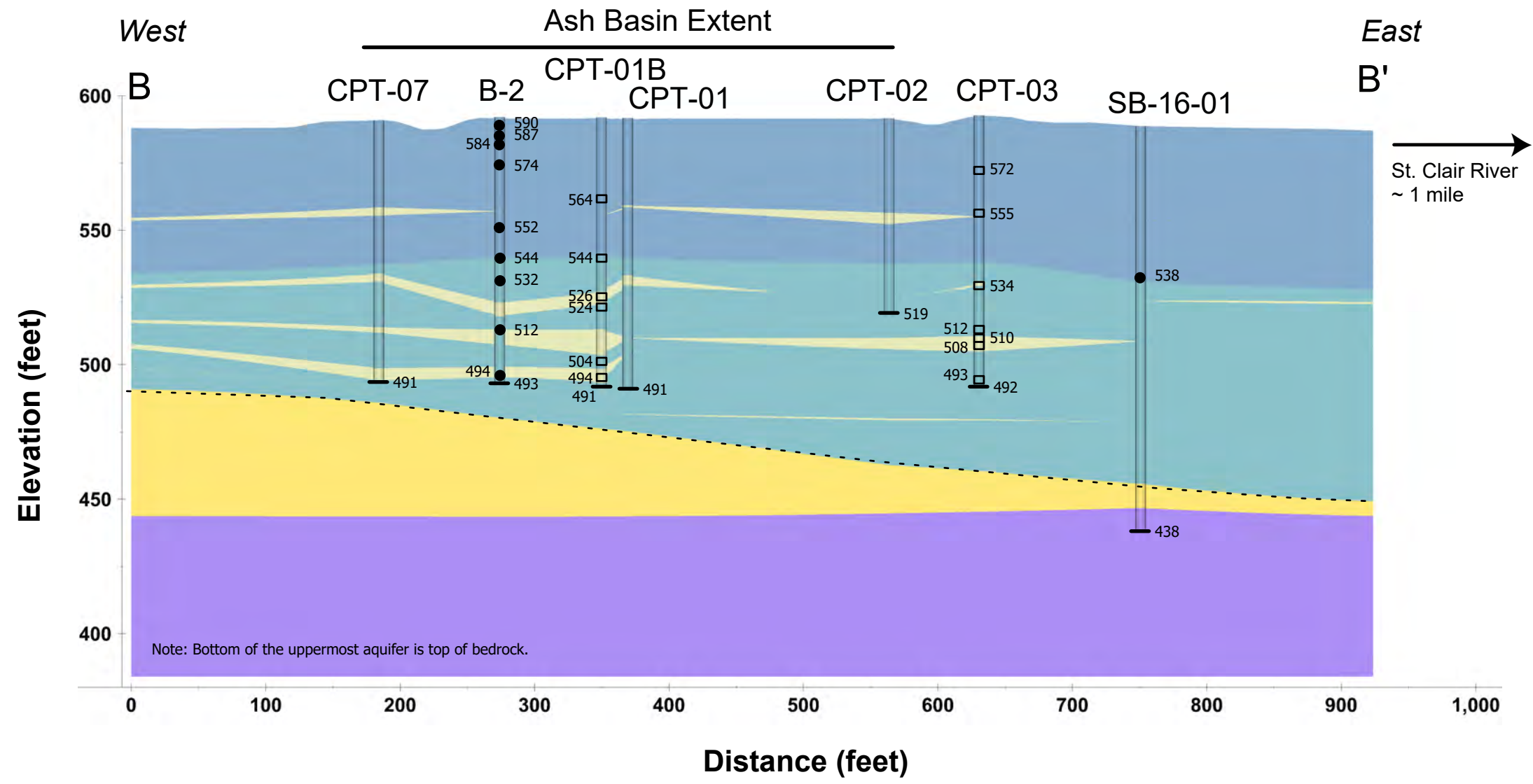


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW- TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



- Lithology**
- Clay
  - Clay with Sand
  - Sandy Seams
  - Uppermost Aquifer
  - Shale Bedrock
- ▼ Water Level of Uppermost Aquifer
  - End of Investigation
  - Well Screen Interval
  - Top of Uppermost Aquifer Unit
  - CPT Pore Pressure Dissipation Test
  - Geotechnical Sample Elevation
- Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section B - B'**  
Belle River Power Plant - Bottom Ash Basins  
China Township, MI

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**Figure**  
**2-4**

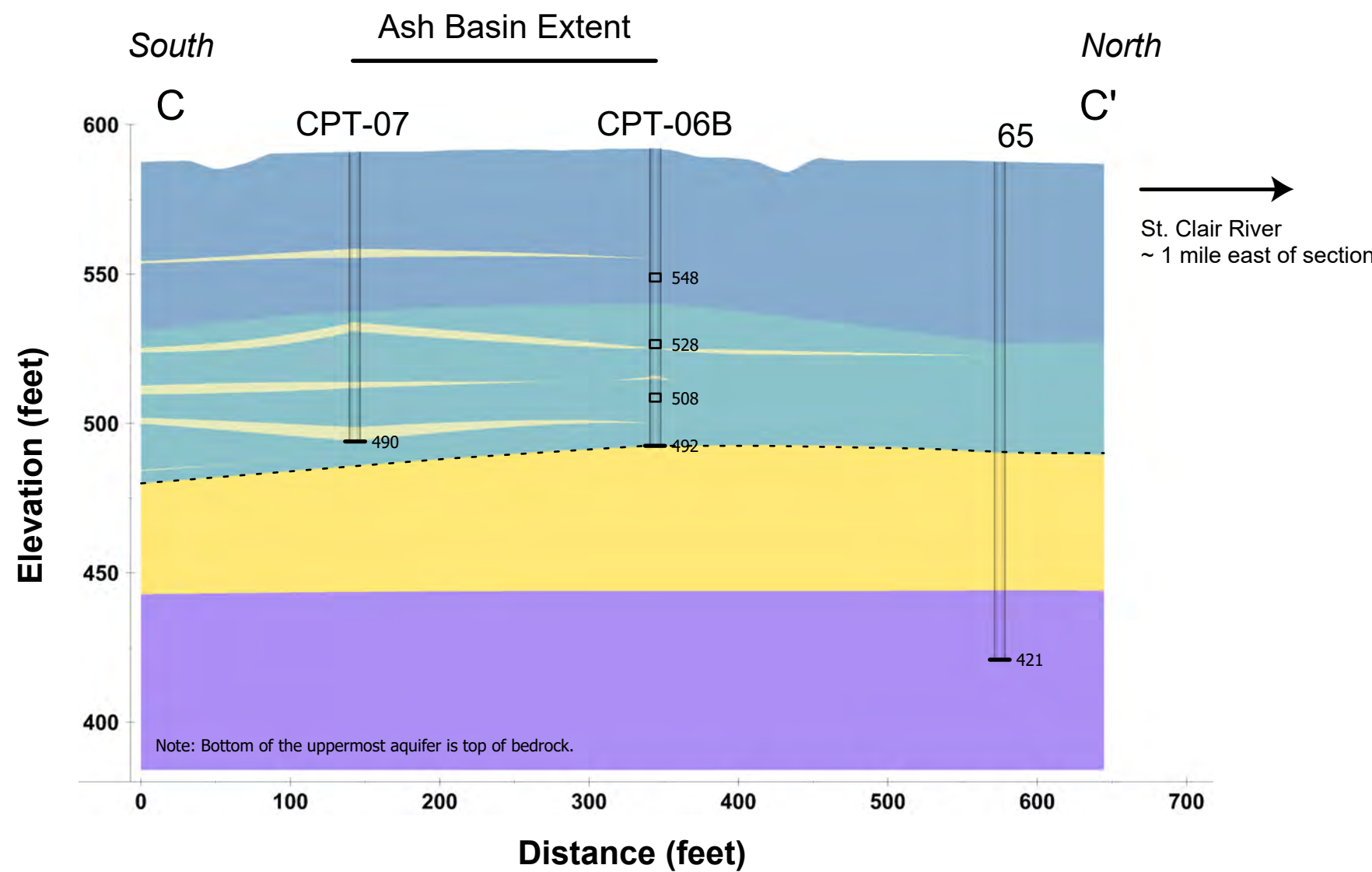


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▤ Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section C - C'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**

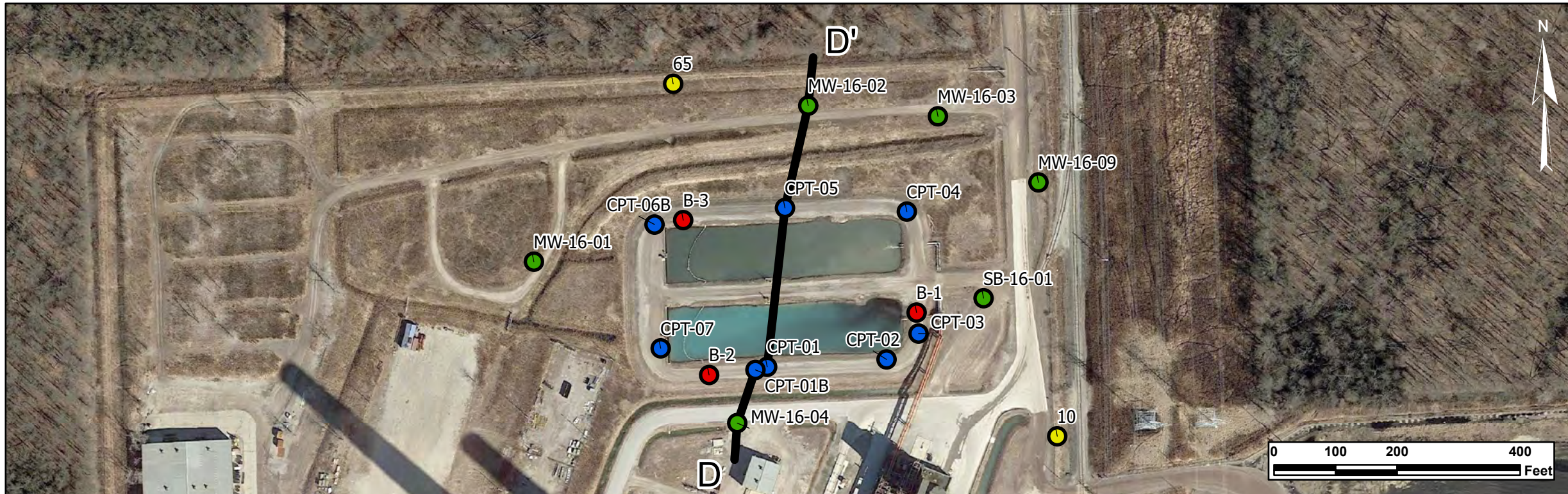
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**Figure**

**2-5**

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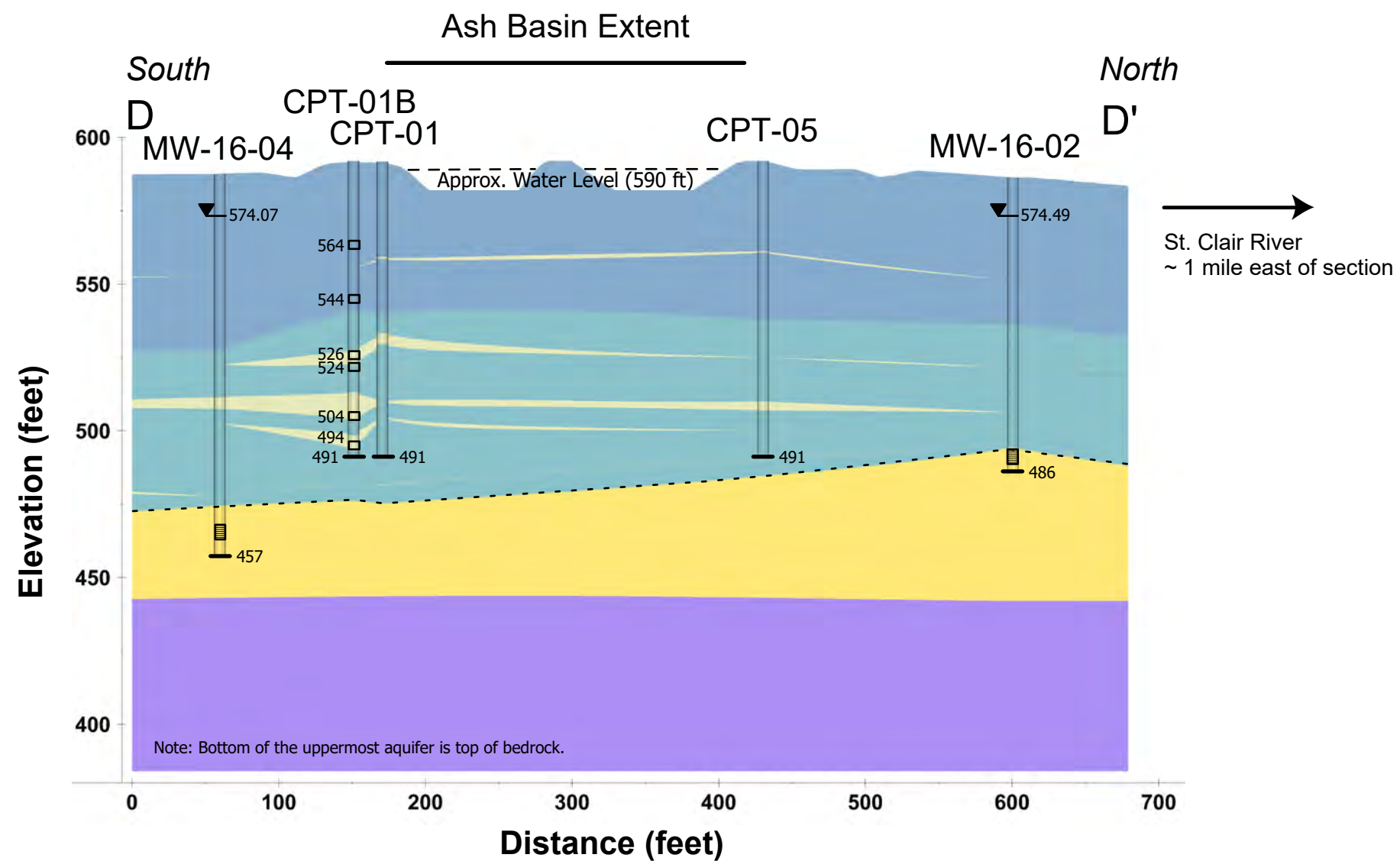


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section D - D'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**

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**Figure**

**2-6**

GLP8017

August 2021

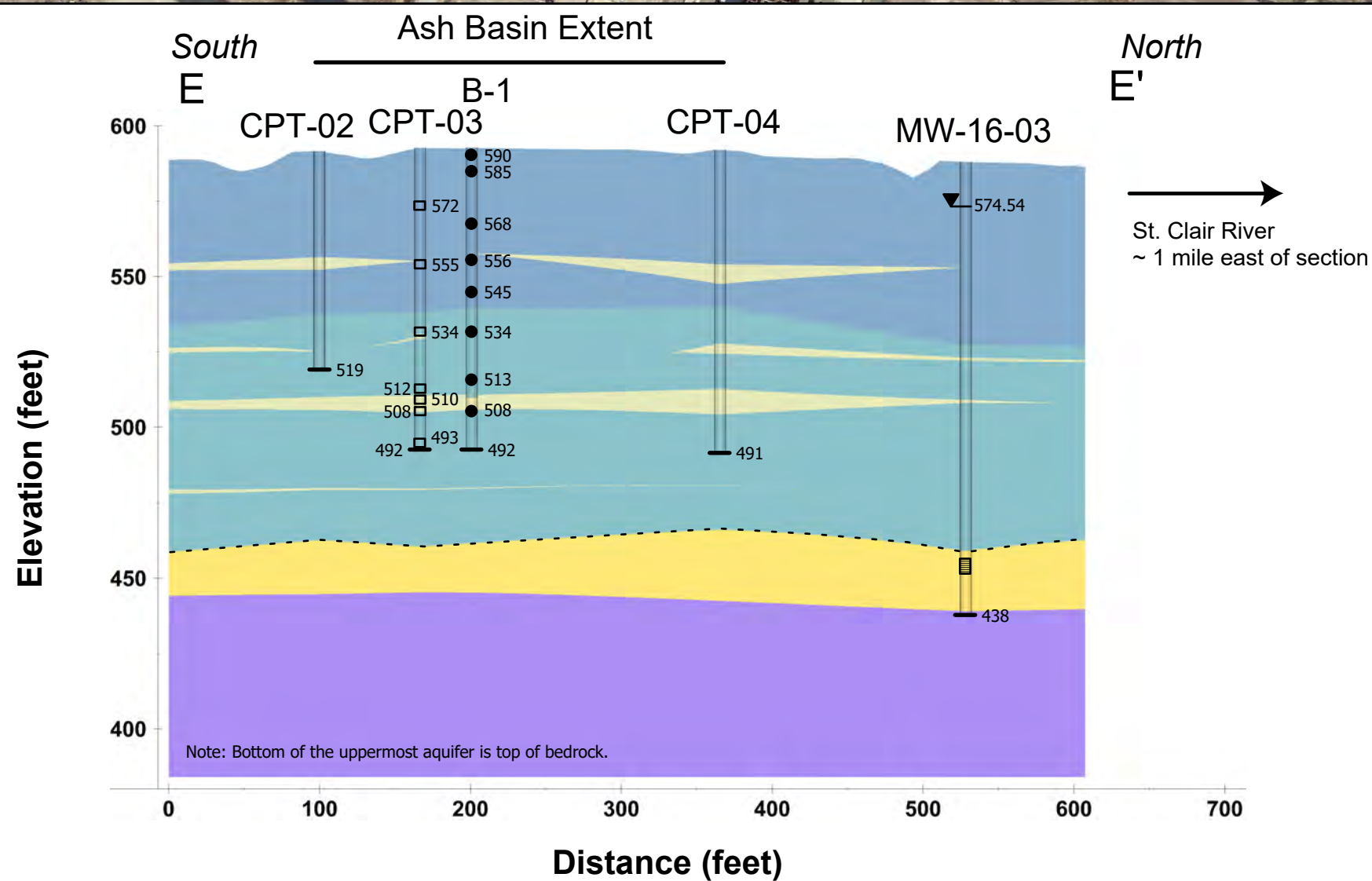


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▤ Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
 Horizontal Scale: 1-inch = 100-feet  
 Elevations are in Average Mean Sea Level  
 Unit interfaces are interpreted from limited data and are approximate.

**Cross Section E - E'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**

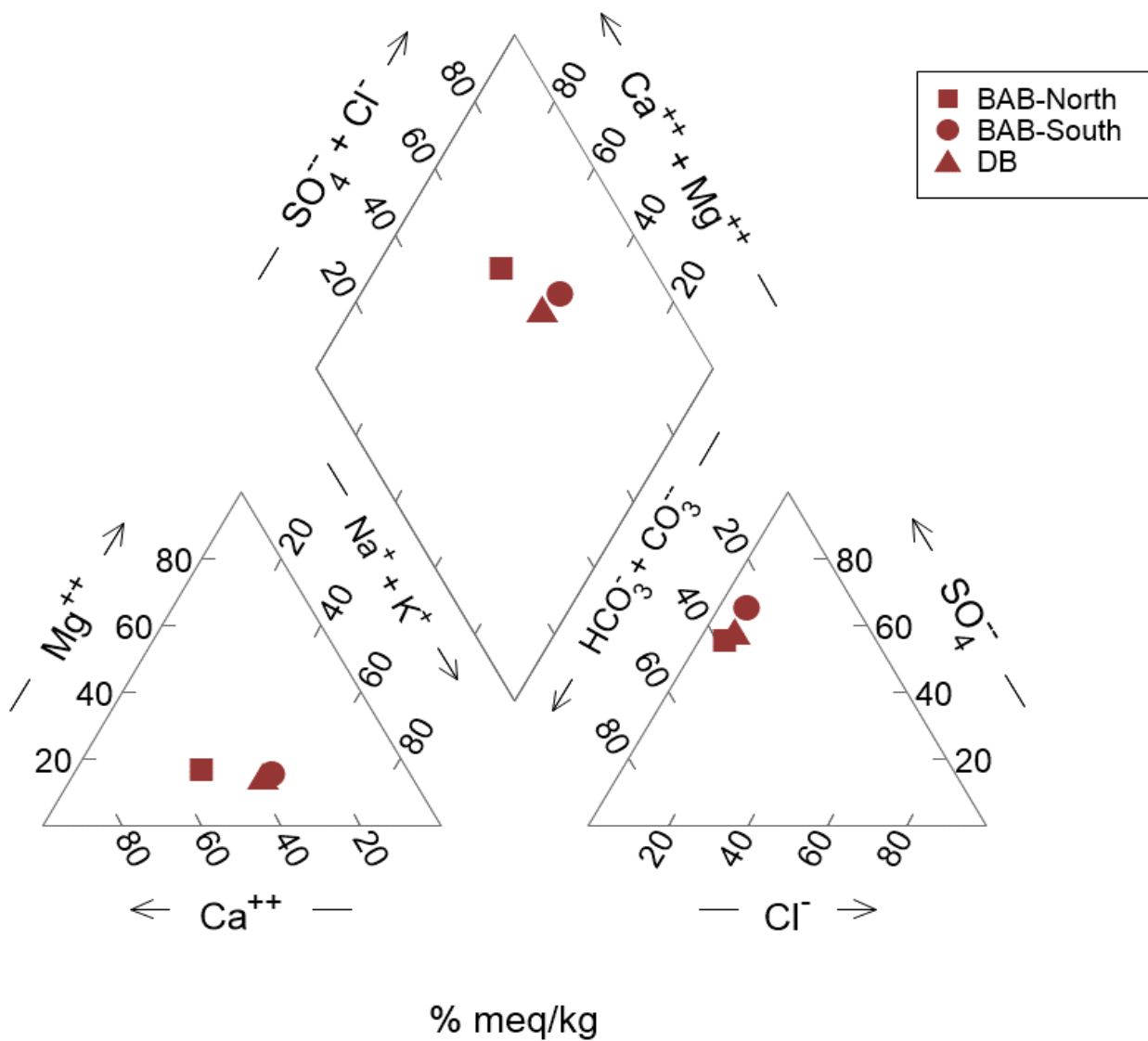
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**Figure**

**2-7**

GLP8017

August 2021



**Note:**  
Results are shown in the relative percentage of milliequivalents per kilogram (meq/kg).

**Filtered BAB and DB Porewater Sample**

**Piper Diagram**  
Belle River Power Plant  
St. Clair County, MI

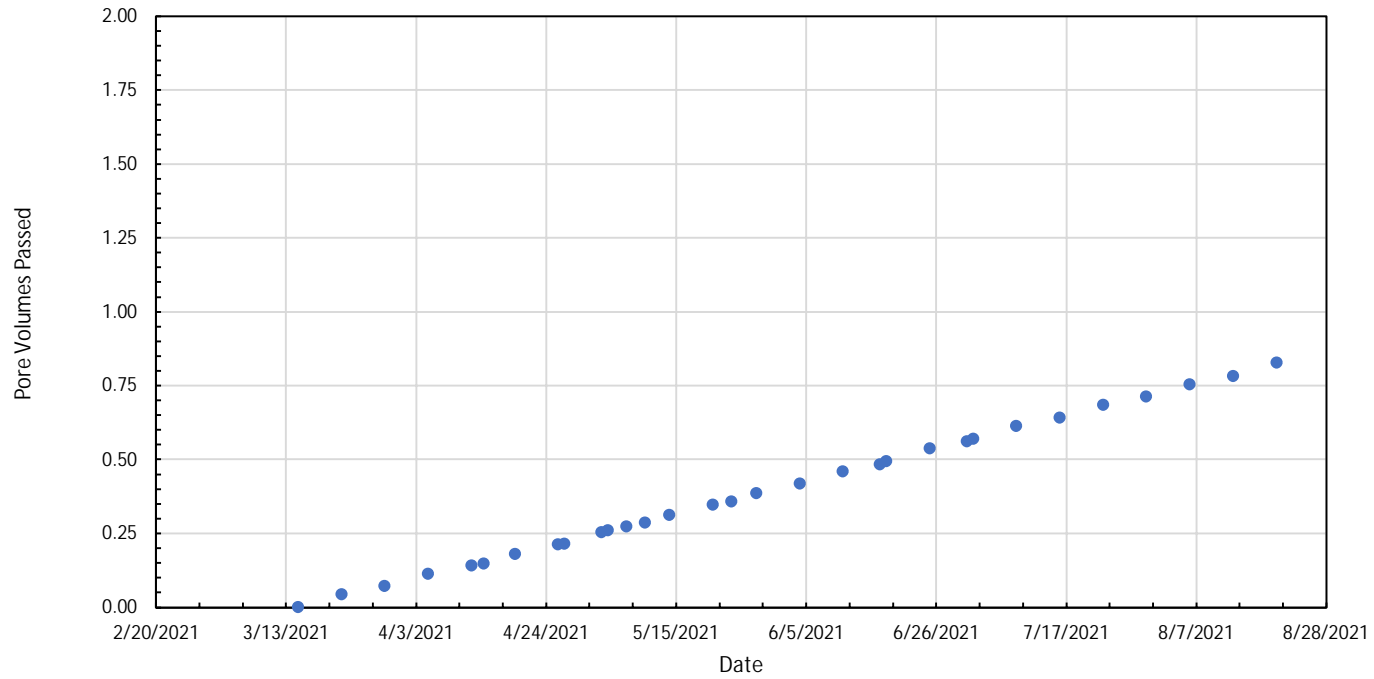


**Figure**

**3-1**

GLP8017

August 2021



**B1-ST-1 (7-9') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

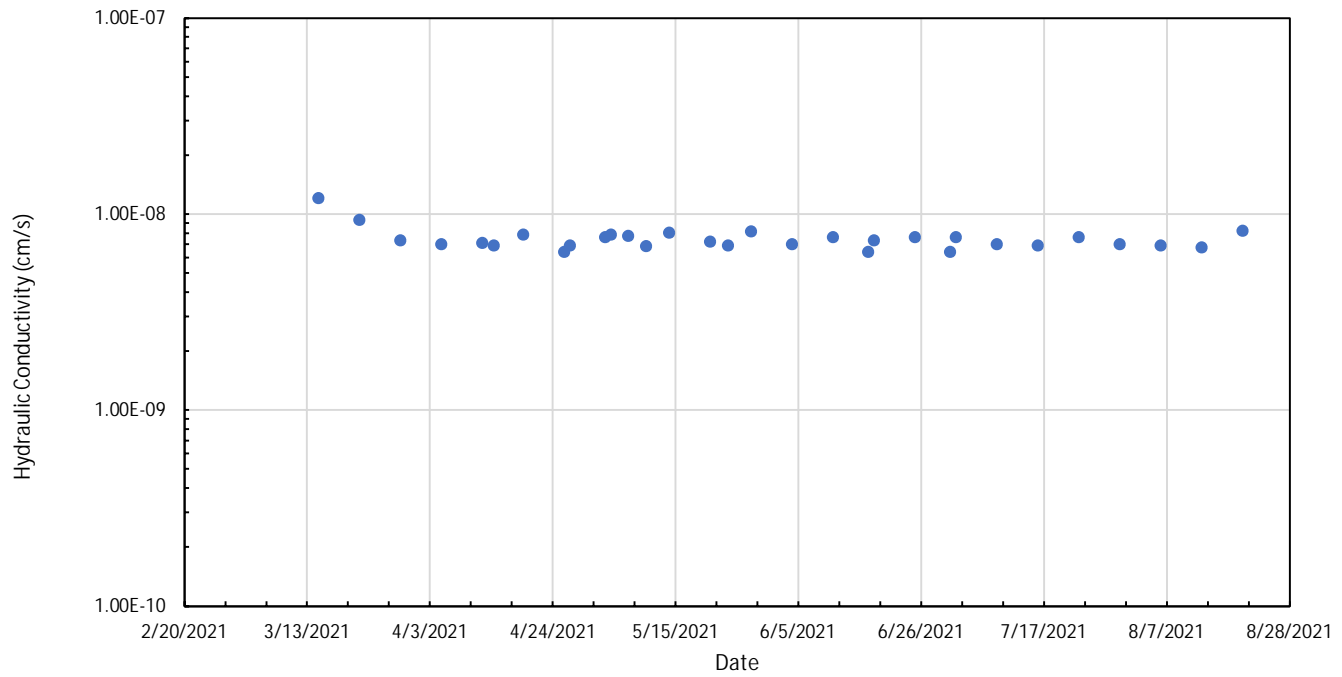


**Figure**

**3-2**

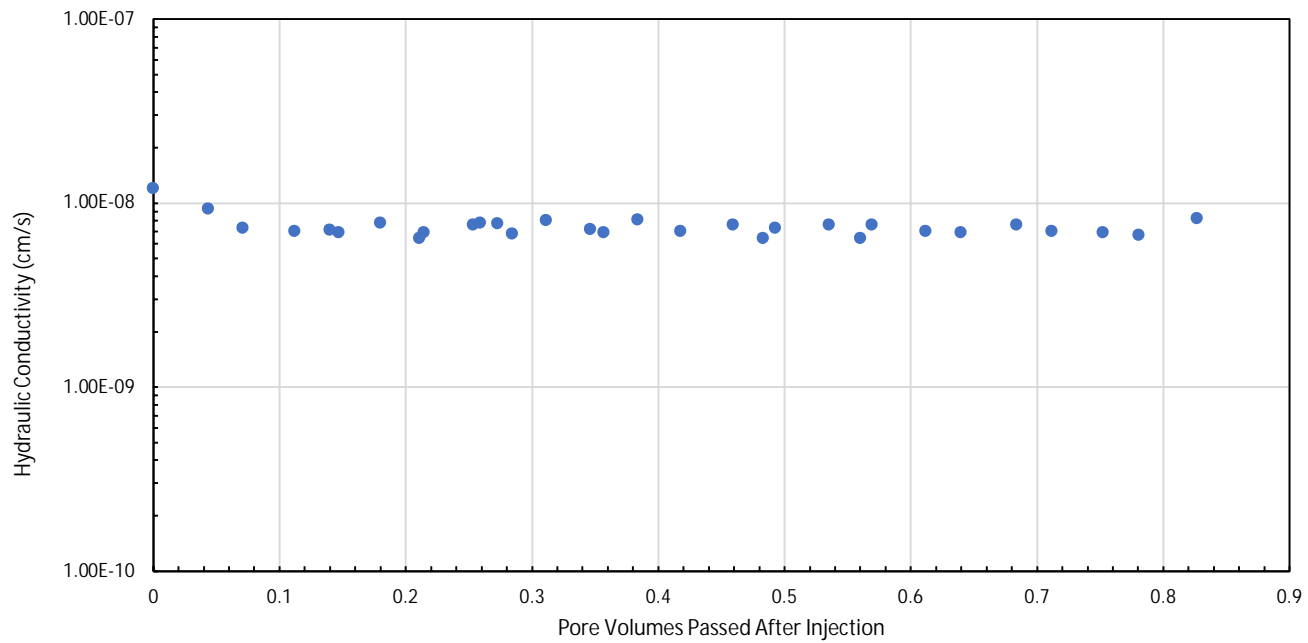
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<b>B1-ST-1 (7-9') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure 3-3</b>
Ann Arbor, MI      September 2021	





**B1-ST-1 (7-9') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

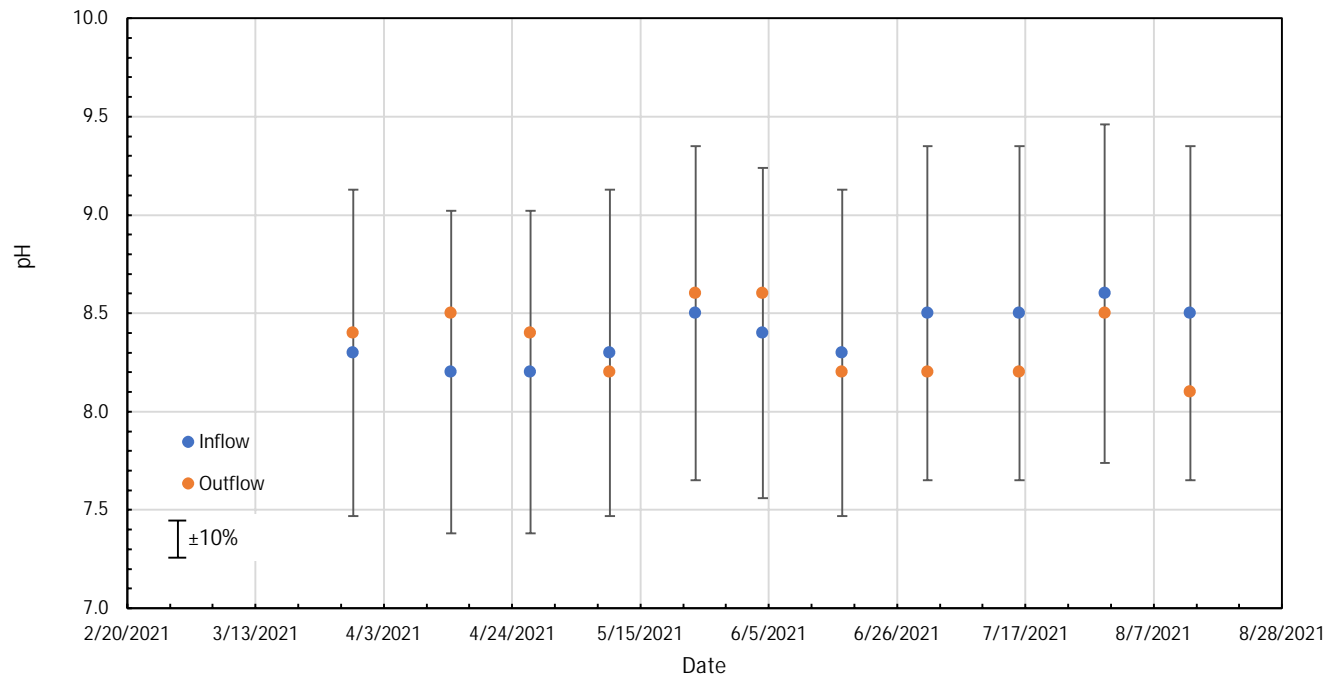


Ann Arbor, MI

September 2021

**Figure**

**3-4**



**B1-ST-1 (7-9') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

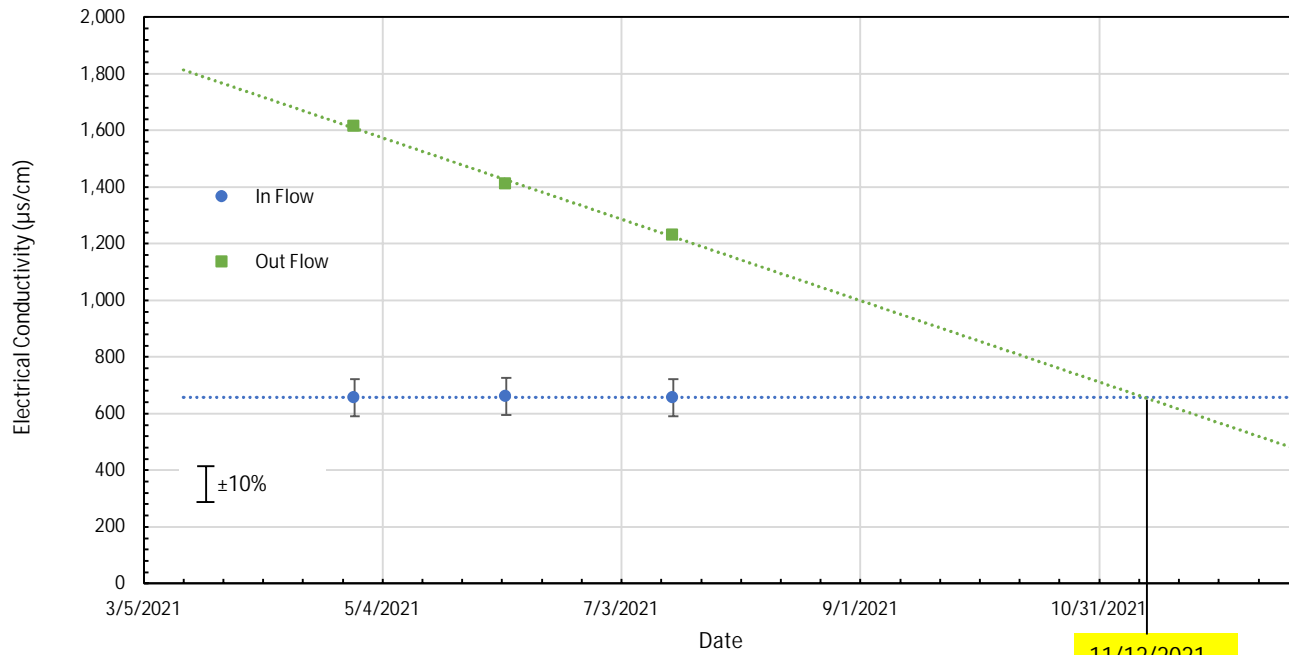


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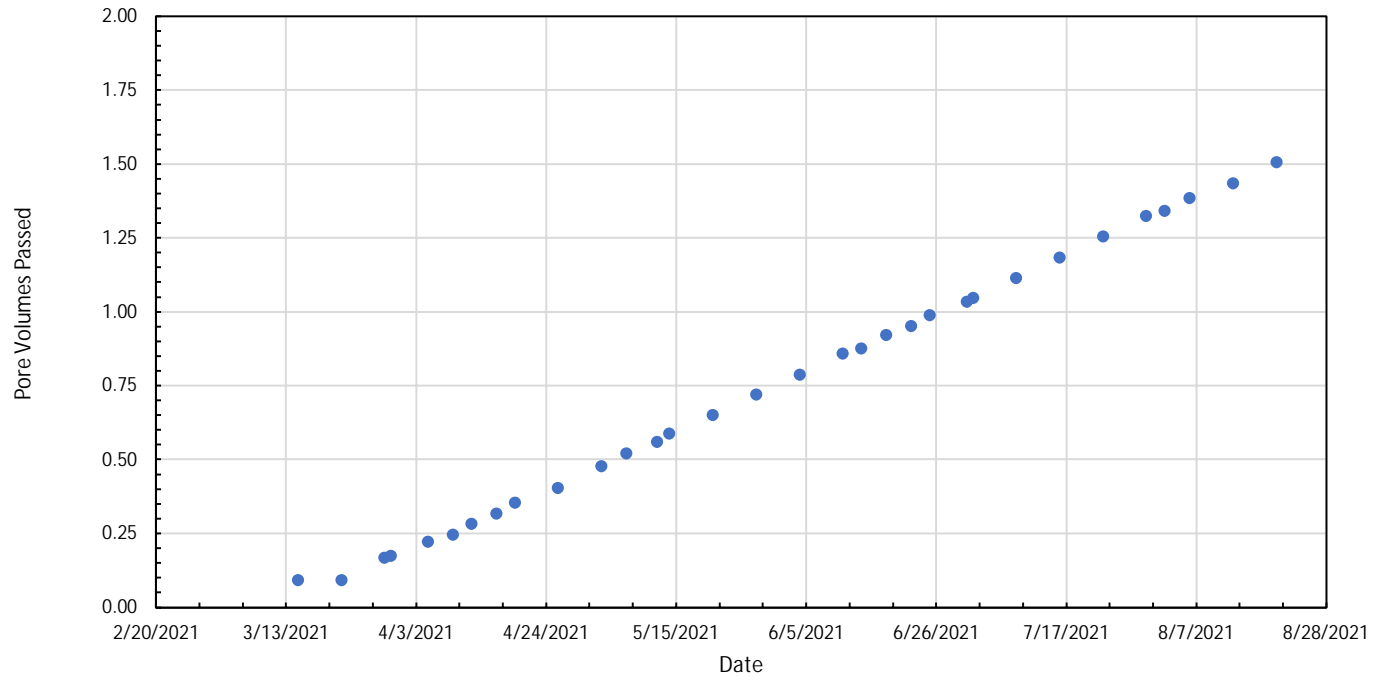
September 2021

**Figure**

**3-5**



<b>B1-ST-1 (7-9') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
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<b>Figure 3-6</b>	



**B2-ST-1 (1-3') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

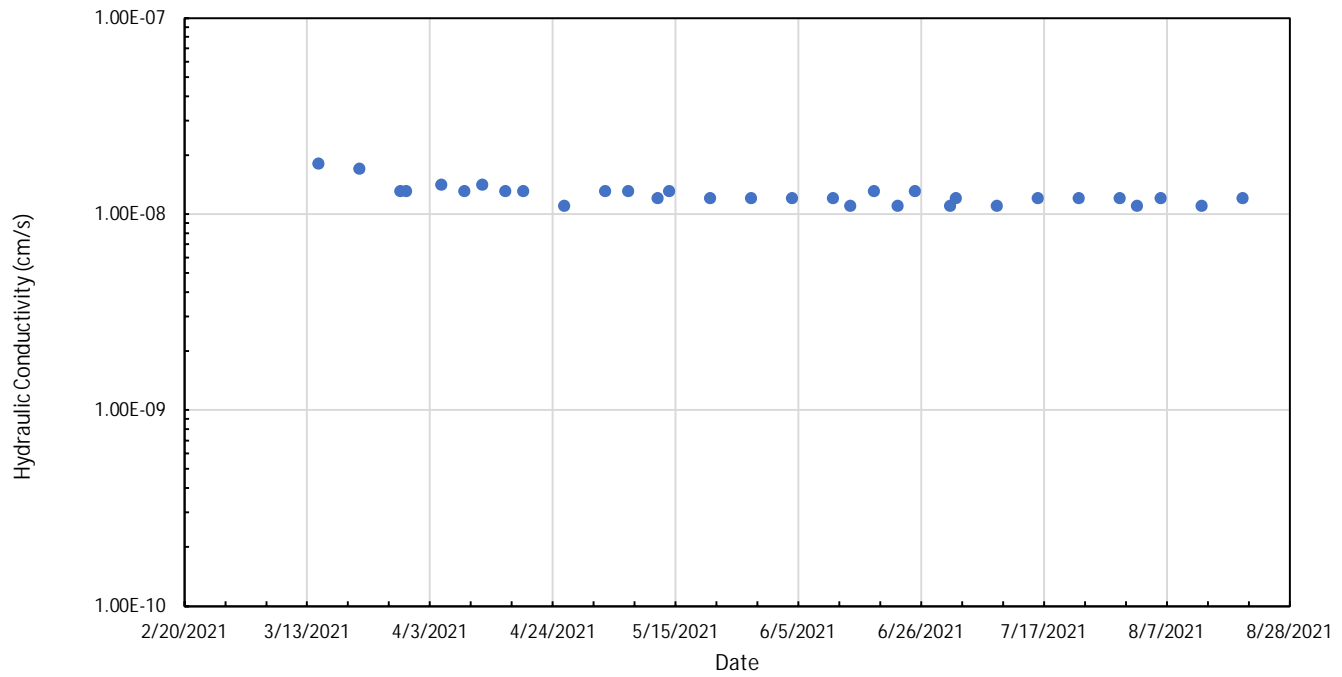


**Figure**

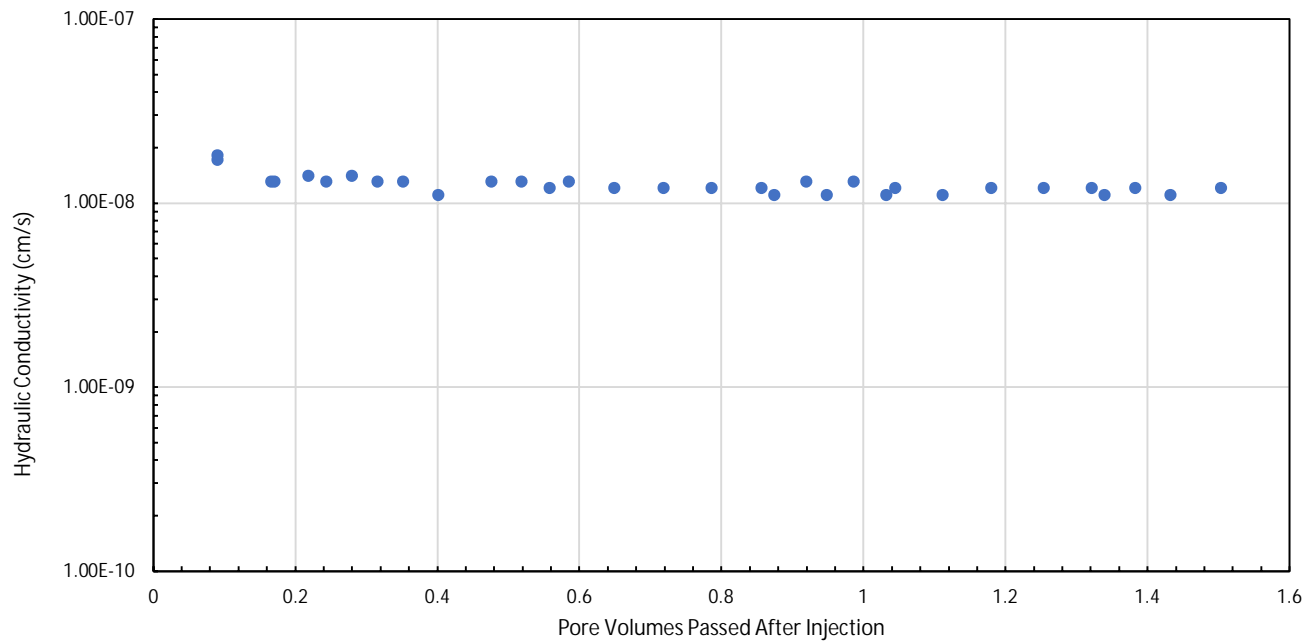
**3-7**

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<b>B2-ST-1 (1-3') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
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<b>Figure 3-8</b>	



**B2-ST-1 (1-3') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

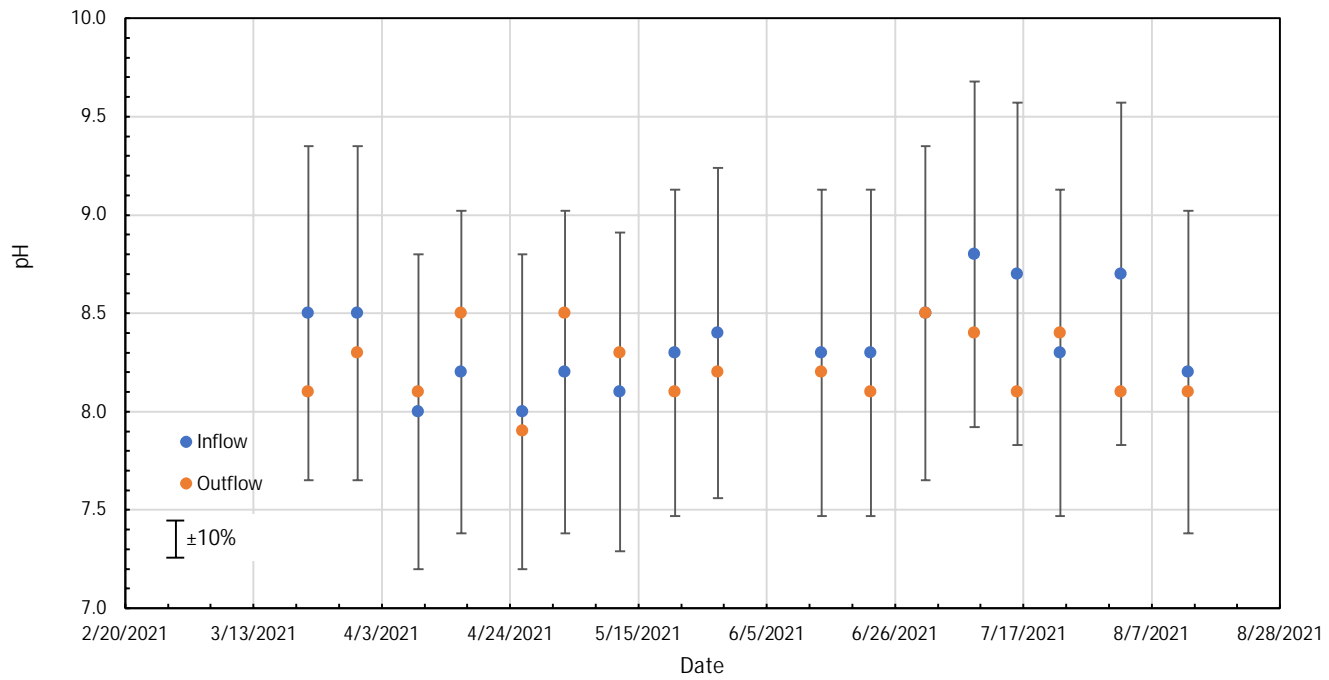


**Figure**

**3-9**

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**B2-ST-1 (1-3') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

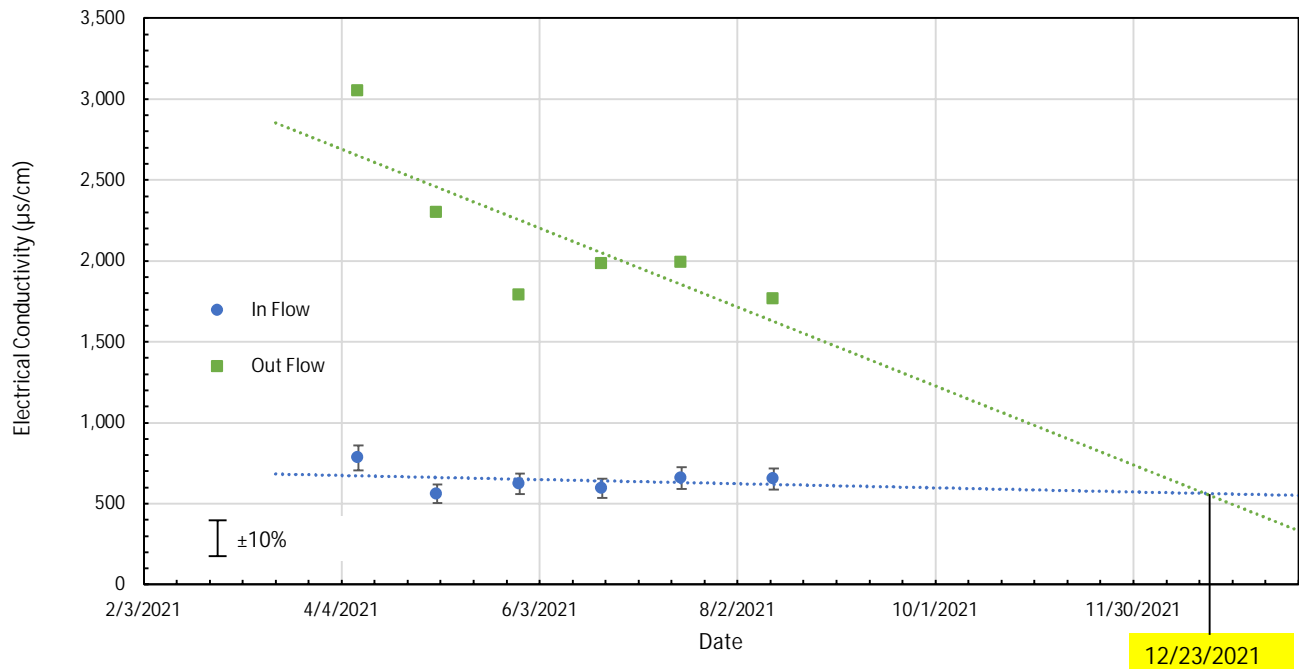


**Figure**

**3-10**

Ann Arbor, MI

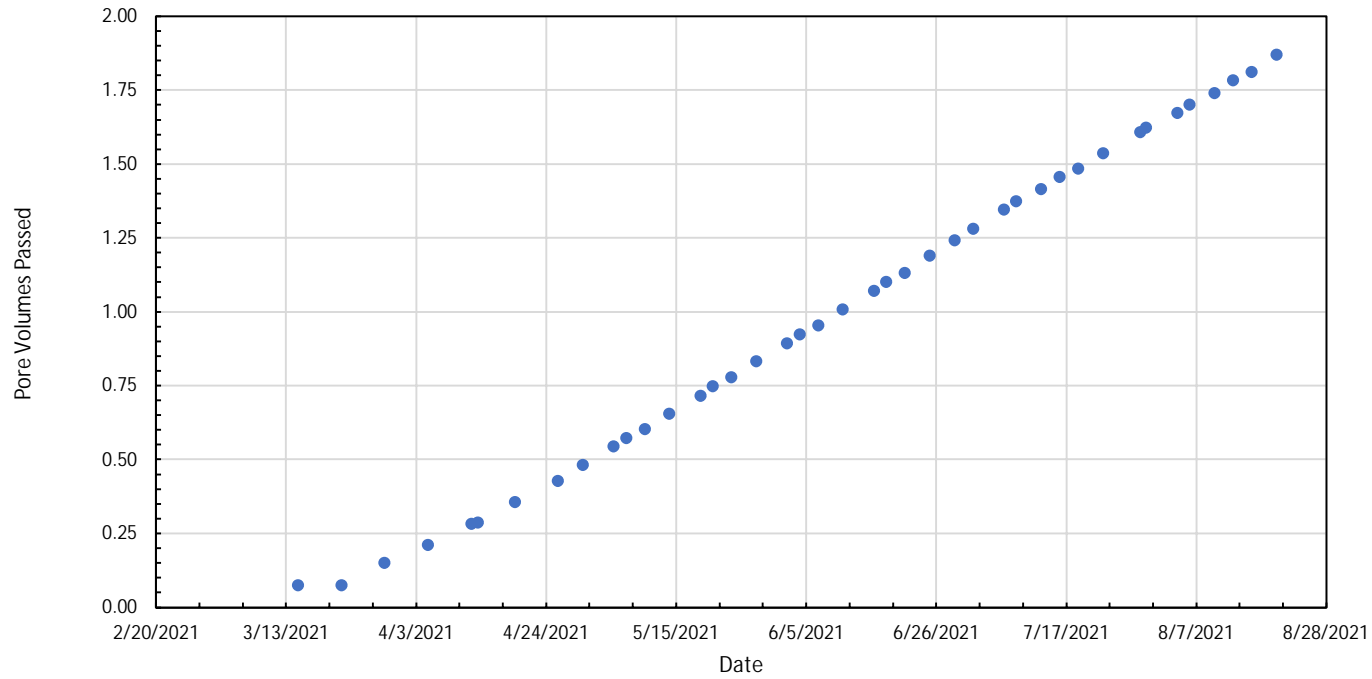
September 2021



12/23/2021

<b>B2-ST-1 (1-3') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-11</b>	





**B2-ST-4 (47-49') PV of Flow With Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

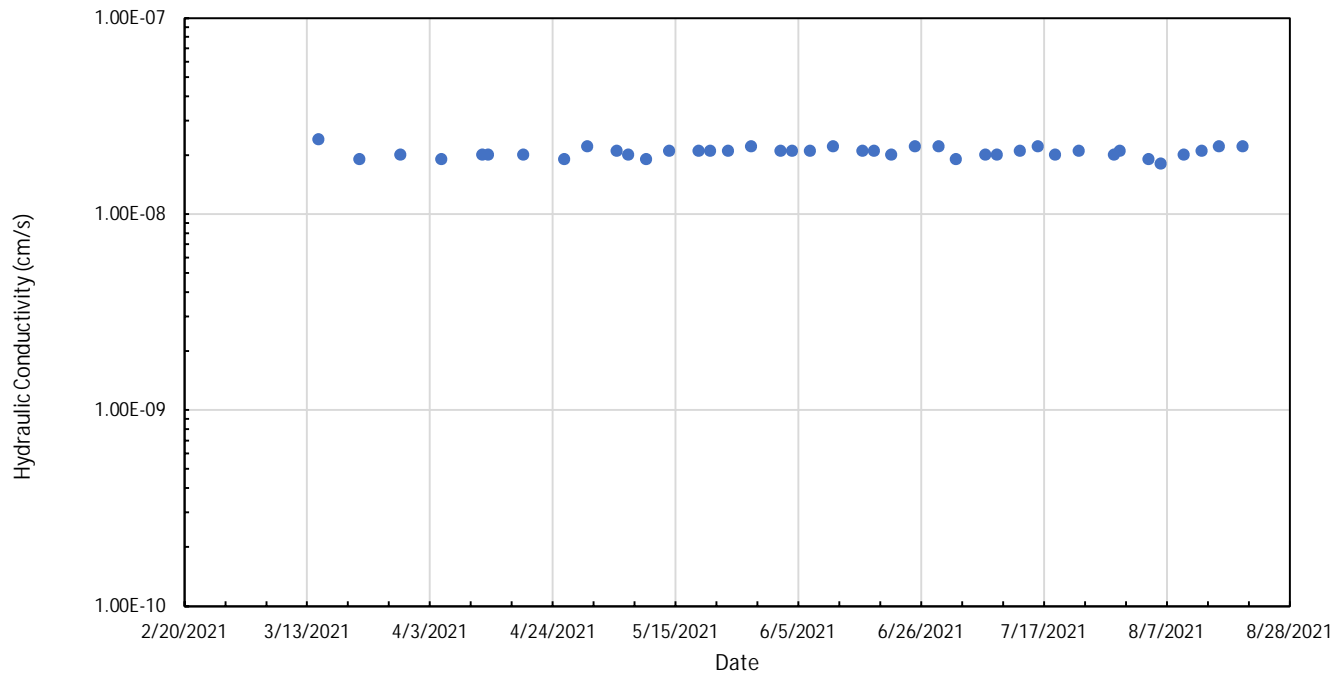


**Figure**

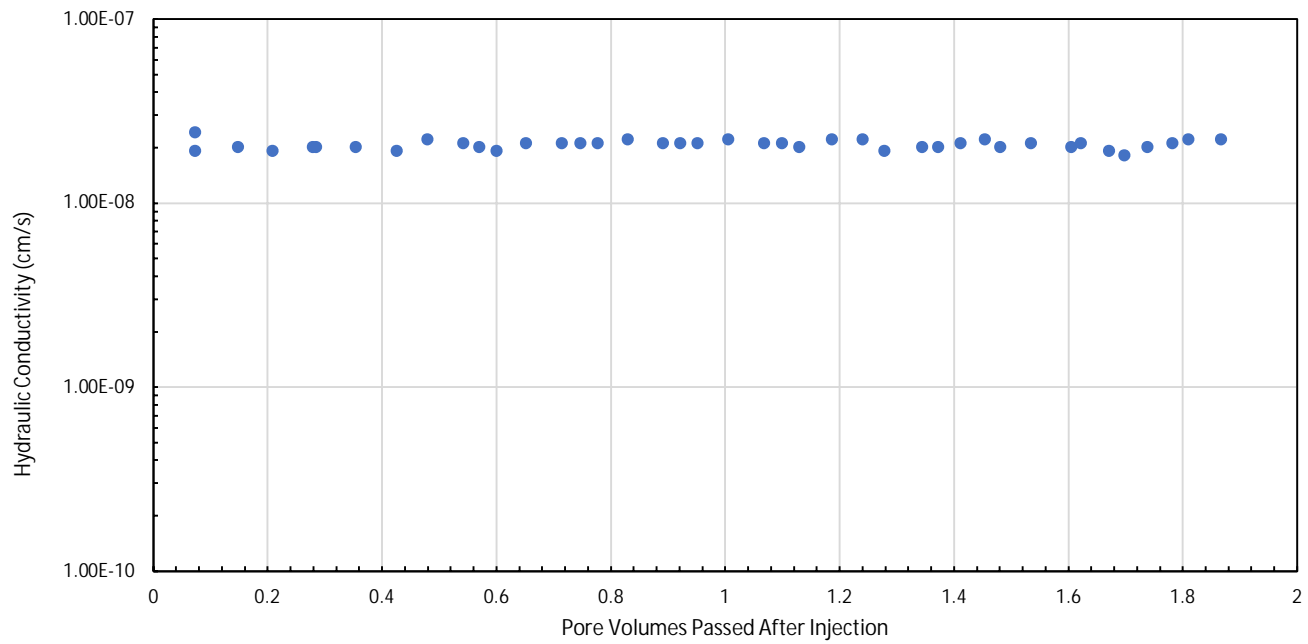
**3-12**

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September 2021



<b>B2-ST-4 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-13</b>	



**B2-ST-4 (47-49') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

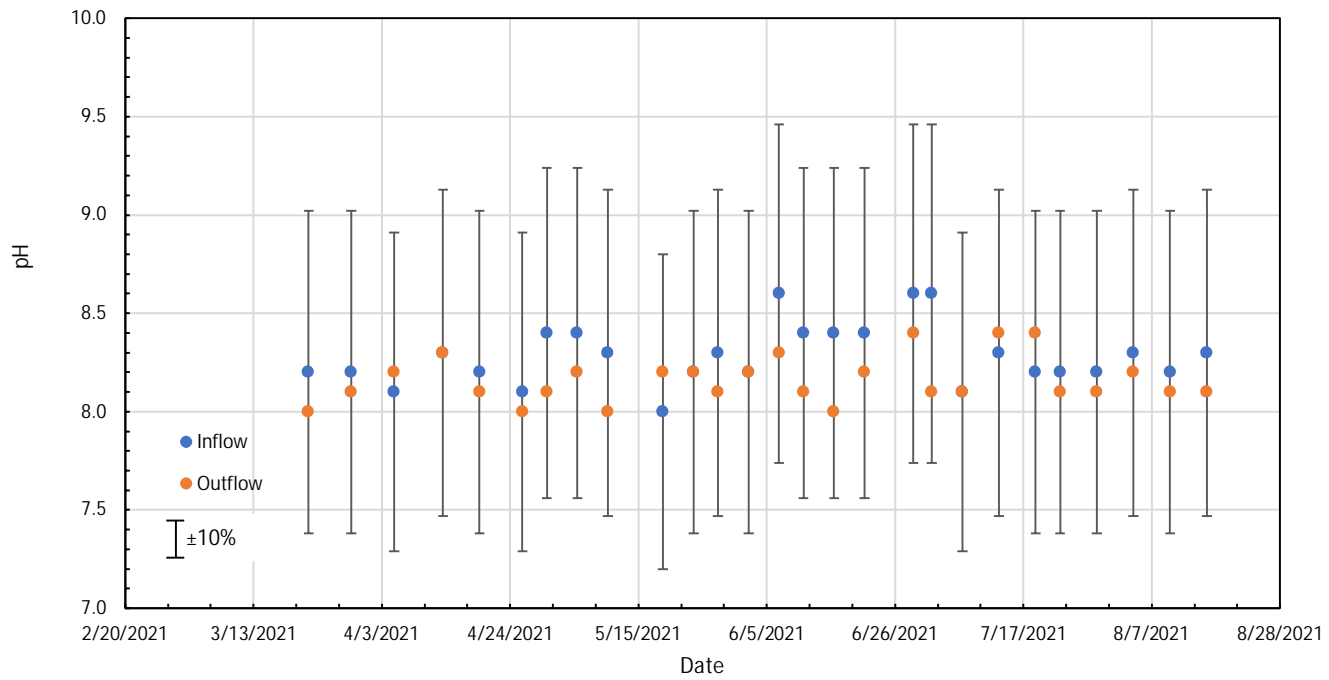


**Figure**

**3-14**

Ann Arbor, MI

September 2021



**B2-ST-4 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

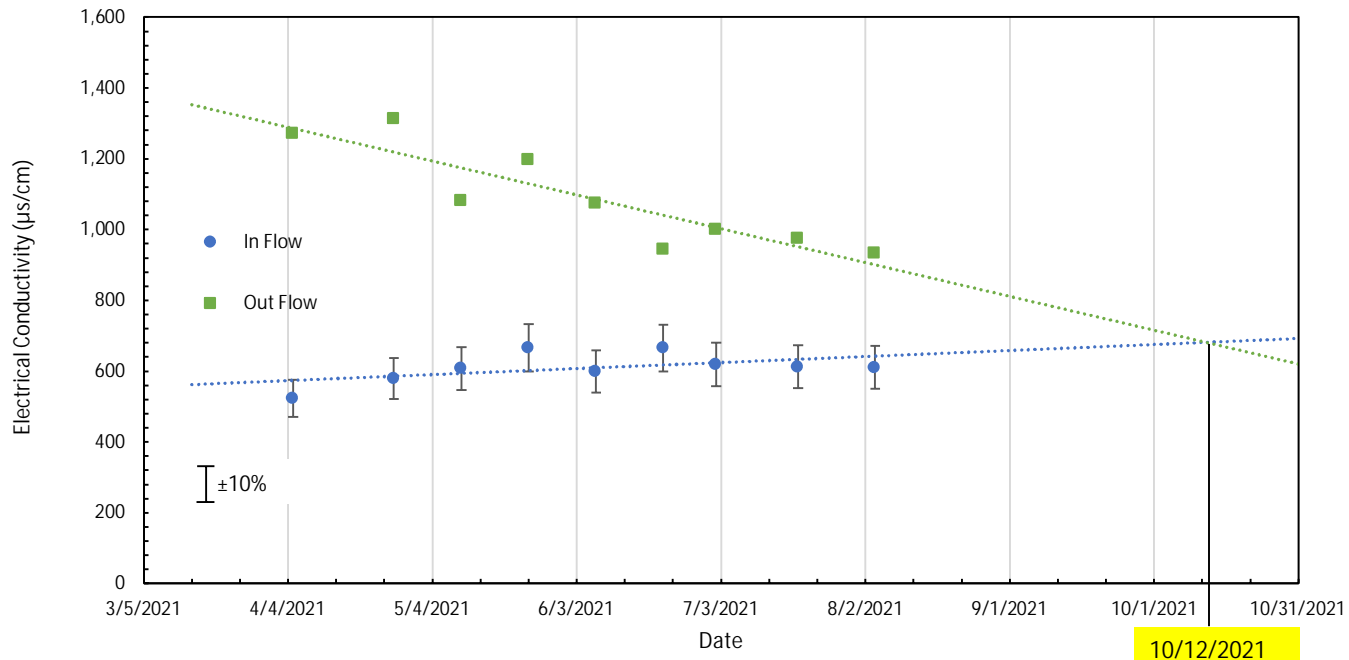


**Figure**

**3-15**

Ann Arbor, MI

September 2021



**B2-ST-4 (47-49') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

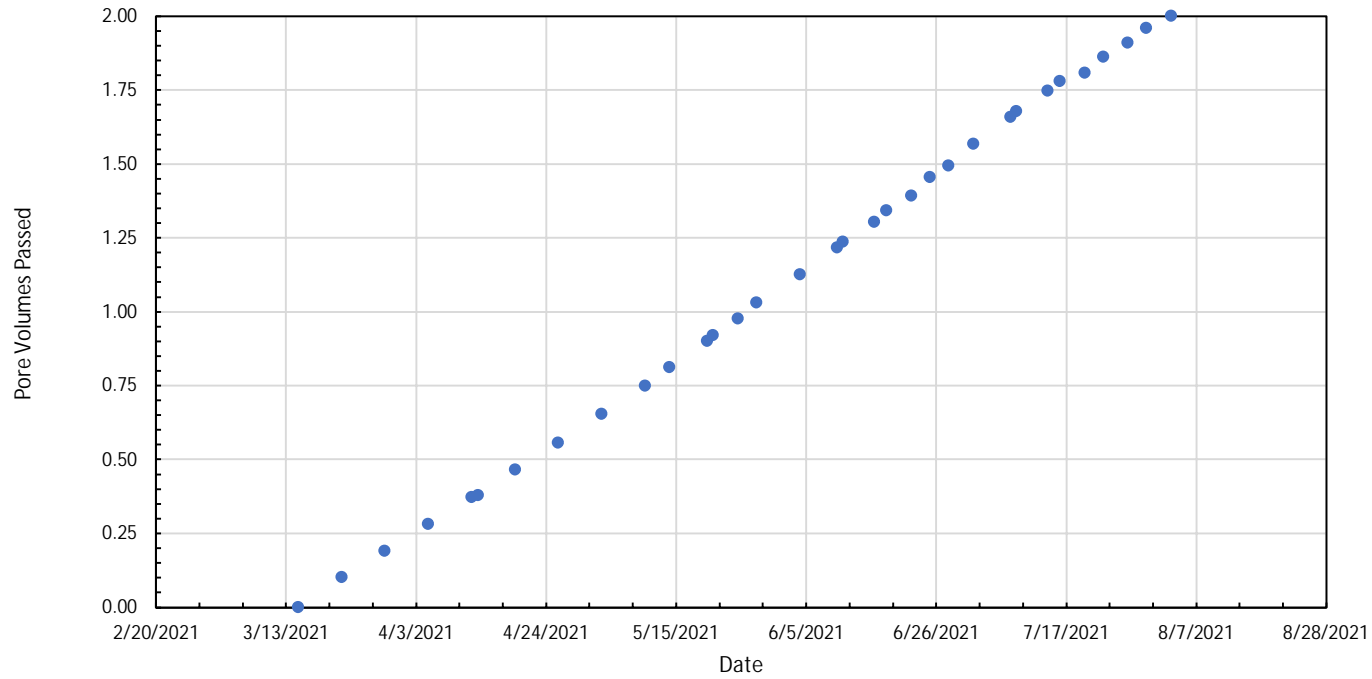


**Figure**

**3-16**

Ann Arbor, MI

September 2021



**B3-ST-5 (77-79') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

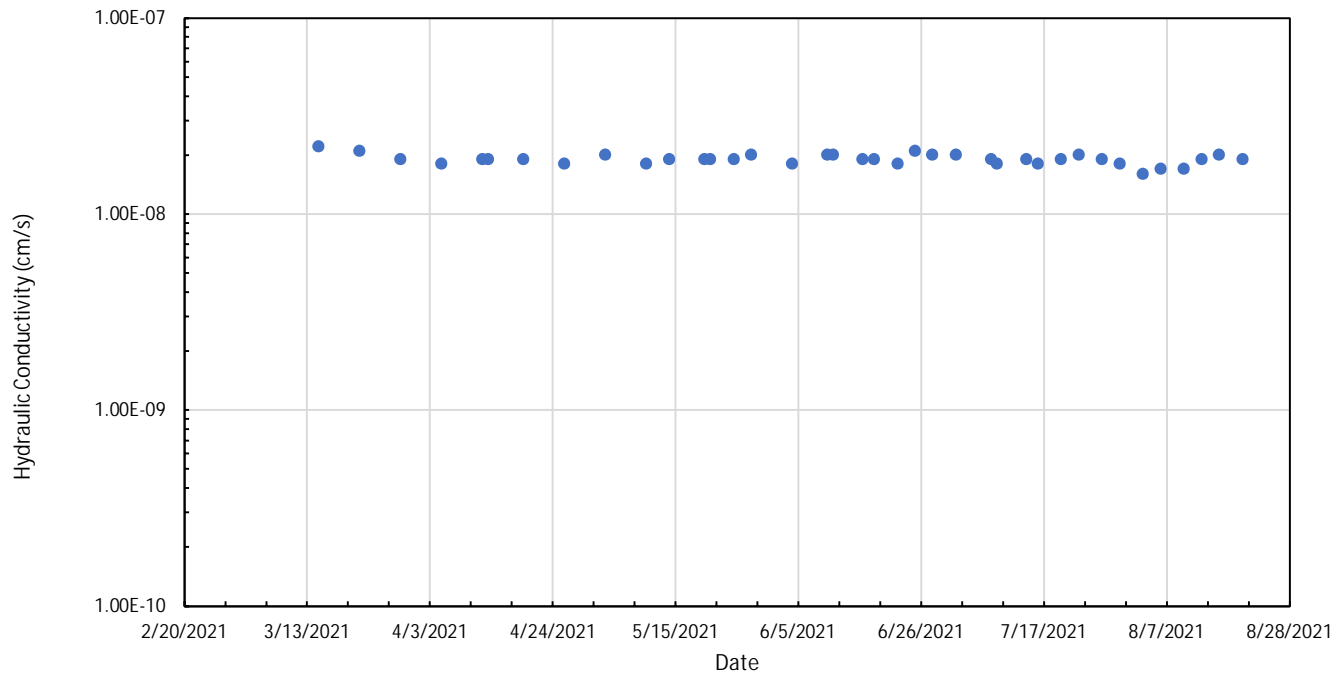


**Figure**

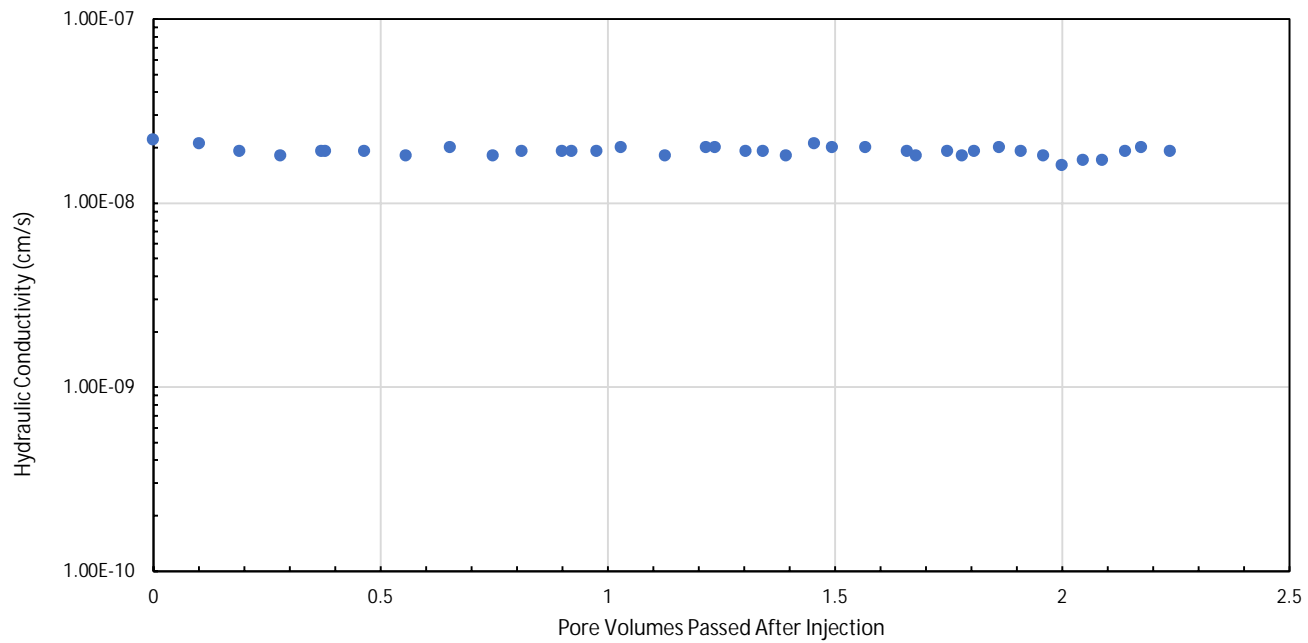
**3-17**

Ann Arbor, MI

September 2021



<b>B3-ST-5 (77-79') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI	<b>3-18</b>
September 2021	



**B3-ST-5 (77-79') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



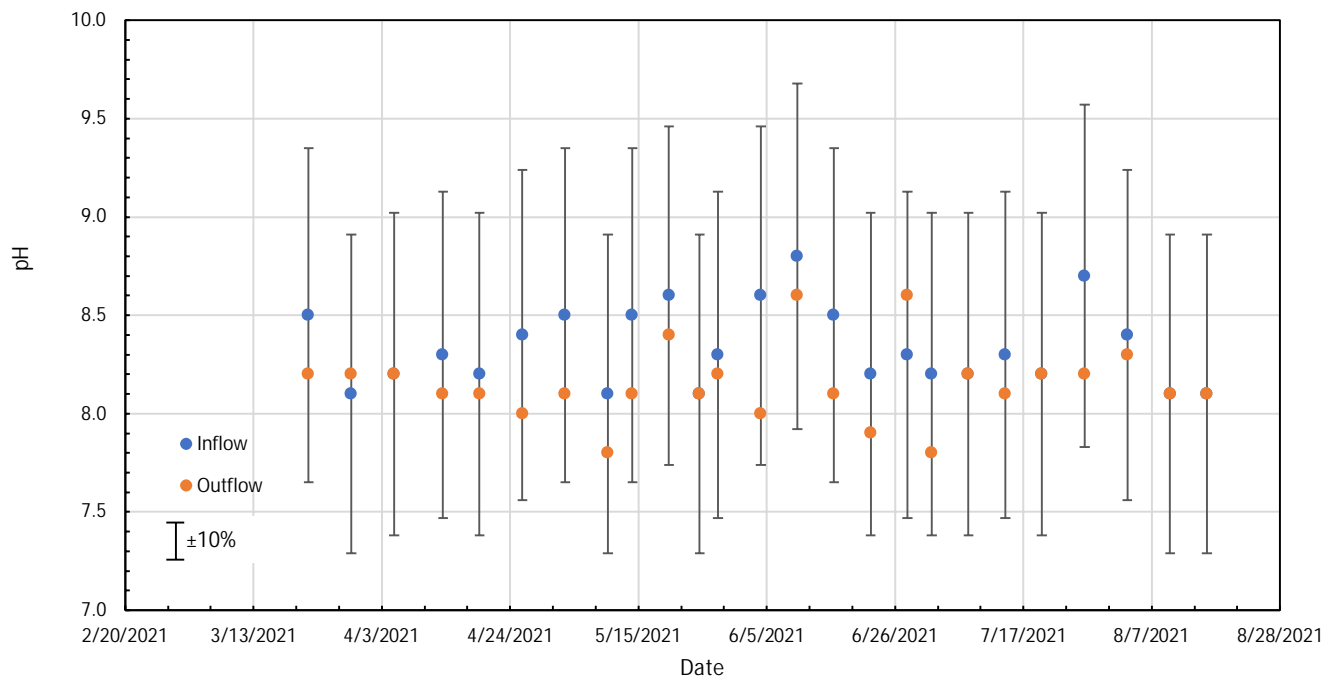
**Figure**

**3-19**

Ann Arbor, MI

September 2021





**B3-ST-5 (77-79') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

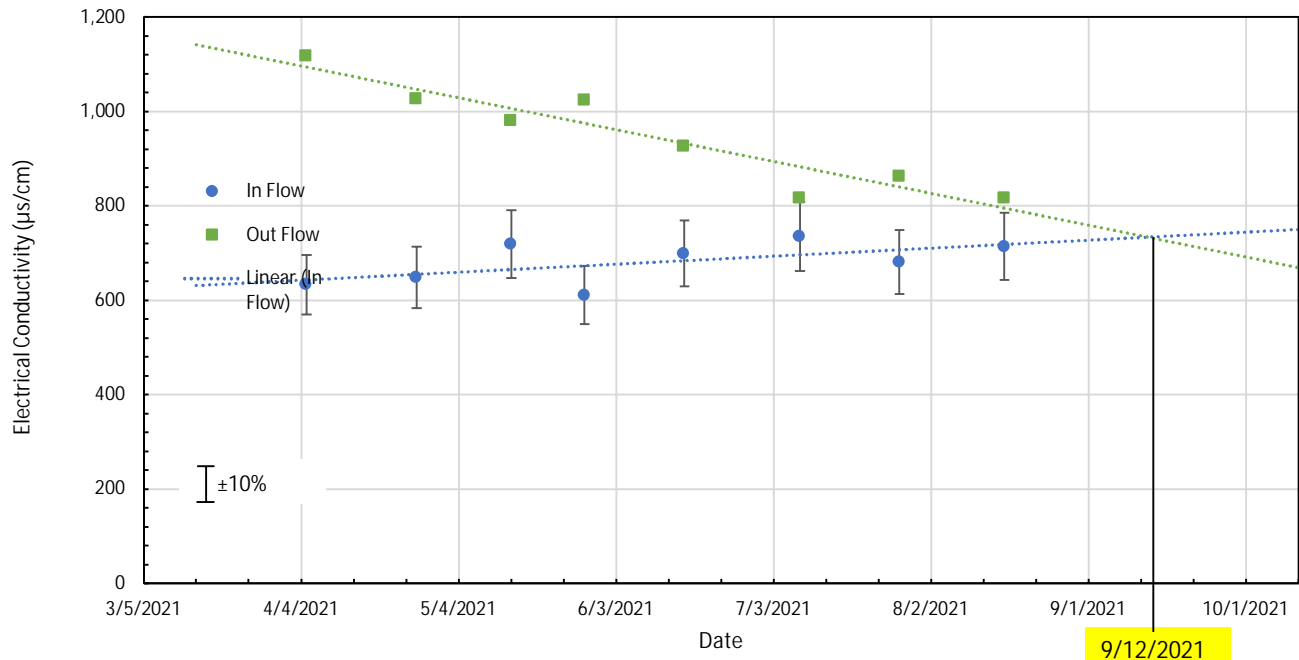


**Figure**

**3-20**

Ann Arbor, MI

September 2021



**B3-ST-5 (77-79') Electrical Conductivity (EC) with Time**

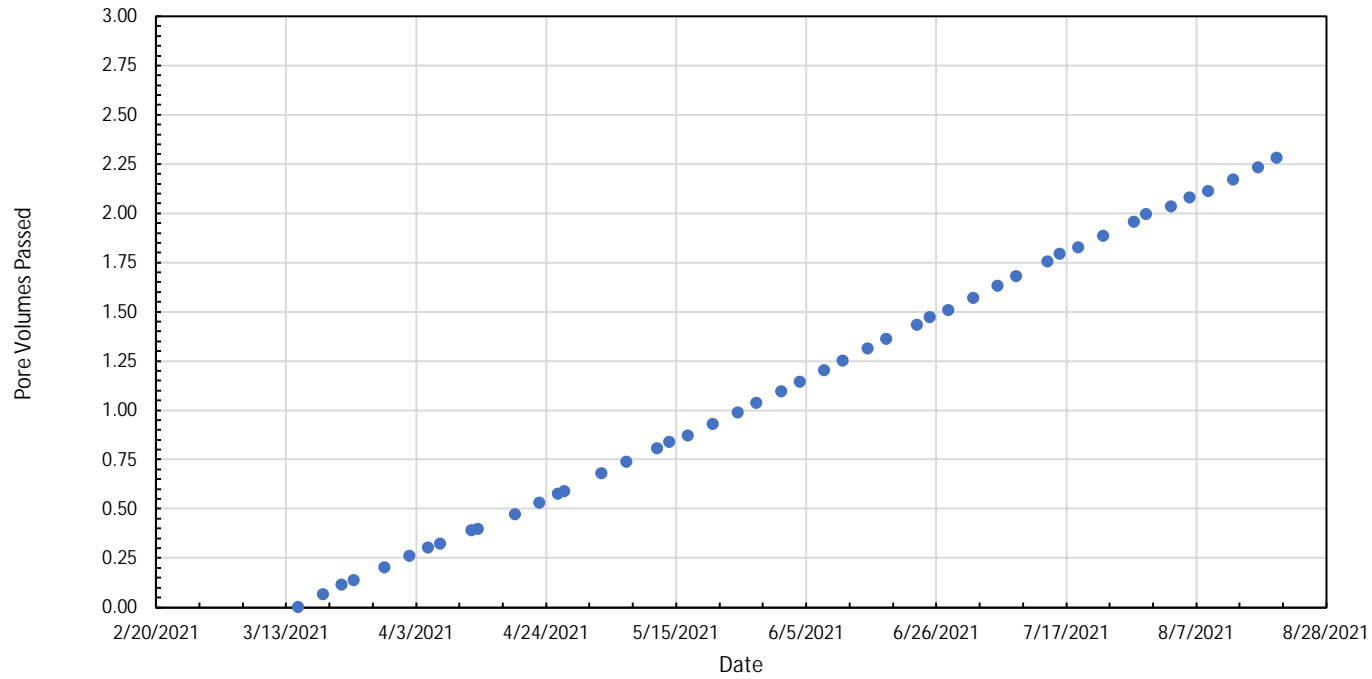
BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



**Figure**  
**3-21**

Ann Arbor, MI

September 2021



**B4-ST-3 (47-49') PV of Flow With Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

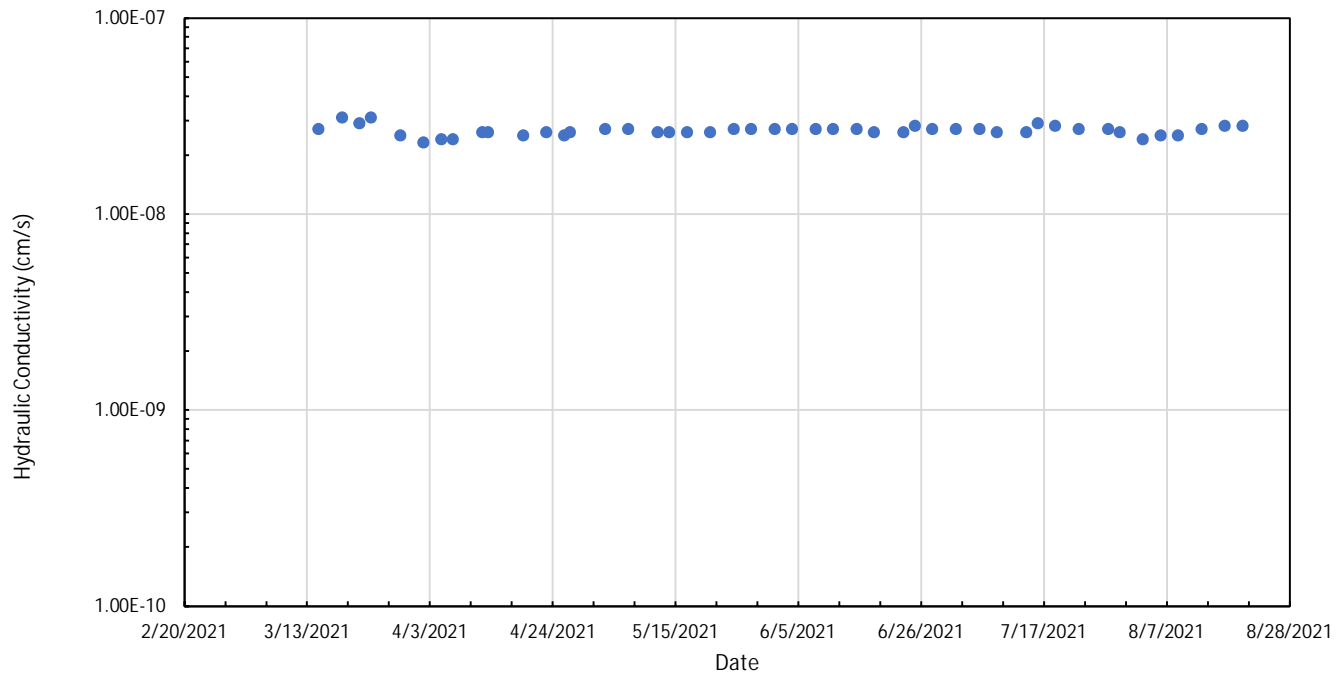


**Figure**

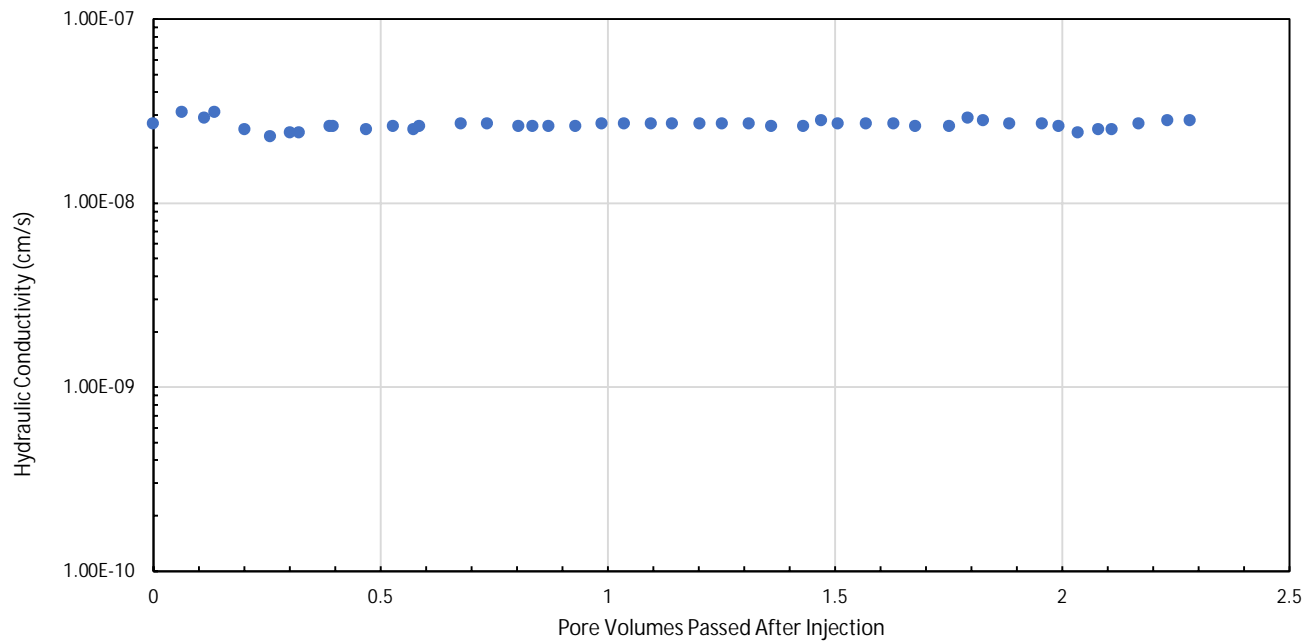
**3-22**

Ann Arbor, MI

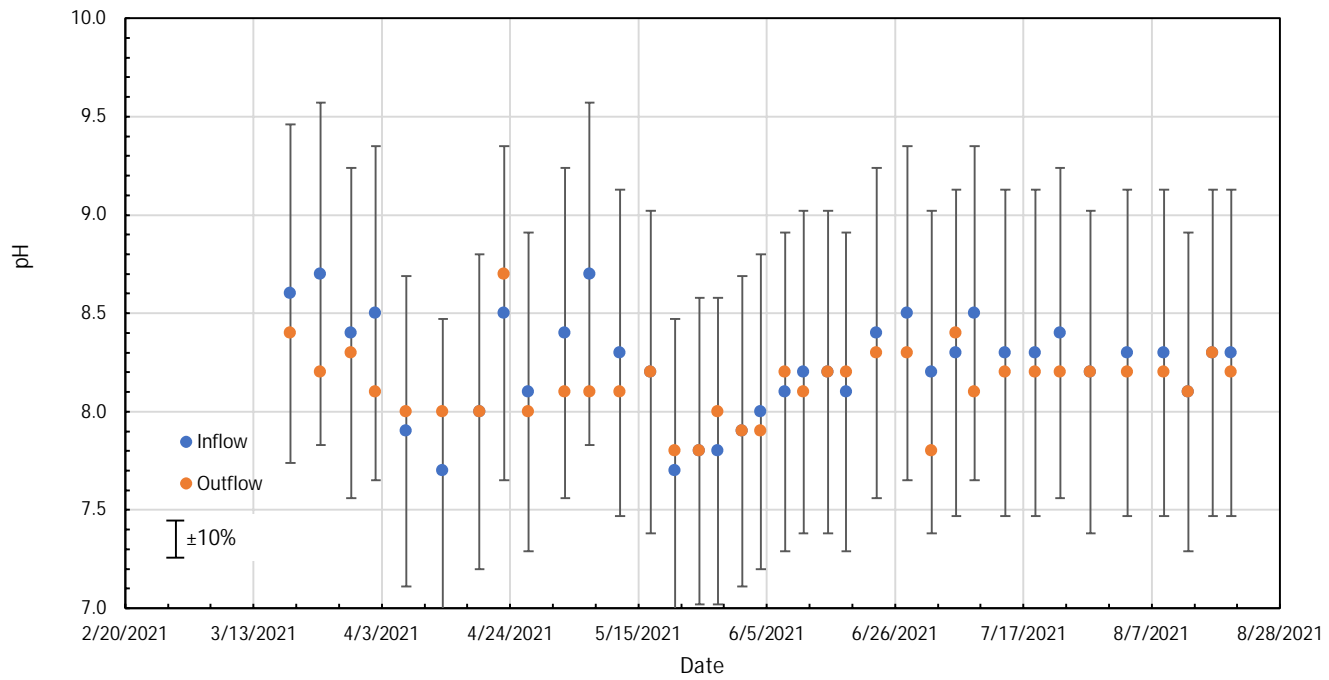
September 2021



<b>B4-ST-3 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI	<b>3-23</b>
September 2021	



<b>B4-ST-3 (47-49') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
Ann Arbor, MI	<b>Figure</b>  <b>3-24</b>
September 2021	



**B4-ST-3 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

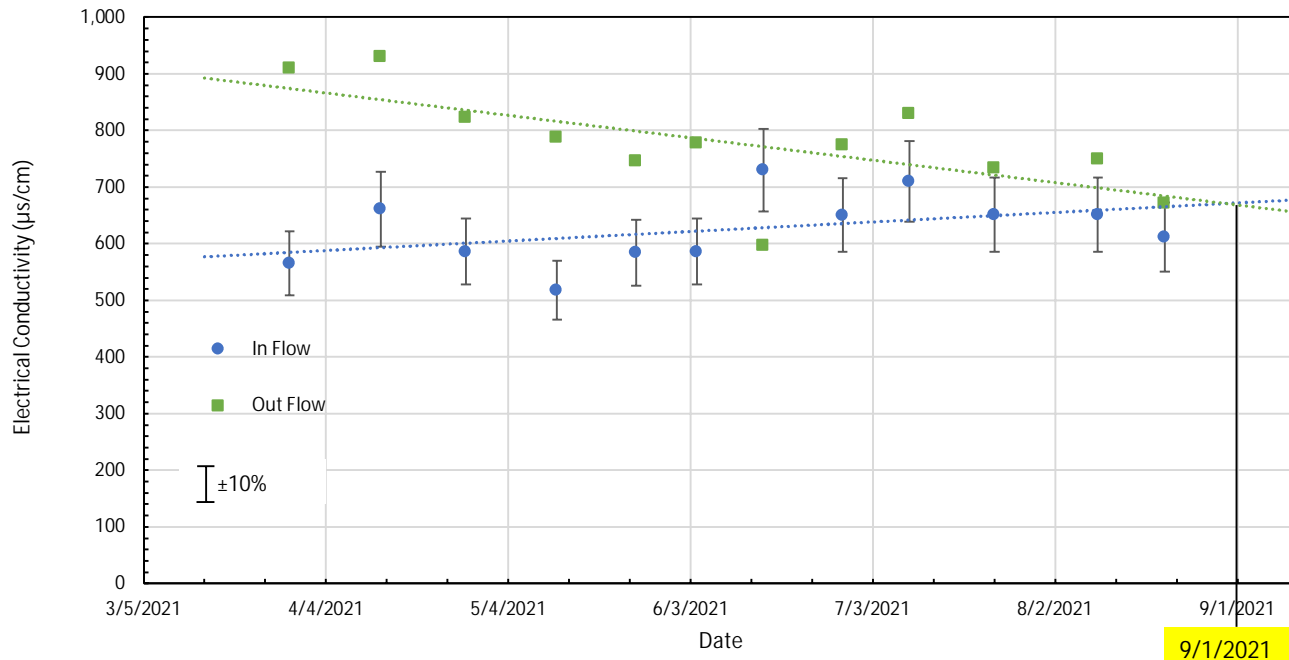


**Figure**

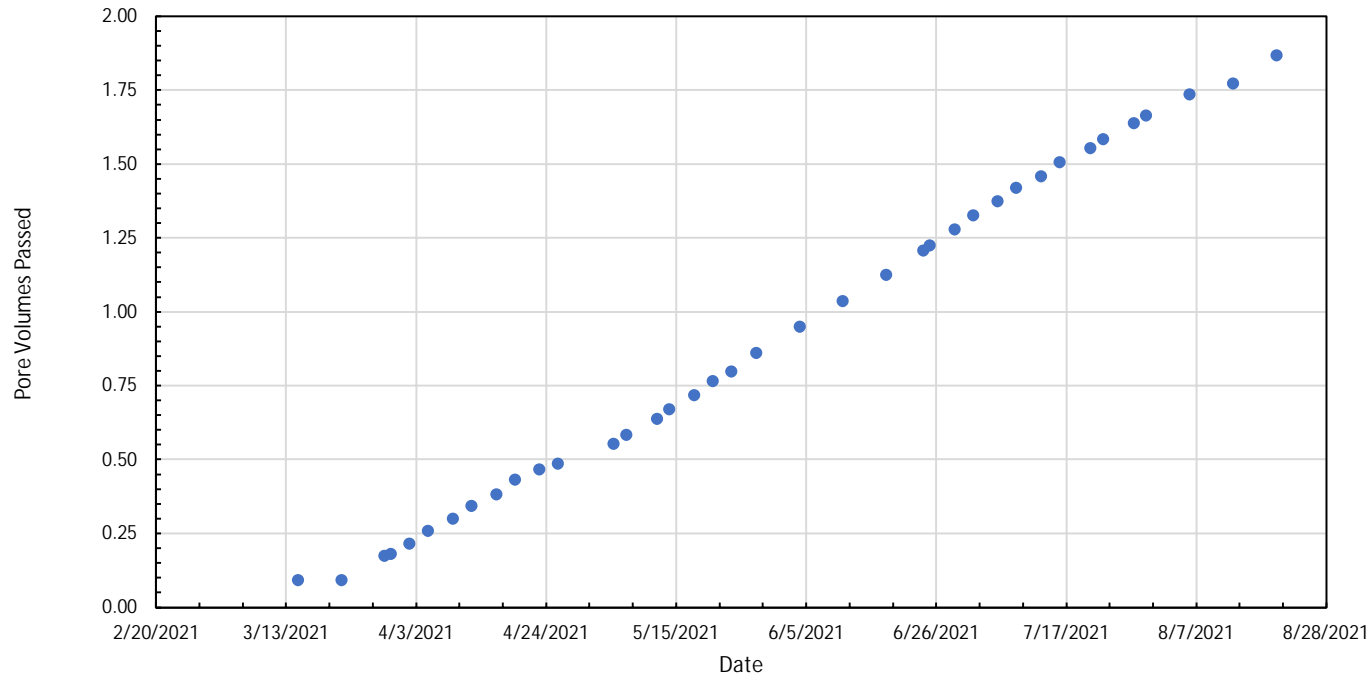
**3-25**

Ann Arbor, MI

September 2021



<b>B4-ST-3 (47-49') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-26</b>	



**B5-ST-5 (87-89') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



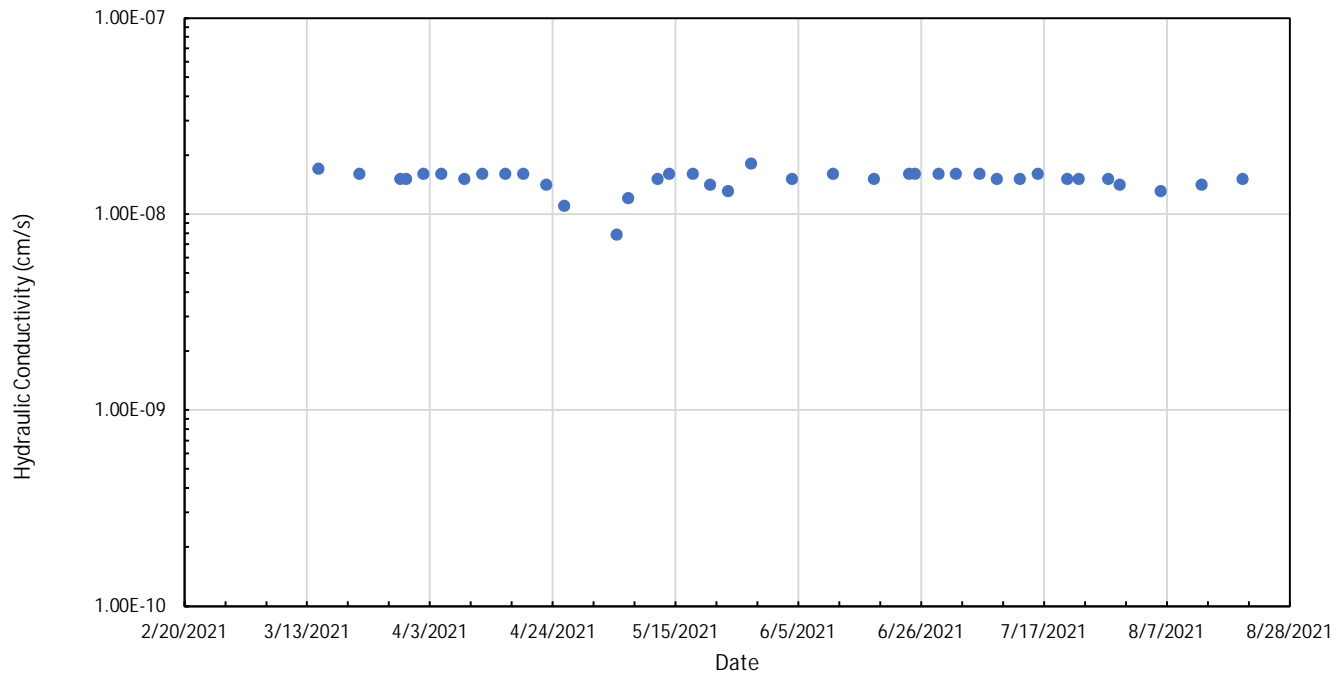
**Figure**

**3-27**

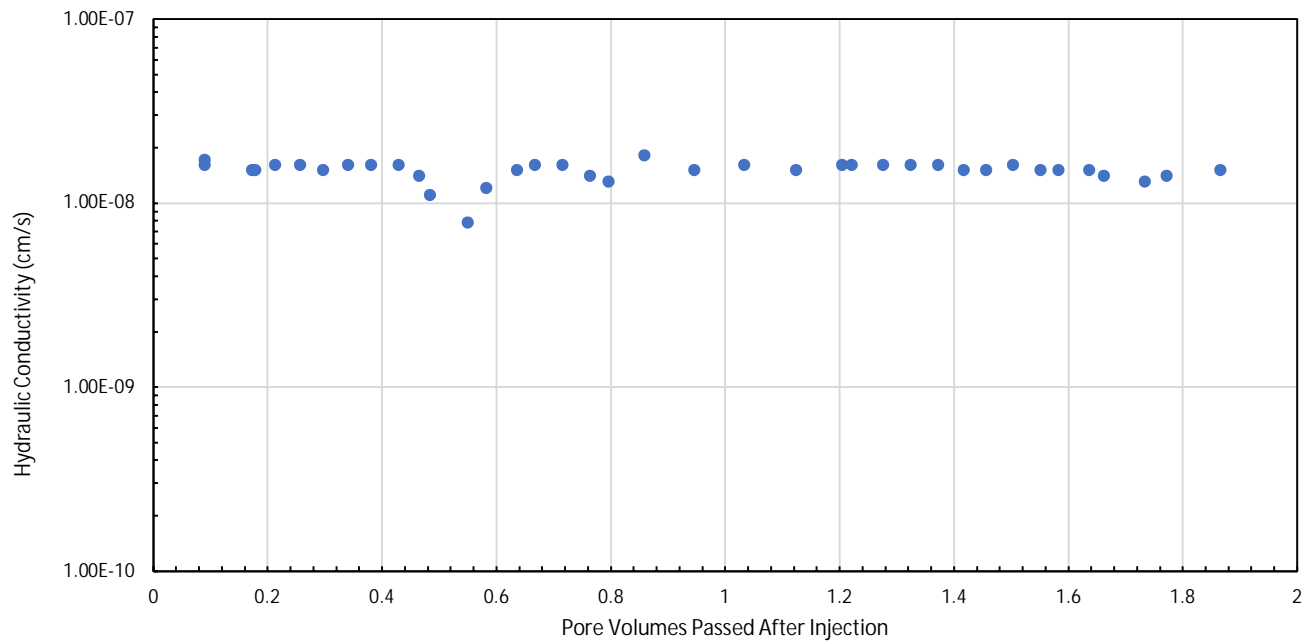
Ann Arbor, MI

September 2021

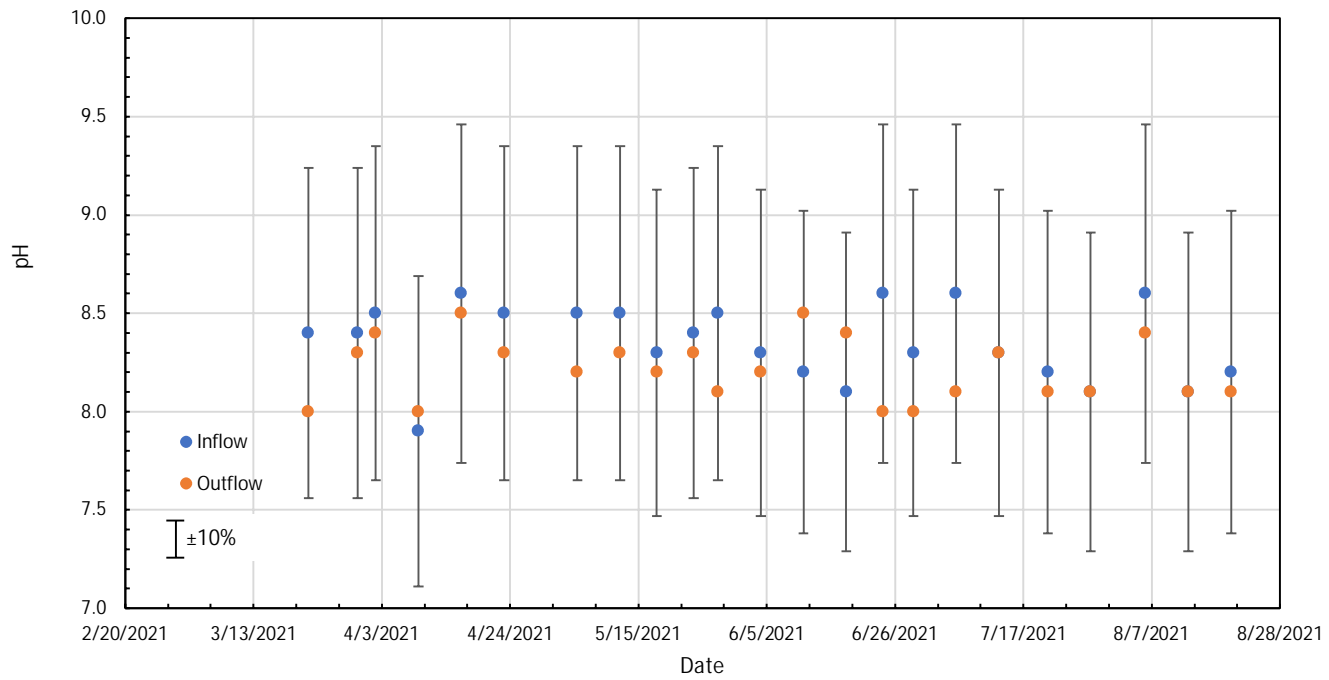




<b>B5-ST-5 (87-89') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-28</b>	



<b>B5-ST-5 (87-89') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI	<b>3-29</b>
September 2021	



**B5-ST-5 (87-89') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

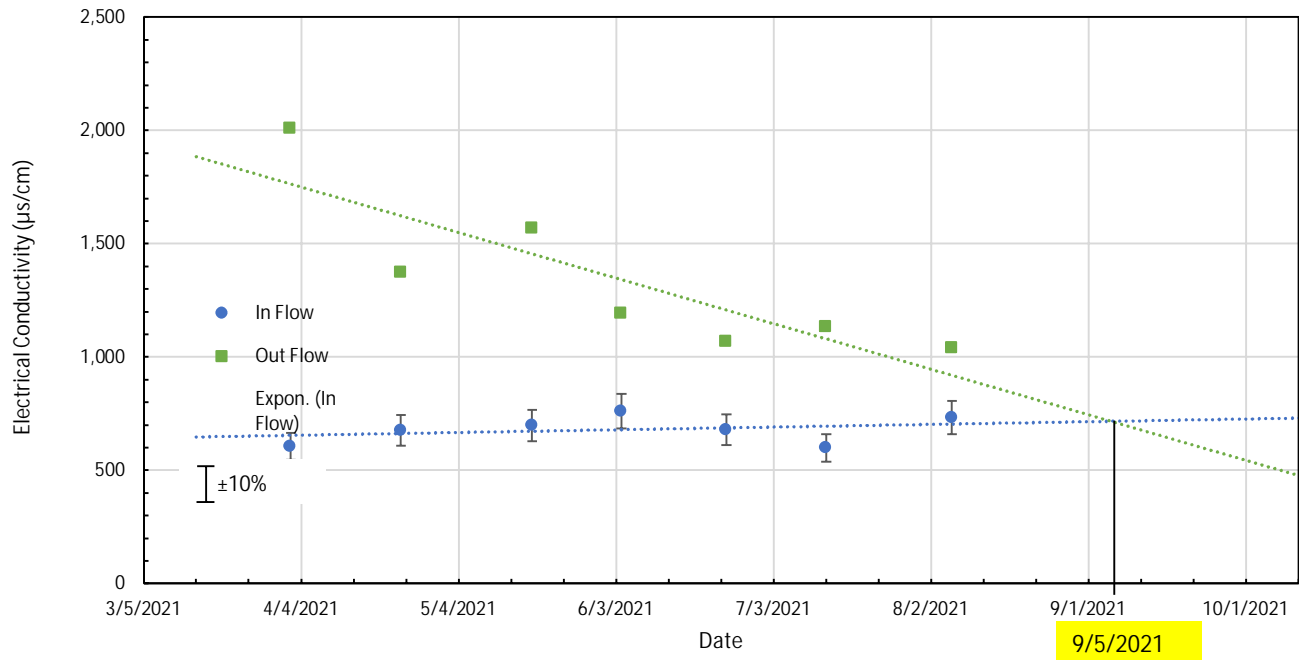


**Figure**

**3-30**

Ann Arbor, MI

September 2021



**B5-ST-5 (87-89') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



**Figure**  
**3-31**

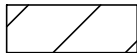
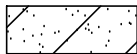
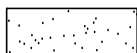
Ann Arbor, MI

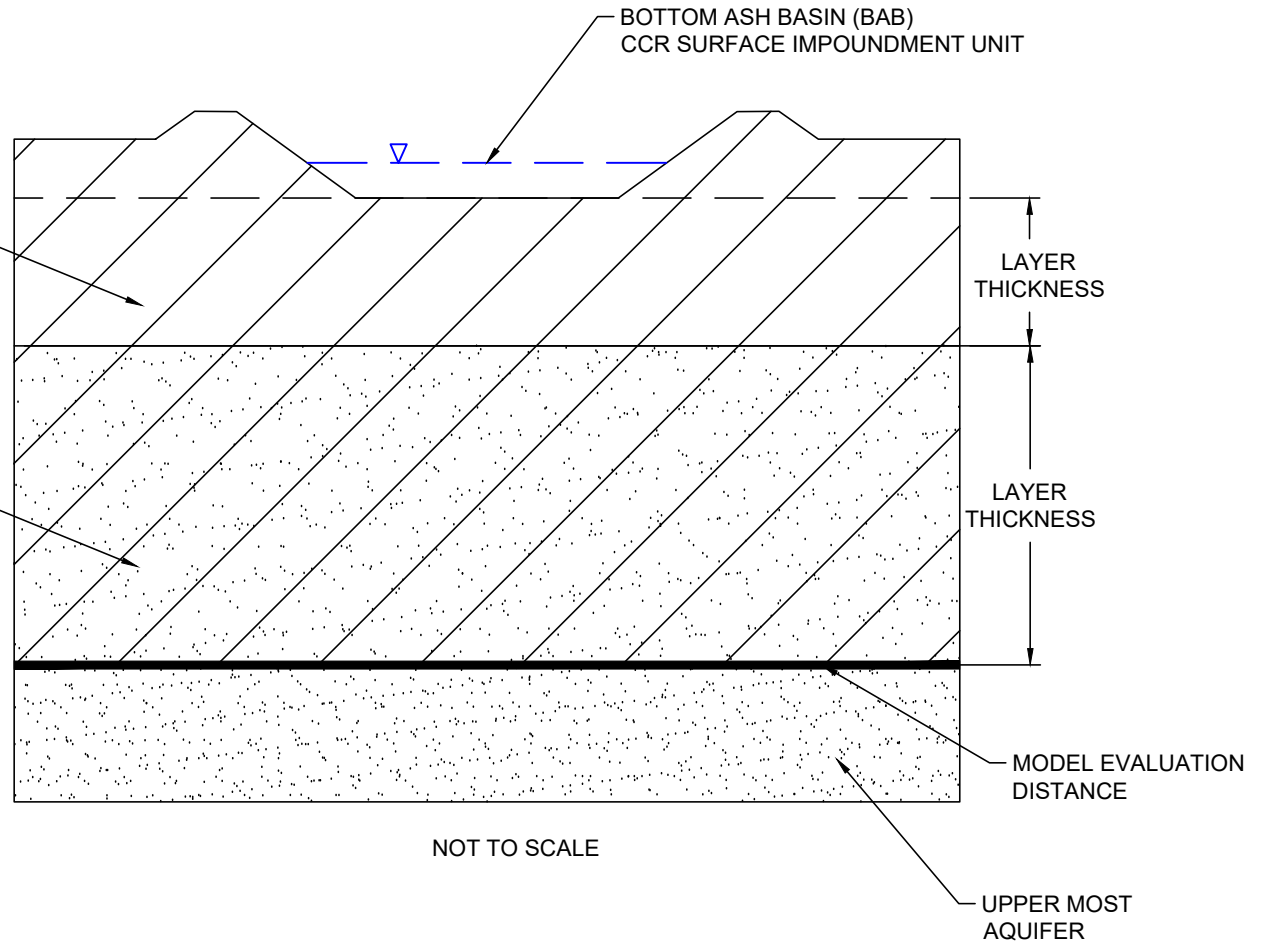
September 2021


CLAY LAYER - LAYER 1		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	12.01
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.42
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>2</sup> /KG	0
DEGRADATION		0

CLAY WITH SAND LAYER - LAYER 2		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	19.29
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.51
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>2</sup> /KG	0
DEGRADATION		0

**LEGEND**

-  CLAY UNIT
-  CLAY WITH SAND UNIT
-  UPPER MOST AQUIFER



<p><b>FIGURE 4-1</b>  <b>FATE AND TRANSPORT</b>  <b>CONCEPTUAL MODEL</b>  <b>BELLE RIVER ALD - BAB</b></p>	
	<p>FIGURE 4-1</p>
PROJECT NO: GLP8017	AUGUST 2021

**Appendix A**  
**Monitoring Well Slug Test Results**

## **2016 Slug Test Results**

**Hydraulic Conductivity Results**  
DTE Electric Company Belle River Power Plant  
ChinaTownship, Michigan

Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01b	3/1/2016	Falling Head	3.58E-04	1.015
		Rising Head	2.72E-04	0.770
		<b>Average</b>	<b>3.15E-04</b>	<b>0.892</b>
MW-16-04	3/1/2016	Falling Head	7.93E-05	0.225
		Rising Head	4.11E-05	0.116
		<b>Average</b>	<b>6.02E-05</b>	<b>0.171</b>
MW-16-05	3/1/2016	Falling Head	4.26E-05	0.121
		Rising Head	2.13E-05	0.060
		<b>Average</b>	<b>3.19E-05</b>	<b>0.090</b>
MW-16-07	3/1/2016	Falling Head	1.24E-04	0.350
		Rising Head	7.21E-05	0.204
		<b>Average</b>	<b>9.79E-05</b>	<b>0.277</b>
<b>Minimum</b>			<b>3.19E-05</b>	<b>9.05E-02</b>
<b>Maximum</b>			<b>3.15E-04</b>	<b>8.92E-01</b>
<b>Geometric Mean</b>			<b>8.77E-05</b>	<b>0.249</b>

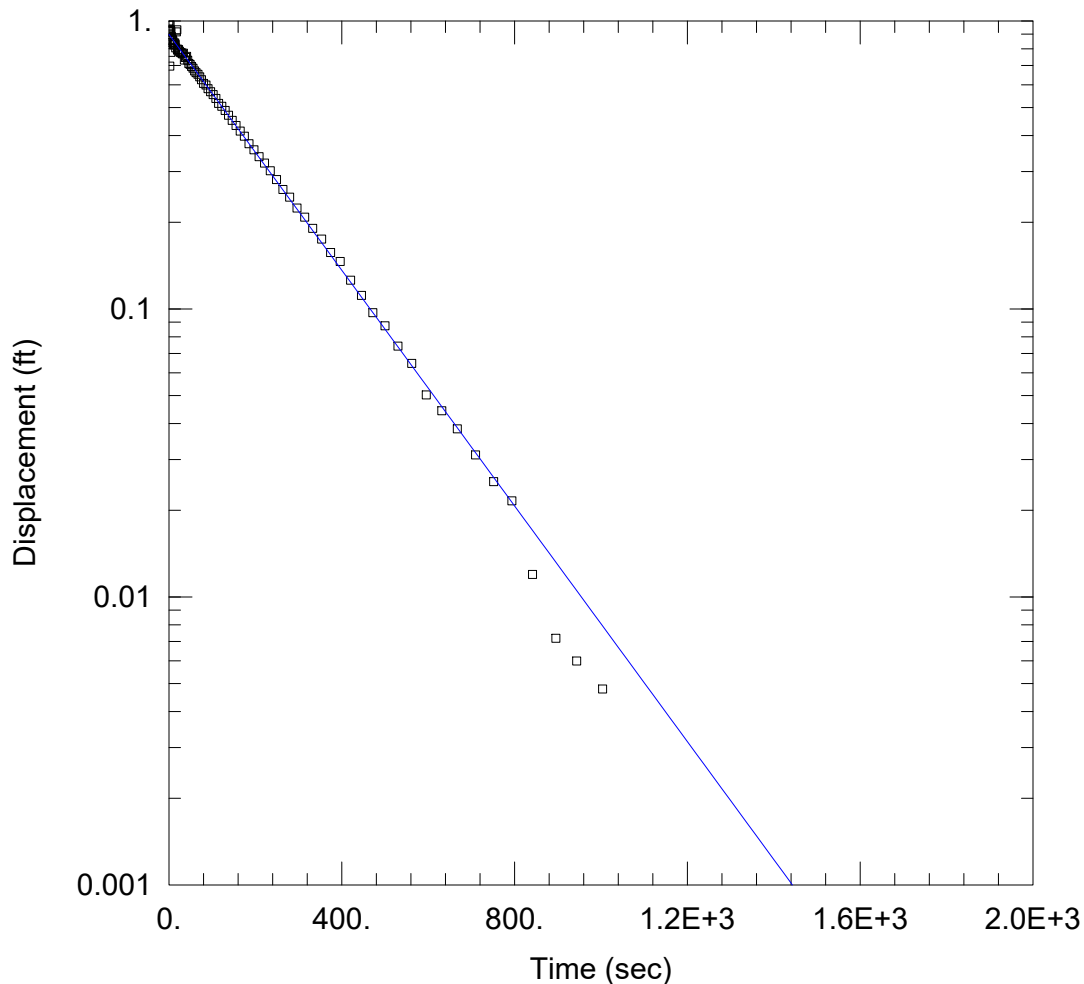
**Conversion:**

$$\frac{1 \text{ cm}}{1 \text{ sec}} \times \frac{86,400 \text{ sec}}{1 \text{ day}} \times \frac{1 \text{ ft}}{30.48 \text{ cm}} = 2.83\text{E}+03 \frac{\text{ft}}{\text{day}}$$

**Notes:**

Slug test results calculated using the Bower-Rice (1976) Solution.





MW-16-01 FALLING HEAD SLUG TEST

Data Set: P:\...\\MW-16-01\_IN.aqt

Date: 05/22/17

Time: 13:38:07

PROJECT INFORMATION

Company: TRC Environmental Corporation

Client: DTE EC BRPP CCR

Project: 231828.0003.0000

Location: China Township, MI

Test Well: MW-16-01

Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

WELL DATA (MW-16-01)

Initial Displacement: 0.835 ft

Static Water Column Height: 84.12 ft

Total Well Penetration Depth: 84.12 ft

Screen Length: 5. ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

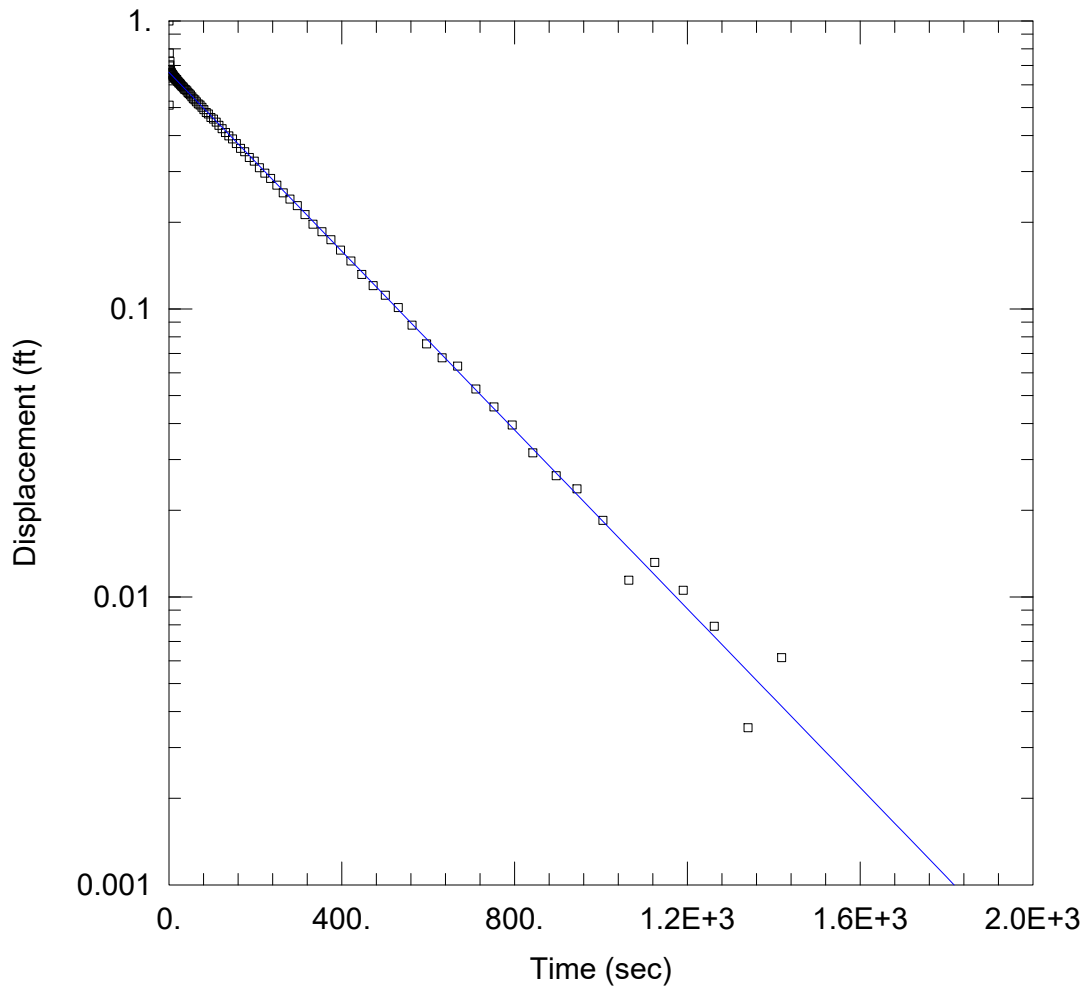
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

$K = 0.0003581$  cm/sec

$y_0 = 0.7491$  ft



MW-16-01 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_OUT.aqt

Date: 05/22/17

Time: 13:40:08

PROJECT INFORMATION

Company: TRC Environmental Corporation

Client: DTE EC BRPP CCR

Project: 231828.0003.0000

Location: China Township, MI

Test Well: MW-16-01

Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

Initial Displacement: 1.138 ft

Static Water Column Height: 84.07 ft

Total Well Penetration Depth: 84.07 ft

Screen Length: 5. ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

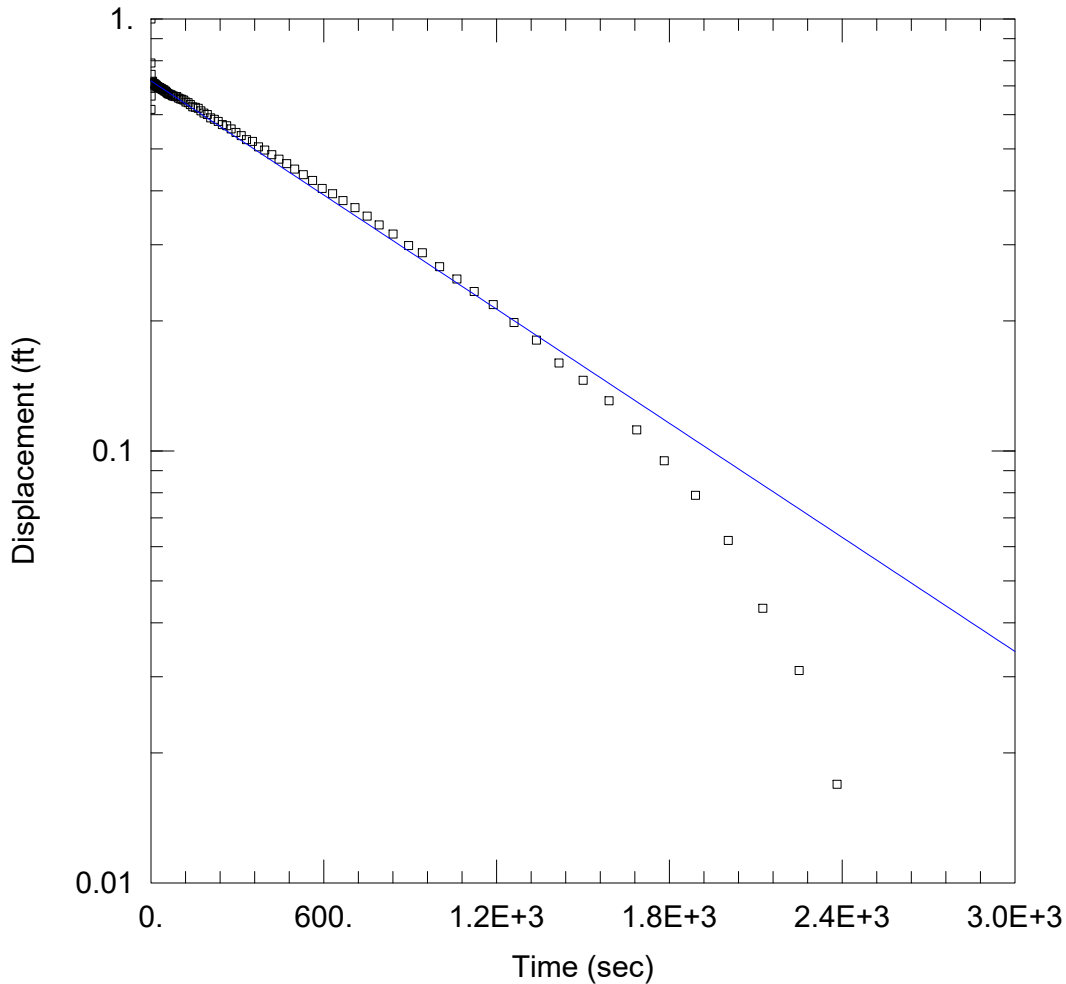
SOLUTION

Aquifer Model: Confined

Solution Method: Bowser-Rice

K = 0.0002716 cm/sec

y0 = 0.7541 ft



MW-16-04 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_IN.aqt  
 Date: 05/22/17

Time: 13:41:00

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

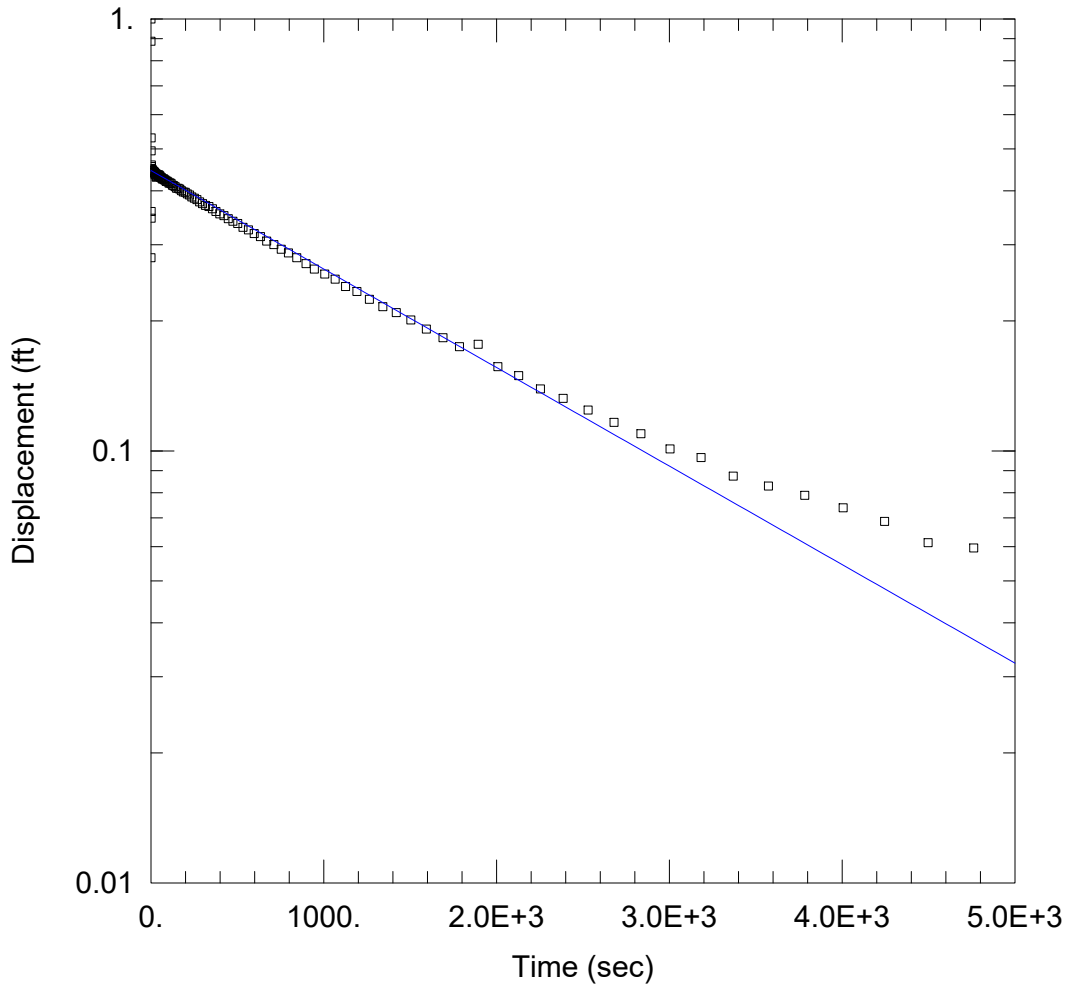
Initial Displacement: 1.064 ft  
 Total Well Penetration Depth: 109.9 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.9 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.93E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7646 ft



MW-16-04 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_OUT.aqt  
Date: 05/22/17

Time: 13:42:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
Client: DTE EC BRPP CCR  
Project: 231828.0003.0000  
Location: China Township, MI  
Test Well: MW-16-04  
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

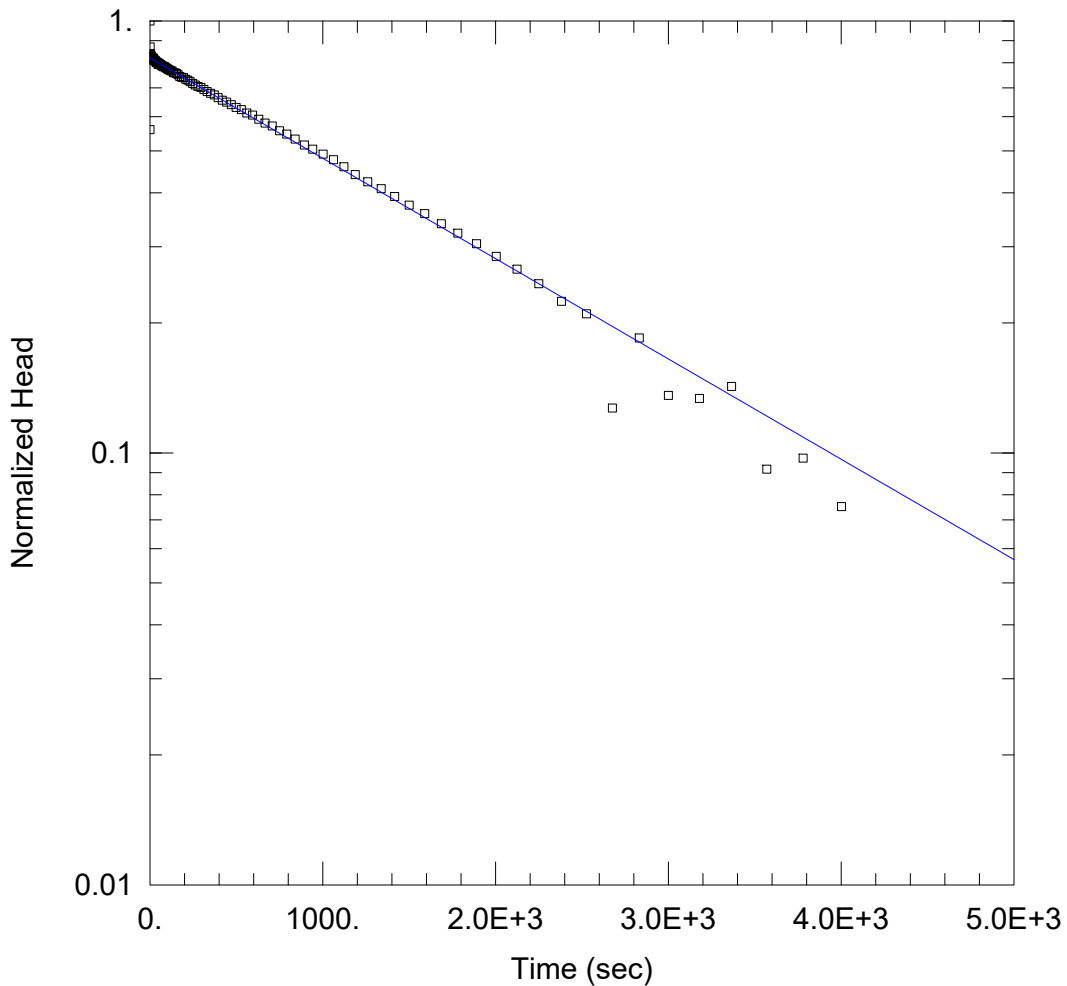
Initial Displacement: 1.761 ft  
Total Well Penetration Depth: 109.7 ft  
Casing Radius: 0.08333 ft

Static Water Column Height: 109.7 ft  
Screen Length: 5. ft  
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
K = 4.108E-5 cm/sec

Solution Method: Bowser-Rice  
y0 = 0.7851 ft



MW-16-05 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-05\_IN.aqt  
 Date: 05/22/17

Time: 13:42:57

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003  
 Location: China Township, MI  
 Test Well: MW-16-05  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

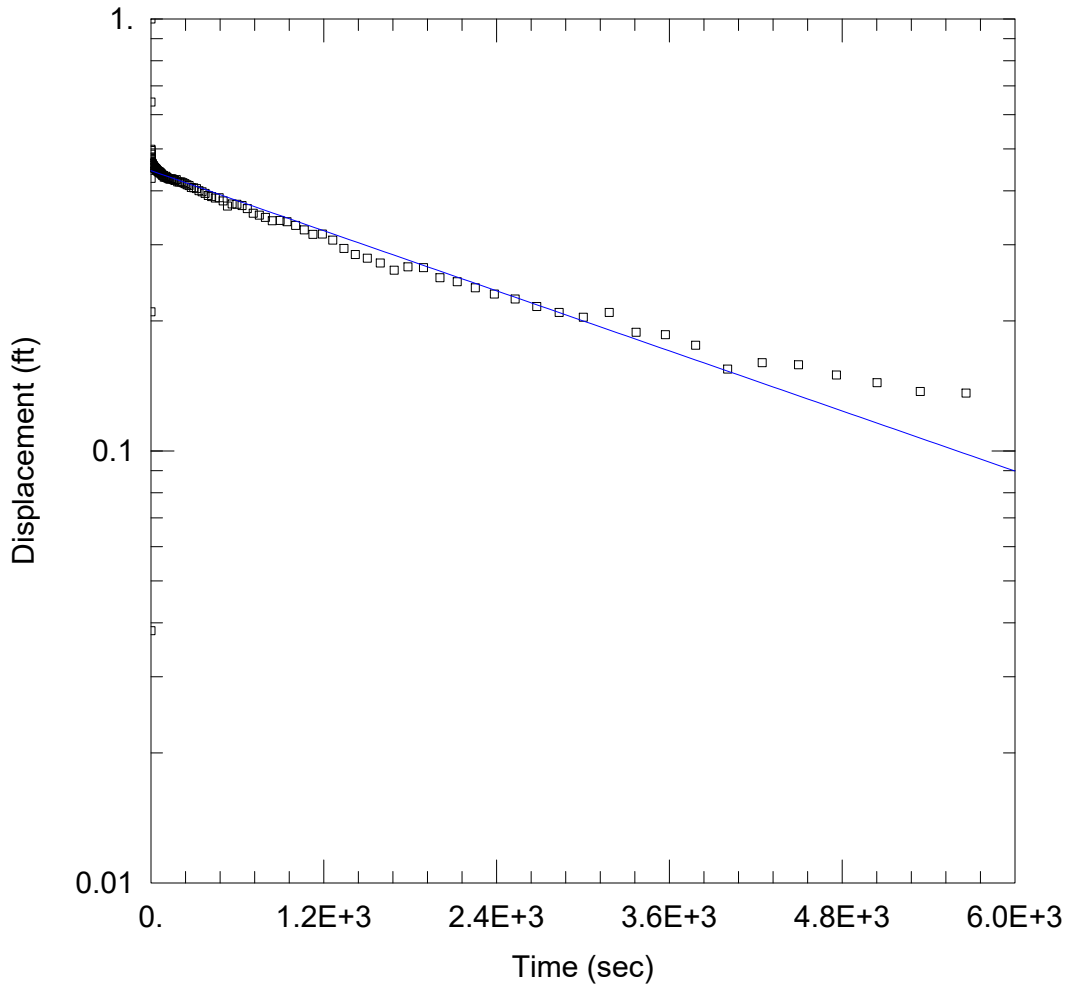
Initial Displacement: 0.905 ft  
 Total Well Penetration Depth: 130.7 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 130.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 4.258E-5 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.7426 ft



MW-16-05 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-05\_OUT.aqt  
 Date: 05/22/17

Time: 13:43:26

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-05  
 Test Date: 4/13/16

AQUIFER DATA

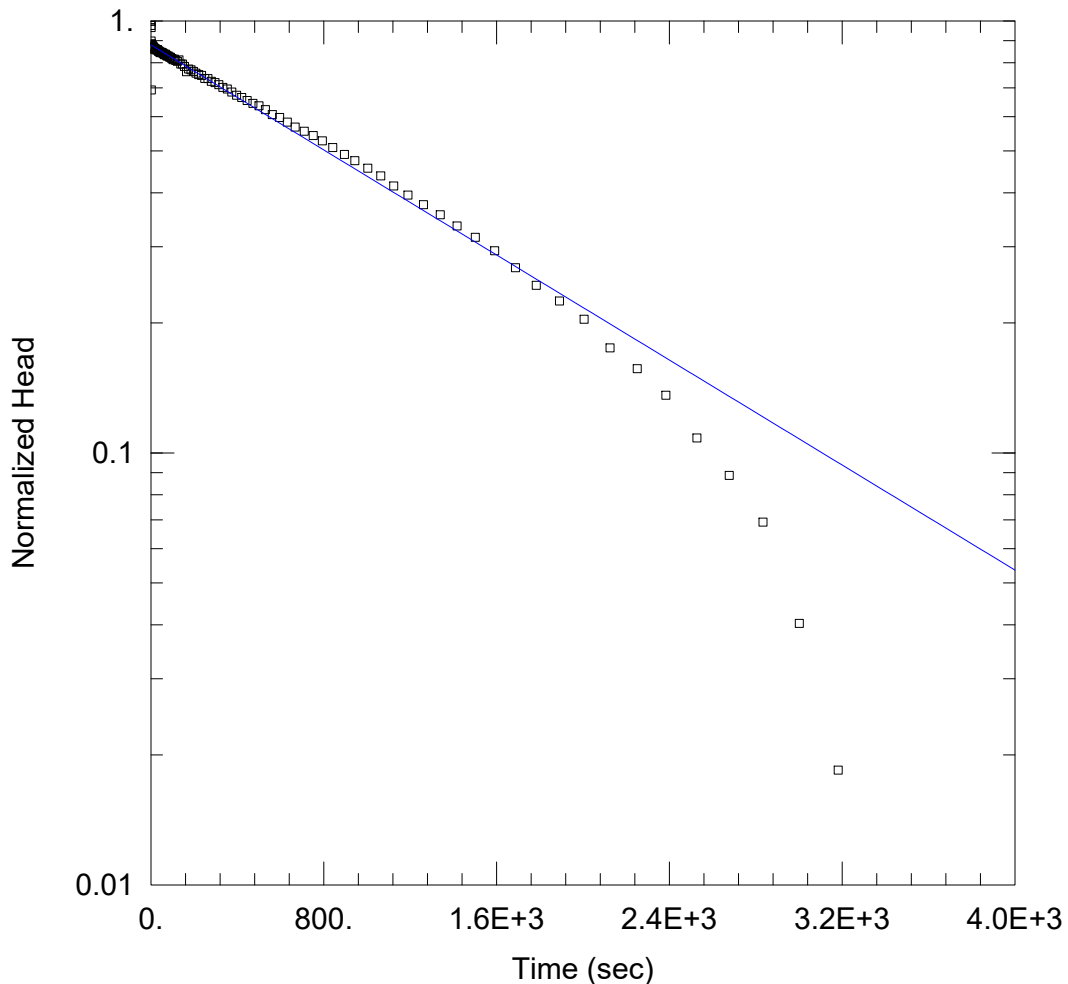
Saturated Thickness: 7. ft                                      Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

Initial Displacement: <u>1.668</u> ft	Static Water Column Height: <u>130.7</u> ft
Total Well Penetration Depth: <u>130.7</u> ft	Screen Length: <u>5.</u> ft
Casing Radius: <u>0.08333</u> ft	Well Radius: <u>0.08333</u> ft

SOLUTION

Aquifer Model: <u>Confined</u>	Solution Method: <u>Bower-Rice</u>
K = <u>2.125E-5</u> cm/sec	y0 = <u>0.743</u> ft



MW-16-07 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_IN.aqt

Date: 05/22/17

Time: 13:44:03

PROJECT INFORMATION

Company: TRC Environmental Corporation

Client: DTE EC BRPP CCR

Project: 231828.0003

Location: China Township, MI

Test Well: MW-16-07

Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.868 ft

Static Water Column Height: 124.9 ft

Total Well Penetration Depth: 124.9 ft

Screen Length: 5. ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

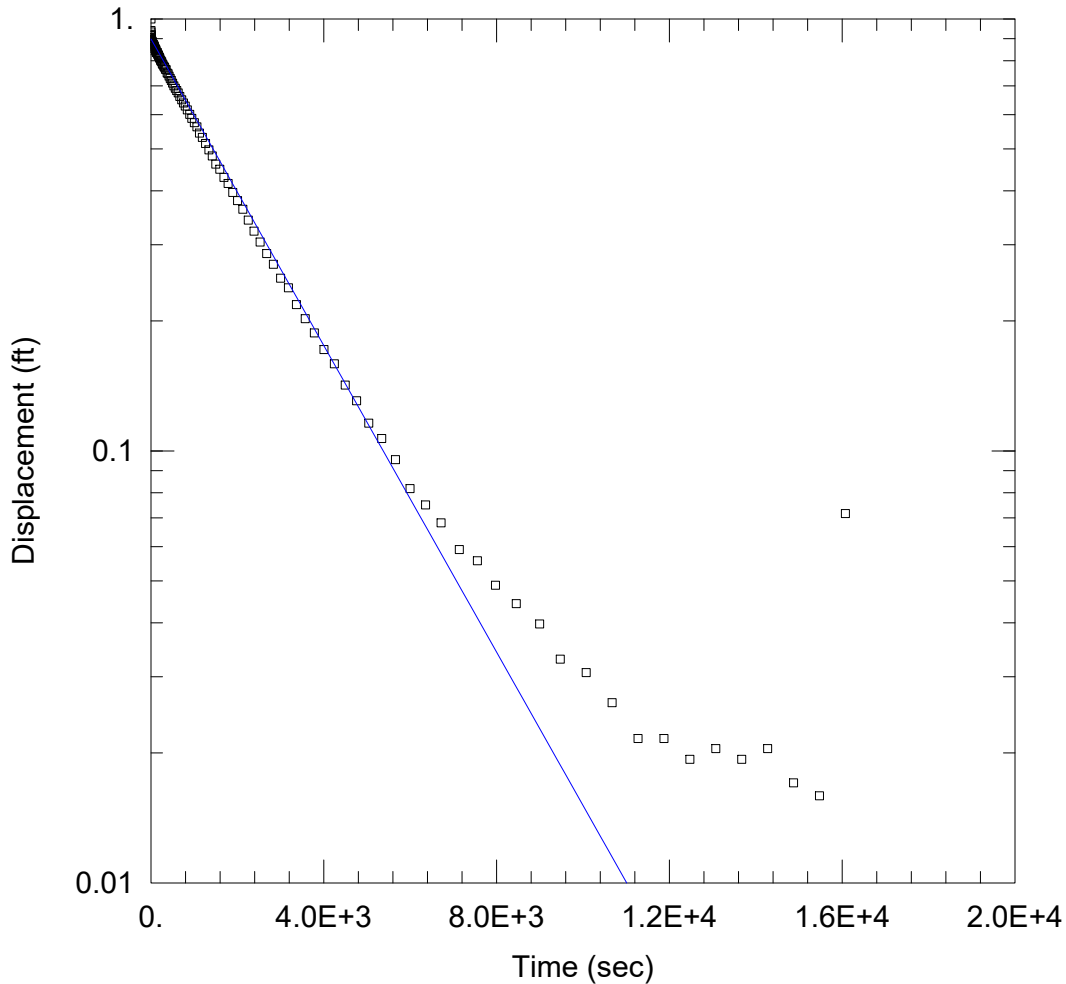
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 0.0001236 cm/sec

y0 = 0.7638 ft



MW-16-07 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_OUT.aqt  
 Date: 05/22/17

Time: 13:44:45

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-07  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.88 ft  
 Total Well Penetration Depth: 124.4 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 124.4 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.212E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7909 ft



## **2021 Slug Test Results**

**2021 Hydraulic Conductivity Results Summary**  
**DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin**  
**4505 King Road, China Township, Michigan**

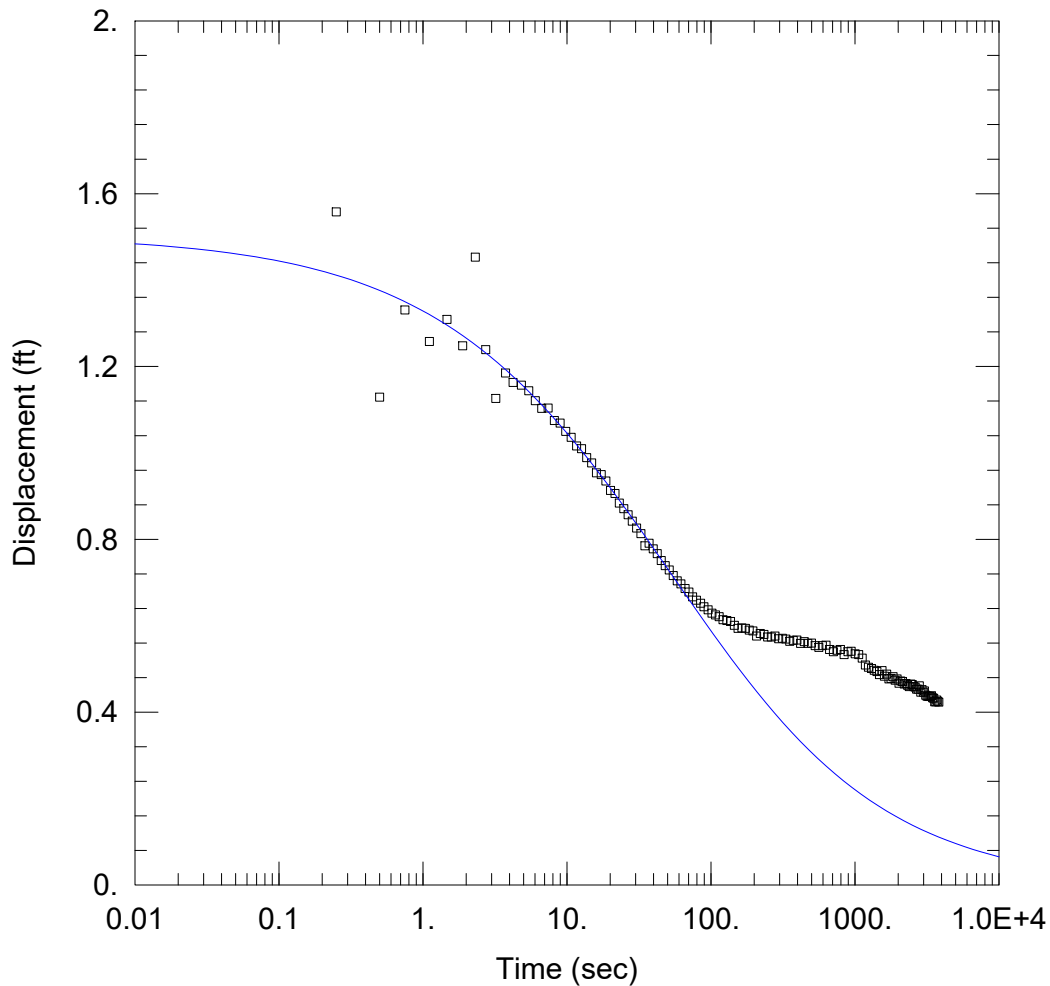
Test	WC (ft)	K (cm/s)	K (ft/day)	Comment/K Geometric mean (cm/s)	K Geometric mean (ft/day)
MW-16-02 Slug In	85.8	NA	NA	Not a good match, use slug out test	NA
MW-16-02 Slug Out	85.8	4.2E-04	1.2	4.2E-04	1.2
MW-16-03 Slug In	123.1	9.8E-03	27.8	9.6E-03	27.4
MW-16-03 Slug Out	123.1	9.5E-03	26.9		
MW-16-06 Slug In	125.6	1.0E-04	0.28	1.0E-04	0.30
MW-16-06 Slug Out	125.6	1.1E-04	0.31		
MW-16-08 Slug In	124.9	1.2E-05	0.03	1.1E-05	0.03
MW-16-08 Slug Out	124.9	1.1E-05	0.03		
MW-16-09 Slug In	126.9	1.5E-04	0.43	1.5E-04	0.43
MW-16-09 Slug Out	126.9	1.5E-04	0.43		
MW-16-10 Slug In	135.3	3.6E-05	0.10	3.6E-05	0.10
MW-16-10 Slug Out	135.3	3.7E-05	0.10		
MW-16-11A Slug In	127.3	6.1E-05	0.17	6.3E-05	0.18
MW-16-11A Slug Out	127.3	6.5E-05	0.18		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A 5' long by 1" diameter slug was utilized to complete slug tests in these wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 In.aqt  
 Date: 10/29/21 Time: 11:44:26

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

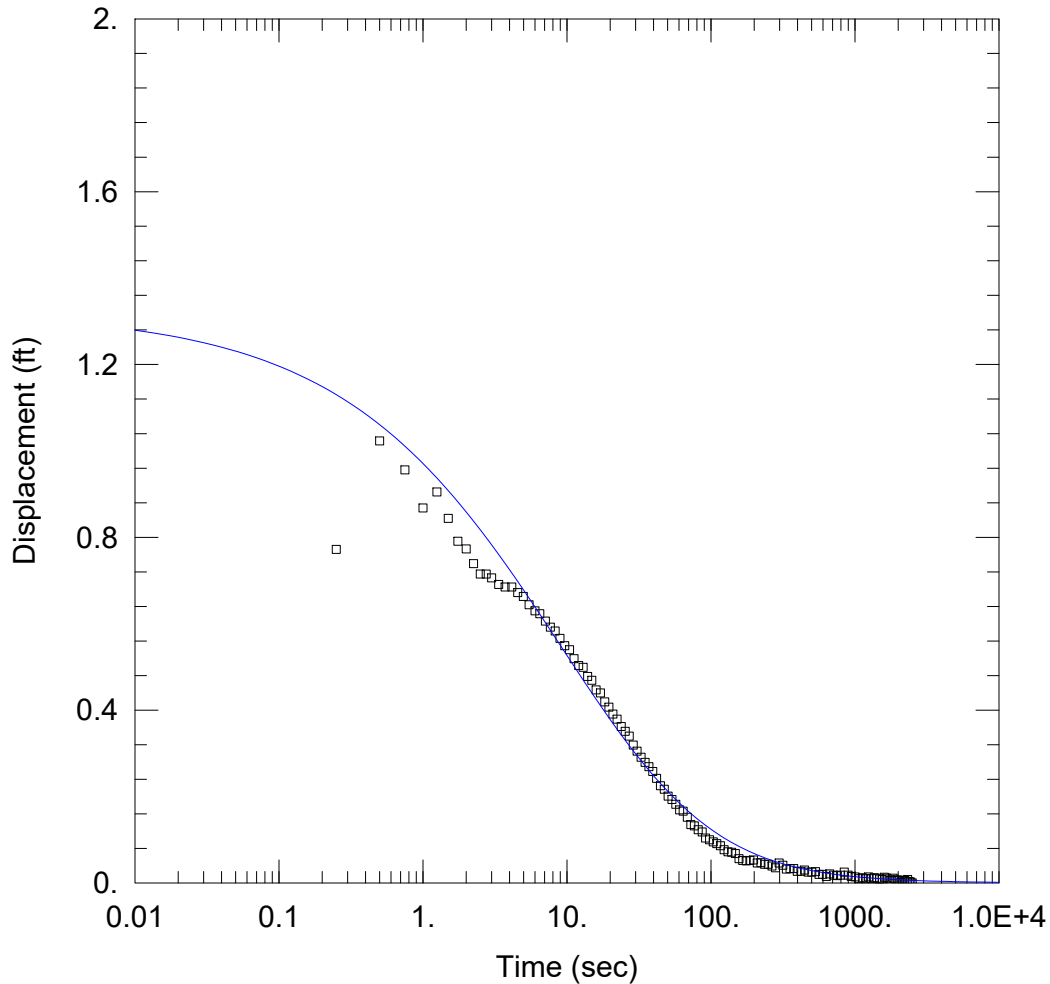
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.503 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.0006905 cm<sup>2</sup>/sec S = 3.692



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 Out.aqt  
 Date: 10/29/21 Time: 11:46:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

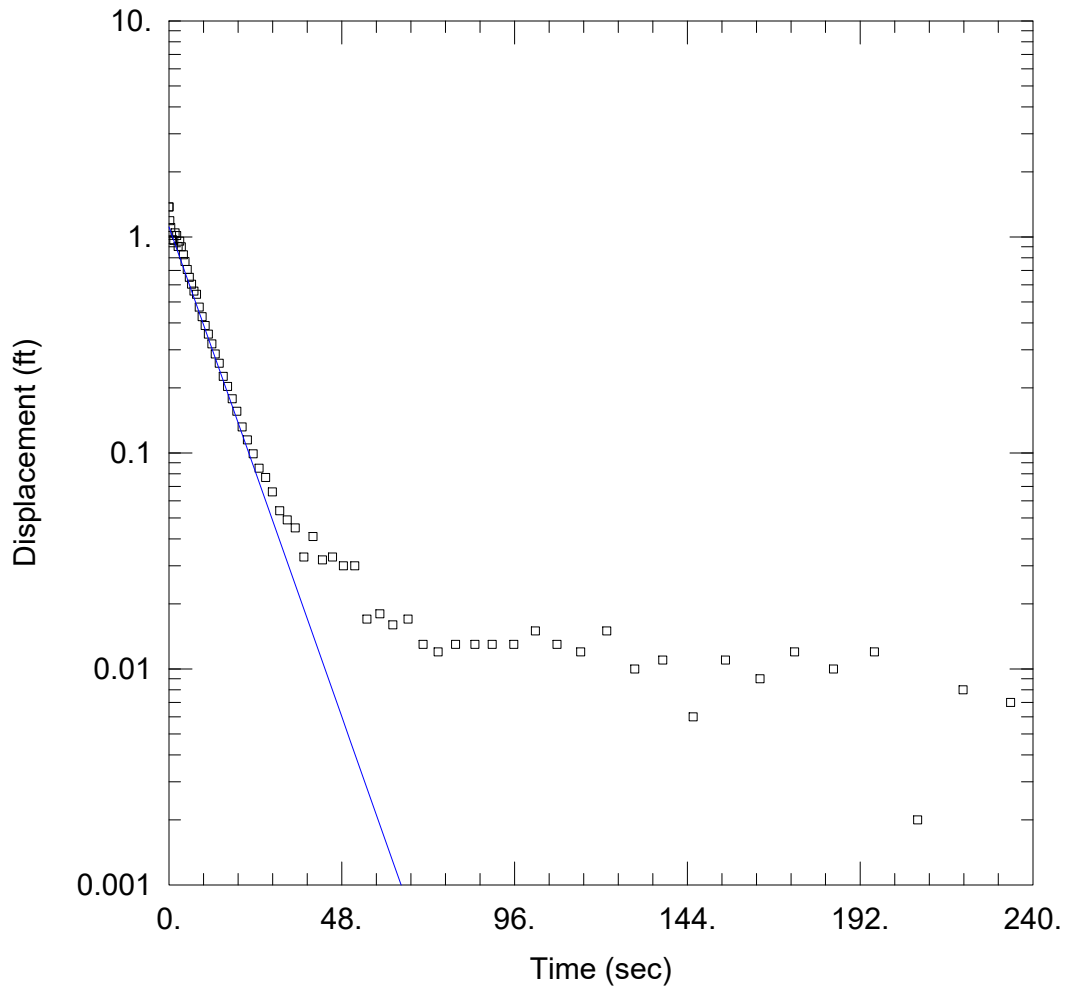
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.32 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.1533 cm<sup>2</sup>/sec S = 0.1



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 In.aqt  
 Date: 10/29/21 Time: 11:52:09

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

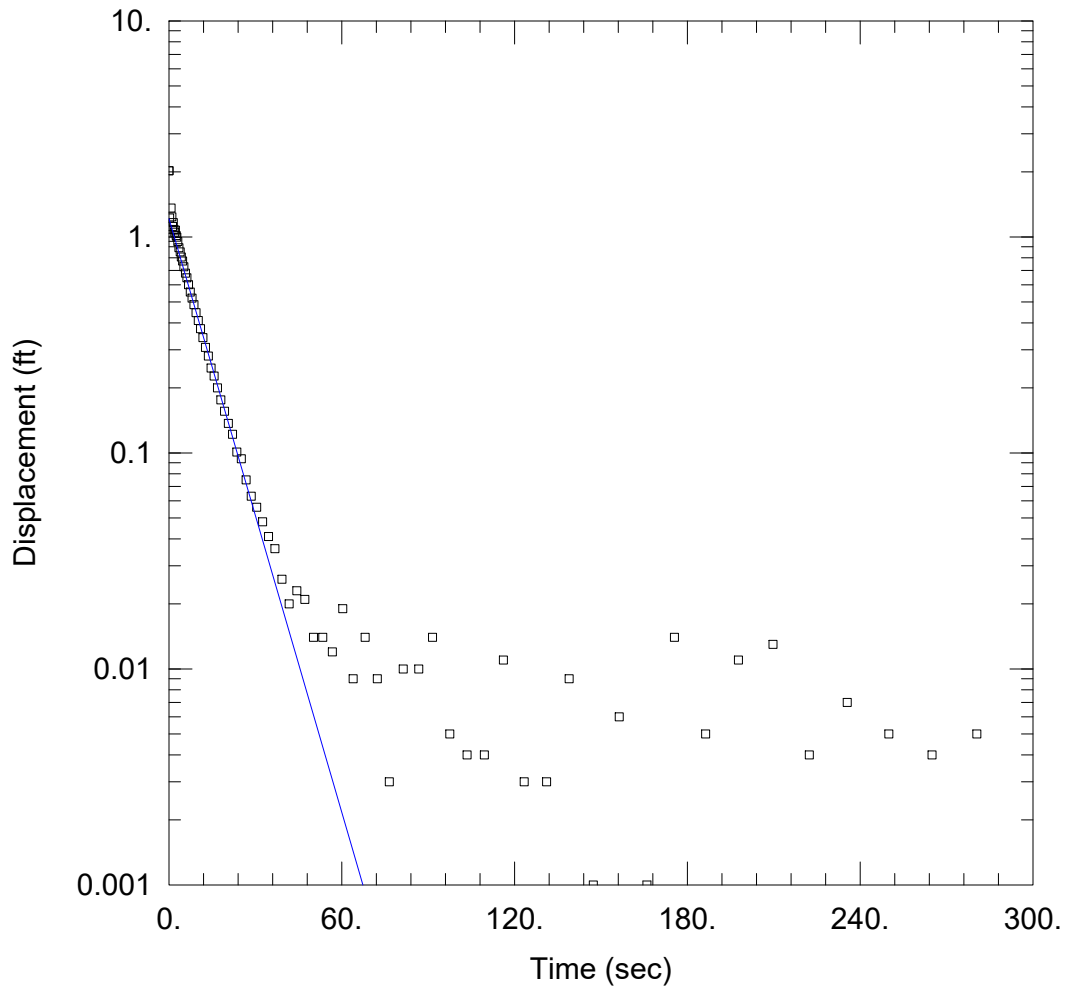
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 1.376 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.009782$  cm/sec  $y_0 = 1.113$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 Out.aqt  
 Date: 10/29/21 Time: 11:53:59

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

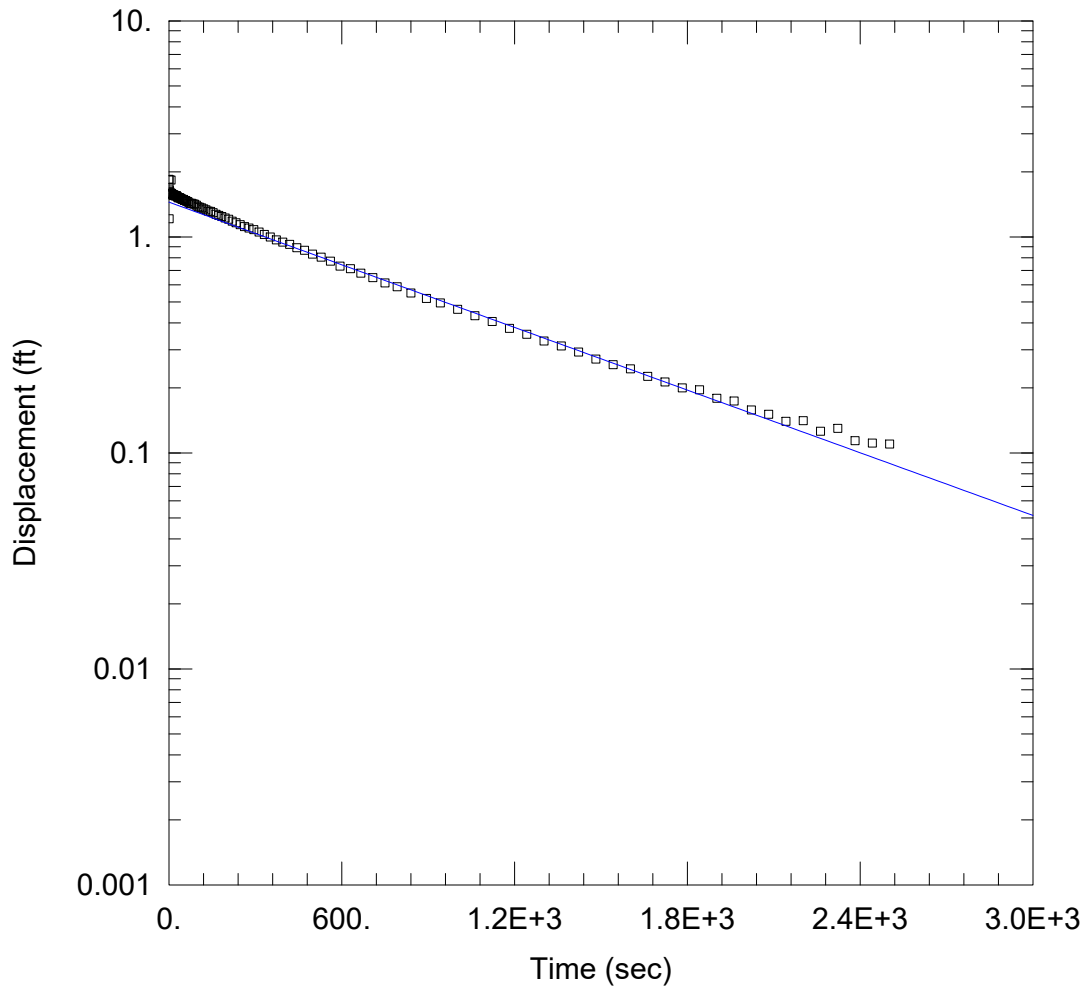
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 2.023 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.009488 cm/sec y0 = 1.215 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 In.aqt  
 Date: 10/29/21 Time: 11:57:18

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

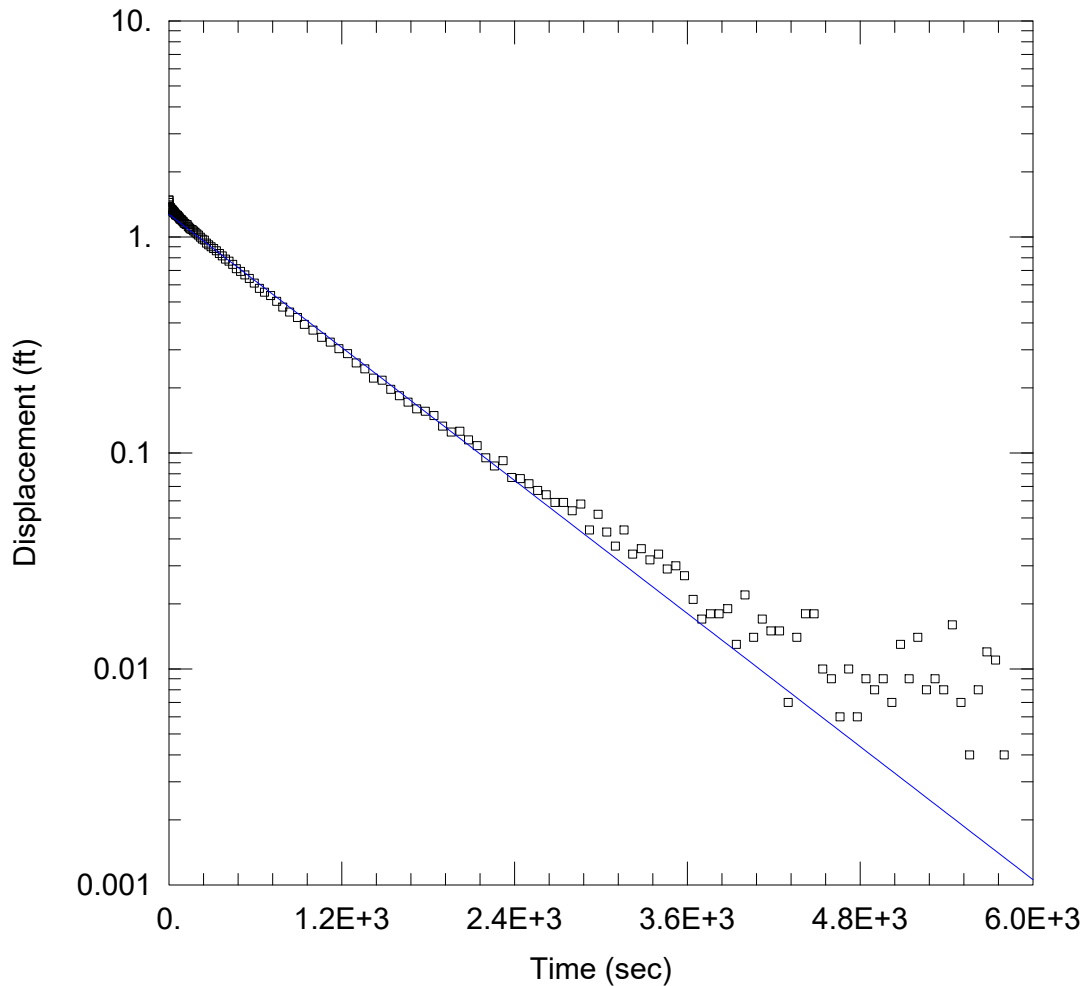
Saturated Thickness: 6. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.847 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.0001002 cm/sec  $y_0 =$  1.449 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 Out.aqt  
 Date: 10/29/21 Time: 11:58:41

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

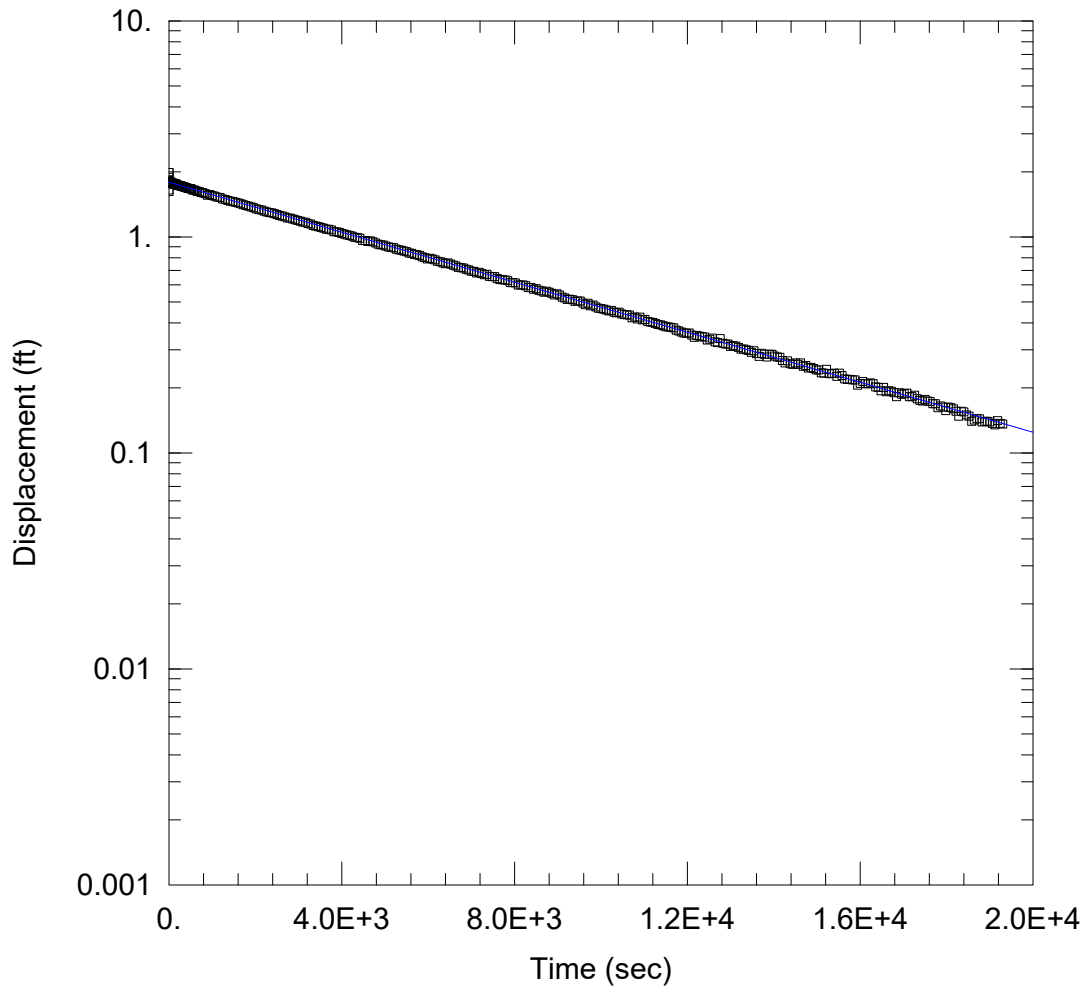
WELL DATA (MW-16-06)

Initial Displacement: 1.481 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001063$  cm/sec  $y_0 = 1.271$  ft





WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 In.aqt  
 Date: 10/29/21 Time: 12:36:01

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

AQUIFER DATA

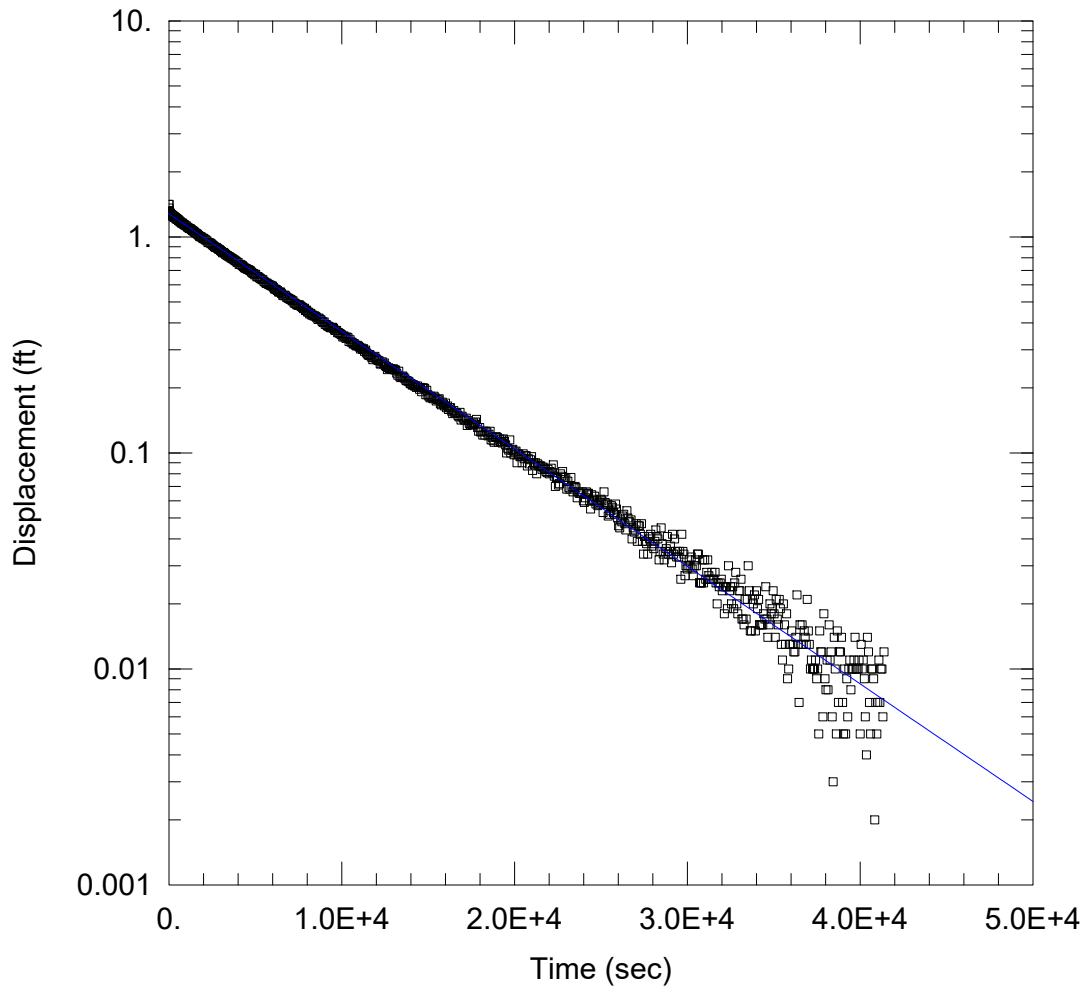
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-08)

Initial Displacement: 1.987 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 1.199E-5 cm/sec y0 = 1.791 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 Out.aqt  
 Date: 10/29/21 Time: 12:38:13

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

### AQUIFER DATA

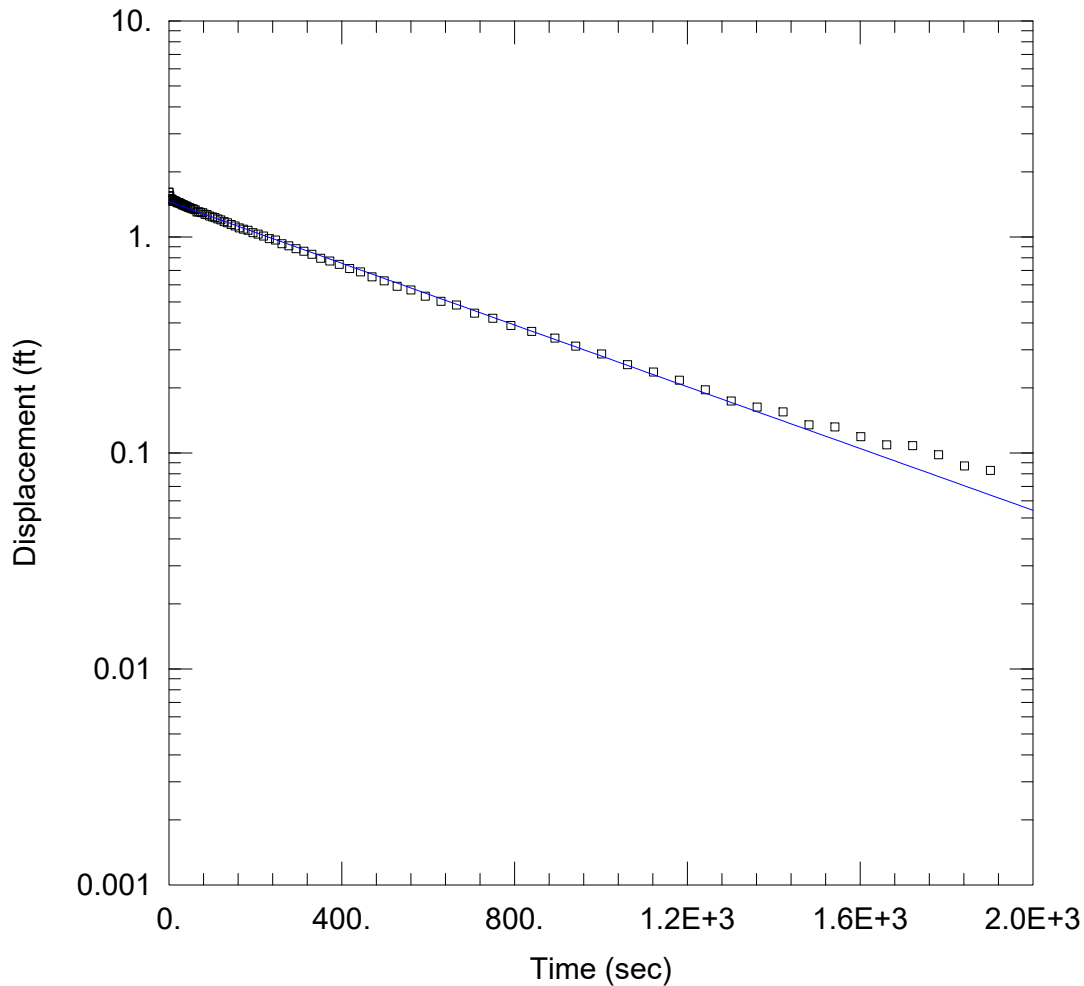
Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-08)

Initial Displacement: 1.415 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 1.127E-5$  cm/sec  $y_0 = 1.279$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 In.aqt  
 Date: 10/29/21 Time: 12:41:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

AQUIFER DATA

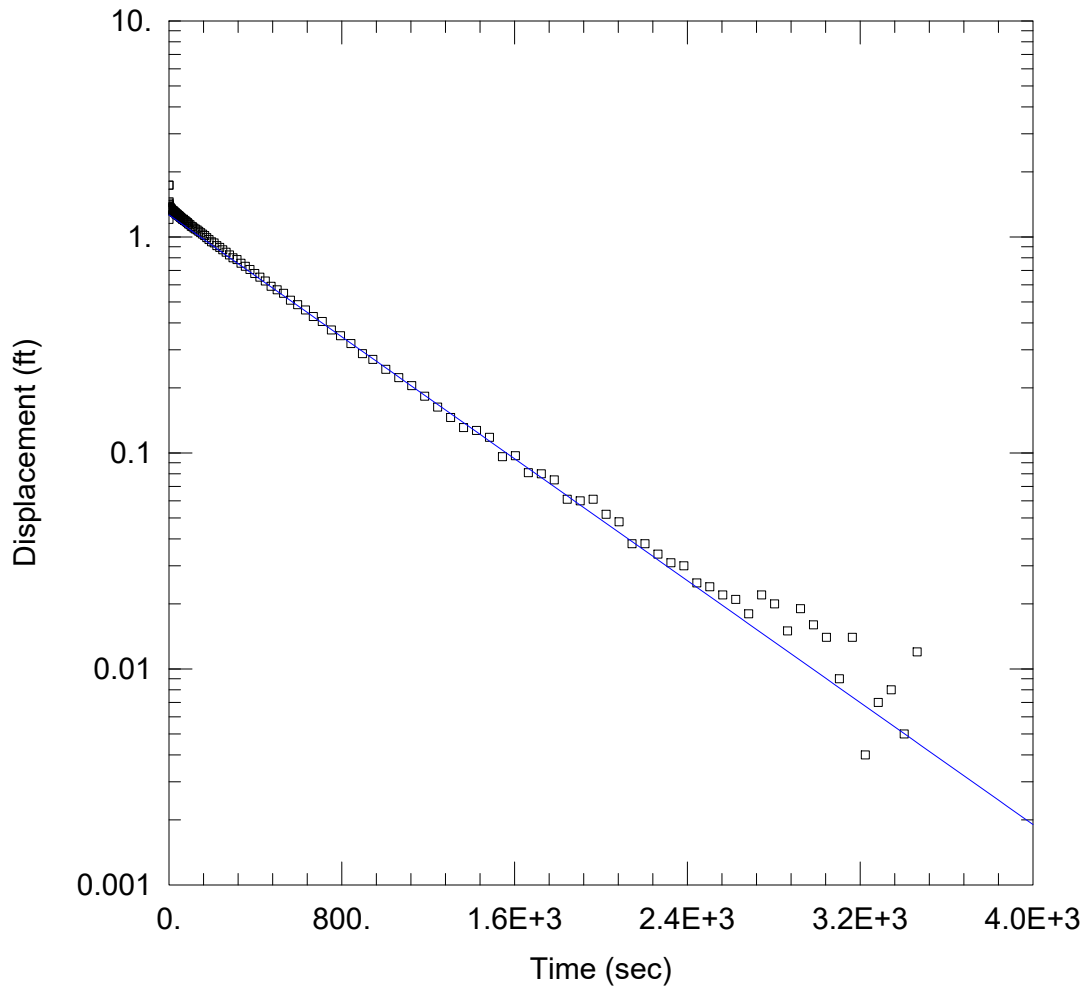
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.611 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.000148 cm/sec y0 = 1.458 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 Out.aqt  
 Date: 10/29/21 Time: 12:43:28

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

### AQUIFER DATA

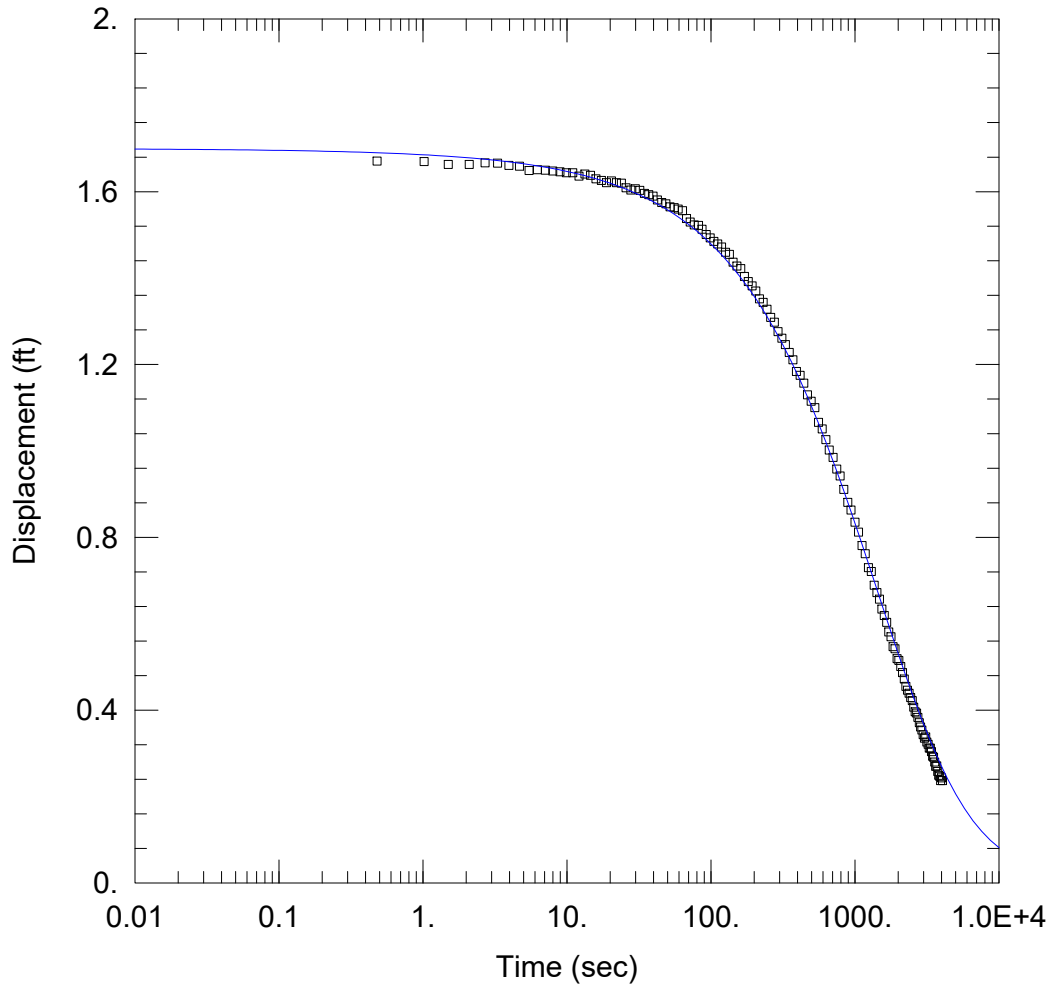
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-09)

Initial Displacement: 1.736 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001461$  cm/sec  $y_0 = 1.265$  ft



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 In.aqt  
 Date: 10/29/21 Time: 12:52:23

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

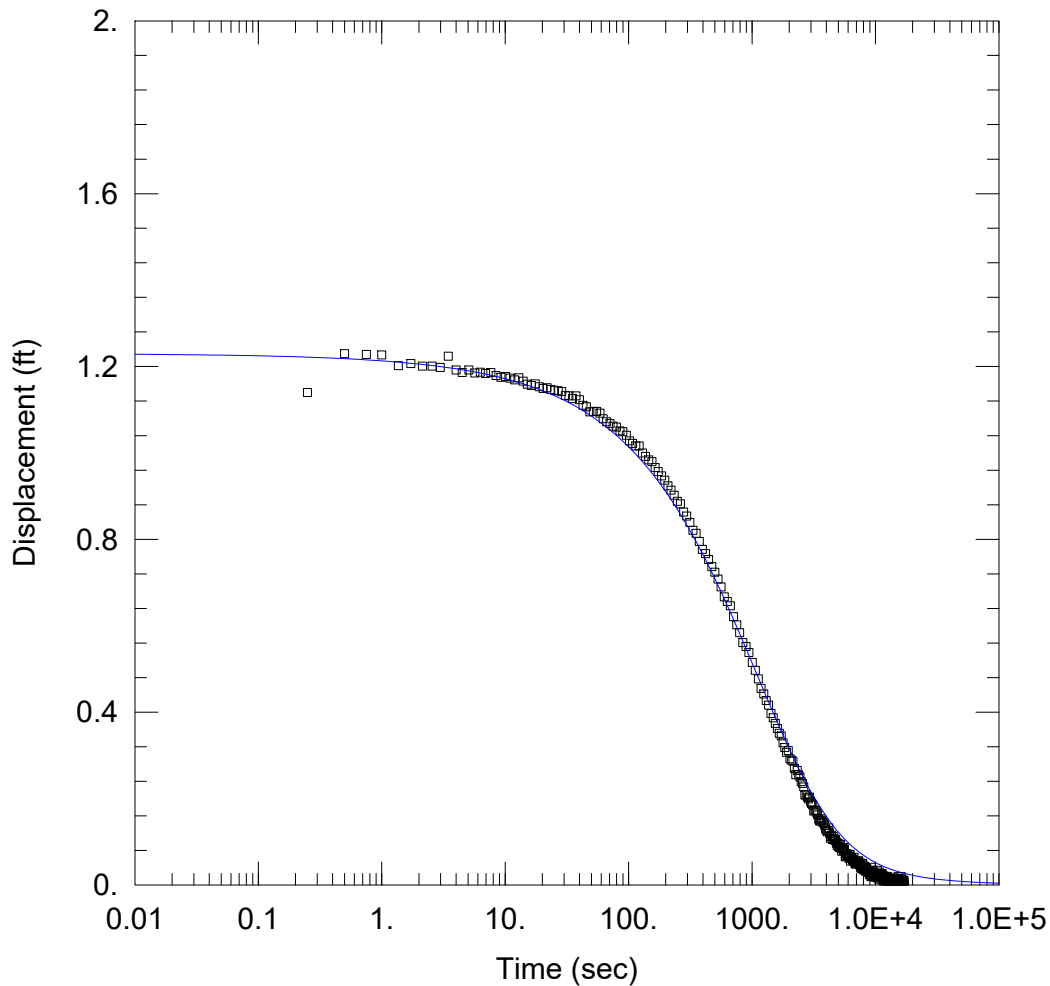
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.7 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005538 cm<sup>2</sup>/sec S = 0.001701



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 Out.aqt  
 Date: 10/29/21 Time: 12:54:58

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

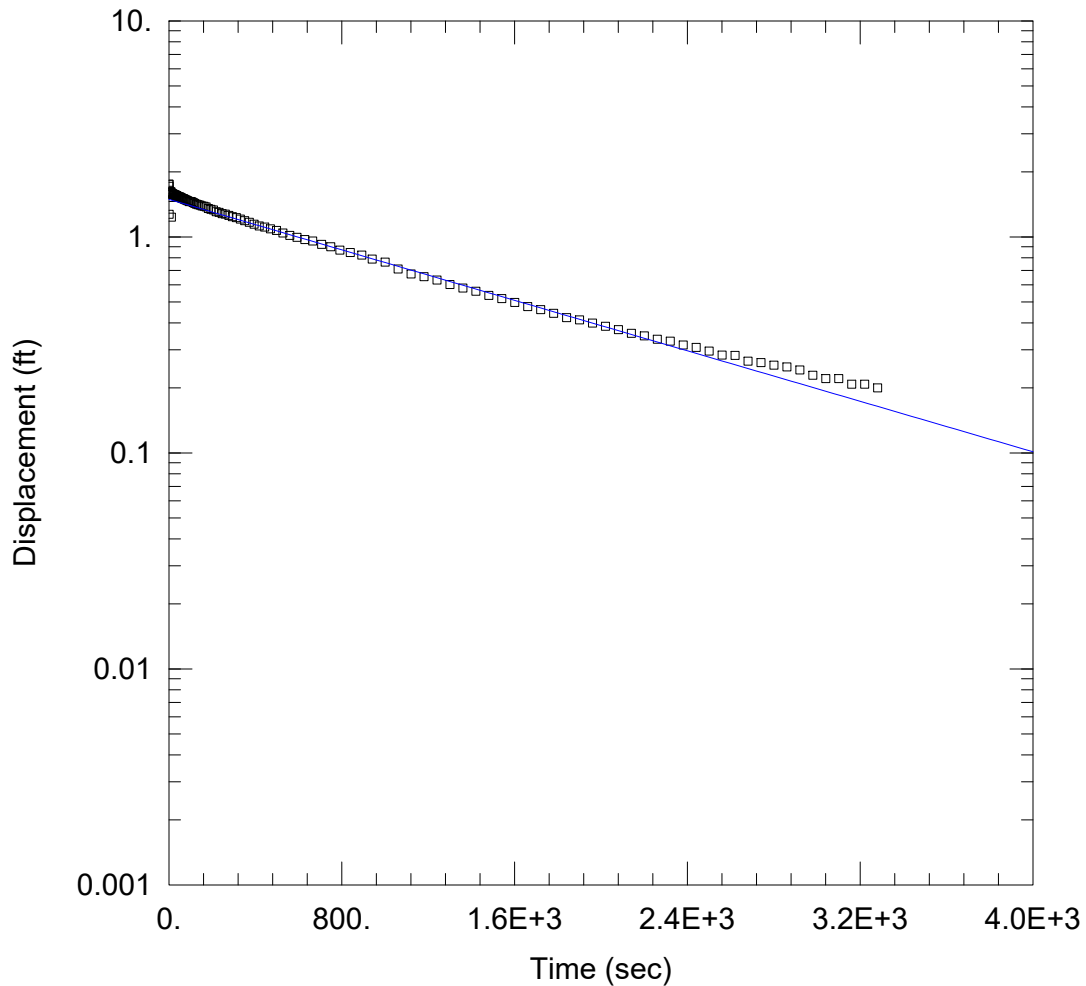
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.23 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopolos  
 T = 0.005626 cm<sup>2</sup>/sec S = 0.004752



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A In.aqt  
 Date: 10/29/21 Time: 12:59:49

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

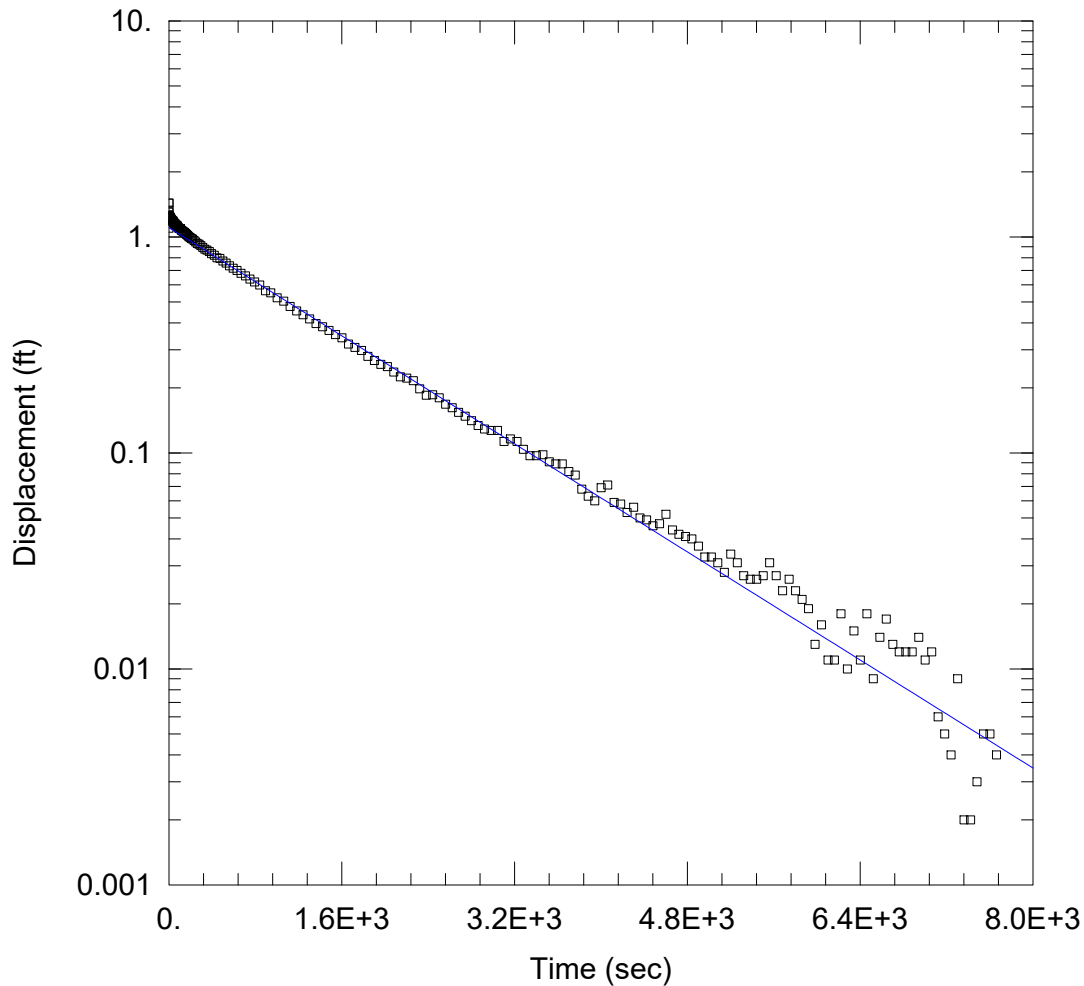
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.753 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 6.051E-5 cm/sec y0 = 1.492 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A Out.aqt  
 Date: 10/29/21 Time: 13:00:15

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.434 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 6.477E-5$  cm/sec  $y_0 = 1.103$  ft



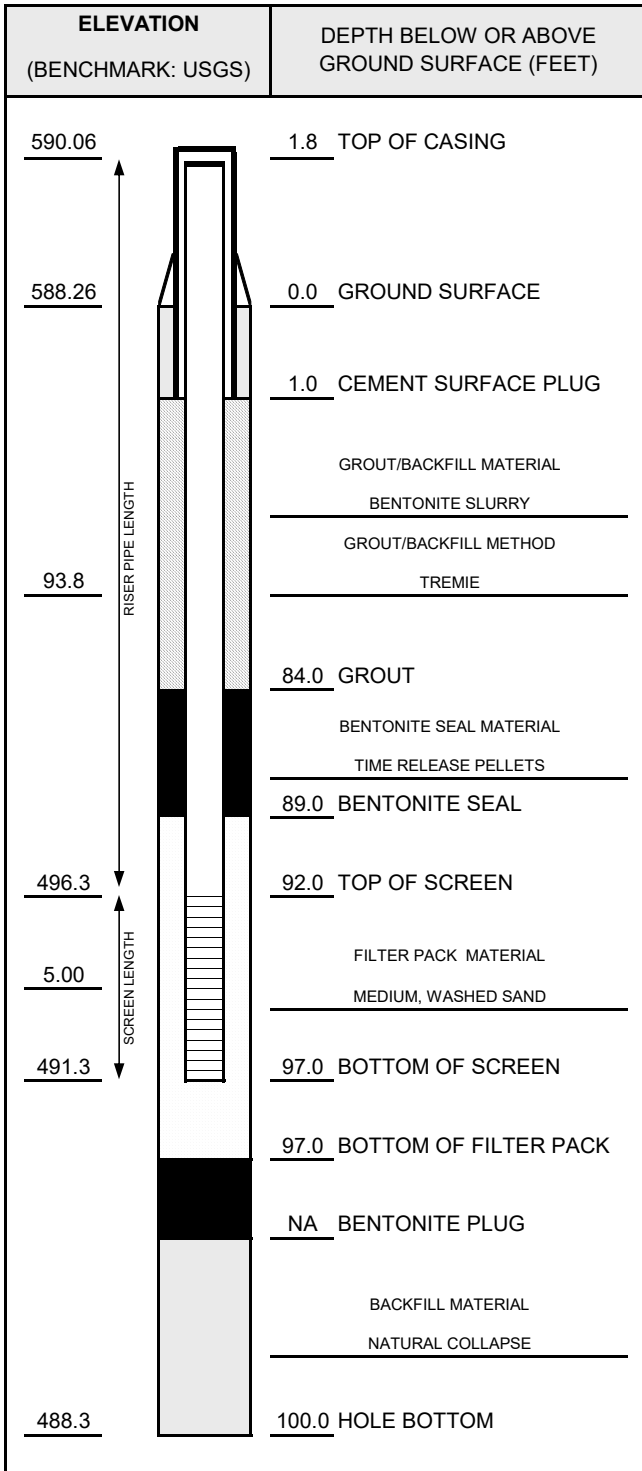
## **Appendix B**

### **Monitoring Well Logs**



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-01</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/17/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	98.20	T/PVC	3/21/2016	--
DTB AFTER DEVELOPING:	100.32	T/PVC	4/13/2016	845
SWL BEFORE DEVELOPING:	12.92	T/PVC	3/21/2016	--
SWL AFTER DEVELOPING:	16.32	T/PVC	4/13/2016	845
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

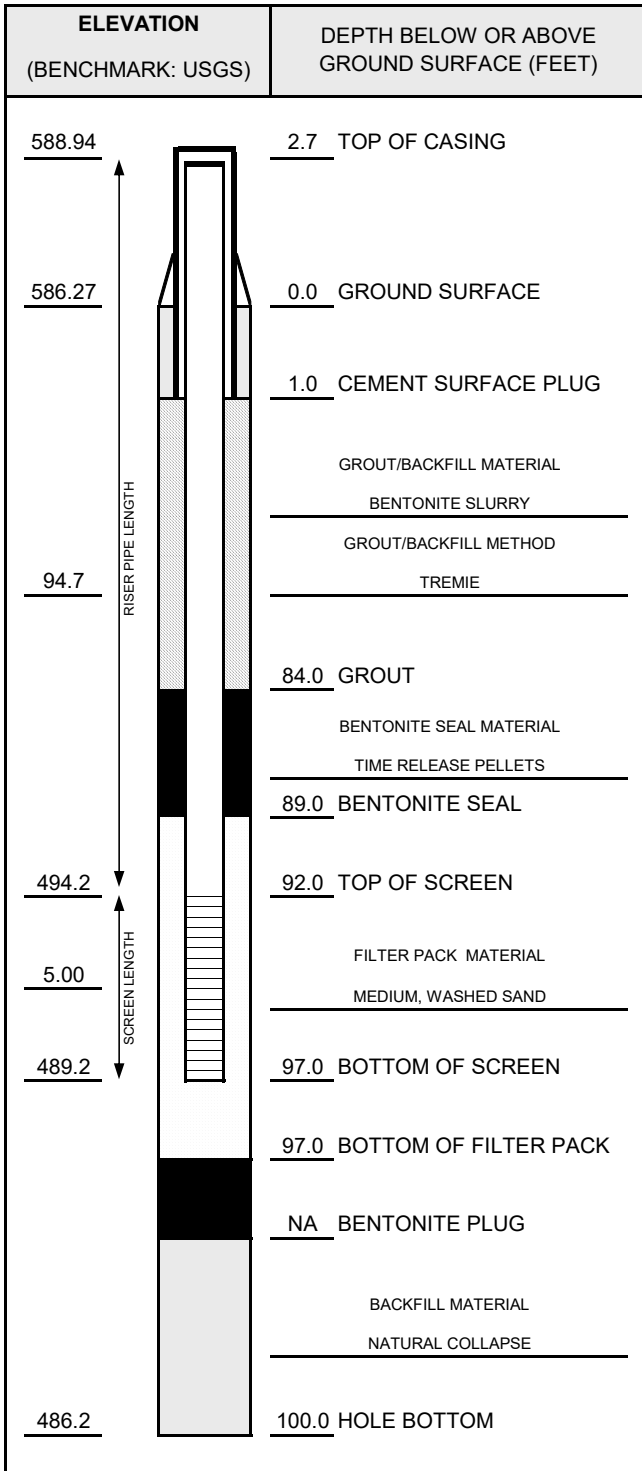
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-02</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>460</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
OTHER SWL:		T/PVC		

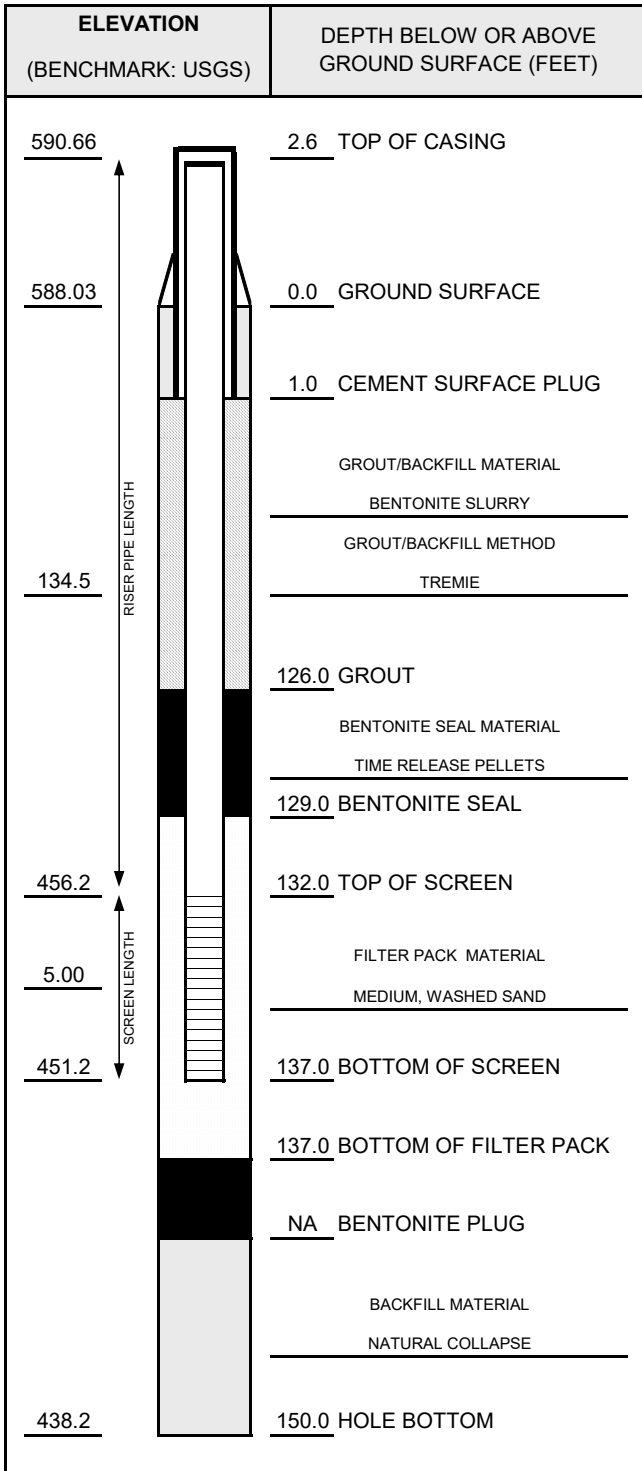
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-03</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>4</u> IN. FROM <u>140</u> TO <u>150</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>60</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>LIGHT GRAY</u>
CLARITY AFTER:	<u>SLIGHTLY TURBID</u>
COLOR AFTER:	<u>VERY LIGHT GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
OTHER SWL:		T/PVC		

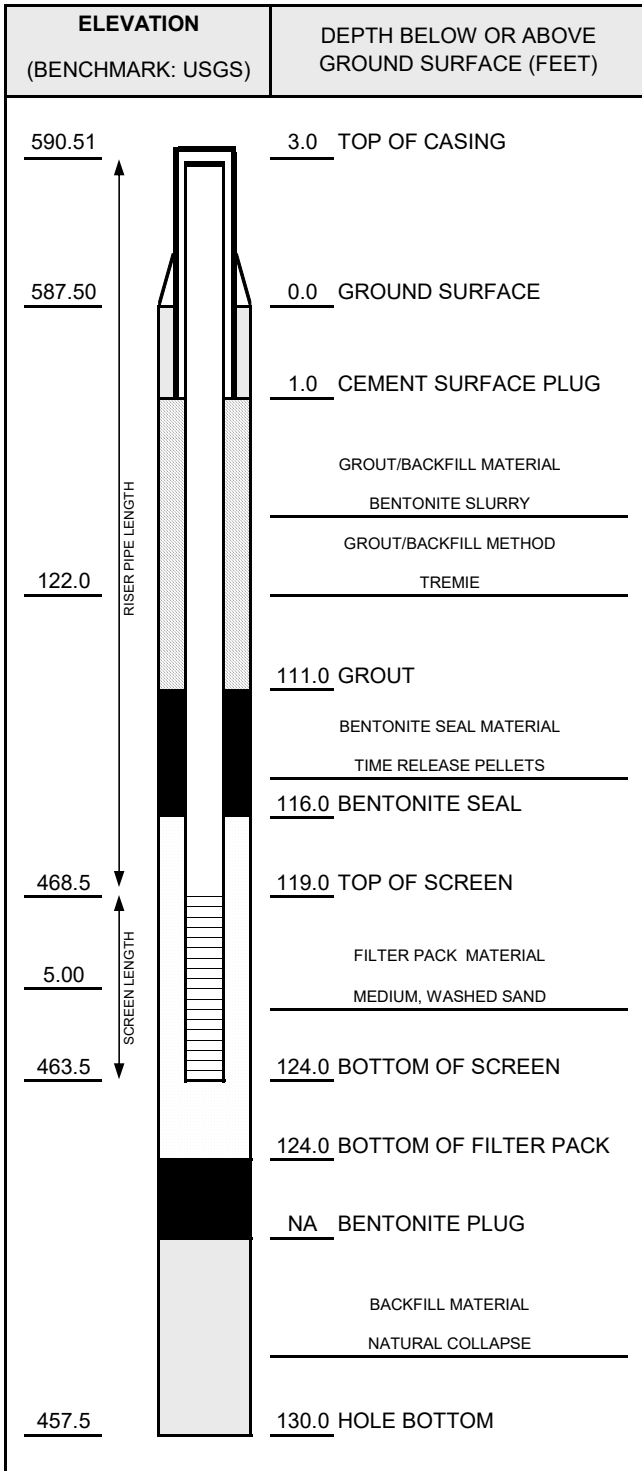
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-04</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>124</u> FT. <u>4</u> IN. FROM <u>124</u> TO <u>130</u> FT.
SURF. CASING DIAMETER:	___ IN. FROM ___ TO ___ FT. ___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>288</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

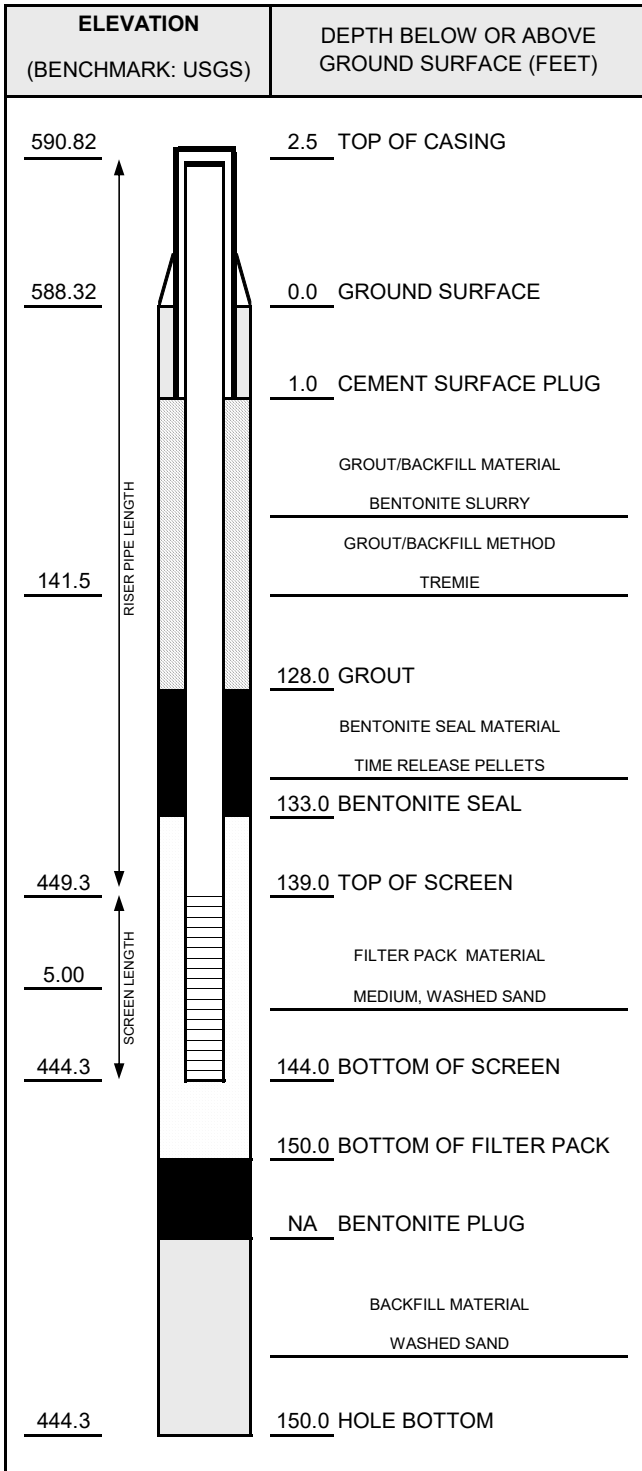
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-05</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>300</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
OTHER SWL:		T/PVC		

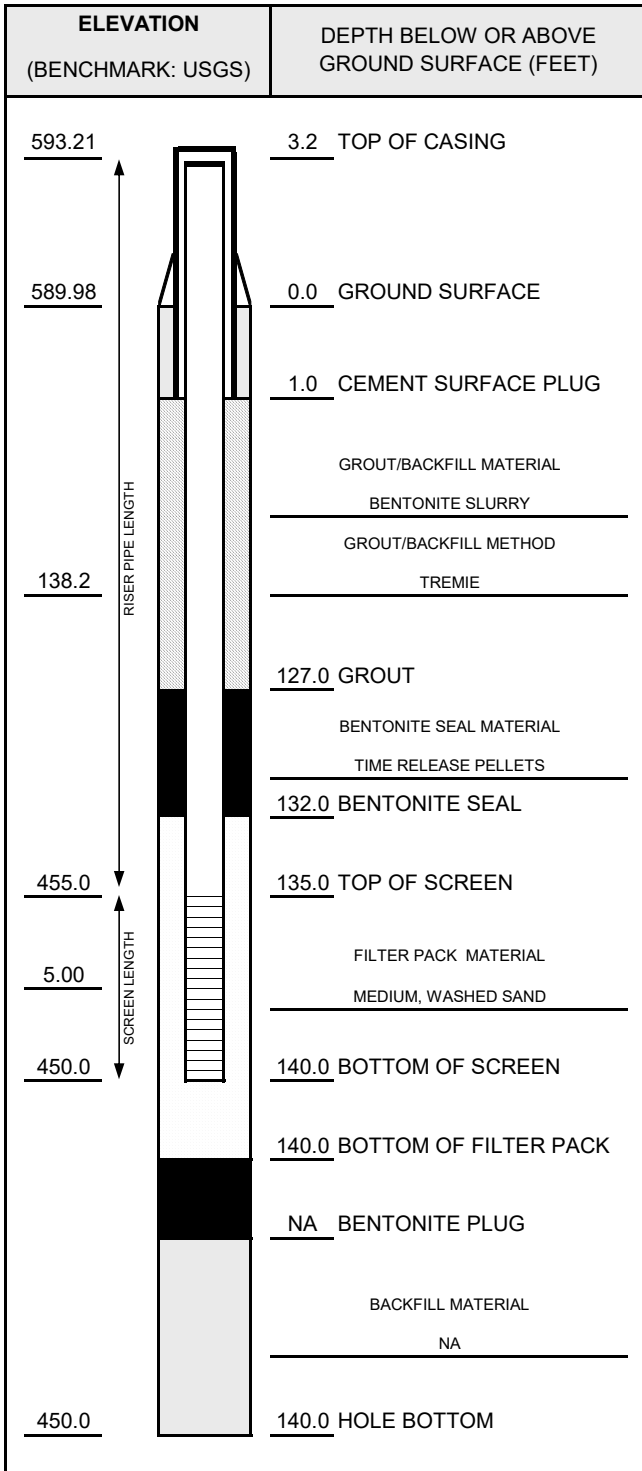
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-06</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>50</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NOT MEASURED</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
OTHER SWL:		T/PVC		

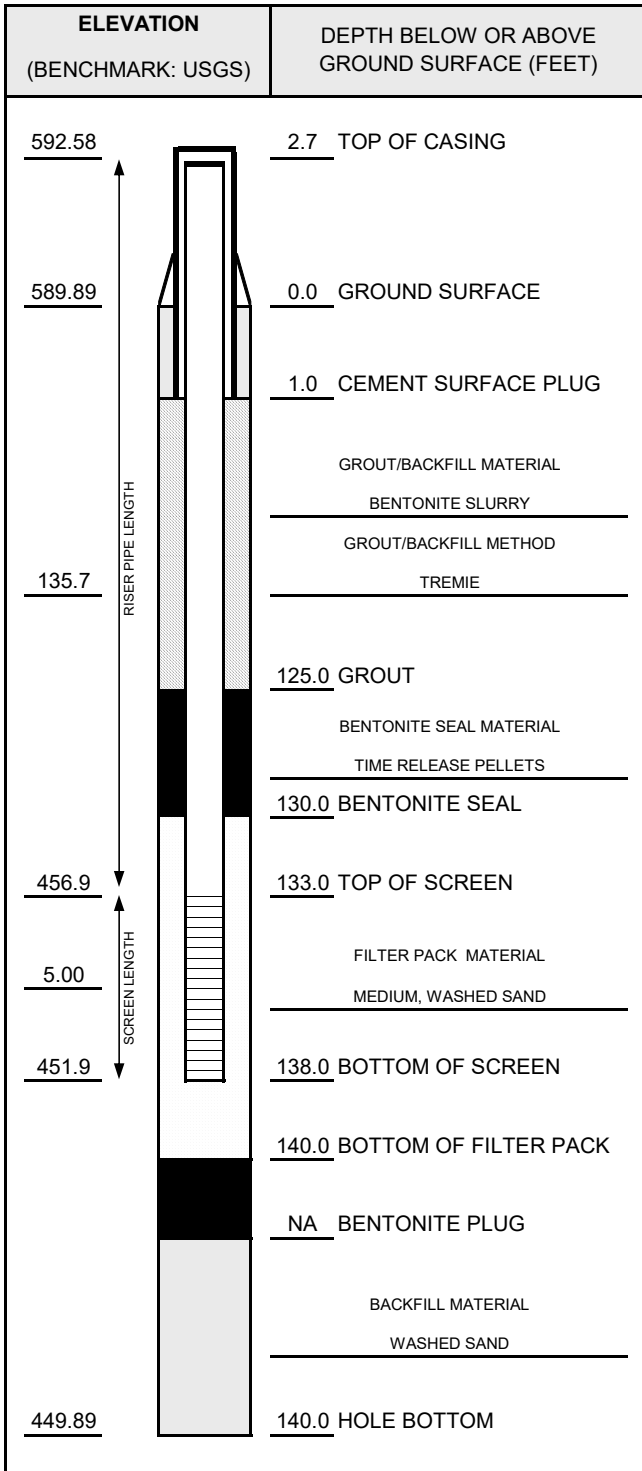
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-07</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
OTHER SWL:		T/PVC		

NOTES:

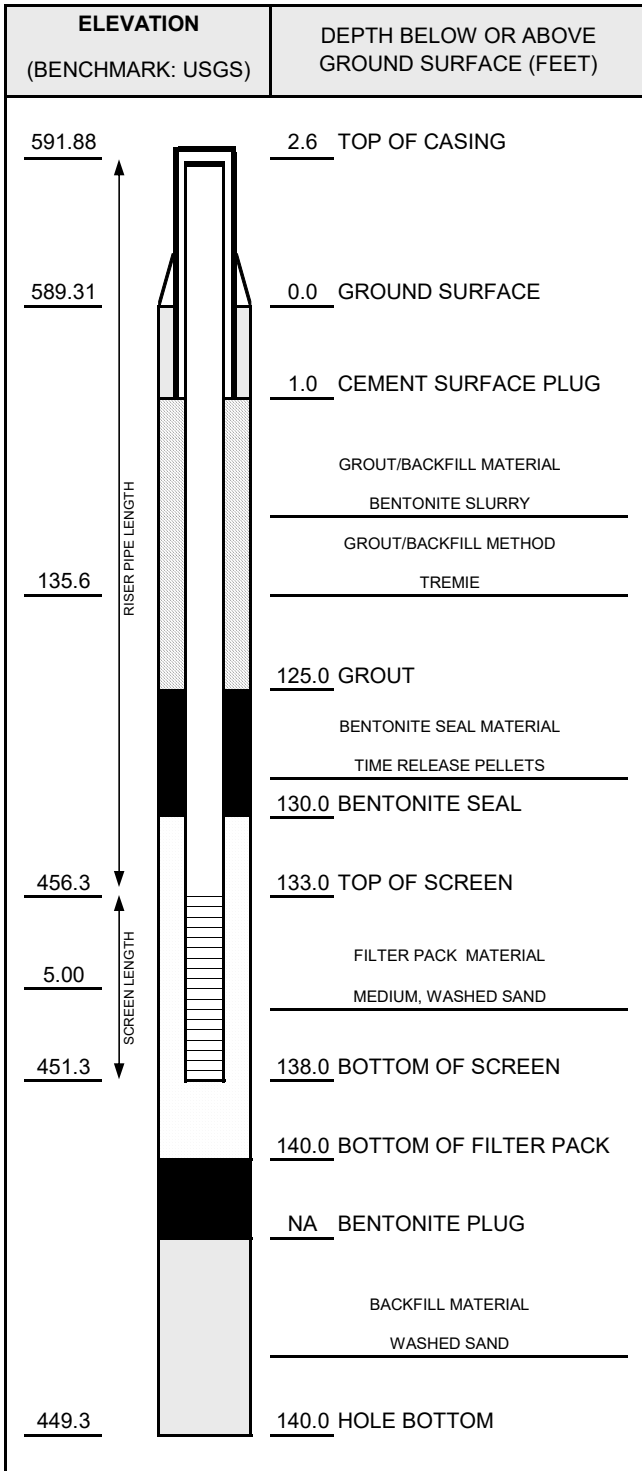
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-08</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>125</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
OTHER SWL:		T/PVC		

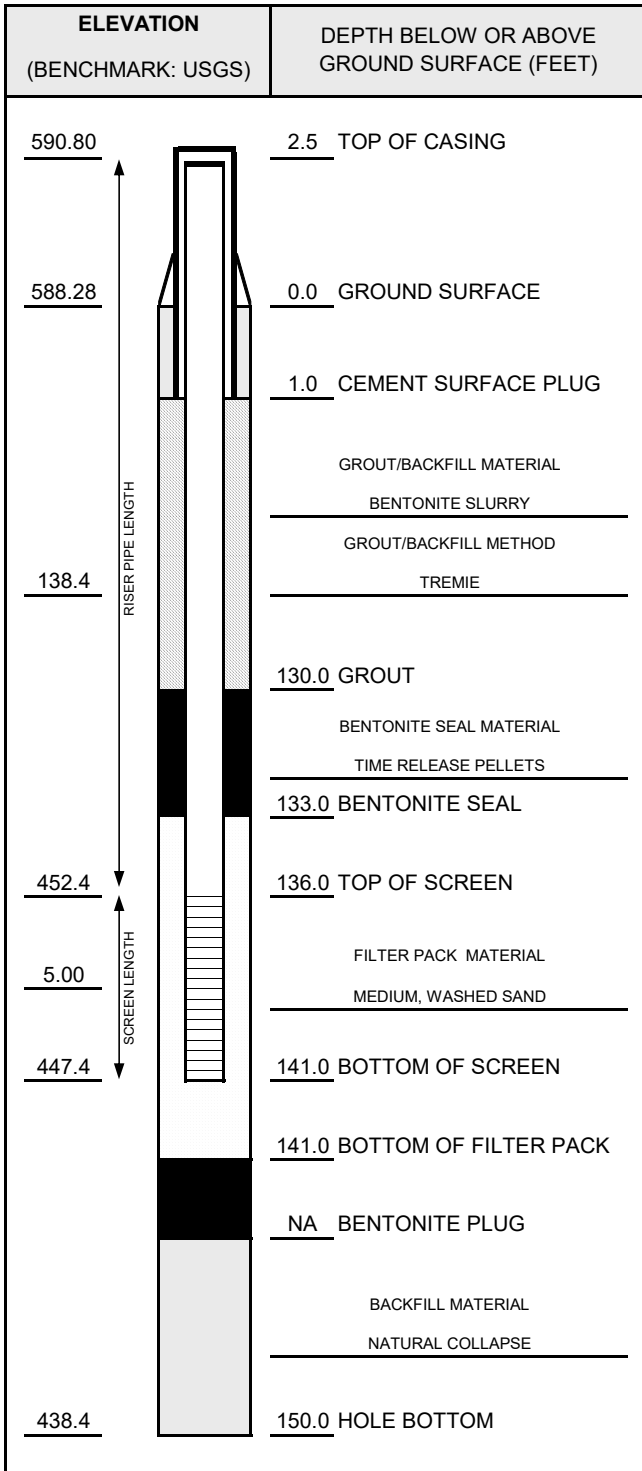
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-09</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016
INSTALLED BY: J. Reed	CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>7</u> HOURS
WATER REMOVED:	<u>30</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/7/2016	12:00
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	10:25
SWL BEFORE DEVELOPING:	7.00	T/PVC	6/7/2016	12:00
SWL AFTER DEVELOPING:	117.42	T/PVC	6/8/2016	10:25
OTHER SWL:	16.76	T/PVC	6/9/2016	15:13
OTHER DTB:	144.30	T/PVC	6/9/2016	15:13

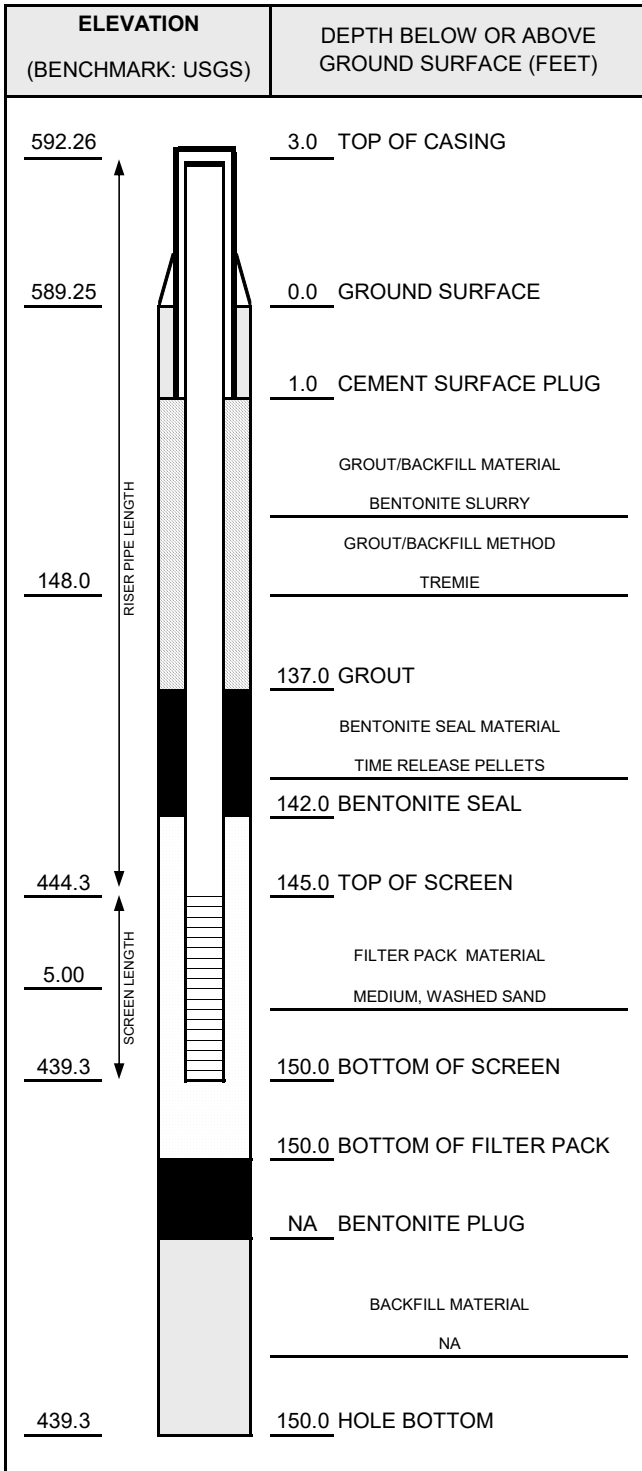
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-10</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/6/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4.5</u> HOURS
WATER REMOVED:	<u>85</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>DARK GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

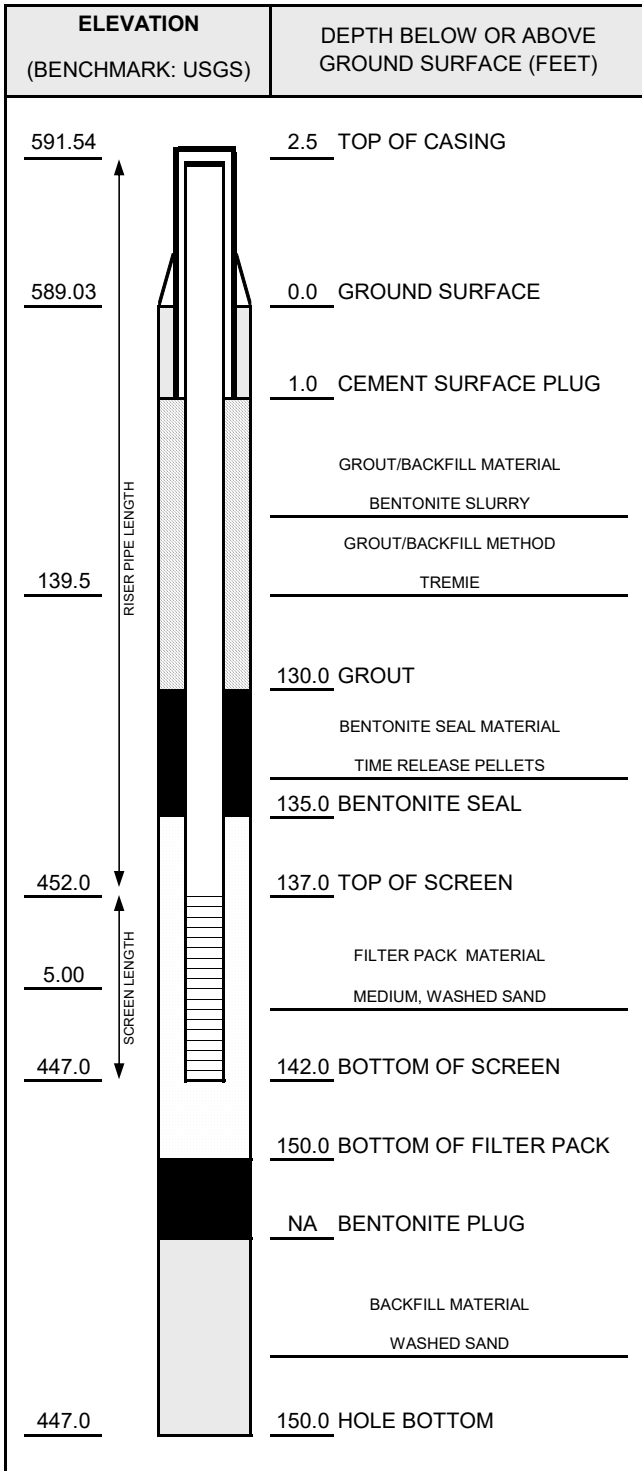
PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>3</u> HOURS
WATER REMOVED:	<u>84</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.36	T/PVC	6/9/2016	12:35
DTB AFTER DEVELOPING:	142.00	T/PVC	6/9/2016	15:45
SWL BEFORE DEVELOPING:	9.65	T/PVC	6/9/2016	12:35
SWL AFTER DEVELOPING:	116.00	T/PVC	6/9/2016	15:45
OTHER SWL:	16.67	T/PVC	6/21/2016	7:45
OTHER SWL:		T/PVC		

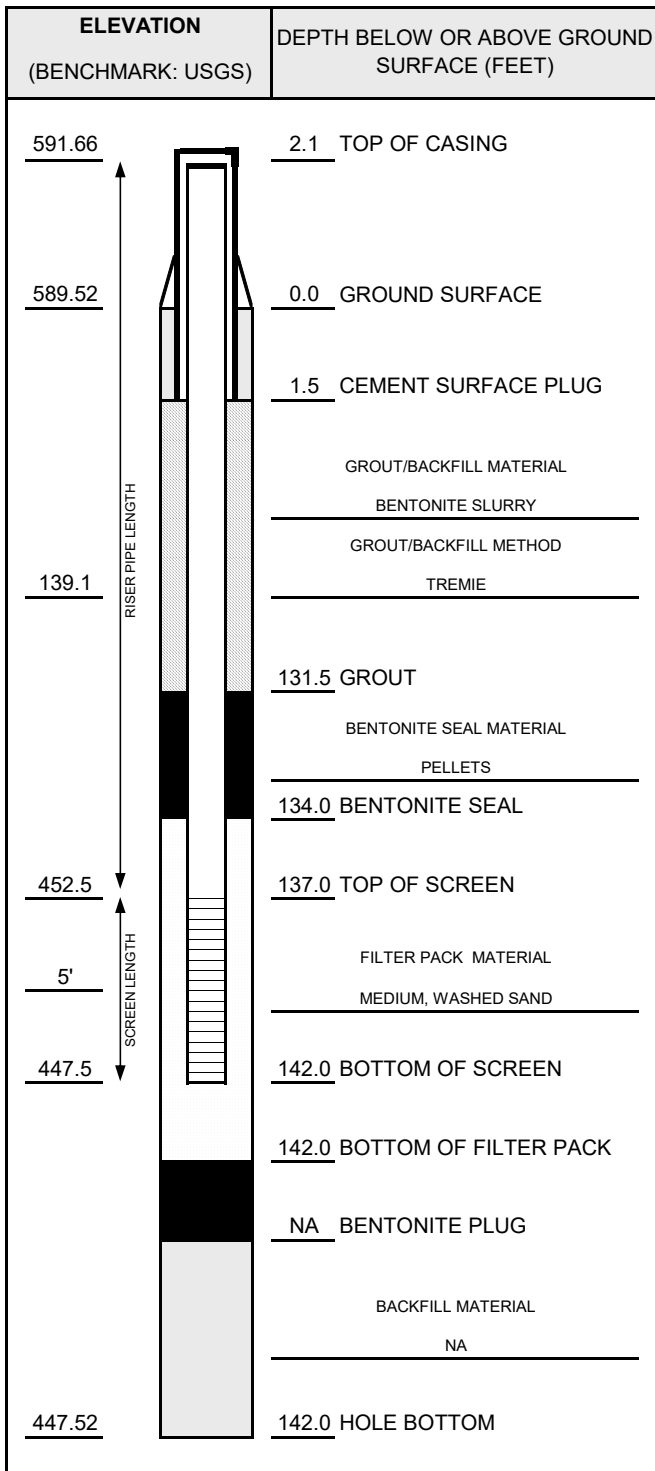
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



## WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: MW-16-11A
PROJ. NO: 265996.0003	DATE INSTALLED: 5/12/2017
INSTALLED BY: Jake Krenz	CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	6 IN. FROM 0 TO 142 FT. NA IN. FROM NA TO NA FT.
SURF. CASING DIAMETER:	NA IN. FROM NA TO NA FT. NA IN. FROM NA TO NA FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	AIR LIFT
TIME DEVELOPING:	3 HOURS
WATER REMOVED:	110 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Dark Gray
CLARITY AFTER:	Very Turbid
COLOR AFTER:	Light Gray
ODOR (IF PRESENT):	None

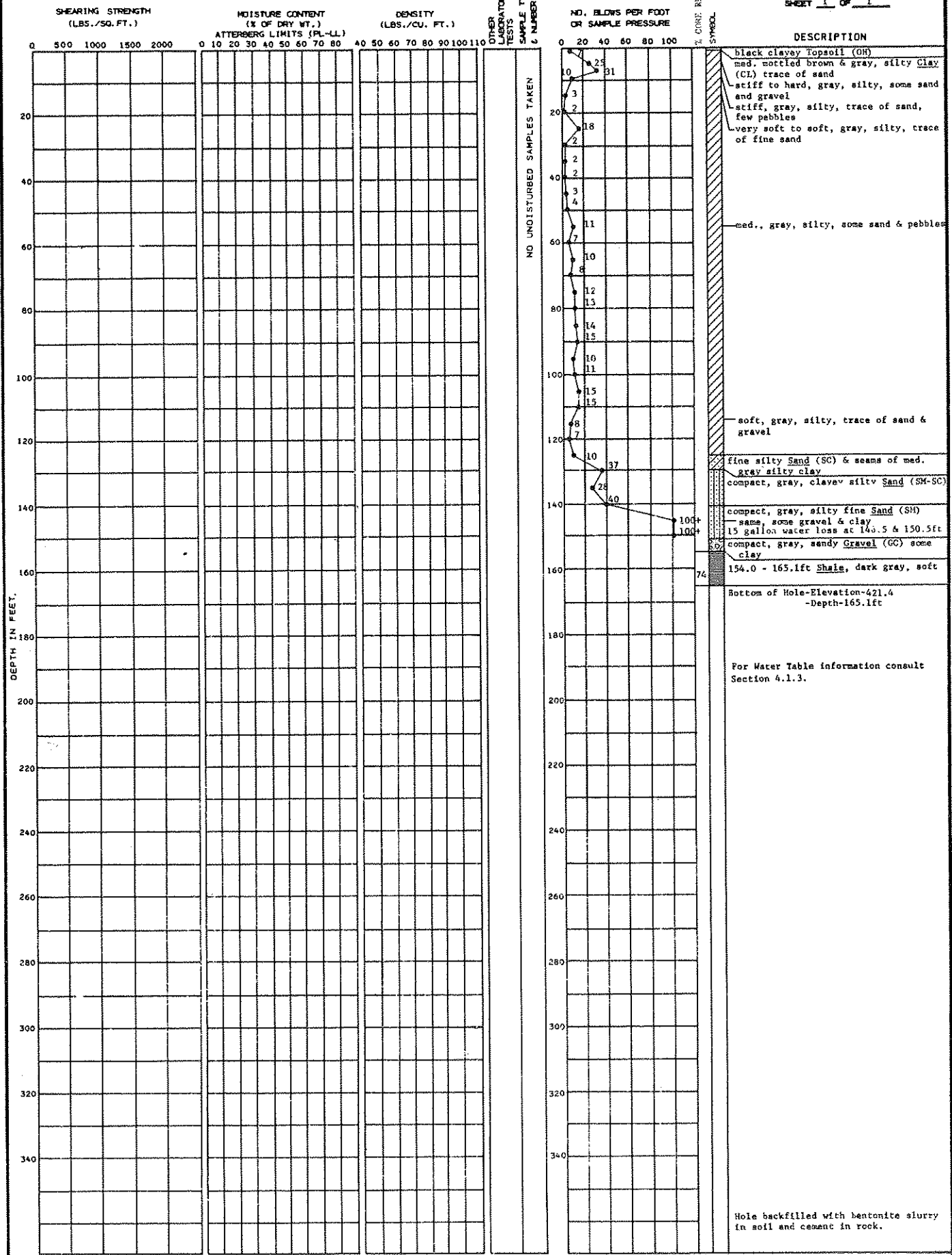
WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	141.98	T/PVC	5/15/2017	0838
DTB AFTER DEVELOPING:	145.45	T/PVC	5/15/2017	1612
SWE BEFORE DEVELOPING:	17.79	T/PVC	5/15/2017	0838
SWE AFTER DEVELOPING:	90.12	T/PVC	5/15/2017	1612
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	3120

**Appendix C**  
**1970's Boring Logs**

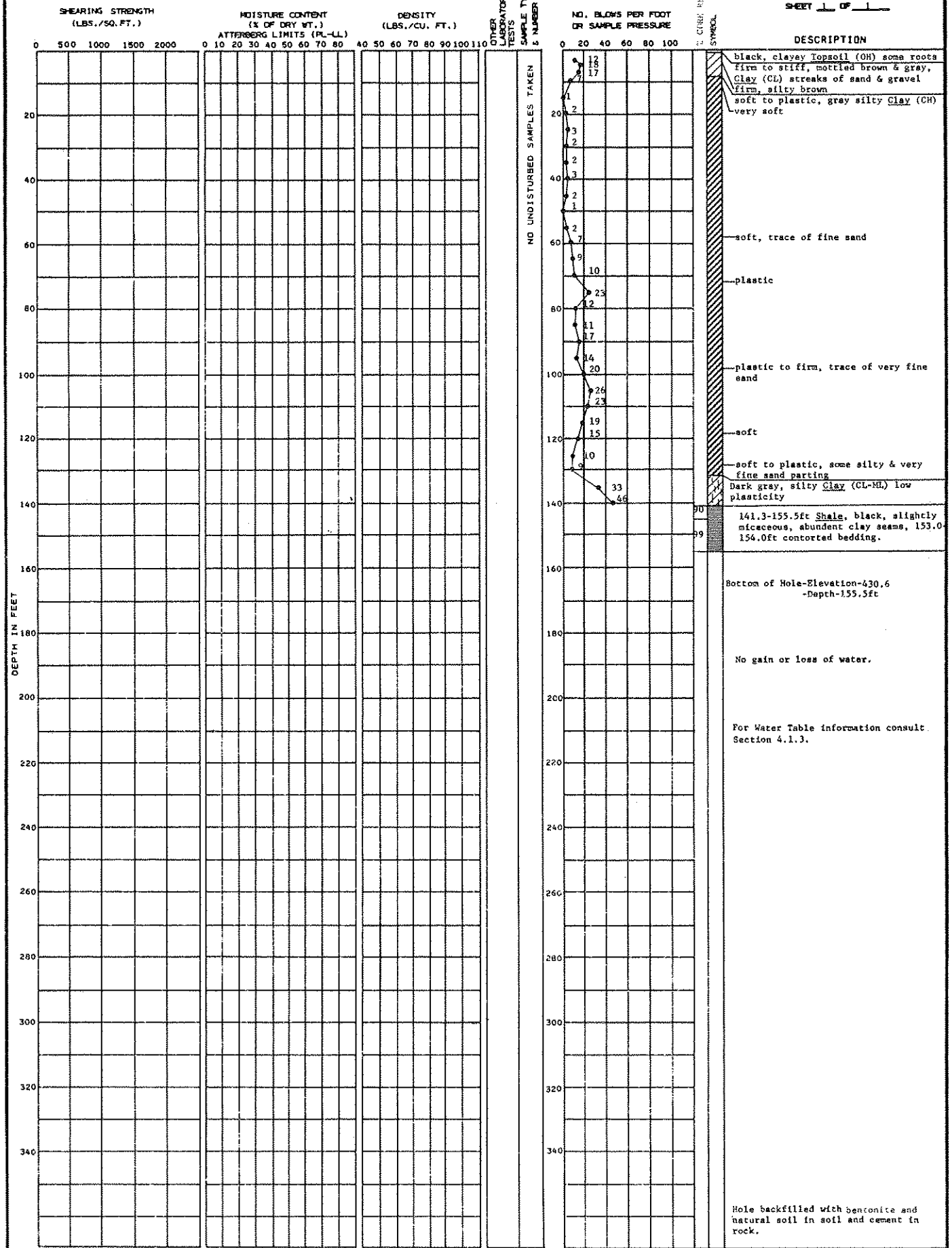
LOCATION: N 7,495 E 8,304 GROUND ELEVATION 586.5

DATE DRILLED: 11-26-73 12-3-73  
 SHEET 1 OF 1



LOCATION: N 8,600 E 9,965 GROUND ELEVATION 509.1

DATE DRILLED: 11-9-73



SOIL BORING NO. 10

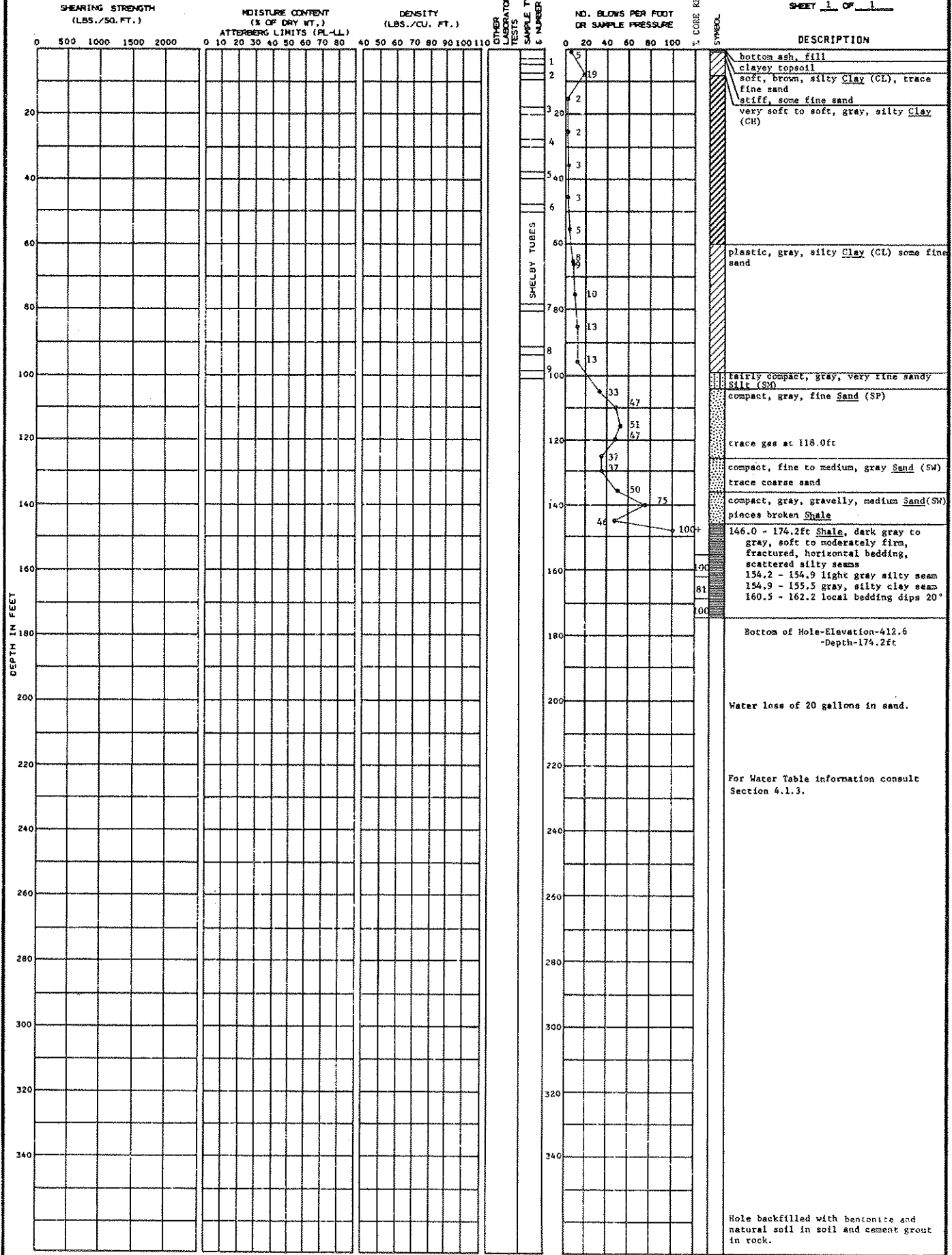
BECHTEL Belle River B-17



LOCATION: N 7,884 E 9,005 GROUND ELEVATION 586.8

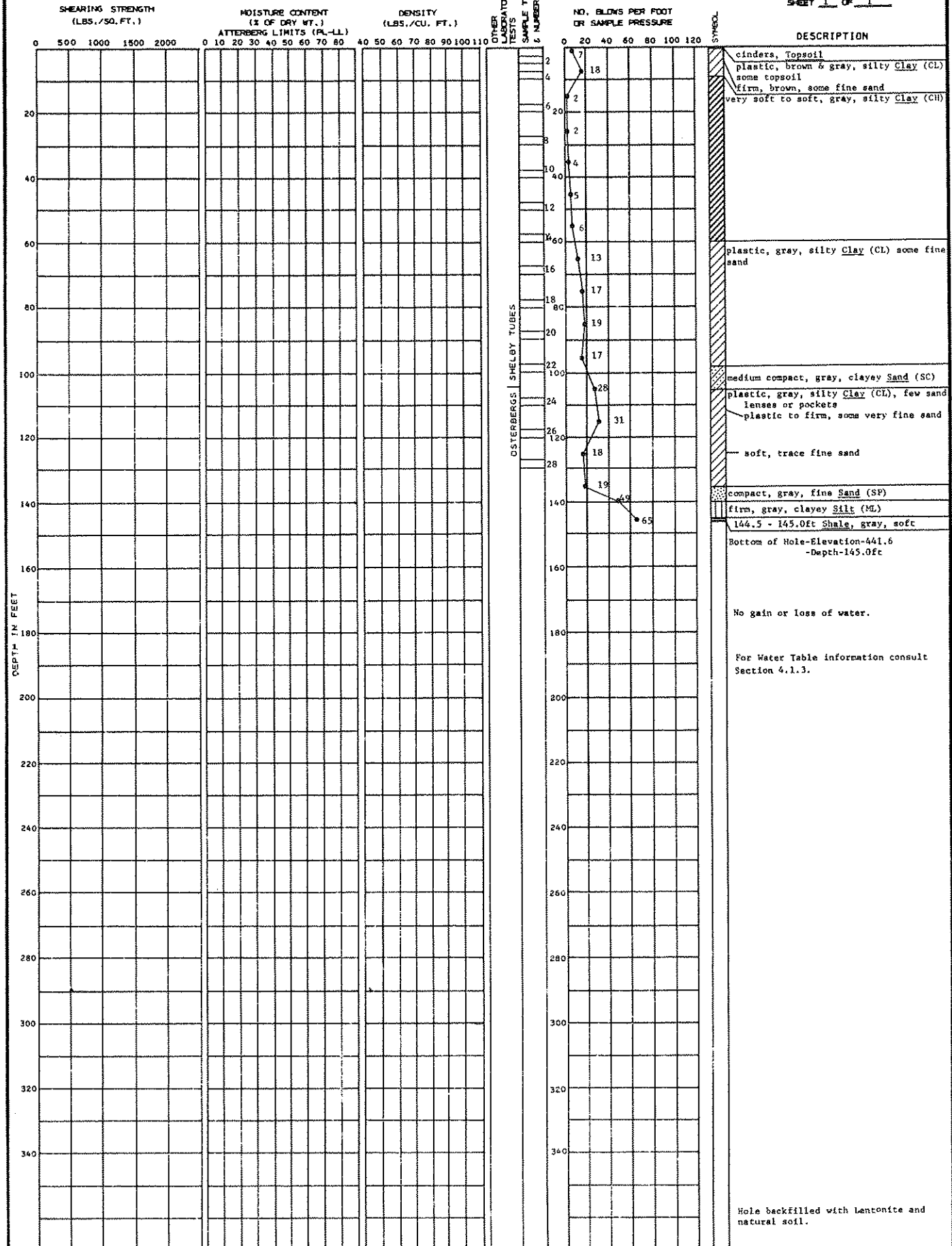
DATE DRILLED: 2-11-74  
2-18-74

SHEET 1 OF 1



LOCATION: N 8,306 E 9,627 GROUND ELEVATION 586.6

DATE DRILLED: 1-28-74  
1-31-76  
SHEET 1 OF 1



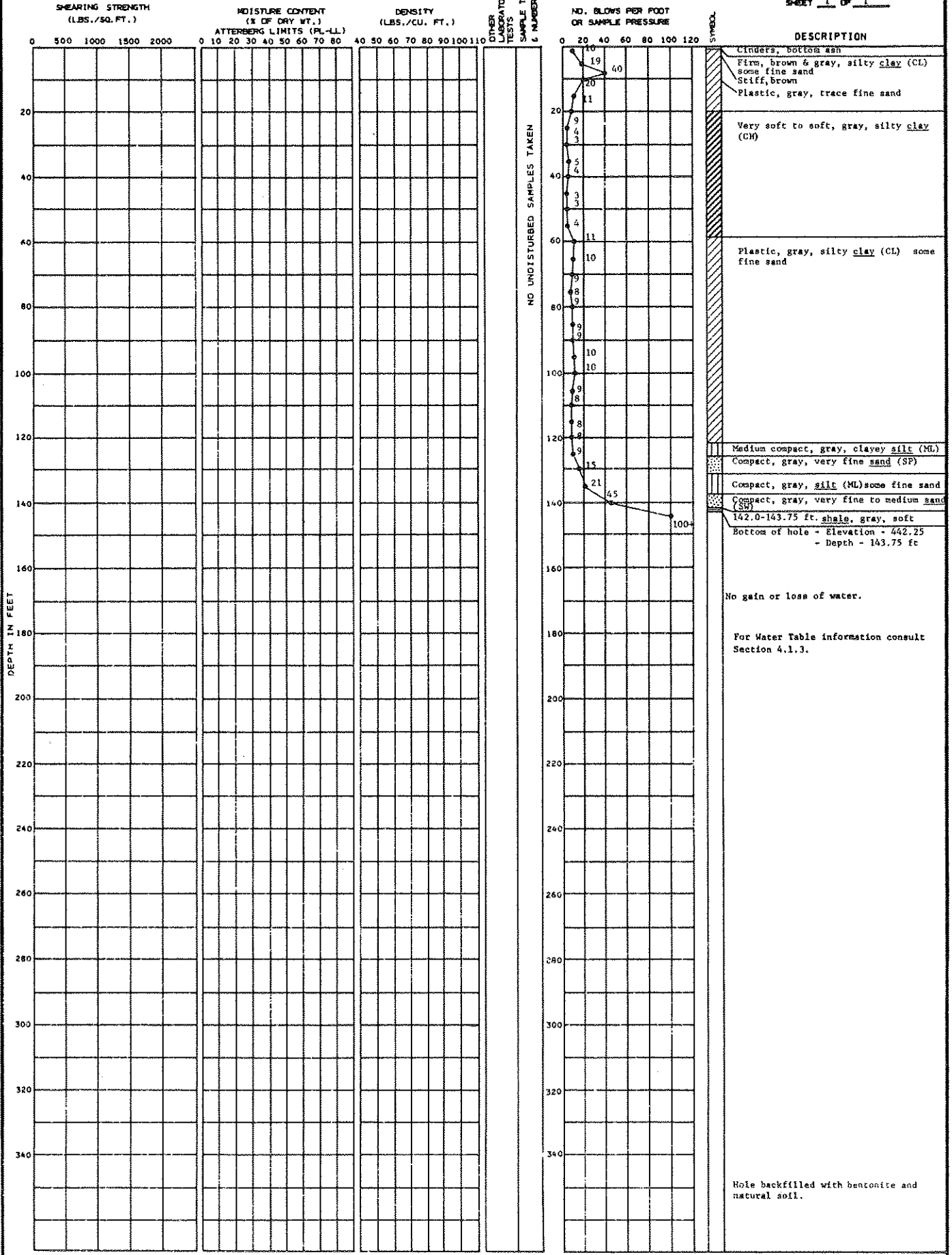
SOIL BORING NO. 14

BECHTEL Belle River

LOCATION: N 7,996 E 8,712 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-16-74

SHEET 1 OF 1



No gain or loss of water.

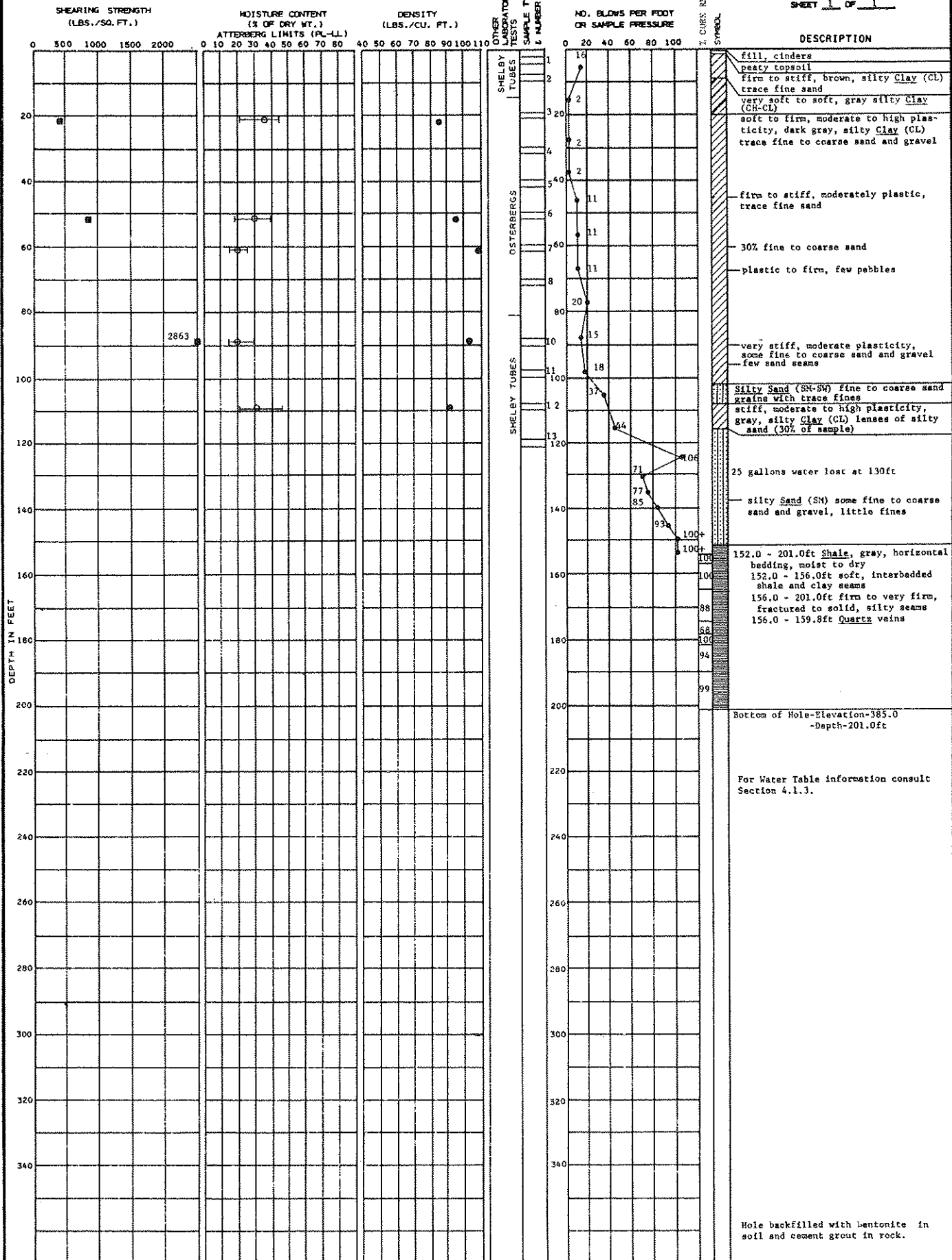
For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite and natural soil.

LOCATION: N 8,081 E 9,193 GROUND ELEVATION 586.0

DATE DRILLED: 1-16-74 1-29-74

SHEET 1 OF 1



Unconsolidated Undrained Atterberg Limits Moisture Content

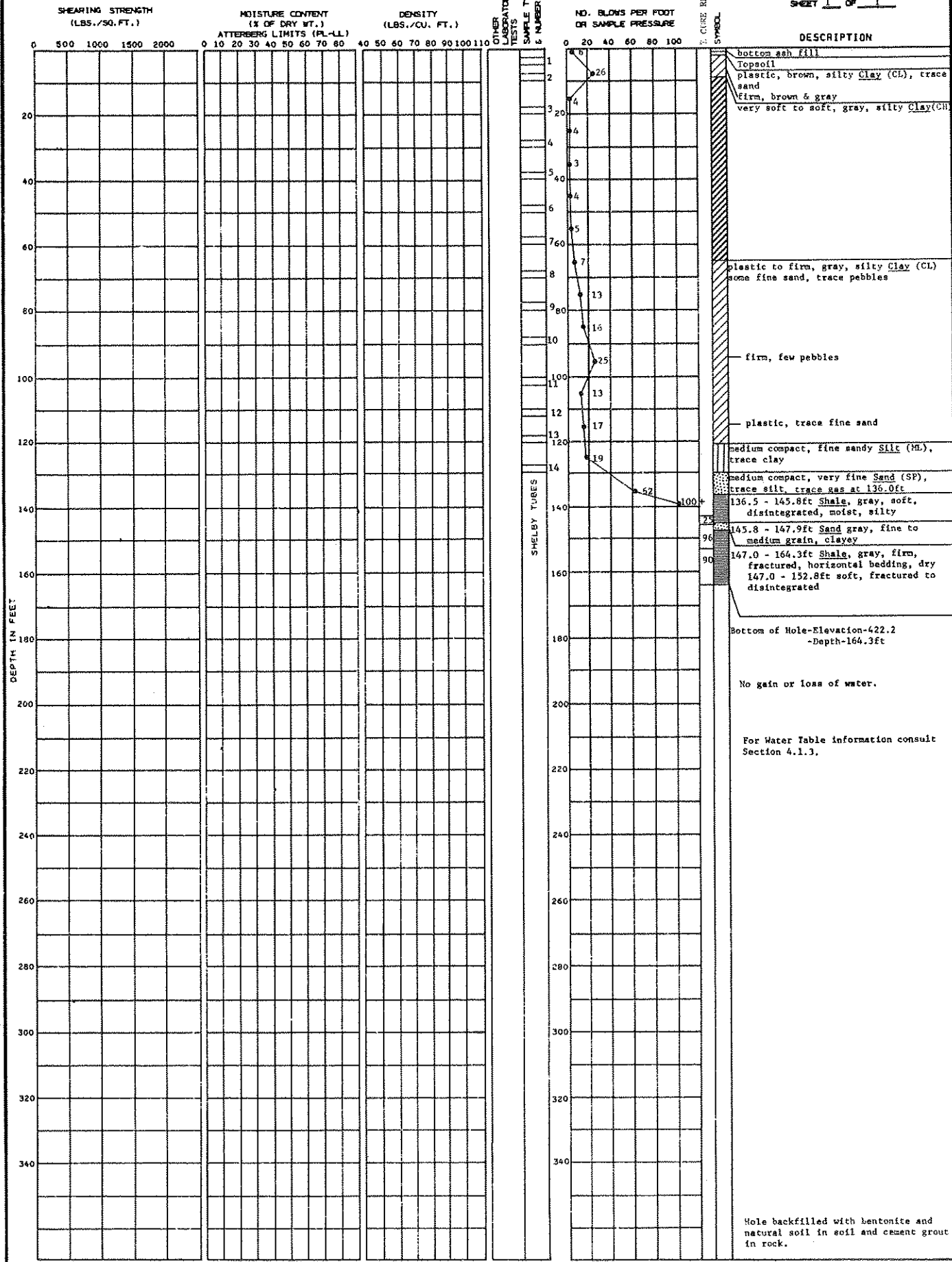
SOIL BORING NO. 18

BECHTEL Belle River

LOCATION: N 9,011 E 9,337 GROUND ELEVATION 586.5

DATE DRILLED: 1-17-74  
1-23-74

SHEET 1 OF 1



LOCATION: N.8,002  
E.9,943

GROUND ELEVATION: 585.9

DATE DRILLED: 11-20-73

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. UNDISTURBED SAMPLES TAKEN	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	% CLAY RESIDUE SYMBOL	SYMBOL	DESCRIPTION
									6 NUMBER
0						20			black clayey Topsoil (OH)
2						24			Firm to stiff, mottled brown, silty Clay (CL) trace of sand.
4						2			Plastic, gray, silty, some fine sand
6						8			very soft gray silty Clay (CH)
20						1			
22						2			plastic, dark gray sandy Clay (CL) some pebbles.
24						8			soft, gray silty Clay (CH)
40						2			
42						2			
44						2			
46						2			
48						4			
50						8			soft to plastic gray silty Clay (CL) some fine sand
60						9			
62						11			
64						24			med., gray, silty some sand & gravel
66						12			med., gray, silty
68						17			trace of sand, a few pebbles
70						12			
72						12			
74						13			
76						14			
78						16			
80						16			
82						18			
84						17			
86						12			med. gray silty Clay (CH)
88						11			Slight to low plasticity, dark gray, clayey Silt (CL-M)
90						15			138.5-160.5ft Shale, black, slightly micaceous, highly weathered to a depth of 140.75ft, crumbles easily.
93									
97									
100									Bottom of Hole-Elevation-425.4 -Depth-160.5ft
140									No gain or loss of water
180									For Water Table information consult Section 4.1.3.
200									
220									
240									
260									
280									
300									
320									
340									Hole backfilled with bentonite slurry in soil and cement grout in rock

SOIL BORING NO. 22

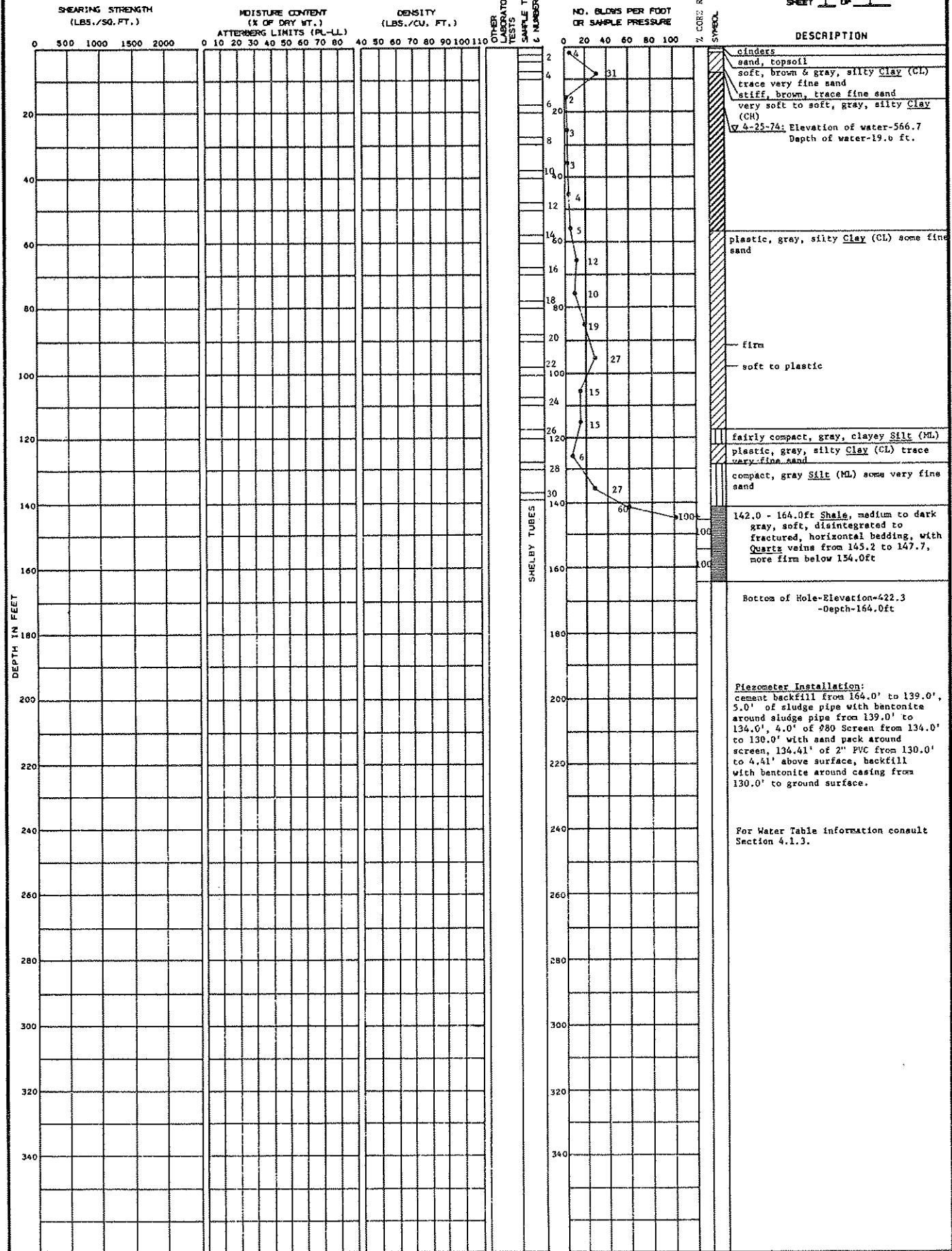
BECHTEL Belle River

LOCATION: N 7,904  
E 9,436

GROUND ELEVATION 586.3

DATE DRILLED: 1-30-74  
2-5-74

SHEET 1 OF 1

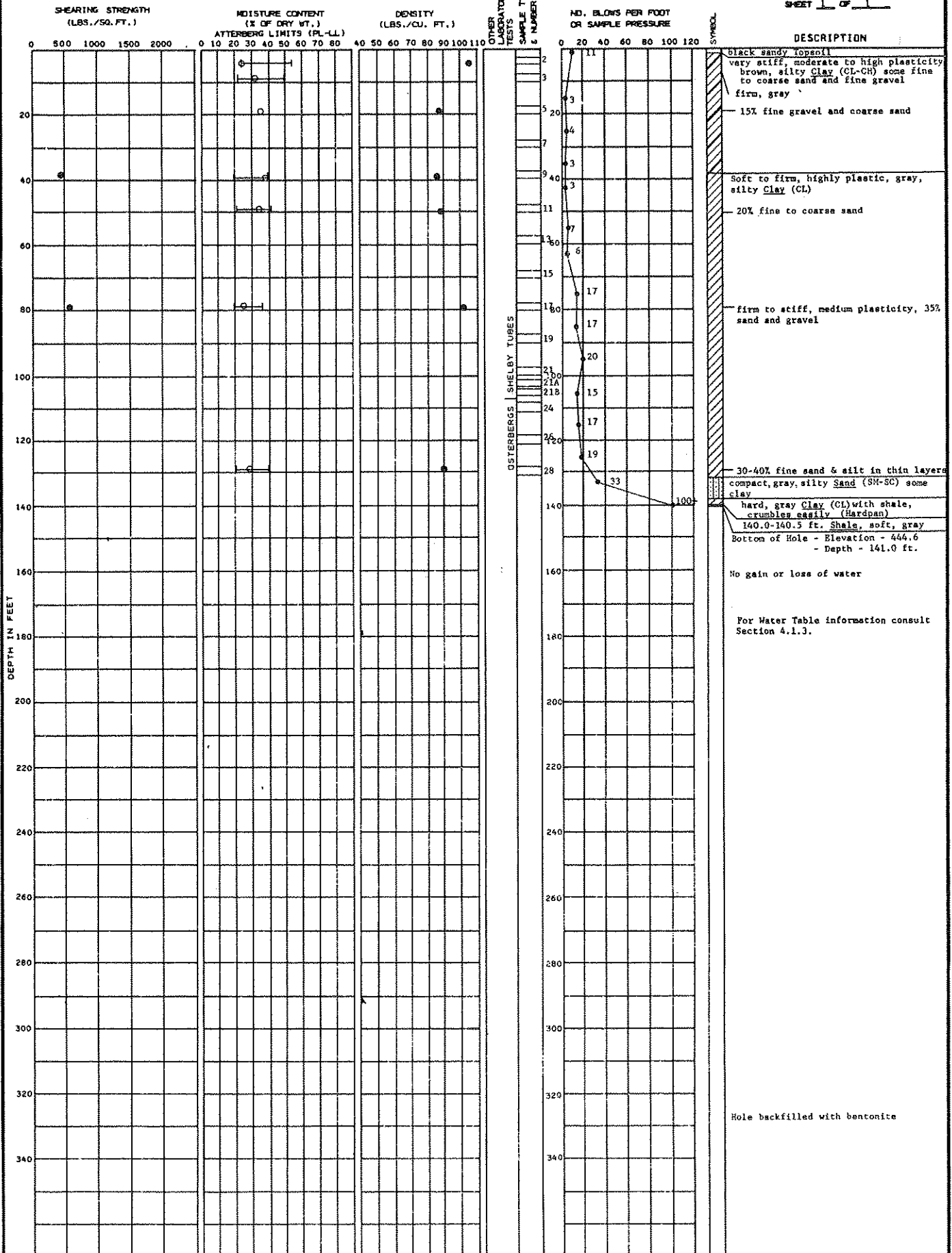


SOIL BORING NO. 24

BECHTEL Belle River

LOCATION: N 7,890 E 9,763 GROUND ELEVATION 585.6

DATE DRILLED: 12-12-73  
12-19-73  
SHEET 1 OF 1

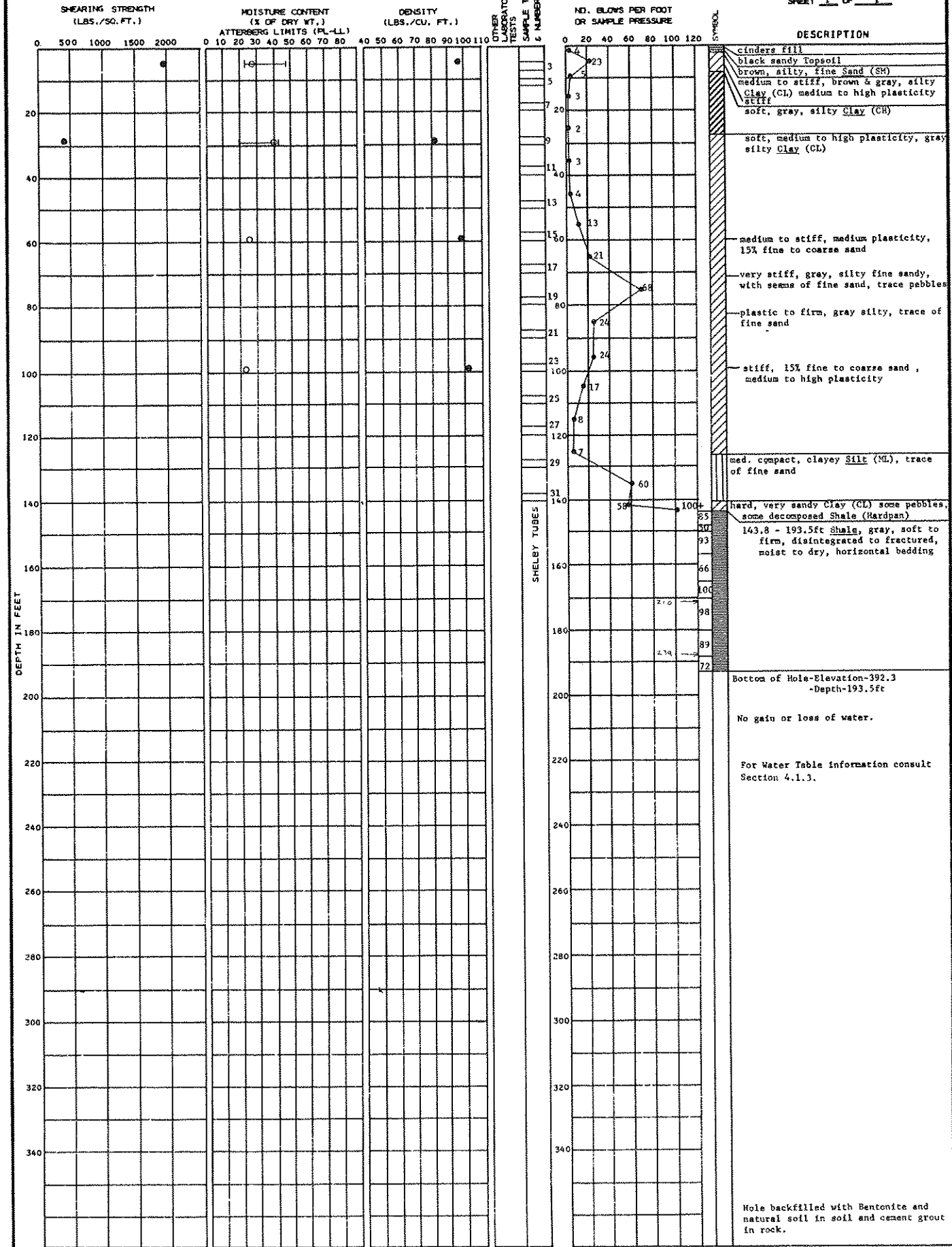


● Unconfined Compression  
○ Atterberg Limits  
○ Moisture Content

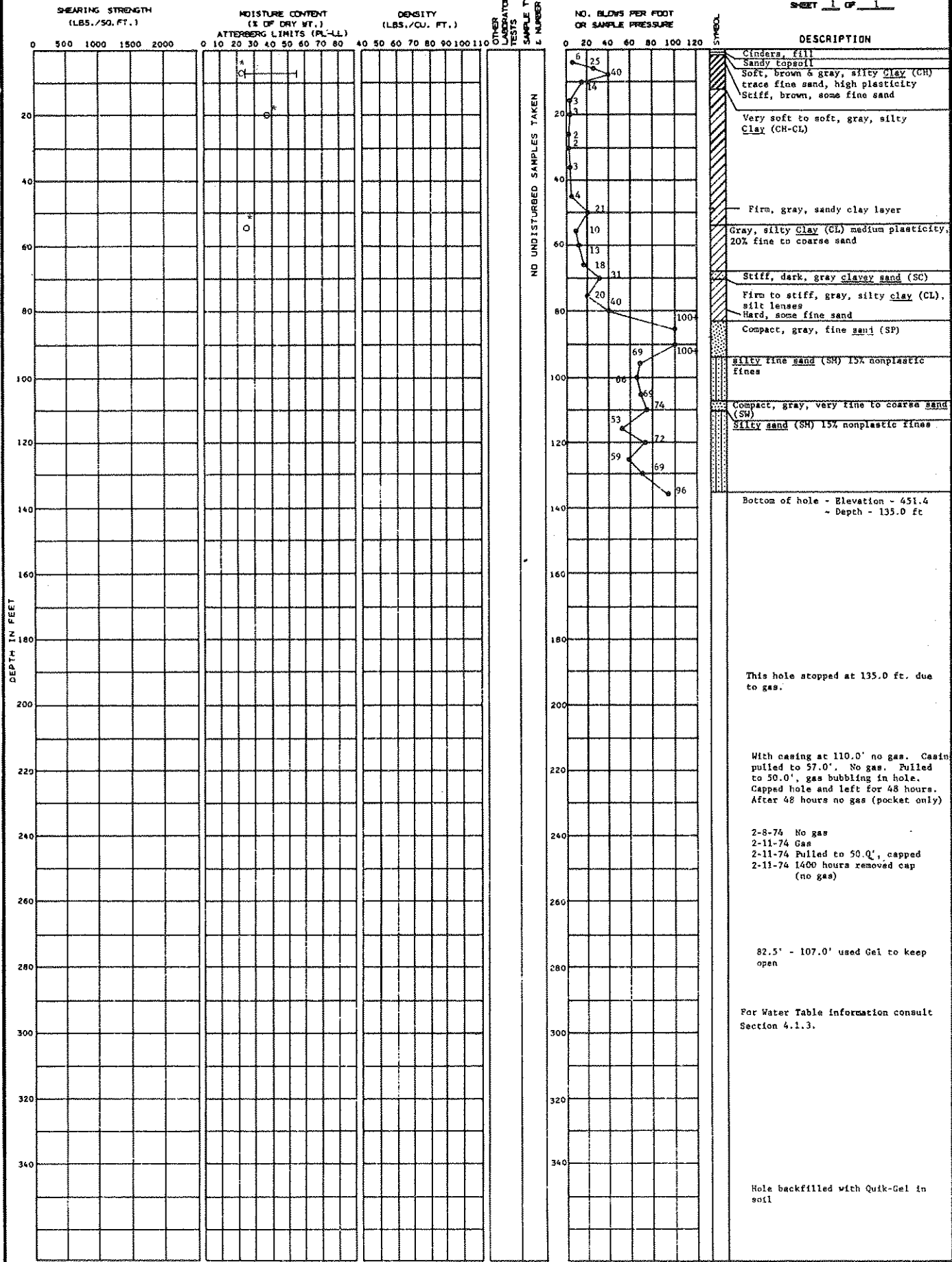


LOCATION: N 7,724 E 9,443 GROUND ELEVATION 585.8

DATE DRILLED: 1-15-74  
1-22-74  
SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterberg Limits



**DESCRIPTION**

Cinders, fill  
Sandy topsoil  
Soft, brown & gray, silty Clay (CH)  
trace fine sand, high plasticity  
Stiff, brown, some fine sand

Very soft to soft, gray, silty Clay (CH-CL)

Firm, gray, sandy clay layer

Gray, silty Clay (CL) medium plasticity, 20% fine to coarse sand

Stiff, dark, gray clayey sand (SC)

Firm to stiff, gray, silty clay (CL), silt lenses  
Hard, some fine sand

Compact, gray, fine sand (SP)

silty fine sand (SM) 15% nonplastic fines

Compact, gray, very fine to coarse sand (SW)

Silty sand (SM) 15% nonplastic fines

Bottom of hole - Elevation - 451.4  
- Depth - 135.0 ft

This hole stopped at 135.0 ft. due to gas.

With casing at 110.0' no gas. Casing pulled to 57.0'. No gas. Pulled to 50.0', gas bubbling in hole. Capped hole and left for 48 hours. After 48 hours no gas (pocket only)

2-8-74 No gas  
2-11-74 Gas  
2-11-74 Pulled to 50.0', capped  
2-11-74 1400 hours removed cap (no gas)

82.5' - 107.0' used Gel to keep open

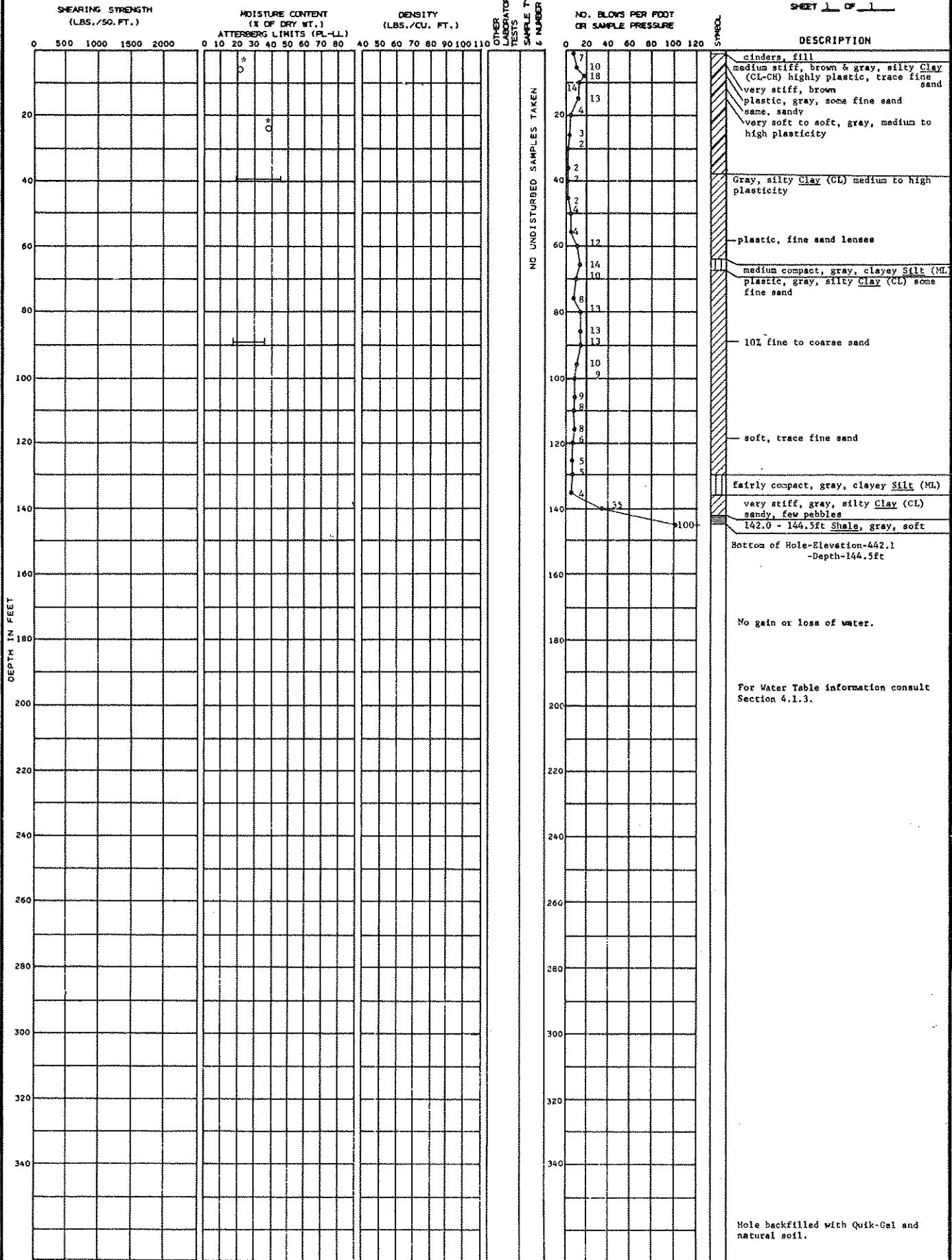
For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil

LOCATION: N 7,663 E 2,659 GROUND ELEVATION 586.6

DATE DRILLED: 2-6-74  
2-12-74

SHEET 1 OF 1



Atterberg Limits  
 ○ Moisture Content  
 \* Sample Jar Unsealed

SOIL BORING NO. 32

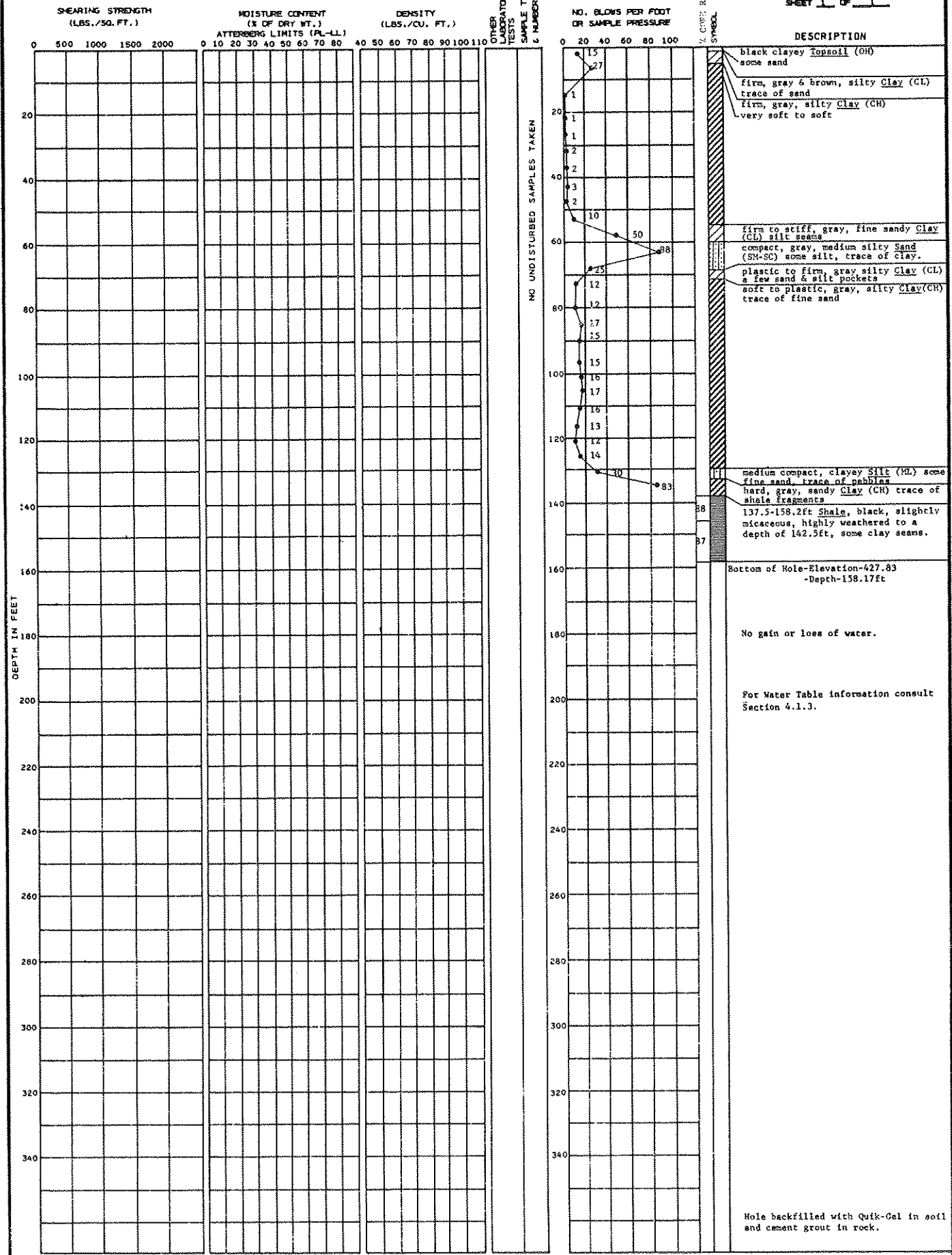
BECHTEL Belle River

LOCATION: N 7,398  
E 9,963

GROUND ELEVATION: 586.0

DATE DRILLED: 11-8-73

SHEET 1 OF 1

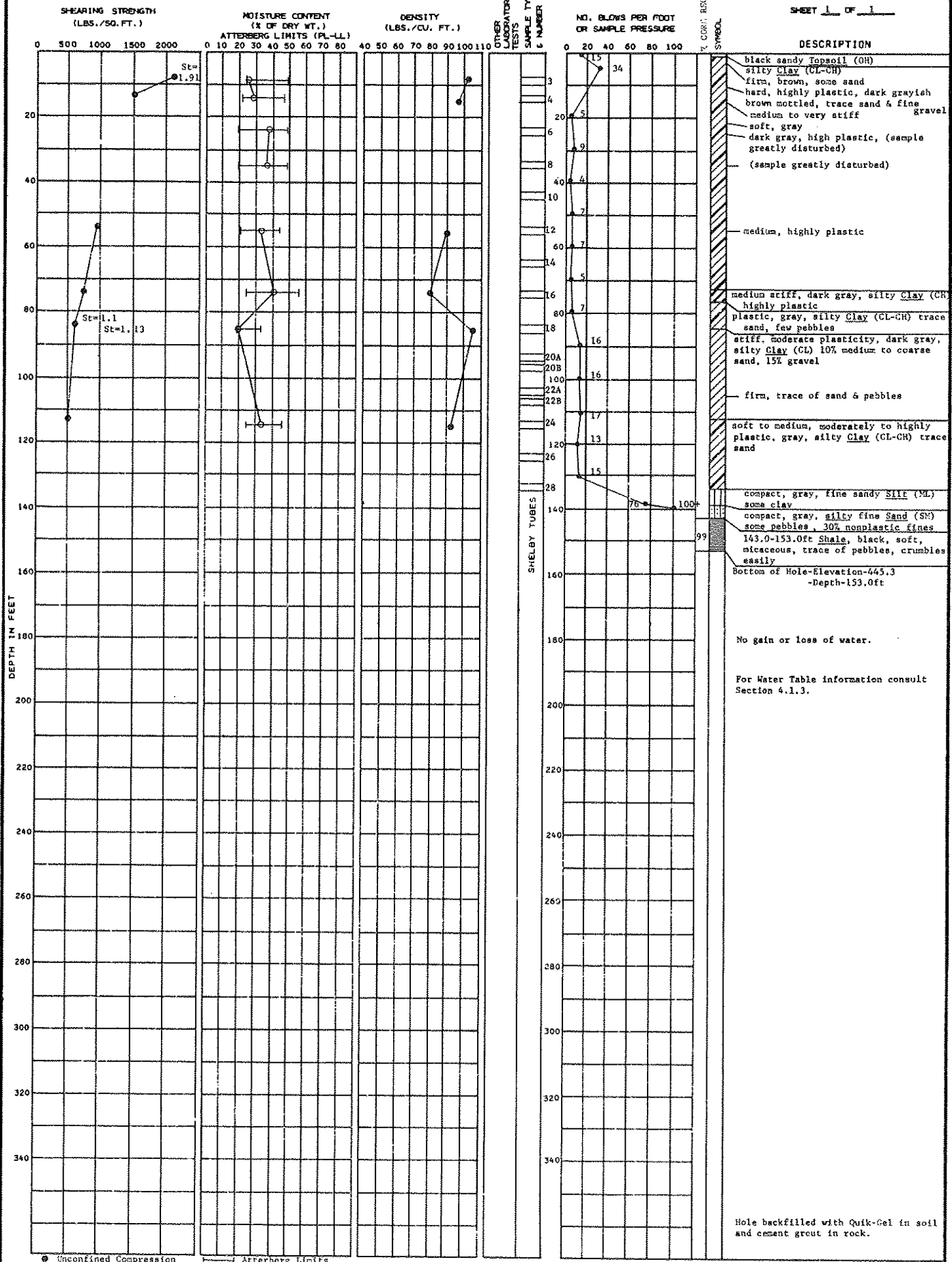


LOCATION: N 9,007  
E 13,035

GROUND ELEVATION: 598.3

DATE DRILLED: 12-6-73  
12-12-73

SHEET 1 OF 1



● Unconfined Compression  
St = Sensitivity

○ Atterberg Limits  
Moisture Content

SOIL BORING NO. 38

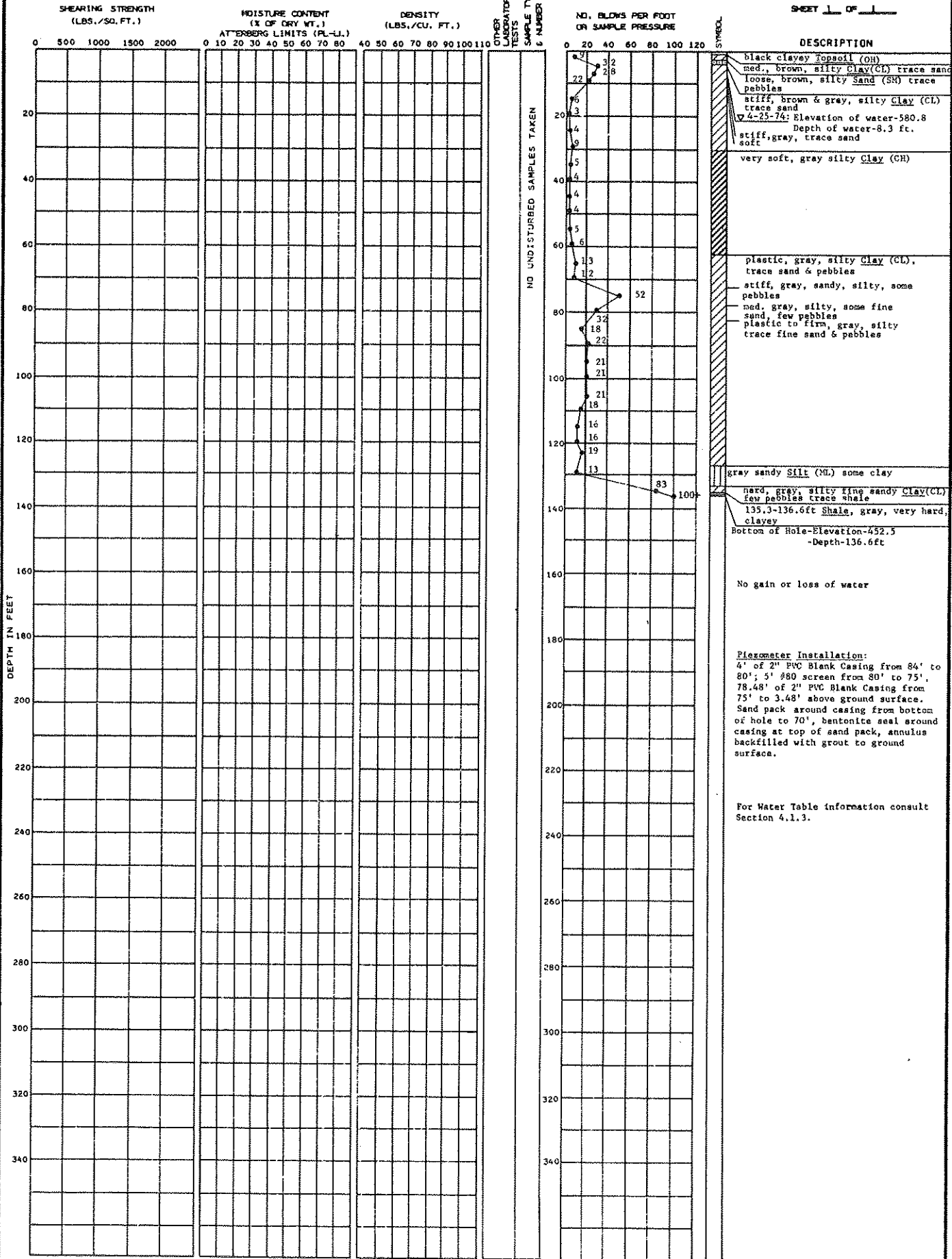
BECHTEL Belle River

B-43

LOCATION: N 8,003 E10,993 GROUND ELEVATION: 589.1

DATE DRILLED: 12-14-73 12-18-73

SHEET 1 OF 1



SOIL BORING NO. 40

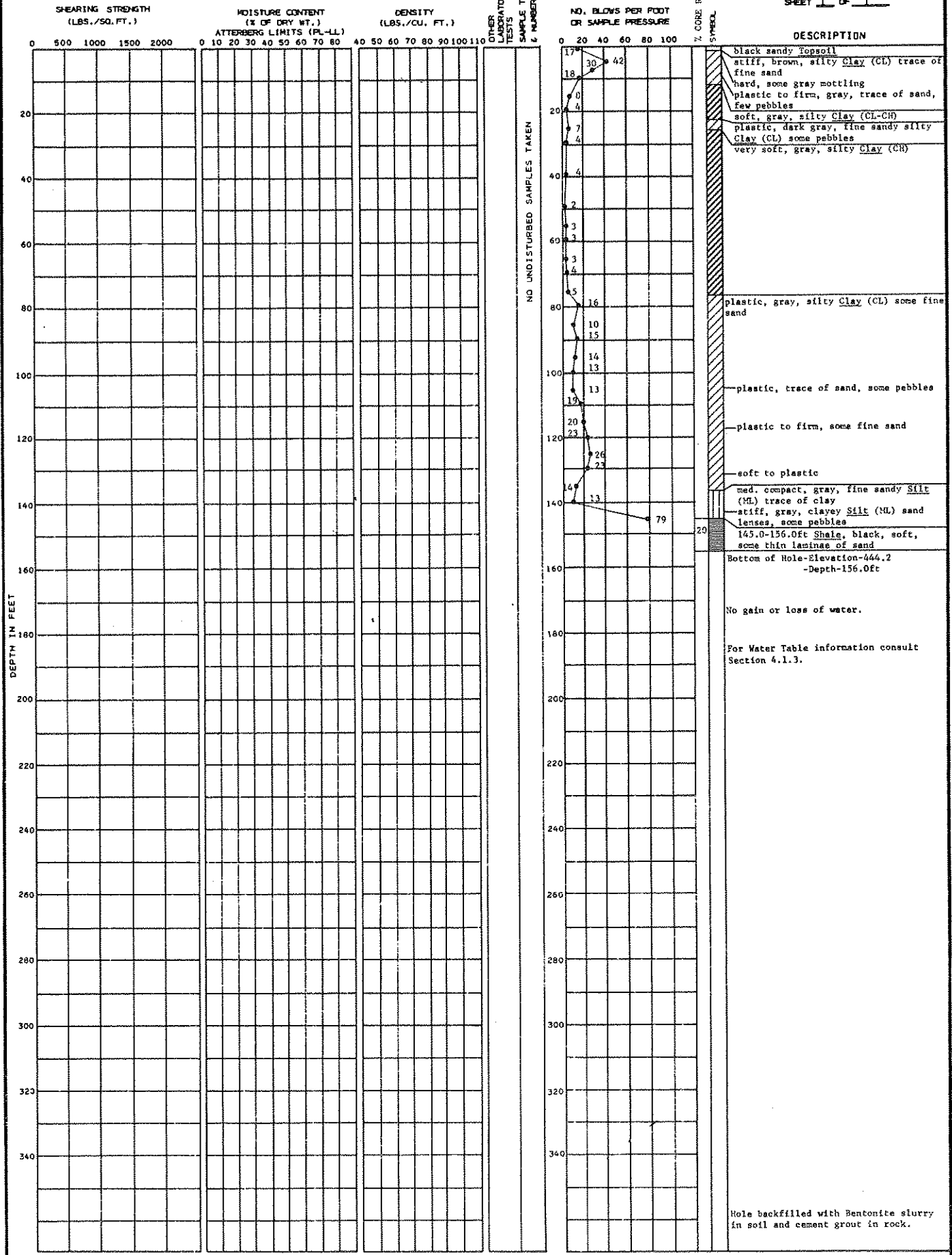
BECHTEL Belle River

LOCATION: N 8,016  
E 12,991

GROUND ELEVATION 500.2

DATE DRILLED: 11-19-73  
11-21-73

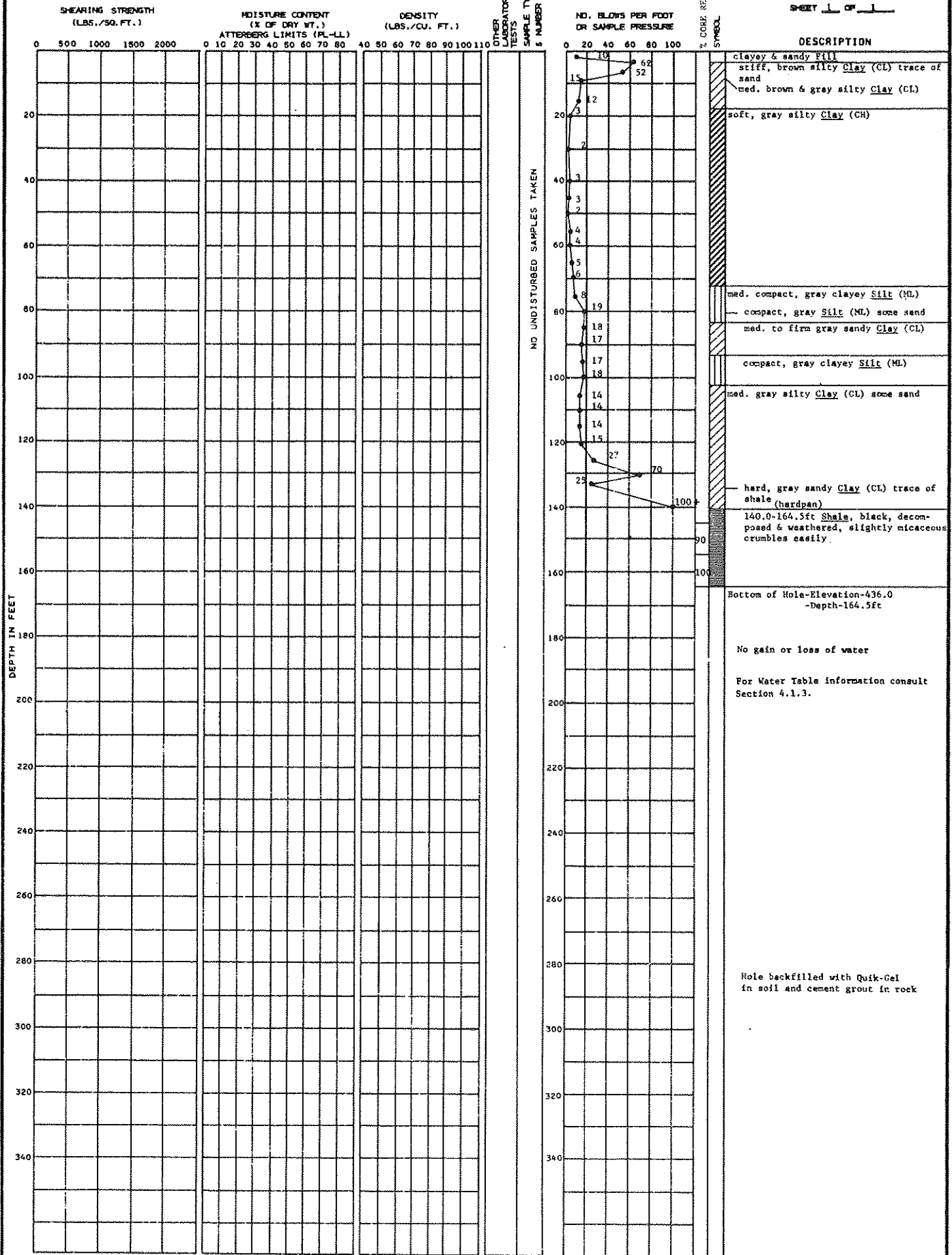
SHEET 1 OF 1



SOIL BORING NO. 42  
BECHTEL Belle River

LOCATION: N 7,004  
E13,000 GROUND ELEVATION 600.5

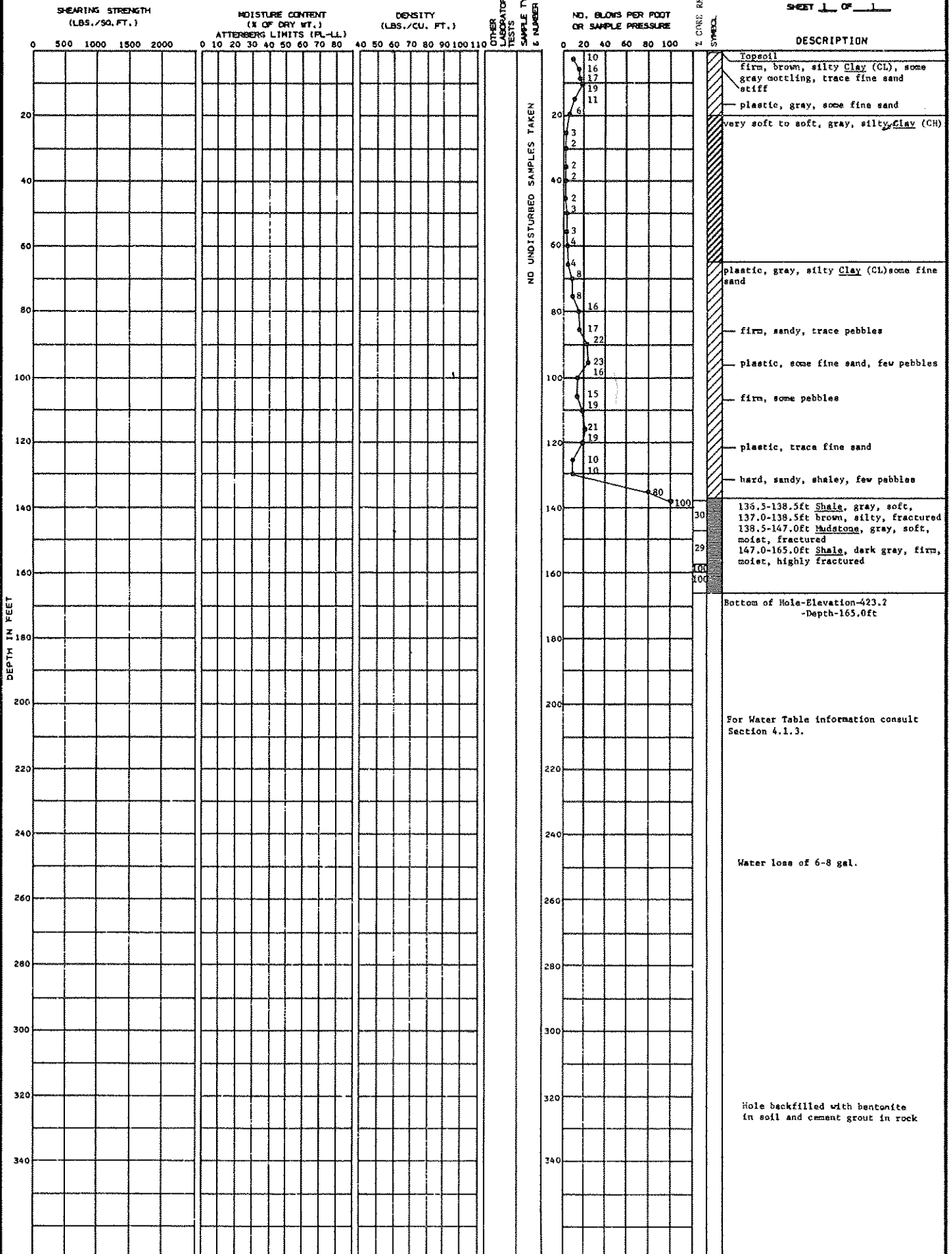
DATE DRILLED: 11-20-73  
SHEET 1 OF 1





LOCATION: N 5,344  
E 12,319 GROUND ELEVATION 588.2

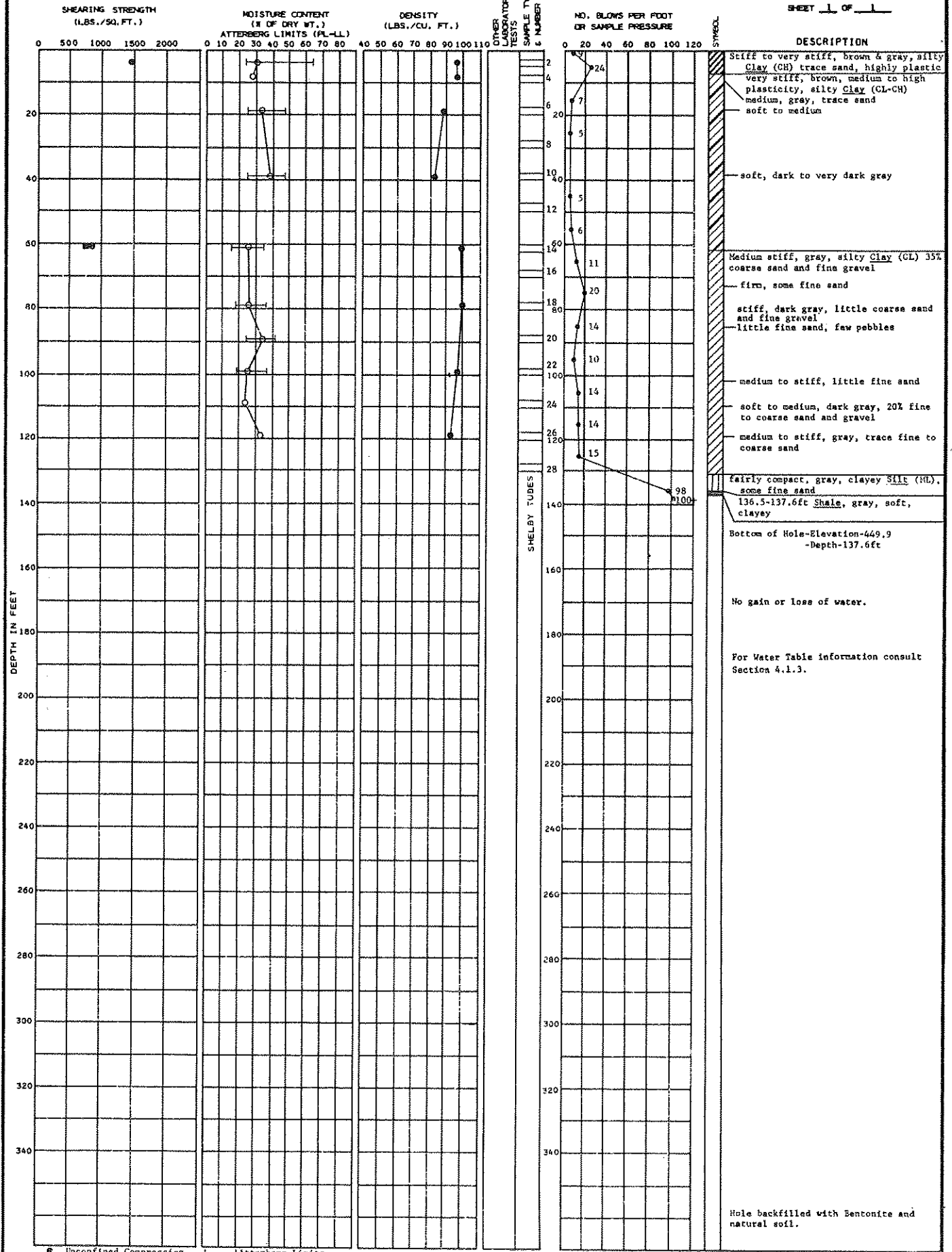
DATE DRILLED: 1-22-74  
1-28-74



LOCATION: N 3,950 E 12,584 GROUND ELEVATION 587.5

DATE DRILLED: 1-14-74  
1-23-74

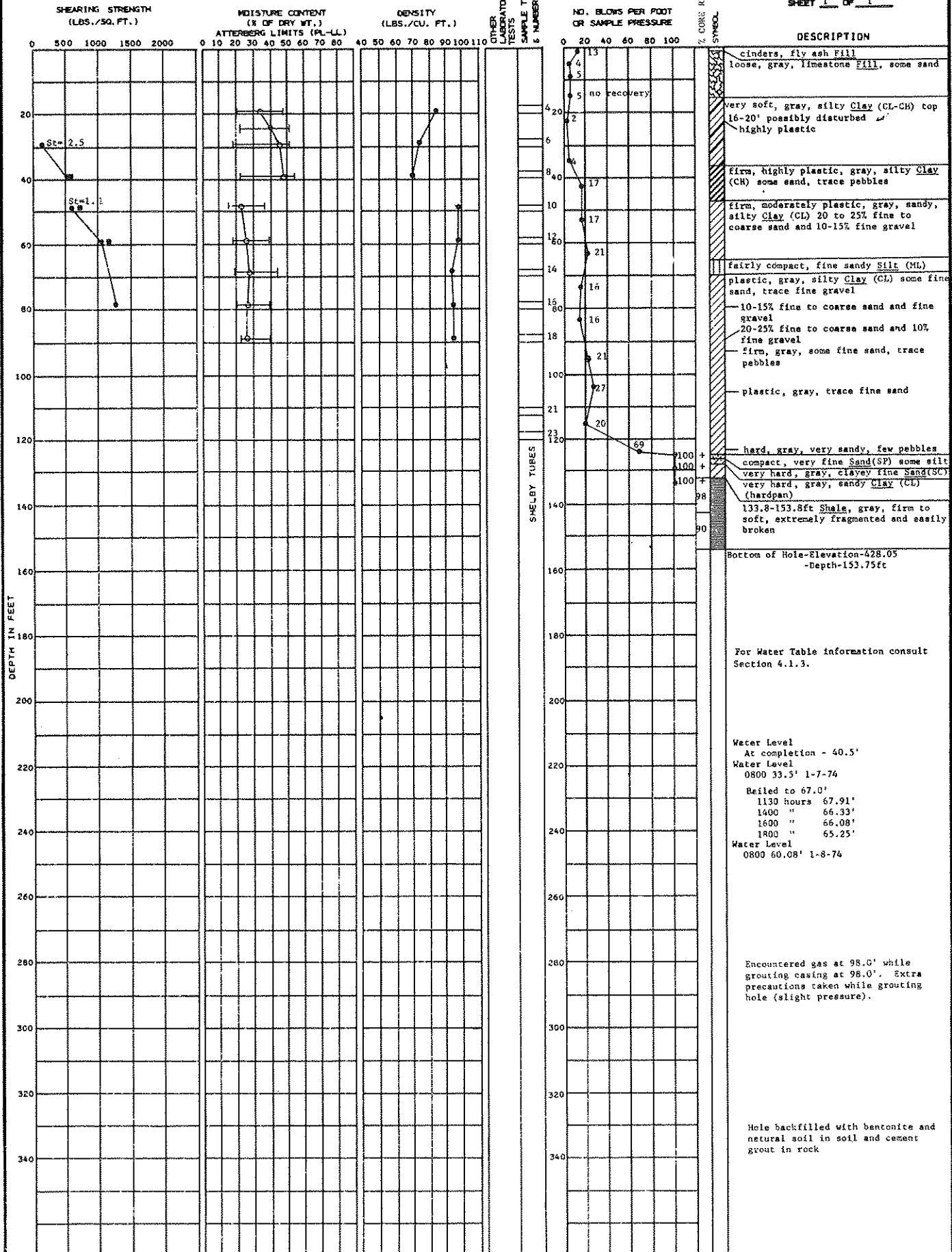
SHEET 1 OF 1



● Unconfined Compression  
 ■ Unconsolidated Undrained  
 — Atterberg Limits  
 ○ Moisture Content

SOIL BORING NO. 48

BECHTEL Belle River



● Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity

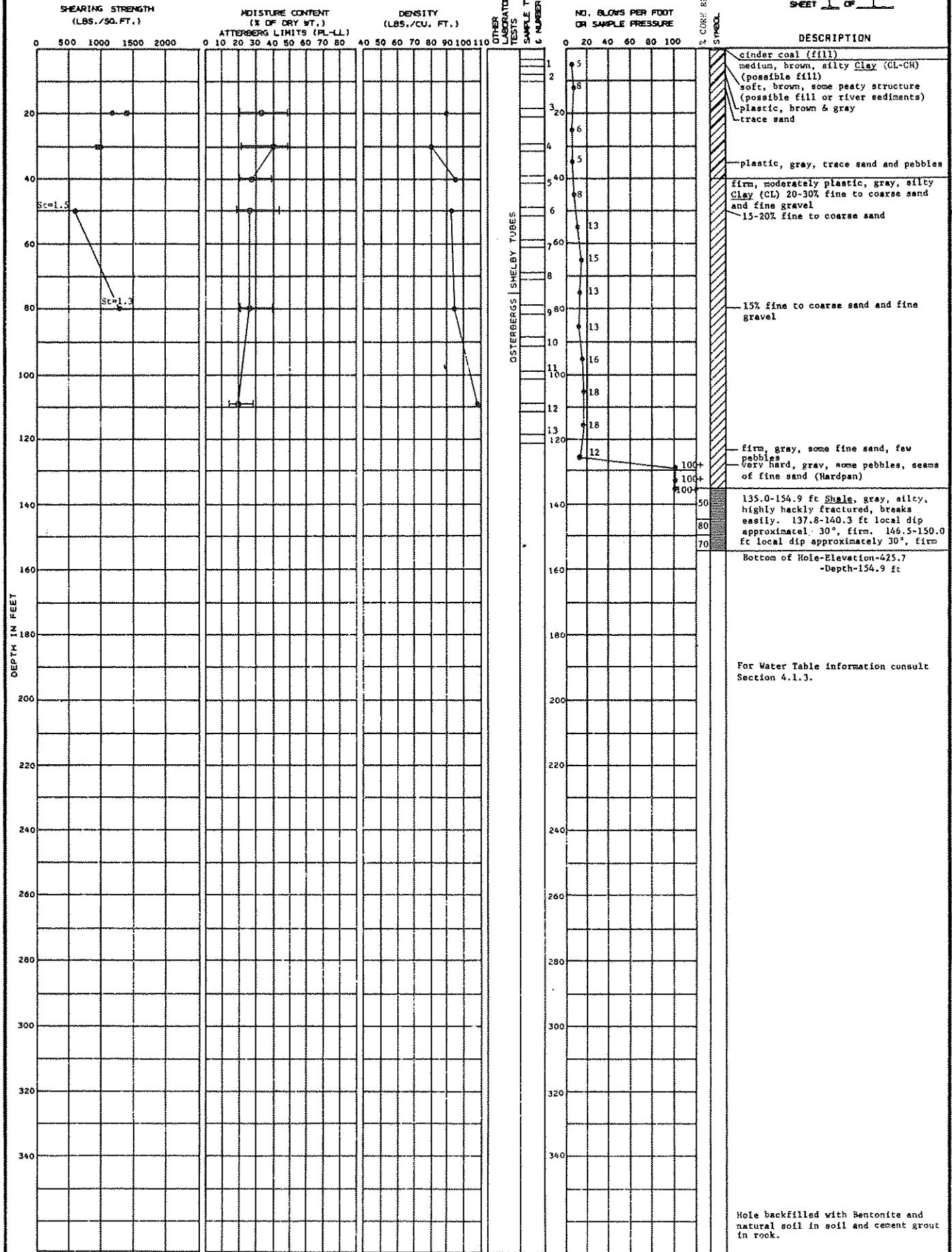
○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 50  
 BECTEL Belle River

LOCATION: N 2,052 E15,176 GROUND ELEVATION 580.6

DATE DRILLED: 12-21-73  
1-7-76

SHEET 1 OF 1



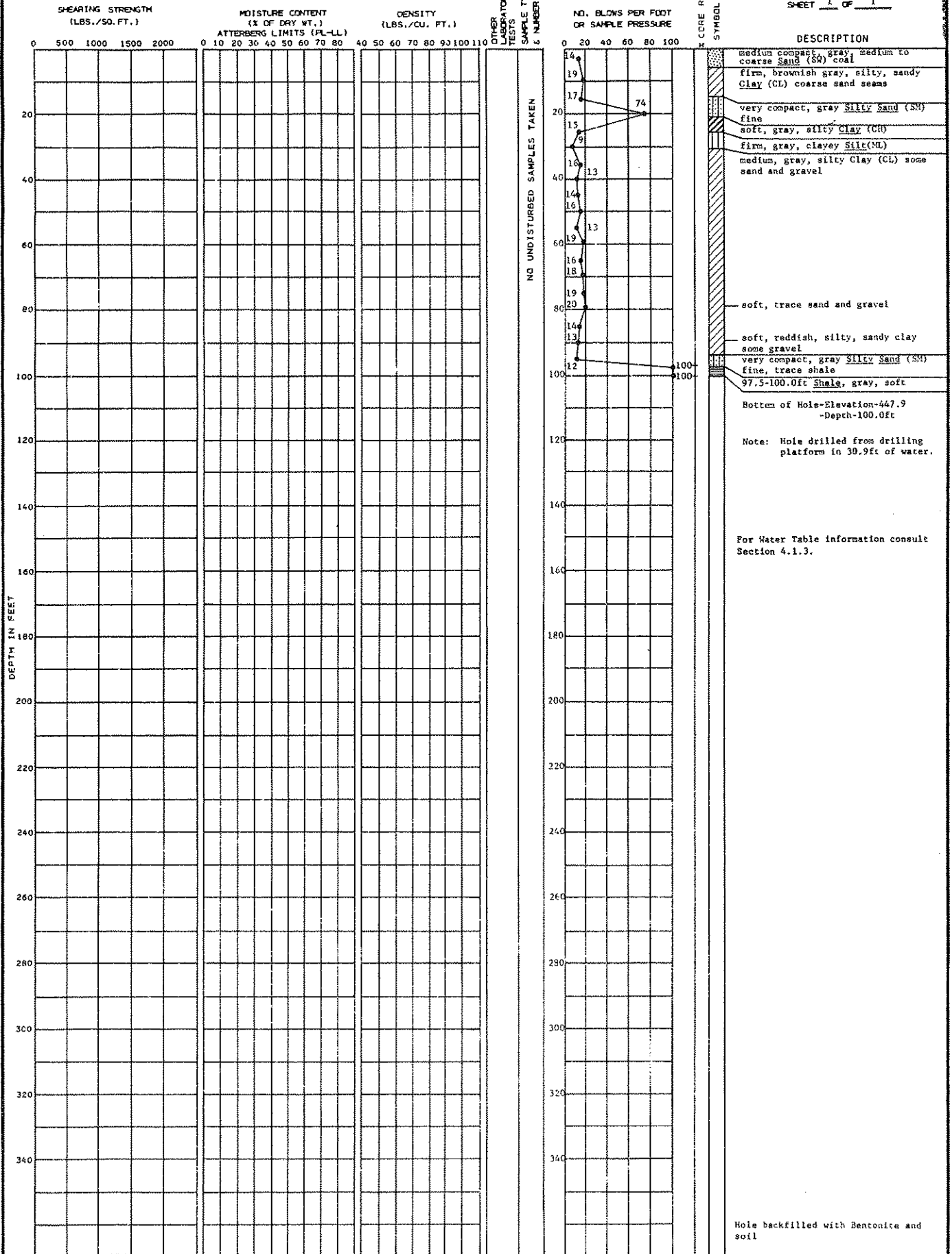
■ Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity  
 ○ Moisture content  
 — Atterberg limits

LOCATION: N 2,645  
E 15,306

GROUND ELEVATION 547.9

DATE DRILLED: 3-29-74

SHEET 1 OF 1



Bottom of Hole-Elevation-447.9  
-Depth-100.0ft

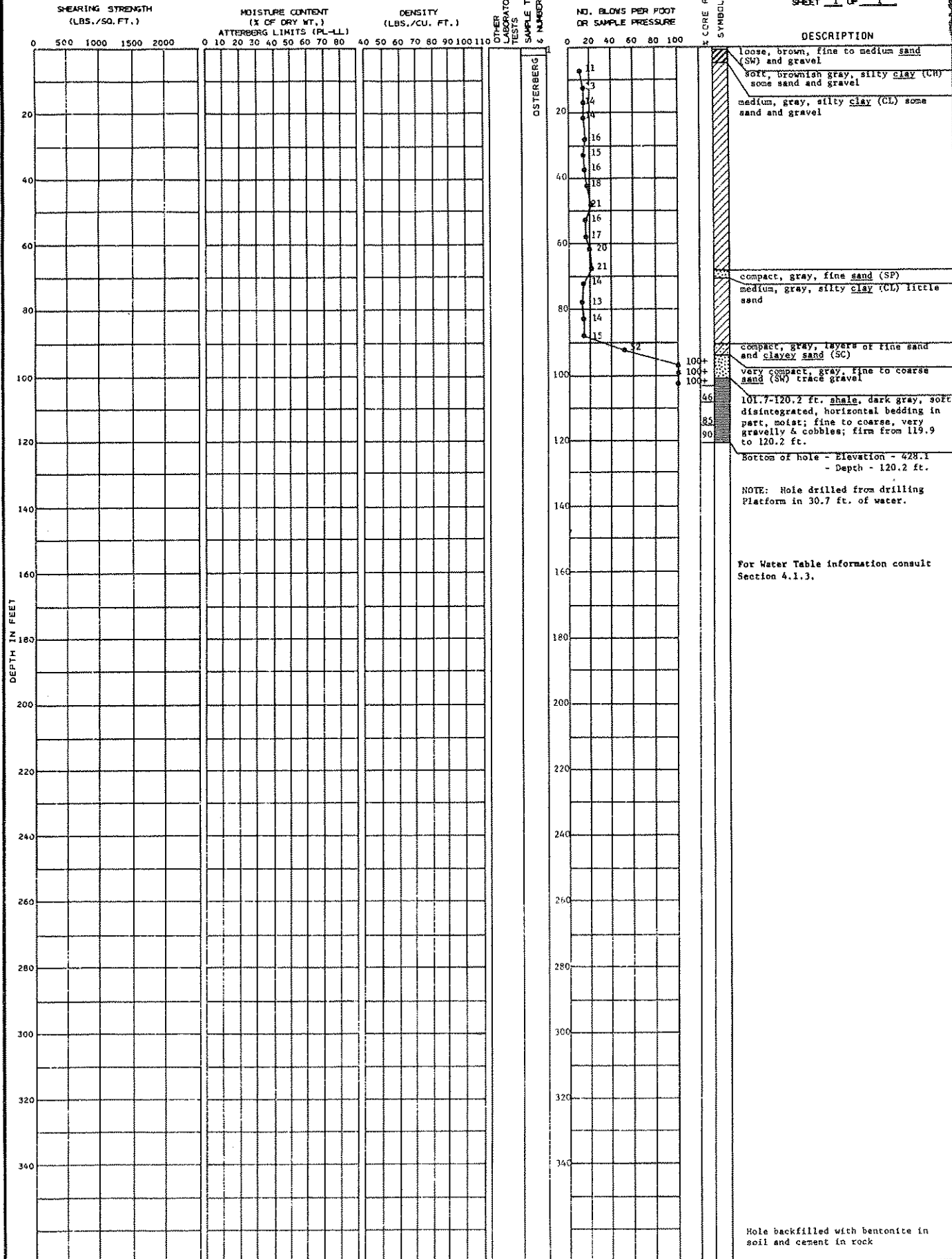
Note: Hole drilled from drilling platform in 30.9ft of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and soil

LOCATION: N 1,907 GROUND ELEVATION 543.3  
 E 15,269

DATE DRILLED: 3-20-74  
 3-26-74  
 SHEET 1 OF 1



NOTE: Hole drilled from drilling Platform in 30.7 ft. of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite in soil and cement in rock

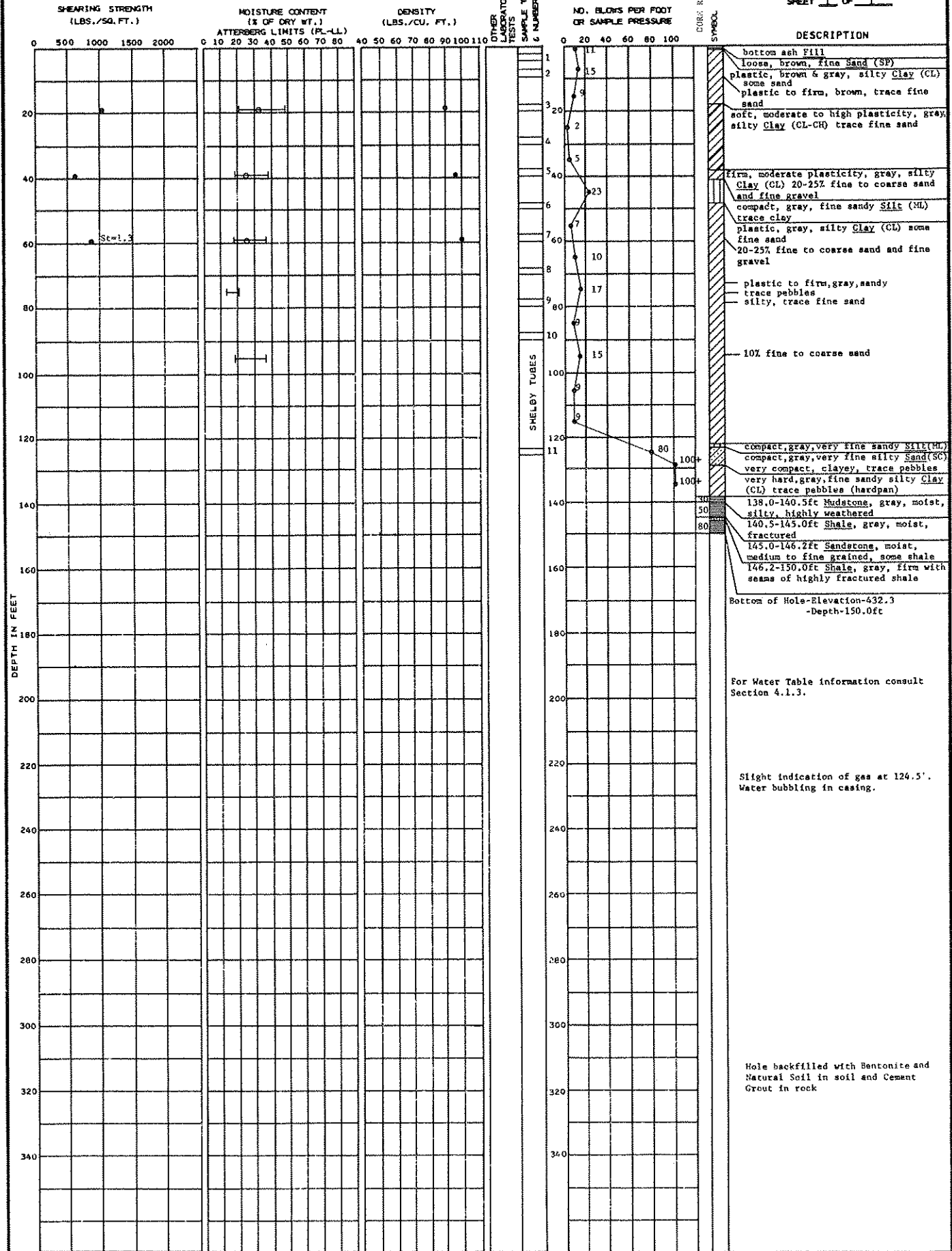
SOIL BORING NO. 57

BECHTEL Belle River

LOCATION: N 2393 E15140 GROUND ELEVATION: 582.3

DATE DRILLED: 1-10-74  
1-16-74

SHEET 1 OF 1



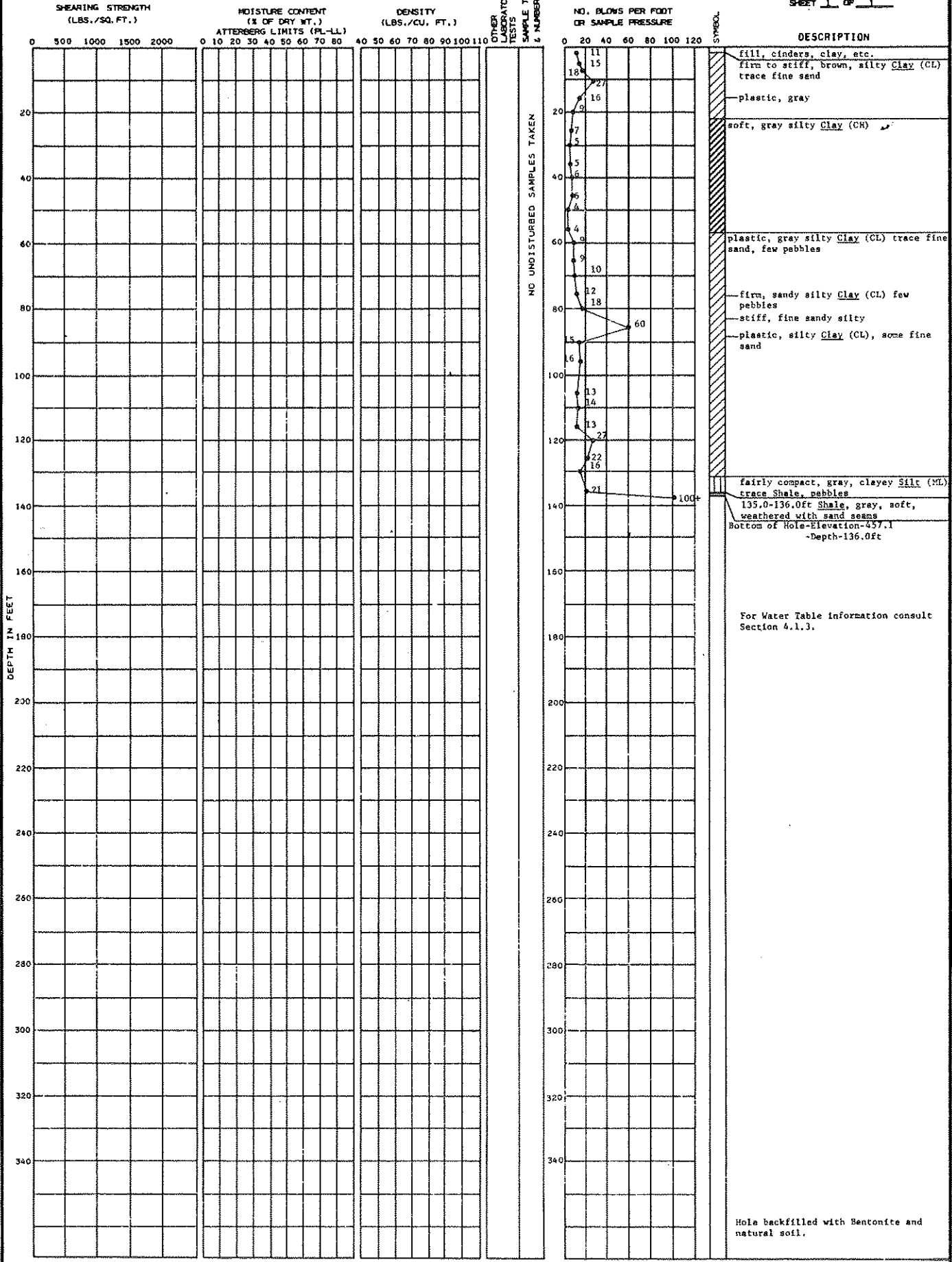
• Unconfined  
 Sr = Sensitivity  
 ○ Moisture Content  
 — Atterberg Limits

LOCATION: N 5,283  
E 14,042

GROUND ELEVATION 593.1

DATE DRILLED: 1-23-74  
1-29-74

SHEET 1 OF 1

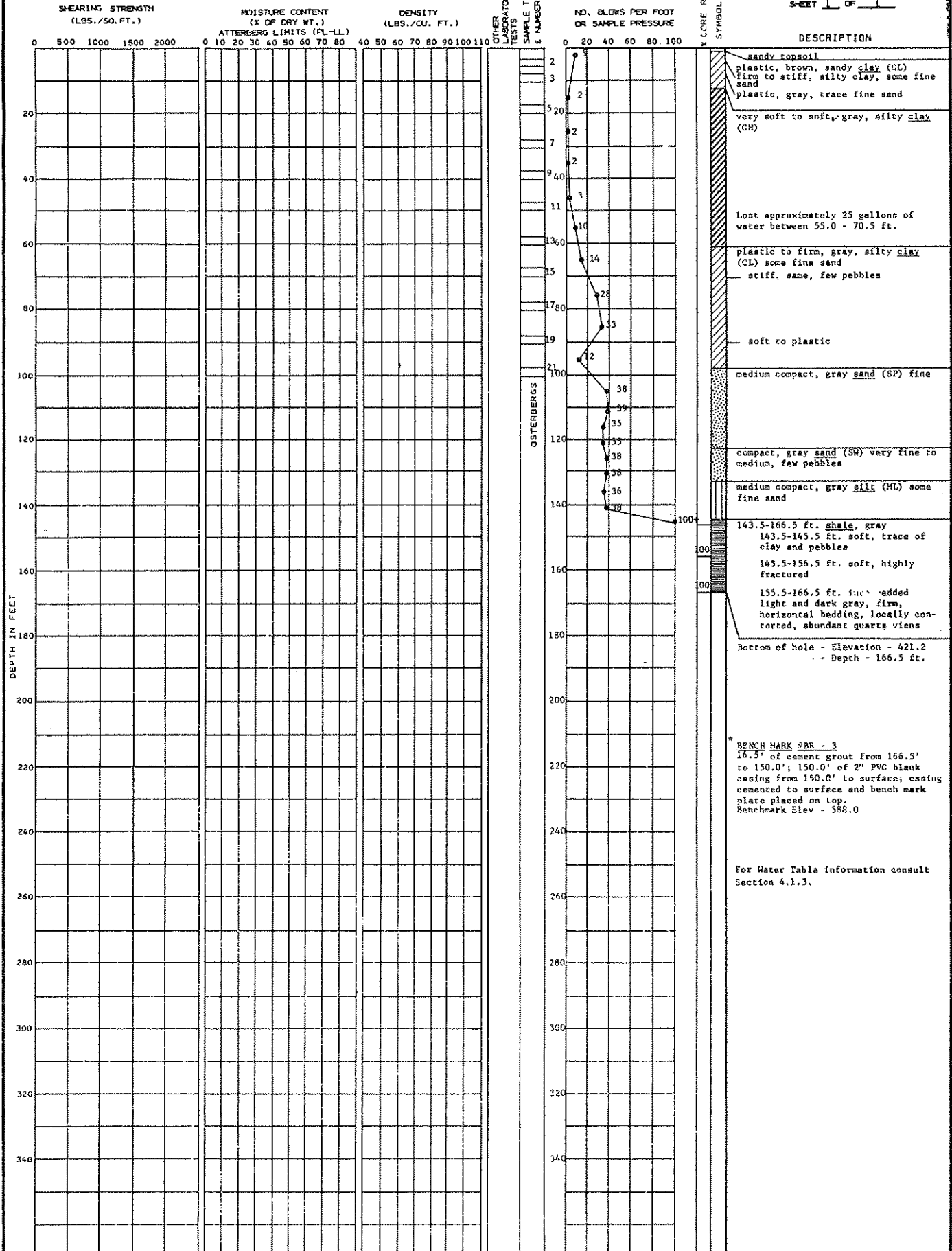




LOCATION: N 9,208.32 GROUND ELEVATION 587.6  
 E 9,376.12

DATE DRILLED: 2-28-74  
 3-7-74

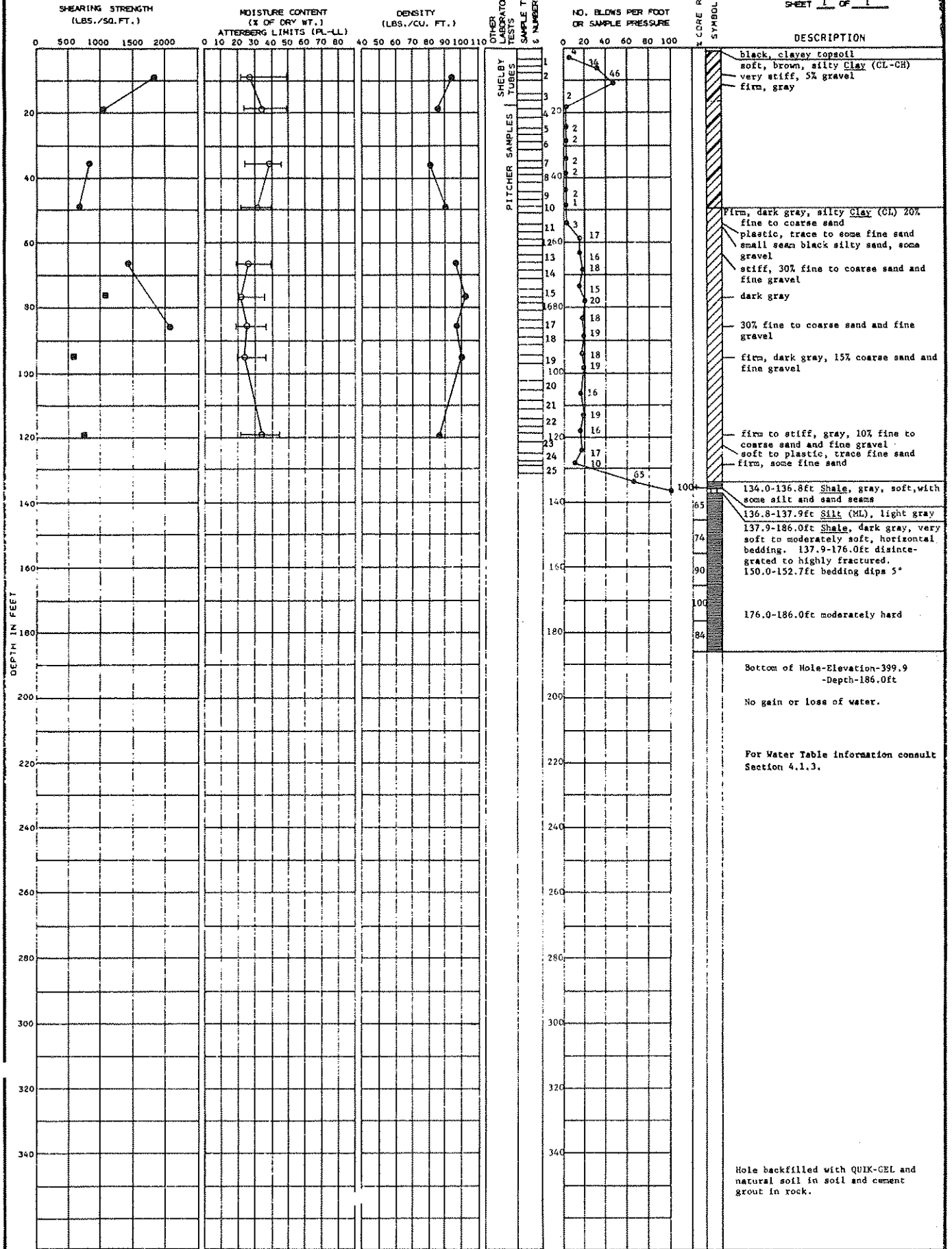
SHEET 1 OF 1



LOCATION: N 3,800 E 12,060 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-26-74

SHEET 1 OF 1



● Unconfined Compression  
 ■ Unconsolidated Undrained  
 — Atterberg Limits  
 ○ Moisture Content

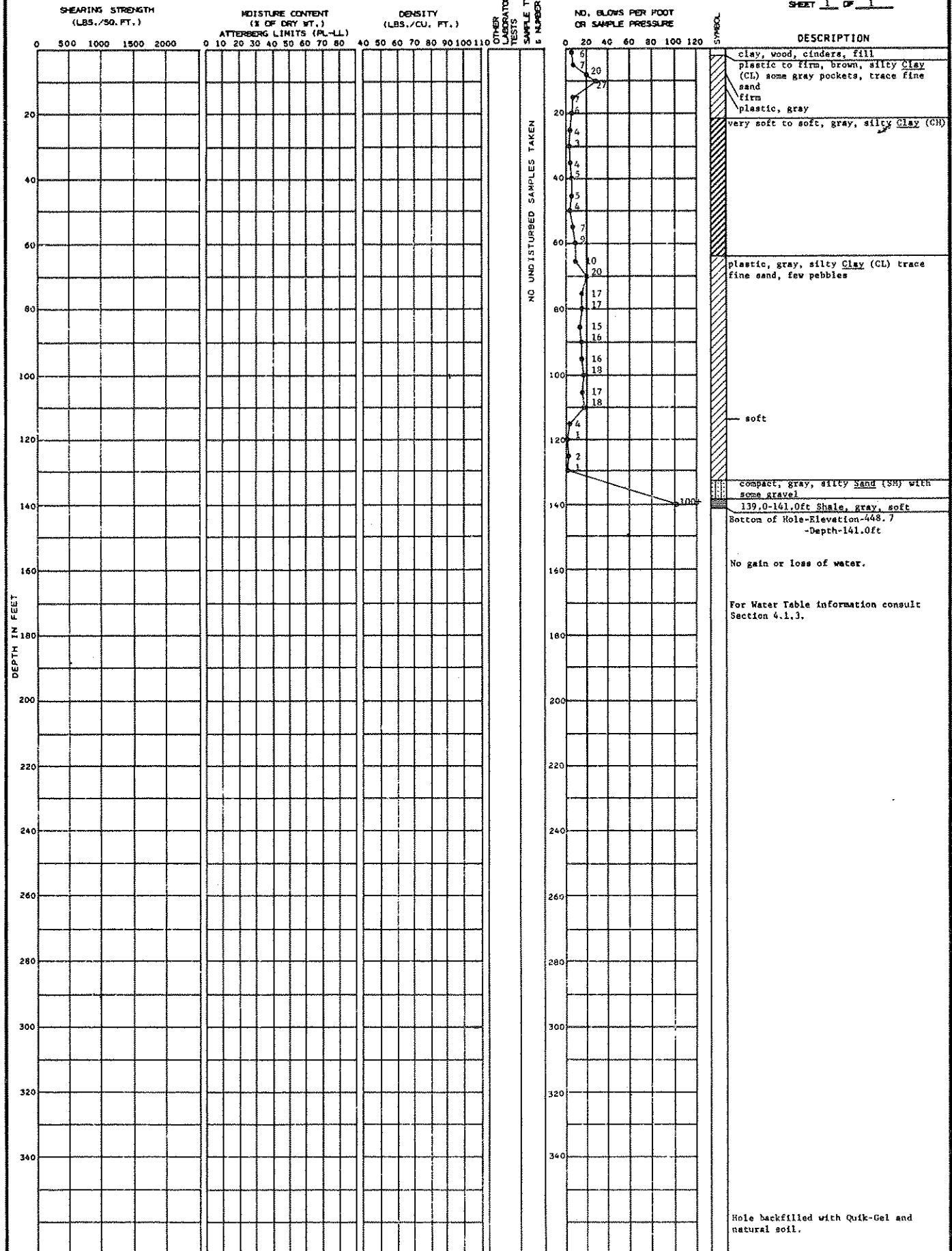
SOIL BORING NO. 101  
 BECHTEL Belle River

LOCATION: N 4,435  
E 12,350

GROUND ELEVATION 589.7

DATE DRILLED: 2-5-74  
2-7-74

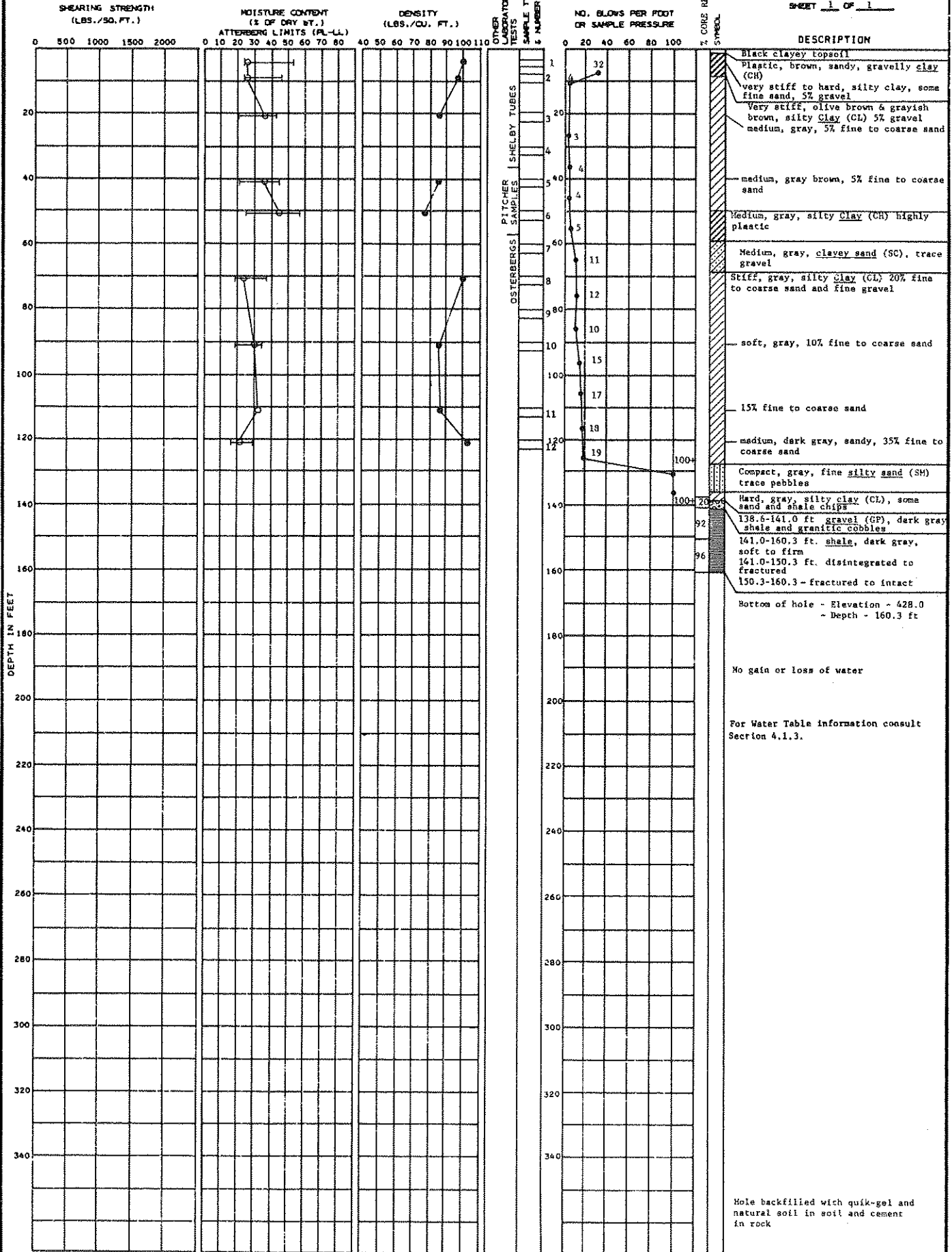
SHEET 1 OF 1



LOCATION: N 5,000 E 11,000 GROUND ELEVATION 588.3

DATE DRILLED: 2-26-74 3-5-74

SHEET 1 OF 1

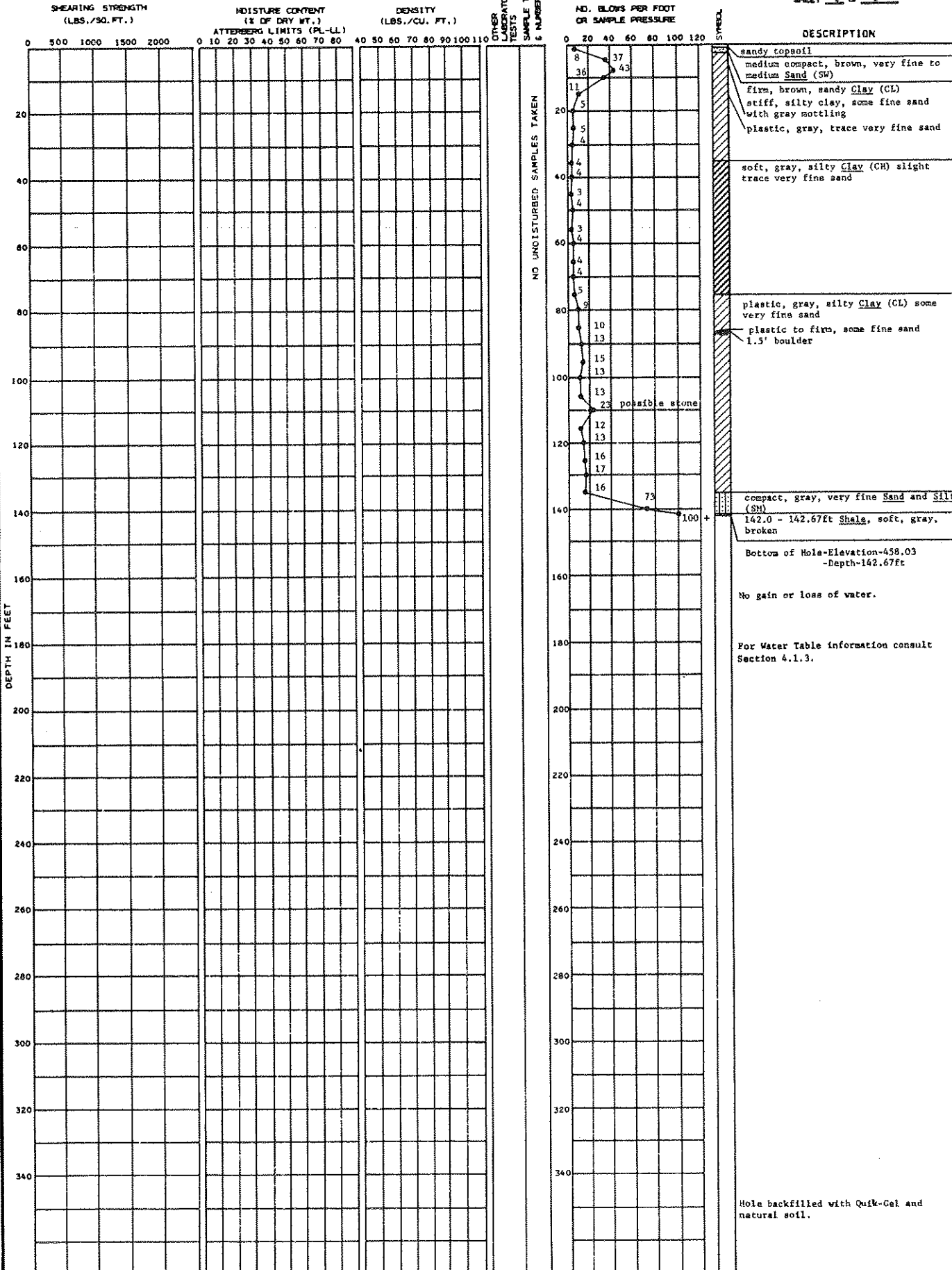


Atterberg Limits  
○ Moisture Content

LOCATION: S 6,450 E 13,140 GROUND ELEVATION 600.7

DATE DRILLED: 2-26-74 3-6-74

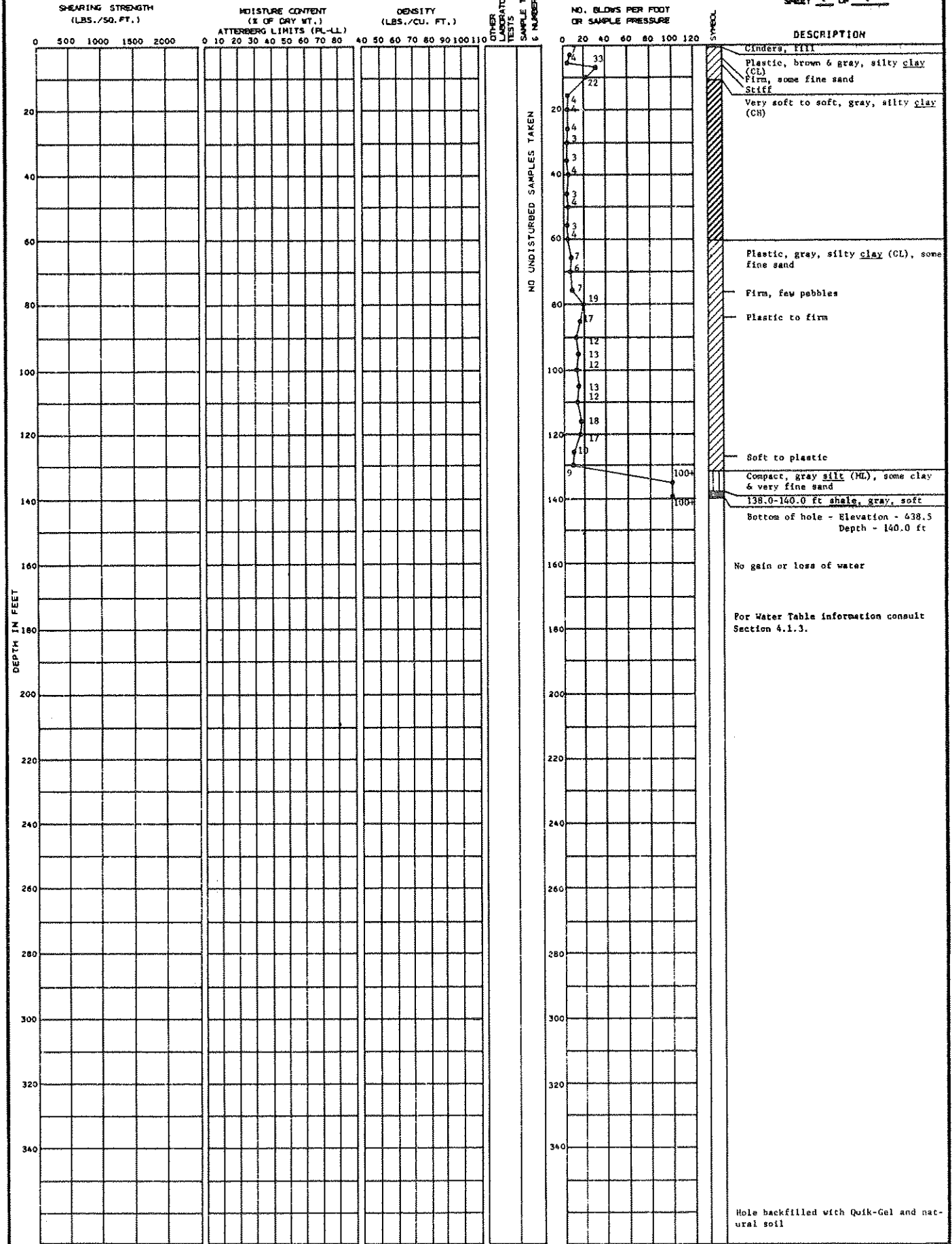
SHEET 1 OF 1



LOCATION: N 6,600 E 11,000 GROUND ELEVATION 588.5

DATE DRILLED: 2-21-74  
2-26-74

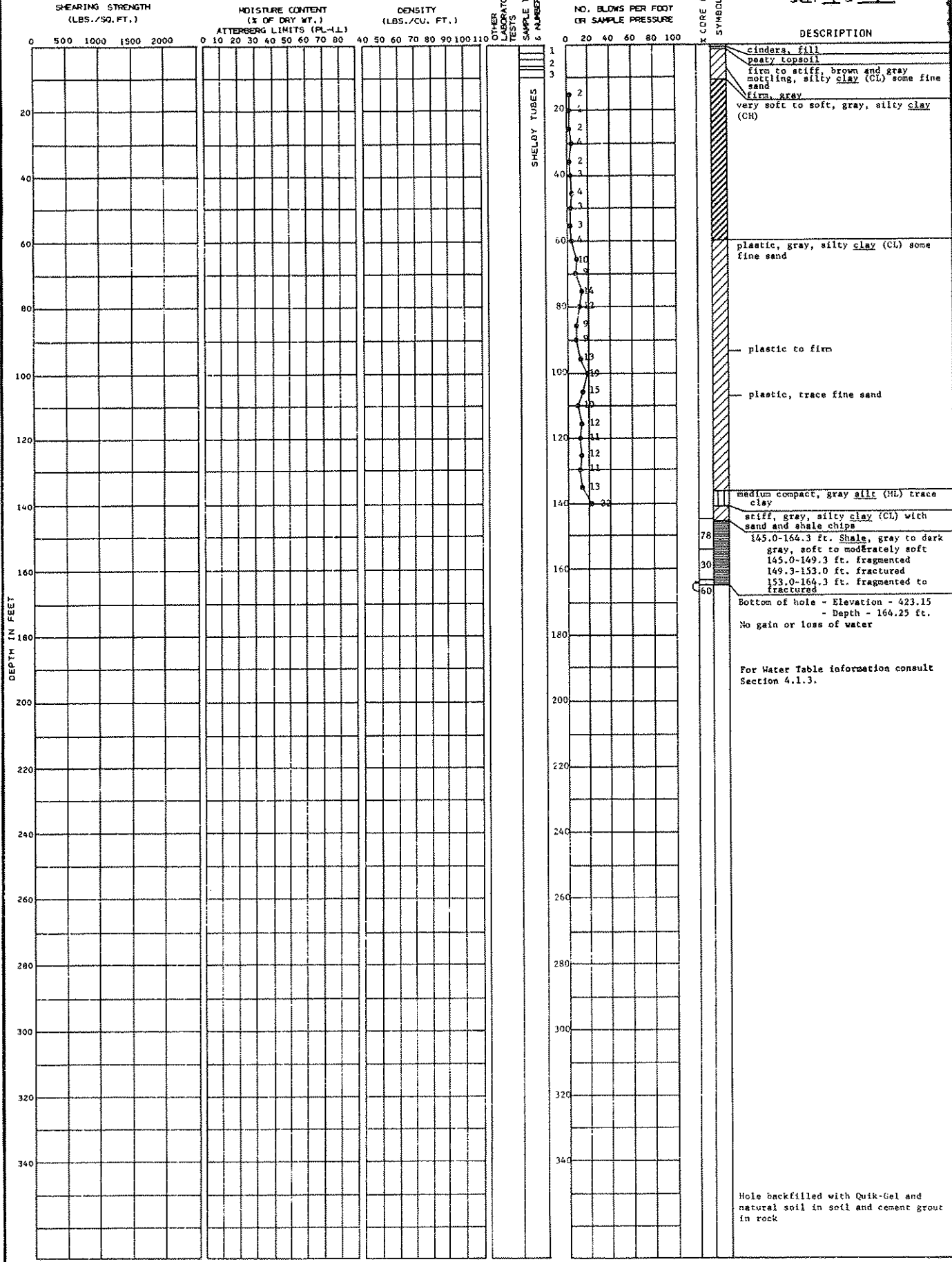
SHEET 1 OF 1



LOCATION: N 6,800 E 9,350 GROUND ELEVATION 587.4

DATE DRILLED: 2-27-74 3-5-74

SHEET 1 OF 1



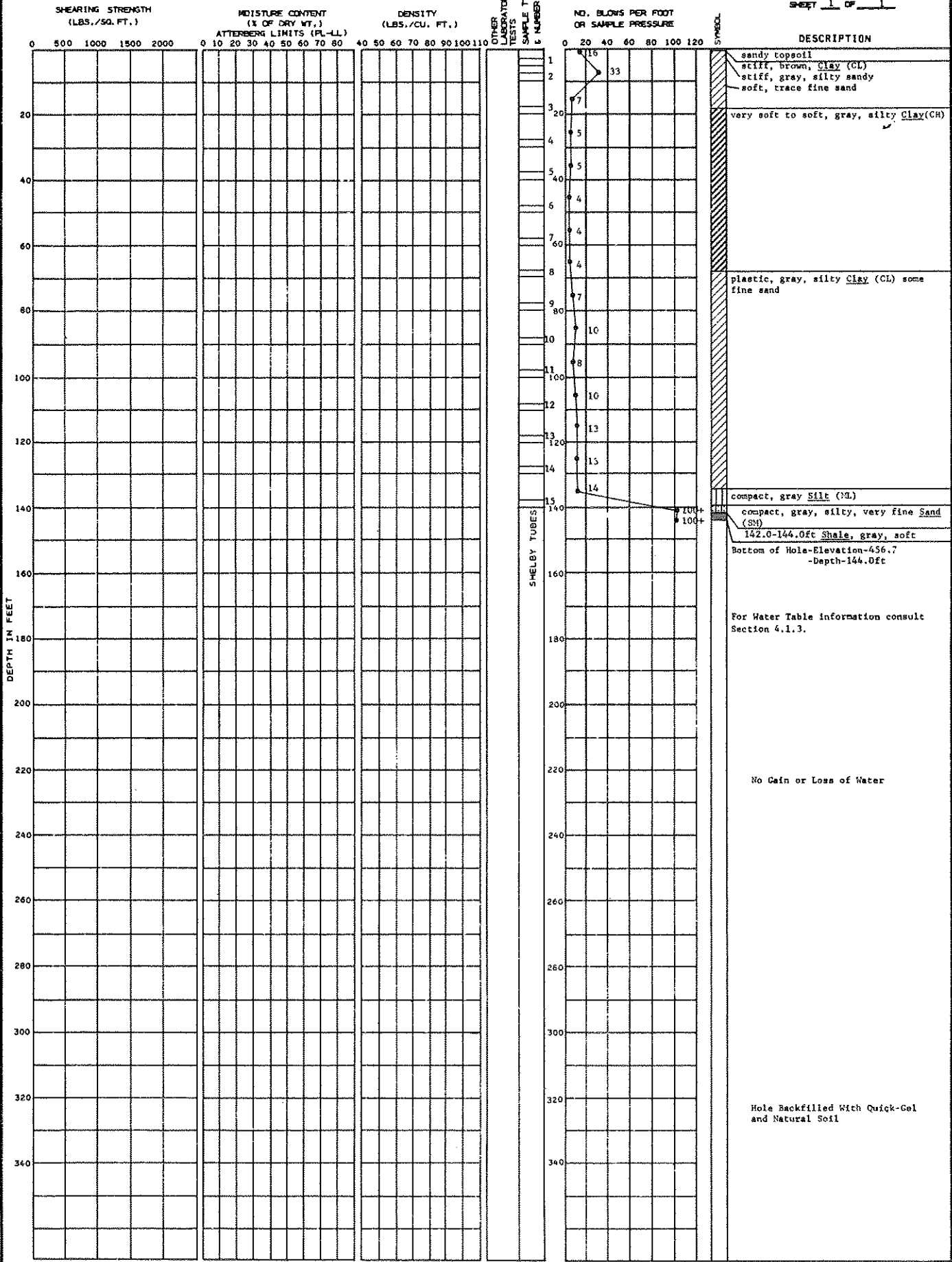
SOIL BORING NO. 113

BECHTEL Belle River

LOCATION: N 7,100 E13,260 GROUND ELEVATION 600.7

DATE DRILLED: 1-30-74 2-6-74

SHEET 1 OF 1



SOIL BORING NO. 115

BECHTEL Belle River

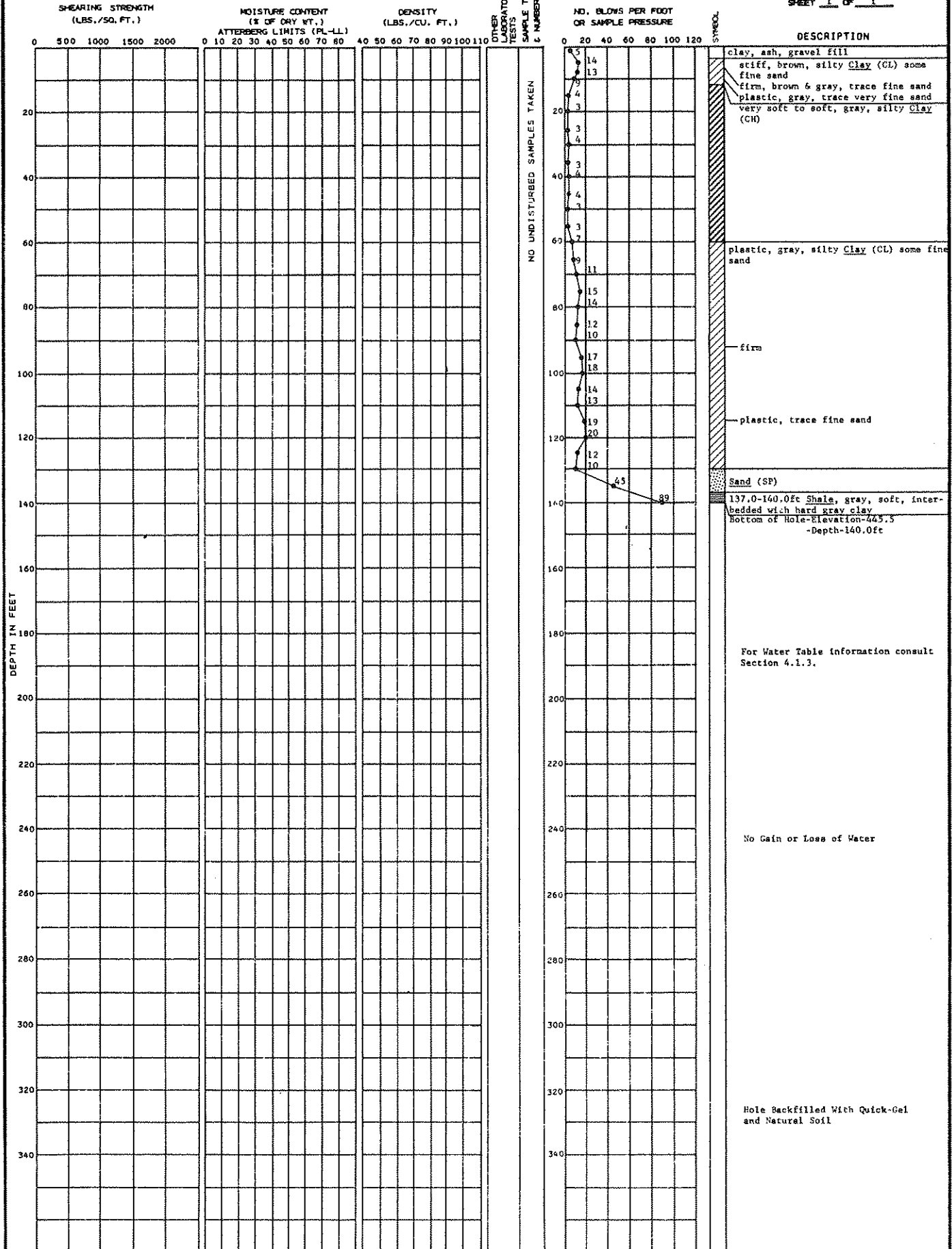


LOCATION: N 7,270  
E 9,360

GROUND ELEVATION 585.5

DATE DRILLED: 2-5-74  
2-12-74

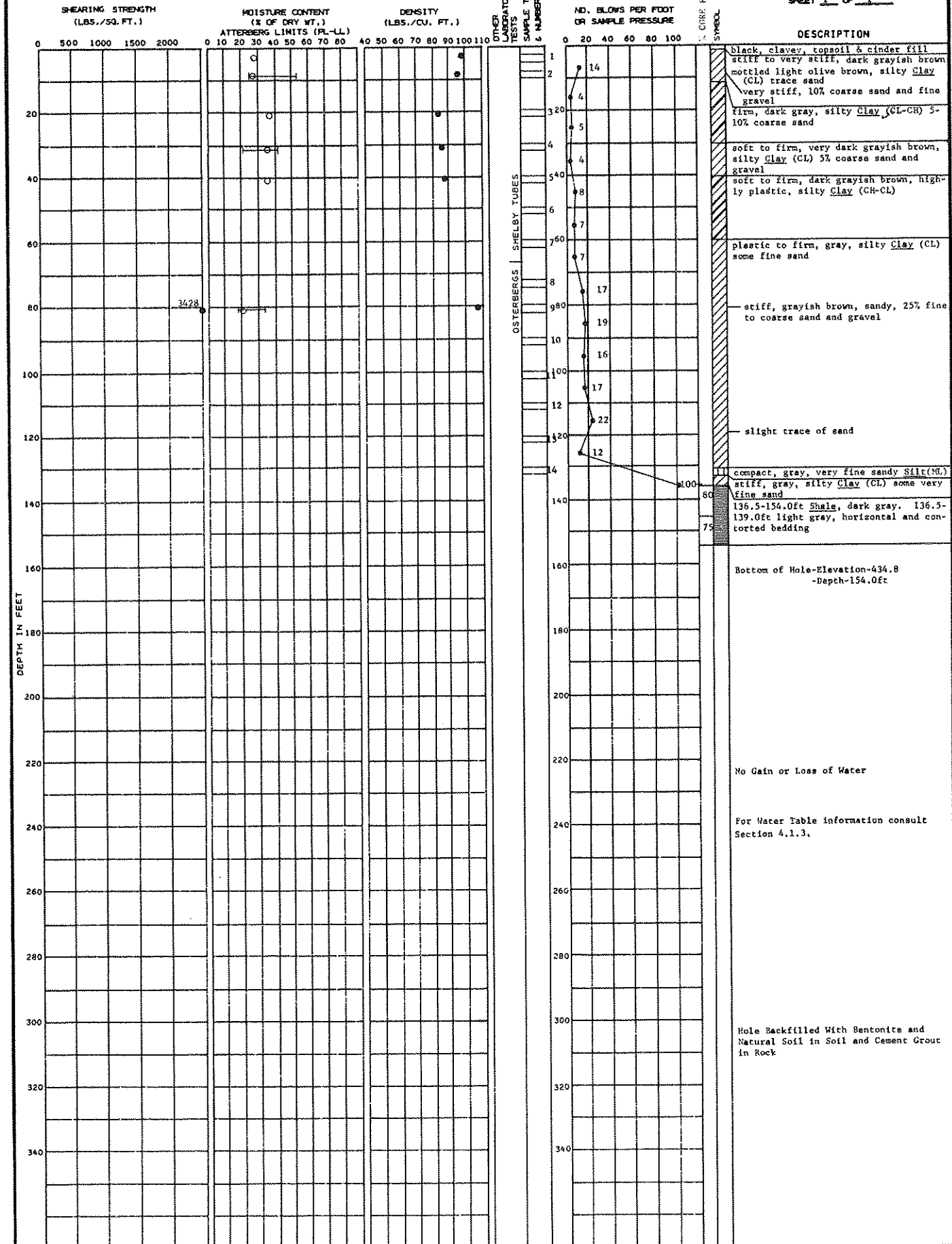
SHEET 1 OF 1



LOCATION: N 7,510  
E11,380 GROUND ELEVATION: 588.8

DATE DRILLED: 1-29-74  
2-5-74

SHEET 1 OF 1



● Unconfined Compression

— Atterberg Limits  
○ Moisture Content

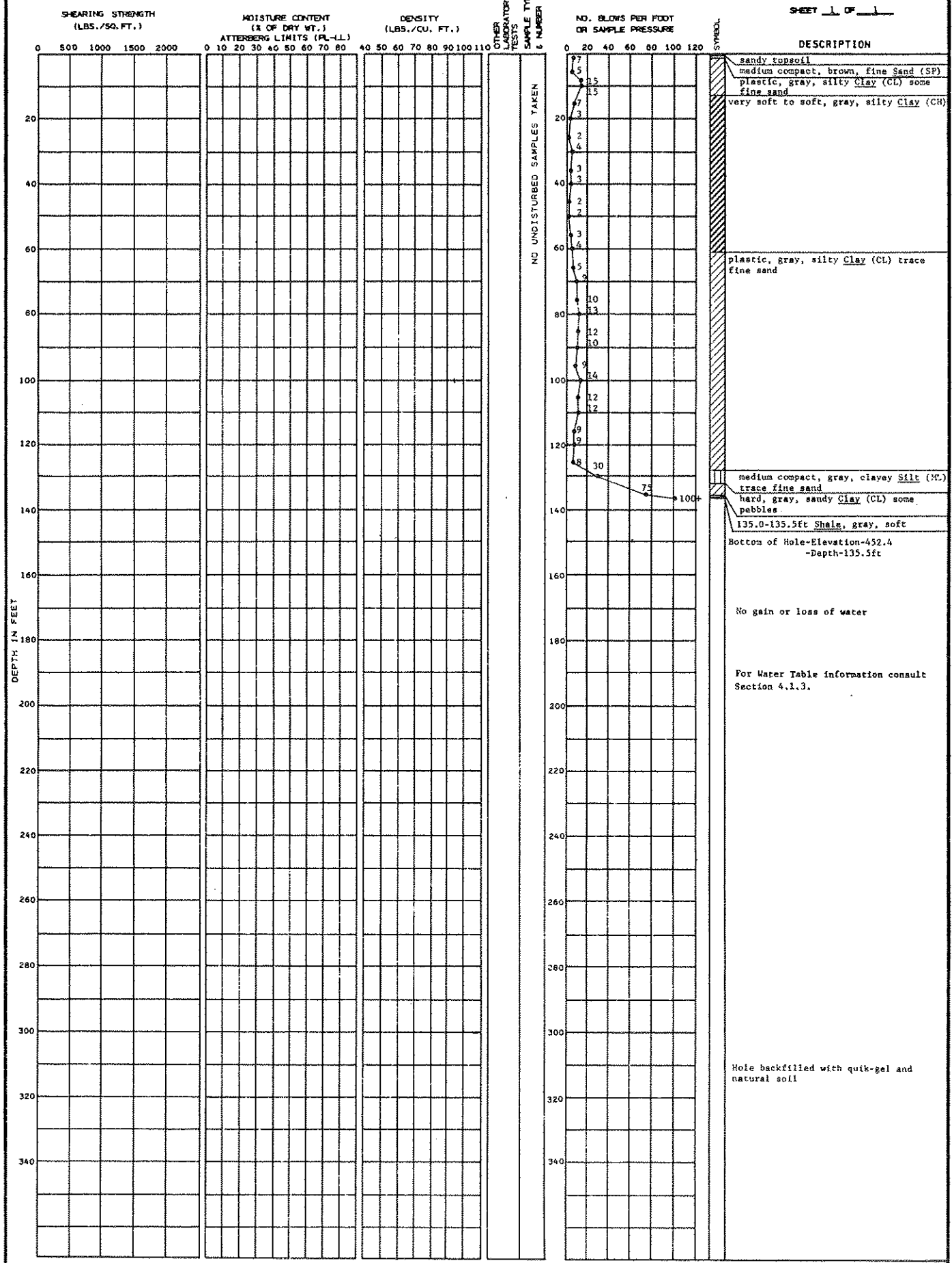
SOIL BORING NO. 119

BECHTEL Belle River

LOCATION: N 7,680 E 10,630 GROUND ELEVATION 587.9

DATE DRILLED: 2-14-74 2-19-74

SHEET 1 OF 1



SOIL BORING NO. 121  
BECHTEL Belle River

LOCATION: N 8,017  
E 4,999

GROUND ELEVATION 588.9

DATE DRILLED: 3-25-74

SHEET 1 OF 1

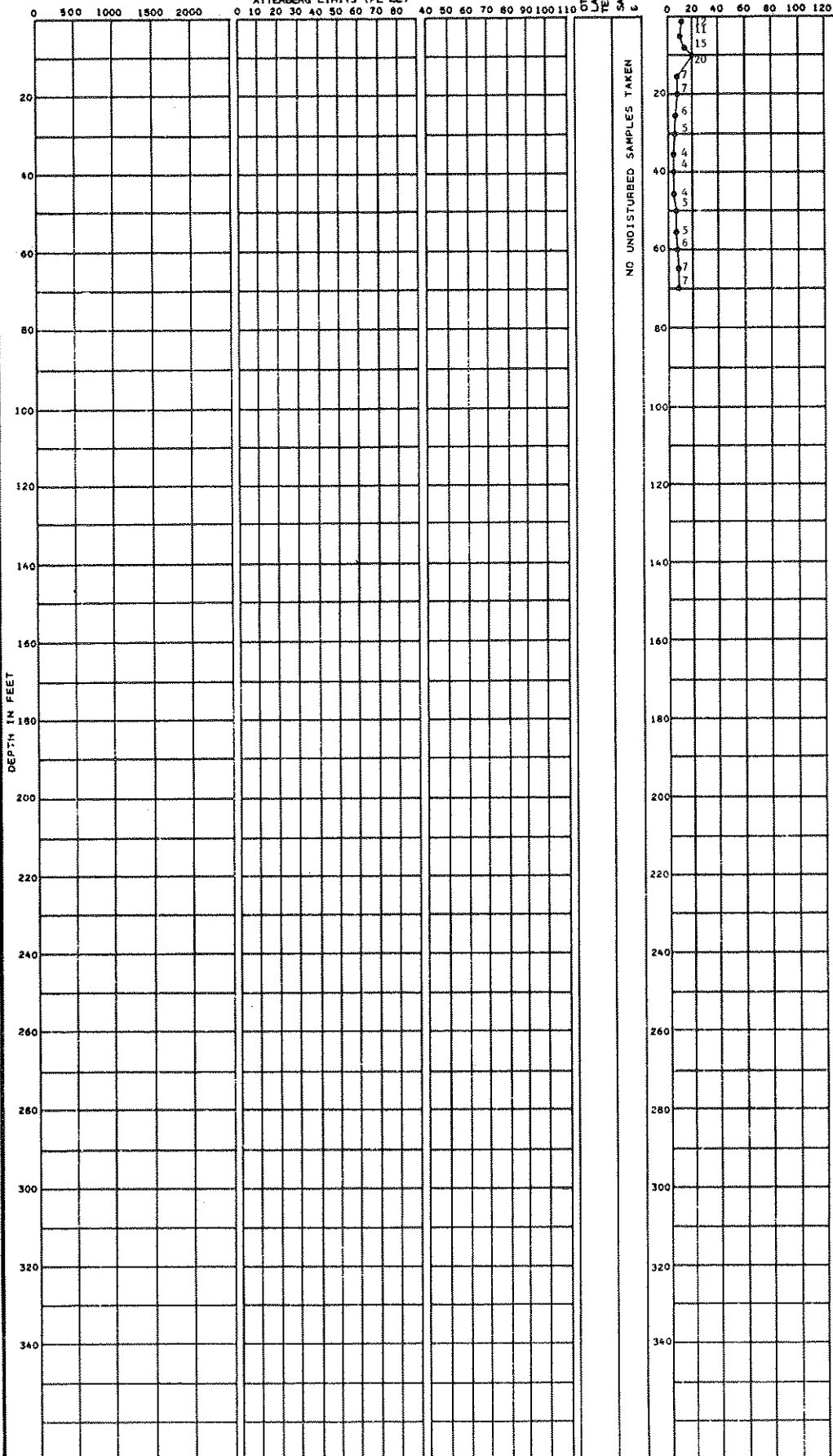
SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

DENSITY  
(LBS./CU. FT.)

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

DESCRIPTION



OTHER LABORATORY TESTS  
SAMPLE TYPE & NUMBER

STRENGTH

Gray, silty topsoil  
 Medium, mottled brown & gray, silty sandy clay (CL), trace of pebbles  
 Soft, gray, silty clay (CH), trace of sand

Bottom of hole - Elevation - 518.9  
 - Depth - 70.0 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

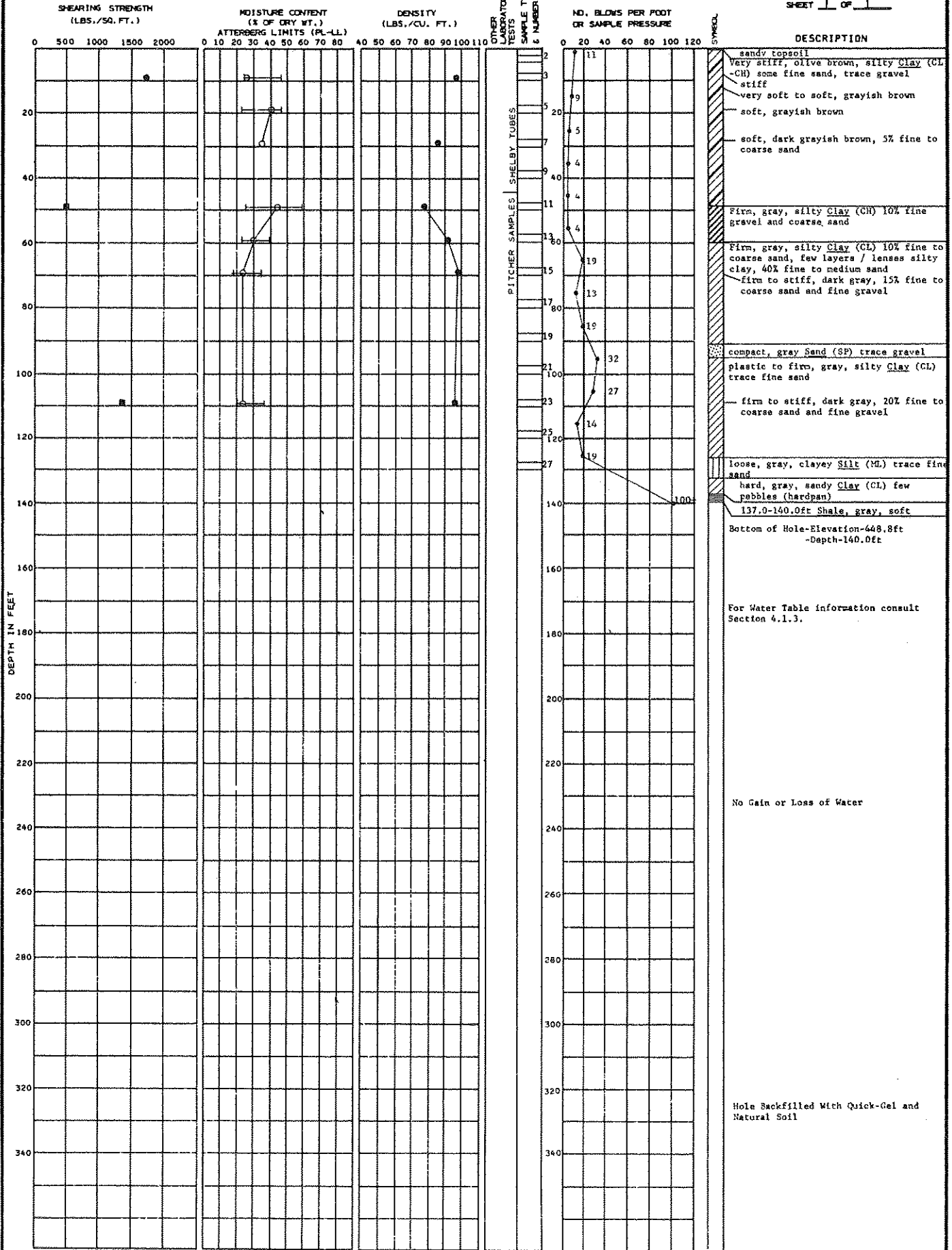
SOIL BORING NO. 123

BECHTEL Belle River

LOCATION: R 7,950 GROUND ELEVATION 588.8  
 E 11,140

DATE DRILLED: 2-1-74  
 2-6-74

SHEET 1 OF 1

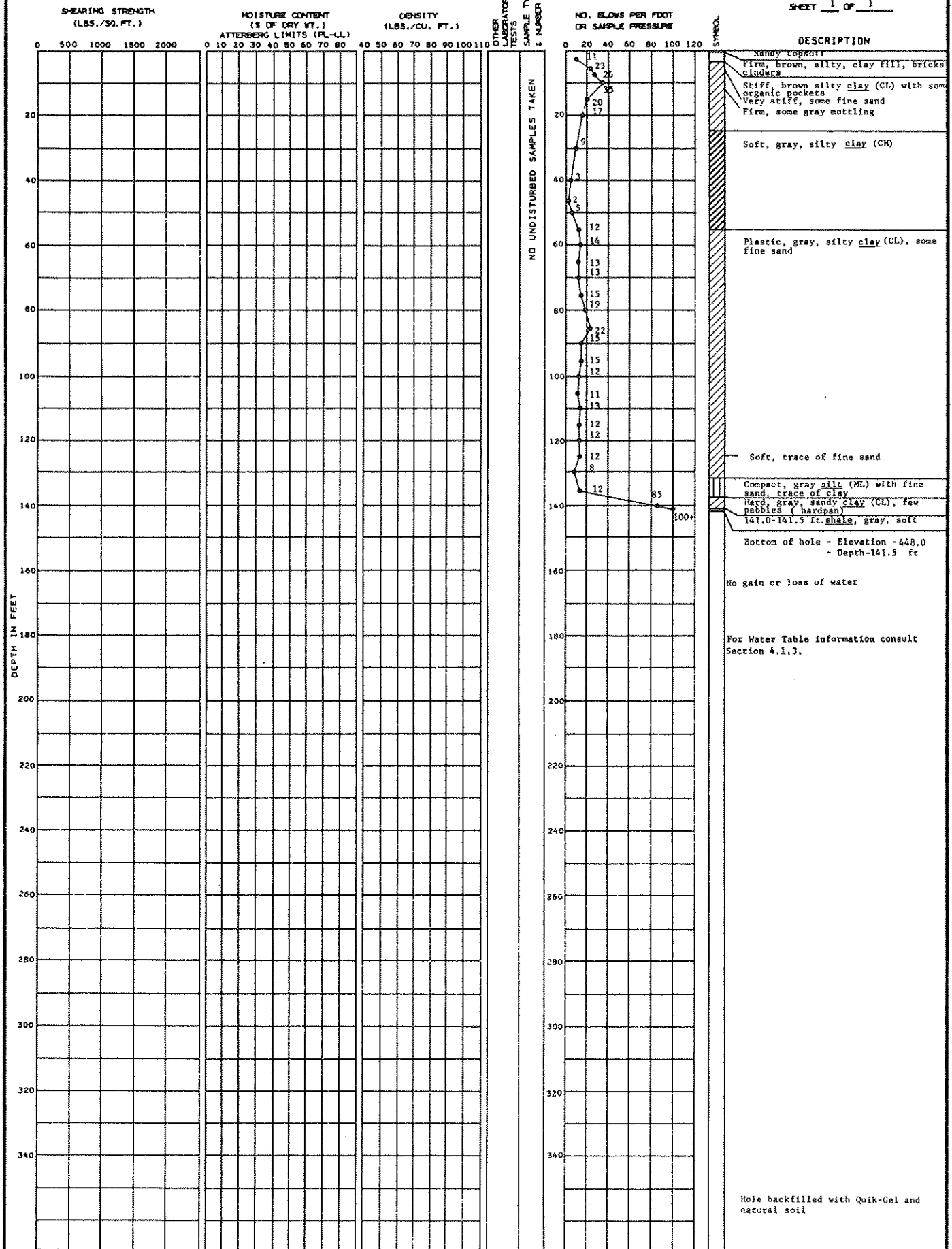


LOCATION: N 3,000  
E 11,000

GROUND ELEVATION 589.5

DATE DRILLED: 2-7-74  
2-13-74

SHEET 1 OF 1

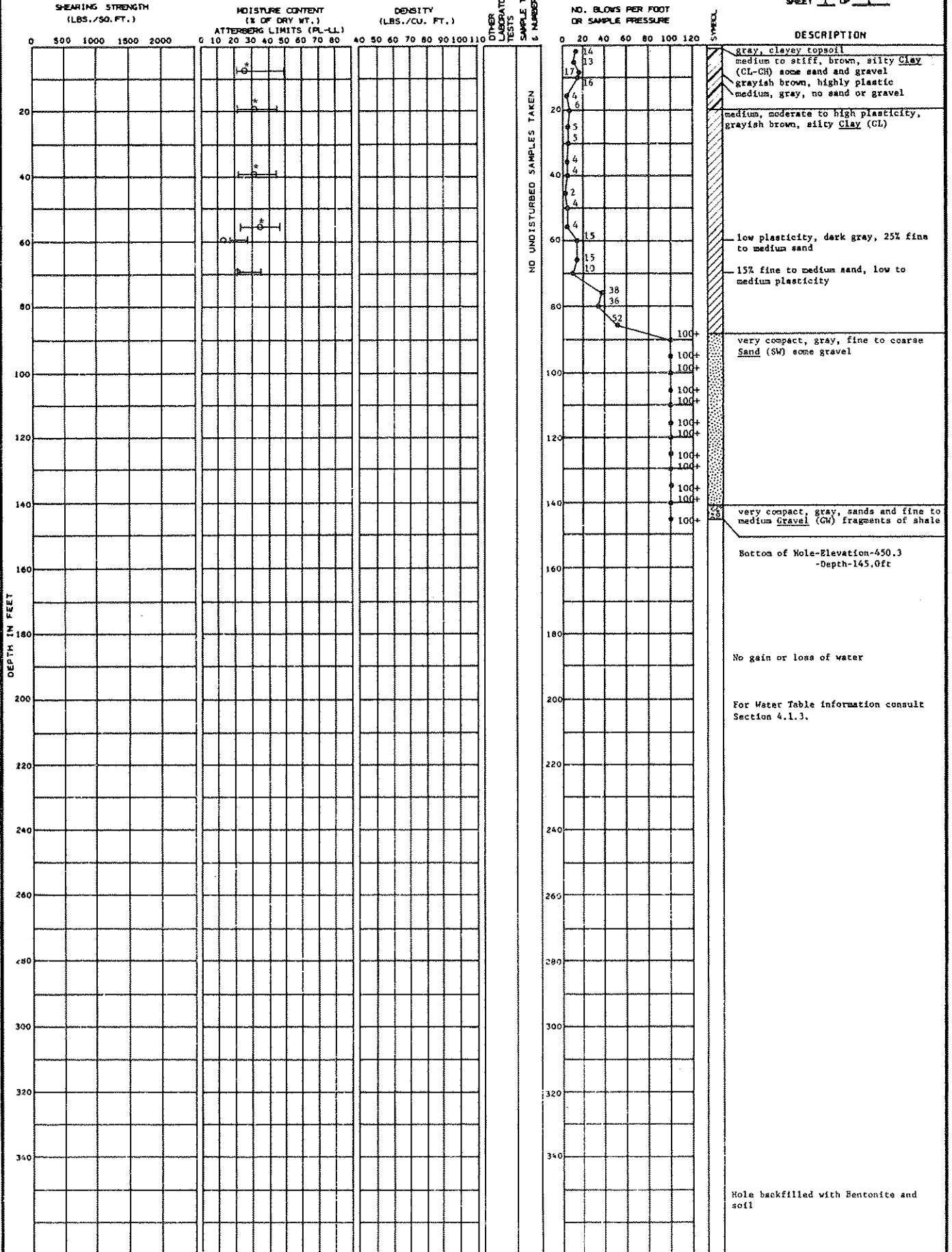


LOCATION: N 9,014 E 4,993 GROUND ELEVATION 595.3

DATE DRILLED: 3-26-74

3-28-74

SHEET 1 OF 1



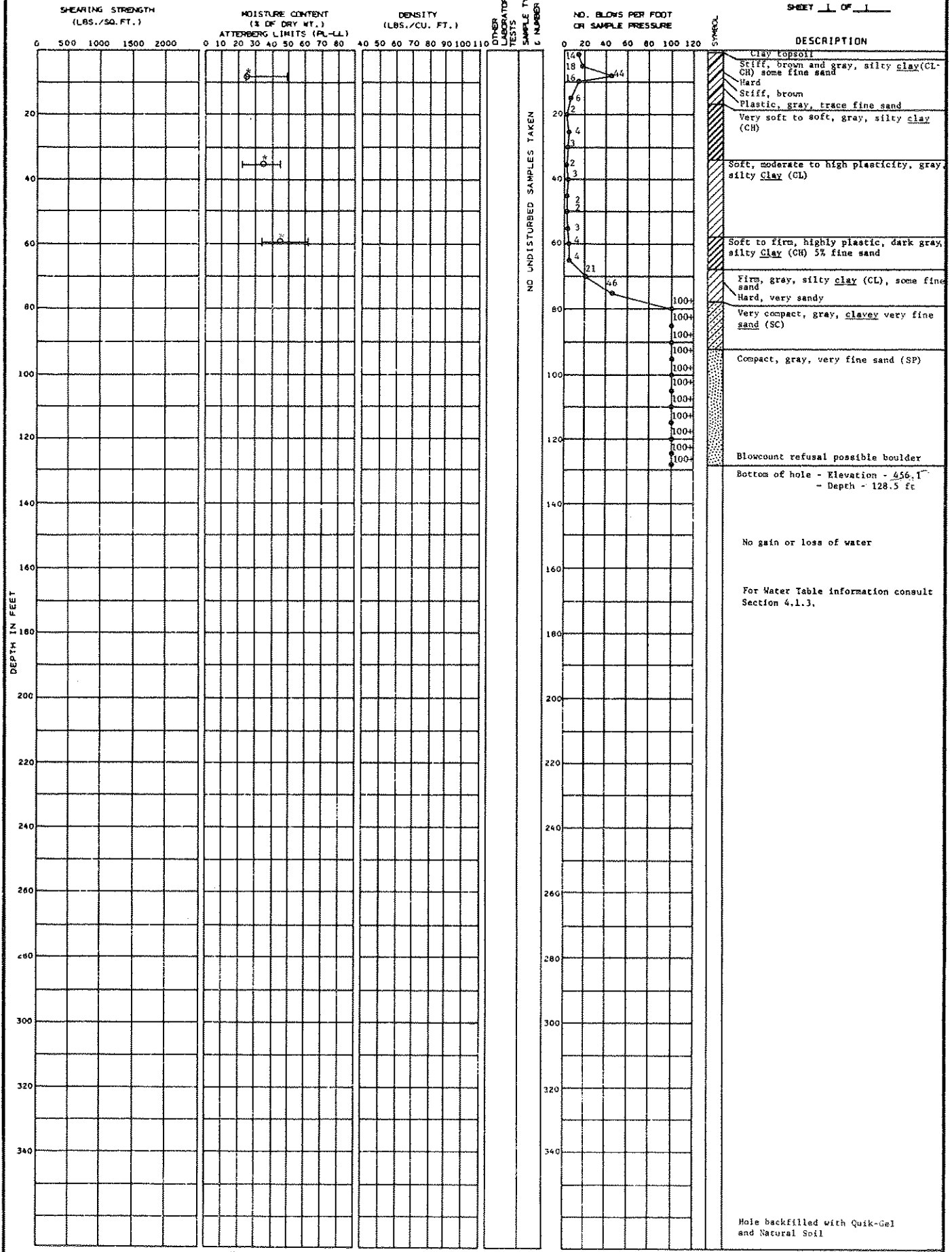
○ Water Content  
 — Atterburg Limiter  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 130

BECHTEL Bella River

LOCATION: N 10,050 E 4,995 GROUND ELEVATION 594.6

DATE DRILLED: 3-5-74 3-7-74 SHEET 1 OF 1



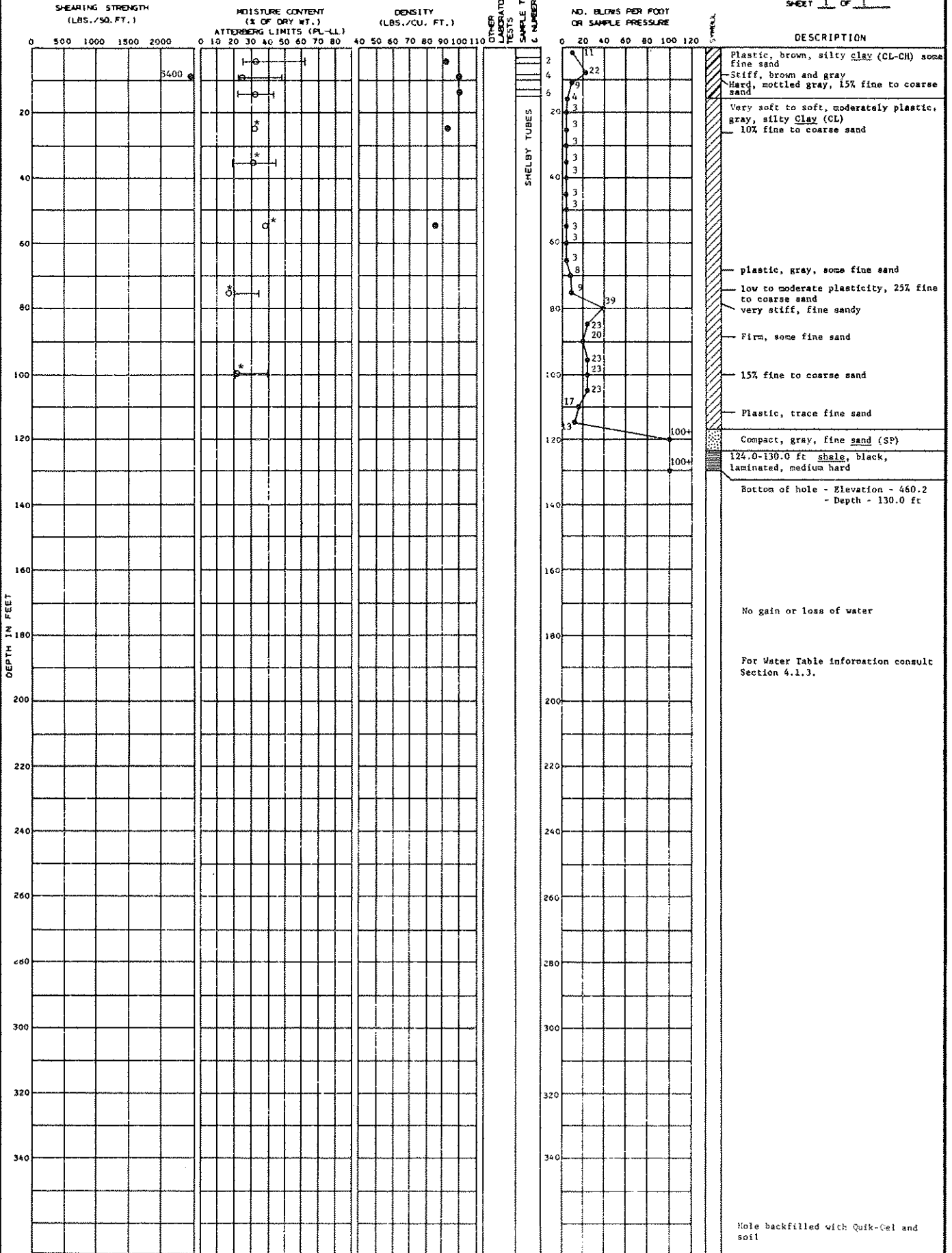
○ Water Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.



LOCATION: N 10,050 E 7,000 GROUND ELEVATION 590.2

DATE DRILLED: 3-8-74  
3-13-74

SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterberg Limits  
\* Water content taken from unsealed jar sample.

SOIL BORING NO. 136

BECHTEL Belle River

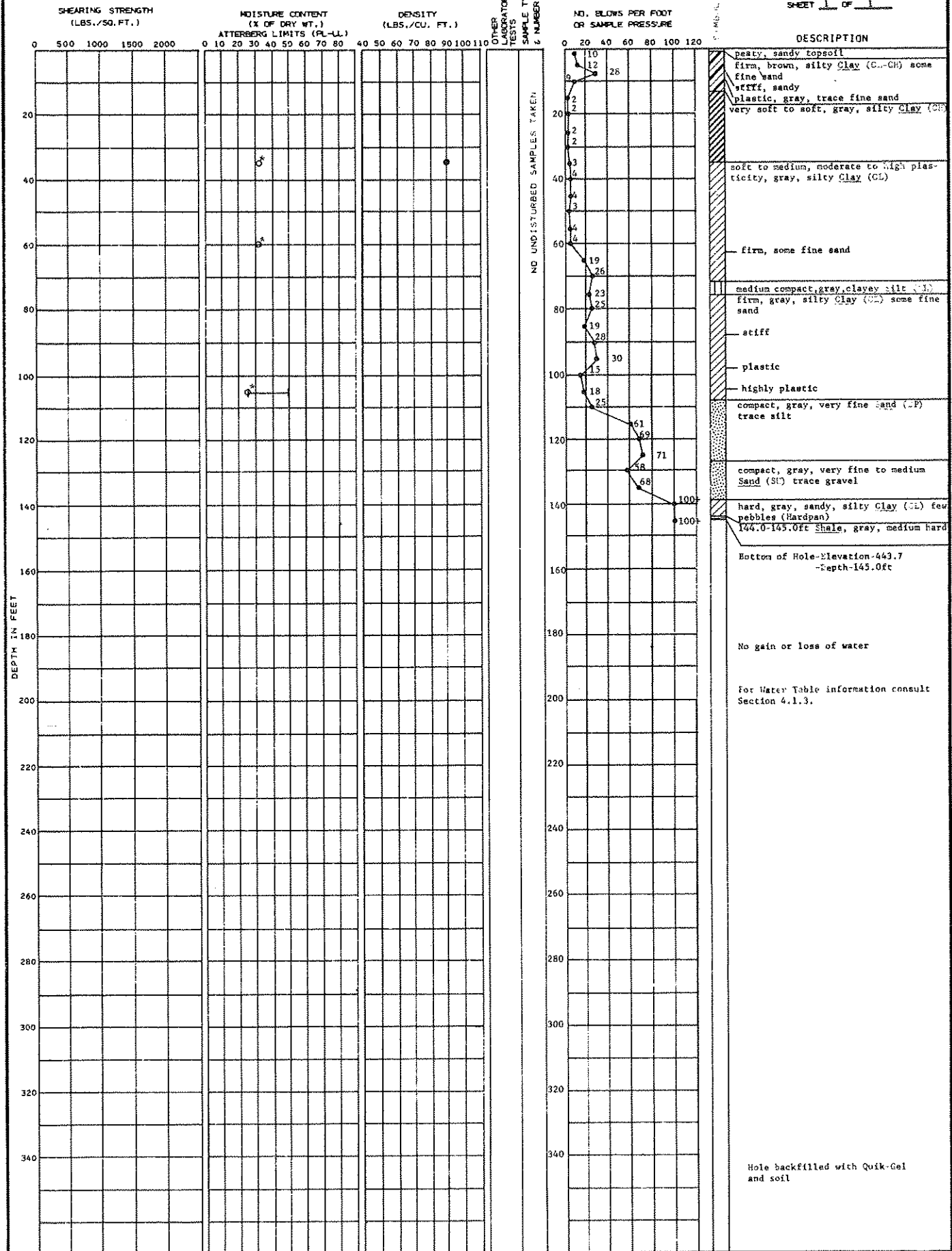
LOCATION: 10,030  
S.977

GROUND ELEVATION

582.7

DATE DRILLED: 3-11-74  
3-14-74

SHEET 1 OF 1

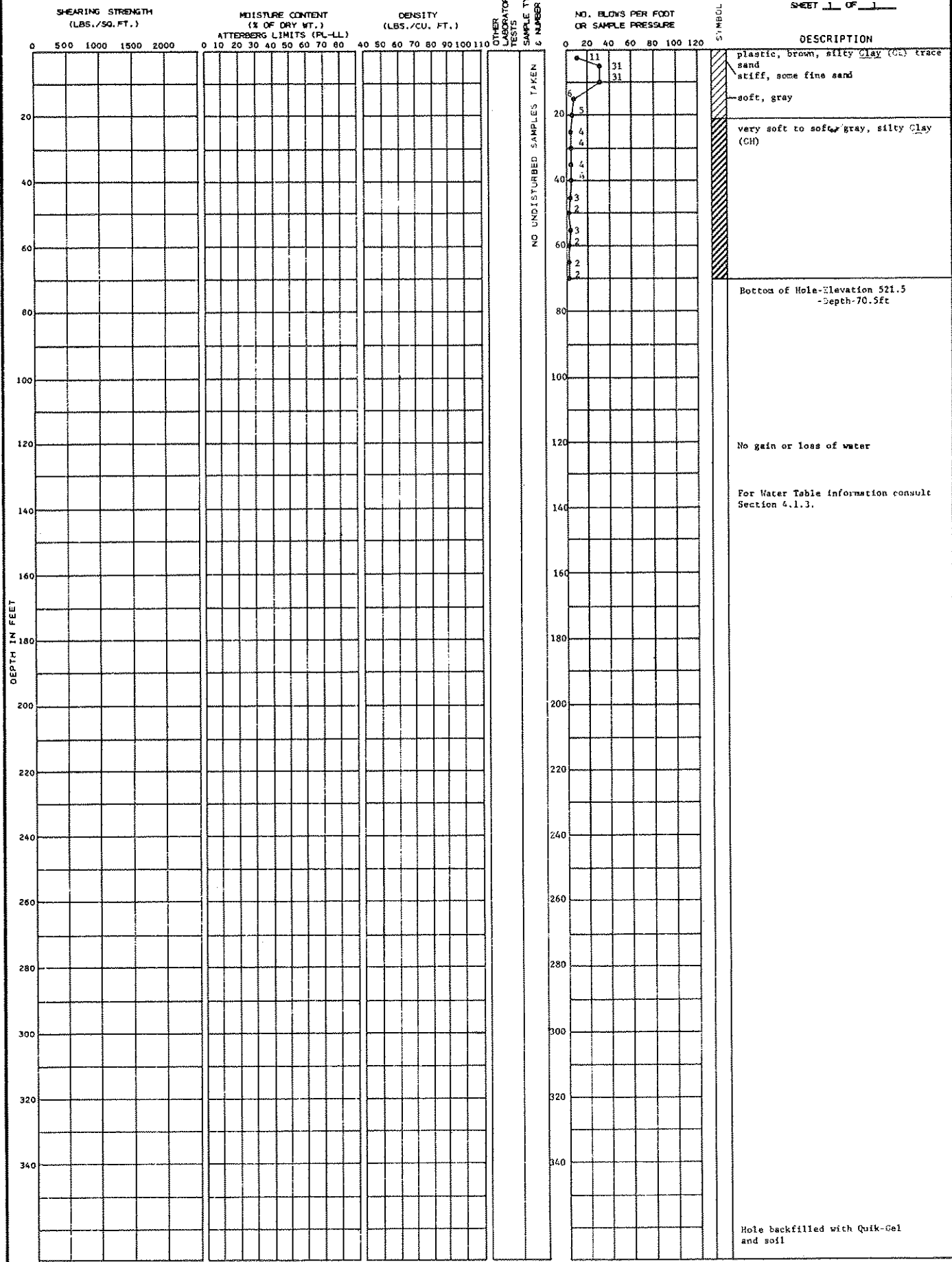


○ Water Content Atterburg Limits  
Water content taken from unsealed jar sample.

LOCATION: 10,850 GROUND ELEVATION: 592.0

DATE DRILLED: 3-19-74  
3-20-74

SHEET 1 OF 1



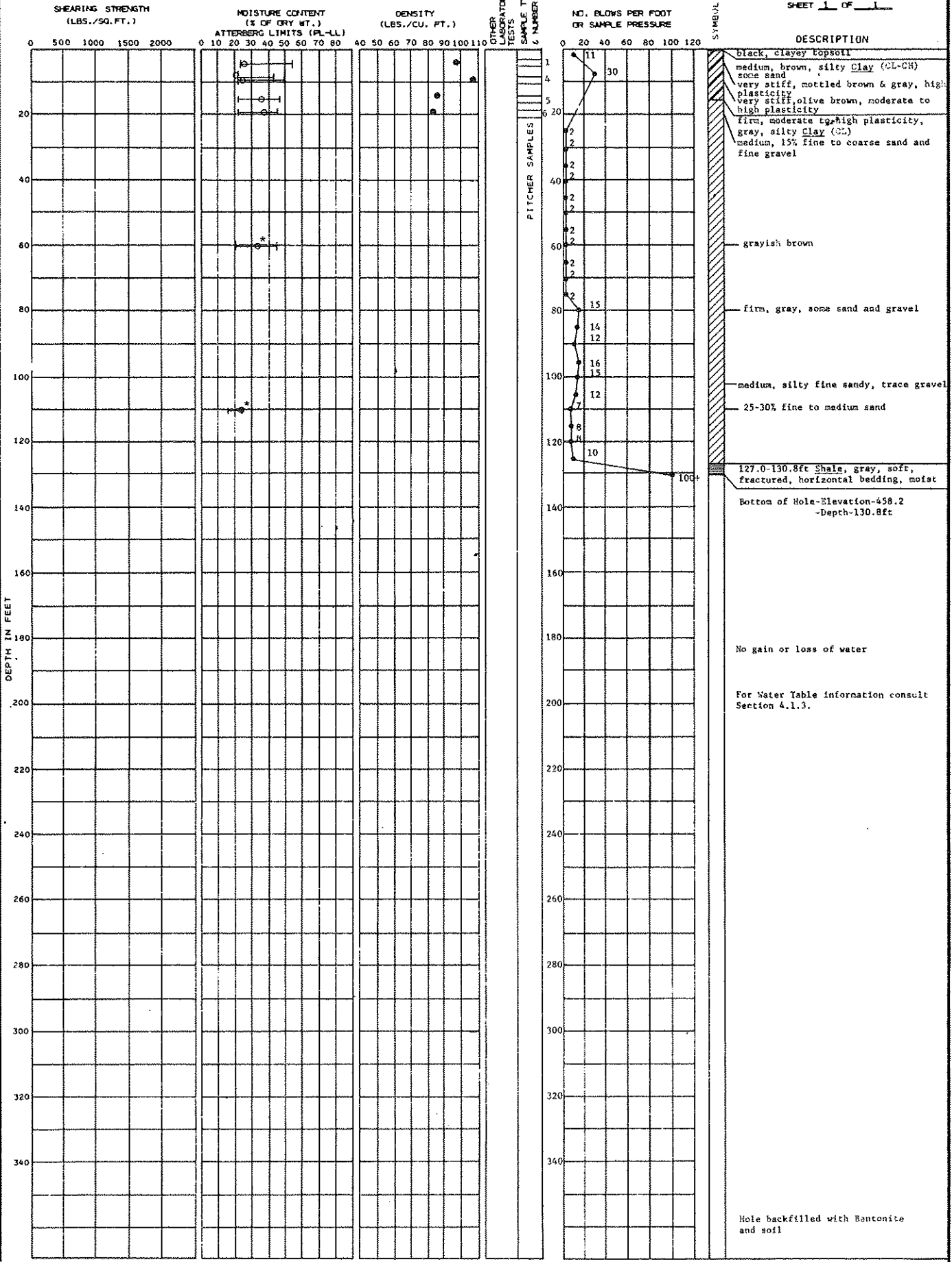
SOIL BORING NO. 140

BECHTEL Belle River

LOCATION: 11,146 GROUND ELEVATION 589.0  
 7,995

DATE DRILLED: 3-25-74  
 3-27-74

SHEET 1 OF 1



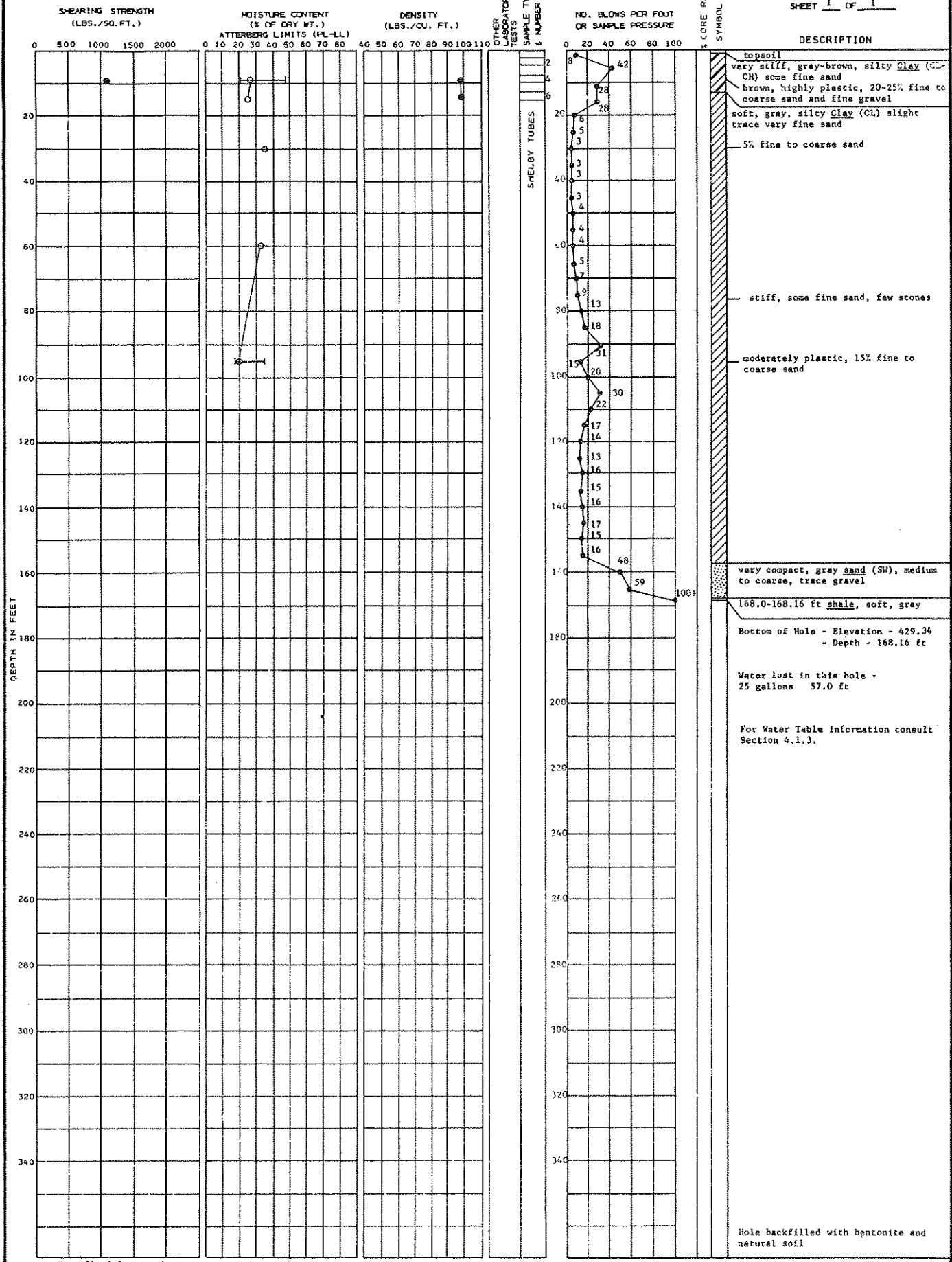
○ Moisture Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 142

BECHTEL Keller

LOCATION: N 12,000 E 5,000 GROUND ELEVATION: 597.5

DATE DRILLED: 3-13-74  
3-15-74  
SHEET 1 OF 1



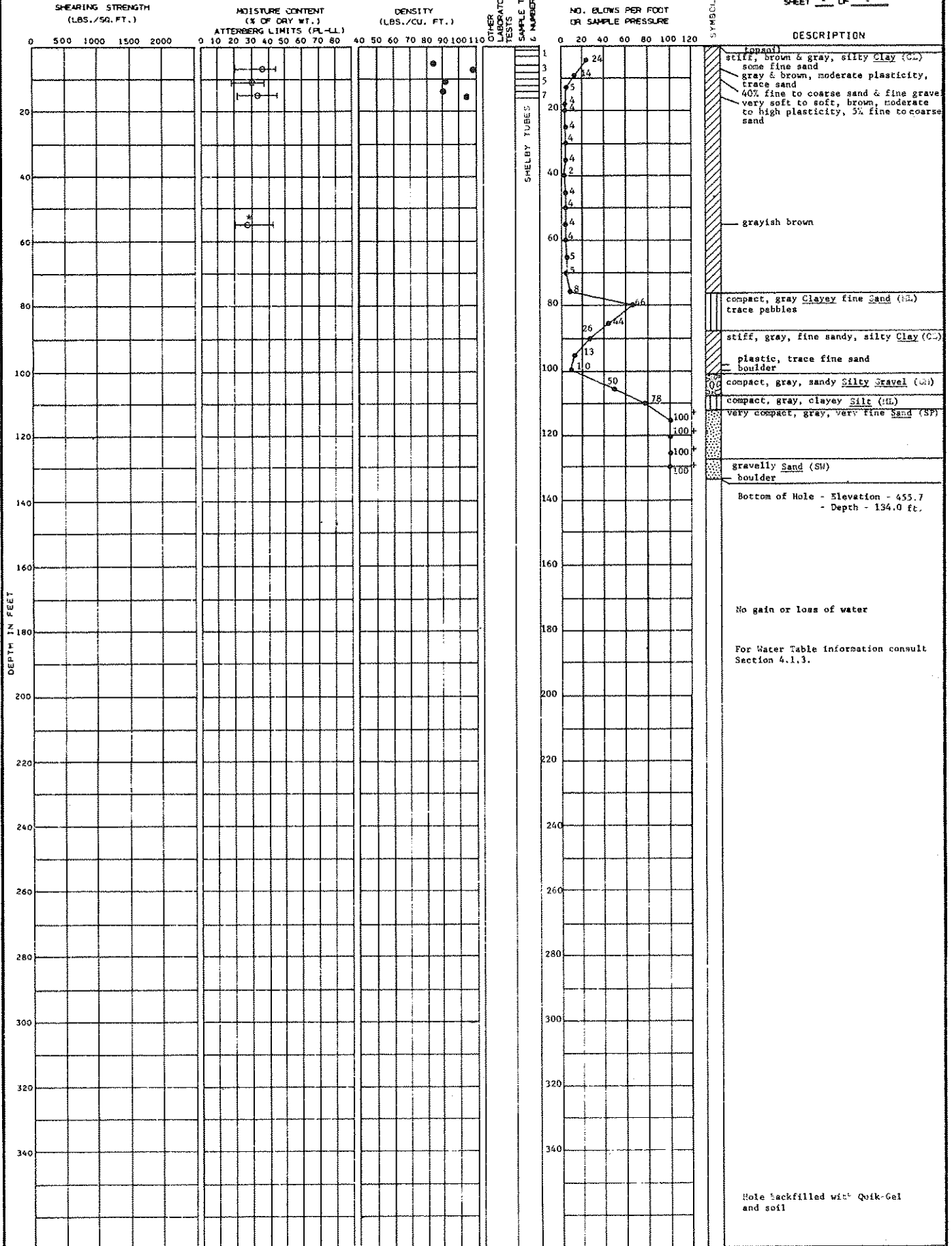
● Unconfined Compression  
○ Moisture Content  
— Atterberg Limits

LOCATION: N 12,000  
E 7,000

GROUND ELEVATION 589.7

DATE DRILLED: 3-18-74  
3-19-74

SHEET 1 OF 1



Moisture Content  
Atterburg Limits  
\* Water content taken from unsealed jar sample.

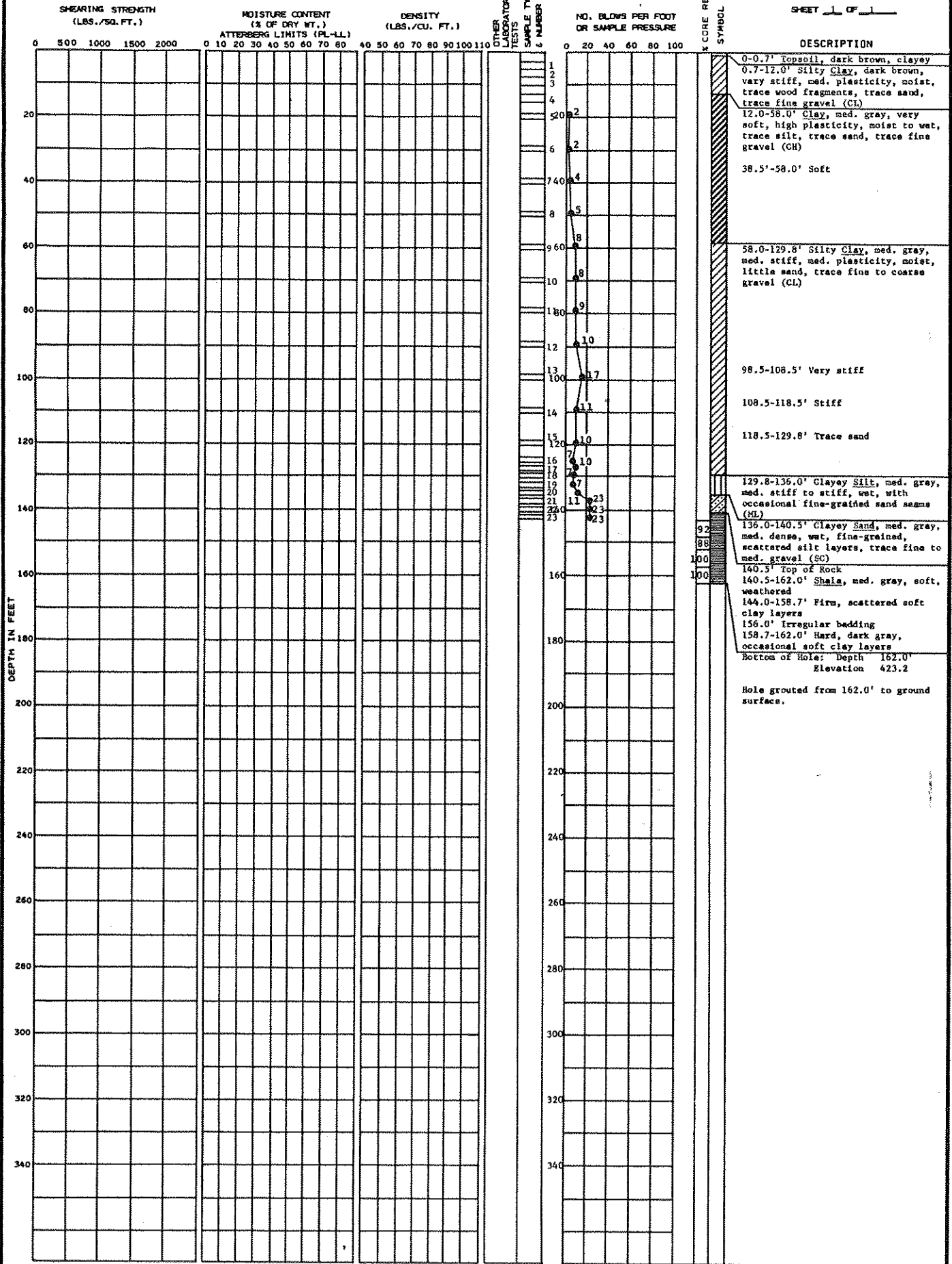
LOCATION: N 13,061 E 5,006 GROUND ELEVATION 598.6

DATE DRILLED: 3-28-74 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)				MOISTURE CONTENT (% OF DRY WT.)				DENSITY (LBS./CU. FT.)				OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION							
	0	500	1000	1500	2000	0	10	20	30	40	50	60					70	80	40	50	60	70	80
0																							Black, clayey topsoil
2																	11						Firm, brown & gray, silty, sandy clay (CL), trace of pebbles
4																	12						
6																	13						
8																	14						Soft, gray, silty clay (CH), trace of sand
10																	15						
20																	4						
30																	4						
40																	2						
50																	2						
60																	2						
70																	2						
80																	2						
100																	2						Bottom of hole - Elevation - 528.6 - Depth - 70.0 ft
120																							No gain or loss of water
140																							For Water Table information consult Section 4.1.3.
160																							
180																							
200																							
220																							
240																							
260																							
280																							
300																							
320																							
340																							Hole backfilled with Quik-Gel and natural soil

LOCATION: N 7455 E 9535 GROUND ELEVATION 585.2

DATE DRILLED: 9/28/77 9/30/77 SHEET 1 OF 1



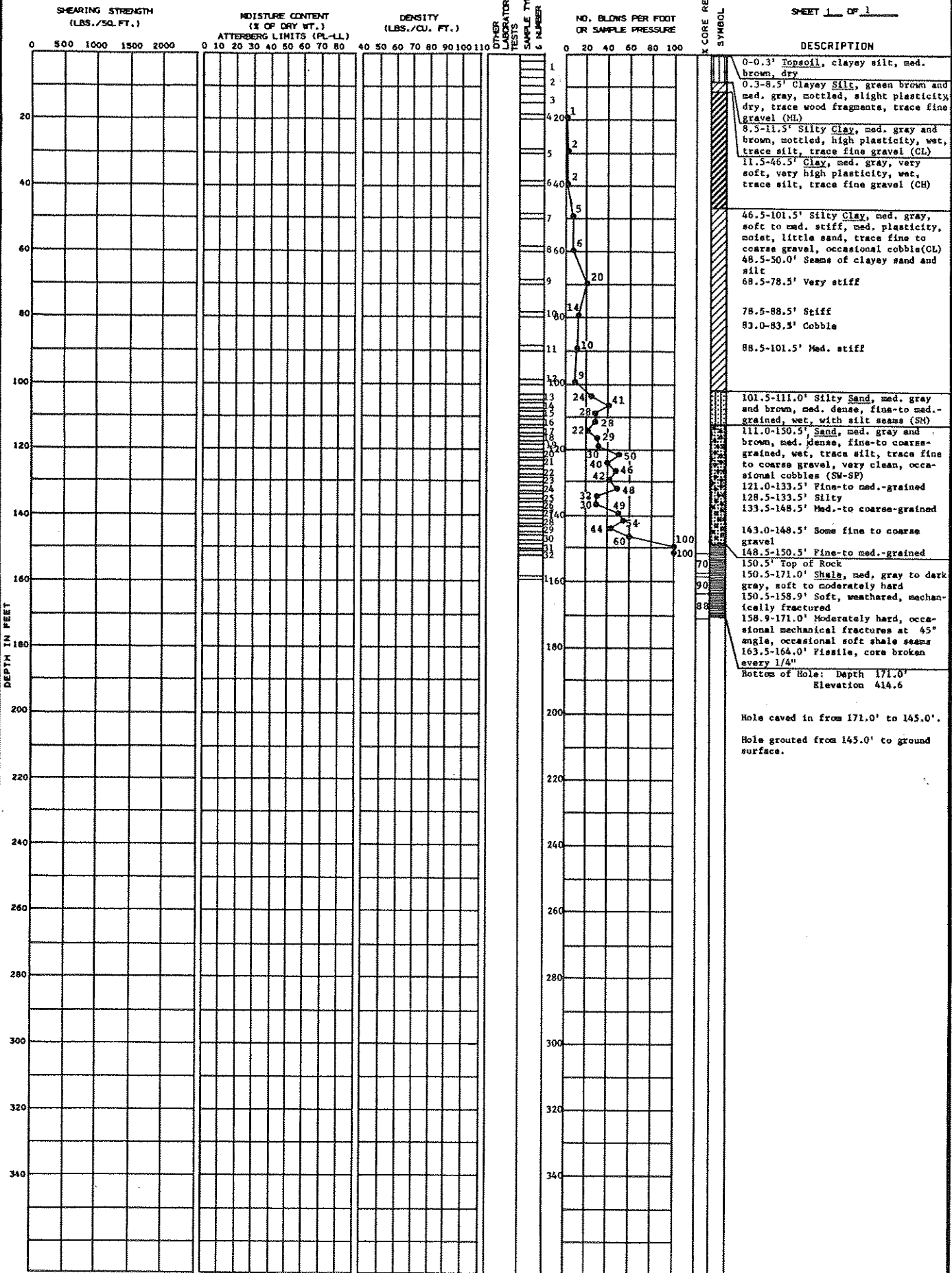
SOIL BORING NO. B-8 BECHTEL Belle River



LOCATION: N 7675 E 9100 GROUND ELEVATION 585.6

DATE DRILLED: 8/8/77 8/11/77

SHEET 1 OF 1

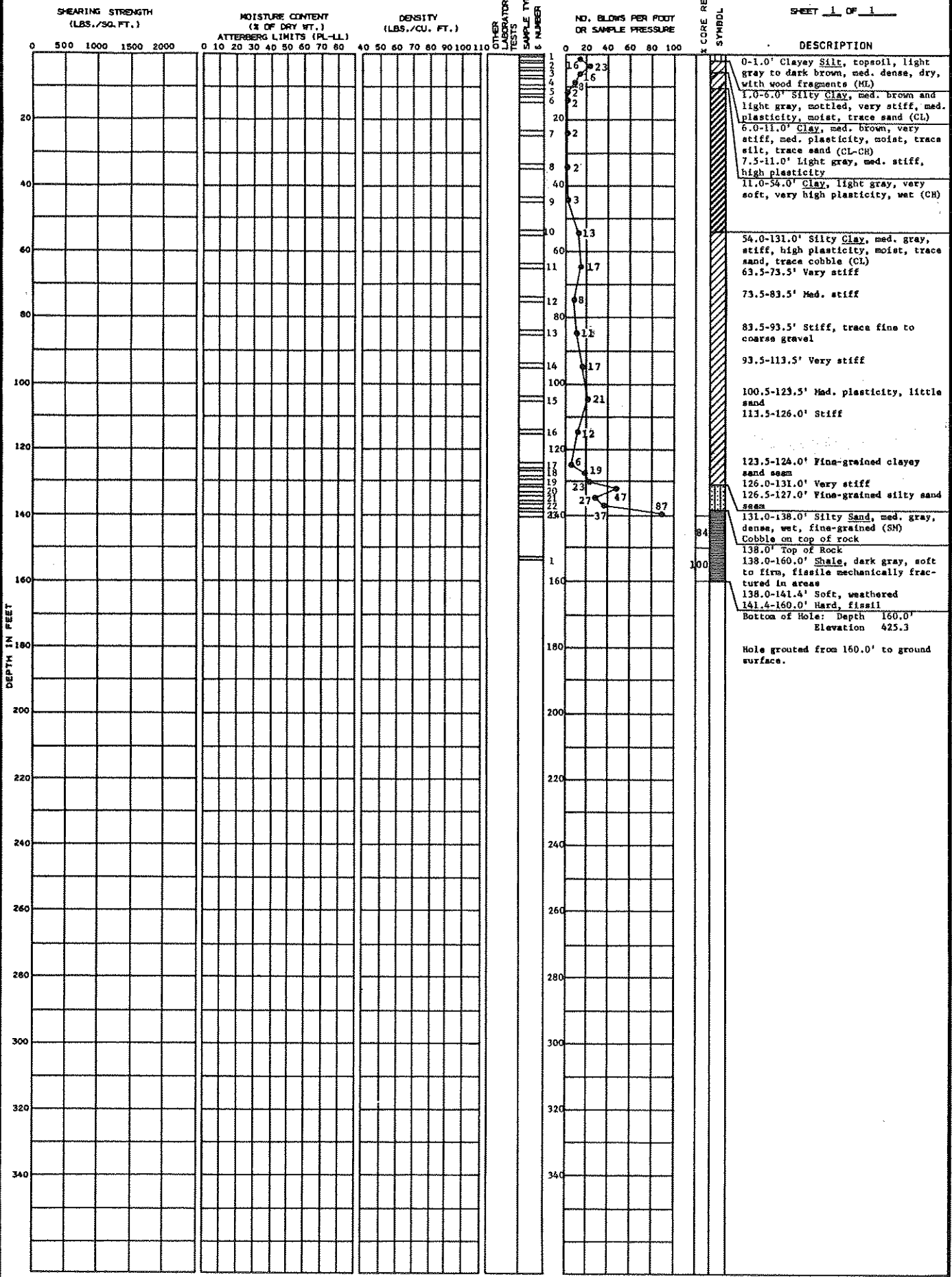


SOIL BORING NO. B-9

BECHTEL Belle River

LOCATION: N 7500 E 9388.7 GROUND ELEVATION 585.3

DATE DRILLED: 7/21/77  
7/23/77  
SHEET 1 OF 1



SOIL BORING NO. B-12  
BECHTEL, Bella River

LOCATION: N 13,000 E 7,000 GROUND ELEVATION 590.6

DATE DRILLED: 3-27-74  
3-28-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0					19		black, clayey topsoil
20					20		medium, brown, silty Clay (CL) trace of sand and gravel
20					13		gray, silty
20					7		soft, gray, sandy, silty Clay (CH)
20					2		no sand
40					4		
40					3		
40					2		
40					2		
60					2		
60					2		
60					2		
60					2		
60					2		
60					2		
80							Bottom of Hole-Elevation-520.1 -Depth-70.5ft
100							
120							No gain or loss of water
140							For Water Table information consult Section 4.1.3.
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							
							Hole backfilled with Bentonite and soil

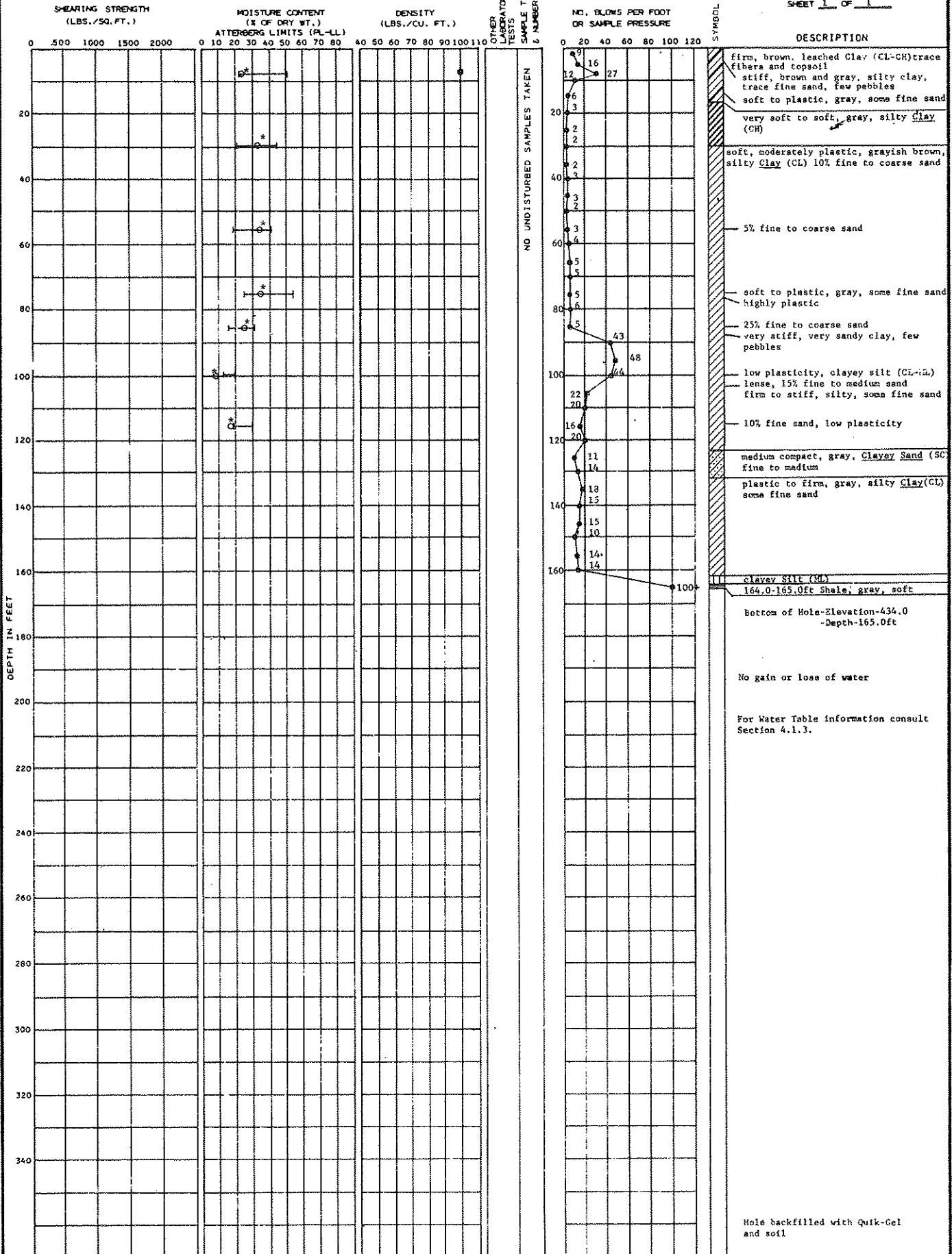
SOIL BORING NO. 150

BECHTEL Belle River

LOCATION: N 13,785 E 5,006 GROUND ELEVATION 599.0

DATE DRILLED: 3-7-74 3-14-74

SHEET 1 OF 1



○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,000 E 8,000 GROUND ELEVATION 591.5

DATE DRILLED: 4-5-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (X OF DRY WT.) ATTENBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0						Consolidated firm to stiff, brown, silty clay (CL) very stiff, trace gravel plastic to firm, gray
20				14 30 22		soft, gray, silty clay (CH)
40				2		
60				2		
80				2		
100				2		
120				2		
140				2		
160				2		
180				2		
200				2		
220				2		
240				2		
260				2		
280				2		
300				2		
320				2		
340				2		

Bottom of Hole - Elevation - 521.5  
- Depth - 70.0 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

SOIL BORING NO. 157

BECHTEL Belle River

LOCATION: N 14,000 E 9,950 GROUND ELEVATION 591.3

DATE DRILLED: 4-3-74

SHEET 1 OF 1

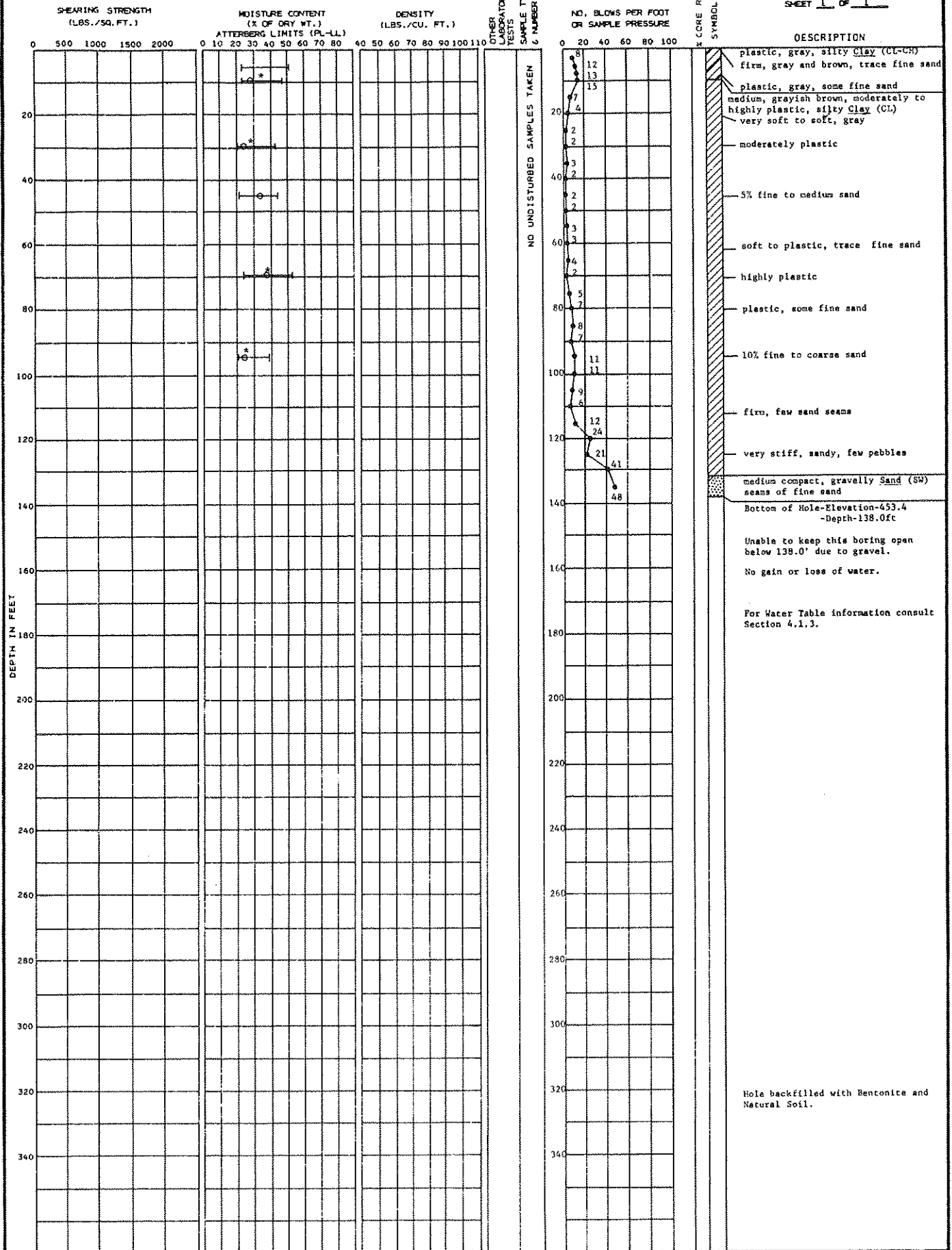
DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. OF LABORATORY TESTS	SAMPLE TYPE	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0								GRAY SILT (ML)
0						17		loose to medium compact, brown to gray, silty sand (SM) fine to medium
0						15		firm, gray, silty clay (CL)
0						4		soft, gray, silty clay (CH)
20						2		
40						2		
60						3		
80						4		
100						5		
120								
140								No gain or loss of water
160								For Water Table information consult Section 4.1.3.
180								
200								
220								
240								
260								
280								
300								
320								
340								Hole backfilled with Quik-Gel in soil

LOCATION: N 15,000  
E 8,000

GROUND ELEVATION: 591.4

DATE DRILLED: 4-8-76

SHEET 1 OF 1

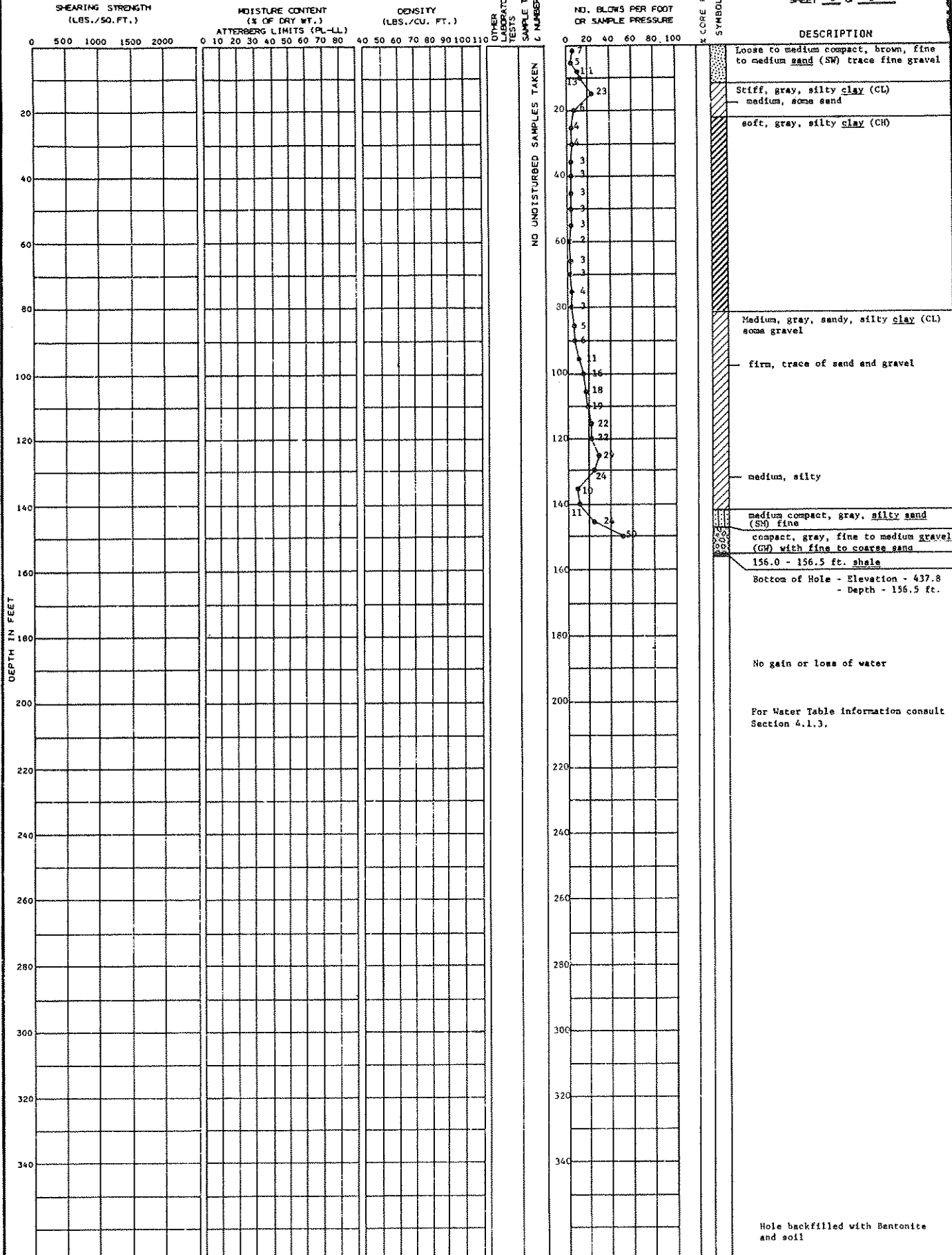


○ Moisture Content  
 — Atterbury Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,830 E 9,938 GROUND ELEVATION 594.3

DATE DRILLED: 3-26-74

SHEET 1 OF 1



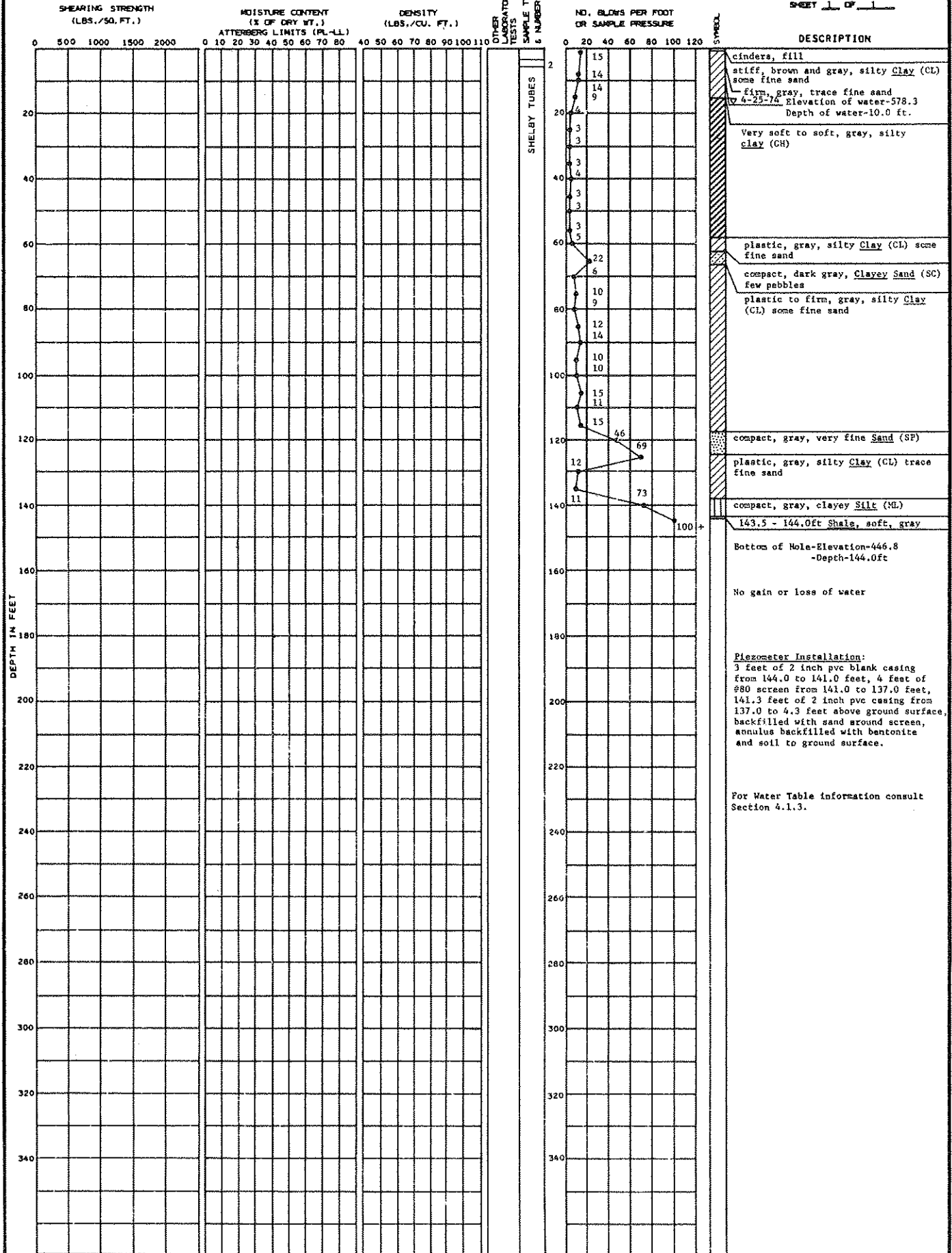


LOCATION: N 3,525  
E 12,533

GROUND ELEVATION 590.8

DATE DRILLED: 3-5-74  
3-7-74

SHEET 1 OF 1



SOIL BORING NO. 181

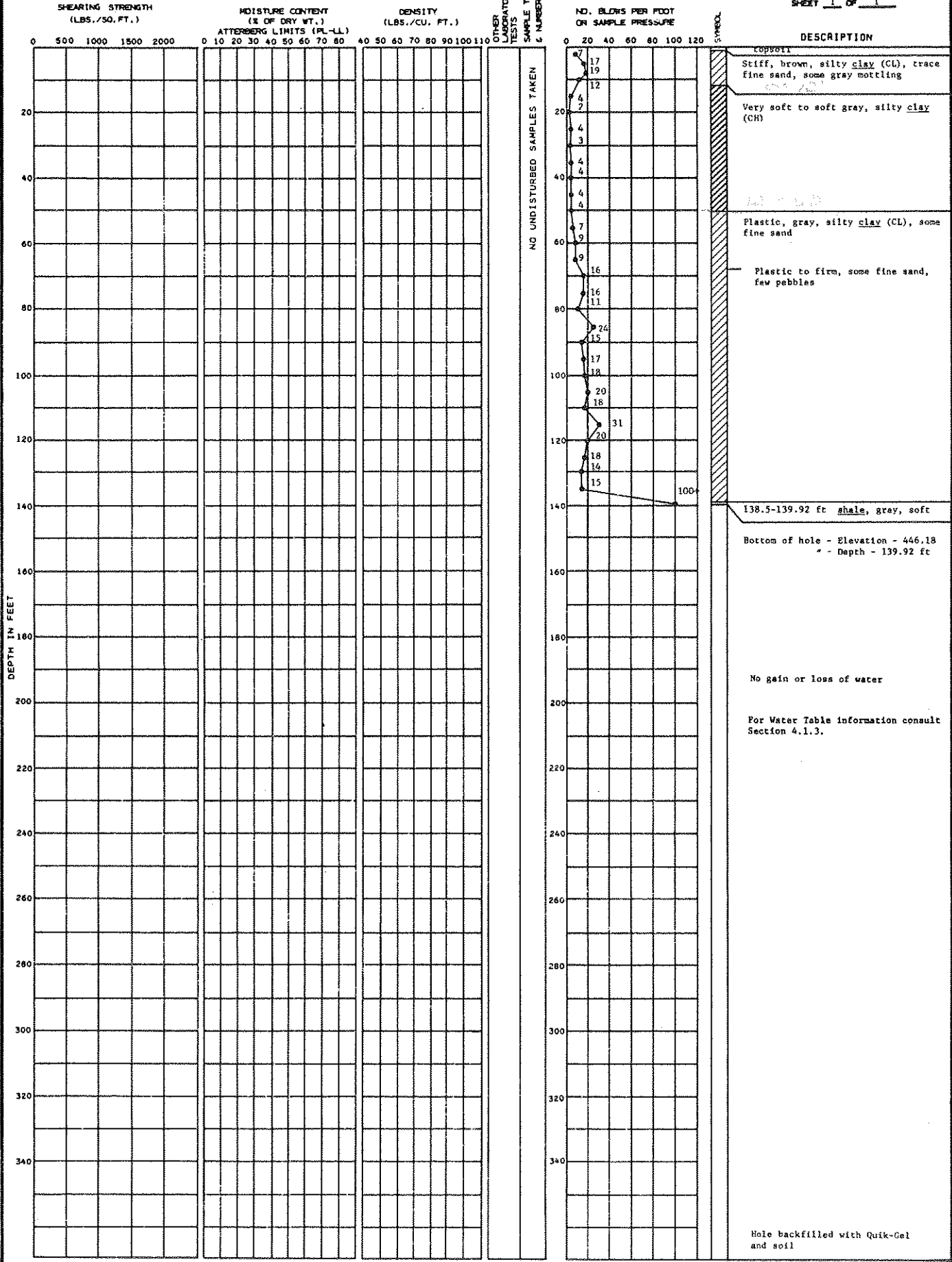
BECHTEL Belle River

B-125

LOCATION: N 3,556 E 9,564 GROUND ELEVATION 586.1

DATE DRILLED: 3-15-74 3-19-74

SHEET 1 OF 1



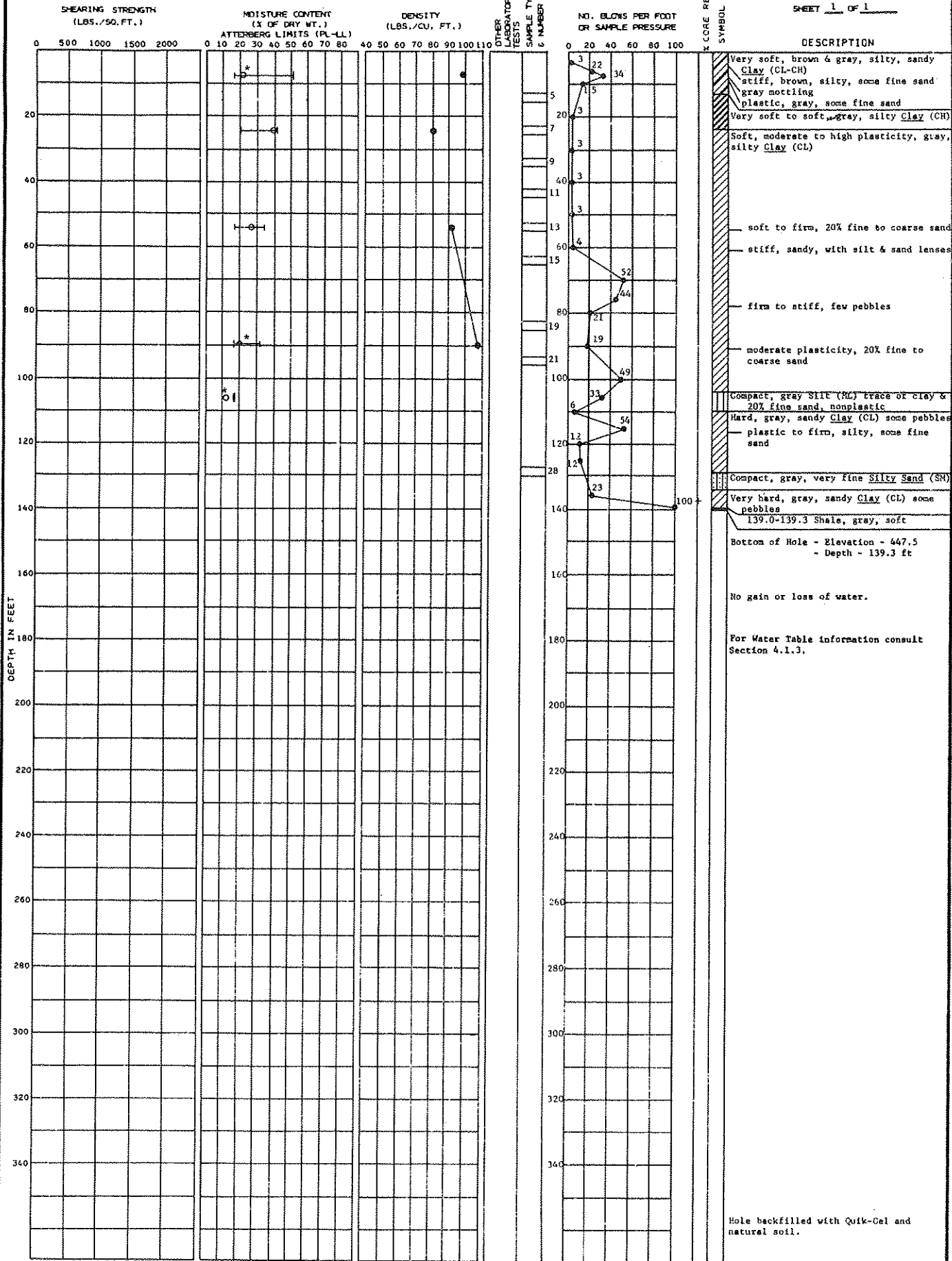
SOIL BORING NO. 184

BECHTEL Belle River

LOCATION: N 5,500 E 9,797 GROUND ELEVATION: 586.8

DATE DRILLED: 2-26-74 2-27-74

SHEET 1 OF 1



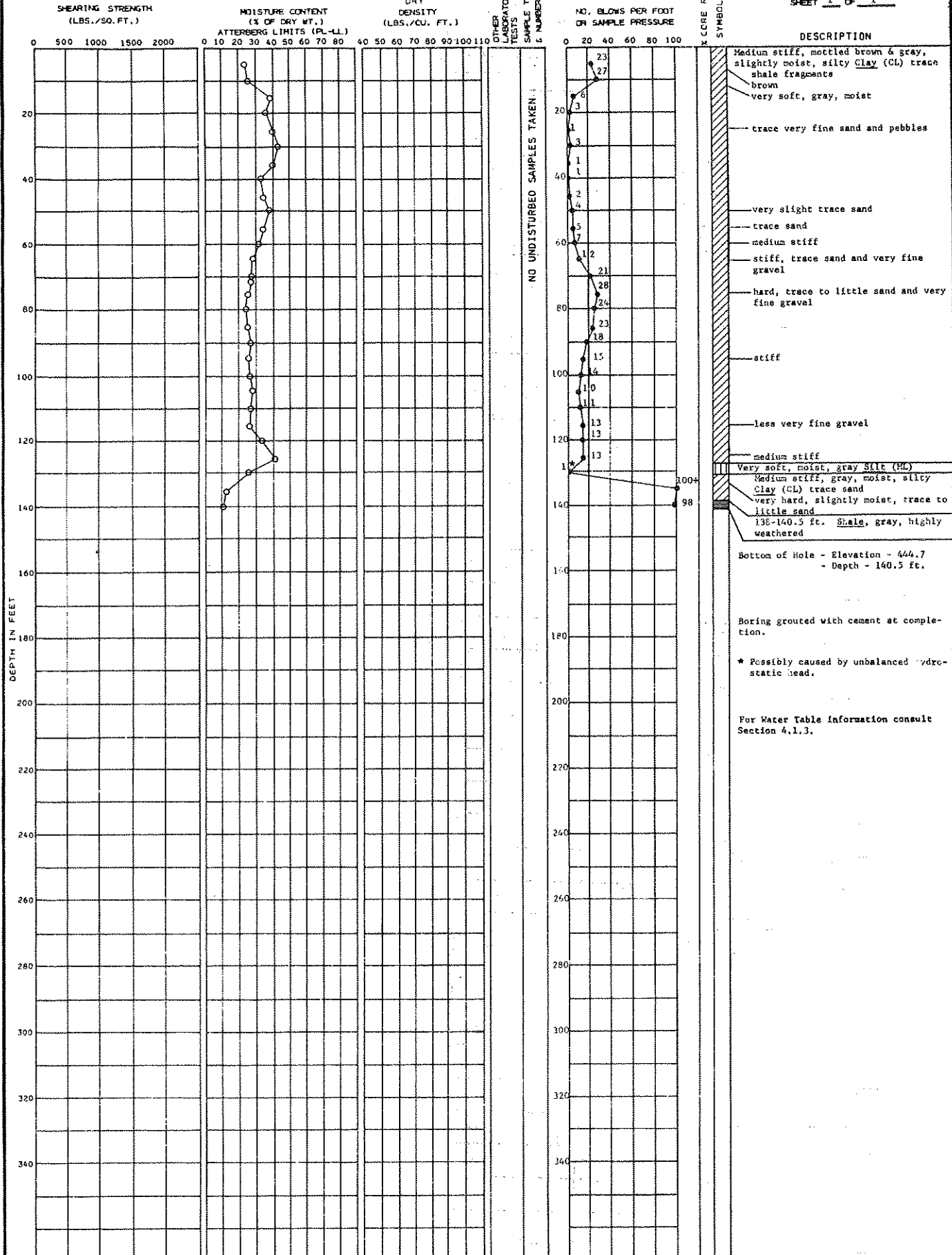
○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 186  
 BECHTEL Belle River

LOCATION: N 3500 E 11741 GROUND ELEVATION: 585.2

DATE DRILLED: 8/6/75 8/8/75

SHEET 1 OF 1

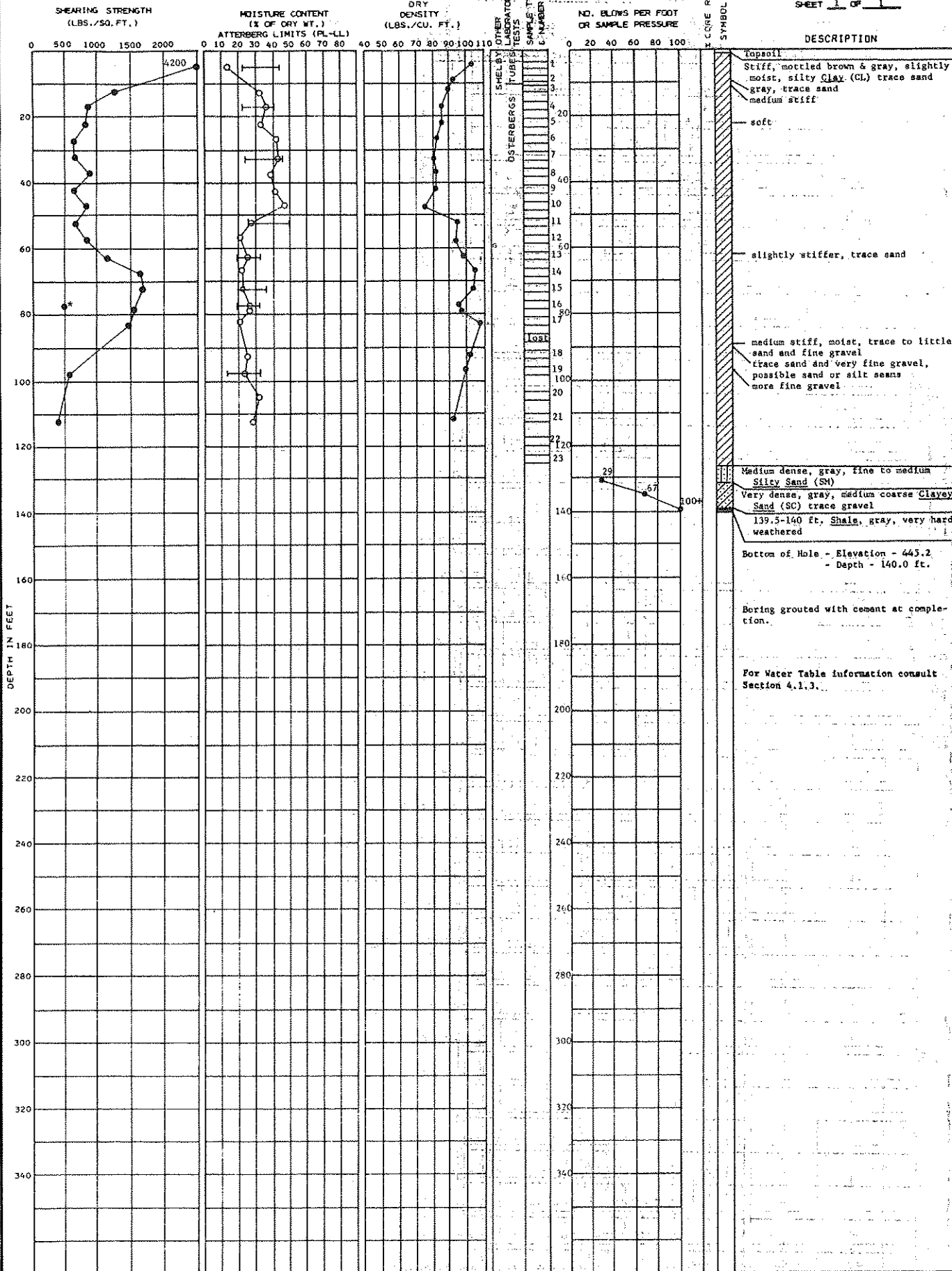


SOIL BORING NO. 191  
BECHTEL BELLE RIVER

H 3558 GROUND ELEVATION 385.2  
 LOCATION: E 11701

DATE DRILLED: 8/11/75  
 8/14/75

SHEET 1 OF 1



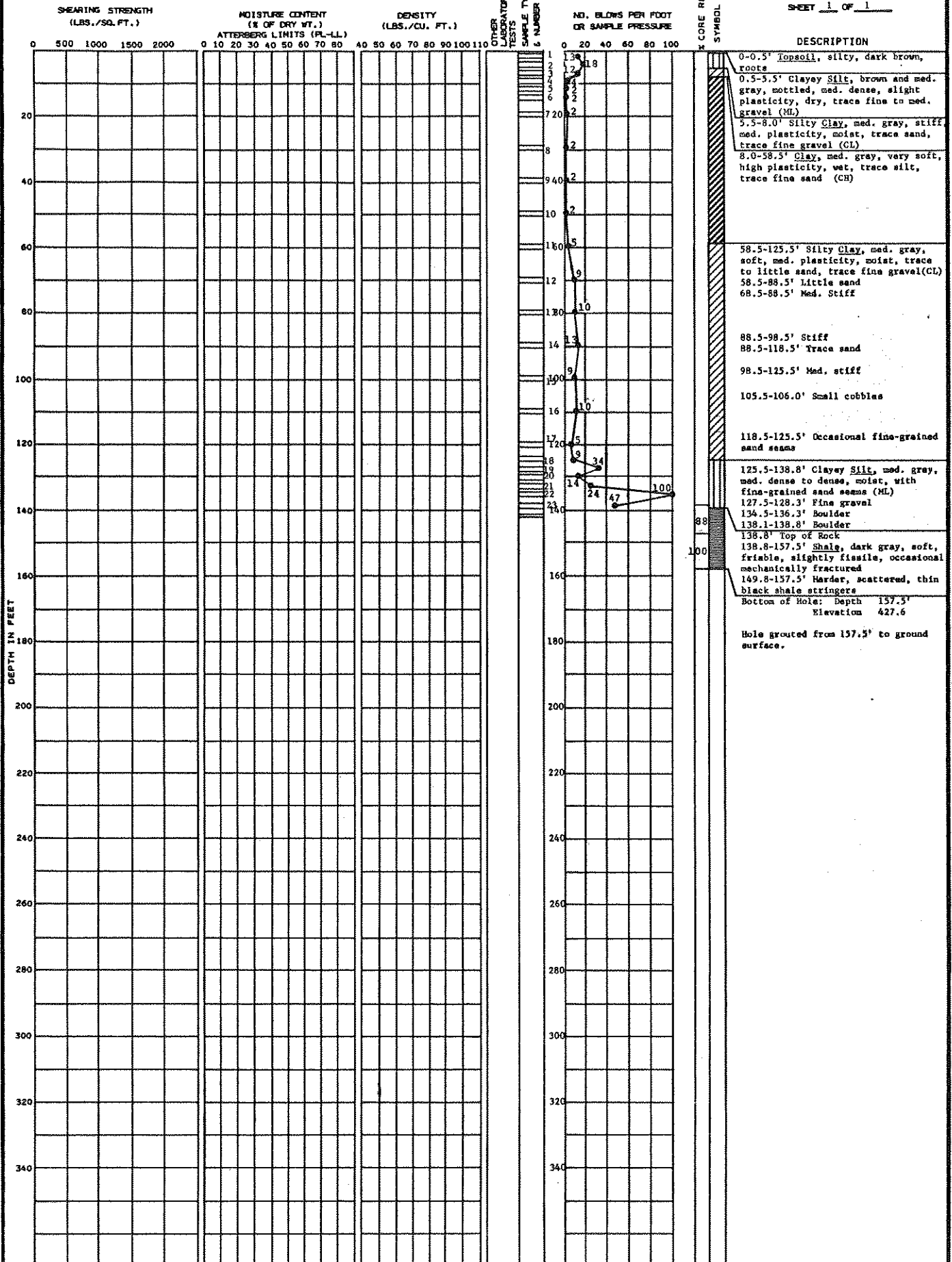
● Unconfined Compression  
 \* Sample contained sand seams.  
 ○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 193  
 BECHTEL BELLE RIVER

LOCATION: N 7800 E 9400 GROUND ELEVATION 585.1

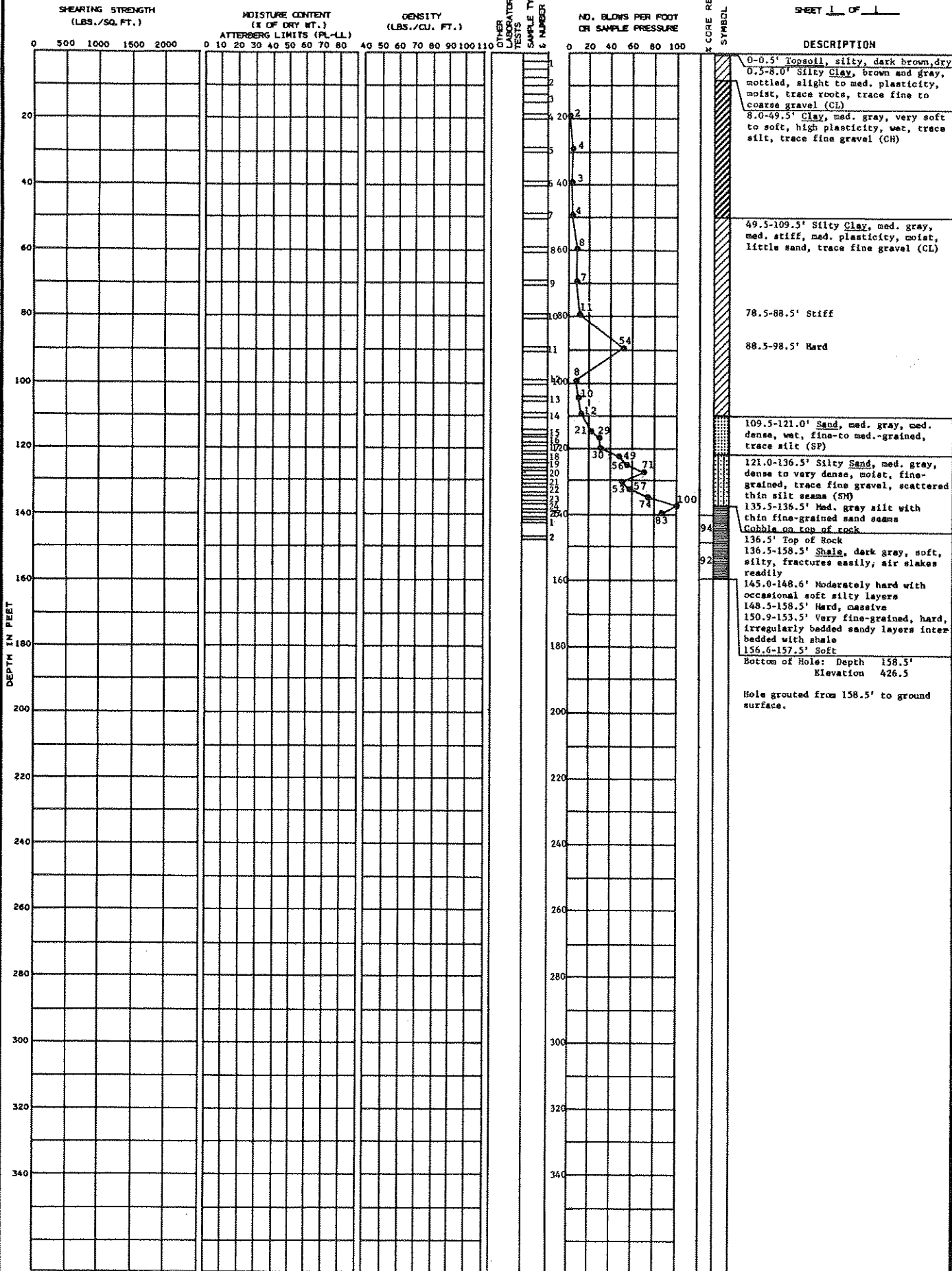
DATE DRILLED: 8/17/77 8/22/77

SHEET 1 OF 1



LOCATION: N 7500 E 9200 GROUND ELEVATION 585.0

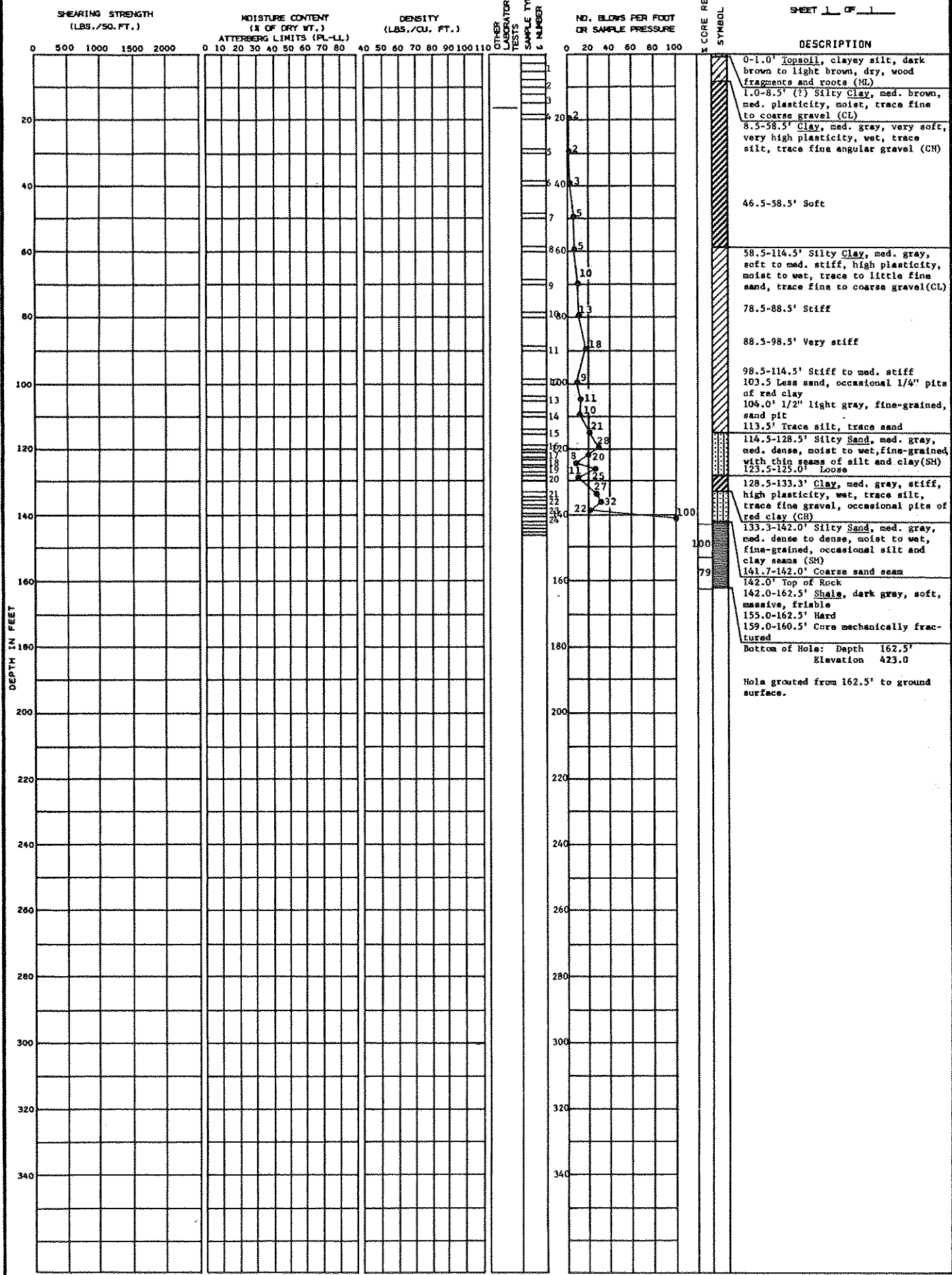
DATE DRILLED: 8/23/77 8/25/77



LOCATION: N 7850 E 9200 GROUND ELEVATION 585.5

DATE DRILLED: 8/2/77  
8/4/77

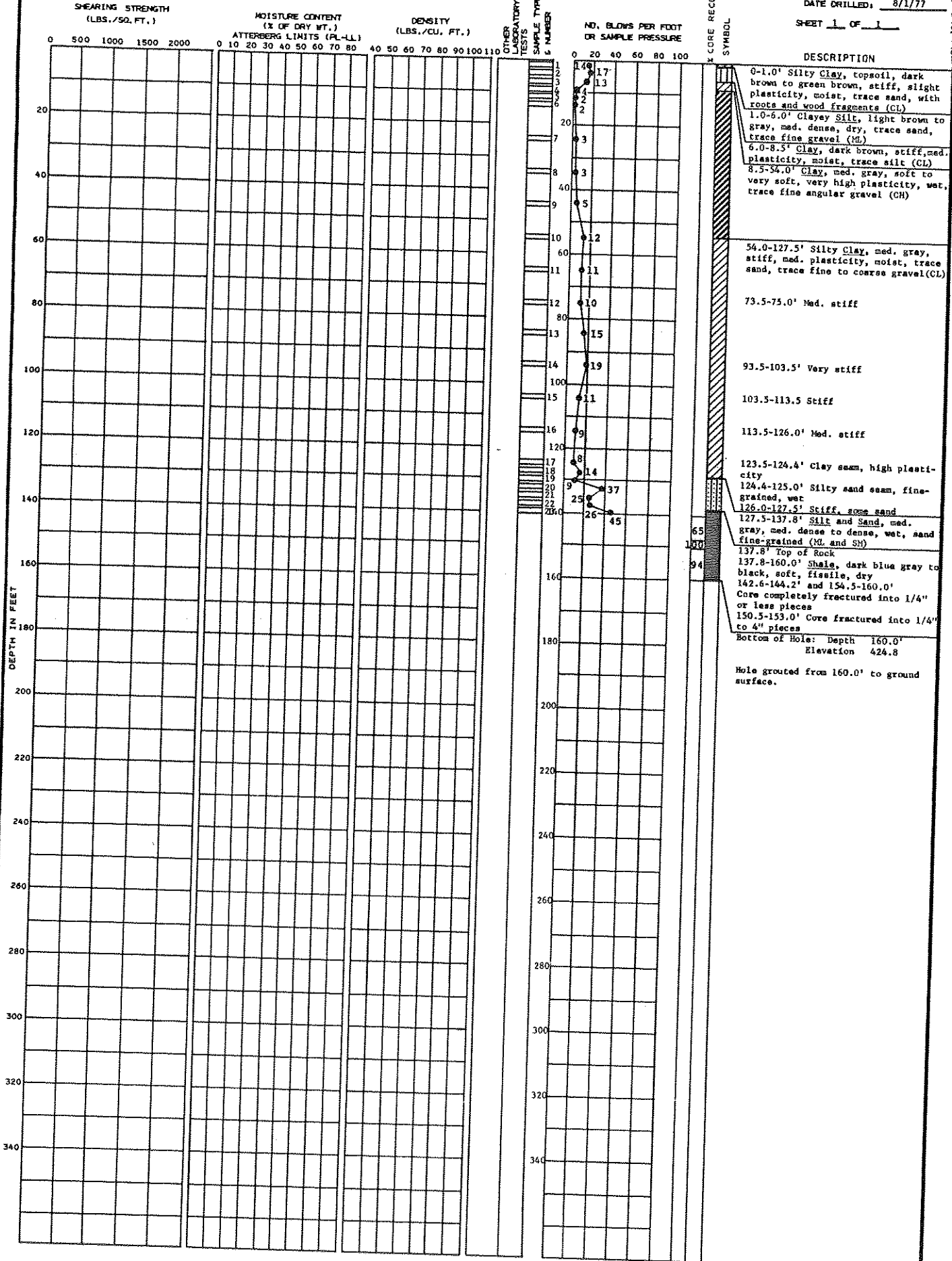
SHEET 1 OF 1





LOCATION: N 7600 E 9400 GROUND ELEVATION 584.8

DATE DRILLED: 7/26/77 8/1/77 SHEET 1 OF 1

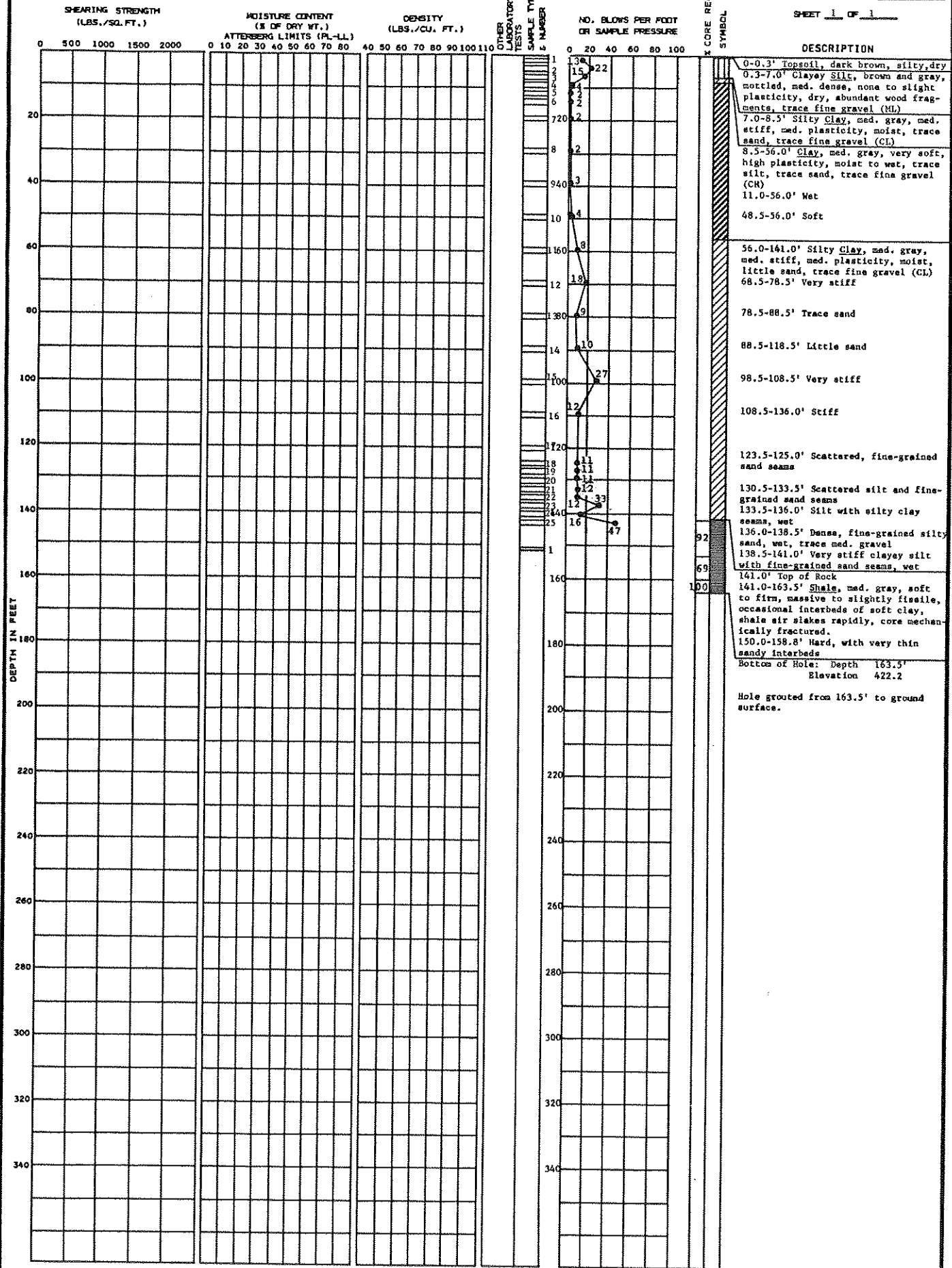


SOIL BORING NO. B-5 BECHTEL Belle River

LOCATION: N 7650 E 9550 GROUND ELEVATION 585.7

DATE DRILLED: 8/25/77 8/31/77

SHEET 1 OF 1



SOIL BORING NO. 8-6 BECHTEL Belle River

LOCATION: N 8180 E 9550 GROUND ELEVATION 585.3

DATE DRILLED: 8/12/77 8/17/77

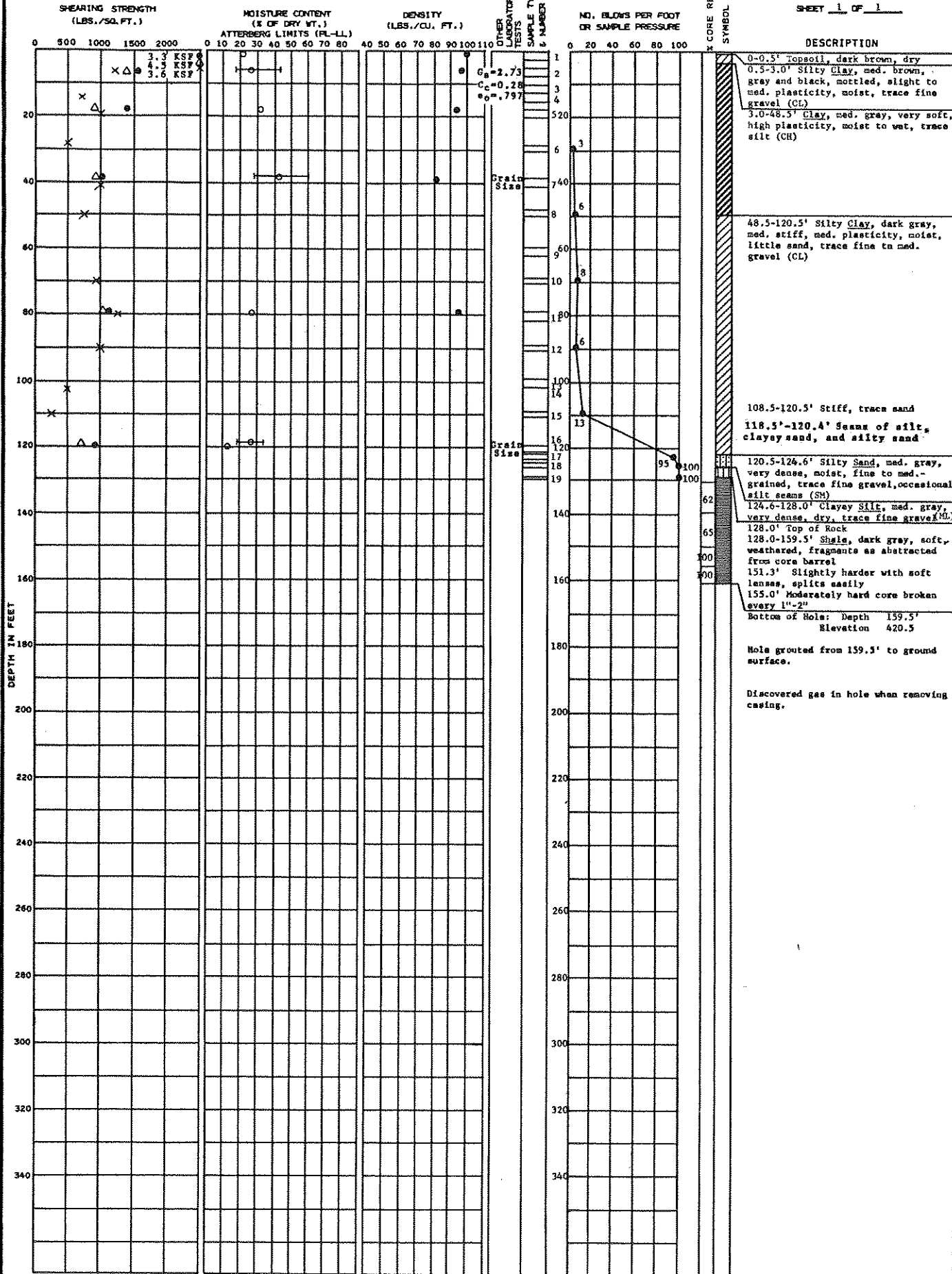
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	LABORATORY TESTS	SAMPLE TYPE NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0								0-0.5' Topsoil, silty dark brown
0.5				17		29		0.5-8.0' Clayey Silt, light gray and med. brown, mottled, med. dense, slight plasticity, dry, trace fine gravel, roots (ML)
8				20				8.0-8.5' Silty Clay, med. brown, very stiff, med. plasticity, very stiff, med. plasticity, moist, trace fine gravel (CH)
8.5				20				8.5-57.0' Clay, med. gray, soft to very soft, high plasticity, wet, trace silt (CH)
48.5								48.5' Trace fine to med. gravel
57.0				16		11		57.0-118.5' Silty Clay, med. gray, stiff, med. plasticity, moist, trace to little sand, trace fine gravel (CL)
68.5				2		46		68.5-88.5' Med. stiff
78.5				13		7		78.5-118.5' Little fine sand
108.5				17		11		108.5-118.5' Very stiff
118.5				16		16		118.5-125.5' Clay, med. gray, very stiff, med. plasticity, moist, trace silt (OL-CH)
123.5				10		7		123.5-125.5' Med. stiff
125.5				11		24		125.5-135.5' Clayey Silt, med. gray, loose to med. dense, wet, trace sand occasional fine to med.-grained sand seams (ML)
128.5				19		24		128.5-131.0' Sandy silt
131.0				24		43		131.0-132.0' Fine-grained silty sand seam
135.5				36		30		135.5-145.0' Sand, gray and brown, med. dense to dense, wet, fine-to med. grained, trace silt (SP)
143.5				1				143.5-144.5' Clayey sand
145.0				2				145.0' Top of Rock
145.0-164.0								145.0-164.0' Shale, green-gray, hard, occasional irregular bedding with very fine black coal stringers, predominately massive
148.7-149.3								148.7-149.3' Very fine-grained, hard, irregularly bedded sandy layers interbedded with shale
162.7-164.0								162.7-164.0' Soft dark gray, dry, friable
164.0								Bottom of Hole: Depth 164.0' Elevation 421.3
								Hole grouted from 164.0' to ground surface.

LOCATION: N 5270 E 15660 GROUND ELEVATION 580.0

DATE DRILLED: 9/7/77  
9/14/77

SHEET 1 OF 1



Δ Torvane  
 ○ Unconsolidated Undrained  
 ⊙ Unconfined Compression  
 — Atterberg Limits  
 $G_s$  Specific Gravity  
 $C_c$  Compression Index  
 $e_0$  Initial Void Ratio  
 X Pocket Penetrometer

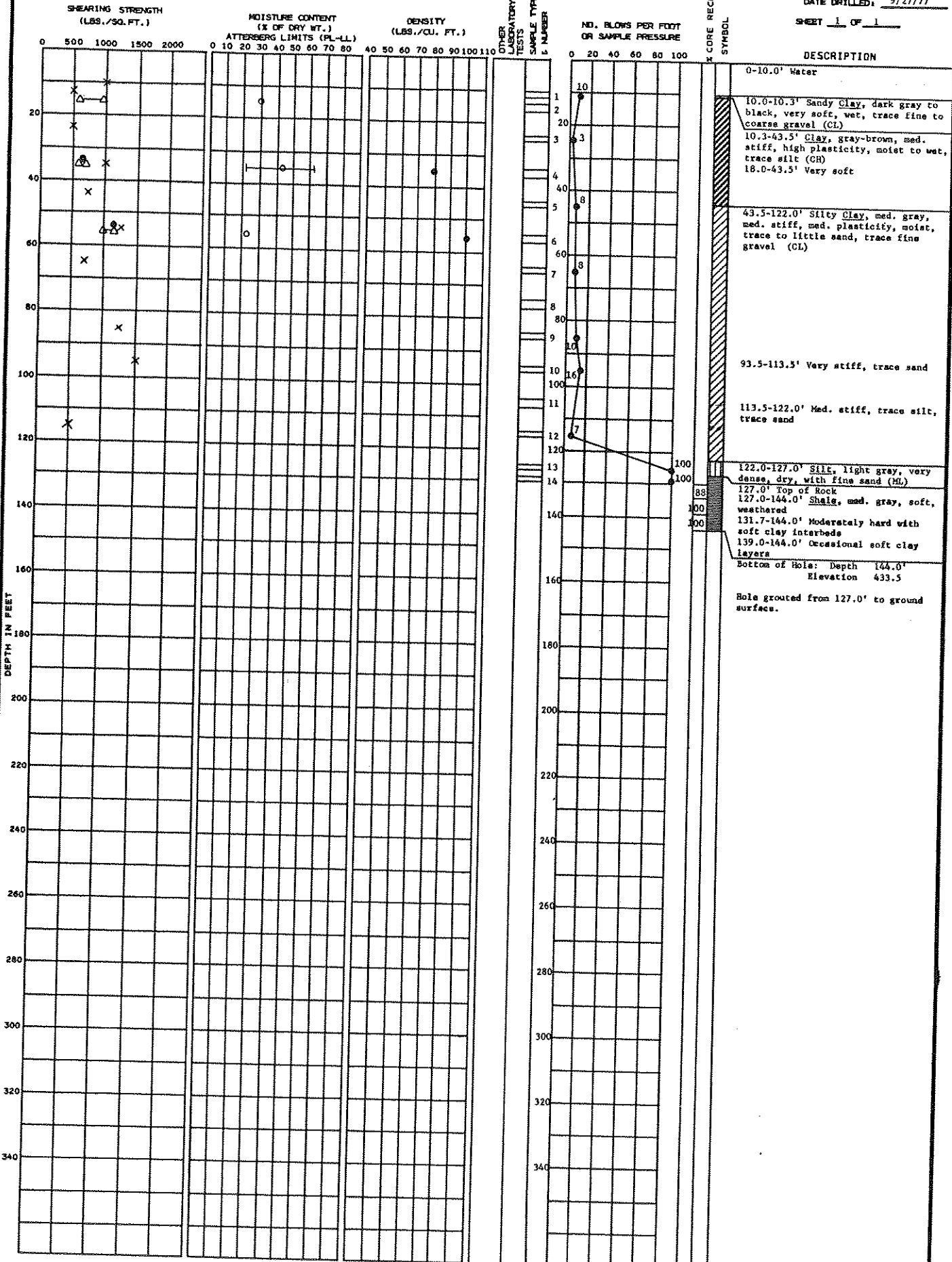
SOIL BORING NO. B-17  
BECHTEL Bells River

LOCATION: N 5163  
E 15744

GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/21/77  
9/27/77

SHEET 1 OF 1



SOIL CORE RECOVERY SYMBOL

DESCRIPTION

0-10.0' Water

10.0-10.3' Sandy Clay, dark gray to black, very soft, wet, trace fine to coarse gravel (CL)

10.3-43.5' Clay, gray-brown, med. stiff, high plasticity, moist to wet, trace silt (CH)

18.0-43.5' Very soft

43.5-122.0' Silty Clay, med. gray, med. stiff, med. plasticity, moist, trace to little sand, trace fine gravel (CL)

93.5-113.5' Very stiff, trace sand

113.5-122.0' Med. stiff, trace silt, trace sand

122.0-127.0' Silt, light gray, very dense, dry, with fine sand (ML)

127.0' Top of Rock

127.0-144.0' Shale, med. gray, soft, weathered

131.7-144.0' Moderately hard with soft clay interbeds

139.0-144.0' Occasional soft clay layers

Bottom of Hole: Depth 144.0'  
Elevation 433.5

Hole grouted from 127.0' to ground surface.

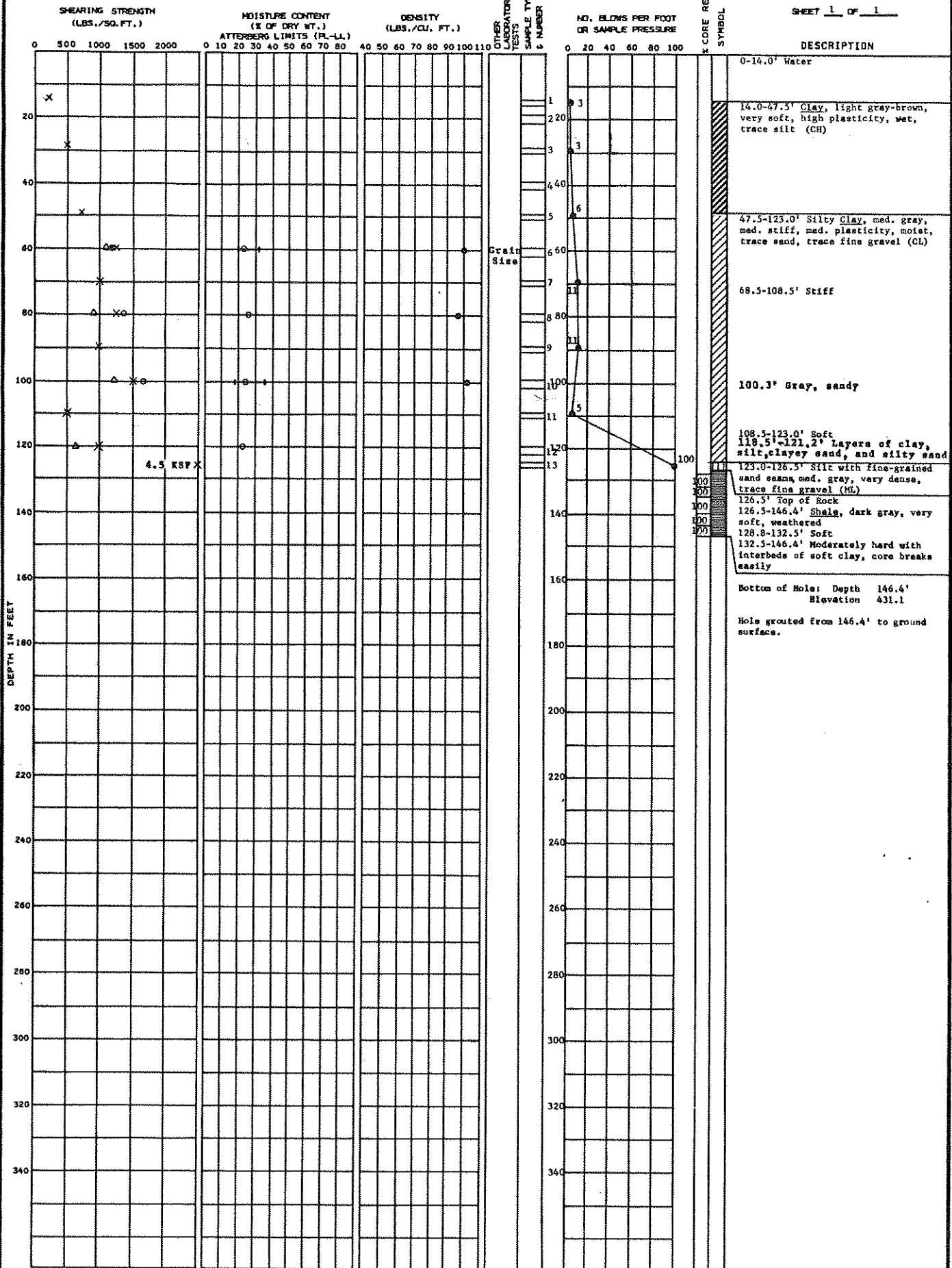
△ Torvane  
 I Atterberg Limits  
 ● Unconfined Compression  
 ○ Unconsolidated Undrained  
 X Pocket Penetrometer

LOCATION: N 5364  
E 15750

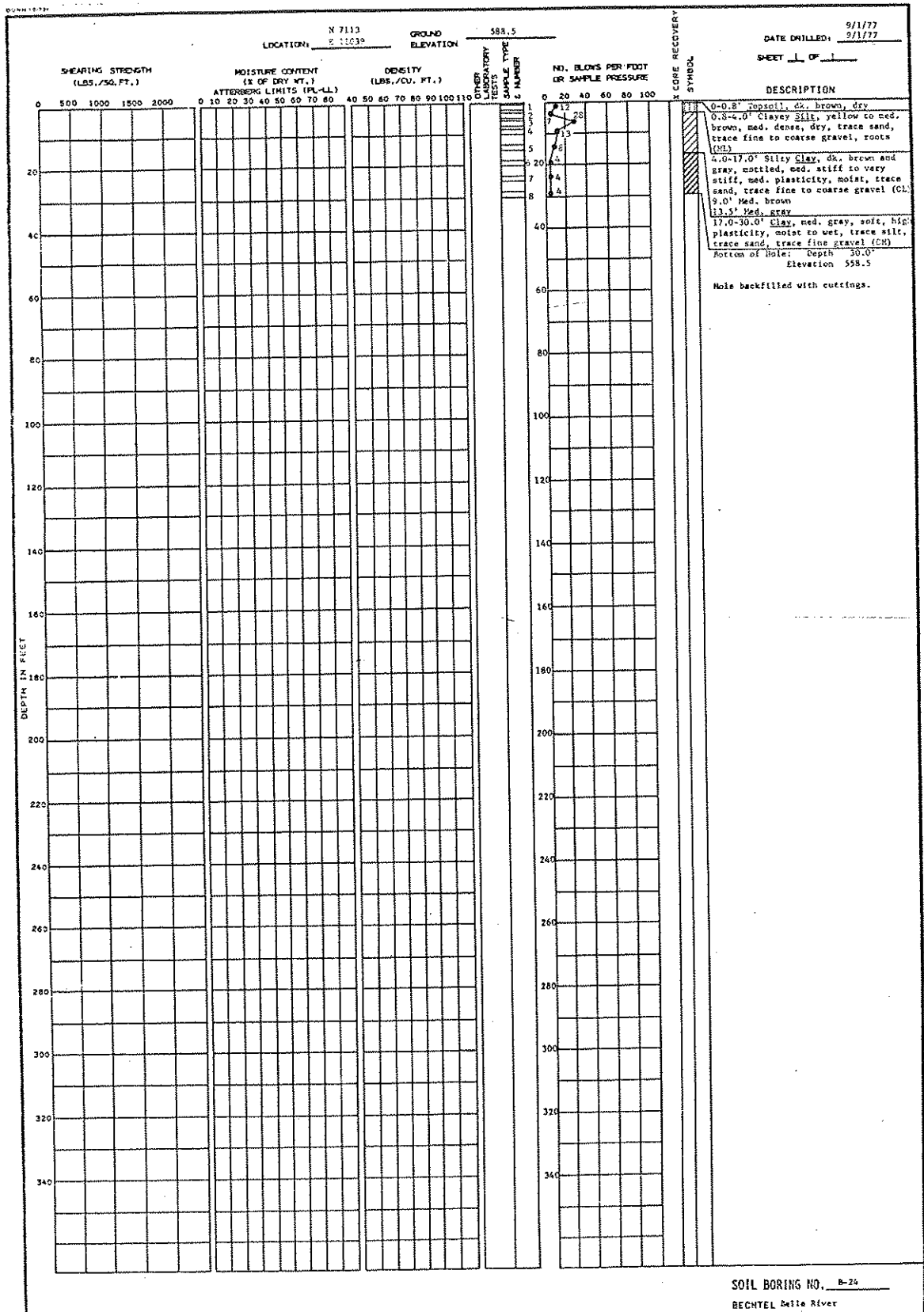
GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/15/77  
9/21/77

SHEET 1 OF 1



△ Ternary  
 ○ Unconsolidated Undrained  
 ● Unconfined Compression  
 — Atterberg Limits  
 × Pocket Penetrometer



LOCATION: N 6921 E 11501 GROUND ELEVATION 587.5

DATE DRILLED: 9/1/77  
SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

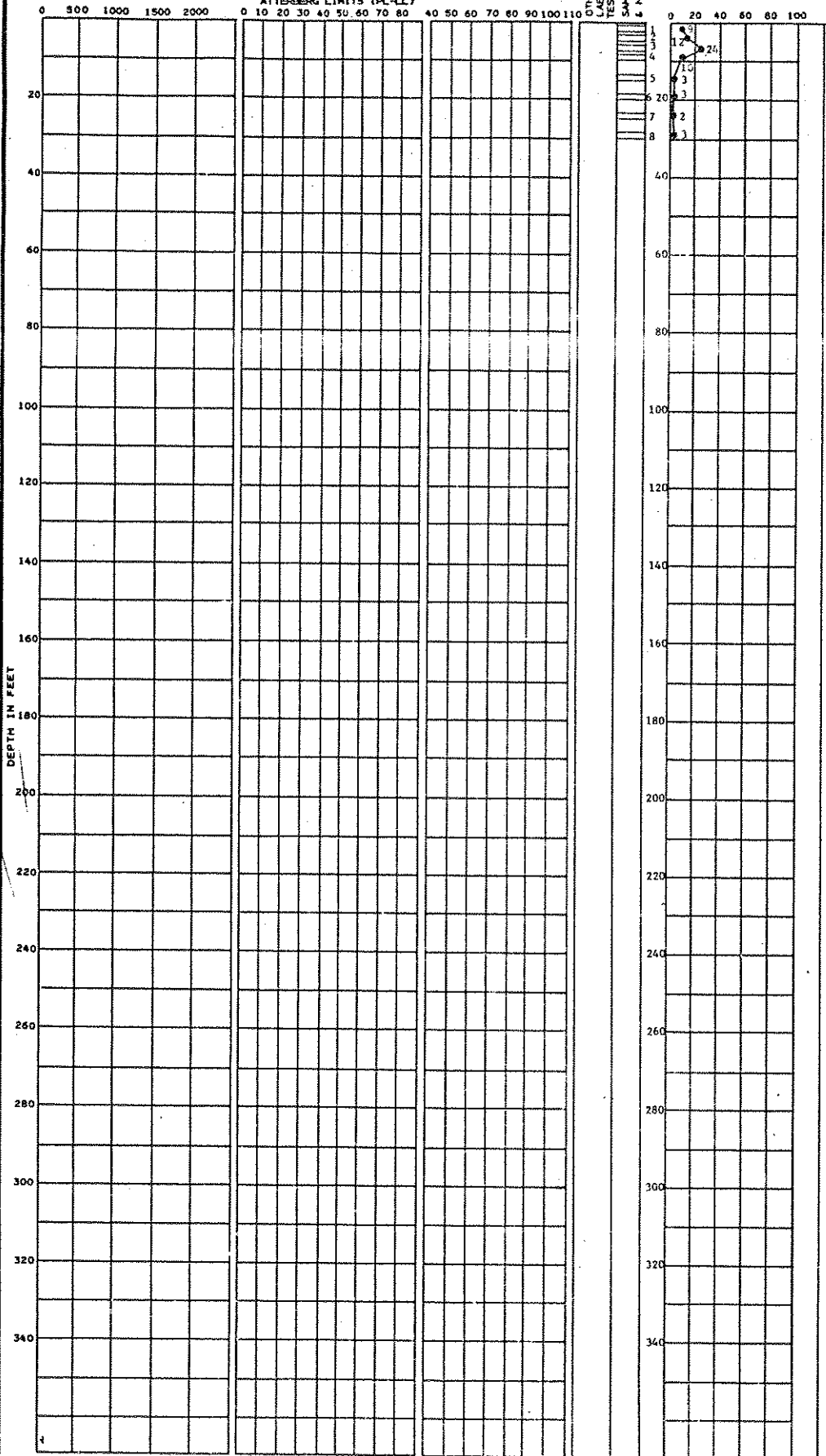
DENSITY (LBS./CU. FT.)

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

OTHER LABORATORY TESTS

SOIL CORE RECOVERY (%)

DESCRIPTION



0-0.7' Topsoil, dk. brown, dry  
0.7-4.5' Silty Sand, tan and yellow, mottled, loose, damp, fine-grained (SM)  
4.5-9.0' Silty Clay, brown and gray, mottled, stiff to very stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CI)  
9.0-30.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace sand, trace fine gravel, trace silt (CH)  
Bottom of Hole: Depth 30.0'  
Elevation 557.5  
Hole backfilled with cuttings.



LOCATION: N 6730 E 11963 GROUND ELEVATION 588.1

DATE DRILLED, 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	OTHER LABORATORY TESTS	SAMPLE TYPE & NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0								0-0.7' Topsoil, dr. brown, dry
0.7						11		0.7-4.0' Silty Sand, tan and gold, mottled, med. dense, dry, fine-grained, roots (SM)
4.0						21		4.0-13.5' Silty Clay, gray and brown, mottled, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5						3		6.0' Green brown
19.5						3		13.5-30.0' Clay, med. gray, soft, high plasticity, moist to wet, trace silt, trace fine gravel (CH)
30.0						3		Bottom of Hole: Depth 30.0' Elevation 558.1
340								Hole backfilled with cuttings.

LOCATION: N 6539 E 12425 GROUND ELEVATION 588.2

DATE DRILLED: 9/2/77  
9/2/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY	SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, fine to med. gravel, dry (GO)
1				16			1.0-5.0' Clayey Silt, dk. brown, med. dense to dense, dry, trace sand, trace fine gravel (ML)
2				37			
3				21			
4							
5				14			5.0-30.0' Silty Clay, dk. brown, hard to very stiff, dry, med. plasticity, trace sand, trace fine to med. gravel (CL)
6				22			
7				12			13.5' Moist, dipping parting in sample med. brown with med. gray filling, with roots
8				7			19.0-28.3' Med. gray, stiff
20							23.5' green-brown and gray, mottled
40							28.5-30.0' Med. gray, med. stiff
60							Bottom of Hole: Depth 30.0' Elevation 558.2
80							Hole backfilled with cuttings.
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

LOCATION: N 6348 E 12890 GROUND ELEVATION 600.0

DATE DRILLED: 9/1/77

SHEET 1 OF 1

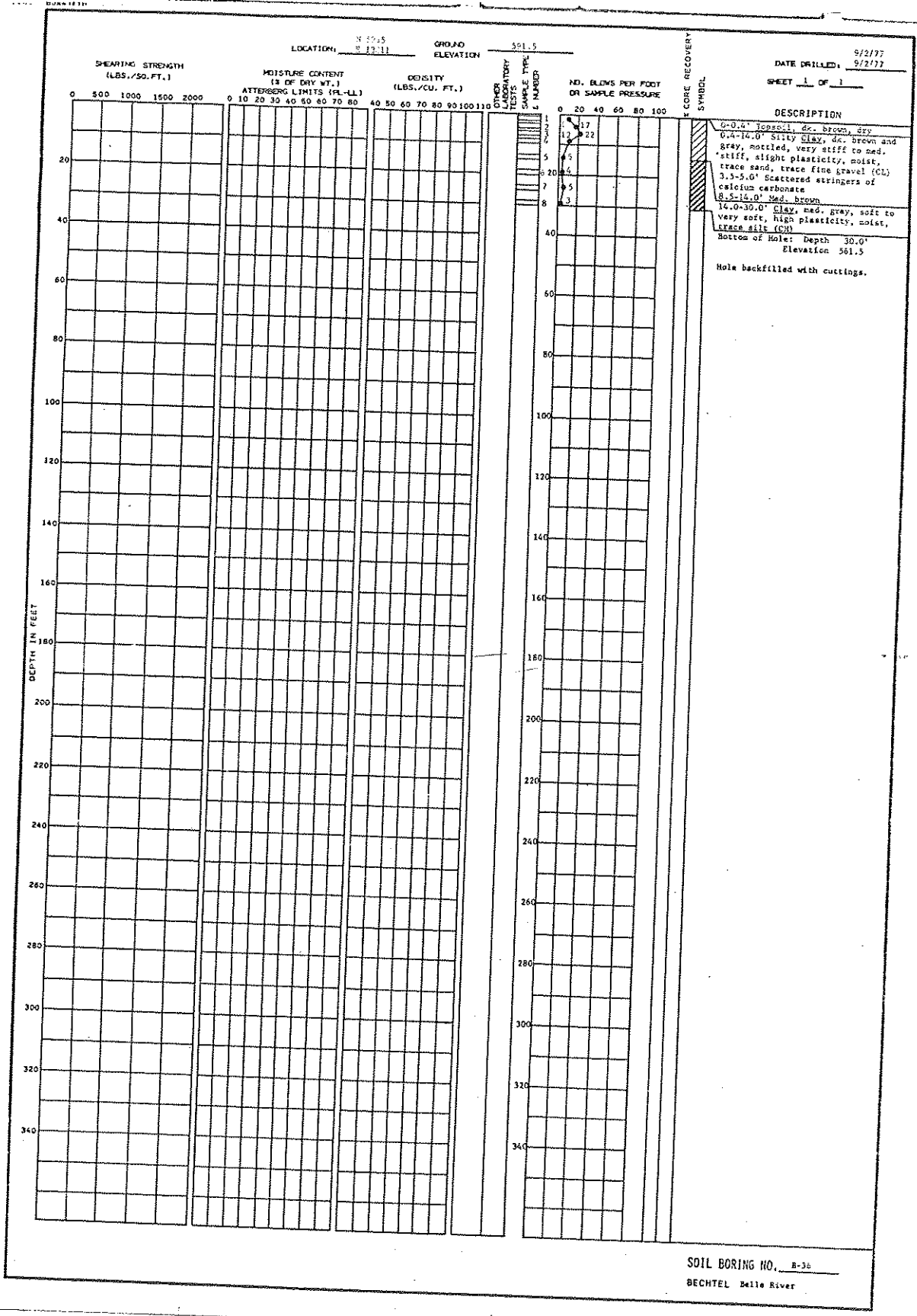
DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, dry, sandy fill with coarse gravel
1							
2							
3							
4							1.0-6.0' Clayey Silt, green brown, med. dense, dry, trace sand (ML)
5							
6							6.0-30.0' Silty Clay, green brown, very stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)
7							13.5' Med. gray, stiff to med. stiff, med. plasticity
8							28.5-30.0' Med. to high plasticity
40							Bottom of Hole: Depth 30.0' Elevation 570.0
60							Hole backfilled with cuttings.
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

LOCATION: N 6156  
E 13309 GROUND ELEVATION 528.8

DATE DRILLED: 9/2/77  
9/2/77

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTENDING LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLINDS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, dry
1							0.3-3.5' Clayey Silt, light brown and gray, mottled, med. dense, none to slight plasticity, dry, trace sand, trace fine to coarse gravel (G)
2							3.5-23.5' Silty Clay, med. brown and gray, lightly mottled, very stiff to hard, med. plasticity, moist, trace sand, trace fine gravel (CL)
3							23.5-30.0' Med. Gray, med. stiff to very soft, high plasticity, moist, trace silt (CH)
30.0'							Bottom of Hole: Depth 30.0' Elevation 568.8
30.0'							Note backfilled with cuttings.
40							
60							
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. B-34  
BECTEL Belle River



BUNN 11-12

LOCATION: J 5774 E 14272 GROUND ELEVATION: 591.2

DATE DRILLED: 9/6/77 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	LABORATORY TESTS SAMPLE TYPE & NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, moist
0.5							0.5-13.5' Silty clay, med. brown and gray, mottled, med. stiff, med. plasticity, trace sand, trace fine gravel (GL)
6.0							6.0-8.5' Med. brown, very stiff
8.5							8.5-13.5' Med. brown, stiff
13.5							13.5-30.0' Clay, med. gray, med. stiff, high plasticity, moist, trace silt (CH)
23.5							23.5-28.5' Very soft, moist to wet
28.5							28.5-30.0' Soft
30.0							Bottom of Hole: Depth 30.0' Elevation 561.2
							Hole backfilled with cuttings.

SOIL BORING NO. B-39  
BECHTEL Belle River

QUMA 1872A

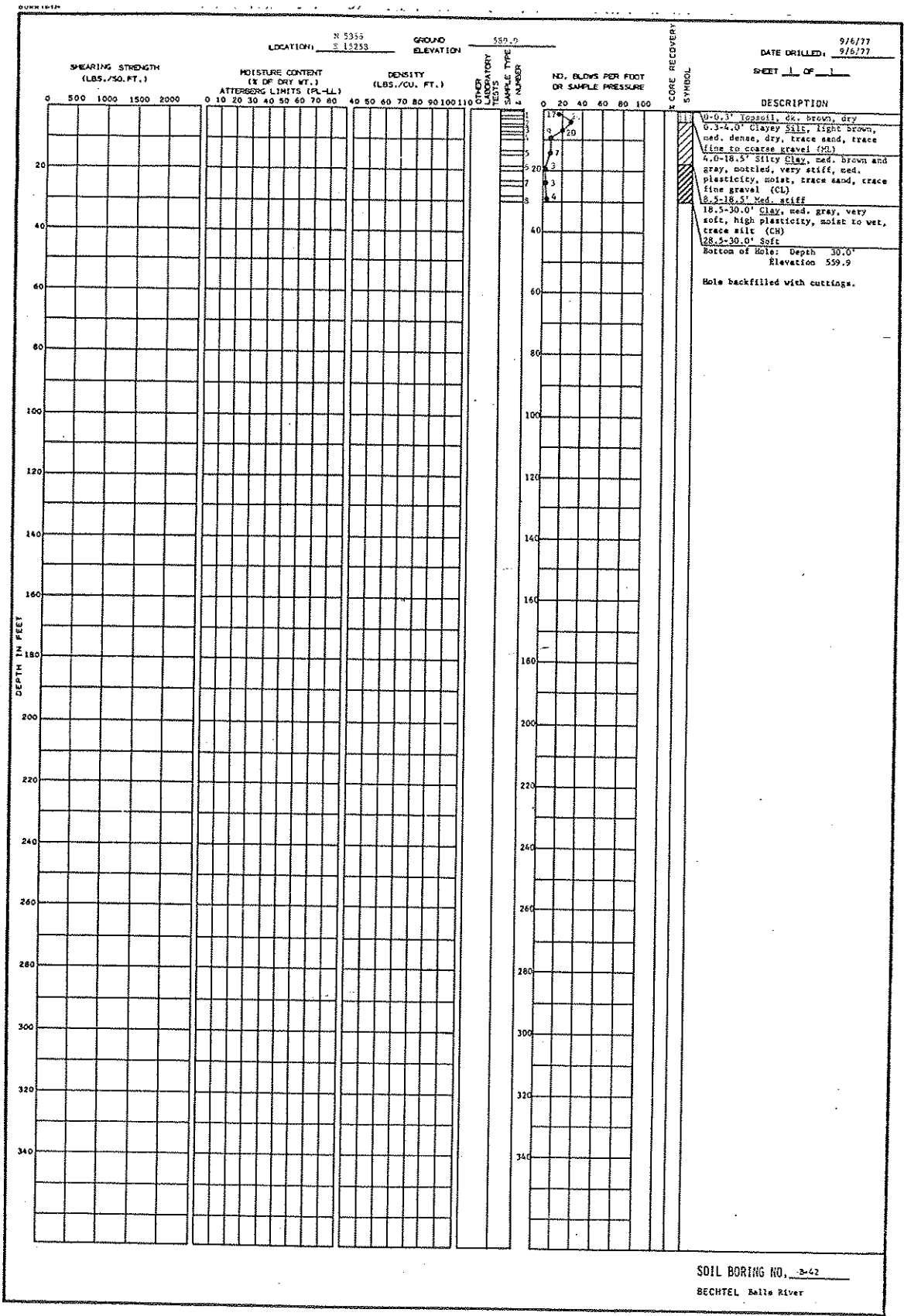
LOCATION: N 5532 E 14735 GROUND ELEVATION 590.2

DATE DRILLED: 9/6/77 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT ON SAMPLE PRESSURE	LABORATORY TESTS SAMPLE TYPE & NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.4' Topsoil, dk. brown, dry
0.4				21			0.4-13.5' Silty clay, med. brown, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5				3			13.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist to wet, trace silt (CH)
30.0				4			Bottom of Hole: Depth 30.0' Elevation 560.2
30.0				4			Hole backfilled with cuttings.
40							
60							
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. E-50  
BECHTEL Belle River





**Appendix D**  
**2016 Boring Logs**



WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 1 of 2

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 2/29/16	Date Drilling Completed: 2/29/16	Project Number: 231828.0003
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.17	TOC Elevation (ft) 591.30	Total Depth (ft bgs) 120.0
Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins. N: 471155.70 E: 13625546.02		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 08:45	
			Depth (ft bgs)	Depth (ft bgs) 14.52

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	<p><b>SILTY CLAY WITH GRAVEL</b> mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.</p> <p><b>CLAY</b> mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.</p> <p>Change to dark gray (10YR 4/1), very stiff at 5.0 feet.</p> <p>Change to soft at 8.0 feet.</p>	CL-ML			<p>Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.</p> <p>Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.</p>
2 CS	50		10	<p>Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.</p>				
3 CS	100		20	<p>Change to dark gray (10YR 4/1) at 20.0 feet.</p>	CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS					
NUMBER AND TYPE	RECOVERY (%)												
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.	CL								
6 ST	100		50										
7 CS	100		55										
8 CS	80		65										
9 CS	100		75										
10 CS	100		85										
11 CS	100		95						<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			100										
									End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 1 of 2

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/14/16</b>	Date Drilling Completed: <b>3/15/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>586.27</b>	TOC Elevation (ft) <b>588.94</b>	Total Depth (ft bgs) <b>100.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins. N: 471409.06 E: 13625991.78		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time <b>4/13/16 09:24</b> Depth (ft bgs) <b>16.07</b>		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<b>CLAY</b> mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.  Change to no gravel at 7.0 feet.  Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	80	15						
3 CS	100	25						
4 CS	90	35						

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16

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WELL CONSTRUCTION LOG

WELL NO. MW-16-02

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	SILTY CLAY mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.				
7 CS	50		55					
8 CS	100		60					
9 CS	100		65		CL-ML			
10 CS	100		70					
			75					
			80					
			85					
			90	CLAYEY SILT mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	SAND mostly fine to coarse sand, dark gray (10YR 4/1), saturated.				
			96.0	Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>5/25/16</b>	Date Drilling Completed: <b>5/31/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.03</b>	TOC Elevation (ft) <b>590.66</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins. N: 471391.78 E: 13626202.49		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time _____ Depth (ft bgs) _____ After Drilling: Date/Time <b>6/8/16 14:30</b> Depth (ft bgs) <b>12.82</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	100		5	<b>TOPSOIL</b> <b>SILTY CLAY</b> mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10	Change to gray (10YR 5/1) at 10.5 feet. <b>CLAY</b> mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
3 CS	100		25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
4 CS	100		41.5	Change to trace fine to coarse sand at 41.5 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

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Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
6 CS	90		50					
			55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	<b>SANDY CLAY</b> mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			70	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.	CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	<b>SANDY SILT</b> mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
			85	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
			90	Change to medium soft at 90.0 feet.	CL			
			95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
10 CS	100		100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11	CS	100	105	CLAY mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12	CS	100	115		CL			
			120					
13	CS	100	125					
			130	<b>SANDY CLAY</b> mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff. <b>SILTY SAND</b> mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	CL SM			
14	CS	90	135	<b>SAND</b> mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
			140	<b>SILTY SAND</b> mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			145	<b>SAND</b> mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
15	CS	100	150	<b>SILT</b> mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense. <b>SHALE</b> weathered shale bedrock, dark gray. End of boring at 150 feet below ground surface.	ML			
			155					





**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-04**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/7/16</b>	Date Drilling Completed: <b>3/8/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>587.50</b>	TOC Elevation (ft) <b>590.51</b>	Total Depth (ft bgs) <b>130.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 200 feet from W corner of road, S of bottom ash basins. N: 470893.74 E: 13625876.34		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 09:31</b>		Depth (ft bgs) Depth (ft bgs) <b>13.91</b>

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
	1	CS	80	5	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.  Change to stiff at 10.5 feet. Change to dark gray (10YR 4/1), very soft at 12.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
	2	CS	100	15					
	3	CS	100	25					
	4	CS	100	35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.				
6 CS	100		55		CL			
			60	Change to few coarse gravel at 60.0 feet.				
7 CS	100		65					
			70					
8 CS	100		75	SILTY CLAY mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
			80	SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	SAND mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
			80	SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
9 CS	100		85	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
			85	CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.				
10 CS	100		95		CL-ML			
			100	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828 0003 0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Page 3 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
12 CS	100		115	<b>SILT</b> mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
13 CS	100		125	<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



# WELL CONSTRUCTION LOG

## WELL NO. MW-16-05

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/3/16	Date Drilling Completed: 3/4/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.32	TOC Elevation (ft) 590.82	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W of diversion basin. N: 470378.15 E: 13626342.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55 Depth (ft bgs) Depth (ft bgs) 14.37		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<b>CLAY WITH GRAVEL</b> mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff. <b>CLAY</b> mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard. Change to no gravel, very stiff at 4.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		15	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
3 CS	100		25	Change to medium stiff at 26.0 feet. Change to very soft at 28.0 feet.				
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP.GDT 7/14/16

Signature:

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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
				SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
6 ST	100		50	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
7 CS	100		55					
			60	Change to few fine to coarse gravel at 60.0 feet.	CL			
8 CS	100		65	Change to medium stiff at 65.0 feet.				
			67.5	Change to stiff at 67.5 feet.				
			70	SILTY CLAY mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
9 CS	100		75	Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.				
			80		CL-ML			
10 CS	60		85	Change to few to little fine sand at 85.5 feet.				
			90	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			93.5	Change to medium stiff at 93.5 feet.				
11 CS	100		95	Change to soft at 97.5 feet.	CL			
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110-115					
14 CS	100		120-125					
15 CS	100		135	CLAYEY SILT mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
16 CS	90		145	SHALE dark gray (10YR 4/1), dry.				
			150	End of boring at 150.0 feet below ground surface.				
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/10/16</b>	Date Drilling Completed: <b>3/11/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.98</b>	TOC Elevation (ft) <b>593.21</b>	Total Depth (ft bgs) <b>140.0</b>
Boring Location: 123 feet S of road connecting to haul road, E of diversion basin. N: 470439.03 E: 13626796.04		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 10:01</b> Depth (ft bgs) <b>14.45</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	GRAVEL WITH SAND mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense. CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to few coarse gravel at 10.0 feet.				
2 CS	100		15	Change to dark gray (10YR 4/1), stiff at 12.0 feet. Change to very soft at 13.0 feet.				
			20					
3 CS	100		25					
			30					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *[Handwritten Signature]* Firm: TRC Environmental Corporation 734.971.7080  
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WELL CONSTRUCTION LOG

WELL NO. MW-16-06

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			50					
6 CS	100		55		CL			
			60					
7 CS	100		65					
			70	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				<b>SAND</b> mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.				
			80					
			85		CL-ML			
9 CS	80		90	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			95		CL			
10 CS	70		100					





WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
12 CS	100		110-115		CL			
13 CS	100		125	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
14 CS	100		135	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			140	<b>SHALE</b> dark gray (10YR 4/1), hard, brittle.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-07**

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/8/16</b>	Date Drilling Completed: <b>3/9/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.89</b>	TOC Elevation (ft) <b>592.58</b>	Total Depth (ft bgs) <b>140.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: 326 feet S of road connecting to haul road, E of diversion basin. N: 470233.47 E: 13626858.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 11:56</b> Depth (ft bgs) <b>14.13</b>		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	CLAY mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
			10	Change to dark gray (10YR 4/1) at 11.0 feet.				
			13	▼ Change to moist, very soft at 13.0 feet.				
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		65	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			66	<b>SAND</b> mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
			67	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			70	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.				
9 CS	100		75					
10 CS	100		85		CL-ML			
11 CS	100		95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231825.0003.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		125					
15 CS	100		135					
			130	<b>SILT</b> mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
			135	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/9/16	Date Drilling Completed: 3/10/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.31	TOC Elevation (ft) 591.88	Total Depth (ft bgs) 140.0	Borehole Dia. (in) 6
Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin. N: 470002.90 E: 13626846.85		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 12:00		
			Depth (ft bgs)	Depth (ft bgs) 13.19	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	CLAY WITH GRAVEL mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15	CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
3 CS	100		25		CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		55					
7 CS	80		65					
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
9 CS	100		85					
10 CS	60		95					
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.  Change to few fine sand at 105.5 feet.	CL-ML			
12 CS	100		110 115	Change to no sand at 110.0 feet.				
13 CS	100		120 125					
14 CS	100		130	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			135	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/1/16</b>	Date Drilling Completed: <b>6/1/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.28</b>	TOC Elevation (ft) <b>590.80</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>6/9/16 15:13</b>		Depth (ft bgs) <b>14.36</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	75		5	<p><b>TOPSOIL</b></p> <p><b>SILTY CLAY</b> mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.</p>	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	<p><b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.</p>	CL			
2 CS	85		15					
3 CS	100		25	<p>Change to trace to few fine gravel at 30.0 feet.</p>	CL			
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers





WELL CONSTRUCTION LOG

WELL NO. MW-16-09

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
			50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6 CS	100		70	Change to soft at 70.0 feet.				
			75		CL			
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
			90					
			95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
8 CS	75		105	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.				
9 CS	80		110					
			115					
			120		CL			
			125					
10 CS	100		130					
			135					
			140	<b>SAND</b> mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
11 CS	80		145	<b>SAND WITH GRAVEL</b> mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
			150	<b>SHALE</b> weathered, gray (10YR 5/1), brittle.				
			155	End of boring at 150.0 feet below ground surface.				



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 6/2/16	Date Drilling Completed: 6/3/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.25	TOC Elevation (ft) 592.26	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W/NW of diversion basin. N: 470532.54 E: 13626417.00		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 6/9/16 07:45		Depth (ft bgs) Depth (ft bgs) 15.30

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	TOPSOIL CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	90		15	Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
3 CS	95		25	Change to soft at 25.0 feet.				
4 CS	100		35	Change to few fine to coarse sand, medium stiff at 30.0 feet. Change to dark gray (10YR 4/1) at 32.0 feet. Change to soft at 35.0 feet.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *M. Powers* Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
6 CS	100		55		CL			
7 CS	100		65					
8 CS	100		75	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.  Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
9 CS	100		85	<b>CLAYEY SAND</b> mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.  <b>SAND</b> mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SC SP			
10 CS	100		95	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			100	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100		115	<b>SAND</b> mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			120	<b>CLAY</b> mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		125					
			130		CL			
14 CS	95		135					
			140					
15 CS	50		145	<b>GRAVELLY SILT</b> mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
			150	<b>SILTY CLAY</b> hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	<b>SHALE</b> dark gray. End of boring at 150.0 feet below ground surface.				
			155					
			160					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-11**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/3/16</b>	Date Drilling Completed: <b>6/6/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.03</b>	TOC Elevation (ft) <b>591.54</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: S of haul road, W of diversion basin. N: 470251.34 E: 13626438.92		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>6/21/16 07:45</b>		Depth (ft bgs) Depth (ft bgs) <b>14.47</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	<b>TOPSOIL</b> CLAY mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to trace gravel at 8.0 feet.				
2 CS	70		15	Change to gray (10YR 5/1) at 12.0 feet. Change to no gravel at 13.0 feet.				
			20	Change to medium stiff at 21.0 feet.	CL			
3 CS	90		25					
			30					
4 CS	90		35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	90		45	CLAY mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			50	Change to medium stiff at 49.0 feet.				
6 CS	100		55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.				
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	85		105	<p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.</p> <p>Change to medium stiff at 110.0 feet.</p>	CL			
12 CS	80		115					
13 CS	85		125					
14 CS	90		135					
15 CS	90		145					
			140	<p><b>SANDY CLAY</b> mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.</p> <p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.</p> <p><b>SHALE</b> dark gray.</p>	CL			
			150	End of boring 150.0 feet below ground surface.				
			155					





WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 5/11/17	Date Drilling Completed: 5/12/17	Project Number: 231828.0003
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.5	TOC Elevation (ft) 591.66	Total Depth (ft bgs) 142.0
Boring Location: North of fuel oil tank number 2, between berm and fence.		Personnel Logged By - J. Krenz Driller - A. Goldsmith		Drilling Equipment: TSi 150cc
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 5/15/17 08:38	
			Depth (ft bgs)	17.79

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90			CLAY mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60		10					
			19.0	▼ Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.				
3 CS	70		20					
4 CS	70		30		CL			
5 CS	100		40					
6 CS	100		50					
7			60					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 8/21/17

Signature: *Paul Krenz* Firm: TRC Environmental Fax

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 8/21/17

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS		
NUMBER AND TYPE	RECOVERY (%)									
CS	100			CLAY mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.	CL					
			70	Change to few fine to coarse gravel at 70.0 feet.						
8 CS	100									
			80	Change to trace fine sand at 80.0 feet.						
9 CS	90									
			90							
10 CS	70									
			100							
11 CS	100									
			110							
12 CS	100									
			120							
13 CS	100			Change to trace medium to coarse gravel at 126.0 feet.						
			130							
14 CS	60			SILT mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.				ML		
			140	SILTY CLAY mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML					
15 CS	100			BEDROCK shale, weathered, gray (10YR 4/1). End of boring at 142.0 feet below ground surface.						
			150							



**SOIL BORING LOG**

**BORING NO. SB-16-01**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/1/16</b>	Date Drilling Completed: <b>3/1/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.69</b>	TOC Elevation (ft) <b>---</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: <b>Corner of E connecting road off haul road, E of bottom ash basins.</b>		Personnel Logged By - <b>A. Knutson</b> Driller - <b>A. Goldsmith</b>		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>		County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time
				Depth (ft bgs) Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p>	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
			10	Change to stiff at 10.0 feet.			
2 CS	100		15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
3 CS	100		25		CL		
4 CS	100		35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP\_GDT 7/14/16

Signature: 	Firm: <b>TRC Environmental Corporation</b> 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
Checked By: <u>M. Powers</u>		



SOIL BORING LOG

BORING NO. SB-16-01

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
			60	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
				<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		65	<b>SANDY SILT</b> mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
			70	<b>CLAY</b> mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
				Change to no gravel, soft at 72.5 feet.			
9 CS	100		75				
			80				
				Change to few coarse gravel at 80.0 feet.			
10 CS	100		85		CL		
			90				
11 CS	100		95				
			100				



SOIL BORING LOG

BORING NO. SB-16-01

Page 3 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
12 CS	100		105	CLAY mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		120				
15 CS	100		125	SILT mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
16 CS	100		130				
			135	SHALE dark gray (10YR 4/1), dry.			
			140				
			145	End of boring at 150.0 feet below ground surface.			
			150				
			155				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

**Appendix E**  
**2020 Boring Logs**

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.8			Lean CLAY - brown, hard, dry	4.5	Gravel road at surface
		6/7'	B-1-1 (3')			
5	587.8		B-1-2 (6')	Gravelly SAND - brown, poorly graded, fine gravel, coarse sand, silt, dry		
		100%	B-1-ST-1	Lean CLAY - brown, hard, dry		
10	582.8	3/3'	B-1-3 (10')	Same as above	4.5	
		6/7'	B-1-4 (15')	Very stiff from 14 to 16 ft.	2.5	
				Lean CLAY - Gray, soft - medium stiff, moist	0.5	
20	572.8	100%	B-1-ST-2			
		6/6'	B-1-5 (22')	Same as above	0.5	
25	567.8		B-1-6 (25')			

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.8	4/9'	B-1-7 (34')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
35	557.8	75%	B-1-ST-3		< 0.5	
40	552.8	4/8'	B-1-8 (40')	Same as above		
45	547.8	2/4'	B-1-9 (48')	Same as above	< 0.5	



**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	542.8	4'7'	B-1-10 (52')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
55	537.8		B-1-ST-4			
60	532.8	50%	B-1-11 (59')	Same as above	0.5	
		6'6'	B-1-12 (63')	Same as above	0.5	
65	527.8					
70	522.8	2'10'	B-1-13 (74')	Consistency increases to stiff	1.0	
75	517.8	1'5'	B-1-14 (80')	Lean CLAY with Sand - Gray, medium stiff - stiff, moist	0.5	
					1.5	

Boring B-1					
<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100		
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.8	25%	B-1-ST-5	Lean CLAY with Sand - Gray, medium stiff - stiff, moist		
			B-1-15 (82')	Becomes very stiff, trace coarse-fine gravel	2.0	
85	507.8	3/6'	B-1-16 (85')			
			B-1-17 (87')	Becomes stiff, no gravel	1.5	
90	502.8	2/8'			1	
			B-1-18 (94')		1	
95	497.8	0%				Shelby tube sample attempted, near zero recovery
		100%	B-1-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
100	492.8			Boring Terminated @ 100'		

Boring B-2					
Drilling Start Date:	12/9/2020	Drilling End Date:	12/10/2020	Boring Depth (ft):	99
Drilling Company:	Cascade Drilling	Drilling Method:	Sonic	Boring Diameter (in.):	4.25
Drilling Equipment:	600T	Sampling Method(s):	Shelby Tube, Grab Sample		
Driller Name:	Joe Lary III	GW During Drilling (ft bgs):	-		
Logged By:	Brian Ares	GW After Drilling (ft bgs):	-		
		Ground Surface Elev. (ft):	592.0		
		Northing, Easting (MI State Plane)	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-2-1 (1')	Fat CLAY - brown, hard, some fine gravel and coarse sand, dry	4.5+	Gravel road at surface
		100%	B-2-ST-1			
				Becomes lean	4.5	
5	587.0	4/4'	B-2-2 (5')		4.5	
		100%	B-2-ST-2			
				Same as above		
10	582.0	3/3'	B-2-3 (10')			
			B-2-4 (12')	Lean CLAY - gray, very stiff, dry	2.0	
15	577.0	8/8'				
			B-2-5 (18')			
20	572.0			Becomes soft - medium stiff, moist	0.5	
		7/7'	B-2-6 (24')		0.5	
25	567.0				0.5	
		100%	B-2-ST-3			

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.0	8'8"	B-2-7 (32')	Lean CLAY - gray, soft, wet	< 0.5	
35	557.0				< 0.5	
40	552.0	10'10"	B-2-8 (40')	Becomes moist	< 0.5	
45	547.0				< 0.5	
			B-2-9 (46')	Becomes soft-stiff	1.0	
		100%	B-2-ST-4		< 0.5	
50	542.0	4'4"	B-2-10 (50')		1.0	
					0.5	

Boring B-2				
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0	
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
55	537.0	8'8"	B-2-11 (54')	Sandy Lean CLAY - gray, stiff, moist	1.0	
60	532.0		B-2-12 (60')	Same as above	1.0	
65	527.0	6'6"	B-2-13 (64')		1.0	
		100%	B-2-ST-5		1.5	
70	522.0	6'6"	B-2-14 (70')	Some coarse gravel (69' - 74')	1.0 1.5	
75	517.0		B-2-15 (75')	Lean CLAY with Sand - gray, stiff, moist	1.0	
80	512.0	8'8"	B-2-16 (80')		1.0	

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	507.0	4'4'	B-2-17 (86')	Lean CLAY with Sand - gray, stiff, moist	1.0	
			B-2-ST-6		1.0	
		100%				
90	502.0	5'5'	B-2-18 (91')	Becomes very stiff	2	
					2	
95	497.0	3'3'	B-2-19 (96')	Same as above	2.5	
					2.5	
99	493.0	100%	B-2-ST-7	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-3				
Drilling Start Date:	12/10/2020	Boring Depth (ft):	99	
Drilling End Date:	12/11/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	592.0	
Logged By:	Brian Ares	Northing, Easting (MI State Plane)	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-3-1 (1')	GRAVELY SAND - tan, well graded, mostly coarse to fine gravel and coarse sand		Gravel road at surface
		100%	B-3-ST-1			
5	587.0	4/4'	B-3-2 (5')	Lean CLAY - brown, trace fine gravel, hard, dry	4.5	
		100%	B-3-ST-2			
10	582.0	7/7'	B-3-3 (10')	Becomes very stiff	2.5	
			Becomes medium stiff	2.5		
			0.5			
			0.5			
15	577.0		B-3-4 (15')	Transition to moist	0.5	
20	572.0	6/6'	B-3-5 (20')		0.5	
					0.5	
					0.5	
25	567.0	5/5'	B-3-6 (25')		0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-3-ST-3	Lean CLAY - gray, medium stiff, moist		
30	562.0	4 1/4'	B-3-7 (30')		0.5	
				Same as above	0.5	
35	557.0	8 7/8'	B-3-8 (35')		0.5	
				Same as above	0.5	
40	552.0		B-3-9 (40')		0.5	
				Same as above	0.5	
45	547.0	6 1/6'	B-3-10 (45')		0.5	
				Same as above	0.5	
		100%	B-3-ST-4			
50	542.0	7 1/7'	B-3-11 (50')		0.5	
				Same as above	0.5	
55	537.0		B-3-12 (55')		0.5	
				Same as above	0.5	



**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	532.0	8/8'	B-3-13 (60')	CLAY - gray, medium stiff, moist	0.5	
65	527.0	4/4'	B-3-14 (67')	Sandy Lean CLAY - gray, very fine - fine sand and silt, some fine gravel, moderate grading, moist	0.5	
70	522.0	0%	B-3-15 (70')	Lean CLAY with Sand - gray, stiff - very stiff, moist	2.0	Shelby tube sample attempted - no recovery
75	517.0	4/4'	B-3-16 (75')	Same as above	1.5	
		100%	B-3-ST-5			

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.0	9'9"	B-3-17 (80')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
85	507.0	5'5"	B-3-18 (85')	Same as above	1.5	
					2.0	
90	502.0	4'4"	B-3-19 (90')	Same as above	2.0	
					2.0	
95	497.0	100%	B-3-20 (95')	Boring Terminated @ 99'	2.0	
					1.5	
99	493.0		B-3-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	586.0	0/1'		Lean CLAY - brown, very stiff, dry		
		0%				Shelby tube sample attempted from 1-3', no recovery
				Same as above	2.5	Very little recovery. This assessment comes from verbal description from drilling crew
5	581.0	0.5/4'				
		100%	B-4-ST-1			
				Becomes hard	4.5	
10	576.0		B-4-1 (10)	Lean CLAY - gray, stiff, dry	1	
		6/6'	B-4-2 (12)		1	
				Becomes medium stiff, moist	0.5	
15	571.0		B-4-3 (15)		0.5	
		6/6'			0.5	
					0.5	
20	566.0		B-4-4 (20)			
				Same as above	0.5	
		6/6'			0.5	
25	561.0		B-4-5 (25)		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-4-ST-2	Lean CLAY - gray, medium stiff, moist		
30	556.0		B-4-6 (30')	Same as above	0.5	
		6'6"	B-4-7 (34')		0.5	
					0.5	
35	551.0		B-4-8 (36')	SILTY SAND - gray, mostly very fine - fine sand and silt, some fine gravel, well graded, moist		
		6'6"	B-4-9 (40')	Lean CLAY - gray, medium stiff, moist	0.5	
40	546.0			Same as above	0.5	
		6'6"	B-4-10 (45')		0.5	
45	541.0			Same as above		
		100%	B-4-ST-3			
50	536.0		B-4-11 (50')	Same as above	0.5	
		7'7"			0.5	
55	531.0		B-4-12 (55')		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	526.0	6'6"	B-4-13 (60')	Lean CLAY - gray, medium stiff, moist	0.5	
65	521.0	5'5"	B-4-14 (65')	Same as above	0.5	
		100%	B-4-ST-4			
70	516.0	8'8"	B-4-15 (70')	Same as above		
75	511.0		B-4-16 (75')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
80	506.0	5'5"	B-4-17 (80')		2.0	
					2.0	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	501.0	5'5'	B-4-18 (85')	Lean CLAY with Sand - gray, stiff - very stiff, dry	1.5	
					2.0	
		100%	B-4-ST-5		1.0	
90	496.0	5'5'	B-4-19 (90')	Same as above	1.0	
					1.5	
95	491.0	3'3'	B-4-20 (95')	Same as above	1.5	
99	487.0	100%	B-4-ST-6	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-5					
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99		
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3		
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	591.3	0.75/1'		Lean CLAY - light brown, little gravel, little sand, hard, moist	4.0	
		50%	B-5-ST-1	Lean CLAY - gray, very stiff - hard, moist	2.0	
					3.5	
5	586.3	4/4'			> 4.5	
			B-5-1 (7')		2.5	
				Fat CLAY - gray to brown, some fine gravel, medium stiff - very stiff	0.5	
10	581.3	7/7'			0.5	
					1.0	
15	576.3		B-5-2 (14')		0.5	
		7/7'		Lean CLAY - gray, medium stiff, moist	0.5	
20	571.3				0.5	
			B-5-3 (21')		0.5	
				Same as above	0.5	
25	566.3				0.5	
					0.5	
		100%	B-5-ST-2		0.5	

Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	561.3	7/7'	B-5-4 (29')	Lean CLAY - gray, medium stiff - stiff, moist	1.0	
			B-5-5 (32')		1.0	
35	556.3	5/5'	B-5-6 (37')	Same as above	1.0	
				0.5		
40	551.3	6/6'	B-5-7 (42')	Same as above	1.0	
				1.0		
45	546.3	100%	B-5-8 (46')		1.0	
		4/4'	B-5-ST-3	color transition to darker gray	0.5	
50	541.3		B-5-9 (52')	Becomes stiff	1.5	



Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
55	536.3	8'8'	B-5-10 (57')	Lean CLAY - dark gray, medium stiff - stiff, moist	1.0	Some fine black gravel observed	
60	531.3			Lean CLAY with Sand - dark gray, trace fine and coarse gravel, medium stiff - stiff, moist	0.5		
65	526.3	6'6'	B-5-11 (62')		1.0		
					0.5		
			B-5-12 (66')		1.0		
		100%	B-5-ST-4		1.5		
					1.5		
70	521.3	9'9'	B-5-13 (72')	Same as above	1.0		
							1.5
75	516.3				B-5-14 (77')		
					1.5		

Boring B-5				
<b>Drilling Start Date:</b>	12/14/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	591.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane)</b>	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
80	511.3	9/9'	B-5-15 (82')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, stiff - very stiff, moist	1.0		
					2.0		
85	506.3	100%	B-5-16 (86')		1.0		
					1.5		
90	501.3	8/8'	B-5-17 (92')		Same as above		2.5
					2.5		
95	496.3		B-5-18 (96')	2.0			
		100%	B-5-19 (99')	2.0			
99	492.3		B-5-ST-6		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite		
				Boring Terminated @ 99'			

Boring B-6				
Drilling Start Date:	12/15/2020	Boring Depth (ft):	99	
Drilling End Date:	12/15/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	589.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane):	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	589.3	1/1'		GRAVEL - light gray to gray, mostly coarse and fine gravel and sand		
		50%	B-6-ST-1	Lean CLAY - gray to brown, trace gravel, very stiff - hard, moist		
5	584.3	3.5/4'	B-6-1 (5')		3.0 4.5 3.5 3.0	
		100%	B-6-ST-2	Lean CLAY - gray, very stiff, moist	3.0	
10	579.3	7/7'	B-6-2 (10')	Becomes medium stiff - stiff	3.0 1.0 0.5	
15	574.3	4/4'	B-6-3 (15')	Same as above	0.5 0.5	
20	569.3	7/7'	B-6-4 (20')	Same as above	0.5 1.0 0.5	
25	564.3		B-6-5 (25')		1.0	

Boring B-6					
Drilling Start Date:	12/15/2020	Boring Depth (ft):	99		
Drilling End Date:	12/15/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	589.3		
Logged By:	Sean Karoly	Northing, Easting (MI State Plane):	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-6-ST-3	Lean CLAY - gray, medium stiff - stiff, moist		
30	559.3		B-6-6 (30')	Same as above	0.5	
		9/9'			0.5	
35	554.3		B-6-7 (35')		1.0	
					0.5	
40	549.3		B-6-8 (40')	Same as above	0.5	
		9/9'			0.5	
45	544.3		B-6-9 (45')		0.5	
					1.0	
		100%	B-6-ST-4			

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.):</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	539.3	9/9'	B-6-10 (50')	Lean CLAY - gray, medium stiff - stiff, moist Color transition to darker gray	1.0	
55	534.3	9/9'	B-6-11 (55')		1.0	
					Lean CLAY with Sand - gray, stiff, moist	
60	529.3	9/9'	B-6-12 (60')		1.0	
					Same as above	
65	524.3	100%	B-6-13 (65')		1.5	
			B-6-ST-5			
70	519.3	9/9'	B-6-14 (70')		1.0	
					Same as above	
75	514.3	9/9'	B-6-15 (75')		1.5	

Boring B-6				
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.):</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	509.3	9'9"	B-6-16 (80')	Lean CLAY with Sand - gray, stiff, moist	1.5	
85	504.3		B-6-17 (85')	Becomes very stiff	2.0	
		100%	B-6-ST-6			
90	499.3	8'8"	B-6-18 (90')	Becomes stiff	1.5	
95	494.3		B-6-19 (95')	Some gravel observed	1.5	
99	490.3	100%	B-6-ST-7 B-6-20 (99')	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

**Appendix F**  
**1970's Lab Test Results**

4-9-5-2

# **SUBSURFACE INVESTIGATION AND FOUNDATION REPORT**

THE DETROIT



EDISON COMPANY

## **BELLE RIVER UNITS 1 & 2 JOB 10539 VOLUME 2 OF 2**

**GEOLOGY AND SOIL PROPERTIES**

P. H. COOK

AUG 31 1978

**AUGUST 1976**

**BECHTEL  
ANN ARBOR, MICHIGAN**





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## Appendix C

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B7/28	Jar Sample Clayey SILT; dark gray, low plasticity (CL-ML)	129.5 to 131.0	64								
			H64.1								See plot
B7/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	138.88 to 140.33	65								
			S/H								
			65.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B10/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	141.3	66 SH 66.1								See plot

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
15/2	1.6' Recovery; say 3.0' to 4.6' depth	3.0-5.0	119								
		3.3-3.6	Saved								
	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL)	3.6-3.7	W119.1	25.5		97					
		3.7	TV								TV=1.00tsf
		3.7-4.1	W119.01	25.4		101		UU	8.0	2386	σ <sub>c</sub> =475 psf
		3.7-4.1	L119.1	23.6	45	21					
		4.1-4.2	W119.2	25.3		97					
		4.2	TV								TV=1.20tsf
		4.2-4.5	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>	
15/4	1.3' Recovery: say 8.0' to 9.3' depth	8.0- 10.0	120									
		8.1- 8.4	saved									
	Silty CLAY, dark gray, stiff consistency, moderate to highly plastic (CL)	8.4	TV									TV=0.70 tsf
		8.4-										
		8.6	W120.1	90	31.2							
		8.6-										
		8.9	U120.1	93	31.1			U	6.0	1257		
		8.6-										
		8.9	L120.1	44	31.5	19						
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)	8.9	TV									TV=0.61 tsf
		9.0-										
		9.4	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
15/6	1.2' Recovery; say 18.0' to 19.2' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to highly plastic (CL)	18.0-20.0	—									
		18.1-18.4	L12L.1	35.0	42	20						
		18.1-18.4	J12L.1	34.1			87	U	15.0	508		@20% strain s= 546 psf
		18.4-18.5	W12L.1	36.1			83					
		18.5	TV									TV=0.28tsf
		18.8-18.9	W12L.2	36.3			83					
		18.9	TV									TV=0.22tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
15/14	2.5' Recovery; say 58.0' to 60.5' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Void occurs along outside edge of upper 1.3' of sample	58.0 - 60.5	125									
		58.3 -	Saved									
		58.7 -	W125.1									
		58.9 -	TV									TV = 0.46tsf
		58.9 -	Saved									
		59.2 -	W125.1									@ 20% strain s = 1260 psf
		59.6 -	L125.1		22.5	104	15.2	1067				
		59.6 -	W125.2		22.6	18						
		59.6 -	TV		34							TV = 0.61tsf
		59.7 -	Saved		22.4	103						
		60.0 -										
		60.4 -										



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/3	2.4' Recovery; say 20.0' to 22.4' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to high plasticity (CL)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	20.0 - 22.5	—									
		20.1 - 20.4	176									
		20.4 - 20.6	WI76.1	39.1	82							
		20.6	TV									TV=0.26tsf
		20.6 - 20.9	WI76.0.1	39.9	83			UU 9.0	411			σ <sub>c</sub> -2448psf
		20.6 - 20.9	L176.1	38.3	44	21						
		20.9 - 21.2	Saved									
		21.2 - 21.4	WI76.2	32.1	88							TV=0.26tsf
		21.4	TV									
		21.7 - 22.0	Saved									
		22.0 - 22.4	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/6	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	50.0 to	—									
		52.5	345									
		50.3 to										
		50.5	W345.1	35.8								
		50.5	TV									TV=0.38tsf
		50.5 to										
		50.8	345.1									
		51.2 to				98						
		51.4	W345.1	24.6								
		51.4	TV									TV=0.50tsf
		51.4 to										
		51.7	I345.0.1	31.0		92	UU	3.0	827			
		51.4 to										
	51.7	I345.1	29.6	39	18							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974  
SHEET \_\_\_ OF \_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
18/7	2.4' Recovery; say 60.0' to 62.4' depth  Silty CLAY, Sandy, dark gray, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 30% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	60.0										
		62.5	346									
		60.6	TV									TV=0.46 tsf
		60.6-61.0	saved									
		61.0	L346.1	20.2	26	16						
		61.3										
		61.4-61.6	W346.2	19.9			109					
		61.6	TV									TV=0.65 tsf
		61.6-62.0	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
18/10	1.3' Recovery; say 88.0' to 89.3' depth		88.0-90.0	179								
	Silty CLAY, sandy, gray, very stiff consistency, moderate plasticity (CL)		88.4	TV								TV=1.3 tsf
	Sample includes about 25% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)		88.4-88.7	W179.1	22.9		99					
			88.7-88.8	W179.2	21.9		98					
			88.8	TV								TV=1.1 tsf
			88.8-90.1	L179.1	17.3 29 15							
			88.8-90.1	U179.01	17.3		110	UU	15.0	2863		σ <sub>c</sub> =6336 psf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
18/11	Jar Sample	103.5 - 105.0	—									
	Silty SAND, subrounded to subangular fine to coarse Sand grains with about 10% non-plastic fines (SM-SW)		430									
				S430.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET	OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
18/12	1.7' Recovery; say 108.0' to 109.7' depth	108.0-110.0	181										
		108.2-108.5	1181.1	34.2	46 22								
	Silty CLAY, grey, stiff consistency, moderate to highly plastic (CL)	108.2-108.5	1181.1.1	34.5		87	CU	5.9	1952		σ <sub>c</sub> =3744psf		
		108.5-108.6	1181.1	32.3		90					TV=0.71tsf		
		108.6	TV										
	Sample includes lenses/layers of Silty Sand, subrounded to subangular fine to medium Sand grains with about 40% non-plastic fines (SM)	108.6-108.9	1181.1.2	31.0		92	CU	6.2	2601		σ <sub>c</sub> =7488psf		
		108.6-108.9	1181.1.3	30.7		92	CU	6.8	4088		σ <sub>c</sub> =15120psf		
		108.9-109.3	Saved										
		109.3-109.4	1181.2	26.8		94							
	Layers/lenses comprise ±30% of total sample below 108.9' depth	109.4	TV								TV=0.51tsf		

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>		
18/16	Jar Sample	139.5-141.0									
	Silty SAND, gravelly; about 25% hard subrounded to subangular gravel size particles (3/4" max. size), subrounded to subangular fine to coarse Sand grains, about 15% non-plastic fines (SM)	431									
		S431.1								See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
19/1	Silty CLAY, dark greyish brown, very stiff consistency moderate to high plasticity (CL-CH)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	3.0-5.0	290									
		3.4-3.6	W290.1	25.7	95							
		3.6	TV									TV=1.15tsf
		3.6-3.9	Saved									
		3.9-4.2	Saved									
		4.2-4.3	W290.2	31.4	87							
		4.3	TV									TV=1.13tsf



PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
19/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0-20.0	292										
		18.1-18.5	L292.1	40.2	49	24							
	Silty CLAY, gray, soft to firm consistency moderate to high plasticity (CL-OH)	18.5-18.6	W292.1	39.1			85						
		18.6	TV									TV=0.27 tsf	
		18.6-19.0	saved										
		19.1-19.3	W292.2		35.3			83					
		19.3	St									TV=0.23 tsf	
		19.4-19.7	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$c_c$
19/8	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	—	68.0-70.0									
		297	68.4-68.5	23.1		1.03						
		TV	68.5								TV=0.80tsf	
		Saved	68.5-68.8									
		W297.2	69.2-69.3	22.2		1.03						
		TV	69.3								TV=0.73tsf	
		Saved	69.3-69.7									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
19/9	1.9' Recovery; say 78.0' to 79.9' depth		—									
			298									
			saved									
			W298.1	21.4		106						
			TV									TV=0.63 tsf
			L298.1	24.4	33	17						
			saved									
			W298.2	24.9		101						
			TV									TV=0.67 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
19/11	1.8' Recovery; say 100.0' to 101.8' depth  Silty CLAY, grey, firm consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	100.0-	—								
		102.0	300								
		100.5	TV								TV-0.43tsf
		100.5-									
		100.6	W300.1		22.7		100				
		100.6-									
		100.9	Saved								
		101.3-									
		101.4	W300.2		27.3		94				TV=0.42 tsf
		101.4-									
		101.7	Saved								

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DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	NAT WATER CONTENT (%)			ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
19/12	1.9' Recovery; say 118.0' to 119.9' depth  Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL)  Sample includes few thin lenses/layers of SILT, sandy (ML) comprising ±5% of total		118.0-	—									
				120.0	30J								
				118.4-									
				118.5	W30L1	35.1		86					
				118.5	TV								TV=0.55tsf
				118.5-									
				118.9	Saved								
				119.2									
				119.3	W30L2	41.4		80					
				119.3	TV								TV=0.68tsf
				119.3-									
				119.6	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974
IDENTIFICATION												SHEET OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B22/29	Jar Sample Clayey SILT; dark gray, slight to low plasticity (CL-ML)	13.5 to 15.5	67 S/H 67.1								See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$
25/1	Silly CLAY, grayish brown, very stiff consistency, highly plastic (CH)  Sample includes about 5% hard subrounded gravel size particles  Note: upper 1.0' of sample disturbed (Wash?)	3.0 to 5.0	266								
		4.0	TV								TV=0.4tsf
		4.0 to 4.3	save								
		4.3 to 4.5	266.1								
		4.5 to 4.8	W266.1		24.1		100				
		4.5 to 4.8	U266.1		22.4		108	U	5.0	3456	
		4.5 to 4.8	I266.1		24.5	59	23				
		4.8	TV								TV=1.8tsf

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FILE NO. 1255

DATE July 1974

SHEET 07 OF 07

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>	
25/3	1. 9' Recovery; say 18.0' to 19.9' depth, upper 0.8' disturbed (WASH??) Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)		18.0-20.0	268										
			18.8-19.2	Saved										
			19.2-19.3	W268.1	39.1	80								
			19.3	TV										TV=0.30tsf
			19.3-19.6	Saved										
			19.6-19.7	W268.2	38.1	81								
			19.7	TV										TV=0.27tsf



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
25/4	Silty CLAY, Sandy, dark grey, soft to firm consistency, moderately plastic (CL)  Sample includes about 30% fine to coarse SAND and fine Gravel size particles (sub-rounded to subangular in shape)  few thin lenses/layers of Silty CLAY (CL-CH) throughout comprising ±10% of total  Note: Entire sample slightly disturbed	28.0-30.0	—								
		28.1-28.5	269								
		28.5-28.7	W269.1		18.1		111				
		28.7	TV								TV=0.27tsf
		28.7-29.1	Saved								
		29.1-29.3	W269.2		22.6		102				
		29.3	TV								TV=0.25 tsf
		29.3-29.7	W269.1		31.0	25	16				

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)		$e_0$
25/6	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	48.0-50.0	271								
		48.3-48.7	saved								
		48.7-48.8	W271.1	80							
		48.8	TV								TV=0.37 tsf
		48.8-49.2	saved								
		49.2-49.4	W271.2	82							
		49.4	TV								TV=0.30 tsf
		49.4-49.8	L271.1		38.0	39	19				

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SHEET \_\_\_ OF \_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	c <sub>c</sub>	
25/7	Silty CLAY, grey, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	58.0-								
		60.0	272							
		58.4-								
		58.5	W272.1	24.1	98					
		58.5	TV							TV=0.45 tsf
		58.5-								
		58.8	Saved							
		59.2-								
		59.3	W272.1	24.4	99					
		59.3	TV							TV=0.58tsf
	59.3-									
	59.6	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
		SHEET OF									
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	$c_c$
25/10	1.8' Recovery; Say 88.0' to 89.8' depth	88.0 to 90.0	275								
		88.1 to 88.4	save 275.1								
		88.4 to 88.6	WZ75.1	19.7		106					
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	88.6	TV								TV=0.74tsf
		88.6 to 88.9	save 275.2								
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	88.9 to 89.2	TZ75.0	22.5		104	UU	11.0	2213		
		88.9 to 89.2	I275.1	21.4	36	19					
		89.2 to 89.4	WZ75.2	22.3		103					
		89.4	TV								TV=0.80tsf

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SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
25/12	2.4' Recovery; say 118.0' to 120.4' depth  Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	118.0-120.5	277									
		118.6-118.7	W277.1	42.8	77							
		118.7	TV									TV=0.70tsf
		118.7-119.0	Saved									
		119.0-119.4	Saved									
		119.4-119.5	W277.2	36.4	82							
		119.8	TV									TV=0.68tsf

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TABLE        SUMMARY OF LABORATORY TEST RESULTS SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B26/2	Recovery 1.6', say 3.5' to 5.1' depth	1								
		TV	25.4							TV=0.88 tsf
	Silty CLAY, grayish brown, moderate to high plasticity, very stiff consistency (CL-CH)	W1.1	25.4							
	Includes about 15% subangular to subrounded fine gravel and coarse sand particles	save								
		1.1								
		TV	23.9							TV=1.4 tsf
		W1.2	23.9							
		T1.1.1	23.0		104	CU	15.0	1100		
		L1.1.	23.0	53	24					
		TV								TV=1.13 tsf
		T1.1.2	23.9		103	CU	15.0	1725		
		TV	21.9							TV= 1.3 tsf
		W1.3	21.9							
		T1.1.3	22.3		108	CU	15.0	2400		

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$c_c$
B26/3	1.5' Recovery; say 8.0' to 9.5' depth	8.0 to 10.0	2									
		8.2	TV	31.5							TV=0.9 tsf	
	Silty CLAY; dark gray, moderately to highly plastic, firm consistency (CL-CH).  Includes about 10% subangular to subrounded fine gravel size particles and $\pm 5\%$ fine to coarse sand size particles.	8.2	W2.1	31.5								
		8.3 to 8.7	save									
		8.7	2.1									
		8.7	TV	33.0								TV=0.6 tsf
		8.7	W2.2	33.0								
		8.8 to 8.9	L2.1	32.0	50	22						
		8.9 to 9.2	save									
		9.2	2.2									
		9.2	TV	32.7								TV=0.4 tsf
		9.2	W2.3	32.7								

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	
B26/5	1.2' Recovery; say 18.0' to 19.2' depth	18.0 to 20.0	3								
		18.0 to 18.3	T3.13	35.7		86	CU	15.2	2175		
	Silty CLAY, gray, soft consistency, highly plastic (CL-CH)	18.3	TV	35.9							TV=0.17 tsf
		18.3	W3.1	35.9							
		18.3 to 18.7	T3.12	35.3		86	CU	10.7	839		
		18.7 to 19.0	T3.11	35.4		89	CU	15.1	676		
		19.0	TV	35.6							TV=0.24 tsf
		19.0	W3.2	35.6							



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
B26/9	1.9' Recovery; say 38.0' to 39.9' depth	38.0 to 40.0	5								
		38.4	TV	40.6							TV=0.20 tsf
	Silty CLAY; gray, soft to firm consistency, highly plastic (CL)	38.4 to 38.5	W5.1	40.6							
		38.5 to 38.8	save 5.1								
		38.8	TV	39.5							TV=0.23 tsf
		38.8 to 38.9	W5.2	39.5							
		38.9 to 39.3	save 5.2								
		39.3	TV	36.0							TV=0.34 tsf
		39.3 to 39.4	W5.3	36.0							
		39.4 to 39.8	U5.1	36.6	86		U	1.6	443		
		39.4 to 39.8	L.5.1	36.6	38	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_o$	$c_c$
B26/11	Silty CLAY: dark gray, firm consistency, highly plastic (CL)  Sample includes about 20% coarse to fine sand grains (subangular to subrounded in shape)	48.0 to 50.0										
		48.0 to 48.3	save 6.1									
		48.3	TV	31.0								TV=0.28 tsf
		48.3 to 48.4	W6.1	31.0								
		48.4 to 48.7	save 6.2									
		48.7	TV									TV=0.32 tsf
		48.7 to 49.0	T6.1.3	30.0		93	CU	4.6	2206			
		49.0	TV	36.3								TV=0.29 tsf
		49.0 to 49.1	W6.2	36.3								
		49.1 to 49.4	T6.1.2	36.5		86	CU	3.9	1222			
		49.4	TV	34.5								TV=0.33 tsf
		49.4 to 49.5	W6.3	34.5								
	49.5 to 49.8	T6.1.1	36.1		88	CU	3.8	896				
	49.5 to 49.8	L6.1	36.1	41	21							

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>				
B26/17	1.0' Recovery; say 78.0' to 79.0' depth  Silty CLAY, dark gray, firm to stiff consistency, highly plastic (CL)  Includes about 35% subangular to subrounded fine Gravel and coarse Sand particles	78.0 to 80.0	9										
		78.2	TV		25.1						TV=0.46		
		78.2	W9.1		25.1								
		78.2 to 78.5	U9.1	101	24.8			U	12.0	580			
		78.2 to 78.5	L9.1		24.8	36	20						
		78.5	TV		25.8						TV=0.52 tsf		
		78.5 to 78.6	W9.2		25.8								
		78.6 to 78.9	save 9.1										
		78.9	TV		25.0						TV=0.38 tsf		
		78.9 to 79.0	W9.3		25.0								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
26/28	Recovery 2.4'; say 128.0' to 130.4' depth  Silty CLAY, dark grey firm to stiff consistency, moderate to highly plastic (CL)  Bottom third of sample includes 30 to 40% fine Sand and non-plastic Silt particles occurring in thin layers (1/16" to 1/4" thick)	—									
		128.0-									
		131.0	13								
		128.0-									
		128.3	TI3.1.3	34.0		90	CU	3.4	4652		$\bar{\sigma}_c=16,704$ psf
		128.4-									
		128.8	TI3.1.2	35.6		86	CU	4.5	2442		$\bar{\sigma}_c=8352$ psf
		128.4-									
		128.8	LI3.1	35.4	39	21					
		128.8-									
		128.9	WI3.2	32.1							
		128.8-									
		128.9	TV	32.1							TV=0.60tsf
	129.7	TV	27.5							TV=0.50tsf	
	129.7-										
	129.8	WI3.3	27.5								
	129.8-										
	130.2	TI3.1.1	22.9		96	CU	15.0	4500		$\bar{\sigma}_c=4176$ psf	

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
27/2	1. 4' Recovery; say 3.5' to 4.9' depth  Silty CLAY; greyish brown, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% coarse sand and fine gravel sized particles (subrounded to subangular in shape)	3.5-5.5										
		3.6-4.0										
		4.0-4.2	W302.1	24.2		99						
		4.2	TV									TV=0.87 tsf
		4.2-4.5	Saved									
		4.5-4.8	T302.2	24.9		103	UU	8.0	2099			
		4.5-4.8	L302.1	23.1	48	24						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE April 1974

IDENTIFICATION

SHEET 0F

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
27/4	1.7' Recovery; Say 8.0' to 9.7' depth  Silty CLAY, grayish brown, firm to stiff consistency, highly plastic (CL-CH)  Sample includes about 10% coarse sand and fine gravel size particles (subrounded to subangular in shape)	8.0 to 10.0	303									
		8.1 to 8.4	save 303.1									
		8.4 to 8.6	W303.1	88								
		8.6	TV									TV=0.66tsf
		8.6 to 8.9	U303.1	94	30.6			U	20.0	1772		@15.0% strain s=1722psf
		8.6 to 8.9	L303.1		30.4	51	23					
		8.9 to 9.2	save 303.2									
		9.2 to 9.4	W303.2	87	33.5							
		9.4	TV									TV=0.47tsf

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
27/10	2.4' Recovery; Say 33.0' to 35.4' depth	33.0 to 35.5	306								
		33.1 to 33.4	save 306.1								
		33.4 to 33.6	W306.1	37.9	84						
	Silty CLAY, gray, firm consistency, moderately plastic (CL)	33.6	st								TV=0.31tsf TVR=0.09tsf
		34.0 to 34.3	C306.1	38.6					1.016	.44	
		34.0 to 34.3	L306.1	37.4	41	22					
		34.0 to 34.3	SC306.1								specific gravity=2.73
		34.3 to 34.6	save 306.2								
		34.6 to 34.8	W306.2	36.3	86						
		34.8 to 35.2	save 306.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 DATE July 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
27/14	1.9' Recovery; say 53.0' to 54.9' depth	308									
	Silty CLAY, Sandy, very dark gray, stiff consistency, low to moderate plasticity (CL)	saved									
	Sample includes about 40% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	W308.1	13.0		120						
		TV									TV=0.78 tsf
		saved									
		W308.2	25.9		98						
		saved									
		W308.1	24.2	32	17						
		TV									TV=0.34 tsf
	At 53.9' change to Silty CLAY, gray, firm consistency, moderate plasticity (CL)										
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)										



PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE \_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
27/17	Jar Sample	68.5-70.0	432								
	Clayey SILT, Sandy, dark gray, low plasticity (CL-ML)		S/H 432.1								See plot
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)										

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FILE NO. 1255

TABLE: SUMMARY OF LABORATORY TEST RESULTS

DATE: April 1974  
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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
27/24	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)  Sample includes about 25% coarse to fine sand grains and fine gravel sized particles (subrounded to subangular in shape)	103.0 to 105.5									
		103.2 to save									
		103.5 to 313.1									
		103.5 TV									TV=0.61tsf
		103.5 to 103.7	W3B.1	27.4		98					
		103.7 to save									
		104.1 to 313.2									
		104.2 to	C3B.1	33.9						0.90	.30
		104.5									
		104.2 to 104.5	L3B.1	31.1	43 25						
		104.2 to 104.5	SC3B.1								specific gravity=2.74

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>	
27/26	1.5' Recovery; say 113.0' to 114.5' depth  Silty CLAY, gray, soft consistency, moderate plasticity (CL) Sample includes few thin lenses/layers of Silty SAND (± 1/8" thick) comprising ± 10% of total  At 113.6' change to - Silty fine SAND, uniform fine Sand grains with about 10% non-plastic fines (SM-SP)	113.0-	---									
		115.0	314									
		113.1	TV									TV=0.16 tsf
		113.1-										
		113.5	W314.1		89							
		113.6-										
		114.4	S314.1		21.4							See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
27/30	2.4' Recovery; say 129.0' to 131.4' depth; upper 0.8' possibly disturbed		129.0-	---									
			131.5	315									
			129.1-	Saved									
			129.4										
	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)		129.5-										
			129.6	W315.1	84							Clay portion	
			129.9-										
			130.1	L315.1	40	21						TV=0.75tsf	
	Sample includes Silty fine Sand lenses/layers throughout comprising about 10% of total sample		130.2	TV									
			130.2-										
			130.6	Saved									
			130.6-										
			131.1	Saved									
			131.1-										
	131.3	W315.2	24.1	99							Silty Sand and Clay portion		

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>	
28/3	1.2' Recovery; say 5.0' to 6.2' depth		5.0-7.0	183										
	Silty CLAY, dark gray, very stiff consistency, moderate to high plasticity (CL)		5.0-5.3	saved										
			5.3-5.5	WI183.1	33.3	95								
			5.5	TV									TV=1.30 tsf	
			5.5-5.8	saved										
			5.8-6.1	UI183.1	25.3	100			U	4.0	1981			
			5.8-6.1	LI183.1	25.5	47	23							

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
28/9	Silly CLAY, dark gray, soft consistency, moderate to highly plastic (CL)	28.0-30.0								
		186								
		28.1-28.4								
		saved								
		28.4-28.5			80					
		WI86.1	40.0							
		28.5								
		TV								TV=0.20 tsf
		28.5-28.8								
		saved								
		28.8-29.1			84		U	7.0	425	
		UI86.1	38.0							
		28.8-29.1								
	LI86.1	39.2	42	20						
	29.1-29.3			78						
	WI86.2	41.4								
	29.3									
	TV								TV=0.20 tsf	
	29.3-29.6									
	saved									

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SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
28/15	2.1' Recovery: say 58.0' to 60.1' depth Silty CLAY, dark gray, firm consistency, moderate plasticity (CL) Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	—									
		58.0-60.0	189								
		58.2-58.5	saved								
		58.5-58.6	WI89.1	25.5	98						TV=0.38 tsf
		58.6	TV								
		59.0-59.3	saved								
		59.3-59.4	WI89.2	25.1	99						
		59.4-59.7	saved								
		59.7	TV								TV=0.43 tsf

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SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
28/23	2.1' Recovery, say 98.0' to 100.1' depth	98.0-100.0	193									
		98.1-98.4	saved									
	Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL) Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	98.4-98.5	W193.1	23.0		104						
		98.5	TV								TV=0.71 tsf	
		98.5-98.9	saved									
		99.2-99.3	W193.2		23.8		98					
		99.3	TV								TV=0.93 tsf	
		99.3-99.6	saved									



BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT.* WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
30/3	Jar Sample		6.0-7.5	433								
	Silty CLAY, dark grayish brown, high plasticity (CH)			L433.1	22.4*	55	25					

\*Note: Water content taken from unsealed jar sample

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
30/6	Jar Sample	18.5-20.0	434								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)		W434.1	37.7*							

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
30/12	Jar Sample	53.5-55.0	435									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subangular to subrounded in shape)  *Note: Water content taken from unsealed jar sample		W435.1	24.7	*							

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IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
30/15	Jar Sample	68.5-70.0	436								
	Silty CLAY, Sandy, gray moderate plasticity (CL)		S/H 436.1								See plot
	Sample includes about 25% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)										

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
30/21	Jar Sample	—									
	Silty fine SAND, uniform fine Sand grains with about 15% non plastic fines (SM)		98.5 - 100.0								

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
30/25	Jar Sample	118.5 120.0	438								
	Silty SAND, subrounded to subangular fine to medium Sand grains, about 15% non-plastic fines (SM)		S438.1								See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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OF

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
32/3	Jar Sample	—							
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)  *Note: Water content taken from unsealed jar sample	6.0-7.5							
		439							
		W499.1	20.3*						

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TABLE: SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974		SHEET _____ OF _____			
IDENTIFICATION			TEST NO.			PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>				
32/7	Jar Sample		23.5-25.0												
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-GH)			37.9*											
	*Note: Water content taken from unsealed jar sample														



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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/10	Jar Sample	38.5-40.0	441								
	Silty CLAY, gray, moderate to high plasticity (CL)		L41.1	44	19						

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/20	Jar Sample	88.5 - 90.0	—								
	Silty CLAY, gray, moderate plasticity (CL)		442								
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		L4421	36	17						

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
33/3*	1.4' Recovery; say 8.0' to 9.4' depth	280								
	Silty CLAY, dark grey, firm to stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (sub-rounded to subangular in shape)  *Note: This sample labeled B33/2, 8'-10'6"	8.0-10.5								
		8.1-8.4	Saved							
		8.4-8.5	W280.1	30.6		92				
		8.5	TV							TV = 0.78tsf
		8.5-8.8	Saved							
		8.8	TV							TV = 0.68tsf
		8.8-9.2	L280.1	31.6	48	25				
		9.2-9.3	W280.2	33.3		89				

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
33/5	<p>Silly CLAY, gray, firm consistency, moderate to high plasticity (CL)</p> <p>Sample includes about 5% fine to coarse Sand grains (sub-rounded to subangular in shape)</p> <p>Note: This sample and 33/9 labeled B33/5, 38-40'6"</p>	18.0-18.5	—									
		18.2-18.5	282									
		18.5-18.6	Saved									
			W282.1	86								
			18.6	TV								TV=0.29 tsf
			18.6-19.0	L282.1	43	23						
			19.7-19.8	W282.1			84					
			19.8	TV								TV=0.32 tsf
			19.8-20.3	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
33/7*	2.1' Recovery, say 28.0' to 30.1' depth		28.0-30.5	281								
	Silty CLAY, gray, soft to firm consistency, moderate to high plasticity (CL)		28.1-28.4	save								
			28.4-28.6	W281.1	40.3	81						
			28.6	TV								TV=0.20 tsf
			28.6-28.9	T281.11	39.0	82		CU	13.4	739		$\bar{\sigma}_c=1440$ psf
			28.9-29.3	T281.12	39.7	82		CU	4.6	966		$\bar{\sigma}_c=2880$ psf
	Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)		29.3-29.4	W281.1	37.7	83						
			29.4	TV								TV=0.26 tsf
			29.4-29.7	T281.13	38.3	84		CU	6.3	1521		$\bar{\sigma}_c=5760$ psf
	* Note: This sample labeled B33/4, 28'-30'6"		29.4-29.7	L281.1	38.7	46	22					

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
33/9*	2.1' Recovery; say 38.0' to 40.1' depth	38.0-40.5	283								
		38.3-38.6	Saved								
	Silty CLAY, grey, soft to firm consistency, moderate to high plasticity (CL)	38.6-38.7	W283.1	36.8		85					
		38.7	TV								TV = 0.27tsf
		38.7-									
		39.1	T283.1.1	37.4		83	CU	6.9	798		$\bar{\sigma}_c = 1728 \text{psf}$
		38.7-									
		39.1	T283.1.2	37.1		85	CU	5.5	1081		$\bar{\sigma}_c = 3456 \text{psf}$
		39.1-									
	* Note: This sample labeled B33/5, 38'-40'6"	39.5	T283.1.3	36.2		86	CU	5.2	1662		$\bar{\sigma}_c = 6912 \text{psf}$
		39.1-									
		39.5	L283.1	37.2	43	23					
		39.5-									
		39.6	W283.2	37.3		85					
		39.6	TV								TV = 0.28tsf
		39.6-									
		39.9	Saved								
		39.9	St								TV = 0.35tsf TV <sub>r</sub> = 0.09tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
												SHEET OF	
IDENTIFICATION		TEST NO.		PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
33/11*	1.9' Recovery; say 48.0' to 49.9' depth	48.0-50.5	284										
	-----	48.1-48.4	saved										
	Silty CLAY, dark gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W284.1	45.1		76							
		48.5	TV								TV = 0.30 tsf		
		48.5-48.8	saved										
	Sample contains about 10% fine to coarse SAND grains (subrounded to subangular in shape)	48.8-49.0	L284.1	41.8	48 25								
		49.0-49.3	saved										
		49.3-49.4	W284.2	34.5		81							
	* Note: This sample labeled B33/6 48'-50'6"												

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B38/3	Silty CLAY; dark grayish brown mottled with blue gray, highly plastic; hard consistency with a blocky structure.  Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape) (CL-GH)		8.0 to 10.0	17									
			8.5	W17.1	25.3								
			8.5	TV	25.3								TV=2.4 tsf
			8.6 to 8.9	L17.1	24.9	49	24						
			8.6 to 8.9	U17.1	24.3			102	U	3.0	212.3		
			8.6 to 8.9	UR17.1	24.2			103	UR	7.0	761		see plot
			8.6 to 8.9	H17.1									
			9.0	W17.2	26.3								
			9.0	ST	26.3								TV=2.1 tsf
			9.1 to 9.5	save 17.1									TV=1.1
	9.6	W17.3	27.3										
	9.9	TV	27.3								TV-2.1 tsf		



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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>			
B38/4	1.8' Recovery; say 13.5' to 15.3' depth; upper 0.2' disturbed	13.5 to 15.5	18												
		13.8 to 14.2	save 18.1												
		14.2	W18.1	28.6											
	Silty CLAY; dark grayish brown, highly plastic, stiff to very stiff consistency.	14.2	TV	28.6									TV=1.1 tsf		
		14.3 to 14.6	UI8.1	28.5		96	U	4.0	1506						
	Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	14.3 to 14.6	L18.1	28.5	46	22									
	(CL-CH)	14.6	H18.1										see plot		
		14.6	C18.1	29.0						.770	.19		specific gravity=2.71		
		14.6	SG18.1												
		14.7	W18.2	28.8											
		14.7	TV	28.8									TV=0.9 t sf		
		14.8 to 15.2	save 18.2												

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS		TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		Cc
					w <sub>L</sub>	w <sub>P</sub>						
B38/6	Recovery 0.7'; say 23.5' to 24.2' depth	23.5 to 25.5	19									
		23.7 to 24.1	19.1	37.6	48	19						
	Silty CLAY, dark gray, highly plastic (CL-CH)	24.1	W19.1	37.6								
	Note: Entire sample greatly disturbed											

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B38/8	0.8' Recovery; say 33.5' to to 34.3' depth	33.5 to 35.5	20								
		34.1	W20.1	35.7							
	Silty CLAY, dark gray, highly plastic (CL-CH)	34.1 to									
		34.3	L20.1	36.3	48	20					
	Note: Entire sample greatly disturbed										

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	
B38/12	1.8' Recovery; say 53.5' to 55.3'	22								
		W22.1	33.7							
		TV	33.7							IV=0.36 tsf
		save								
		22.1								
		W22.2	33.1							
		TV	33.1							IV=0.41 tsf
		54.1 to 54.4								
		U22.1	33.4		90	U	5.0	985		
		54.1 to 54.4								
		54.4	32.9	44	21					
		54.1 to 54.4								See plot
		H22.1								
		54.5	33.5							
		W22.3	33.5							
		54.5	33.5							
		5.45 to 54.9								IV=0.44 tsf
		22.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974											
IDENTIFICATION		SHEET ___ OF ___											
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
B38/16	0.6' Recovery; say 73.5' to 74.1' depth	73.5 to 75.5	24										
		73.6	TV	43.5								TV=0.27 tsf	
	Silty CLAY, dark gray, highly plastic, soft to firm consistency (CH)	73.6	W24.1	43.5									
		73.7 to 74.0	U24.1	41.3	79	U	4.8	704					
		73.7 to 74.0	L24.1	41.3	55	24							
		73.7 to 74.0	H24.1									See plot	
		74.0 to 74.1	C24.1	36.0					.935	.33		specific gravity=2.72	
		74.0 to 74.1	SC24.1										
		74.0 to 74.1	W24.2	40.7									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B38/18	1.5' Recovery; say 83.5' to 85.0' depth  Silty CLAY; gravelly dark gray, moderate plasticity, stiff consistency (CL)  Includes ±10 % medium to coarse Sand and ±15% sub-angular to subrounded Gravel size particles (1/4" to 1" size)	83.5 to 85.5	25									
		83.7	TV		14.4							TV=0.78 tsf
		83.7	W25.1		14.4							
		83.7 to 84.1	save 25.1									
		84.1	TV		17.8							TV=0.82 tsf
		84.1	W25.2		17.8							
		84.2 to 84.6	save 25.2									
		84.6	St		22.8							
		84.6	W25.3		22.8							
		84.6 to 85.0	U25.1		22.2		104	U	14.0	603		
		84.6 to 85.0	U25.1		22.2		105	Ur	17.4	548		
		84.6 to 85.0	L25.1		22.2	33	19					
	84.6 to 85.0	H25.1									See plot	

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B38/24	1.9' Recovery; say 113.0' to 114.9' depth		113.0 to 115.0	26								
	Silty CLAY; gray, moderately to highly plastic, soft to firm consistency (CL-CH) Includes about 5% fine Sand size particles		113.3	TV	34.5							TV=0.32 tsf
			113.3	W26.1	34.5							
			113.3 to 113.7	save 26.1								
			113.7	TV	32.2							TV=0.48 tsf
			113.7	W26.2	32.2							
			113.7 to 114.1	save 26.2								
			114.1	TV	33.1							TV=0.44 tsf
			114.1	W26.3	33.1							
			114.1 to 114.6	U26.1	31.9				U	6.0	500	
			114.1 to 114.6	L26.1	31.9	45	25					
			114.1 to 114.6	H26.1								See plot
			114.6	TV								TV=0.52 tsf

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 TABLE 1 SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc <sub>o</sub>	
B38/30	Jar Sample Silty SAND; subrounded to subangular fine to coarse Sand grains, about 30% non-plastic fines (SM)	138.5 to 140.0	69 S/H 69.1									See plot

C-70 GOLDBERG-ZOINO AND ASSOCIATES, INC.



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/2	1.1' Recovery; say 4.0' to 5.1' depth	4.0 to 6.0	28								
		4.1	W28.1	33.6							
	Silty CLAY; olive gray mottled with yellowish brown, highly plastic, very stiff consistency throughout	4.1	TV	33.6							TV=1.0 tsf
		4.1 to 4.4	save 28.1								
		4.4	W28.2	31.1							
	Soil includes 2 to 5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	4.4	TV	31.1							TV=1.1 tsf
		4.5 to 4.8	U28.1	29.4		94	U	5.0	1024		
		4.5 to 4.8	Up28.1	29.4		95	Up	9.0	974		
	(CH)	4.5 to 4.8	L28.1	29.4	63	28					
		4.5 to 4.8	H28.1								See plot
		4.8	W28.3	39.5							
		4.8	ST	39.5							TV=1.4 tsf TV <sub>R</sub> =1.0 tsf
		4.9 to 5.1	save 28.2								

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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B41/5	1.2' Recovery: say 10.0' to 11.2' depth	29									
		TV	29.0								TV=1.25 tsf
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	W29.1	29.0								
		save 29.1									
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	TV	27.5								TV=1.43 tsf
		W29.2	27.5								
		C29.1	29.5						.799	.23	
		I29.1	29.5	46	23						
		11.1 to 11.2	28.9								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B 41/7	Silty CLAY, dark gray, highly plastic; soft to firm consistency throughout (CL-CH)	20.0 to 22.0	30								
		20.5	W30.1	39.7							
		20.5	TV	39.7							TV=0.28 tsf
		20.6 to 20.9	U30.1	39.2			83	3.0	338		
		20.6 to 20.9	L30.1	39.2	47	24					
		20.6 to 20.9	H30.1								See plot
		21.0 to 21.1	C30.1	38.1						1.055	.34
		21.0 to 21.1	SG30.1								
		21.1	W30.2	39.4							
		21.1	TV	39.4							TV=0.30 tsf
		21.1 to 21.5	save 30.1								
		21.5	W30.3	38.2							
		21.5	TV	38.2							TV=0.30 tsf

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/9	1.7' Recovery; say 30.0' to 31.7' depth		30.0 to 32.0	31								TV=0.30 tsf
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)		30.4 to 30.5	TV	36.6							
	Includes about 5% subangular to subrounded coarse Sand particles		30.4 to 30.5	W31.1	36.6							
	Note: Upper 0.4' of sample disturbed		30.5 to 30.8	save 31.1								
			30.8	TV	35.6							TV=0.28 tsf
			30.8 to 30.9	W31.2	35.6							
			30.9 to 31.2	U31.1	36.9	86	U	15.0	696			
			30.9 to 31.2	L31.1	36.9	45	21					
			31.2	TV	36.1							TV=0.32 tsf
			31.2 to 31.3	W31.3	36.1							
			31.3 to 31.6	save 31.2								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B41/11	1.1' Recovery; say 40.0' to 41.1' depth  Silty CLAY, sandy, very dark gray, about 35% fine to coarse Sand, ±10% sub-angular to subrounded fine Gravel size particles, fines of low plasticity  (CL-SC)	40.0 to 42.0	32								
		40.2	TV		16.8						TV=0.30 tsf
		40.2	W32.1		16.8						
		40.2 to 40.6	save 32.1								
		40.6	ST		16.5						TV=0.34 tsf TV=0.28 tsf
		40.6	W32.2		16.5						
		40.6 to 41.0	U32.1		16.0		118	U 20.0	884		@15.0% strain s = 648 psf
		40.6 to 41.0	L32.1		16.0	20	12				
		40.6 to 41.0	S/H 32.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B41/13	1.5' Recovery; say 52.0' to 53.5' depth; upper 0.3' disturbed	52.0 to 54.0	33								
		52.3	TV	47.5							TV=0.21 tsf
		52.3 to 52.4	W33.1	47.5							
		52.4 to 52.7	save 33.1			76					
		52.7	TV	45.5							TV=0.23 tsf
		52.7 to 52.8	W33.2	45.5							
		53.0 to 53.2	C33.1	46.5					1.235	.35	
		53.0 to 53.2	L33.1	46.5	52	25					TV=0.27 tsf TVR=0.16 tsf
		53.2	ST	44.1							
		53.2 to 53.3	W33.3	44.1							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 10, 1974  
SHEET 1 OF 1

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc	
B41/17	1.0' Recovery; say 72.5' to 73.5' depth; upper 0.1' is 'wash' disturbed sample (?)		72.5 to 74.5	35								
	Silty CLAY, sandy, dark gray, soft to firm consistency; sand occurs primarily as pockets of Silty fine Sand (±30% of sample) (CL-SC)		72.8	TV								TV=0.15 tsf
			72.9 to 73.2	T35.0	19.6		105	UU	14.0	454		
			72.9 to 73.2	L35.1	19.6	25	15					
			72.9 to 73.2	S/H 35.1								See plot
	Also 5% to 10% Gravel size particles throughout		73.3	C35.1	26.7					697	.21	Specific Gravity=2.68
			73.3	SG35.1								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B41/23	Silty CLAY, dark gray, moderate plasticity, firm consistency (CL); includes 10% to 15% fine to coarse Sand and fine Gravel size particles	101.0 to 103.0									
		101.3	TV	23.2							TV=0.46 tsf
		101.3	W37.1	23.2							
		101.3 to 101.8	save 37.1								
		101.8	TV	25.4							TV=0.62 tsf
		101.8	W37.2	25.4							
		101.9 to 102.3	U37.1	26.4	99	U	10.0	534			
		101.9 to 102.3	L37.1	26.4	34	20					
		101.9 to 102.3	HB7.1								See plot



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B41/25	1.7 Recovery; say 112.0' to 113.7' depth	112.0 to 114.0	38								
		112.3	TV	20.9							TV=0.65 tsf
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	112.3 to 112.4	W38.1	20.9							
		112.4 to 112.7	save 38.1								
		112.7	TV	24.0							TV=0.60 tsf
	Includes about 35% subrounded to subangular fine Gravel and coarse Sand particles	112.7 to 112.8	W38.2	24.0							
		113.0 to 113.2	C38.1	24.2					.642	.18	
		113.0 to 113.2	L38.1	24.2	29	19	104				
		113.2	TV	19.4							TV=1.0 tsf
		113.2 to 113.3	W38.3	19.4							
		113.3 to 113.7	save 38.2								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/29	1.1' Recovery; say 130.0' to 131.1' depth		130.0 to 132.0	40								
	Clayey SAND, gravelly, dark gray; about 35% fine to coarse Sand particles and ±10% sub-rounded Gravel size particles; fines of low plasticity (GC-SC)		130.2	TV	14.7							TV=0.50 tsf
			130.2	W40.1	14.7							
			130.2 to 130.6	save 40.1								
			130.6	W40.2	10.9							
			130.6 to 130.9	U40.1	13.8		124	8.0	1749			
			130.6 to 130.9	L40.1	13.8	25	17					
			130.6 to 130.9	S/H 40.1								See plot
			130.9 to 131.1	C40.1	11.3					.370	.09	Specific Gravity = 2.69
			130.9 to 131.1	SC40.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω <sub>L</sub> ω <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B48/2	0.9' Recovery; say 3.0' to 3.9' depth	3.0 to 5.0	198									
		3.1	TV	32.4							TV=0.68 tsf	
	Silty CLAY, dark grayish brown mottled light gray, stiff to very stiff consistency, highly plastic (CH)  Sample includes 5-10% medium to coarse Sand grains (subrounded to sub-angular in shape)	3.1 to 3.2	W198.1	32.4								
		3.2 to 3.5	L198.1	27.3	63	24						
		3.2 to 3.5	U198.1	27.3			97	U	3.2	1466		TV=1.18 tsf
			3.5	TV								
			3.5 to 3.9	save 198.1								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$C_c$
B48/4	Silty CLAY; dark grayish brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	8.0 to 10.0										
		8.5 to 8.7	H199.1									See plot
		8.7	TV	27.5								TV=1.23 tsf
		8.7 to 8.8	W199.1	27.5								
		8.8 to 9.1	save 199.1			97						
		9.1	TV	28.9								TV=1.23 tsf
		9.1 to 9.2	W199.2	28.9								
		9.2 to 9.5	save 199.2									
		9.5	TV									TV=1.43 tsf
		9.5 to 9.9	save 199.3									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
B48/6	Recovery 2.3'; say 18.0' to 20.3' depth; upper 0.4' disturbed	—									
		200									
		TV	34.4								TV=0.26 tsf
	Silty CLAY; dark gray, firm consistency, highly plastic (CL-GH)	W200.1	34.4								
		save									
		200.1									
		TV									TV=0.49 tsf
	Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	TV									
		W200.1	32.8		90	CU	6.5	928			
		L200.1	34.3	47	25						
		TV									
		W200.2	32.7								
		L200.1	34.2		89	CU	4.5	1304			
		TV	34.1								TV=0.38 tsf
		W200.3	34.1								
		L200.1	35.6		88	CU	10.6	1579			

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE: \_\_\_\_\_

SHEET: \_\_\_\_\_

OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B48/10	1.5' Recovery; say 38.0' to 39.5' depth; Upper 1.0' disturbed	202								
		TV	40.4							TV = 0.10 tsf
		W202.1	40.4							
		TV								TV = 0.15 tsf
		save								
		202.1								
		C202.1	38.8					1.027	.33	
		L202.1	38.8	47	24					
		SC202.1								Specific Gravity=2.73
		Y202.1	38.8		82					
		TV	40.0							TV = 0.25 tsf
		W202.2	40.0							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE

SUMMARY OF LABORATORY TEST RESULTS

DATE

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		cc
B48/14	2.0' Recovery; say 60.0' to 62.6' depth. Upper 0.4' depth disturbed	— 204									
		TV	26.0							TV = 0.34 tsf	
	Silty CLAY, Sandy, dark gray, firm consistency, moderately plastic (CL)  Sample includes ±35% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	60.0 to 62.6									
		60.4 to 60.7	save 204.1								
		60.7 to 60.8	W204.1	26.0							
		60.8 to 61.1	L204.1	26.3	34	16					
		60.8 to 61.1	UU 204.1	26.3			99	UU	15.0	746	
		61.1 to 61.2	TV	25.8							TV = 0.42 tsf
		61.2 to 61.5	W204.2 U204.1	25.8			100	U	15.0	745	
		61.5 to 61.6	TV	25.3							TV = 0.38 tsf
		61.6 to 61.9	W204.3 save 204.2	25.3							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B48/18	1.5' Recovery: say 78.0' to 79.5' depth	78.0 to 80.0	206								
		78.1	TV	25.6							TV=0.56 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)  Sample includes about 15% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	78.1 to 78.2	W206.1	25.6							
		78.2 to 78.5	save 206.1								
		78.5 to 78.6	L206.1		25.6	36	18				
		78.6	TV		25.6						TV=0.70 tsf
		78.6 to 78.7	W206.2		25.6						
		78.7 to 79.0	save 206.2				100				
		79.0	TV		26.0						TV=0.73 tsf
		79.0 to 79.1	W206.3		26.0						
		79.1 to 79.4	save 206.3								
		79.4	TV								TV=0.63 tsf



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DATE Jan. 1974

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
B48/20	1. 3' Recovery; say 88.0' to 89.3' depth  Silty CLAY, dark gray, very soft consistency, highly plastic (CL-CH)  Sample includes ±10% coarse Sand or fine Gravel size particles (subrounded to subangular)  Note: Entire sample much disturbed	88.0 to 90.0									
		88.2 to 88.3	W207.1	44.51							
		88.9 to 89.0	W207.2	30.2							
		89.0 to 89.2	L207.1	28.2	41	25					

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974
IDENTIFICATION												SHEET OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
B48/22	2.0' Recovery; say 98.0' to 100.0' depth, upper 0.4' disturbed	98.0 to 100.0	208									
		98.4	TV	27.5								TV=0.45 tsf
		98.4 to 98.5	W208.1	27.5								
	Silty CLAY; dark gray, firm to stiff consistency, moderately to highly plastic (CL)	98.5 to 98.9	T208.1	27.6		97	CU	11.4	4410			TV=0.54 tsf
		98.9	TV									
		98.9 to 99.2	T208.1	26.8		99	CU	11.5	2017			
	Sample includes 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	98.9 to 99.2	L208.1	26.8	36	19						
		99.2	TV	26.1								
		99.2 to 99.3	W208.2	26.1								
		99.3 to 99.6	T208.1	26.0		96	CU	11.8	2880			TV=0.52 tsf
		99.6	TV	24.0								
		99.6 to 99.7	W208.3	24.0								
		99.7 to save	208.1									
		100.0										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
48/24	<p>Silty CLAY; dark gray, soft to medium consistency, moderately plastic (CL)</p> <p>Sample contains ±20% coarse to fine Sand and fine Gravel particles (subrounded to sub-angular in shape)</p> <p>Note: Entire sample thoroughly disturbed</p>	108.0 to 110.0	209								
		108.6	TV		25.6						TV=0.26 tsf
		108.6 to 108.7	W209.1		25.6						
		108.7 to 109.1	save 209.1								
		109.1	TV		23.0						TV=0.31 tsf
		109.1 to 109.2	W209.2		23.0						
		109.6 to 110.0	save 209.2								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE \_\_\_\_\_ OF \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/26	2.1' Recovery; say 118.0' to 120.1' depth	210								
		TV	33.2							TV = 0.43 tsf
	Silty CLAY, gray, medium to stiff consistency, moderate to highly plastic (CL)	W210.1	33.2							
		save 210.1								
	Sample includes about 5% fine to coarse Sand sized particles (subrounded to subangular in shape)	save 210.2								
		TV	32.8							TV = 0.51 tsf
		W210.2	32.8							
		W210.1	32.9		91					
		S/H 210.1								See Plot
		TV	33.0							TV = 0.60 tsf
		W210.3	33.0							
		save 210.3								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/2	2.1' Recovery; say 6.0' to 8.1' depth  Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)  Sample includes about 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	6.0 to 8.0	—								
		6.5	TV	29.3							TV=1.6 tsf
		6.5 to 6.6	W132.1	29.3							
		7.1	TV	28.8							TV=1.4 tsf
		7.1 to 7.2	W132.2	28.8							
		7.2 to 7.6	X132.1	28.0		95					
		7.6	TV								TV=1.85 tsf
		7.6 to 7.8	L132.1	26.2	50	17					
		6.0 to 8.1	M132.1	28.1							γ <sub>dry</sub> Max=116 W <sub>opt</sub> =16.5

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/3	Silty CLAY; dark grayish brown, firm to stiff consistency, highly plastic (CL-CH)	13.0 to 15.0	133								
		13.2	TV	29.0							TV=0.73tsf
		13.2 to 13.3	MB3.1	29.0							
		13.3 to 13.7	save 133.1			92					
		13.7	TV								TV=0.53tsf
		13.7 to 14.0	CB3.1	33.3					.823	.26	
		13.7 to 14.0	133.1	31.8	47	23					
		13.7 to 14.0	SG33.1								
		14.0	TV	31.3							TV=0.42tsf
		14.0 to 14.1	MB3.2	31.3							
		14.1 to 14.4	save 133.2								
		14.4	TV	30.4							TV=0.45tsf
		14.4 to 14.5	MB3.3	30.4							
		14.5 to 14.9	save 133.3								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/4	1.9' Recovery; say 23.0 to 24.9' depth	23.0 to 25.0	134								
		23.1	TV	32.2							TV=0.34 tsf
		23.1 to 23.2	W134.1	32.2							
	Silty CLAY; grayish brown, firm consistency, moderately to highly plastic (CL)	23.2 to 23.5	save 134.1								
		23.5	TV								TV=0.37 tsf
		23.5 to 23.9	save 134.2								
		23.9	TV	34.0							TV=0.41 tsf
		23.9 to 24.0	W134.2	34.0							
		24.0 to 24.3	U134.1	34.0	90			U	6.0	1028	
		24.0 to 24.3	L134.1	32.8	42	22					
		24.4	TV								TV=0.42 tsf
		24.4 to 24.8	save 134.3								
		24.8	TV	34.0							TV=0.37 tsf
		24.8 to 24.9	W134.3	34.0							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
49/6	1.9' Recovery; say 43.0' to 44.9' depth	43.0-45.0	136							
	Silty CLAY; dark greyish brown, firm consistency, highly plastic (CH-CL)	43.1-43.2	WI36.1	39.9						
		43.5	TV							TV=0.42tsf
		43.8-43.9	WI36.2	35.2						
	Sample includes ±5% coarse Sand grains (subrounded to subangular in shape)	43.9-44.2	TI36.12	46.3		75	CU	2.9	1356	σ <sub>c</sub> =3744psf
		43.9-44.2	LI36.1	45.5	53	22				
	Lower portions of sample appear to be "sensitive", i.e. became soft and sticky on remolding	44.2	TV	45.7						TV=0.37tsf
		44.2-44.3	WI36.3	45.7						
		44.3-44.7	TI36.11	43.5		78	CU	5.8	921	σ <sub>c</sub> =1872psf
		44.3-44.7	TI36.13	44.9		77	CU	4.7	1928	σ <sub>c</sub> =7488psf



PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE SHEET OF

IDENTIFICATION

TEST NO. PROPERTIES STRENGTH CONSOLIDATION OTHER TESTS AND REMARKS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTY LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP				e <sub>0</sub>	c <sub>c</sub>	
B49/7	1.9' Recovery; say 53.0' to 54.6' depth	53.0 to 55.0	137								
		53.2	TV			25.9					TV = 0.34 tsf
		53.2 to 53.3	W								
		53.3 to 53.7	save			25.7					
		53.7 to 53.7	137.1								
		53.7 to 54.1	8								
		54.1 to 54.4	137.1			25.0					
		54.4 to 54.4	S/H								See Plot
		54.4 to 54.4	137.1								
		54.4	TV			25.9					TV = 0.65 tsf
		54.4 to 54.6	W								
		54.6 to 54.6	137.2			25.9					
		54.6 to 54.9	save								
		54.9	137.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/9	1.5' Recovery; say 73.0' to 74.5' depth	73.0 to 75.0	139							
		73.1	TV	25.7						TV=0.68 tsf
	Silty CLAY, sandy; dark gray, stiff consistency, moderately plastic (CL)	73.1 to 73.2	W139.1	25.7						
		73.2 to 73.5	save 139.1			99				
		73.5	TV	24.1						TV=0.75 tsf
	Sample includes ±30% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	73.5 to 73.6	W139.2	24.1						
		73.6 to 73.9	save 139.2							
		73.9	TV							TV=0.80 tsf
		73.9 to 74.3	U139.1	25.6		100	U	20.0	2513	@ 15% strain s=2254 psf
		73.9 to 74.3	L139.1	18.2	33	22				
		74.3	TV	22.8						TV=0.76 tsf
		74.3 to 74.4	W139.3	22.8						

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE _____		DATE _____									
SUMMARY OF LABORATORY TEST RESULTS		SHEET _____ OF _____									
BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
B49/11	1.5' Recovery; say 93.0' to 94.5' depth	93.0 to 95.0	141								
		93.1	TV	26.6							TV = 0.62 tsf
	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	93.1 to 93.2	W141.1	26.6							
		93.2 to 93.5	save 141.1			98					
	Sample includes ±20% coarse Sand and fine Gravel size particles (subangular to subrounded in shape)	93.5	TV	26.2							TV = 0.70 tsf
		93.5 to 93.6	W141.2	26.2							
		93.8 to 94.0	C141.1	28.6				0.701	0.20		
		93.8 to 94.0	L141.1	24.3	37	22					
		93.8 to 94.0	SG141.1								Specific Gravity=2.68
		94.0	TV	27.0							TV = 0.68 tsf
		94.0 to 94.1	W141.3	27.0							
		94.1 to 94.5	save 141.2								

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
B49/13	1.6' Recovery; say 113.0' to 114.6' depth	113.0 to 115.0	—							
		113.1	TV	29.3						TV=0.55 tsf
		113.1 to 113.2	W143.1	29.3						
		113.2 to 113.5	143.1.3	29.2		93	CU	11.1	4132	
		113.5	TV							
		113.5 to 113.8	143.1.2	28.7		95	CU	11.8	2426	TV=0.62 tsf
		113.8	TV	28.1						
		113.8 to 113.9	W143.2	28.1						TV=0.64 tsf
		113.9 to 114.2	143.1.1	24.0		100	CU	12.7	1787	
		113.9 to 114.2	L143.1	24.0	33 22					
		114.2	TV	28.7						TV=0.64 tsf
		114.2 to 114.3	W143.3	28.7						
		114.3 to 114.6	save 143.1							

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/4	SOIL DESCRIPTION	DEPTH (FEET)	—								
	1.5' Recovery; say 18.0' to 19.5' depth - disturbed	18.0 to 20.0	84								
	_____	18.7 to 19.0	saved								
	Silty CLAY, gray, moderate to high plasticity (CL)	19.0 to 19.1	W84.1	34.6		84					
	Note: Entire sample disturbed	19.1	TV								TV = 0.13tsf
		19.1 to 19.4	L84.1	34.6	45	20					

FILE NO. 1255

DATE July 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT.* WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/5	Jar Sample	23.5- 25.0	453								
	Silty CLAY, gray, high plasticity (CH-CL)		L453.1	* 39.8	52    22						

\*Note: Water content taken from unsealed jar sample

PROJECT: GREENWOOD ENERGY CENTER UNITS 2 & 3

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/6	1.9' Recovery; say 28.0' to 29.9' depth  Silty CLAY, gray, firm consistency, moderate plasticity (CL)  Note: Below 29.4' depth sample becomes softer, more sensitive on remolding	28.0 to 30.0	85								
		28.1 to 28.3	V85.1	35.2			VS	443			St = 2.1
		28.3 to 28.5	k85.1	37.2		84			1.002		hydrometer - see plot
		28.5 to 28.6	W85.1	35.2							
		28.6 to 28.9	T85.1	33.0		88	CU	13.1	842		σ <sub>c</sub> = 1440 psf
		28.6 to 28.9	T85.12	33.1		90	CU	14.5	1050		σ <sub>c</sub> = 2880 psf
		29.0 to 29.1	W85.2	34.3							TV = 0.28 tsf
		29.1 to 29.4	L85.2	34.3	39	18					
		29.1 to 29.4	T85.13	34.3		86	CU	14.0	1718		σ <sub>c</sub> = 5760 psf
		29.4 to 29.7	U85.1	45.8		75	U	2.4	197		
	29.4 to 29.7	L85.1	45.7	51	18						

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE SHEET OF									
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BDRING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
50/8	2.0' Recovery	38.0 to 40.0									
	Silty CLAY, gray, firm consistency, highly plastic (CH)	38.1 to 38.4	46.2		74	UU	4.0	643			$\sigma_c = 3456$ psf
		38.4 to 38.5	47.6		71						
		38.5									TV = 0.39 tsf
		38.5 to 38.9		51.6					1.383	0.55	
		38.5 to 38.9									
		38.9 to 39.2		51.3		70	U	2.0	550		
		38.9 to 39.2		51.2	55 23						
		39.2 to 39.3		48.6		71					
		39.3 to 39.6									



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
50/10	1.8' Recovery; say 48.0' to 49.8' depth	48.0 to 50.0 48.1 to 48.4	87									
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)  Sample includes 20 to 25% fine to coarse Sand particles and 10 to 15% subrounded to subangular Gravel size particles to 1/2 inch maximum	48.5	W87.1	25.9	96						St = 1.1	
		48.6 to 48.8	k87.1	26.9	97				.730		sieve/hydrometer see plot	
		48.9	W87.2	24.2	97							
		48.9	TV	24.2							TV = 0.41 tsf	
		49.0 to 49.3	U87.1	23.6	99	U	15.0	527				
		49.0 to 49.3	L87.1	23.4	36	16						
		49.3 to 49.6	T87.0.1	23.2	100	UU	15.0	721			σ <sub>c</sub> = 4320	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/12	1.9' Recovery; say 58.0' to 59.9' depth	58.0 to 60.0 58.1 to 58.5	88 saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.5	W88.1	23.8		99					
		58.5	TV	23.8							TV = 0.53 tsf
		58.6 to 58.9	U88.1	25.8		99	U	9.0	1008		
		58.6 to 58.9	L88.1	24.2	39	18					
	Sample includes about 20% fine to coarse Sand particles and about 10% subrounded to subangular Gravel particles to 1/2 inch maximum size	59.0	W88.2	24.8		97					
		59.0	TV	24.8							TV = 0.54 tsf
		59.1 to 59.4	T88.0.1	24.3		101	UU	10.0	1132		σ <sub>c</sub> = 4608 psf
		59.4 to 59.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/14	1.9' Recovery; say 68.0' to 69.9' depth	89									
		saved									
	Silty CLAY, sandy; gray, firm to stiff consistency, moderately plastic (CL)	W89.1	27.3		93						
		TV	27.3								IV = 0.48 tsf
	Sample includes 20 to 25% fine to coarse Sand particles and subrounded to subangular Gravel size particles	saved									
		L89.1	27.9	43	18						
		W89.2	29.5		94						
		TV	29.5								IV = 0.54 tsf
		saved									

PROJECT: BELLE RIVER PLANT UNITS I & II											FILE NO. 1255		
TABLE SUMMARY OF LABORATORY TEST RESULTS											DATE _____		
IDENTIFICATION											SHEET _____ OF _____		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$	
50/16	1.9' Recovery; say 78.0' to 79.9' depth	78.0 to 80.0 78.2 to 78.5 saved	—										
		78.5	W90.1	27.7		95							
	Silty CLAY, gray, firm to stiff consistency, moderate plasticity (CL)	78.5	IV	27.7									TV = 0.56 tsf
		78.6 to 78.9	U90.1	27.9		95	U	10.0	1271				
	Sample includes 10 to 15% fine to coarse Sand particles and subrounded to subangular	78.6 to 78.9	L90.1	27.9	39	20							
	Gravel particles to 1/2 inch maximum size	79.0	W90.2	27.8		92							TV = 0.63 tsf
		79.0	IV	27.8									
		79.1 to 79.7	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255		
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE		
										SHEET		
										OF		
BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
					w <sub>L</sub>	w <sub>P</sub>		%				
50/18	1.9' Recovery, say 88.0' to 89.9' depth; upper 0.3' disturbed		88.0 to 90.0	91								
			88.3 to 88.6	T9L1.1			97	CU	14.6	1923		σ <sub>c</sub> = 3456 psf
			88.6	W9L1.1			95					
			88.6	TV								TV = 0.59 tsf
	Silty CLAY, sandy, gray, firm to stiff consistency, moderate plasticity (CL)		88.7 to 89.0	T9L1.2			97	CU	11.7	2590		σ <sub>c</sub> = 6912 psf
			88.7 to 89.0	L9L1.1			23					
			89.0	W9L1.2			95					
	Sample includes 20 to 25% fine to coarse Sand size particles and about 10% subrounded to subangular Gravel size particles		89.0	TV								TV = 0.69 tsf
			89.1 to 89.4	T9L1.3			96	CU	11.8	3989		σ <sub>c</sub> = 13,824 psf
			89.5 to 89.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE: SUMMARY OF LABORATORY TEST RESULTS												DATE _____	
SUMMARY OF LABORATORY TEST RESULTS												SHEET _____ OF _____	
IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$	
52/3	2.3' Recovery; say 20.0' to 22.3' depth	20.0 to 22.3'	—										
		20.1 to 20.5	saved										
	Silty CLAY; gray, very stiff consistency, moderate to high plasticity (CL - CH)	20.5	W108.1	31.1		92					TV = 1.2 tsf		
		20.5	TV										
		20.5 to 20.9	J108.1	30.3		92	U	4.0	2737				
		20.5 to 20.9	L108.1	30.9	49	20							
	NOTE: Consistency of soil decreases within lower half of sample with no visible signs of disturbance	20.9 to 21.0	W108.2	30.4		92							
		21.2 to 21.5	T			92	UU	8.0	1591		$\sigma_c = 2016$ psf		
		21.5 to 21.6	W108.3	31.1		91							
		21.6	TV								TV = 0.7 tsf		
		21.6 to 21.9	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
52/4	2.5' Recovery; say 28.0' to 30.5' depth	28.0 to 30.5	I09								
	28.2 to 28.5 saved										
	Silty CLAY, gray, firm consistency, of moderate plasticity (CL)	28.5	WI09.1	32.5		89					
		28.6 to 28.9	UI09.1	31.8		94	U 9.0	489			
		28.6 to 28.9	LI09.1	29.4	35	18					
	Sample includes lenses or layers of non-plastic sandy Silt (about 15% of total sample)	28.9 to 29.2	VI09.1	30.5			VS rVS	568 277			St = 2.1
		29.3	WI09.2	30.5		89					
	Note change in physical properties of soil below 29.5' depth - is Silty CLAY (CL-CH)	29.4 to 29.7									
		29.8	WI09.3	41.3		79					
		29.9 to 30.2	CI09.1	40.5					1.013	0.45	
		29.9 to 30.2	SG109.1								Specific Gravity = 2.70
		29.9 to 30.2	LI09.2	40.5	49	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
52/6	2.4' Recovery; say 48.0' to 50.4' depth	48.0 to 50.5 48.1 to 48.4	III TIII.1	22.1		101	CU	10.2	15159		$\bar{\sigma}_c = 2160$ psf
	SILT, dark gray, firm consistency, non-plastic to slightly plastic (ML)	48.4	WIII.1	22.9		99					TV = 0.27 tsf
		48.4	TV	22.9							
		48.5 to 48.8	TIII.12	22.7		99	CU	15.0	17508		$\bar{\sigma}_c = 4320$ psf
		48.8 to 49.1	TIII.13	22.1		104	CU	13.3	27777		$\bar{\sigma}_c = 8640$ psf
	Becomes more plastic with depth,	49.1	WIII.2	21.5		103					
		49.1	TV	21.5							TV = 0.35 tsf
	At ±49.5' depth-change to Silty CLAY, sandy; dark gray, stiff consistency; moderately plastic (CL)	49.2 to 49.5	UIII.1	25.2		100	U	2.5	317		
		49.2 to 49.5	LIII.1	25.2	22	18					
	Includes 15 to 20% fine to coarse Sand size particles with less than 5% fine Gravel size pieces to 1/4 inch maximum size	49.5	WIII.3	23.6		101					
		49.5	TV	23.6							TV = 0.73 tsf
		49.6 to 49.8	VIII.1	23.6			VS		2160		
							FVS		1950		St = 1.1



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
52/7	2.4' Recovery; say 58.0' to 60.4' depth	112								
		saved								
	Silty CLAY; sandy, very dark gray, very stiff consistency, moderate plasticity (CL)	W1121	16.0		112					
		TV								TV = 1.10 tsf
		U1121	15.1					0.411		sieve/hydro-meter see plot
	Sample includes about 30 - 35% fine to coarse subrounded to rounded Sand grains; also about 10 - 15% Gravel pieces (subrounded to subangular, 1-1/2" max. size)	U1121	13.0		116	U	6.0	1799		
		L1121	12.9	23	14					
		saved								
		W1122	14.6		115					
		TV								TV = 1.20 tsf

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
52/8	1.5' Recovery; say 68.0' to 69.5' depth	113								
		W113.1	14.5		111					
	Silty CLAY, sandy, very dark gray, stiff to very stiff consistency, moderate plasticity (CL)	TV								TV = 1.0 tsf
		U113.1	14.2		115	U	13.0	1677		
		L113.1	13.8	24	14					
		W113.2	14.3							
	Includes about 30% fine to coarse rounded to subrounded Sand grains, and about ±10% subrounded to subangular Gravel pieces (3/4" max. size)	TV								TV = 1.2 tsf
		T								
		113.0.1	16.2		111	UU	15.0	1891		c <sub>c</sub> = 5184 psf
		W113.3	19.4							
		TV								TV = 0.8 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/9	2.5' Recovery; say 78.0' to 80.5' depth		78.0 to 80.5'	114								
	Silty CLAY; gray, stiff consistency, moderately plastic (CL)		78.2 to 78.5'	saved								
			78.5 to 78.6'	W114.1	23.3		105					
			78.6 to 78.6'	TV								TV = 0.5 tsf
			78.6 to 78.9'	T								
	Sample includes about 20% fine to coarse Sand and fine Gravel particles (subangular to subrounded)		78.9 to 79.0'	W14.0.1	21.8		105	UU	14.0	1157		σ <sub>c</sub> = 5760 psf
			78.9 to 79.0'	L114.1	23.5	35 18						
			79.0 to 79.0'	W114.2	22.1		106					
			79.0 to 79.0'	TV								TV = 0.8 tsf
			79.0 to 79.3'	saved								
			79.3 to 79.7'	saved								
			79.7 to 79.8'	W114.3	21.9		103					
			79.8 to 79.8'	TV								TV = 0.95 tsf

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DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/10	2.5' Recovery; say 88.0' to 90.5' depth		88.0 to 90.5	115								
			88.2 to 88.5	saved								
	Silty CLAY; sandy, gray, stiff consistency, moderate plasticity (CL)		88.5	W115.1	26.7		97					
			88.6 to 88.9	U115.1	27.2		97	U	8.0	2435		
			88.6 to 88.9	L115.1	26.4	39	18					
	Sample includes 25 to 30% fine to coarse Sand size particles and subrounded to subangular Gravel particles		89.0	W115.2	26.4		96					
			89.1 to 89.4	V115.1	26.4			VS		1662		
			89.5 to 89.8	saved				rVS		1529		St = 1.1
			89.8	W115.3	27.0		95					
			89.9 to 90.3	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/12	2.5' Recovery; say 108.0' to 110.5' depth	108.0 - 110.5	117								
		108.1 - 108.5	saved								
	Silty CLAY; gray, medium to stiff consistency, moderate to high plasticity (CL)	108.5	W117.1	29.7		83					TV = 0.55 tsf
		108.5	TV								
		108.5 - 108.8	saved								
	Sample includes about 10% fine to coarse subrounded to rounded Sand grains	108.8 - 109.1	saved								
		109.1	W117.2	35.1							
		109.1	TV								TV = 0.35 tsf
		109.3 - 109.6'	T 117.0.1	35.8		87		UU	3.0	1596	$\sigma_c = 7632$ psf
		109.3 - 109.6	L117.1	36.2	46	22					
		109.6 - 109.9	saved								
		110.0	W117.3	35.5		87					
		110.0	TV								TV = 0.51 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
52/12	Jar Sample	115.5	567									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)		L567.1	34	18							

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TABLE SUMMARY OF LABORATORY TEST RESULTS  
 DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
53/3	1.7' Recovery; say 19.0' to 20.7' depth	96									
		saved									
	Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL-CH)	19.5	32.0		87						
		19.5	TV								
		19.6 to 19.9	U96.1	31.8		88	U	5.0	1156		
		19.6 to 19.9	L96.1	31.7	49	20					
		20.0	W96.2	32.1		87					
		20.0	TV								
		20.1 to 20.4	T96.0.1	32.2		91	UU	8.9	1425		

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
53/4	1.8' Recovery; say 29.0' to 30.8' depth	29.0 to 31.0	97								
		29.1 to 29.4	saved								
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	29.5	W97.1	42.5	77						
		29.5	TV	42.5							
		29.6 to 29.9	U97.1	40.7	80	U	5.0	1006			TV = 0.53 tsf
		29.6 to 29.9	L97.1	41.1	49	22					
		30.0	W97.2	38.8		91					
		30.0	TV	38.8							TV = 0.47 tsf
		30.1 to 30.4	T97.0.1	34.2	88	UU	2.4	973			$\sigma_c = 3024$ psf
		30.4 to 30.7	saved								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE								
IDENTIFICATION		SHEET ____ OF ____								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
53/5	1.7' Recovery; say 39.0' to 40.7' depth	39.0 to 41.0	98							
		39.1 to 39.4	saved							
		39.4 to 39.5	W98.1	26.3	97					
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	39.5	TV	26.3						TV = 0.49 tsf
		39.5 to 39.8	C98.1	30.9						
	Sample includes 20 to 30% coarse to fine Sand and fine Gravel size particles	39.5 to 39.8	CG98.1							Specific Gravity = 2.72
	(subrounded to subangular in shape)	39.5 to 39.8	L98.1	30.5	39	20				
		39.5 to 39.8	k98.1	30.2						Sieve Hydro-meter seepbt
		39.8 to 40.1	saved							
		40.1 to 40.2	W98.2	29.6	92					
		40.2	TV	29.6						TV = 0.34 tsf
		40.2 to 40.6	saved							

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>		
53/6	1.5' Recovery; say 49.0' to 50.5' depth	49.0-51.0	99										
	Silty CLAY, grey, soft to firm consistency, moderately plastic (CL)  Sample includes 15 to 20% fine to coarse Sand size particles and subrounded to subangular gravel size pieces  Sample slightly disturbed throughout	49.1	W99.1	36.2		89							
		49.2	U99.1	27.9			94	14.9	561				
		49.2	L99.1	27.8	43	18							
		49.6	W99.2	27.3			94						
		49.7	V99.1	27.3						VS	540		
		50.0	V99.1	27.3						FVS	340		
		50.0-50.3	50.3	Saved									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
53/9	2.5' Recovery; say 79.0' to 81.5' depth	79.0 to 81.5	101								
	Silty CLAY; mottled gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel size particles	79.4	W10L1	27.6		97					
		79.5 to 79.8	V10L1	27.9		95	VS	1371			
		80.1 to 80.4	U01.1	27.9		95	rVS	1025		St = 1.3	
		80.1 to 80.4	L10L1	28.0	39	21	U	6.0	1275		
		80.5 to 80.8	saved								
		80.9 to 81.2	saved								

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TABLE: SUMMARY OF LABORATORY TEST RESULTS												DATE			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>					
53/12	2.5' Recovery; say 109.0' to 111.5' depth	109.0 - 111.5'	104												
		109.2 - 109.5	saved												
	Silty CLAY; dark gray, stiff consistency, moderate plasticity (CL)	109.5 - 109.7	W1041	20.0		108					TV = 0.68 tsf				
		109.7	TV												
		109.7 - 110.0	11041	20.5	29	15									
	Sample includes about 15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	110.0 - 110.4	saved												
		110.4 - 110.5	W1042	20.1		107					TV = 0.85 tsf				
		110.5	TV												
		110.5' - 110.8	saved												

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
53/12	Jar Sample Silty CLAY, grey, moderate plasticity (CL) Sample includes about 15% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)	116.0	568							
			L568.1	36	19					

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OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
54/4	1.8' Recovery, say 53.0' to 54.8' depth	397								
		T397.1.1	23.6		102	CU	10.7	488		$\bar{\sigma}_c = 2160$ psf
	Clayey SILT, dark gray, firm consistency, slightly plastic to non-plastic (CL - ML)	T397.0.1	24.4		99	UU	15.0	533		$\bar{\sigma}_c = 4320$ psf
		T397.1	22.8	21	17					
	@ ± 53.5' depth, change to Silty CLAY sandy very dark gray, firm to stiff consistency, moderately plastic (CL)	W397.1	25.7							
		TV								TV = 0.36 tsf
		T397.1.4	22.6		101	CU	14.9	1430		$\bar{\sigma}_e = 2160$ psf
	Sample includes few lenses/ layers of clayey SILT; also about 15% fine to coarse sand size particles and subrounded to subangular gravel size pieces	T397.1.2	23.2		102	CU	14.8	2022		$\bar{\sigma}_c = 4320$ psf
		T397.1.3	23.2		102	CU	13.8	3867		$\bar{\sigma}_c = 8640$ psf
		W397.2	23.3							
		T397.1.5	24.0		100	CU	10.6	2805		$\bar{\sigma}_c = 6480$ psf
		T397.2	24.0	31	18					
		TV								TV = 0.47 tsf

IDENTIFICATION

TEST NO.

PROPERTIES

STRENGTH

CONSOLIDATION

OTHER TESTS AND REMARKS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	OTHER TESTS AND REMARKS	
				w <sub>L</sub>	w <sub>P</sub>								
54/5	2.0' Recovery	58.5 to 60.5											
		58.6 to 58.9											
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 20% fine to coarse Sand size particles and about 10% subangular to subrounded Gravel particles to 2 inch maximum size	58.9	25.2	93									
		58.9	25.2									TV = 0.44 tsf	
		59.0 to 59.3	25.4										
		59.3 to 59.6	25.8									σ <sub>c</sub> = 4464 psf	
		59.3 to 59.6	26.2	38	17								
		59.6	27.5			92							
		59.6	27.5										
		59.7 to 60.0	27.5										
		60.0 to 60.3				92							
													TV = 0.55 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/6	2.0' Recovery	63.0 to 65.0	399									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 25% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	63.1 to 63.4	T399.0.1	26.1		98	UU	13.0	796		$\bar{\sigma}_c = 5040$ psf	
		63.4 to 63.5	W399.1	24.3		92						
		63.5	TV	24.3							TV = 0.46 tsf	
		63.5 to 63.8	C399.1	26.0						0.696	0.24	
		63.5 to 63.8	SG399.1									Specific Gravity = 2.71 Sieve/hydrometer See plot
		63.5 to 63.8	k399.1	27.2		98				.724		
		63.5 to 63.8	L399.1	26.0	36	18						
		63.8 to 64.1	T399.1.1	26.4		98	CU	12.0	1362			$\bar{\sigma}_c = 2448$ psf
		64.1 to 64.2	W399.2	25.0		98						TV = 0.52 tsf
		64.2	TV	25.0								$\bar{\sigma}_c = 4896$ psf
		64.2 to 64.5	T399.1.2	25.2		98	CU	12.1	2008			$\bar{\sigma}_c = 2792$ psf
		64.5 to 64.8	T399.1.3	25.8		98	CU	11.6	2929			TV = 0.48 tsf
	64.8	TV										



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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$	$c_c$	
54/7	2.0' Recovery	400	68.0 to 70.0										
	Silty CLAY, sandy, gray, stiff consistency, moderately plastic (CL)  Sample includes 30 to 40% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	V400.1	68.1 to 68.4	26.3		VS		1300			St = 1.5		
		W400.1	68.4 to 68.5	26.3		96							
		TV	68.5	26.3								TV = 0.58 tsf	
		U400.1	68.5 to 68.8	25.9		98	U	8.9	788				
		L400.1	68.5 to 68.8	26.2	37								
		P400.0.1	68.8 to 69.1	25.9		98	UU	12.0	1148			$\sigma_c = 5112$ psf	
		W400.2	69.1 to 69.2	22.5		102							
		TV	69.2	22.5								TV = 0.54 tsf	
			saved	69.2 to 69.8									
			TV	69.8								TV = 0.56 tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/8	2.0' Recovery	73.0 to 75.0	401								
	Silty CLAY, gray, stiff consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains and silty fine Sand lenses	73.0 to 73.3	saved								
		73.3 to 73.4	W40L1	81							
		73.4	TV								TV = 0.54 tsf
		73.4 to 73.7	saved								
		73.7 to 74.0	C40L1						0.982	0.41	
		73.7 to 74.0	SC40L1								Specific Gravity=2.73
		73.7 to 74.0	L40L1		31.6	45	21				
		73.7 to 74.0	K40L1		31.6					0.851	see hydrometer see plot
		74.0 to 74.1	W40L2		30.0						
		74.1	TV		30.0						TV = 0.50 tsf
	74.1 to 74.7	saved									

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TABLE SUMMARY OF LABORATORY TEST RESULTS		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	OTHER TESTS AND REMARKS
58/2	Jar Sample Silty CLAY, dark greyish brown, moderate to high plasticity (CL)	6.0'	562		42 19							
			L562.1									

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TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS												DATE <u>July 1974</u>	
												SHEET <u>      </u> OF <u>      </u>	
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	$e_0$		$c_c$		
58/6	Jar Sample	563	25.0'										
	Silty CLAY, grey, moderate to high plasticity (CL-CH)	L563.1		48    20									

PROJECT: BELLE RIVER PLANT UNITS I & II			FILE NO. 1255							
TABLE SUMMARY OF LABORATORY TEST RESULTS			DATE July 1974							
			SHEET OF							
BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε	e <sub>o</sub>	
	SOIL DESCRIPTION	DEPTH (FEET)		w <sub>L</sub>	w <sub>p</sub>		MAX. SHEAR STRESS (PSF)			
58/10	Jar Sample	45.0'	564							
	Silty CLAY, Sandy, low to moderate plasticity (CL) Sample includes about 35% fine Sand grains		1564.1	27	19					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	$e_o$	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)							
58/13	Jar Sample Silty CLAY, Sandy, gray, moderately plastic (CL) Sample includes about 45% fine to coarse Sand grains (Subrounded to subangular in shape)	60.0'		34 17					

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u>												
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS DATE <u>July 1974</u>												
SHEET <u>      </u> OF <u>      </u>												
BORING SAMPLE	IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
58/17	Jar Sample Silty CLAY, dark gray, moderate to high plasticity (CL)	80.0'		566		43 20						

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE        OF         
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B59/3	1.8' Recovery; say 18.0' to 19.8' depth	76								
		saved								
		W76.1	32.1		83					
		TV	32.1							TV = 0.58 tsf
		V76.1	32.8			VS				
		U76.1	32.8		90	U	6.9	1056		
		L76.1	32.7	48	20					
		W76.1	31.6		90					
		TV	31.6							TV = 0.56 tsf
		saved								



TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
59/5	1.9' Recovery; say 38.0' to 39.9' depth; upper 0.5' disturbed	38.0 to 40.0 38.6 to 38.7	78 W78.1	26.7	94						
		38.7	TV	26.7							TV = 0.46 tsf
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)	38.7 to 39.0 38.7 to 39.0	U78.1 L78.1	26.2	99	14.9	626				
	Sample includes 20 to 25% fine to coarse Sand and fine Gravel size particles, subrounded to subangular in shape	39.0 to 39.3 39.3 to 39.4	saved W78.2	25.6	96						
		39.4	TV	25.6							TV = 0.47 tsf
		39.4 to 39.7	V78.1	25.6			637				

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE	
										SHEET OF	
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
59/7	1.5' Recovery; say 58.0' to 59.5' depth	58.0 to 60.0 58.1 to 58.4 58.4 to 58.6									
	Silty CLAY, sandy, dark gray, firm to stiff consistency, moderately plastic (CL)	58.6 to 58.9	25.0		100						TV = 0.49 tsf
	Sample includes 20 to 25% coarse to fine Sand and fine Gravel size particles (subrounded to subangular in shape)	58.6 to 58.9	26.3	36 18	98		U 8.0	835			
		58.9 to 59.0	24.5		102						
		59.0 to 59.3	24.1								TV = 0.51 tsf
			24.1			VS		734 (969)			
			24.1			rVS					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
59/9	Jar Sample	75.0	569								
	Clayey SAND, subrounded to subangular fine to coarse Sand and fine Gravel size particles with 35 to 40% low to moderately plastic fines (SC)		L569.1	22	14						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
59/11	Jar Sample	95.0	570								
	Silly CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand size particles (subrounded to sub-angular in shape)		L570.1	37	19						

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
B60/1	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	5.0 to 6.5	70		50 20					
			L70.1	27.3						
			H70.1							See plot
B60/2	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	10.0 to 12.5	71		44 19					
			L71.1	28.0						
			H71.1							See plot
B60/3	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	19.0 to 20.5	72		43 19					
			L72.1	30.3						
			H72.1							See plot
B60/5	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	27.0 to 28.5	73		48 20					
			L73.1	34.3						
			H73.1							See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE Jan. 1974  
SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/2	Silty CLAY; grayish brown, stiff to very stiff consistency, highly plastic (CL-CH)		8.0 to 10.0	42								
			8.0 to 8.3	save 42.1								
			8.3	TV	28.3							TV=1.1tsf
			8.3 to 8.4	W42.1	28.3							
			8.4 to 8.7	save 42.2								
			8.7 to 9.0	T42.1.3	28.9		96	CU	5.3	1336		
			8.7 to 9.0	T42.1.3	28.9		98	CU <sub>p</sub>	11.6	1751		Remolded sample
			9.0	TV	29.0							TV=0.88tsf
			9.0 to 9.1	W42.2	29.0							
			9.1 to 9.4	T42.1.2	29.3		95	CU	5.2	882		Remolded sample
			9.1 to 9.4	T42.1.2	29.3		99	CU <sub>p</sub>	10.8	1244		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		94	CU	3.6	530		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		96	CU <sub>p</sub>	15.0	875		Remolded sample
			9.7	TV	29.7							TV=1.1tsf
			9.7 to 9.8	W42.3	29.7							
			9.8 to 10.0	C42.1	30.0							Specific Gravity=2.71
			9.8 to 10.0	L42.1	29.7	53	26					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/3	2.0 Recovery; say 17.0' to 19.0' depth. Upper 0.5' disturbed	17.0 to 19.0	43								
		17.5	TV	29.9							TV=0.27 tsf
		17.5 to 17.6	W43.1	29.9							
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)	17.6 to 18.0	U43.1	24.3		105	U	20.0	1143		@15.0% strain s=1029 psf
		17.6 to 18.0	Ur43.1	24.3		103	Ur	20.0	1053		@15.0% strain s=879 psf
	Sample includes about 10% fine to coarse Sand grains (sub-rounded to subangular in shape)	17.6 to 18.0	L43.1	24.3	39	21					
		18.0	TV	19.2							TV=0.87 tsf
		18.0 to 18.1	W43.2	19.2							
		18.1 to 18.3	L43.1	26.1							
		18.1 to 18.3	H43.1								See plot
		18.6	TV	19.5							TV=0.46 tsf
		18.6 to 18.7	W43.3	19.5							
		18.7 to 19.0	save 43.1								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
B60/4	1.8' Recovery; say 21.0' to 22.8' depth  Silty CLAY, grayish brown, stiff consistency, highly plastic (CL-CH)  Includes about 5% coarse Sand and fine Gravel particles	21.0 to 23.0	44										
		21.1	TV	31.8									TV=0.52 tsf
		21.1 to 21.2	W44.1		31.8								
		21.2 to 21.5	T44.1.3		31.0	94	CU	3.8	2658				
		21.8	TV		30.9								TV=0.71 tsf
		21.8 to 21.9	W44.2		30.9								
		21.9 to 22.3	T44.1.1		30.4	94	CU	6.7	1389				
		21.9 to 22.3	I44.1		30.4	43	17						
		22.3	TV		29.9								TV=0.68 tsf
		22.3 to 22.4	W44.3		29.9								
		22.4 to 22.8	T44.1.4		30.6	95	CU	7.6	1588				



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$C_c$
B60/5	1.9' Recovery; say 25.0' to 26.9' depth  Silty CLAY; gray, moderate to high plasticity, firm to stiff consistency (CH-CL)	25.0 to 27.0	45									
		25.1	TV		34.8							TV=0.53 tsf
		25.1	W45.1		34.8							
		25.2 to 25.6	save 45.1									
		25.6	TV		35.5							TV=0.55 tsf
		25.6	W45.2		35.5							
		25.7 to 26.1	U45.1		36.8	86	U	4.0	1002			
		25.7 to 26.1	save 45.1		36.8	51	22					
		26.2	TV		36.3							
		26.2	W45.3		36.3							
		26.2 to 26.5	save 45.2									
		26.5	TV									TV=0.50 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
60/6	Silty CLAY, gray, firm to stiff consistency, high plasticity (CL-CH)	30.0-											
		32.0	46										
		30.1-	Saved										
		30.4	W46.1	40.4	81								
		30.4	TV										TV=0.47tsf
		30.5-	U46.1	35.0	88		U	3.7	1577				
		30.5-	L46.1	34.7	48	25							
		31.0	V46.1	34.0			VS		1000				
		31.3	TV				rVS		550				TV=0.40tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B60/8	1.7' Recovery; say 40.0' to 41.7' depth  Silty CLAY; dark gray, moderate to high plasticity, firm consistency (CL-GH)  Includes about 10% Silty fine Sand occurring as pockets or lenses 1/8" to 3/8" long	40.0 to 42.0										
		40.1	TV	23.6								TV=0.46 tsf
		40.1 to 40.2	W48.1	23.6								
		40.2 to 40.6	save 48.1									
		40.6	TV	33.7								TV=0.40 tsf
		40.6	W48.2	33.7								
		40.7 to 41.1	U48.1	39.7		83	U	3.0	338			
		40.7 to 41.1	L48.1	39.7	47	25						
		41.1	TV	41.4								TV=0.40 tsf
		41.1	W48.3	41.4								
		41.1 to 41.5	save 48.2									
		41.5	TV									TV=0.33 tsf

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/9	1.9' Recovery; say 45.0' to 46.9' depth	45.0 to 47.0	49								
		45.1	TV	25.9							TV=0.45tsf
	Silty CLAY, sandy, dark gray, firm to stiff consistency, highly plastic (CL)	45.1 to 45.2	W49.1	25.9							
	Includes about 30% subangular to subrounded fine Gravel to coarse Sand size particles	45.2 to 45.5	T49.1.3	26.0		102	CU	8.5	2510		
		45.5 to 45.8	T49.1.2	27.0		98	CU	8.2	1499		
		45.8	TV	25.4							TV=0.50tsf
		45.8 to 45.9	W49.2	25.4							
		45.9 to 46.3	T49.1.1	26.6		99	CU	12.9	1267		
		45.9 to 46.3	L49.1	24.8	38 16						
		46.3	TV	25.3							TV=0.52tsf
		46.3 to 46.4	W49.3	25.3							
		46.4 to 46.7	save 49.1								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
60/10	1.7' Recovery; say 50.0' to 51.7' depth; upper 0.5' disturbed	—								
		50								
		W50.1	29.3							
		saved								
	Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)	TV								TV=0.36 tsf
		U50.1	25.5			100	U	15.2	1255	@20% strain s=1367 psf
		L50.1	25.7	34	16					
	Sample includes about 10% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	W50.2	25.9			97				
		TV								TV=0.42 tsf
		V50.1					VS	1950		
							rVS	1050		
	Few thin (± 1/16" thick) lenses / layers of SILT, grey, non-plastic (ML) appear throughout comprising 5% of total sample									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE March 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/11	1.8' Recovery; say 55.0' to 56.8' depth	55.0 to 57.0	51								
		55.1	TV	25.9							TV=0.33 tsf
	Silty CLAY, dark gray, moderate plasticity, firm to stiff consistency (CL)	55.1 to 55.2	W51.1	25.9							
		55.2 to 55.5	save 51.1								
		55.5	TV	24.8							TV=0.63 tsf
		55.5 to 55.9	U51.1	24.8		103	U	24.0	1407		@15.0% strain s=1299 psf
		55.5 to 55.9	J <sub>r</sub> 51.1	24.8		103	U <sub>r</sub>	20.0	1002		@15.0% strain s=817 psf
		55.5 to 55.9	L51.1	24.8	33	18					
		56.0	TV	25.9							TV=0.50 tsf
		56.0	W51.2	25.9							
		56.1 to 56.4	K51.1	25.5							
		56.1 to 56.4	S/H 51.1								See plot
		56.4	TV	25.9							TV=0.46 tsf
		56.4	W51.3	25.9							
		56.4 to 56.7	save 51.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974

SHEET 06 OF 06

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/12	0.5' Recovery; say 60.0' to 60.5' depth  Silty CLAY, dark gray, moderate plasticity (CL) Entire sample disturbed	60.0 to 62.0	52								
		60.0 to 60.2	W52.2	28.9							
		60.2	W52.1	27.9							
		60.2 to 60.4	L52.1	27.9	36	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B60/13	1.9' Recovery; say 67.0' to 68.9' depth	67.0 to 69.0	53								
		67.1	TV	24.7							TV=0.63 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	67.1 to 67.2	W53.1	24.7							
	Sample includes zones of Silty CLAY, gravelly, stiff to very stiff consistency, moderately plastic (CL) and Clayey GRAVEL, sandy, slightly plastic (GC)	67.2 to 67.5	T53.1.4	15.5		114	CU	12.9	4613		
		67.2 to 67.5	T53.1.5	21.0		104	CU	11.9	3178		TV=0.95 tsf
		67.5	TV	16.4							
		67.5 to 67.6	W53.2	16.4							
		67.6 to 67.9	T53.1.3	19.7		104	CU	15.0	4060		
		67.9	TV								TV=0.48tsf
		67.9 to 68.3	L53.1	29.4	40	19					
		68.3 to 68.6	T53.1.1	23.6		104	CU	15.0	1945		
		68.3 to 68.6	T53.1.2	31.9		91	CU	6.2	1723		
		68.6	TV								TV=0.50 tsf
		68.6 to 68.7	W53.3	33.2							



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B60/14	2.2' Recovery; say 74.0' to 76.2' depth	74.0 to 76.5	54									
		74.4	TV	25.9							TV=0.54tsf	
	Silty CLAY, dark gray, moderately to highly plastic, medium consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	74.4	W54.1	25.9								
		74.5 to 75.0	save 54.1									
		75.0	TV	26.8								TV=0.70tsf
		75.0	W54.2	26.8								
		75.1 to 75.6	U54.1	26.9	97			U	5.0	652		
		75.1 to 75.6	L54.1	26.9	40	20						
		75.6	TV	26.0								TV=0.70tsf
		75.6	W54.3	26.0								
		75.6 to 76.0	save 54.2									
		76.0	TV									TV=0.63tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/16	2.4' Recovery; say 84.0' to 86.4' depth	84.0 to 86.5	56.0								
	Silty CLAY, dark gray, moderate to high plasticity, firm consistency (CL)  Includes about 20% fine to coarse sand particles and ±15% subangular to subrounded Gravel particles	84.2	TV	27.4							TV=0.62 tsf
		84.2	W56.1	27.4							
		84.2 to 84.6	save 56.1								
		84.6	TV	26.7							TV=0.73 tsf
		84.6	W56.2	26.7							
		84.7 to 85.1	save 56.2								
		85.2 to 85.4	C56.1	27.9					.744	.27	
		85.2 to 85.4	L56.1	26.9	40	19					
		85.2 to 85.4	SC56.1								Specific Gravity=2.73
		85.6	TV	26.1							TV=0.65 tsf
	85.6	W56.3	26.1								
	85.6 to 86.1	k56.1	29.1								
	85.6 to 86.1	S/H 56.1								See plot	
	86.1	TV								TV=0.65 tsf	

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
B60/19	2.5' Recovery; say 99.0' to 101.5' depth	59								
		TV	27.6							TV=0.61 tsf
	Silty CLAY; dark gray, highly plastic, firm to stiff consistency (CL)	W59.1	27.6							
	Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	99.5 to 99.9								
		TV	26.9							TV=0.80 tsf
		W59.2	26.9							
		100.0 to 100.4	U59.1	27.1		101	U	7.0	1132	
		100.0 to 100.4	L59.1	27.1	38	20				
		100.4	TV	26.8						TV=0.80 tsf
		100.4	W59.3	26.8						
		100.5 to 100.9	save 59.2							
		100.9	TV							TV=0.66 tsf
		100.9 to 101.4	save 59.3							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255		DATE Jan. 1974		SHEET ___ OF ___		
TABLE SUMMARY OF LABORATORY TEST RESULTS		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		TEST TYPE	MAX. SHEAR STRESS (PSF)	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP			DRY UNIT WEIGHT (PCF)
B60/23	2.3' Recovery; say 119.0' to 121.3' depth	119.0 to 121.5	63					
		119.6	TV	32.9				TV=0.35 tsf
	Silty CLAY, gray mottled reddish brown, low plasticity, soft consistency; includes about 40% fine to coarse Sand grains (subrounded to subangular) (CL-ML) At 120.0' change to Clayey SAND about 10% hard, subrounded to subangular Gravel particles, about 15% plastic and non-plastic fines (SC)	119.6 to 120.0	W63.1	32.9				
		120.0	U63.1	15.4	115	U	6.0 335	
		119.6 to 120.0	L63.1	15.4	17 11			
		120.0	TV	12.9				TV=0.10 test performed on sand lens
		120.0	W63.2	12.9				
		120.1 to 120.5	save 63.1					
		120.5	TV	17.2				TV=0.21 tsf
		120.5	W63.3	17.2				
		120.5 to 121.0	save 63.2					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET 1 OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
101/2	Silty CLAY, olive brown very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard, subrounded to rounded gravel size particles	8.0 to 10.0	349									
		8.1 to 8.7	save 349.1									sample used for T466.1, 2, 3
		8.7 to 8.9	W349.1	27.7	94							
		8.9 to 9.2	U349.1	27.8	96			U	2.4	1828		
		8.9 to 9.2	L349.1	27.8	50	22						
		9.2	TV									
		9.2 to 10.0	save 349.2									TV=1.8tsf sample used for T466.1, 2, 3

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE April 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/4	2.3' Recovery; Say 19.0' to 21.3' depth	19.0 to 21.5	351								
		19.0 to 19.3	save 351.1								
		19.3 to 19.5	W351.1			89					
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	19.5	TV								TV=0.48tsf
		19.5 to 19.9	save 351.2								
		19.9 to 20.2	U351.1			86		U	6.0	1014	
		19.9 to 20.2	L351.1		49	24					
		20.2 to 20.4	W351.2			88					
		20.4	TV								TV=0.38tsf
		20.4 to 20.8	save 351.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
101/7	2.1' Recovery; Say 34.0' to 36.1' depth  Silty CLAY, gray, firm consistency, moderately to highly plastic (CL-CH)	34.0 to 36.5	—								
		34.1 to save	354								
		34.4	354.1								
		34.4 to 34.6	W354.1		39.9	81					
		34.6	TV								TV=0.27tsf
		34.6 to 34.9	save 354.2								
		34.9 to 35.2	U354.1		40.0	81		U	2.4	796	
		34.9 to 35.2	L354.1		37.8	46	24				
		35.2 to 35.4	W354.2		38.6	83					
		35.4	TV								TV=0.34tsf
		35.4 to 35.7	save 354.3								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/10	2.4' Recovery; Say 49.0' to 51.4' depth	49.0 to 51.6	357								
		49.1 to 49.4	save 357.1								
		49.4 to 49.6	W357.1	33.0		88					
	Silty CLAY; dark gray, firm consistency, moderately plastic (CL)	49.6	TV								TV=0.32tsf
		46.6 to 49.9	save 357.2								
	Sample includes about 20% coarse to fine sand grains (subrounded to subangular in shape)	50.1 to 50.4	U357.1	32.8		90			5.0	722	
		50.1 to 50.4	L357.1	31.0	40	22					
		50.4	TV								TV=0.44tsf
		50.6 to 50.8	W357.2	28.8		93					
		50.8	TV								TV=0.30tsf
		50.8 to 51.2	save 357.3								



PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
DATE April 1974  
SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/13	2.4' Recovery; say 64.0' to 66.4' depth	64.0 to 66.5	360								
		64.6 to 64.9	save 360.1								
	Silty CLAY; sandy, gray, stiff consistency, moderately plastic (CL)	64.9	TV								TV=0.49tsf
		64.9 to 65.1	W360.1	26.3	97						
		65.2 to 65.6	U360.1	26.6	97		U	20.0	1430		@15.0%strain s=1337 psf
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	65.2 to 65.6	360.1	26.6	39	19					
		65.6 to 65.8	W360.2	26.2	96						
		65.8	TV								TV=0.52tsf
		65.8 to 66.1	save 360.2								

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 DATE April 1974  
 SHEET      OF     

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
101/15	1.0' Recovery; Say 74.0' to 75.0' depth  Silty CLAY; sandy, dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 30% coarse sand and fine gravel size particles (subrounded to subangular in shape)	74.0 to 76.5										
		74.1 to 74.4	362.1									
		74.4 to 74.6	W362.1	24.5		99						
		74.6	TV									TV=0.69tsf
		74.6 to 74.9	T362.01	22.8		105	UU	17.0	1098			@15.0% strain s=1054 psf
		74.6 to 74.9	L362.1	22.8	36	21						

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
101/17	2.3' Recovery; Say 84.0' to 86.3' depth  Silty CLAY; sandy, dark gray, stiff consistency. moderately plastic (CL)  Sample includes about 30% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	84.0 to 86.5	—									
		84.1 to 84.4	save									
		84.4 to 84.6	W364.1		23.9		98					
		84.6 to 84.9	TV									TV=0.60tsf
		84.9 to 85.2	save									
		85.2 to 85.5	UB364.1		25.2		97	U	20.0	207		@15.0% strain s=1923 psf
		85.5 to 85.7	W364.2		25.2	37	19					
		85.7 to 86.1	TV		26.2		99					TV=0.57tsf
			save									
			364.3									

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974							
IDENTIFICATION		SHEET ___ OF ___							
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES	STRENGTH	CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>
101/19	1.3' Recovery; say 94.0' to 95.3' depth; upper 0.9' disturbed (Wash?)	94.0 to 96.5	366						
		94.9	TV						
		94.9 to 95.3	366.0.1	24.5		UU	20.0		
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	94.9 to 95.3	1366.1	24.5	36 20				
	Sample includes about 15% coarse sand and fine gravel size particles (subrounded to subangular in shape)								

TV=0.36tsf @15.0%strain s=548 psf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
101/23	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 10% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	119.0 to 121.5										
		119.1 to 119.4	370.1									
		119.4 to 119.5	W370.1	31.8		91						
		119.5	TV									TV=0.42 tsf
		119.5 to 119.8	370.2									
		119.8 to 120.2	U370.0.1	37.2		85			UU	8.0	721	
		119.8 to 120.2	L370.1	37.2	44	22						
		120.2 to 120.4	W370.2	32.6		88						
		120.4	TV									TV=0.55tsf
		120.4 to 120.7	370.3									
		120.7 to 121.1	370.4									

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DATE April 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
105/1	Silty CLAY; olive brown and grayish brown, very stiff to hard consistency, highly plastic (CH)  Sample includes about 5% hard, rounded gravel sized particles	4.0 to 6.0	373								
		4.2 to 4.5	save 373.1								
		4.5 to 4.7	W373.1	100							
		4.7 to 5.0	save 373.2								
		5.0	TV								TV=2.00tsf
		5.1 to 5.4	C373.1						.642	.10	
		5.1 to 5.4	L373.1		53 24						
		5.1 to 5.4	SC373.1								specific gravity=2.72
		5.4 to 5.6	W373.2	101							
		5.6 to 5.9	save 373.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/2	<p>Silty CLAY, olive brown and greyish brown, very stiff consistency, moderate to highly plastic (CL)</p> <p>Sample includes about 5% hard subrounded gravel particles to 3/4" max. size</p> <p>Note: Saved material used as part of MC466.1 and T466.1.1, 2, 3 test series</p>	9.0-11.0	—									
		9.1-9.4	T374.14	27.7		98	CU	5.8	1189			$\bar{\sigma}_c = 864 \text{psf}$
		9.4-9.7	L374.1	27.6	46	24						
		9.7-9.9	W374.1	26.1		100						
		9.9-10.2	T374.1.1	26.3		97	CU	3.0	1273			$\bar{\sigma}_c = 576 \text{psf}$
		10.2	TV									TV-1.1tsf
		10.2-10.6	T374.1.2	26.4		99	CU	4.4	1227			$\bar{\sigma}_c = 1152 \text{psf}$
		10.6-10.9	T374.1.3	26.9		96	CU	10.5	2191			$\bar{\sigma}_c = 2304 \text{psf}$

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July, 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/3	Silty CLAY, grey, medium consistency, moderately plastic (CL)  Sample includes about 5% fine to coarse Sand grain (subrounded to subangular in shape)	20.0-									
		22.0	375								
		20.1-									
		20.4	Saved								
		20.4-									
		20.6	W375.1	85							
		20.6	TV								TV=0.39tsf
		20.6-									
		20.9	Saved								
		20.9-									
		21.2	L375.1		33.4	42	20				
		21.2-									
		21.4	W375.2	86	33.3						TV=0.41tsf
	21.4	TV									
	21.4-										
	21.7	Saved									



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TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/4	SOIL DESCRIPTION		30.0- 32.0	—								
	1.1' Recovery; say 30.0' to 31.1' depth		30.7- 31.0	376								
	Silty CLAY, grey, moderately plastic (CL)			Saved								
	Note: Entire Sample much disturbed.											

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/5	2.2' Recovery; say 40.0' to 42.2' depth	40.0-42.5	377								
		40.1-40.4	T377.1A	39.2		84	CU	7.6	1902		$\bar{\sigma}_c = 7200$ psf
		40.4	TV								TV=0.35 tsf
		40.4-									
		40.6	W377.1	35.7							
		40.6-41.0	T377.1I	35.9		84	CU	5.9	1068		$\bar{\sigma}_c = 1800$ psf
		40.6-									
		41.0	L377.1	35.9	44	21					
		41.0-41.3	T377.1J	35.9		85	CU	3.1	1376		$\bar{\sigma}_c = 3600$ psf
		41.3-									
		41.5	W377.2	34.9		86					
		41.5	TV								TV=0.37 tsf
		41.5-41.8	T377.1K	35.1		85	CU	3.8	1830		$\bar{\sigma}_c = 7200$ psf

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
105/6	1.7' Recovery; say 50.0' to 51.7' depth	378								
	Silty CLAY, grey, medium consistency, highly plastic (CH)	50.0-52.5								
		50.0-50.3	Saved							
		50.3-50.5	W378.1	42.8	76					
		50.5	TV							TV=0.35tsf
		50.5-50.8	Saved							
		50.8-51.1	L378.2	46.2	57	25				
		51.1-51.3	W378.2	41.2	78					
		51.3	TV							TV=0.33tsf

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255		
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974		
IDENTIFICATION										SHEET OF		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
105/8	2.3' Recovery; say 70.0' to 72.3' depth	70.0-72.5	380									
		70.1-70.4	Saved									
	Silty CLAY, dark grey, stiff consistency, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	70.4-70.6	W380.1	23.9		100						
		70.6	TV								TV=0.65tsf	
		70.6-70.9	Saved									
		70.9-71.2	C380.1	23.7						0.625	.21	
		70.9-71.2	L380.1	23.8	37	19						
		70.9-71.2	SG 380.1									Specific Gravity-2.70
		71.3-71.5	W380.2	23.5			100					
		71.5	TV									TV=0.70tsf
		71.5-71.8	Saved									
		71.8-72.2	Saved									

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
105/10	1.6' Recovery; say 90.0' to 91.6' depth  Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	90.0-92.0	382										
		90.5-90.6	W382.1	31.0	84								
		90.6	TV										TV=0.17tsf
		90.6-90.9	L382.1	29.4	34	19							
		90.9-91.2	Saved										
		91.2-91.3	W382.2	30.3	88								
		91.3	TV										TV=0.18tsf

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
105/11	1.7' Recovery; say 110.0' to 111.7' depth; upper 0.7' disturbed, WASH? ?	110.0- 111.5	383								
		110.7- 110.9	W383.1	31.7		86					
	Silly CLAY, grey, soft consistency, moderately plastic (CL)	110.9	TV								TV-0.25tsf
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)	110.9- 111.3	Saved								
	Note: Entire Sample disturbed.										

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	
105/12	0.7' Recovery; say 120.0' to 120.7' depth	384								
		W384.1	22.1		102					
	Silty CLAY, Sandy, dark gray, medium consistency, moderate plasticity (CL)	saved								
	Sample includes about 35% fine to coarse SAND grains (subrounded to subangular in shape)	I384.1	20.4	29	17					
	Note: Entire sample slightly disturbed									

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
118/1	2.1' Recovery; say 3.0' to 5.1' depth; upper 1.0' disturbed (WASH??)		3.0-5.0	252								
	Silty CLAY, greyish brown, hard consistency, moderate to highly plastic (CL-CH)		4.0-4.3	L252.1	21.4	49 26						
			4.4-4.5	W252.1	22.3		101					
			4.5	TV								TV > 2.5tsf
			4.6-5.0	Saved								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
118/2	1.5' Recovery; say 8.0' to 9.5' depth	8.0 - 10.0'	253								
		8.1'	W253.1	23.8							
	Silty CLAY, dark grayish brown, very stiff to hard consistency, highly plastic (CL - CH)	8.2 - 8.5'	T253.2	23.0	107	CD	4.3	754		$\bar{\sigma}_c = 576$ psf	
		8.2 - 8.5'	L253.1	23.3	49	23					
		8.5'	W253.2	21.5							
		8.6 - 8.9'	T253.2	23.3		105	CD	3.6	1248		$\bar{\sigma}_c = 1152$ psf
	Sample includes ±5% coarse Sand and fine Gravel size particles	8.9 - 9.2'	T253.3	24.2		103	CD	2.2	2156		$\bar{\sigma}_c = 2304$ psf
		9.2 - 9.5'	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
118/3	2.1' Recovery; say 18.0' to 20.1' depth; upper 0.5' disturbed  Silly CLAY, grey, firm consistency, moderate to high plasticity (CL)		—									
			18.0 - 20.0	254								
			18.7 - 18.9	W254.1	35.5		84					
			18.9	TV								TV=0.37tsf
			18.9 - 19.3	Saved								
			19.3 - 19.5	W254.2	31.6		89					
			19.5	TV								TV=0.40tsf
			19.5 - 19.9	L254.1	35.3	45	23					

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
118/4	21.4' Recovery; say 28.0' to 30.1' depth	28.0-30.0	255										
		28.5-28.6	W255.1	25.3		94							
	Silty CLAY, gray, mottled very dark gray, firm to stiff consistency, moderate plasticity (CL)	28.6	TV								TV= 0.28 tsf		
		28.6-28.9	saved										
		28.9-29.3	saved										
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	29.3-29.4	W255.2	20.6		103							
		29.4	TV								TV=0.64 tsf		
	Note: Upper 1.3' of sample slightly disturbed	29.4-29.8	saved										

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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
118/5	Silty CLAY, greyish brown, firm consistency, moderately plastic (CL)		38.0-40.0	—									
			38.1-38.4	256	Saved								
			38.4	TV	TV								TV=0.34tsf
			38.4-										
			38.6	W256.1			36.9		85				
			38.6-										
			38.9	Saved									
			38.9-										
			39.3	C256.1			36.9					0.969	0.39
			38.9-39.3	I256.1			36.9	41	22				
			39.3	SG									Specific Gravity-2.70
			39.3	256.1									TV-0.35tsf
			39.3	TV									
			39.3-										
	39.5	W256.2			36.6		86						
	39.5-												
	39.8	Saved											

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
118/6	2.1' Recovery; say 48.0' to 50.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes few thin lenses/layers of SILT, Sandy (ML) comprising ±5% of total	48.0-50.0	—									
		48.4-	257									
		48.5	W257.1	42.6	76							
		48.5	TV									TV=0.30tsf
		48.5-48.8	Saved									
		48.8-	Saved									
		49.2	Saved									
		49.2-49.3	W257.2	43.9	76							
		49.3	TV									TV=0.43tsf

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TABLE: SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
IDENTIFICATION										SHEET 1 OF 1	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
118/9	1.9' Recovery; say 78.0' to 79.9' depth; upper 0.3' disturbed	78.0-80.0	260								
		78.1-78.4	Saved								
	Silty CLAY; dark grey, stiff consistency, moderately plastic (CL)	78.4-78.7	W260.1	22.1		103					TV=0.68tsf
		78.7	TV								
		78.7-									
		79.0	C260.1	27.8					0.741	.24	
	Sample includes about 20% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	78.7-79.0	L260.1	25.3	42	23					
		78.7-	SG								Specific Gravity -2.70
		79.0	260.1								
	Note: Proportions of Sand and fine Gravel increase with depth approaching 40% near bottom of sample.	79.0-79.4	Saved								
		79.4-									
		79.7	W260.2	13.1		123					

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TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
B119/1	0.8' Recovery; say 3.0' to 3.8' depth  Silty CLAY; dark grayish brown mottled light olive brown, stiff to very stiff consistency, moderately to highly plastic (CL)		3.0 to 5.0	331										
			3.1	TV	32.4								TV=1.0 tsf	
			3.1	W33L1	32.4									
			3.1 to 3.4	save 33L1										
			3.4	TV	25.4									
			3.4 to 3.8	Y33L1	25.4	98								TV=1.34 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B119/2	Recovery 2.2'; say 8.0' to 10.2' depth	8.0 to 10.0	332								
	Silty CLAY, dark, grayish brown, very stiff consistency, moderately to highly plastic (CL)	8.2	TV								TV=1.25 tsf
	Sample includes about 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	8.2 to 8.3	W332.1	28.4							
		8.3 to 8.6	T332.1.3	27.9	98	CU	2.2	2012			
		8.6	TV								TV=1.43 tsf
		8.6 to 9.0	T332.1.4	29.2	94	CU	1.5	1240			
		9.0	TV								TV=1.43 tsf
		9.0 to 9.1	W332.2	27.5							
		9.1 to 9.4	T332.1.1	28.3	95	CU	2.2	887			
		9.4	TV								TV=1.50 tsf
		9.4 to 9.5	W332.3	29.2							
		9.5 to 9.7	L332.1	30.8	53	26					
	9.7 to 10.1	save 332.1									



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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B119/3	1.9' Recovery; say 20.0' to 21.9' depth; upper 0.3' disturbed	333								
		St	37.3							TV=0.31 tsf IV <sub>R</sub> =0.17 tsf
	Silty CLAY: dark gray, firm consistency, highly plastic (CL-CH)	W333.1	37.3							
		20.4 to save								
		20.7								
		TV								TV=0.32 tsf
	Sample includes about 5 to 10% coarse Sand grains (subrounded to subangular in shape)	333.2								
		21.1								
		TV	37.2							TV=0.31 tsf
		21.1 to								
		21.2	37.2							
		W333.2								
		21.2 to save								
		21.5								
		333.3								
		TV								
		21.5								
		TV								TV=0.29 tsf
		21.5 to								
		21.9	36.3	83						
		W333.1								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	C <sub>c</sub>		
B119/4	Silty CLAY: very dark grayish brown, soft to firm consistency, highly plastic (CL)	—	30.0 to 32.0											
		334	30.1	35.4										TV=0.24 tsf
		TV	30.1 to 30.2											
		W334.1	30.2 to 30.5	35.4										
	Sample includes ±5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	save 334.1	30.5											TV=0.26 tsf
		TV	30.5 to 30.8											
		T334.1.3	30.8	35.3		87	CU	5.6	1655					TV=0.29 tsf
		St	30.8 to 30.9	37.8										TV=0.11 tsf
		W334.2	30.9 to 31.2	37.8		85	CU	1.5	1229					
		T334.1.2	31.2	38.5										TV=0.30 tsf
		TV	31.2 to 31.6											
		T334.1.1	31.6	36.9		86	CU	1.5	985					
		I334.1	31.2 to 31.6	36.4										
		save 334.2	31.6 to 31.9	41.22										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B119/5	Silty CLAY: dark grayish brown, soft to firm consistency, highly plastic (CL-CH)		40.0 to 42.5	335								
			40.2 to 40.5	TV	35.4		88					TV=0.26 tsf
			40.5 to 40.6	TV	35.6							TV=0.27 tsf
			40.6 to 40.9	W335.1 save 335.1	35.6							
			40.9 to 41.3	TV								TV=0.29 tsf
			41.3 to 41.4	save 335.2								TV=0.27 tsf
			41.4 to 41.7	St	36.0							TV <sub>R</sub> =0.14 tsf
			41.7 to 42.1	W335.2 save 335.3	36.0							
			42.1 to 42.1	TV								TV=0.31 tsf
												TV=0.30 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
B119/9	2.1' Recovery; say 80.0' to 82.1' depth	80.0 to 82.5	339								
		80.1	TV	22.4							TV = 0.90 tsf
		80.1 to 80.2	W339.1	22.4							
		80.2 to 80.5	save 339.1								
		80.5 to 80.8	W339.1	21.6		107					
		80.5 to 80.8	save 339.2								
		80.8	TV	21.0							TV = 1.0 tsf
		80.8 to 80.9	W339.2	21.0							
		80.9 to 81.2	save 339.3								
		81.2 to 81.5	save 339.4								
		81.5	TV	22.1							TV = 0.73 tsf
		81.5 to 81.6	W339.1	22.1							
		81.6 to 81.9	U339.1	20.7		107					@15% Strain s = 3072 psf
		81.6 to 81.9	L339.1	20.7	33	20					

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
126/3	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard subrounded to subangular gravel particles	8.0 to 10.0								
		8.2 to 8.6	26.2	99	U	2.4	1735			
		8.2 to 8.6	26.6	47	24					
		8.6 to 8.8	27.1	97						
		9.1	TV							TV=1.12tsf
		9.4 to 9.6	W24.2	27.0	96					
		9.6 to 9.9	save 241.2							

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE April 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>		
126/5	1.9' Recovery: Say 18.0' to 19.9' depth	18.0 to 20.0	242										
		18.4 to 18.5	W242.1	49.3									
		19.2 to 19.3	W242.2	34.7									
	Silty CLAY, grayish brown soft consistency, moderately to highly plastic (CL-CH)	19.6 to 19.8	L242.1	35.6	47	23							
	Note: Entire sample disturbed												

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SUMMARY OF LABORATORY TEST RESULTS

SHEET

OF

IDENTIFICATION

CONSO-LI-DATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSO-LI-DATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/7	Silty CLAY, dark grayish brown, soft consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse to fine sand grains (subrounded to subangular in shape)  Note: Entire sample disturbed	28.0 to 30.0	243									
		28.5	TV									
		28.5 to 28.7	W2431			86						TV=0.18tsf
		29.0 to 29.3	save 243.1									
		29.3 to 29.5	W243.2			86						
		29.5	TV									
		29.5 to 29.9	save 243.2									TV=0.19tsf

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
126/11	SOIL DESCRIPTION	DEPTH (FEET)	—								
	2.3' Recovery; Say 48.0' to 50.3' depth	48.0 to 50.5	245								
		48.2 to 48.5	save 245.1								
		48.5 to 48.7	W245.1	46.3		76					
	Silty CLAY, gray, firm consistency, highly plastic (CH)	48.7	TV								TV=0.35tsf
		48.7 to 49.1	save 245.2								
		49.1 to 49.4	T245.01	41.1		81	UU	4.0	498		
	Sample includes about 10% fine gravel and coarse sand size particles (subrounded to subangular in shape)	49.1 to 49.4	L245.1	41.2	59	25					
		49.4 to 49.6	W245.2	41.4		80					TV=0.40tsf
		49.6	TV								
		49.6 to 49.9	save 245.3								



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/13	Silty CLAY, dark grey, firm consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  few layers/lenses ±1" thick of Silty CLAY, Sandy, very stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to medium Sand grains (subrounded to subangular in shape)	58.0-60.5										
		58.2-58.5	246									
		58.5-58.7	W246.1	38.8		79						Silty Clay Portion
		58.7	TV									TV=0.32tsf
		59.0-59.3	L246.1	32.9	40	23						
		59.9-60.0	W246.2	22.1		104						Silty clay, Sandy layer
		60.0	TV									TV=0.46tsf
		60.0-60.3	Saved									

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FILE NO. 1255

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/15	2.4' Recovery; say 68.0' to 70.4' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel sized particles (sub-rounded to subangular in shape)	68.0-70.5										
		68.3-68.7										
		68.7-68.8	W247.1	24.1		99						
		68.8	TV									TV=0.50tsf
		68.8-69.3	L247.1	23.2	34	18						
		69.6-69.9	Saved									
		70.1-70.2	W247.2	24.0		100						
		70.2	TV									TV=0.47tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/23	Silty CLAY; dark gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	108.0 to 110.0	251									
		108.1 to 108.4	save 251.1									
		108.4 to 108.6	W251.1		25.1		97					
		108.6	TV									TV=0.48tsf
		108.6 to 108.9	I251.0.1		25.3		96					@15.0%strain
		108.6 to 108.9	I251.1		23.6	36 20						s=1339 psf
		109.2 to 109.4	W251.2		24.2		97					
		109.4	TV									TV=0.48 tsf
		109.4 to 109.8	save 251.3									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
127/2	1.4' Recovery; Say 3.5' to 4.9' depth	3.5 to 5.5	302								
		3.6 to 4.0	save 302.1								
	Silty CLAY; grayish brown, stiff consistency, moderately to highly plastic (CL-CH)	4.0 to 4.2	W302.1	24.2		99					
		4.2	TV								TV=0.87tsf
		4.2 to 4.5	save 302.2								
		4.5 to 4.8	I302.0.1	24.9		103	UU	8.0	2099		
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	4.5 to 4.8	I302.1	23.1	48 24						

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
127/3	<p>Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL-CH)</p> <p>@ 5.2' change to -            Clayey SAND, dark grey, fine to coarse Sand grains with about 40% moderately plastic fines (SC) roots and fibers evident</p> <p>@ 5.6' change to -            Silty CLAY, olive grey, firm to stiff consistency, moderate to high plasticity (CL-CH)</p> <p>Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)</p>	5.0-7.0	416									
		5.1	TV									TV=1.20tsf
		5.4-5.5	W416.1		29.3	77						
		5.0-5.2	MC									See plot
		5.6-7.0	416.1									TV=0.68tsf
		5.9	TV									
		6.2-6.3	W416.2		27.0	94						
		6.6	TV									TV=1.1tsf
		6.6-7.0	L416.1		25.8	49	22					
		6.6-7.0	416.1		13.5	113	rU	3.2	9403			Test at 95% of MC 416.1

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS      DATE <u>April 1974</u> SHEET <u>      </u> OF <u>      </u>													
BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$		
127/4	1.6' Recovery; Say 8.0' to 9.6' depth		8.0 to 10.0	417								sample used for T466.1.2, 3	
			8.1 to 8.7	save 417.1									
			8.7 to 8.9	W417.1		21.9	107					sample used for T466.1.2, 3	
	Silty CLAY, olive brown mottled grayish brown, very stiff to hard consistency, moderately to highly plastic (CL-CH)		8.9 to 9.6	save 417.2								TV=2.0 tsf	
	Sample includes about 20% coarse to fine sand and fine gravel size particles (sub-rounded to subangular in shape)		9.1	TV									

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
127/8	2.1' Recovery; say 16.0' to 18.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes lenses/layers which contain about 20% fine to coarse Sand grains (sub-rounded to subangular in shape)	16.0-18.0	—									
			421									
			16.2-16.5	Saved								
			16.6-16.7	W421.1	28.0	91						
			16.7	TV								TV=0.77tsf
			16.7-17.0	Saved								
			17.0-17.3	Saved								
			17.3-17.4	W421.2	30.7	93						
			17.4	TV								TV=0.40tsf
			17.4-17.7	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
127/11	Jar Sample	28.5 - 30.0	456									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  *Note: Water content taken from unsealed jar sample		W456.1	22.8								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/13	Jar Sample	38.0-40.0	457								
	Silty CLAY, grey, moderate plasticity (CL)		W457.1	21.4							
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
127/14	Jar Sample		43.5-45.0	458								
	Silty CLAY, dark grey, moderate plasticity (CL)			1458.1	32	18						
	Sample includes < 5% fine to coarse Sand grains (subrounded to subangular in shape)											

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TABLE        SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
127/15	Jar Sample	48.5 - 50.0	459								
	Silty CLAY, dark grey, moderate plasticity (CL)		W459.1	20.6							
	Sample includes 10 to 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %		MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>
127/18	Jar Sample	63.5-65.0										
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10 to 15% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)  *Note: Water content taken from unsealed jar sample											

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 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
127/19	Jar Sample	—									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	68.5-									
		70.0	461								
			L461.1		33	16					

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	$C_c$	
127/24	Jar Sample	93.5 - 95.0	462									
	SILT, grey, non-plastic (ML)		W462.1	24.9*								
	Sample includes about 25% fine Sand grains											

\*Note: Water content taken from unsealed jar sample

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (psf)	e <sub>0</sub>	
127/29	Jar Sample	—								
		113.5- 115.0								
	Silty CLAY, dark gray, moderate plasticity (CL)	L463.1	41	21						
	Sample includes 5 to 10% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)									

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF) $w_p$	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)	$e_0$	
127/32	Jar Sample	128.5- 130.0	464								
	Silty CLAY, dark gray, moderate plasticity (CL)		W464.1	30.9*							

\*Note: Water content taken from unsealed jar sample.



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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
129/3	1.1' Recovery; Say 8.0' to 9.1' depth; upper 0.3' disturbed (Wash?)	386									
		save 386.1									
		TV									TV = 1.5tsf
	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)	8.6 to 8.7	22.9		108						
		8.7 to 9.0	22.3		108	UU	6.0	3381			
		8.7 to 9.0	22.9	48	23						

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
129/5	2.1' Recovery; say 18.0' to 20.1' depth	387									
		Saved									
	Silty CLAY, greyish brown, stiff consistency, moderate to highly plastic (CL-CH)	T387.1.1	33.5		90	CU	6.8	1102			$\bar{\sigma}_c=1152\text{psf}$
		T387.1	30.8	48	21						
		W387.1	31.7								
		TV									TV=0.63tsf
		T387.1.4	33.1			90	CU	9.7	1276		$\bar{\sigma}_c=2304\text{psf}$
		T387.1.3	31.9			90	CU	3.6	2087		$\bar{\sigma}_c=4608\text{psf}$
		W387.2	33.1			89					
		TV									TV=0.53tsf
		Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
129/7	SOIL DESCRIPTION	DEPTH (FEET)										
	2.0' Recovery; Say 28.0' to 30.0' depth  Silty CLAY, gray, moderately to highly plastic (CL-CH) Note: Entire sample highly disturbed	28.0 to 30.5	388									
		28.3 to 28.4	W388.1	35.8	88							
		28.4 to 28.6	L388.1	35.6	45	20						

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/9	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL)	38.0 to 40.5	389								
		38.1 to 38.4	save 389.1								
		38.4 to 38.6	W389.1	87							
		38.6	TV								TV=0.29tsf
		38.6 to 38.9	save 389.2								
		39.1 to 39.3	L389.1		41	22					
		39.1 to 39.3	C389.1						1.083	.39	
		39.1 to 39.3	SC389.1								specific gravity=2.73
		39.3 to 39.6	save 389.3								
		39.6	TV								TV=0.31tsf
		39.6 to 39.8	W389.2	88							
		39.8 to 40.0	save 389.4								

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
129/11	1.8' Recovery; say 48.0' to 49.81' depth	48.0-50.5	390									
	Silty CLAY, grey, soft consistency, moderate to highly plastic (CL)	48.2-48.5	Saved									
		48.5	TV									
	Note: Sample much disturbed below 48.8' depth	48.5-48.6	W390.1	45.2		77					TV=0.28tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
129/13	0.6' Recovery; say 58.5' to 59.1' depth	58.5-60.5	391								
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire sample slightly disturbed	58.6-58.7	W391.1	25.7	35	18	97				
		58.7-58.9	L391.1	31.7							
		58.9-59.1	Saved								

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
129/15	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse sand and fine gravel sized particles (subrounded to subangular in shape)  Note: Upper 0.8' of sample disturbed (Wash?)	DEPTH (FEET)	—									
			73.0 to 75.5	392								
			73.8 to 74.0	W392.1	24.6	99						
			74.0 to 74.3	L392.1	22.8	36	21					
			74.0 to 74.3	T392.01	24.8	101		UU	7.0	954		
			74.3 to 74.7	save 392.1								
			74.7 to 74.9	W392.2	23.2	102						TV=0.68tsf
			74.9	TV								
			74.9 to 75.2	save 392.2								

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
129/19	1.8' Recovery; say 93.0' to 94.8' depth		93.0-95.5	394								
			93.1-93.4	T394.1.1	23.7		99	CU	15.0	1518		$\bar{\sigma}_c = 3240$ psf
			93.1-93.4	L394.1	23.7	41	21					
	Silty CLAY, grey, firm to stiff consistency, moderate to high plasticity (CL)		93.4	TV								TV=0.50tsf
			93.4-93.5	W394.1	25.8							
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)		93.5-93.8	T394.1.2	25.9		99	CU	15.0	3047		$\bar{\sigma}_c = 6480$ psf
			93.8-94.1	I394.1.3	27.0		99	CU	13.2	4450		$\bar{\sigma}_c = 12960$ psf
			94.1-94.3	W394.2	26.8		98					TV=0.44tsf
			94.3	TV								
			94.3-94.6	Saved								



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE April 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/21	2.2' Recovery; Say 103.0' to 105.2' depth	103.0 to 105.5	395								
		103.2 to save									
		103.5 to 395.1									
		103.5 to									
		103.7 W395.1		27.3	97						
	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.7 TV									TV=0.68tsf
		103.7 to									
		104.0 C395.1		28.0					.703	.23	
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	103.7 to 104.0 SC395.1									specific gravity=2.71
		103.7 to 104.0 L395.1		26.1	39 21						
		104.1 to save 395.2									
		104.4									
		104.4 to									
		104.6 W395.2		25.1	102						
		104.6 TV									TV=0.51tsf
		104.6 to save									
		104.9 395.3									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT* WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/22	Jar Sample	108.5	—								
		110.0	465								
			W465.1	26.6*							
			L465.1	39	19						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE April 1974  
SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
129/24	1.8' Recovery; Say 123.0' to 124.8' depth; upper 0.5' disturbed (Wash?)	123.0 to 125.5 396									
		123.5 TV									IV=0.36tsf
		123.5 to 123.9 396.1									
	Silty CLAY, gray, stiff consistency, moderately to highly plastic (CL-CH)	123.9 to 124.1 396.1	32.4		90						
		124.1 to 124.4 396.01	30.6		95	UU	8.0	679			
		124.1 to 124.4 396.1	30.2	46 22							
	Sample includes about 10% hard subrounded gravel size particles	124.4 TV									IV=0.34tsf

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
130/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)		7.5'	571								
				L571.1	24.9*	49	21					
130/SS6	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		20.0'	572								
				L572.1	30.1*	44	22					
130/SS10	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		40.0'	573								
				L573.1	30.7*	44	23					
130/SS13	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		55.0'	574								
				L574.1	34.3*	46	23					

\*Not: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE 12/74

SUMMARY OF LABORATORY TEST RESULTS

SHEET

OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	cc	
130/SS14	Jar Sample Silty CLAY, dark gray, low plasticity (CL)  Sample includes ±25% fine to medium Sand size particles	60	575									
			575.1			13.5	26	17				
130/SS16	Jar Sample Silty CLAY, dark gray, low to moderate plasticity (CL)  Sample includes about 15% fine to medium Sand size particles	70	576									
			576.1			20.8	34	21				

\*Note: Water content taken from unsealed jar sample

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PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
134/SS4	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	— 578								
		8.5-10.0'								
		L578.1	24.2*	49	24					
134/SS9	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	— 579								
		33.5-35.0'								
		L579.1	34.5*	45	22					
134/SSL4	Jar Sample Silty CLAY, dark gray, highly plastic (CH) Sample includes ±5% fine Sand	— 580								
		58.5-60.0'								
		L580.1	44.1*	52	33					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Nov., 1974

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B136/2	1.9' Recovery; say 3.0' to 4.9' depth		3.0-5.0'	525								
			3.1-3.4'	MC								
			3.4-3.5'	W525.1	36.2							
	Silty CLAY, mottled gray-brown and yellow-brown, very stiff consistency, high plasticity (CH)		3.5'	TV								Used for processor. See plot
			3.5-4.2'	MC								
	Includes about $\pm 5\%$ fine to coarse subangular to subrounded Sand grains		4.2-4.3'	W525.2	29.8		92					TV = 1.28 tsf Used for processor. See plot
			4.3'	TV								
			4.3-4.9'	MC								
			3.0-4.9'	I525.1		62	25					TV = 1.62 tsf Used for processor. See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE Nov. 1974  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B136/4	1.8' Recovery; say 8.0' to 9.8' depth	526								
	8.0'-10.0'									
	8.5'-8.8'	saved								
	Silty CLAY, mottled gray, gray-brown and yellow brown, hard consistency, moderate to high plasticity (CL-CH)	U526.1	24.3		102	U	3.0	5446		
		L526.1	25.1	48    22						
		9.2'-9.3'								
		W526.2	25.7		98					
	Upper 0.5' of sample includes about ±15% fine to coarse Sand size particles (subrounded to subangular in shape)	TV								TV > 2.5 tsf
		9.3'-9.6'								



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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
136/6	1.6' Recovery; say 13.0' to 14.6' depth	13.0-15.0'	527									
		13.1-13.5'	FC / rU									
		13.5'	W527.1	31.5	90							used for compacted C/U
		13.5'	TV									
		13.6-14.1'	FC / rU									TV = 0.62 tsf used for compacted C/U
		14.1'	TV									
		14.1-14.6'	FC / rU									
		13.0-14.6'	L527.1	43	22							
		13.0-14.6'	C527.1	17.3	101				0.675	.15		
		13.0-14.6'	U1527.1	17.5	100							
		13.0-14.6'	SC527.1									Specific Gravity=2.74

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
136/SS9	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±10% fine to coarse Sand size particles (CL)	23.5 - 25.0'	581								
			W5811	31.1*		93*					
136/SS11	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	33.5 - 35.0'	582								
			L5821	31.9* 43	19						
136/SS15	Jar Sample Silty CLAY, gray-brown, moderate plasticity (CL)	53.5 - 55.0'	583								
			W5831	38.5*		85*					
136/SS19	Jar Sample Silty CLAY dark gray, of low to moderate plasticity. Sample includes about 25% fine to coarse Sand size particles (CL)	73.5 - 75.0'	584								
			L5841	17.0* 34	21						

\* Water content taken from unsealed jar samples

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>					
136/SS24	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)  Sample includes ±15% fine to coarse Sand size particles	98.5- 100.0'	585 L585.1	21.0%	40    21										

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
137/SS1	Jar Sample Silty CLAY, yellow-brown, moderately to highly plastic (CL-CH)	1.5 to 3.0	586								
			S/H								
			586.1								See plot
	Sample includes ±15% fine to coarse Sand size particles										
137/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH)	9.5 to 11.0	587								
			1587.1	24.8*	53	24					

Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
138/SS4	Jar Sample Silty CLAY, dark gray, moderate to high plasticity. Sample includes about 10% fine to coarse Sand size particles occurring as pockets (CL-CH)	588	8.5 - 10.0'								
138/SS9	Jar Sample Silty CLAY, light gray-brown, moderate to high plasticity (CL)	W589.1	33.5 - 35.0'	32.0*	90						
138/SS14	Jar Sample Silty CLAY, dark gray-brown, high plasticity (CL-CH)	W590.1	58.5 - 60.0'	31.9*							
138/SS23	Jar Sample Silty CLAY, dark gray, high plasticity (CL-CH)	W591.1	103.5 - 105.0'	26.7* 49 25							

\* Water content taken from unsealed jar sample

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TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE _____ OF _____	
IDENTIFICATION		TEST NO.		PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
139/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CH-CL) Sample includes ±5% fine to medium Sand size particles	6.5- 8.0'									
			23.5*	50    24							
139/SS8	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	29.5- 31.0'									
			25.2*	42    22							
139/SS12	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	49.5- 51.0'									
			31.4*	43    20							
139/SS22	Jar Sample GRAVEL, subangular to sub- rounded Gravel particles, 1/2" to 1-1/2" in size with about 15% fine to coarse Sand, less than 10% non-plastic fines (GP)	99.5- 101.0'									See plot
			59%								

\*Note: Water content taken from unsealed jar sample

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PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	ε %	e <sub>0</sub>		C <sub>c</sub>
B141/1	SOIL DESCRIPTION  1.9' Recovery; say 3.0' to 4.9' depth  Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH)  Includes ±5% Gravel size pieces (subrounded to sub-angular in shape)  Breaks vertical and laterally in a blocky manner	—									
		3.0-5.0'	528								
		3.1-3.4'	MC								
		3.4-3.5'	W528.1	28.9		90					
		3.5'	TV								Used for processor. See plot
		3.5-4.1'	MC								
		4.1-4.2'	W528.2	25.7		88					TV=1.50 tsf Used for processor. See plot
		4.2-4.5'	MC								
		4.5'	TV								Used for processor. See plot
		4.5-4.9'	MC								
		3.0-4.9'	W528.1	56	23						TV -1.00 tsf Used for processor. See plot

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
141/2	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH-CL)  Sample includes ±20% fine to coarse Sand size particles		8.0-10.0'	529									
			8.1-8.7'	rU									Used for compacted U
			8.7'	W529.1	26.3	95							
			8.7'	TV									TV = 1.77 tsf Used for compacted U
			8.8-9.2'	rU									
			9.2'	W529.2	25.0	95							
			9.2'	TV									TV = 1.02 tsf Used for compacted U
			9.3-10.0'	rU									
			8.0-10.0'	U529.1			49	23					
			8.0-10.0'	U529.1	17.5	103			rU	2.0	5558		



SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	$c_c$	
B141/4	1.9' Recovery, say 18.0 to 19.9' depth Silty CLAY, gray, medium consistency, moderate to high plasticity (CL) Sample includes $\pm 5\%$ fine to coarse Sand grains and fine subangular to subrounded Gravel pieces (1/4" max. size)		18.1-20.1	531								
			18.0-18.3	Saved								
			18.3-18.4	W531.1		35.3	86					
			18.4	TV								TV=0.37 tsf.
			18.4-									
			18.7	T531.1		35.5	87		CU	3.2	1393	$\bar{\sigma}_c = 2304$ psf
			18.4-									
			18.7	L531.1		35.2	45	21				
			18.7-									
			19.1	T531.1		36.3	86		CU	3.0	1040	$\bar{\sigma}_c = 1152$ psf
			19.1-19.2	W531.2		36.6	85					
			19.2	TV								TV=0.32 tsf
		19.2-										
		19.5	T531.1	b	37.3	84		CU	9.6	1626	$\bar{\sigma}_c = 46.37$ psf	
		19.5-		a								
		19.9	T531.1		35.1	85		CU	4.2	1625	$\bar{\sigma}_c = 46.08$ psf	

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PROJECT: BELLE RIVER PLANT UNITS I & II

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
141/SS4	Jar Sample Silty CLAY, brown, moderate to high plasticity (CL)	29.5- 31.0'	597								
			L597.1	33.8*	47 21						
141/SS10	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	59.5- 61.0'	598								
			L598.1	30.2*	41 19						
141/SS21	Jar Sample Sandy GRAVEL, hard sub-angular to subrounded Gravel size particles to 3/4" maximum about 30% fine to coarse Sand and 20% non-plastic fines (GM)	114.5- 116.0'	599								
			S599.1								See plot
141/SS27	Jar Sample Sandy CLAY, gray, low plasticity; about 45% fine to coarse Sand and fine Gravel size particles to 1/4" max. size (SM-SC)	144.5- 146.0'	600								
			S600.1								See plot

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B142/1	0.9' Recovery; say 3.0' to 3.9' depth		3.0-5.5'	532								
			3.0-3.4'	MC								
	Silty CLAY, mottled brown and gray, very stiff consistency high plasticity (CH)		3.4-3.5'	W532.1	28.9		98					
	Includes ±10% subrounded to subangular fine to coarse Sand grains		3.5'	TV								Used for processor. See plot
			3.5-3.7'	MC								
			3.7-3.8'	W532.2	25.1		97					TV=1.53 tsf Used for processor. See plot
			3.8'	TV								
			3.8-3.9'	MC								
			3.0-3.9'	L532.1		54	23					TV=1.58 tsf Used for processor. See plot

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)								
B142/4	0.7' Recovery; say 8.0' to 8.6' depth	8.0'-10.5'	22.8		106					
		8.0'-8.3'	21.4	42 22						
		8.3'-8.4'	24.8							
	Silty CLAY, olive brown to dark brown with layers of Sandy CLAY; very stiff consistency, moderate to high plasticity (CL)	8.4'								
		8.4'-8.6'	24.5	49 22						
	at 8.3' <u>CHANGE TO:</u> Olive-gray/brown Silty CLAY, very stiff consistency, highly plastic (CL-CH)									
	Sample includes ±10% fine to coarse Sand and Gravel size particles (subrounded to sub-angular in shape; 1/2 inch maximum size)									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: \_\_\_\_\_  
 SHEET: \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
142/5	2.1' Recovery: say 14.0' to 16.1' depth	—									
	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)										
		14.0 - 16.5'	534								
		14.1 - 14.4'	I CU								
		14.4'	W534.1	36.5		82					Used for compacted CU
		14.4'	TV								
		14.5' - 15.1'	I CU								TV = 0.35 tsf
		15.1'	W534.2	34.0		86					Used for compacted CU
		15.1'	TV								
		15.2 - 15.6'	I CU								TV = 0.40 tsf
		15.6'	W534.3	35.1		88					Used for compacted CU
		15.6'	TV								
		15.7 - 16.1'	I CU								TV = 0.41 tsf
		14.0 - 16.1'	L534.1		47 22						Used for compacted CU
	14.0 - 16.1'	T534.1.2	15.3		105	CU	15.0	1475		$\bar{\sigma}_c = 1872$ psf	
	14.0 - 16.1'	T534.1.3	15.1		105	CU	15.0	2625		$\bar{\sigma}_c = 3600$ psf	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B142/6	2.3' Recovery; say 19.0' to 21.4' depth	19.0'- 21.5'	535								
		19.2'	TV								TV = 0.30 tsf
		19.2'- 19.5'	saved								
	Silty CLAY, gray-brown, medium consistency, moderate to high plasticity (CL)	19.5'- 19.6'	W535.1	38.5							
		19.6	TV								TV = 0.32 tsf
	Sample includes ±15% fine to coarse Sand and fine Gravel size pieces (1/2 inch maximum size)	19.6'- 19.9'	saved								
		20.1'- 20.5	C535.1	38.2					1.019	.41	Specific gravity = 2.69
		20.1'- 20.5'	SC535.1								
		20.1'- 20.5'	L535.1	37.9	45	22					
		20.5'- 20.6'	W535.2	37.7			83				
		20.6'	TV								TV = 0.36 tsf
		20.6'- 20.9'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	cc	
142/SS14	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	601		44 20						
		1601.1	34.3*							
142/SS24	Jar Sample Silty CLAY, sandy, gray, of low plasticity (CL-ML)  Sample includes 25-30% fine to medium Sand size particles	602								
		1602.1	22.0*	23 16						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
143/SS2	Jar Sample Silty CLAY, yellow-brown, of moderate to high plasticity (CL)	6.0'	603	23.1*	45 20						
143/SS4	Jar Sample Silty CLAY, gray, moderately plastic (CL)	16.0'	604	26.7*	43 22						
143/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	36.0'	605	36.1*	46 23						
143/SS11	Jar Sample Silty CLAY, grayish-brown, of moderate plasticity (CL)	51.0'	606	31.6	43 22						

\*Note: Water content taken from unsealed jar sample



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
143/SS15	Jar Sample Silty CLAY, grayish-brown, highly plastic (CL-CH)	71.0'	607								
			L607.1	29.9*	48 21						
143/SS20	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes 20-25% fine to coarse Sand size particles	96.0'	608								
			L608.1	19.3*	38 20						
143/SS27	Jar Sample Sandy CLAY, gray, of low plasticity (SC) Sample includes ±35% fine to coarse Sand and ±5% fine Gravel size particles to 1/4" maximum	131.0'	609								
			L609.1	14.7*	27 17						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Nov. 1974  
 SHEET        OF       

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B144/4	2' Recovery; say 8.0' to 10.0' Silty CLAY, brown, hard consistency, highly plastic (CL-CH) Includes about 20 - 25% fine to coarse Sand and fine Gravel size pieces (sub-rounded to subangular in shape; 1/2 inch max. size) Entire sample slightly disturbed?	8.0-10.0'	—									
		8.2'	TV									TV = 1.80 tsf
		8.2-8.5'	saved									
		8.5-8.8'	U537.1	97			1.7	861				
		8.5-8.8'	U537.1	99			15.0	1482				
		8.5-8.8'	L537.1		48	21						
		8.8-8.9'	W537.1									
		8.9'	TV									TV = 1.70 tsf
		8.9-9.2'	U537.2	100			3.0	1002				
		9.2-9.3'	W537.2									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
B144/6	1.7' Recovery; say 13.0' to 14.7' depth  Silty CLAY, brown and gray- ish brown, very stiff consistency, moderate to high plasticity (CL)  Sample includes 15 to 20% fine to coarse Sand size particles	13.0-	—								
		15.0'	538	25.7		99					
		13.3-									
		13.7'	saved								
		13.7-									
		13.8'	W538.1	25.7							
		13.8'	TV								TV = 1.53 tsf
		14.1'	S/H538.1								sieve/hydro-meter. See plot
		14.1-									
		14.2'	W538.2	25.7							
		14.2'	TV								TV = 1.88 tsf
		14.2-									
		14.5'	saved								

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DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
144/SS10	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±5% fine to coarse sand size particles (CL)	28.5 to 30	35.5								
144/SS16	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity (CL)	58.5 to 60									
144/SS23	Jar Sample Silty CLAY, gray, moderate plasticity (CL) Sample includes 15% fine to coarse sand size particles	93.5 to 95	19.8	35	18						

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B146/3	1.8' Recovery: say 6.0' to 7.8' depth	6.0 - 8.0'	540								
		6.1 - 6.4'	r CU								
	Silty CLAY, brown & gray mottled, very stiff to hard consistency, moderate plasticity (CL)	6.4 - 6.5'	W540.1	36.2		84					
		6.5'	TV								TV = 2.03 tsf
		6.5' - 6.9'	r CU								Used for compacted CU
	Sample includes ±5% fine to medium Sand size particles (subangular to subrounded in shape)	6.9 - 7.0'	W540.2	37.8		83					
		7.0'	TV								TV = 2.03 tsf
		7.0 - 7.3'	r CU								Used for compacted CU
		7.4 - 7.5'	L540.1	37.2	44	21					
		7.5 - 7.8'	r CU								Used for compacted CU
		6.0 - 7.8'	T540.1.2	14.4		108	CU	15.0	2163		σ <sub>c</sub> = 1872 psf
		6.0 - 7.8'	T540.1.3	14.2		108	CU	10.9	3173		σ <sub>c</sub> = 3888 psf

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B146/5	1.6' Recovery; say 10.0' to 11.6' depth	10.0-12.0'	541								
		10.1-10.4'	MC								Used for proc-tor. See plot
	Silty CLAY, mottled brown and gray, firm consistency, moderate plasticity (CL) includes $\pm 10\%$ fine to coarse Sand size particles	10.4'	W541.1	33.9		90					
		10.4'	TV								TV = 0.67 tsf
		10.5-11.0'	MC								Used for proc-tor. See plot
		11.0'	W541.1	27.5		92					
	@ $\pm 11.1'$ depth changes to Silty CLAY, Sandy, firm consistency, moderately plastic (CL) Includes $\pm 40\%$ fine to coarse Sand and Gravel size pieces	11.0'	TV								TV = 0.73 tsf
		11.1-11.6'	MC								Used for proc-tor. See plot
		10.0-11.6'	L541.1		38 19						

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TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION				WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
146/7	2.1' Recovery; say 14.0' to 16.1' depth  Silty CLAY, brown, firm to stiff consistency, moderate to high plasticity (CL)  Sample includes ±5% fine to coarse Sand size particles		14.0-16.0'	—									
			14.1-14.5'	rC / rU									used for compacted C/U
			14.5'	W542.1		32.2		88					
			14.5'	TV									
			14.6-15.1'	rC / rU									TV = 0.48 tsf used for compacted C/U
			15.1'	W542.2		33.3		90					
			15.1'	TV									
			15.2-15.6'	rC / rU									TV = 0.50 tsf used for compacted C/U
			15.6'	W542.3		34.0		85					
			15.6'	TV									
			15.7-16.1'	rC / rU									TV = 0.49 tsf used for compacted C/U
			14.0-16.1'	L542.1		46	22						
			14.0-16.1'	C542.1		15.9		103			(.679)	.15	
			14.0-16.1'	U542.1		16.6		104	rU	2.0	3282		
		14.0-16.1'	S0542.1									Specific Gravity = 2.75	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
146/SS16	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	614	28.7*	43    20					

\*Note: Water content taken from unsealed jar sample



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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT* WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
147/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH) Sample includes ±10% fine to coarse Sand size particles	624		58 24						
147/SS7	Jar Sample Silty CLAY, gray, of moderate to high plasticity (CL) Sample includes ±5% fine to coarse Sand size particles	616 L66.1	31.9*	46 23						

\*Note: Water content taken from unsealed jar sample

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B151A/2	1.2' Recovery; say 7.5' to 8.7' depth	7.5'- 10.0'	544								
		7.7'- 8.0'	544 S/H								
	Silty CLAY, mottled yellow-brown and gray, very stiff consistency, moderate to high plasticity	8.0'	W544.1		25.0	94					TV = 1.40 tsf
		8.0'	TV								
		8.1'- 8.4'	saved								
		8.5'	W544.2		24.8	98					TV = 1.40 tsf
	Sample includes 5-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/2 inch maximum size)	8.5'	TV								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B151A/3	1.2' Recovery; say 12.5' to 13.7' depth	—									
		545									
		saved									
	Silty CLAY, gray, very stiff consistency, highly plastic (CL-CH)  Sample includes 10-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/4 inch maximum size)	W345.1	27.5		94						
		TV									TV = 1.13 tsf
		T									
		545.0.1	28.3			95	UU	10.0	2325		0 <sub>c</sub> - 1555 psf
		1545.1	27.7	48	20						
		saved									
		W345.2	31.5			93					
		TV									TV = 0.55 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
154/SS3	Jar Sample Silty CLAY, yellow brown, highly plastic (CH-CL) Sample includes ±10% fine to coarse Sand size particles	6.0'- 7.5'	617								
			L617.1	23.2*	51	23					
			W617.1				100				
154/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±10% fine to coarse Sand size particles	28.5'- 30.0'	618								
			L618.1	33.3*	44	21					
154/SS13	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to coarse Sand size particles	53.5'- 55.0'	619								
			L619.1	33.4*	40	19					
154/SS17	Jar Sample Silty CLAY, gray, highly plastic (CH)	73.5'- 75.0'	620								
			L620.1	33.1*	54	25					

Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	
154/SS19	Jar Sample Silty CLAY, Sandy, dark gray, of low to moderate plasticity (CL)	83.5-85.0'	25.7*	31    16					
	Sample includes ±25% fine to coarse Sand size particles								
154/SS22	Jar Sample Clayey SILT, gray, of low plasticity (CL-ML)	98.5-100.0'	9.6*	20    13					
	Sample includes ±15% fine to medium Sand size particles								
154/SS25	Jar Sample Silty CLAY, gray, of low plasticity, (CL)	113.5-115.0'	18.4*	30    19					
	Sample includes ±10% fine Sand size particles								

Note: Water content taken from unsealed jar sample

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PROJECT: BELLE RIVER PLANT UNITS I & II

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
158/2	2.2' Recovery; say 7.5' to 9.7' depth; upper 1.5' disturbed	7.5-10.0'	548								
		7.6-8.1'	rU								used for compacted U
		8.1'	W548.1	29.0		94					
		8.2-8.5'	rU								used for compacted U
		8.5'	W548.2	28.2		95					used for compacted U
		8.6-8.9'	rU								used for compacted U
		9.0'	W548.3	24.3							
		9.0'	TV								
		9.1-9.4'	rU								used for compacted U
		9.4'	W548.4	21.6		101					
		9.4'	TV								
		9.5-9.7'	rU								used for compacted U
		7.5-9.7'	L548.1	50	21						
		7.5-9.7'	Ur548.1	16.8		104	rU	2.0	347		

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub> c <sub>c</sub>		
B158/4	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)  Sample includes 5-10% fine to coarse Sand size particles	17.5-20.0'									
		17.5-17.8'									
		17.9'	36.2		84						
		17.9'									TV = 0.34 tsf
		18.0-18.5'									
		18.5'	37.8		83						
		18.5'									TV = 0.37 tsf
		18.6-18.9'	37.5		83	CU	3.2	885			σ <sub>c</sub> = 1080 psf
		18.6-18.9'		46 19							
		19.0-19.3'	33.5		87	CU	5.1	971			σ <sub>c</sub> = 2160 psf
		19.3-19.6'	37.1		83	CU	5.7	1297			σ <sub>c</sub> = 4320 psf
		19.8	37.2								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255							
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____							
		SHEET _____ OF _____							
IDENTIFICATION		TEST NO.	PROPERTIES	STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>
163/SS2	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH-CL) Sample includes ±5% fine to coarse Sand size particles	3.5-5.0'		51    24					
163/SS4	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	8.5-10.0'		47    23					
163/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	28.5-30.0'							
163/SS11	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to medium Sand size particles	43.5-45.0'		45    21					

\*Note: Water content taken from unsealed jar sample



PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u>											
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS SHEET <u>      </u> OF <u>      </u>											
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	cc*
163/SS16	Jar Sample Silty CLAY, grayish-brown, highly plastic (CH)	628		52    24							
		L628.1	36.9*								
163/SS21	Jar Sample Silty CLAY, gray, moderately plastic (CL)	629									
	Sample includes ±10% fine to coarse Sand size particles	L629.1	22.3*	39    20							

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255 DATE Nov. 1974												
TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET ____ OF ____												
BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
B185/3	2.7' Recovery; say 6.0' to 8.7' depth		6.0' 9.0'	552								
			6.5'- 6.8'	saved								
	Silty CLAY, mottled gray-brown and brown, very stiff to hard consistency, highly plastic (CL-CH)		6.8' 6.9'- 7.2'	W552.1 saved	25.2		99					
			7.5'- 7.8'	U552.1	23.9		104	U	4.0	2948		
	Sample includes <5% fine to coarse Sand and Gravel particles (subrounded to subangular in shape- to 1" maximum size)		7.5'- 7.8'	I552.1	24.7	50	23					
			7.8'	W552.2	26.9		99					
			7.8'	TV								TV = 1.75 tsf
			7.9'- 8.1'	C552.1	29.1					.757	0.18	Specific Gravity = 2.72
			7.9'- 8.1'	SG552.1								
			8.2'- 8.5'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	cc		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)									
B185/7	2.7' Recovery; say 18.0' to 20.7' depth  Silty CLAY, gray, medium consistency, highly plastic (CL-CH)  Sample includes less than 5% fine Sand size particles	18.0-21.0'									
		18.2-18.5'	554								
		18.5-18.8'	saved								
		18.8-18.5'	U554.1	39.3		81	U	2.4	416		
		18.8'	L554.1	39.0	49	22					
		18.9'	W554.1	38.8		81					TV = 0.35 tsf
		18.9'	TV								
		19.2-19.8'	saved								
		19.9'	W554.2	35.4		82					
		19.9'	TV								TV = 0.32 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      PL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B185/13	2.8' Recovery; say 48.0' to 50.8' depth  Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)  Sample includes varying amounts of fine to medium Sand, ±10% at top of sample to ±40% near bottom; less than 5% subangular to subrounded Gravel particles to 1/4" size occur throughout	48.0-51.0'	556									
		48.2-48.5'	saved									
		48.5'	W556.1	85	34.7							TV = 0.44 tsf
		48.5'	TV									
		48.6-48.9'	L556.1		37.1	47	22					
		49.4'	W556.2	87	31.5							
		49.5-49.9'	L556.2		25.9	28	17					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
186/3	Jar Sample	6.0 7.5	443								
	Silty CLAY, dark greyish brown, high plasticity (CH-CL)		L443.1	52	18						
			W443.1	21.5*		99					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
186/7	0.8' Recovery; say 23.0' to 23.8' depth		23.0 - 25.0	423										
	Silty CLAY, grey, soft consistency, moderate to high plasticity (CL)  Note: Entire sample much disturbed		23.0 - 23.3	I423.1	40.5	42	21							
			23.3 - 23.5	W423.1	39.0	80								
			23.5 - 23.8	Saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
186/13	SOIL DESCRIPTION	DEPTH (FEET)	—								
	1.5' Recovery; say 53.0' to 54.5' depth	53.0-55.0	426								
	Silty CLAY, grey, soft to firm consistency, moderate plasticity (CL)  below 53.8' depth, sample includes about 20% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	53.2-	Saved								
		53.5-									
		53.6	W426.1	40.7			80				
		53.6	TV								TV = 0.28tsf
		53.6-									
		54.0	Saved								
		54.0-									
		54.3	L426.1	27.0	33	17					
		54.3-									
		54.4	W426.2	28.6			92				TV = 0.21tsf
	54.4	TV									

FILE NO. 1255  
DATE July 1974  
SHEET OF

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
186/20	Jar Sample		88.5-90.0	444								
	Silty CLAY, grey, moderate plasticity (CL)			W444.1	20.2*		107					
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)			L444.1		32 17						
	*Note: Water content taken from unsealed jar sample											



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974  
SHEET        OF       

BORING SAMPLE	IDENTIFICATION  SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
186/23	Jar Sample	103.5 - 105.0	— 445								
	SILT, grey, non-plastic (ML)		W445.1	12.0 *							
	Sample includes about 20% fine Sand grains		L445.1		18	18					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255			
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974			
										SHEET OF			
BORING SAMPLE	IDENTIFICATION			DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
						NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
						ω <sub>L</sub>	ω <sub>P</sub>		ε %				
187/6	Jar Sample		18.5-20.0	446									
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)			W446.1		35.9	*						
	*Note: Water content taken from unsealed jar sample												

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
187/7	Jar Sample	447								
	Silty CLAY, gray, moderate to high plasticity (CL-CH)	1447.1	37.9*	47 20						
	*Note: Water content taken from unsealed jar sample									

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET      OF     

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			DEPTH (FEET)	NAT* WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε    %	
BORING SAMPLE	SOIL DESCRIPTION								
187/13	Jar Sample	448	53.5 - 55.0						
	Silty CLAY, grey, moderate to high plasticity (CL)	W448.1		39.5*					
	*Note: Water content taken from unsealed jar sample								

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
187/14	Jar Sample	—									
	Clayey SILT, Sandy, gray, low to moderate plasticity (CL-ML) Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	58.5-									
		60.0									
			S/H								
			449.1								See plot

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
187/17	Jar Sample	73.5-75.0	450								
	Silty CLAY, dark grey, moderate plasticity (CL)		W450.1	25.6							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

FILE NO. 1255  
DATE July 1974

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

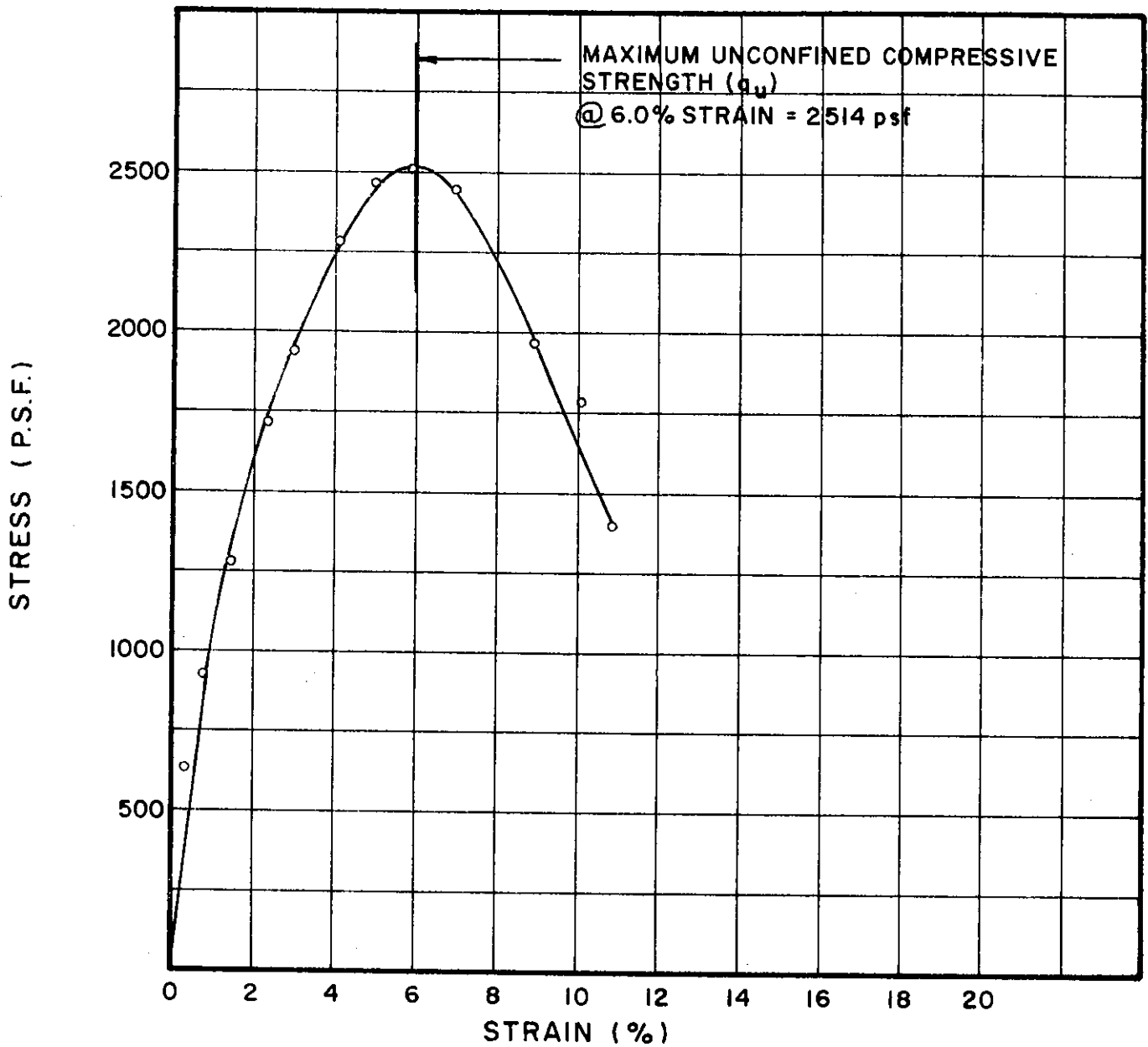
SHEET 1 OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	$e_o$ $c_c$	
187/22	Jar Sample	451								
	Silty CLAY, dark grey, moderate plasticity (CL)	W45L1	24.1							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)									
	*Note: Water content taken from unsealed jar sample									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET 0F								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
187/23	Jar Sample	103.5 105.0	— 452							
	Silty CLAY, gray, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		1452.1	28.8	34	19				

\*Note: Water content taken from unsealed jar sample



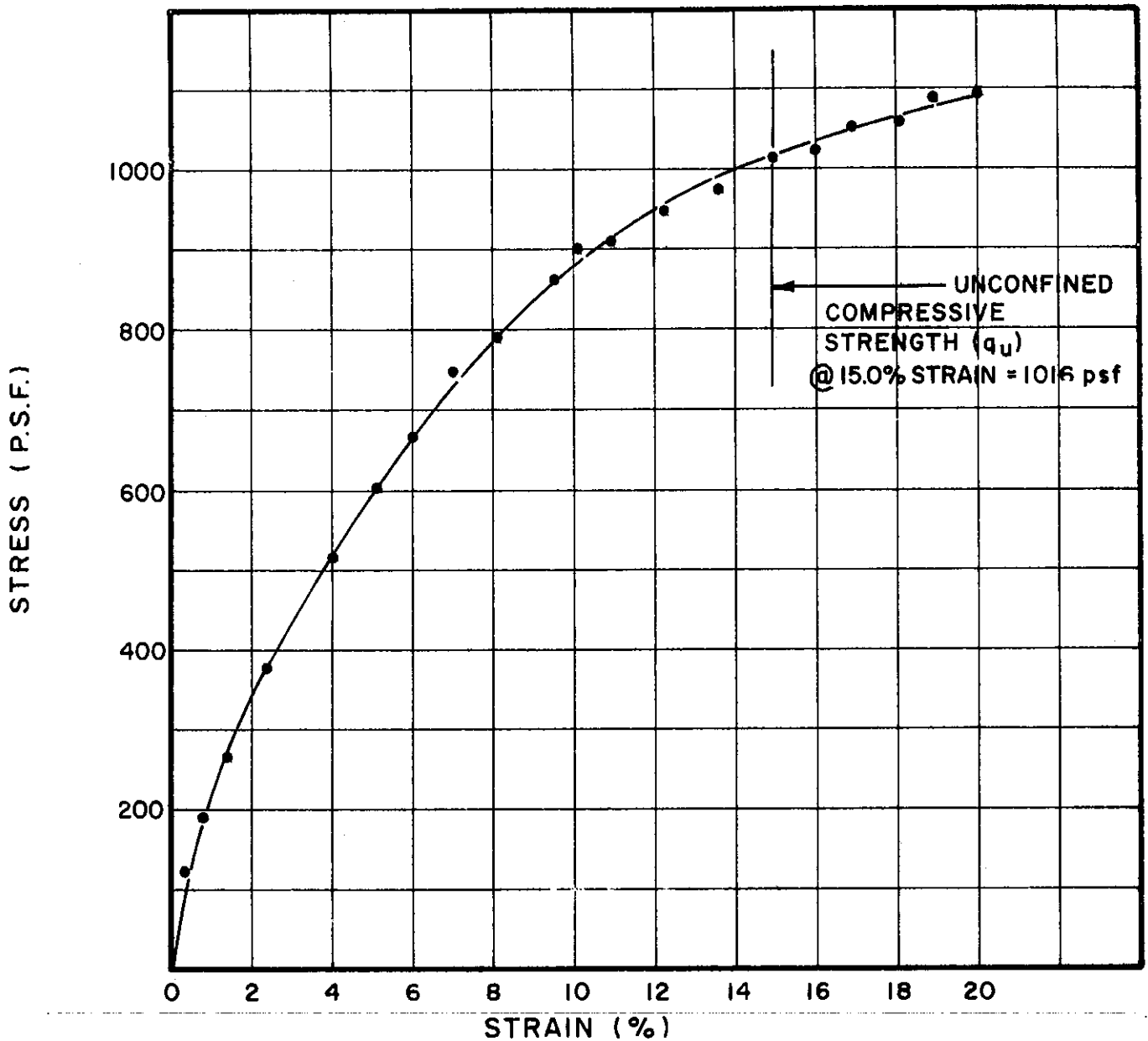


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI20.2	1.40	3.50	0.26	31.6	93	44	19	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



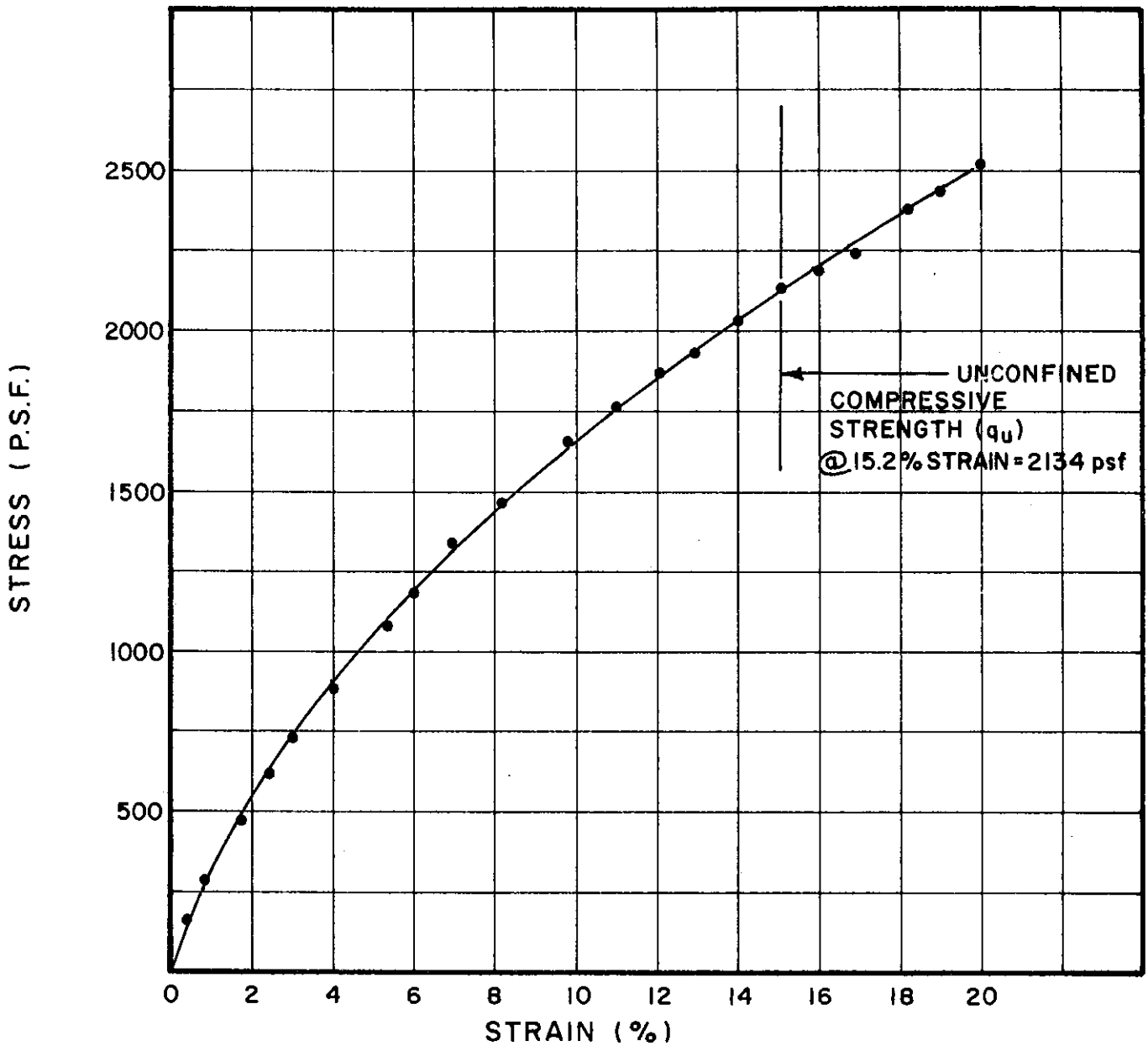
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
UI21.1	1.40	3.50	0.26	34.1	87	42	20	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 6  
 DEPTH 18.1' TO 18.4'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

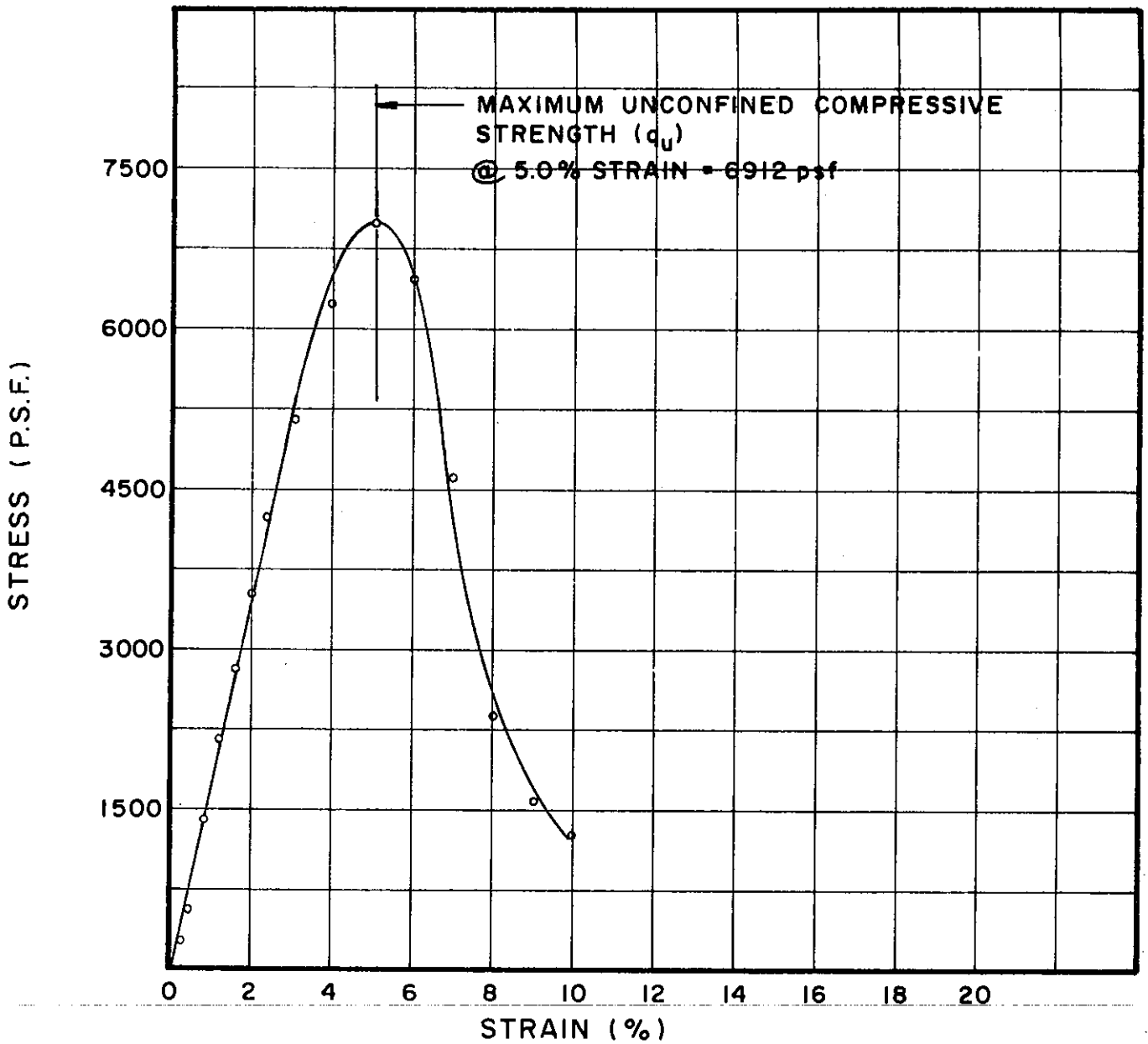


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI25.1	1.40	3.50	0.26	22.5	104	34	18	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 14  
 DEPTH 59.2' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U266.1	1.44	3.46	.260	22.4	108	59	23	SILTY CLAY (CH)

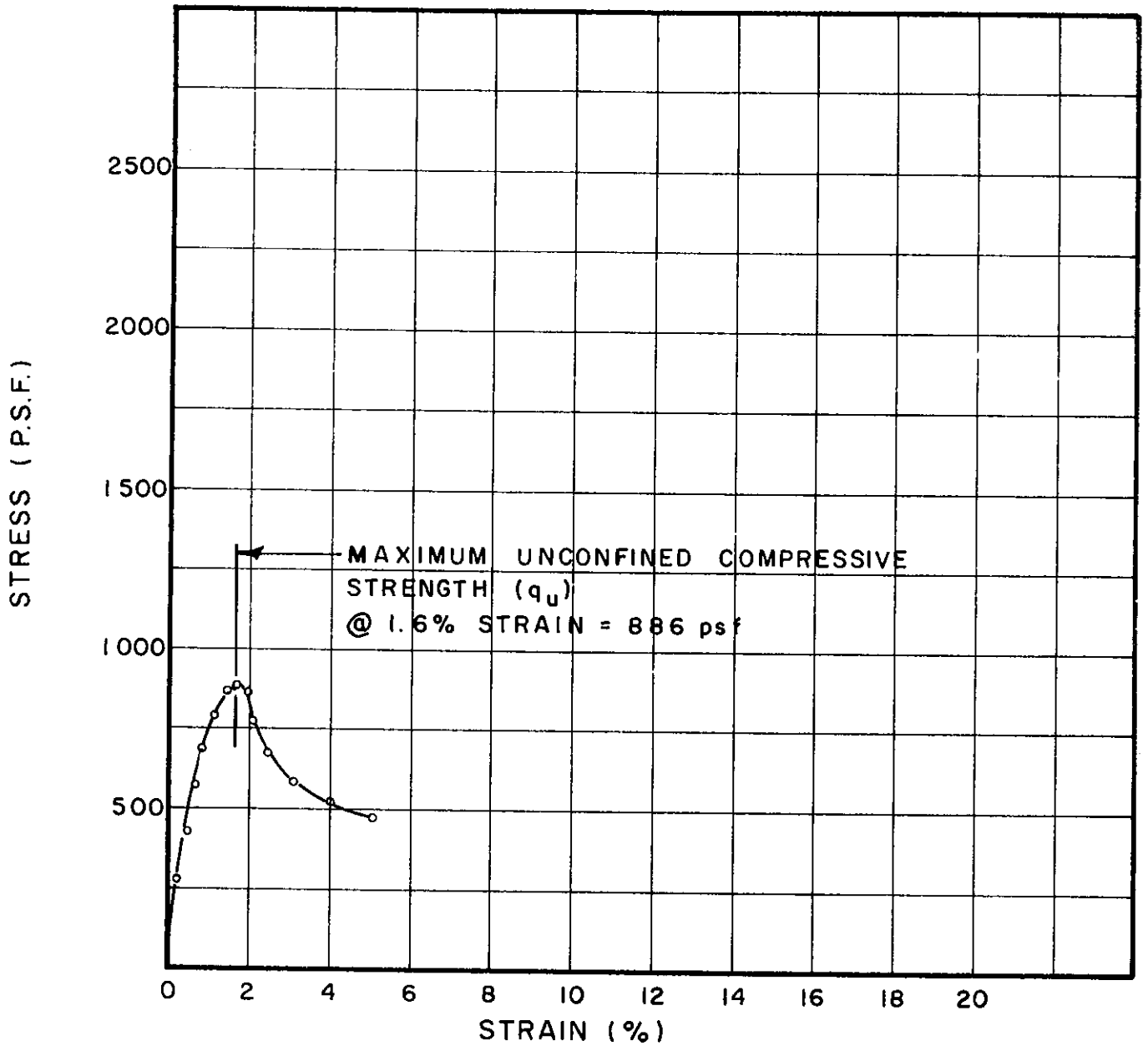
BORING NO. 25

SAMPLE NO. 1

DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

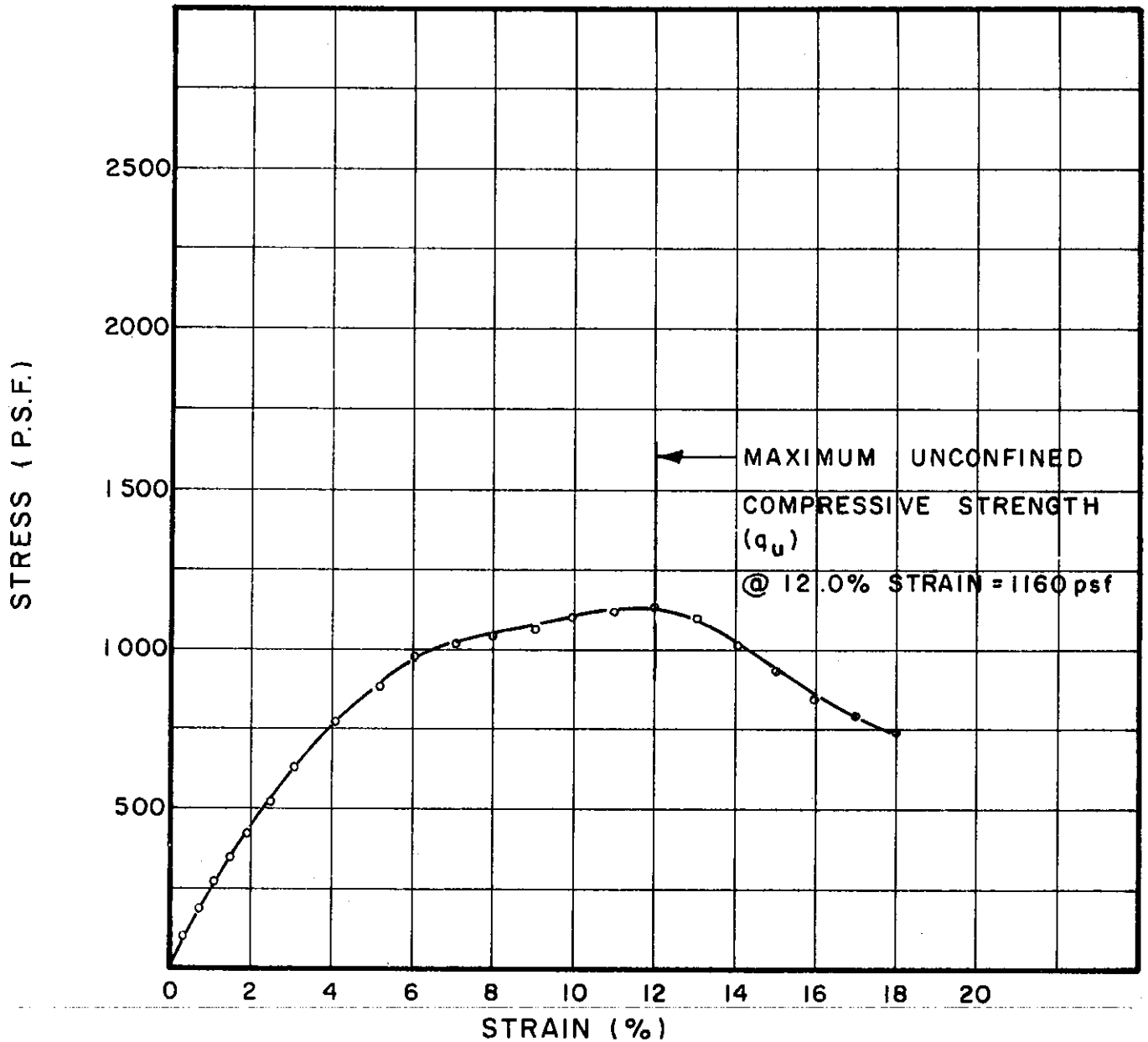


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U5.1	1.41	3.50	.257	36.6	86	38	20	SILTY CLAY (CL)

BORING NO. 26  
 SAMPLE NO. 9  
 DEPTH 39.4' TO 39.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U9.1	1.41	3.45	.261	24.8	101	36	20	SILTY CLAY, SANDY (CL)

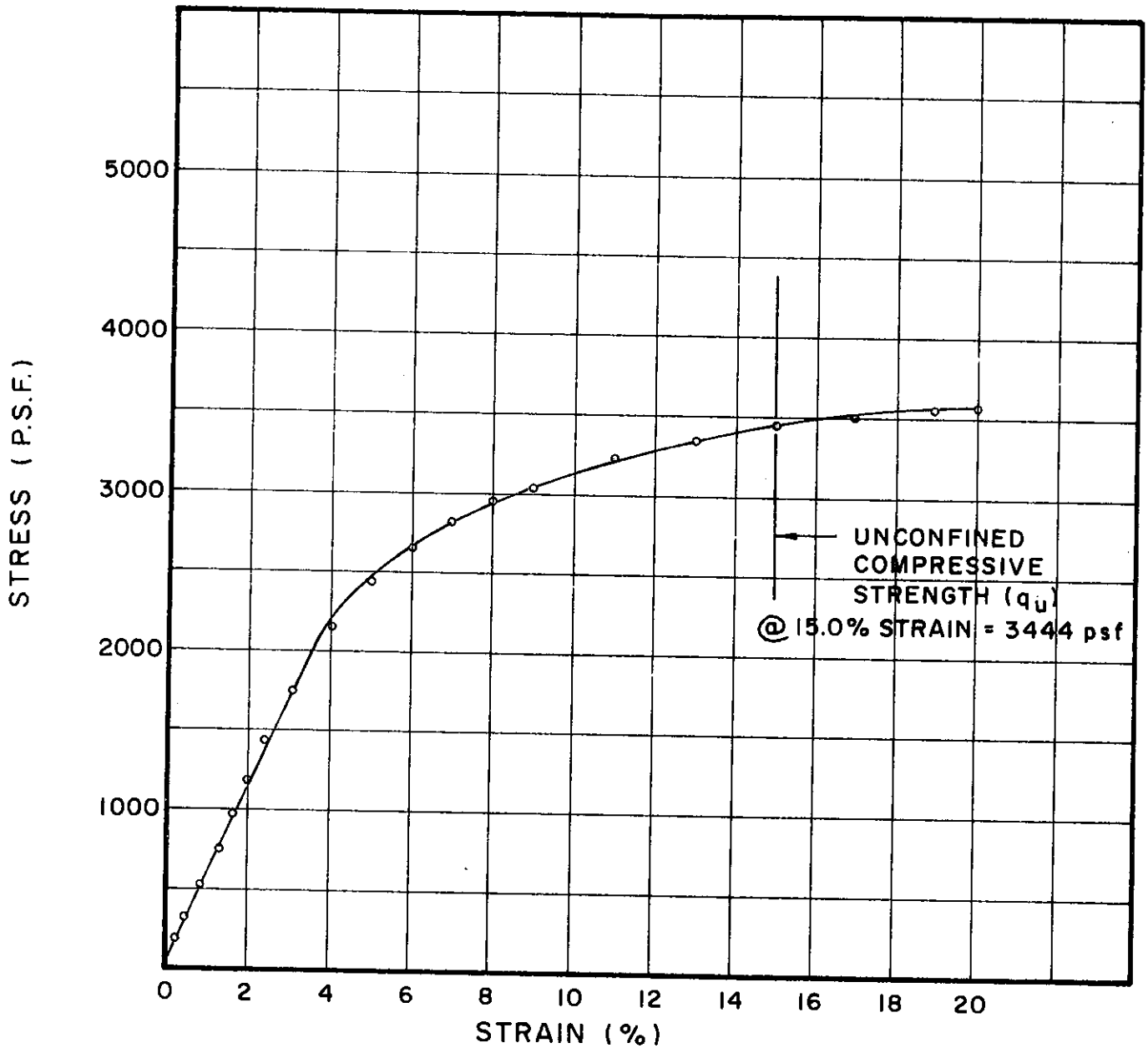
BORING NO. 26

SAMPLE NO. 17

DEPTH 78.2' TO 78.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

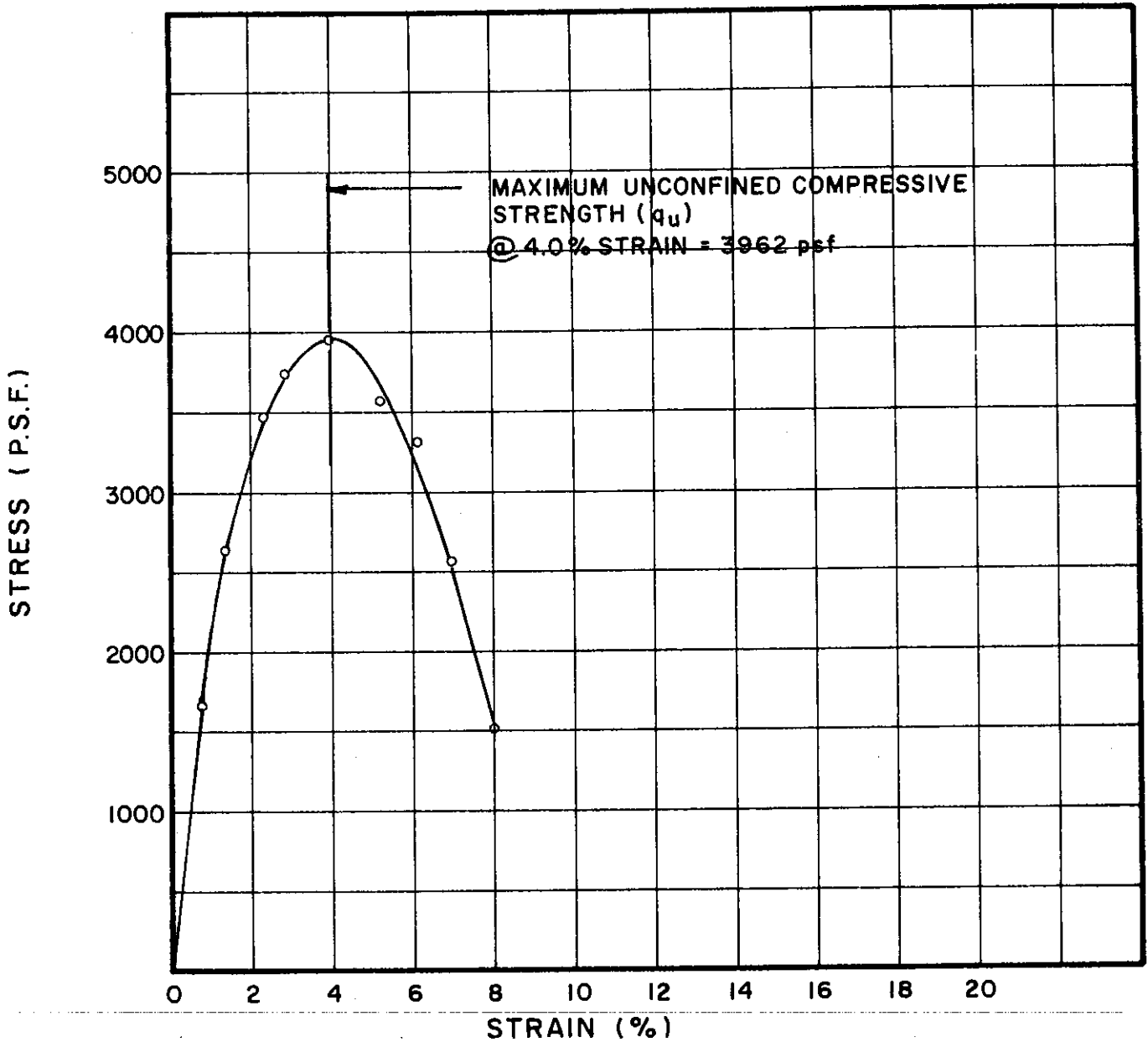


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U303.1	1.41	3.45	.261	30.6	94	51	23	SILTY CLAY (CL-CH)

BORING NO. 27  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U183.1	1.39	3.49	0.26	25.3	100	47	23	SILTY CLAY (CL)

BORING NO. 28

SAMPLE NO. 3

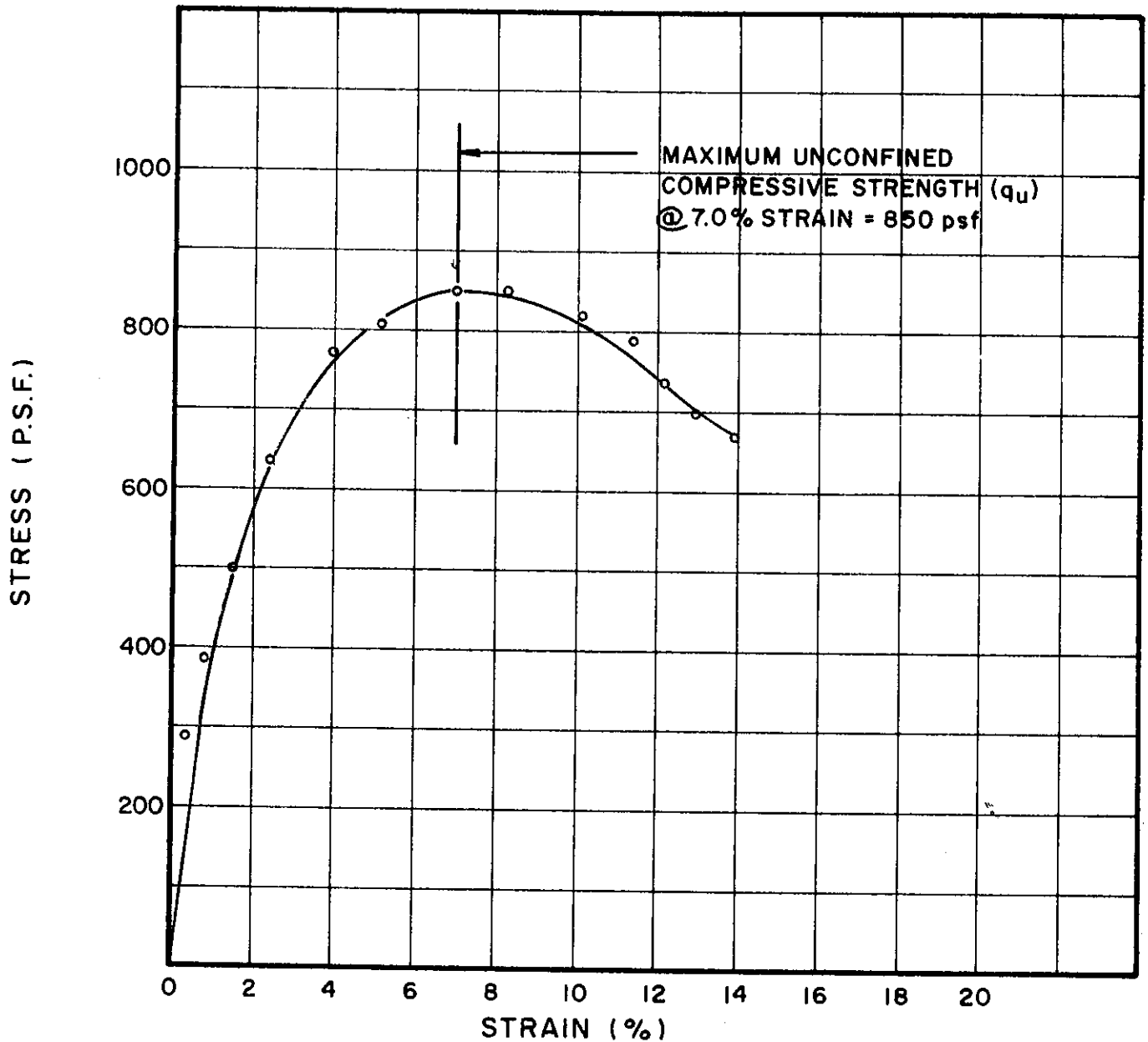
DEPTH 5.8' TO 6.1'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
UI86.2	1.40	3.50	0.26	38.0	84	42	20	SILTY CLAY (CL)

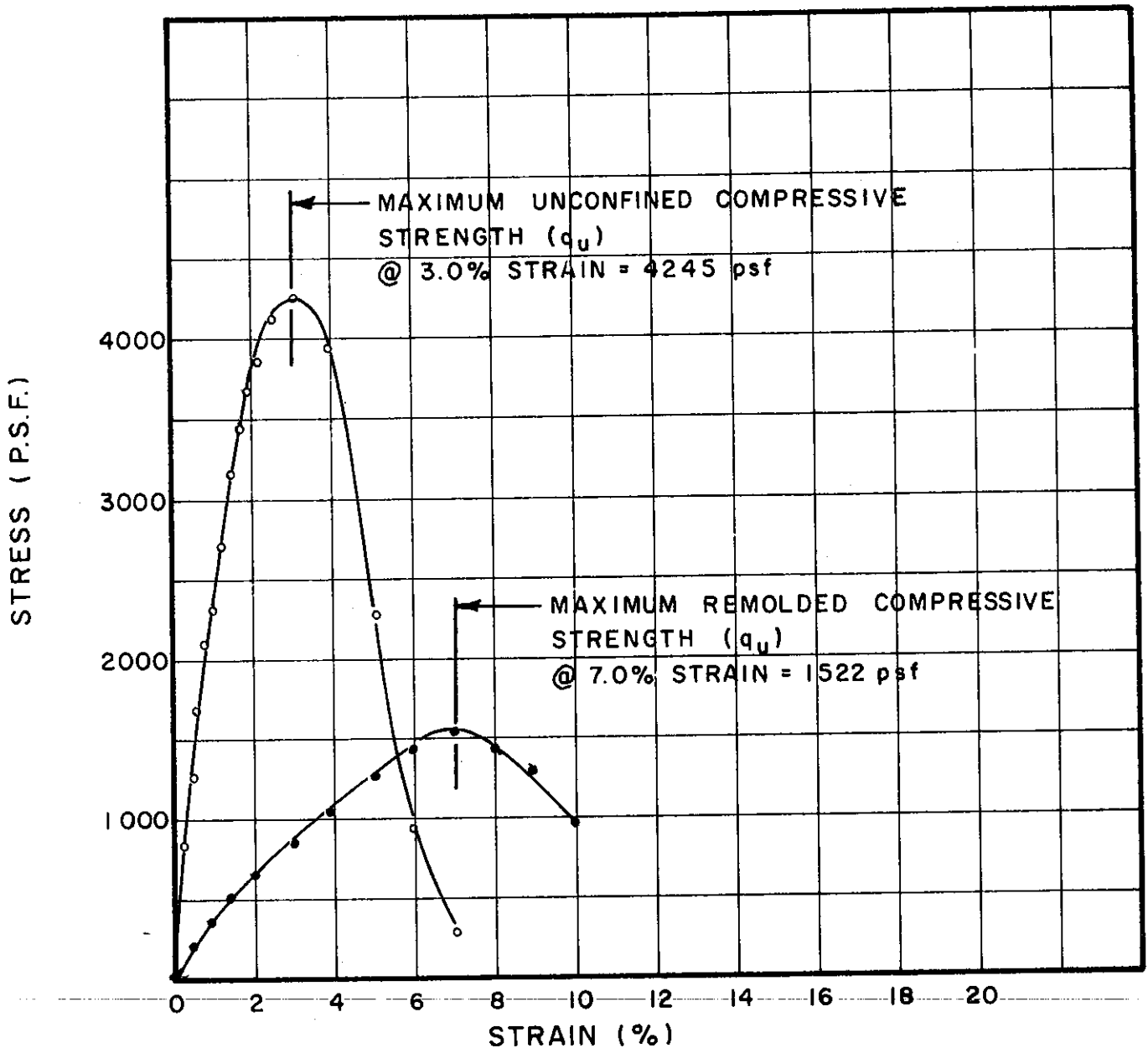
BORING NO. 28

SAMPLE NO. 9

DEPTH 28.8' TO 29.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



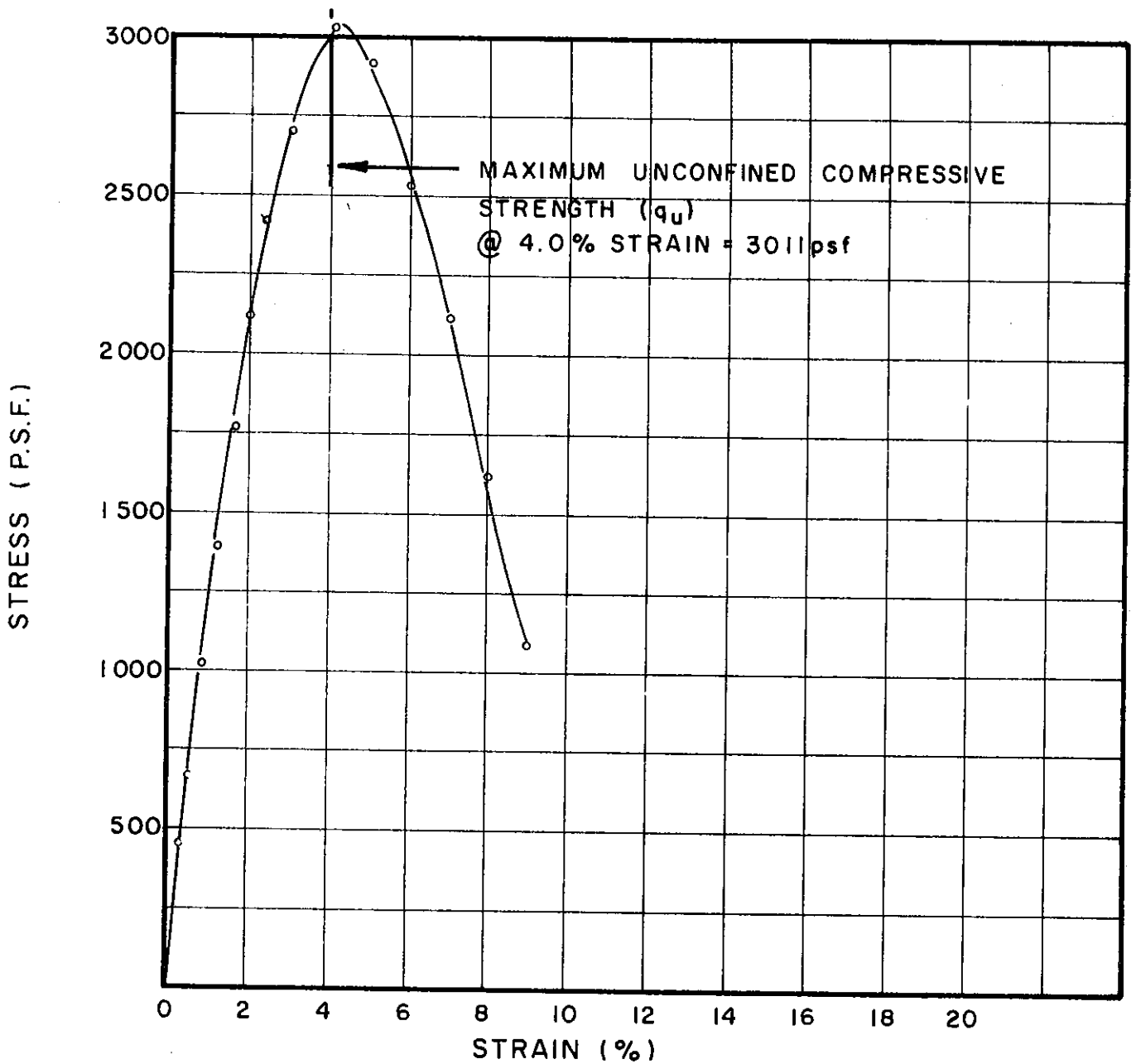
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI7.1	1.44	3.54	.254	24.3	102	49	24	SILTY CLAY (CL-CH)
UI7.1	1.40	3.50	.257	24.3	103	49	24	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 3  
 DEPTH 8.7' TO 9.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

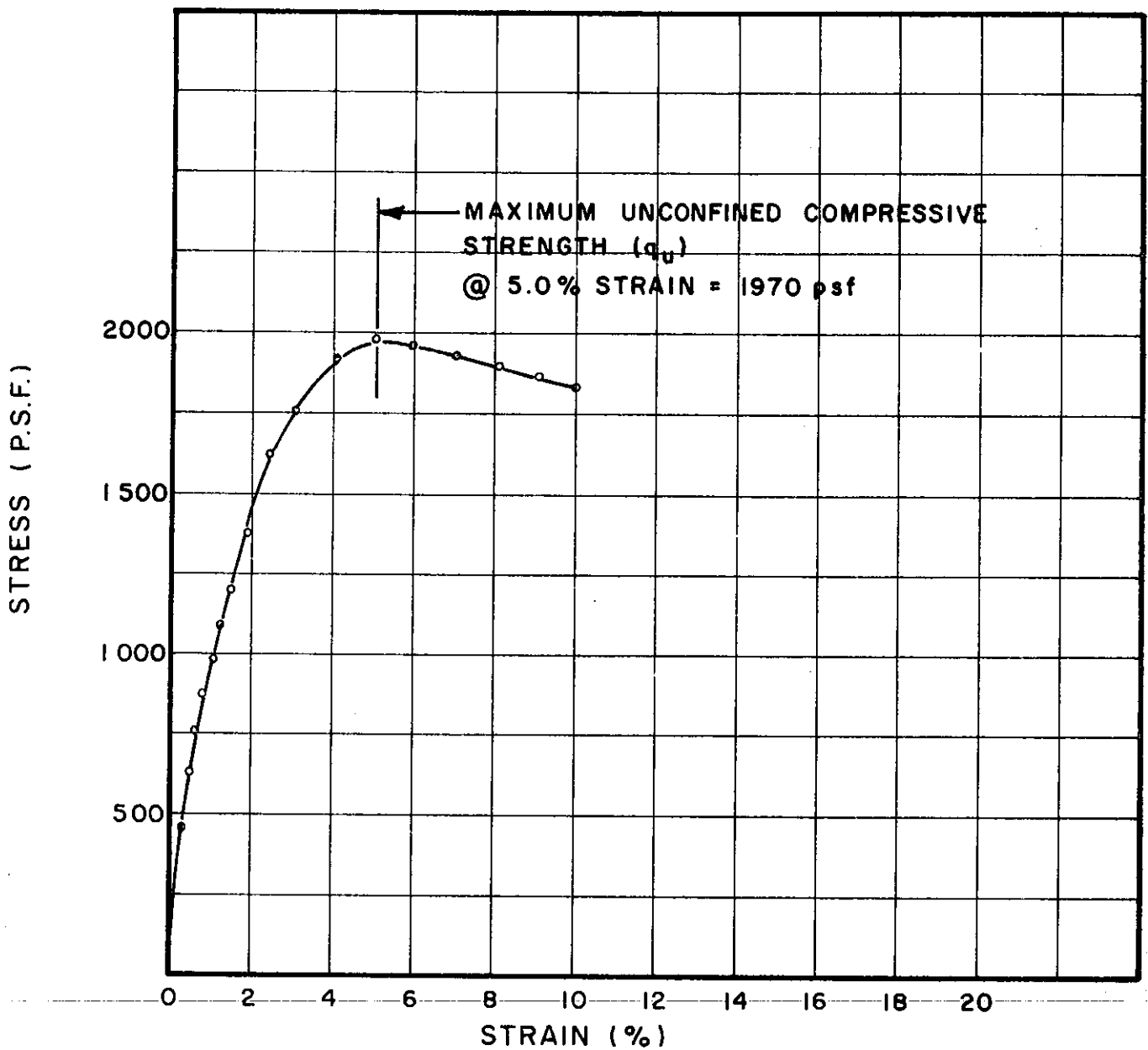


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI8.1	1.42	3.50	.257	28.5	96	46	22	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.3' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U22.1	1.41	3.50	.257	33.4	90	44	21	SILTY CLAY (CL-CH)

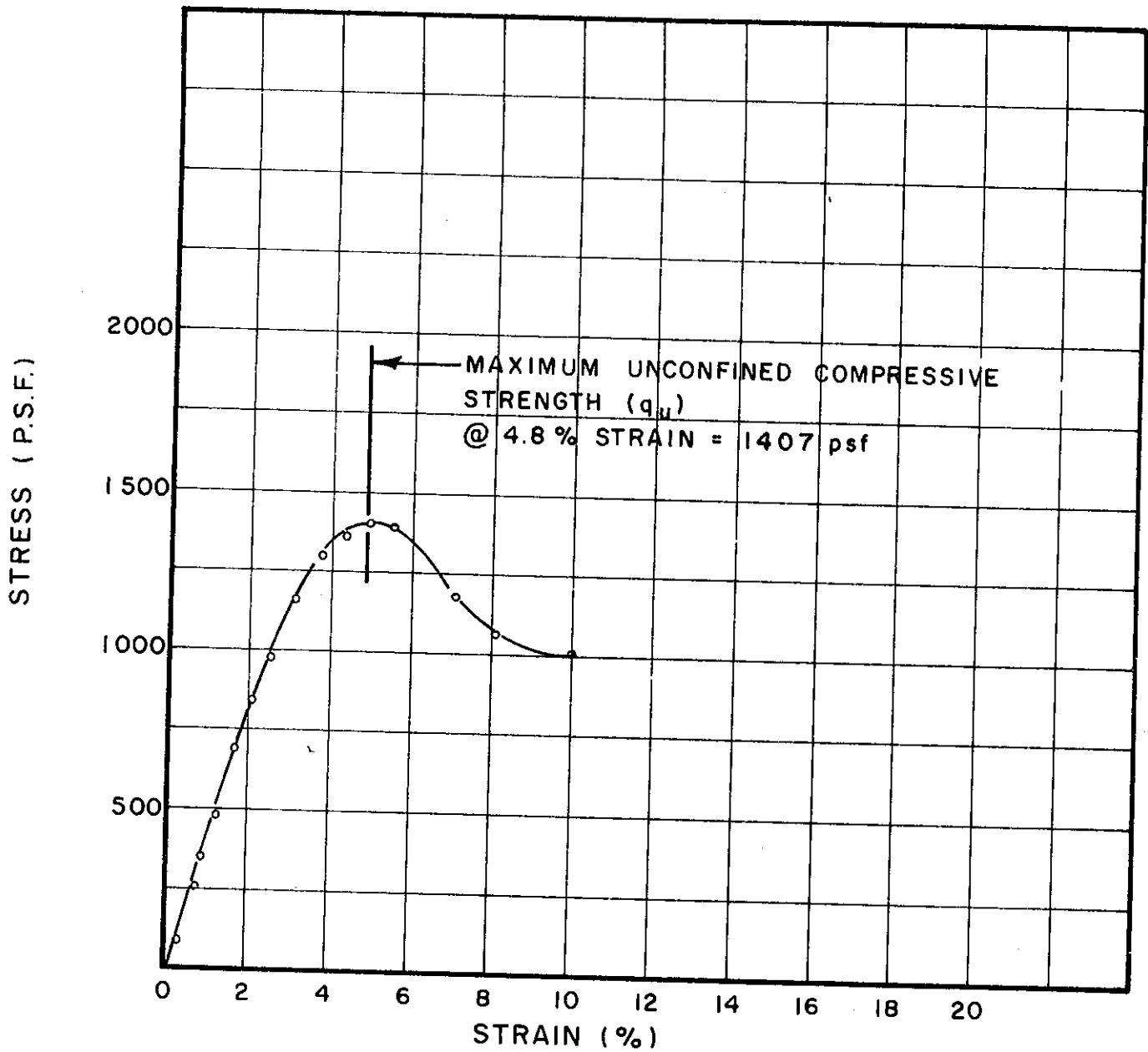
BORING NO. 38

SAMPLE NO. 12

DEPTH 54.2' TO 54.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U24.1	1.40	3.50	.257	41.3	79	55	24	SILTY CLAY (CL-CH)

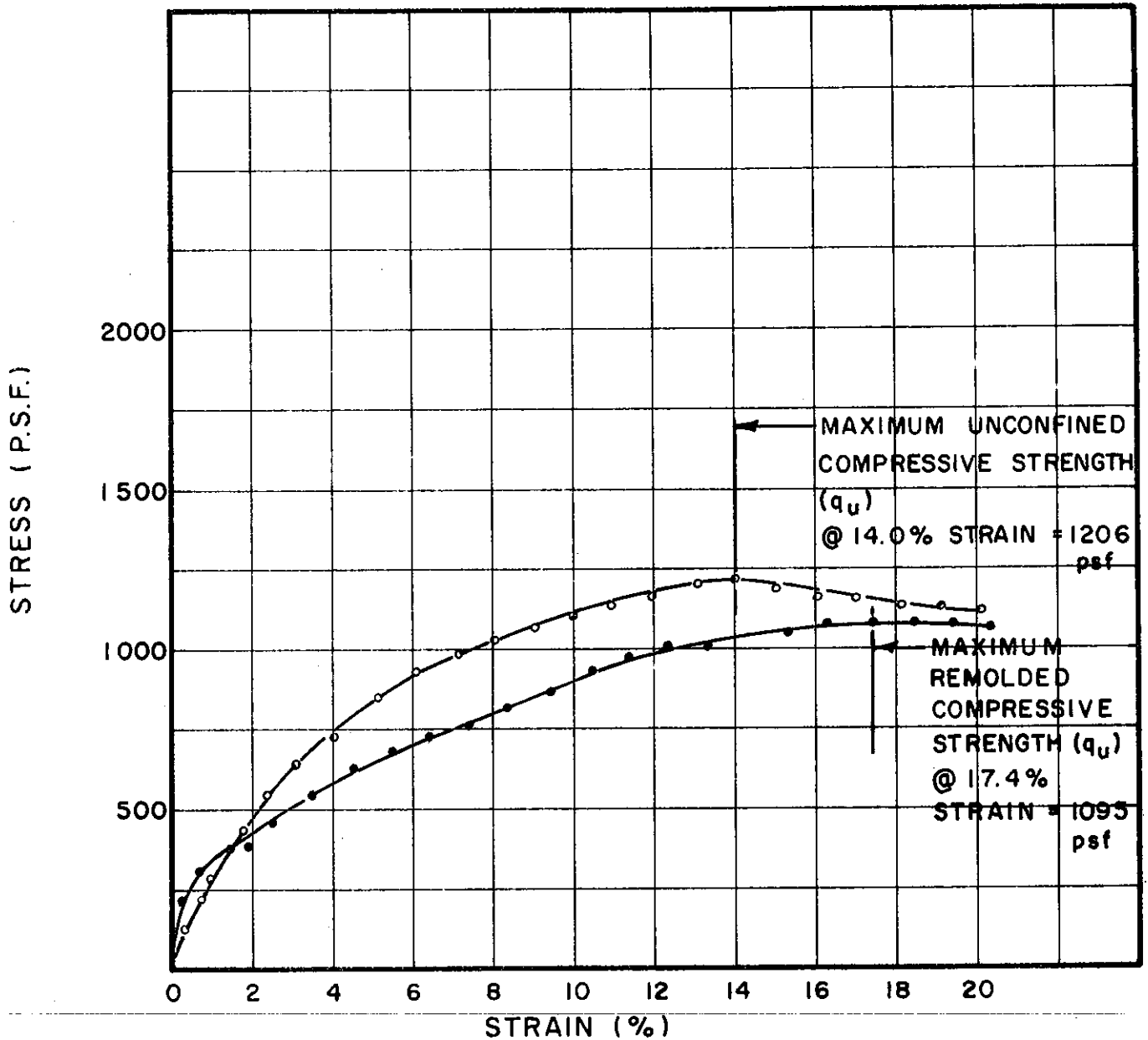
BORING NO. 38

SAMPLE NO. 16

DEPTH 73.7' TO 74.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U25.1	1.41	3.50	.257	22.2	104	33	19	SILTY CLAY GRAVELLY (CL)
U <sub>r</sub> 25.1	1.40	3.52	.256	22.2	105	33	19	SILTY CLAY GRAVELLY (CL)

BORING NO. 38

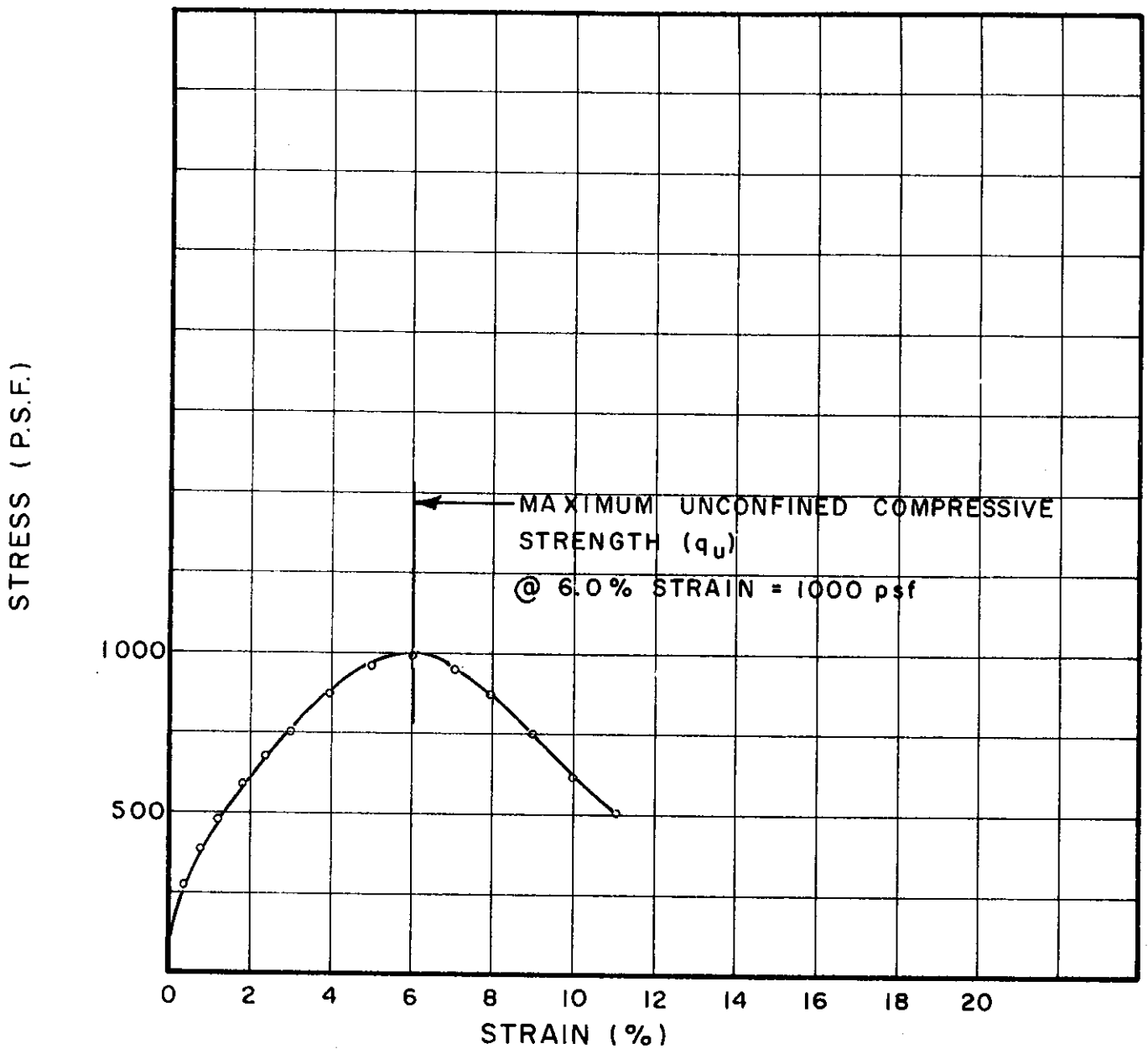
SAMPLE NO. 18

DEPTH 84.6' TO 84.9'

## UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

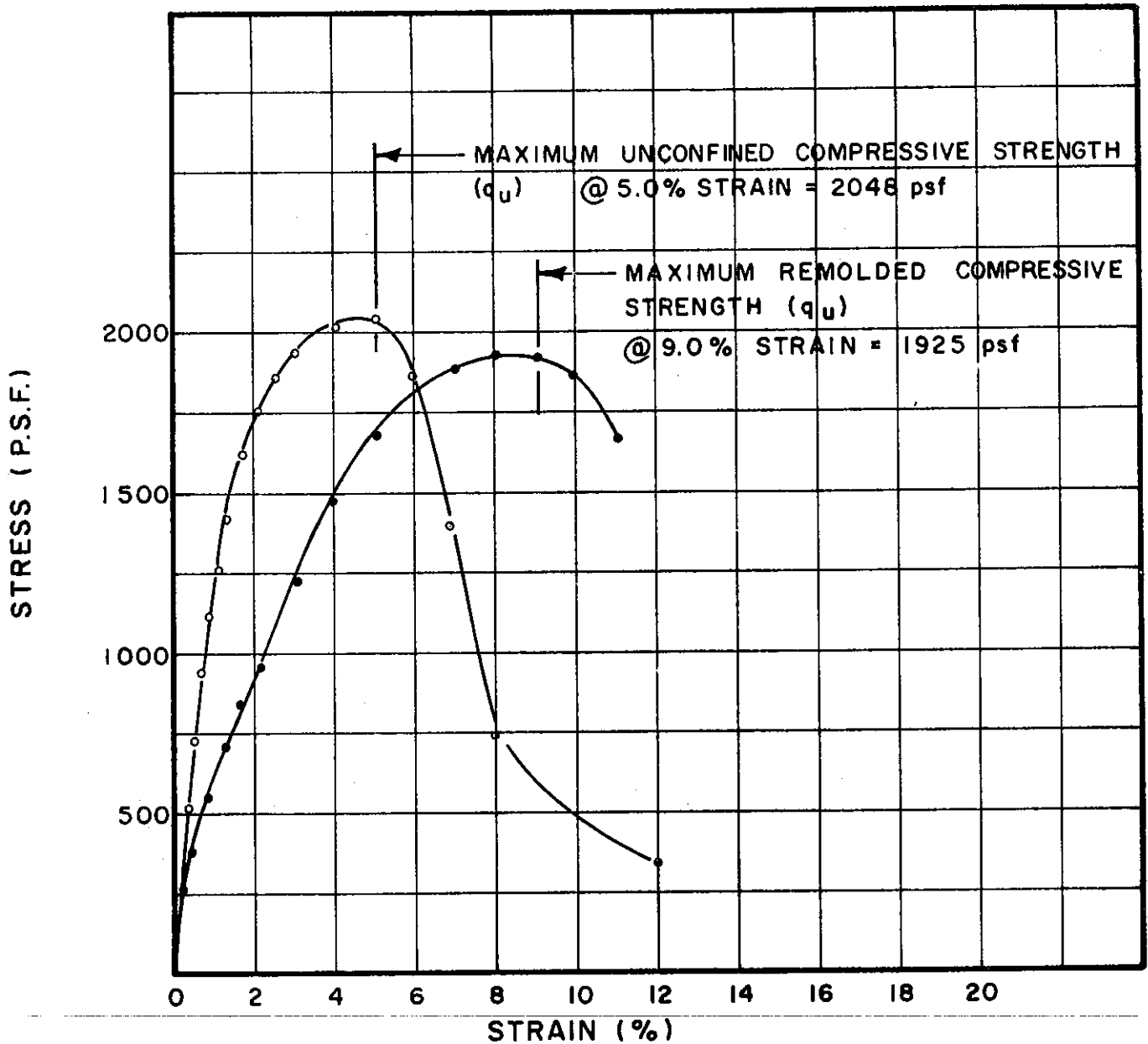


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U26.1	1.42	3.50	.257	31.9	92	45	25	SILTY CLAY (CL)

BORING NO. 38  
 SAMPLE NO. 24  
 DEPTH 114.2' TO 114.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U28.1	1.43	3.50	.257	29.4	94	63	28	SILTY CLAY (CH)
U <sub>r</sub> 28.1	1.40	3.38	.266	29.4	95	63	28	SILTY CLAY (CH)

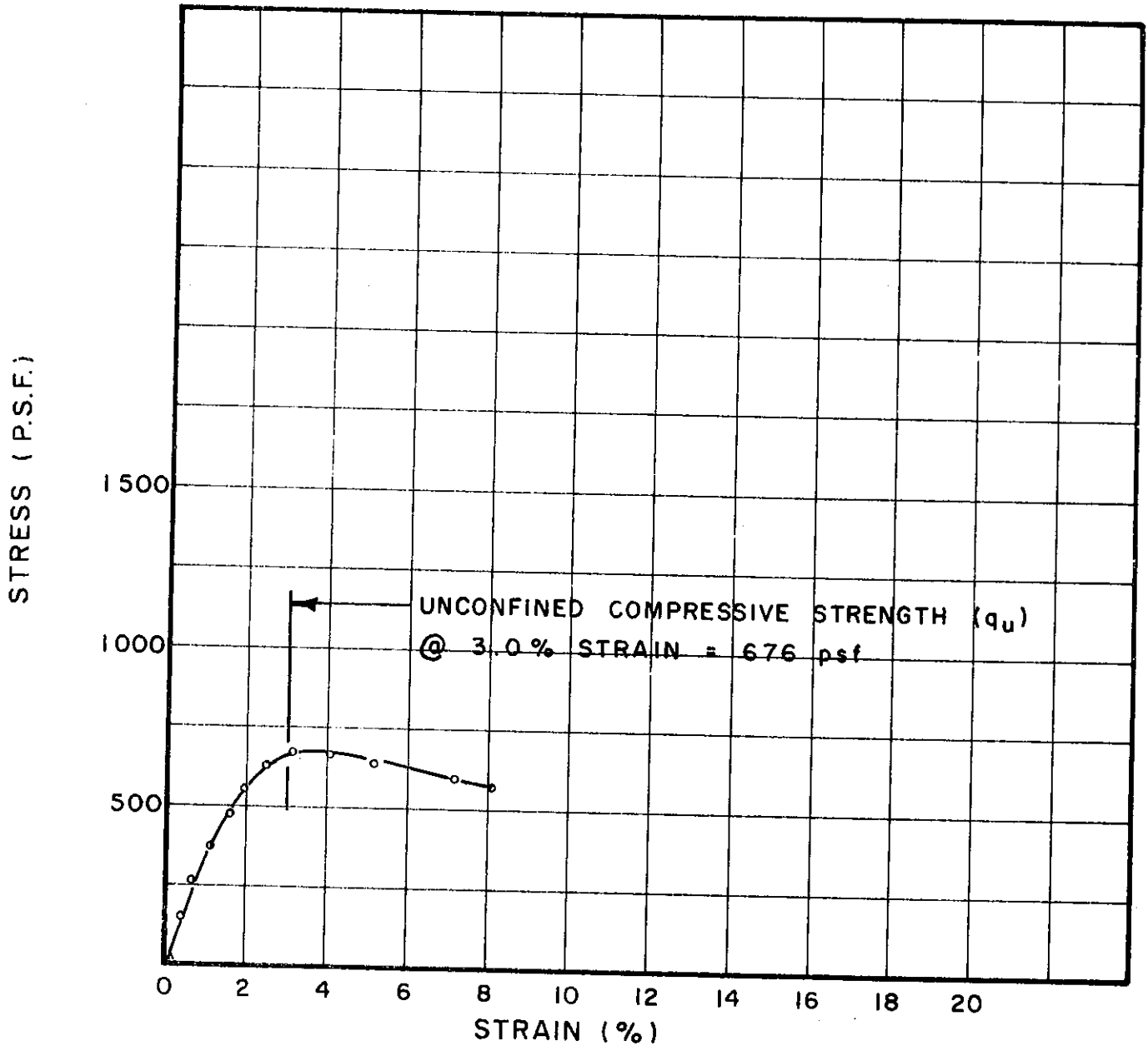
BORING NO. 41  
 SAMPLE NO. 2  
 DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



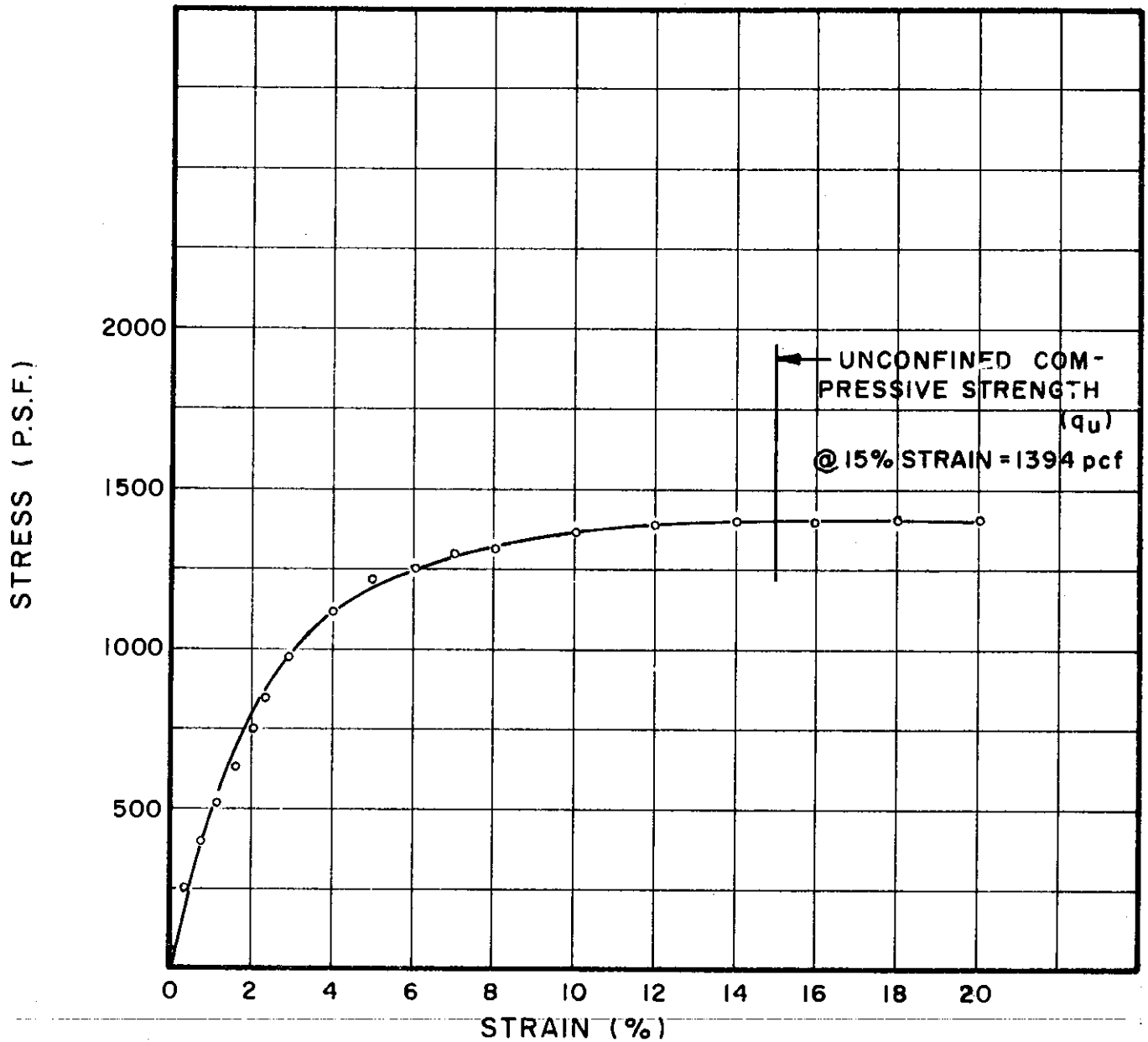


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U30.1	1.42	3.50	.257	39.2	83	47	24	SILTY CLAY (CL-CH)

BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 20.6' TO 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



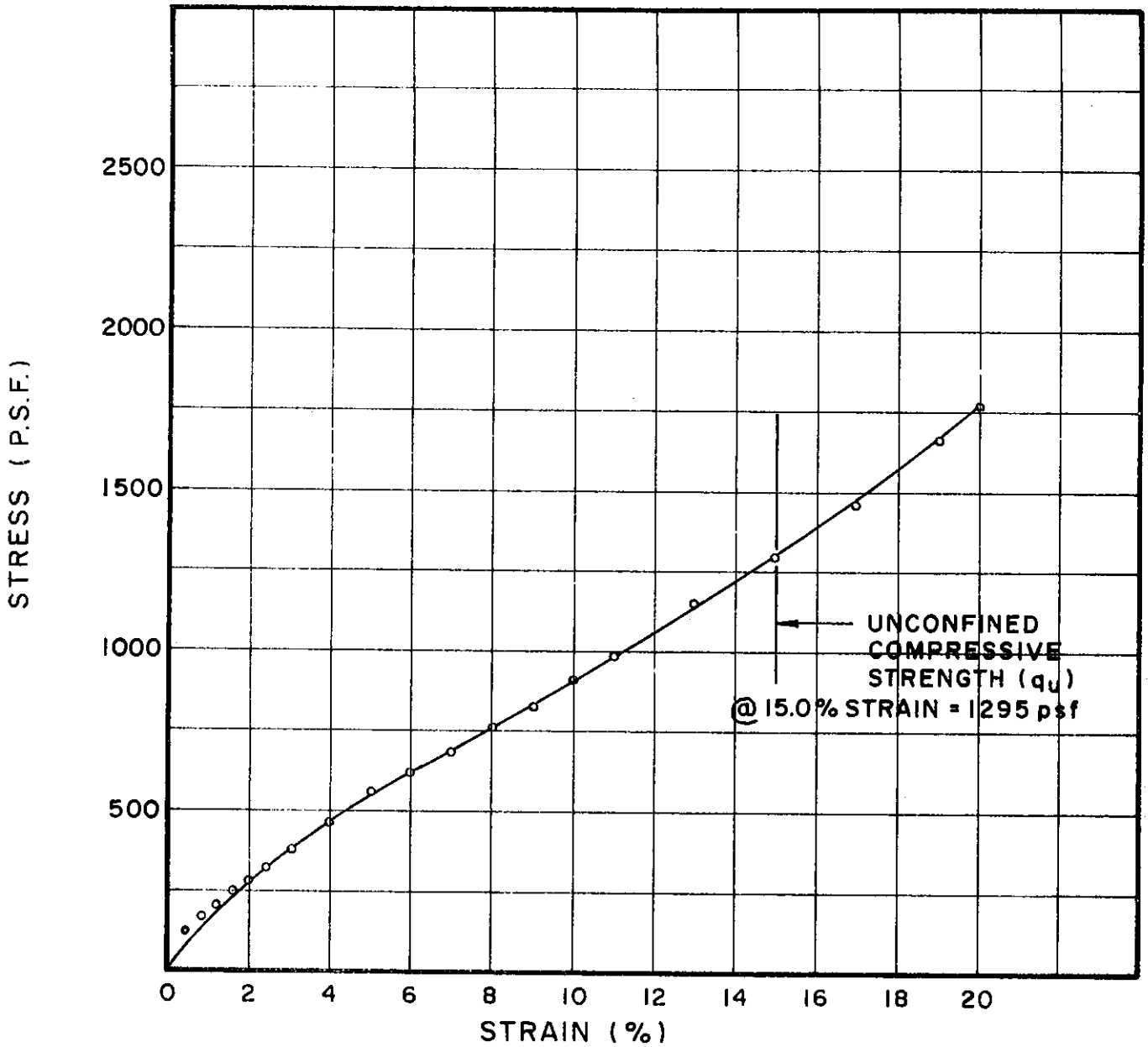
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U31.1	1.40	3.50	.257	36.9	86	45	21	SILTY CLAY, (CL-CH)

BORING NO. 41  
 SAMPLE NO. 9  
 DEPTH 30.9' TO 31.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

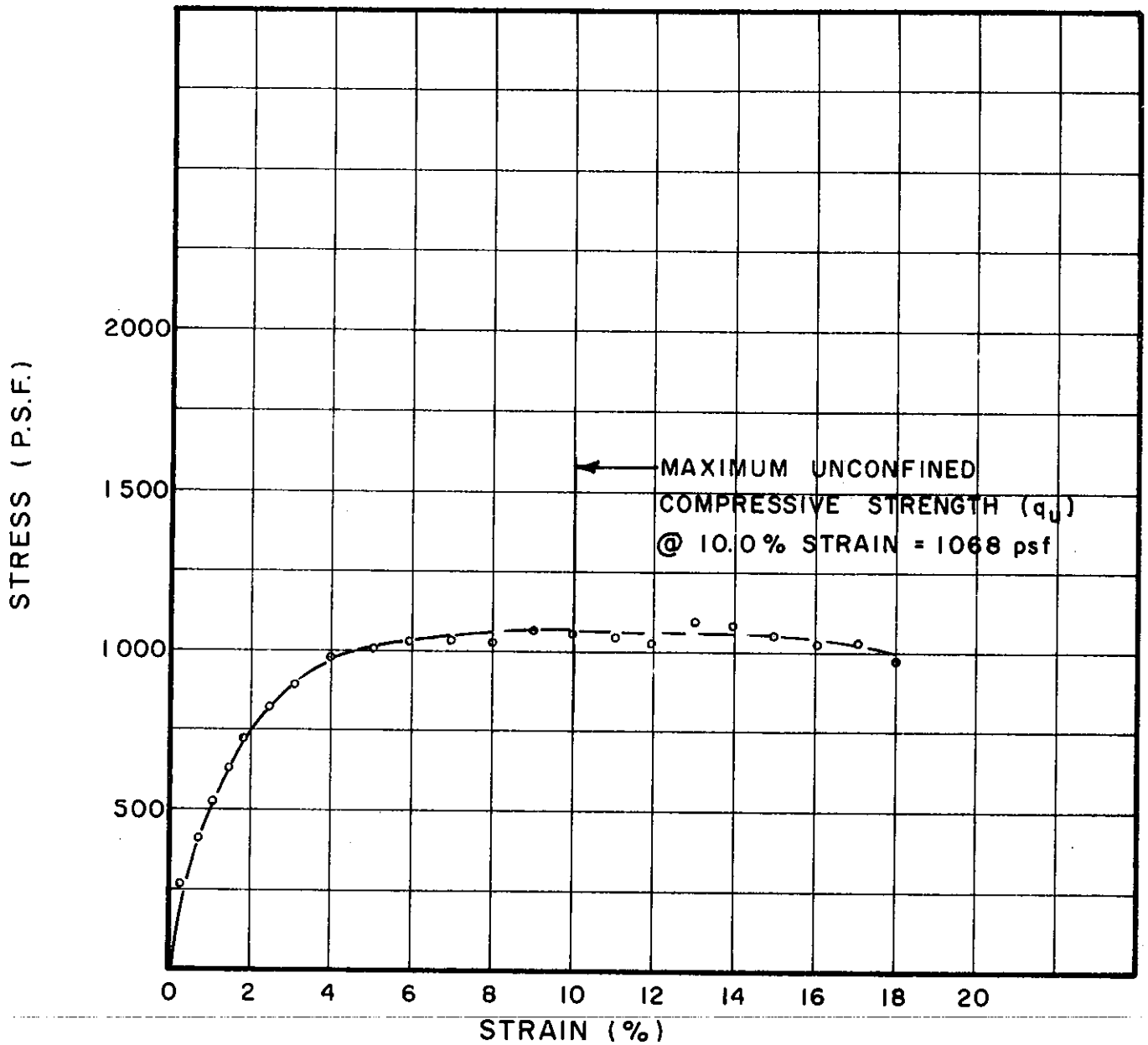


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U32.1	1.37	3.45	.260	16.0	118	20	12	SILTY CLAY, SANDY (CL-SC)
								(SAMPLE SLIGHTLY DISTURBED)

BORING NO. 41  
 SAMPLE NO. 11  
 DEPTH 40.6' TO 41.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

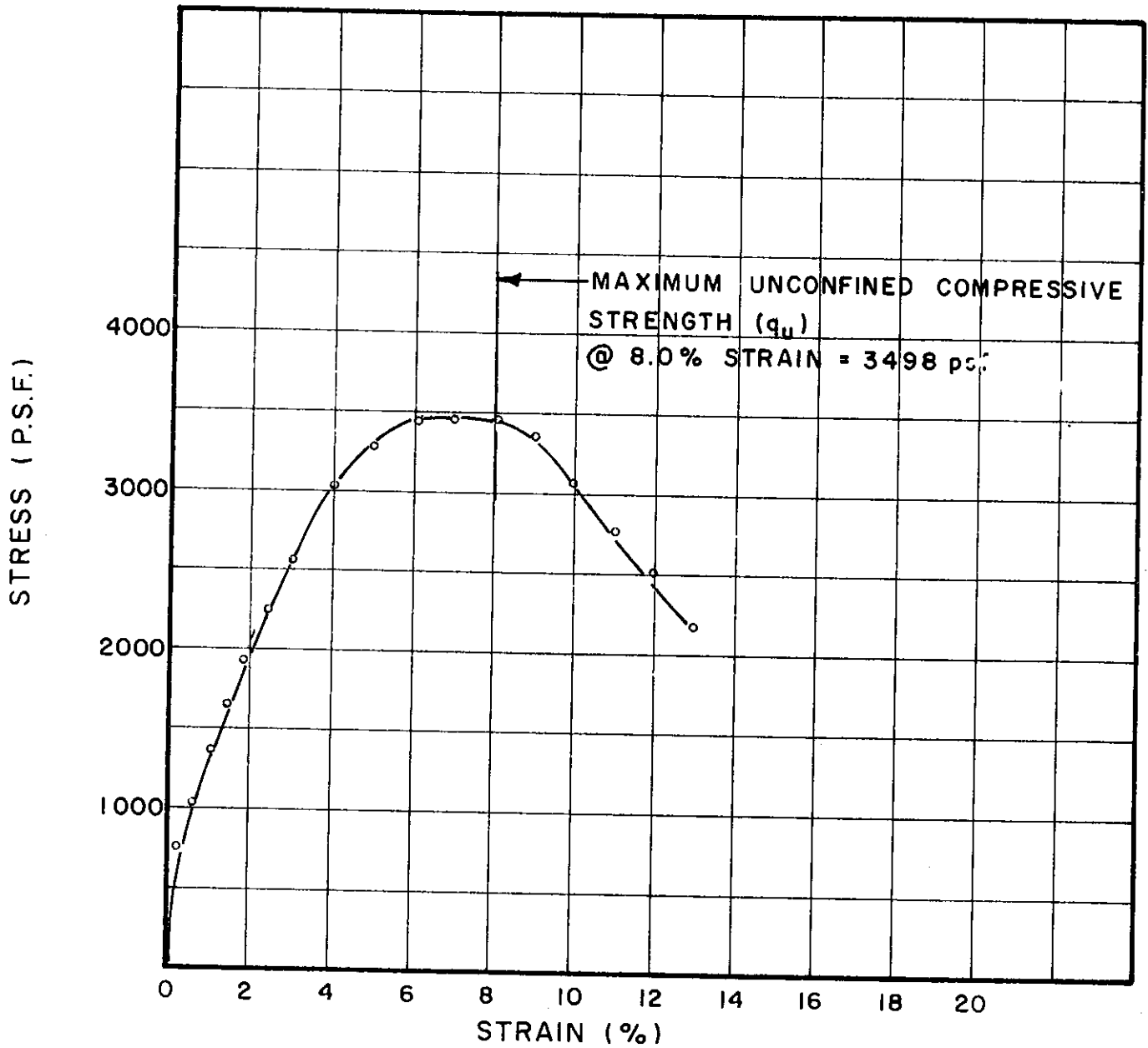


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	PL (%)	SOIL DESCRIPTION
U37.1	1.41	3.47	.259	26.4	99	34	20	SILTY CLAY, SANDY (CL)

BORING NO. 41  
 SAMPLE NO. 23  
 DEPTH 101.8' TO 102.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

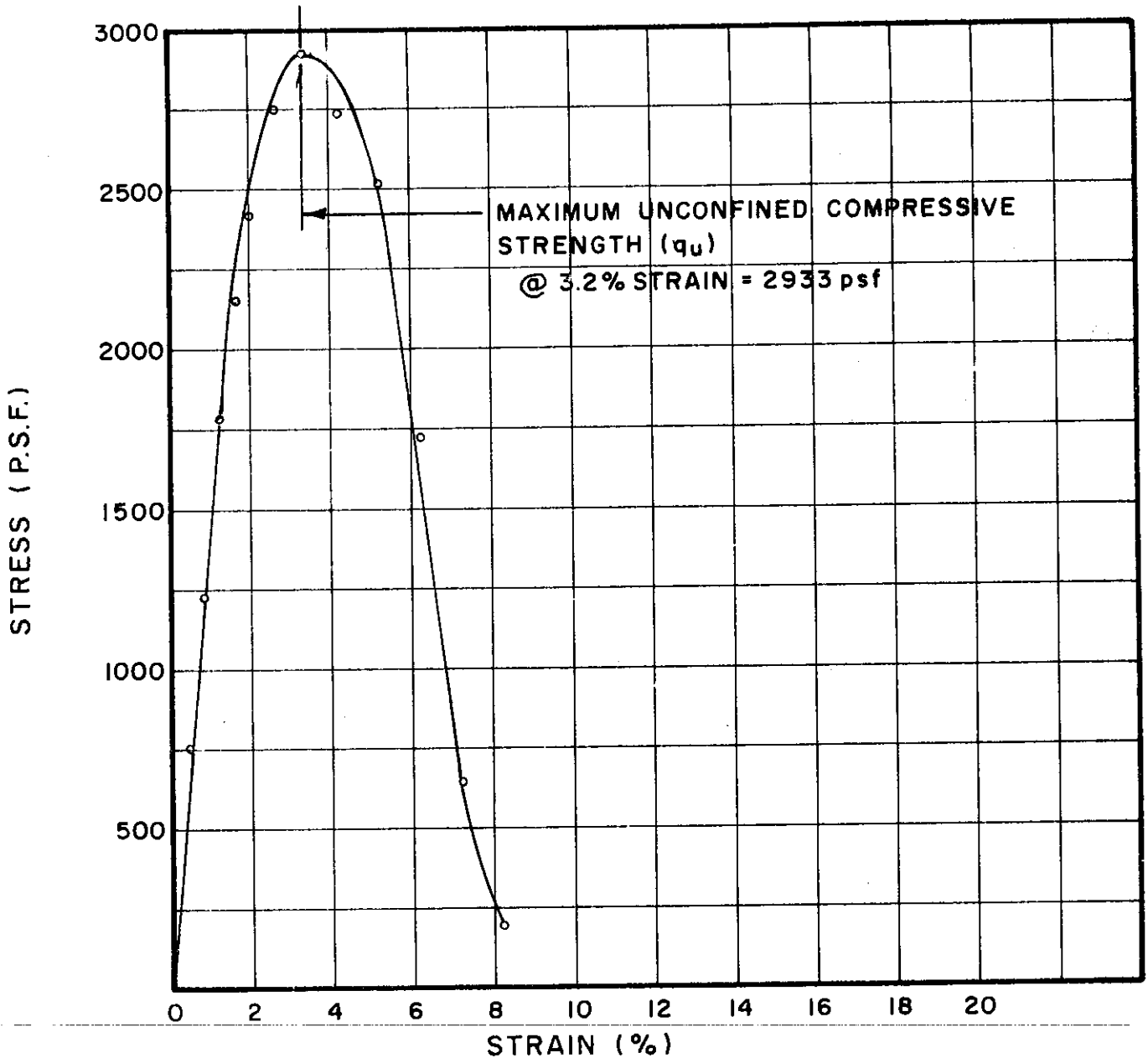


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U40.1	1.44	3.13	.29	13.8	124	25	17	CLAYEY SAND (GC-SC)

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.7' TO 131.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI98.1	1.43	3.50	.257	27.3	97	63	24	SILTY CLAY (CH)

BORING NO. 48

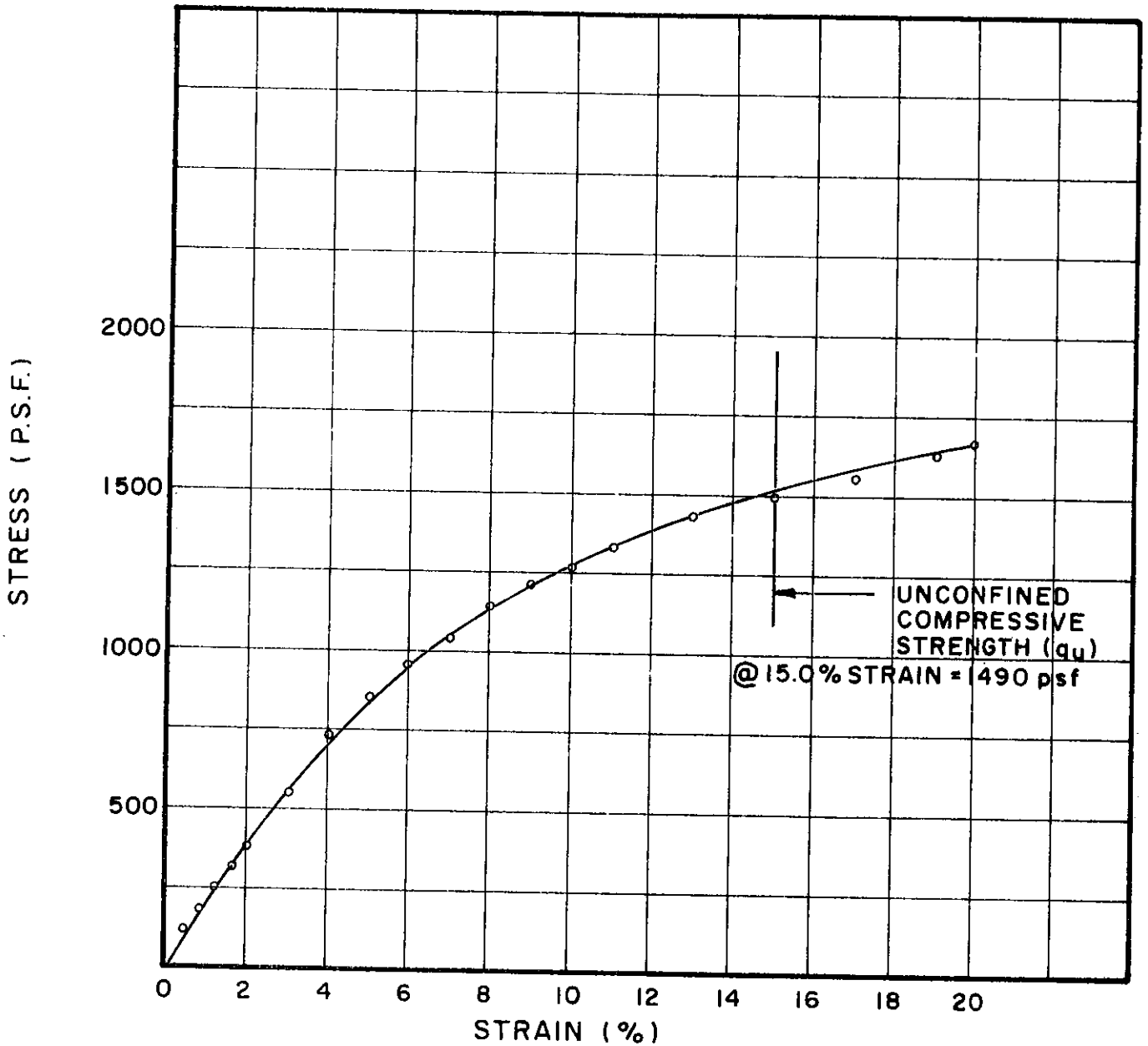
SAMPLE NO. 2

DEPTH 3.2' TO 3.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

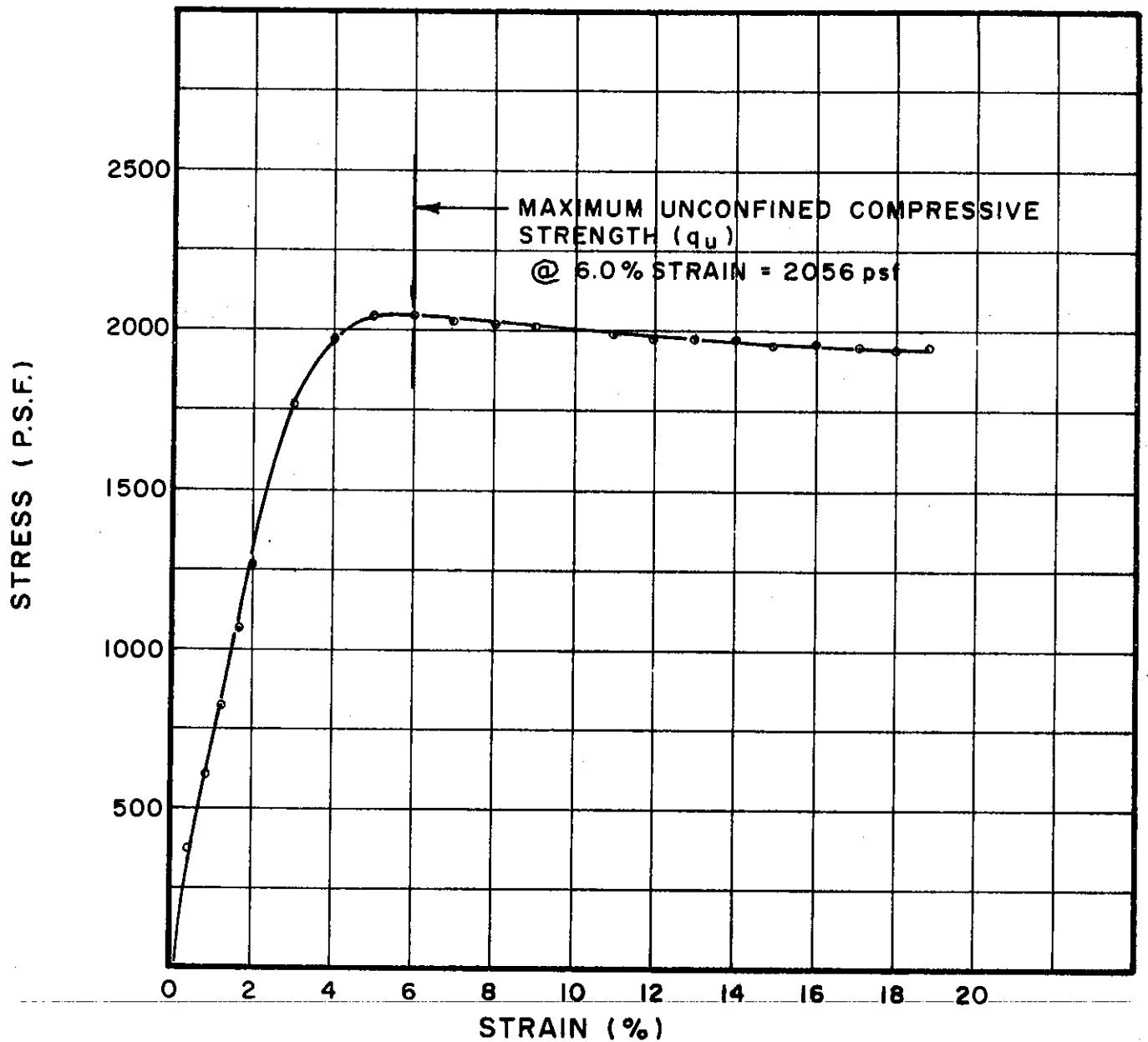


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U204.1	1.41	3.41	.264	25.2	100	34	16	SILTY CLAY, SANDY (CL)

BORING NO. 48  
 SAMPLE NO. 14  
 DEPTH 61.2' TO 61.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U134.1	1.41	3.51	.256	34.0	90	42	22	SILTY CLAY (CL)

BORING NO. 49

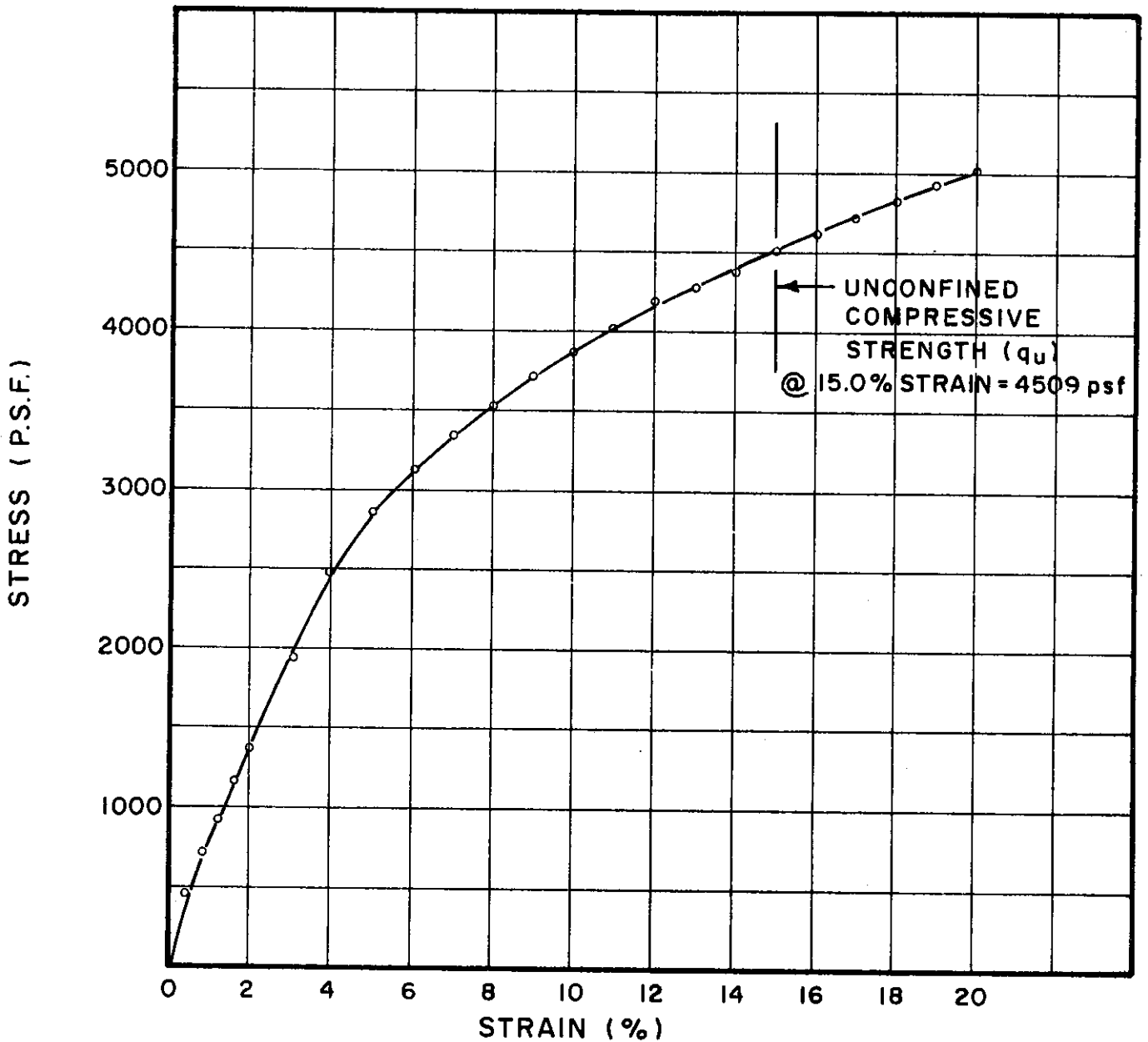
SAMPLE NO. 4

DEPTH 24.0' TO 24.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI39.1	1.41	3.36	.268	25.6	100	33	22	SILTY CLAY; SANDY
								(CL)

BORING NO. 49

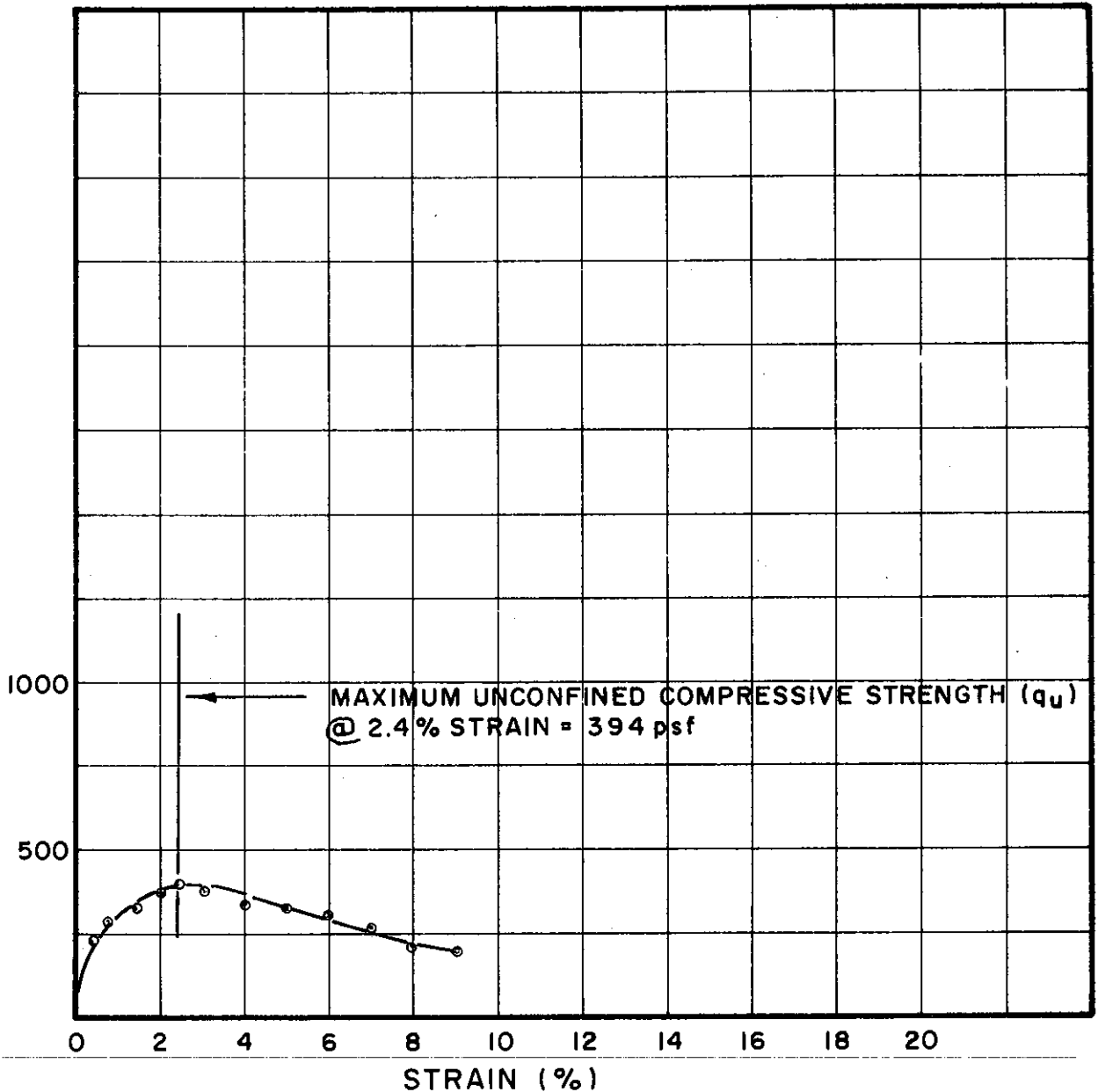
SAMPLE NO. 9

DEPTH 73.9' TO 74.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

STRESS (PSF)



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U85.1	1.39	3.21	.25	45.8	75	51	18	SILTY CLAY (CH-CL)

BORING NO. 50

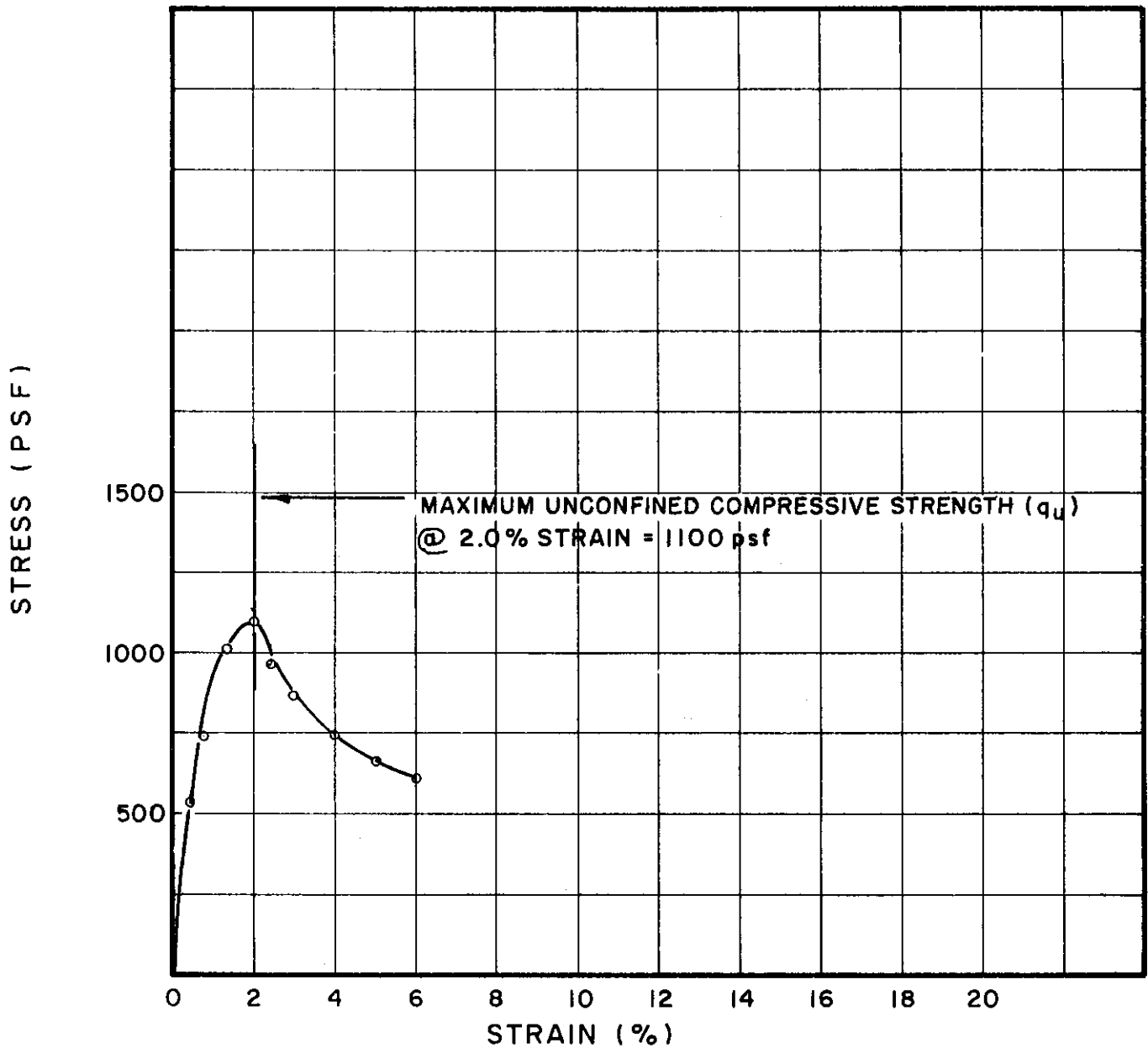
SAMPLE NO. 6

DEPTH 29.3' TO 29.7'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

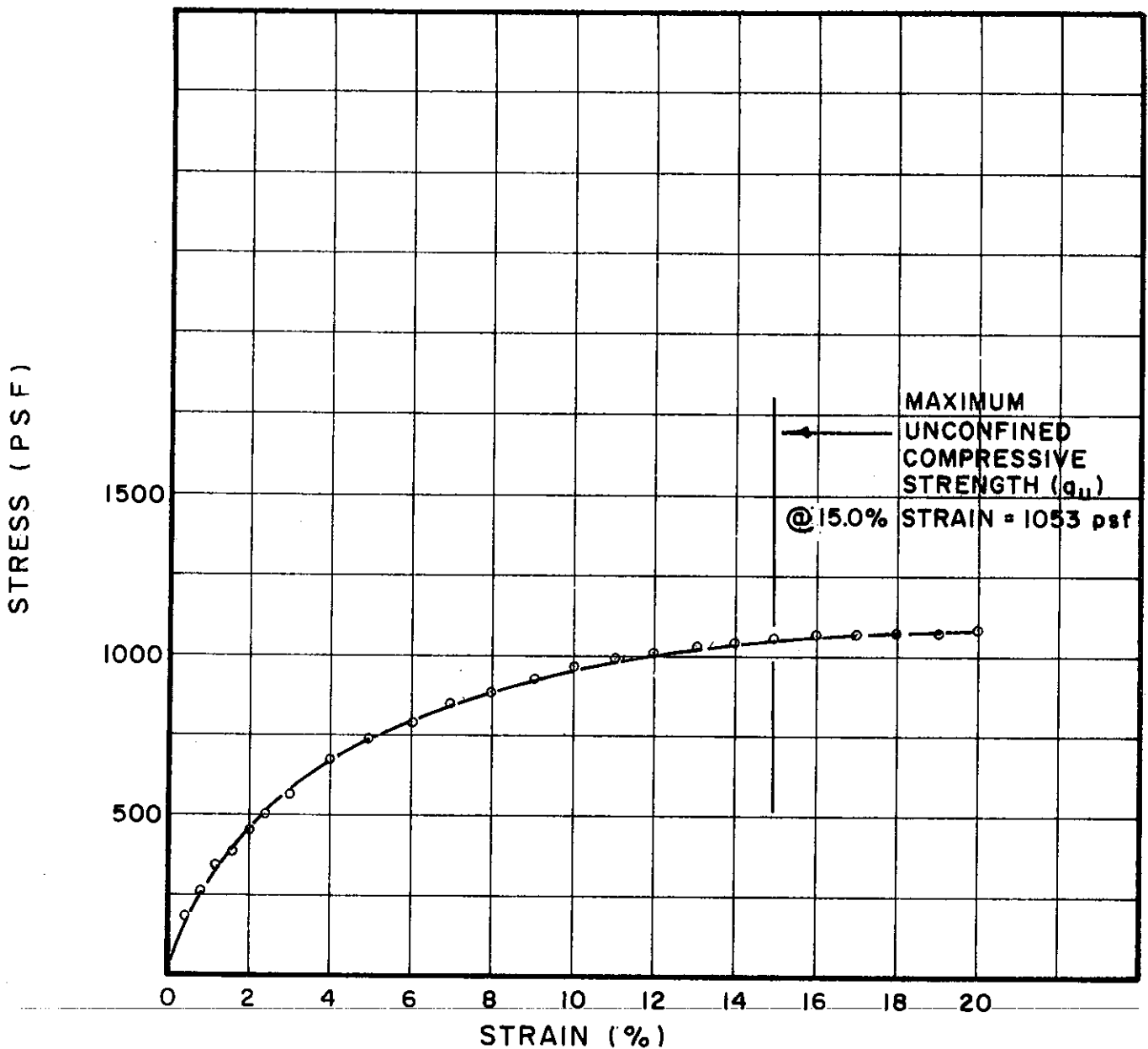


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U86.1	1.40	3.27	0.25	51.3	70	55	23	SILTY CLAY (CH)

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.9' TO 39.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U87.1	1.40	3.25	.25	23.6	99	36	16	SILTY CLAY, SANDY (CL)

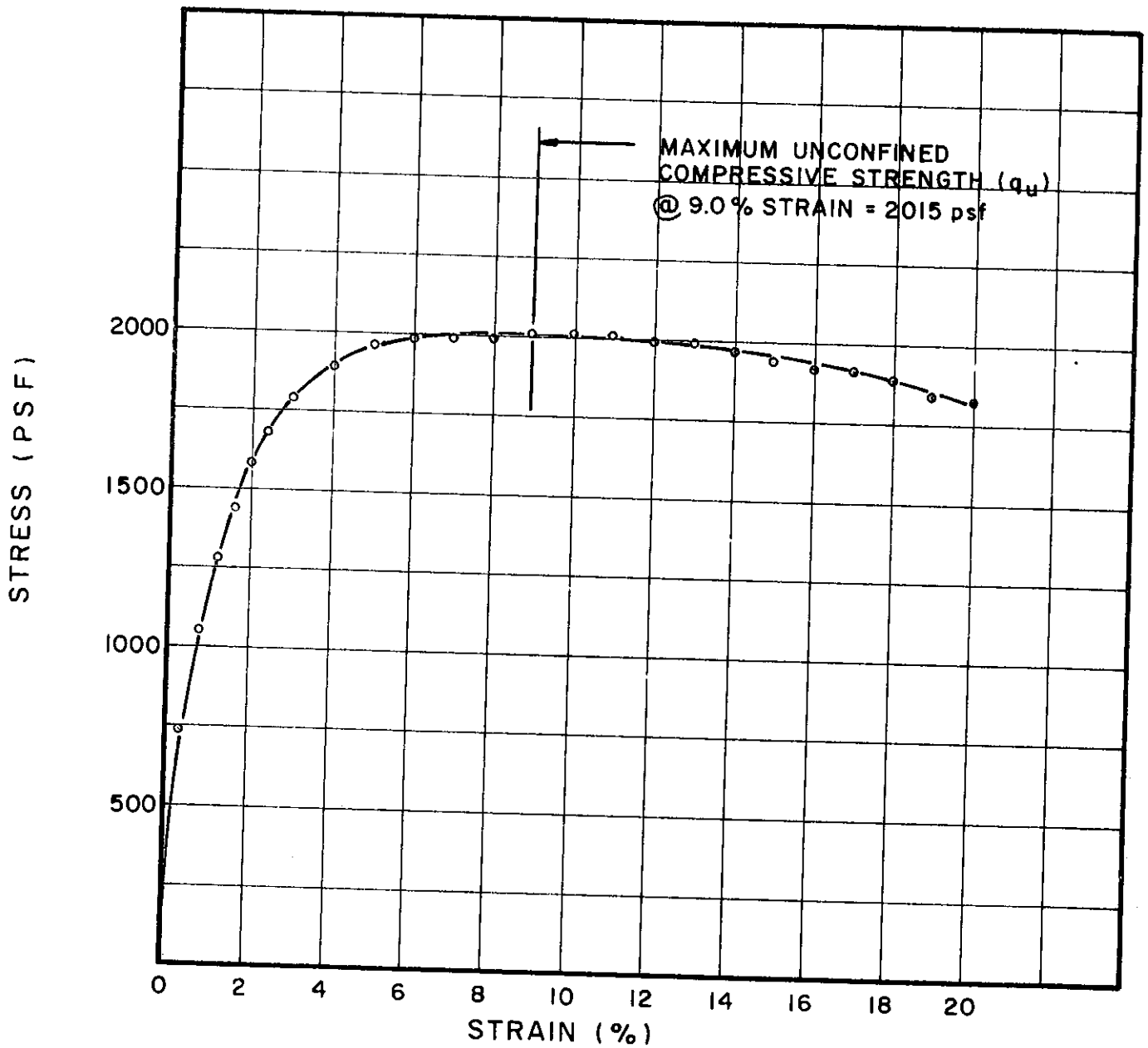
BORING NO. 50

SAMPLE NO. 10

DEPTH 49.0' TO 49.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U88.1	1.38	3.20	.25	25.8	99	39	18	SILTY CLAY (CL)

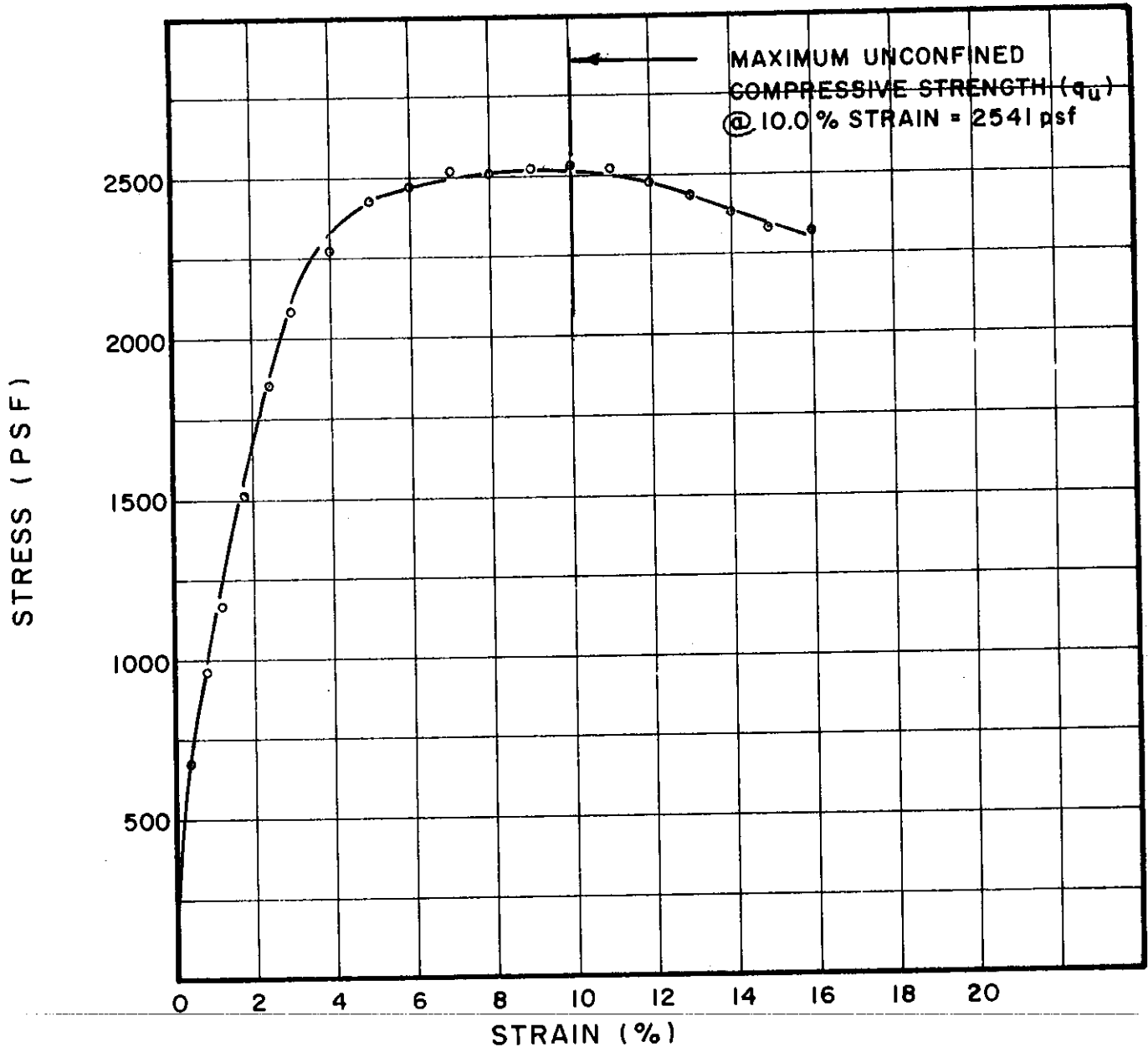
BORING NO. 50

SAMPLE NO. 12

DEPTH 58.6' - 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U90.1	1.39	3.20	.25	27.9	95	39	20	SILTY CLAY (CL)

BORING NO. 50

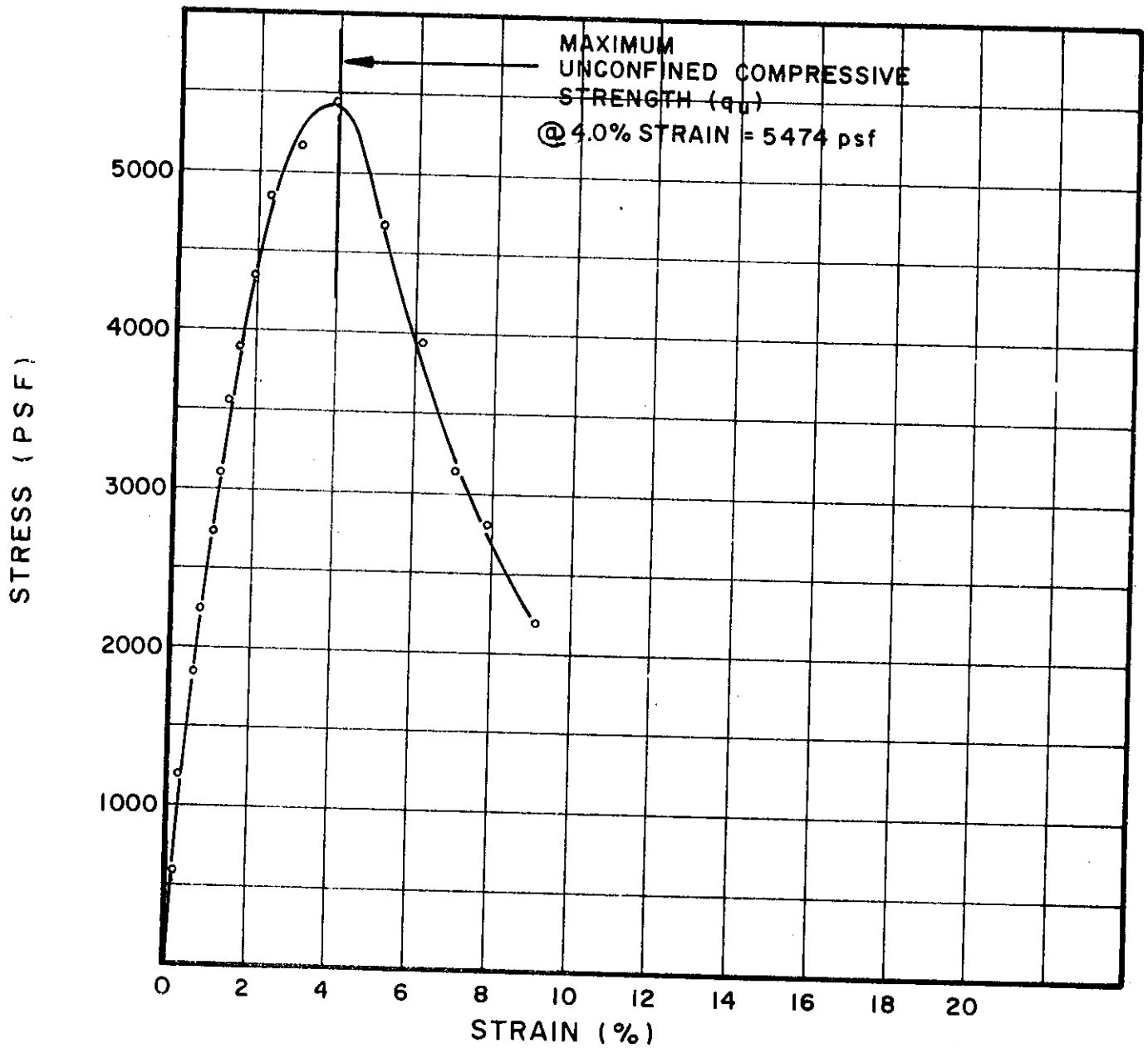
SAMPLE NO. 16

DEPTH 78.6' - 78.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI08.1	1.37	3.48	.25	30.3	92	49	20	SILTY CLAY (CL-CH)

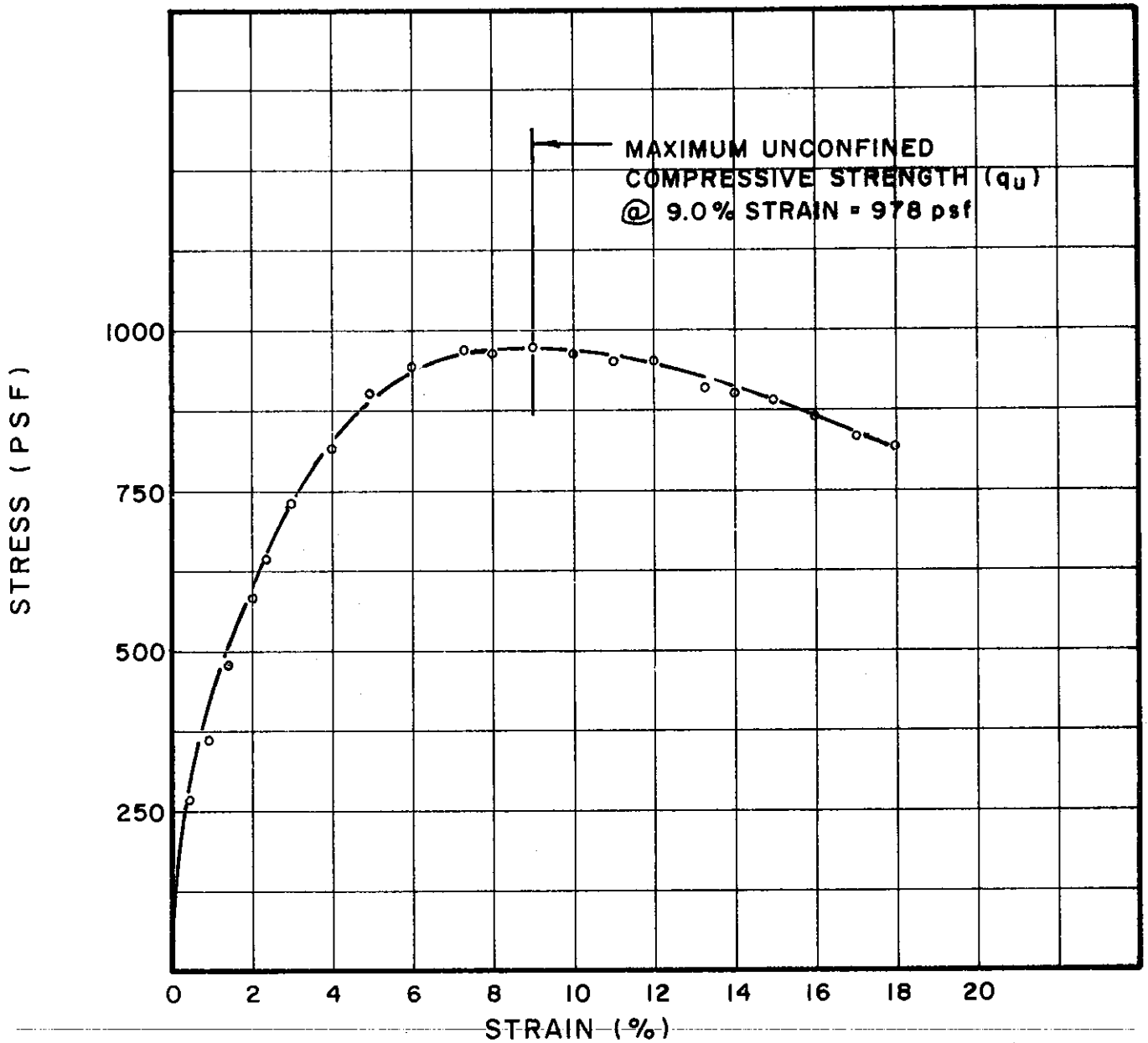
BORING NO. 52

SAMPLE NO. 3

DEPTH 20.5' - 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI09.1	1.37	3.25	.25	31.8	94	35	18	SILTY CLAY (CL)

BORING NO. 52

SAMPLE NO. 4

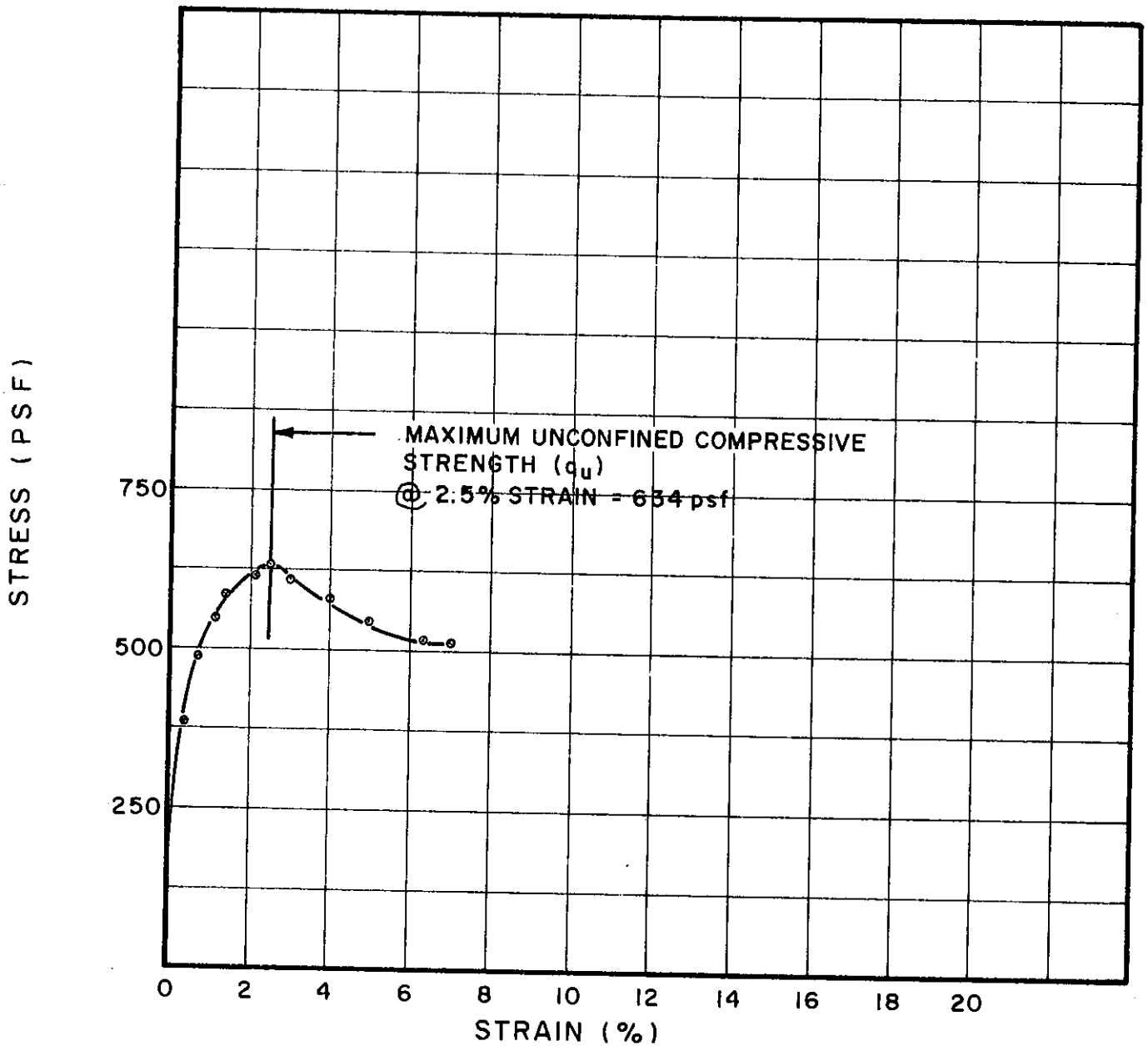
DEPTH 28.6' TO 28.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U111.1	1.38	3.02	.29	25.2	100	22	18	SILTY CLAY (CL-ML)

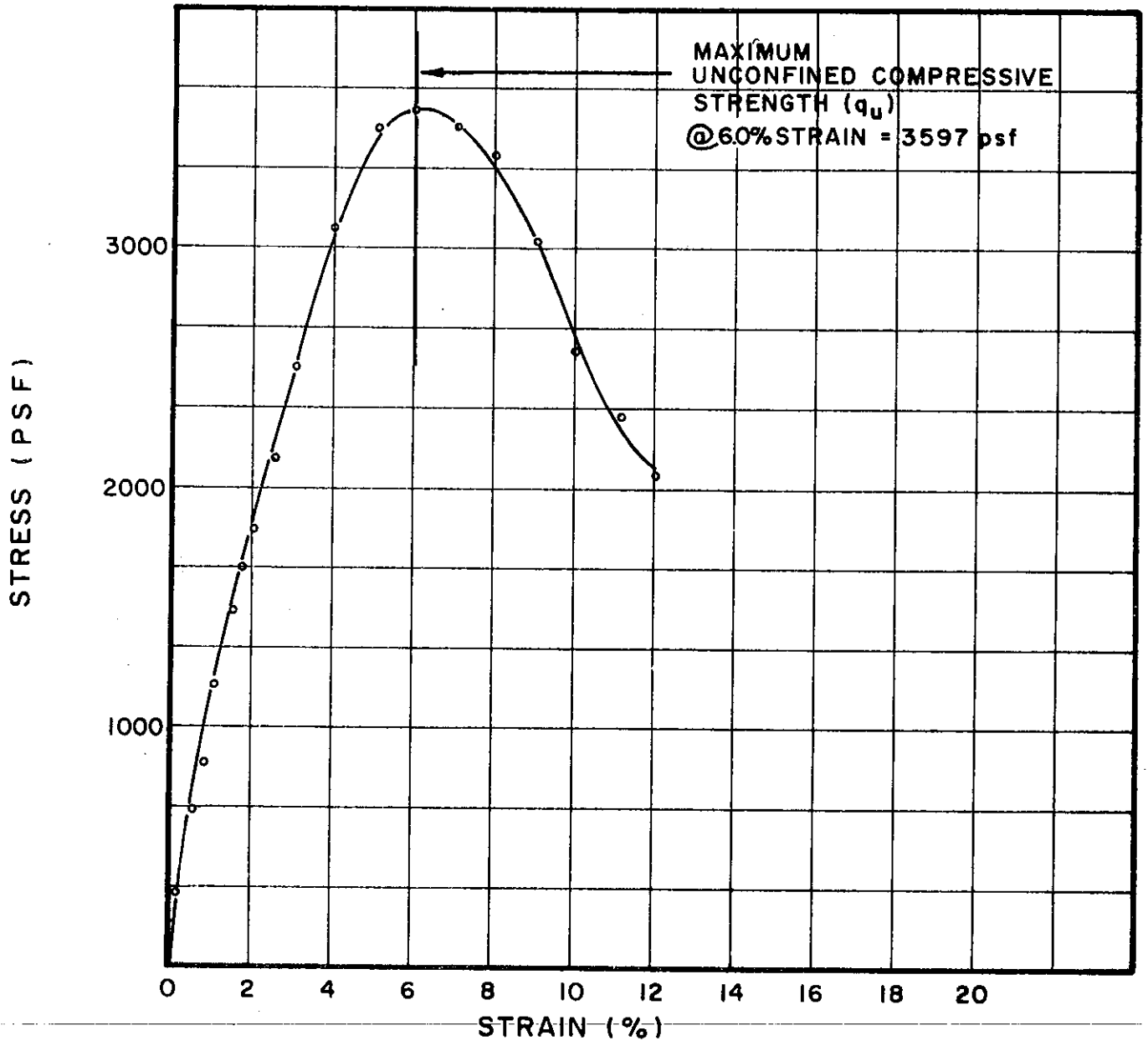
BORING NO. 52

SAMPLE NO. 6

DEPTH 49.2' - 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U112.1	1.36	3.37	.25	13.0	116	23	14	SILTY CLAY, SANDY
								(CL)

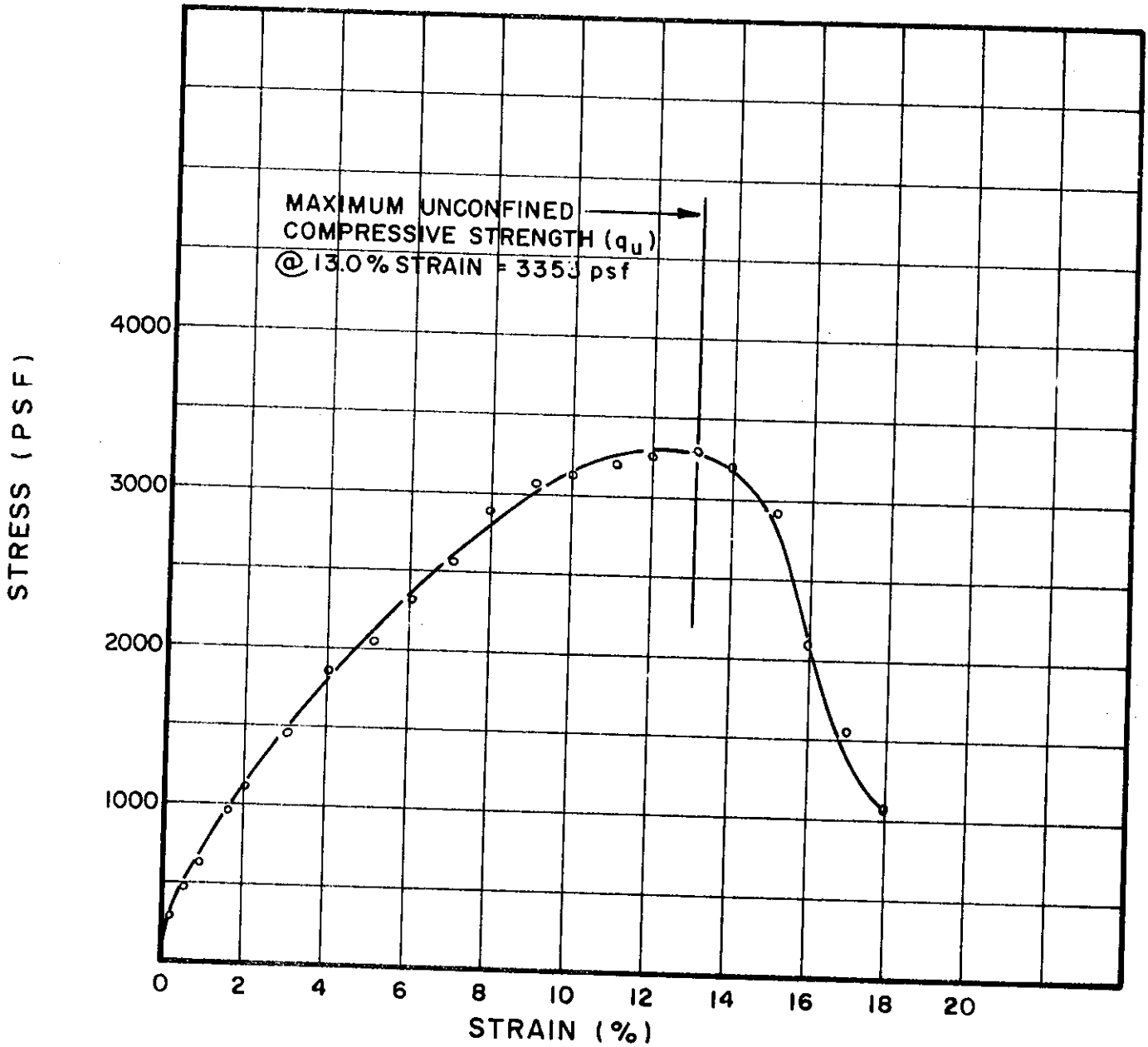
BORING NO. 52

SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U113.1	1.34	3.50	.25	14.2	115	24	14	SILTY CLAY, SANDY
								(CL)

BORING NO. 52  
 SAMPLE NO. 8  
 DEPTH 68.2' TO 68.5'

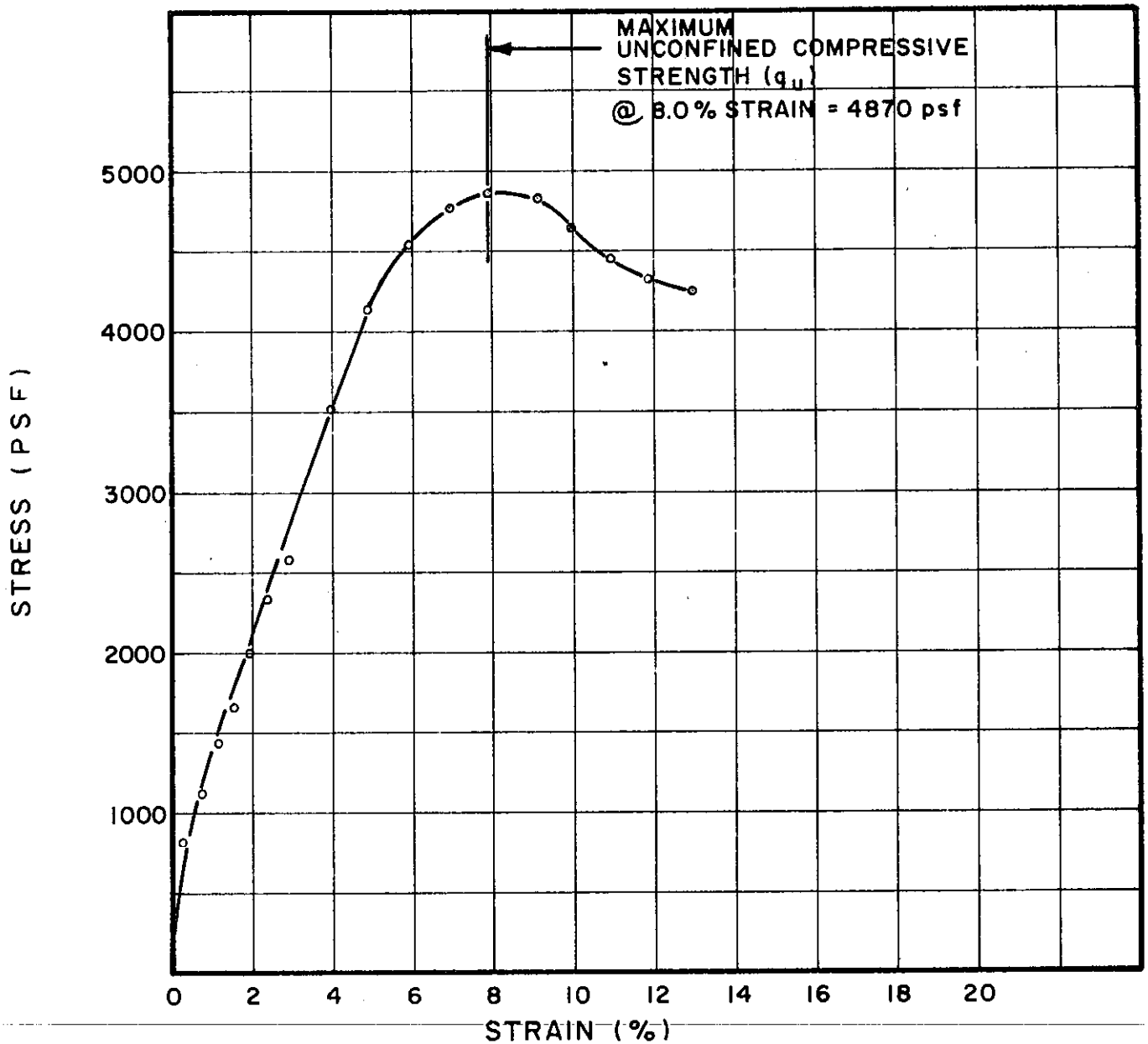
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-305



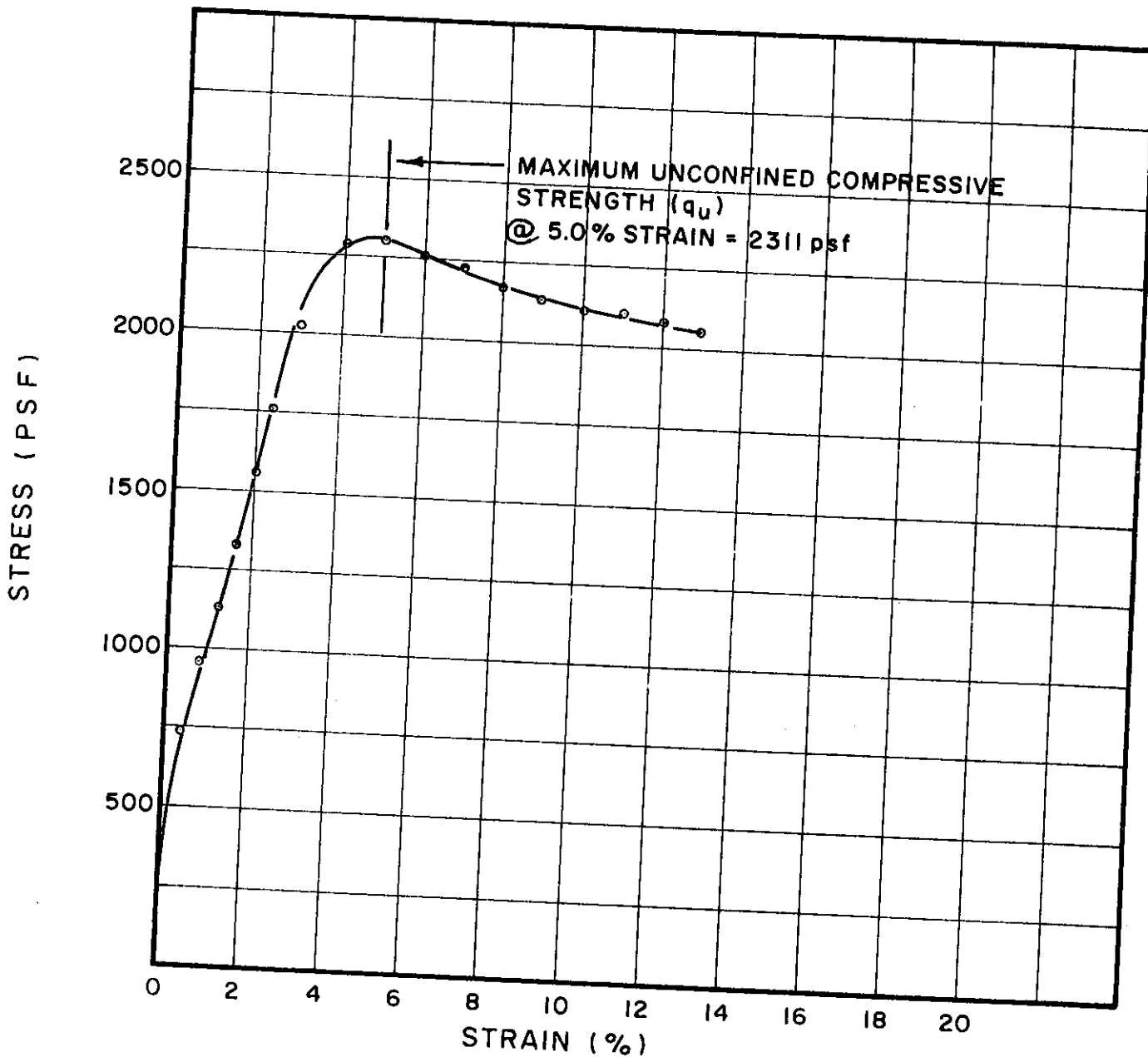
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U115.1	1.39	3.27	.28	27.2	97	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 88.6' - 88.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U96.1	1.40	3.20	.25	31.8	88	49	20	SILTY CLAY (CL-CH)

BORING NO. 53  
 SAMPLE NO. 3  
 DEPTH 19.6' TO 19.9'

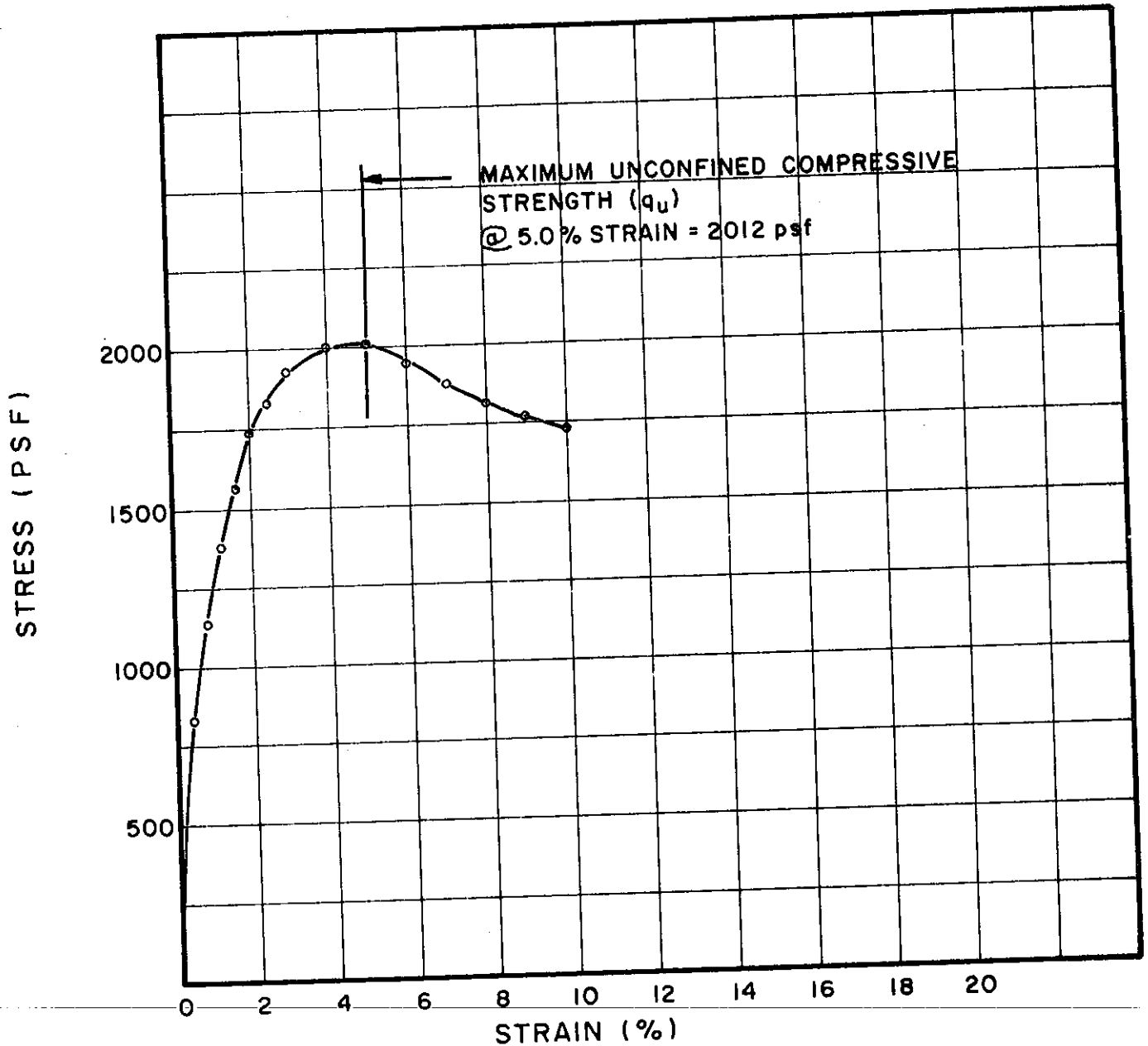
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-307



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U97.1	1.38	3.24	.25	40.7	80	49	22	SILTY CLAY (CL-CH)

BORING NO. 53

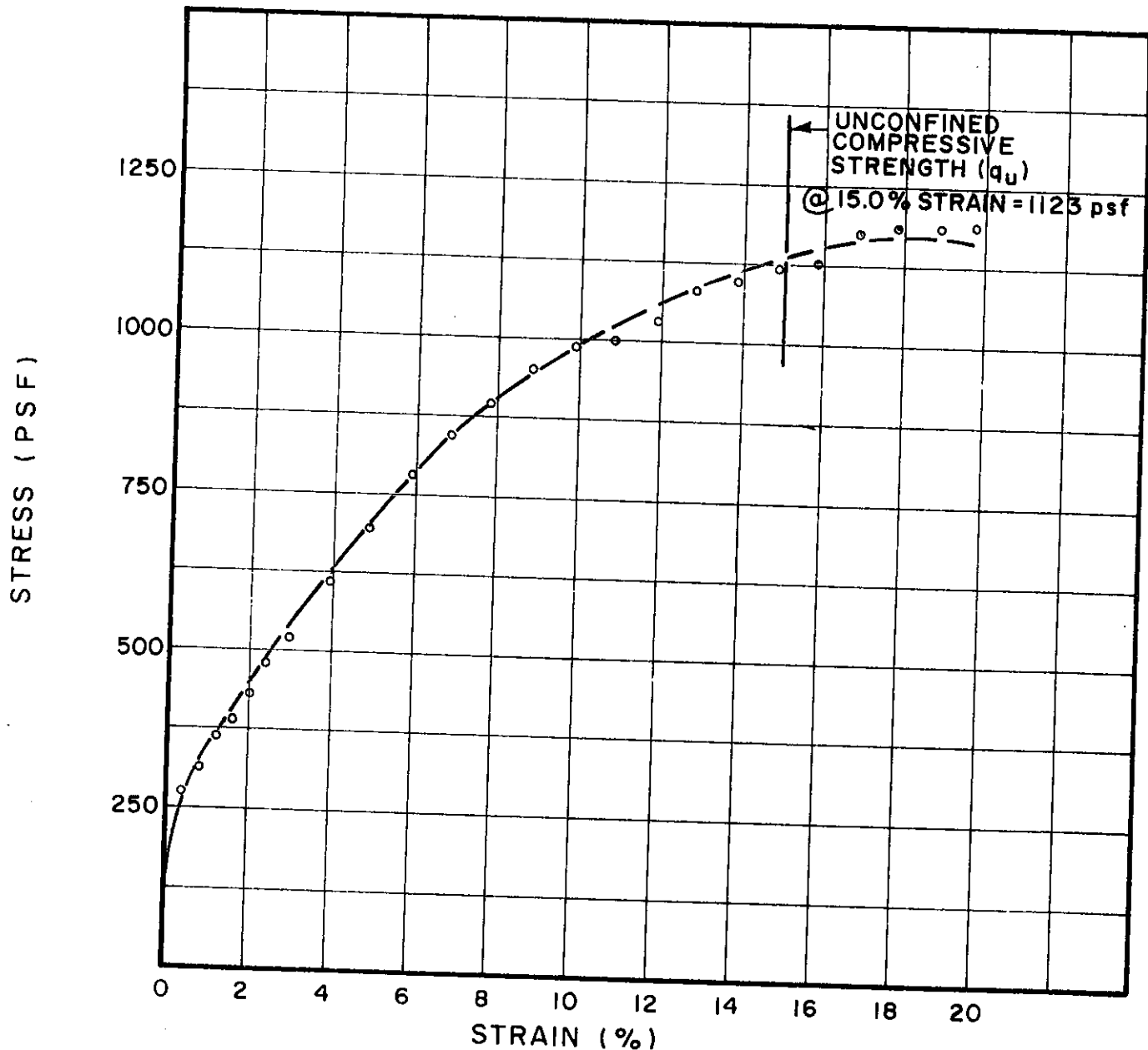
SAMPLE NO. 4

DEPTH 29.6' - 29.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U99.1	1.37	3.17	.25	27.9	94	43	18	SILTY CLAY (CL)

BORING NO. 53

SAMPLE NO. 6

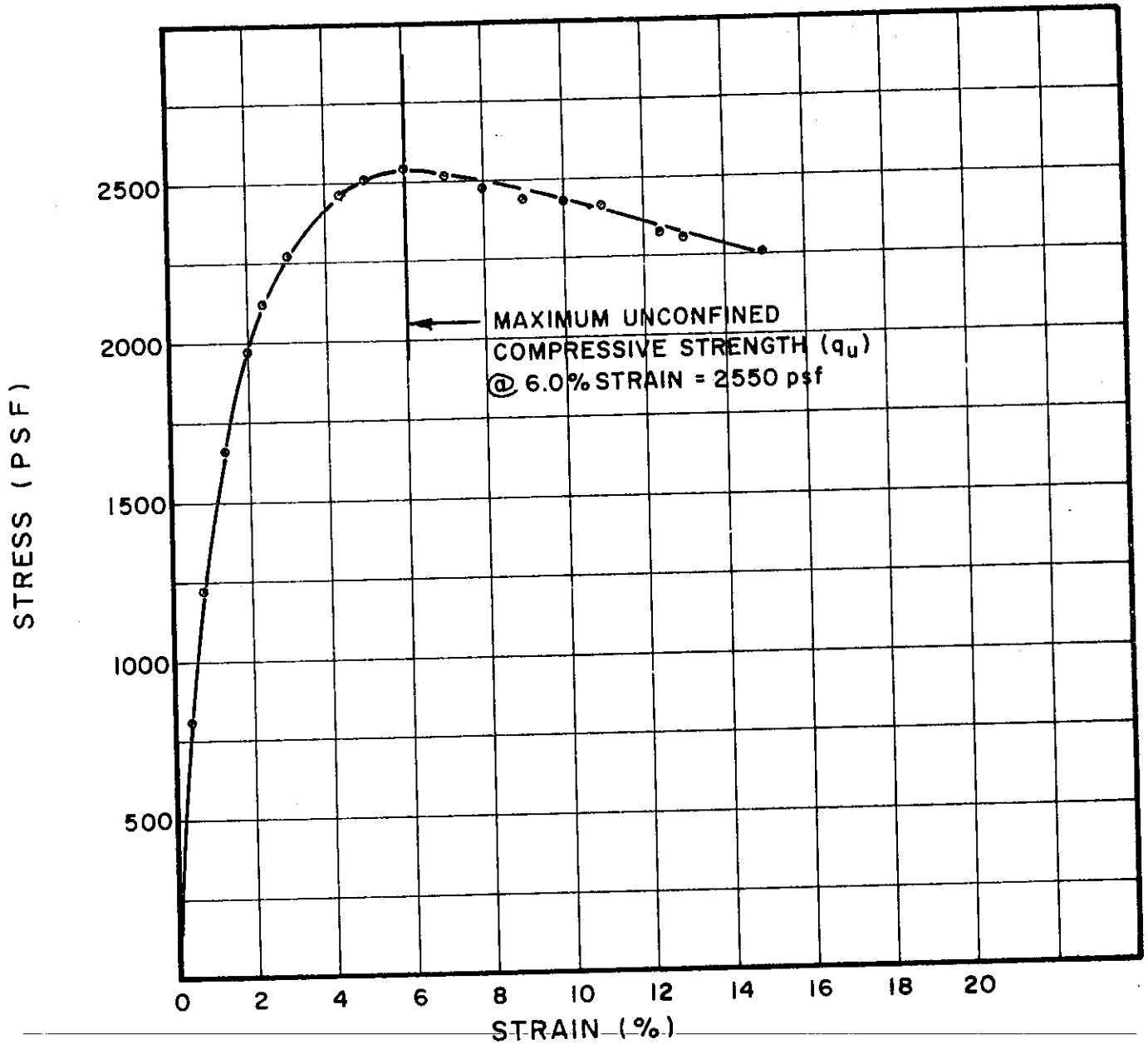
DEPTH 49.2' TO 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-309



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U101.1	1.40	3.20	.25	27.9	95	39	21	SILTY CLAY (CL)

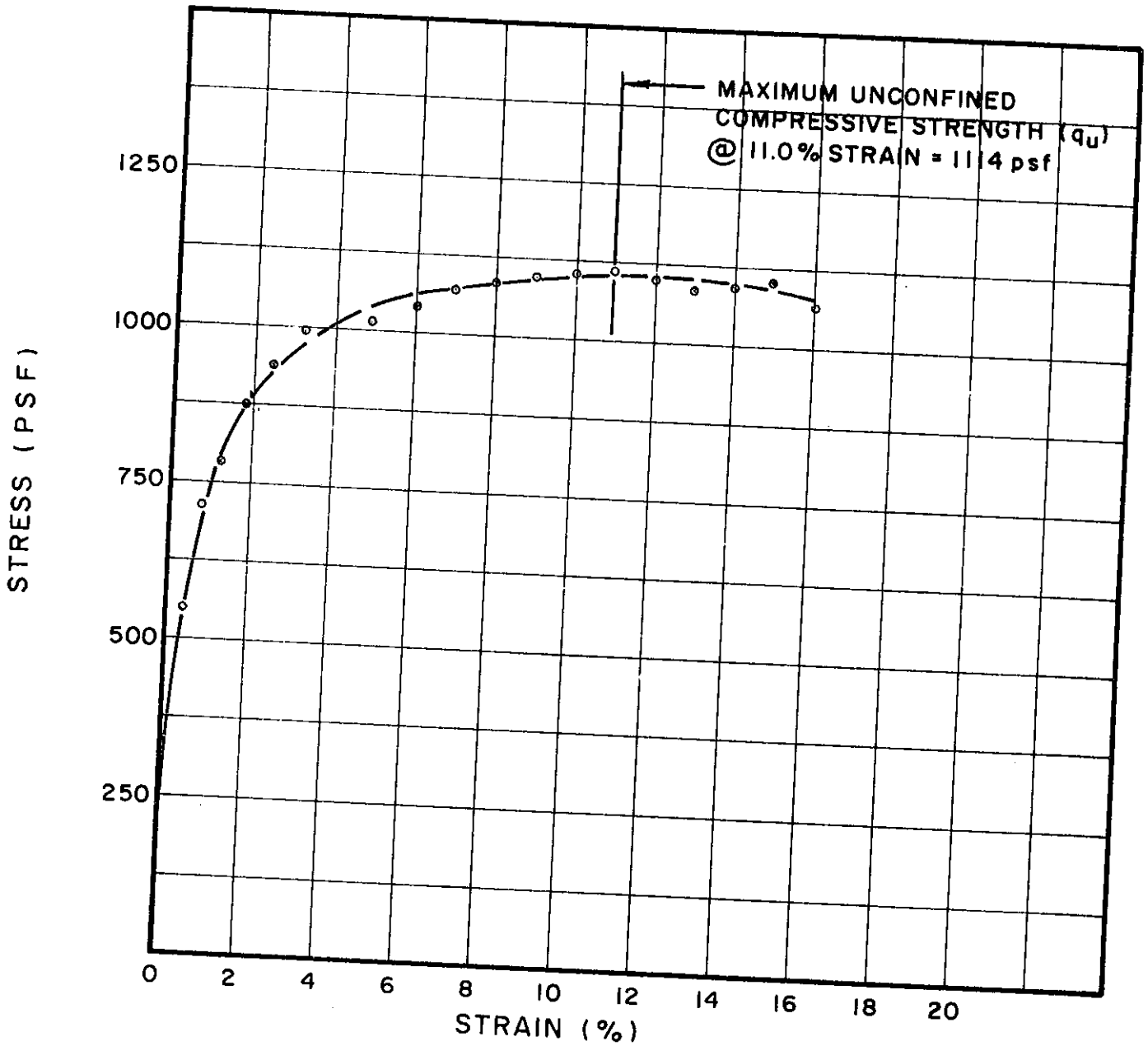
BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 80.1' - 80.4'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



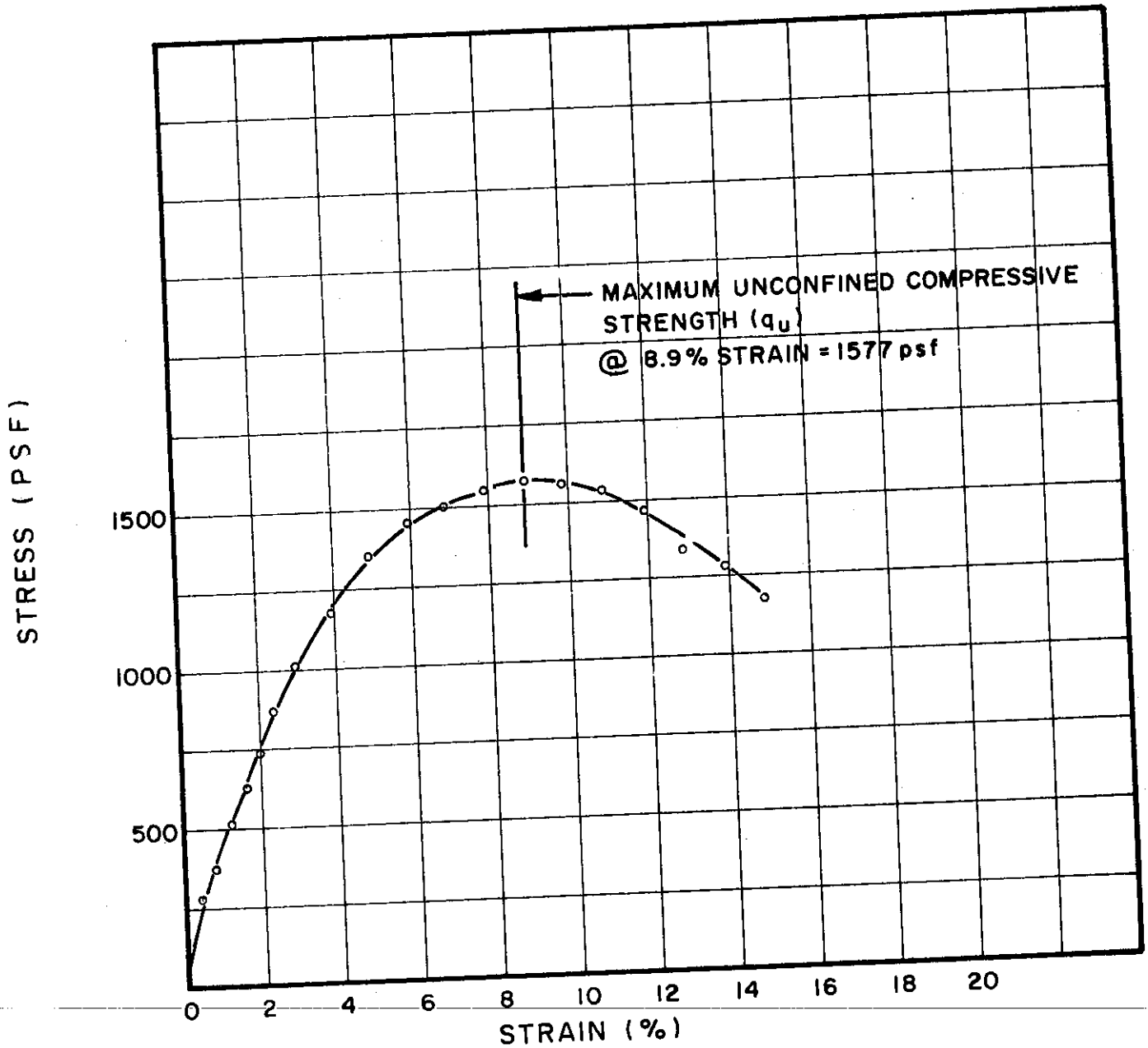


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U398.1	1.38	3.25	.25	25.8	99	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 5  
 DEPTH 59.3' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



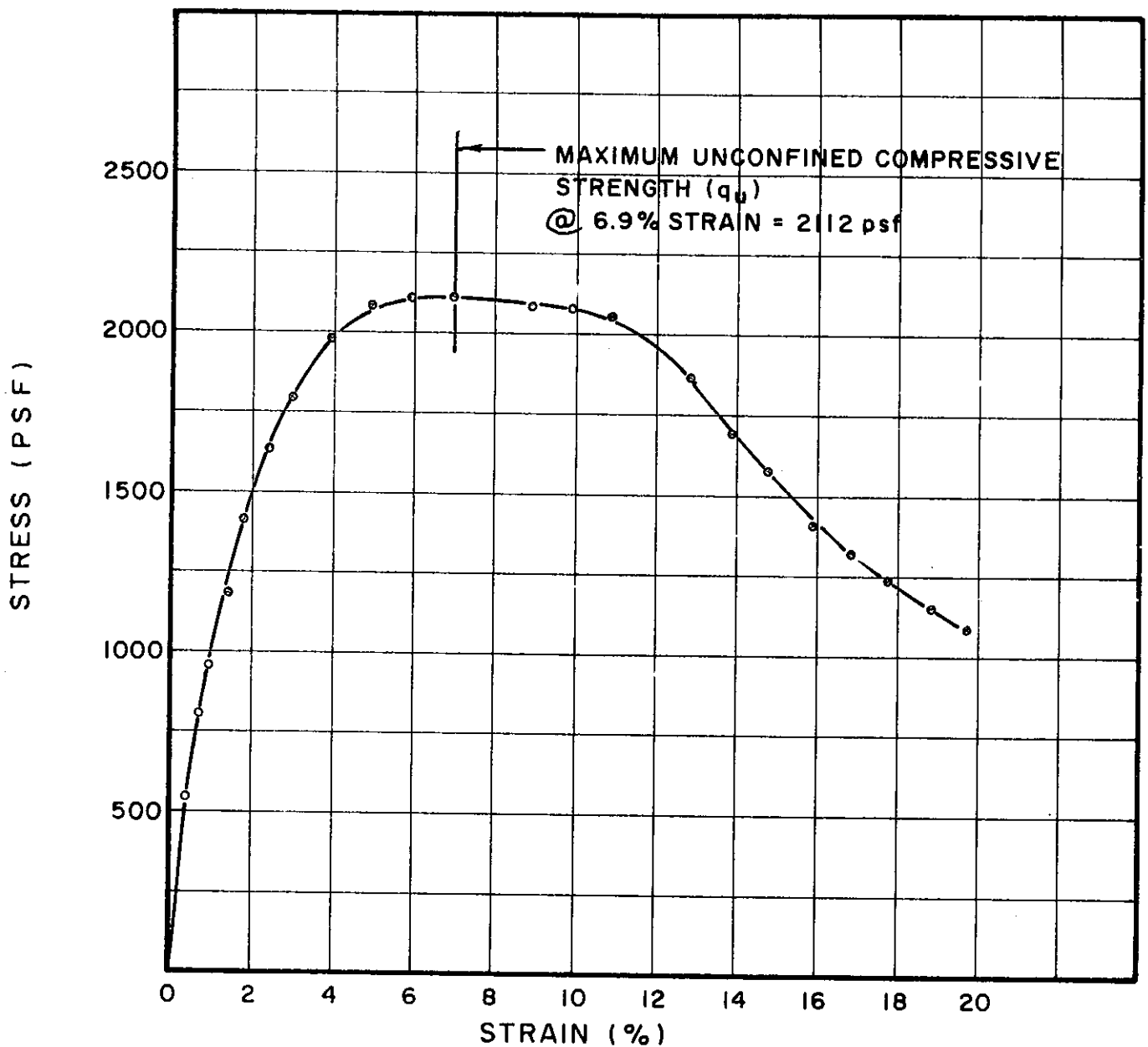
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U400.1	1.39	3.17	.25	25.9	98	37	18	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 7  
 DEPTH 68.5' TO 68.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

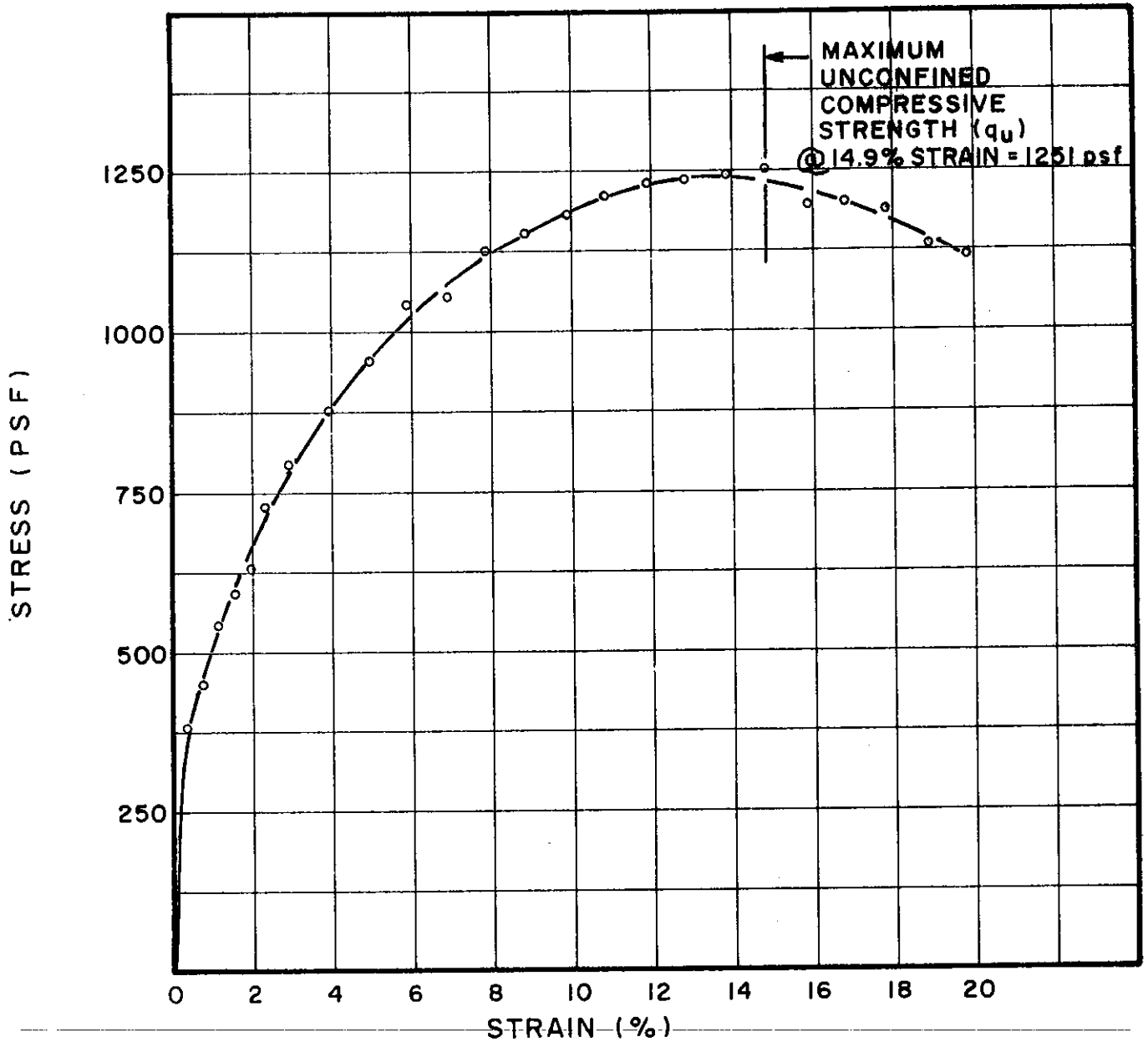


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U76.1	1.38	3.22	.25	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.8' TO 19.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U78.1	1.38	3.27	.25	26.2	99	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

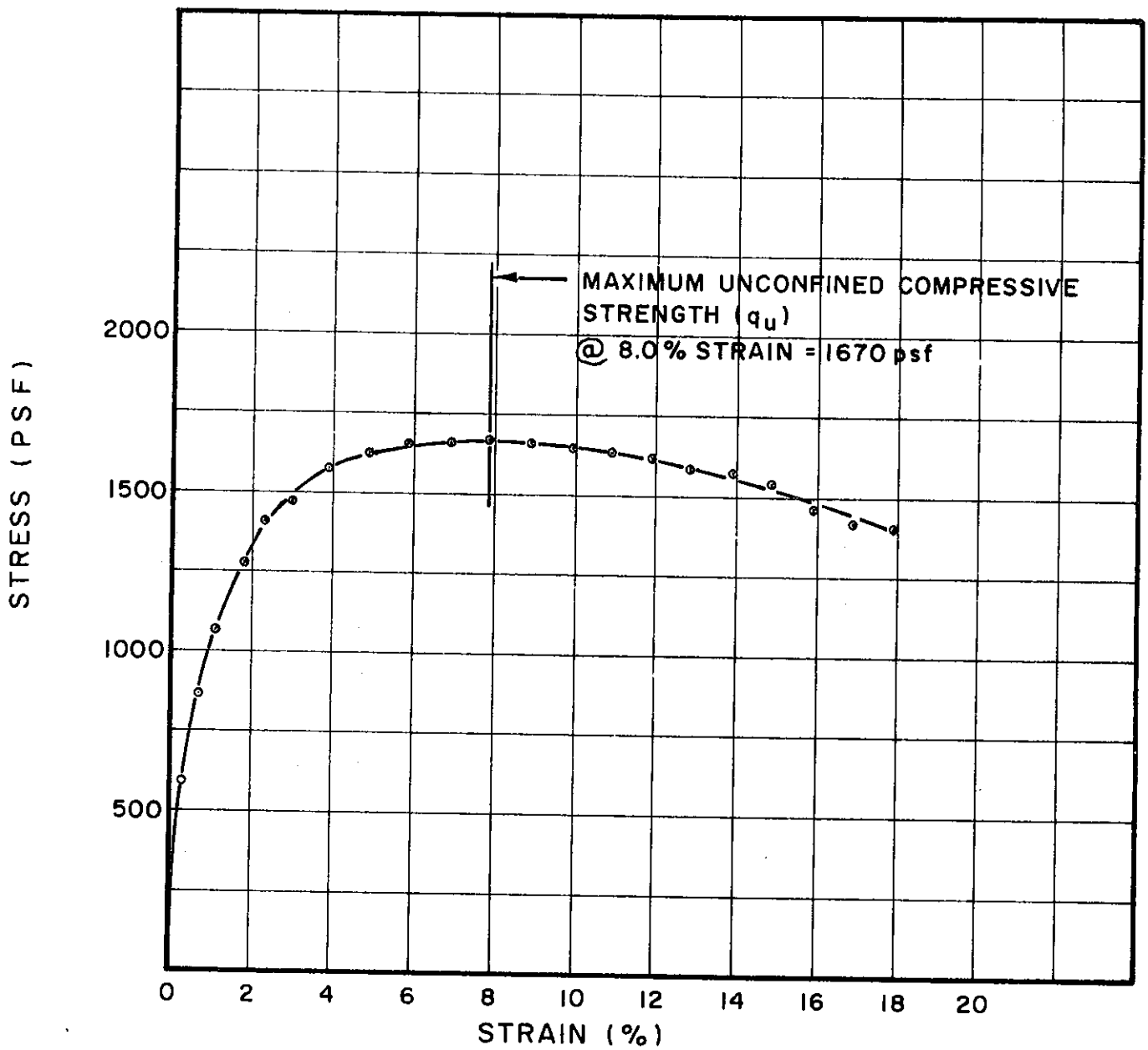
SAMPLE NO. 5

DEPTH 38.7' TO 39.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U80.1	1.38	3.26	.25	26.3	98	36	18	SILTY CLAY, SANDY (CL)

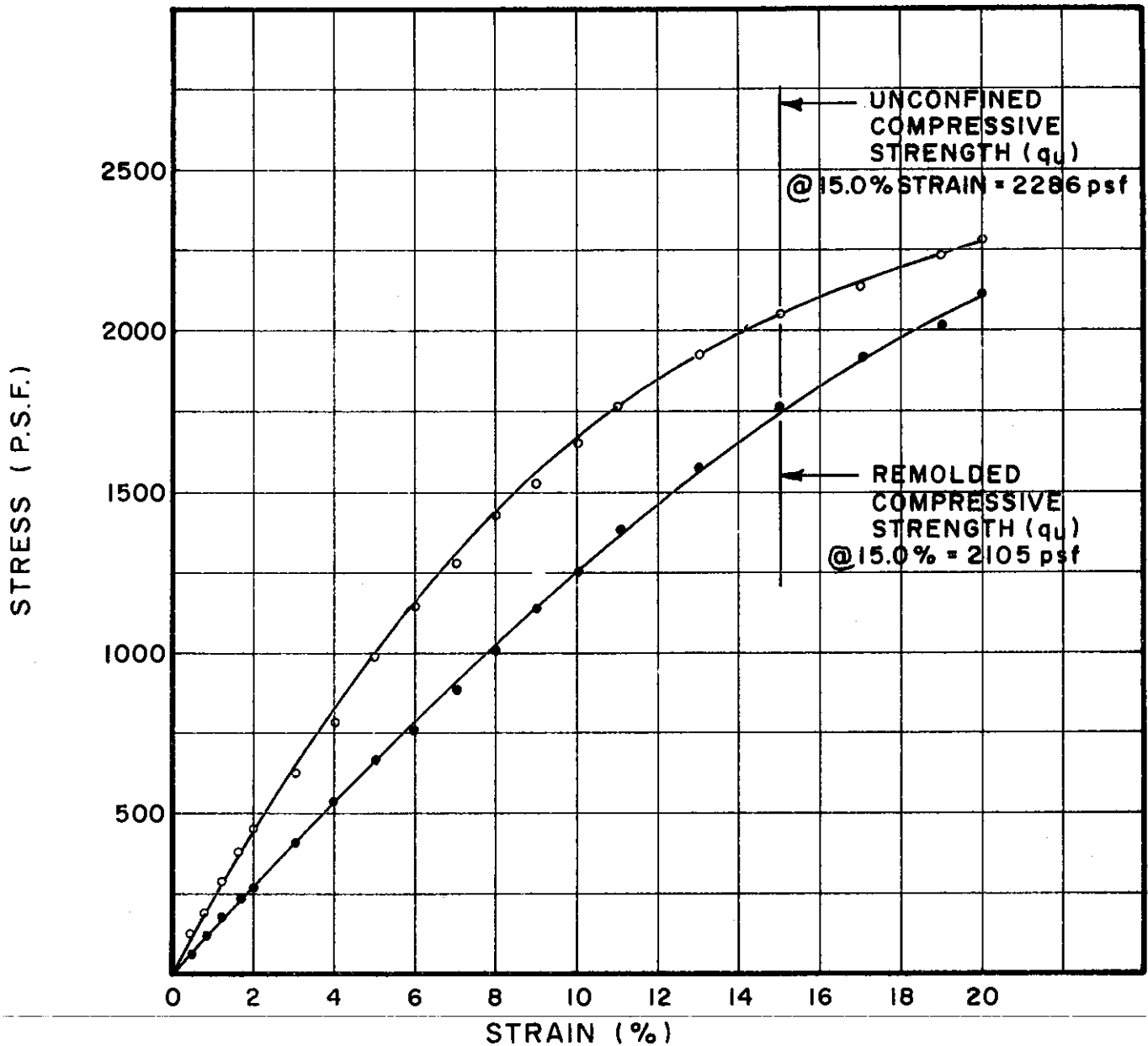
BORING NO. 59

SAMPLE NO. 7

DEPTH 58.6' TO 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



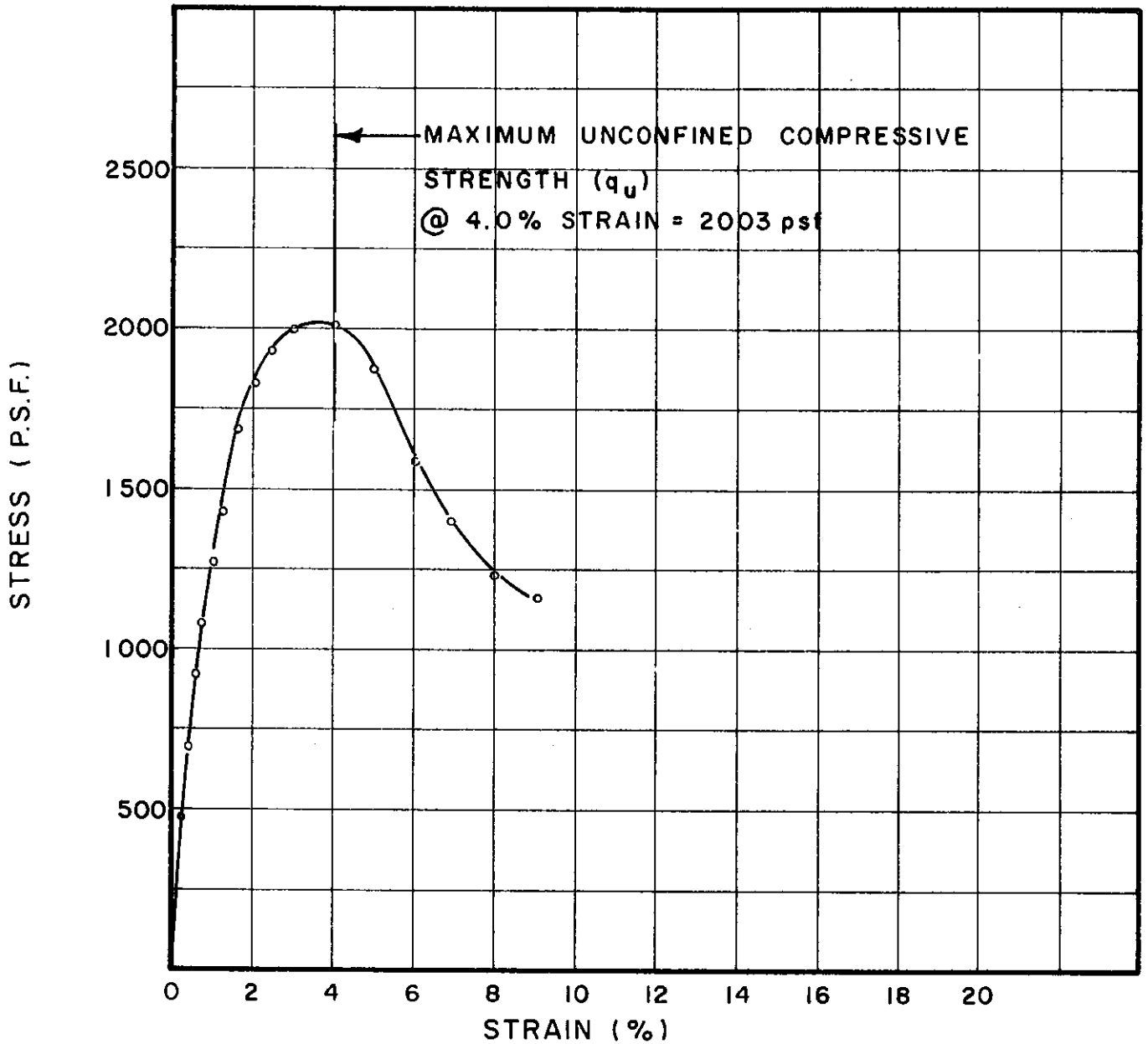
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U43.1	1.40	2.85	.316	24.3	105	39	21	SILTY CLAY (CL)
U <sub>R</sub> 43.1	1.44	2.70	.333	24.3	103	39	21	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 3  
 DEPTH 17.6' TO 18.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U45.1	1.43	3.50	.257	36.8	86	51	22	SILTY CLAY (CH)

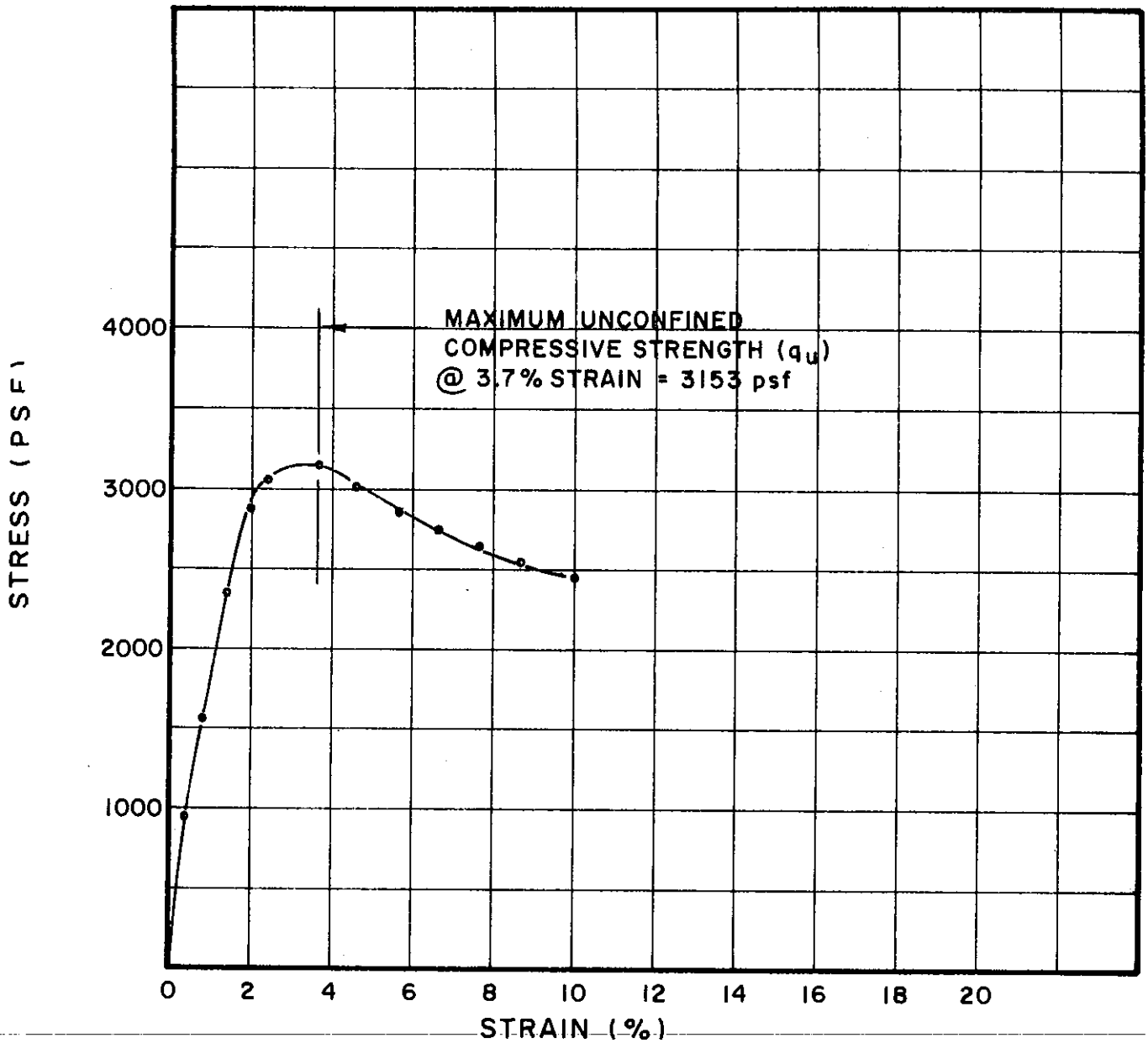
BORING NO. 60

SAMPLE NO. 5

DEPTH 25.6' TO 25.9'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U46.1	1.41	3.06	.26	35.0	88	48	25	SILTY CLAY (CL-CH)

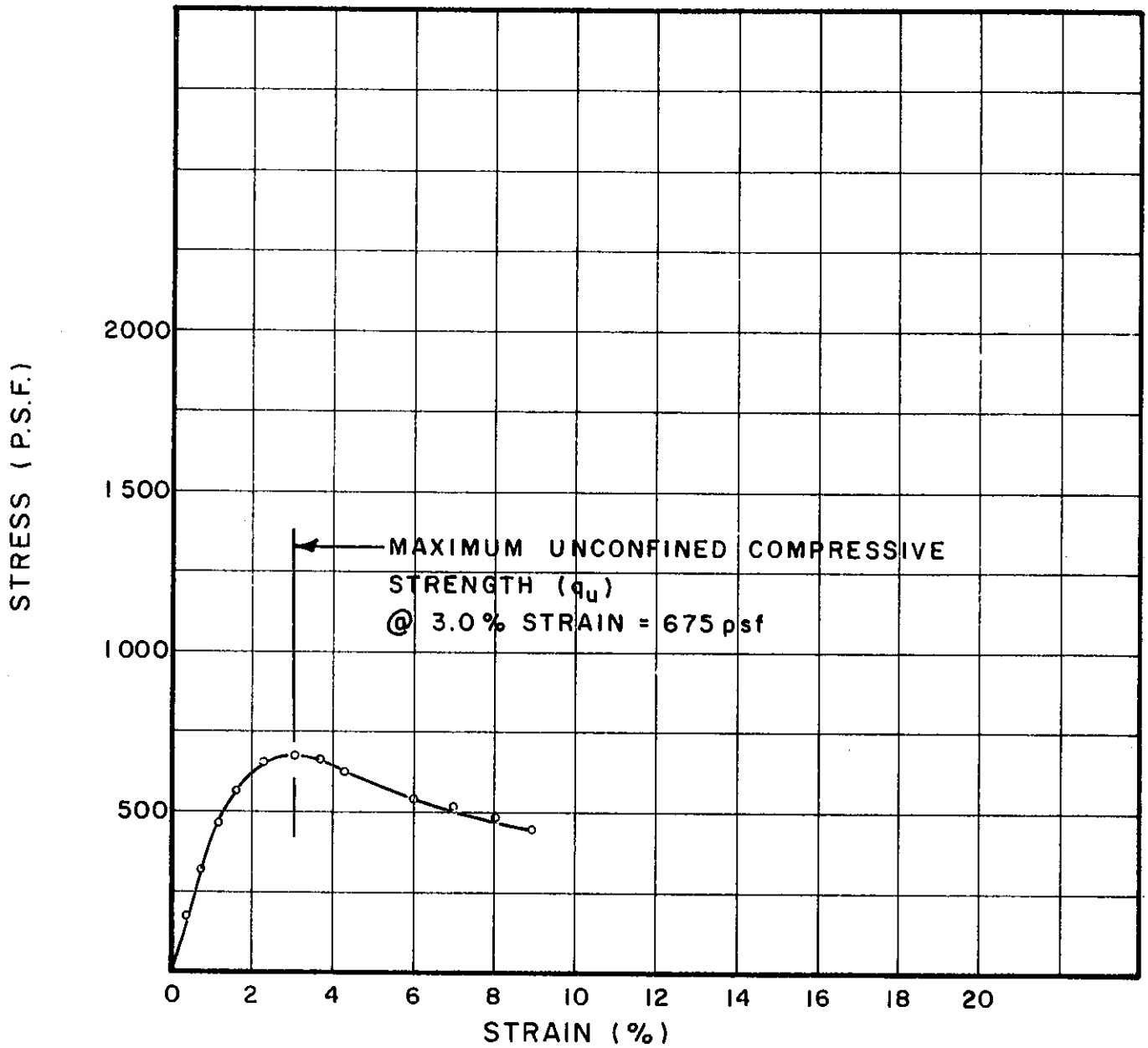
BORING NO. 60  
 SAMPLE NO. 6  
 DEPTH 30.5' TO 30.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



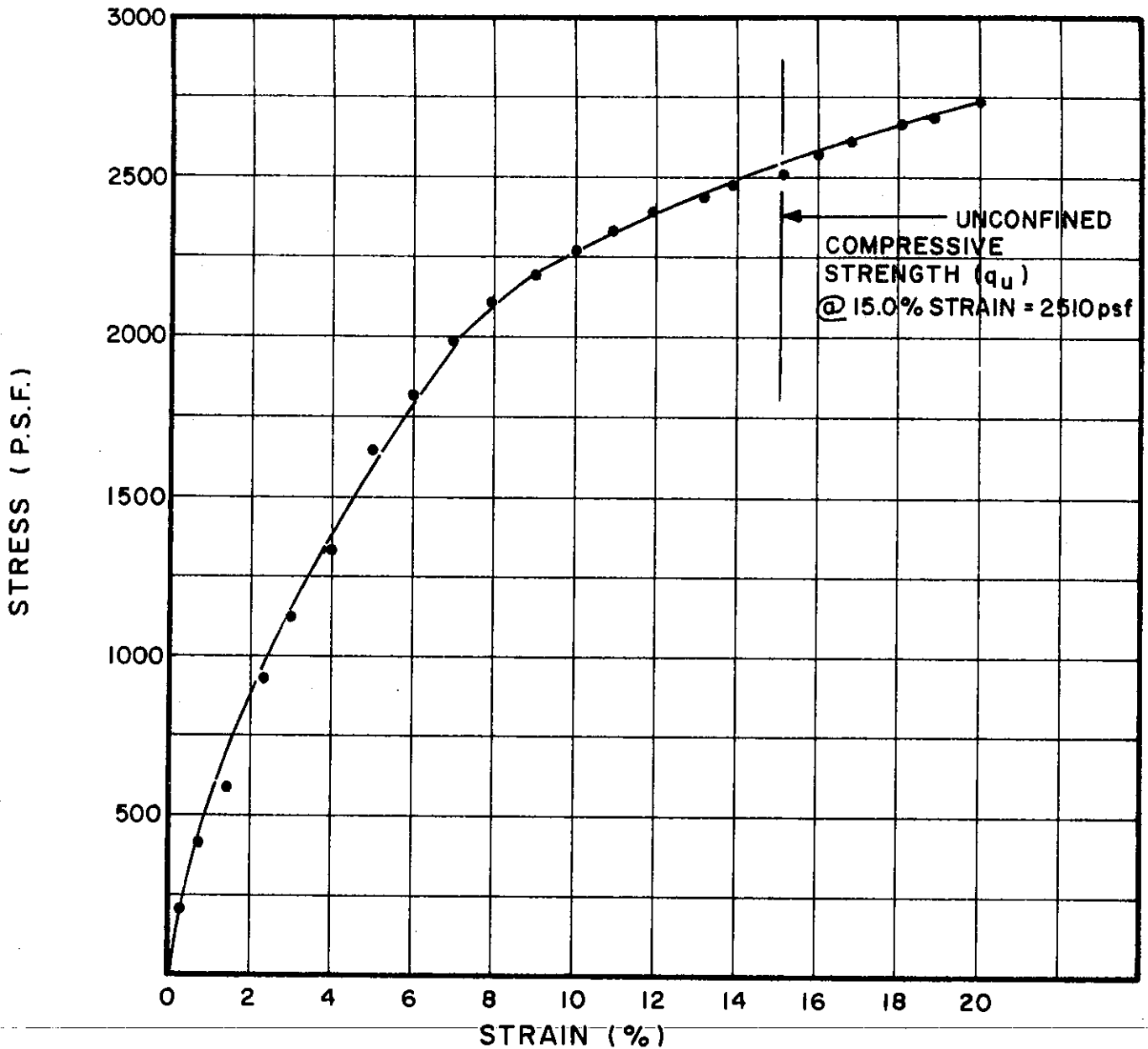


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U48.1	1.41	3.50	.257	39.7	83	47	25	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 8  
 DEPTH 40.6' TO 41.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

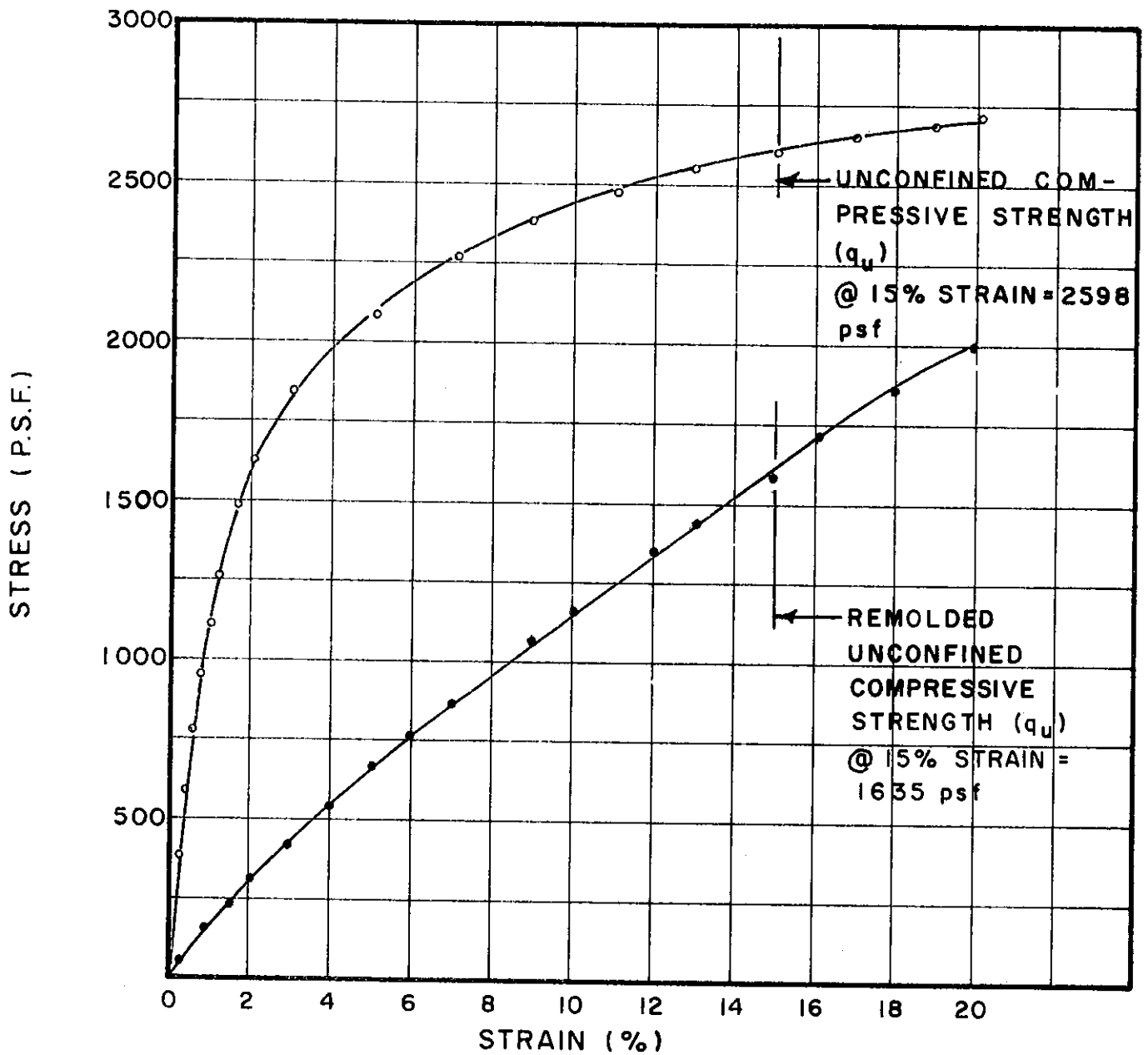


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U50.1	1.40	3.50	0.26	25.5	100	34	16	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 10  
 DEPTH 50.9' TO 51.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

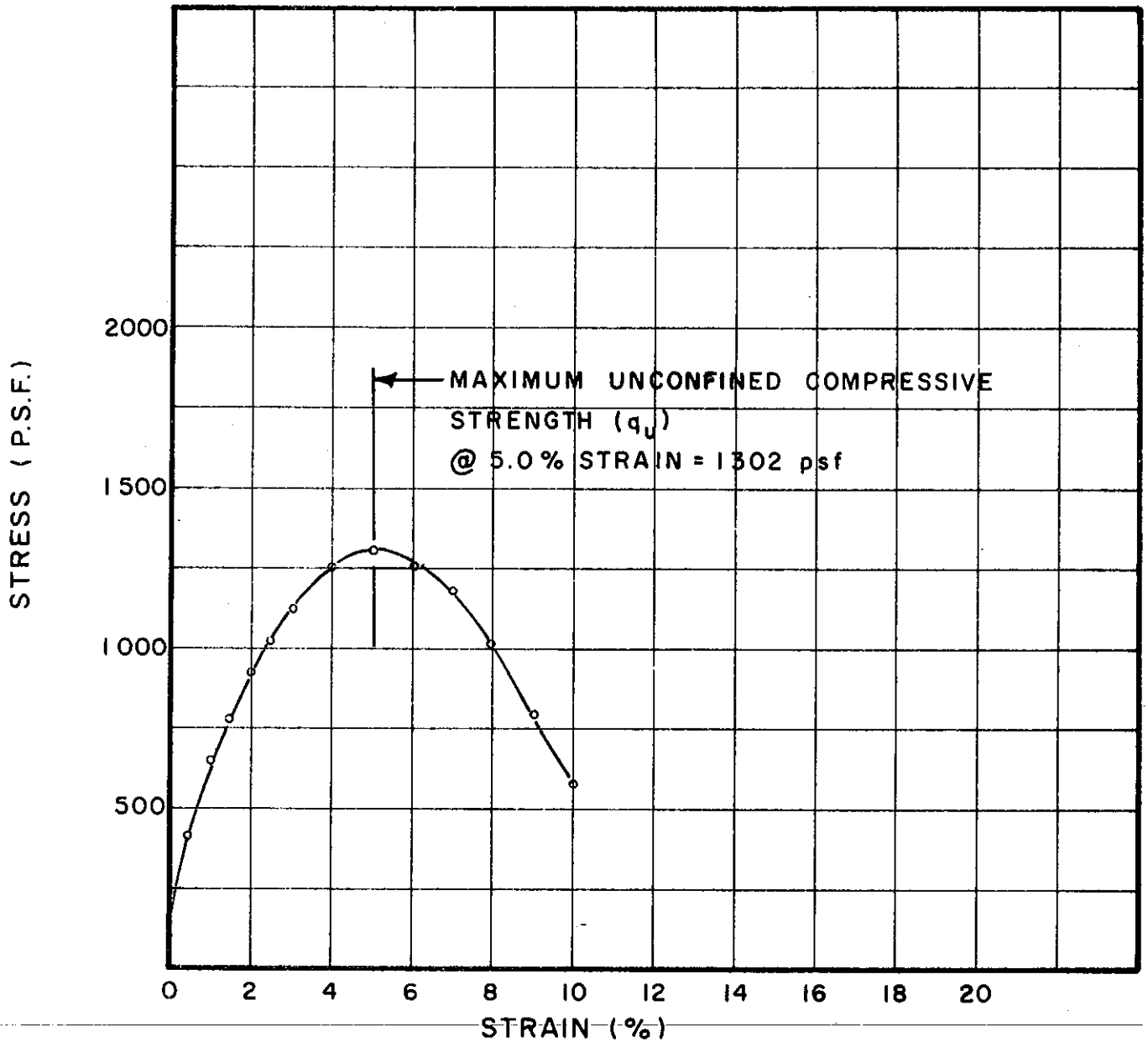


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U51.1	1.41	3.49	.258	24.8	103	33	18	SILTY CLAY, SANDY (CL)
U51.1	1.41	3.30	.273	24.8	103	33	18	SILTY CLAY, SANDY (CL)

BORING NO. 60  
 SAMPLE NO. 11  
 DEPTH 55.6' TO 56.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U54.1	1.42	3.50	.257	26.9	97	40	20	SILTY CLAY (CL)

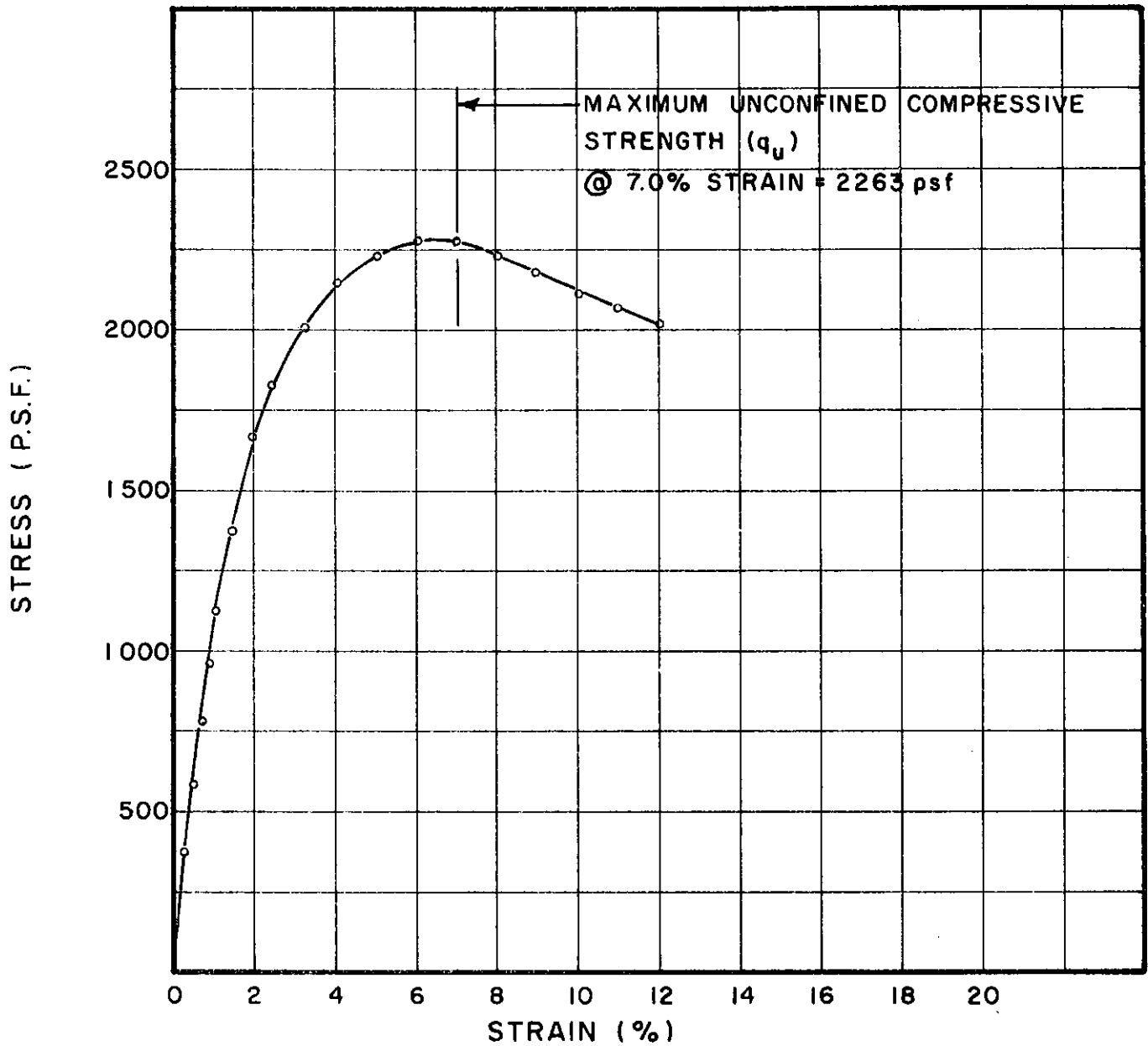
BORING NO. 60

SAMPLE NO. 14

DEPTH 75.1' TO 75.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U59.1	1.41	3.50	.257	27.1	101	38	20	SILTY CLAY SANDY (CL)

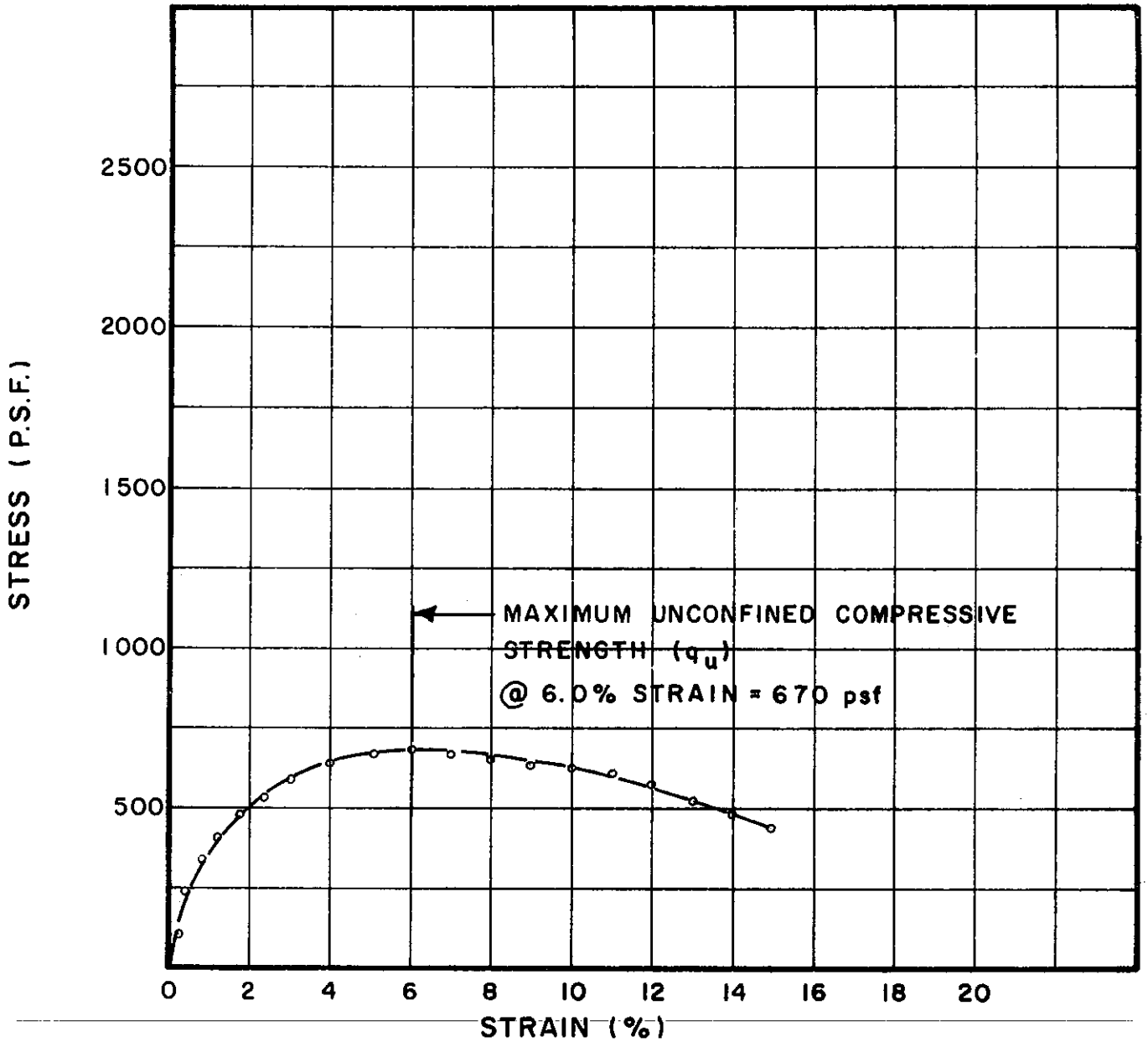
BORING NO. 60

SAMPLE NO. 19

DEPTH 100.1' TO 100.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



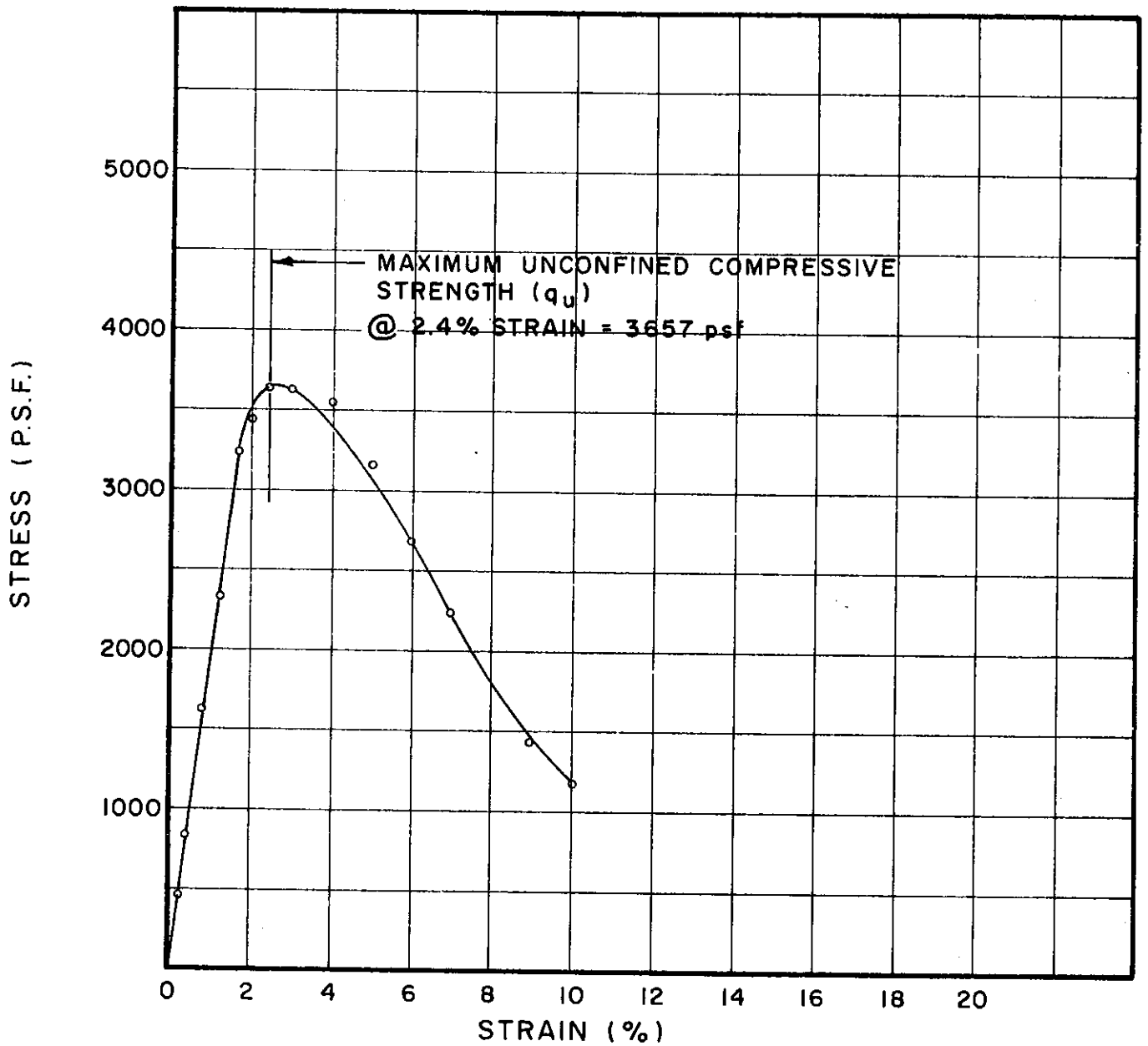
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U63.1	1.44	3.50	.257	15.4	115	17	11	SILTY CLAY, SANDY (CL - ML)

BORING NO. 60  
 SAMPLE NO. 23  
 DEPTH 119.6' TO 120.0

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

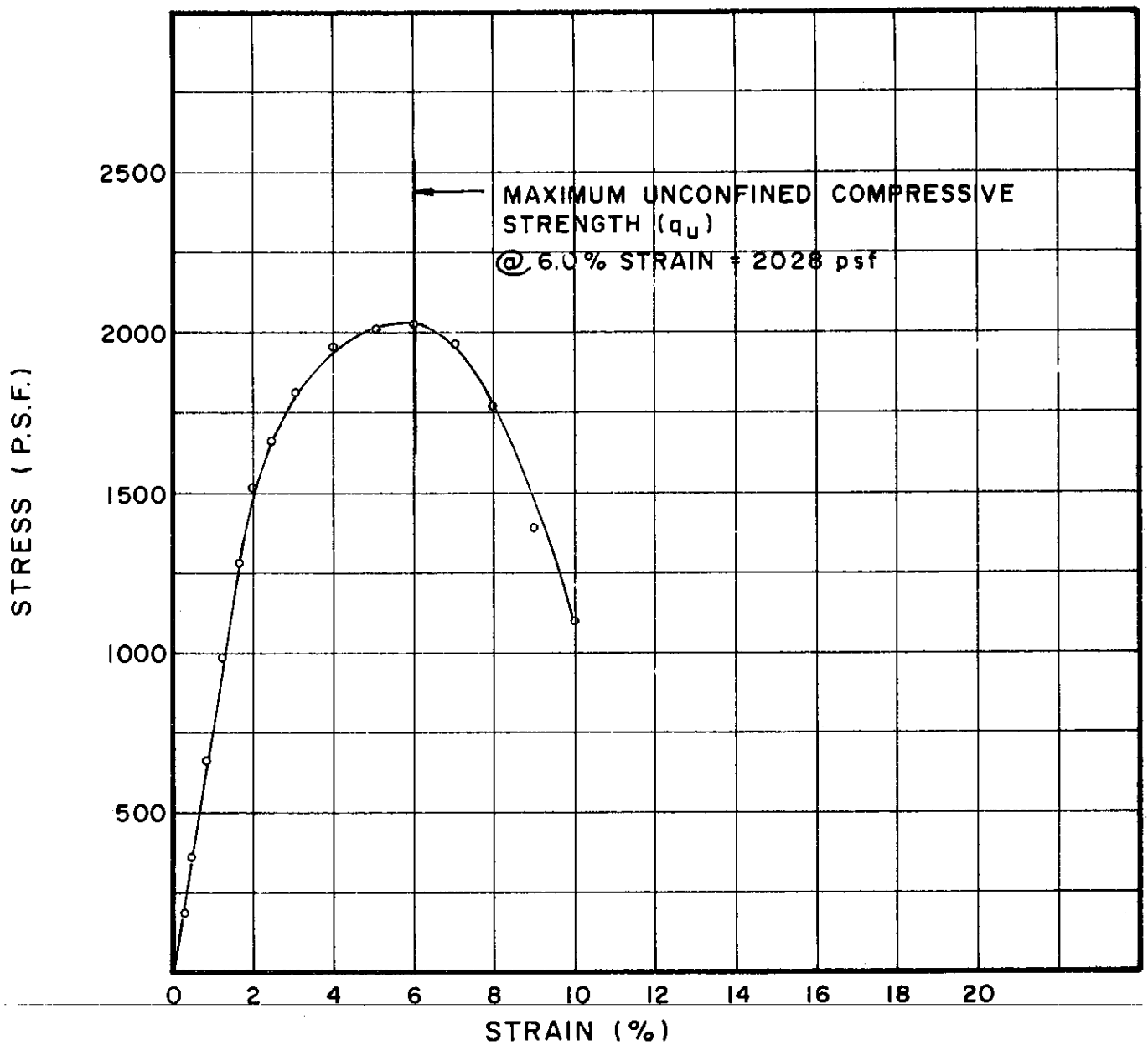


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U349.1	1.44	3.15	.286	27.8	96	50	22	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 2  
 DEPTH 8.9' TO 9.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U351.1	1.41	3.29	.274	35.8	86	49	24	SILTY CLAY (CL-CH)

BORING NO. 101

SAMPLE NO. 4

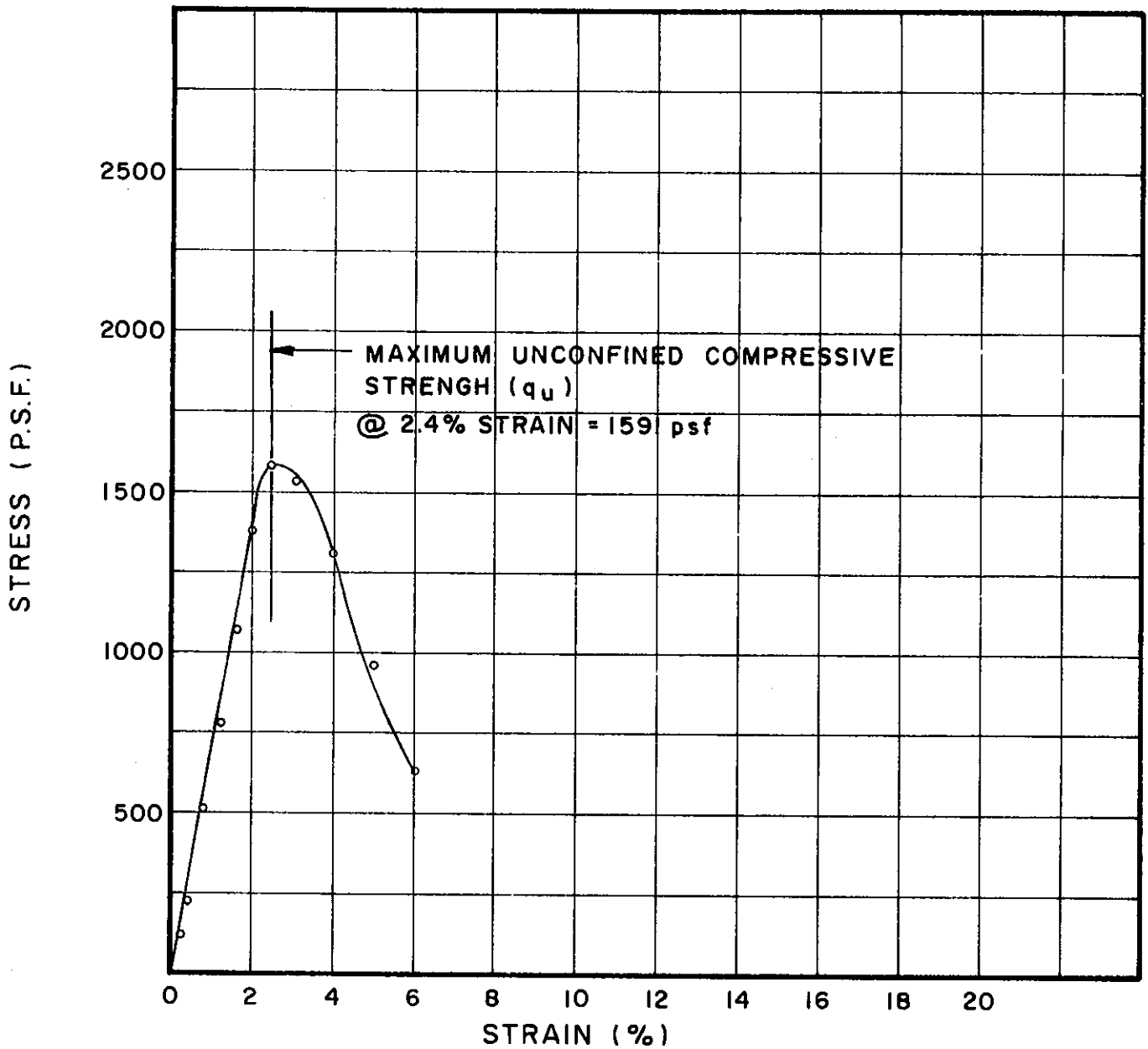
DEPTH 19.9' TO 20.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



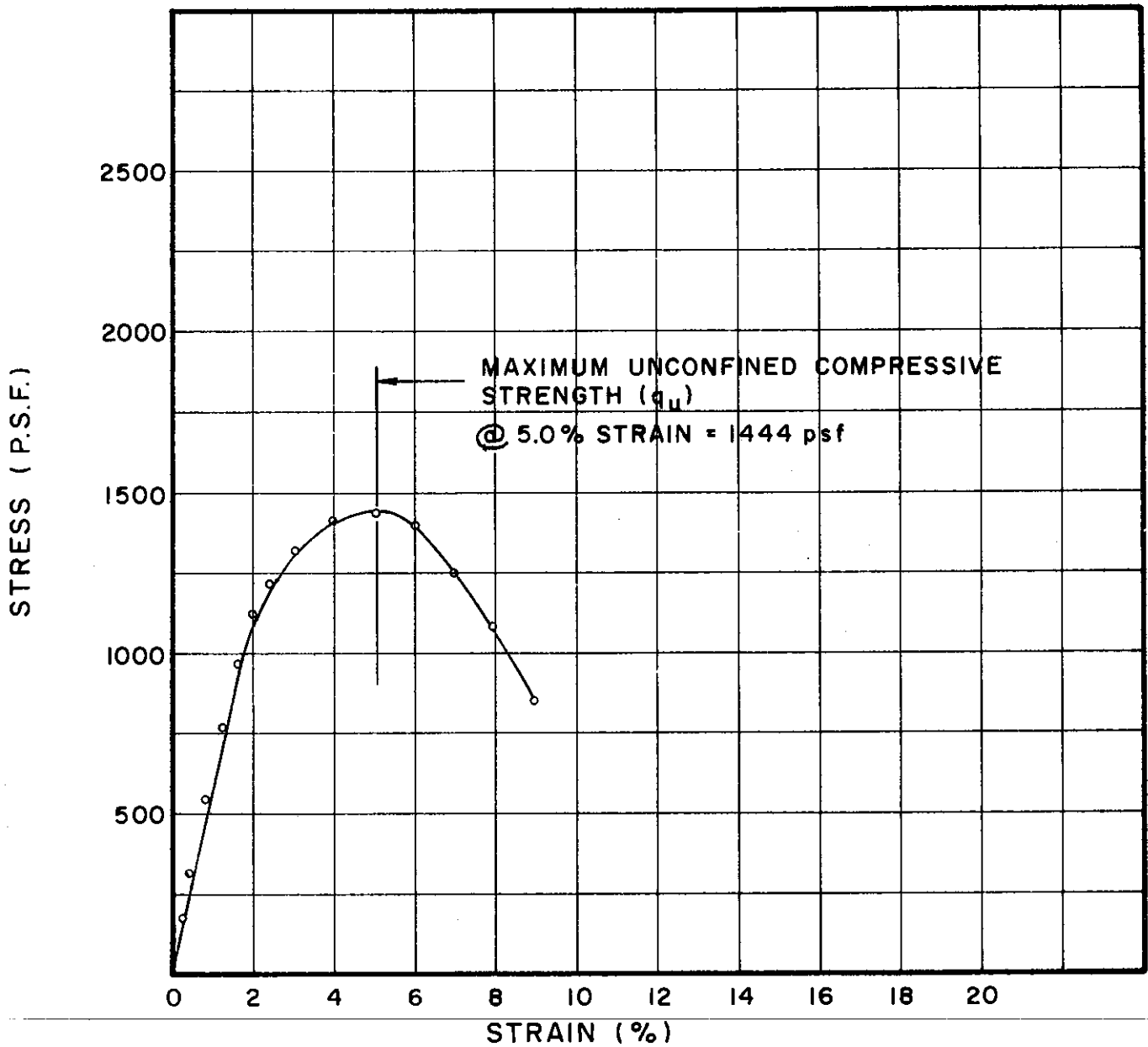


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U354.1	1.41	3.37	.267	40.0	81	46	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 7  
 DEPTH 34.9' TO 35.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U357.1	1.40	3.30	.273	32.8	90	40	22	SILTY CLAY (CL-CH)

BORING NO. 101

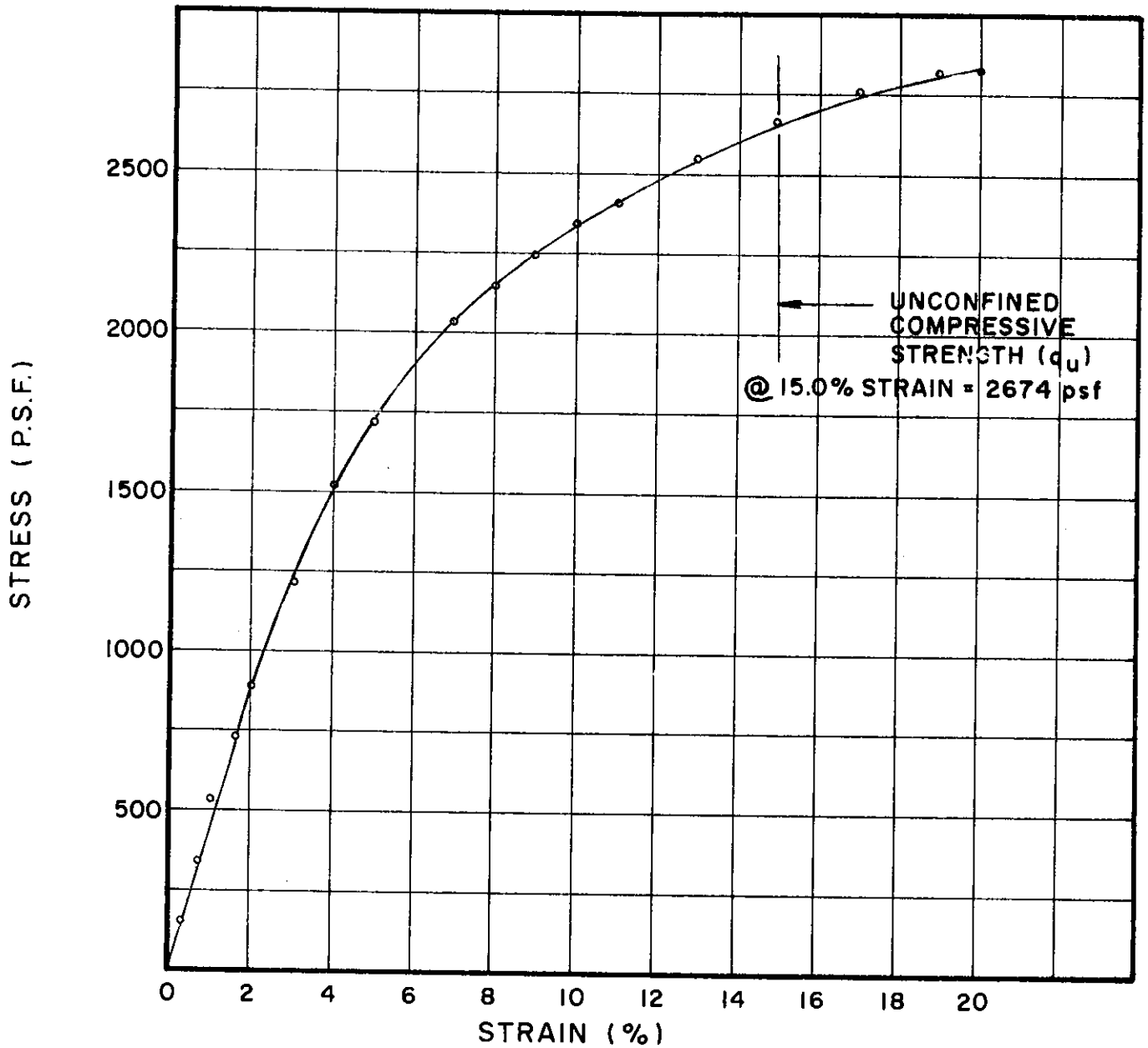
SAMPLE NO. 10

DEPTH 50.1' TO 50.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

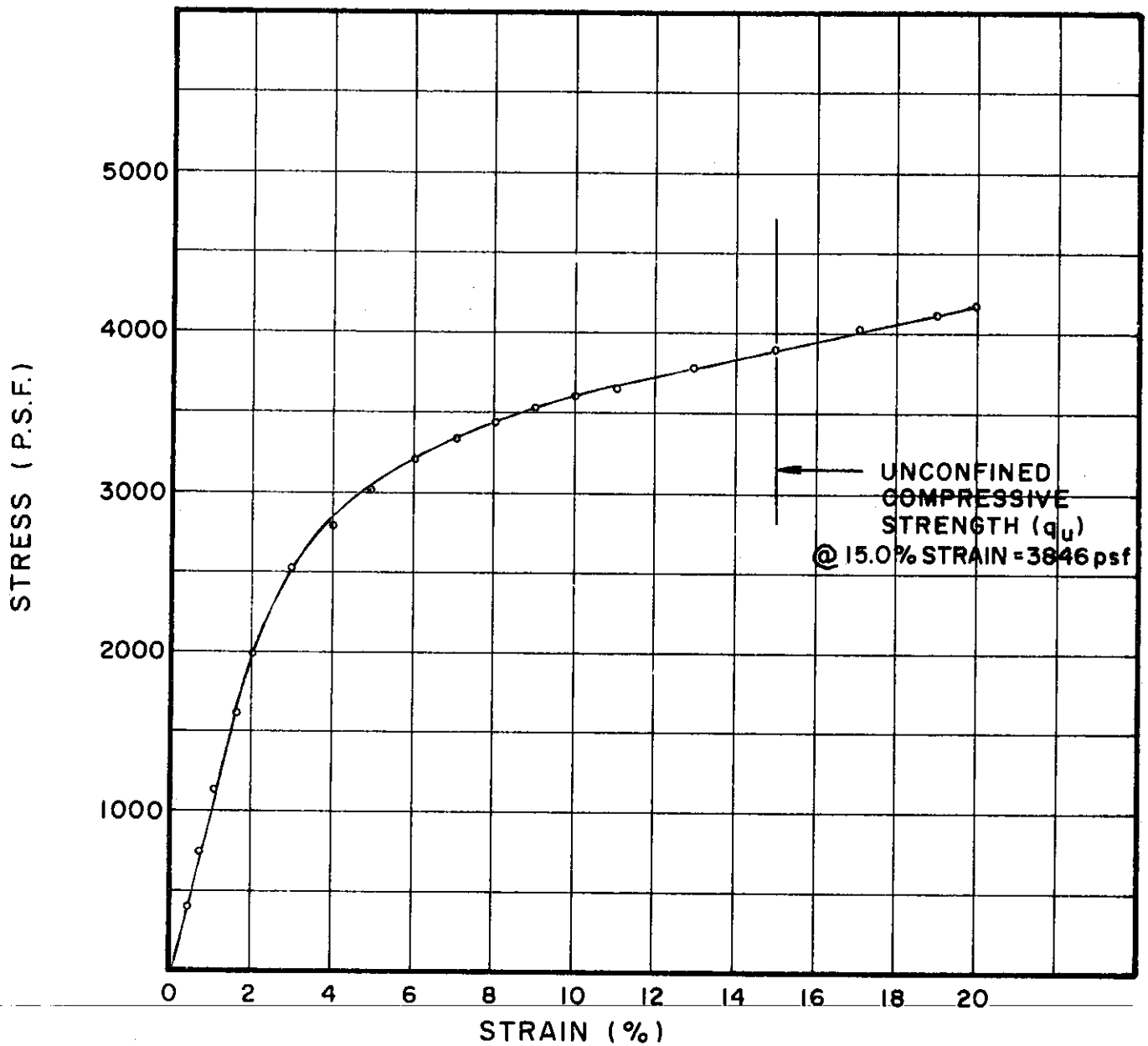


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U360.1	1.39	3.28	.274	26.6	97	36	19	SILTY CLAY, SANDY (CL)

BORING NO. 101  
 SAMPLE NO. 13  
 DEPTH 65.2' TO 65.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U364.1	1.41	3.35	.269	25.2	97	37	19	SILTY CLAY, SANDY (CL)

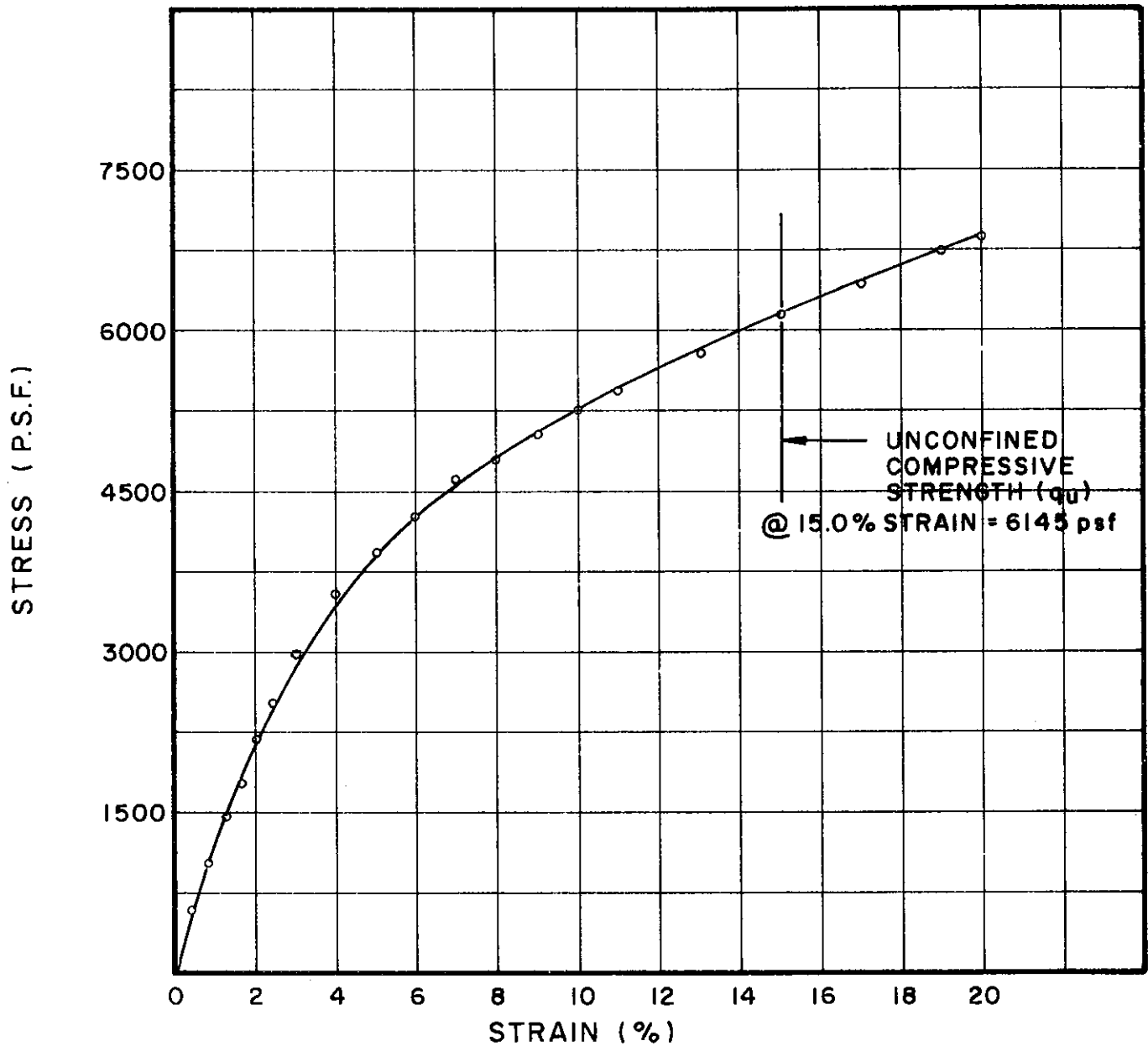
BORING NO. 101

SAMPLE NO. 17

DEPTH 85.2' TO 85.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U339.1	1.41	3.35	.268	20.7	107	33	20	SILTY CLAY, SANDY (CL)

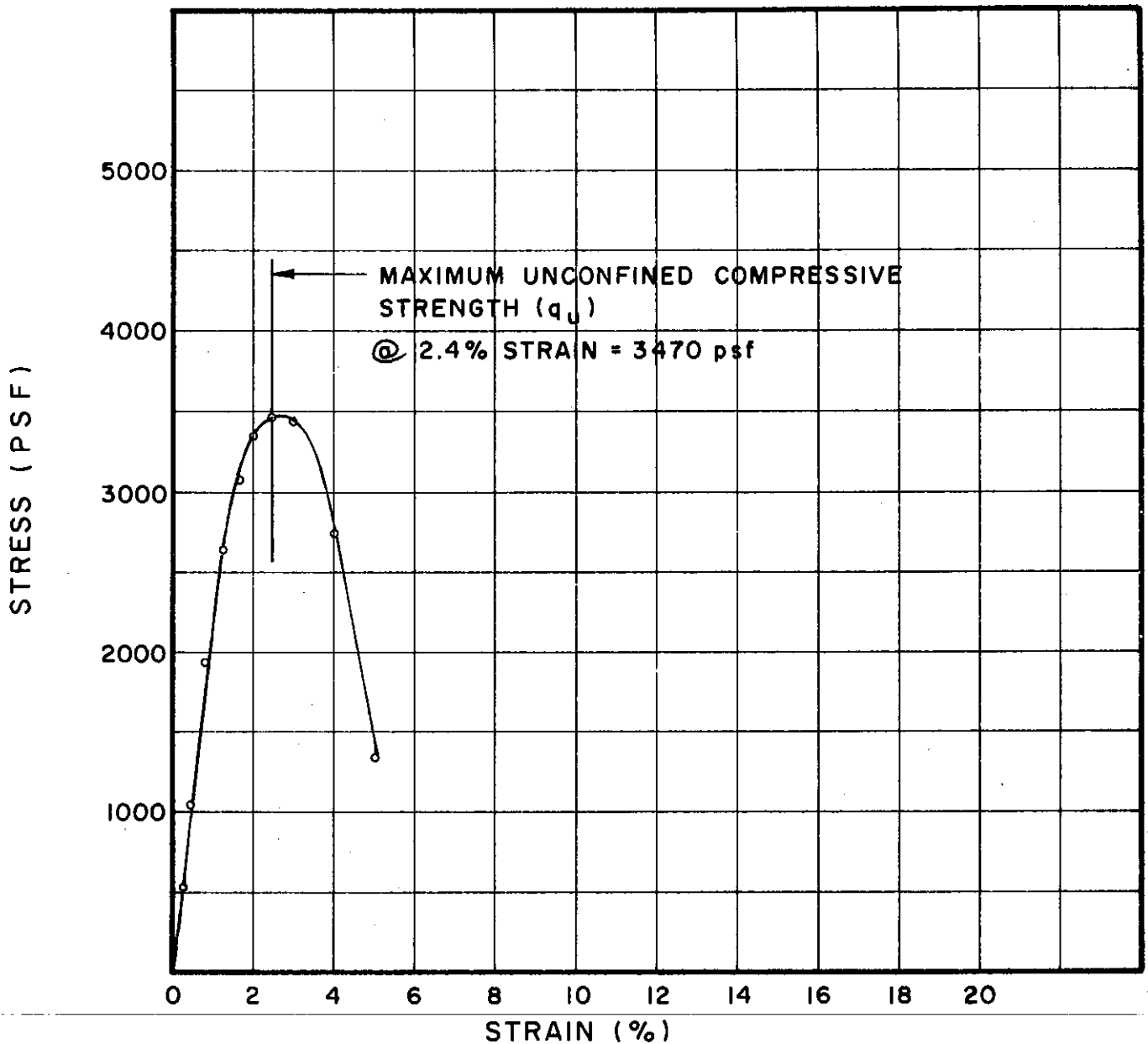
BORING NO. 119

SAMPLE NO. 9

DEPTH 81.6' TO 81.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U241.1	1.46	3.50	.257	26.2	99	47	24	SILTY CLAY (CL-CH)

BORING NO. 126

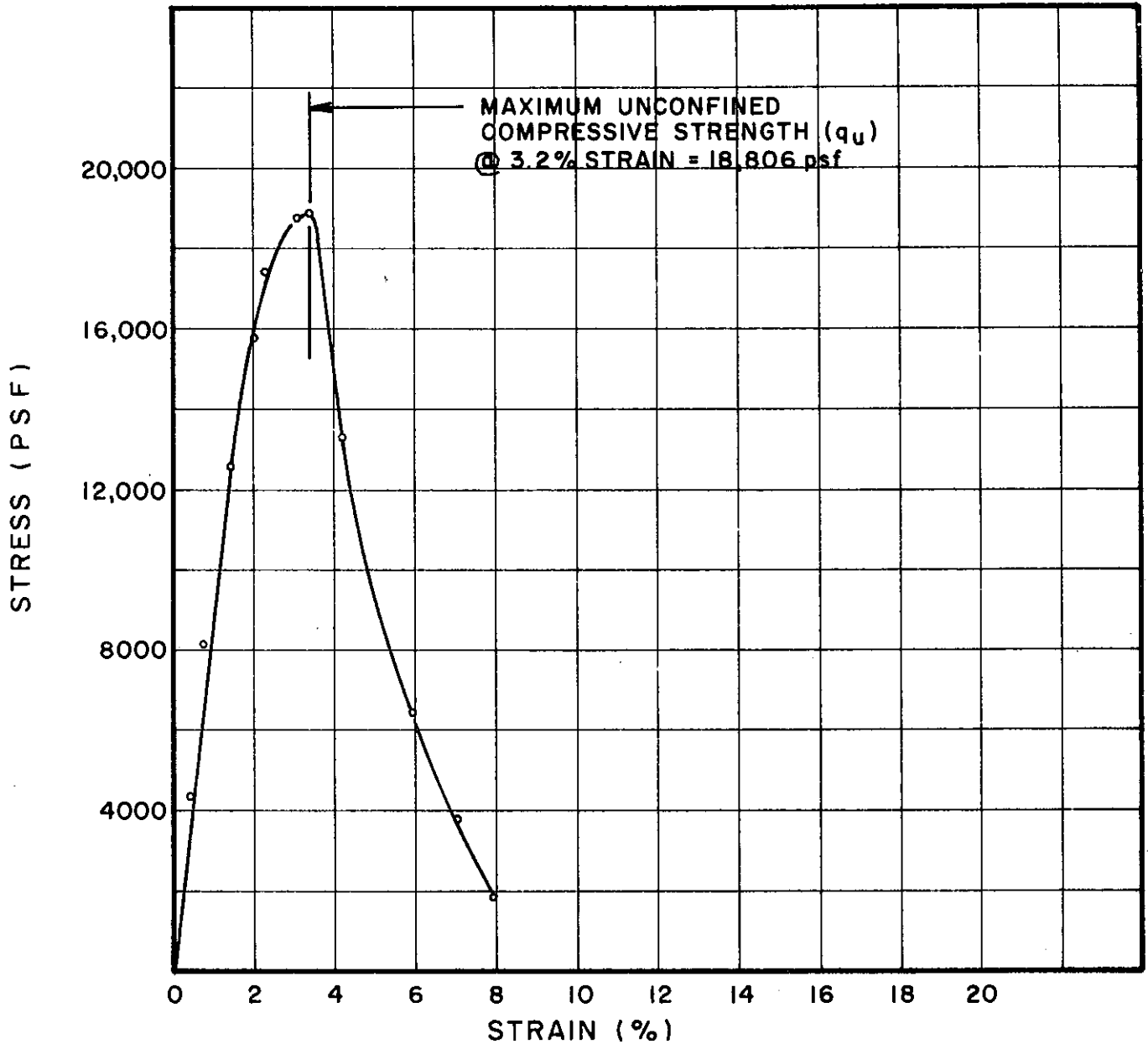
SAMPLE NO. 3

DEPTH 8.2' TO 8.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

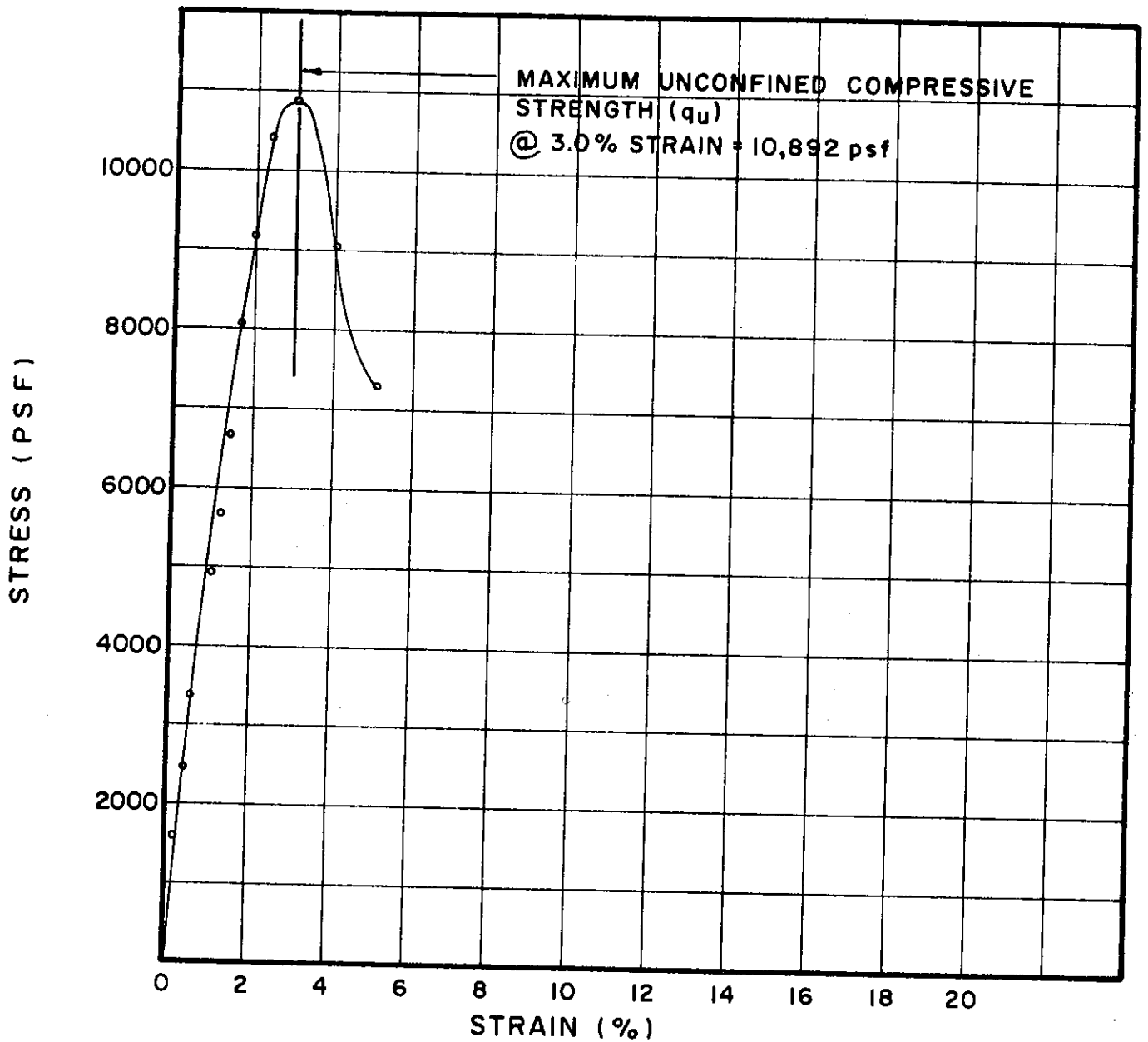


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U416.2	1.42	3.55	0.26	13.5	113	49	22	SILTY CLAY (CL-CH)
								"COMPACTED SAMPLE"

BORING NO. 127  
 SAMPLE NO. 3  
 DEPTH 5.6' TO 7.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U526.1	1.42	3.46	0.25	24.3	102	48	22	SILTY CLAY (CL-CH)

BORING NO. 136

SAMPLE NO. 4

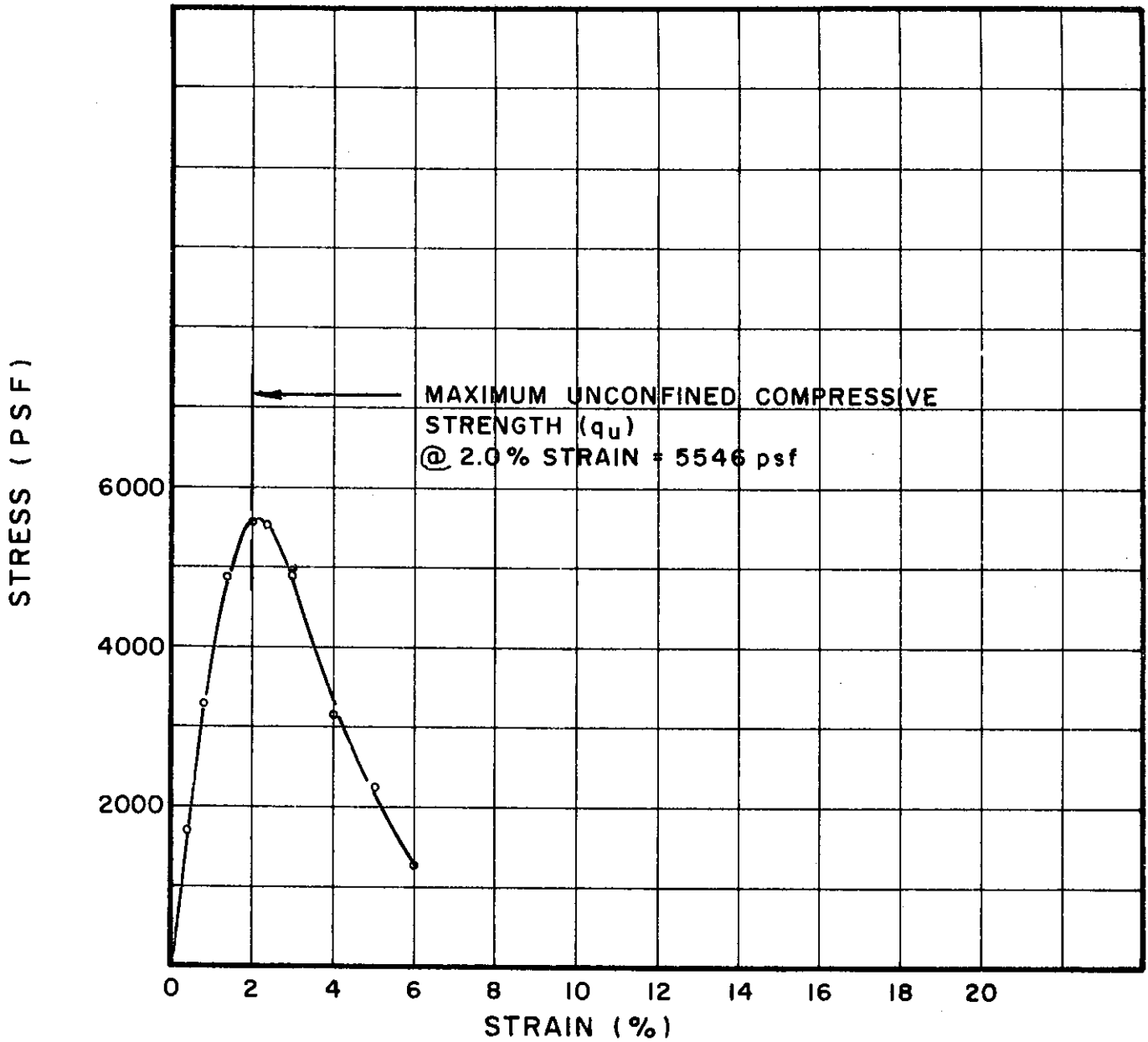
DEPTH 8.8' TO 9.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



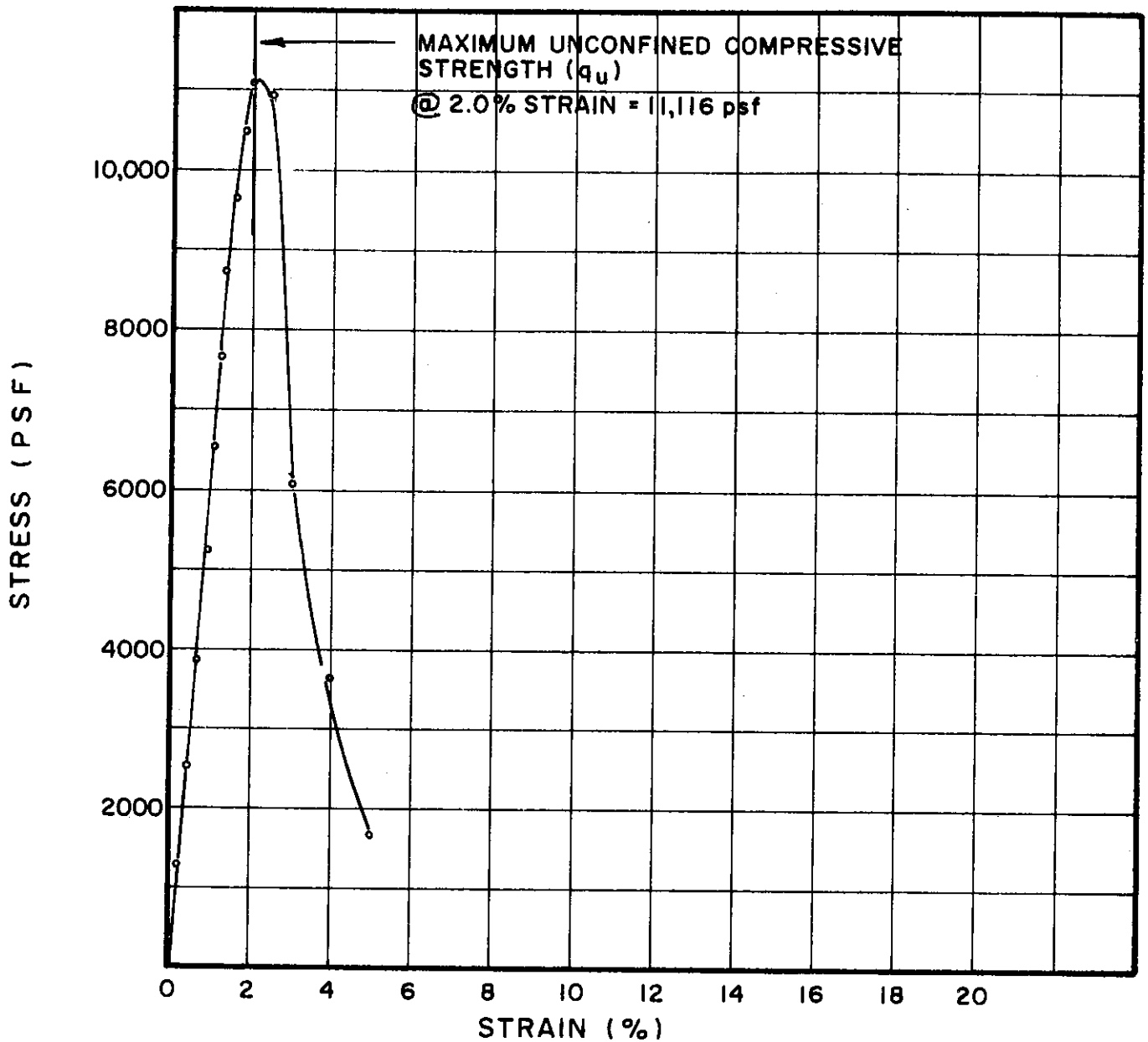


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>p</sub> 527.1	1.40	3.28	.274	17.5	100	43	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U529.1	1.41	3.05	.28	17.5	103	49	23	SILTY CLAY (CL-CH)

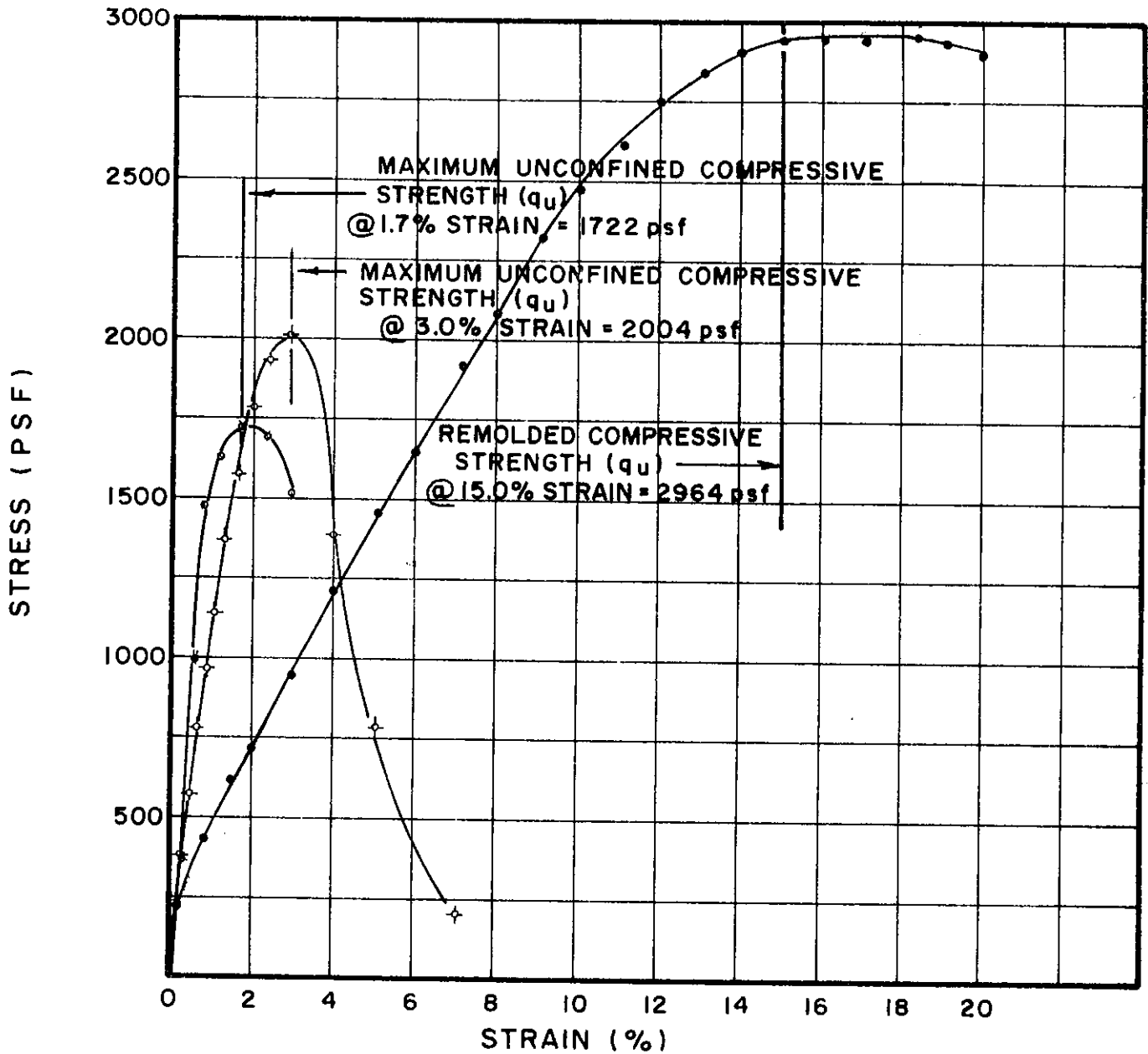
BORING NO. 141

SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

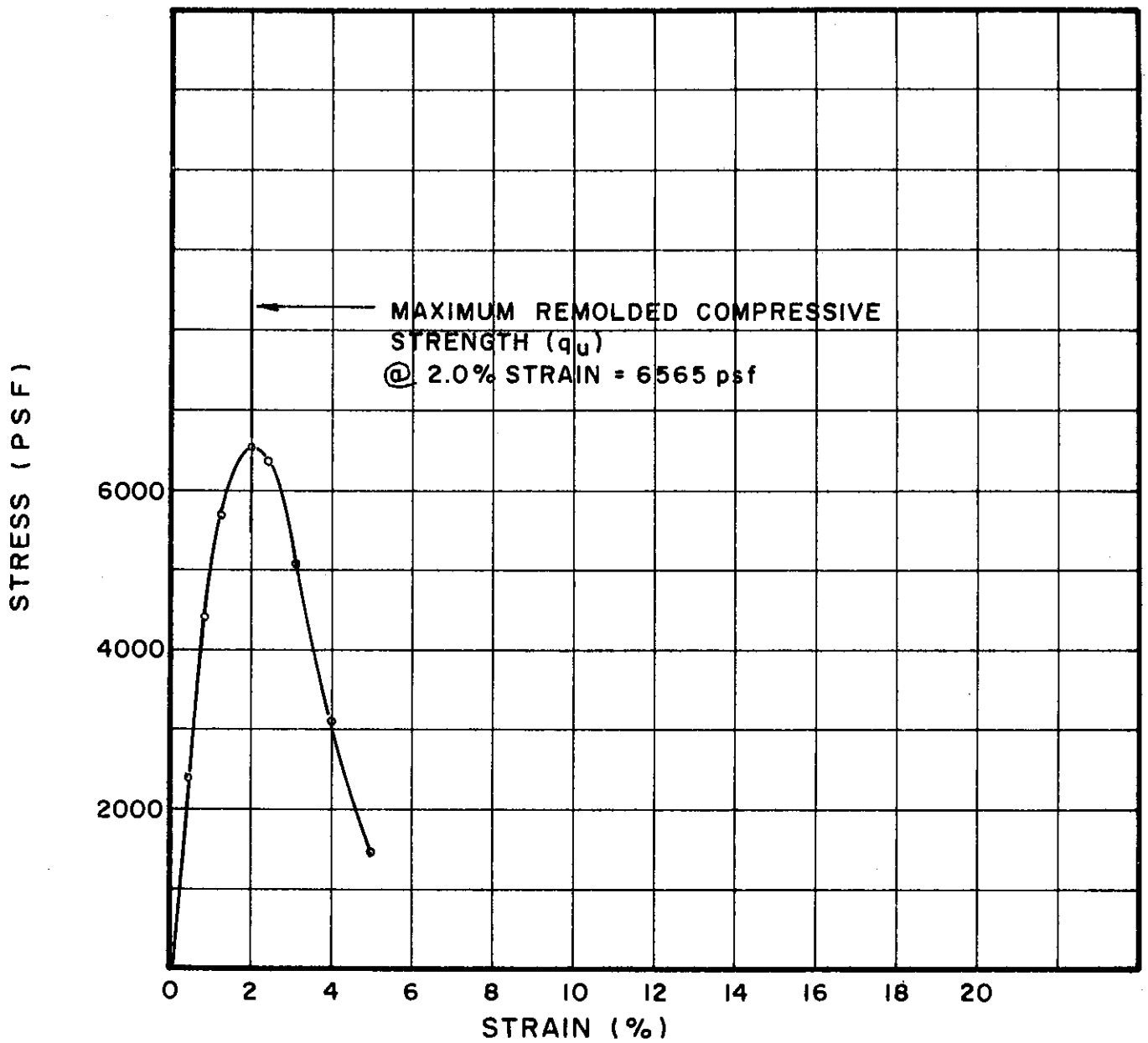


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U537.1	1.41	3.24	.28	26.3	97	48	21	SILTY CLAY (CL-CH)
U537.2	1.39	3.23	.28	24.1	99			
rU537.1	1.42	3.15	.28	24.1	100			

BORING NO. 144  
 SAMPLE NO. 4  
 DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U <sub>r</sub> 542.1	1.40	3.18	.283	16.6	104	46	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 146

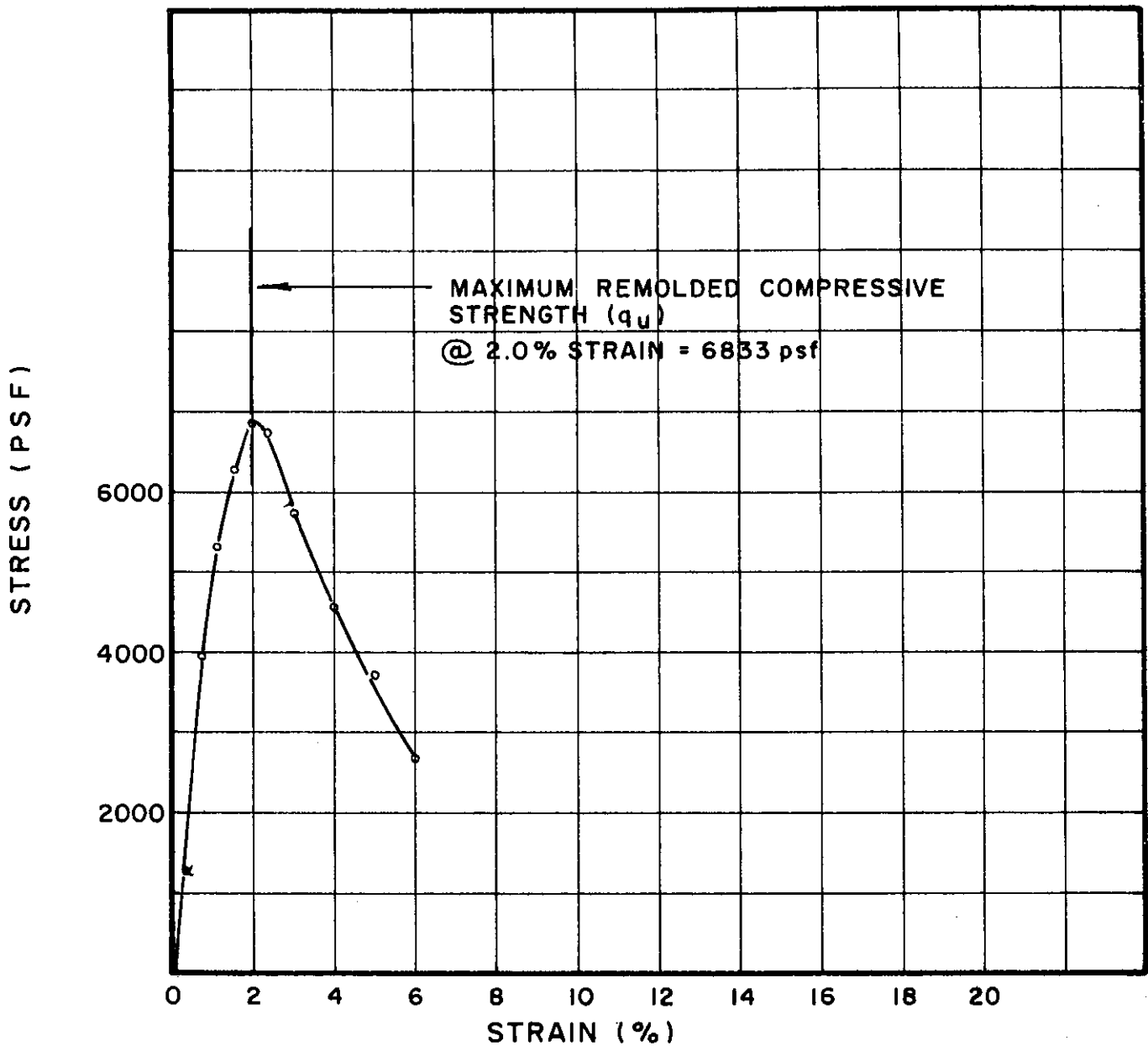
SAMPLE NO. ST 7

DEPTH 14.0' TO 16.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>r</sub> 548.1	1.37	3.20	.281	16.8	104	50	21	SILTY CLAY (CL-CH)
								COMPACTED SAMPLE

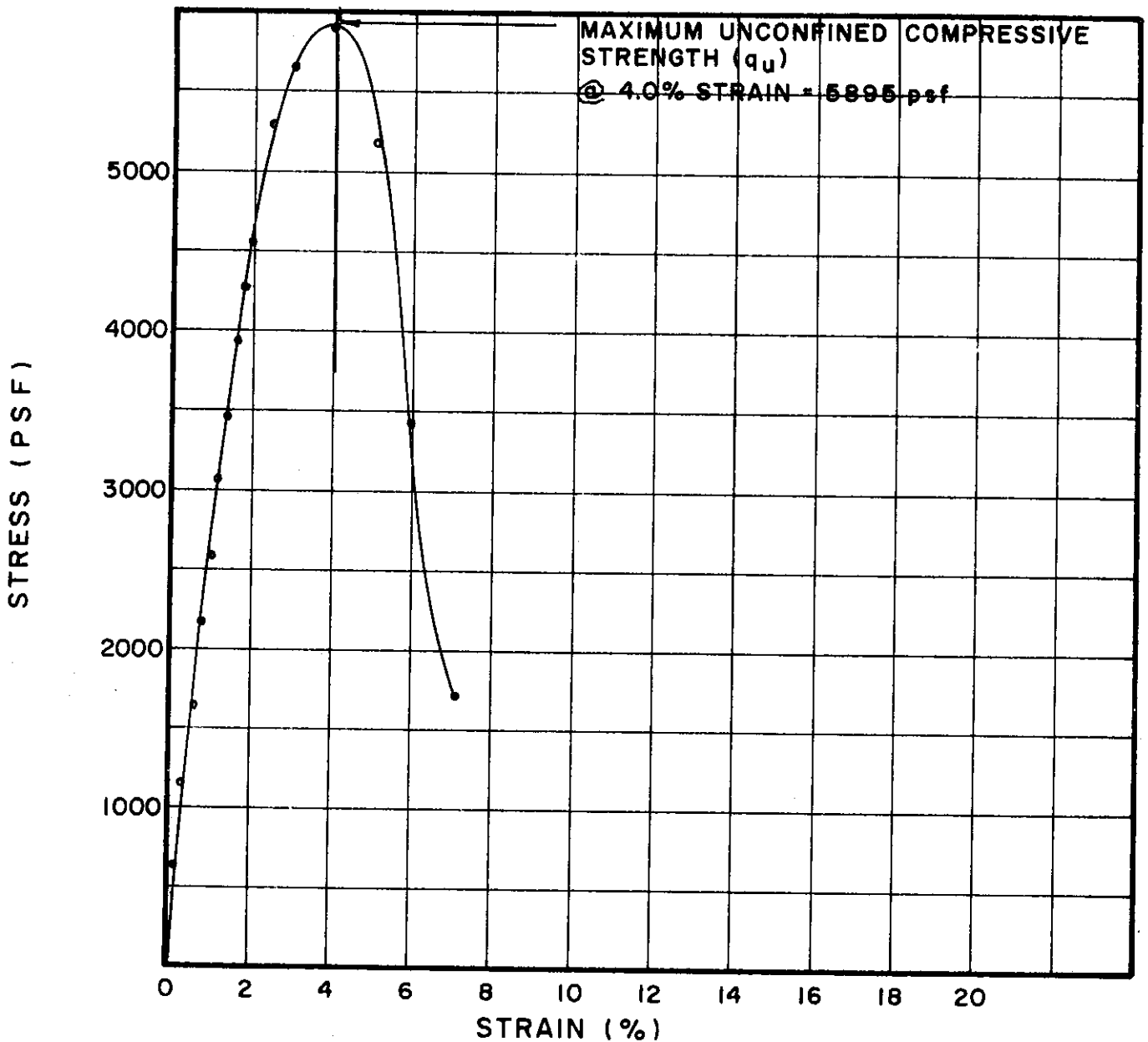
BORING NO. 158

SAMPLE NO. ST 2

DEPTH 7.5' TO 9.7'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U552.1	1.40	3.43	0.25	23.9	104	50	23	SILTY CLAY (CL-CH)

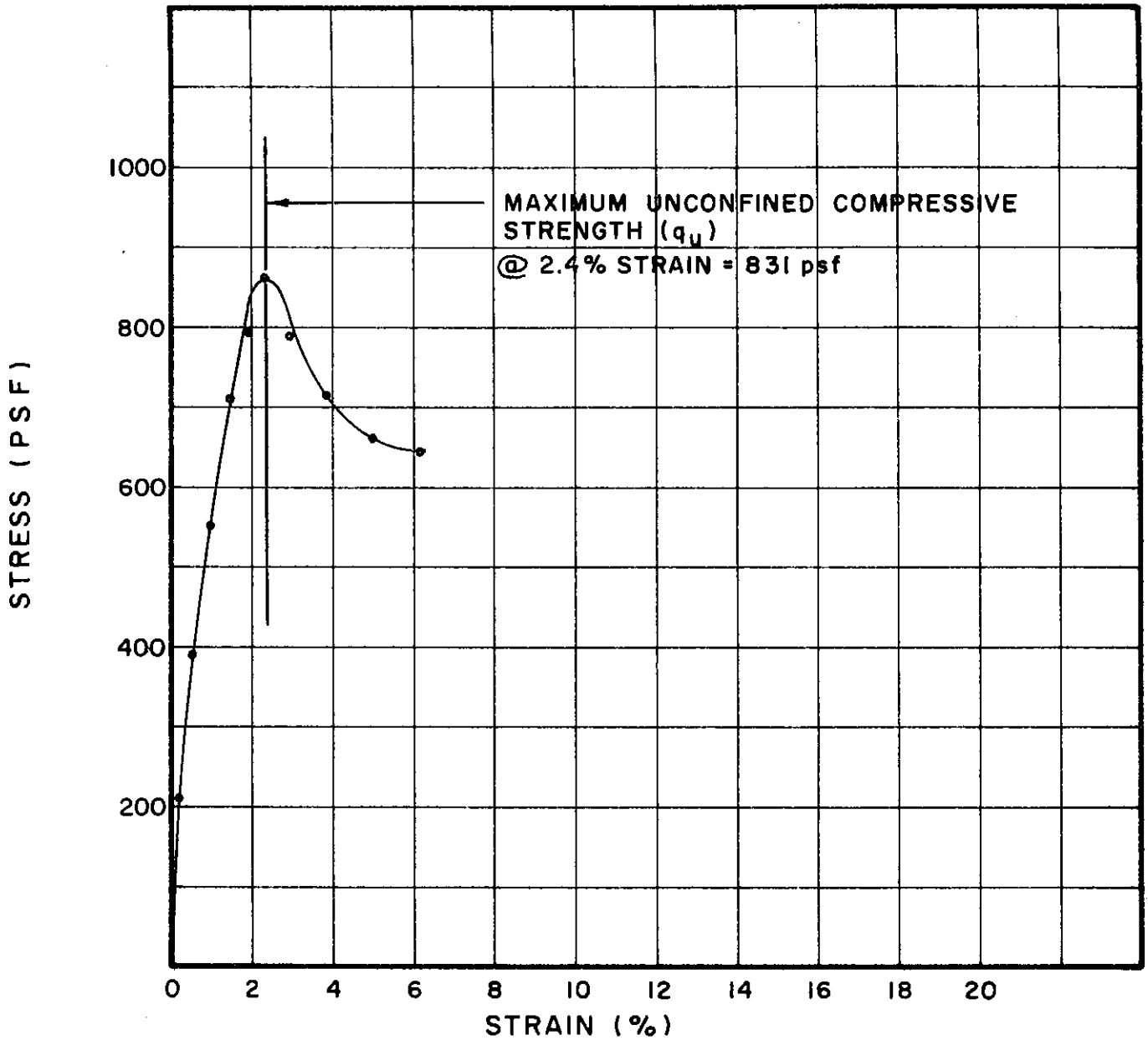
BORING NO. 185

SAMPLE NO. 3

DEPTH 7.5' TO 7.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U554.1	1.41	3.33	0.25	39.3	81	49	22	SILTY CLAY (CL-CH)

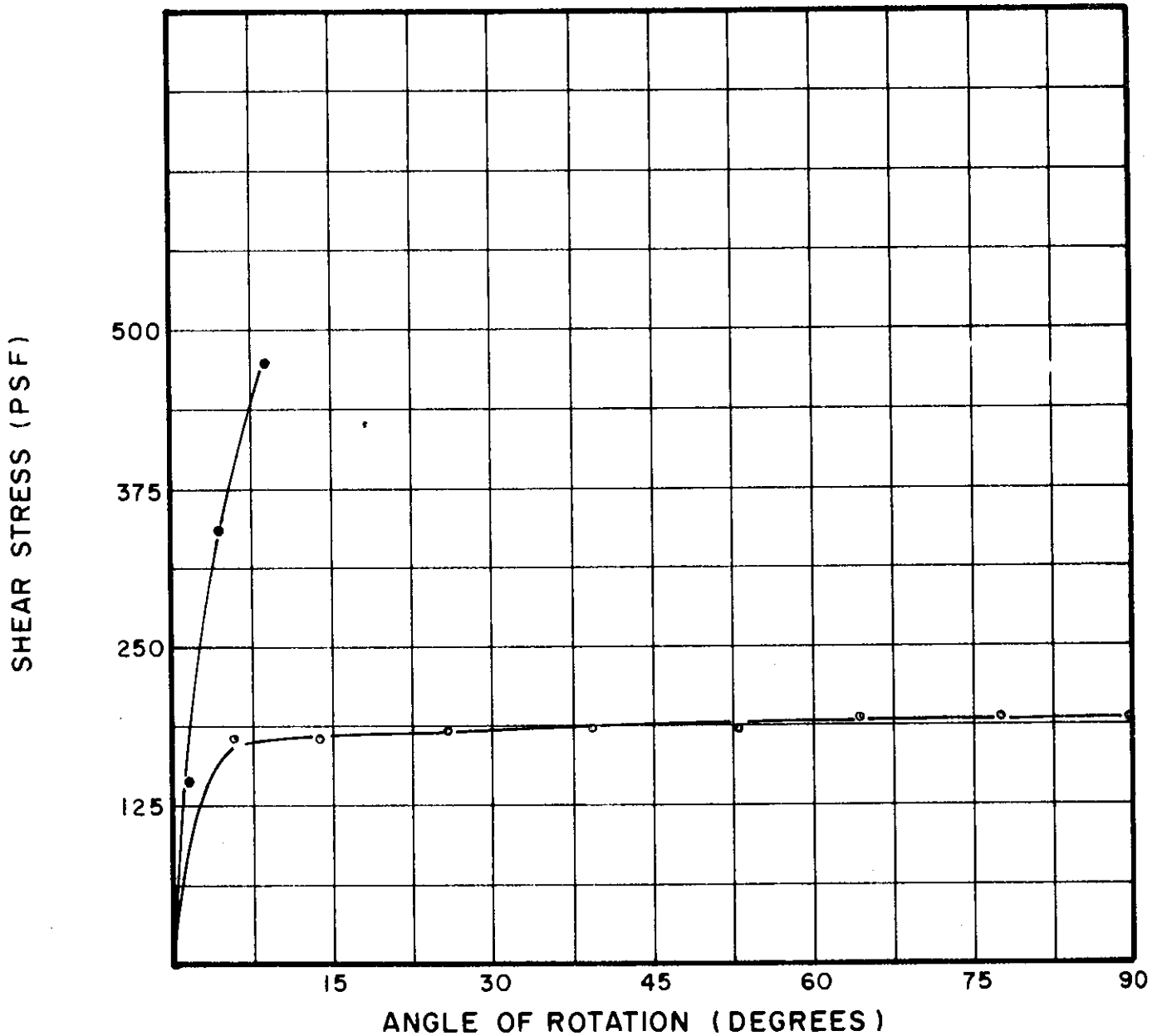
BORING NO. 185  
 SAMPLE NO. 7  
 DEPTH 18.5' TO 18.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II







TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)

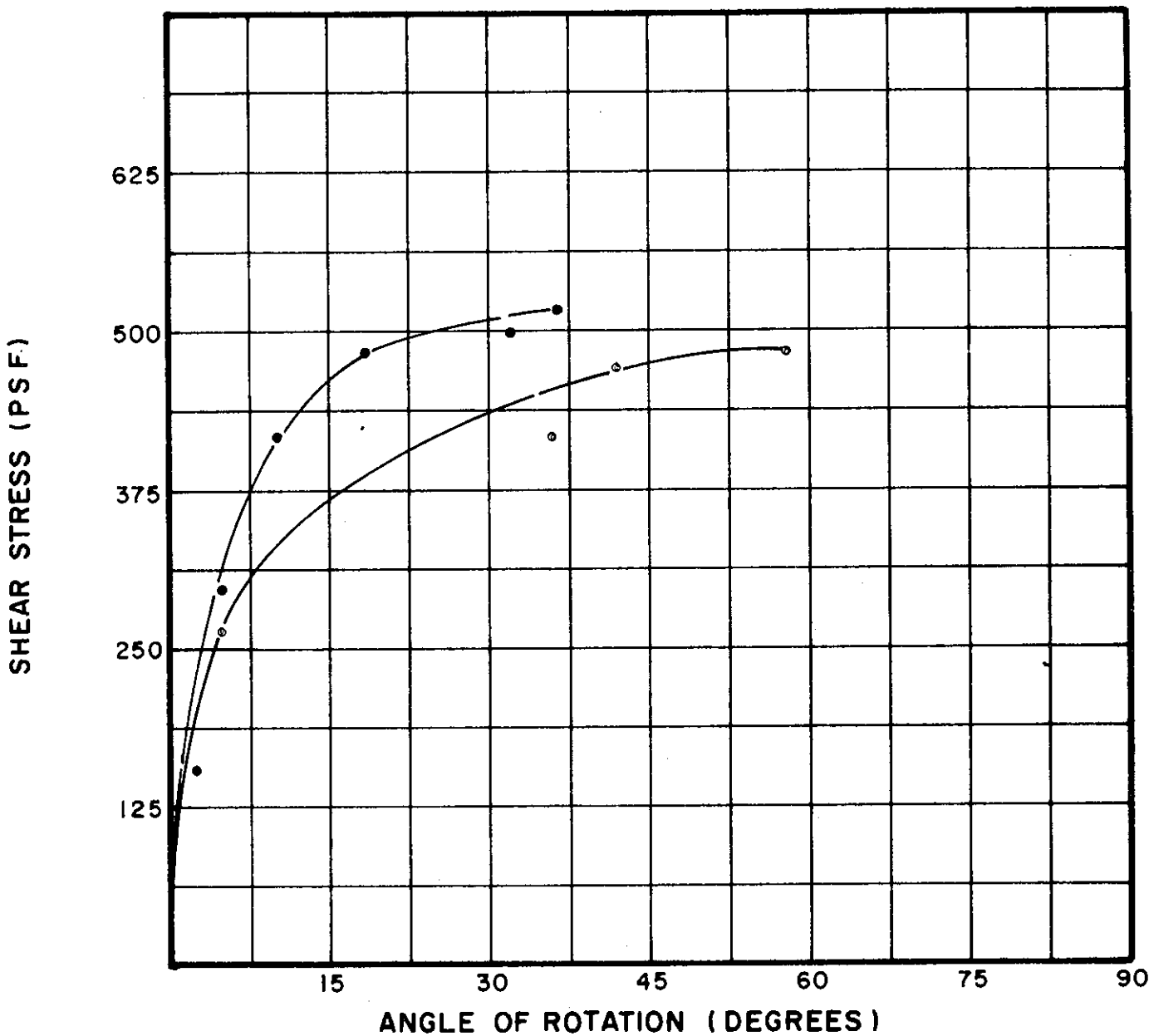
BORING NO. 50

SAMPLE NO. 6

DEPTH 28.1' - 28.3'

**LABORATORY VANE SHEAR TESTS**

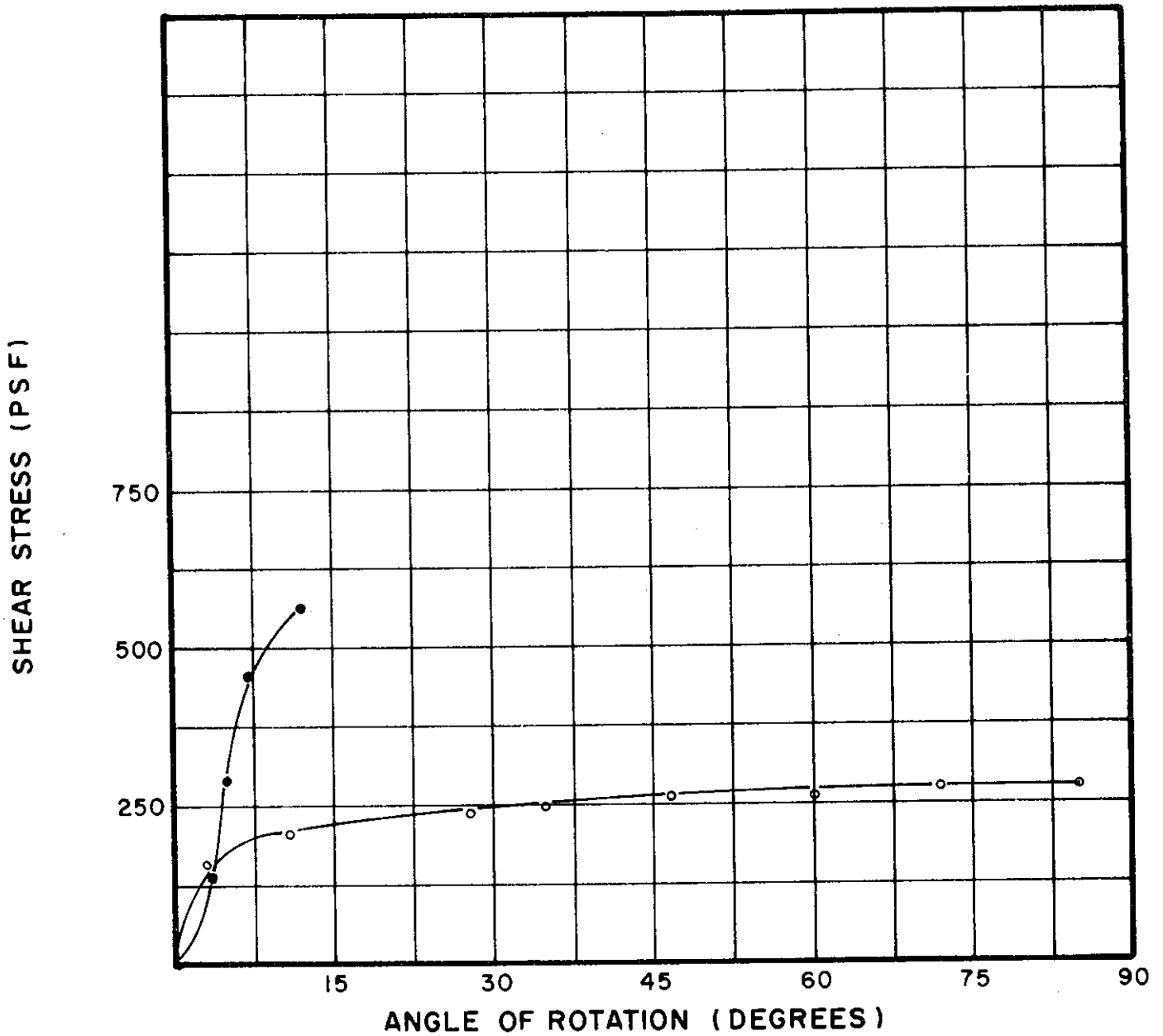
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50  
SAMPLE NO. 10  
DEPTH 48.1' - 48.4'

LABORATORY VANE SHEAR TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

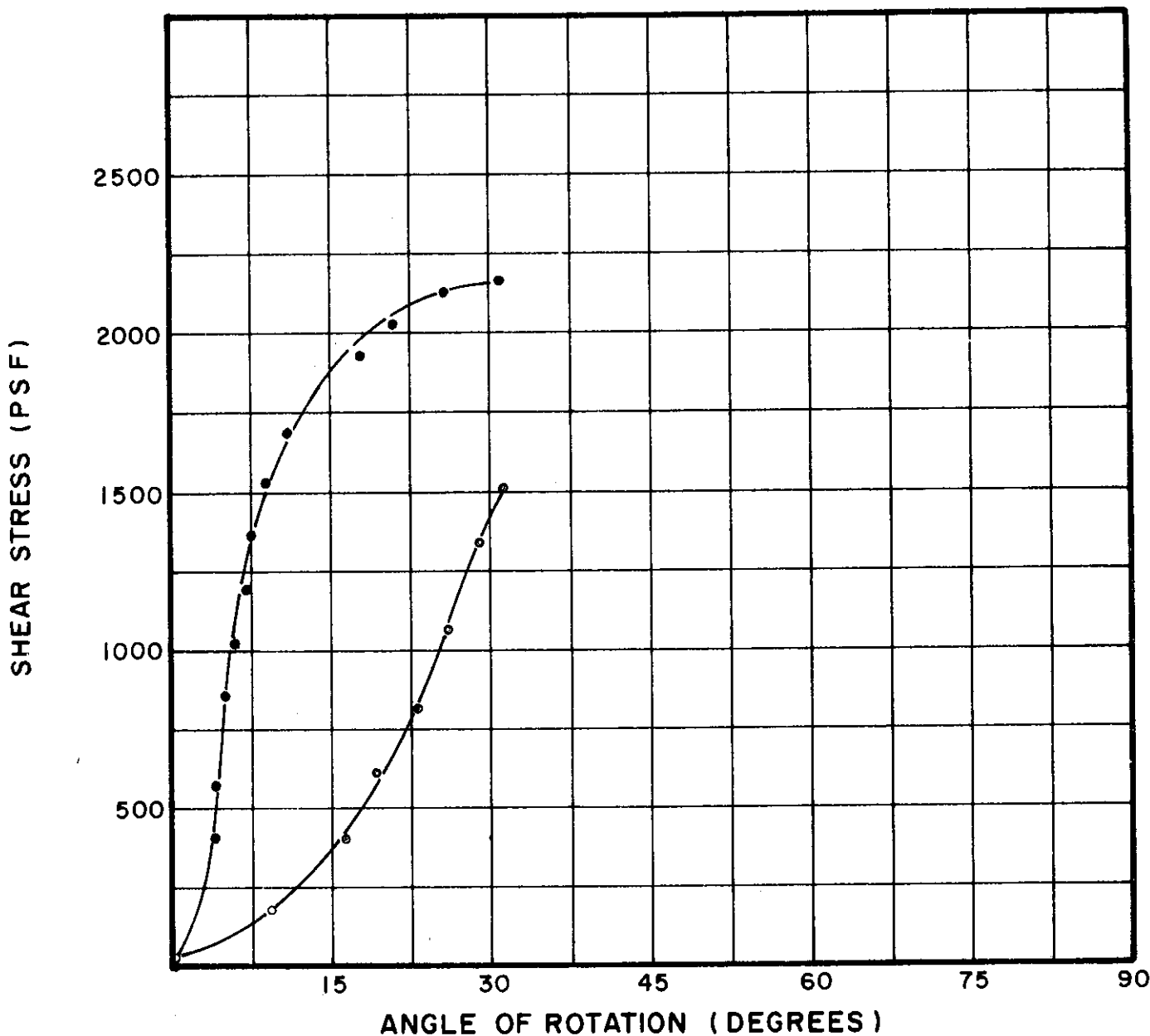


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VSI09.1 ●	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)
VSI09.1 ○	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 28.9' - 29.2'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

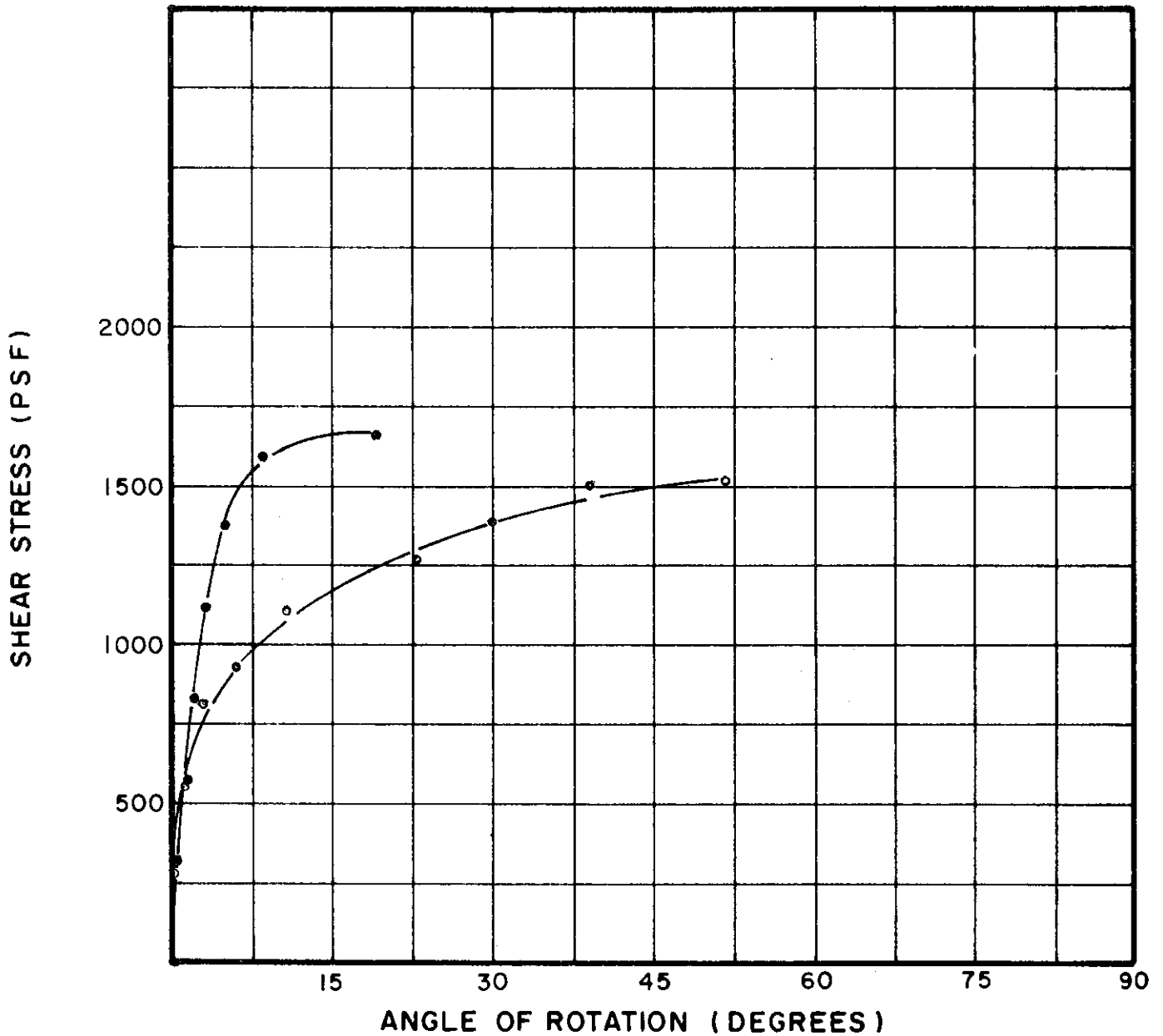


TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%) PL (%)	
VS111.1 ●	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)
VS111.1 ○	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 49.6' - 49.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

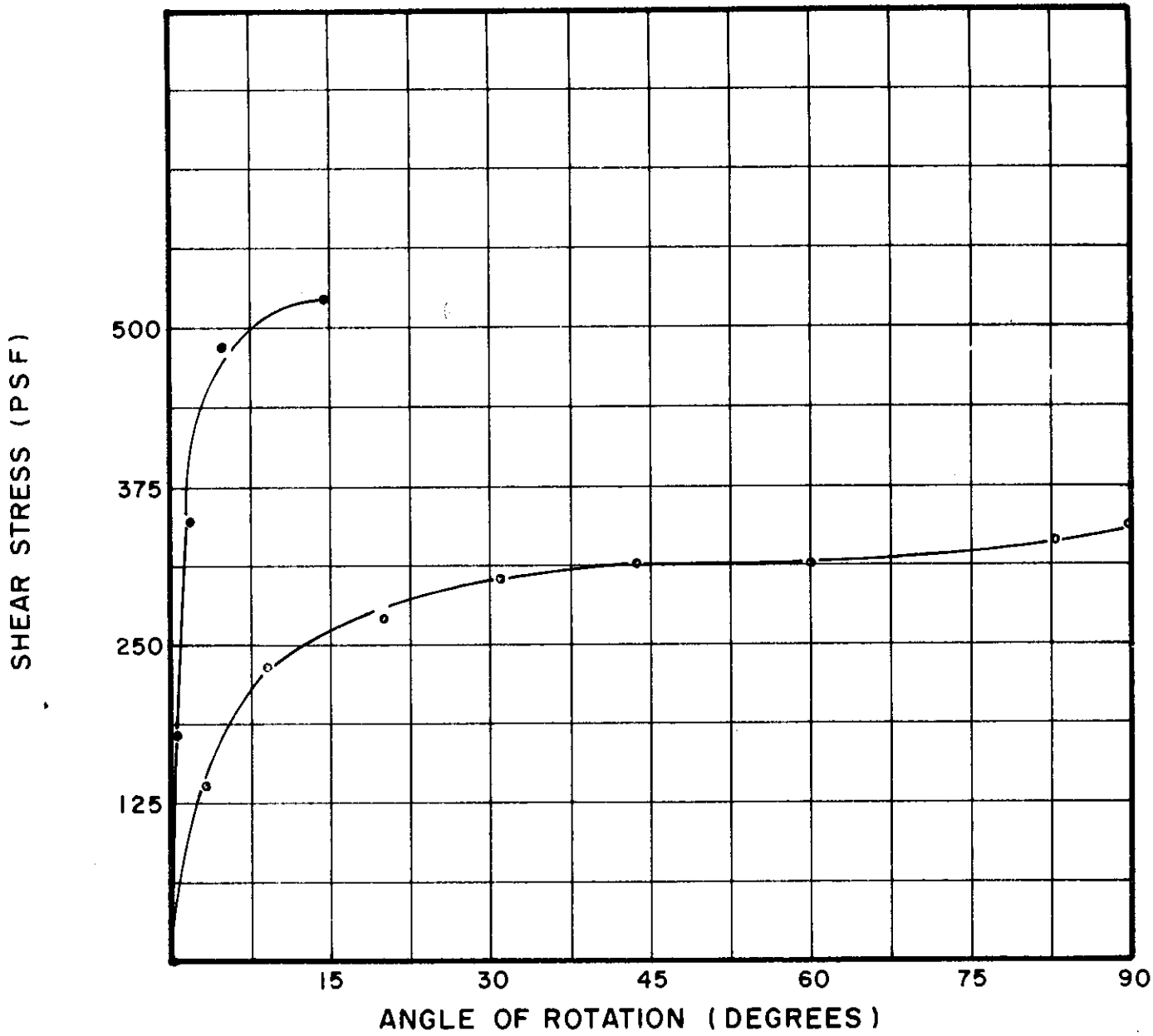


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 89.1' - 89.4'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS99.2	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)
rVS99.2	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)

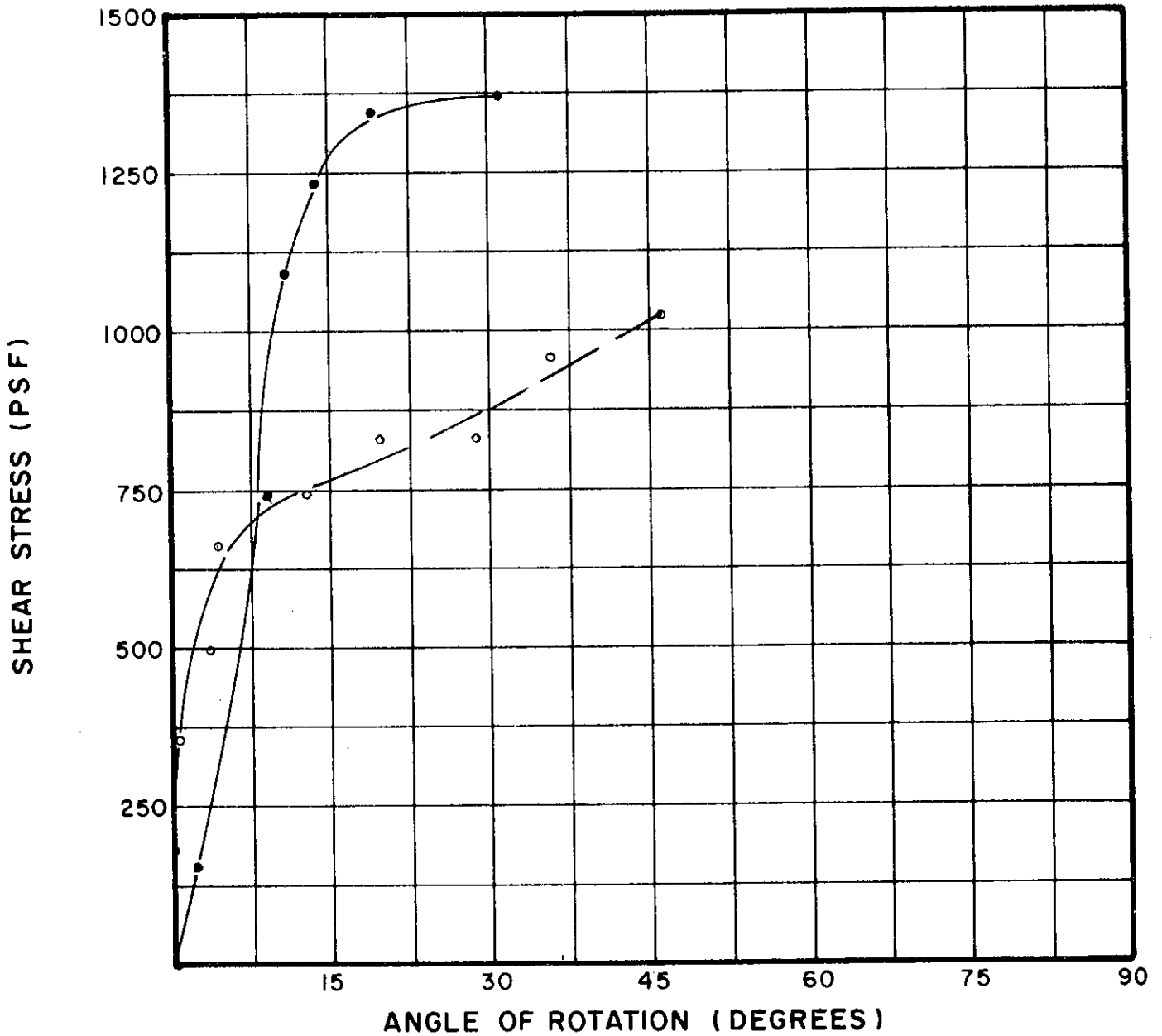
BORING NO. 53

SAMPLE NO. 6

DEPTH 49.7' - 50.0'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

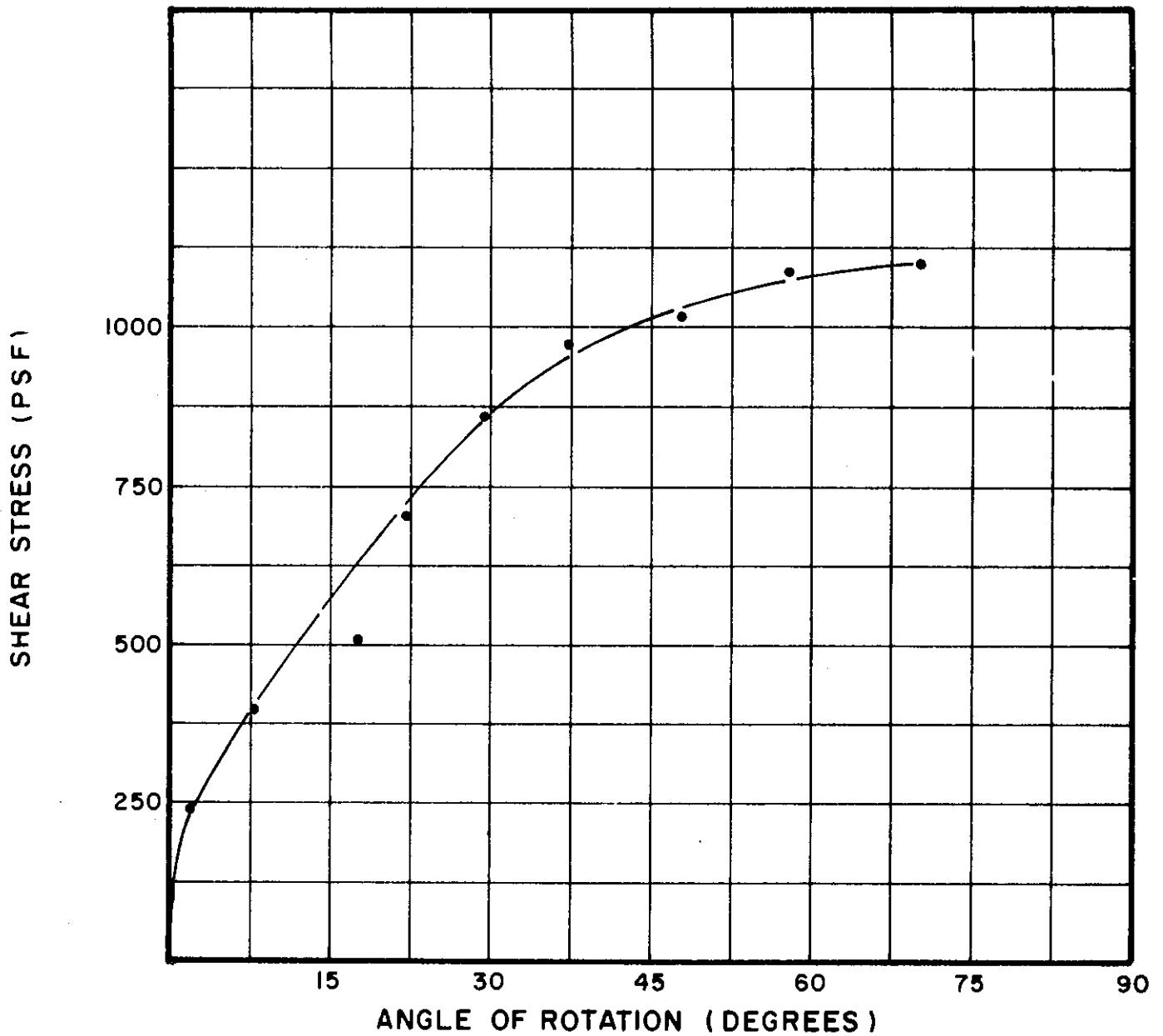


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 79.5' - 79.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS398.1	.50	.25	6.0	27.5	92	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54

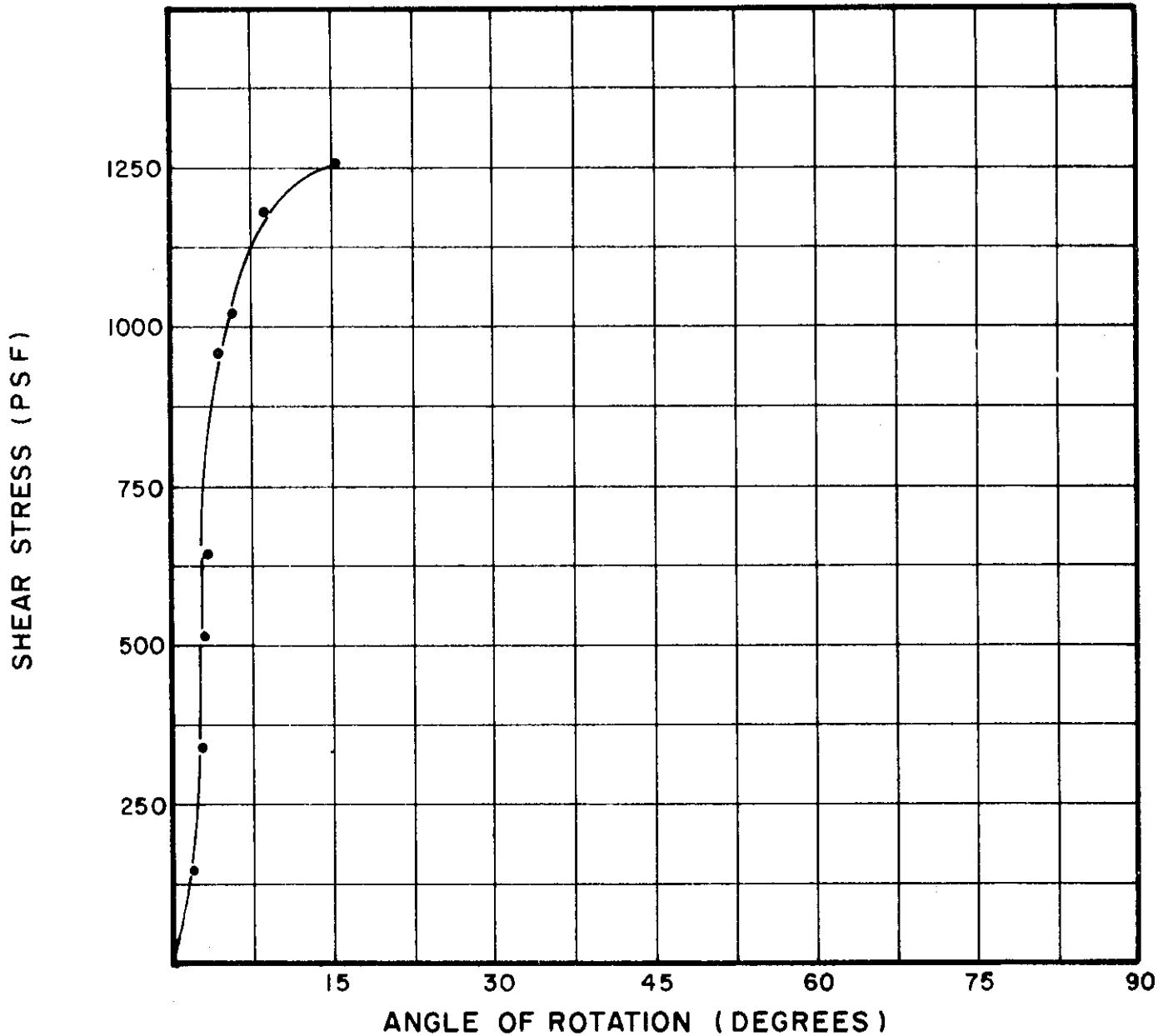
SAMPLE NO. 5

DEPTH 59.7' - 60.0'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



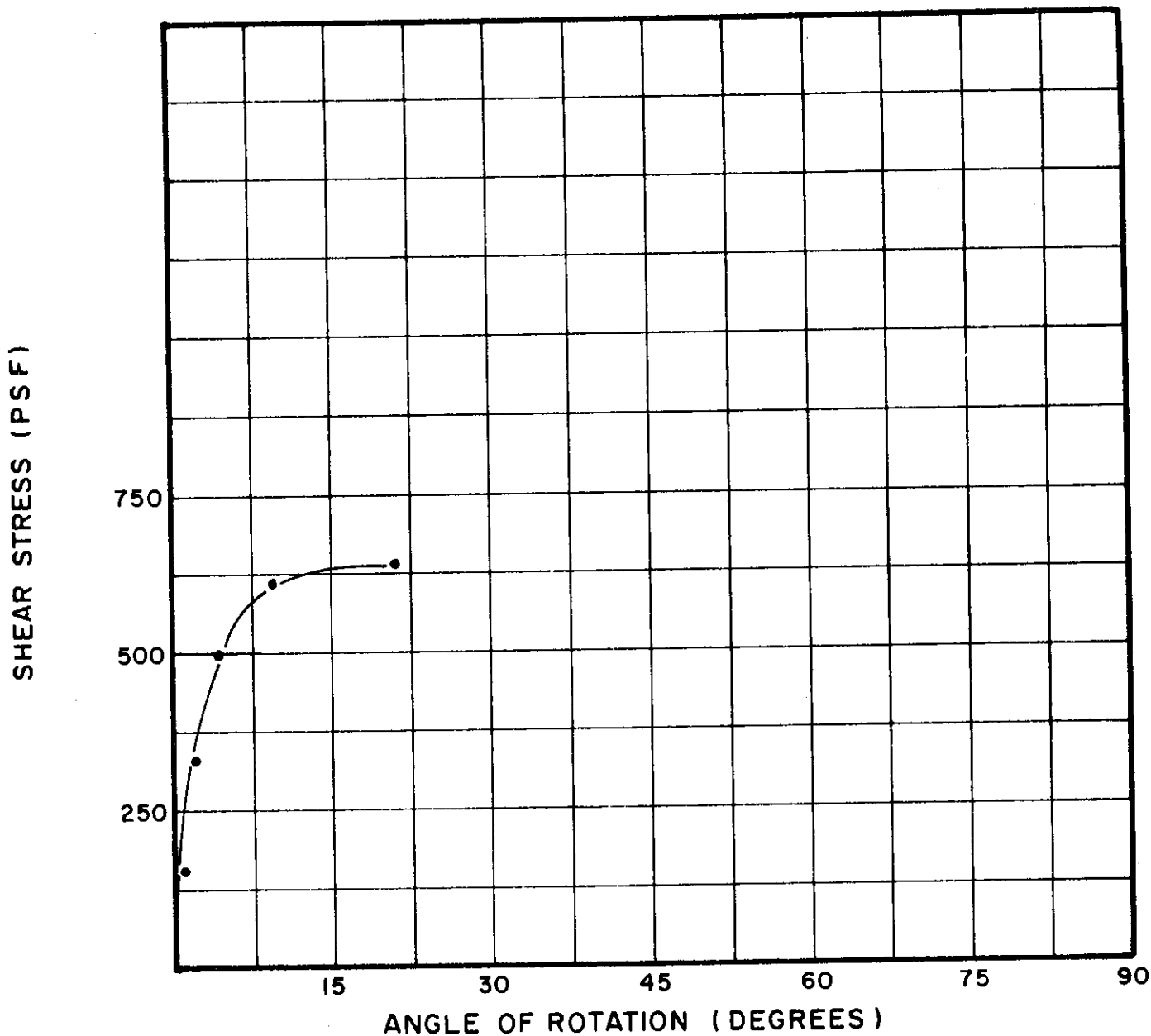


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS76.1	.50	.25	6.0	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.5' - 18.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

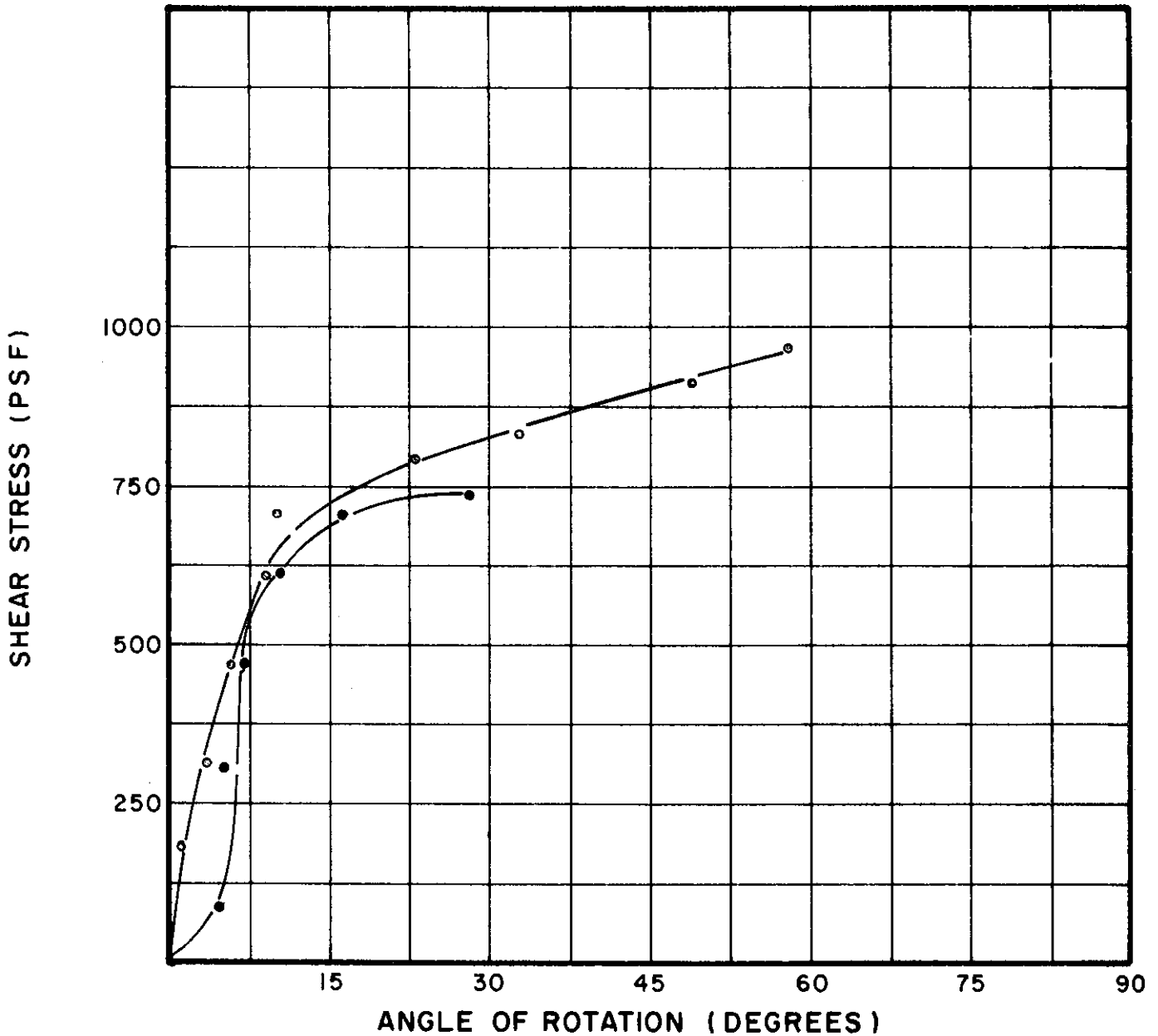


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS78.1	.50	.25	6.0	25.6	96	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59  
 SAMPLE NO. 5  
 DEPTH 39.4' - 39.7'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)
rVS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

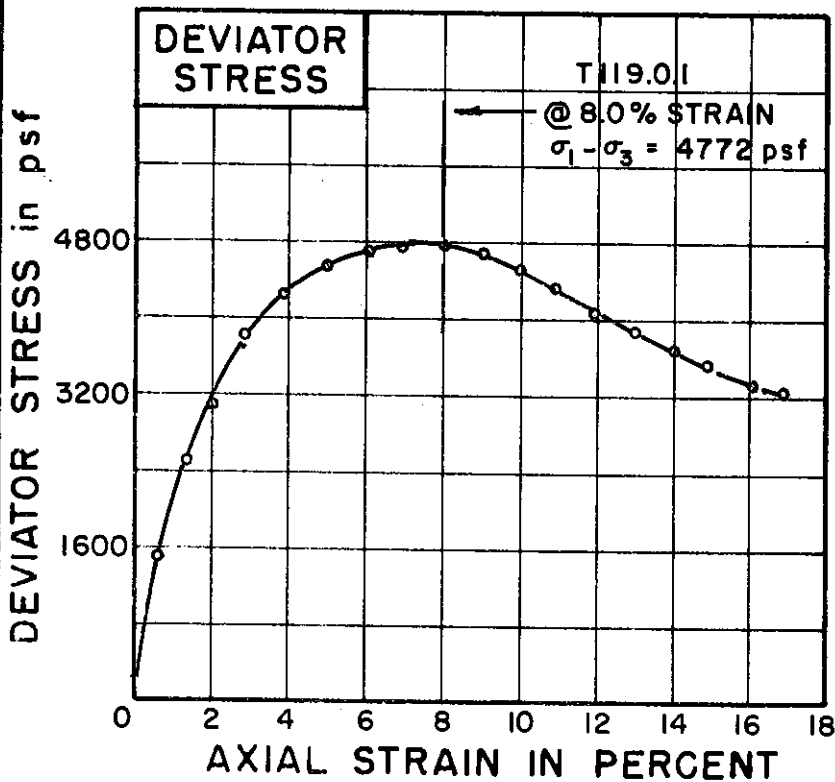
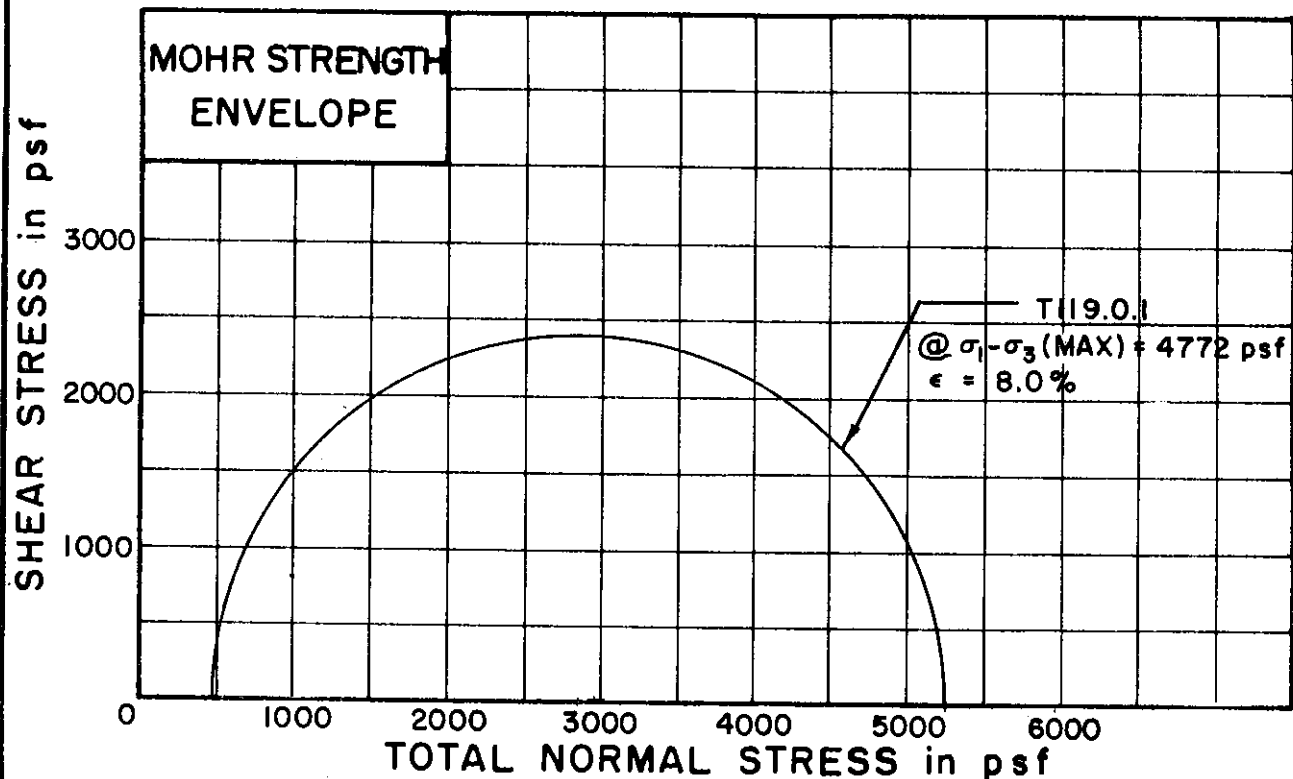
SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T119.0.1		
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INITIAL WATER CONTENT	$w_0$	25.4%	
DRY DENSITY pcf	$\gamma_d$	101	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.41	

CONFINING PRESSURE psf	$\sigma_3$	475	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	25.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 15

SAMPLE NO. 2

DEPTH 3.7' TO 4.1'

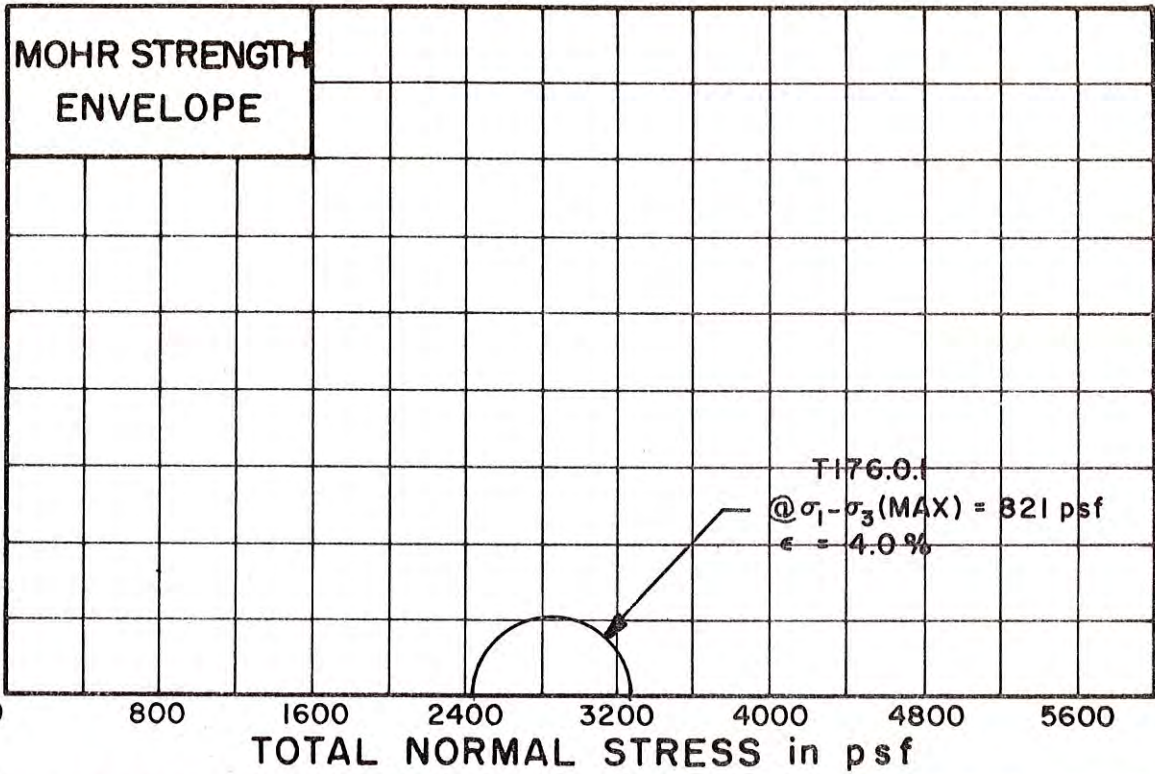
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

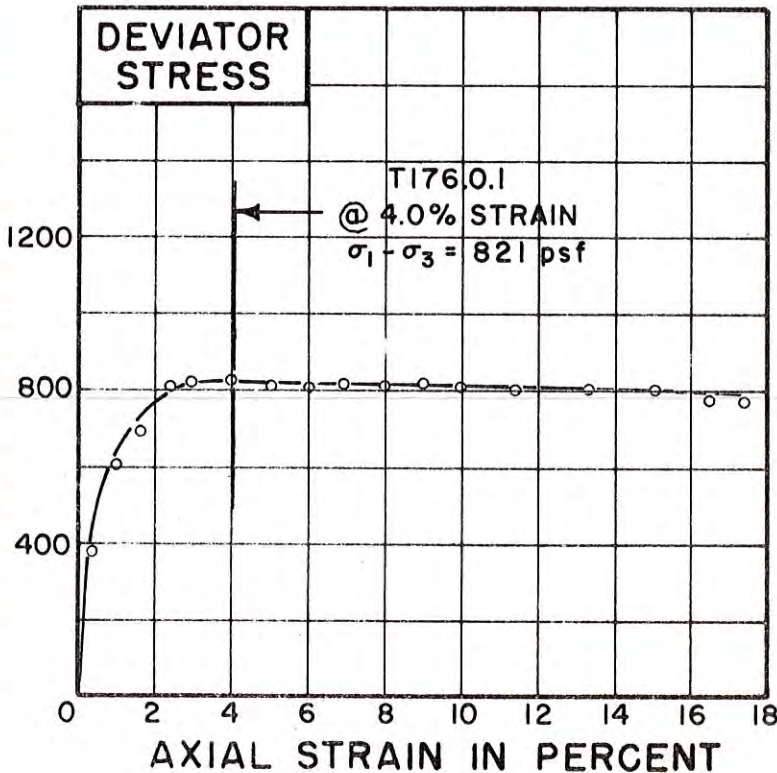
**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL T176.0.1

INITIAL WATER CONTENT  $w_o$  39.9%

DRY DENSITY  $\rho_{cf}$   $\gamma_d$  83

SAMPLE DIAMETER, in.  $D_o$  1.37

SAMPLE HEIGHT in.  $H_o$  3.29

CONFINING PRESSURE  $\sigma_3$  2448

RATE OF STRAIN PERCENT/MINUTE 0.26

FINAL WATER CONTENT  $w_f$  39.8%

SKETCH OF SAMPLE AT END OF TEST

BORING NO. 18

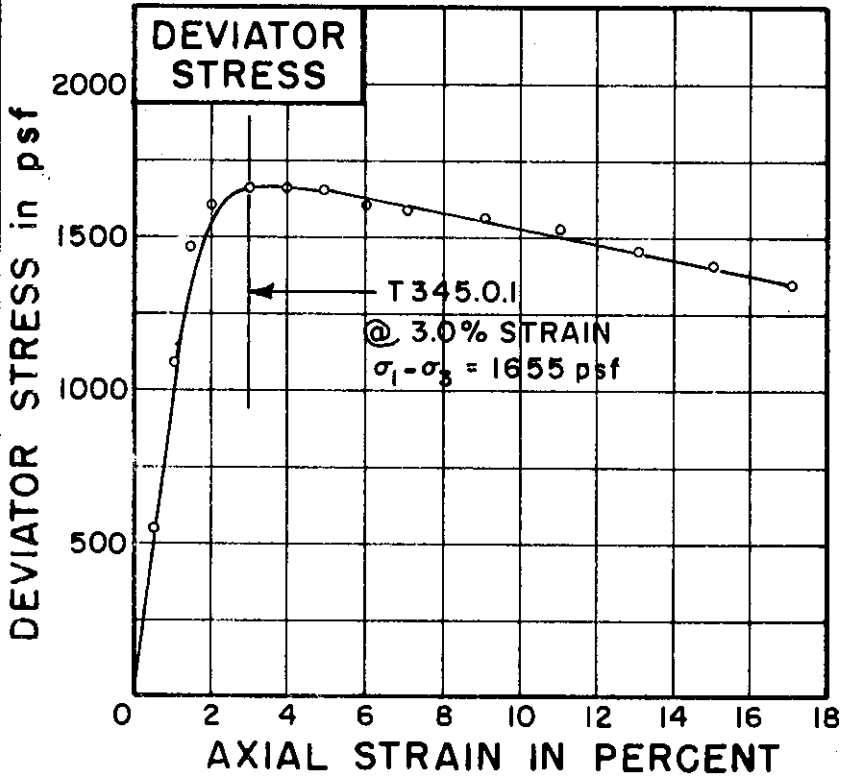
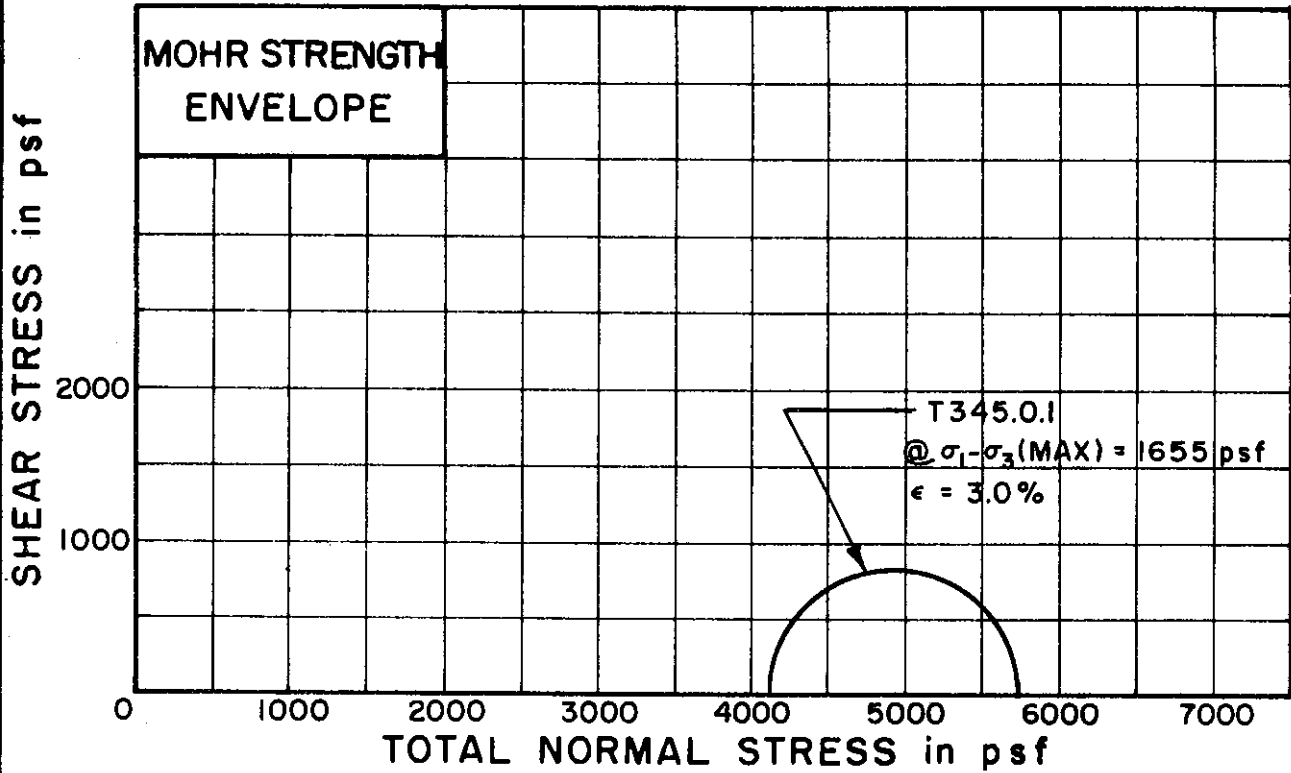
SAMPLE NO. 3

DEPTH 20.6' TO 20.9'

SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T345.0.1		
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INITIAL WATER CONTENT	$w_0$	31.0%		
DRY DENSITY pcf	$\gamma_d$	92		
SAMPLE DIAMETER in.	$D_0$	1.41		
SAMPLE HEIGHT in.	$H_0$	3.34		

CONFINING PRESSURE psf	$\sigma_3$	4104		
RATE OF STRAIN PERCENT/MINUTE		0.27		

FINAL WATER CONTENT	$w_f$	30.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 6

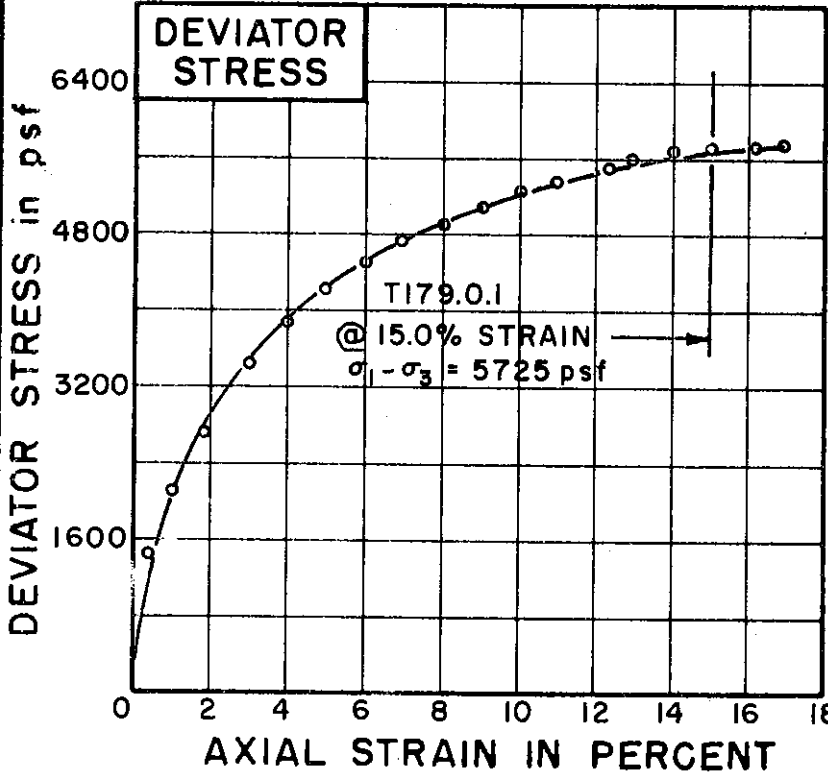
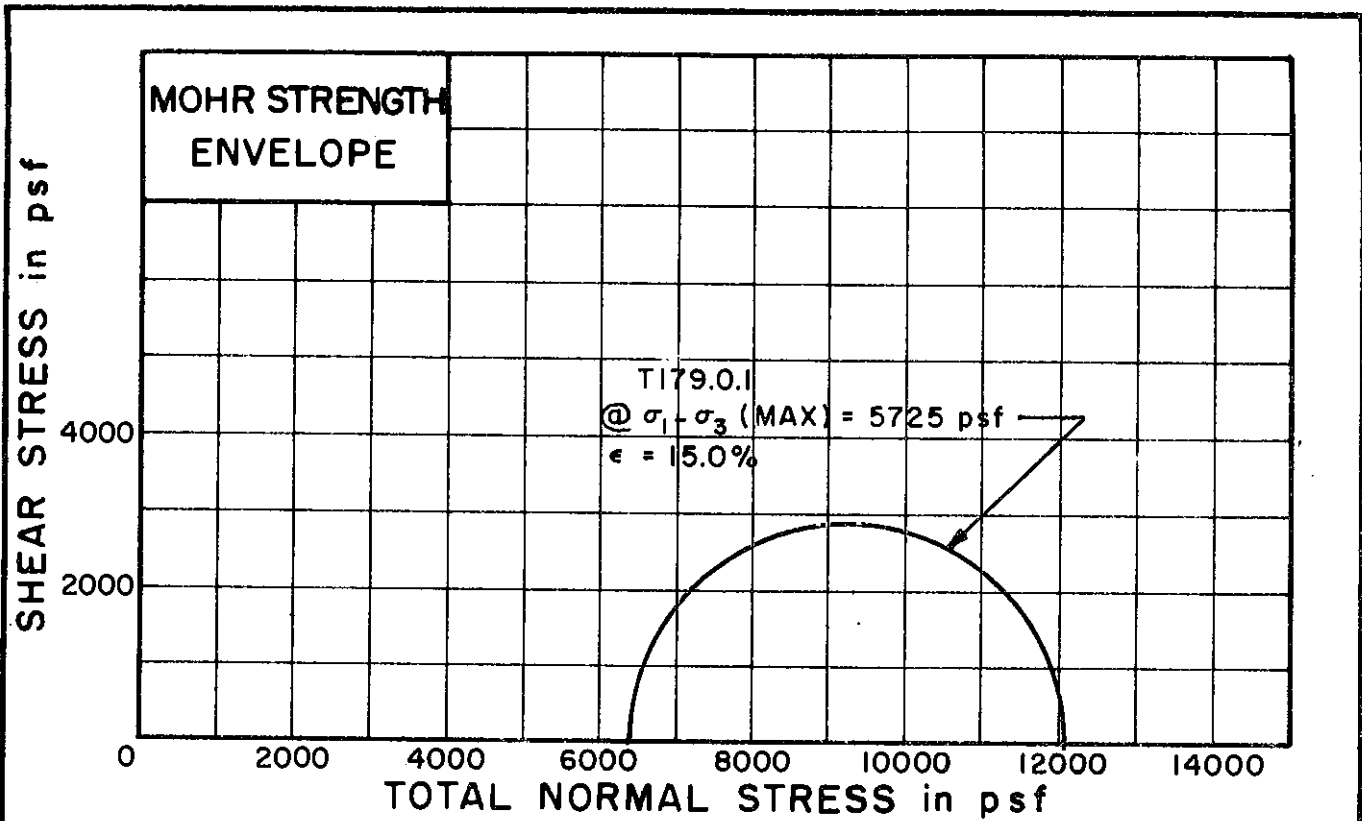
DEPTH 51.4' TO 51.7'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T179.0.1		
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INITIAL WATER CONTENT	$w_0$	17.3%	
DRY DENSITY	$\rho_d$	111	
SAMPLE DIAMETER	$D_0$	1.36	
SAMPLE HEIGHT	$H_0$	3.22	

CONFINING PRESSURE	$\sigma_3$	6336	
RATE OF STRAIN		0.26	

FINAL WATER CONTENT	$w_f$	17.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 18

SAMPLE NO. 10

DEPTH 88.8' TO 90.1'

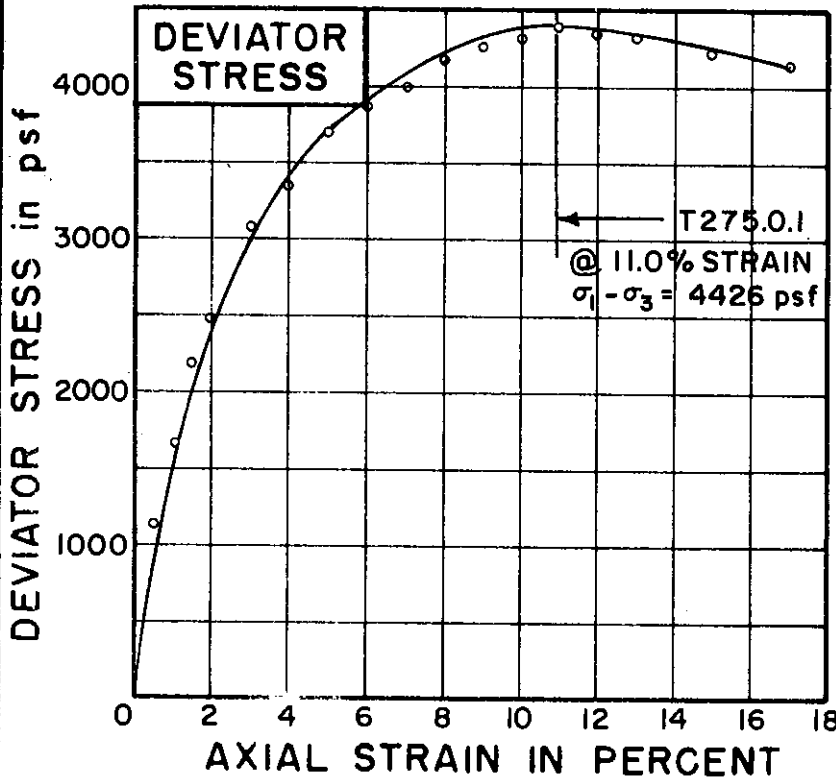
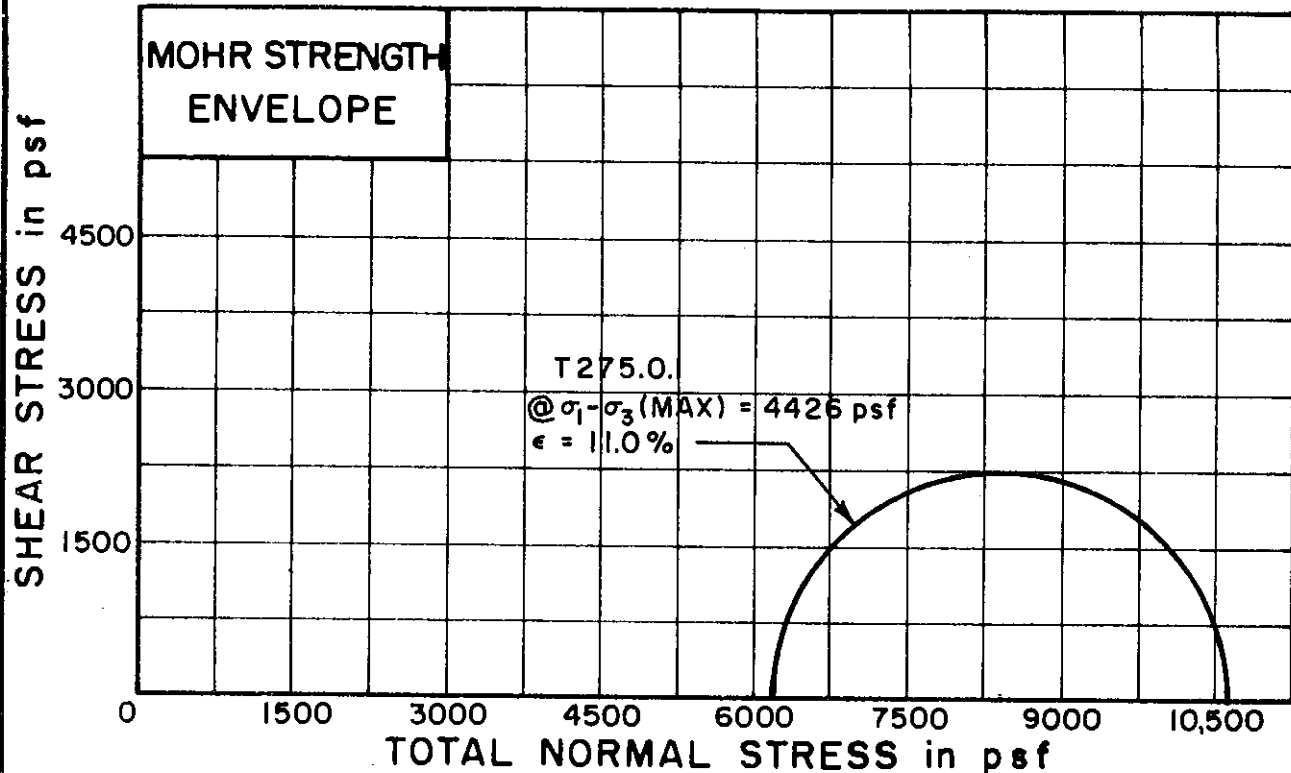
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 29 PLASTIC LIMIT 15

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T275.0.		
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INITIAL WATER CONTENT	$w_o$	22.5%	
DRY DENSITY pcf	$\gamma_d$	104	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.35	

CONFINING PRESSURE psf	$\sigma_3$	6192	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	22.4%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 25

SAMPLE NO. 10

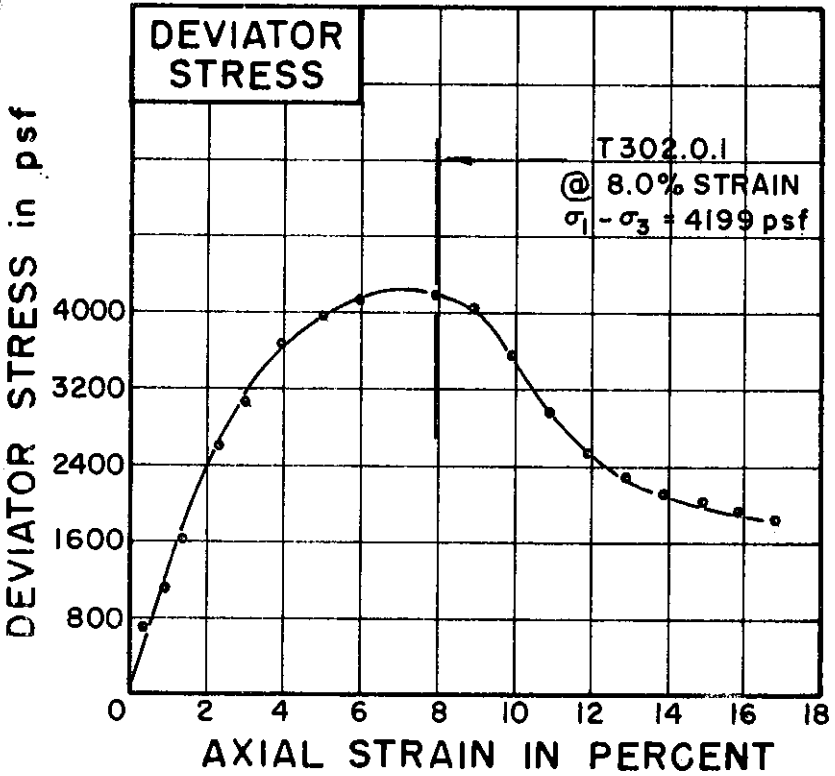
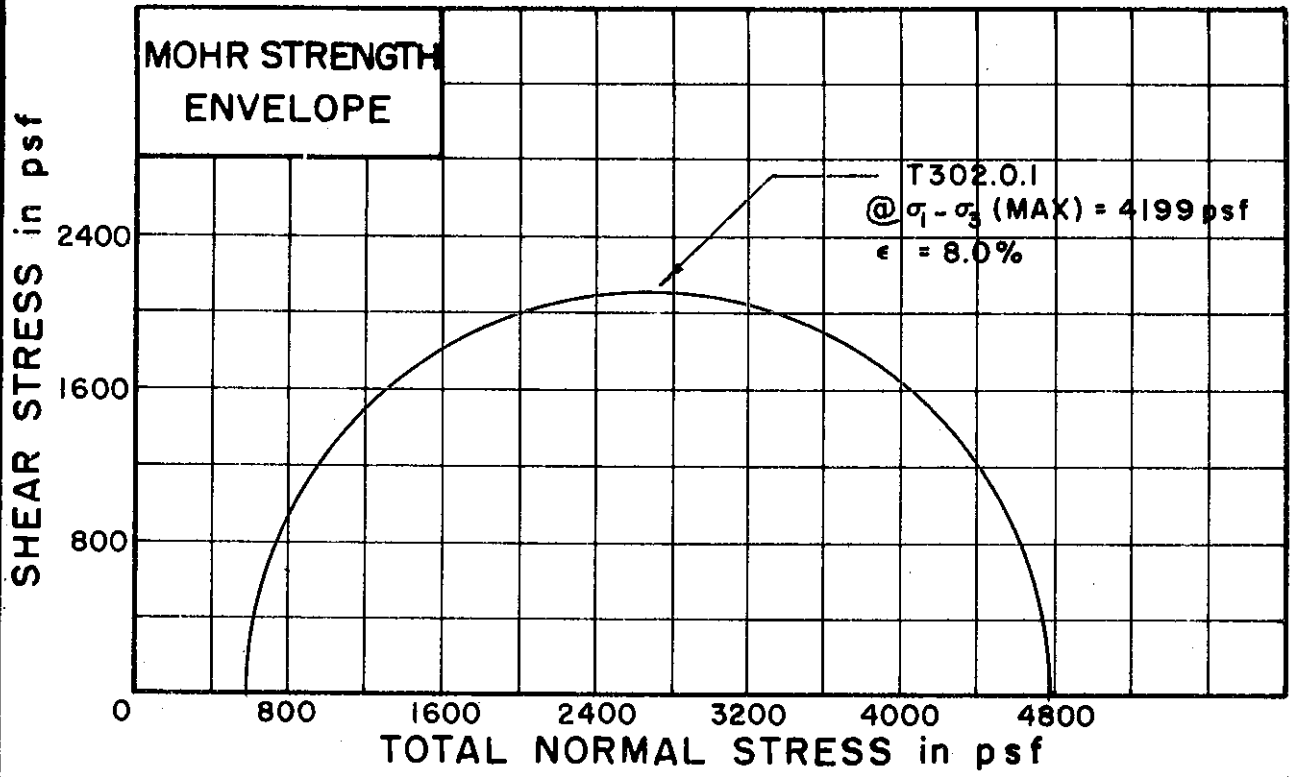
DEPTH 88.9' TO 89.2'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 19

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T302.0.		
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INITIAL WATER CONTENT	$w_o$	24.9%		
DRY DENSITY	$\gamma_d$ pcf	103		
SAMPLE DIAMETER	$D_o$ in.	1.40		
SAMPLE HEIGHT	$H_o$ in.	3.33		

CONFINING PRESSURE	$\sigma_3$ psf	576		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	24.7%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 27

SAMPLE NO. 2

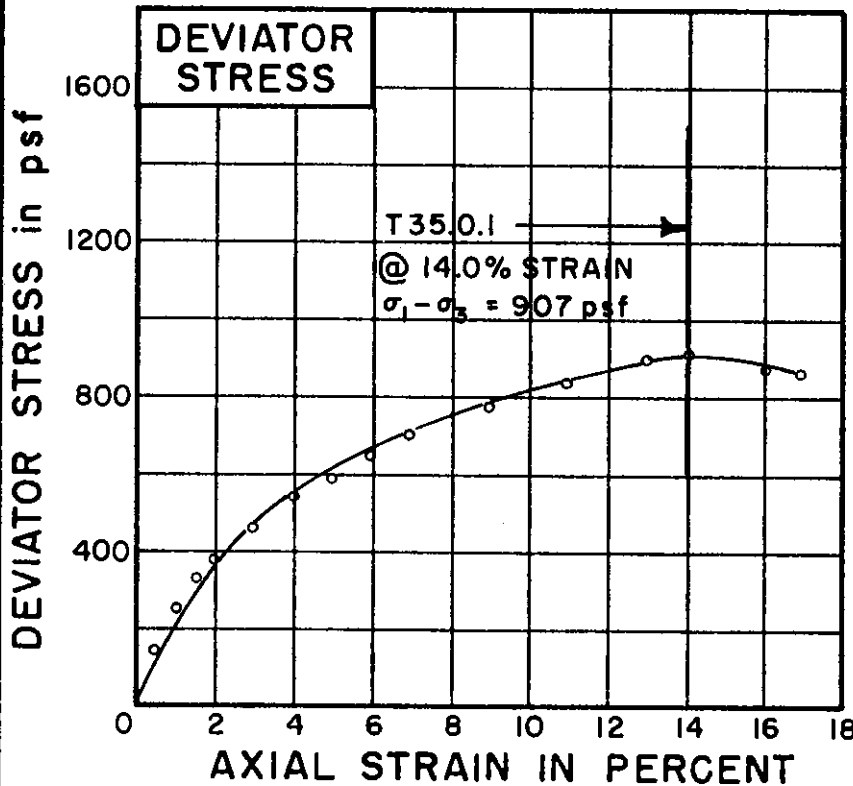
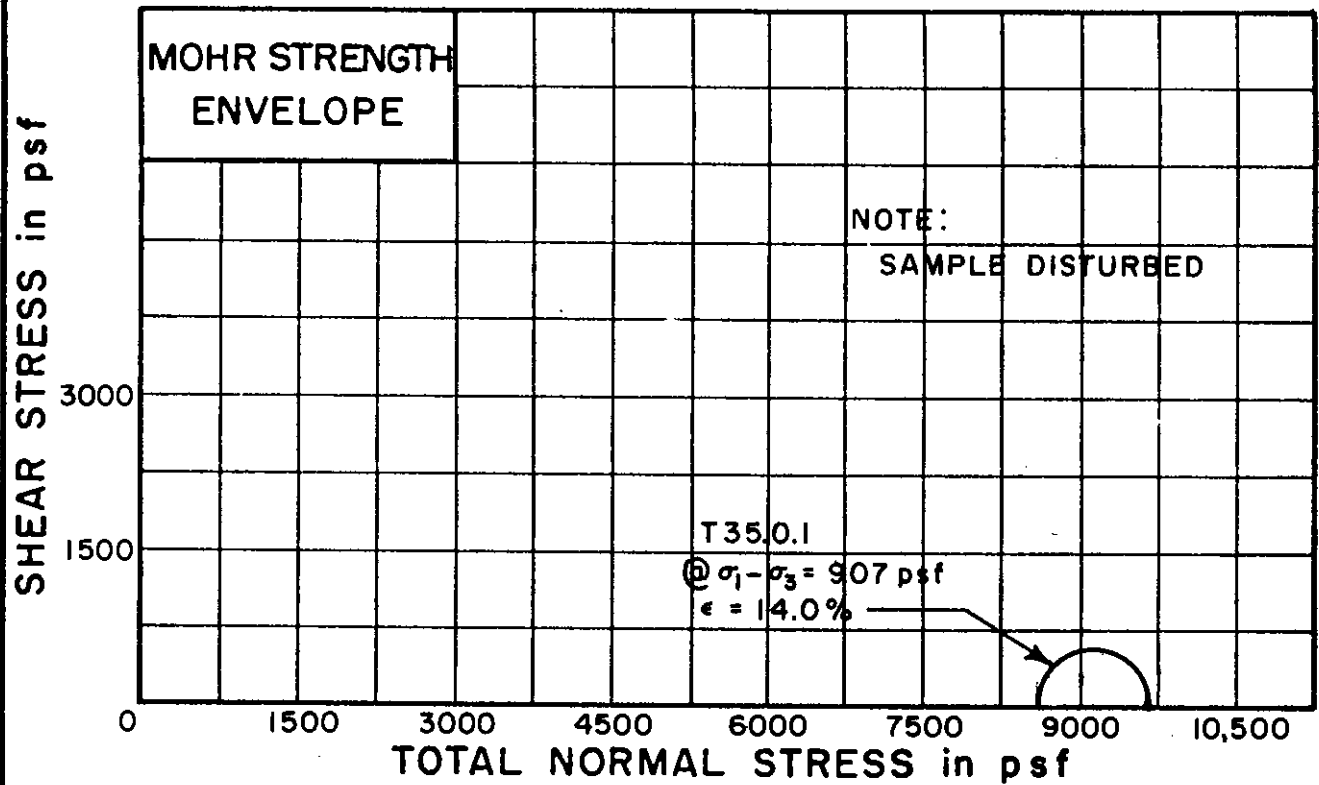
DEPTH 4.5' TO 4.8'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 24

**UNCONSOLIDATED UNDRAINED  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T35.0.1		
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INITIAL WATER CONTENT	$w_0$	19.6%	
DRY DENSITY pcf	$\gamma_d$	105	
SAMPLE DIAMETER in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	8654	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	19.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 41

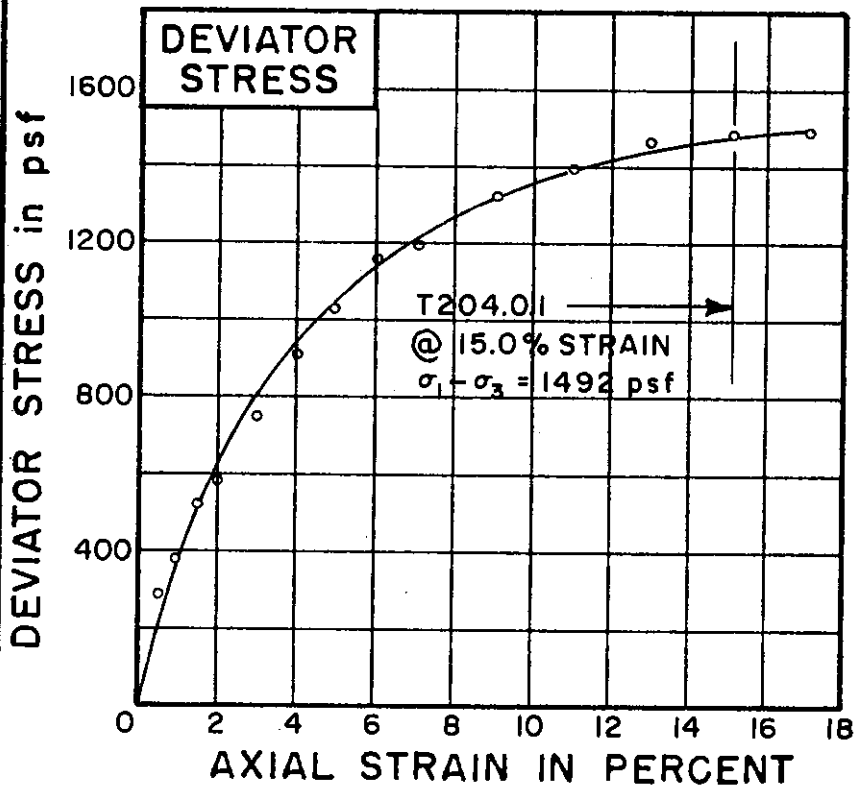
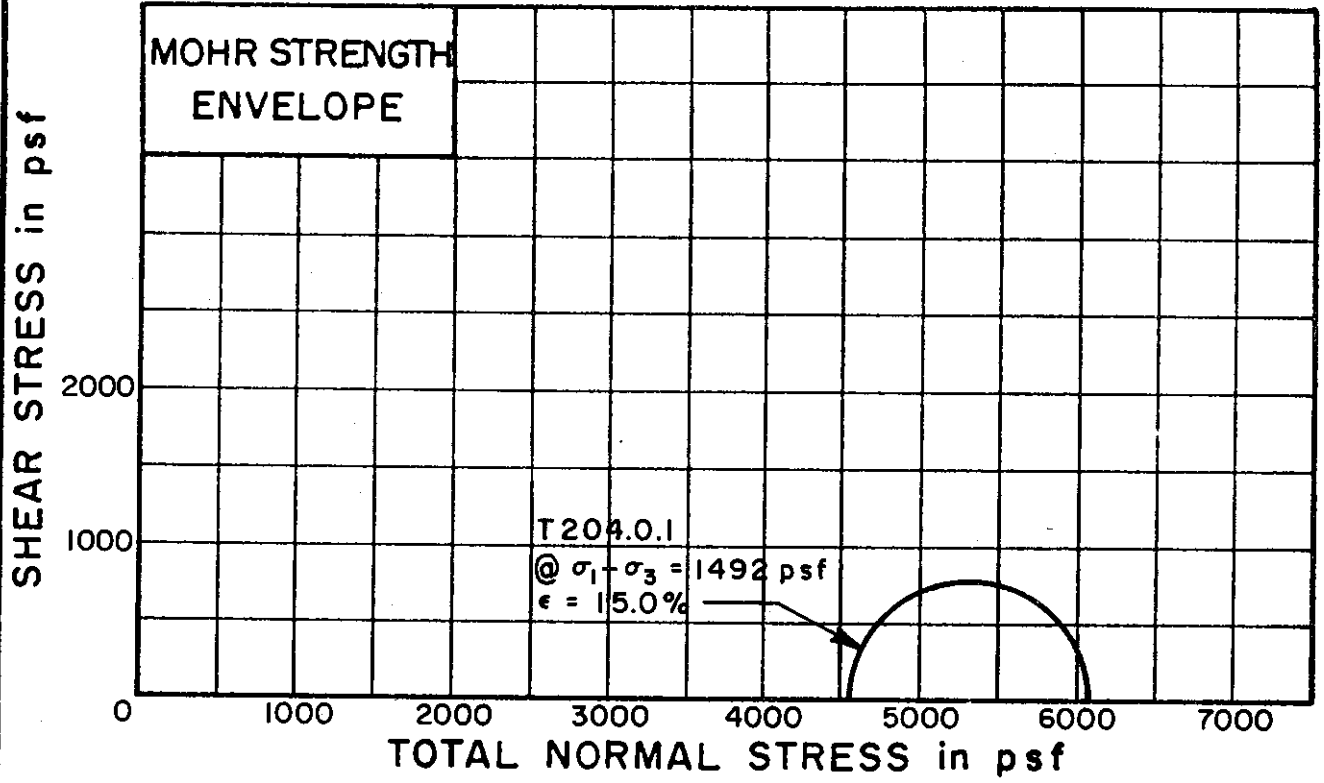
SAMPLE NO. 17

DEPTH 72.9' TO 73.2'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T204.0.1		
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INITIAL WATER CONTENT	$w_o$	26.3%	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.40	
SAMPLE HEIGHT in.	$H_o$	3.43	

CONFINING PRESSURE psf	$\sigma_3$	4608	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	25.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 48

SAMPLE NO. 14

DEPTH 60.8' TO 61.1'

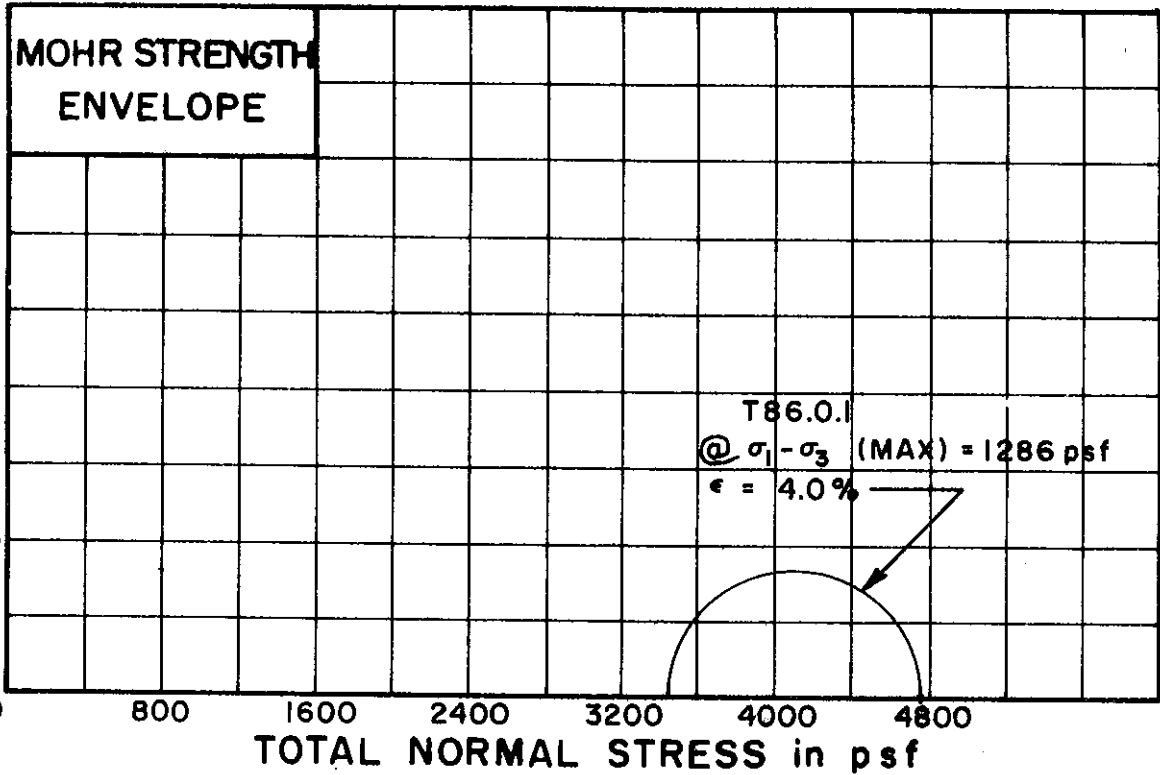
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 34% PLASTIC LIMIT 16%

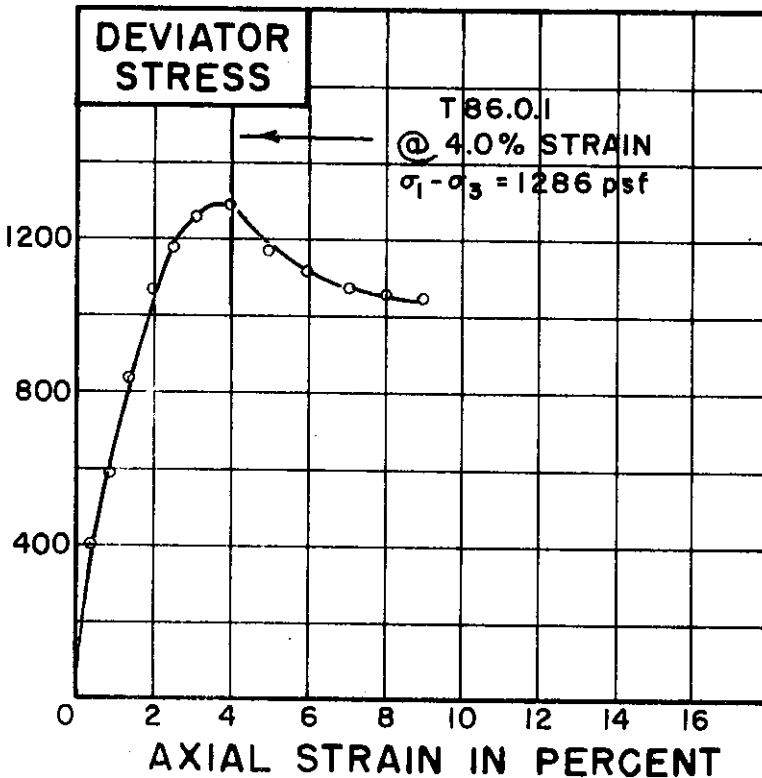
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T86.0.1	
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INITIAL WATER CONTENT	w <sub>o</sub>	46.2%
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DRY DENSITY pcf	γ <sub>d</sub>	74
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SAMPLE DIAMETER in.	D <sub>o</sub>	1.40
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SAMPLE HEIGHT in.	H <sub>o</sub>	3.27
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CONFINING PRESSURE psf	σ <sub>3</sub>	3456
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RATE OF STRAIN PERCENT/MINUTE		.25
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FINAL WATER CONTENT	w <sub>f</sub>	46.3%
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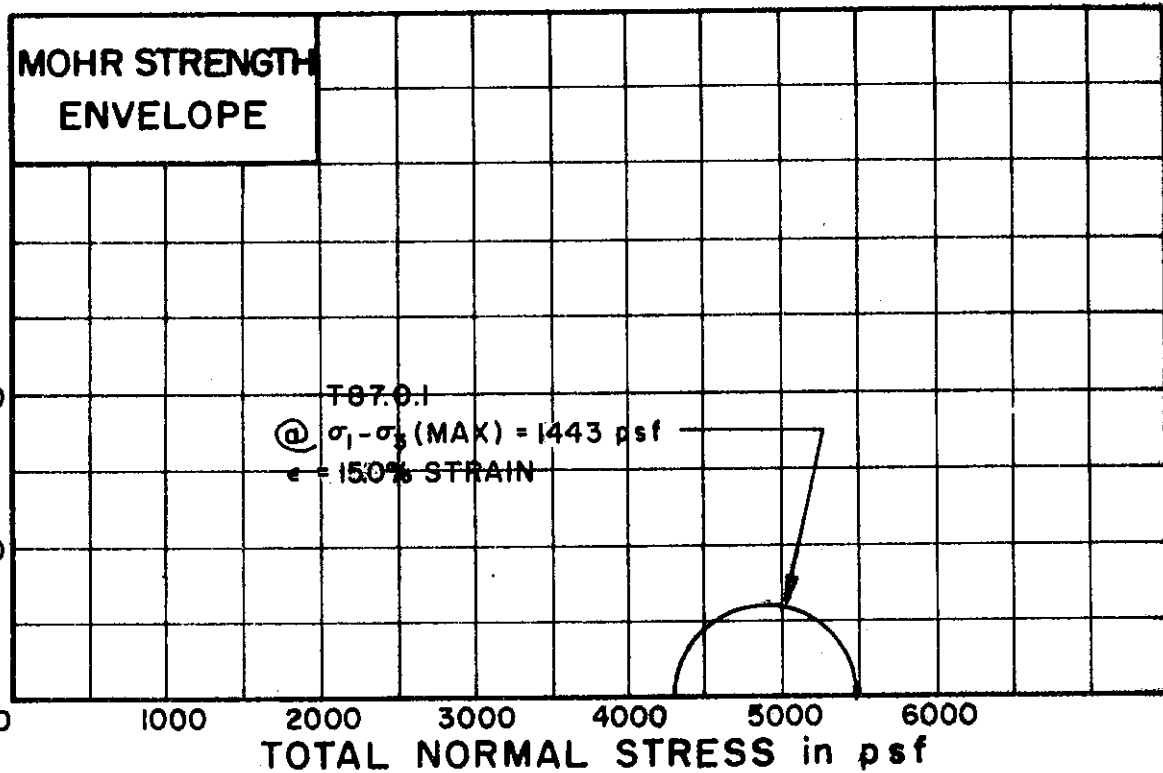
SKETCH OF SAMPLE AT END OF TEST		
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BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.1' TO 38.4'  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 LIQUID LIMIT 55 PLASTIC LIMIT 23

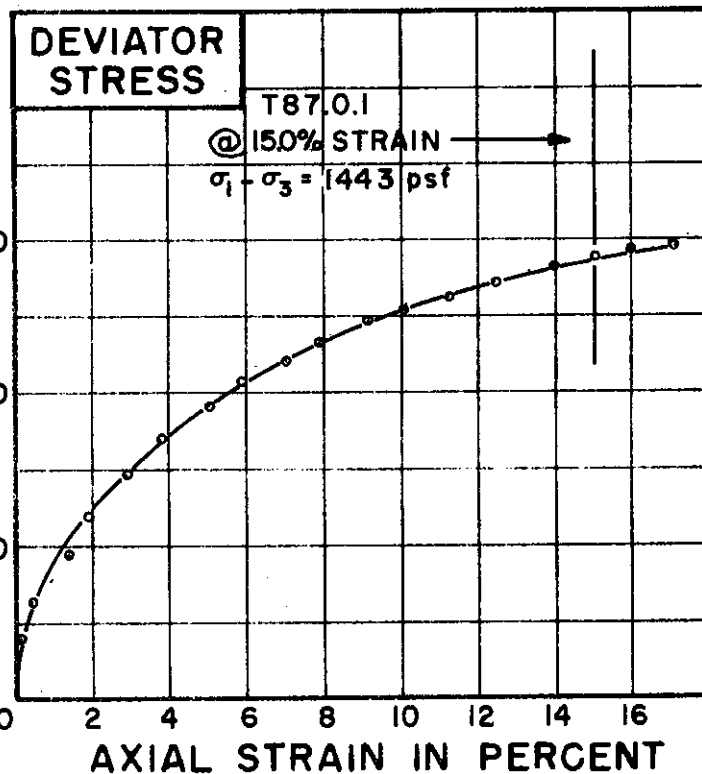
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T87.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	23.2	
DRY DENSITY	γ <sub>d</sub>	100	
SAMPLE DIAMETER	D <sub>o</sub>	1.40	
SAMPLE HEIGHT	H <sub>o</sub>	3.12	

CONFINING PRESSURE	σ <sub>3</sub>	4320	
RATE OF STRAIN		.25	

FINAL WATER CONTENT	w <sub>f</sub>	23.0	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 10

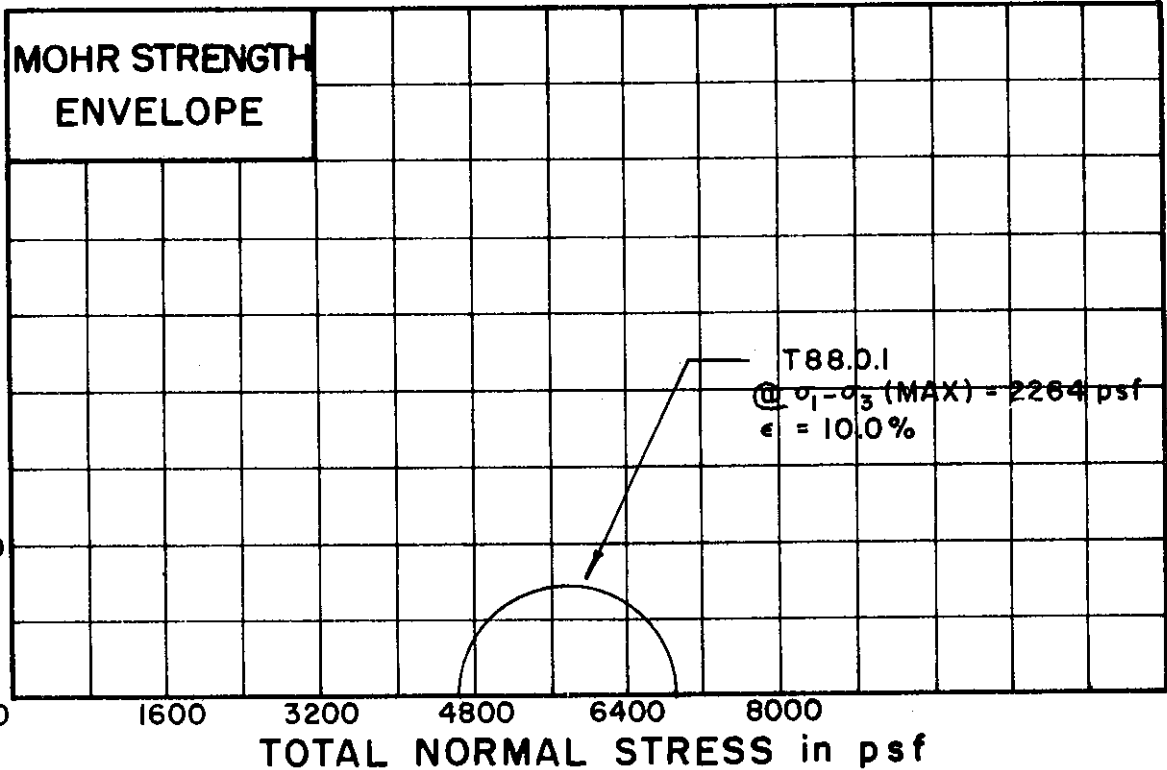
DEPTH 49.3' TO 49.6'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 16 (CL)

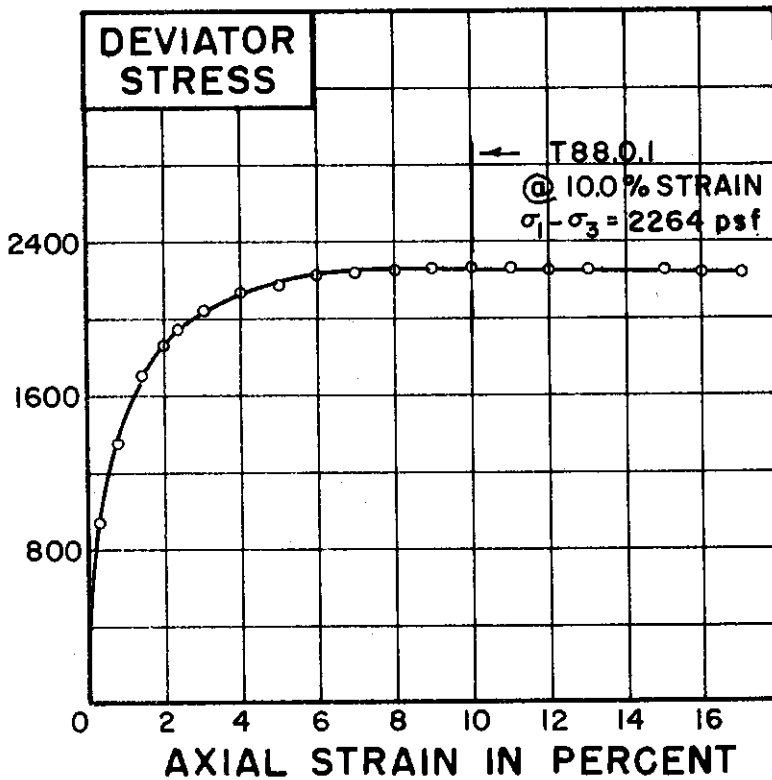
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T88.0.1		
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INITIAL WATER CONTENT	$w_0$	24.3	
DRY DENSITY pcf	$\gamma_d$	101	
SAMPLE DIAMETER in.	$D_0$	1.38	
SAMPLE HEIGHT in.	$H_0$	3.11	

CONFINING PRESSURE psf	$\sigma_3$	4608	
RATE OF STRAIN PERCENT/MINUTE		.26	

FINAL WATER CONTENT	$w_f$	23.5	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 12

DEPTH 59.1' TO 59.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

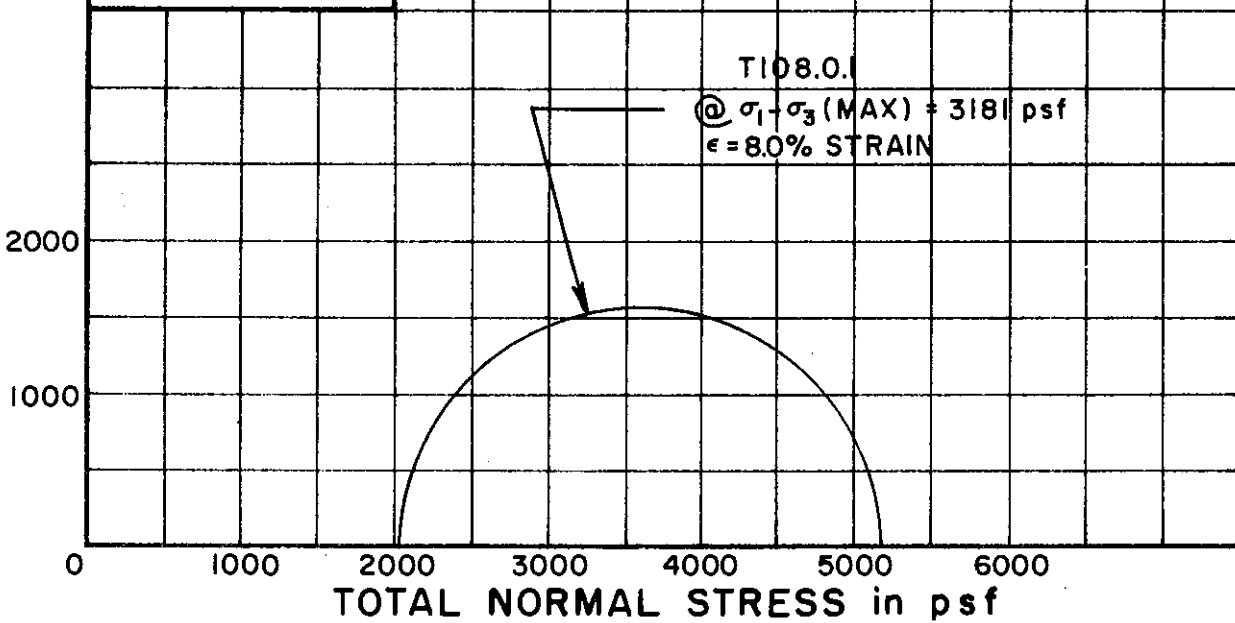
LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

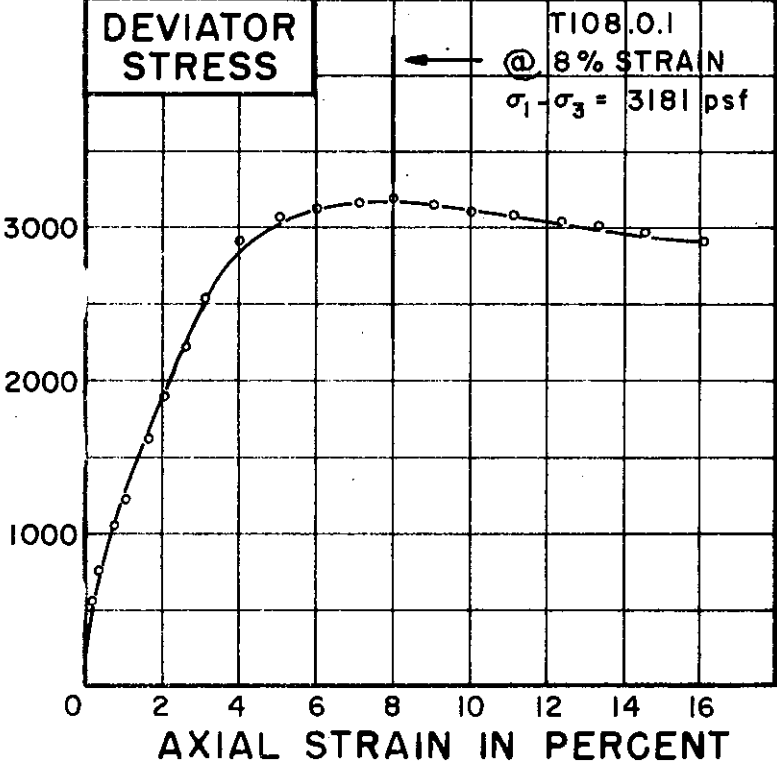
SHEAR STRESS in psf

**MOHR STRENGTH ENVELOPE**



DEVIATOR STRESS in psf

**DEVIATOR STRESS**



TEST NO./SYMBOL	T108.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	31.1		
DRY DENSITY p <sub>cf</sub>	γ <sub>d</sub>	92		
SAMPLE DIAMETER in.	D <sub>o</sub>	1.41		
SAMPLE HEIGHT in.	H <sub>o</sub>	3.25		

CONFINING PRESSURE p <sub>sf</sub>	σ <sub>3</sub>	2016		
RATE OF STRAIN PERCENT/MINUTE		.25		

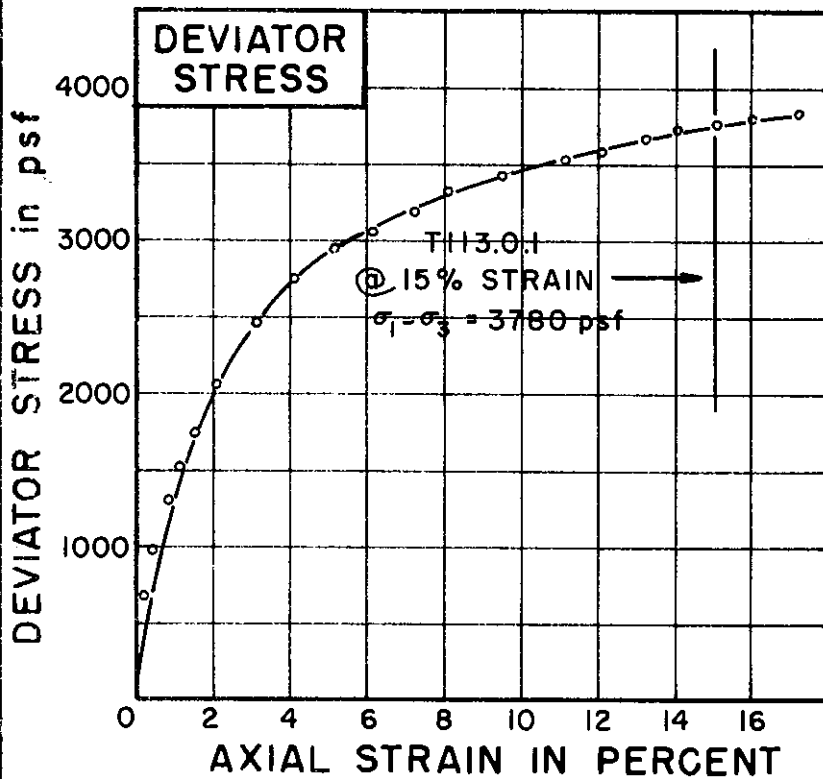
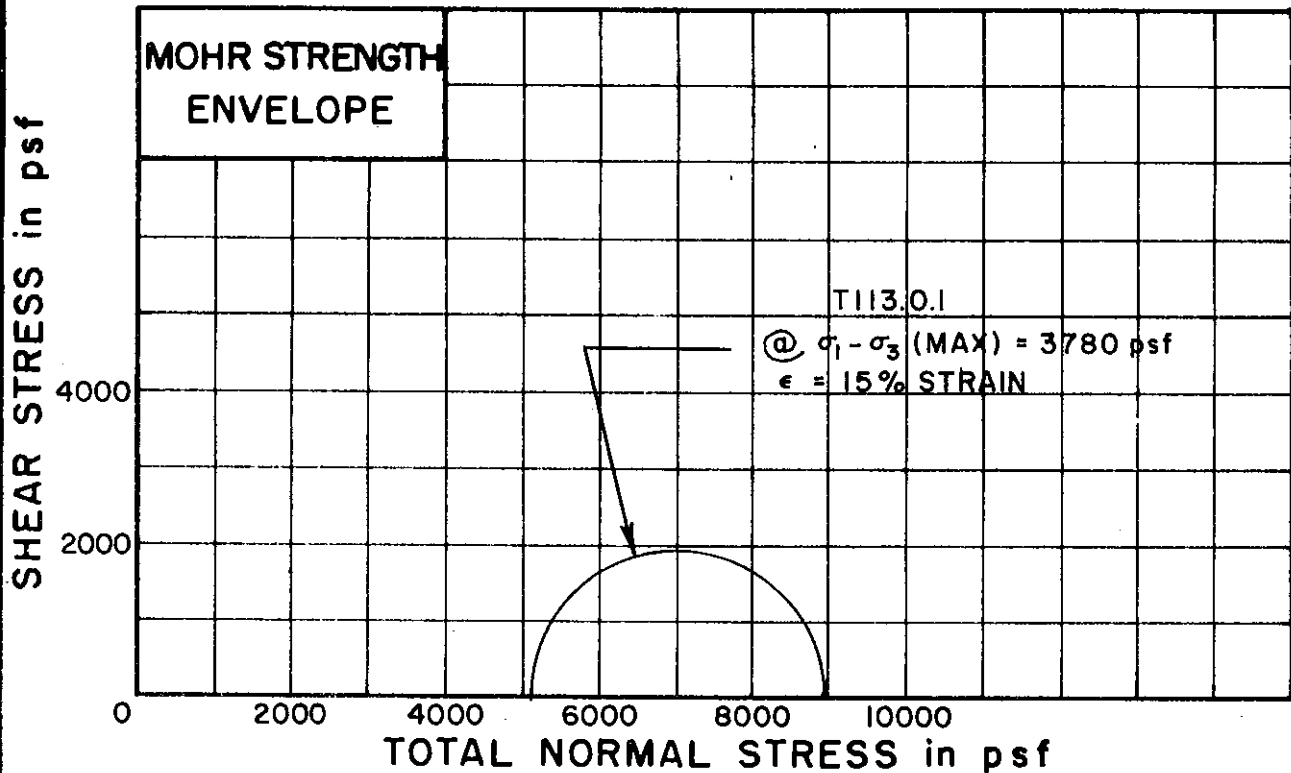
FINAL WATER CONTENT	w <sub>f</sub>	30.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 3  
 DEPTH 21.2' TO 21.5'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T113.0.1		
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INITIAL WATER CONTENT	$w_0$	16.2		
DRY DENSITY pcf	$\gamma_d$	111		
SAMPLE DIAMETER, in.	$D_0$	1.38		
SAMPLE HEIGHT in.	$H_0$	3.18		

CONFINING PRESSURE psf	$\sigma_3$	5184		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	16.1		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

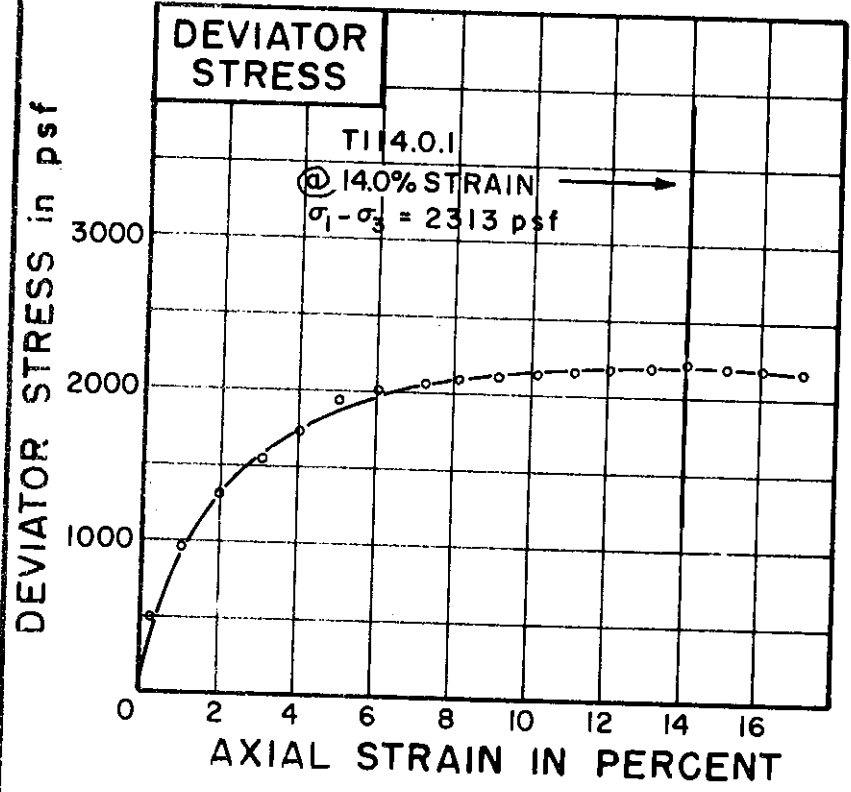
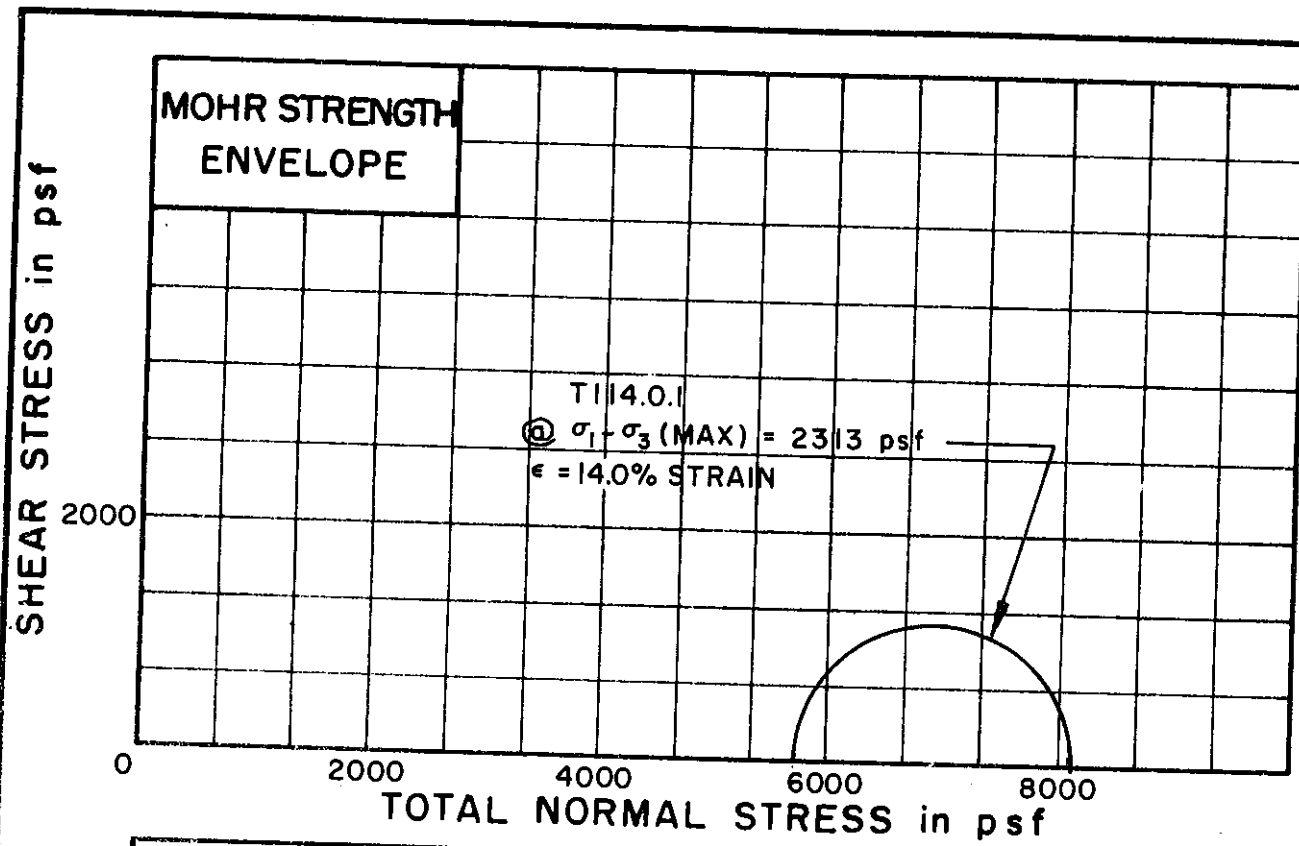
SAMPLE NO. 8

DEPTH 69.0 TO 69.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 24 PLASTIC LIMIT 14 (CL)

**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T114.0.1		
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INITIAL WATER CONTENT	$w_0$	21.8		
DRY DENSITY	$\gamma_d$ pcf	105		
SAMPLE DIAMETER	$D_0$ in.	1.38		
SAMPLE HEIGHT	$H_0$ in.	3.31		

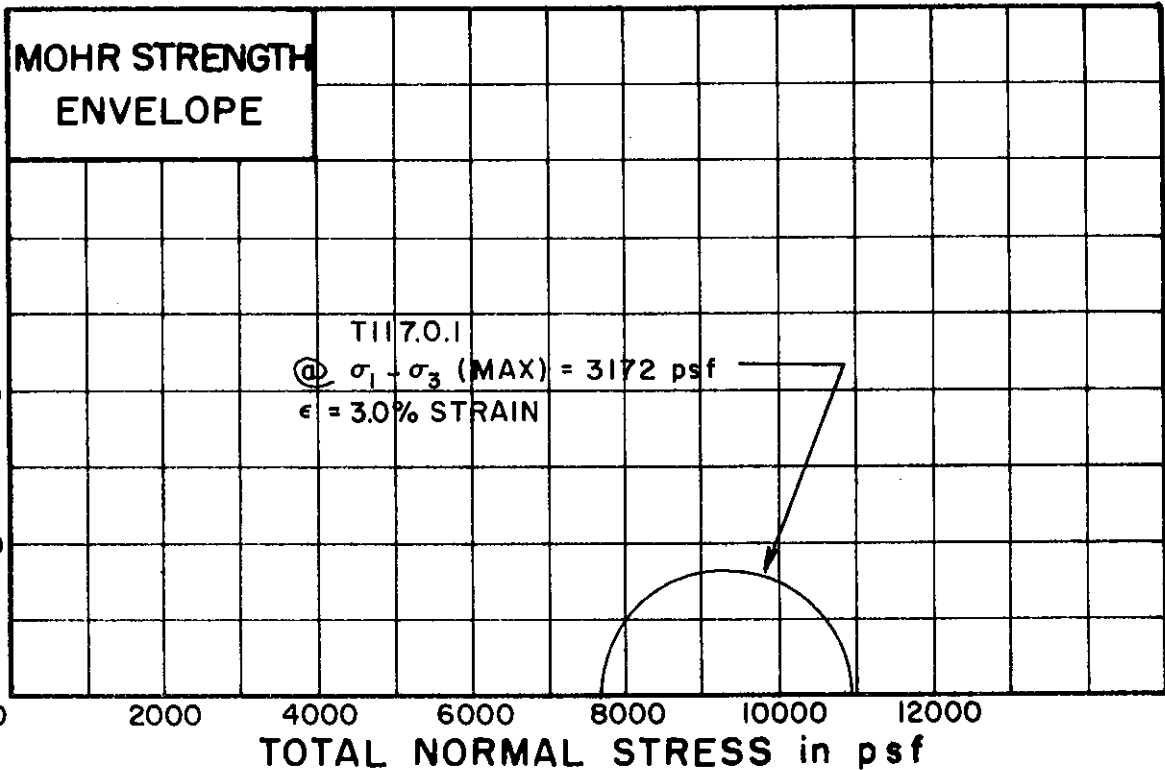
CONFINING PRESSURE	$\sigma_3$ psf	5760		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	21.7		
SKETCH OF SAMPLE AT END OF TEST				

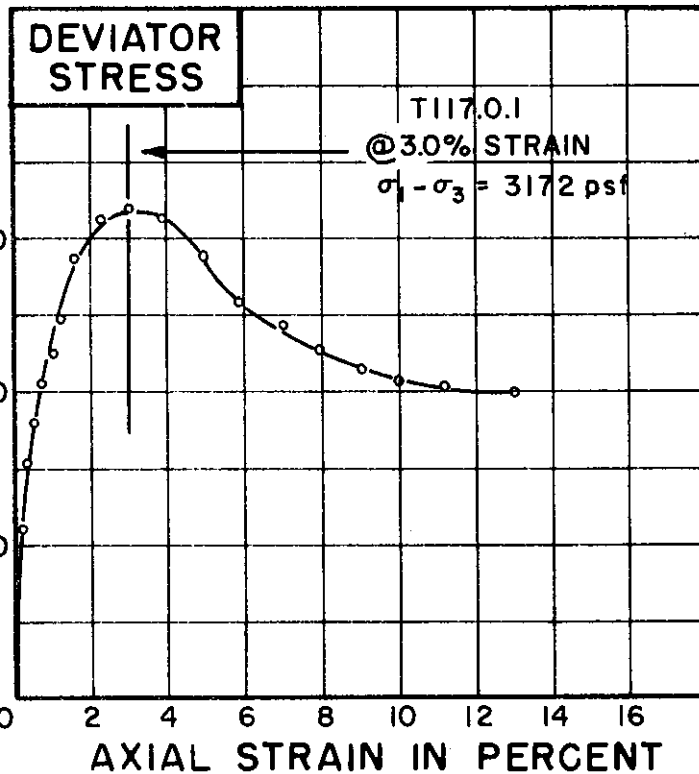
BORING NO. 52  
 SAMPLE NO. 9  
 DEPTH 78.6' TO 78.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 35 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T117.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	35.8		
DRY DENSITY pcf	γ <sub>d</sub>	87		
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38		
SAMPLE HEIGHT in.	H <sub>o</sub>	3.45		

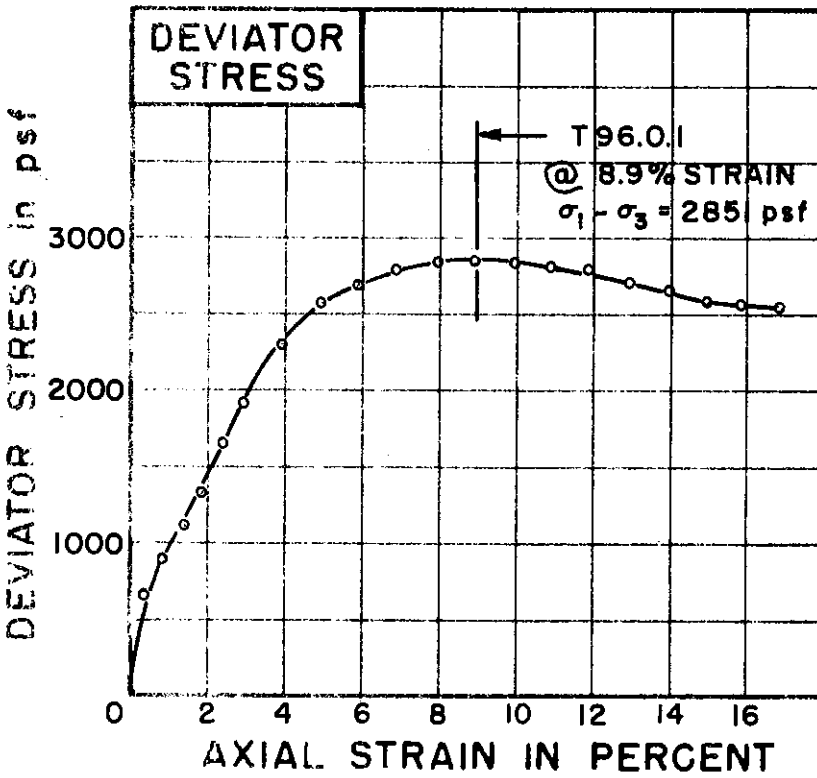
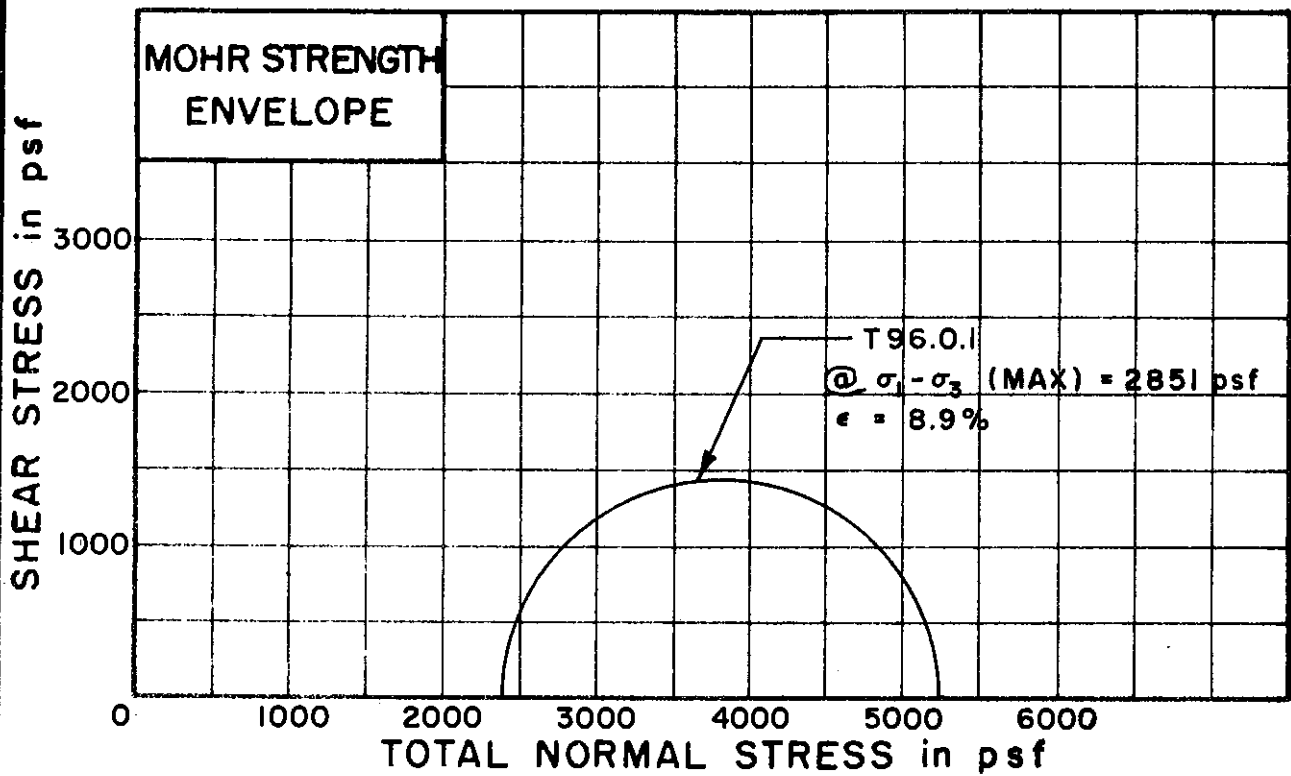
CONFINING PRESSURE psf	σ <sub>3</sub>	7632		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	35.7		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 12  
 DEPTH 109.3' TO 109.6'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T96.0.1		
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INITIAL WATER CONTENT	$w_0$	32.2%		
DRY DENSITY pcf	$\gamma_d$	91		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.26		

CONFINING PRESSURE psf	$\sigma_3$	2405		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	31.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 53

SAMPLE NO. 3

DEPTH 20.1' TO 20.4'

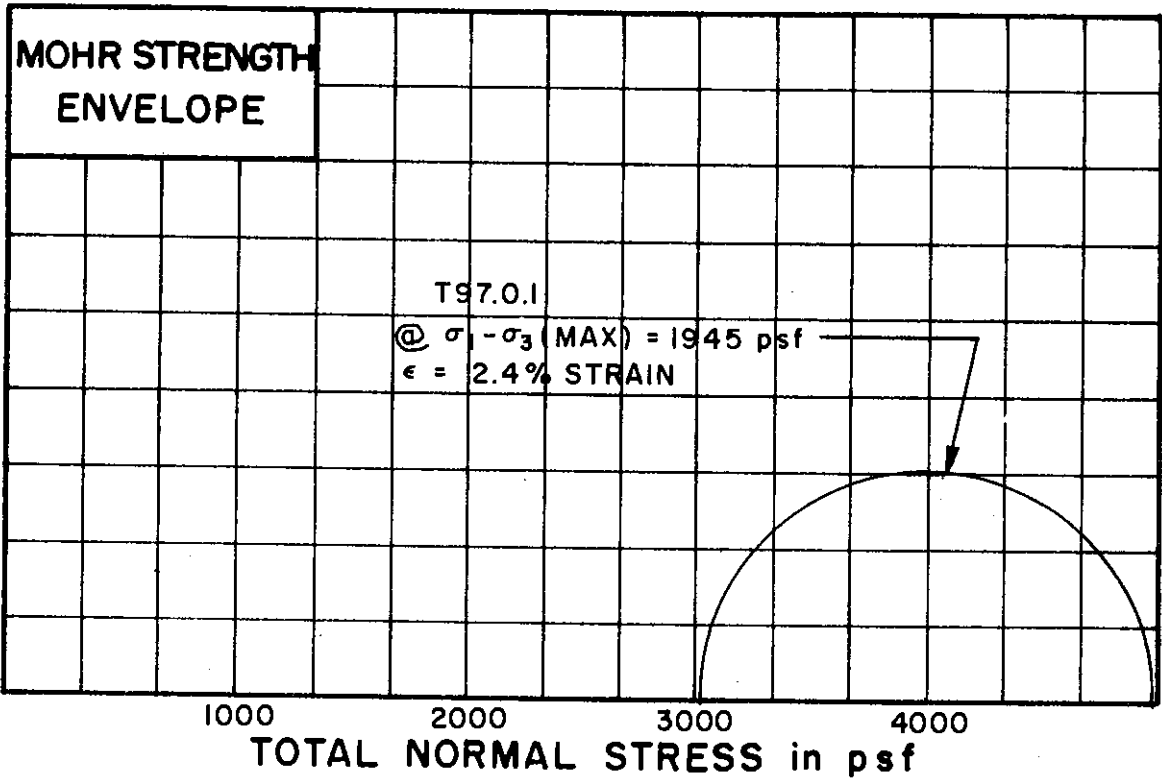
SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 20

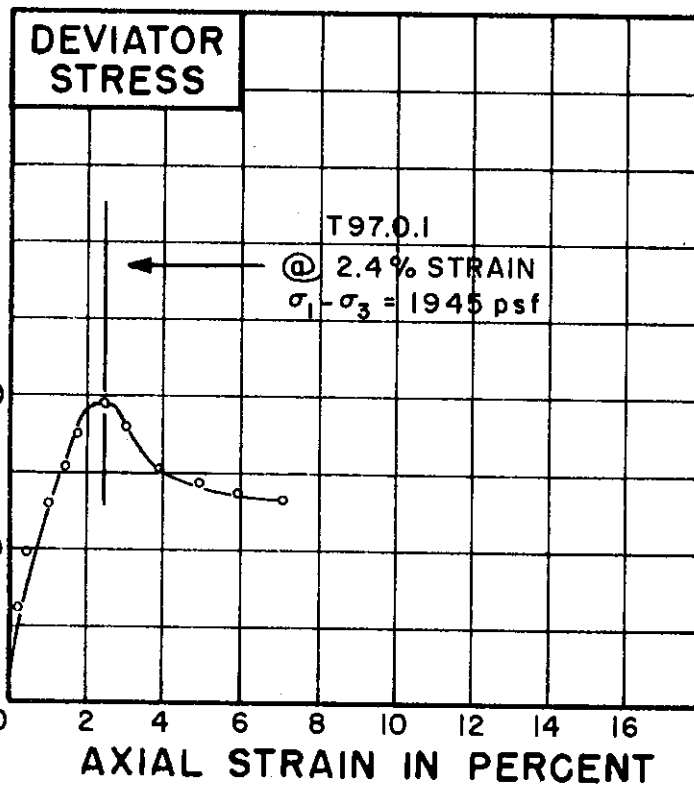
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T97.0.1		
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INITIAL WATER CONTENT	$w_0$	34.0		
DRY DENSITY	$\gamma_d$ pcf	88		
SAMPLE DIAMETER	$D_0$ in.	1.39		
SAMPLE HEIGHT	$H_0$ in.	3.21		

CONFINING PRESSURE	$\sigma_3$ psf	3024		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_1$	3.42		
SKETCH OF SAMPLE AT END OF TEST				

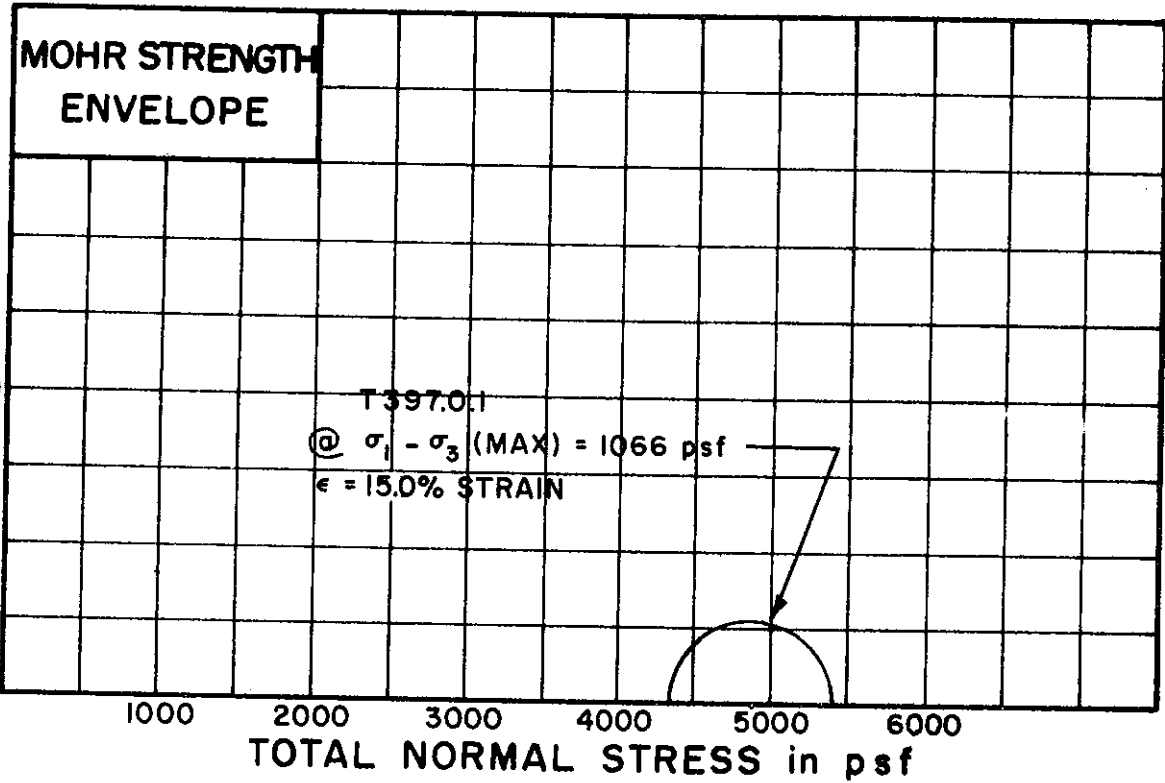
BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 30.1' TO 30.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 22

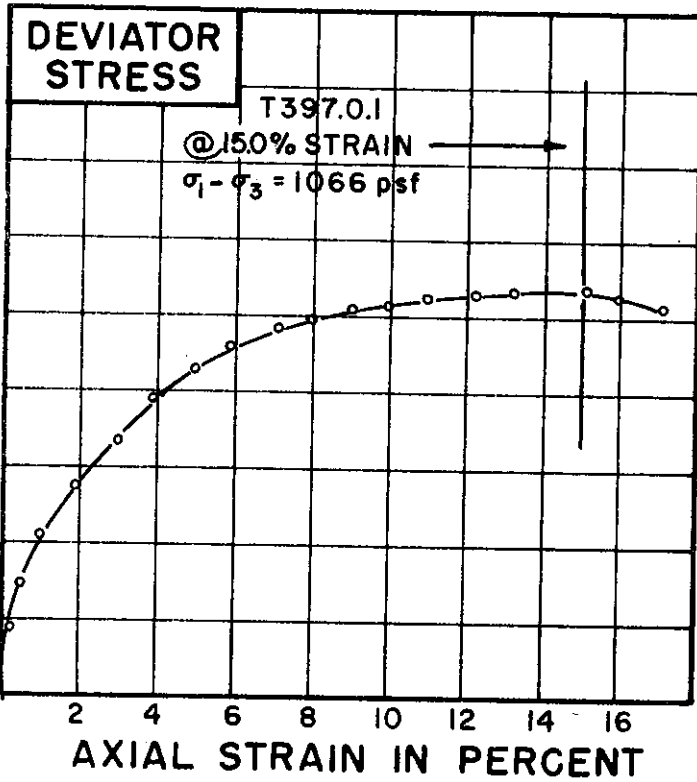
**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T397.0.1		
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INITIAL WATER CONTENT	$w_o$	24.4	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.24	

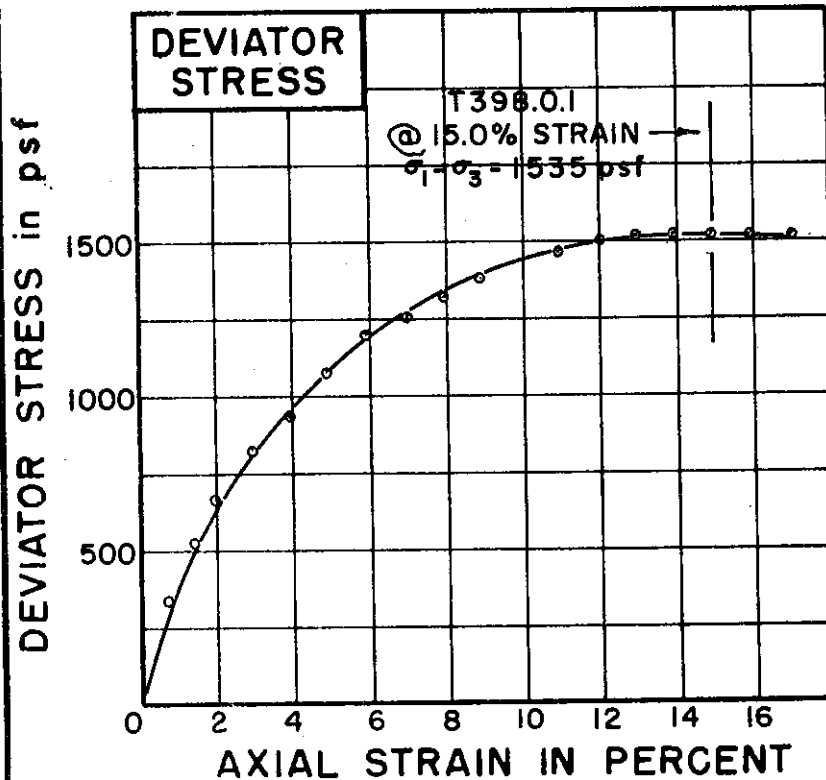
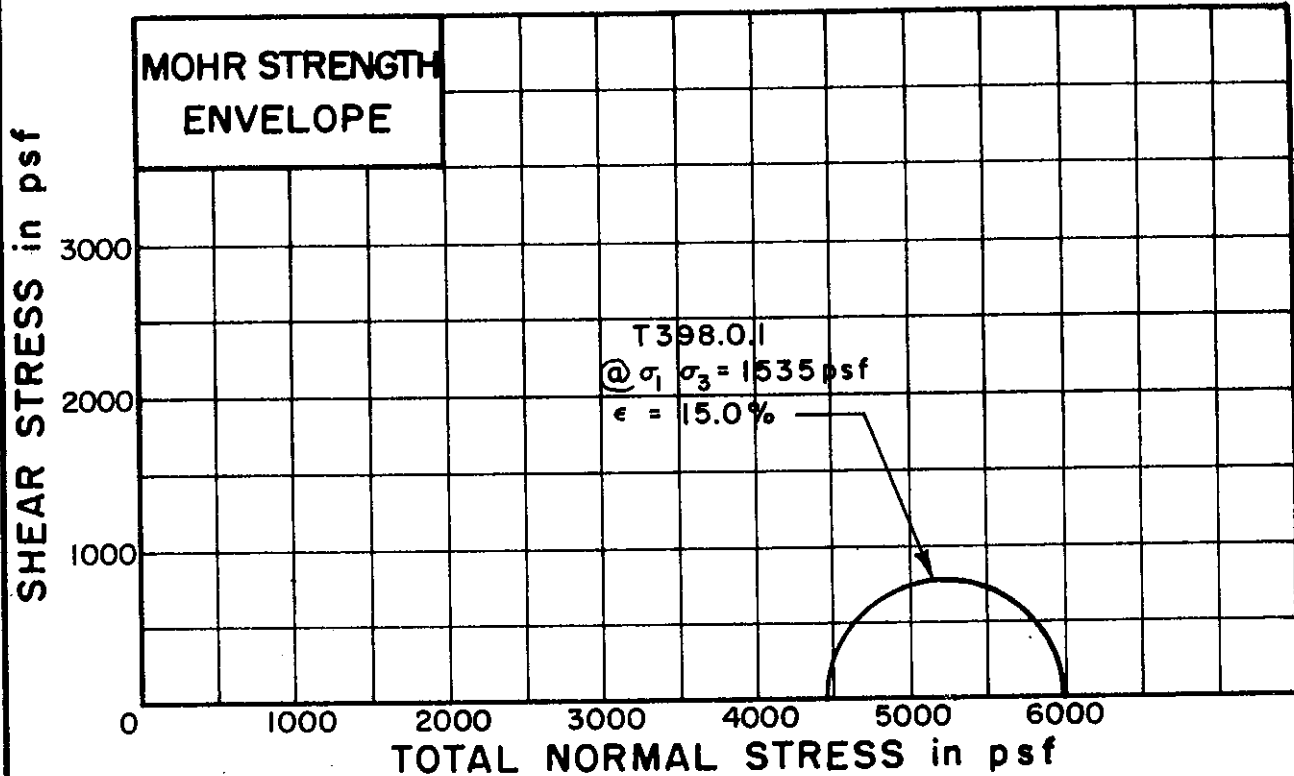
CONFINING PRESSURE psf	$\sigma_3$	4320	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	23.9	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.2' TO 53.5'  
 SOIL DESCRIPTION: CLAYEY SILT (ML-CL)  
 LIQUID LIMIT 21 PLASTIC LIMIT 17

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T398.0.1	
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.38	
SAMPLE HEIGHT in.	$H_o$	3.26	

CONFINING PRESSURE psf	$\sigma_3$	4464	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 5

DEPTH 59.0' TO 59.3'

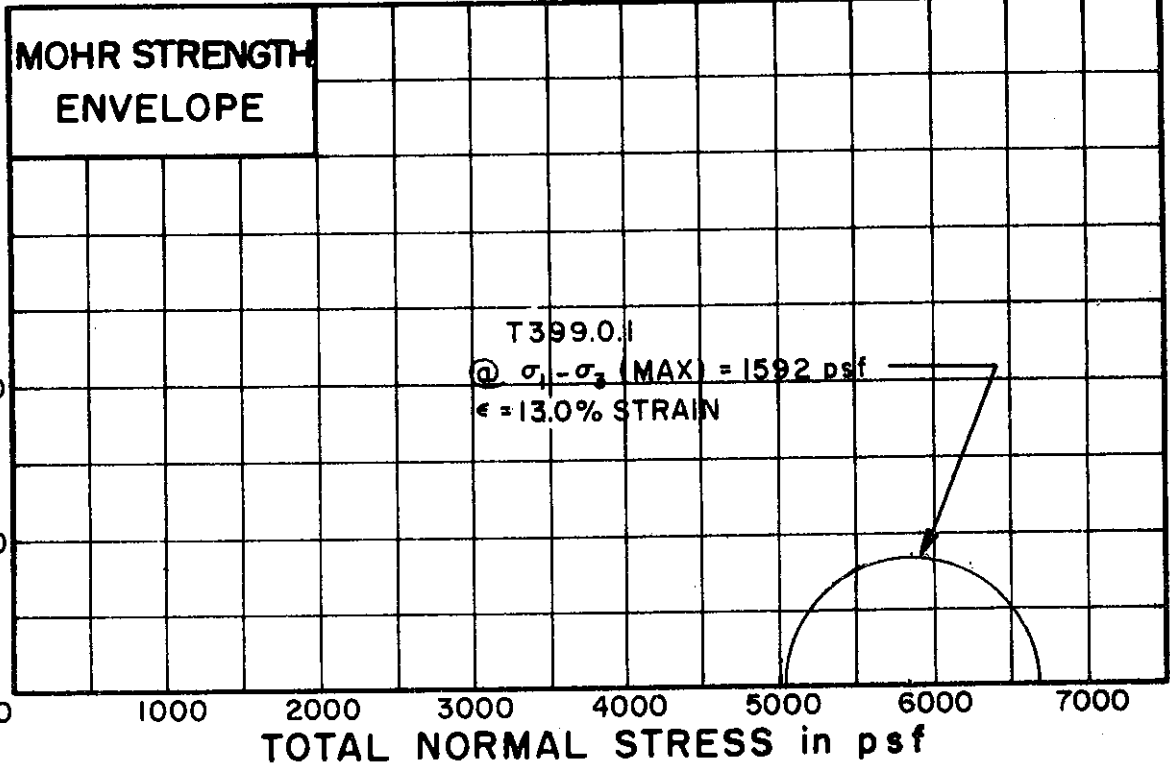
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 17

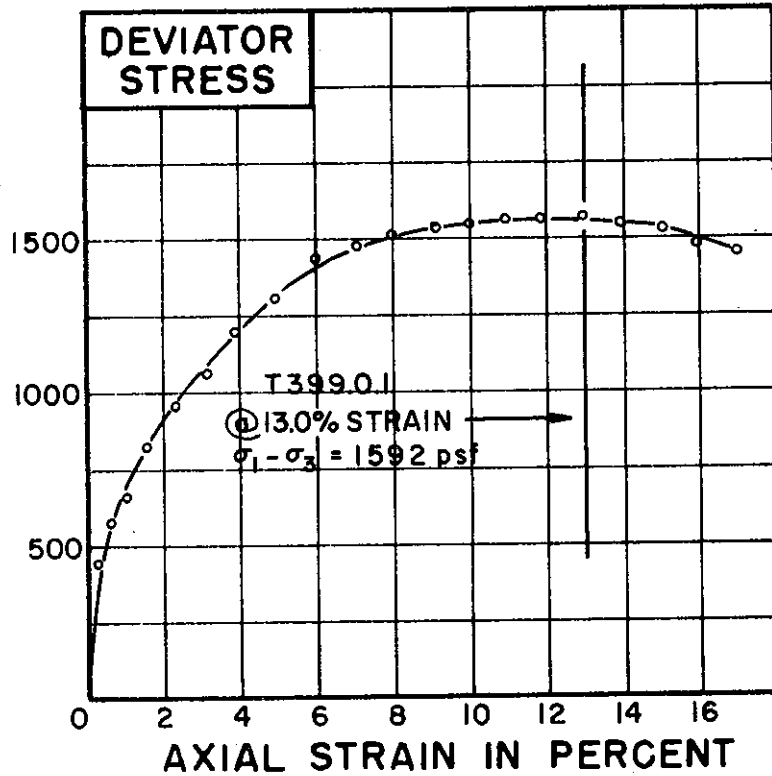
**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T399.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	26.1	
DRY DENSITY pcf	γ <sub>d</sub>	98	
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38	
SAMPLE HEIGHT in.	H <sub>o</sub>	3.33	

CONFINING PRESSURE psf	σ <sub>3</sub>	5040	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	w <sub>f</sub>	25.8	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 6

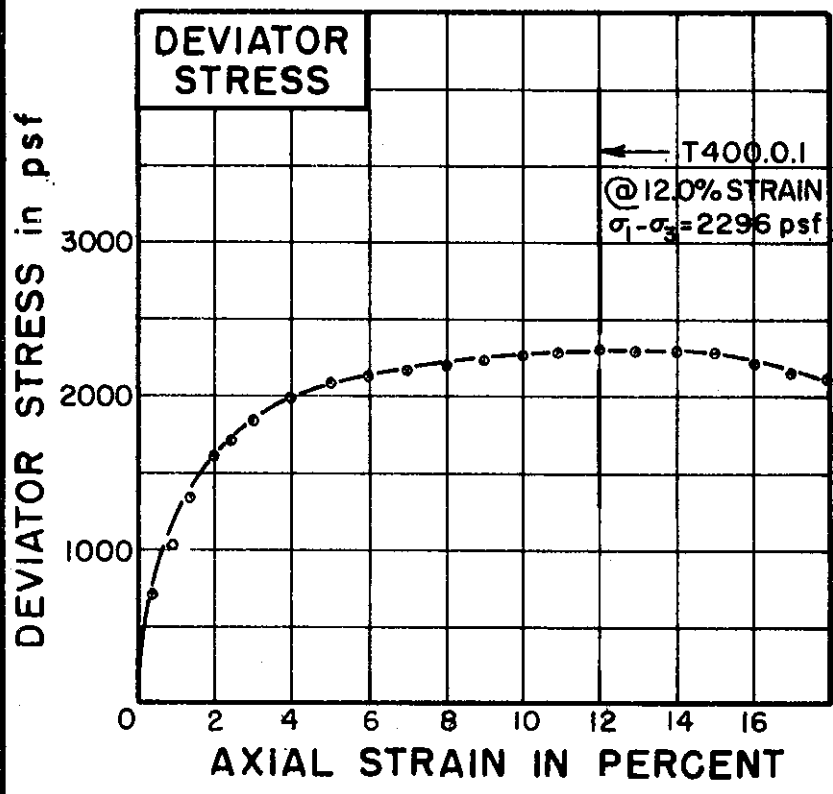
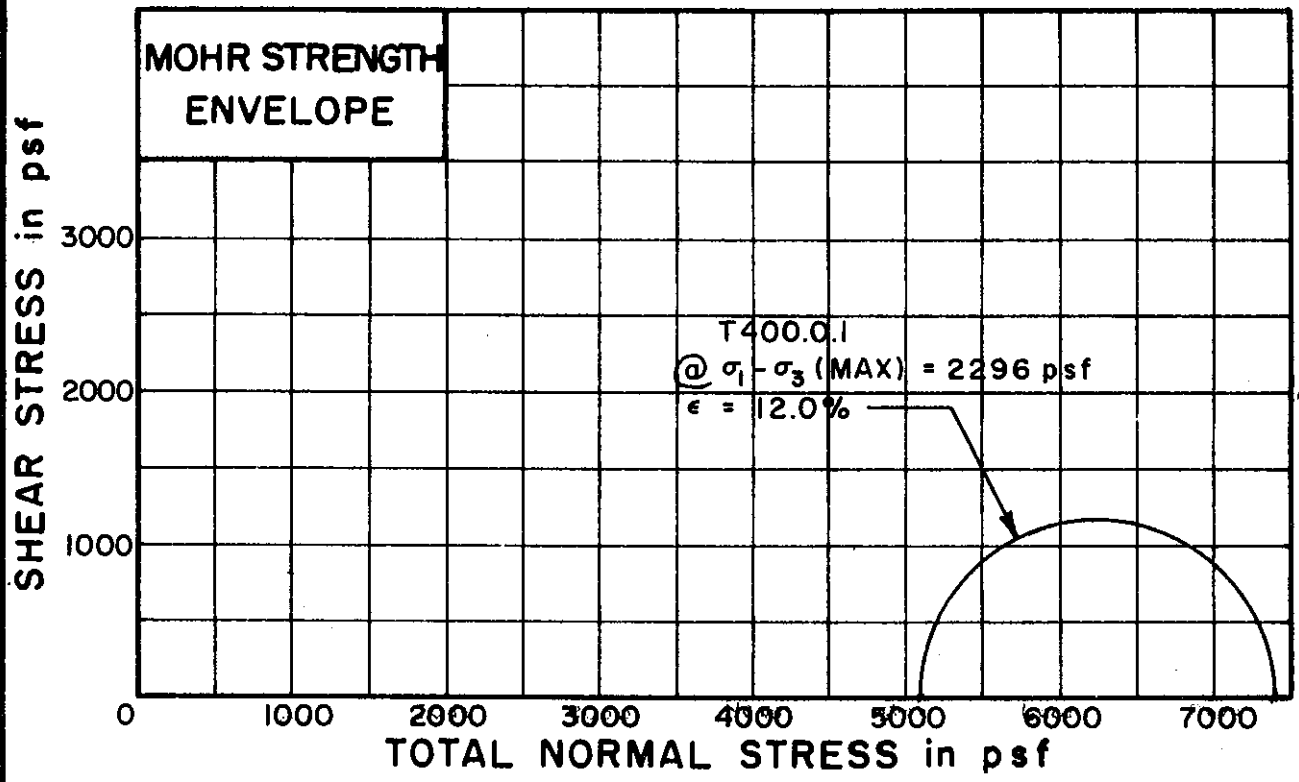
DEPTH 63.1' TO 63.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 18 (CL)

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T400.0.		
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INITIAL WATER CONTENT	$w_0$	25.9%		
DRY DENSITY	$\gamma_d$ pcf	98		
SAMPLE DIAMETER	$D_0$ in.	1.39		
SAMPLE HEIGHT	$H_0$ in.	3.25		

CONFINING PRESSURE	$\sigma_3$ psf	5112		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	25.5%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

SAMPLE NO. 7

DEPTH 68.8' TO 69.1'

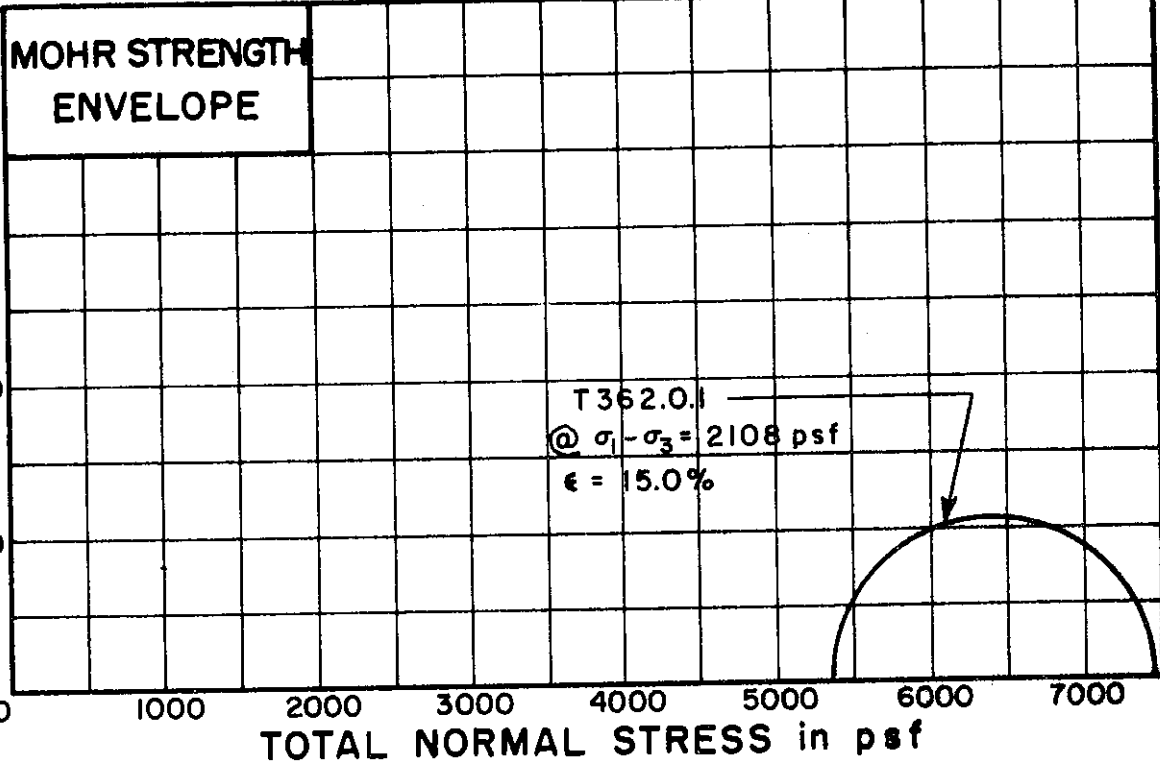
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 37 PLASTIC LIMIT 18

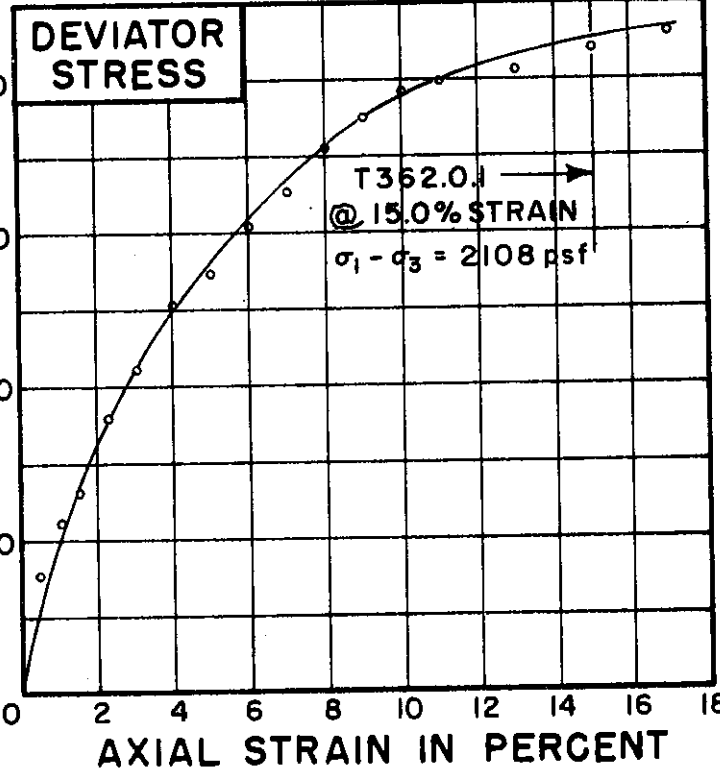
**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T362.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	22.6%	
DRY DENSITY	pcf	γ <sub>d</sub>	105
SAMPLE DIAMETER	in.	D <sub>o</sub>	1.40
SAMPLE HEIGHT	in.	H <sub>o</sub>	3.31

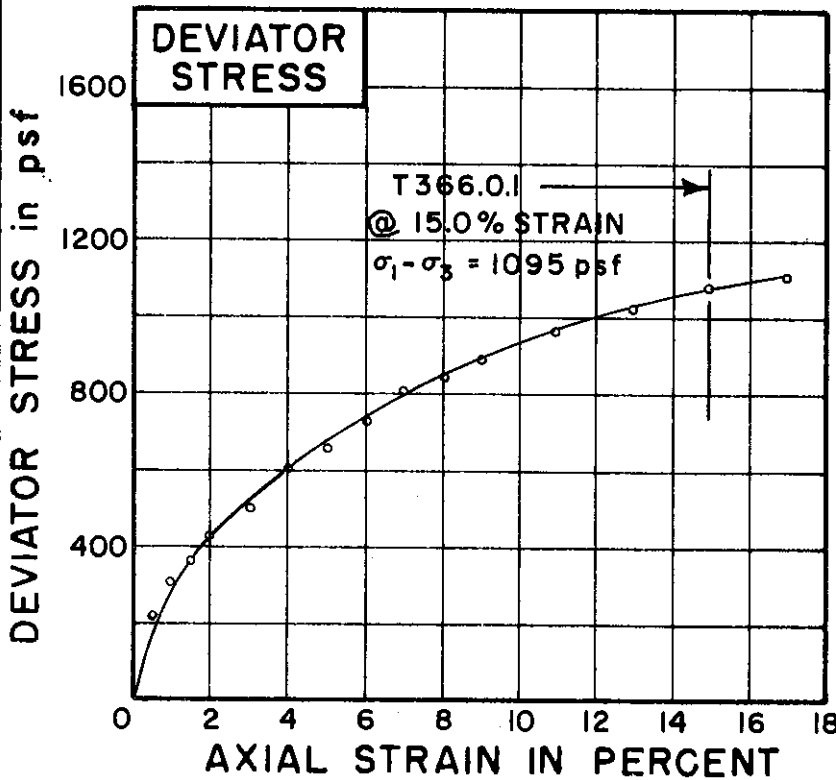
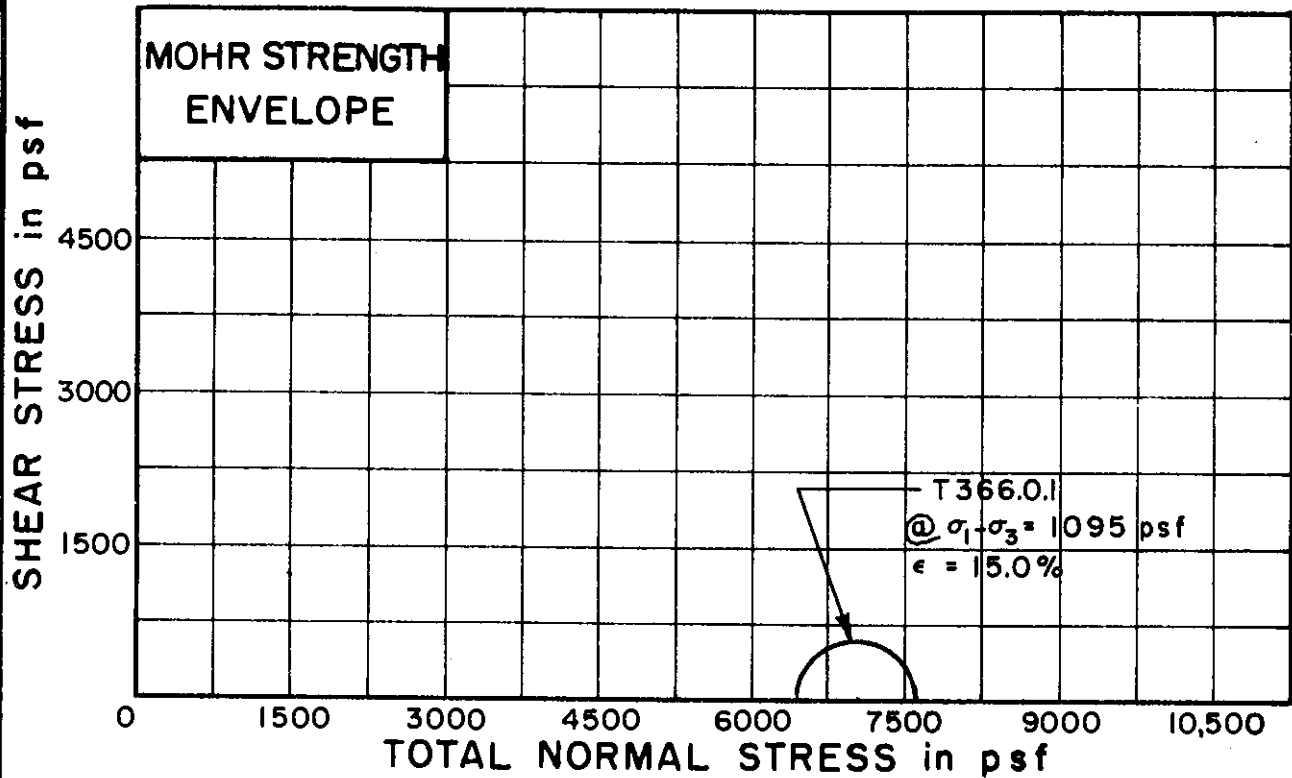
CONFINING PRESSURE	psf	σ <sub>3</sub>	5328
RATE OF STRAIN	PERCENT/MINUTE		0.27

FINAL WATER CONTENT	w <sub>f</sub>	22.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 15  
 DEPTH 74.6' TO 74.9'  
 SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T366.0.1		
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INITIAL WATER CONTENT	$w_0$	24.5%	
DRY DENSITY pcf	$\gamma_d$	100	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.27	

CONFINING PRESSURE psf	$\sigma_3$	6480	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_1$	24.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 19

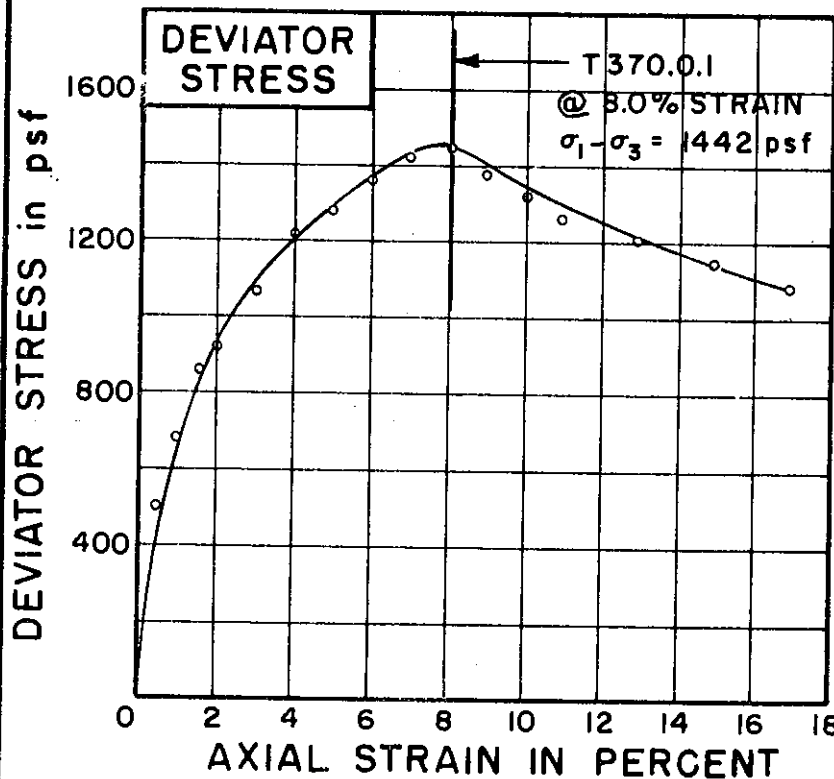
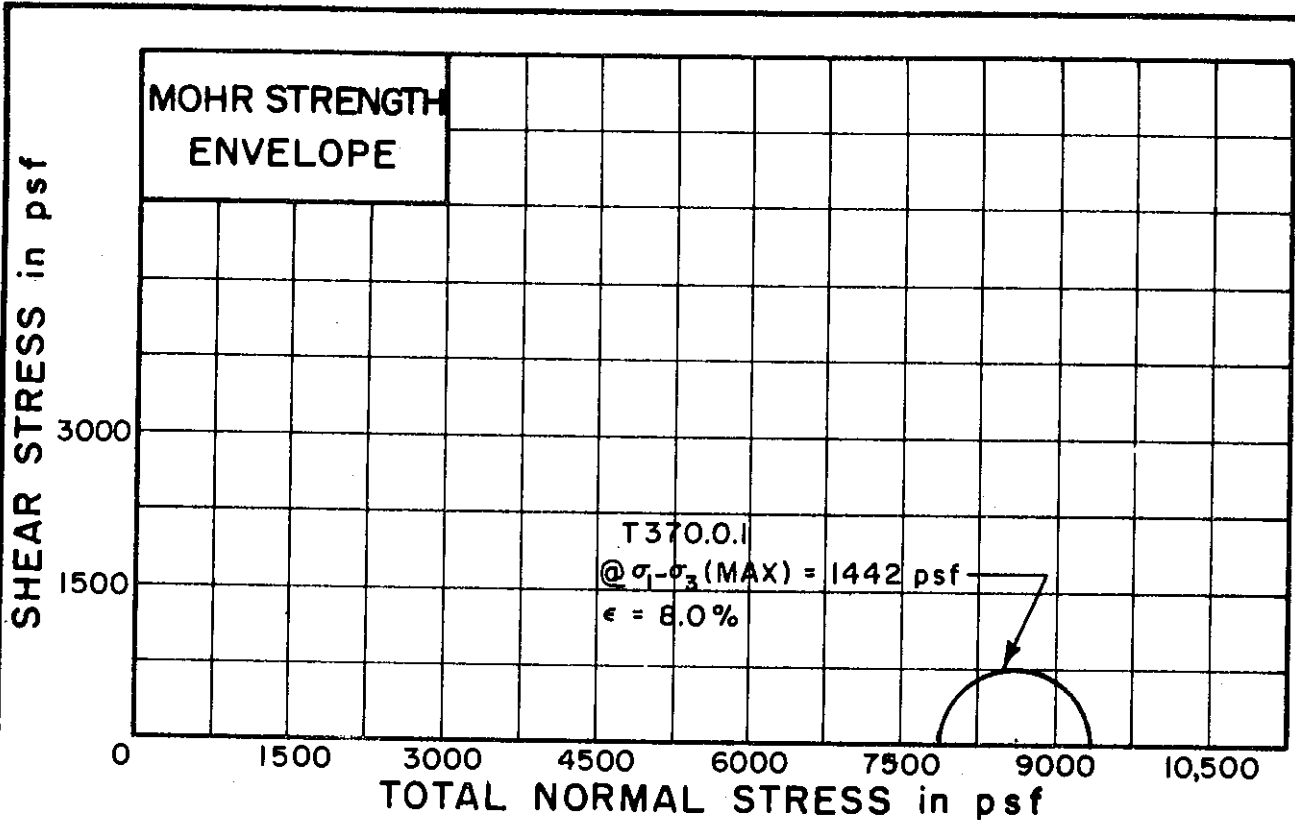
DEPTH 94.9' TO 95.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T370.0.1		
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INITIAL WATER CONTENT	$w_0$	37.2%	
DRY DENSITY $\rho_{cf}$	$\gamma_d$	85	
SAMPLE DIAMETER, in.	$D_0$	1.40	
SAMPLE HEIGHT, in.	$H_0$	3.23	

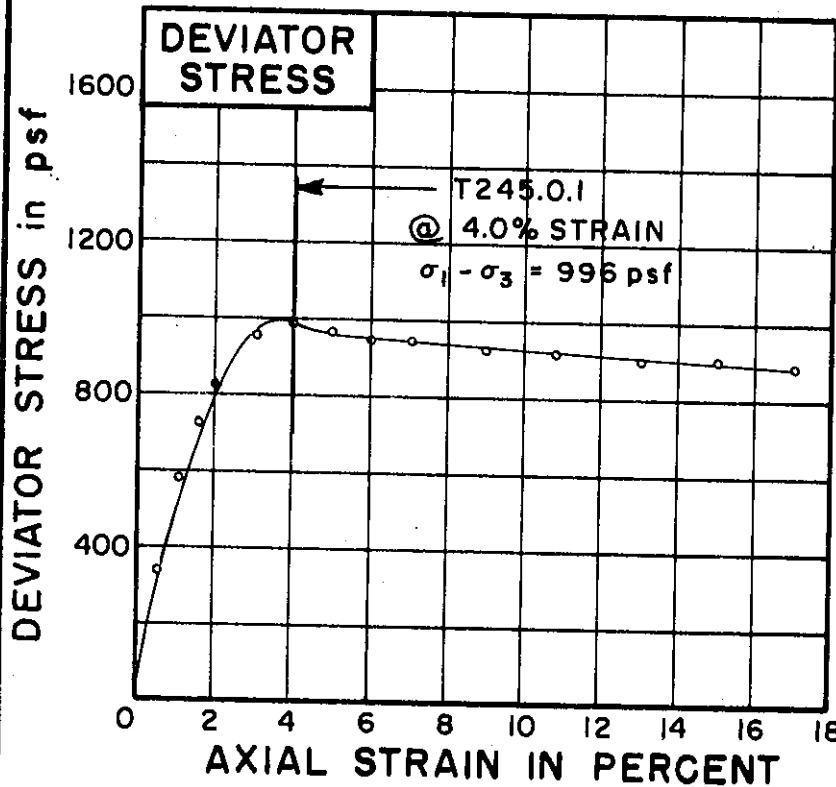
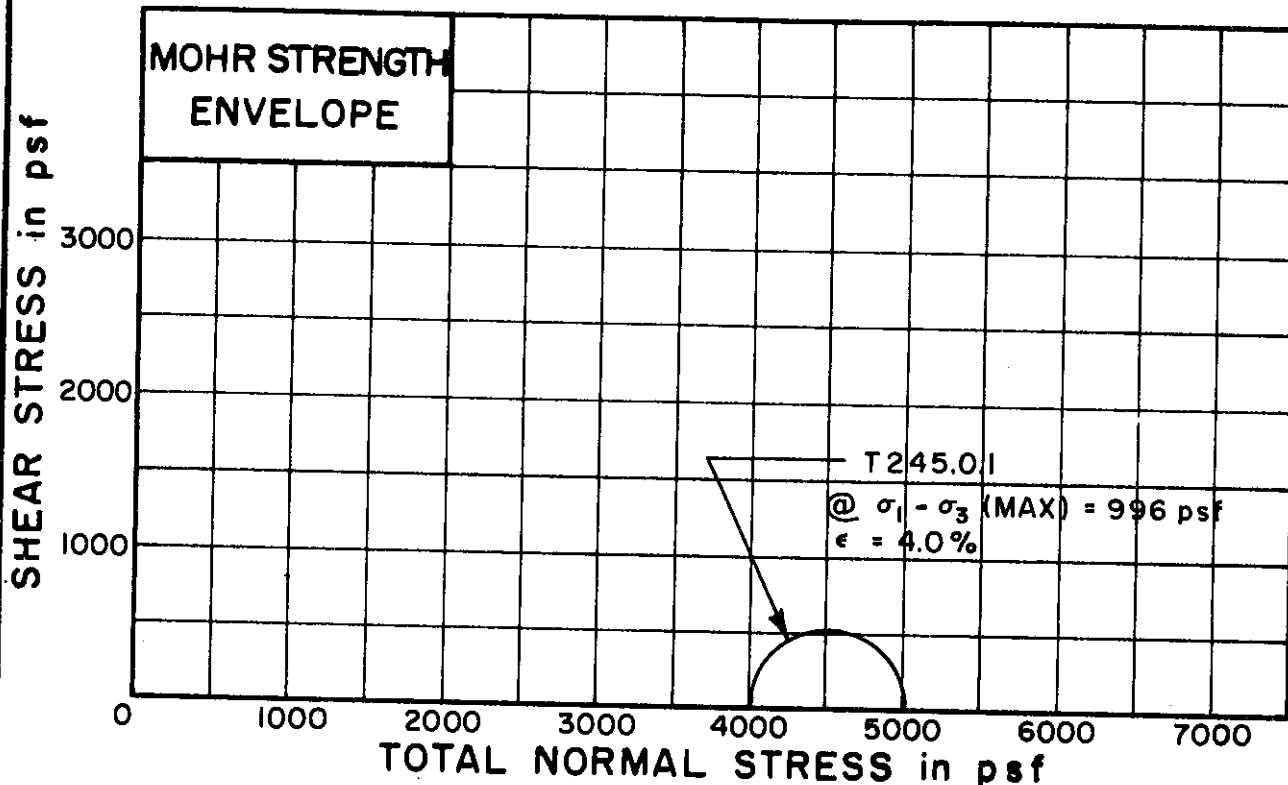
CONFINING PRESSURE $\rho_{cf}$	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	36.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 23  
 DEPTH 119.8' TO 120.2'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 22

**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T245.0.1		
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INITIAL WATER CONTENT	$w_0$	41.1%	
DRY DENSITY psf	$\gamma_d$	81	
SAMPLE DIAMETER in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.25	

CONFINING PRESSURE psf	$\sigma_3$	4032	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	40.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126

SAMPLE NO. 11

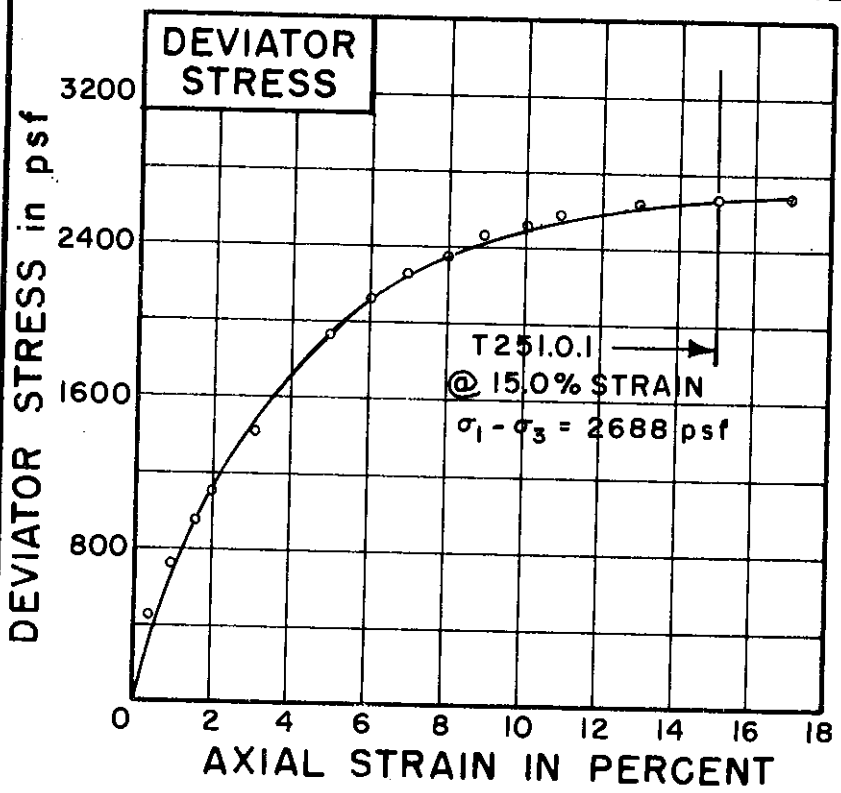
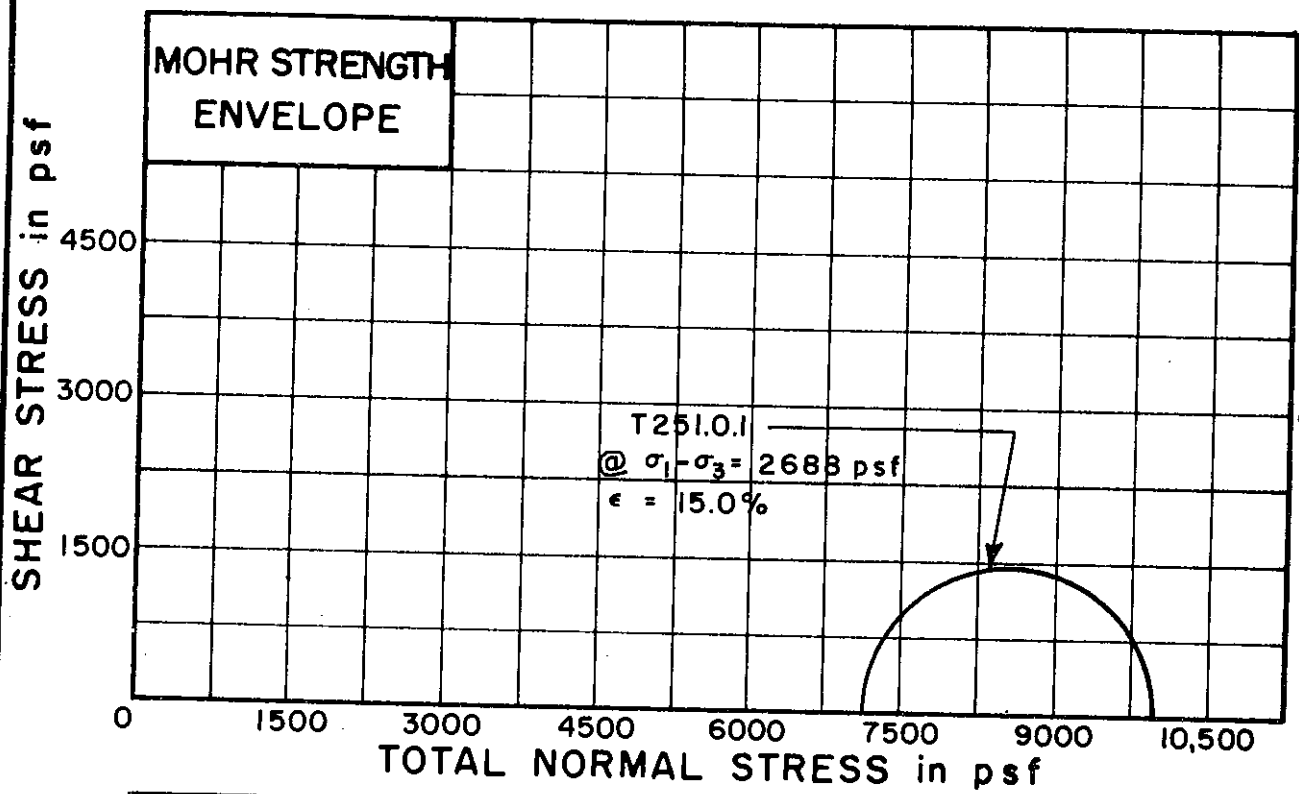
DEPTH 49.1' TO 49.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 59 PLASTIC LIMIT 25

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T251.0.1		
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INITIAL WATER CONTENT	$w_0$	25.3%	
DRY DENSITY pcf	$\gamma_d$	96	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.33	

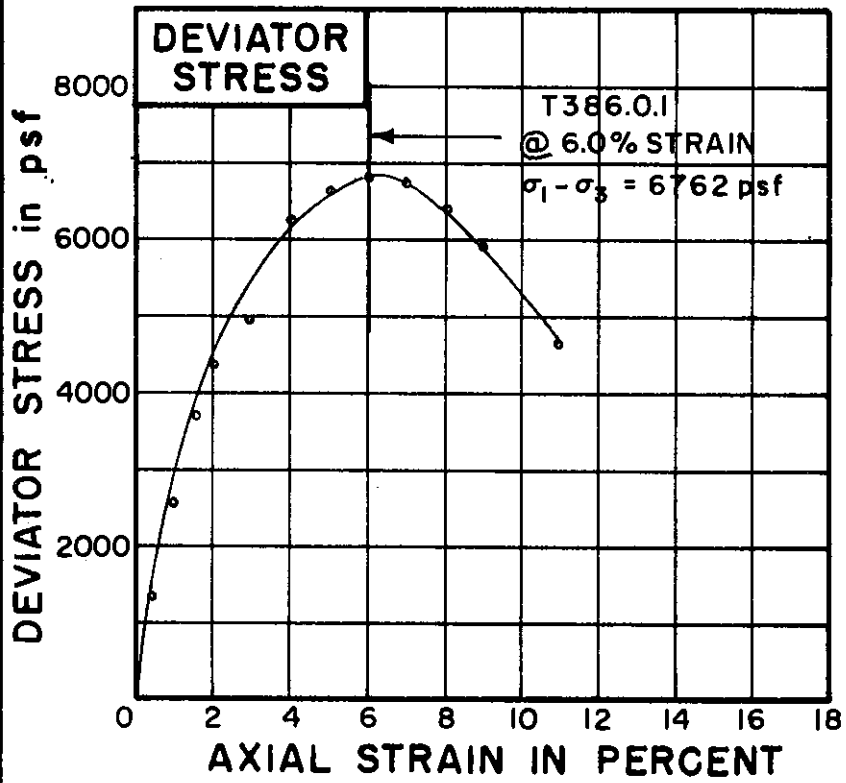
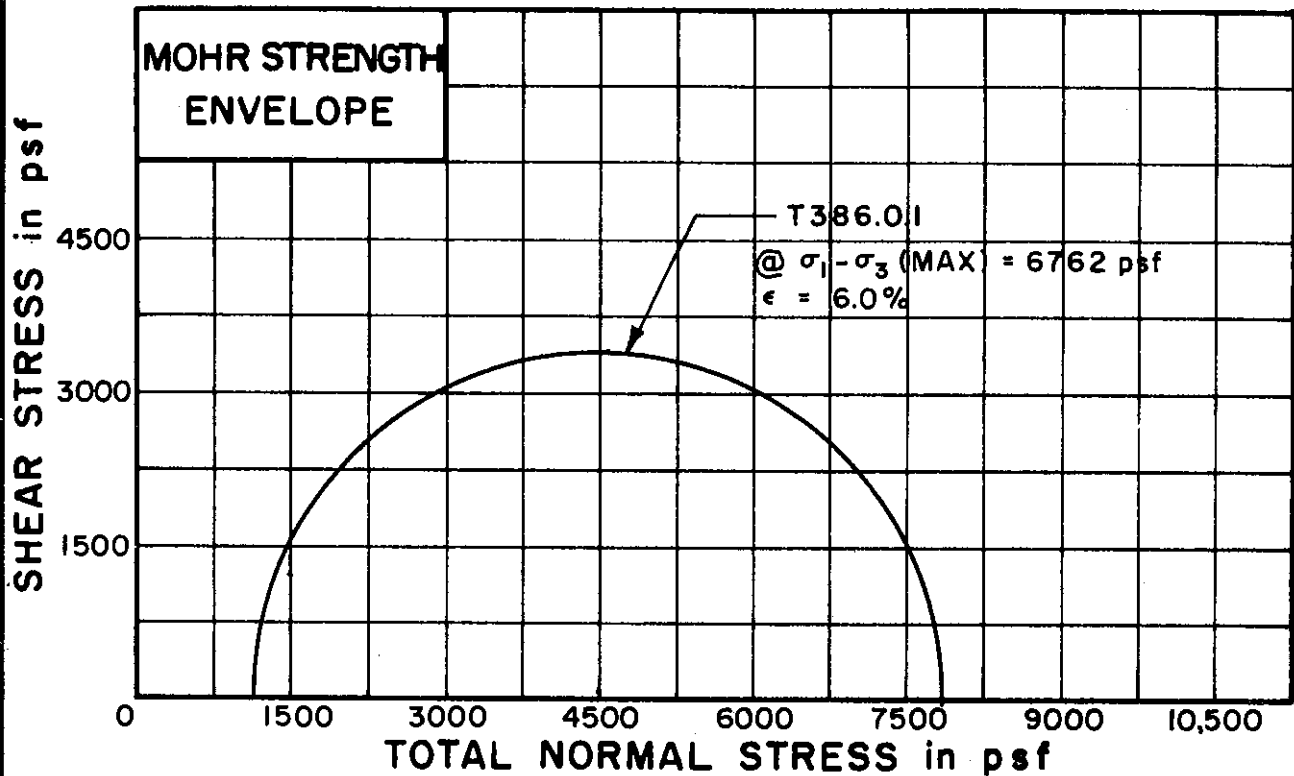
CONFINING PRESSURE psf	$\sigma_3$	7200	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	25.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126  
 SAMPLE NO. 23  
 DEPTH 108.6' TO 108.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T386.0.1		
INITIAL WATER CONTENT	w <sub>0</sub>	22.3%	
DRY DENSITY pcf	$\gamma_d$	108	
SAMPLE DIAMETER in.	D <sub>0</sub>	1.45	
SAMPLE HEIGHT in.	H <sub>0</sub>	3.50	
CONFINING PRESSURE psf	$\sigma_3$	1080	
RATE OF STRAIN PERCENT/MINUTE		0.26	
FINAL WATER CONTENT	w <sub>f</sub>	22.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 3

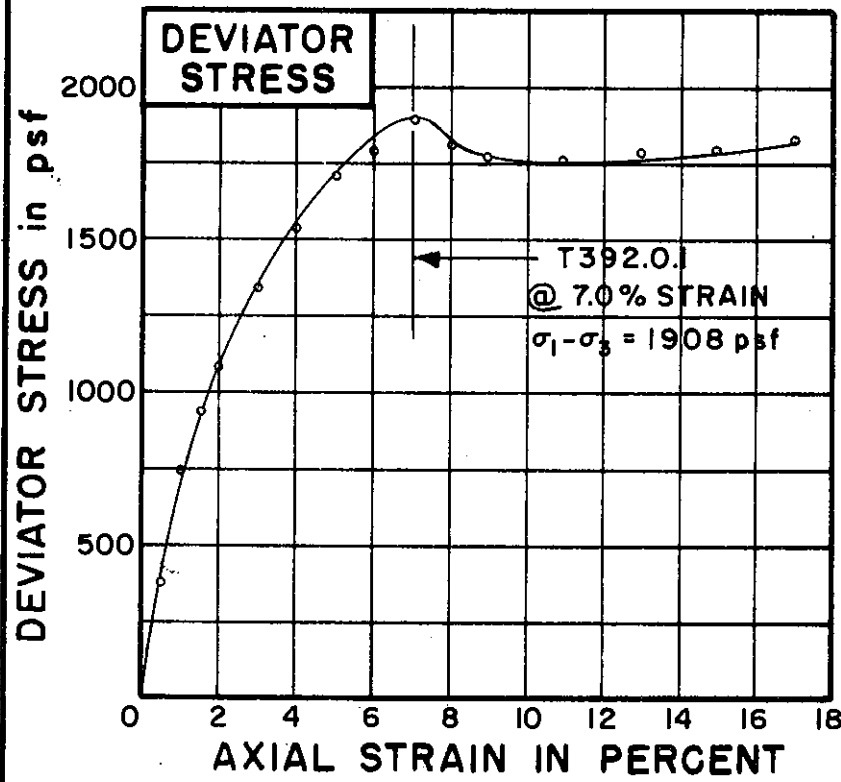
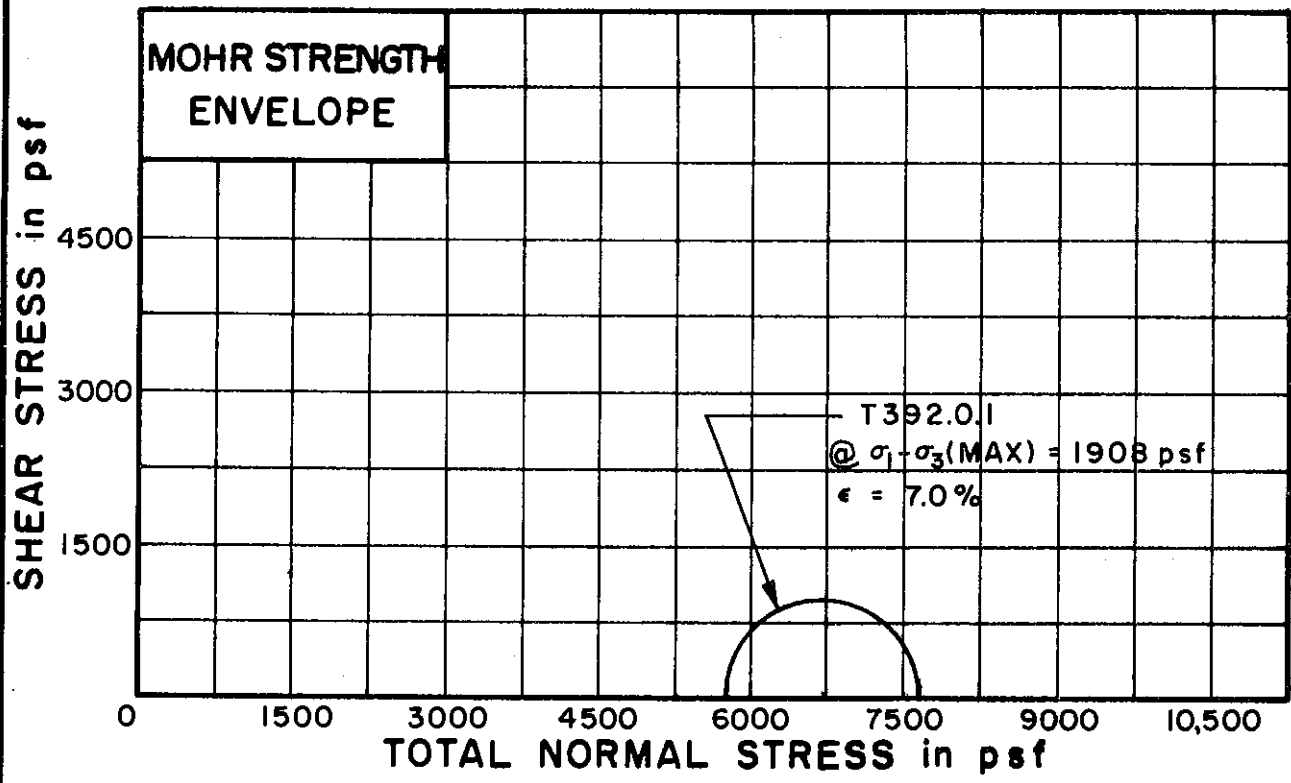
DEPTH 8.7' TO 9.0'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 23

**UNCONSOLIDATED UNDRAINED  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T392.0.1		
INITIAL WATER CONTENT	w <sub>o</sub> 24.8%		
DRY DENSITY pcf	γ <sub>d</sub> 101		
SAMPLE DIAMETER in.	D <sub>o</sub> 1.41		
SAMPLE HEIGHT in.	H <sub>o</sub> 3.35		
CONFINING PRESSURE psf	σ <sub>3</sub> 5760		
RATE OF STRAIN PERCENT/MINUTE	0.27		
FINAL WATER CONTENT	w <sub>f</sub> 24.6%		
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 15

DEPTH 74.0' TO 74.3'

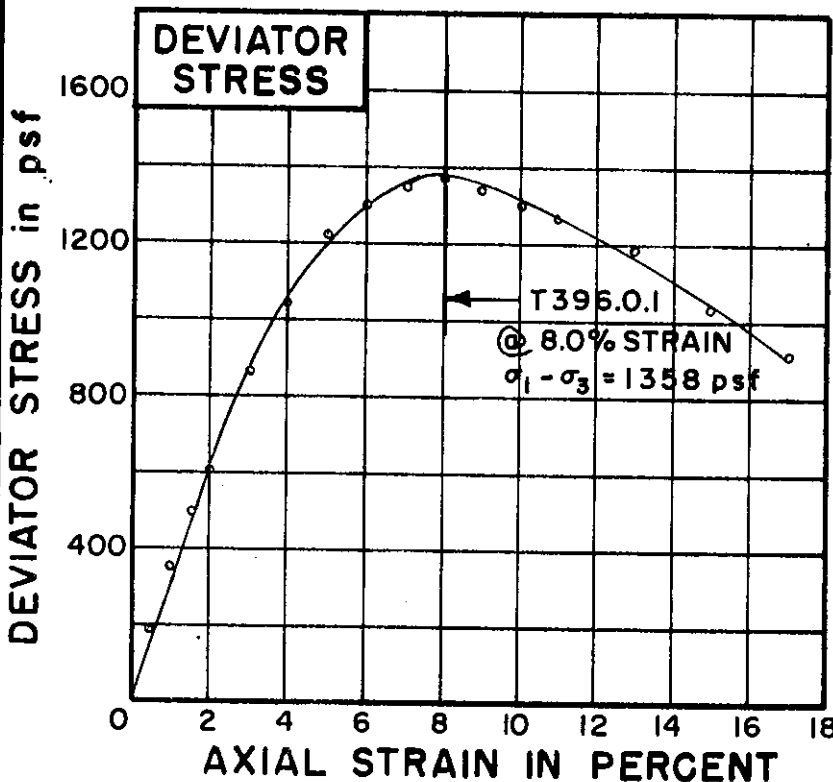
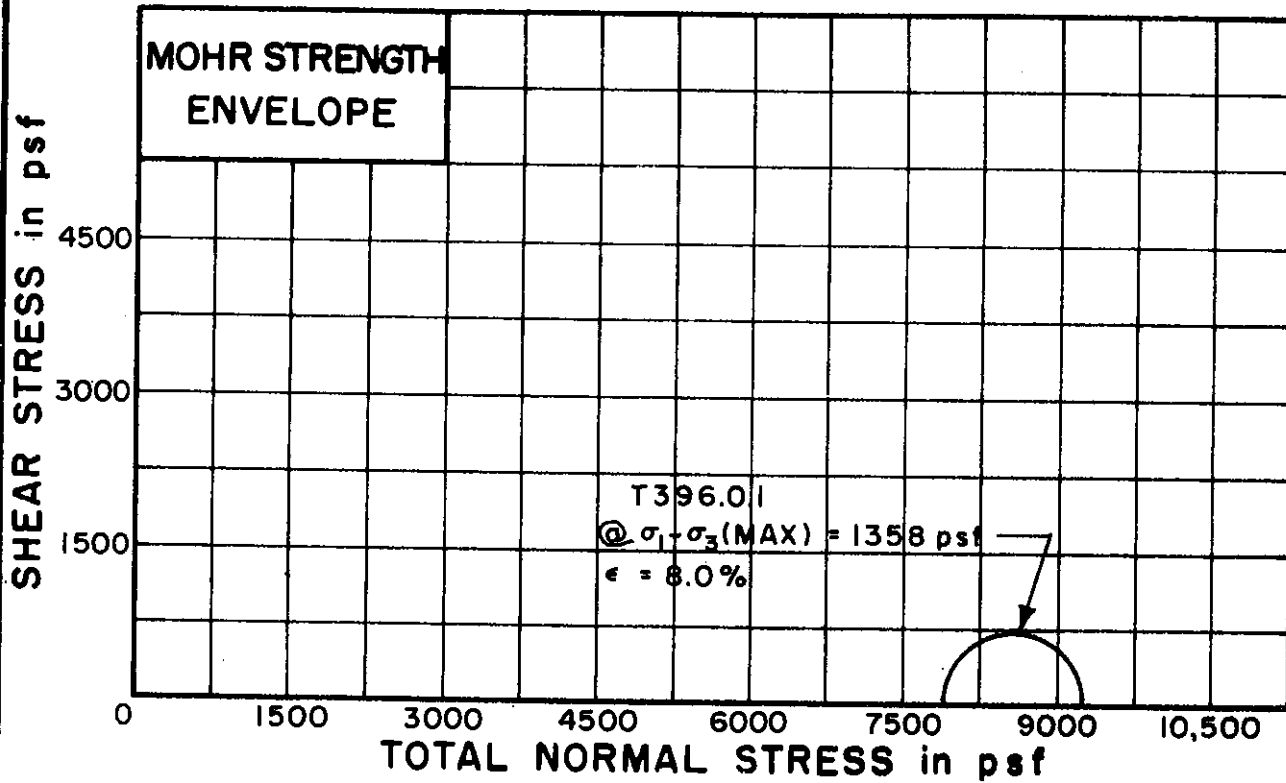
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T396.0.1		
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INITIAL WATER CONTENT	$w_0$	30.6%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER, in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.20	

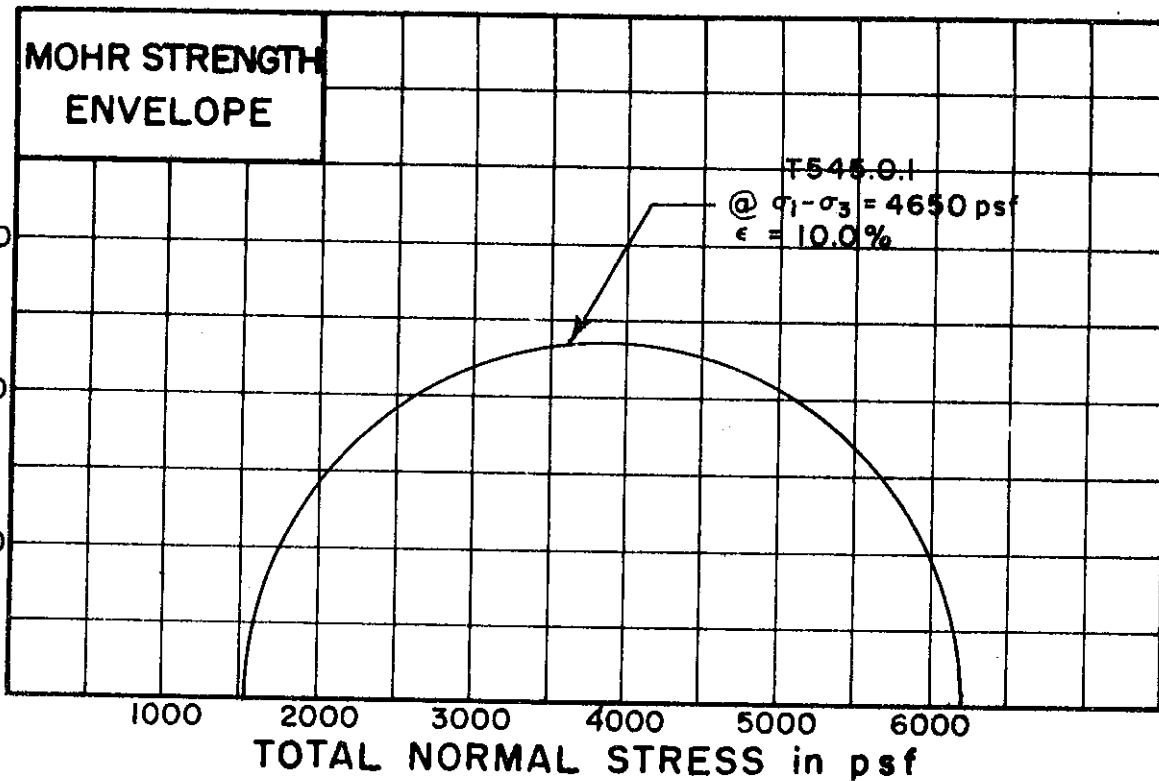
CONFINING PRESSURE psf	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.28	

FINAL WATER CONTENT	$w_f$	30.3%	
SKETCH OF SAMPLE AT END OF TEST			

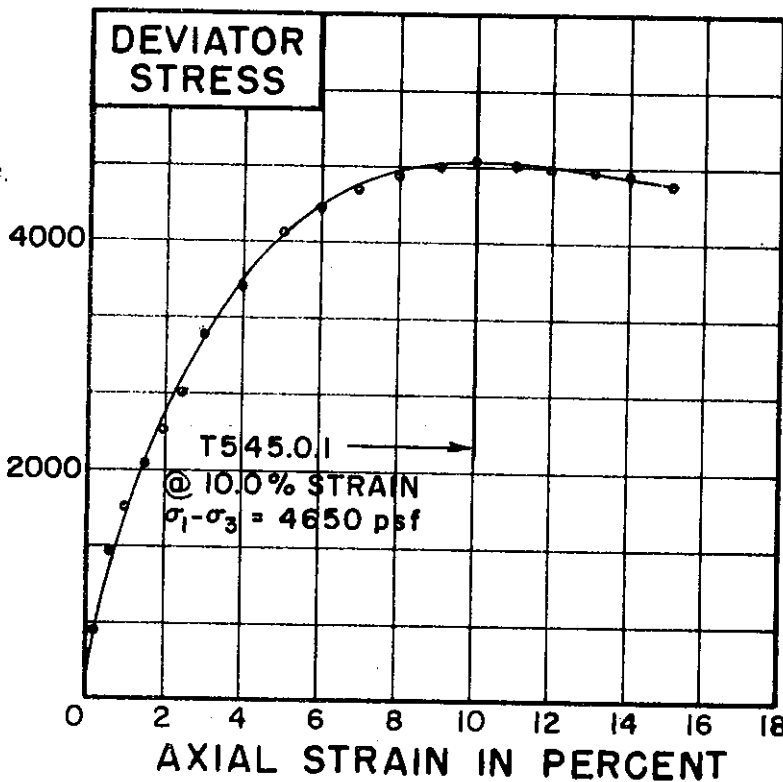
BORING NO. 129  
 SAMPLE NO. 24  
 DEPTH 124.1' TO 124.4'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T545.0.1		
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INITIAL WATER CONTENT	$w_o$	28.3%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.32	

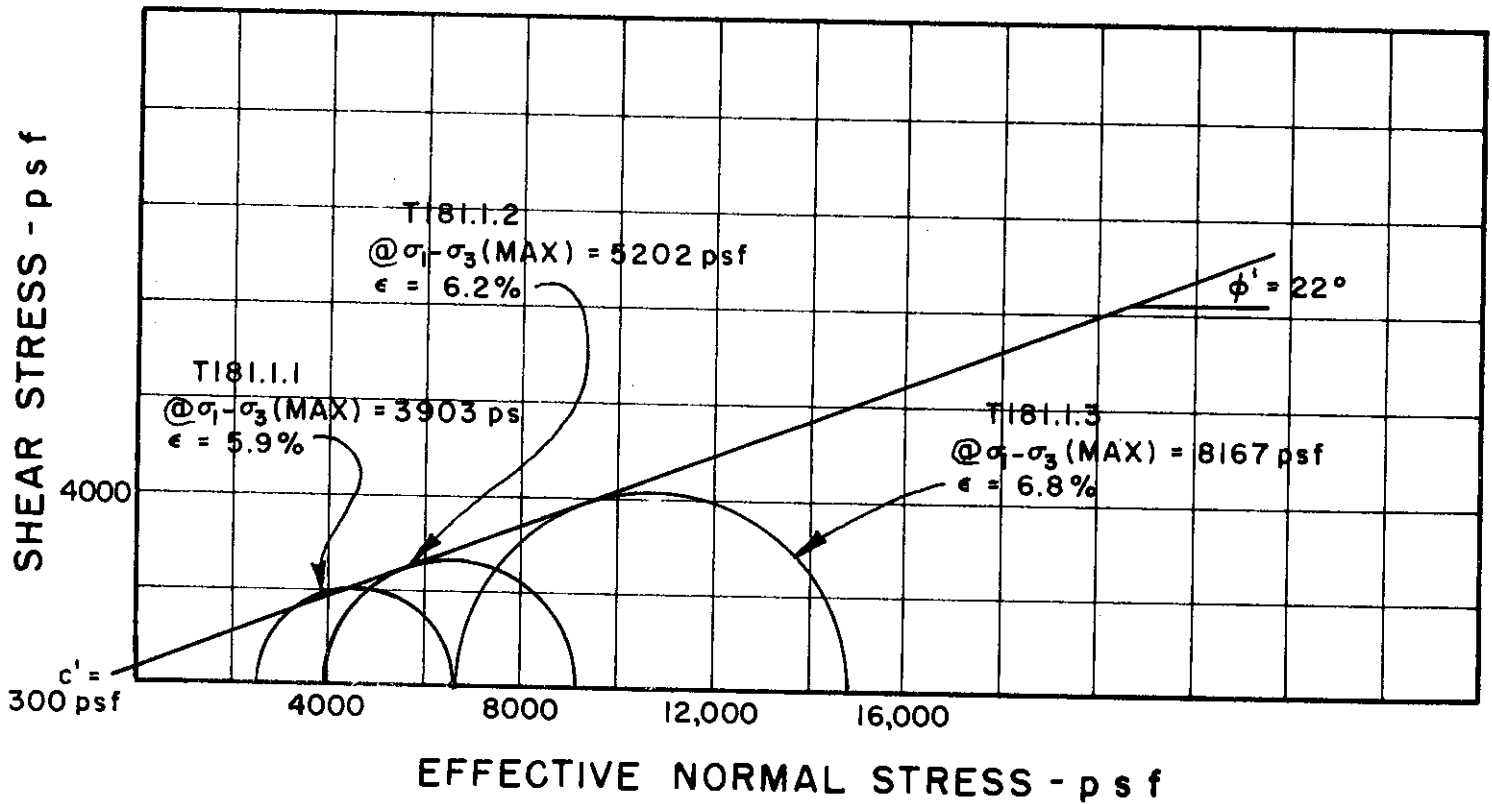
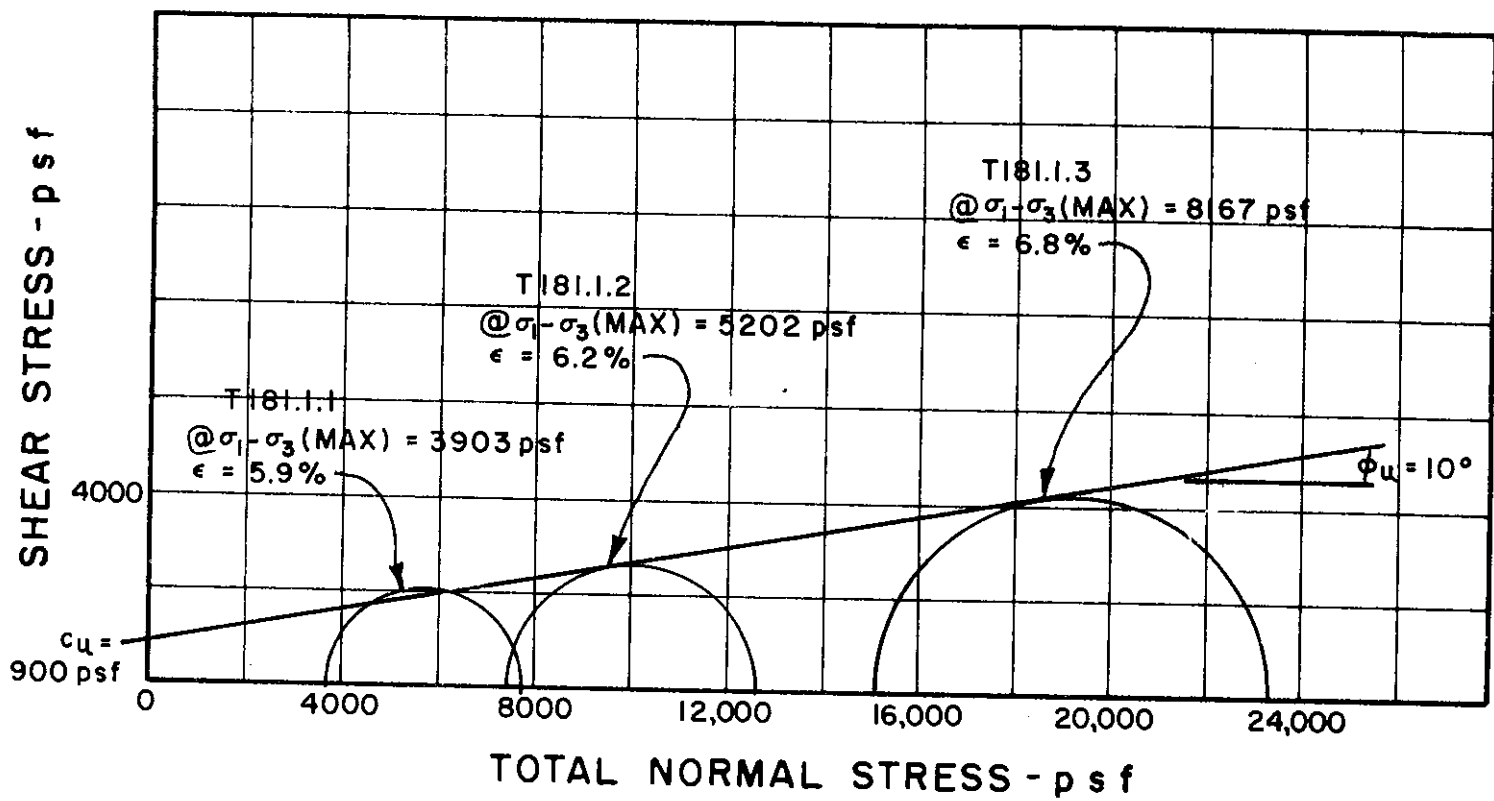
CONFINING PRESSURE psf	$\sigma_3$	1555	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	28.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 151A  
 SAMPLE NO. 3  
 DEPTH 13.0' TO 13.3'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 48 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 18

SAMPLE NO. 12

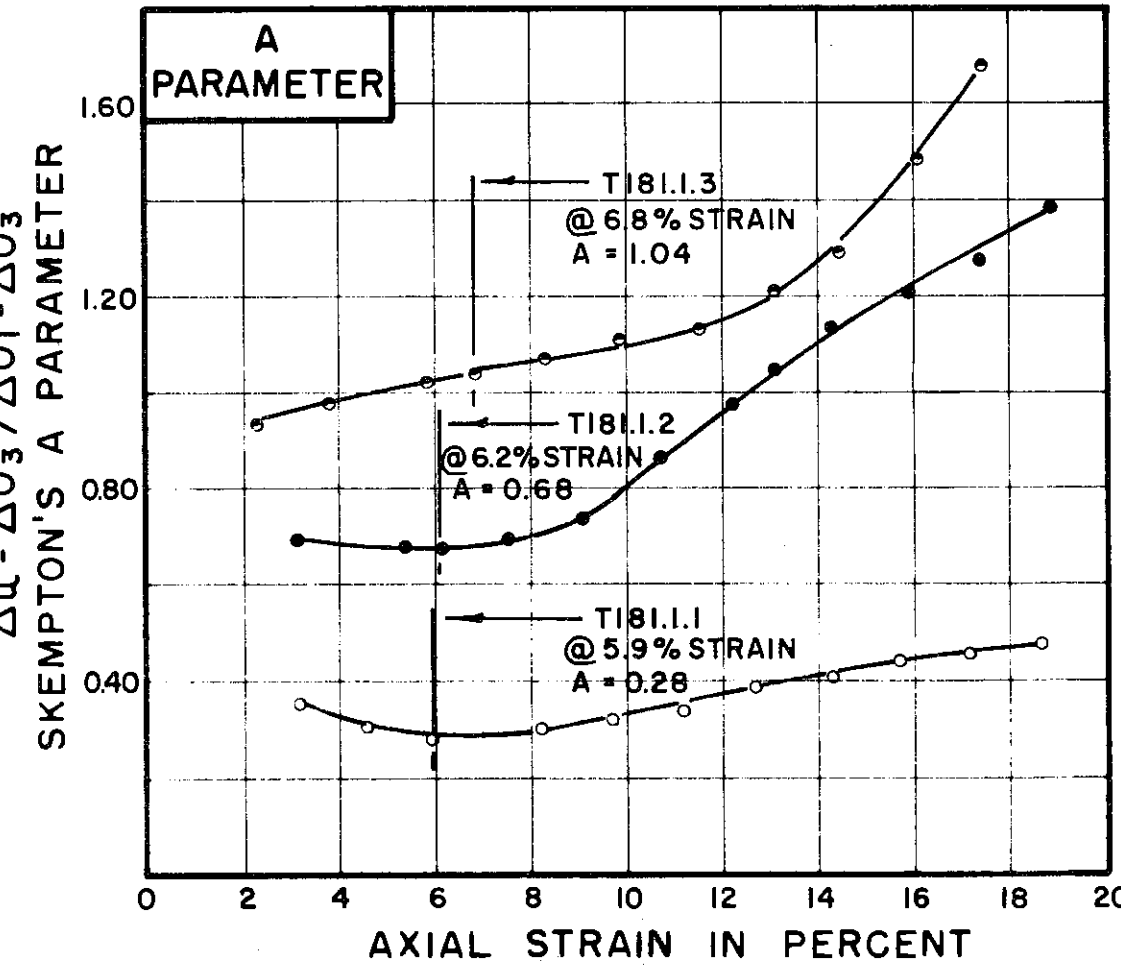
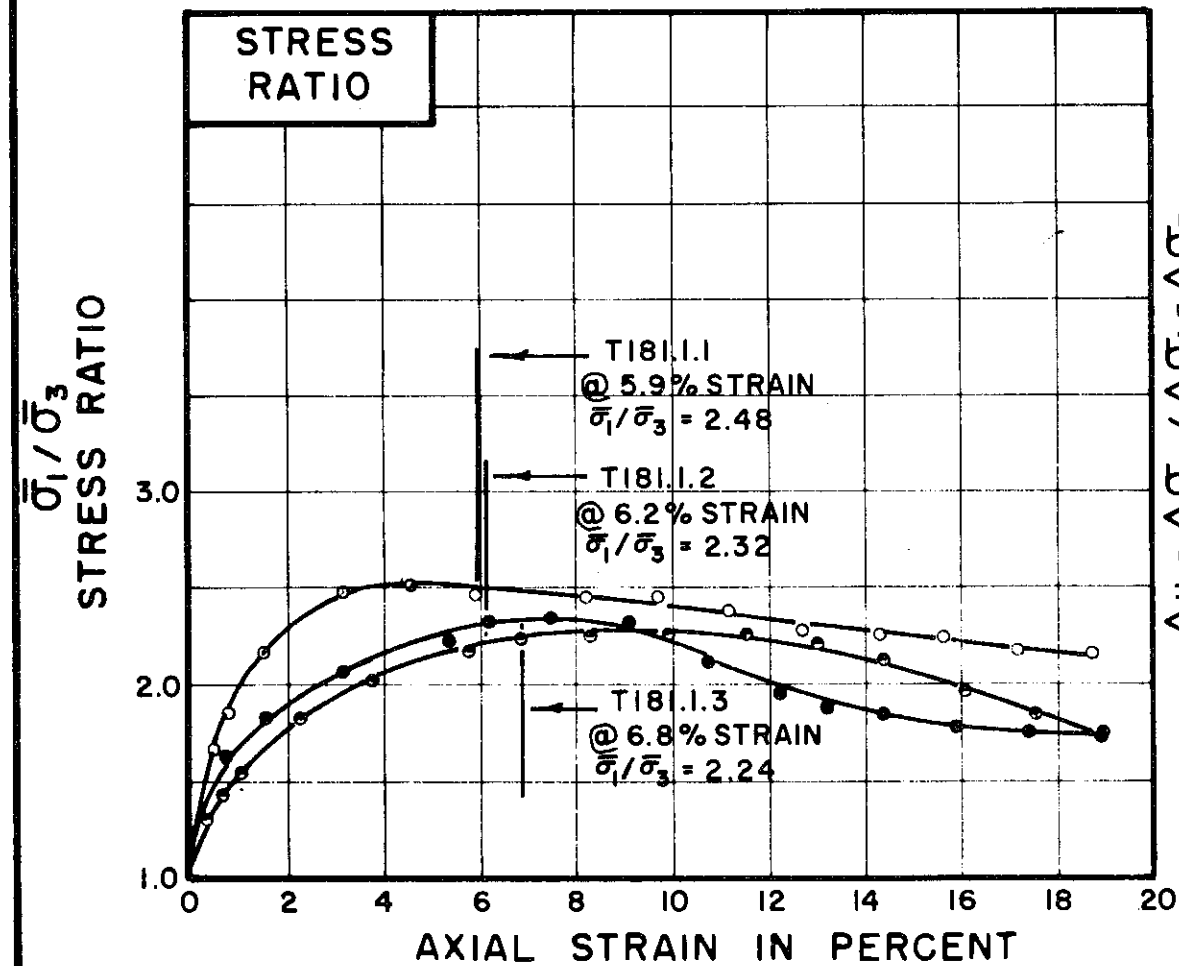
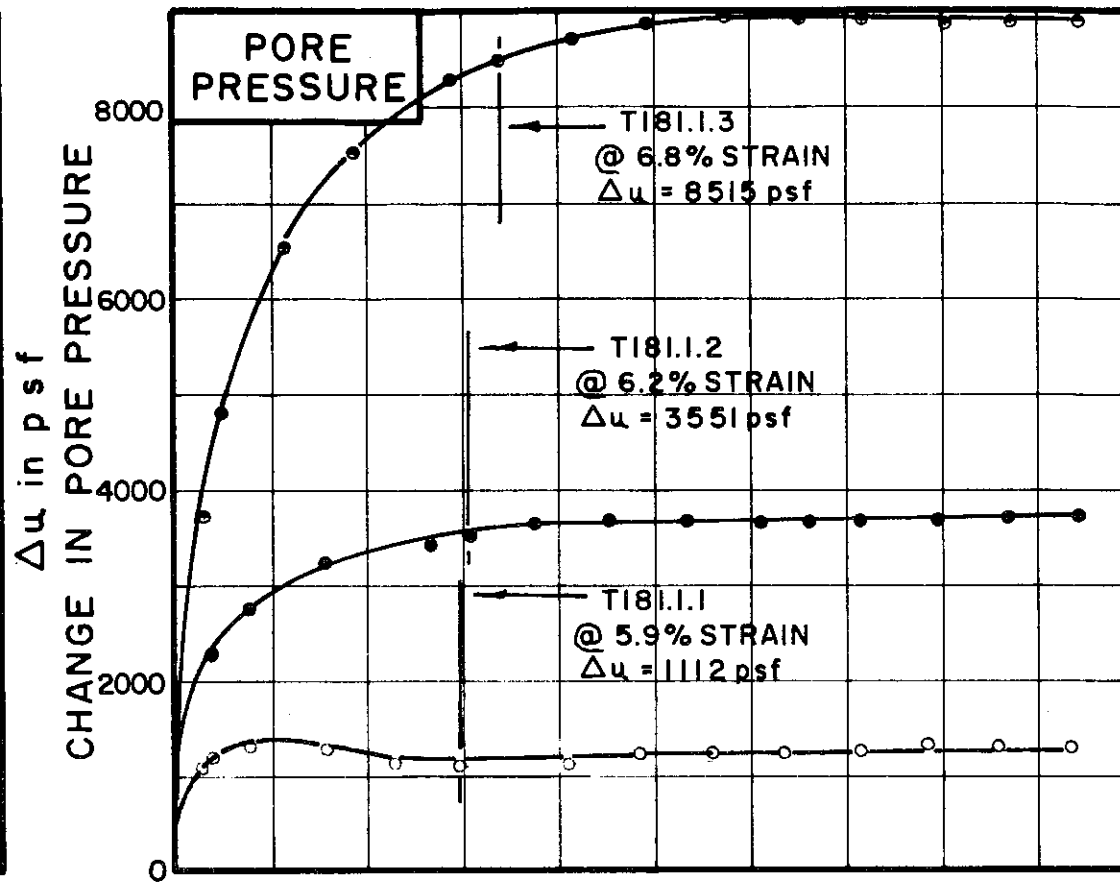
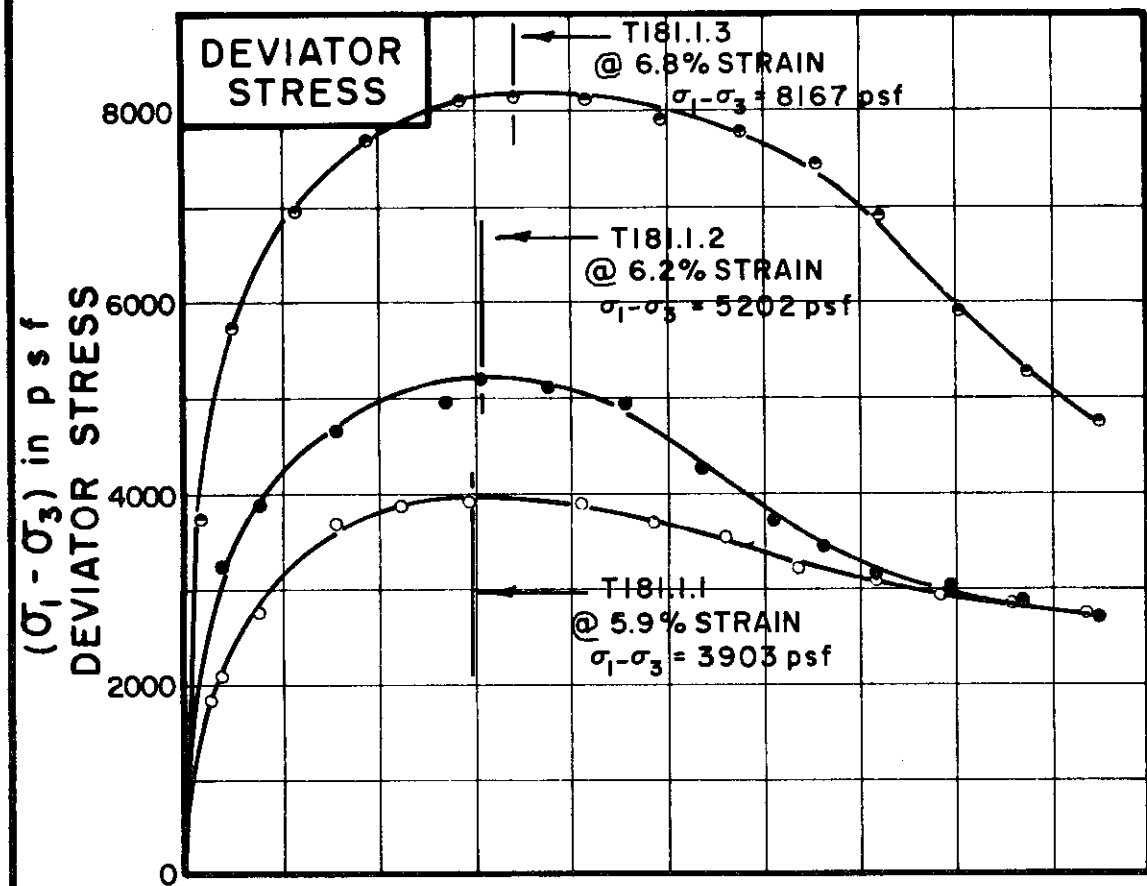
DEPTH 108.0' TO 110.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



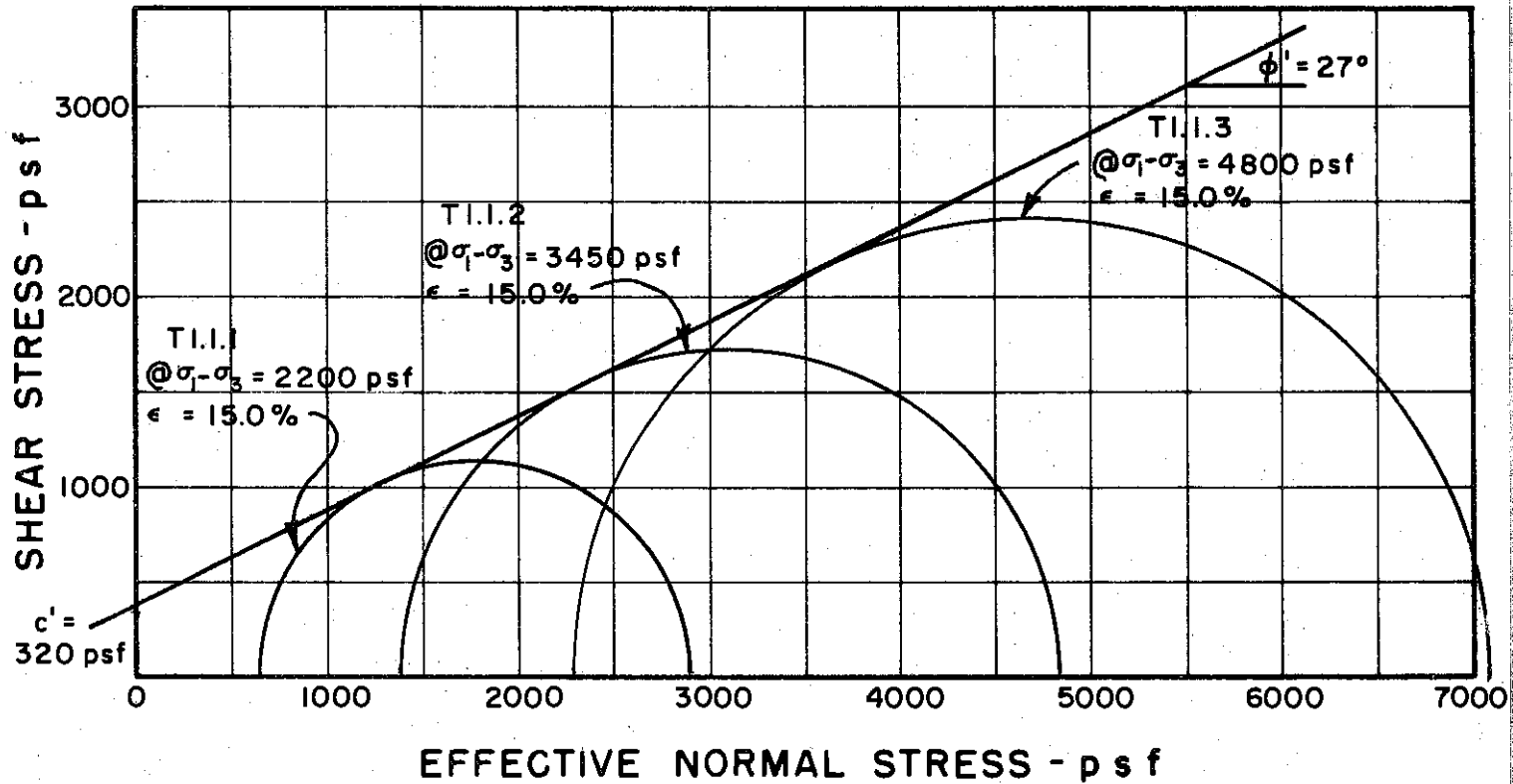
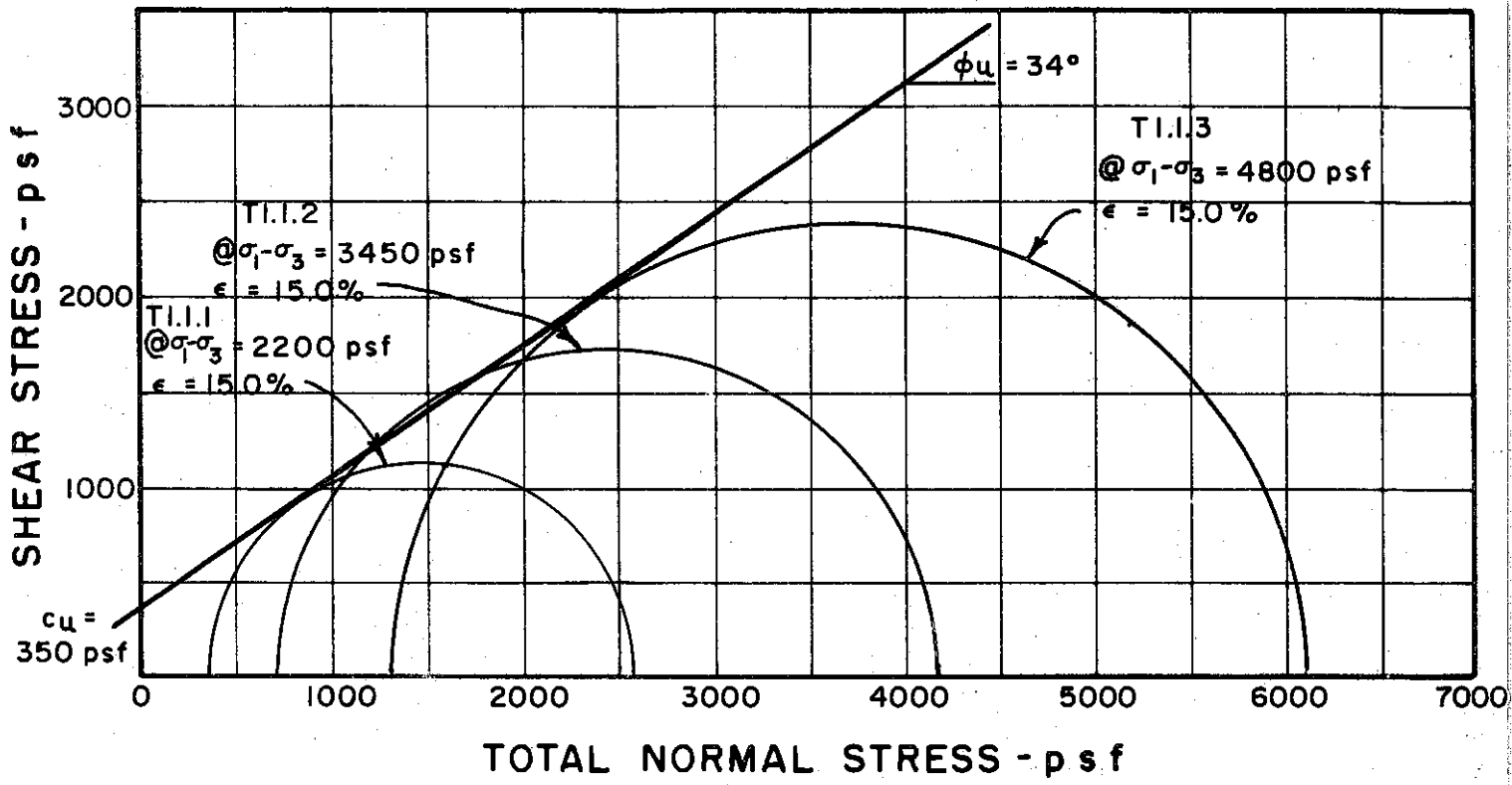
TEST NO. / SYMBOL	T181.1.1	T181.1.2	T181.1.3
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	34.5%	31.0%	30.7%
	DRY DENSITY	$\gamma_d$	87	92	92
	lb/cu ft				
CONDITIONS BEFORE SHEAR	SAMPLE DIAMETER	$D_0$	1.40	1.39	1.37
	in.				
	SAMPLE HEIGHT	$H_0$	3.37	3.35	3.37
CONDITIONS AFTER SHEAR	FINAL BACK PRESSURE	$u_0$	10080	7200	6480
	psf				
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 - \bar{\sigma}_3$	3744	7488	15120
FINAL CONDITIONS	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.32%	4.19%	6.61%
	PORE PRESSURE RESPONSE		95%	97%	93%
	WATER CONTENT	$w_f$	33.7%	29.3%	27.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 18  
 SAMPLE NO. 12  
 DEPTH 108.0' TO 110.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



BORING NO. 26

SAMPLE NO. 2

DEPTH 3.5 TO 5.5

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

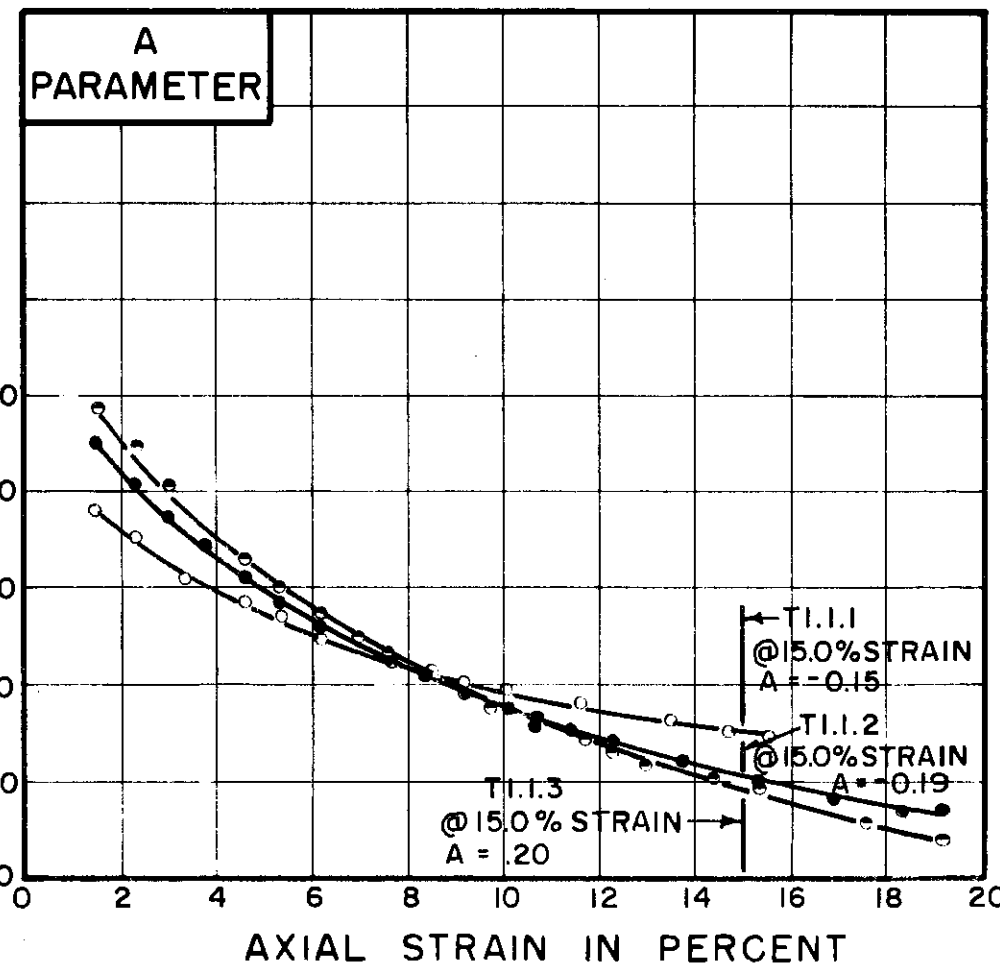
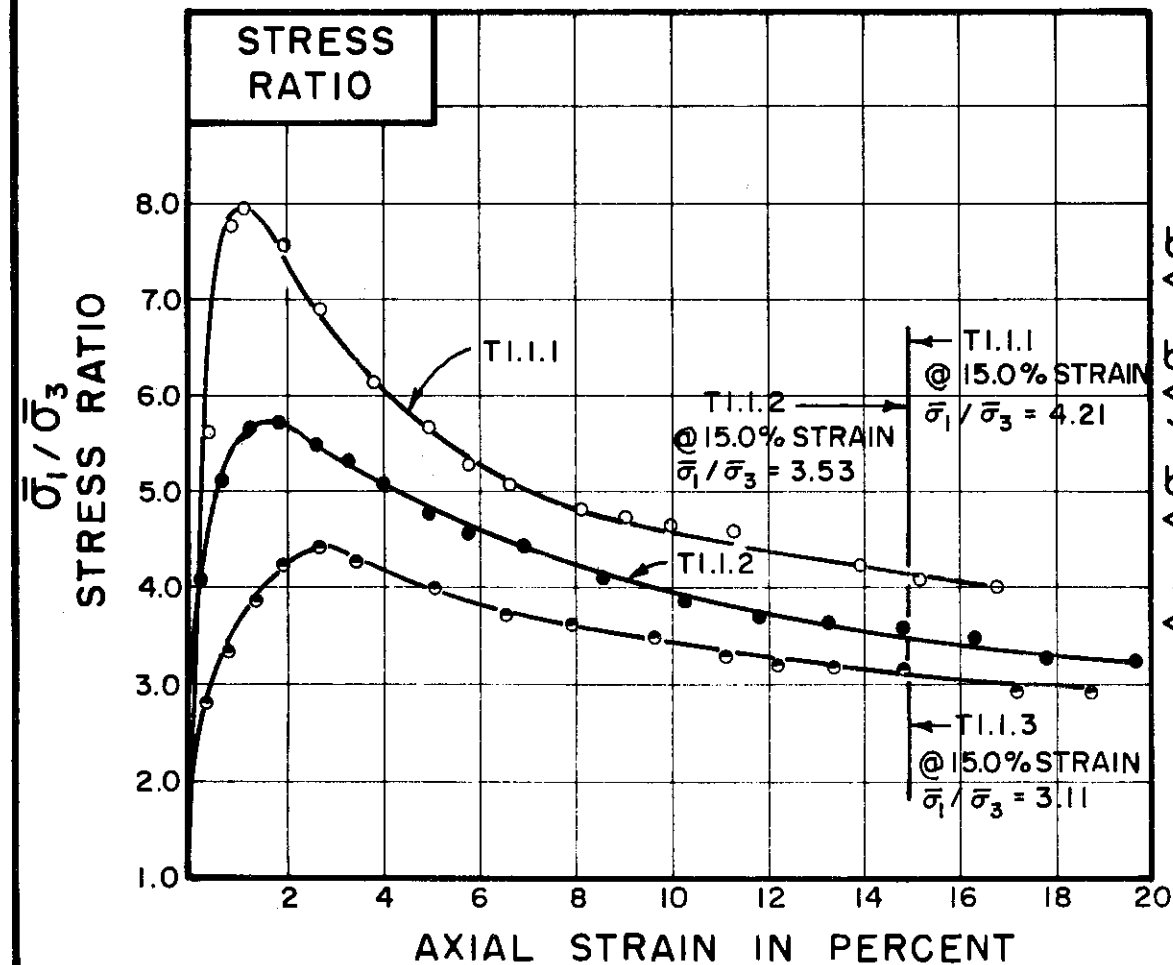
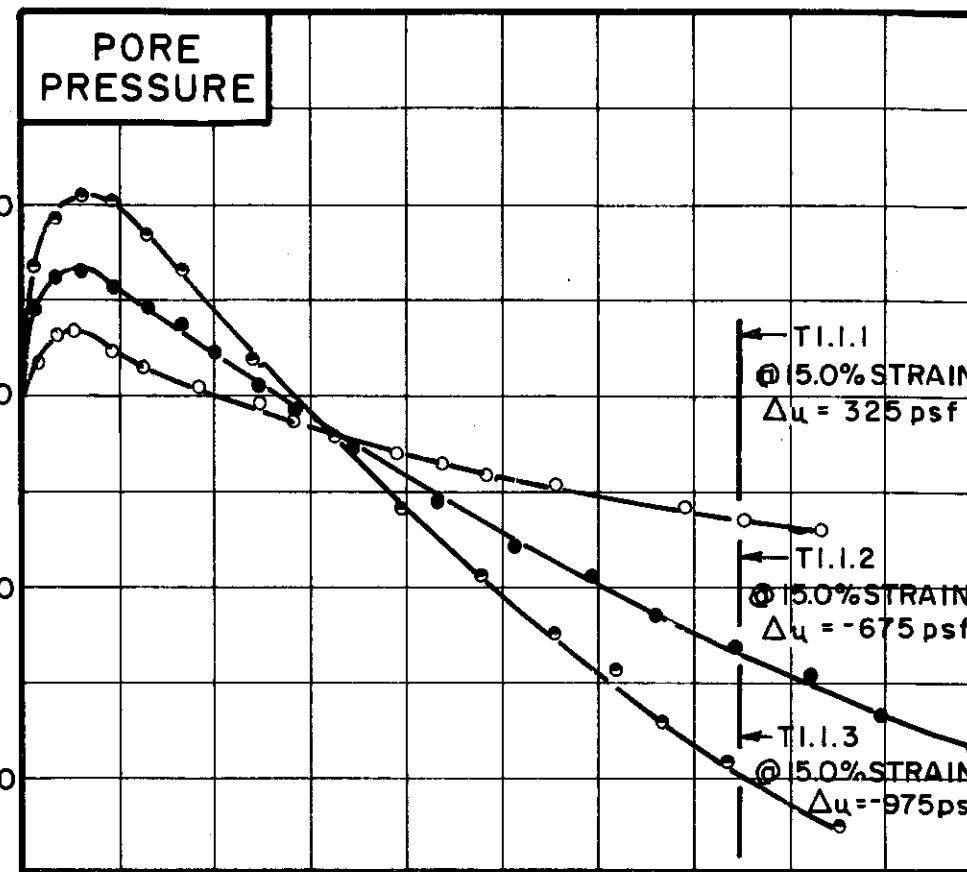
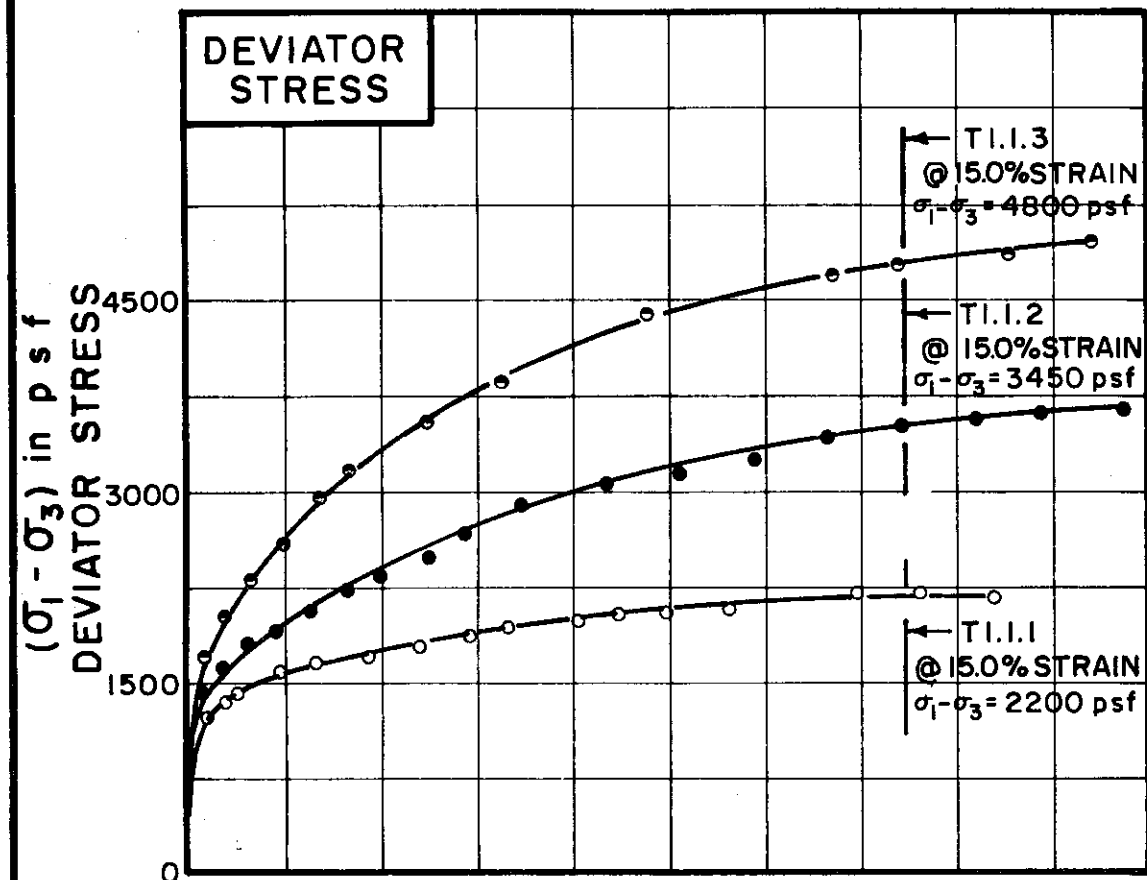
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-387



TEST NO. / SYMBOL	T1.1.1	T1.1.2	T1.1.3
	○	●	○

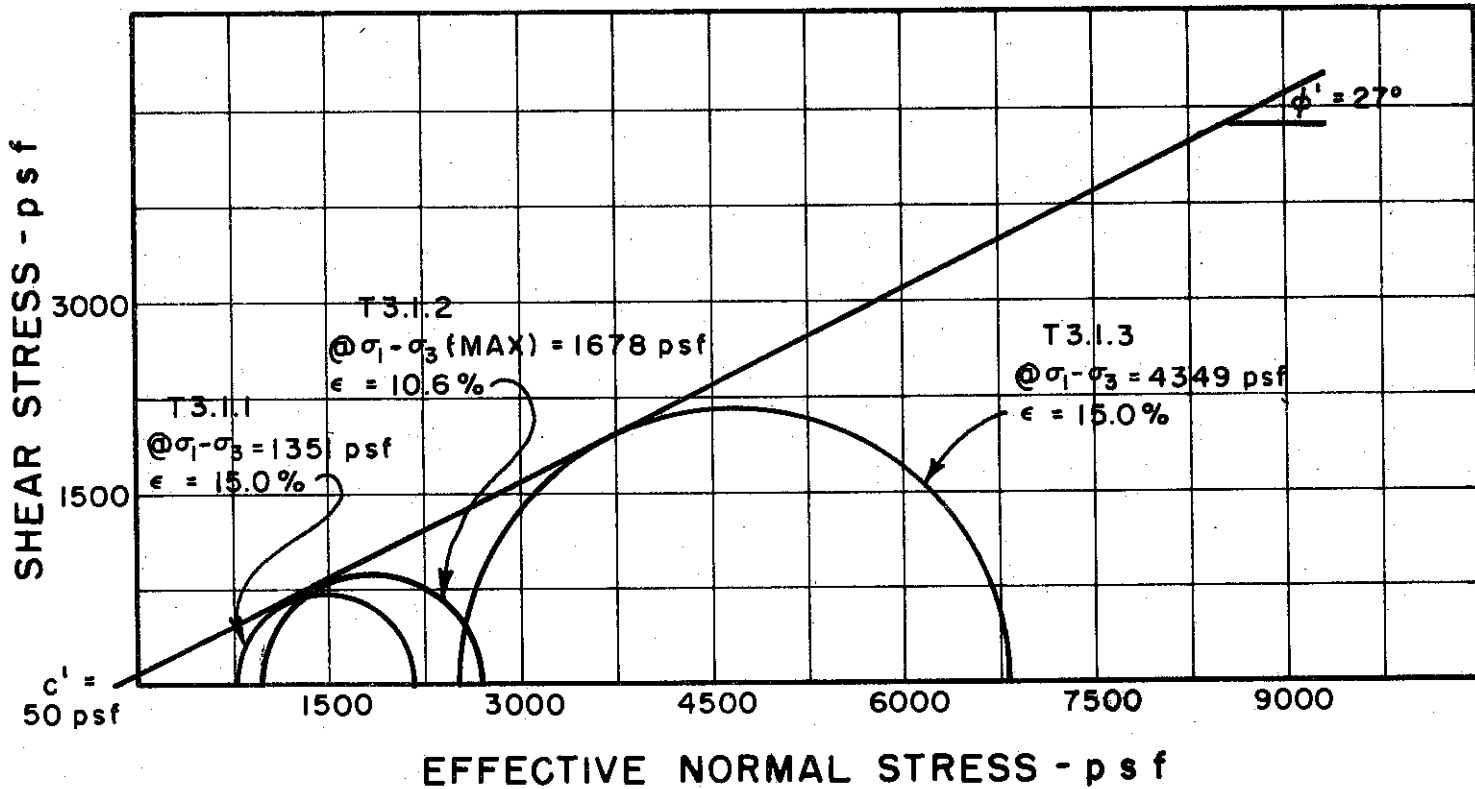
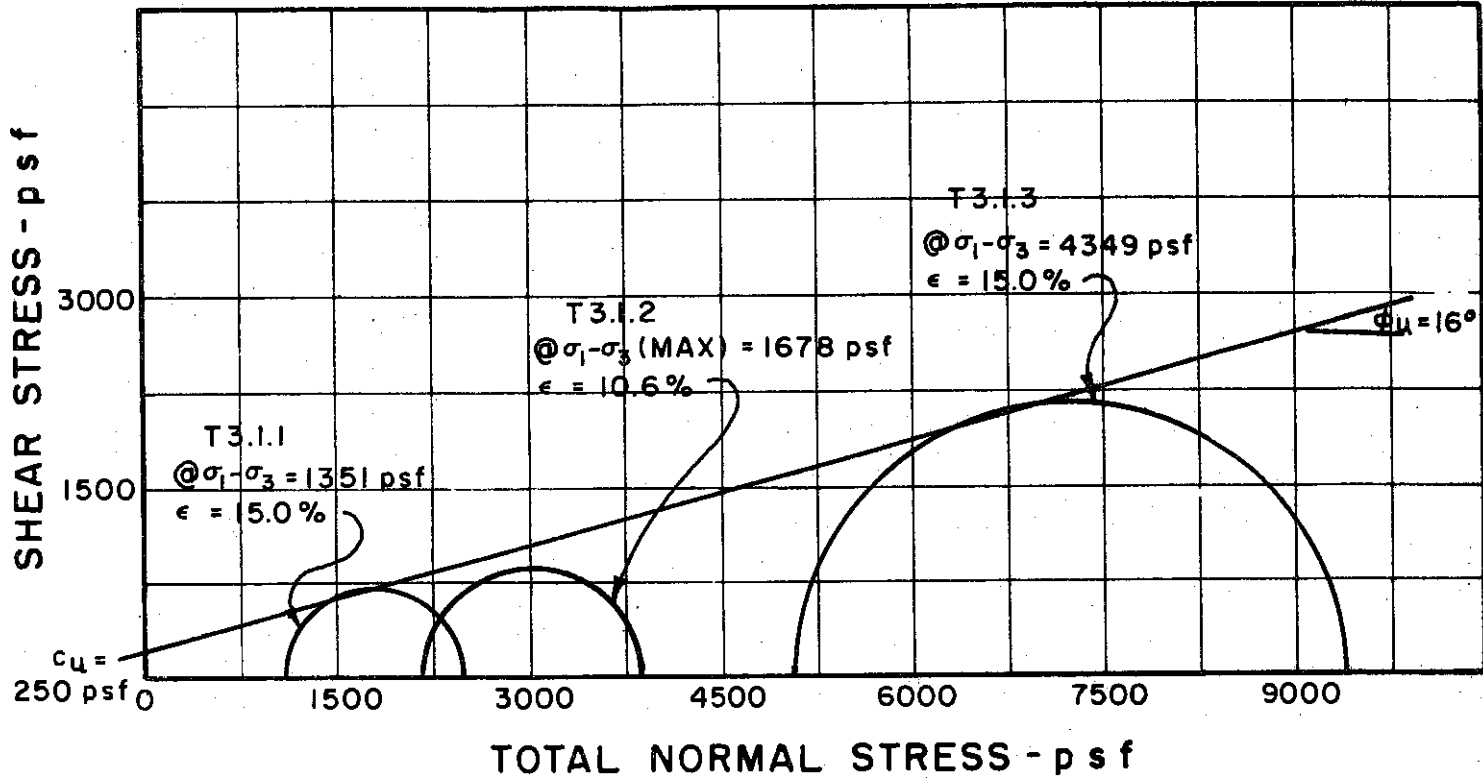
INITIAL CONDITIONS		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_0$	23.0%	23.9%	22.3%
DRY DENSITY	$\gamma_d$ pcf	104	103	108
SAMPLE DIAMETER	$D_0$ in.	1.39	1.39	1.47
SAMPLE HEIGHT	$H_0$ in.	3.22	3.25	3.26
FINAL CONDITIONS BEFORE SHEAR		T1.1.1	T1.1.2	T1.1.3
FINAL BACK PRESSURE	$u_0$ psf	8740	8352	8410
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$ psf	360	691	1296
VOLUMETRIC STRAIN	$\epsilon_{vol}$	.4%	1.0%	1.4%
PORE PRESSURE RESPONSE		100%	98%	94%
FINAL CONDITIONS AFTER SHEAR		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_f$	26.7%	26.7%	25.3%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

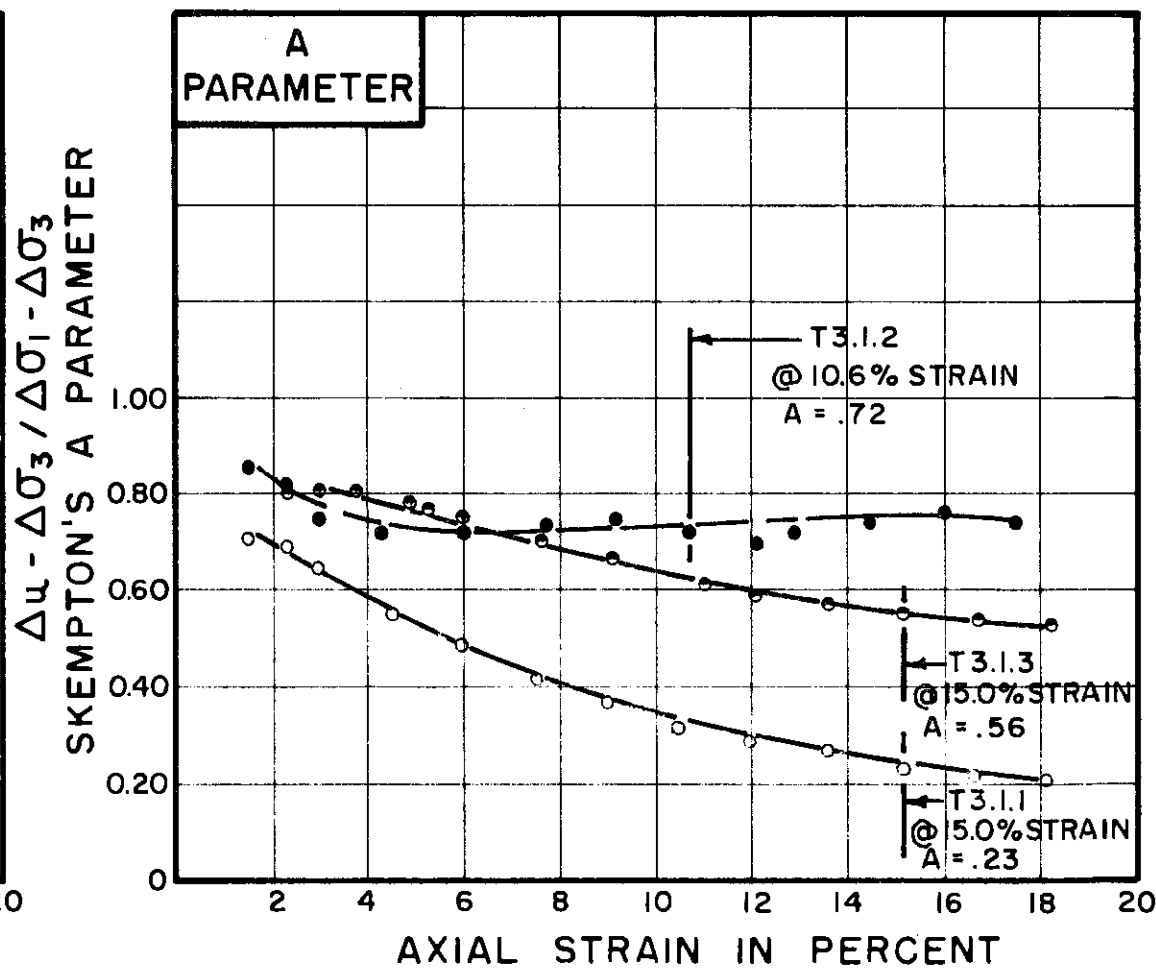
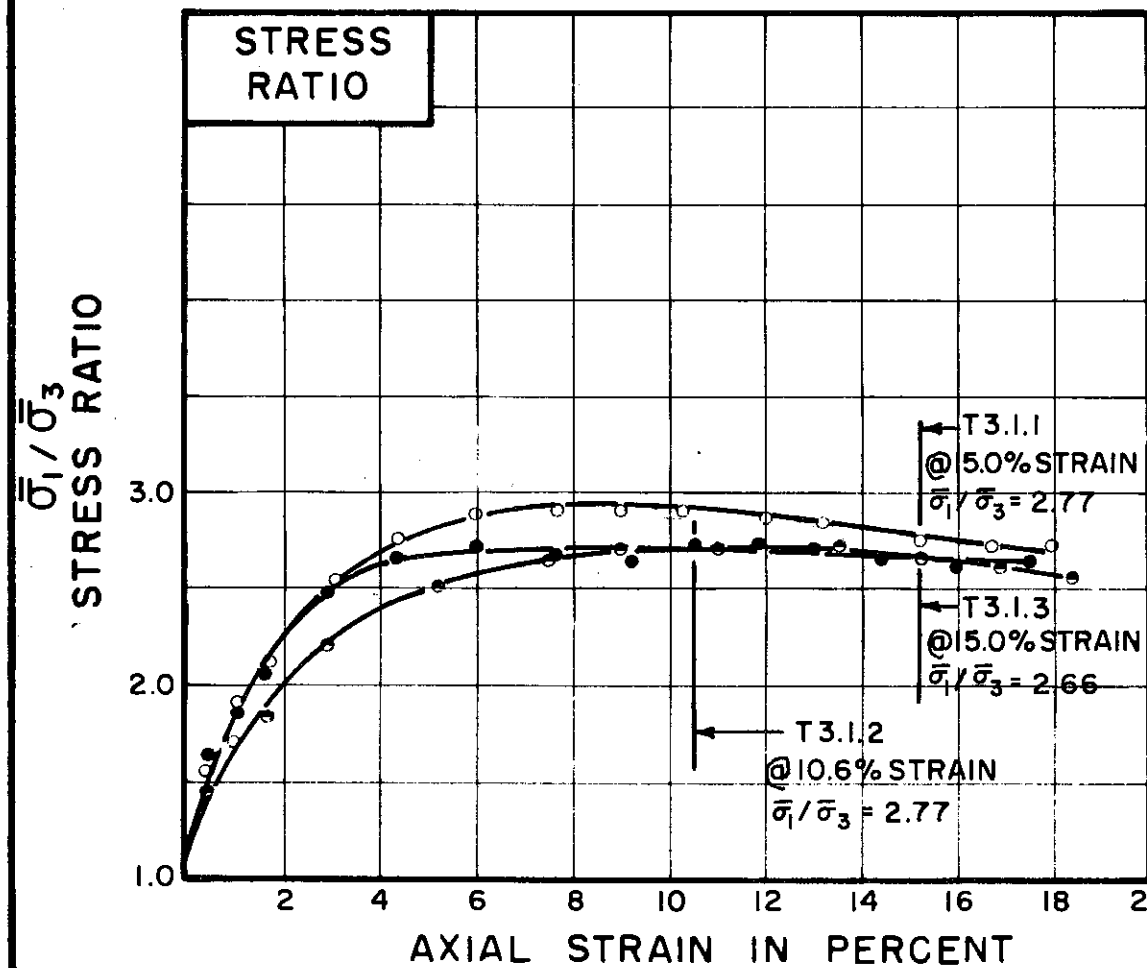
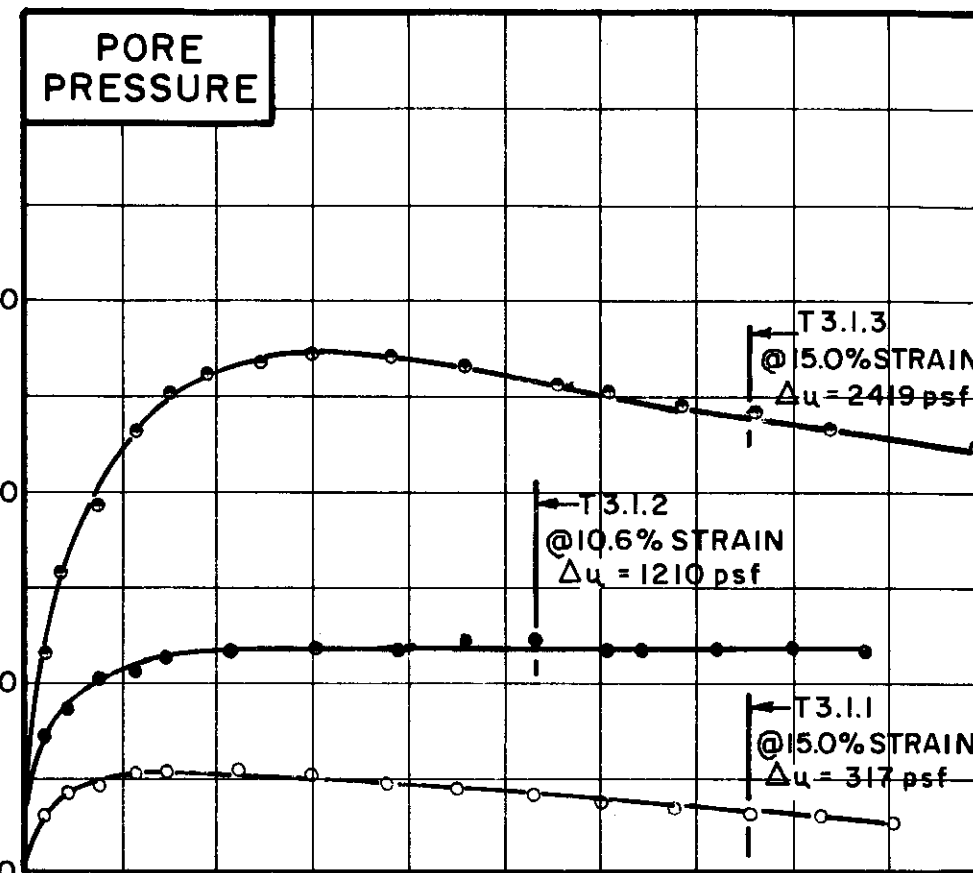
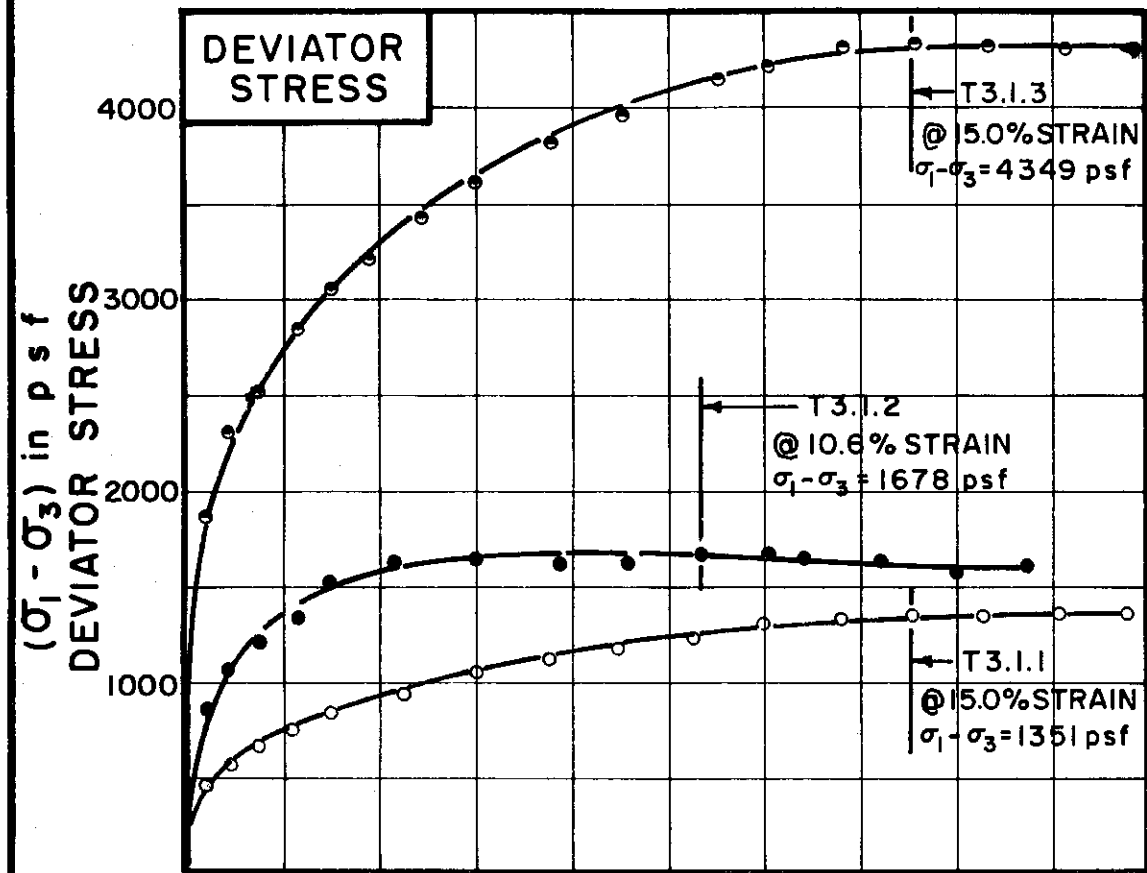
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T3.1.1 ○	T3.1.2 ●	T3.1.3 ◉
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INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	35.4%	35.3%	35.7%	
DRY DENSITY		pcf	γ <sub>d</sub>	89	86	86	
SAMPLE DIAMETER		in.	D <sub>0</sub>	1.40	1.40	1.41	
SAMPLE HEIGHT		in.	H <sub>0</sub>	3.36	3.35	3.35	
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	psf	u <sub>0</sub>	7200	7200	10800
INITIAL EFFECTIVE STRESS		psf	$\sigma_{1,0} / \sigma_{3,0}$	1080	2160	5040	
VOLUMETRIC STRAIN			ε <sub>vol</sub>	5.3%	6.2%	8.7%	
PORE PRESSURE RESPONSE				100%	98%	95%	
FINAL CONDITIONS		WATER CONTENT	w <sub>f</sub>	31.1%	30.8%	28.4%	
SKETCH OF SAMPLE AT END OF TEST							

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

SOIL DESCRIPTION SILTY CLAY (CL-CH)

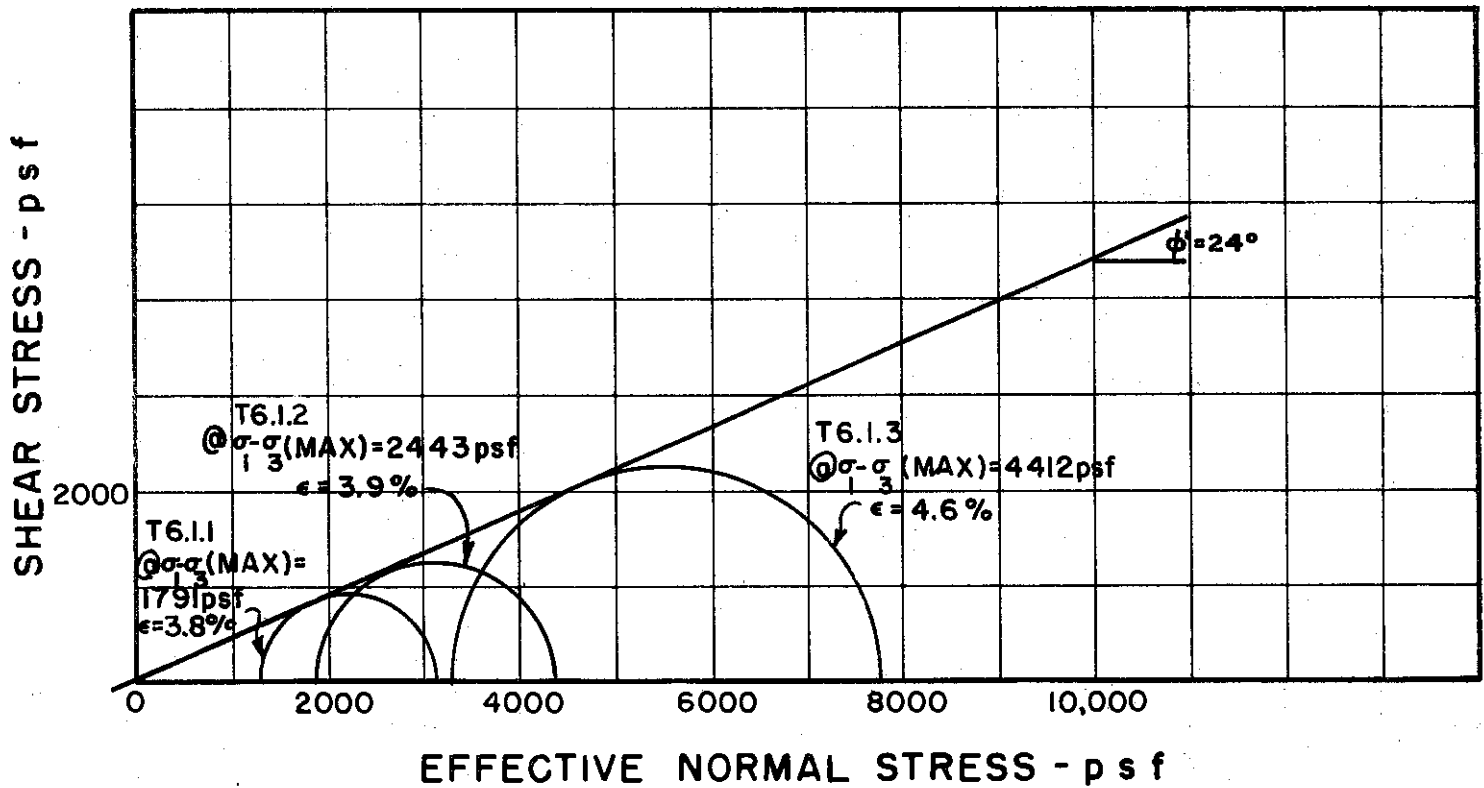
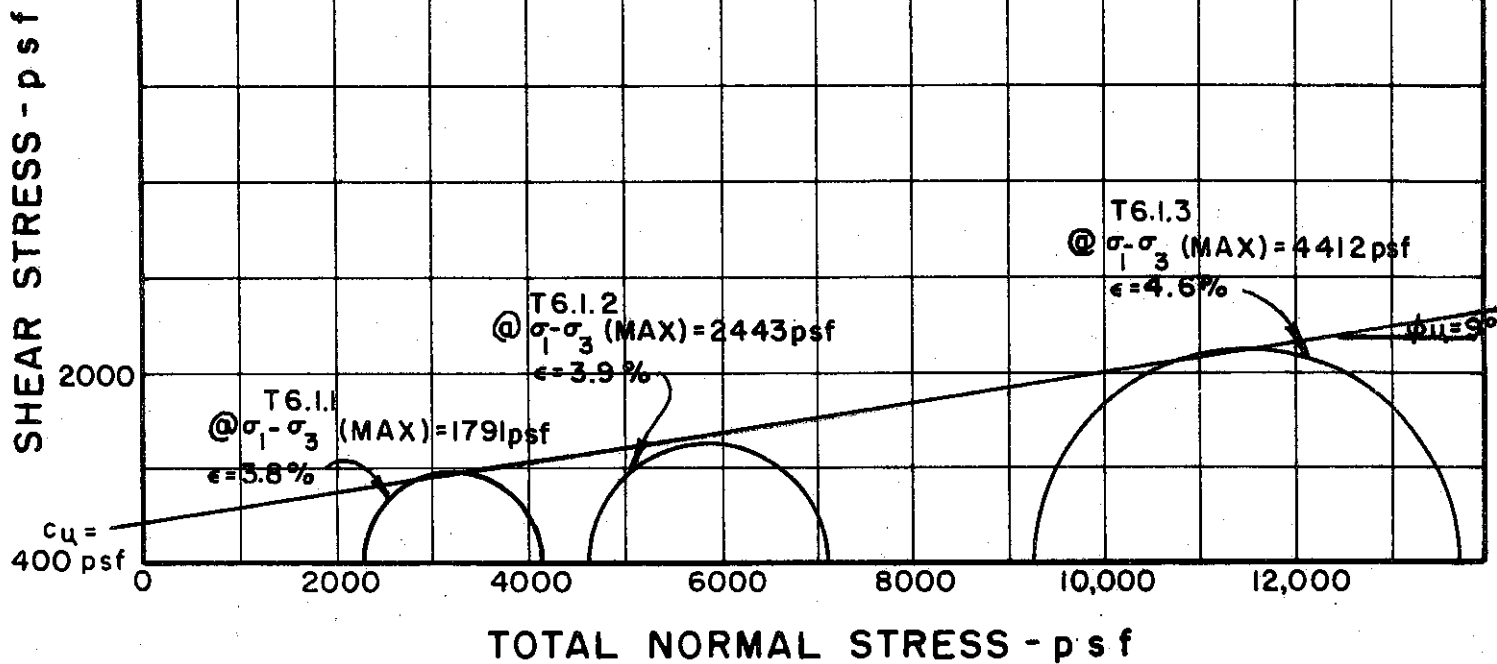
LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





BORING NO. 26

SAMPLE NO. 11

DEPTH 48.0 TO 50.0

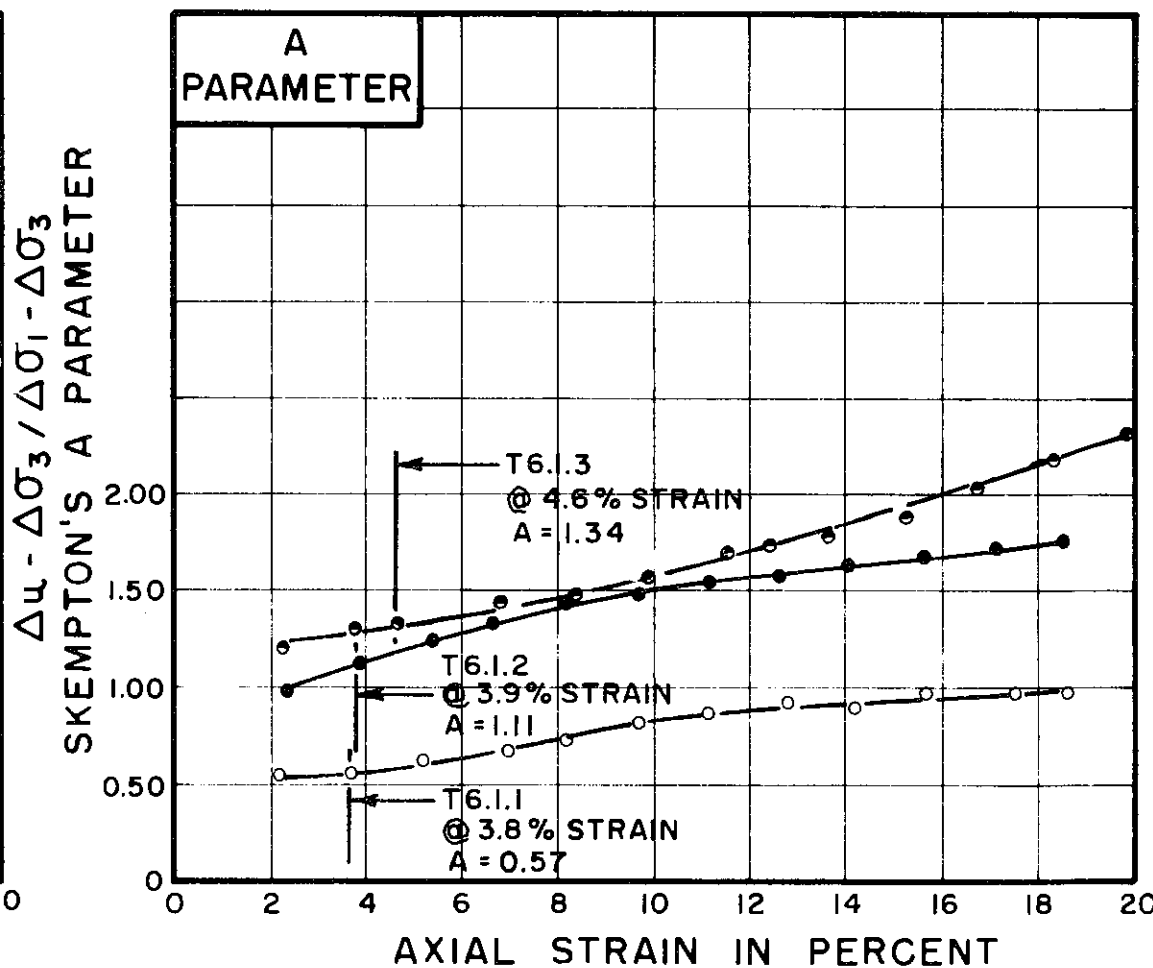
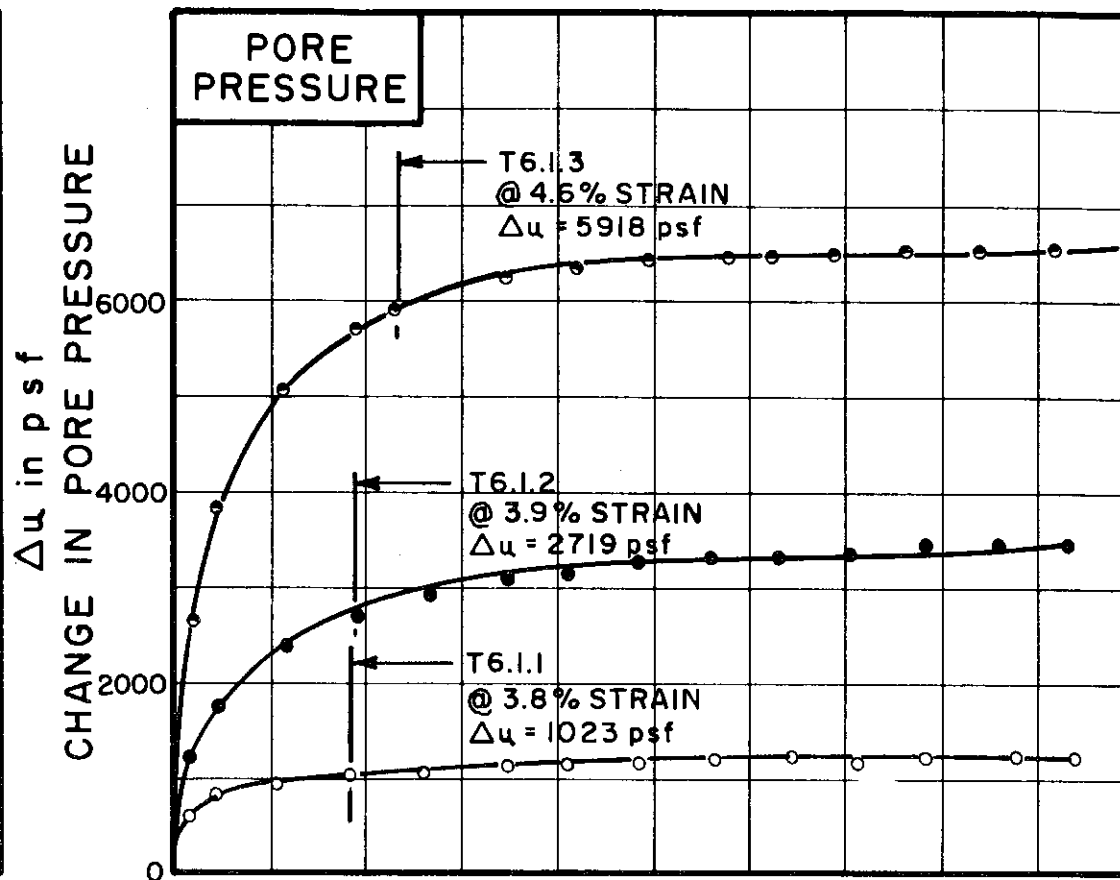
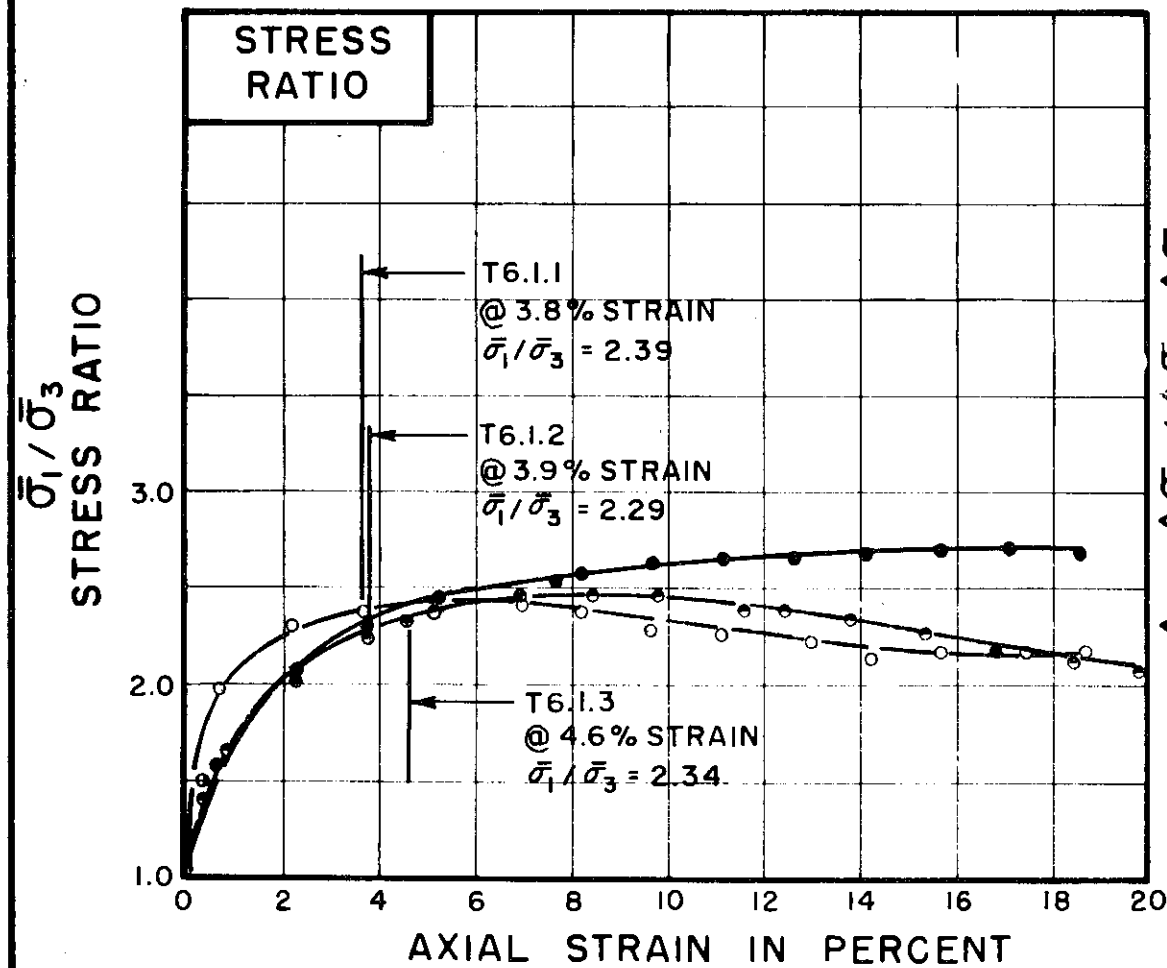
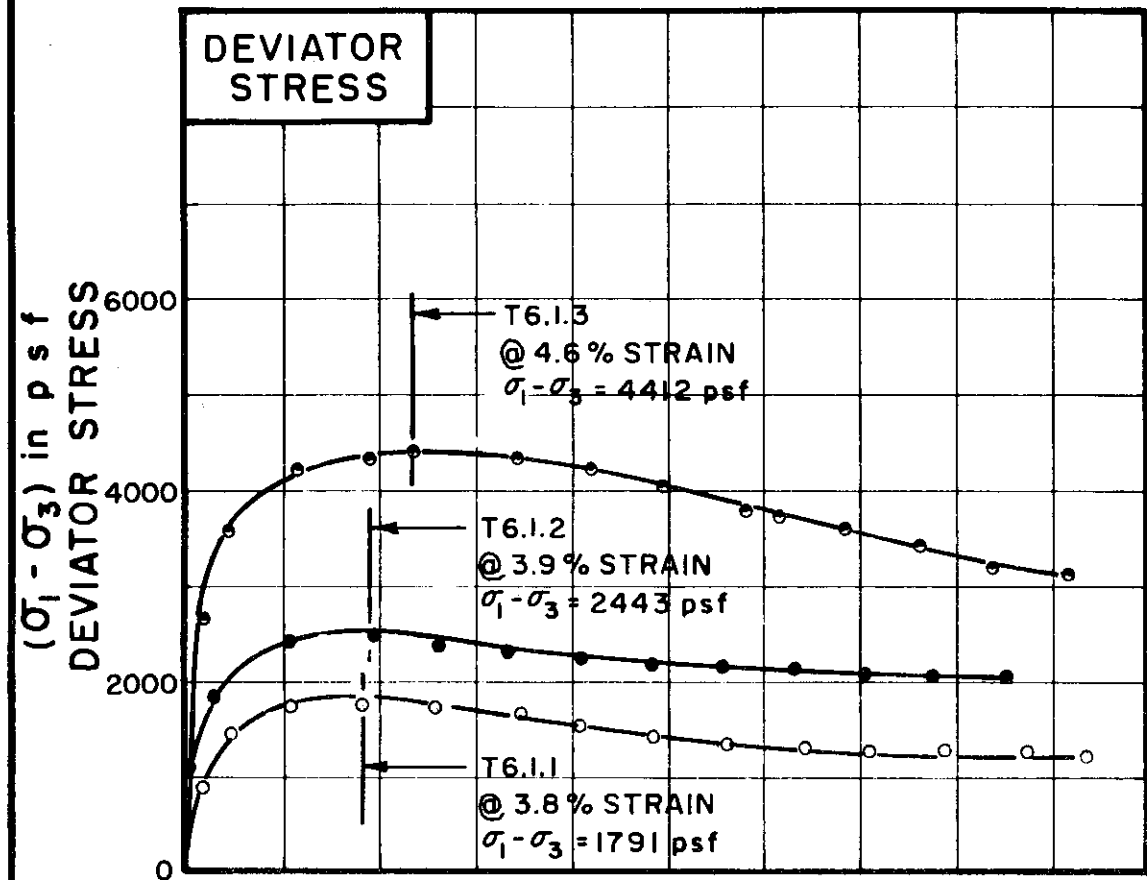
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS

AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255



TEST NO. / SYMBOL	T6.1.1	T6.1.2	T6.1.3
	○	●	○

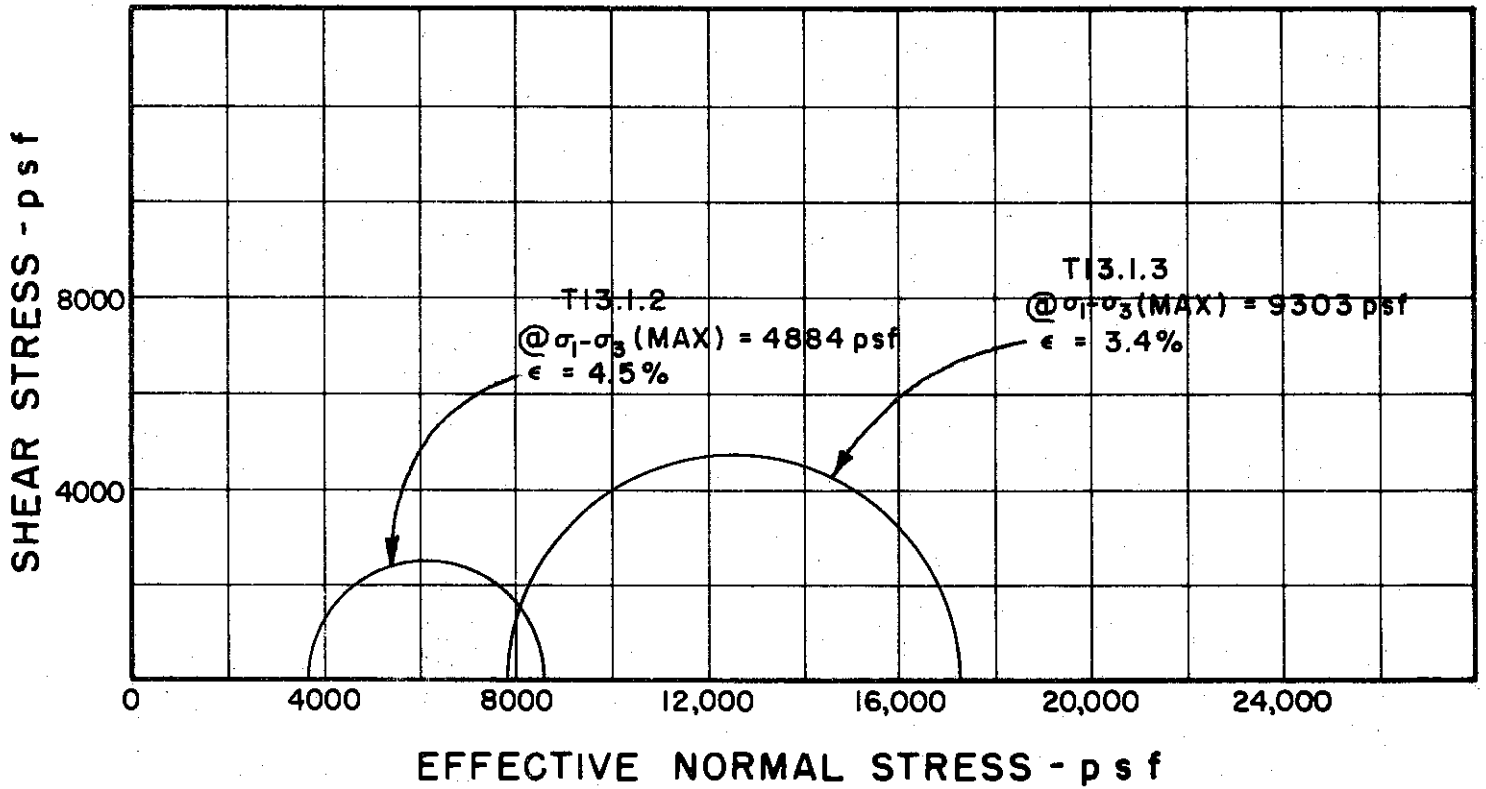
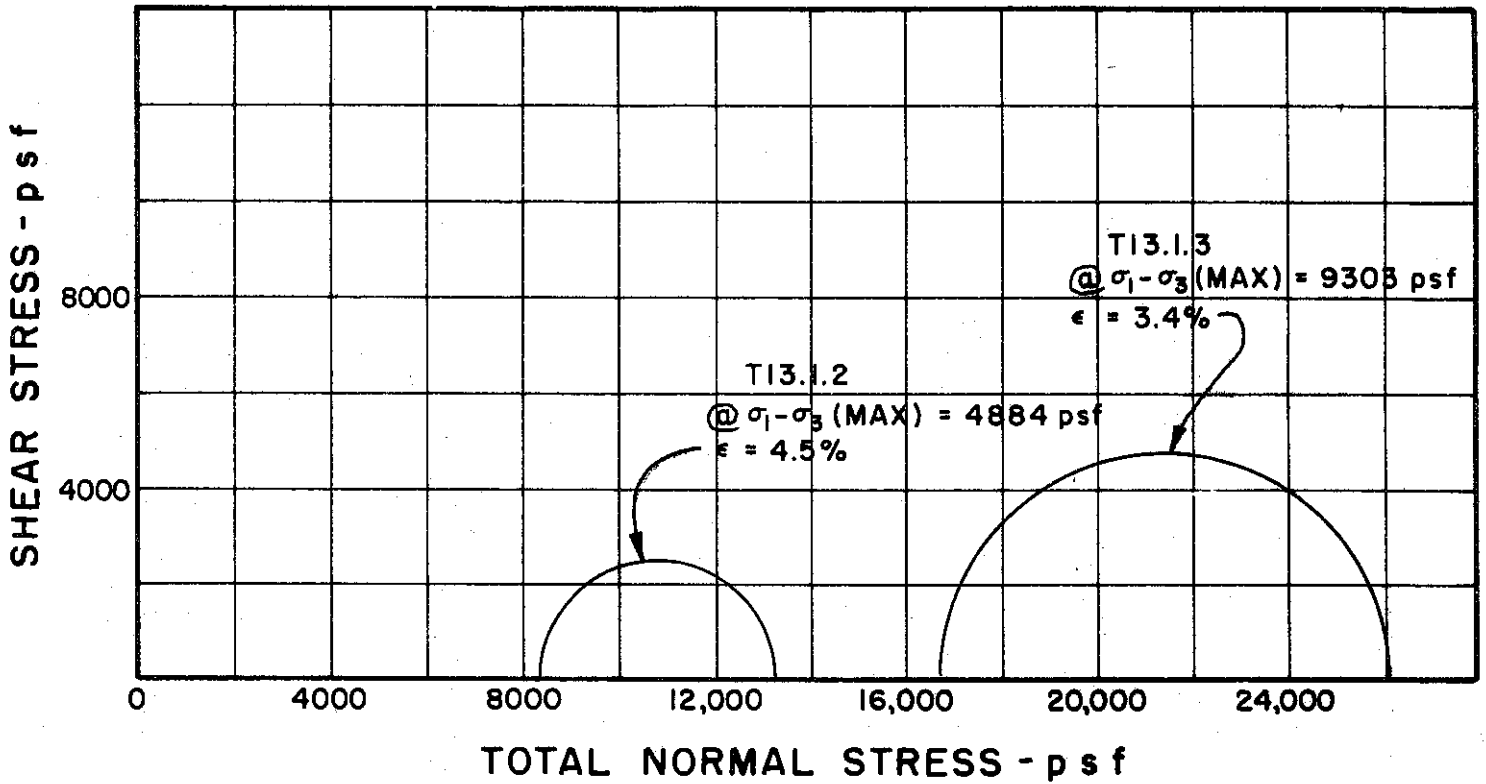
INITIAL CONDITIONS			T6.1.1	T6.1.2	T6.1.3
WATER CONTENT	$w_0$		36.1%	36.5%	30.0%
DRY DENSITY	$\gamma_d$	pcf	88	86	93
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.35	3.40	3.36
FINAL CONDITIONS BEFORE SHEAR			T6.1.1	T6.1.2	T6.1.3
FINAL BACK PRESSURE	$u_0$	psf	5760	7200	7200
INITIAL EFFECTIVE STRESS	$\sigma'_{1/3}$	psf	2304	4608	9216
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.0%	4.8%	8.5%
PORE PRESSURE RESPONSE			99%	95%	100%
FINAL CONDITIONS			T6.1.1	T6.1.2	T6.1.3
WATER CONTENT	$w_f$		34.3%	32.9%	23.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025
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BORING NO. 26  
 SAMPLE NO. 11  
 DEPTH 48.0 TO 50.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

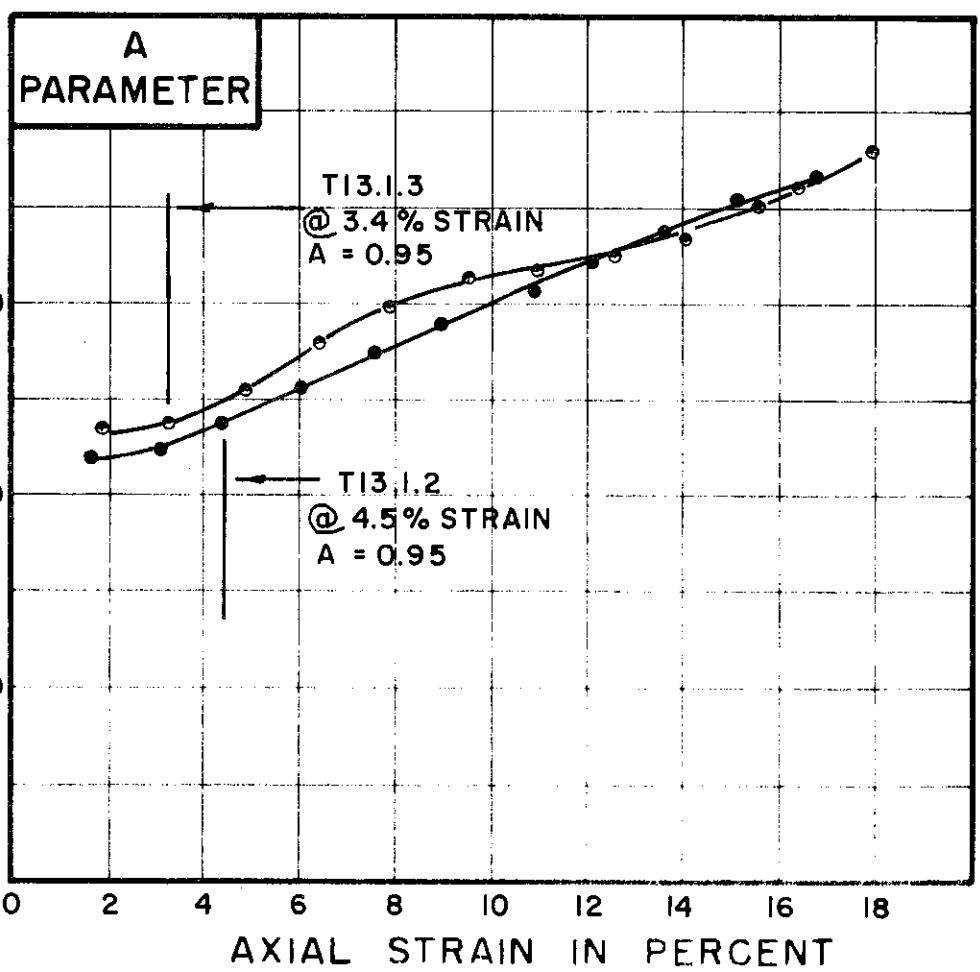
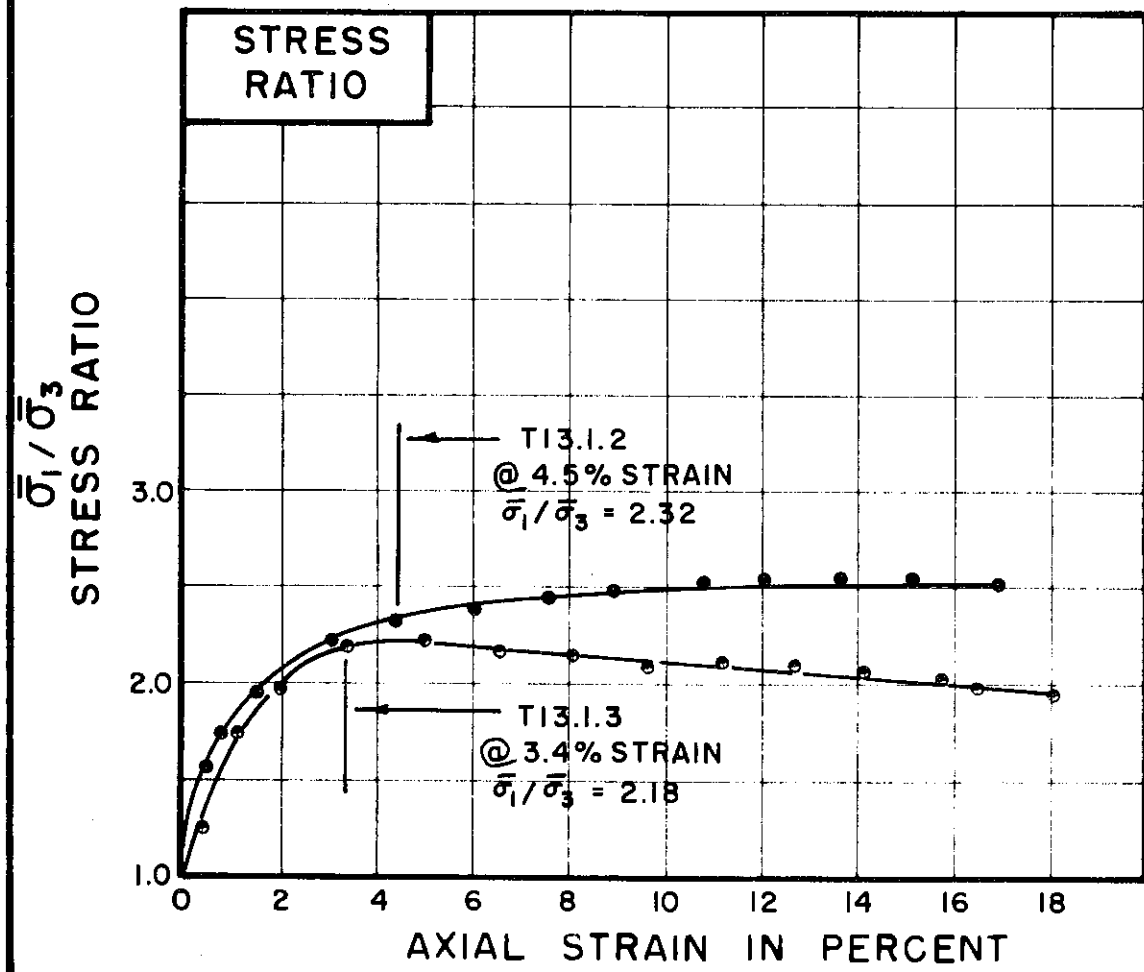
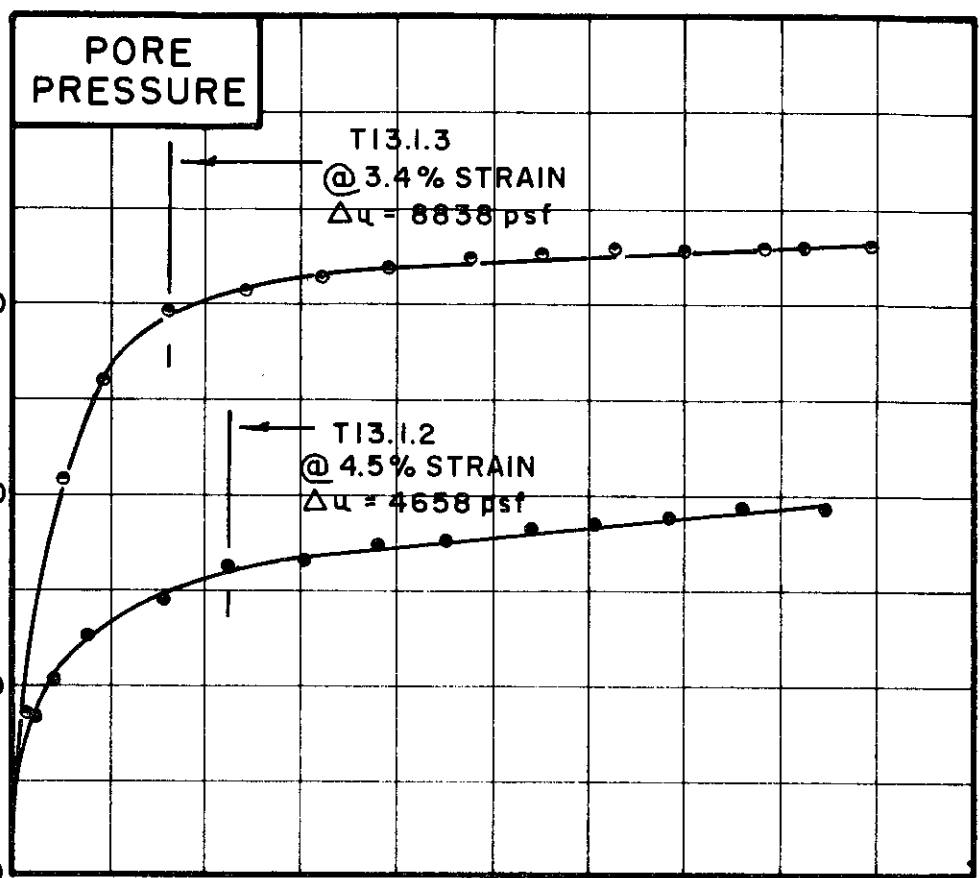
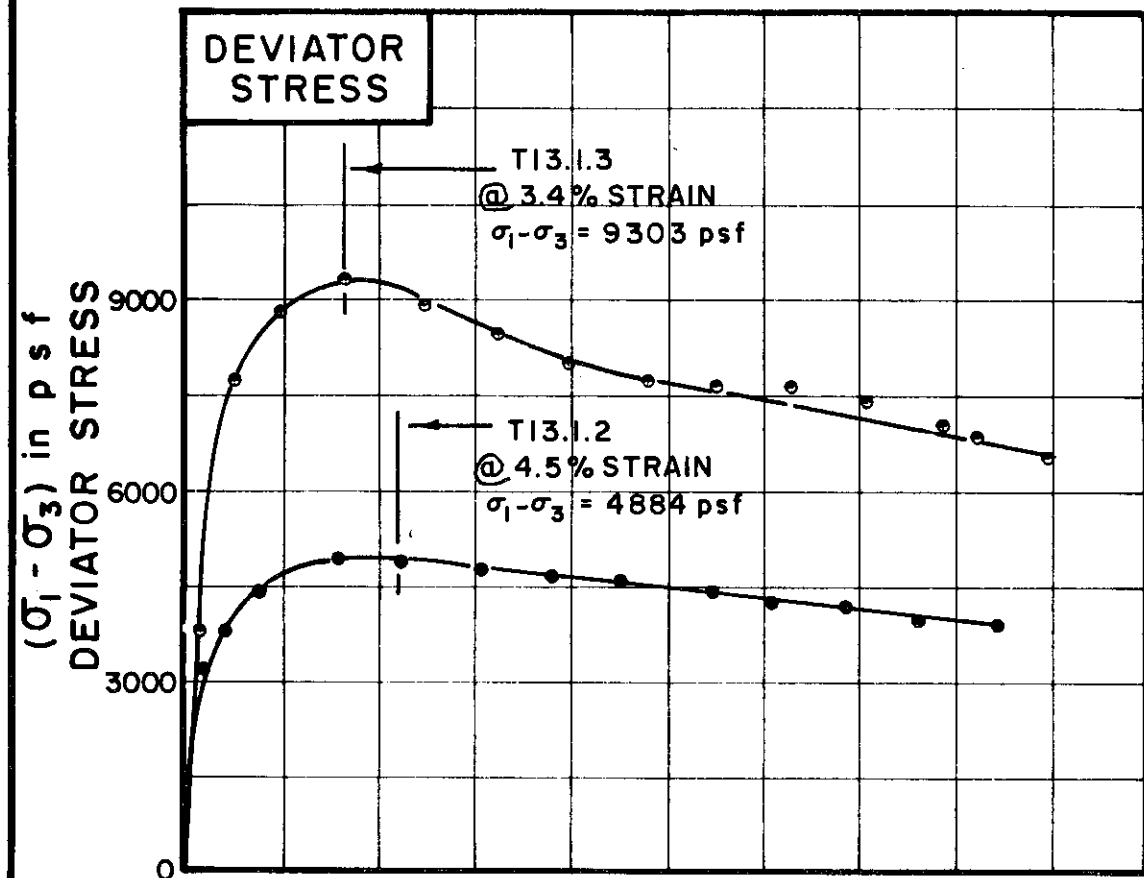
REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.1

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T13.1.2	T13.1.3
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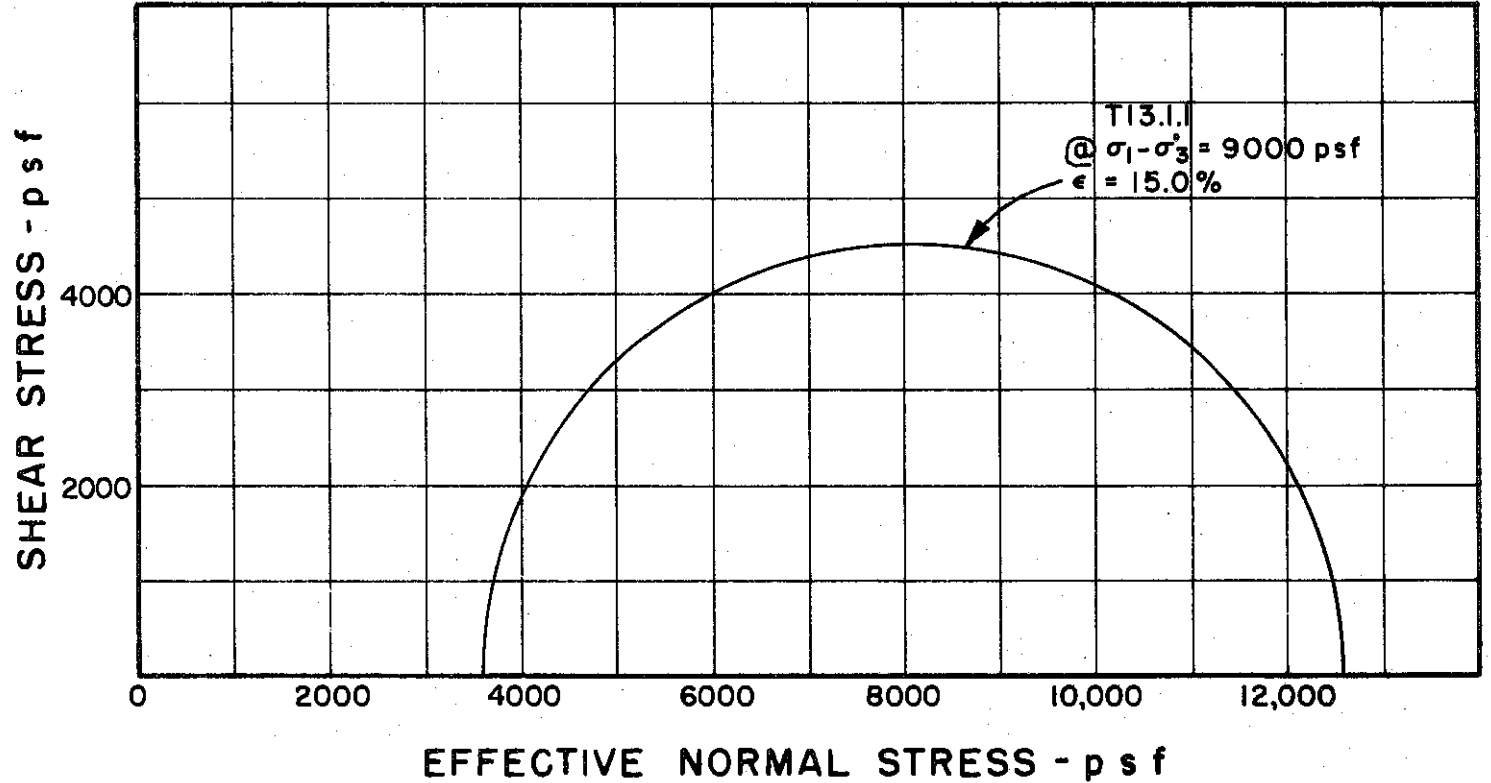
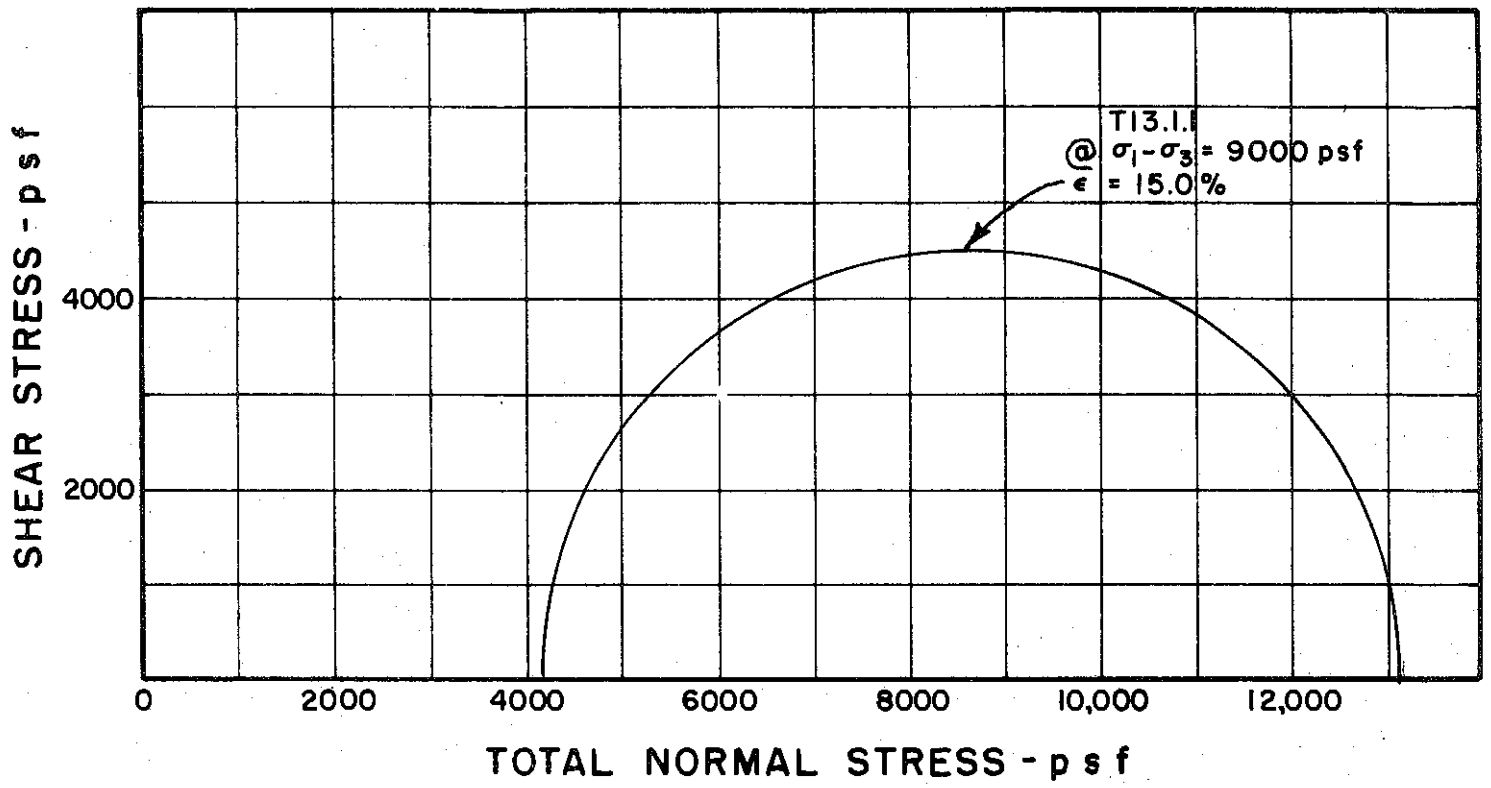
INITIAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_0$		35.6%	34.0%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	86	90	
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	
SAMPLE HEIGHT	$H_0$	in.	3.35	3.38	
FINAL CONDITIONS BEFORE SHEAR			T13.1.2	T13.1.3	
FINAL BACK PRESSURE	$u_0$	psf	6480	8640	
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1$ $\bar{\sigma}_3$	psf	8352	16704	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		60.9%	10.9%	%
PORE PRESSURE RESPONSE			98%	98%	
FINAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_f$		31.4%	27.6%	%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025
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BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 21  
 NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

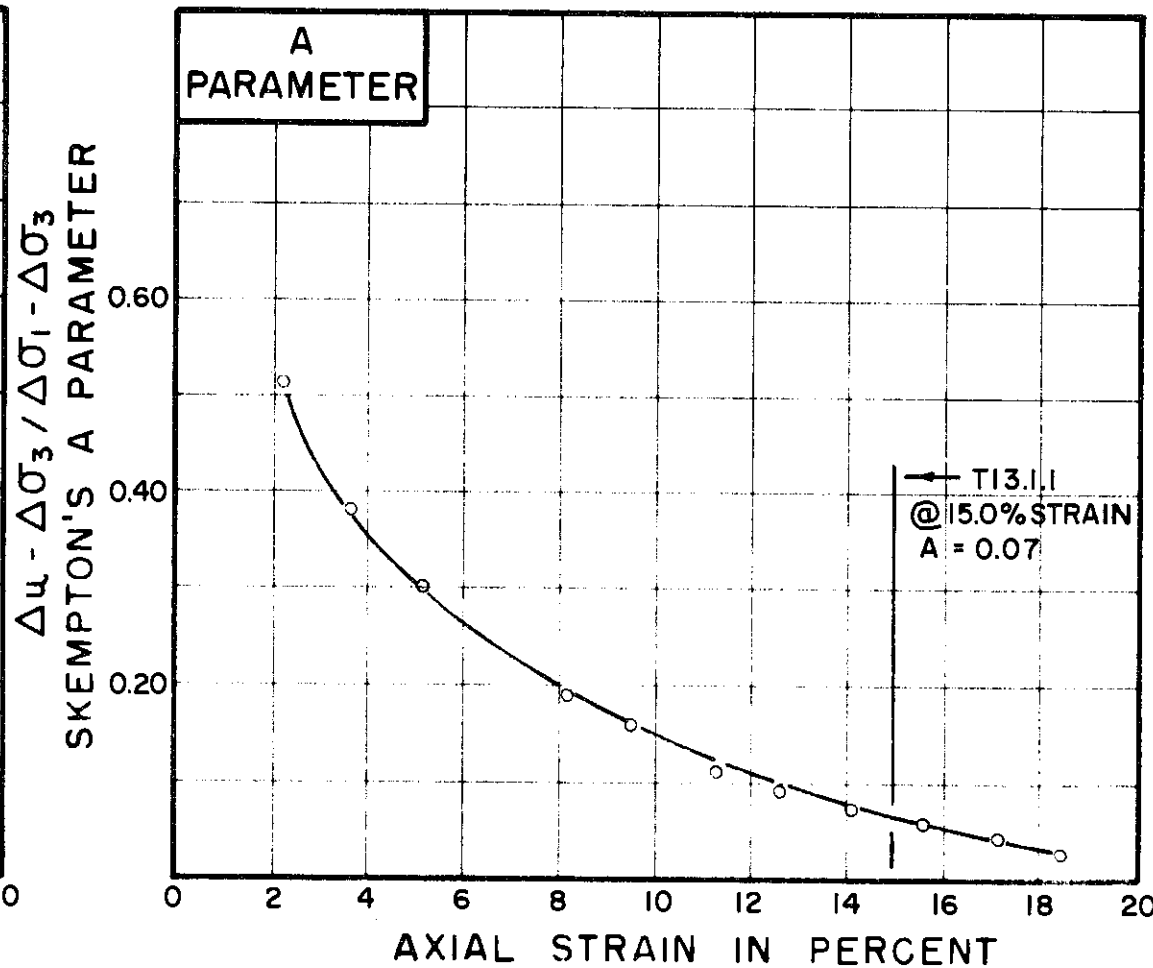
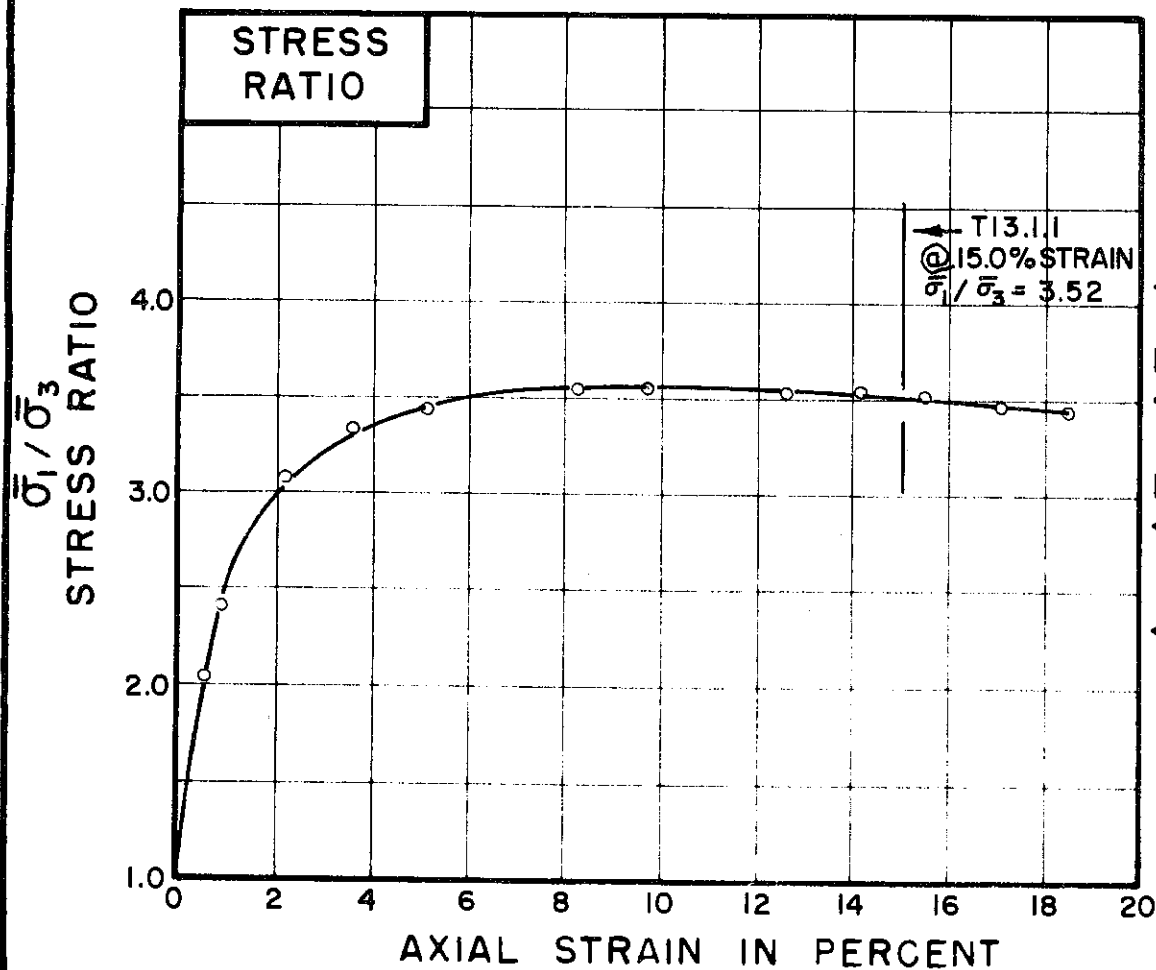
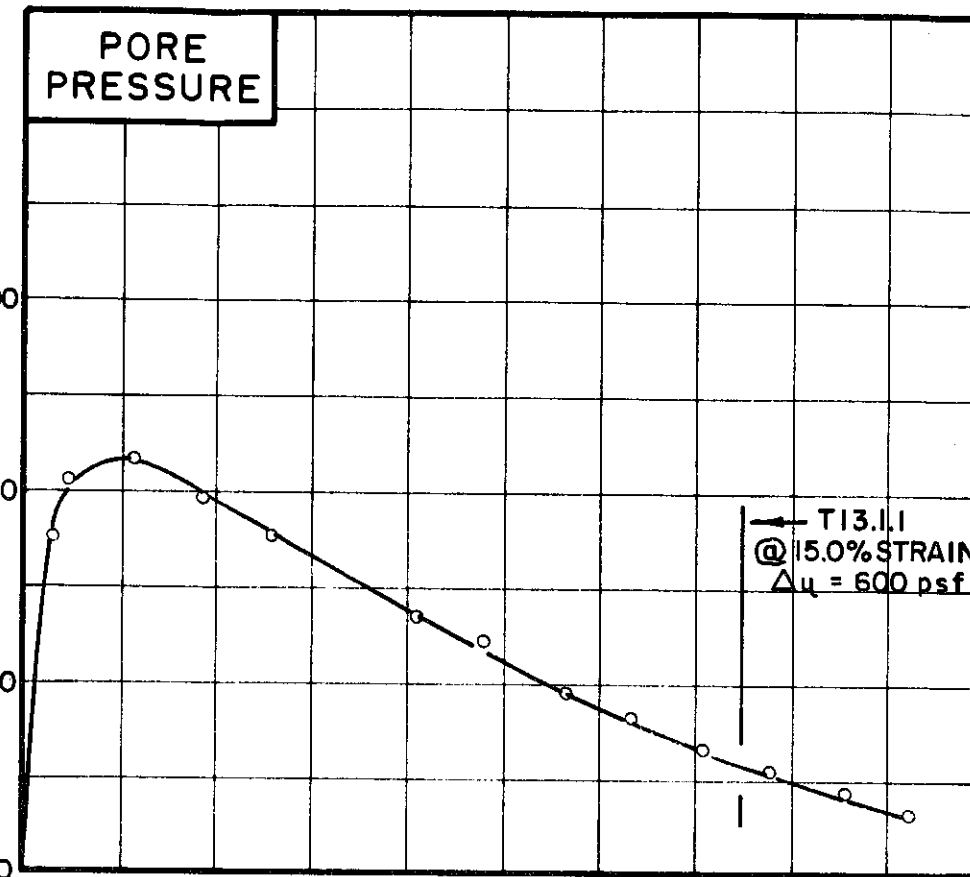
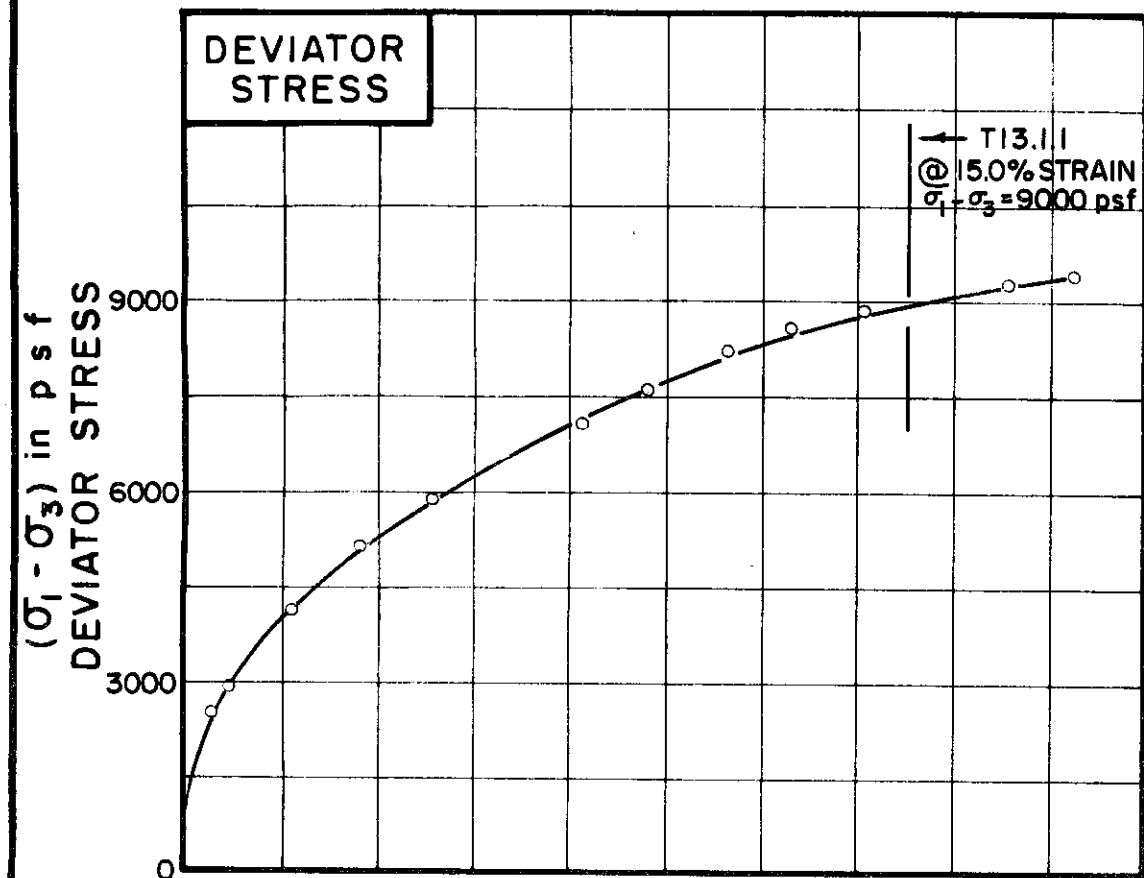
REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.2 & T13.1.3

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-395



TEST NO. / SYMBOL T13.1.1

INITIAL CONDITIONS	WATER CONTENT	w <sub>o</sub>	22.9%	%	%
	DRY DENSITY lb/cu ft	γ <sub>d</sub>	96		
	SAMPLE DIAMETER in.	D <sub>o</sub>	1.40		
	SAMPLE HEIGHT in.	H <sub>o</sub>	3.38		
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u <sub>o</sub>	6480		
	INITIAL EFFECTIVE STRESS psf	σ <sub>1</sub> σ <sub>3</sub>	4176		
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	1.77%	%	%
	PORE PRESSURE RESPONSE		96%		
FINAL CONDITIONS	WATER CONTENT	w <sub>f</sub>	22.9%	%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE .024

BORING NO. 26

SAMPLE NO. 28

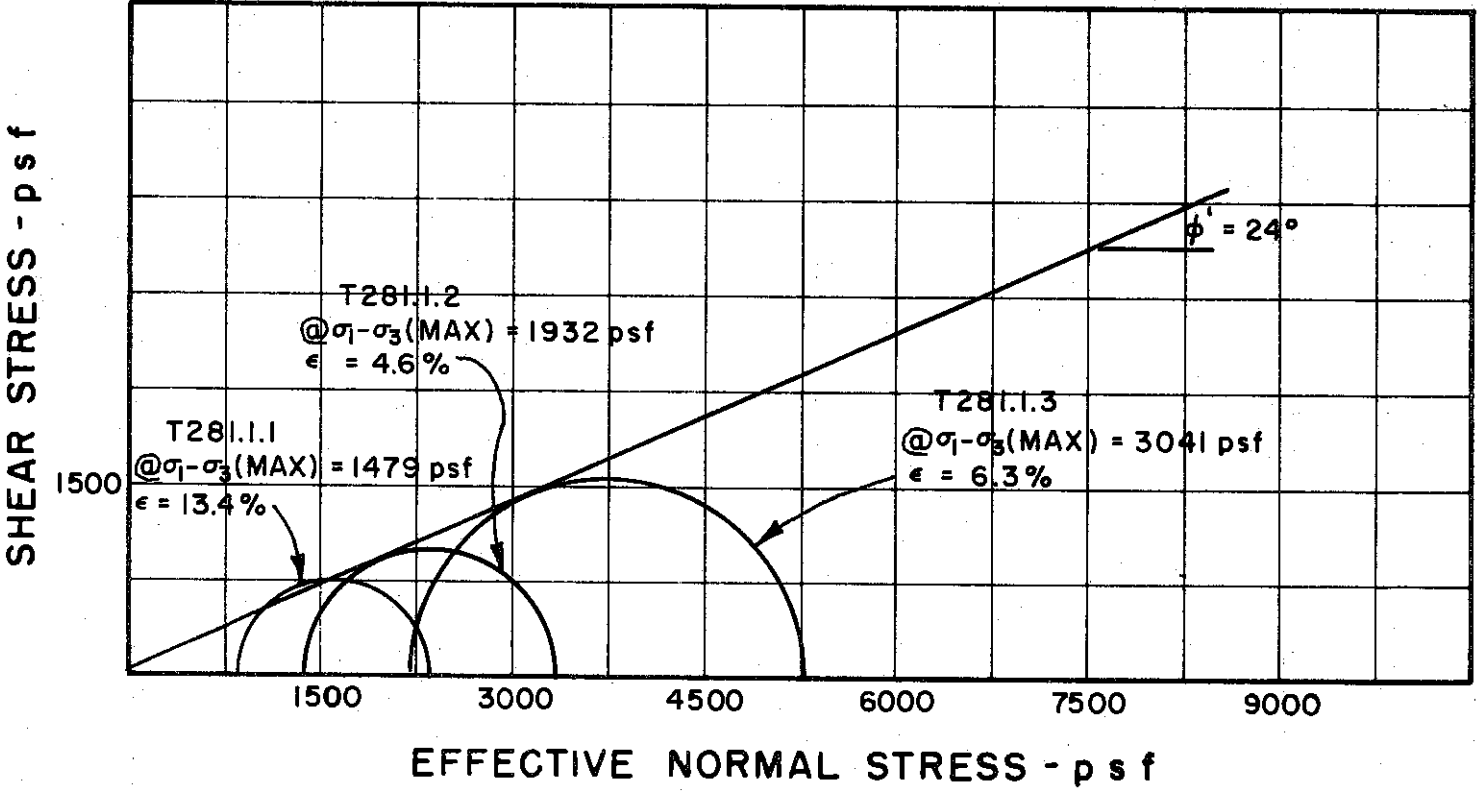
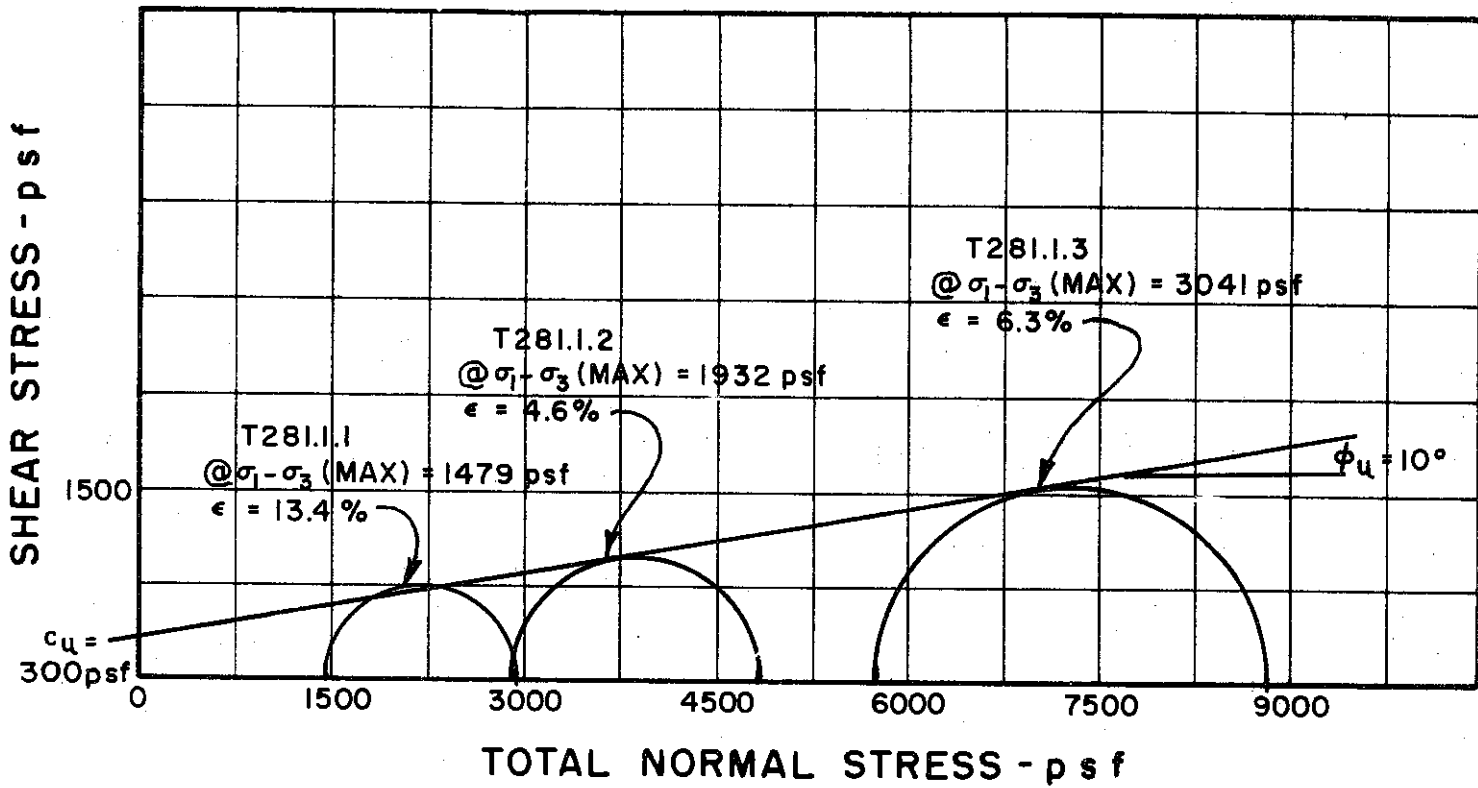
DEPTH 128.0' TO 130.0'

SOIL DESCRIPTION SILTY CLAY WITH LAYERS OF FINE SAND & SILT

LIQUID LIMIT — PLASTIC LIMIT —

NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 7

DEPTH 28.0' TO 30.5'

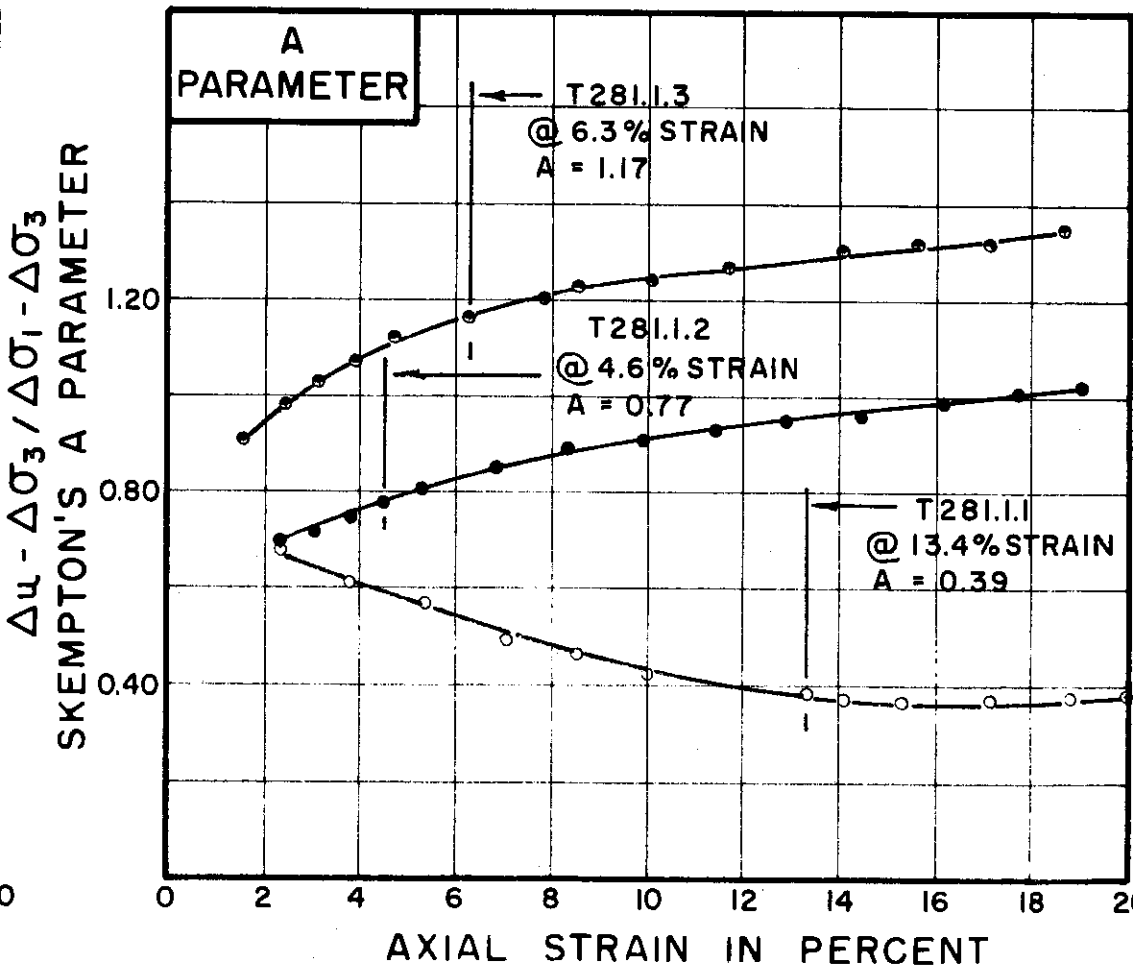
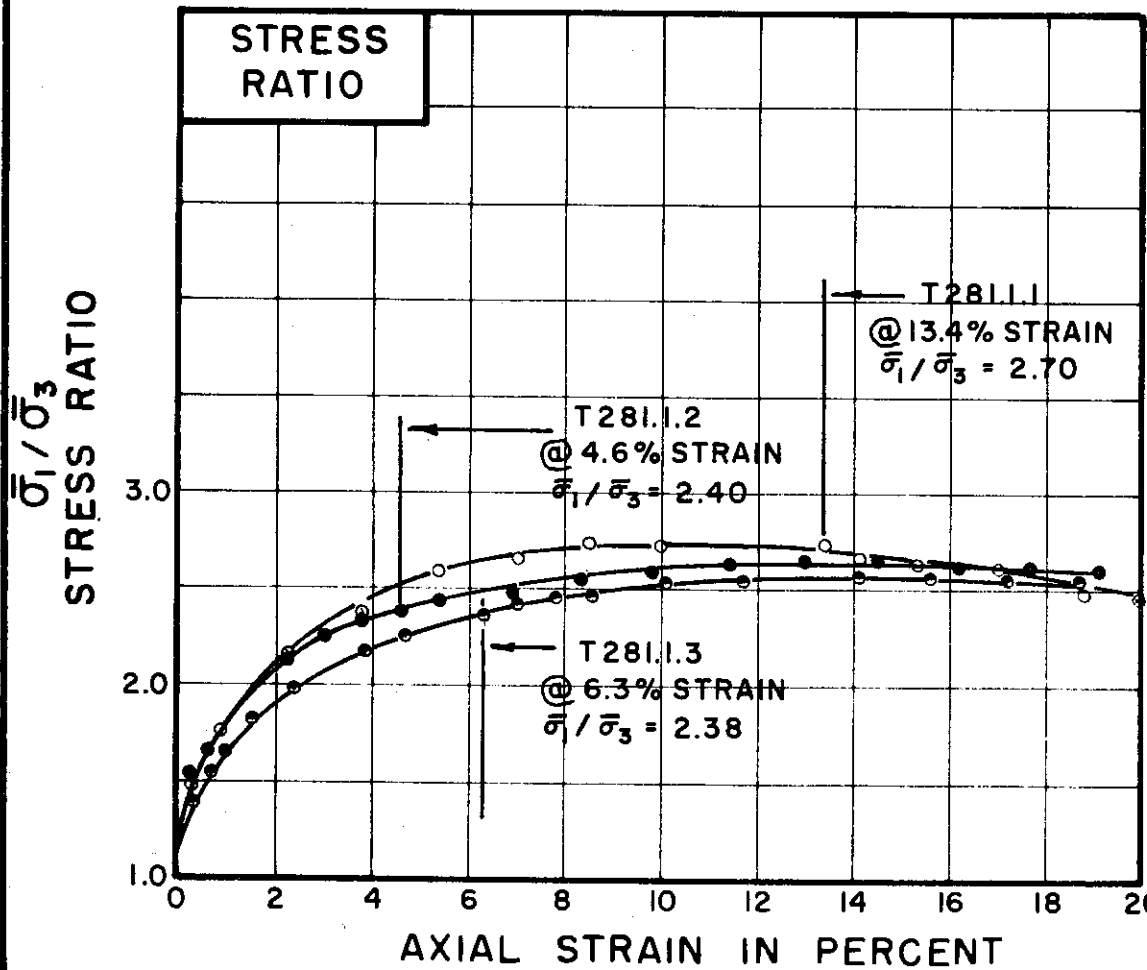
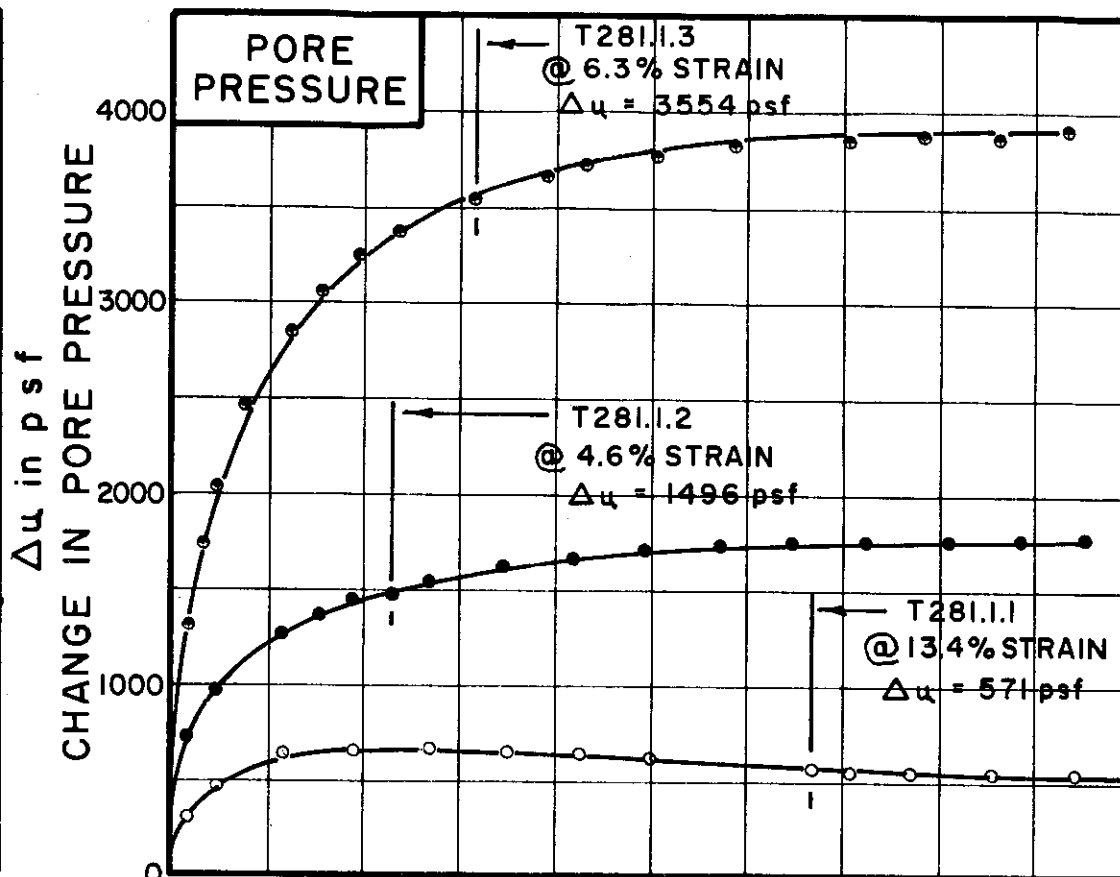
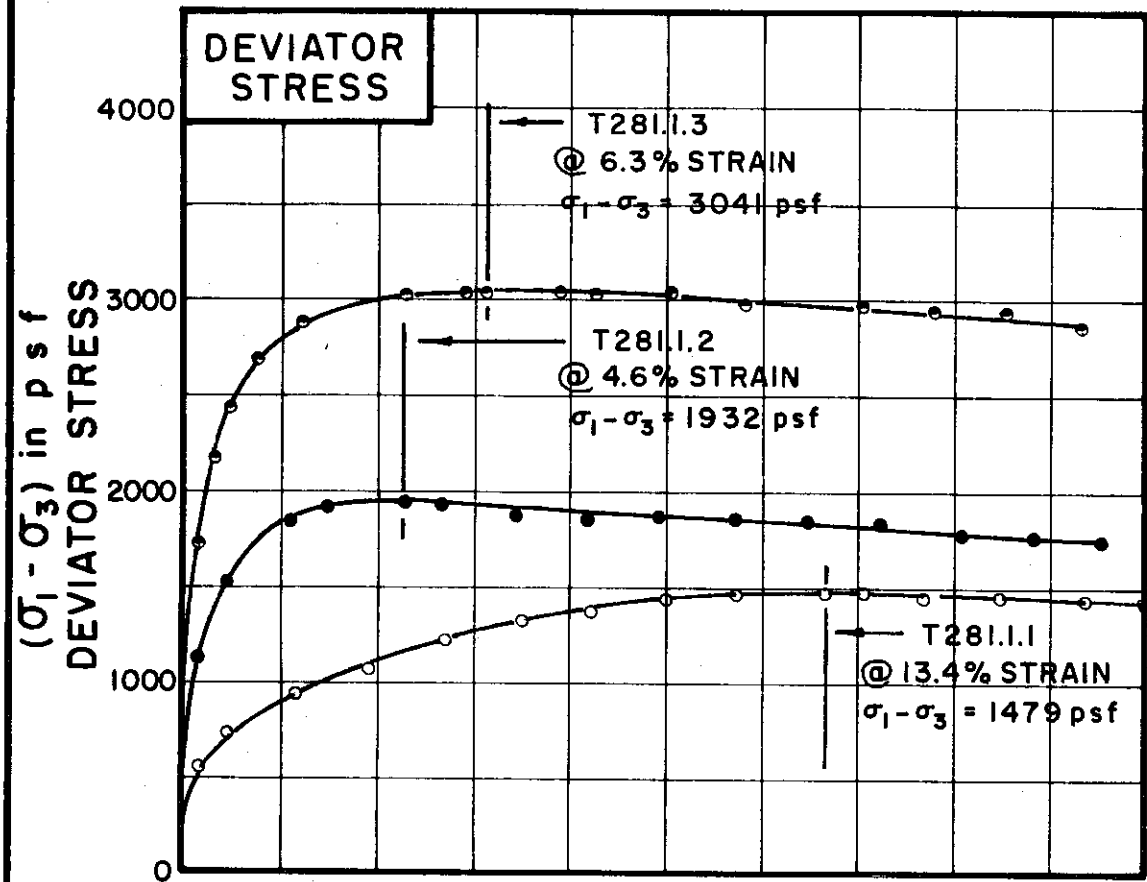
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T281.1.1	T281.1.2	T281.1.3
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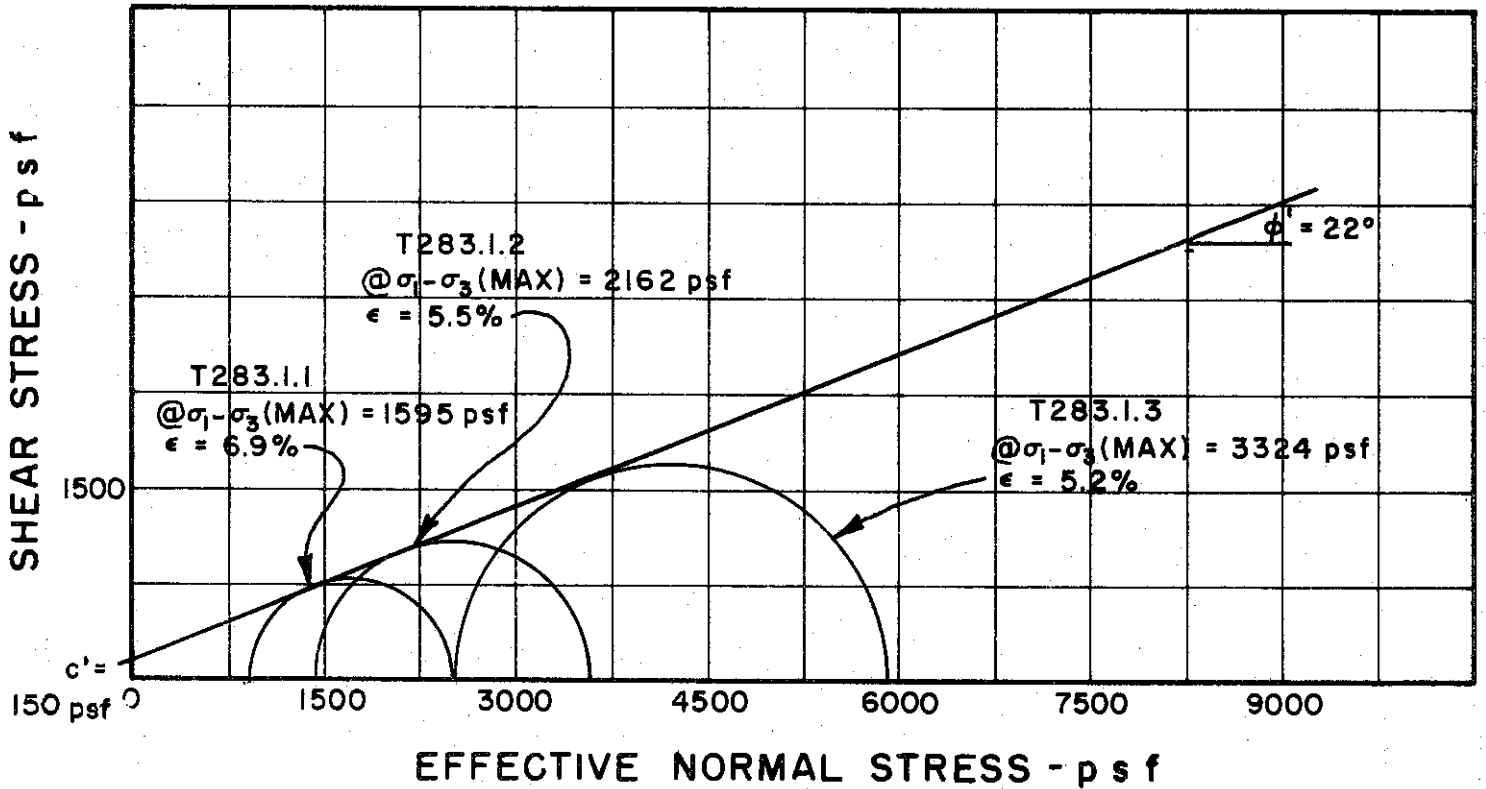
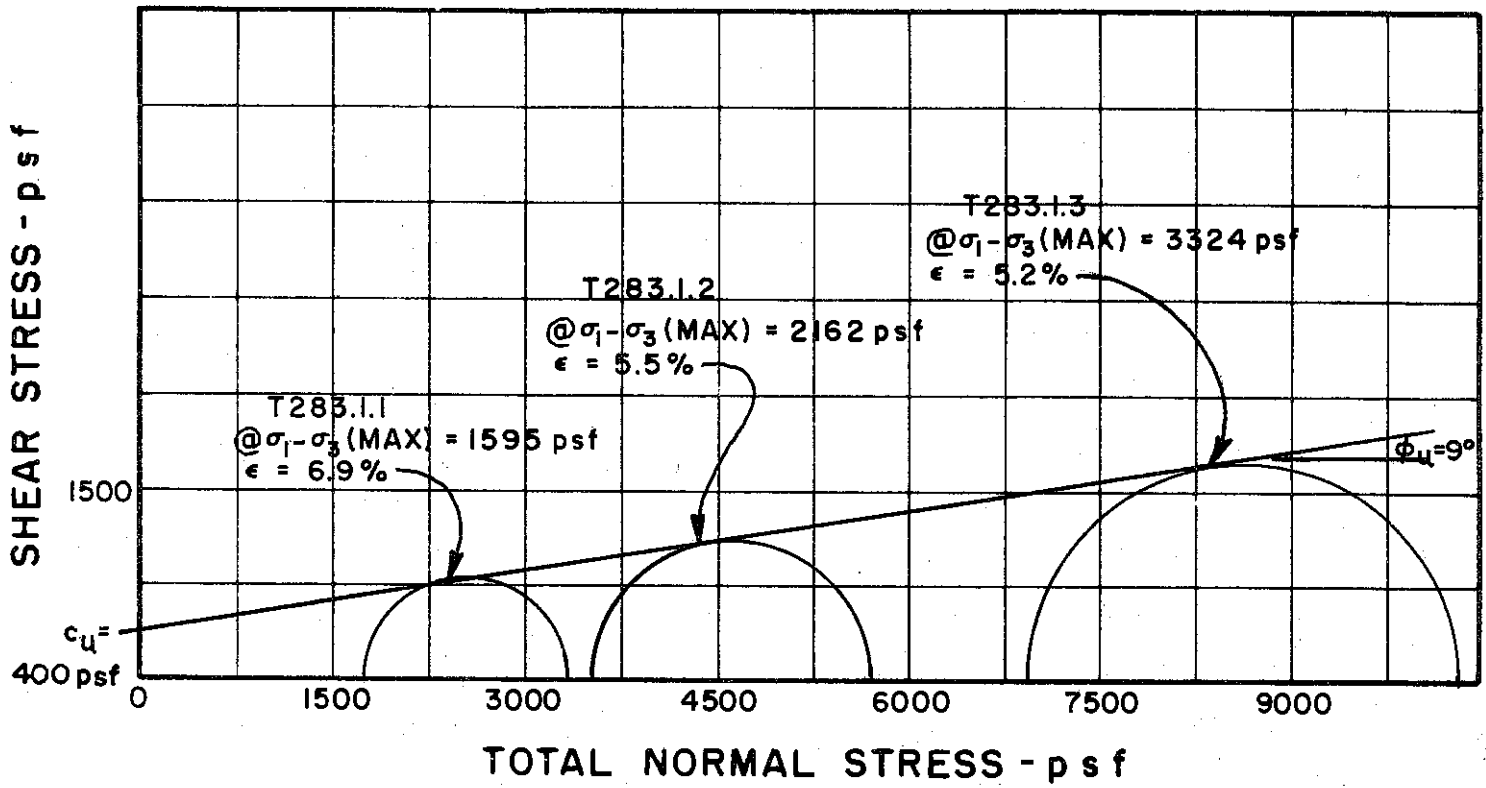
INITIAL CONDITIONS			T281.1.1	T281.1.2	T281.1.3
WATER CONTENT	w <sub>0</sub>		39.0%	39.7%	38.3%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	82	82	84
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.38	1.38	1.38
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.28	3.27	3.28
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	u <sub>0</sub>	psf	7200	7200	11520
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	psf	1440 / 2880	2880 / 5760	5760 / 11520
VOLUMETRIC STRAIN	ε <sub>vol</sub>		2.96%	4.10%	7.21%
PORE PRESSURE RESPONSE			98%	98%	96%
FINAL CONDITIONS					
WATER CONTENT	w <sub>f</sub>		37.3%	36.6%	31.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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BORING NO. 33  
SAMPLE NO. 7  
DEPTH 28.0' TO 30.5'  
SOIL DESCRIPTION SILTY CLAY (CL)  
LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





BORING NO. 33

SAMPLE NO. 9

DEPTH 38.0' TO 40.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

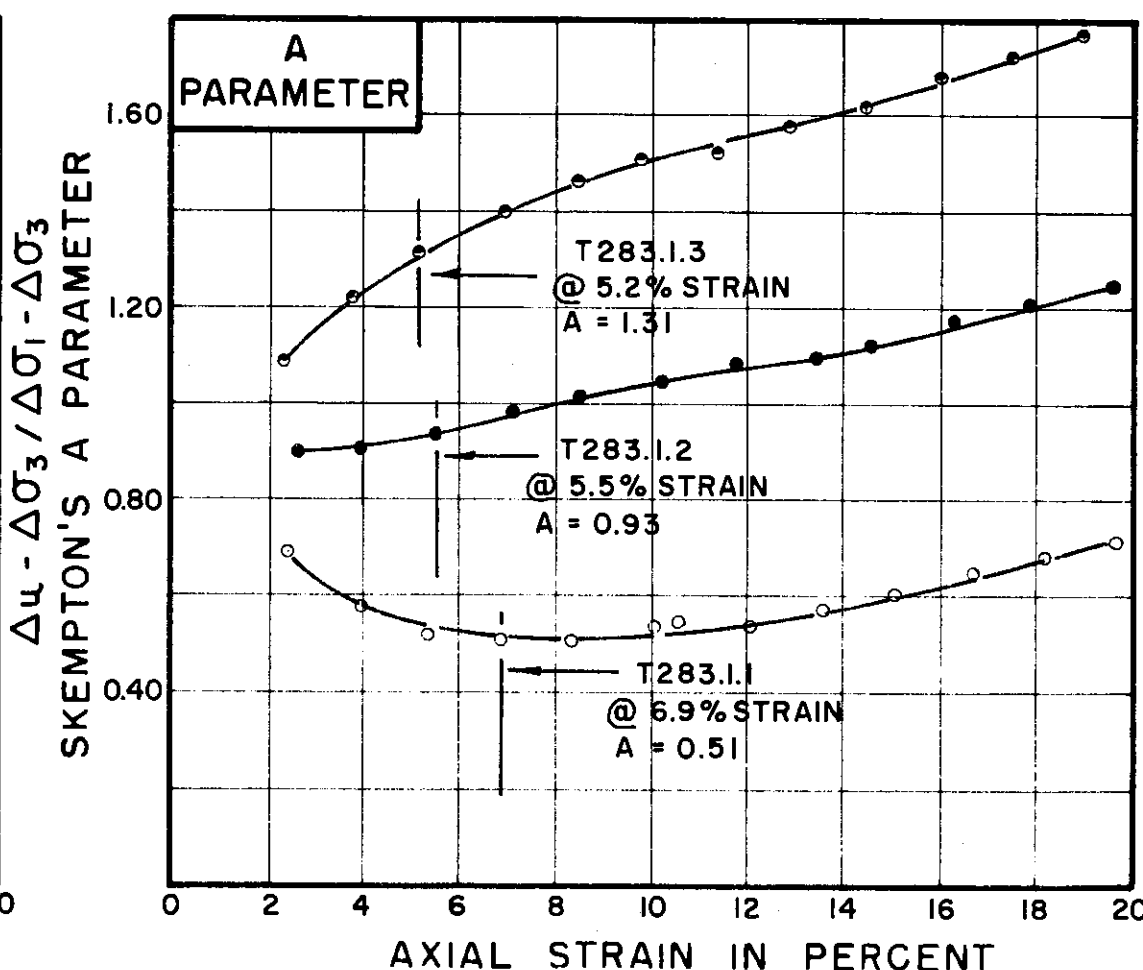
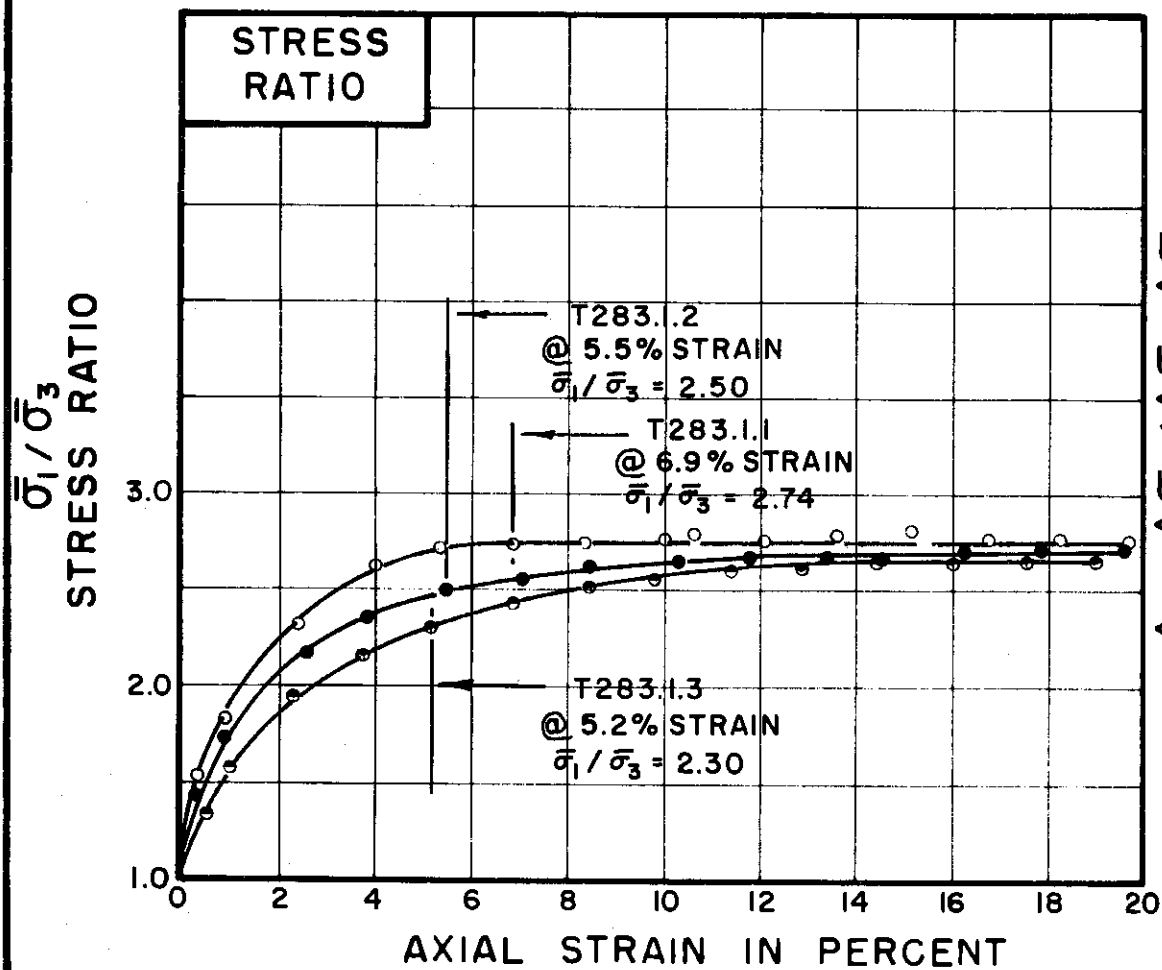
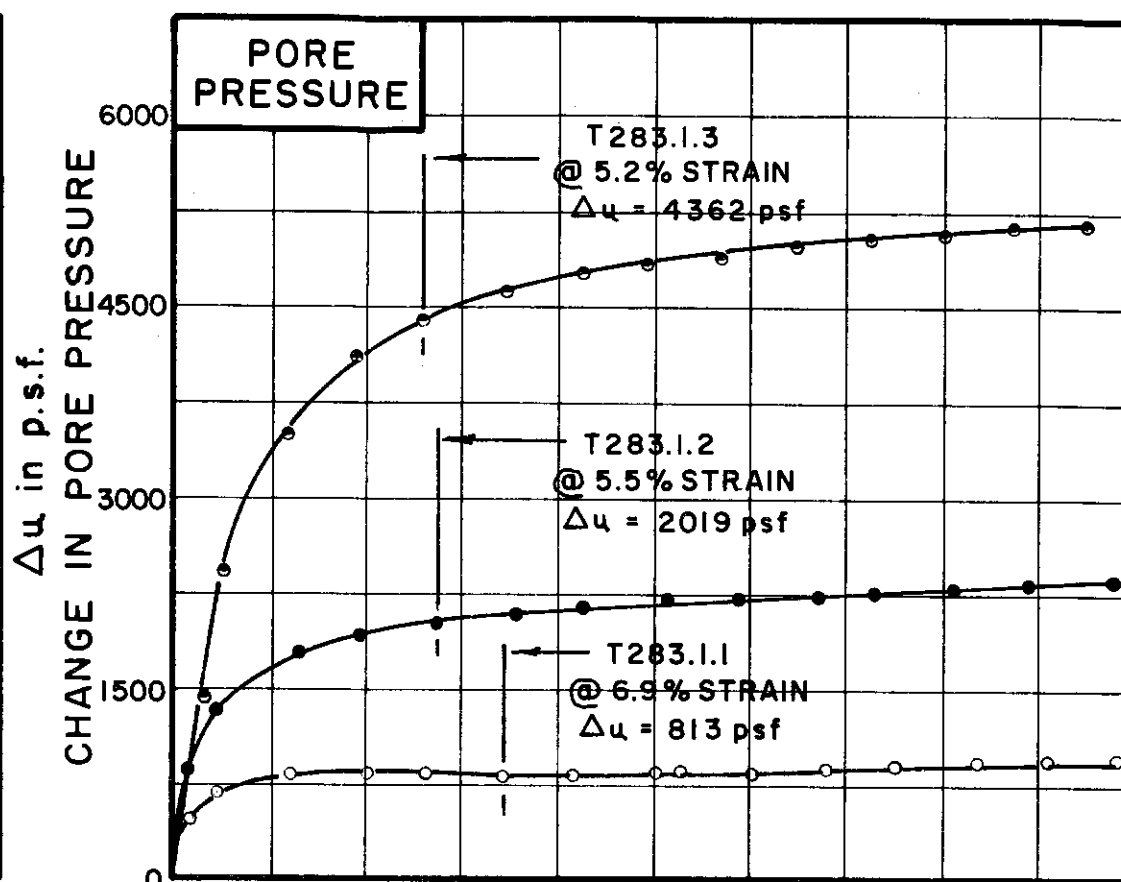
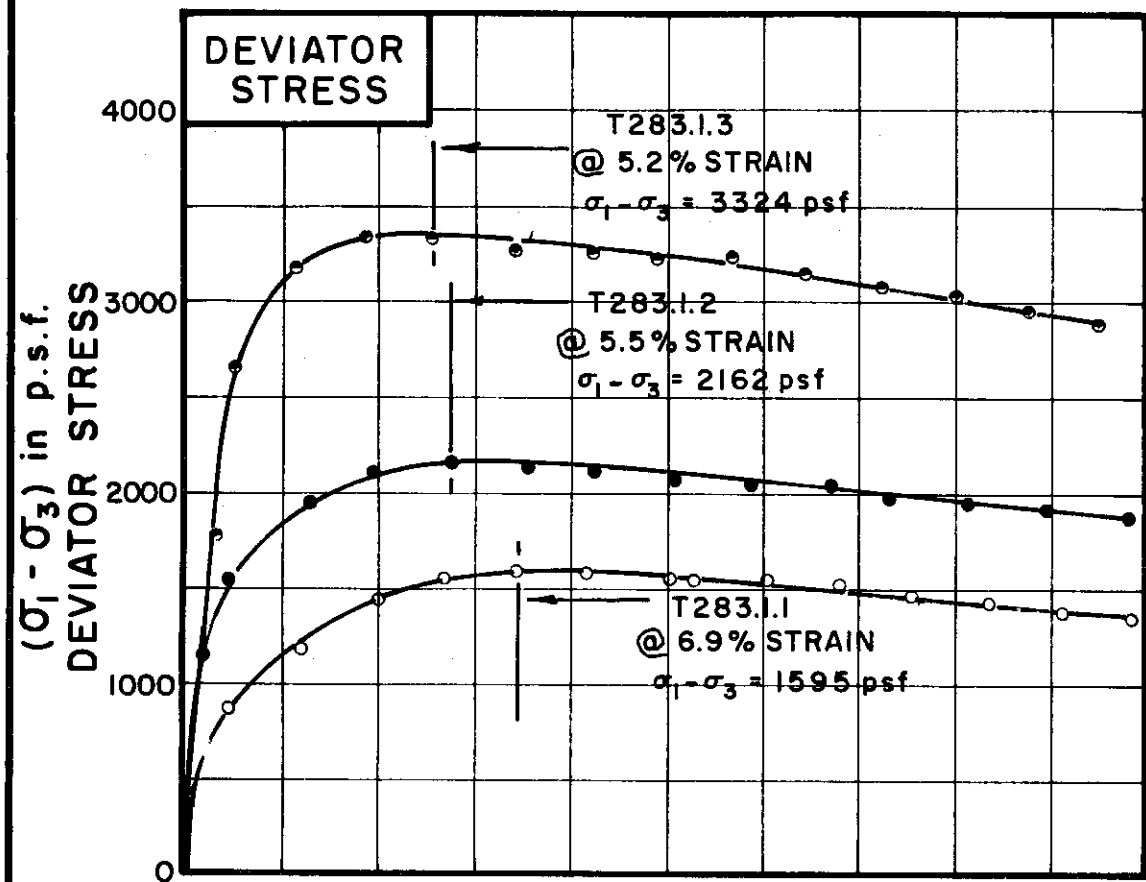
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-399



TEST NO. / SYMBOL	T283.1.1	T283.1.2	T283.1.3
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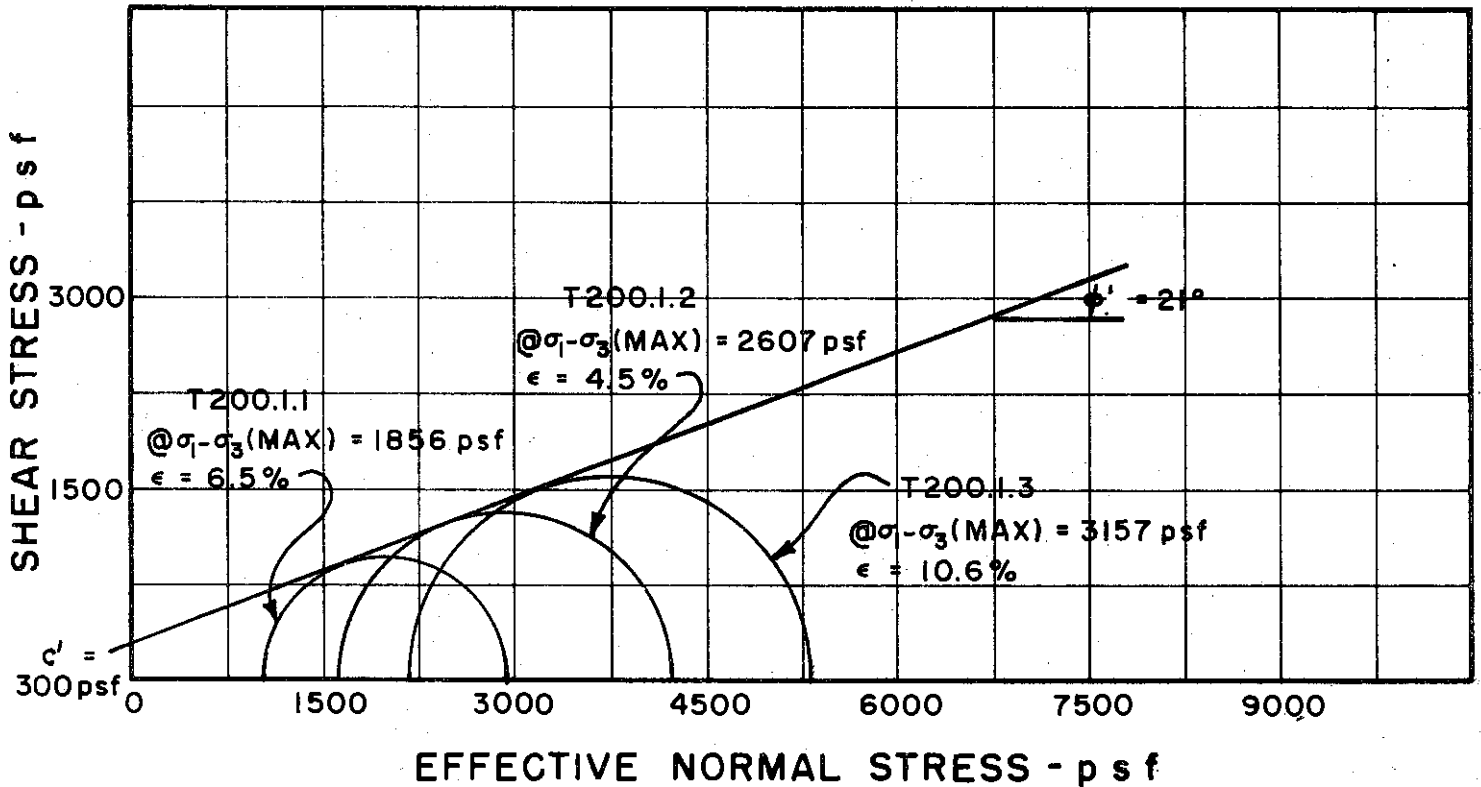
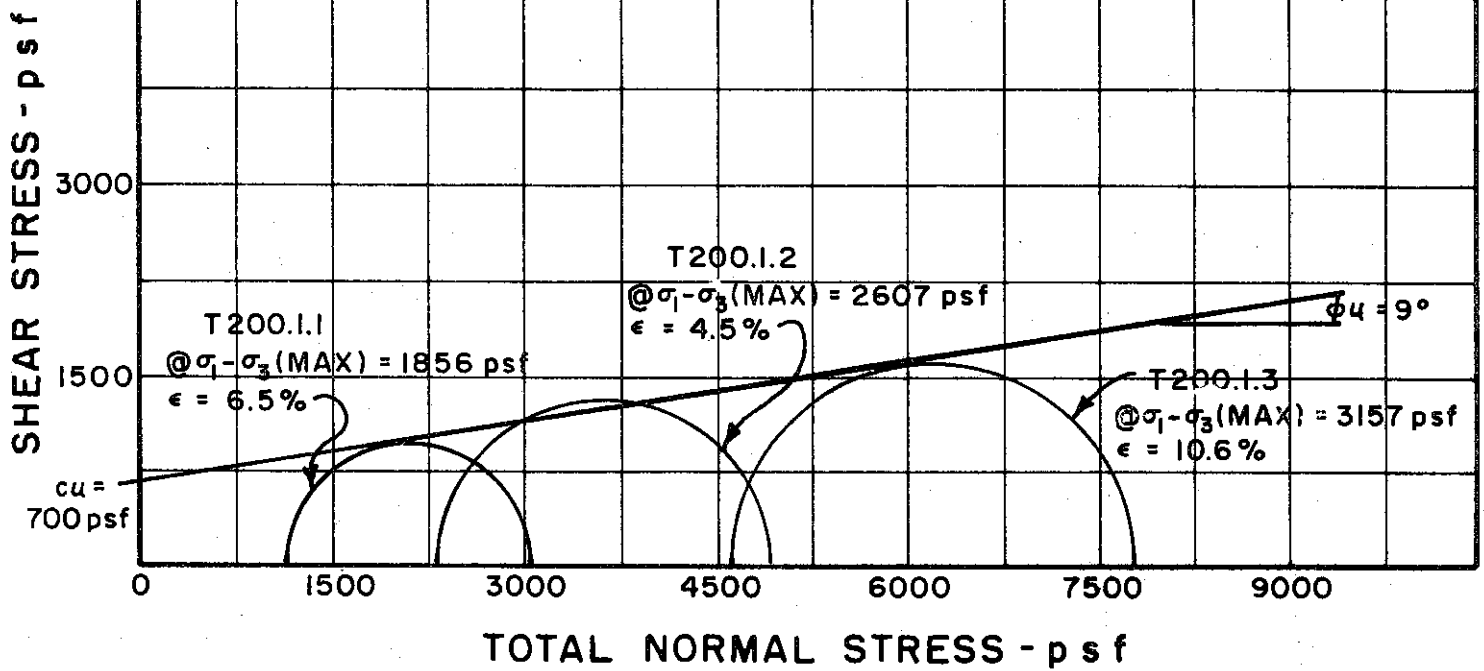
INITIAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_0$		37.4%	37.1%	36.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	85	86
SAMPLE DIAMETER	$D_0$	in.	1.40	1.39	1.39
SAMPLE HEIGHT	$H_0$	in.	3.31	3.25	3.32
CONDITIONS BEFORE SHEAR			T283.1.1	T283.1.2	T283.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	12960
INITIAL EFFECTIVE STRESS	$\frac{\bar{\sigma}_1}{\bar{\sigma}_3}$	p.s.f.	1728	3456	6912
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.35%	5.16%
PORE PRESSURE RESPONSE			96%	98%	95%
FINAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_f$		35.5%	33.6%	30.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025	.024
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BORING NO. 33  
 SAMPLE NO. 9  
 DEPTH 38.0' TO 40.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 43 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0

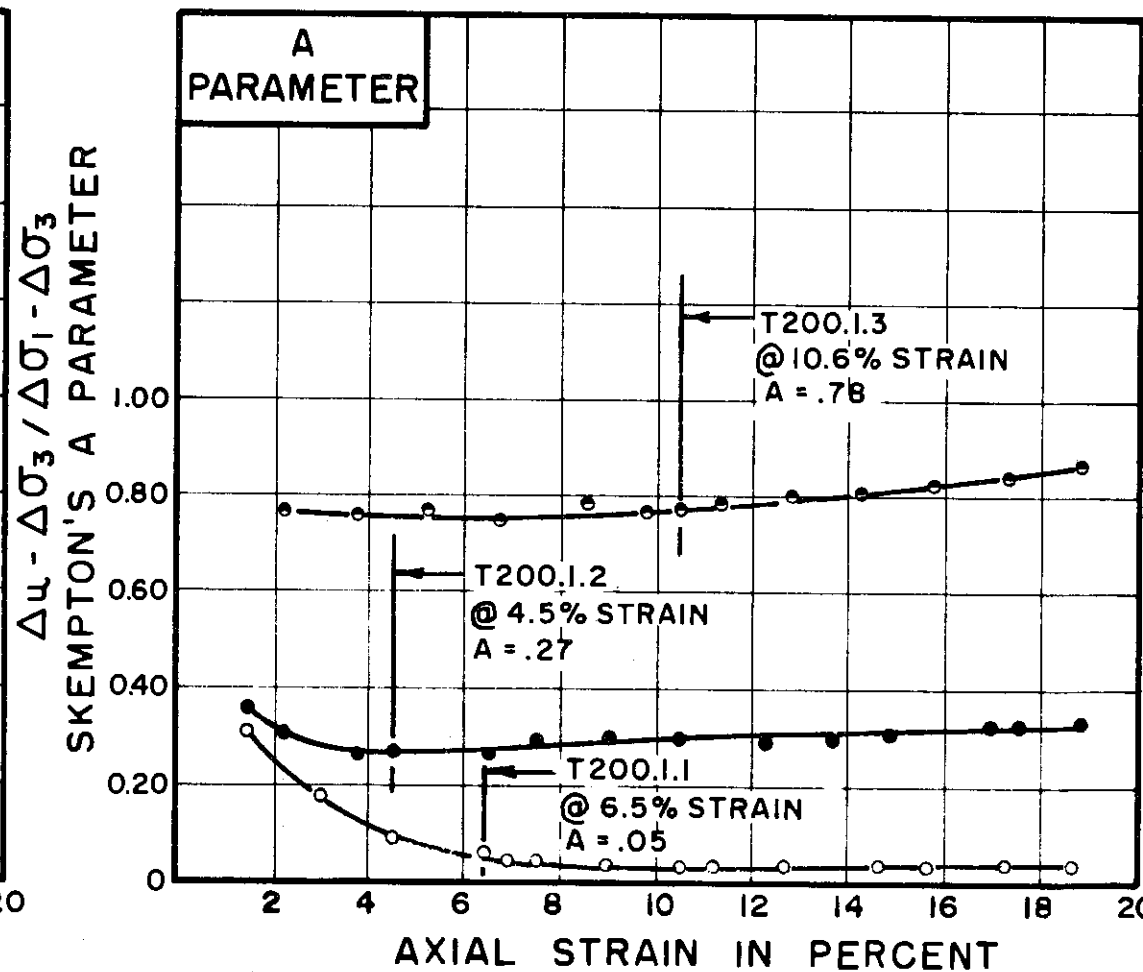
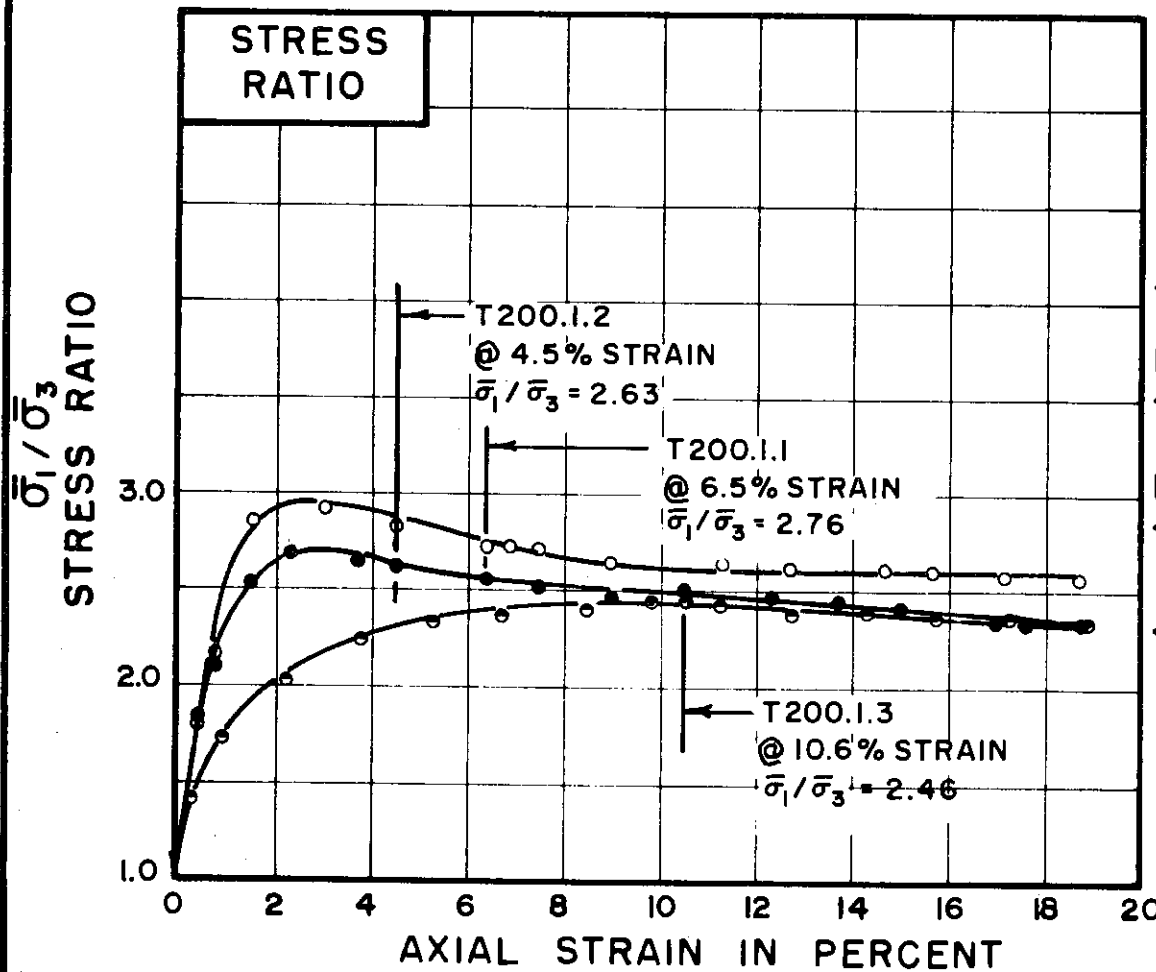
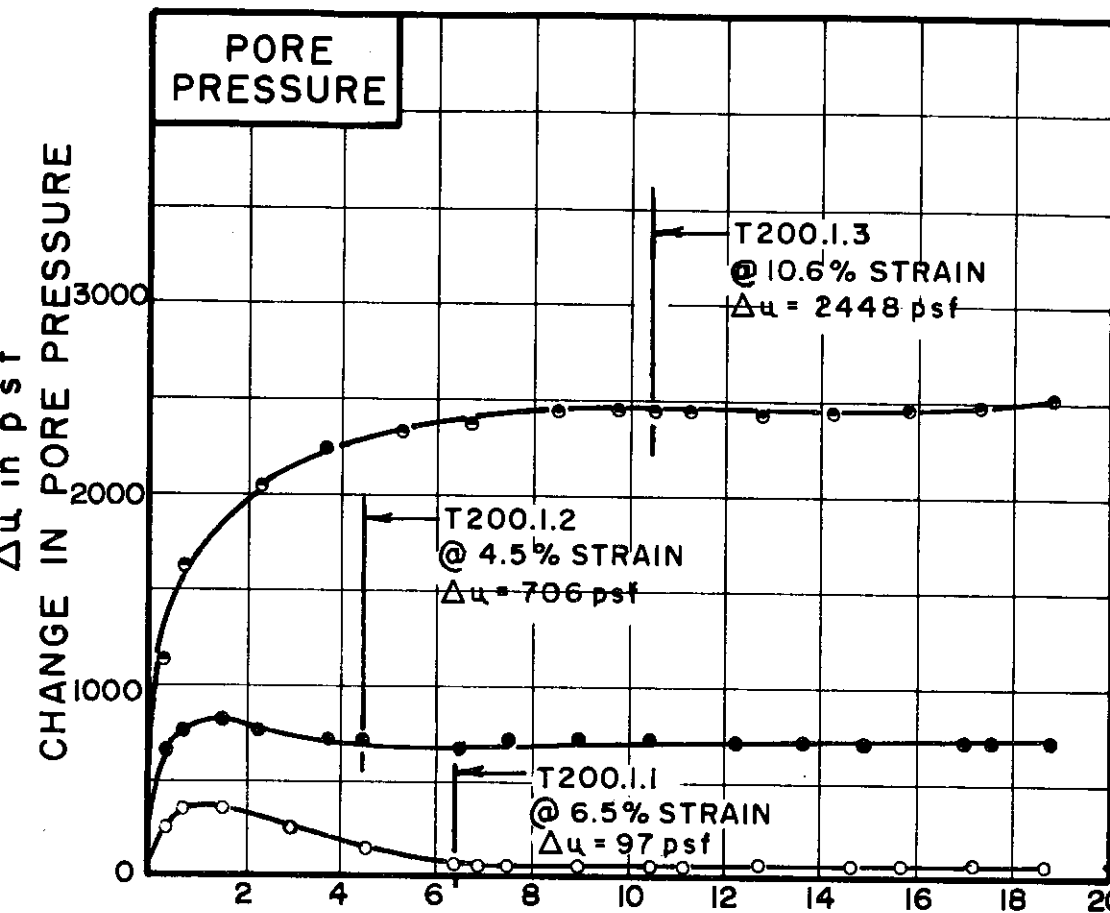
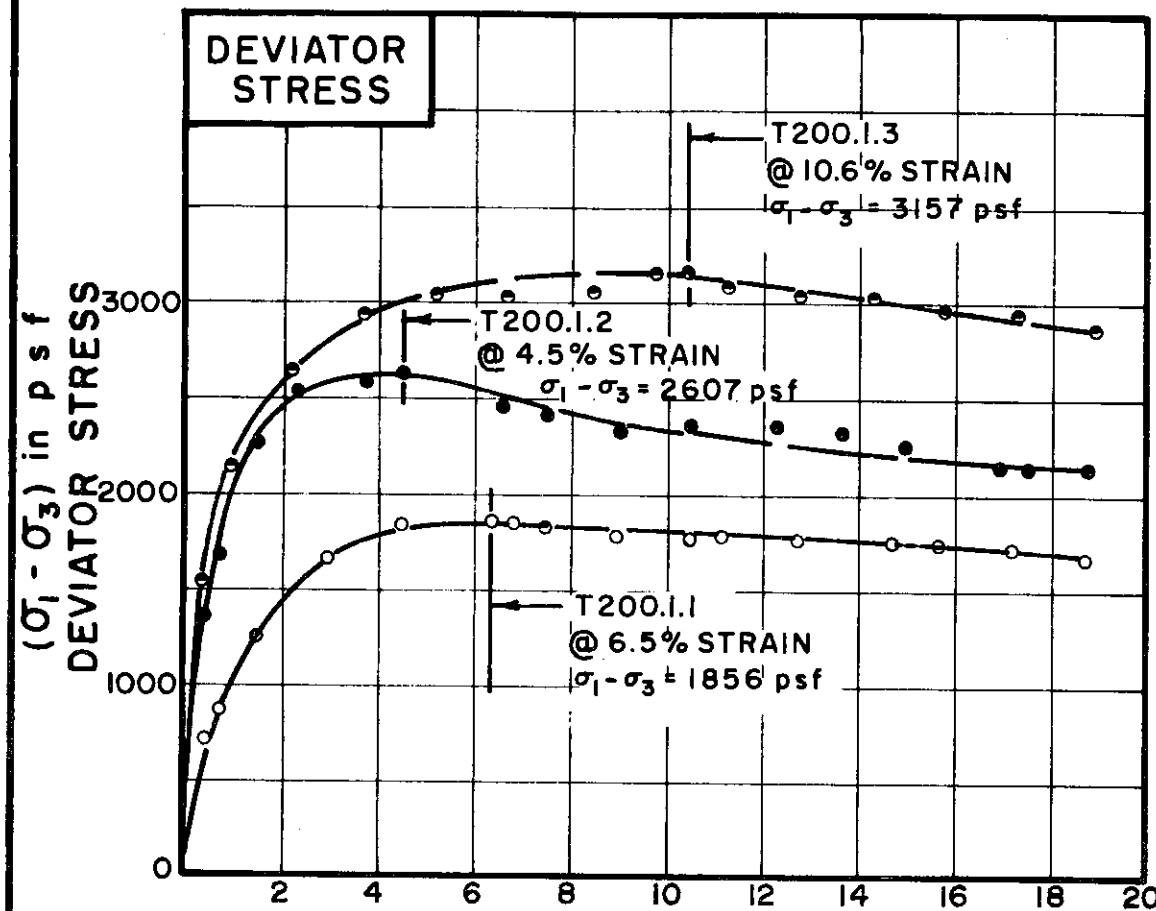
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255



TEST NO. / SYMBOL	T200.1.1	T200.1.2	T200.1.3
	○	●	○

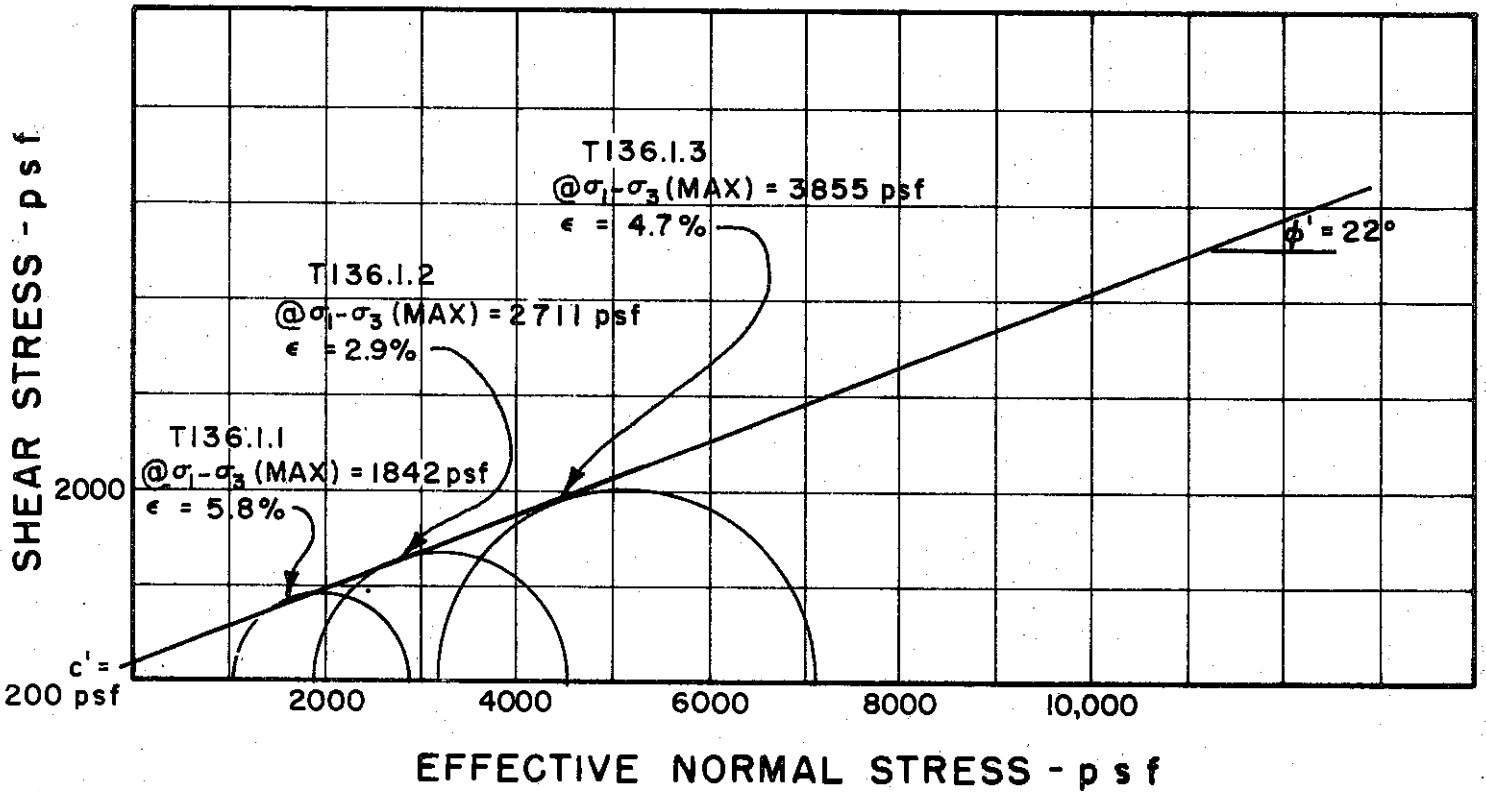
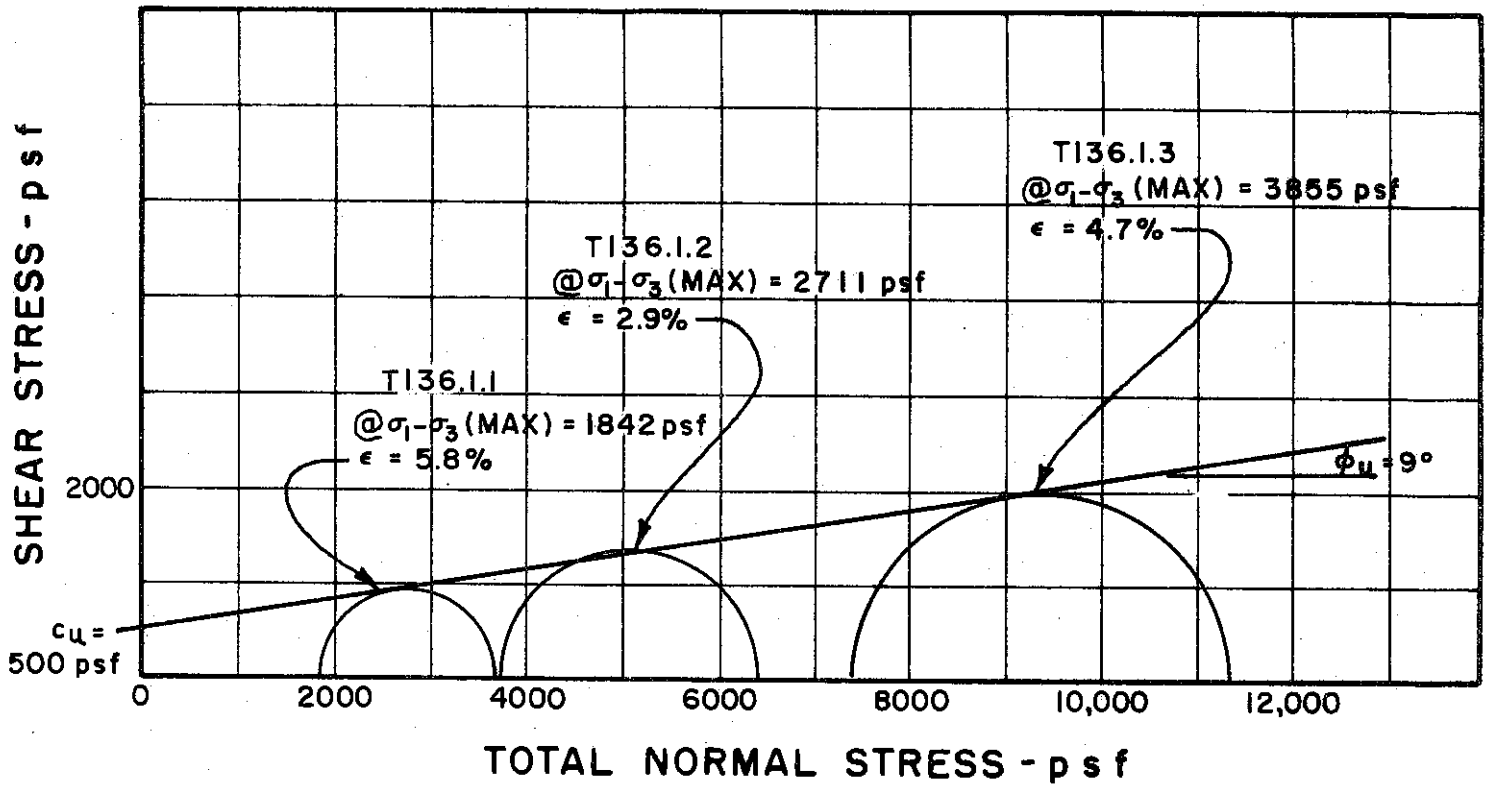
INITIAL CONDITIONS			T200.1.1	T200.1.2	T200.1.3
WATER CONTENT	$w_0$		32.8%	34.2%	35.6%
DRY DENSITY	$\gamma_d$	pcf	90	89	88
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.35	3.35	3.38
FINAL CONDITIONS BEFORE SHEAR			T200.1.1	T200.1.2	T200.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	8640	8640
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.6%	2.7%	5.9%
PORE PRESSURE RESPONSE			96%	99%	100%
FINAL CONDITIONS			T200.1.1	T200.1.2	T200.1.3
WATER CONTENT	$w_f$		32.1%	33.4%	31.0%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0  
 SOIL DESCRIPTION SILTY CLAY, (CL-CH)  
 LIQUID LIMIT 47 PLASTIC LIMIT 25

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 49

SAMPLE NO. 6

DEPTH 43.0' TO 45.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

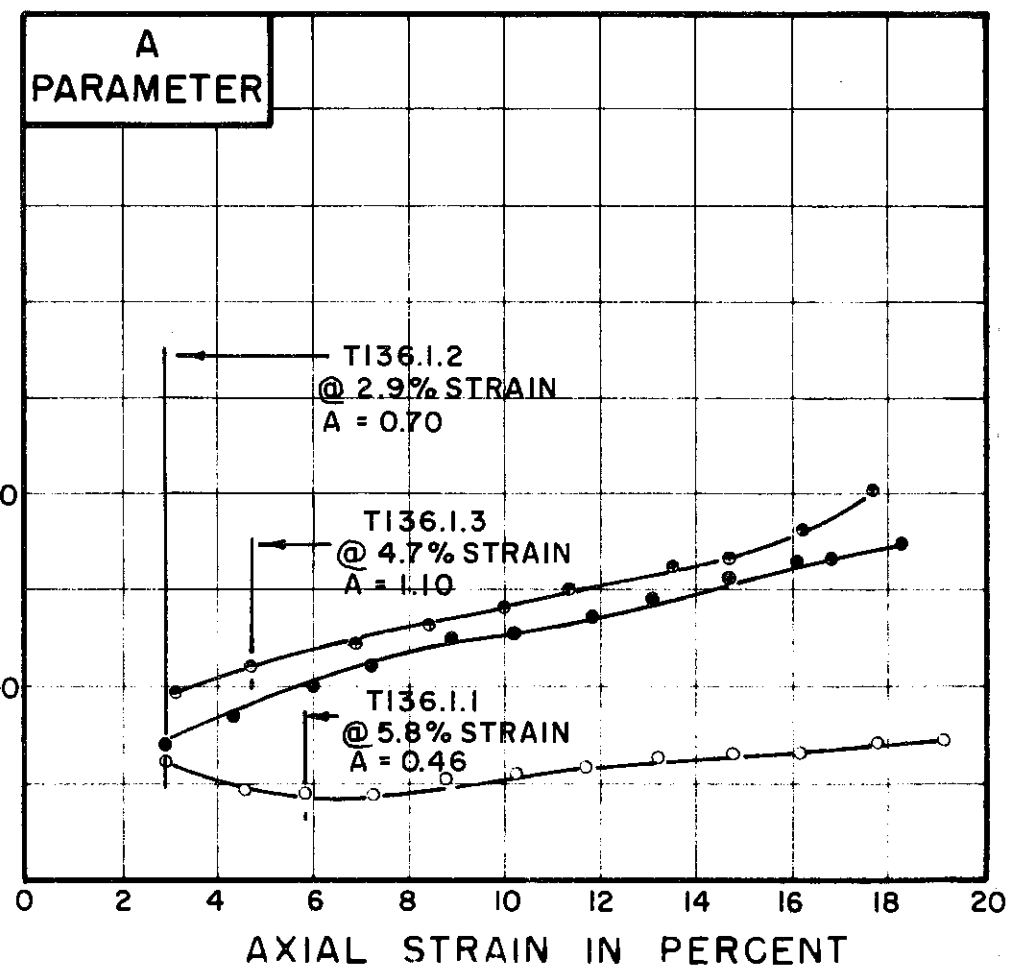
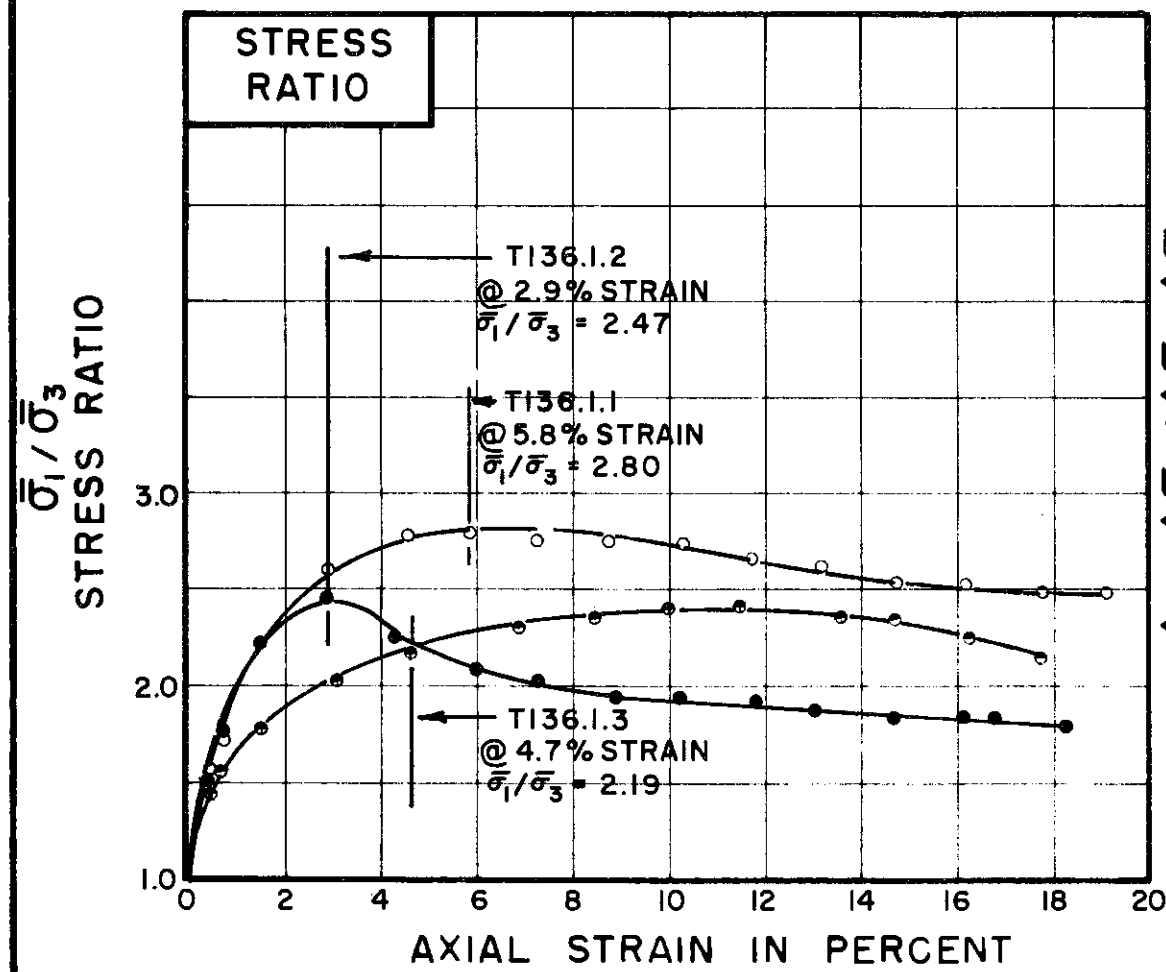
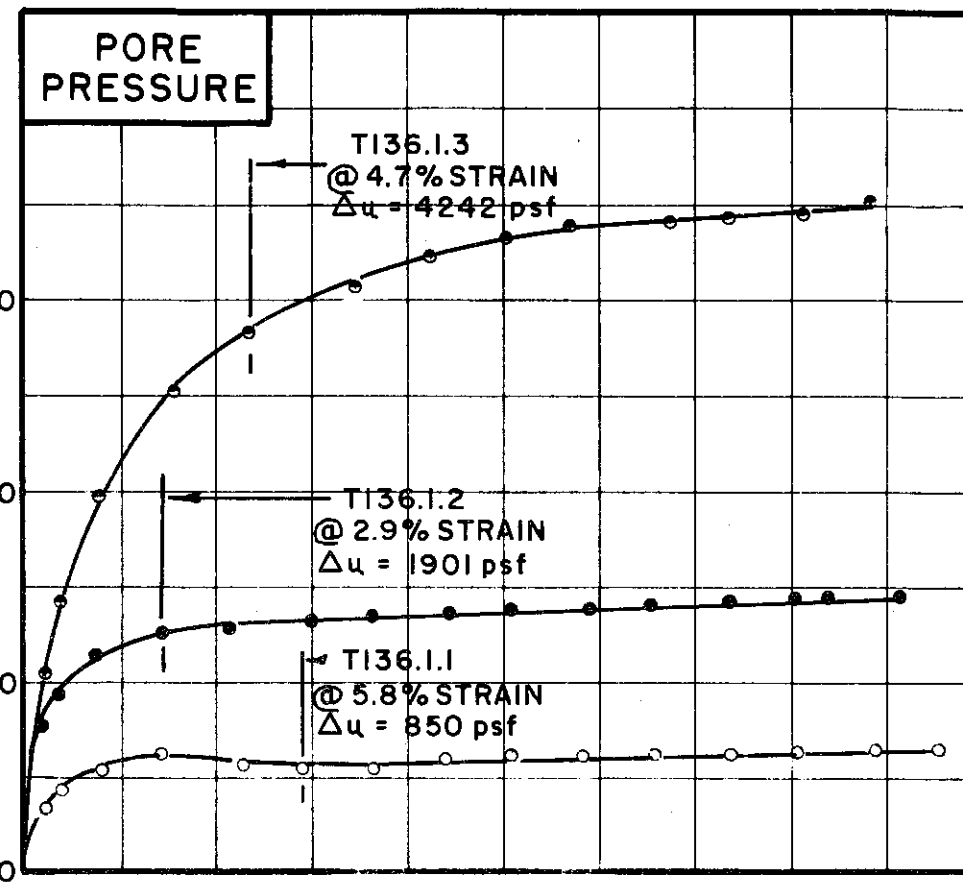
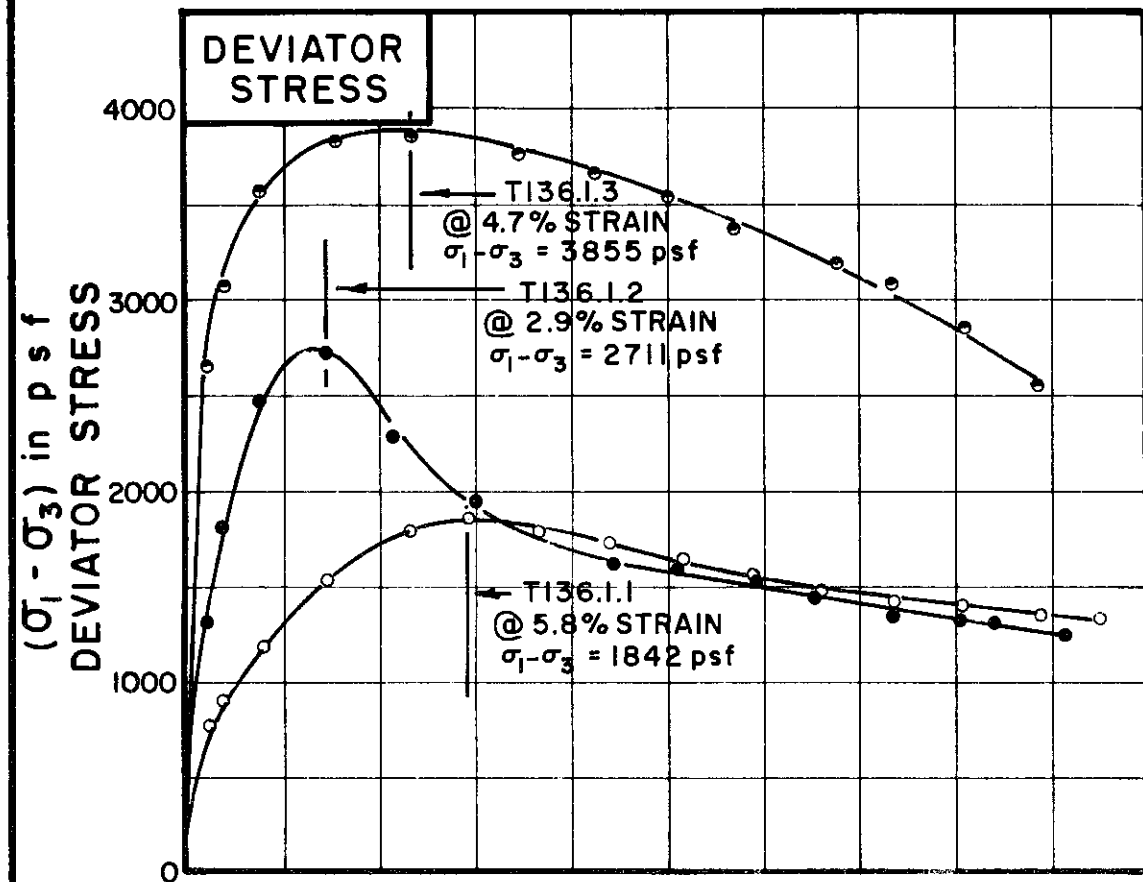
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-403



TEST NO. / SYMBOL	T136.1.1	T136.1.2	T136.1.3
	○	●	○

INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	43.5%	46.3%	44.9%	
DRY DENSITY		lb/cu ft	γ <sub>d</sub>	78	75	77	
SAMPLE DIAMETER		in.	D <sub>0</sub>	1.40	1.40	1.41	
SAMPLE HEIGHT		in.	H <sub>0</sub>	3.43	3.45	3.34	
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	psf	u <sub>0</sub>	11520	8640	7200
INITIAL EFFECTIVE STRESS		psf	$\bar{\sigma}_1 =$	1872	3744	7488	
VOLUMETRIC STRAIN			ε <sub>vol</sub>	2.55%	2.88%	8.59%	
PORE PRESSURE RESPONSE				98%	100%	96%	
FINAL CONDITIONS		WATER CONTENT	W <sub>f</sub>	41.5%	44.7%	38.5%	
SKETCH OF SAMPLE AT END OF TEST							

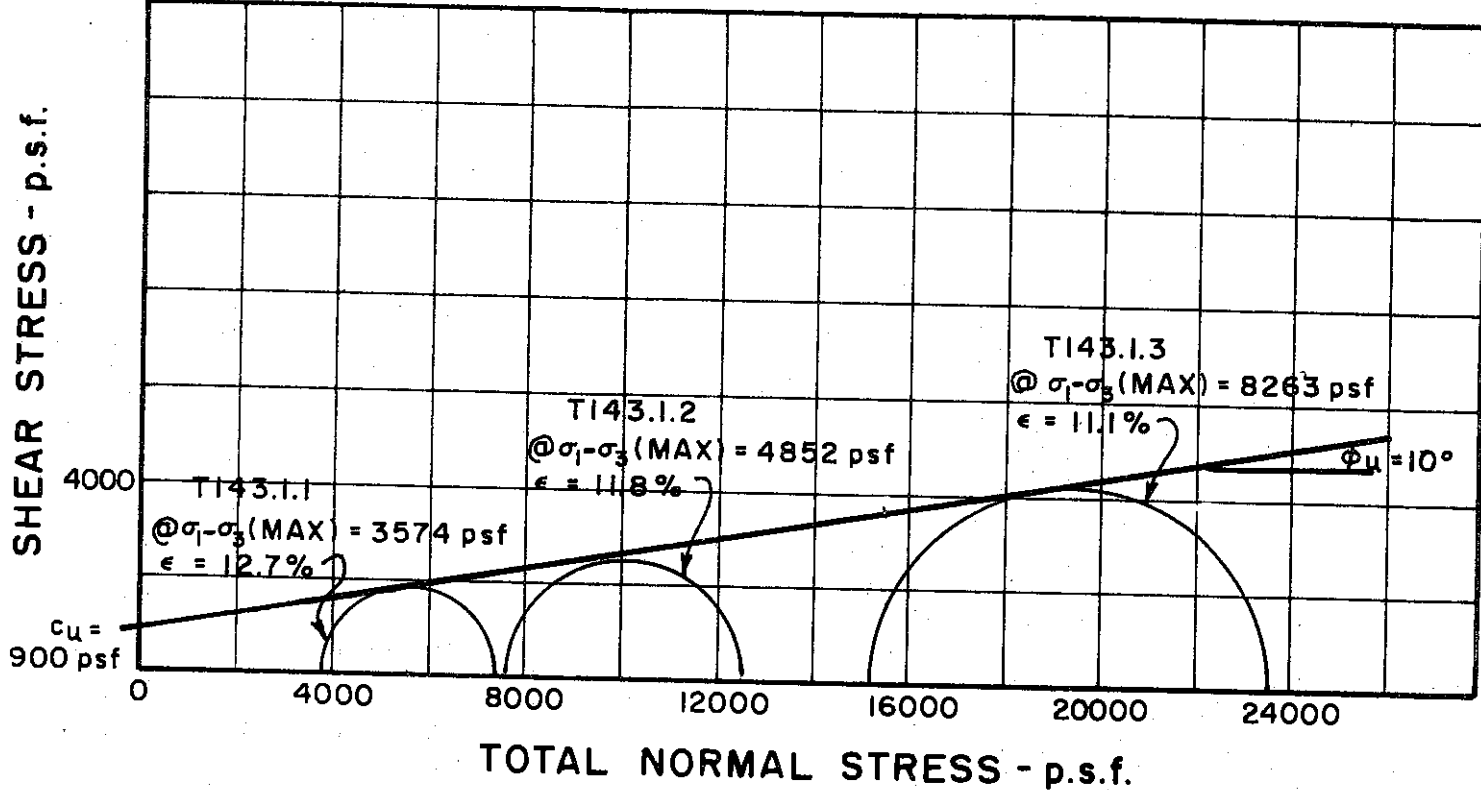
RATE OF STRAIN PERCENT/MINUTE	.024	.023	.025
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BORING NO. 49  
 SAMPLE NO. 6  
 DEPTH 43.0' TO 45.0'  
 SOIL DESCRIPTION SILTY CLAY (CH-CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 22

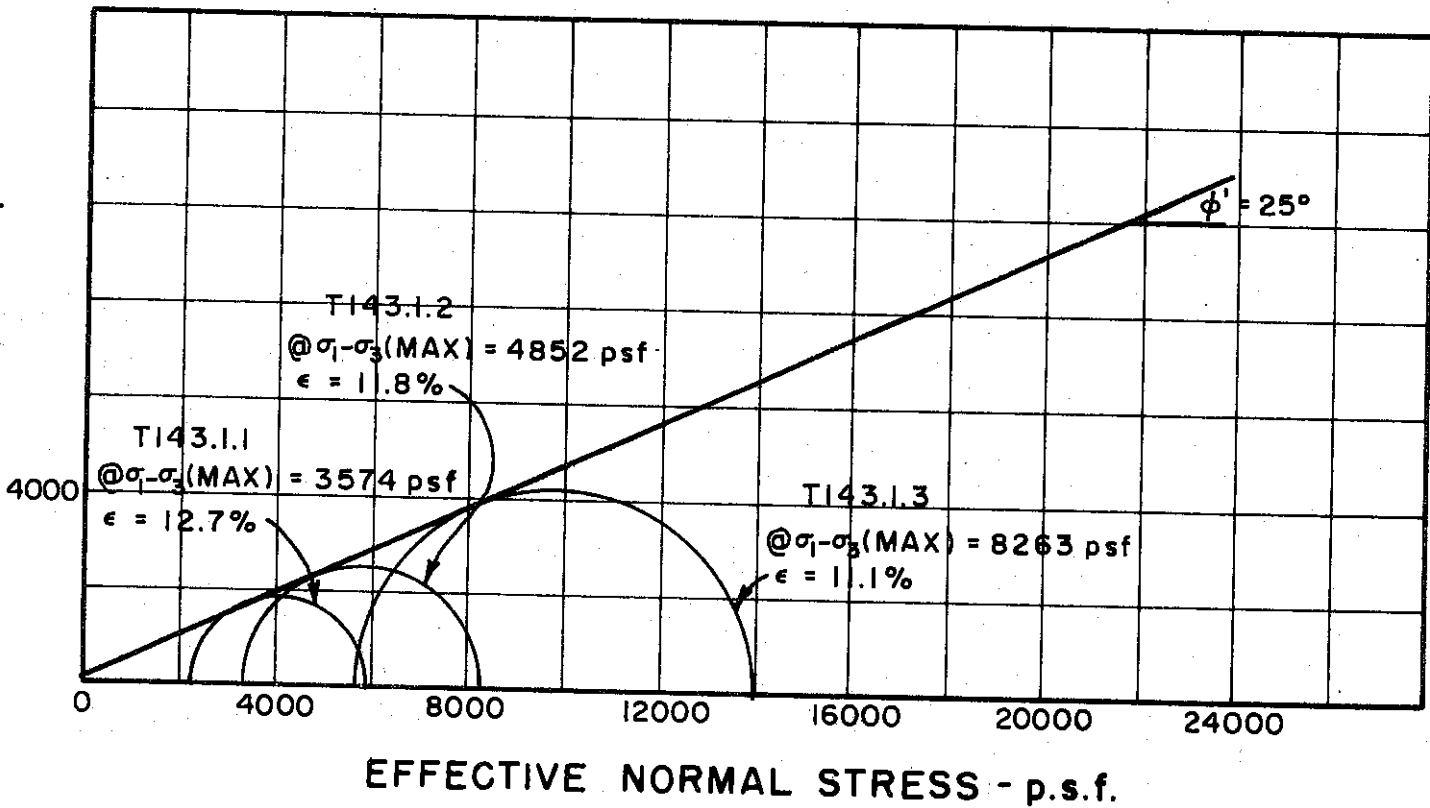
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p.s.f.



SHEAR STRESS - p.s.f.



BORING NO. 49

SAMPLE NO. 13

DEPTH 113.0' TO 115.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

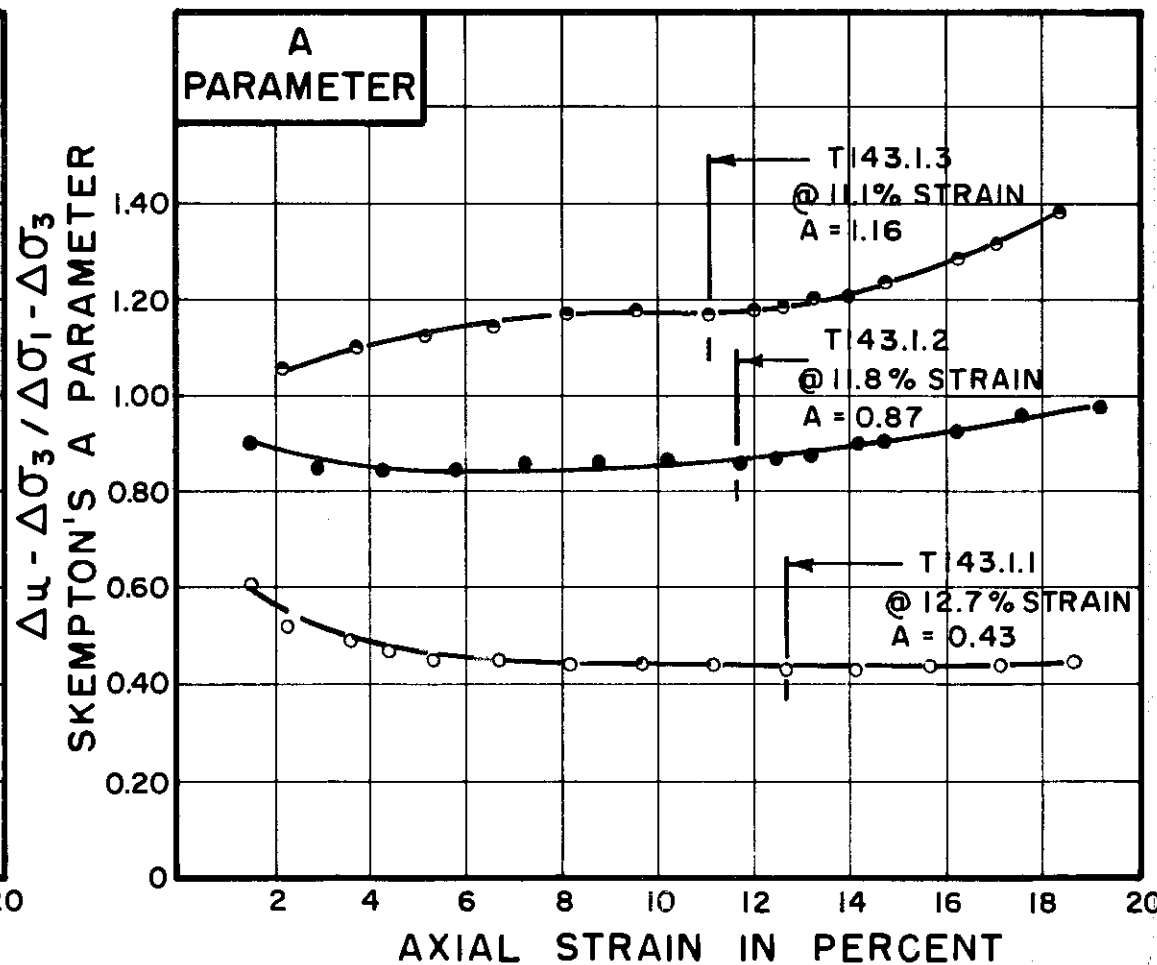
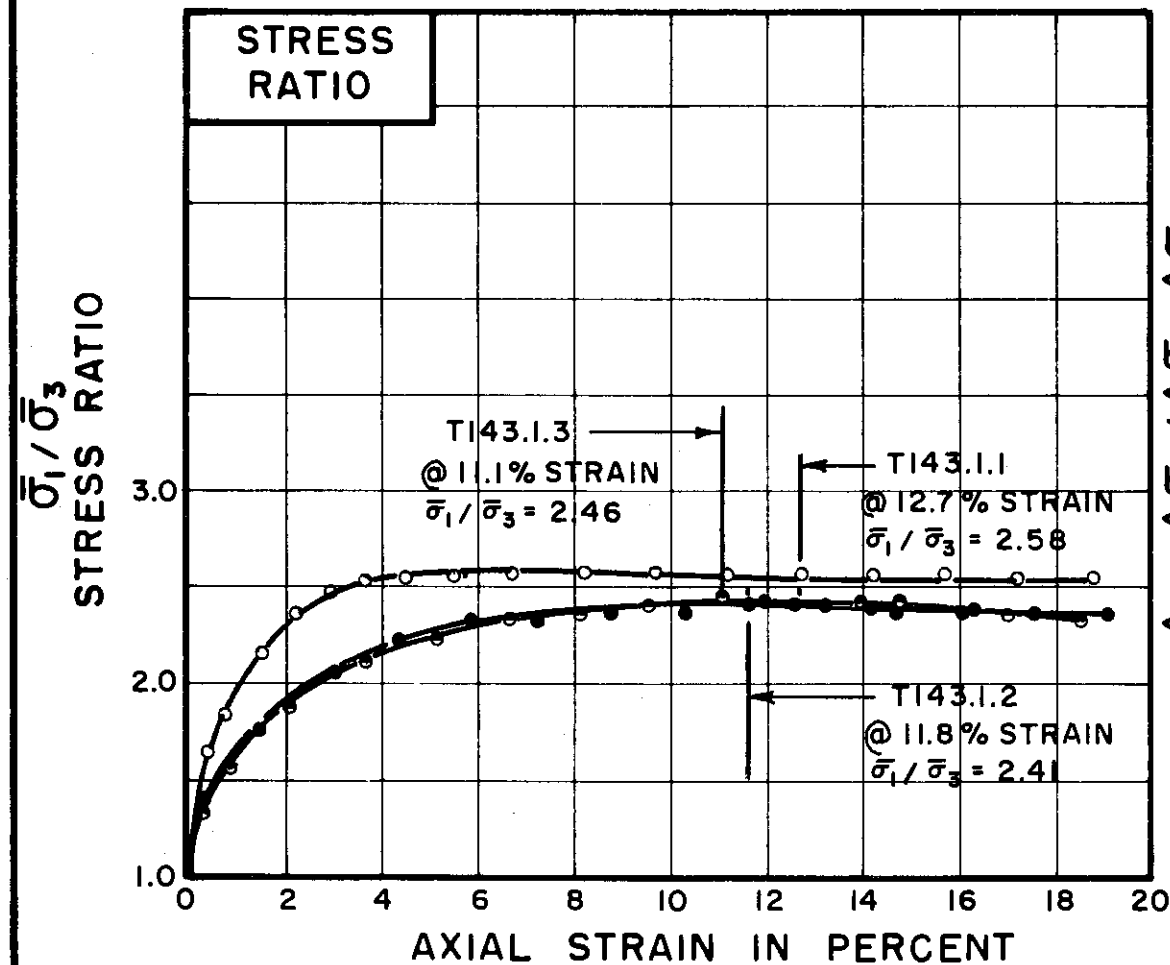
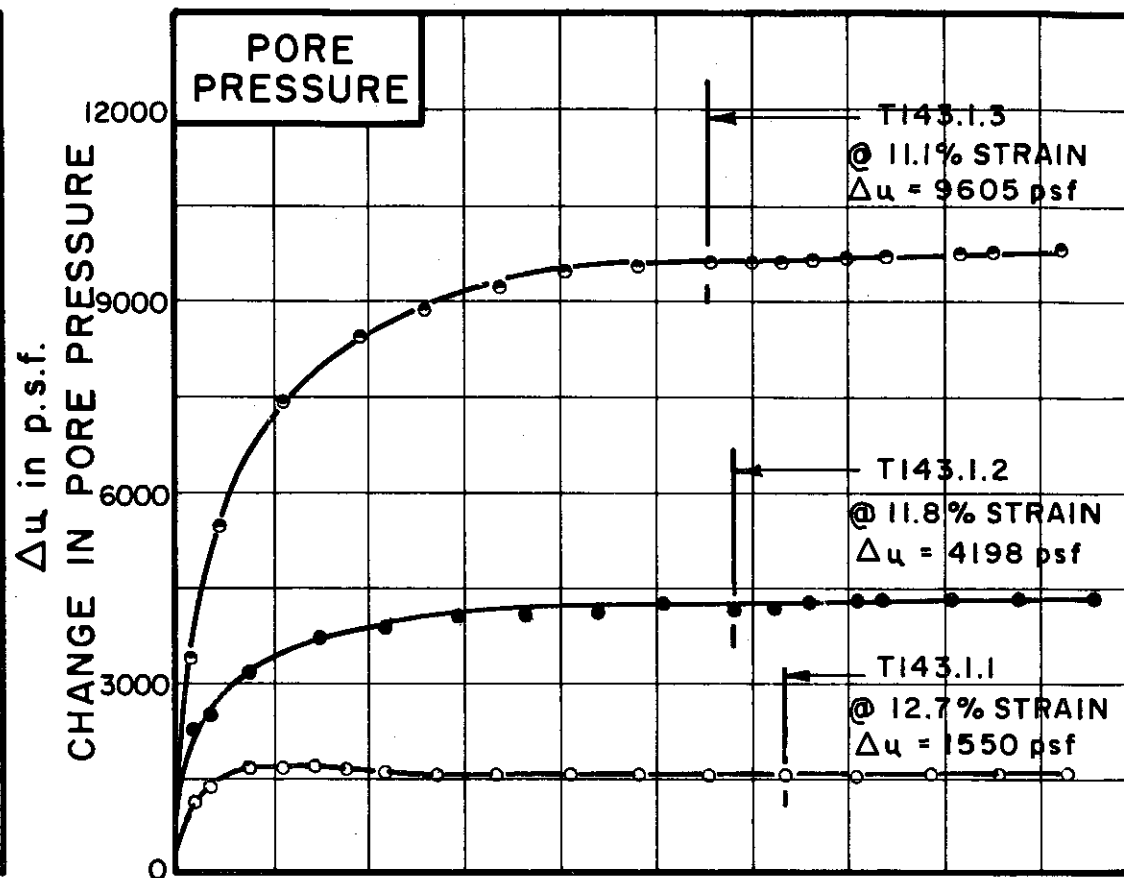
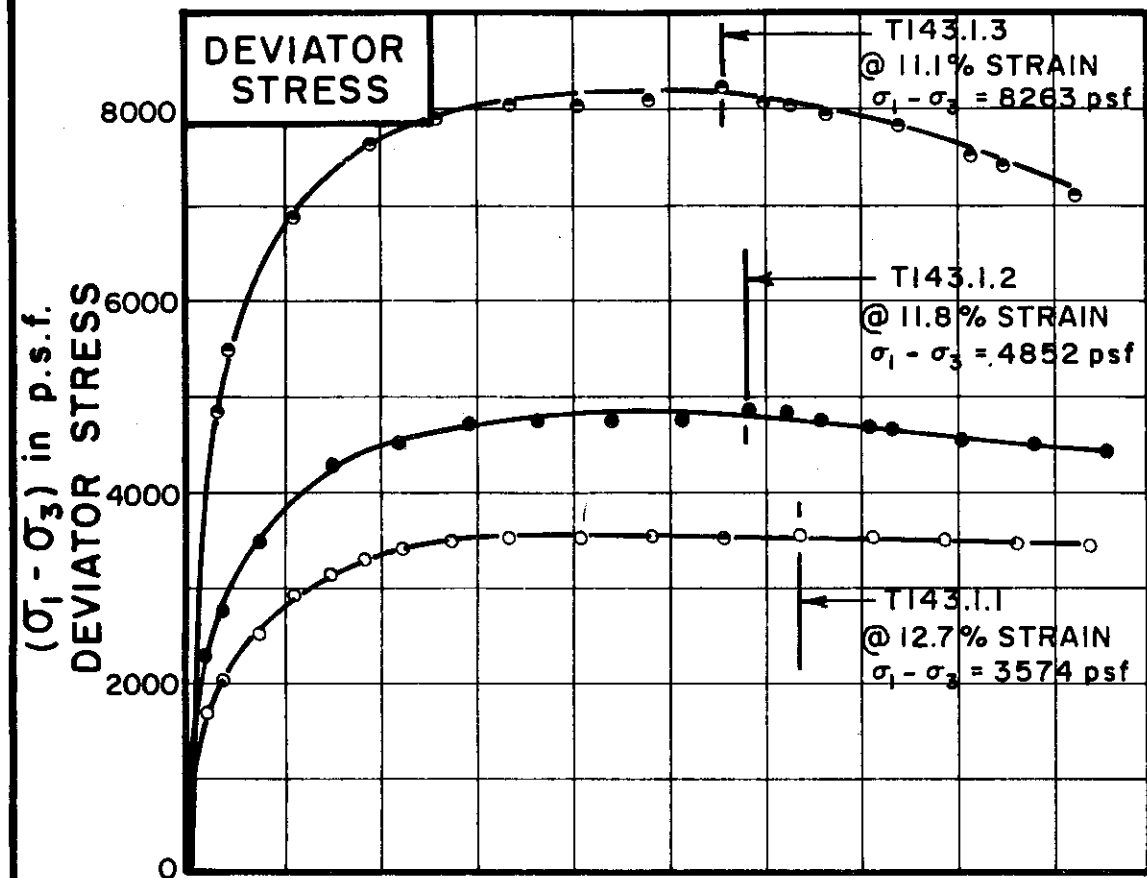
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-405



TEST NO. / SYMBOL	T143.1.1	T143.1.2	T143.1.3
	○	●	○

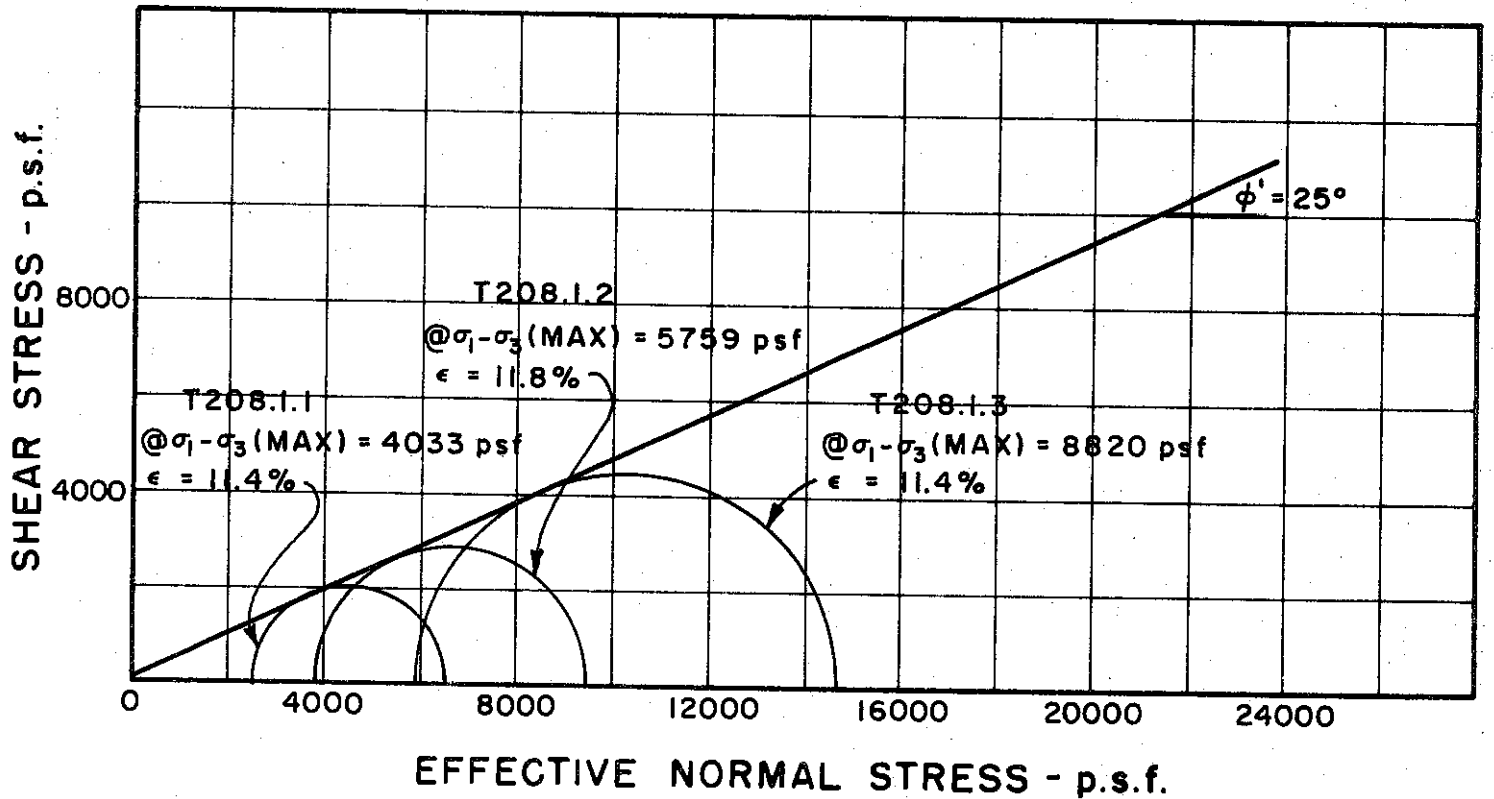
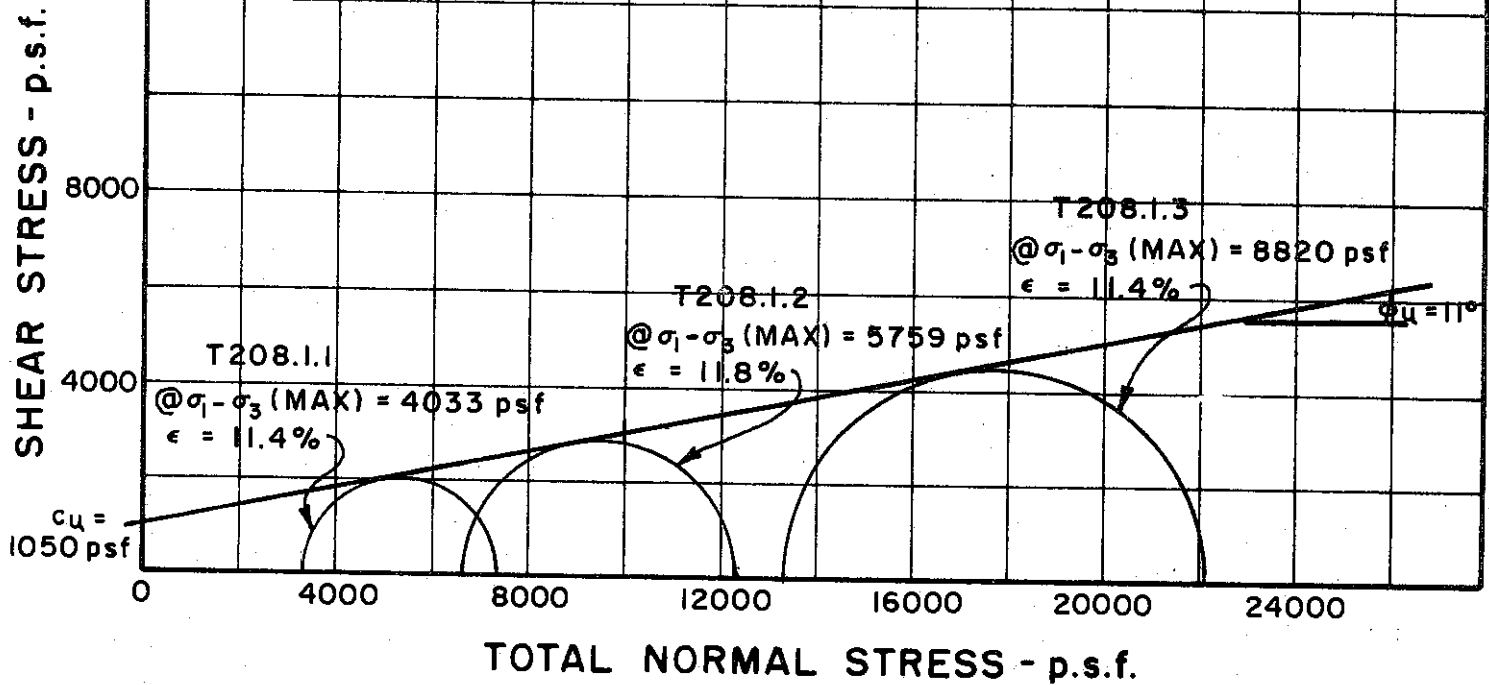
INITIAL CONDITIONS			T143.1.1	T143.1.2	T143.1.3
WATER CONTENT	$w_0$		24.0%	28.7%	29.2%
DRY DENSITY	$\gamma_d$	pcf	100	95	93
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.41
SAMPLE HEIGHT	$H_0$	in.	3.37	3.46	3.44
FINAL CONDITIONS BEFORE SHEAR			T143.1.1	T143.1.2	T143.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	11520	7200	7200
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	p.s.f.	3816	7632	15264
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.6%	5.1%	6.3%
PORE PRESSURE RESPONSE			95	100	100
WATER CONTENT	$w_f$		23.1%	26.5%	24.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 49  
 SAMPLE NO. 13  
 DEPTH 113.0' TO 115.0'  
 SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 33 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 48

SAMPLE NO. 22

DEPTH 98.0' TO 100.0'

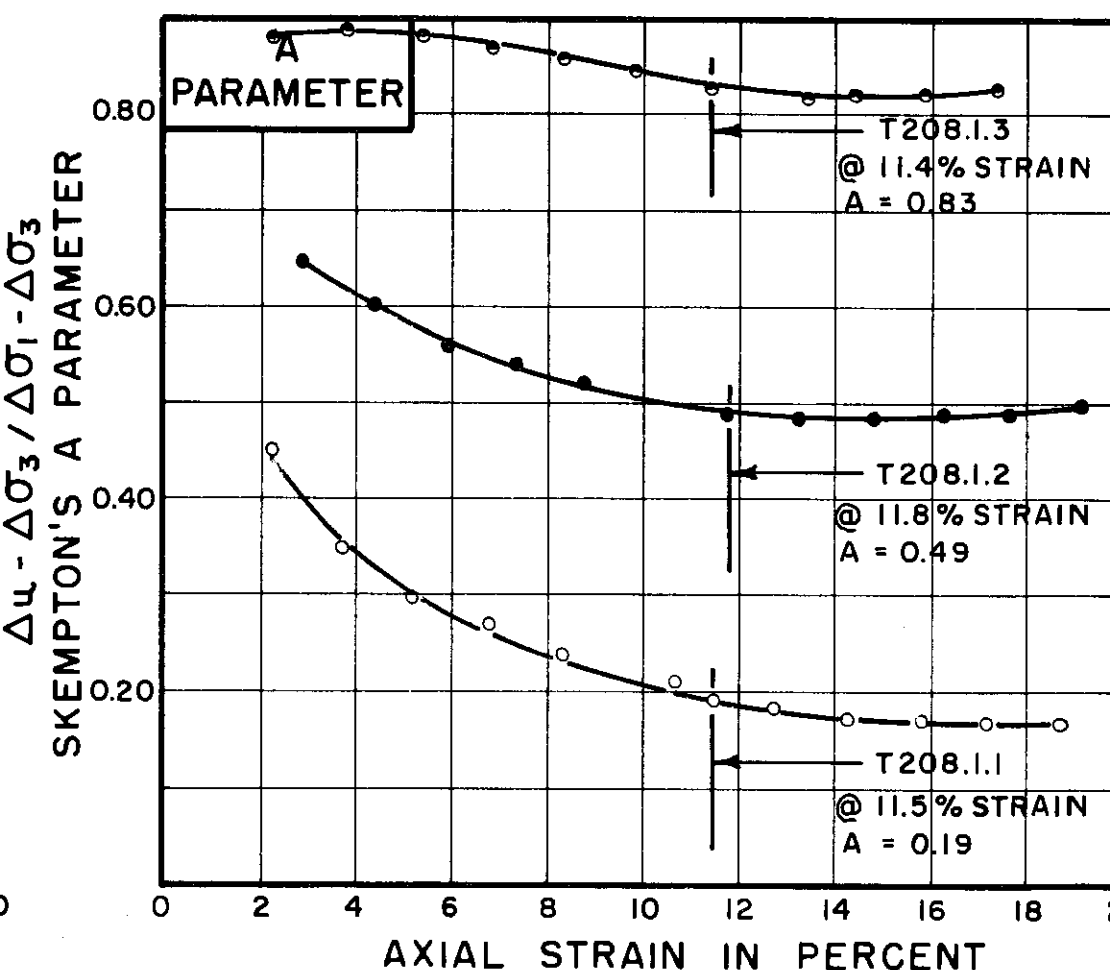
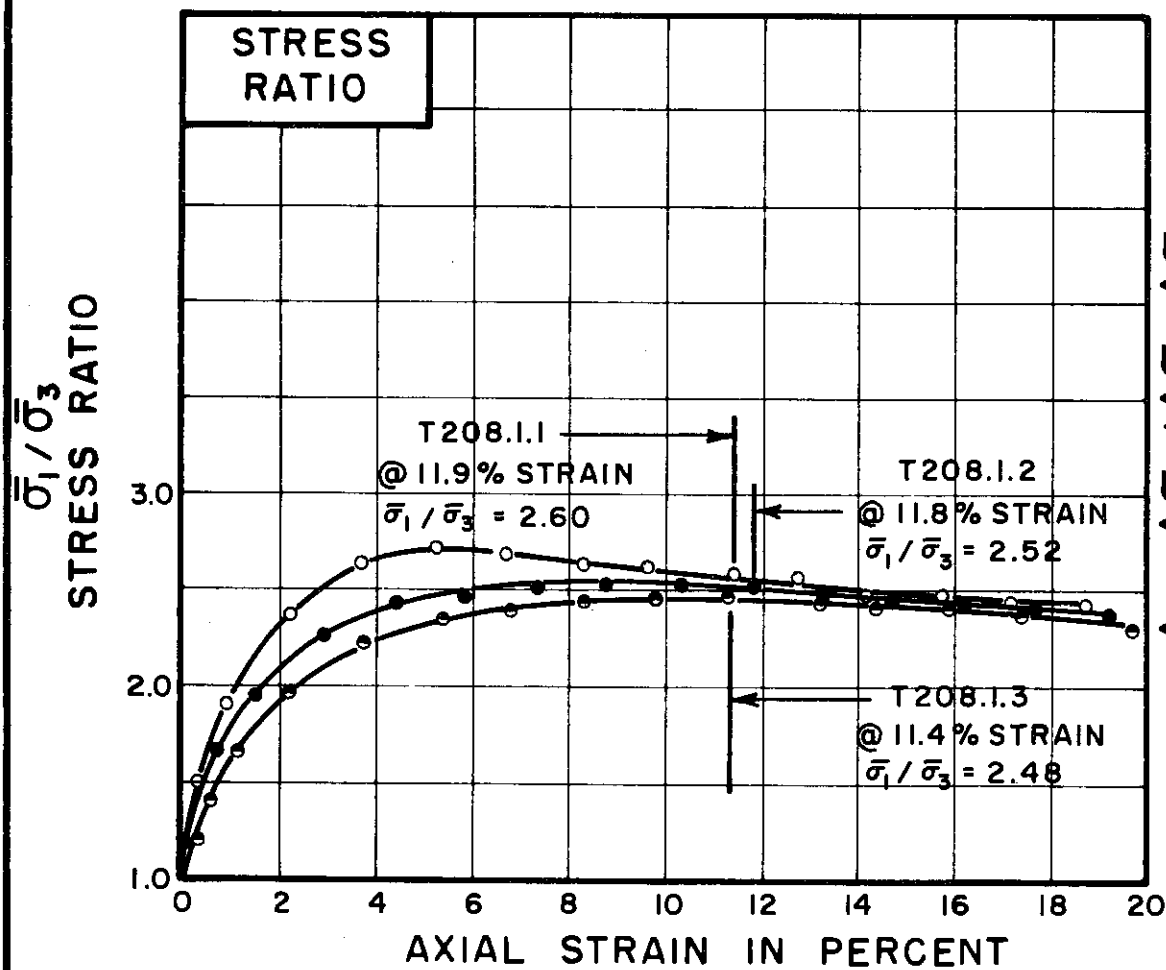
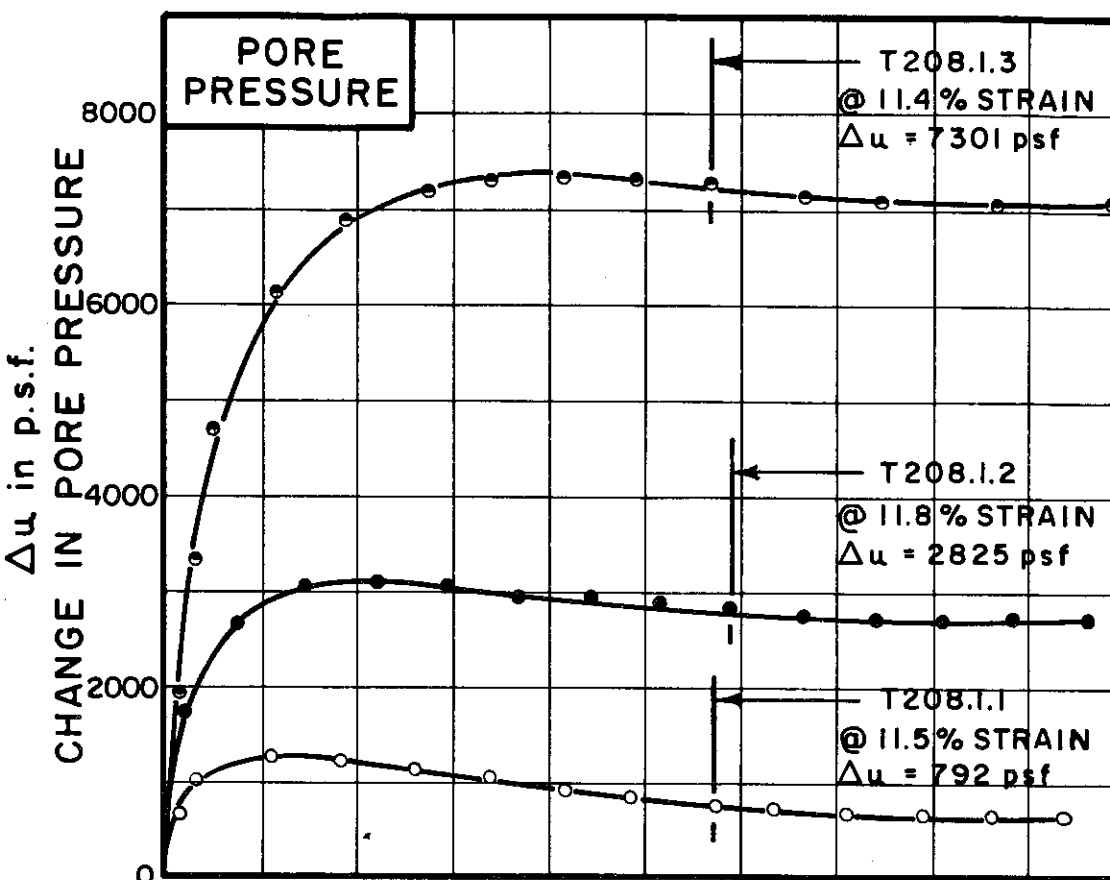
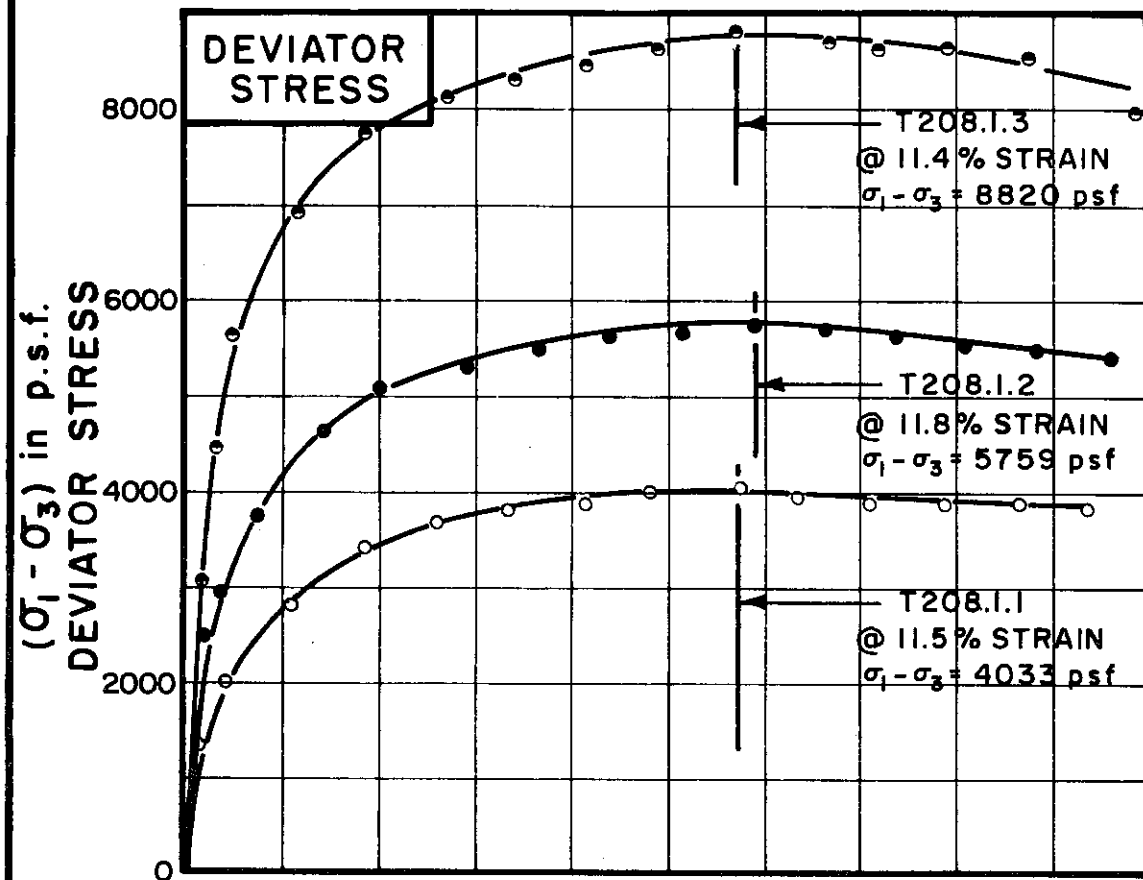
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



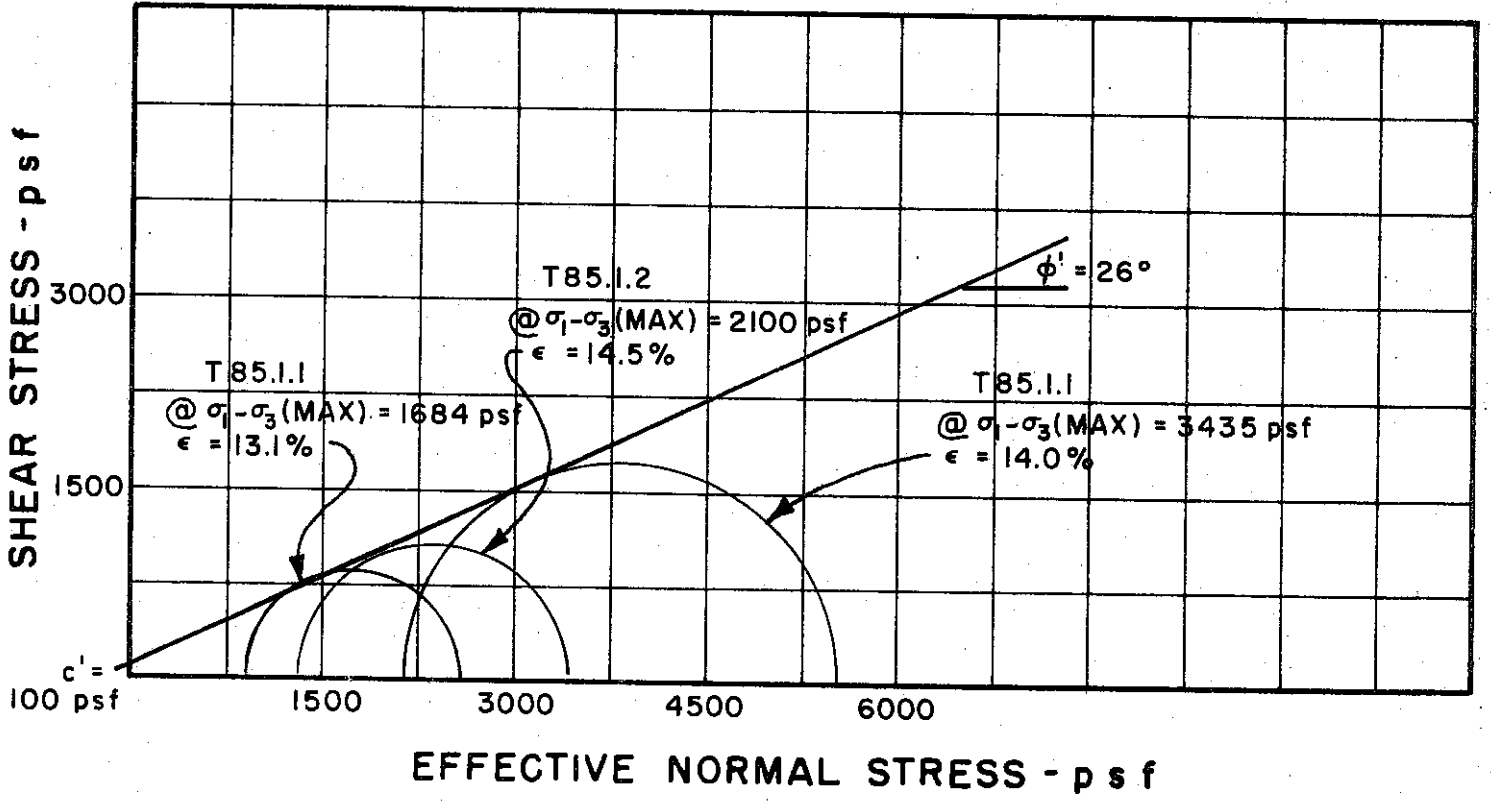
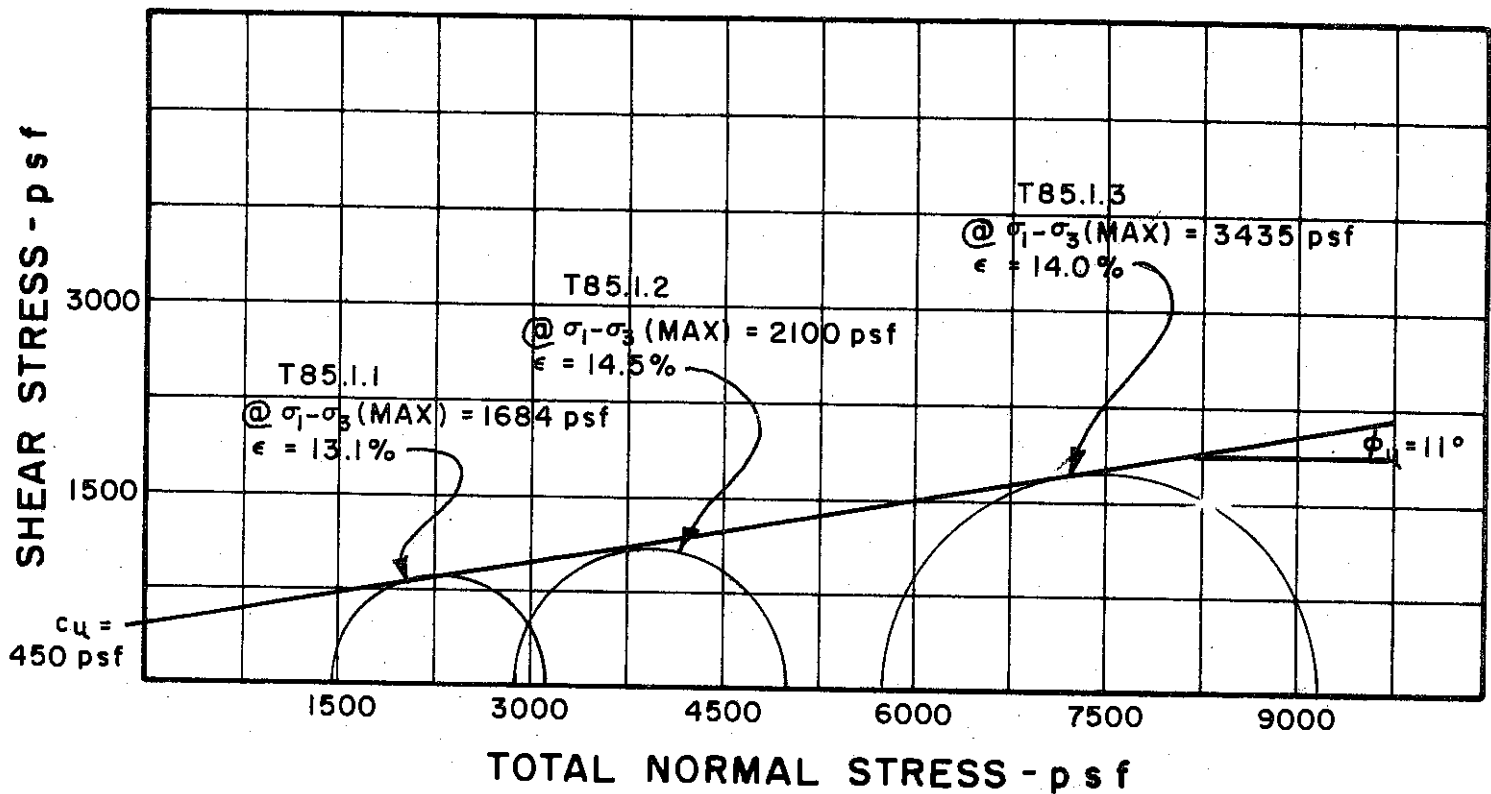
TEST NO. / SYMBOL	T208.1.1	T208.1.2	T208.1.3
	○	●	○

INITIAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>0</sub>		26.8%	26.0%	27.6%
DRY DENSITY	γ <sub>d</sub>	pcf	99	96	97
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.36	3.44	3.32
CONDITIONS BEFORE SHEAR			T208.1.1	T208.1.2	T208.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	8640	11520	7200
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	p.s.f.	3312	6624	13248
VOLUMETRIC STRAIN	ε <sub>vol</sub>		3.0%	5.2%	7.8%
PORE PRESSURE RESPONSE			95%	94%	98%
FINAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>f</sub>		25.3%	23.7%	22.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 48  
 SAMPLE NO. 22  
 DEPTH 98.0' TO 100.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

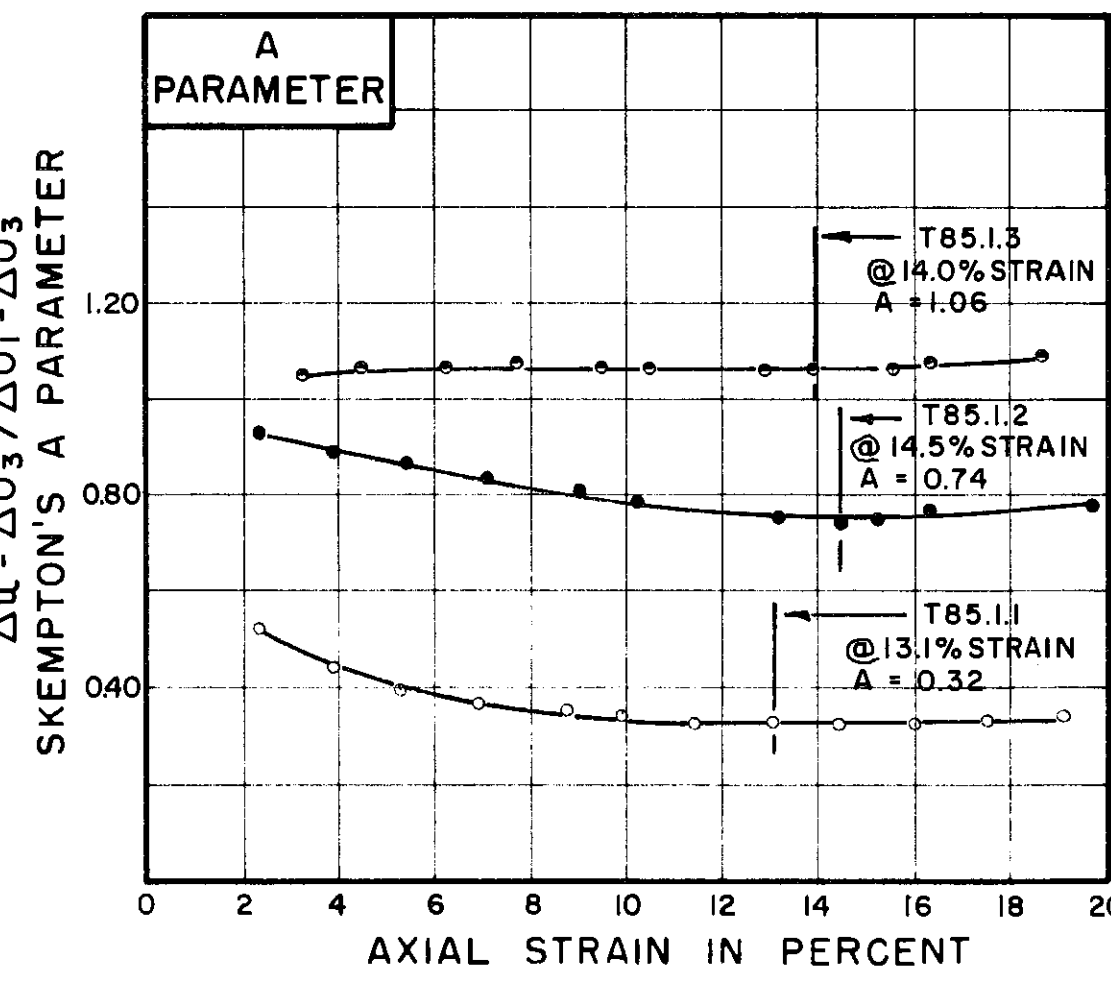
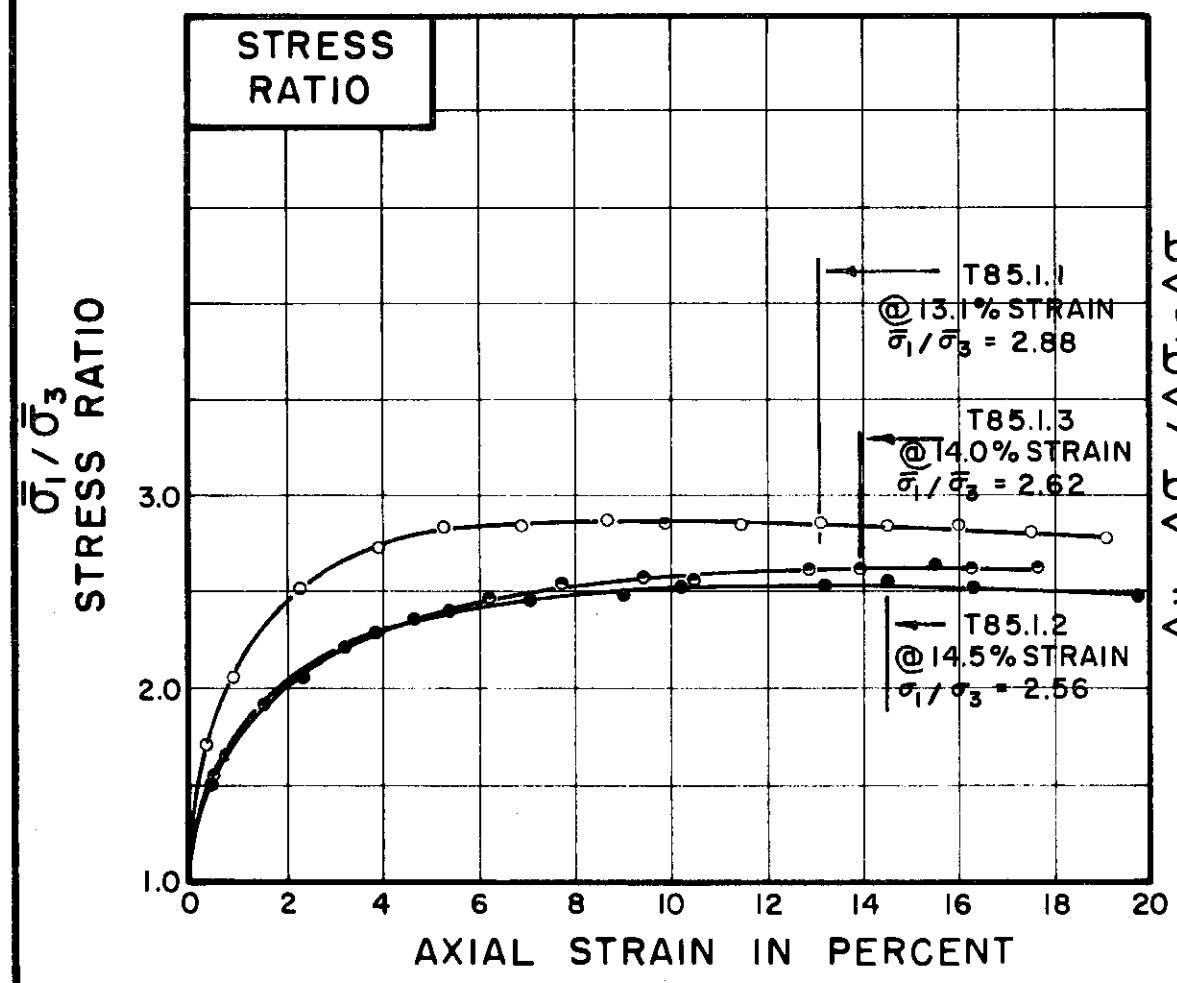
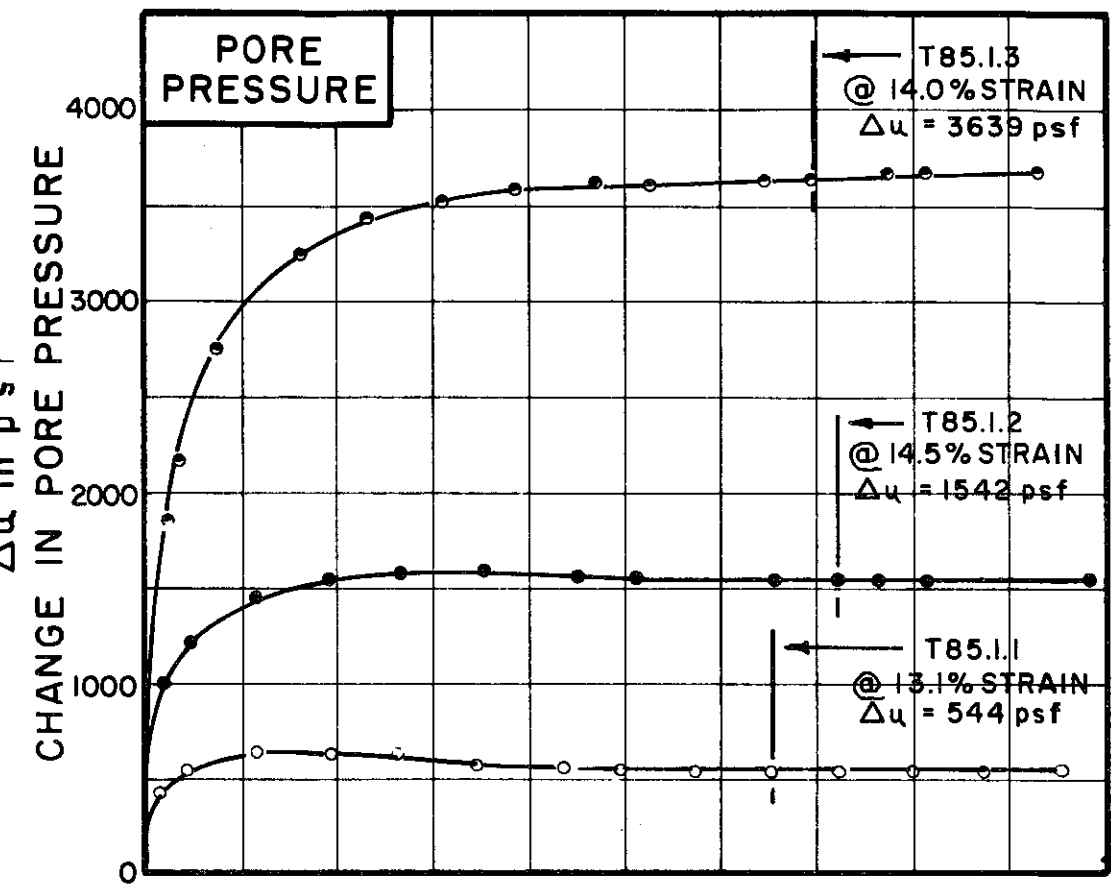
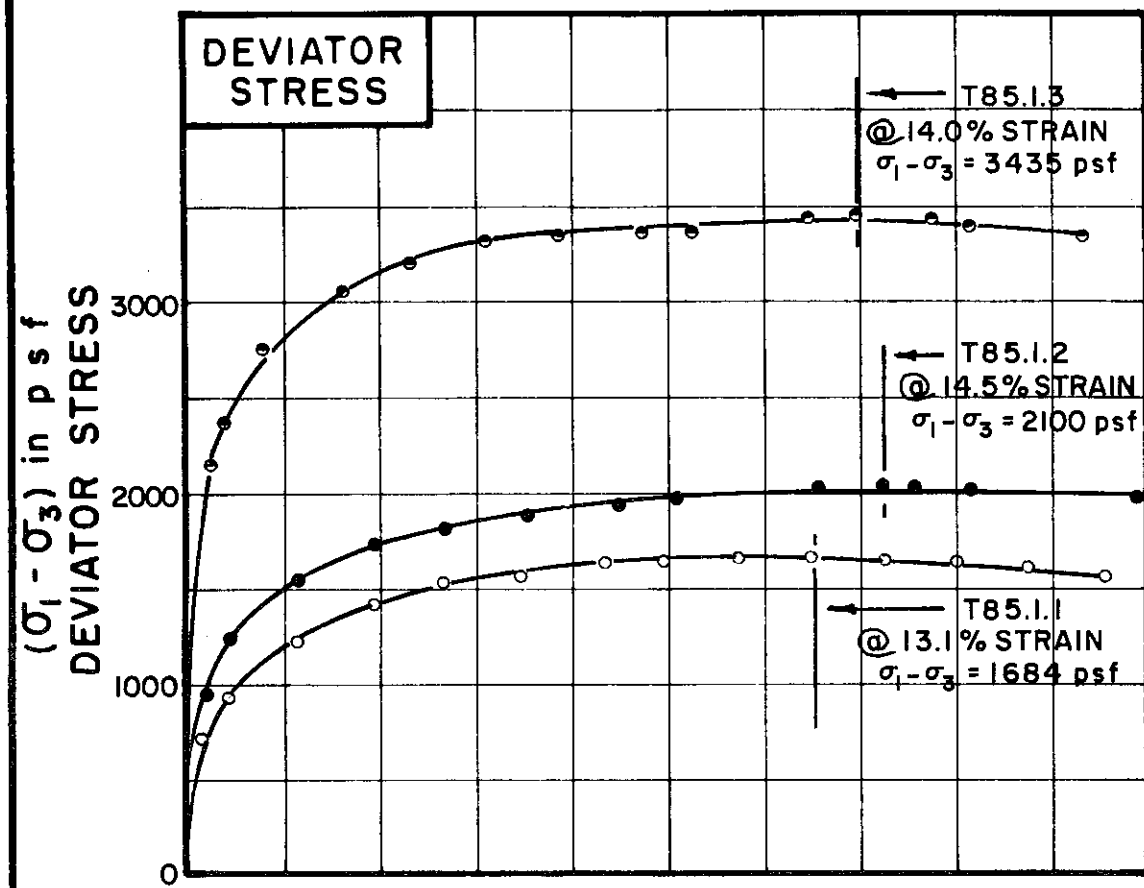


BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 \_\_\_\_\_  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-409



TEST NO. / SYMBOL	T85.1.1	T85.1.2	T85.1.3
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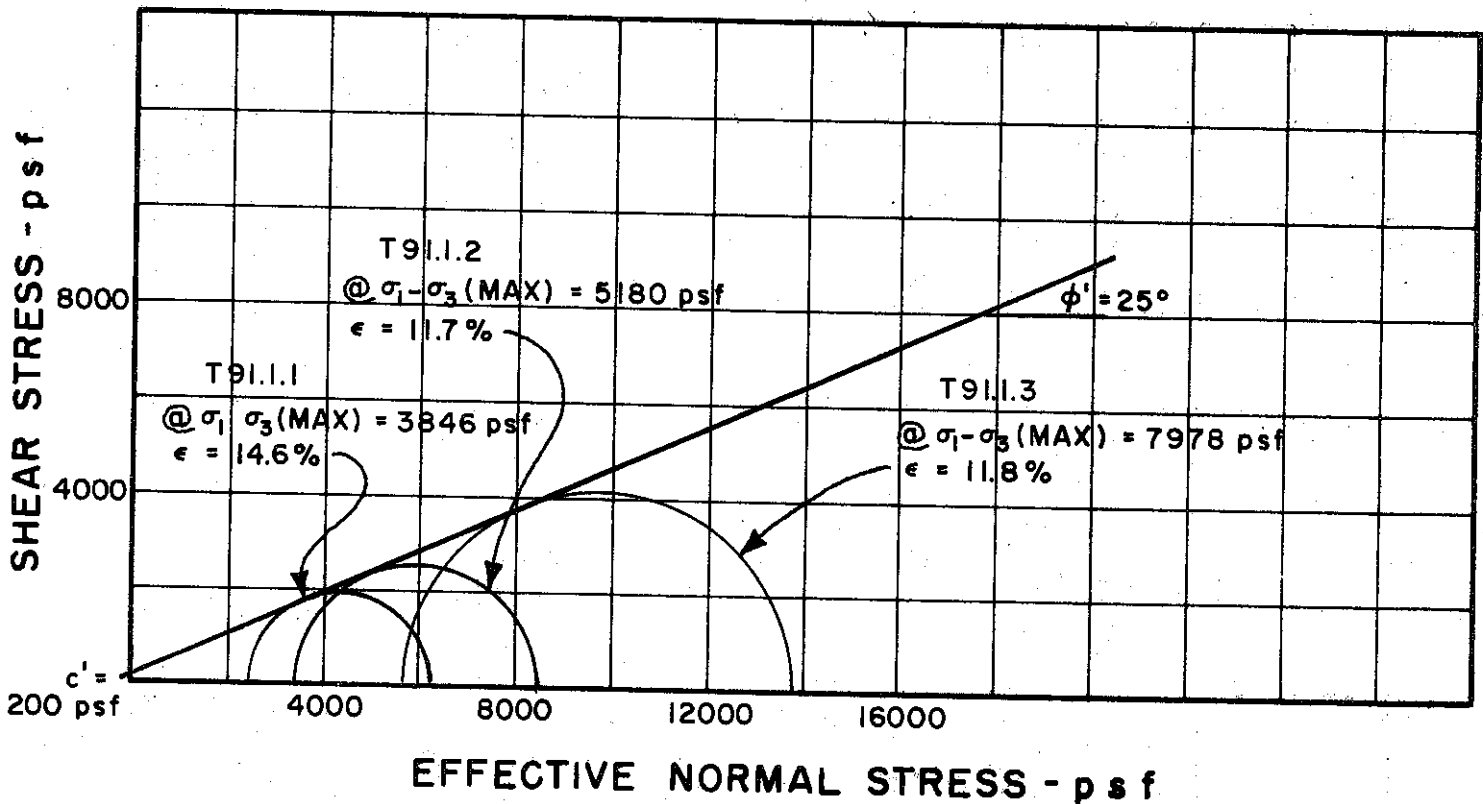
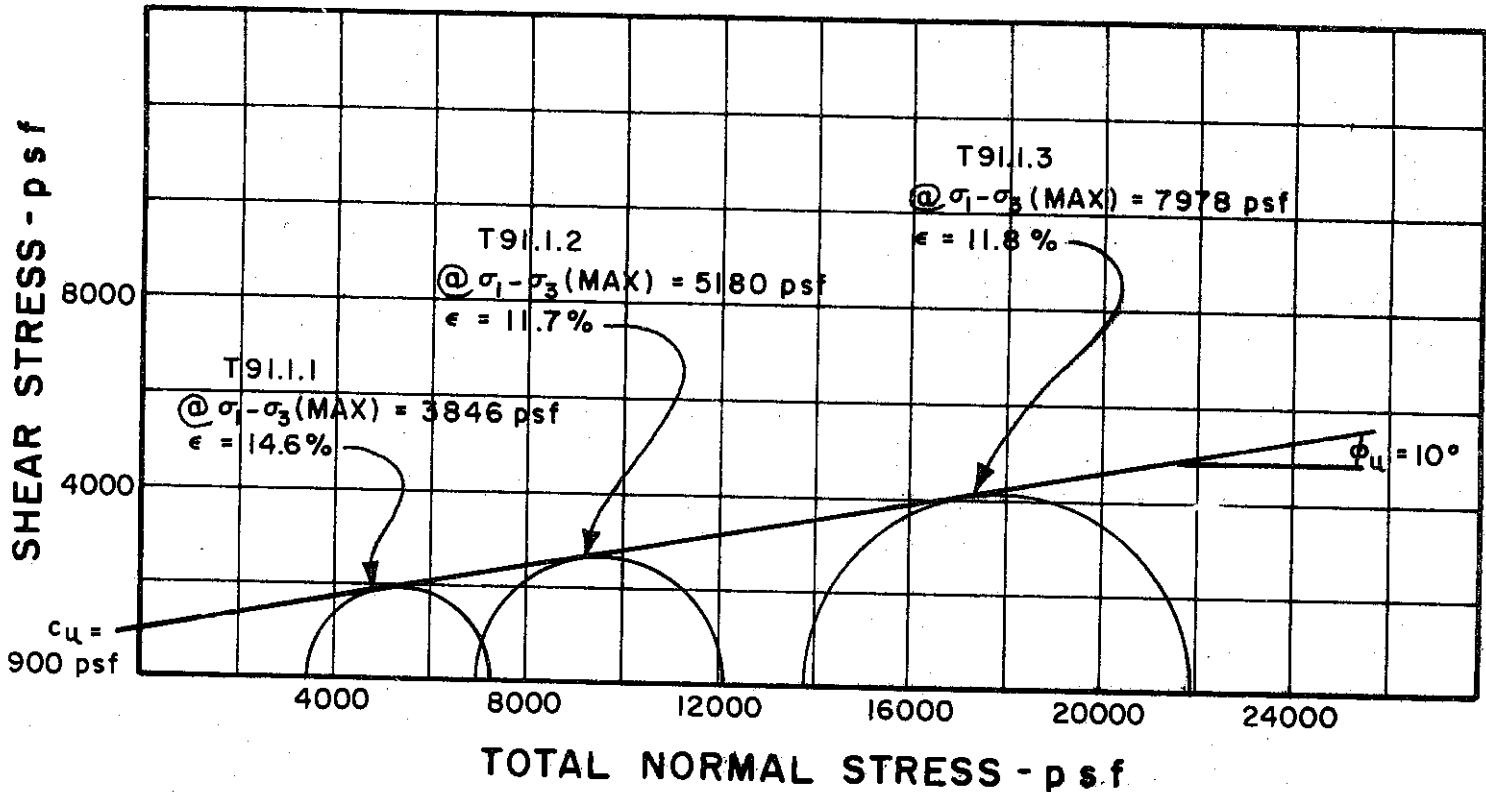
INITIAL CONDITIONS	WATER CONTENT	$w_0$	33.0%	33.1%	34.3%
	DRY DENSITY lb/cu ft	$\gamma_d$	88	90	86
SAMPLE DIAMETER in.	$D_0$	1.38	1.39	1.39	
SAMPLE HEIGHT in.	$H_0$	3.30	3.25	3.27	
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1, \bar{\sigma}_3$	1440	2880	5760
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.58%	3.18%	4.86%
	PORE PRESSURE RESPONSE		96%	95%	100%
FINAL CONDITIONS	WATER CONTENT	$w_f$	31.5%	27.3%	28.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.024
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BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 39 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 50

SAMPLE NO. 18

DEPTH 88.0' TO 90.0'

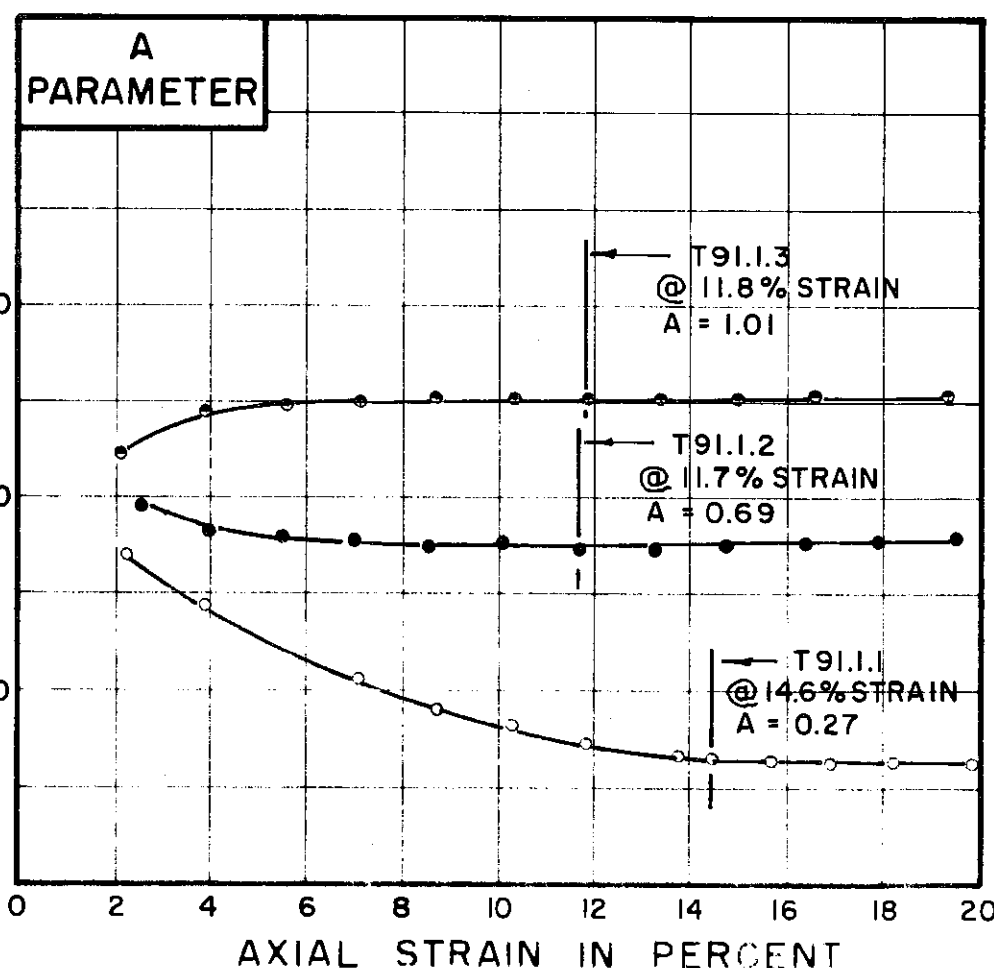
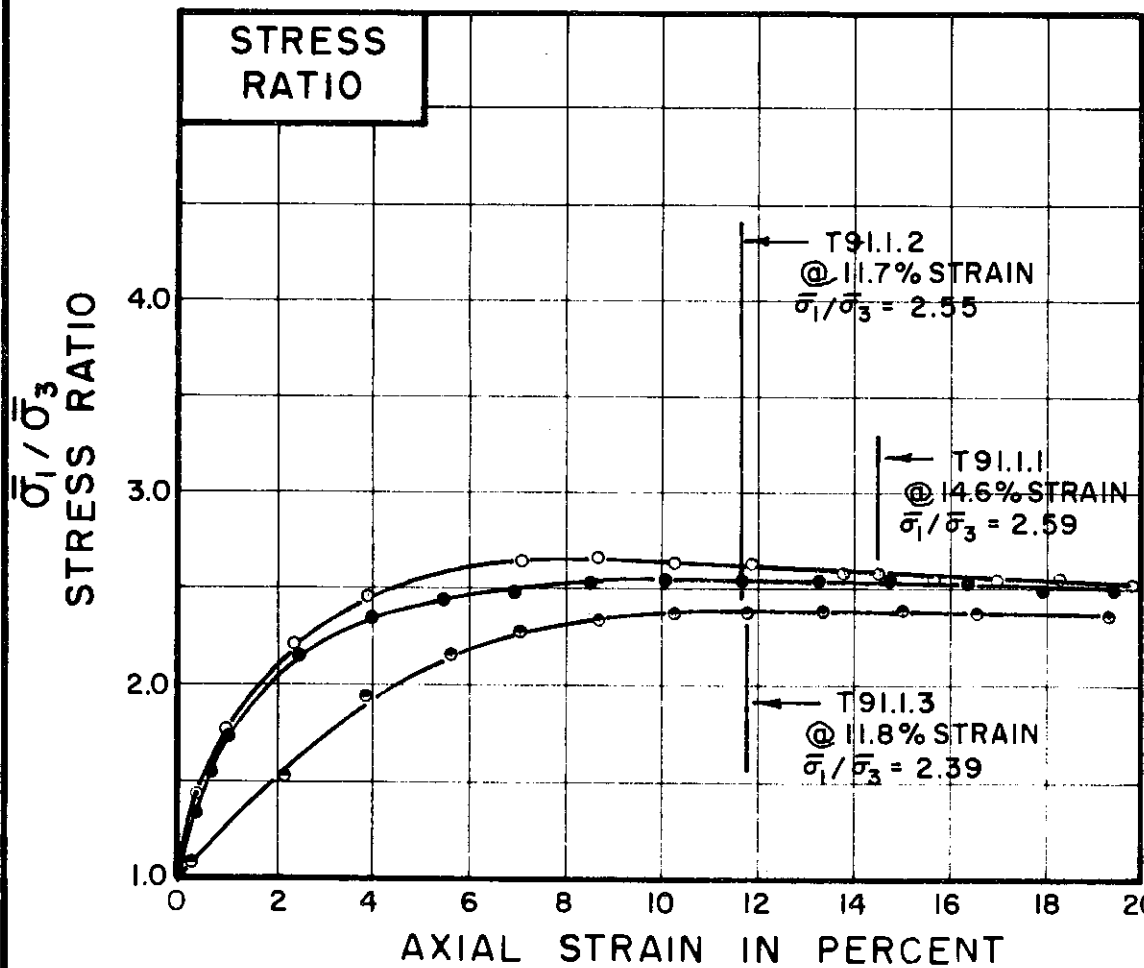
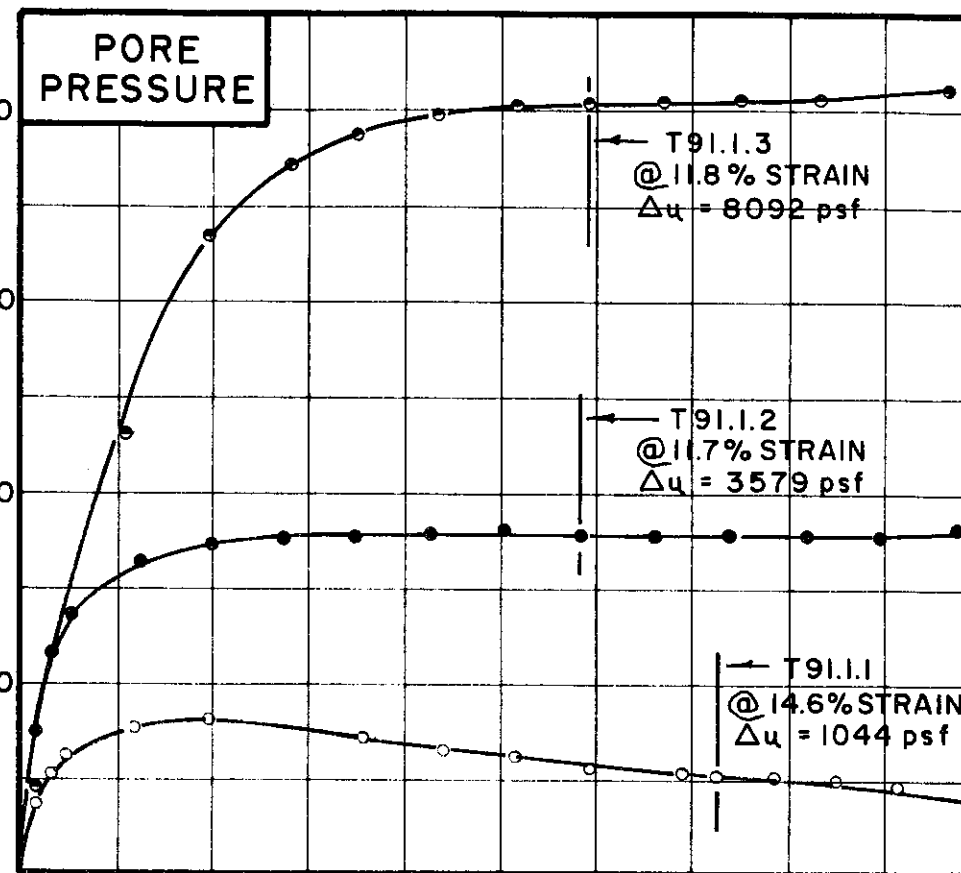
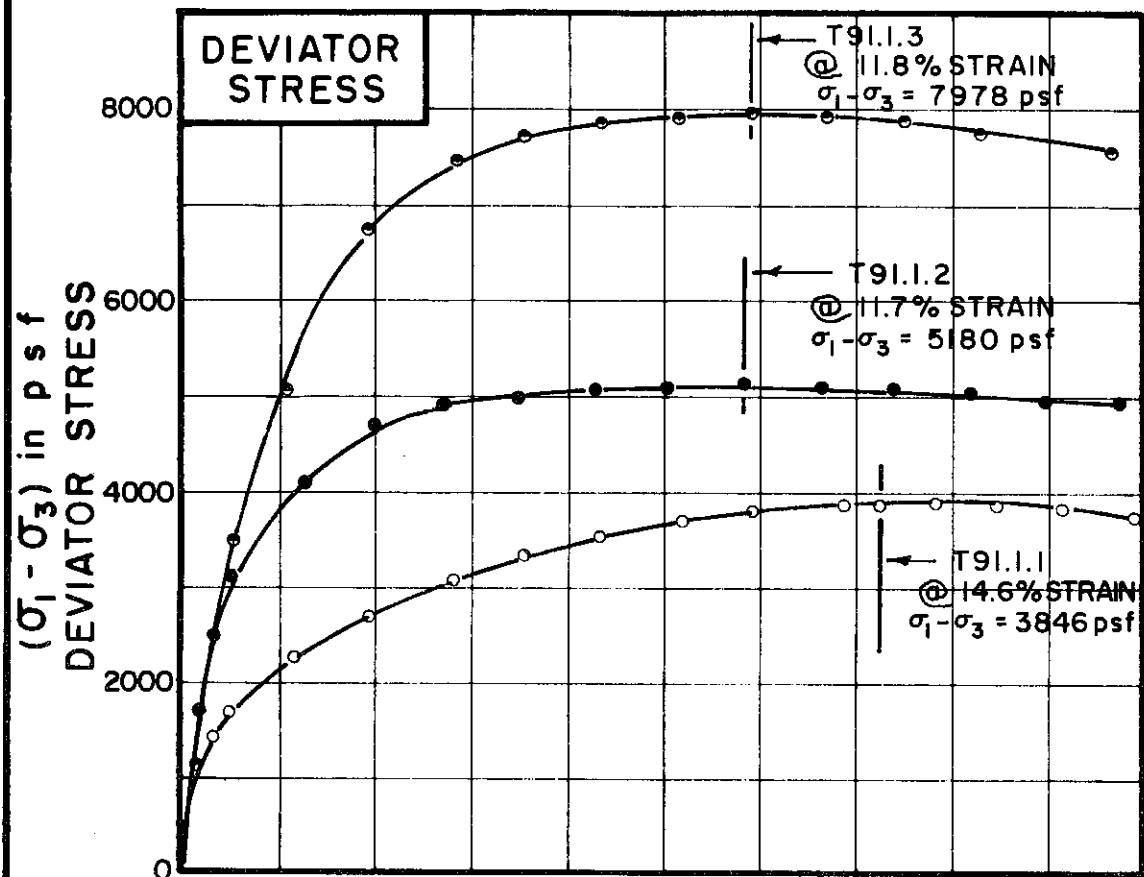
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-411



TEST NO. / SYMBOL	T91.1.1	T91.1.2	T91.1.3
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INITIAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_0$		28.0%	27.6%	27.6%
DRY DENSITY	$\gamma_d$	lb/cu ft	97	97	96
SAMPLE DIAMETER	$D_0$	in.	1.37	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.18	3.25	3.25
FINAL CONDITIONS BEFORE SHEAR			T91.1.1	T91.1.2	T91.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	8640	12960
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	3456	6912	13824
VOLUMETRIC STRAIN	$\epsilon_{vol}$		3.54%	4.24%	6.87%
PORE PRESSURE RESPONSE			96%	95%	96%
FINAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_f$		25.5%	26.0%	22.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

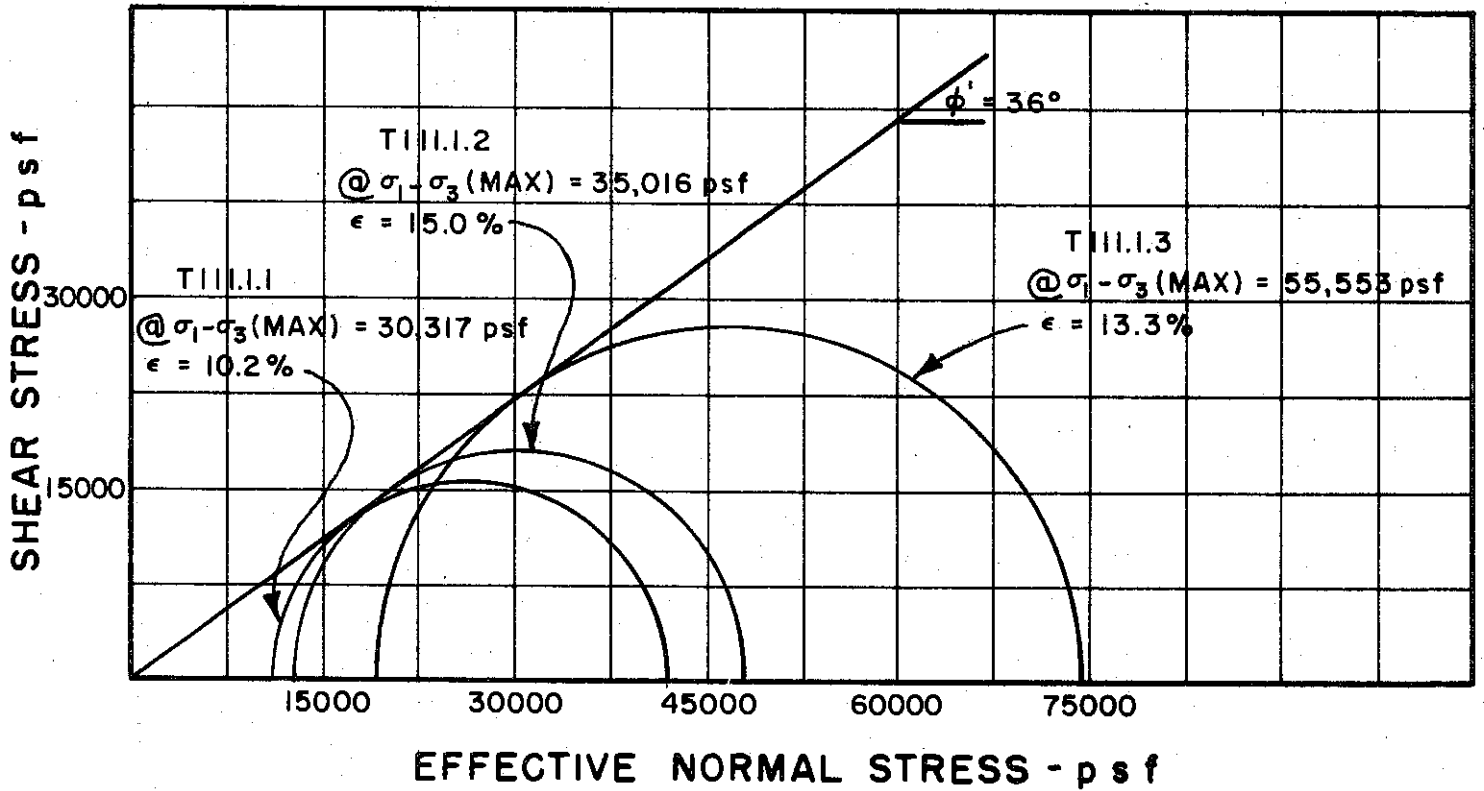
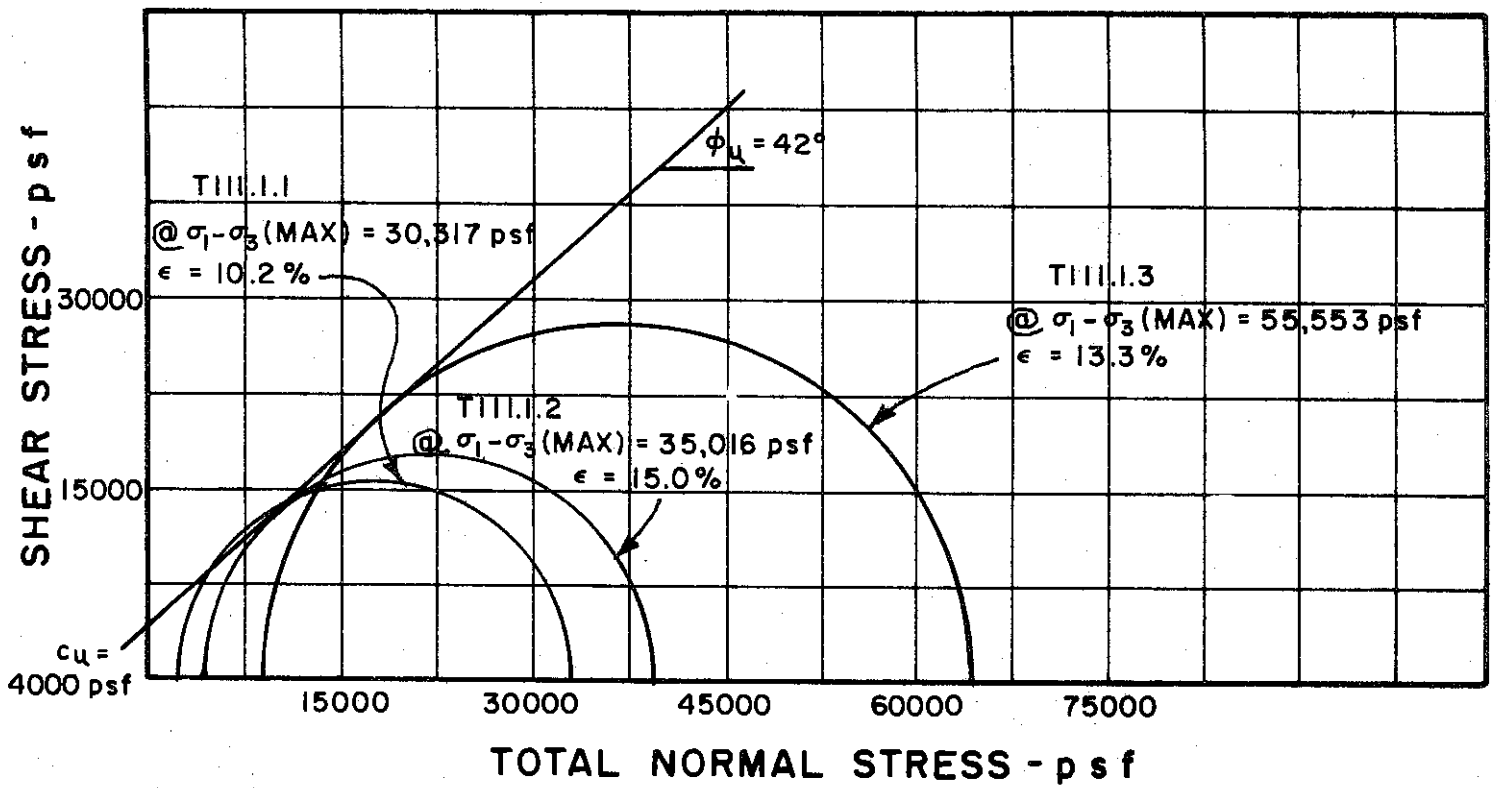
LIQUID LIMIT 39 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-412



BORING NO. 52

SAMPLE NO. 6

DEPTH 48.0' TO 50.5'

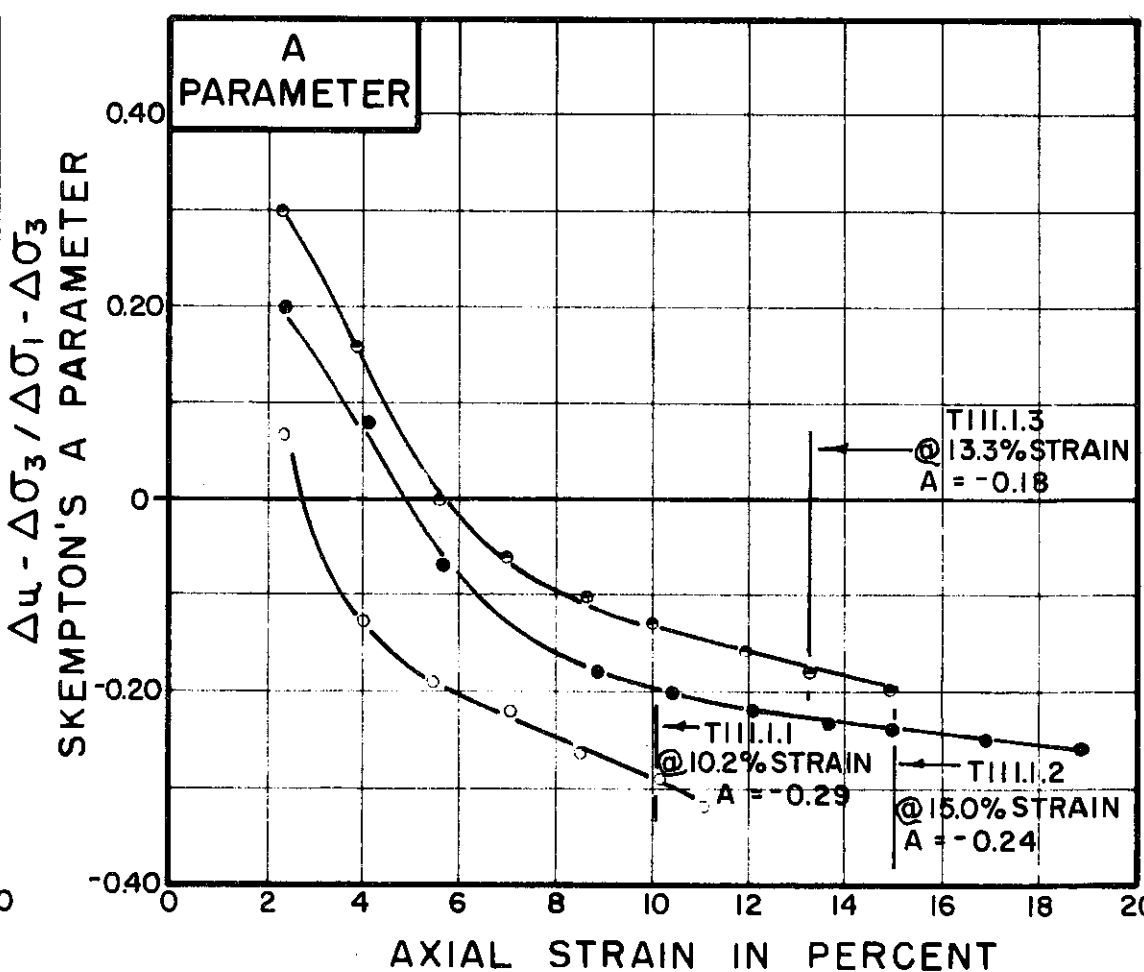
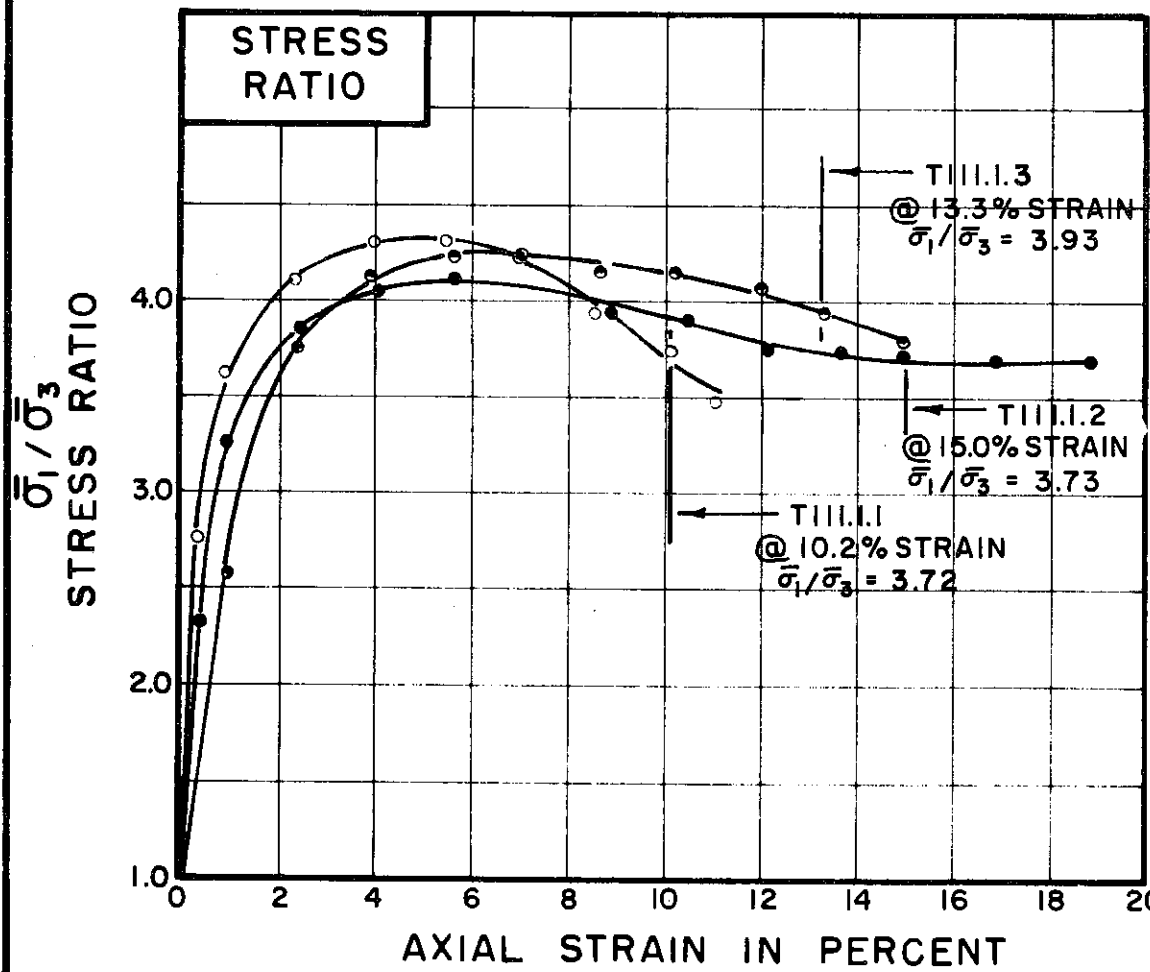
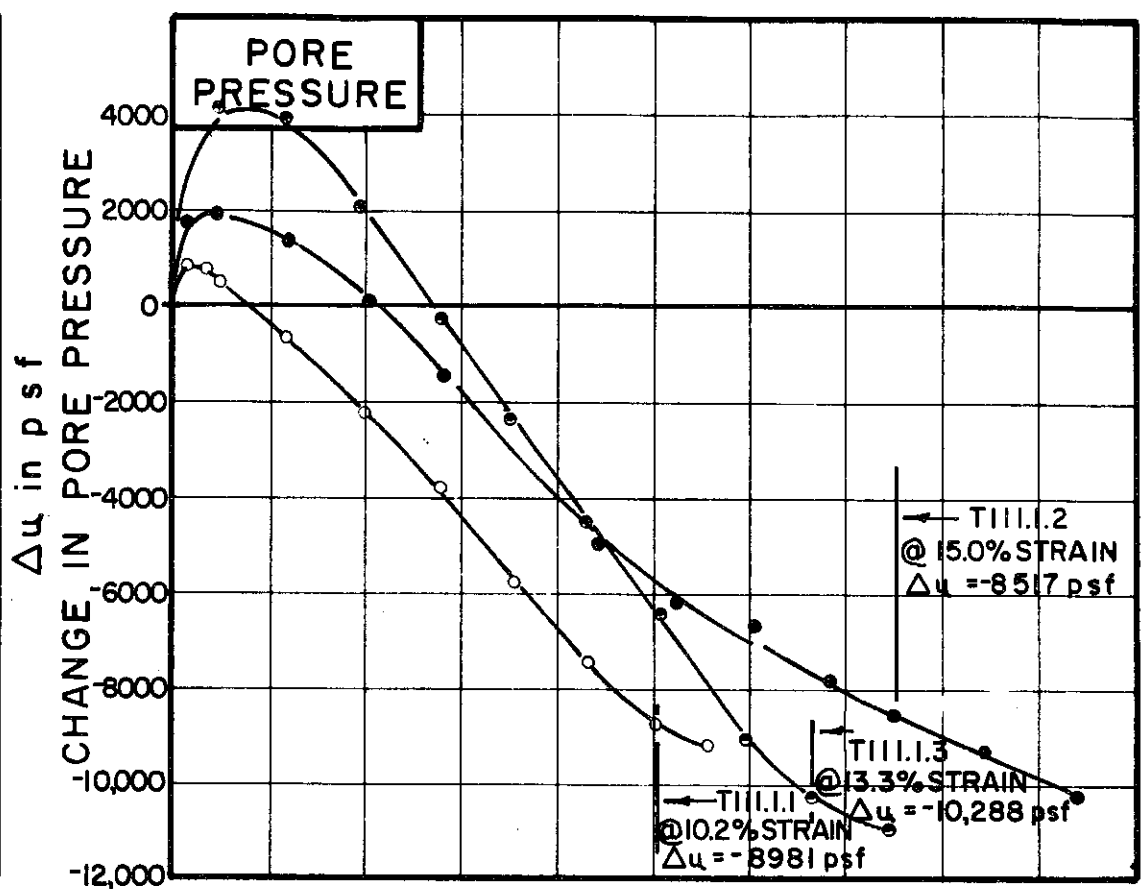
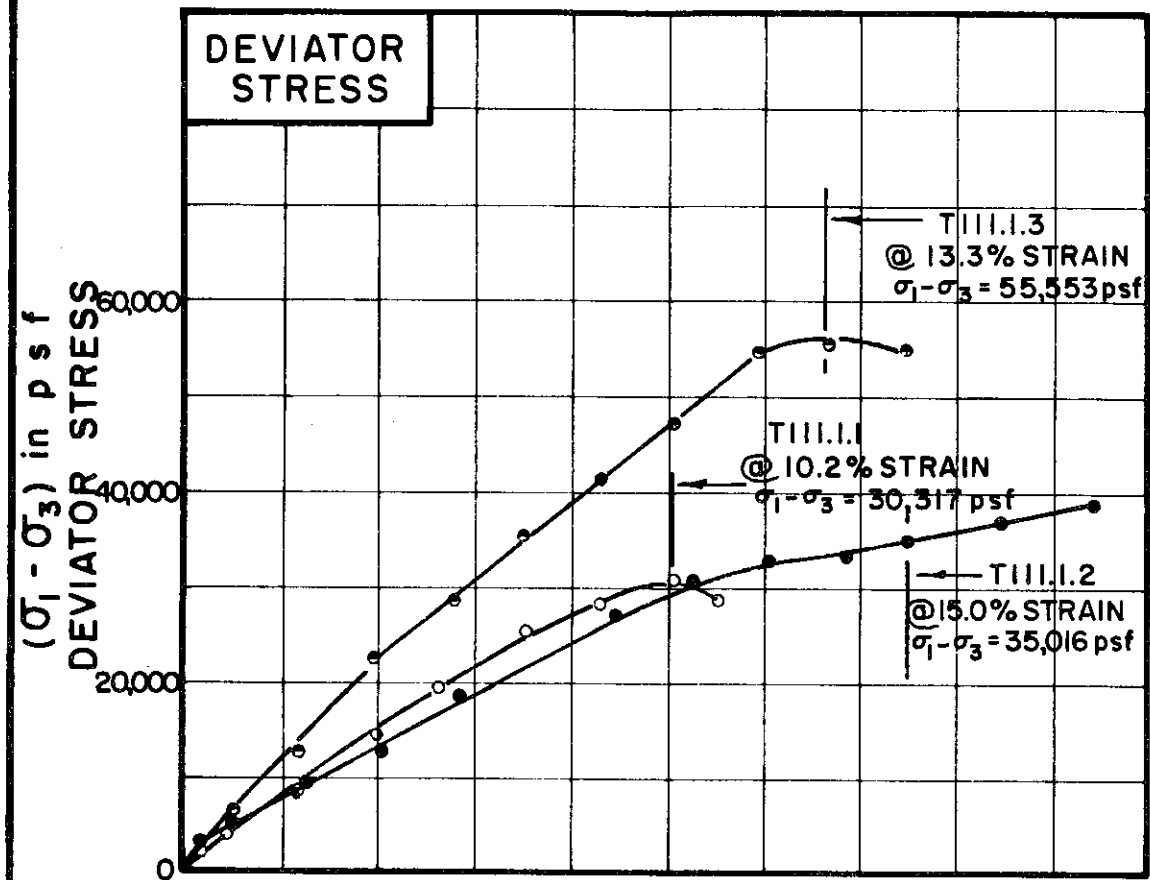
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	TIII.I.1	TIII.I.2	TIII.I.3
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INITIAL CONDITIONS		TIII.I.1	TIII.I.2	TIII.I.3
WATER CONTENT	$w_0$	22.1%	22.7%	22.1%
DRY DENSITY	$\gamma_d$ lb/cu ft	101	99	104
SAMPLE DIAMETER	$D_0$ in.	1.39	1.38	1.38
SAMPLE HEIGHT	$H_0$ in.	3.20	3.10	3.21
FINAL CONDITIONS BEFORE SHEAR		TIII.I.1	TIII.I.2	TIII.I.3
FINAL BACK PRESSURE	$u_0$ psf	9360	11,520	11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$ psf	2160	4320	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.62%	1.22%	1.78%
PORE PRESSURE RESPONSE		99%	97%	97%
FINAL CONDITIONS		TIII.I.1	TIII.I.2	TIII.I.3
WATER CONTENT	$w_f$	21.8%	21.8%	21.8%
SKETCH OF SAMPLE AT END OF TEST				

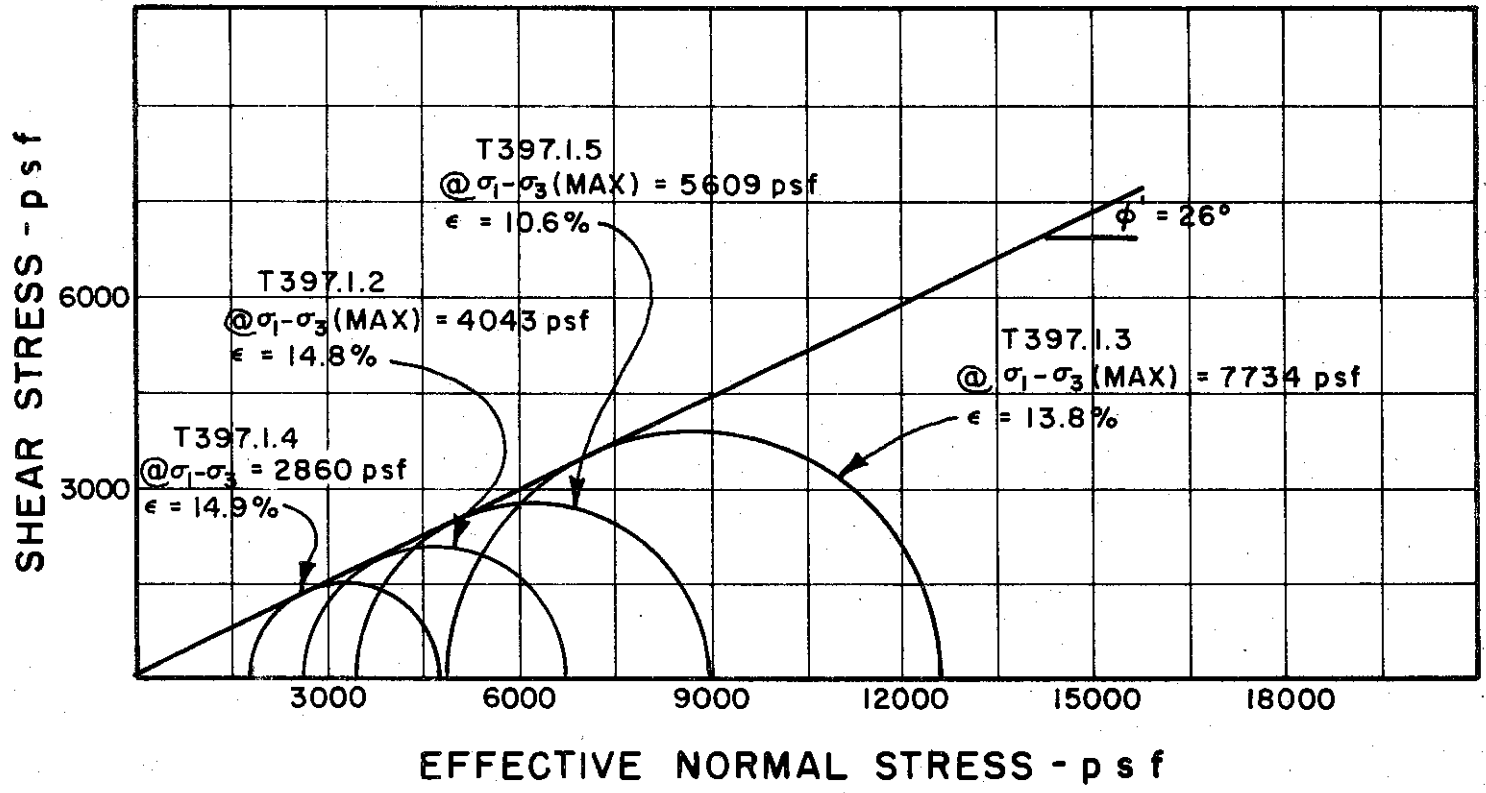
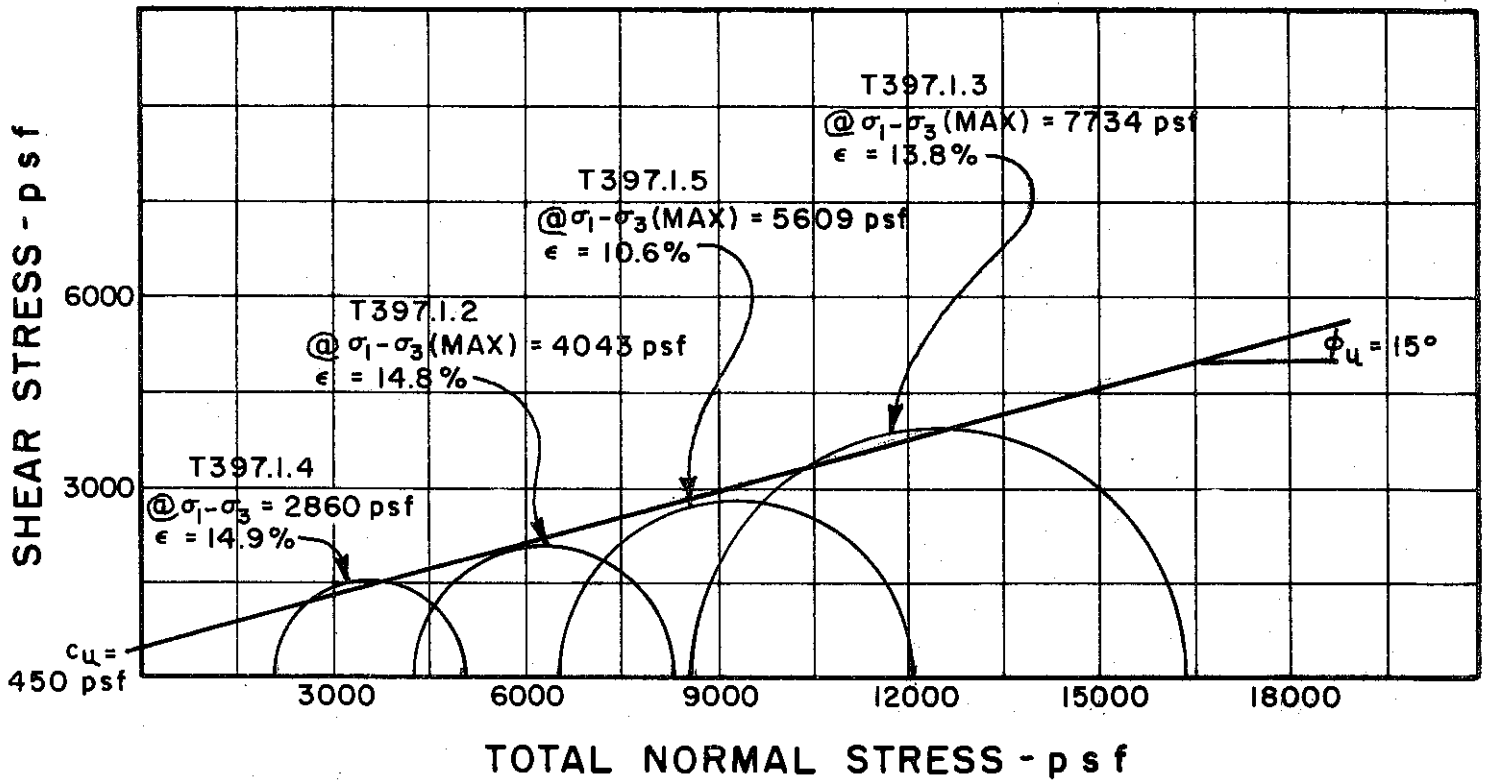
RATE OF STRAIN PERCENT/MINUTE	.025	.026	.025
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BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 48.0' TO 50.5'  
 SOIL DESCRIPTION SILT (ML)  
 LIQUID LIMIT NON-PLASTIC PLASTIC LIMIT       

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



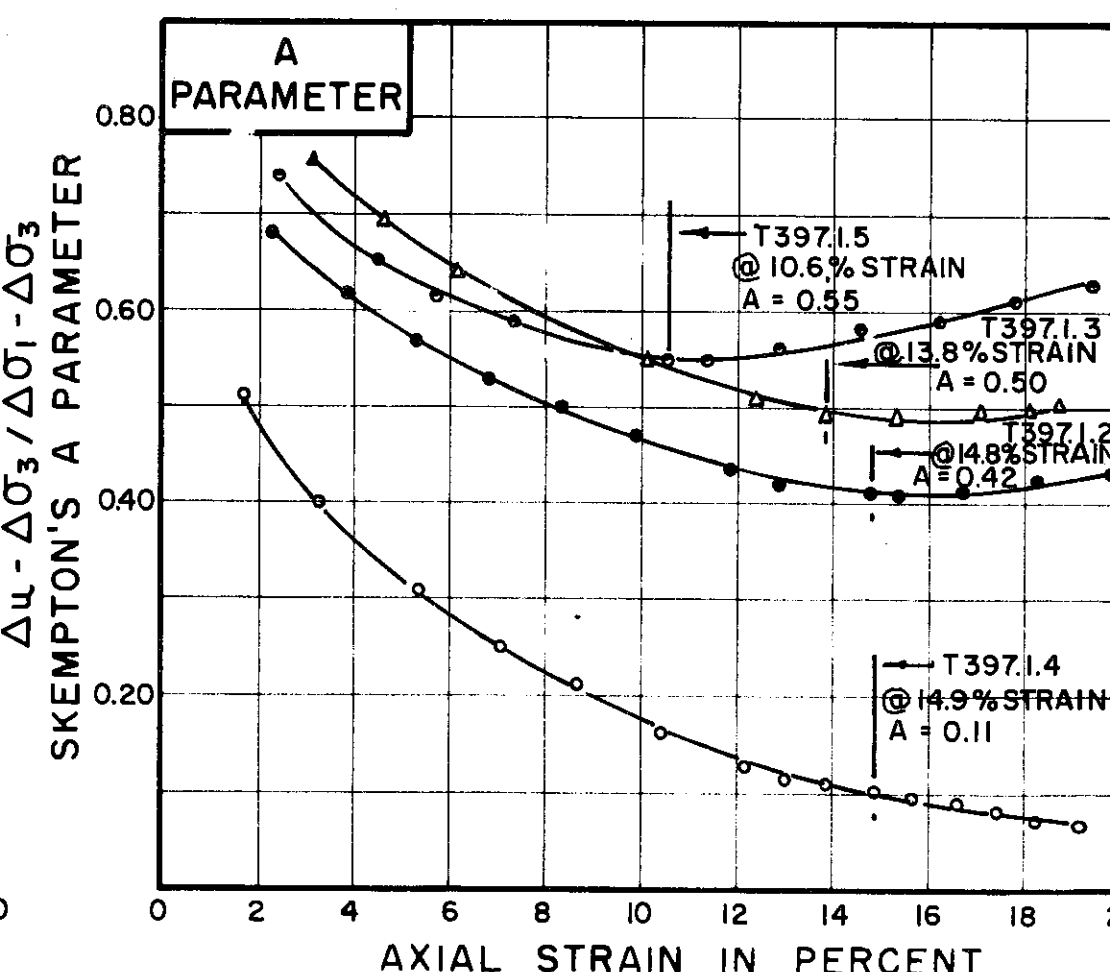
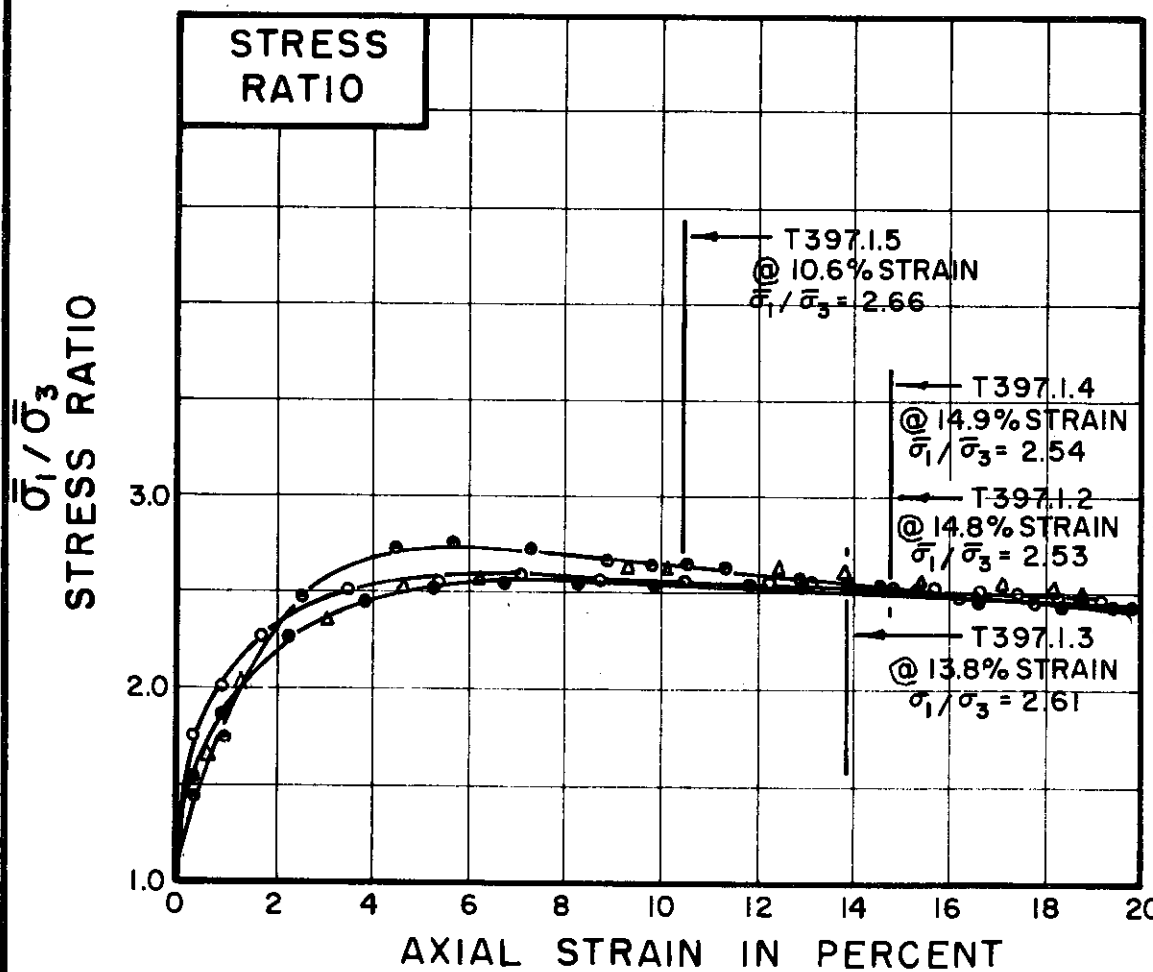
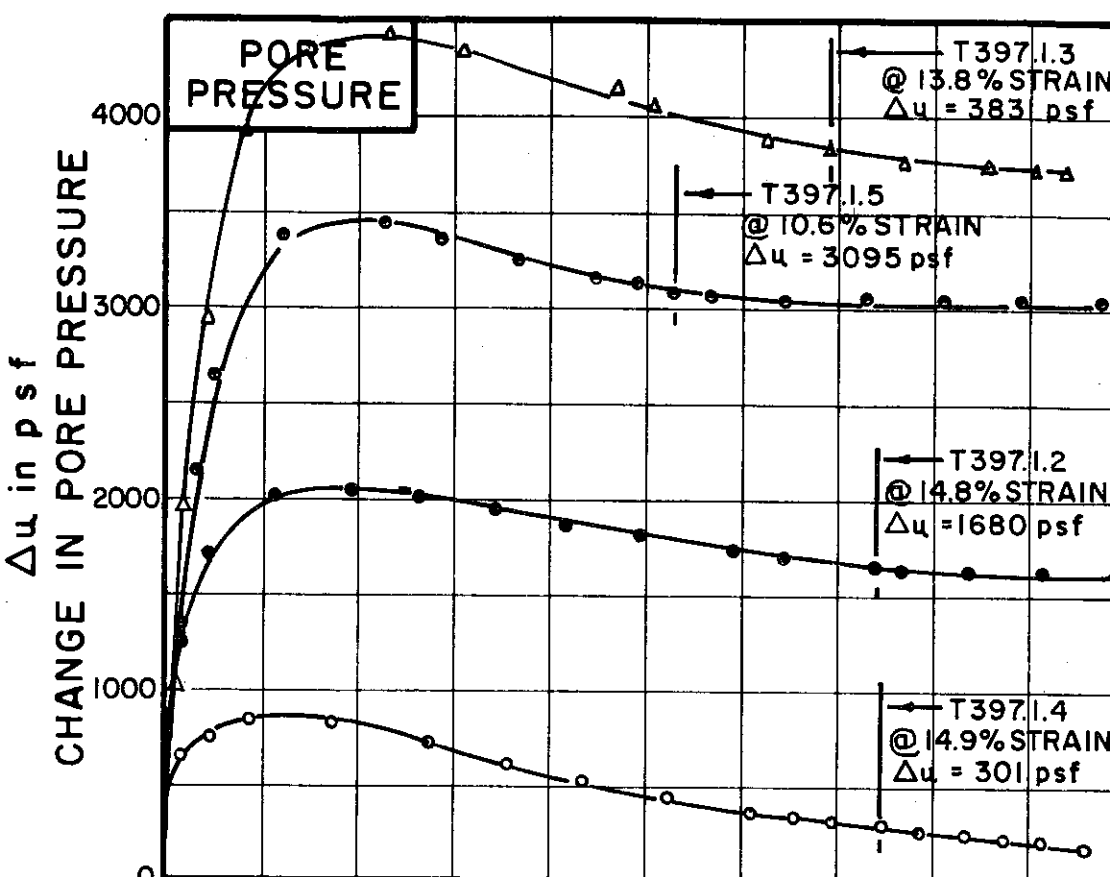
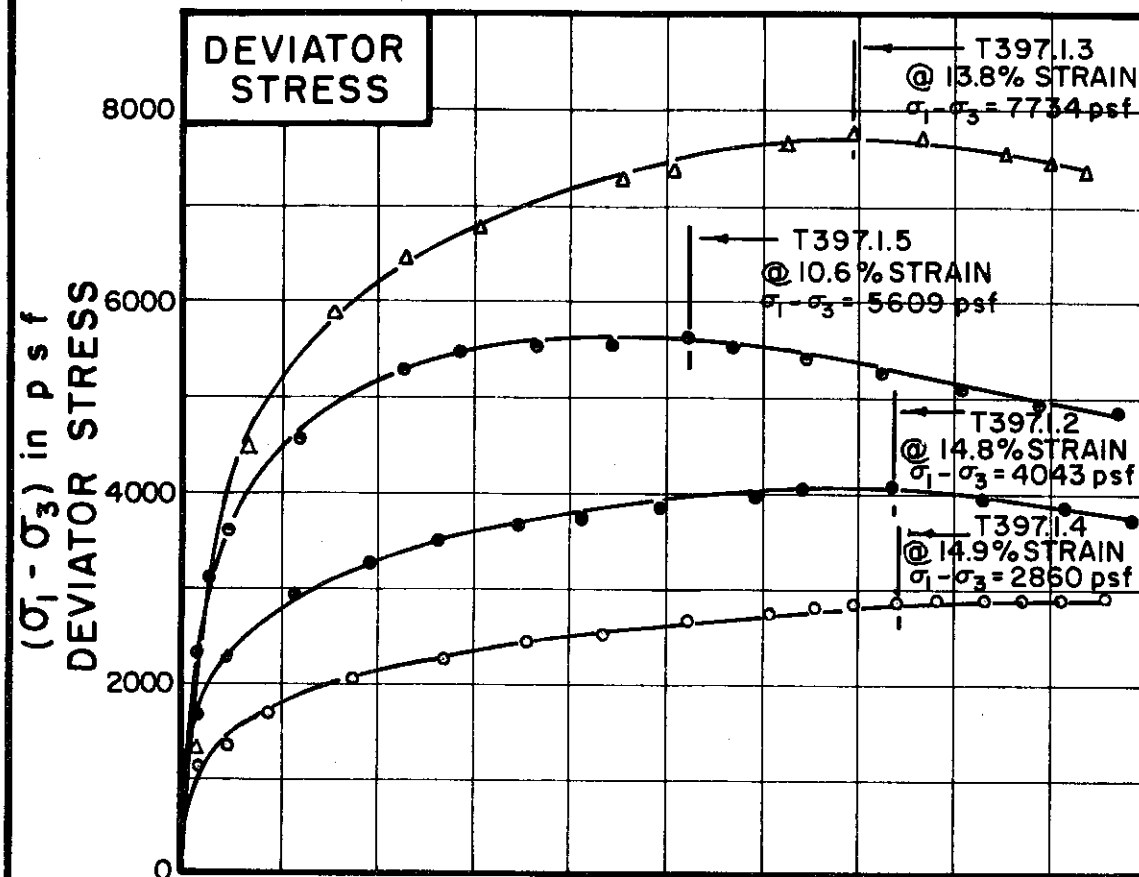


BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-415



TEST NO. / SYMBOL	T397.1.4	T397.1.2	T397.1.5	T397.1.3
	○	●	●	△

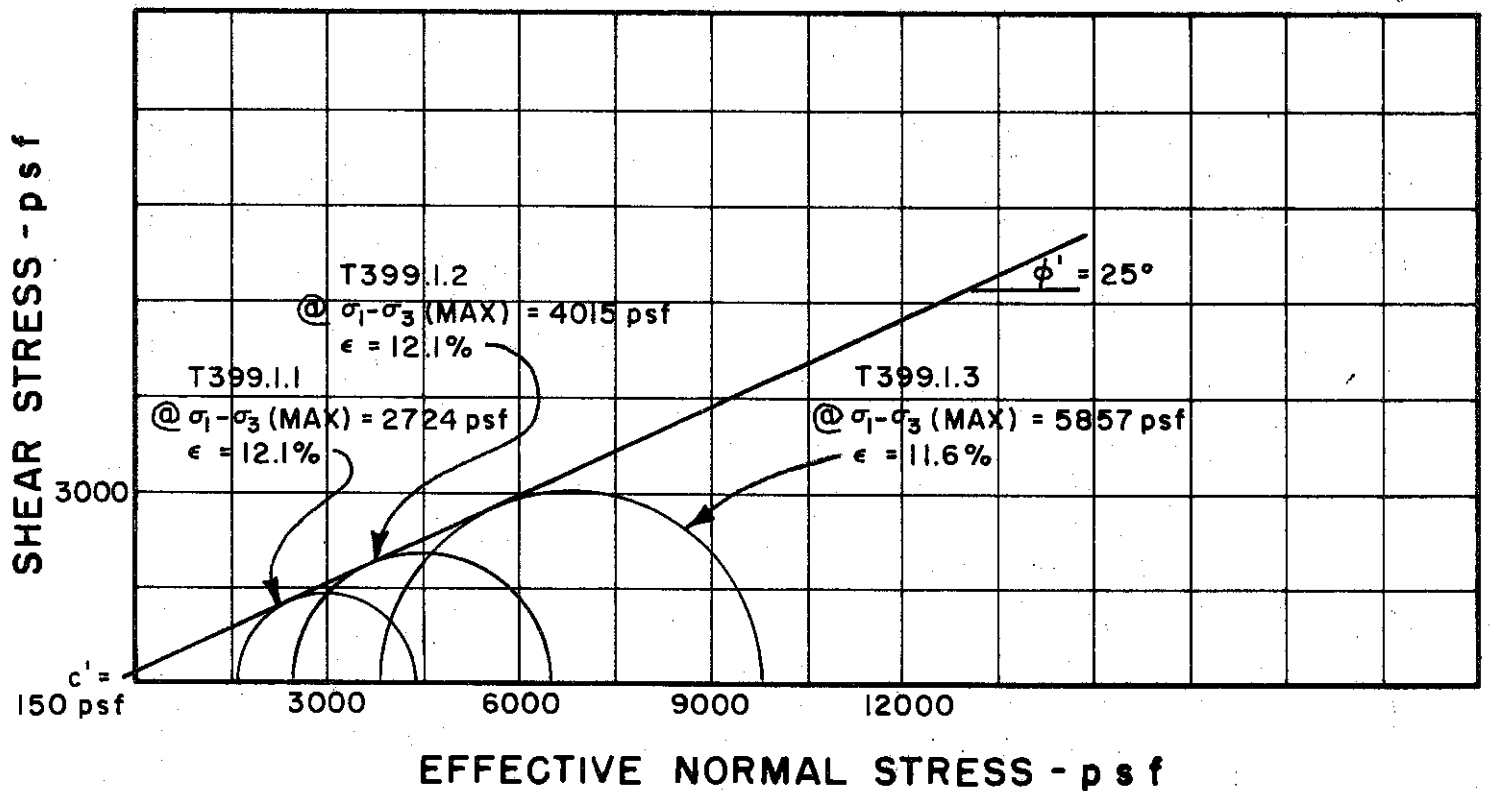
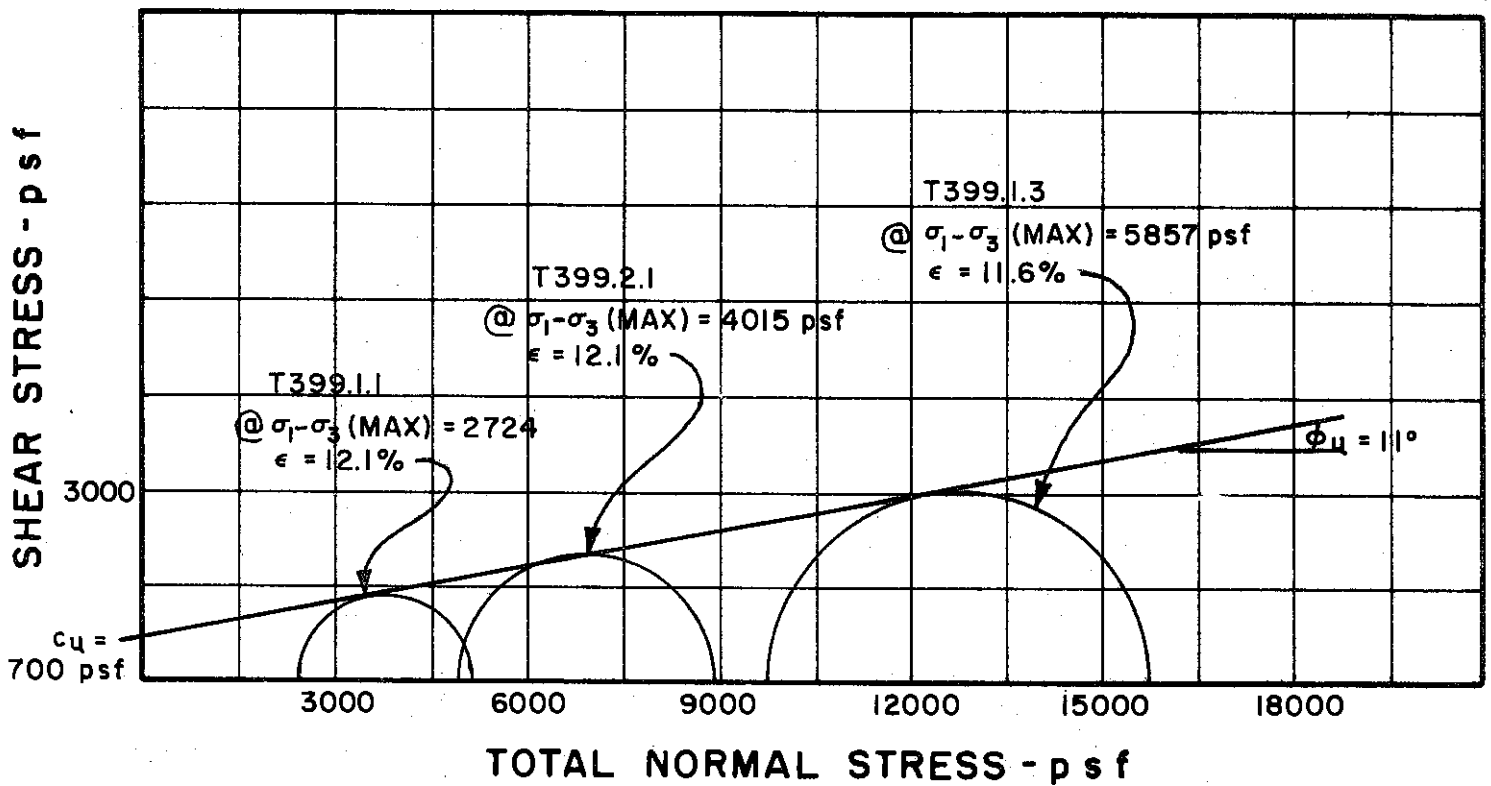
INITIAL CONDITIONS			T397.1.4	T397.1.2	T397.1.5	T397.1.3
WATER CONTENT	$w_0$		22.6%	23.2%	24.0%	23.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	101	102	100	102
SAMPLE DIAMETER	$D_0$	in.	1.37	1.37	1.37	1.38
SAMPLE HEIGHT	$H_0$	in.	2.88	3.30	3.12	3.30
FINAL CONDITIONS BEFORE SHEAR			T397.1.4	T397.1.2	T397.1.5	T397.1.3
FINAL BACK PRESSURE	$u_0$	psf	7200	10080	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	psf	2160	4320	6480	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.68%	1.94%	3.33%	4.95%
PORE PRESSURE RESPONSE			95%	96%	98%	95%
FINAL CONDITIONS AT END OF TEST			T397.1.4	T397.1.2	T397.1.5	T397.1.3
WATER CONTENT	$w_f$		21.5%	21.3%	19.9%	19.8%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT/MINUTE	.028	.024	.026	.025
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BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 31 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

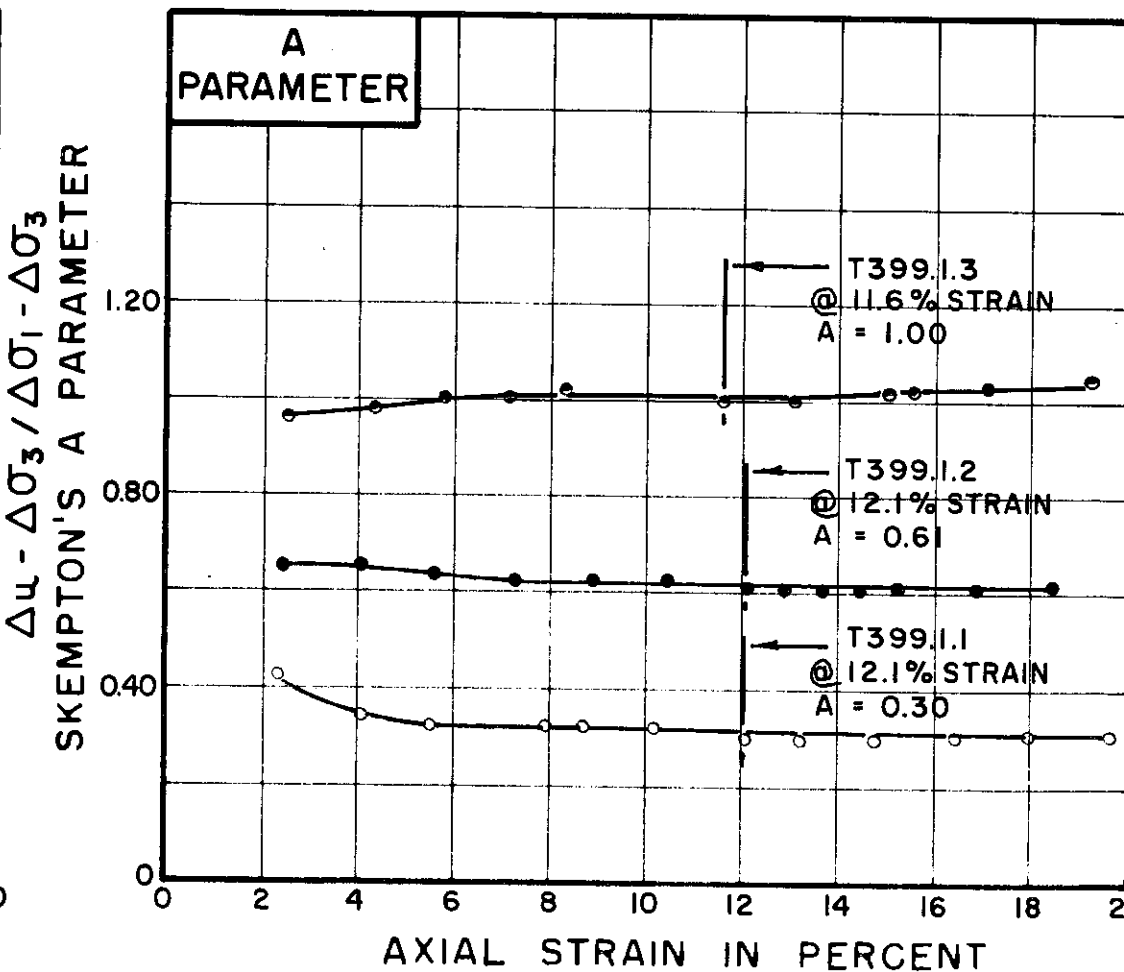
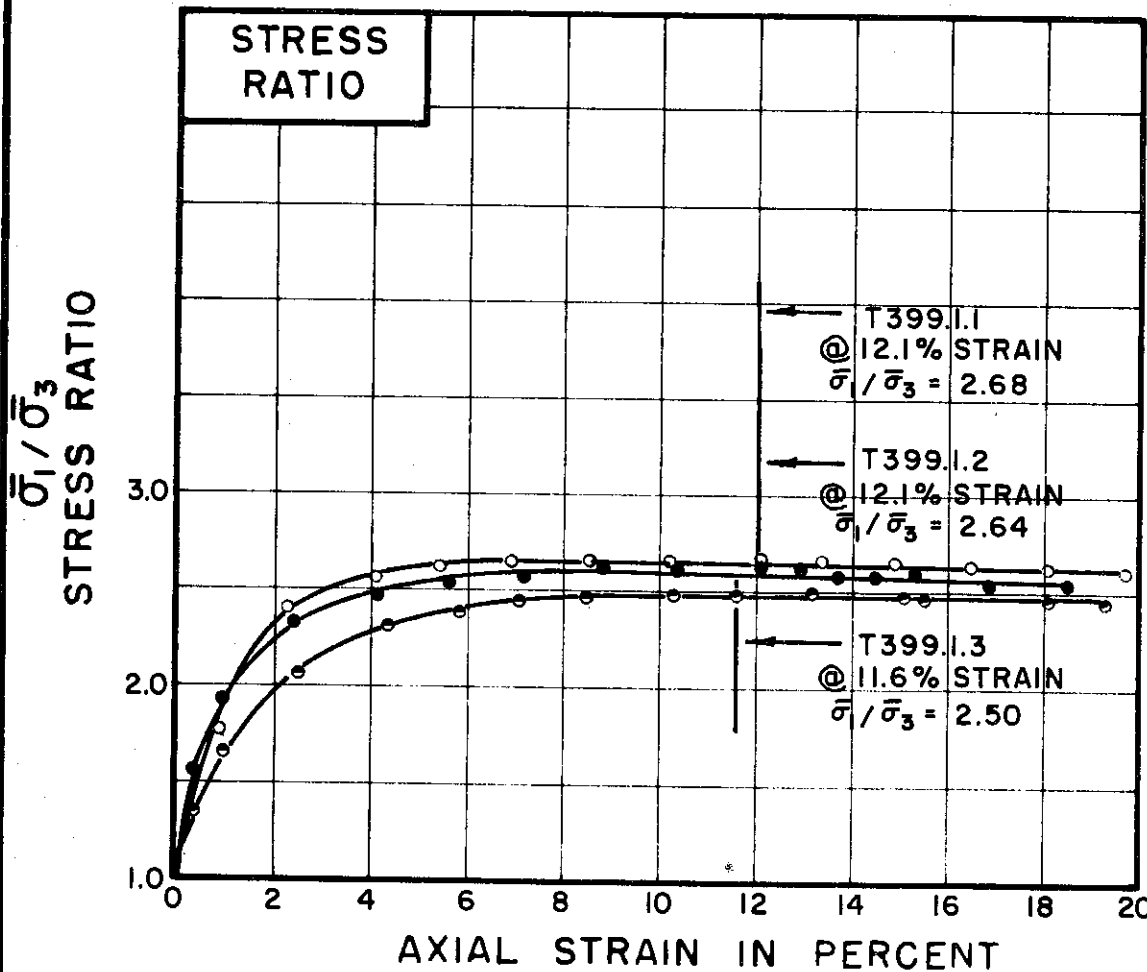
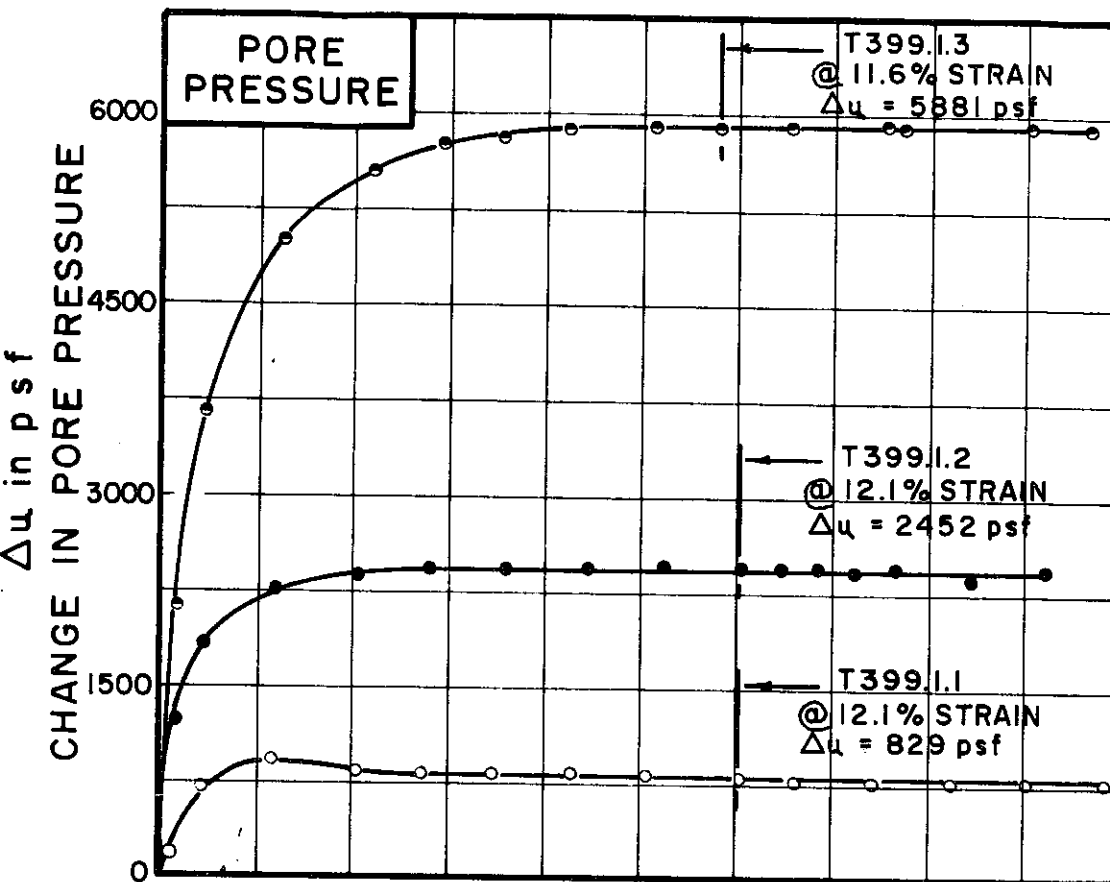
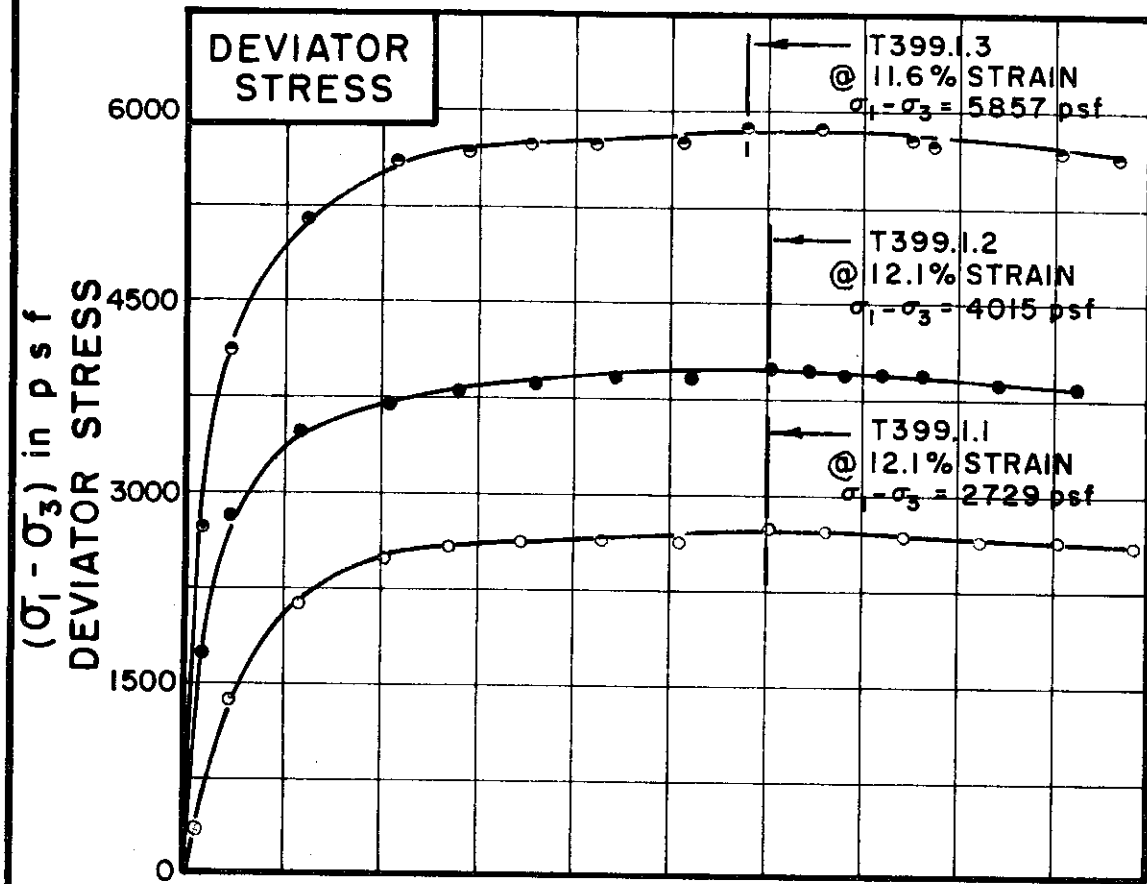
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-417



TEST NO. / SYMBOL	T399.1.1	T399.1.2	T399.1.3
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INITIAL CONDITIONS			T399.1.1	T399.1.2	T399.1.3
WATER CONTENT	$w_0$		26.4%	25.2%	25.8%
DRY DENSITY	$\gamma_d$	lb/cu ft	98	98	98
SAMPLE DIAMETER	$D_0$	in.	1.39	1.38	1.39
SAMPLE HEIGHT	$H_0$	in.	3.20	3.14	3.29
FINAL CONDITIONS BEFORE SHEAR			T399.1.1	T399.1.2	T399.1.3
FINAL BACK PRESSURE	$u_0$	psf	10,080	10,080	10,080
INITIAL EFFECTIVE STRESS	$\frac{\sigma'_1}{\sigma'_3}$	psf	2448	4896	9792
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.48%	5.79%
PORE PRESSURE RESPONSE			96%	95%	98%
WATER CONTENT	$w_f$		25.5%	22.8%	22.2%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.026	.025
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BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

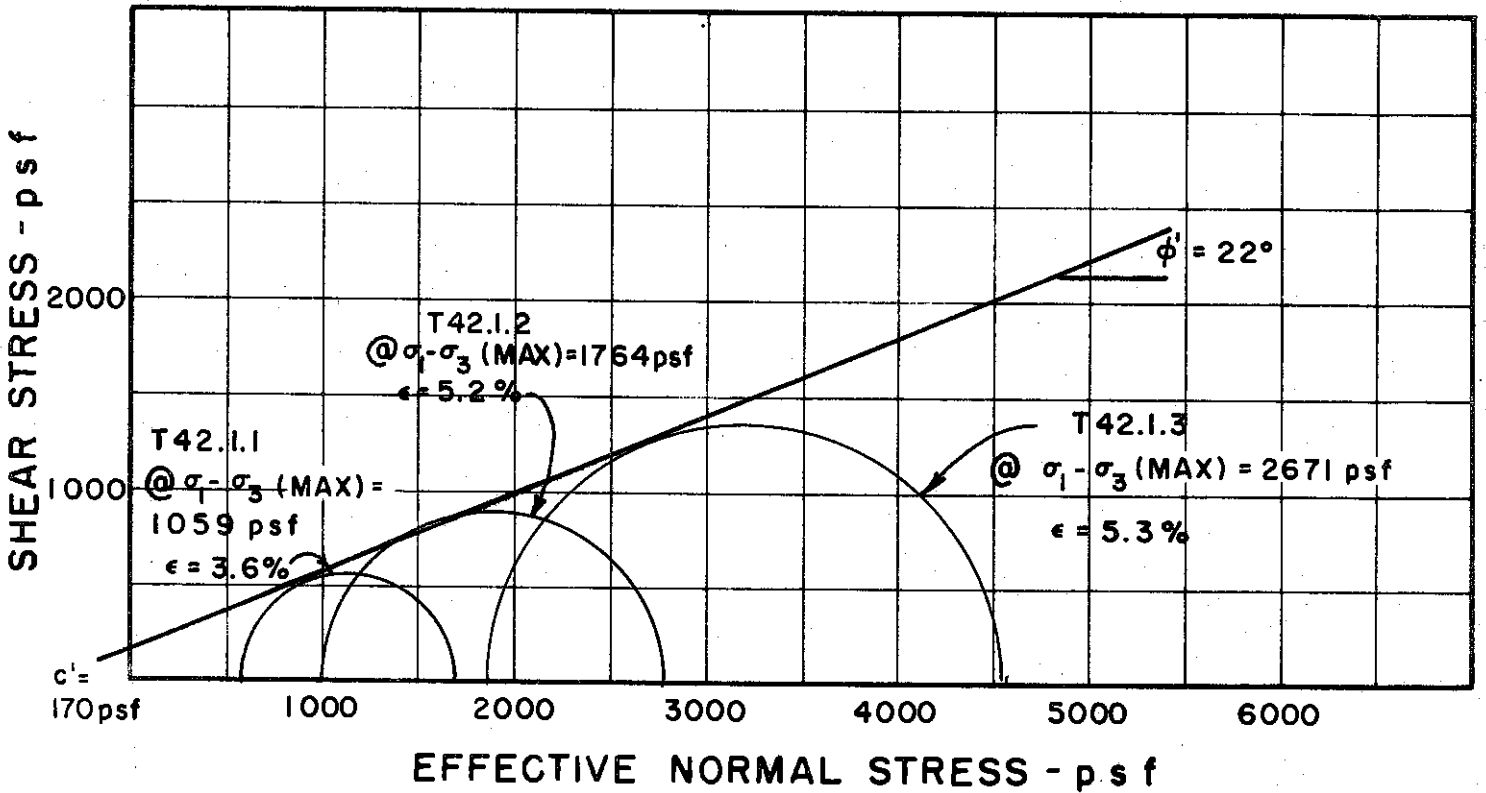
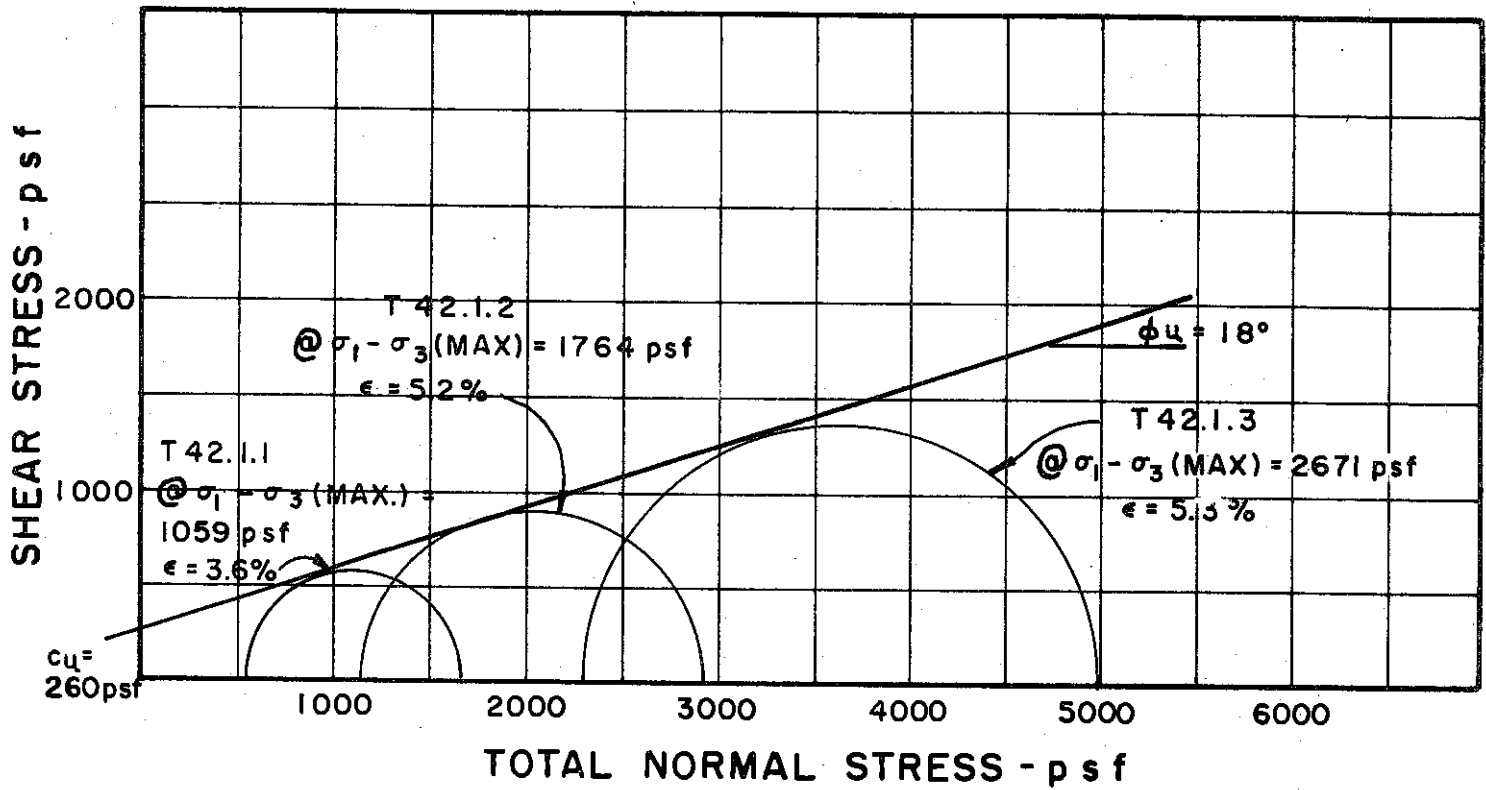
LIQUID LIMIT 36 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-418



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

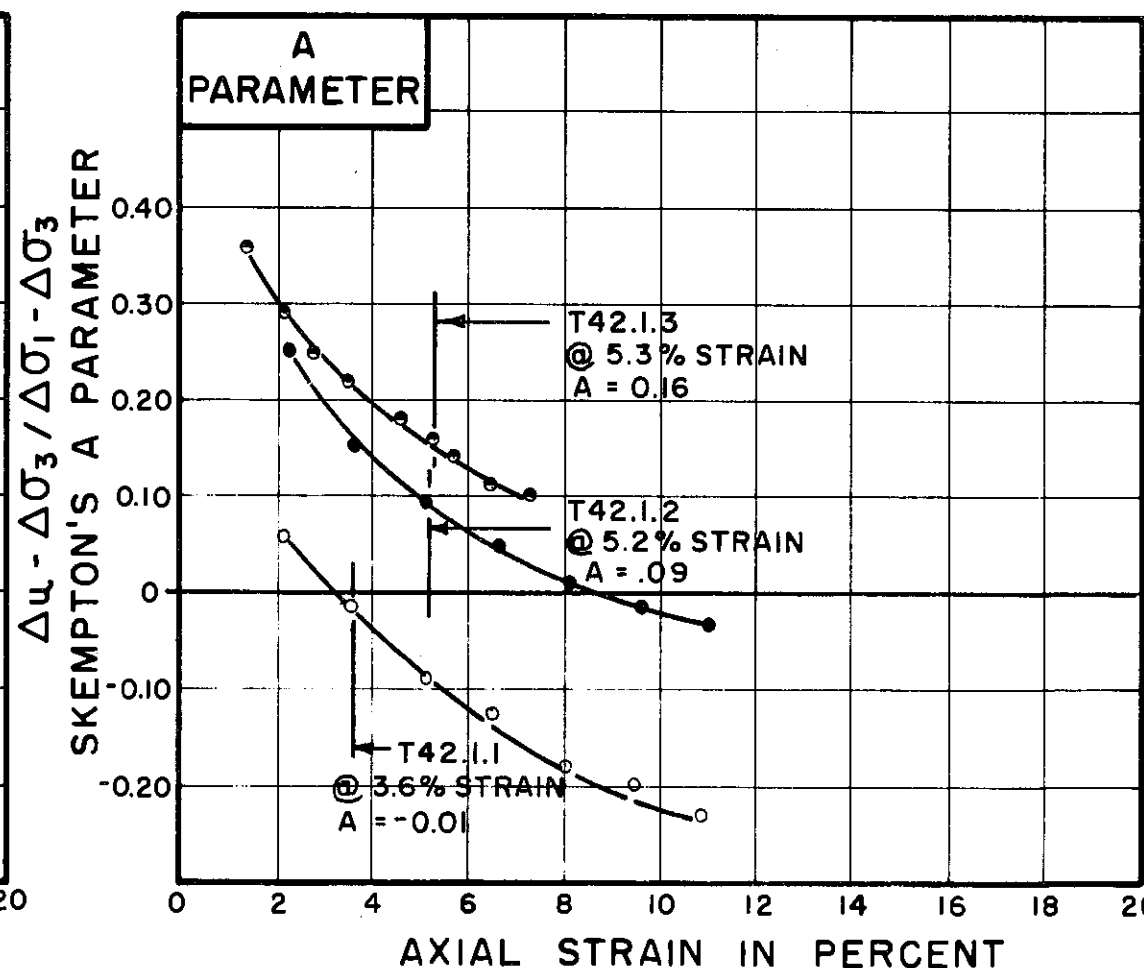
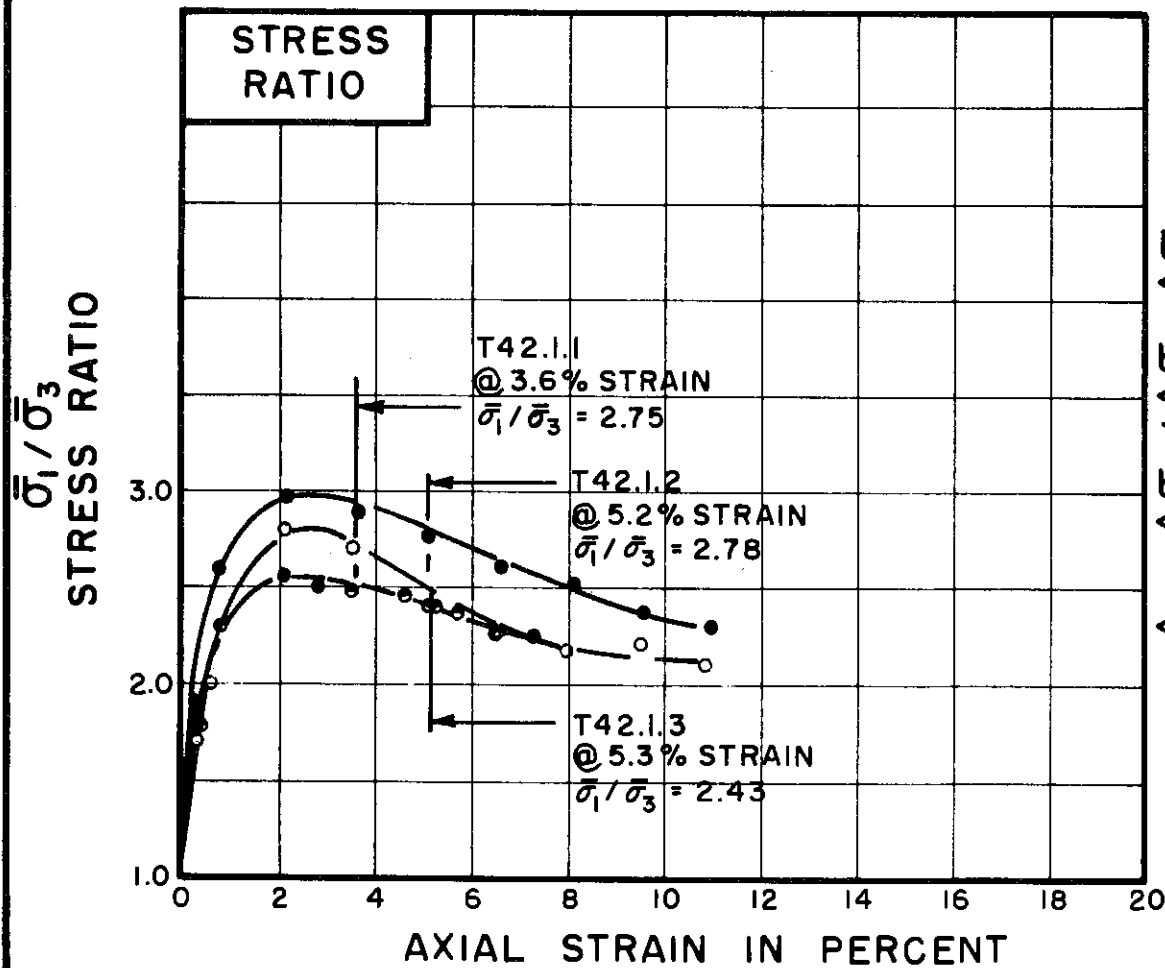
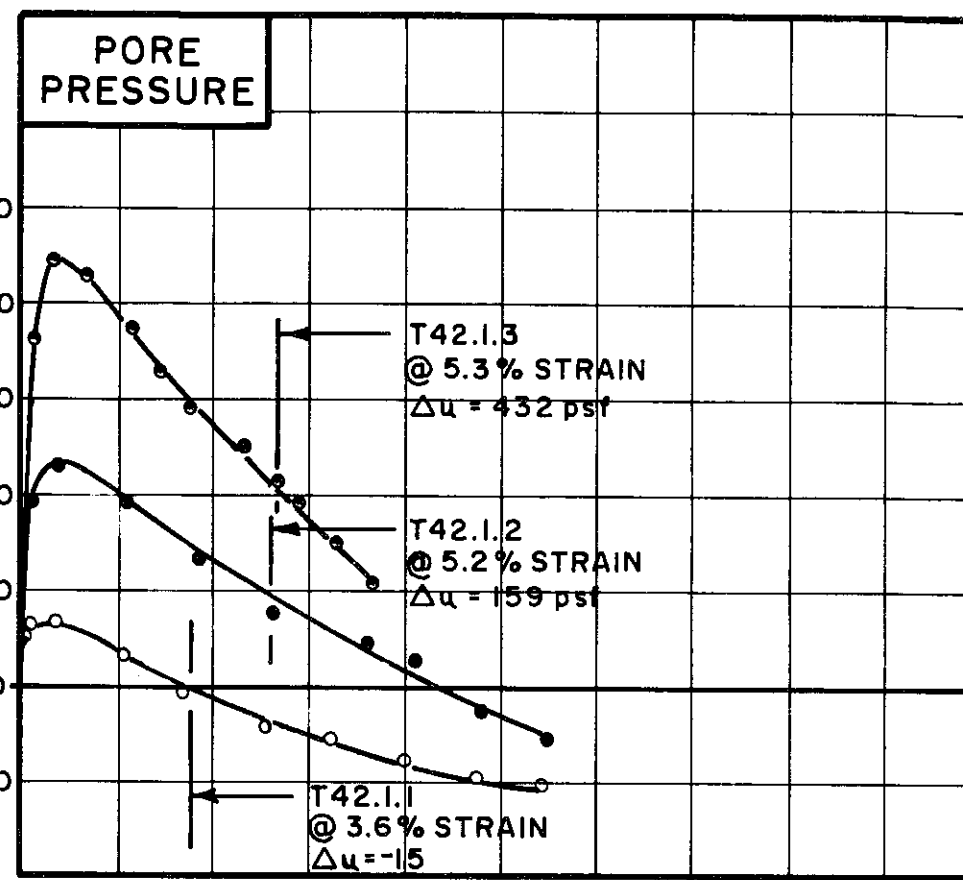
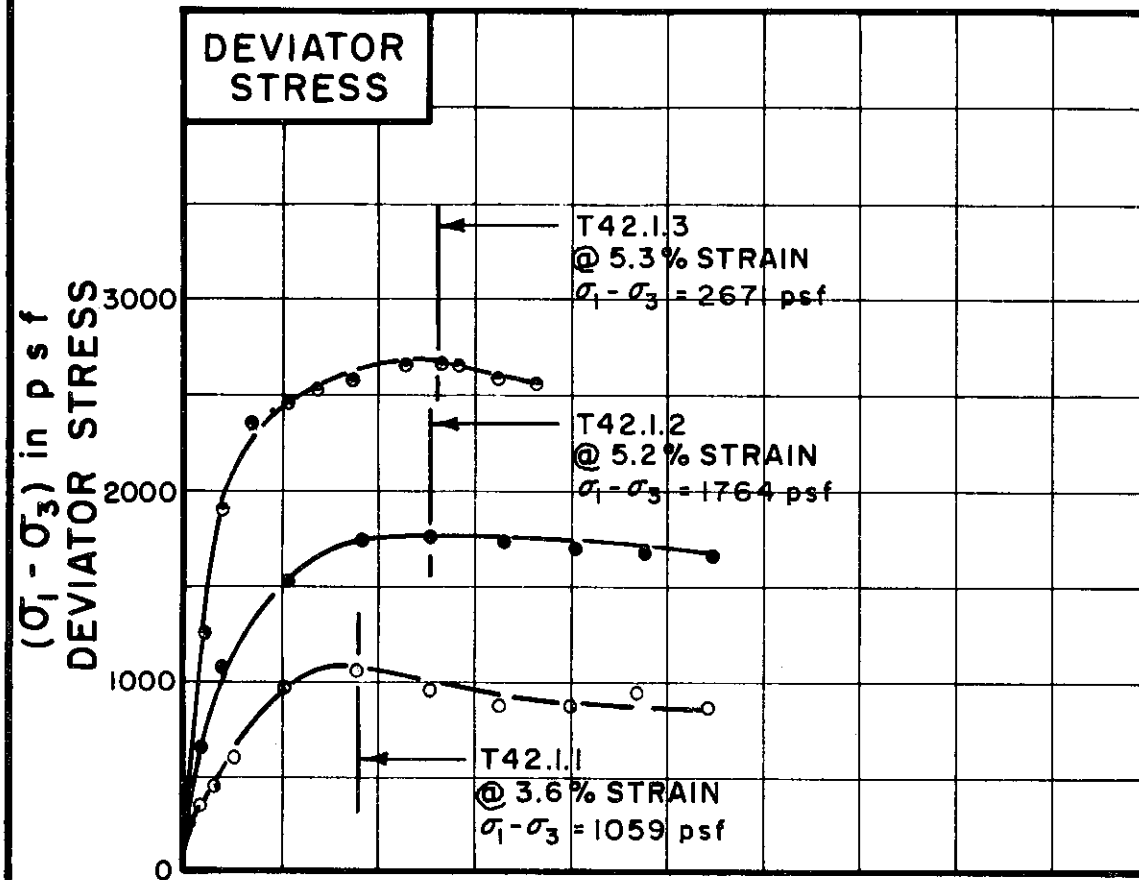
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T42.1.1 ○	T42.1.2 ●	T42.1.3 ○
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INITIAL CONDITIONS			T42.1.1	T42.1.2	T42.1.3
WATER CONTENT	$w_0$		29.8%	29.3%	28.9%
DRY DENSITY	$\gamma_d$	pcf	94	95	96
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.43	3.40	3.42
FINAL CONDITIONS BEFORE SHEAR			T42.1.1	T42.1.2	T42.1.3
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	8784
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	psf	590	1152	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.2%	1.6%	1.4%
PORE PRESSURE RESPONSE			98%	99%	98%
FINAL CONDITIONS			T42.1.1	T42.1.2	T42.1.3
WATER CONTENT	$w_f$		32.3%	30.9%	29.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.023
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BORING NO. 60

SAMPLE NO. 2

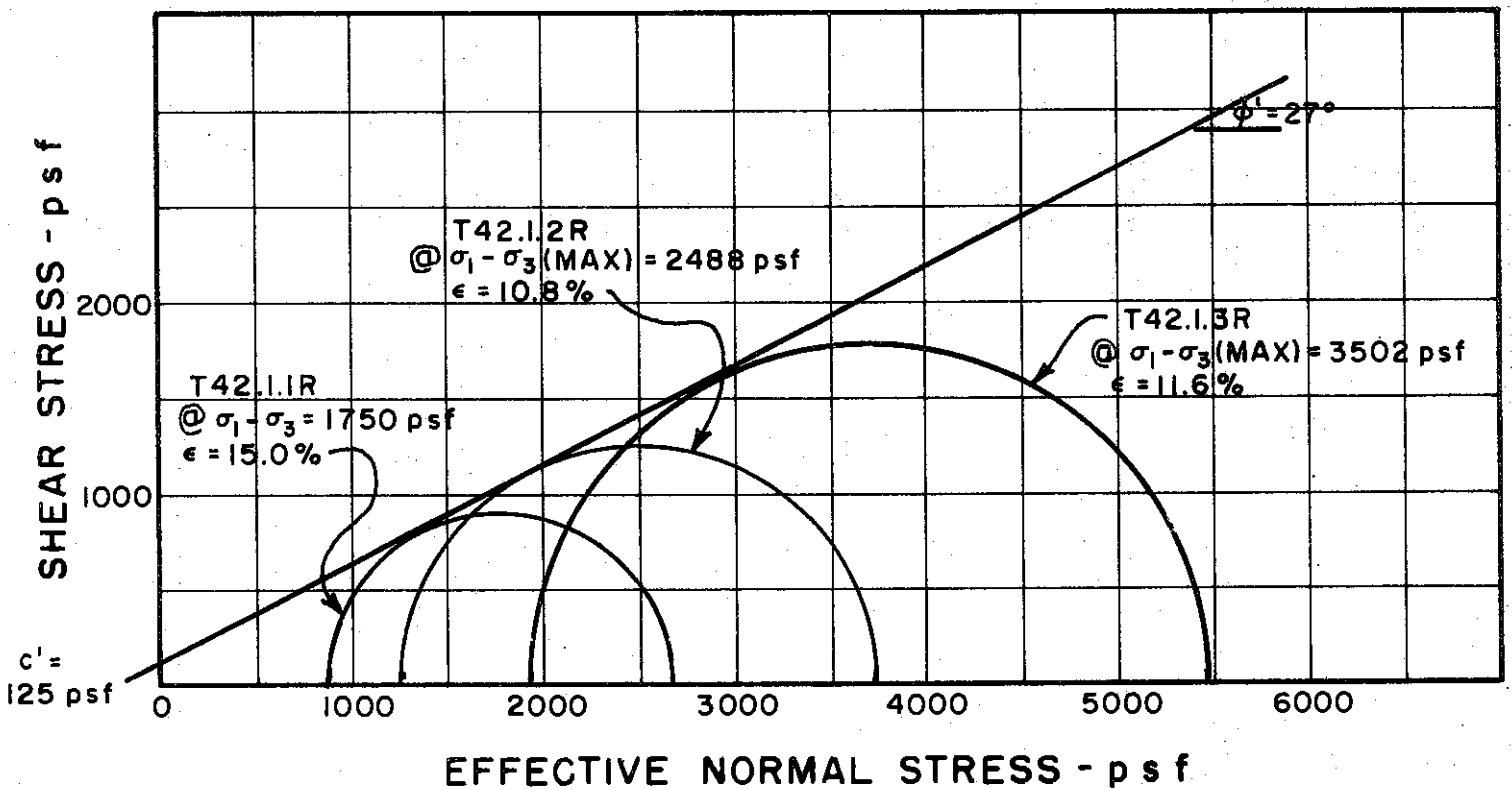
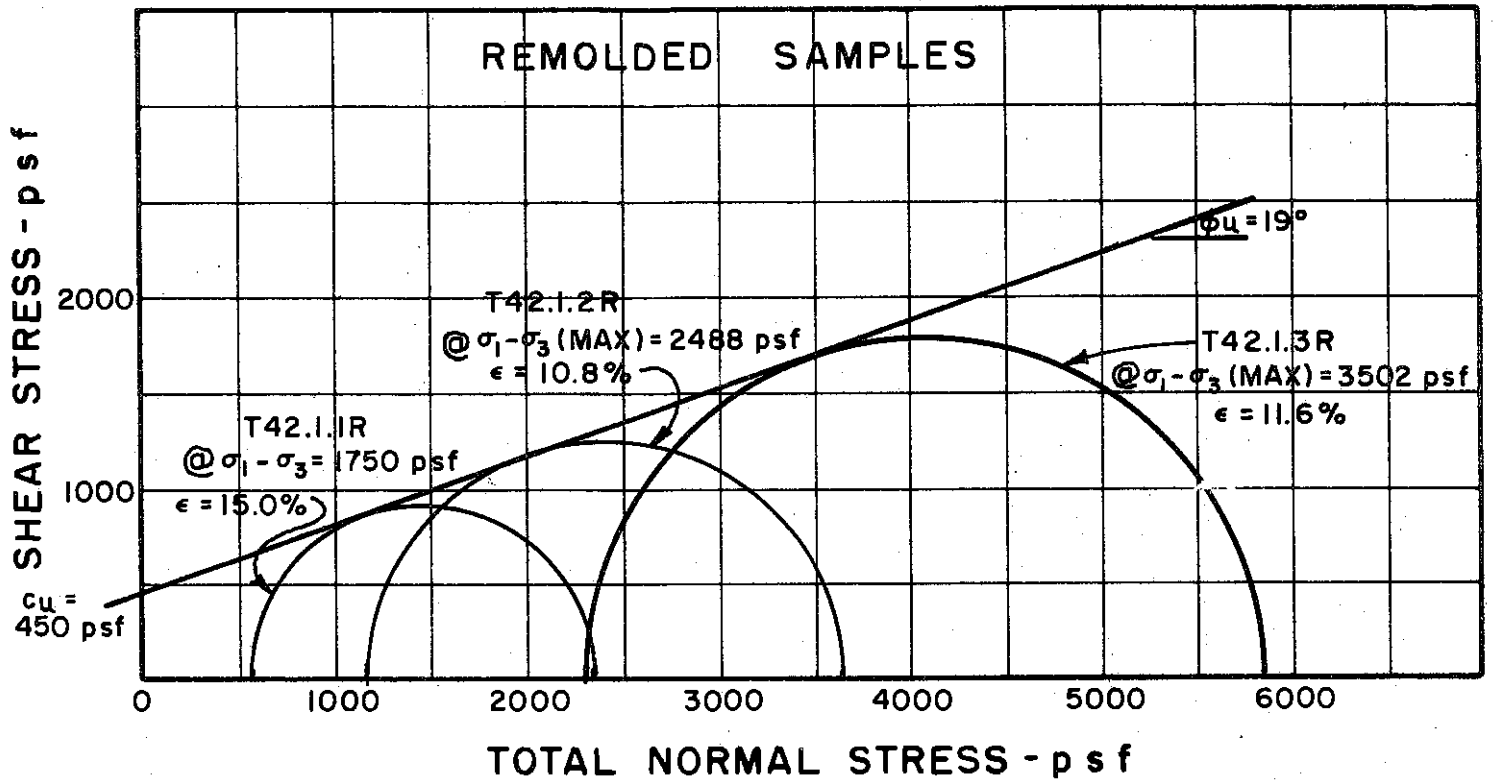
DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CH)

LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

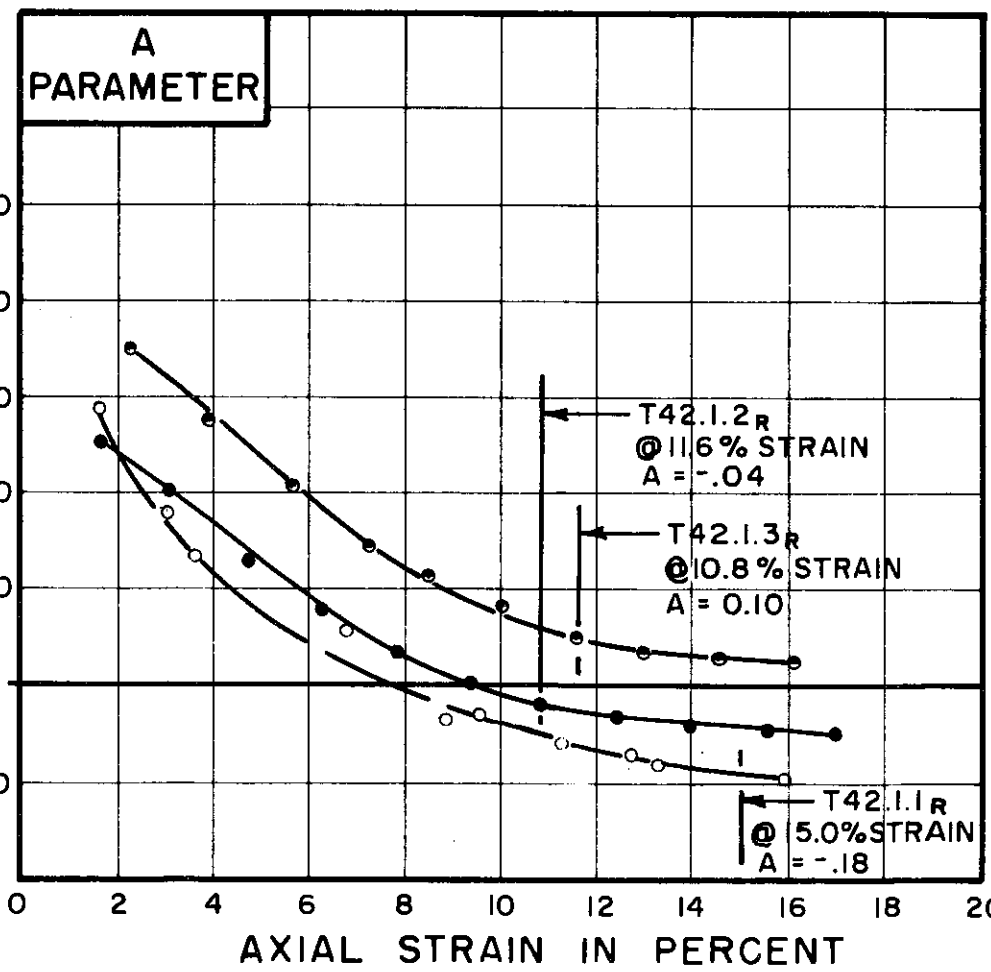
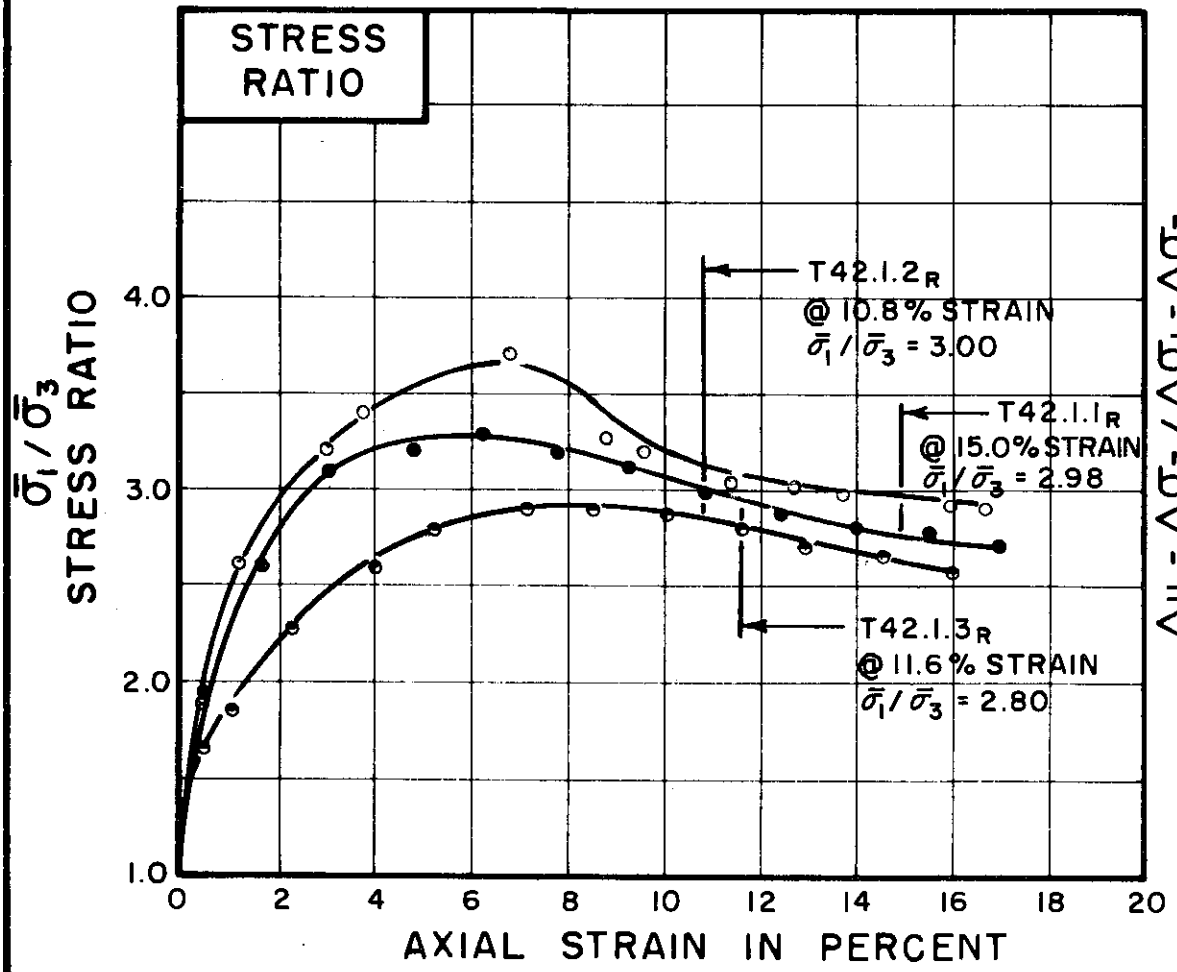
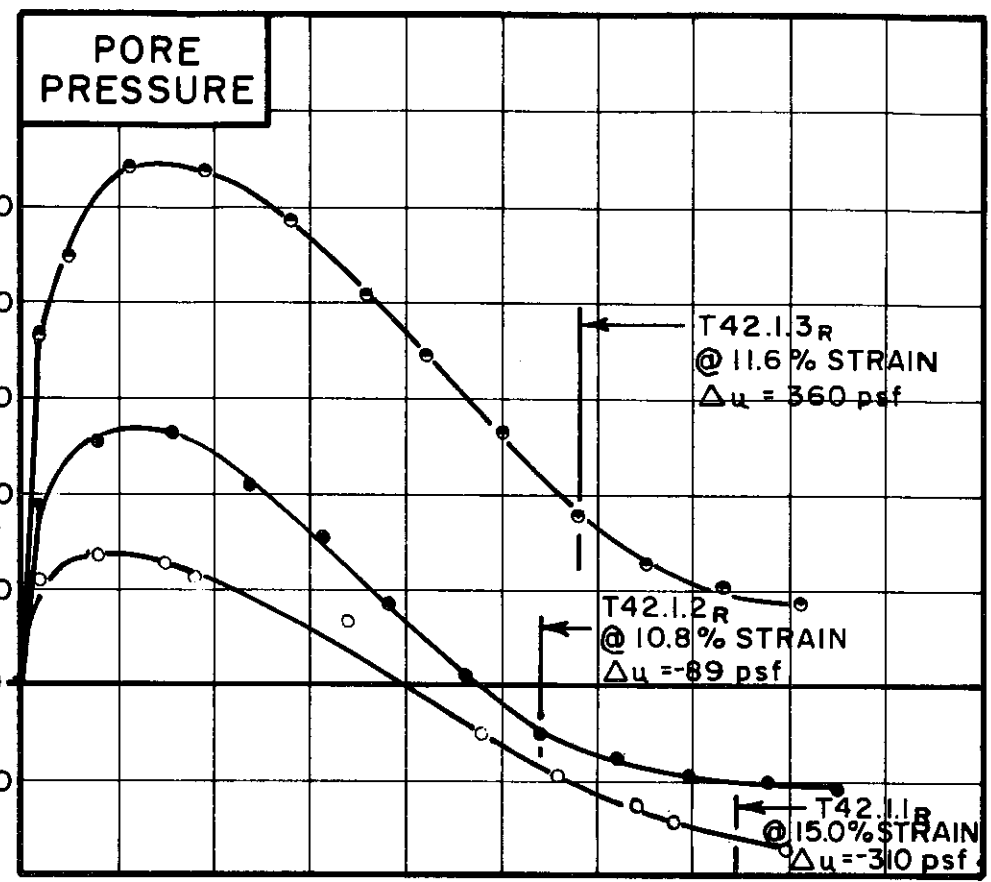
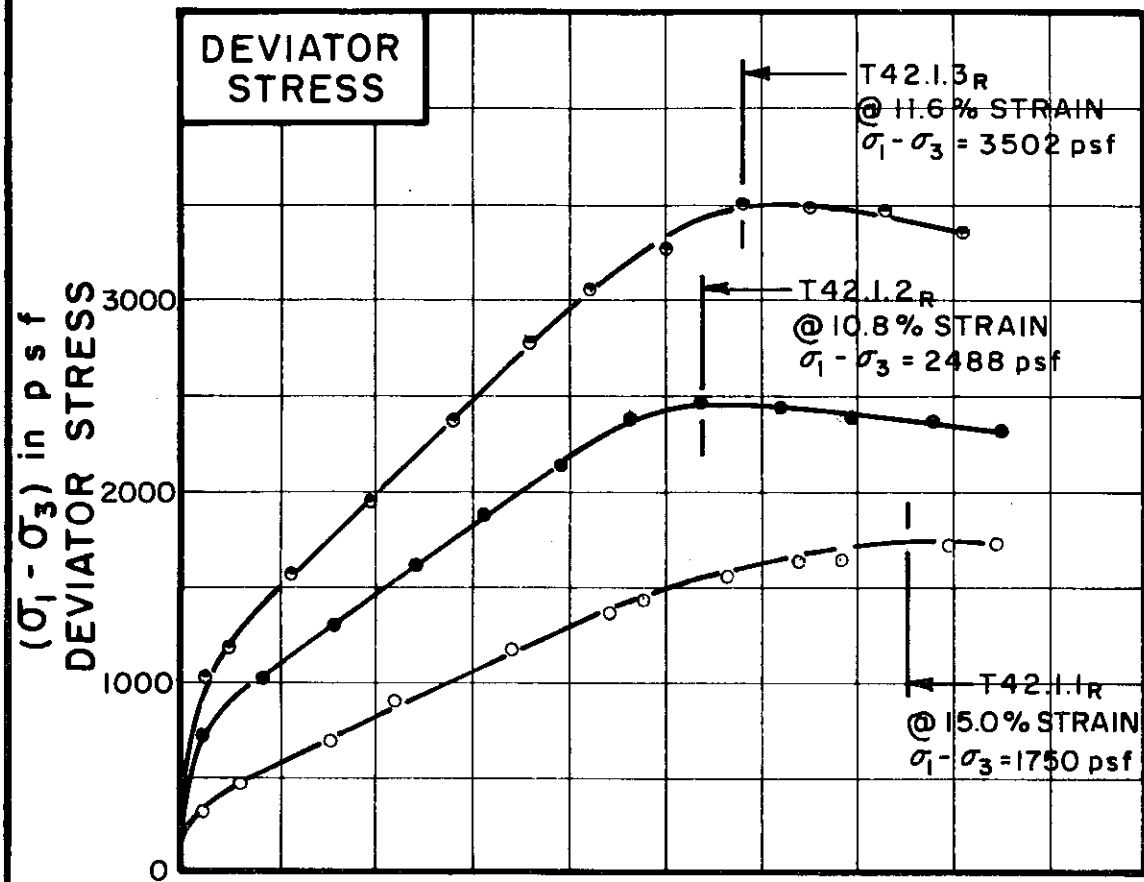
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

**MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-421



TEST NO. / SYMBOL	T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
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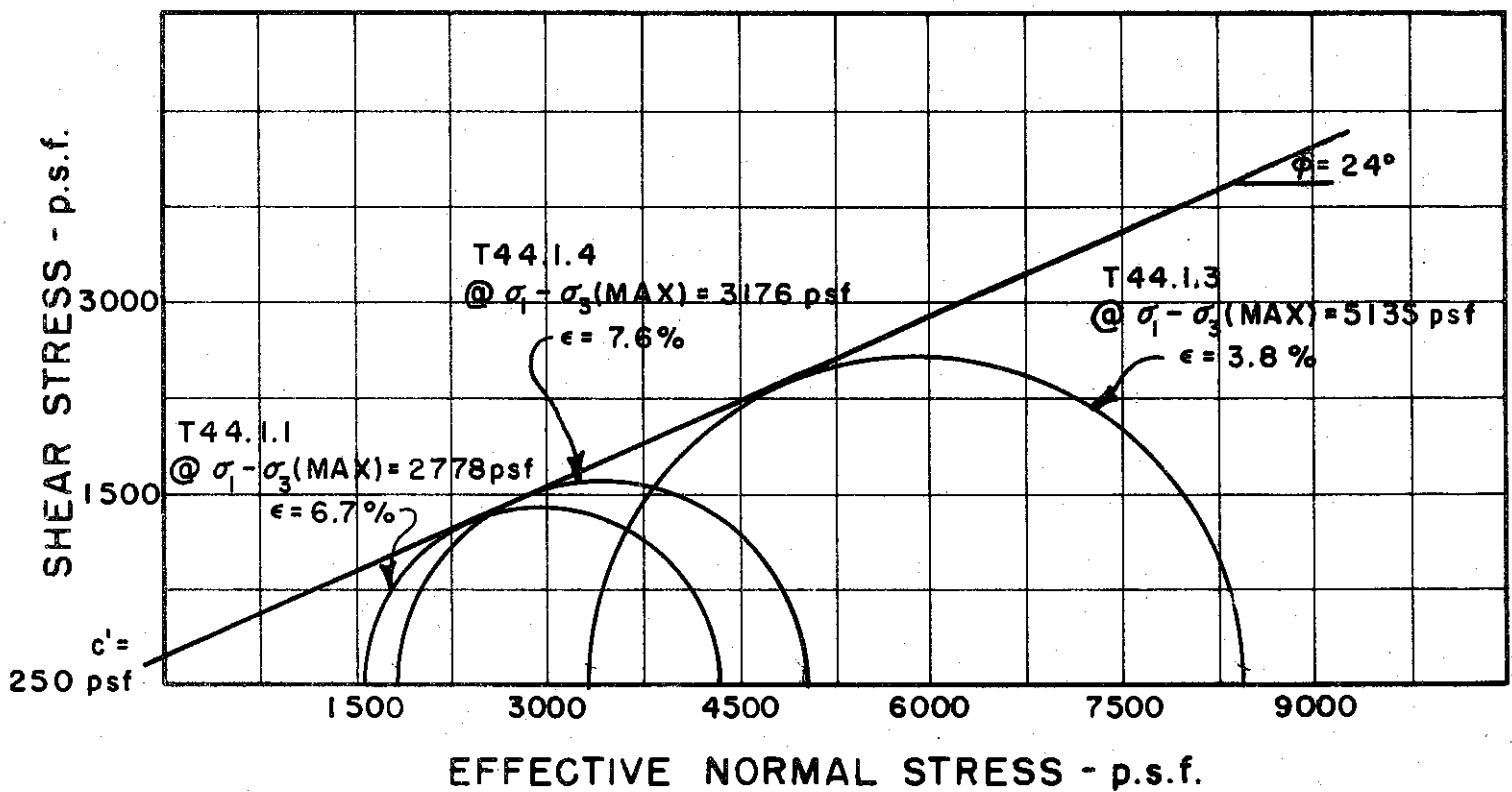
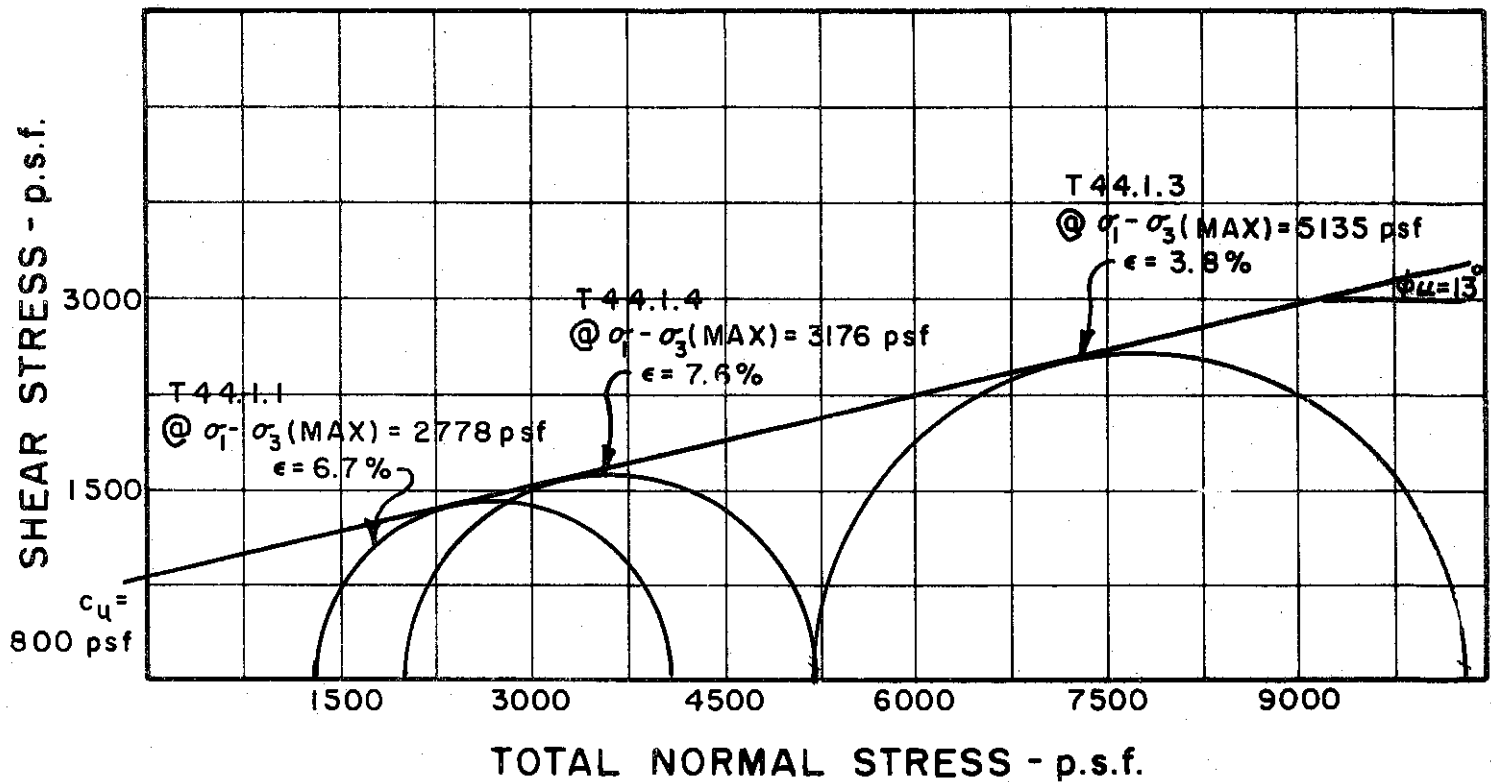
INITIAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_0$	29.3%	29.3%	29.3%
DRY DENSITY	$\gamma_d$	96	99	98
pcf				
SAMPLE DIAMETER	$D_0$	1.40	1.40	1.40
in.				
SAMPLE HEIGHT	$H_0$	3.30	3.25	3.29
in.				
FINAL CONDITIONS BEFORE SHEAR		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
FINAL BACK PRESSURE	$u_0$	8640	8640	8640
psf				
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1152	2304
psf				
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.7%	2.4%	3.3%
PORE PRESSURE RESPONSE		97%	97%	97%
FINAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_f$	29.0%	26.1%	25.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.025	.025
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BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 8.0 TO 10.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26  
 REMOLDED SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





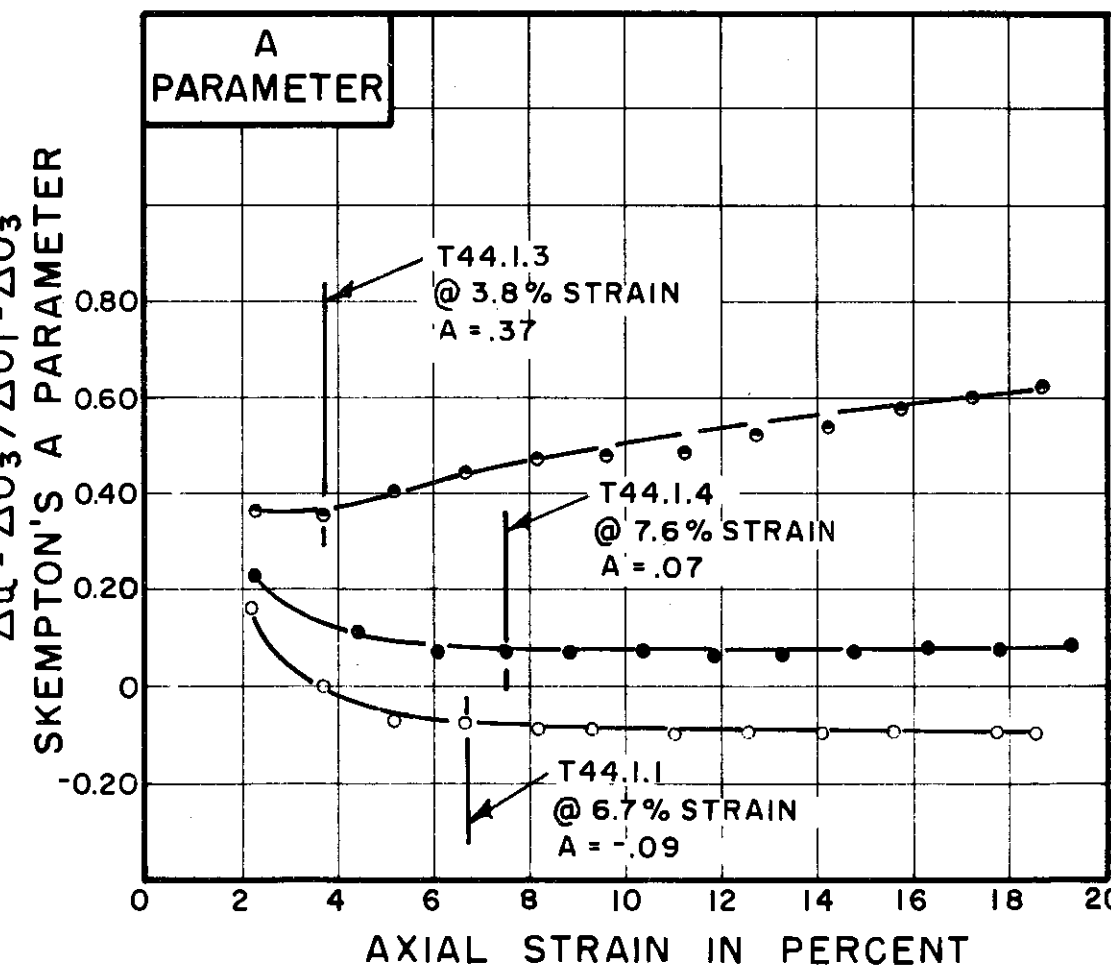
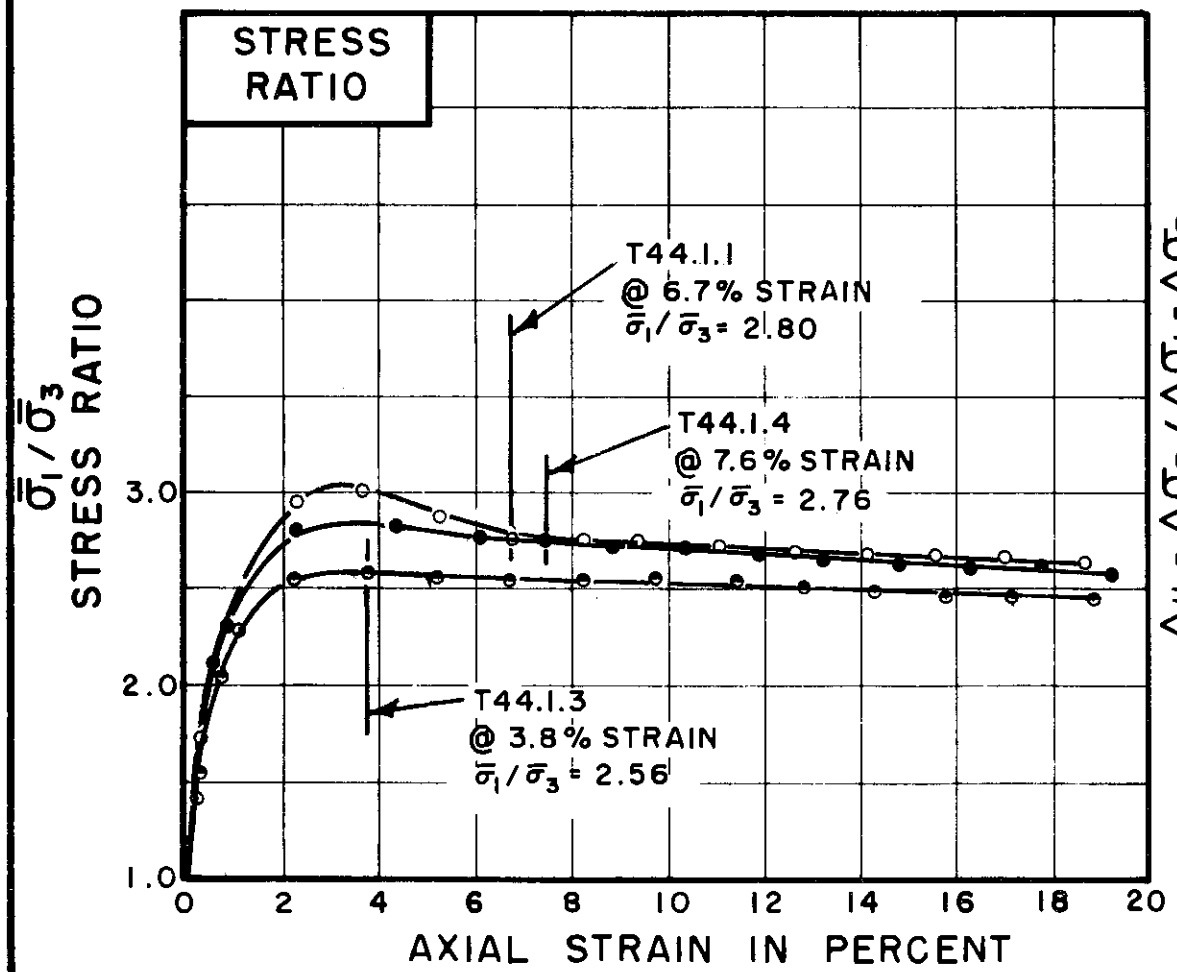
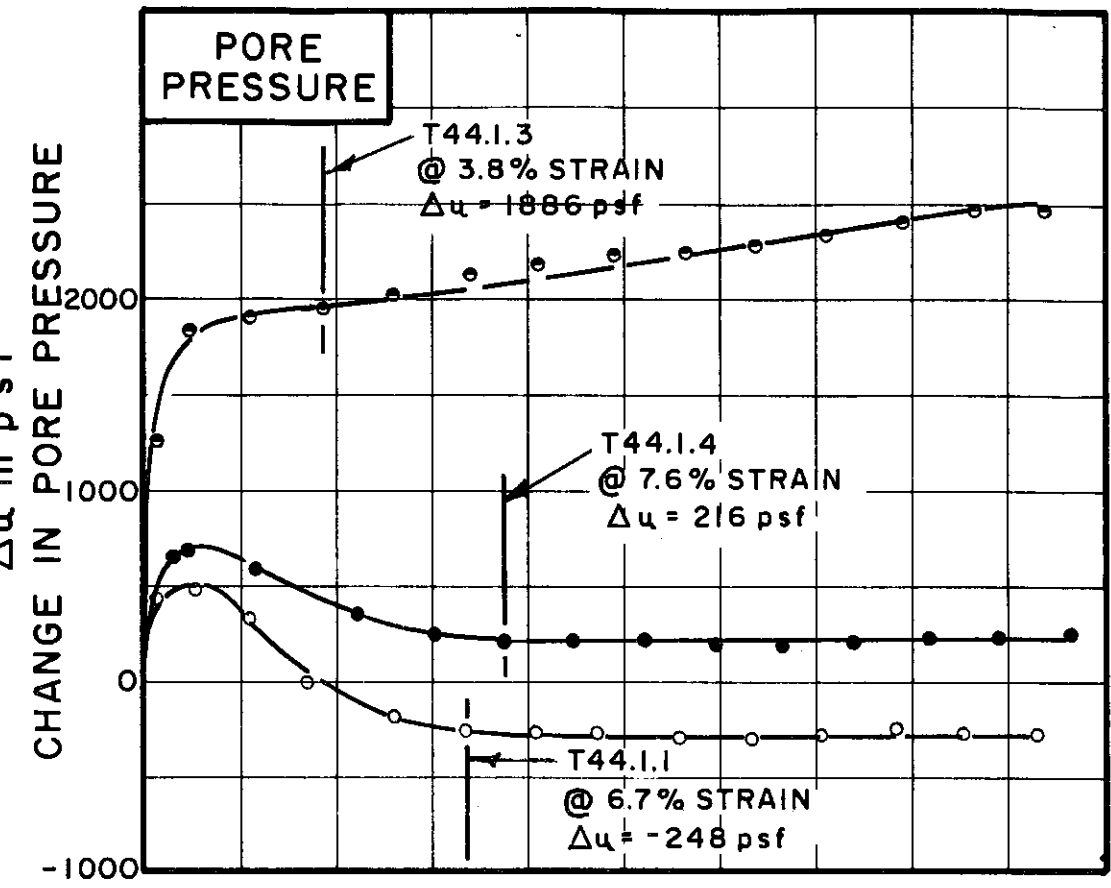
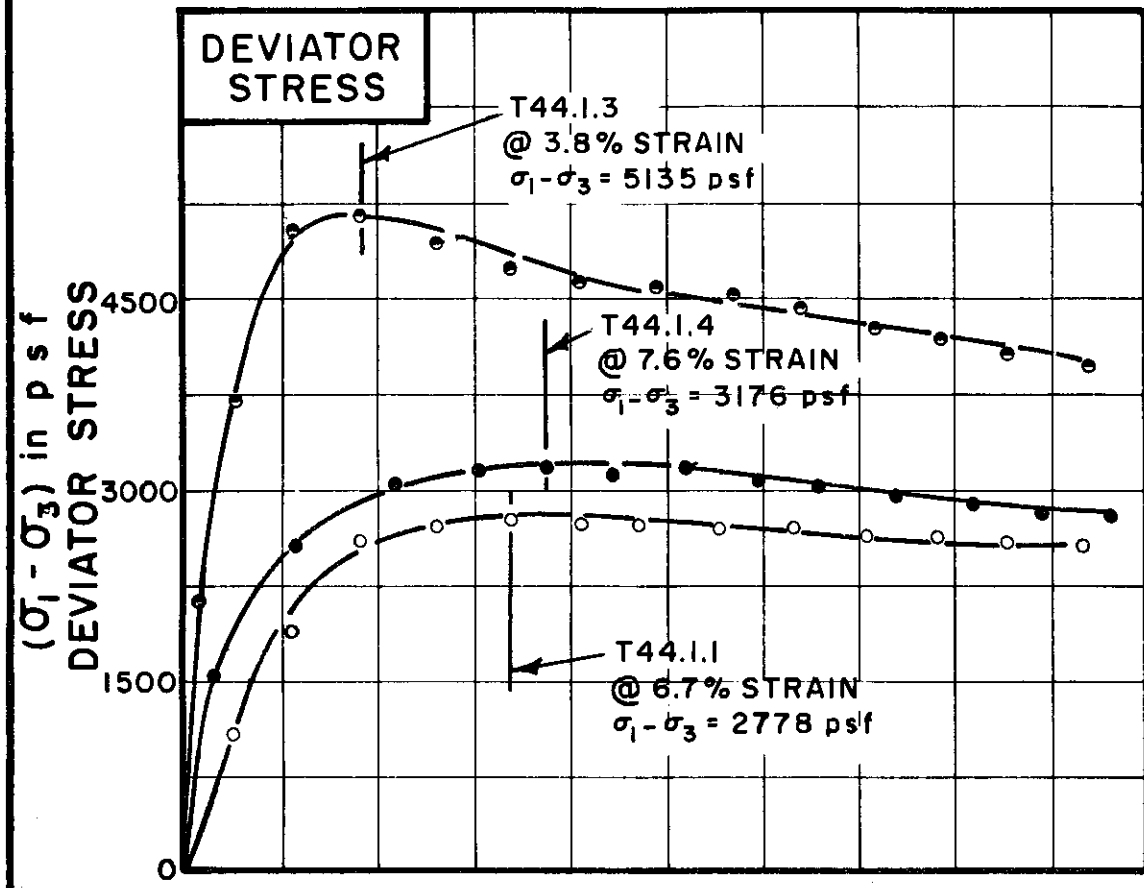
BORING NO. 60  
 SAMPLE NO. 4  
 DEPTH 21.0 TO 23.0

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T44.1.1	T44.1.4	T44.1.3
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INITIAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_0$		30.4%	30.6%	31.0%
DRY DENSITY	$\gamma_d$	pcf	94	95	94
SAMPLE DIAMETER	$D_0$	in.	1.43	1.42	1.43
SAMPLE HEIGHT	$H_0$	in.	3.37	3.40	3.36
CONDITIONS BEFORE SHEAR			T44.1.1	T44.1.4	T44.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	8640	10080
INITIAL EFFECTIVE STRESS	$\sigma'_{1,0}$ $\sigma'_{3,0}$	psf	1296 5184	2016 5184	5184 5184
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.5%	3.6%	3.8%
PORE PRESSURE RESPONSE			98%	97%	96%
FINAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_f$		31.2%	30.1%	29.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024
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BORING NO. 60

SAMPLE NO. 4

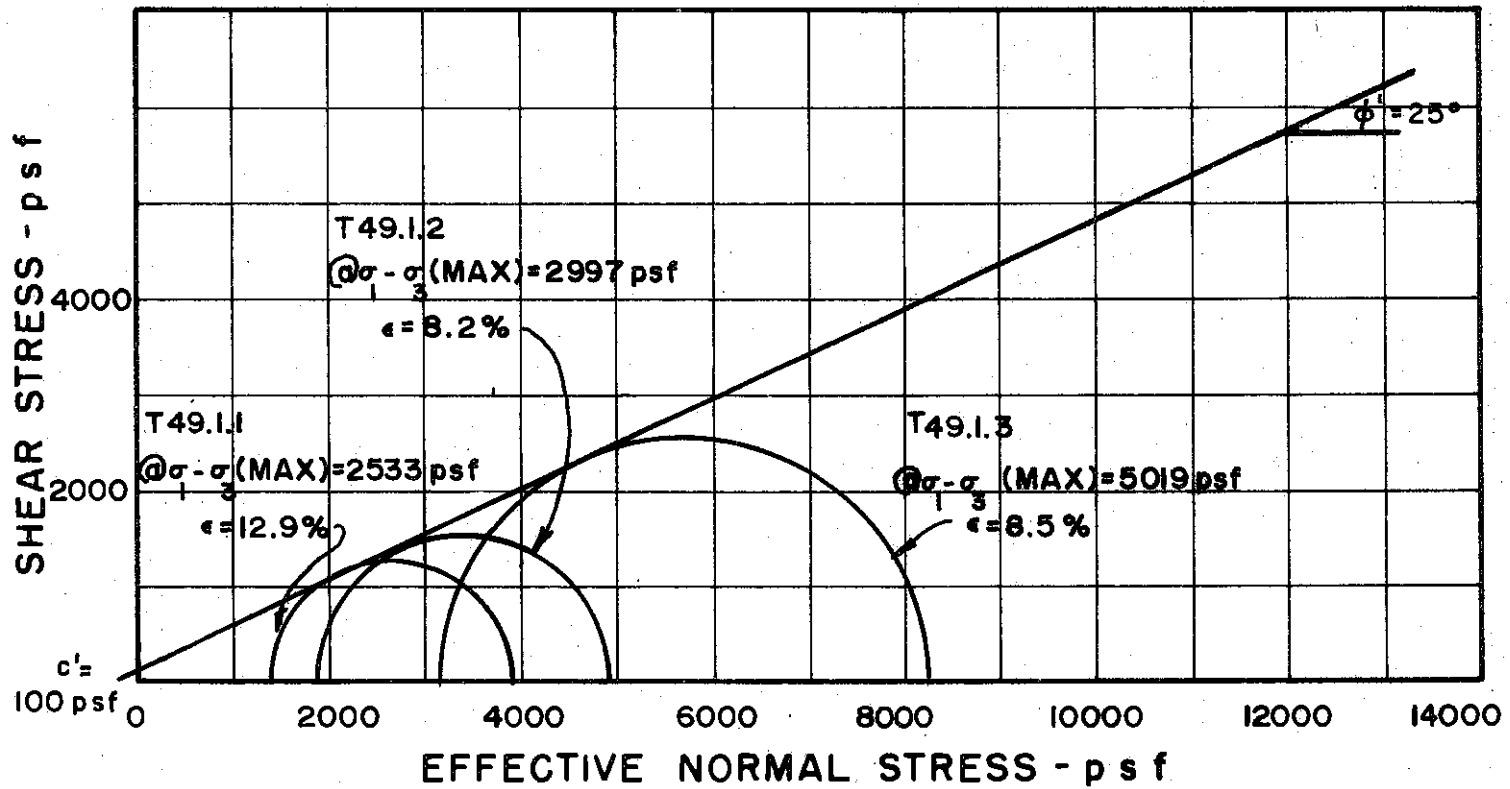
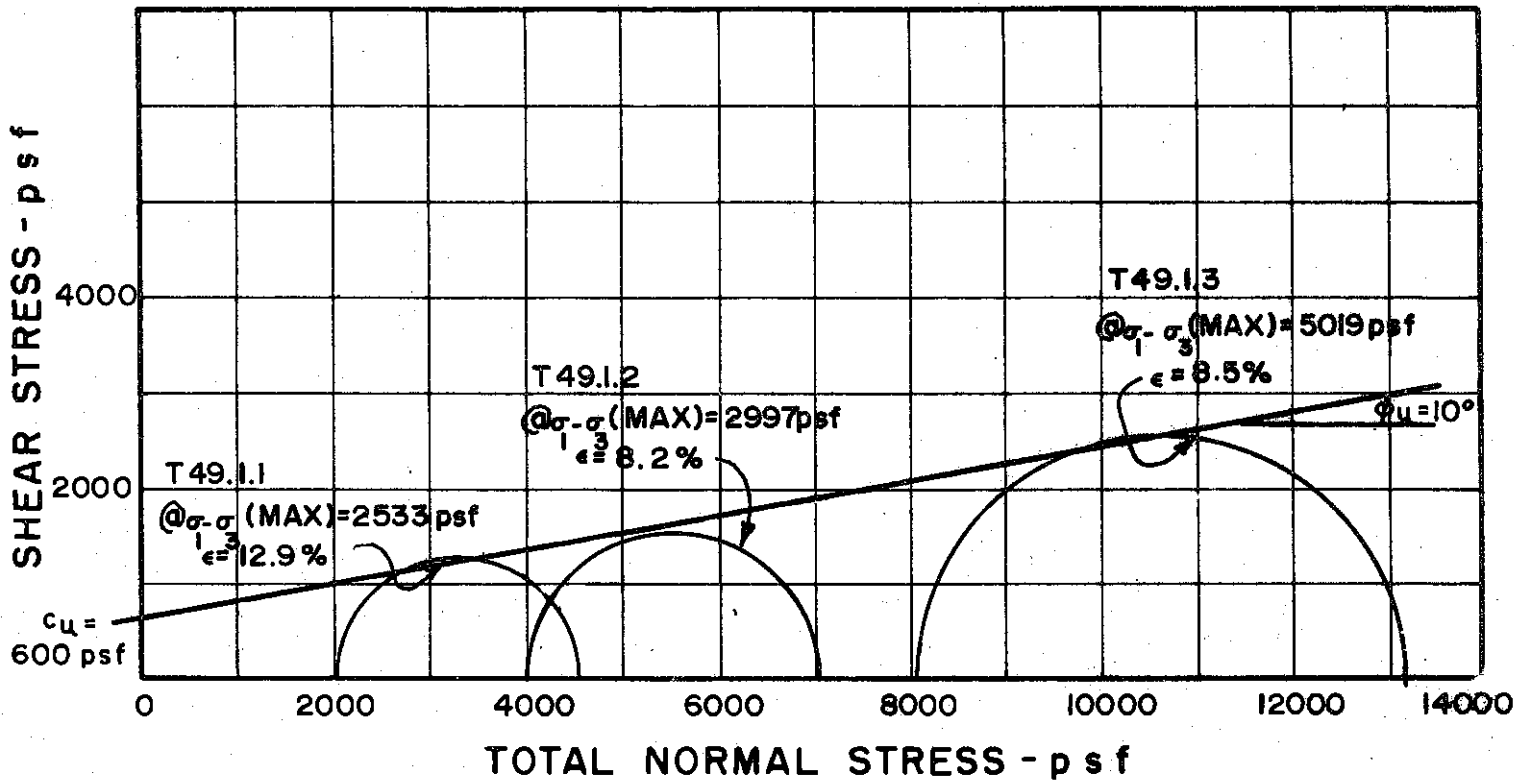
DEPTH 21.0 TO 23.0

SOIL DESCRIPTION SILTY CLAY, (CL)

LIQUID LIMIT 43 PLASTIC LIMIT 17

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

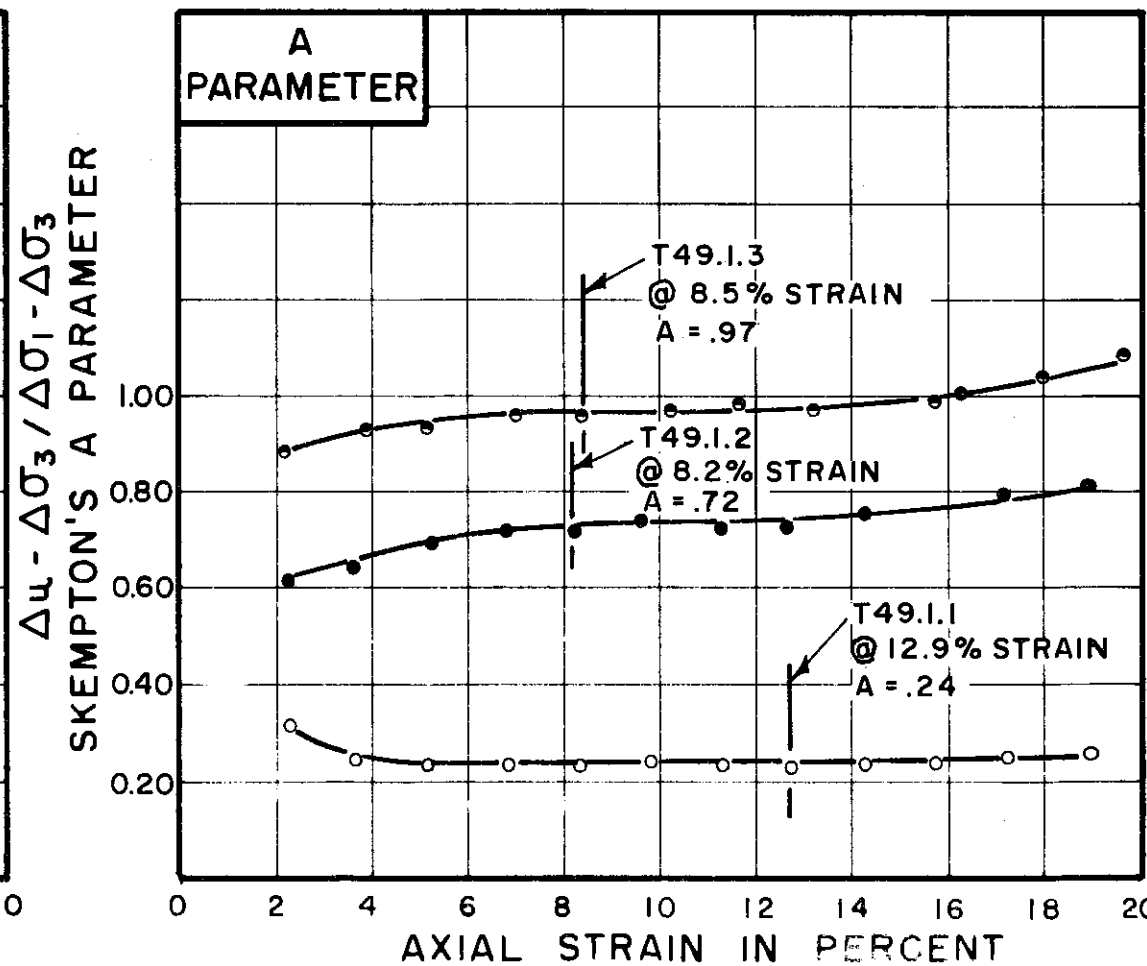
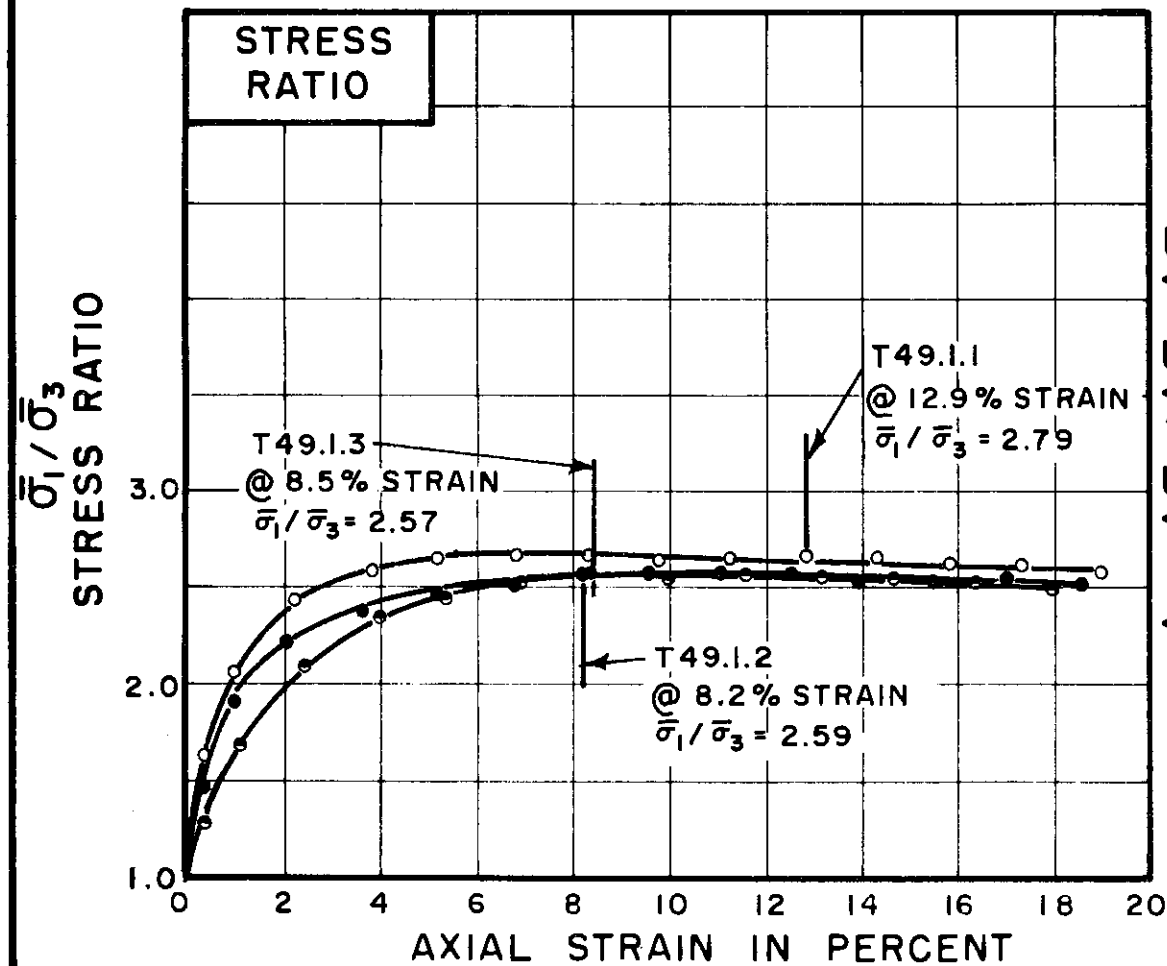
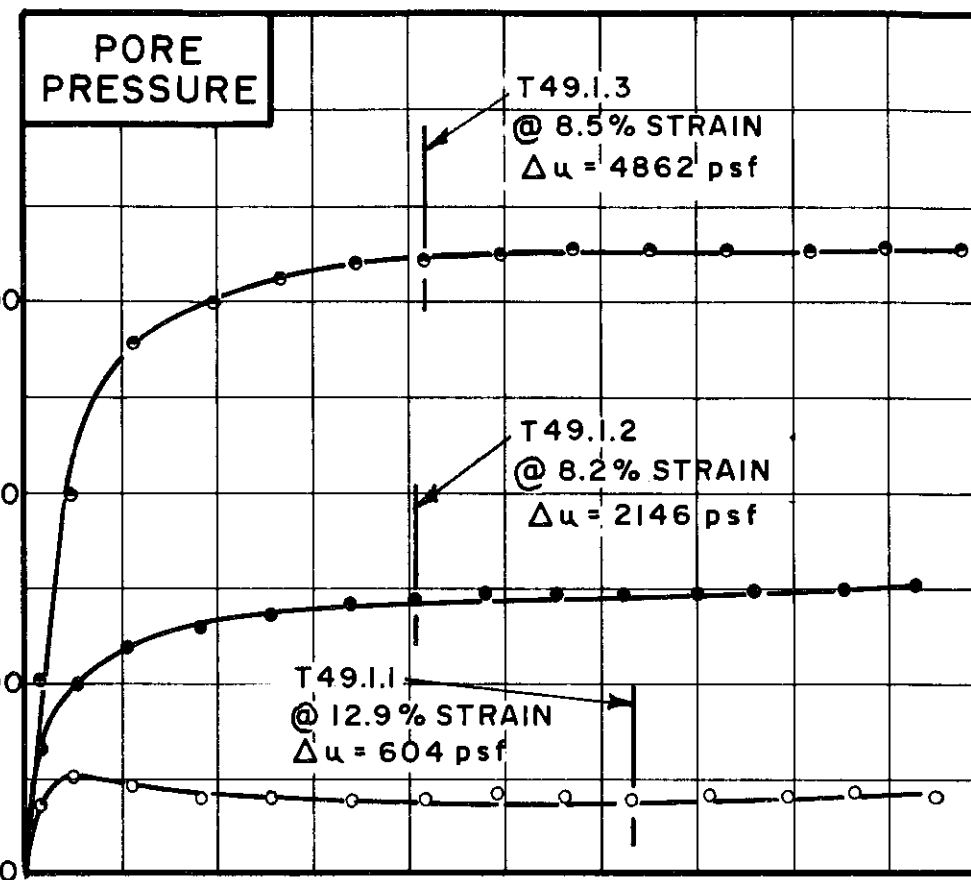
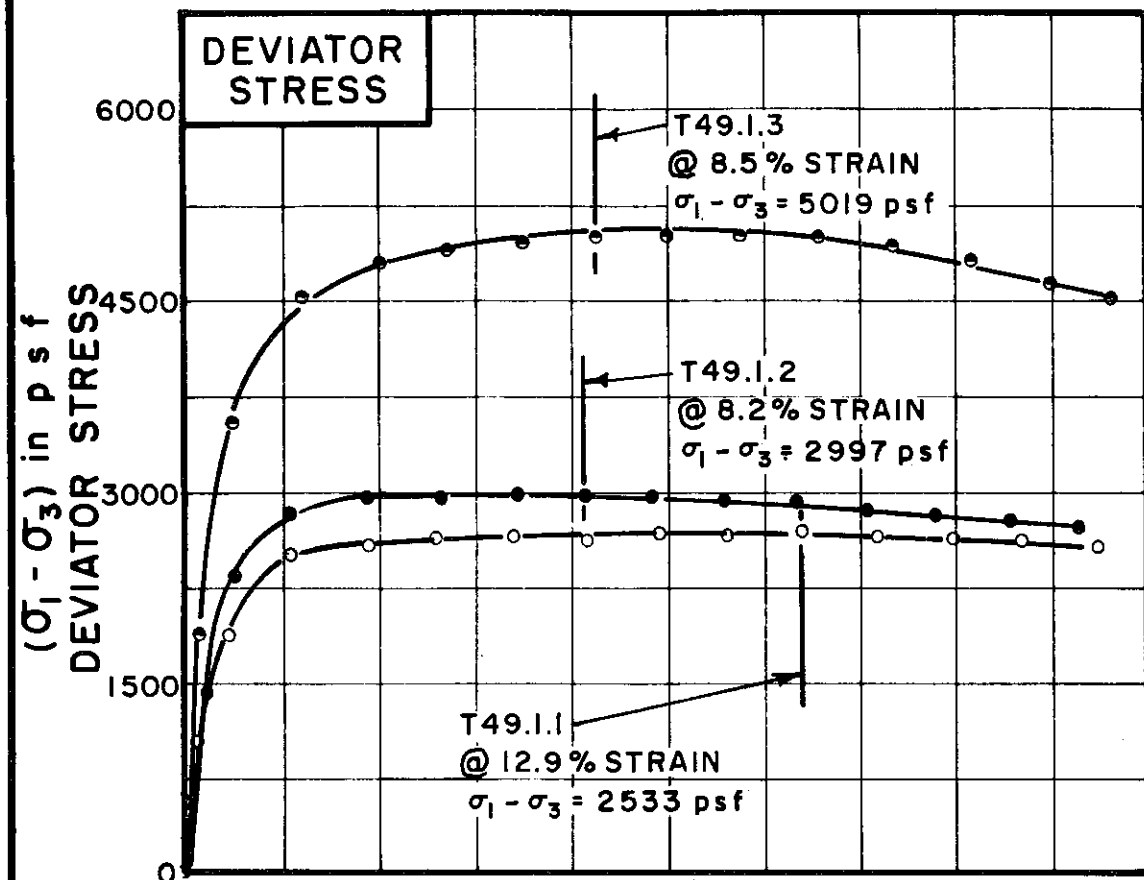
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-425



TEST NO. / SYMBOL	T49.1.1	T49.1.2	T49.1.3
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INITIAL CONDITIONS			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_0$		26.6%	27.0%	26.0%
DRY DENSITY	$\gamma_d$	pcf	99	98	102
SAMPLE DIAMETER	$D_0$	in.	1.42	1.40	1.39
SAMPLE HEIGHT	$H_0$	in.	3.32	3.40	3.26
FINAL CONDITIONS BEFORE SHEAR			T49.1.1	T49.1.2	T49.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	10080	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	2016	4032	8064
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.9%	3.5%	5.7%
PORE PRESSURE RESPONSE			97%	96%	91%
FINAL CONDITIONS AT END OF TEST			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_f$		26.0%	25.5%	22.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.025
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BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

SOIL DESCRIPTION SILTY CLAY, SANDY  
(CL)

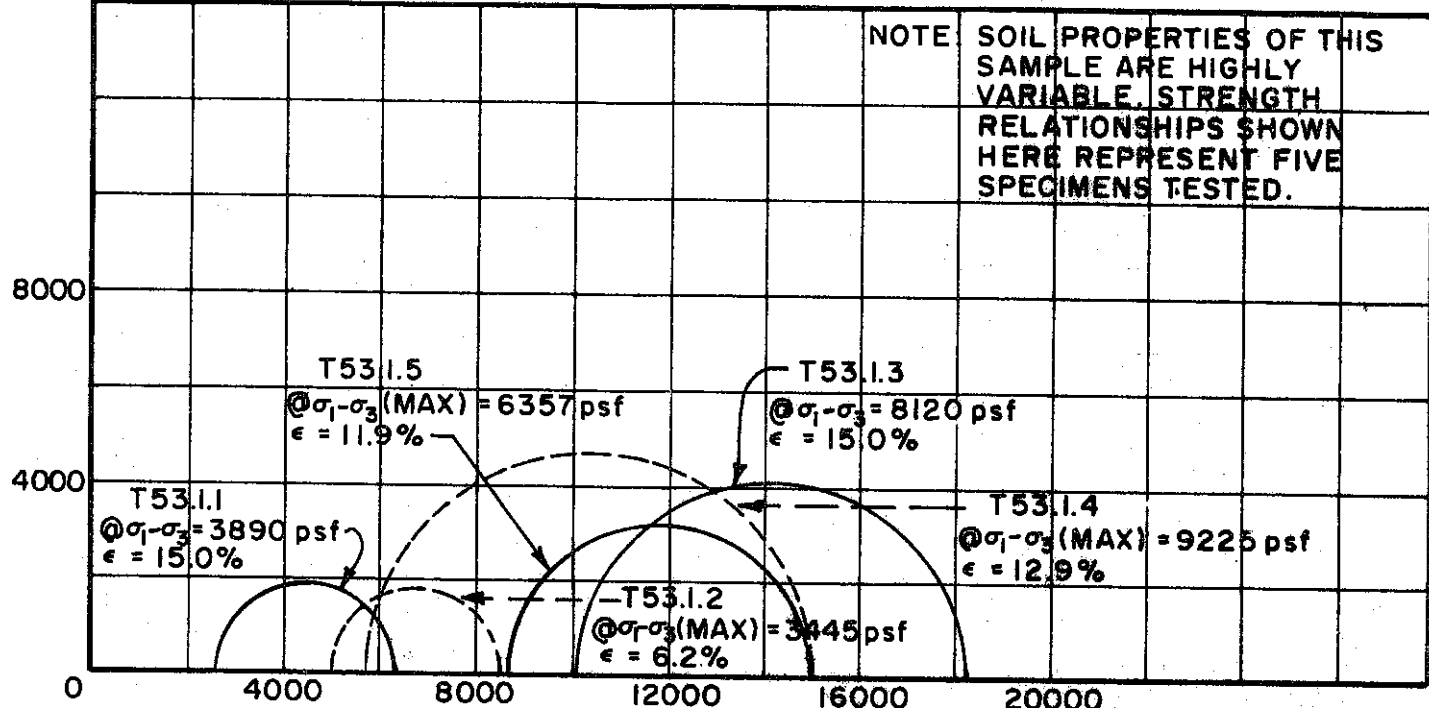
LIQUID LIMIT 38 PLASTIC LIMIT 16

CONSOLIDATED UNDRAINED  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

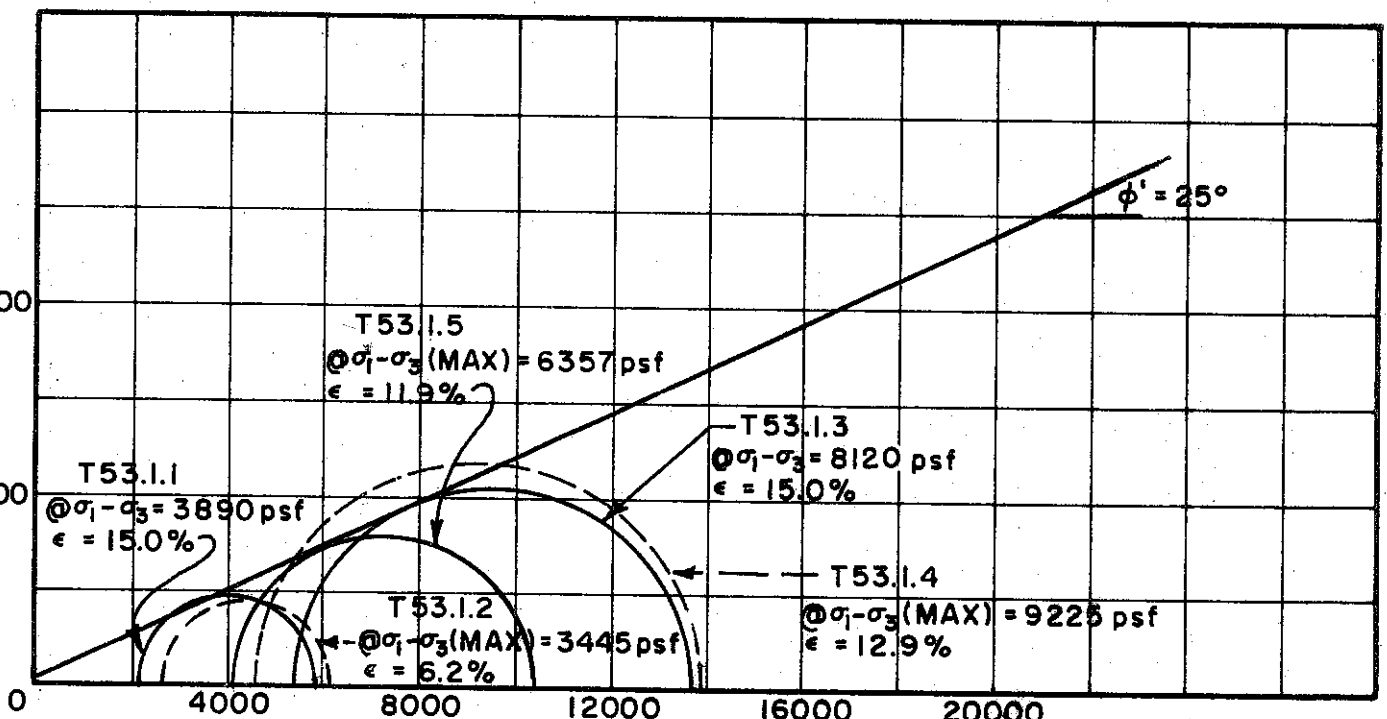
NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE. STRENGTH RELATIONSHIPS SHOWN HERE REPRESENT FIVE SPECIMENS TESTED.

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f

SHEAR STRESS - p s f



EFFECTIVE NORMAL STRESS - p s f

BORING NO. 60

SAMPLE NO. 13

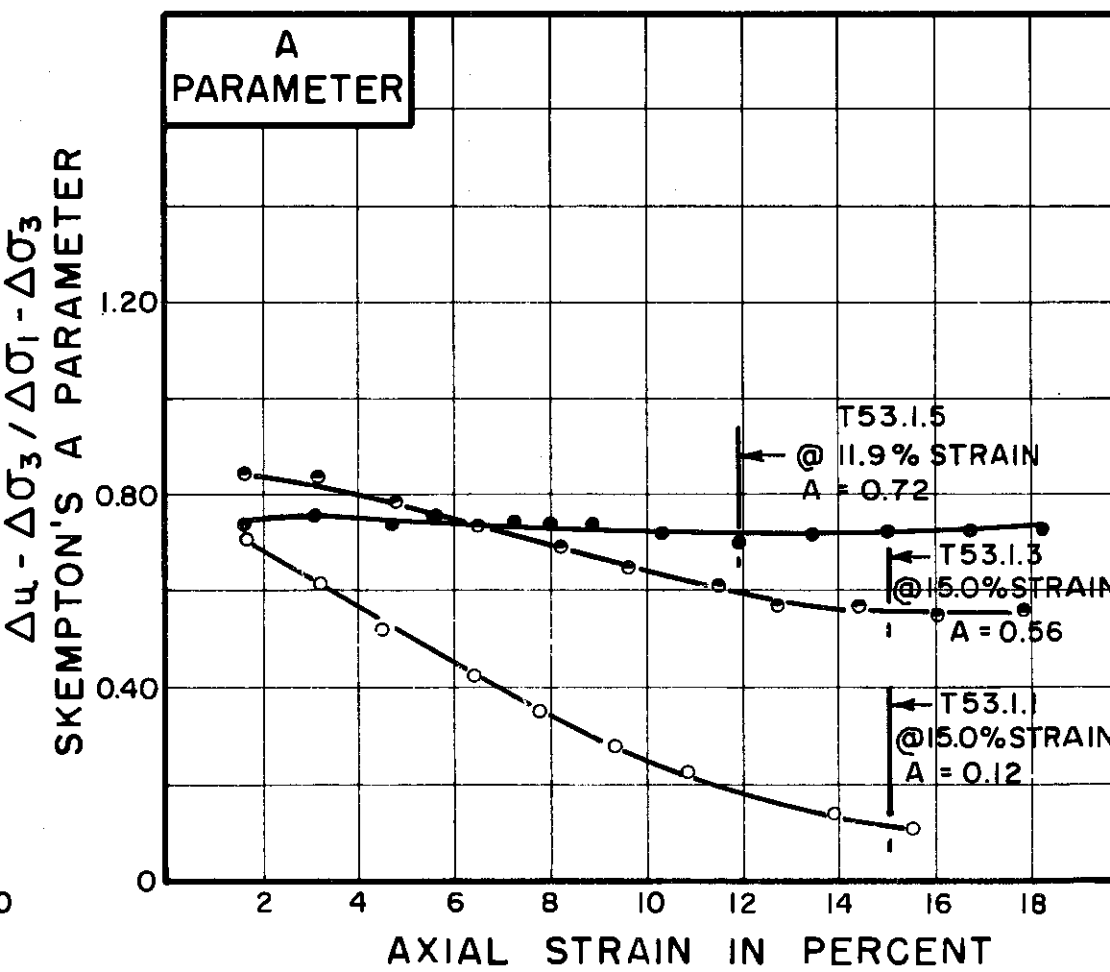
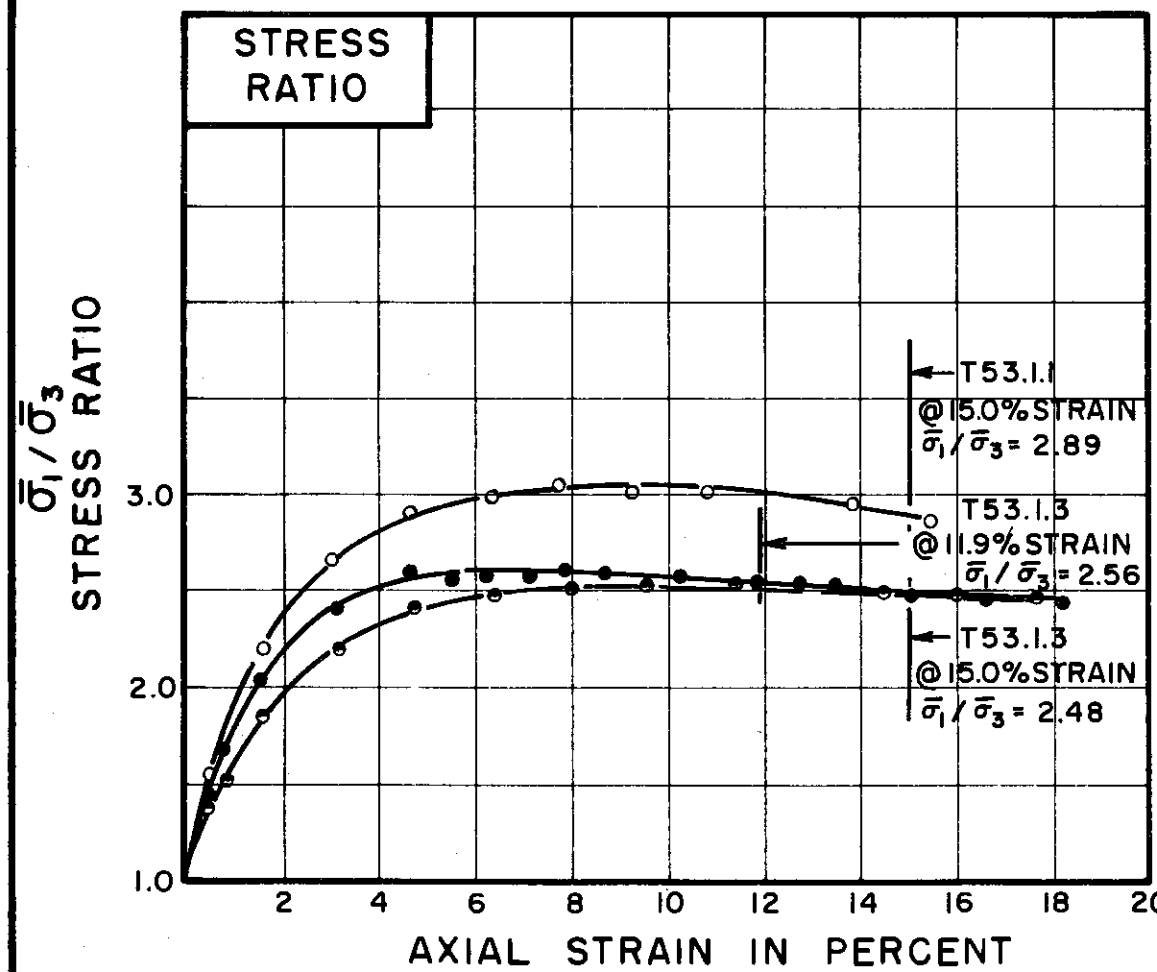
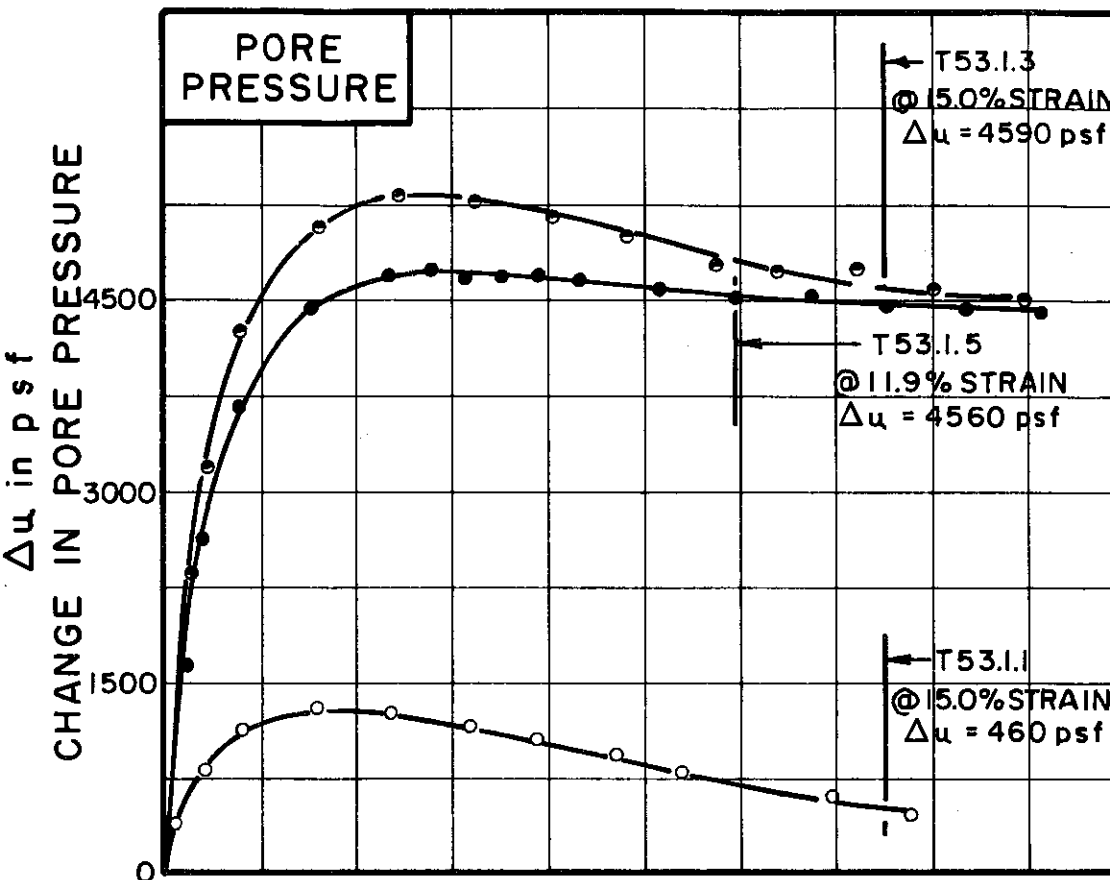
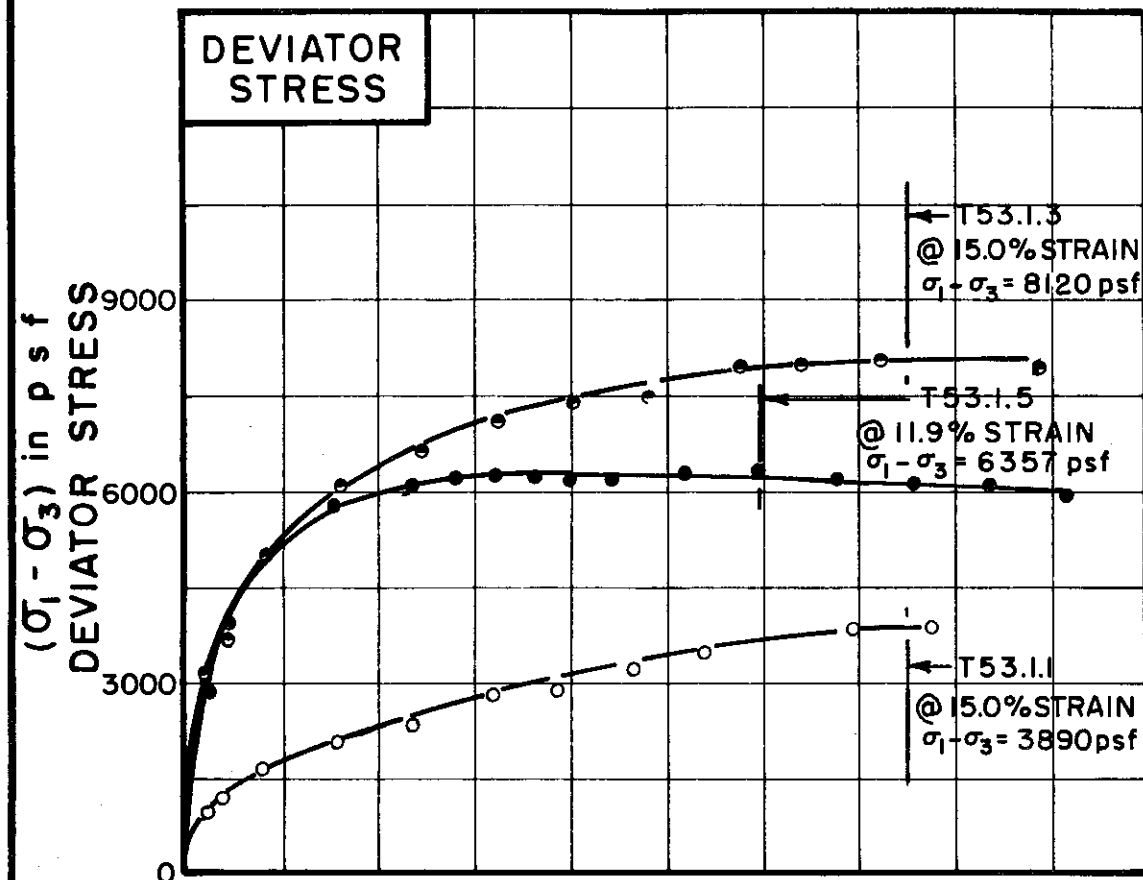
DEPTH 67.0' TO 69.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



TEST NO.*/SYMBOL	T53.1.1	T53.1.5	T53.1.3
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INITIAL CONDITIONS		T53.1.1	T53.1.5	T53.1.3
WATER CONTENT	$w_0$	23.6%	21.0%	19.7%
DRY DENSITY	$\gamma_d$ pcf	103	104	104
SAMPLE DIAMETER	$D_0$ in.	1.42	1.42	1.41
SAMPLE HEIGHT	$H_0$ in.	3.25	3.19	3.20
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$ p.s.f.	7200	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$ p.s.f.	2520	8640	10080
VOLUMETRIC STRAIN	$\epsilon_{vol}$	3.0%	5.0%	6.1%
PORE PRESSURE RESPONSE		97%	100%	100%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	21.7%	18.9%	17.6%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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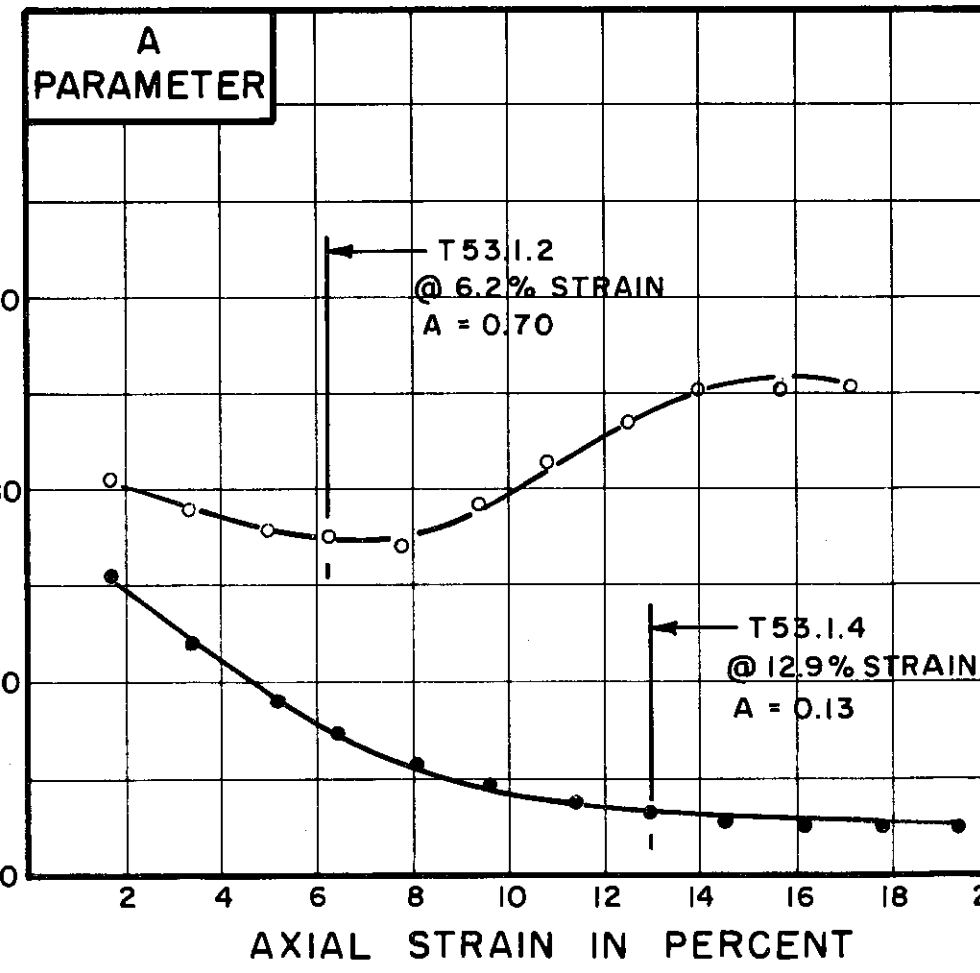
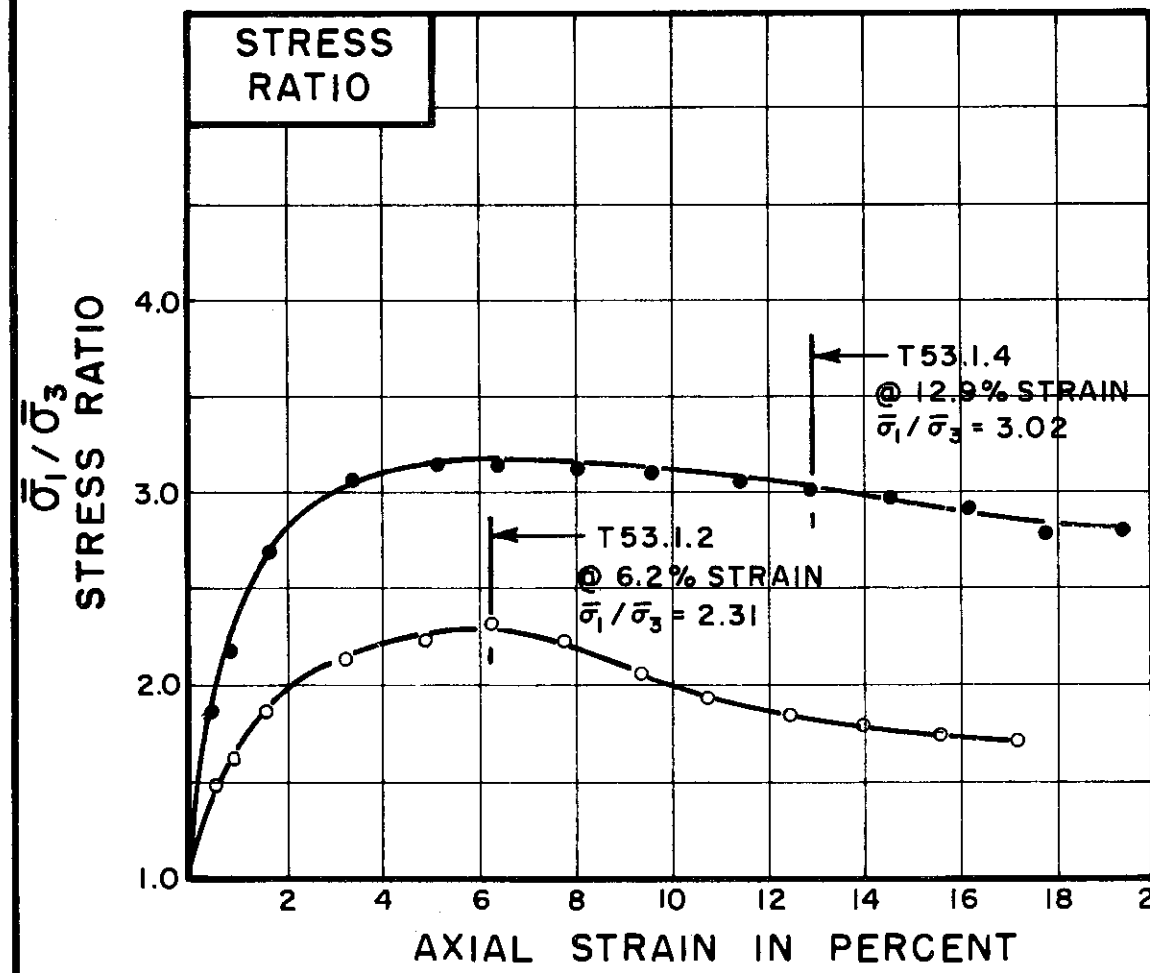
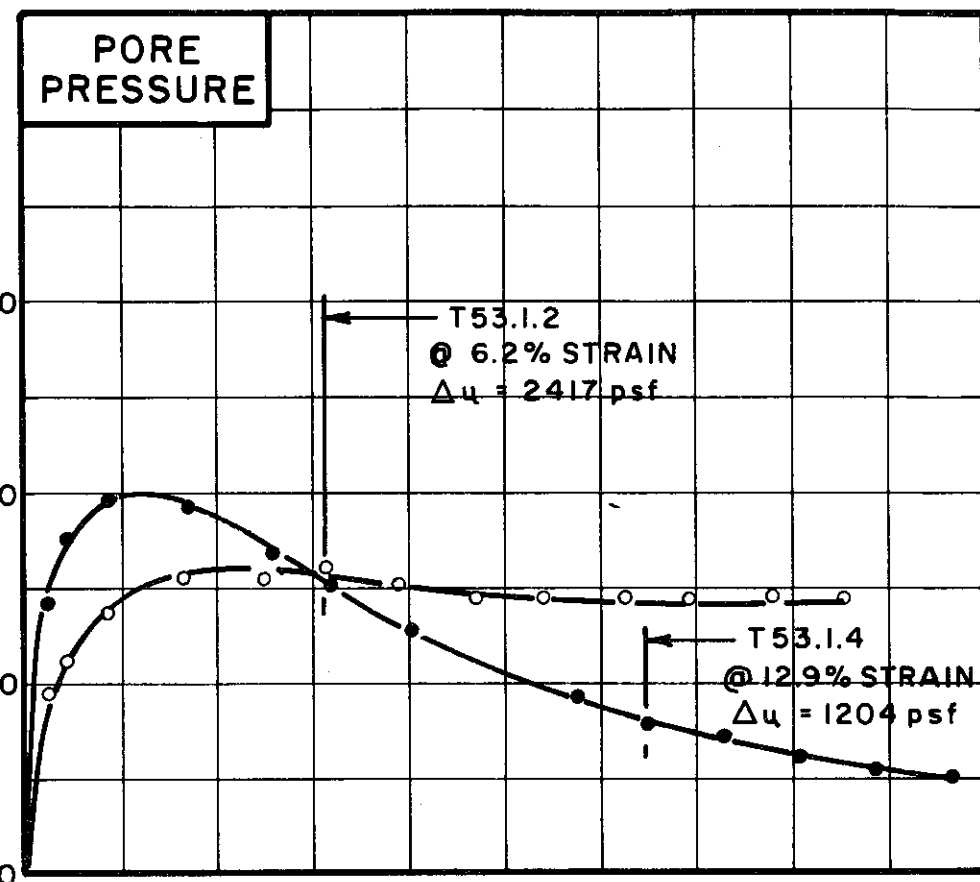
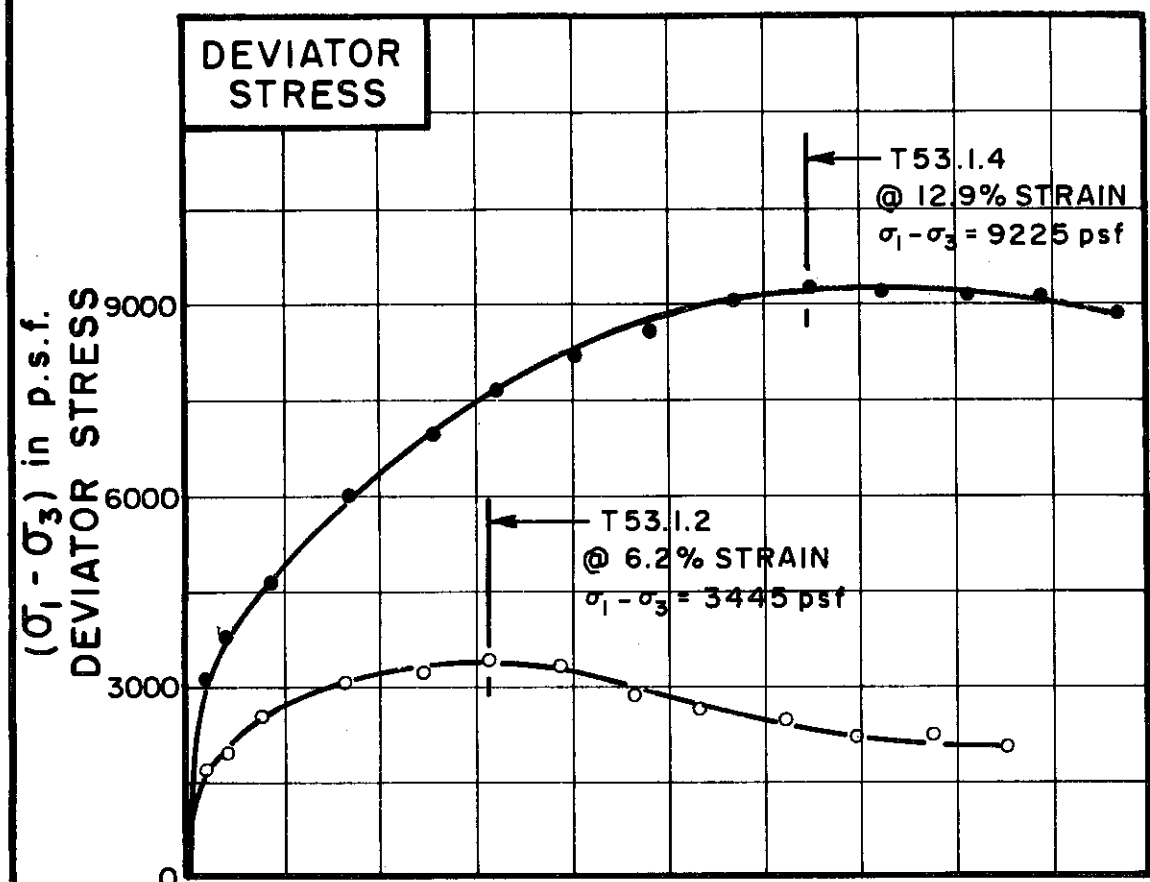
BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

SOIL DESCRIPTION SILTY CLAY, GRAVELLY  
 (CL-ML)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE-SEE DATA FOR TESTS T53.1.2 AND T53.1.4

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO. <sup>*</sup> 7 SYMBOL	T53.1.2	T53.1.4
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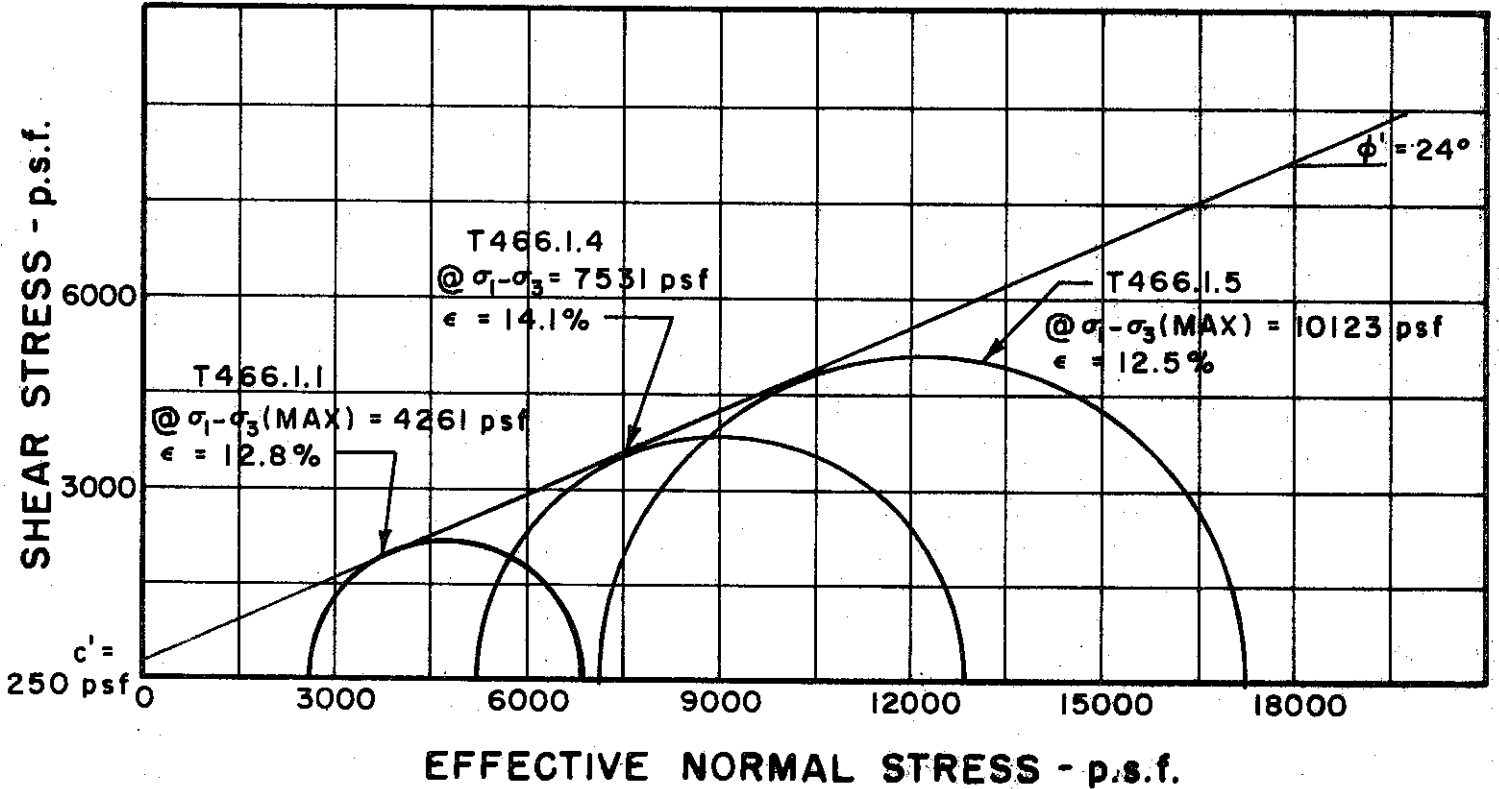
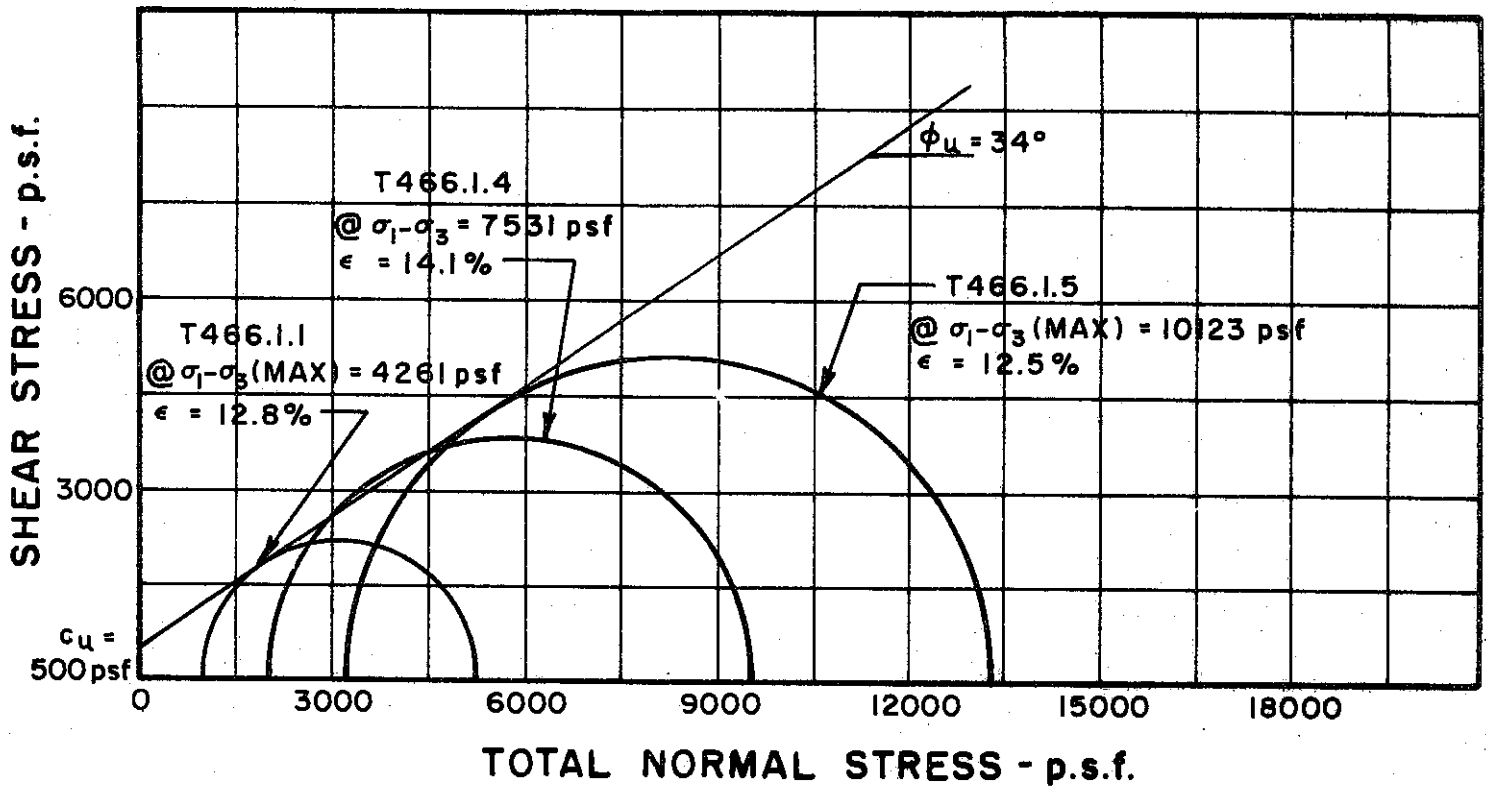
INITIAL CONDITIONS		INITIAL CONDITIONS	
WATER CONTENT	$w_0$	31.9%	% 15.5%
DRY DENSITY	$\gamma_d$	91	114
SAMPLE DIAMETER	$D_0$	1.41	1.40
SAMPLE HEIGHT	$H_0$	3.28	3.15
FINAL CONDITIONS BEFORE SHEAR		FINAL CONDITIONS BEFORE SHEAR	
FINAL BACK PRESSURE	$u_0$	8640	11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	5040	5760
VOLUMETRIC STRAIN	$\epsilon_{vol}$	5.3%	% 2.4%
PORE PRESSURE RESPONSE		97%	93%
FINAL CONDITIONS		FINAL CONDITIONS	
WATER CONTENT	$w_f$	28.4%	% 14.9%
SKETCH OF SAMPLE AT END OF TEST			

RATE OF STRAIN PERCENT/MINUTE	.025	.026
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BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'  
 SOIL DESCRIPTION T53.1.2-CLAYEY GRAVEL(GC)  
T53.1.4-SILTY CLAY(CL)

LIQUID LIMIT (40) PLASTIC LIMIT (19)  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR T53.1.1, T53.1.3 AND T53.1.5

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 101,105,127,128,180 & 183

SAMPLE NO. COMBINED SAMPLES

DEPTH 2.0' TO 10.0'

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

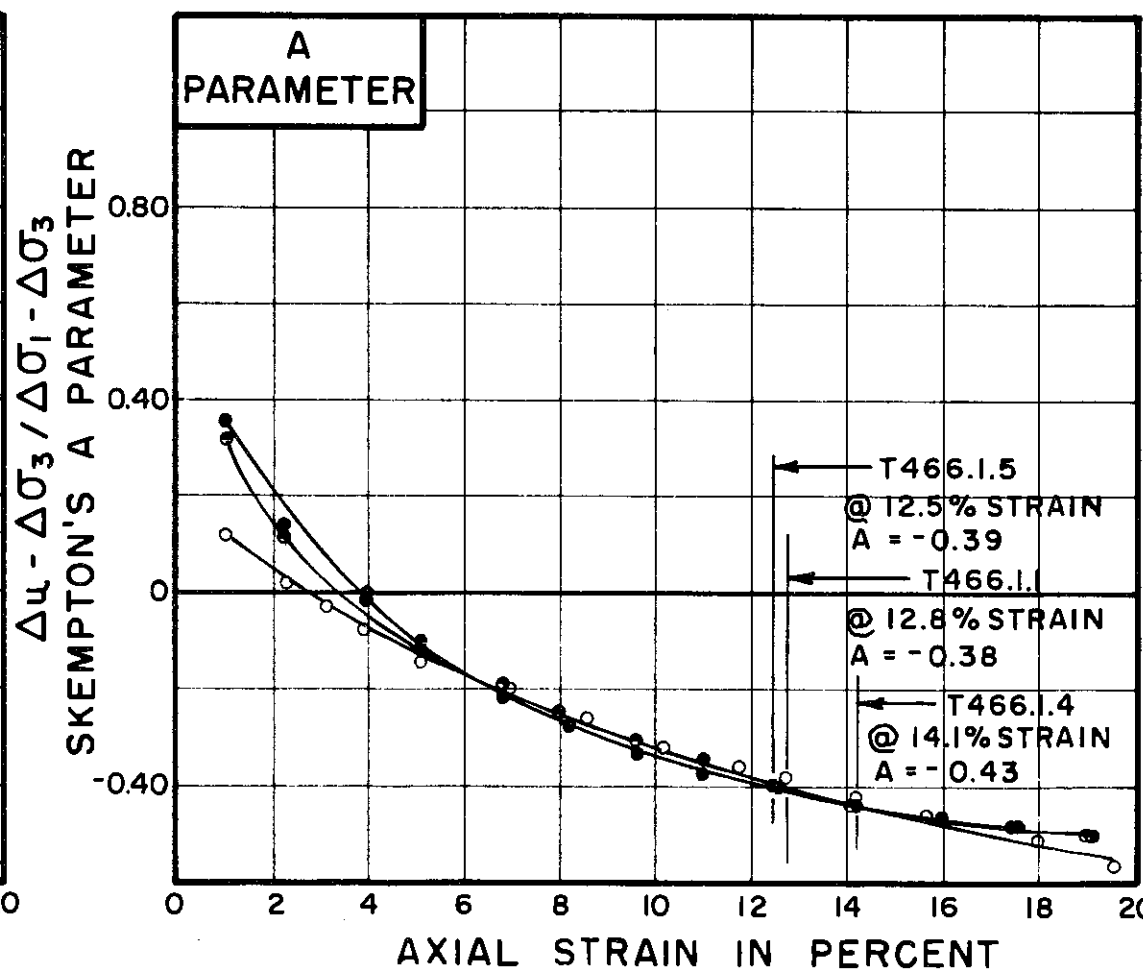
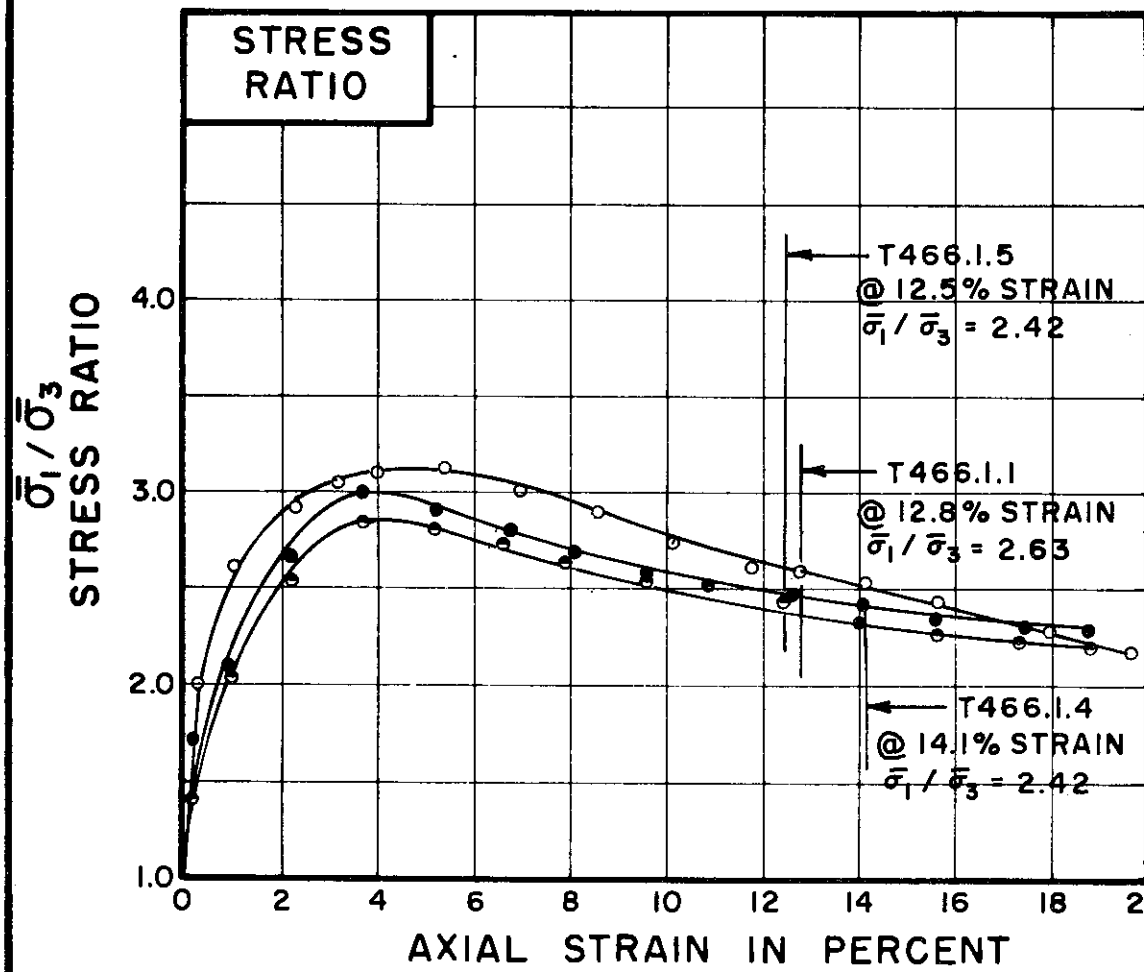
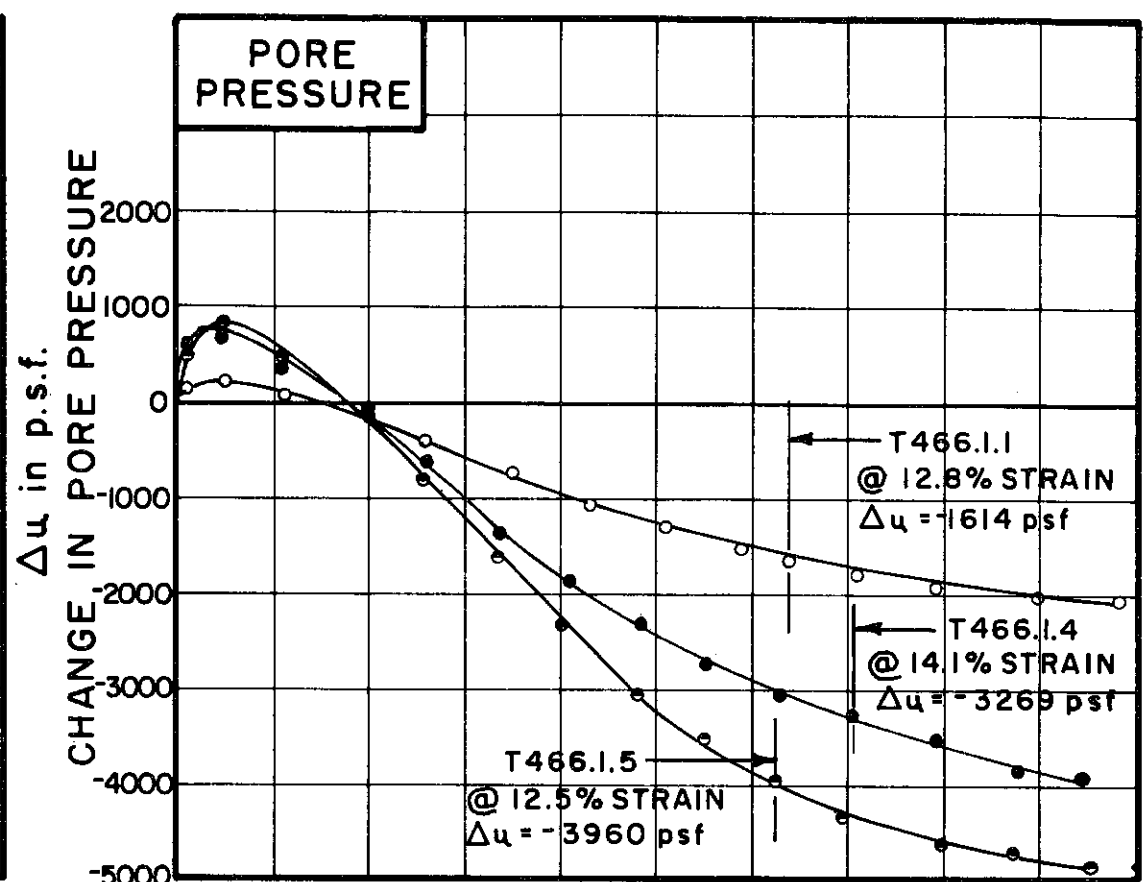
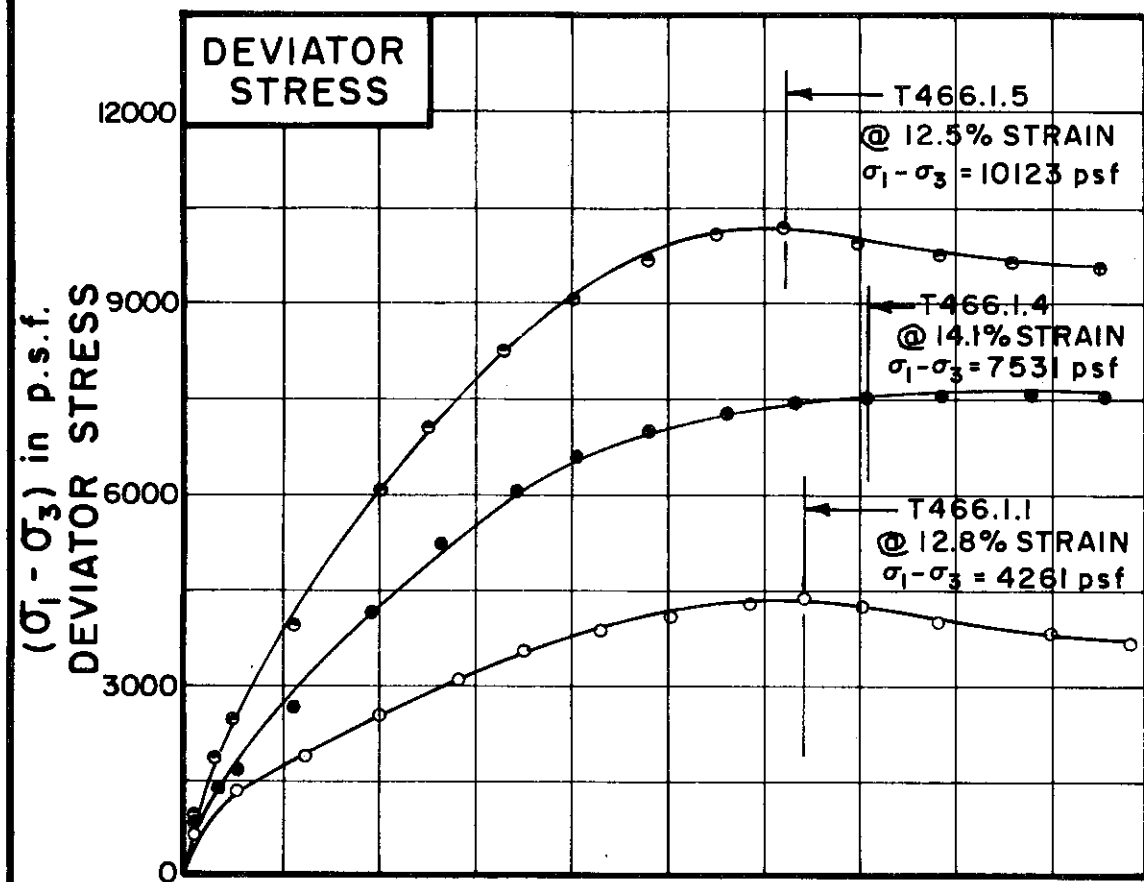
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-430





TEST NO. / SYMBOL	T466.1.1	T466.1.4	T466.1.5
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	15.3%	15.5%	15.9%
	DRY DENSITY	$\gamma_d$	113	114	114
	SAMPLE DIAMETER	$D_0$	1.38	1.39	1.40
	SAMPLE HEIGHT	$H_0$	3.19	3.36	3.44
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	7200	7200	7200
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	1008	2016	3168
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	— %	.14 %	.14 %
PORE PRESSURE RESPONSE			98%	99%	98%
FINAL CONDITIONS	WATER CONTENT	$w_f$	21.3%	19.1%	18.4%
	SKETCH OF SAMPLE AT END OF TEST				

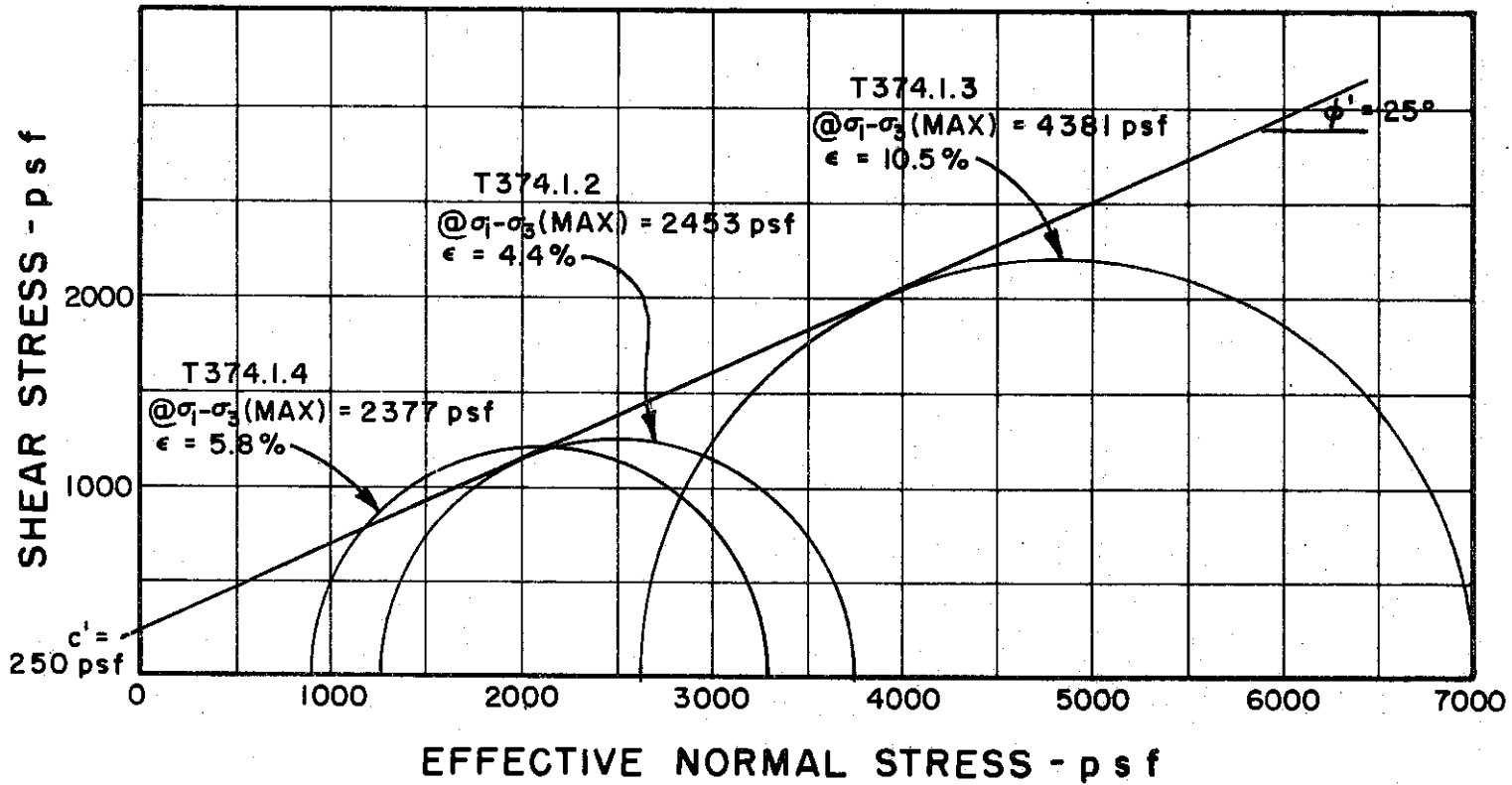
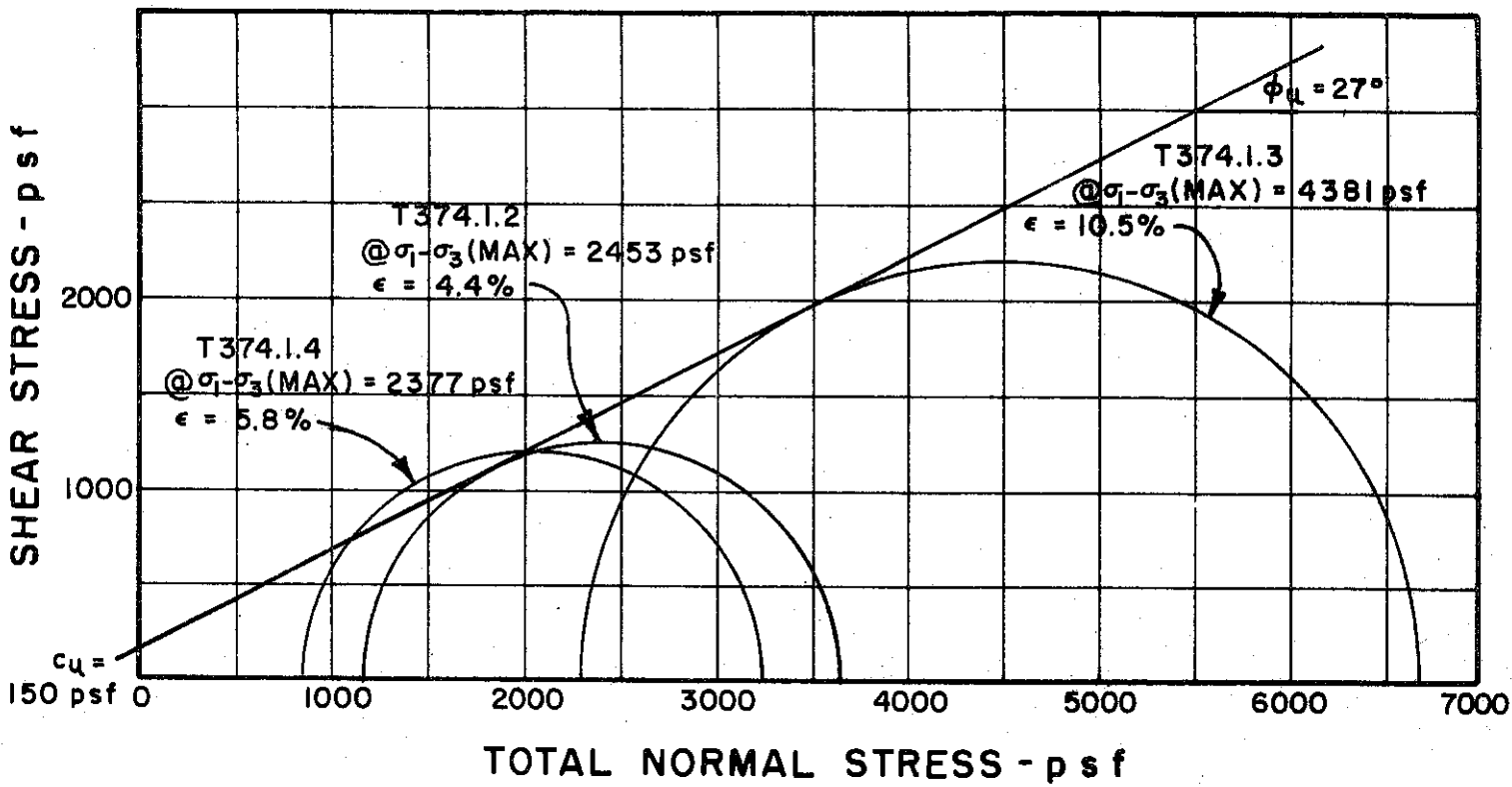
RATE OF STRAIN PERCENT/MINUTE	.025	.024	.023
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BORING NO. 101, 105, 127, 128, 180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 SEE DATA FOR INDIVIDUAL SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 2

DEPTH 9.0' TO 11.0'

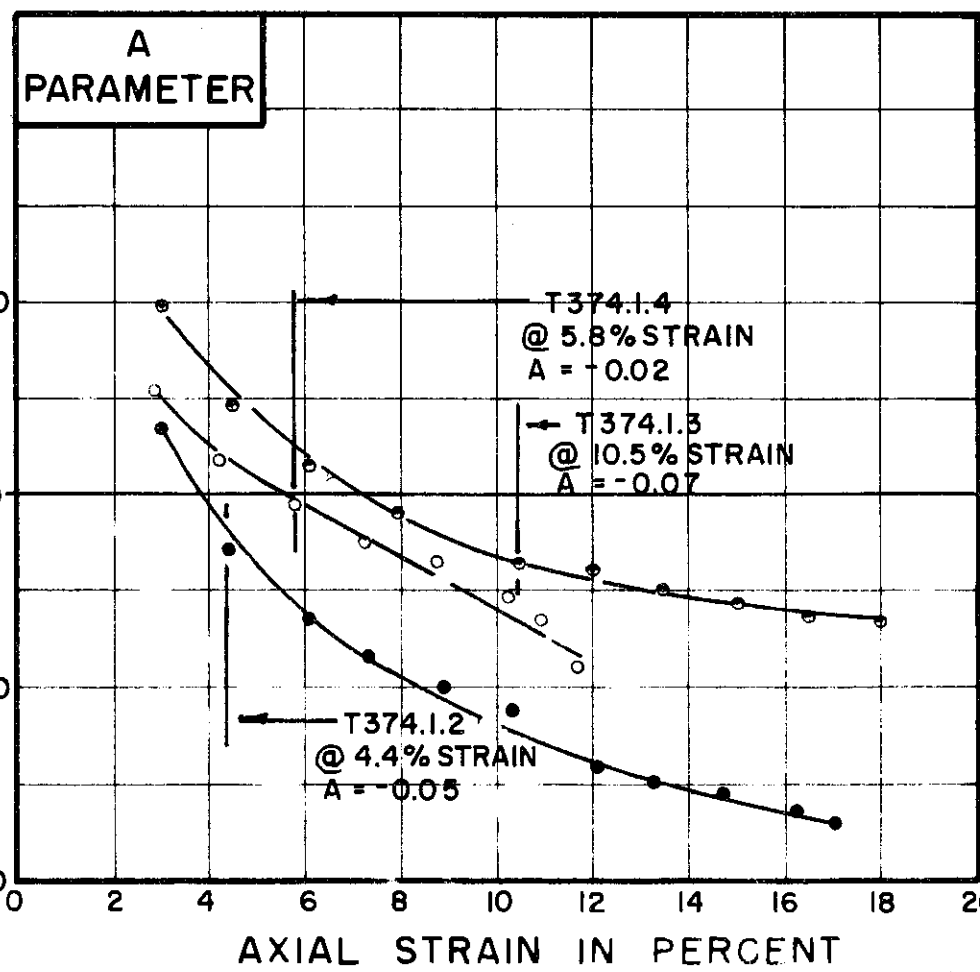
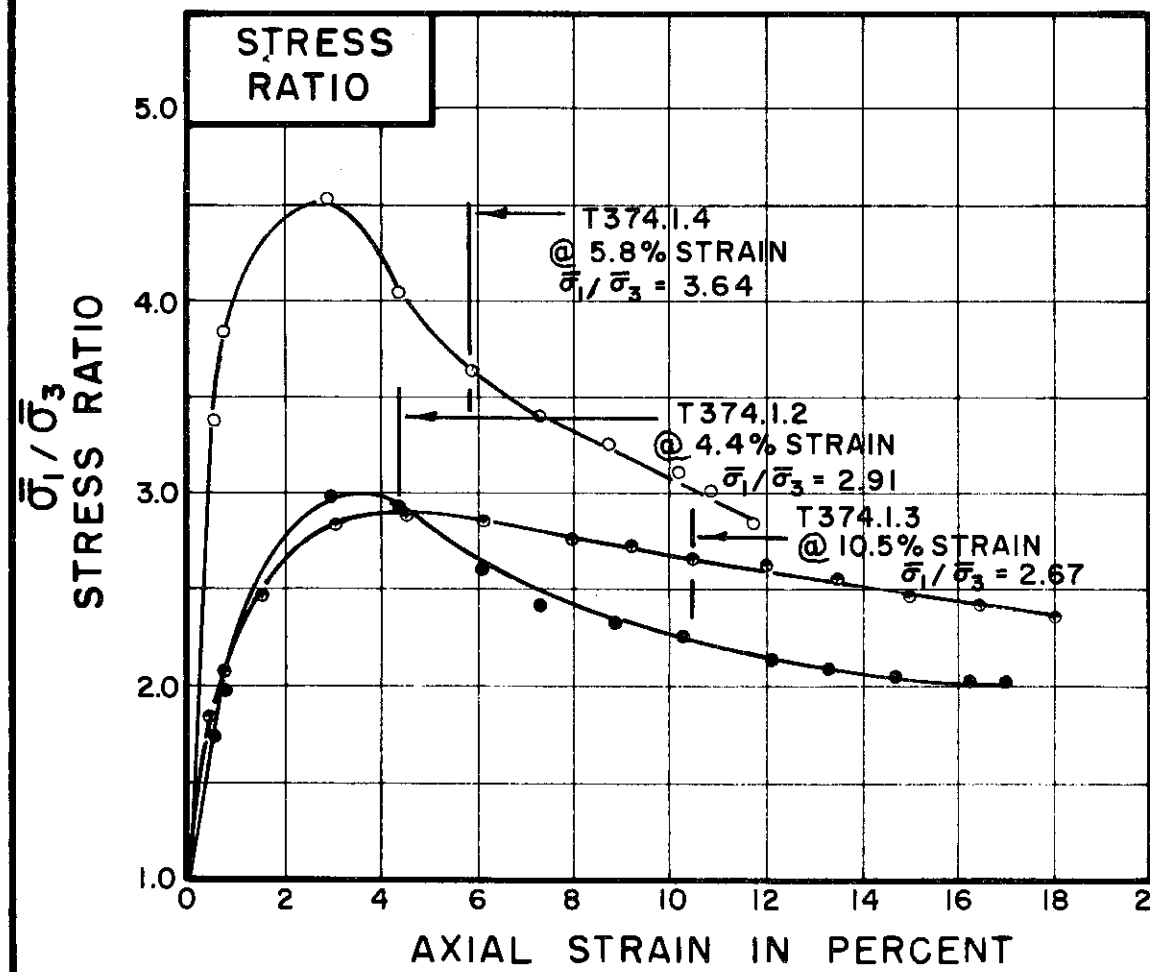
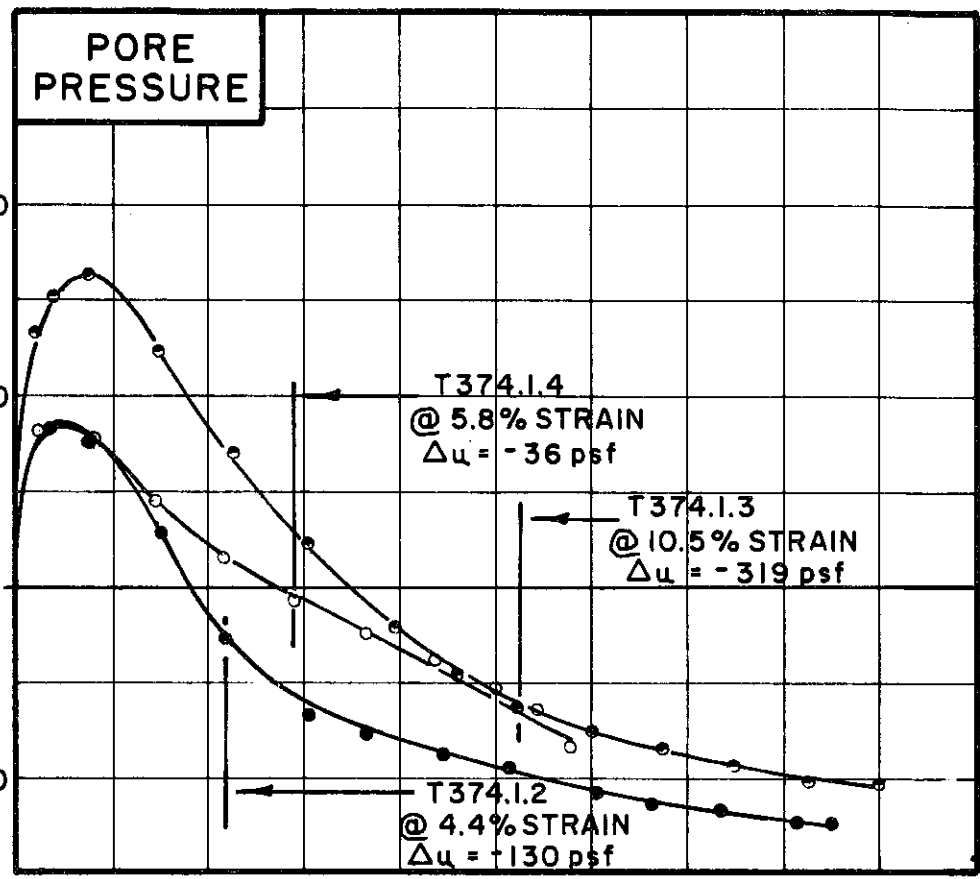
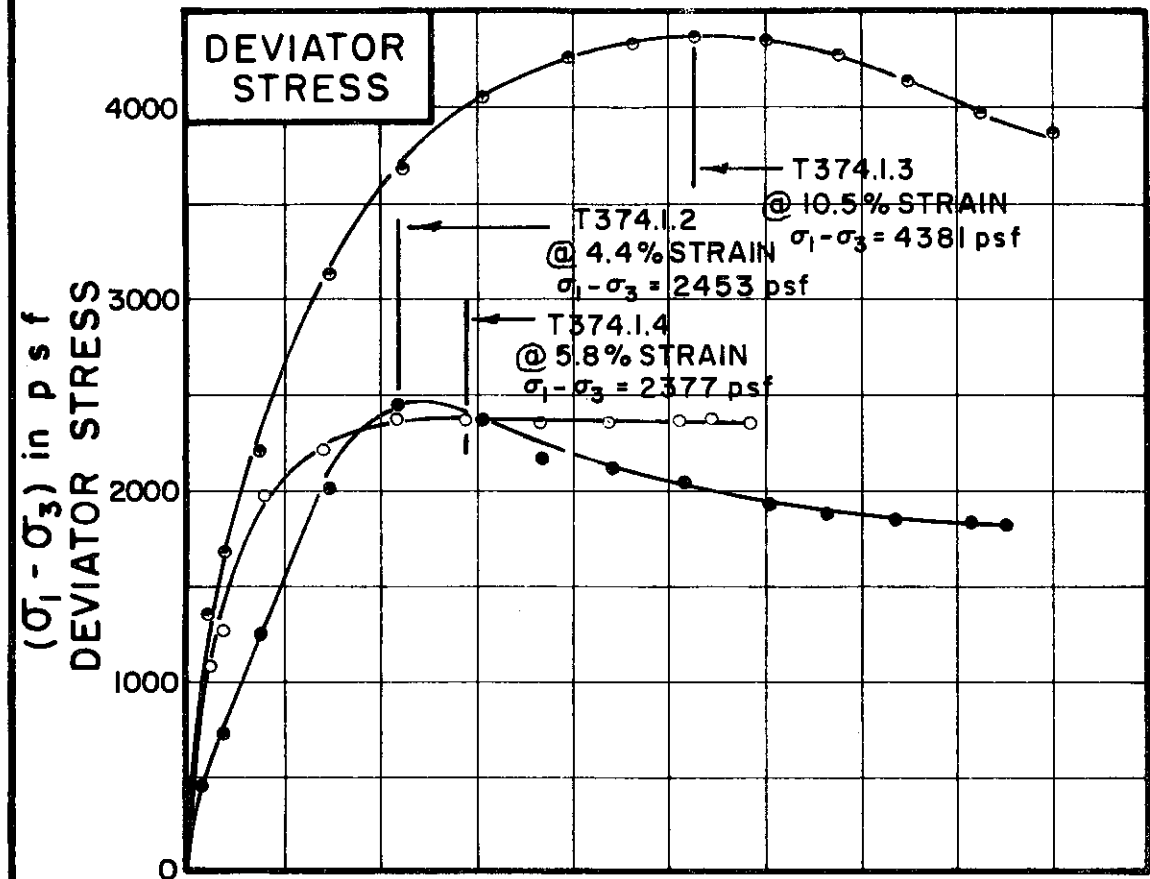
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T374.1.4	T374.1.2	T374.1.3
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INITIAL CONDITIONS		W <sub>0</sub>	27.7%	26.4%	26.9%
WATER CONTENT	W <sub>0</sub>	27.7%	26.4%	26.9%	
DRY DENSITY	γ <sub>d</sub>	98	99	96	
lb/cu ft					
SAMPLE DIAMETER	D <sub>0</sub>	1.42	1.40	1.38	
in.					
SAMPLE HEIGHT	H <sub>0</sub>	3.44	3.39	3.35	
in.					
FINAL CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	u <sub>0</sub>	5760	6480	7200	
psf					
INITIAL EFFECTIVE STRESS	$\sigma_1 = \sigma_3$	864	1152	2304	
psf					
VOLUMETRIC STRAIN	ε <sub>vol</sub>	0.60%	0.50%	1.35%	
PORE PRESSURE RESPONSE		98%	95%	95%	
FINAL CONDITIONS					
WATER CONTENT	W <sub>f</sub>	28.5%	27.7%	27.6%	
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.024
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BORING NO. 105

SAMPLE NO. 2

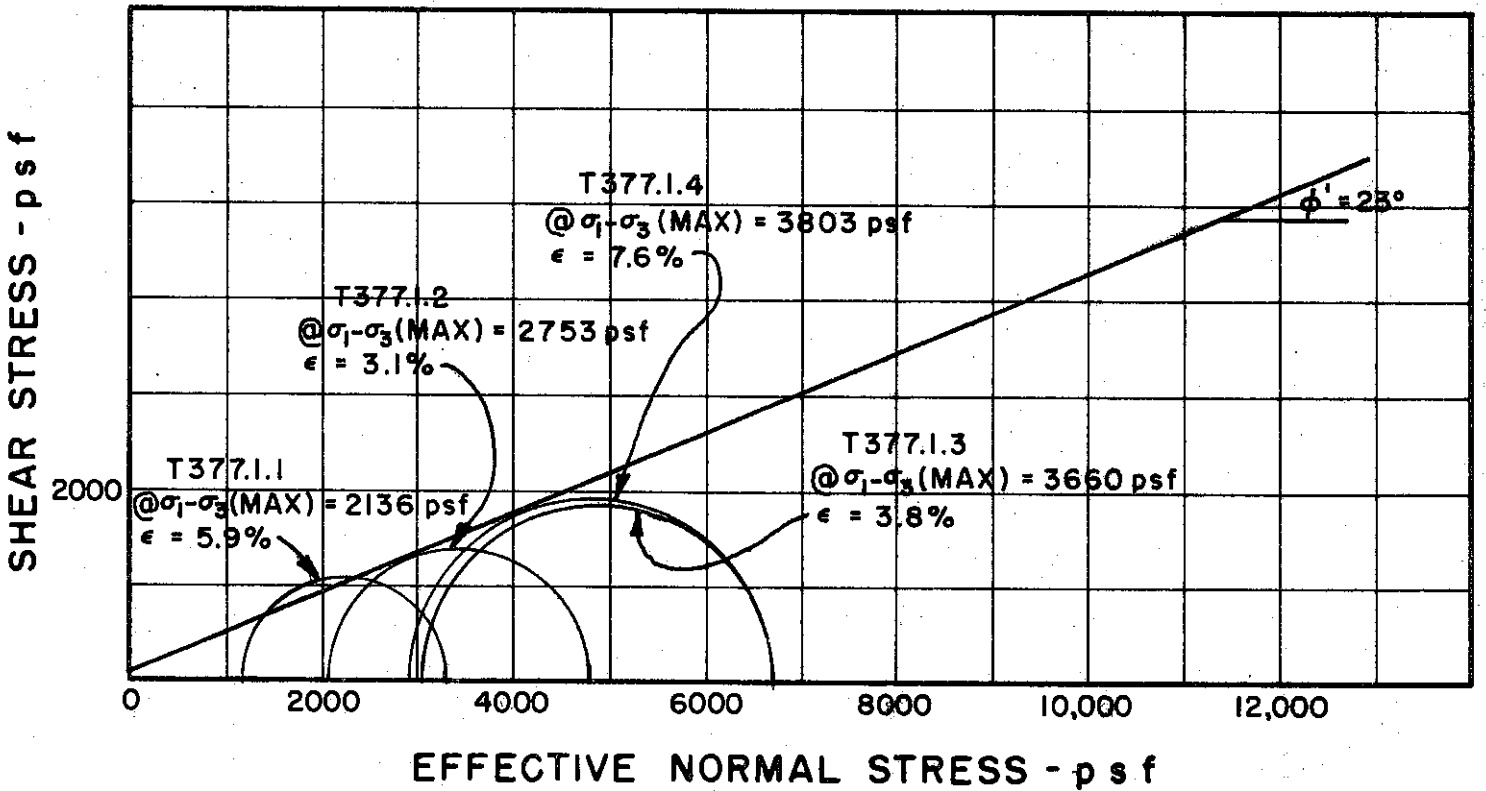
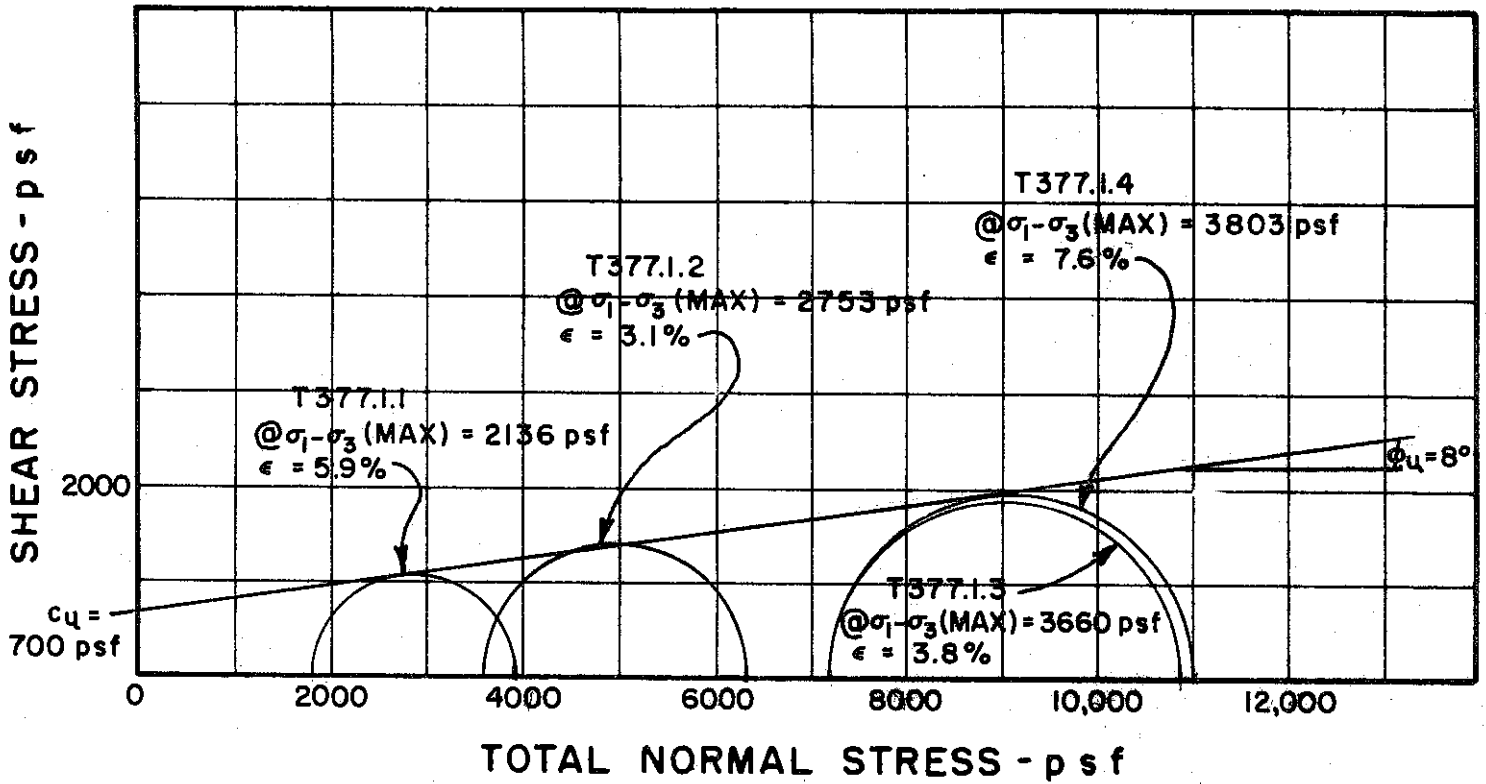
DEPTH 9.0' TO 11.0'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 46 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 5

DEPTH 40.0' TO 42.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

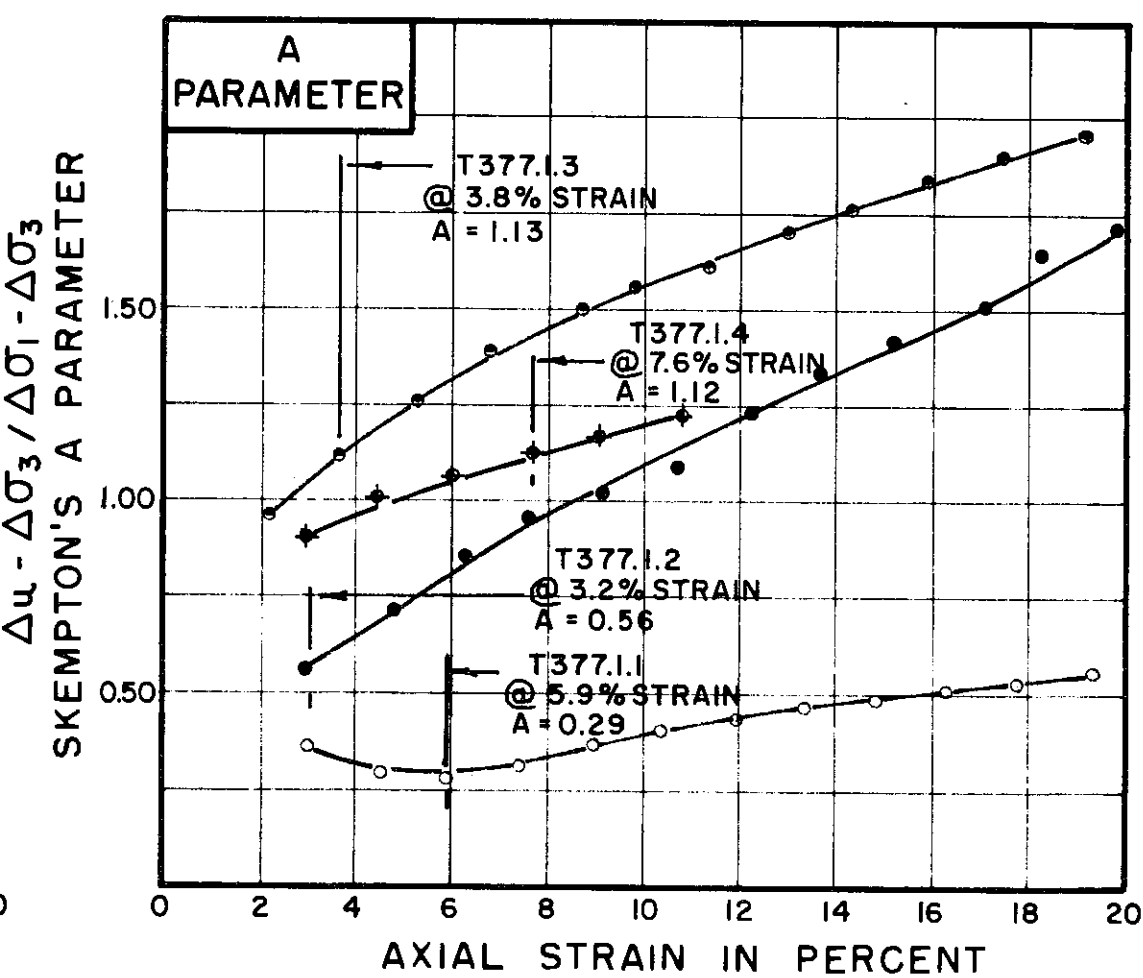
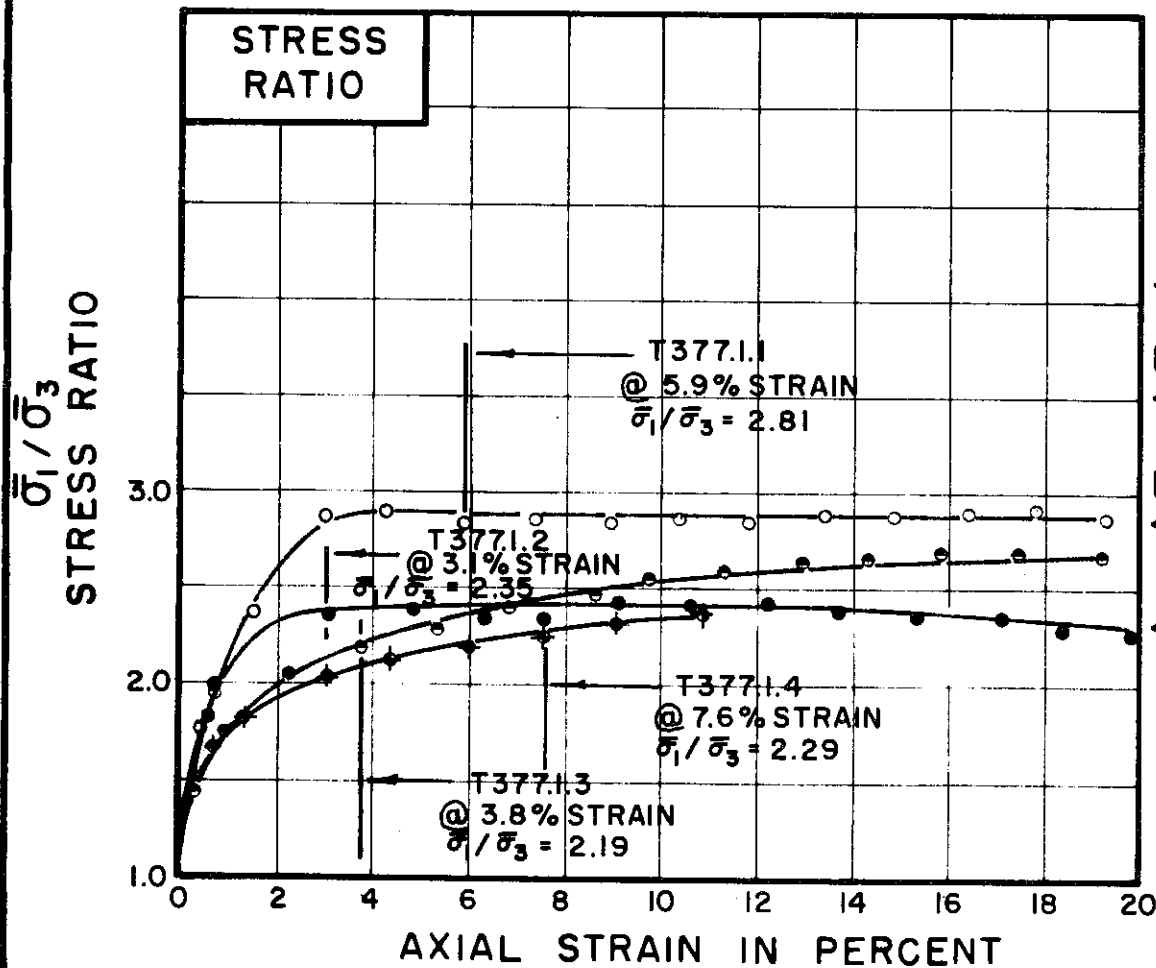
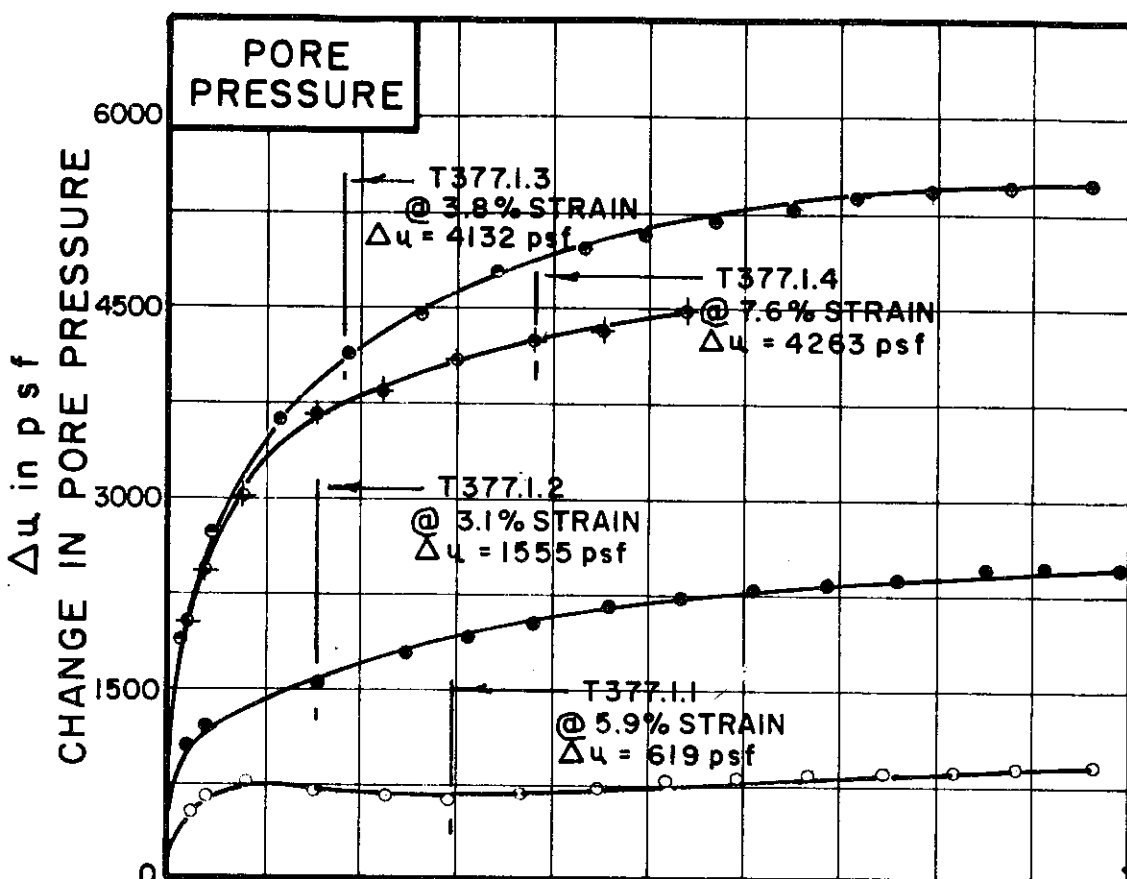
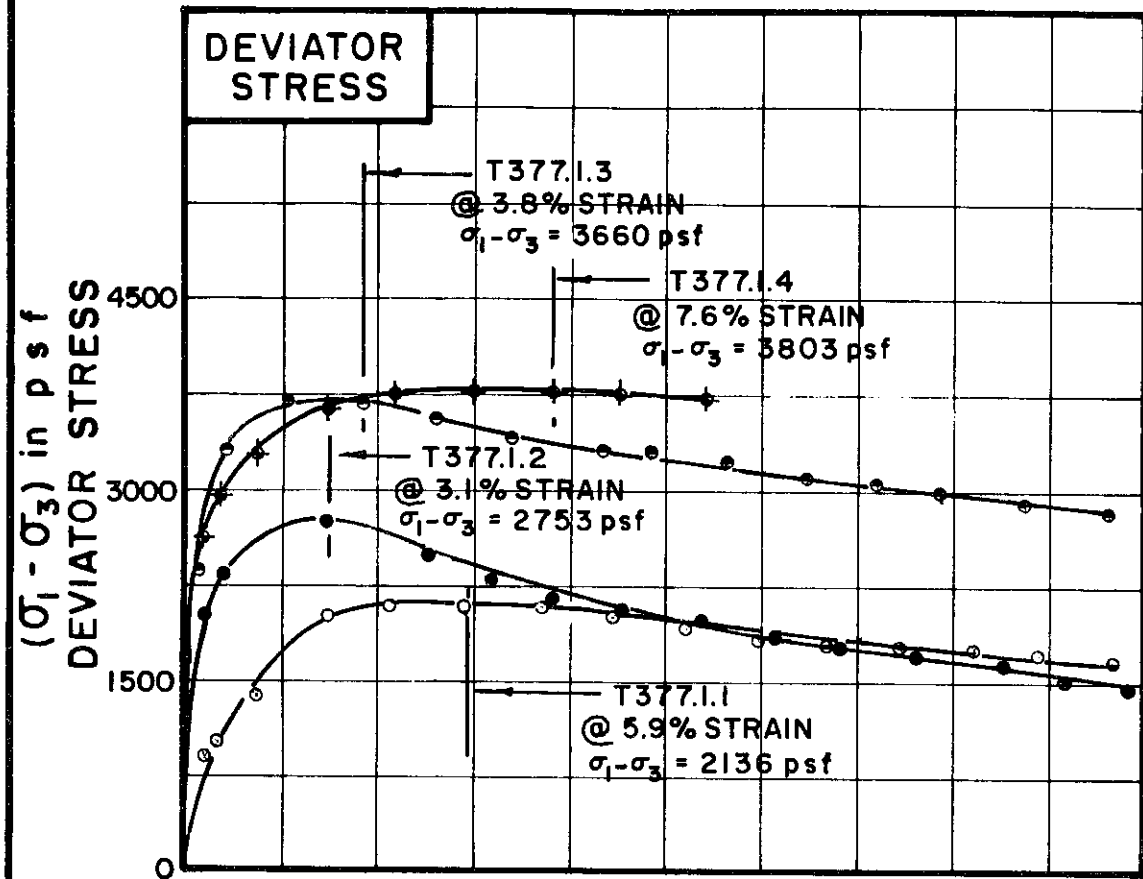
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-434



TEST NO. / SYMBOL	T377.1.1	T377.1.2	T377.1.3	T377.1.4
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INITIAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_0$		35.9%	35.9%	35.1%	39.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	84	85	85	84
SAMPLE DIAMETER	$D_0$	in.	1.39	1.42	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.38	3.30	3.34	3.37
CONDITIONS BEFORE SHEAR			T377.1.1	T377.1.2	T377.1.3	T377.1.4
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\sigma_1 / \sigma_3$	psf	1800	3600	7200	7200
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.49%	2.38%	4.36%	7.47%
PORE PRESSURE RESPONSE			97%	96%	96%	96%
FINAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_f$		35.3%	34.1%	30.9%	33.4%
SKETCH OF SAMPLE AT END OF TEST						

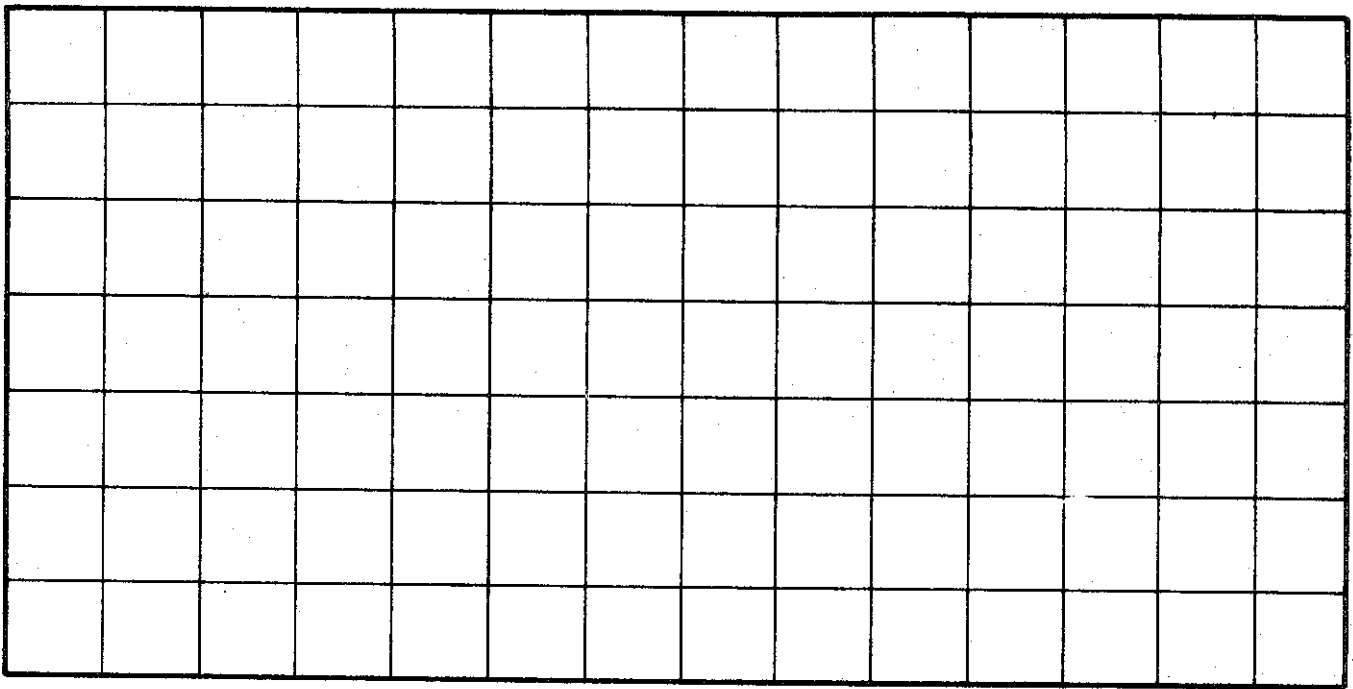
RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024	.024
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BORING NO. 105  
 SAMPLE NO. 5  
 DEPTH 40.0' TO 42.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

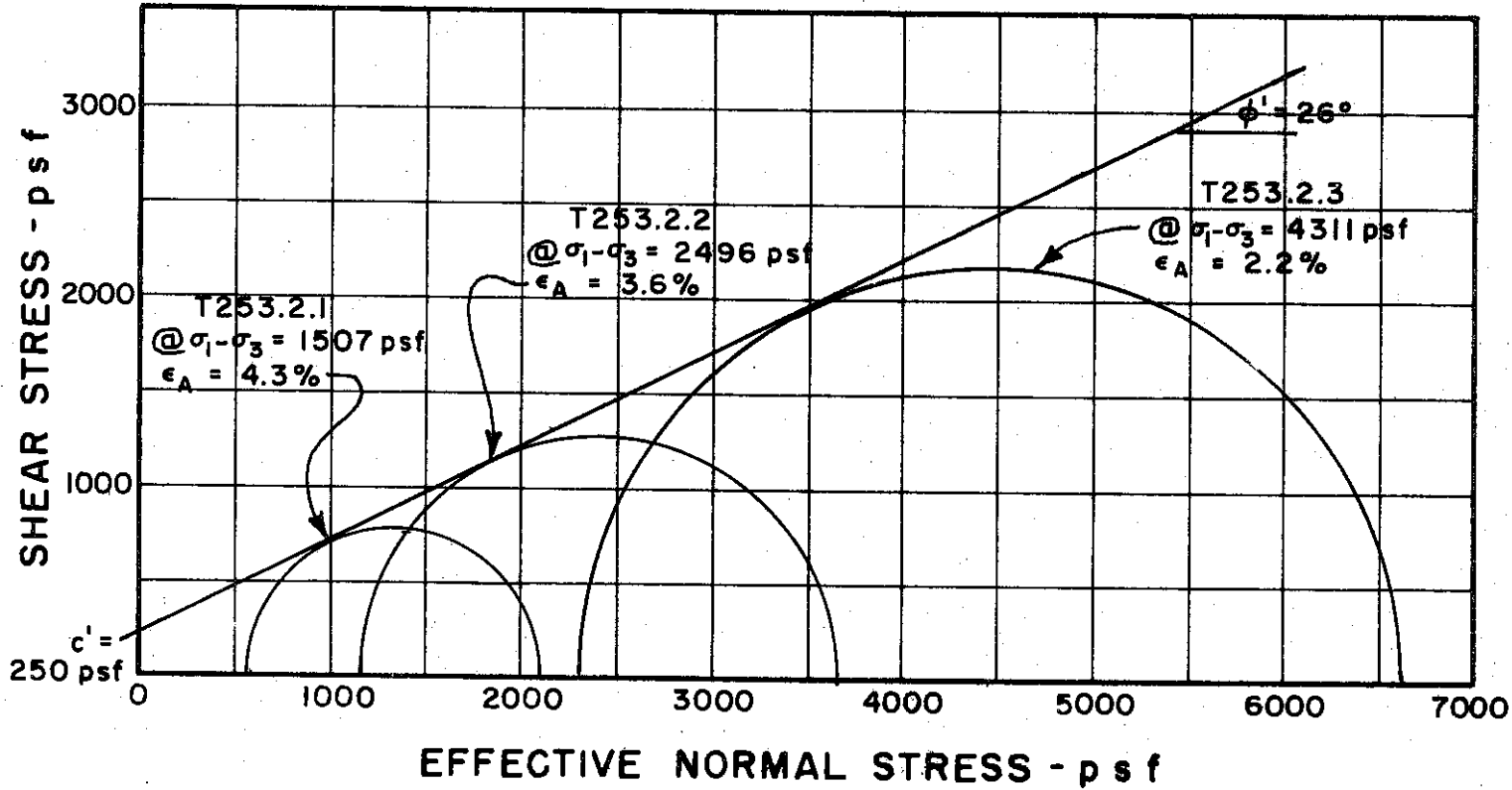
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f



BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

REMARKS \_\_\_\_\_

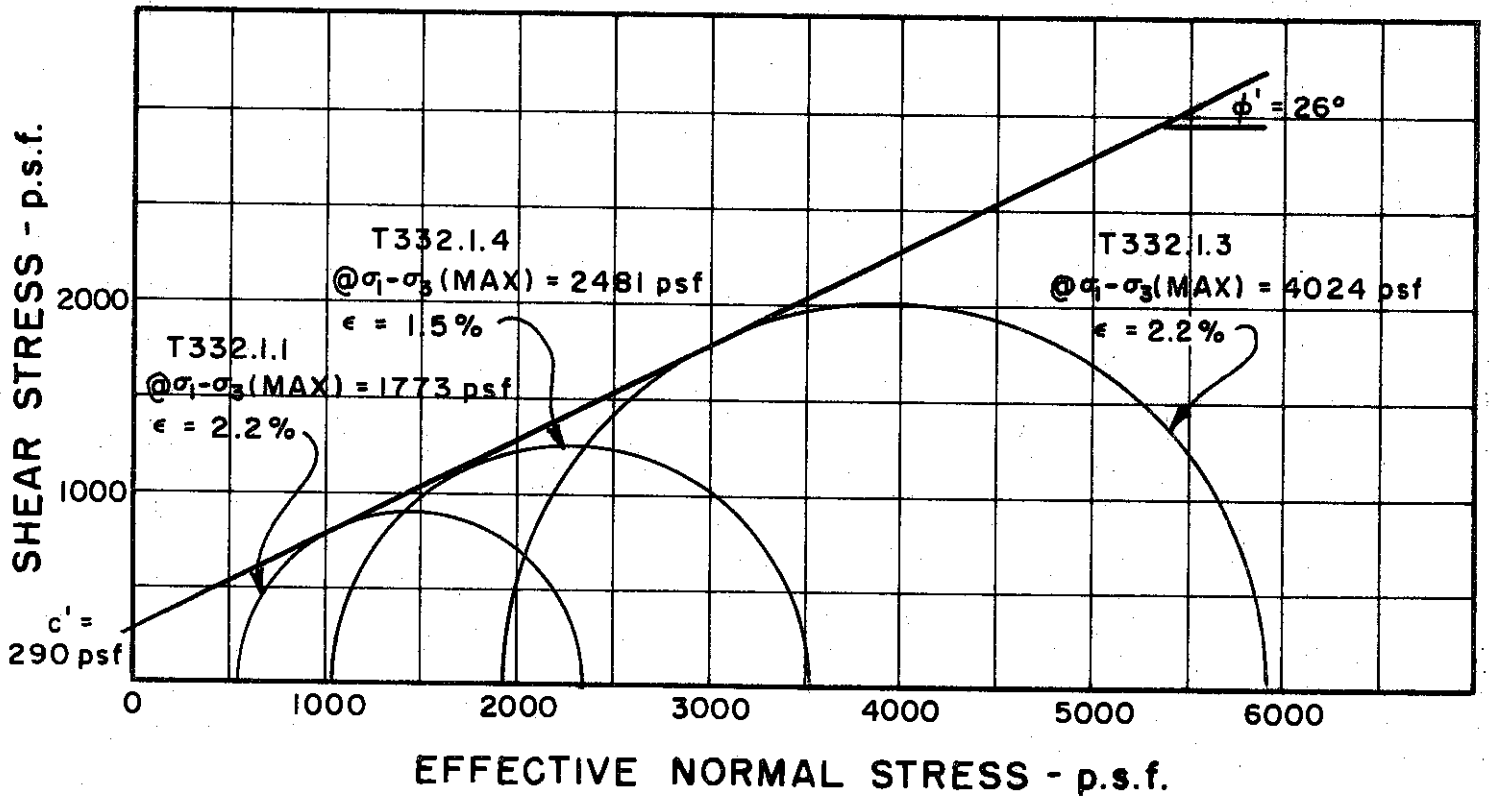
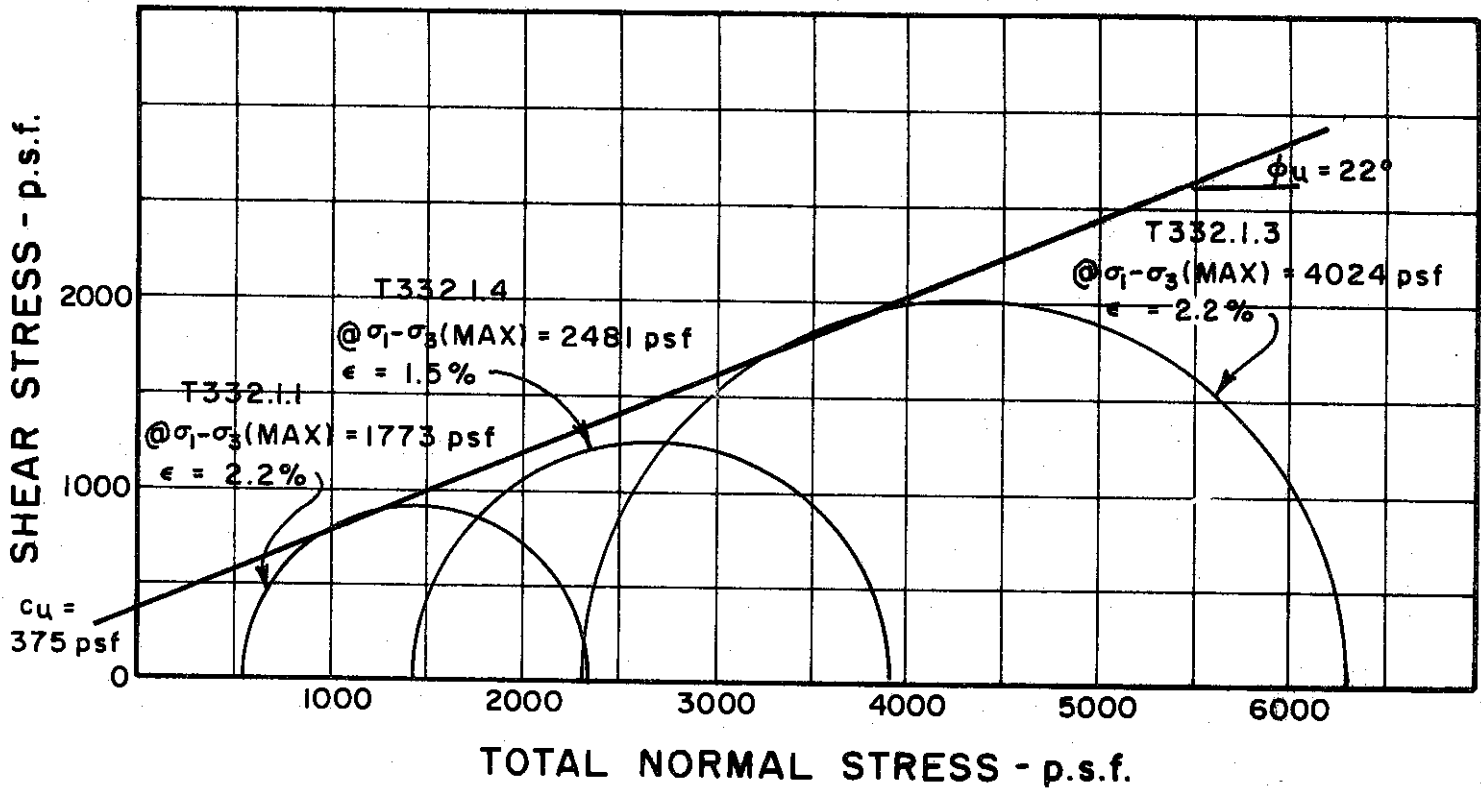
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-436



BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

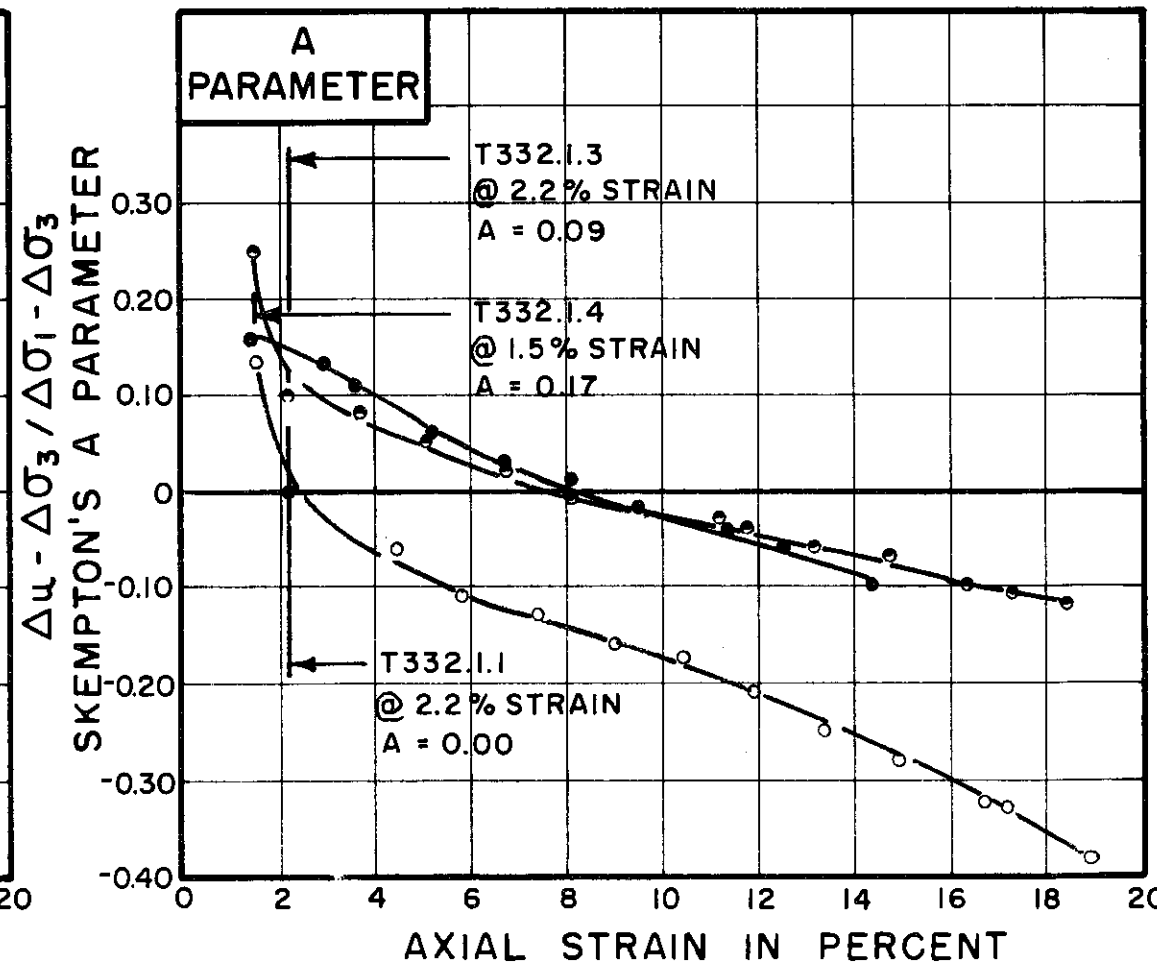
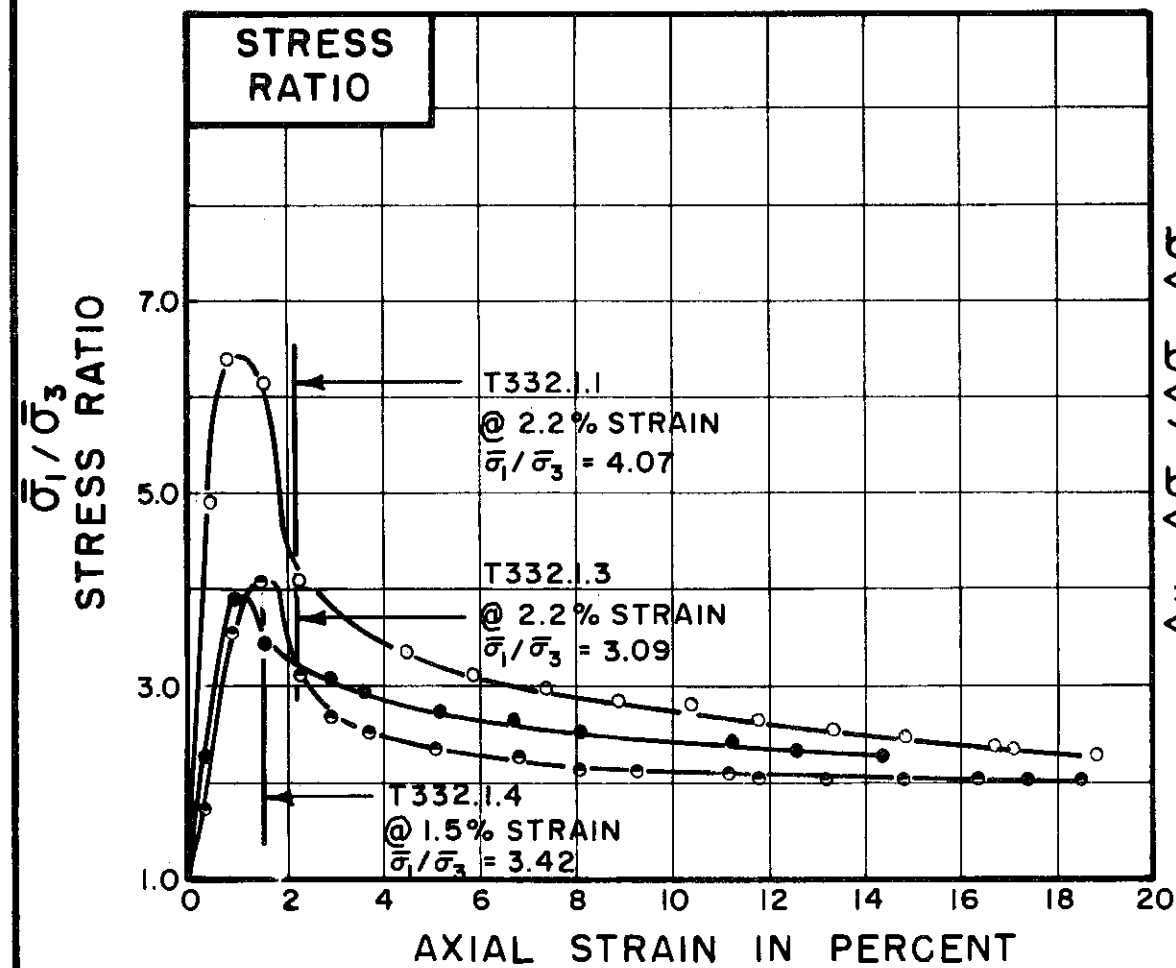
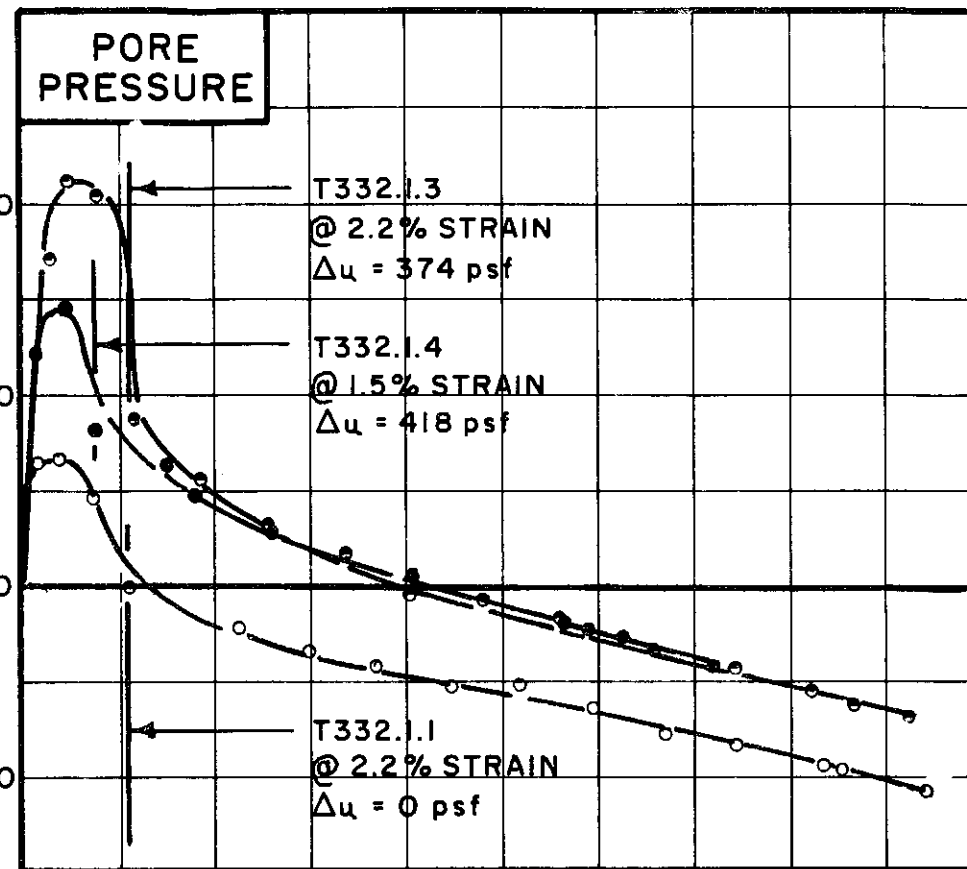
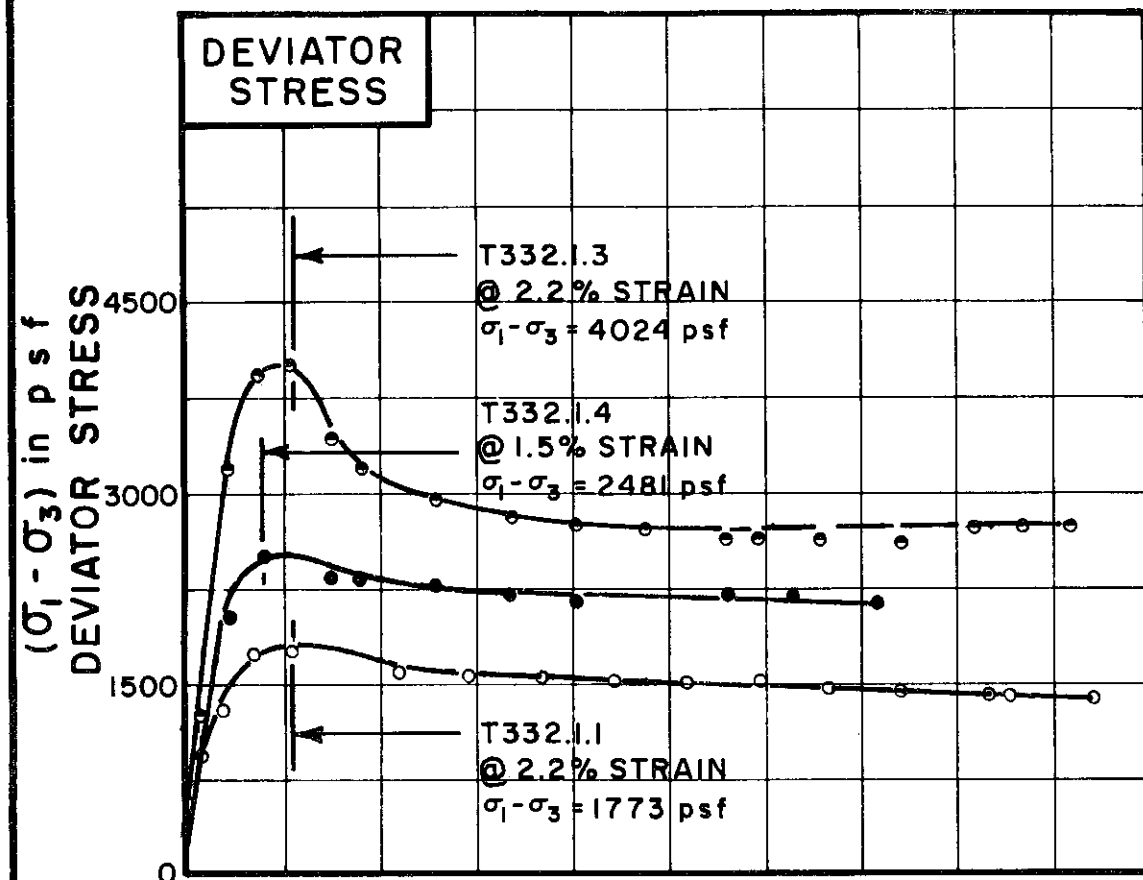
REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-437



TEST NO. / SYMBOL	T332.1.1	T332.1.4	T332.1.3
	○	●	●

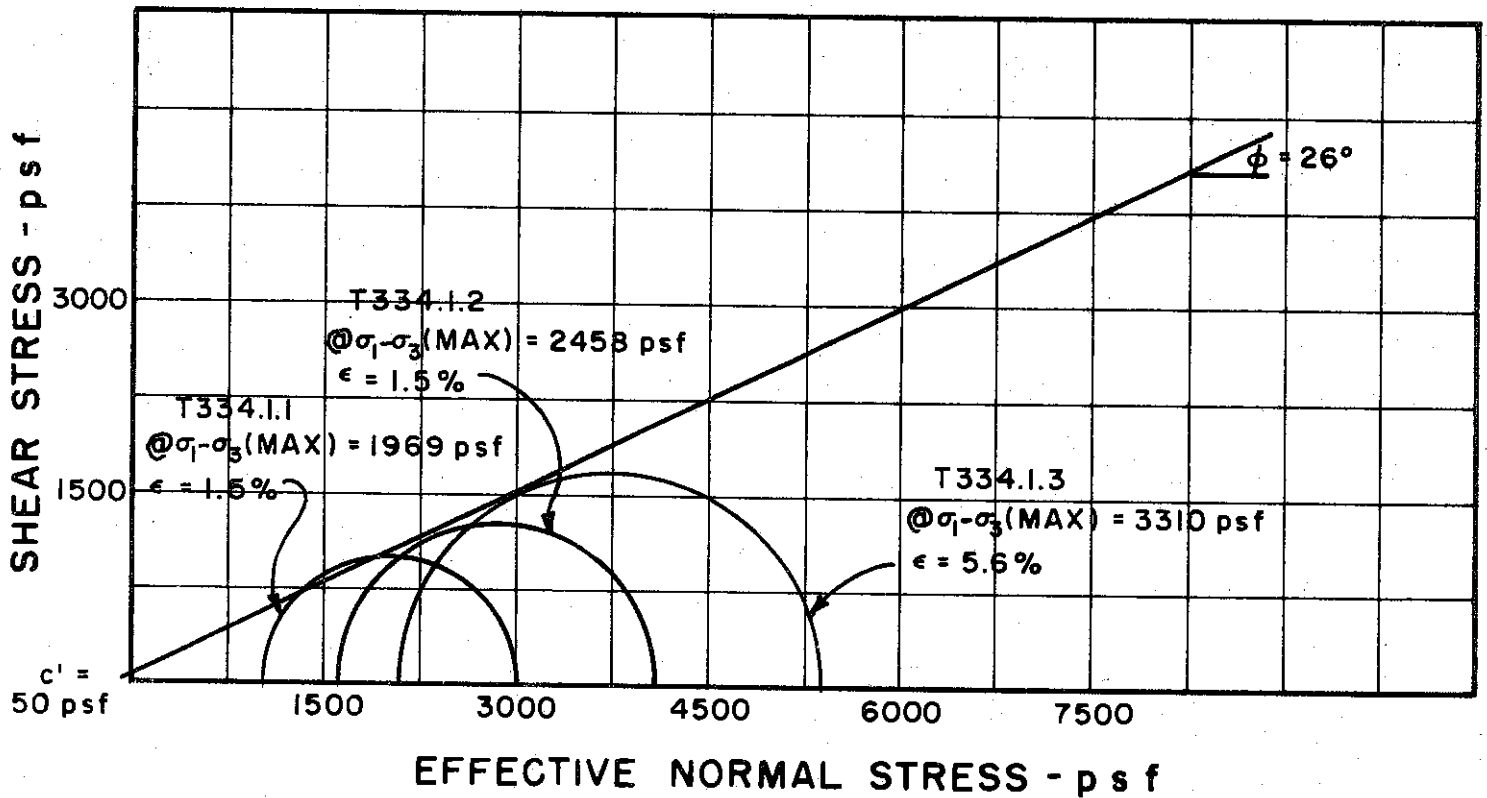
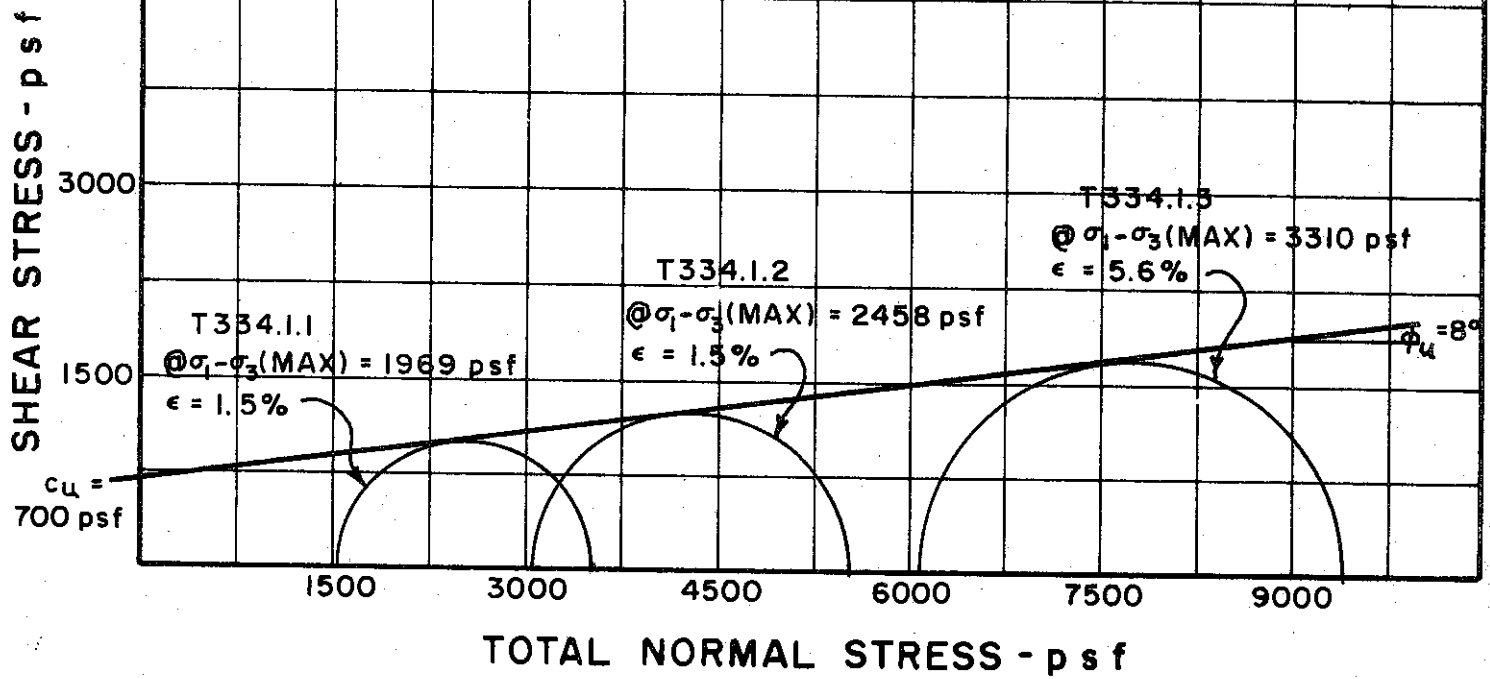
INITIAL CONDITIONS			T332.1.1	T332.1.4	T332.1.3
WATER CONTENT	$w_0$		28.3%	29.2%	27.9%
DRY DENSITY	$\gamma_d$	pcf	95	94	99
SAMPLE DIAMETER	$D_0$	in.	1.42	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.36	3.38	3.40
FINAL CONDITIONS BEFORE SHEAR			T332.1.1	T332.1.4	T332.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	7200	8640
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	576	1440	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.4%	1.7%	1.9%
PORE PRESSURE RESPONSE			98%	98%	99%
FINAL CONDITIONS			T332.1.1	T332.1.4	T332.1.3
WATER CONTENT	$w_f$		29.4%	29.5%	27.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-438





BORING NO. 119

SAMPLE NO. 4

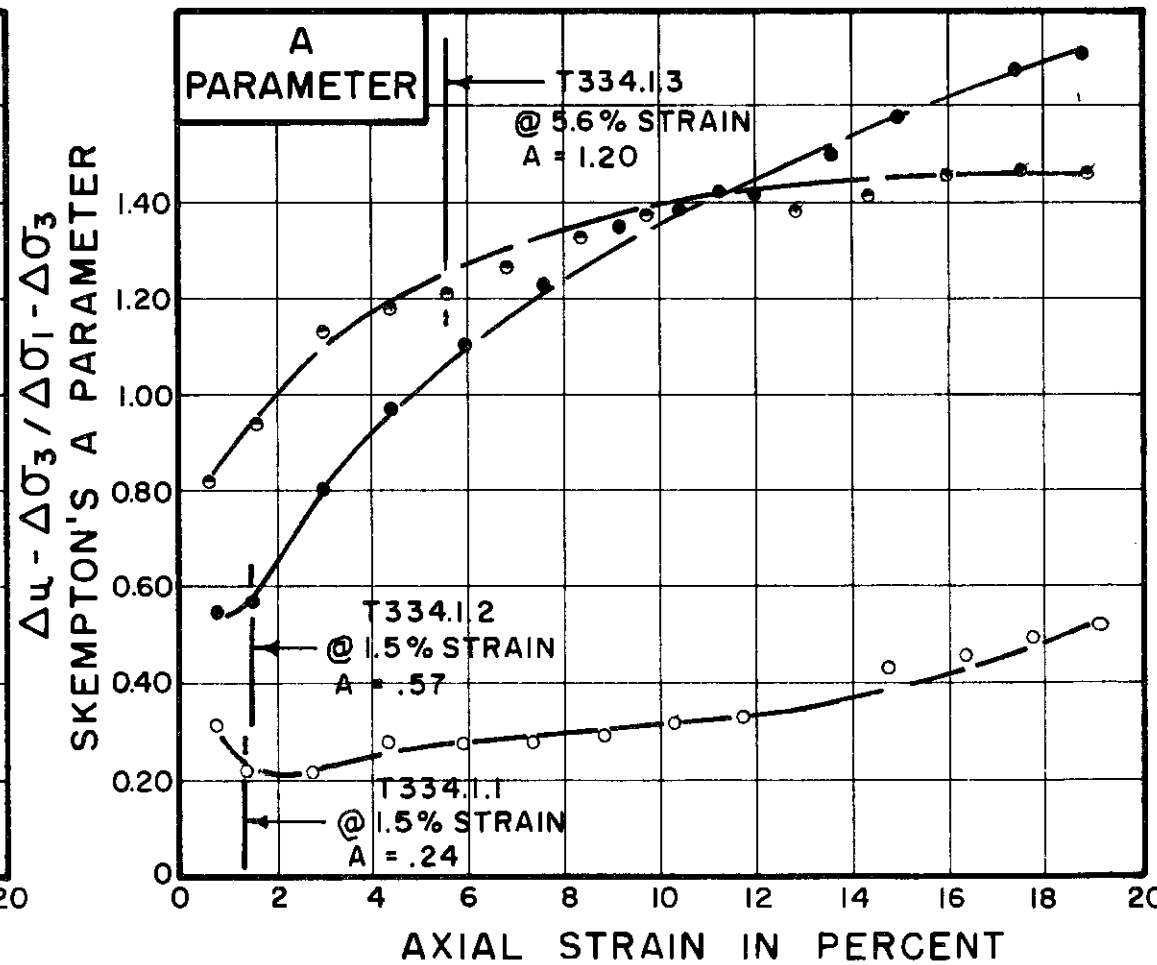
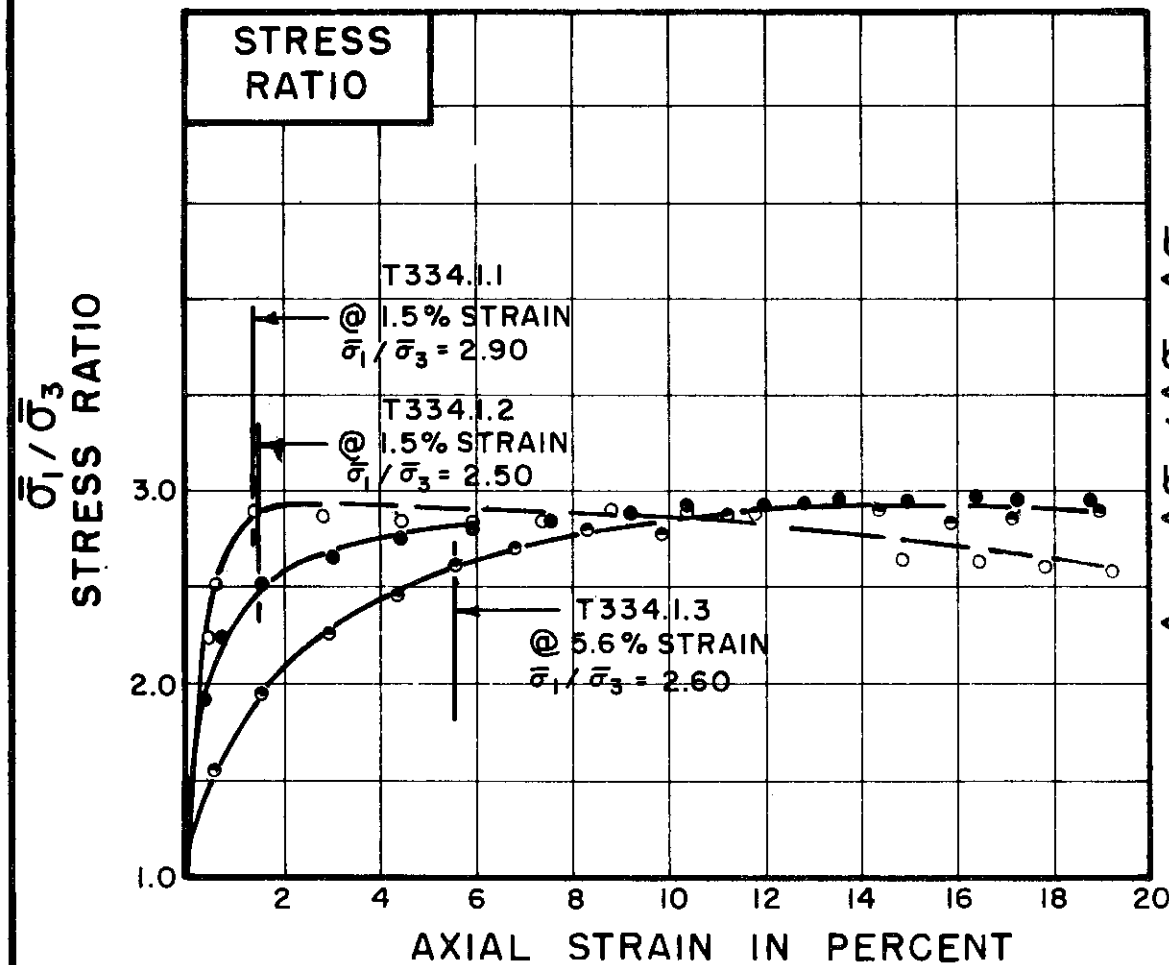
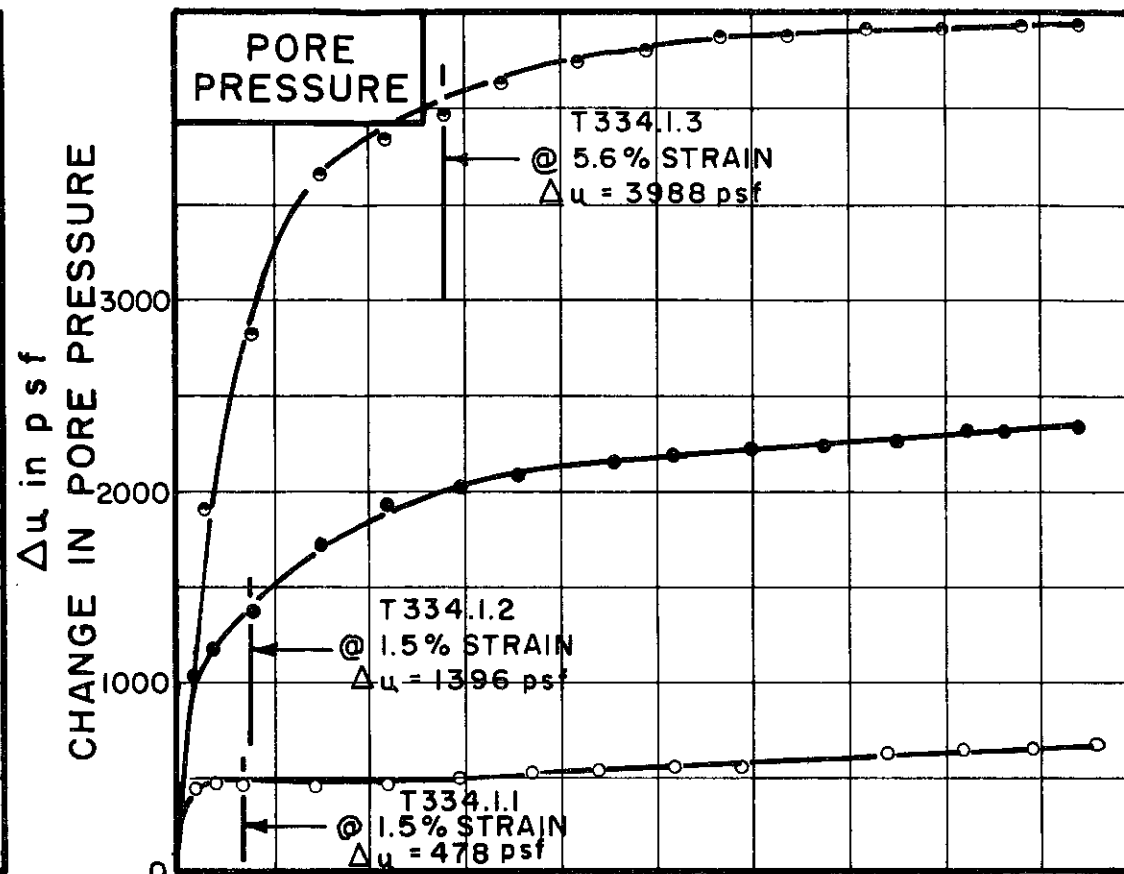
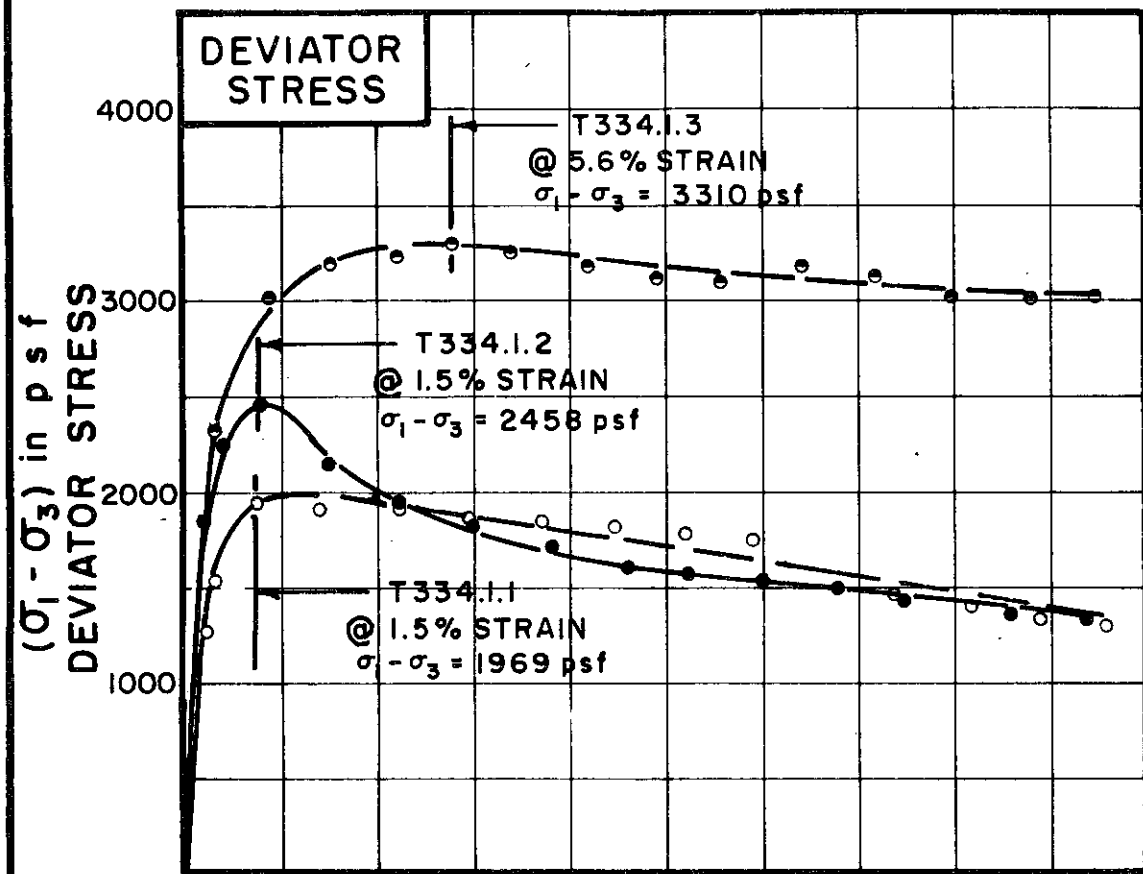
DEPTH 30.0 TO 32.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-439



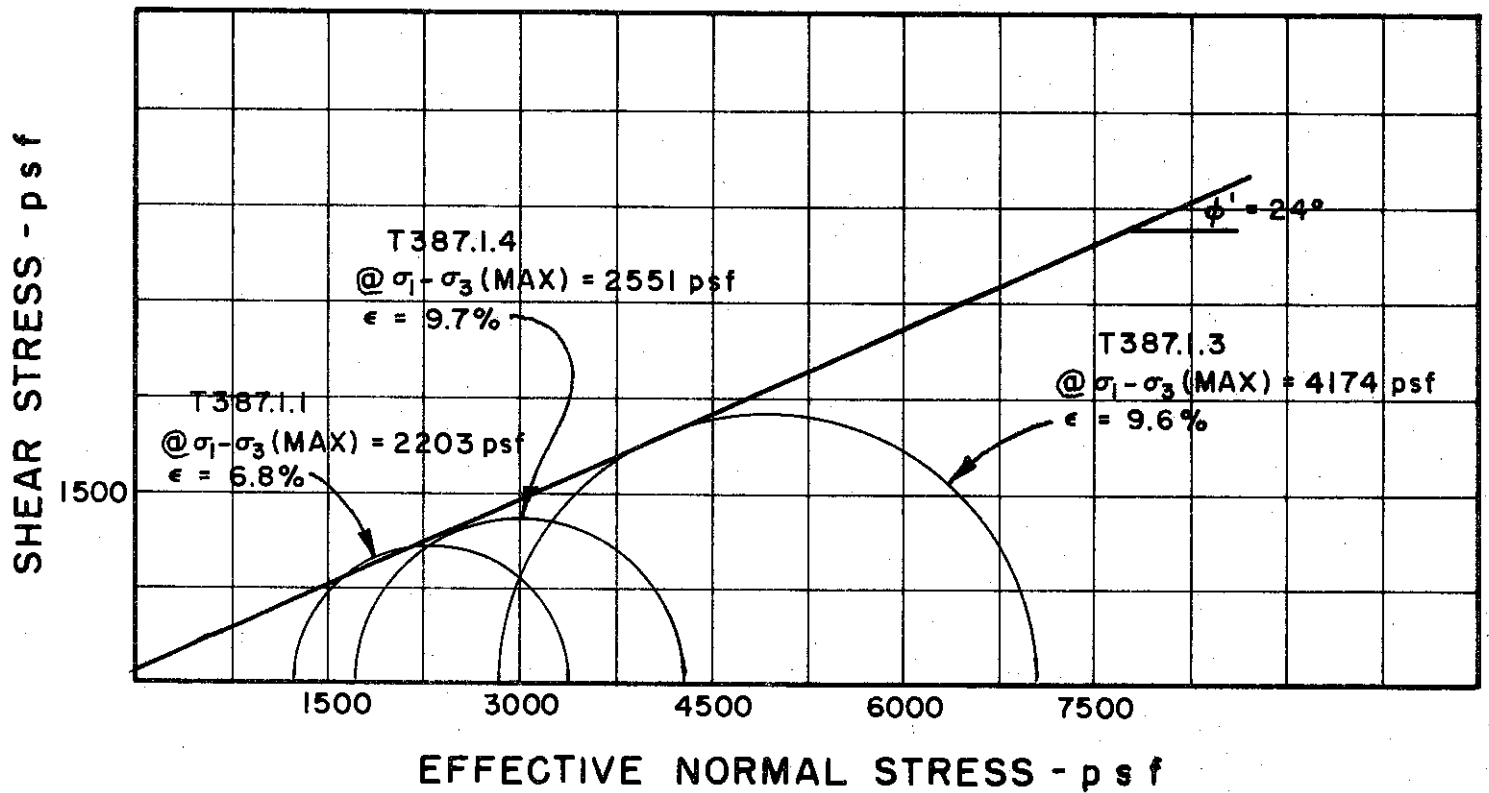
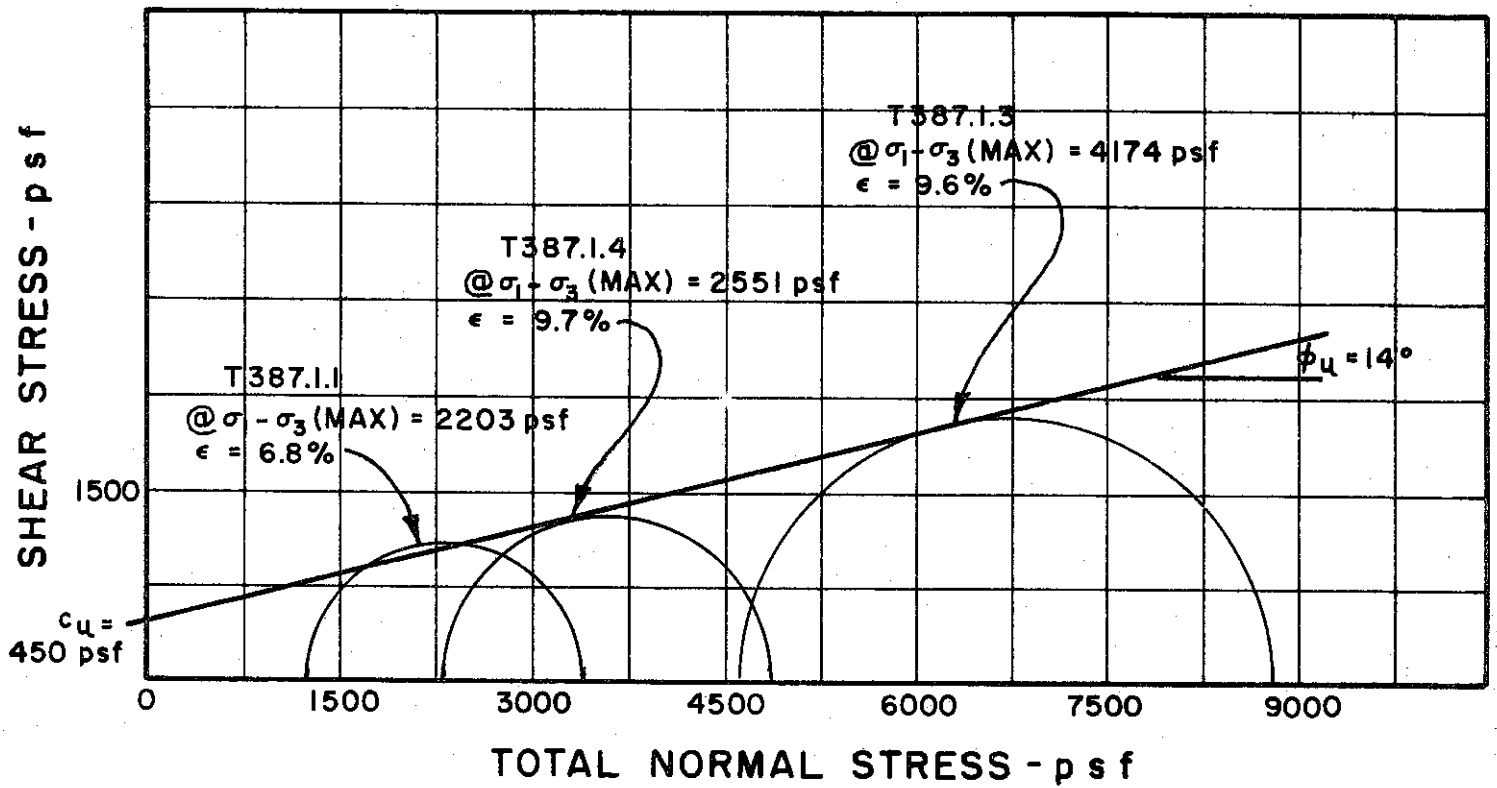
TEST NO. / SYMBOL	T334.1.1	T334.1.2	T334.1.3
	○	●	○

INITIAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_0$		36.9%	38.5%	35.3%
DRY DENSITY	$\gamma_d$	pcf	86	85	87
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.35	3.36
CONDITIONS BEFORE SHEAR			T334.1.1	T334.1.2	T334.1.3
FINAL BACK PRESSURE	$u_0$	psf	11520	7200	11520
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	1512	3024	6048
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.7%	6.4%
PORE PRESSURE RESPONSE			95%	99%	100%
FINAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_f$		35.2%	36.1%	29.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 4  
 DEPTH 30.0 TO 32.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

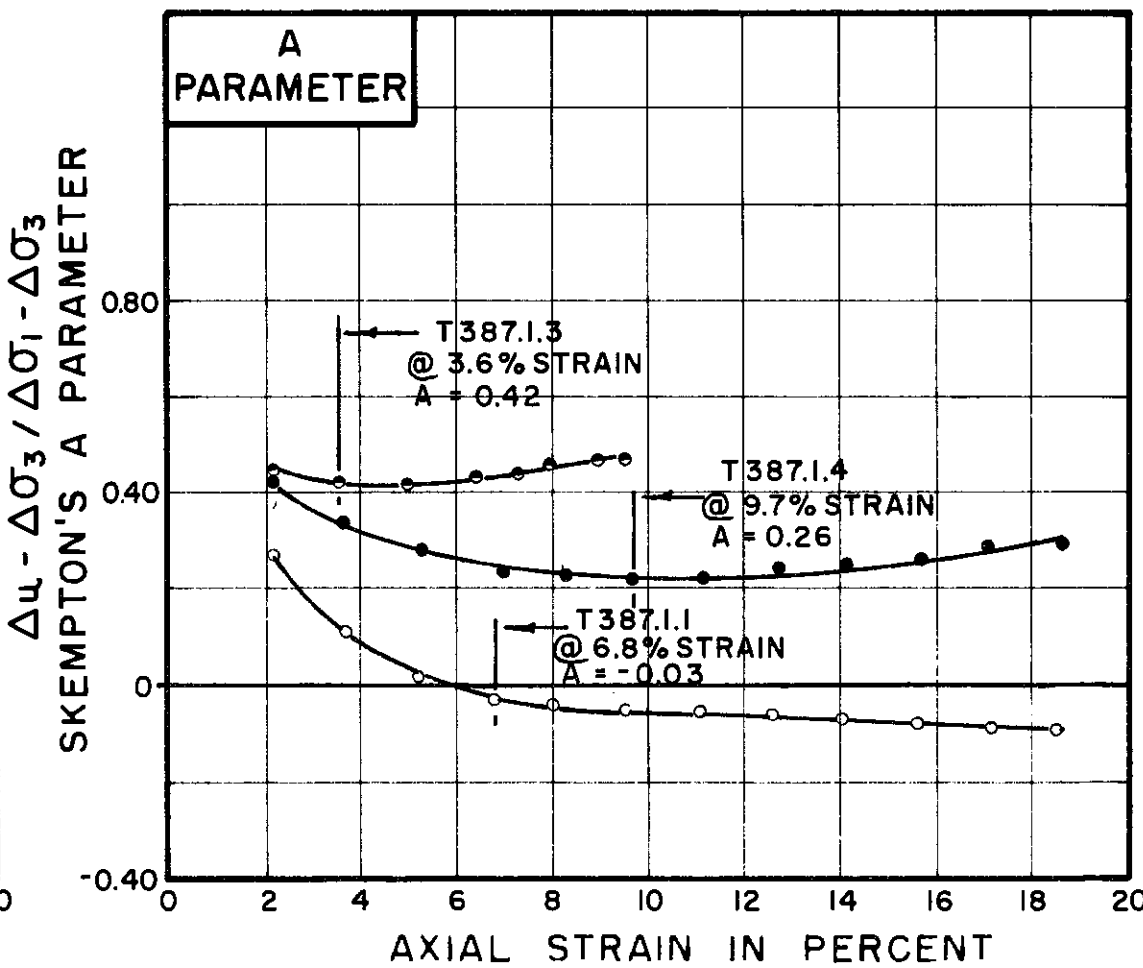
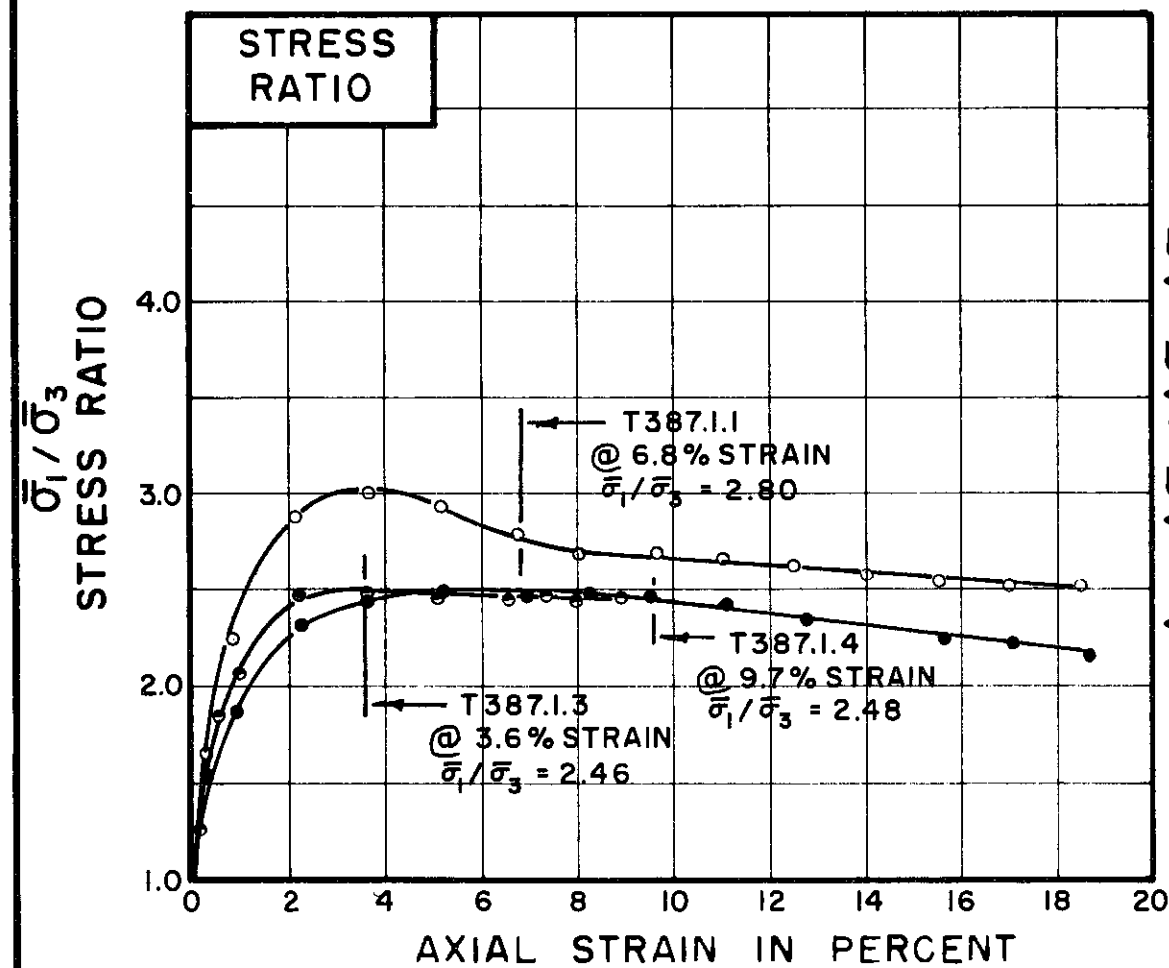
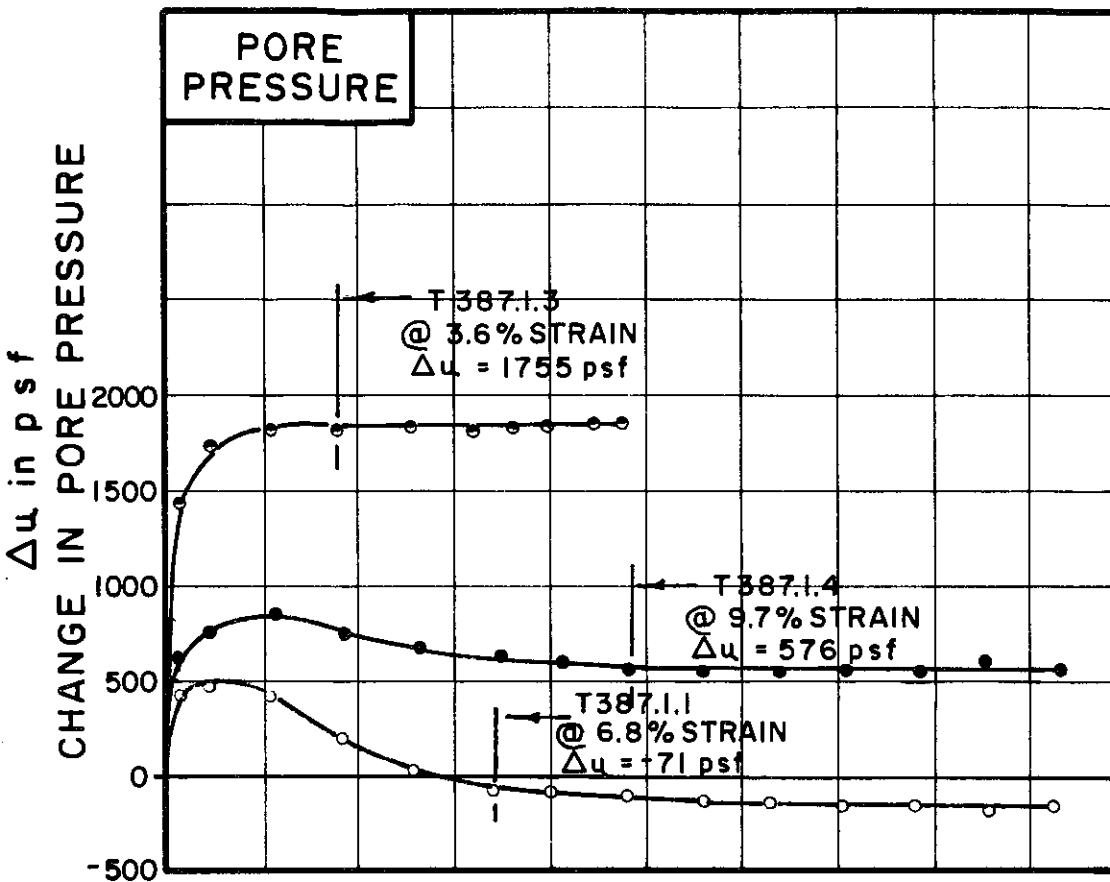
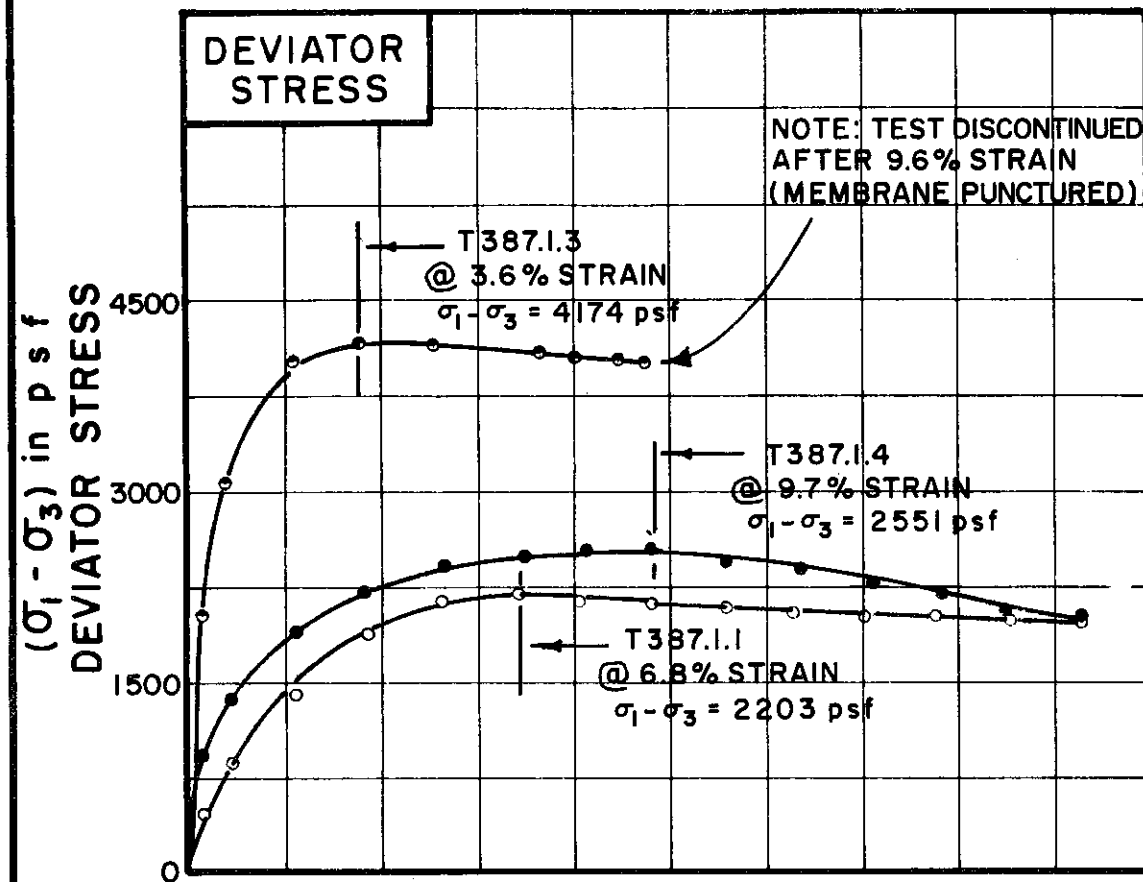
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-441



TEST NO. / SYMBOL	T387.1.1	T387.1.4	T387.1.3
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INITIAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_0$		33.5%	33.1%	31.9%
DRY DENSITY	$\gamma_d$	lb/cu ft	90	90	90
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.38	3.45
FINAL CONDITIONS BEFORE SHEAR			T387.1.1	T387.1.4	T387.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	6480	5760	6480
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	p.s.f.	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.31%	2.94%	3.20%
PORE PRESSURE RESPONSE			98%	99%	97%
FINAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_f$		33.4%	31.9%	—%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.023
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BORING NO. 129

SAMPLE NO. 5

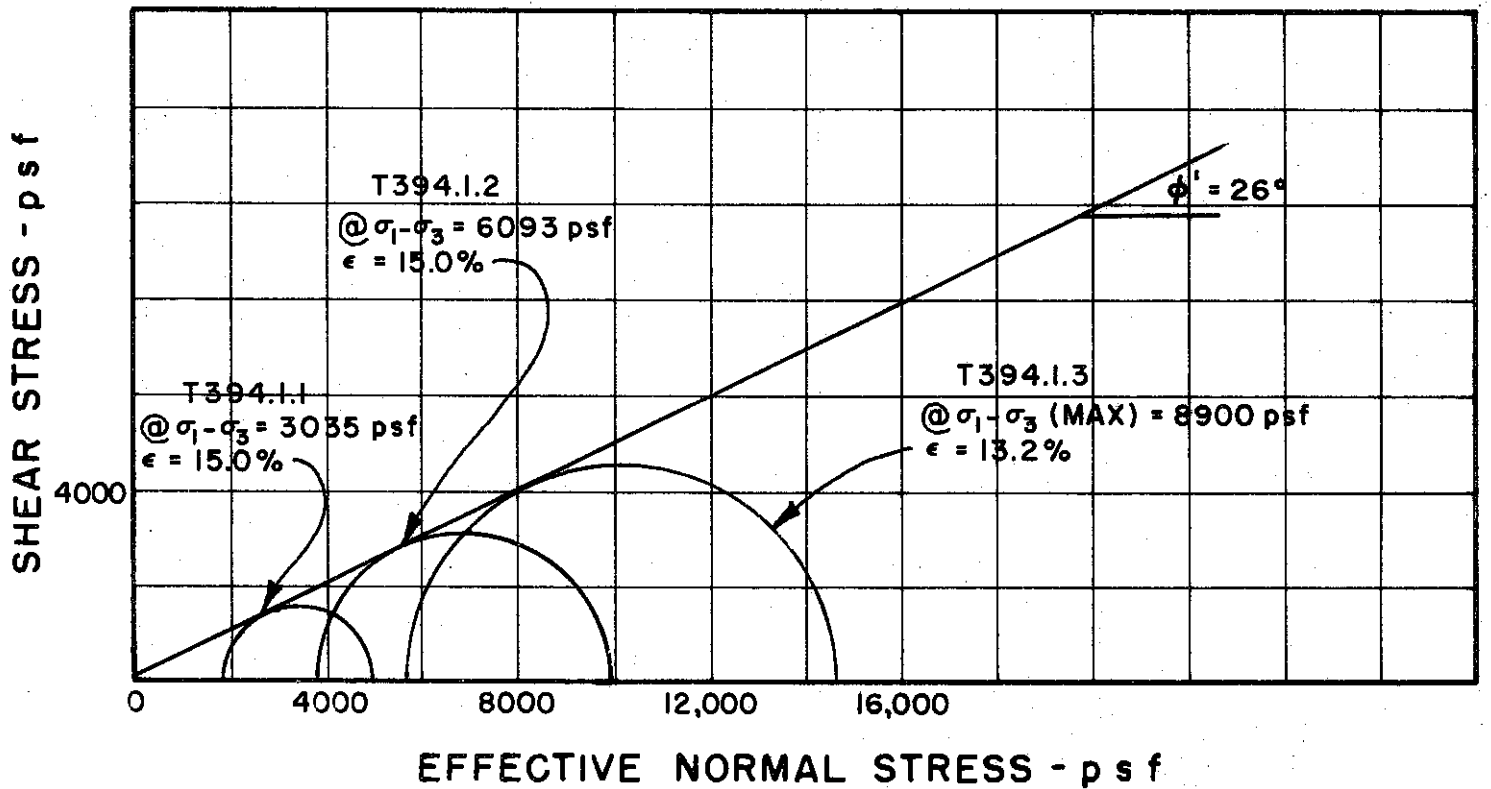
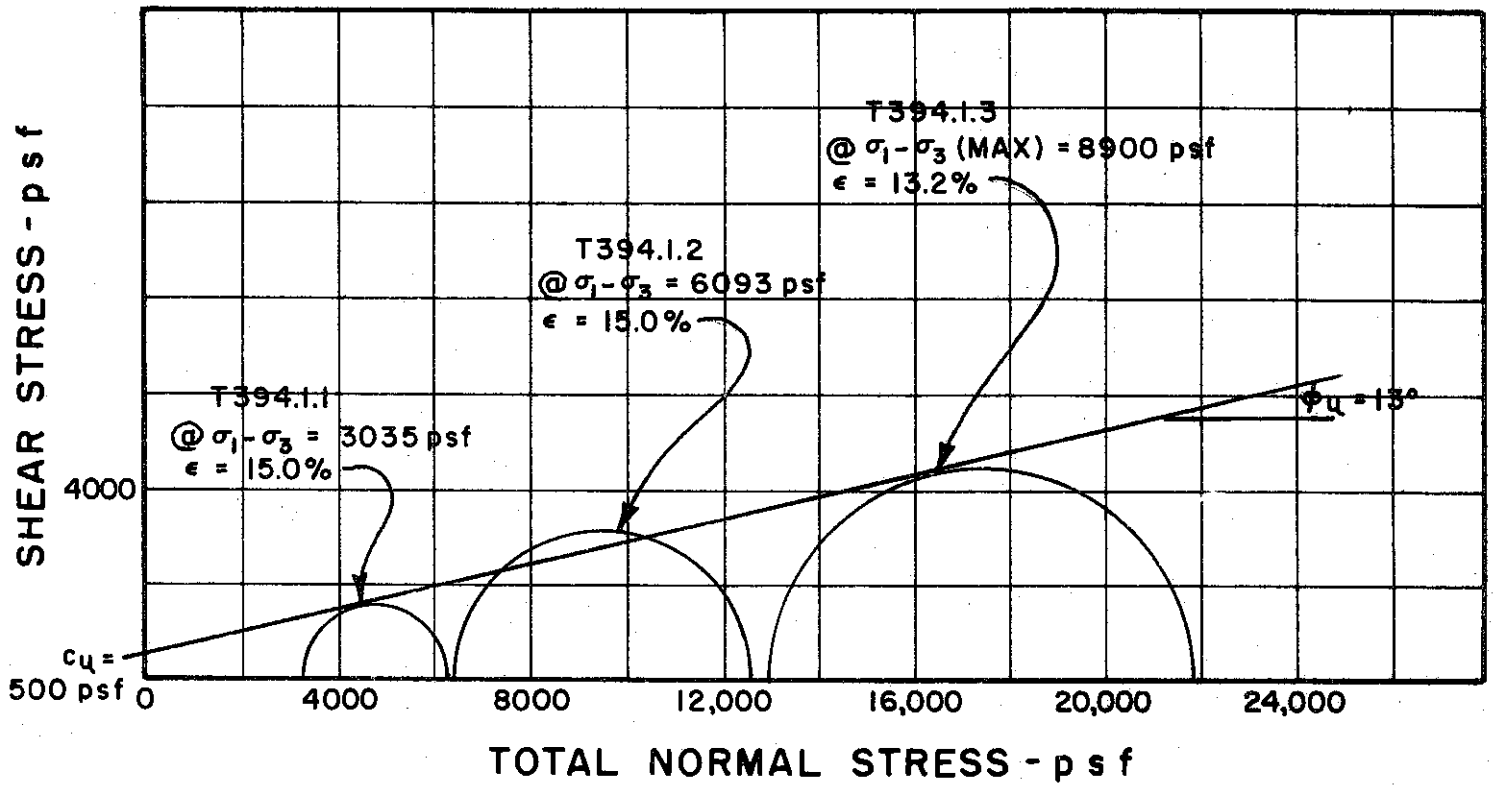
DEPTH 18.0' TO 21.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 19

DEPTH 93.0' TO 95.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

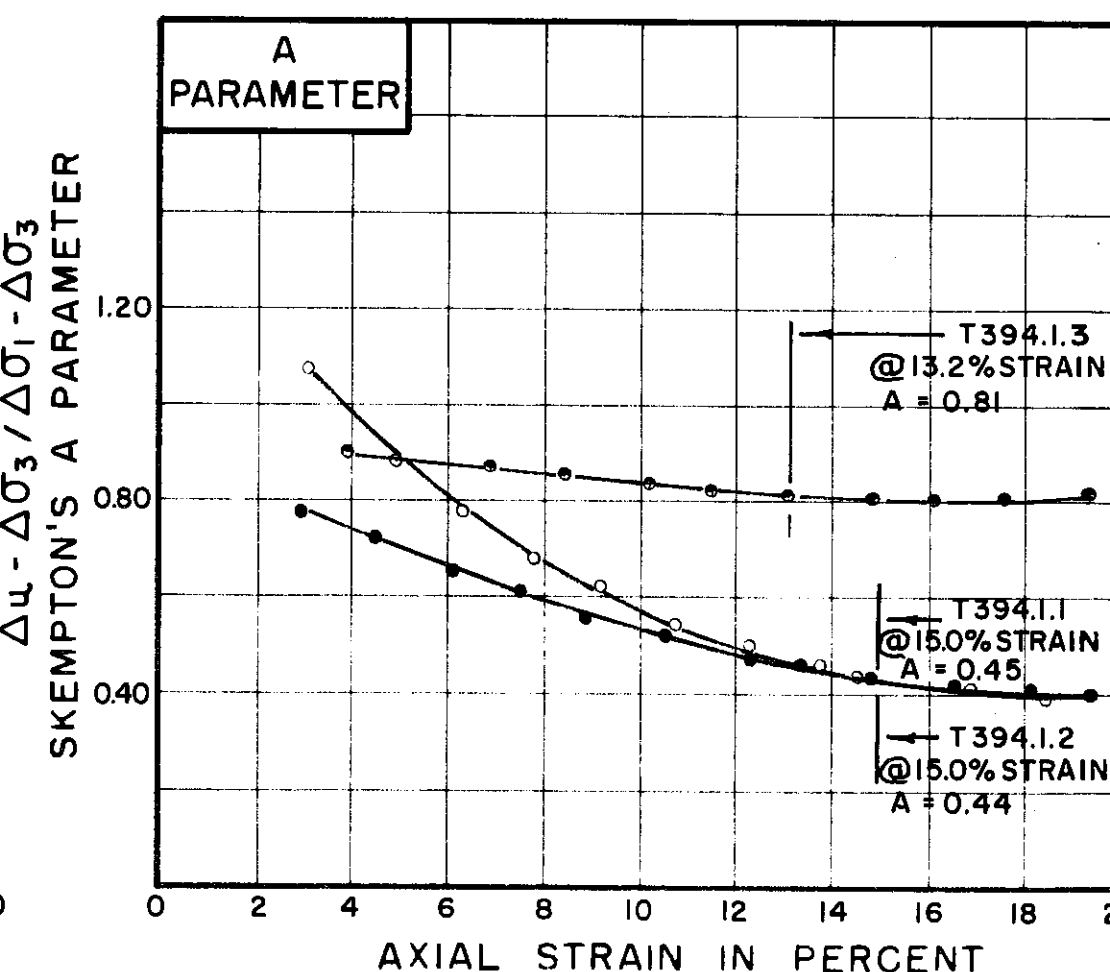
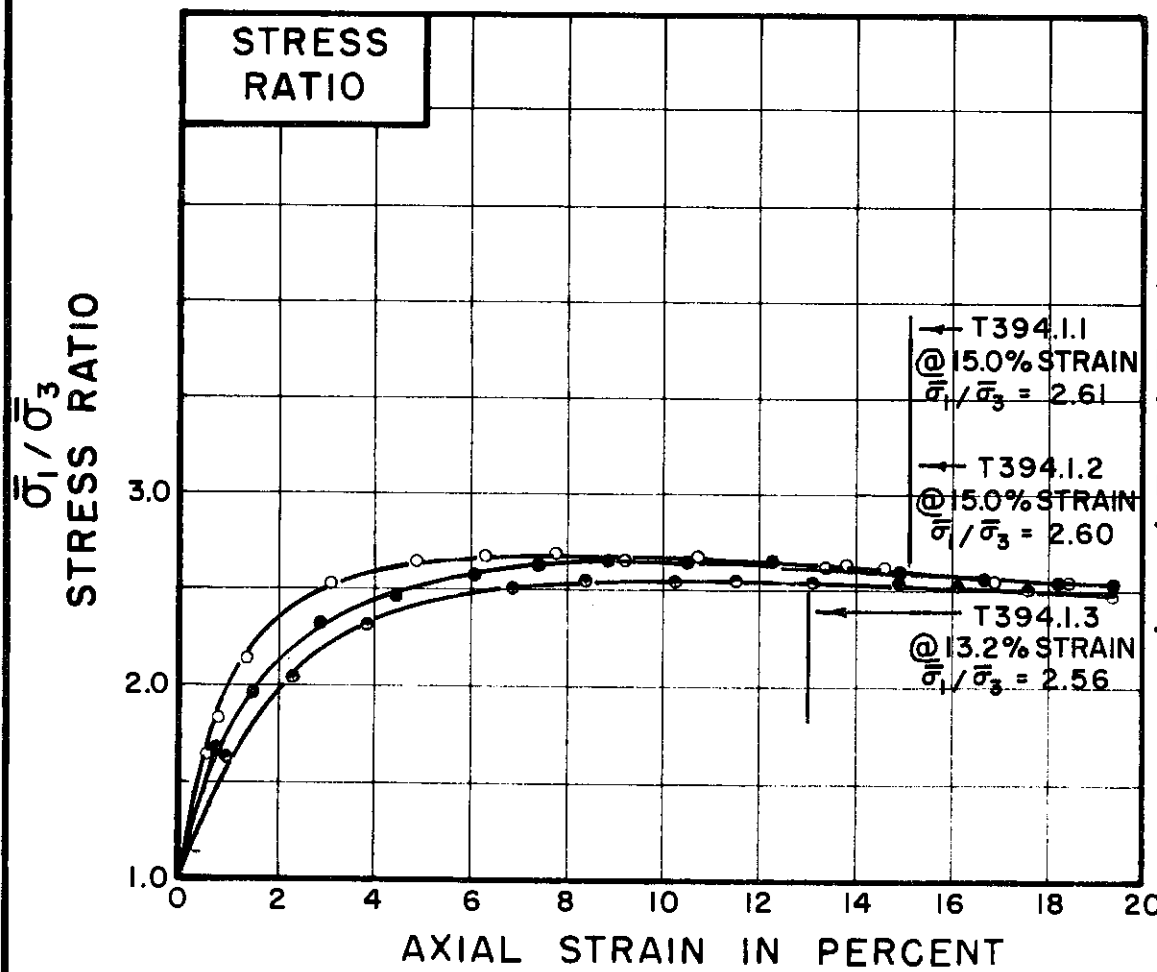
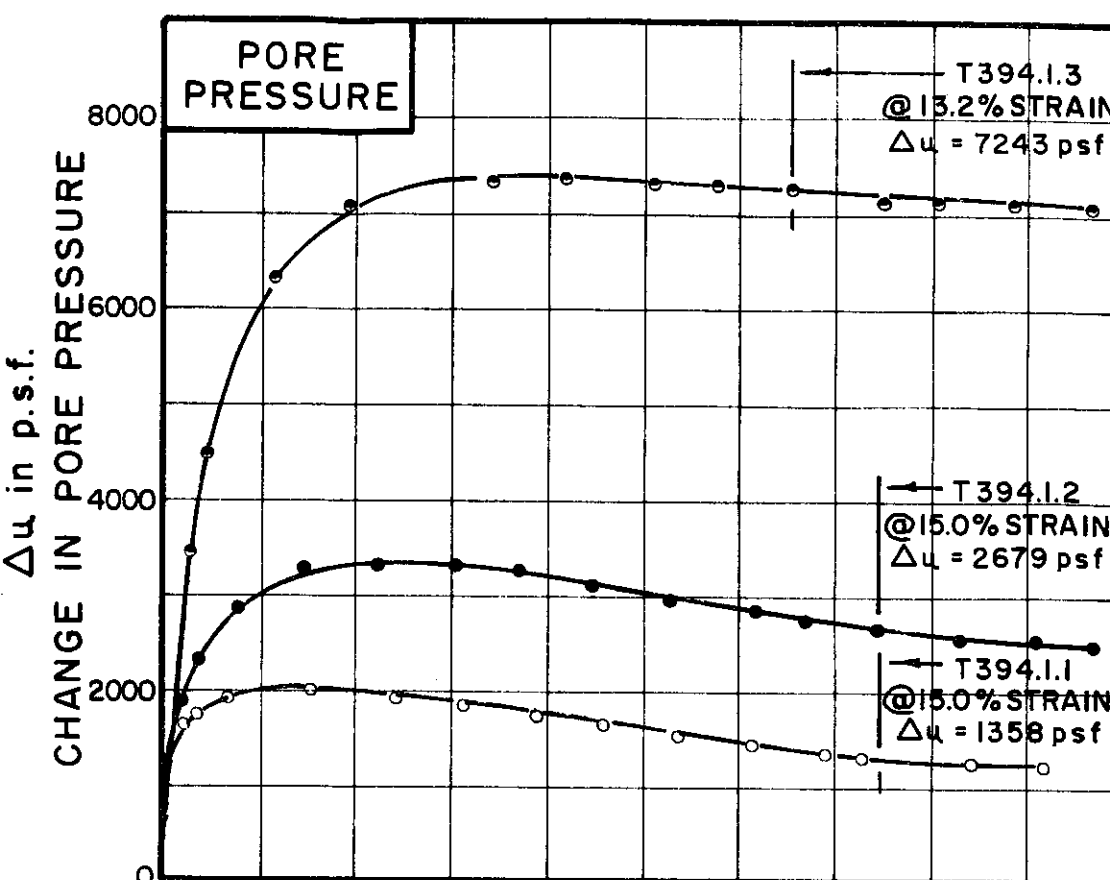
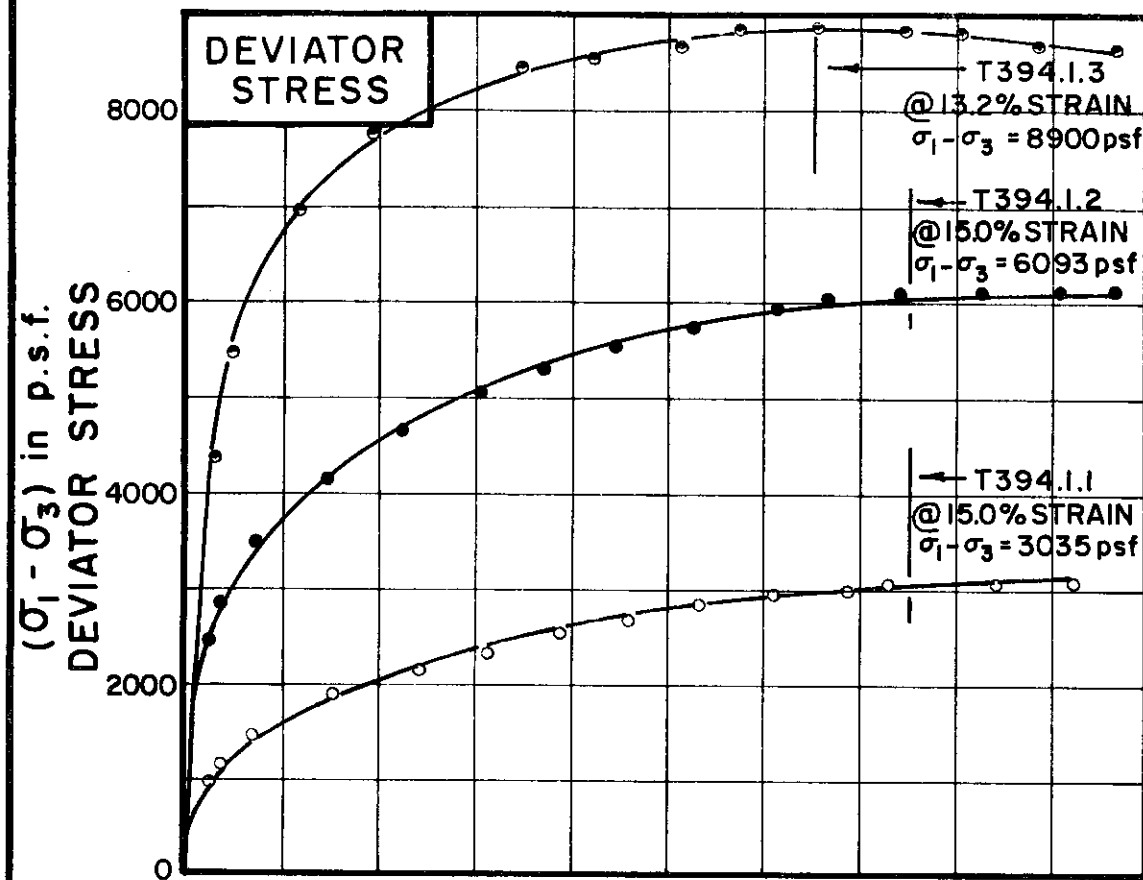
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-443



TEST NO. / SYMBOL	T394.1.1	T394.1.2	T394.1.3
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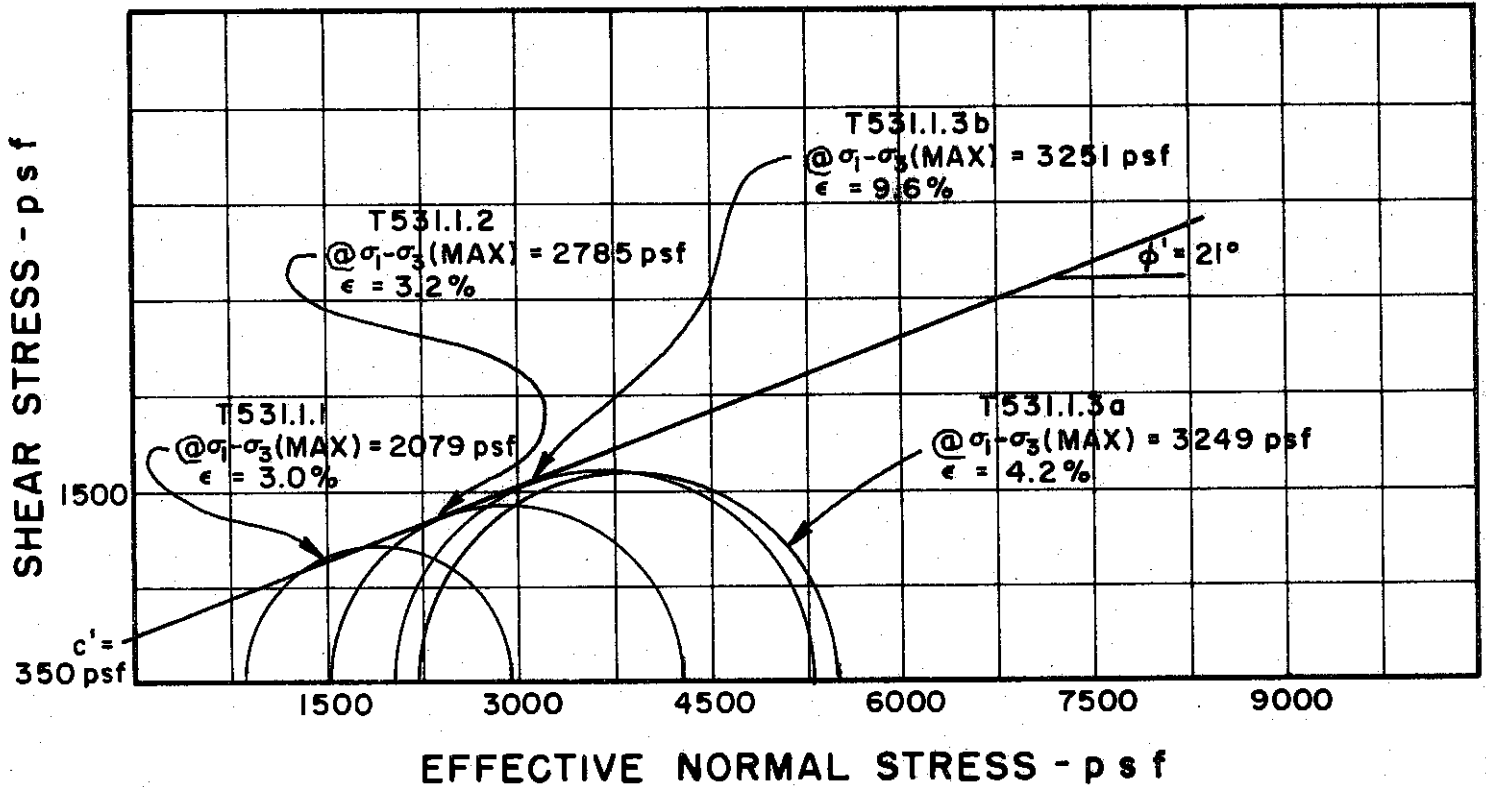
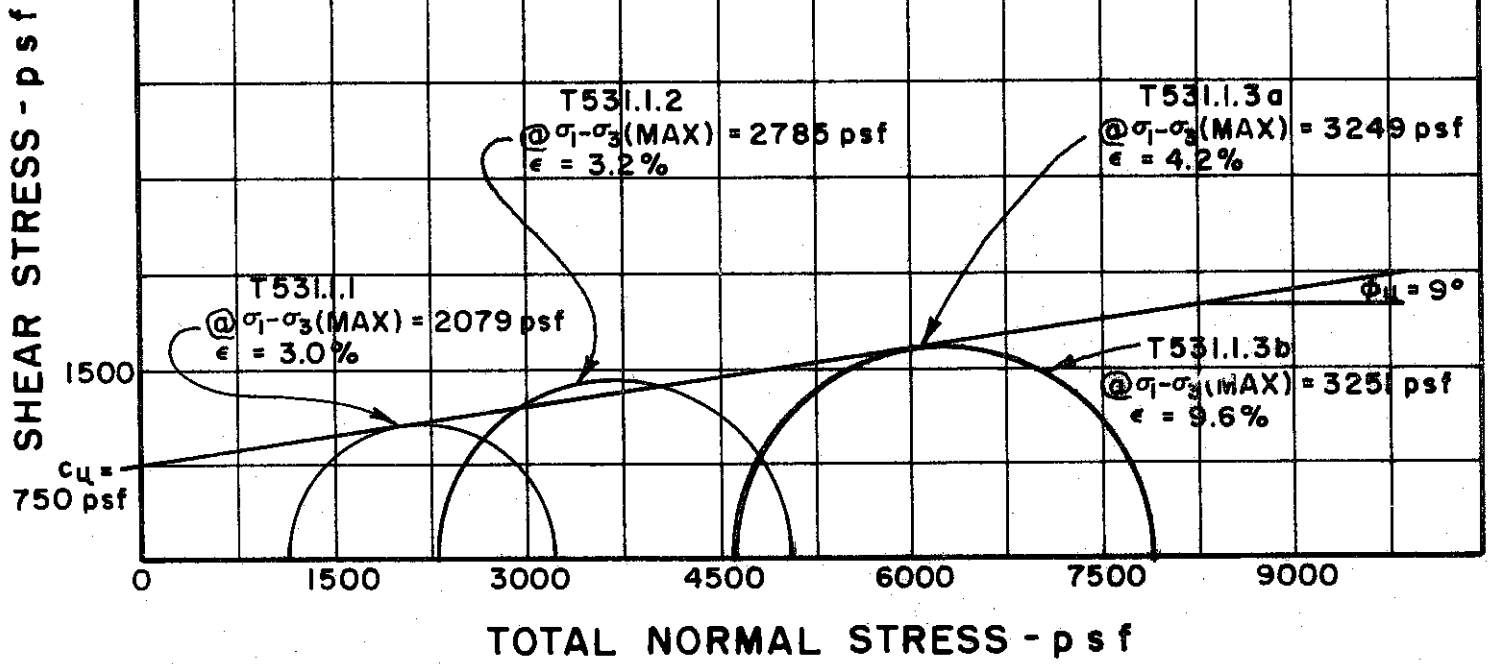
INITIAL CONDITIONS			T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_0$		23.7%	25.9%	27.0%
DRY DENSITY	$\gamma_d$	lb/cu ft	99	99	99
SAMPLE DIAMETER	$D_0$	in.	1.39	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.27	3.38	3.32
FINAL CONDITIONS BEFORE SHEAR			T394.1.1	T394.1.2	T394.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	p.s.f.	3240	6480	12960
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.73%	2.61%	5.03%
PORE PRESSURE RESPONSE			99%	98%	98%
FINAL CONDITIONS			T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_f$		22.2%	22.7%	21.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.024	.025
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BORING NO. 129  
 SAMPLE NO. 19  
 DEPTH 93.0' TO 95.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 141

SAMPLE NO. 4

DEPTH 18.0' TO 20.0'

**MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

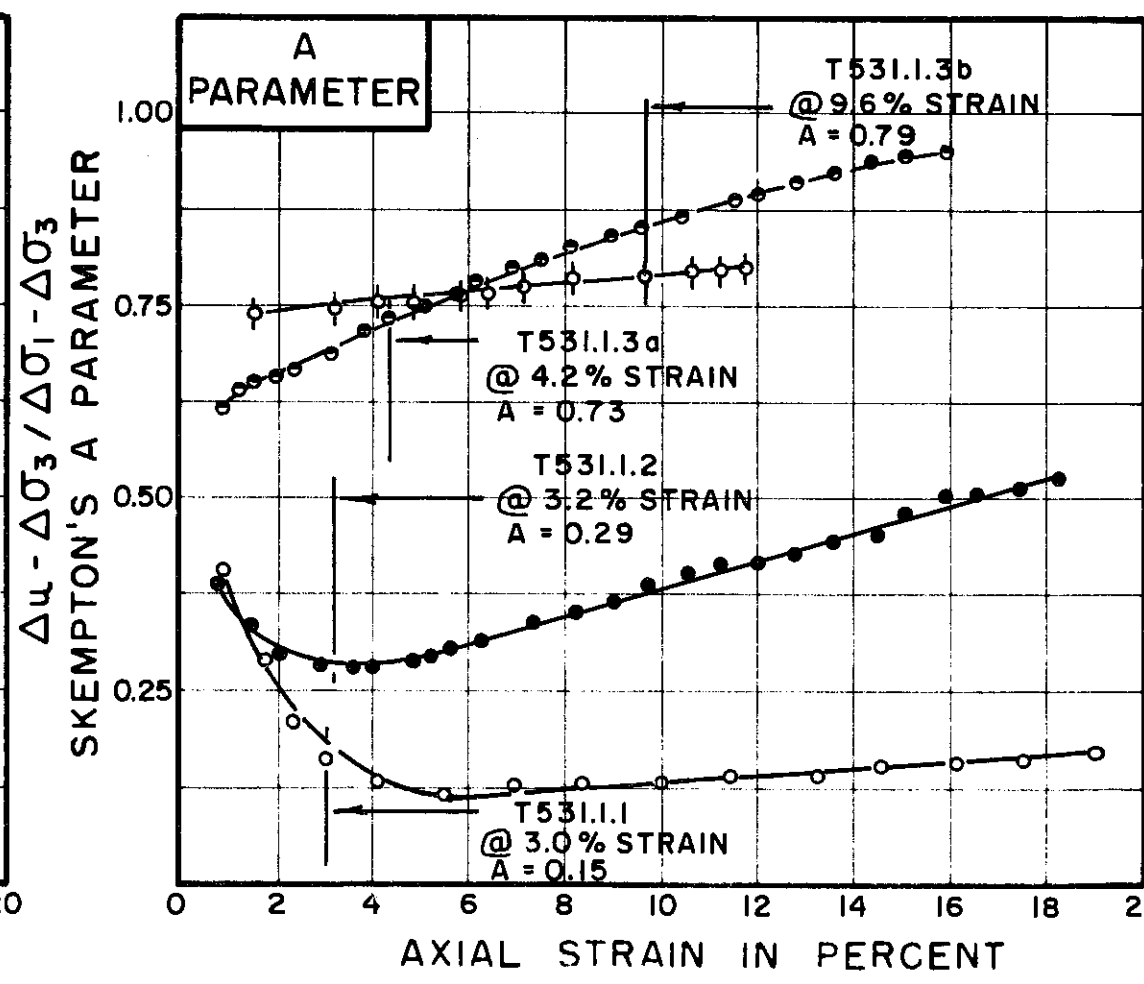
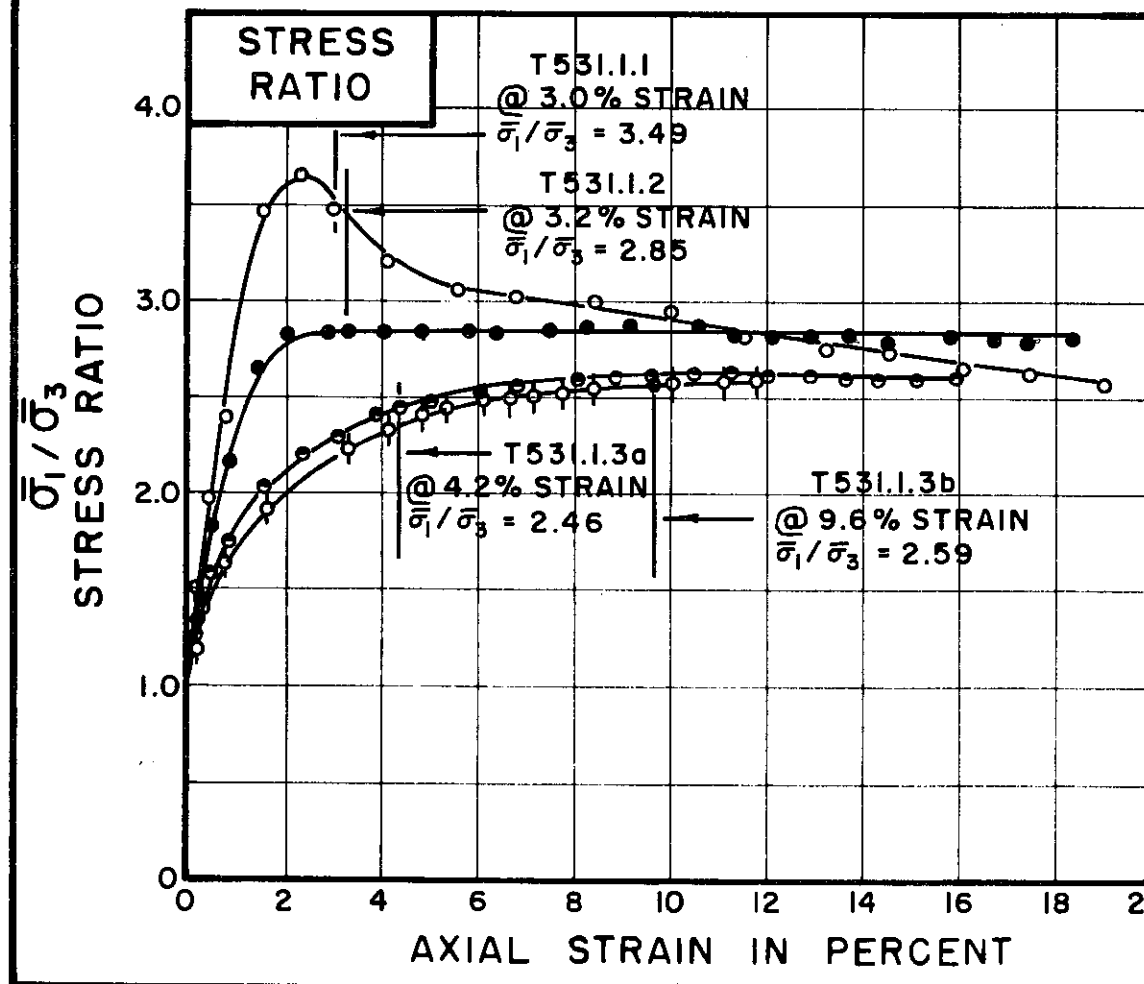
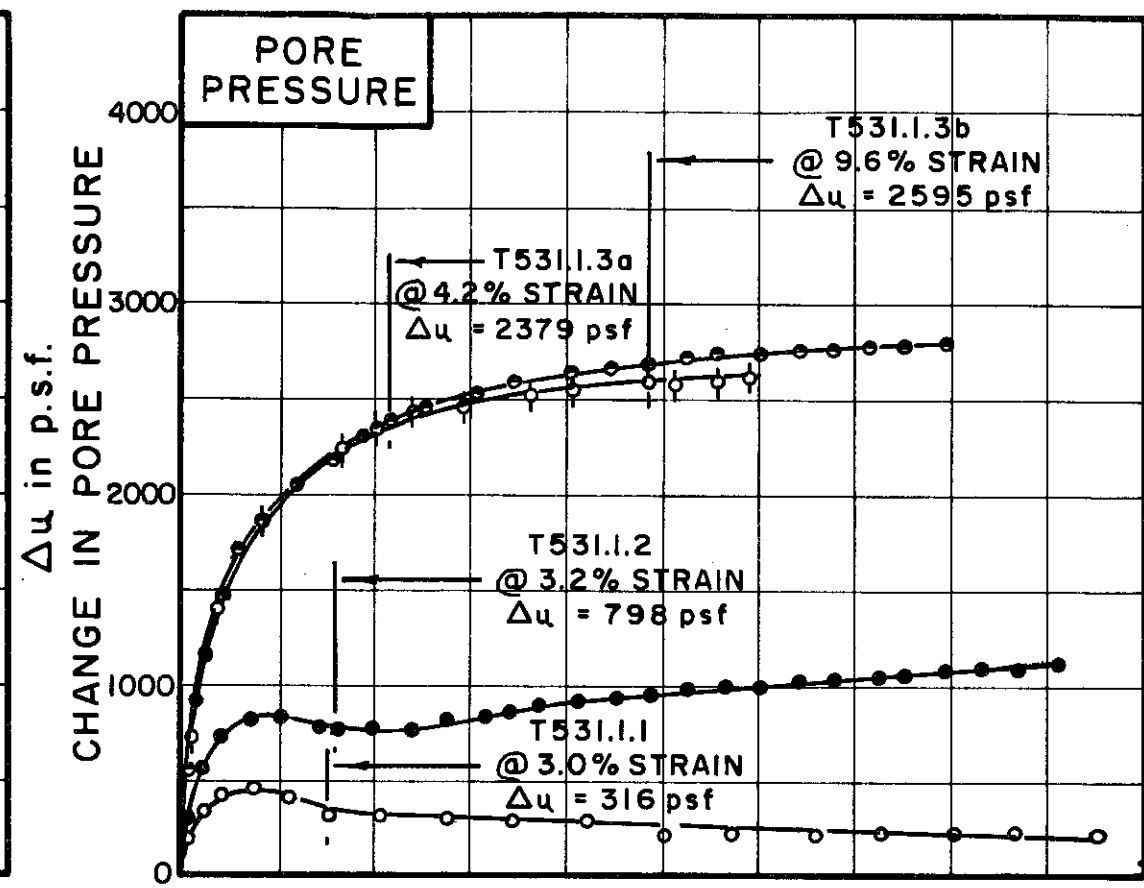
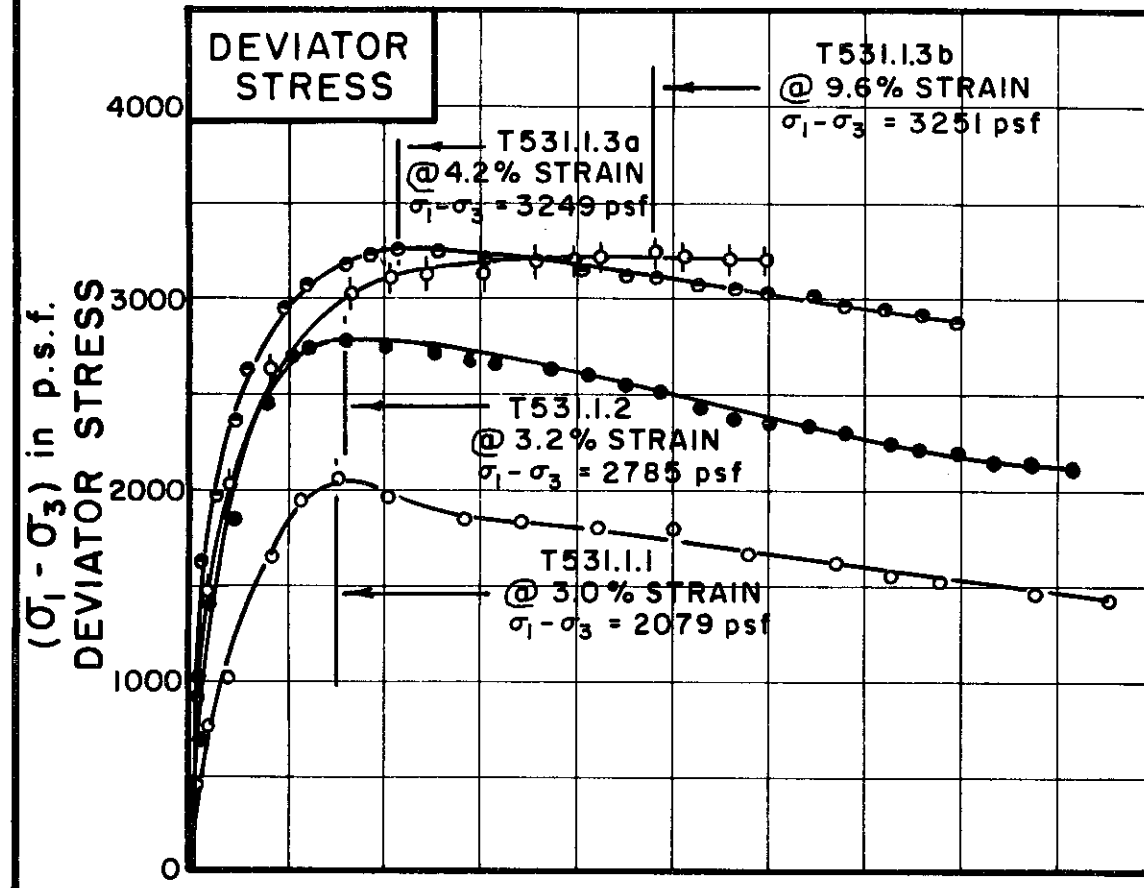
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-445

TEST NO. / SYMBOL	T531.1.1	T531.1.2	T531.1.3a
	○	●	◊



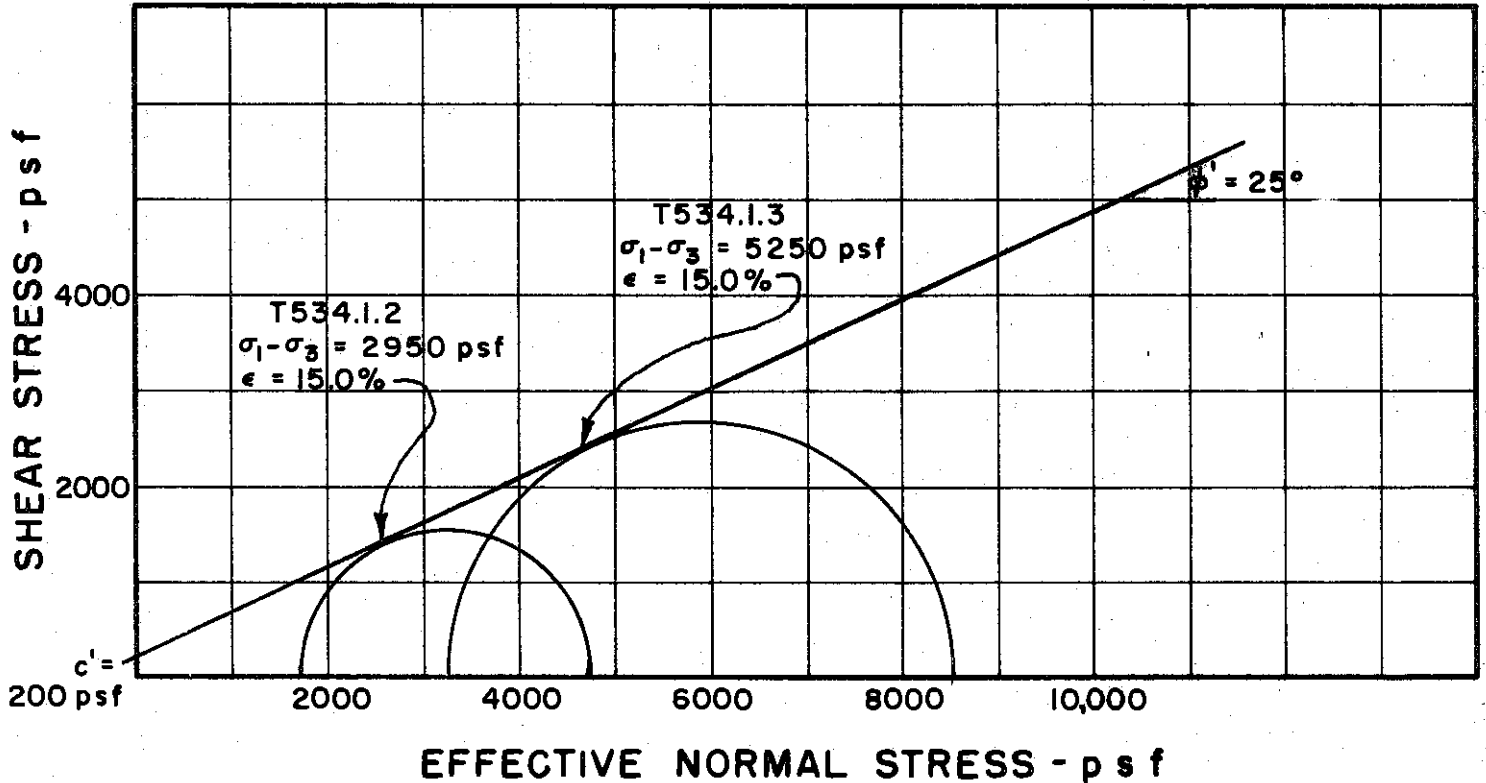
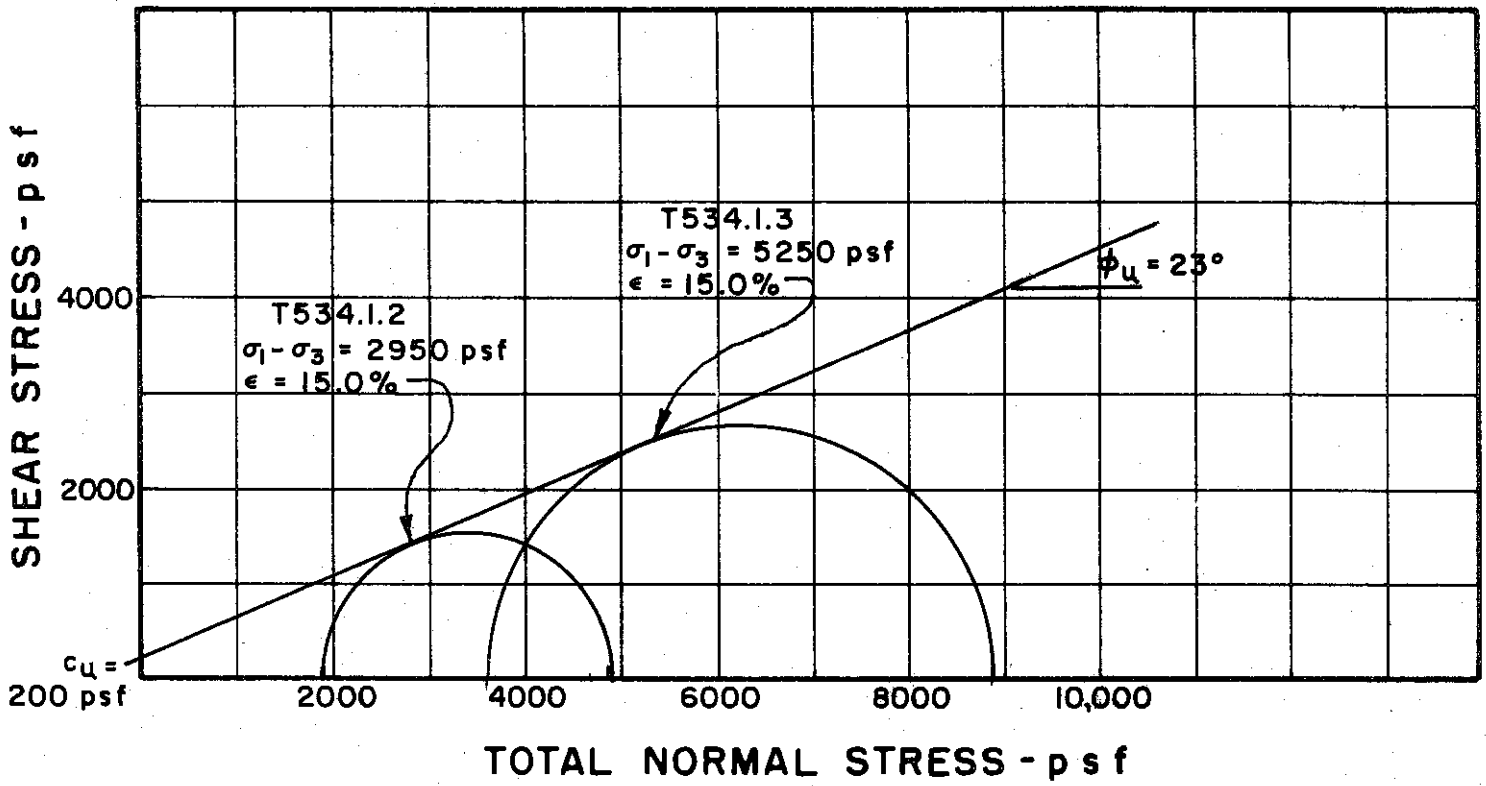
INITIAL CONDITIONS			T531.1.1	T531.1.2	T531.1.3a
WATER CONTENT	w <sub>0</sub>		36.3%	35.5%	35.1%
					37.3%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	86	87	85
					84
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.39	1.40	1.41
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.30	3.20	3.33
					3.28
FINAL CONDITIONS BEFORE SHEAR			T531.1.1	T531.1.2	T531.1.3a
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	10080	8640	11520
					14400
INITIAL EFFECTIVE STRESS	σ <sub>1</sub> σ <sub>3</sub>	p.s.f.	1152	2304	4608
					4637
VOLUMETRIC STRAIN	ε <sub>vol</sub>		0.9%	1.2%	4.3%
					5.1%
PORE PRESSURE RESPONSE			96%	95%	96%
					91%
FINAL CONDITIONS			T531.1.1	T531.1.2	T531.1.3a
WATER CONTENT	w <sub>f</sub>		35.5%	34.5%	30.9%
					34.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	0.24	.010	.010
			.007

BORING NO. 141  
 SAMPLE NO. 4  
 DEPTH 18.0' TO 20.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 45 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'

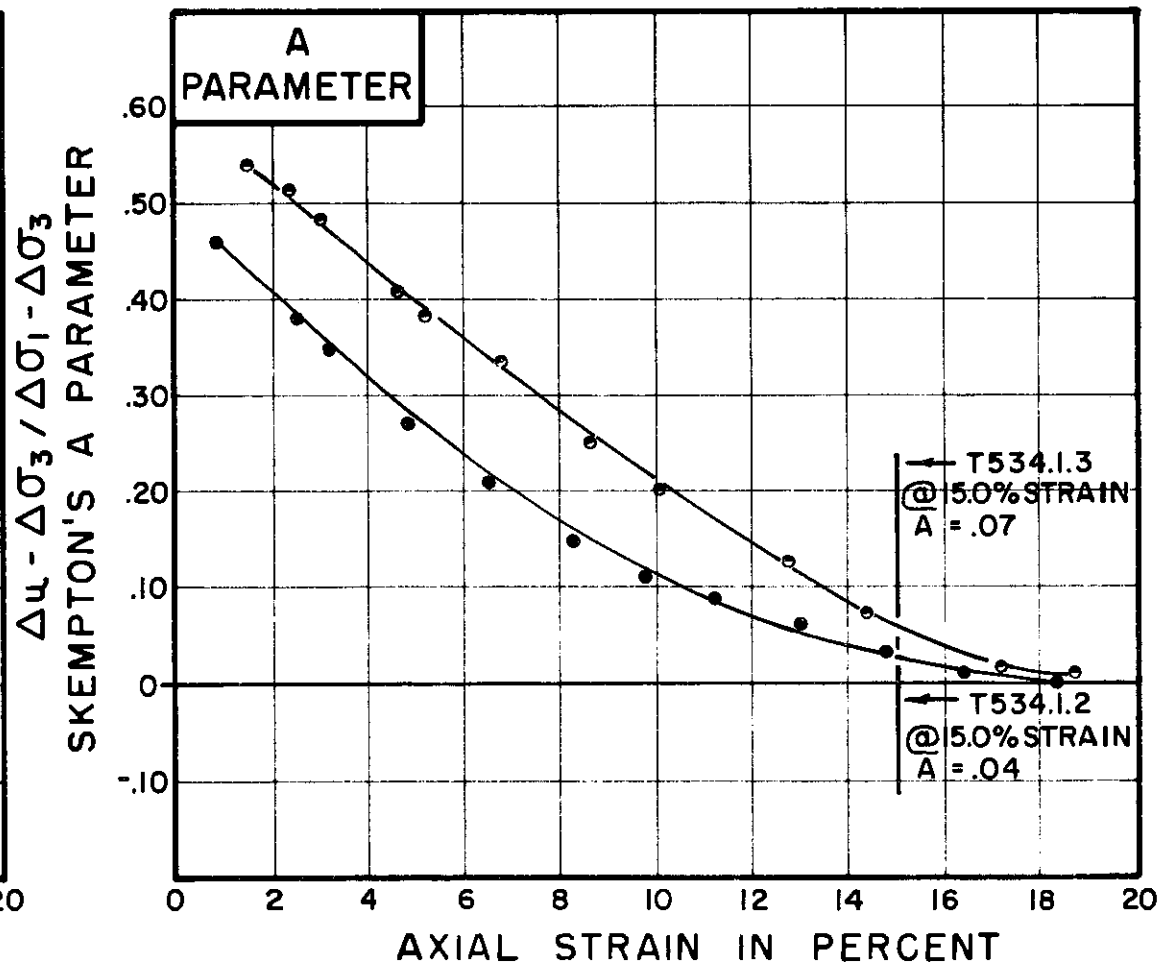
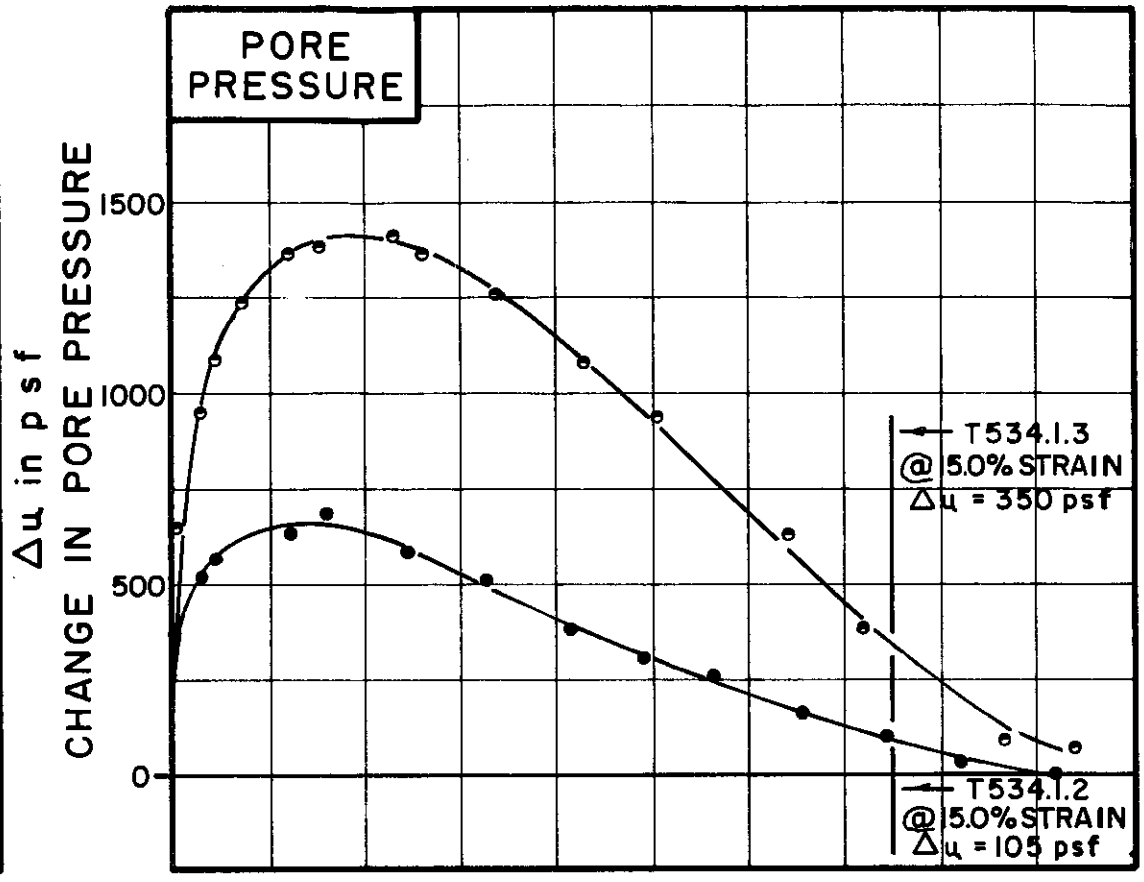
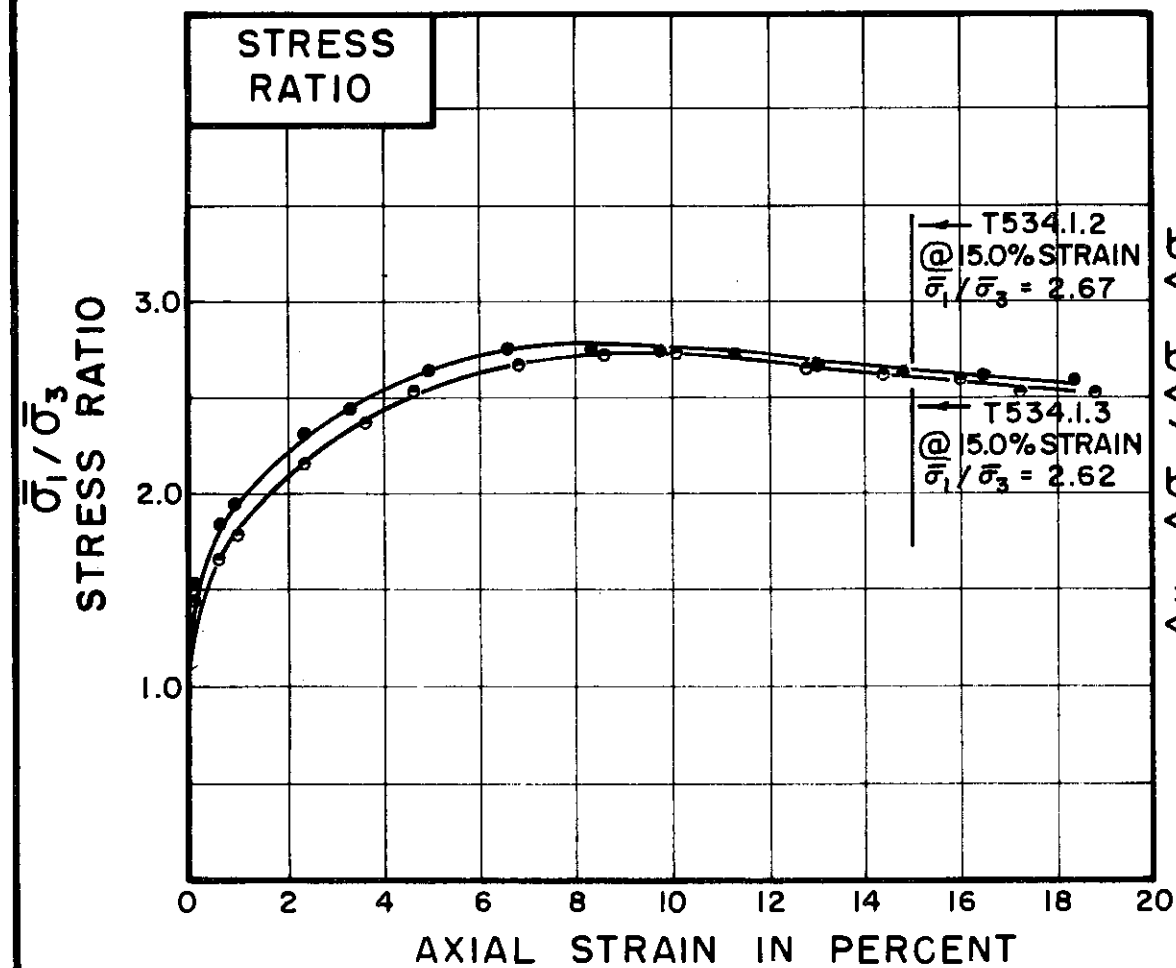
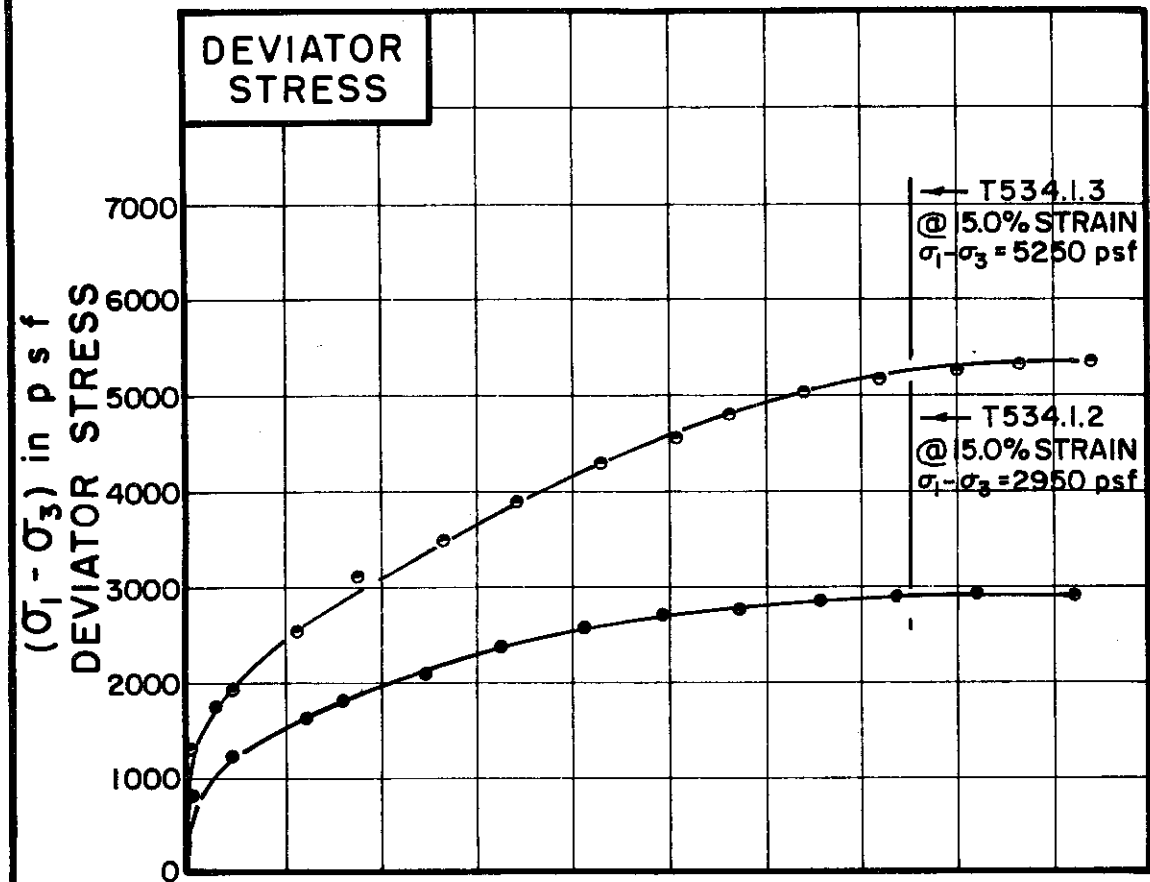
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255  
 C-447



TEST NO. / SYMBOL	T534.1.2	T534.1.3
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INITIAL CONDITIONS		T534.1.2	T534.1.3	UNIT
WATER CONTENT	$w_0$	15.3%	15.1%	%
DRY DENSITY	$\gamma_d$	105	105	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.385	1.37	in.
SAMPLE HEIGHT	$H_0$	3.05	3.31	in.
CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	20160	23155	psf
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	1872	3600	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.13%	0.13%	%
PORE PRESSURE RESPONSE		97%	94%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	29.0%	24.1%	%
SKETCH OF SAMPLE AT END OF TEST				

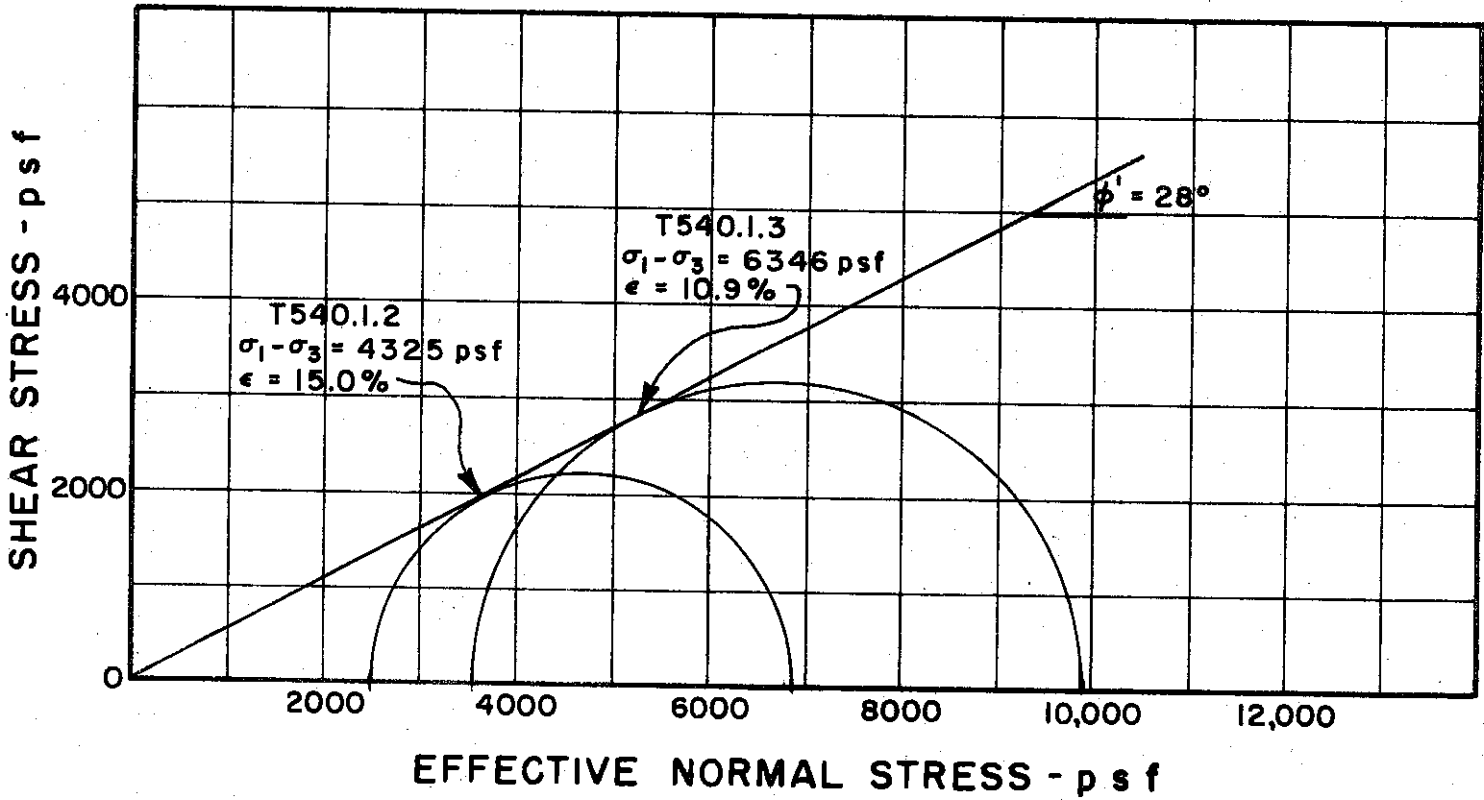
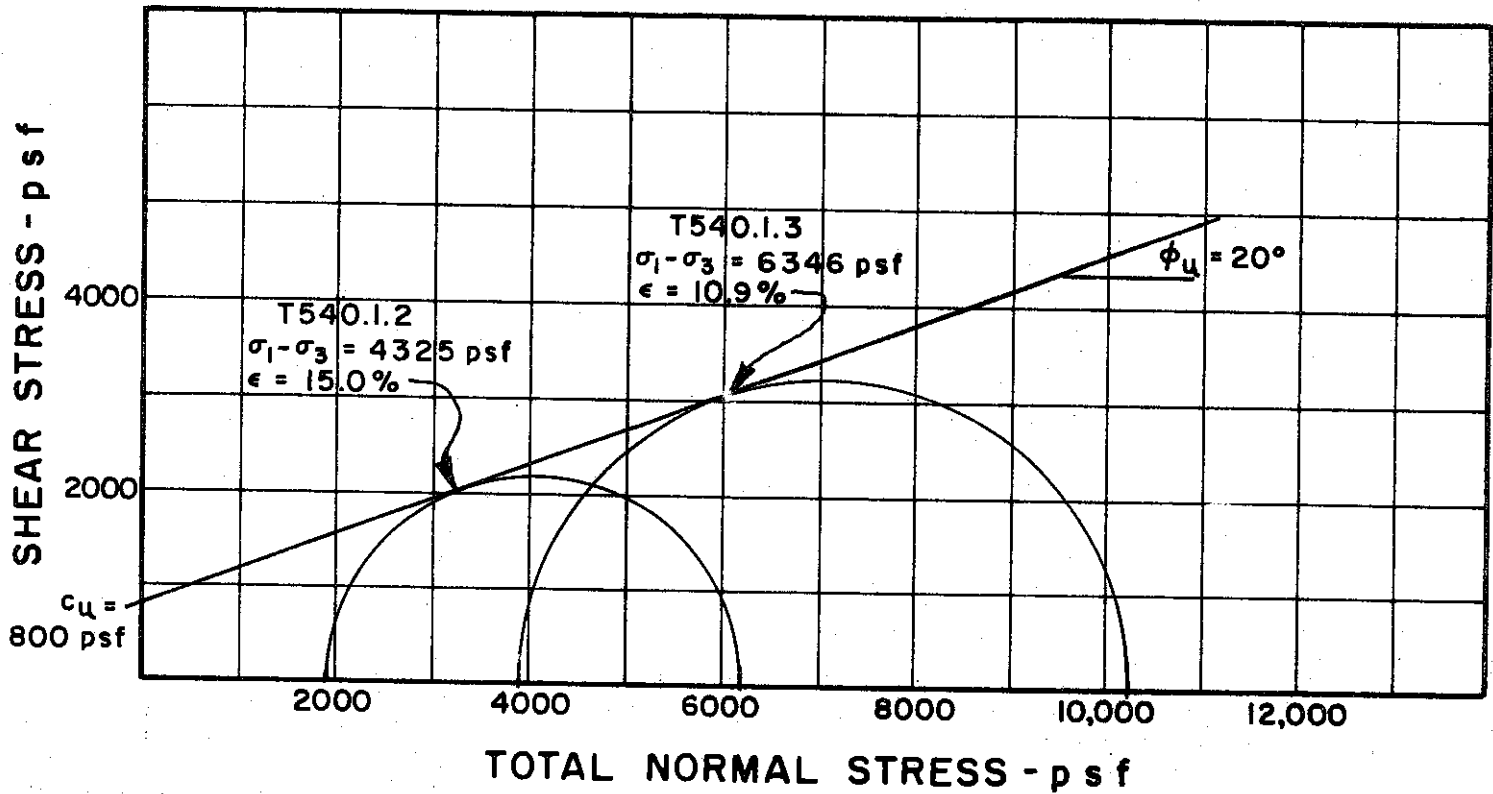
RATE OF STRAIN PERCENT / MINUTE	.0078	.0072
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BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 47 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 146

SAMPLE NO. ST 3

DEPTH 6.0' TO 7.8'

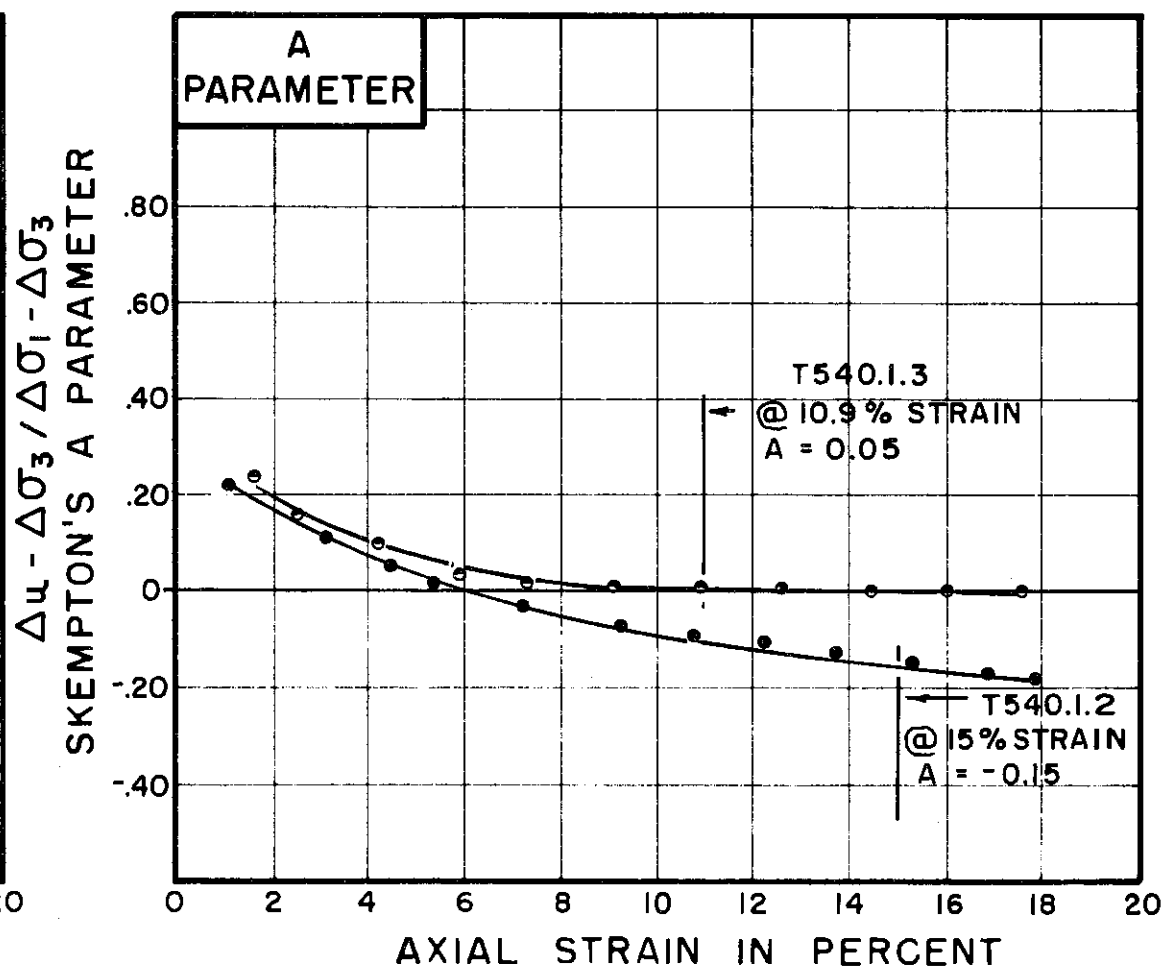
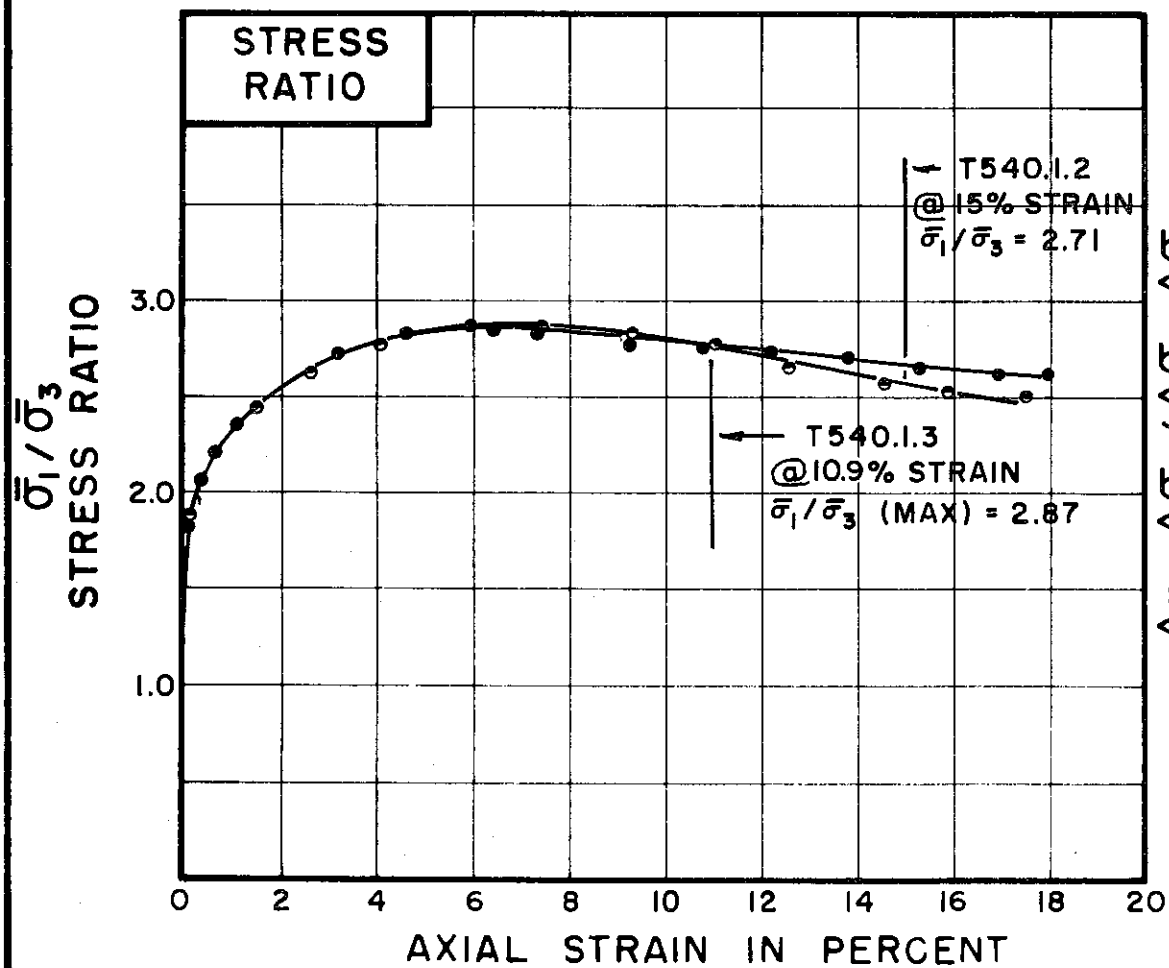
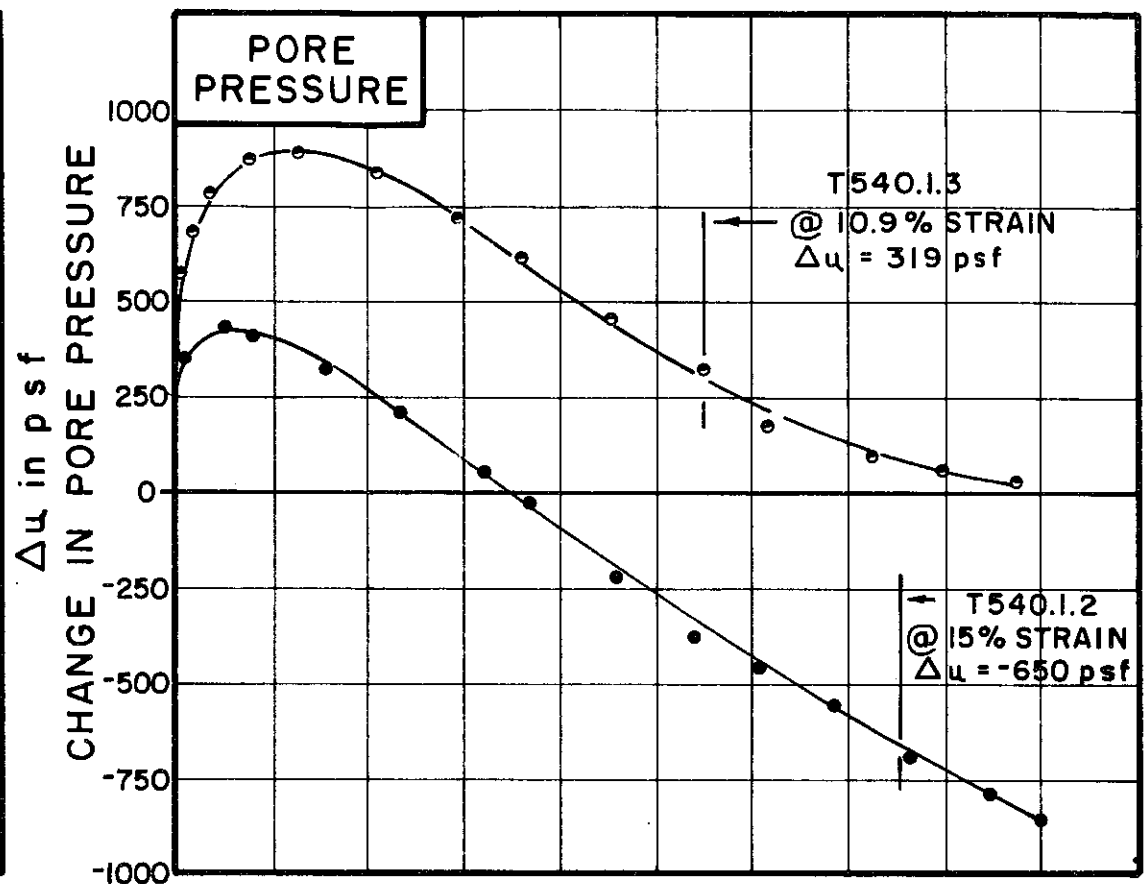
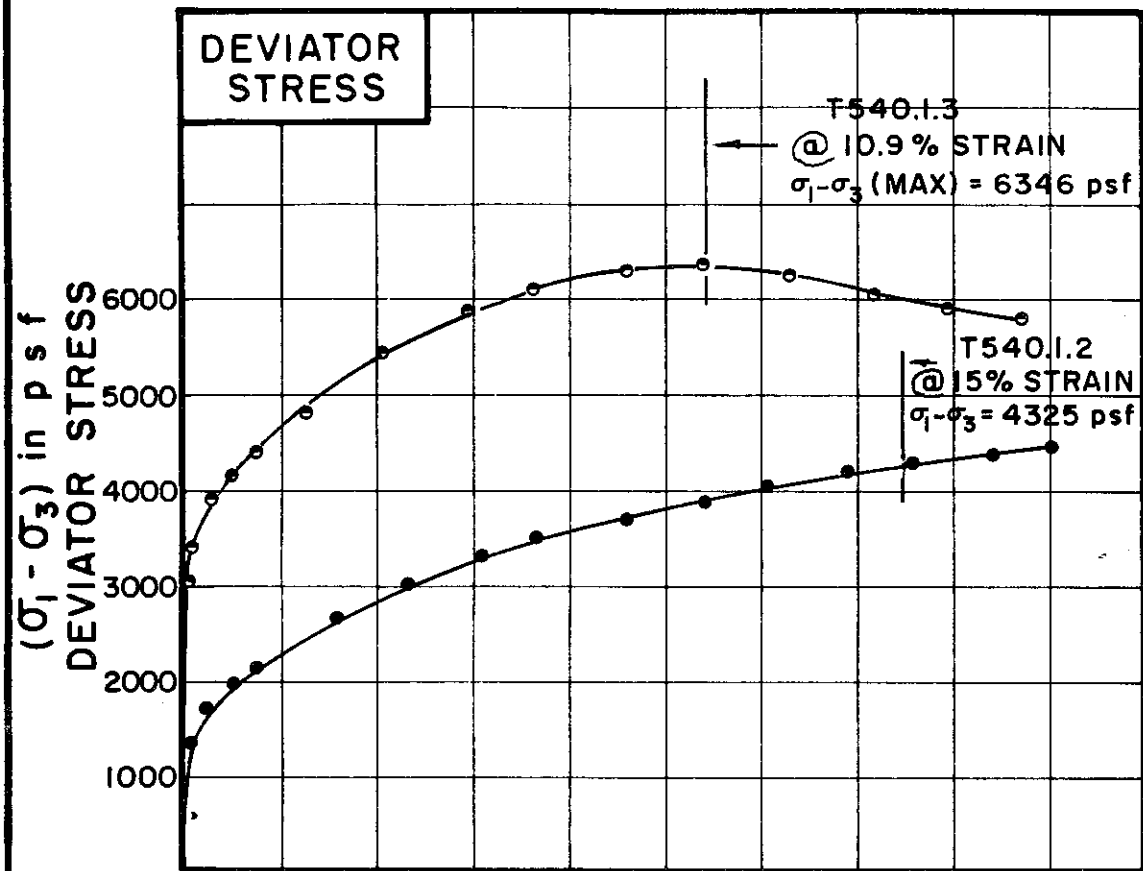
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T540.1.2	T540.1.3
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INITIAL CONDITIONS		T540.1.2	T540.1.3	UNIT
WATER CONTENT	$w_0$	14.4%	14.2%	%
DRY DENSITY	$\gamma_d$	108	108	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.35	1.37	in.
SAMPLE HEIGHT	$H_0$	3.27	3.02	in.
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	25344	25344	psf
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	1872	3888	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.82%	4.12%	%
PORE PRESSURE RESPONSE		97%	96%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	24.4%	23.2%	%
SKETCH OF SAMPLE AT END OF TEST				

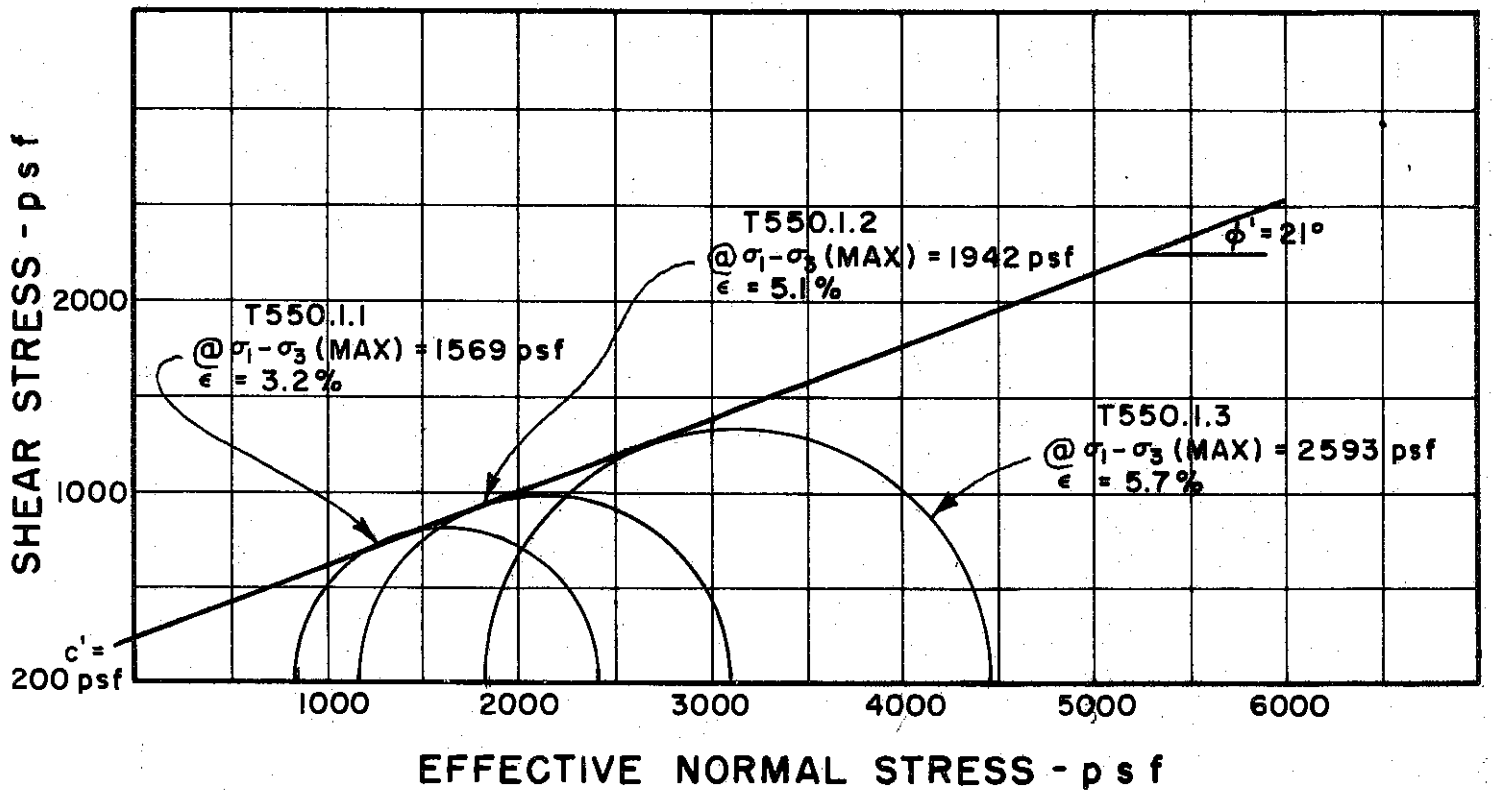
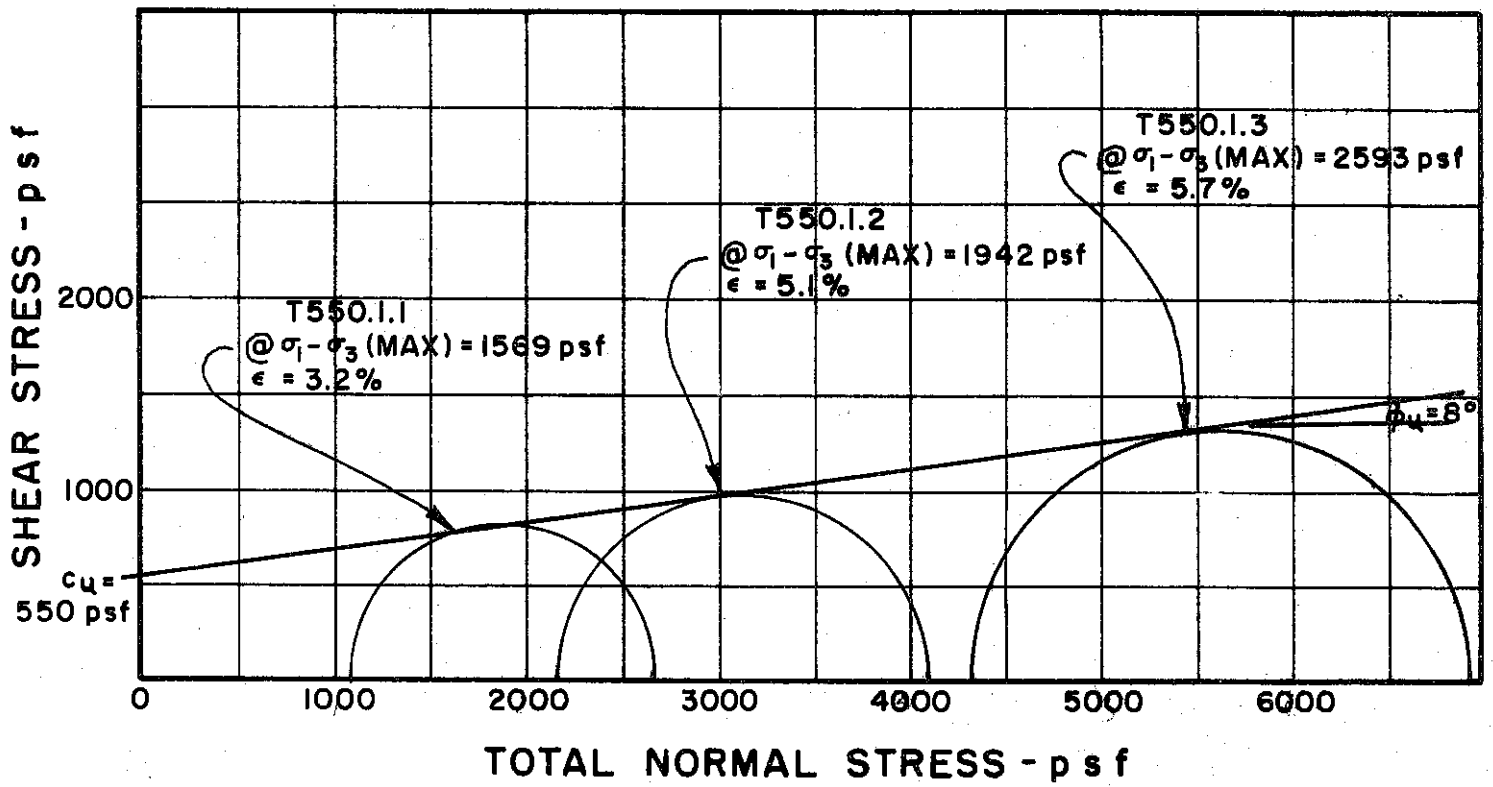
RATE OF STRAIN PERCENT/MINUTE	.0073	.0079
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BORING NO. 146  
 SAMPLE NO. ST 3  
 DEPTH 6.0' TO 7.8'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-450



BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

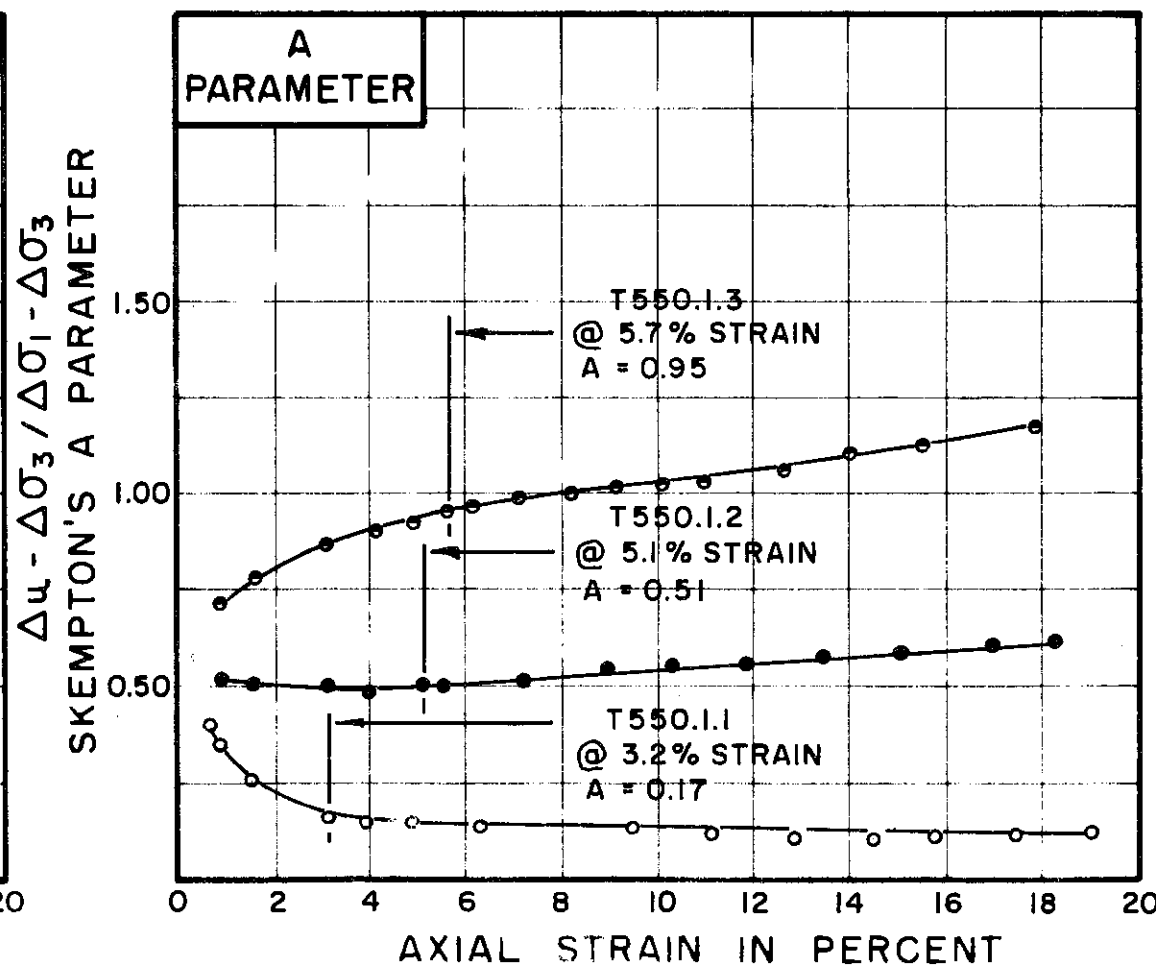
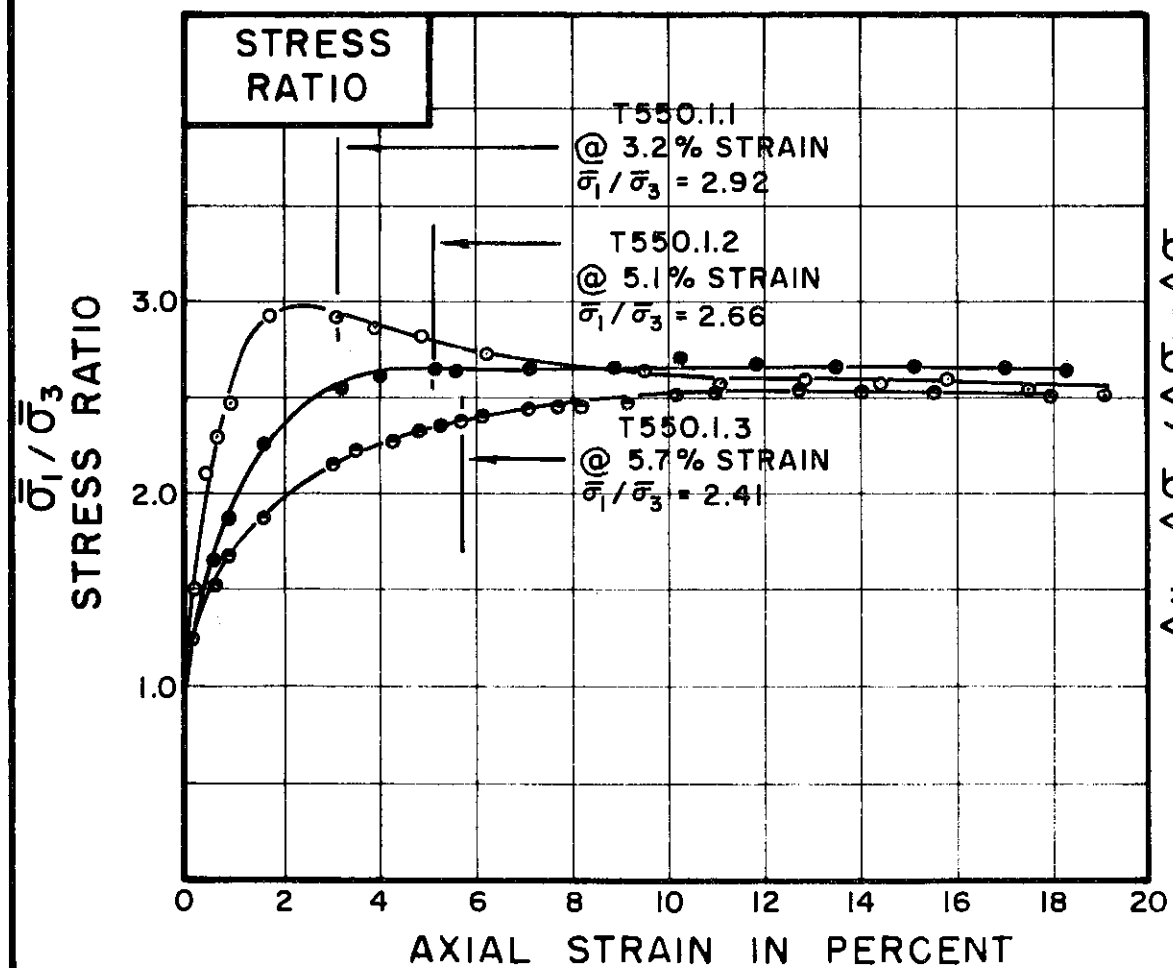
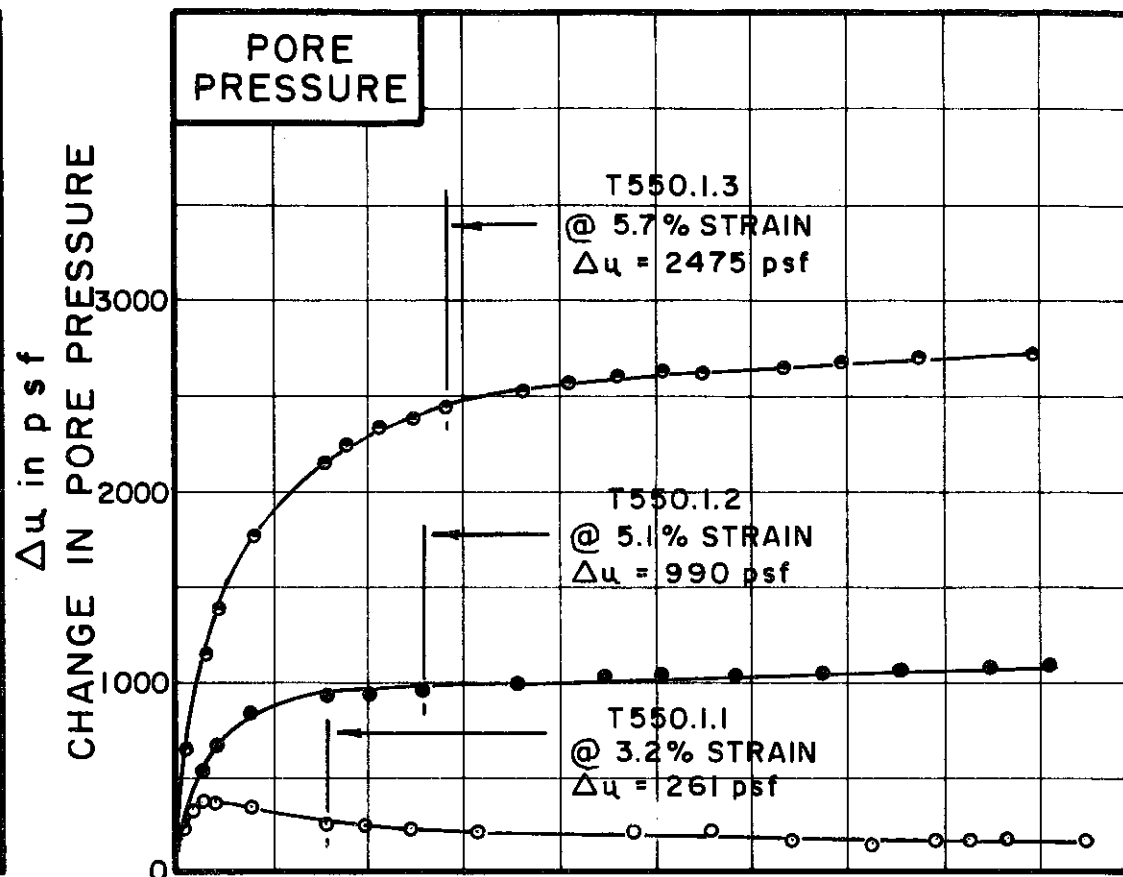
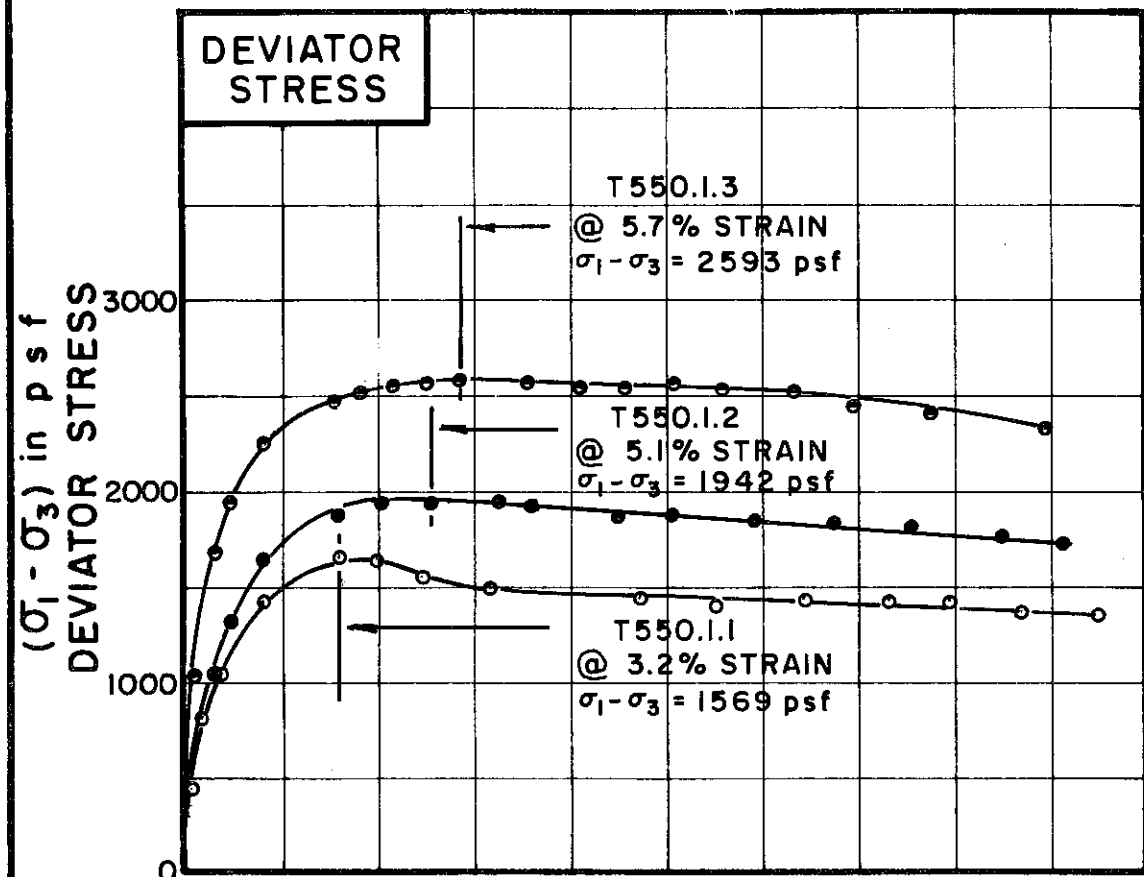
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T550.1.1	T550.1.2	T550.1.3
	o	•	•

INITIAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	$w_0$		37.5%	33.5%	37.1%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	87	83
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.16	3.18	3.19
FINAL CONDITIONS BEFORE SHEAR			T550.1.1	T550.1.2	T550.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	10080	15840
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	1080	2160	4320
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.4%	4.2%
PORE PRESSURE RESPONSE			95%	95%	96%
FINAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	$w_f$		37.4%	32.2%	33.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.008
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BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

SOIL DESCRIPTION SILTY CLAY (CL)

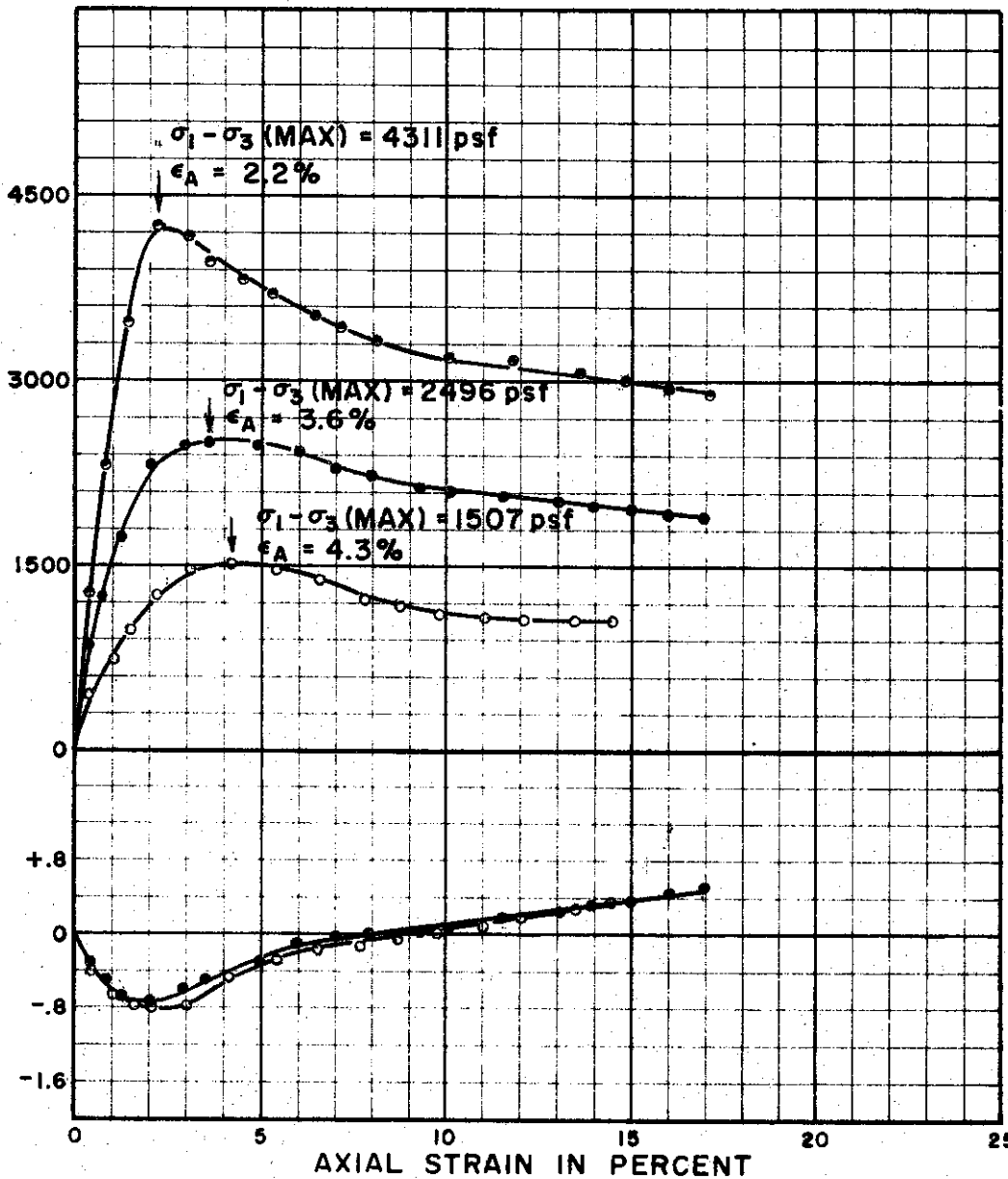
LIQUID LIMIT 46 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

DEVIATOR STRESS,  $\sigma_1 - \sigma_3$  IN psf

VOLUMETRIC STRAIN,  $\Delta V/V_0$  IN PERCENT



SKETCHES AT FAILURE



TEST NO. 253.23



TEST NO. 253.22



TEST NO. 253.21

TEST NO./SYMBOL		253.21	253.22	253.23
INITIAL CONDITIONS	INITIAL WATER CONTENT %	$w_0$ 23.0	23.3	24.2
	INITIAL UNIT WEIGHT pcf	$\gamma_d$ 107	105	103
	SAMPLE HEIGHT & DIAMETER in	$D_0$ 1.39	1.39	1.41
		$H_0$ 3.51	3.46	3.43
CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS psf	$\sigma_1 = \sigma_3$ 576	1152	2304
	FINAL BACK PRESSURE psf	$u_0$ 7776	8352	7776
	VOLUMETRIC STRAIN %	$\epsilon_{vol}$ .94	1.28	2.74
	PORE PRESSURE RESPONSE %	99	97	96
	FINAL CONDITIONS	FINAL WATER CONTENT %	$w_f$ 26.8	26.1
	FINAL UNIT WEIGHT pcf	$\gamma_d$ 107	106	—
RATE OF STRAIN PERCENT PER MINUTE		.002	.002	.002

BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 23

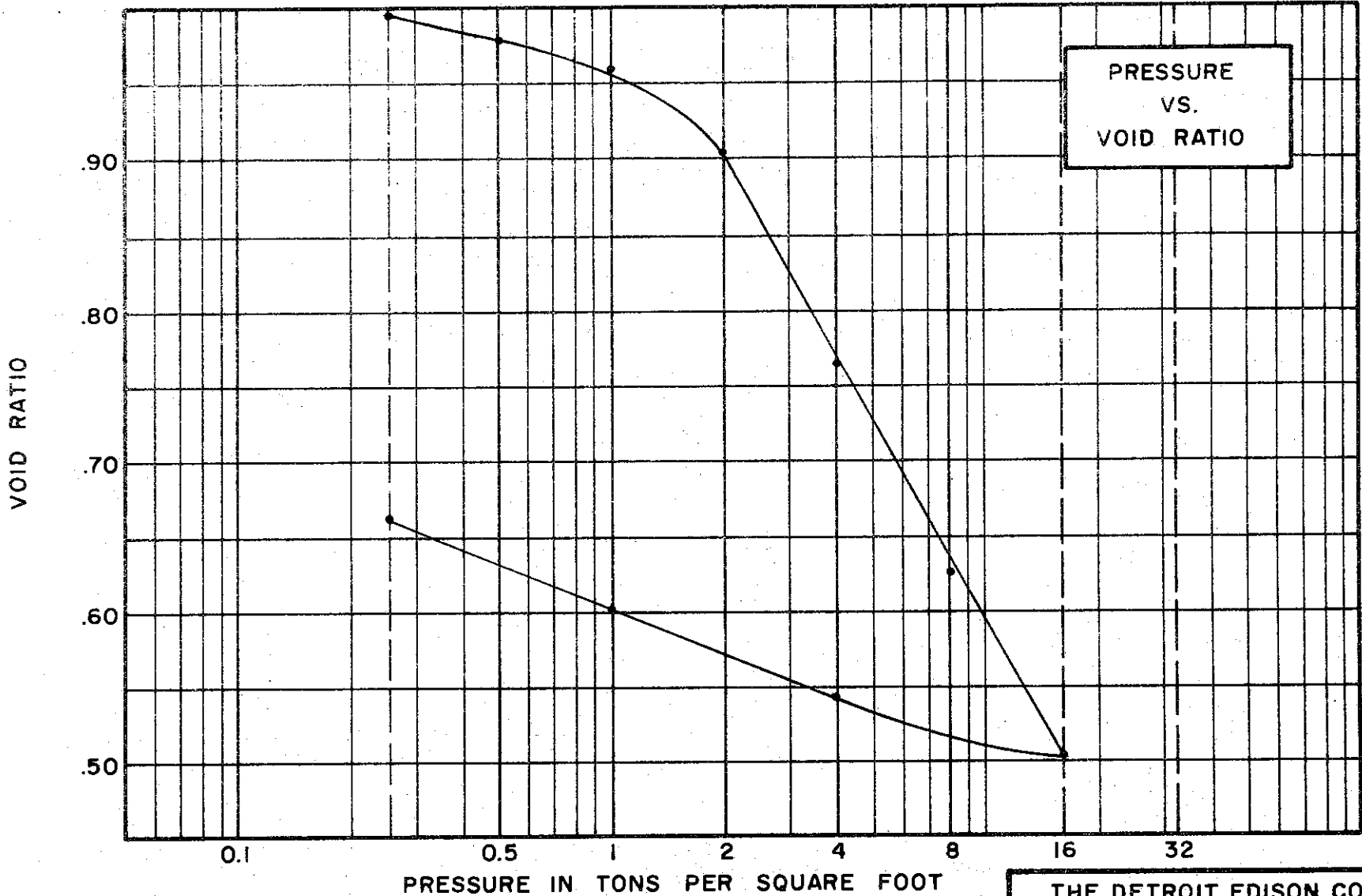
### CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255







**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.6% FINAL 27.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

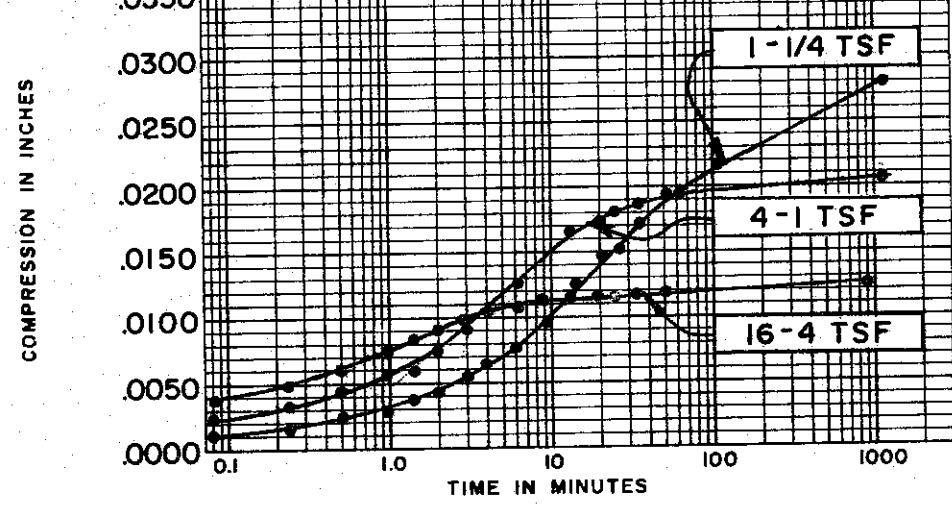
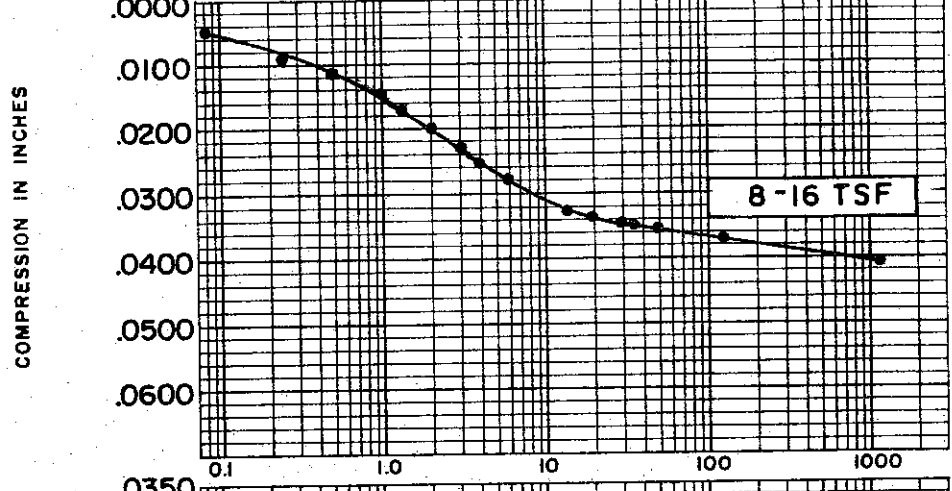
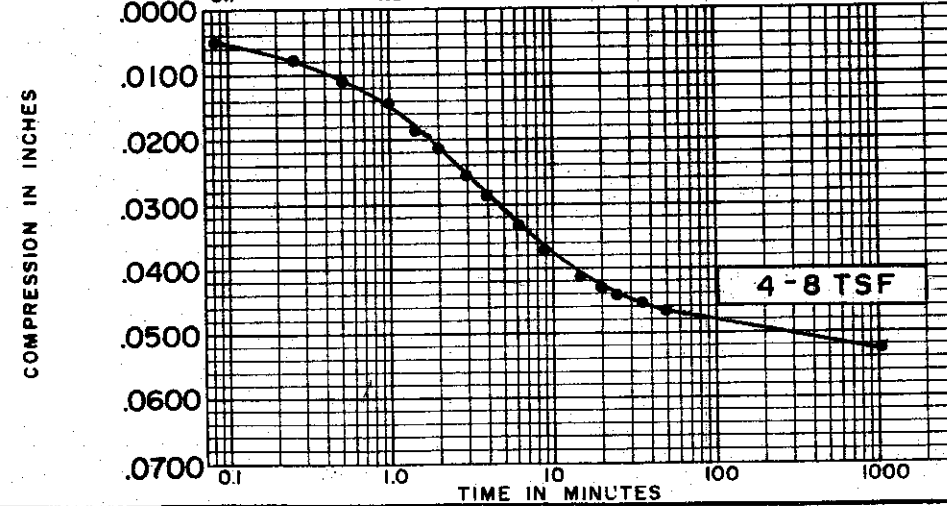
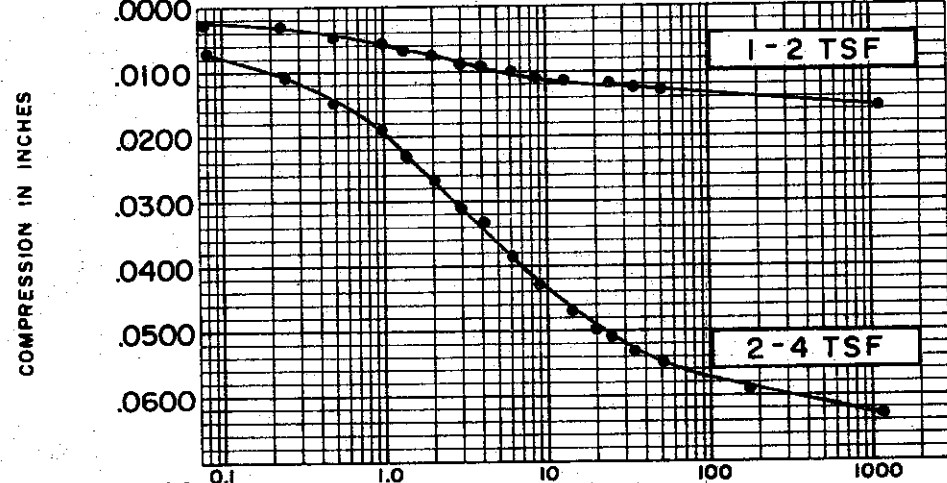
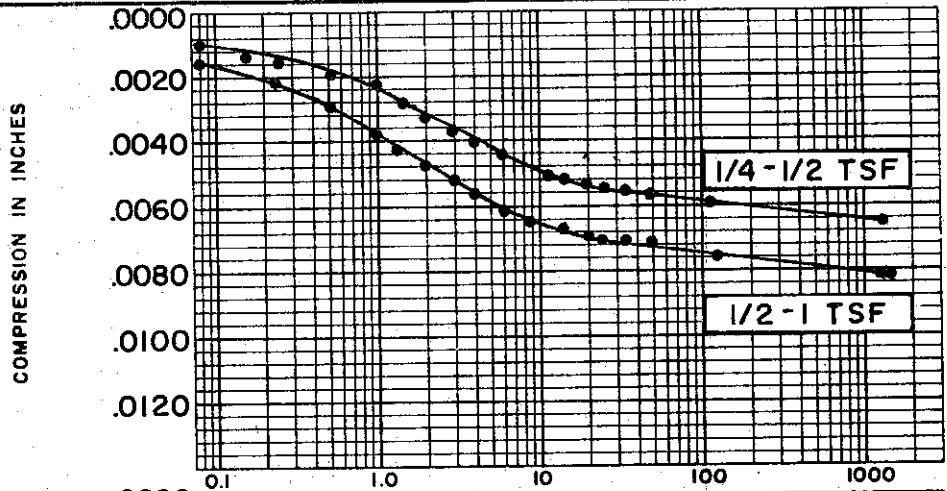
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C306.1  
 SAMPLE NO. 10 DATE APRIL 74  
 DEPTH 34.0' TO 34.3'

C-455



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.6%  
 FINAL WATER CONTENT 27.9%

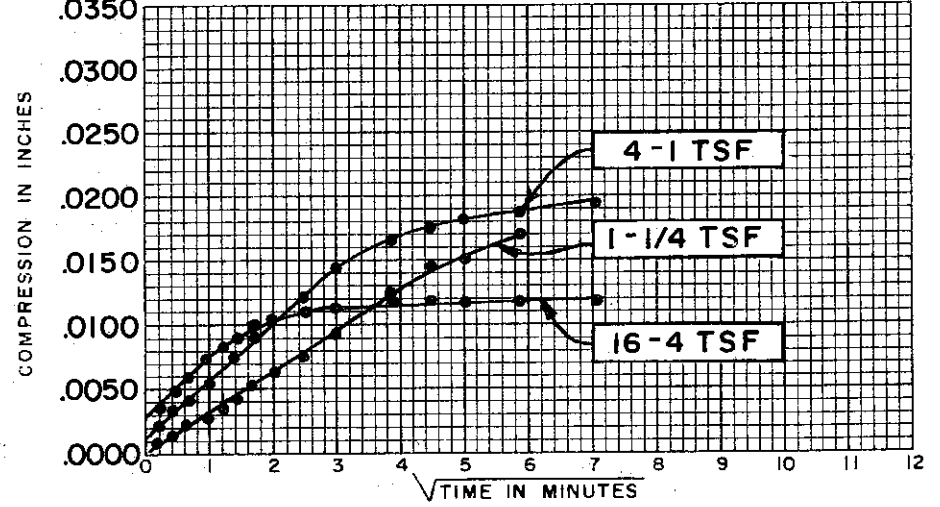
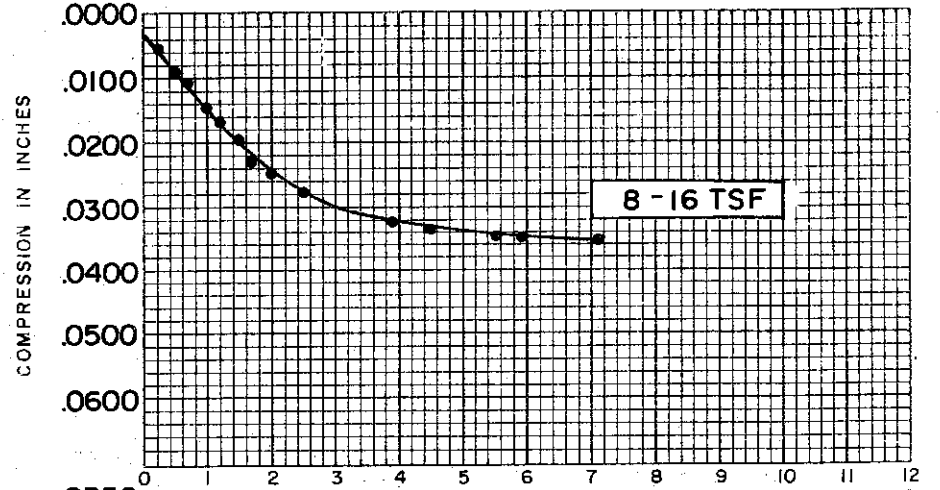
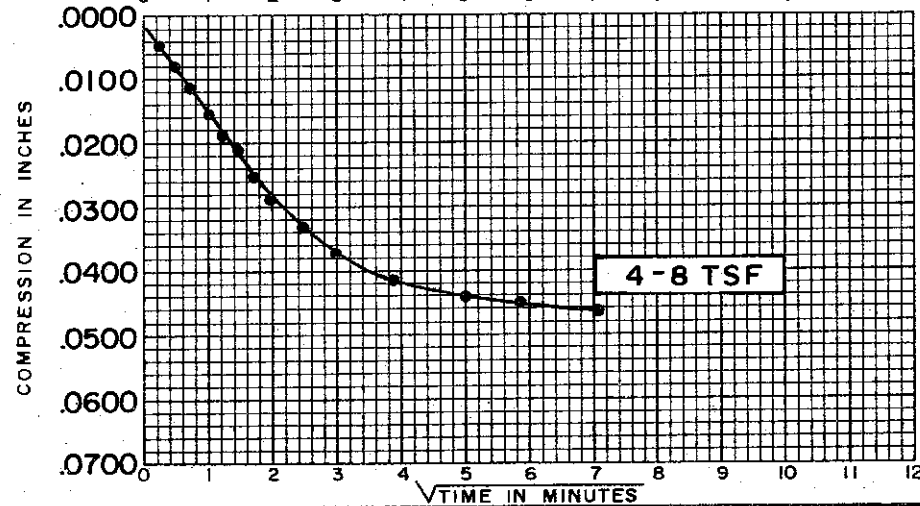
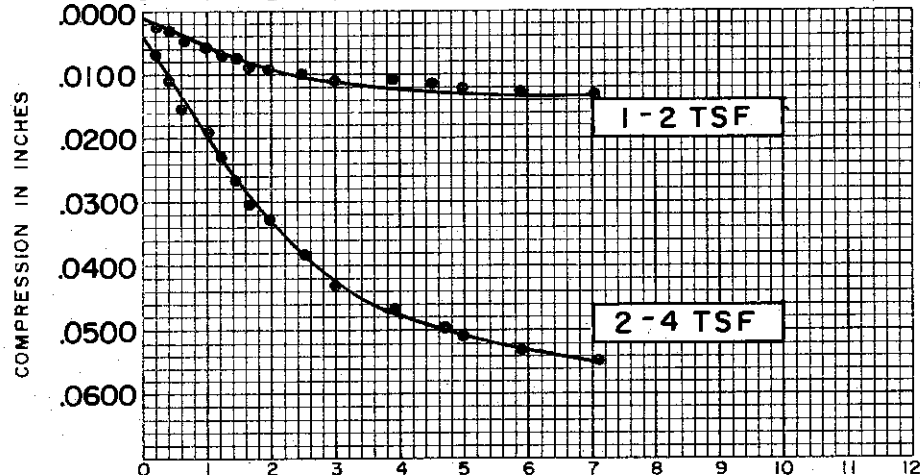
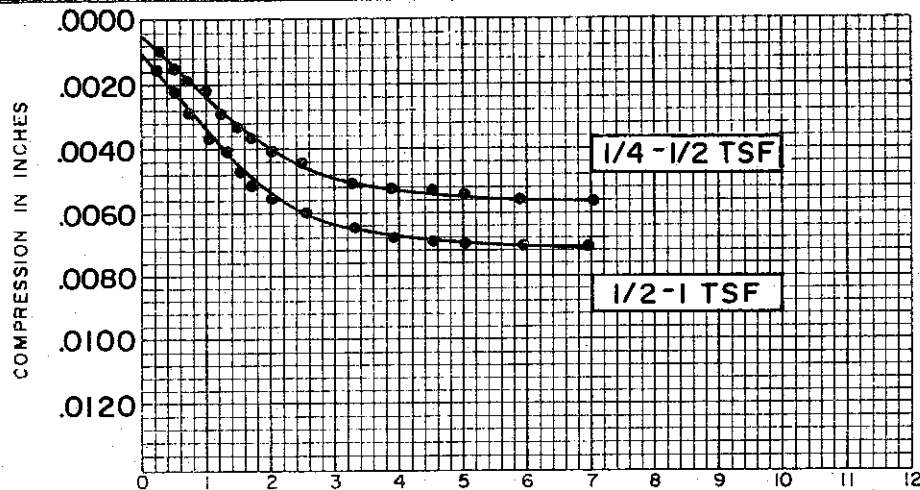
BORING NO. 27  
 SAMPLE NO. 10  
 DEPTH 34.0' TO 34.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

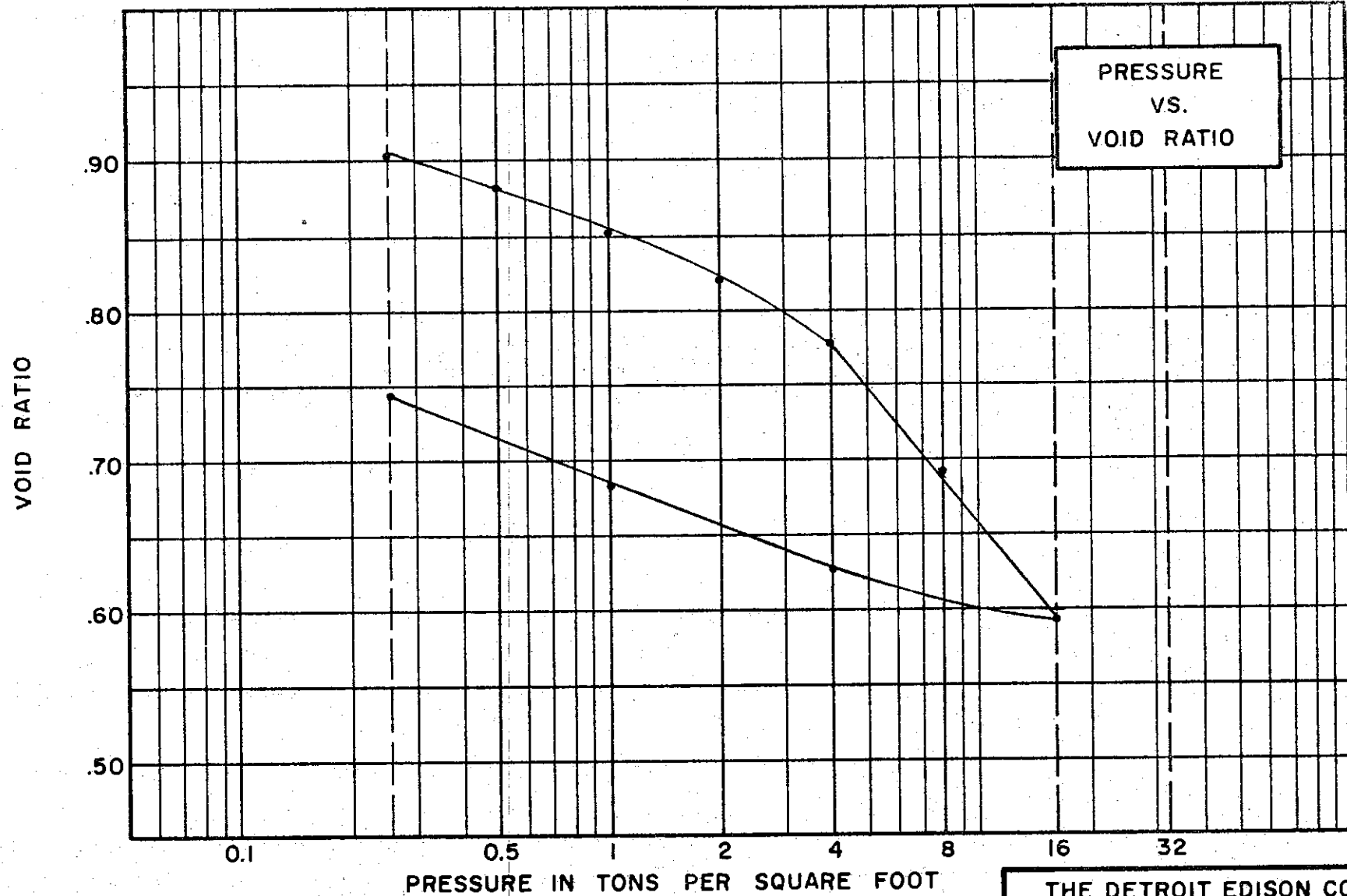


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.6%
FINAL WATER CONTENT	27.9%
BORING NO.	27
SAMPLE NO.	10
DEPTH	34.0' TO 34.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.016

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-457



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 33% FINAL 30%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 25 %

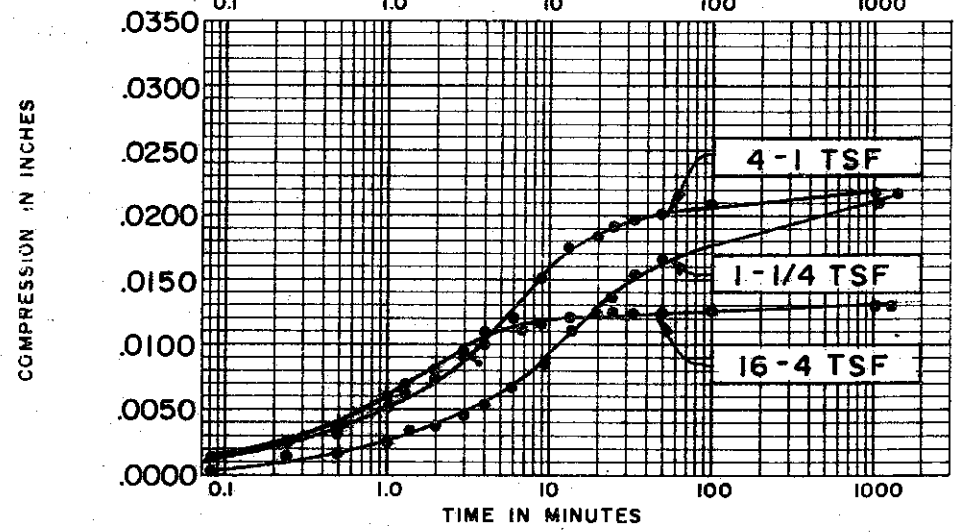
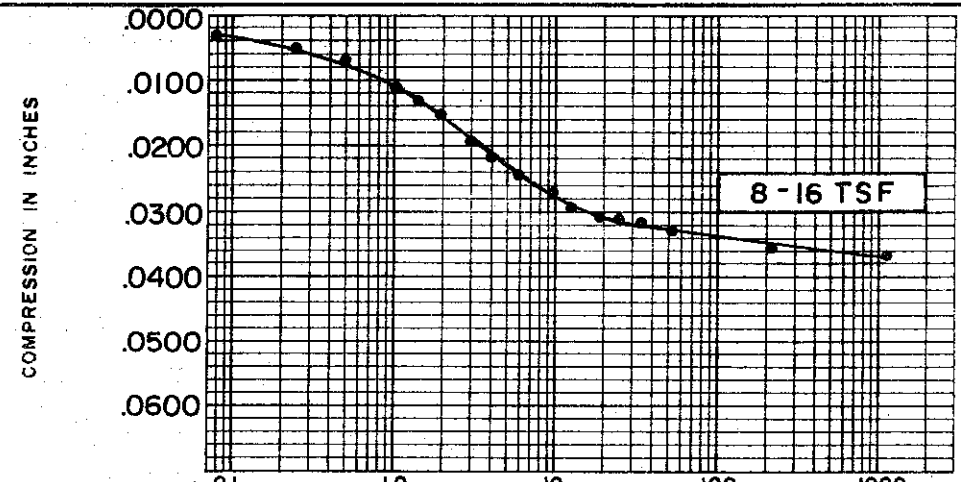
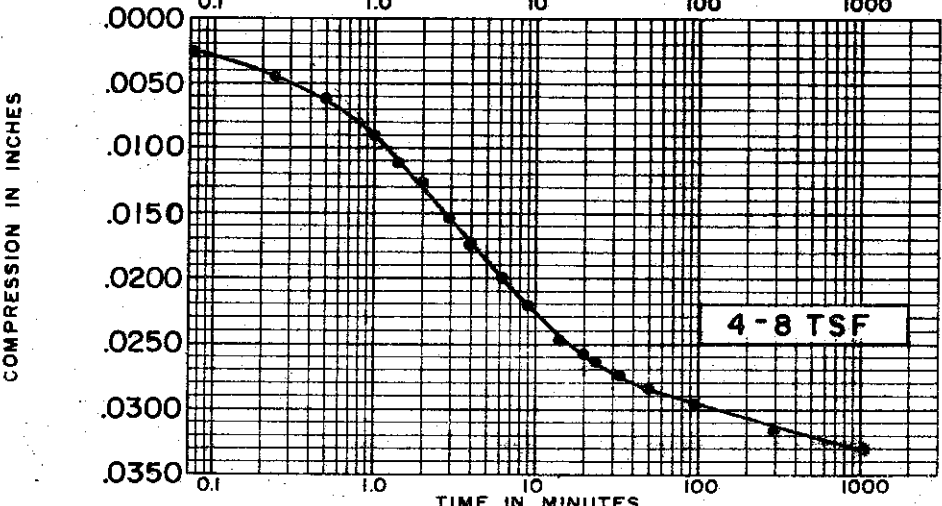
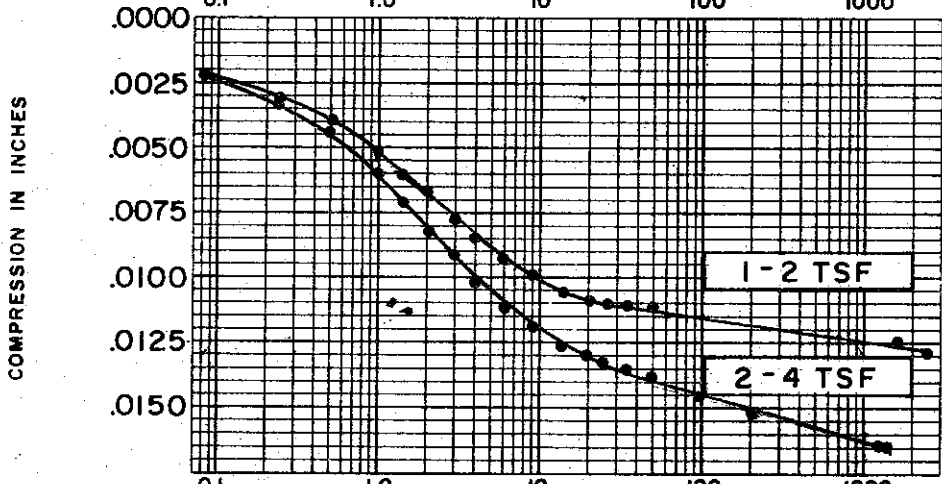
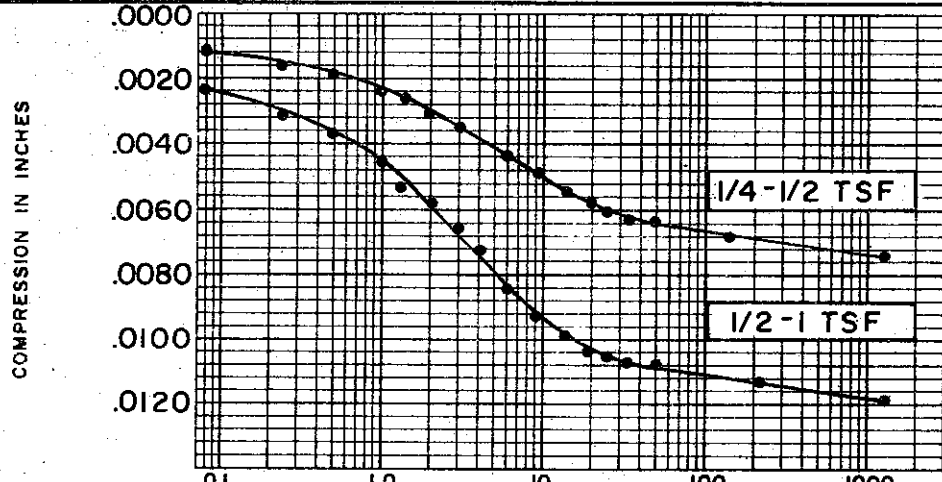
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C313.1  
 SAMPLE NO. 24 DATE APRIL 74  
 DEPTH 104.2' TO 104.5'

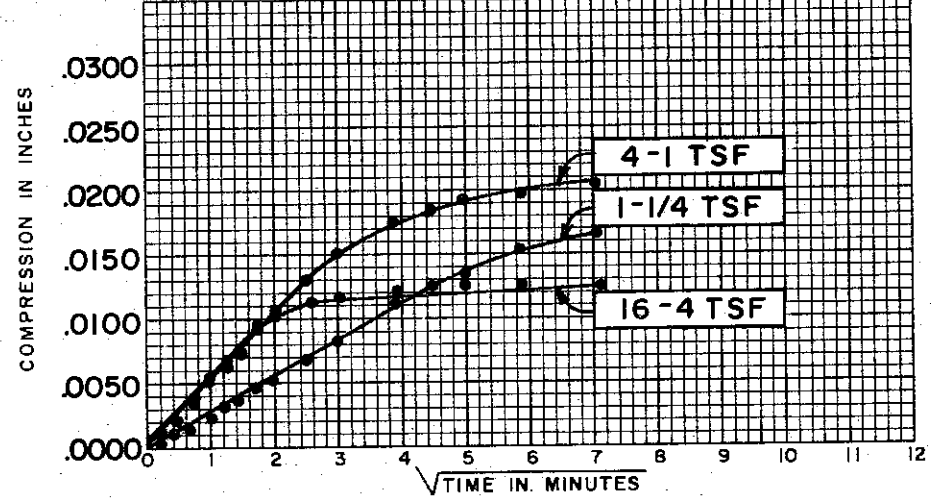
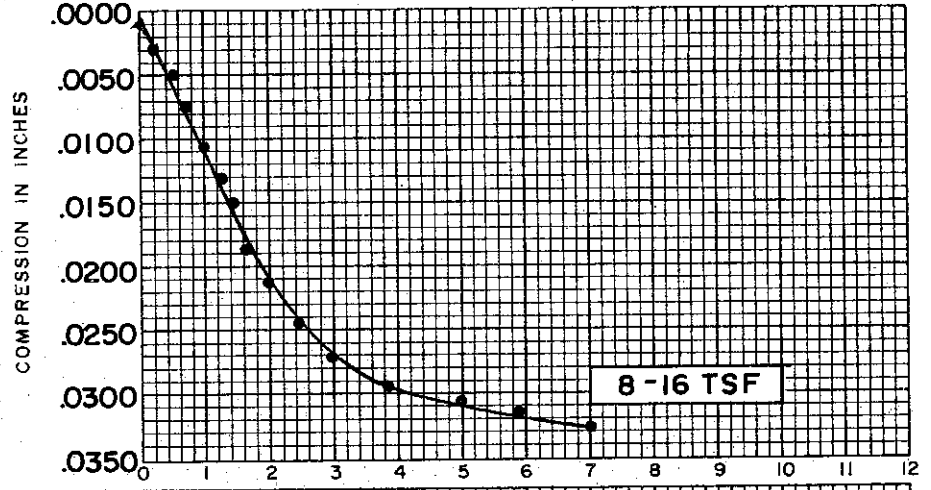
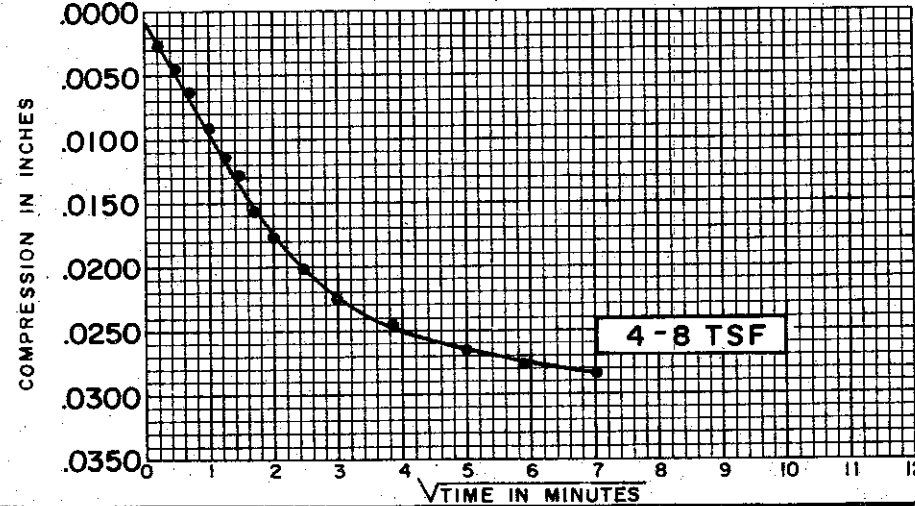
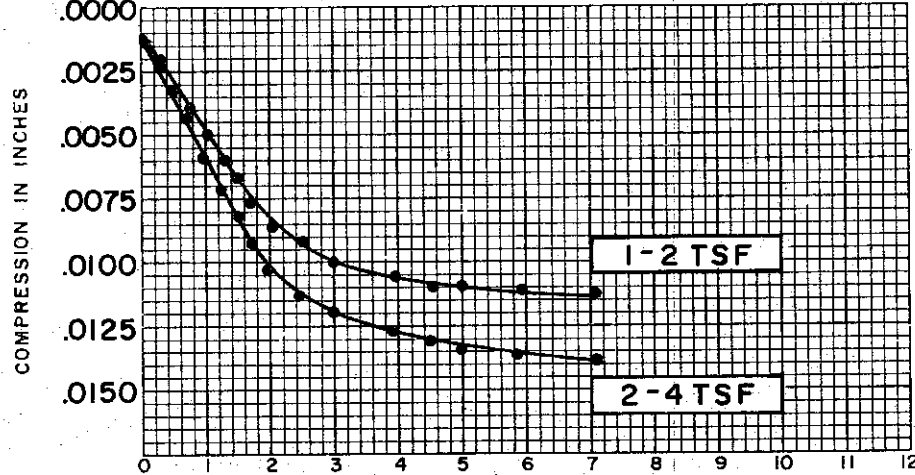
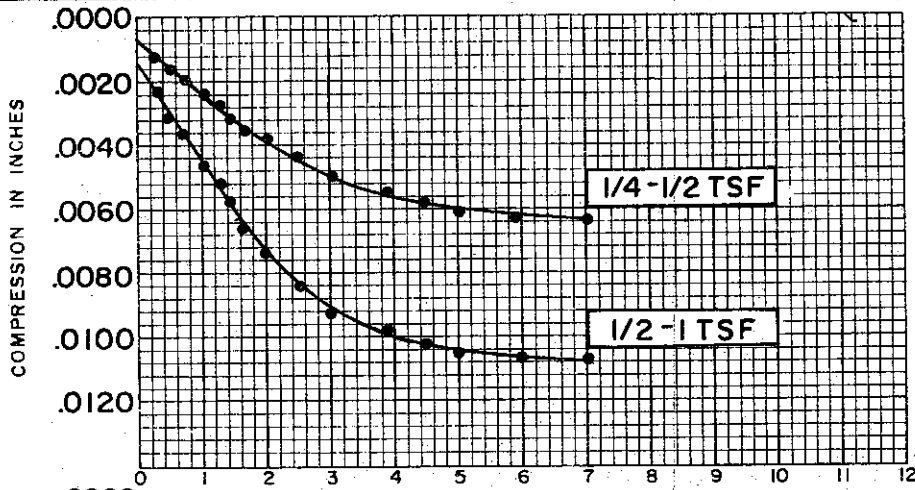


SOIL PROPERTIES		BORING NO. <u>27</u>
SOIL DESCRIPTION:	<u>SILTY CLAY; SANDY (CL)</u>	SAMPLE NO. <u>24</u>
SPECIFIC GRAVITY	<u>2.74</u>	DEPTH <u>104.2' TO 104.5'</u>
INITIAL WATER CONTENT	<u>33.9%</u>	
FINAL WATER CONTENT	<u>30.0%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.910</u>

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE:  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

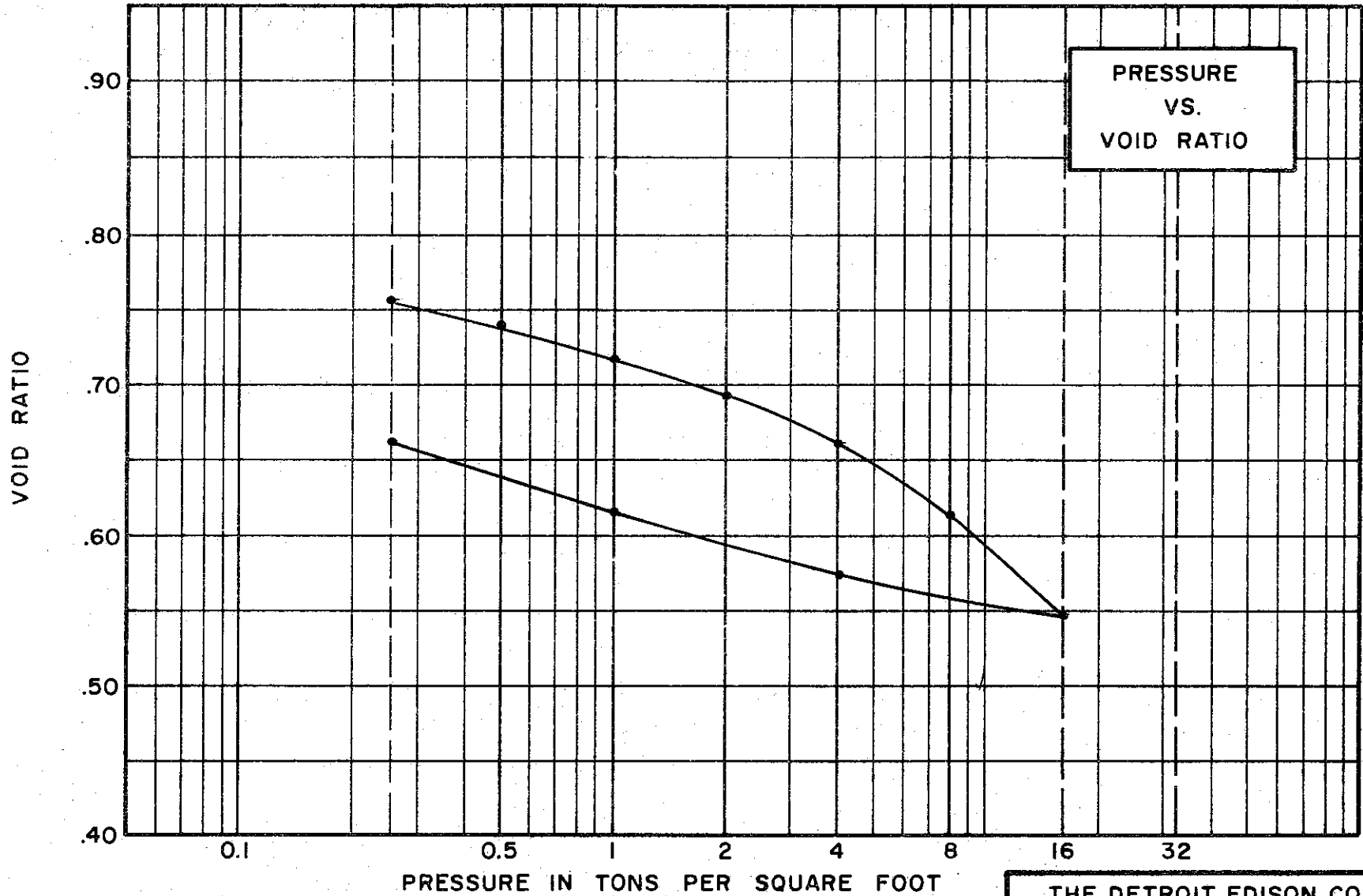
C-459



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY	2.74
INITIAL WATER CONTENT	33.9%
FINAL WATER CONTENT	30.0%
BORING NO.	27
SAMPLE NO.	24
DEPTH	104.2' TO 104.5'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.910

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 29.0% FINAL 28.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

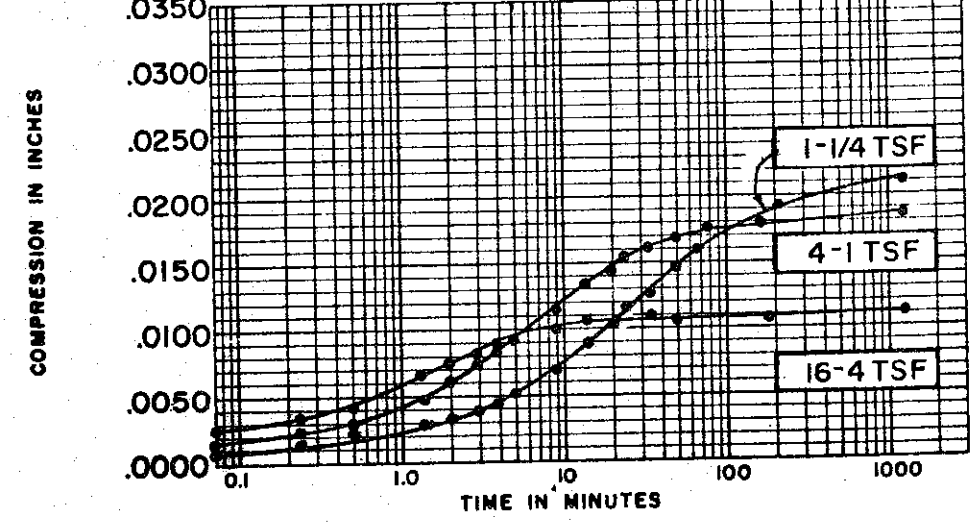
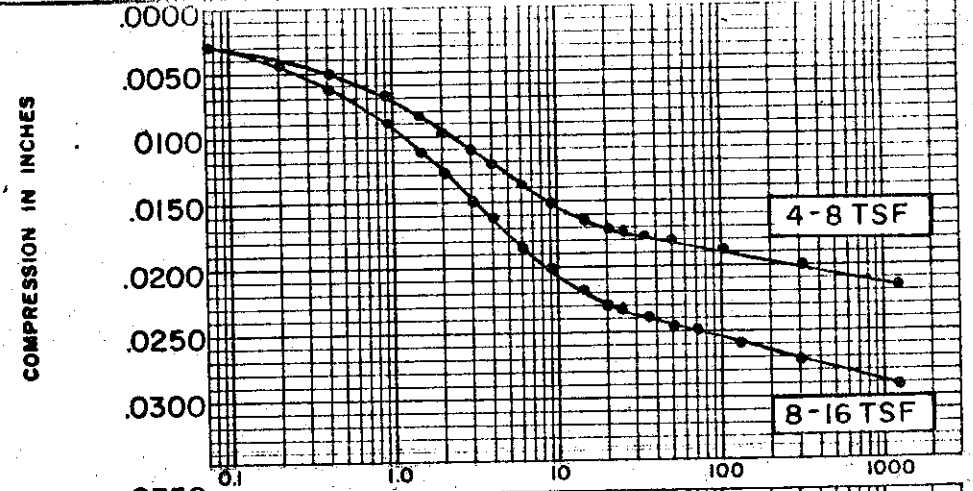
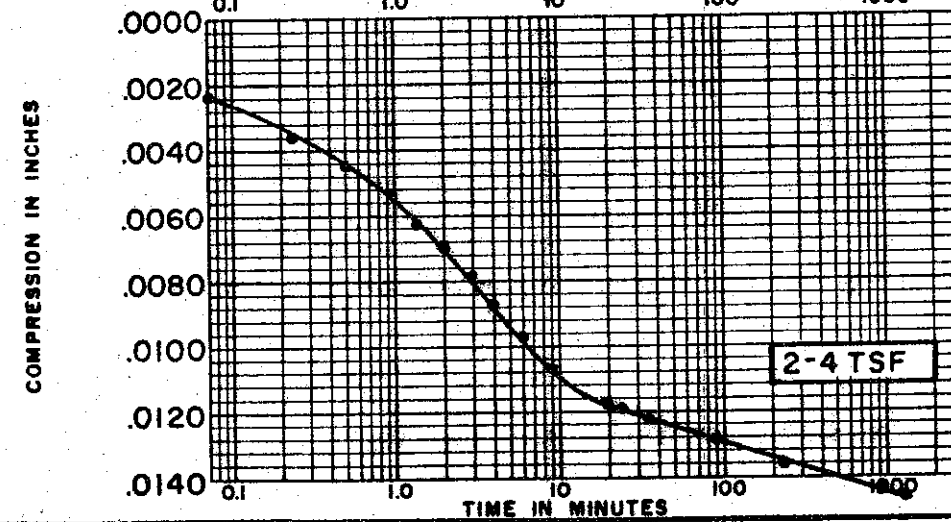
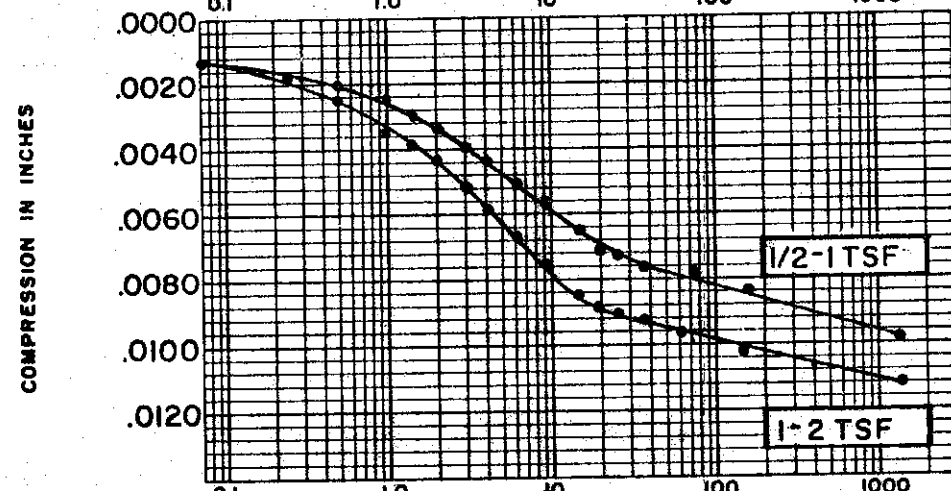
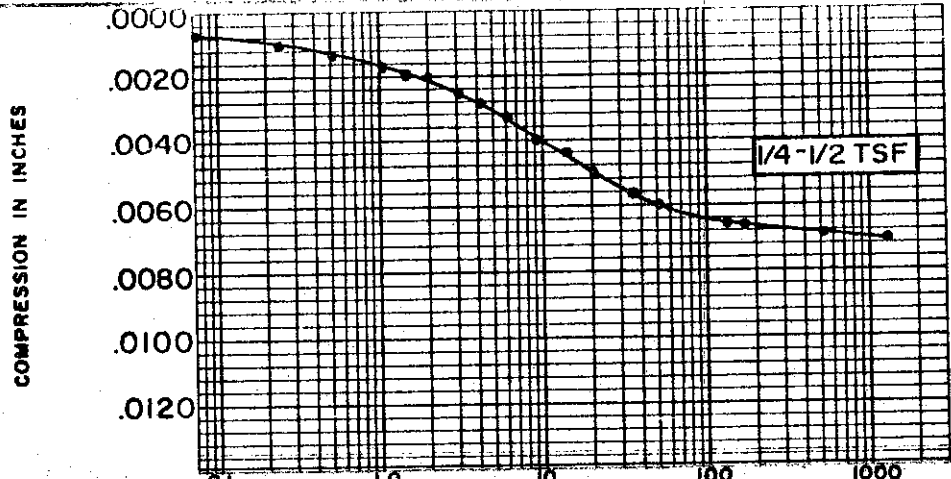
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C18.1  
 SAMPLE NO. 4 DATE JAN. 1974  
 DEPTH 14.6' TO 14.7'

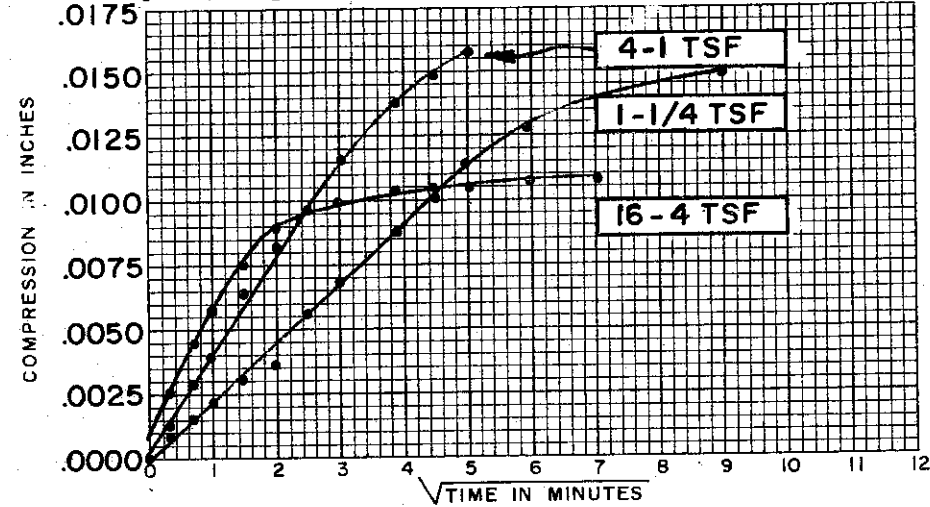
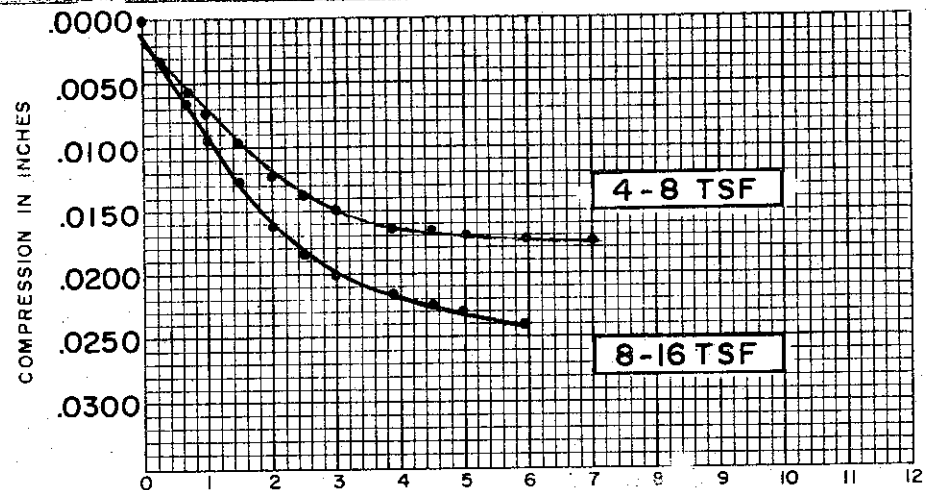
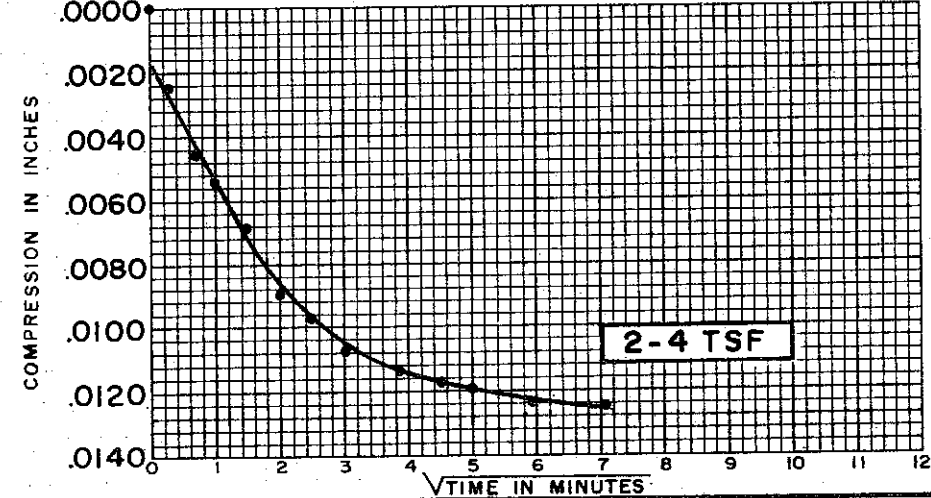
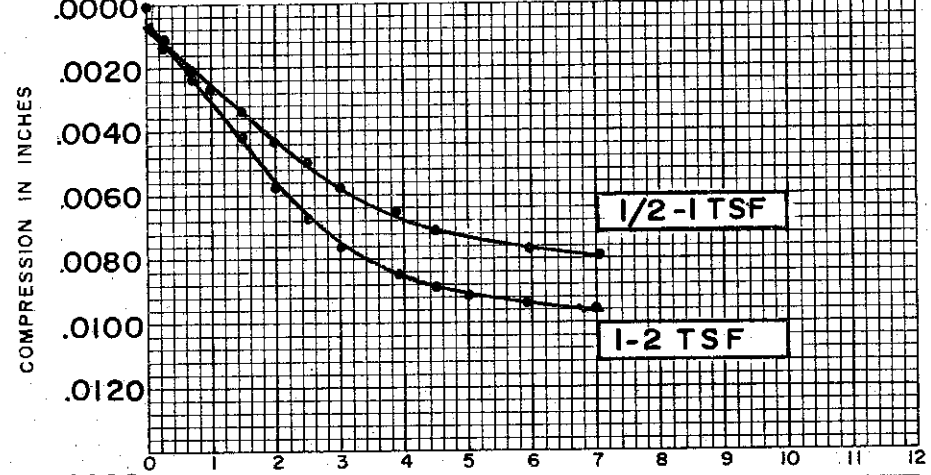
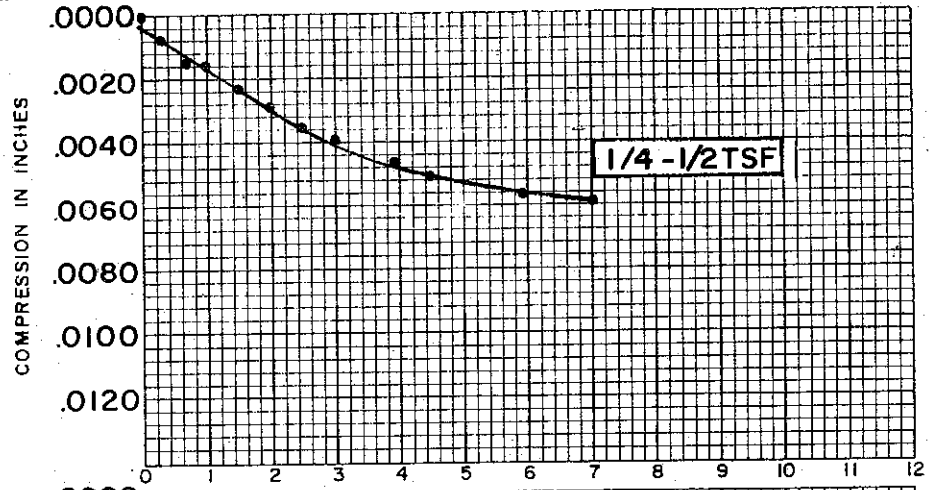
T94-C-461



SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>4</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>14.6' TO 14.7'</u>
INITIAL WATER CONTENT	<u>29.0%</u>	
FINAL WATER CONTENT	<u>28.0%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.800"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.770</u>	
CONSOLIDATION TEST TIME VS. COMPRESSION CURVE		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		



C-463

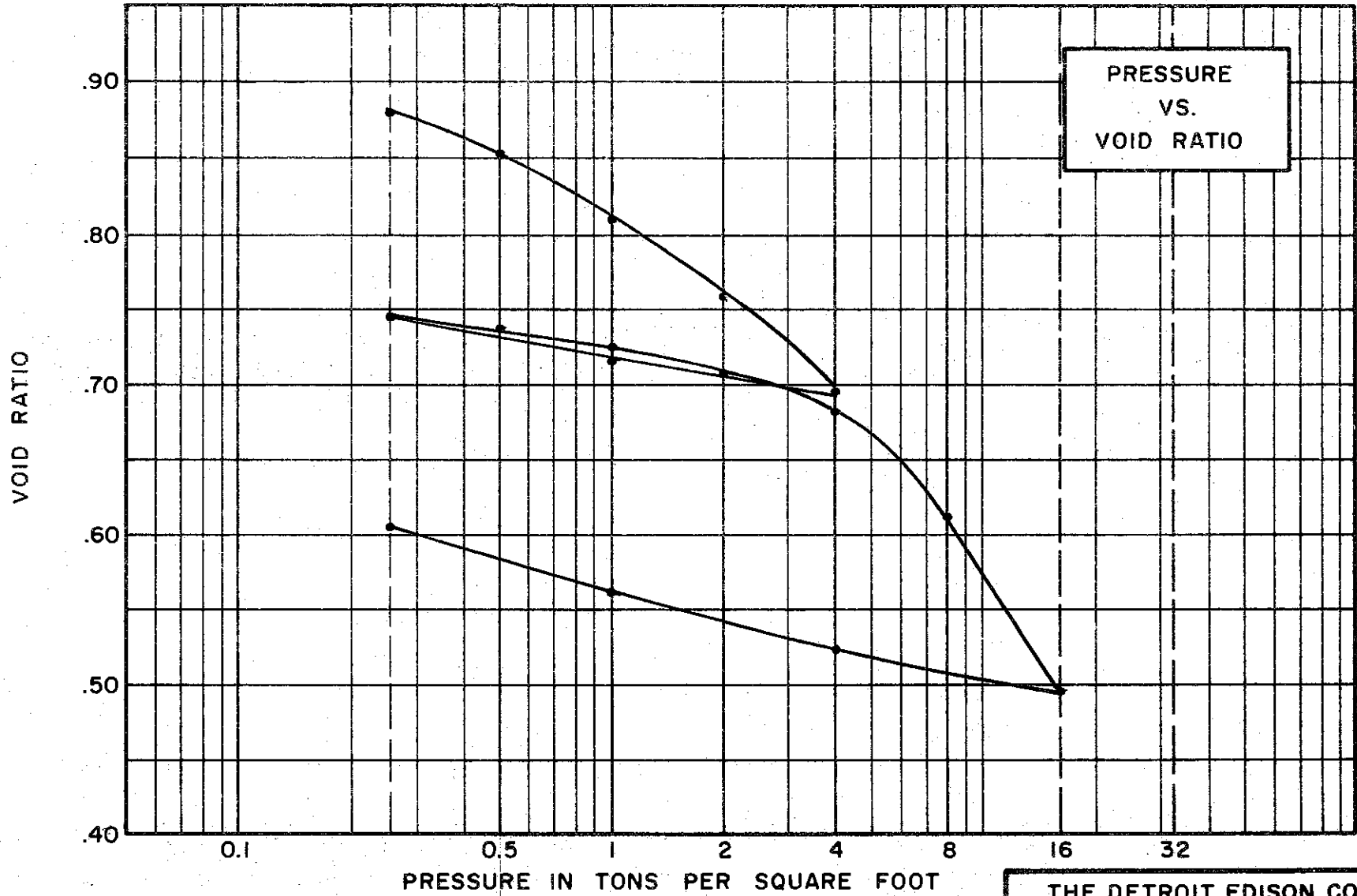


SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>4</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>14.6' TO 14.7'</u>
INITIAL WATER CONTENT	<u>29.0 %</u>	
FINAL WATER CONTENT	<u>28.0 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.770</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 36.0% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55% PLASTIC LIMIT 24%

**TEST DATA**

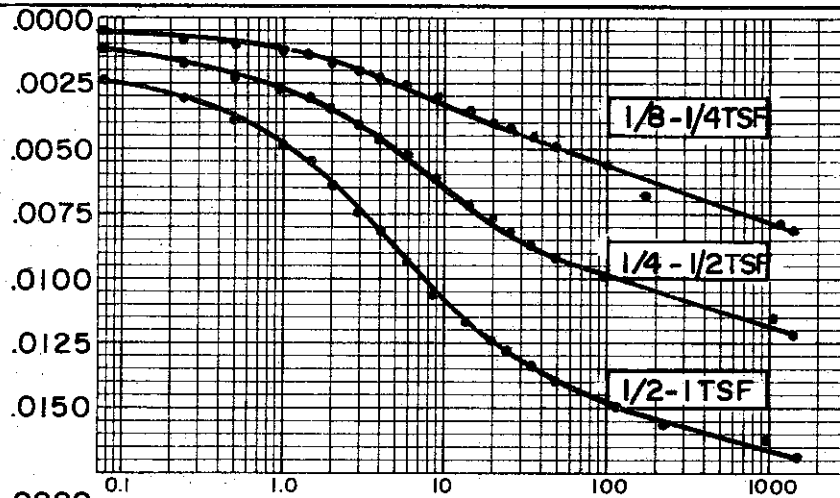
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

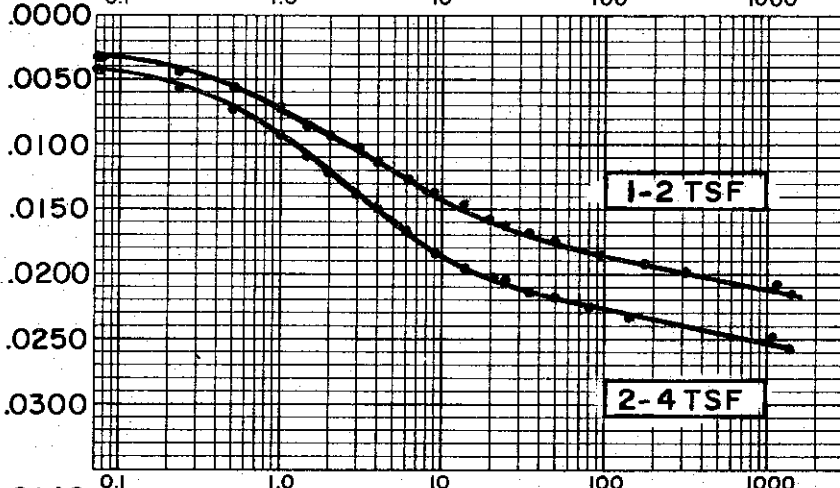
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C24.1  
 SAMPLE NO. 16 DATE JAN. 1974  
 DEPTH 74.0' TO 74.1'

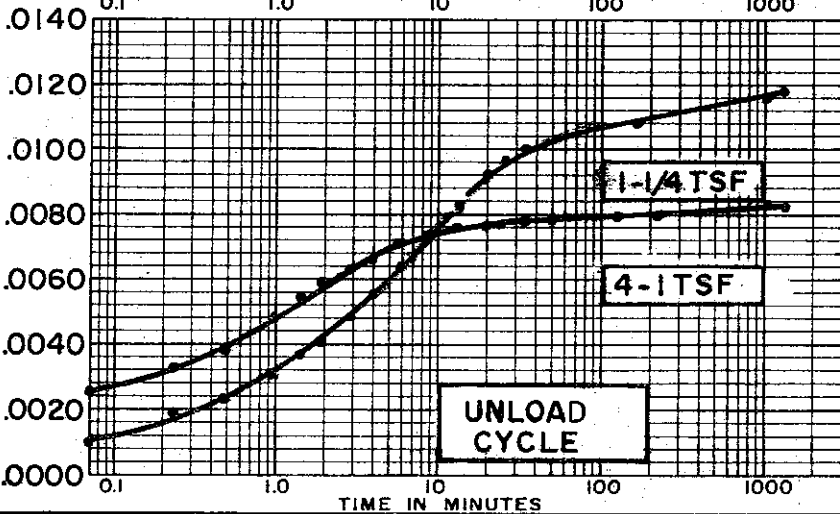
COMPRESSION IN INCHES



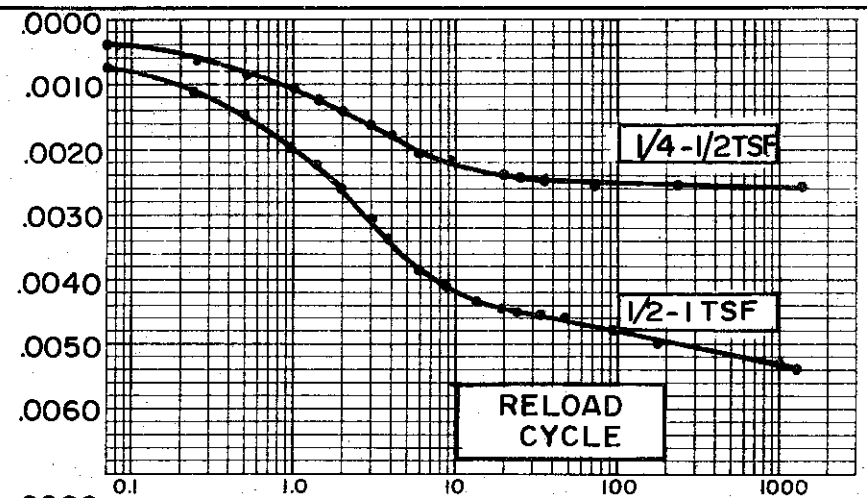
COMPRESSION IN INCHES



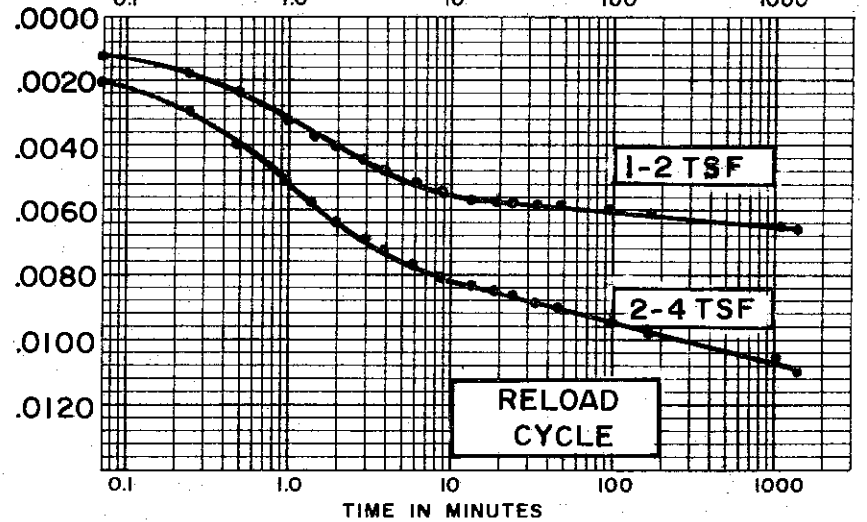
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CH)  
SPECIFIC GRAVITY 2.72  
INITIAL WATER CONTENT 36.0 %  
FINAL WATER CONTENT 27.0 %

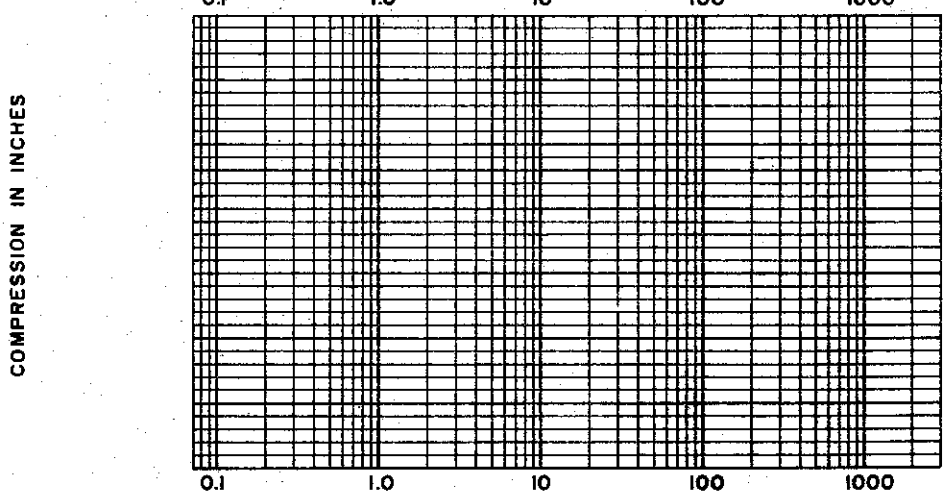
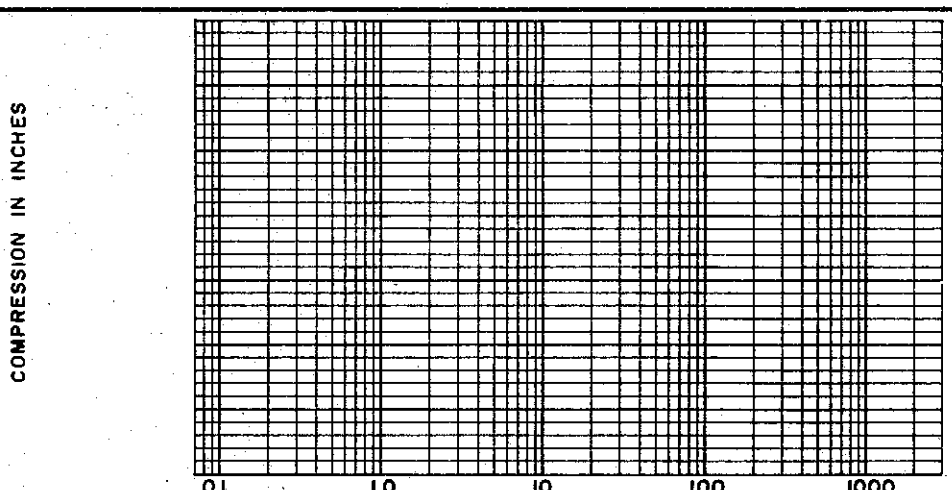
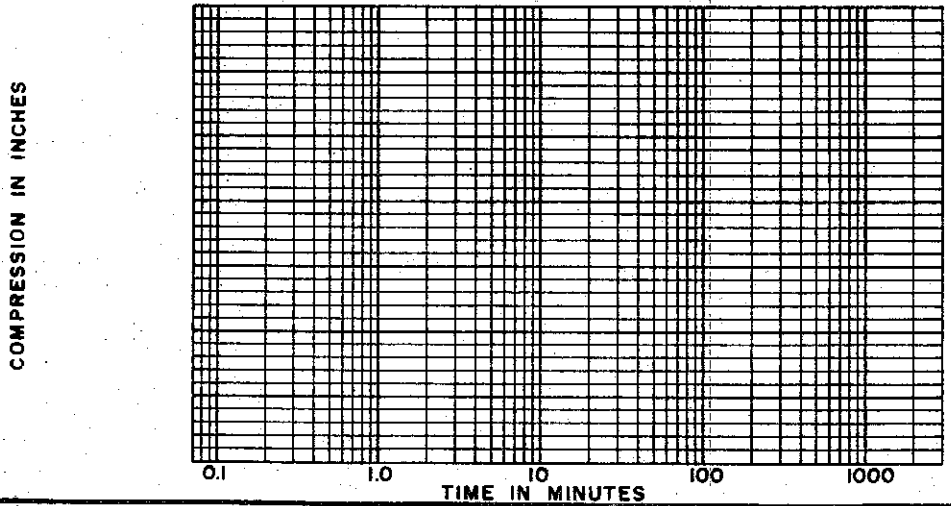
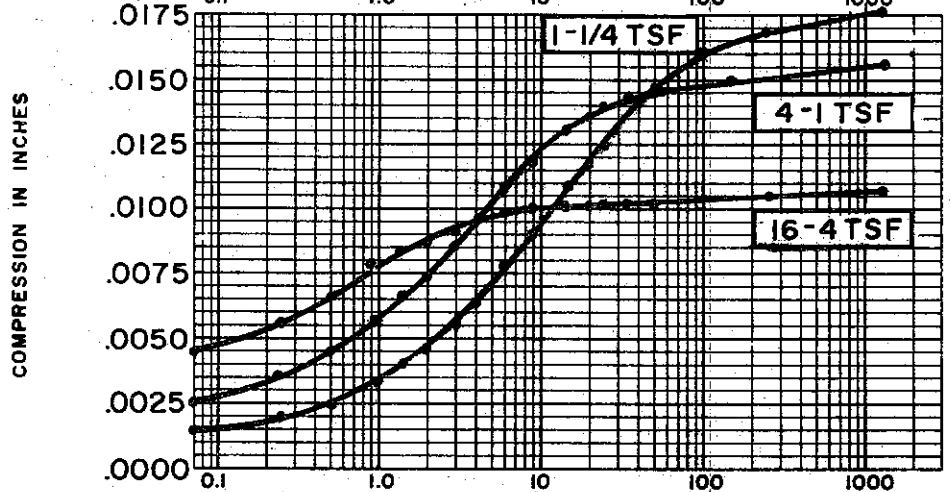
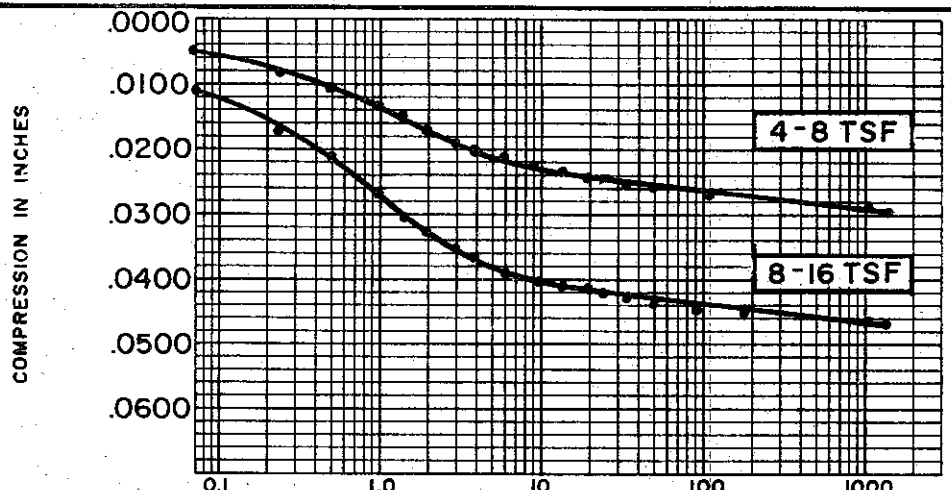
BORING NO. 38  
SAMPLE NO. 16  
DEPTH 74.0' TO 74.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.90"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.935

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

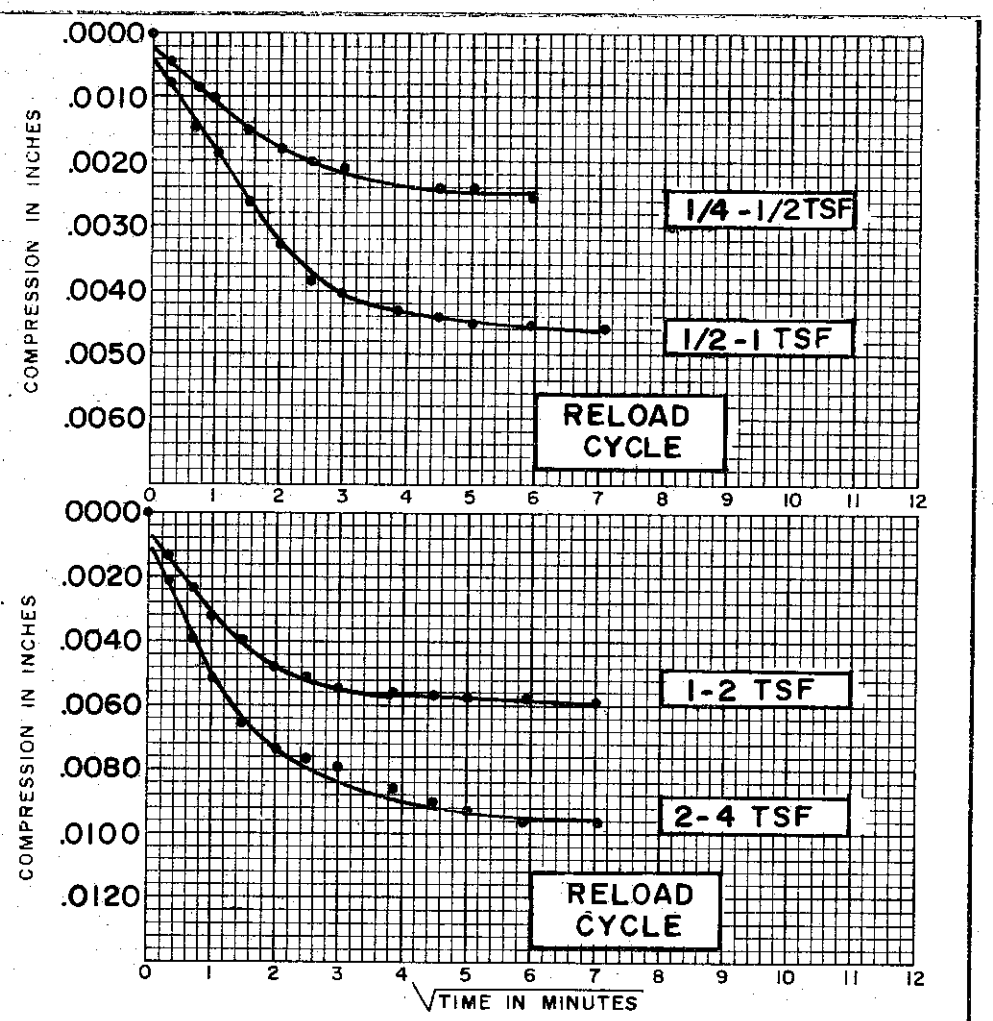
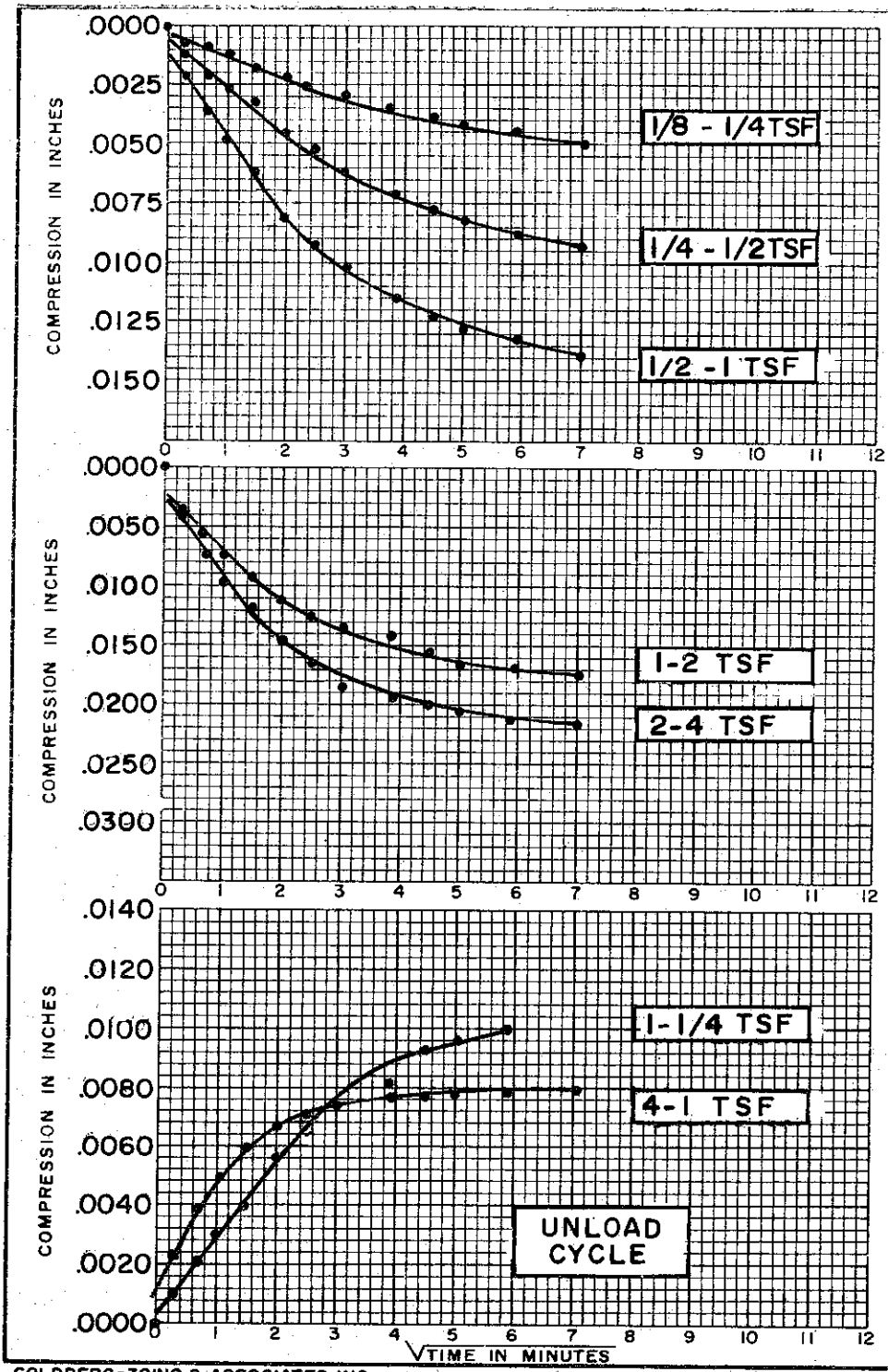


TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	36.0%
FINAL WATER CONTENT	27.7%
BORING NO.	38
SAMPLE NO.	16
DEPTH	74.0 TO 74.1

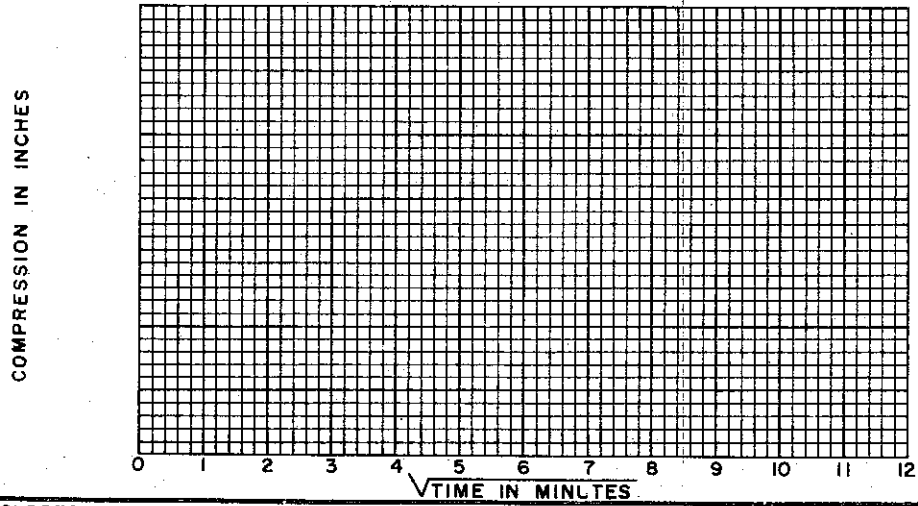
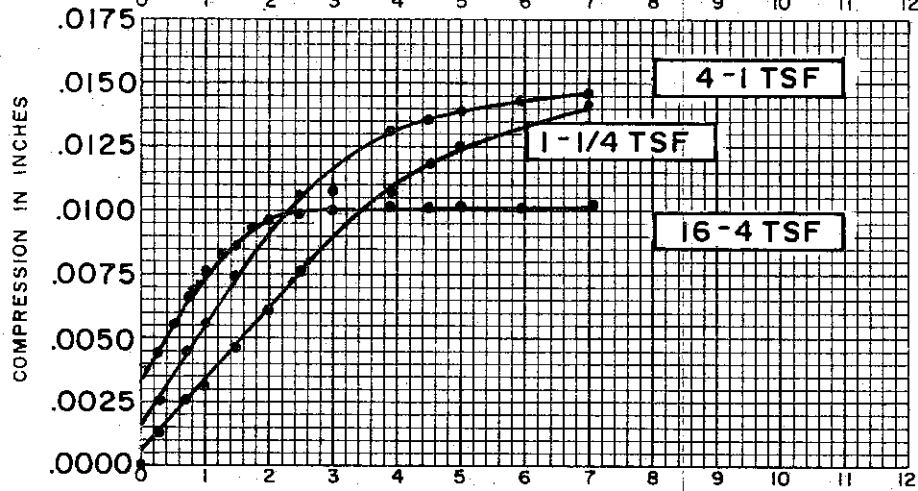
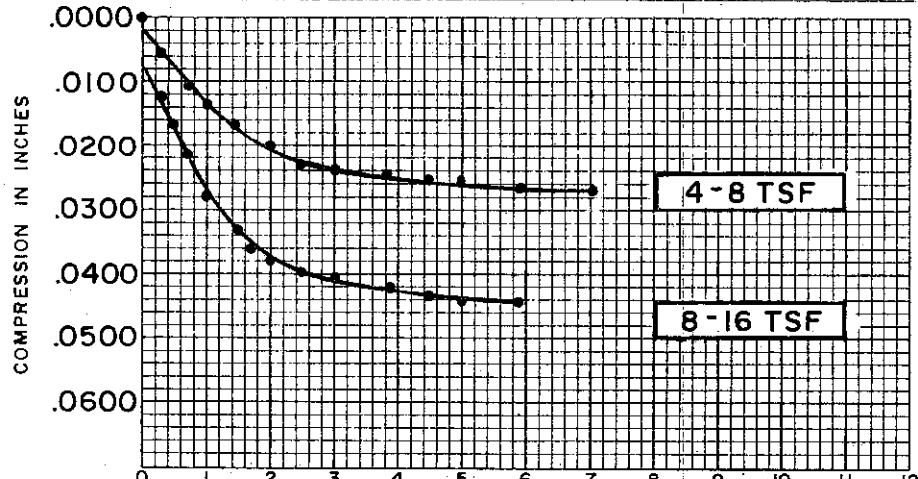
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.935

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



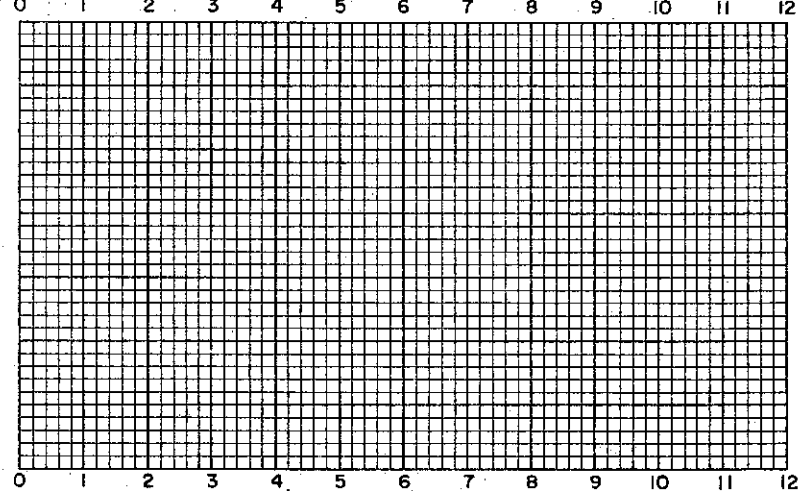
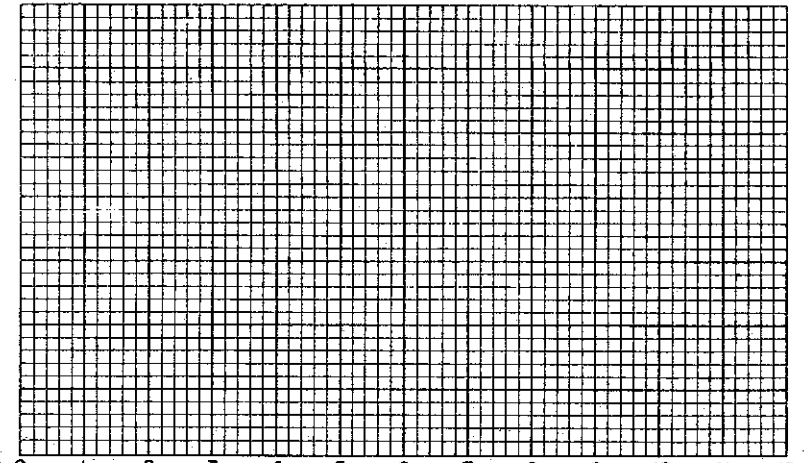
SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	SILTY CLAY (CH)	SAMPLE NO. <u>16</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>74.0' TO 74.1'</u>
INITIAL WATER CONTENT	<u>36.0%</u>	
FINAL WATER CONTENT	<u>27.7%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.935</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		

C-467



COMPRESSION IN INCHES

COMPRESSION IN INCHES

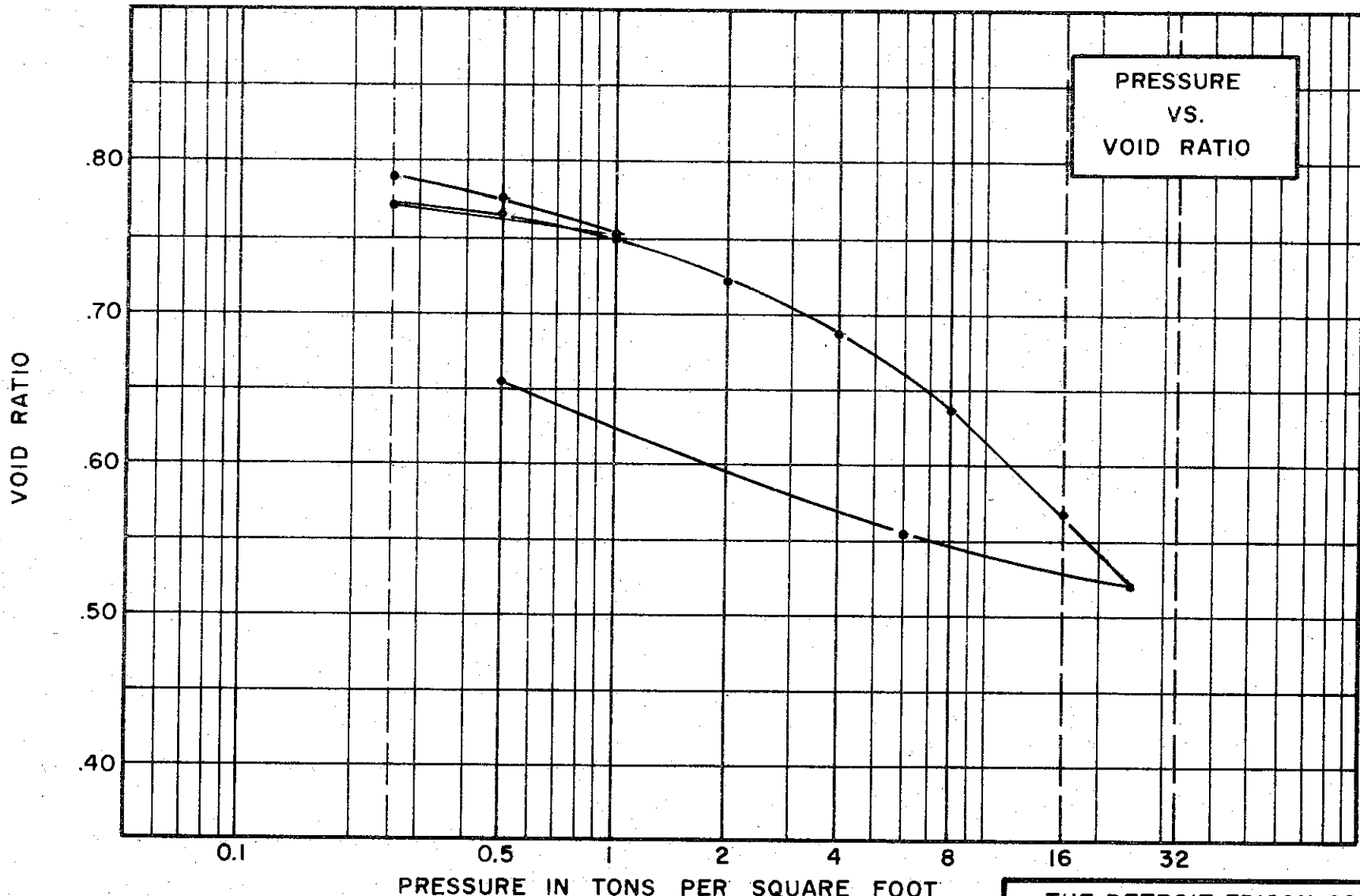


√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION: <u>SILTY CLAY (CH)</u>	BORING NO. <u>38</u>
SPECIFIC GRAVITY <u>2.72</u>	SAMPLE NO. <u>16</u>
INITIAL WATER CONTENT <u>36.0 %</u>	DEPTH <u>74.0 TO 74.1</u>
FINAL WATER CONTENT <u>27.7 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.935</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.5% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 23%

**TEST DATA**

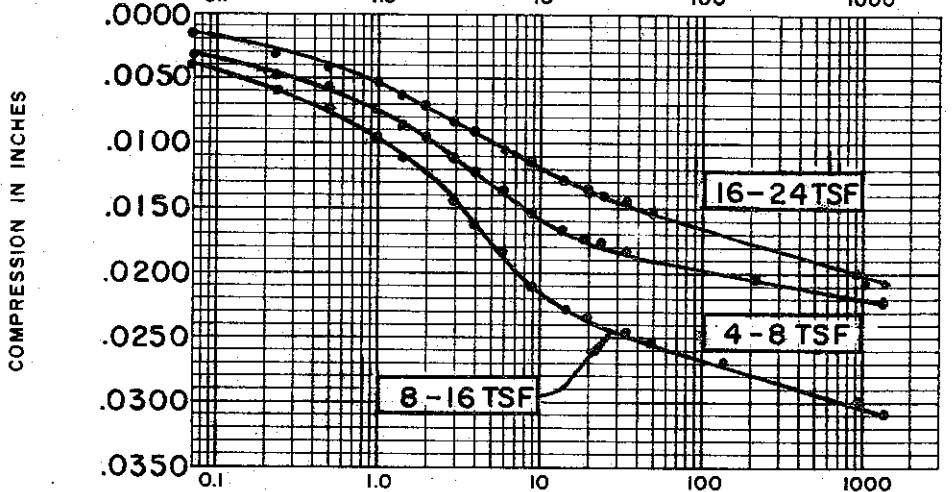
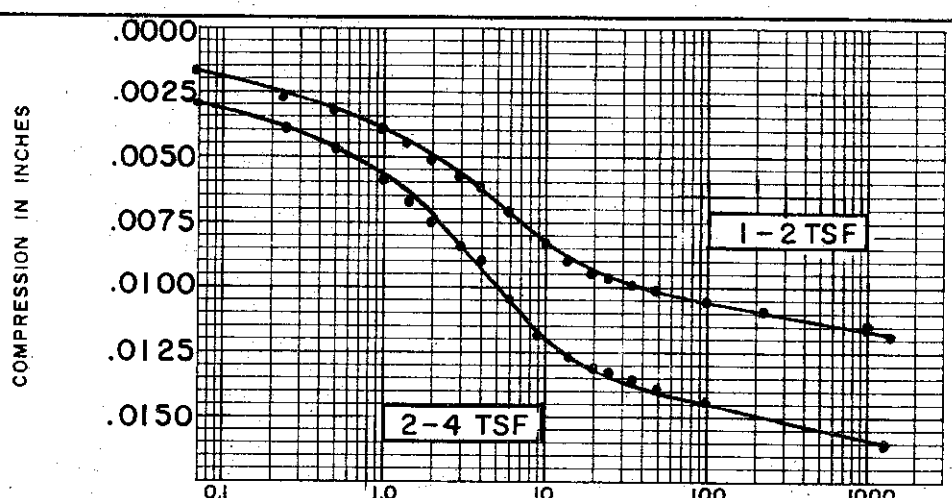
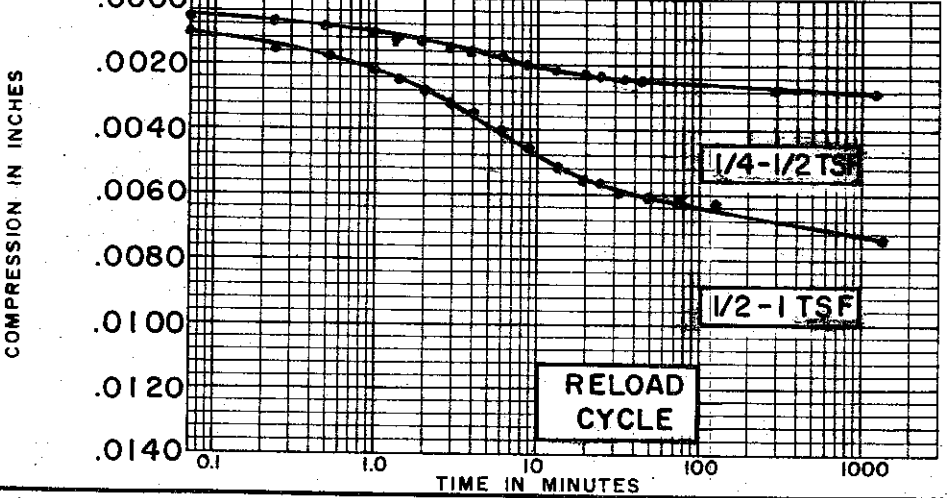
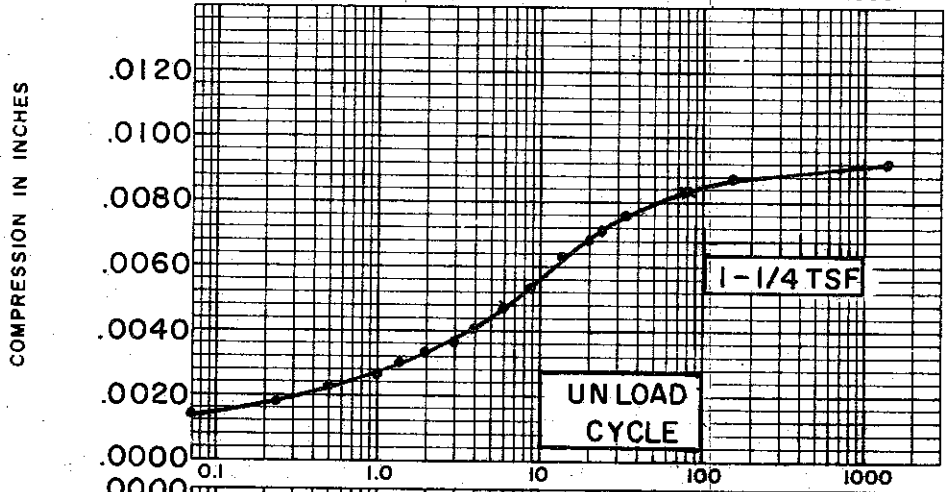
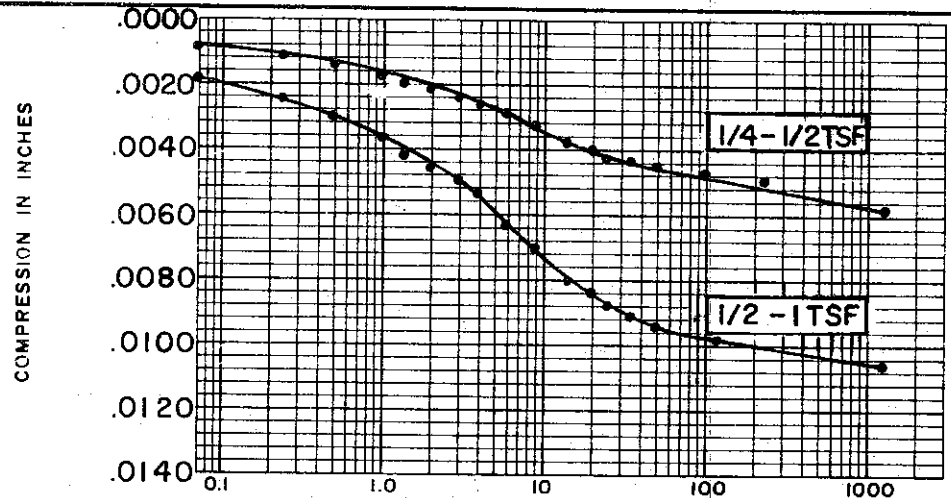
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C29.1  
 SAMPLE NO. 5 DATE JAN 74  
 DEPTH 10.8'

694-C-469



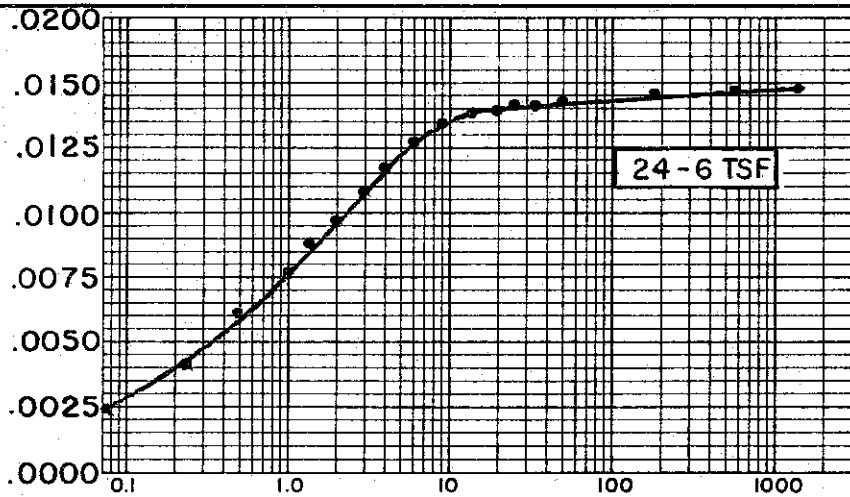
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	23.5 %
FINAL WATER CONTENT	27.7 %
BORING NO.	41
SAMPLE NO.	5
DEPTH	10.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.799

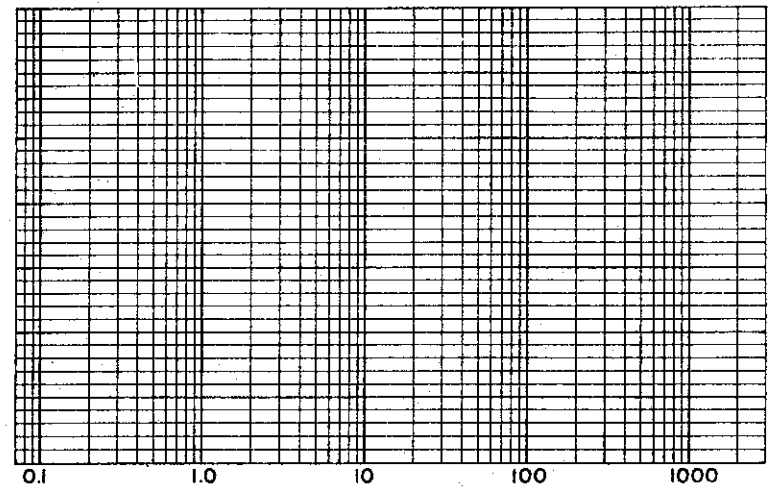
CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



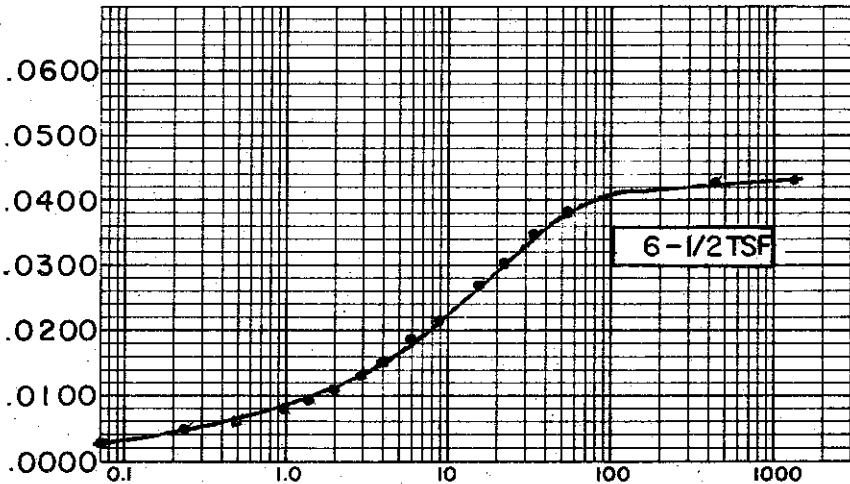
COMPRESSION IN INCHES



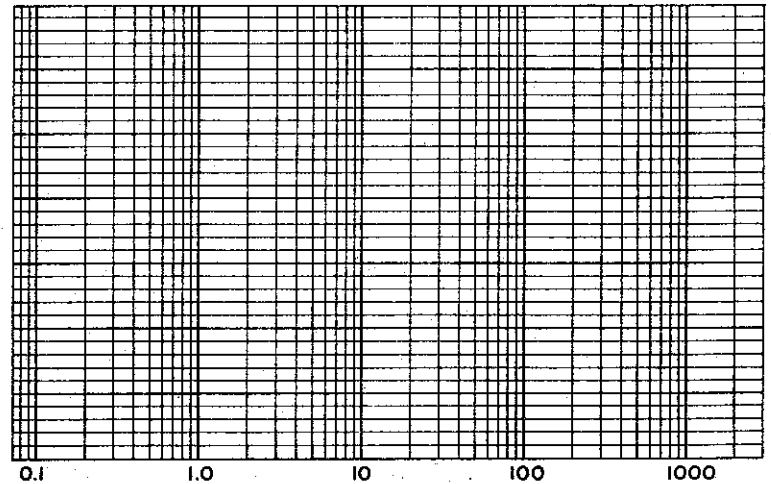
COMPRESSION IN INCHES



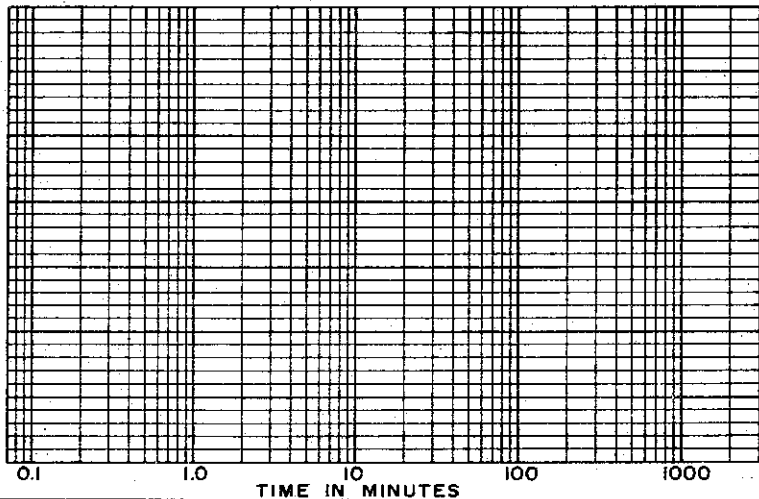
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5 %  
 FINAL WATER CONTENT 27.7 %

BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.6'

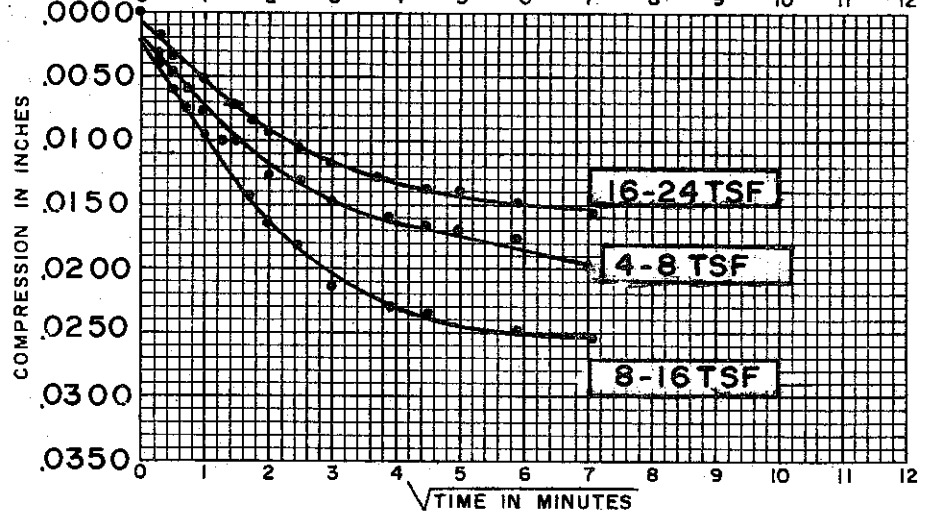
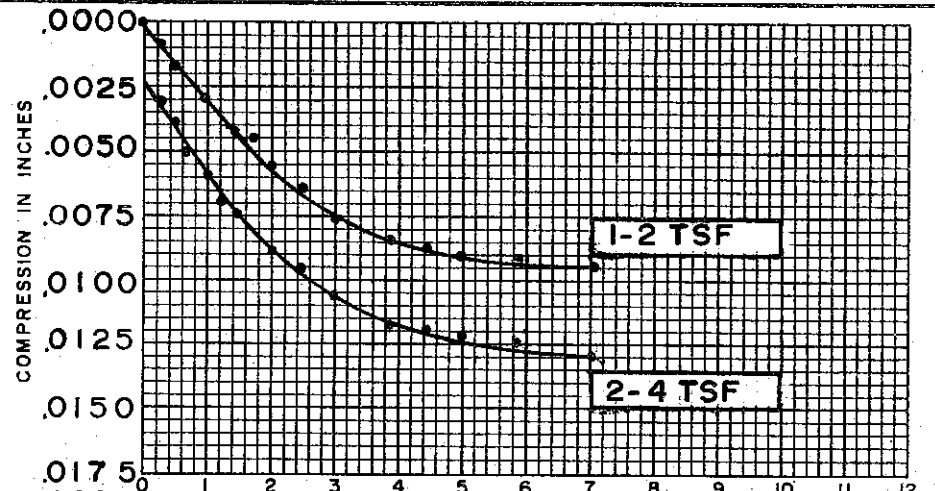
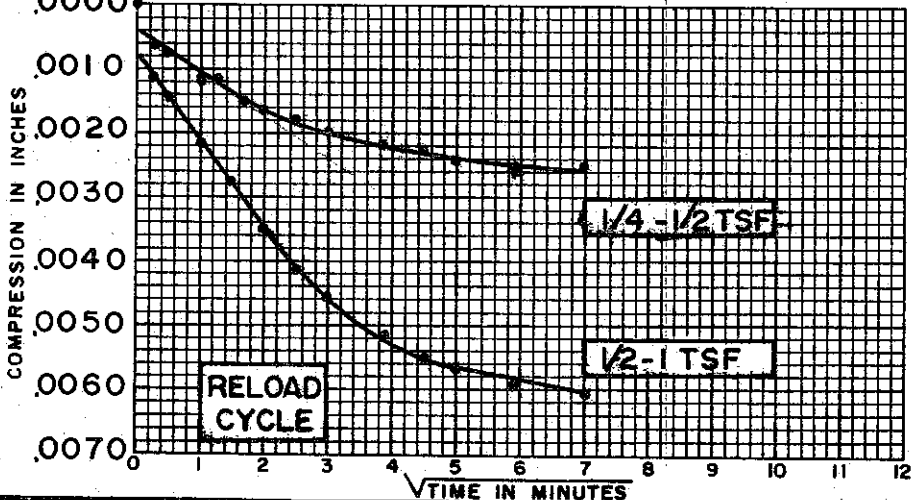
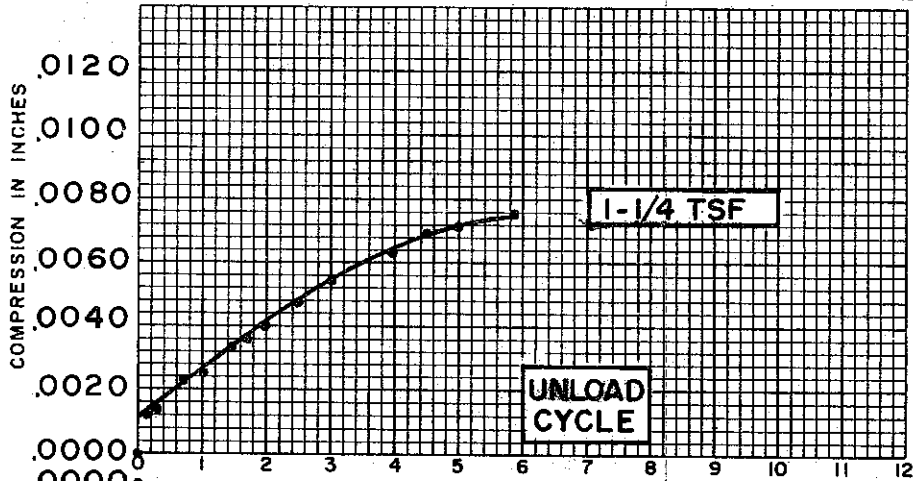
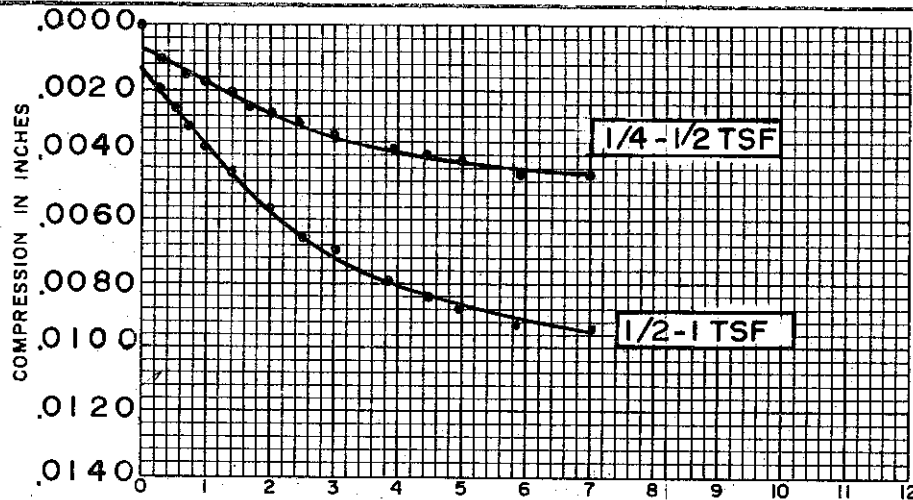
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-471



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5%  
 FINAL WATER CONTENT 27.7%

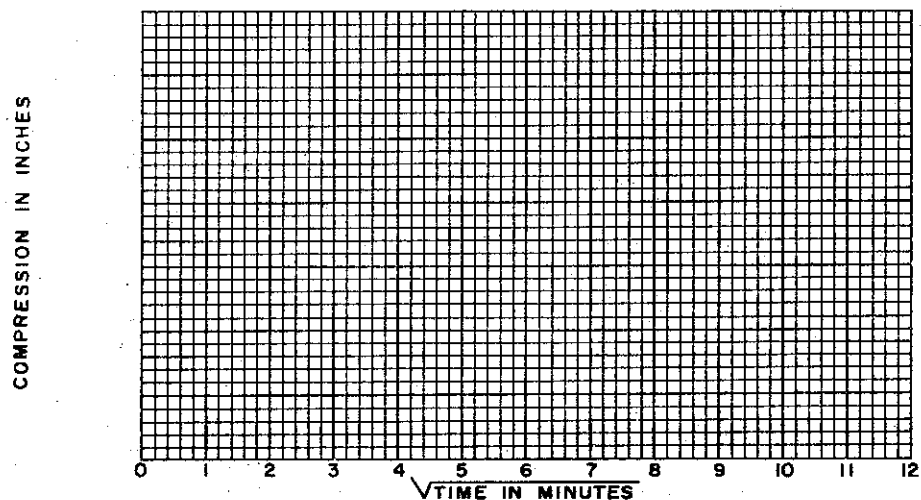
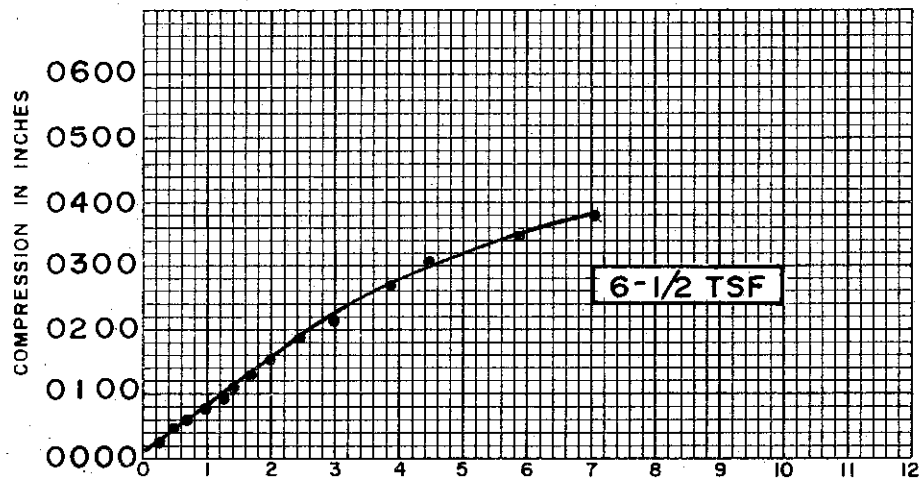
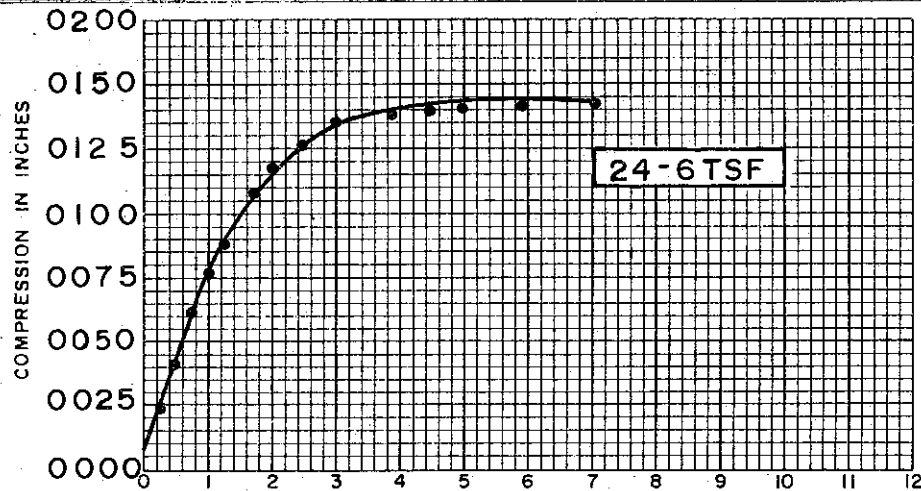
BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.8'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .789

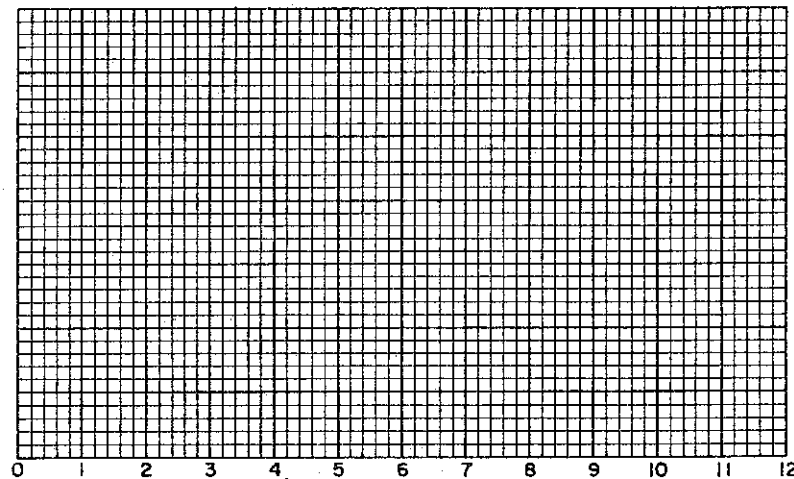
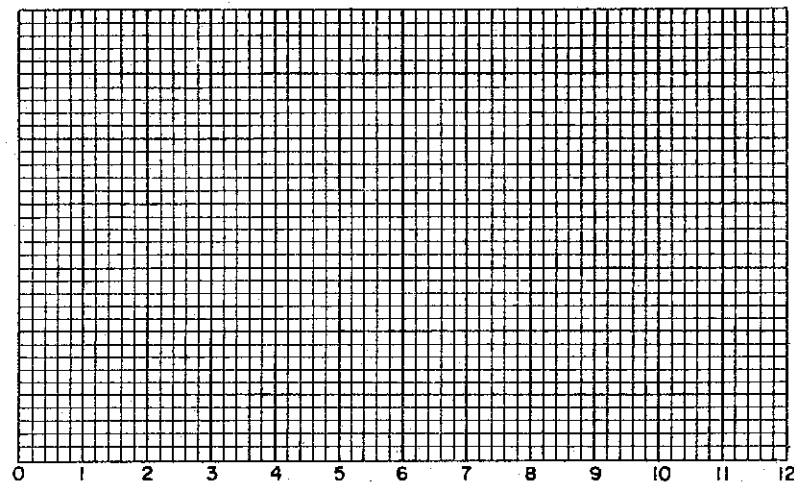
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5 %  
 FINAL WATER CONTENT 27.7 %

BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.8'

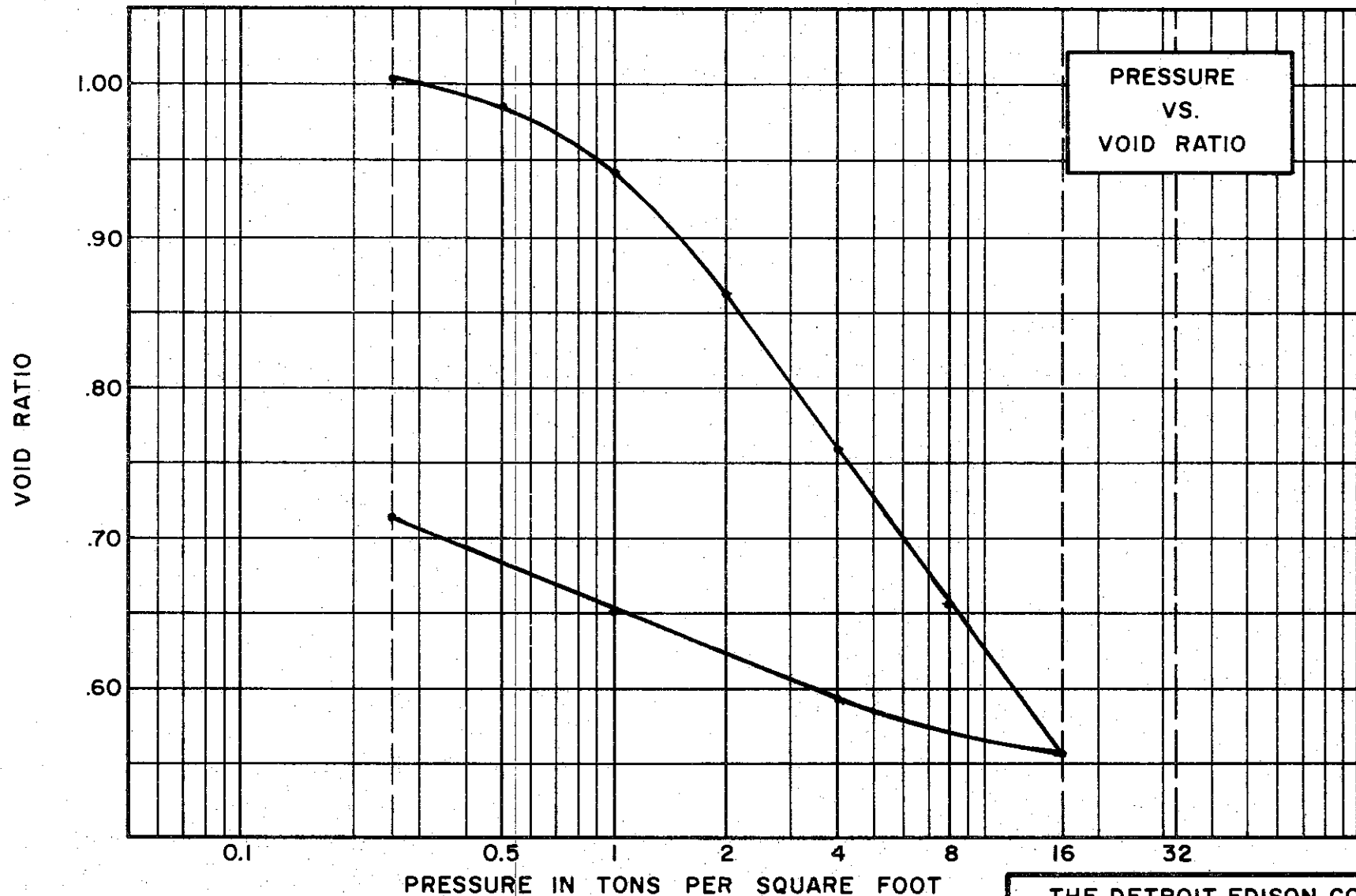
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .799

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
SPECIFIC GRAVITY 2.70  
WATER CONTENT, INITIAL 38.1% FINAL 30.1%  
ATTERBERG LIMITS:  
LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

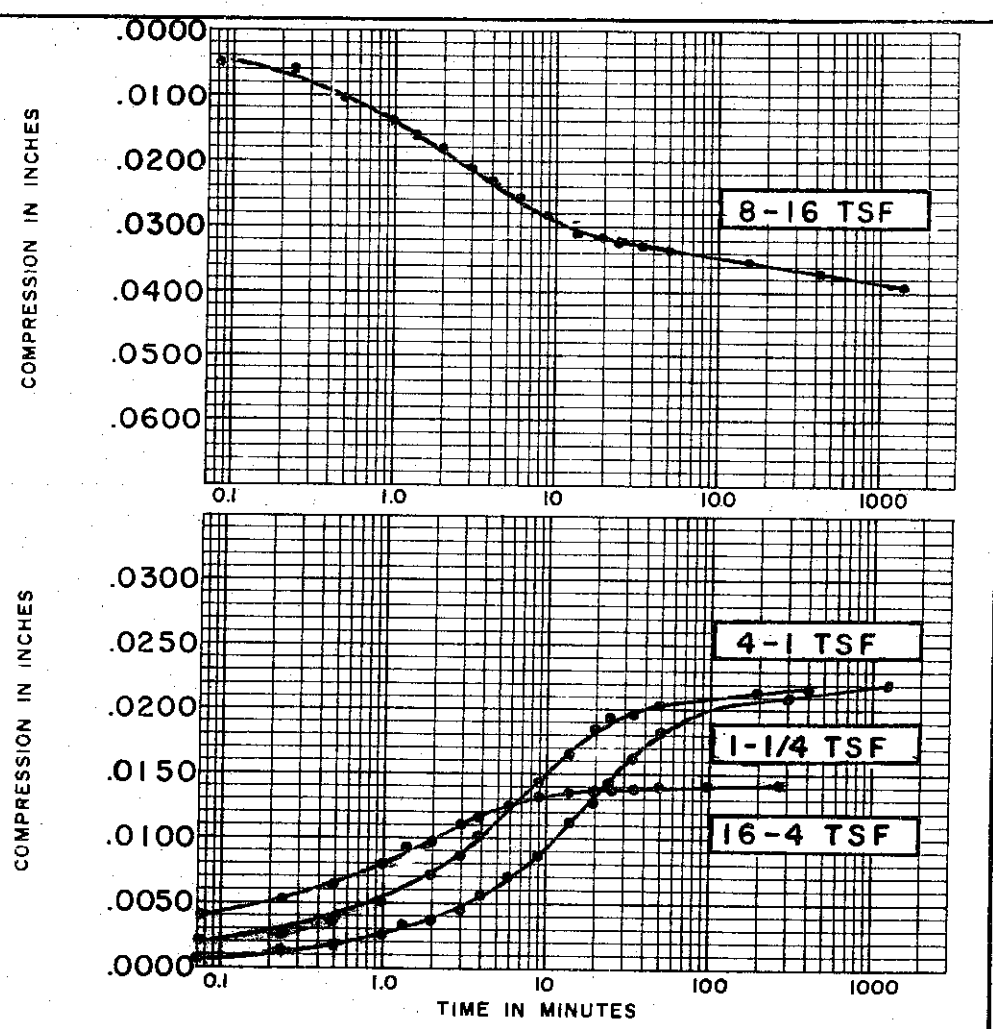
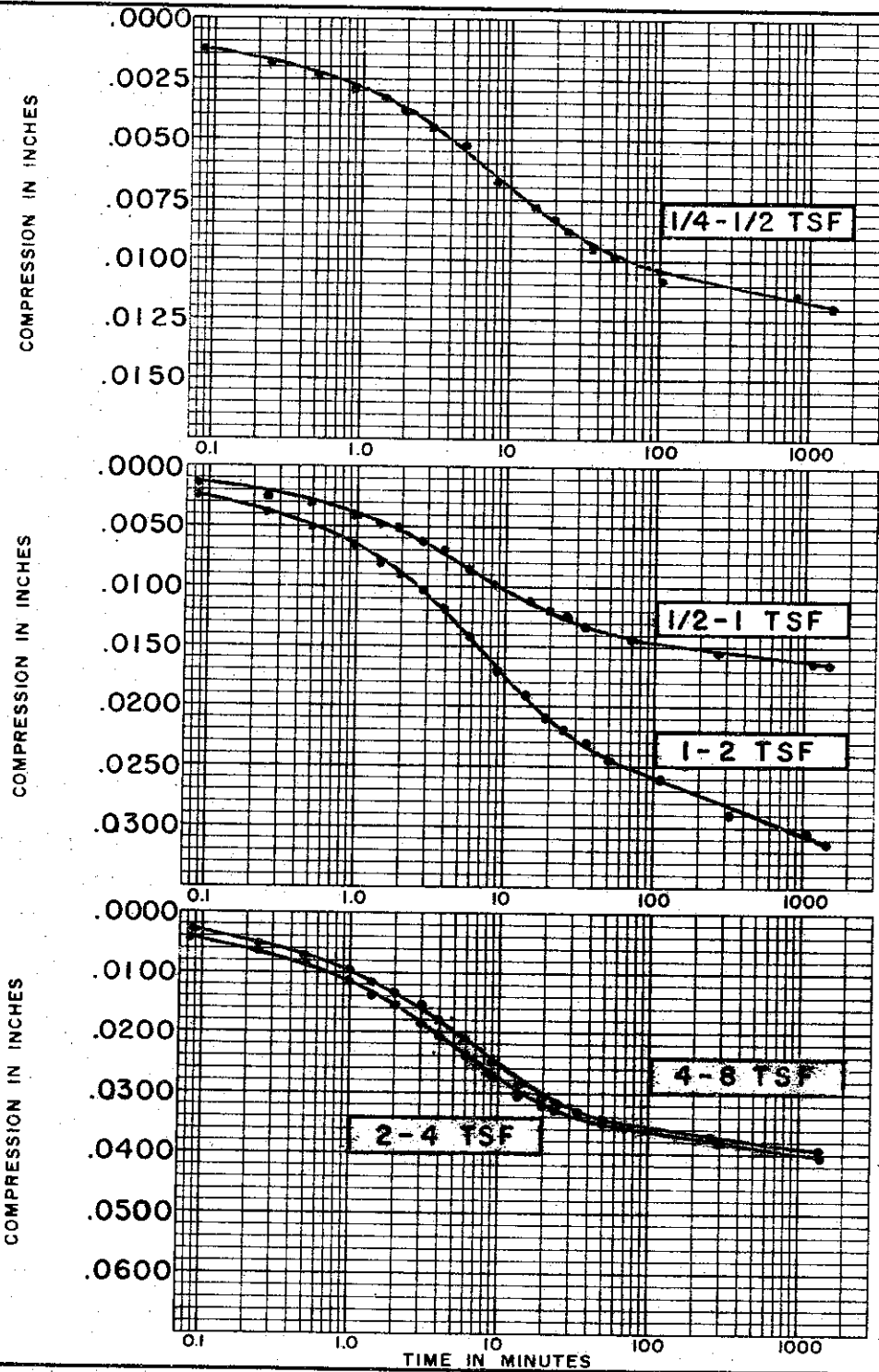
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.055

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C 30.1  
SAMPLE NO. 7 DATE FEB 74  
DEPTH 21.0' TO 21.1'

C-475

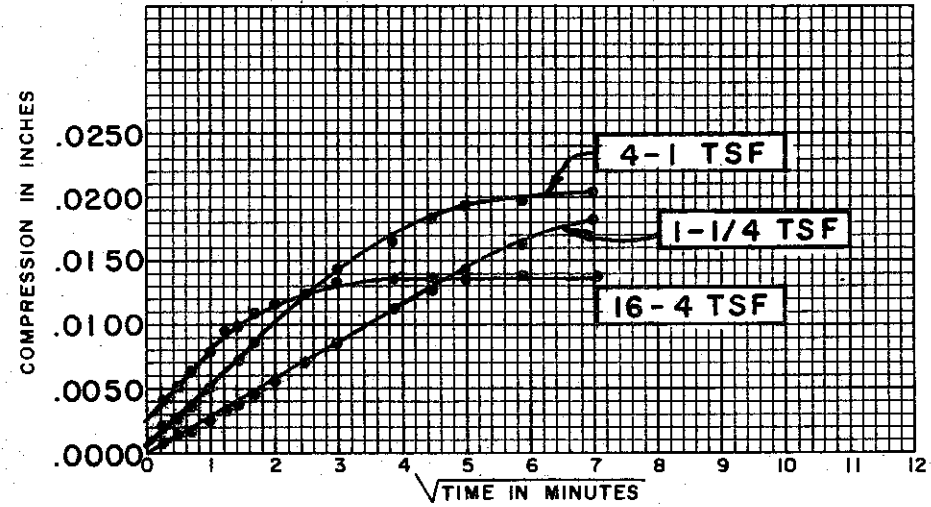
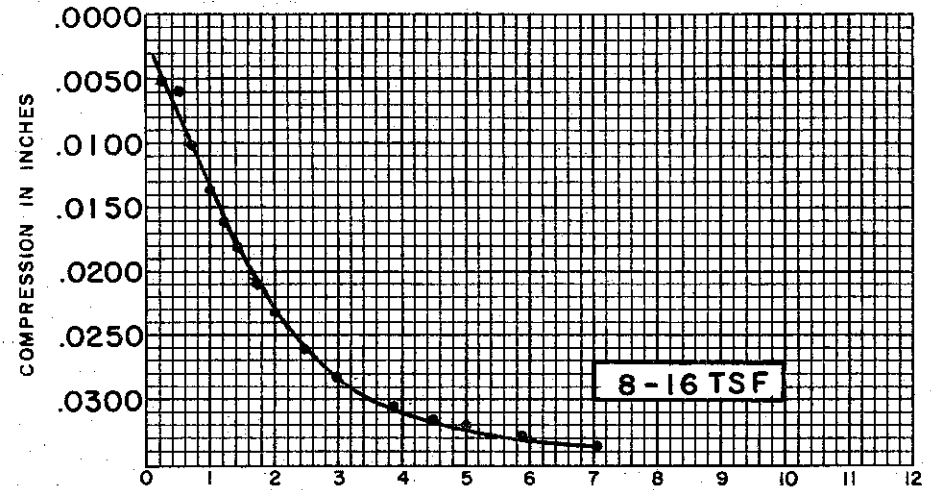
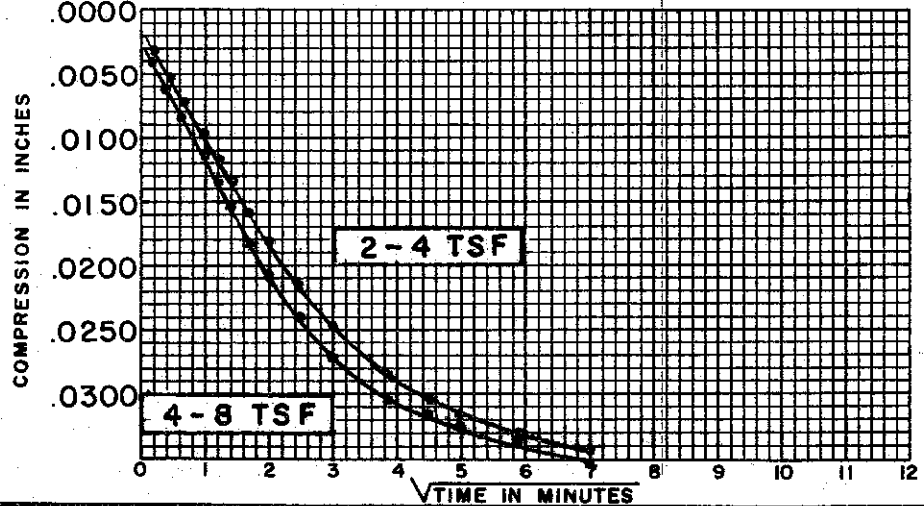
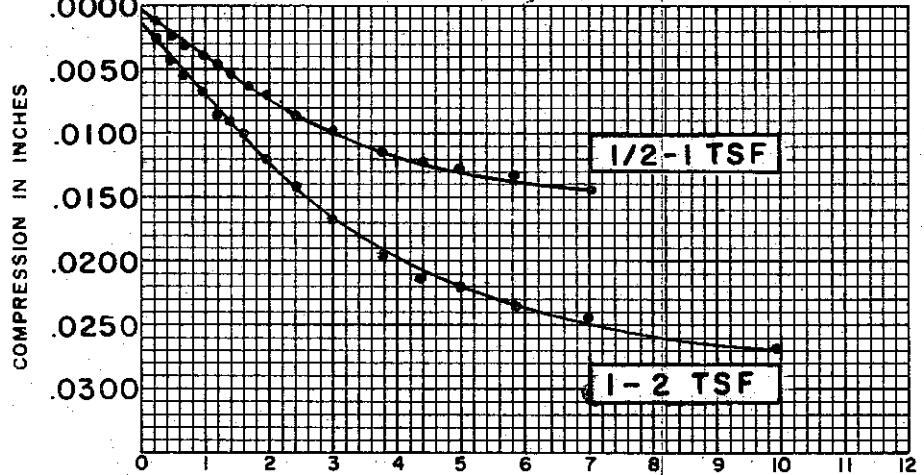
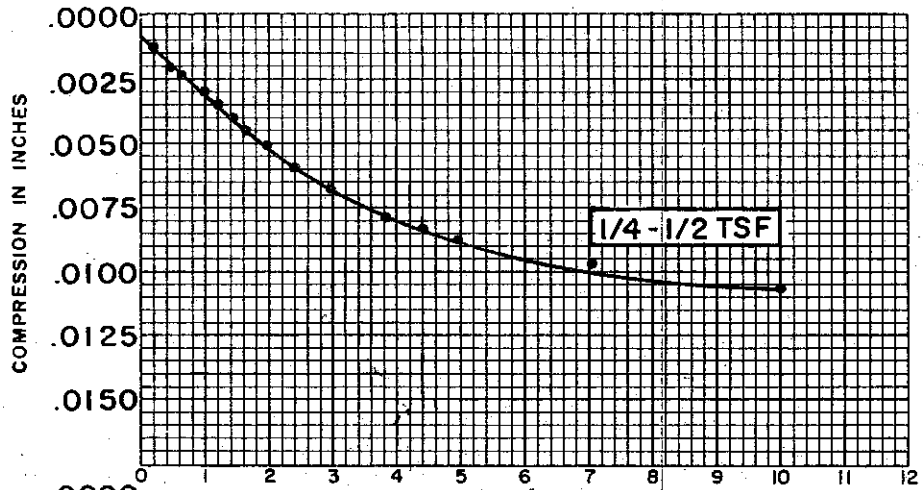


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	38.1 %
FINAL WATER CONTENT	30.1 %

BORING NO.	41
SAMPLE NO.	7
DEPTH	21.1

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.055

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

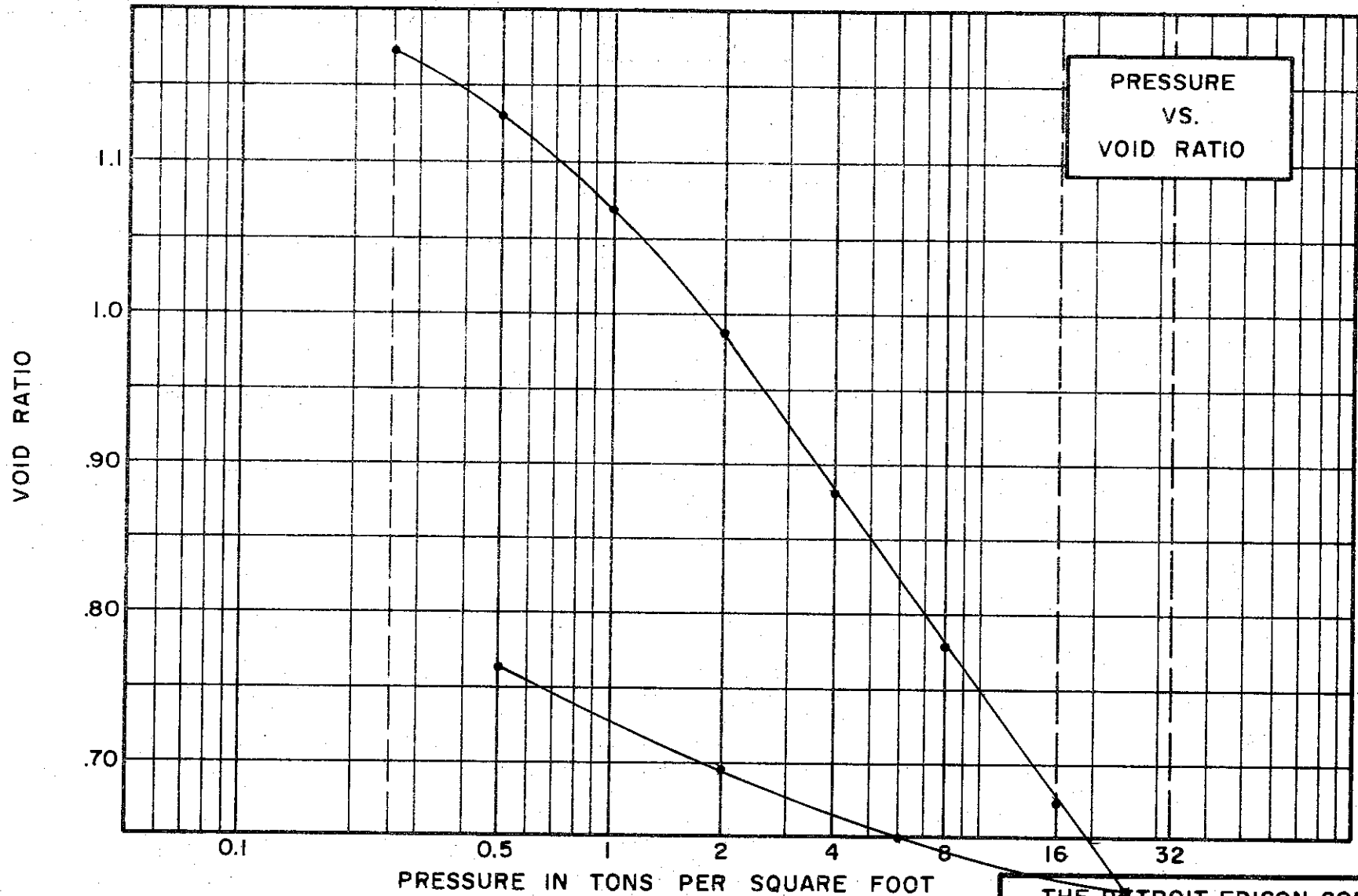
BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.0

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.75  
WATER CONTENT, INITIAL 46.5% FINAL 31.9%  
ATTERBERG LIMITS:  
LIQUID LIMIT 52% PLASTIC LIMIT 25%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.235

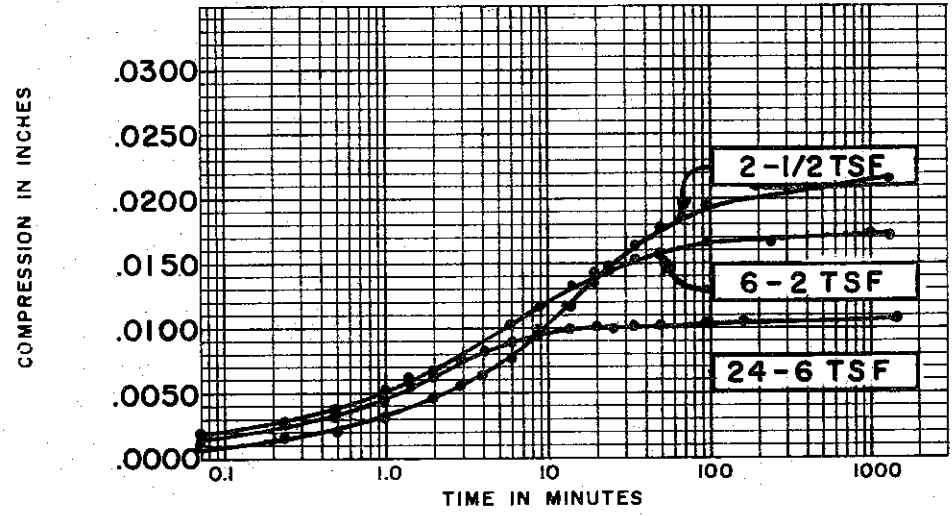
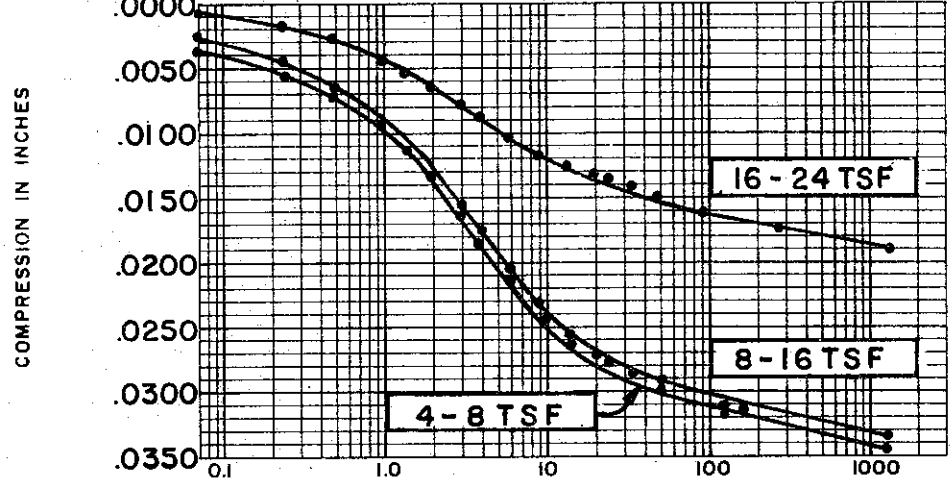
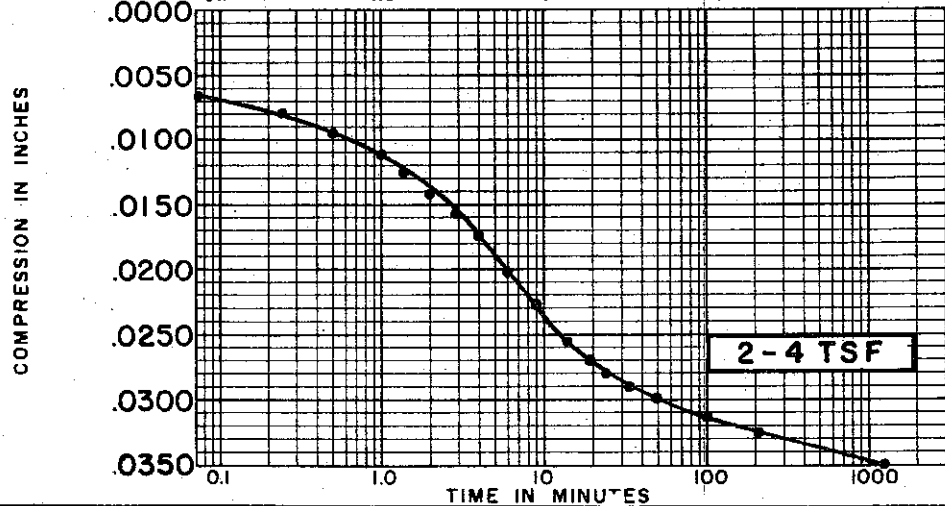
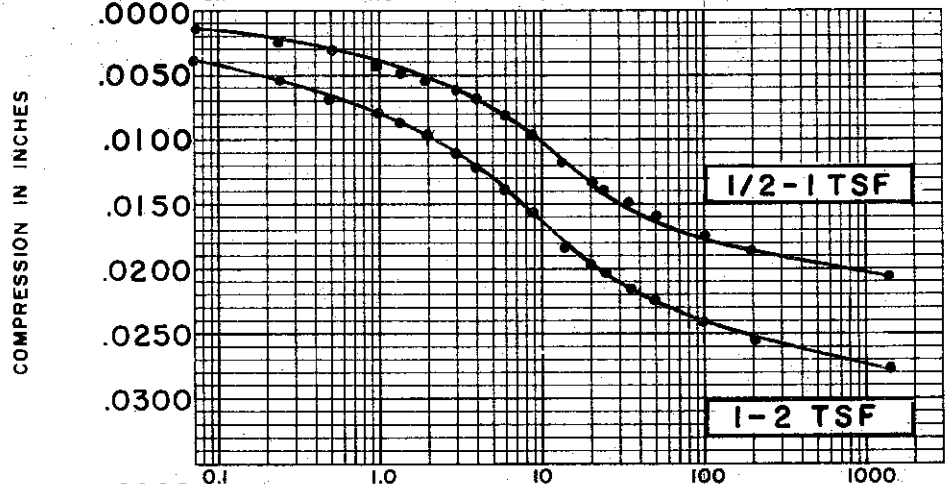
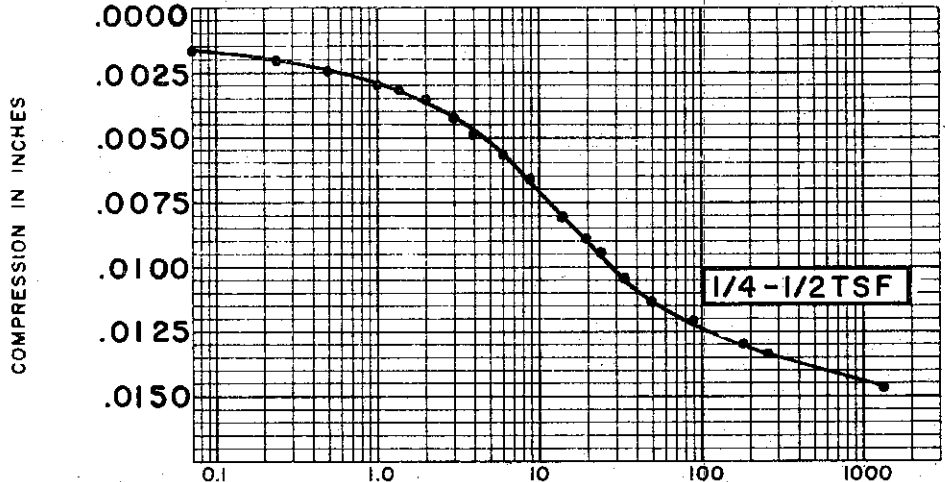
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C33.1  
SAMPLE NO. 13 DATE JAN. 1974  
DEPTH 53'

C-477

0-7-0



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 43.5%  
 FINAL WATER CONTENT 31.9%

BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

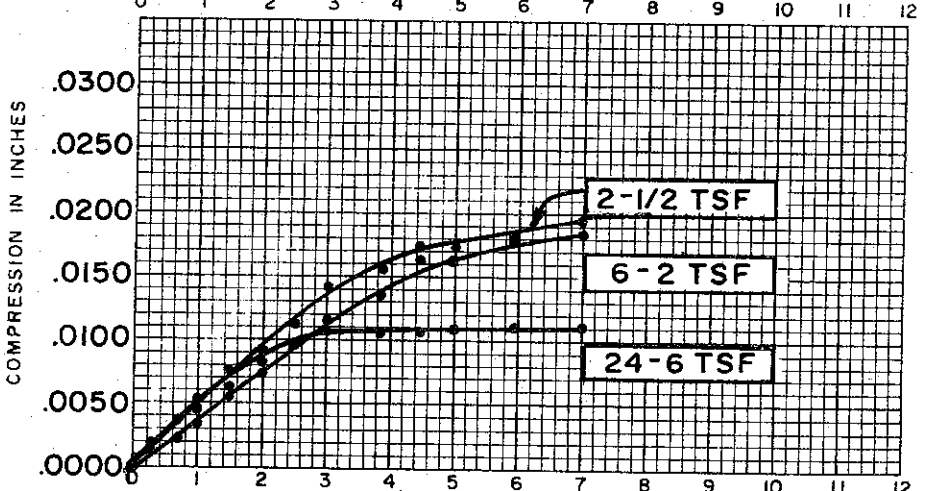
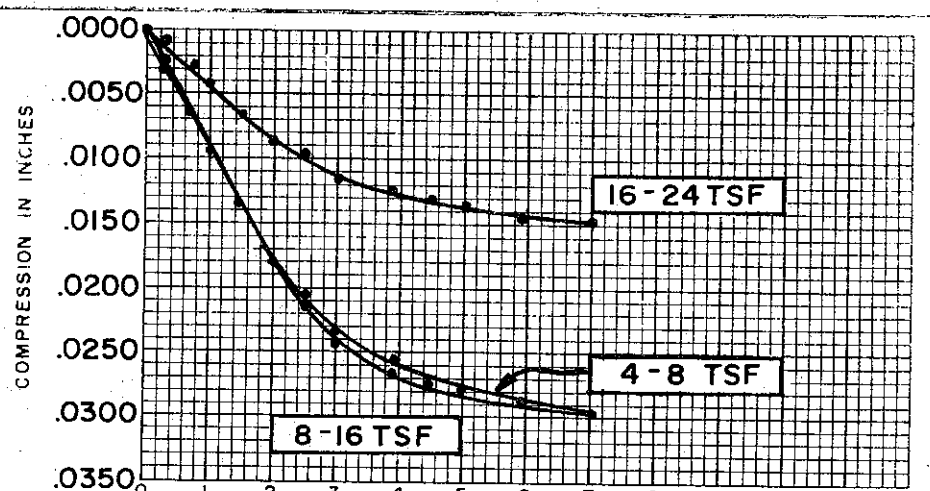
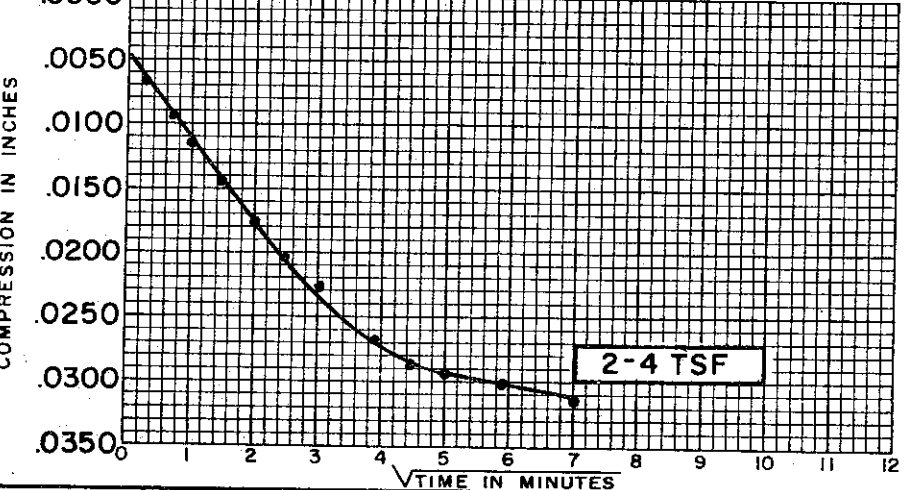
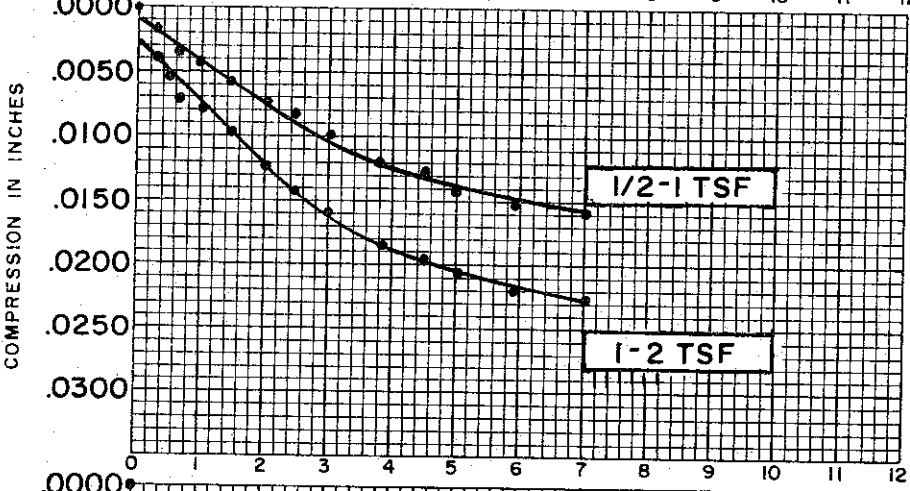
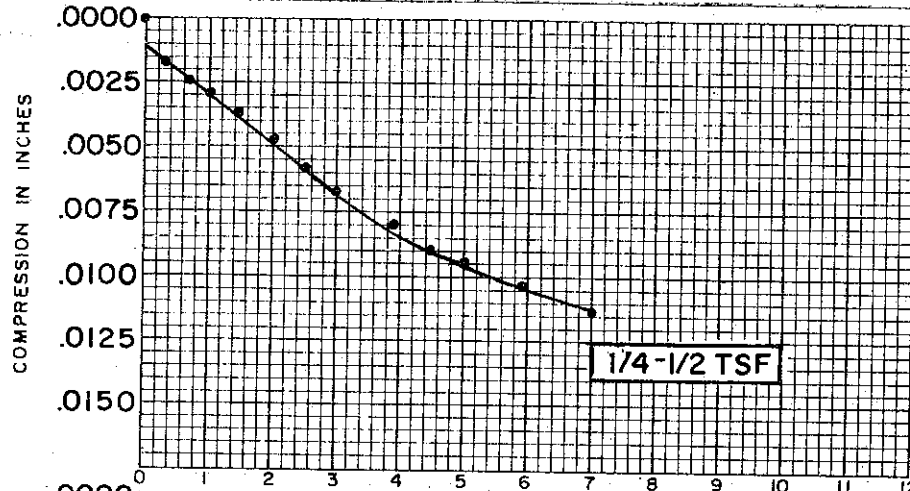
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 46.5%  
 FINAL WATER CONTENT 31.9%

BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

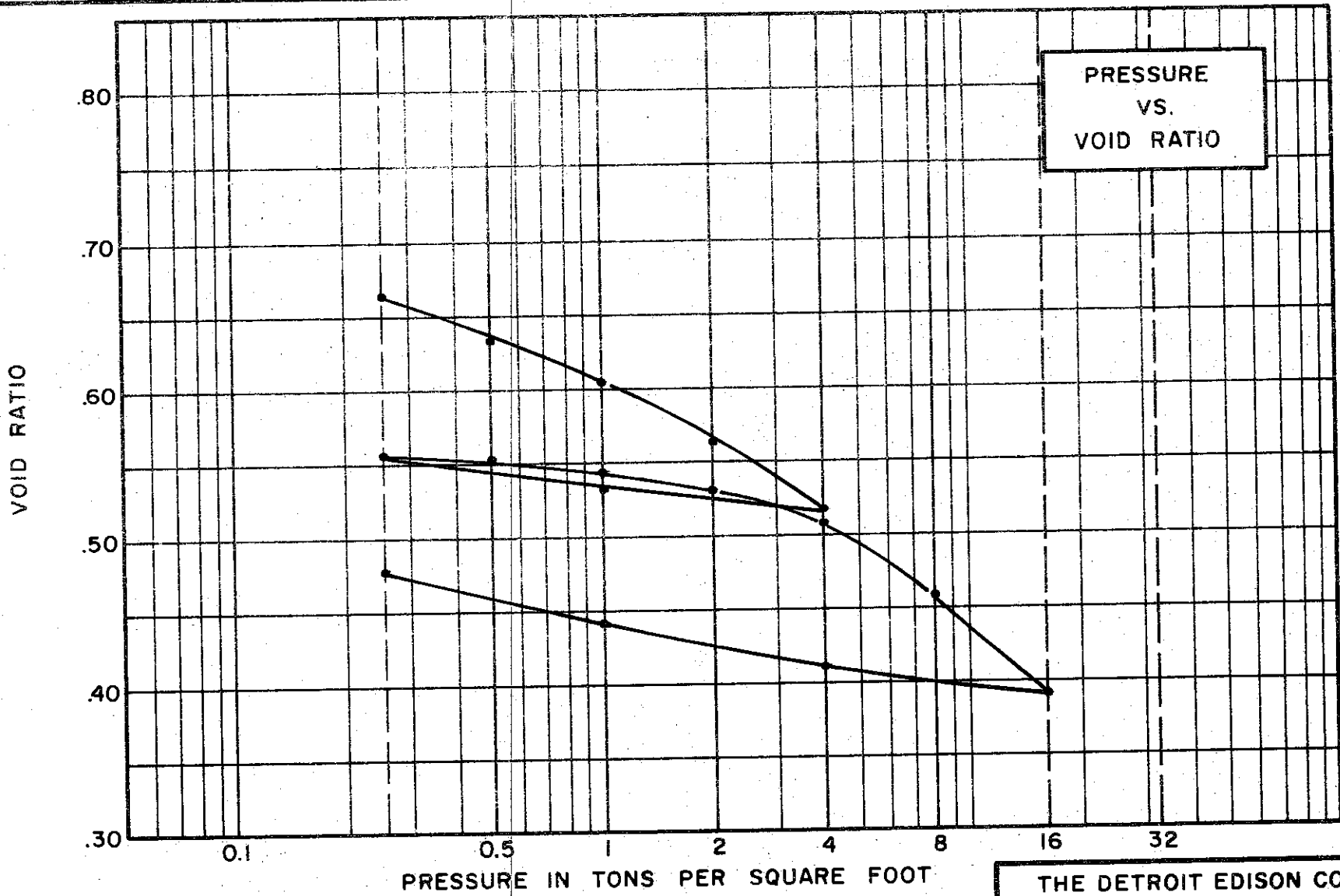
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C35.1  
 SAMPLE NO. 17 DATE JAN. 1974  
 DEPTH 73.5'

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY;  
SANDY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 26.7% FINAL 19.7%

ATTERBERG LIMITS:  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

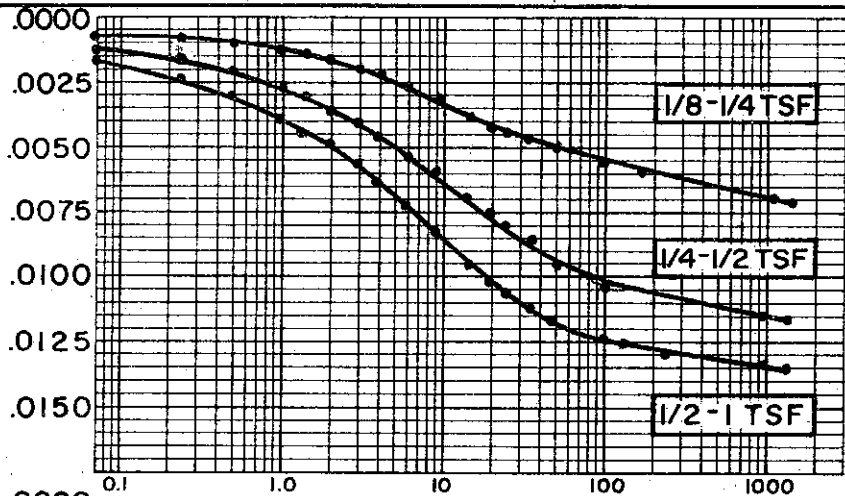
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

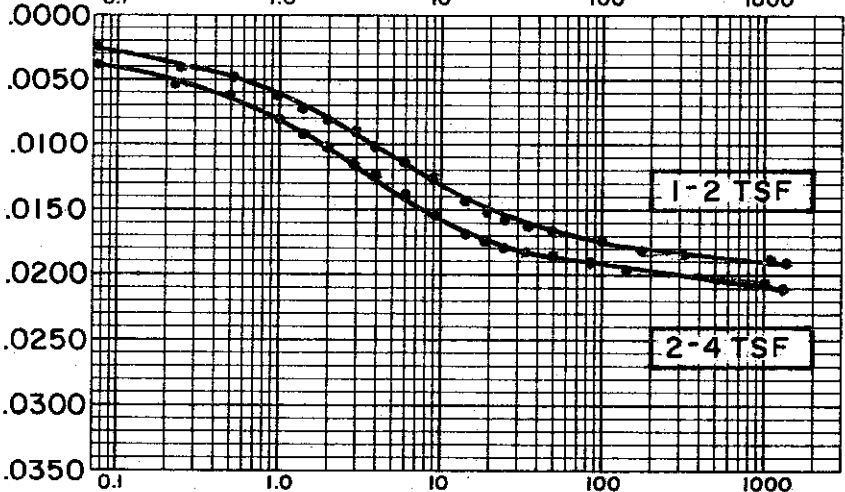
INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.697

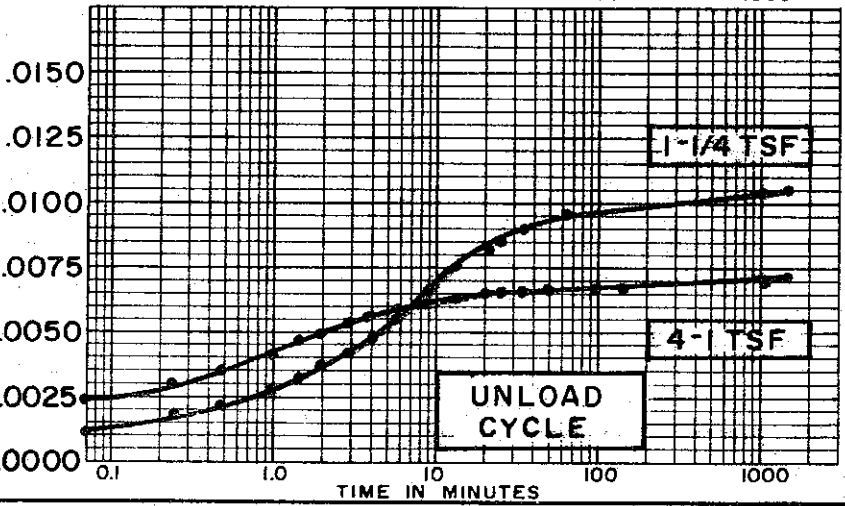
COMPRESSION IN INCHES



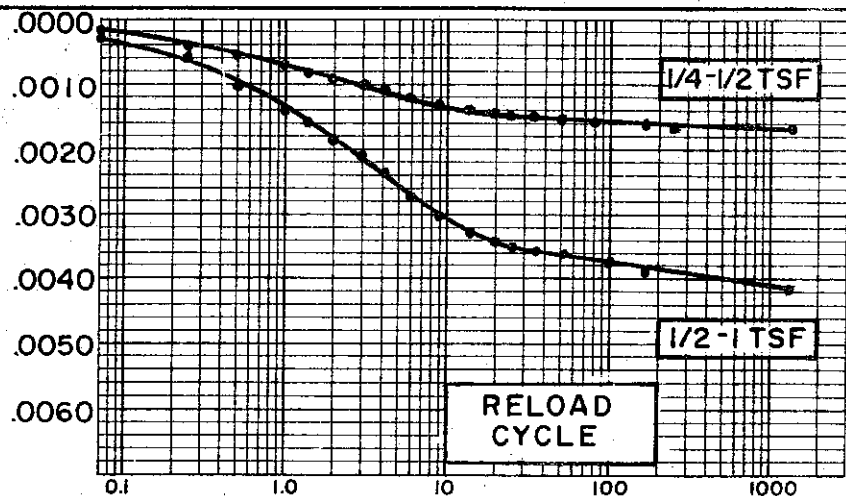
COMPRESSION IN INCHES



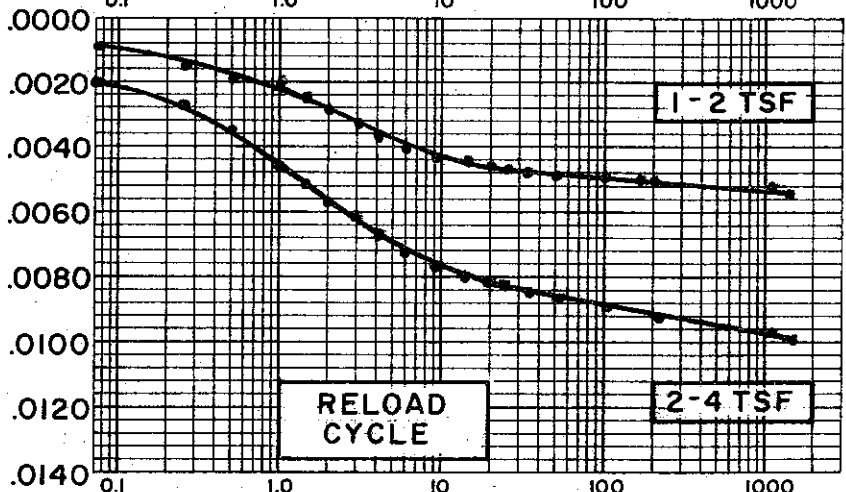
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7%  
 FINAL WATER CONTENT 19.7%

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5'

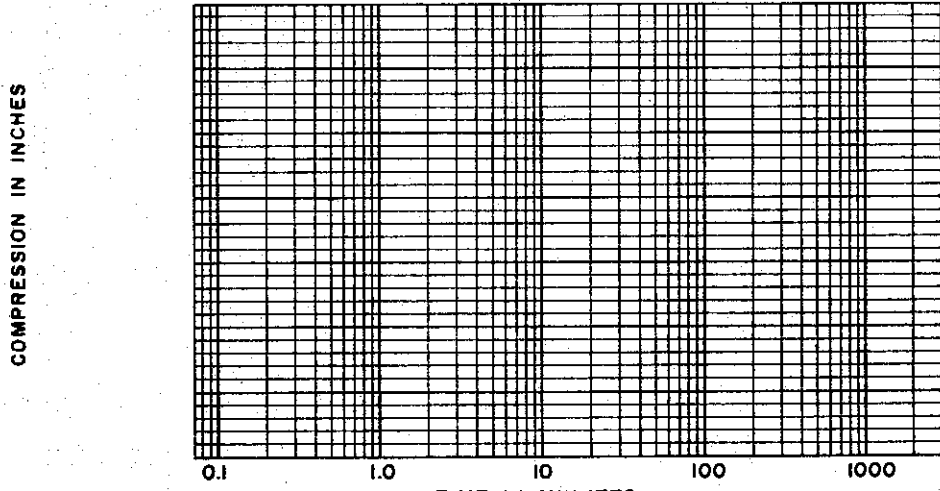
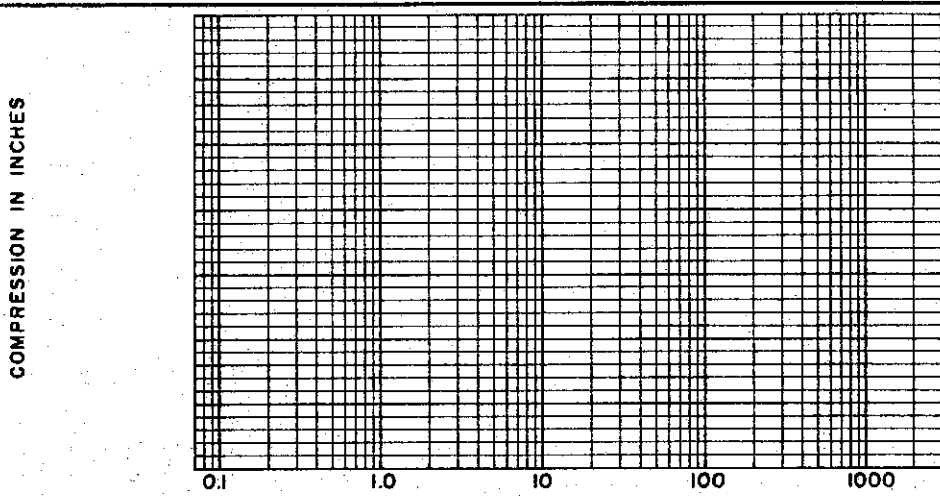
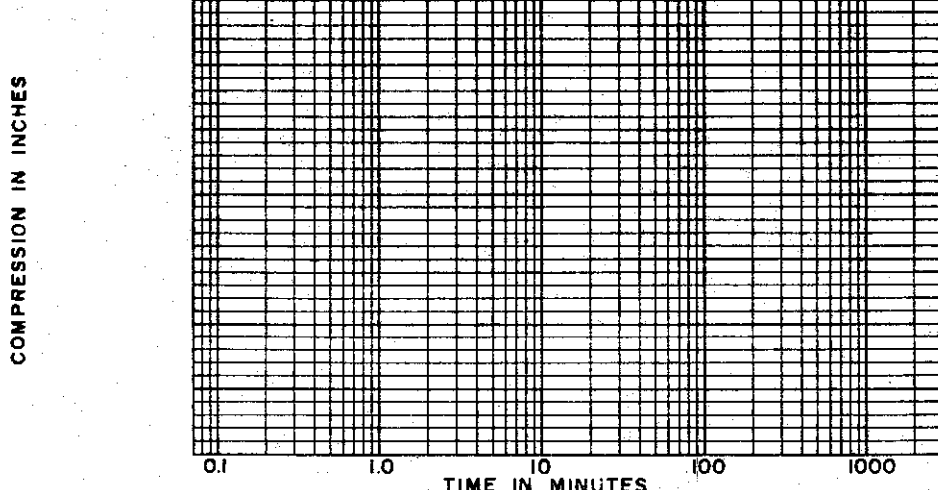
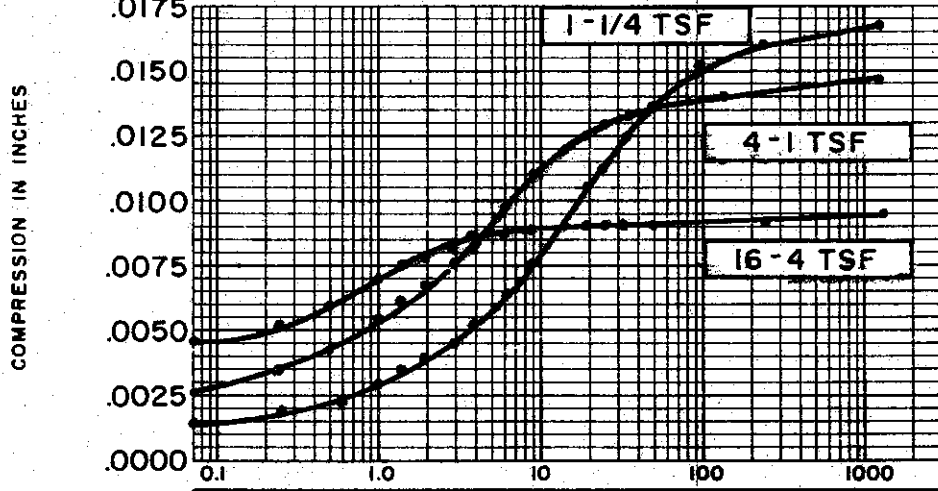
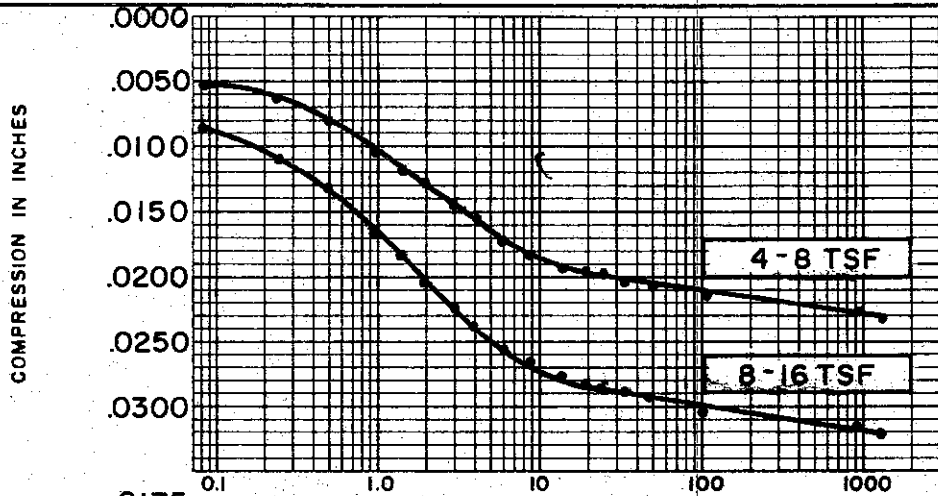
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DI. METER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-481

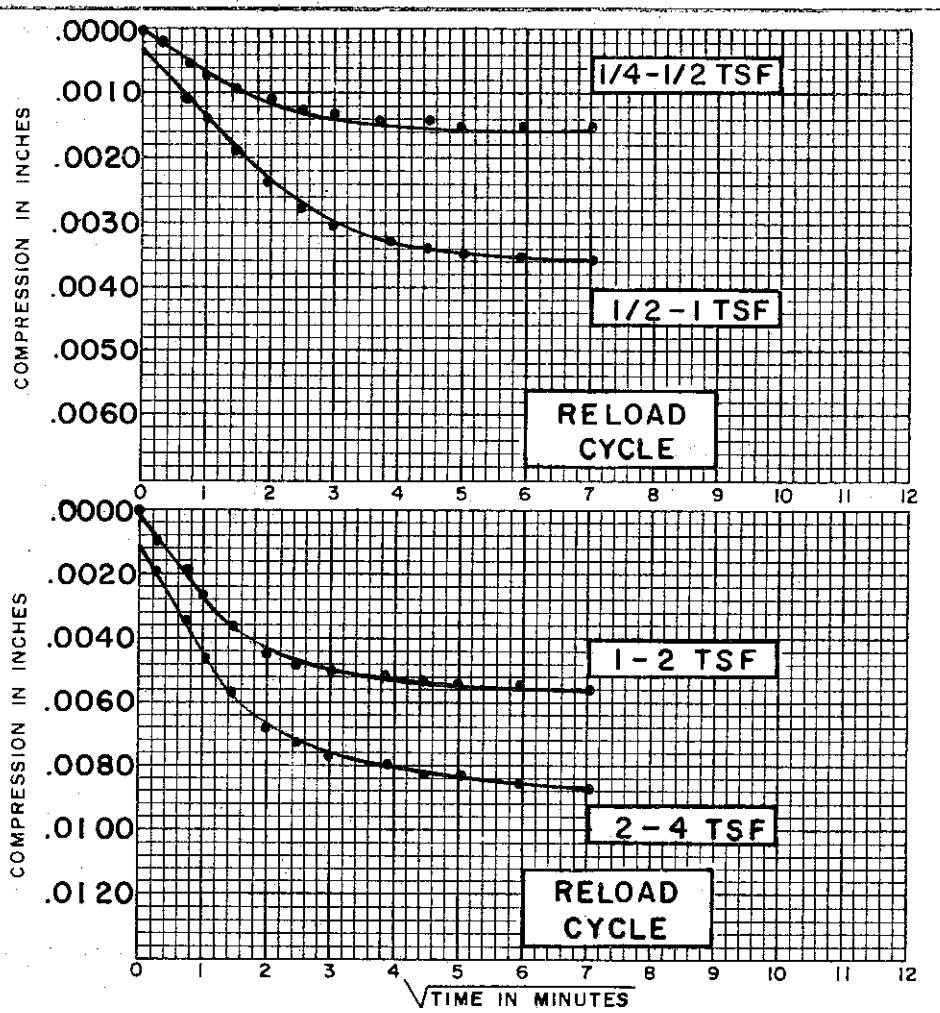
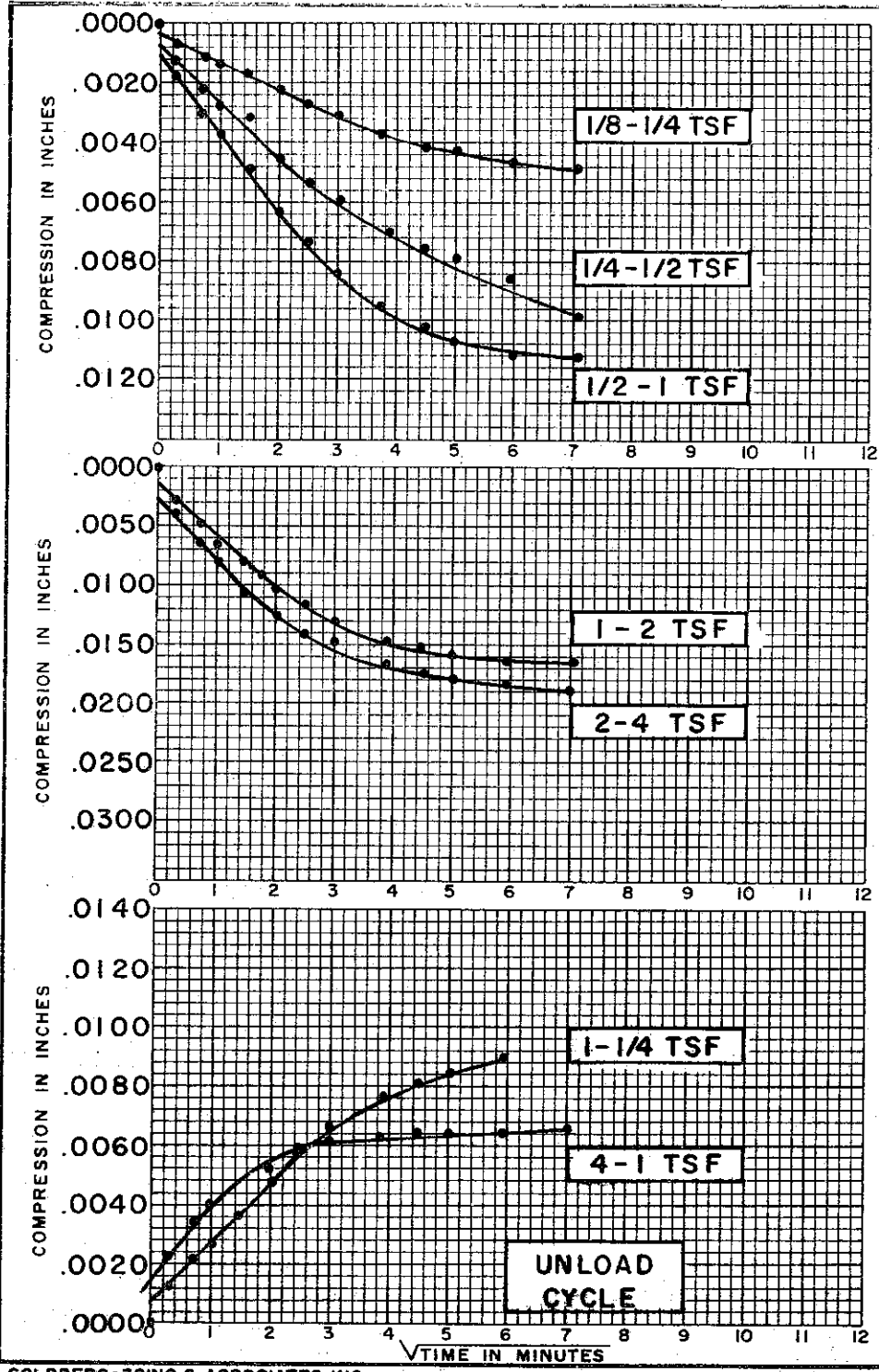


TIME IN MINUTES

SOIL PROPERTIES		BORING NO.	41
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)	SAMPLE NO.	17
SPECIFIC GRAVITY	2.68	DEPTH	73.5
INITIAL WATER CONTENT	26.7%		
FINAL WATER CONTENT	19.7%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

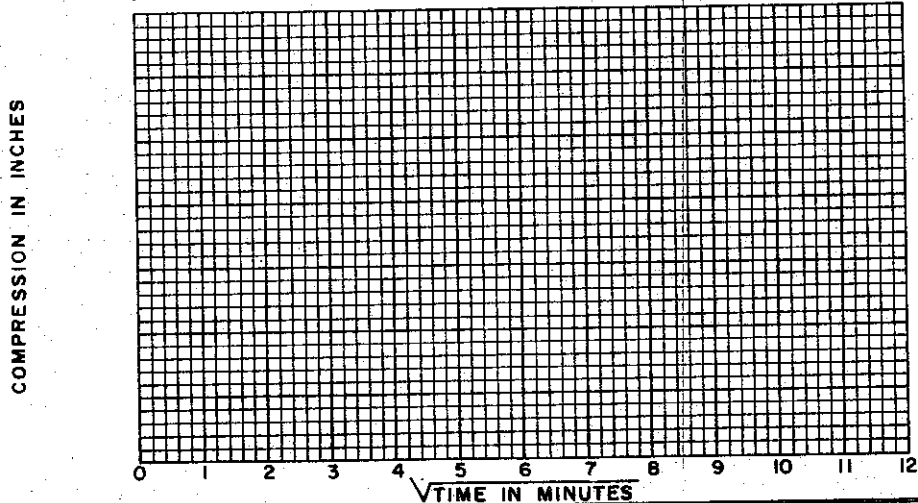
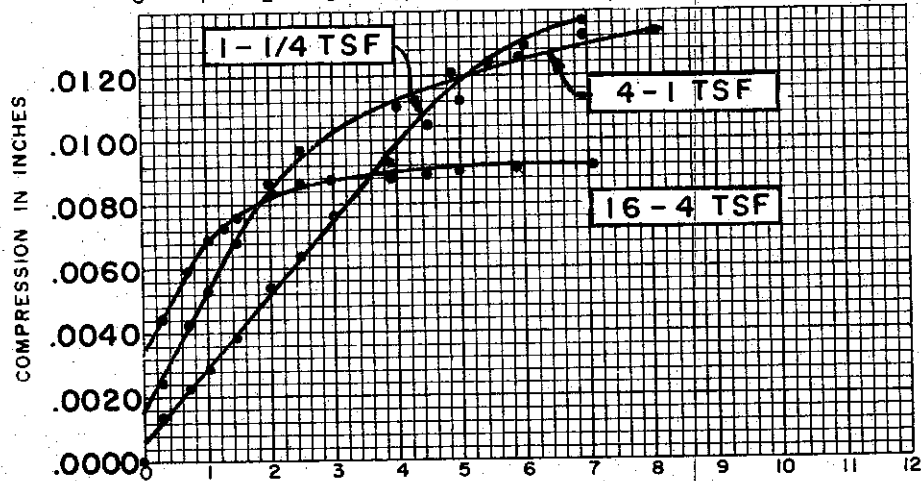
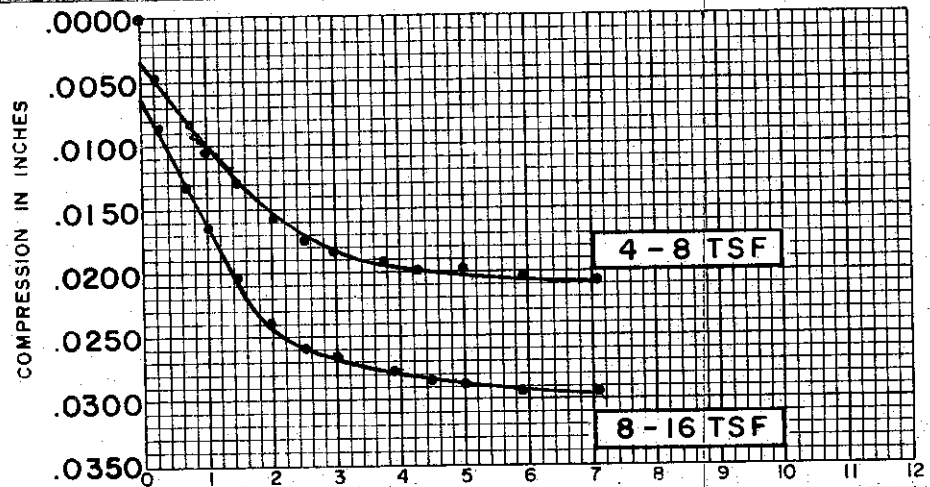


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

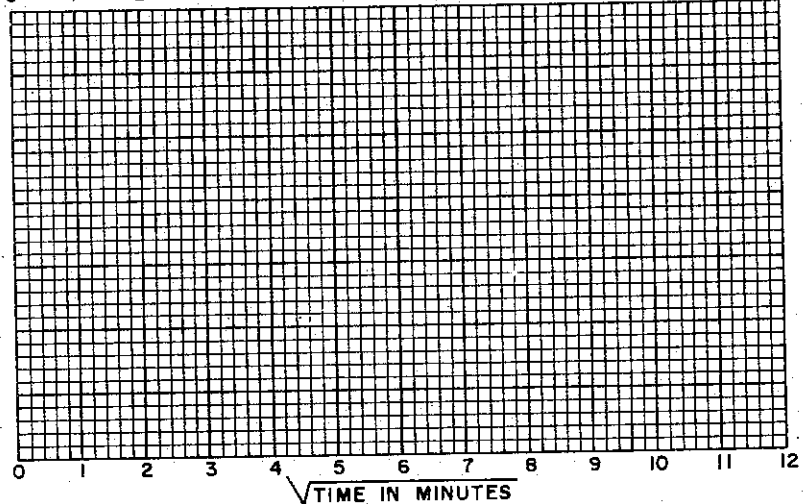
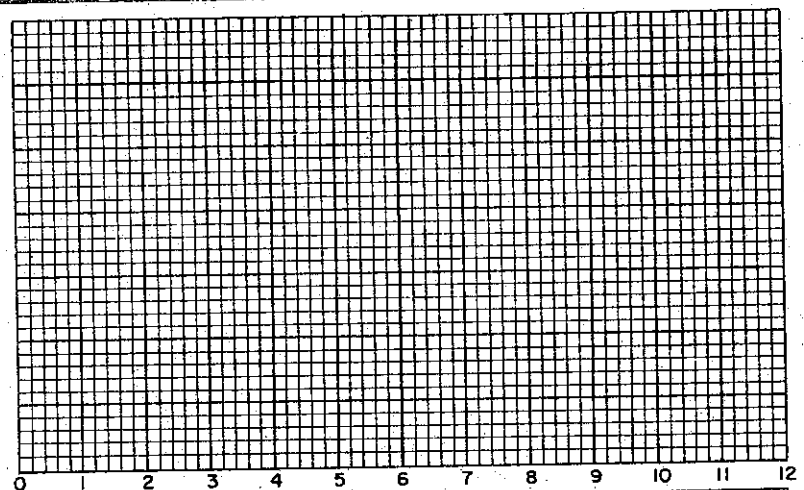
C-483

787-484



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7 %  
 FINAL WATER CONTENT 19.7 %

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5

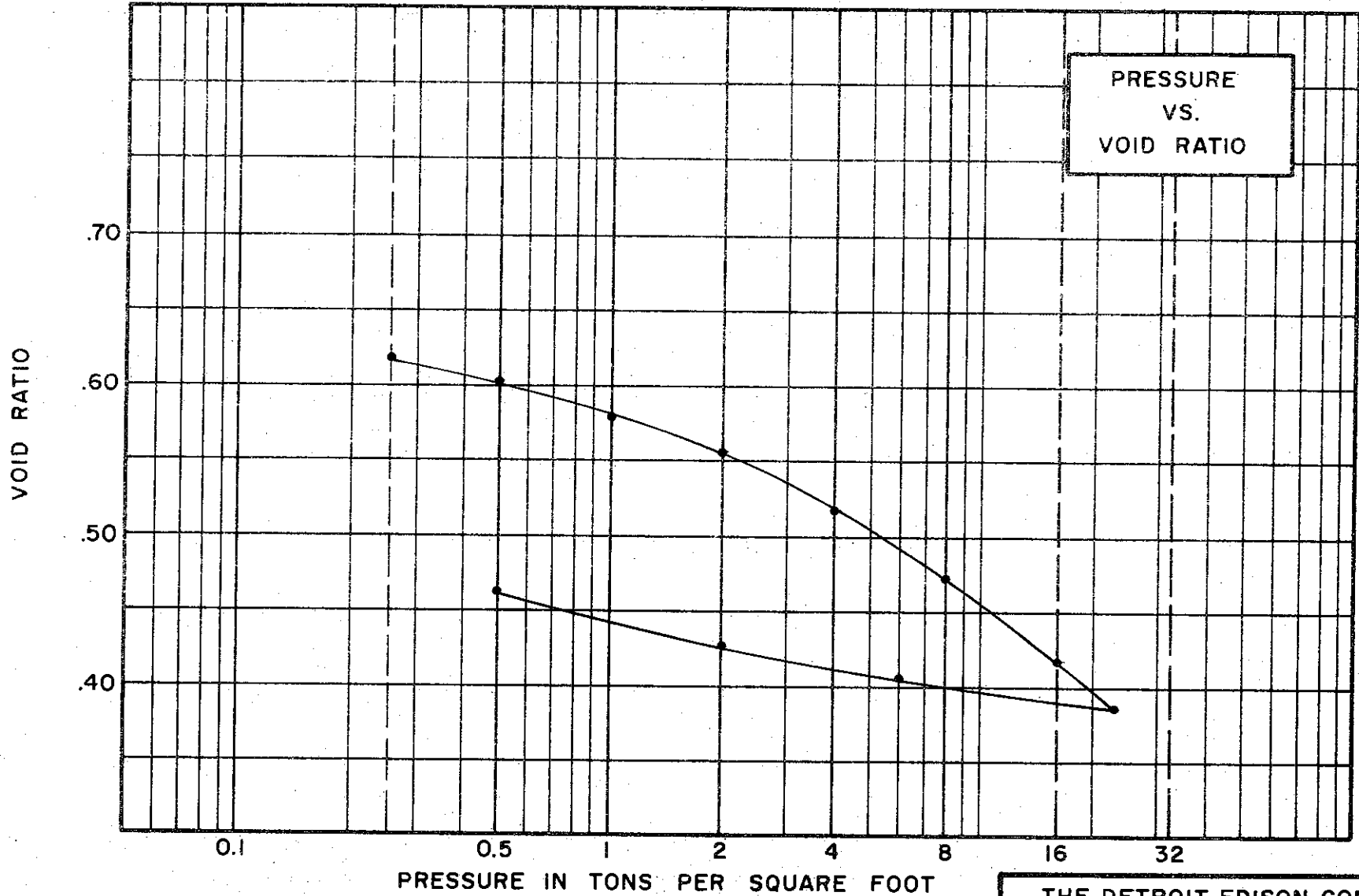
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 24.2% FINAL 19.4%  
ATTERBERG LIMITS:  
LIQUID LIMIT 29% PLASTIC LIMIT 19%

**TEST DATA**

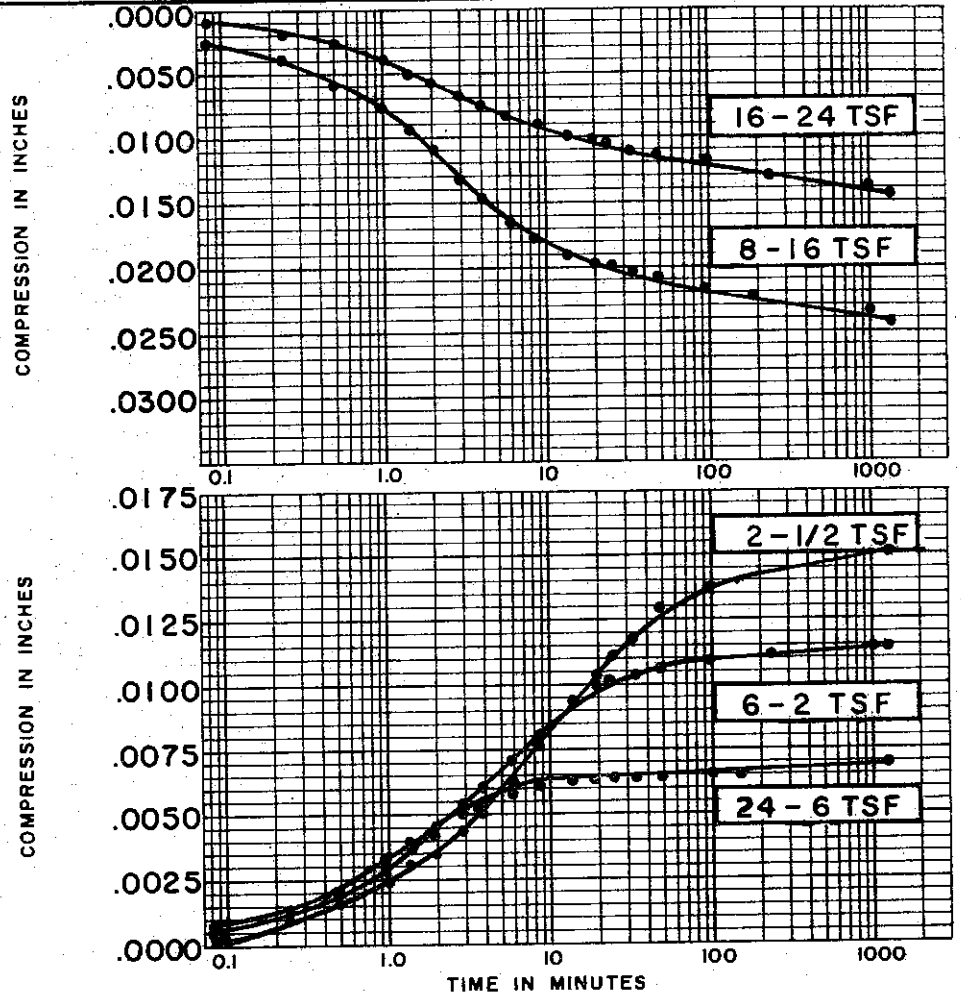
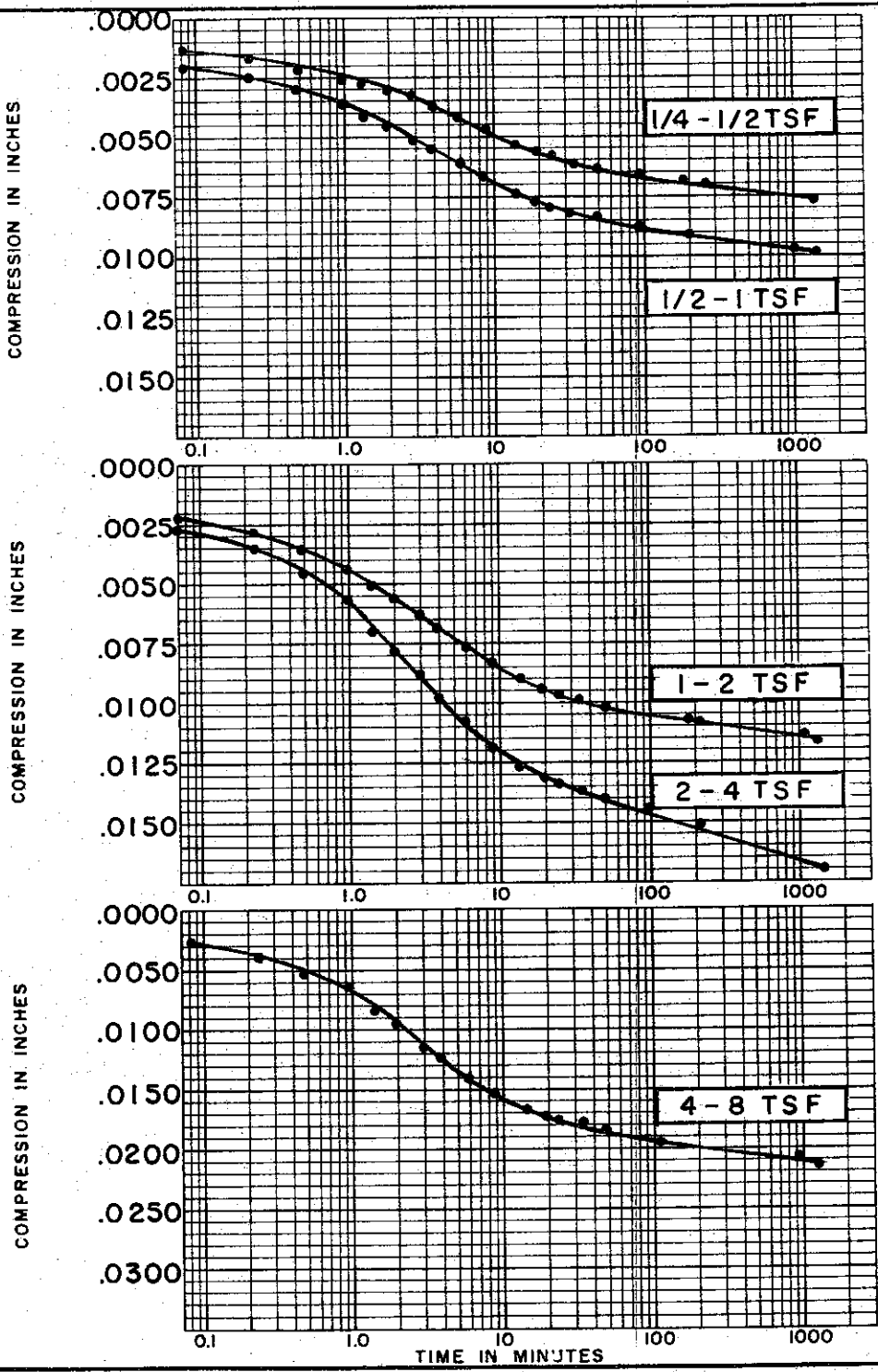
INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C38.1  
SAMPLE NO. 25 DATE JAN. 1974  
DEPTH 113'

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

INITIAL WATER CONTENT 24.2 %

FINAL WATER CONTENT 19.4 %

BORING NO. 41

SAMPLE NO. 25

DEPTH 113'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"

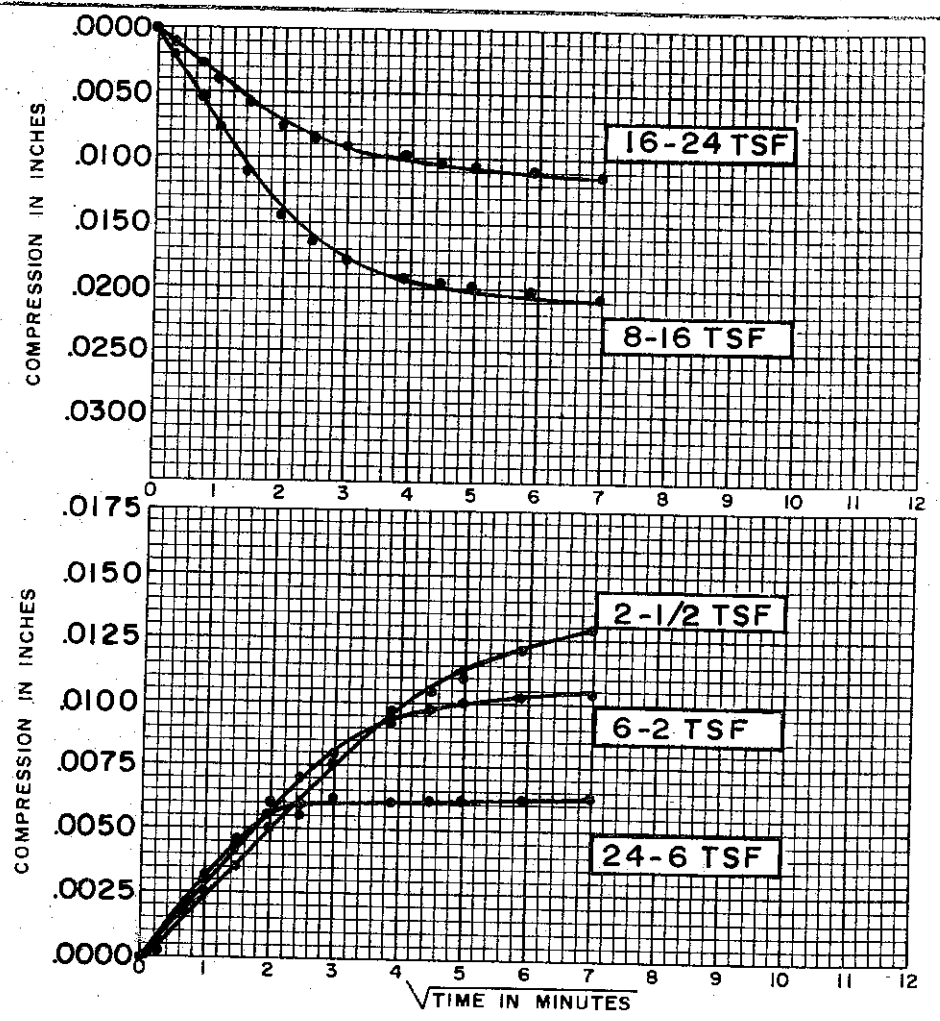
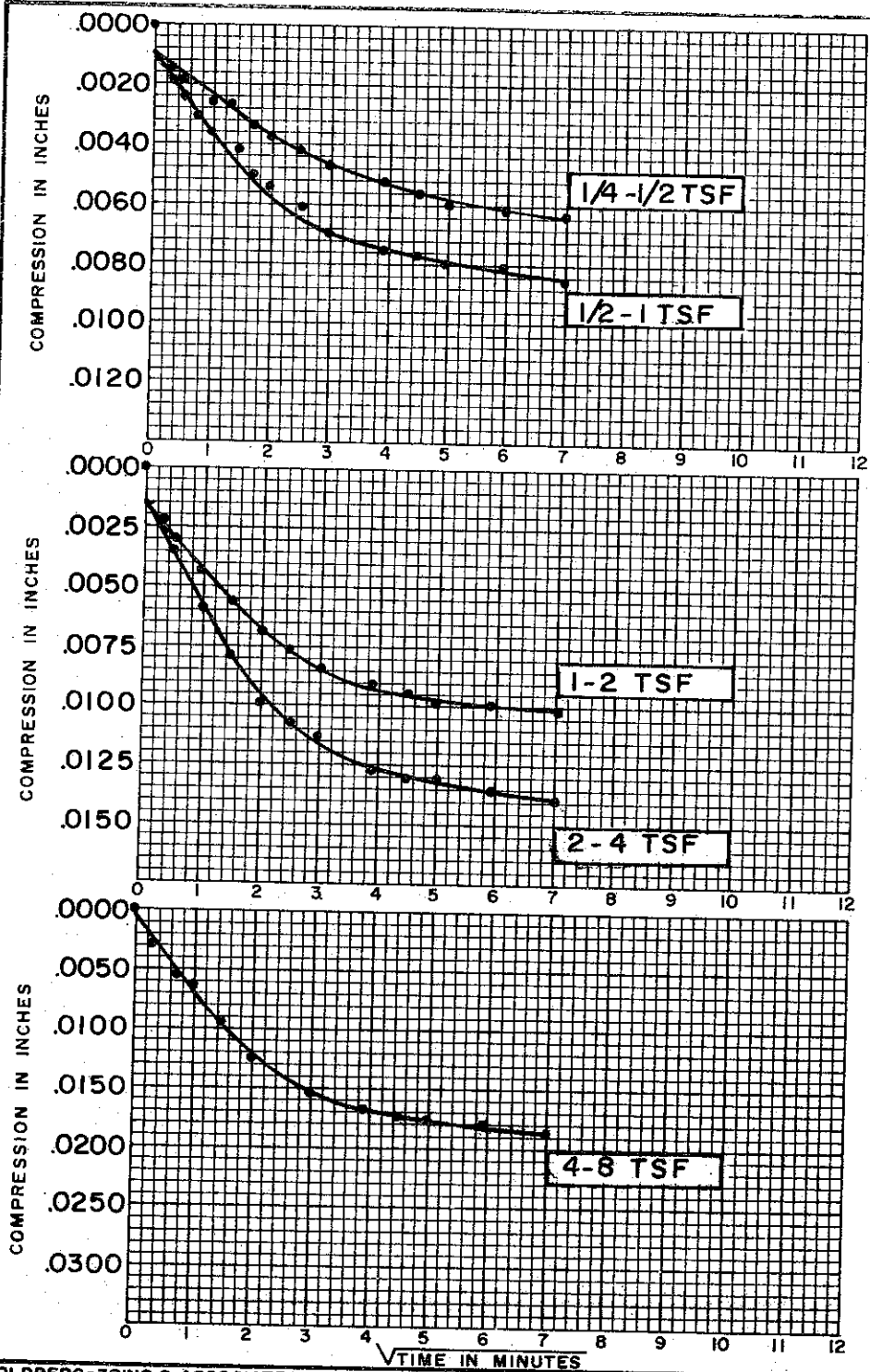
INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 24.2%  
 FINAL WATER CONTENT 19.4%

BORING NO. 41  
 SAMPLE NO. 25  
 DEPTH 113'

**TEST DATA**

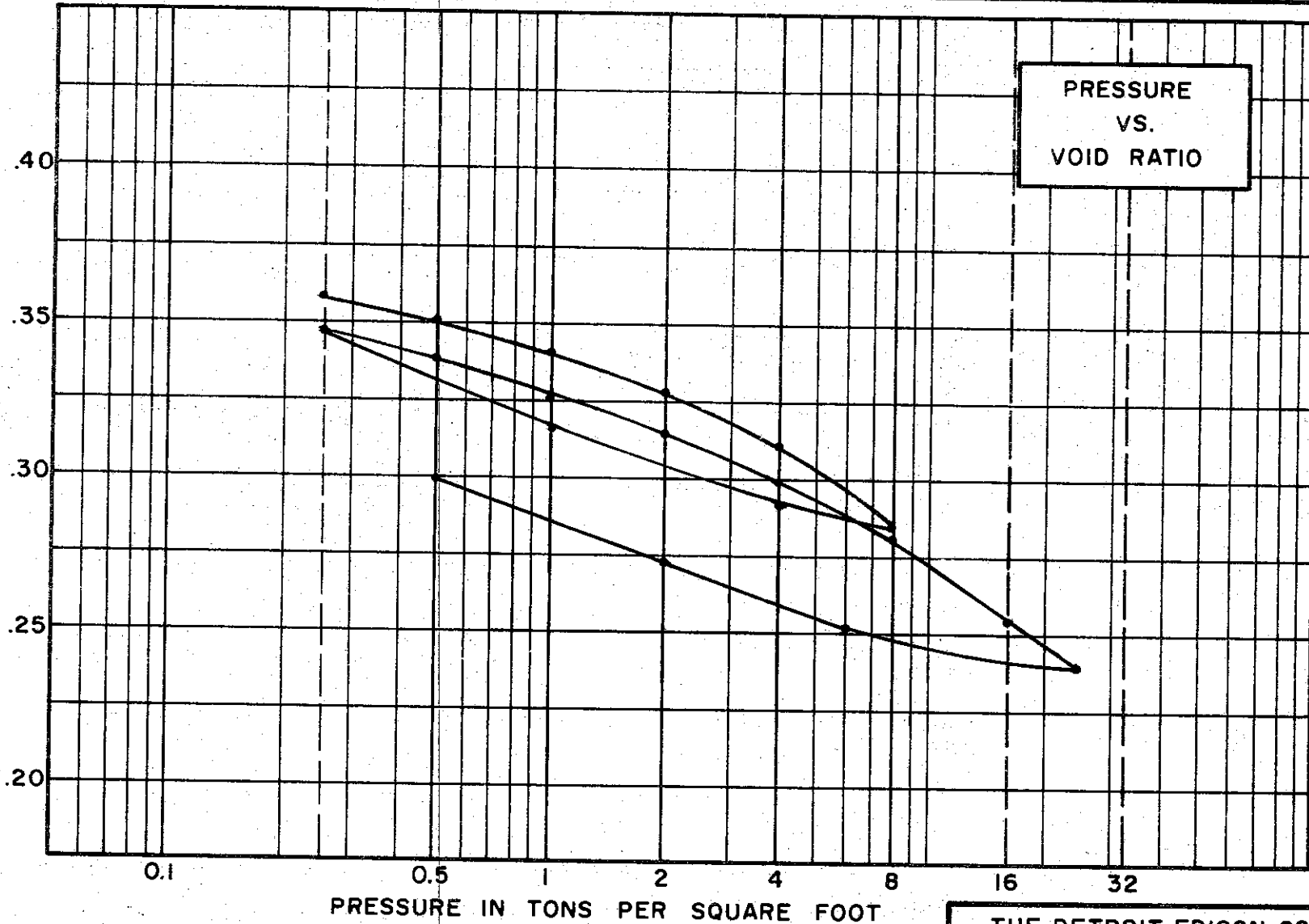
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 WATER CONTENT, INITIAL 11.3% FINAL 12.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

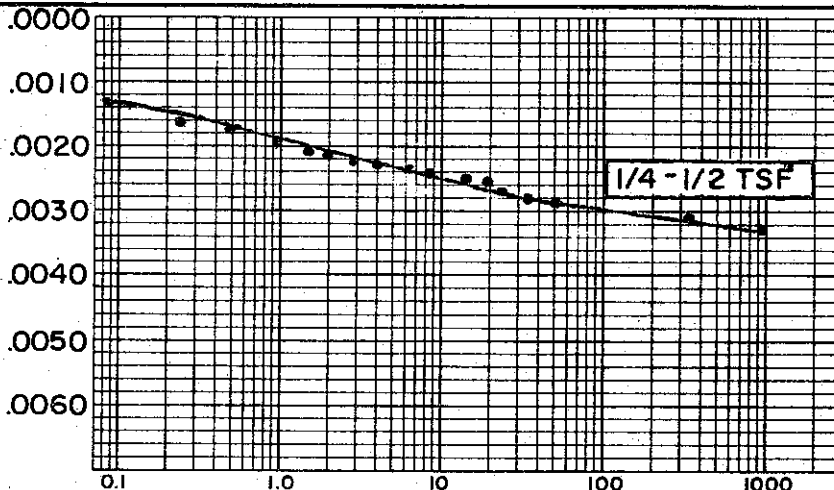
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.370

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

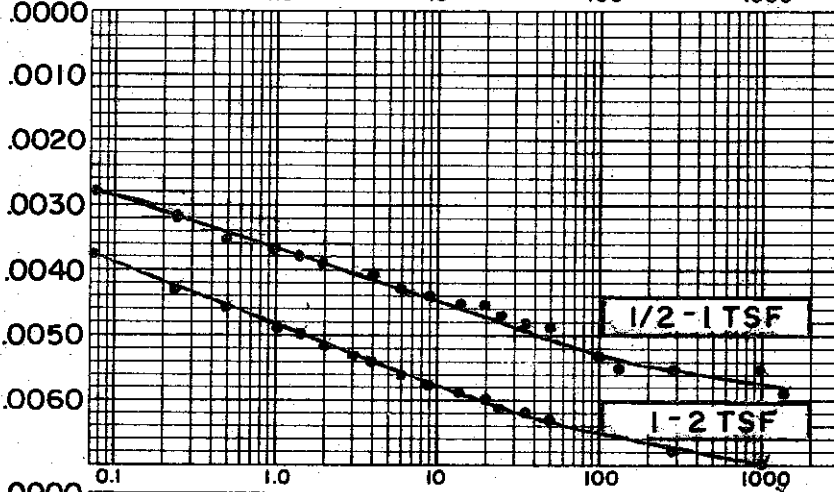
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C4C.1  
 SAMPLE NO. 29 DATE FEB. 1974  
 DEPTH 130.8'

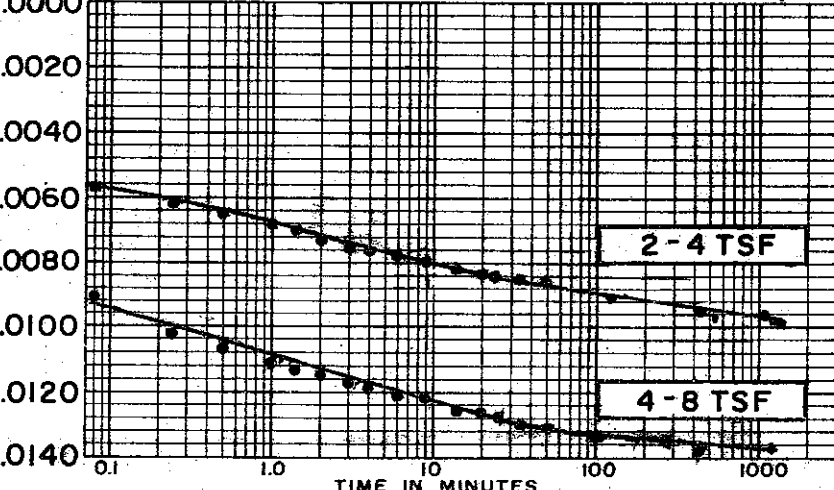
COMPRESSION IN INCHES



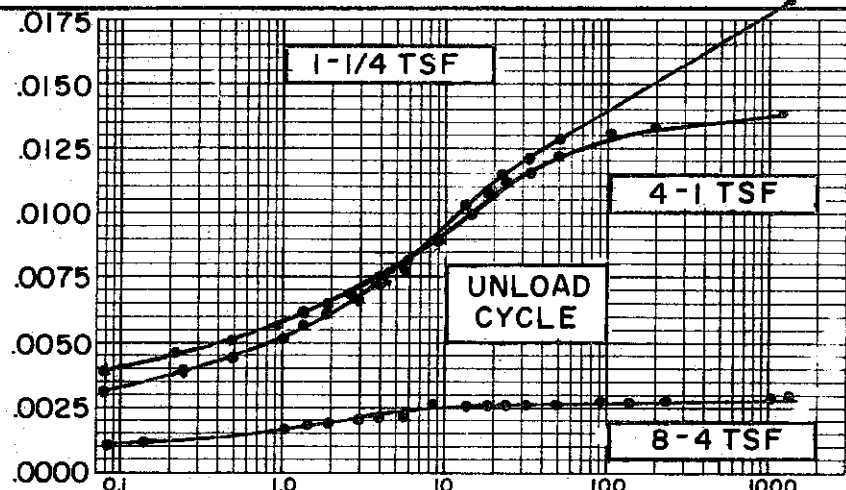
COMPRESSION IN INCHES



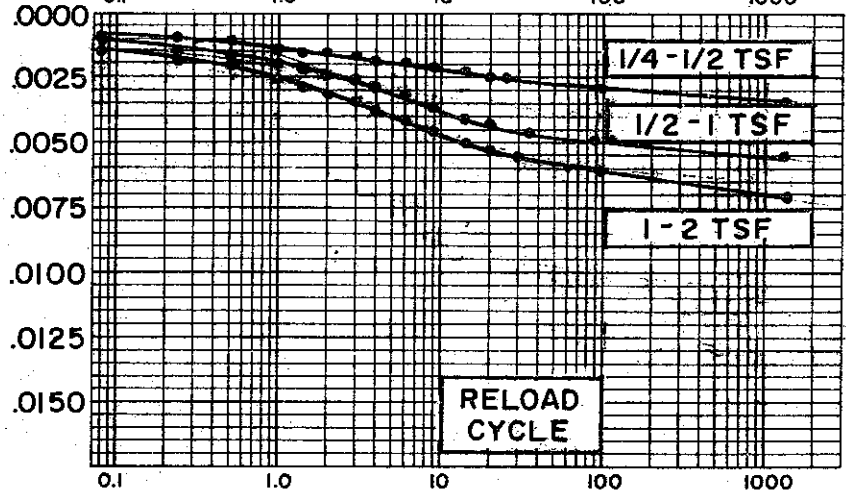
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



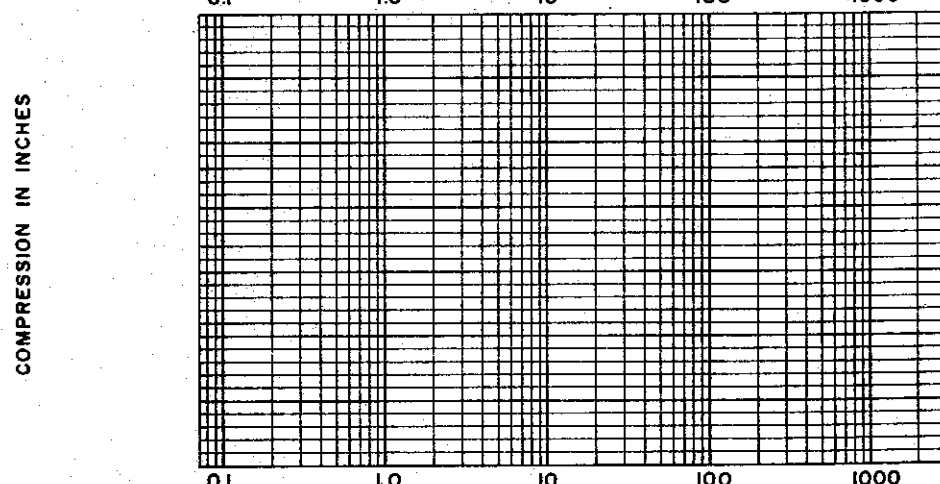
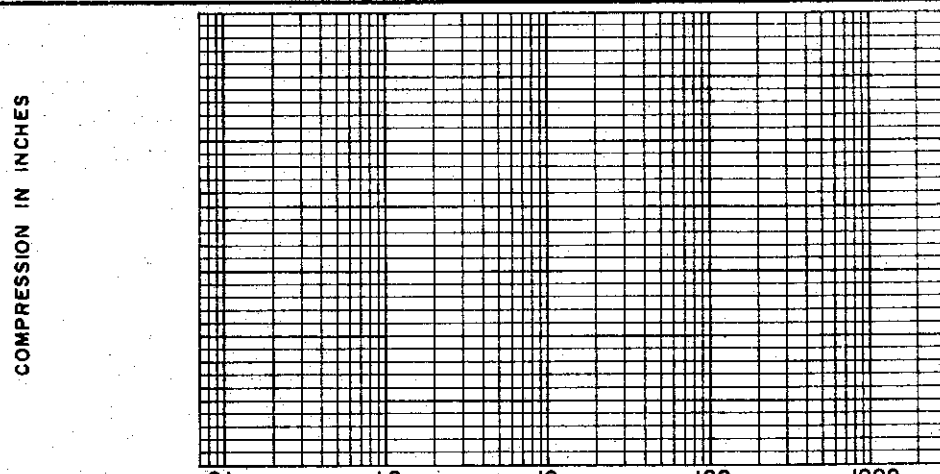
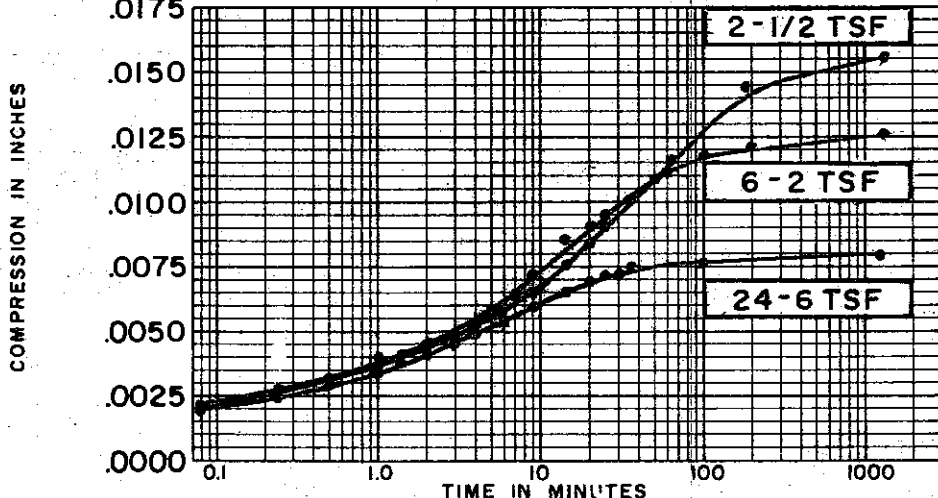
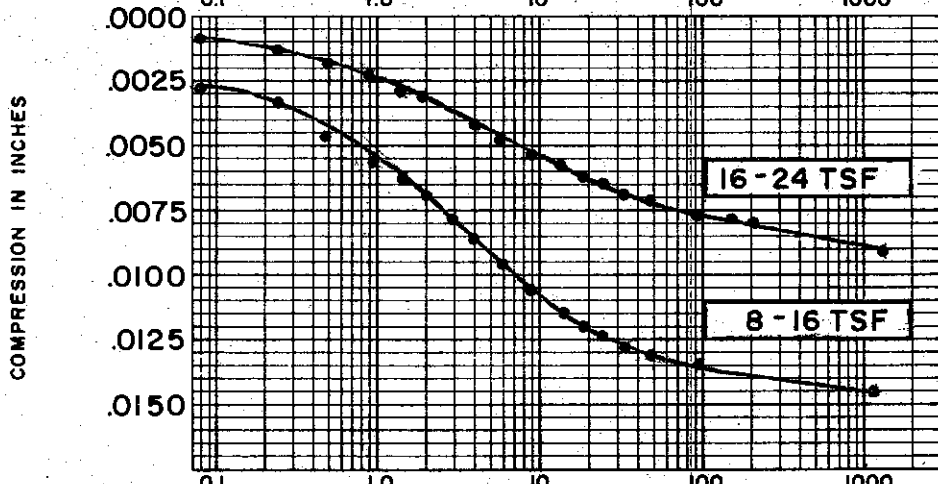
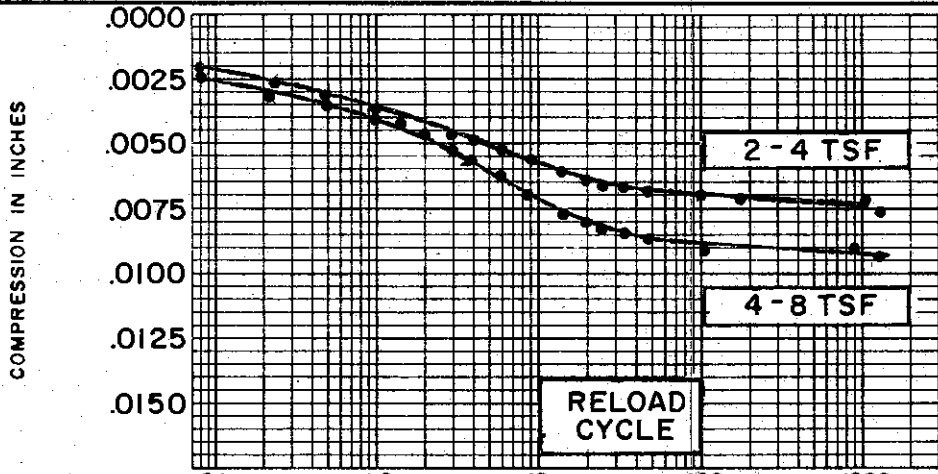
TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

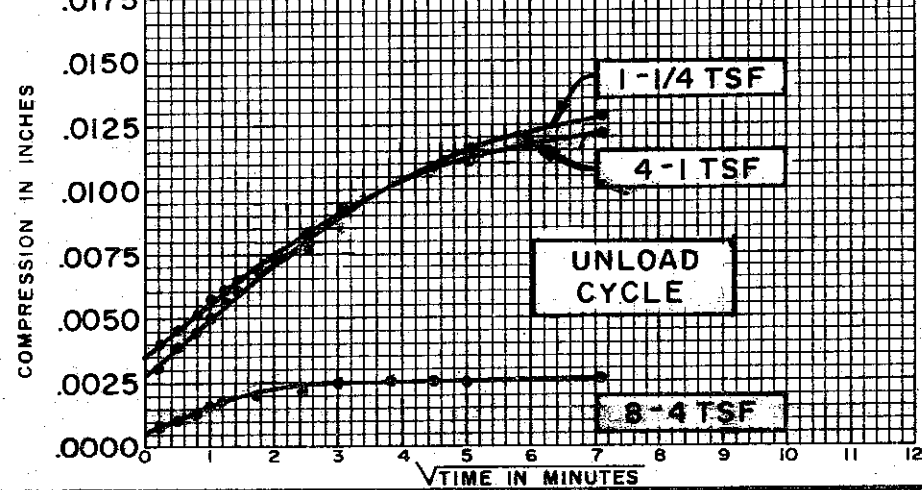
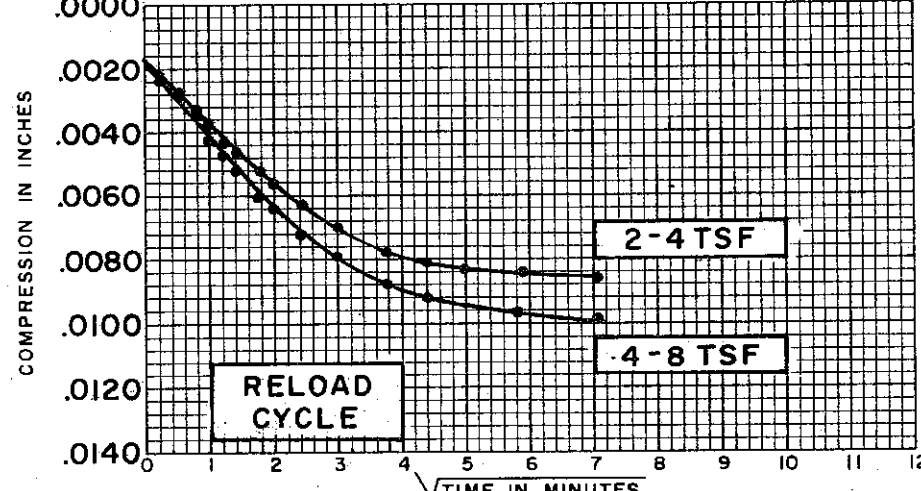
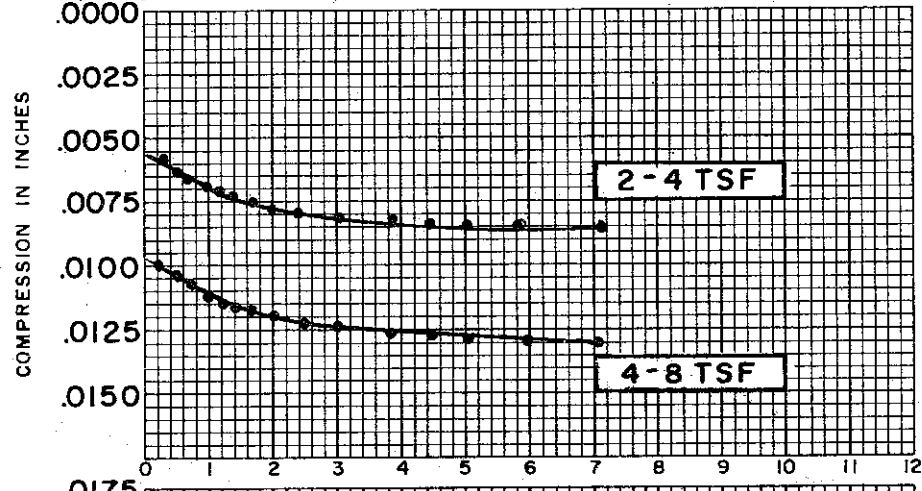
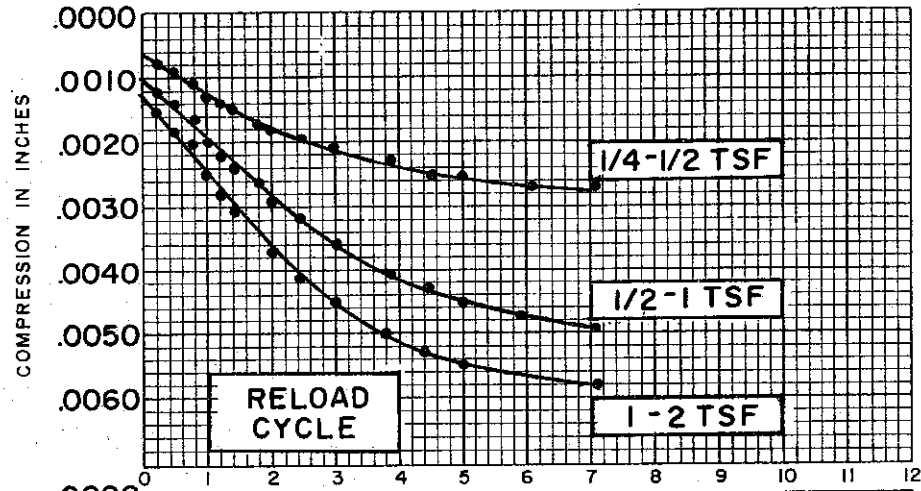
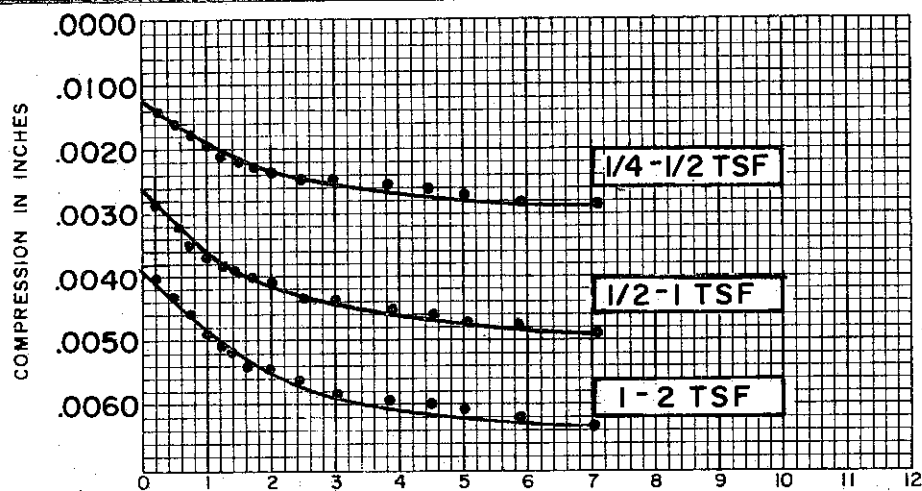
C-489



SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

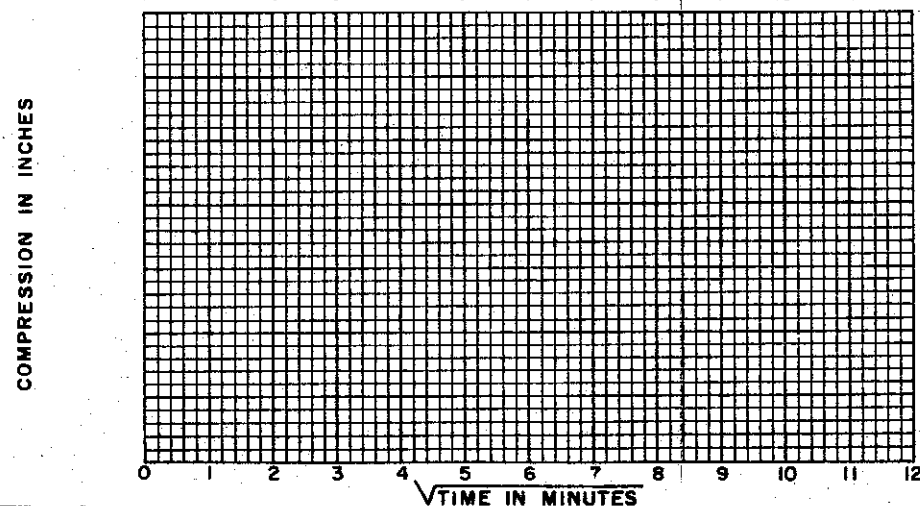
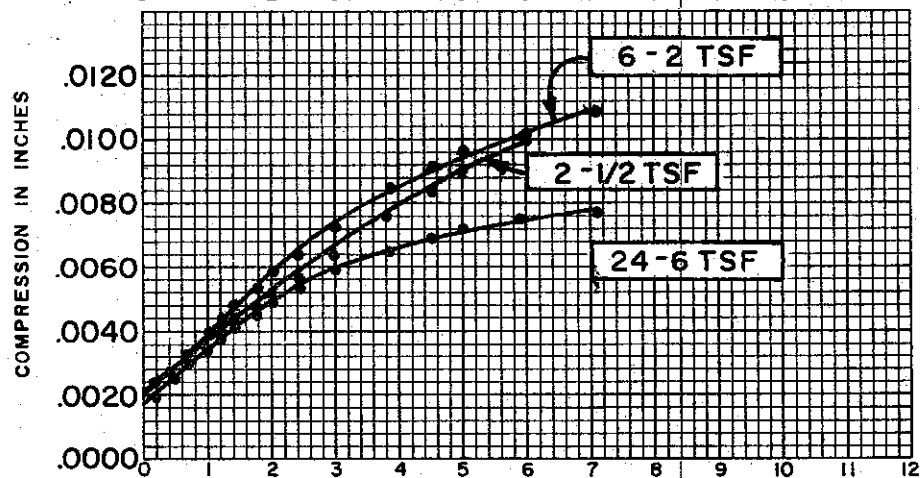
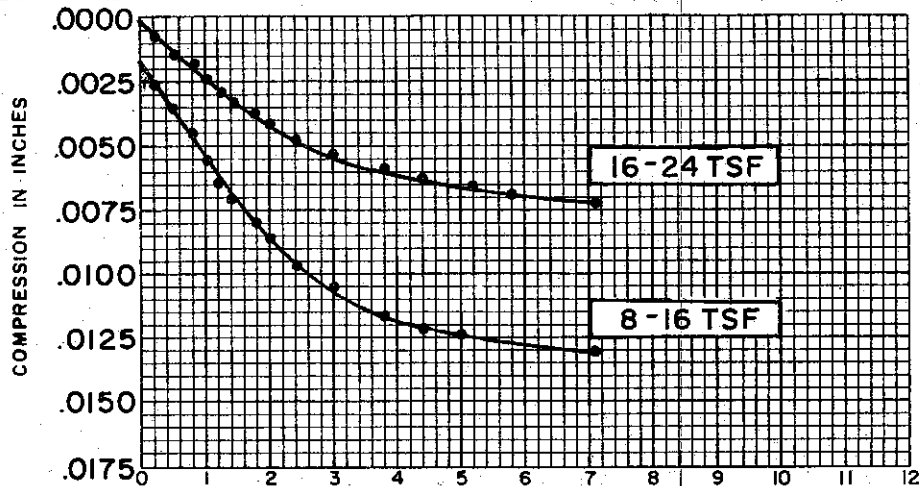
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



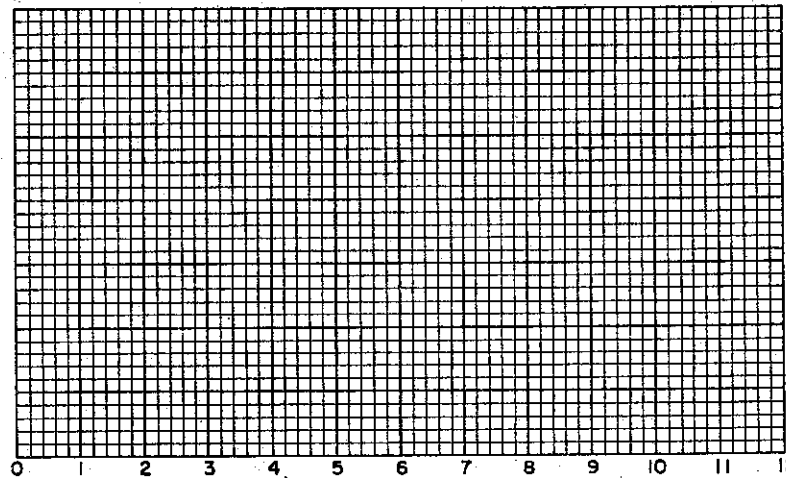
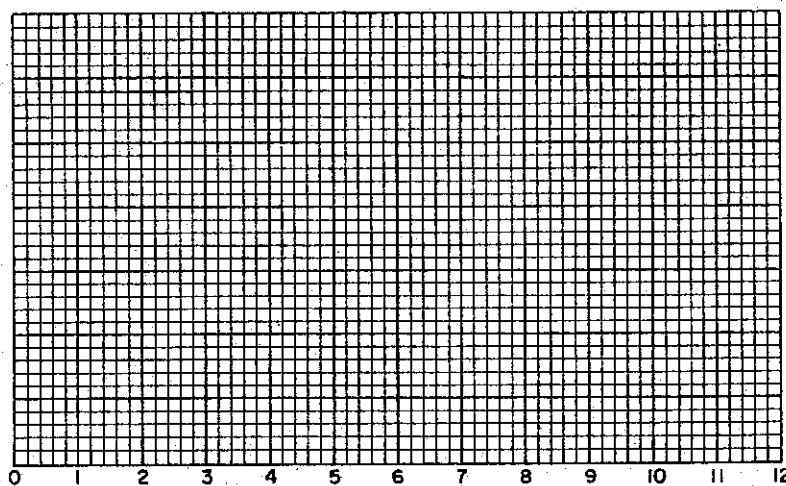
SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



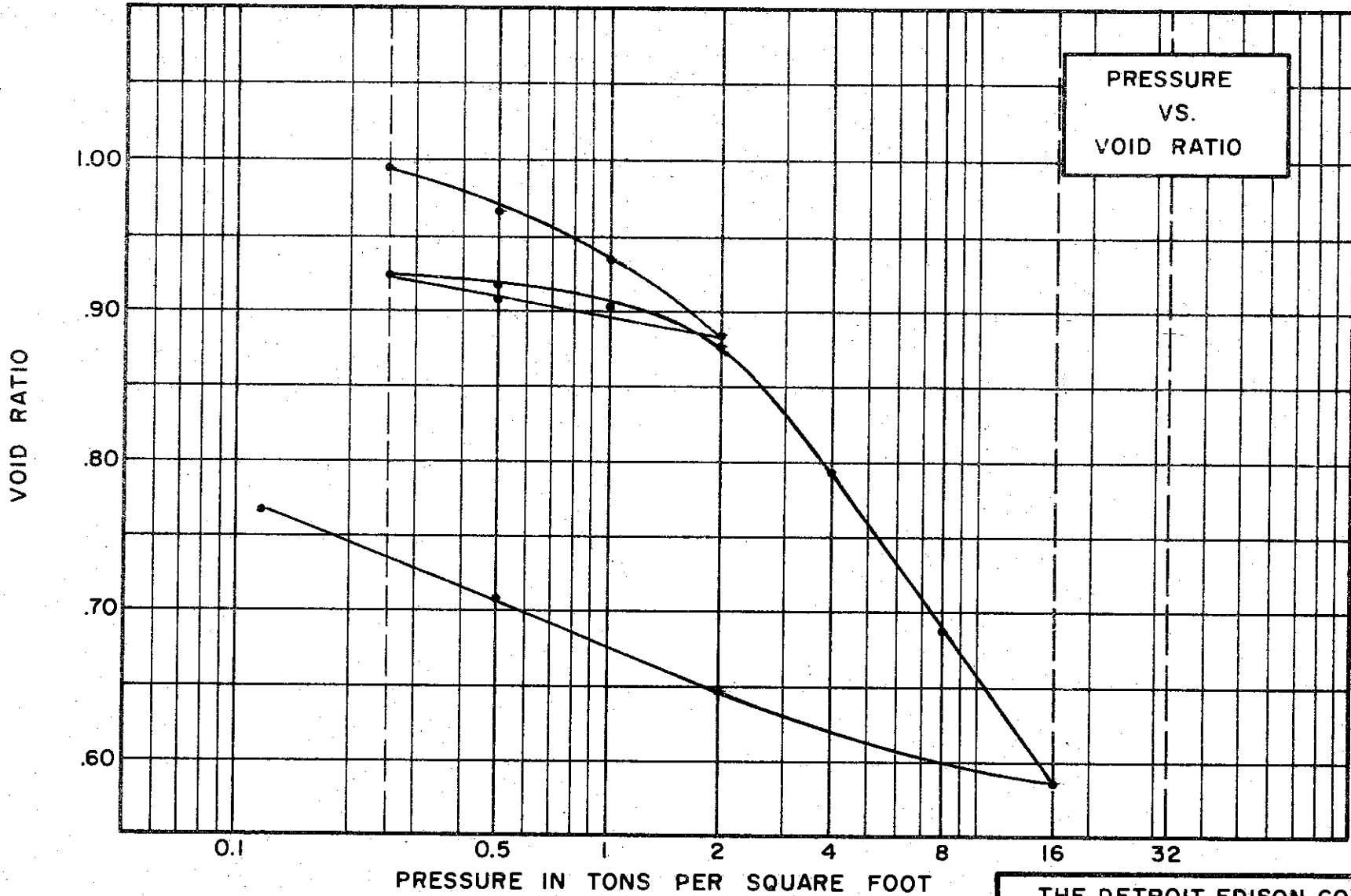
√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.5%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.8% FINAL 31.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

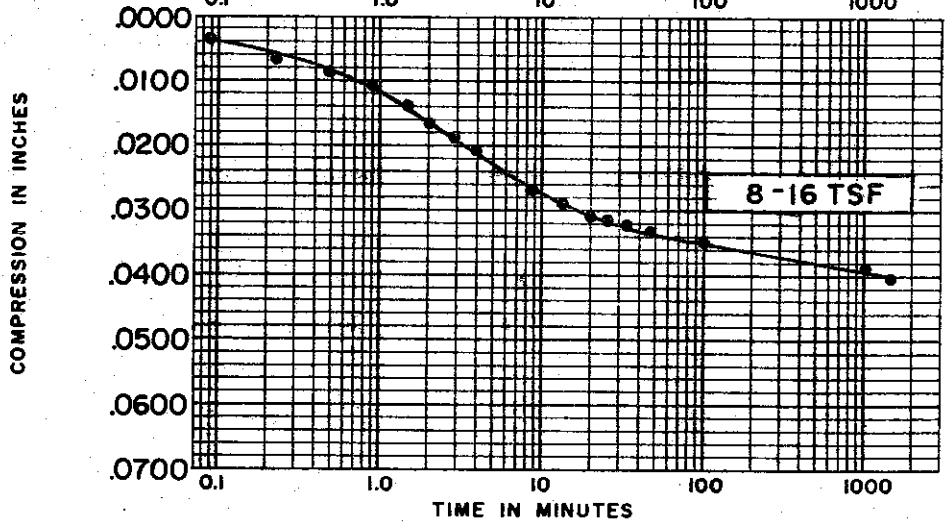
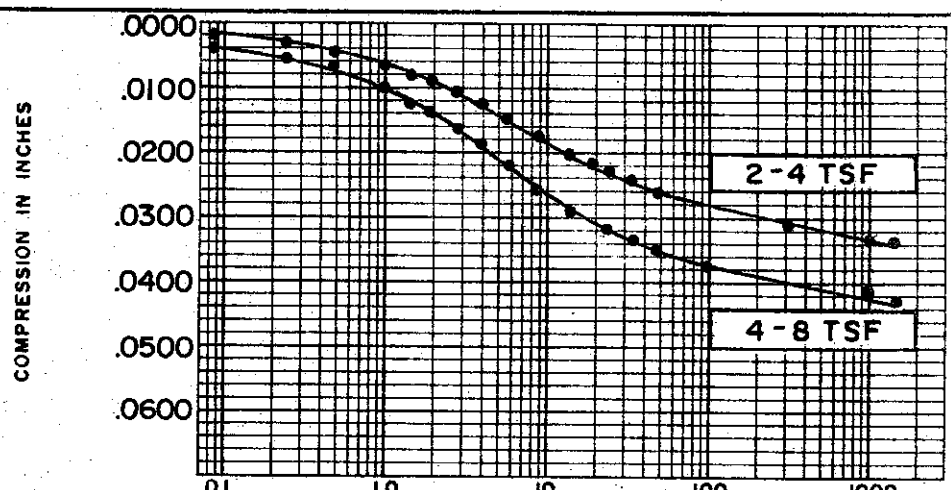
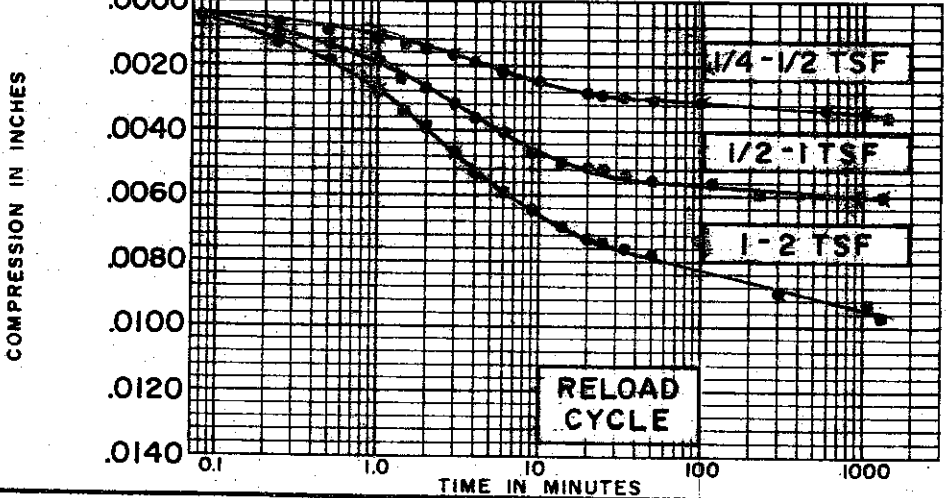
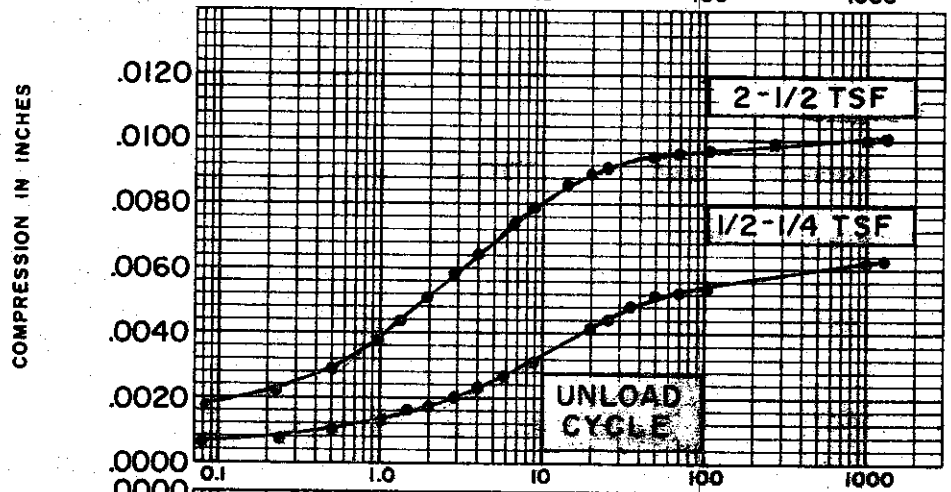
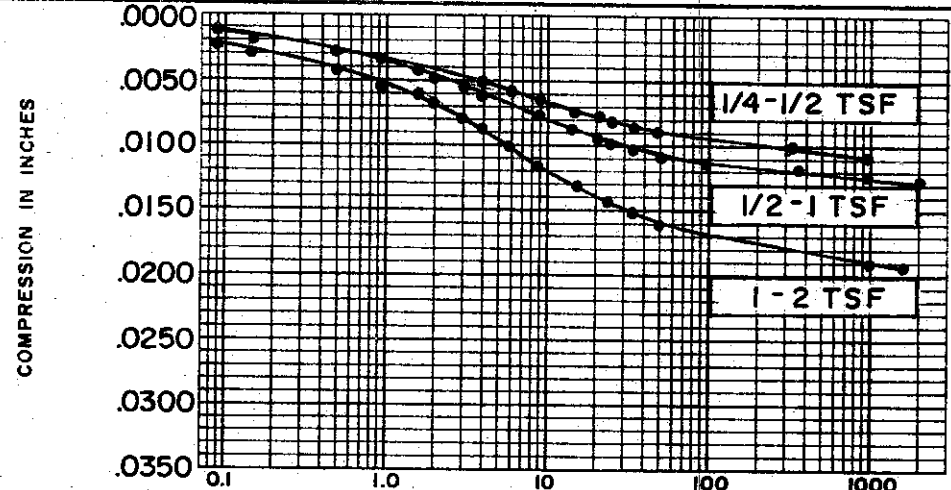
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 48 TEST NO. C202.1  
 SAMPLE NO. 10 DATE MARCH 74  
 DEPTH 39.2' TO 39.4'

C-493



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	29.8%
FINAL WATER CONTENT	31.5%
BORING NO.	48
SAMPLE NO.	10
DEPTH	39.2' TO 39.4'

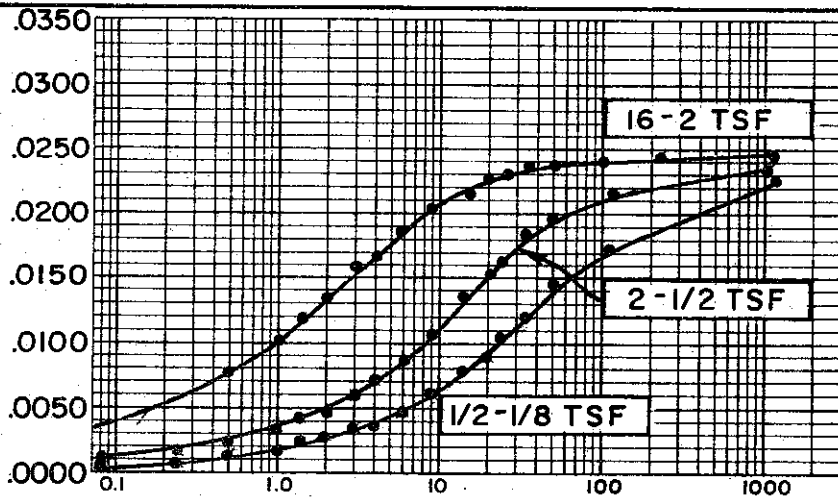
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.027

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

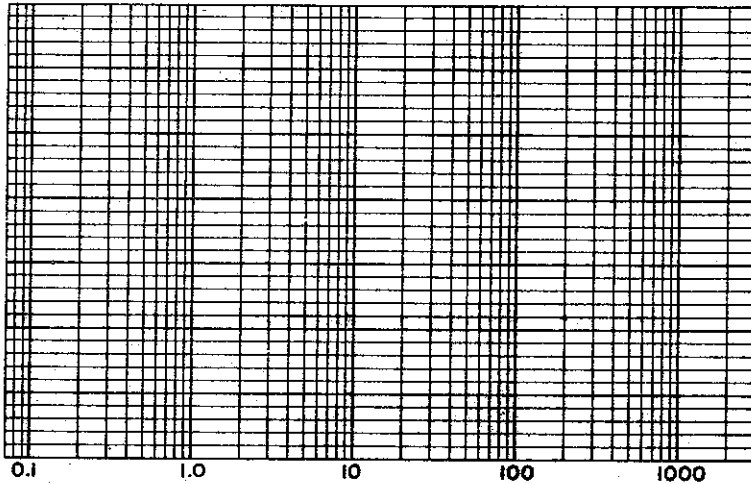


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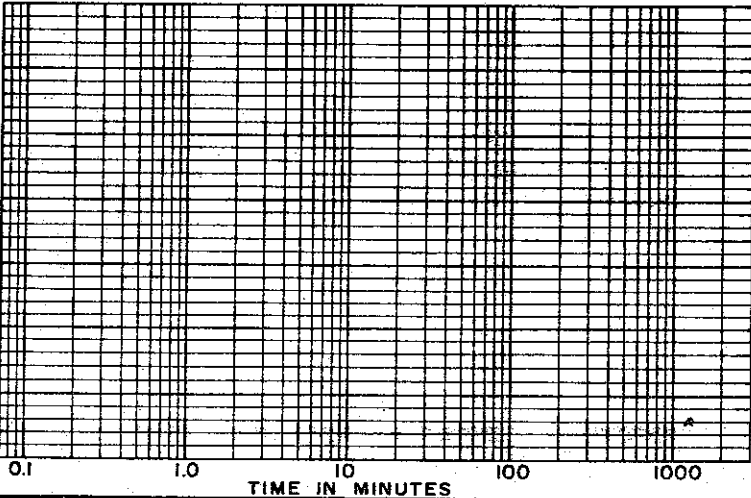
COMPRESSION IN INCHES



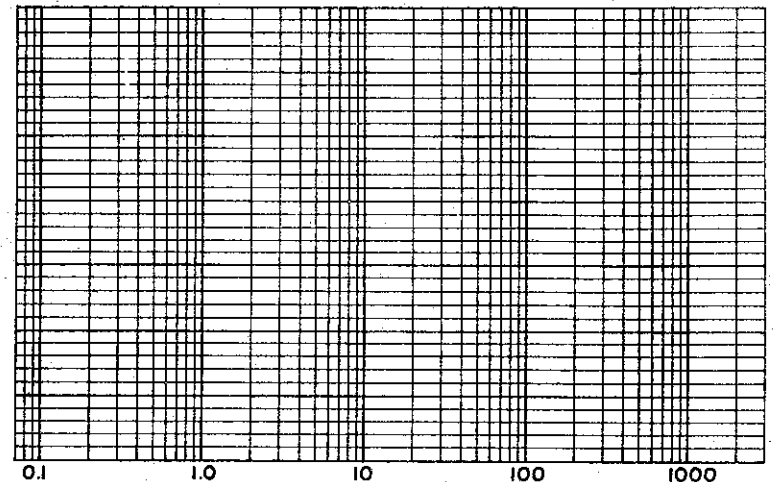
COMPRESSION IN INCHES



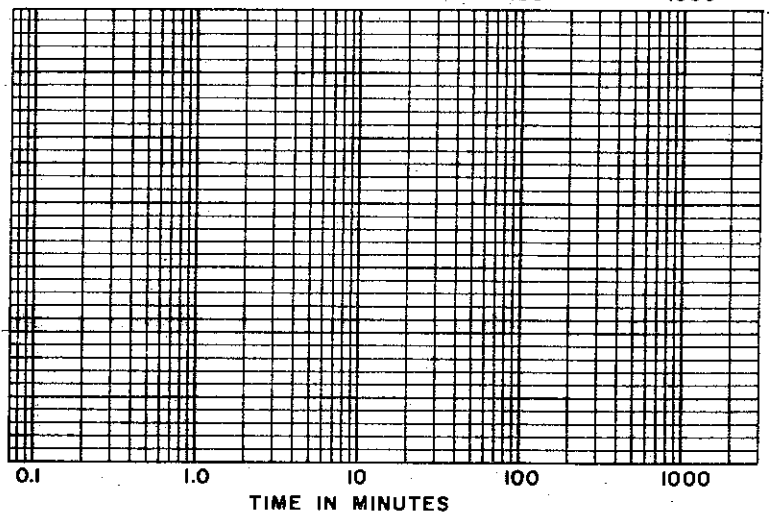
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

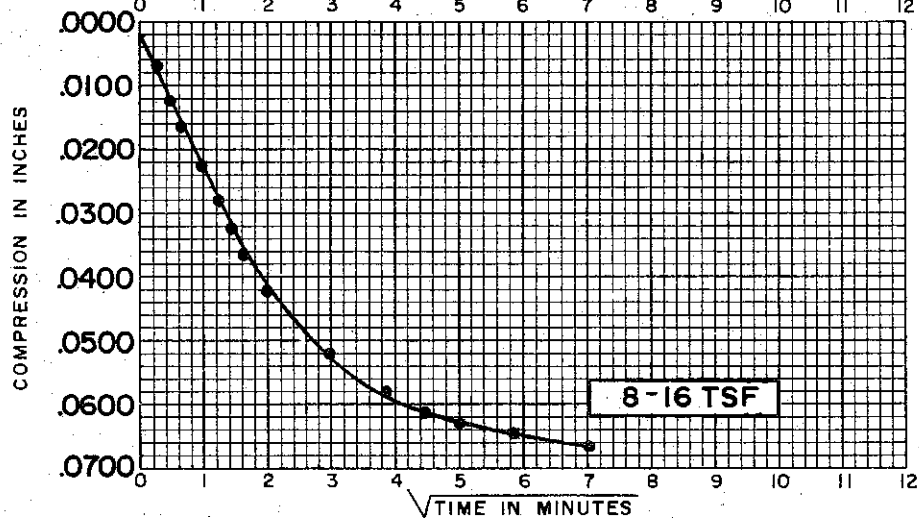
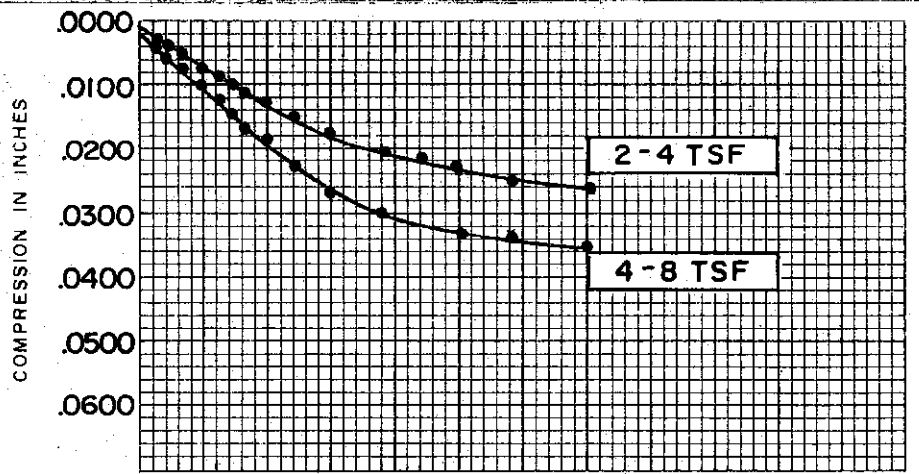
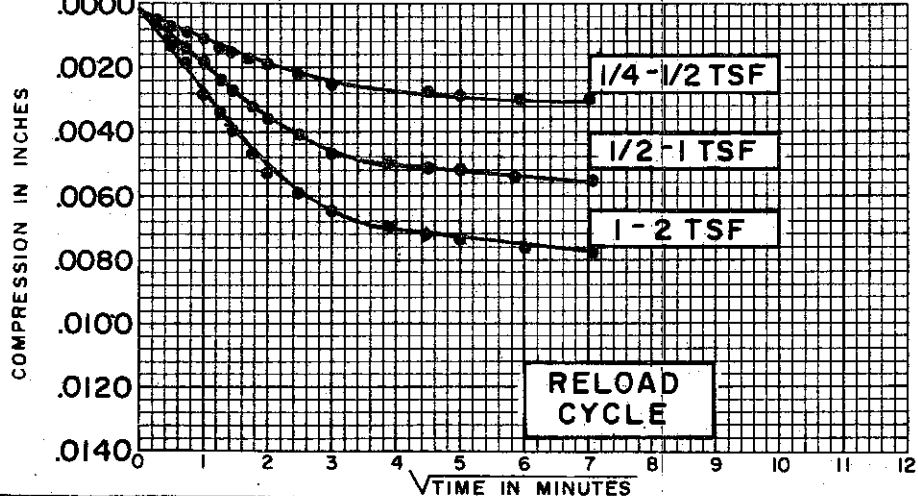
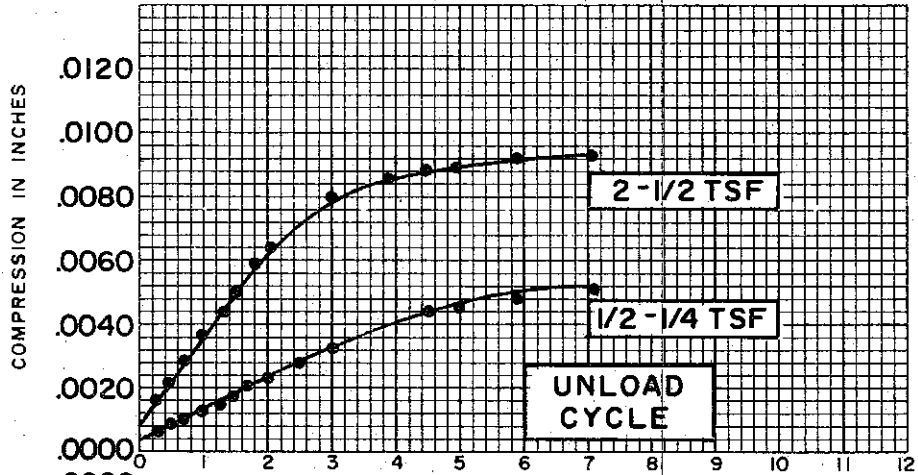
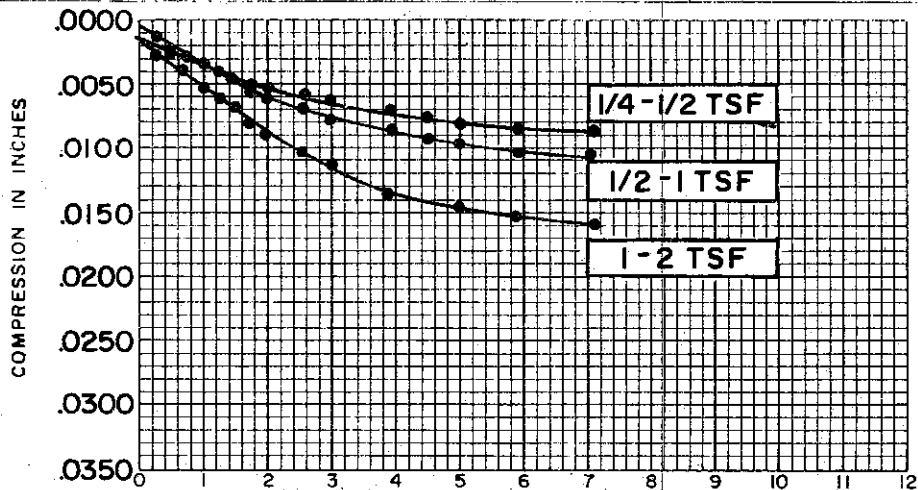
BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.7'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

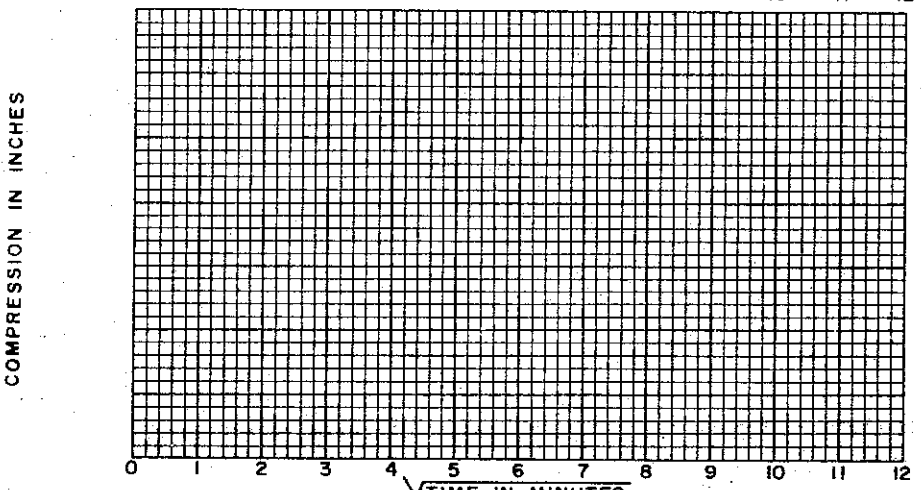
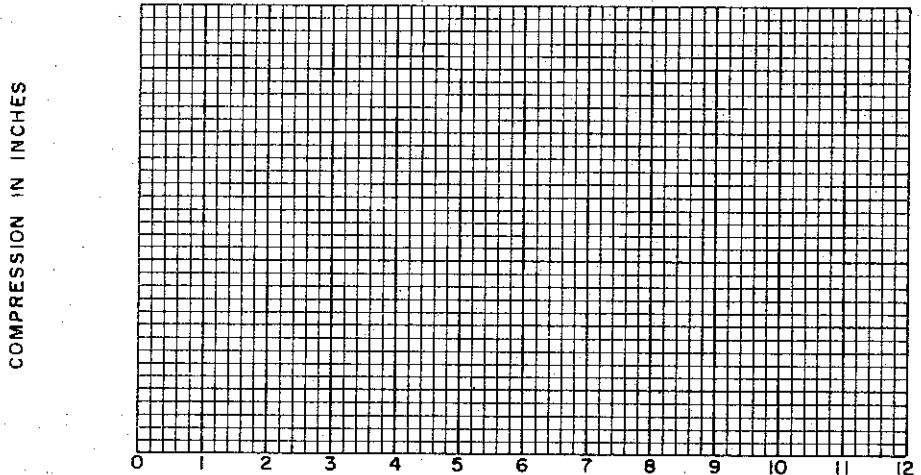
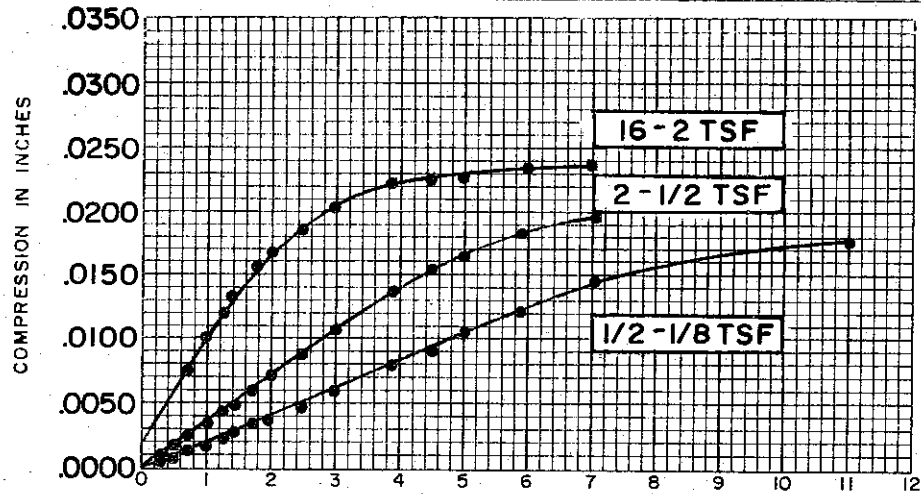
BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

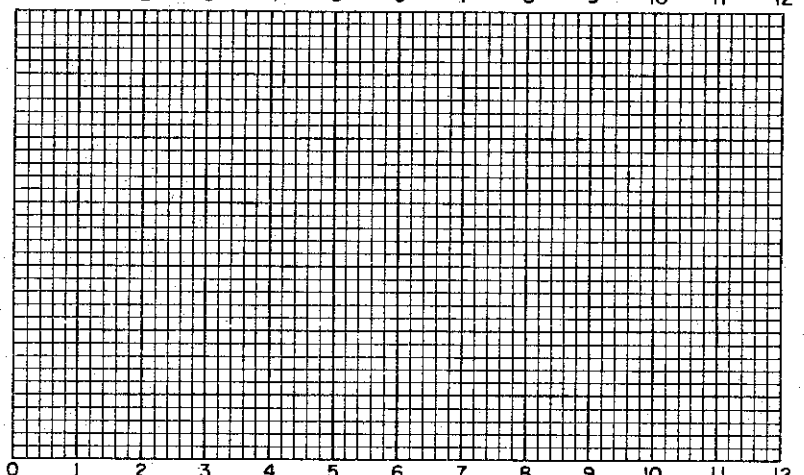
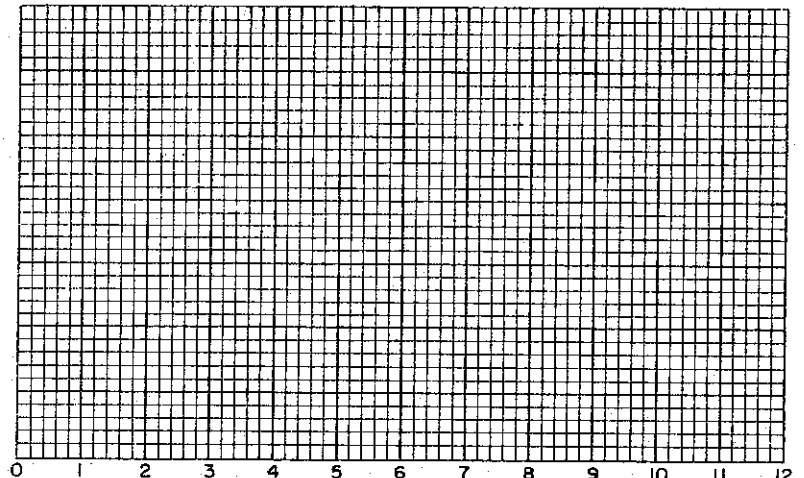
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

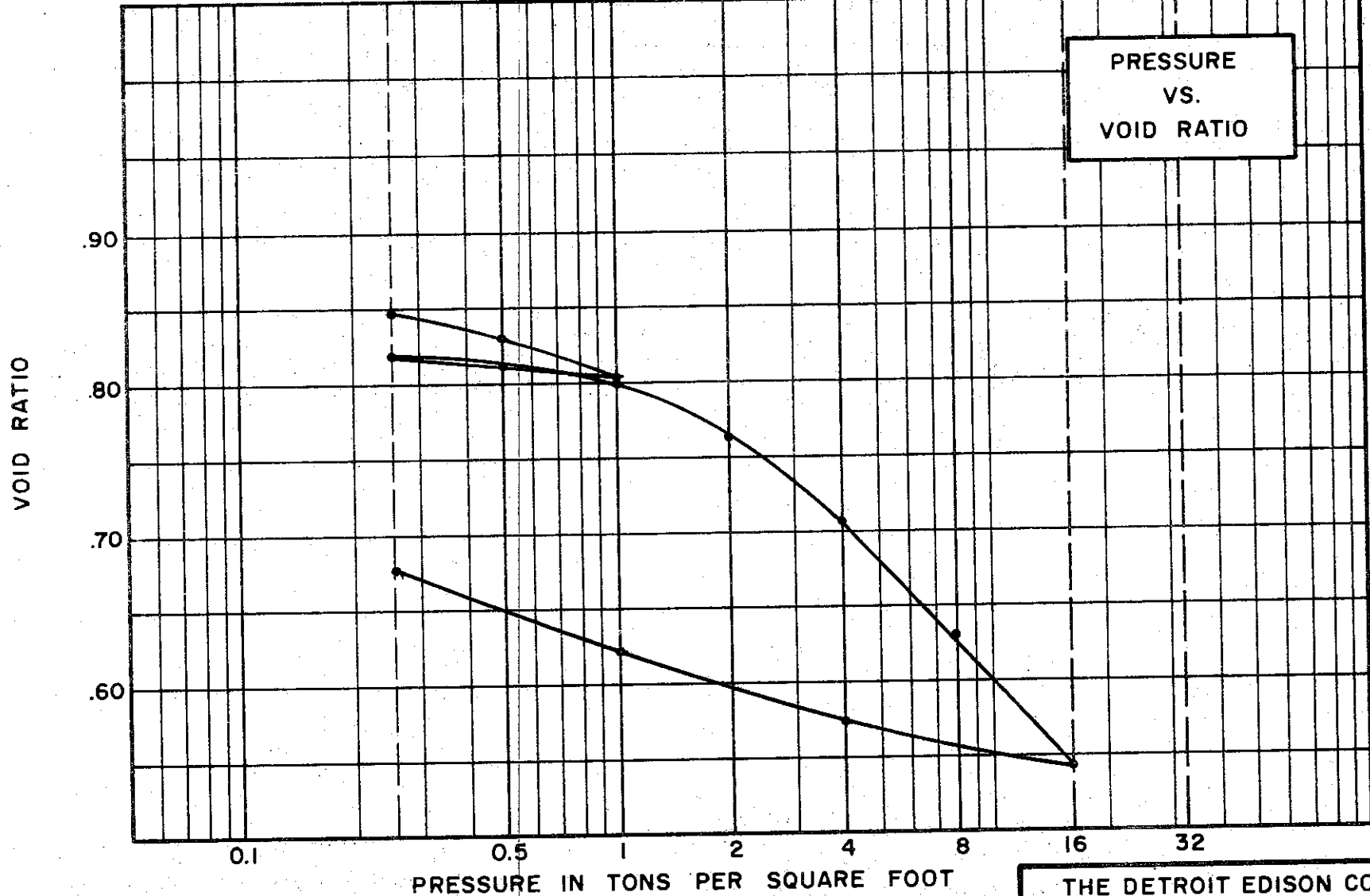
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-497

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 33.3% FINAL 28.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 23%

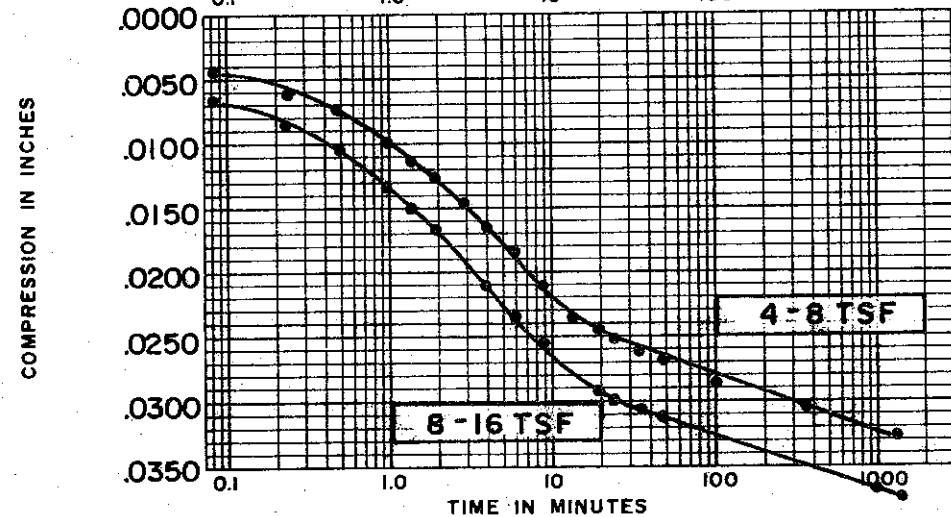
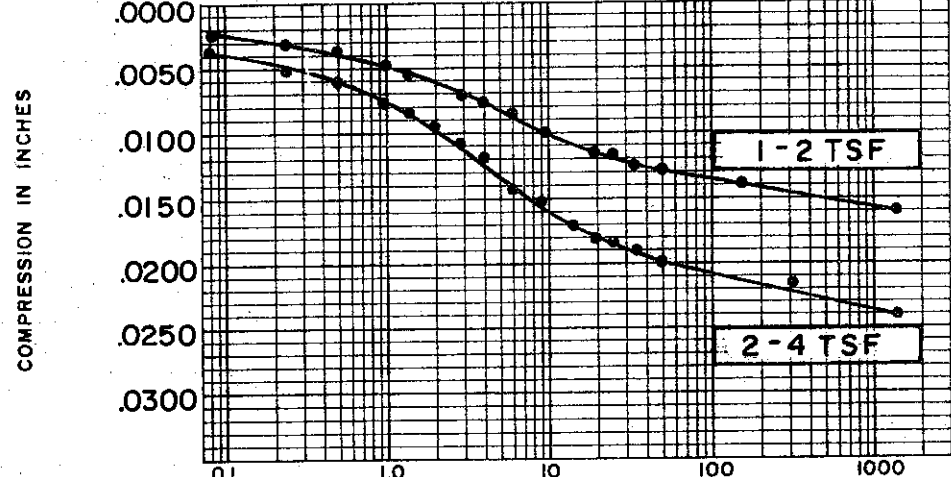
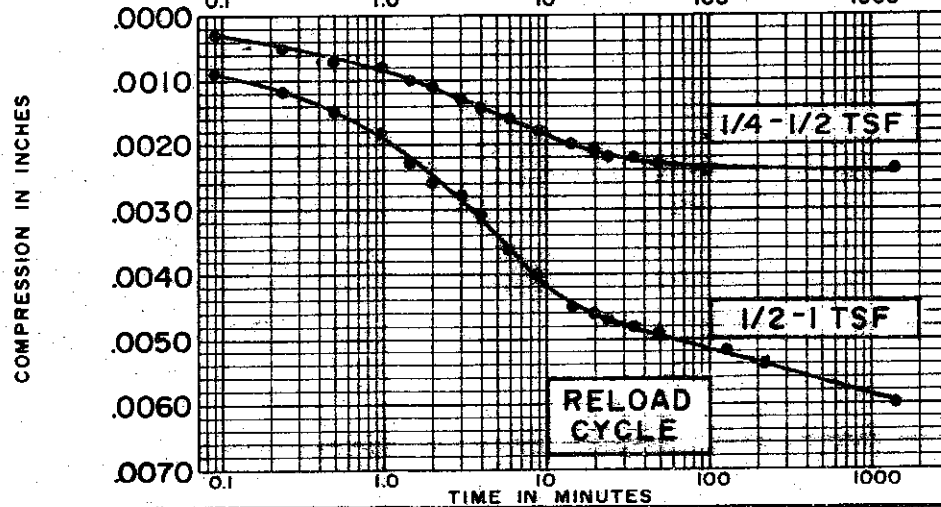
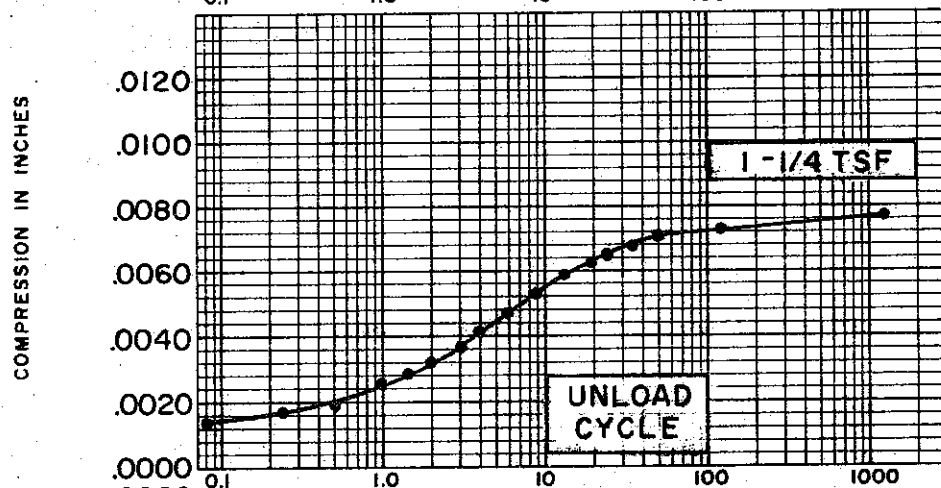
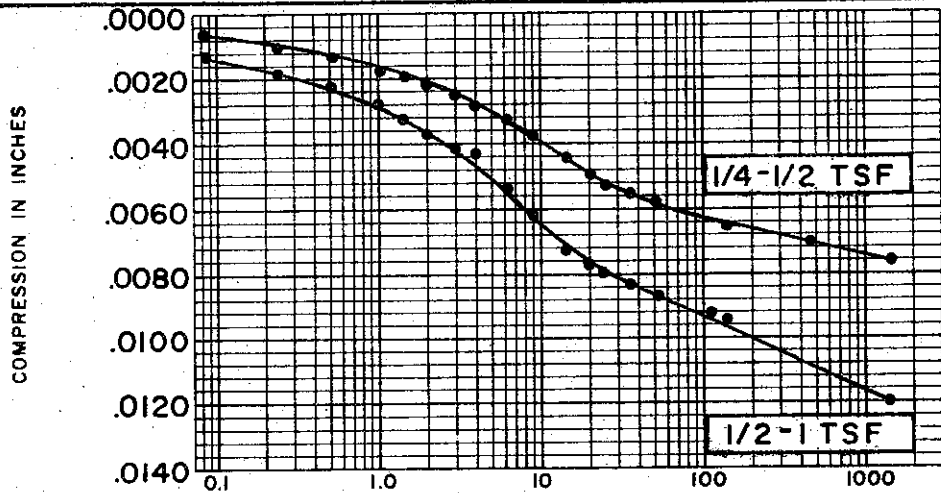
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 49 TEST NO. C133.1  
 SAMPLE NO. 3 DATE FEB. 1974  
 DEPTH 13.7' TO 14.0'



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

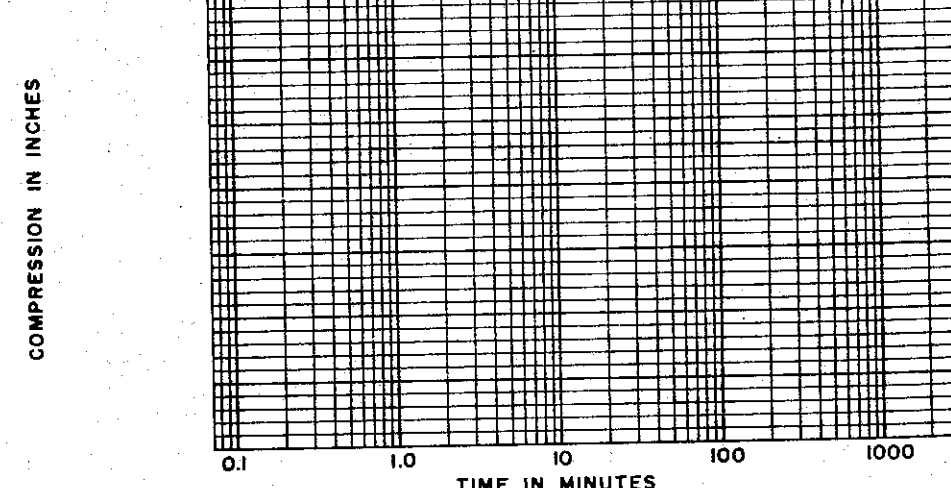
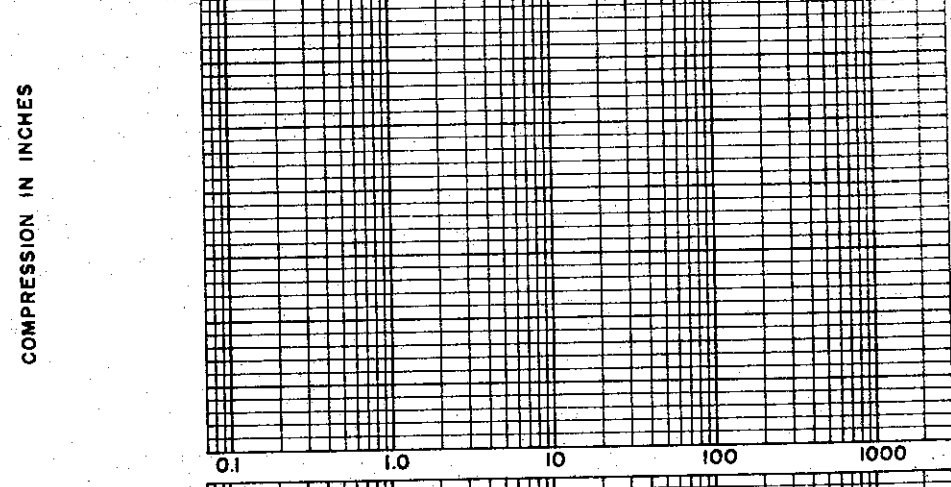
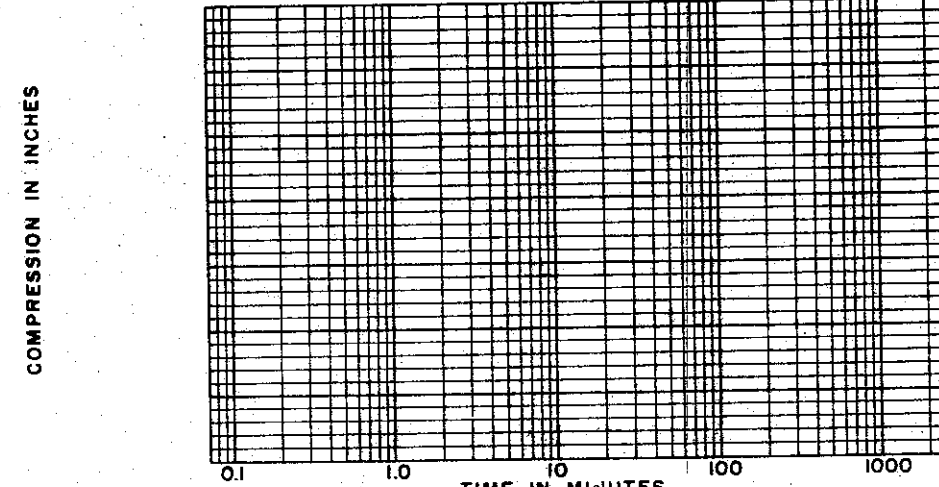
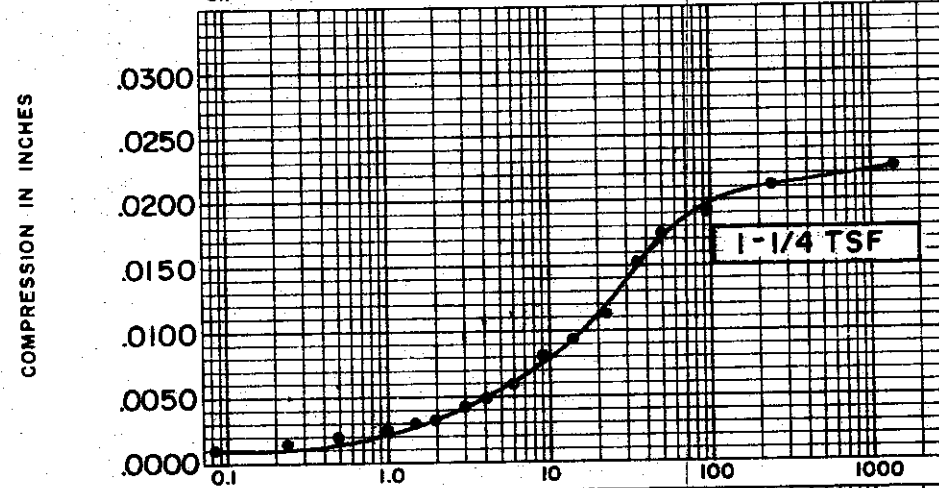
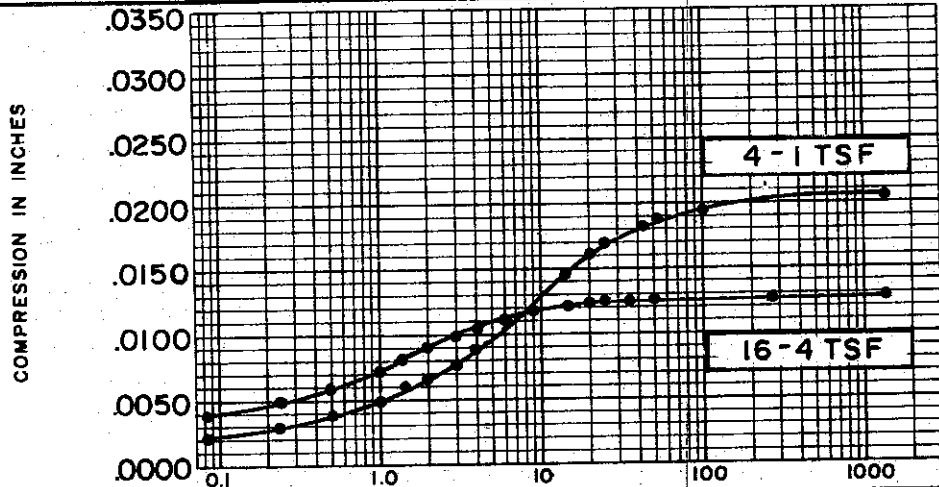
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

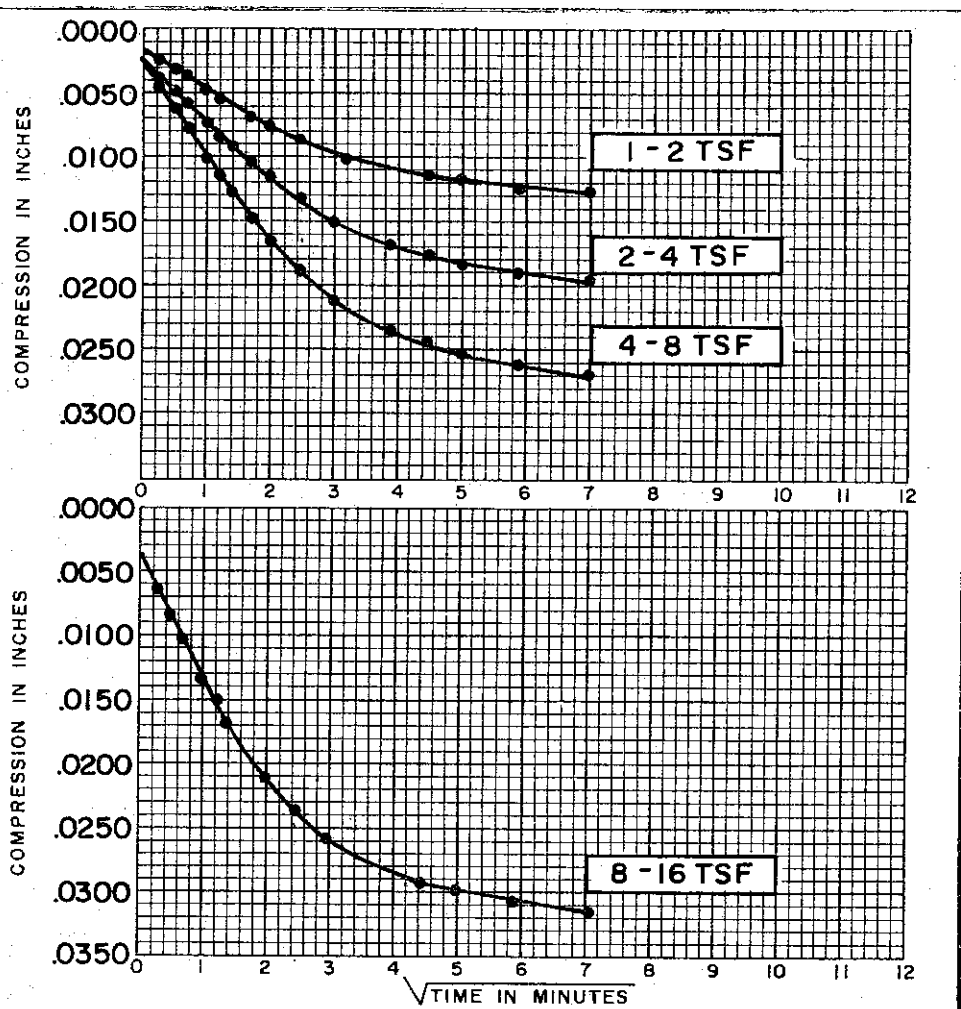
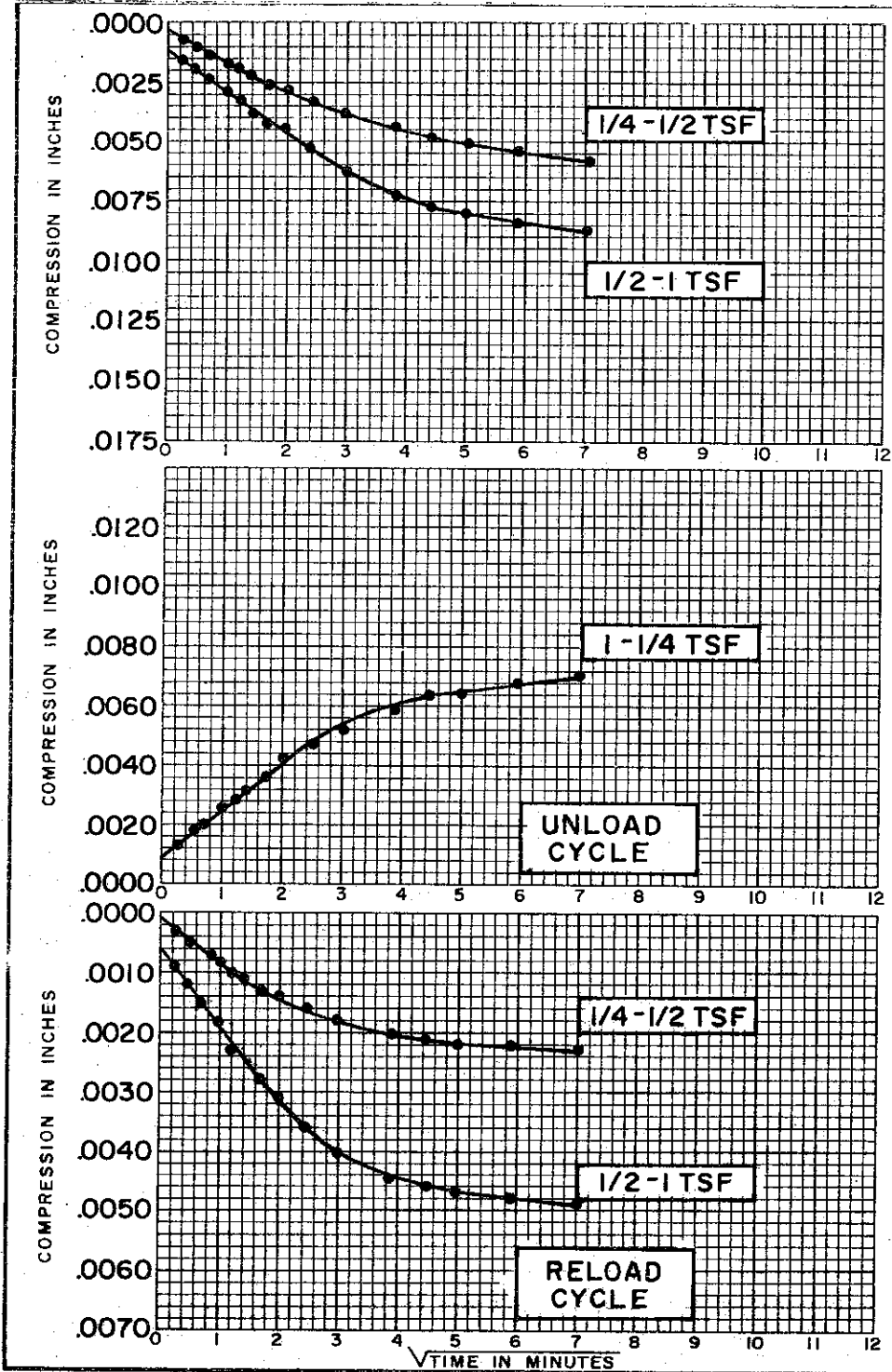
C-499



<b>SOIL PROPERTIES</b>		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>3</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>13.7' TO 14.0'</u>
INITIAL WATER CONTENT	<u>33.3%</u>	
FINAL WATER CONTENT	<u>28.5%</u>	
<b>TEST DATA</b>		<b>CONSOLIDATION TEST</b>
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	<b>TIME VS. COMPRESSION CURVE</b>
INITIAL SAMPLE DIAMETER	<u>2.80"</u>	
INITIAL VOID RATIO	<u>0.863</u>	

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255

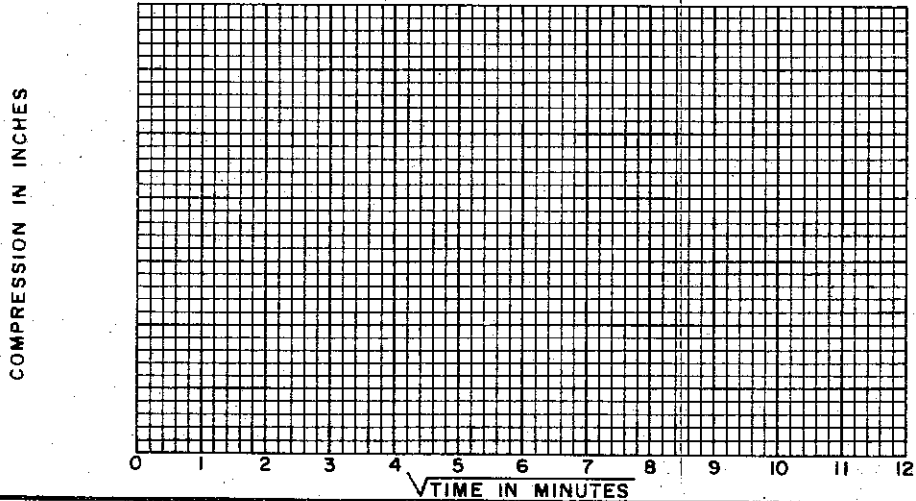
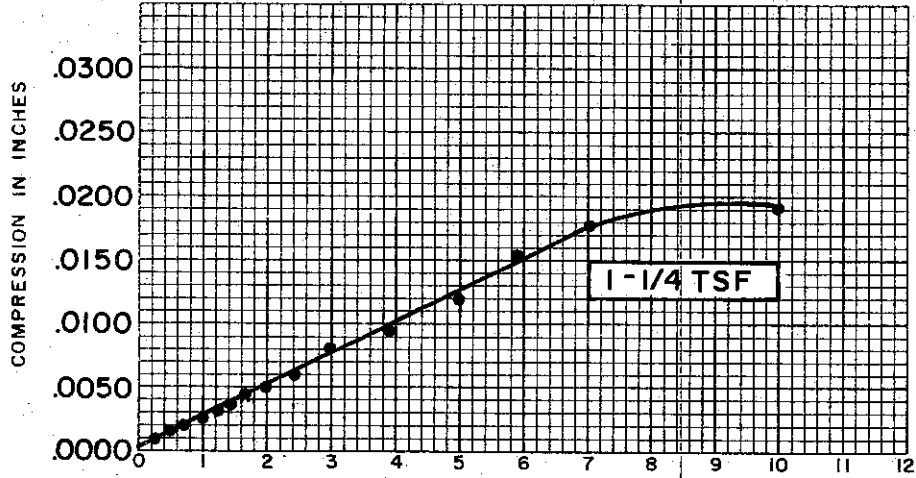
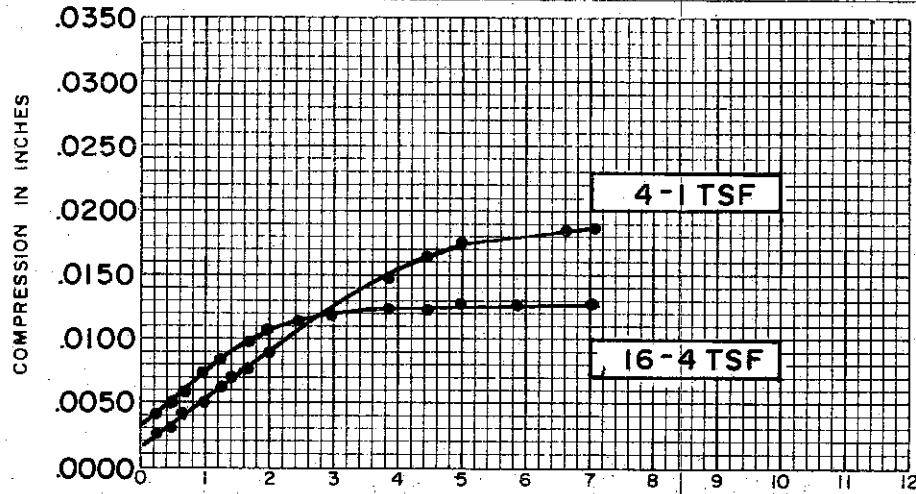
C-501



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	33.3%
FINAL WATER CONTENT	28.5%
BORING NO.	49
SAMPLE NO.	3
DEPTH	13.7' TO 14.0'

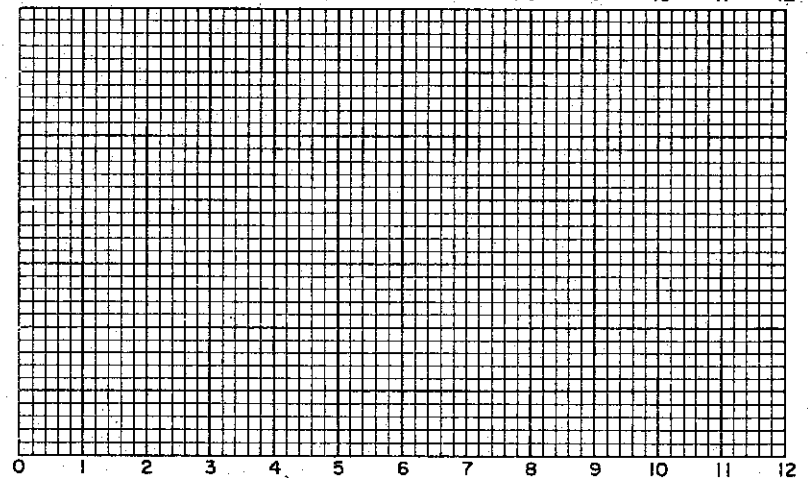
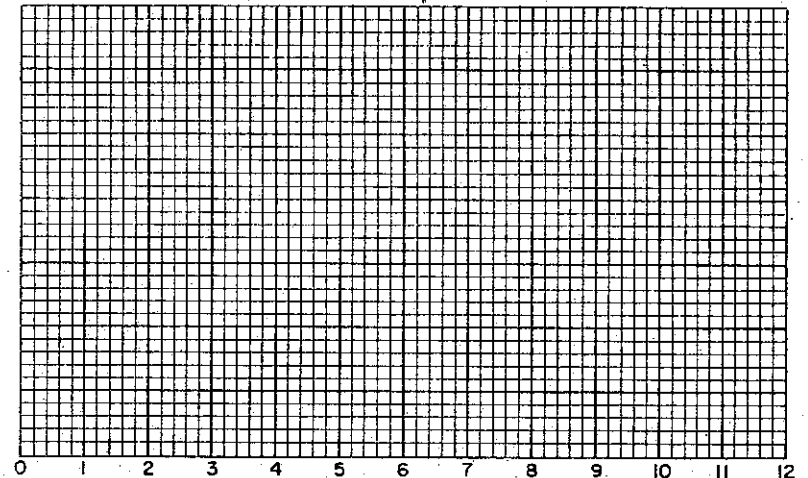
TEST DATA	
INITIAL SAMPLE HEIGHT	0.60"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.863

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

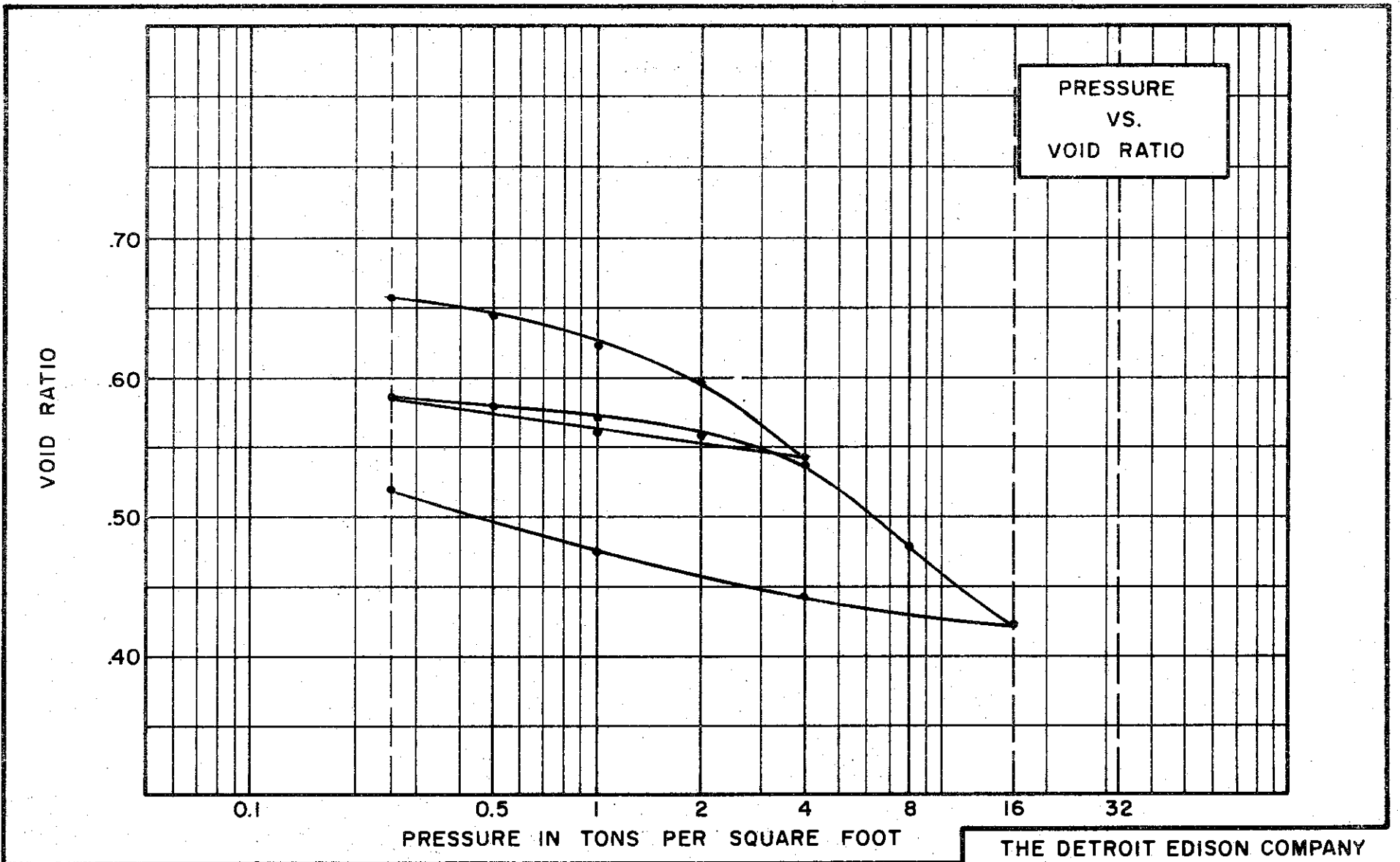
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 28.6% FINAL 24.4%

ATTERBERG LIMITS:  
 LIQUID LIMIT 37% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.701

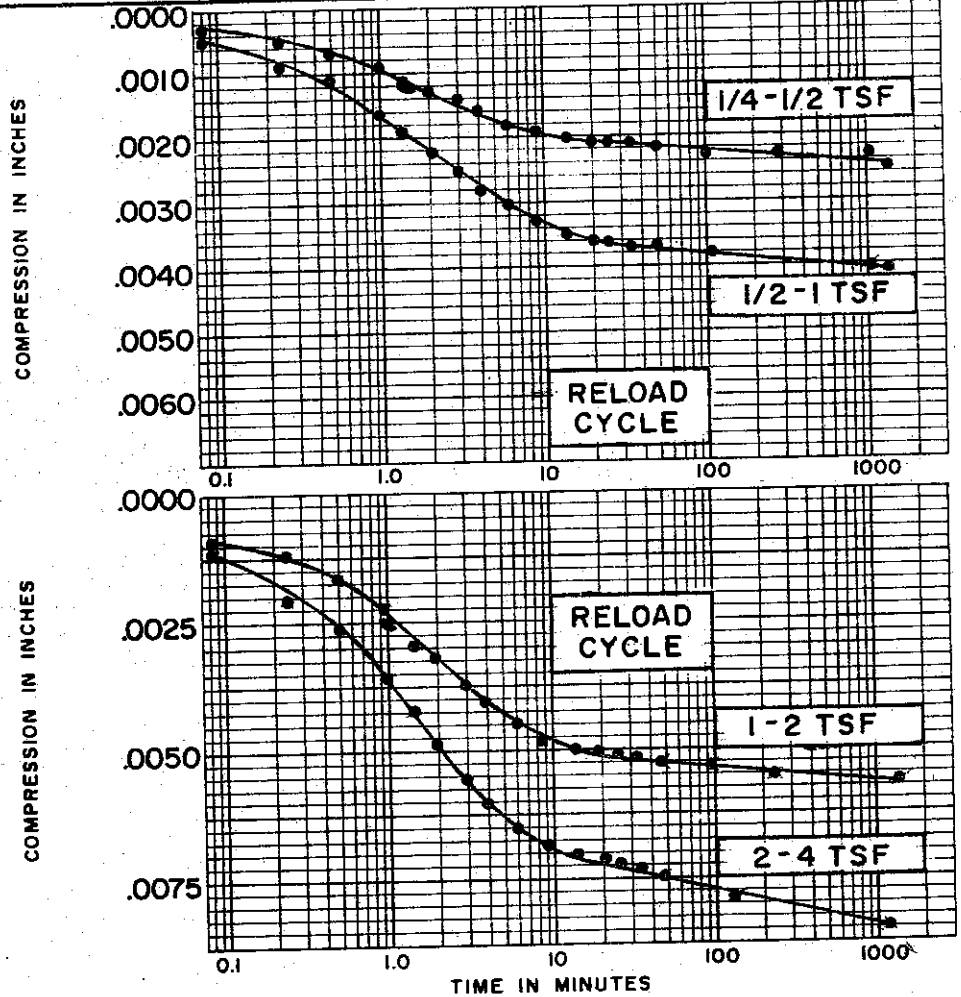
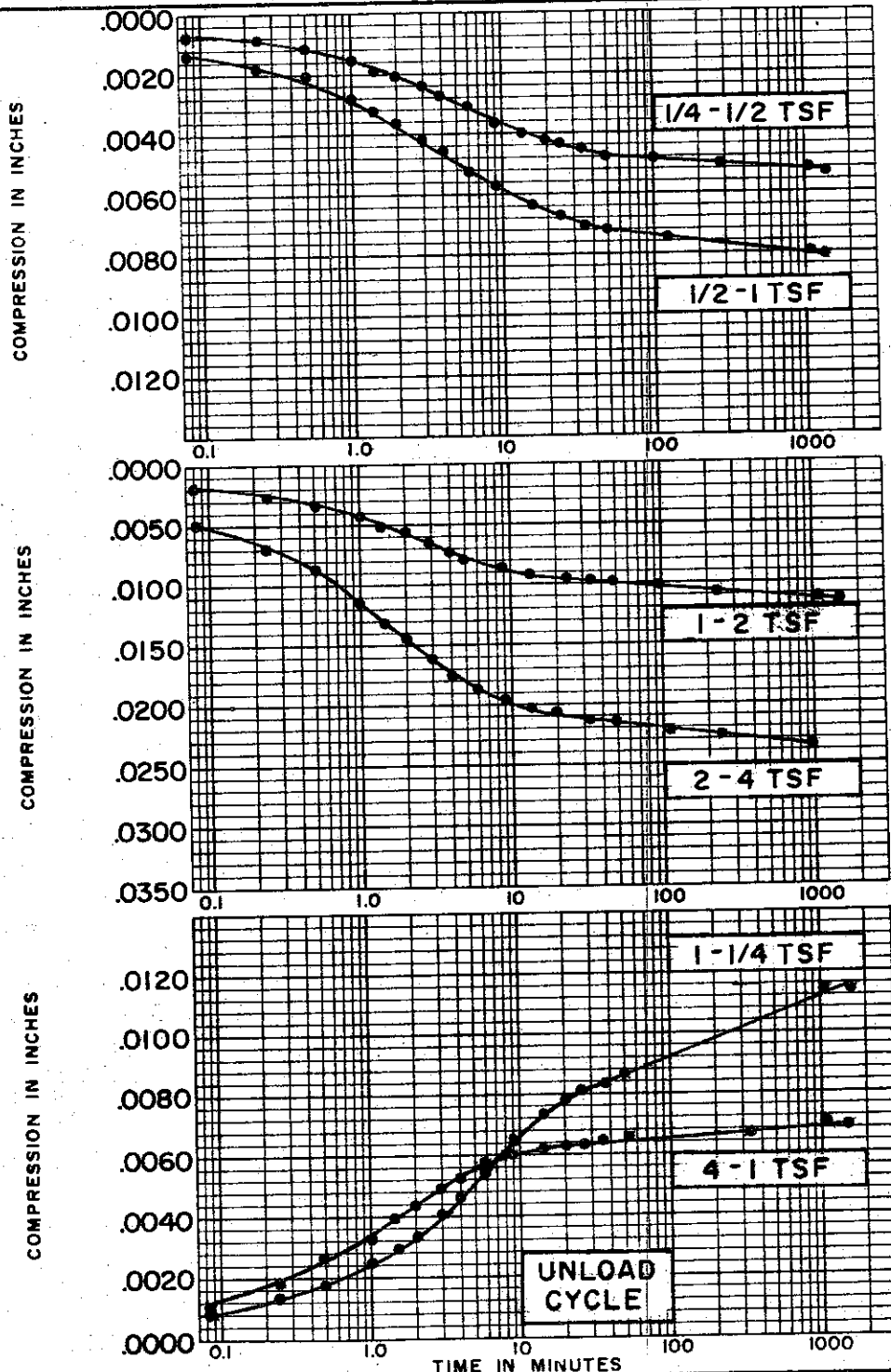
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 49 TEST NO. C141.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 93.8' TO 94.0'

C-503

C-504



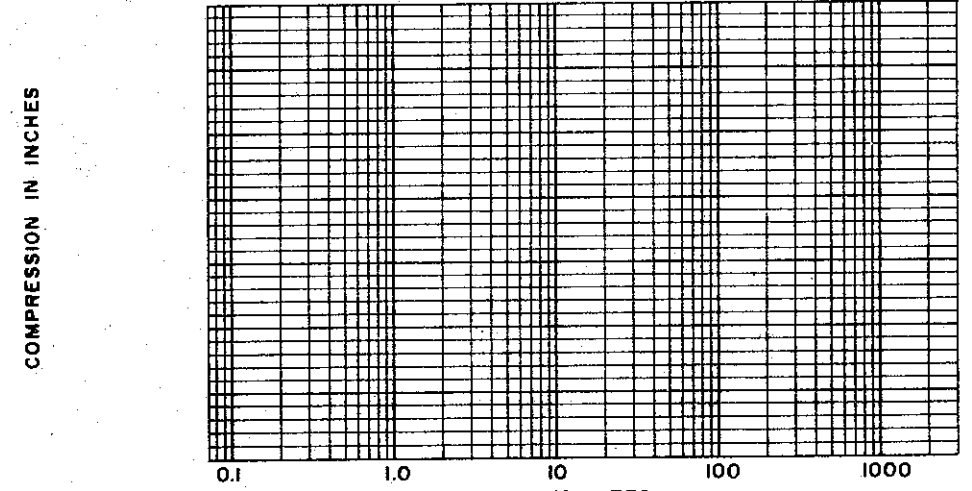
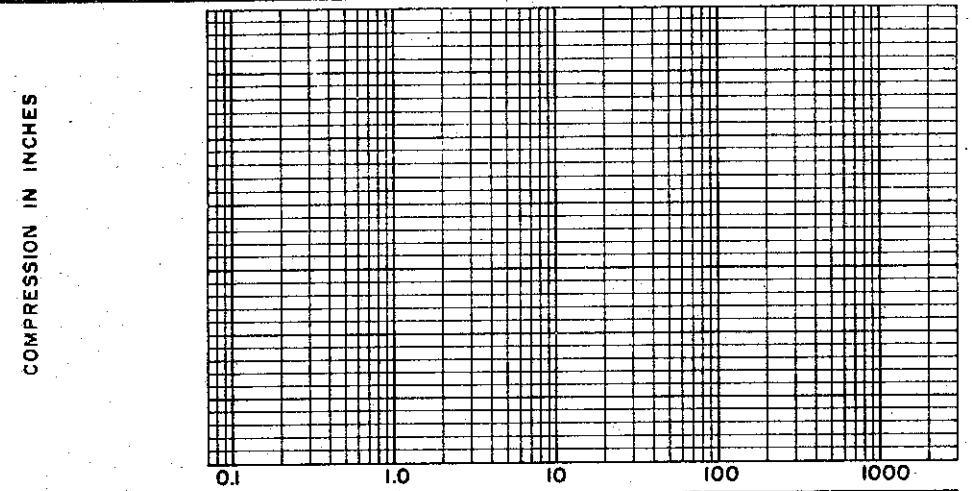
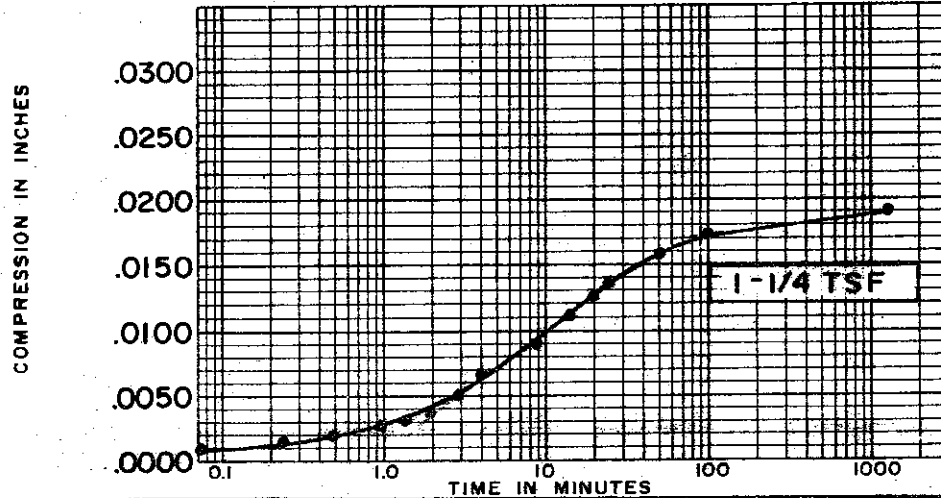
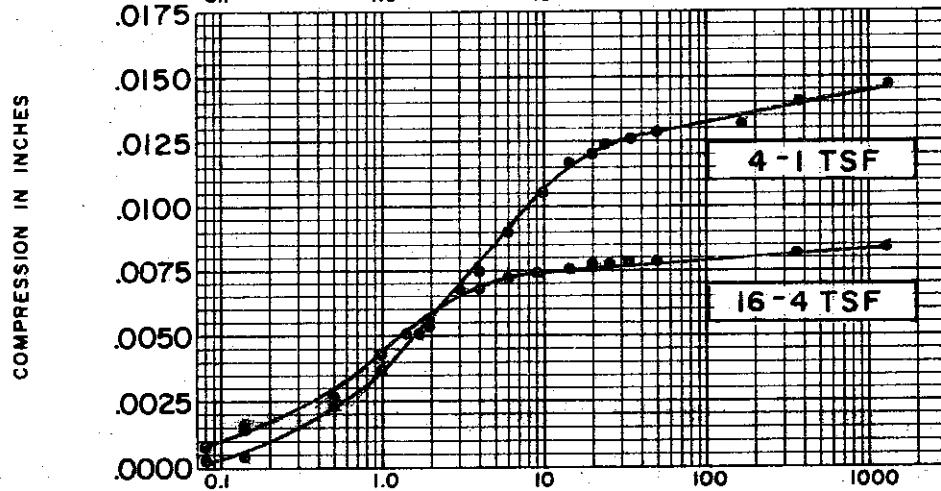
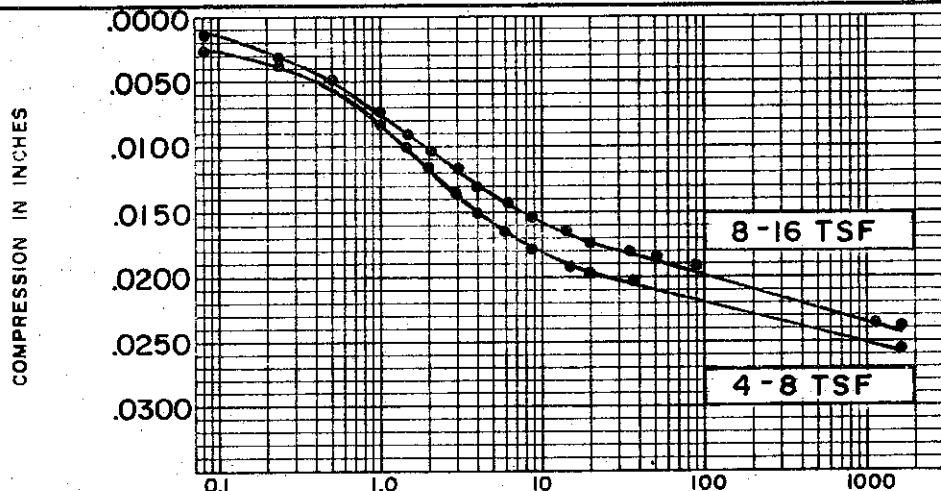
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 28.6%  
 FINAL WATER CONTENT 24.4%

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

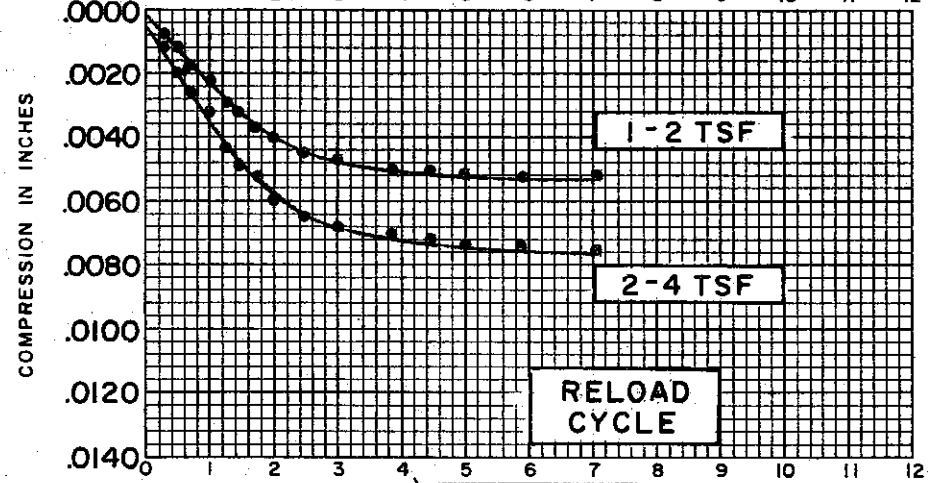
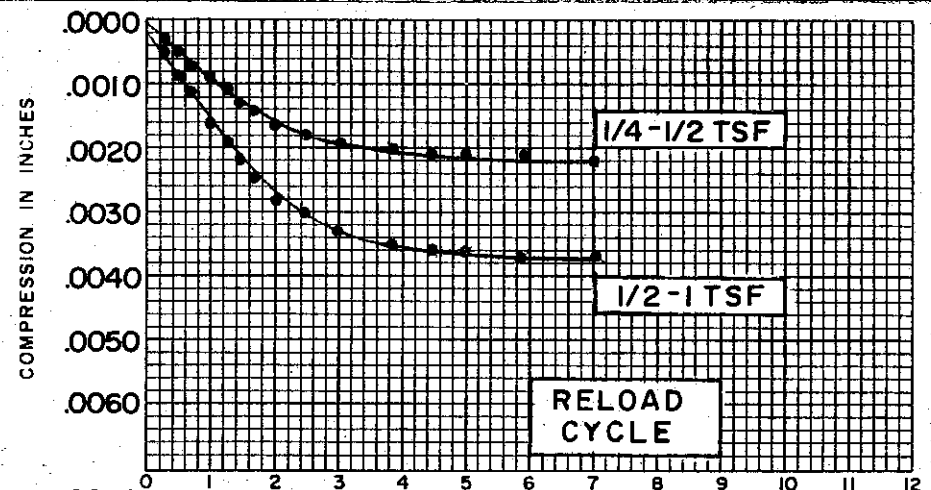
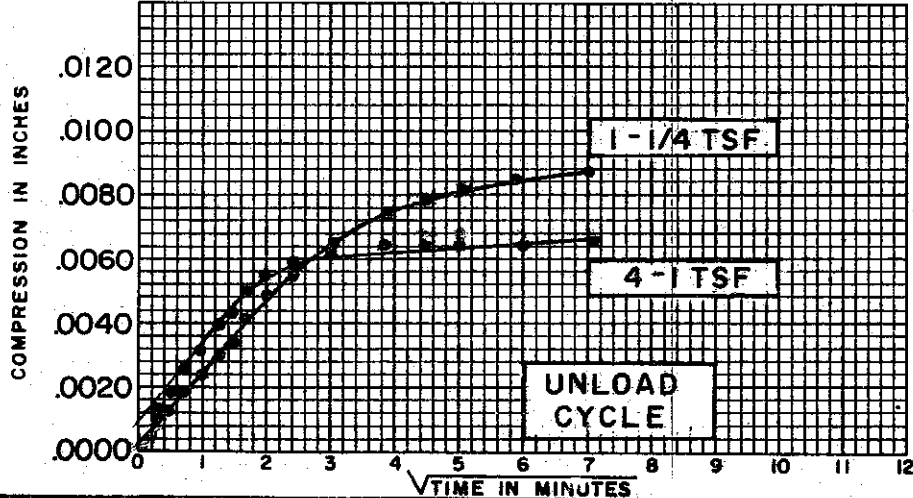
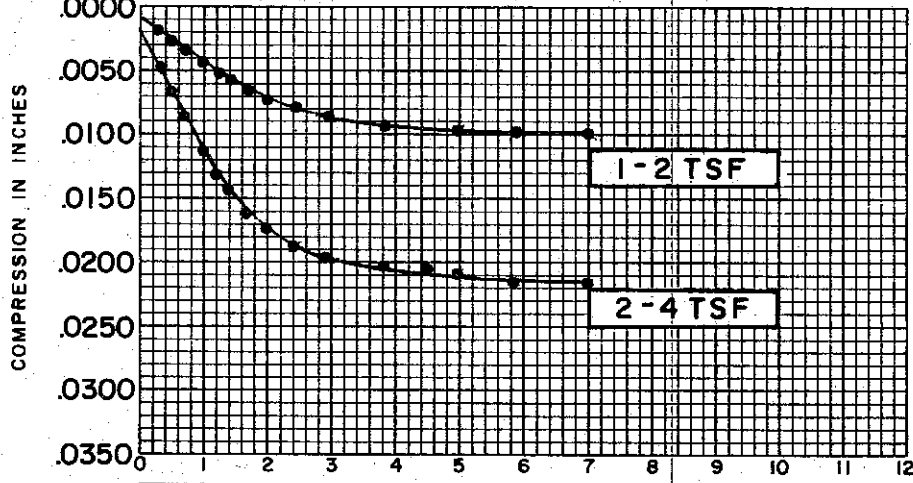
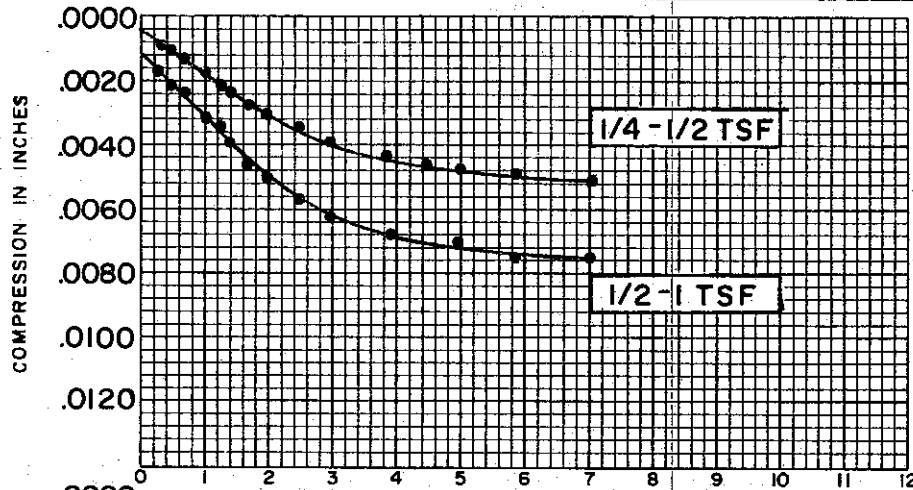
**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.701

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVE**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-505



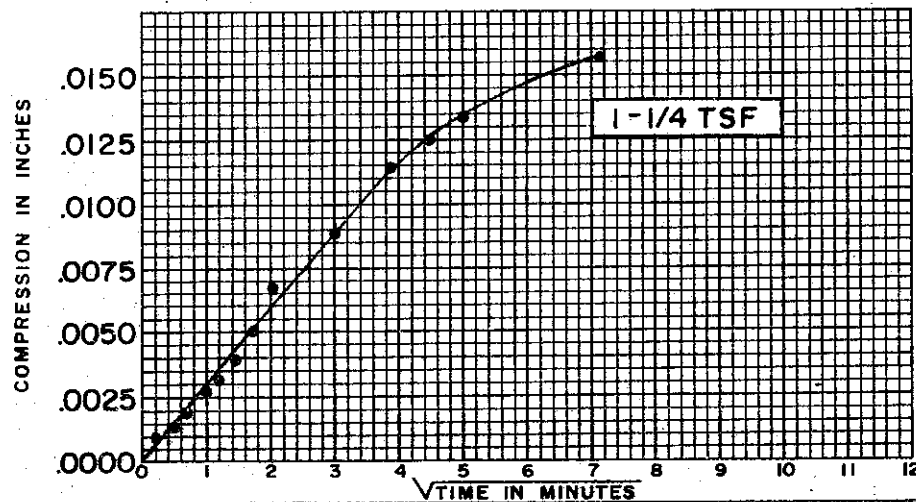
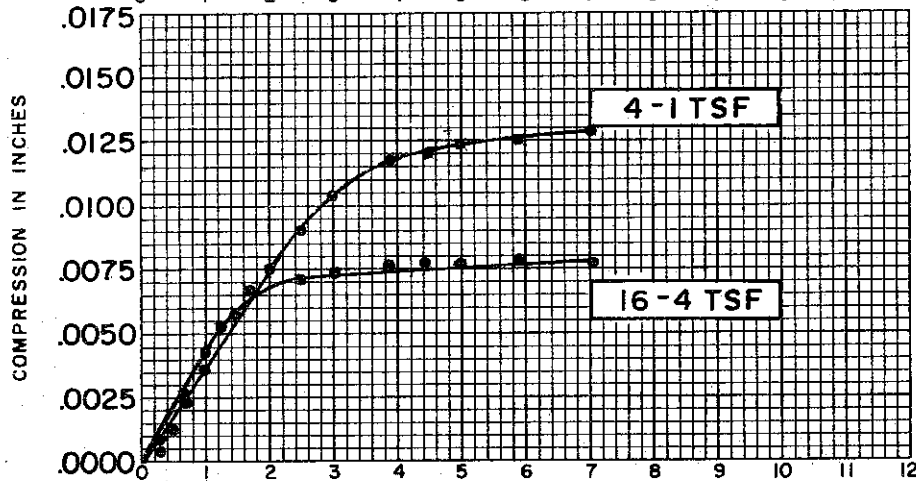
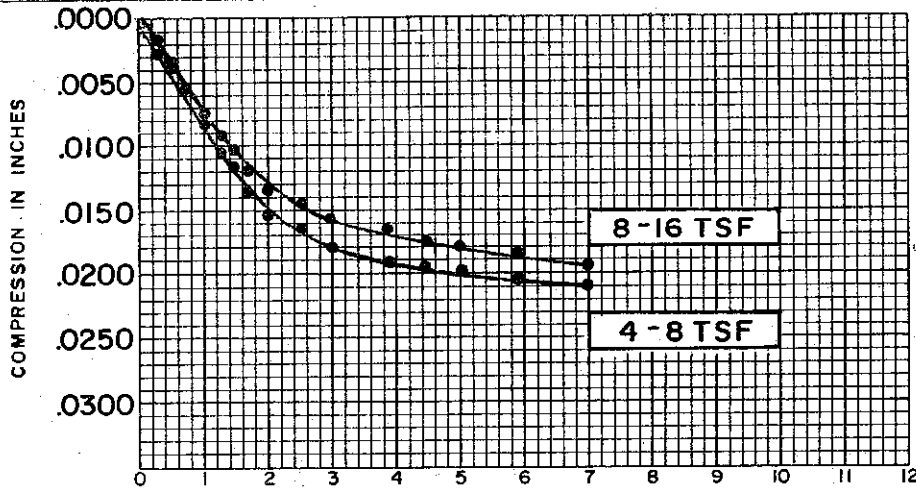
SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.75"</u>	<b>CONSOLIDATION TEST TIME VS. COMPRESSION CURVE</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.701</u>	



SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	

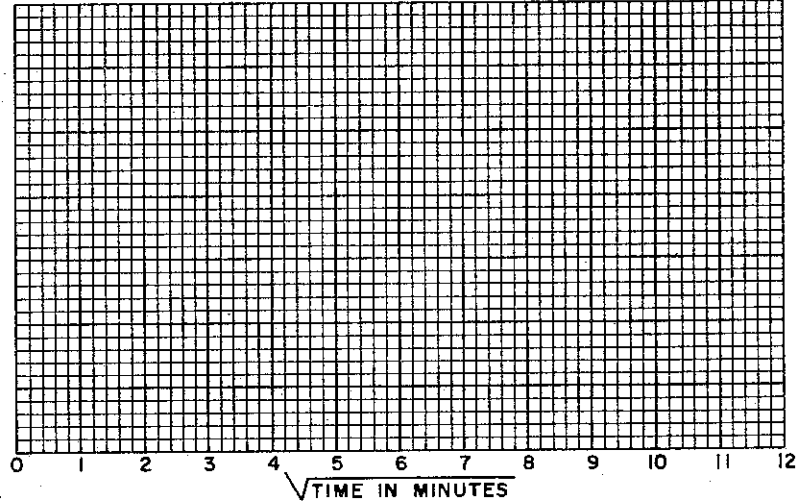
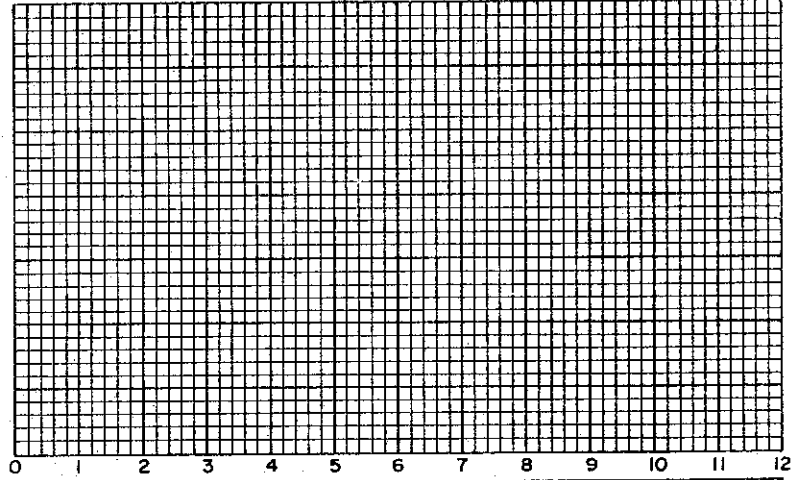
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.701</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 28.6%  
 FINAL WATER CONTENT 24.4%

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

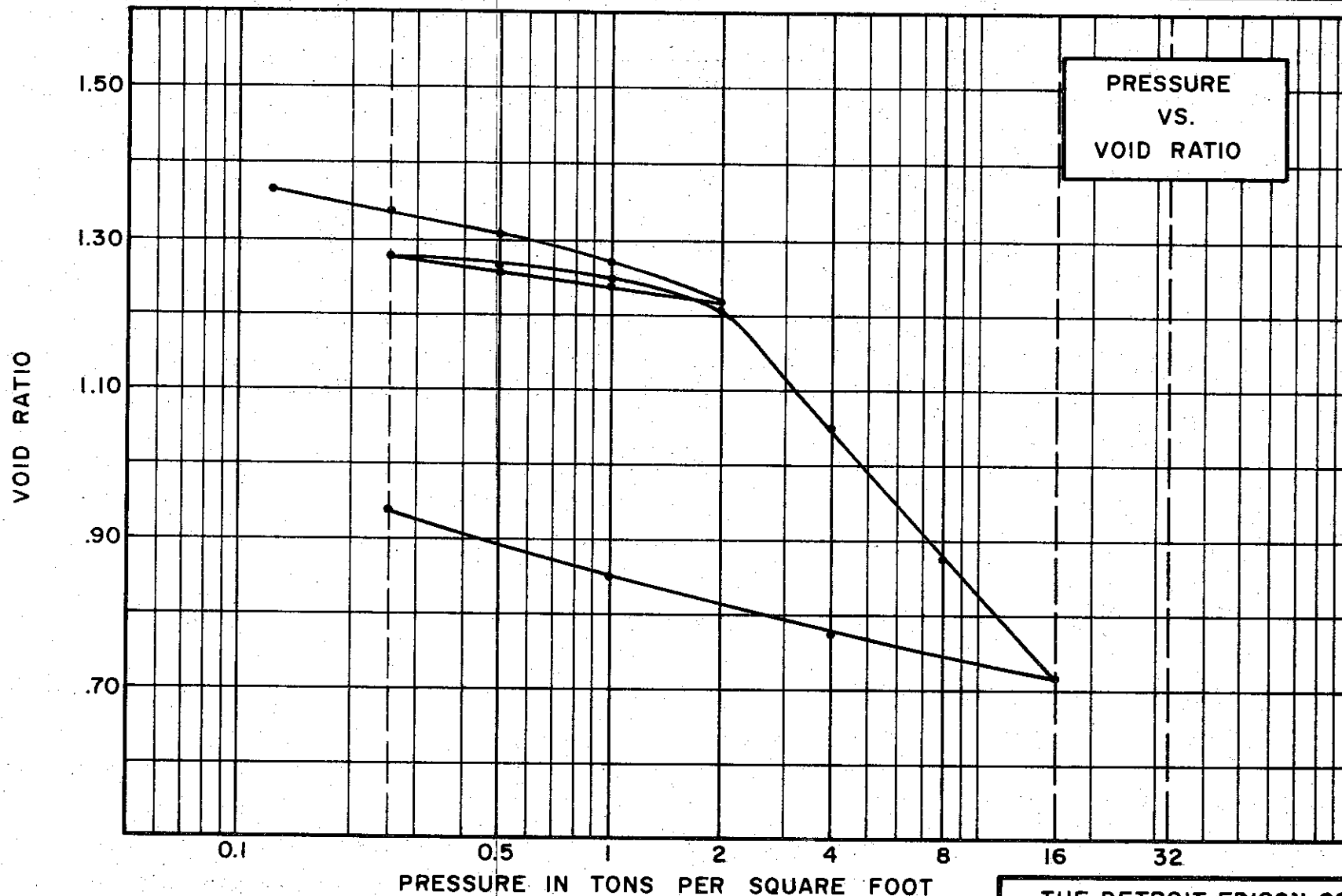
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.701

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-507



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 51.6% FINAL 39.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

**TEST DATA**

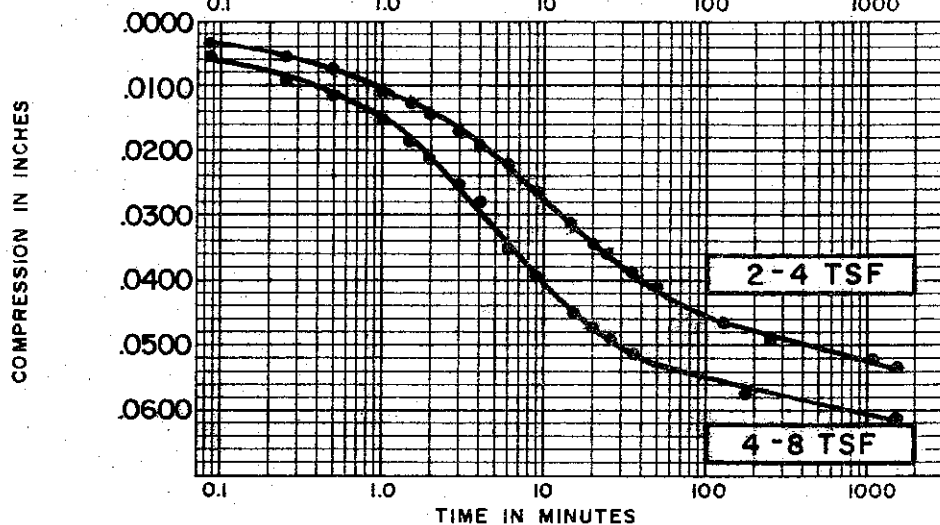
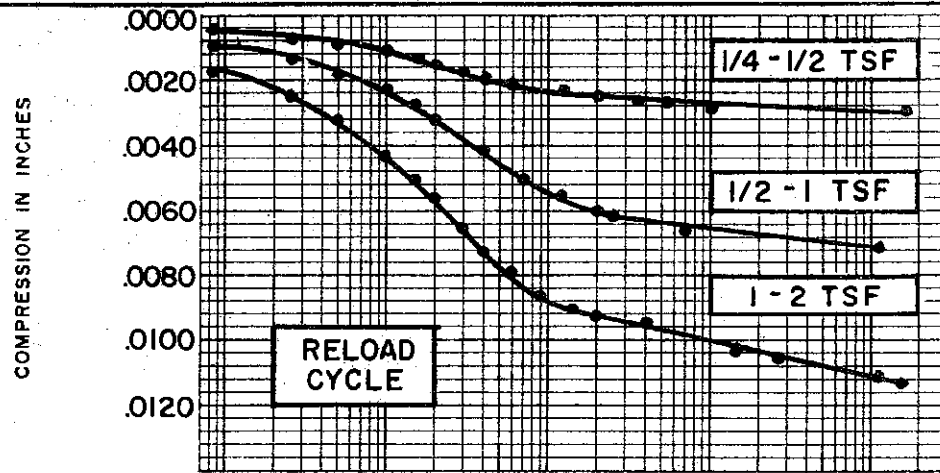
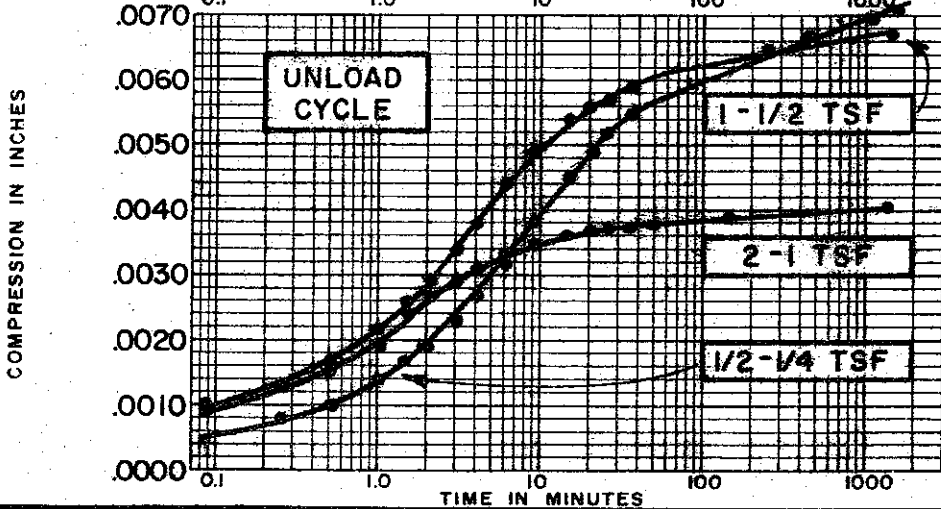
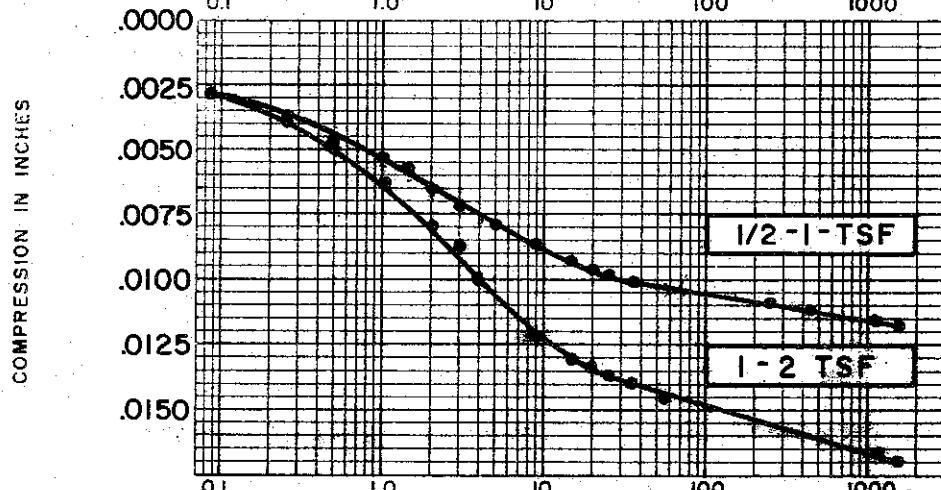
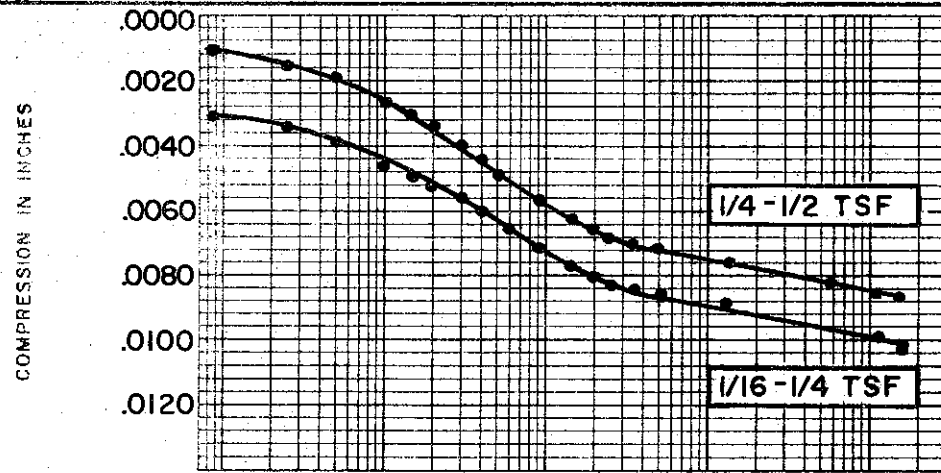
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 50 TEST NO. C86.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 38.5' TO 38.9'

C-509



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

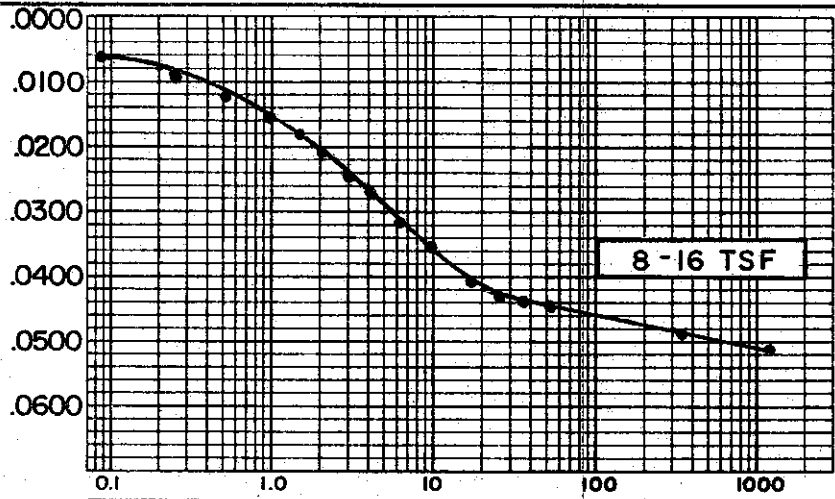
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE D. AMETER 2.50"  
 INITIAL VOID RATIO 1.383

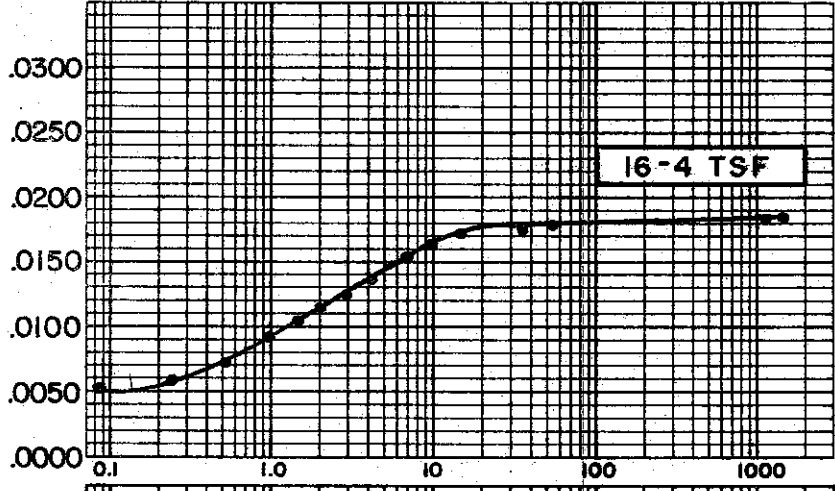
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

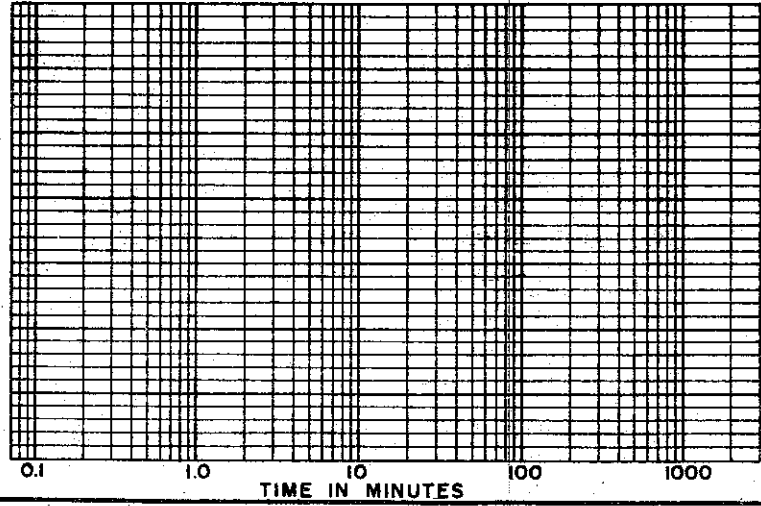
COMPRESSION IN INCHES



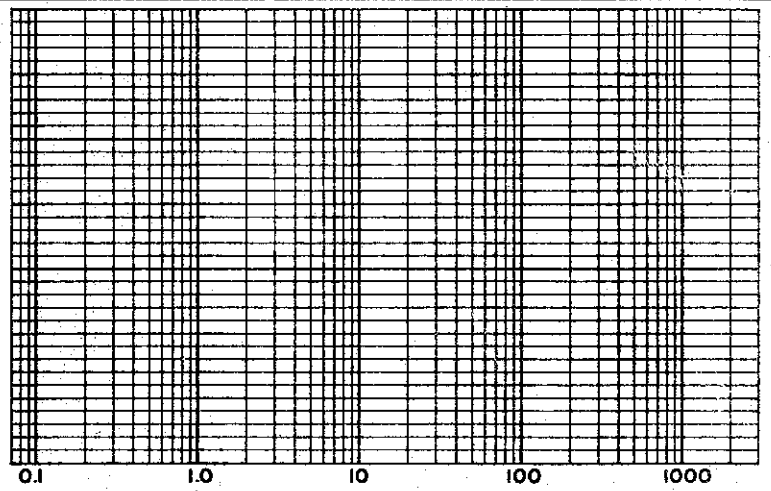
COMPRESSION IN INCHES



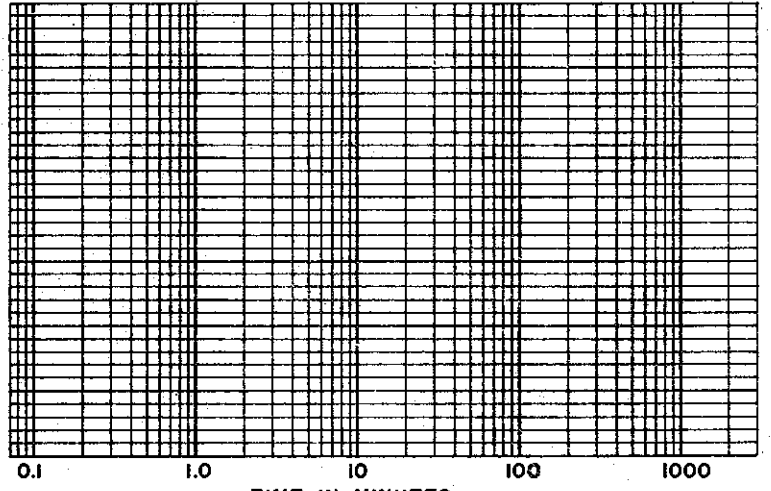
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

**TEST DATA**

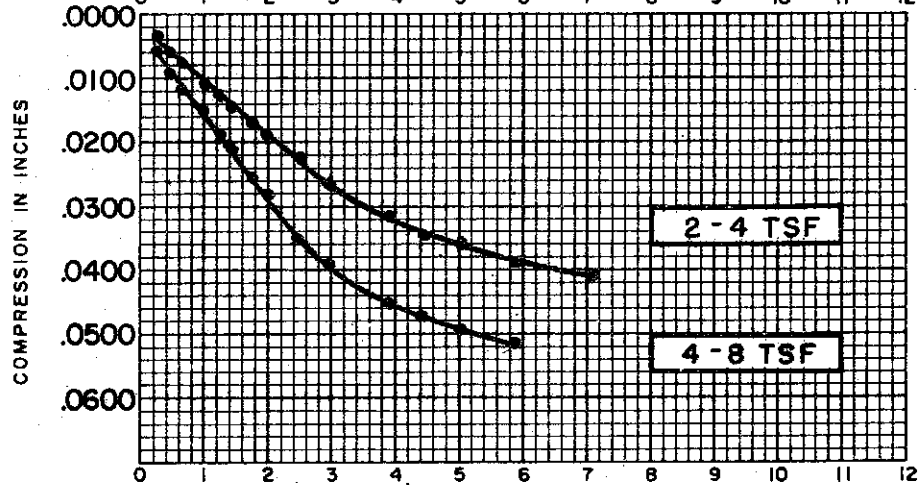
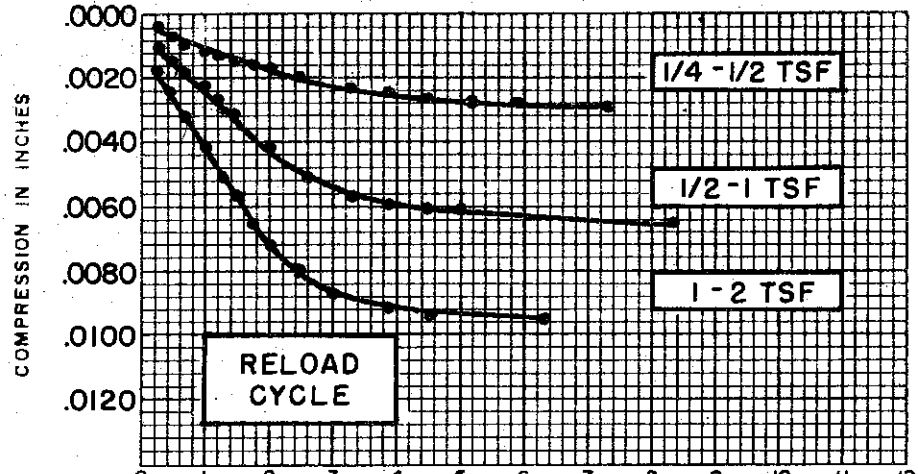
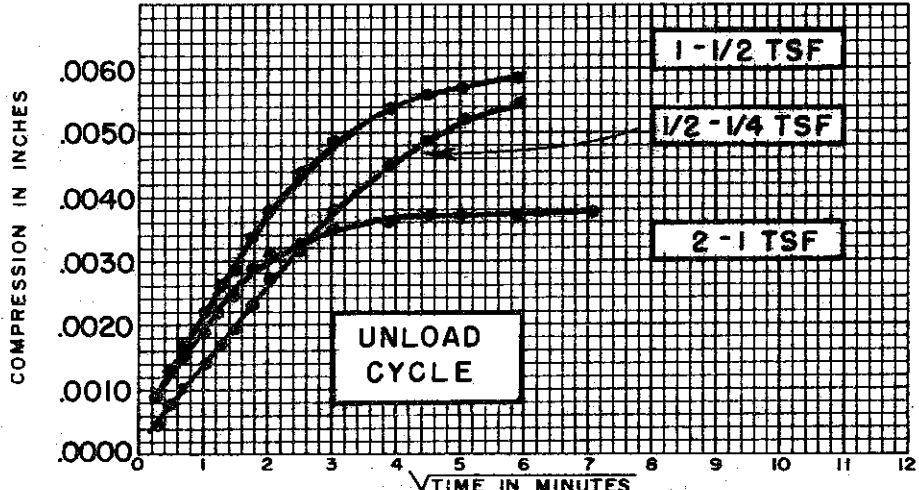
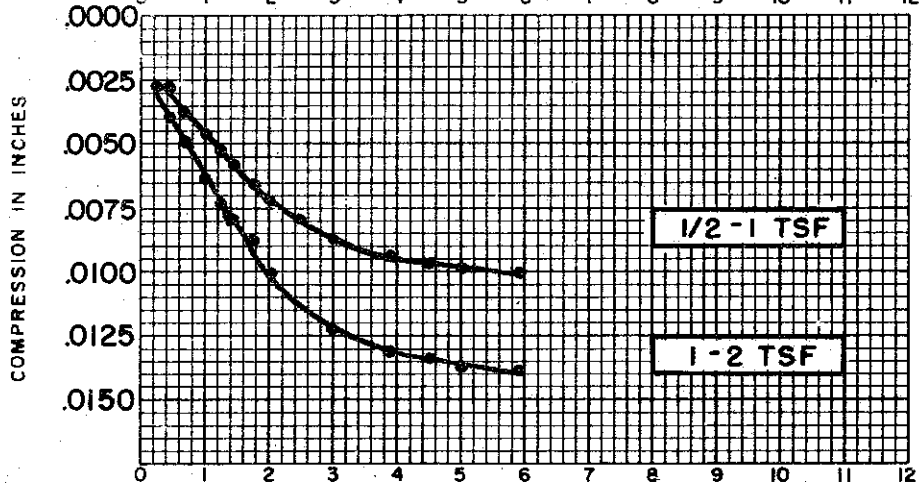
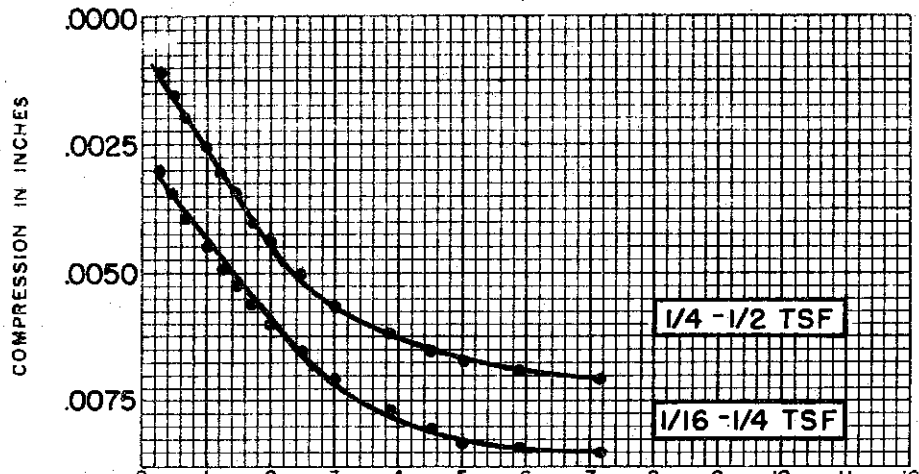
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



C-511



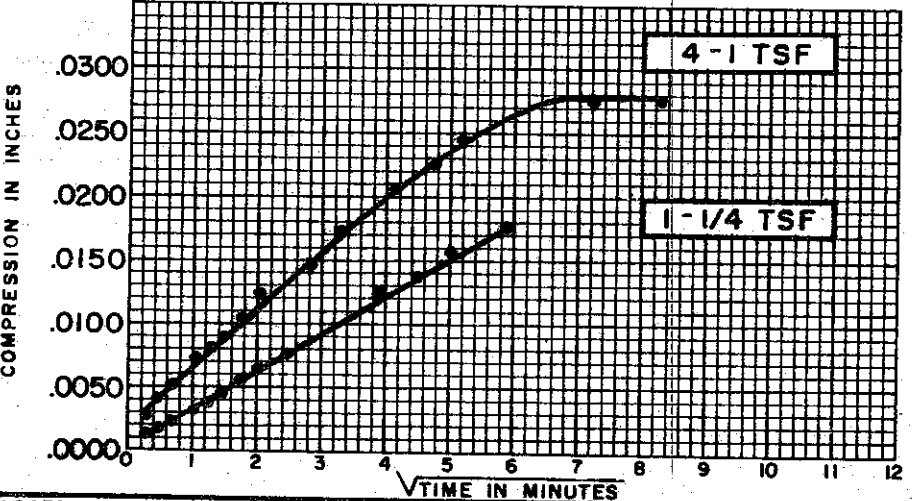
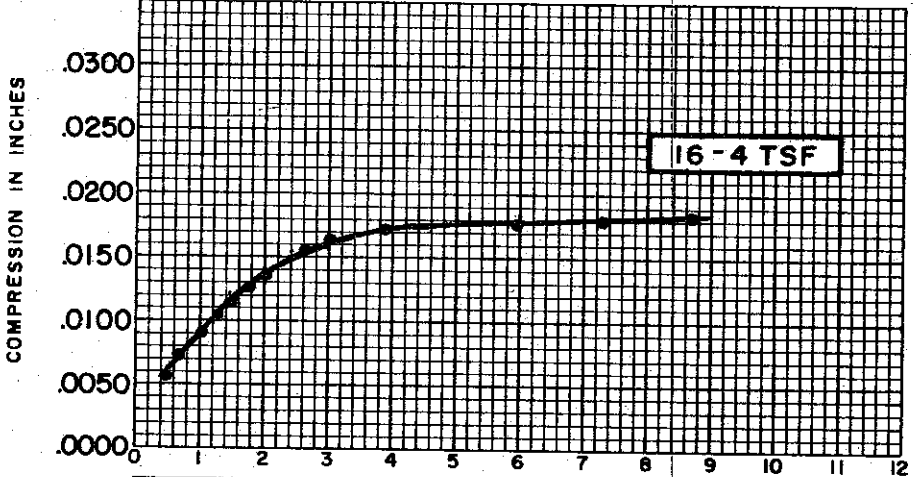
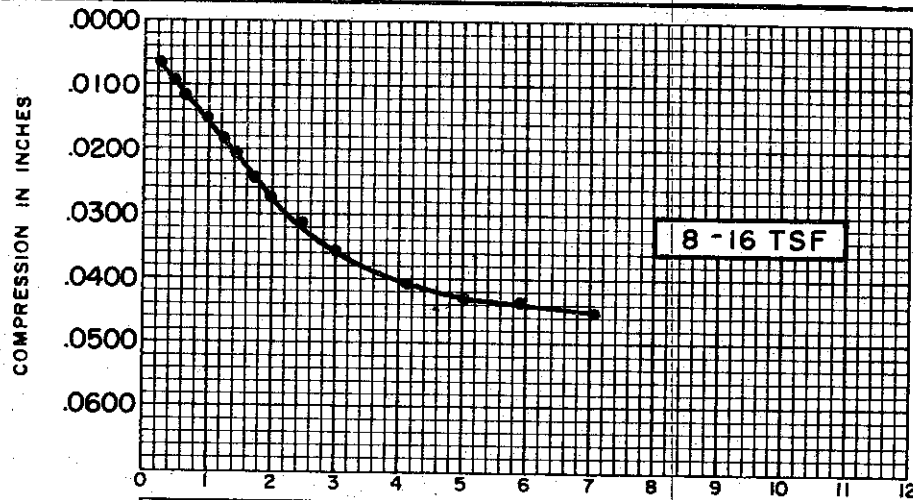
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

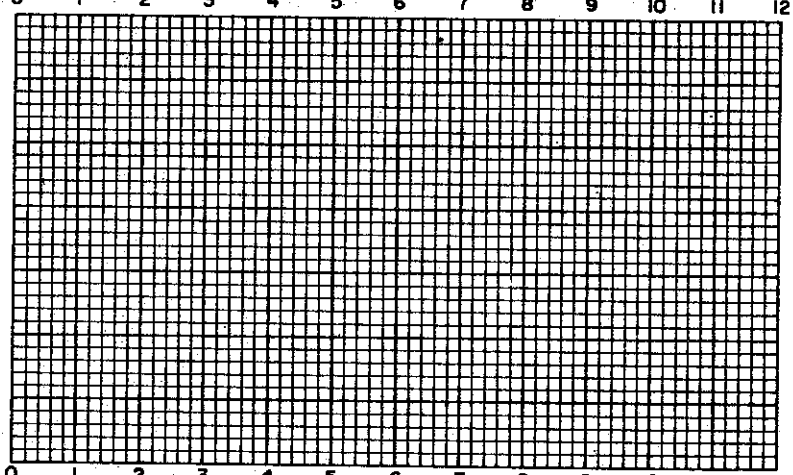
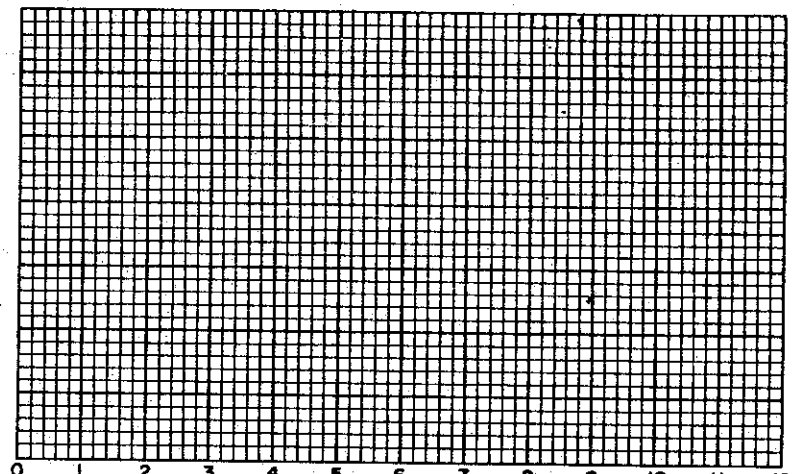
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

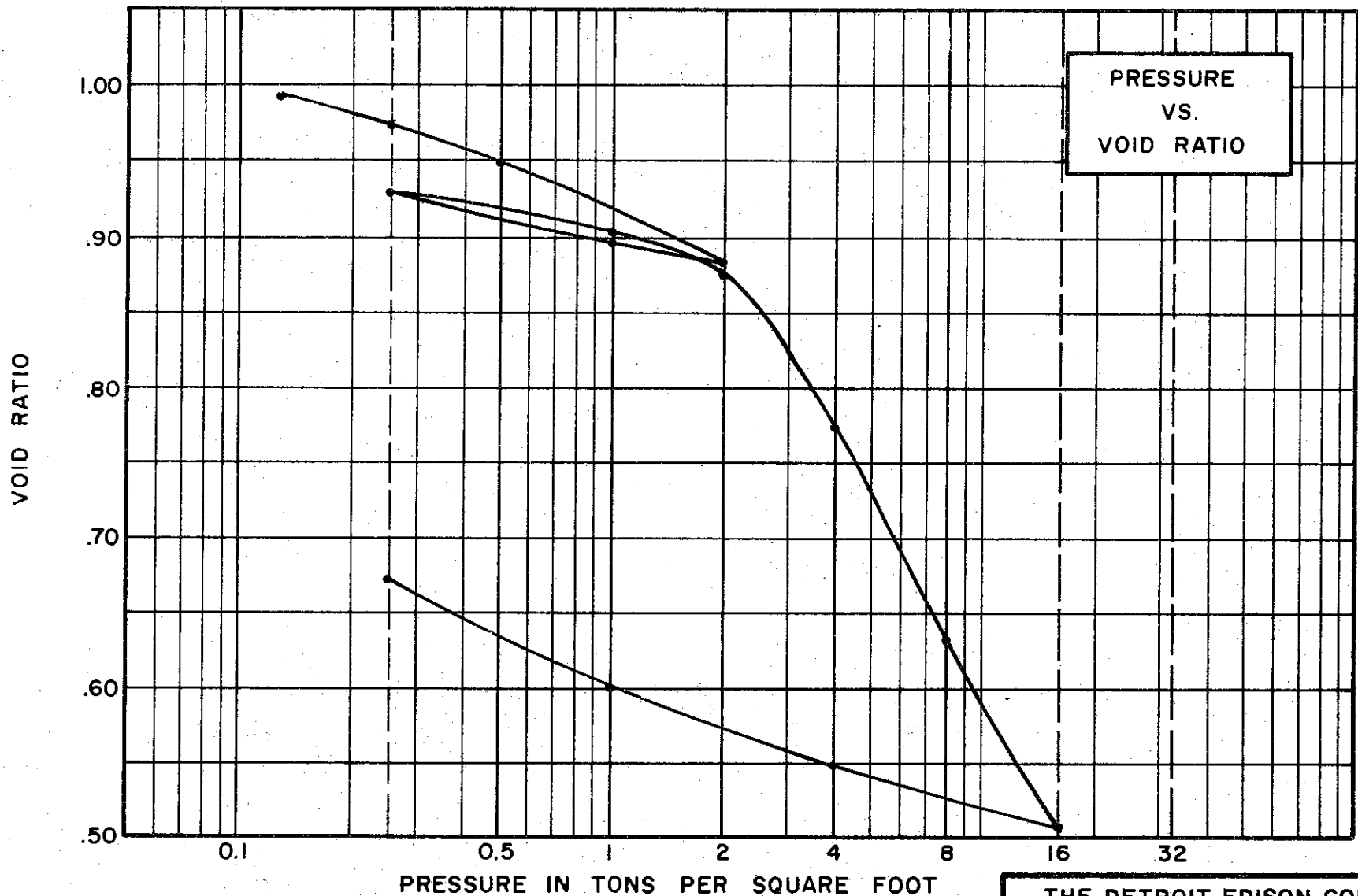
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.75
INITIAL WATER CONTENT	51.6 %
FINAL WATER CONTENT	39.9 %
BORING NO.	50
SAMPLE NO.	8
DEPTH	38.5'-38.9'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.383

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 40.5% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

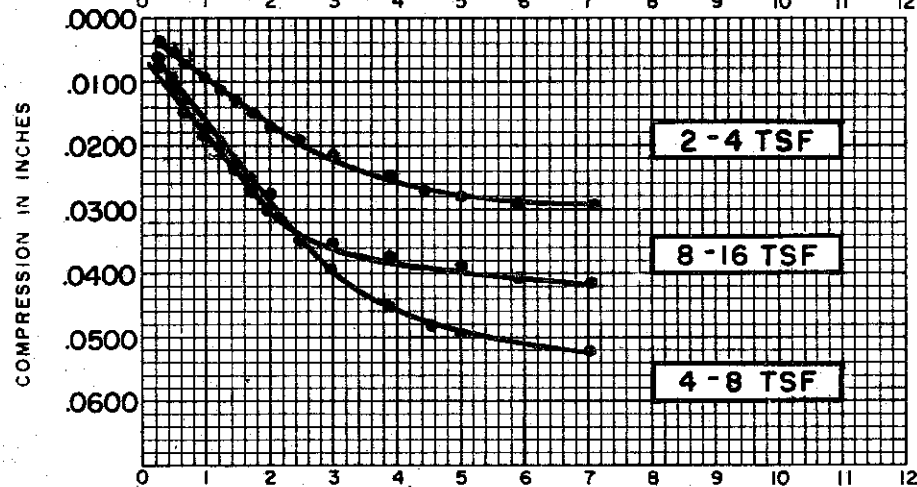
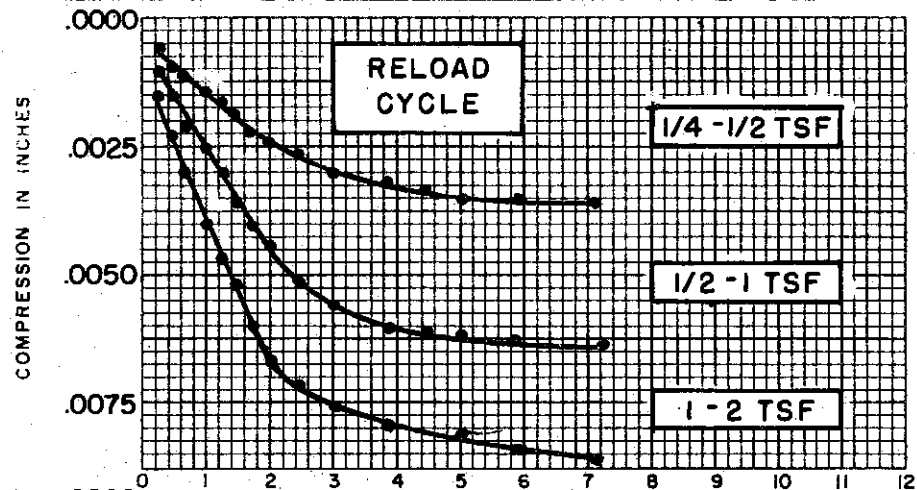
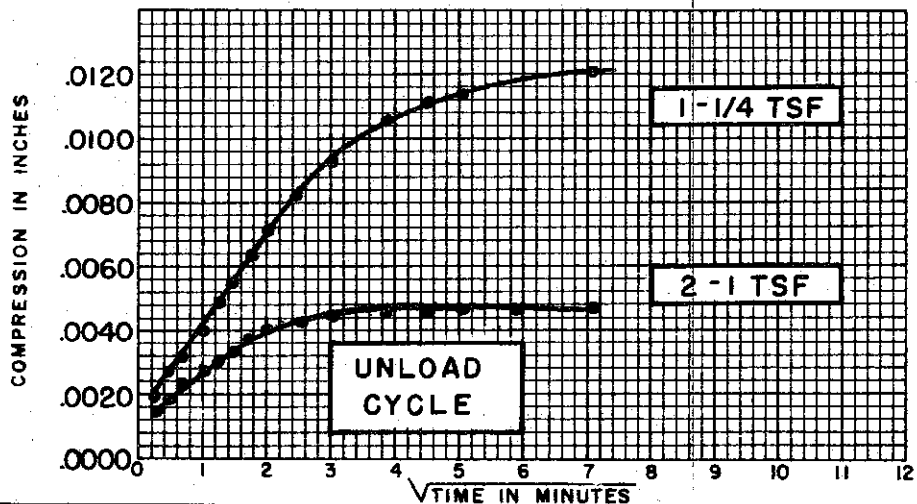
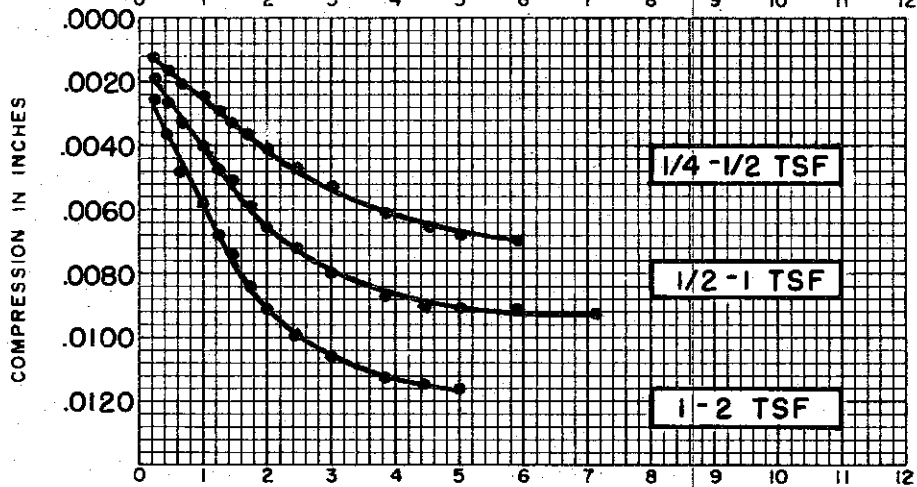
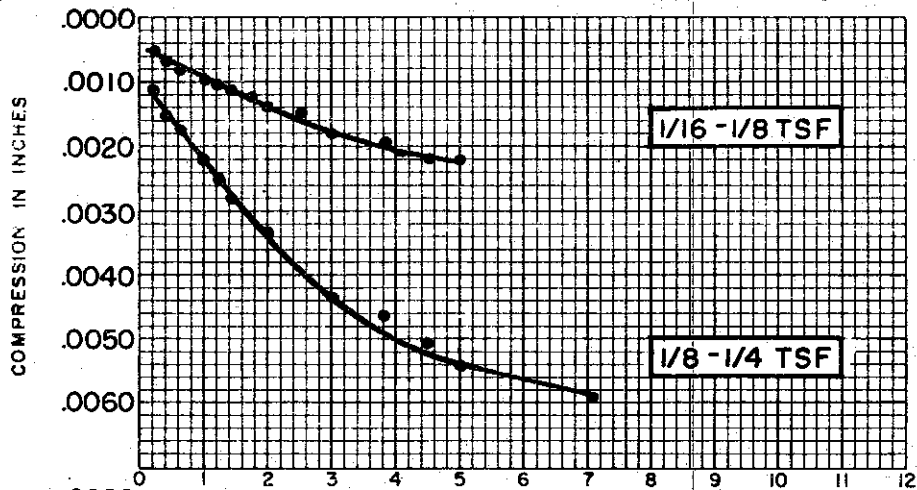
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 52 TEST NO. C109.1  
 SAMPLE NO. 4 DATE JULY 1974  
 DEPTH 29.9' TO 30.2'

C-513

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

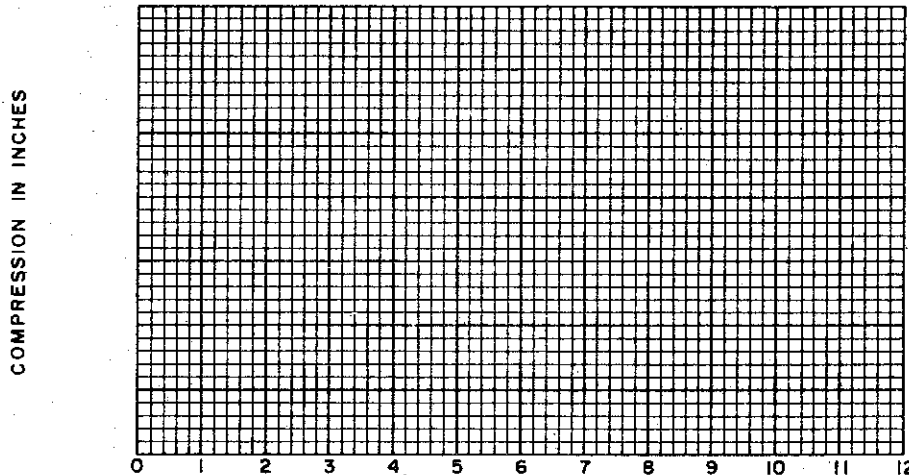
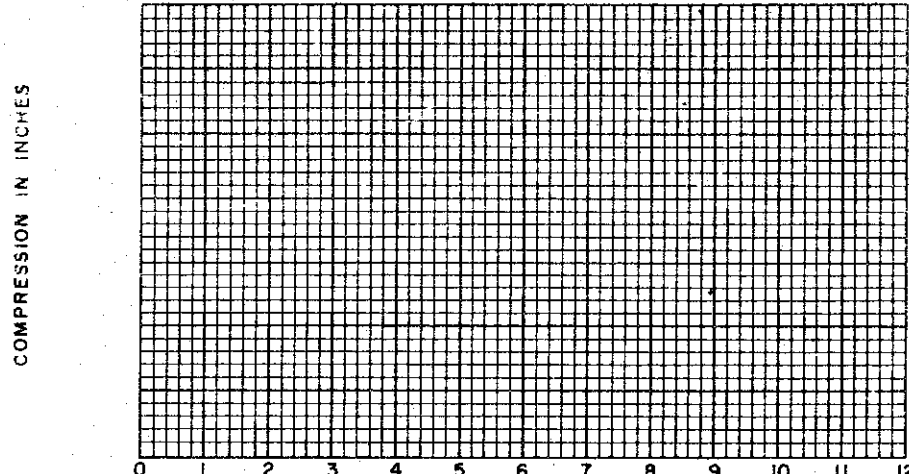
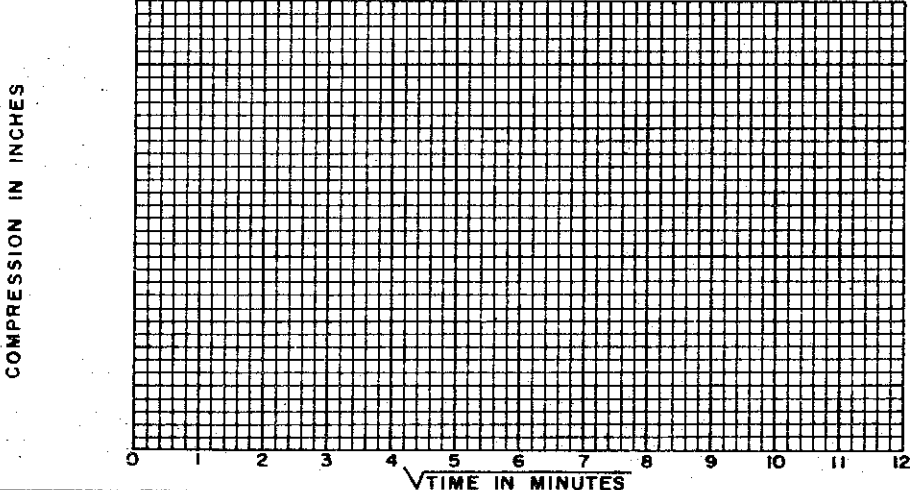
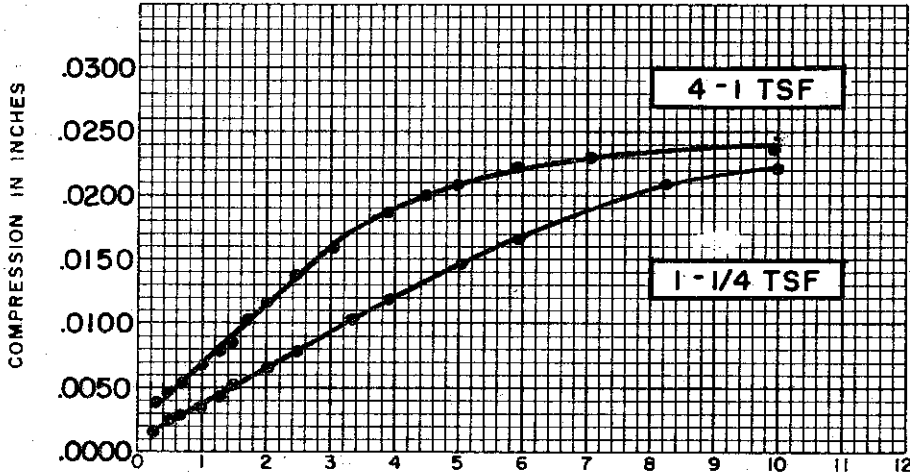
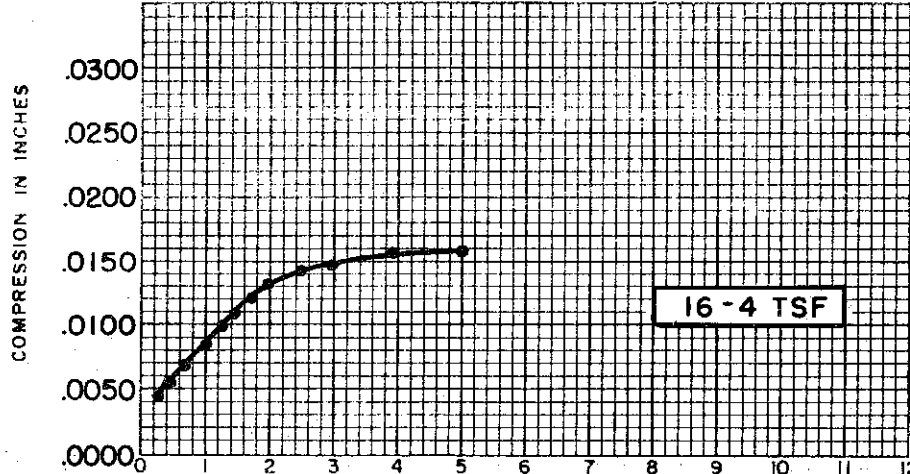
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-515

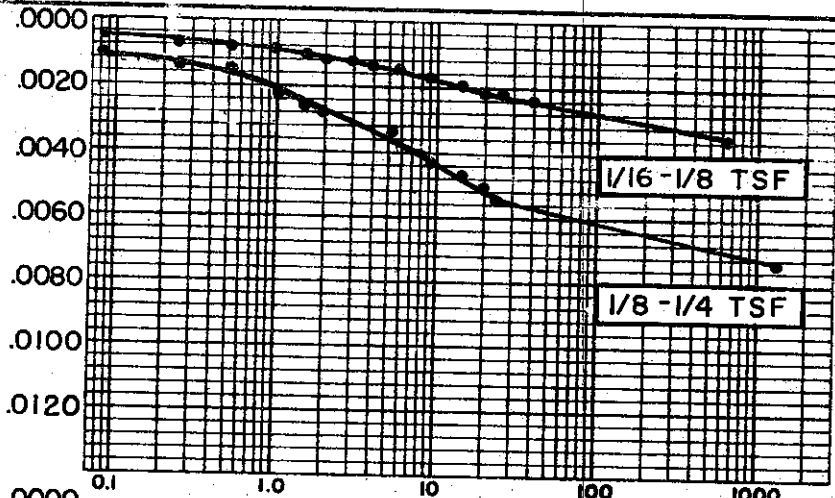


SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>
SPECIFIC GRAVITY	<u>2.70</u>
INITIAL WATER CONTENT	<u>40.5 %</u>
FINAL WATER CONTENT	<u>28.9 %</u>
BORING NO.	<u>52</u>
SAMPLE NO.	<u>4</u>
DEPTH	<u>29.9'-30.2'</u>

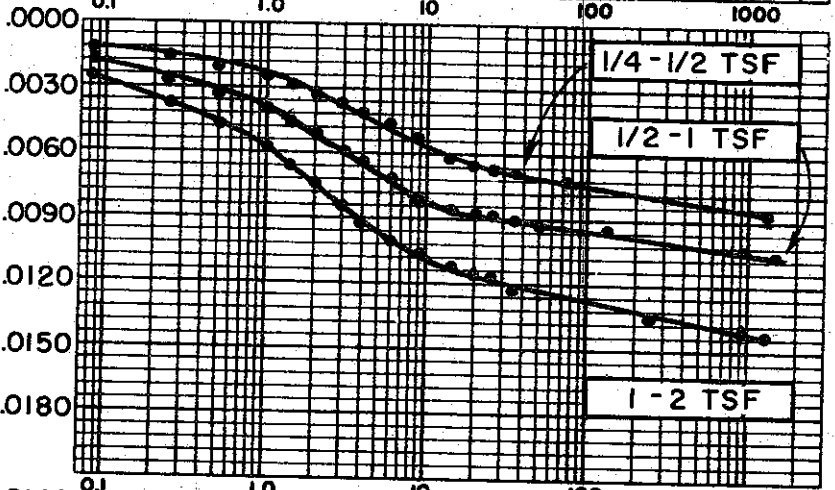
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>1.013</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

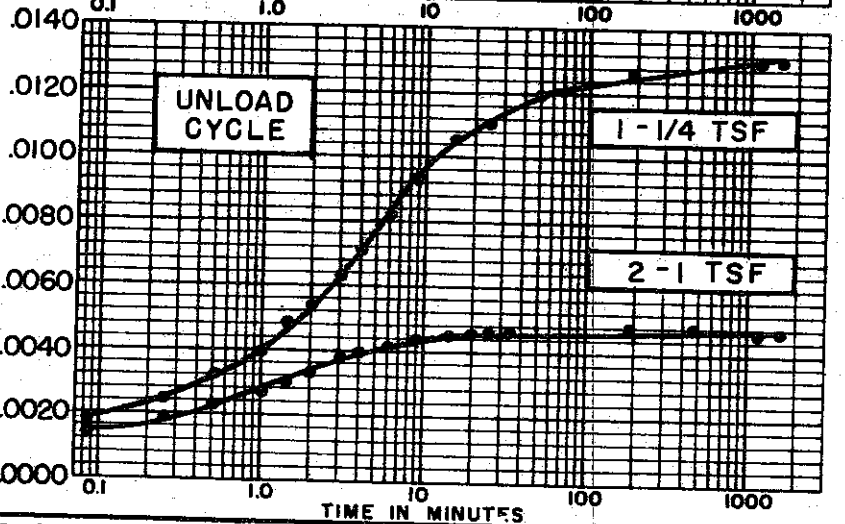
COMPRESSION IN INCHES



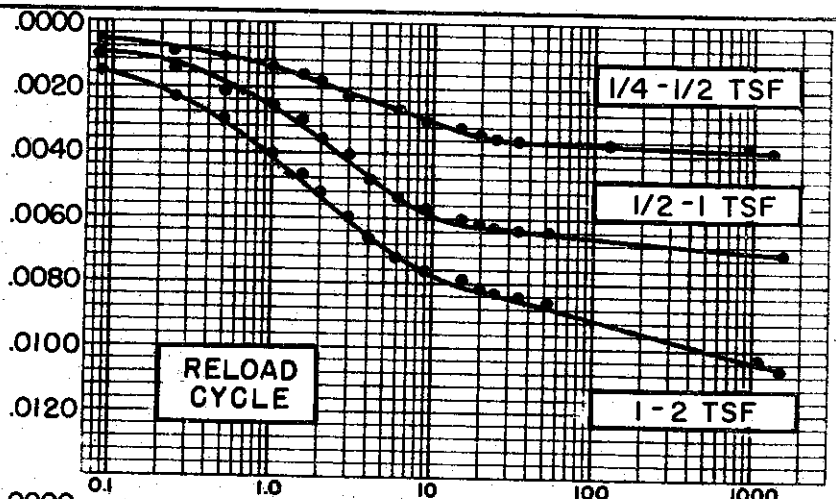
COMPRESSION IN INCHES



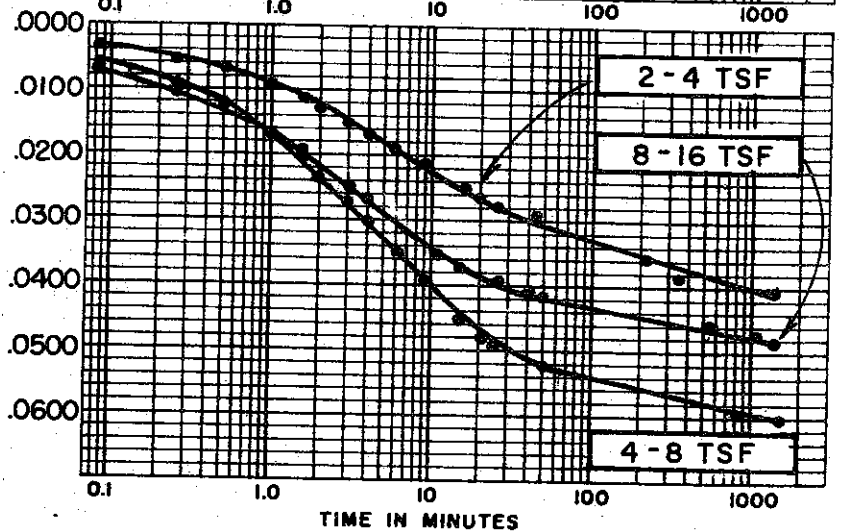
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 40.5 %  
FINAL WATER CONTENT 28.9 %

BORING NO. 52  
SAMPLE NO. 4  
DEPTH 29.9'-30.2'

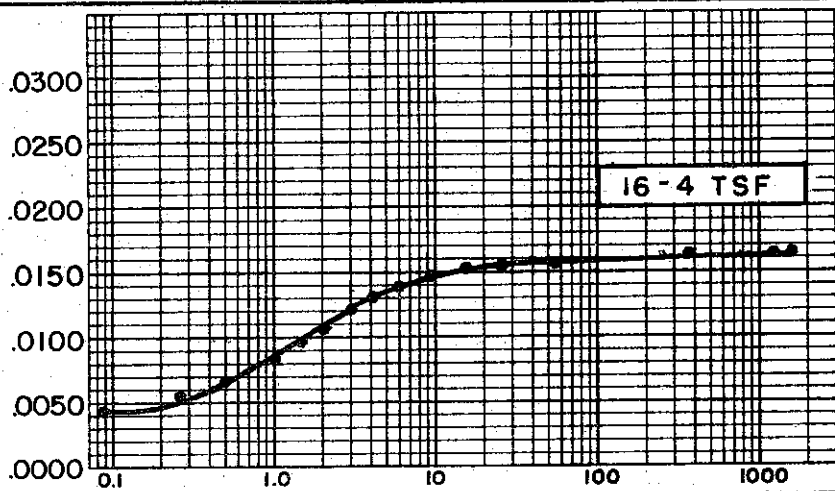
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.013

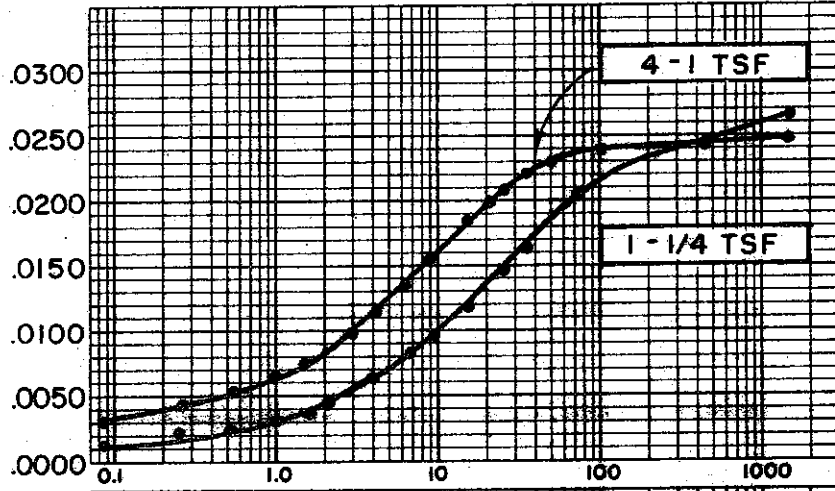
**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

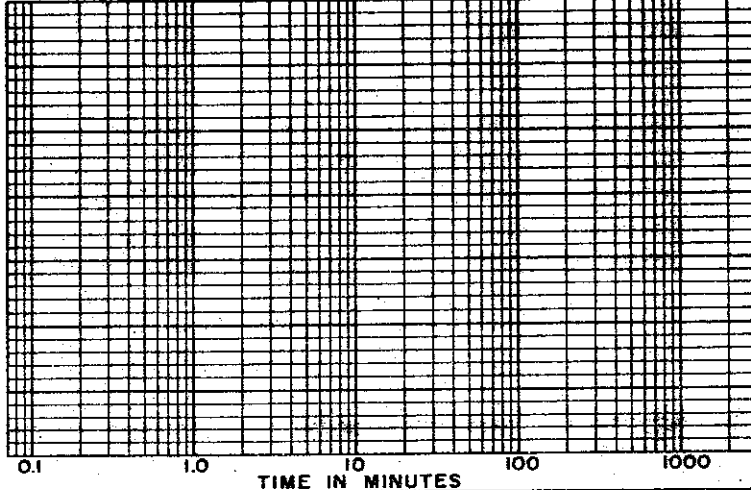
COMPRESSION IN INCHES



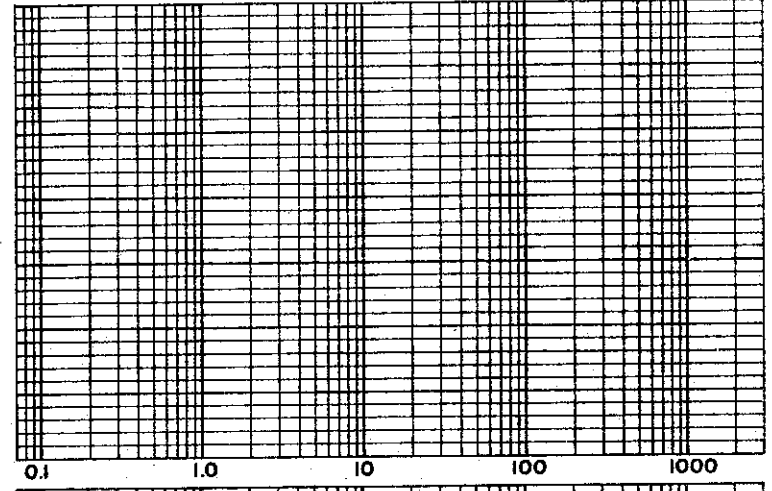
COMPRESSION IN INCHES



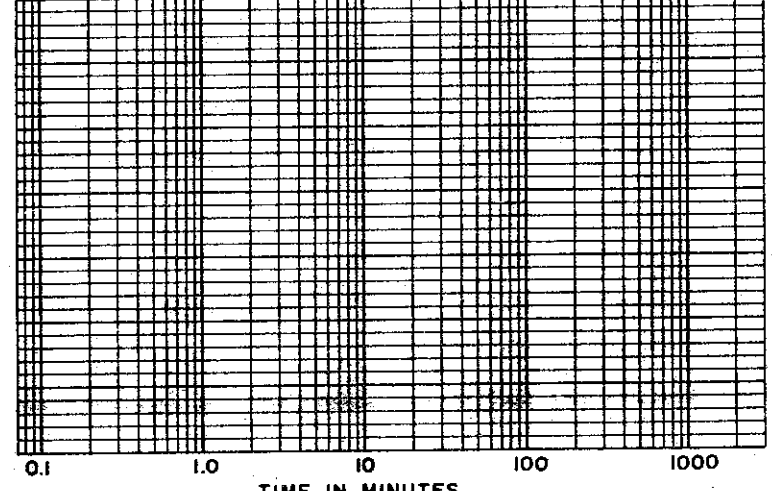
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

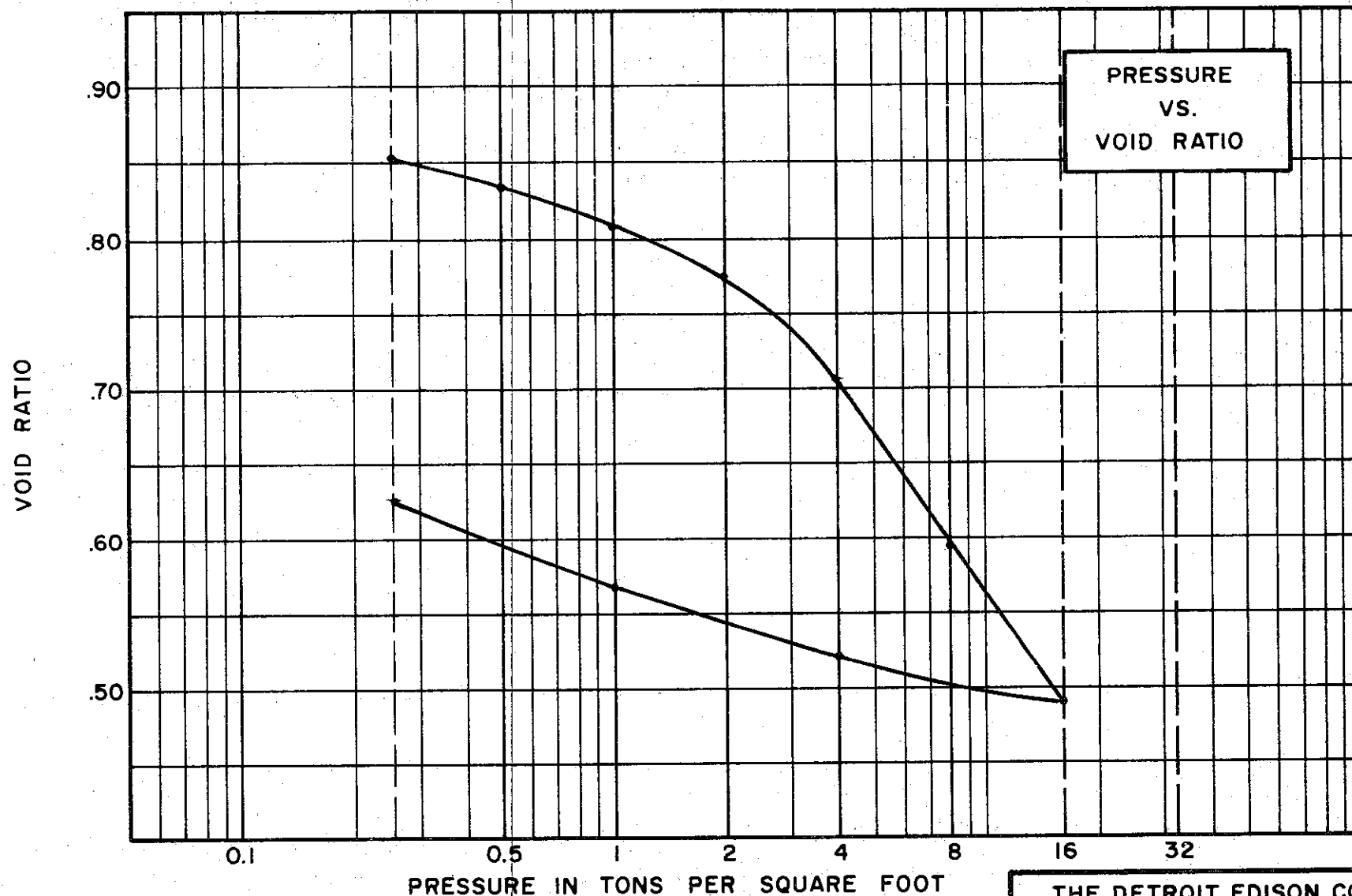
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 0.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-517

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY,  
SANDY (CL)  
SPECIFIC GRAVITY 2.72  
WATER CONTENT, INITIAL 30.9% FINAL 22.7%  
ATTERBERG LIMITS:  
LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.872

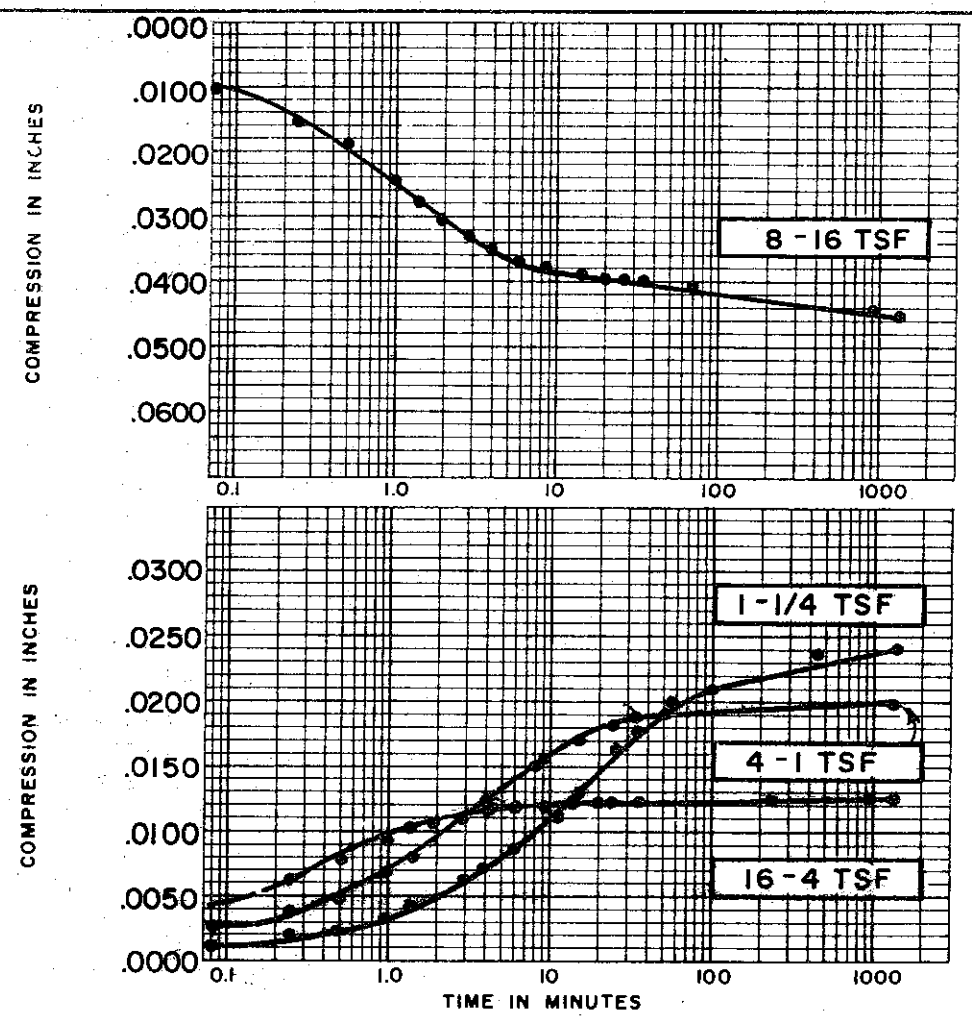
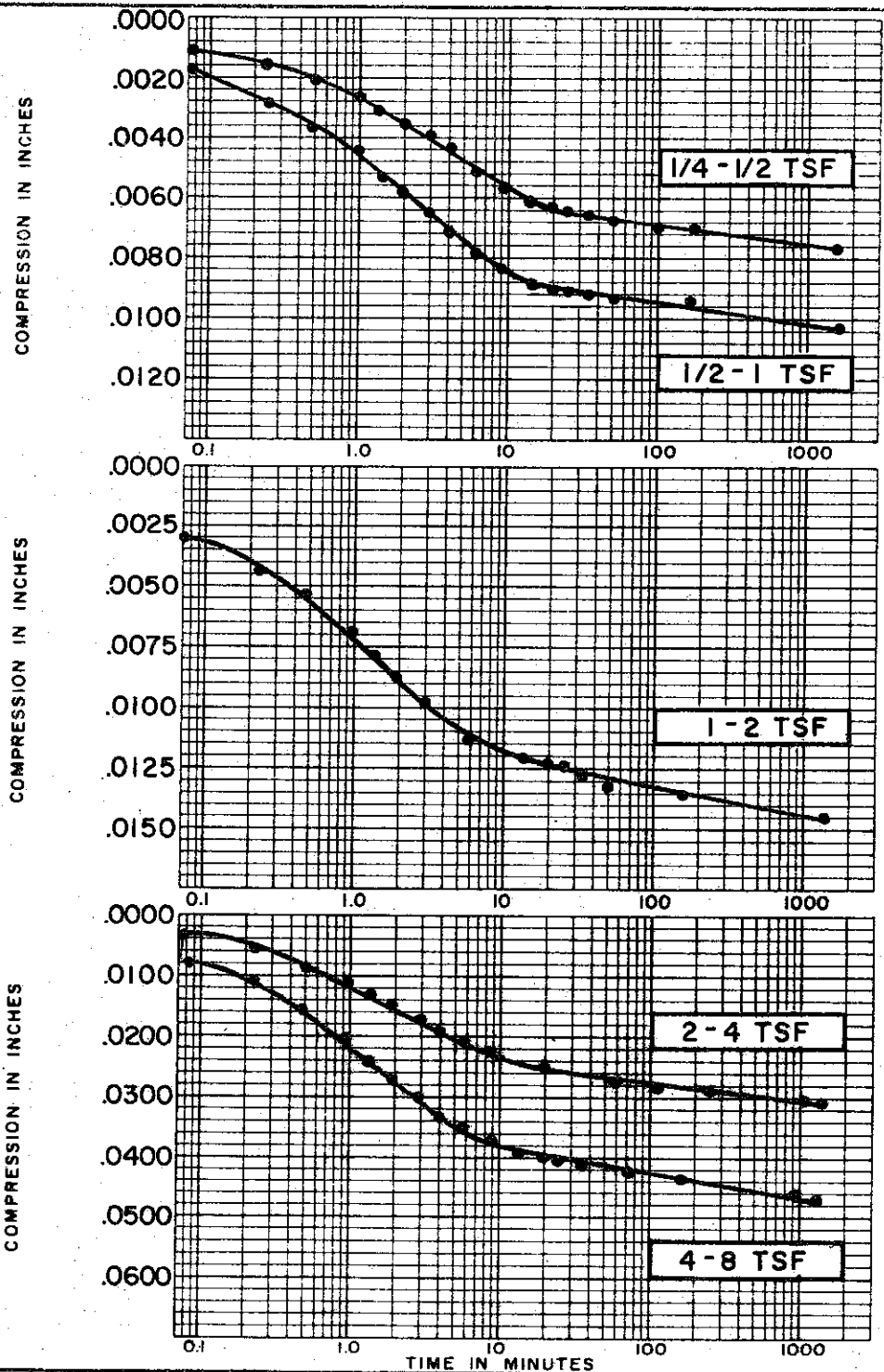
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 53 TEST NO. C98.1  
SAMPLE NO. 5 DATE JULY 1974  
DEPTH 39.5' TO 39.8'



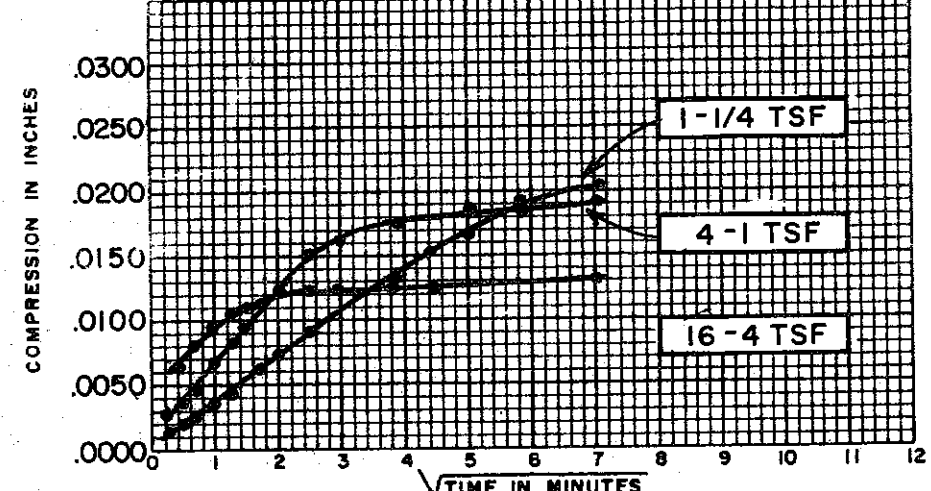
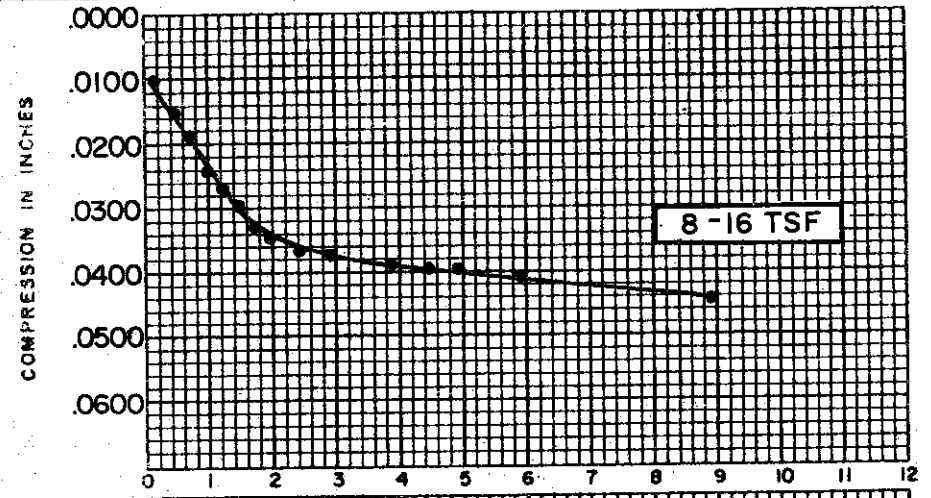
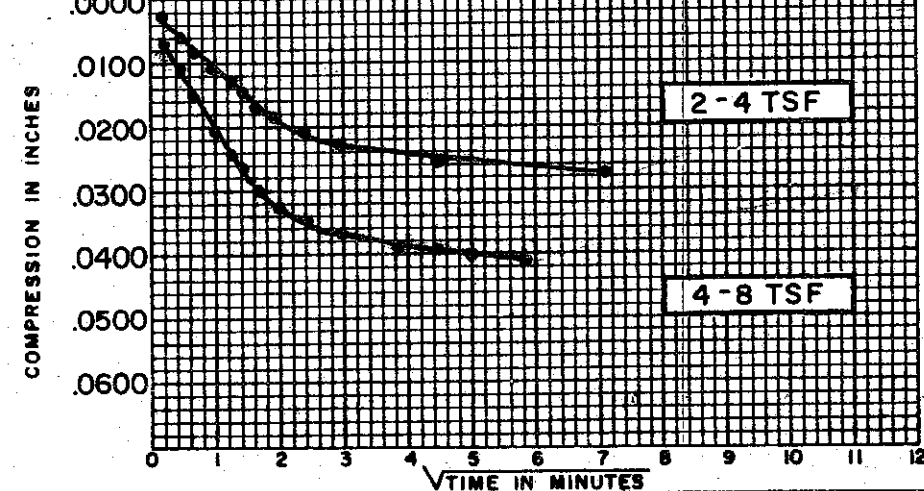
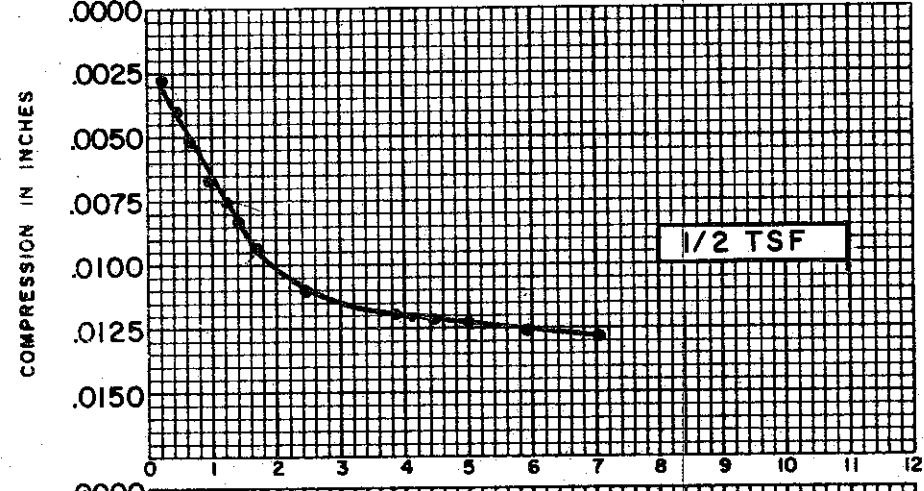
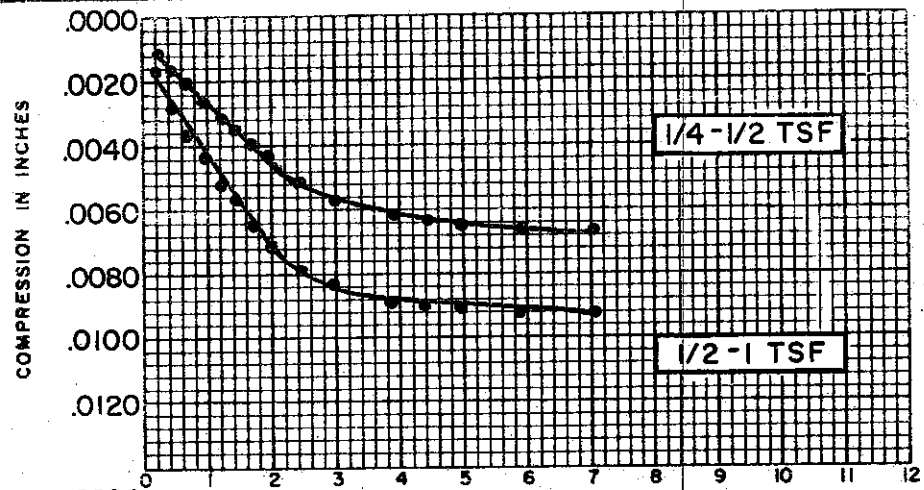
C-519



SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY, SANDY (CL)</u>
SPECIFIC GRAVITY	<u>2.72</u>
INITIAL WATER CONTENT	<u>30.9 %</u>
FINAL WATER CONTENT	<u>22.7 %</u>
BORING NO.	<u>53</u>
SAMPLE NO.	<u>5</u>
DEPTH	<u>39.5' - 39.8'</u>
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.872</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-520

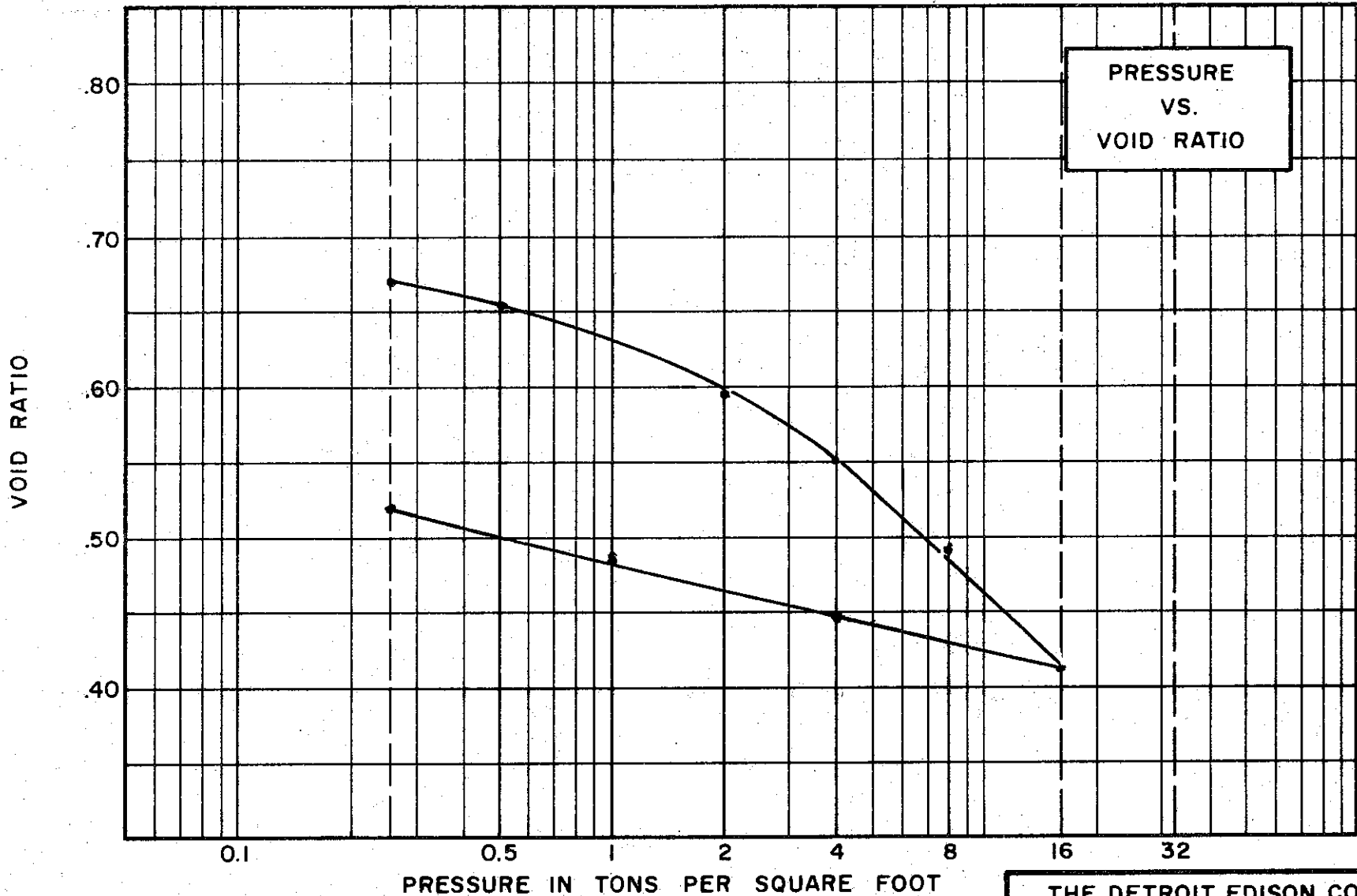


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	30.9%
FINAL WATER CONTENT	22.7%
BORING NO.	53
SAMPLE NO.	5
DEPTH	39.5'-39.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.872

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY  
(CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 260% FINAL 220%  
ATTERBERG LIMITS:  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

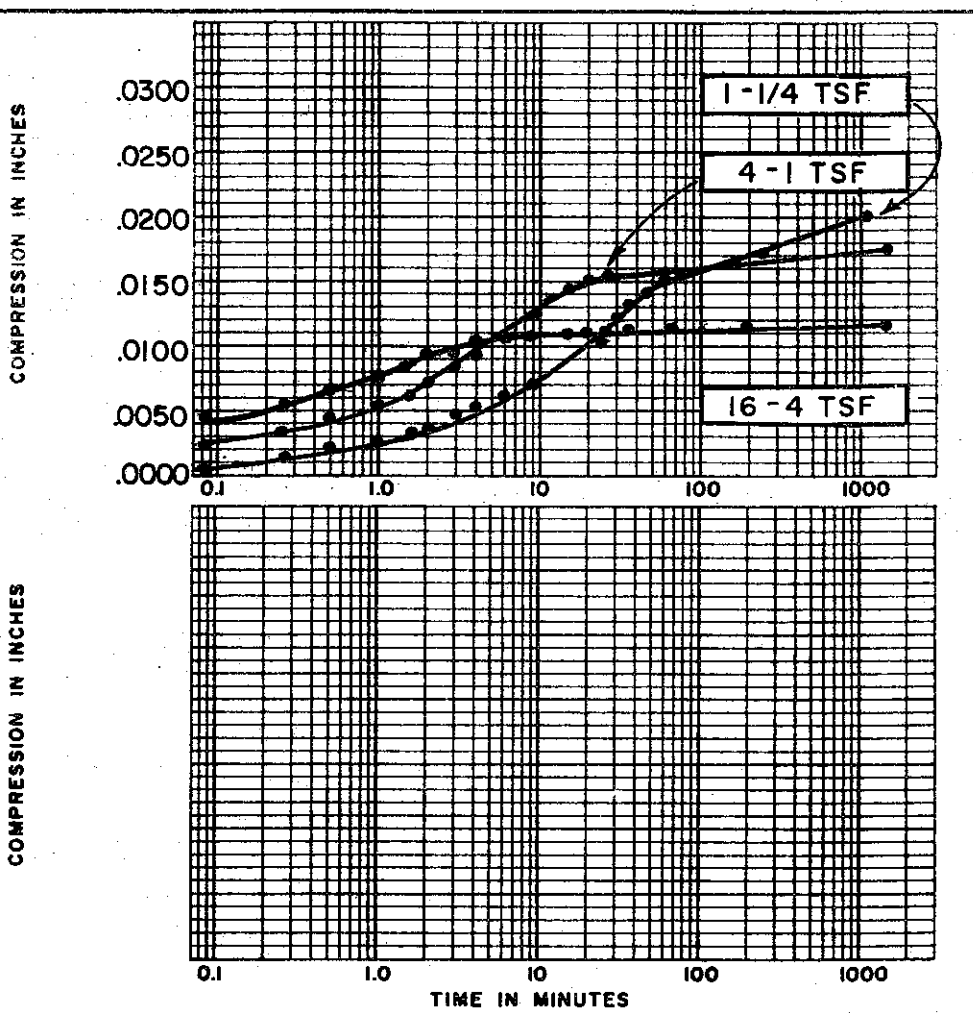
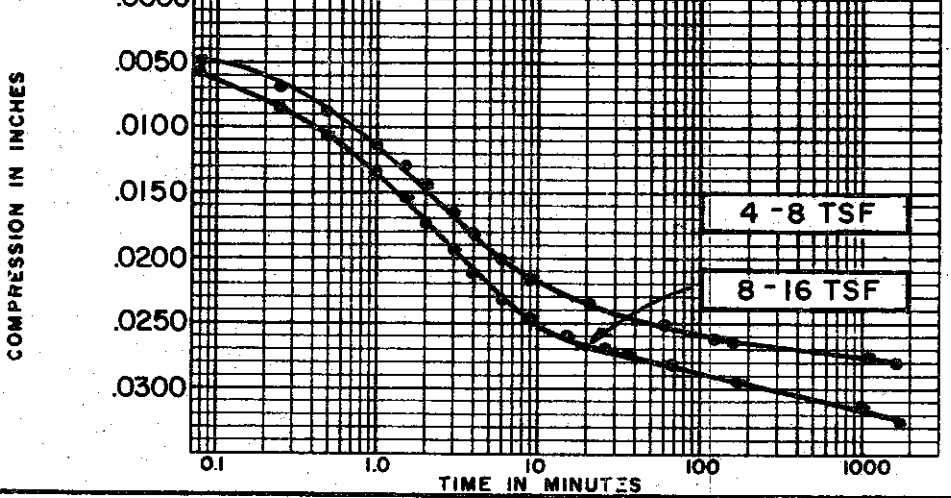
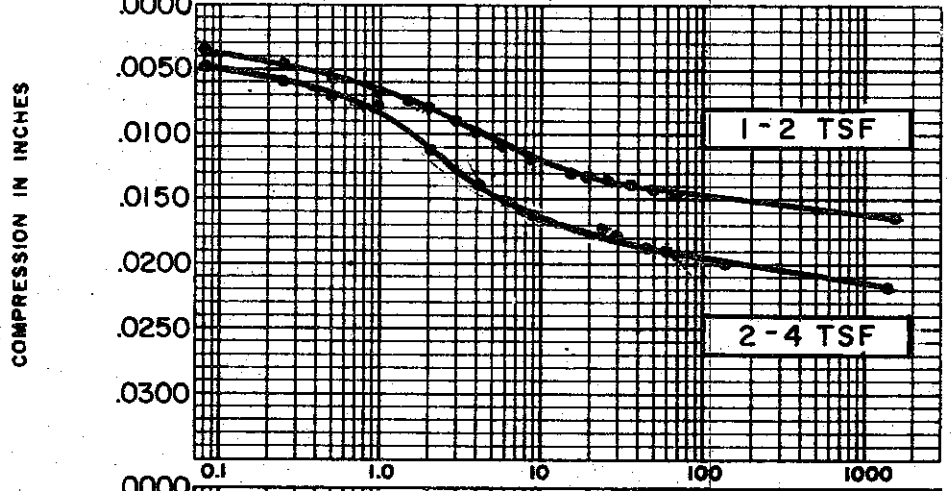
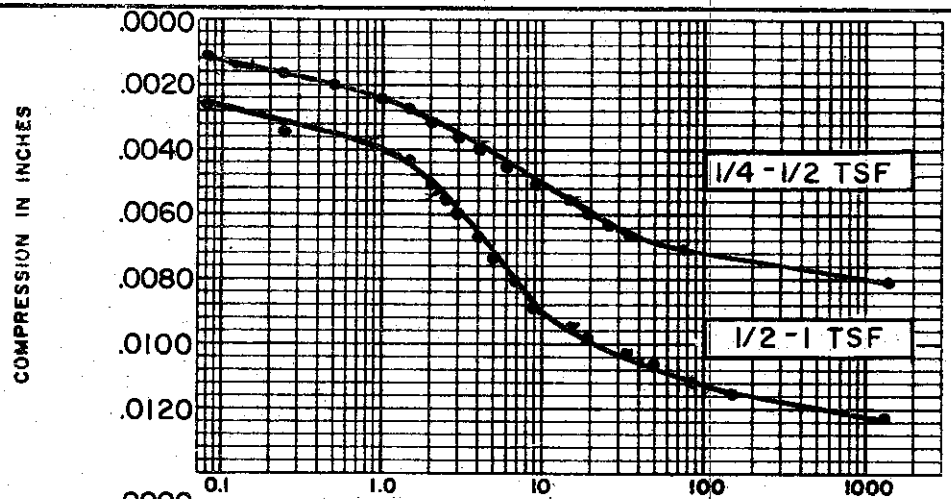
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.696

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 54 TEST NO. C399.1  
SAMPLE NO. 6 DATE JULY 1974  
DEPTH 63.5' TO 63.8'

C-521



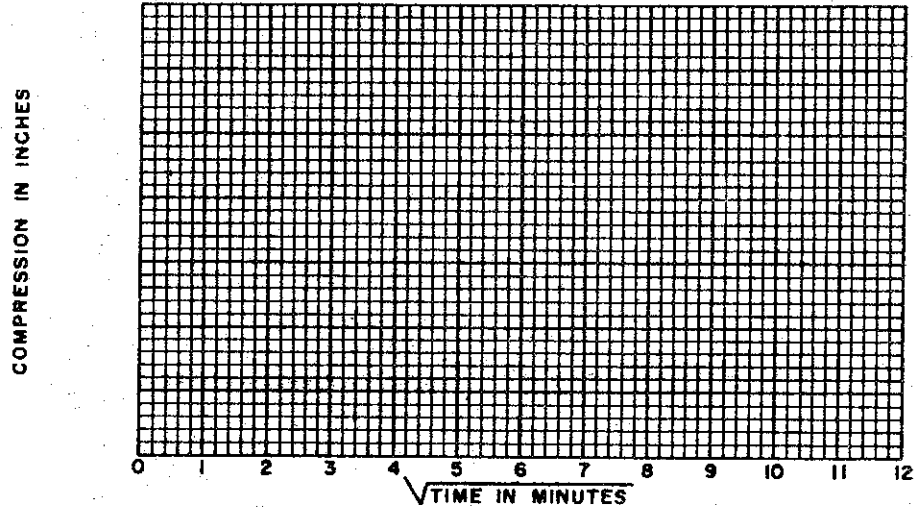
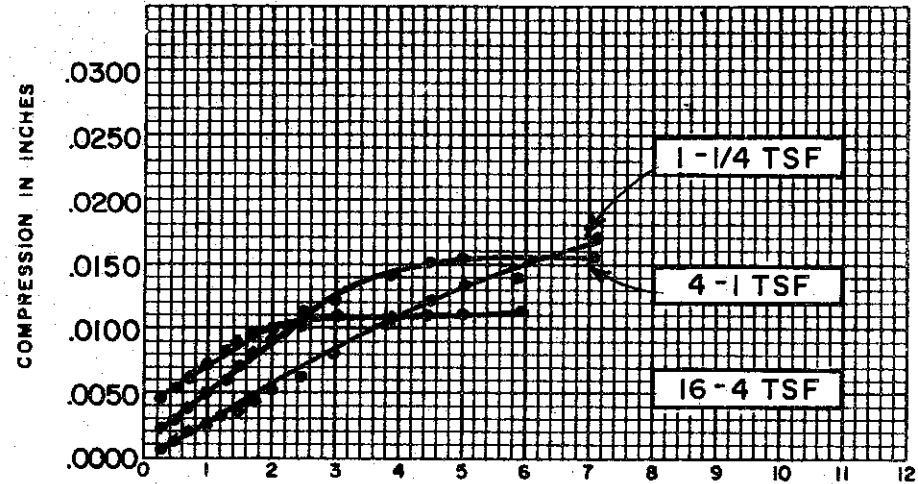
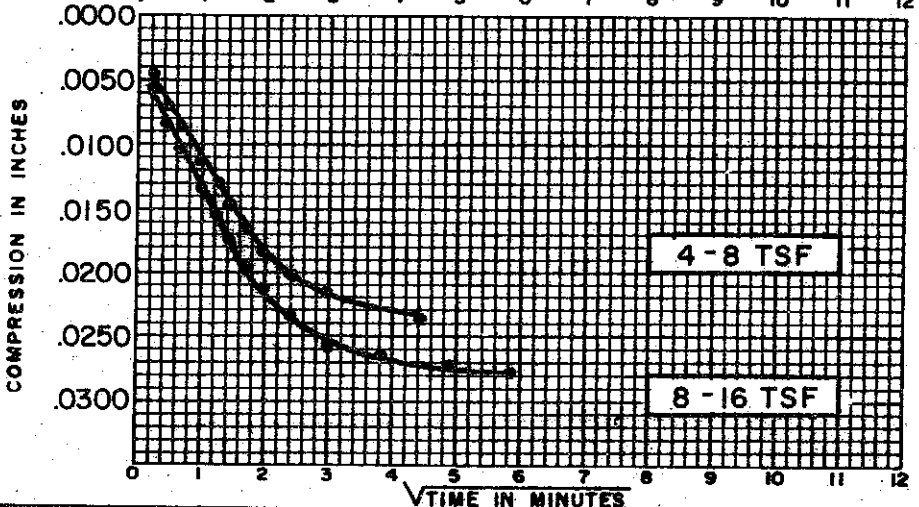
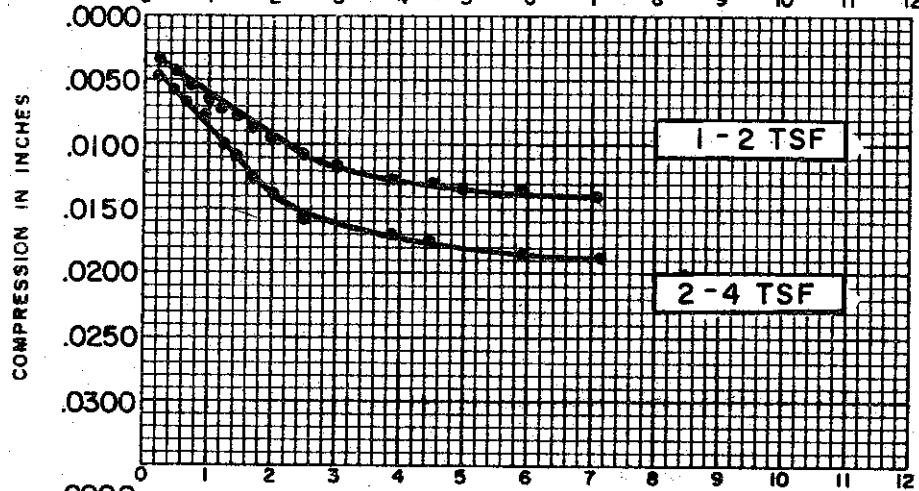
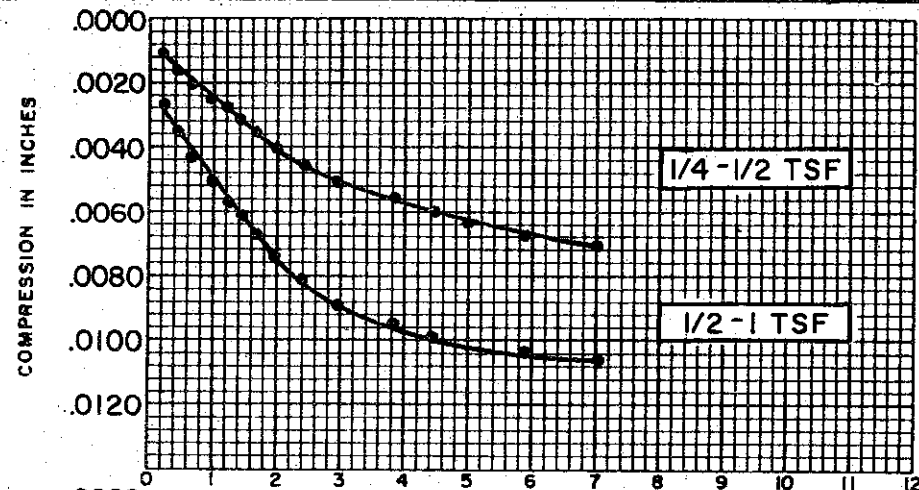
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	20.0 %
FINAL WATER CONTENT	22.0 %

BORING NO.	54
SAMPLE NO.	6
DEPTH	63.5' - 63.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.696

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 26.0%  
 FINAL WATER CONTENT 22.0%

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5'-63.8'

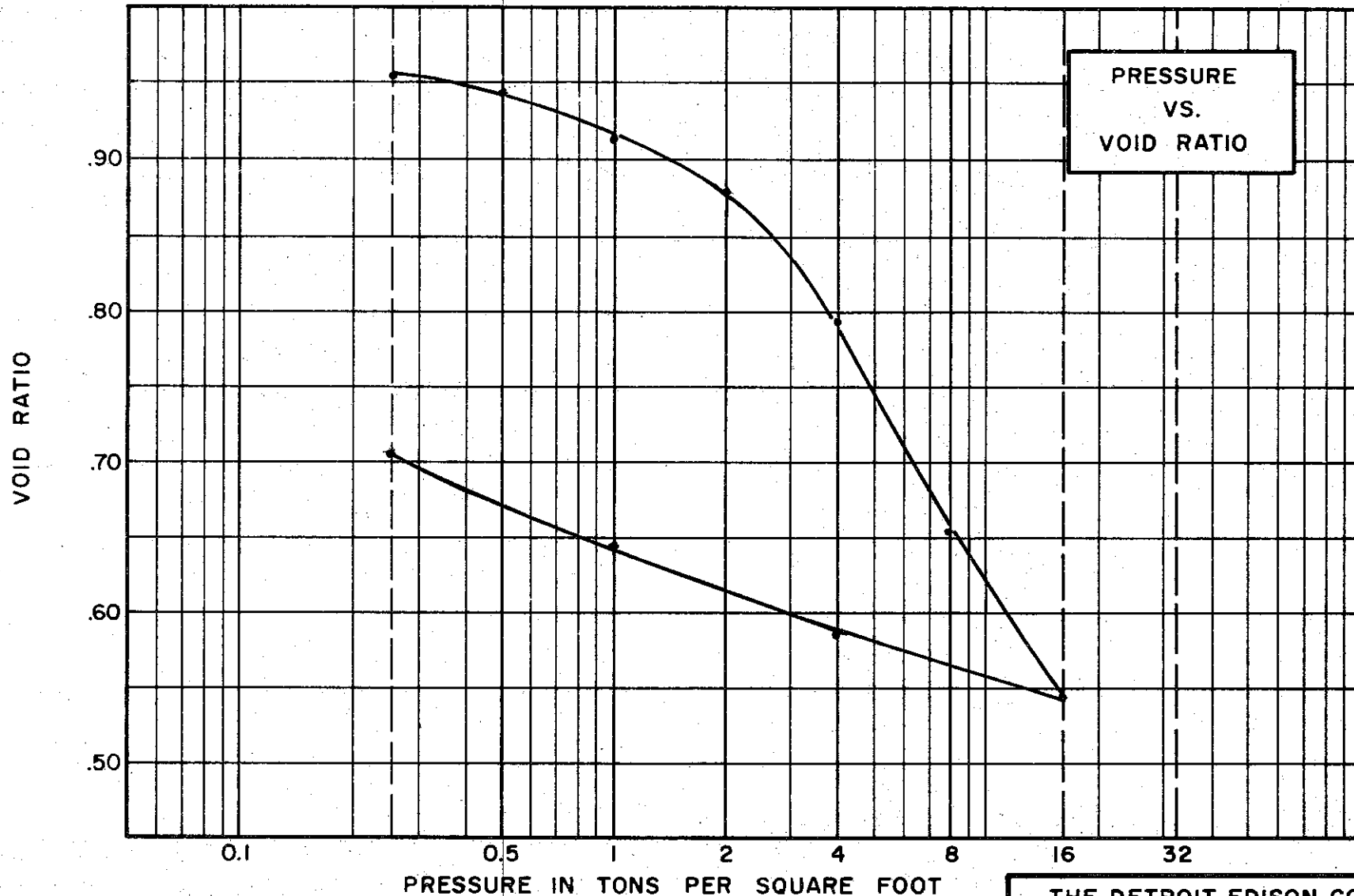
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.696

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-523



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.3% FINAL 30.6%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**

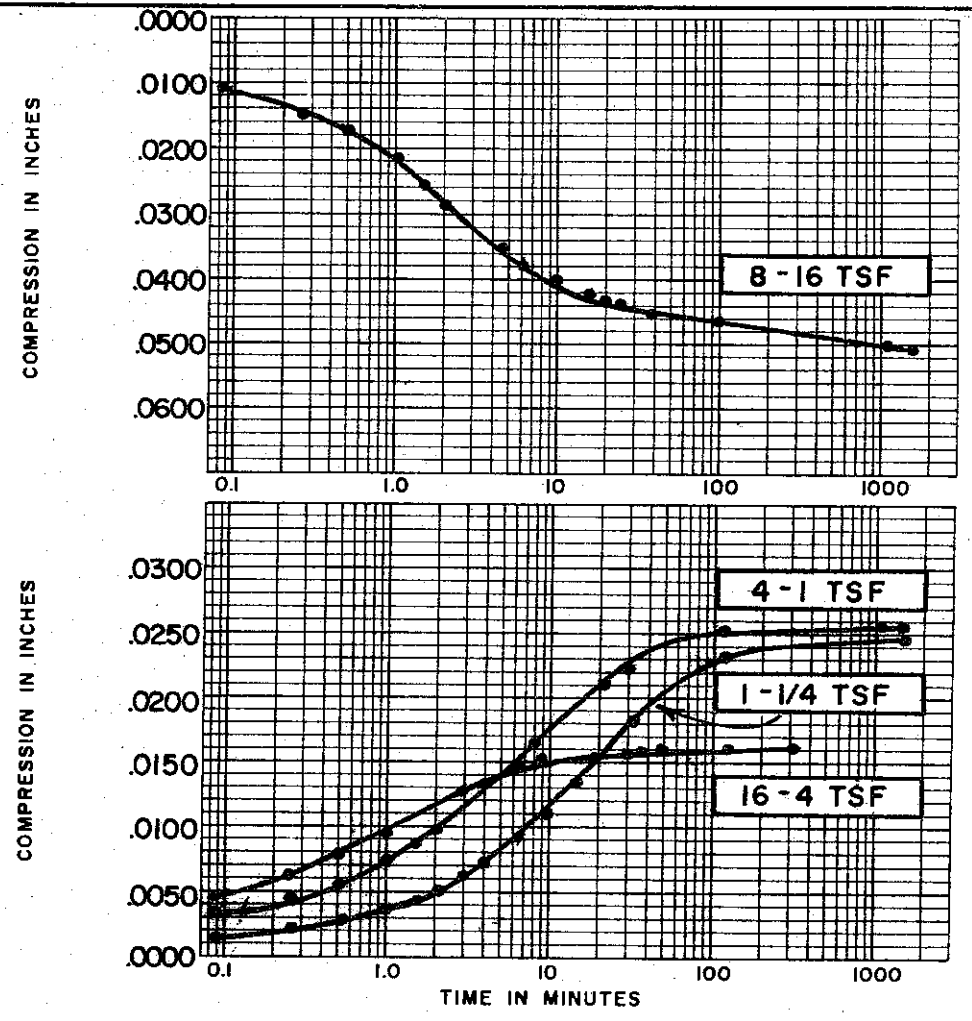
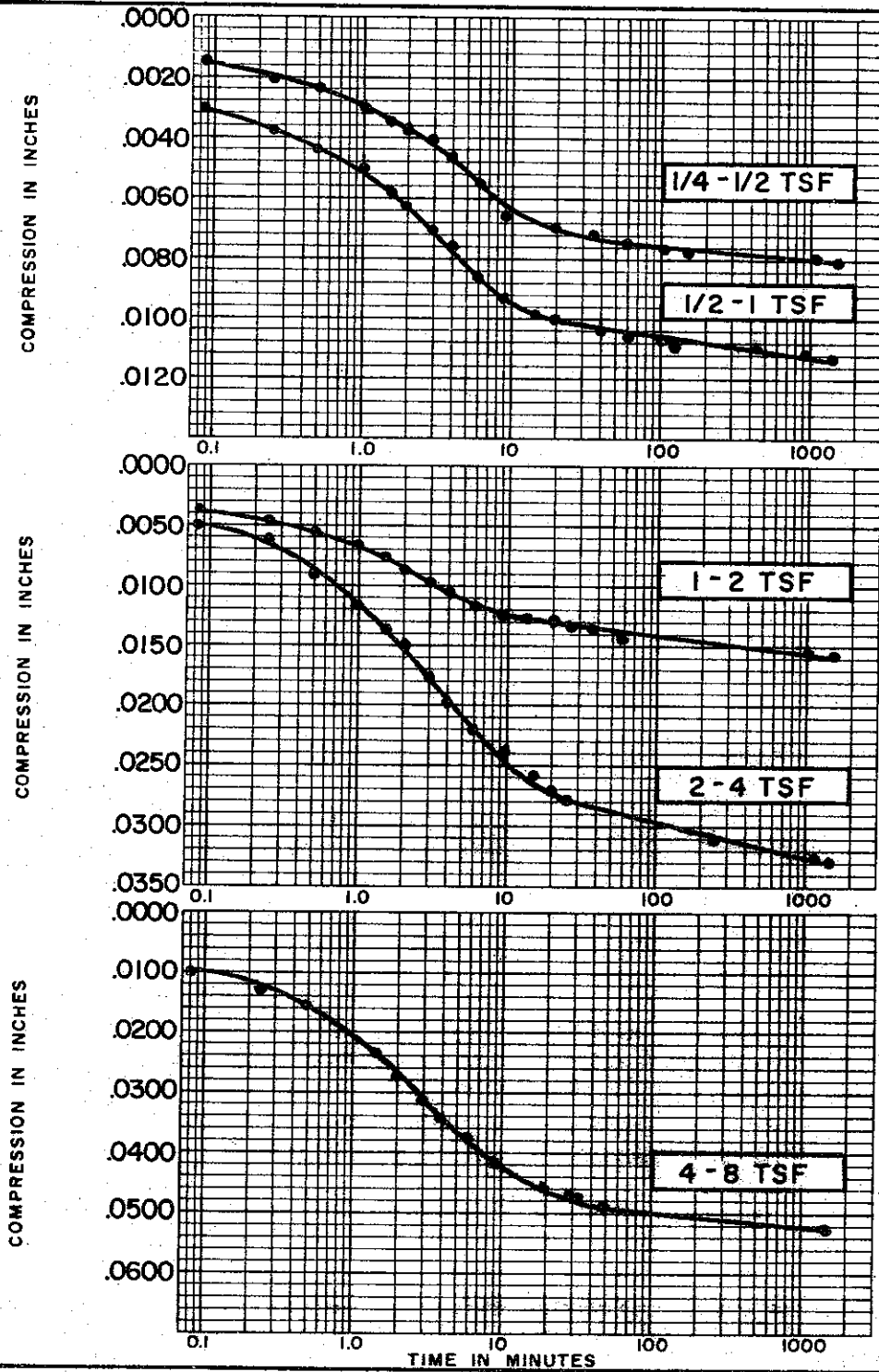
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

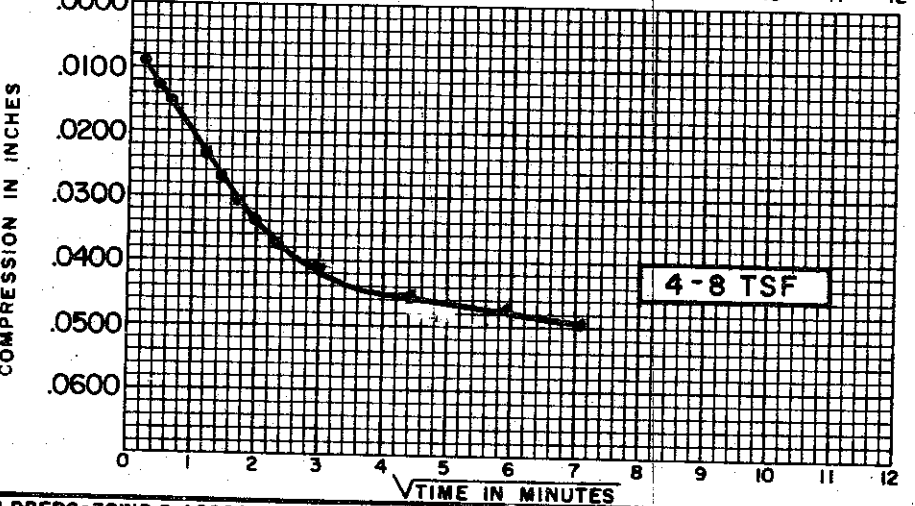
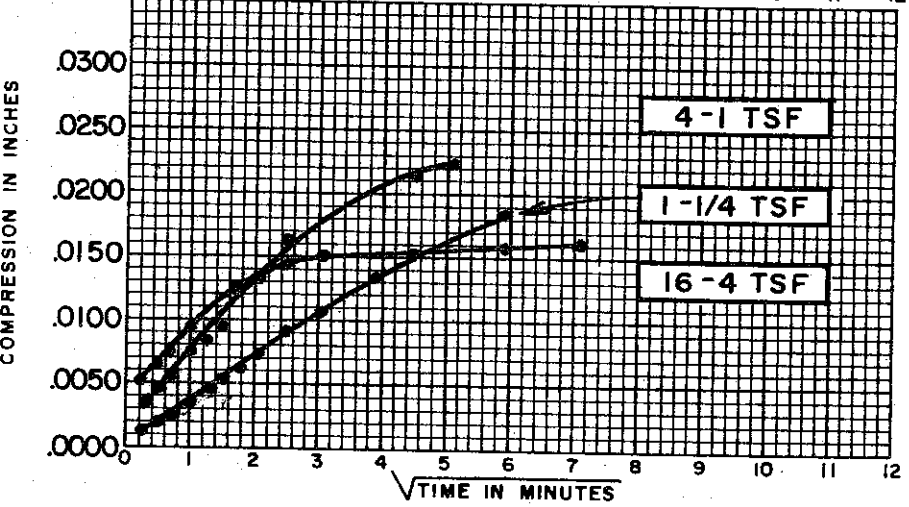
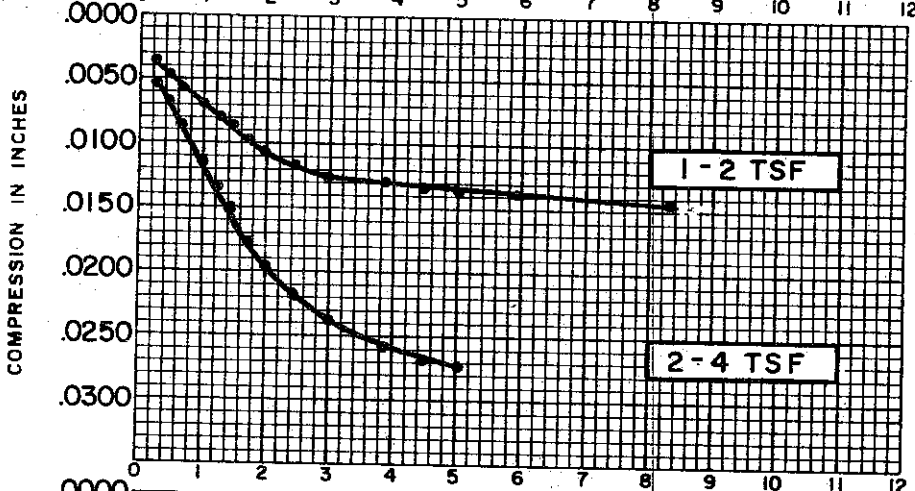
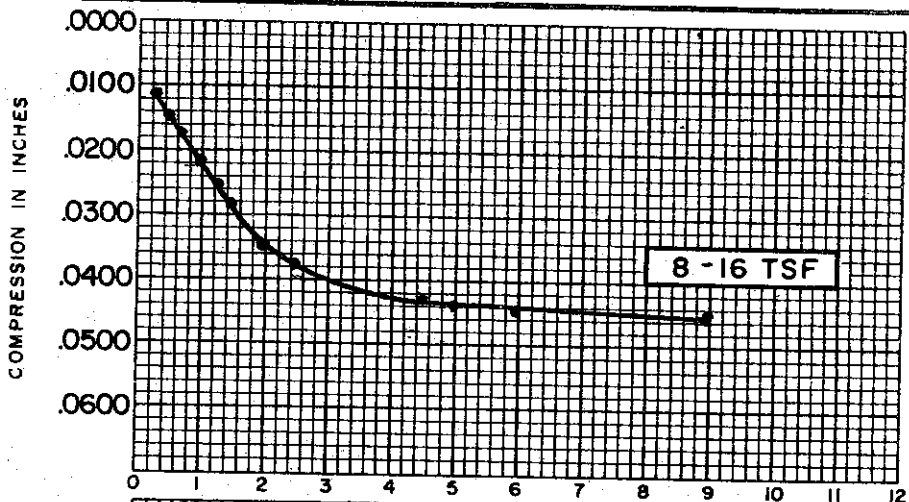
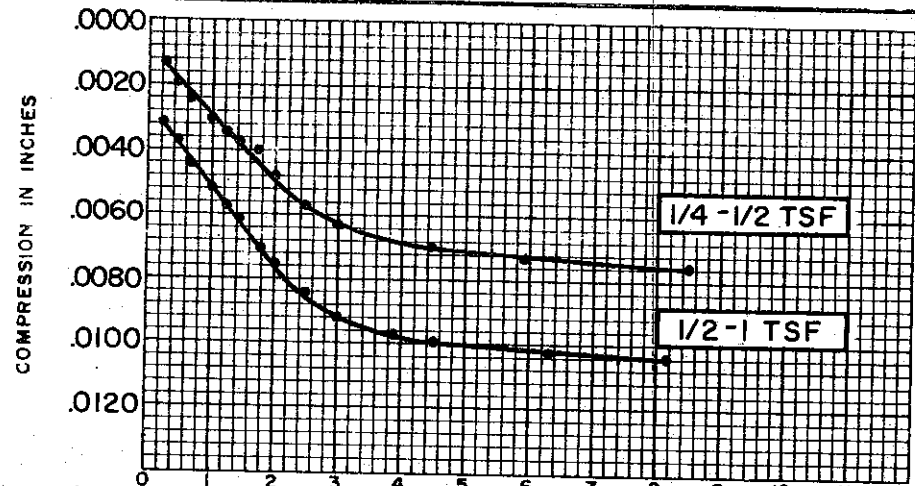
BORING NO. 54 TEST NO. C401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7' TO 74.0'

C-525



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.3 %
FINAL WATER CONTENT	30.6 %
BORING NO.	54
SAMPLE NO.	8
DEPTH	73.7'-74.0'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.962

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

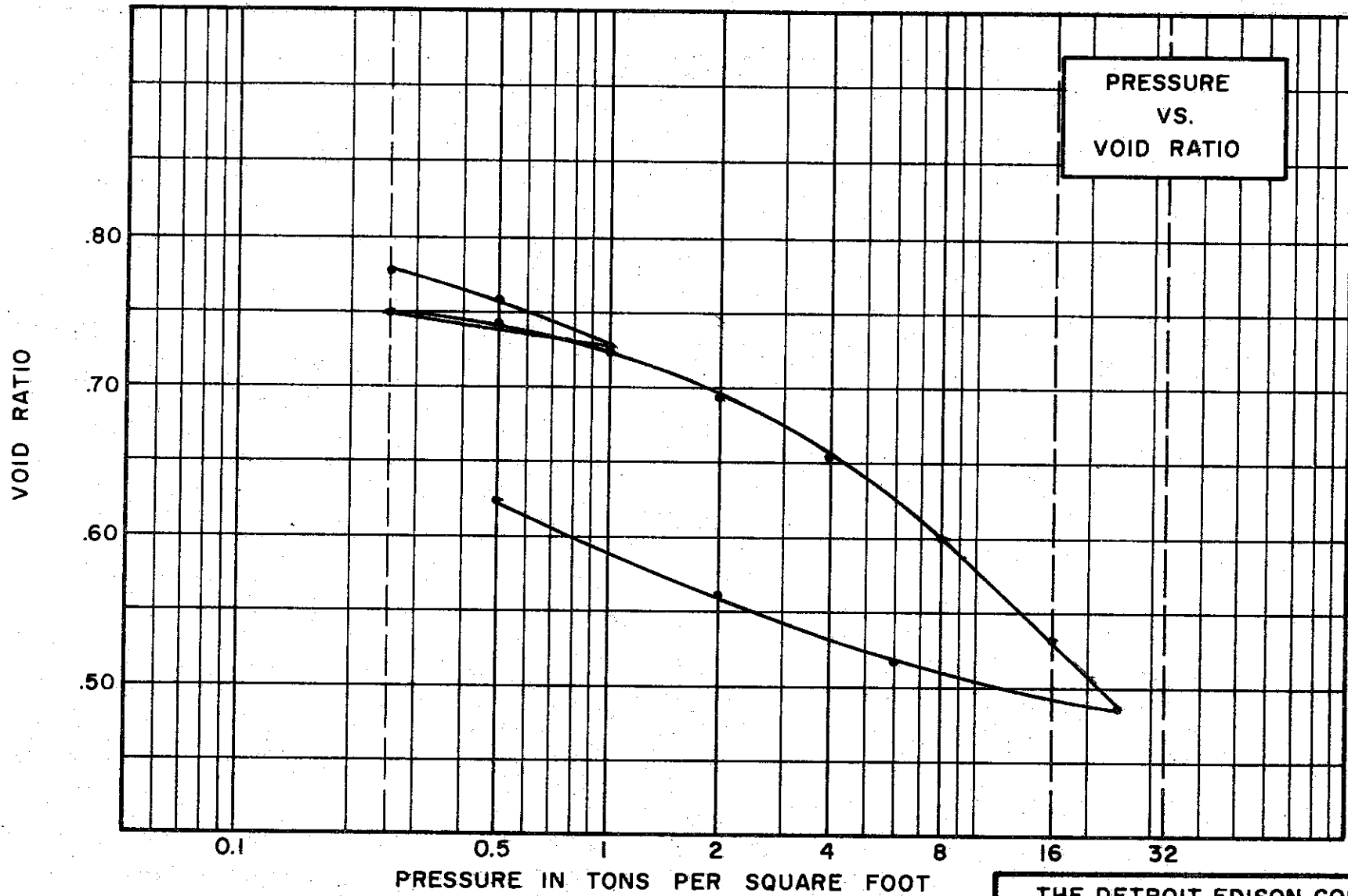


**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 BORING NO. 54  
 SAMPLE NO. 8  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.3%  
 FINAL WATER CONTENT 30.6%  
 DEPTH 73.7'-74.0'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

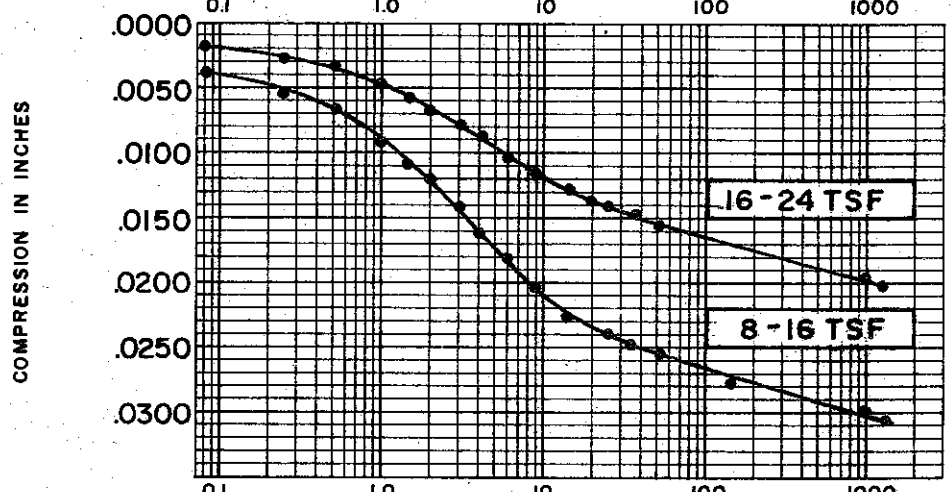
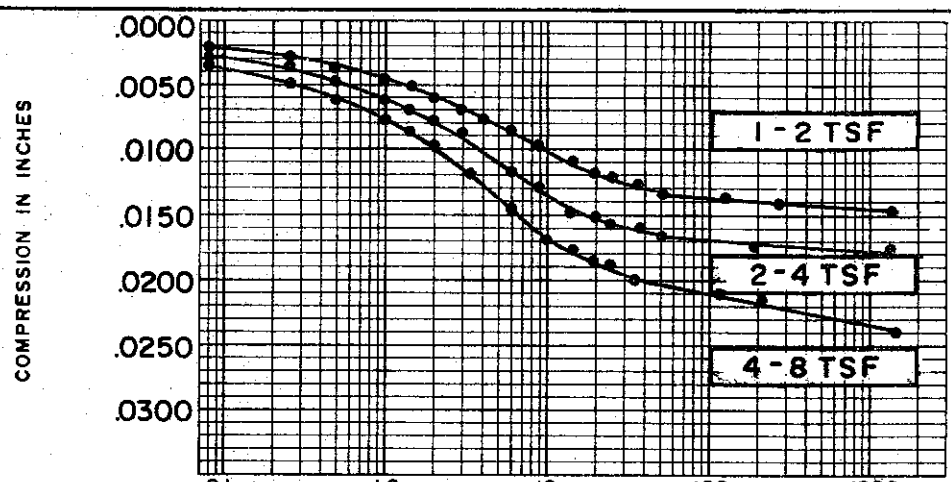
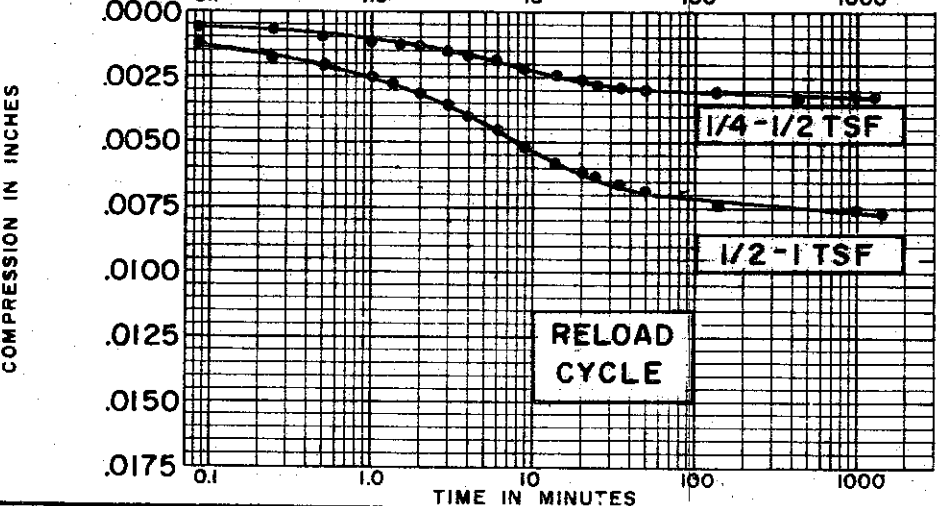
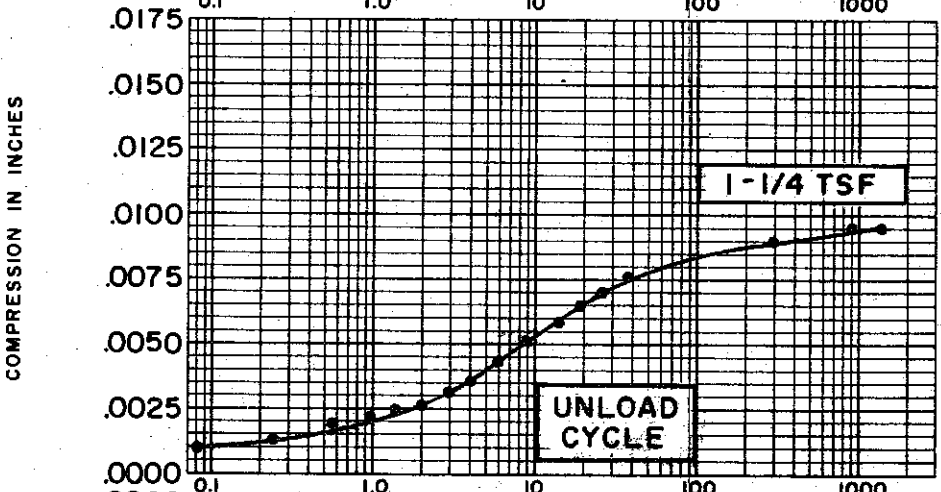
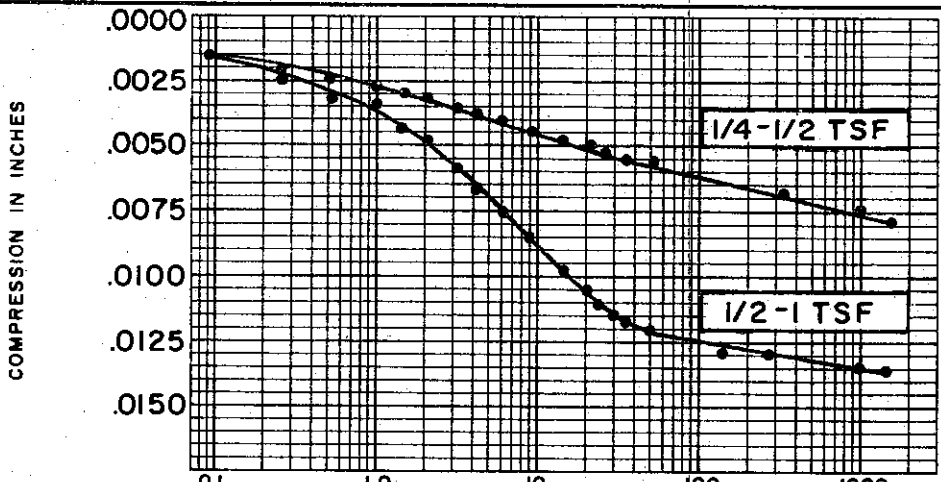
SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 30.0% FINAL 28.8%  
ATTERBERG LIMITS:  
LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.787

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**  
BORING NO. 60 TEST NO. C42.1  
SAMPLE NO. 2 DATE FEB. 1974  
DEPTH 9.8' TO 10.0'

C-527



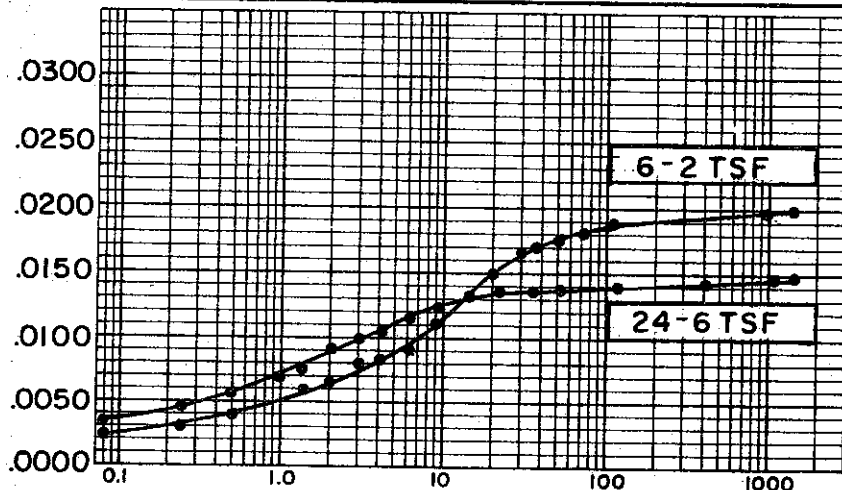
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	30.0%
FINAL WATER CONTENT	28.8%
BORING NO.	60
SAMPLE NO.	2
DEPTH	9.8' TO 10.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

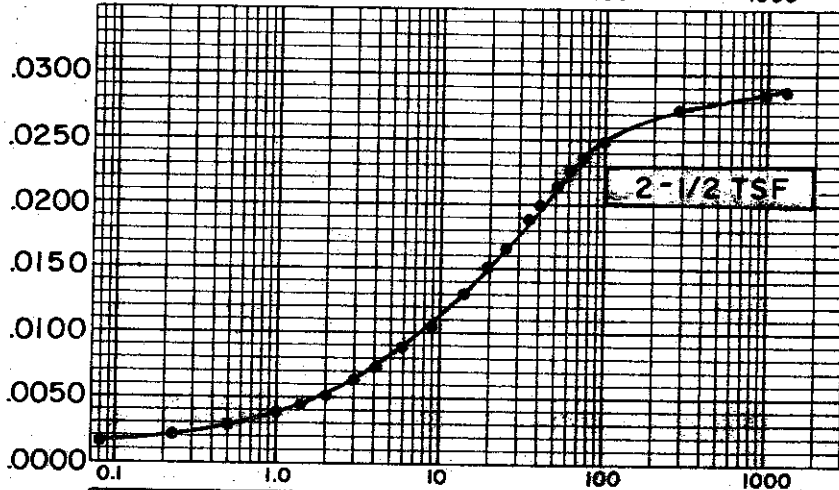
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-529

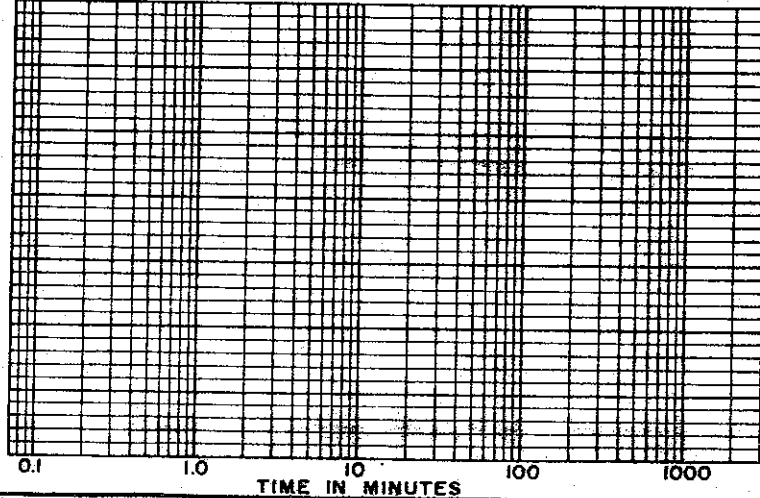
COMPRESSION IN INCHES



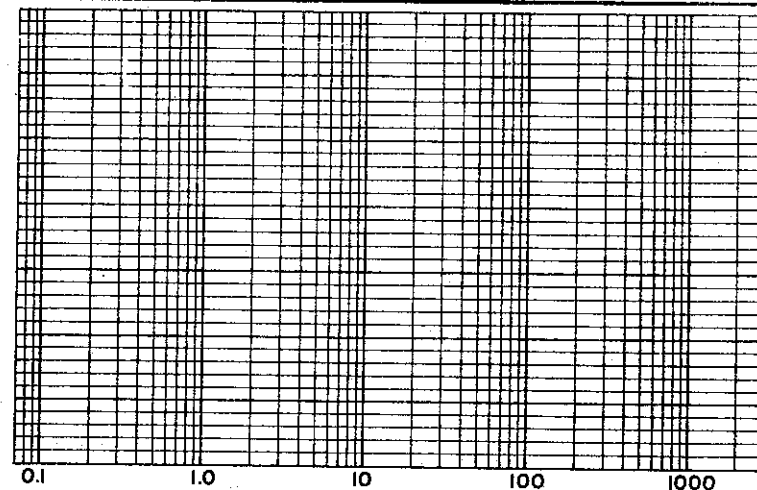
COMPRESSION IN INCHES



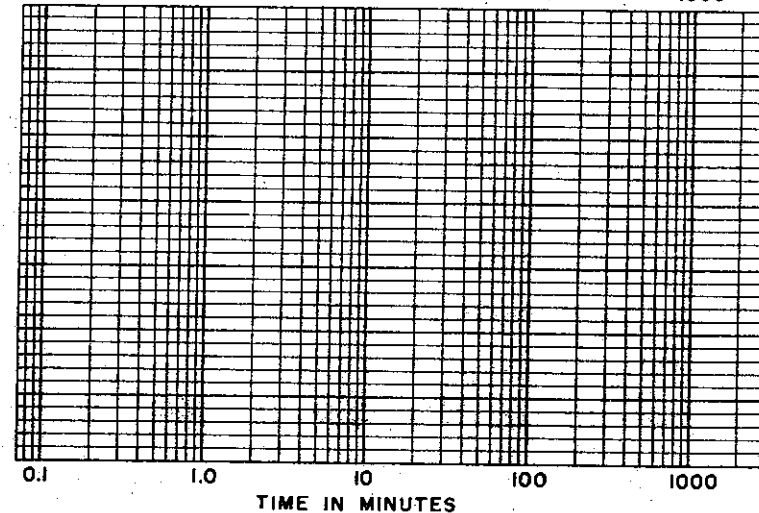
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CM)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

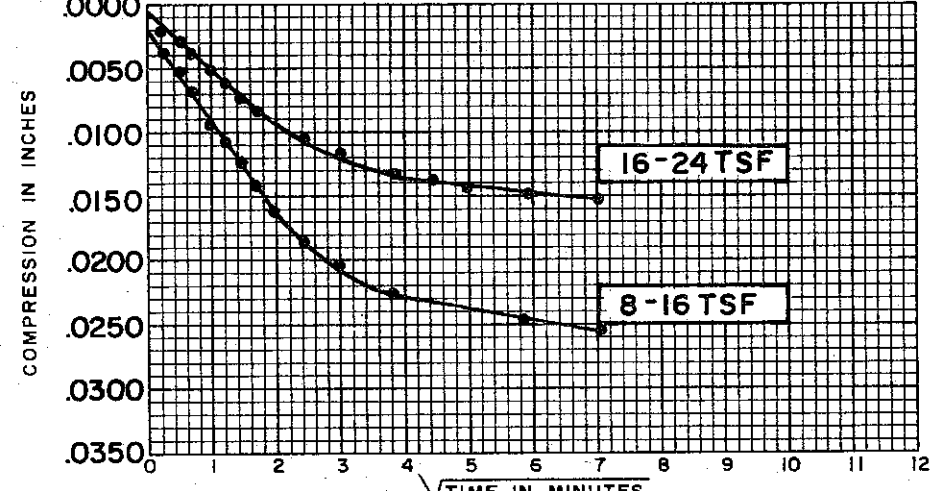
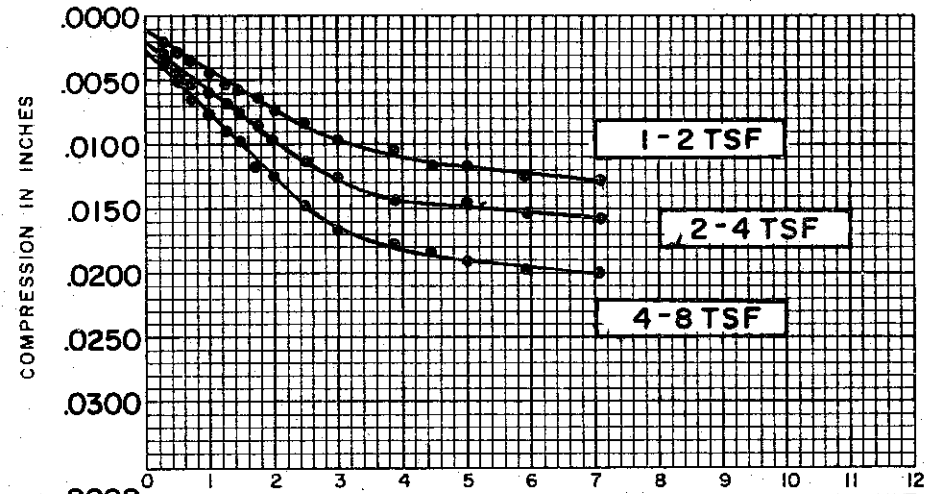
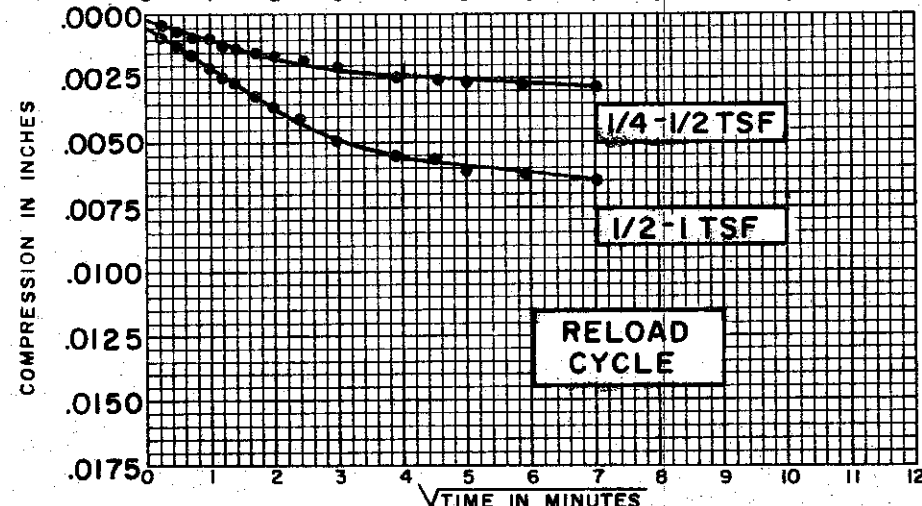
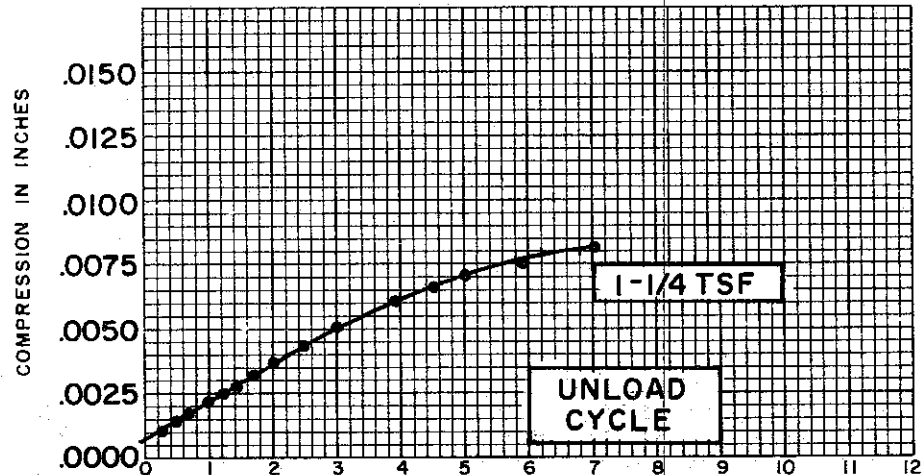
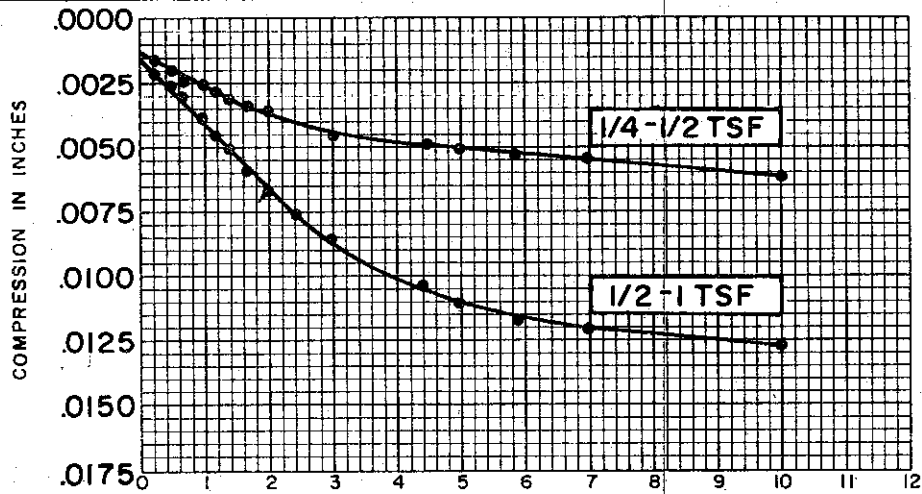
BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.60"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

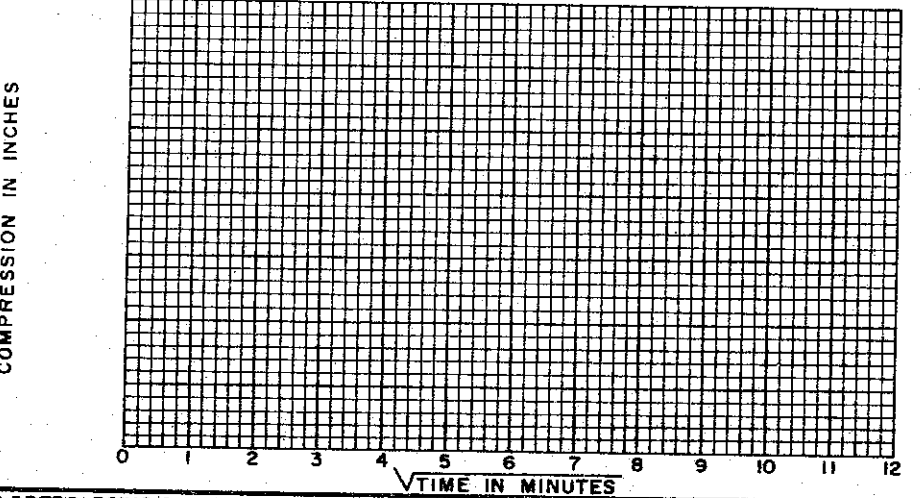
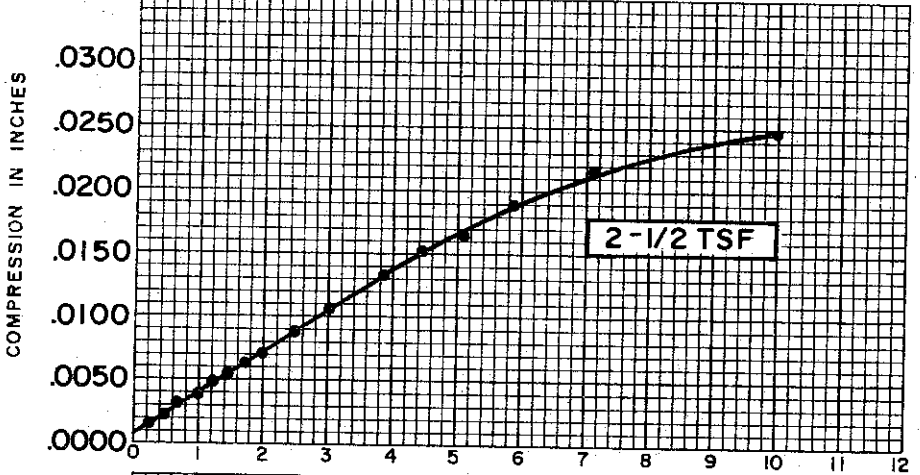
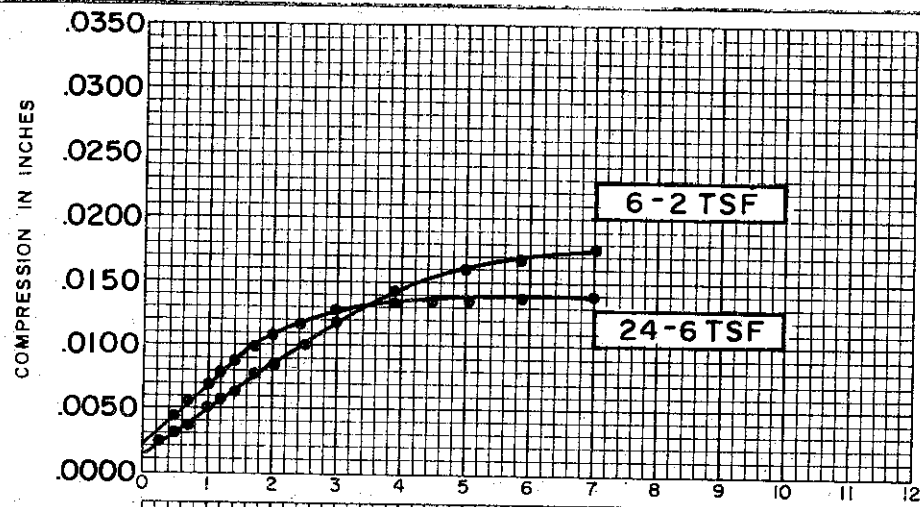
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO. <u>60</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>2</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>9.8' TO 10.0'</u>
INITIAL WATER CONTENT	<u>30.0%</u>	
FINAL WATER CONTENT	<u>28.8%</u>	

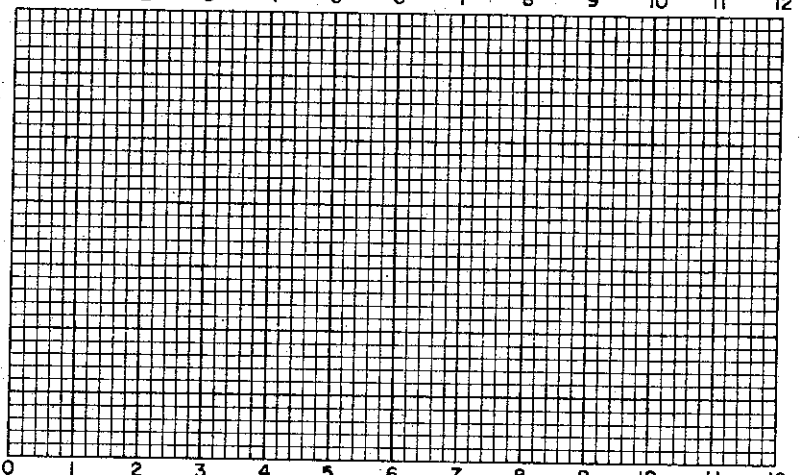
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.787</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

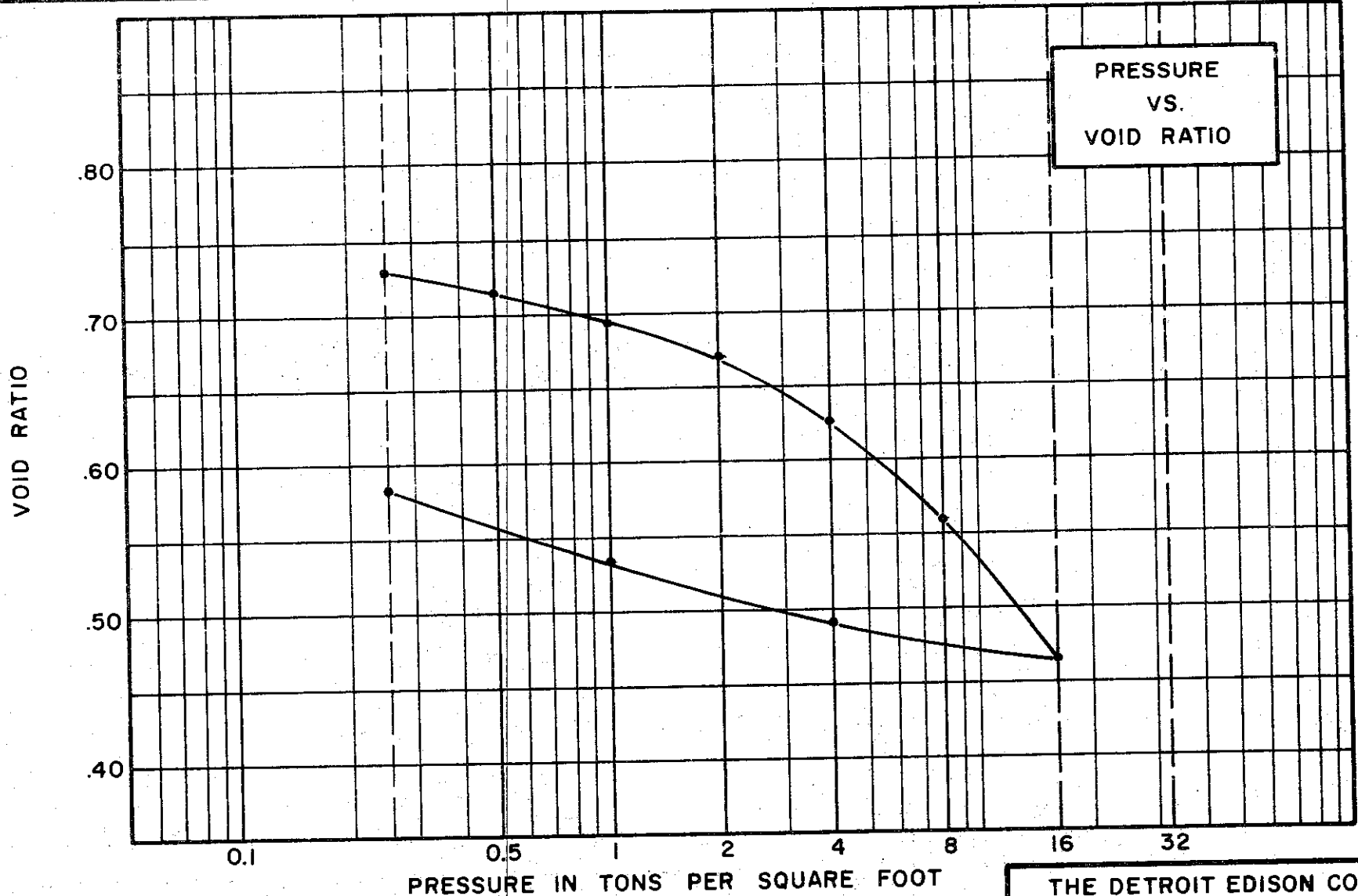
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-531



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 27.9% FINAL 25.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 40% PLASTIC LIMIT 19%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.744

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

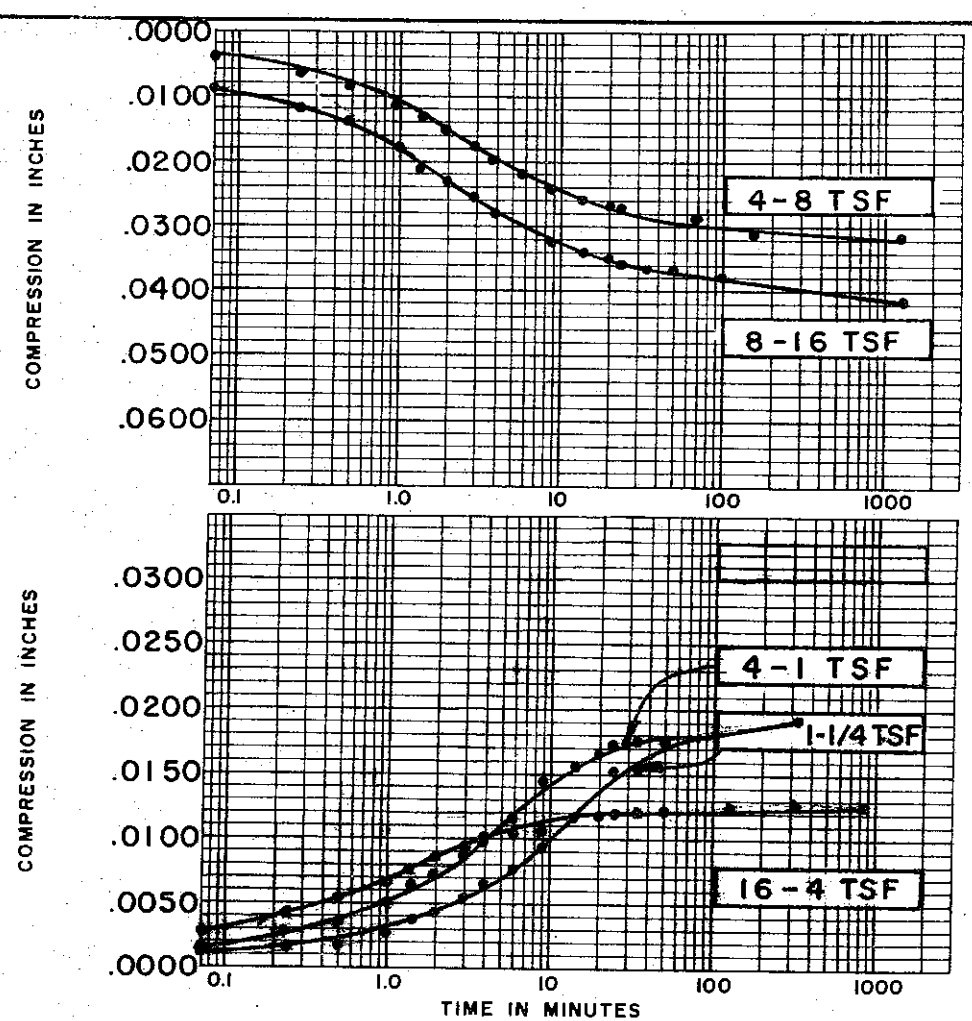
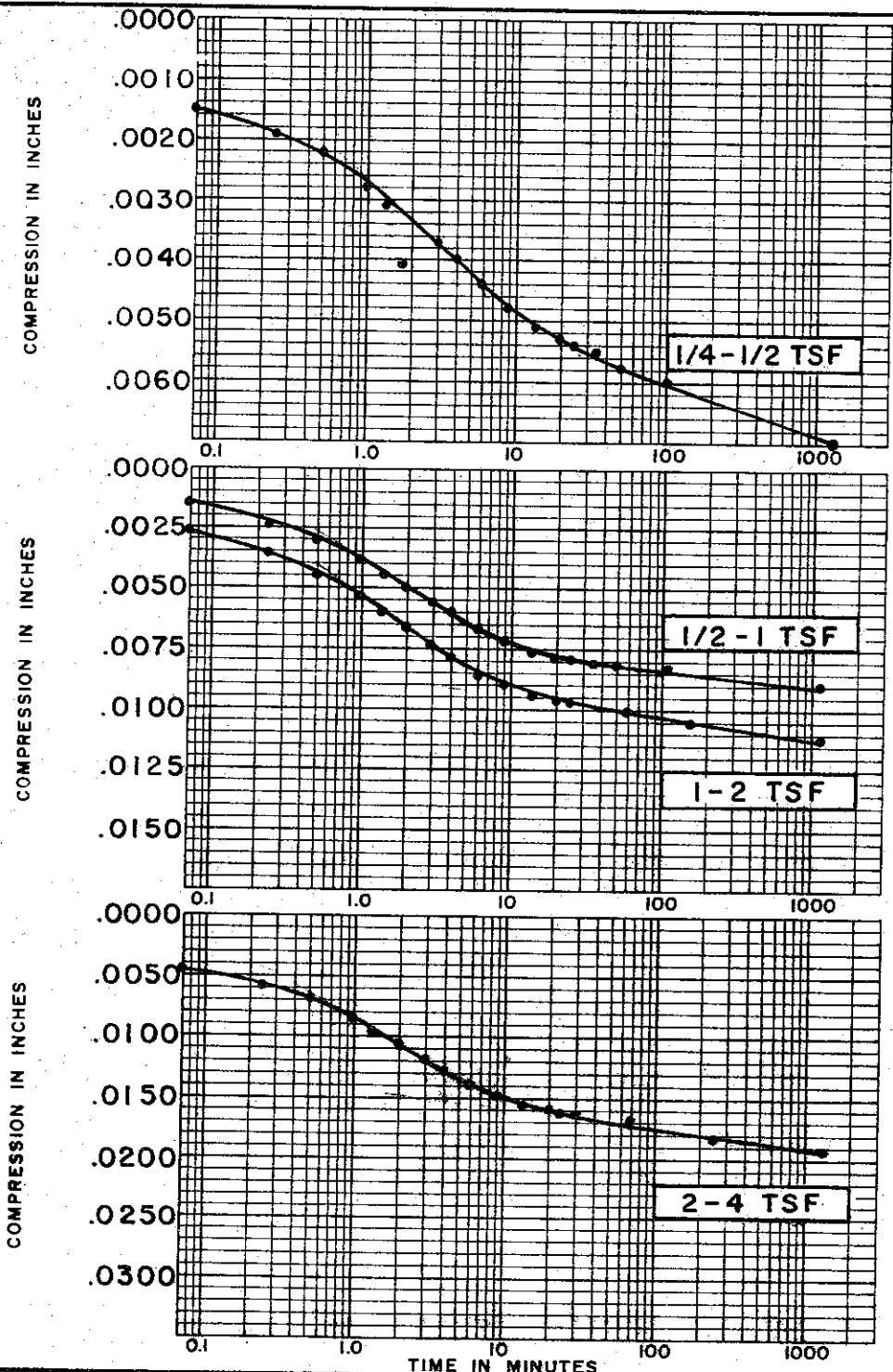
**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 60 TEST NO. C56.1

SAMPLE NO. 16 DATE JAN. 1974

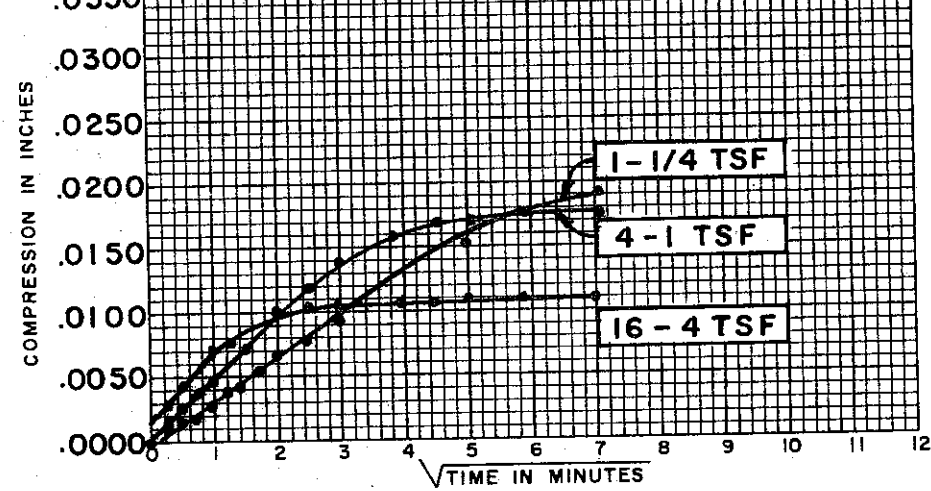
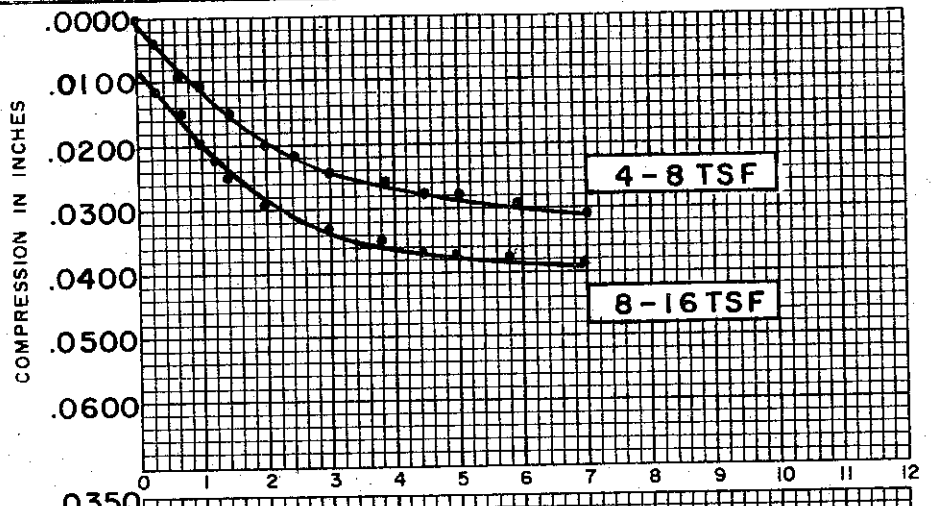
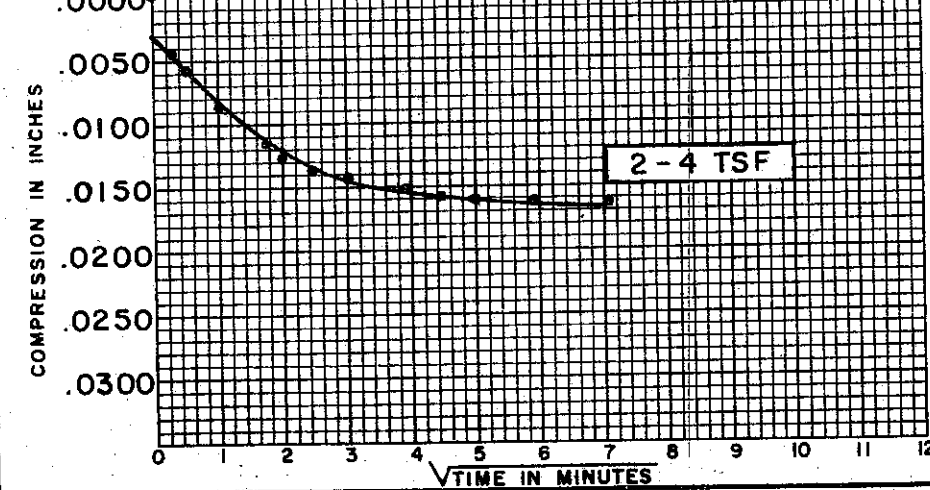
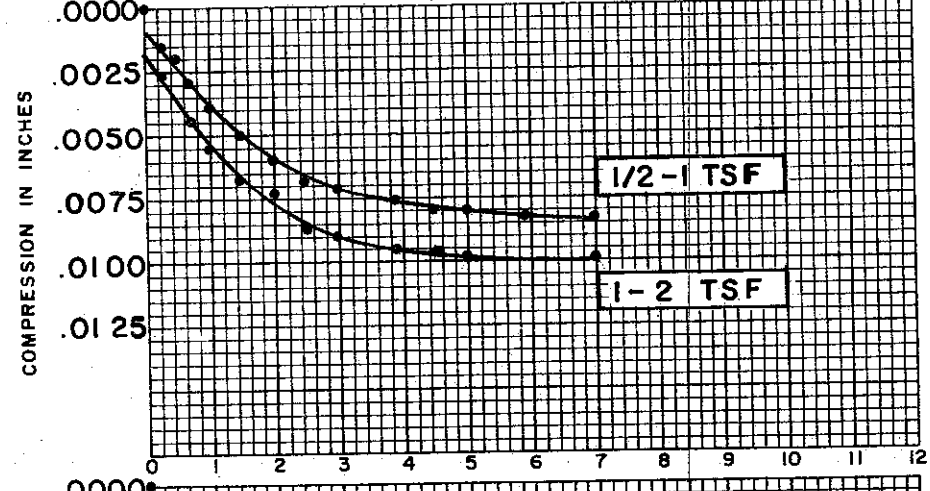
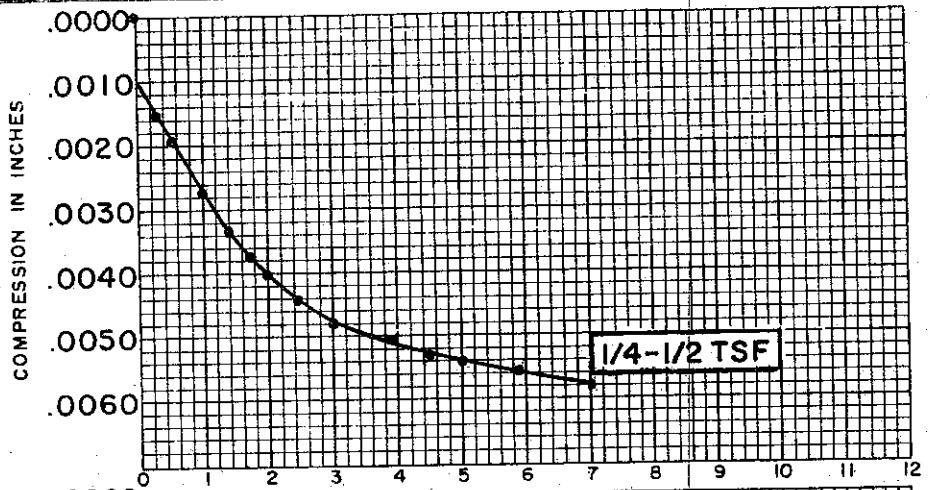
DEPTH 85.5'

C-533



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	27.9 %
FINAL WATER CONTENT	25.5 %
BORING NO.	60
SAMPLE NO.	16
DEPTH	85.5'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



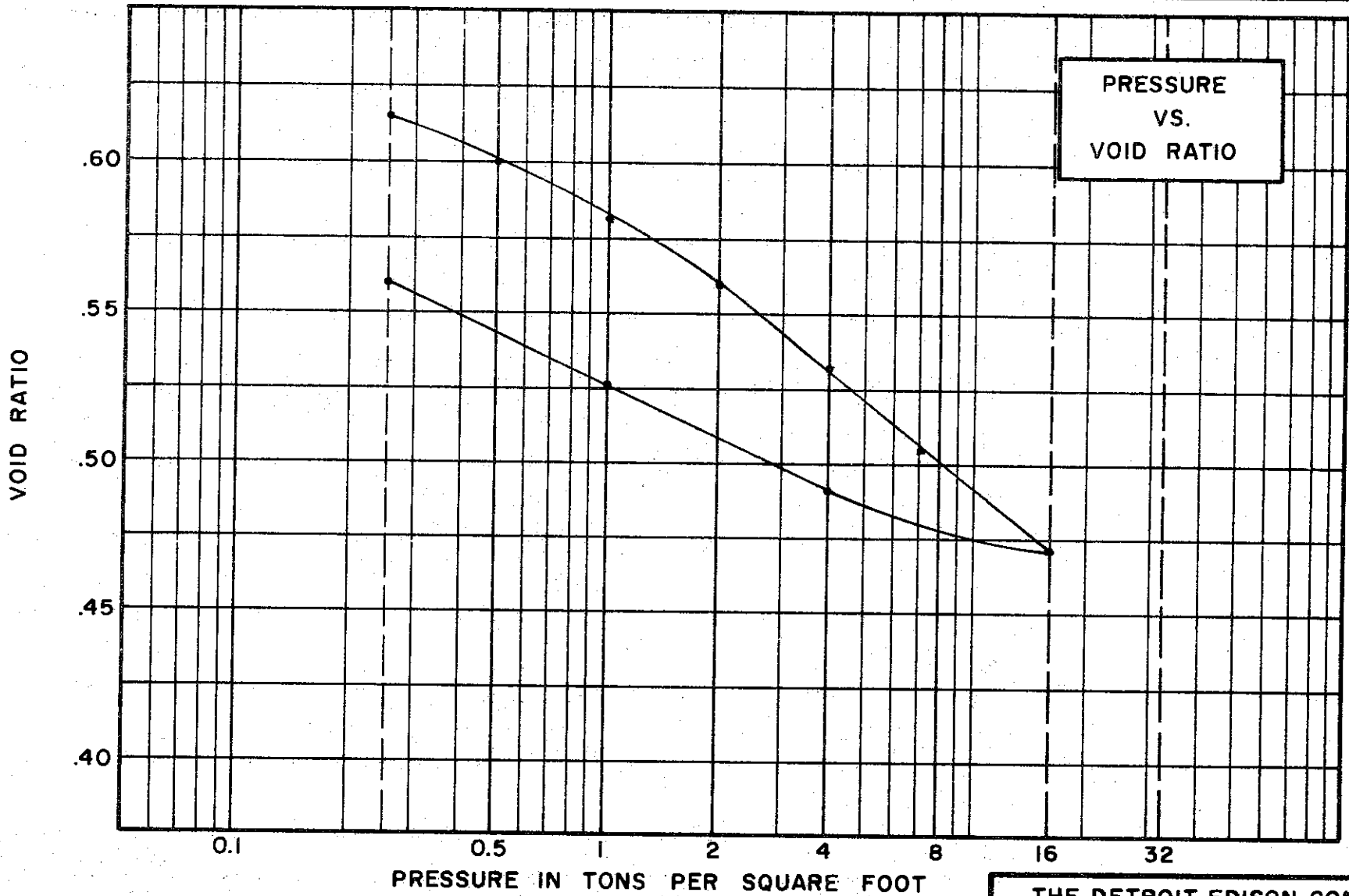
SOIL PROPERTIES		BORING NO.	60
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	16
SPECIFIC GRAVITY	2.73	DEPTH	85.5'
INITIAL WATER CONTENT	27.9 %		
FINAL WATER CONTENT	25.5 %		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CH)  
SPECIFIC GRAVITY 2.72  
WATER CONTENT, INITIAL 23.6% FINAL 23.4%  
ATTERBERG LIMITS:  
LIQUID LIMIT 53% PLASTIC LIMIT 24%

**TEST DATA**

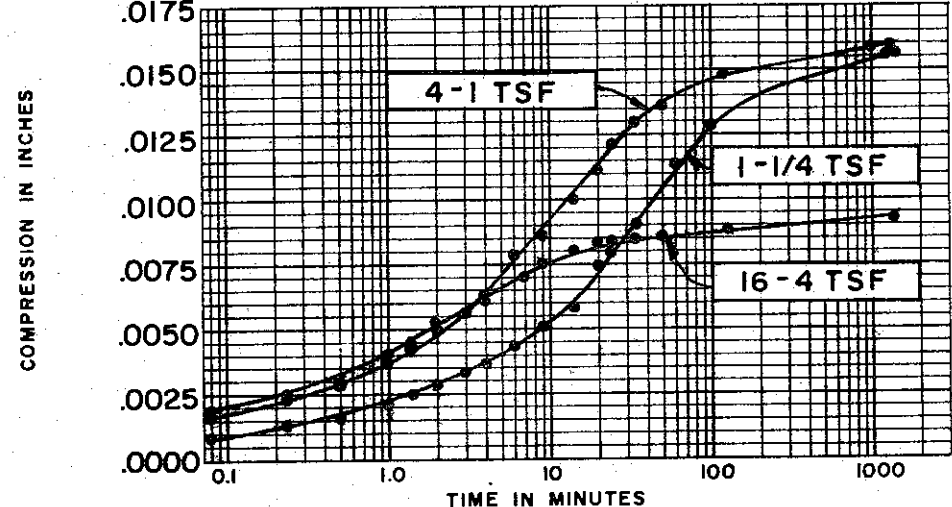
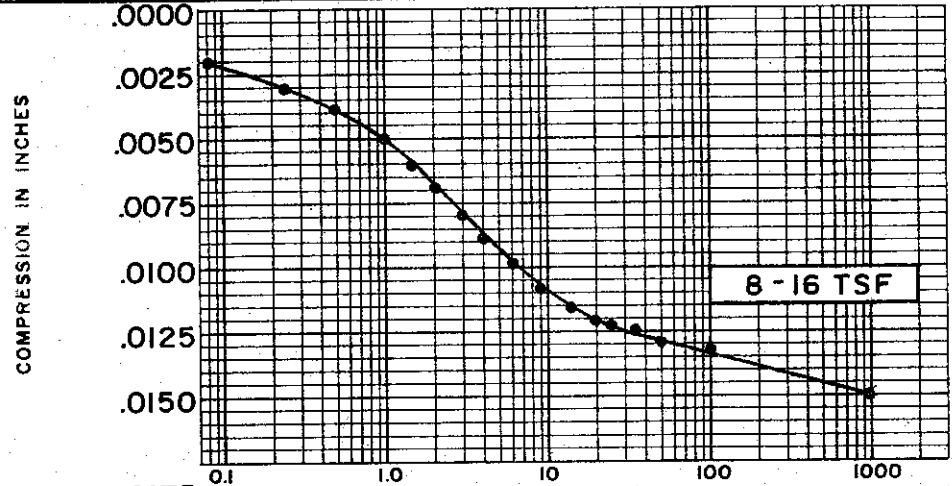
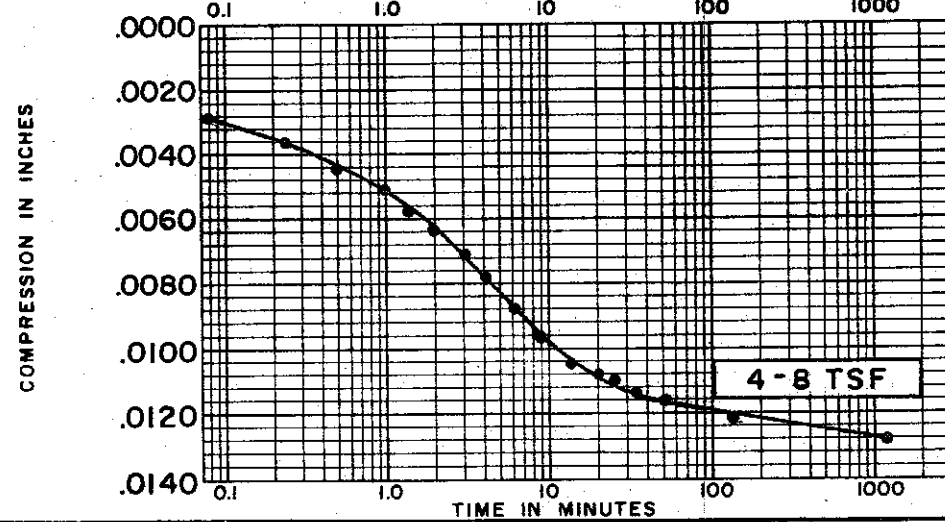
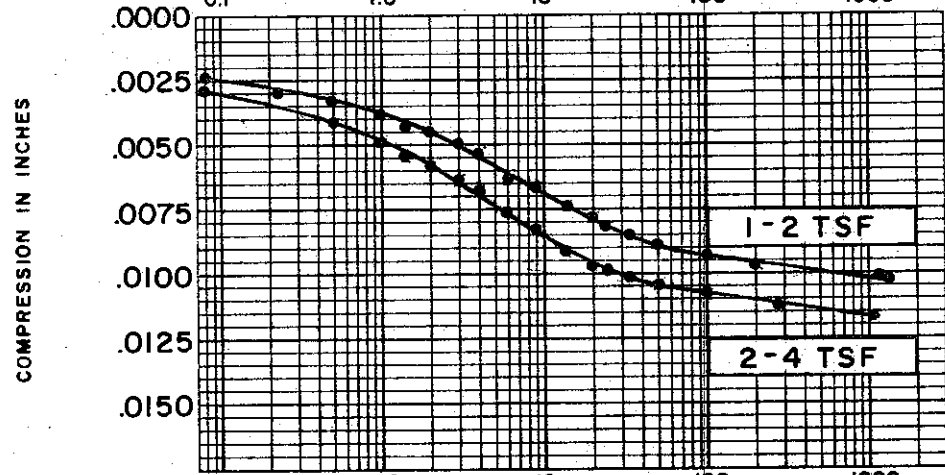
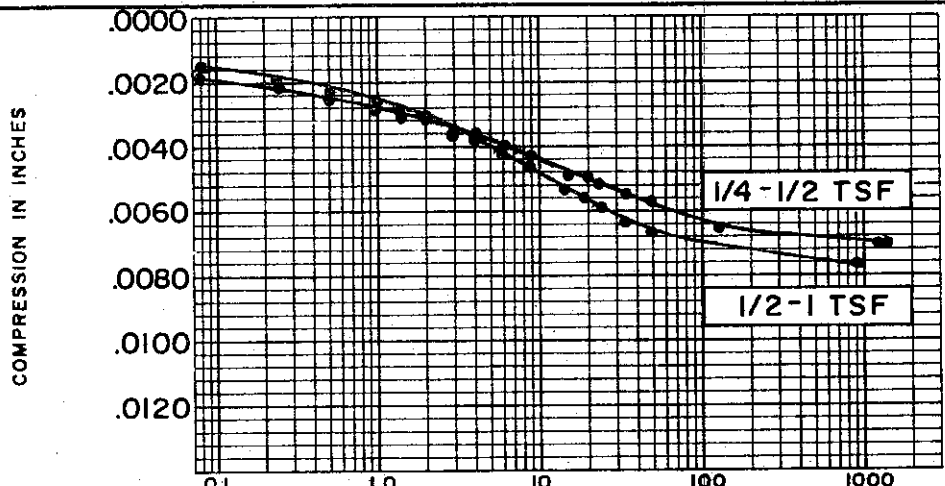
INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
VOID RATIO VS. LOG PRESSURE

BORING NO. 105 TEST NO. C373.1  
SAMPLE NO. 1 DATE APRIL 74  
DEPTH 5.1' TO 5.4'

C-535



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

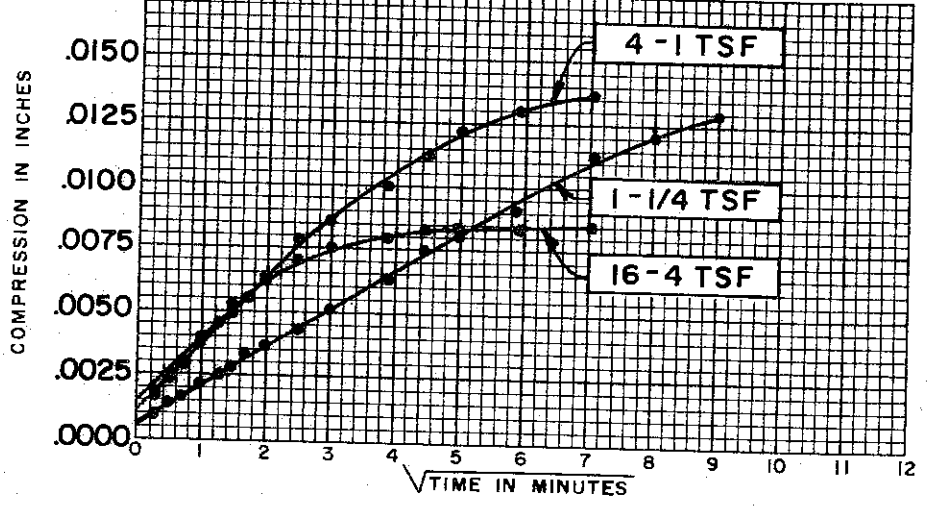
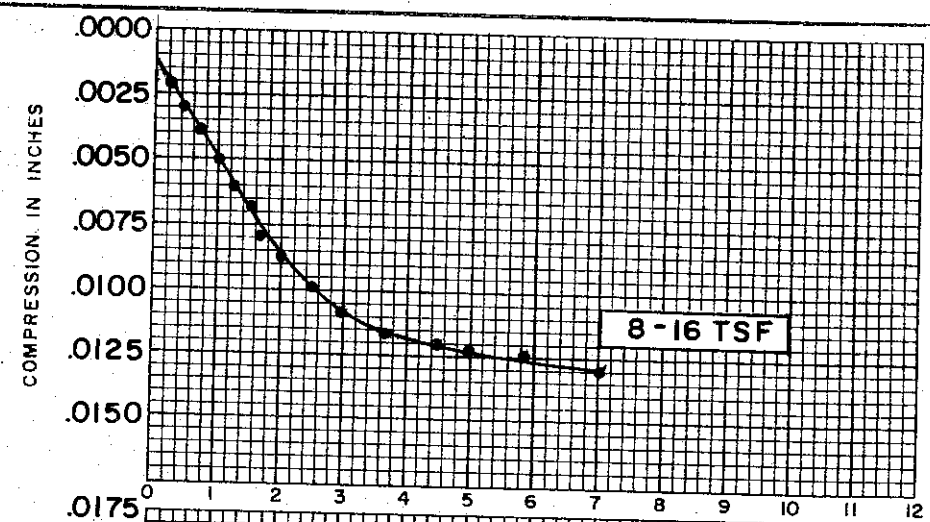
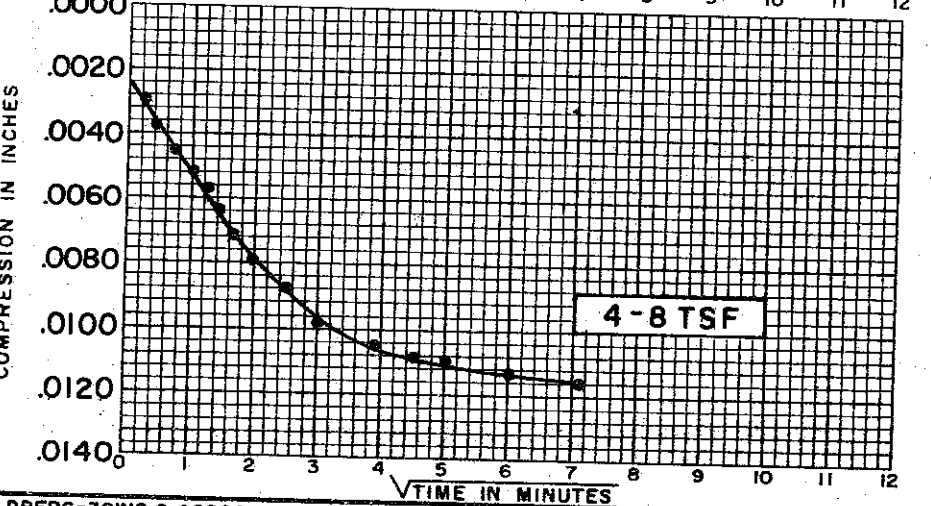
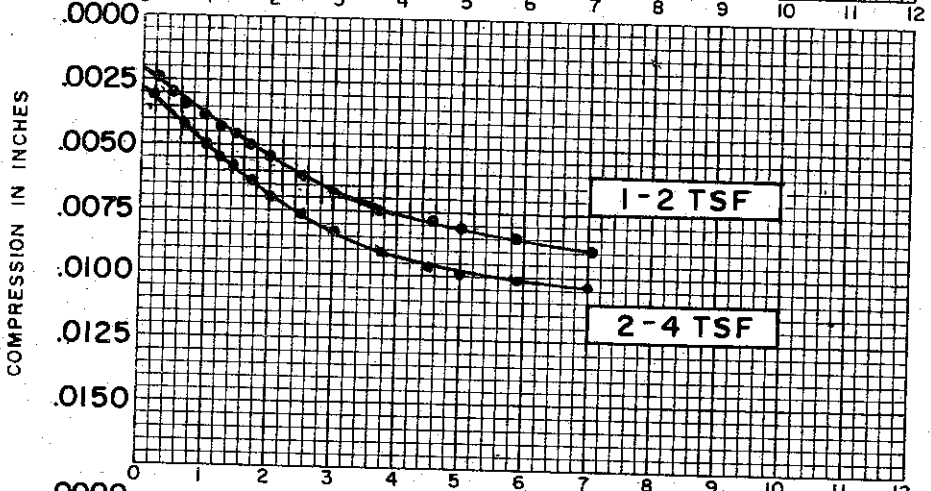
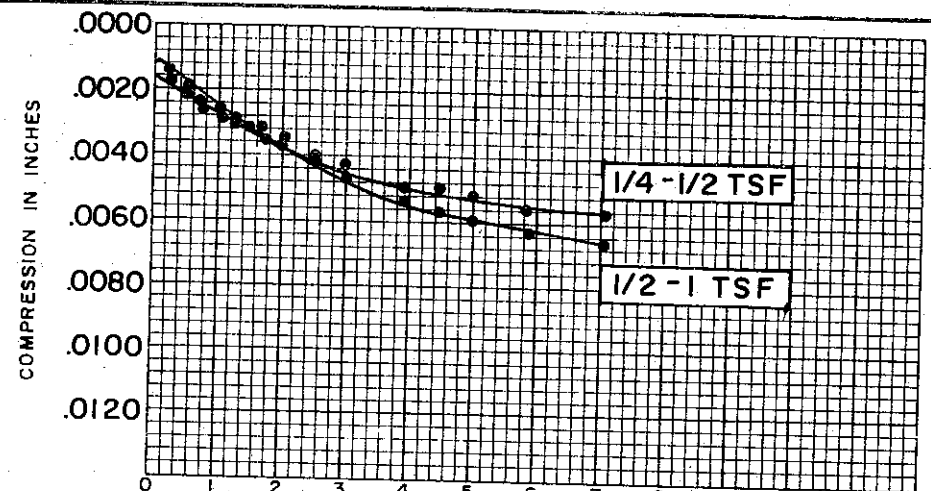
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

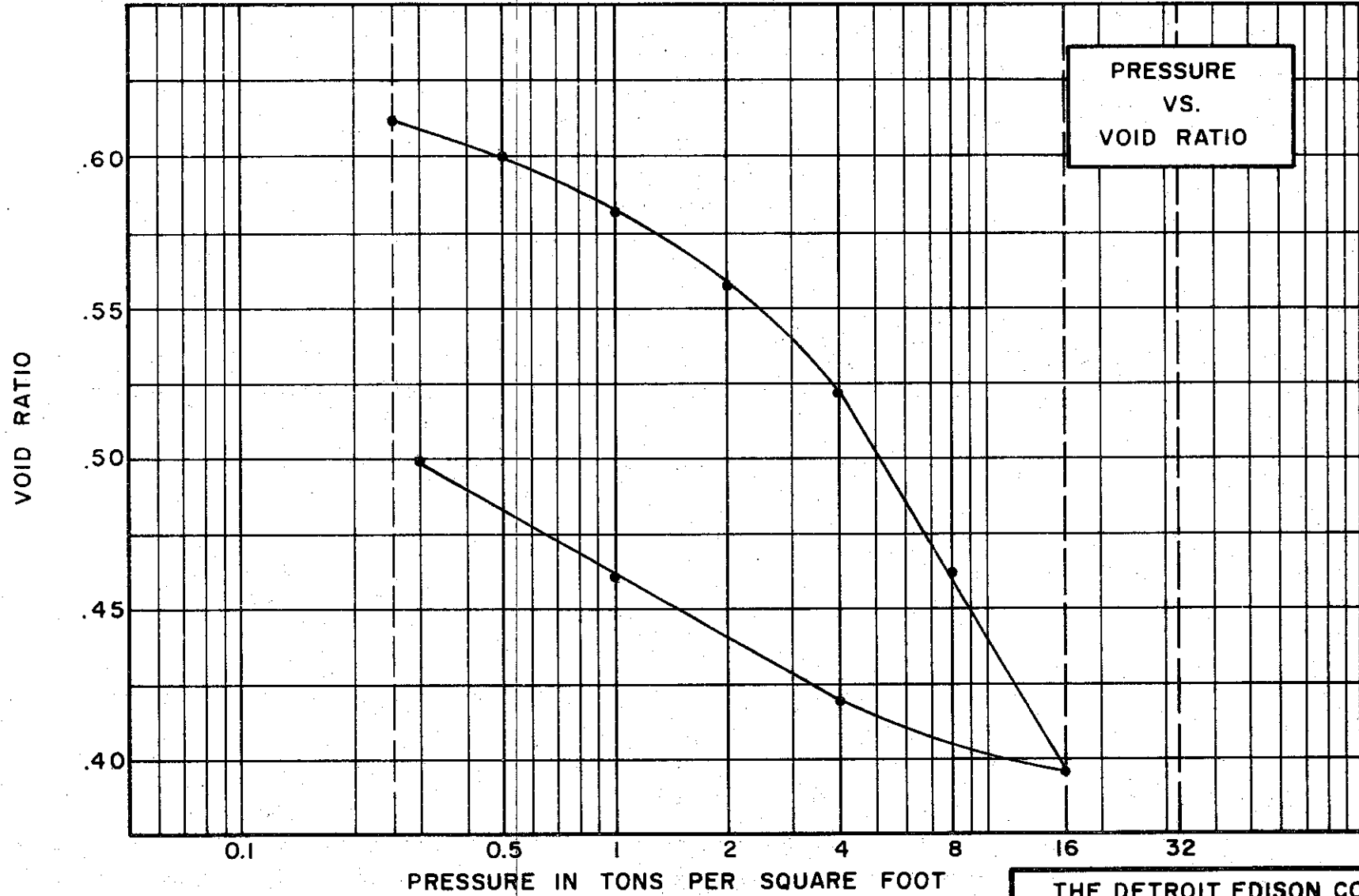
C-537



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	23.6%
FINAL WATER CONTENT	23.4%
BORING NO.	105
SAMPLE NO.	1
DEPTH	5.1' TO 5.4'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.642

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 23.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

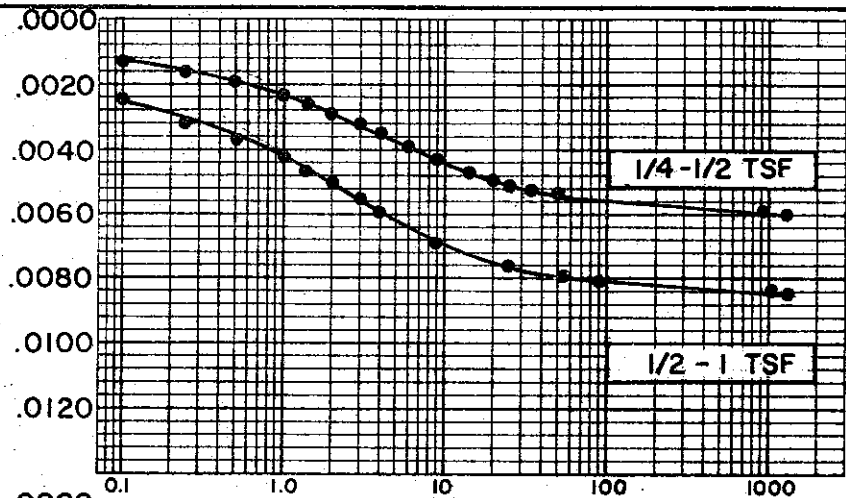
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

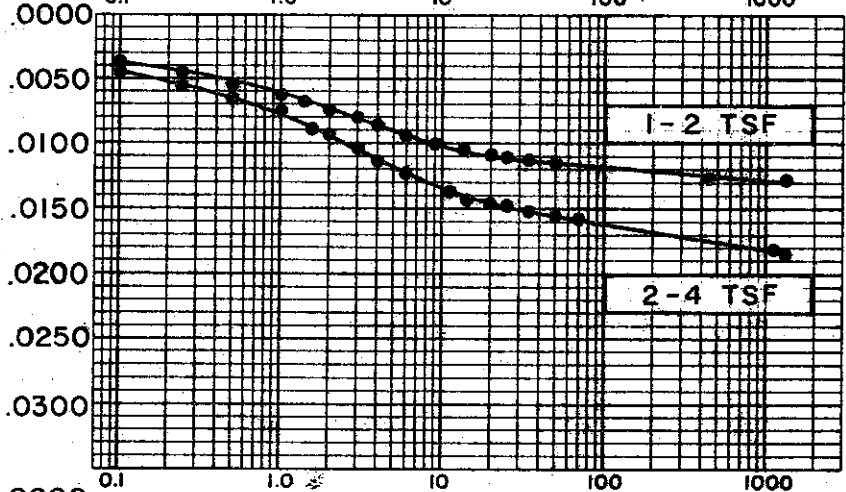
BORING NO. 105 TEST NO. C380.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 70.9' TO 71.2'

C-539

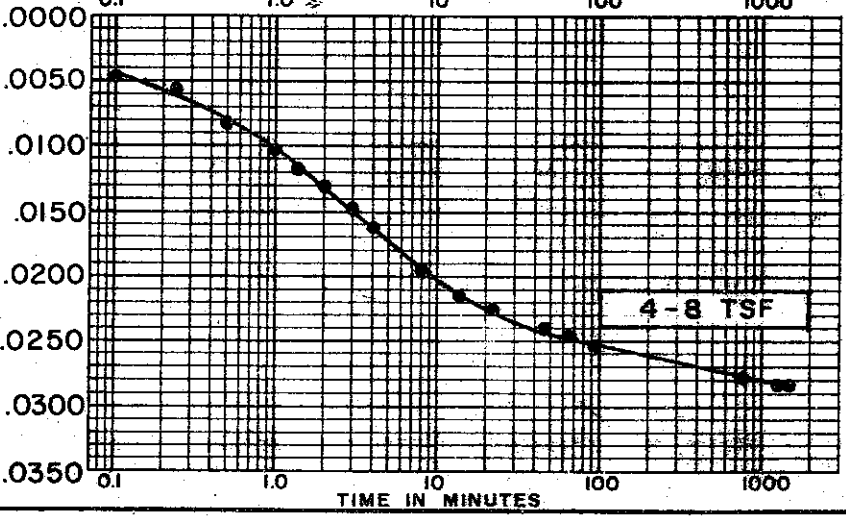
COMPRESSION IN INCHES



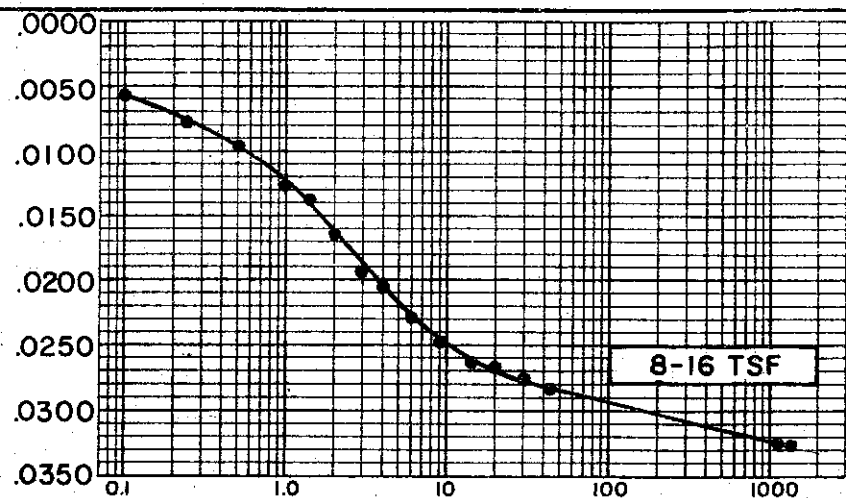
COMPRESSION IN INCHES



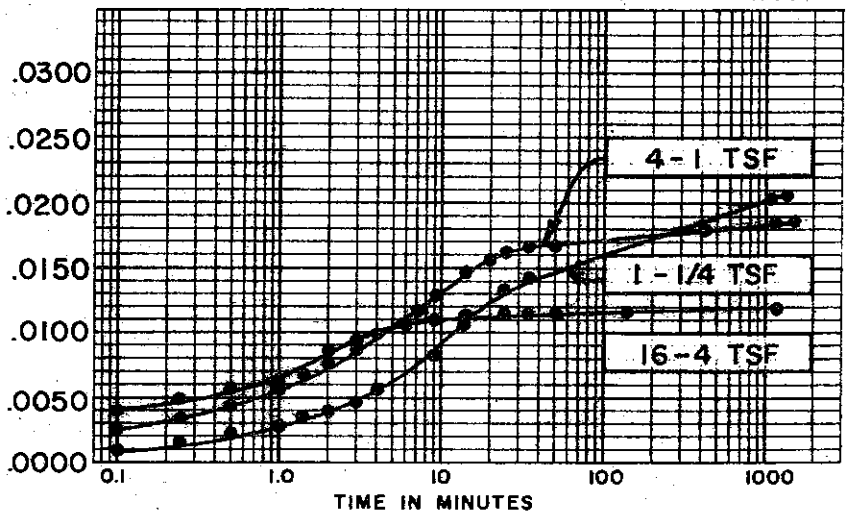
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 23.7 %  
 FINAL WATER CONTENT 22.5 %

BORING NO. 105  
 SAMPLE NO. 8  
 DEPTH 70.9' TO 71.2'

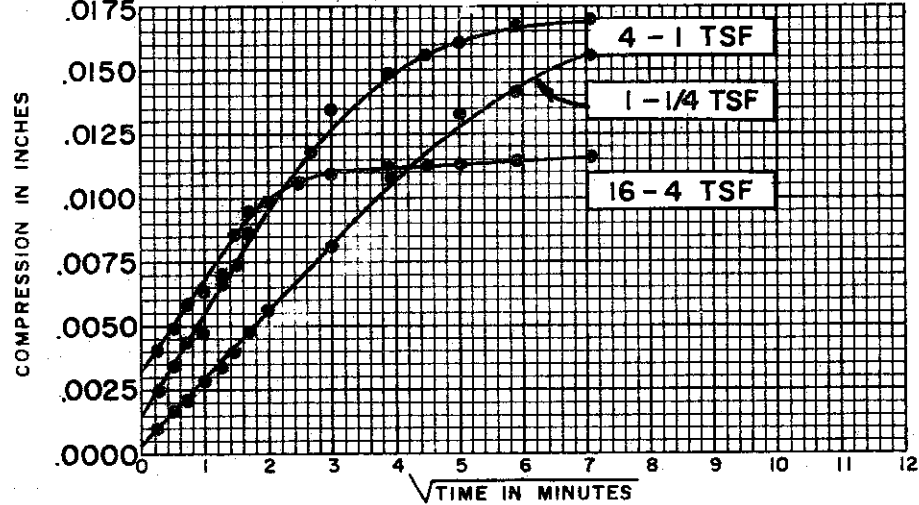
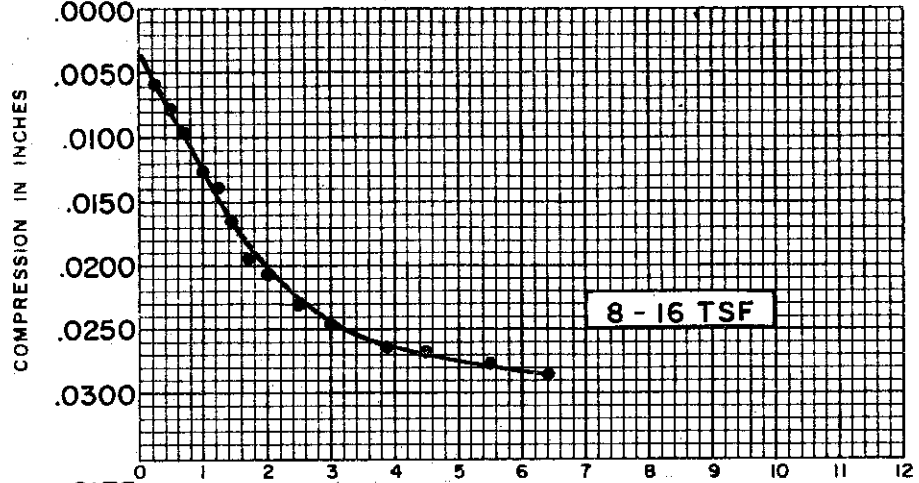
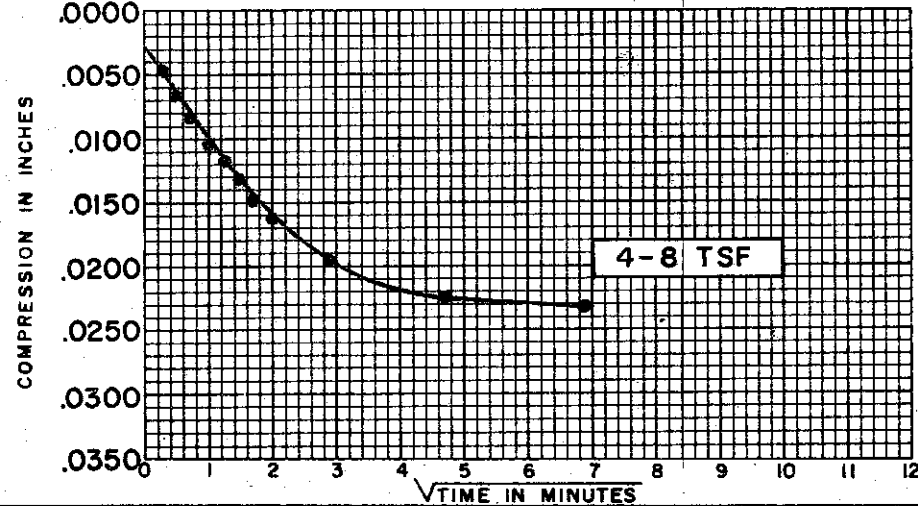
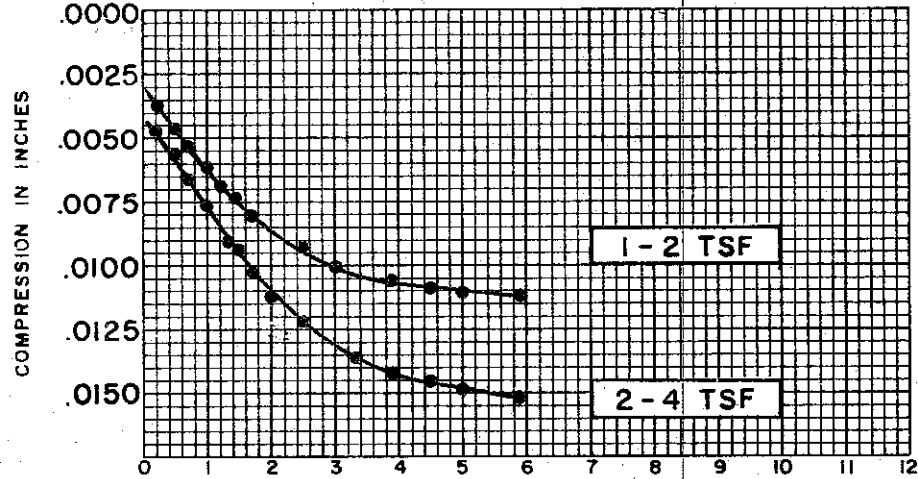
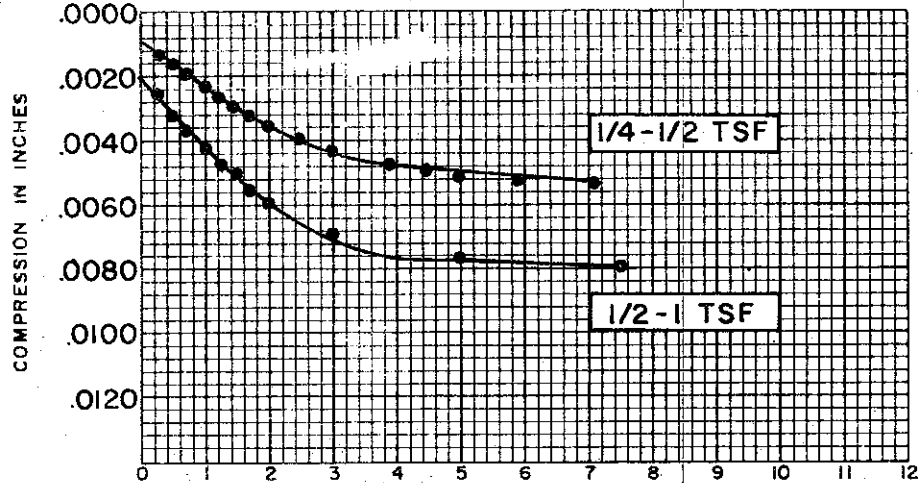
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-540



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 23.7 %  
 FINAL WATER CONTENT 22.5 %

BORING NO. 105  
 SAMPLE NO. 8  
 DEPTH 70.9' TO 71.2

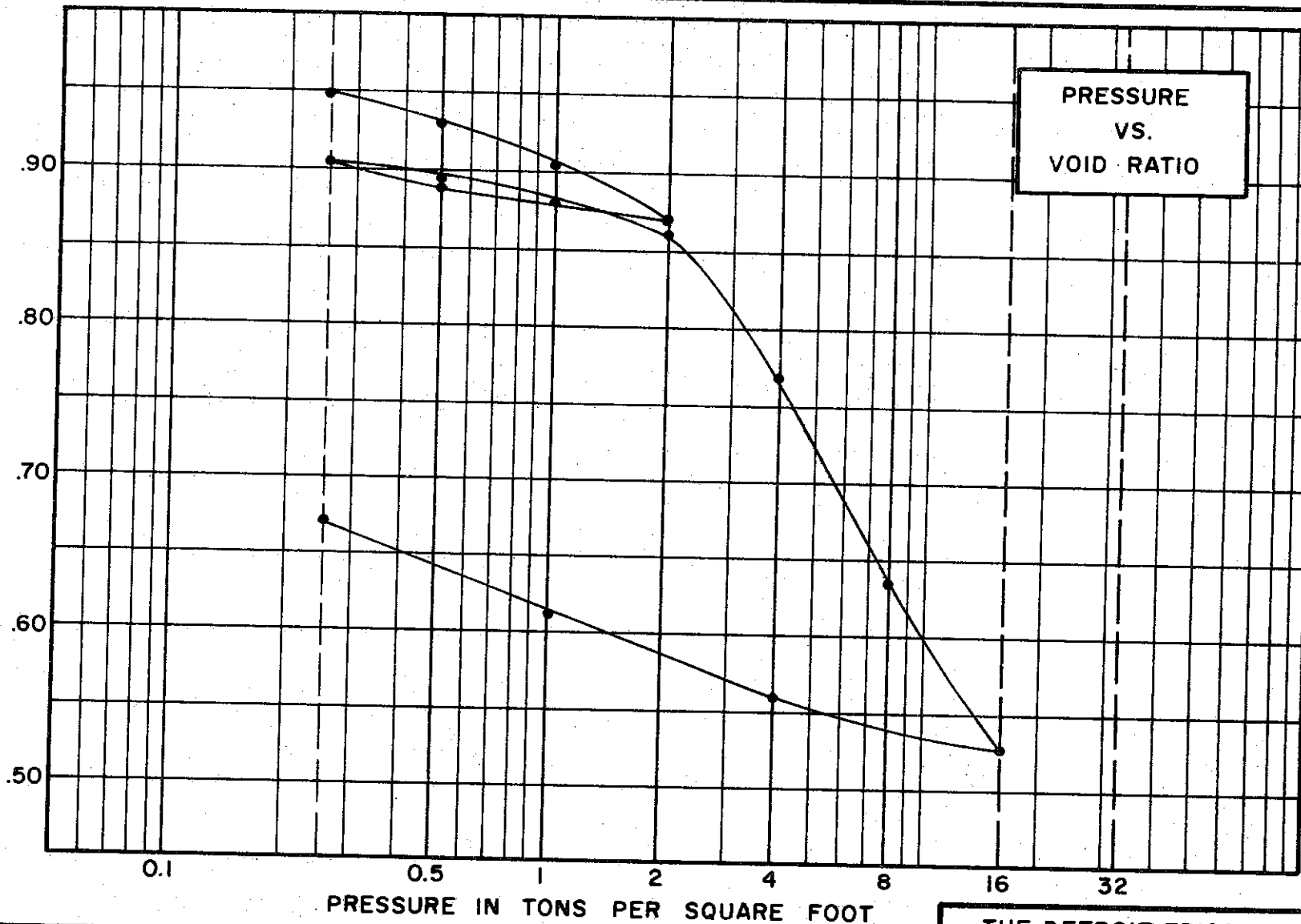
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 36.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

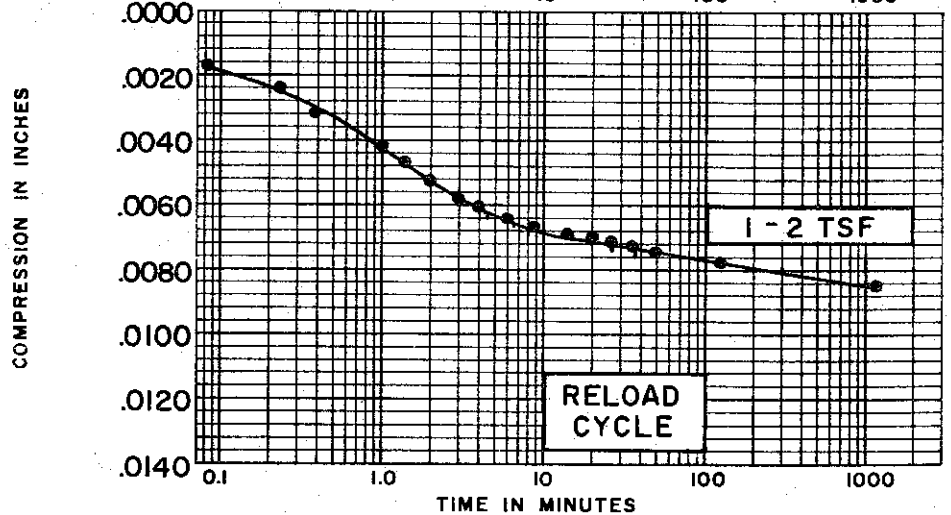
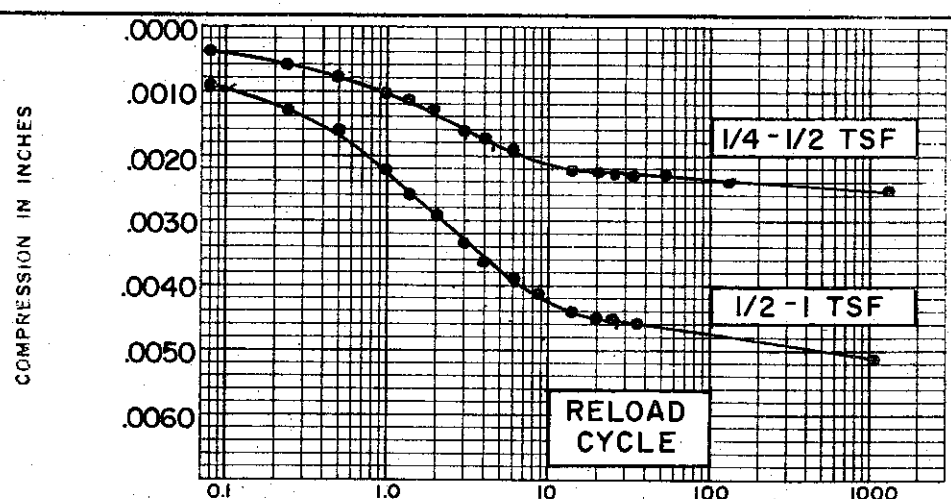
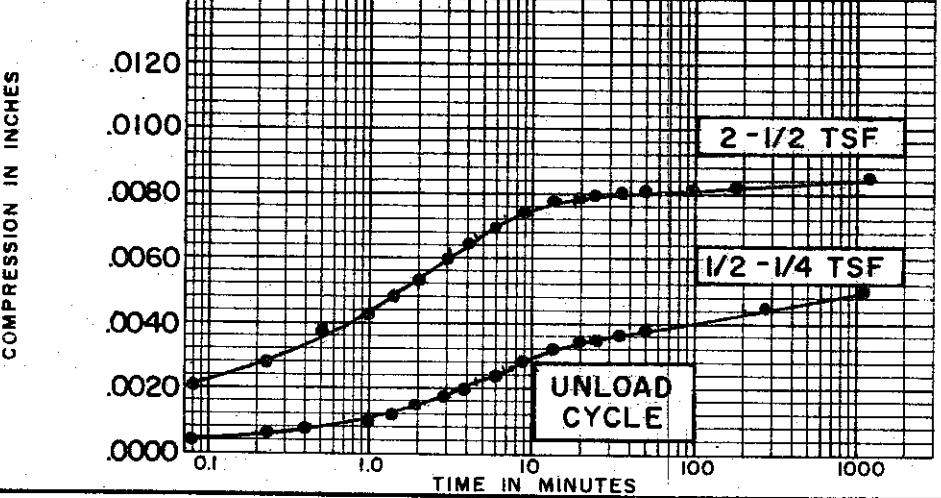
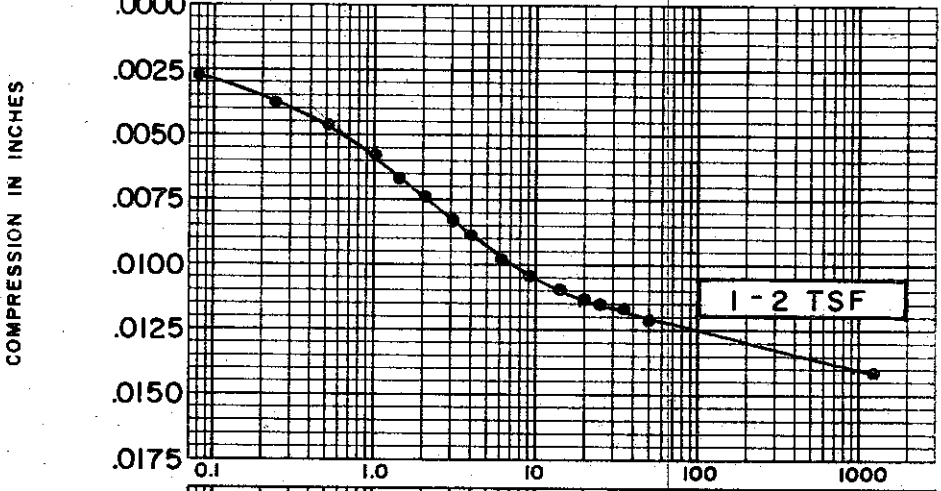
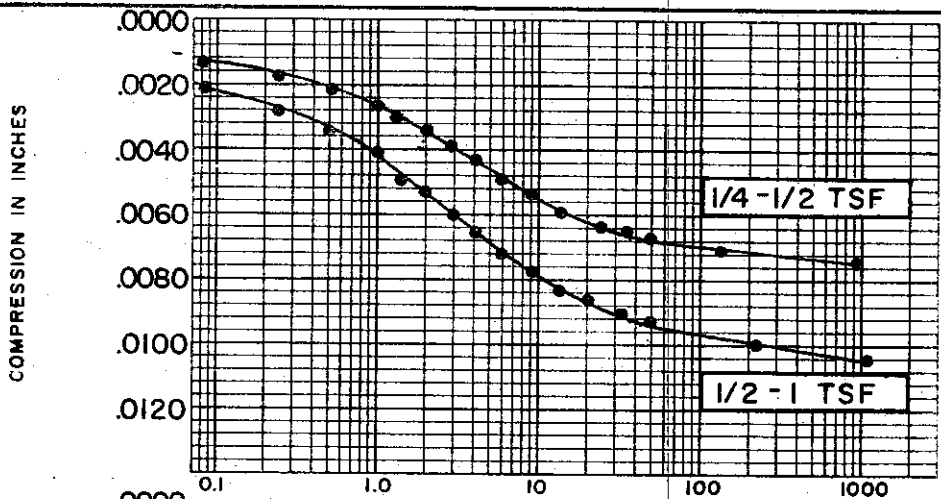
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C256.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 38.6' TO 38.9'

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

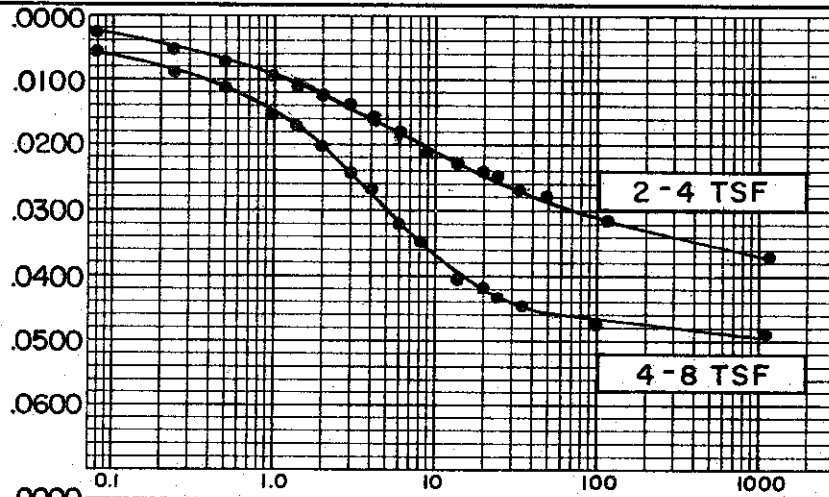
C-541



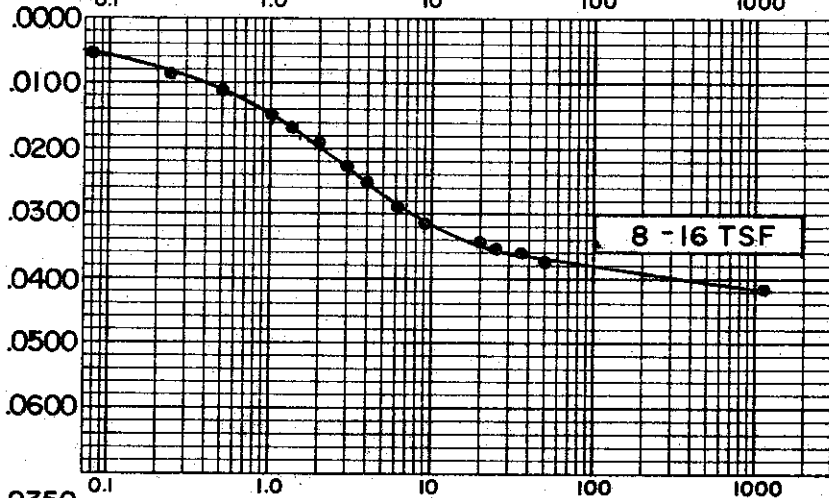
SOIL PROPERTIES		BORING NO.	118
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO.	5
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH	<u>38.6' TO 38.9'</u>
INITIAL WATER CONTENT	<u>36.9 %</u>		
FINAL WATER CONTENT	<u>    %    </u>		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	TIME VS. COMPRESSION CURVE	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	<u>0.969</u>	BELLE RIVER PLANT UNITS I & II	
		FILE 1255	



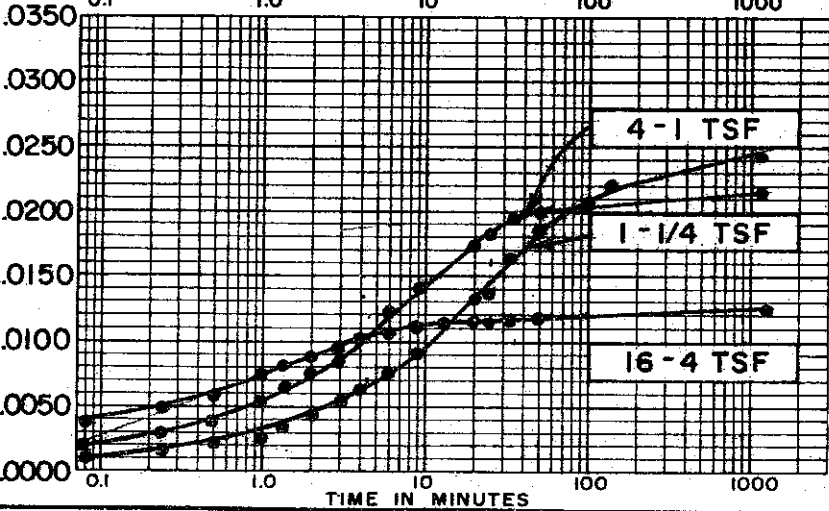
COMPRESSION IN INCHES



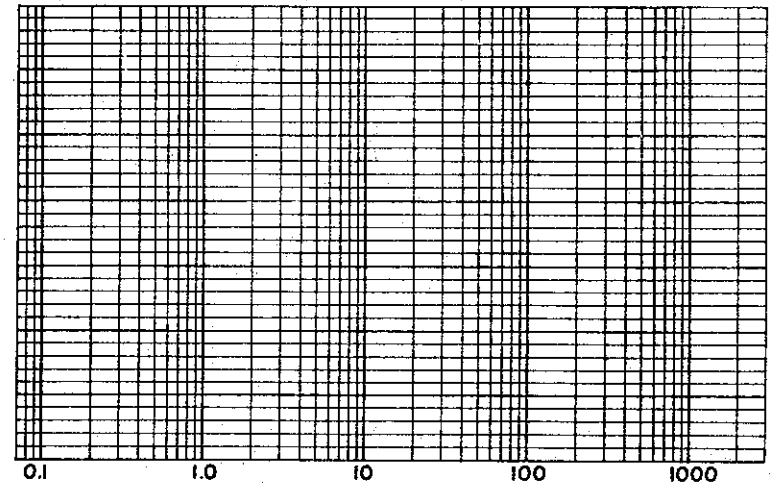
COMPRESSION IN INCHES



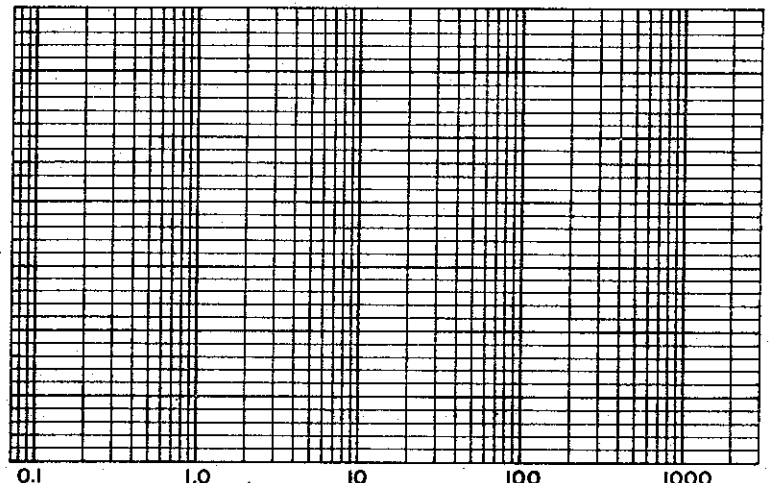
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT     %

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

**TEST DATA**

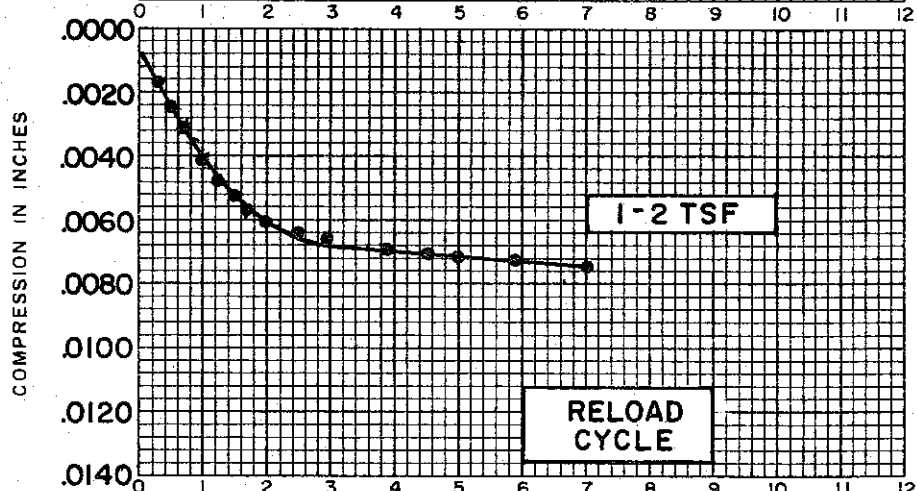
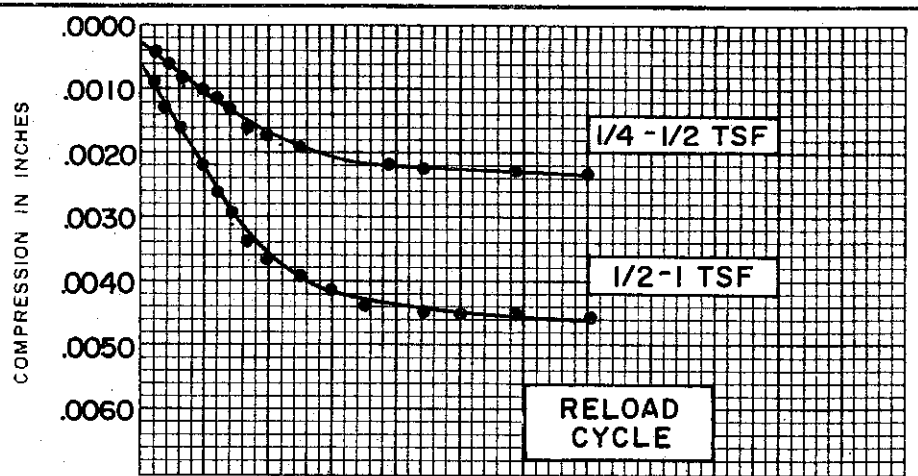
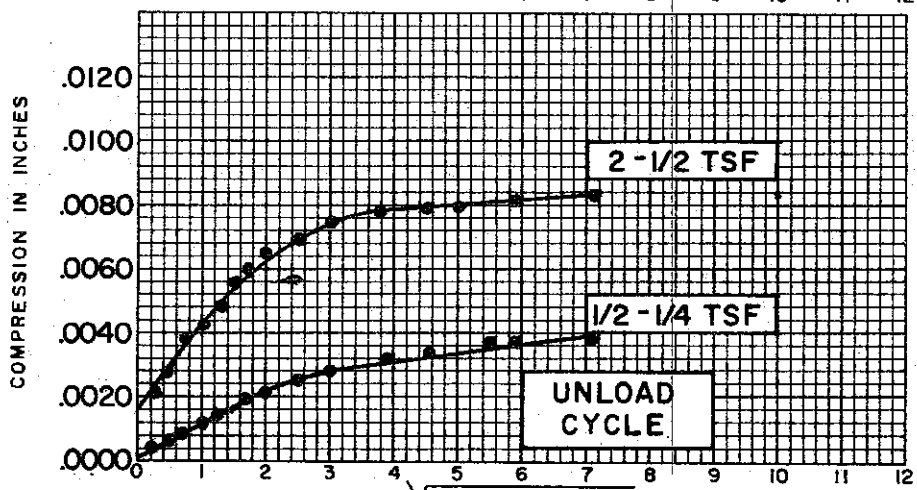
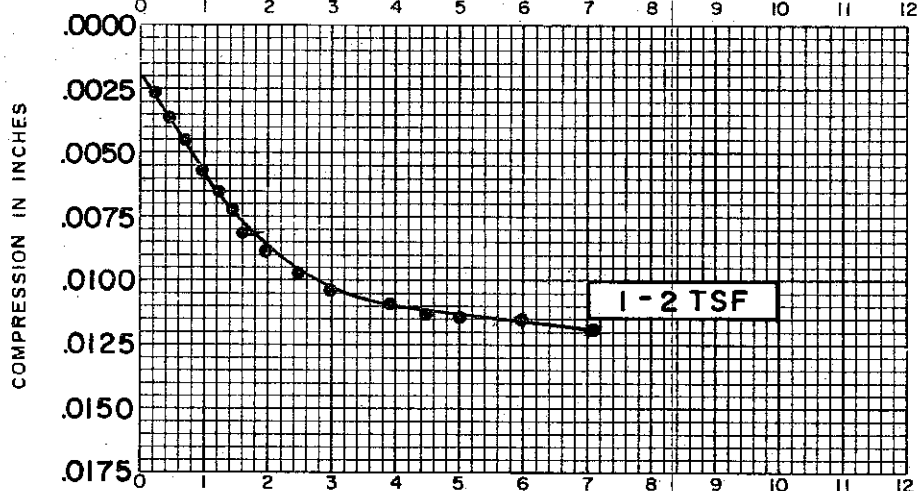
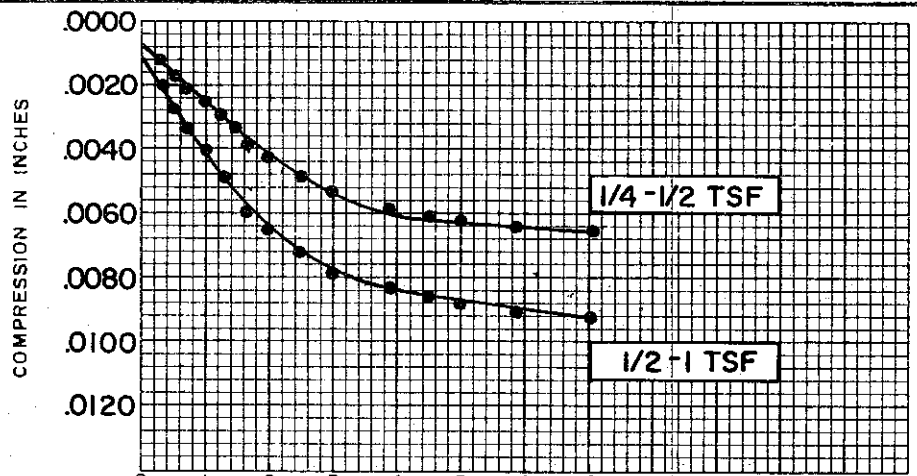
INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

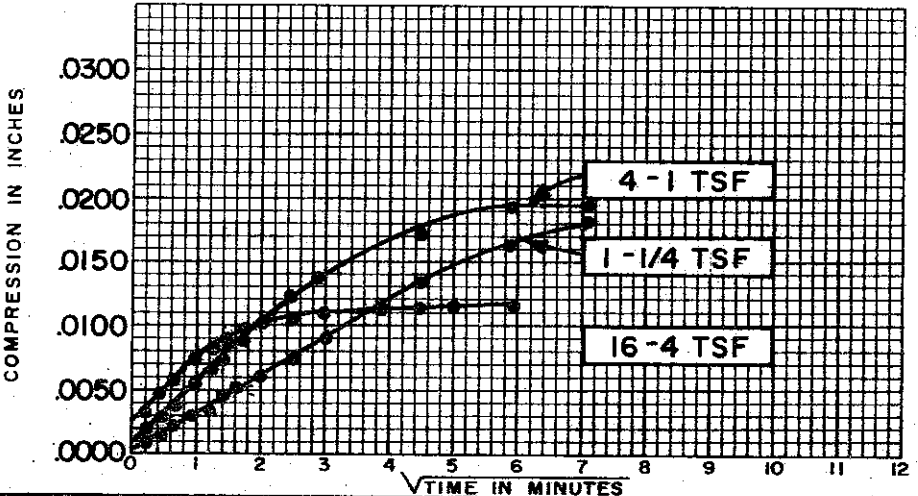
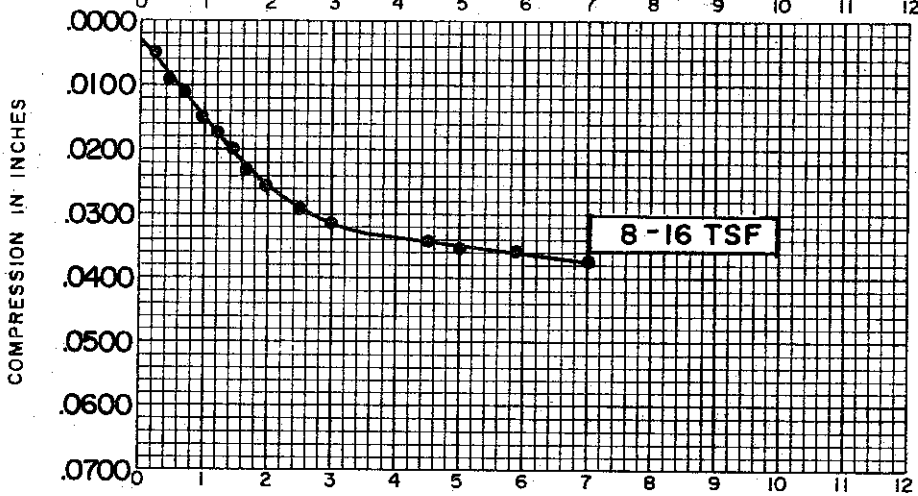
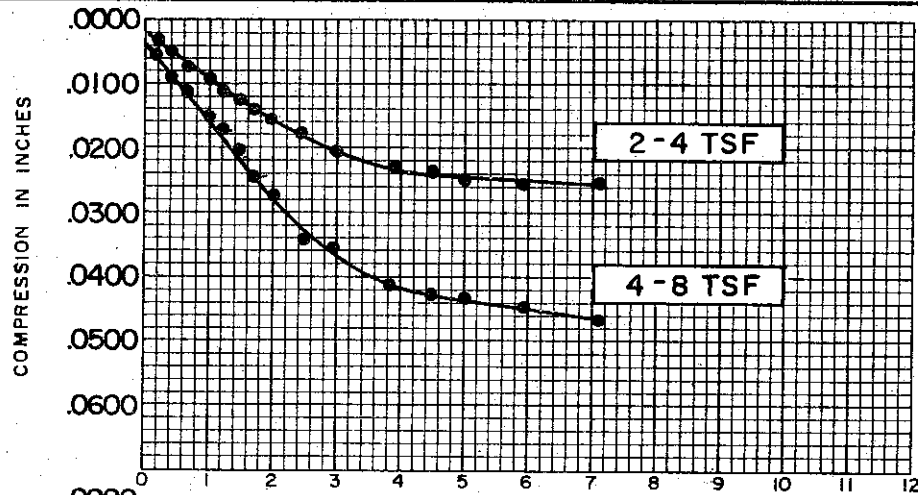
C-543



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	36.9 %
FINAL WATER CONTENT	%
BORING NO.	118
SAMPLE NO.	5
DEPTH	38.6' TO 38.9'

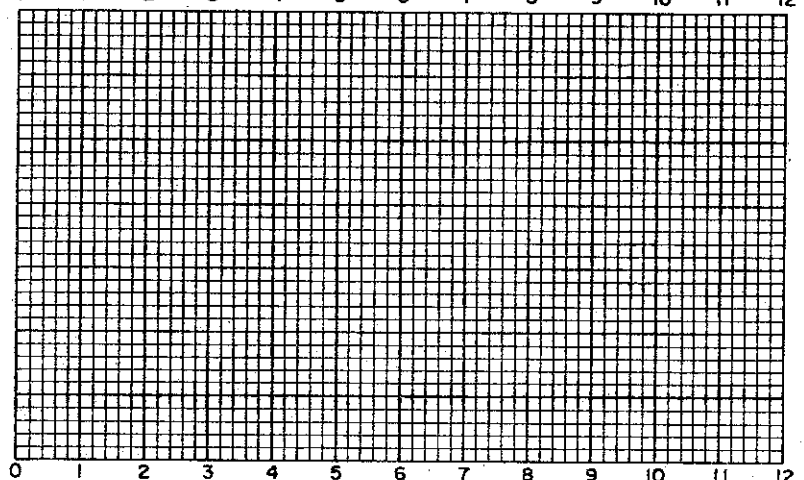
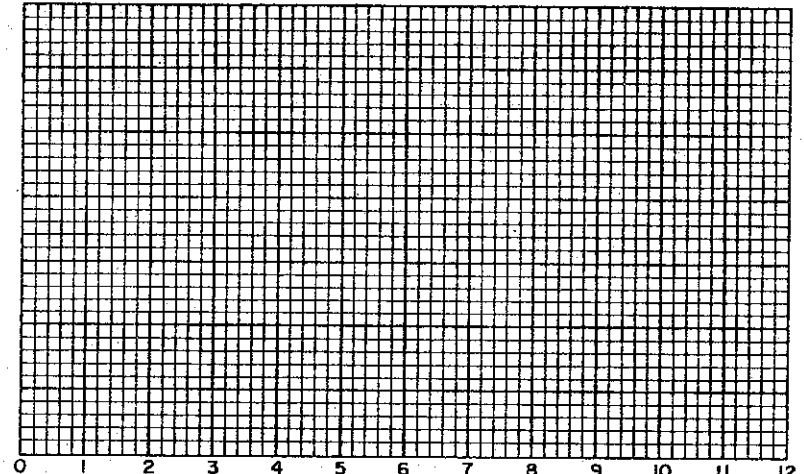
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.969

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 36.9 %  
FINAL WATER CONTENT       %      

BORING NO. 118  
SAMPLE NO. 5  
DEPTH 38.6' TO 38.9'

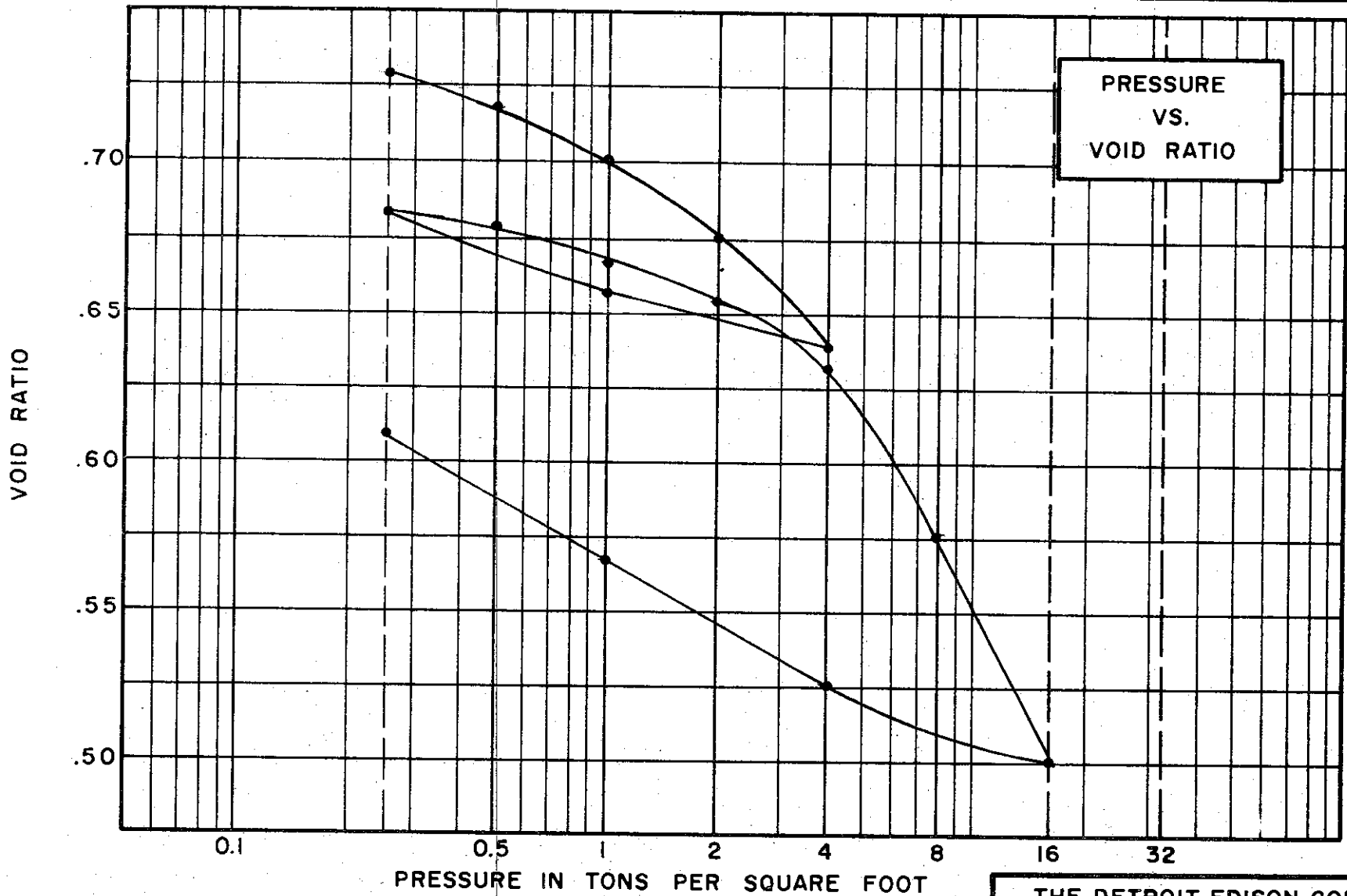
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 27.8%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

**TEST DATA**

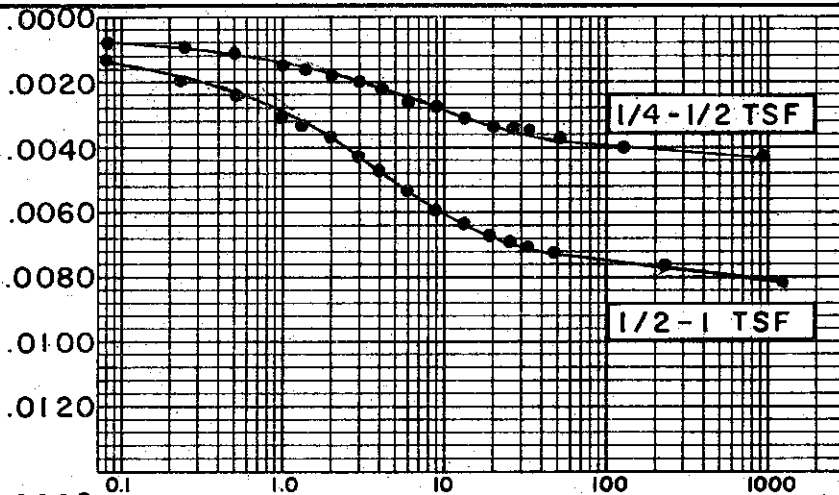
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

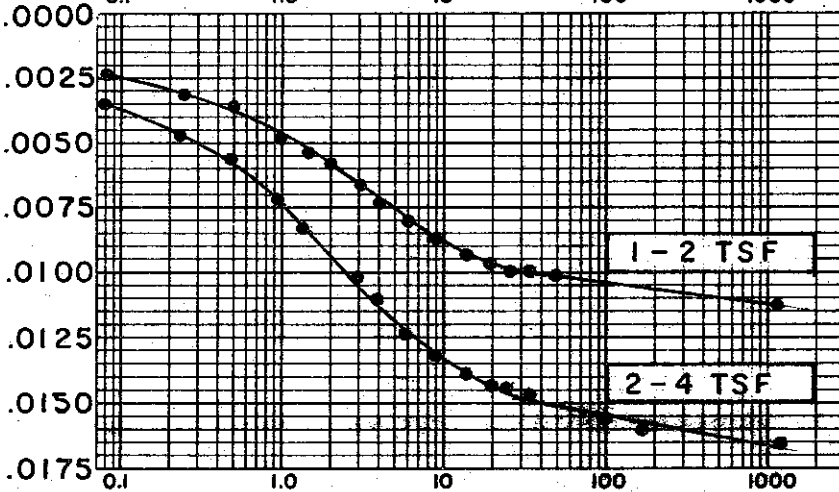
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C260.1  
 SAMPLE NO. 9 DATE JULY 1974  
 DEPTH 78.7' TO 79.0'

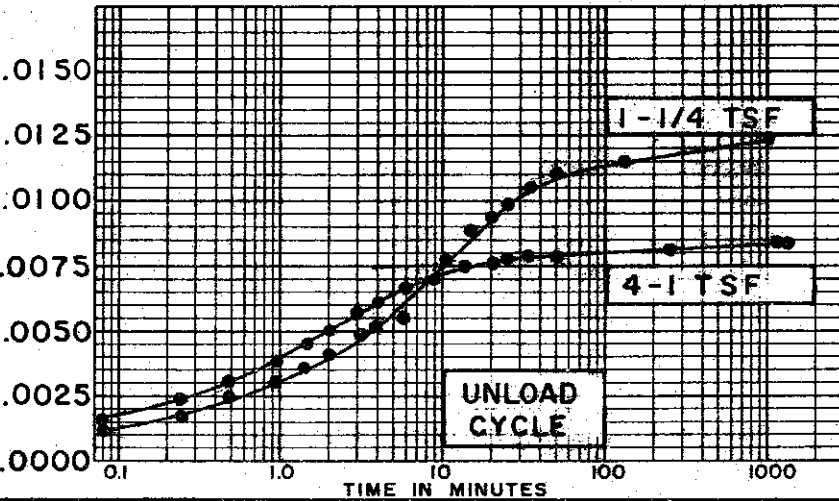
COMPRESSION IN INCHES



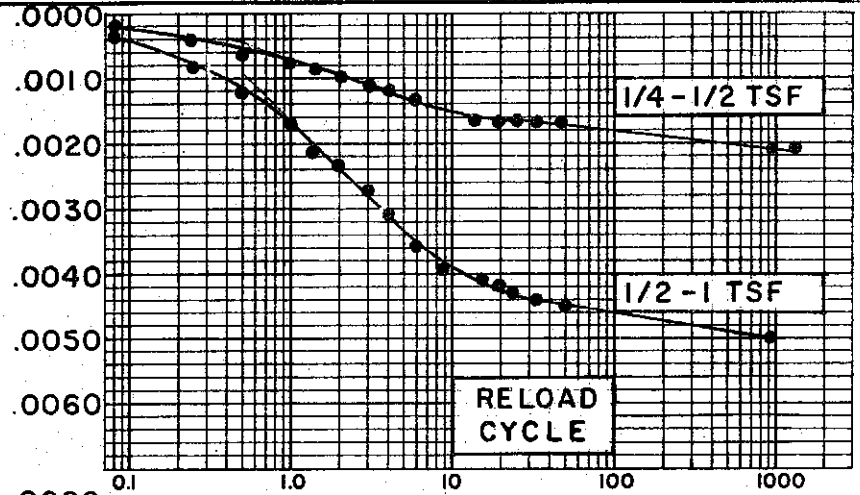
COMPRESSION IN INCHES



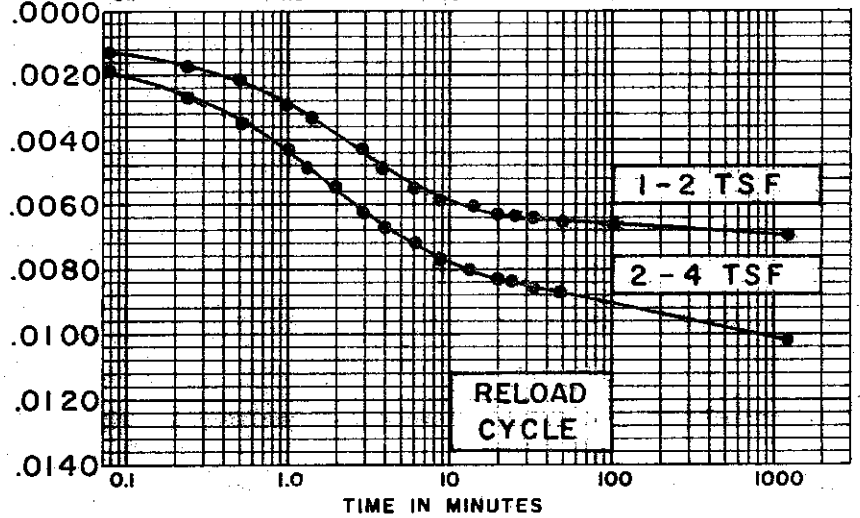
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

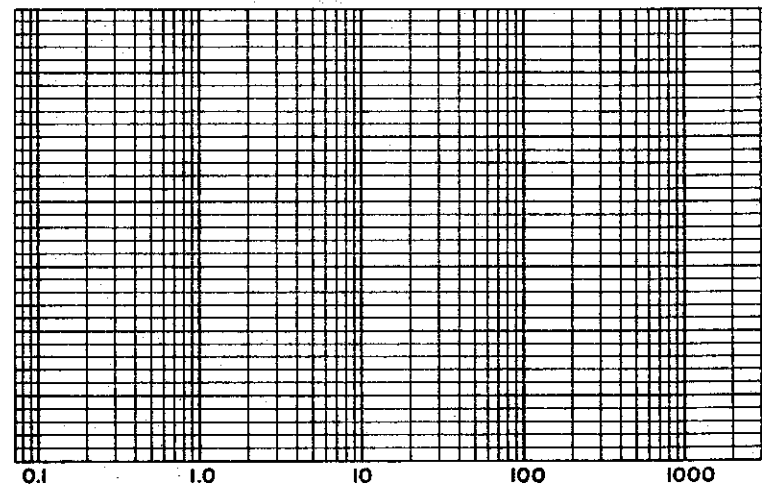
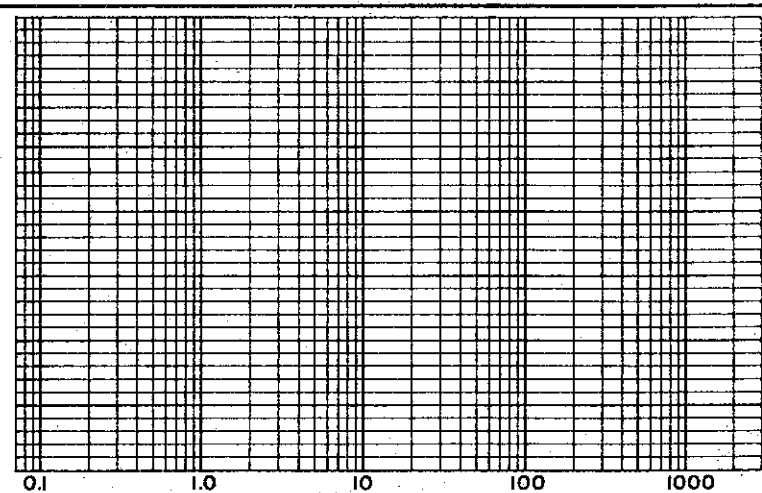
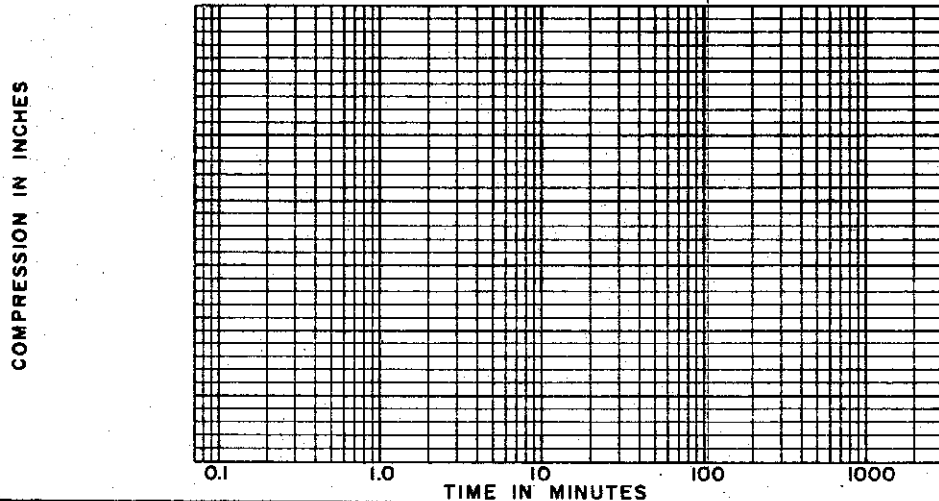
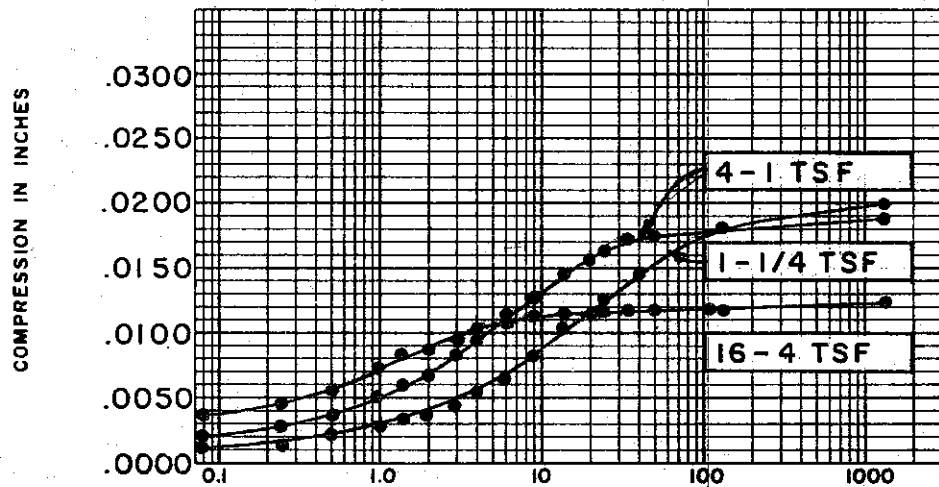
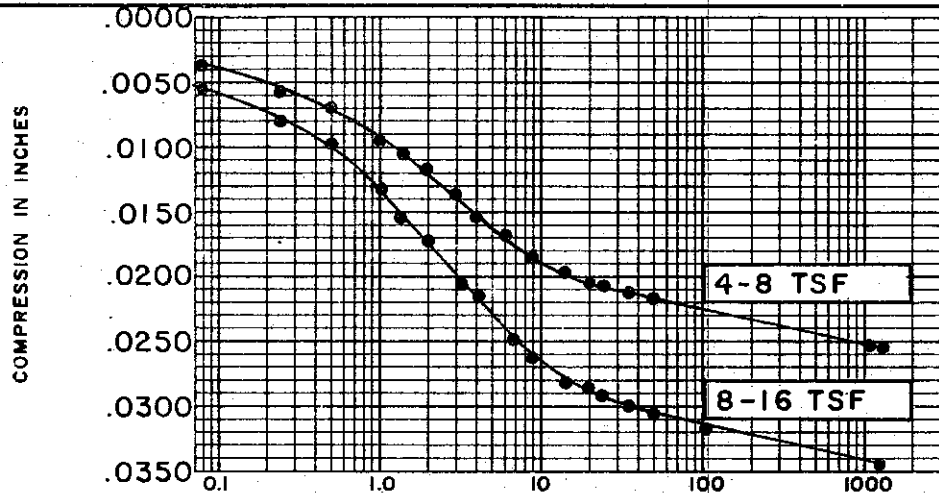
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

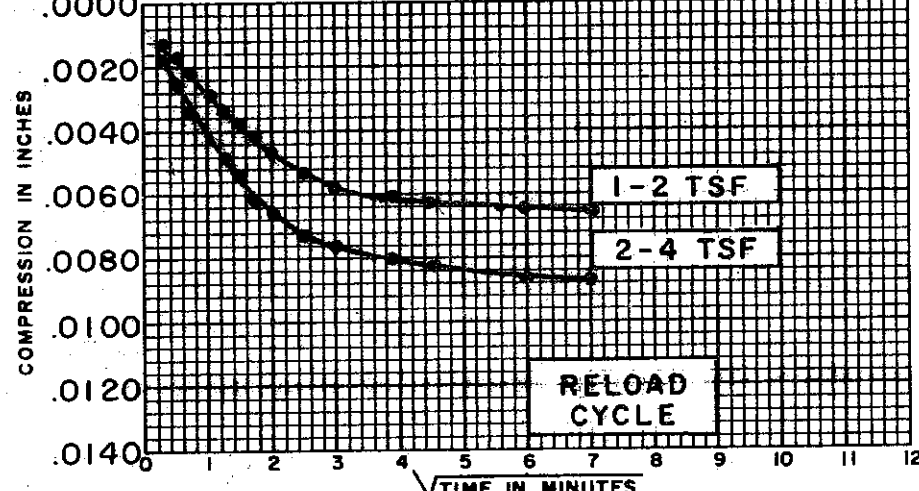
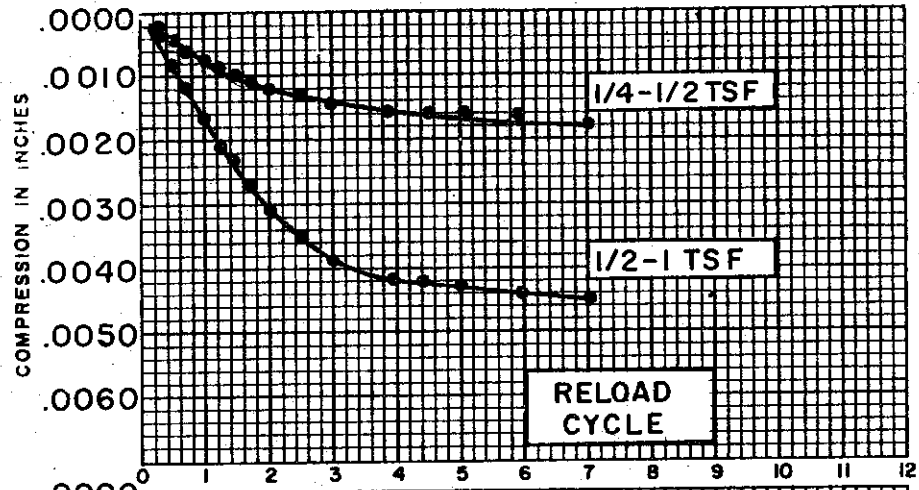
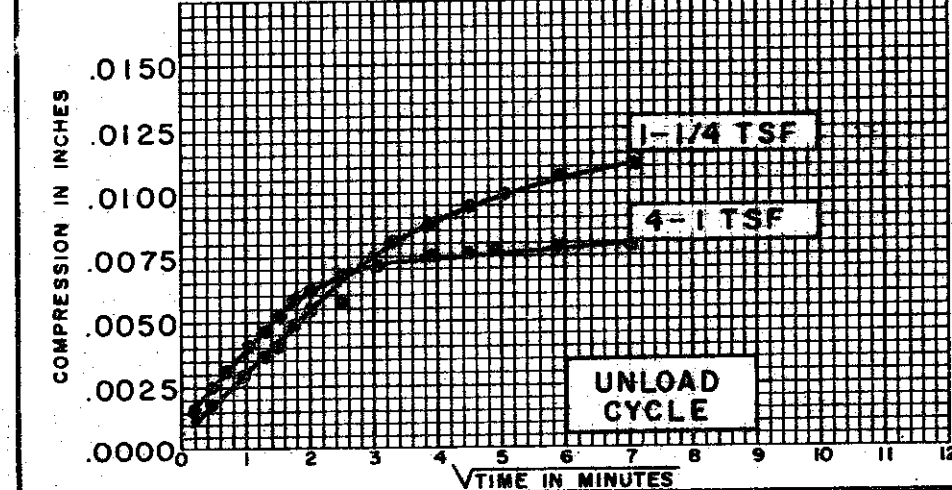
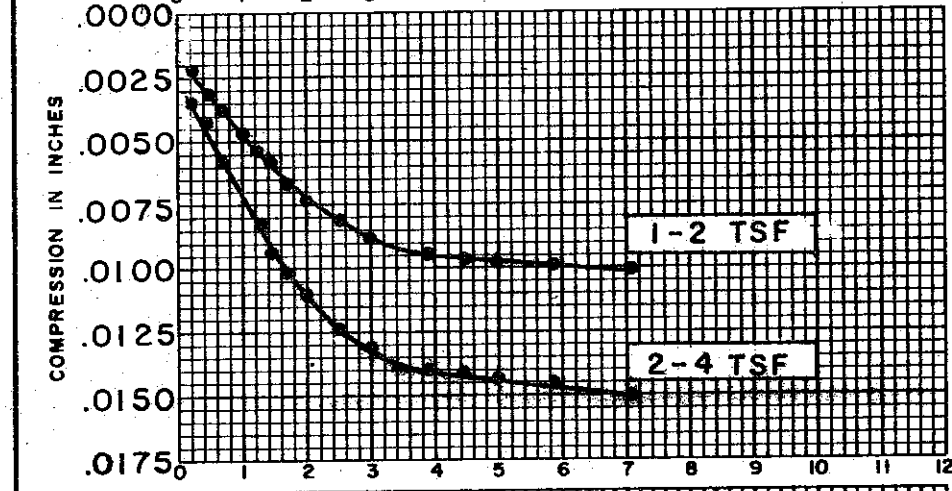
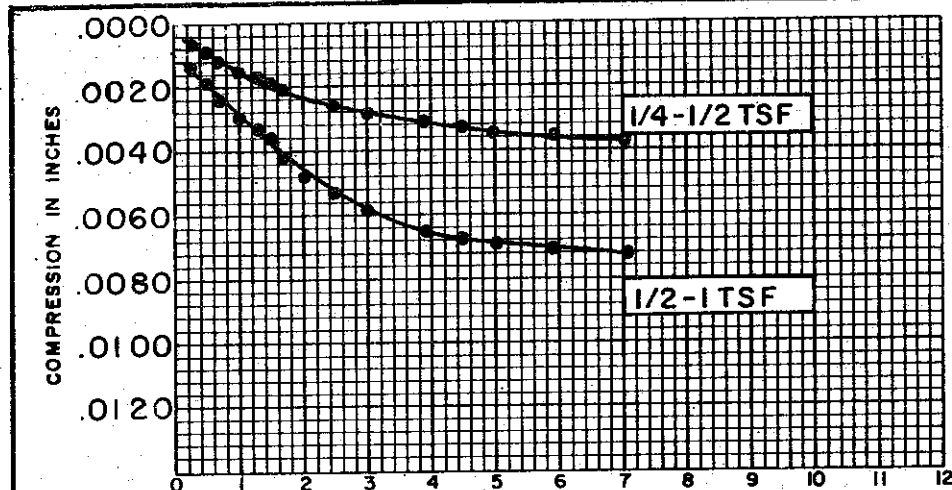
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TIME IN MINUTES

SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, (CE)</u>	SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.30"</u>	
INITIAL VOID RATIO	<u>0.741</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		

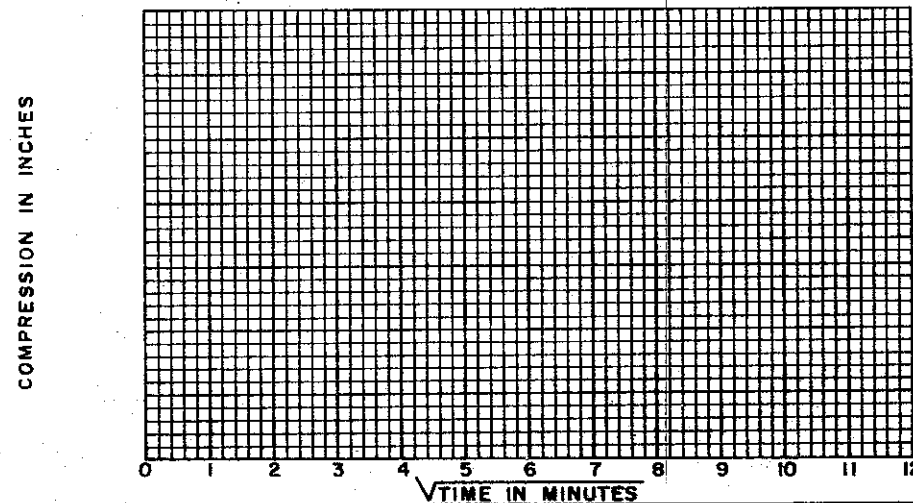
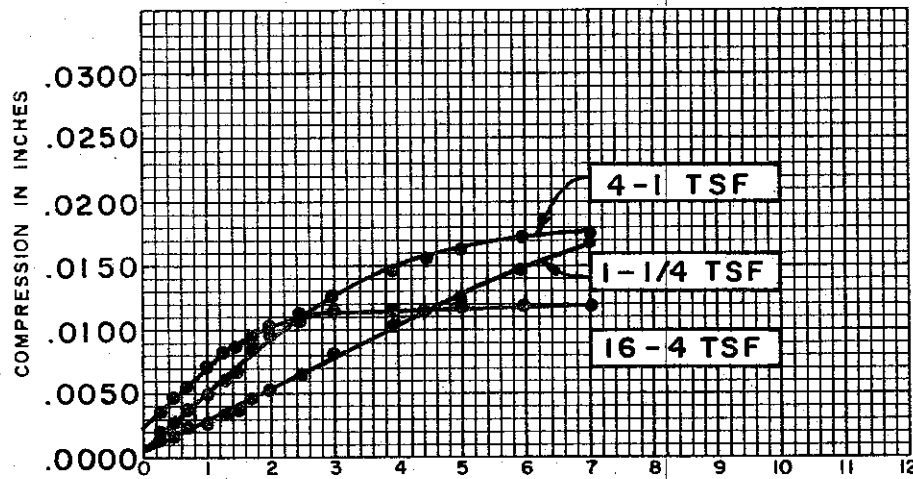
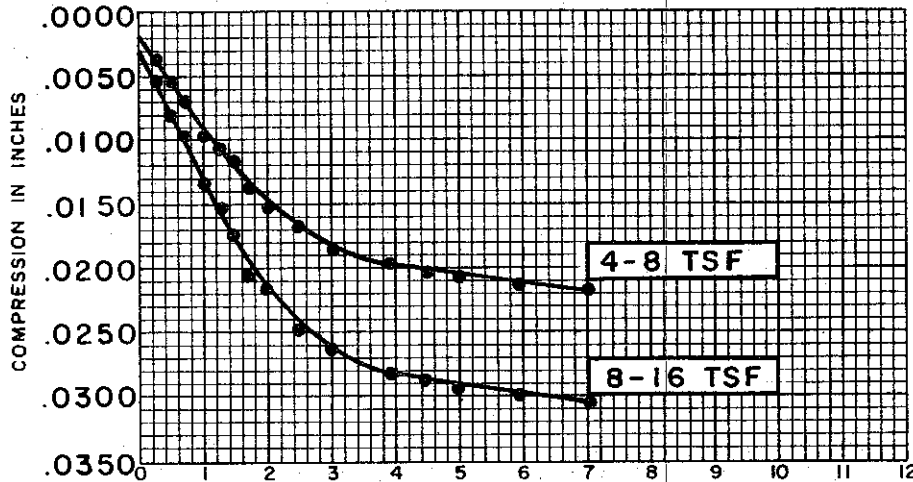


SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION: <u>SILTY CLAY, (CL)</u>		SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.741</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

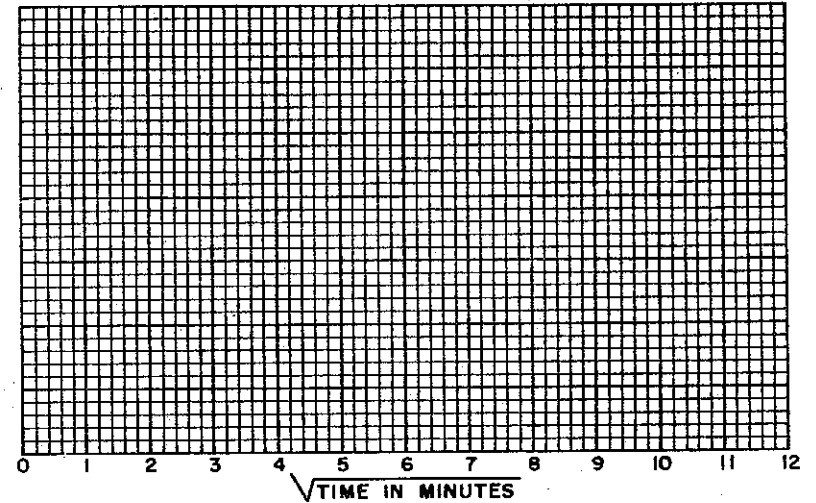
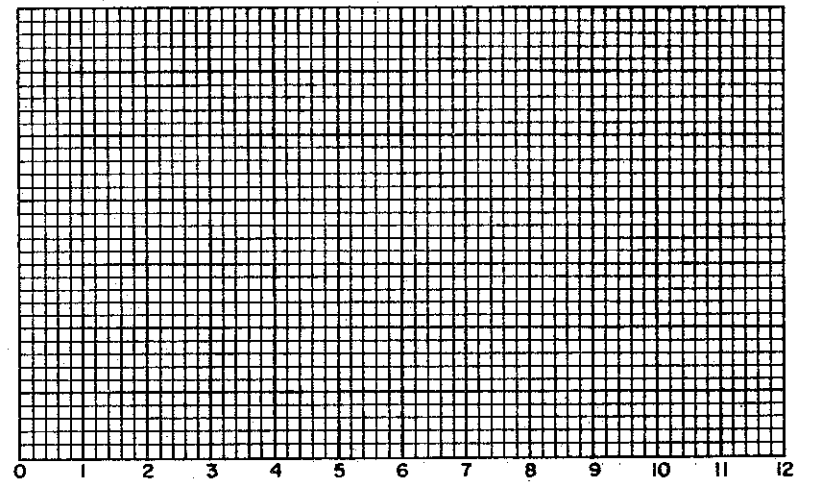
C-549



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

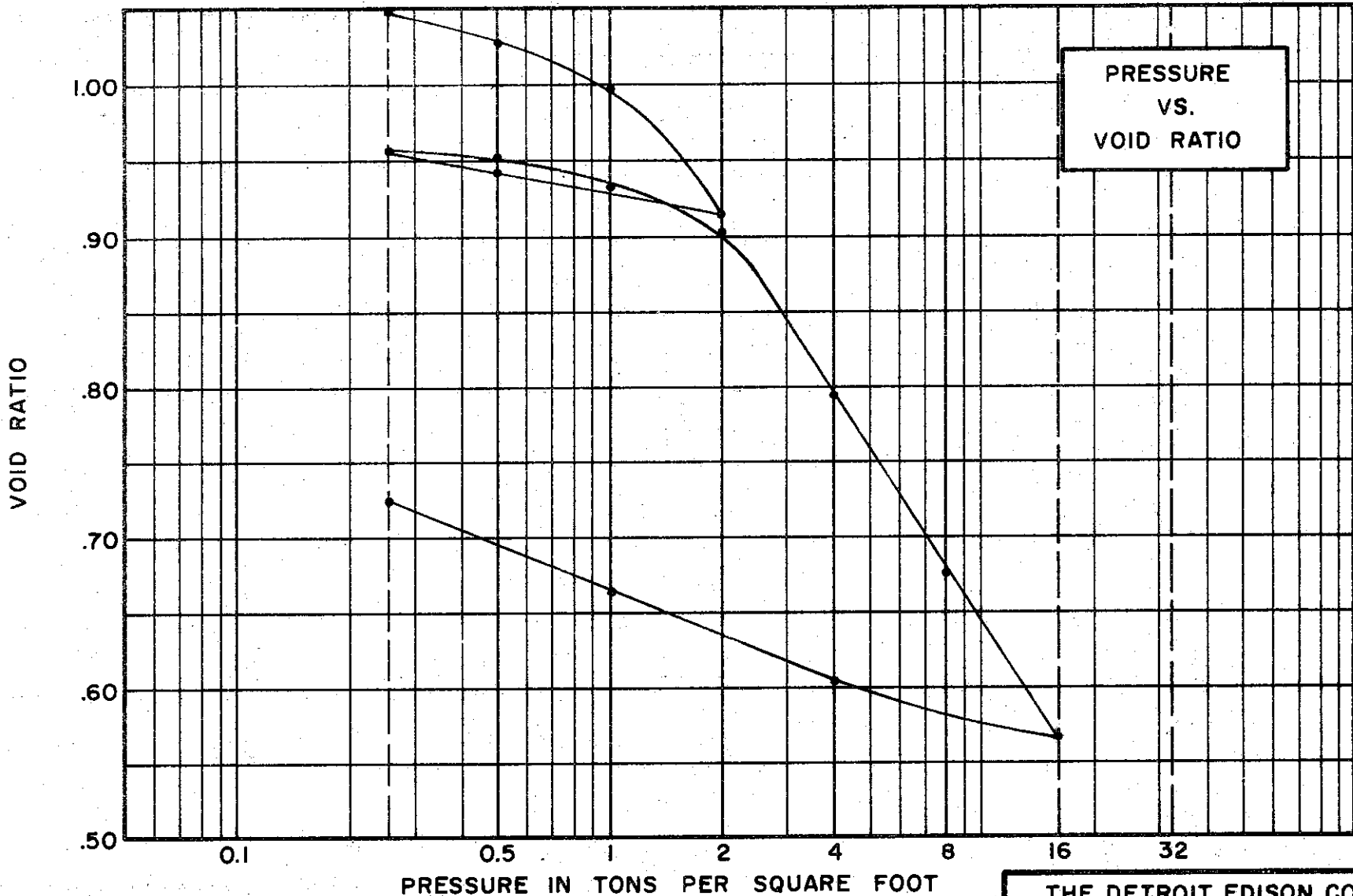
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 40.2% FINAL 30.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

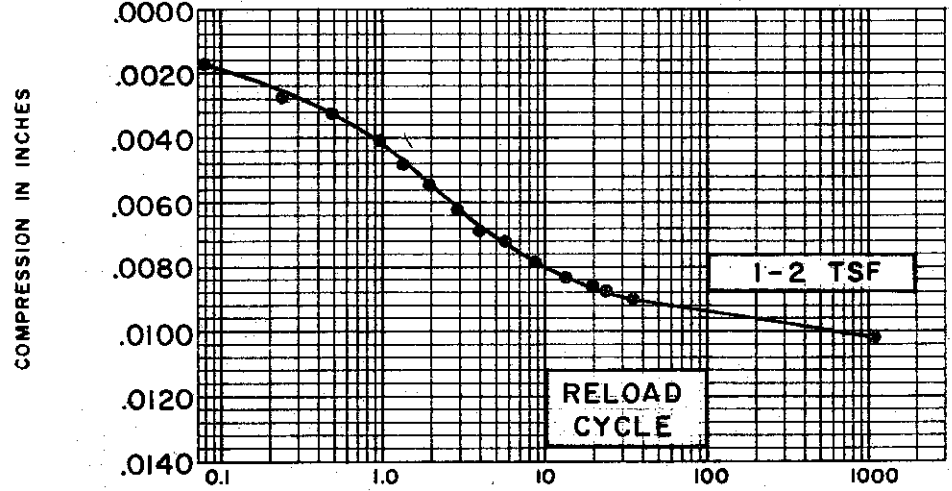
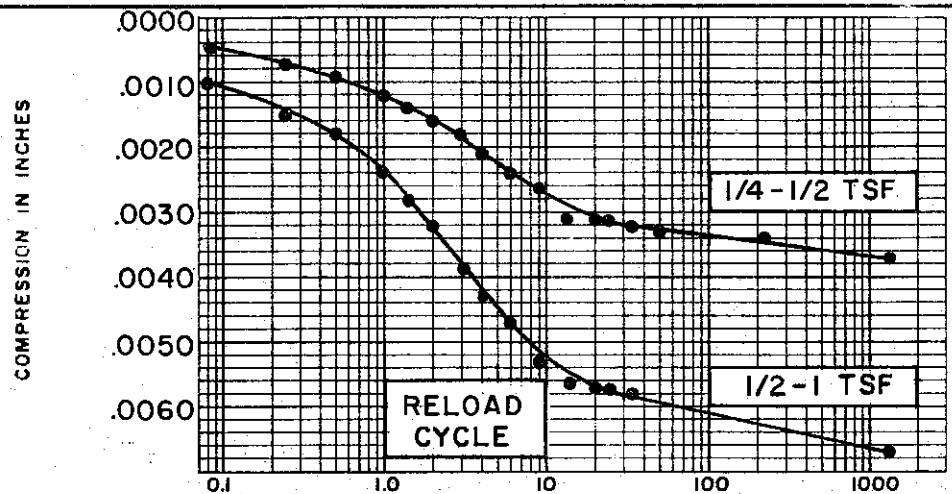
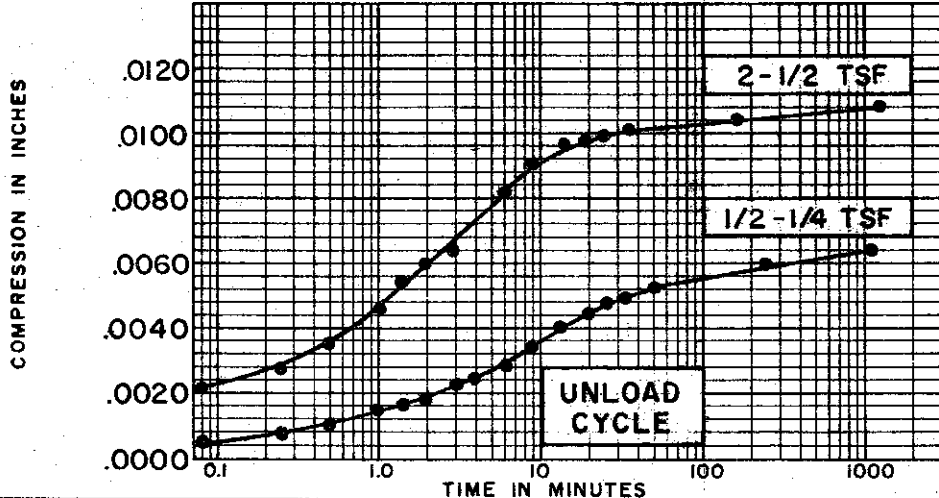
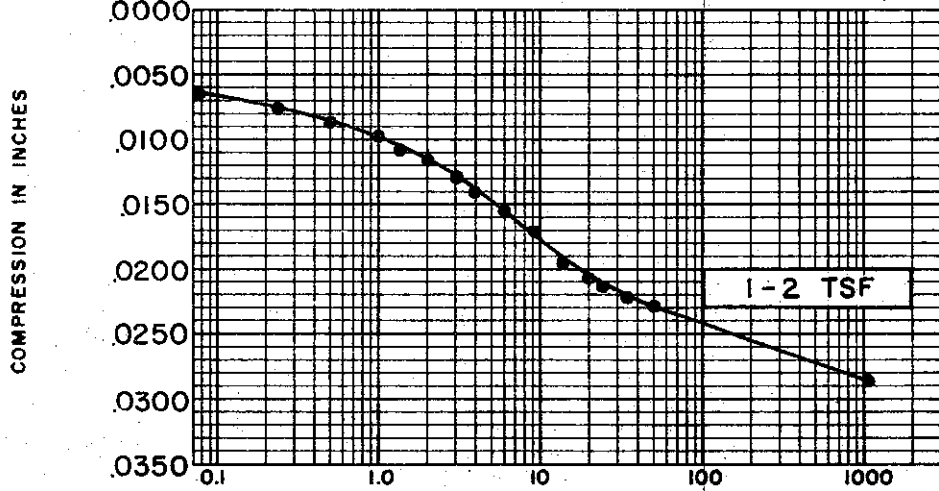
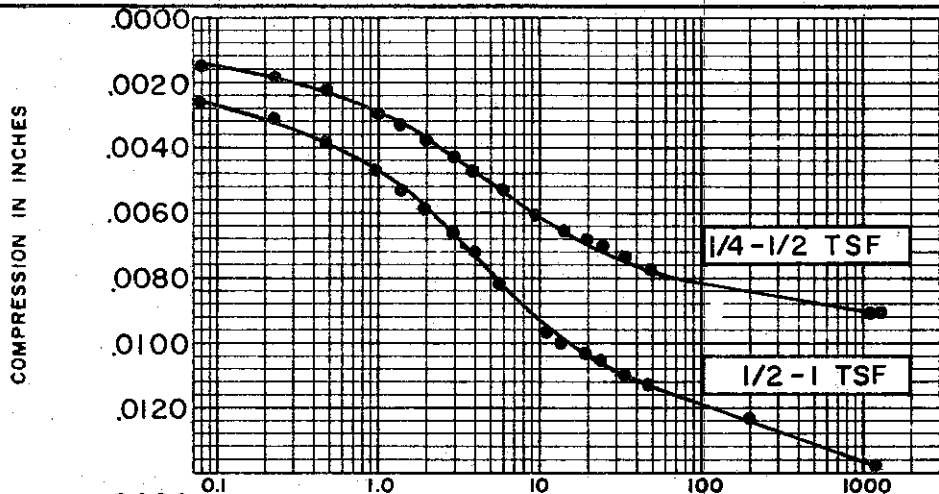
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C389.1  
 SAMPLE NO. 9 DATE APRIL 74  
 DEPTH 39.1' TO 39.3'

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GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

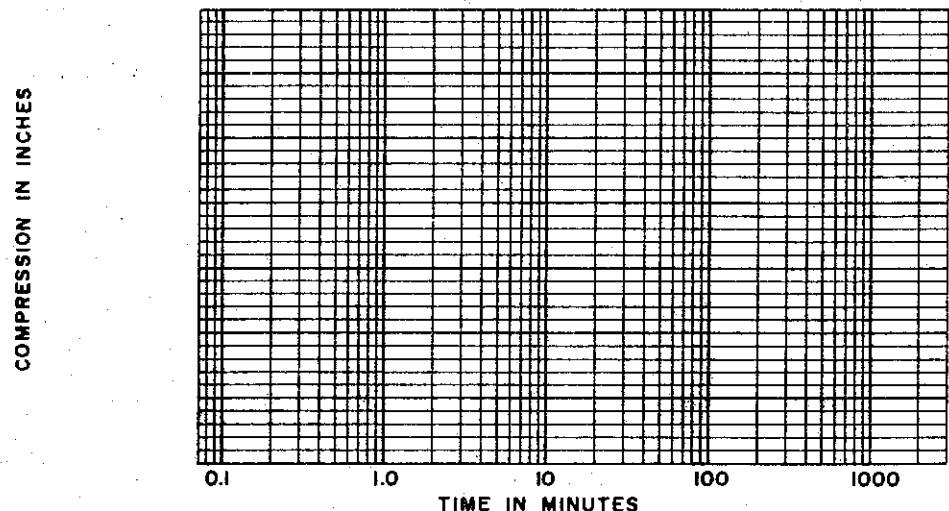
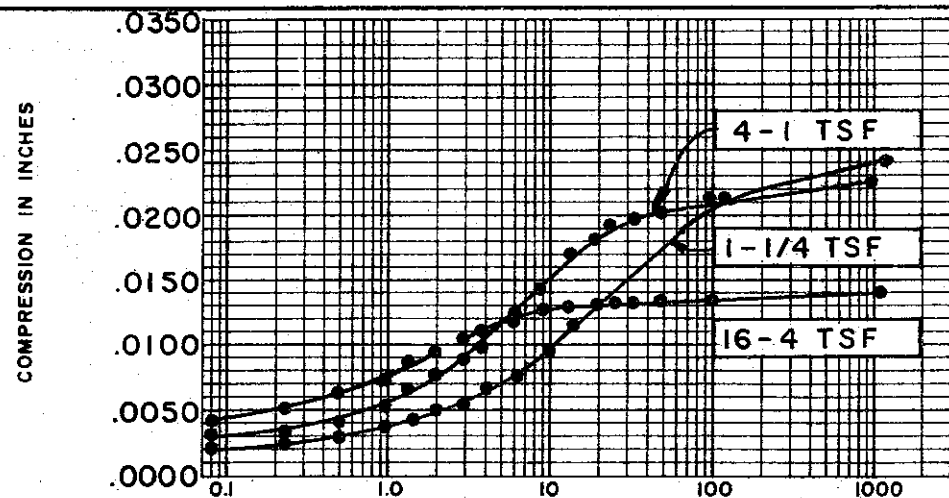
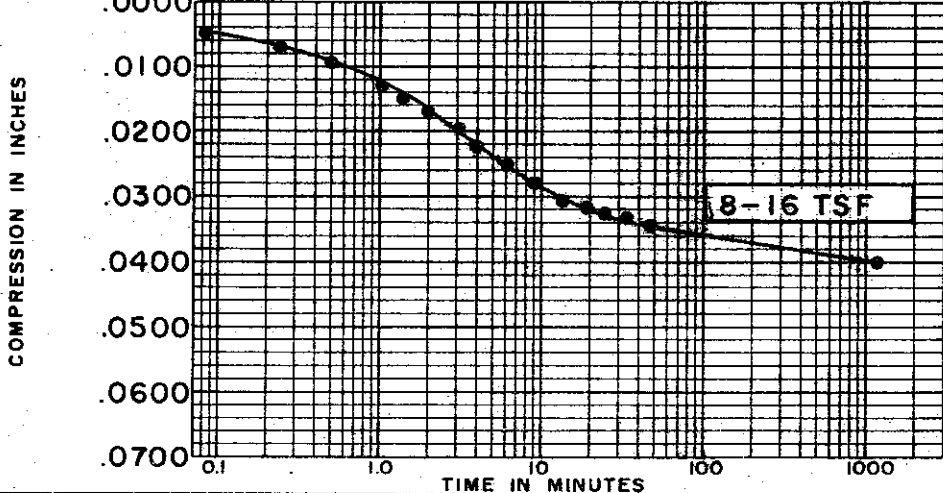
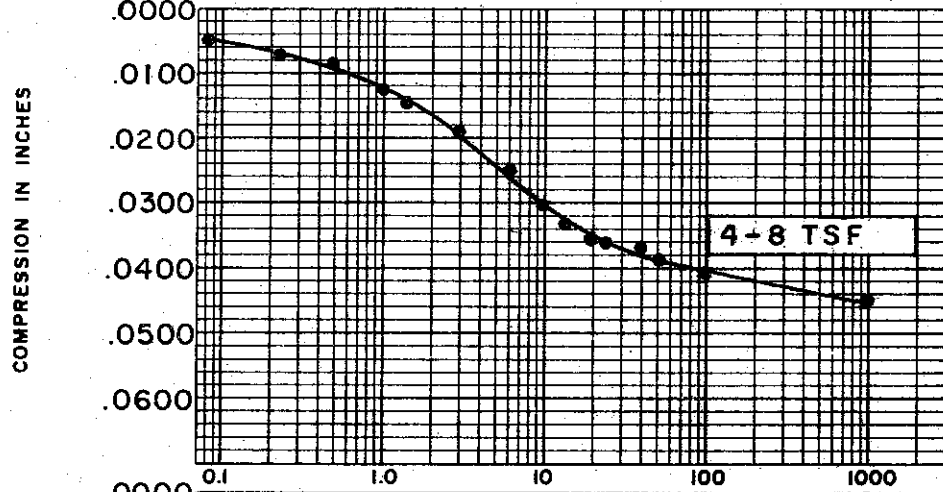
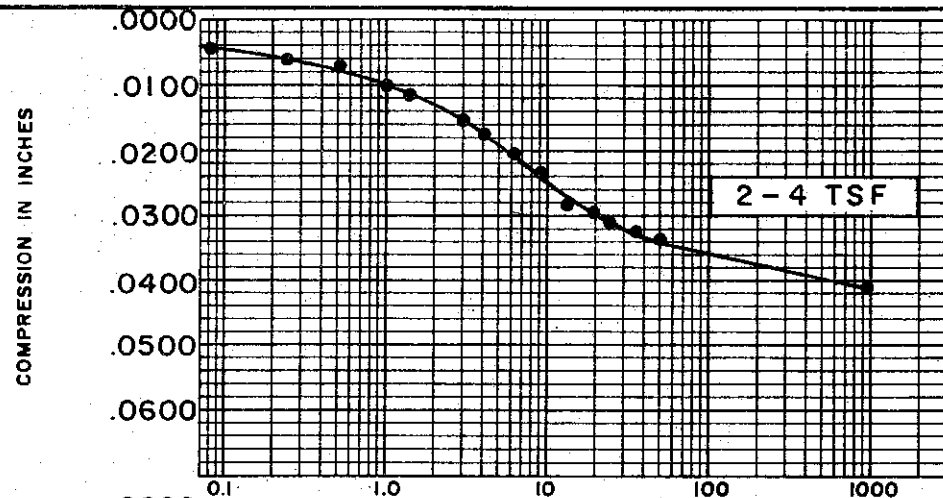


SOIL PROPERTIES		BORING NO.	129
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	9
SPECIFIC GRAVITY	2.73	DEPTH	39.1' TO 39.3'
INITIAL WATER CONTENT	40.2 %		
FINAL WATER CONTENT	30.0 %		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 40.2 %  
 FINAL WATER CONTENT 30.0 %

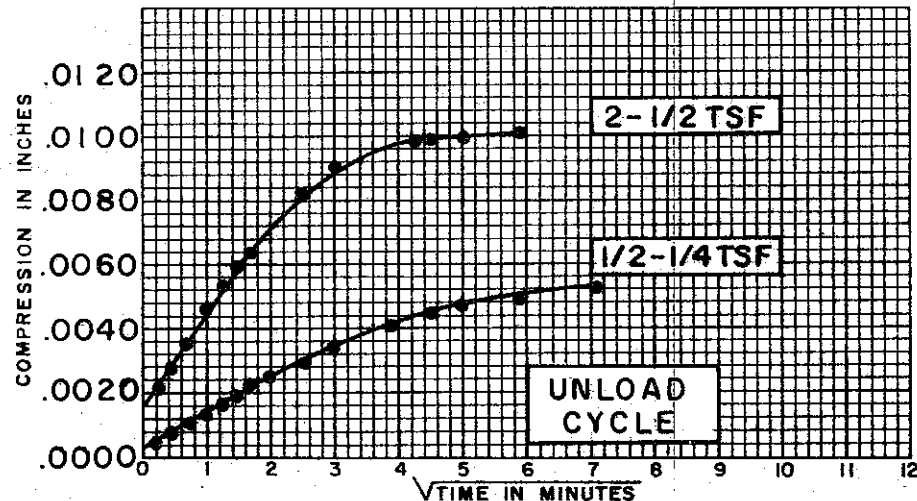
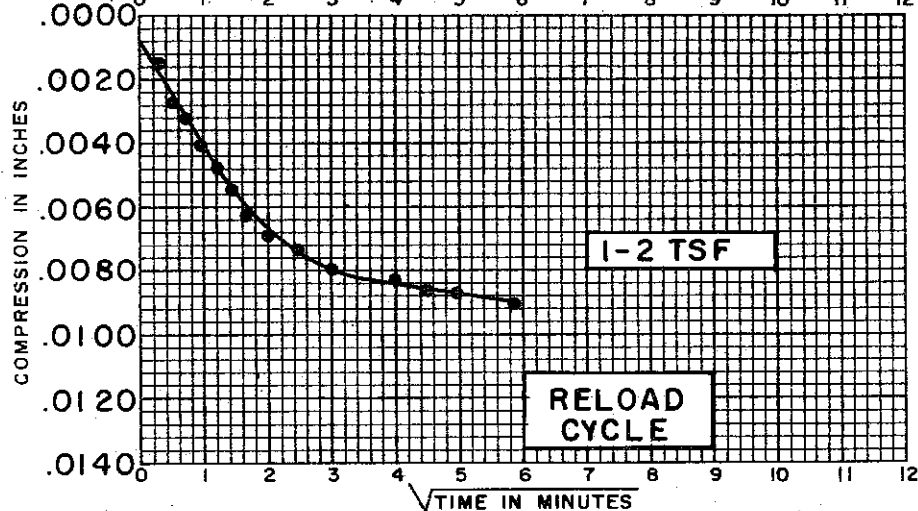
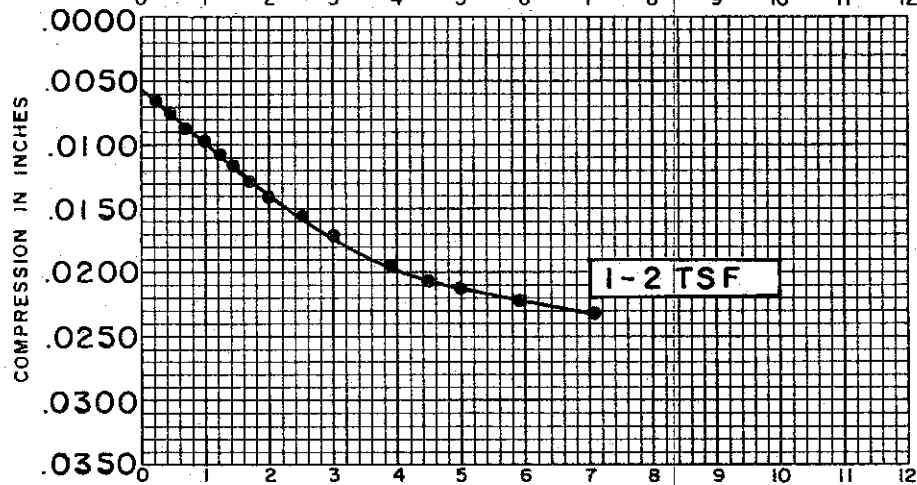
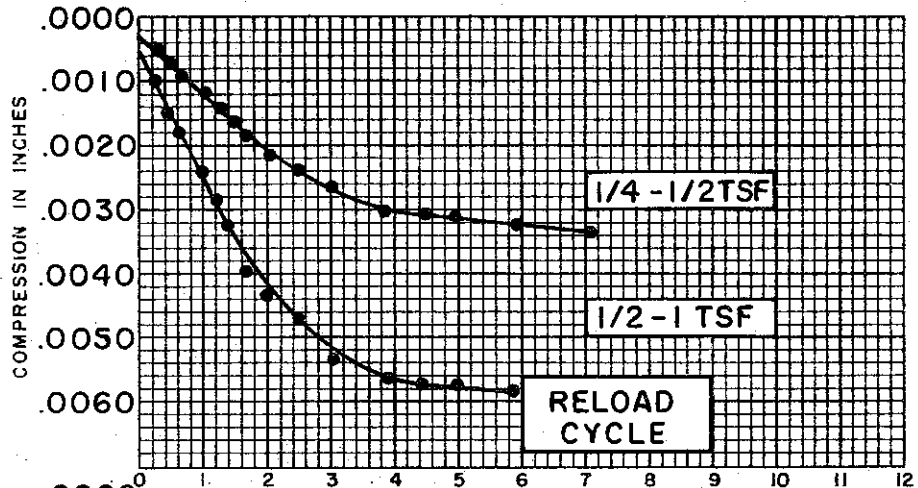
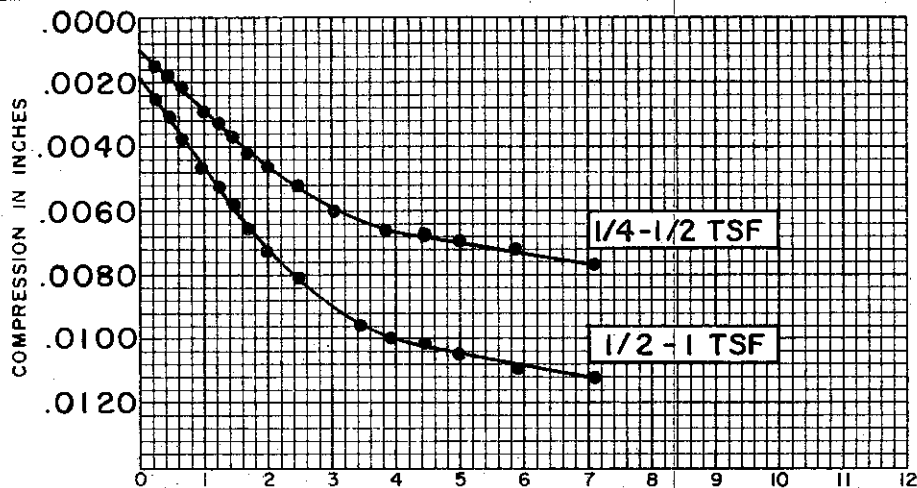
BORING NO. 129  
 SAMPLE NO. 9  
 DEPTH 39.1 TO 39.3'

**TEST DATA**

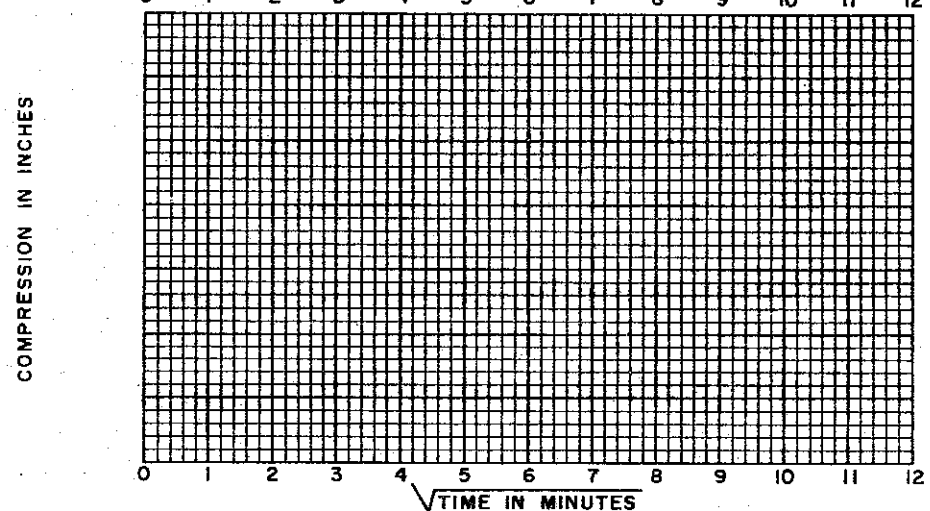
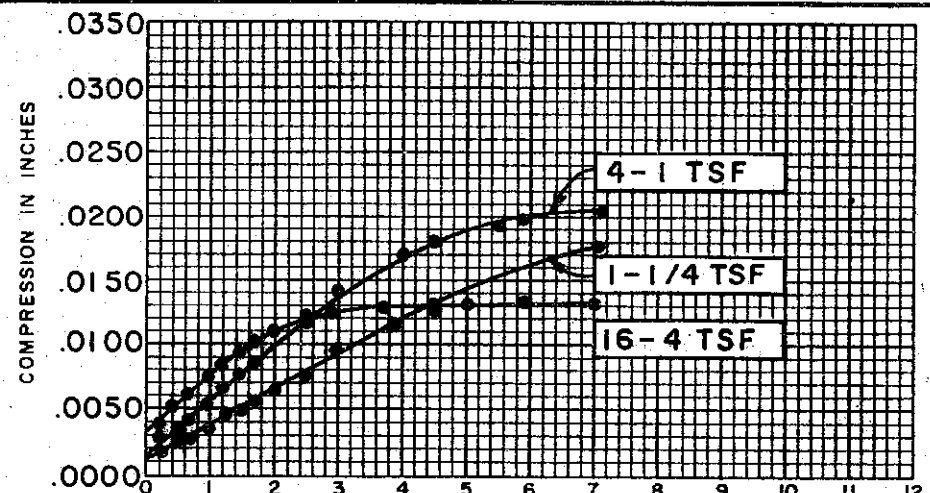
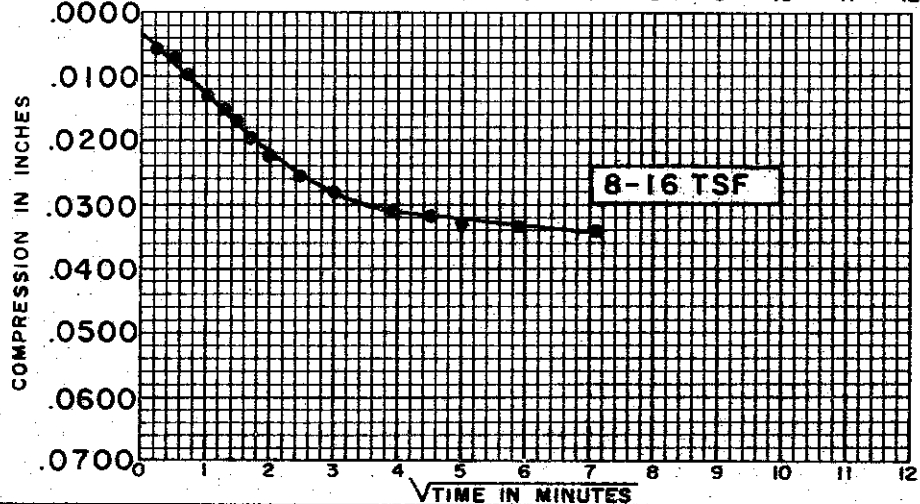
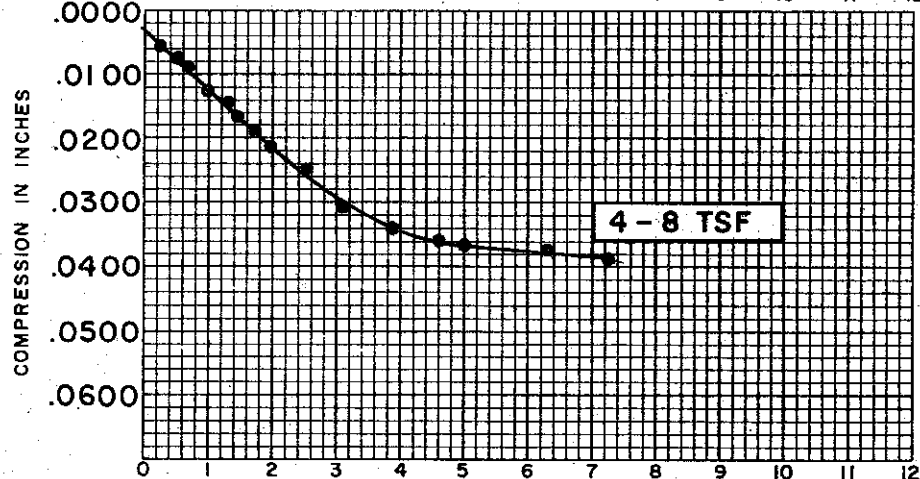
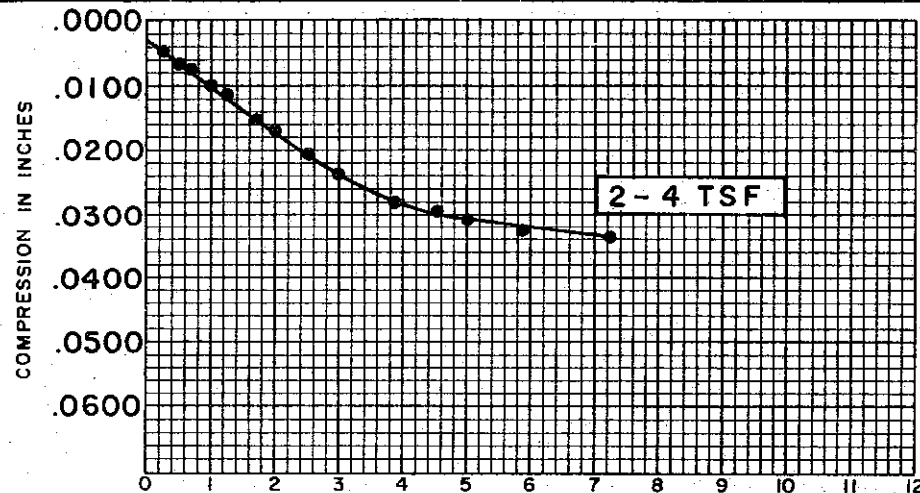
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE:**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

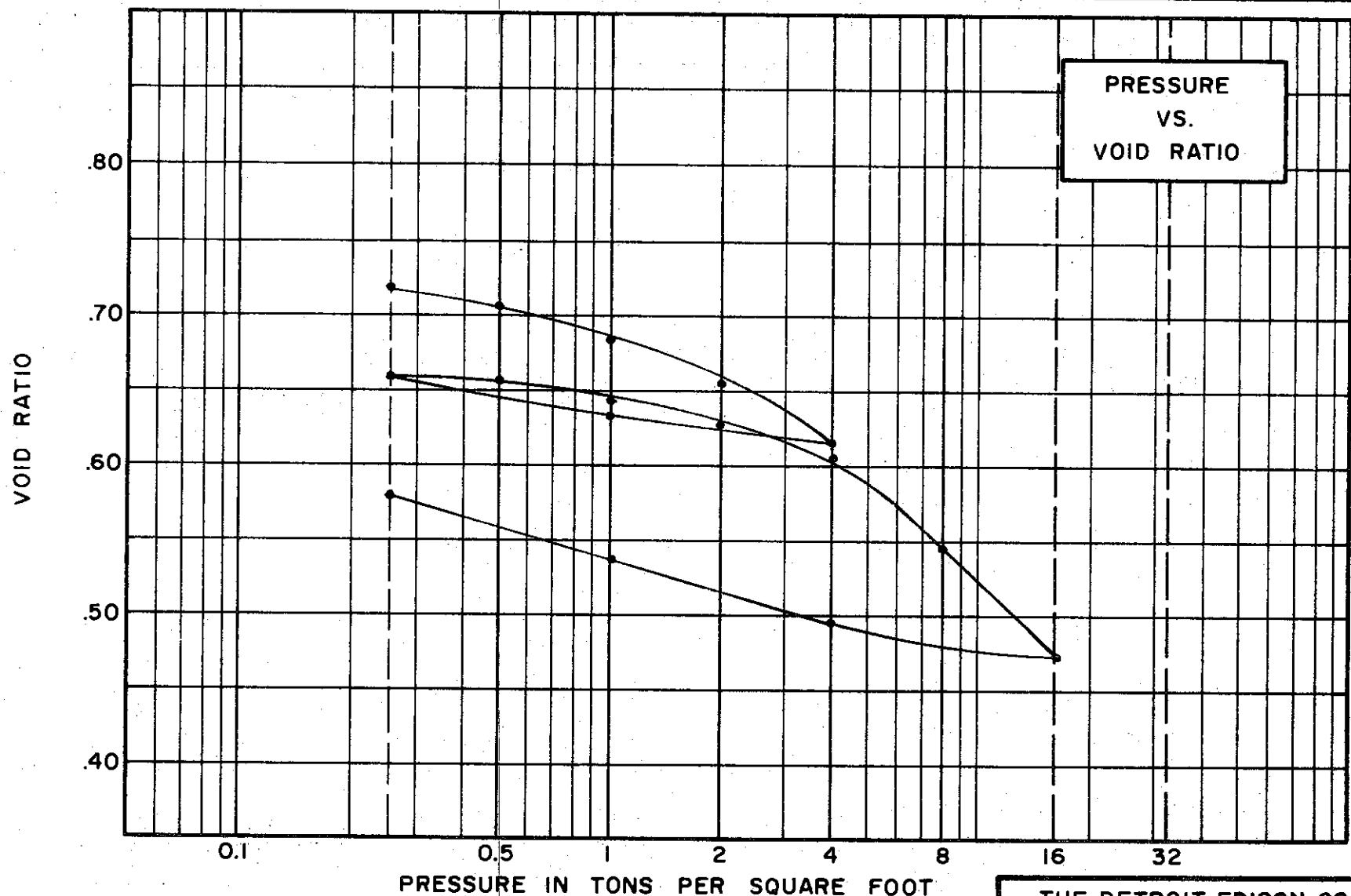


SOIL PROPERTIES		BORING NO. <u>129</u>	
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO. <u>9</u>	
SPECIFIC GRAVITY <u>2.73</u>		DEPTH <u>39.1' TO 39.3'</u>	
INITIAL WATER CONTENT <u>40.2 %</u>			
FINAL WATER CONTENT <u>30.0 %</u>			
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT <u>0.80"</u>		TIME VS. COMPRESSION CURVES	
INITIAL SAMPLE DIAMETER <u>2.50"</u>		THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO <u>1.075</u>		BELLE RIVER PLANT UNITS I & II	



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	40.2 %
FINAL WATER CONTENT	30.0 %
BORING NO.	129
SAMPLE NO.	9
DEPTH	39.1' TO 39.3'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075
CONSOLIDATION TEST	
TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 28.0% FINAL 24.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**

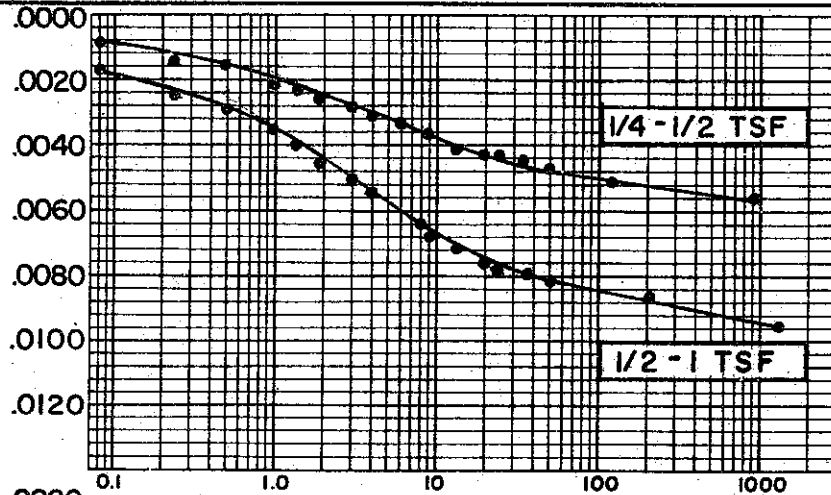
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.703

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

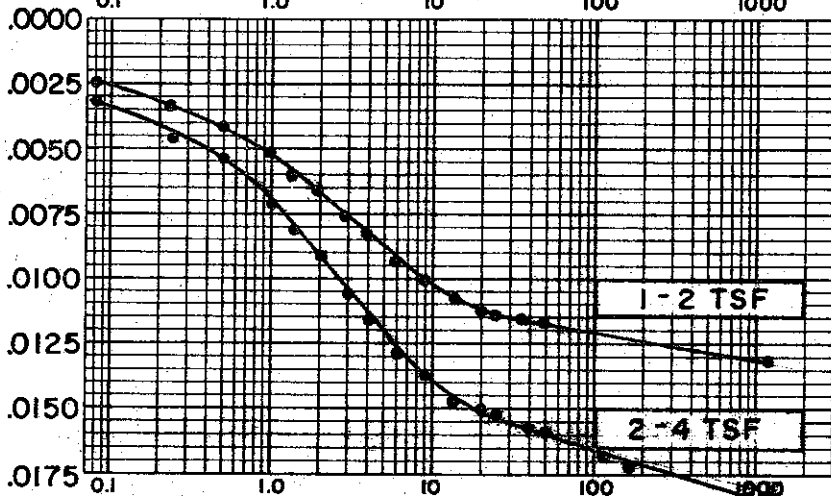
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C395.1  
 SAMPLE NO. 21 DATE APRIL 74  
 DEPTH 103.7' TO 104.0'

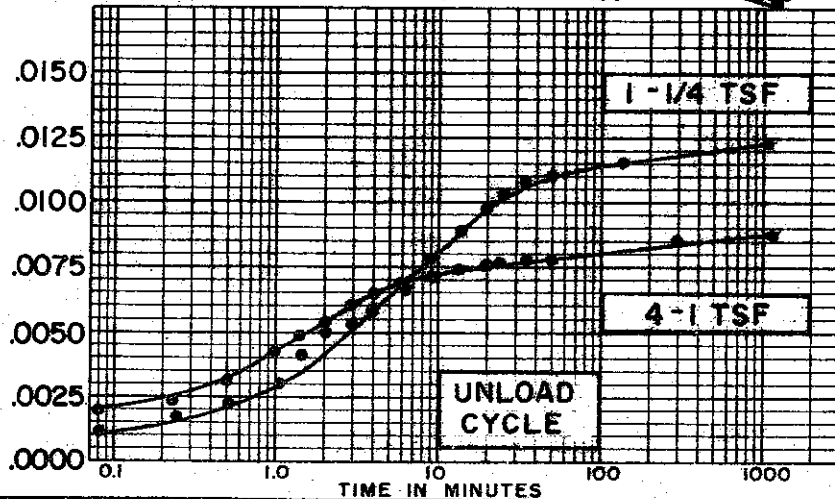
COMPRESSION IN INCHES



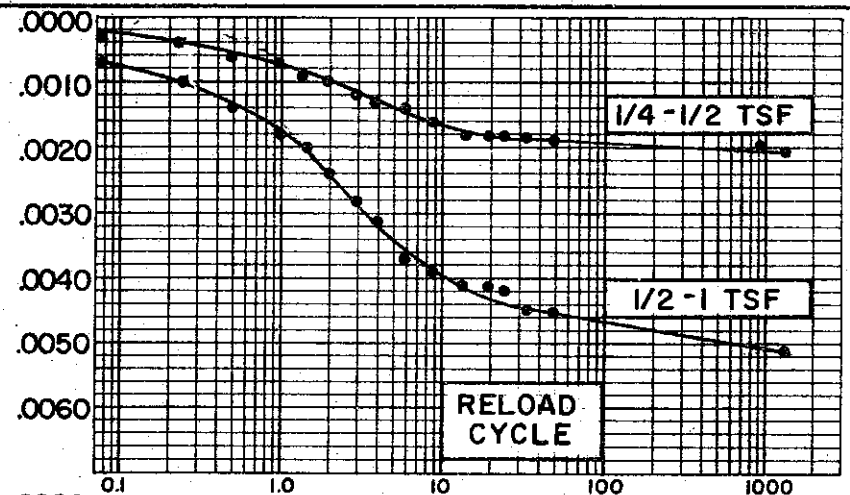
COMPRESSION IN INCHES



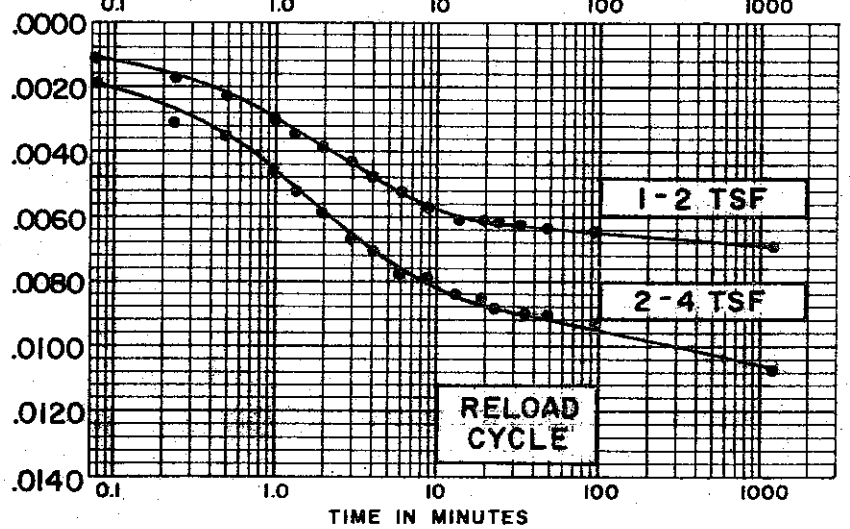
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

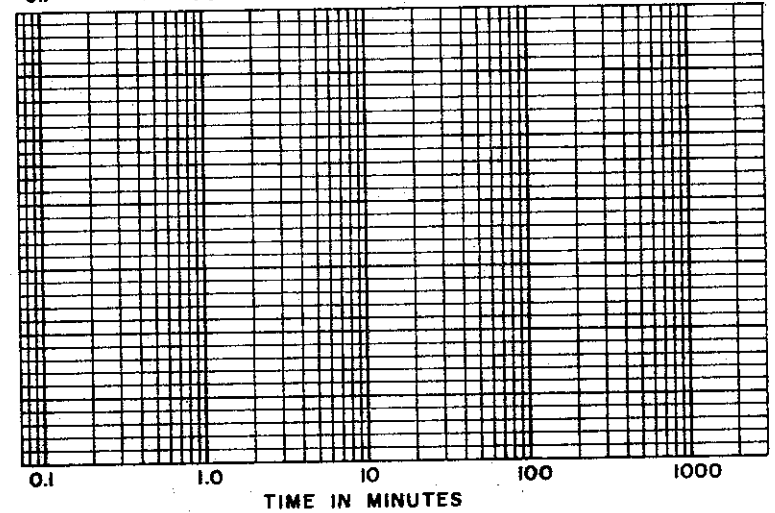
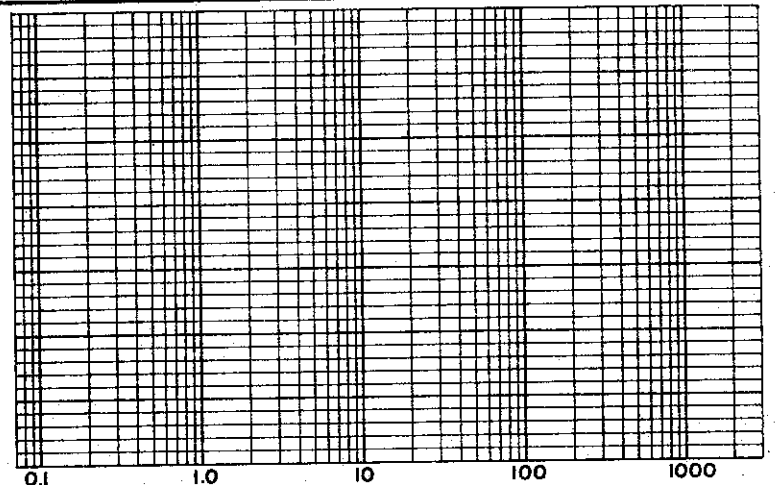
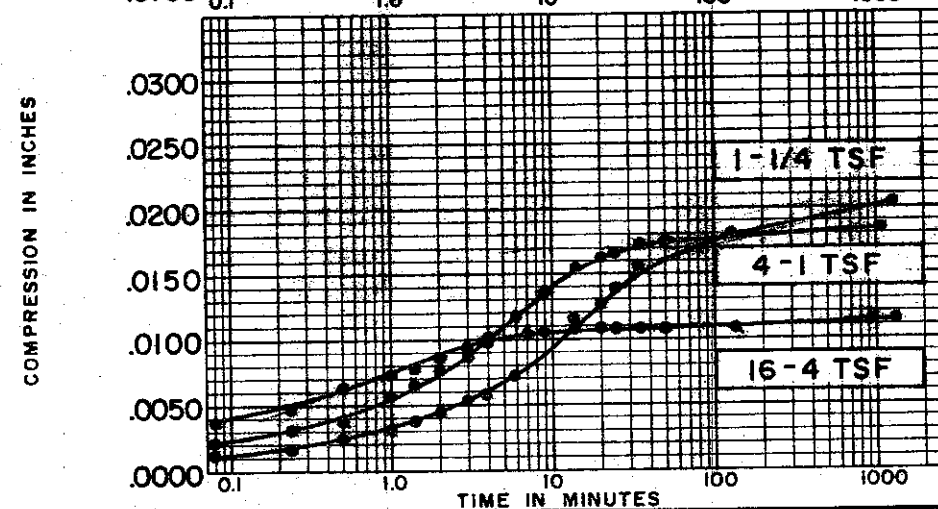
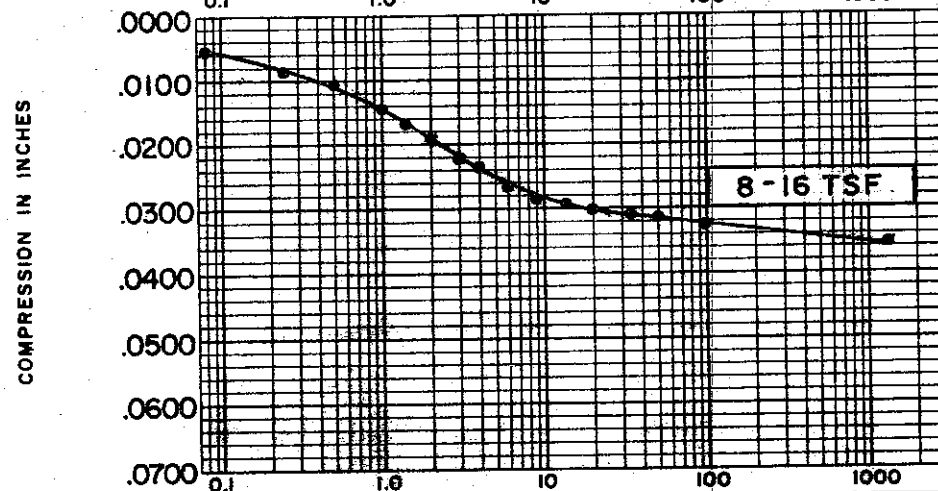
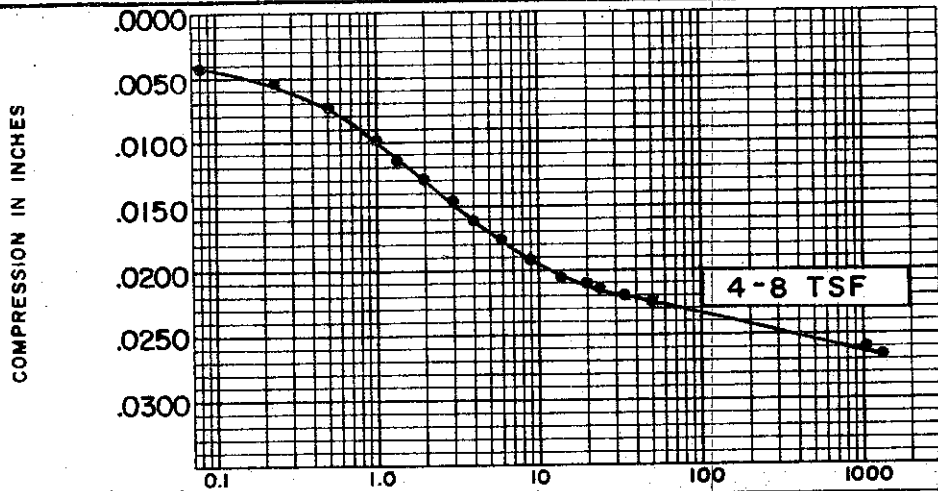
BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE.**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

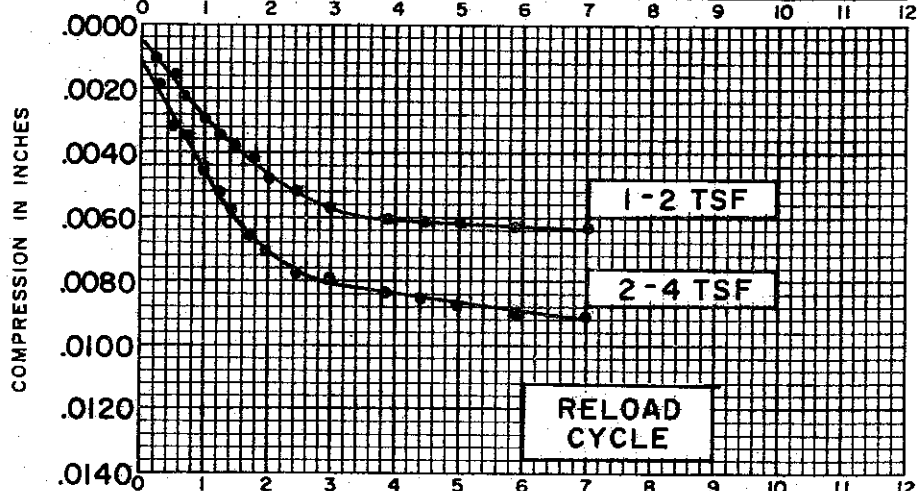
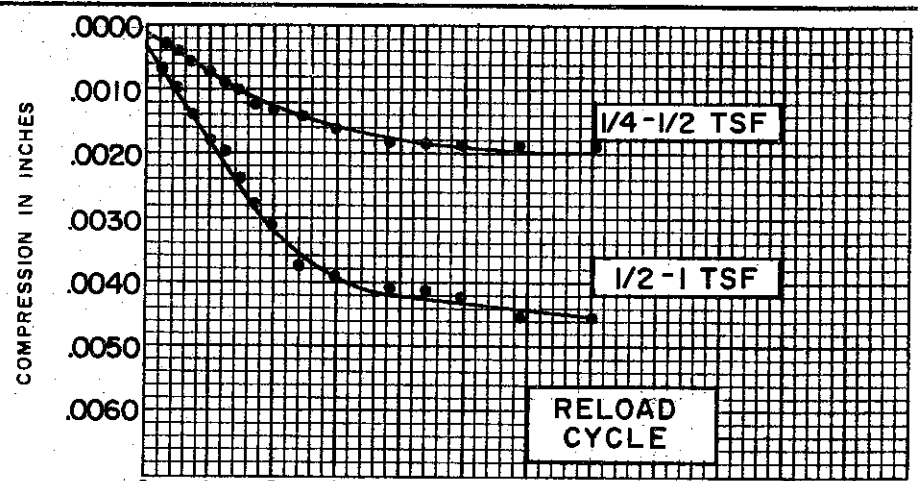
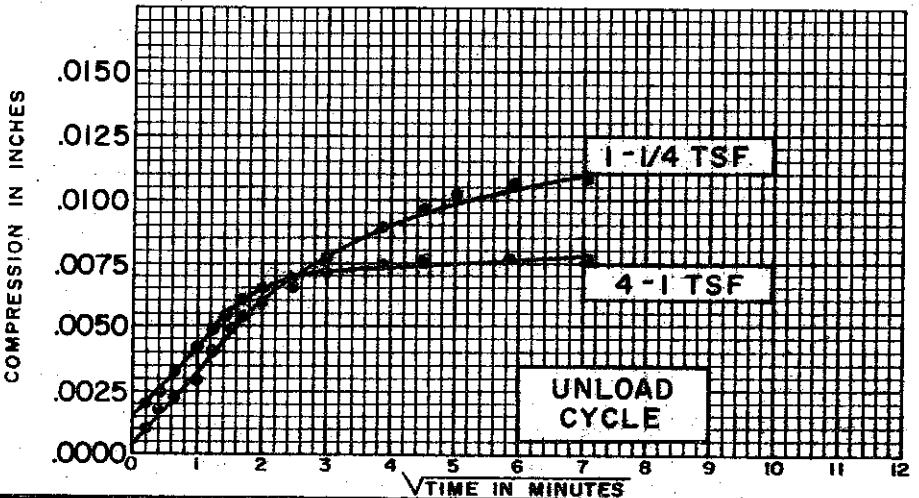
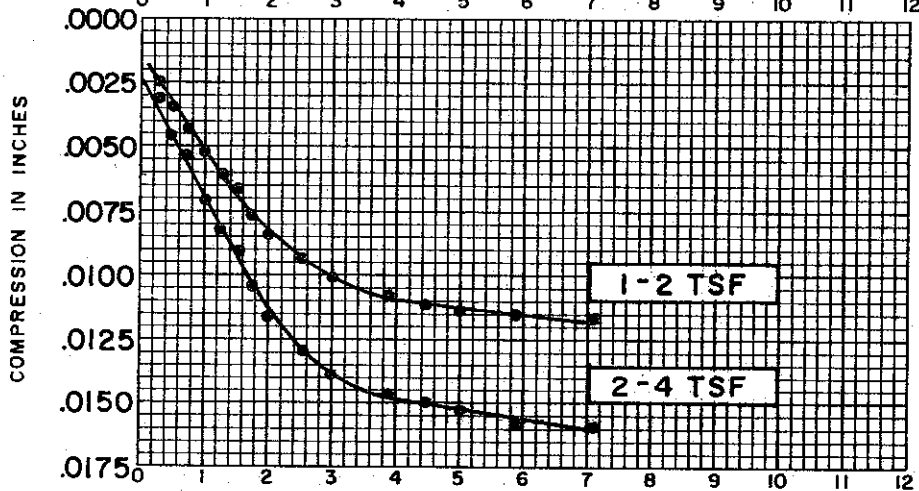
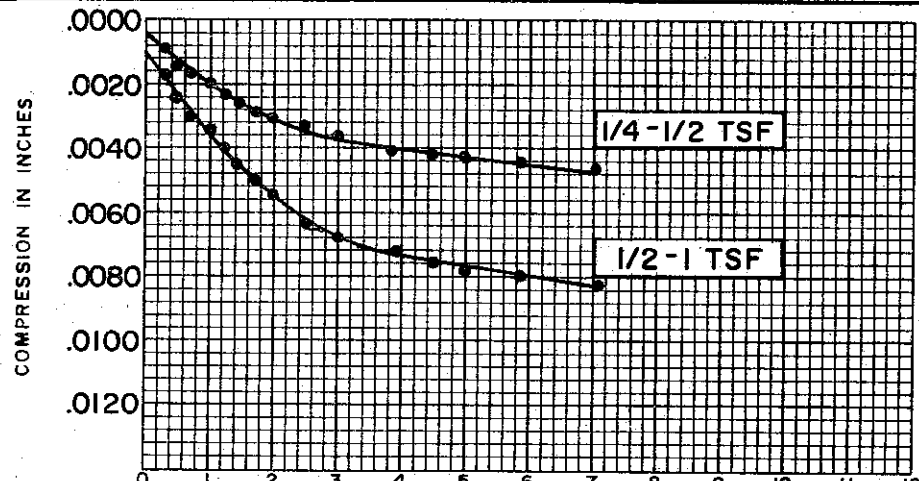
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





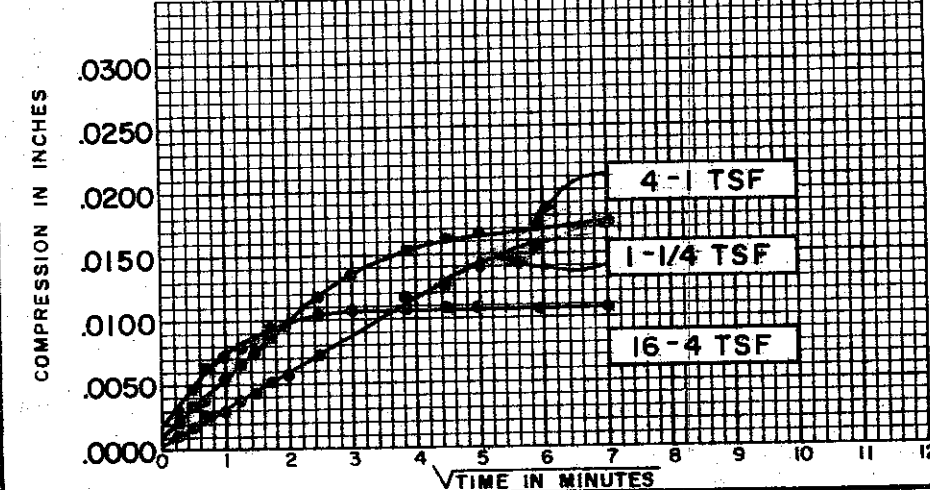
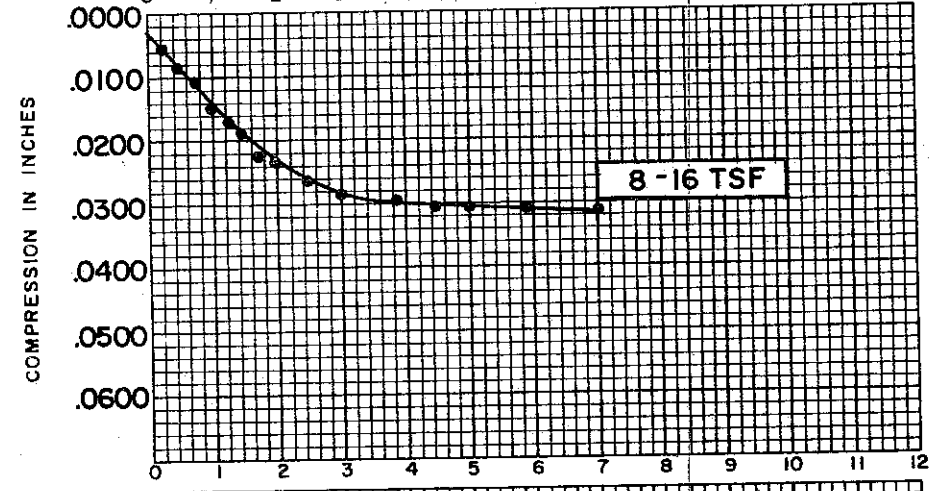
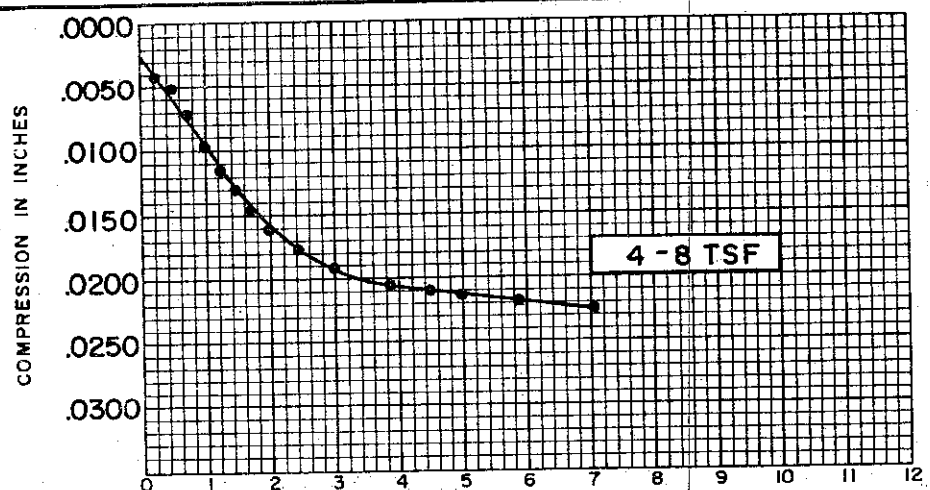
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	28.0 %
FINAL WATER CONTENT	24.5 %
BORING NO.	129
SAMPLE NO.	21
DEPTH	103.7' TO 104.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.730

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

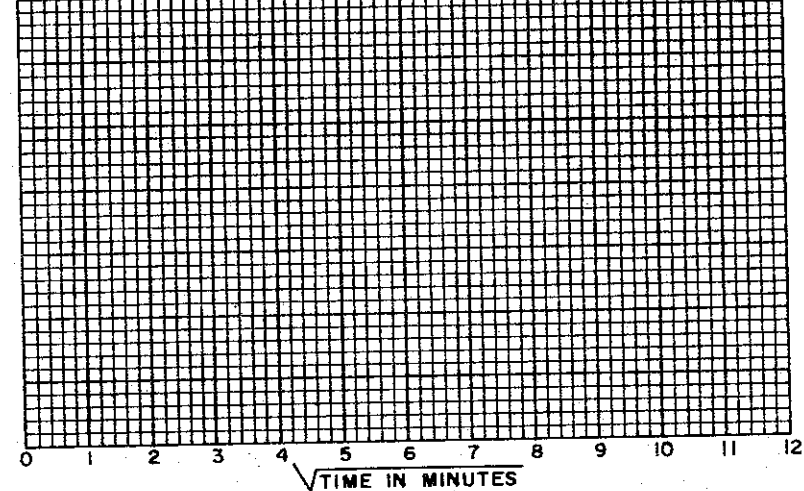
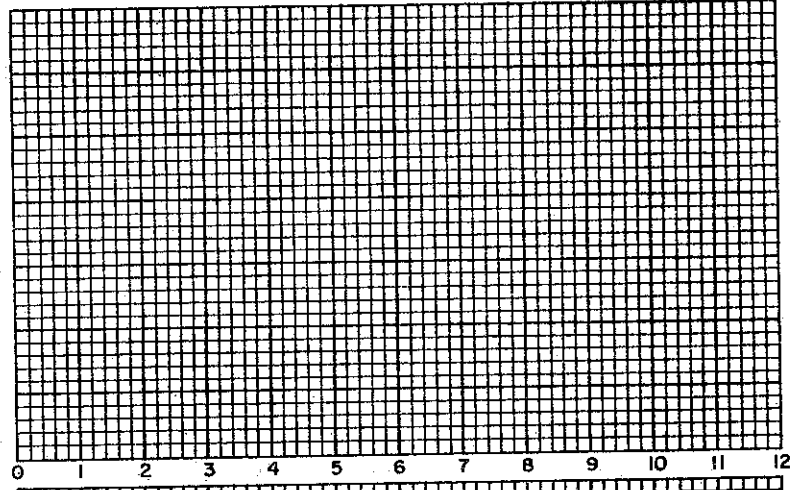
C-559

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

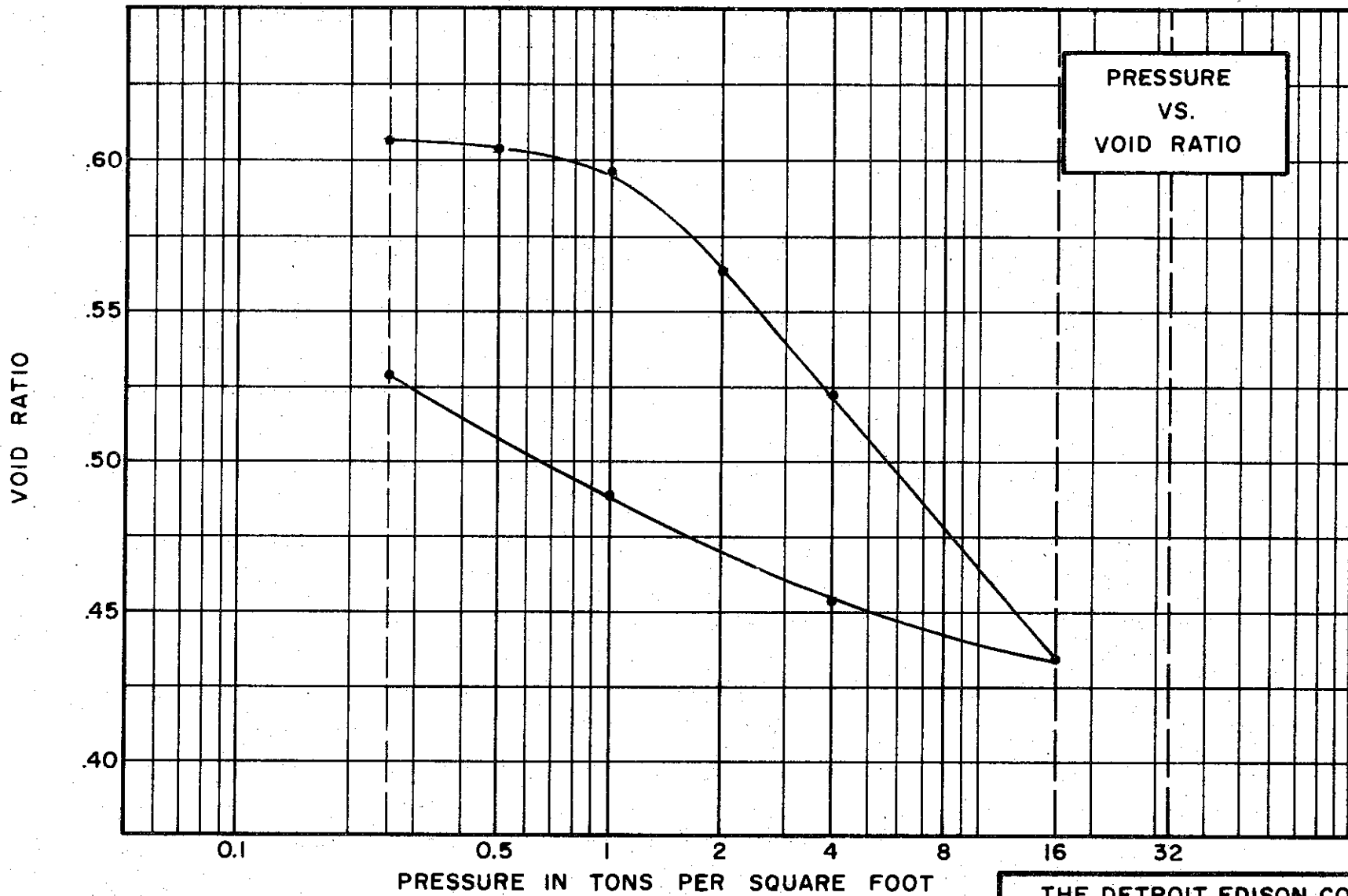
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 17.3% FINAL 21.3%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**

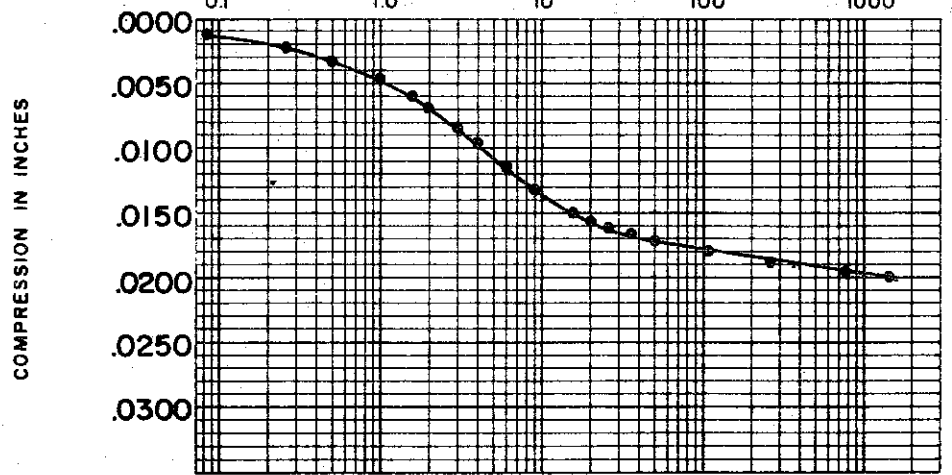
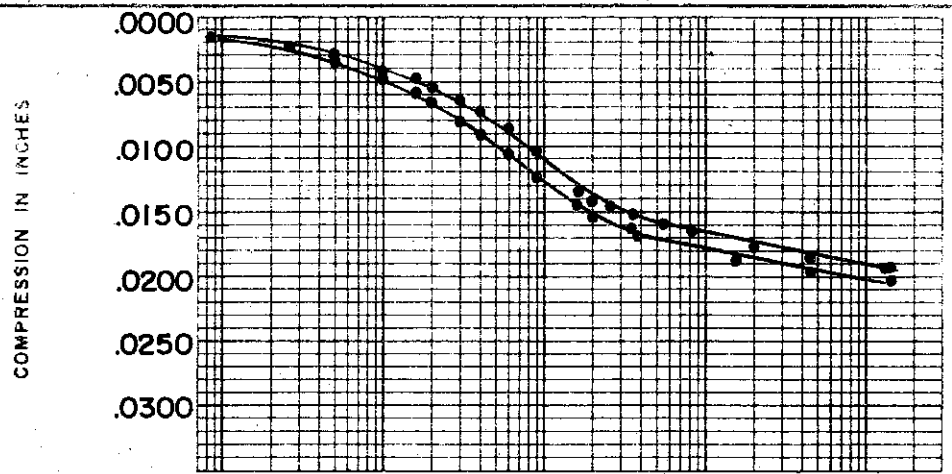
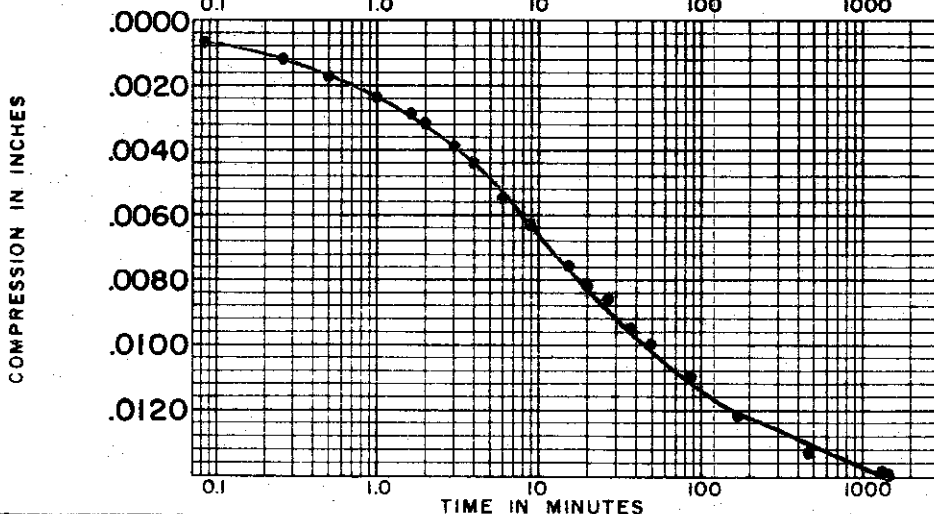
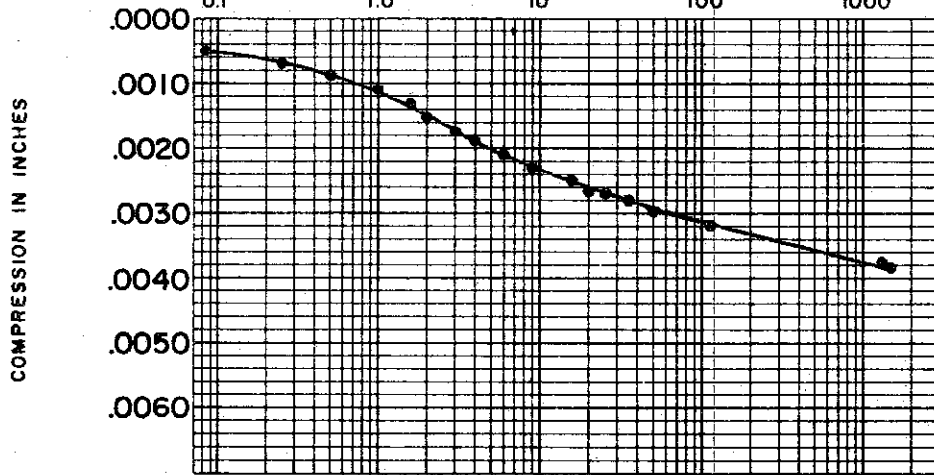
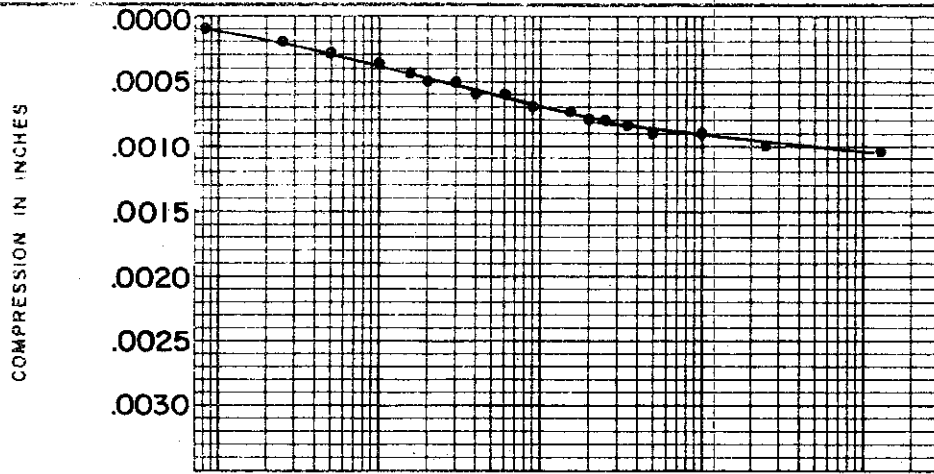
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.448"  
 INITIAL VOID RATIO (0.675) AS COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 136 TEST NO. C527.1  
 SAMPLE NO. ST6 DATE DEC. 1974  
 DEPTH 13.0' TO 14.6'

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**

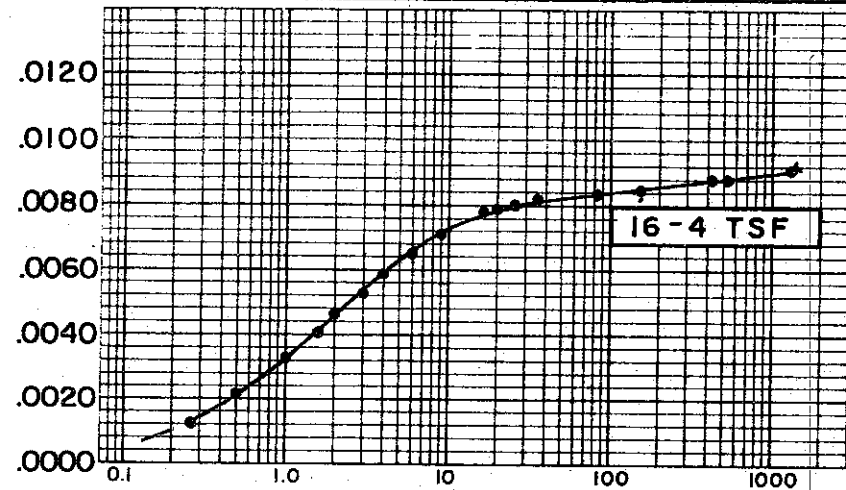
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

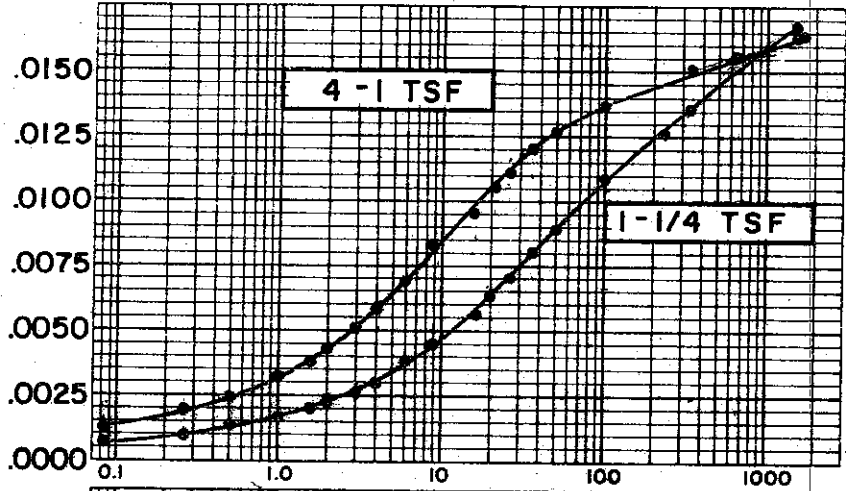
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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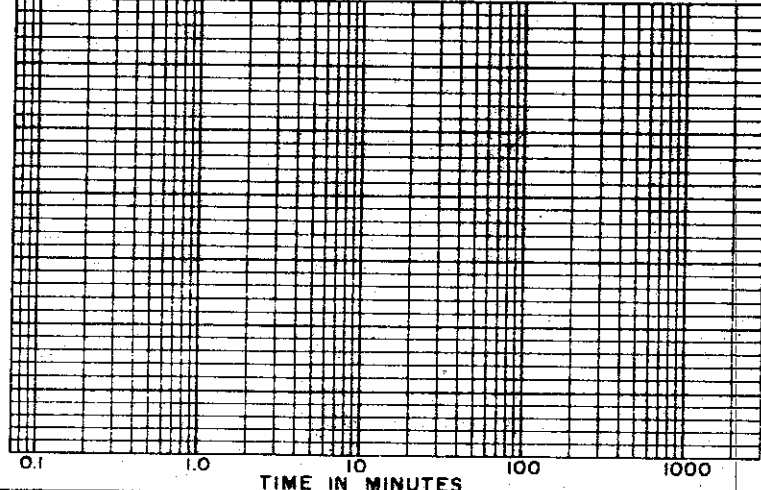
COMPRESSION IN INCHES



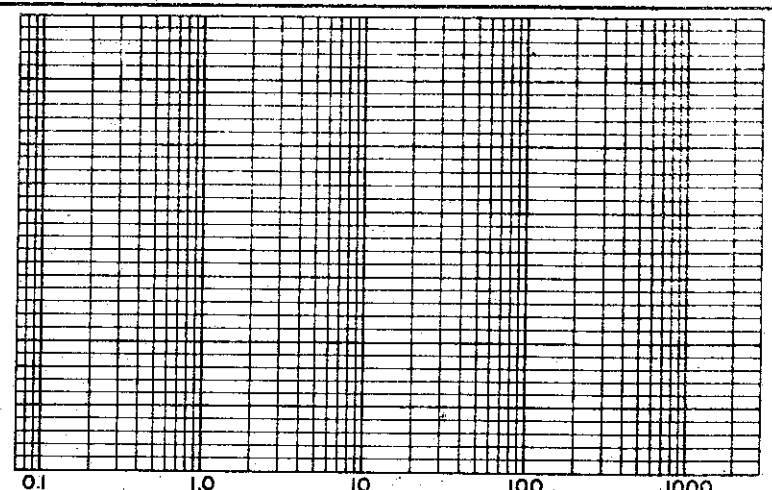
COMPRESSION IN INCHES



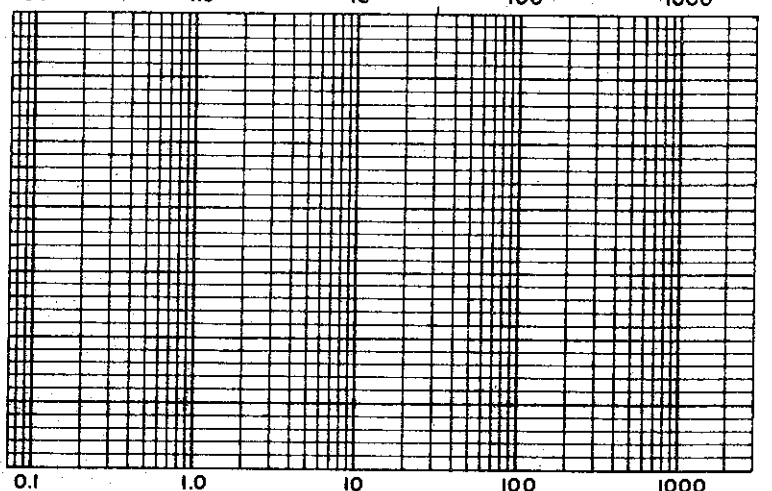
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

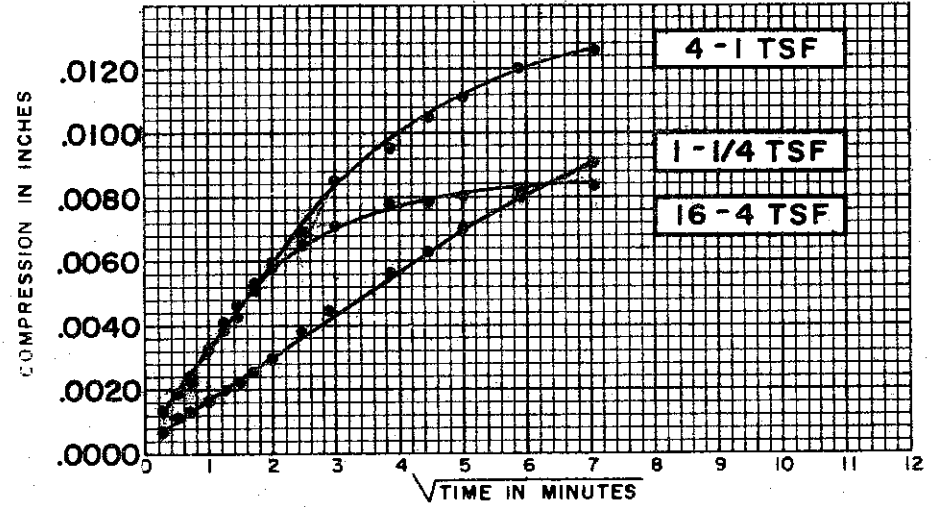
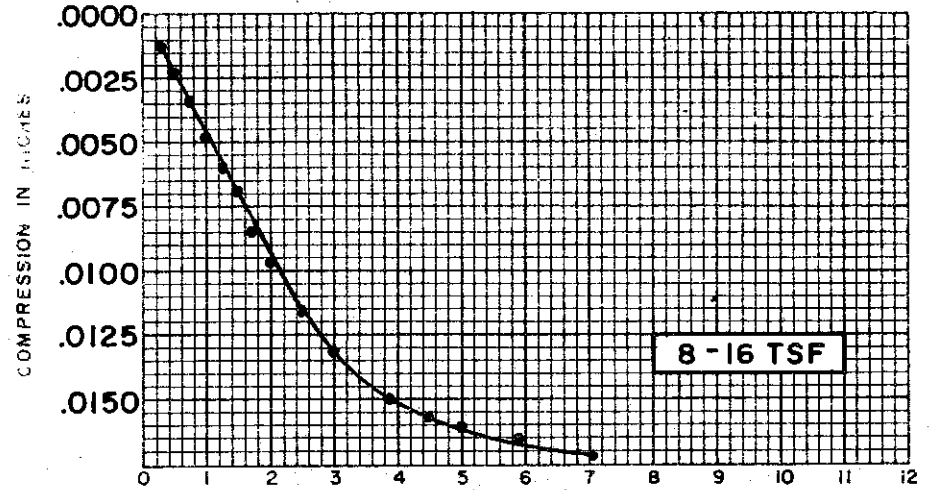
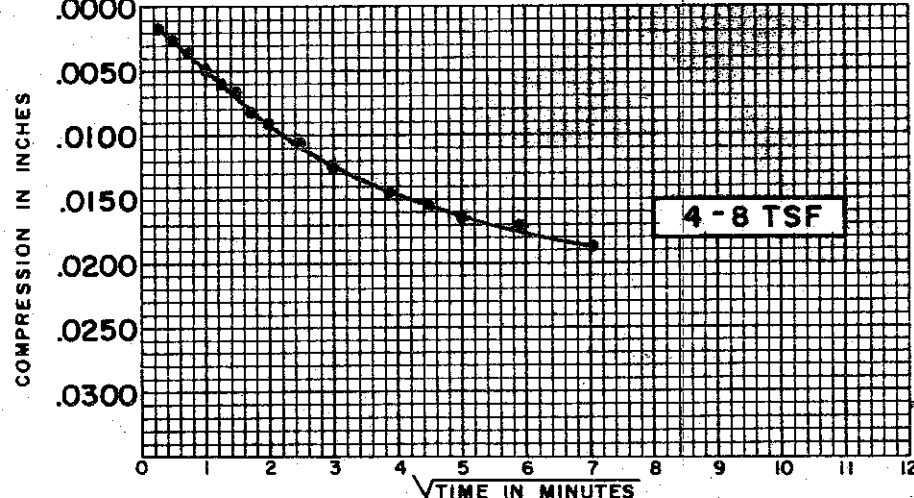
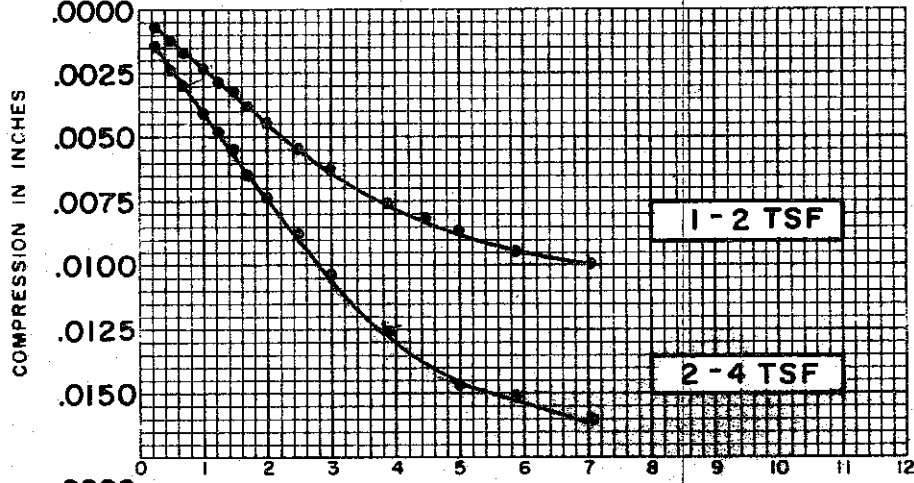
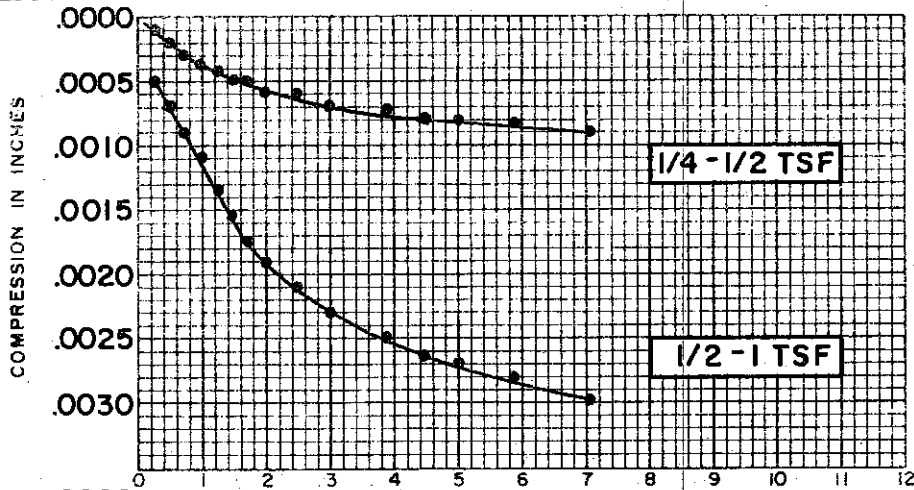
BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

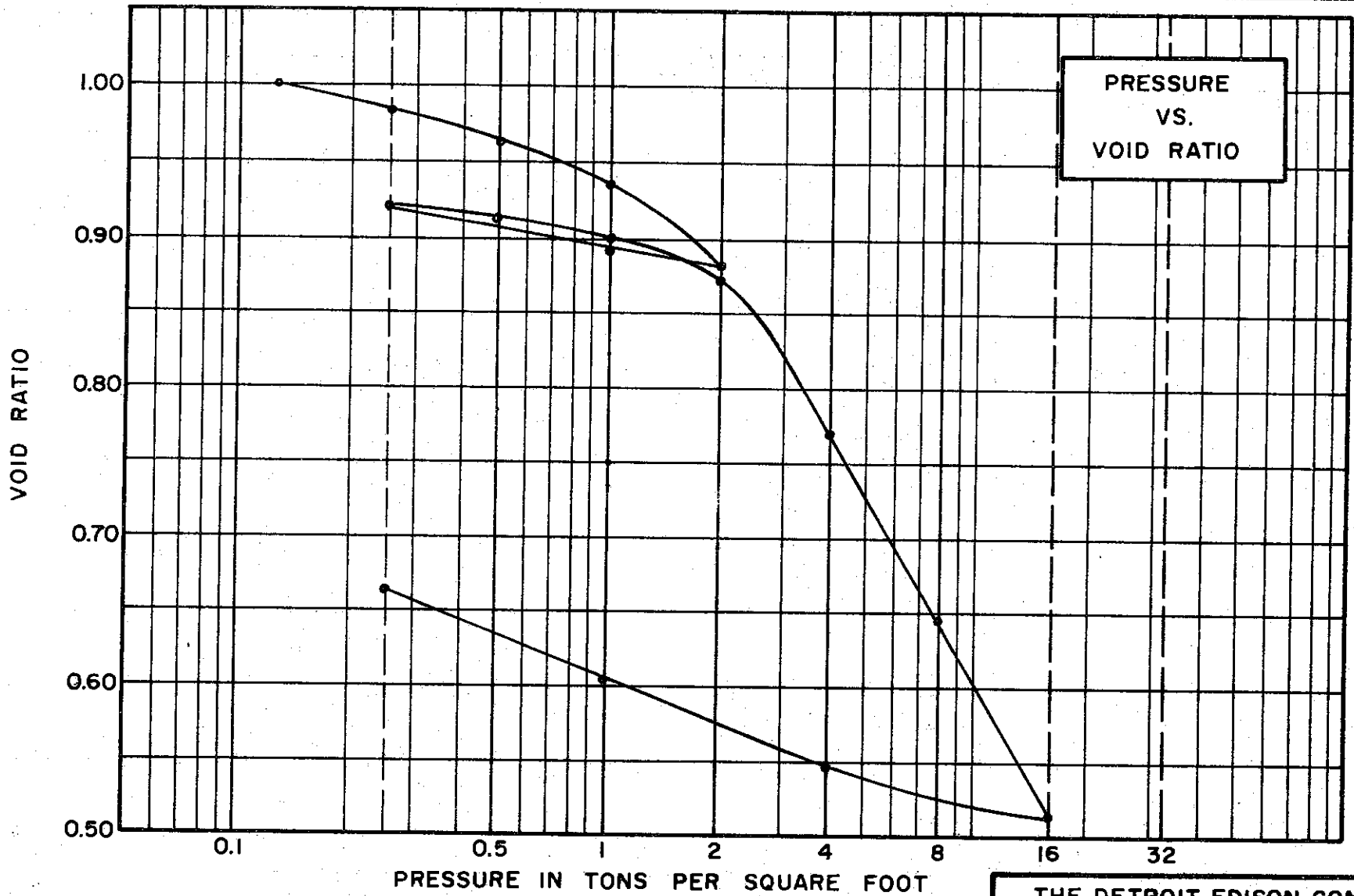


**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 BORING NO. 136  
 SAMPLE NO. ST 6  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 DEPTH 13.0' TO 14.6'  
 FINAL WATER CONTENT 21.3 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.2% FINAL 30.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.019

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

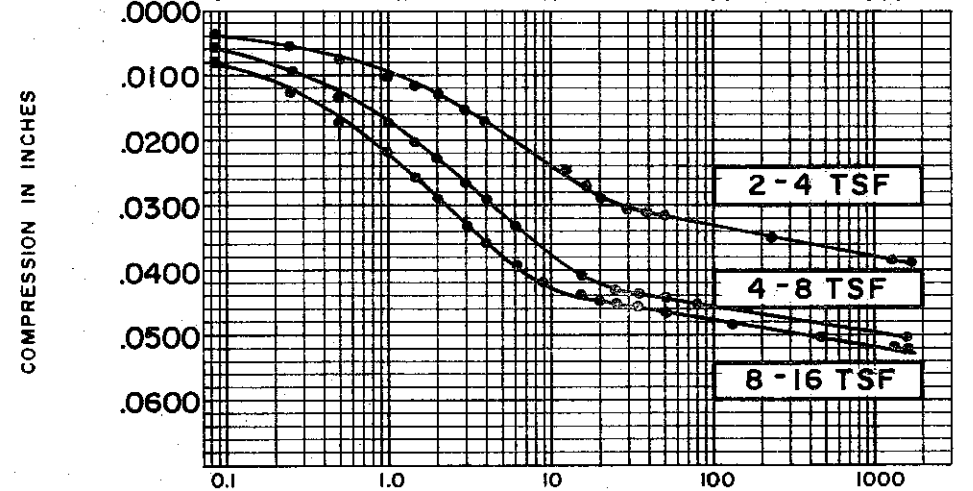
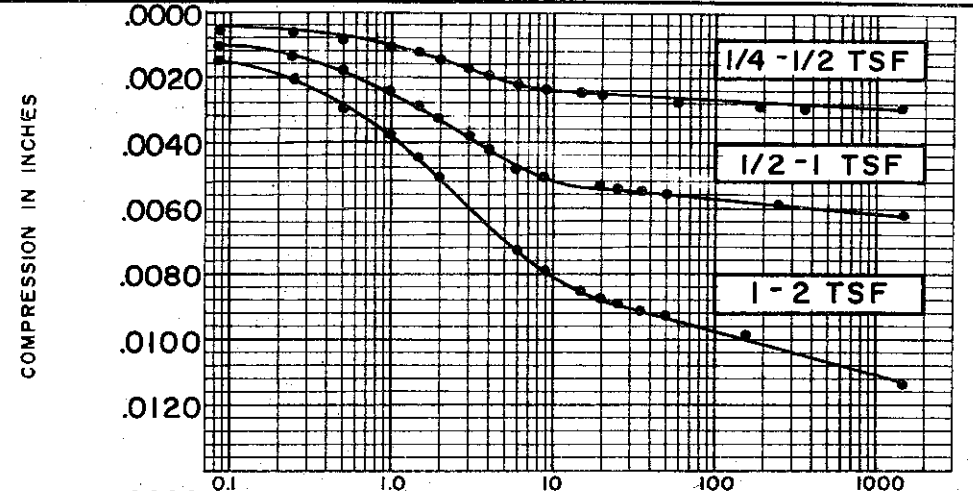
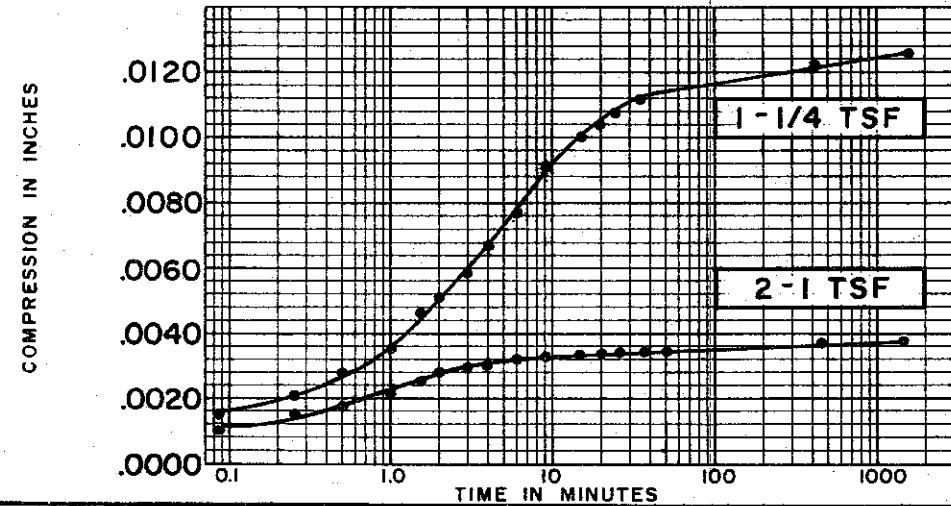
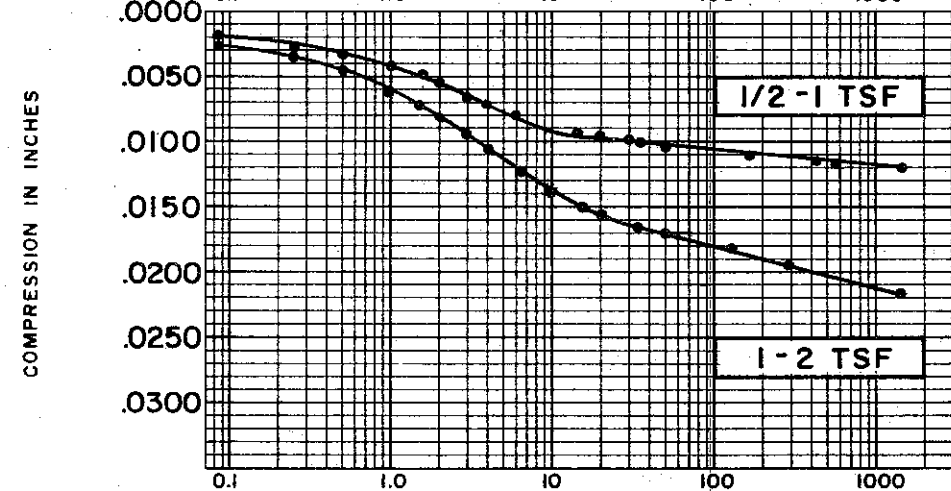
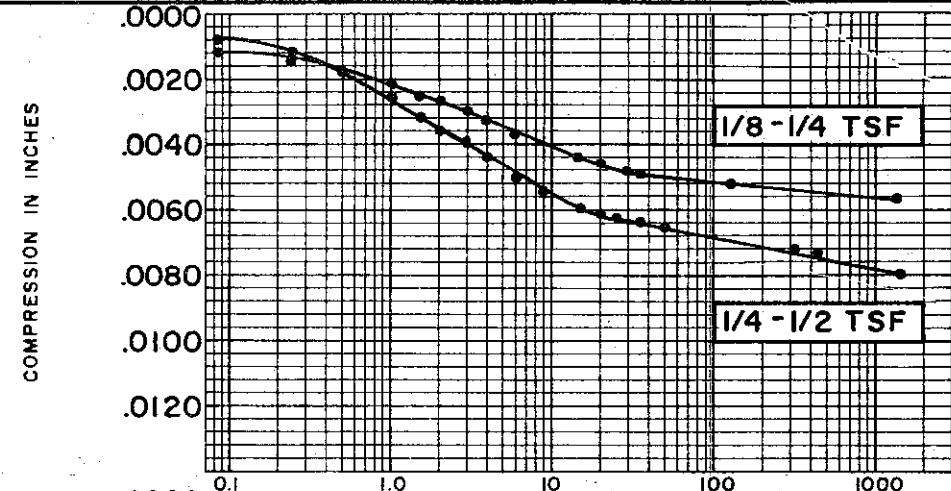
**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 142 TEST NO. C535.1

SAMPLE NO. 6 DATE NOV. 1974

DEPTH 20.1' TO 20.5'

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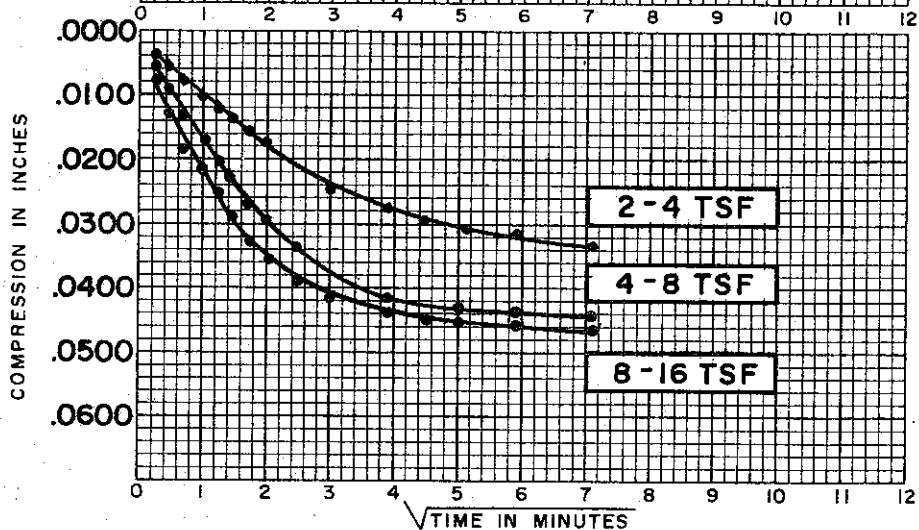
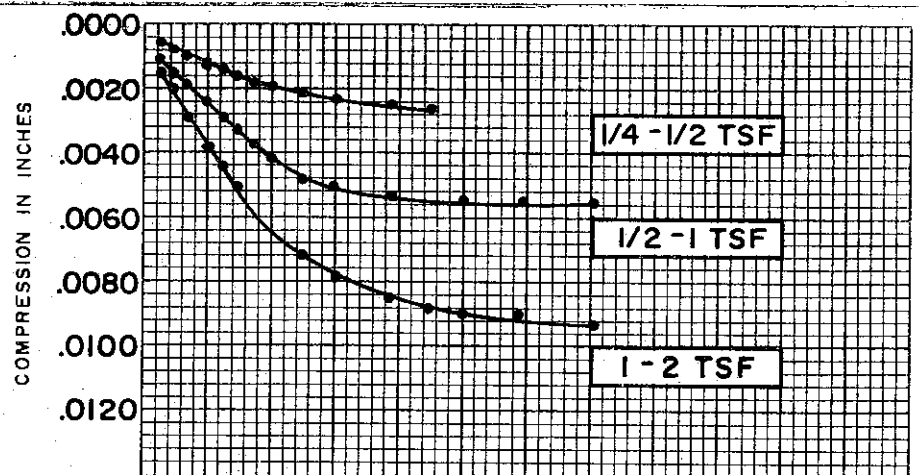
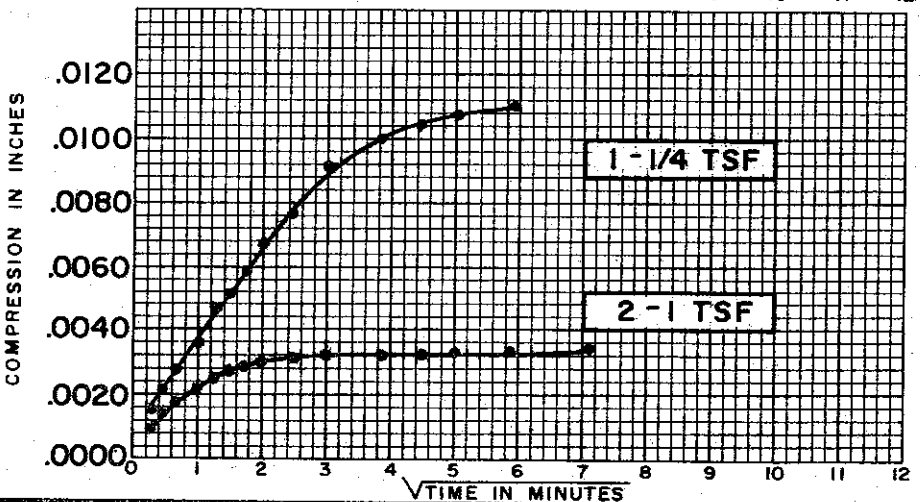
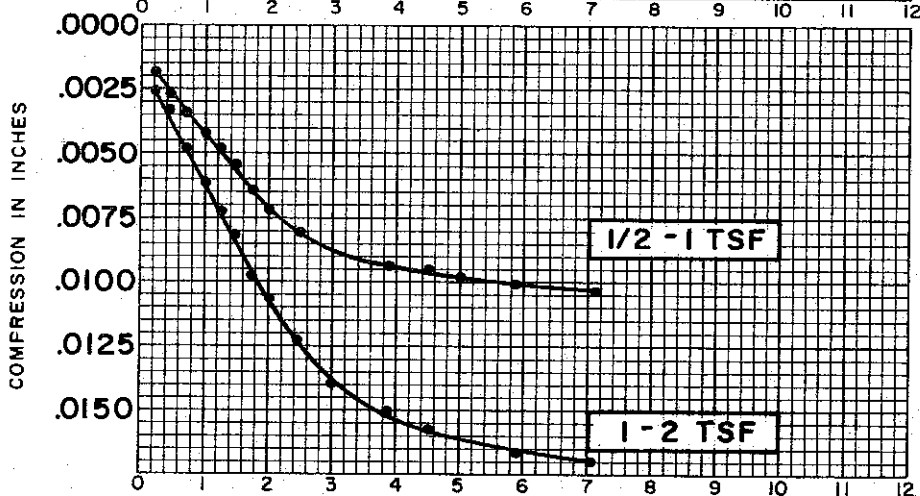
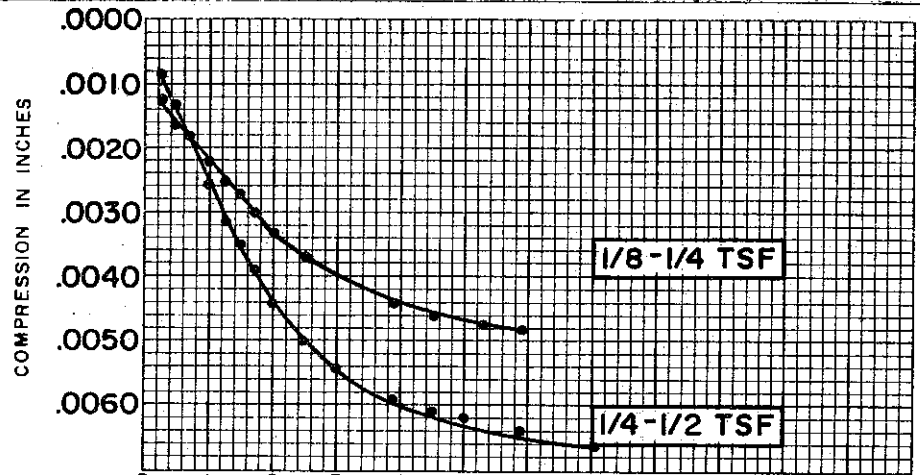
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2%  
 FINAL WATER CONTENT 30.5%

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2 %  
 FINAL WATER CONTENT 30.5 %

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

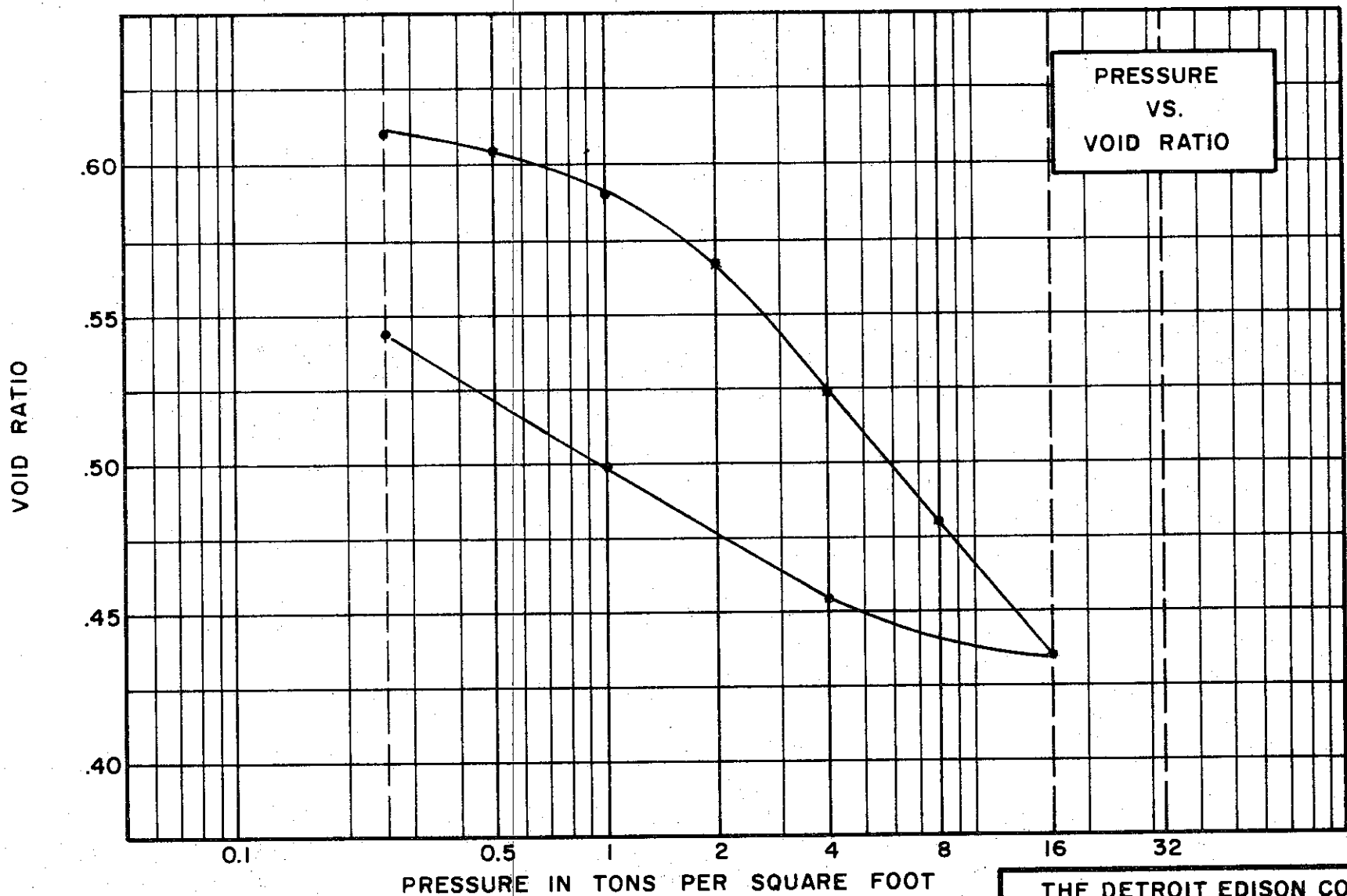
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 5.9% FINAL 22.2%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

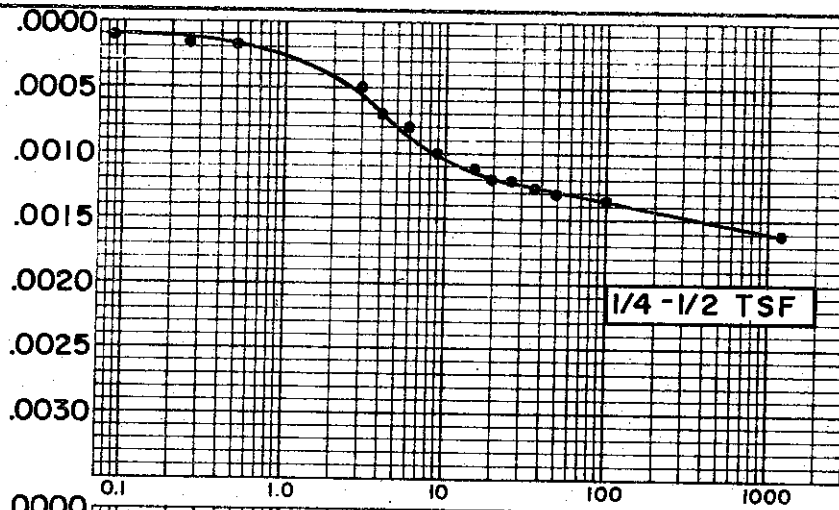
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.447"  
 INITIAL VOID RATIO (0.679) <sup>AS</sup> COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

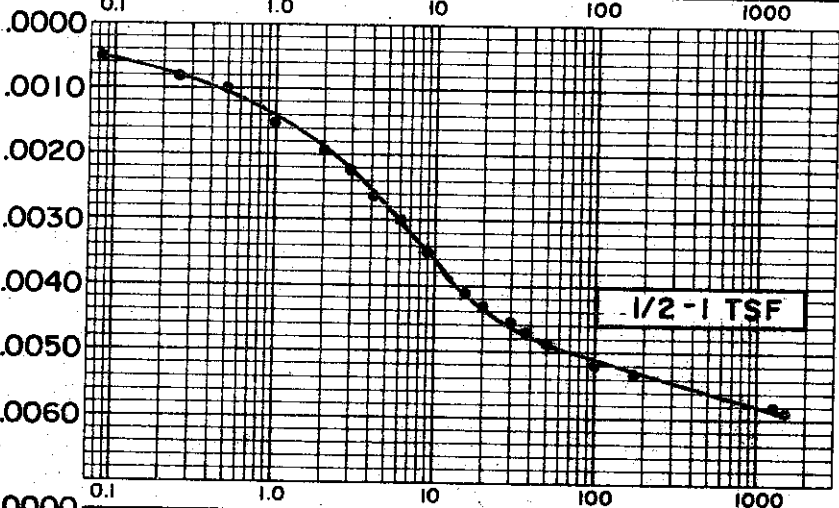
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 146 TEST NO. C542.1  
 SAMPLE NO. 7 DATE DEC. 1974  
 DEPTH 14.0' TO 16.1'

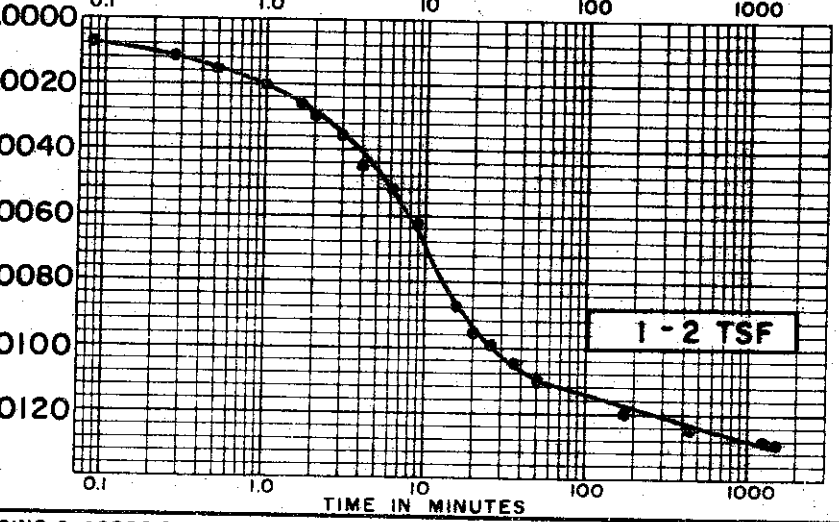
COMPRESSION IN INCHES



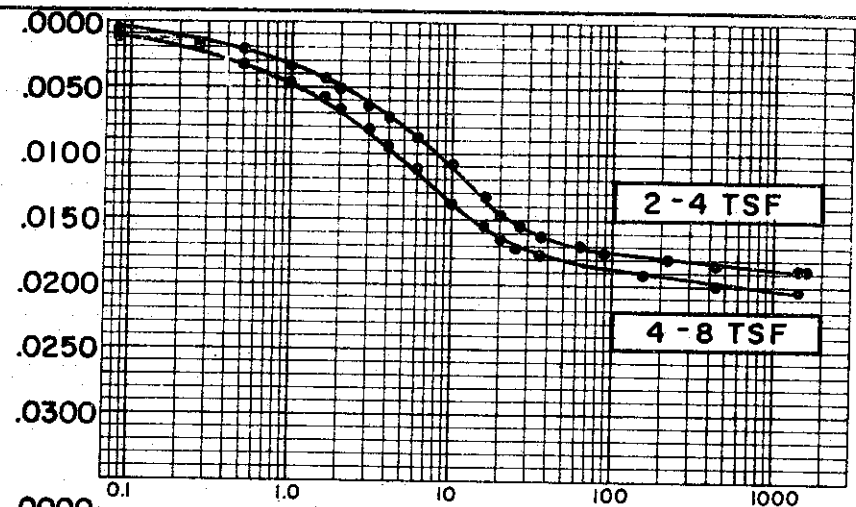
COMPRESSION IN INCHES



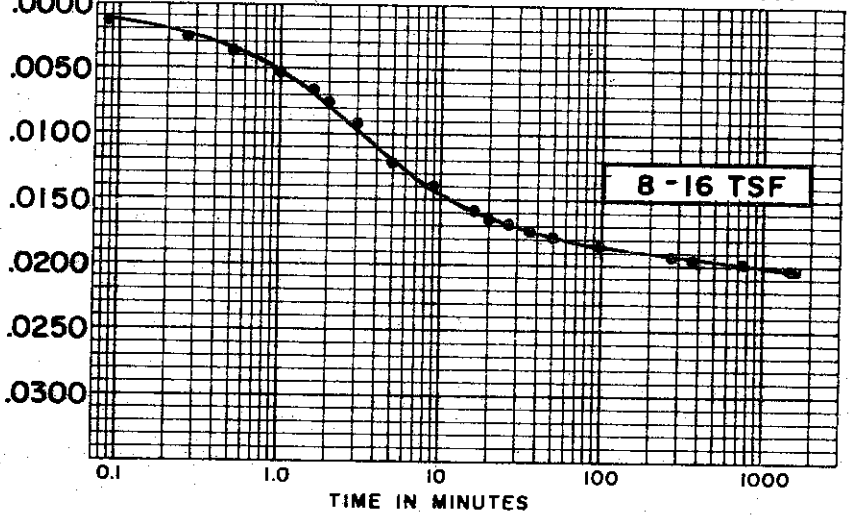
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9)%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

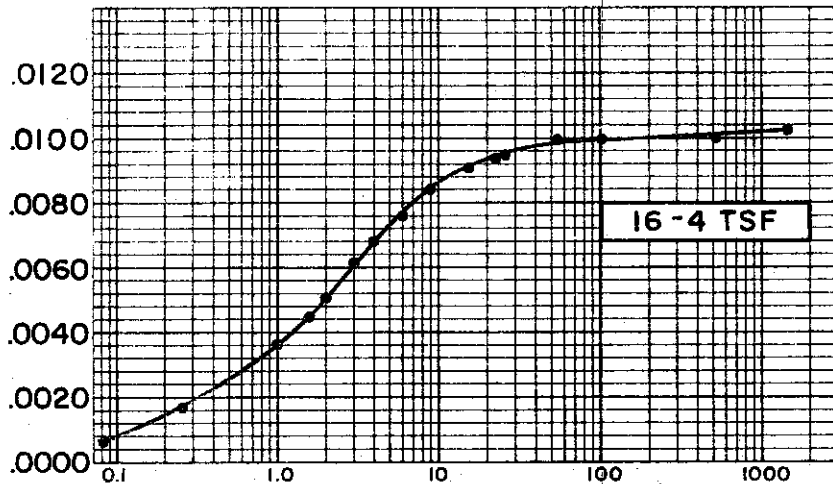
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

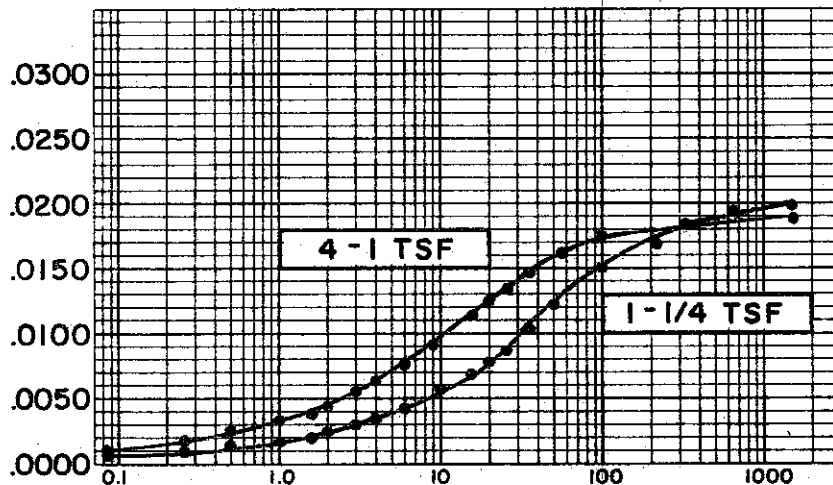
C-569

C-570

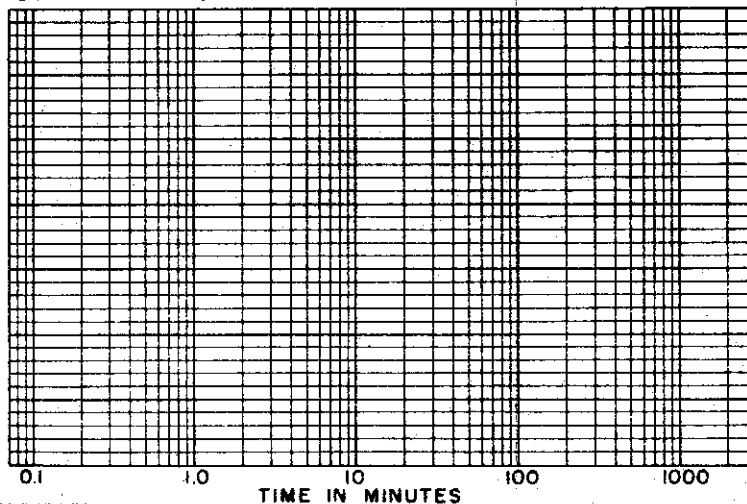
COMPRESSION IN INCHES



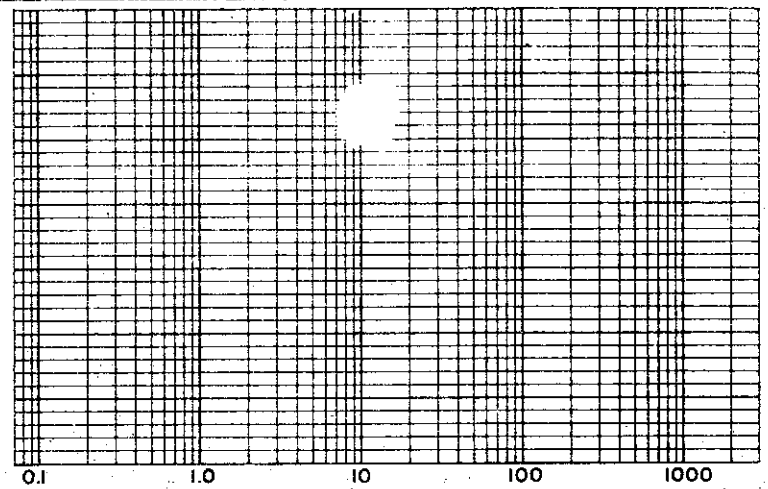
COMPRESSION IN INCHES



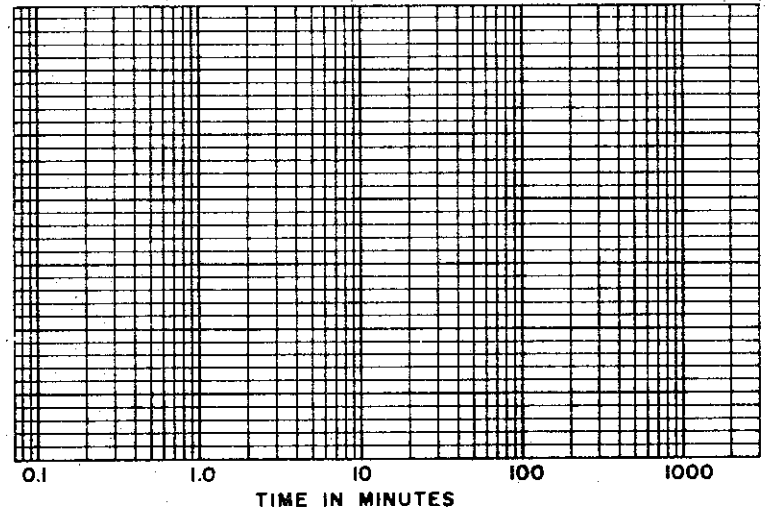
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.75  
INITIAL WATER CONTENT (15.9)%  
FINAL WATER CONTENT 22.2%

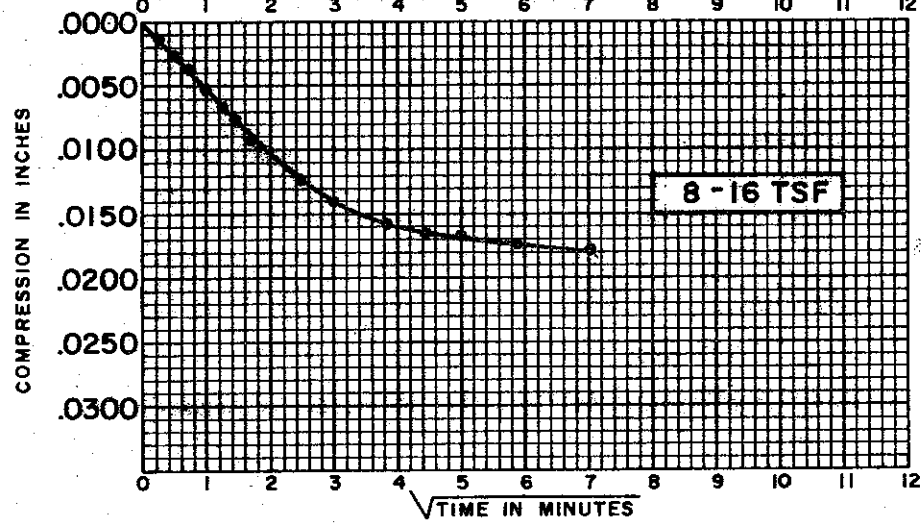
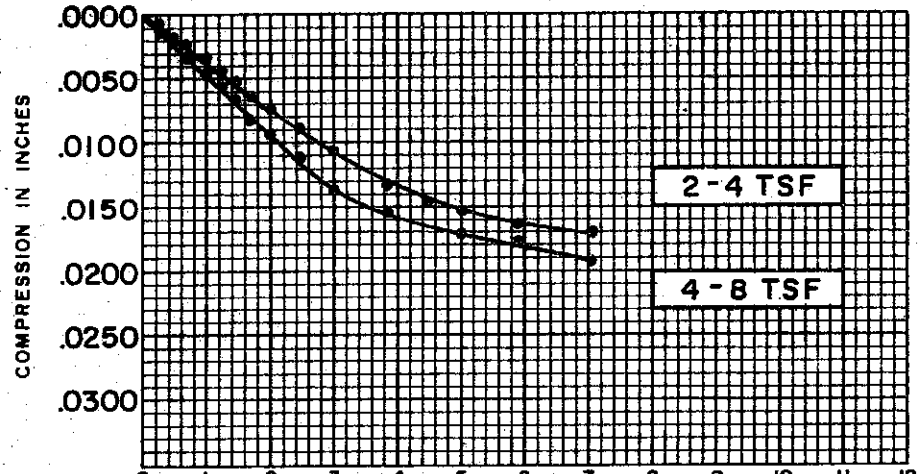
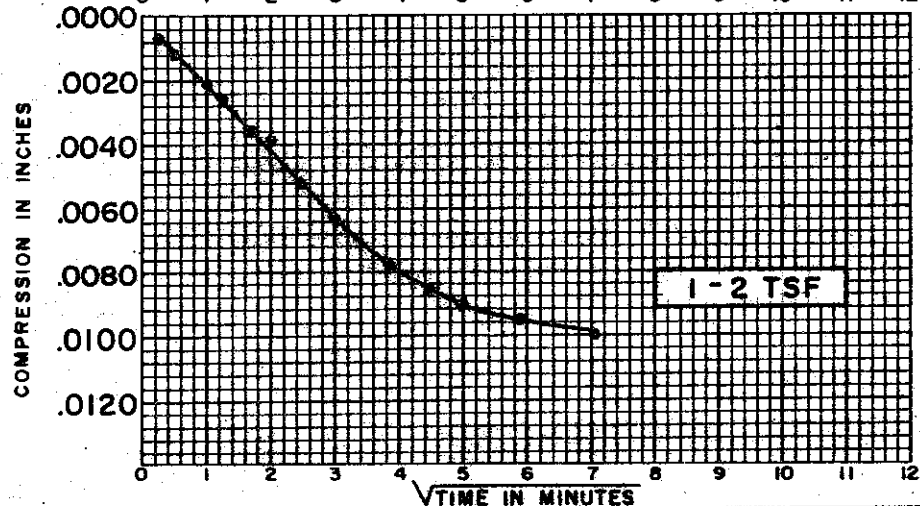
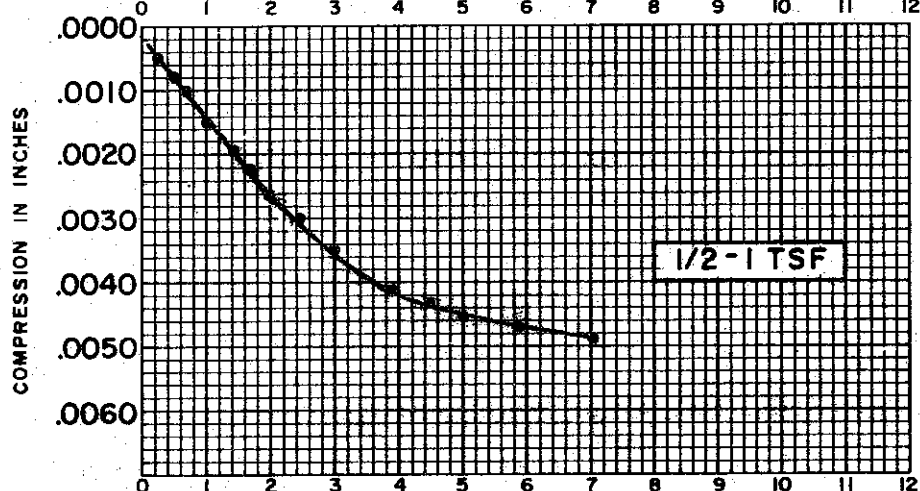
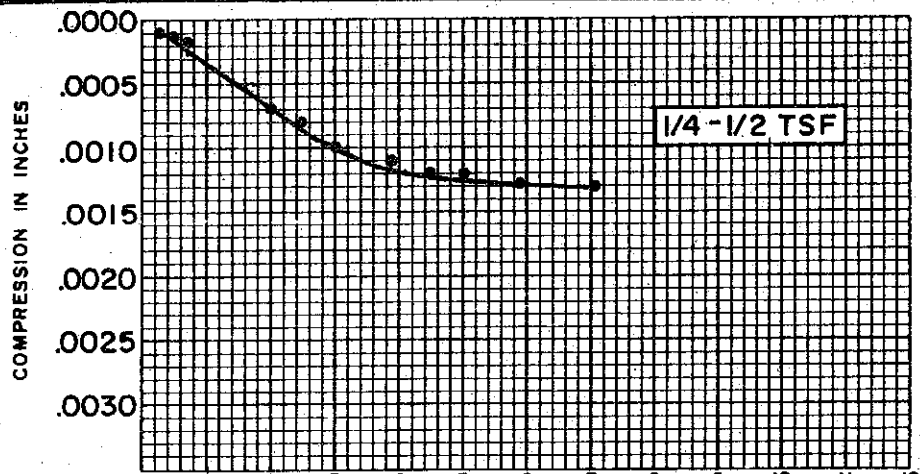
BORING NO. 146  
SAMPLE NO. ST 7  
DEPTH 14.0' TO 16.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9) %  
 FINAL WATER CONTENT 22.2 %

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

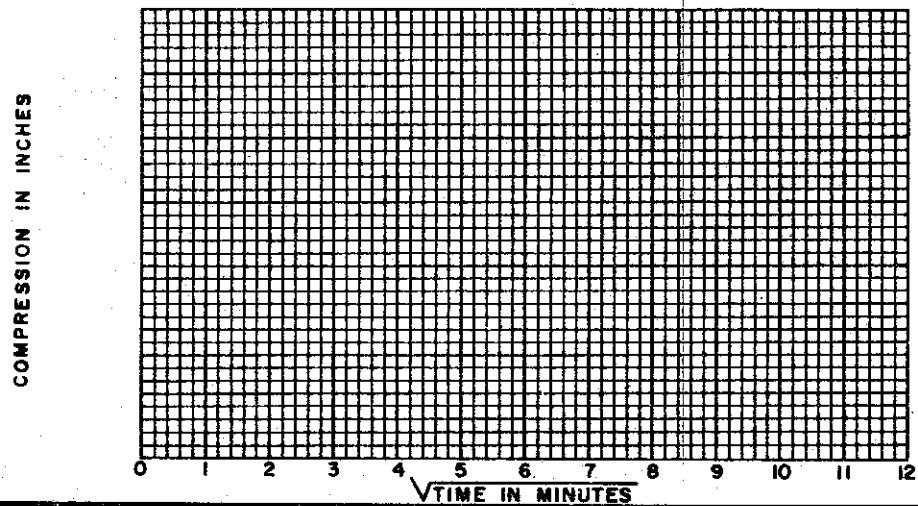
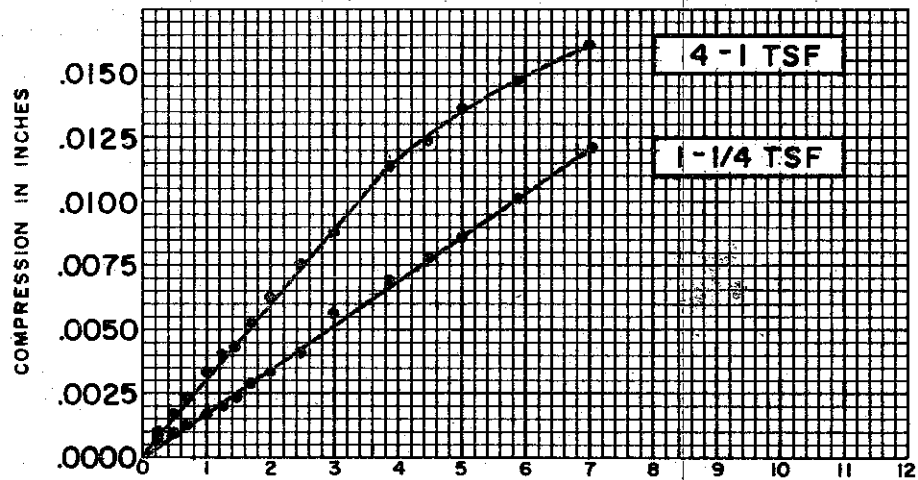
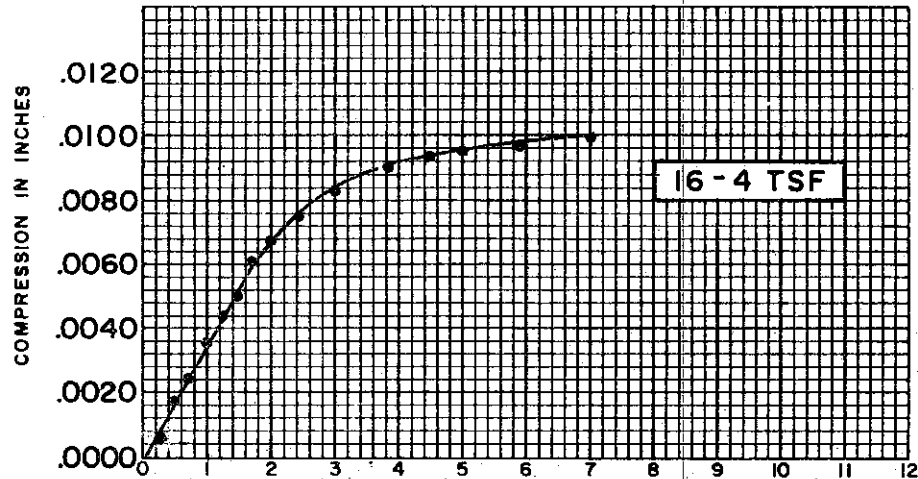
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

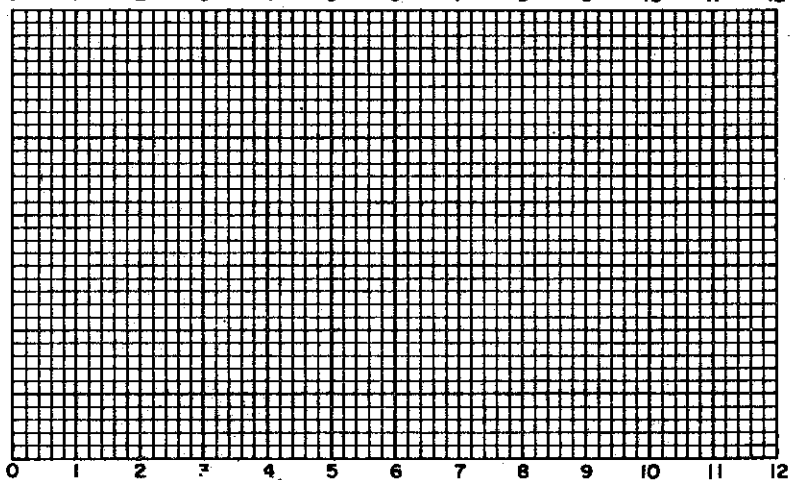
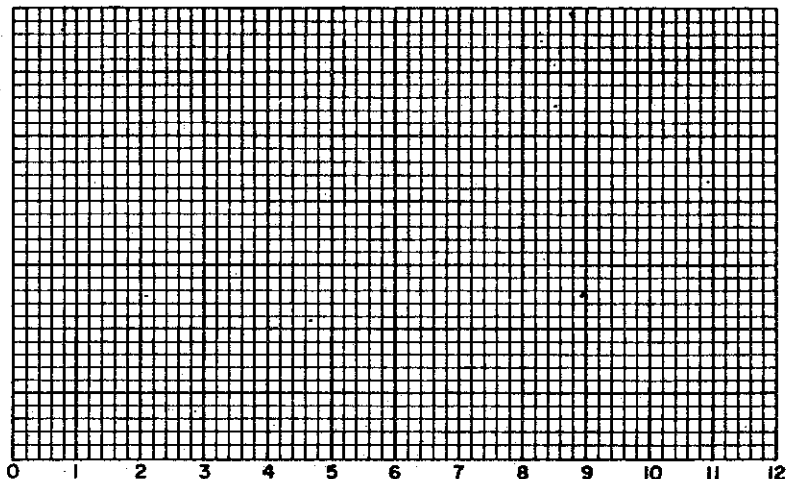
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 15.9%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

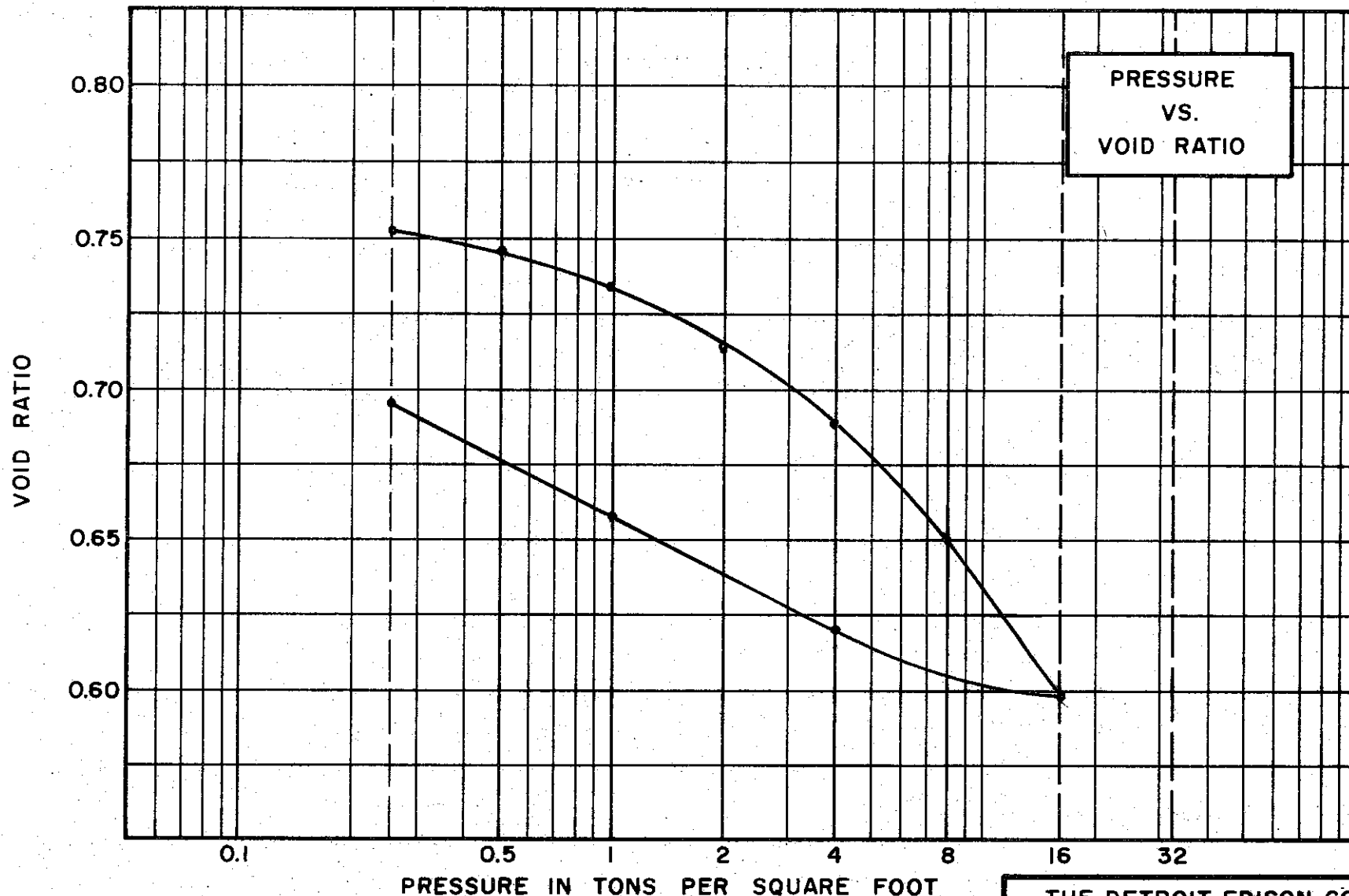
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.1% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

**TEST DATA**

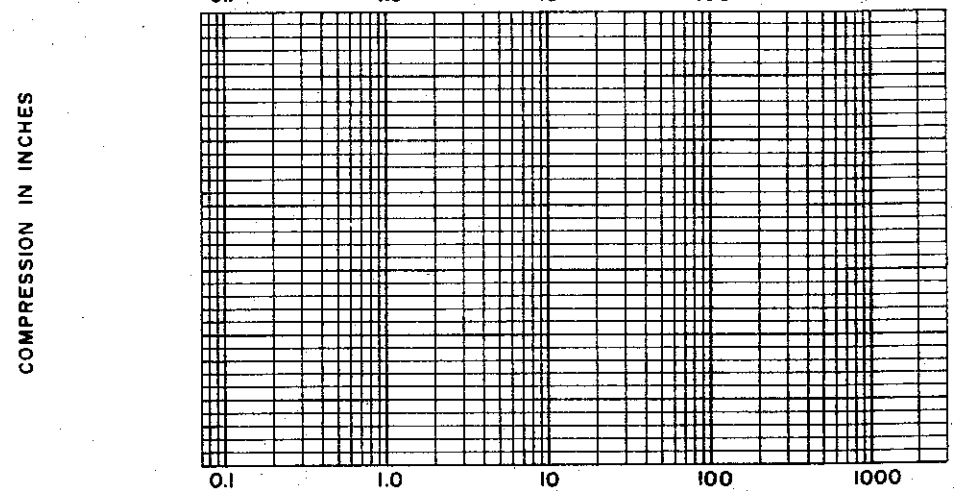
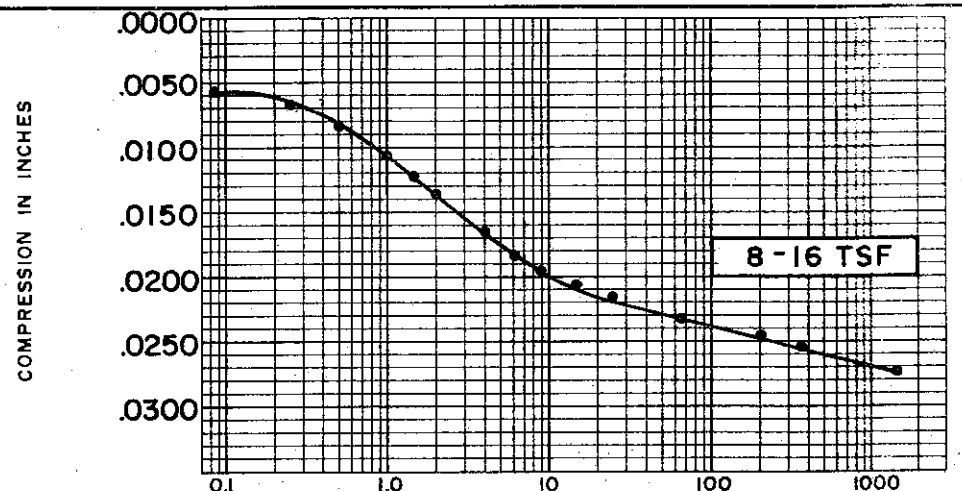
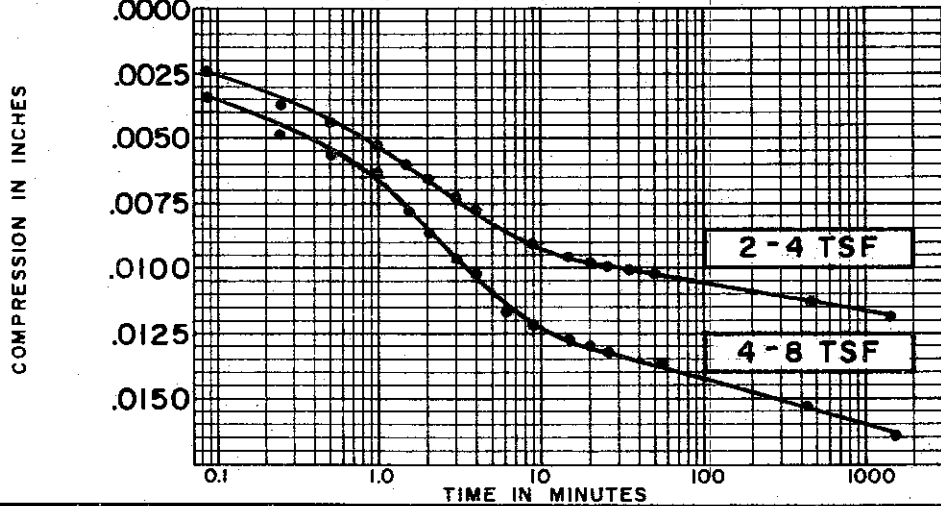
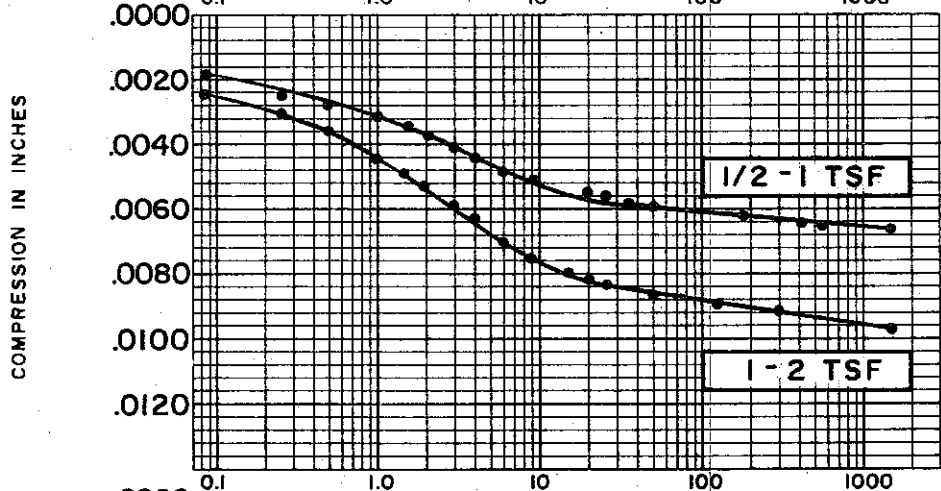
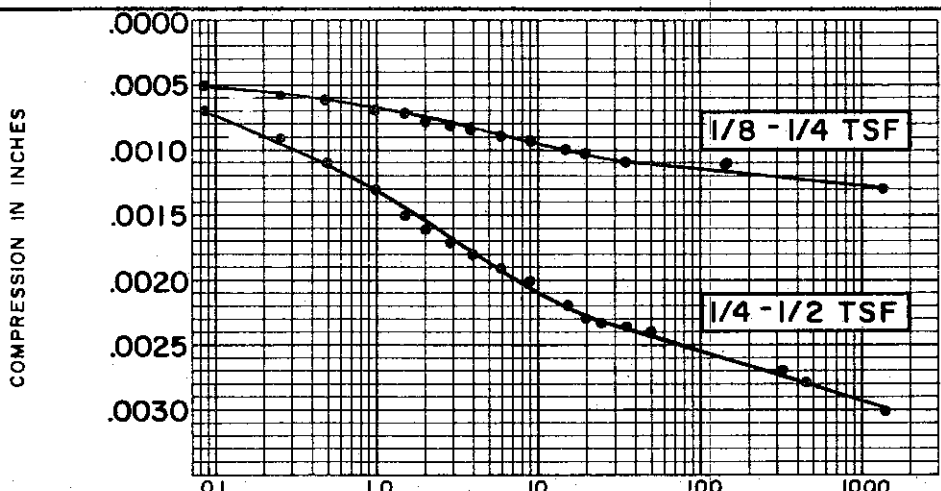
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.757

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 185 TEST NO. C552.1  
 SAMPLE NO. 3 DATE NOV. 1974  
 DEPTH 7.9' TO 8.1'

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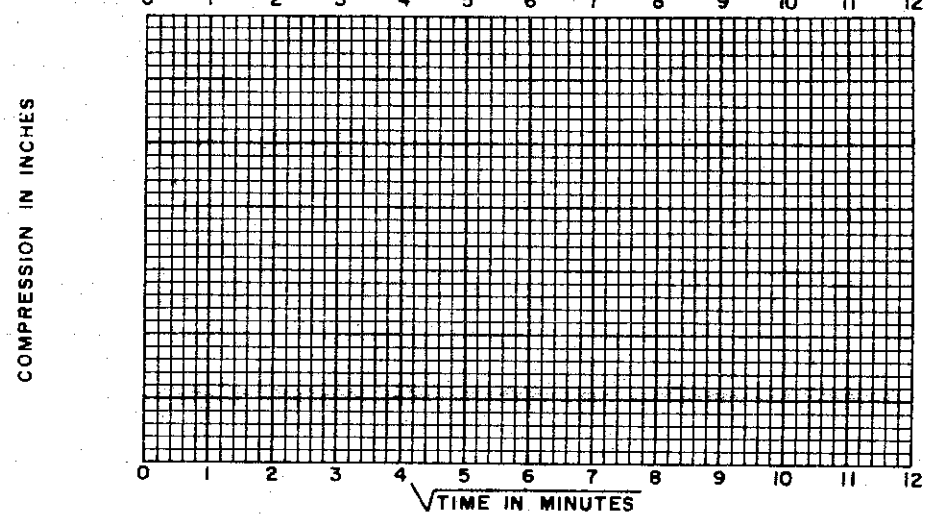
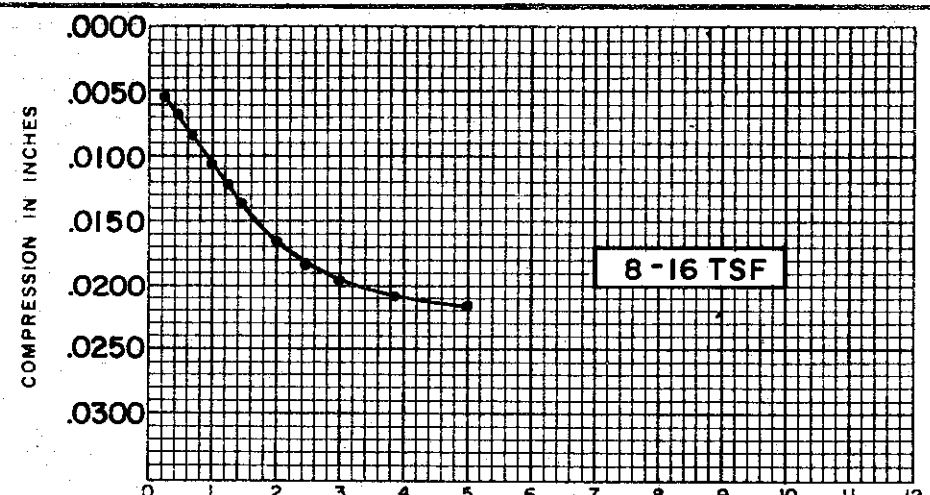
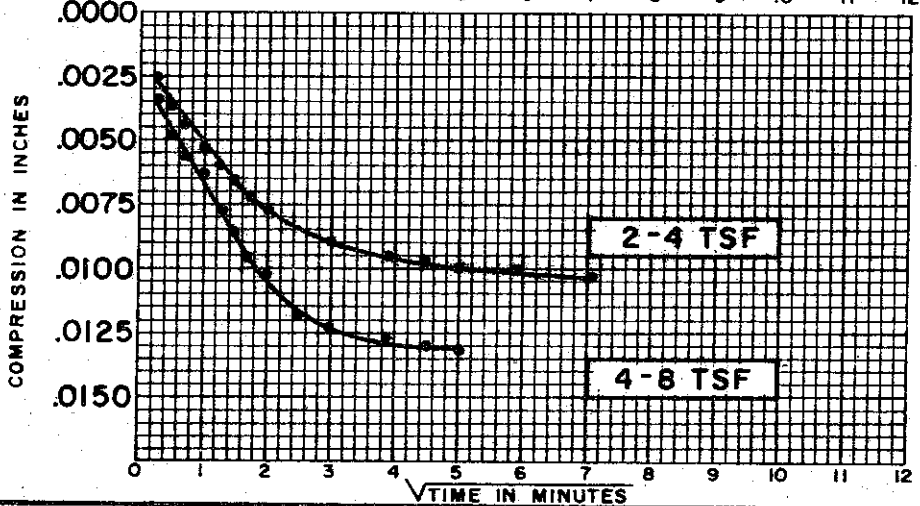
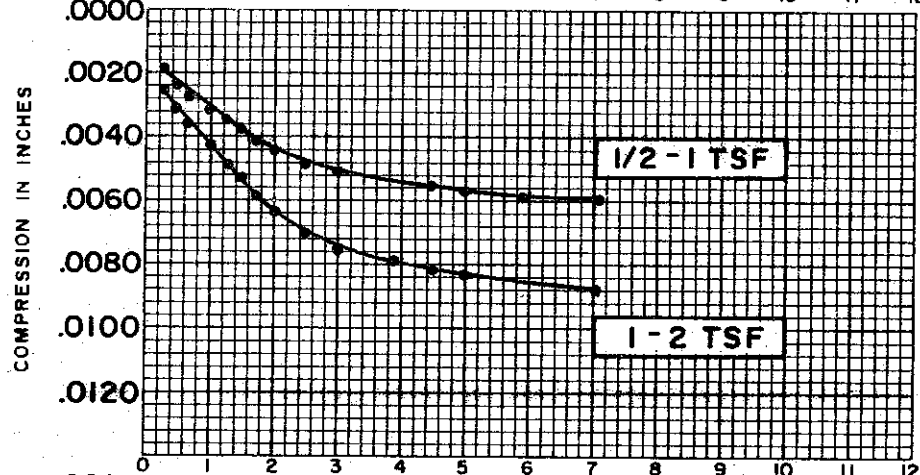
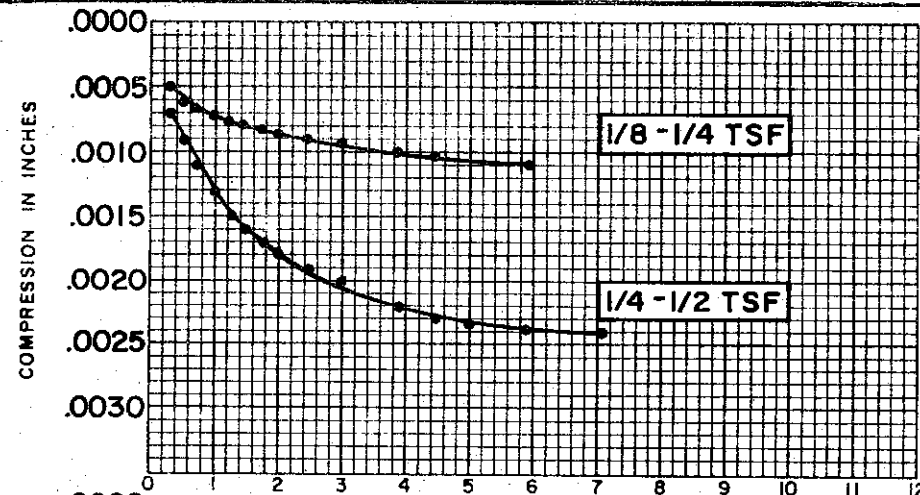


SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>
SPECIFIC GRAVITY	<u>2.72</u>
INITIAL WATER CONTENT	<u>29.1 %</u>
FINAL WATER CONTENT	<u>28.9 %</u>
BORING NO.	<u>185</u>
SAMPLE NO.	<u>3</u>
DEPTH	<u>7.9' TO 8.1'</u>

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.757</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





SOIL PROPERTIES		BORING NO.	185
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	3
SPECIFIC GRAVITY	2.72	DEPTH	7.9' TO 8.1'
INITIAL WATER CONTENT	29.1%		
FINAL WATER CONTENT	28.9%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.757

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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9-576

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	738	.11	.0012	300	.07	.0007
1/2 - 1	612	.13	.0014	180	.10	.0011
1 - 2	540	.14	.0015	138	.13	.0014
2 - 4	378	.19	.0020	78	.21	.0023
4 - 8	468	.15	.0016	108	.15	.0016
8 - 16	378	.17	.0018	108	.19	.0015
16 - 4	174	.36	.0039	60	.24	.0026
4 - 1	1164	.06	.0006	240	.07	.0007
1 - 1/4	3024	.02	.0002	900	.02	.0002

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' to 14.7'  
 TEST NO. C18.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .770 C<sub>c</sub> .19

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/8 - 1/4	960	.08	.0009	---	---	----
1/4 - 1/2	612	.12	.0013	180	.10	.0011
1/2 - 1	468	.16	.0017	156	.11	.0012
1 - 2	378	.19	.0020	120	.13	.0014
2 - 4	288	.22	.0024	90	.17	.0018
4 - 1	135	.46	.0050	54	.27	.0029
1 - 1/4	912	.07	.0008	216	.07	.0007
1/4 - 1/2	264	.25	.0027	102	.15	.0016
1/2 - 1	438	.15	.0016	84	.18	.0019
1 - 2	173	.37	.0040	48	.31	.0033
2 - 4	135	.46	.0050	36	.40	.0043
4 - 8	216	.27	.0029	48	.28	.0030
8 - 16	192	.27	.0029	42	.29	.0031
16 - 4	138	.36	.0039	33	.34	.0037
4 - 1	576	.09	.0010	150	.08	.0009
1 - 1/4	1380	.04	.0004	450	.03	.0003

BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' to 74.1'  
 TEST NO. C24.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CH)  
 INITIAL WATER CONTENT 36.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .935 C<sub>c</sub> .33

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	168	.11	.0012
1/2 - 1	408	.20	.0021	180	.10	.0011
1 - 1/4	1164	.07	.0007	312	.06	.0006
1/4 - 1/2	438	.18	.0019	120	.15	.0016
1/2 - 1	822	.09	.0010	180	.10	.0011
1 - 2	378	.20	.0022	132	.13	.0014
2 - 4	408	.18	.0019	120	.14	.0015
4 - 8	408	.17	.0018	102	.16	.0017
8 - 16	540	.11	.0012	120	.13	.0014
24 - 6	138	.42	.0046	45	.31	.0033
6 - 1/2	1218	.06	.0006	450	.04	.0004

BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8' to 11.0'  
TEST NO. C29.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 29.5 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 23 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.799 C<sub>c</sub> 0.23

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	614	.12	.0013	240	.07	.0008
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	614	.11	.0012	225	.07	.0008
2 - 4	778	.08	.0009	210	.07	.0007
4 - 8	614	.09	.0010	162	.08	.0009
8 - 16	406	.12	.0013	96	.12	.0013
16 - 4	194	.24	.0026	54	.20	.0022
4 - 1	1110	.05	.0005	240	.05	.0005
1 - 1/4	3024	.02	.0002	720	.02	.0002

BORING NO. 41  
SAMPLE NO. 7  
DEPTH 21.0' to 21.1'  
TEST NO. C30.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 38.1 %  
ATTERBERG LIMITS  
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 1.055 C<sub>c</sub> 0.34

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	1500	.05	.0005	420	.04	.0004	SAMPLE NO. <u>13</u>
1/2 - 1	1056	.06	.0006	300	.05	.0005	DEPTH <u>53.0' to 53.2'</u>
1 - 2	738	.08	.0009	240	.06	.0006	TEST NO. <u>C33.1</u>
2 - 4	696	.07	.0008	228	.06	.0006	<b>SOIL PROPERTIES</b>
4 - 8	540	.09	.0010	150	.07	.0008	SOIL DESCRIPTION: _____
8 - 16	504	.08	.0009	108	.09	.0010	<u>Silty CLAY (CL-CH)</u>
24 - 6	378	.10	.0011	90	.10	.0011	INITIAL WATER CONTENT <u>46.5 %</u>
6 - 2	912	.05	.0005	192	.05	.0005	ATTERBERG LIMITS
2 - 1/2	1500	.03	.0003	480	.02	.0002	LIQUID LIMIT <u>52 %</u> PLASTIC LIMIT <u>25 %</u>
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.75</u> IN <u>1.905</u> CM.
							INITIAL VOID RATIO <u>1.235</u> C <sub>c</sub> <u>0.35</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/8 - 1/4	1500	.06	.0006	360	.05	.0005	SAMPLE NO. <u>17</u>
1/4 - 1/2	696	.11	.0012	240	.07	.0008	DEPTH <u>73.3'</u>
1/2 - 1	696	.10	.0011	180	.09	.0010	TEST NO. <u>C35.1</u>
1 - 2	468	.15	.0016	168	.10	.0011	<b>SOIL PROPERTIES</b>
2 - 4	318	.21	.0023	120	.13	.0014	SOIL DESCRIPTION: <u>Silty</u>
4 - 1	240	.27	.0029	45	.33	.0036	<u>CLAY, sandy (CL)</u>
1 - 1/4	1008	.07	.0007	228	.07	.0007	INITIAL WATER CONTENT <u>26.7 %</u>
1/4 - 1/2	264	.26	.0028	60	.26	.0028	ATTERBERG LIMITS
1/2 - 1	504	.13	.0014	102	.15	.0016	LIQUID LIMIT <u>25 %</u> PLASTIC LIMIT <u>15 %</u>
1 - 2	174	.38	.0041	78	.20	.0021	<b>TEST DATA</b>
2 - 4	216	.30	.0032	54	.28	.0030	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
4 - 8	348	.18	.0019	96	.15	.0016	INITIAL VOID RATIO <u>.697</u> C <sub>c</sub> <u>0.21</u>
8 - 16	348	.17	.0018	72	.19	.0020	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
16 - 4	138	.40	.0043	36	.35	.0038	
4 - 1	438	.13	.0014	54	.24	.0026	
1 - 1/4	2382	.03	.0003	660	.02	.0002	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.13	.0014	210	.07	.0008
1/2 - 1	408	.17	.0018	132	.12	.0013
1 - 2	378	.18	.0019	114	.13	.0014
2 - 4	408	.16	.0017	108	.13	.0014
4 - 8	408	.15	.0016	114	.12	.0013
8 - 16	408	.14	.0015	96	.13	.0014
24 - 6	216	.24	.0026	54	.22	.0024
6 - 2	822	.07	.0007	168	.07	.0008
2 - 1/2	1686	.04	.0004	348	.04	.0004

BORING NO. 41  
SAMPLE NO. 25  
DEPTH 113'  
TEST NO. C38.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 24.2 %  
ATTERBERG LIMITS  
LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.642 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	240	.33	.0036	108	.17	.0018
1/2 - 1	216	.36	.0039	120	.15	.0016
1 - 2	318	.24	.0026	90	.20	.0021
2 - 4	240	.32	.0034	108	.16	.0017
4 - 8	240	.31	.0033	108	.16	.0017
8 - 4	174	.41	.0044	54	.31	.0033
4 - 1	780	.09	.0010	276	.07	.0007
1 - 1/4	1380	.06	.0006	276	.07	.0007
1/4 - 1/2	348	.22	.0024	150	.12	.0013
1/2 - 1	540	.14	.0015	174	.10	.0011
1 - 2	780	.09	.0010	150	.11	.0012
2 - 4	654	.11	.0012	108	.16	.0017
4 - 8	468	.15	.0016	150	.16	.0012
8 - 16	378	.19	.0020	120	.13	.0014
24 - 6	540	.12	.0013	150	.10	.0011
6 - 2	960	.07	.0008	540	.03	.0003
2 - 1/2	1272	.06	.0006	960	.02	.0002

BORING NO. 41  
SAMPLE NO. 29  
DEPTH 130.9' to 131.1'  
TEST NO. C40.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Clayey SAND, gravelly (GC-SC)  
INITIAL WATER CONTENT 11.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.370 C<sub>c</sub> 0.09

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>48</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	438	.18	.0019	180	.10	.0011	DEPTH <u>39.2' to 39.4'</u>
1/2 - 1	540	.14	.0015	210	.08	.0009	TEST NO. <u>C202.1</u>
1 - 2	654	.11	.0012	156	.10	.0011	<b>SOIL PROPERTIES</b>
2 - 1/2	504	.13	.0014	114	.14	.0015	
1/2 - 1/4	1500	.05	.0005	390	.05	.0005	<u>Silty CLAY (CL-CH)</u>
1/4 - 1/2	576	.13	.0014	138	.12	.0013	INITIAL WATER CONTENT <u>38.8 %</u>
1/2 - 1	468	.15	.0016	138	.12	.0013	ATTERBERG LIMITS
1 - 2	504	.14	.0015	108	.15	.0016	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>24 %</u>
2 - 4	696	.09	.0010	300	.05	.0005	<b>TEST DATA</b>
4 - 8	654	.09	.0010	174	.08	.0009	
8 - 16	504	.10	.0011	144	.08	.0009	INITIAL VOID RATIO <u>1.027</u> C <sub>c</sub> <u>0.33</u>
16 - 2	438	.12	.0013	108	.11	.0012	
2 - 1/2	2232	.03	.0003	540	.11	.0002	
1/2 - 1/8	4440	.01	.0001	1020	.01	.0001	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>49</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	470	.17	.0018	240	.07	.0008	DEPTH <u>13.7' to 14.0'</u>
1/2 - 1	540	.14	.0015	162	.11	.0012	TEST NO. <u>C133.1</u>
1 - 1/4	738	.10	.0011	210	.08	.0009	<b>SOIL PROPERTIES</b>
1/4 - 1/2	264	.29	.0031	126	.14	.0015	
1/2 - 1	540	.14	.0015	120	.15	.0016	<u>Silty CLAY (CL-CH)</u>
1 - 2	540	.14	.0015	156	.11	.0012	INITIAL WATER CONTENT <u>33.3 %</u>
2 - 4	540	.13	.0014	156	.10	.0011	ATTERBERG LIMITS
4 - 8	504	.13	.0014	126	.12	.0013	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>23 %</u>
8 - 16	318	.19	.0020	108	.13	.0014	<b>TEST DATA</b>
16 - 4	318	.18	.0019	66	.20	.0021	
4 - 1	1320	.05	.0005	330	.05	.0005	INITIAL VOID RATIO <u>0.863</u> C <sub>c</sub> <u>0.26</u>
1 - 1/4	4620	.01	.0001	1140	.01	.0001	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							SOIL PROPERTIES SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							TEST DATA INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 49 SAMPLE NO. _____ 11 DEPTH _____ 93.8' to 94.0' TEST NO. _____ C141.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	504	.13	.0014	174	.09	.0010	SOIL PROPERTIES SOIL DESCRIPTION: _____ Silty CLAY (CL)
1/2 - 1	504	.13	.0014	132	.11	.0012	INITIAL WATER CONTENT 28.6%
1 - 2	348	.19	.0020	96	.16	.0017	ATTERBERG LIMITS
2 - 4	192	.32	.0034	57	.25	.0027	LIQUID LIMIT 37% PLASTIC LIMIT 22%
4 - 1	264	.22	.0024	48	.29	.0031	TEST DATA
1 - 1/4	780	.07	.0008	168	.08	.0009	INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.
1/4 - 1/2	288	.22	.0023	66	.22	.0023	INITIAL VOID RATIO 0.701 C <sub>c</sub> 0.20
1/2 - 1	318	.20	.0021	84	.17	.0018	
1 - 2	264	.23	.0025	84	.17	.0018	
2 - 4	240	.25	.0027	60	.23	.0025	
4 - 8	264	.22	.0023	72	.19	.0020	
8 - 16	264	.20	.0021	60	.21	.0022	
16 - 4	156	.33	.0035	39	.30	.0032	
4 - 1	738	.07	.0008	120	.10	.0011	
1 - 1/4	2016	.03	.0003	420	.03	.0003	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/16 - 1/4	438	.18	.0019	174	.10	.0011
1/4 - 1/2	540	.14	.0015	138	.13	.0014
1/2 - 1	438	.18	.0019	84	.20	.0022
1 - 2	438	.17	.0018	84	.20	.0022
2 - 1	264	.27	.0029	60	.28	.0030
1 - 1/2	576	.13	.0014	156	.11	.0012
1/2 - 1/4	1272	.06	.0006	240	.07	.0008
1/4 - 1/2	240	.31	.0033	60	.29	.0031
1/2 - 1	468	.16	.0017	120	.14	.0015
1 - 2	408	.18	.0019	60	.28	.0030
2 - 4	960	.07	.0007	360	.05	.0005
4 - 8	698	.08	.0009	240	.06	.0006
8 - 16	612	.07	.0008	156	.07	.0007
16 - 4	288	.15	.0016	90	.11	.0012
4 - 1	2538	.02	.0002			
1 - 1/4	4338	.01	.0001			

BORING NO. _____ 50
SAMPLE NO. _____ 8
DEPTH _____ 38.5 - 38.9
TEST NO. _____ C86.1
<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ Silty CLAY (CH) INITIAL WATER CONTENT <u>51.6</u> % ATTERBERG LIMITS LIQUID LIMIT <u>55</u> % PLASTIC LIMIT <u>23</u> % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.383</u> C <sub>c</sub> <u>0.55</u>

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<b>SOIL PROPERTIES</b>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTERBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/16 - 1/8	378	.21	.0023	150	.12	.0013	DEPTH _____
1/8 - 1/4	690	.11	.0012	210	.08	.0009	TEST NO. _____
1/4 - 1/2	576	.13	.0014	168	.10	.0011	<b>SOIL PROPERTIES</b>
1/2 - 1	378	.20	.0021	90	.20	.0021	SOIL DESCRIPTION: _____
1 - 2	288	.25	.0027	72	.24	.0026	Silty CLAY (CL-CH)
2 - 1	288	.25	.0027	51	.33	.0035	INITIAL WATER CONTENT <u>40.5</u> %
1 - 1/4	780	.09	.0010	144	.12	.0013	ATTERBERG LIMITS
1/4 - 1/2	348	.21	.0023	114	.15	.0016	LIQUID LIMIT <u>49</u> % PLASTIC LIMIT <u>20</u> %
1/2 - 1	504	.15	.0016	108	.16	.0017	<b>TEST DATA</b>
1 - 2	378	.19	.0020	60	.28	.0030	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
2 - 4	648	.10	.0011	156	.10	.0011	INITIAL VOID RATIO <u>1.013</u> C <sub>c</sub> <u>0.45</u>
4 - 8	540	.11	.0012	156	.08	.0009	
8 - 16	624	.07	.0008	120	.09	.0010	
16 - 4	318	.15	.0016	84	.13	.0014	
4 - 1	1164	.05	.0005	312	.04	.0004	
1 - 1/4	3744	.02	.0002	840	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	504	.16	.0017	72	.25	.0027
1/2 - 1	438	.18	.0019	114	.16	.0017
1 - 2	288	.26	.0028	43	.40	.0043
2 - 4	240	.29	.0031	60	.27	.0029
4 - 8	264	.24	.0026	45	.33	.0035
8 - 16	240	.23	.0025	36	.35	.0038
16 - 4	138	.38	.0041	18	.68	.0073
4 - 1	654	.08	.0009	144	.09	.0010
1 - 1/4	2616	.02	.0002	600	.02	.0002

BORING NO. 53  
 SAMPLE NO. 5  
 DEPTH 39.5'-39.8'  
 TEST NO. C98.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY, Sandy (CL)  
 INITIAL WATER CONTENT 30.9%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 39% PLASTIC LIMIT 20%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .872 C<sub>c</sub> 0.35

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>54</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	216	.08	.0009	DEPTH <u>63.5' - 63.8'</u>
1/2 - 1	438	.18	.0019	216	.08	.0009	TEST NO. <u>C399.1</u>
1 - 2	540	.14	.0015	132	.13	.0014	<b>SOIL PROPERTIES</b>
2 - 4	438	.16	.0017	114	.14	.0015	SOIL DESCRIPTION: _____
4 - 8	408	.16	.0017	84	.18	.0019	<u>Silty CLAY, sandy (CL)</u>
8 - 16	348	.18	.0019	84	.17	.0018	INITIAL WATER CONTENT <u>26.0</u> %
16 - 4	348	.17	.0018	27			ATTERBERG LIMITS
4 - 1	1008	.06	.0006	144	.10	.0011	LIQUID LIMIT <u>36</u> % PLASTIC LIMIT <u>18</u> %
1 - 1/4	2304	.03	.0003	540	.03	.0003	<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
							INITIAL VOID RATIO <u>0.696</u> C <sub>c</sub> <u>0.24</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<b>SOIL PROPERTIES</b>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTERBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	156	.12	.0013
1/2 - 1	540	.14	.0015	102	.18	.0019
1 - 2	408	.19	.0020	96	.18	.0019
2 - 4	348	.20	.0022	108	.15	.0016
4 - 8	438	.14	.0015	120	.12	.0013
8 - 16	318	.17	.0018	96	.13	.0014
16 - 4	216	.23	.0025	45	.26	.0028
4 - 1	576	.09	.0010	240	.06	.0006
1 - 1/4	2160	.03	.0003	570	.03	.0003

BORING NO. 54  
 SAMPLE NO. 8  
 DEPTH 73.7' - 74.0'  
 TEST NO. C401.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 INITIAL WATER CONTENT 38.3 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.982 C<sub>c</sub> 0.41

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	348	.23	.0025	114	.16	.0017	SAMPLE NO. <u>2</u>
1/2 - 1	654	.12	.0013	216	.08	.0009	DEPTH <u>9.8' to 10.0'</u>
1 - 1/4	1560	.05	.0005	330	.06	.0006	TEST NO. <u>C42.1</u>
1/4 - 1/2	318	.24	.0026	180	.10	.0011	<b>SOIL PROPERTIES</b>
1/2 - 1	774	.10	.0011	270	.07	.0007	SOIL DESCRIPTION: _____
1 - 2	468	.16	.0017	180	.09	.0010	<u>Silty CLAY (CL-CH)</u>
2 - 4	576	.12	.0013	168	.10	.0011	INITIAL WATER CONTENT <u>30.0%</u>
4 - 8	540	.12	.0013	156	.10	.0011	ATTERBERG LIMITS
8 - 16	318	.20	.0021	132	.11	.0012	LIQUID LIMIT <u>53%</u> PLASTIC LIMIT <u>26%</u>
24 - 6	318	.18	.0019	72	.19	.0020	<b>TEST DATA</b>
6 - 2	1218	.05	.0005	420	.04	.0004	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
2 - 1/2	3378	.02	.0002	960	.02	.0002	INITIAL VOID RATIO <u>0.787</u> C <sub>c</sub> <u>0.23</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	240	.33	.0035	90	.20	.0022	SAMPLE NO. <u>16</u>
1/2 - 1	240	.33	.0035	78	.23	.0025	DEPTH <u>85.2' to 85.4'</u>
1 - 2	192	.39	.0042	54	.33	.0035	TEST NO. <u>C56.1</u>
2 - 4	264	.28	.0030	72	.23	.0025	<b>SOIL PROPERTIES</b>
4 - 8	264	.26	.0028	84	.19	.0020	SOIL DESCRIPTION: _____
8 - 16	348	.18	.0019	84	.17	.0018	<u>Silty CLAY (CL)</u>
16 - 4	156	.37	.0040	51	.26	.0028	INITIAL WATER CONTENT <u>27.9%</u>
4 - 1	864	.07	.0008	210	.07	.0007	ATTERBERG LIMITS
1 - 1/4	2400	.03	.0003	450	.04	.0004	LIQUID LIMIT <u>40%</u> PLASTIC LIMIT <u>19%</u>
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
							INITIAL VOID RATIO <u>0.744</u> C <sub>c</sub> <u>0.27</u>

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							INITIAL WATER CONTENT _____ %			
							ATTEBERG LIMITS			
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.			
							INITIAL VOID RATIO _____ C <sub>c</sub> _____			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	408	.20	.0021	138	.14	.0014	105	8	70.9 - 71.2	C380.1
1/2 - 1	318	.24	.0026	96	.19	.0020				
1 - 2	318	.24	.0026	102	.17	.0018				
2 - 4	408	.18	.0019	90	.19	.0020				
4 - 8	438	.16	.0017	114	.14	.0015				
8 - 16	318	.20	.0021	96	.15	.0016				
16 - 4	318	.20	.0021	72	.20	.0021				
4 - 1	774	.08	.0008	180	.09	.0009				
1 - 1/4	2454	.03	.0003	480	.03	.0003				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							Silty CLAY (CL)			
							INITIAL WATER CONTENT <u>23.7</u> %			
							ATTEBERG LIMITS			
							LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>19</u> %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.			
							INITIAL VOID RATIO <u>0.625</u> C <sub>c</sub> <u>0.21</u>			
							<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>			
							THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118 SAMPLE NO. _____ 5 DEPTH _____ 38.9' - 39.3' TEST NO. _____ C256.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	156	.13	.0013	<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ Silty CLAY (CL) INITIAL WATER CONTENT <u>36.9</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>0.969</u> C <sub>c</sub> <u>0.39</u>
1/2 - 1	378	.21	.0022	108	.17	.0018	
1 - 2	264	.28	.0030	84	.21	.0022	
2 - 1/2	264	.28	.0030	72	.24	.0026	
1/2 - 1/4	468	.16	.0017	132	.13	.0014	
1/4 - 1/2	240	.31	.0034	78	.22	.0024	
1/2 - 1	318	.24	.0025	72	.24	.0026	
1 - 2	174	.42	.0045	45	.38	.0041	
2 - 4	576	.12	.0013	192	.09	.0009	
4 - 8	654	.10	.0010	138	.11	.0011	
8 - 16	378	.14	.0014	102	.12	.0013	
16 - 4	102	.51	.0053	42	.28	.0030	
4 - 1	816	.07	.0007	240	.05	.0005	
1 - 1/4	2856	.02	.0002	780	.02	.0002	

**CONSOLIDATION TEST**  
**SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118	SAMPLE NO. _____ 9	DEPTH _____ 78.7' - 79.0'	TEST NO. _____ C260.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	540	.15	.0016	186	.11	.0011				
1/2 - 1	540	.15	.0016	138	.13	.0014				
1 - 2	378	.20	.0022	114	.16	.0017				
2 - 4	348	.21	.0023	96	.18	.0019				
4 - 1	318	.22	.0025	72	.23	.0025				
1 - 1/4	1008	.08	.0008	288	.06	.0006				
1/4 - 1/2	240	.31	.0034	78	.22	.0024				
1/2 - 1	288	.26	.0028	84	.21	.0022				
1 - 2	408	.19	.0020	108	.16	.0017				
2 - 4	264	.28	.0030	66	.25	.0027				
4 - 8	264	.26	.0028	90	.18	.0019				
8 - 16	348	.20	.0022	96	.17	.0017				
16 - 4	216	.28	.0031	48	.30	.0032				
4 - 1	738	.09	.0009	228	.07	.0007				
1 - 1/4	3198	.02	.0002	630	.03	.0003				

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL)

INITIAL WATER CONTENT 27.8%  
ATTERBERG LIMITS  
LIQUID LIMIT 42% PLASTIC LIMIT 23%

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.741 C<sub>c</sub> 0.24

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							BORING NO. _____ 129 SAMPLE NO. _____ 9 DEPTH _____ 39.1' - 39.3' TEST NO. _____ C389 <b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL)</u> INITIAL WATER CONTENT <u>40.2</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.083</u> C <sub>c</sub> <u>0.39</u>
1/4 - 1/2	540	.14	.0015	180	.11	.0011	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
1/2 - 1	468	.16	.0017	156	.12	.0012	
1 - 2	780	.10	.0010	216	.08	.0008	
2 - 1/2	438	.16	.0017	96	.17	.0018	
1/2 - 1/4	1110	.07	.0007	270	.07	.0007	
1/4 - 1/2	540	.13	.0014	144	.12	.0012	
1/2 - 1	318	.22	.0024	102	.16	.0017	
1 - 2	264	.26	.0028	78	.20	.0022	
2 - 4	738	.09	.0009	186	.08	.0008	
4 - 8	738	.08	.0008	168	.08	.0008	
8 - 16	540	.10	.0010	132	.09	.0009	
16 - 4	288	.17	.0018	72	.15	.0016	
4 - 1	1056	.05	.0005	264	.05	.0005	
1 - 1/4	2779	.02	.0002	840	.01	.0001	

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	348	.22	.0024	108	.17	.0018
1/2 - 1	378	.20	.0022	120	.15	.0016
1 - 2	318	.23	.0026	96	.19	.0020
2 - 4	438	.17	.0018	96	.18	.0019
4 - 1	288	.24	.0027	51	.32	.0035
1 - 1/4	540	.14	.0015	192	.09	.0009
1/4 - 1/2	288	.26	.0028	78	.22	.0024
1/2 - 1	432	.17	.0018	96	.22	.0024
1 - 2	240	.30	.0033	72	.23	.0025
2 - 4	240	.29	.0032	60	.28	.0030
4 - 8	438	.16	.0016	90	.18	.0019
8 - 16	288	.21	.0023	78	.19	.0020
16 - 4	120	.48	.0053	30	.47	.0050
4 - 1	780	.09	.0009	186	.08	.0008
1 - 1/4	2265	.02	.0002	480	.03	.0003

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7 - 104.0  
 TEST NO. C395.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY, Sandy (CL)  
 INITIAL WATER CONTENT 28.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.730 C<sub>c</sub> .23

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	135		.0052	72		.0023
1/2 - 1	317		.0022	102		.0016
1 - 2	1009		.0007	348		.0005
2 - 4	913		.0007	270		.0006
4 - 8	738		.0008	216		.0007
8 - 16	778		.0007	180		.0007
16 - 4	346		.0016	66		.0020
4 - 1	960		.0006	330		.0004
1 - 1/4	4338		.0001	1440		.0001

BORING NO. 136  
SAMPLE NO. ST6  
DEPTH 13.0' to 16.0'  
TEST NO. C527.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: SILTY CLAY (CL)  
INITIAL WATER CONTENT 17.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 3.28 IN 8.33 CM.  
INITIAL VOID RATIO (0.675) C<sub>c</sub> 0.15

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4-1/2	378	.21	.0022	84	.21	.0023
1/2-1	504	.15	.0016	114	.17	.0017
1 - 2	576	.14	.0014	150	.12	.0012
2 - 1	812	.09	.0009	180	.10	.0010
1 - 1/4	72	1.0	.0105	36	.50	.0050
1/4-1/2	288	.25	.0027	108	.17	.0017
1/2-1	345	.21	.0022	108	.17	.0017
1 - 2	318	.23	.0024	102	.17	.0017
2 - 4	696	.10	.0010	186	.09	.0009
4 - 8	378	.17	.0017	108	.13	.0013
8 - 16	290	.19	.0020	72	.17	.0017

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' to 20.5'  
 TEST NO. C535.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 \_\_\_\_\_  
 INITIAL WATER CONTENT 38.2%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45% PLASTIC LIMIT 22%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 1.019 C<sub>c</sub> 0.41

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/2 - 1	540	.12	.0013	228	.07	.0007
1 - 2	1440	.05	.0005	408	.04	.0004
2 - 4	1272	.05	.0005	306	.05	.0005
4 - 8	612	.09	.0010	216	.07	.0007
8 - 16	540	.10	.0011	150	.08	.0009
16 - 4	438	.12	.0013	96	.13	.0014
4 - 1	1752	.03	.0003	450	.03	.0003
1 - 1/4				1560	.01	.0001

BORING NO. 146  
SAMPLE NO. 7  
DEPTH 14.0' to 16.0'  
TEST NO. C542.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 15.9 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.679 C<sub>c</sub> 0.14

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.
1/4-1/2	194	.43	.0045	72	.26	.0028
1/2- 1	317	.25	.0027	96	.20	.0021
1 - 2	378	.21	.0022	96	.19	.0020
2 - 4	345	.23	.0024	72	.24	.0026
4 - 8	378	.19	.0020	84	.21	.0022
8-16	324	.20	.0021	108	.16	.0016

BORING NO. 185  
 SAMPLE NO. 3  
 DEPTH 7.9' to 8.1'  
 TEST NO. C552.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.1%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 50% PLASTIC LIMIT 23%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.757 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

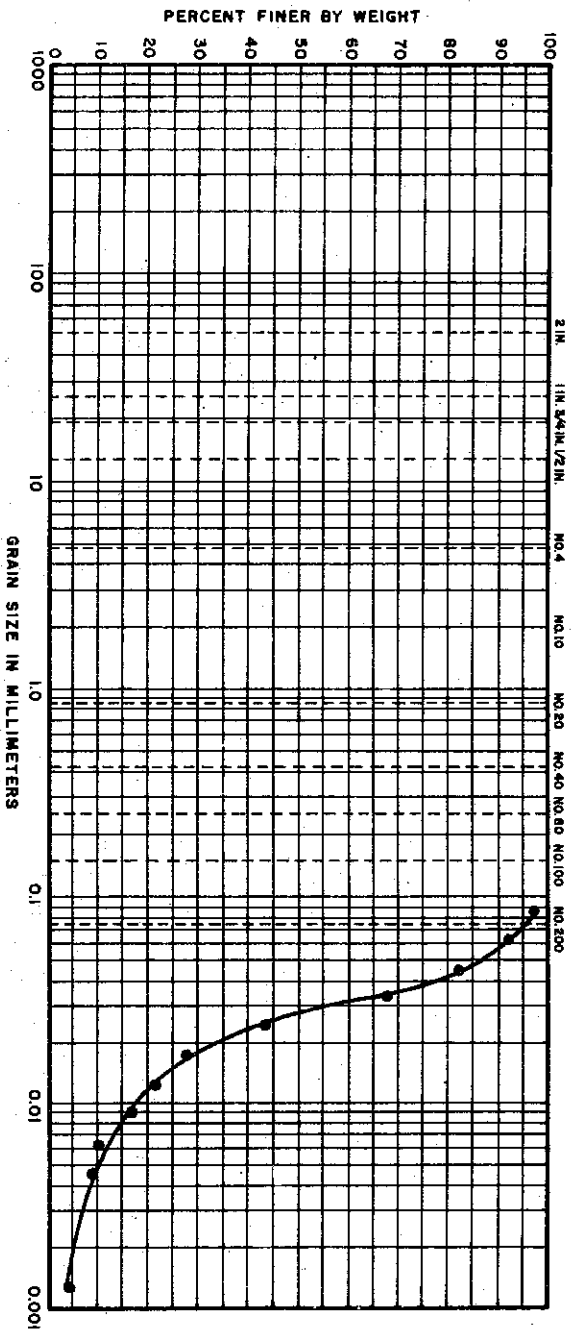
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

### GRAIN SIZE DISTRIBUTION

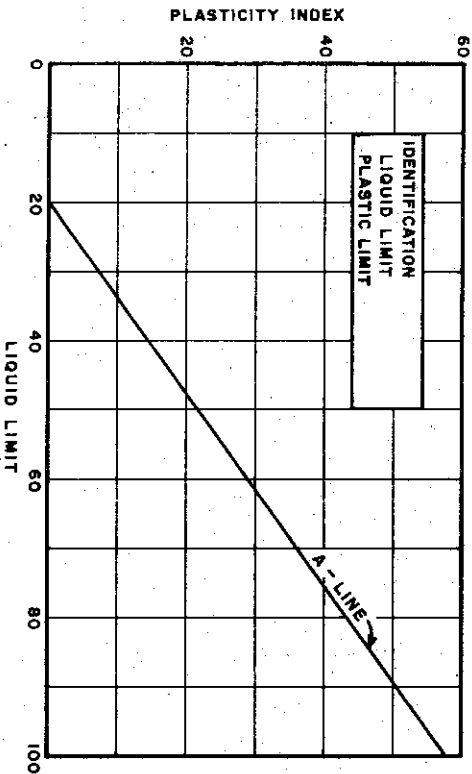
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)

EXPLORATION: BORING 7

SAMPLE : SS28

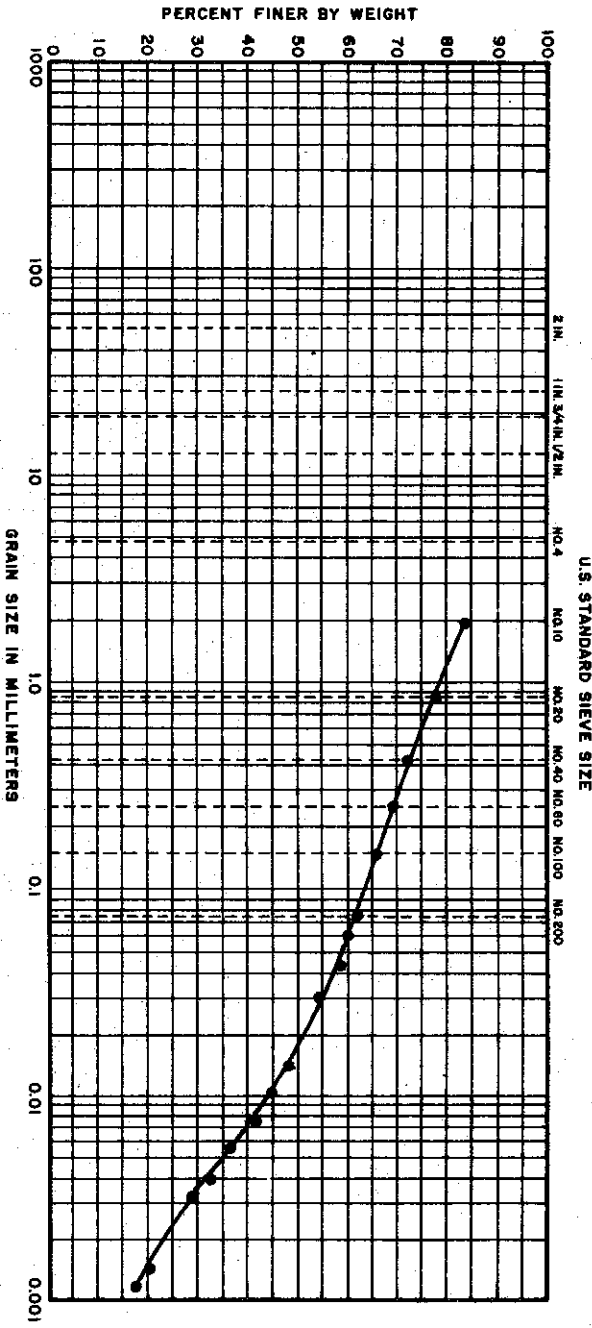
DEPTH : 129.6' TO 131.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

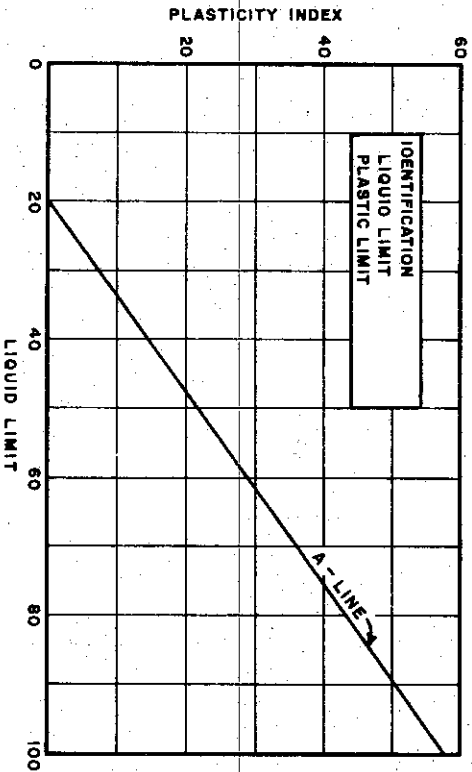
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 7  
 SAMPLE : S630  
 DEPTH : 136.8' TO 140.3'  
 SPECIFIC GRAVITY : USED 2.70

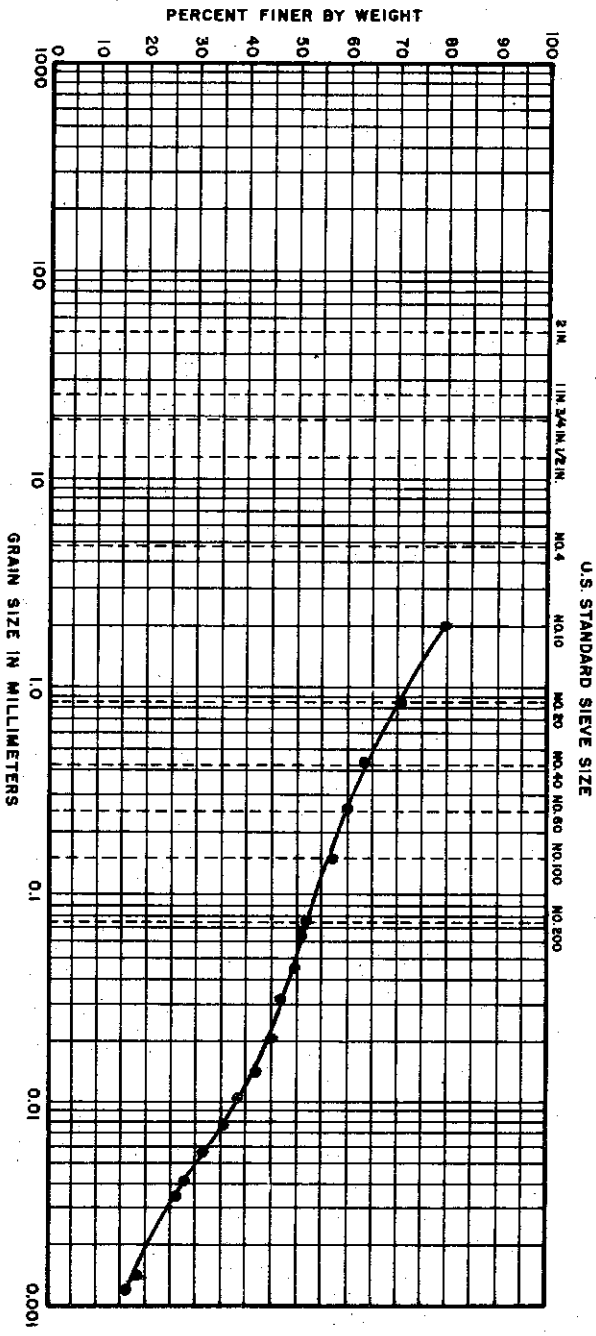
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-598

FILE NO. 1255 DATE JAN. 74



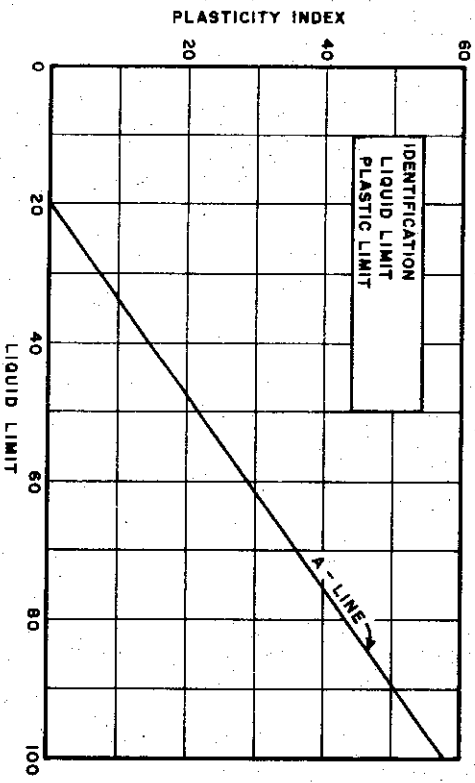
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



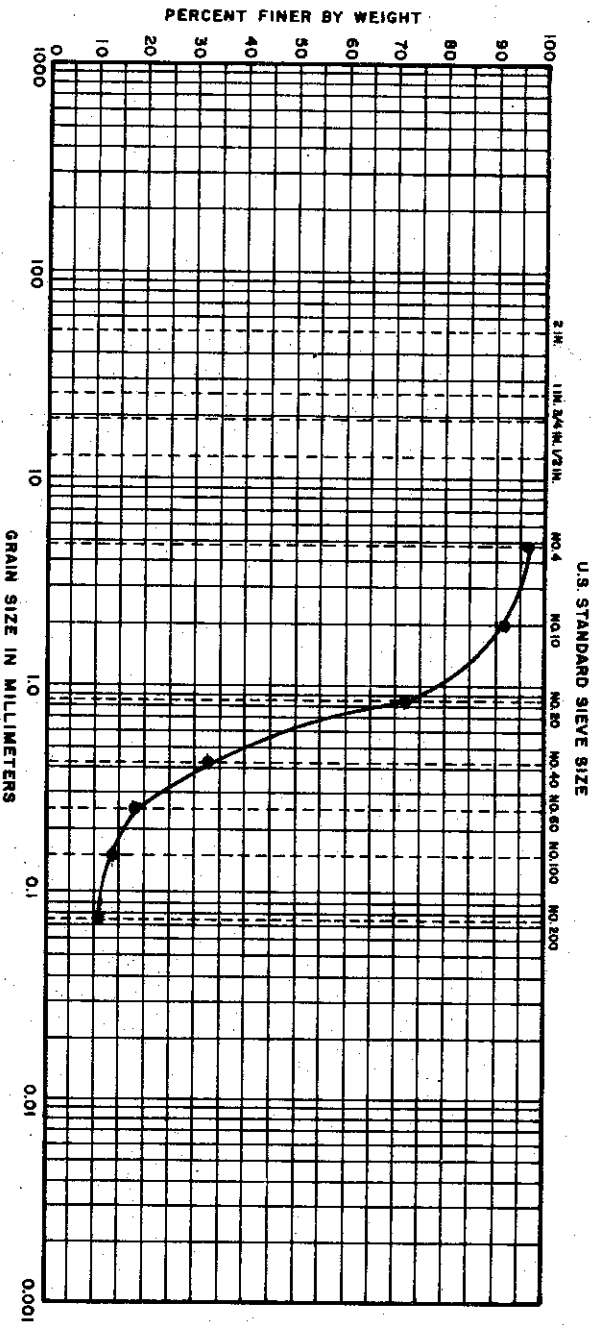
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 10  
 SAMPLE : SS30  
 DEPTH : 141'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

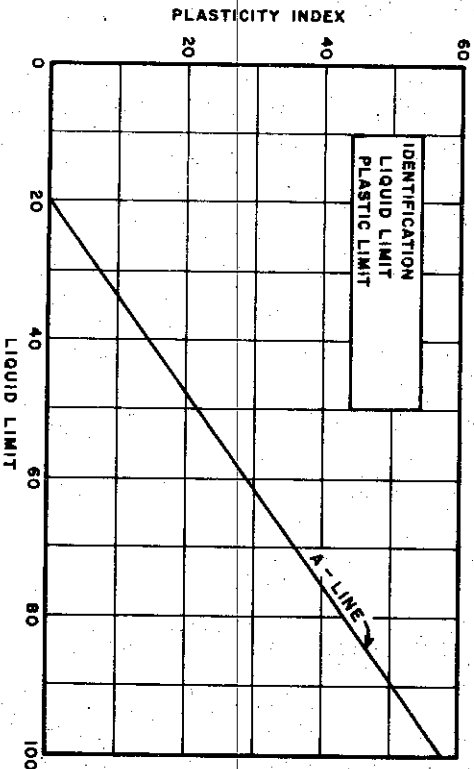
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

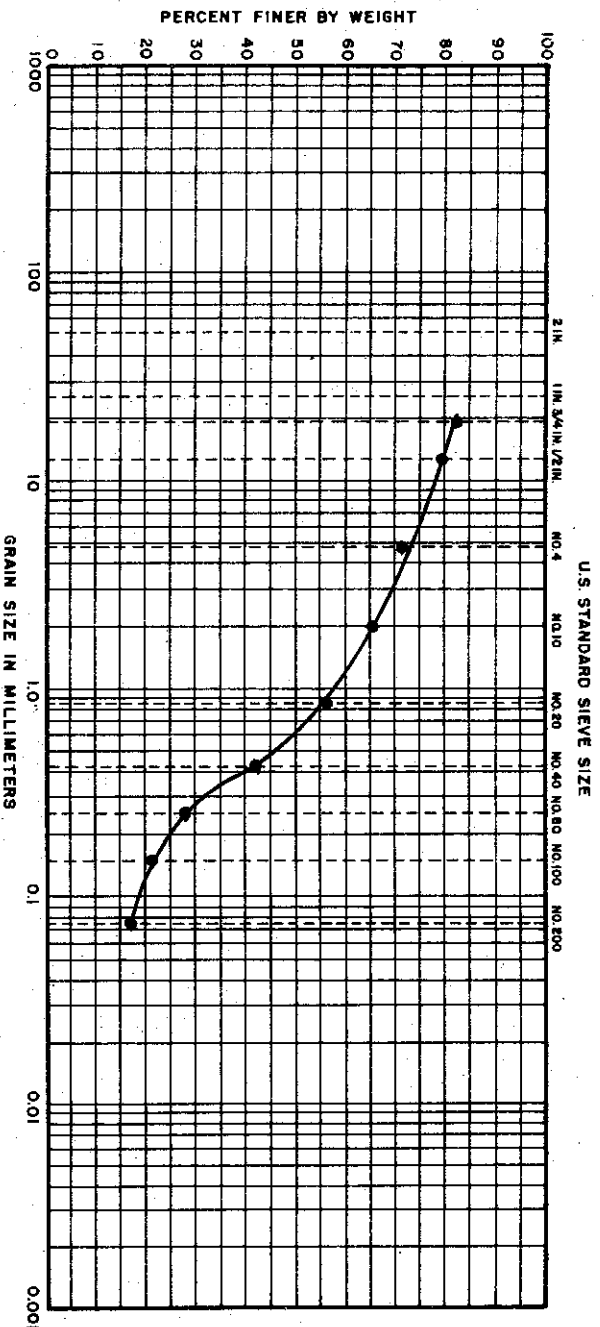
IDENTIFICATION : SILTY SAND (SM-SW)  
 EXPLORATION: BORING 18  
 SAMPLE : 11  
 DEPTH : 103.5' TO 105.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-600

FILE NO. 1255 DATE JULY 1974

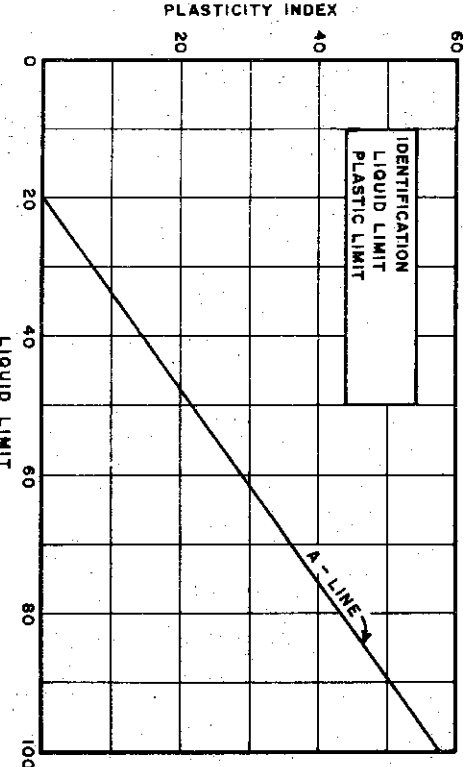
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

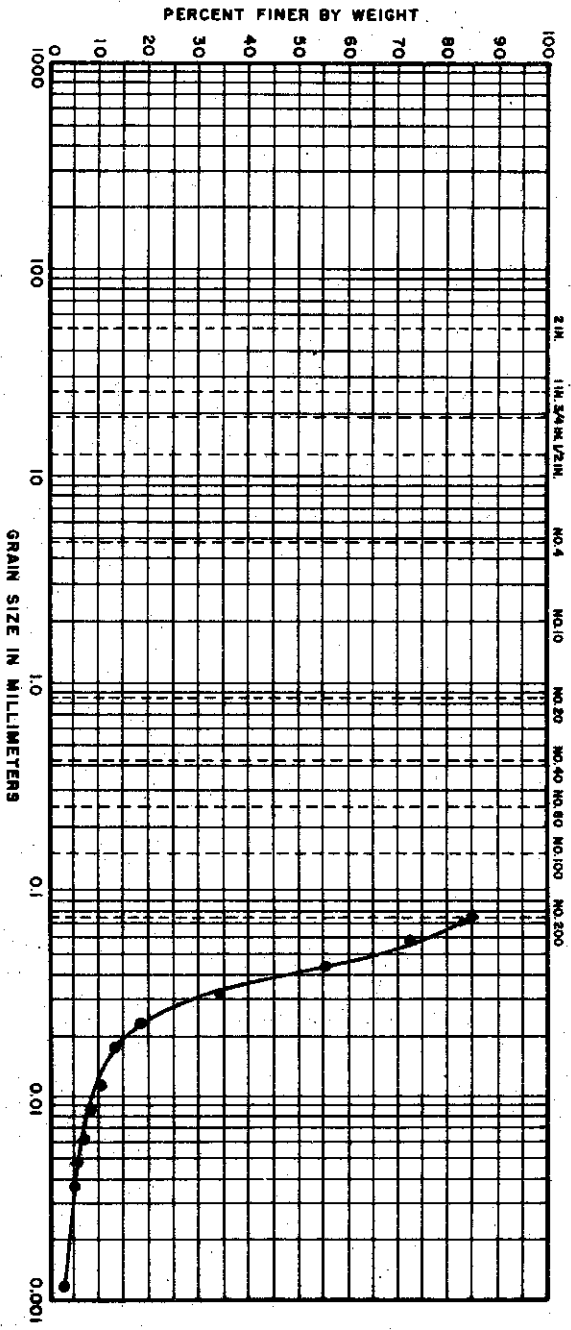
IDENTIFICATION : SILTY SAND, GRAVELLY (SM)  
 EXPLORATION : BORING 18  
 SAMPLE : 16  
 DEPTH : 139.6' TO 141.0'  
 SPECIFIC GRAVITY : USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

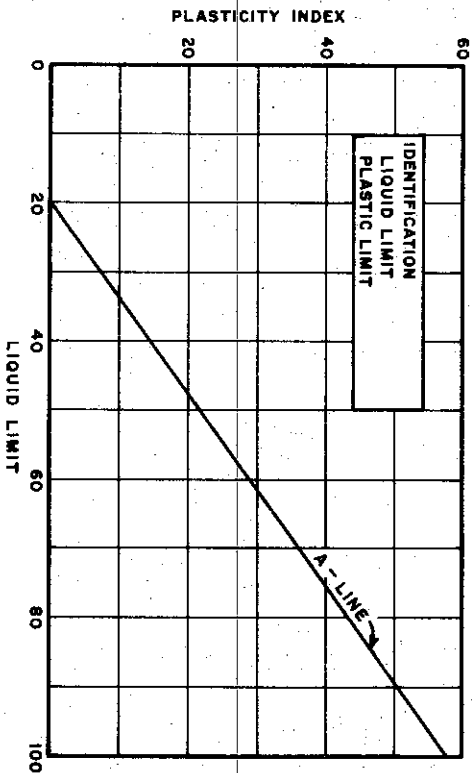
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

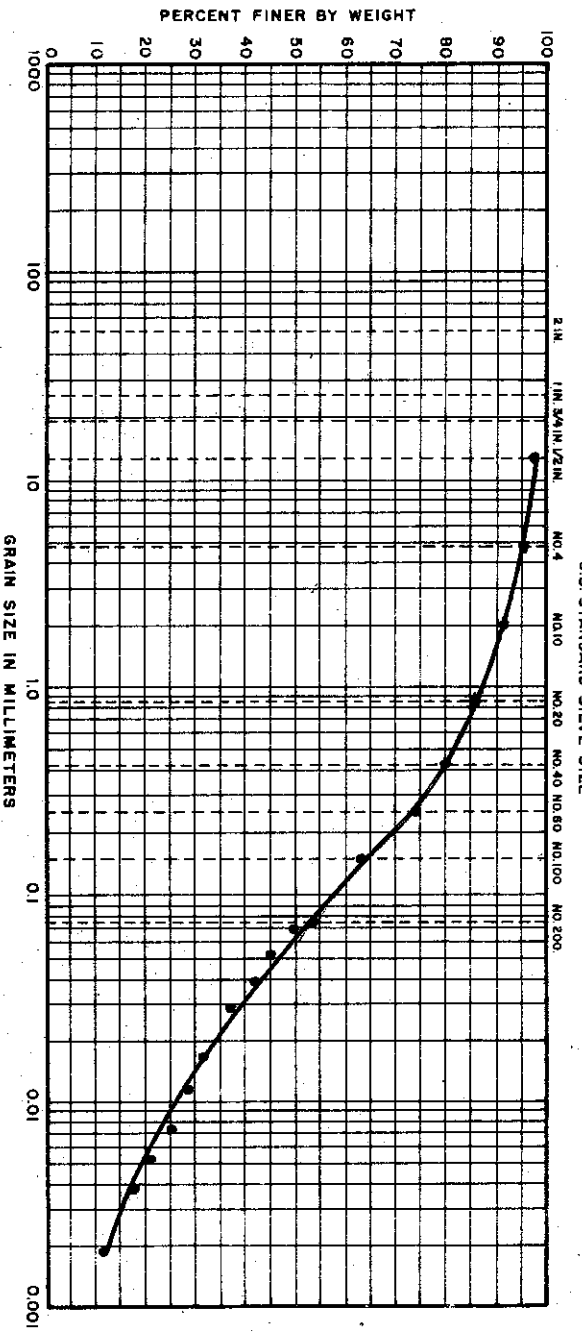
IDENTIFICATION : CLAYEY SILT (CL-ML)  
 EXPLORATION: BORING 22  
 SAMPLE : SS29  
 DEPTH : 133.5' TO 135.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-602

FILE NO. 1255 DATE JAN. 74

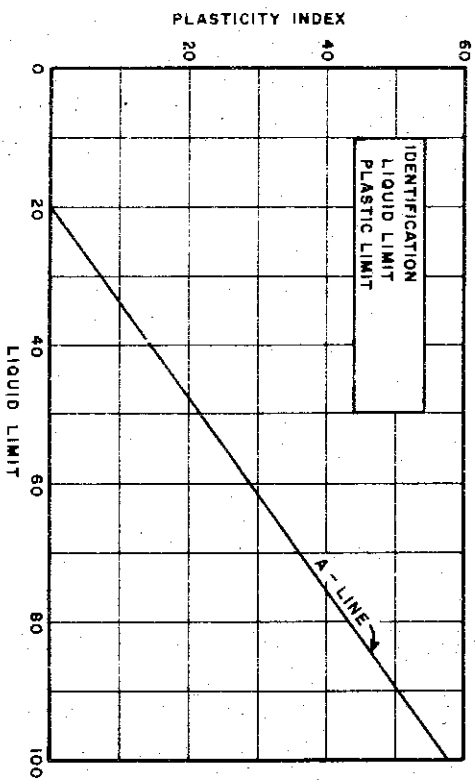
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



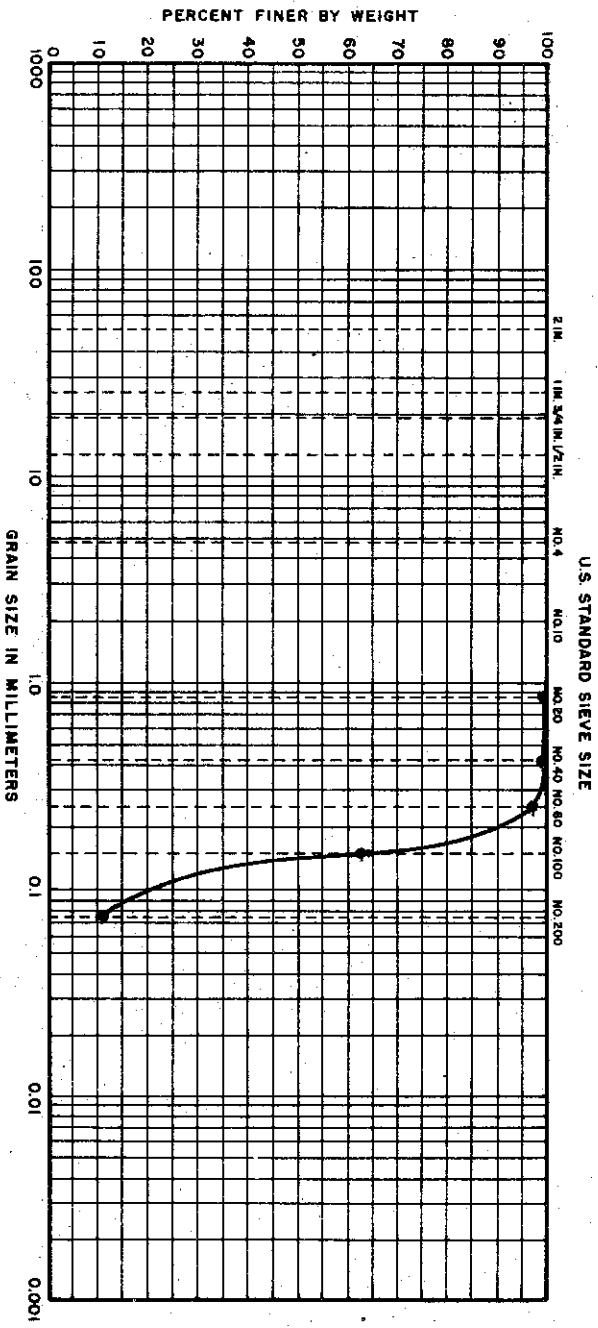
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)  
 EXPLORATION: BORING 27  
 SAMPLE : SS17  
 DEPTH : 68.5' TO 70.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

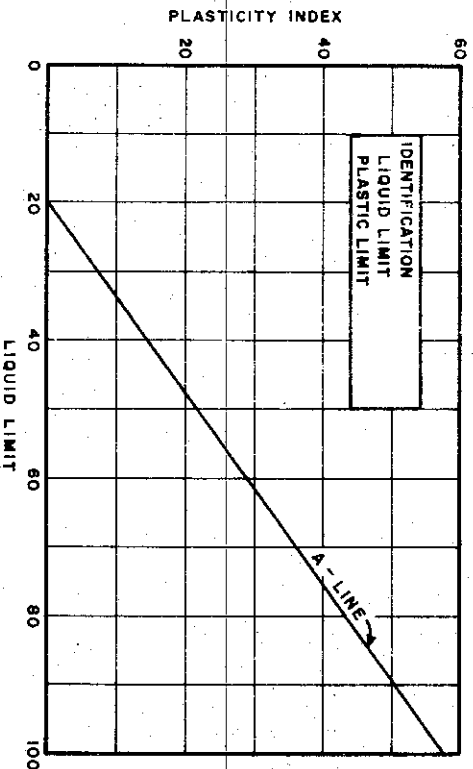
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

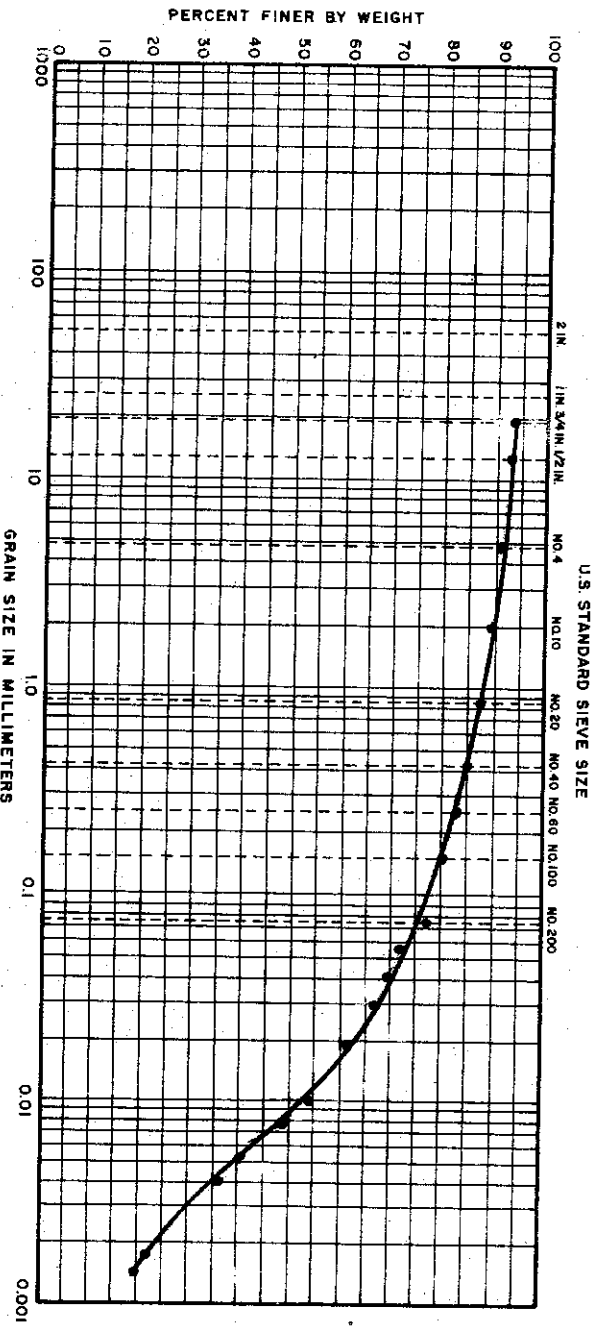
IDENTIFICATION : SILTY FINE SAND (SM-SP)  
 EXPLORATION: BORING 27  
 SAMPLE : 26  
 DEPTH : 113.6' TO 114.4'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-604

FILE NO. 1255 DATE JULY 1974

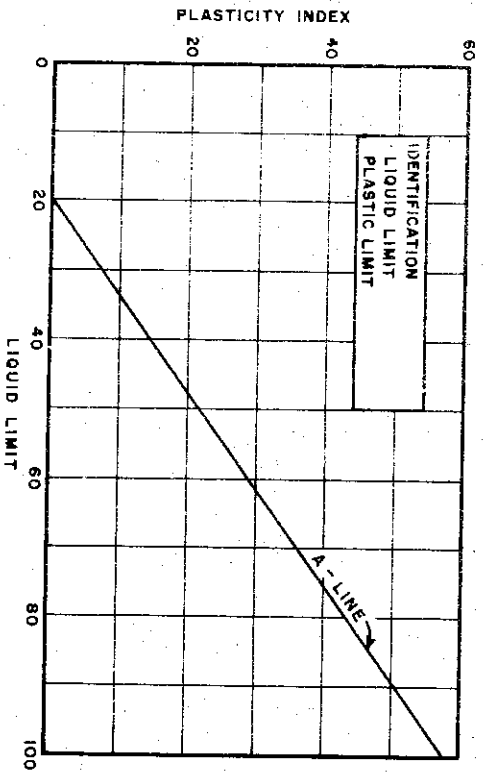
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

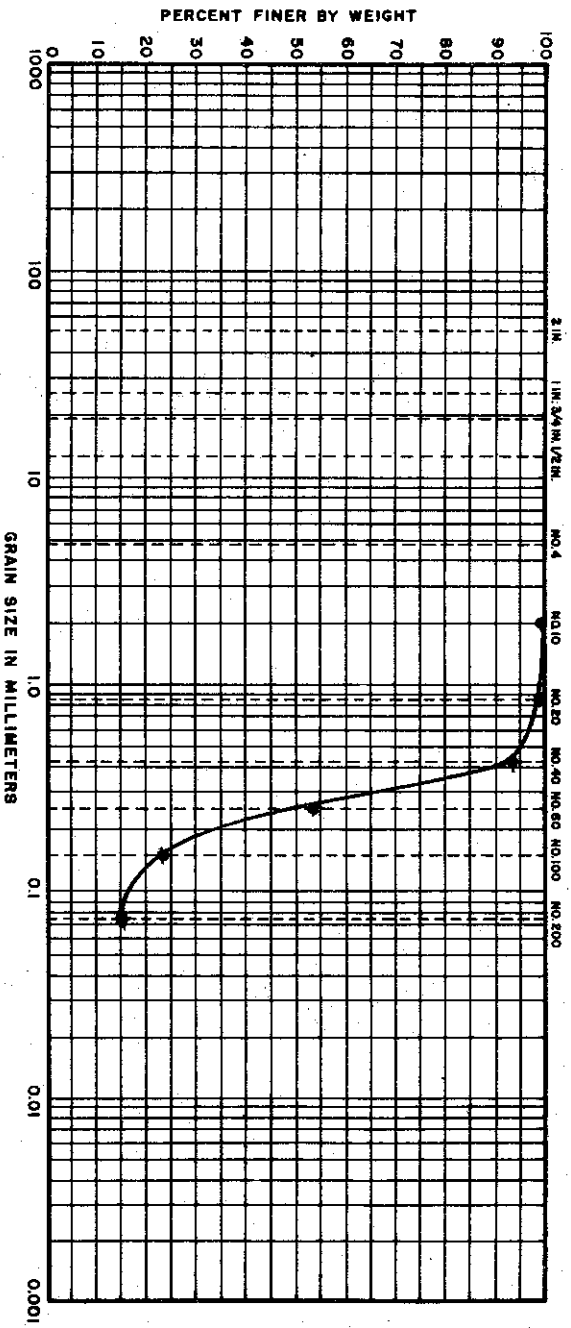
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 30  
 SAMPLE: SS15  
 DEPTH: 68.5' TO 70.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

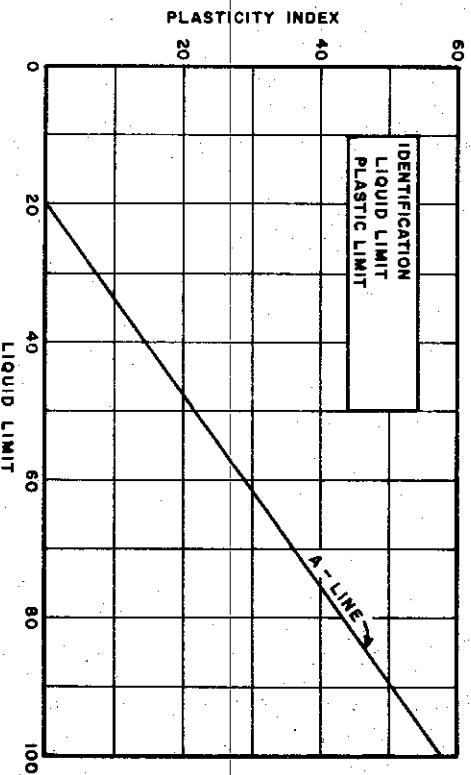
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 21  
 DEPTH : 98.5' TO 100.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

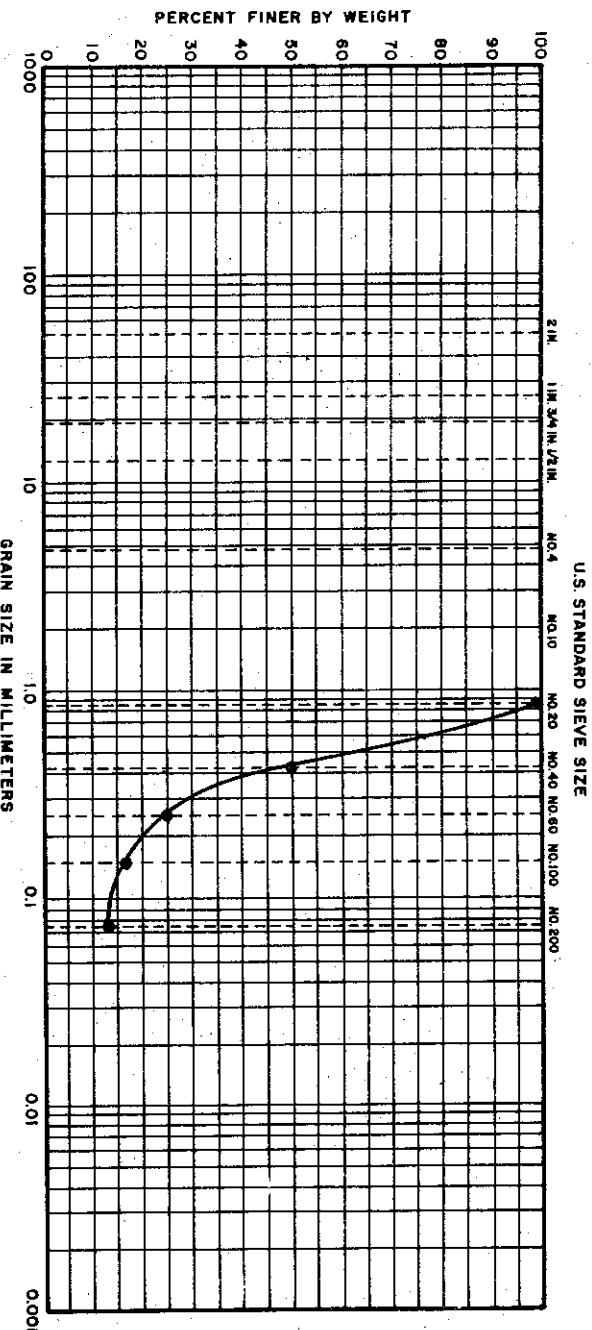
C-606

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974



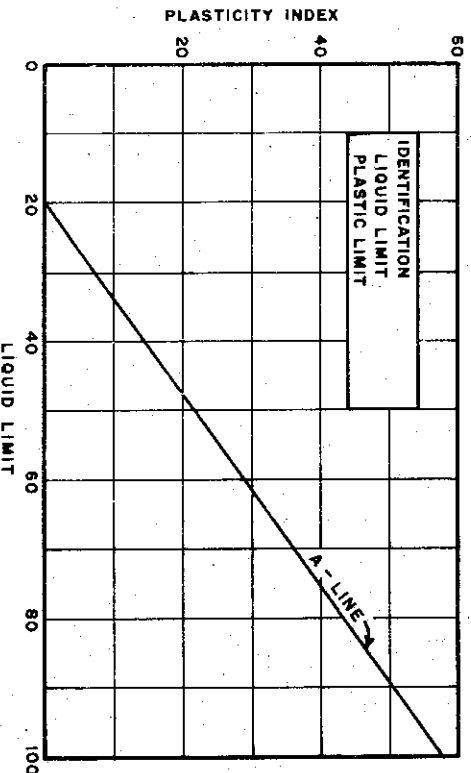
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

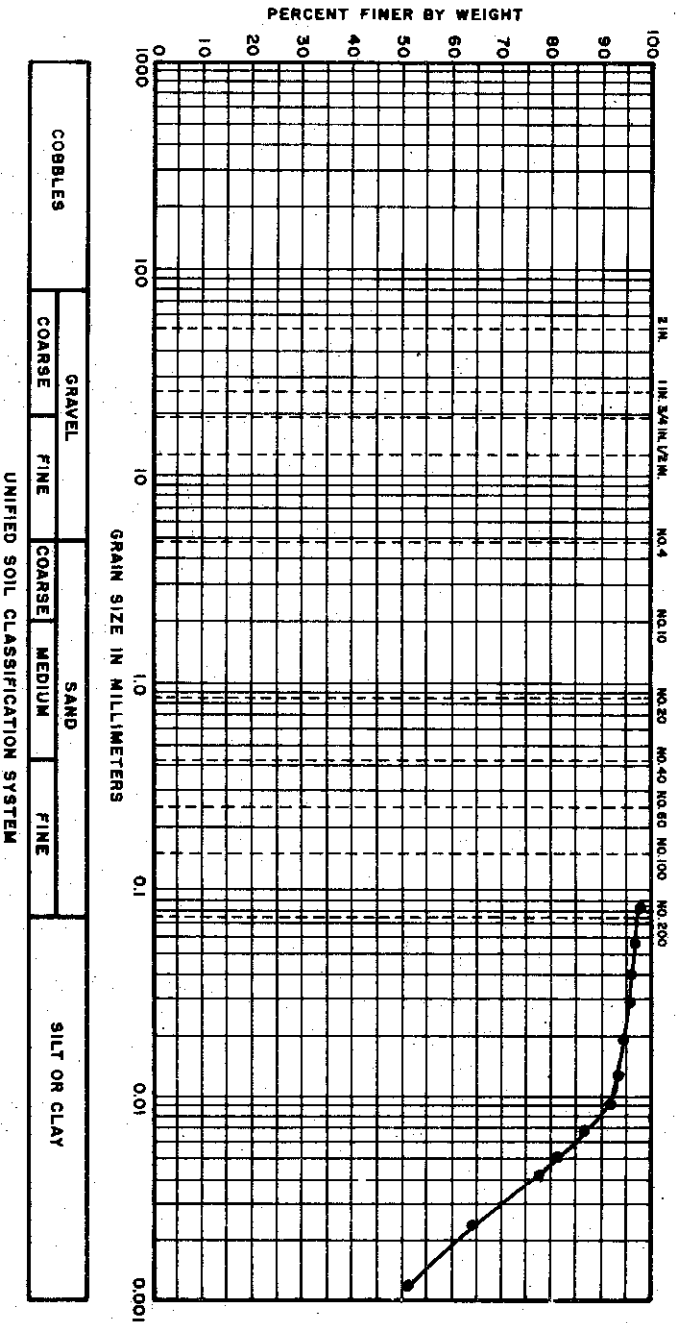
IDENTIFICATION : SILTY SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 25  
 DEPTH : 118.5' TO 120.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

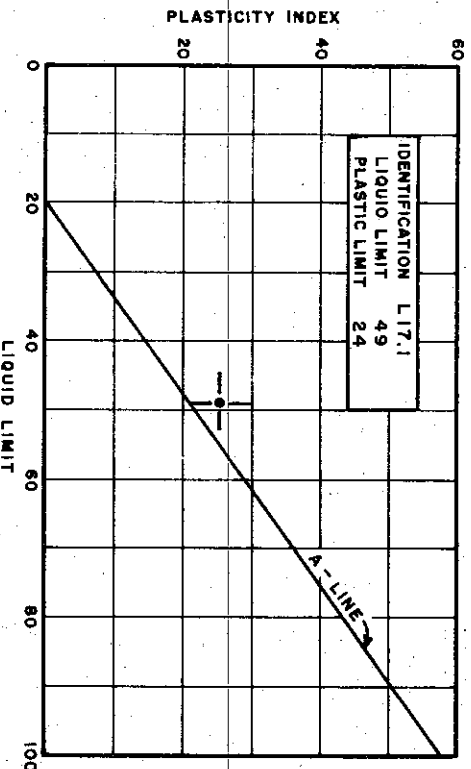
FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

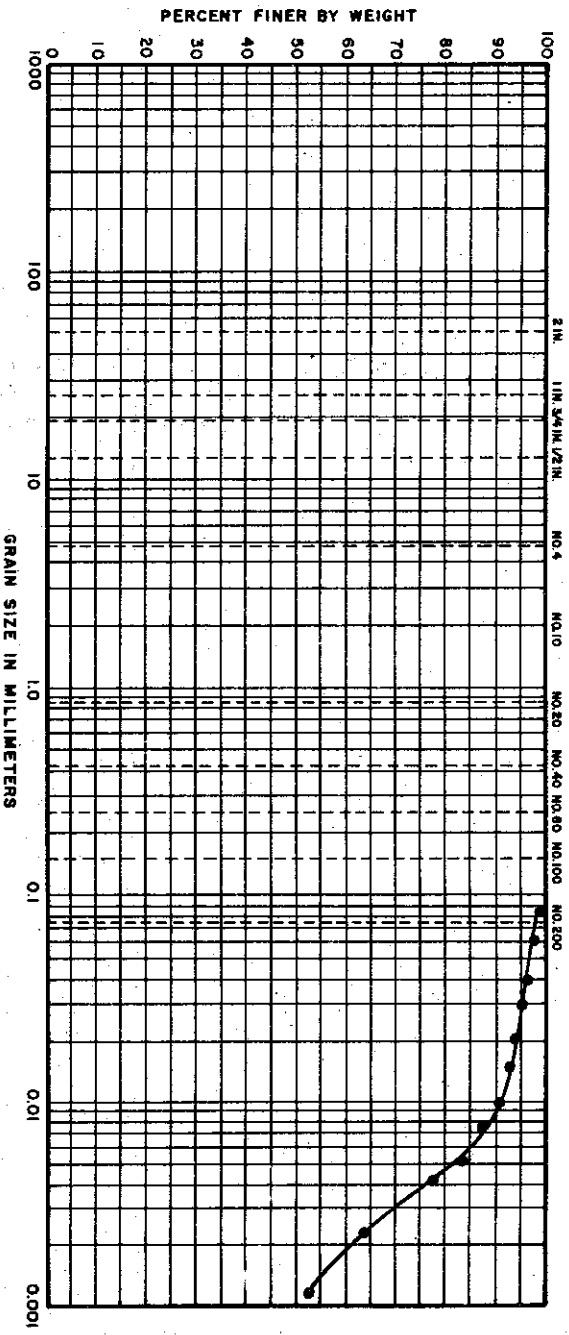
IDENTIFICATION : SILTY CLAY (CL-CH)  
EXPLORATION: BORING 38  
SAMPLE : 5  
DEPTH : 8.7' TO 9.0'  
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-608

### GRAIN SIZE DISTRIBUTION

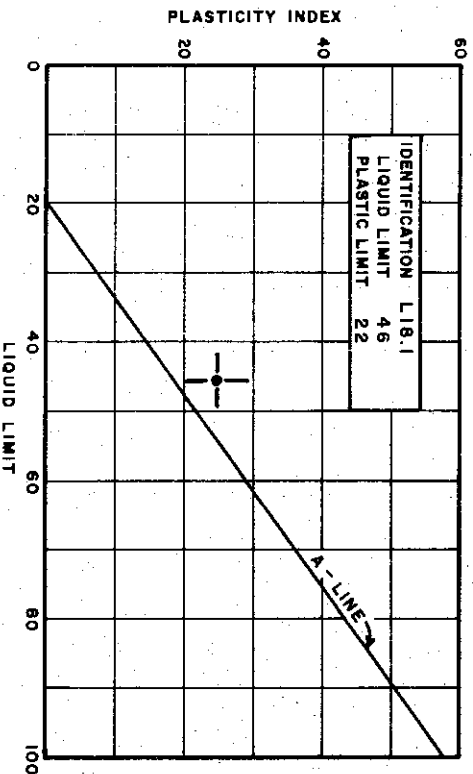
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)

EXPLORATION: BORING 3B

SAMPLE : 4

DEPTH : 14.3' TO 14.6'

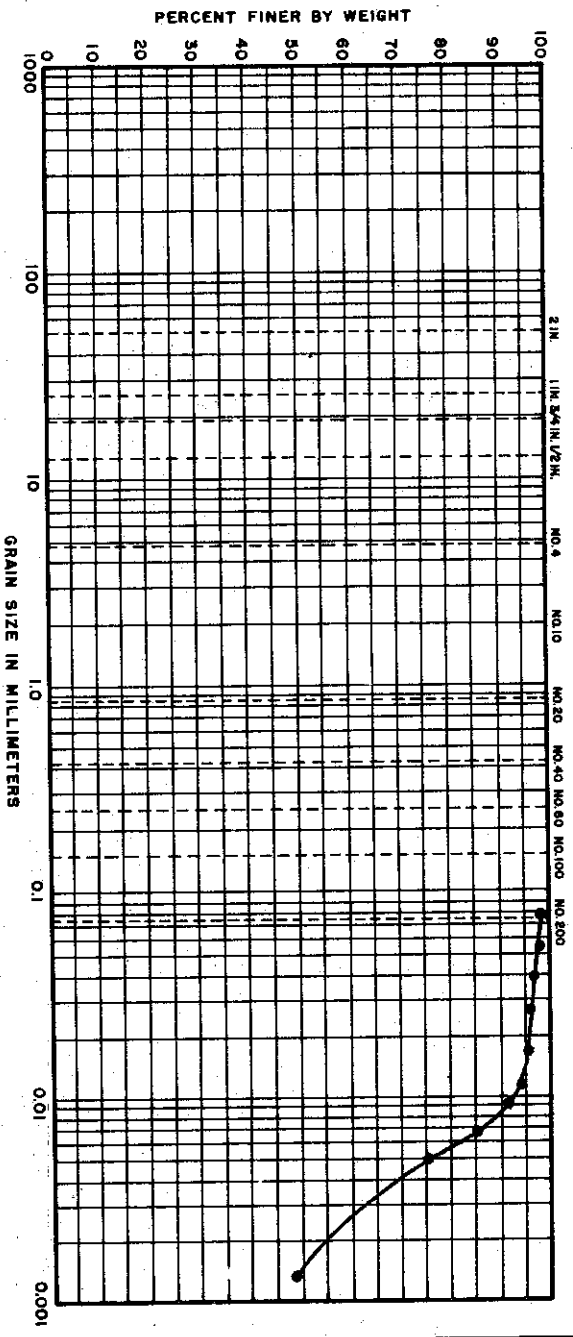
SPECIFIC GRAVITY = 2.71

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

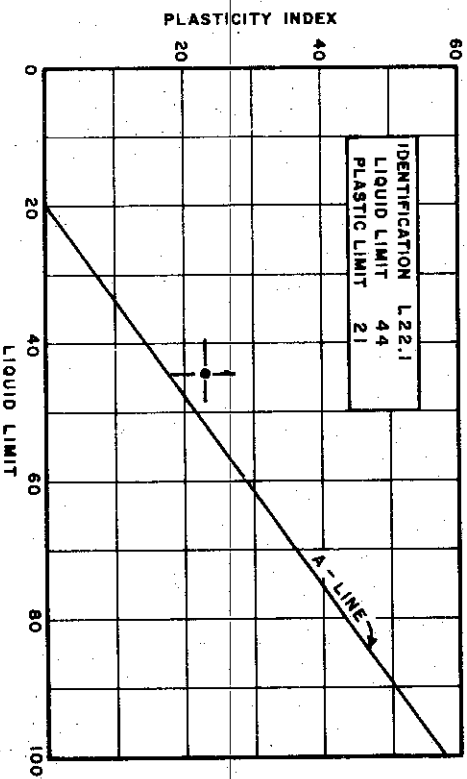
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE : 12  
 DEPTH : 54.1' TO 54.5'  
 SPECIFIC GRAVITY : USED 2.70

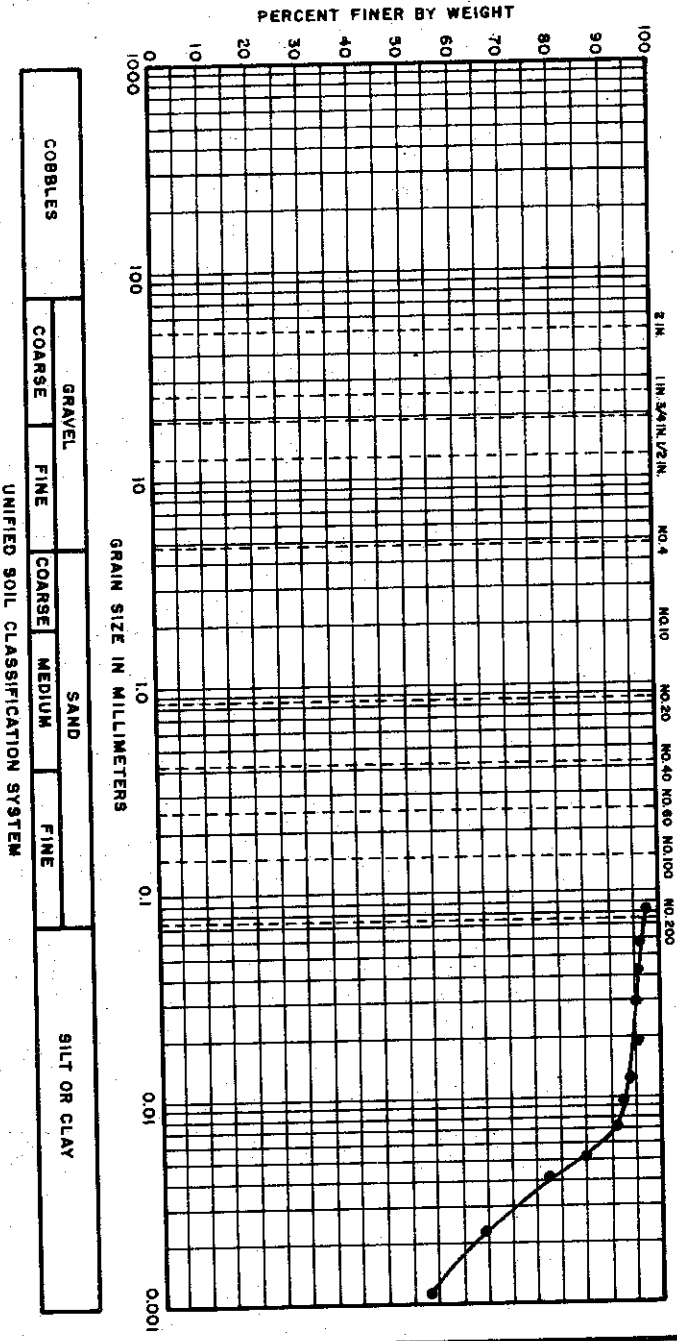
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-610

FILE NO. 1255 DATE JAN 74

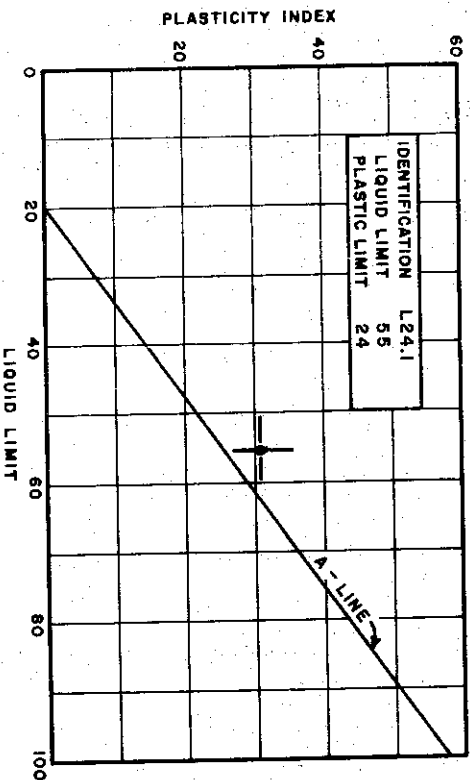
# GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



# PLASTICITY CHART

(COHESIVE SOIL ONLY)



# MATERIAL SOURCE

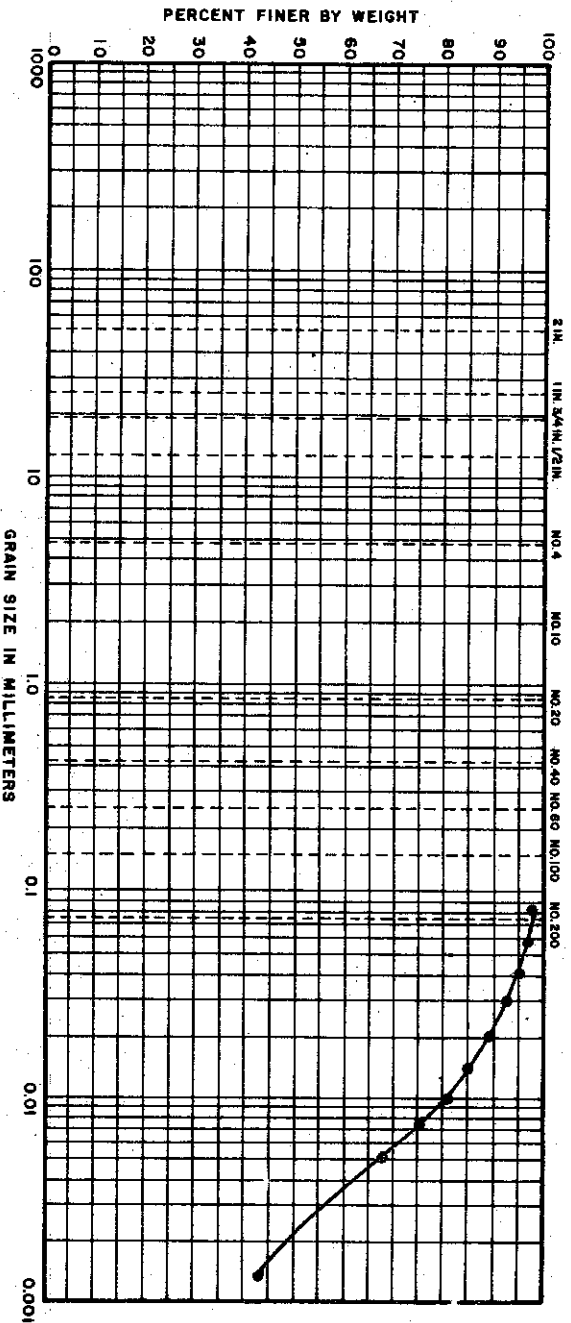
IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 38  
 SAMPLE : 16  
 DEPTH : 74.0' TO 74.1'  
 SPECIFIC GRAVITY = 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

# GRAIN SIZE DISTRIBUTION

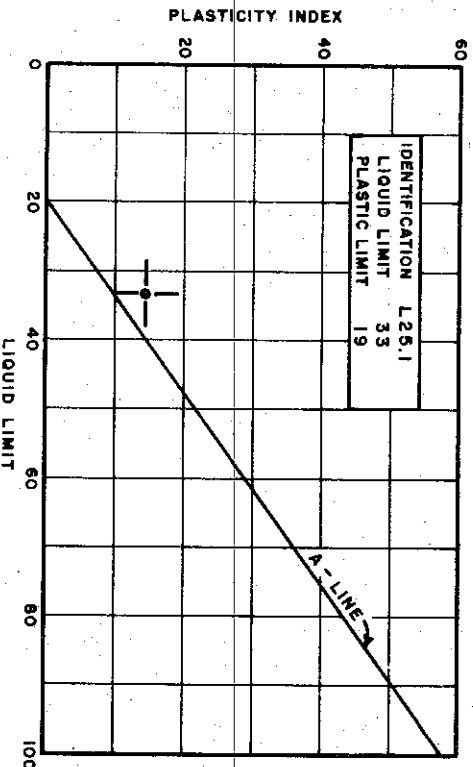
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

# PLASTICITY CHART (COHESIVE SOIL ONLY)



# MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
EXPLORATION: BORING 38  
SAMPLE : 18  
DEPTH : 84.6' TO 84.9'  
SPECIFIC GRAVITY : USED 2.70

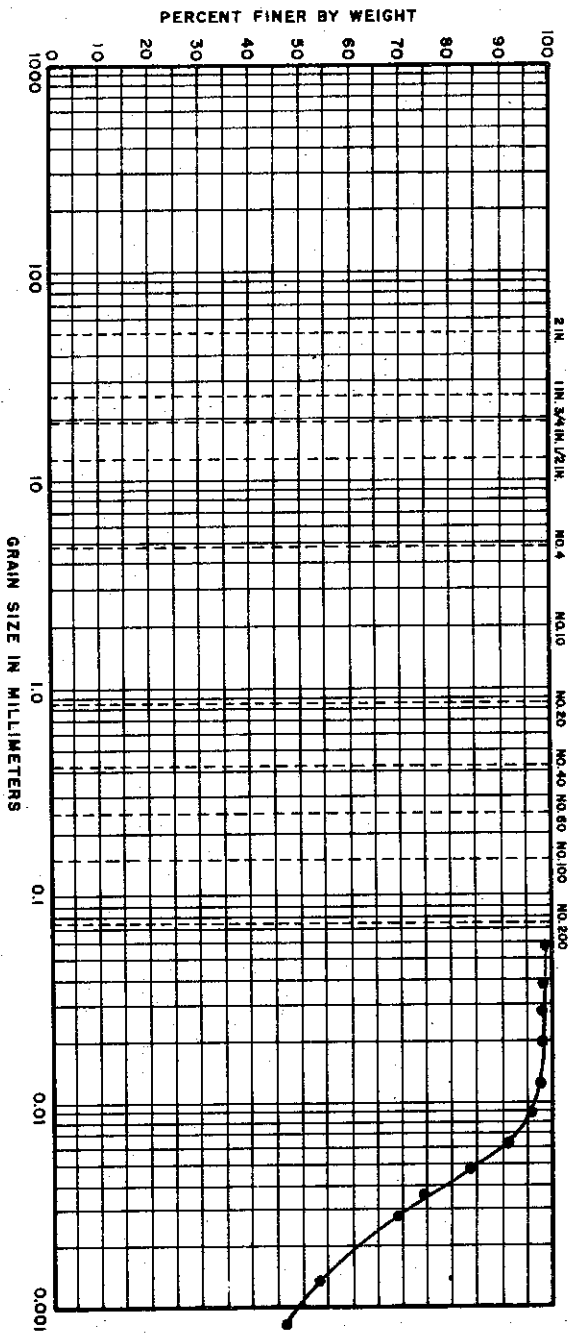
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-612

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

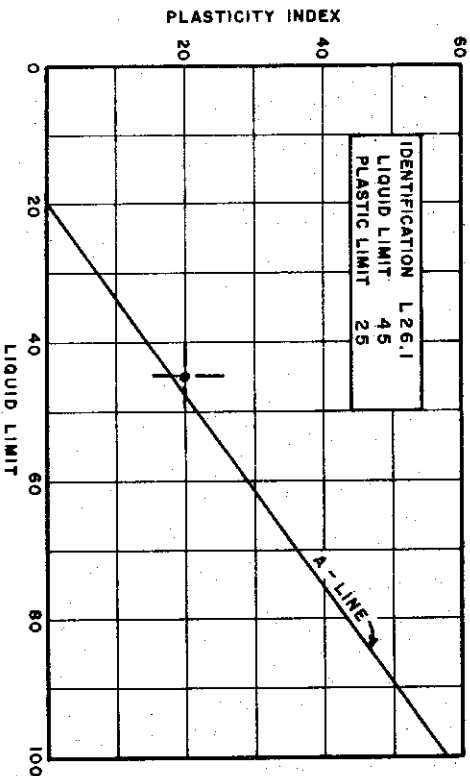
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L 26.1  
LIQUID LIMIT 45  
PLASTIC LIMIT 25

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 38

SAMPLE : 24

DEPTH : 114.2' TO 114.5'

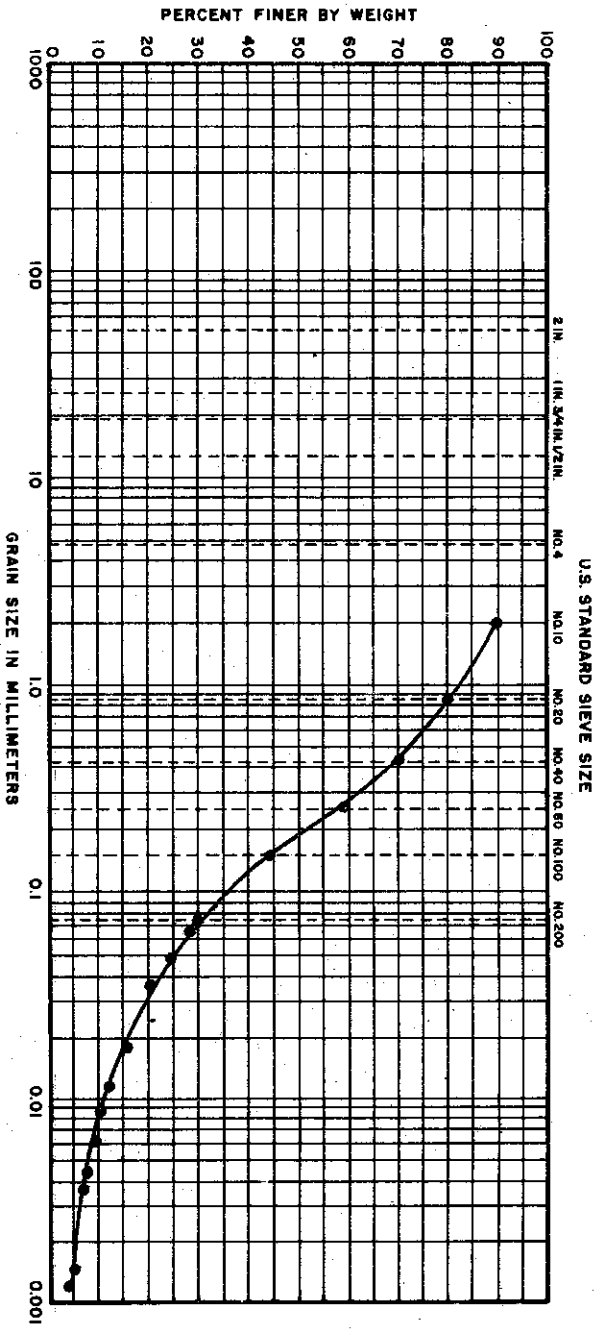
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255

DATE JAN. 74

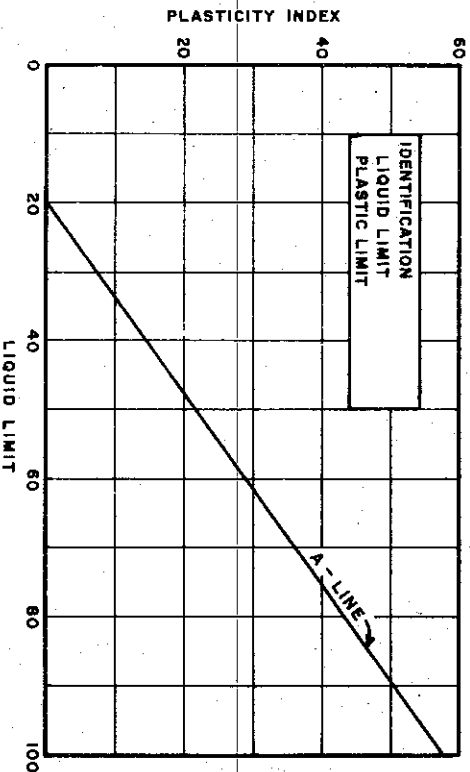
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY SAND (SM)  
 EXPLORATION: BORING 38  
 SAMPLE : SS30  
 DEPTH : 138.5' TO 140.0'  
 SPECIFIC GRAVITY : USED 2.70

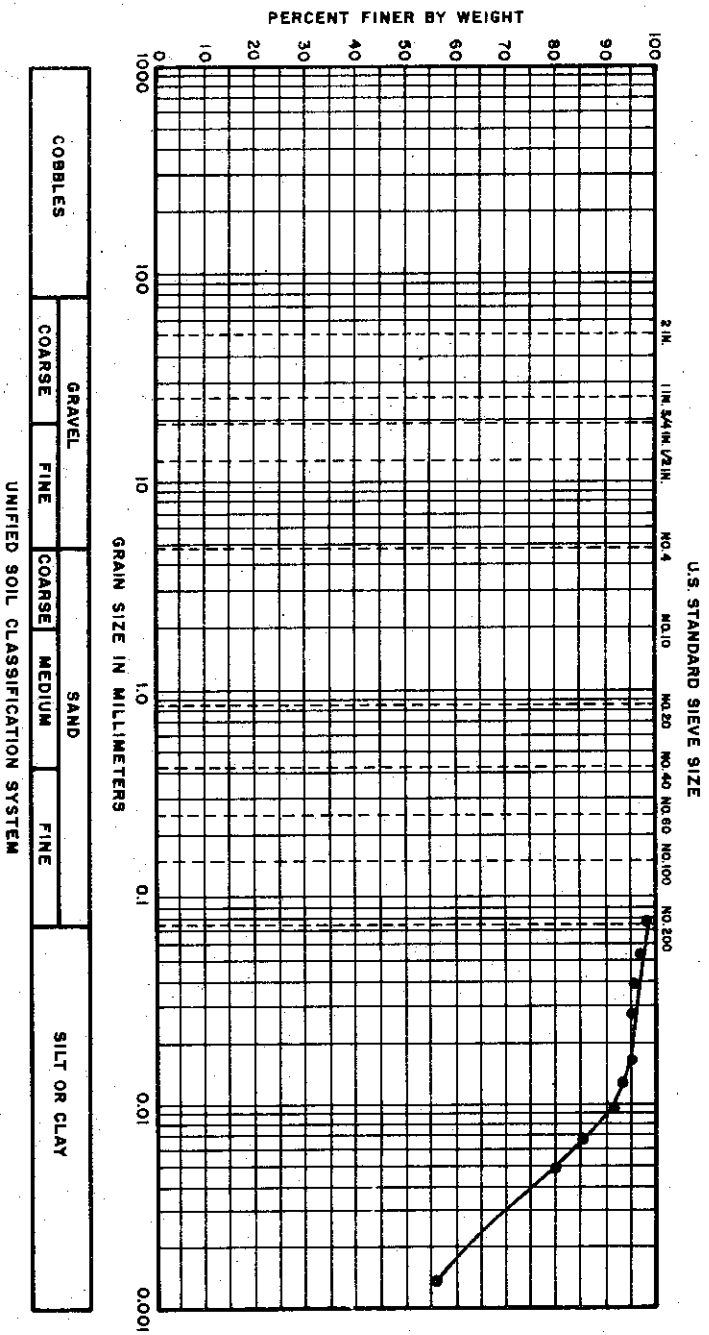
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-614

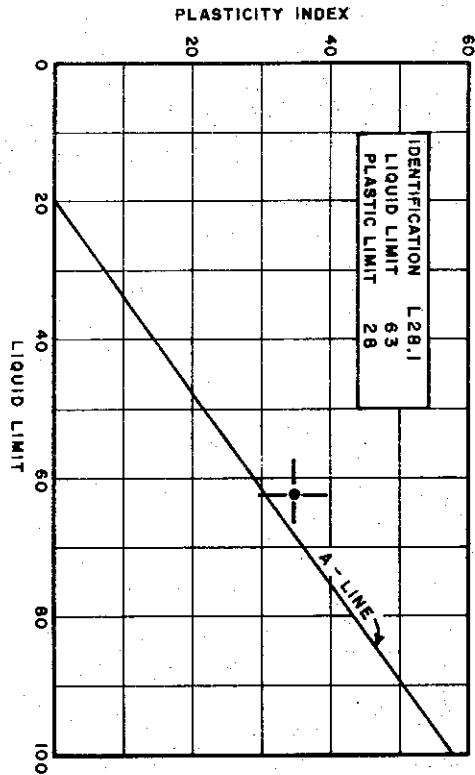
FILE NO. 1255 DATE JAN. 74



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



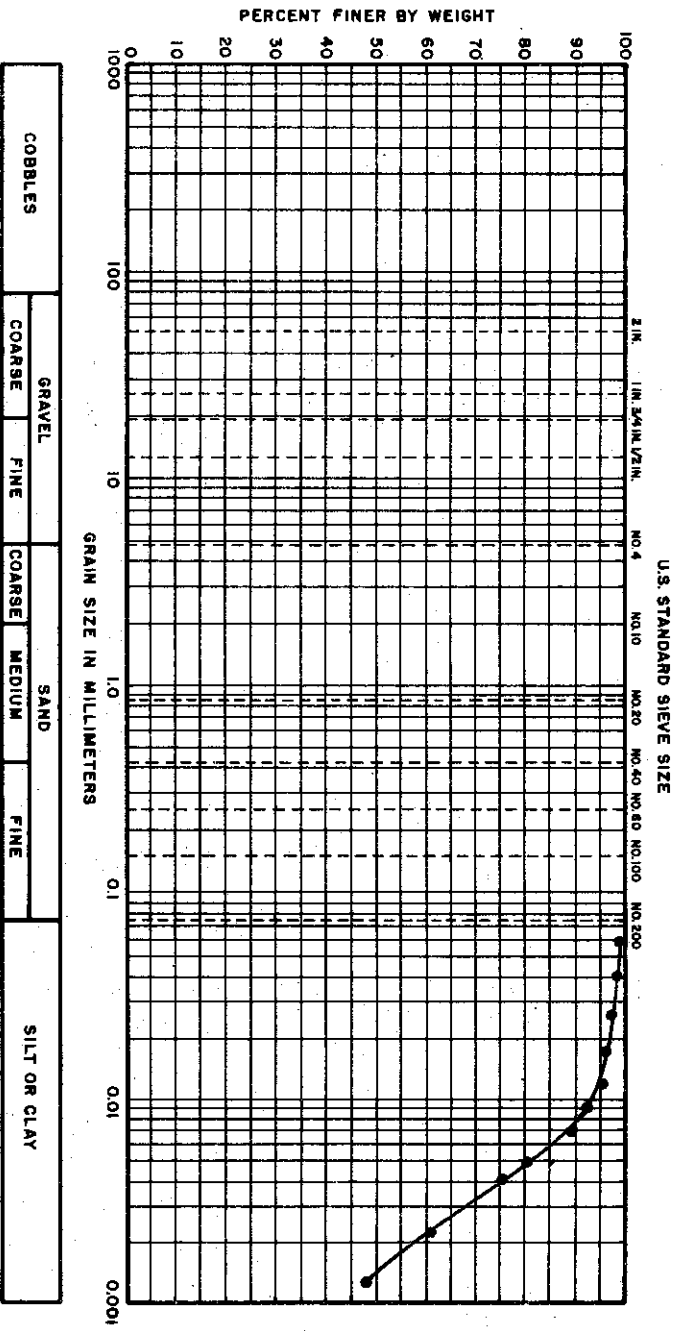
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION : BORING 41  
 SAMPLE : 2  
 DEPTH : 4.5' TO 4.8'  
 SPECIFIC GRAVITY : USED 2.70

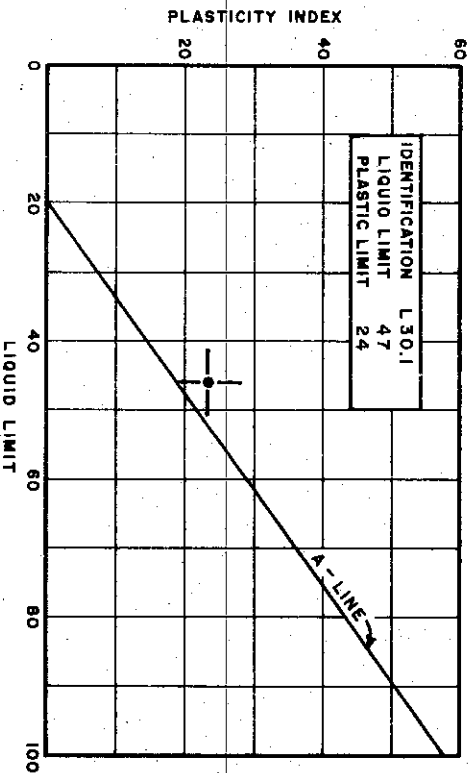
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

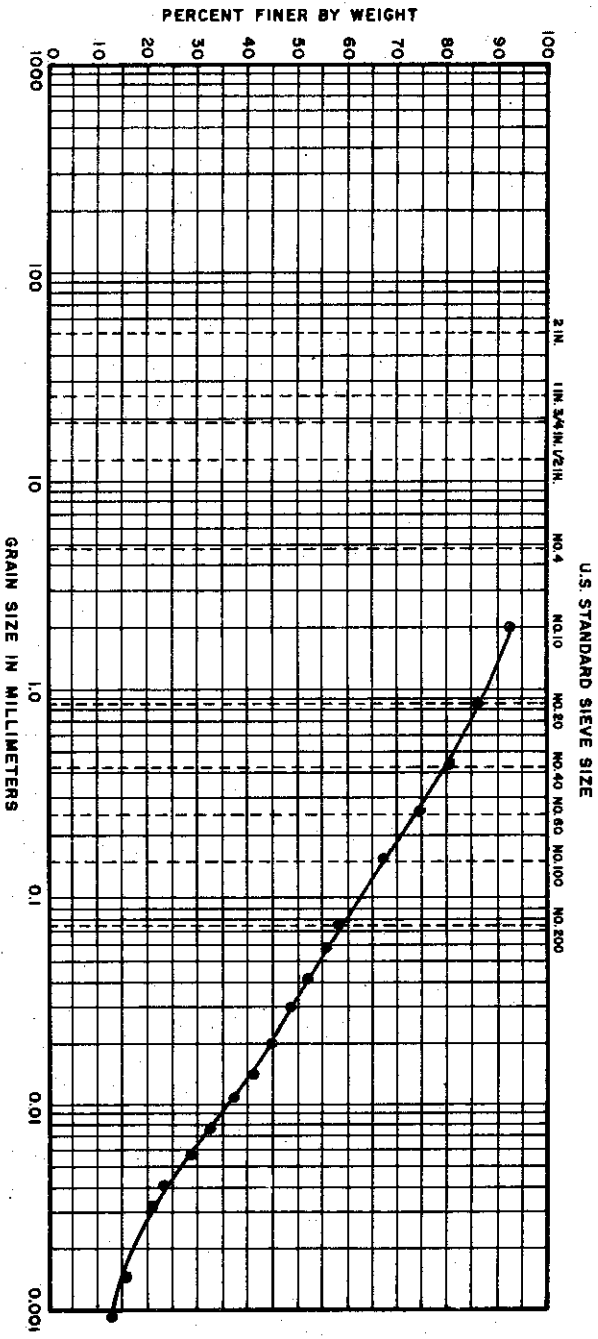
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 7  
 DEPTH : 20.6' TO 21.0'  
 SPECIFIC GRAVITY = 2.66

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

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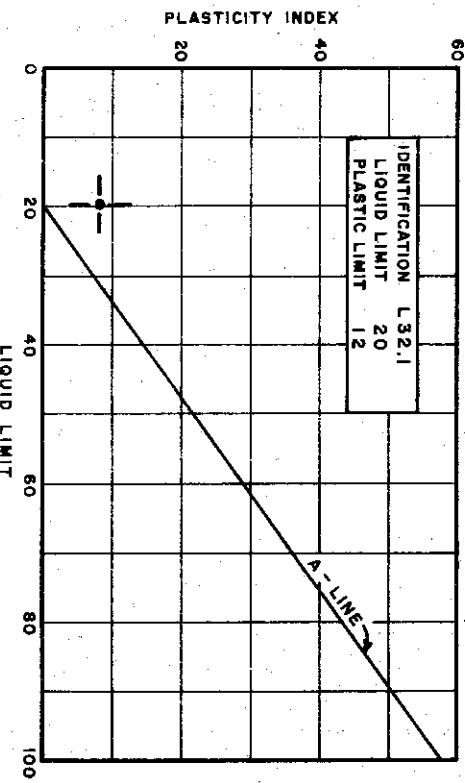
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



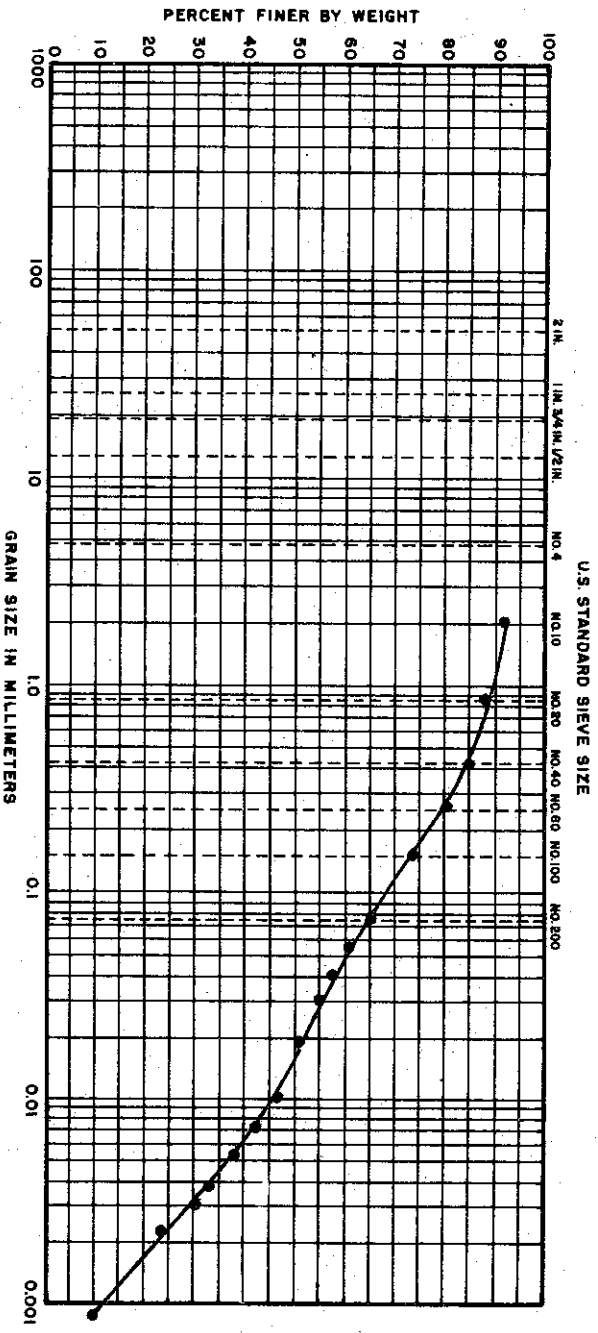
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (SC)  
 EXPLORATION: BORING 41  
 SAMPLE : II  
 DEPTH : 40.7' TO 41.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

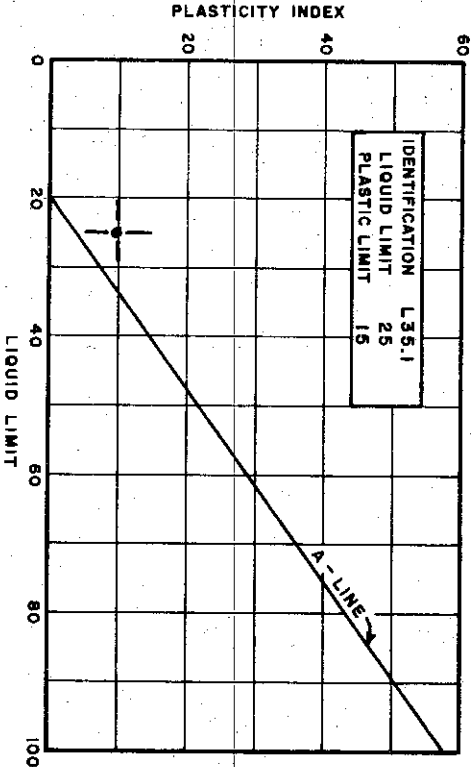
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL			SAND			SILT OR CLAY
	COARSE	FINE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY; ZONES OF SAND (CL-SC)  
 EXPLORATION: BORING 4I  
 SAMPLE : 17  
 DEPTH : 72.9' TO 73.2'  
 SPECIFIC GRAVITY = 2.68

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

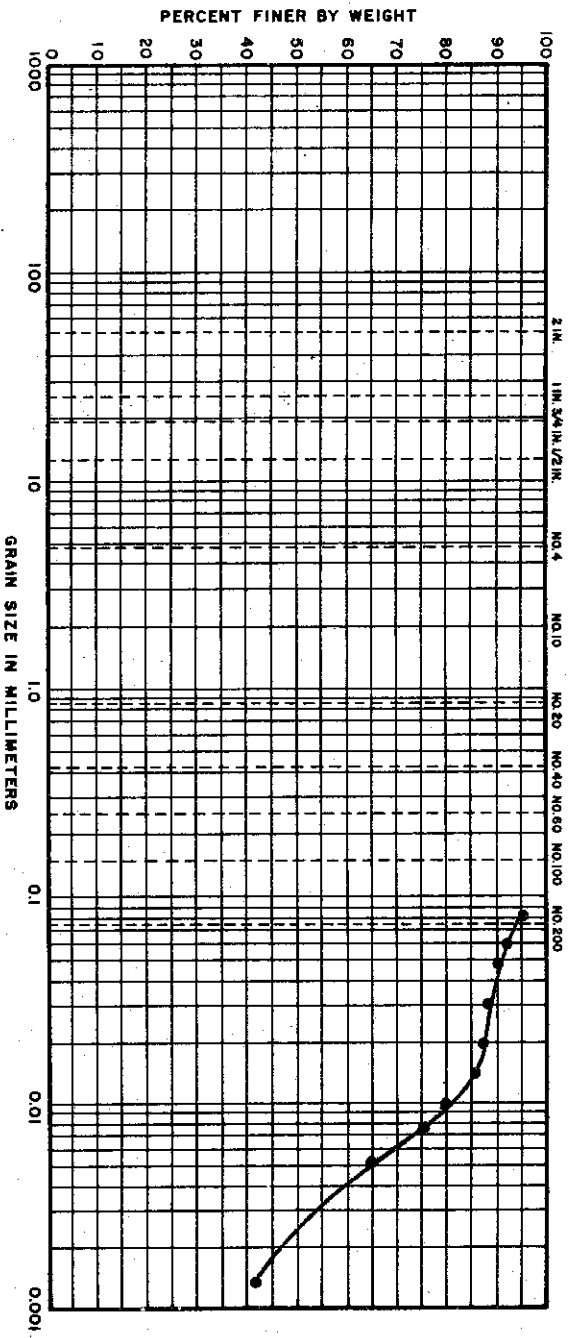
C-618

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

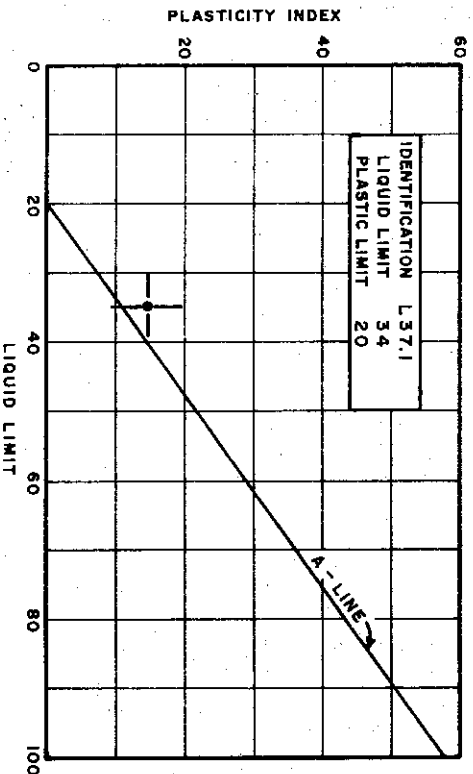
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



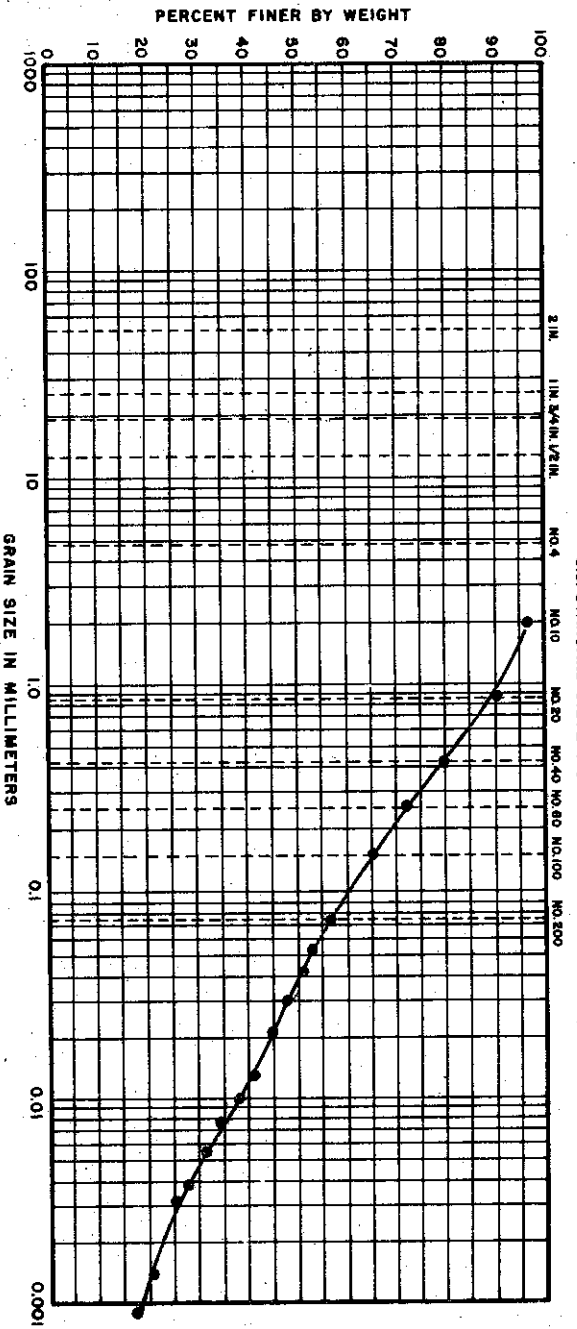
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 23  
 DEPTH : 101.9' TO 102.2'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

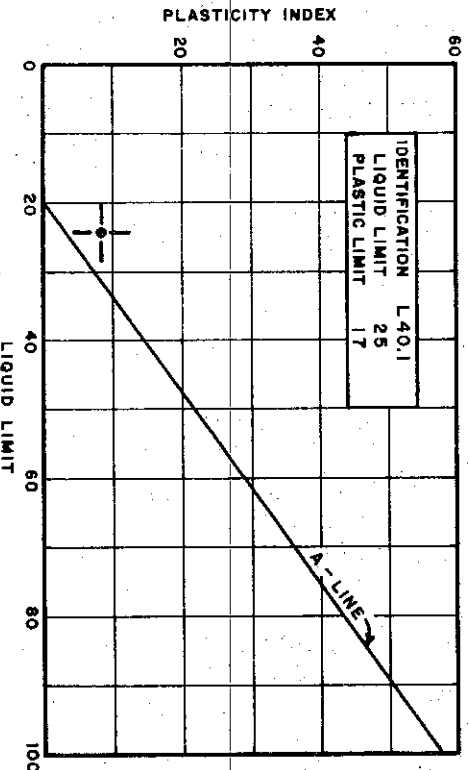
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (GC-SC)  
 EXPLORATION: BORING 41  
 SAMPLE : 29  
 DEPTH : 130.7' TO 130.9'  
 SPECIFIC GRAVITY = 2.69

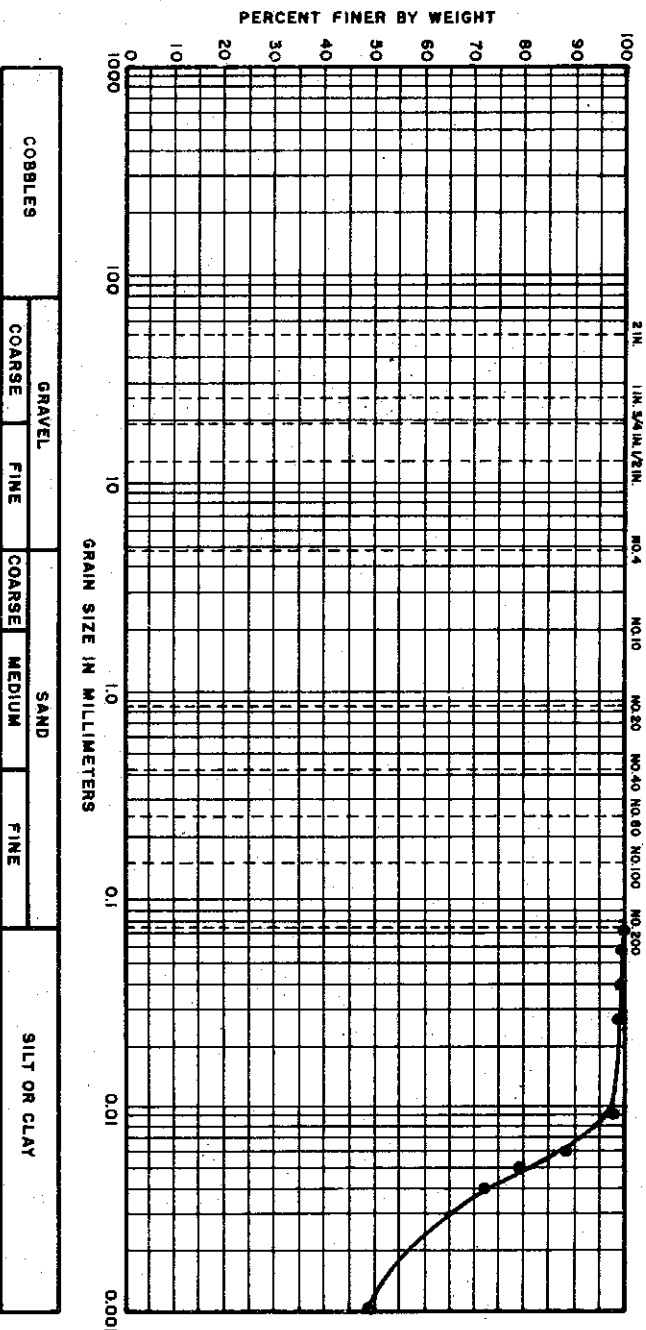
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-620

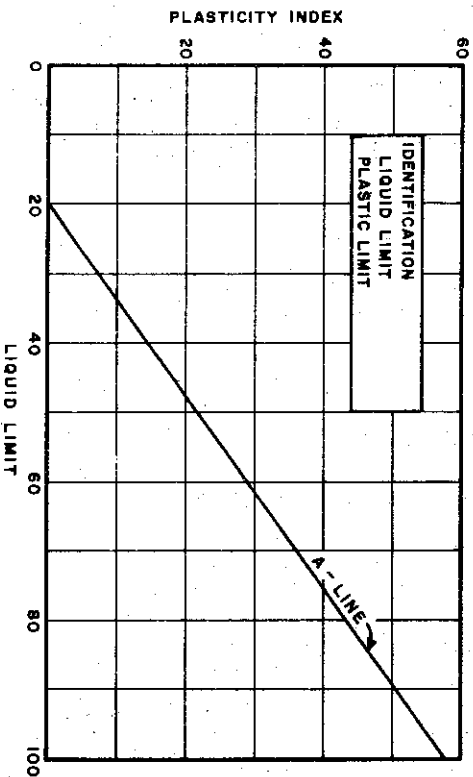
FILE NO. 1255 DATE JAN. 74

## GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



## PLASTICITY CHART (COHESIVE SOIL ONLY)



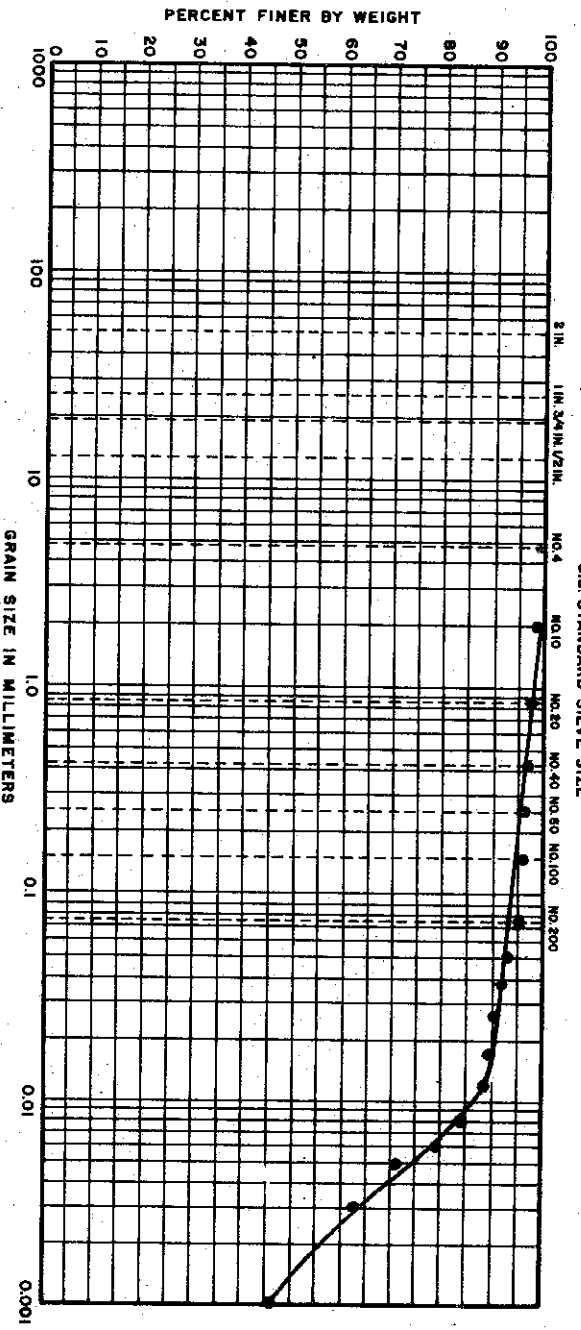
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 48  
 SAMPLE : 4  
 DEPTH : 8' - 10'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255      DATE MARCH 74

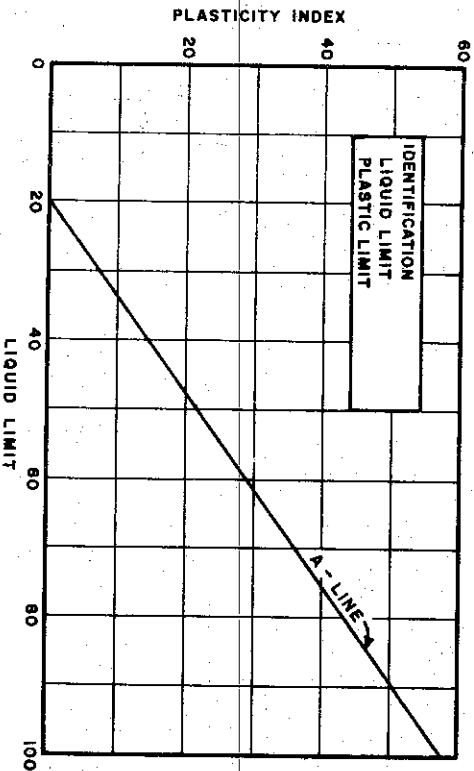
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 48  
 SAMPLE : 26  
 DEPTH : 118' - 120.6'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

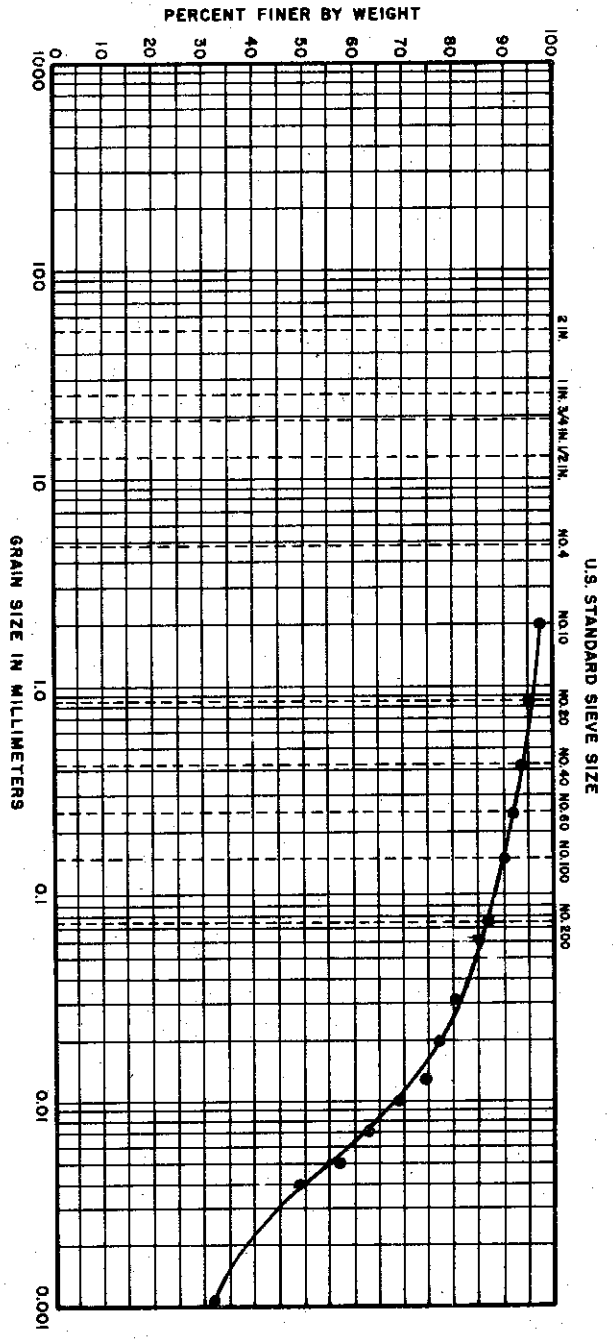
C-622

FILE NO. 1255

DATE MARCH 74



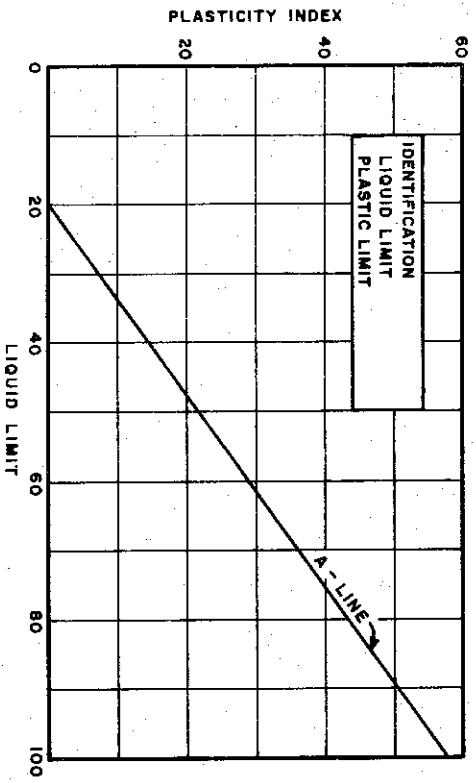
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



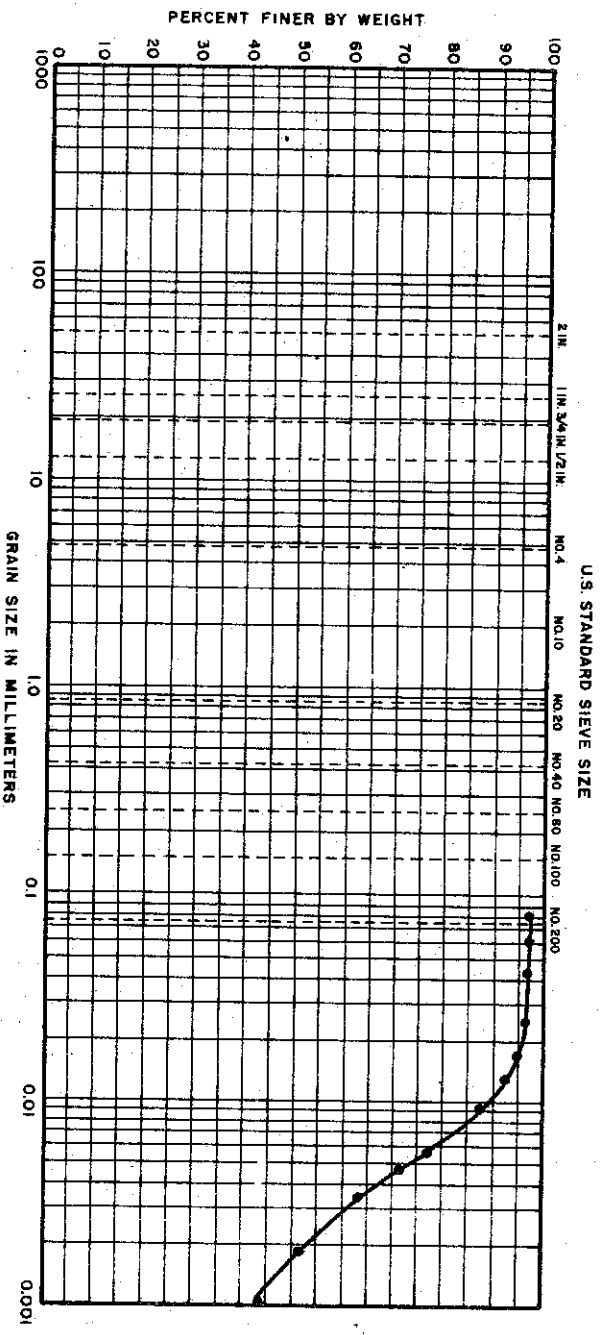
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 49  
 SAMPLE : 7  
 DEPTH : 53' - 55'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

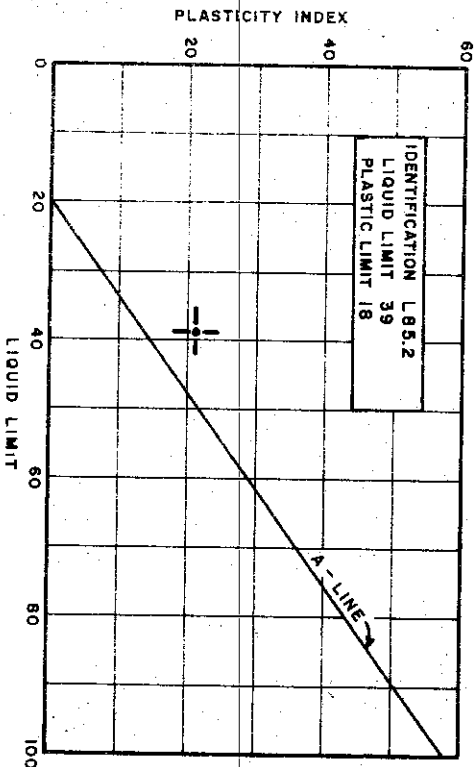
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 6  
 DEPTH: 28.3' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

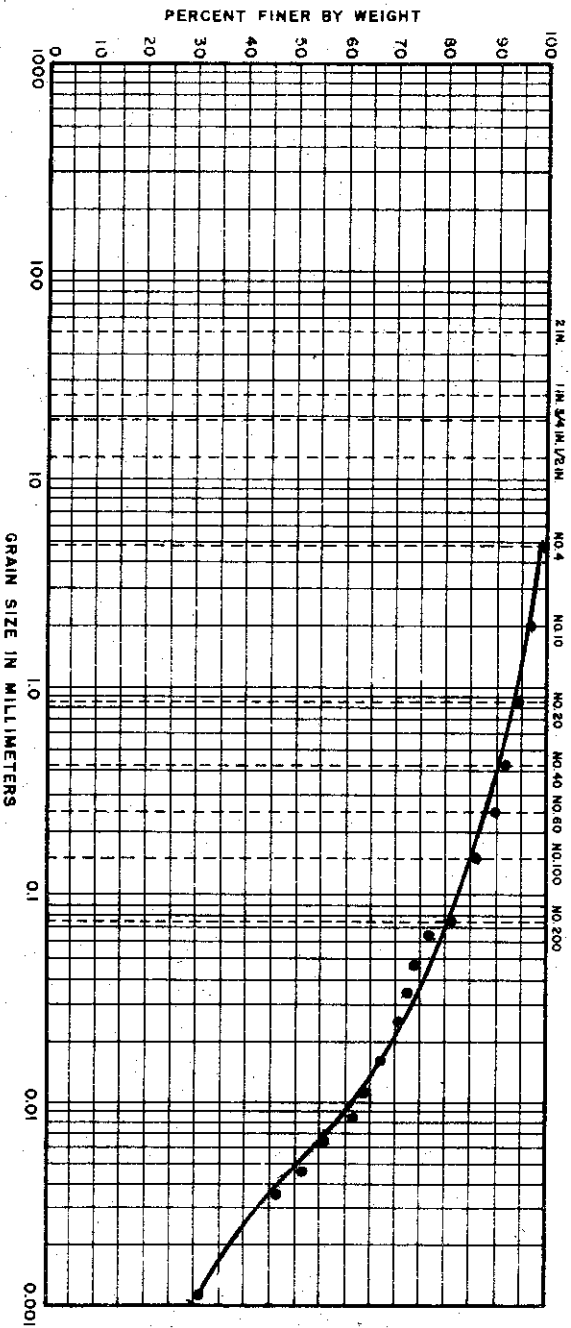
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

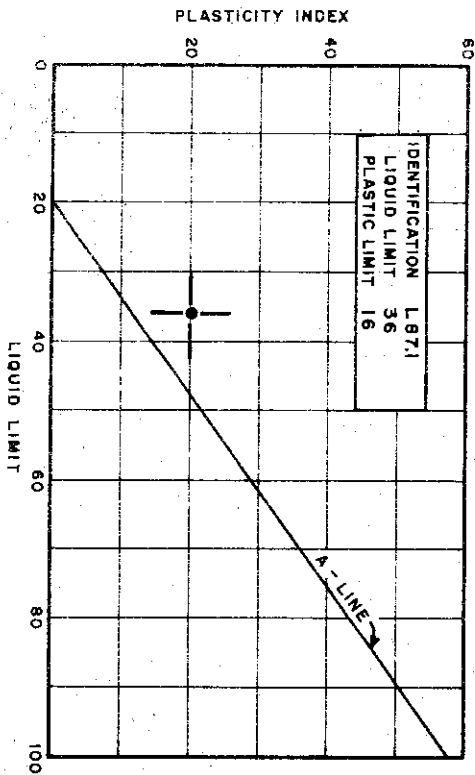
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

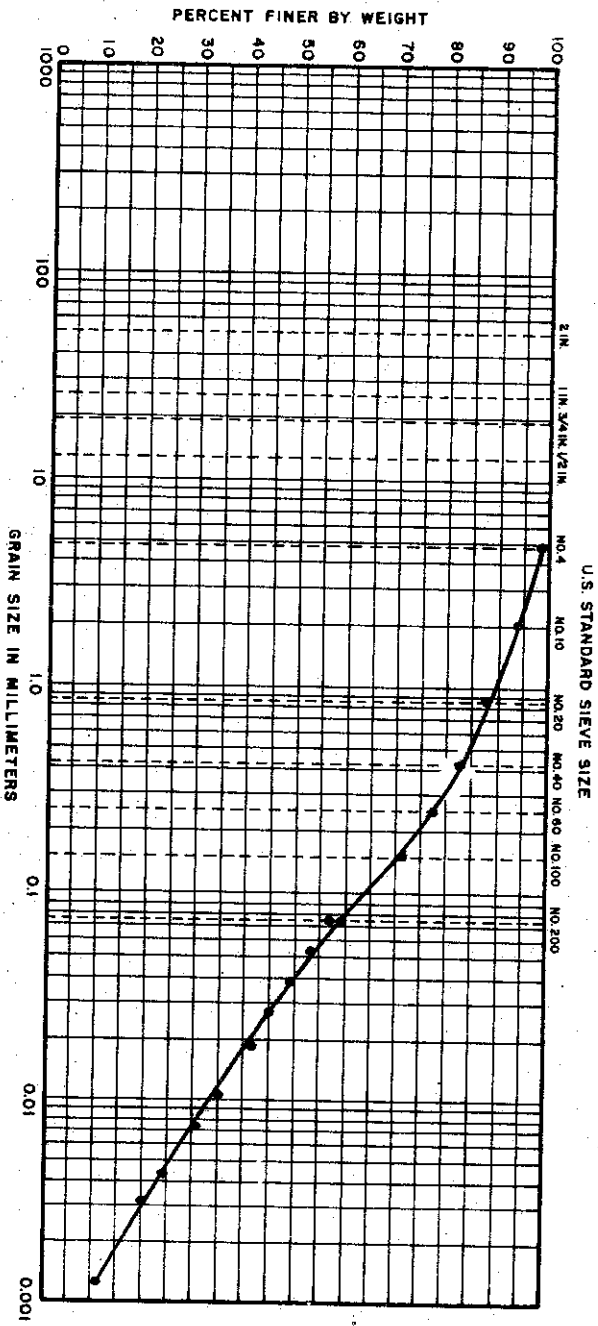


### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 10  
 DEPTH: 48.6' TO 48.8'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

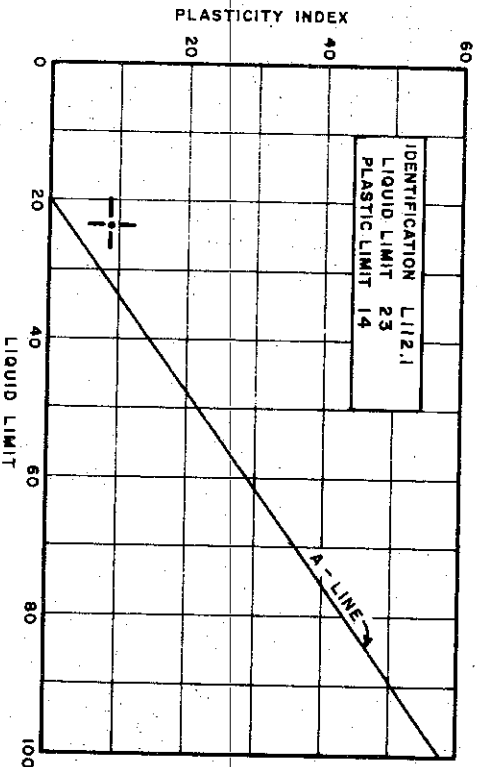
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL.)  
 EXPLORATION: BORING 52  
 SAMPLE : 7  
 DEPTH : 58.6' TO 58.9'  
 SPECIFIC GRAVITY: USED 2.70

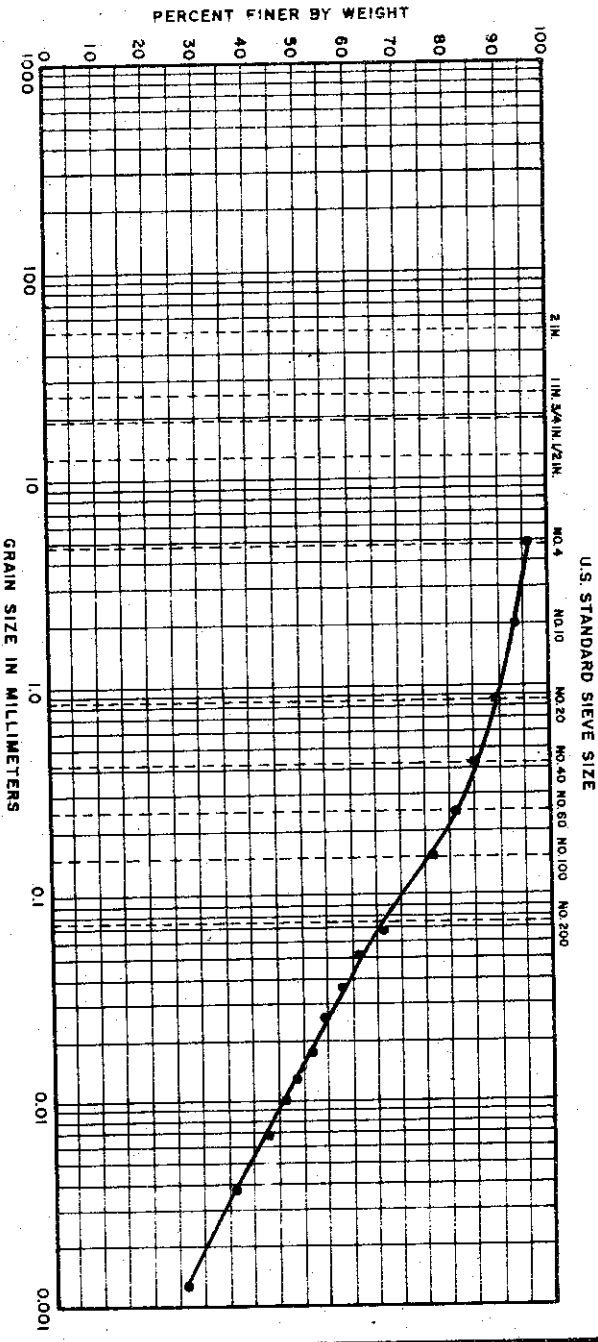
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974

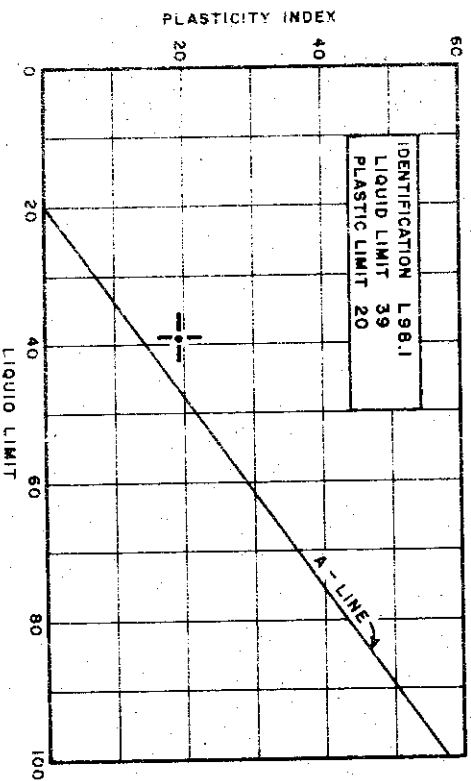
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

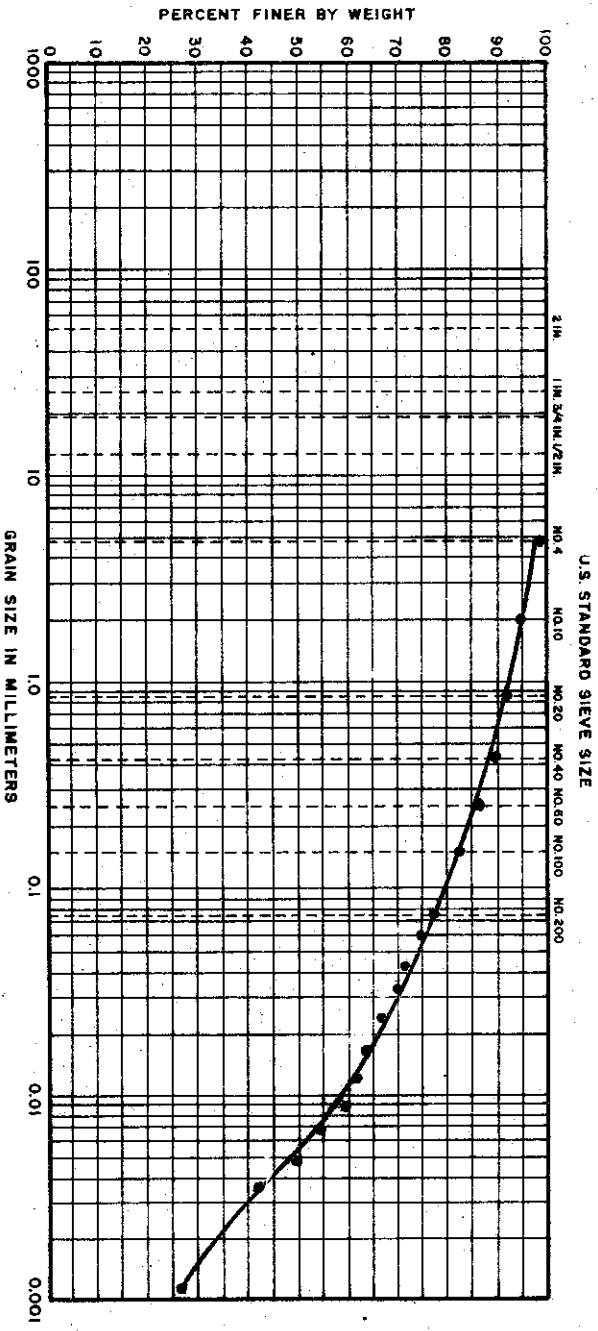
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING: 53  
 SAMPLE: 5  
 DEPTH: 39.8' TO 39.8'  
 SPECIFIC GRAVITY: 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

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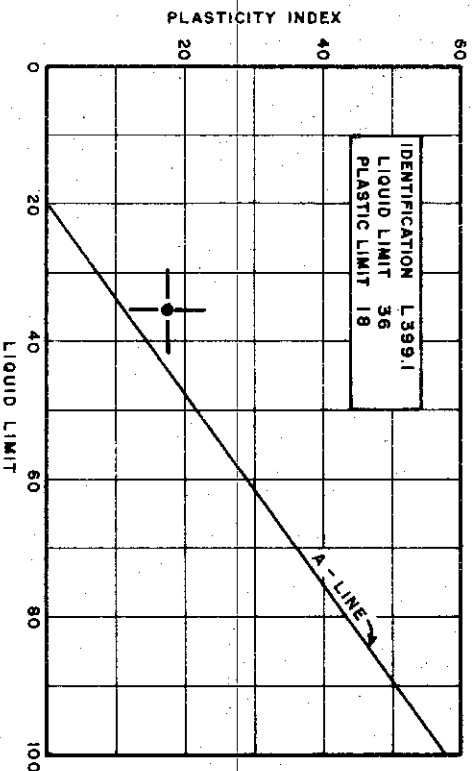
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

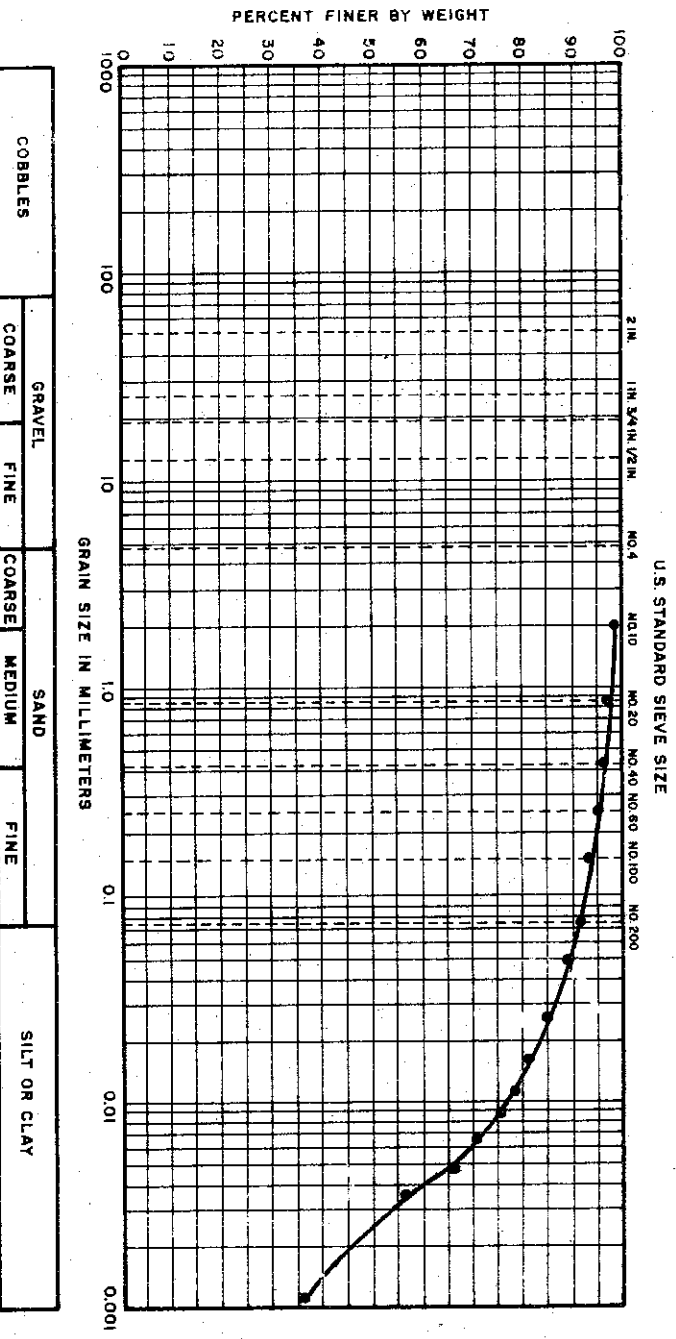
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 54  
 SAMPLE: 6  
 DEPTH: 63.5' TO 63.8'  
 SPECIFIC GRAVITY: 2.71

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

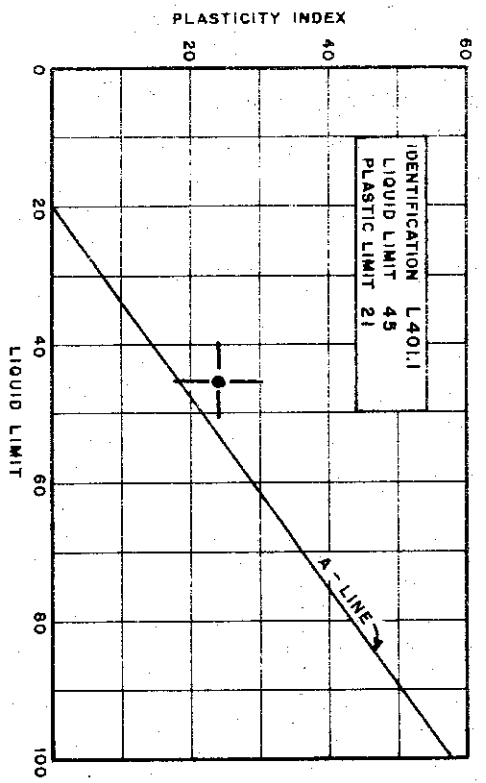
C-628

FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

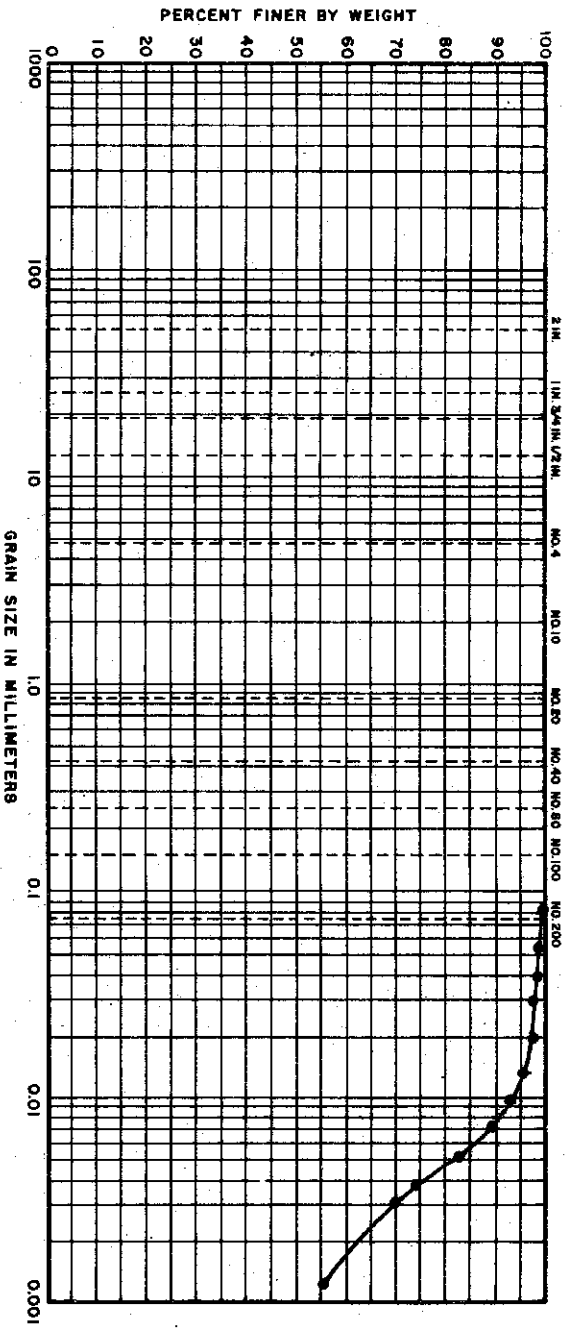
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 54  
 SAMPLE: 8  
 DEPTH: 73.7' TO 74.0'  
 SPECIFIC GRAVITY: 2.73

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

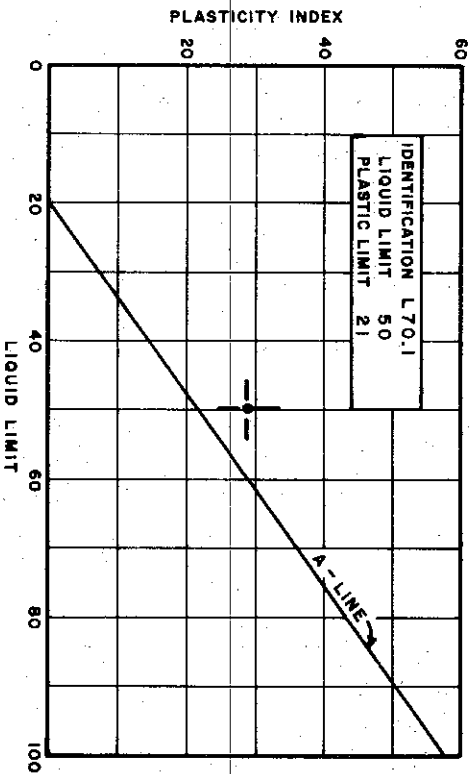
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL - CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS1  
 DEPTH : 5.0' TO 6.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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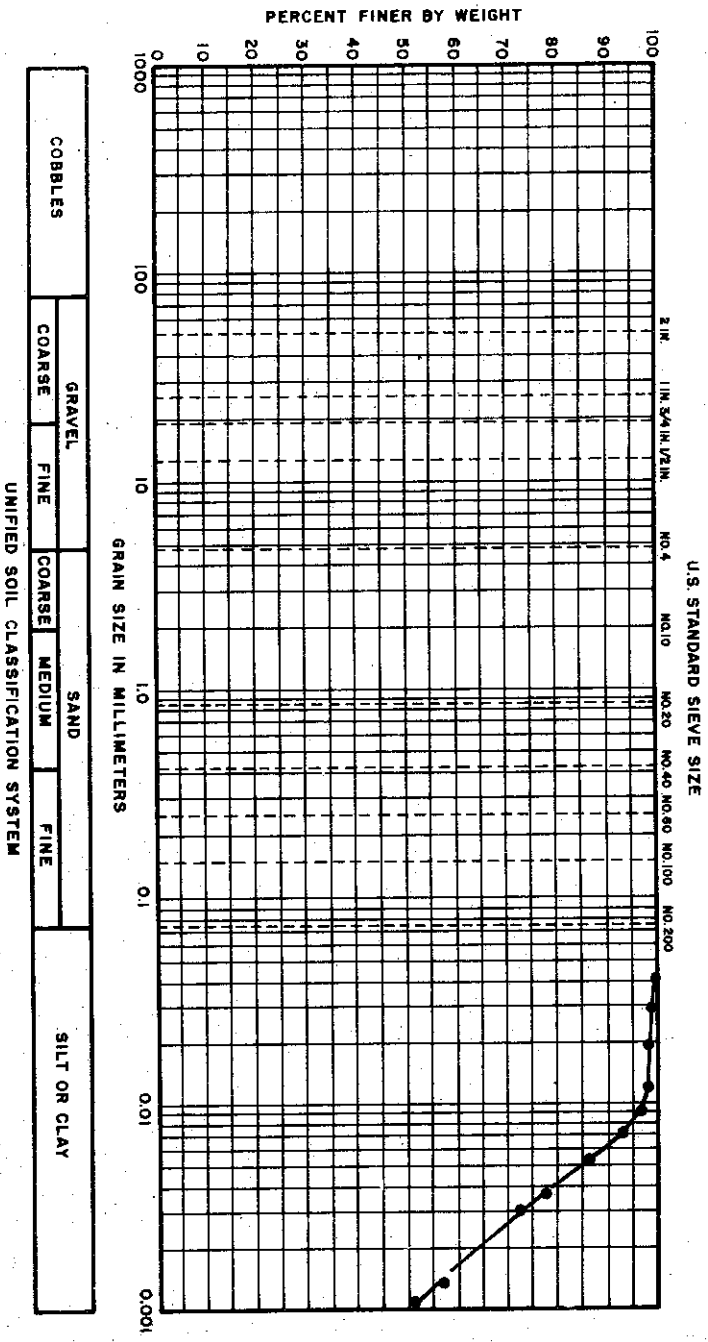
GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

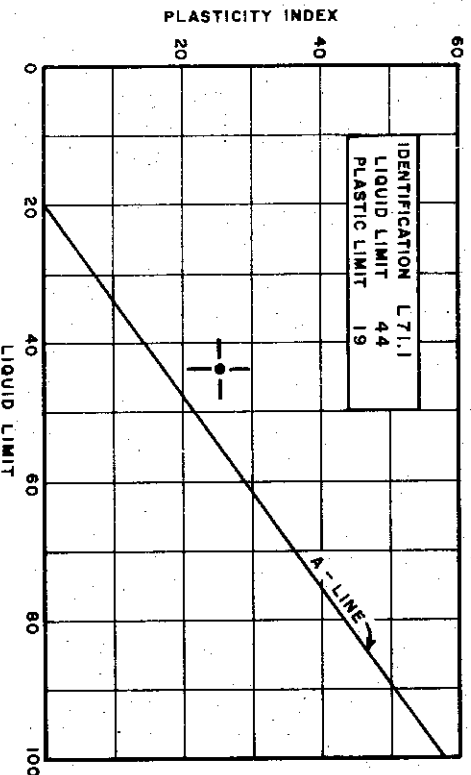
DATE JAN. 74



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 60

SAMPLE : SS2

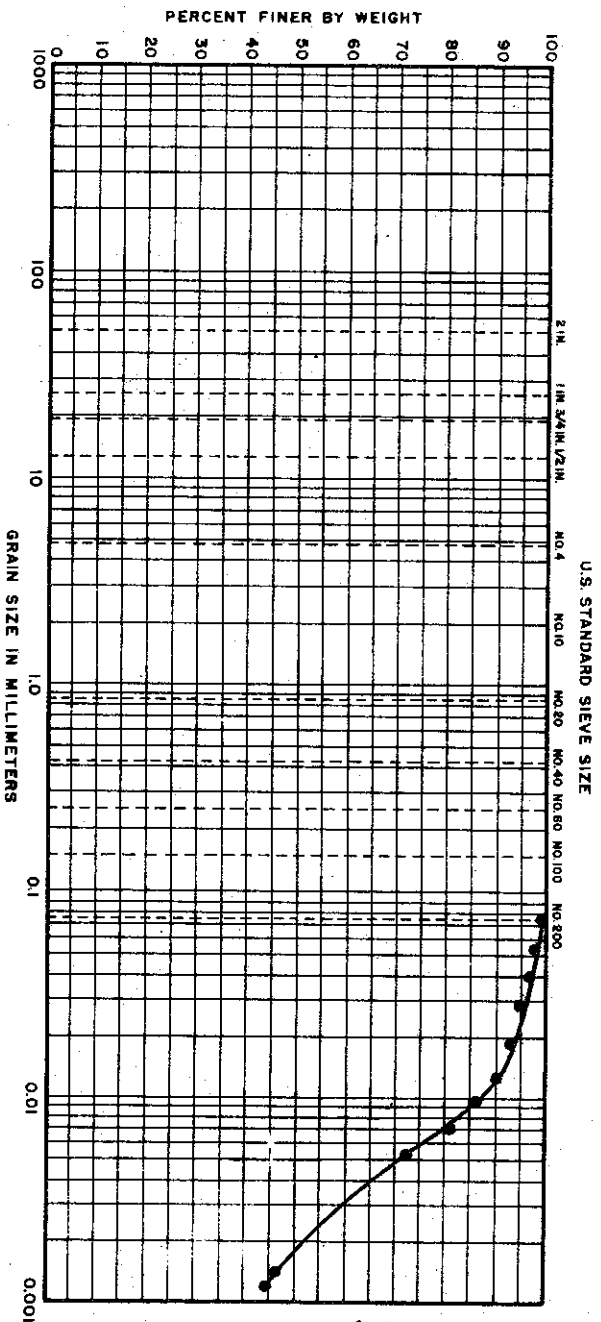
DEPTH : 10' TO 12.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

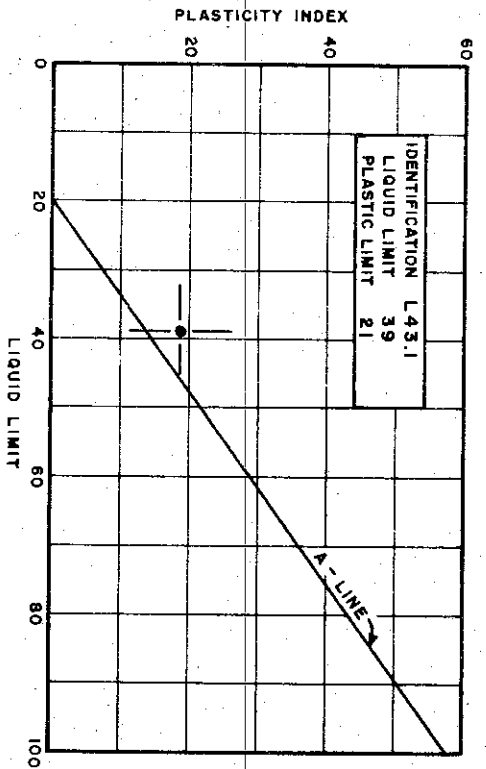
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE: 3  
 DEPTH: 18.1' TO 18.3'  
 SPECIFIC GRAVITY ASSUMED 2.70

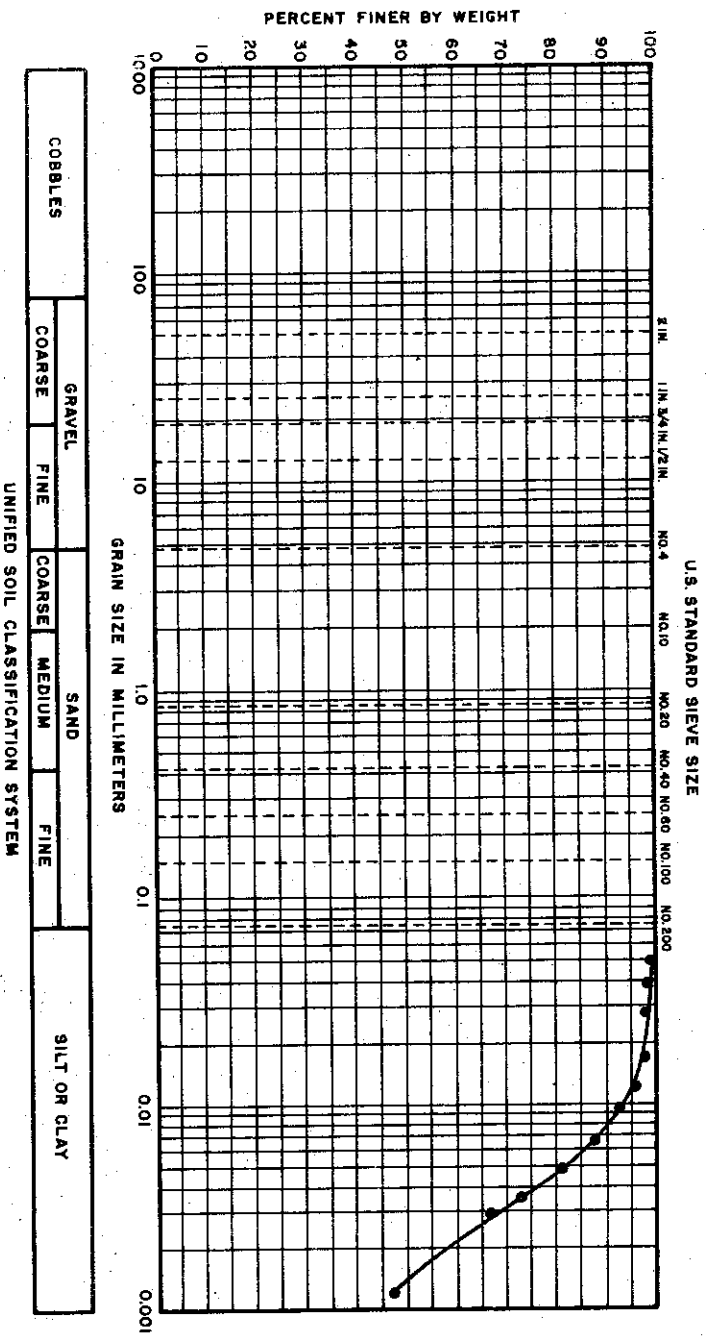
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-632

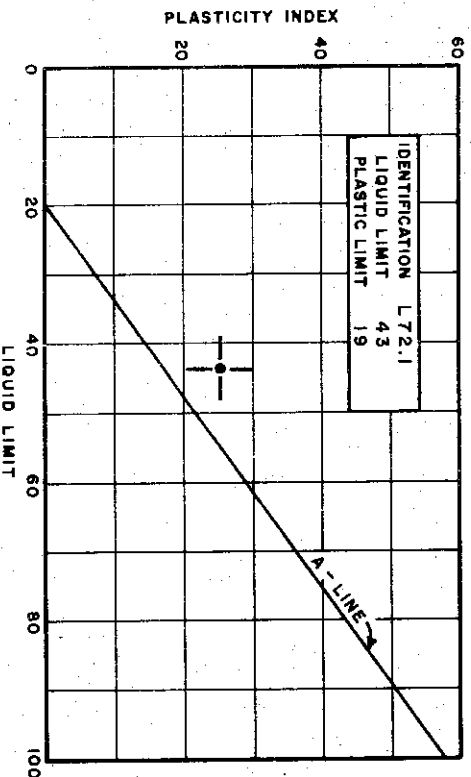
FILE NO. 1255

DATE MARCH 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 60

SAMPLE : 553

DEPTH : 19' TO 20.5'

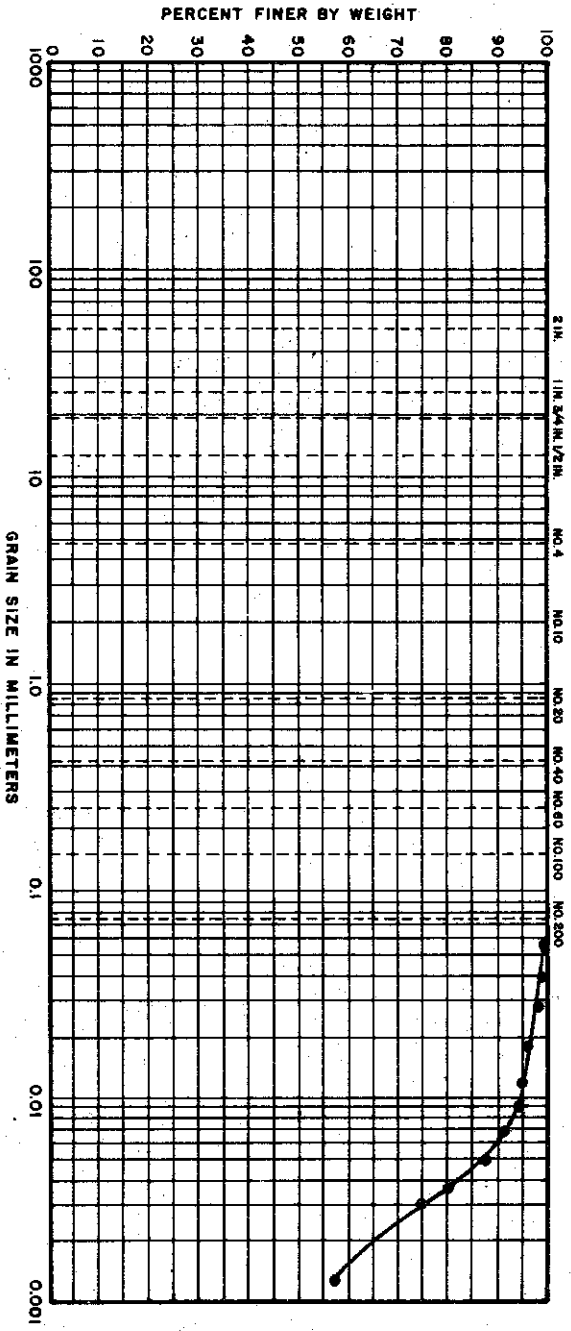
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

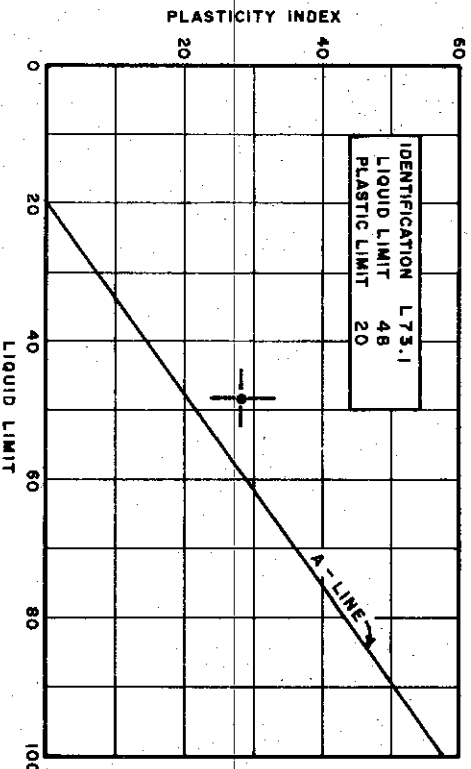
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

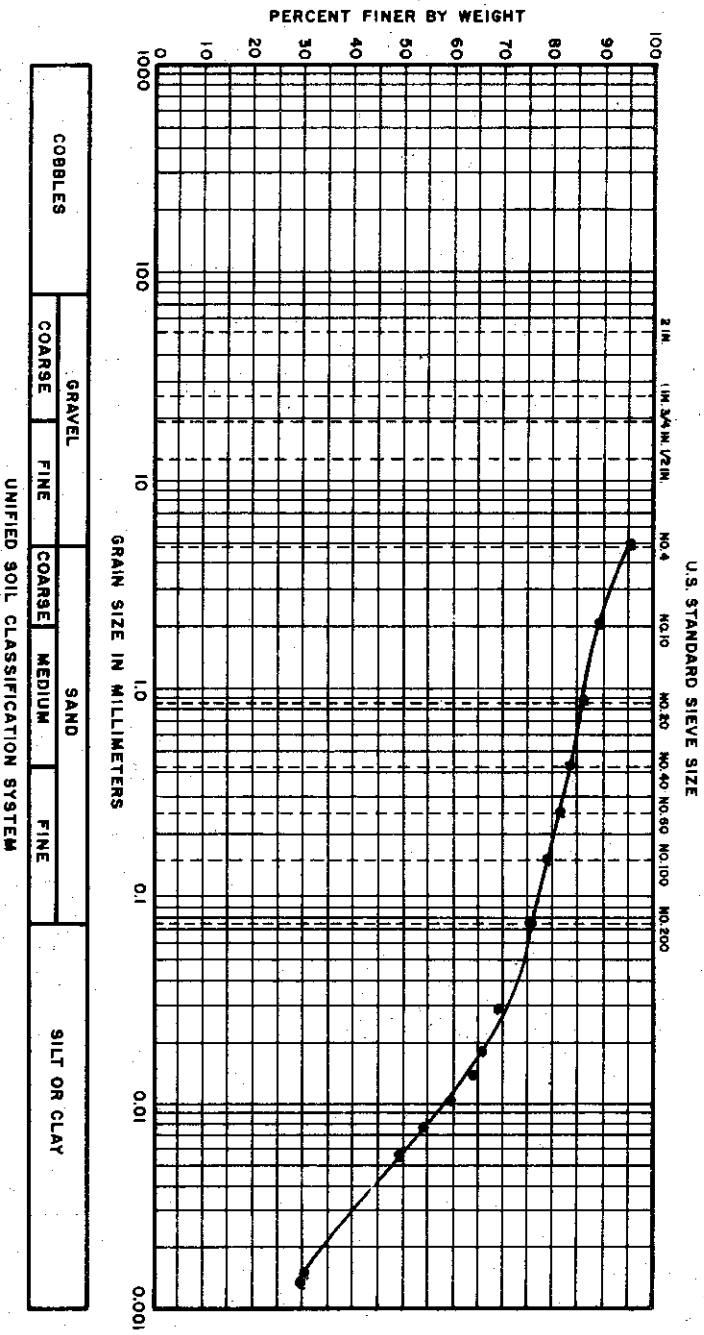
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS 5  
 DEPTH : 27' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

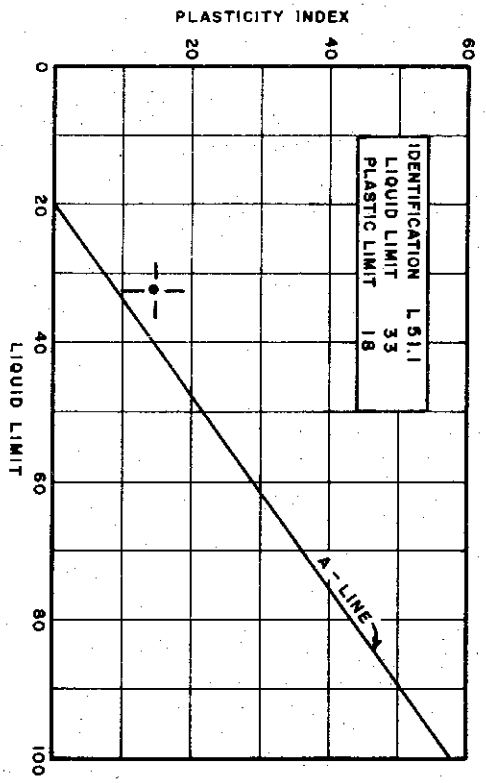
C-634

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



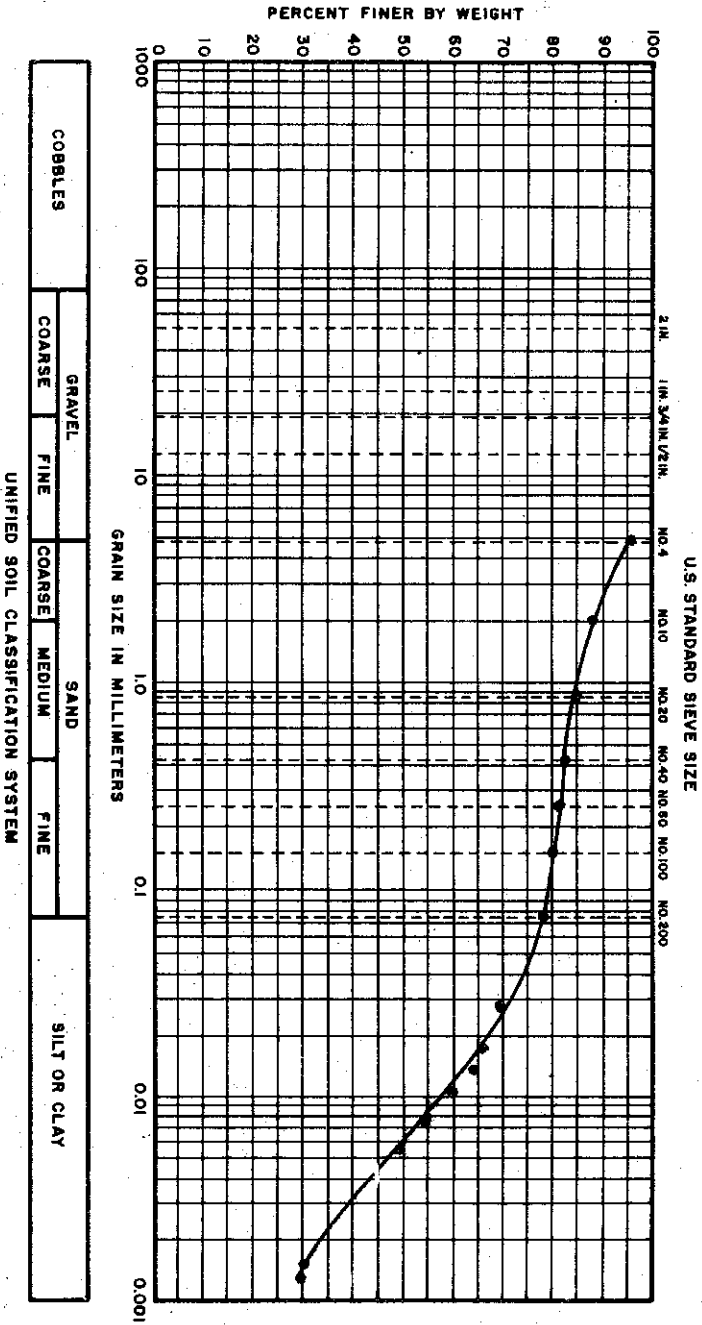
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 11  
 DEPTH : 56.1' TO 56.4'  
 SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

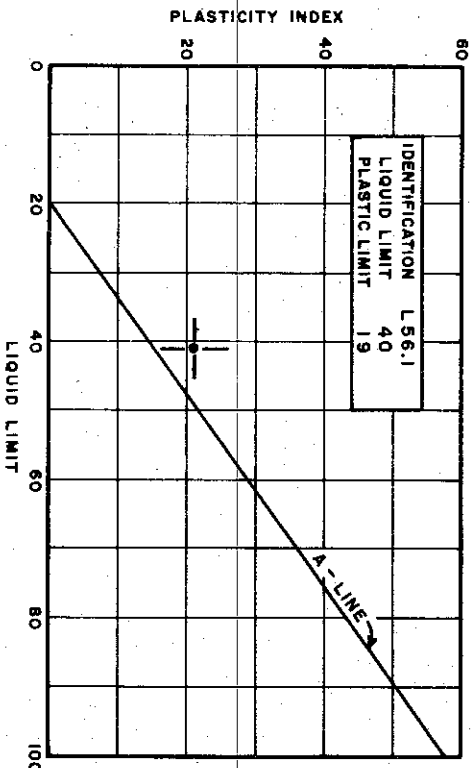
FILE NO. 1255  
 DATE MARCH 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART

(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

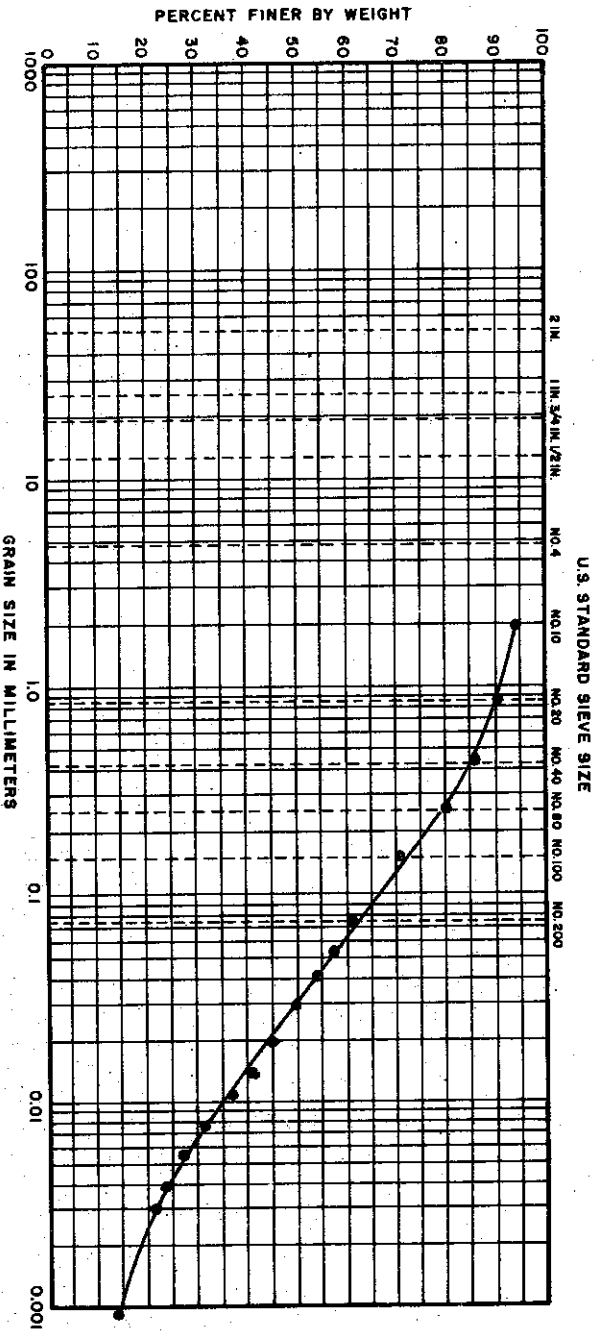
IDENTIFICATION : SILTY CLAY (CL)  
EXPLORATION: BORING 60  
SAMPLE : 16  
DEPTH : 85.6' TO 86.1'  
SPECIFIC GRAVITY 2.73

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE MARCH 74

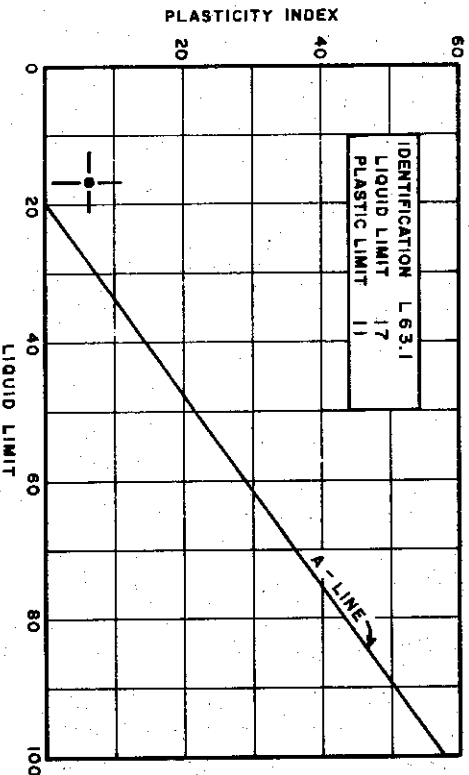
## GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL					SAND				
	COARSE	FINE	COARSE	MEDIUM	FINE		FINE	MEDIUM	COARSE	FINE

UNIFIED SOIL CLASSIFICATION SYSTEM

## PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)

EXPLORATION: BORING 60

SAMPLE : 23

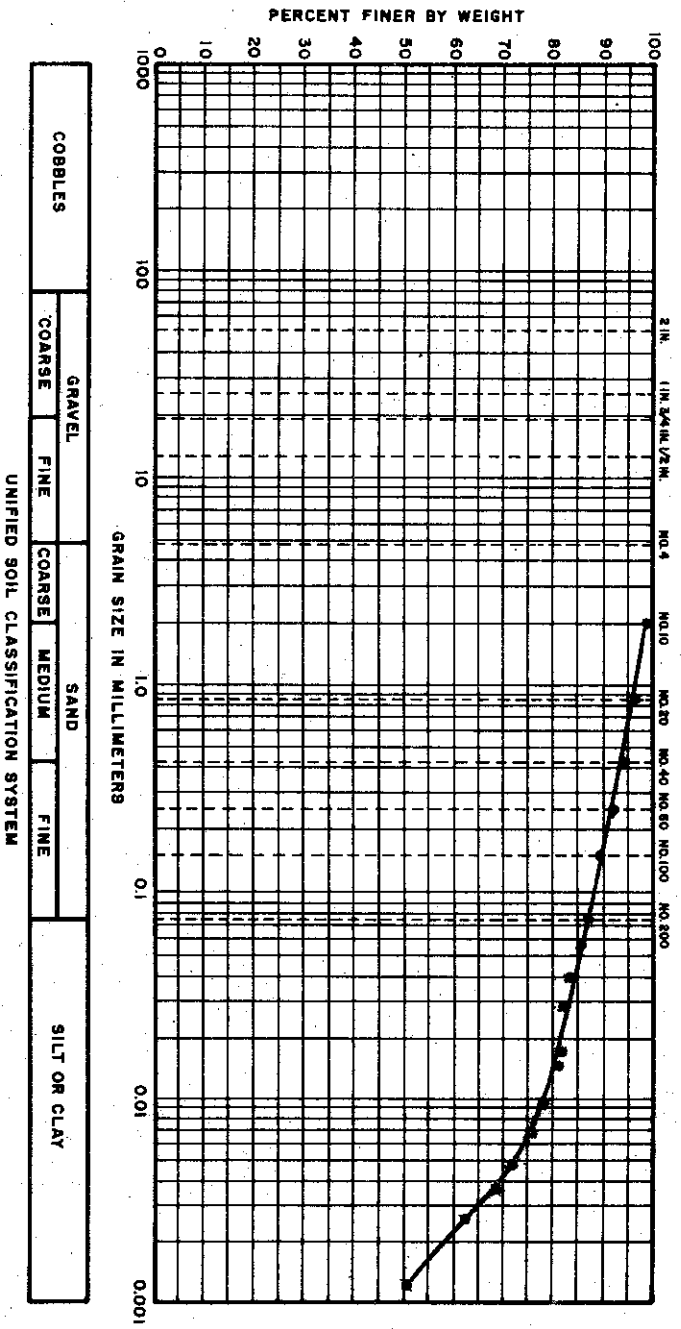
DEPTH : 119.5' TO 119.9'

SPECIFIC GRAVITY : USED 2.70

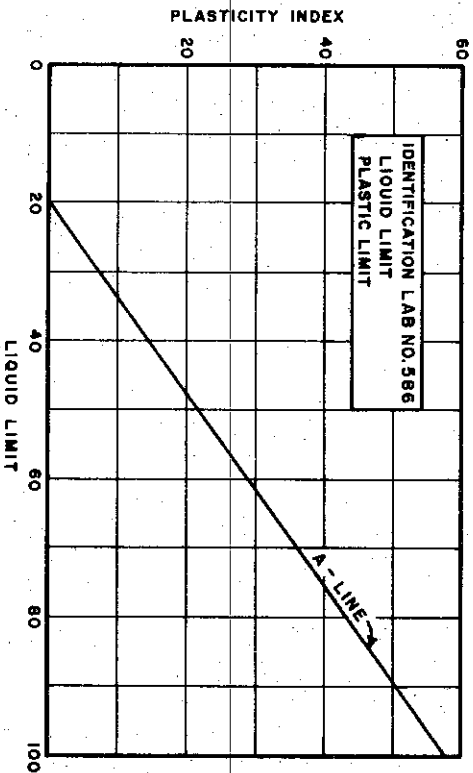
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255      DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 137  
 SAMPLE : SS1  
 DEPTH : 1.5' TO 3.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

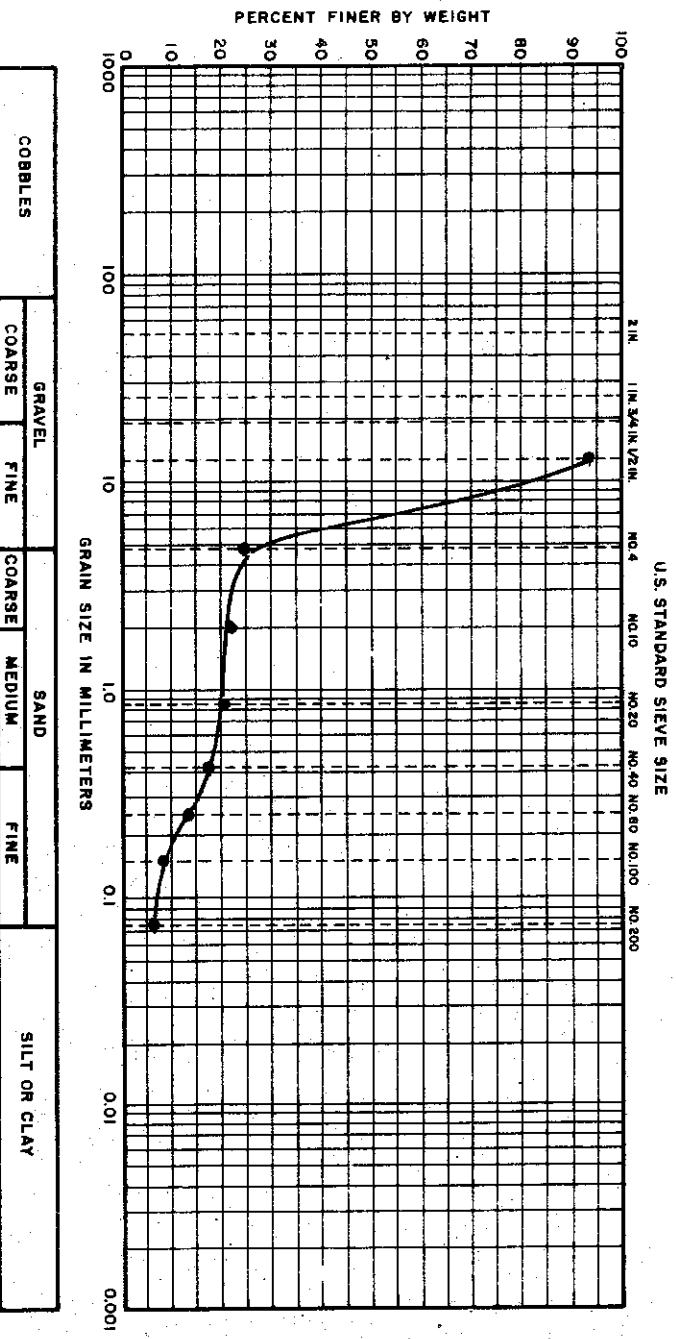
C-638

FILE NO. 1255

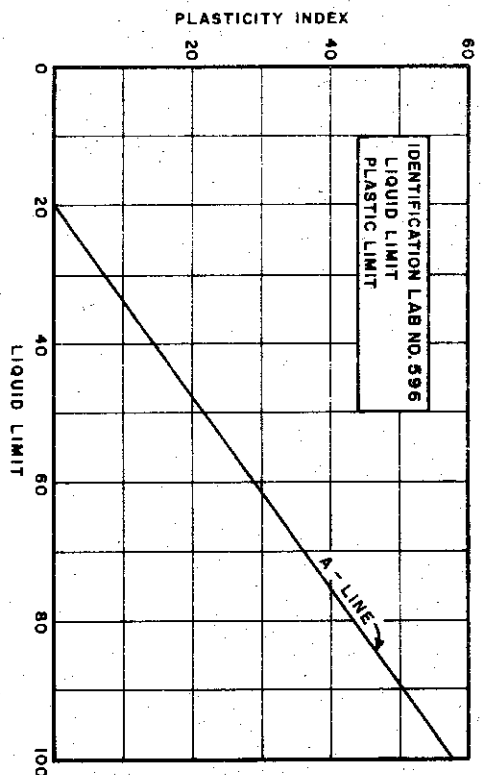
DATE NOV. 1974



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : GRAVEL (GP)  
 EXPLORATION: BORING 139  
 SAMPLE : SS22  
 DEPTH : 99.5' TO 101.0'

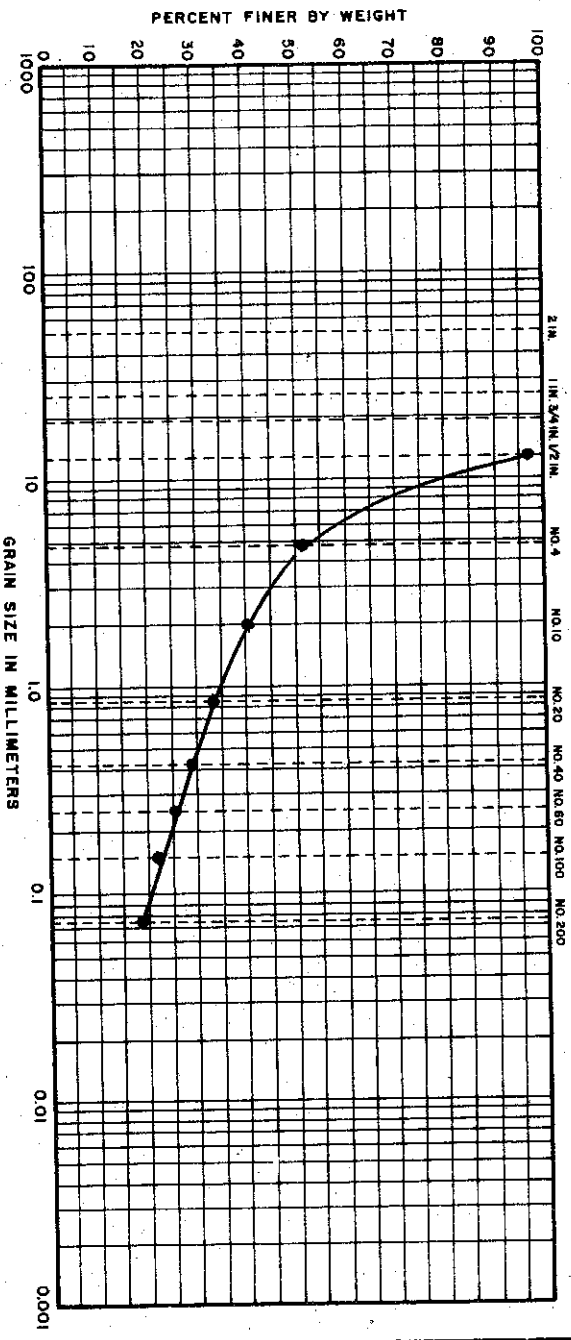
SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255      DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE

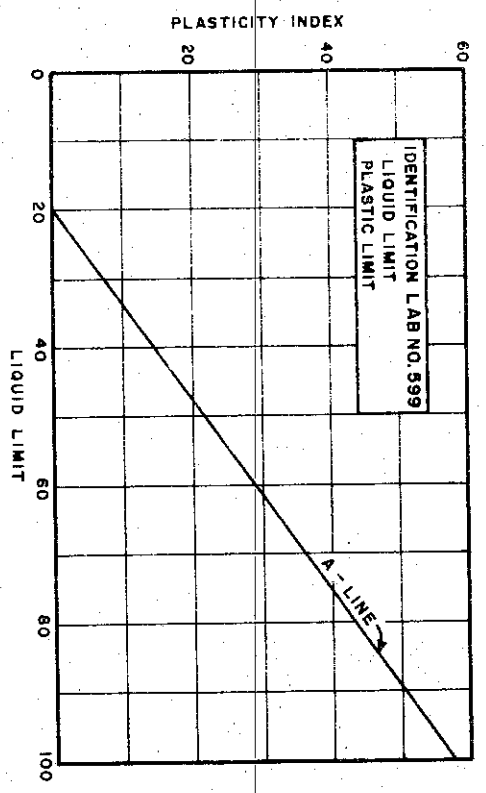


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART

(COHESIVE SOIL ONLY)



IDENTIFICATION LAB NO. 599  
LIQUID LIMIT  
PLASTIC LIMIT

### MATERIAL SOURCE

IDENTIFICATION : SANDY GRAVEL (GM)  
EXPLORATION: BORING 141  
SAMPLE : SS21  
DEPTH : 114.6' TO 116.0'  
SPECIFIC GRAVITY

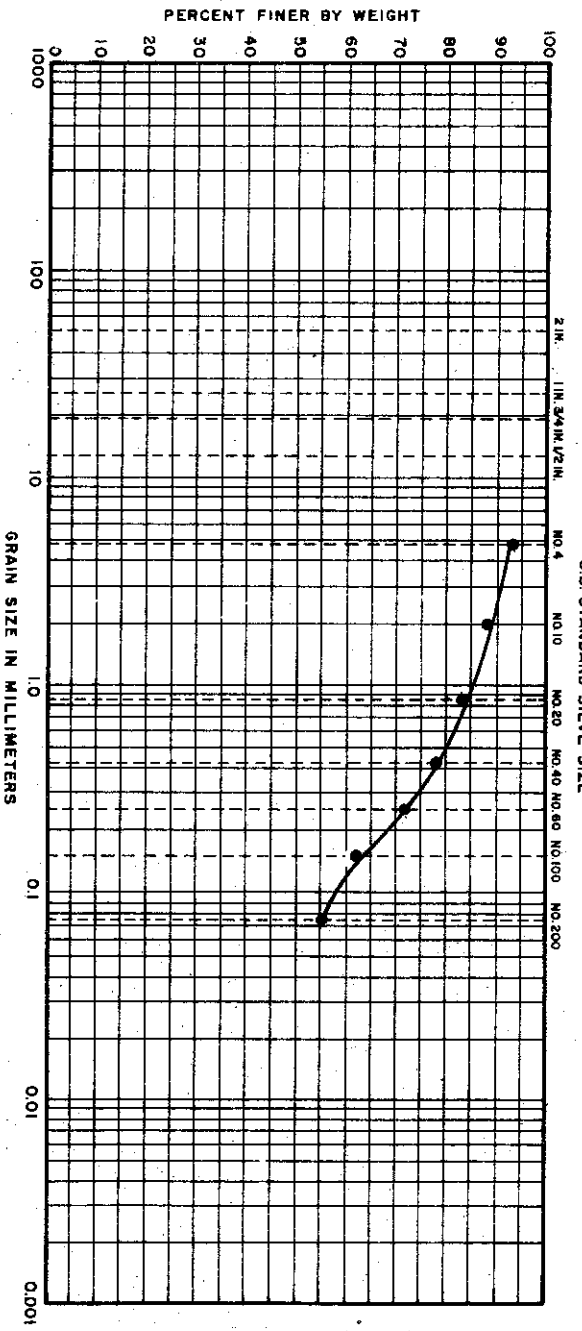
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

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FILE NO. 1255

DATE NOV. 1974

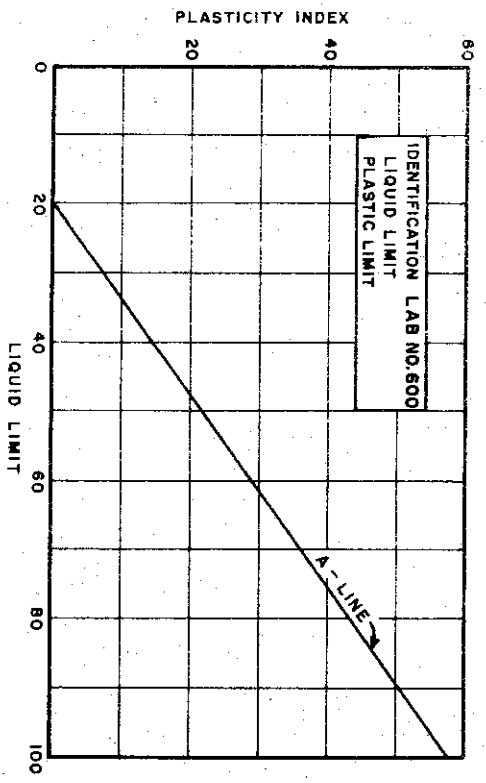
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

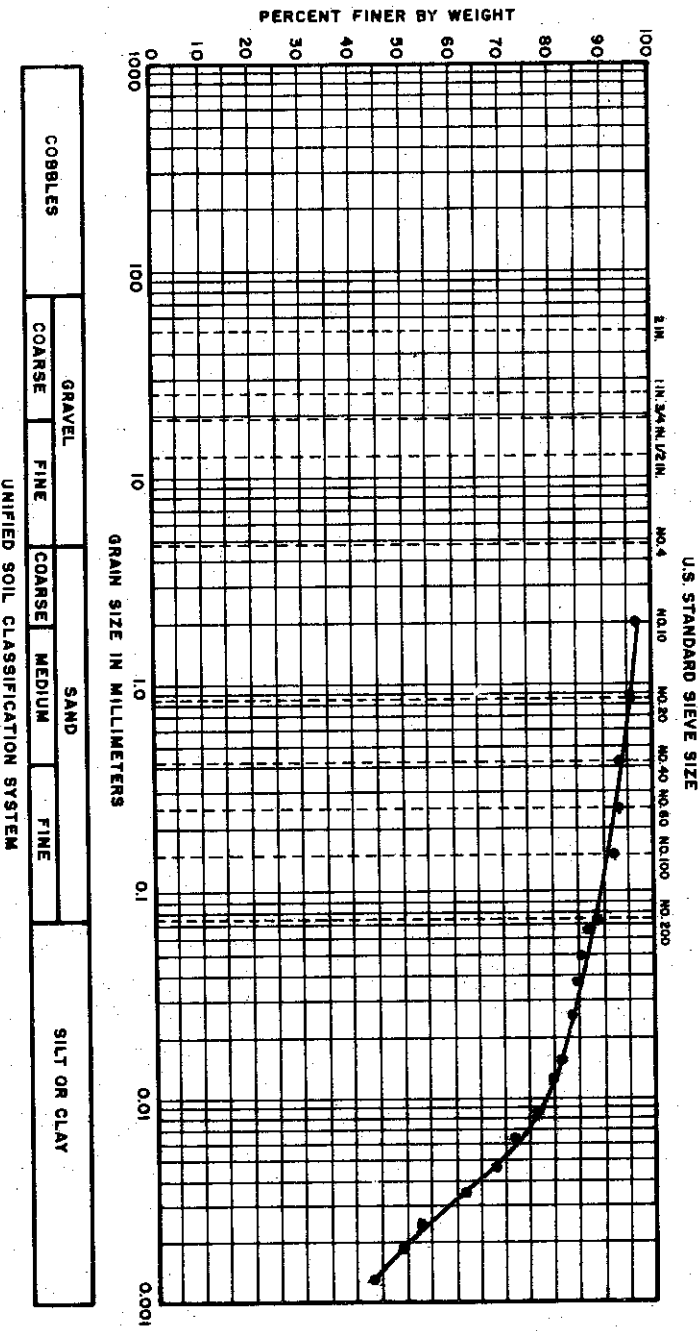


### MATERIAL SOURCE

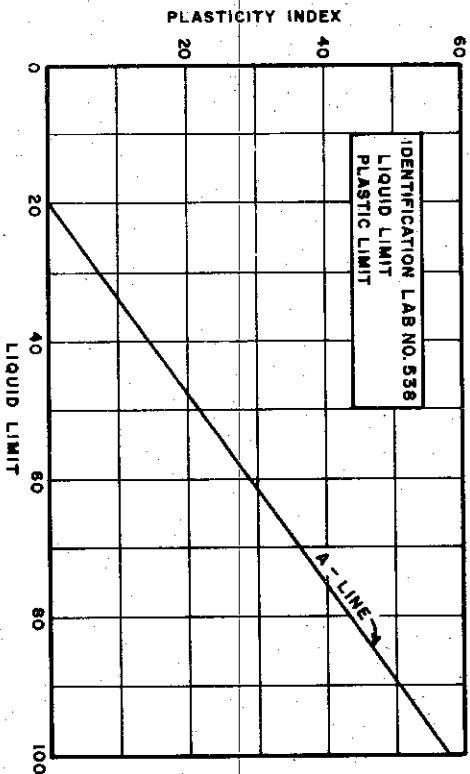
IDENTIFICATION: SANDY CLAY (SM-SC)  
 EXPLORATION: BORING 141  
 SAMPLE: SS27  
 DEPTH: 144.5' TO 146.0'  
 SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

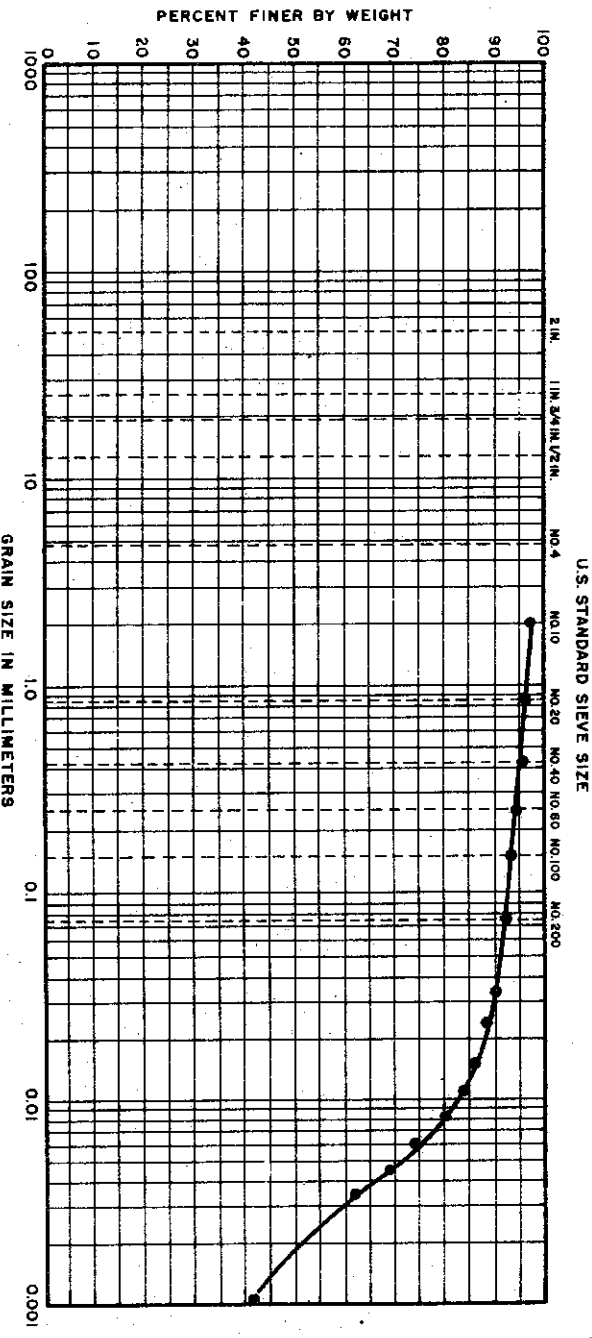
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 144  
 SAMPLE : 6  
 DEPTH : 13.8' TO 14.1'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE NOV. 1974

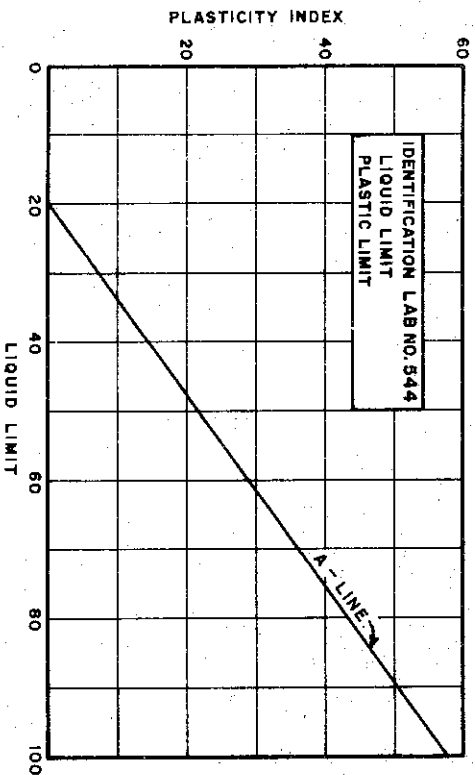
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

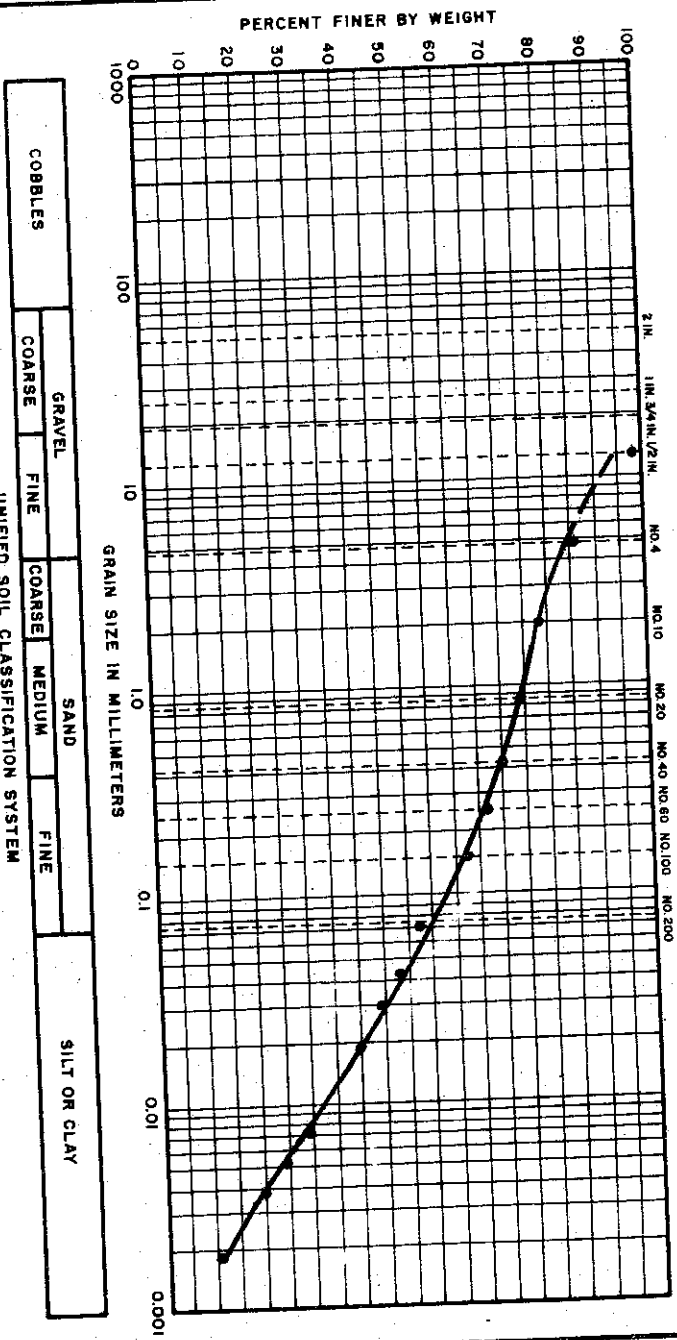
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 151A  
 SAMPLE : 2  
 DEPTH : 7.7' TO 8.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

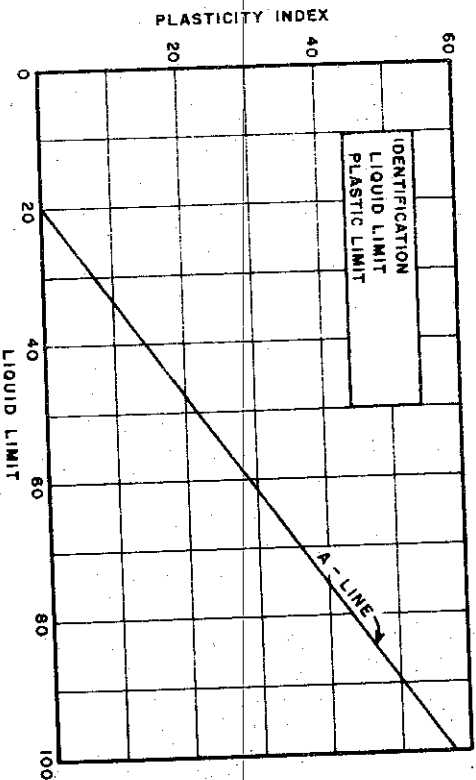
FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-MU)

EXPLORATION: BORING 187

SAMPLE : SS14

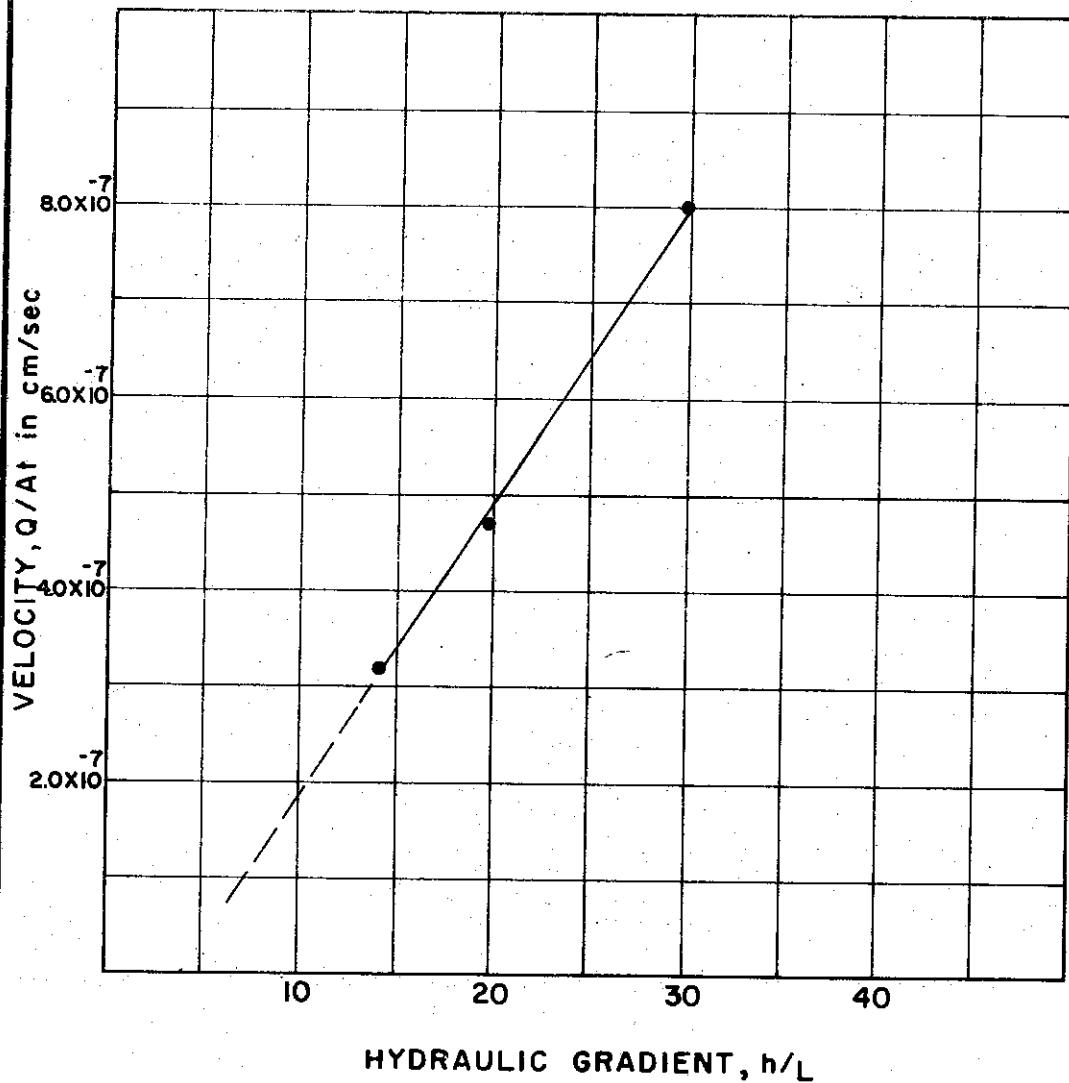
DEPTH : 59.5' TO 60.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

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REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.875

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 84 pcf  
 INITIAL WATER CONTENT 37.2 % INITIAL VOID RATIO 1.002  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
				1.50	1.50	1.50
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		1.50	1.50	1.50	1.50
BACK PRESSURE TOP $\frac{kg}{cm^2}$	$u_{top}$			2.841	2.854	2.876
BACK PRESSURE BOTTOM $\frac{kg}{cm^2}$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.39	2.39	2.39	2.39
HYDRAULIC GRADIENT	i			14.72	20.6	29.44
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.94	4.00	6.85
TIME OF DISCHARGE sec	t			190,800	266,400	270,000
PERMEABILITY $cm/sec$	k			$2.18 \times 10^{-8}$	$2.30 \times 10^{-8}$	$2.72 \times 10^{-8}$

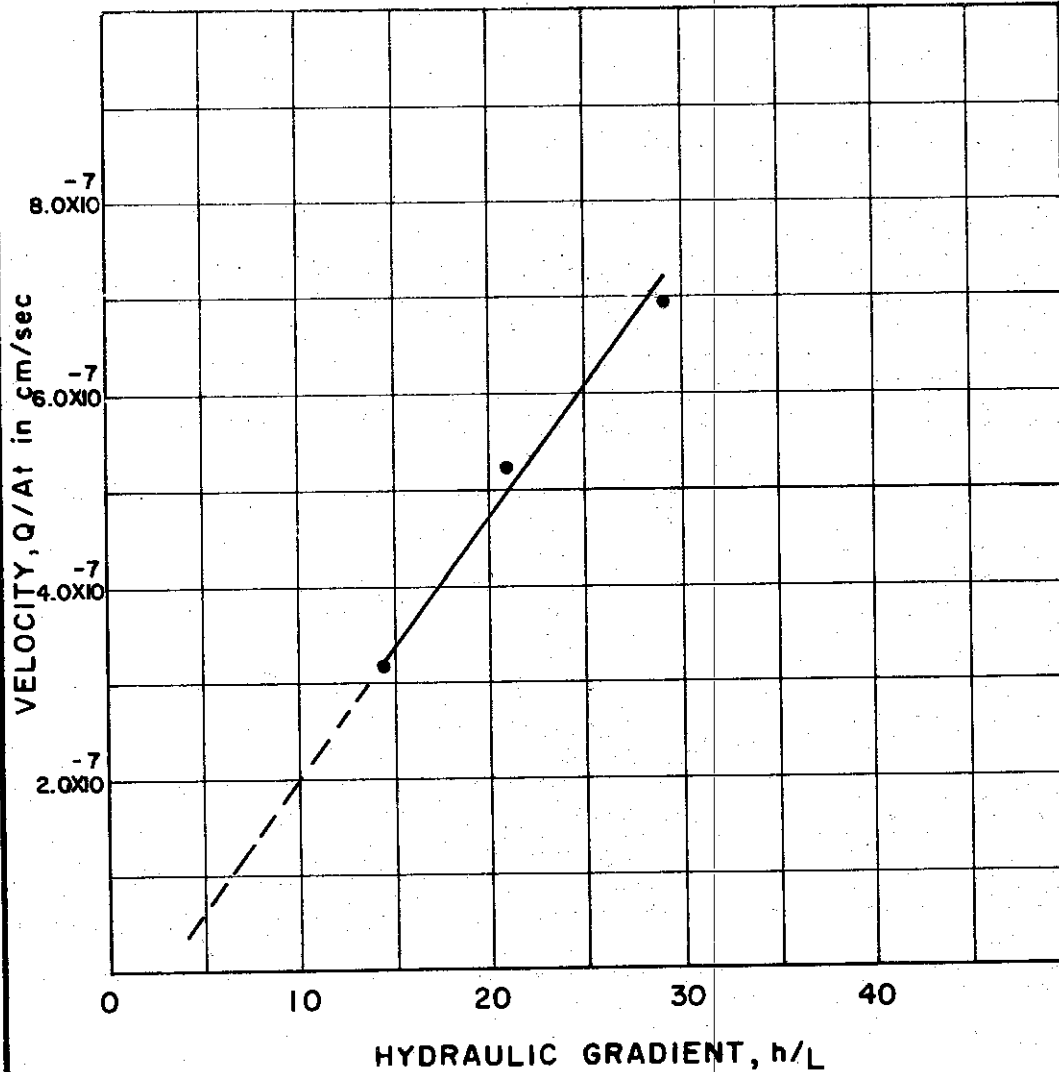
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.3' TO 28.5'

TEST NO. k 85.1  
 DATE JULY 74

FILE 1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.645

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 97 pcf  
 INITIAL WATER CONTENT 26.9 % INITIAL VOID RATIO 0.730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 16 %

**TEST DATA**

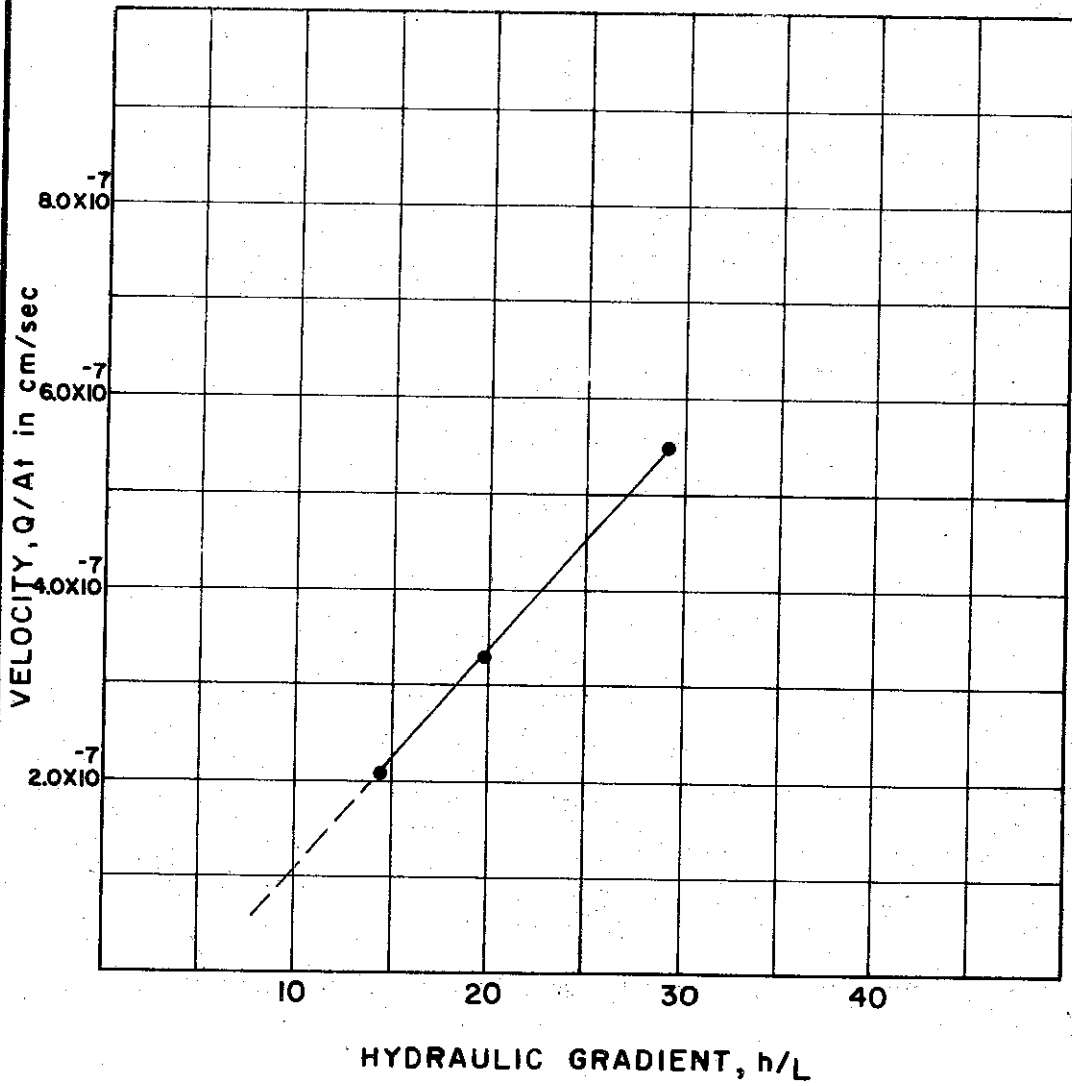
	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_1$ kg/cm <sup>2</sup>			2.00	2.00	2.00	2.00
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.31	29.00
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.94	1.38	1.66
TIME OF DISCHARGE sec t				93,600	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.18x10	<sup>-8</sup> 2.58x10	<sup>-8</sup> 2.39x10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.6 TO 48.8'

TEST NO. K 87.1  
 DATE JULY 1974





REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.374

C-647

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 119 pcf  
 INITIAL WATER CONTENT 15.1 % INITIAL VOID RATIO 0.411  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 23 % PLASTIC LIMIT 14 %

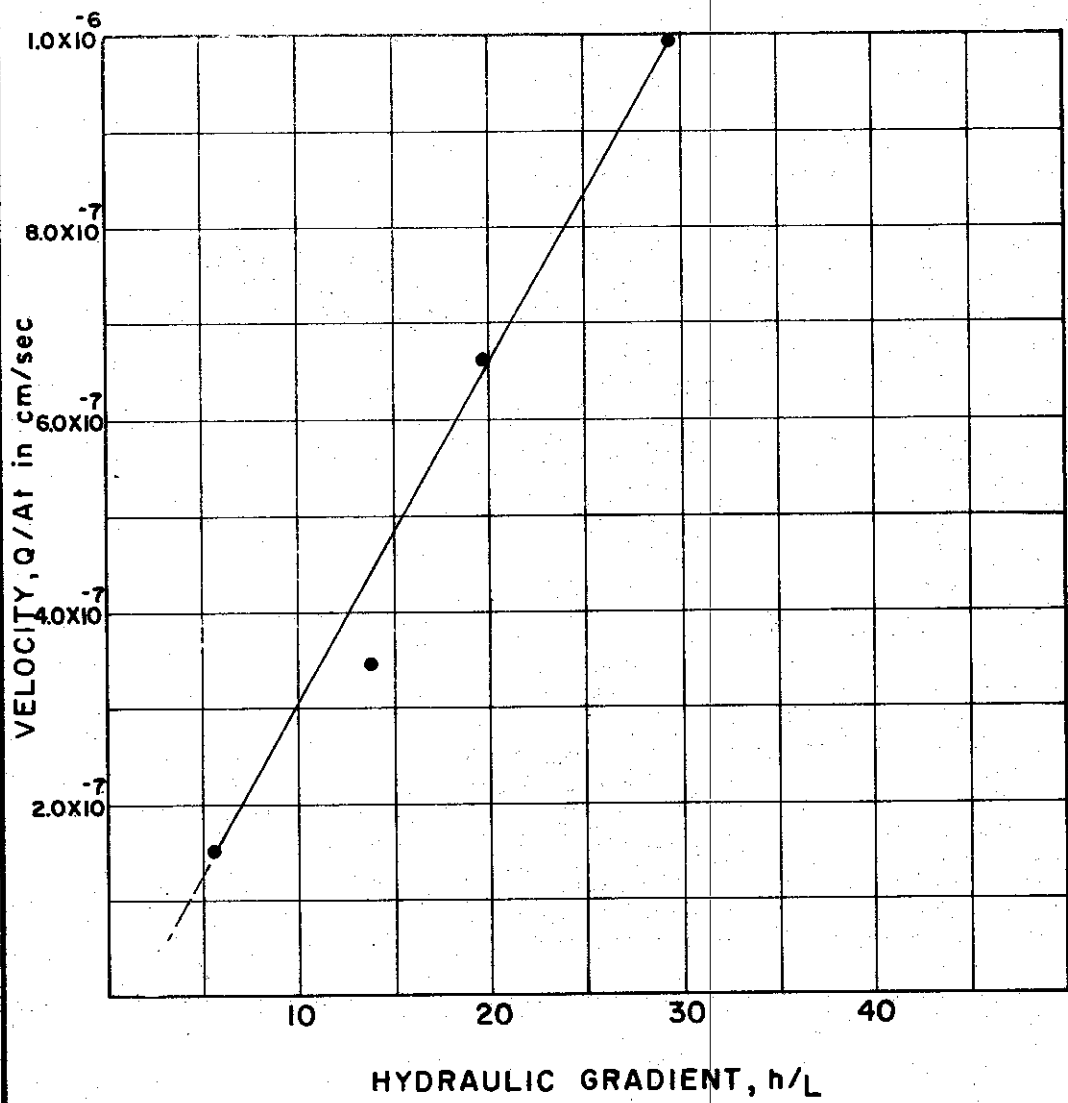
**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\text{kg/cm}^2$	$\bar{\sigma}$		2.30	2.30	2.30	2.30
BACK PRESSURE TOP $\text{kg/cm}^2$	$u_{top}$			2.841	2.854	2.876
BOTTOM $\text{kg/cm}^2$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.47	2.47	2.47	2.47
HYDRAULIC GRADIENT	i			14.20	19.87	28.40
SAMPLE AREA $\text{cm}^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $\text{cm}^3$	Q			1.26	3.38	3.40
TIME OF DISCHARGE sec	t			190,800	320,400	198,000
PERMEABILITY $\text{cm/sec}$	k			$1.46 \times 10^{-8}$	$1.68 \times 10^{-8}$	$1.91 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 52  
 SAMPLE NO. 7  
 DEPTH 58.6' TO 58.9'

TEST NO. k112.1  
 DATE JULY 74



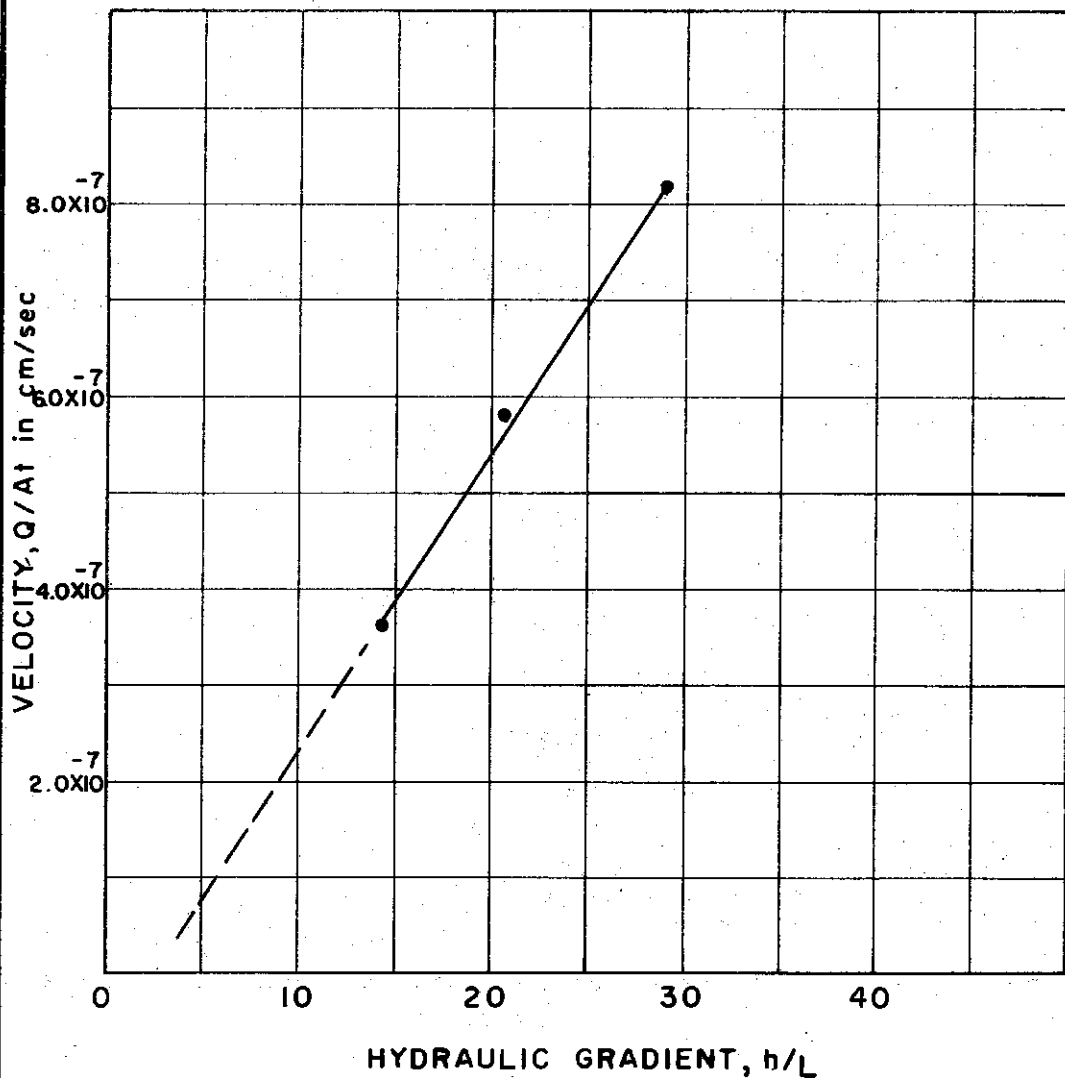
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.685

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
DRY UNIT WEIGHT	104 pcf
INITIAL WATER CONTENT	30.2 %
INITIAL VOID RATIO	0.732
ATTERBERG LIMITS:	
LIQUID LIMIT	39 %
PLASTIC LIMIT	20 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_{cm}^2$	$\sigma$		1.74	1.74	1.74	1.74	1.74
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.810	2.841	2.854	2.876
BOTTOM $kg/cm^2$	$u_{bot}$			2.806	2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			14.06	35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.49	2.49	2.49	2.49	2.49
HYDRAULIC GRADIENT	i			5.64	14.11	19.75	28.22
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.22	2.30	5.89	8.50
TIME OF DISCHARGE $sec$	t			248,400	212,400	277,200	270,000
PERMEABILITY $cm/sec$	k			$2.75 \times 10^{-8}$	$2.42 \times 10^{-8}$	$3.40 \times 10^{-8}$	$3.52 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 53 TEST NO. k 98.1  
 SAMPLE NO. 5 DATE JULY 74  
 DEPTH 39.5' TO 39.8'



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE=0.641

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2 % INITIAL VOID RATIO 0.724  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.40	2.40	2.40	2.40
BACK PRESSURE TOP $u_{top}$ BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.847	2.862	2.883
DIFFERENTIAL HEAD cm.	h			35.15	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT	i			14.52	20.33	29.0
SAMPLE AREA cm <sup>2</sup>	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $Q$ cm <sup>3</sup>	Q			1.08	1.52	1.76
TIME OF DISCHARGE sec	t			93,800	82,800	75,600
PERMEABILITY cm/sec	k			<sup>-8</sup> 2.52X10	<sup>-8</sup> 2.85X10	<sup>-8</sup> 2.53X10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

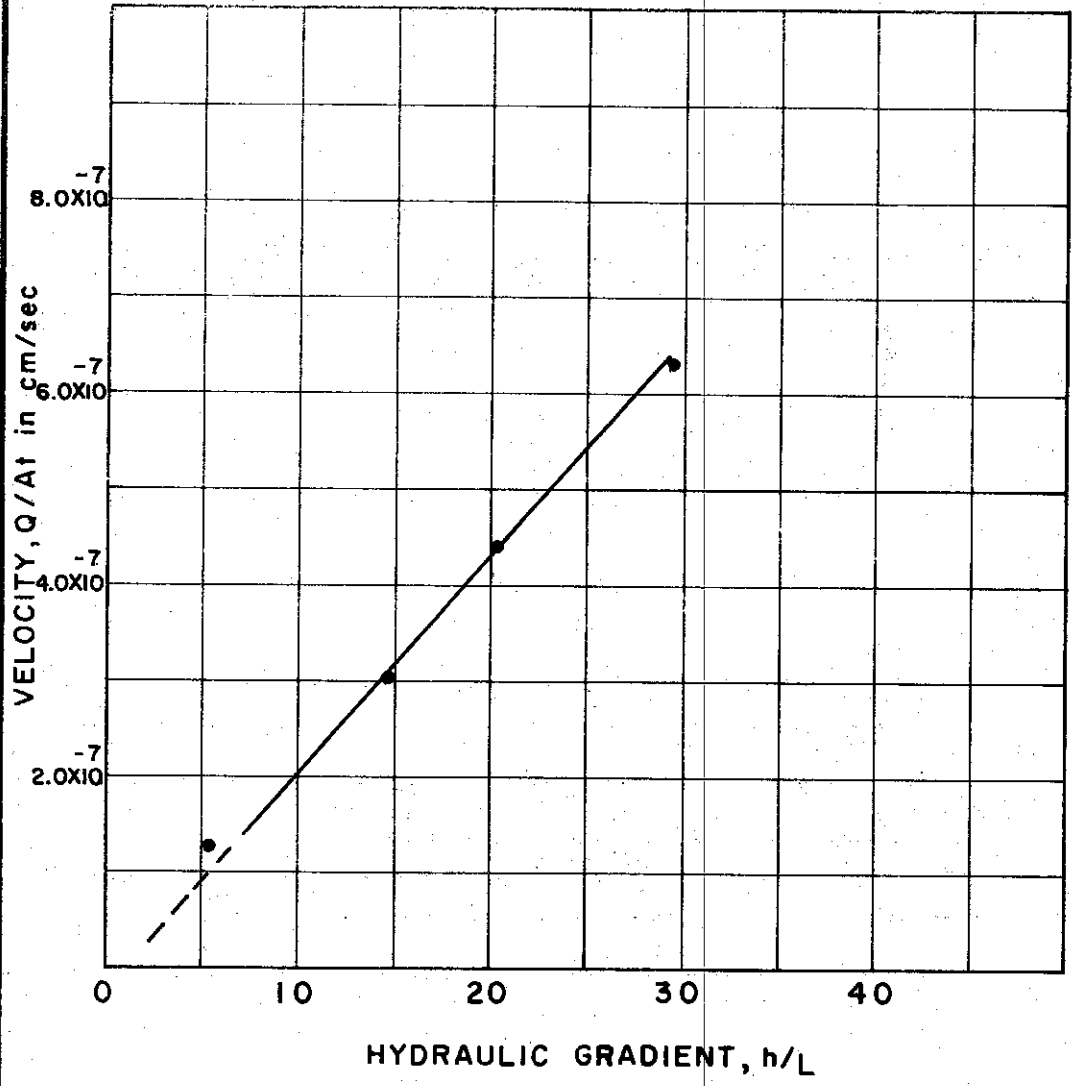
## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5' TO 63.8'

TEST NO. K 399.1  
 DATE JULY 1974

FILE 1255

C-650



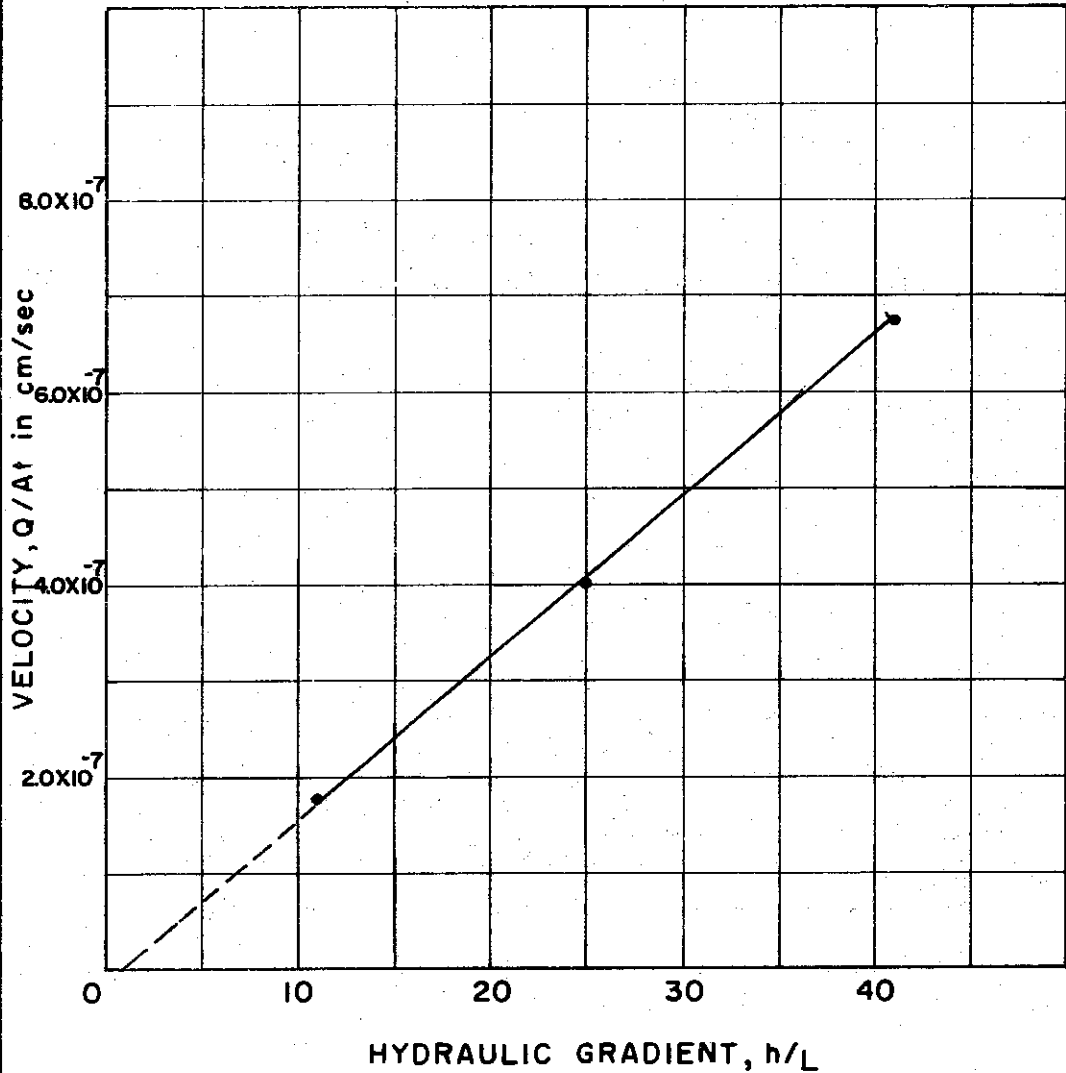
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.72

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
DRY UNIT WEIGHT	90 pcf
INITIAL WATER CONTENT	31.6 %
INITIAL VOID RATIO	0.851
ATTERBERG LIMITS:	
LIQUID LIMIT	45 %
PLASTIC LIMIT	21 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.71	2.71	2.71	2.71	2.71
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2826	2847	2862	2883
BACK PRESSURE BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2812	2812	2812	2812
DIFFERENTIAL HEAD cm. h				14.06	35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.376	2.376	2.376	2.376	2.376
HYDRAULIC GRADIENT i				5.92	14.80	20.71	29.50
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.48	0.88	1.10	1.39
TIME OF DISCHARGE sec t				108,000	90,000	79,200	75,600
PERMEABILITY cm/sec k				2.37x10 <sup>-8</sup>	2.09x10 <sup>-8</sup>	2.18x10 <sup>-8</sup>	2.00x10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 54 TEST NO. K 401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7 TO 74.0'



REMARKS:

C-651

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 103 pcf  
 INITIAL WATER CONTENT 26.1 % INITIAL VOID RATIO 0.707  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

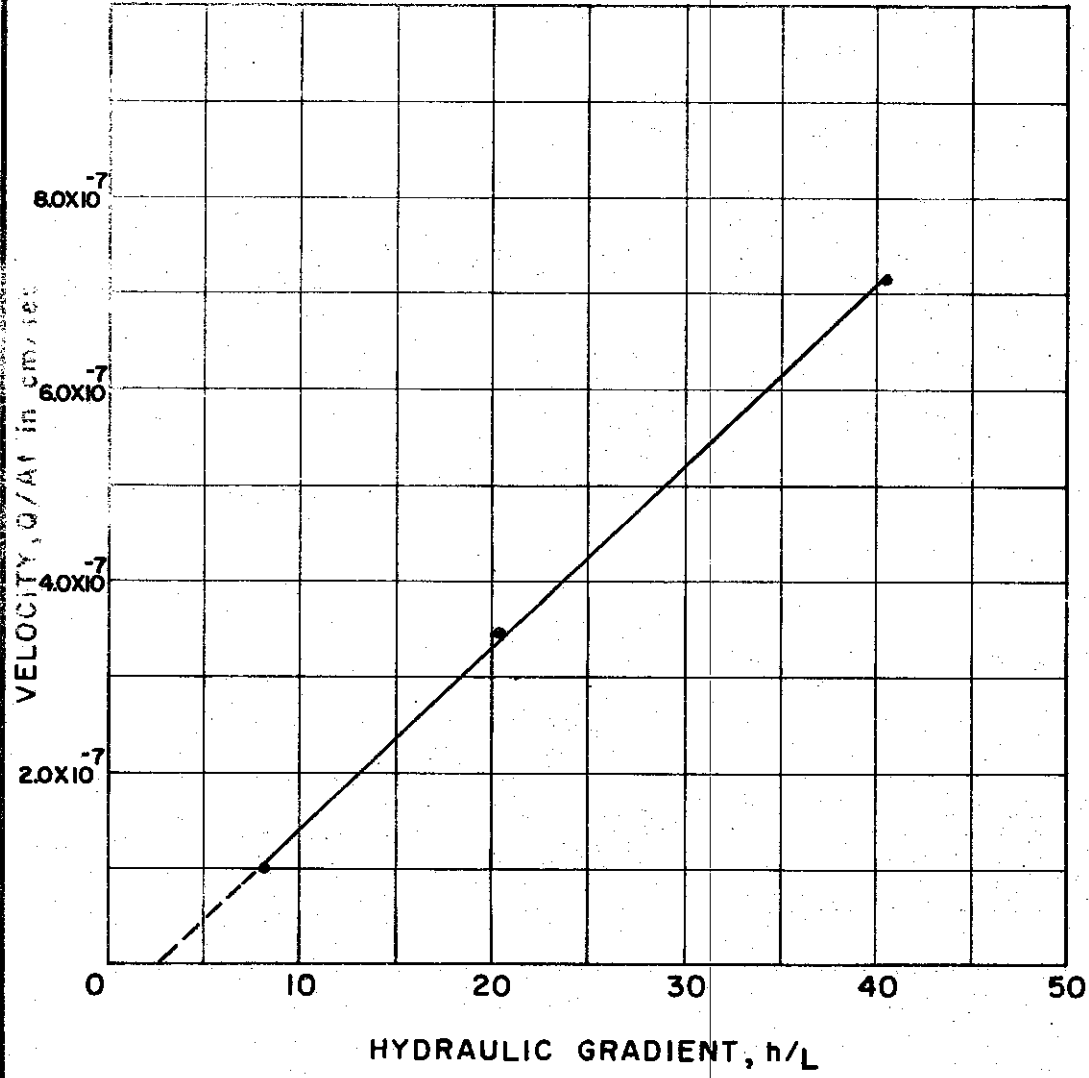
**TEST DATA**

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			1.05	1.05	1.05	1.05
BACK PRESSURE TOP $u_{top}$ kg/cm <sup>2</sup>				2.488	2.521	2.565
BACK PRESSURE BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.460	2.460	2.460
DIFFERENTIAL HEAD cm.	h			27.7	63.0	103.8
SAMPLE LENGTH cm.	L	6.48	6.40	6.40	6.40	6.40
HYDRAULIC GRADIENT	i			11.0	25.0	41.2
SAMPLE AREA cm <sup>2</sup>	A	11.37	11.37	11.37	11.37	11.37
WATER DISCHARGED cm <sup>3</sup>	Q			.13	.29	.58
TIME OF DISCHARGE sec	t			72,000	72,000	86,000
PERMEABILITY cm/sec	k			1.60 x 10 <sup>-8</sup>	1.61 x 10 <sup>-8</sup>	1.63 x 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 60 TEST NO. k43.1  
 SAMPLE NO. 3 DATE MARCH 74  
 DEPTH 18.1' TO 18.3'

C-652



REMARKS:

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY ≈ 2.70 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2% INITIAL VOID RATIO .730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 33 % PLASTIC LIMIT 18 %

**TEST DATA**

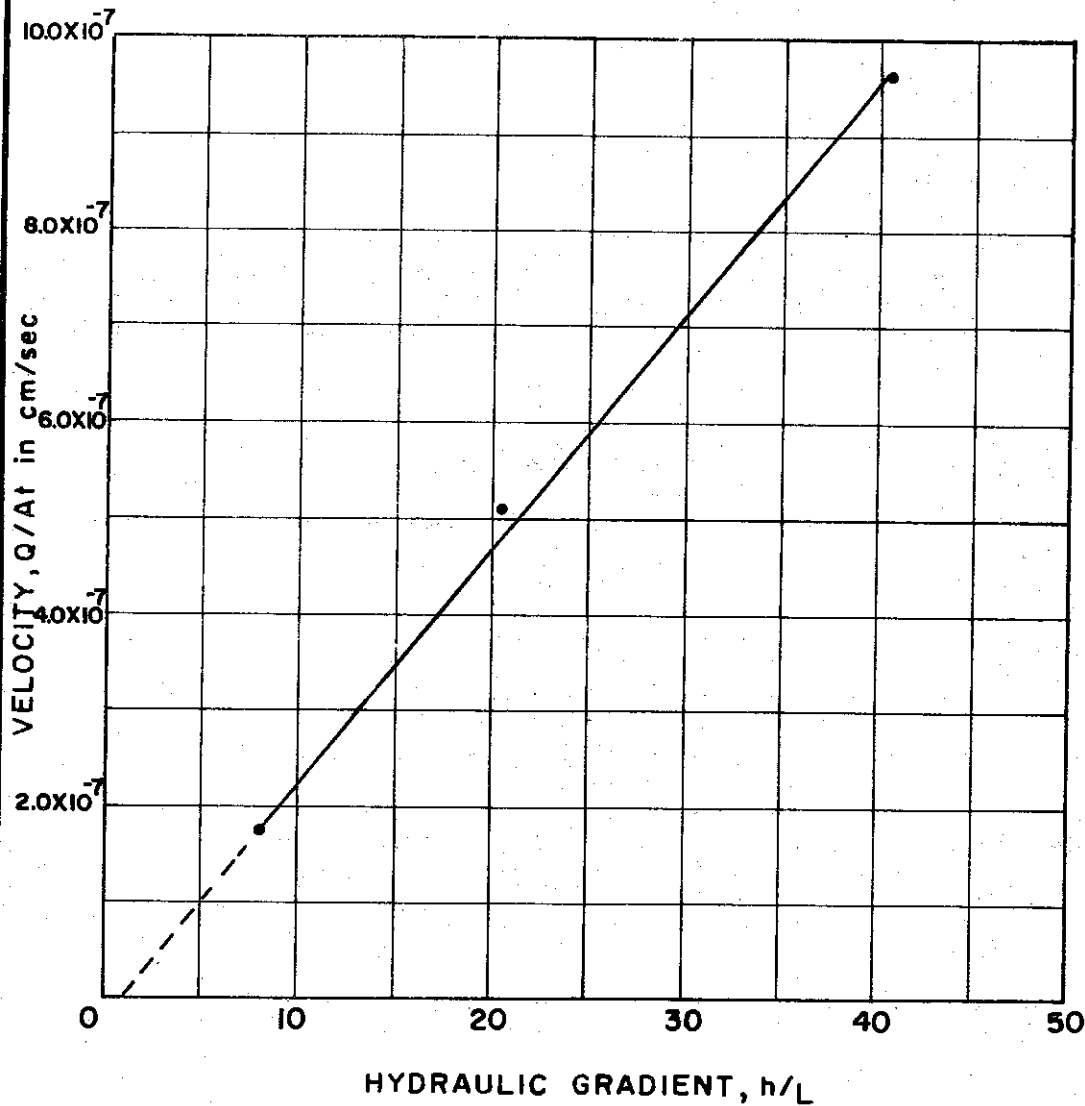
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_{cm}^2$	$\sigma$		2.20	2.20	2.20	2.20
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.826	2.847	2.882
BOTTOM $kg/cm^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	h			14.06	35.16	70.30
SAMPLE LENGTH cm.	L	1.90	1.73	1.73	1.73	1.73
HYDRAULIC GRADIENT	i			8.13	20.32	40.63
SAMPLE AREA $cm^2$	A	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $cm^3$	Q			.21	.66	.23
TIME OF DISCHARGE $sec$	t			66,600	59,400	10,200
PERMEABILITY $cm/sec$	k			$1.25 \times 10^{-8}$	$1.75 \times 10^{-8}$	$1.76 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 60  
 SAMPLE NO. 11  
 DEPTH 56.1' TO 56.4'

TEST NO. k51.1  
 DATE MARCH 74



REMARKS:

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 96 pcf  
 INITIAL WATER CONTENT 29.1 % INITIAL VOID RATIO .753  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $kg/cm^2$	$\sigma$		3.00	3.00	3.00	3.00
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.836	2.847	2.882
BOTTOM $kg/cm^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	$h$			14.06	35.16	70.30
SAMPLE LENGTH cm.	$L$	1.90	1.74	1.74	1.74	1.74
HYDRAULIC GRADIENT	$i$			8.08	20.20	40.40
SAMPLE AREA $cm^2$	$A$	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $cm^3$	$Q$			.34	.97	.31
TIME OF DISCHARGE $sec$	$t$			63,000	59,400	10,200
PERMEABILITY $cm/sec$	$k$			$2.10 \times 10^{-8}$	$2.55 \times 10^{-8}$	$2.37 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

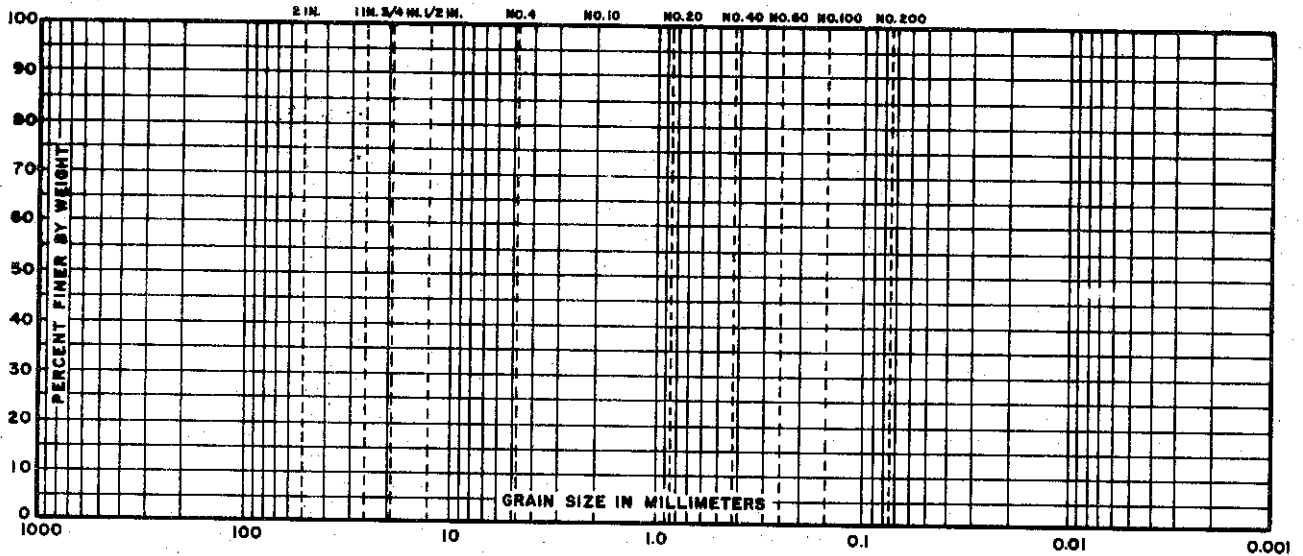
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.6' TO 86.1'

TEST NO. k 56.1  
 DATE MARCH 74

FILE 1255

# GRAIN SIZE DISTRIBUTION

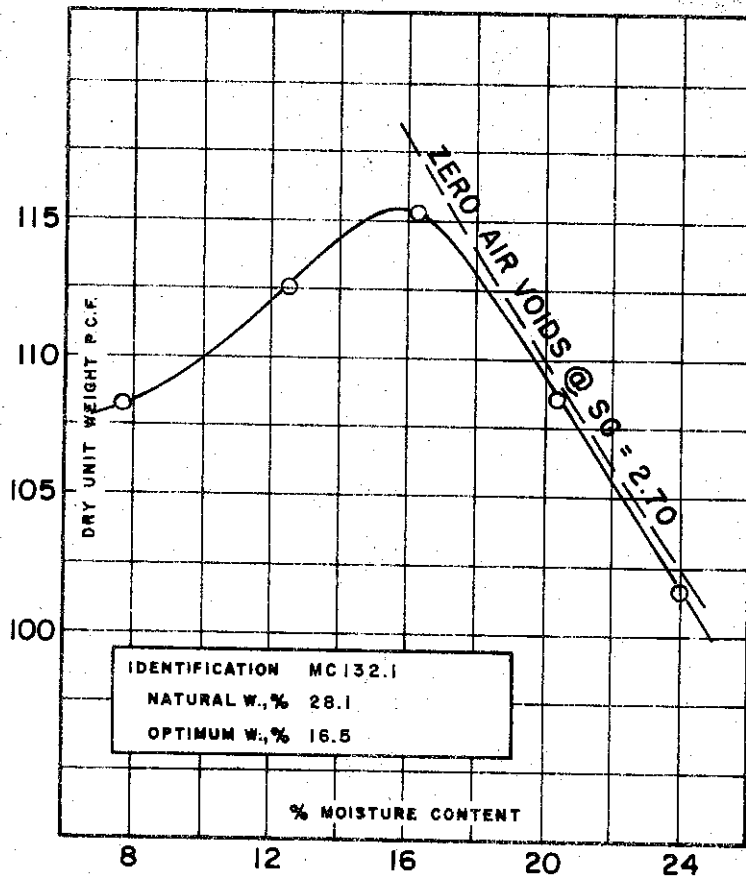
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 50  
 PLASTIC LIMIT 17

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 49  
 SAMPLE 2  
 DEPTH 6.0' TO 8.1'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

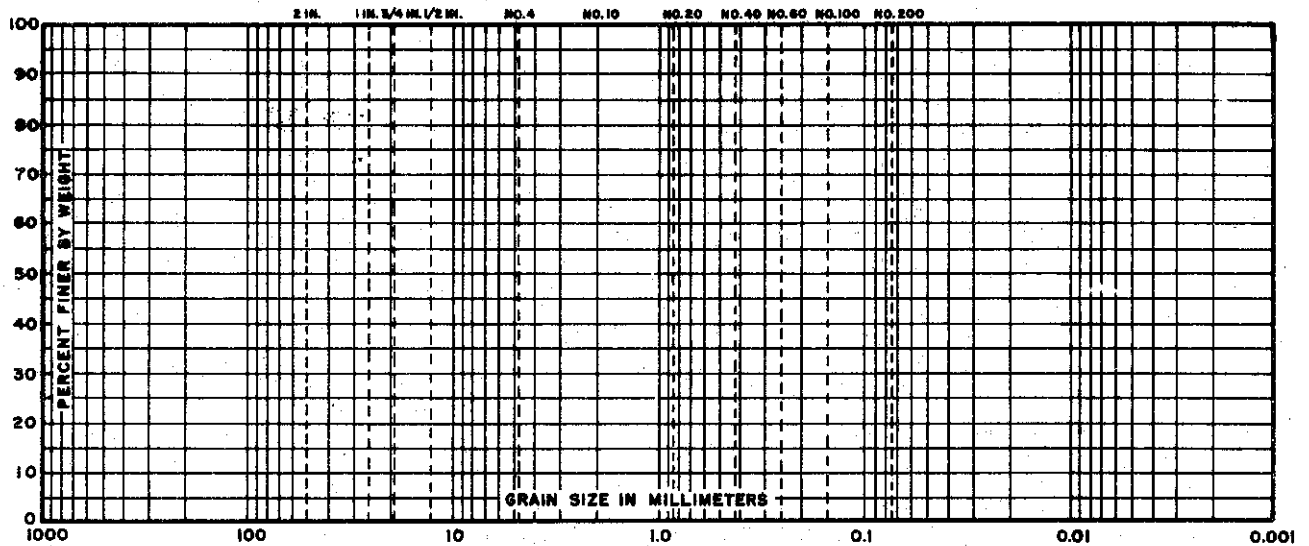
## COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE MARCH 74



# GRAIN SIZE DISTRIBUTION

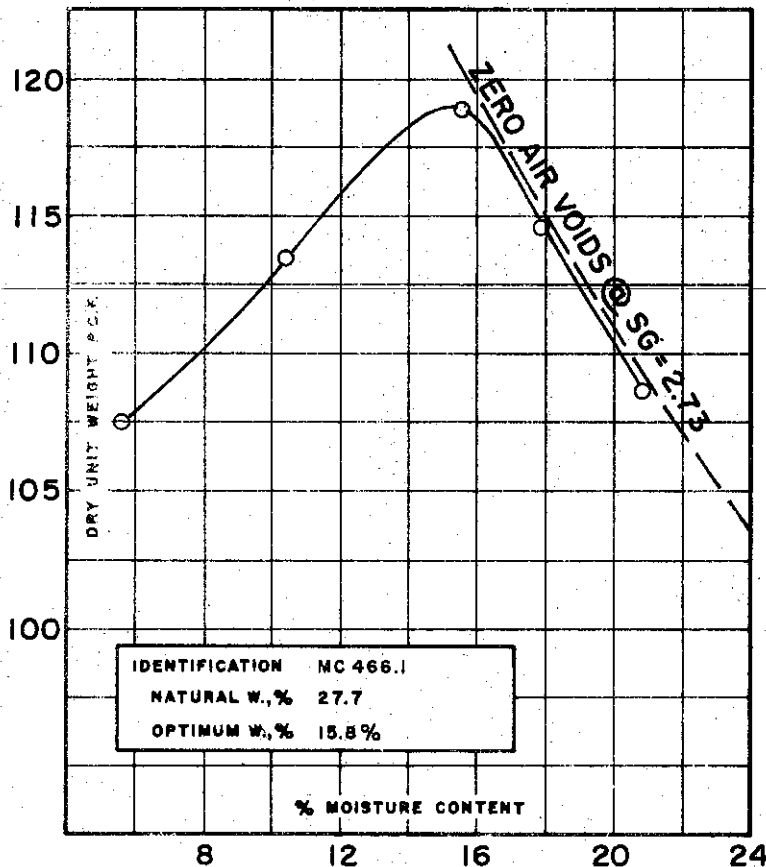
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 466.1  
 NATURAL W.%, 27.7  
 OPTIMUM W.%, 15.8%

## ATTERBERG LIMITS

IDENTIFICATION SEE DATA FOR  
 LIQUID LIMIT INDIVIDUAL  
 PLASTIC LIMIT SAMPLES

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 101, 105, 127, 128, 180 & 183  
 SAMPLE COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

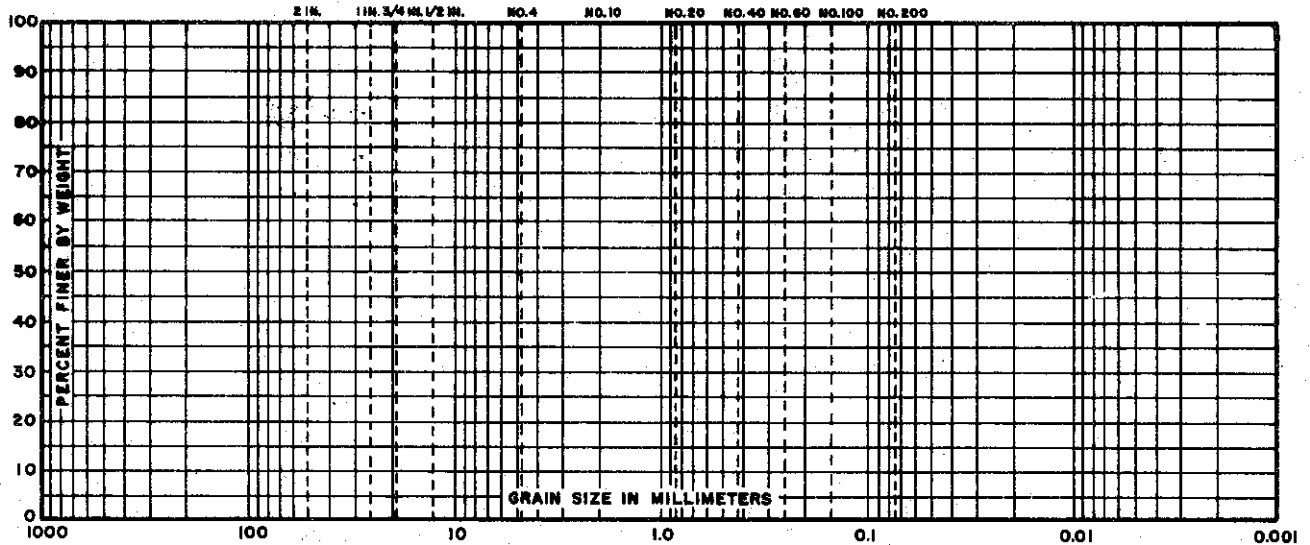
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

C-656

FILE NO. 1255 DATE APRIL 74

# GRAIN SIZE DISTRIBUTION

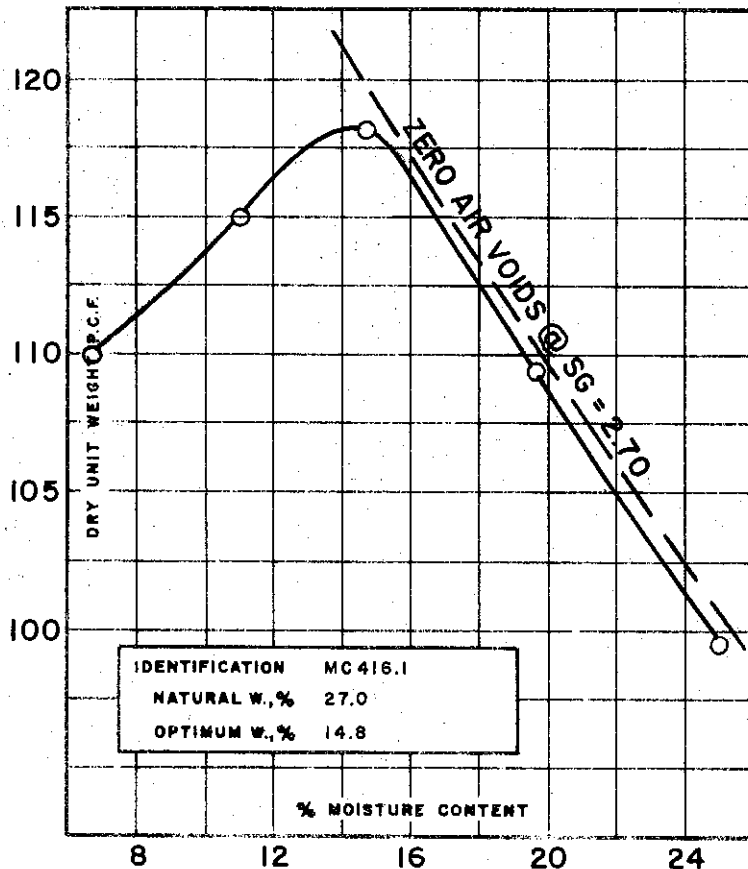
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION	MC 416.1
NATURAL W., %	27.0
OPTIMUM W., %	14.8

## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49  
 PLASTIC LIMIT 22

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 127  
 SAMPLE 3  
 DEPTH 5.6' TO 7.0'

## COMPACTION METHOD

ASTM TEST 01557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.56", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

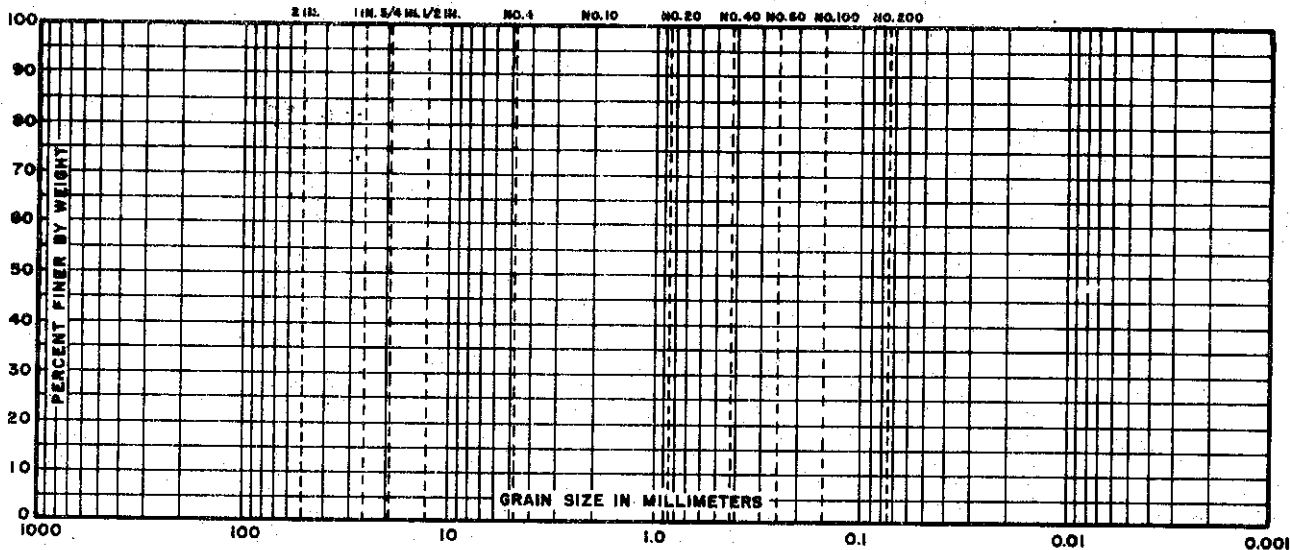
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE JULY 74

# GRAIN SIZE DISTRIBUTION

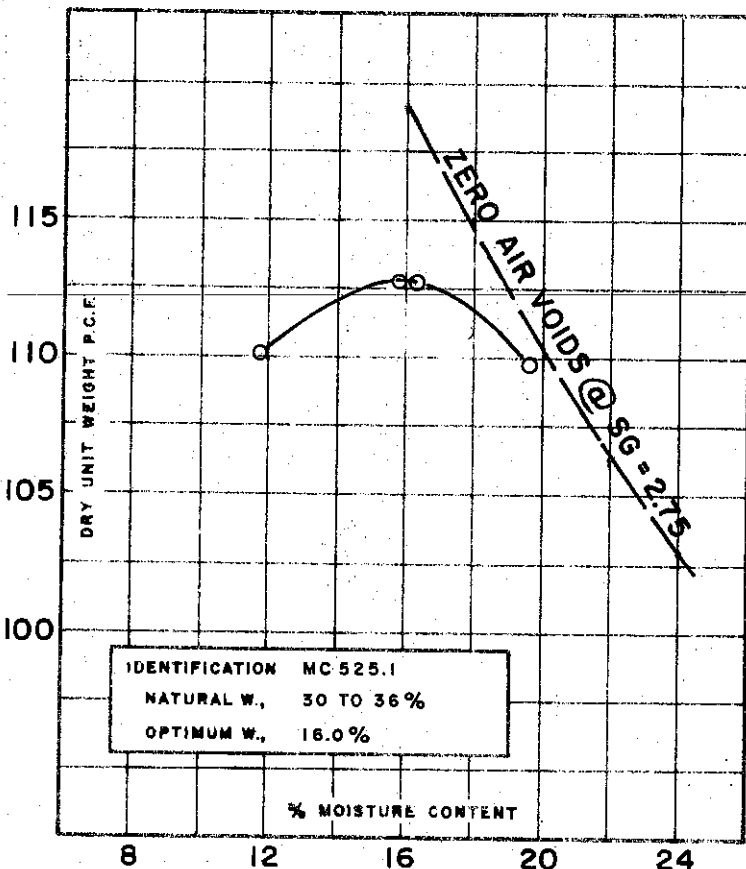
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION  
LIQUID LIMIT  
PLASTIC LIMIT

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
EXPLORATION BORING 136  
SAMPLE 2  
DEPTH 3:0' TO 5:0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
AASHTO TEST  
MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
NO. LAYERS 5, BLOWS/LAYER 25,  
HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

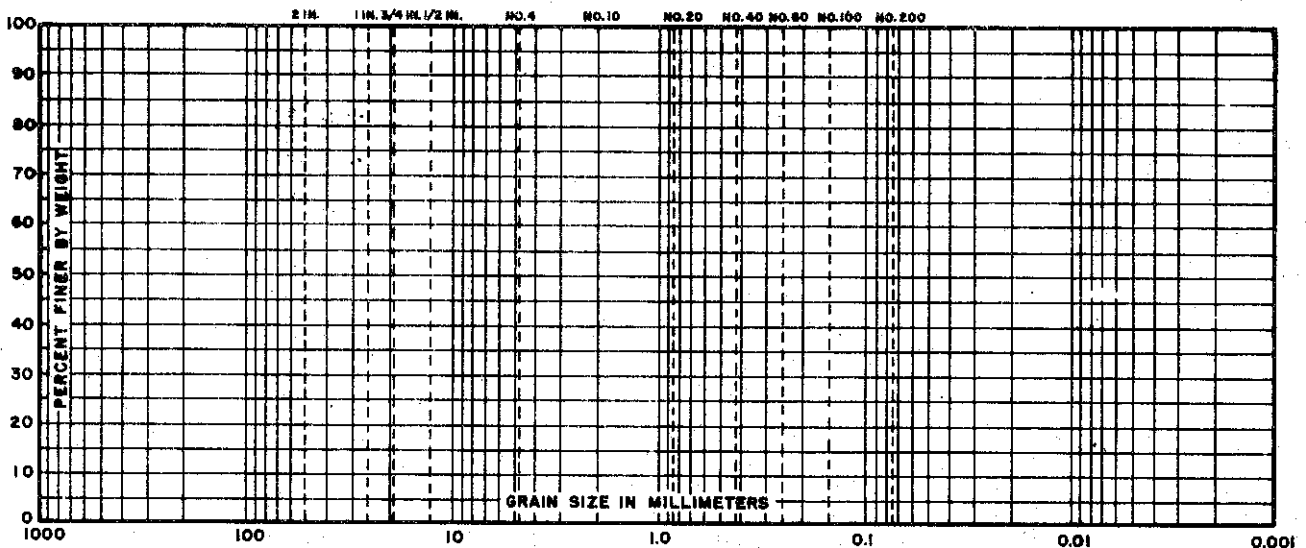
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
COMPACTION - GRADATION  
TESTS

C-658

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

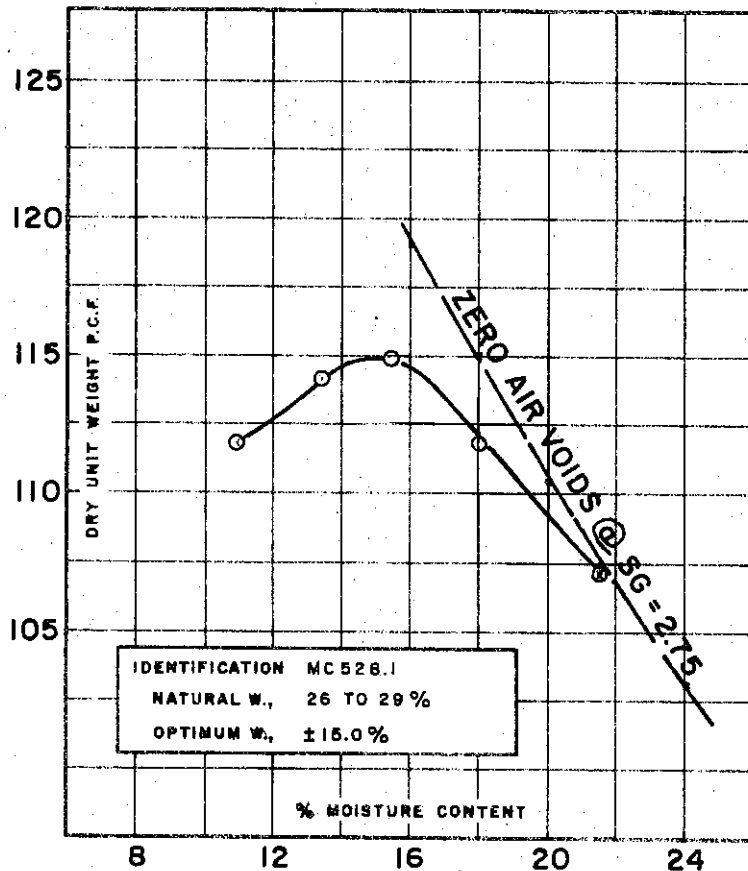
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 528.1  
 LIQUID LIMIT 56  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 141  
 SAMPLE 1  
 DEPTH 3.0' TO 5.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C.  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

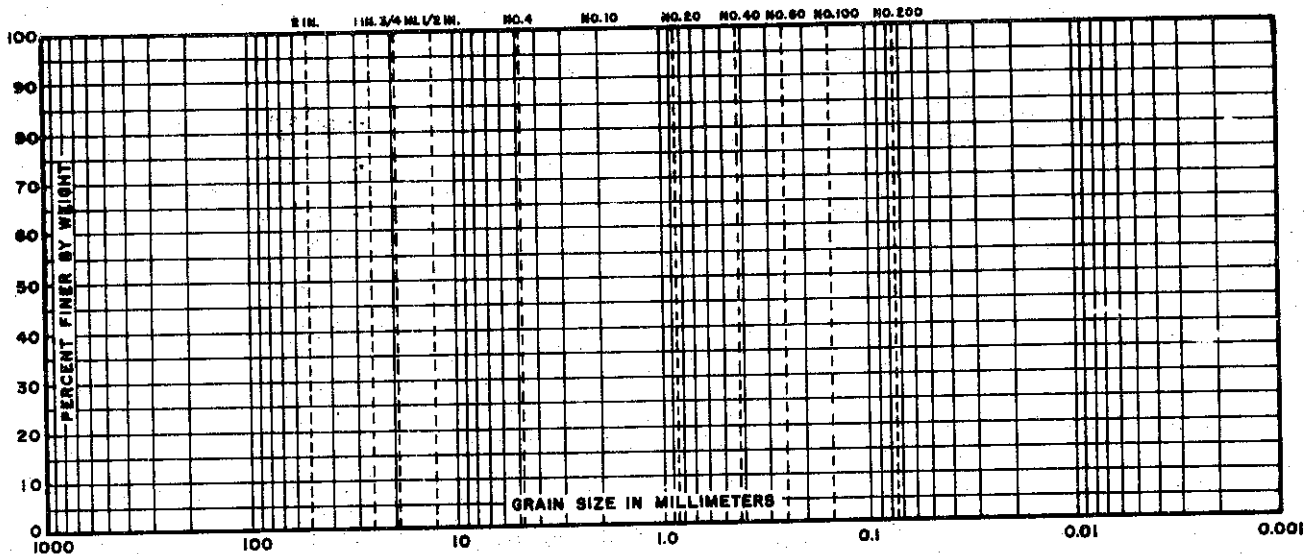
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

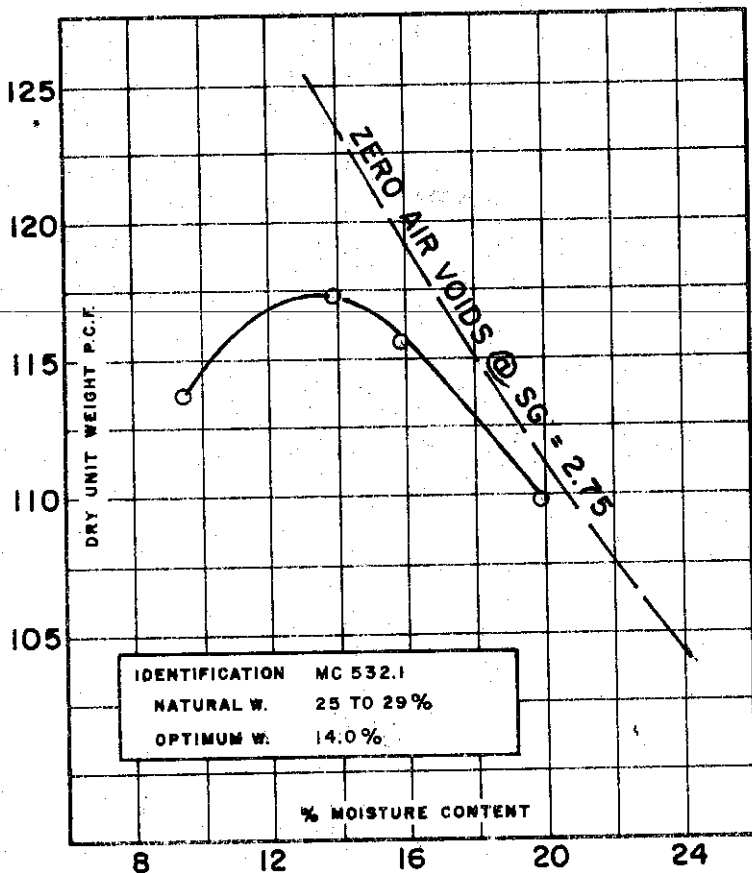
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 532.1  
 LIQUID LIMIT 54  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 142  
 SAMPLE 1  
 DEPTH 3.0' TO 5.5'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

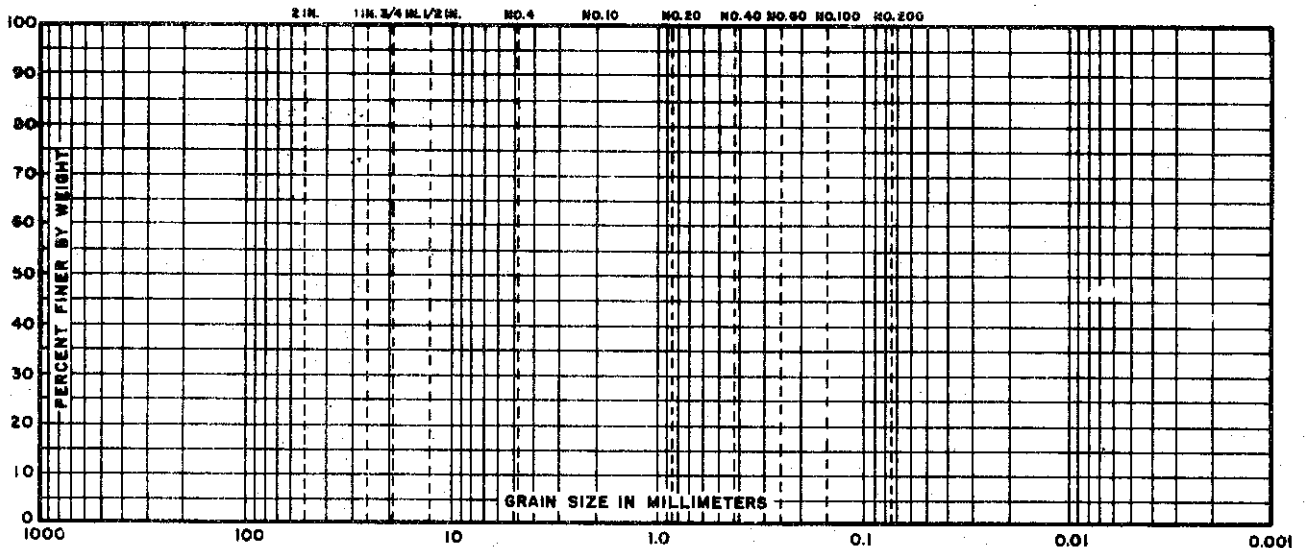
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

C-660

## GRAIN SIZE DISTRIBUTION

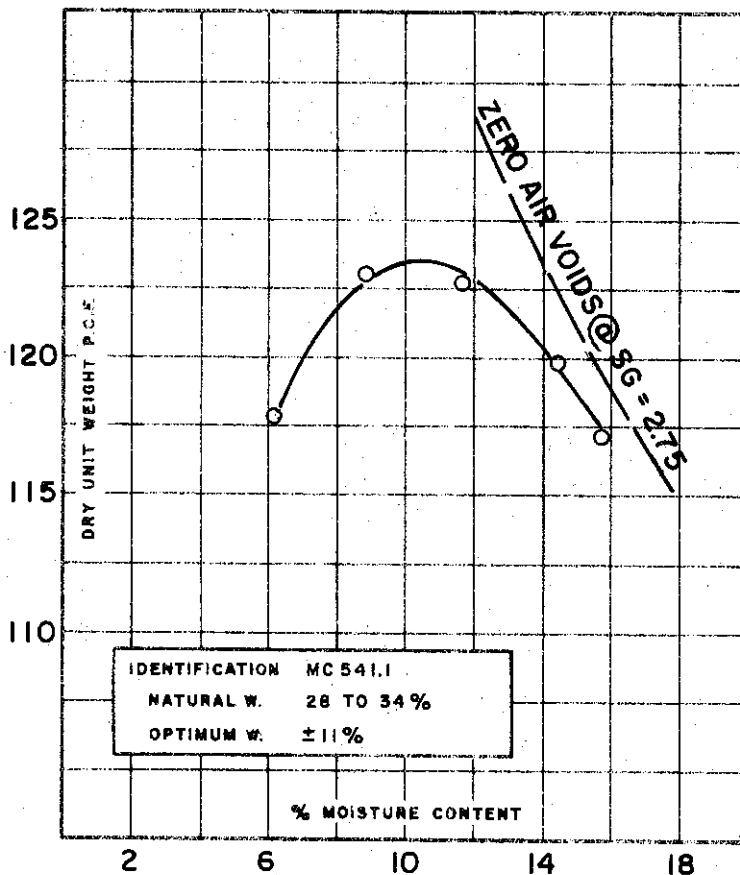
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### COMPACTION



### ATTERBERG LIMITS

IDENTIFICATION L 541.1  
 LIQUID LIMIT 38  
 PLASTIC LIMIT 19

### MATERIAL SOURCE

IDENTIFICATION SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING 146  
 SAMPLE 5  
 DEPTH 10.0' TO 12.0'

### COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

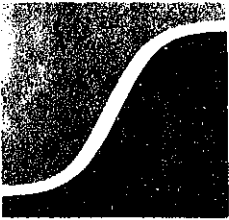
### NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

### COMPACTION - GRADATION TESTS

FILE NO. 1255      DATE APRIL 74

## Appendix D



U.W. STOLL AND ASSOCIATES soil mechanics and foundation consultants  
111 WEST KINGSLEY STREET ANN ARBOR, MICHIGAN 48103 (313) 994-5055

ULRICH W. STOLL  
GARRETT EVANS  
IN-KUIN KIM

September 8, 1975

Mr. Sherif Afifi  
Bechtel Power Corporation  
P. O. Box 1000  
777 East Eisenhower Parkway  
Ann Arbor, Michigan 48106

SUBJECT: Soil Testing  
Hopper Investigation  
Belle River Coal Handling  
Detroit Edison Company  
Technical Specification, 10539-3-C-13  
REFERENCE: Purchase Order No. AA2184

Dear Sir:

Enclosed herewith is the summary of laboratory testing conducted on soil samples received from the subject site, as authorized by the referenced purchase order. The laboratory testing was performed in accordance with your technical specification 10539-3-C-13 and included the following tests:

	<u>Pages</u>
30 Visual Classification and In-Situ Moistures	B-1, B-2, B-9
10 Atterberg Limits	B-3, B-4, B-5
30 Unconfined Compression	B-6 through B-28
2 In-Situ Moisture and Density	B-6, B-8
5 Mechanical Analysis	B-29, B-30

We appreciate the opportunity of serving you and trust that this work has been performed to your satisfaction.

Very truly yours,

U. W. STOLL AND ASSOCIATES

In-Kuin Kim, P.E.

IKK/jb

Enclosures



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-1	23.2	GRAY-BROWN MOTTLED CLAY
	S-2	25.6	BROWN LAYERED CLAY
	S-3	38.6	GRAY CLAY WITH DRILL WASH
	S-4	35.9	GRAY CLAY WITH DRILL WASH
	S-5	39.6	GRAY CLAY WITH DRILL WASH
	S-6	43.1	GRAY CLAY WITH DRILL WASH
	S-7	39.4	GRAY CLAY
	S-8	32.5	GRAY CLAY
	S-9	34.6	GRAY CLAY
	S-10	37.1	GRAY CLAY
	S-11	33.4	GRAY CLAY
	S-12	30.7	GRAY CLAY WITH DRILL WASH
	S-13	28.7	GRAY CLAY WITH TRACE OF DRILL WASH
	S-14	27.2	GRAY CLAY WITH TRACE OF DRILL WASH
	S-15	27.1	GRAY CLAY
	S-16	24.2	GRAY CLAY
	S-17	24.0	GRAY CLAY
	S-18	24.8	GRAY CLAY
	S-19	26.8	GRAY CLAY WITH TRACE OF DRILL WASH
	S-20	25.4	GRAY CLAY
	S-21	25.9	GRAY CLAY
	S-22	27.8	GRAY CLAY
	S-23	26.7	GRAY CLAY
	S-24	25.9	GRAY CLAY
	S-25	32.2	GRAY CLAY

U. W. STILL AND ASSOCIATES  
soil mechanics and foundation consultants

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BY: IKK      DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-26	40.6	GRAY CLAY
	S-27	25.7	WET CLAYEY SILT
	S-28	12.6	SANDY SILT
	S-29	10.2	DECOMPOSED SHALE



**U. W. STOLL and ASSOCIATES**  
 SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: LABORATORY TEST DATA SUMMARY

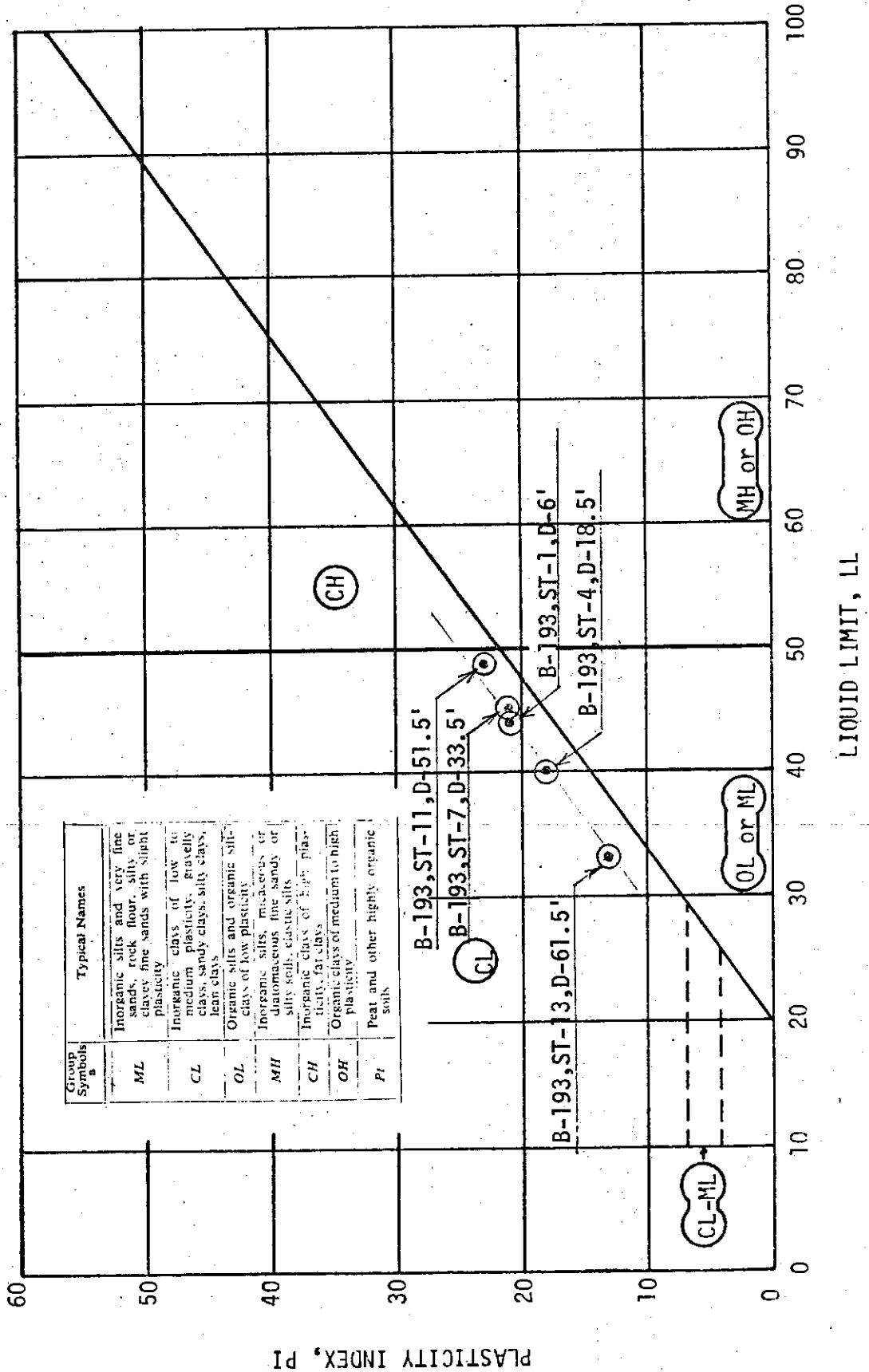
BORING NO.	SAMPLE NO.	DEPTH OF SAMPLE (FT.)	MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION (% OF TEST SAMPLE)							ATTERBERG LIMITS			STRENGTH TESTS			
			NATURAL MOISTURE (% OF DRY WTS.)	NATURAL DRY DENSITY (LBS/CU.FT.)	COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	TYPE OF TEST	MAX. PRINCIPAL STRESS (KG/SQ.CM.)	MIN. PRINCIPAL STRESS (KG/SQ.CM.)	AXIAL STRAIN AT FAILURE (%)
B-193	ST-1	6	13.4	103.6										UNCONF.			5%	4200
	ST-4	18.5	36.3	85.5										UNCONF.			3%	870
	ST-7	33.5	42.6	80.5										UNCONF.			3%	690
	ST-11	51.5	27.5	95.5										UNCONF.			6%	680
	ST-13	61.5	25.7	99.3										UNCONF.			16%	1190
	ST-15	72.5	22.2	103.6										UNCONF.			14%	1690
	ST-16	77.0	26.9	95.5										UNCONF.			5%	500
	ST-16	78.0	26.3	96.1										UNCONF.			4%	1560
	ST-19	98.0	23.6	99.3										UNCONF.				590
B-192	ST-1	20.0	31.9	88.7										UNCONF.			8%	460
	ST-4	35.0	33.1	88.0										UNCONF.			2%	710
	ST-6	45.0	39.2	78.7										UNCONF.			1%	630
	ST-7	52.0	34.5	87.4										UNCONF.			4%	660



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 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: PLASTICITY CHART



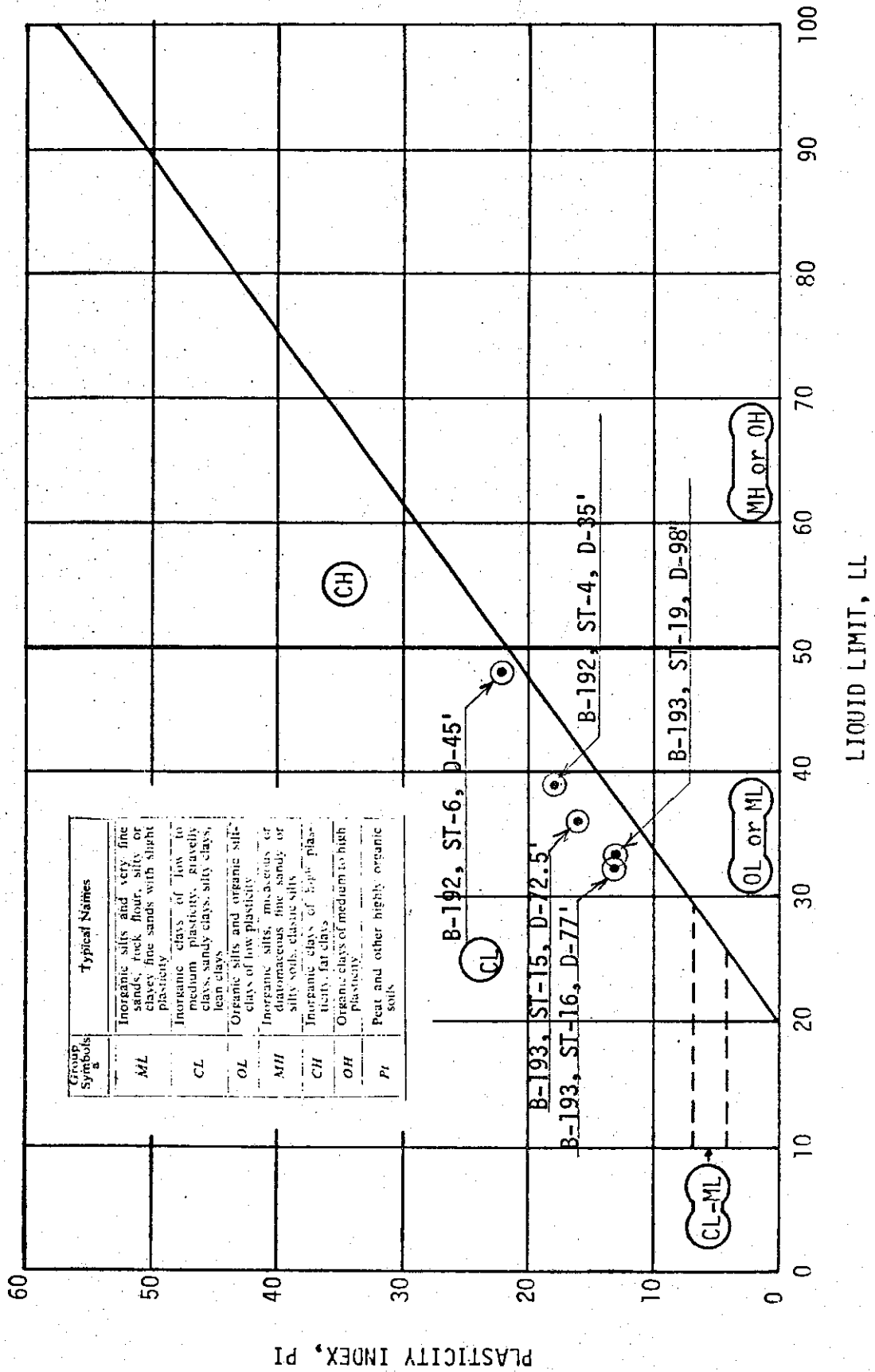


# U. W. STOLL and ASSOCIATES

SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: PLASTICITY CHART



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION BLOW	DEPTH				UNDIST	MOISTURE
							REMOLED (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	6.0			STIFF BROWN SILT	UNCF		201.0	13.4%
ST-1	-6.0	PUSHED		CLAY WITH PEBBLE	72.0	5%		1.66
		\$		QU=4.5 TSF				
B-193	10.0			BROWN MOTTLED	NONE			30.0%
ST-2	-10.0	PUSHED		CLAY WITH PEBBLE	72.5			1.49
				SAMPLING DISTURBED				
				QU=1.75 TSF				
B-193	12.8			SOFT GRAY, CLAY	UNCF		61.3	32.6%
ST-3	-12.8	PUSHED		WITH SEAM OF SILTY	72.5	4%		1.44
				DARK GRAY SANDY				
				CLAY, TV=.57 TSF				
B-193	18.5			TAN GRAY SOFT	UNCF		41.8	36.3%
ST-4	-18.5	PUSHED		SILTY CLAY	72.5	3%		1.37
				(LACUSTRINE)				
				TV=.32 TSF				
B-193	23.5			TAN GRAY SOFT	UNCF		39.3	32.8%
ST-5	-23.5	PUSHED		PLASTIC CLAY	72.5	2%		1.38
				(LACUSTRINE)				
				TV=.29 TSF				
B-193	28.5			TAN GRAY SOFT	UNCF		29.6	41.4%
ST-6	-28.5	PUSHED		PLASTIC CLAY	72.0	2%		1.32
				(LACUSTRINE)				
				TV=.27 TSF				
B-193	33.5			TAN GRAY SOFT	UNCF		32.9	42.6%
ST-7	-33.5	PUSHED		PLASTIC CLAY	72.1	3%		1.29
				(LACUSTRINE)				
				TV=.27 TSF				

UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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soil mechanics and foundation consultants

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 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA			LABORATORY DATA				
BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW DEPTH	LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST ----- REMOLD (KN/SQ.M)	NATURAL MOISTURE ----- DRY DENS (MG/CU.M)
B-193	38.5	PUSHED	TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.37TSF	UNCF	3%	42.9	38.4%
ST-8	-38.5		72.9			1.33	
B-193	41.5	PUSHED	TAN GRAY SOFT LACUSTRINE CLAY TV=0.35TSF	UNCF	2%	31.6	40.6%
ST-9	-41.5		72.3			1.30	
B-193	46.5	PUSHED	REDDISH-GRAY SOFT CLAY (LACUSTRINE) TV=0.35TSF	UNCF	2%	40.4	46.5%
ST-10	-46.5		72.2			1.21	
B-193	51.5	PUSHED	SOFT GRAY MOTTLED LACUSTRINE CLAY TV=.29TSF	UNCF	6%	32.4	27.5%
ST-11	-51.5		72.3			1.53	
B-193	56.5	PUSHED	SOFT GRAY PEBBLY SANDY CLAY TV=.41TSF	UNCF	16%	41.1	20.6%
ST-12	-56.5		72.3			1.52	
B-193	61.5	PUSHED	PLASTIC GRAY SILTY CLAY WITH PEBBLES TV=.5 TSF	UNCF	16%	56.9	25.7%
ST-13	-61.5		72.5			1.59	

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BY: IKK      DATE: 8/75  
SUBJECT:

FIELD DATA      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
						STRENGTH UNDIST	MOISTURE
						REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	66.0		FIRM GRAY SILTY CLAY	UNCF		78.9	22.3%
ST-14	-66.0	PUSHED	WITH PEBBLES TV= 0.63 TSF	72.3	20%		1.67
B-193	72.5		GRAY SILTY CLAY	UNCF		80.8	22.2%
ST-15	-72.5	PUSHED	WITH PEBBLES TV=.67-.78 TSF	72.4	14%		1.66
B-193	77.0		FIRM V. SILTY GRAY CLAY	UNCF		24.1	26.9%
ST-16	-77.0	PUSHED	SAND SEAMS TV=.65 TSF	72.9	5%		1.53
B-193	78.0		GRAY SILTY CLAY	UNCF		74.9	26.3%
ST-16	-78.0	PUSHED	WITH PEBBLES TV= .77 TSF	72.1	4%		1.54
B-193	82.0		GRAY SILTY CLAY	UNCF		70.8	20.4%
ST-17	-82.0	PUSHED	WITH PEBBLES TV= .85 TSF	72.2	14%		1.72
B-193	93.5		GRAY SILTY CLAY	NONE			25.5%
ST-18	-93.5	PUSHED	WITH PEBBLES DRILL WASH	71.1			1.62

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)



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 CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
 SUBJECT:

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR STRENGTH		NATURAL
						UNDIST	REMOLD	MOISTURE
						(KN/SQ.M)	(MG/CU.M)	DRY DENS
B-193	98.0		GRAY SILTY CLAY WITH SOME PEBBLES & MOTTLE	UNCF	20%	28.0		23.6%
ST-19	-98.0	PUSHED	TV=.45 TSF	72.4				1.59
B-193, ST-20		PUSHED	GRAY SILTY CLAY WITH PEBBLES & DRILL WASH	NO TEST				31.1%
B-193	112.0		SOFT GRAY SILTY CLAY WITH PEBBLES	UNCF	20%	19.1		28.5%
ST-21	-112.0	PUSHED	TV=0.22 TSF	72.7				1.47
B-193, ST-22		}	NO TESTS DUE TO DRILL WASH					
B-193, ST-23								

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD	DRY DENS
							(KN/SQ.M)	(MG/CU.M)
B-192	20.0			GRAYISH BROWN	UNCF		22.1	31.9%
		PUSHED		PLASTIC SOFT		8%		
ST-1	-20.0			LACUSTRINE CLAY	72.7			1.42
				TV=.27 TSF				
B-192	25.0			GRAYISH BROWN	UNCF		27.8	35.6%
		PUSHED		SOFT PLASTIC		4%		
ST-2	-25.0			LACUSTRINE CLAY	72.2			1.37
				TV=.27 TSF				
B-192	30.0			GRAYISH BROWN	UNCF		27.7	41.8%
		PUSHED		PLASTIC SOFT		3%		
ST-3	-30.0			LACUSTRINE CLAY	72.3			1.28
				TV=.25 TSF				
B-192	35.0			GRAYISH BROWN	UNCF		34.2	33.1%
		PUSHED		SOFT PLASTIC		2%		
ST-4	-35.0			CLAY(LACUSTRINE)	72.5			1.41
				TV=.28 TSF				
B-192	40.0			GRAYISH BROWN	UNCF		40.5	36.4%
		PUSHED		PLASTIC SOFT		2%		
ST-5	-40.0			LACUSTRINE CLAY	72.4			1.31
				TV=.28 TSF				
B-192	45.0			BROWNISH GRAY	UNCF		30.2	39.2%
		PUSHED		PLASTIC LACUSTRI		1%		
ST-6	-45.0			CLAY (MOTTLED)	72.3			1.26
				TV=.32 TSF				
B-192	52.0			FIRM GRAY	UNCF		31.4	34.5%
		PUSHED		SILTY CLAY		4%		
ST-7	-52.0			WITH PEBBLES	72.3			1.40
				TV= 0.26 TSF				

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

F I E L D      D A T A                      L A B O R A T O R Y      D A T A

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOULD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-192	55.0			SOFT GRAY SILTY CLAY	UNCF		36.8	27.8%
		PUSHED				10%		
ST-8	-55.0			WITH PEBBLES TV=0.40 TSF	72.5			1.54
B-192	80.0			SOFT GRAY SILTY CLAY WITH	UNCF		84.5	26.6%
		PUSHED		FINE SAND LAYERS		7%		
ST-11	-80.0			TV=.52 TSF	72.5			1.55
B-192	60.0			PLASTIC GRAY SILTY CLAY	UNCF		46.0	26.5%
		PUSHED				16%		
ST-9	-60.0			WITH PEBBLES TV=0.50 TSF	72.5			1.57
B-192	70.0			FIRM GRAY SILTY CLAY	UNCF		85.2	24.3%
		PUSHED				20%		
ST-10	-70.0			WITH PEBBLES TV=0.82 TSF	72.3			1.64

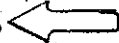
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION: B-193, ST-1, D-6

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.50	.0	.00	119.33
2.00	5.0	.33	1064.92
2.50	11.0	.66	2192.85
3.00	16.5	.98	3219.35
3.50	21.0	1.31	4051.68
4.00	25.0	1.64	4785.06
4.50	28.5	1.97	5420.41
5.00	31.8	2.29	6014.33
5.50	35.0	2.62	6585.65
6.00	37.5	2.95	7024.04
6.50	39.8	3.28	7422.60
7.00	41.8	3.60	7763.41
7.50	43.5	3.93	8047.02
8.00	44.9	4.26	8274.00
8.50	45.6	4.59	8372.46
9.00	45.9	4.91	8397.85
9.50	45.9	5.24	8368.92
10.00	44.0	5.57	7999.41
10.50	39.0	5.90	7078.55



SAMPLE IDENTIFICATION: B-193, ST-3, D-12.8

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	117.69
1.50	113.0	.35	595.39
2.00	222.0	.71	1052.83
2.50	332.0	1.06	1511.20
3.00	422.0	1.41	1882.54
3.50	485.0	1.77	2138.56
4.00	527.0	2.12	2305.42
4.50	558.0	2.48	2425.46
5.00	578.0	2.83	2499.18
5.50	590.0	3.18	2539.42
6.00	597.5	3.54	2560.86
6.50	600.0	3.89	2561.68
6.80	600.0	4.10	2556.02
7.00	599.0	4.24	2548.19
7.50	596.0	4.60	2526.63
8.00	593.0	4.95	2505.15



SAMPLE IDENTIFICATION: B-193, ST-4, D-18.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
6.50	.0	.00	117.69
7.00	87.0	.33	485.48
7.50	160.0	.67	791.74
8.00	230.0	1.00	1083.33
8.50	290.0	1.34	1331.04
9.00	336.0	1.67	1518.59
9.50	366.0	2.00	1638.26
10.00	385.0	2.34	1711.47
10.50	395.0	2.67	1746.94
11.00	396.5	3.01	1747.13
11.50	388.0	3.34	1706.22
12.00	364.0	3.67	1600.15

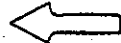


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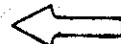
JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION;		B-193, ST-5, D-23.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.50	.0	.00	117.69
5.00	80.0	.33	455.87
5.50	175.0	.66	855.09
6.00	272.0	.99	1260.05
6.50	337.0	1.32	1528.21
7.00	363.0	1.65	1631.69
7.30	366.0	1.85	1640.91
7.50	355.0	1.98	1592.92
8.00	323.0	2.31	1454.83
8.50	310.0	2.64	1396.17



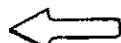
SAMPLE IDENTIFICATION;		B-193, ST-6, D-28.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.33
1.00	124.0	.64	649.00
1.50	200.0	.96	970.96
2.00	250.0	1.28	1180.32
2.50	264.0	1.60	1235.80
3.00	265.0	1.92	1236.00
4.00	260.0	2.56	1206.94
5.00	250.0	3.21	1157.33
6.00	244.0	3.85	1124.83



SAMPLE IDENTIFICATION;		B-193, ST-7, D-33.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
2.00	.0	.00	119.00
3.00	89.0	.65	497.86
4.00	177.0	1.30	867.51
5.00	260.0	1.95	1211.21
6.00	300.5	2.60	1372.55
7.00	290.0	3.25	1319.78
8.00	272.0	3.90	1236.66
9.00	262.0	4.55	1187.32



SAMPLE IDENTIFICATION;		B-193, ST-8, D-38.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
1.50	85.0	.35	471.73
2.00	138.0	.70	691.11
2.50	198.0	1.04	938.03
3.00	267.0	1.39	1220.47
3.50	331.0	1.74	1480.26
4.00	376.0	2.09	1660.05
4.50	400.0	2.44	1752.48
5.00	411.0	2.79	1791.13
5.50	412.5	3.13	1790.82
6.00	408.0	3.48	1766.14
6.50	399.0	3.83	1723.42



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BY: IKK  
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DATE: 8/75

SAMPLE IDENTIFICATION:

B-193, ST-9, D-41.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	91.0	.32	505.25
1.00	151.0	.64	758.14
1.25	179.0	.81	875.50
1.50	203.0	.97	975.56
1.75	224.0	1.13	1062.62
2.00	244.0	1.29	1145.18
2.50	272.0	1.61	1259.07
3.00	288.0	1.93	1321.94
3.50	288.0	2.26	1317.60
3.80	286.0	2.45	1306.66
4.30	281.0	2.77	1281.59
4.50	278.0	2.90	1267.45
5.00	270.0	3.22	1230.19



SAMPLE IDENTIFICATION:

B-193, ST-10, D-46.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.25	69.0	.16	413.41
.50	116.0	.33	613.30
.75	160.0	.49	799.74
1.00	205.0	.66	989.82
1.25	245.0	.82	1158.03
1.50	285.0	.99	1325.68
2.00	349.0	1.32	1591.68
2.50	373.0	1.64	1687.44
3.00	358.0	1.97	1618.84
4.00	325.0	2.63	1470.41



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SAMPLE IDENTIFICATION;		B-193, ST-11, D-51.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	118.35
1.25	38.0	.17	280.13
1.50	60.0	.33	373.29
2.00	100.0	.66	541.71
2.50	138.0	.99	700.54
3.00	176.0	1.32	858.31
3.50	205.0	1.65	977.21
4.00	232.0	1.98	1086.93
4.50	252.0	2.31	1166.68
5.00	266.0	2.64	1220.93
5.50	277.0	2.97	1262.36
6.00	284.5	3.30	1289.03
6.50	290.5	3.63	1309.31
7.00	295.0	3.96	1323.28
7.50	299.0	4.29	1335.07
8.00	302.0	4.62	1342.68
8.50	303.5	4.95	1344.12
9.00	306.0	5.28	1349.56
9.50	307.5	5.61	1350.90
10.00	309.0	5.94	1352.20
10.50	309.5	6.27	1349.45
11.00	310.2	6.61	1347.49
11.50	310.9	6.94	1345.50
12.00	311.3	7.27	1342.31
12.50	311.6	7.60	1338.72
13.00	311.7	7.93	1334.32
13.50	311.7	8.26	1329.54
14.50	310.5	8.92	1315.30
15.00	310.0	9.25	1308.59

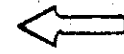


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SAMPLE IDENTIFICATION;		B-193, ST-12, D-56.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	44.0	.16	305.71
.50	63.0	.33	386.06
.75	81.0	.49	461.89
1.00	96.0	.66	524.75
1.75	135.0	1.15	686.75
2.00	150.0	1.32	748.81
2.50	177.0	1.64	859.69
3.00	204.0	1.97	969.82
3.50	227.0	2.30	1062.51
4.00	249.0	2.63	1150.39
4.50	268.0	2.96	1225.22
5.00	284.0	3.29	1287.14
6.00	309.0	3.95	1380.91
7.00	329.0	4.61	1452.91
8.00	345.0	5.26	1507.61
9.00	358.5	5.92	1551.37
10.00	369.5	6.58	1584.40
11.00	379.0	7.24	1610.86
12.00	387.5	7.89	1632.87
13.00	395.0	8.55	1650.49
14.00	401.5	9.21	1663.81
16.00	413.0	10.53	1683.63
17.00	418.0	11.18	1690.21
18.00	422.5	11.84	1694.63
19.00	428.0	12.50	1702.53
20.00	432.5	13.16	1706.41
21.00	437.0	13.82	1710.04
22.00	441.0	14.47	1711.60
24.00	449.5	15.79	1715.82
25.00	453.5	16.45	1716.69
27.00	461.0	17.76	1715.99
28.00	465.0	18.42	1716.19
29.00	468.0	19.08	1712.72
30.40	471.5	20.00	1705.18



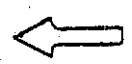


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BY: IKK                      DATE: 8/75  
 SUBJECT:

SAMPLE IDENTIFICATION;		B-193, ST-13, D-61.5	
DIAL GAGE	LOAD GAGE	STRAIN	STRESS
		%	(PSF)
1.00	.0	.00	117.69
1.50	76.0	.33	438.93
2.00	113.0	.67	593.53
2.50	48.0	1.00	318.30
3.00	182.0	1.33	878.63
3.50	218.0	1.66	1025.99
4.00	255.0	2.00	1176.49
4.50	292.0	2.33	1325.94
5.00	323.0	2.66	1449.55
5.50	353.0	2.99	1568.17
6.00	378.0	3.33	1665.41
6.50	398.0	3.66	1741.49
7.00	414.0	3.99	1800.71
7.50	429.0	4.32	1855.40
8.00	443.0	4.66	1905.63
8.50	456.0	4.99	1951.42
9.00	467.5	5.32	1990.82
9.50	478.0	5.66	2025.89
10.00	487.0	5.99	2054.67
10.50	496.0	6.32	2083.20
11.00	504.5	6.65	2109.50
12.00	520.0	7.32	2155.46
13.00	534.0	7.98	2194.68
14.00	547.0	8.65	2229.24
15.00	558.0	9.31	2255.36
16.00	569.0	9.98	2280.86
17.00	579.5	10.65	2303.84
18.00	588.5	11.31	2320.58
19.00	597.0	11.98	2334.94
20.00	604.5	12.64	2345.11
21.00	612.0	13.31	2354.86
22.00	619.0	13.97	2362.35
23.00	626.5	14.64	2371.27
24.00	633.0	15.30	2376.16
25.00	639.0	15.97	2378.90
26.00	644.0	16.63	2377.77
27.00	648.5	17.30	2374.59
28.00	653.0	17.96	2371.16
29.00	657.0	18.63	2365.75
30.00	660.5	19.29	2358.40
31.00	664.0	20.00	2349.68



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SAMPLE IDENTIFICATION;		B-193, ST-14, D-66	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	105.0	.68	562.77
2.00	205.0	1.37	980.01
3.00	300.0	2.05	1370.48
4.00	382.0	2.74	1701.42
5.00	446.0	3.42	1953.33
6.00	495.0	4.11	2140.09
7.00	535.0	4.79	2287.40
8.00	570.0	5.48	2412.19
9.00	598.0	6.16	2506.89
10.00	625.0	6.85	2595.98
11.00	651.0	7.53	2679.54
12.00	675.0	8.22	2753.74
13.00	697.0	8.90	2818.76
14.00	717.0	9.59	2874.77
15.00	736.0	10.27	2925.78
16.00	755.0	10.96	2975.68
17.00	773.0	11.64	3020.69
18.00	788.0	12.33	3053.42
19.00	804.0	13.01	2088.99
20.00	818.0	13.70	3116.25
21.00	834.0	14.38	3150.01
22.00	848.0	15.07	3175.58
23.00	861.0	15.75	3196.73
24.00	875.0	16.44	3220.69
25.00	887.0	17.12	3236.75
26.00	900.0	17.81	3255.62
27.00	911.0	18.49	3266.77
28.00	923.0	19.18	3280.73
29.00	935.0	19.86	3293.99
29.20	937.0	20.00	3295.19
30.00	947.0	20.55	3306.54
31.00	958.0	21.23	3315.03



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SUBJECT:

SAMPLE IDENTIFICATION:		B-193, ST-15, D-72.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	80.0	.62	455.81
2.00	130.0	1.24	663.23
3.00	180.0	1.86	868.02
4.00	230.0	2.47	1070.18
5.00	290.0	3.09	1310.96
6.00	355.0	3.71	1569.09
7.00	418.0	4.33	1815.64
8.00	476.0	4.95	2038.64
9.00	529.0	5.57	2238.48
11.00	620.0	6.80	2570.27
12.00	659.0	7.42	2706.94
13.00	692.0	8.04	2818.07
14.00	722.0	8.66	2915.80
15.00	751.0	9.28	3008.08
16.00	776.0	9.89	3083.49
17.00	798.0	10.51	3146.15
18.00	818.0	11.13	3200.08
19.00	838.0	11.75	3252.97
20.00	857.0	12.37	3301.06
22.00	890.0	13.61	3375.86
24.00	902.5	14.84	3372.86
26.00	880.0	16.08	3243.47
28.00	850.0	17.32	3090.05



SAMPLE IDENTIFICATION:		B-193, ST-16, D-77	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
2.00	88.0	.61	483.01
3.00	145.0	1.22	716.51
4.00	187.0	1.83	885.24
5.00	210.0	2.44	973.98
7.00	217.0	3.66	990.13
8.00	222.0	4.27	1003.96
10.00	226.0	5.49	1007.05
11.00	225.0	6.10	996.61



SAMPLE IDENTIFICATION:		B-193, ST-16, D-78	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.00
1.00	250.0	.53	1186.01
2.00	420.0	1.06	1901.79
3.00	535.0	1.59	2377.45
4.00	610.0	2.12	2679.78
5.00	663.0	2.66	2886.75
6.00	698.0	3.19	3016.48
7.00	722.0	3.72	3099.14
8.00	733.0	4.25	3127.27



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SAMPLE IDENTIFICATION:		B-193, ST-17, D-82	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.00	.0	.00	118.67
4.50	105.0	.28	566.65
5.00	138.0	.56	705.57
6.00	192.0	1.11	930.26
7.00	242.0	1.67	1135.54
8.00	289.0	2.22	1325.88
9.00	333.0	2.78	1501.50
10.00	374.0	3.33	1662.61
11.00	412.0	3.89	1809.42
12.00	447.0	4.44	1942.15
13.00	481.0	5.00	2069.15
14.00	510.0	5.56	2174.32
15.00	538.0	6.11	2274.08
16.00	565.0	6.67	2368.52
17.00	590.0	7.22	2453.73
18.00	611.0	7.78	2521.95
19.00	634.0	8.33	2597.03
20.00	655.0	8.89	2663.21
22.00	692.0	10.00	2773.30
24.00	724.0	11.11	2860.85
26.00	751.0	12.22	2926.56
28.00	768.0	13.33	2952.59
30.00	780.0	14.44	2958.69
32.00	786.0	15.56	2941.96
34.00	789.5	16.67	2915.74
35.00	793.0	17.22	2908.70
36.00	796.0	17.78	2899.74



B-193, ST-1B NO STRENGTH TEST DUE TO DRILL WASH

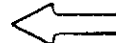
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SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-19, D-98	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	23.0	.66	214.53
2.00	49.0	1.32	322.35
3.00	68.0	1.97	399.51
4.00	85.0	2.63	467.31
5.00	98.0	3.29	517.68
6.00	112.0	3.95	571.41
7.00	124.0	4.61	616.24
8.00	136.0	5.26	660.40
9.00	147.0	5.92	699.87
10.00	158.0	6.58	738.73
11.00	169.0	7.24	776.98
12.00	179.0	7.89	810.68
13.00	188.0	8.55	839.94
14.00	198.0	9.21	872.55
15.00	207.0	9.87	900.77
16.00	215.0	10.53	924.67
17.00	224.0	11.18	951.90
18.00	233.0	11.84	978.64
19.00	241.0	12.50	1001.14
20.00	250.0	13.16	1026.89
21.00	257.0	13.82	1044.80
22.00	265.0	14.47	1065.95
23.00	272.0	15.13	1083.05
24.00	279.0	15.79	1099.75
25.00	285.0	16.45	1112.51
26.00	292.0	17.11	1128.45
27.00	297.0	17.76	1137.00
28.00	302.0	18.42	1145.27
29.00	307.0	19.08	1153.27
30.00	311.5	19.74	1159.27
30.40	316.0	20.00	1170.80



B-193, ST-20 No STRENGTH TEST DUE TO DRILL WASH  
(W<sub>m</sub> = 31.1%)

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SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-21, D-112	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
1.00	10.0	.65	158.23
2.00	28.0	1.31	232.21
3.00	45.0	1.96	301.05
4.00	58.0	2.62	352.50
5.00	70.0	3.27	399.15
6.00	80.0	3.92	437.02
7.00	90.0	4.58	474.34
8.00	98.0	5.23	503.10
9.00	105.0	5.89	527.45
10.00	112.0	6.54	551.41
11.00	119.0	7.19	574.98
12.00	126.0	7.85	598.17
13.00	132.0	8.50	617.11
14.00	138.0	9.16	635.71
15.00	144.0	9.81	653.99
16.00	148.0	10.46	664.37
17.00	153.0	11.12	678.28
18.00	158.0	11.77	691.92
19.00	163.0	12.43	705.28
20.00	168.0	13.08	718.37
21.00	172.0	13.73	727.53
22.00	177.0	14.39	740.09
23.00	180.0	15.04	745.20
24.00	185.0	15.70	757.26
25.00	188.0	16.35	761.99
26.00	192.0	17.00	770.05
27.00	195.0	17.66	774.41
28.00	198.0	18.31	778.61
29.00	202.0	18.97	786.06
30.00	205.0	19.62	789.90
31.00	210.0	20.27	800.31
32.00	212.0	20.93	800.42
30.60	208.0	20.01	796.18



B-193    ST-22 }  
B-193    ST-23 } NO TEST DUE TO DRILL WASH

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK

DATE: 8/75

SUBJECT:

SAMPLE IDENTIFICATION:		B-192, ST-1, D-20	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
.40	11.5	.26	165.17
.80	20.0	.52	200.45
1.20	28.0	.79	233.44
1.60	35.0	1.05	262.07
2.00	42.0	1.31	290.55
2.40	50.0	1.57	323.03
2.80	57.0	1.83	351.18
3.20	65.0	2.10	383.32
3.60	73.0	2.36	415.28
4.00	81.0	2.62	447.07
4.40	90.0	2.88	482.77
4.80	99.0	3.14	518.28
5.20	108.0	3.41	553.59
5.60	118.0	3.67	592.77
6.80	147.0	4.45	704.94
7.20	157.0	4.72	743.24
7.60	166.0	4.98	777.31
8.00	174.0	5.24	807.18
8.40	181.0	5.50	832.88
8.80	187.0	5.76	854.45
9.20	192.0	6.02	871.92
9.60	197.0	6.29	889.27
10.00	200.0	6.55	898.63
10.40	203.0	6.81	907.91
10.80	206.0	7.07	917.13
11.20	208.0	7.33	922.38
11.60	209.0	7.60	923.67
12.00	210.0	7.86	924.94



SAMPLE IDENTIFICATION:		B-192, ST-2, D-25	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.50	27.0	.33	233.50
1.00	51.0	.66	334.80
1.50	78.0	.99	448.15
2.00	105.0	1.32	560.73
2.50	135.0	1.65	685.17
3.00	165.0	1.98	808.78
3.50	192.0	2.31	918.98
4.00	213.0	2.64	1003.41
4.50	229.0	2.97	1066.48
5.00	242.0	3.30	1116.67
5.50	250.0	3.63	1145.87
6.00	255.0	3.96	1162.51
6.50	256.0	4.29	1162.61
7.00	251.0	4.62	1138.18



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

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BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-192, ST-3, D-30	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	45.0	.32	309.47
1.00	83.0	.65	469.65
1.50	118.0	.97	616.10
2.00	157.0	1.30	778.43
2.50	193.0	1.62	927.07
3.00	222.0	1.95	1045.42
3.50	241.0	2.27	1121.23
4.00	250.0	2.60	1154.93
4.30	251.0	2.79	1156.77
4.50	250.0	2.92	1151.08
5.00	247.0	3.25	1134.84



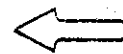
SAMPLE IDENTIFICATION:		B-192, ST-4, D-35	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	136.0	.65	690.61
2.00	275.0	1.31	1268.54
2.80	315.0	1.83	1428.53
4.00	254.0	2.62	1164.87



SAMPLE IDENTIFICATION:		B-192, ST-5, D-40	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
.50	86.0	.33	482.60
1.00	147.0	.66	739.02
1.50	205.0	.99	981.08
2.00	263.0	1.32	1221.51
2.50	313.0	1.65	1426.81
3.00	354.0	1.98	1593.15
3.50	377.0	2.31	1683.47
3.70	379.5	2.44	1691.58
4.10	372.0	2.70	1655.94
4.50	336.0	2.97	1502.71
5.00	310.0	3.30	1390.55



SAMPLE IDENTIFICATION:		B-192, ST-6, D-45	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	111.0	.33	590.33
1.00	194.0	.66	940.43
1.50	249.0	.99	1169.84
2.00	272.0	1.31	1262.87
2.15	272.0	1.41	1261.61
2.50	266.0	1.64	1233.47
3.00	254.0	1.97	1179.12
3.50	247.0	2.30	1145.97





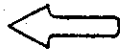
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION;		B-192, ST-7, D-52	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	100.0	.71	541.43
2.00	170.0	1.42	832.16
3.00	224.0	2.14	1051.79
4.00	262.0	2.85	1201.77
5.00	285.0	3.56	1287.67
6.00	293.0	4.27	1310.87
7.00	270.0	4.98	1207.81

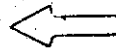


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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION;		B-192, ST-8, D-55	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	103.0	.62	551.62
2.00	165.0	1.23	808.20
3.00	132.0	1.85	665.62
4.00	195.0	2.47	922.33
5.00	247.0	3.09	1130.48
6.00	282.0	3.70	1266.39
7.00	305.0	4.32	1351.71
8.00	322.0	4.94	1411.61
9.00	334.0	5.56	1450.56
11.00	352.0	6.79	1502.84
12.00	358.0	7.41	1516.48
13.00	363.0	8.02	1525.90
14.00	367.5	8.64	1533.11
15.00	370.0	9.26	1532.38
16.00	373.5	9.88	1535.35
18.00	379.0	11.11	1535.08
19.00	381.0	11.73	1531.92
20.00	382.0	12.35	1524.93
21.00	383.0	12.96	1517.88
22.00	384.0	13.58	1510.79
23.00	384.0	14.20	1500.00
24.00	383.5	14.81	1487.40
25.00	381.0	15.43	1467.64



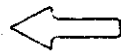
SAMPLE IDENTIFICATION;		B-192, ST-9, D-60	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	70.0	.63	412.31
2.00	130.0	1.26	661.26
3.00	185.0	1.89	886.18
4.00	235.0	2.52	1087.46
5.00	280.0	3.14	1265.51
6.00	317.0	3.77	1408.47
7.00	347.0	4.40	1521.04
8.00	371.0	5.03	1607.81
9.00	389.0	5.66	1669.27
10.00	404.0	6.29	1717.83
11.00	417.0	6.92	1757.68
12.00	429.0	7.55	1792.91
13.00	439.0	8.18	1819.70
14.00	447.0	8.81	1838.22
16.00	463.0	10.06	1873.96
17.00	471.0	10.69	1891.20
18.00	476.0	11.32	1896.70
19.00	482.0	11.95	1905.68
20.00	488.0	12.58	1914.34
21.00	493.0	13.21	1919.00
D-28 22.00	497.0	13.84	1919.73

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BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

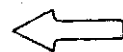
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
24.00	505.0	15.09	1920.54
25.00	509.0	15.72	1920.63
26.00	512.0	16.35	1916.95
27.00	516.0	16.98	1916.64
28.00	519.0	17.61	1912.62
29.00	523.0	18.24	1911.90
30.00	525.0	18.87	1904.09
31.80	530.5	20.00	1896.20



SAMPLE IDENTIFICATION:

B-192, ST-10, D-70

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	30.0	.16	246.05
.50	60.0	.31	373.36
.75	90.0	.47	500.27
1.00	117.0	.62	614.05
1.50	164.0	.93	810.94
2.00	209.0	1.24	998.14
2.50	252.0	1.55	1175.75
3.00	295.0	1.86	1352.21
3.50	336.0	2.17	1519.18
4.00	377.0	2.48	1685.06
4.50	417.0	2.80	1845.71
5.00	450.0	3.11	1976.33
5.50	482.0	3.42	2101.96
6.00	512.0	3.73	2218.52
6.50	537.0	4.04	2313.79
7.00	560.0	4.35	2400.23
7.50	582.0	4.66	2482.00
8.00	603.0	4.97	2559.12
9.00	639.0	5.59	2687.51
10.00	672.0	6.21	2801.97
11.00	702.0	6.83	2902.75
12.00	727.0	7.45	2982.19
13.00	751.0	8.07	3056.37
14.00	773.0	8.70	3121.48
15.00	792.0	9.32	3173.81
16.00	810.0	9.94	3221.29
17.00	827.0	10.56	3263.99
18.00	844.0	11.18	3305.79
19.00	859.0	11.80	3339.16
20.00	874.0	12.42	3371.74
22.00	900.0	13.66	3419.75
24.00	926.0	14.91	3465.01
26.00	949.0	16.15	3496.77
28.00	971.0	17.39	3522.56
30.00	992.0	18.63	3542.54
32.20	1014.0	20.00	3558.20
34.00	1037.0	21.12	3585.93



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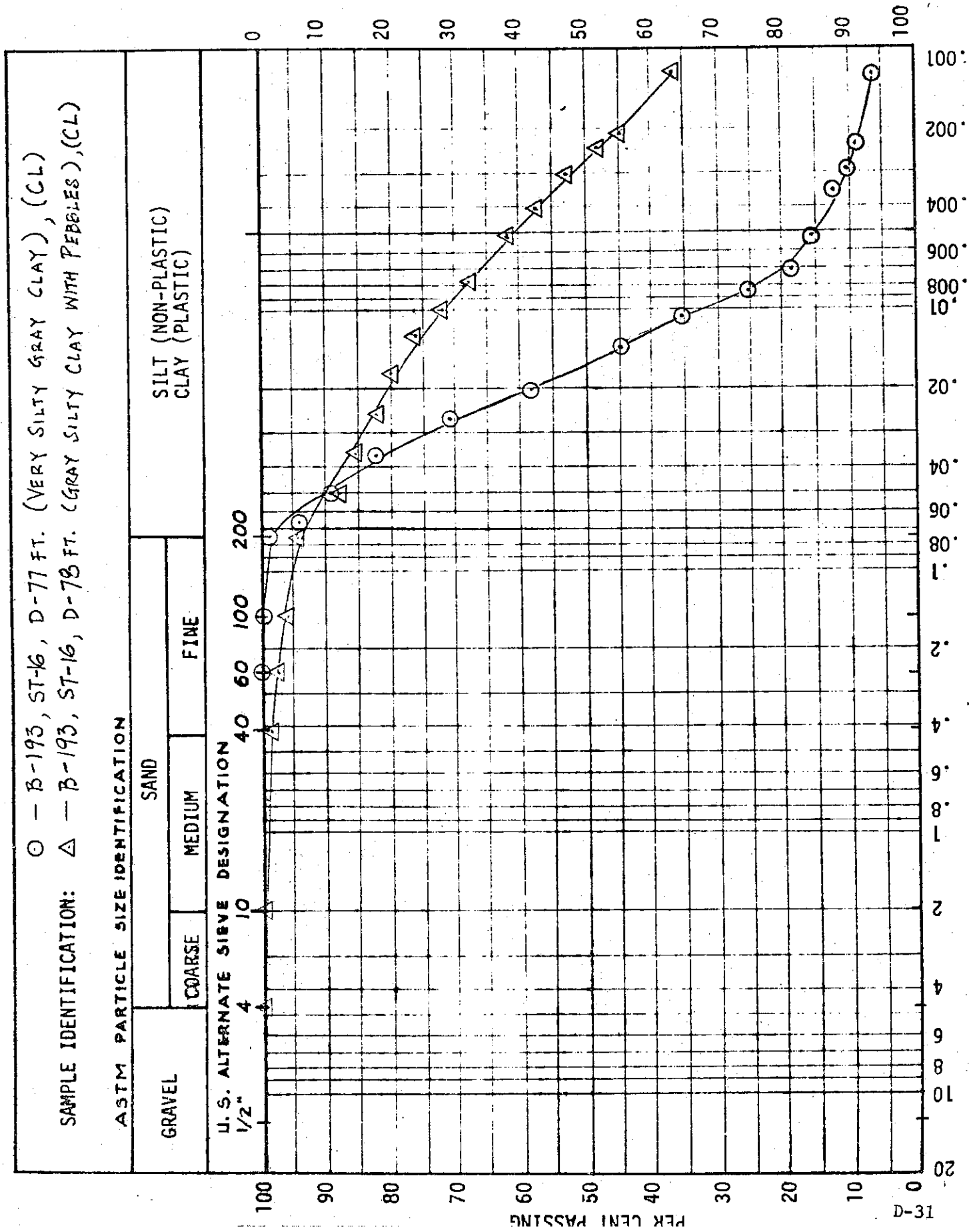
BY: IKK DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION;		B-192, ST-11, D-80	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
.25	42.0	.16	295.57
.50	92.0	.31	506.76
.75	137.0	.47	696.15
1.00	177.0	.62	863.86
1.25	216.0	.78	1026.83
1.50	253.0	.93	1180.87
1.75	288.0	1.09	1326.02
2.00	324.0	1.24	1474.90
2.25	360.0	1.40	1623.31
2.50	395.0	1.55	1767.07
3.00	460.0	1.86	2032.36
3.50	522.0	2.17	2283.48
4.00	578.0	2.48	2508.12
4.50	622.0	2.79	2681.75
5.00	664.0	3.10	2846.00
5.50	696.0	3.41	2968.13
6.00	726.0	3.72	3081.24
6.50	752.0	4.03	3177.26
7.00	774.0	4.34	3256.35
7.50	795.0	4.65	3330.81
8.00	810.0	4.96	3380.51
8.50	826.0	5.27	3433.83
9.00	838.0	5.58	3470.69
9.50	848.0	5.89	3499.25
10.00	856.0	6.20	3519.58
11.00	864.5	6.82	3529.93
11.50	850.0	7.13	3461.00
12.00	820.0	7.44	3331.54
12.50	795.0	7.75	3222.46



JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY  
DATE: 9/75



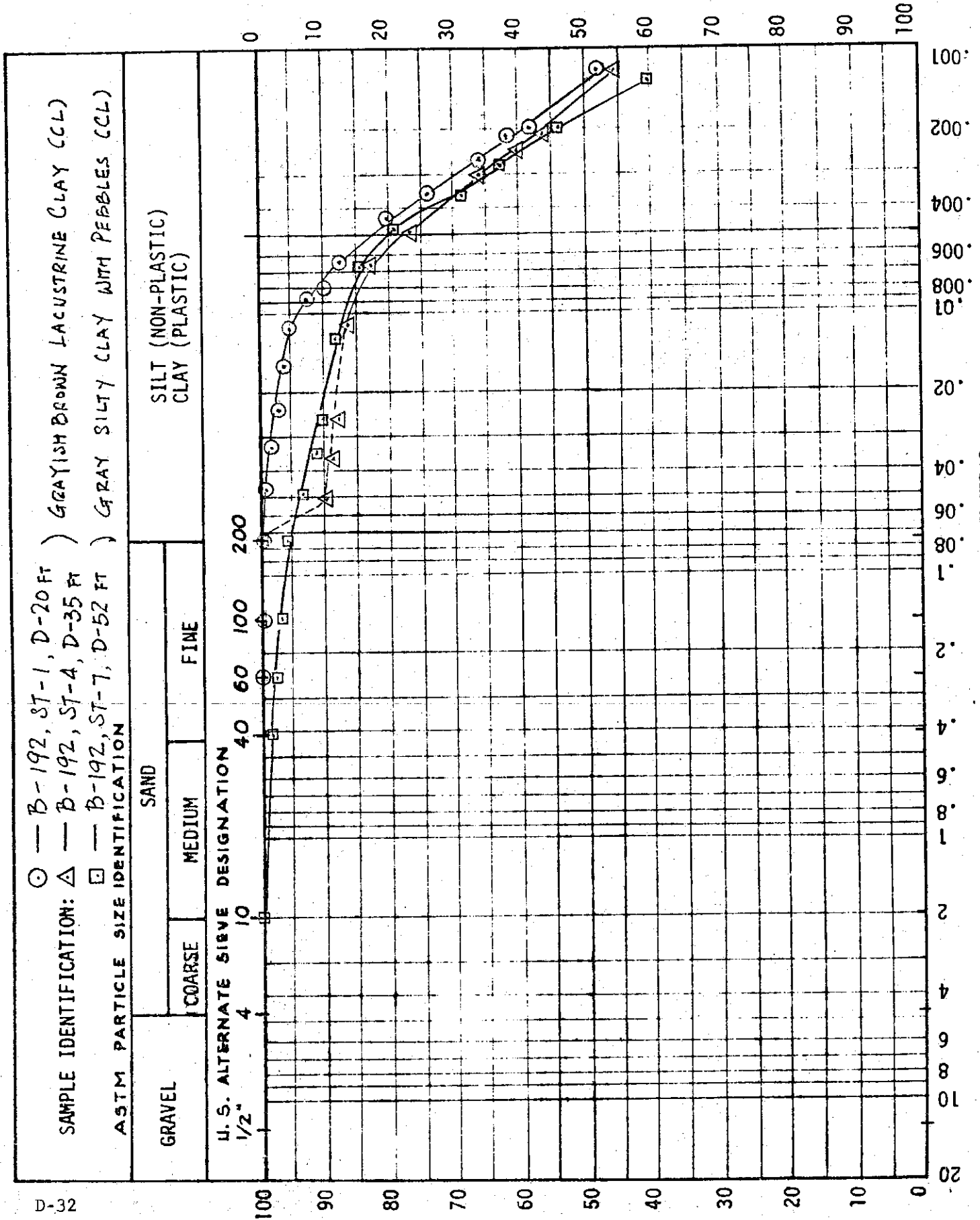
**U. W. STOLL AND ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK

DATE: 9/75

SUBJECT: PARTICLE SIZE DISTRIBUTION  
 ANALYSIS SUMMARY



**Appendix G**  
**2016 Lab Test Results**

TRC Environmental Corporation													QC:	JPH				
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH				
Project Name: DTE - BRPP BAB and DB						Cell #:						8						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-01, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray lean clay						Average Kv =						2.9E-08 cm/s						
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.87		2.87		Permeant: Water												
Sample Ht. (in)		3.02		3.02		Permeant Specific Gravity: 1.00												
Tare & Wet (g)		775.10		649.20		Sample Specific Gravity: 2.70 Est.												
Tare & Dry (g)		562.60		471.50		Confining Pressure (psi): 100.0												
Tare (g)		88.86		88.64		Burette Diameter (in): 0.250												
Sample Wt. (g)		563.65		560.56		Burette Zero (cm): 100.0												
Moisture (%)		44.9		46.4		Maximum Gradient: 7.0												
Wet Density (pcf)		109.9		109.5		Average Gradient: 6.5												
Dry Density (pcf)		75.9		74.8		Max. Effect. Stress (psi): 5.7												
Saturation (%)		99.2		100.0		Min. Effect. Stress (psi): 4.3												
						Ave. Effect. Stress (psi): 4.8												
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1	
1	2016	3	15	8	10.00	0.0	95	95	55.40		3.45		102.60					
2	2016	3	15	11	15.00	11100	23.0	95	95	56.10	0.70	4.05	0.60	101.30	1.30	-36.8	4.7E-08	
3	2016	3	15	14	16.00	10860	23.0	95	95	57.00	0.90	4.75	0.70	100.60	0.70	0.0	3.6E-08	
4	2016	3	15	18	15.00	14340	23.0	95	95	57.75	0.75	5.55	0.80	99.75	0.85	-3.0	3.3E-08	
5	2016	3	16	4	55.00	38400	22.0	95	95	59.30	1.55	7.65	2.10	97.50	2.25	-3.4	3.4E-08	
6	2016	3	16	8	38.00	13380	23.0	95	95	59.80	0.50	8.35	0.70	96.80	0.70	0.0	3.2E-08	
7	2016	3	16	11	56.00	11880	23.0	95	95	60.35	0.55	9.05	0.70	96.30	0.50	16.7	3.1E-08	
8	2016	3	16	15	1.00	11100	23.0	95	95	60.40	0.05	9.60	0.55	95.70	0.60	-4.3	3.2E-08	
9	2016	3	17	5	14.00	51180	22.0	95	95	61.30	0.90	12.10	2.50	93.20	2.50	0.0	3.2E-08	
10	2016	3	17	8	17.00	10980	24.0	95	95	62.05	0.75	12.65	0.55	92.75	0.45	10.0	3.0E-08	
11	2016	3	17	12	19.00	14520	23.0	95	95	62.15	0.10	13.25	0.60	92.05	0.70	-7.7	3.0E-08	
12	2016	3	17	17	49.00	19800	23.0	95	95	62.60	0.45	14.15	0.90	91.30	0.75	9.1	2.9E-08	
13	2016	3	18	5	23.00	41640	22.0	95	95	63.15	0.55	16.00	1.85	89.40	1.90	-1.3	3.3E-08	
14	2016	3	18	8	58.00	12900	24.0	95	95	63.60	0.45	16.55	0.55	88.90	0.50	4.8	3.0E-08	
15	2016	3	18	12	55.00	14220	23.0	95	95	63.80	0.20	17.10	0.55	88.30	0.60	-4.3	3.0E-08	
16	2016	3	18	16	30.00	12900	23.0	95	95	64.10	0.30	17.65	0.55	87.90	0.40	15.8	2.8E-08	
17	2016	3	21	4	58.00	217680	22.0	95	95	67.20	3.10	25.35	7.70	80.20	7.70	0.0	3.1E-08	
18	2016	3	21	8	1.00	10980	24.0	95	95	67.60	0.40	25.70	0.35	79.85	0.35	0.0	3.1E-08	
19	2016	3	21	12	10.00	14940	23.0	95	95	67.60	0.00	26.15	0.45	79.40	0.45	0.0	3.0E-08	
20	2016	3	21	15	12.00	10920	23.0	95	95	67.70	0.10	26.40	0.25	79.15	0.25	0.0	2.3E-08	1
21	2016	3	21	19	36.00	15840	23.0	95	95	68.30	0.60	26.90	0.50	78.70	0.45	5.3	3.1E-08	1
22	2016	3	21	21	31.00	6900	23.0	95	95	68.10	-0.20	27.10	0.20	78.50	0.20	0.0	3.0E-08	1
23	2016	3	22	5	52.00	30060	25.0	95	95	68.90	0.80	28.05	0.95	77.65	0.85	5.6	3.1E-08	1
24	2016	3	22	10	31.00	16740	23.0	95	95	68.85	-0.05	28.45	0.40	77.20	0.45	-5.9	2.8E-08	1
25	2016	3	22	15	59.00	19680	24.0	95	95	69.40	0.55	29.00	0.55	76.70	0.50	4.8	2.9E-08	1
26	2016	3	22	22	32.00	23580	24.0	95	95	69.80	0.40	29.55	0.55	76.10	0.60	-4.3	2.7E-08	1
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.			2.9E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.					



TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-05, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.7E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.84		Permeant: Water											
Sample Ht. (in)		3.25		3.20		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		536.11		691.40		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		403.90		517.10		Confining Pressure (psi): 100.0											
Tare (g)		93.83		91.24		Burette Diameter (in): 0.250											
Sample Wt. (g)		610.40		600.16		Burette Zero (cm): 100.0											
Moisture (%)		42.6		40.9		Maximum Gradient: 7.3											
Wet Density (pcf)		110.6		112.8		Average Gradient: 6.9											
Dry Density (pcf)		77.5		80.0		Max. Effect. Stress (psi): 6.1											
Saturation (%)		98.2		100.0		Min. Effect. Stress (psi): 4.6											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	25.20		1.95		101.75				
2	2016	3	15	11	15.00	0.0	95	95	27.70		1.80		99.60				
3	2016	3	15	14	17.00	10920	23.0	95	95	29.40	1.70	2.00	0.20	98.65	0.95	-65.2	3.2E-08
4	2016	3	15	18	16.00	14340	23.0	95	95	30.65	1.25	2.40	0.40	97.60	1.05	-44.8	3.1E-08
5	2016	3	16	4	56.00	38400	22.0	95	95	32.20	1.55	3.85	1.45	95.40	2.20	-20.5	3.1E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	32.40	0.20	4.40	0.55	94.85	0.55	0.0	2.6E-08
7	2016	3	16	11	57.00	11880	23.0	95	95	33.85	1.45	4.95	0.55	94.40	0.45	10.0	2.7E-08
8	2016	3	16	15	2.00	11100	23.0	95	95	34.00	0.15	5.35	0.40	93.90	0.50	-11.1	2.7E-08
9	2016	3	17	5	15.00	51180	22.0	95	95	35.20	1.20	7.35	2.00	91.80	2.10	-2.4	2.8E-08
10	2016	3	17	8	17.00	10920	24.0	95	95	35.80	0.60	7.80	0.45	91.45	0.35	12.5	2.5E-08
11	2016	3	17	12	20.00	14580	23.0	95	95	35.90	0.10	8.30	0.50	89.85	1.60	-52.4	5.1E-08
12	2016	3	17	17	50.00	19800	23.0	95	95	36.40	0.50	9.10	0.80	89.25	0.60	14.3	2.6E-08
13	2016	3	18	5	23.00	41580	22.0	95	95	37.00	0.60	10.65	1.55	88.60	0.65	40.9	2.0E-08
14	2016	3	18	8	58.00	12900	24.0	95	95	37.50	0.50	11.15	0.50	88.15	0.45	5.3	2.7E-08
15	2016	3	18	12	55.00	14220	23.0	95	95	37.70	0.20	11.65	0.50	87.60	0.55	-4.8	2.8E-08
16	2016	3	18	16	31.00	12960	23.0	95	95	38.00	0.30	12.10	0.45	87.20	0.40	5.9	2.5E-08
17	2016	3	21	4	59.00	217680	22.0	95	95	41.00	3.00	19.25	7.15	79.85	7.35	-1.4	3.0E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	41.40	0.40	19.55	0.30	79.60	0.25	9.1	2.4E-08
19	2016	3	21	12	10.00	14880	23.0	95	95	41.40	0.00	19.95	0.40	79.15	0.45	-5.9	2.8E-08
20	2016	3	21	15	13.00	10980	23.0	95	95	41.60	0.20	20.25	0.30	78.85	0.30	0.0	2.7E-08
21	2016	3	21	19	37.00	15840	23.0	95	95	42.00	0.40	20.80	0.55	78.55	0.30	29.4	2.7E-08
22	2016	3	21	21	32.00	6900	23.0	95	95	41.80	-0.20	20.90	0.10	78.30	0.25	-42.9	2.6E-08
23	2016	3	22	5	53.00	30060	25.0	95	95	42.75	0.95	21.75	0.85	77.55	0.75	6.3	2.6E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	42.75	0.00	22.20	0.45	77.10	0.45	0.0	2.8E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	43.25	0.50	22.75	0.55	76.65	0.45	10.0	2.7E-08
26	2016	3	22	22	33.00	23580	24.0	95	95	43.60	0.35	23.35	0.60	76.10	0.55	4.3	2.6E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.7E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray sandy lean clay, with gravel						Average Kv =						2.9E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.86		2.83		Permeant: Water											
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity: 2.68 Est.											
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi): 100.0											
Tare (g)		92.18		89.22		Burette Diameter (in): 0.250											
Sample Wt. (g)		666.40		648.58		Burette Zero (cm): 100.0											
Moisture (%)		42.2		40.1													
Wet Density (pcf)		112.9		112.9													
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi): 6.2											
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.0											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	4	21	11	16.00	0.0	95	95	16.80		2.50		102.25				
2	2016	4	21	20	32.00	33360	27.0	95	95	27.60	10.80	1.25	-1.25	96.40	5.85	-154.3	4.1E-08
3	2016	4	22	9	22.00	46200	24.0	95	95	32.50	4.90	2.40	1.15	93.40	3.00	-44.6	3.0E-08
4	2016	4	22	12	18.00	10560	24.0	95	95	33.50	1.00	2.85	0.45	92.90	0.50	-5.3	3.1E-08
5	2016	4	22	18	33.00	22500	25.0	95	95	35.05	1.55	3.80	0.95	91.95	0.95	0.0	2.9E-08
6	2016	4	25	11	30.00	233820	23.0	95	95	44.30	9.25	12.75	8.95	83.10	8.85	0.6	3.1E-08
7	2016	4	25	17	41.00	22260	24.0	95	95	45.35	1.05	13.50	0.75	82.40	0.70	3.4	2.9E-08
8	2016	4	25	20	39.00	10680	24.0	95	95	45.30	-0.05	13.80	0.30	82.00	0.40	-14.3	3.0E-08
9	2016	4	25	23	15.00	9360	24.0	95	95	45.35	0.05	14.10	0.30	81.70	0.30	0.0	3.0E-08
10	2016	4	26	4	59.00	20640	25.0	95	95	46.00	0.65	14.75	0.65	81.00	0.70	-3.7	3.0E-08
11	2016	4	26	8	19.00	12000	24.0	95	95	45.95	-0.05	15.10	0.35	80.60	0.40	-6.7	3.0E-08
12	2016	4	26	13	18.00	17940	24.0	95	95	46.40	0.45	15.70	0.60	80.10	0.50	9.1	3.0E-08
13	2016	4	27	4	57.00	56340	23.0	95	95	47.60	1.20	17.40	1.70	78.60	1.50	6.2	2.9E-08
14	2016	4	27	12	47.00	28200	23.0	95	95	47.95	0.35	18.20	0.80	77.90	0.70	6.7	2.8E-08
15	2016	4	27	15	8.00	8460	23.0	95	95	47.90	-0.05	18.45	0.25	77.65	0.25	0.0	3.2E-08
16	2016	4	28	5	1.00	49980	22.0	95	95	48.80	0.90	19.80	1.35	76.35	1.30	1.9	3.0E-08
17	2016	4	28	8	5.00	11040	24.0	95	95	49.40	0.60	20.15	0.35	76.15	0.20	27.3	2.8E-08
18	2016	4	28	14	56.00	24660	23.0	95	95	49.60	0.20	20.75	0.60	75.55	0.60	0.0	2.8E-08
19	2016	4	28	20	48.00	21120	23.0	95	95	49.90	0.30	21.30	0.55	75.10	0.45	10.0	2.8E-08
20	2016	4	29	5	31.00	31380	26.0	95	95	51.05	1.15	22.10	0.80	74.35	0.75	3.2	2.8E-08
21	2016	4	29	10	27.00	17760	23.0	95	95	50.90	-0.15	22.50	0.40	73.90	0.45	-5.9	3.0E-08
22	2016	4	29	14	41.00	15240	23.0	95	95	51.25	0.35	22.90	0.40	73.60	0.30	14.3	2.9E-08
23	2016	4	29	18	0.00	11940	23.0	95	95	51.55	0.30	23.20	0.30	73.40	0.20	20.0	2.7E-08
24	2016	5	1	16	23.00	166980	22.0	95	95	54.25	2.70	26.95	3.75	70.05	3.35	5.6	3.0E-08
25	2016	5	2	4	58.00	45300	23.0	95	95	55.05	0.80	27.85	0.90	69.25	0.80	5.9	2.9E-08
26	2016	5	2	8	4.00	11160	23.0	95	95	55.30	0.25	28.10	0.25	69.05	0.20	11.1	3.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.				
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation													QC:	JPH				
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH				
Project Name: DTE - BRPP BAB and DB						Cell #:						9						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray sandy lean clay, with gravel																		
Sample Type: Undisturbed			Initial Values		Final Values													
Sample Dia. (in)			2.86		2.83		Permeant:			Water								
Sample Ht. (in)			3.50		3.48		Permeant Specific Gravity:			1.00								
Tare & Wet (g)			512.00		737.80		Sample Specific Gravity:			2.68 Est.								
Tare & Dry (g)			387.40		552.10		Confining Pressure (psi):			100.0								
Tare (g)			92.18		89.22		Burette Diameter (in):			0.250								
Sample Wt. (g)			666.40		648.58		Burette Zero (cm):			100.0								
Moisture (%)			42.2		40.1		Maximum Gradient:			3.8								
Wet Density (pcf)			112.9		112.9		Average Gradient:			3.6								
Dry Density (pcf)			79.4		80.6		Max. Effect. Stress (psi):			5.2								
Saturation (%)			102.4		100.0		Min. Effect. Stress (psi):			4.6								
							Ave. Effect. Stress (psi):			4.9								
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1	
1	2016	5	2	8	4.00	0.0	95	95	55.30		28.10		69.05					
2	2016	5	2	13	15.00	18660	23.0	95	95	55.65	0.35	28.50	0.40	68.80	0.25	23.1	2.8E-08	
3	2016	5	2	20	45.00	27000	26.0	95	95	56.30	0.65	29.00	0.50	68.35	0.45	5.3	2.6E-08	
4	2016	5	3	4	50.00	29100	23.0	95	95	56.00	-0.30	29.50	0.50	67.75	0.60	-9.1	3.1E-08	
5	2016	5	3	8	0.00	11400	25.0	95	95	56.35	0.35	29.70	0.20	67.60	0.15	14.3	2.5E-08	
6	2016	5	3	11	10.00	11400	23.0	95	95	56.30	-0.05	29.90	0.20	67.35	0.25	-11.1	3.4E-08	
7	2016	5	3	14	12.00	10920	23.0	95	95	56.40	0.10	30.15	0.25	67.25	0.10	42.9	2.8E-08	
8	2016	5	3	19	36.00	19440	24.0	95	95	57.20	0.80	30.55	0.40	67.05	0.20	33.3	2.6E-08	
9	2016	5	4	5	24.00	35280	23.0	95	95	57.60	0.40	31.15	0.60	66.50	0.55	4.3	2.9E-08	
10	2016	5	4	9	48.00	15840	23.0	95	95	57.60	0.00	31.40	0.25	66.25	0.25	0.0	2.9E-08	
11	2016	5	4	14	50.00	18120	23.0	95	95	57.70	0.10	31.70	0.30	66.00	0.25	9.1	2.8E-08	
12	2016	5	4	20	0.00	18600	25.0	95	95	58.25	0.55	32.10	0.40	65.80	0.20	33.3	2.9E-08	
13	2016	5	5	5	24.00	33840	24.0	95	95	58.35	0.10	32.60	0.50	65.30	0.50	0.0	2.8E-08	1
14	2016	5	5	10	25.00	18060	24.0	95	95	58.60	0.25	32.90	0.30	65.10	0.20	20.0	2.7E-08	1
15	2016	5	5	14	42.00	15420	24.0	95	95	58.90	0.30	33.20	0.30	64.85	0.25	9.1	3.5E-08	1
16	2016	5	6	4	52.00	51000	23.0	95	95	59.50	0.60	34.00	0.80	64.25	0.60	14.3	2.8E-08	1
17	2016	5	6	9	32.00	16800	23.0	95	95	59.70	0.20	34.25	0.25	64.05	0.20	11.1	2.9E-08	1
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.9E-08	cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.					

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						10					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: SB-16-01, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.1E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.82		Permeant: Water											
Sample Ht. (in)		2.88		2.86		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		534.46		607.60		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		400.40		448.80		Confining Pressure (psi): 100.0											
Tare (g)		98.45		86.36		Burette Diameter (in): 0.250											
Sample Wt. (g)		532.36		521.24		Burette Zero (cm): 100.0											
Moisture (%)		44.4		43.8		Maximum Gradient: 8.9											
Wet Density (pcf)		109.0		111.0		Average Gradient: 8.4											
Dry Density (pcf)		75.5		77.2		Max. Effect. Stress (psi): 6.1											
Saturation (%)		97.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	24.00		1.65		102.30				
2	2016	3	15	11	16.00	0.0	95	95	27.35		1.15		99.70				
3	2016	3	15	14	17.00	0.0	95	95	29.50		1.15		98.60				
4	2016	3	15	18	17.00	14400	23.0	95	95	30.90	1.40	1.35	0.20	97.50	1.10	-69.2	2.5E-08
5	2016	3	16	4	56.00	38340	22.0	95	95	34.75	3.85	2.00	0.65	95.00	2.50	-58.7	2.4E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	35.00	0.25	2.50	0.50	94.55	0.45	5.3	2.0E-08
7	2016	3	16	11	58.00	11940	23.0	95	95	35.45	0.45	3.00	0.50	94.10	0.45	5.3	2.3E-08
8	2016	3	16	15	3.00	11100	23.0	95	95	35.80	0.35	3.35	0.35	93.60	0.50	-17.6	2.2E-08
9	2016	3	17	5	15.00	51120	22.0	95	95	38.75	2.95	4.55	1.20	91.10	2.50	-35.1	2.2E-08
10	2016	3	17	8	18.00	10980	24.0	95	95	38.25	-0.50	5.25	0.70	90.95	0.15	64.7	2.3E-08
11	2016	3	17	12	21.00	14580	23.0	95	95	38.60	0.35	5.65	0.40	90.35	0.60	-20.0	2.1E-08
12	2016	3	17	17	51.00	19800	23.0	95	95	38.50	-0.10	6.45	0.80	89.85	0.50	23.1	2.1E-08
13	2016	3	18	5	24.00	41580	22.0	95	95	40.80	2.30	7.40	0.95	87.95	1.90	-33.3	2.3E-08
14	2016	3	18	8	59.00	12900	24.0	95	95	40.40	-0.40	8.05	0.65	87.70	0.25	44.4	2.3E-08
15	2016	3	18	12	56.00	14220	23.0	95	95	40.70	0.30	8.40	0.35	87.25	0.45	-12.5	1.9E-08
16	2016	3	18	16	32.00	12960	23.0	95	95	40.70	0.00	8.95	0.55	86.90	0.35	22.2	2.4E-08
17	2016	3	21	4	59.00	217620	22.0	95	95	45.25	4.55	15.10	6.15	80.30	6.60	-3.5	2.2E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	45.25	0.00	15.50	0.40	80.10	0.20	33.3	2.2E-08
19	2016	3	21	12	11.00	14940	23.0	95	95	45.40	0.15	15.90	0.40	79.65	0.45	-5.9	2.4E-08
20	2016	3	21	15	13.00	10920	23.0	95	95	45.70	0.30	16.10	0.20	79.35	0.30	-20.0	1.9E-08
21	2016	3	21	19	38.00	15900	23.0	95	95	45.70	0.00	16.65	0.55	79.10	0.25	37.5	2.1E-08
22	2016	3	21	21	33.00	6900	23.0	95	95	46.10	0.40	16.70	0.05	78.80	0.30	-71.4	2.2E-08
23	2016	3	22	5	53.00	30000	25.0	95	95	47.20	1.10	17.35	0.65	78.00	0.80	-10.3	2.0E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	47.10	-0.10	17.80	0.45	77.60	0.40	5.9	2.2E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	47.40	0.30	18.35	0.55	77.15	0.45	10.0	2.2E-08
26	2016	3	22	22	34.00	23640	24.0	95	95	47.10	-0.30	19.10	0.75	76.80	0.35	36.4	2.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.1E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

**Appendix H**  
**2020 Lab Test Results**



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

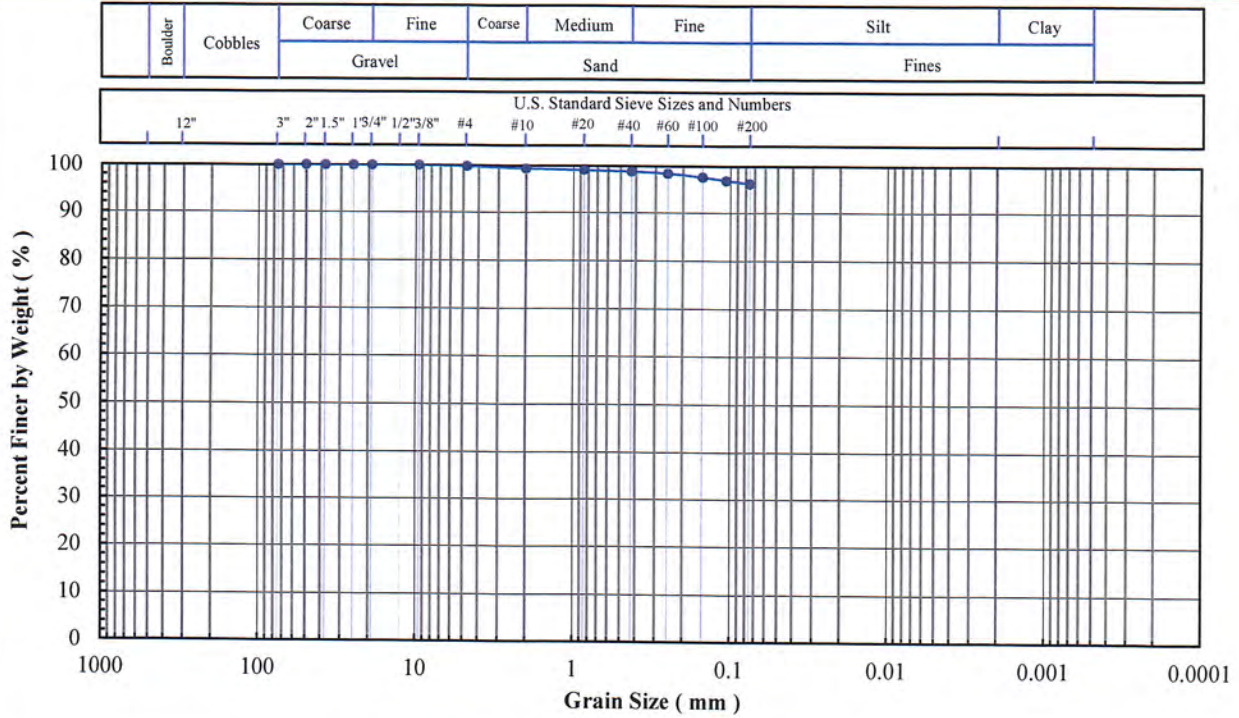
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-1 (3')  
Lab Sample No: 20L186

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

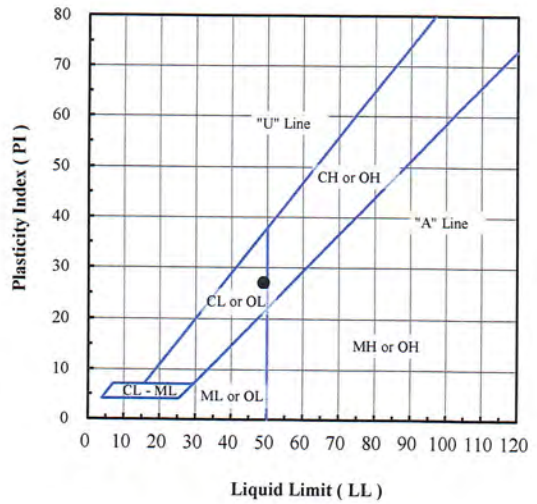


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	99.0
#40	0.425	98.7
#60	0.250	98.3
#100	0.150	97.5
#140	0.106	96.8
#200	0.075	96.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	3.7
Fines (%):	96.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-1 (3')	20L186	22.6	96.1	49	22	27	CL - Lean clay

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

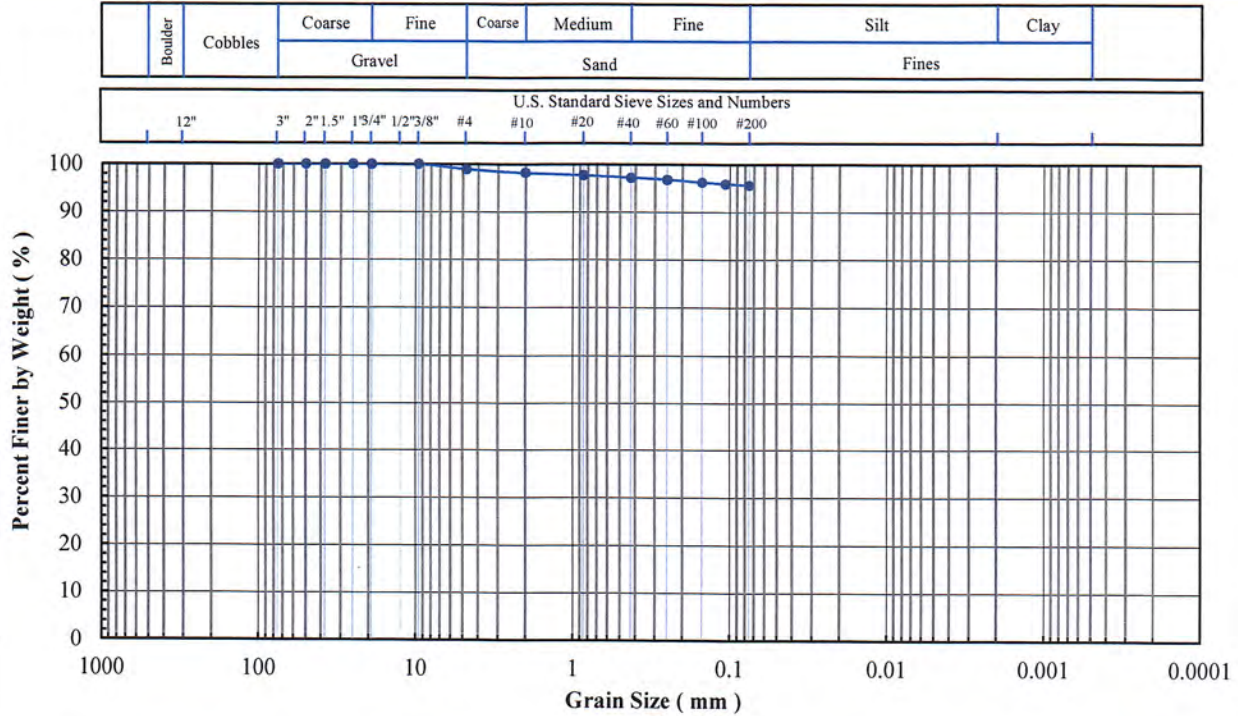
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B1-6 (25')  
Lab Sample No: 20L191

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

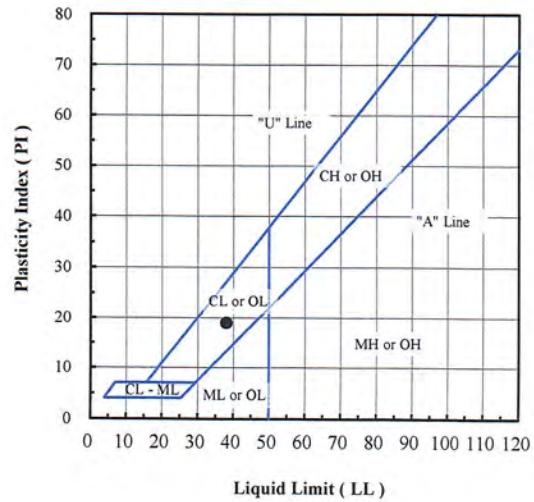


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	98.2
#20	0.850	97.7
#40	0.425	97.2
#60	0.250	96.8
#100	0.150	96.2
#140	0.106	95.9
#200	0.075	95.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	3.3
Fines (%):	95.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-6 (25')	20L191	35.5	95.6	38	19	19	CL - Lean clay

Note(s):

01-26-2021  
AAi NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

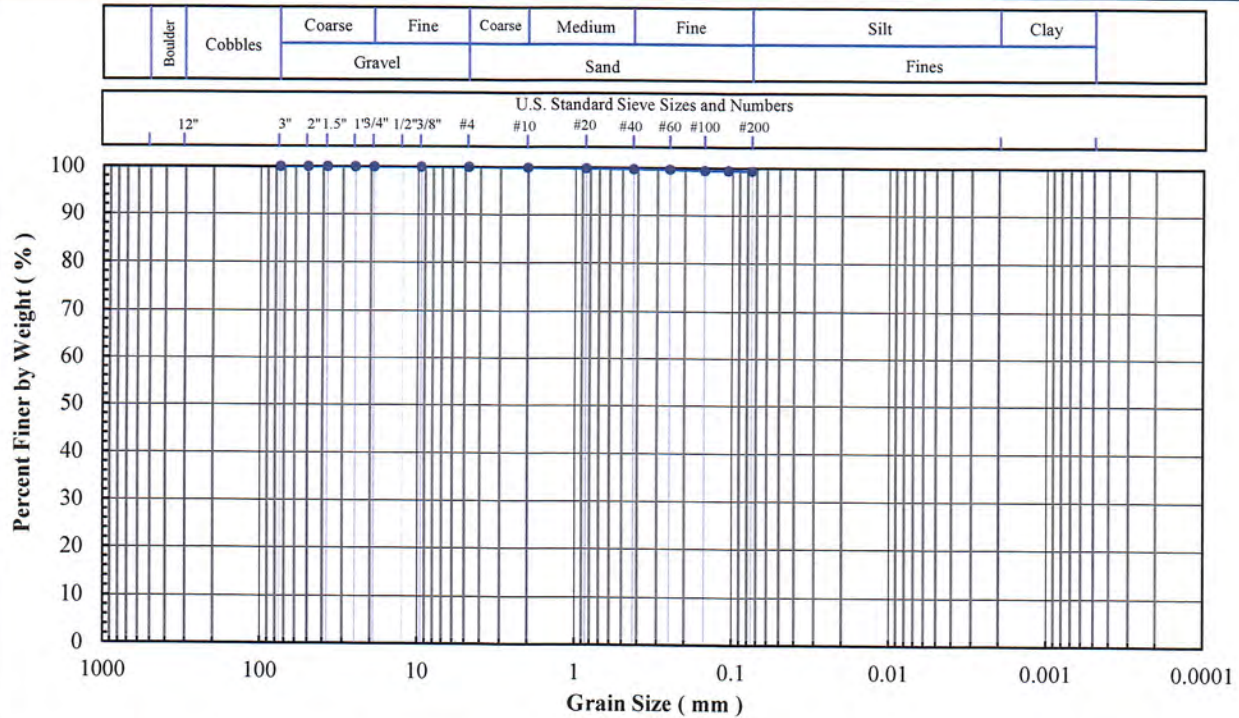
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-9 (48')  
 Lab Sample No: 20L194

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content



Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.6
#100	0.150	99.4
#140	0.106	99.4
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

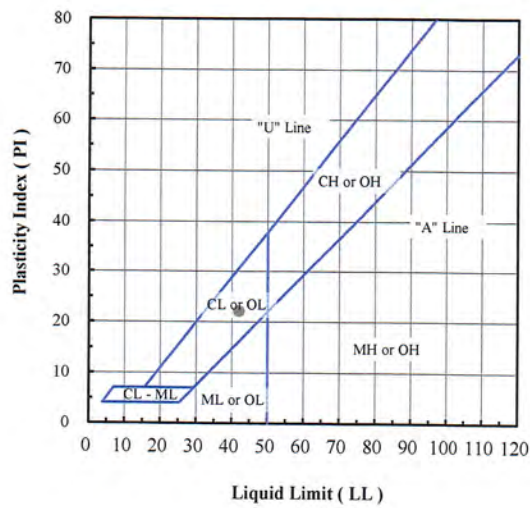
Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-9 (48')	20L194	39.5	99.3	42	20	22	CL - Lean clay

Note(s):

01-21-2021  
AA, NSR





**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

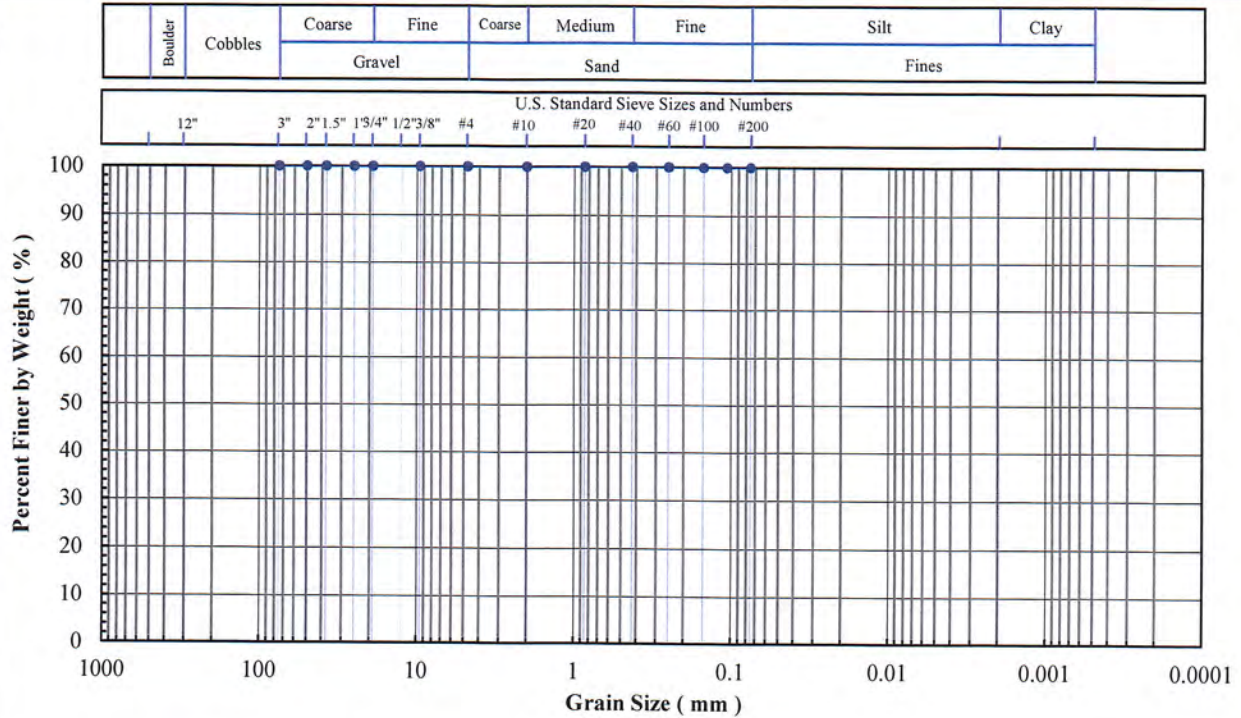
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-11 (59')  
Lab Sample No: 20L196

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

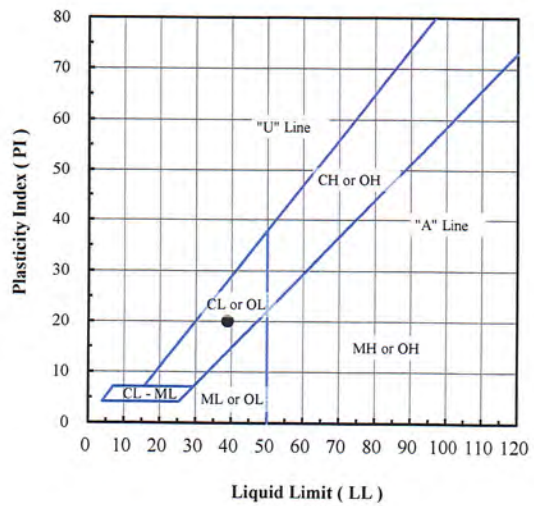


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	100.0
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-11 (59')	20L196	36.8	99.9	39	19	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

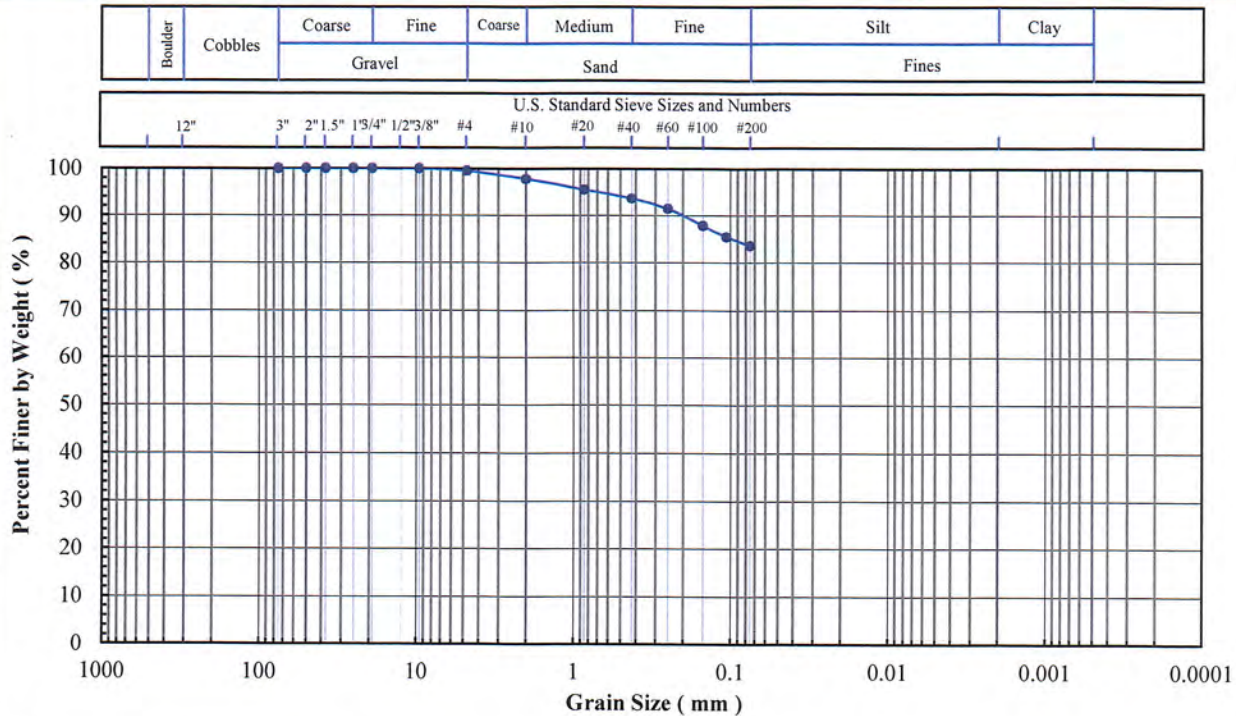
Client Sample ID: B1-14 (80')

Lab Sample No: 20L199

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

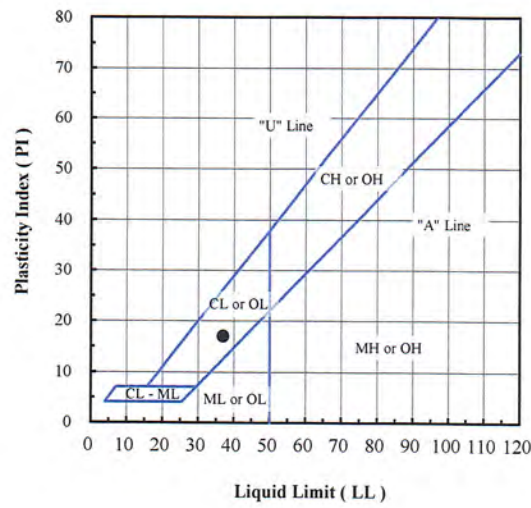


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.8
#20	0.850	95.5
#40	0.425	93.6
#60	0.250	91.4
#100	0.150	87.8
#140	0.106	85.4
#200	0.075	83.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	16.0
Fines (%):	83.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-14 (80')	20L199	24.6	83.5	37	20	17	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

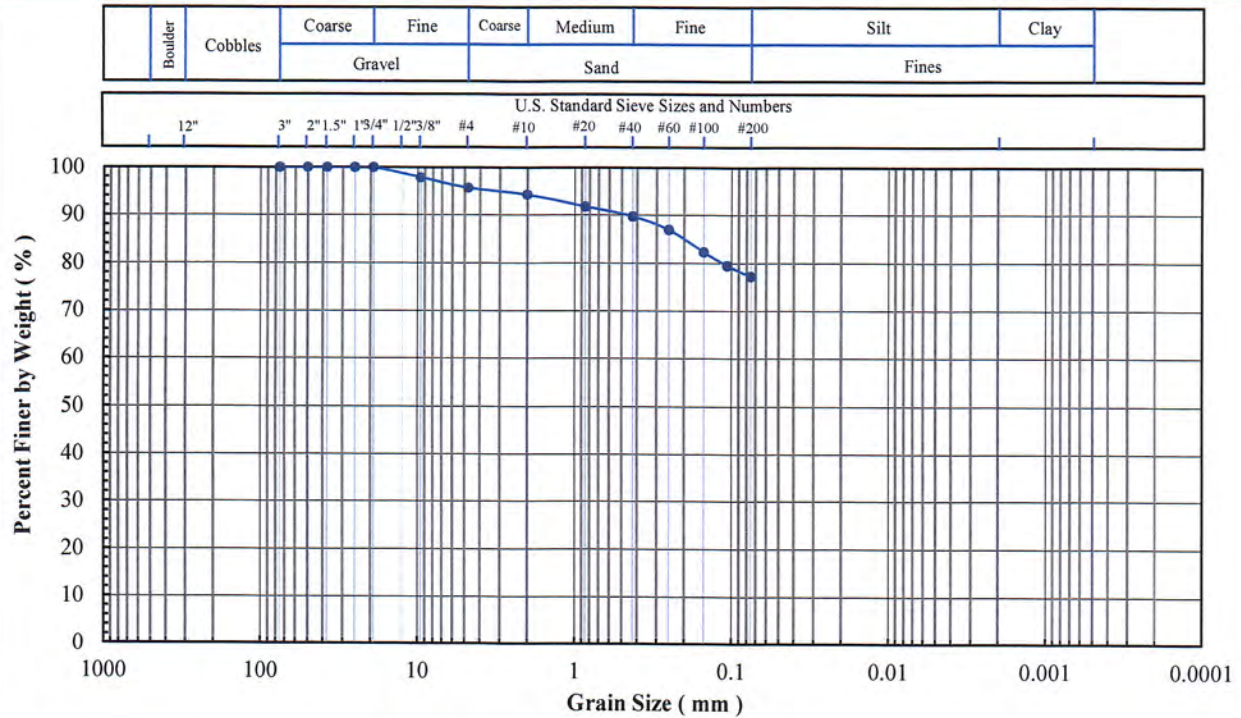
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-16 (85')  
 Lab Sample No: 20L201

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

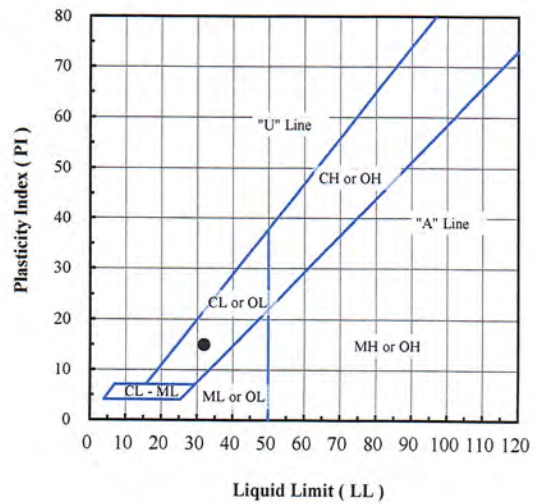


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	96
#10	2.00	94
#20	0.850	92
#40	0.425	90
#60	0.250	87
#100	0.150	82
#140	0.106	79
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	19
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-16 (85')	20L201	19.5	77	32	17	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
 AA1NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

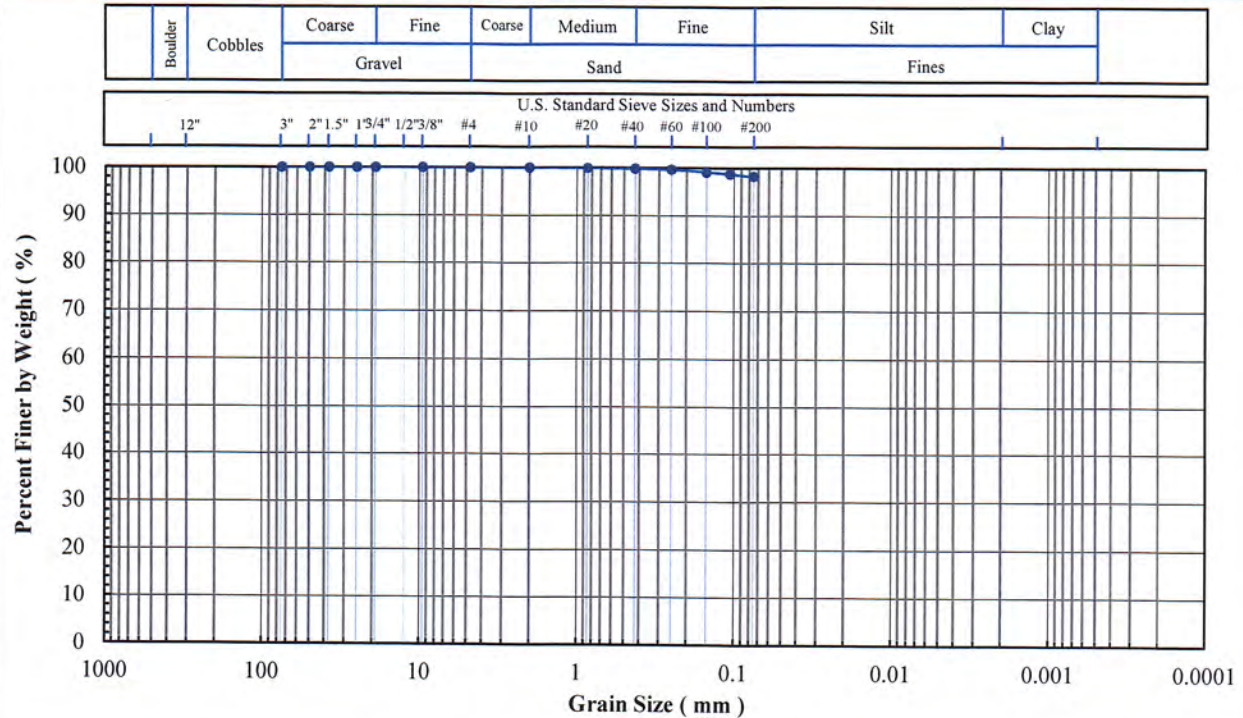
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-ST-1 (7-9)  
 Lab Sample No: 20L143

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

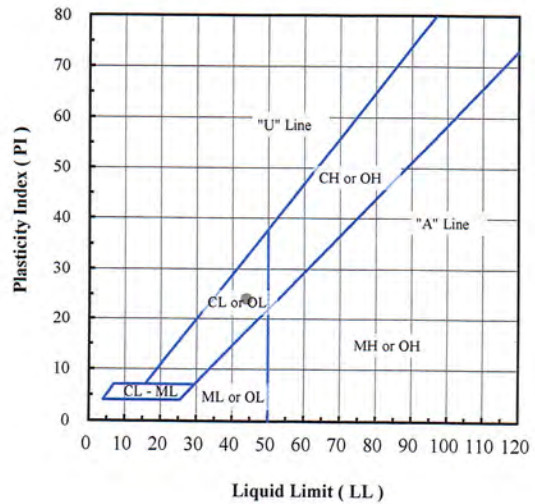


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	99.1
#140	0.106	98.7
#200	0.075	98.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	1.8
Fines (%):	98.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-1 (7-9)	20L143	22.7	98.2	44	20	24	CL - Lean clay

Note(s):

*02-01-2021  
 AA, NSB*



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

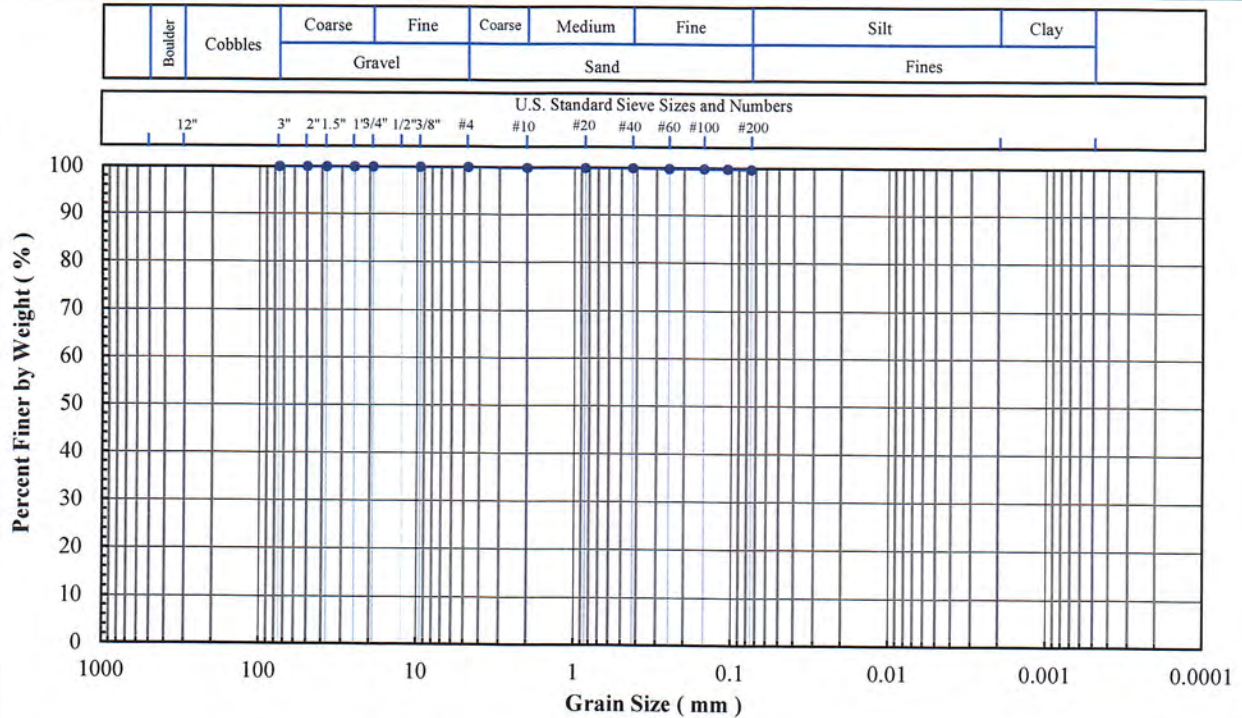
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-ST-3 (36-38')  
Lab Sample No: 20L145

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

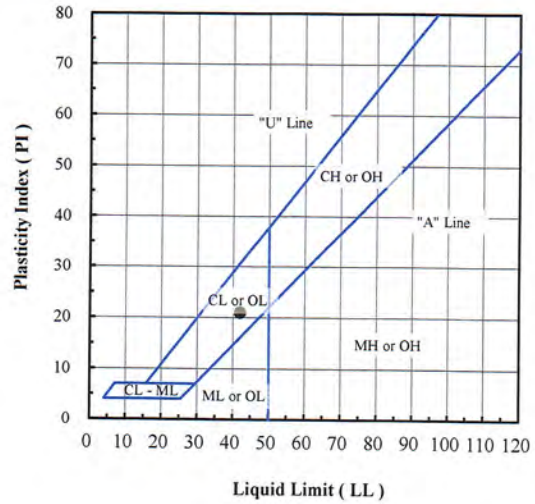


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.9
#40	0.425	99.9
#60	0.250	99.8
#100	0.150	99.8
#140	0.106	99.8
#200	0.075	99.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.3
Fines (%):	99.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
-------------------	--

Carbon. Content (%):	
----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (36-38')	20L145	35.2	99.7	42	21	21	CL - Lean clay

Note(s):

02-01-2021  
AA1 NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

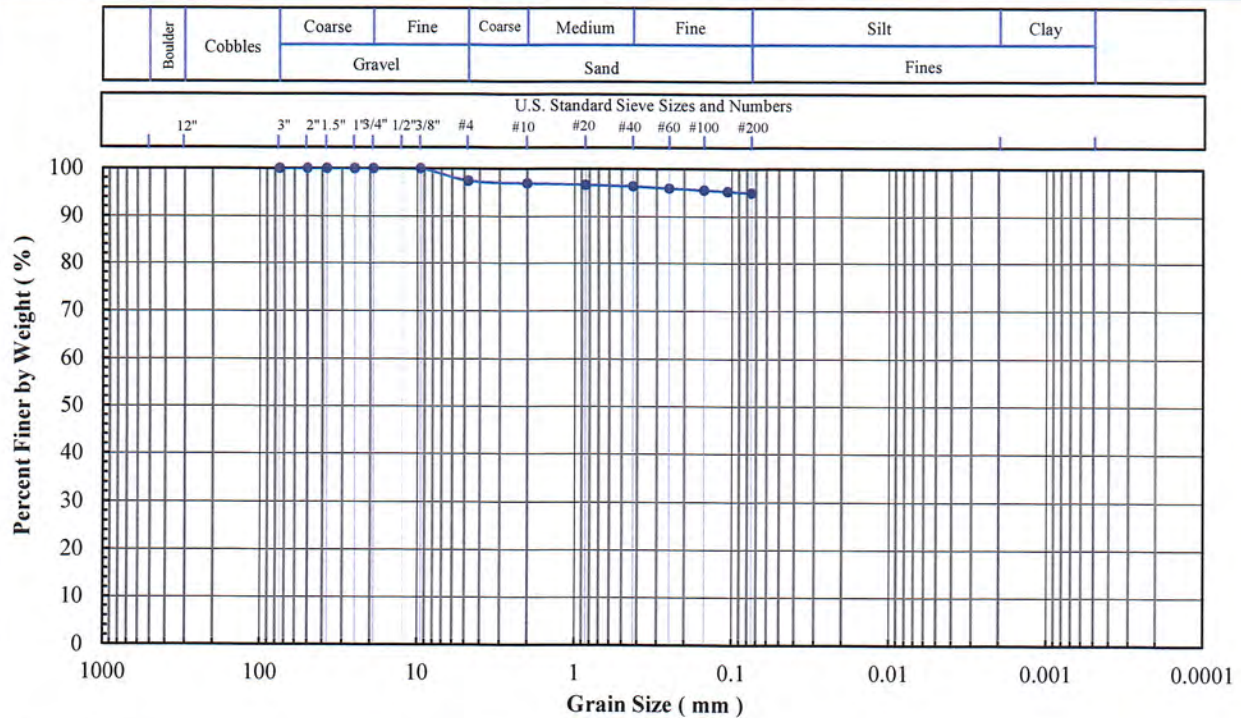
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-2 (5')  
Lab Sample No: 20L205

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

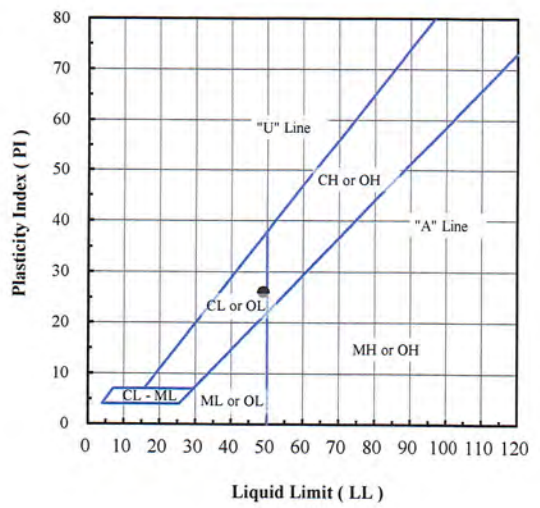


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	96.9
#20	0.850	96.6
#40	0.425	96.3
#60	0.250	95.9
#100	0.150	95.5
#140	0.106	95.2
#200	0.075	94.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	2.5
Fines (%):	94.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-2 (5')	20L205	26.9	94.9	49	23	26	CL - Lean clay

Note(s):

01-25-2021  
AA1/NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

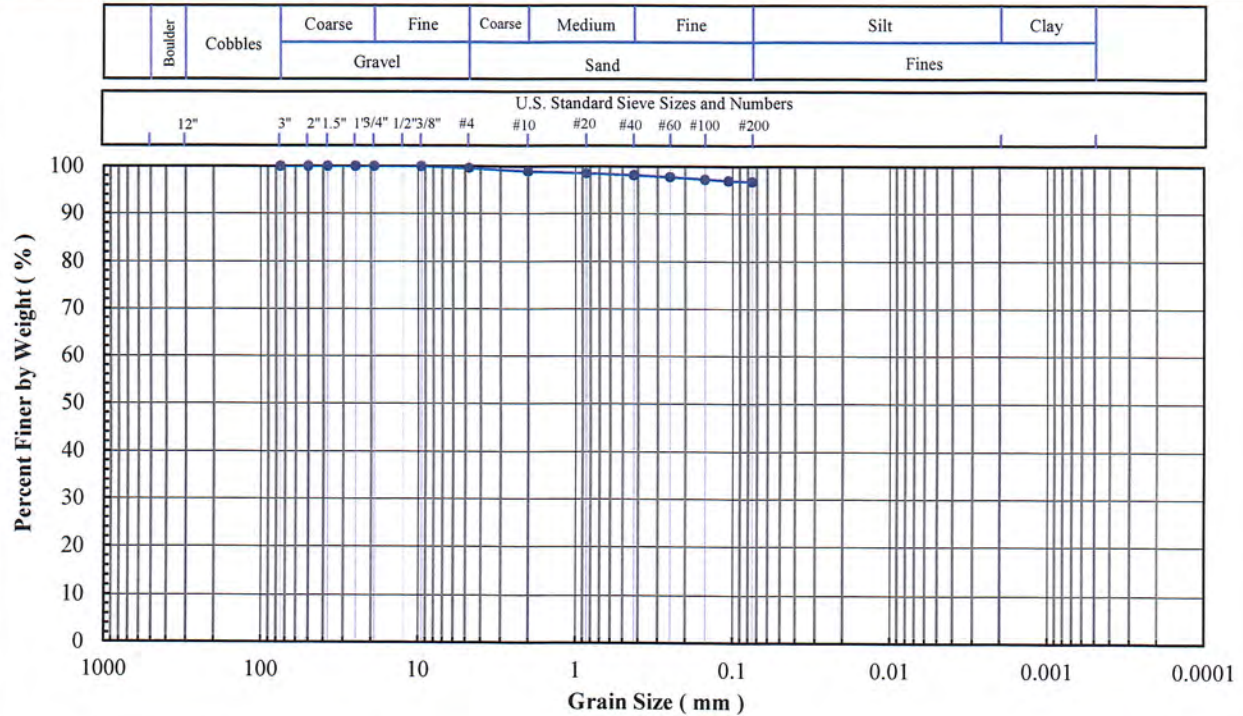
Client Sample ID: B2-5 (18')

Lab Sample No: 20L208

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

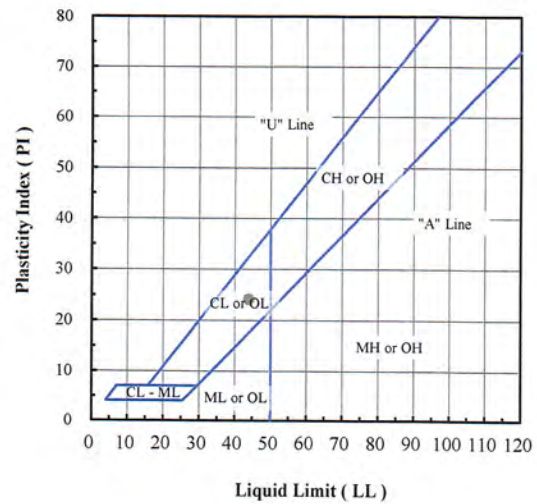


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	98.5
#40	0.425	98.1
#60	0.250	97.7
#100	0.150	97.2
#140	0.106	96.9
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	2.9
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
-----------------------	--

Org. Content (%):	
-------------------	--

Carbon. Content (%):	
----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-5 (18')	20L208	36.3	96.7	44	20	24	CL - Lean Clay

Note(s):

01-25-2021  
AA, N5R



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

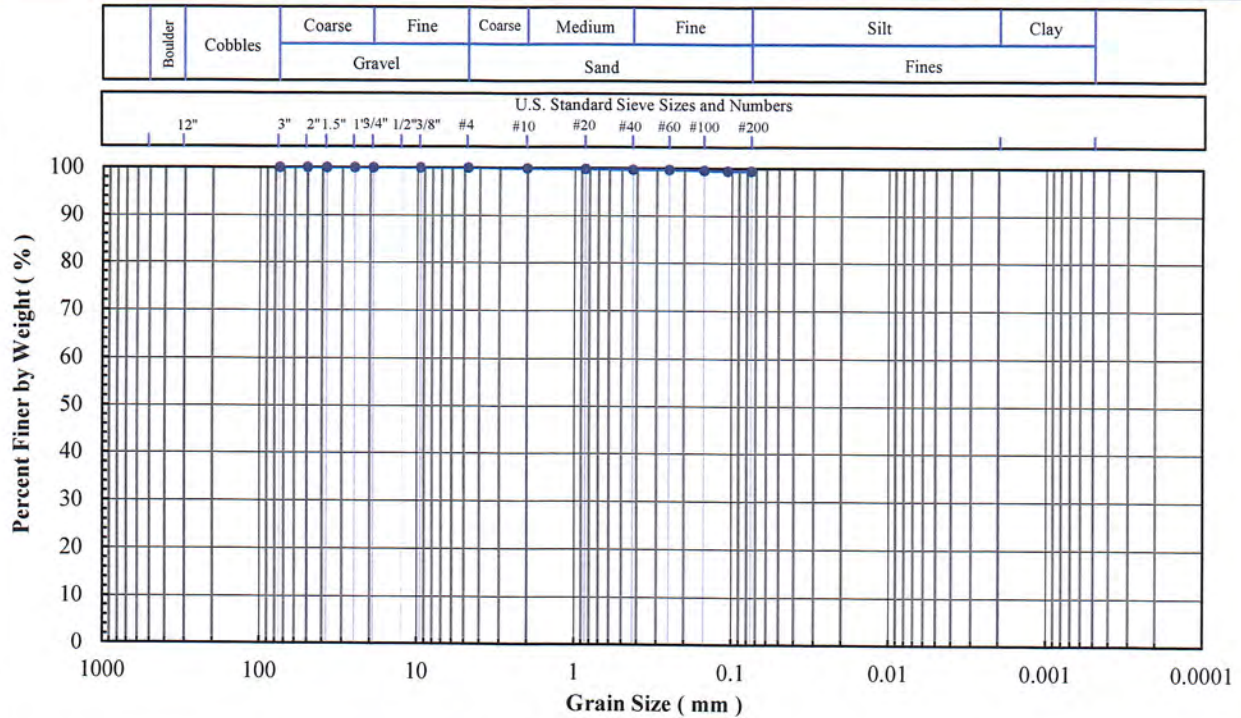
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-8 (40')  
Lab Sample No: 20L211

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

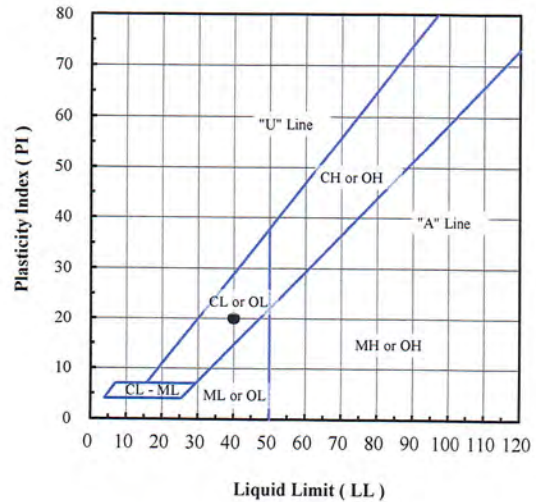


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.5
#140	0.106	99.4
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-8 (40')	20L211	37.5	99.4	40	20	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR





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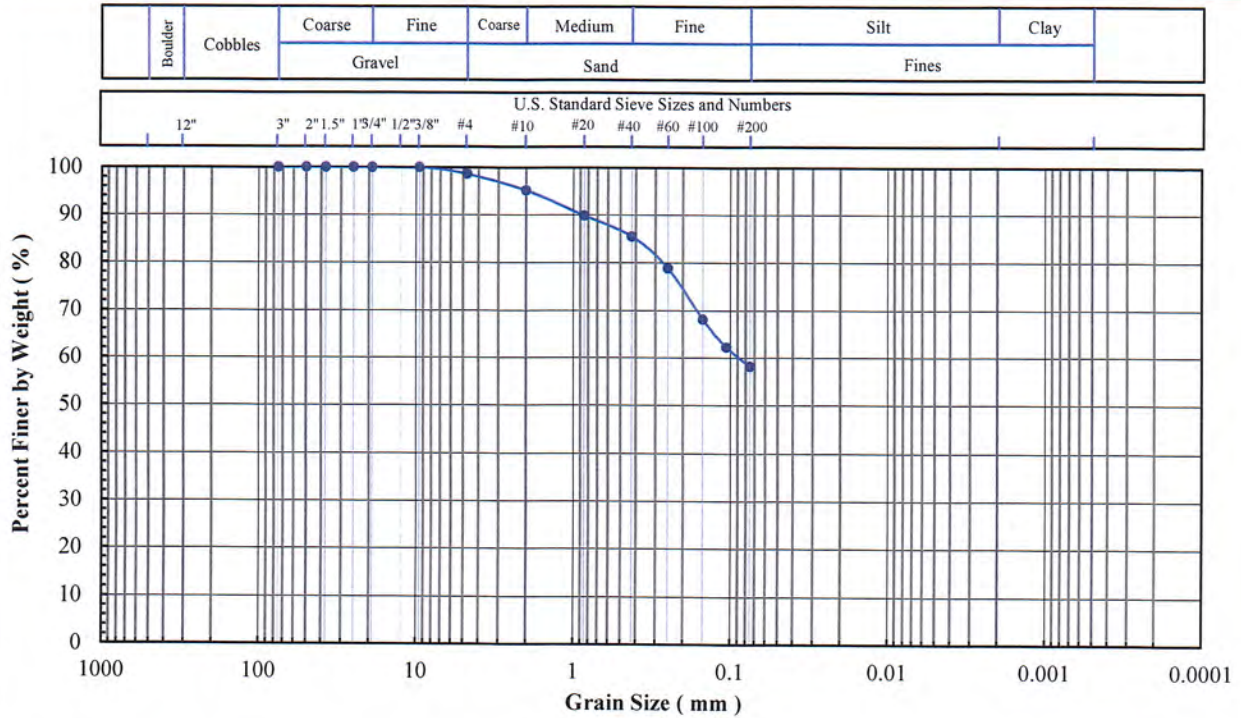
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B2-12 (60')  
**Lab Sample No:** 20L215

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

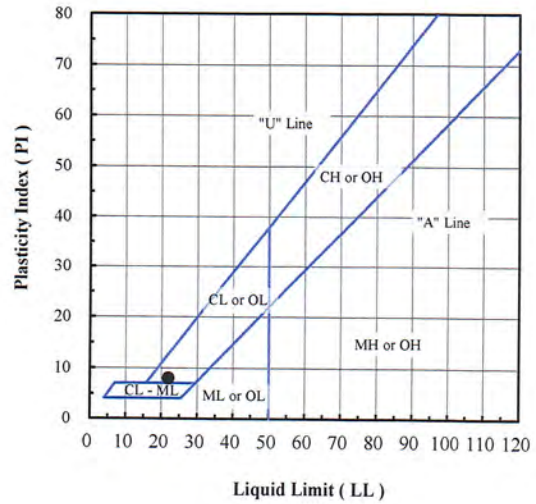


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	95.1
#20	0.850	89.8
#40	0.425	85.4
#60	0.250	78.8
#100	0.150	68.1
#140	0.106	62.2
#200	0.075	58.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	40.5
Fines (%):	58.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-12 (60')	20L215	17.4	58.1	22	14	8	CL - Sandy lean clay

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
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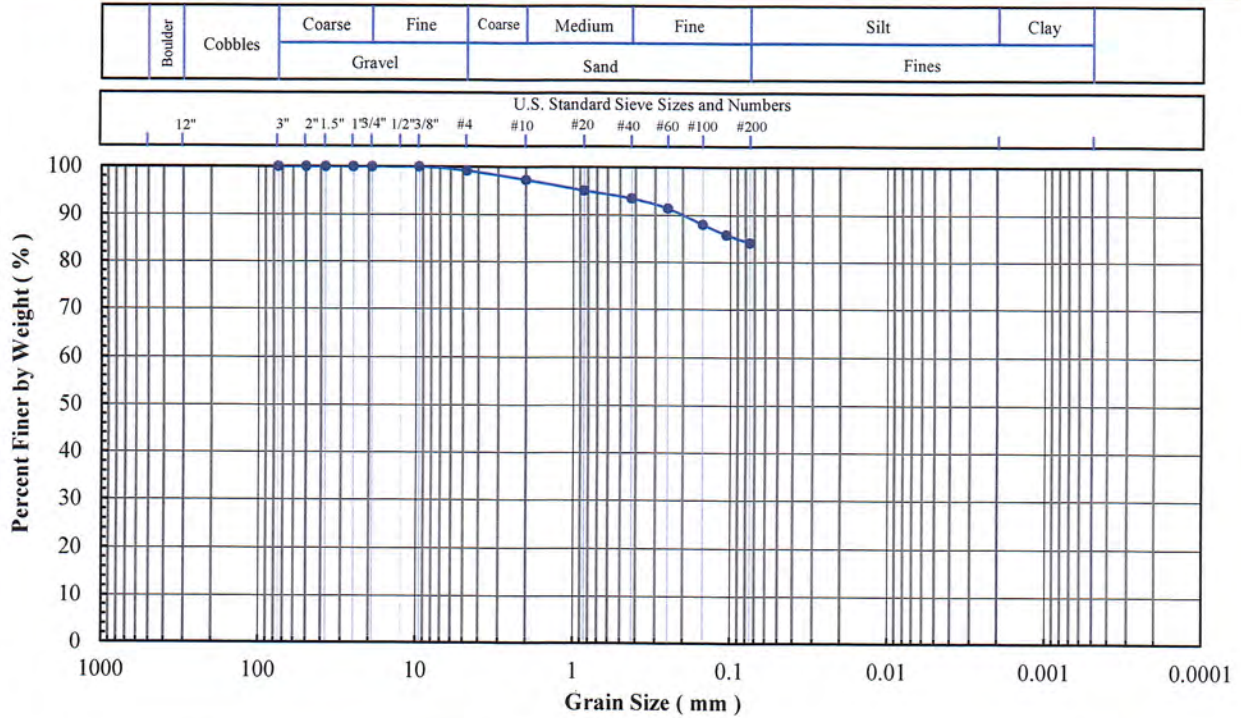
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-16 (80')  
 Lab Sample No: 20L219

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

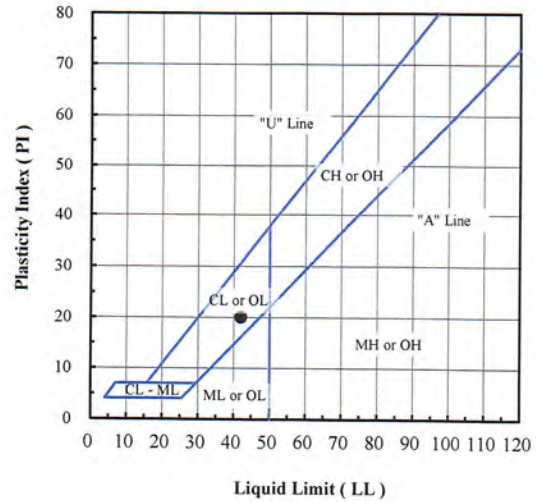


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	95.1
#40	0.425	93.5
#60	0.250	91.4
#100	0.150	88.0
#140	0.106	85.8
#200	0.075	84.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	15.1
Fines (%):	84.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-16 (80')	20L219	25.2	84.1	42	22	20	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

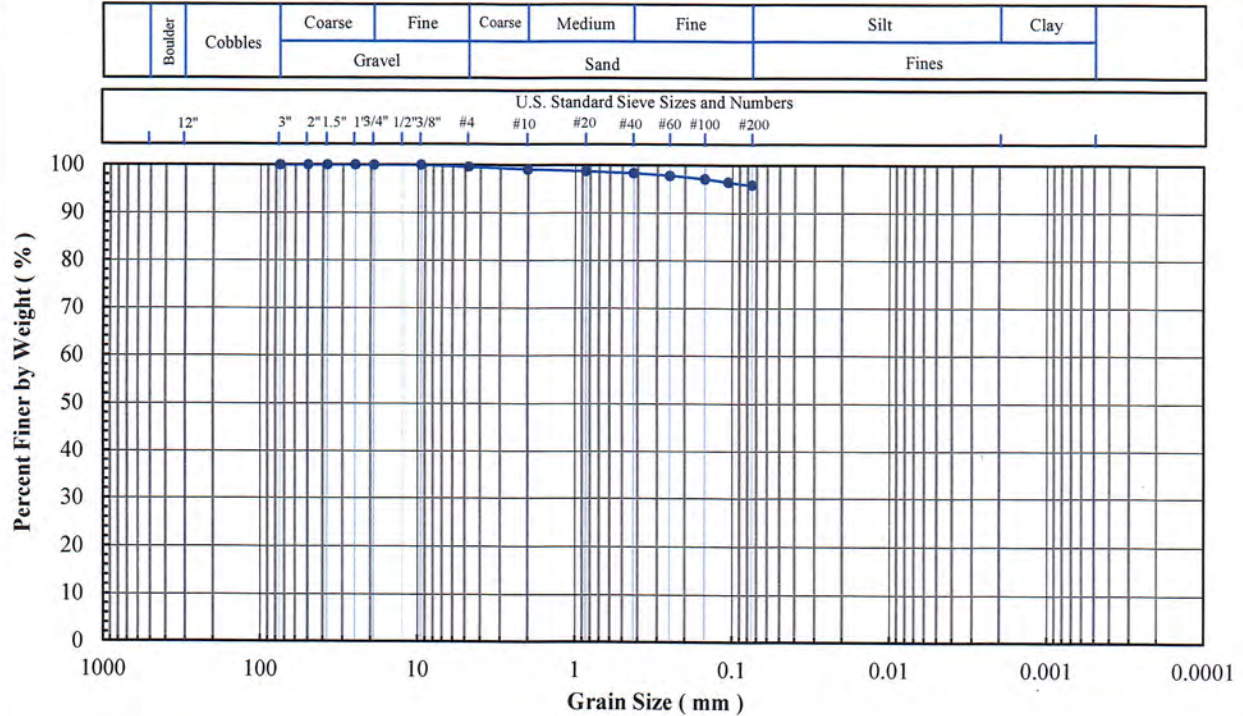
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-ST-1 (1-3')  
 Lab Sample No: 20L149

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

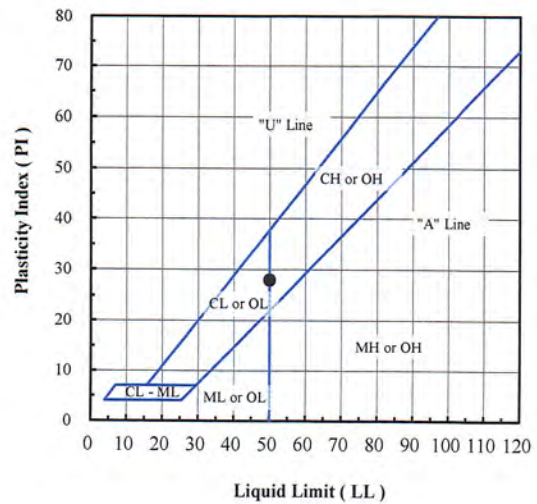


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	99.1
#20	0.850	98.7
#40	0.425	98.3
#60	0.250	97.8
#100	0.150	97.1
#140	0.106	96.4
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	3.8
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-ST-1 (1-3')	20L149	23.0	95.8	50	22	28	CL - Lean clay

Note(s):

*02-01-2021  
 AA1NSA*



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

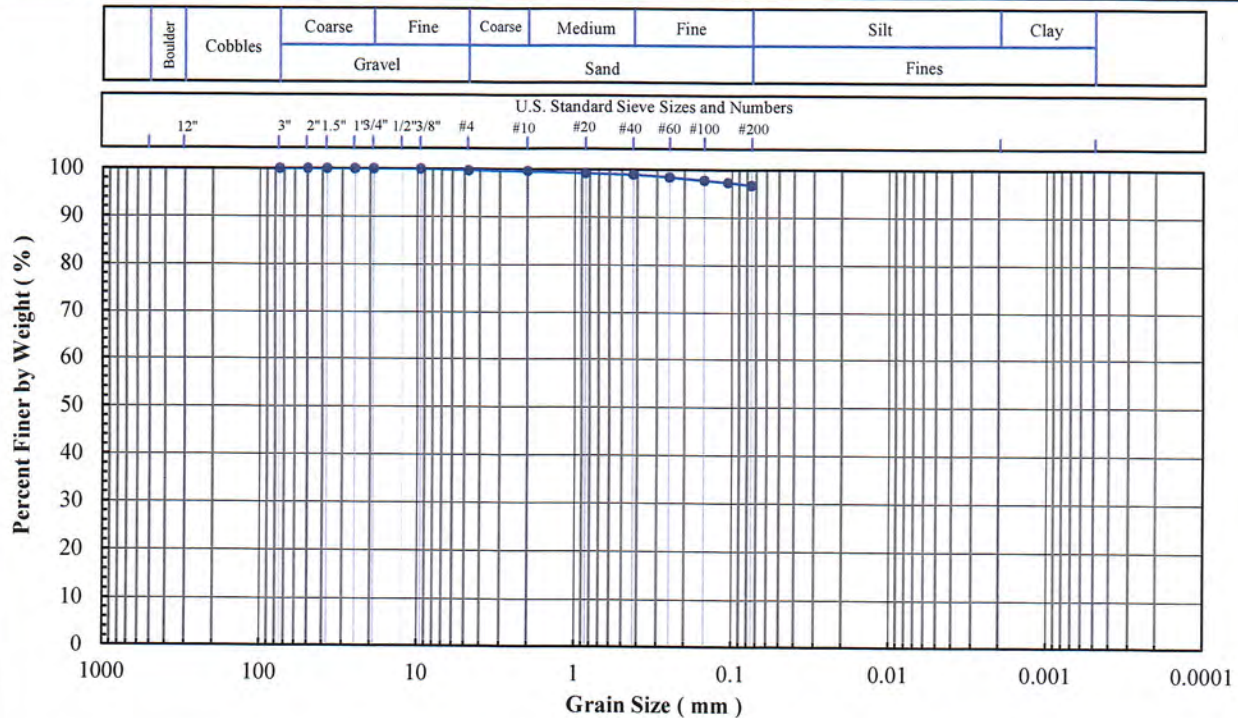
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-2 (5')  
 Lab Sample No: 20L224

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

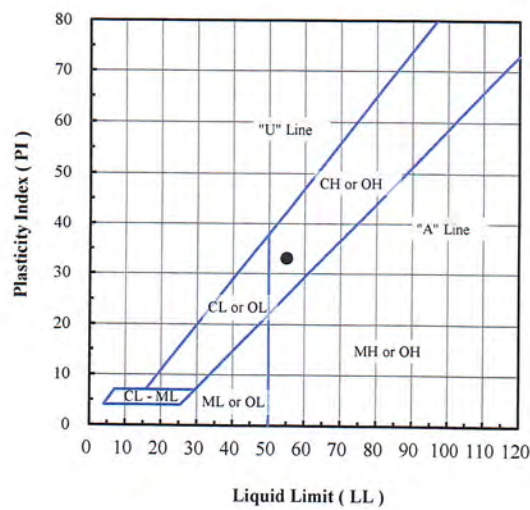


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.6
#20	0.850	99.2
#40	0.425	98.9
#60	0.250	98.4
#100	0.150	97.7
#140	0.106	97.3
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	3.0
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-2 (5')	20L224	24.1	96.7	55	22	33	CH - Fat clay

Note(s):

*01-25-2021  
AA, MSR*



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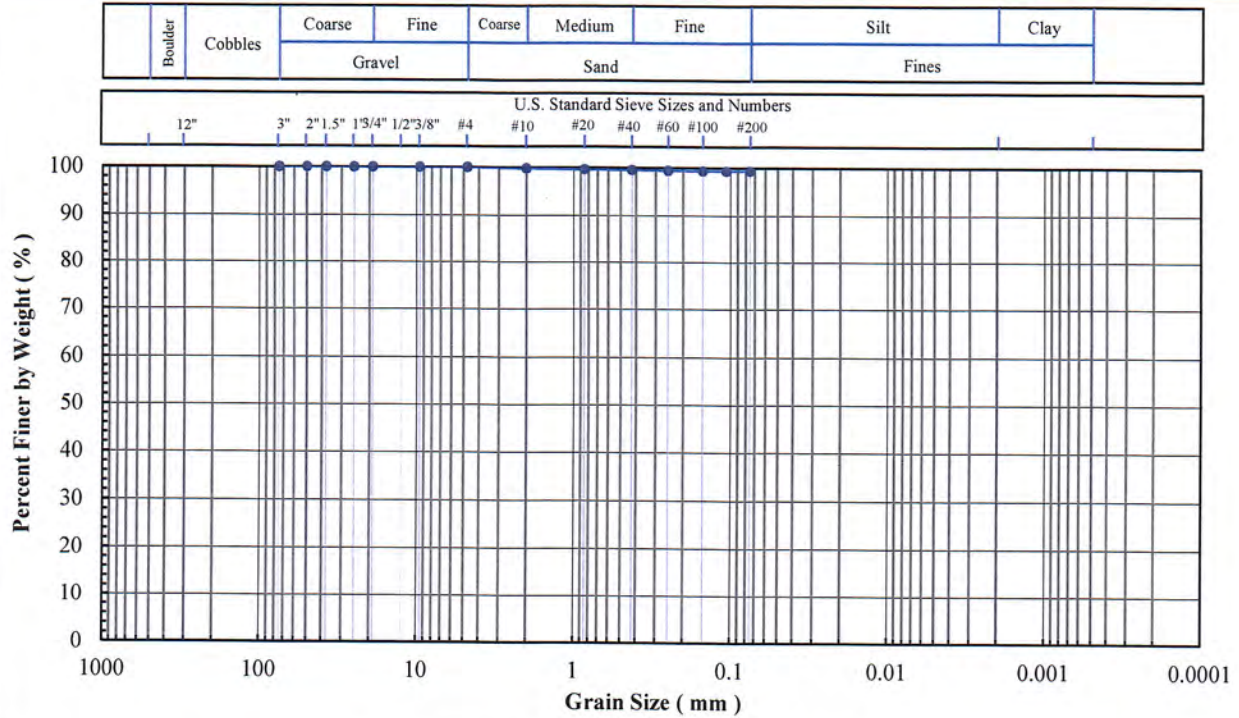
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-6 (25')  
 Lab Sample No: 20L228

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

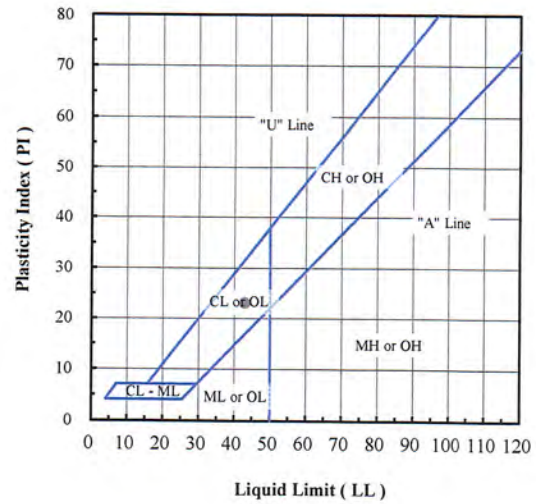


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.6
#40	0.425	99.5
#60	0.250	99.4
#100	0.150	99.3
#140	0.106	99.3
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (25')	20L228	37.7	99.3	43	20	23	CL - Lean clay

Note(s):

01-25-2021  
 AA, NSR



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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

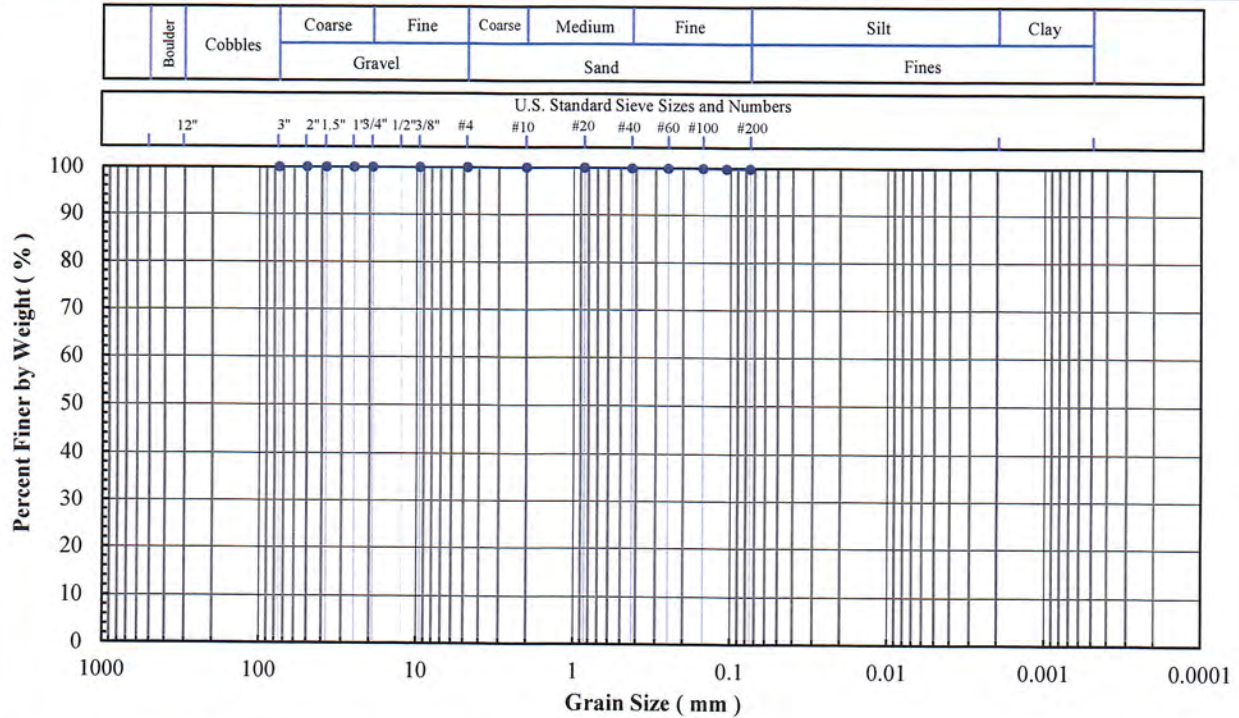
Client Sample ID: B3-10 (45')

Lab Sample No: 20L232

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

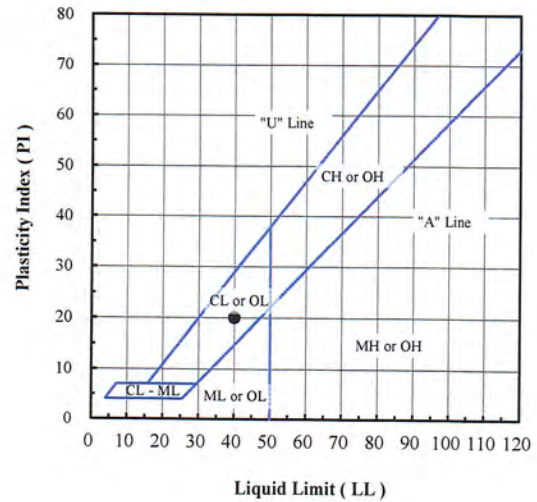


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.8
#200	0.075	99.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.2
Fines (%):	99.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-10 (45')	20L232	36.5	99.8	40	20	20	CL - Lean clay

Note(s):

*01-25-2021  
AA, NSK*



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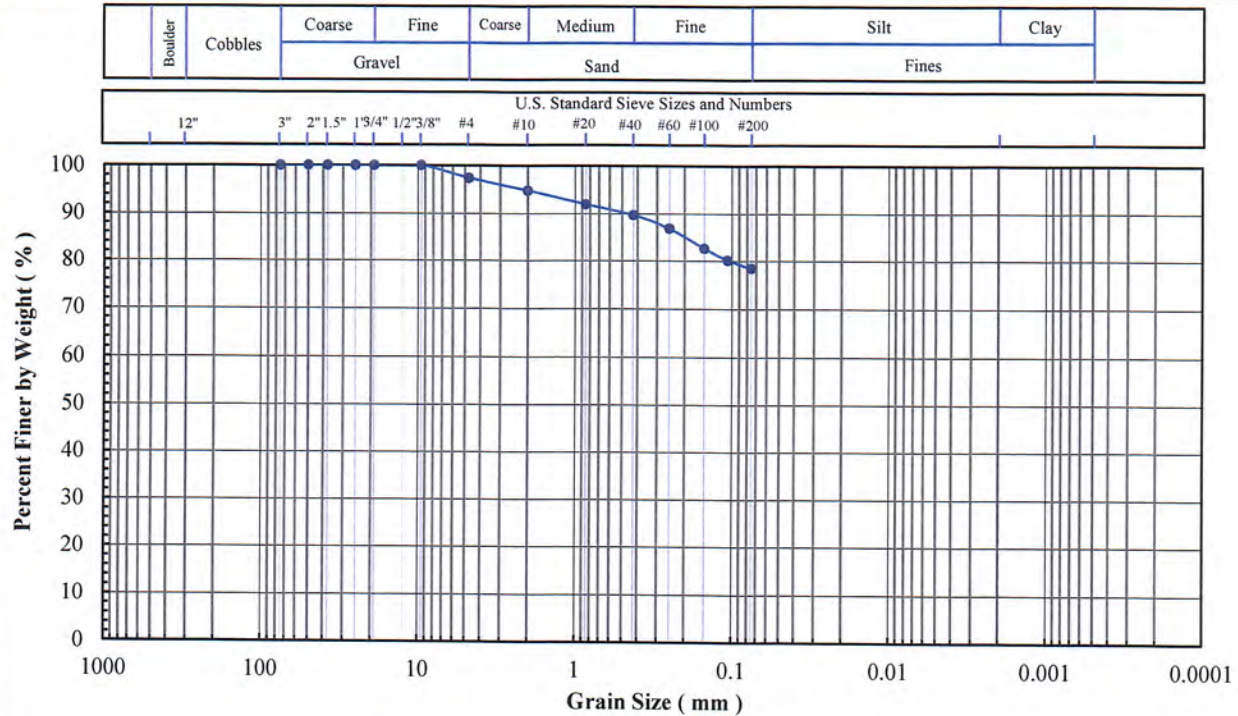
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-18 (85')  
Lab Sample No: 20L240

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

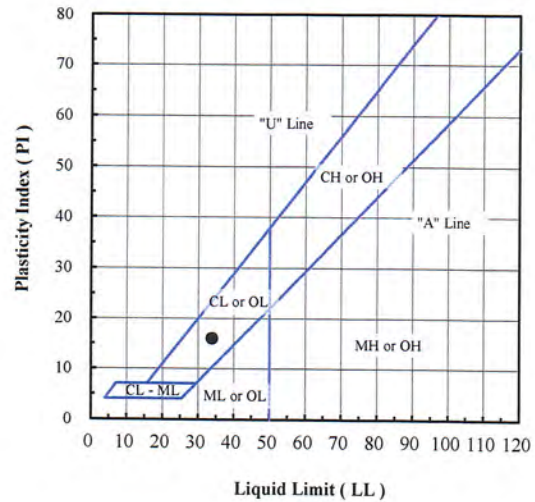


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	94.8
#20	0.850	91.9
#40	0.425	89.7
#60	0.250	86.8
#100	0.150	82.6
#140	0.106	80.1
#200	0.075	78.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	19.0
Fines (%):	78.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-18 (85')	20L240	21.9	78.4	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1159



**Excel Geotechnical Testing, Inc.**  
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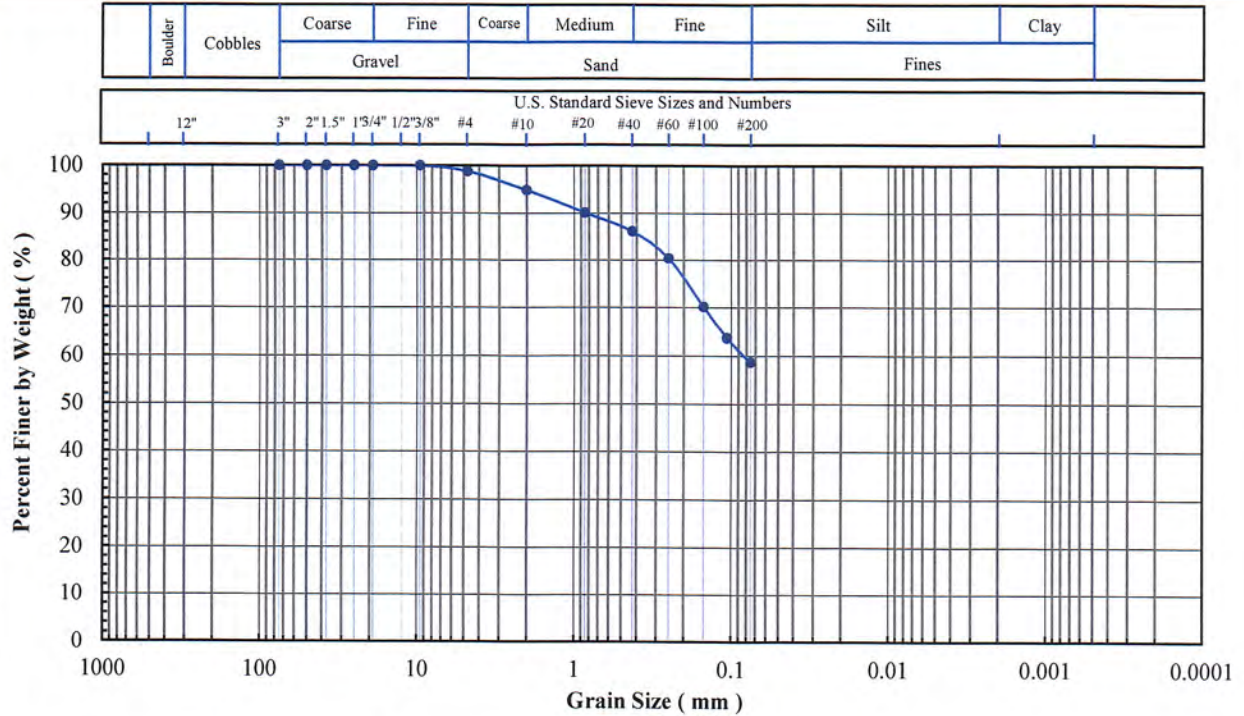
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-14 (67)  
 Lab Sample No: 20L236

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

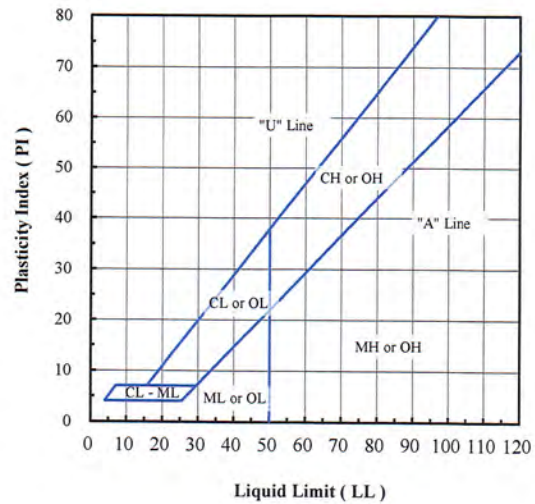


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	94.9
#20	0.850	90.1
#40	0.425	86.2
#60	0.250	80.4
#100	0.150	70.1
#140	0.106	63.7
#200	0.075	58.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	40.2
Fines (%):	58.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-14 (67)	20L236	15.2	58.6				

Note(s):

02-03-2021  
 AA, NSF





**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

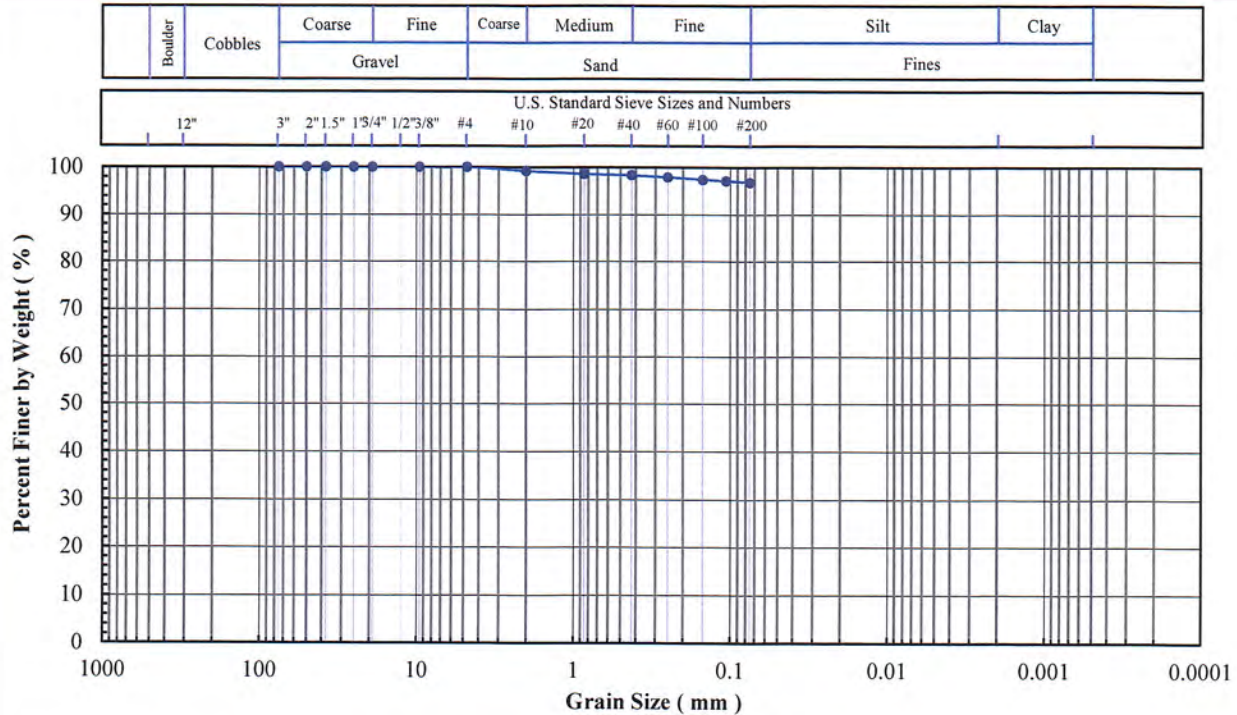
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-1 (10')  
Lab Sample No: 20L243

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

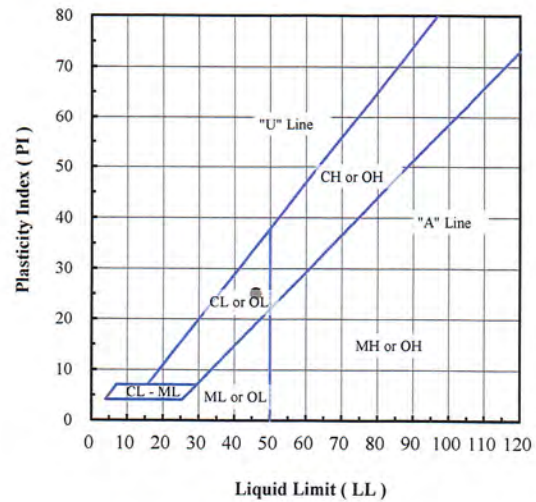


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.2
#20	0.850	98.6
#40	0.425	98.3
#60	0.250	97.9
#100	0.150	97.4
#140	0.106	97.1
#200	0.075	96.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	3.2
Fines (%):	96.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (10')	20L243	25.6	96.8	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, NSR



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"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

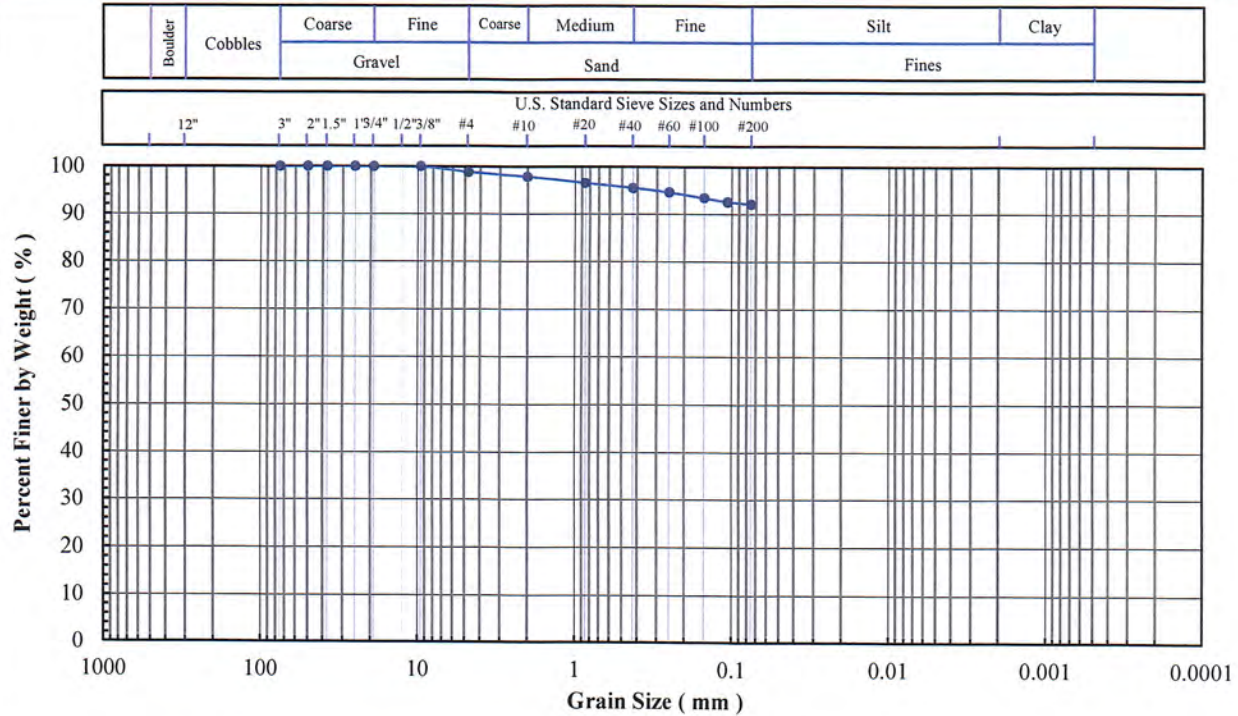
Client Sample ID: B4-7 (34')

Lab Sample No: 20L249

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

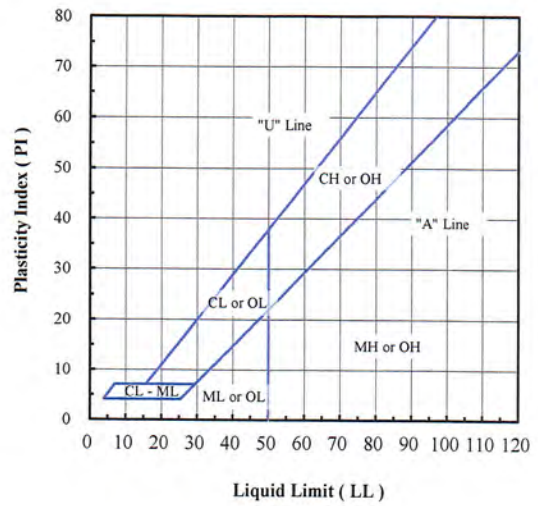


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.8
#20	0.850	96.4
#40	0.425	95.4
#60	0.250	94.5
#100	0.150	93.3
#140	0.106	92.5
#200	0.075	92.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	6.8
Fines (%):	92.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-7 (34')	20L249	33.9	92.0				

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

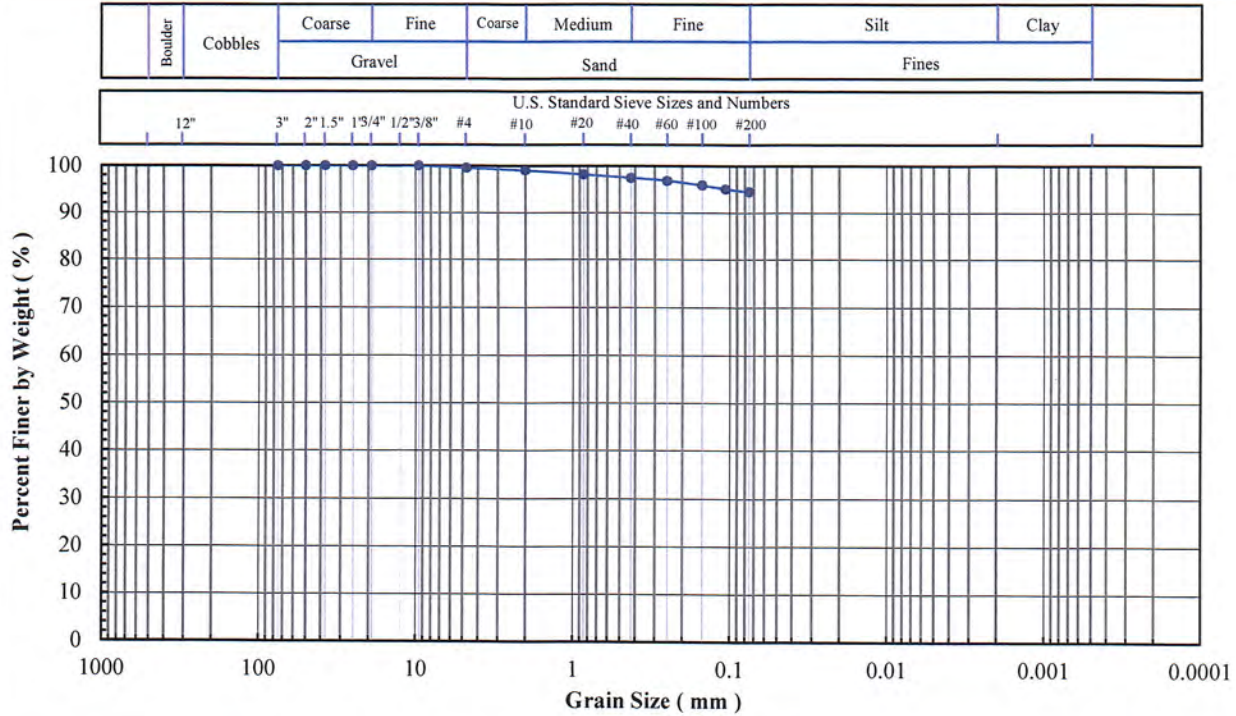
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-12 (55')  
Lab Sample No: 20L254

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

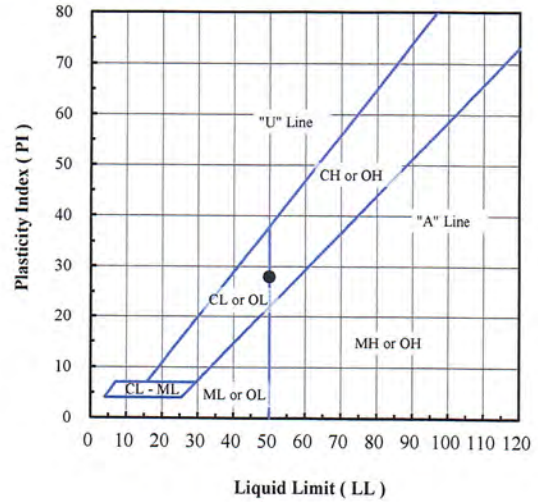


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	97.4
#60	0.250	96.8
#100	0.150	95.8
#140	0.106	95.0
#200	0.075	94.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	5.1
Fines (%):	94.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (55')	20L254	41.4	94.4	50	22	28	CH - Fat clay

Note(s):

01-25-2021  
AA1NSR



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Project Name: Belle River ALD Support

Project No: PN1017

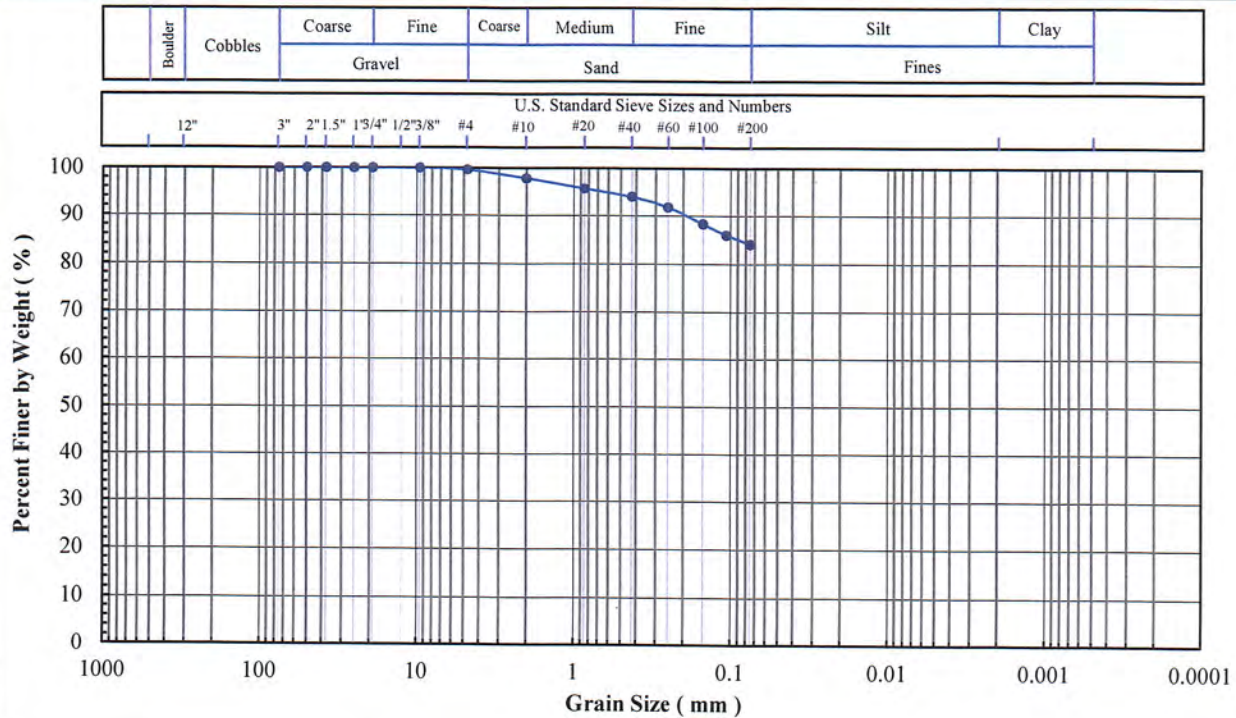
Client Sample ID: B4-16 (75')

Lab Sample No: 20L258

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

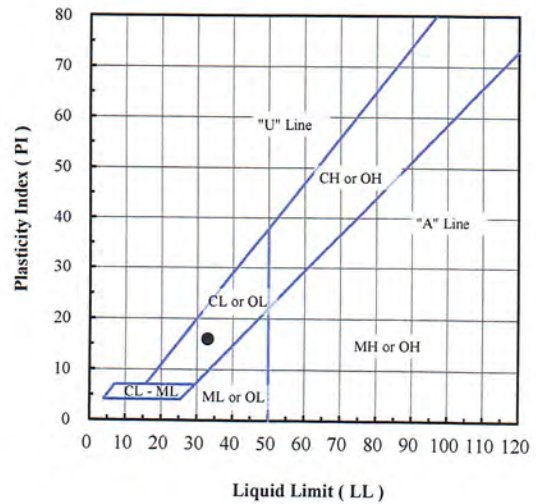


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	97.8
#20	0.850	95.6
#40	0.425	93.9
#60	0.250	91.7
#100	0.150	88.2
#140	0.106	85.9
#200	0.075	84.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	15.6
Fines (%):	84.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-16 (75')	20L258	24.0	84.0	33	17	16	CL - Lean clay with sand

Note(s):

*01-25-2021  
AA, NJSR*



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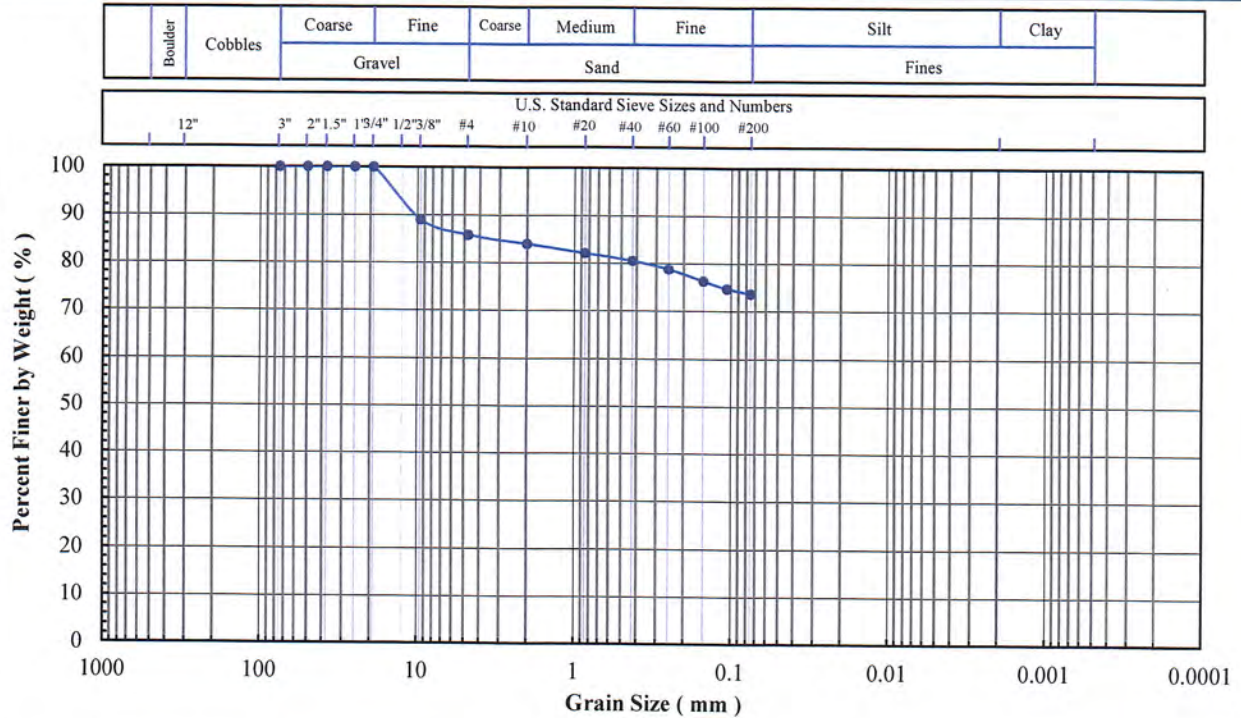
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B4-20 (95')  
 Lab Sample No: 20L262

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

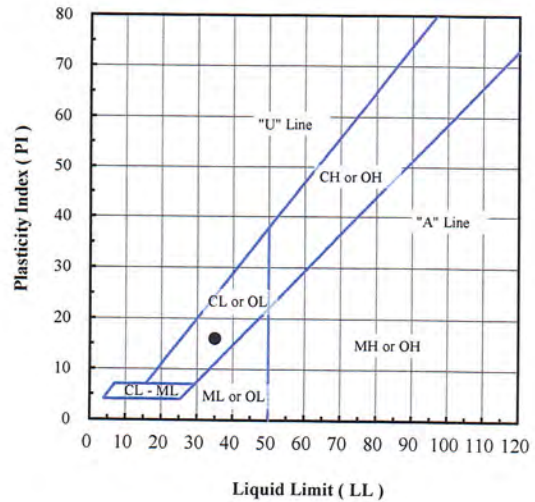


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	89
#4	4.75	86
#10	2.00	84
#20	0.850	82
#40	0.425	81
#60	0.250	79
#100	0.150	76
#140	0.106	75
#200	0.075	74

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	14
Sand (%):	12
Fines (%):	74
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-20 (95')	20L262	21.7	74	35	19	16	CL - Lean clay with gravel

Note(s): Sieve specimen was undersized.

01-25-2021  
 AA1 NSR



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Project Name: Belle River ALD Support

Project No: PN1017

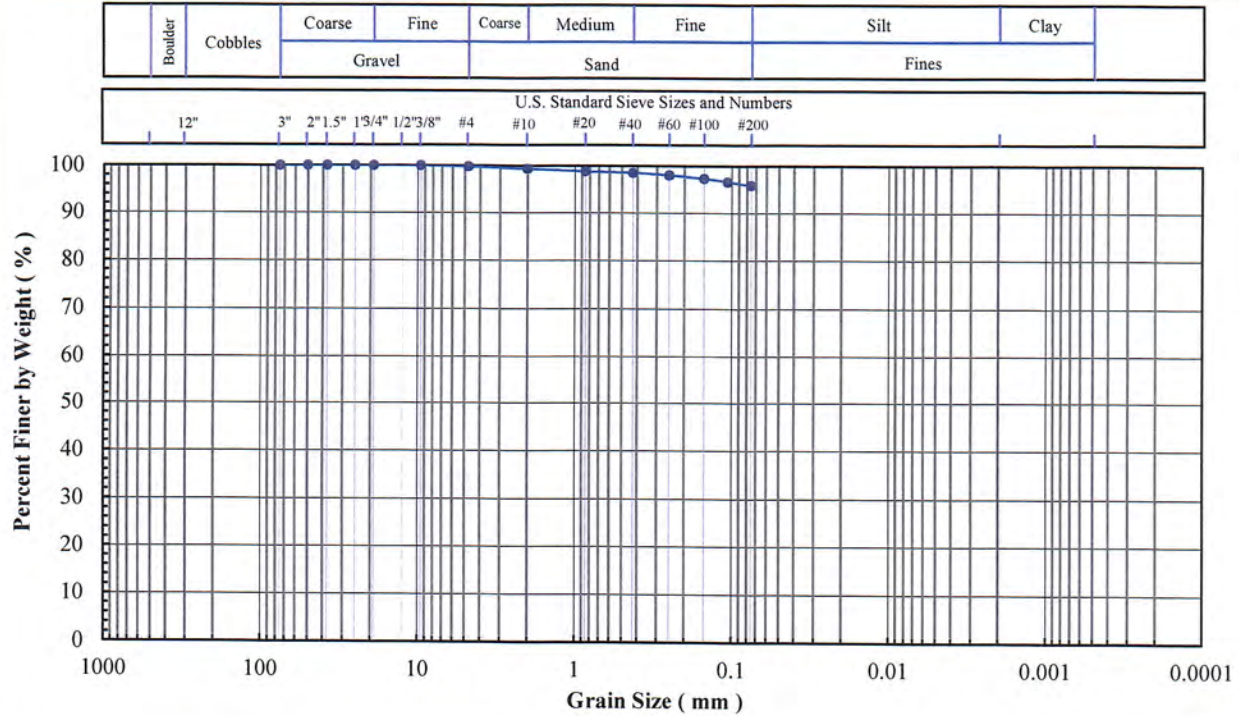
Client Sample ID: B5-1 (7')

Lab Sample No: 20L263

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

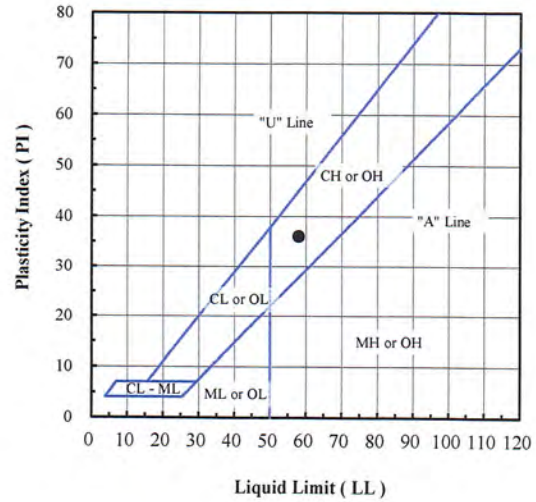


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	98.8
#40	0.425	98.5
#60	0.250	98.0
#100	0.150	97.3
#140	0.106	96.6
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	4.0
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-1 (7')	20L263	35.7	95.8	58	22	36	CH - Fat clay

Note(s):

01-25-2021  
AA, NSR



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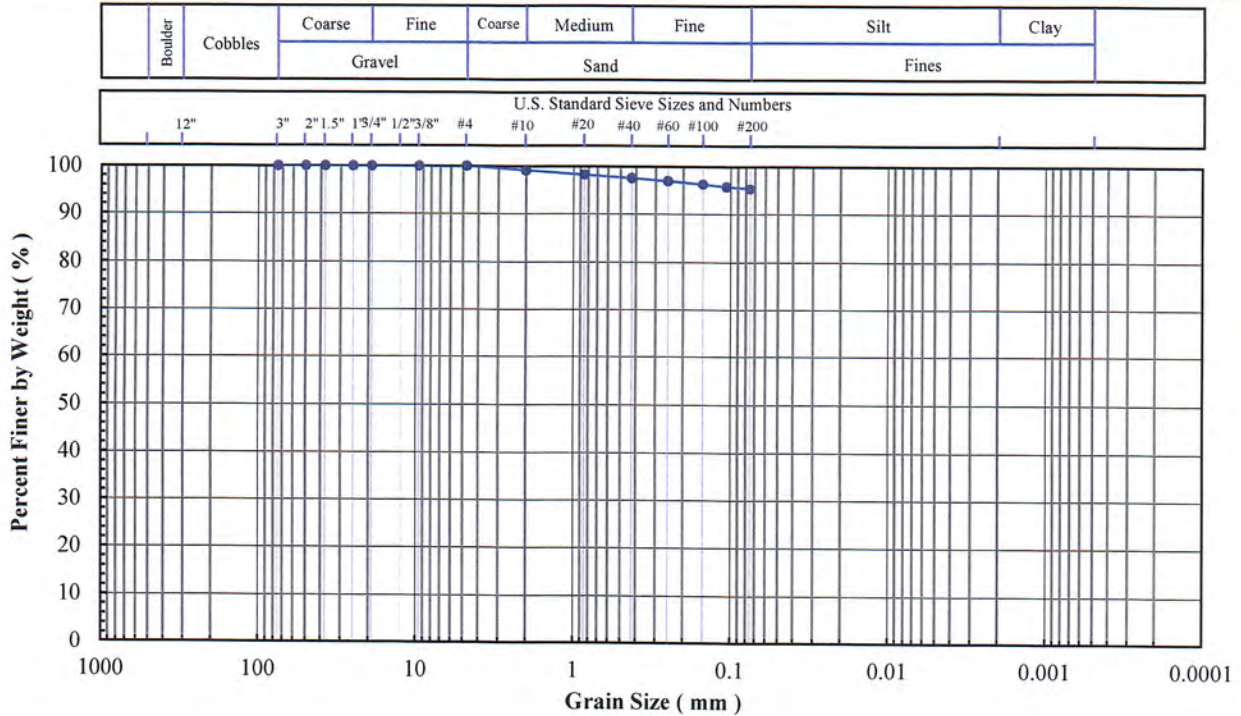
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-4 (29')  
Lab Sample No: 20L266

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

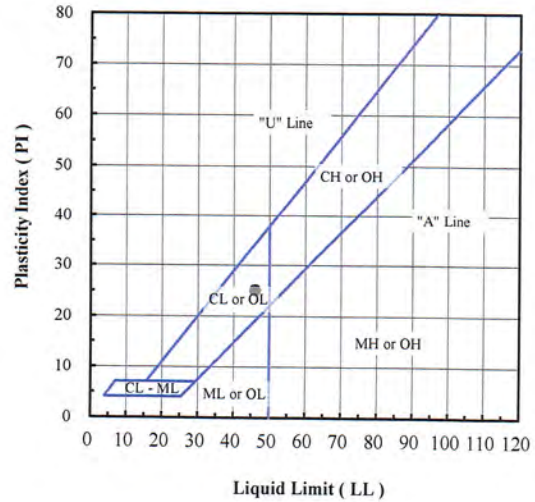


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.1
#20	0.850	98.2
#40	0.425	97.5
#60	0.250	96.9
#100	0.150	96.2
#140	0.106	95.7
#200	0.075	95.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	4.7
Fines (%):	95.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-4 (29')	20L266	39.1	95.3	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

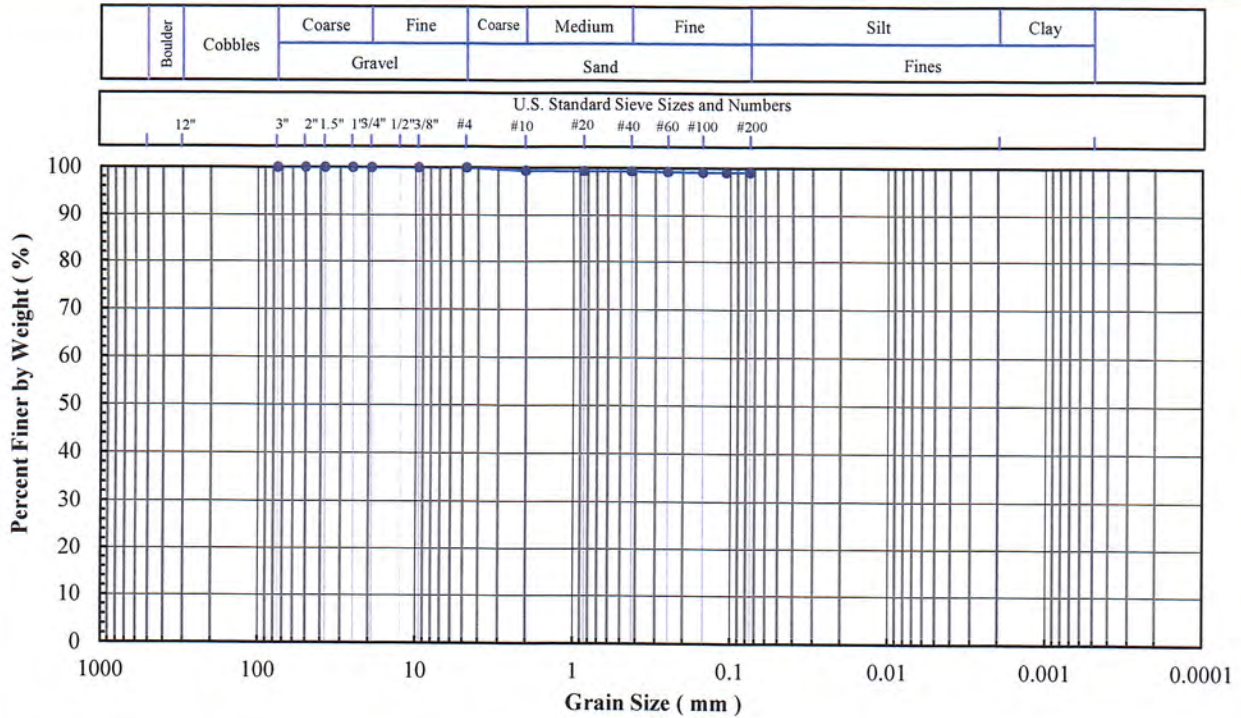
Client Sample ID: B5-9 (52')

Lab Sample No: 20L271

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

## SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

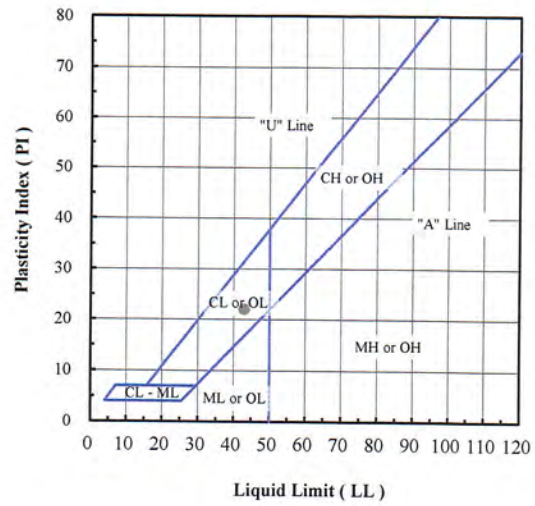


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.4
#20	0.850	99.3
#40	0.425	99.3
#60	0.250	99.2
#100	0.150	99.1
#140	0.106	99.1
#200	0.075	99.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.9
Fines (%):	99.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-9 (52')	20L271	40.2	99.1	43	21	22	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR





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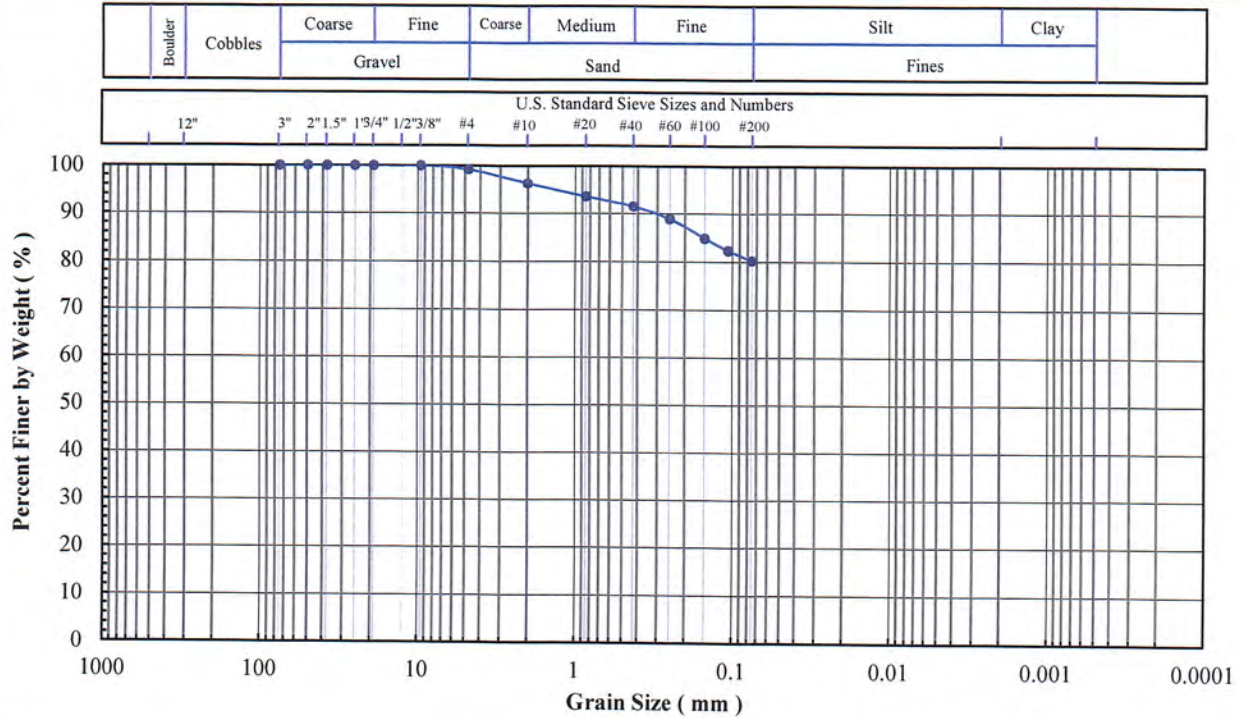
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-13 (72')  
Lab Sample No: 20L275

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

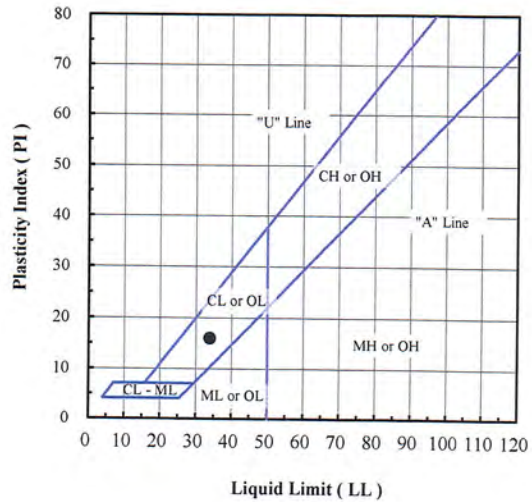


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	93.5
#40	0.425	91.4
#60	0.250	88.8
#100	0.150	84.8
#140	0.106	82.3
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	19.0
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-13 (72')	20L275	27.1	80.2	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1, NSR



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 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

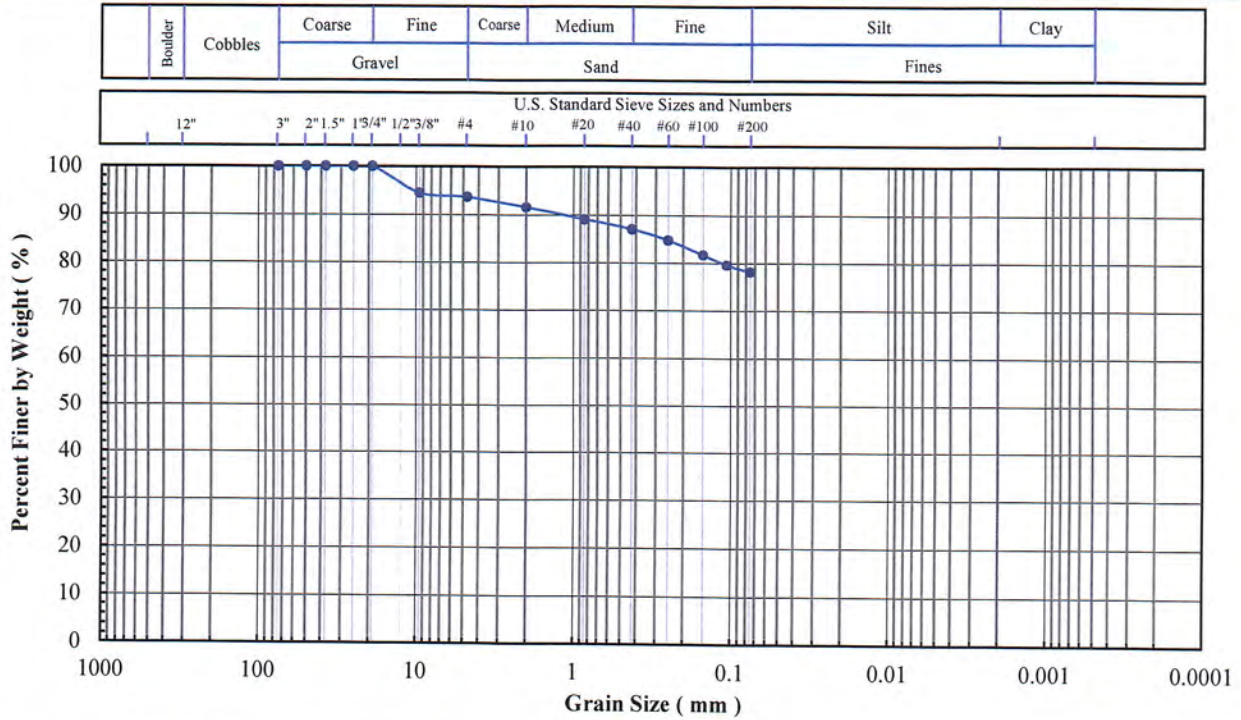
Client Sample ID: B5-17 (92')

Lab Sample No: 20L279

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

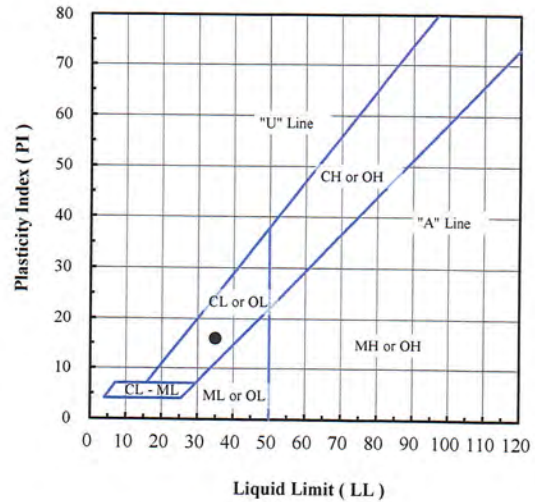


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	92
#20	0.850	89
#40	0.425	87
#60	0.250	85
#100	0.150	82
#140	0.106	80
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	16
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-17 (92')	20L279	22.0	78	35	19	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

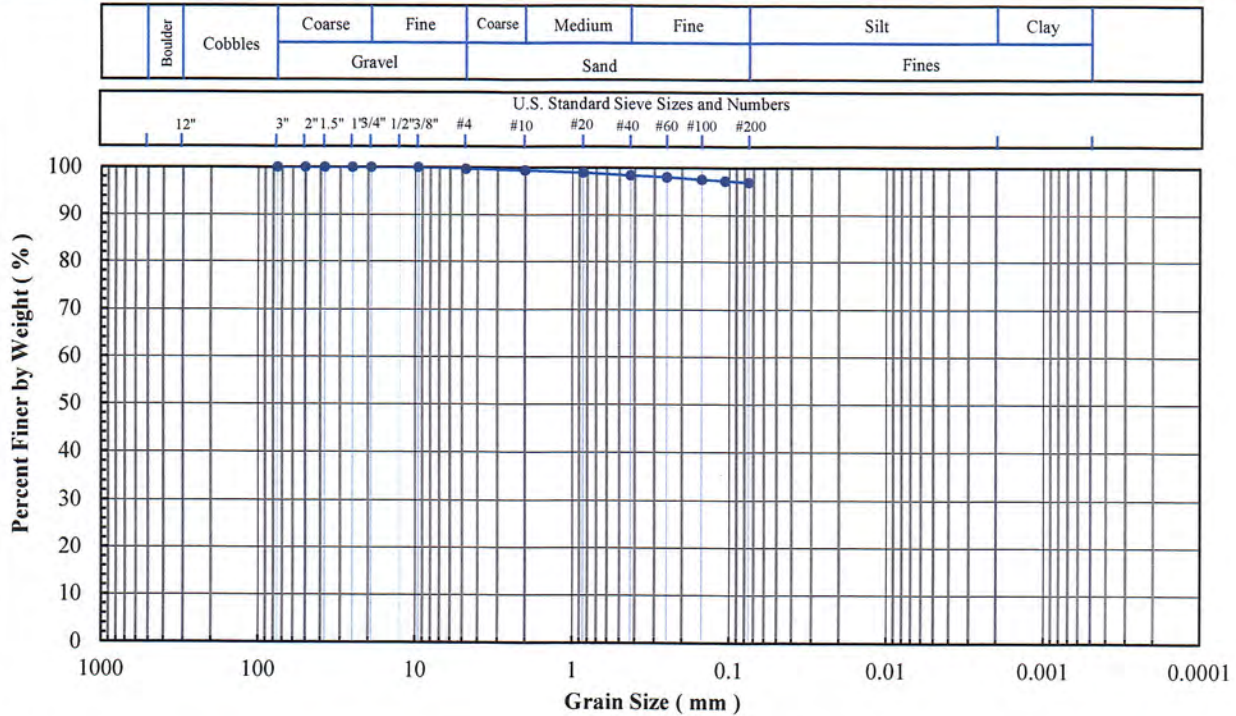
Client Sample ID: B6-3 (15')

Lab Sample No: 20L284

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

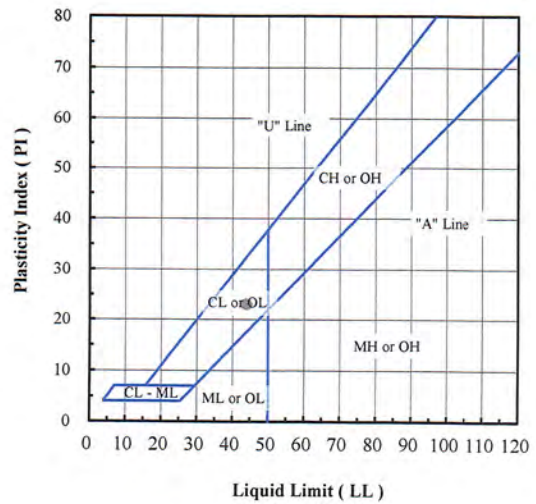


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.4
#20	0.850	98.9
#40	0.425	98.4
#60	0.250	98.0
#100	0.150	97.5
#140	0.106	97.2
#200	0.075	96.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	2.8
Fines (%):	96.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-3 (15')	20L284	36.7	96.9	44	21	23	CL - Lean clay

Note(s):

*01-26-2021  
AA, NSR*



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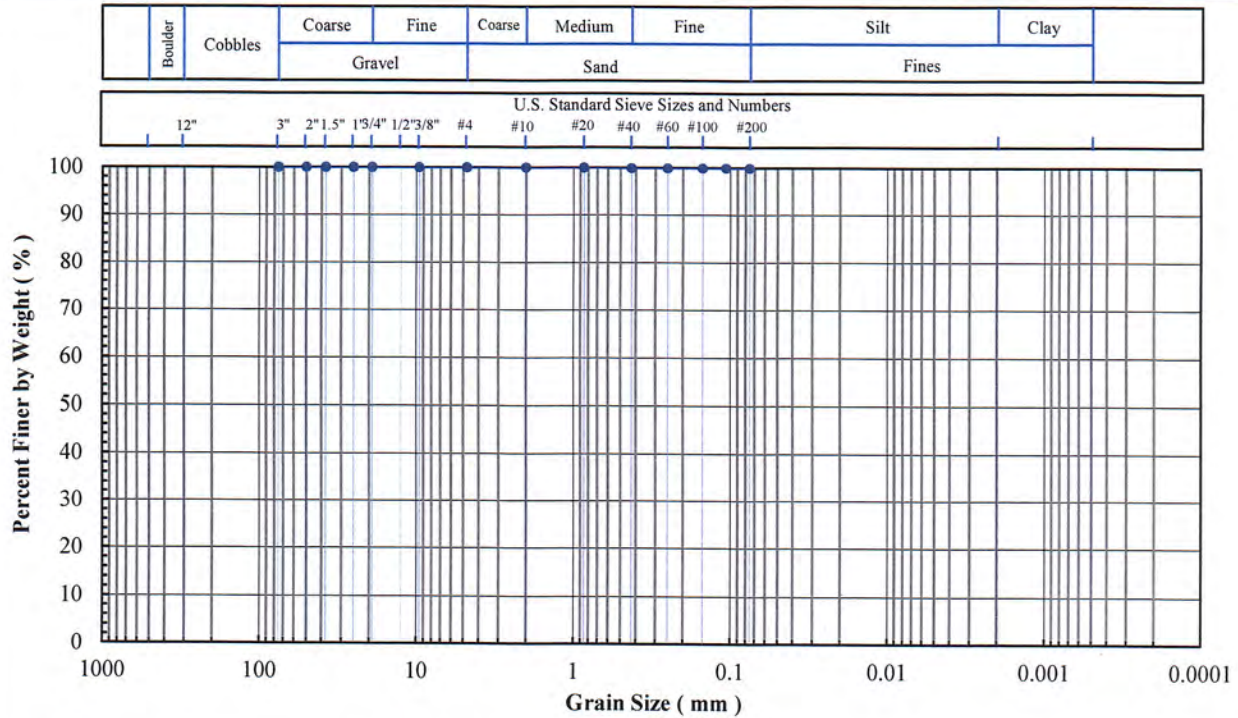
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-7 (35')  
Lab Sample No: 20L288

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

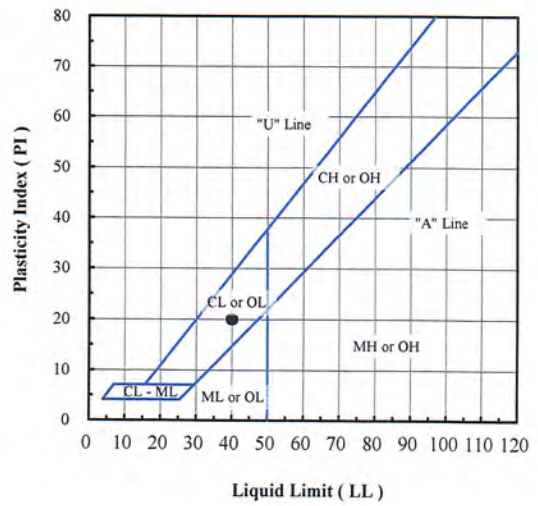


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (35')	20L288	37.8	99.9	40	20	20	CL - Lean clay

Note(s):

01-26-2021  
AAI/NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

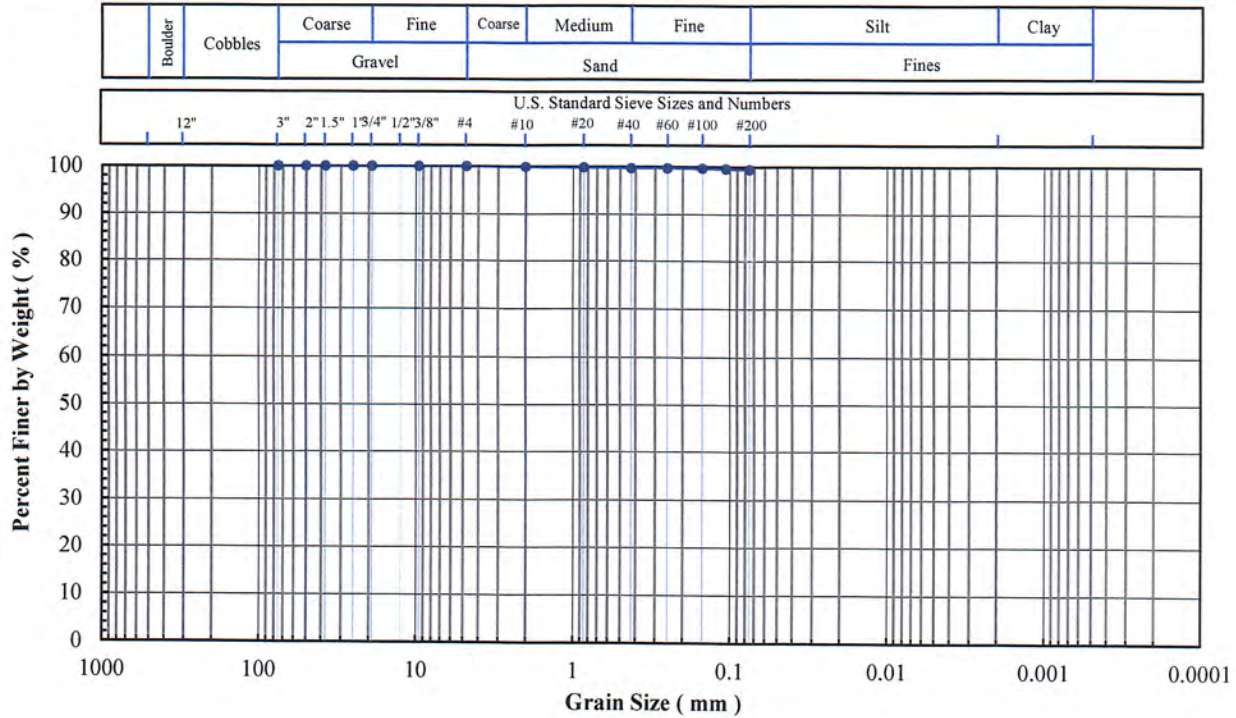
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-11 (55')  
Lab Sample No: 20L292

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

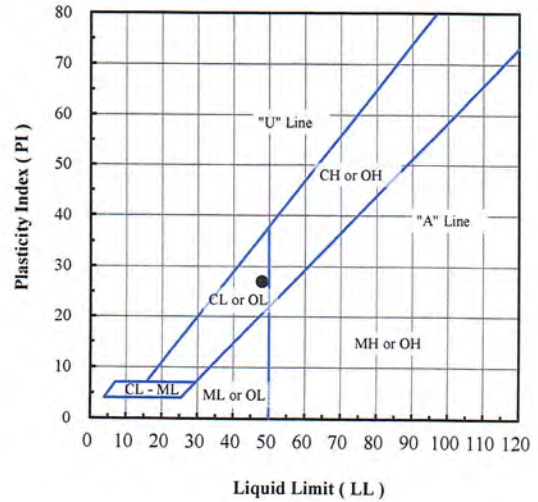


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.6
#140	0.106	99.5
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-11 (55')	20L292	38.7	99.4	48	21	27	CL - Lean Clay

Note(s):

01-26-2021  
AA, NSR



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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

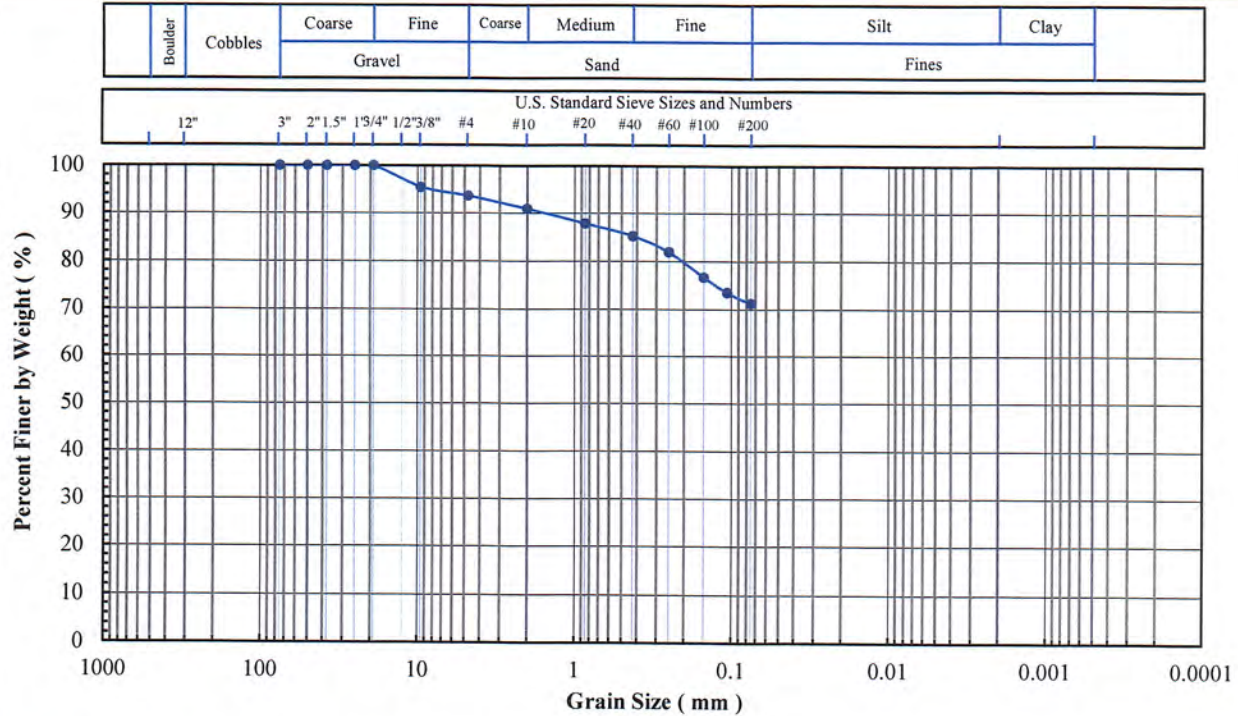
Client Sample ID: B6-15 (75')

Lab Sample No: 20L296

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

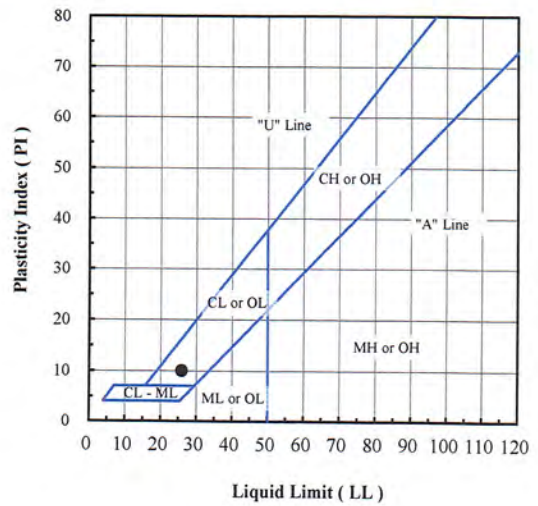


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	91
#20	0.850	88
#40	0.425	85
#60	0.250	82
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	23
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-15 (75')	20L296	20.5	71	26	16	10	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

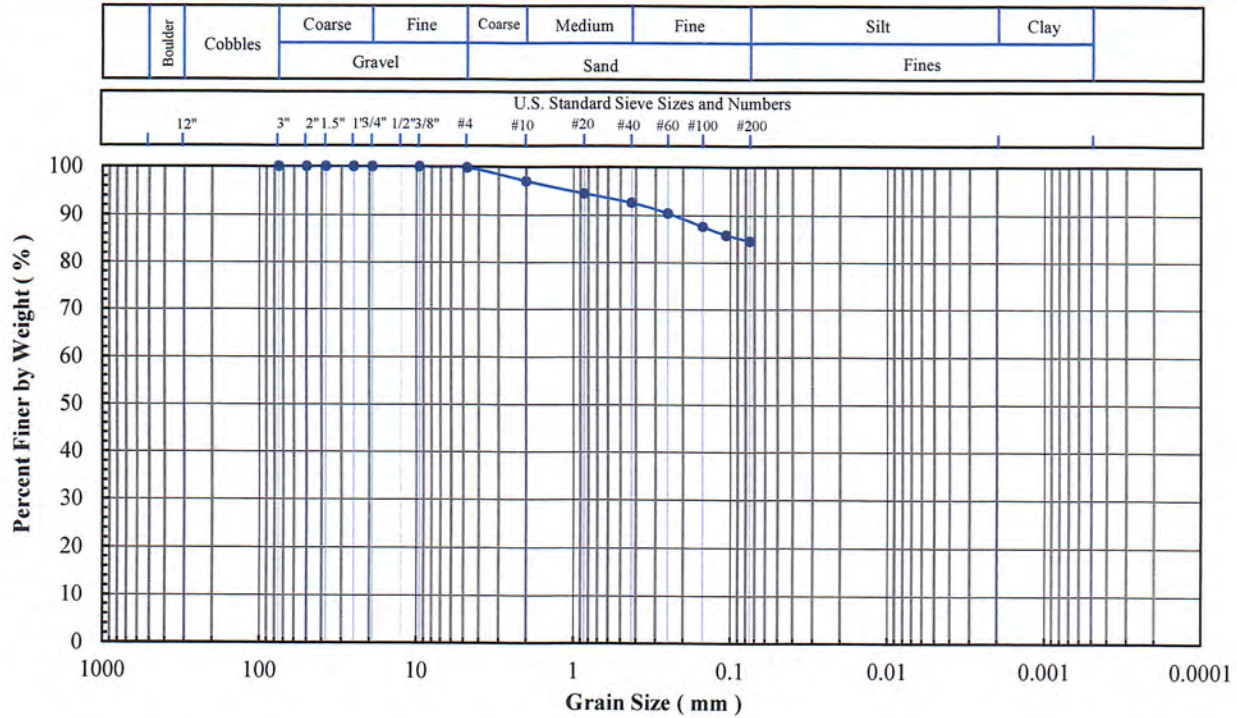
Client Sample ID: B6-19 (95')

Lab Sample No: 20L300

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

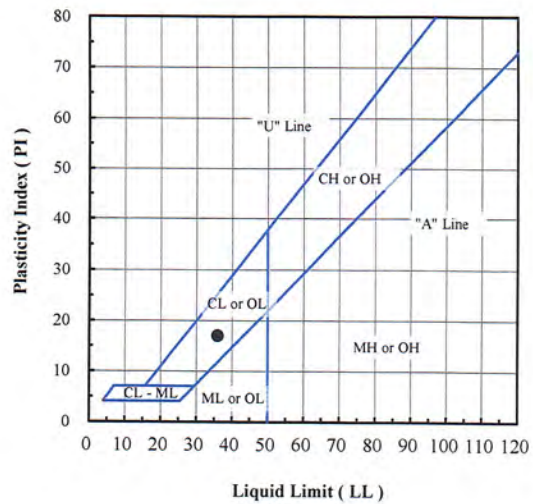


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	97.0
#20	0.850	94.5
#40	0.425	92.6
#60	0.250	90.4
#100	0.150	87.6
#140	0.106	85.8
#200	0.075	84.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	15.2
Fines (%):	84.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-19 (95')	20L300	26.5	84.6	36	19	17	CL - Lean clay with sand

Note(s):

01-26-2021  
AAI, NSR



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B1-ST-3 (36-38')
<b>Lab Sample Number:</b>	20L145
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.43	7.37	89.5	35.0	53.0	50.0	3.0	DDW	12	2.2E-8
	3.47	7.04	97.4	27.6	63.00	50.0	13.0	DDW	10	2.7E-9

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
APK, NSR*





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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-2 (7-9')
<b>Lab Sample Number:</b>	20L150
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.54	7.22	98.2	26.8	53.0	50.0	3.0	DDW	12	2.1E-8
	3.54	7.20	98.8	26.4	54.00	50.0	4.0	DDW	12	2.0E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L155
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.24	110.9	20.3	53.0	50.0	3.0	DDW	3	3.3E-8
	3.50	7.16	114.2	18.5	77.00	50.0	27.0	DDW	6	2.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

\* Deviations:

Laboratory temperature at 22±3 °C.

*7-21-2021  
APK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B3-ST-1 (1-3')
<b>Lab Sample Number:</b>	20L156
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/8/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.17	111.4	19.1	53.0	50.0	3.0	DDW	8	9.6E-9
	3.62	7.29	104.7	22.7						

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B4-ST-4 (67-69')
<b>Lab Sample Number:</b>	20L165
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.23	129.8	11.6	53.0	50.0	3.0	DDW	5	2.8E-8
	3.55	7.21	129.5	11.1	69.00	50.0	19.0	DDW	10	1.8E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, MSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B5-ST-2 (27-29')
<b>Lab Sample Number:</b>	20L169
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Specimen Final Conditions				Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid <sup>(3)</sup> (-)	Average Gradient (-)	
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)						
ST	3.49	7.34	85.9	36.8	53.0	50.0	3.0	DDW	9	3.4E-8
	3.48	7.02	93.4	30.7	60.00	50.0	10.0	DDW	4	2.1E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, ASR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-4 (47-49')
<b>Lab Sample Number:</b>	20L177
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity  ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.32	86.6	38.3	53.0	50.0	3.0	DDW	5	2.5E-8
	3.45	7.16	93.3	29.6	65.00	50.0	15.0	DDW	10	1.8E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 AFK, NSB*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L180
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.29	104.1	23.5	53.0	50.0	3.0	DDW	4	2.4E-8
	3.51	7.18	108.3	21.0	76.00	50.0	26.0	DDW	9	1.2E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, MSK*



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# LAST PAGE

**Test Applicability and Limitations:**

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

**Storage Policy:**

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of \$1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of \$1.30 per sample per day will be applied after the initial 3 months storage.



# **Appendix I1**

## **CPT Logs**



GeoSyntec

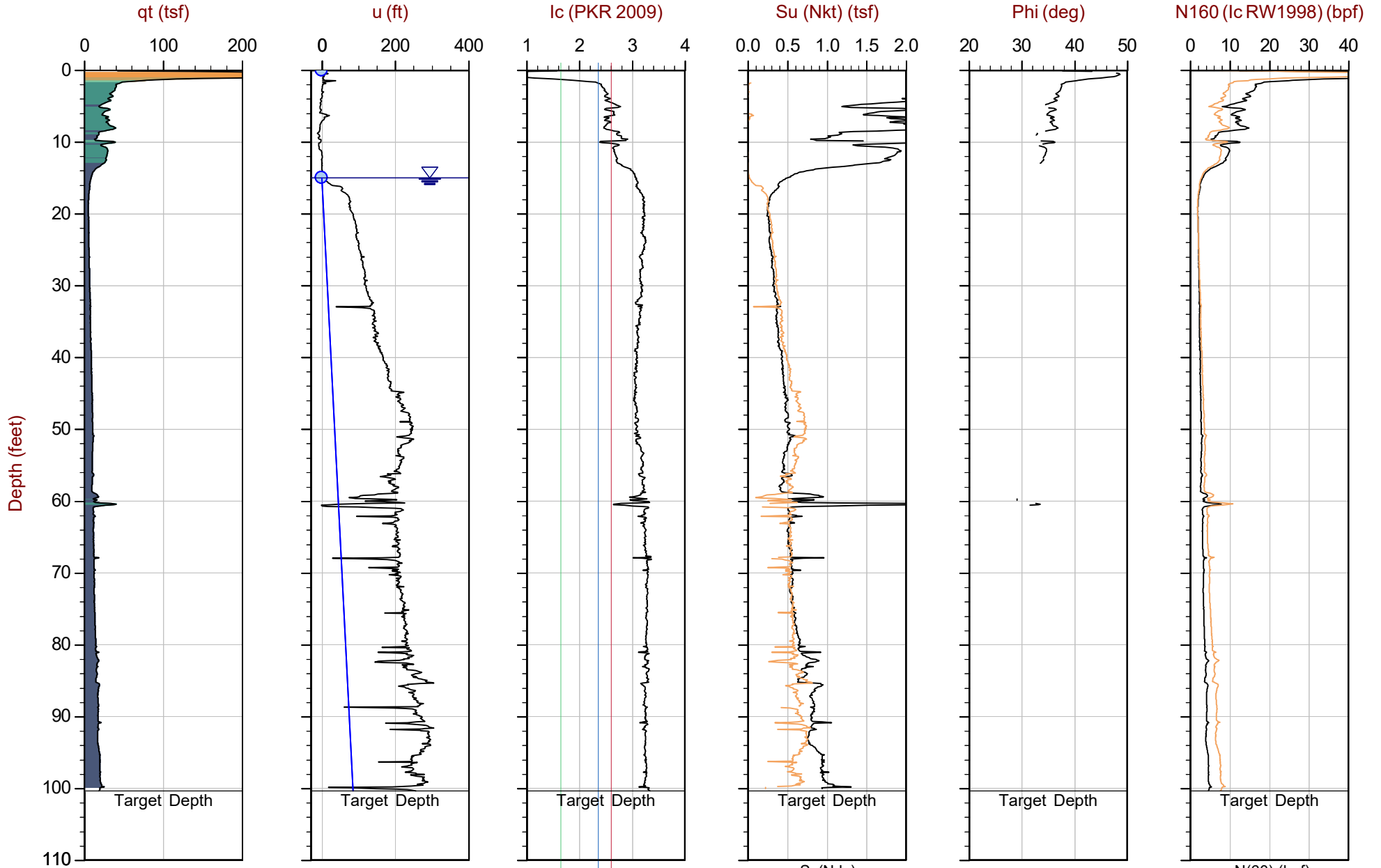
Job No: 20-61-21681

Date: 2020-12-10 14:55

Site: DTE Belle River Power Plant

Sounding: CPT20-01

Cone: 551:T1500F15U500



Max Depth: 30.600 m / 100.39 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP01.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470985ft E: 13625925ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

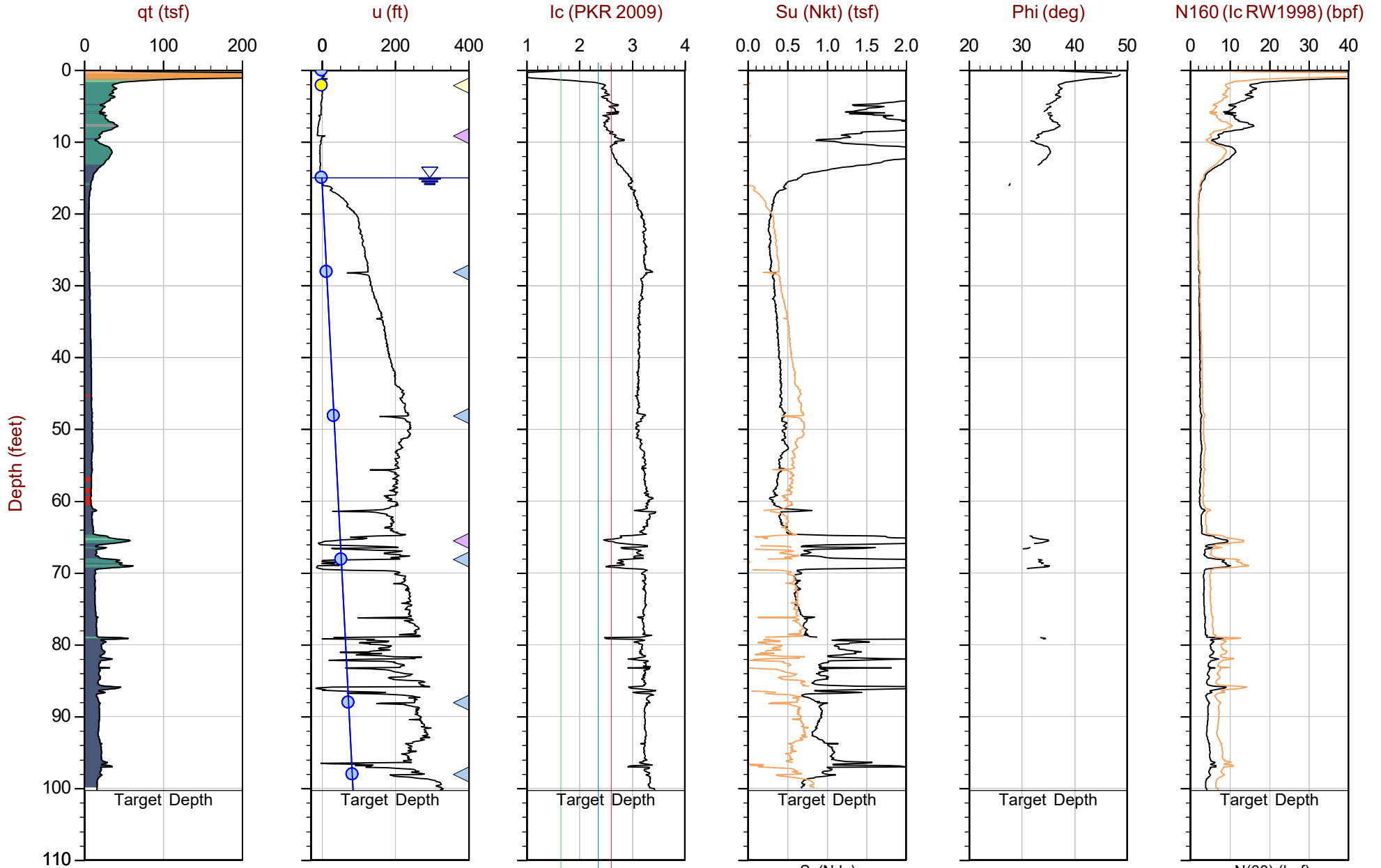
Job No: 20-61-21681

Date: 2020-12-11 08:28

Site: DTE Belle River Power Plant

Sounding: CPT20-01B

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP01B.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470980ft E: 13625906ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

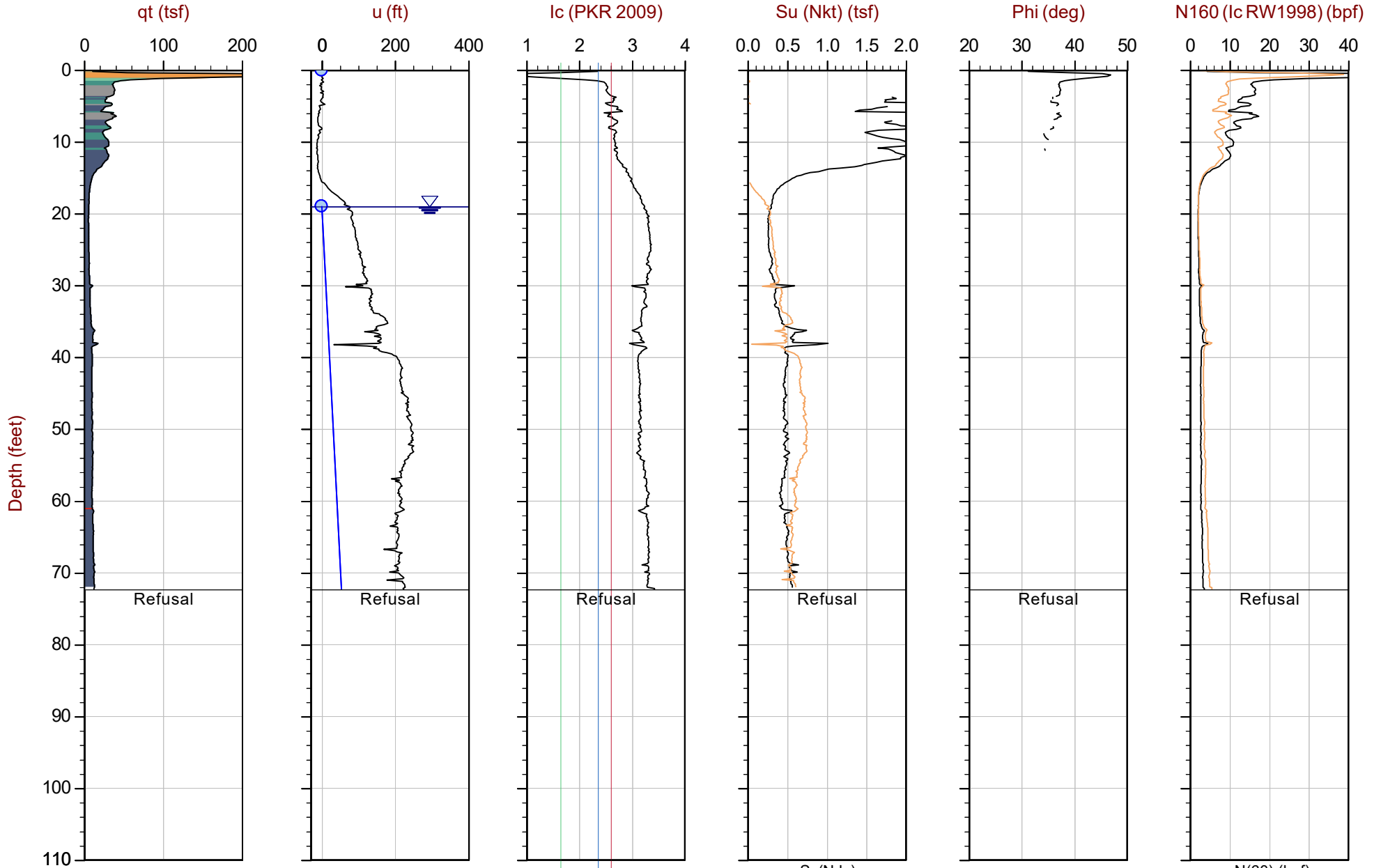
Job No: 20-61-21681

Date: 2020-12-09 12:28

Site: DTE Belle River Power Plant

Sounding: CPT20-02

Cone: 513:T1500F15U500



Max Depth: 22.050 m / 72.34 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP02.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470997ft E: 13626119ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

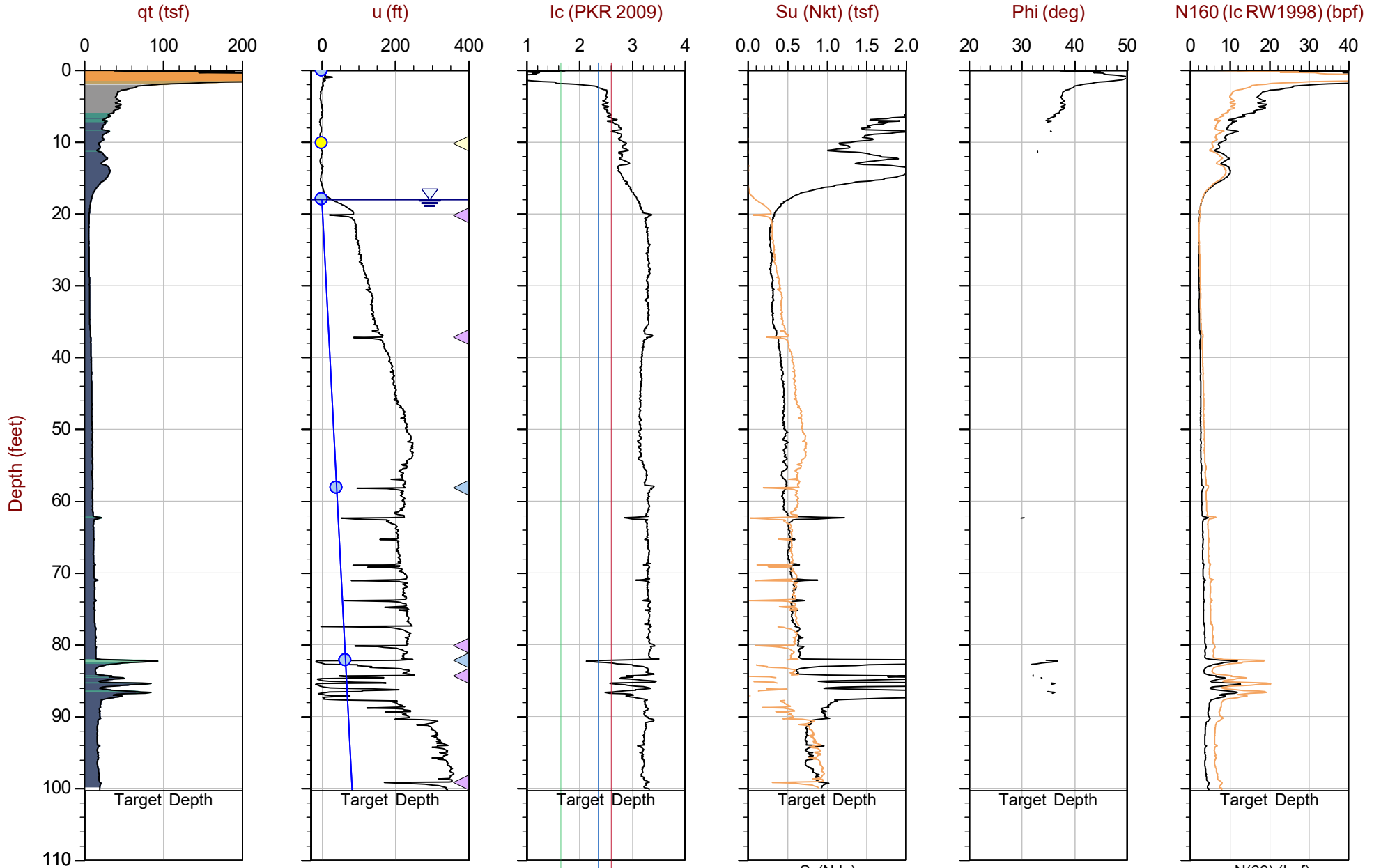
Job No: 20-61-21681

Date: 2020-12-09 14:00

Site: DTE Belle River Power Plant

Sounding: CPT20-03

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP03.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471039ft E: 13626171ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

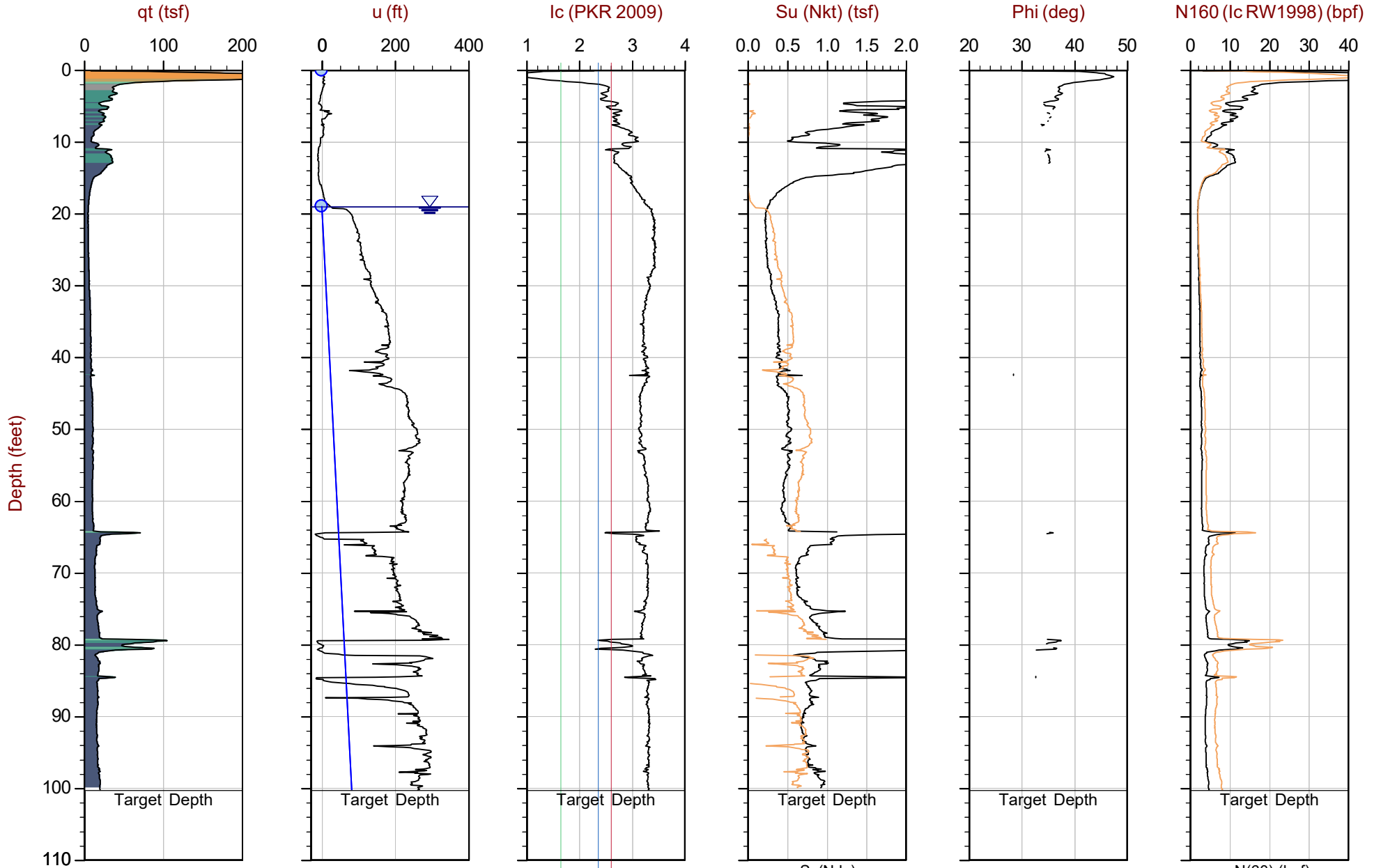
Job No: 20-61-21681

Date: 2020-12-09 11:05

Site: DTE Belle River Power Plant

Sounding: CPT20-04

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP04.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471237ft E: 13626152ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

◁ Dissipation, Ueq not achieved

— N(60) (bpf)



GeoSyntec

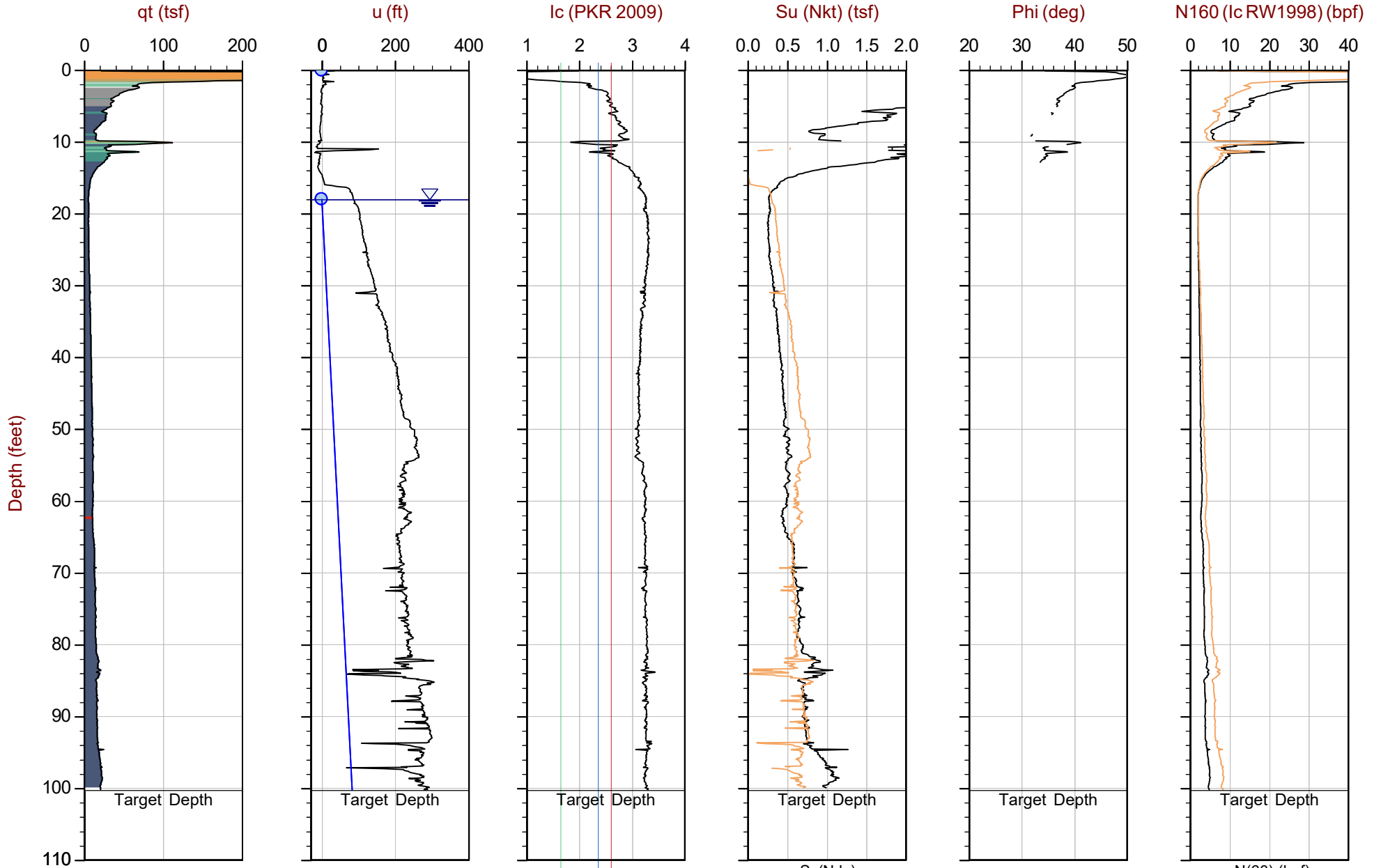
Job No: 20-61-21681

Date: 2020-12-09 12:02

Site: DTE Belle River Power Plant

Sounding: CPT20-05

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP05.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471243ft E: 13625954ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

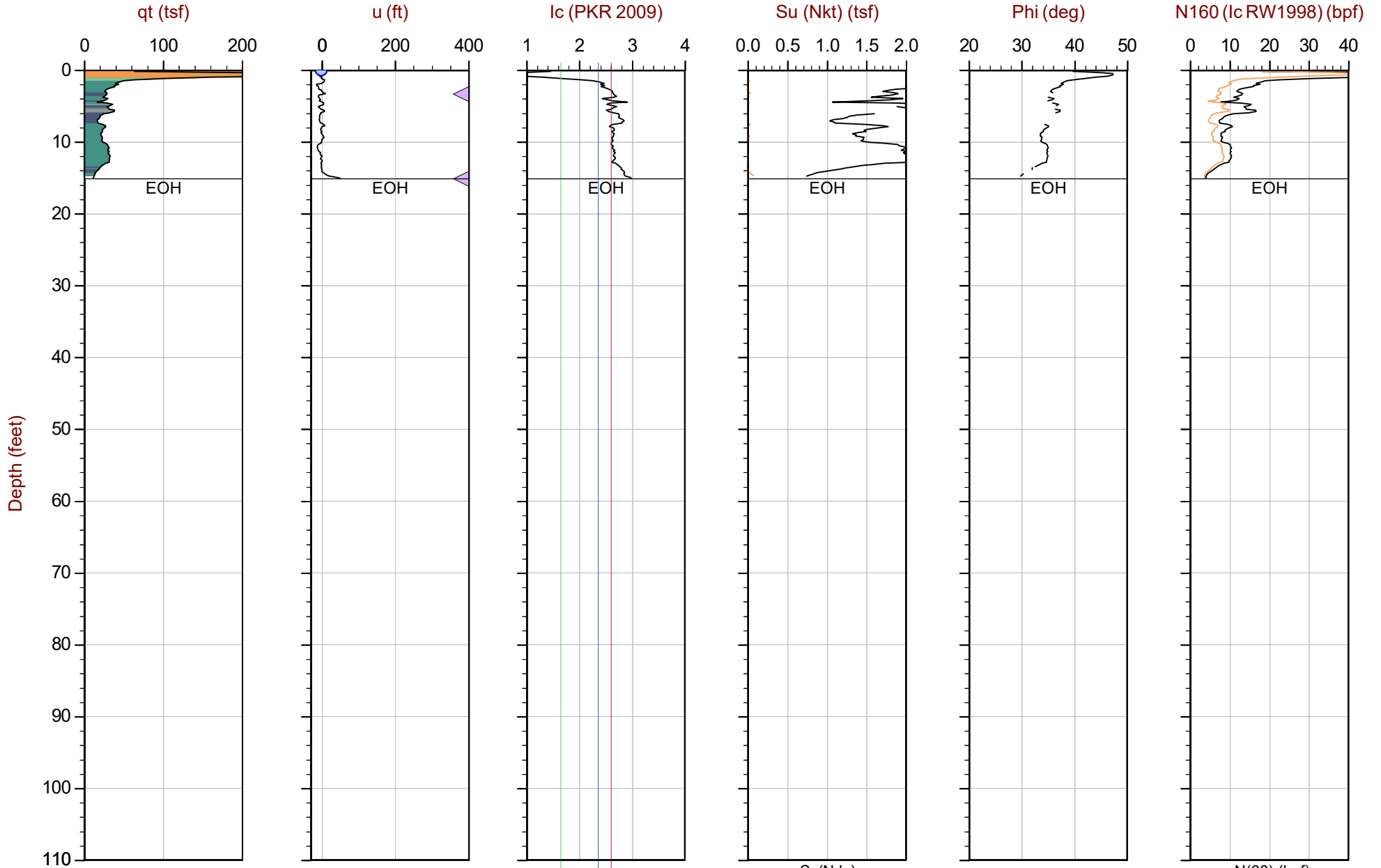
Job No: 20-61-21681

Date: 2020-12-09 13:54

Site: DTE Belle River Power Plant

Sounding: CPT20-06

Cone: 513:T1500F15U500



Max Depth: 4.600 m / 15.09 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471221ft E: 13625753ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

Su(Ndu)

N(60) (bpf)





GeoSyntec

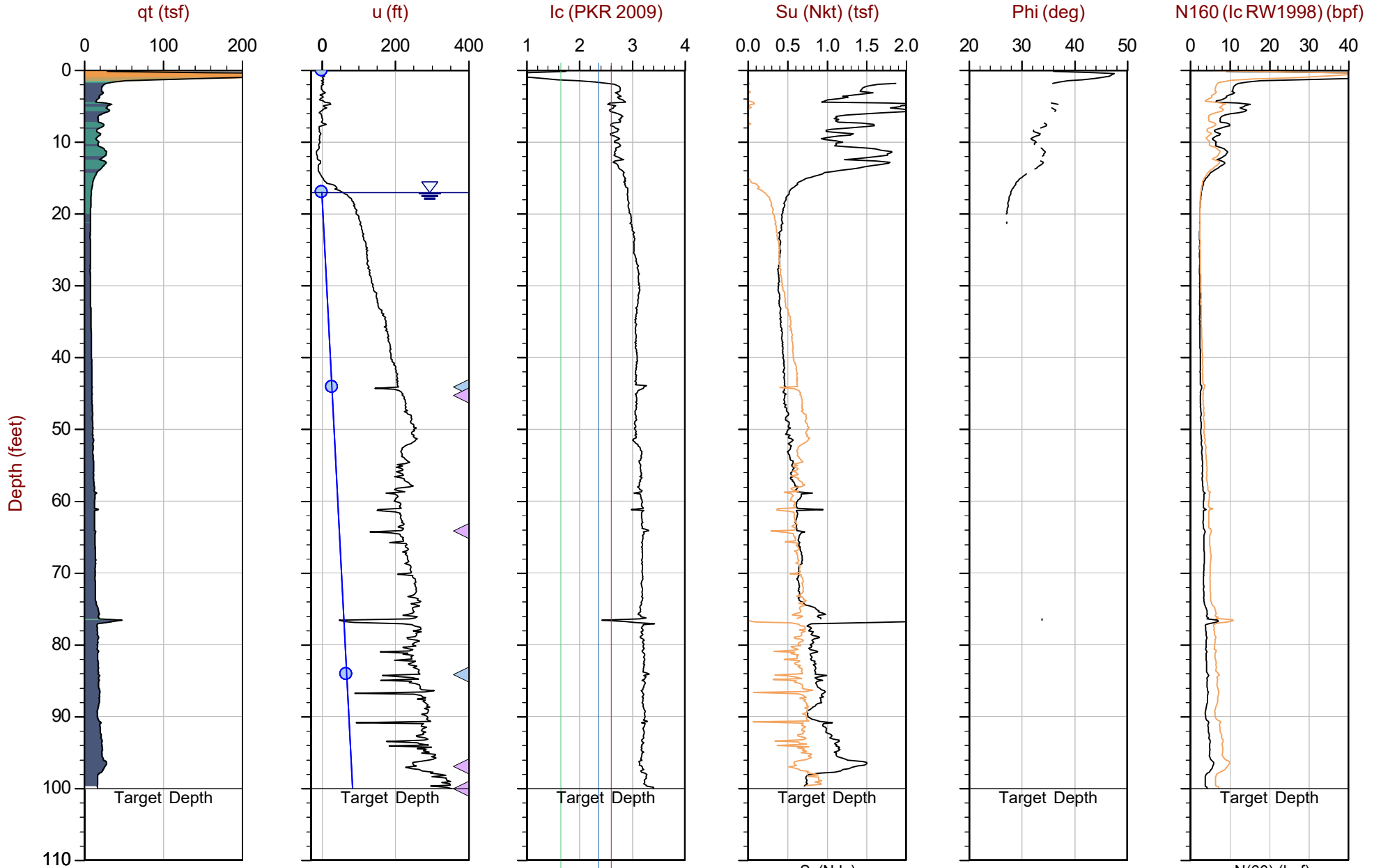
Job No: 20-61-21681

Date: 2020-12-10 08:43

Site: DTE Belle River Power Plant

Sounding: CPT20-06B

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471216ft E: 13625742ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

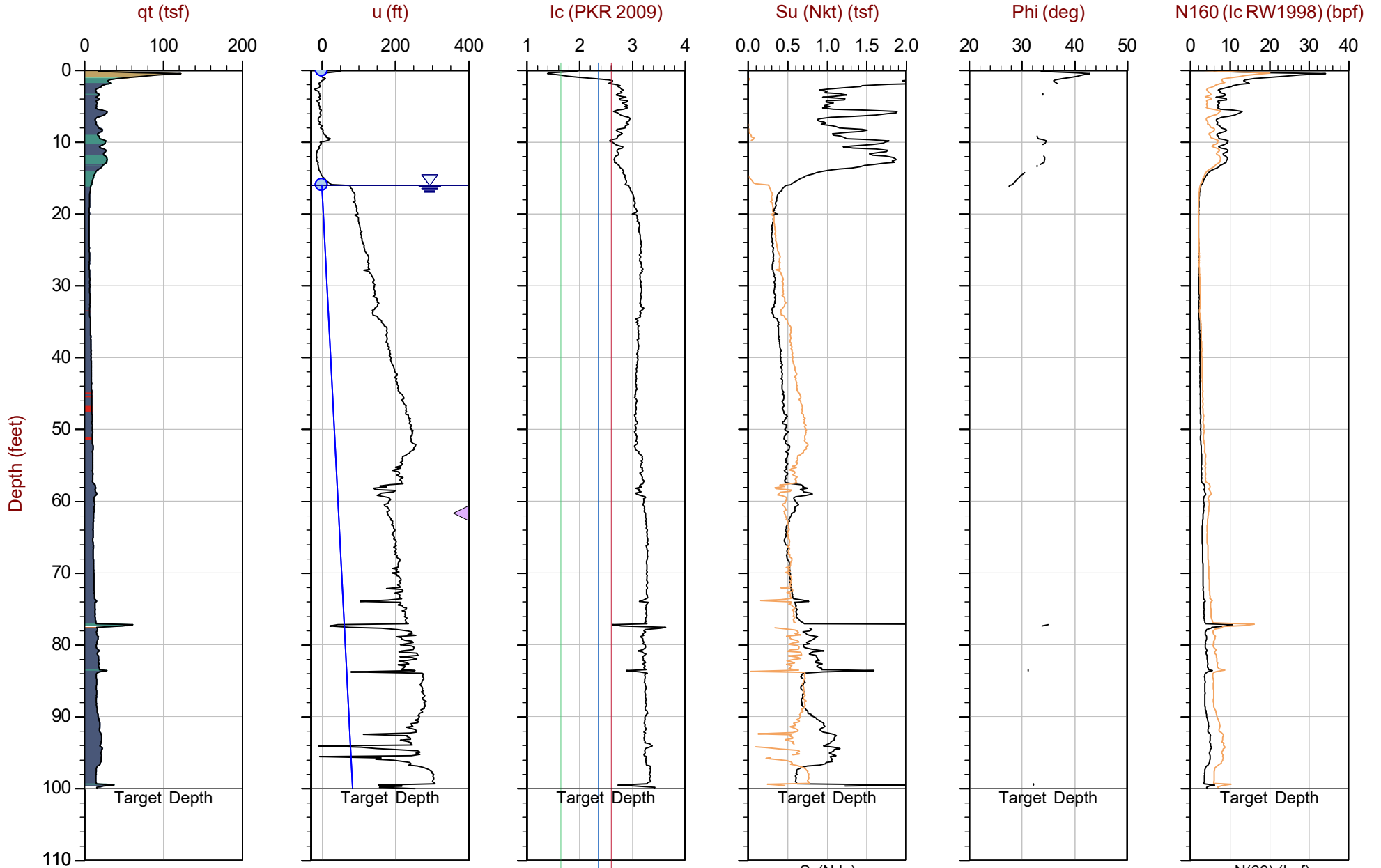
Job No: 20-61-21681

Date: 2020-12-09 11:04

Site: DTE Belle River Power Plant

Sounding: CPT20-07

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP07.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471015ft E: 13625752ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

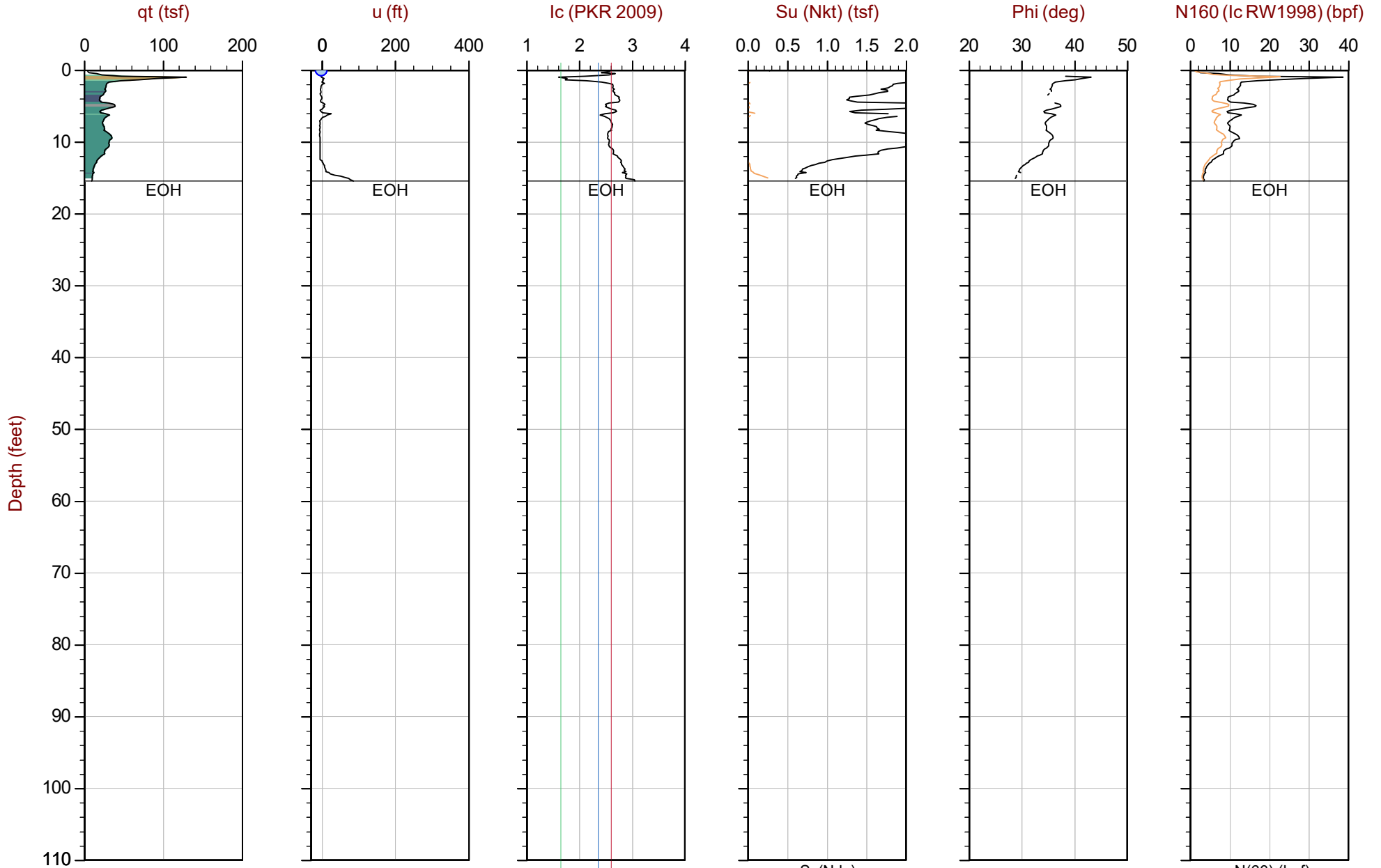
Job No: 20-61-21681

Date: 2020-12-11 12:09

Site: DTE Belle River Power Plant

Sounding: CPT20-08

Cone: 568:T1500F15U500



Max Depth: 4.700 m / 15.42 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470392ft E: 13626398ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

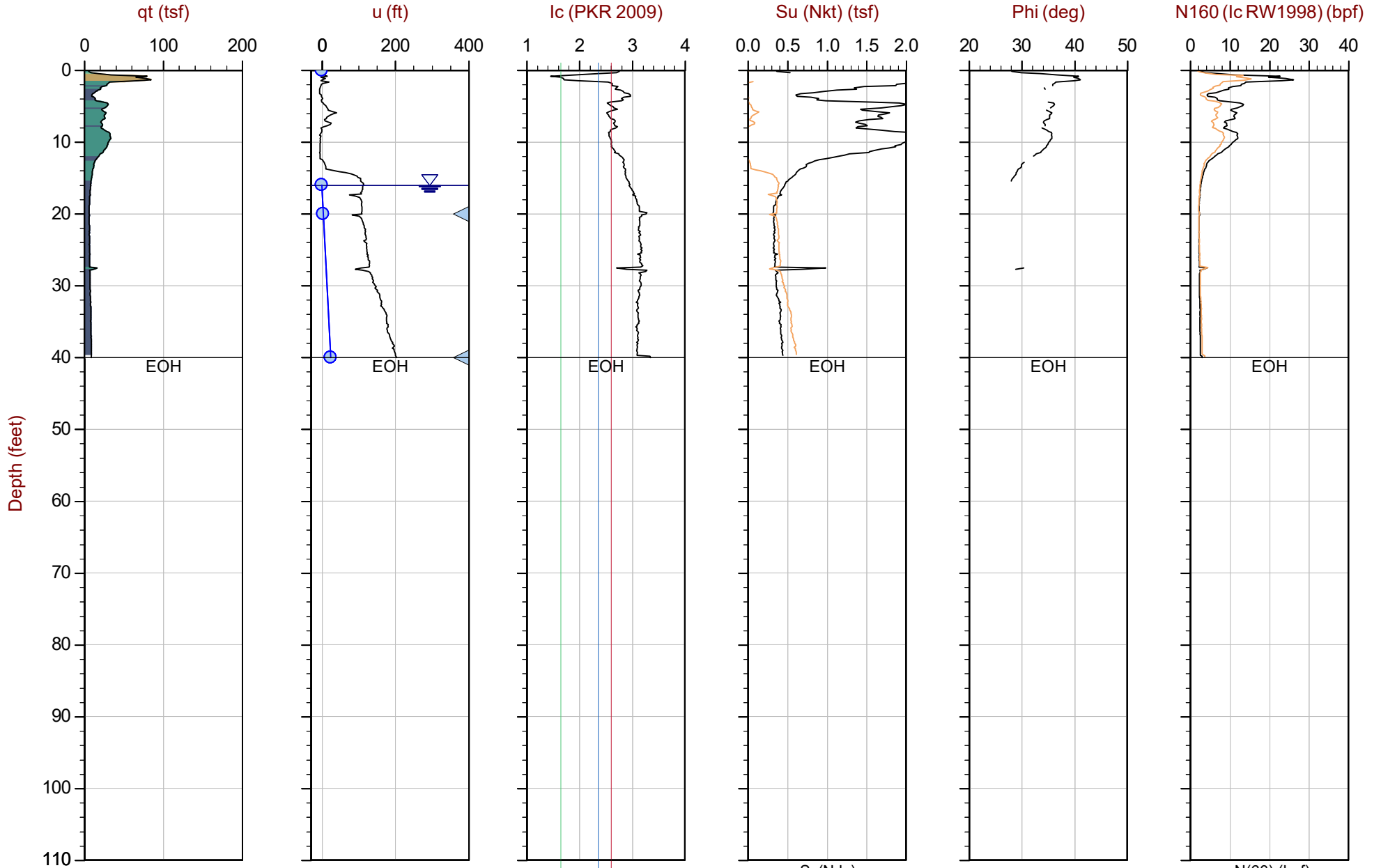
Job No: 20-61-21681

Date: 2020-12-11 12:35

Site: DTE Belle River Power Plant

Sounding: CPT20-08B

Cone: 568:T1500F15U500



Max Depth: 12.200 m / 40.03 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470382ft E: 13626396ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

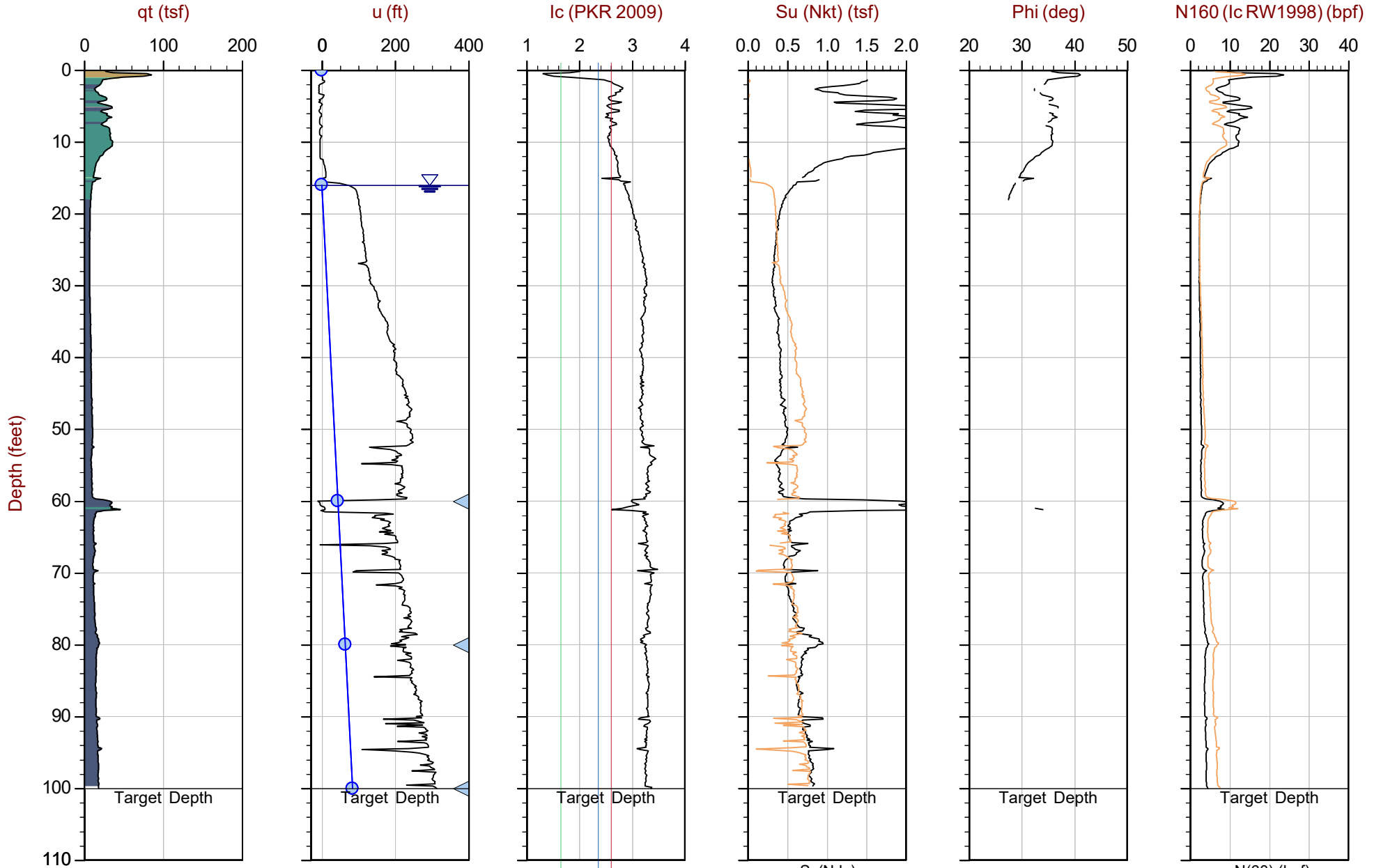
Job No: 20-61-21681

Date: 2020-12-15 08:41

Site: DTE Belle River Power Plant

Sounding: CPT20-08C

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP08C.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470384ft E: 13626391ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

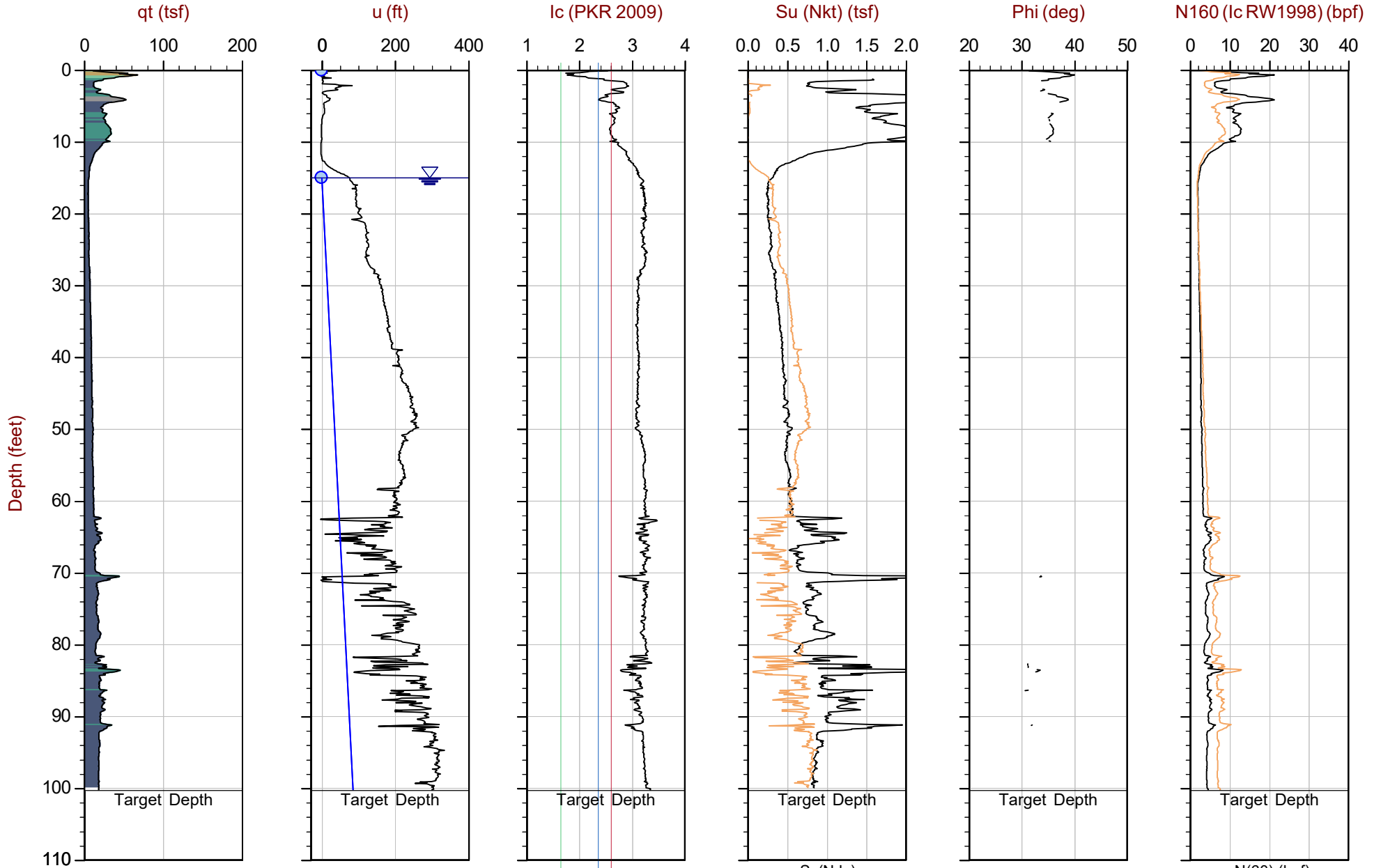
Job No: 20-61-21681

Date: 2020-12-16 11:02

Site: DTE Belle River Power Plant

Sounding: CPT20-10.1

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP10.1.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469861 ft E: 13626732 ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

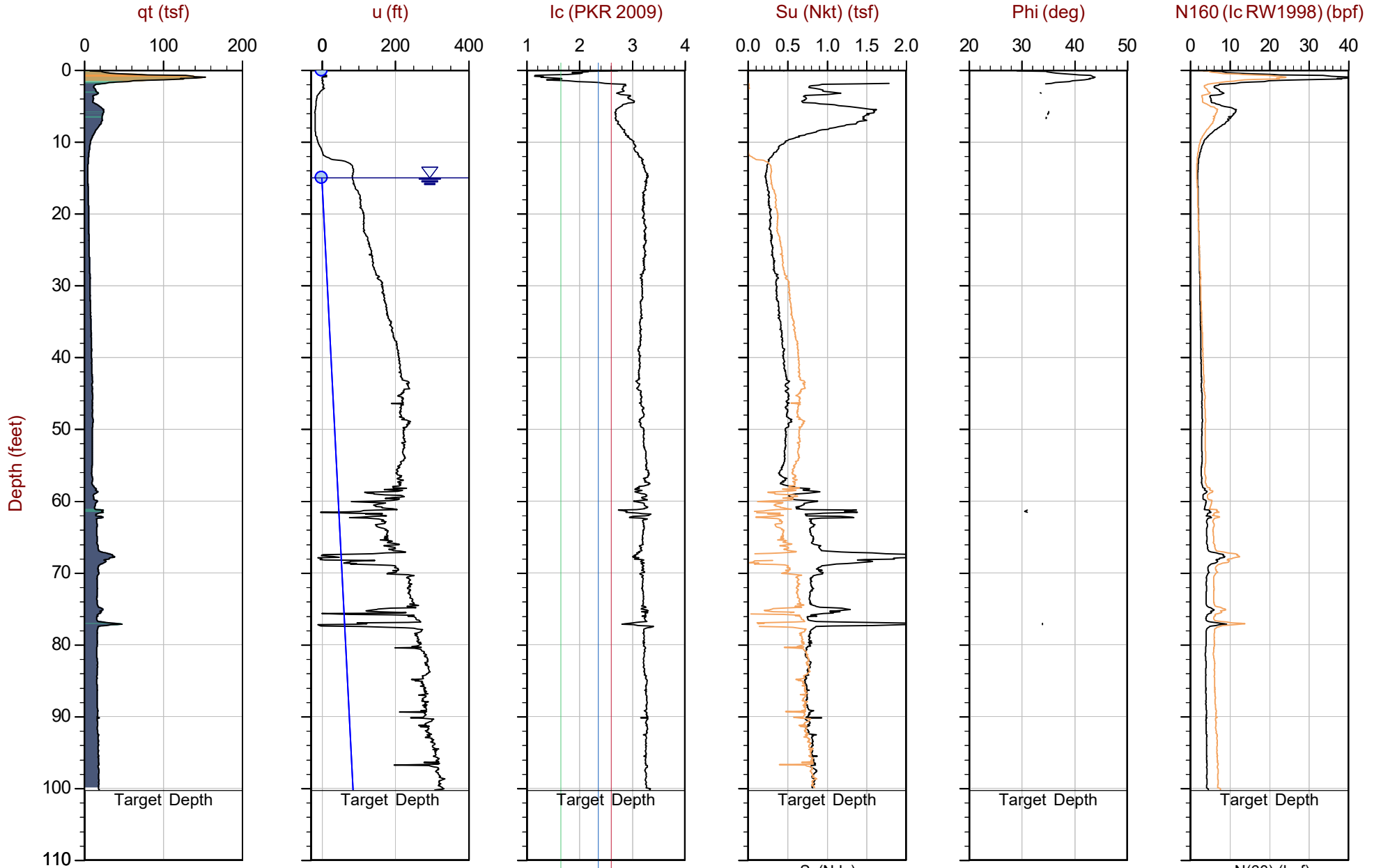
Job No: 20-61-21681

Date: 2020-12-16 11:53

Site: DTE Belle River Power Plant

Sounding: CPT20-10A

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP10A.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469934ft E: 13626592ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

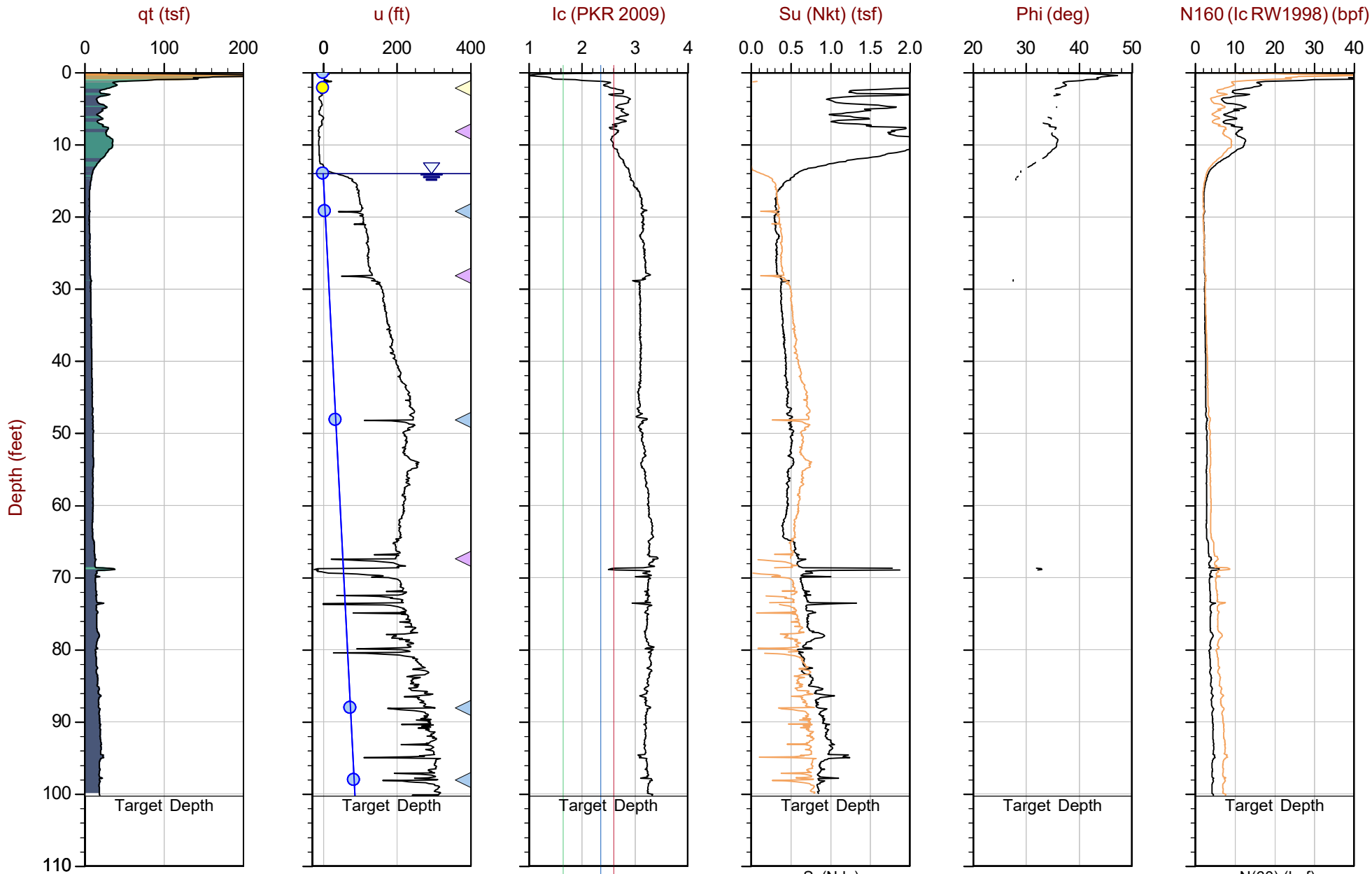
Job No: 20-61-21681

Date: 2020-12-15 11:07

Site: DTE Belle River Power Plant

Sounding: CPT20-11

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP11.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469979ft E: 13626765ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line

— N(60) (bpf)





GeoSyntec

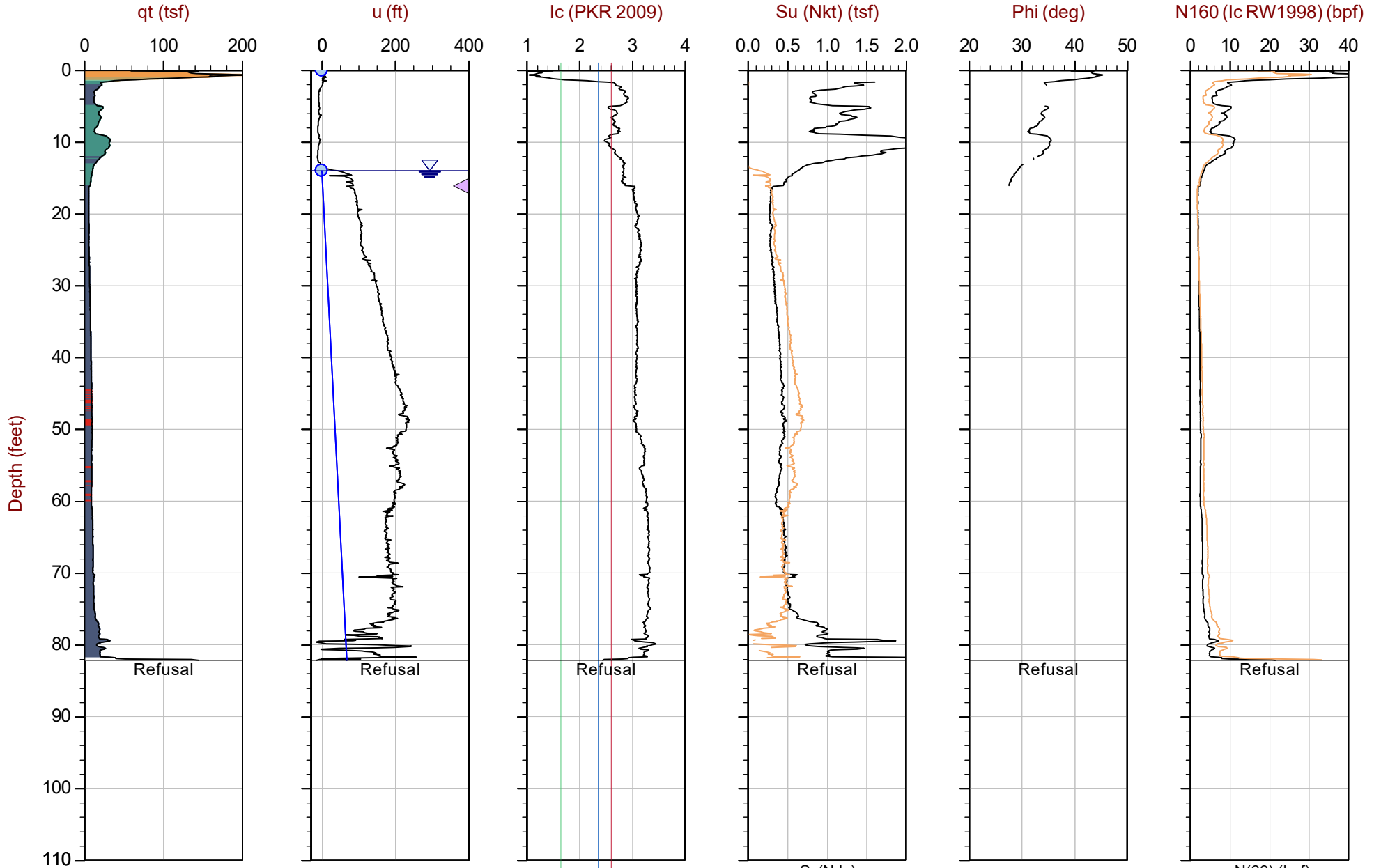
Job No: 20-61-21681

Date: 2020-12-15 08:44

Site: DTE Belle River Power Plant

Sounding: CPT20-12

Cone: 551:T1500F15U500



Max Depth: 25.050 m / 82.18 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP12.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470292ft E: 13626802ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

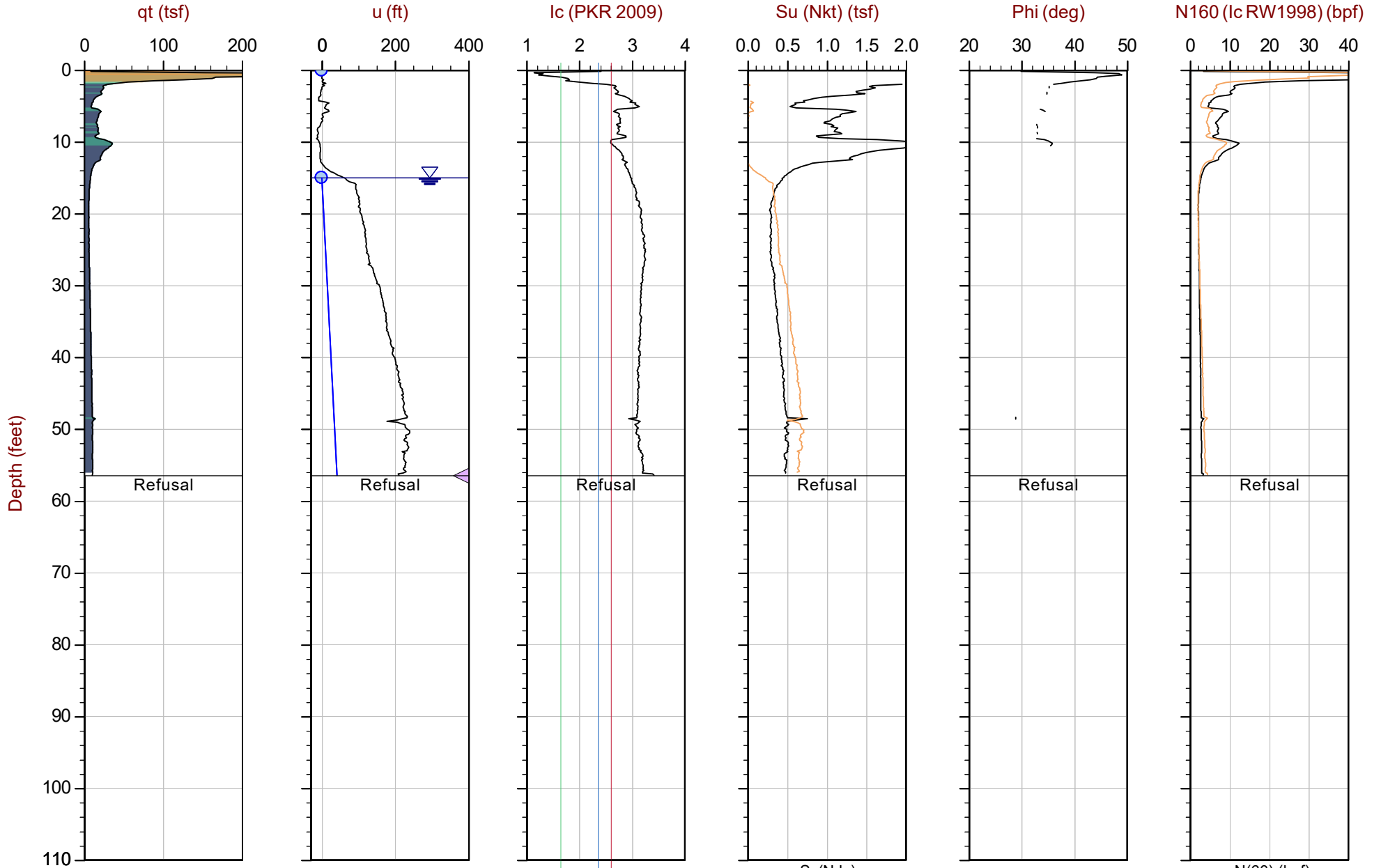
Job No: 20-61-21681

Date: 2020-12-10 15:00

Site: DTE Belle River Power Plant

Sounding: CPT20-13

Cone: 513:T1500F15U500



Max Depth: 17.200 m / 56.43 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP13.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470478ft E: 13626800ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

— Su(Ndu)

— N(60) (bpf)



GeoSyntec

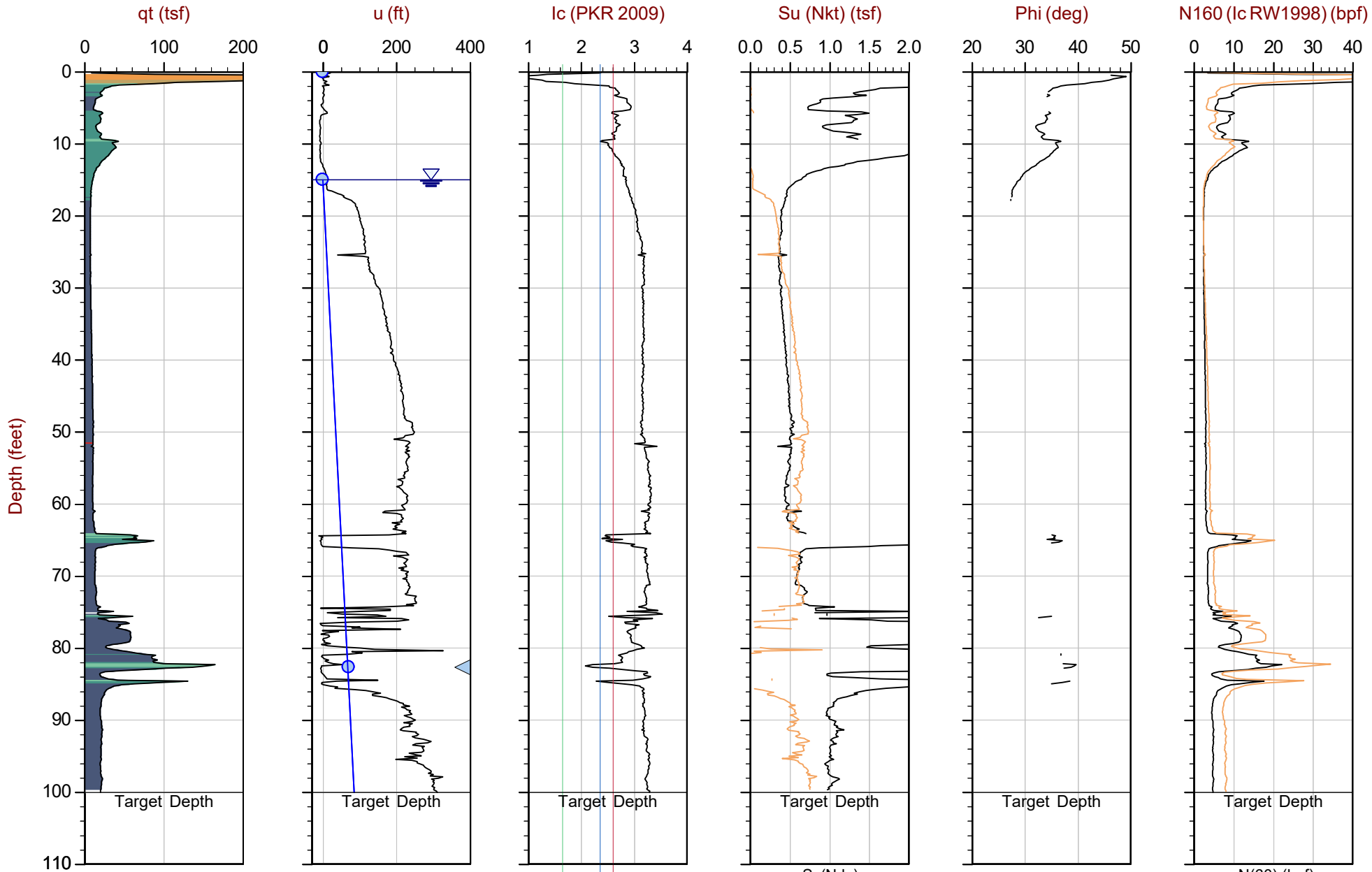
Job No: 20-61-21681

Date: 2020-12-11 09:09

Site: DTE Belle River Power Plant

Sounding: CPT20-13B

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP13B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

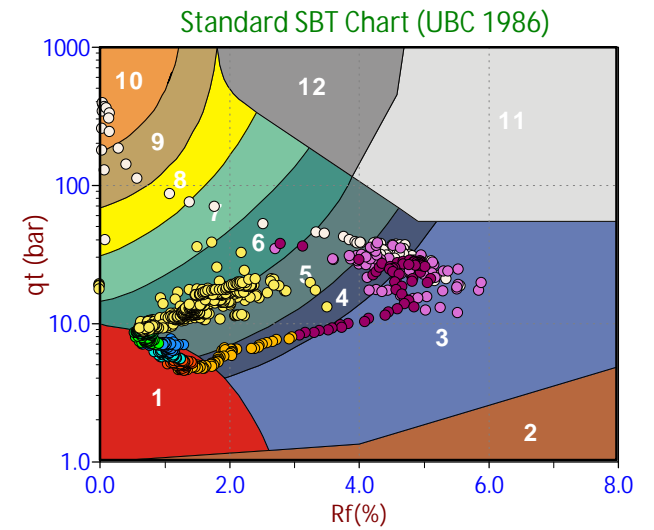
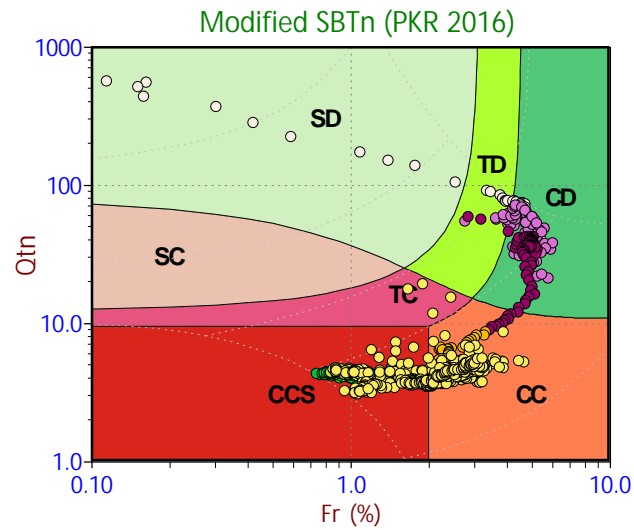
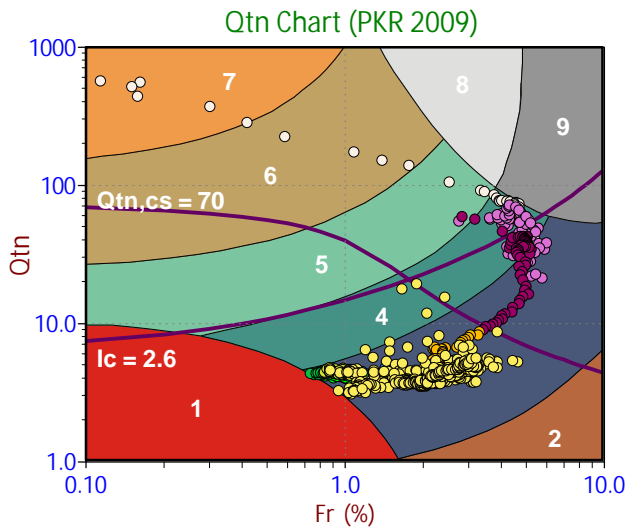
Coords: Michigan State Plane South N: 470491ft E: 13626793ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line

## Soil Behavior Type (SBT) Scatter Plots



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

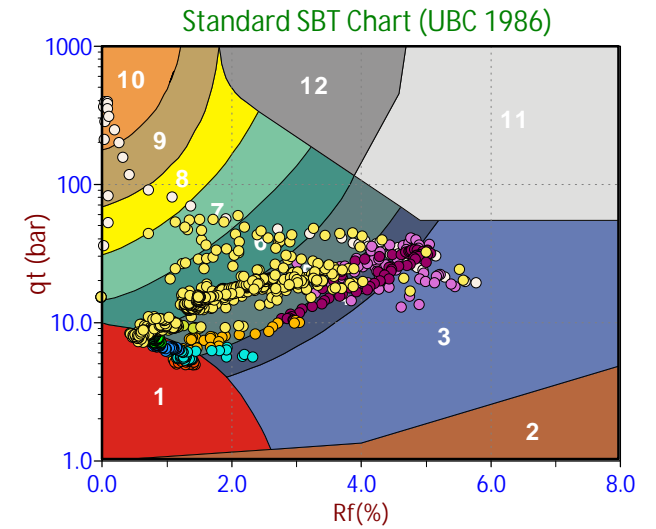
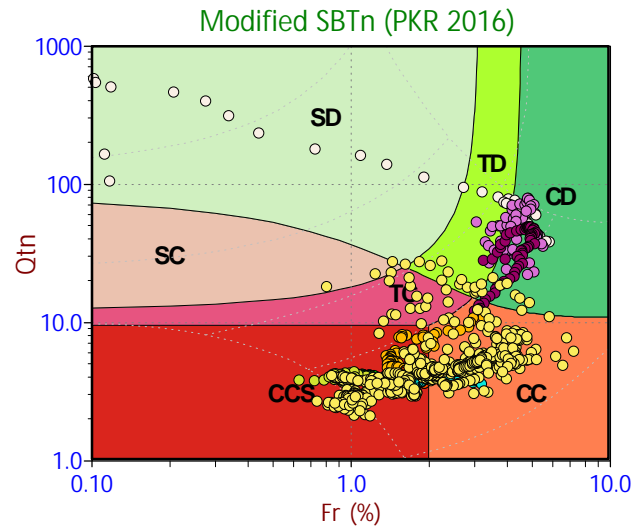
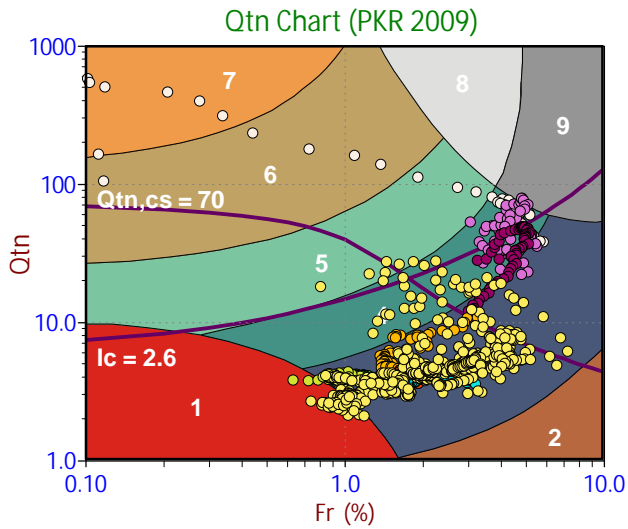
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

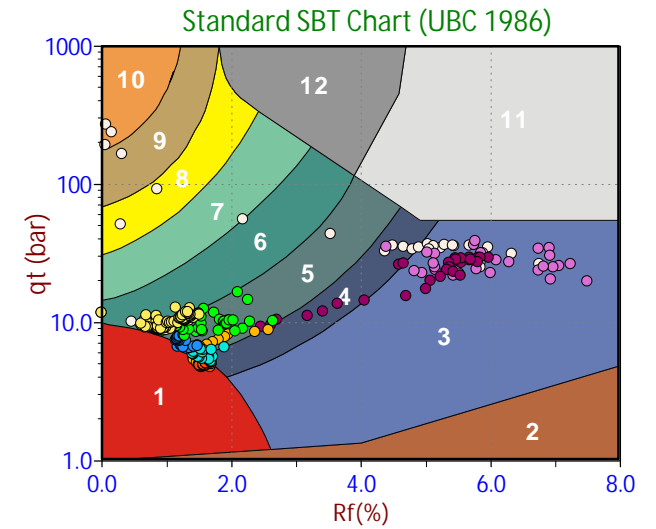
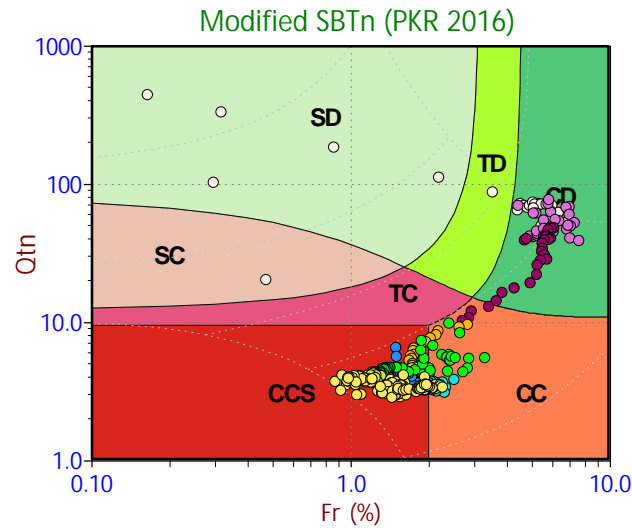
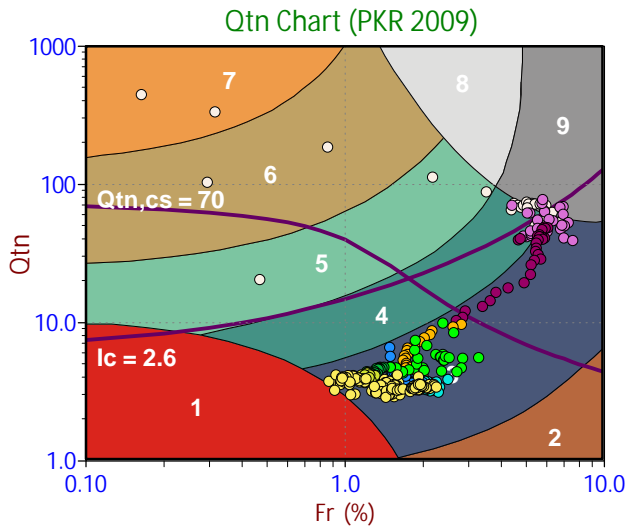
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

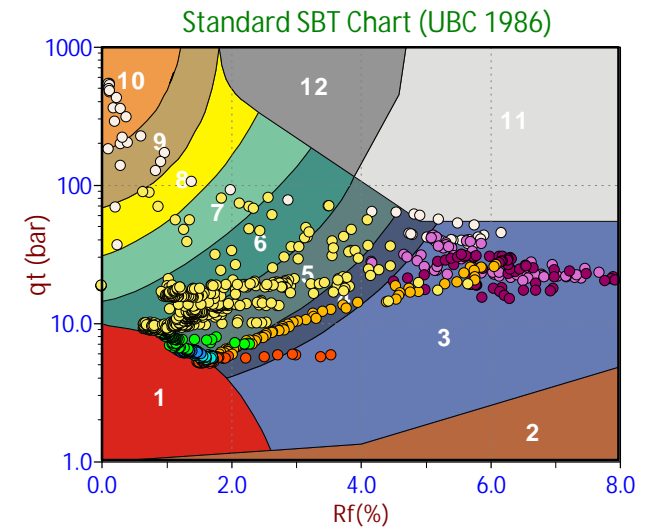
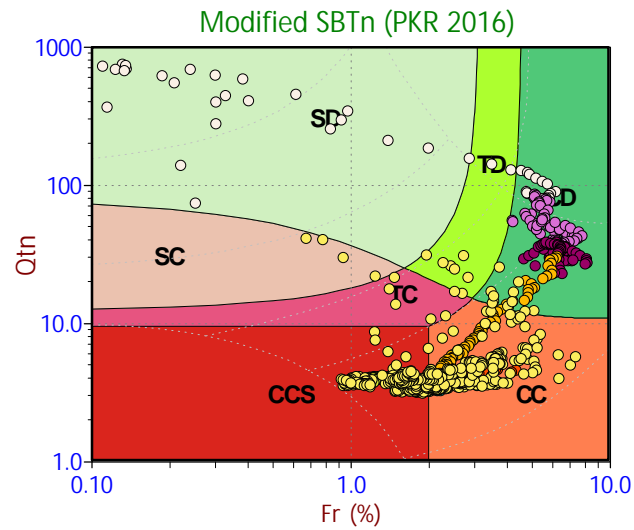
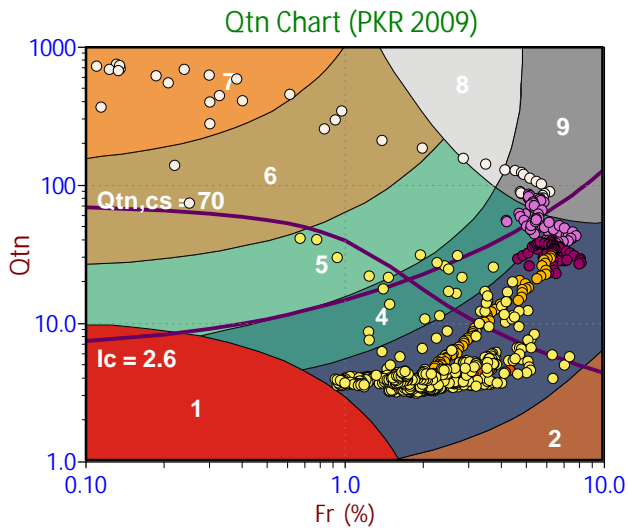
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

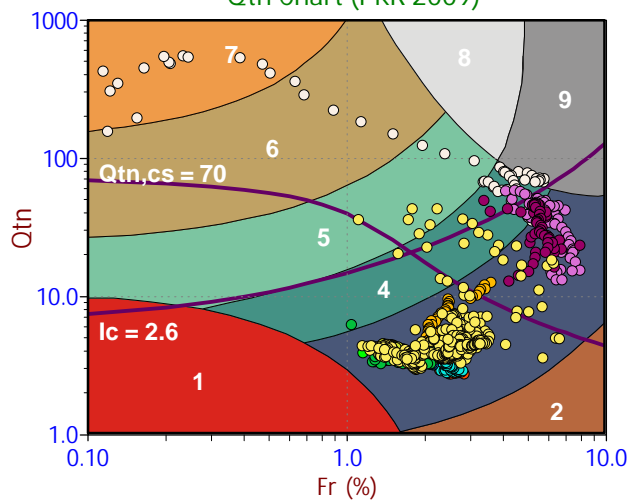
#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

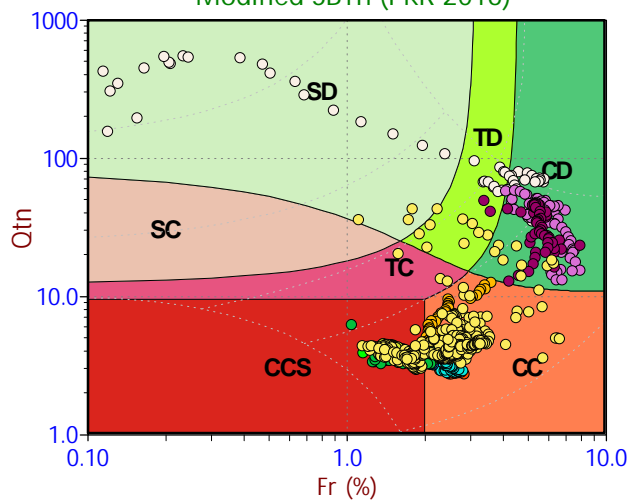




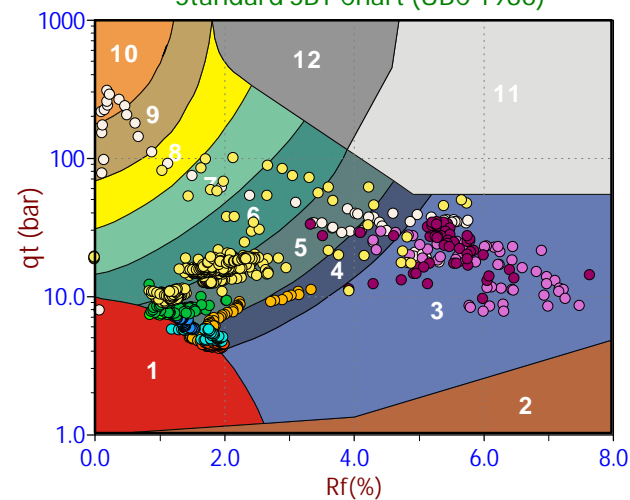
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

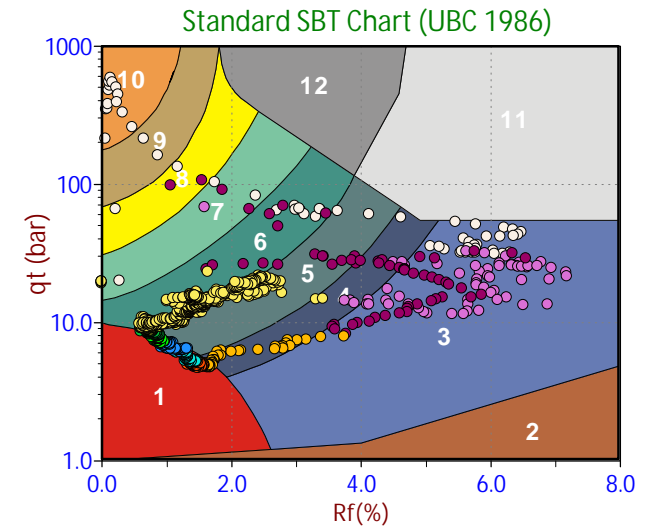
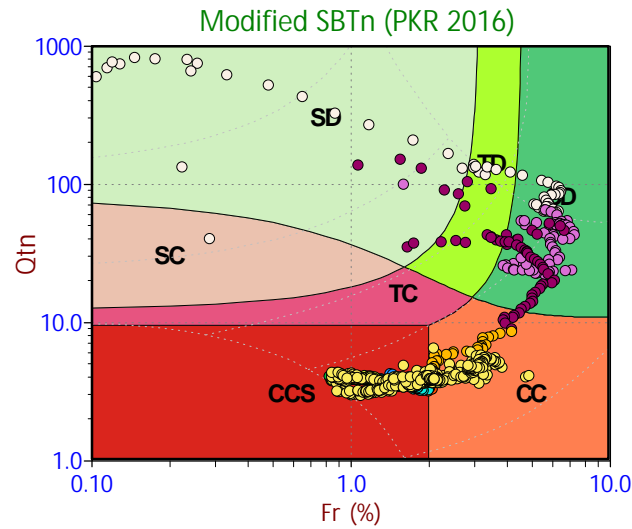
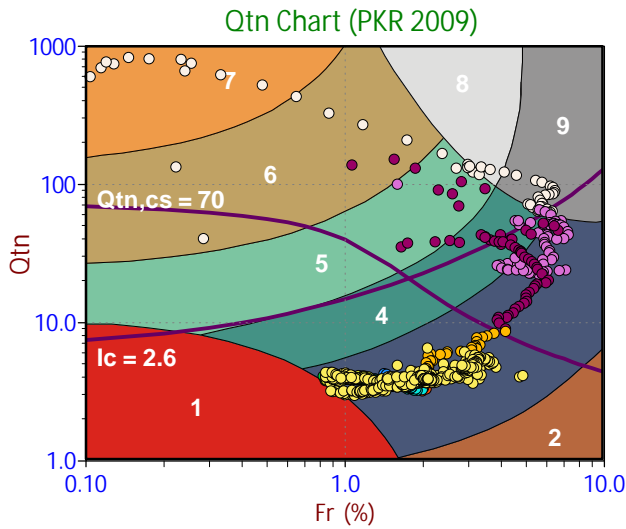
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

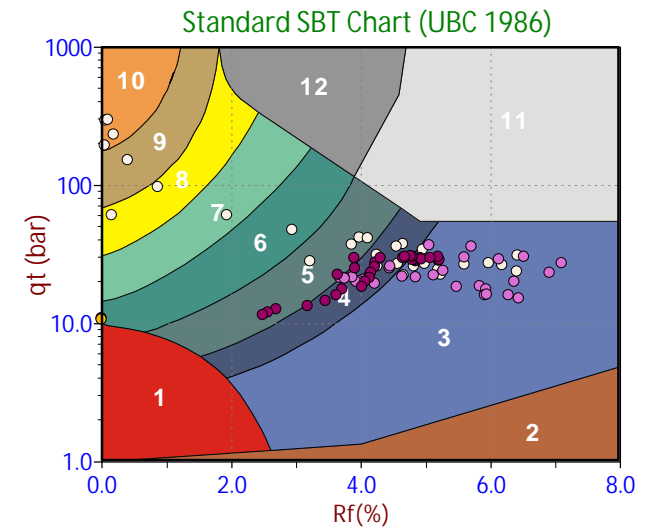
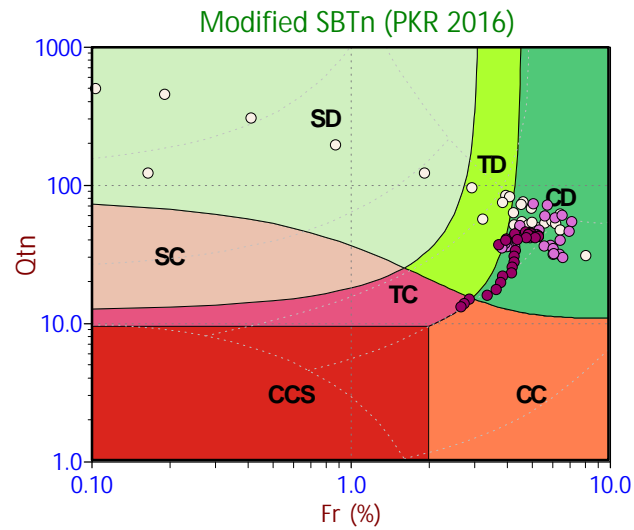
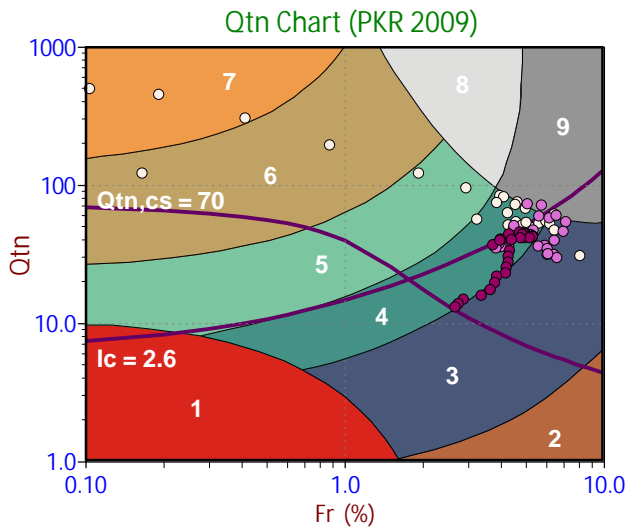
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

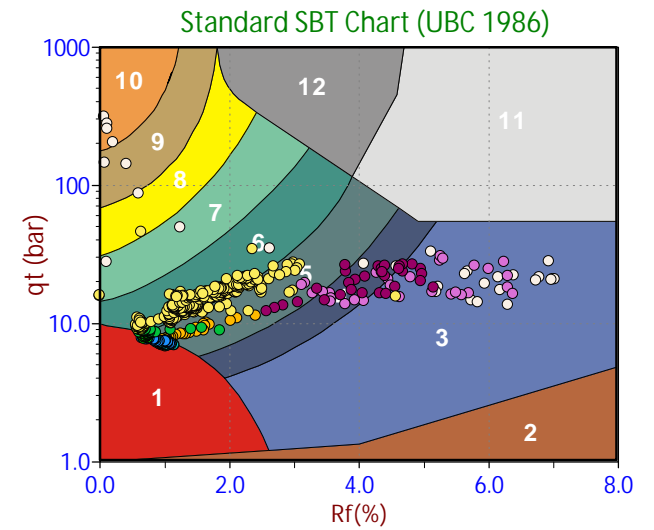
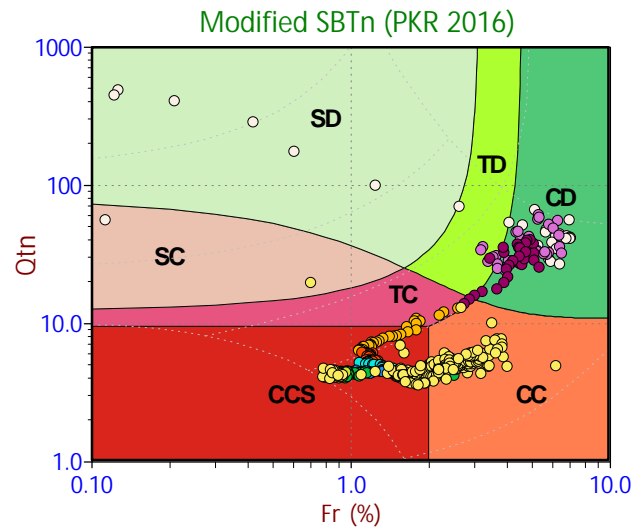
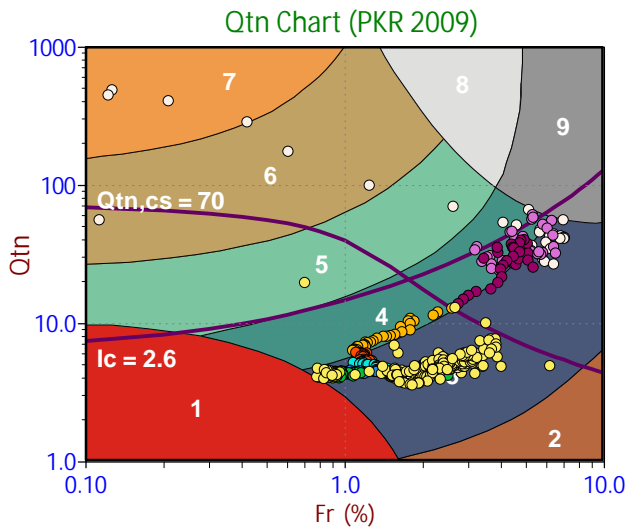
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

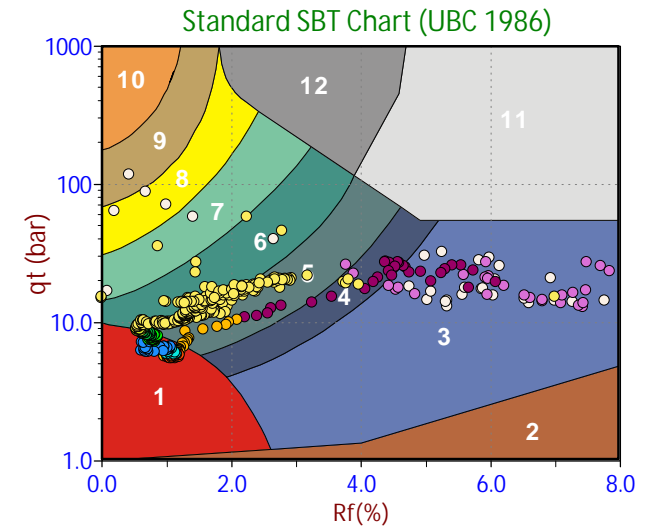
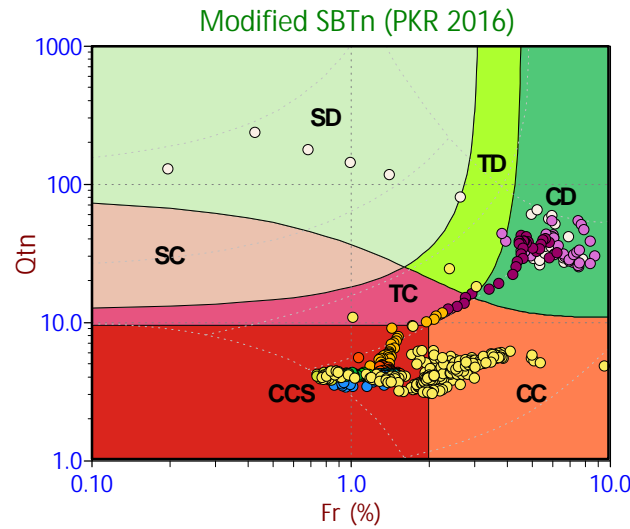
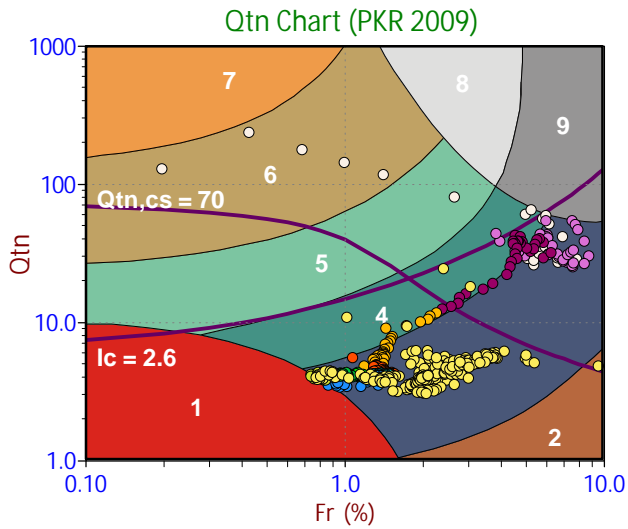
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

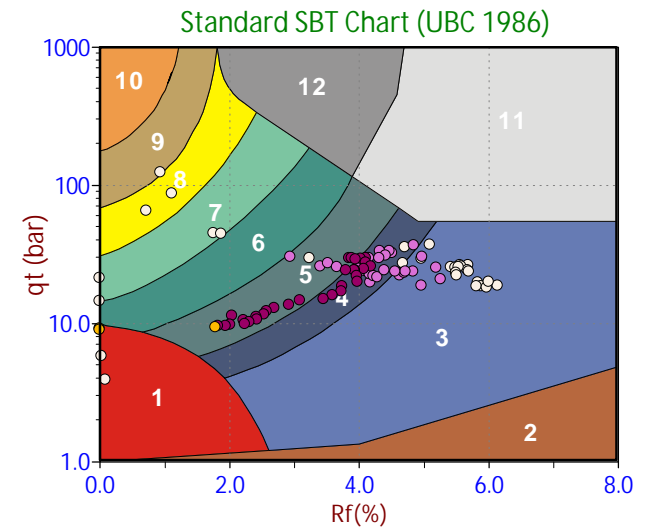
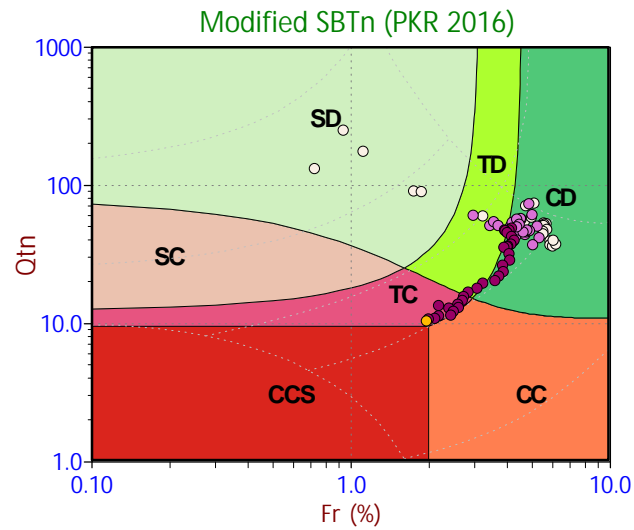
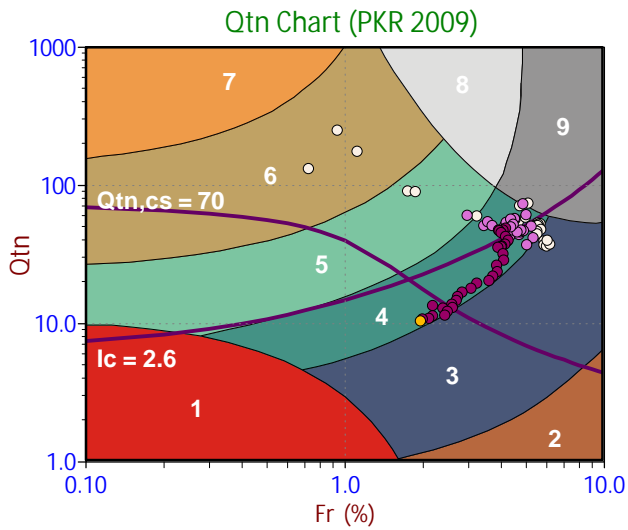
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
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#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

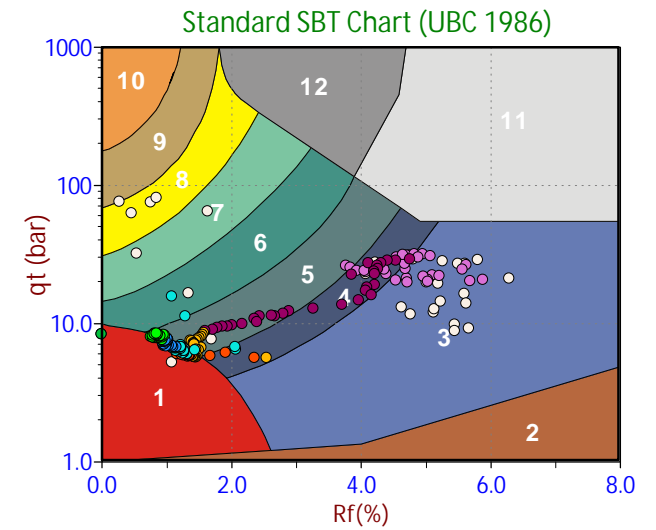
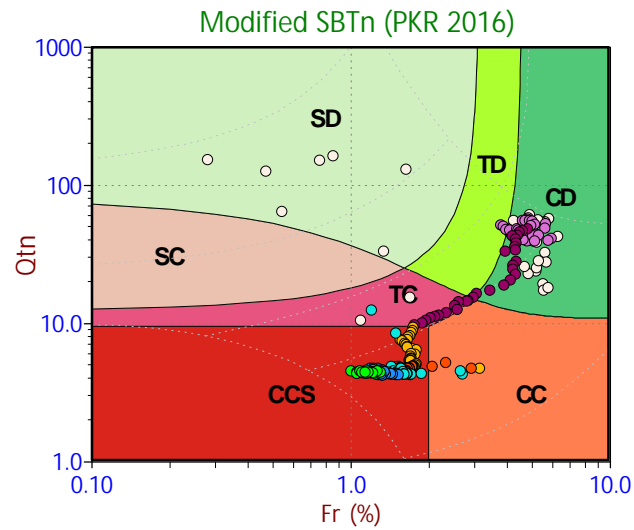
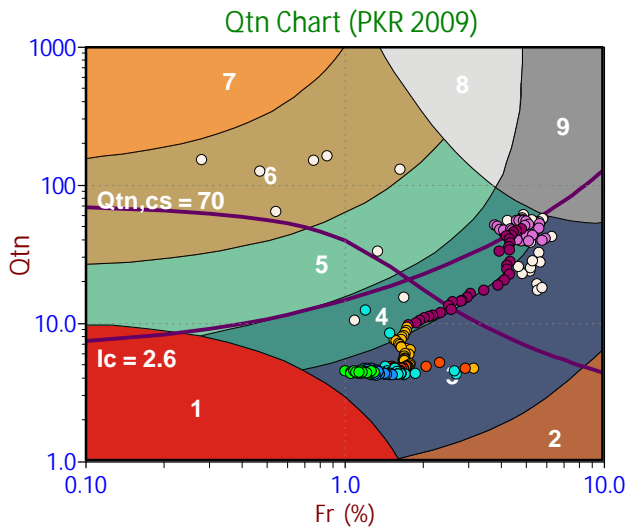
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
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#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
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Depth Ranges

- >0.0 to 5.0 ft
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- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

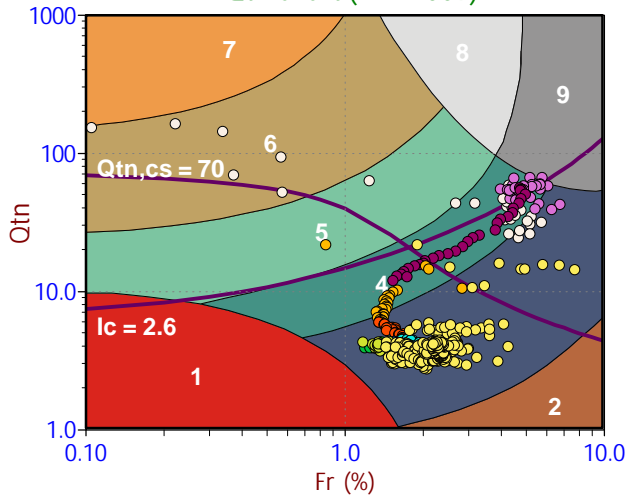
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

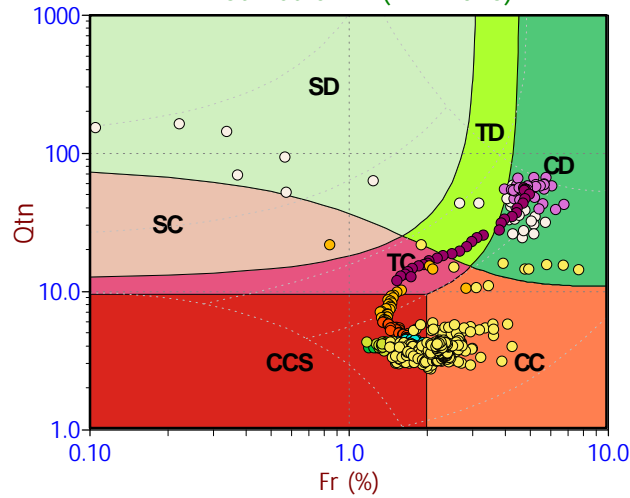
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

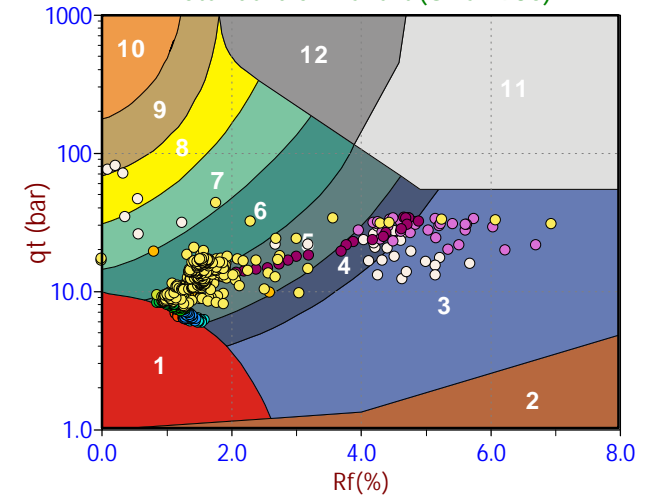
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

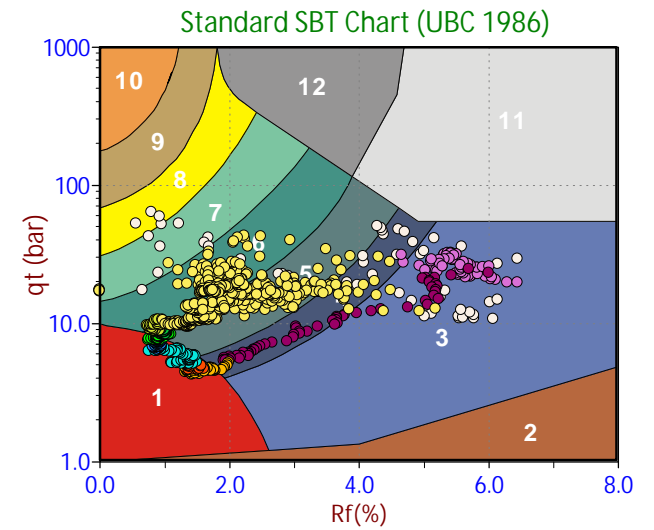
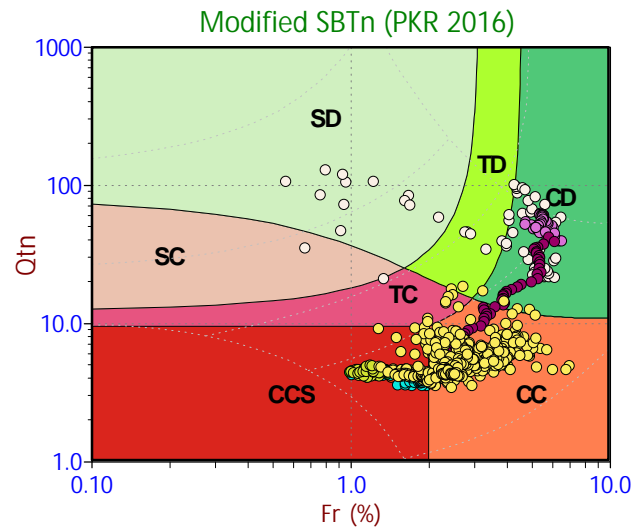
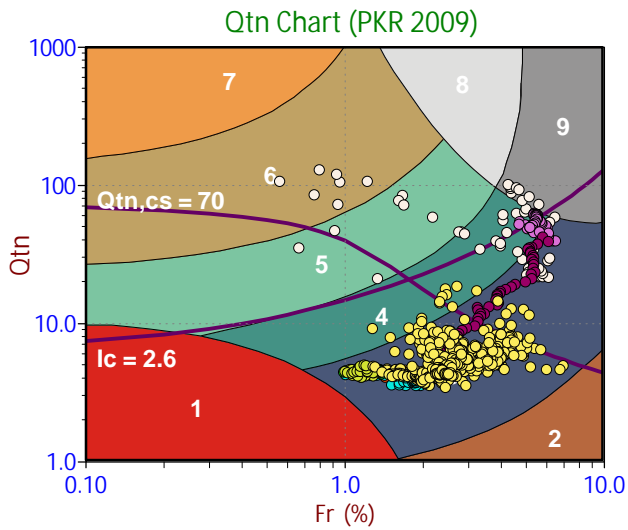
**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
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- Sand
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Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

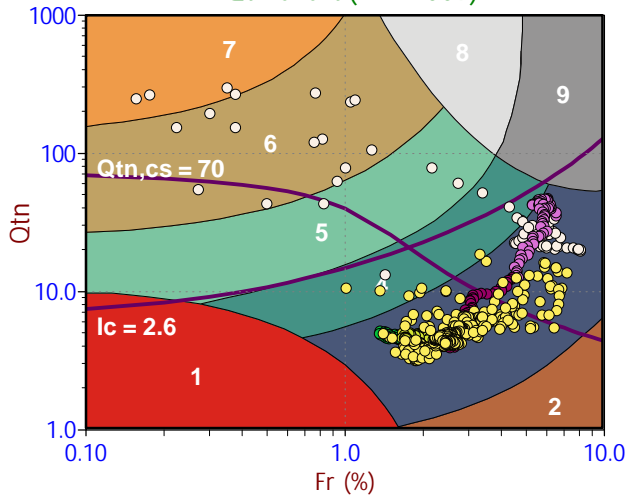
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
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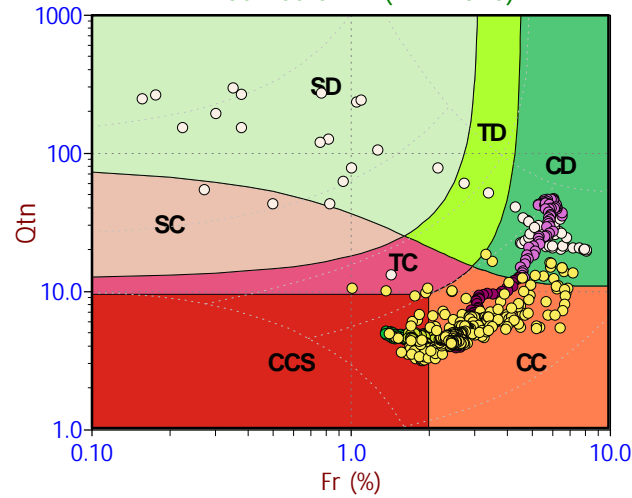
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

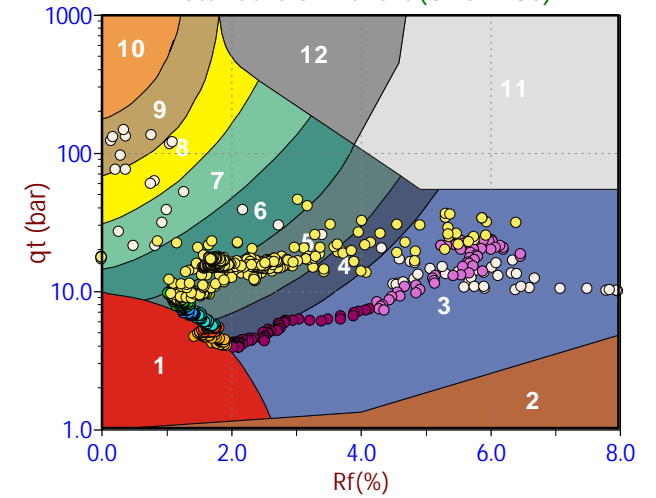
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

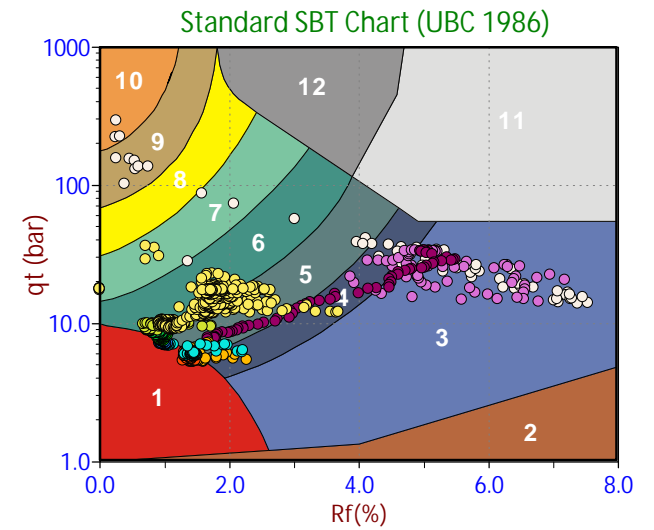
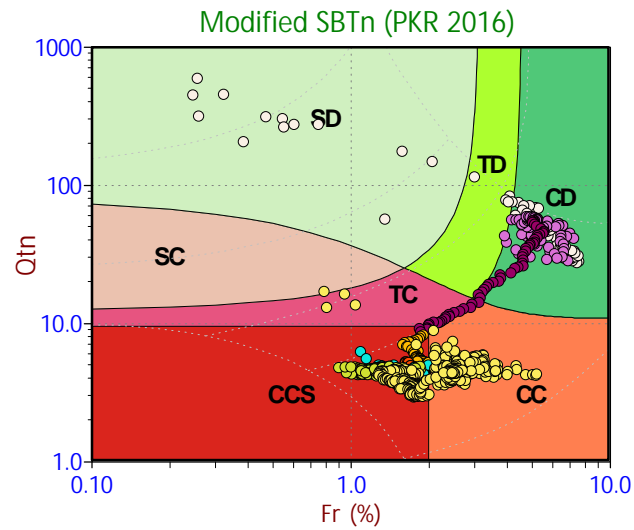
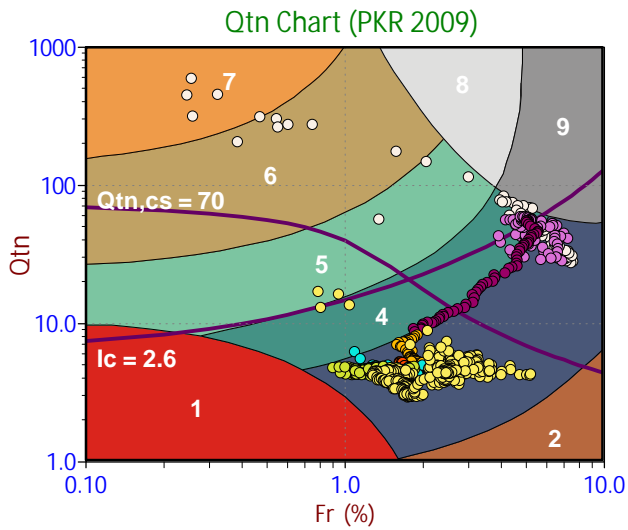
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
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- Silty Sand/Sand
- Sand
- Gravelly Sand
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Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

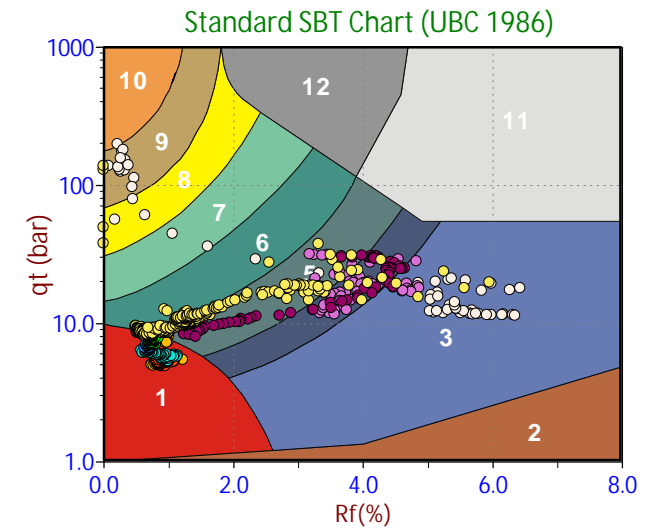
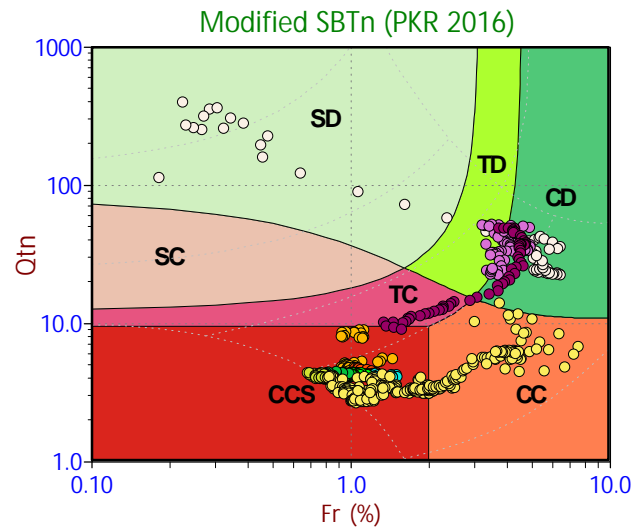
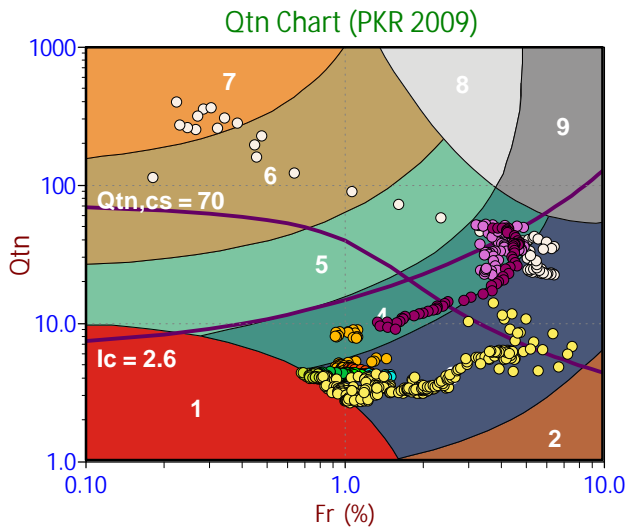
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
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- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
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#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

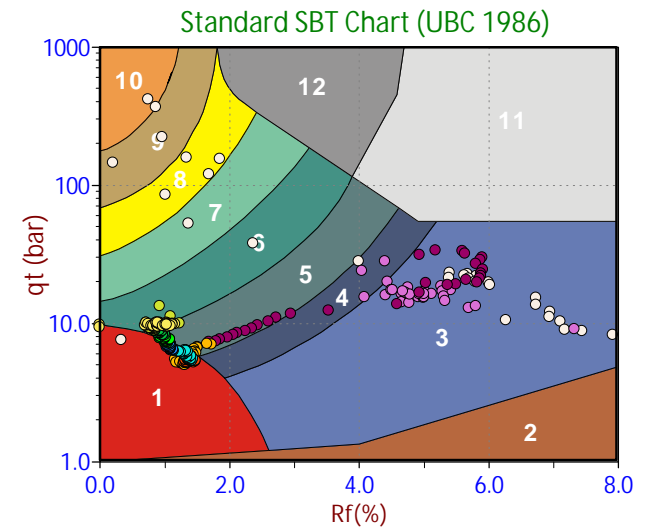
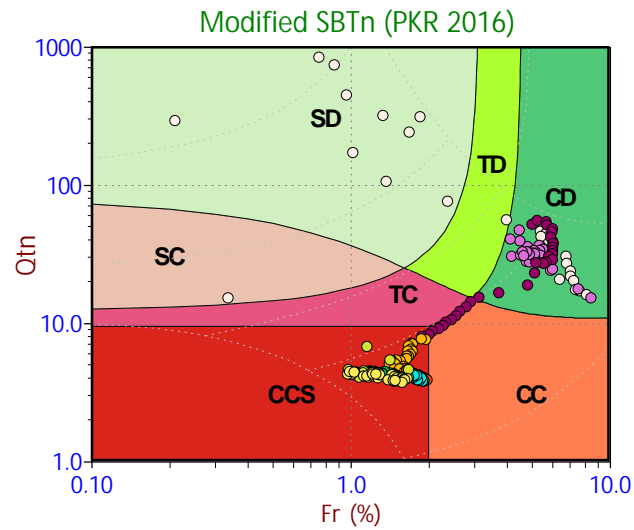
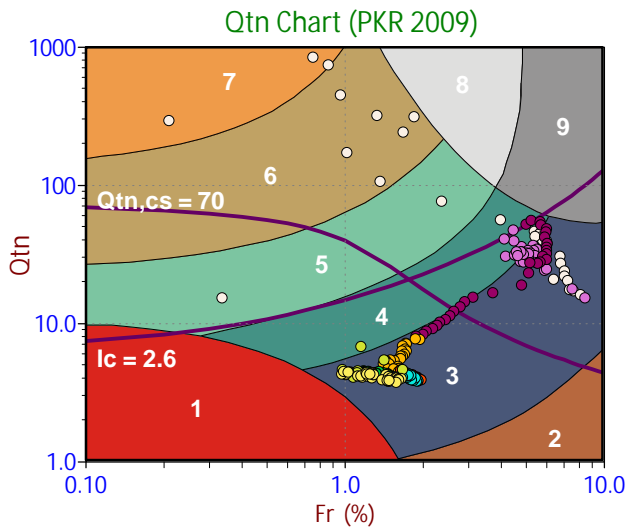
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

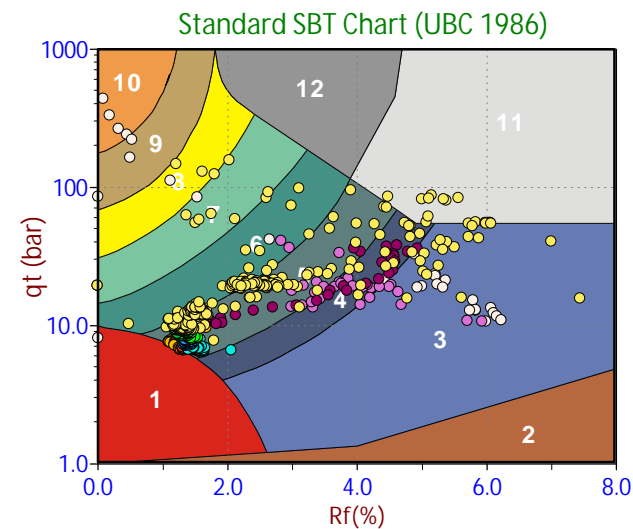
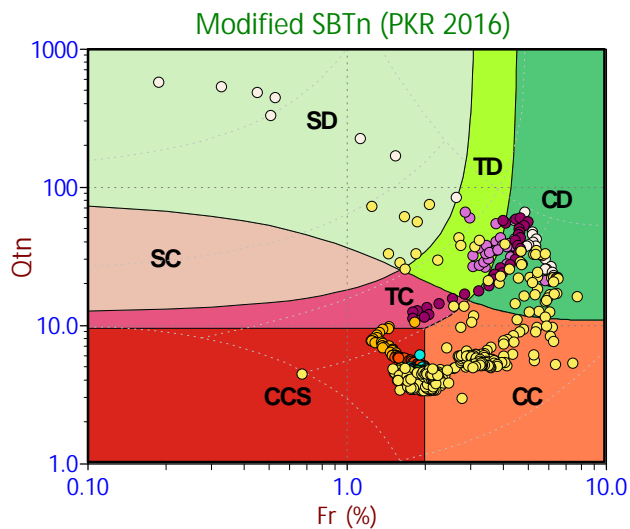
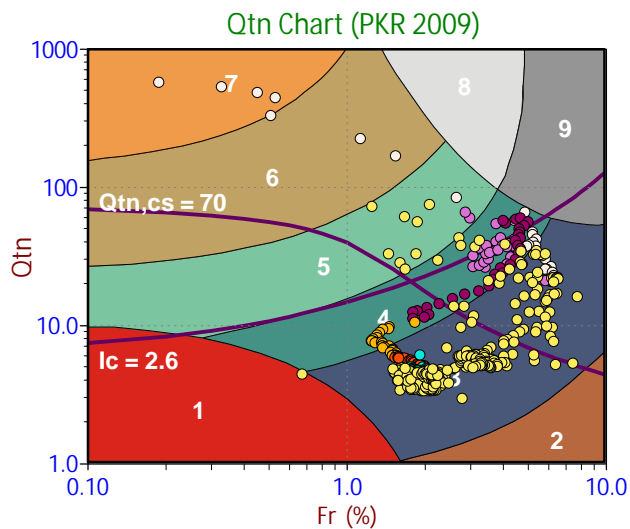
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
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Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

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- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
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Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

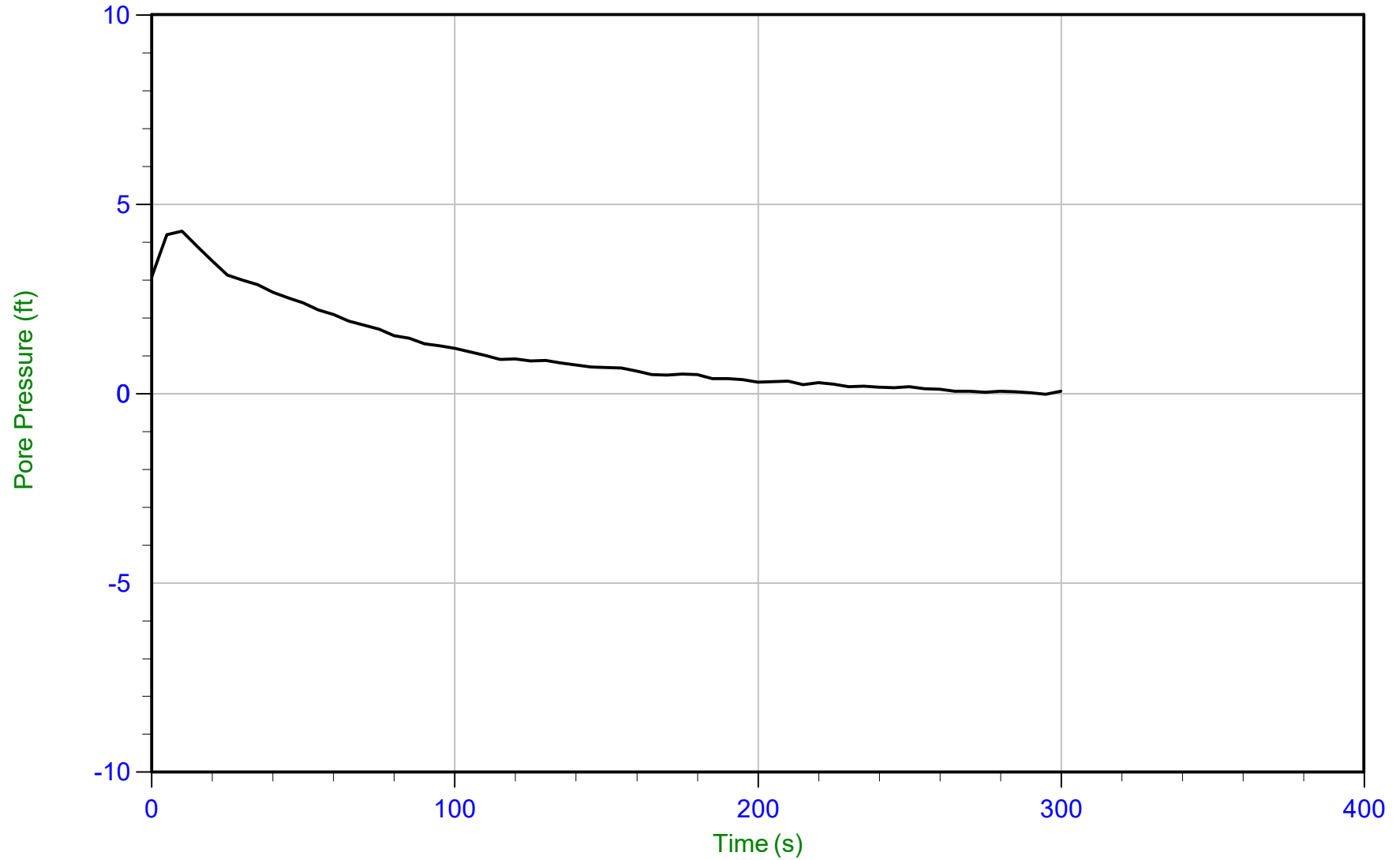
**Appendix I2**  
**PPD Test Results**



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 300.0 s

u Min: -0.0 ft  
u Max: 4.3 ft  
u Final: 0.1 ft

WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft

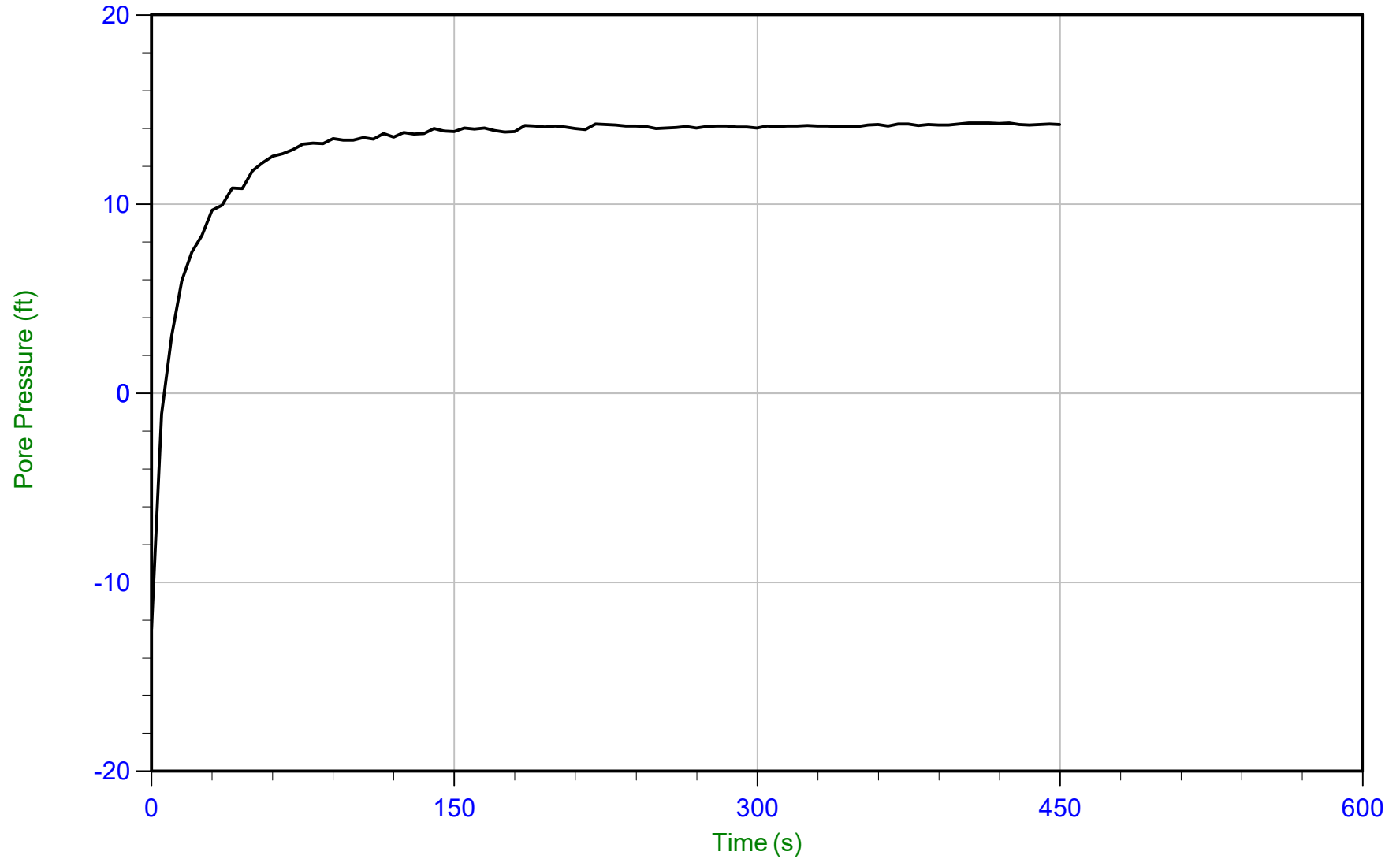




Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 2.775 m / 9.104 ft  
Duration: 450.0 s

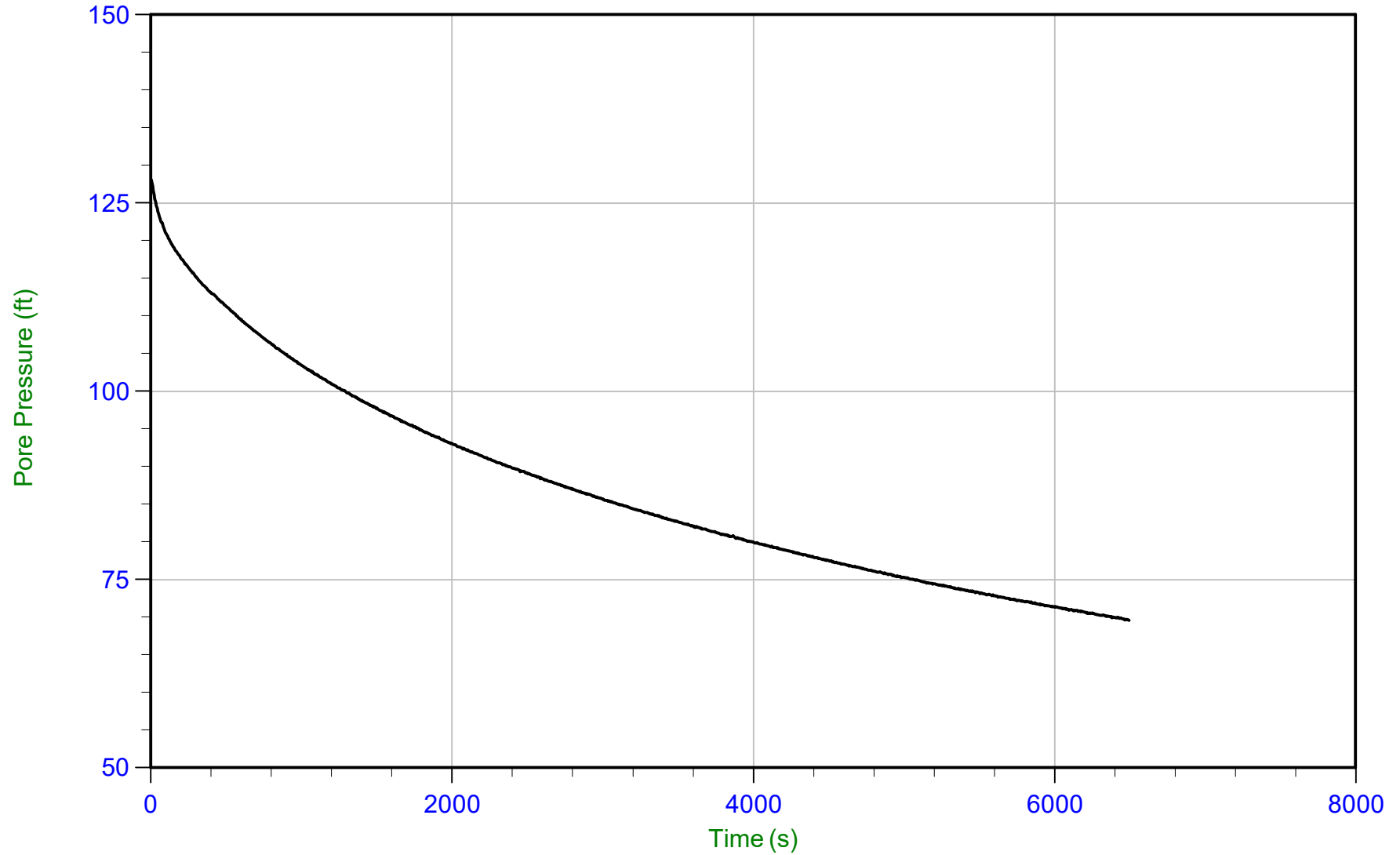
u Min: -12.5 ft  
u Max: 14.3 ft  
u Final: 14.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 6500.0 s

u Min: 69.6 ft  
u Max: 128.1 ft  
u Final: 69.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 13.1 ft  
U(50): 70.62 ft

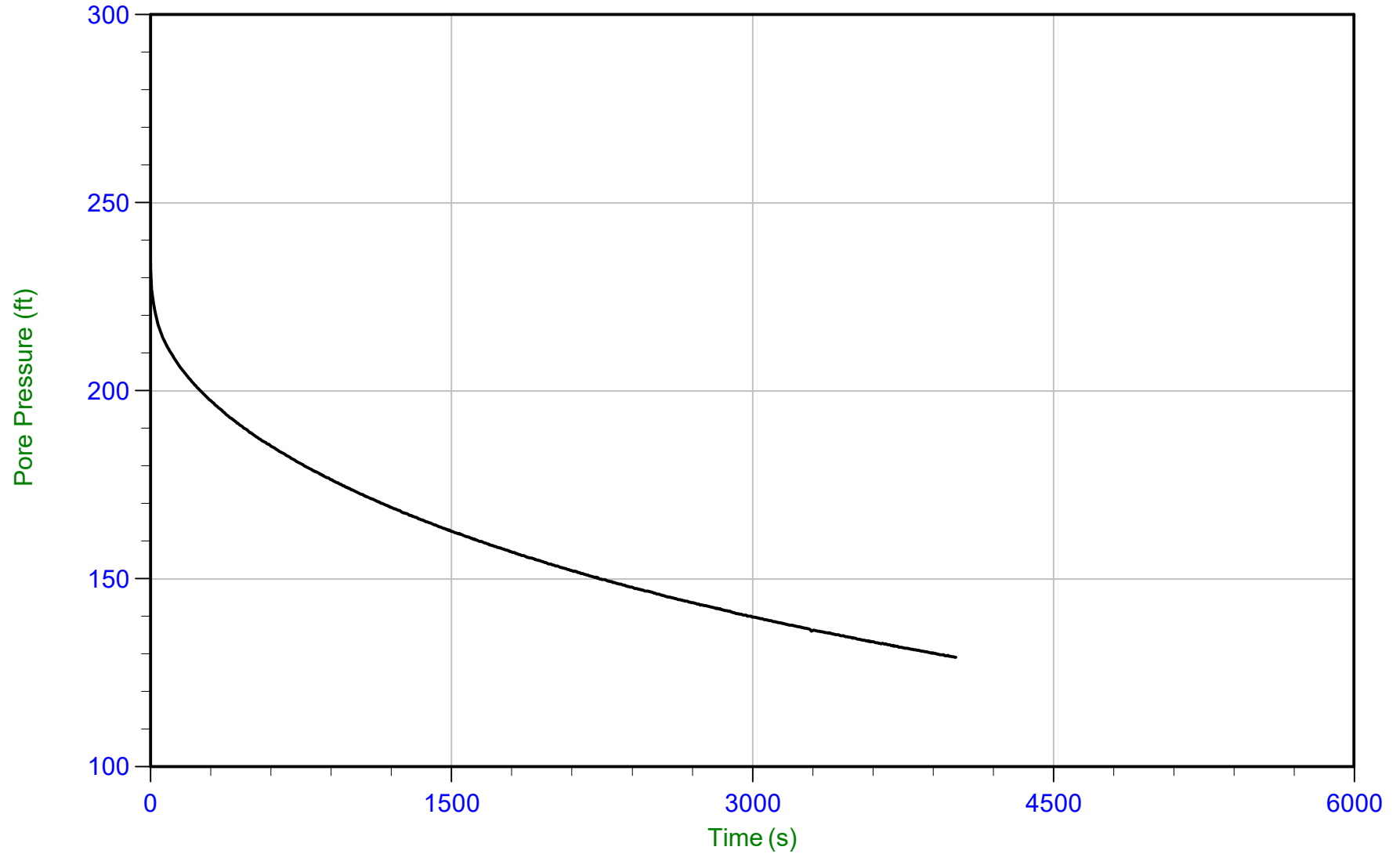
T(50): 6203.4 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 4015.0 s

u Min: 129.2 ft  
u Max: 234.0 ft  
u Final: 129.2 ft

WT: 4.572 m / 15.000 ft  
Ueq: 33.1 ft  
U(50): 133.60 ft

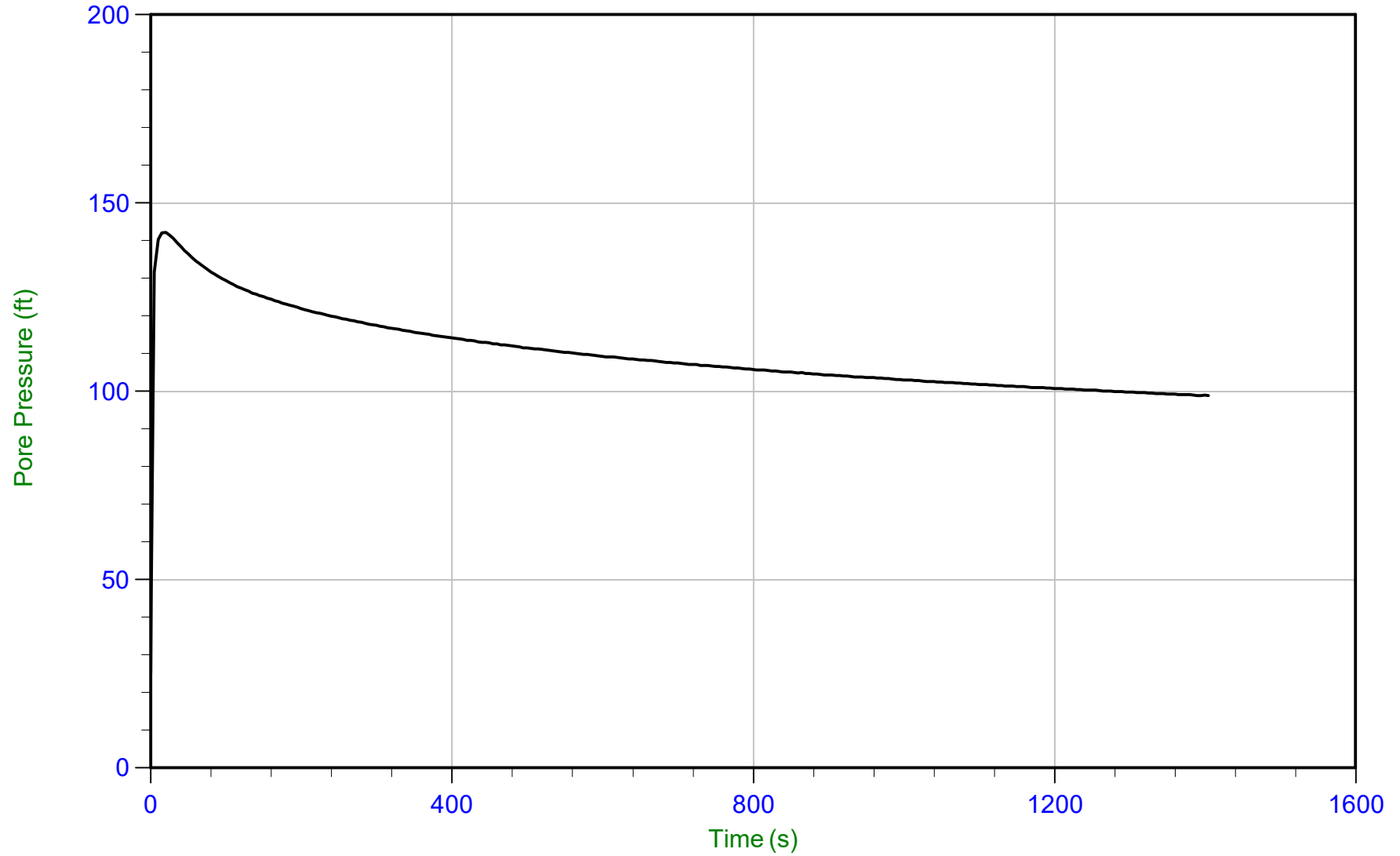
T(50): 3564.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 19.975 m / 65.534 ft  
Duration: 1405.0 s

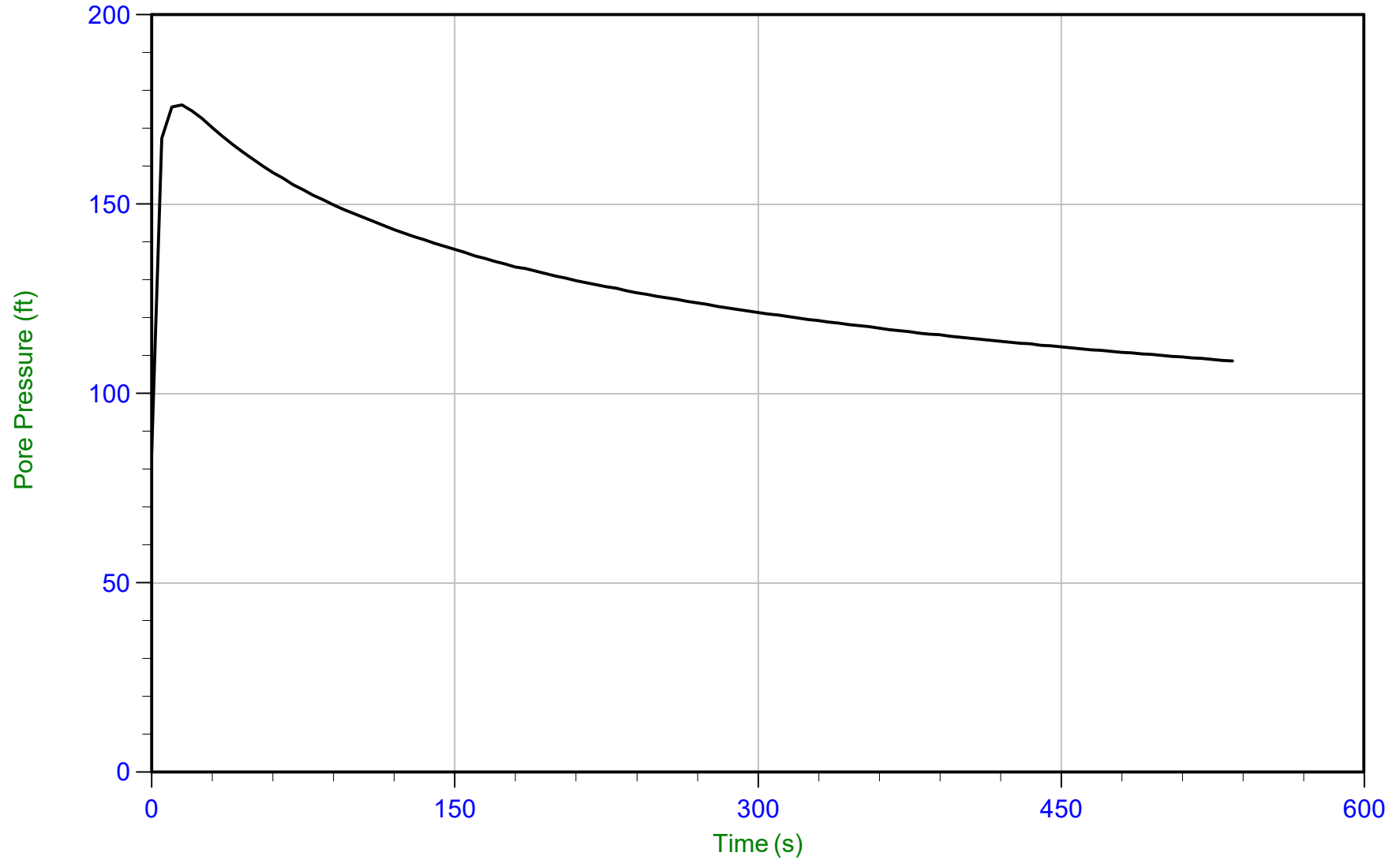
u Min: 25.2 ft  
u Max: 142.2 ft  
u Final: 98.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 20.775 m / 68.159 ft  
Duration: 535.0 s

u Min: 84.4 ft  
u Max: 176.2 ft  
u Final: 108.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 53.2 ft  
U(50): 114.66 ft

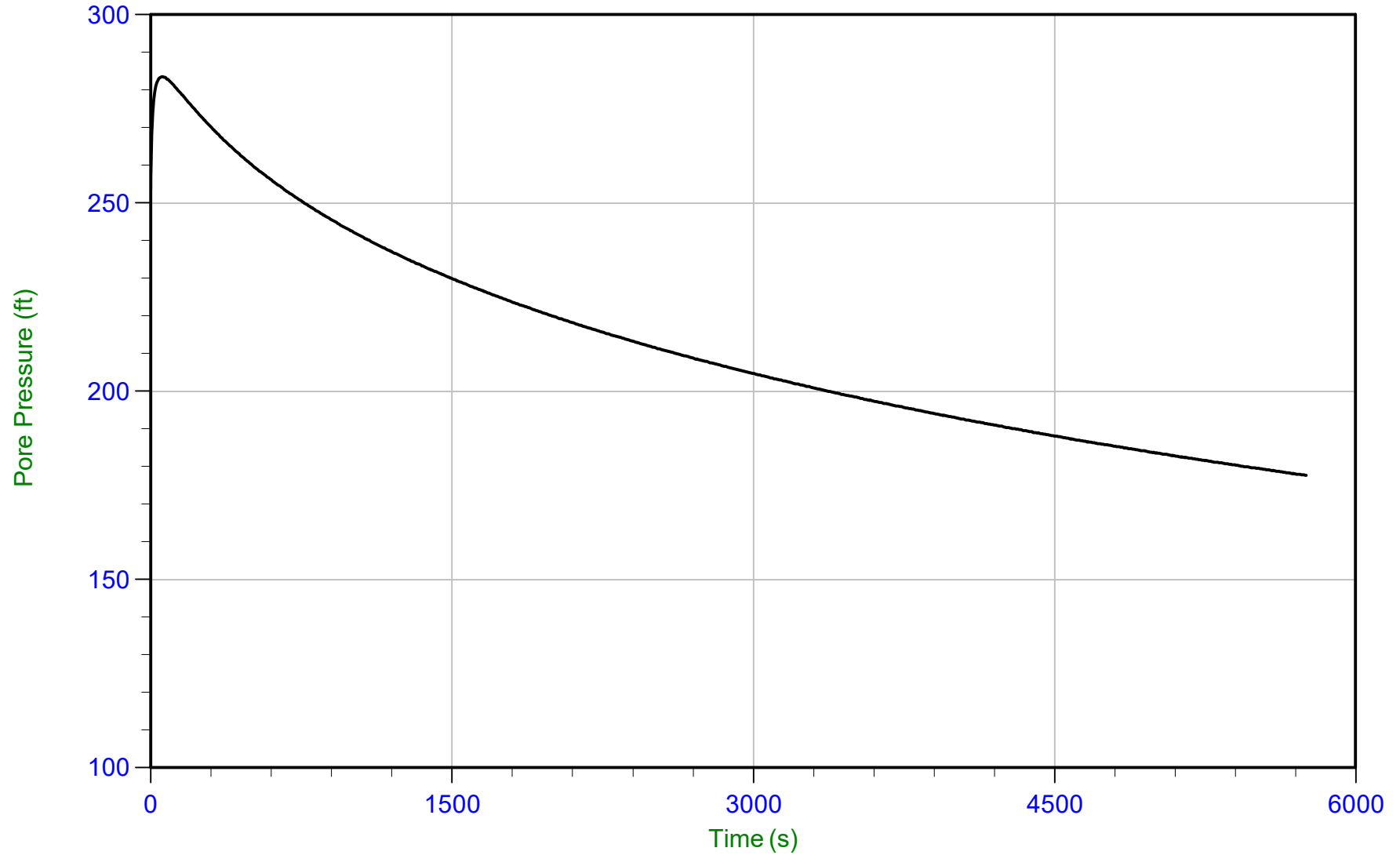
T(50): 389.0 s  
lr: 100  
Ch: 1.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 5755.0 s

u Min: 177.6 ft  
u Max: 283.6 ft  
u Final: 177.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 73.1 ft  
U(50): 178.34 ft

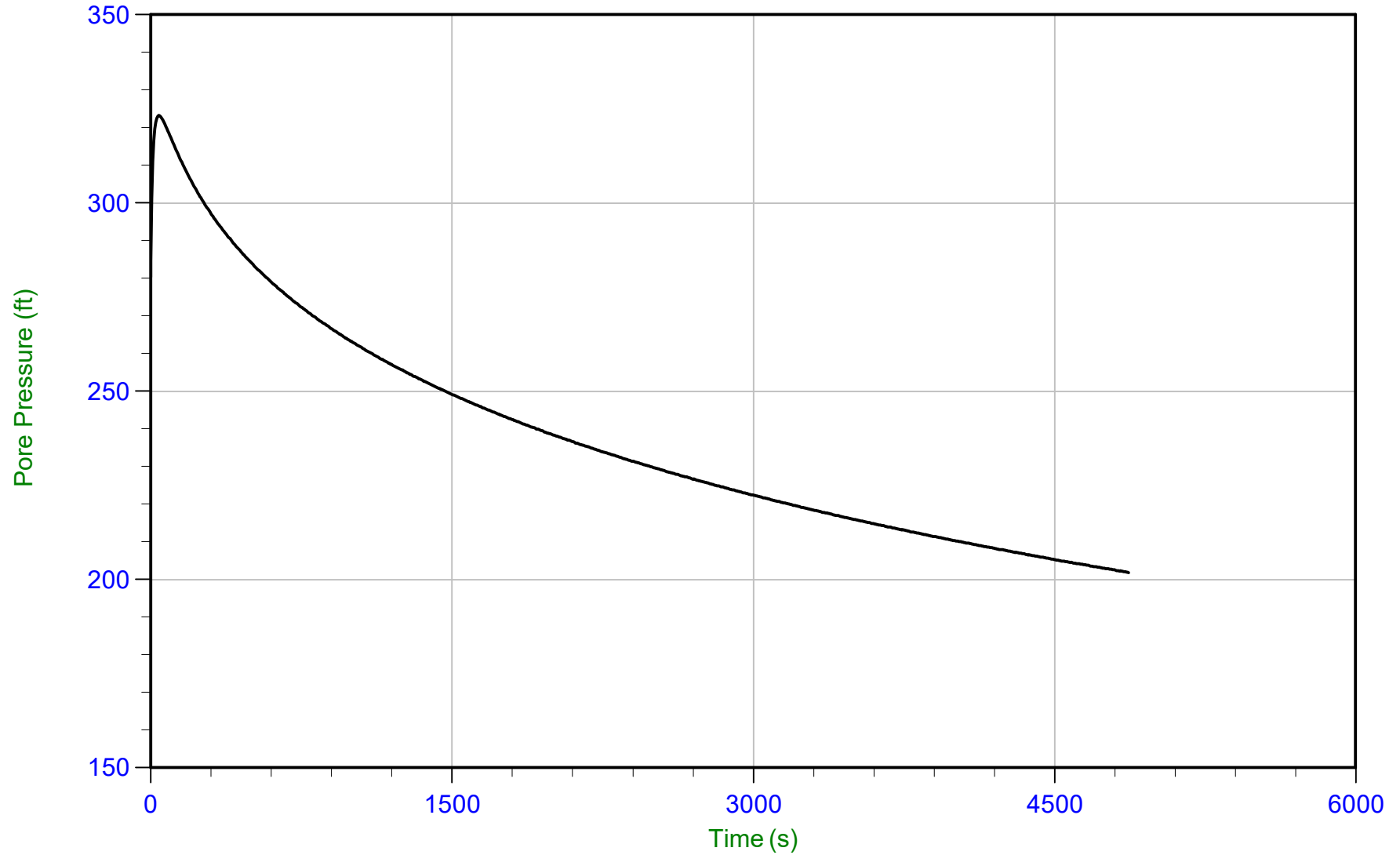
T(50): 5600.8 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4870.0 s

u Min: 201.9 ft  
u Max: 323.3 ft  
u Final: 201.9 ft

WT: 4.572 m / 15.000 ft  
Ueq: 83.1 ft  
U(50): 203.21 ft

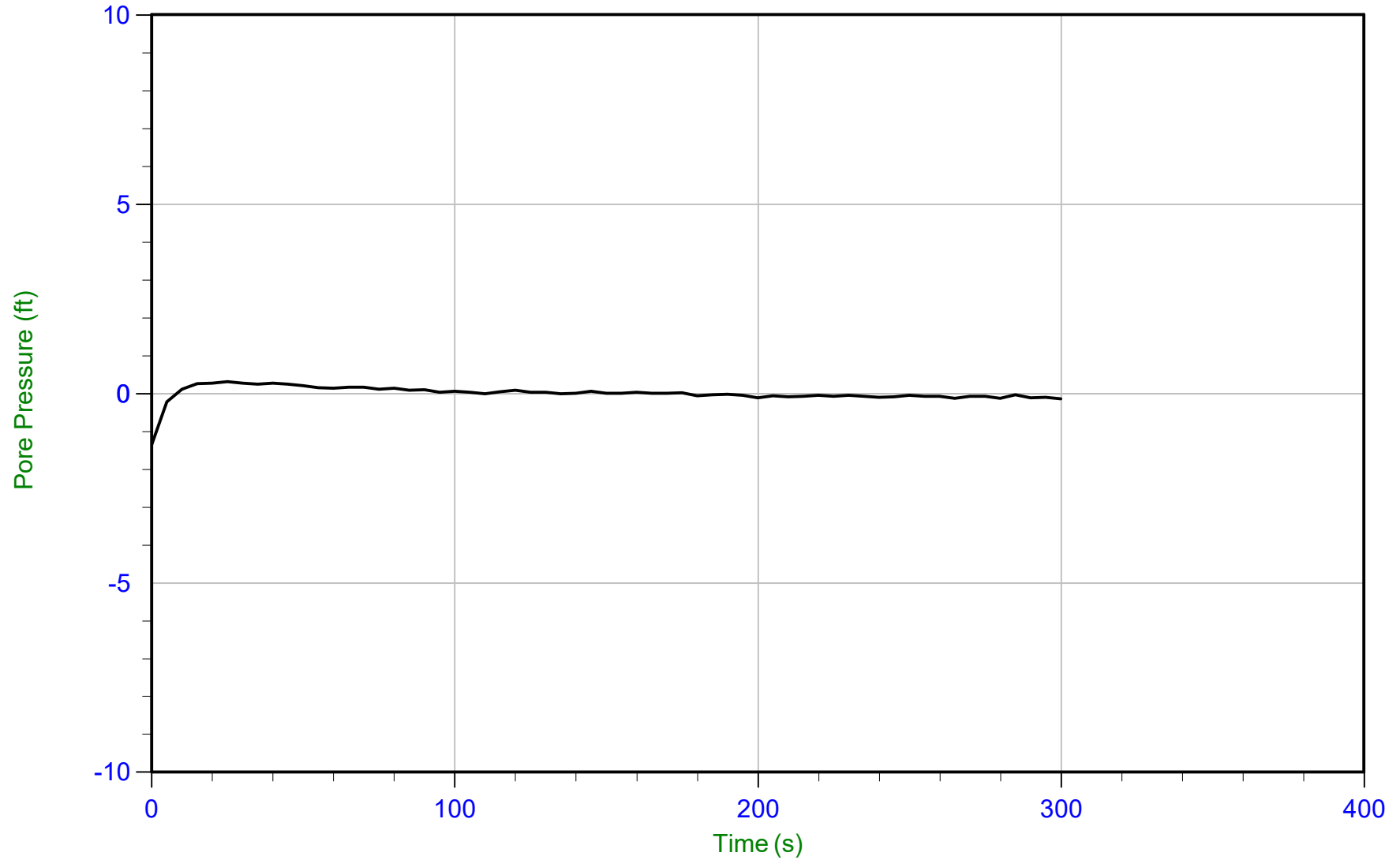
T(50): 4686.3 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 3.100 m / 10.170 ft  
Duration: 300.0 s

u Min: -1.4 ft  
u Max: 0.3 ft  
u Final: -0.1 ft

WT: 3.100 m / 10.170 ft  
Ueq: 0.0 ft

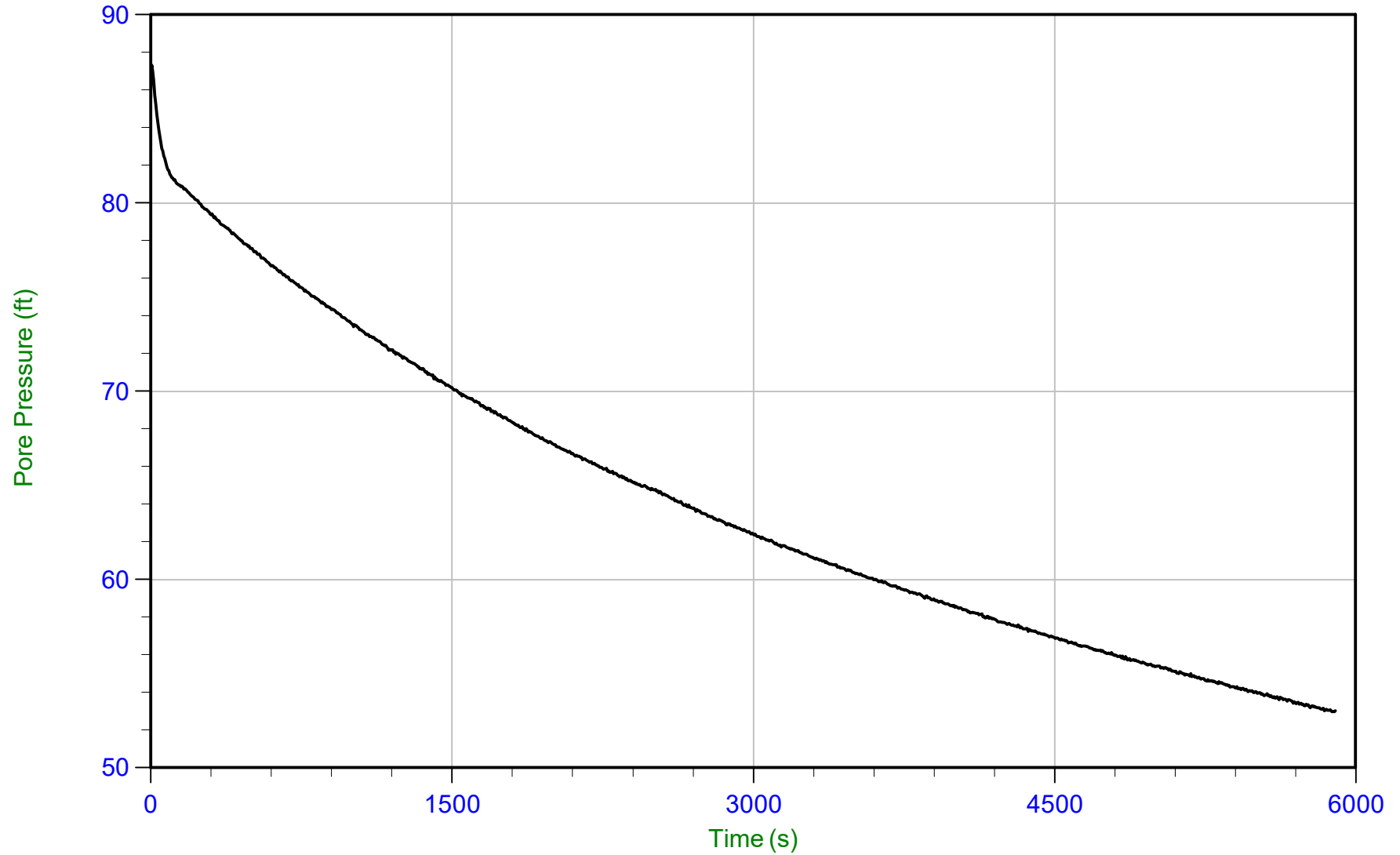




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 6.150 m / 20.177 ft  
Duration: 5900.0 s

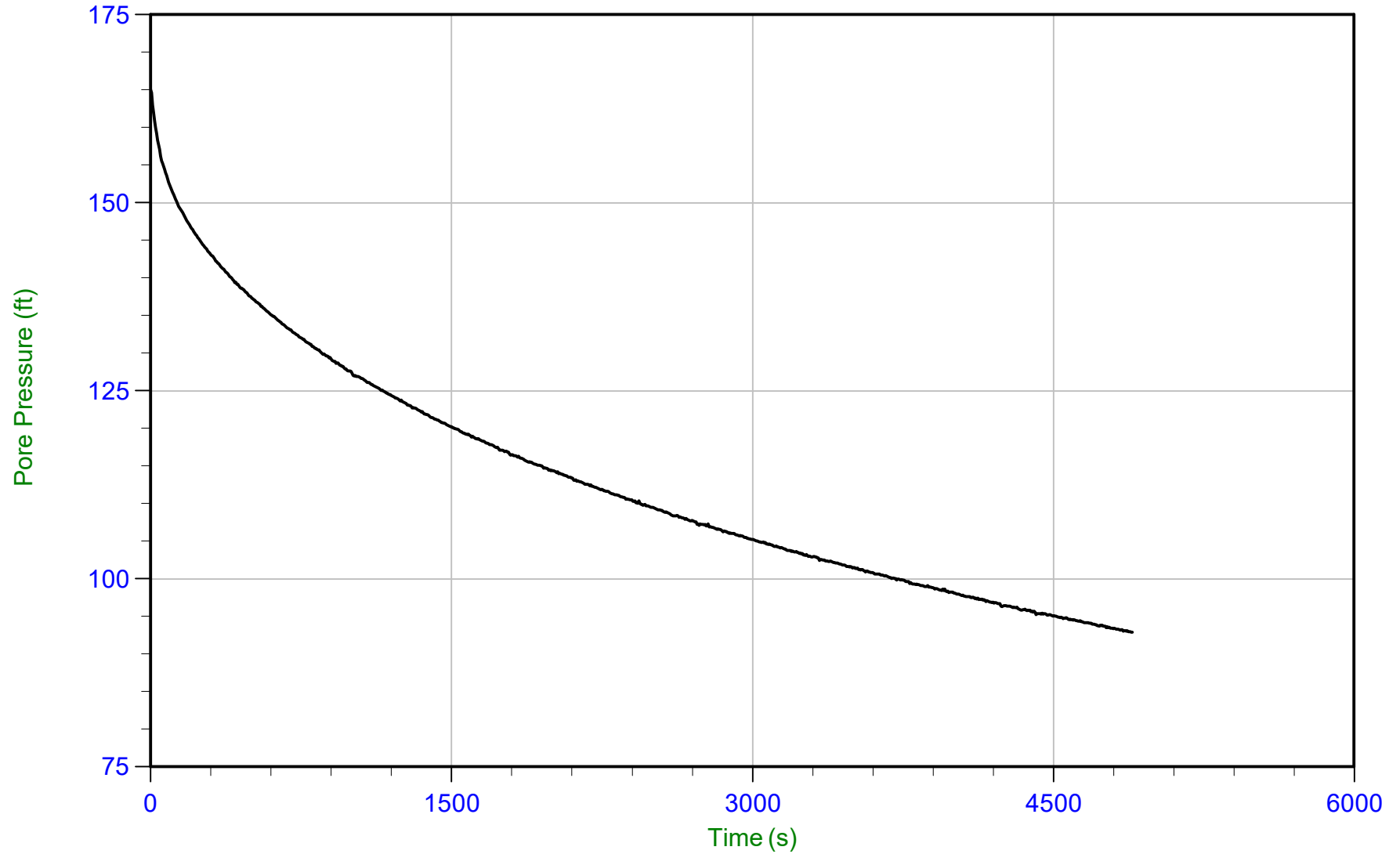
u Min: 53.0 ft  
u Max: 87.3 ft  
u Final: 53.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 11.325 m / 37.155 ft  
Duration: 4895.0 s

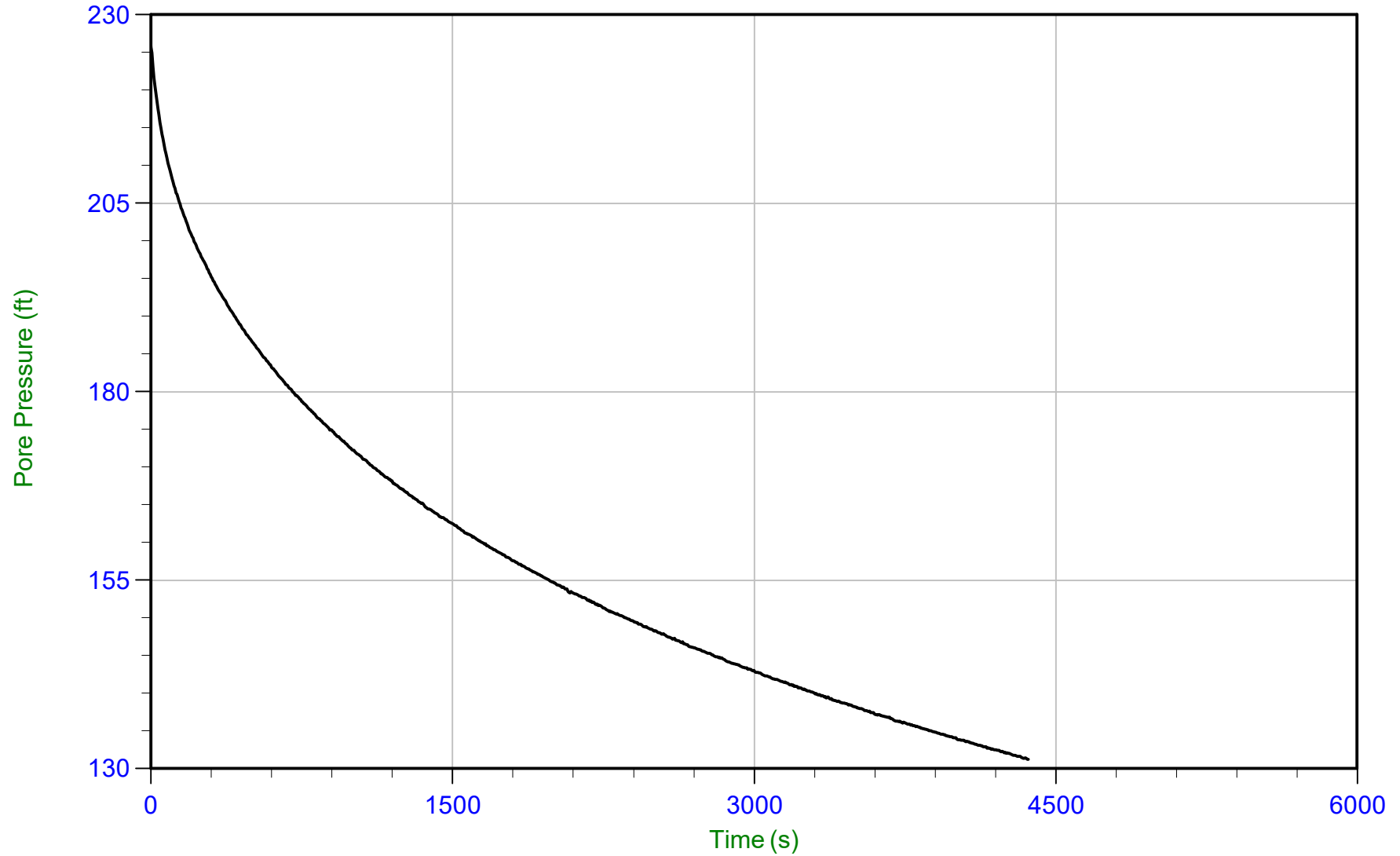
u Min: 92.9 ft  
u Max: 165.1 ft  
u Final: 92.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 17.725 m / 58.152 ft  
Duration: 4365.0 s

u Min: 131.3 ft  
u Max: 225.8 ft  
u Final: 131.3 ft

WT: 5.486 m / 17.998 ft  
Ueq: 40.2 ft  
U(50): 133.00 ft

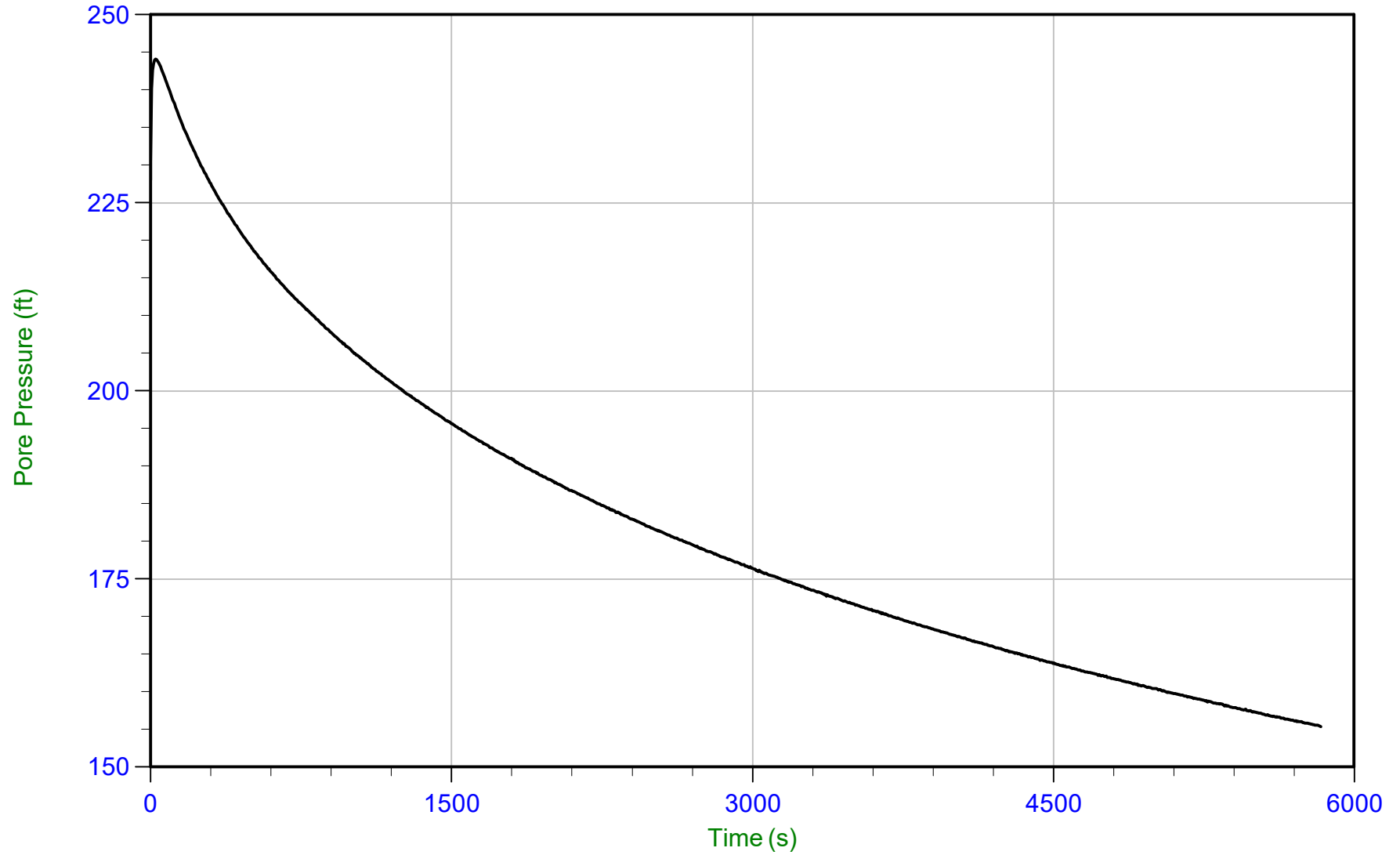
T(50): 4136.3 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 24.425 m / 80.134 ft  
Duration: 5835.0 s

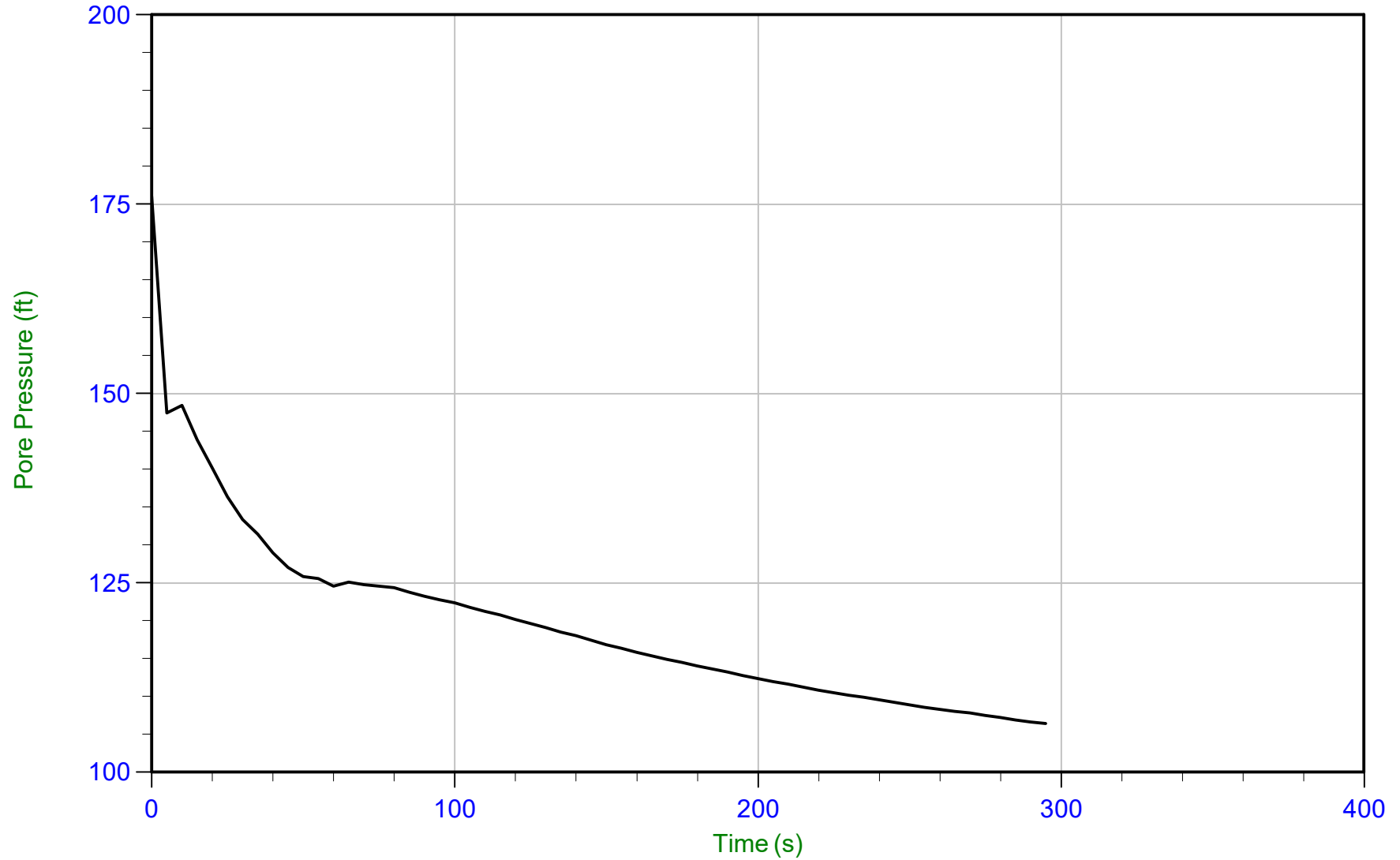
u Min: 155.4 ft  
u Max: 244.1 ft  
u Final: 155.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.050 m / 82.184 ft  
Duration: 295.0 s

u Min: 106.4 ft  
u Max: 176.0 ft  
u Final: 106.4 ft

WT: 5.486 m / 17.998 ft  
Ueq: 64.2 ft  
U(50): 120.10 ft

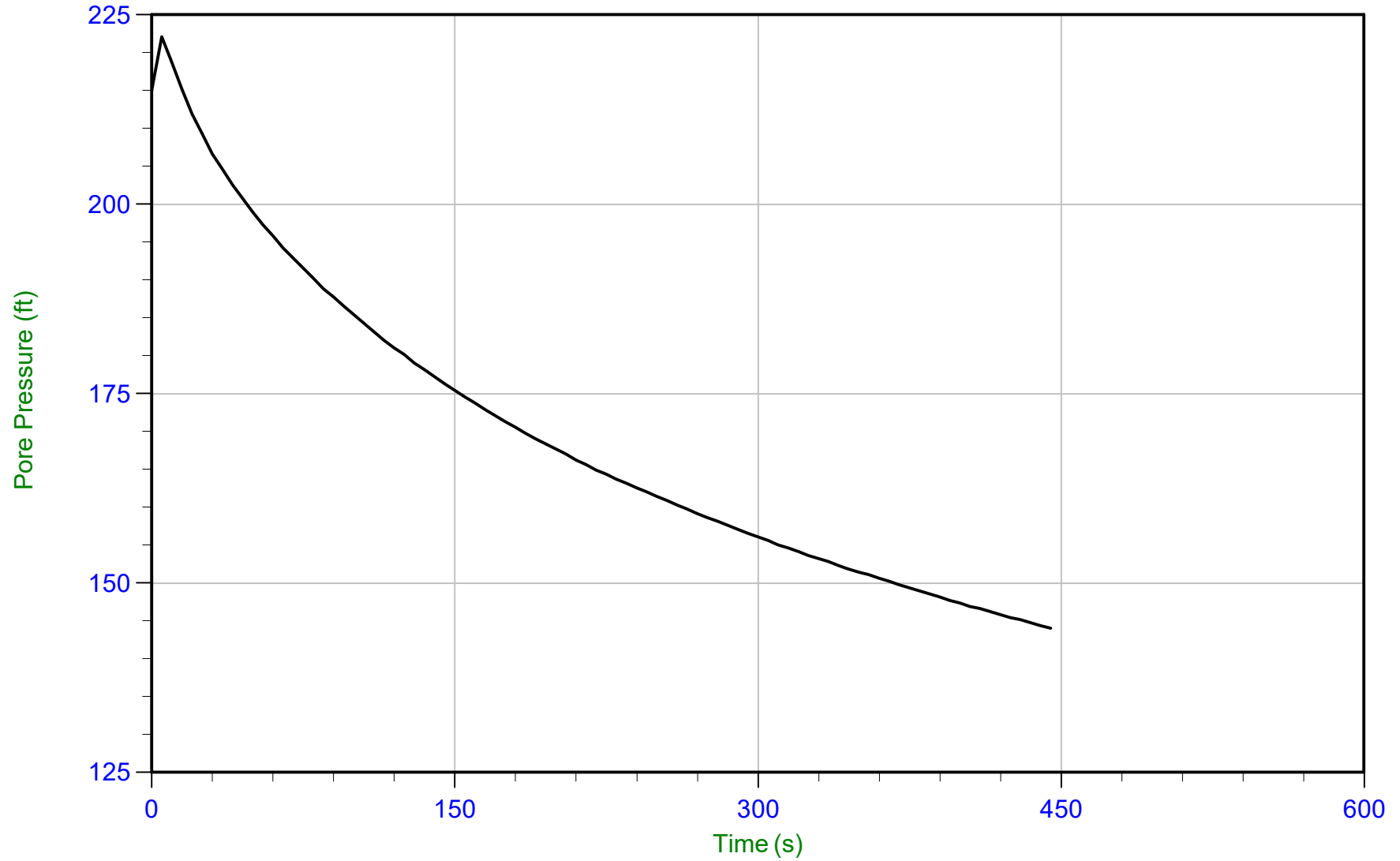
T(50): 120.6 s  
lr: 100  
Ch: 5.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.700 m / 84.317 ft  
Duration: 445.0 s

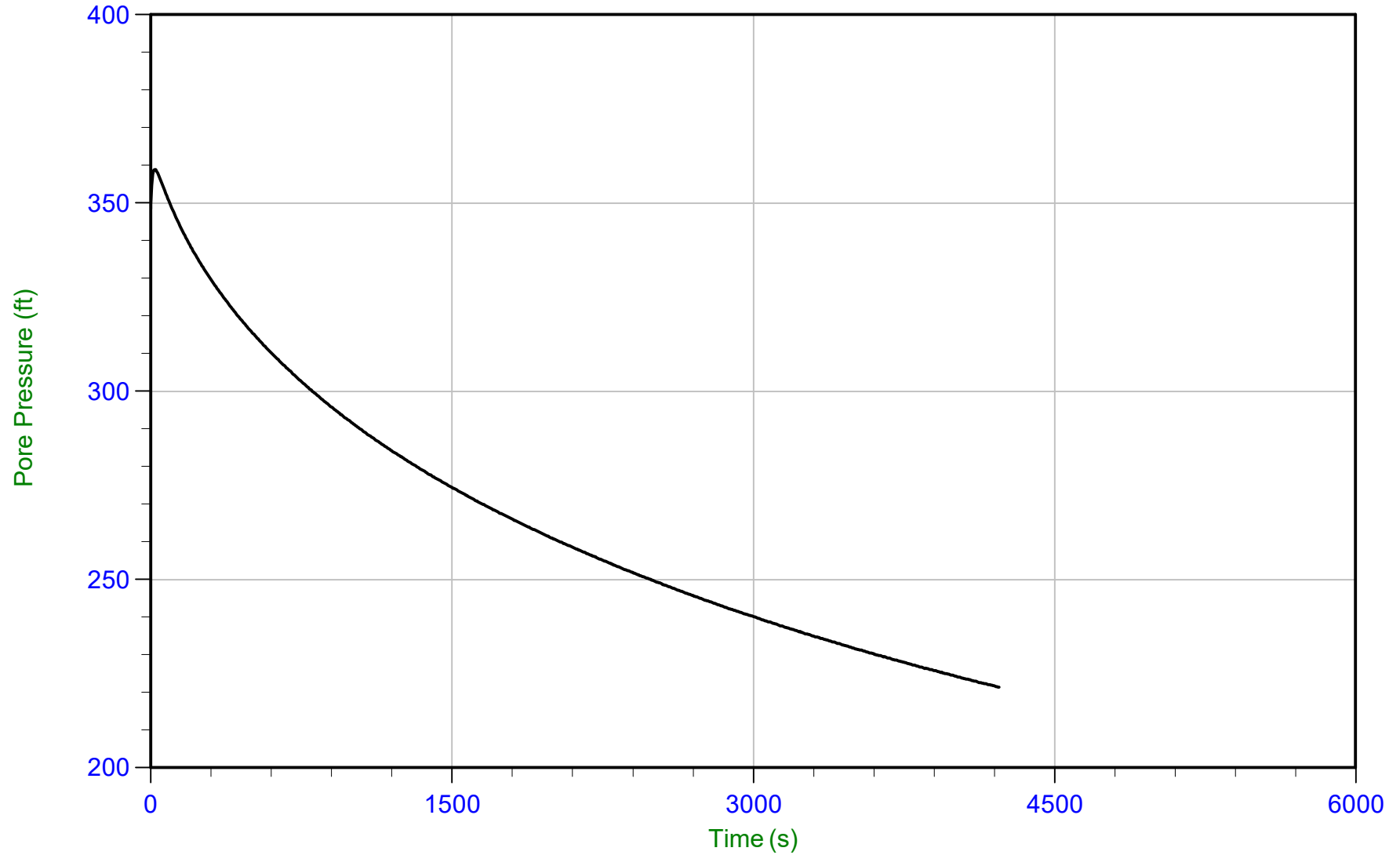
u Min: 144.0 ft  
u Max: 222.1 ft  
u Final: 144.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 30.225 m / 99.162 ft  
Duration: 4225.0 s

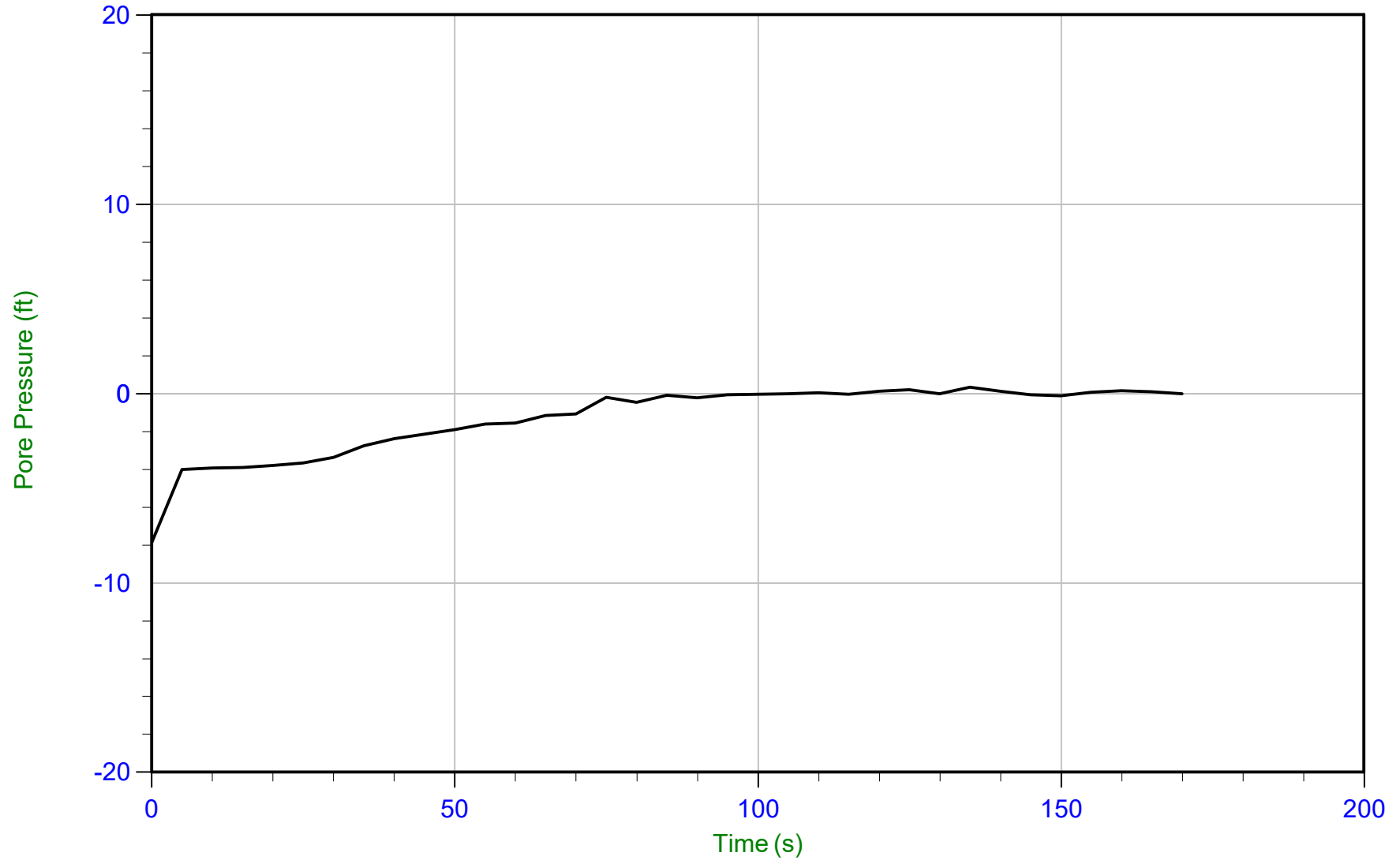
u Min: 221.4 ft  
u Max: 358.9 ft  
u Final: 221.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 170.0 s

u Min: -7.9 ft  
u Max: 0.3 ft  
u Final: -0.0 ft

WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft

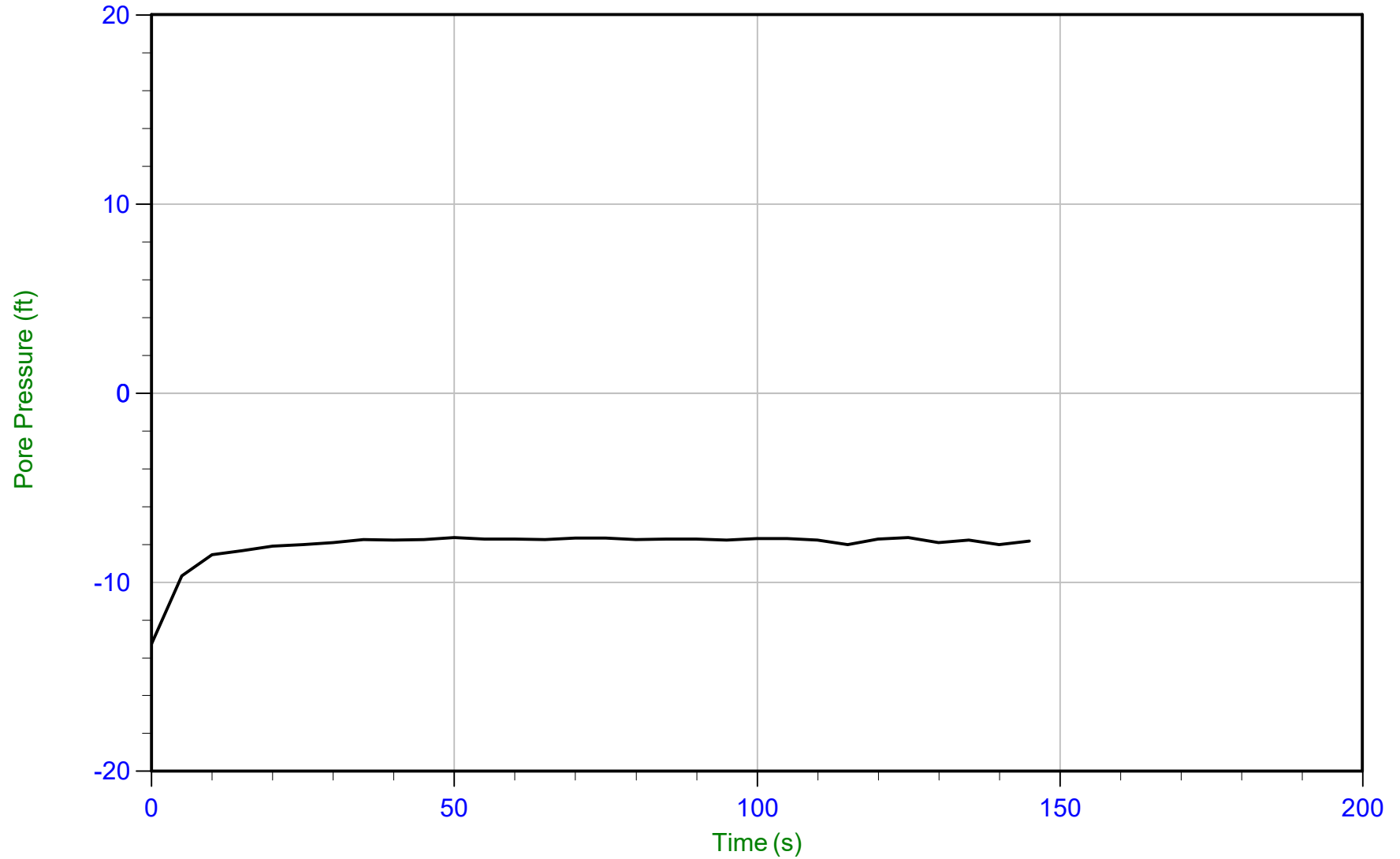




Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 2.475 m / 8.120 ft  
Duration: 145.0 s

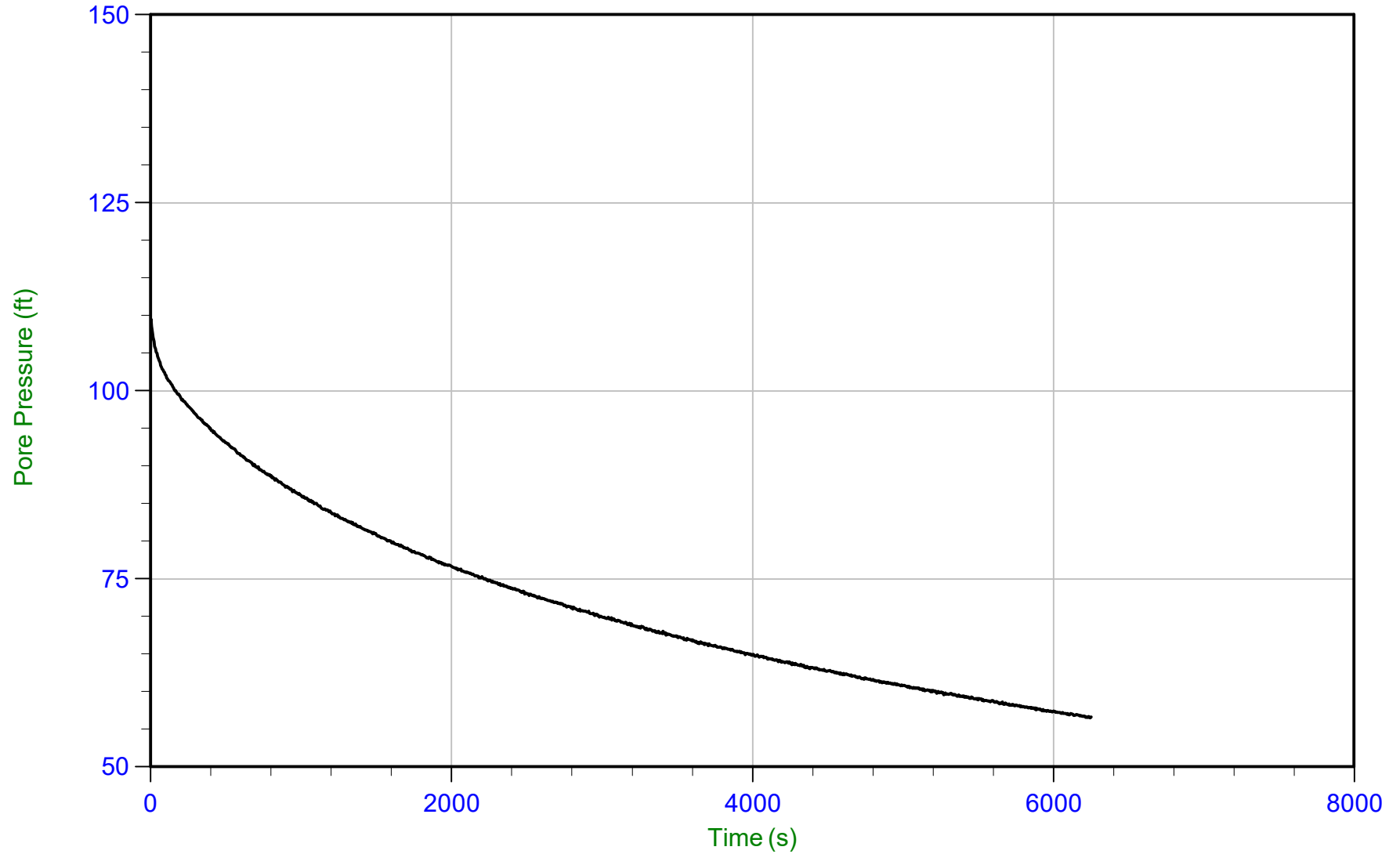
u Min: -13.3 ft  
u Max: -7.6 ft  
u Final: -7.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 5.850 m / 19.193 ft  
Duration: 6255.0 s

u Min: 56.5 ft  
u Max: 109.5 ft  
u Final: 56.6 ft

WT: 4.267 m / 13.999 ft  
Ueq: 5.2 ft  
U(50): 57.33 ft

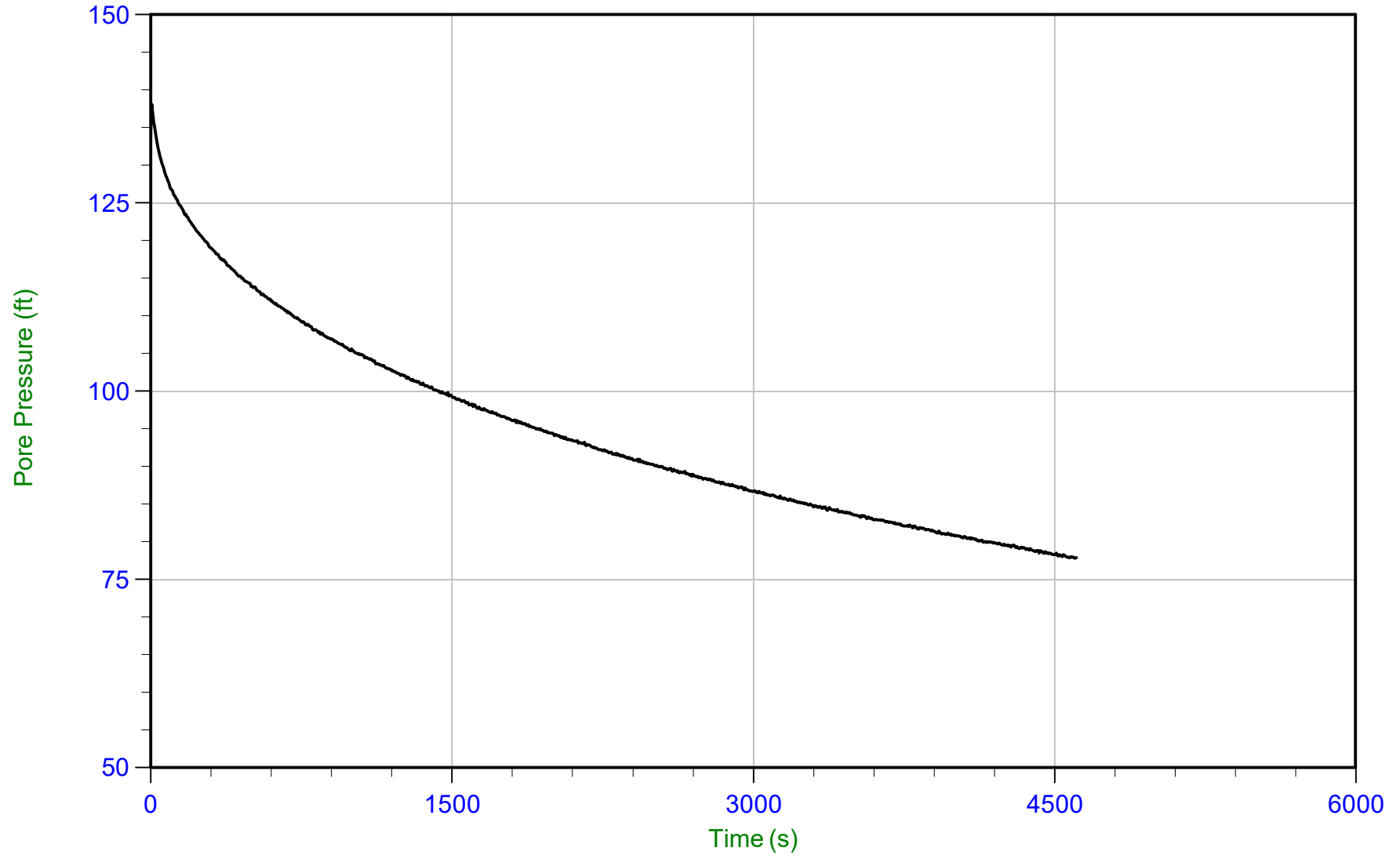
T(50): 5985.9 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 4610.0 s

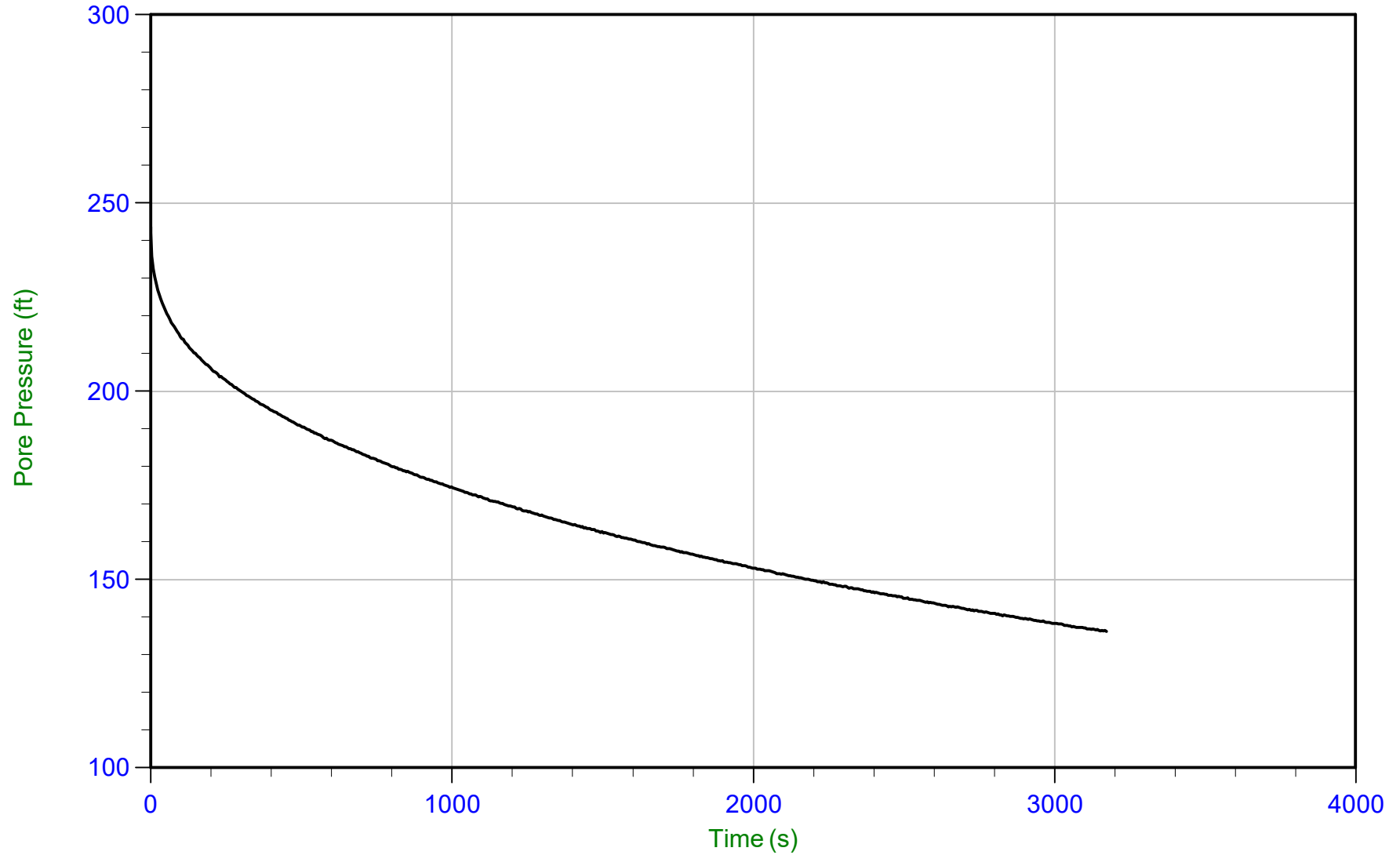
u Min: 77.8 ft  
u Max: 138.1 ft  
u Final: 77.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 3175.0 s

u Min: 136.1 ft  
u Max: 243.7 ft  
u Final: 136.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 34.1 ft  
U(50): 138.91 ft

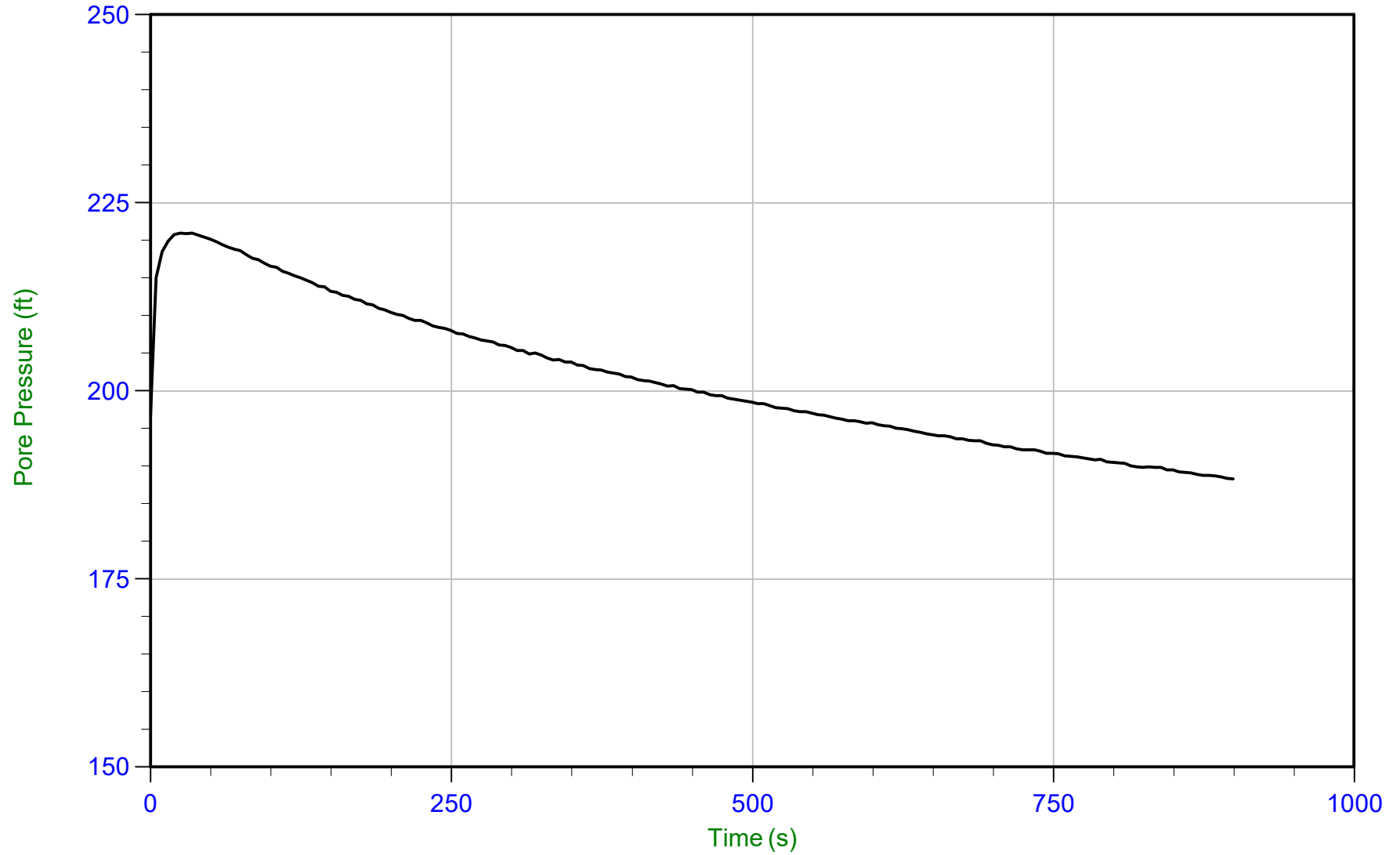
T(50): 2952.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 20.550 m / 67.420 ft  
Duration: 900.0 s

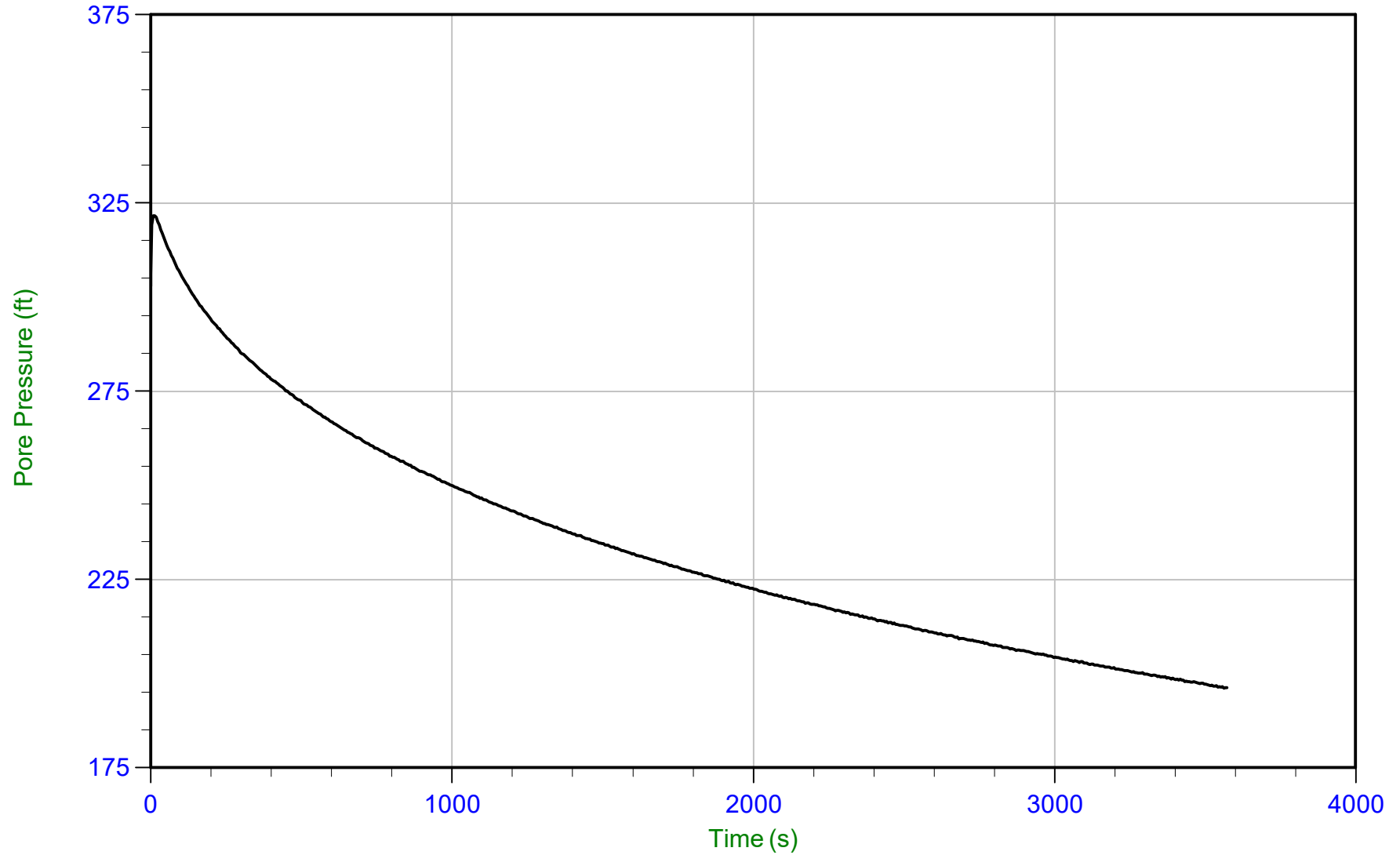
u Min: 188.3 ft  
u Max: 221.0 ft  
u Final: 188.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 3575.0 s

u Min: 196.1 ft  
u Max: 321.7 ft  
u Final: 196.3 ft

WT: 4.267 m / 13.999 ft  
Ueq: 74.1 ft  
U(50): 197.88 ft

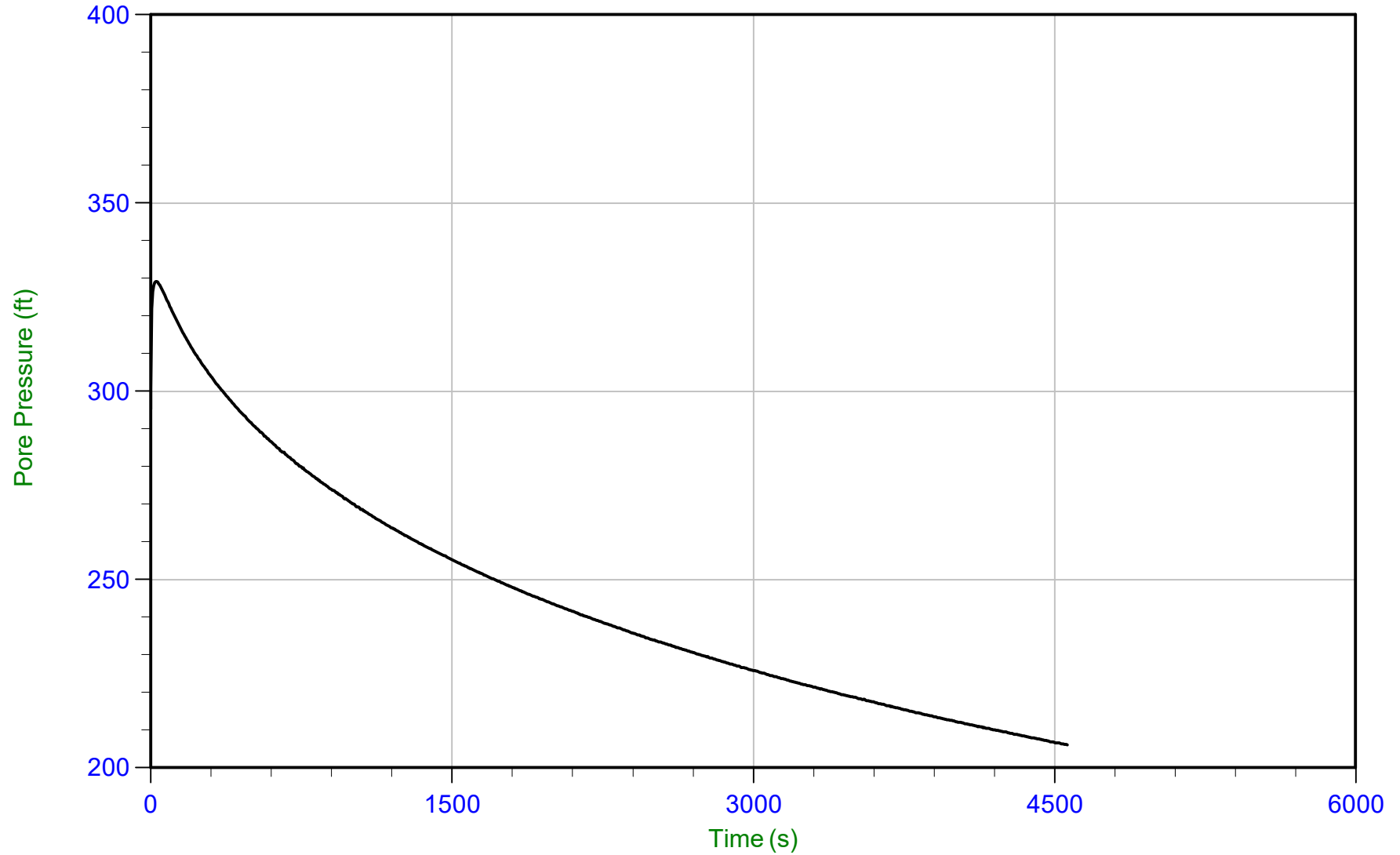
T(50): 3435.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4565.0 s

u Min: 206.1 ft  
u Max: 329.2 ft  
u Final: 206.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 84.1 ft  
U(50): 206.63 ft

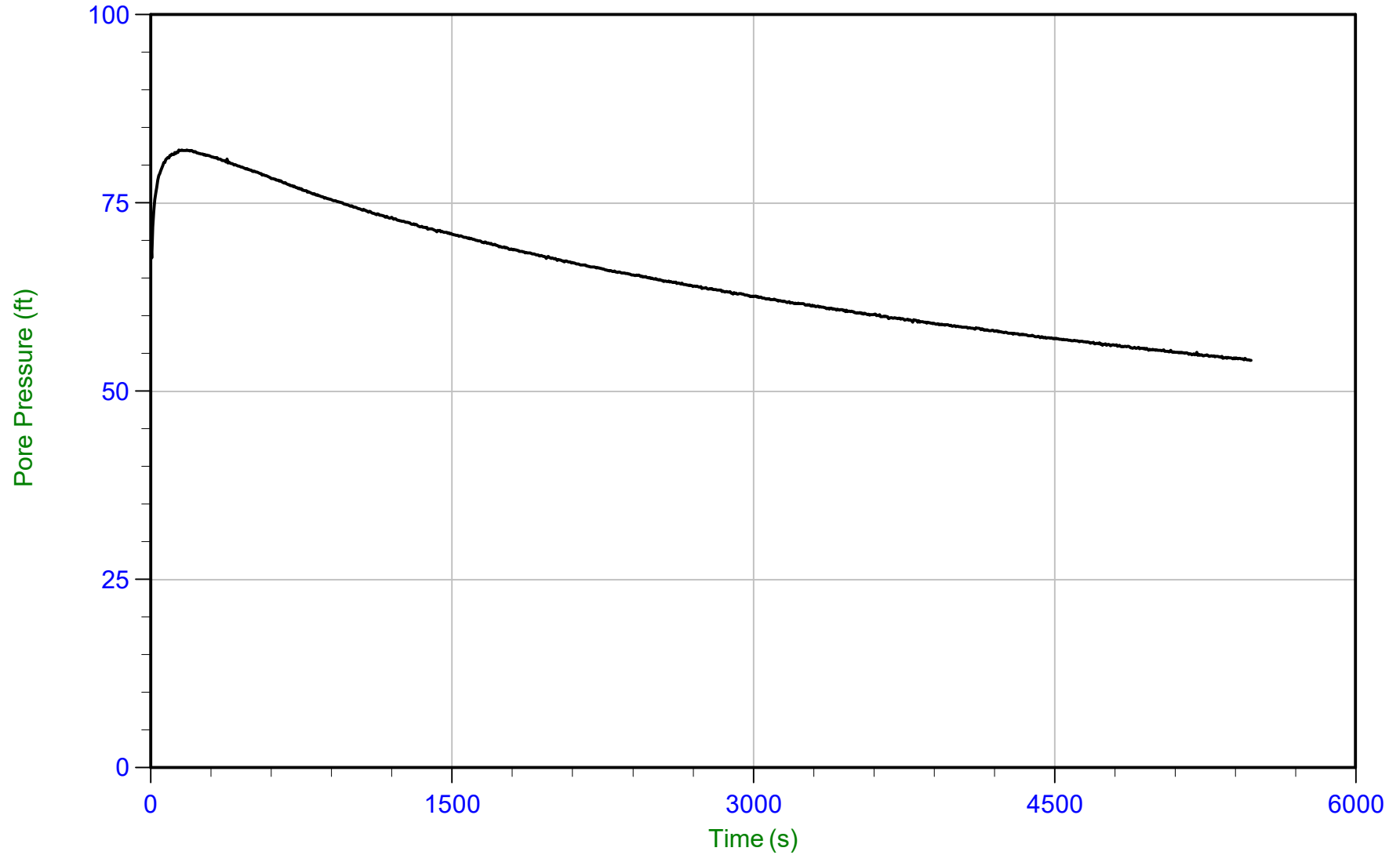
T(50): 4484.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:44  
Site: DTE Belle River Power Plant

Sounding: CPT20-12  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP12.PPF  
Depth: 4.900 m / 16.076 ft  
Duration: 5480.0 s

u Min: 54.1 ft  
u Max: 82.0 ft  
u Final: 54.1 ft

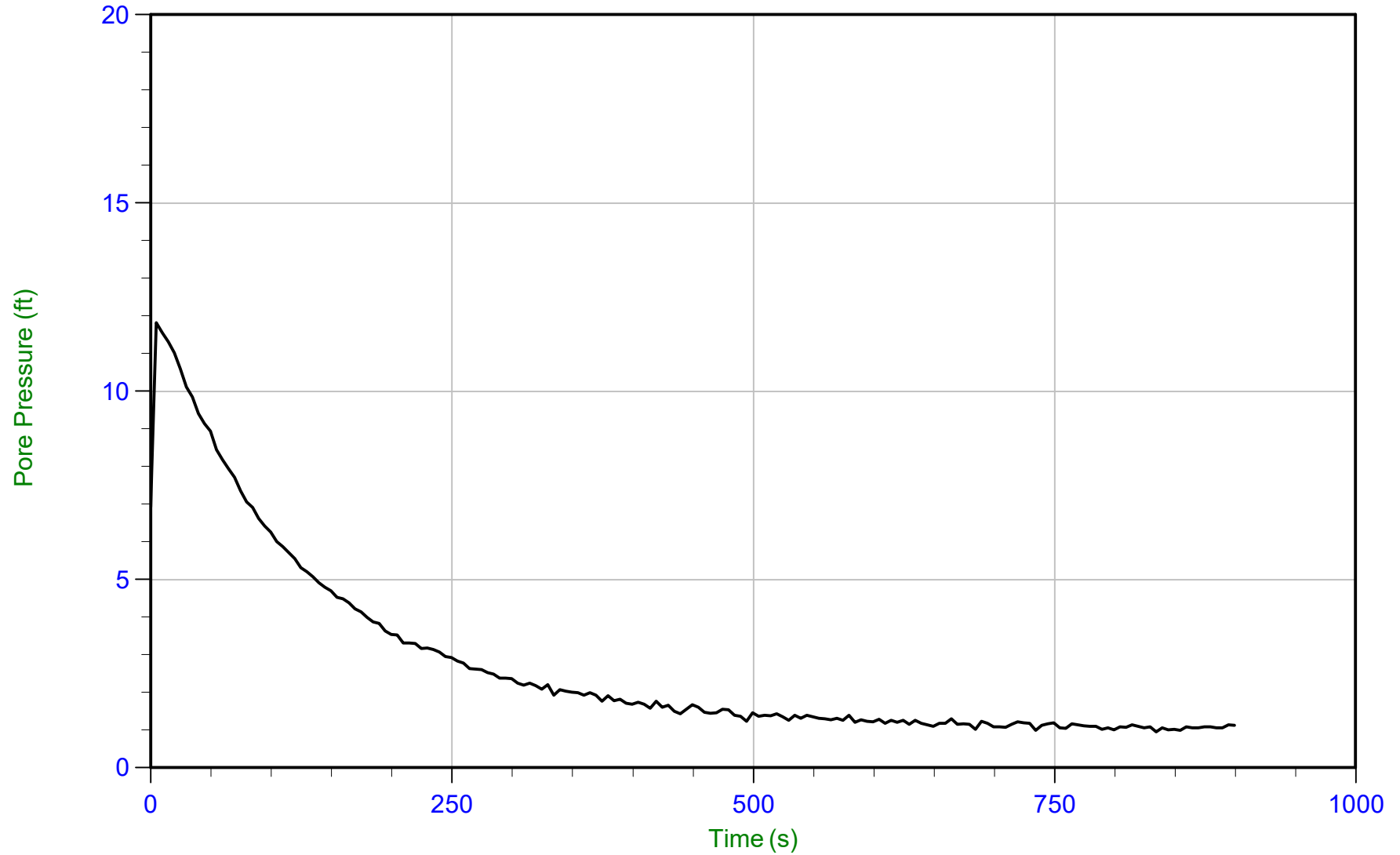




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 1.000 m / 3.281 ft  
Duration: 900.0 s

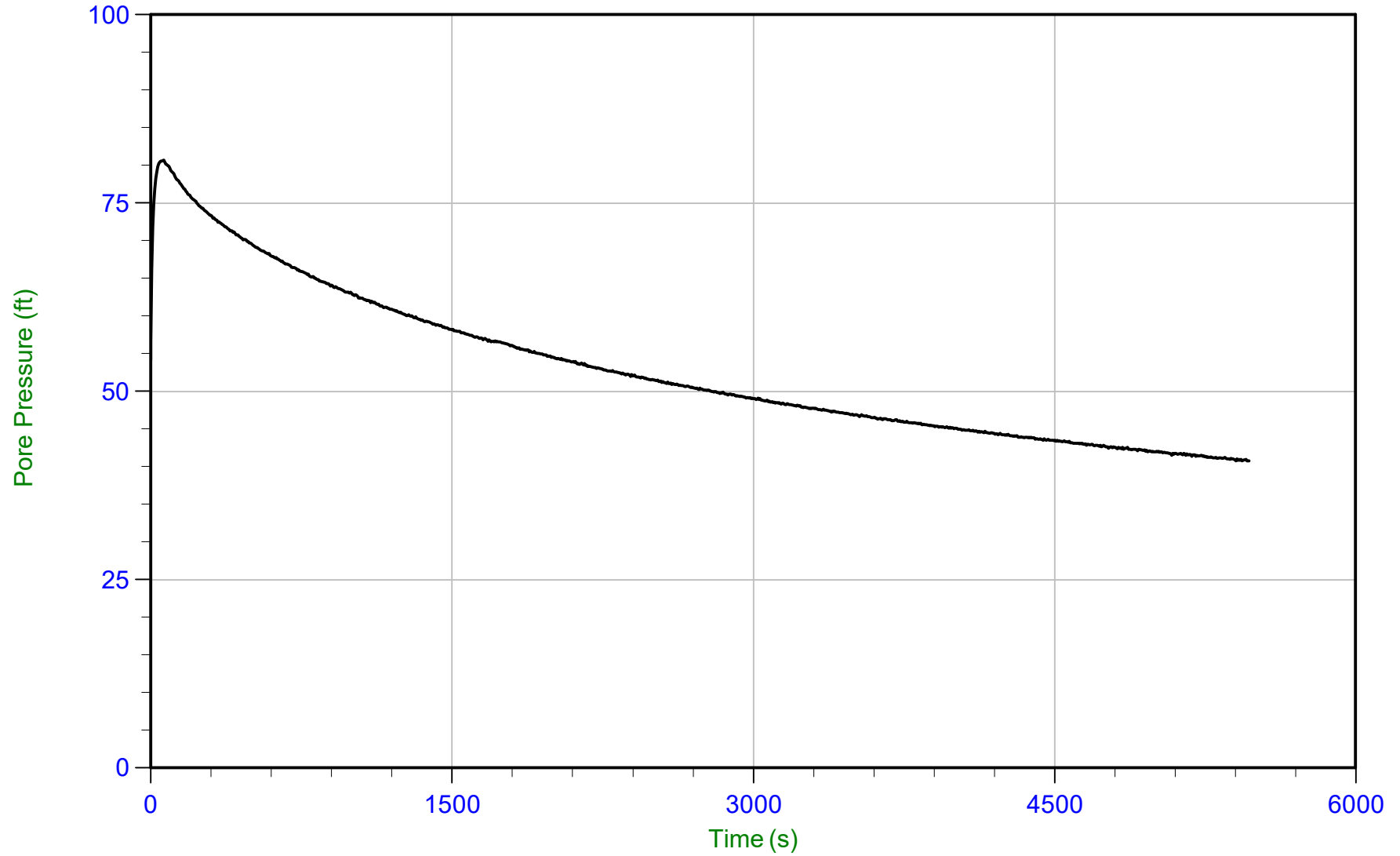
u Min: 1.0 ft  
u Max: 11.8 ft  
u Final: 1.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 4.600 m / 15.092 ft  
Duration: 5470.0 s

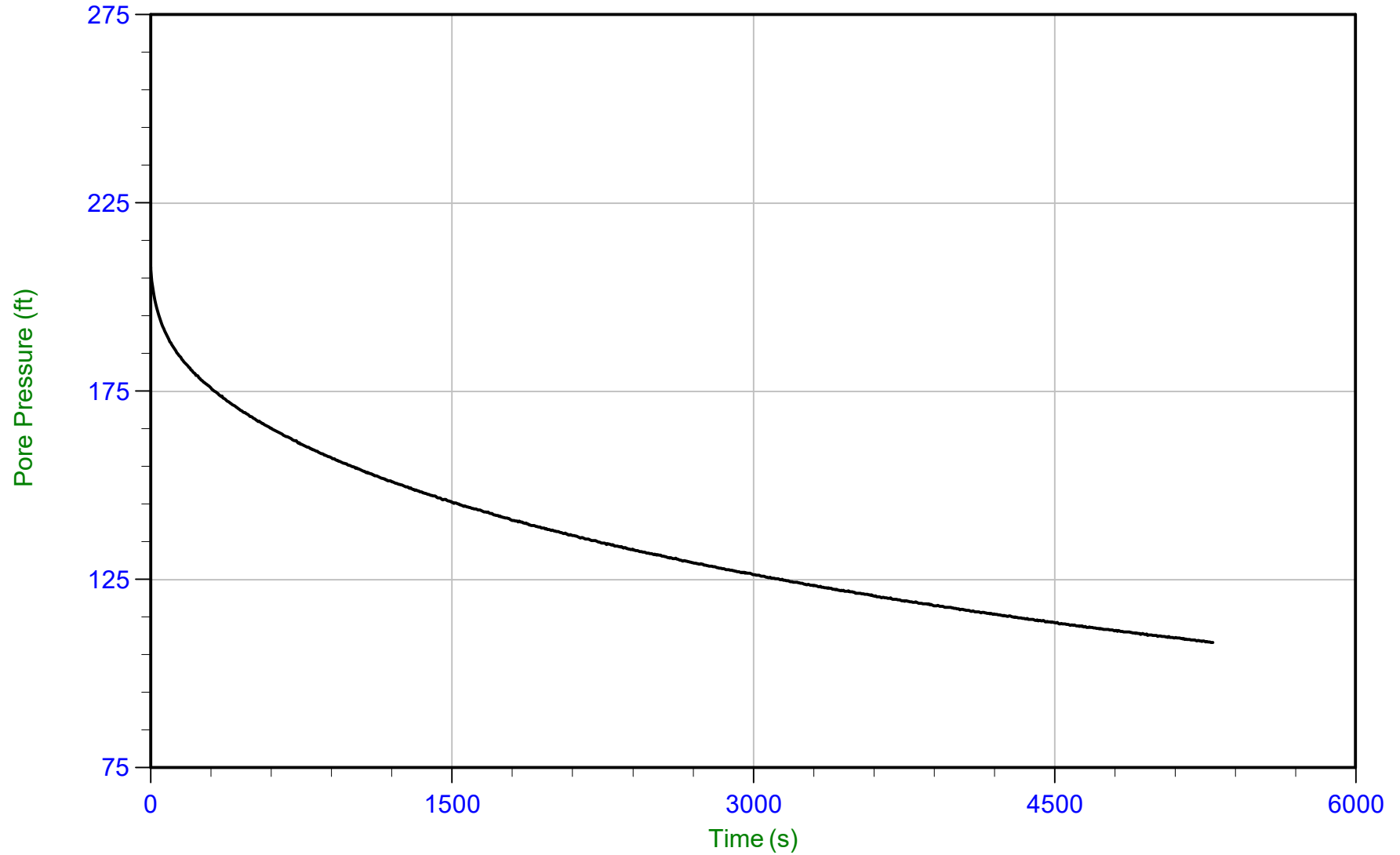
u Min: 40.7 ft  
u Max: 80.7 ft  
u Final: 40.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.450 m / 44.127 ft  
Duration: 5290.0 s

u Min: 108.2 ft  
u Max: 208.0 ft  
u Final: 108.3 ft

WT: 5.182 m / 17.000 ft  
Ueq: 27.1 ft  
U(50): 117.58 ft

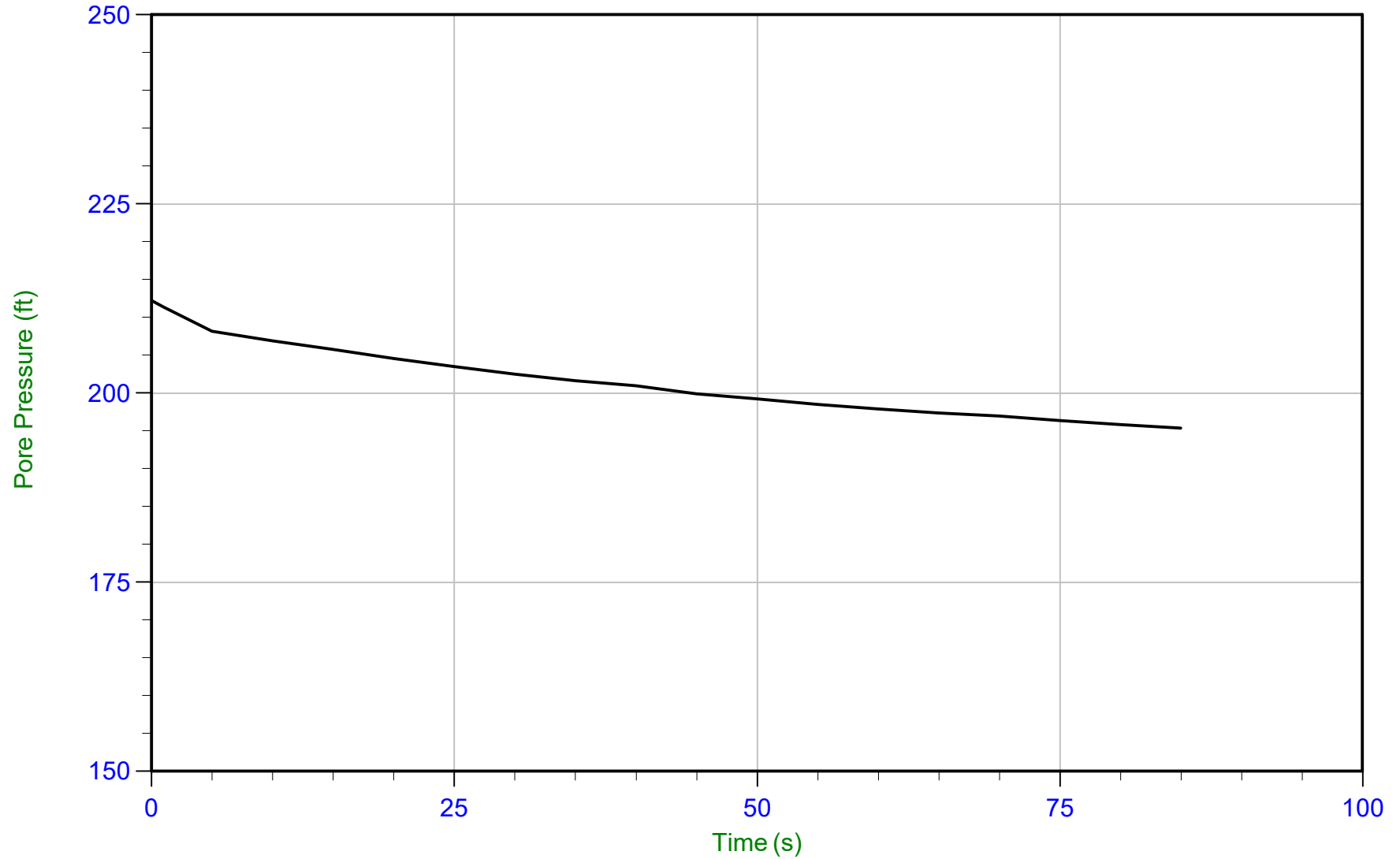
T(50): 3964.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.800 m / 45.275 ft  
Duration: 85.0 s

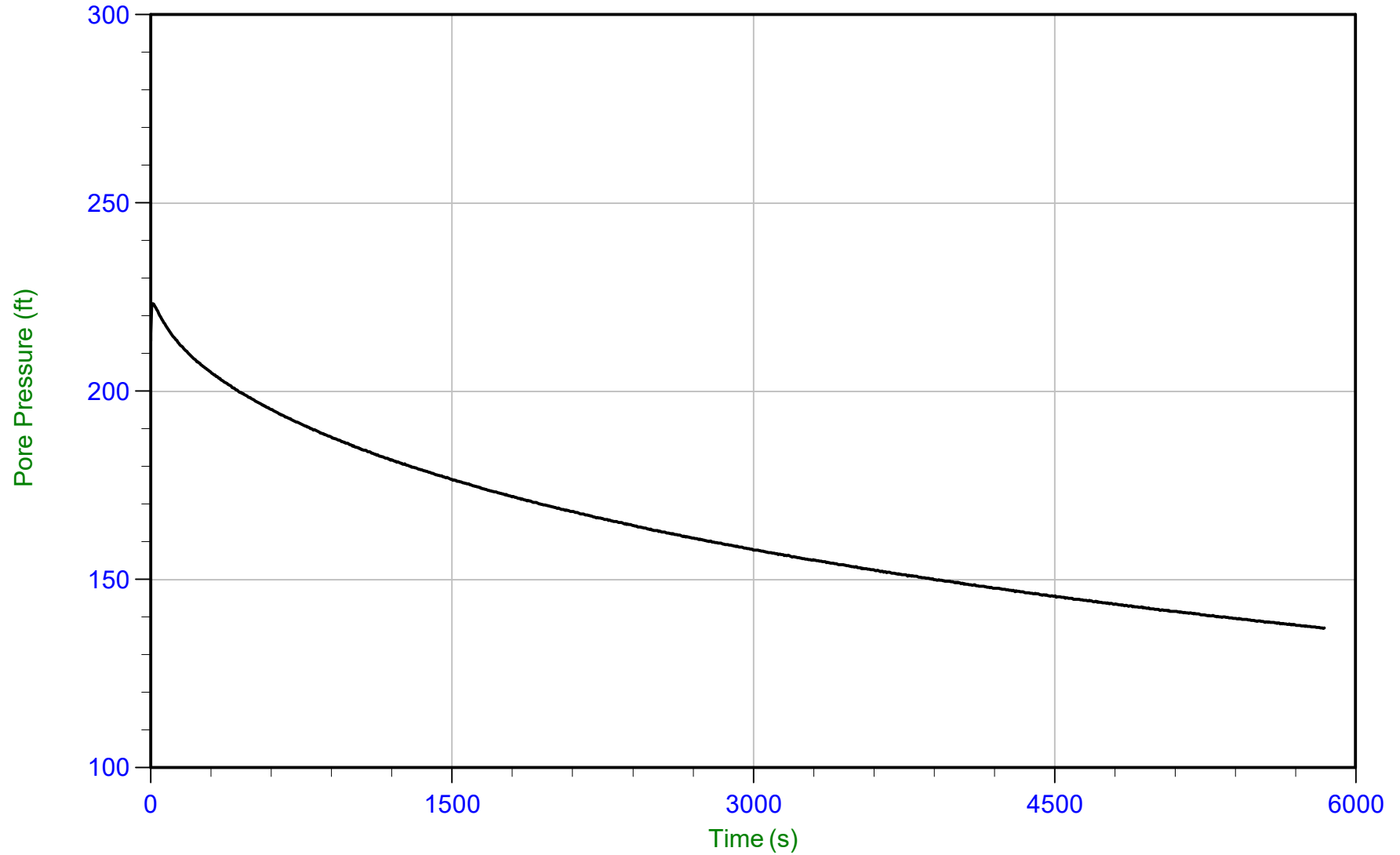
u Min: 195.3 ft  
u Max: 212.2 ft  
u Final: 195.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 19.550 m / 64.140 ft  
Duration: 5845.0 s

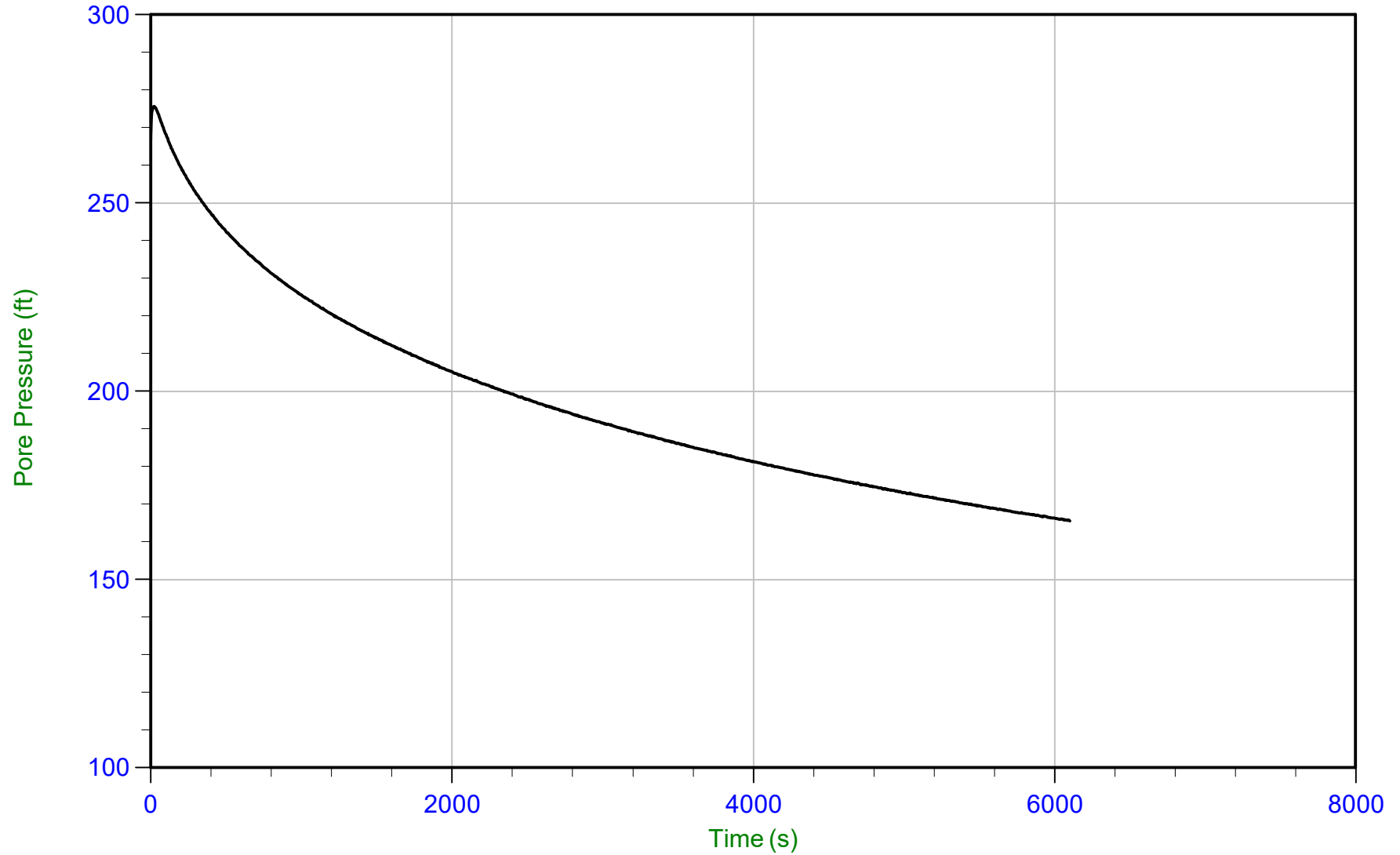
u Min: 137.0 ft  
u Max: 223.2 ft  
u Final: 137.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 25.650 m / 84.153 ft  
Duration: 6105.0 s

u Min: 165.5 ft  
u Max: 275.6 ft  
u Final: 165.5 ft

WT: 5.182 m / 17.000 ft  
Ueq: 67.2 ft  
U(50): 171.39 ft

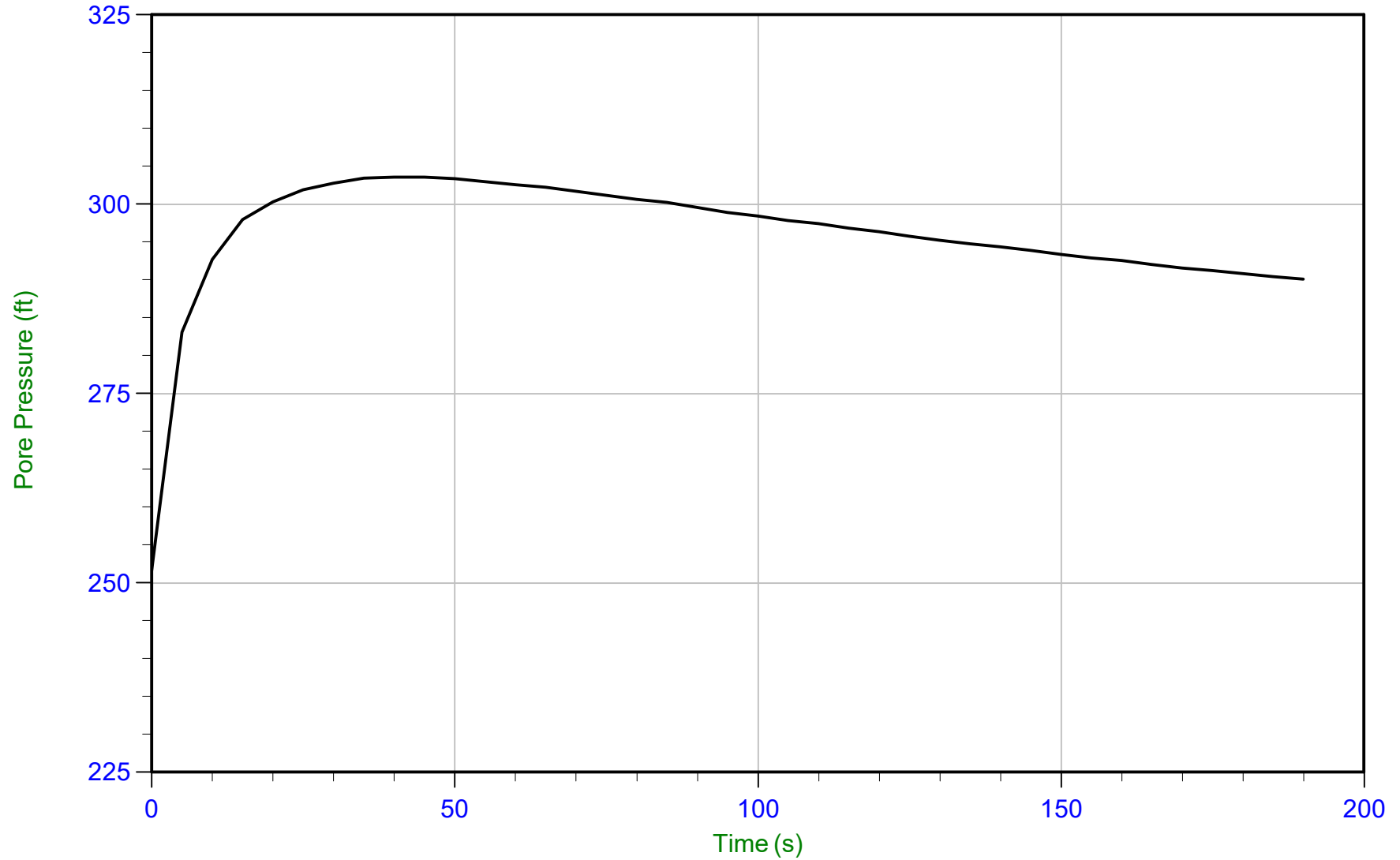
T(50): 5203.0 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 29.550 m / 96.948 ft  
Duration: 190.0 s

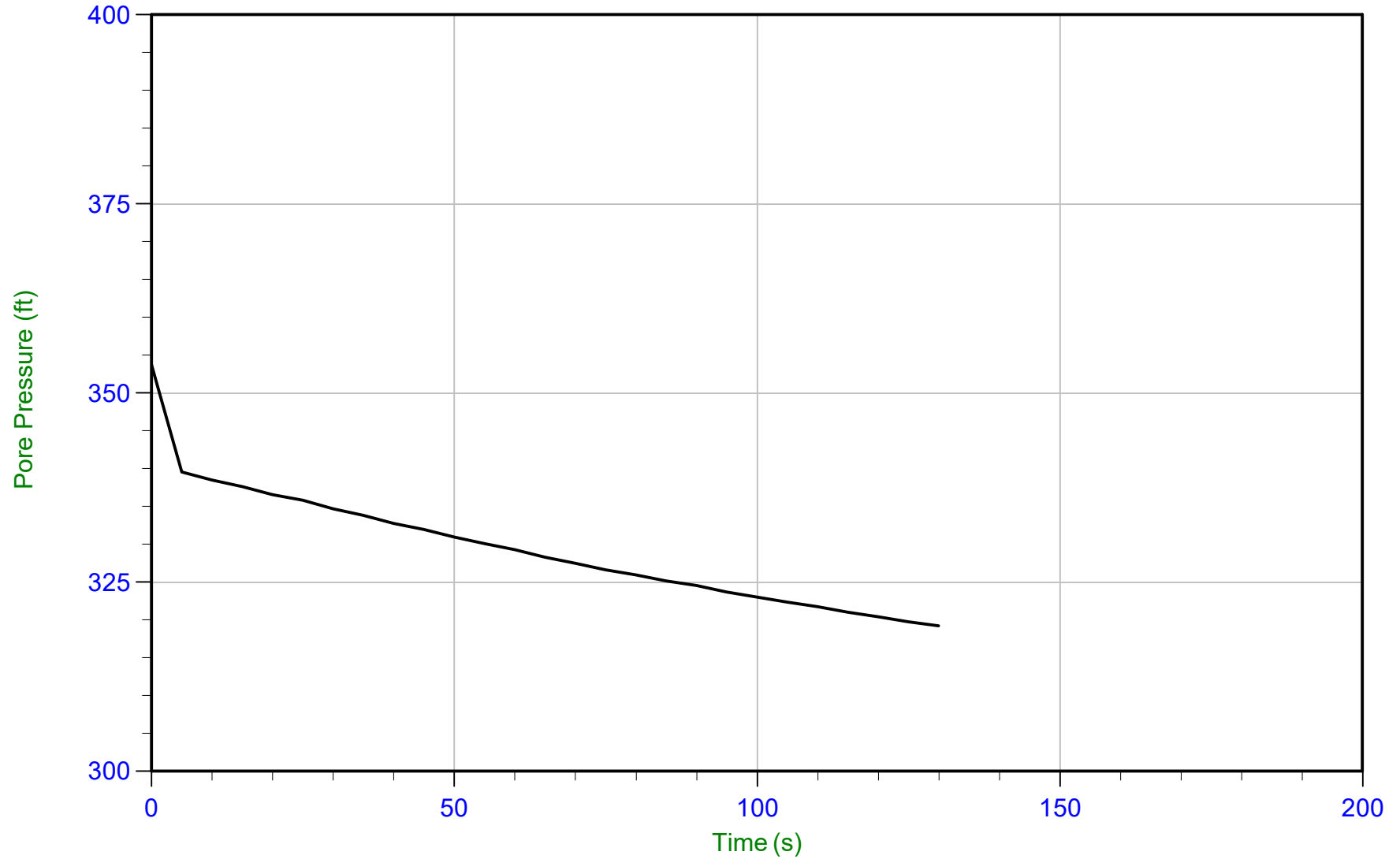
u Min: 251.6 ft  
u Max: 303.6 ft  
u Final: 290.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 130.0 s

u Min: 319.2 ft  
u Max: 353.7 ft  
u Final: 319.2 ft

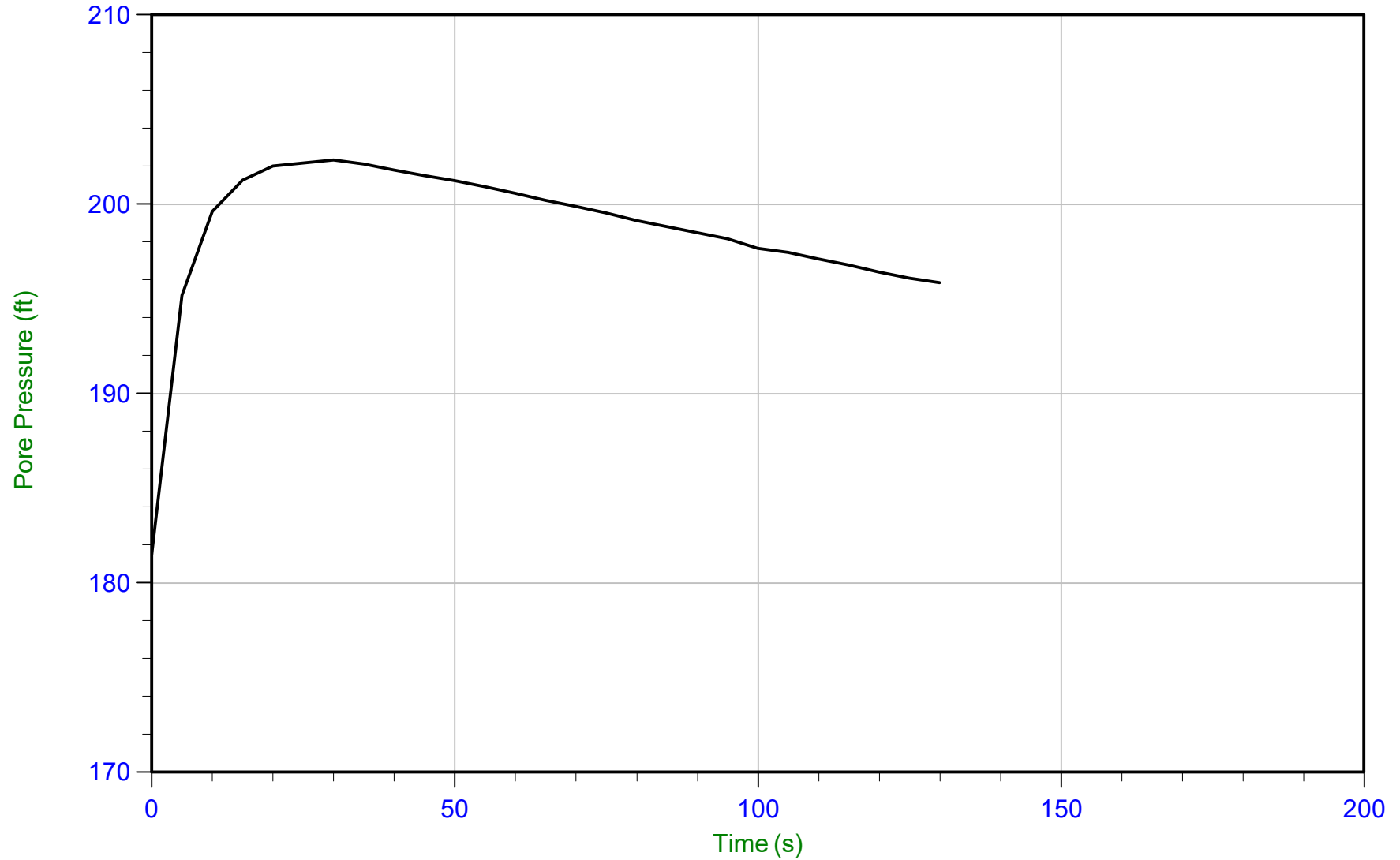




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 11:04  
Site: DTE Belle River Power Plant

Sounding: CPT20-07  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP07.PPF  
Depth: 18.800 m / 61.679 ft  
Duration: 130.0 s

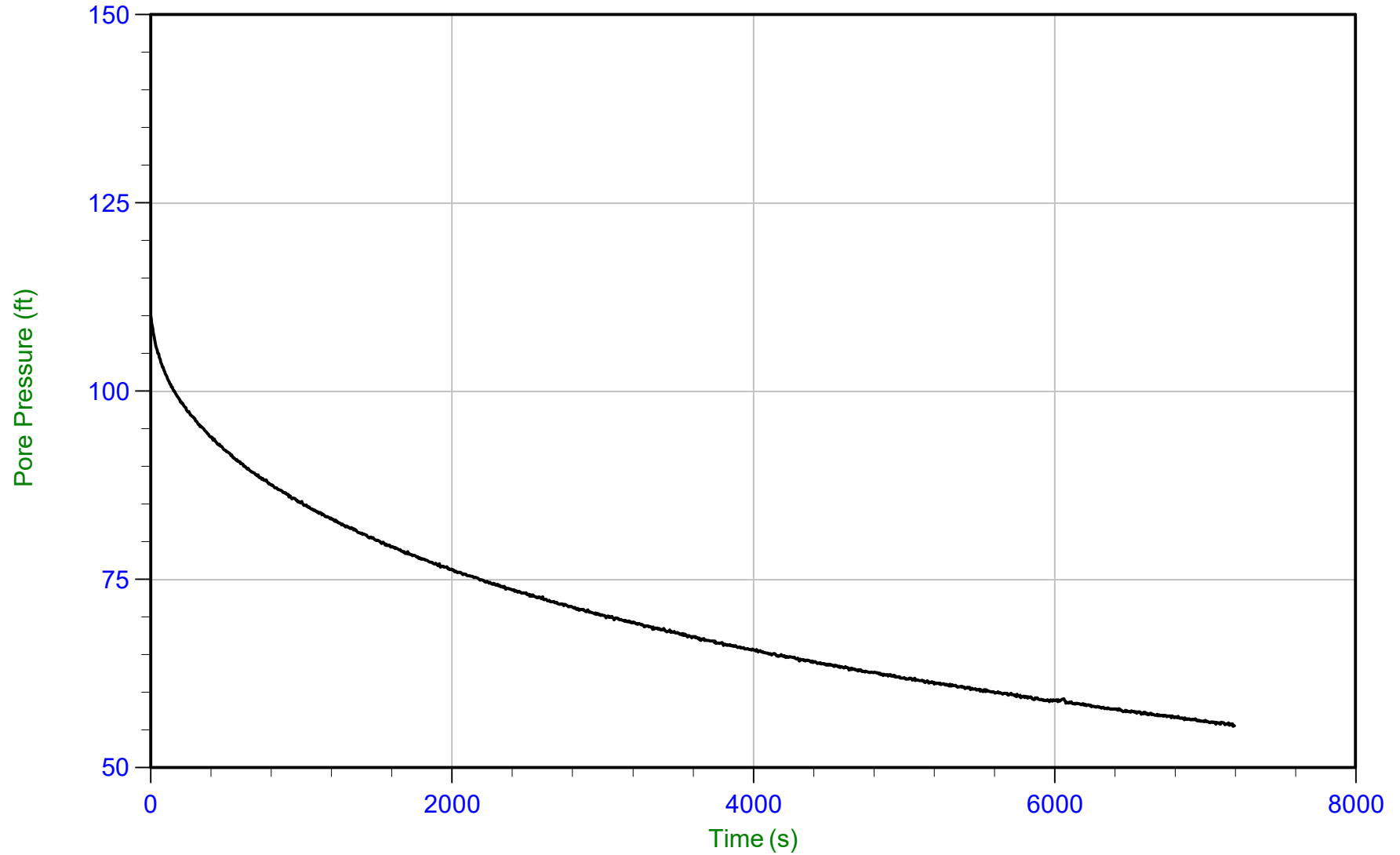
u Min: 181.5 ft  
u Max: 202.3 ft  
u Final: 195.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 6.100 m / 20.013 ft  
Duration: 7200.0 s

u Min: 55.5 ft  
u Max: 110.1 ft  
u Final: 55.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 4.0 ft  
U(50): 57.04 ft

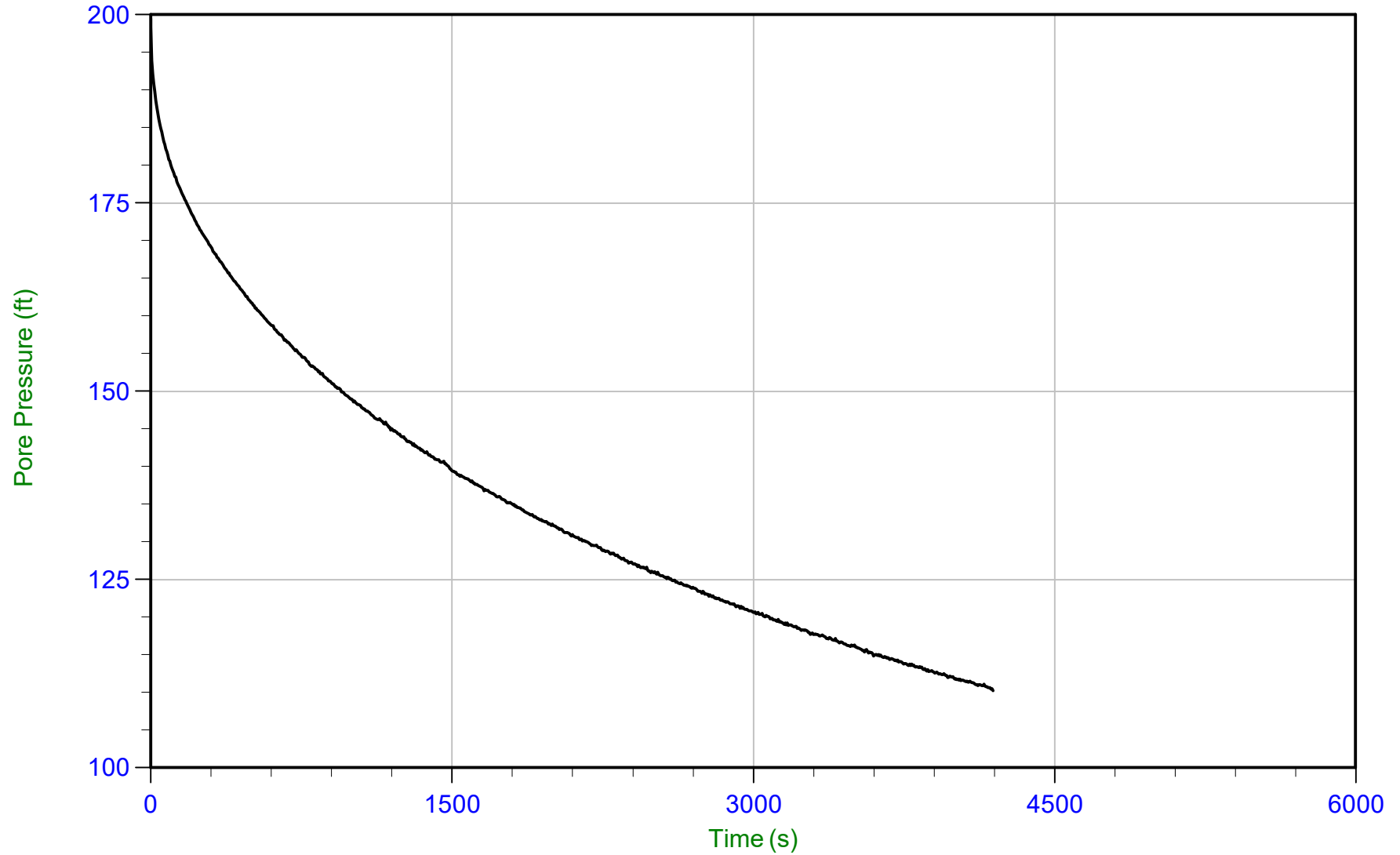
T(50): 6624.7 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 12.200 m / 40.026 ft  
Duration: 4195.0 s

u Min: 110.2 ft  
u Max: 199.5 ft  
u Final: 110.2 ft

WT: 4.877 m / 16.000 ft  
Ueq: 24.0 ft  
U(50): 111.76 ft

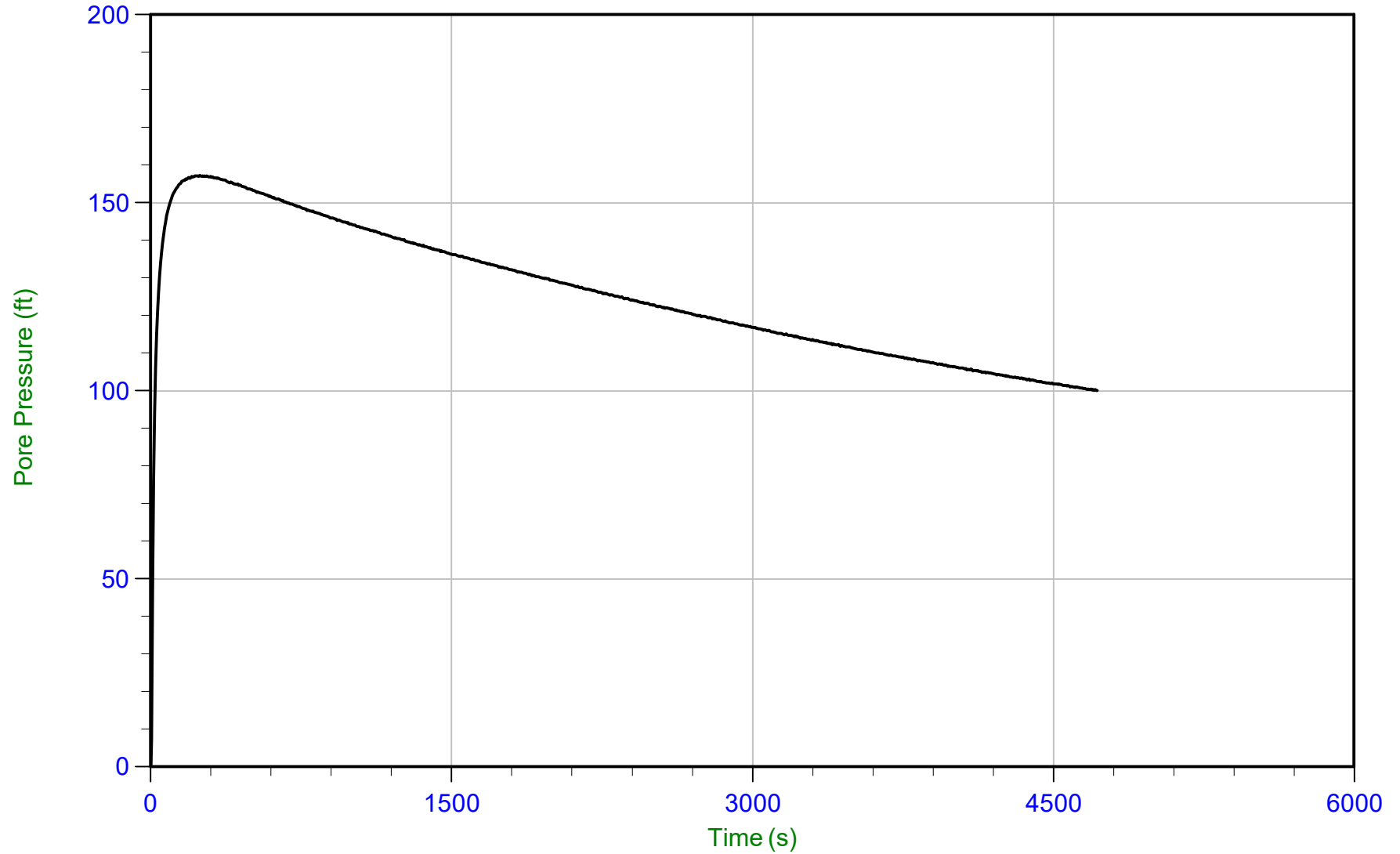
T(50): 4004.2 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 18.300 m / 60.039 ft  
Duration: 4720.0 s

u Min: -7.2 ft  
u Max: 157.2 ft  
u Final: 100.1 ft

WT: 4.877 m / 16.000 ft  
Ueq: 44.0 ft  
U(50): 100.63 ft

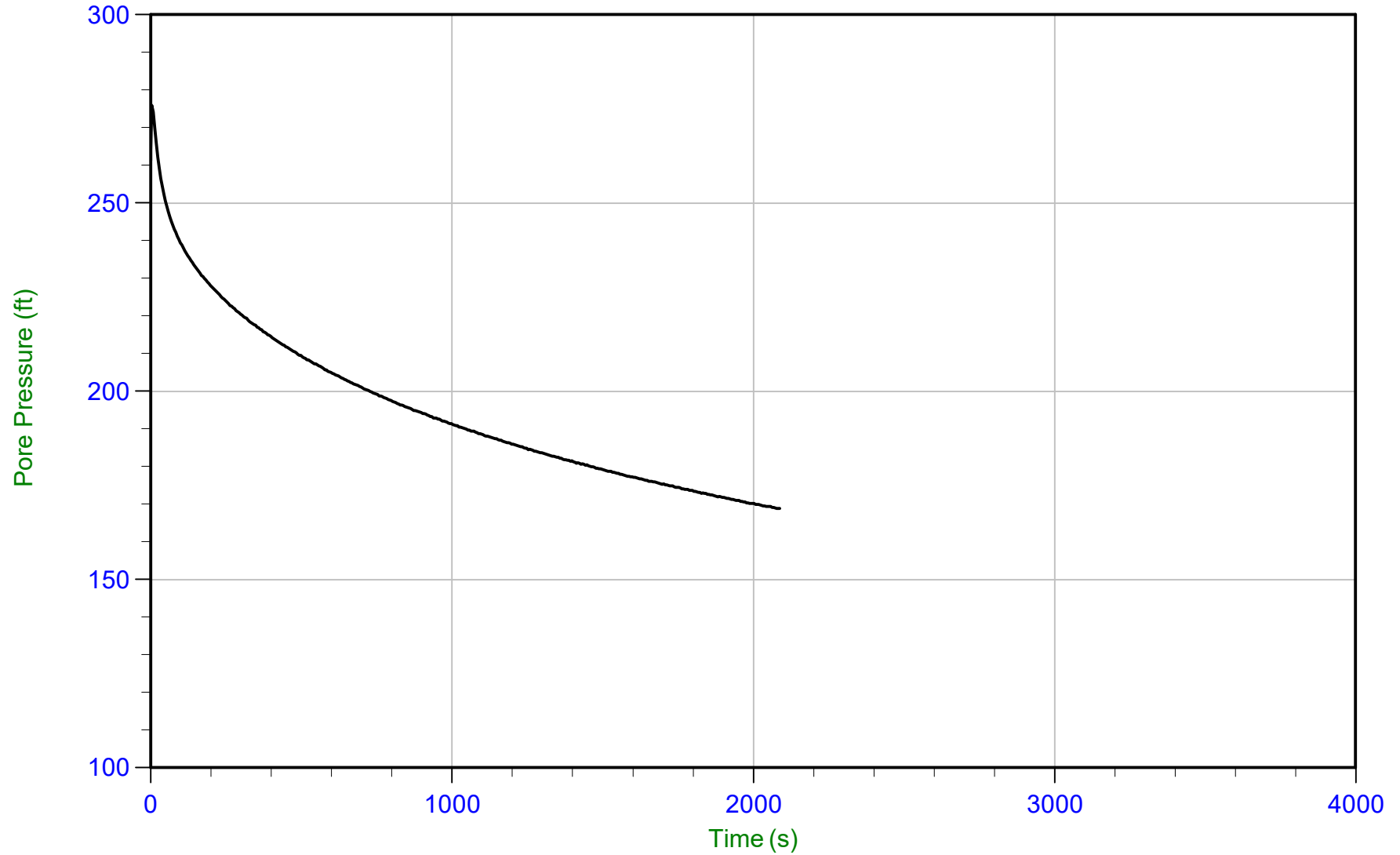
T(50): 4406.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 24.400 m / 80.052 ft  
Duration: 2090.0 s

u Min: 168.8 ft  
u Max: 276.0 ft  
u Final: 168.8 ft

WT: 4.877 m / 16.000 ft  
Ueq: 64.1 ft  
U(50): 170.02 ft

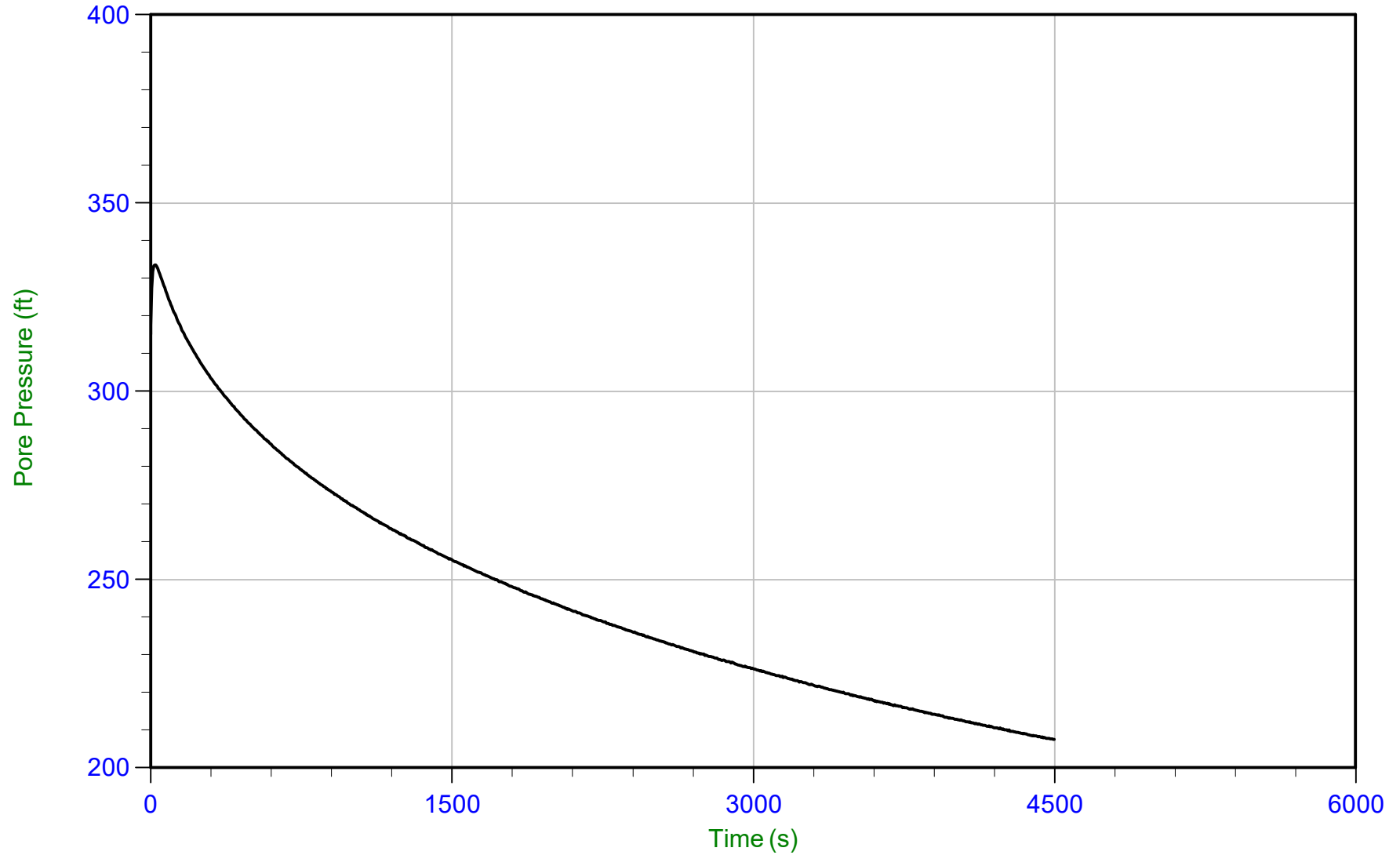
T(50): 2003.9 s  
lr: 100  
Ch: 0.4 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 4500.0 s

u Min: 207.5 ft  
u Max: 333.6 ft  
u Final: 207.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 84.1 ft  
U(50): 208.83 ft

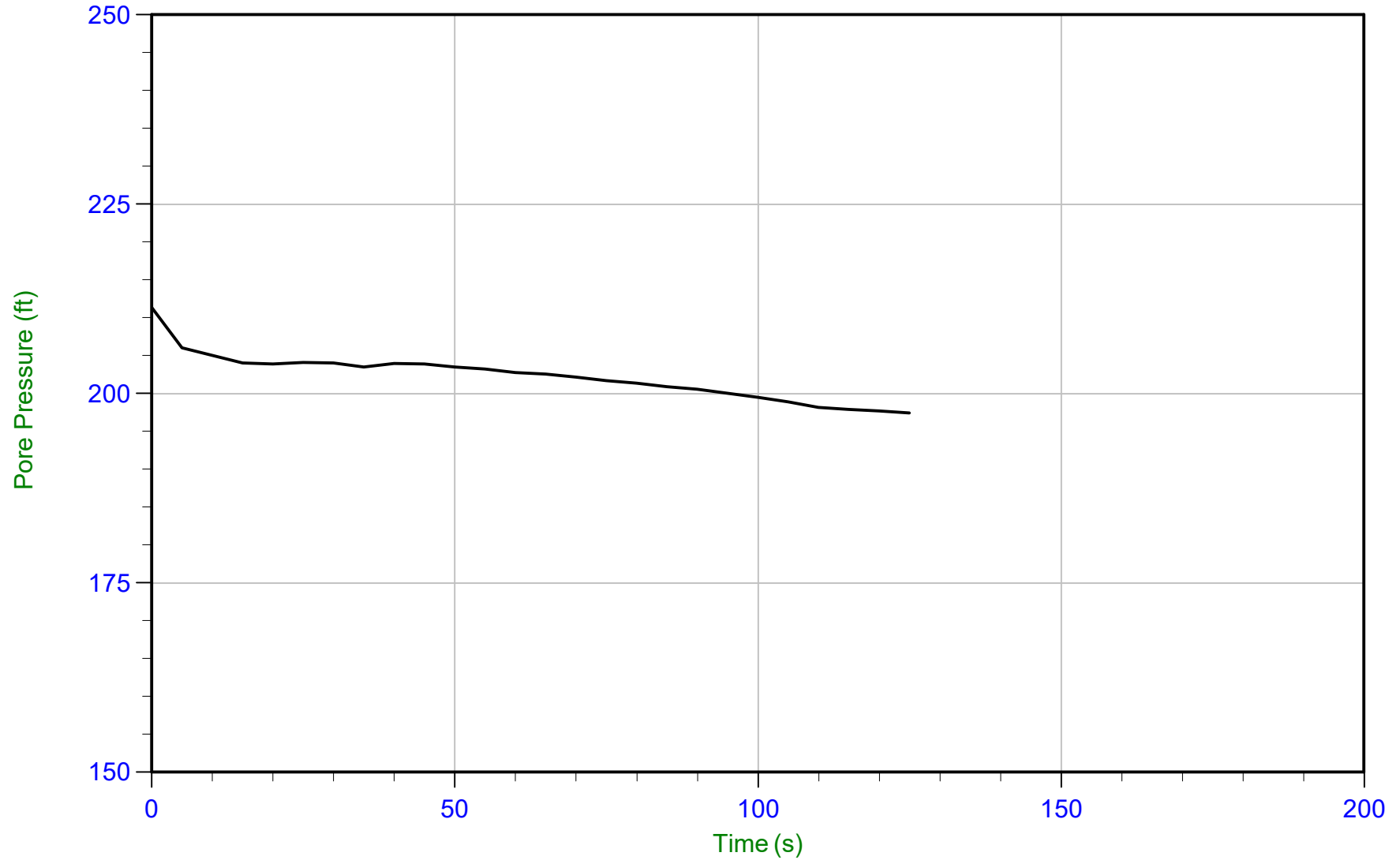
T(50): 4346.6 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 15:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-13  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13.PPF  
Depth: 17.200 m / 56.430 ft  
Duration: 125.0 s

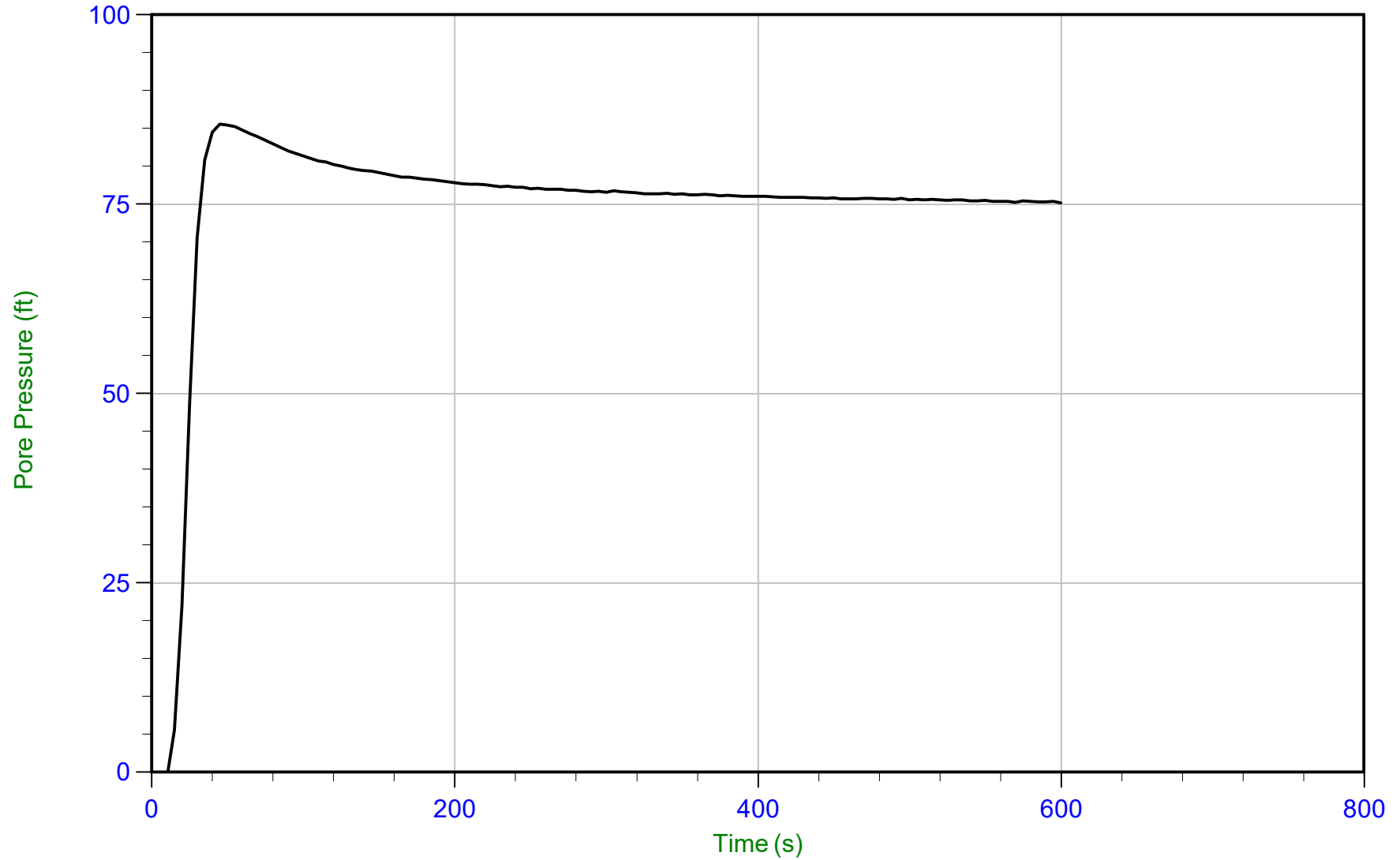
u Min: 197.4 ft  
u Max: 211.4 ft  
u Final: 197.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 09:09  
Site: DTE Belle River Power Plant

Sounding: CPT20-13B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13B.PPF  
Depth: 25.200 m / 82.676 ft  
Duration: 600.0 s

u Min: -3.9 ft  
u Max: 85.6 ft  
u Final: 75.2 ft

WT: 3.962 m / 13.000 ft  
Ueq: 69.7 ft  
U(50): 77.63 ft

T(50): 171.6 s  
lr: 100  
Ch: 4.1 cm<sup>2</sup>/min



**Appendix J**  
**Chemistry Analysis of Site-Specific Water**



05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental ALS

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

---

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

---

**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>			
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>			
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			
<b>Chloride</b>	<b>9.9</b>		<b>1.0</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Fluoride</b>	<b>0.22</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Sulfate</b>	<b>140</b>		<b>8.0</b>	<b>mg/L</b>	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			
<b>pH (laboratory)</b>	<b>8.43</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>			
<b>Total Dissolved Solids</b>	<b>330</b>		<b>50</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>43</b>		<b>20</b>	<b>mg/L</b>	20	12/30/2020 06:55 PM
<b>Fluoride</b>	<b>0.44</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:49 PM
<b>Sulfate</b>	<b>1,200</b>		<b>100</b>	<b>mg/L</b>	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.32</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>2,100</b>		<b>300</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125		0			
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125		0			
Barium	0.1197	0.0050	0.1	0.01914	101	75-125		0			
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125		0			
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125		0			
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125		0			
Calcium	63.88	0.50	10	53.04	108	75-125		0		O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125		0			
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125		0			
Iron	8.964	0.080	10	0.02083	89.4	75-125		0			
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125		0			
Lithium	0.1112	0.010	0.1	0.01095	100	75-125		0			
Magnesium	61.4	0.20	10	51.16	102	75-125		0		O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125		0			
Potassium	12.35	0.20	10	2.605	97.4	75-125		0			
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125		0			
Sodium	65.82	0.20	10	55.83	99.9	75-125		0		O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125		0			

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125		0			
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125		0			
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125		0			
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125		0			
Boron	0.5169	0.020	0.5	0.056	92.2	75-125		0			
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125		0			
Calcium	34.88	0.50	10	25.15	97.2	75-125		0			
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125		0			
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125		0			
Iron	9.488	0.080	10	0.143	93.5	75-125		0			
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125		0			
Lithium	0.107	0.010	0.1	0.006549	100	75-125		0			
Magnesium	24.92	0.20	10	15.27	96.4	75-125		0			
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125		0			
Potassium	12.88	0.20	10	3.03	98.5	75-125		0			
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125		0			
Sodium	71.55	0.20	10	61.63	99.1	75-125		0		O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125		0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO	

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO	

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20		
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20		
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20		
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20		
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20		
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20		
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O	
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20		
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20		
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20		
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20		
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20		
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O	
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20		
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20		
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20		
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O	
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:37 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043032		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20		
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20		
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20		
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20		
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20		
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20		
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20		
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20		
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20		
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20		
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20		
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20		
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20		
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20		
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20		
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20		
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O	
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20		

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:22 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046544		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO	

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:41 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046556		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO	

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

MBLK		Sample ID: <b>MBLK-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021476</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids ND 30

LCS		Sample ID: <b>LCS-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021475</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

DUP		Sample ID: <b>20121752-03B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID: <b>DB</b>		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021469</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
--------------	--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information		Project Information					Parameter/Method Request for Analysis										
Purchase Order		Project Name	DTE Belle River			A	Metals										
Work Order		Project Number	GLP 8017			B	pH, Anions, TDS, Alkalinity										
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants			C											
Send Report To	Michael Coram	Invoice Attn.	Michael Coram			D											
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.			E											
	Suite 100		Suite 100			F											
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105			G											
Phone	734-794-1547	Phone	734-794-1547			H											
Fax	734-332-8063	Fax	734-332-8063			I											
e-Mail Address						J											
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

Sampler(s): Please Print & Sign <i>Mike Coram</i>		Shipment Method: Carrier <i>FedEx</i>		Turnaround Time: (Business Days) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____				Results Due Date:	
Relinquished by: <i>[Signature]</i>	Date: 12/17	Time: 3:00	Received by:	Date:	Time:	Notes: <b>Separate Report</b>			
Relinquished by: <i>Fedex</i>	Date: 12/18/20	Time: 10:00	Received by (Laboratory): <i>[Signature]</i>	Date:	Time:	ALS Cooler ID:	Cooler Temp: 5.8°C	QC Package: (Check Box Below)	
Logged by (Laboratory): <i>MTG</i>	Date: 12/18/20	Time: 13:46	Checked by (Laboratory): <i>[Signature]</i>					<input checked="" type="checkbox"/> Level II: Standard QC	<input type="checkbox"/> Level III: Raw Data
								<input type="checkbox"/> TRRP LRC	<input type="checkbox"/> TRRP Level IV
								<input type="checkbox"/> Level IV: SW846 Methods/CLP like	
								<input type="checkbox"/> Other: _____	

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752**

Received by: **MJG**

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 5.8/5.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 12/18/2020 1:47:53 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.





## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

**Client Project Name:** DTE - Belle River

**Client Project Number:** GLP-8017

**Client PO Number:**

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00



Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

Chain of Custody Form  
Parameter/Method Request for Analysis  
Radium 226 and 228 combined  
Report Separate

Customer Information		Project Information		ALS Project Manager: 33730													
Purchase Order		Project Name	DTE - Belle River	Parameter/Method Request for Analysis													
Work Order		Project Number	GRP - 8017	Radium 226 and 228 combined													
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants														
Send Report To	Michael Coram	Invoice Attn	Michael Coram														
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100														
City/State/Zip	Ann Arbor MI 48106	City/State/Zip	Ann Arbor MI 48105														
Phone	(734) 794-1547	Phone	(734) 794-1547														
Fax	(734) 322-8063	Fax	(734) 322-8063														
e-Mail Address		e-Mail Address															
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB - E	12/16	3:00	SW	2	2	X										
2	BAB - W	12/16	2:00	SW	2	2	X										
3	DB	12/16	4:00	SW	2	2	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Shipments Method: Fed Ex  
Received by: Mike Coram  
Time: 12/17 3:00  
Received by (Laboratory):  
Time:  
Checked by (Laboratory):  
Time:  
Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

QC Package: (Check One Box Below)  
 Level III Std QC Prep Data  
 Level III Std QC Prep Data  
 Level IV SW/826-CLP  
 Other

TRPP Check List  
 TRPP Level I  
 TRPP Level II  
 TRPP Level III  
 TRPP Level IV

Results Due Date:  
 5 WK Days  
 Std. 10 WK Days  
 24 Hour  
 2 WK Days  
 Other

Notes:

Relinquished by: Mike Coram  
Date: 12/17

Relinquished by:

Logged by (Laboratory):

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20

ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWTG: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-455 RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECEIVING**  
**225 COMMERCÉ DR**

12-1  
3.2

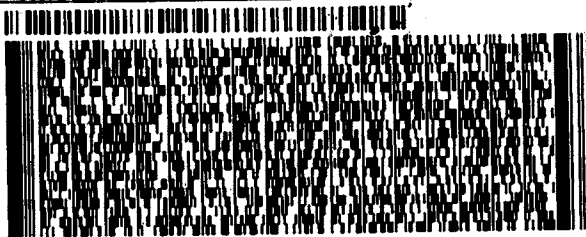
**FORT COLLINS CO 80524**

(616) 582-5201

REF:

THU:

DEPT:



**FedEx**  
Express



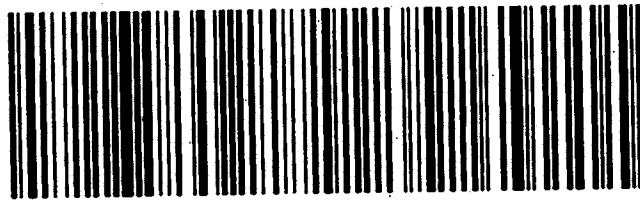
14107-10002027

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	45		40-110	%REC	DL = NA	1/15/2021 07:48



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C

ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch: 

2012397-1	2012397-2	2012397-3
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Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1			Units: ug		Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1			Units: ug		Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1			Units: ug		Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3

**Appendix K**  
**ALD Hydraulic Conductivity Test Results**



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143	26.7	98.1	-	-	3/15/2021	0	1.2E-08	0.0434	-	-	-	-	
						3/22/2021	7	9.3E-09	0.0434	-	-	-	-	
						3/29/2021	14	7.3E-09	0.0710	8.3	8.4	-	-	
						4/05/2021	21	7.0E-09	0.1122	-	-	-	-	
						4/12/2021	28	7.1E-09	0.1402	-	-	-	-	
						4/14/2021	30	6.9E-09	0.1468	8.2	8.5	-	-	
						4/19/2021	35	7.8E-09	0.1798	-	-	-	-	
						4/26/2021	42	6.4E-09	0.2107	-	-	-	-	
						4/27/2021	43	6.9E-09	0.2146	8.2	8.4	656	1614	
						5/3/2021	49	7.6E-09	0.2537	-	-	-	-	
						5/04/2021	50	7.8E-09	0.2592	-	-	-	-	
						5/07/2021	53	7.7E-09	0.2730	-	-	-	-	
						5/10/2021	56	6.8E-09	0.2843	8.3	8.2	-	-	
						5/14/2021	60	8.0E-09	0.3114	-	-	-	-	
						5/21/2021	67	7.2E-09	0.3464	-	-	-	-	
						5/24/2021	70	6.9E-09	0.3568	8.5	8.6	-	-	
						5/28/2021	74	8.1E-09	0.3840	-	-	-	-	
						6/04/2021	81	7.0E-09	0.4176	8.4	8.6	660	1411	
6/11/2021	88	7.6E-09	0.4591	-	-	-	-							
6/17/2021	94	6.4E-09	0.4830	8.3	8.2	-	-							
6/18/2021	95	7.3E-09	0.4929	-	-	-	-							
6/25/2021	102	7.6E-09	0.5356	-	-	-	-							
7/01/2021	108	6.4E-09	0.5602	8.5	8.2	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.4 657 1418

PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com



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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143					7/02/2021	109	7.6E-09	0.5692	-	-	-	-	
						7/09/2021	116	7.0E-09	0.6119	-	-	-	-	
						7/16/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
						7/23/2021	130	7.6E-09	0.6838	-	-	-	-	
						7/30/2021	137	7.0E-09	0.7116	8.6	8.5	-	-	
						8/06/2021	144	6.9E-09	0.7521	-	-	-	-	
						8/13/2021	151	6.7E-09	0.7806	8.5	8.1	-	-	
						8/20/2021	158	8.2E-09	0.8267	-	-	-	-	

PRELIMINARY

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.4 657 1418  
PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com



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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (1-3')	20L149	20.4	105.7	-	-	3/15/2021	0	1.8E-08	0.0911	-	-	-	-		
						3/22/2021	7	1.7E-08	0.0911	8.5	8.1	-	-		
						3/29/2021	14	1.3E-08	0.1666	-	-	-	-		
						3/30/2021	15	1.3E-08	0.1716	8.5	8.3	-	-		
						4/05/2021	21	1.4E-08	0.2192	-	-	-	-		
						4/09/2021	25	1.3E-08	0.2442	8.0	8.1	782	3050		
						4/12/2021	28	1.4E-08	0.2807	-	-	-	-		
						4/16/2021	32	1.3E-08	0.3163	8.2	8.5	-	-		
						4/19/2021	35	1.3E-08	0.3522	-	-	-	-		
						4/26/2021	42	1.1E-08	0.4021	8.0	7.9	-	-		
						5/03/2021	49	1.3E-08	0.4766	8.2	8.5	560	2300		
						5/07/2021	53	1.3E-08	0.5194	-	-	-	-		
						5/12/2021	58	1.2E-08	0.5592	8.1	8.3	-	-		
						5/14/2021	60	1.3E-08	0.5859	-	-	-	-		
						5/21/2021	67	1.2E-08	0.6498	8.3	8.1	-	-		
						5/28/2021	74	1.2E-08	0.7192	8.4	8.2	621	1790		
						6/04/2021	81	1.2E-08	0.7866	-	-	-	-		
						6/11/2021	88	1.2E-08	0.8573	-	-	-	-		
6/14/2021	91	1.1E-08	0.8748	8.3	8.2	-	-								
6/18/2021	95	1.3E-08	0.9204	-	-	-	-								
6/22/2021	99	1.1E-08	0.9495	8.3	8.1	595	1982								
6/25/2021	102	1.3E-08	0.9867	-	-	-	-								
7/01/2021	108	1.1E-08	1.0332	8.5	8.5	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.2 645 2146

PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com



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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	-	-	7/02/2021	109	1.2E-08	1.0459	-	-	-	-	
						7/09/2021	116	1.1E-08	1.1124	8.8	8.4	-	-	
						7/16/2021	123	1.2E-08	1.1811	8.7	8.1	657	1988	
						7/23/2021	130	1.2E-08	1.2542	8.3	8.4	-	-	
						7/30/2021	137	1.2E-08	1.3223	-	-	-	-	
						8/02/2021	140	1.1E-08	1.3400	8.7	8.1	-	-	
						8/06/2021	144	1.2E-08	1.3836	-	-	-	-	
						8/13/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
						8/20/2021	158	1.2E-08	1.5042	-	-	-	-	

Preliminary  
 Report

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 645 2146  
 PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com





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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49)	20L152	36.6	84.2	-	-	3/15/2021	0	2.4E-08	0.0736	-	-	-	-		
						3/22/2021	7	1.9E-08	0.0736	8.2	8.0	-	-		
						3/29/2021	14	2.0E-08	0.1494	8.2	8.1	-	-		
						4/05/2021	21	1.9E-08	0.2090	8.1	8.2	523	1271		
						4/12/2021	28	2.0E-08	0.2804	-	-	-	-		
						4/13/2021	29	2.0E-08	0.2860	8.3	8.3	-	-		
						4/19/2021	35	2.0E-08	0.3546	8.2	8.1	-	-		
						4/26/2021	42	1.9E-08	0.4262	8.1	8.0	578	1313		
						4/30/2021	46	2.2E-08	0.4799	8.4	8.1	-	-		
						5/05/2021	51	2.1E-08	0.5425	8.4	8.2	-	-		
						5/07/2021	53	2.0E-08	0.5706	-	-	-	-		
						5/10/2021	56	1.9E-08	0.6011	8.3	8.0	607	1081		
						5/14/2021	60	2.1E-08	0.6528	-	-	-	-		
						5/19/2021	65	2.1E-08	0.7152	8.0	8.2	-	-		
						5/21/2021	67	2.1E-08	0.7473	-	-	-	-		
						5/24/2021	70	2.1E-08	0.7774	8.2	8.2	666	1197		
						5/28/2021	74	2.2E-08	0.8301	8.3	8.1	-	-		
						6/02/2021	79	2.1E-08	0.8917	8.2	8.2	-	-		
						6/04/2021	81	2.1E-08	0.9222	-	-	-	-		
						6/07/2021	84	2.1E-08	0.9528	8.6	8.3	598	1074		
6/11/2021	88	2.2E-08	1.0062	8.4	8.1	-	-								
6/16/2021	93	2.1E-08	1.0692	8.4	8.0	-	-								
6/18/2021	95	2.1E-08	1.1005	-	-	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.3 8.2 609 1087

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49')	20L152	36.6	84.2	-	-	6/21/2021	98	2.0E-08	1.1309	8.4	8.2	665	944		
						6/25/2021	102	2.2E-08	1.1877	-	-	-	-		
						6/29/2021	106	2.2E-08	1.2408	8.6	8.4	-	-		
						7/02/2021	109	1.9E-08	1.2789	8.6	8.1	618	1000		
						7/07/2021	114	2.0E-08	1.3455	8.1	8.1	-	-		
						7/09/2021	116	2.0E-08	1.3736	-	-	-	-		
						7/13/2021	120	2.1E-08	1.4129	8.3	8.4	-	-		
						7/16/2021	123	2.2E-08	1.4552	-	-	-	-		
						7/19/2021	126	2.0E-08	1.4823	8.2	8.4	612	974		
						7/23/2021	130	2.1E-08	1.5353	8.2	8.1	-	-		
						7/29/2021	136	2.0E-08	1.6059	8.2	8.1	-	-		
						7/30/2021	137	2.1E-08	1.6223	-	-	-	-		
						8/04/2021	142	1.9E-08	1.6722	8.3	8.2	610	933		
						8/06/2021	144	1.8E-08	1.6991	-	-	-	-		
						8/10/2021	148	2.0E-08	1.7386	8.2	8.1	-	-		
						8/13/2021	151	2.1E-08	1.7827	-	-	-	-		
8/16/2021	154	2.2E-08	1.8112	8.3	8.1	-	-								
8/20/2021	158	2.2E-08	1.8678	-	-	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.3 8.2 609 1087

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79)	20L160	20.5	106.6	-	-	3/15/2021	0	2.2E-08	0.1027	-	-	-	-		
						3/22/2021	7	2.1E-08	0.1027	8.5	8.2	-	-		
						3/29/2021	14	1.9E-08	0.1903	8.1	8.2	-	-		
						4/05/2021	21	1.8E-08	0.2806	8.2	8.2	633	1118		
						4/12/2021	28	1.9E-08	0.3709	-	-	-	-		
						4/13/2021	29	1.9E-08	0.3789	8.3	8.1	-	-		
						4/19/2021	35	1.9E-08	0.4651	8.2	8.1	-	-		
						4/26/2021	42	1.8E-08	0.5563	8.4	8.0	648	1027		
						5/03/2021	49	2.0E-08	0.6537	8.5	8.1	-	-		
						5/10/2021	56	1.8E-08	0.7482	8.1	7.8	-	-		
						5/14/2021	60	1.9E-08	0.8117	8.5	8.1	719	980		
						5/20/2021	66	1.9E-08	0.8996	8.6	8.4	-	-		
						5/21/2021	67	1.9E-08	0.9209	-	-	-	-		
						5/25/2021	71	1.9E-08	0.9765	8.1	8.1	-	-		
						5/28/2021	74	2.0E-08	1.0299	8.3	8.2	611	1024		
						6/04/2021	81	1.8E-08	1.1265	8.6	8.0	-	-		
						6/10/2021	87	2.0E-08	1.2169	8.8	8.6	-	-		
						6/11/2021	88	2.0E-08	1.2366	-	-	-	-		
						6/16/2021	93	1.9E-08	1.3037	8.5	8.1	699	927		
						6/18/2021	95	1.9E-08	1.3425	-	-	-	-		
6/22/2021	99	1.8E-08	1.3929	8.2	7.9	-	-								
6/25/2021	102	2.1E-08	1.4542	-	-	-	-								
6/28/2021	105	2.0E-08	1.4939	8.3	8.6	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79)	20L160	20.5	106.6	-	-	7/02/2021	109	2.0E-08	1.5670	8.2	7.8	-	-		
						7/08/2021	115	1.9E-08	1.6590	8.2	8.2	735	816		
						7/09/2021	116	1.8E-08	1.6784	-	-	-	-		
						7/14/2021	121	1.9E-08	1.7482	8.3	8.1	-	-		
						7/16/2021	123	1.8E-08	1.7795	-	-	-	-		
						7/20/2021	127	1.9E-08	1.8074	8.2	8.2	-	-		
						7/23/2021	130	2.0E-08	1.8619	-	-	-	-		
						7/27/2021	134	1.9E-08	1.9098	8.7	8.2	681	862		
						7/30/2021	137	1.8E-08	1.9593	-	-	-	-		
						8/03/2021	141	1.6E-08	1.9998	8.4	8.3	-	-		
						8/06/2021	144	1.7E-08	2.0456	-	-	-	-		
						8/10/2021	148	1.7E-08	2.0883	8.1	8.1	-	-		
						8/13/2021	151	1.9E-08	2.1392	-	-	-	-		
						8/16/2021	154	2.0E-08	2.1745	8.1	8.1	714	817		
						8/20/2021	158	1.9E-08	2.2383	-	-	-	-		

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49)	20L164	42.1	80.7	-		3/15/2021	0	2.7E-08	0.0636	-	-	-	-		
						3/19/2021	4	3.1E-08	0.0636	8.6	8.4	-	-		
						3/22/2021	7	2.9E-08	0.1133	-	-	-	-		
						3/24/2021	9	3.1E-08	0.1358	8.7	8.2	-	-		
						3/29/2021	14	2.5E-08	0.2018	8.4	8.3	565	910		
						4/02/2021	18	2.3E-08	0.2600	8.5	8.1	-	-		
						4/05/2021	21	2.4E-08	0.3038	-	-	-	-		
						4/07/2021	23	2.4E-08	0.3234	7.9	8.0	-	-		
						4/12/2021	28	2.6E-08	0.3905	-	-	-	-		
						4/13/2021	29	2.6E-08	0.3978	7.7	8.0	661	930		
						4/19/2021	35	2.5E-08	0.4718	8.0	8.0	-	-		
						4/23/2021	39	2.6E-08	0.5303	8.5	8.7	-	-		
						4/26/2021	42	2.5E-08	0.5757	-	-	-	-		
						4/27/2021	43	2.6E-08	0.5880	8.1	8.0	586	823		
						5/03/2021	49	2.7E-08	0.6796	8.4	8.1	-	-		
						5/07/2021	53	2.7E-08	0.7380	8.7	8.1	-	-		
						5/12/2021	58	2.6E-08	0.8059	8.3	8.1	518	788		
						5/14/2021	60	2.6E-08	0.8380	-	-	-	-		
						5/17/2021	63	2.6E-08	0.8719	8.2	8.2	-	-		
						5/21/2021	67	2.6E-08	0.9310	7.7	7.8	-	-		
5/25/2021	71	2.7E-08	0.9895	7.8	7.8	584	746								
5/28/2021	74	2.7E-08	1.0384	7.8	8.0	-	-								
6/01/2021	78	2.7E-08	1.0976	7.9	7.9	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.2 8.1 625 778

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49)	20L164	42.1	80.7	-	-	6/04/2021	81	2.7E-08	1.1447	8.0	7.9	586	778		
						6/08/2021	85	2.7E-08	1.2046	8.1	8.2	-	-		
						6/11/2021	88	2.7E-08	1.2536	8.2	8.1	-	-		
						6/15/2021	92	2.7E-08	1.3129	8.2	8.2	730	597		
						6/18/2021	95	2.6E-08	1.3630	8.1	8.2	-	-		
						6/23/2021	100	2.6E-08	1.4333	8.4	8.3	-	-		
						6/25/2021	102	2.8E-08	1.4724	-	-	-	-		
						6/28/2021	105	2.7E-08	1.5088	8.5	8.3	650	774		
						7/02/2021	109	2.7E-08	1.5703	8.2	7.8	-	-		
						7/06/2021	113	2.7E-08	1.6320	8.3	8.4	-	-		
						7/09/2021	116	2.6E-08	1.6795	8.5	8.1	710	830		
						7/14/2021	121	2.6E-08	1.7543	8.3	8.2	-	-		
						7/16/2021	123	2.9E-08	1.7946	-	-	-	-		
						7/19/2021	126	2.8E-08	1.8287	8.3	8.2	-	-		
						7/23/2021	130	2.7E-08	1.8868	8.4	8.2	651	734		
						7/28/2021	135	2.7E-08	1.9561	8.2	8.2	-	-		
						7/30/2021	137	2.6E-08	1.9925	-	-	-	-		
						8/03/2021	141	2.4E-08	2.0346	8.3	8.2	-	-		
8/06/2021	144	2.5E-08	2.0800	-	-	-	-								
8/09/2021	147	2.5E-08	2.1094	8.3	8.2	651	749								
8/13/2021	151	2.7E-08	2.1691	8.1	8.1	-	-								
8/17/2021	155	2.8E-08	2.2325	8.3	8.3	-	-								
8/20/2021	158	2.8E-08	2.2807	8.3	8.2	611	671								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.2 8.1 625 778

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89)	20L172	21.6	107.5	-	-	3/15/2021	0	1.7E-08	0.0905	-	-	-	-		
						3/22/2021	7	1.6E-08	0.0905	8.4	8.0	-	-		
						3/29/2021	14	1.5E-08	0.1730	-	-	-	-		
						3/30/2021	15	1.5E-08	0.1794	8.4	8.3	-	-		
						4/02/2021	18	1.6E-08	0.2136	8.5	8.4	605	2010		
						4/05/2021	21	1.6E-08	0.2577	-	-	-	-		
						4/09/2021	25	1.5E-08	0.2972	7.9	8.0	-	-		
						4/12/2021	28	1.6E-08	0.3419	-	-	-	-		
						4/16/2021	32	1.6E-08	0.3816	8.6	8.5	-	-		
						4/19/2021	35	1.6E-08	0.4302	-	-	-	-		
						4/23/2021	39	1.4E-08	0.4658	8.5	8.3	676	1372		
						4/26/2021	42	1.1E-08	0.4844	-	-	-	-		
						5/05/2021	51	7.8E-09	0.5510	8.5	8.2	-	-		
						5/07/2021	53	1.2E-08	0.5830	-	-	-	-		
						5/12/2021	58	1.5E-08	0.6371	8.5	8.3	-	-		
						5/14/2021	60	1.6E-08	0.6685	-	-	-	-		
						5/18/2021	64	1.6E-08	0.7166	8.3	8.2	697	1569		
						5/21/2021	67	1.4E-08	0.7643	-	-	-	-		
5/24/2021	70	1.3E-08	0.7968	8.4	8.3	-	-								
5/28/2021	74	1.8E-08	0.8590	8.5	8.1	-	-								
6/04/2021	81	1.5E-08	0.9471	8.3	8.2	760	1192								
6/11/2021	88	1.6E-08	1.0343	8.2	8.5	-	-								
6/18/2021	95	1.5E-08	1.1243	8.1	8.4	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 678 1341

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89)	20L172	21.6	107.5			6/24/2021	101	1.6E-08	1.2048	8.6	8.0	679	1067		
						6/25/2021	102	1.6E-08	1.2226	-	-	-	-		
						6/29/2021	106	1.6E-08	1.2773	8.3	8.0	-	-		
						7/02/2021	109	1.6E-08	1.3251	-	-	-	-		
						7/06/2021	113	1.6E-08	1.3731	8.6	8.1	-	-		
						7/09/2021	116	1.5E-08	1.4176	-	-	-	-		
						7/13/2021	120	1.5E-08	1.4573	8.3	8.3	598	1134		
						7/16/2021	123	1.6E-08	1.5039	-	-	-	-		
						7/21/2021	128	1.5E-08	1.5523	8.2	8.1	-	-		
						7/23/2021	130	1.5E-08	1.5831	-	-	-	-		
						7/28/2021	135	1.5E-08	1.6370	8.1	8.1	-	-		
						7/30/2021	137	1.4E-08	1.6636	-	-	-	-		
						8/06/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040		
						8/13/2021	151	1.4E-08	1.7722	8.1	8.1	-	-		
						8/20/2021	158	1.5E-08	1.8667	8.2	8.1	-	-		

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.2 678 1341

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**Test Results Summary**  
**Compatibility Test Results as of August 20, 2021**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information														Remarks
		Initial Conditions				Specific Gravity	Date Test Started	Date Comp Started (Injection)	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Total Volume	Volume of Pores							In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(cm3)	(cm3)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B1-ST-1 (7-9')	20L143	26.7	98.1	145.8	62.5	2.750	1/29/2021	3/15/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
									151	6.7E-09	0.7806	8.5	8.1	-	-	
									158	8.2E-09	0.8267	-	-	-	-	
B2-ST-1 (1-3')	20L149	20.4	105.7	144.9	57.1	2.796	2/12/2021	3/15/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
									158	1.2E-08	1.5042	-	-	-	-	
B2-ST-4 (47-49')	20L152	36.6	84.2	146.8	75.6	2.781	2/12/2021	3/15/2021	142	1.9E-08	1.6722	8.3	8.2	610	933	
									154	2.2E-08	1.8113	8.3	8.1	-	-	
									158	2.2E-08	1.8678	-	-	-	-	
B3-ST-5 (77-79')	20L160	20.5	106.6	149.0	55.1	2.709	2/12/2021	3/15/2021	154	2.0E-08	2.1745	8.1	8.1	714	817	
									158	1.9E-08	2.2383	-	-	-	-	
B4-ST-3 (47-49')	20L164	42.1	80.7	143.2	77.0	2.795	2/12/2021	3/15/2021	158	2.8E-08	2.2807	8.3	8.2	611	671	
B5-ST-5 (87-89')	20L172	21.6	107.5	146.2	54.3	2.740	2/20/2021	3/15/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040	
									158	1.5E-08	1.8667	8.2	8.1	-	-	

Notes: 1- Based on Specimen Initial Conditions.

2- Based on average of four readings.

Average:

8.3

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**Appendix L**  
**Groundwater Protection Standard**  
**Calculations**

## Technical Memorandum

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**Date:** November 24, 2021

**To:** Chris Scieszka, DTE Electric Company

**From:** Vince Buening, TRC  
Sarah Holmstrom, TRC  
Kristin Lowery, TRC

**Project No.:** 413591.0003.0000 Phase 1 Task 1

**Subject:** Groundwater Protection Standard Calculation – DTE Electric Company, Belle River Power Plant Bottom Ash Basins

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DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Belle River Power Plant (BRPP) Bottom Ash Basins (BABs) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule<sup>1</sup> (“Part B”) that allows a facility to prepare demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the BRPP BABs remain in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)<sup>2</sup>, the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the BRPP BABs CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the BRPP BABs from August 2016 through September 2017, as part of

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<sup>1</sup> On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

<sup>2</sup> As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

## Technical Memorandum

initiating the detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to September 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the BRPP BABs were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Per the Stats Plan, the BRPP BABs CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL. The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for BRPP BABs includes MW-16-01, MW-16-02, MW-16-03, MW-16-04, and MW-16-09. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of nondetects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

### Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum

## Technical Memorandum

included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. Data collected at MW-16-09 on 7/24/2017 were found to be anomalous due to high turbidity in the sample. Monitoring well MW-16-09 was resampled on 7/25/2017 with acceptable turbidity; therefore, the 7/24/2017 data was rejected and replaced with the 7/25/2017 data. The remaining data were found to be complete and usable for the purposes of the CCR monitoring program.

### Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix IV parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

### Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

As noted above, data collected at MW-16-09 on 7/24/2017 was found to be anomalous due to high turbidity in the sample. Therefore, these data were removed from the background data set and replaced with acceptable data from 7/25/2017. Outlier removal from the background data set is summarized in Table 1.

### Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 2.

### Tolerance Limits

Table 2 presents the calculated UTLs for the background/baseline data sets. As discussed above, the BRPP BABs CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For non-normal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

## Technical Memorandum

### Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 3.

### Attachments

Table 1 – Summary of Outlier Evaluation

Table 2 – Summary of Descriptive Statistics and Tolerance Limit Calculations

Table 3 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

# Technical Memorandum

## Tables

**Table 1**  
 Summary of Outlier Evaluation  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Antimony	ug/L	MW-16-09	7/24/2017	< 2.0	High turbidity in sample; results replaced by 7/25/2017 sample
Arsenic	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Barium	ug/L	MW-16-09	7/24/2017	310	High turbidity in sample; results replaced by 7/25/2017 sample
Beryllium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Cadmium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Chromium	ug/L	MW-16-09	7/24/2017	18	High turbidity in sample; results replaced by 7/25/2017 sample
Cobalt	ug/L	MW-16-09	7/24/2017	6.3	High turbidity in sample; results replaced by 7/25/2017 sample
Fluoride	mg/L	MW-16-09	7/24/2017	1.6	High turbidity in sample; results replaced by 7/25/2017 sample
Lead	ug/L	MW-16-09	7/24/2017	5	High turbidity in sample; results replaced by 7/25/2017 sample
Lithium	ug/L	MW-16-09	7/24/2017	57	High turbidity in sample; results replaced by 7/25/2017 sample
Mercury	ug/L	MW-16-09	7/24/2017	< 0.20	High turbidity in sample; results replaced by 7/25/2017 sample
Molybdenum	ug/L	MW-16-09	7/24/2017	66	High turbidity in sample; results replaced by 7/25/2017 sample
Radium-226/228	pCi/L	MW-16-09	7/24/2017	1.67	High turbidity in sample; results replaced by 7/25/2017 sample
Selenium	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Thallium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample

**Notes:**

ug/L = micrograms per liter

mg/L = milligrams per liter

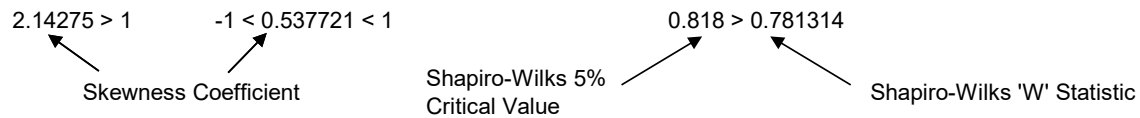
pCi/L = picocuries per liter



**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Antimony (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	2.0
MW-16-02		100% Non-Detect			N	PQL	2.0
MW-16-03		100% Non-Detect			N	PQL	2.0
MW-16-04		100% Non-Detect			N	PQL	2.0
MW-16-09		100% Non-Detect			Y	PQL	2.0
<b>Arsenic (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	5.0
MW-16-02		100% Non-Detect			N	PQL	5.0
MW-16-03		100% Non-Detect			N	PQL	5.0
MW-16-04		> 50% Non-Detect			N	Non-Parametric	7.0
MW-16-09		> 50% Non-Detect			Y	Non-Parametric	7.2
<b>Barium (ug/L)</b>							
MW-16-01	1 < 1.93433	1 < 1.85565	0.829 > 0.647993	0.829 > 0.665248	N	Non-Parametric	300
MW-16-02	1 < 1.09096	1 < 1.04324	0.829 > 0.778715	0.829 > 0.789832	N	Non-Parametric	330
MW-16-03	-1.40422 < -1	-1.4678 < -1	0.818 > 0.800797	0.818 > 0.787552	N	Non-Parametric	310
MW-16-04	1 < 1.50819	1 < 1.41108	0.829 > 0.737494	0.829 > 0.756518	N	Non-Parametric	440
MW-16-09	-1 < -0.562075 < 1	--	--	--	Y	Parametric	330
<b>Beryllium (ug/L)</b>							
MW-16-01		> 50% Non-Detect			N	Non-Parametric	2.8
MW-16-02		> 50% Non-Detect			N	Non-Parametric	2.8
MW-16-03		100% Non-Detect			N	PQL	1.0
MW-16-04		> 50% Non-Detect			N	Non-Parametric	1.0
MW-16-09		100% Non-Detect			Y	PQL	1.0

**Notes:**

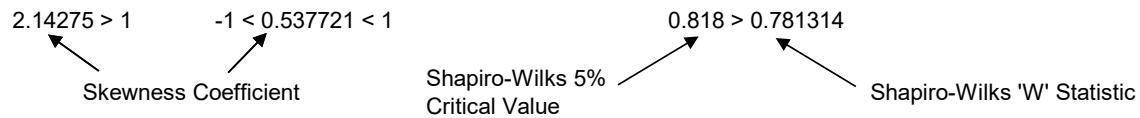


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Cadmium (ug/L)</b>							
MW-16-01			100% Non-Detect		N	PQL	1.0
MW-16-02			100% Non-Detect		N	PQL	1.0
MW-16-03			100% Non-Detect		N	PQL	1.0
MW-16-04			100% Non-Detect		N	PQL	1.0
MW-16-09			100% Non-Detect		Y	PQL	1.0
<b>Chromium (ug/L)</b>							
MW-16-01			> 50% Non-Detect		N	Non-Parametric	13
MW-16-02			> 50% Non-Detect		N	Non-Parametric	19
MW-16-03			100% Non-Detect		N	PQL	2.0
MW-16-04	1 < 1.19014	1 < 1.01083	0.829 > 0.703824	0.829 > 0.772663	N	Non-Parametric	27
MW-16-09	-1 < -0.0757045 < 1	--	--	--	Y	Parametric	25
<b>Cobalt (ug/L)</b>							
MW-16-01			> 50% Non-Detect		N	Non-Parametric	3.6
MW-16-02			> 50% Non-Detect		N	Non-Parametric	3.9
MW-16-03			100% Non-Detect		N	PQL	1.0
MW-16-04	1 < 1.05578	-1 < 0.709812 < 1	--	--	N	Parametric	13
MW-16-09	-1 < 0.577785 < 1	--	--	--	Y	Parametric	7.7
<b>Fluoride (mg/L)</b>							
MW-16-01	-1 < -0.926404 < 1	--	--	--	N	Parametric	2.0
MW-16-02	-1 < -0.531685 < 1	--	--	--	N	Parametric	1.4
MW-16-03	-1 < -0.534079 < 1	--	--	--	N	Parametric	2.0
MW-16-04	-1 < -0.959228 < 1	--	--	--	N	Parametric	1.9
MW-16-09	-1 < -0.838747 < 1	--	--	--	Y	Parametric	1.8

**Notes:**

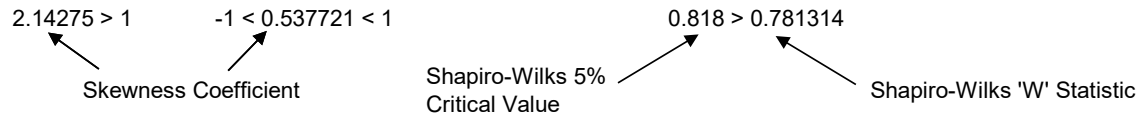


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**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Lead (ug/L)</b>							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	3.5
MW-16-02	> 50% Non-Detect				N	Non-Parametric	2.9
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	1 < 1.03004	-1 < 0.630363 < 1	--	--	N	Parametric	12
MW-16-09	-1 < 0.692648 < 1	--	--	--	Y	Parametric	6.9
<b>Lithium (ug/L)</b>							
MW-16-01	1 < 1.09646	-1 < -0.656345 < 1	--	--	N	Parametric	42
MW-16-02	1 < 1.83731	1 < 1.66952	0.829 > 0.693604	0.829 > 0.735502	N	Non-Parametric	19
MW-16-03	-1 < -0.163822 < 1	--	--	--	N	Parametric	24
MW-16-04	1 < 1.69658	1 < 1.51405	0.829 > 0.748153	0.829 > 0.790765	N	Non-Parametric	37
MW-16-09	-1 < 0.201671 < 1	--	--	--	Y	Parametric	65
<b>Mercury (ug/L)</b>							
MW-16-01	100% Non-Detect				N	PQL	0.20
MW-16-02	100% Non-Detect				N	PQL	0.20
MW-16-03	100% Non-Detect				N	PQL	0.20
MW-16-04	100% Non-Detect				N	PQL	0.20
MW-16-09	100% Non-Detect				Y	PQL	0.20
<b>Molybdenum (ug/L)</b>							
MW-16-01	-1 < 0.522804 < 1	--	--	--	N	Parametric	96
MW-16-02	1 < 2.33768	1 < 2.23139	0.829 > 0.55159	0.829 > 0.606275	N	Non-Parametric	65
MW-16-03	-1 < -0.738383 < 1	--	--	--	N	Parametric	110
MW-16-04	-1 < 0.881343 < 1	--	--	--	N	Parametric	120
MW-16-09	-1 < -0.202509 < 1	--	--	--	Y	Parametric	69

**Notes:**

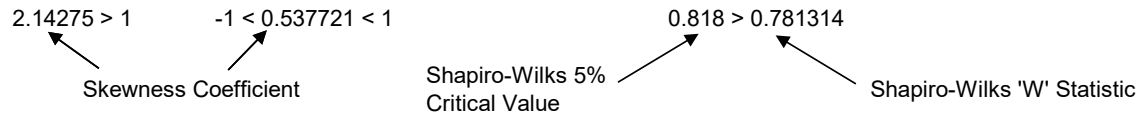


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**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Radium 226/228 (pCi/L)</b>							
MW-16-01	-1 < 0.444198 < 1	--	--	--	N	Parametric	2.36
MW-16-02	1 < 1.14403	-1 < 0.68333 < 1	--	--	N	Parametric	3.63
MW-16-03	1 < 1.45519	-1 < 0.909563 < 1	--	--	N	Parametric	4.87
MW-16-04	-1 < 0.379575 < 1	--	--	--	N	Parametric	3.49
MW-16-09	-1 < 0.00907827 < 1	--	--	--	Y	Parametric	4.14
<b>Selenium (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	5.0
MW-16-02		100% Non-Detect			N	PQL	5.0
MW-16-03		100% Non-Detect			N	PQL	5.0
MW-16-04		100% Non-Detect			N	PQL	5.0
MW-16-09		100% Non-Detect			Y	PQL	5.0
<b>Thallium (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	1.0
MW-16-02		100% Non-Detect			N	PQL	1.0
MW-16-03		100% Non-Detect			N	PQL	1.0
MW-16-04		100% Non-Detect			N	PQL	1.0
MW-16-09		100% Non-Detect			Y	PQL	1.0

**Notes:**



PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 3**  
 Summary of Groundwater Protection Standards  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>
Arsenic	ug/L	MCL	10	5.0	<b>10</b>	5.0	<b>10</b>	5.0	<b>10</b>	7.0	<b>10</b>	7.2	<b>10</b>
Barium	ug/L	MCL	2,000	300	<b>2,000</b>	330	<b>2,000</b>	310	<b>2,000</b>	440	<b>2,000</b>	330	<b>2,000</b>
Beryllium	ug/L	MCL	4	2.8	<b>4.0</b>	2.8	<b>4.0</b>	1.0	<b>4.0</b>	1.0	<b>4.0</b>	1.0	<b>4.0</b>
Cadmium	ug/L	MCL	5	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>
Chromium	ug/L	MCL	100	13	<b>100</b>	19	<b>100</b>	2.0	<b>100</b>	27	<b>100</b>	25	<b>100</b>
Cobalt	ug/L	Background or RSL	6	3.6	<b>6.0</b>	3.9	<b>6.0</b>	1.0	<b>6.0</b>	13	<b>13</b>	7.7	<b>7.7</b>
Fluoride	mg/L	MCL	4	2.0	<b>4.0</b>	1.4	<b>4.0</b>	2.0	<b>4.0</b>	1.9	<b>4.0</b>	1.8	<b>4.0</b>
Lead	ug/L	RSL	15	3.5	<b>15</b>	2.9	<b>15</b>	1.0	<b>15</b>	12	<b>15</b>	6.9	<b>15</b>
Lithium	ug/L	Background or RSL	40	42	<b>42</b>	19	<b>40</b>	24	<b>40</b>	37	<b>40</b>	65	<b>65</b>
Mercury	ug/L	MCL	2	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>
Molybdenum	ug/L	Background or RSL	100	96	<b>100</b>	65	<b>100</b>	110	<b>110</b>	120	<b>120</b>	69	<b>100</b>
Radium-226/228	pCi/L	MCL	5	2.36	<b>5.00</b>	3.63	<b>5.00</b>	4.87	<b>5.00</b>	3.49	<b>5.00</b>	4.14	<b>5.00</b>
Selenium	ug/L	MCL	50	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>
Thallium	ug/L	MCL	2	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

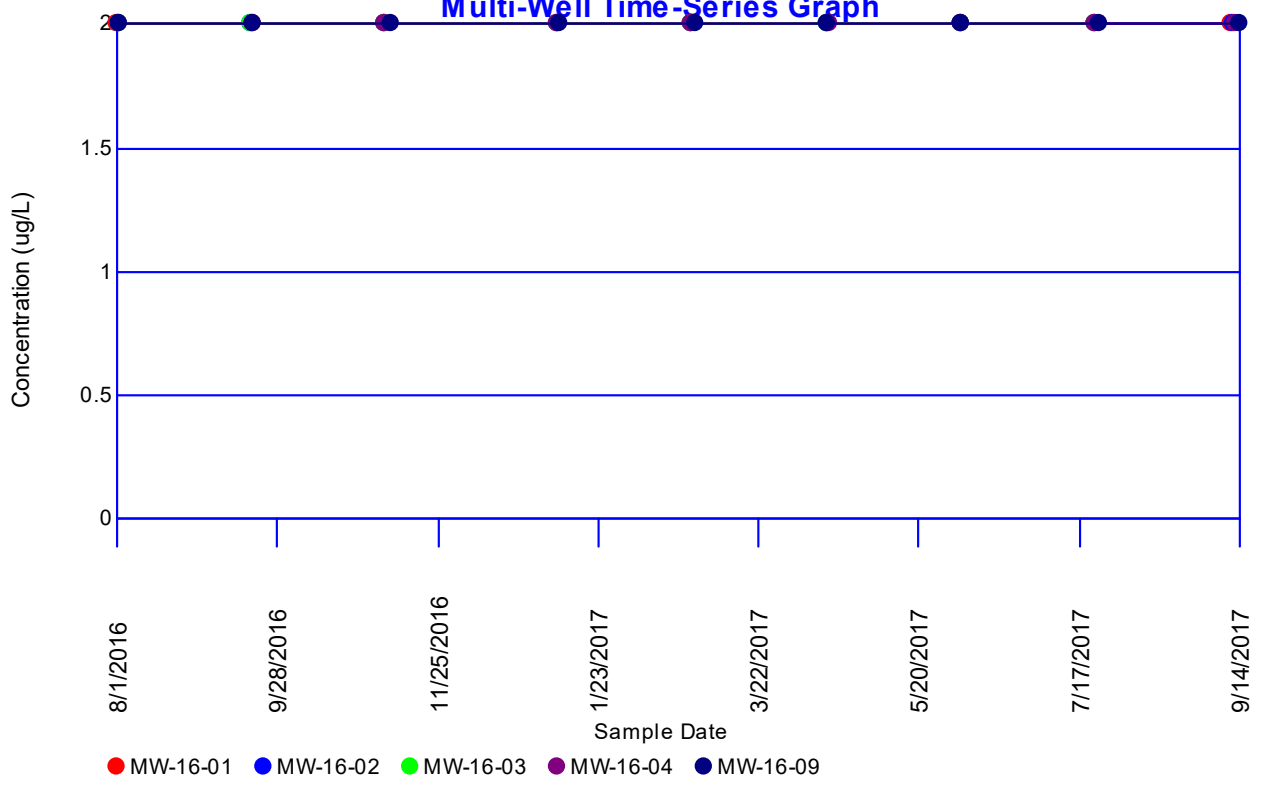
pCi/L = picocuries per liter

## Technical Memorandum

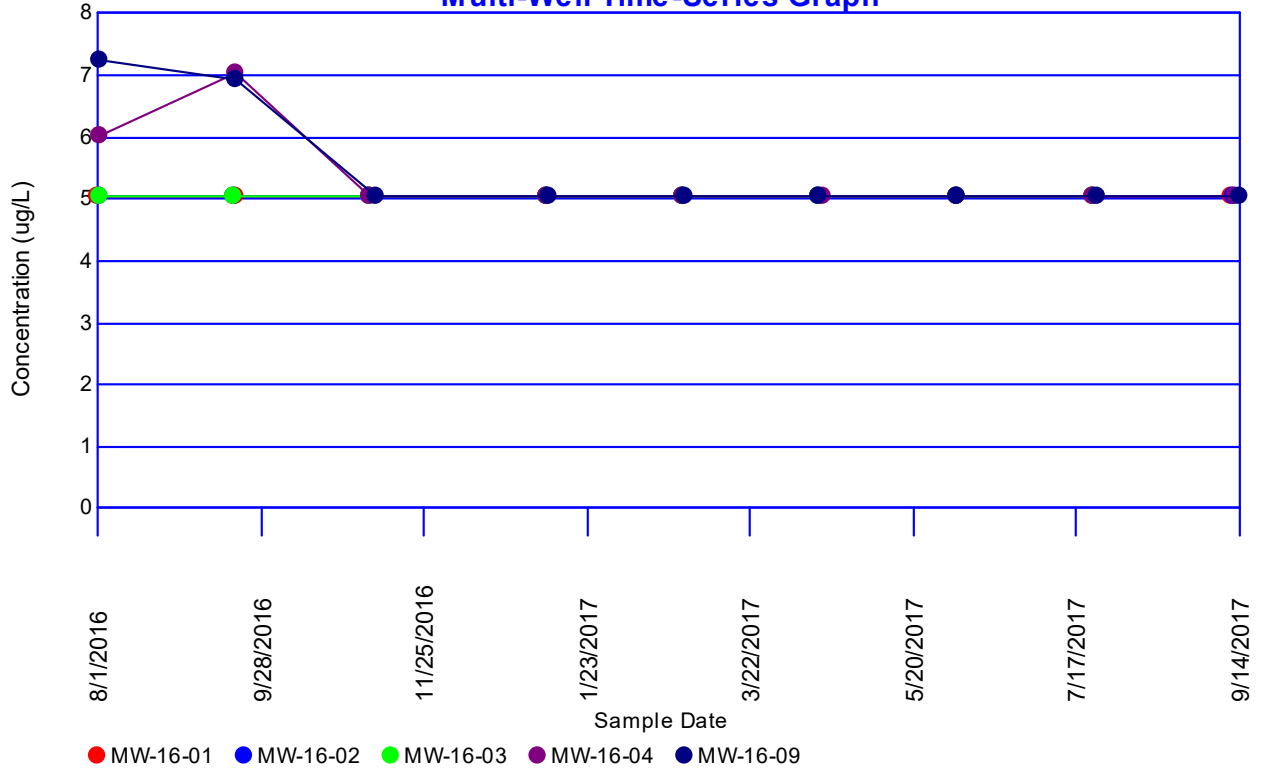
# Attachment A ChemStat™ Outputs

# Antimony

## Multi-Well Time-Series Graph

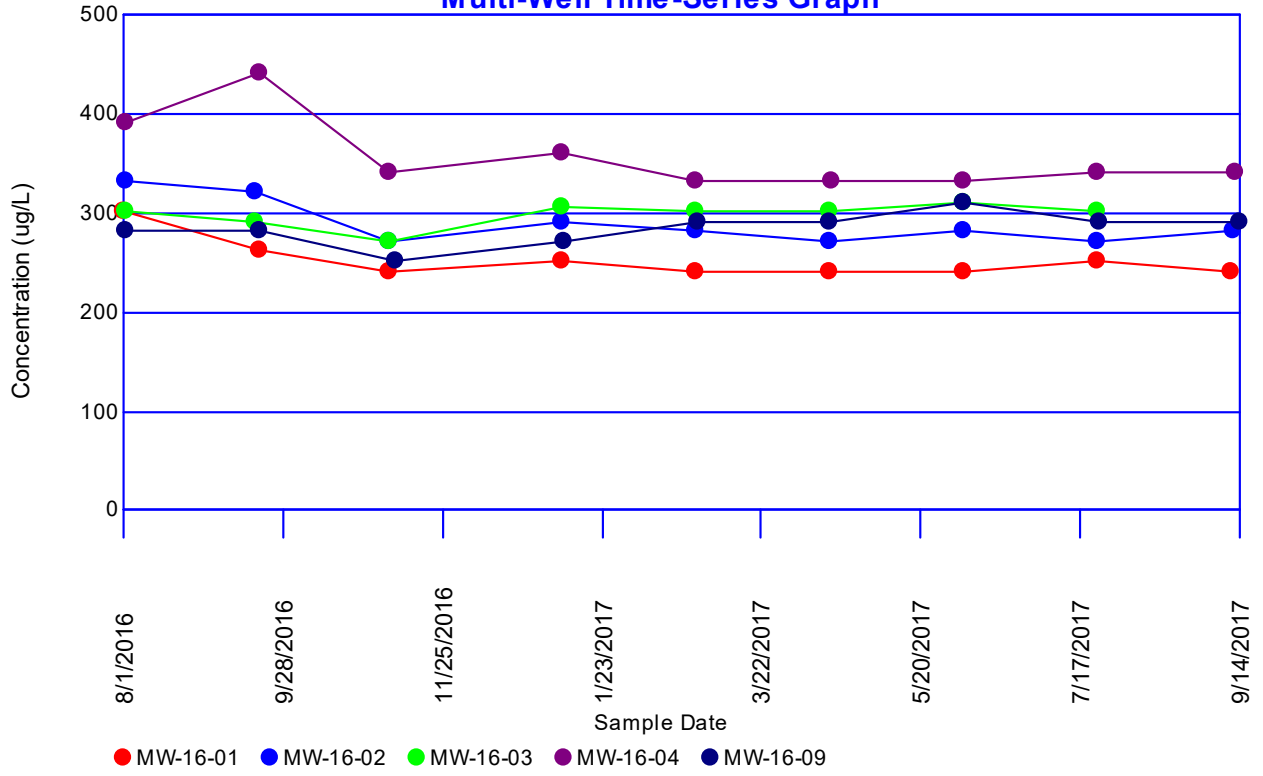


# Arsenic Multi-Well Time-Series Graph

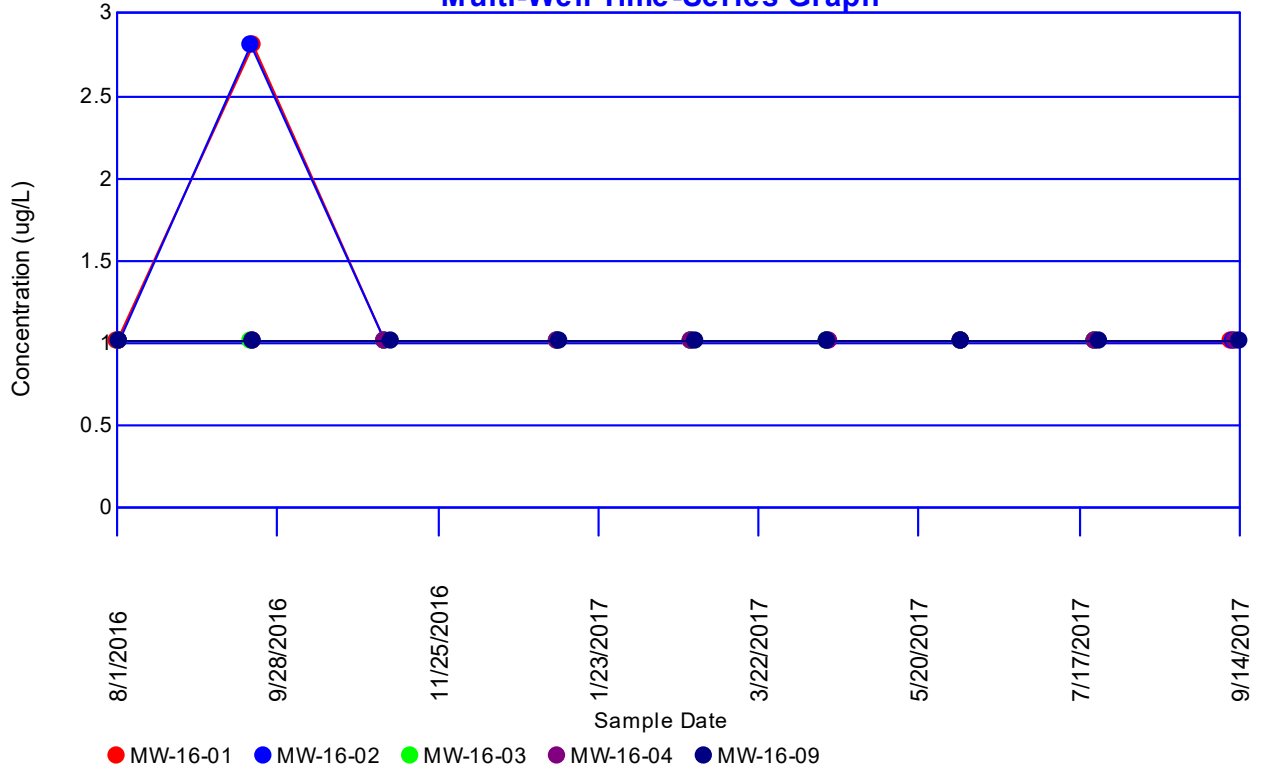




# Barium Multi-Well Time-Series Graph

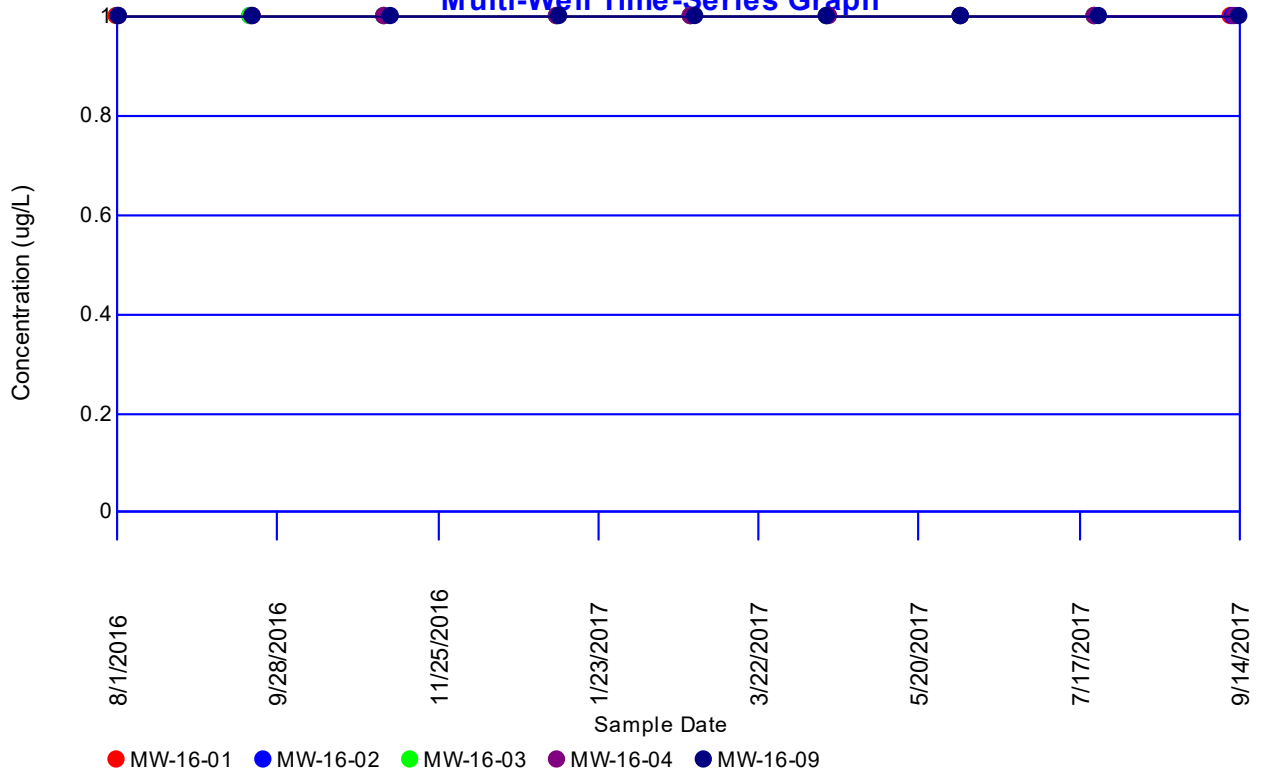


# Beryllium Multi-Well Time-Series Graph

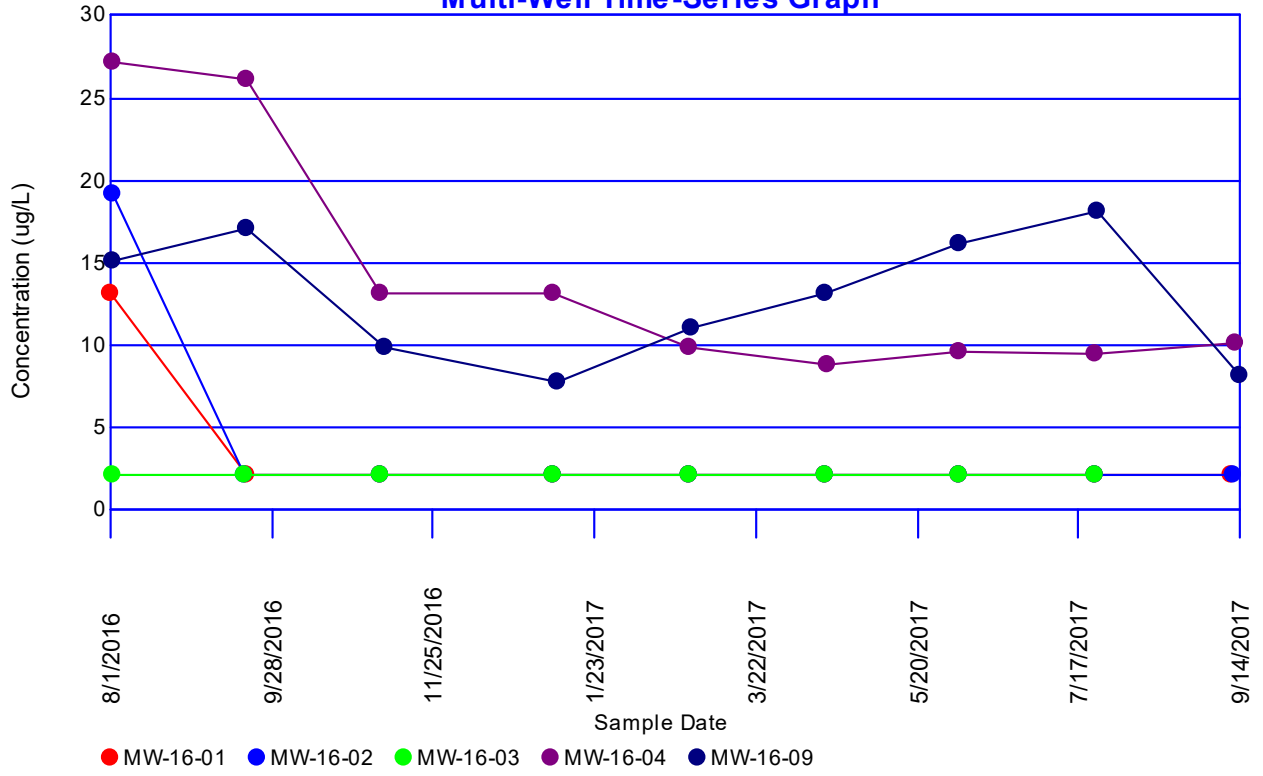


# Cadmium

## Multi-Well Time-Series Graph

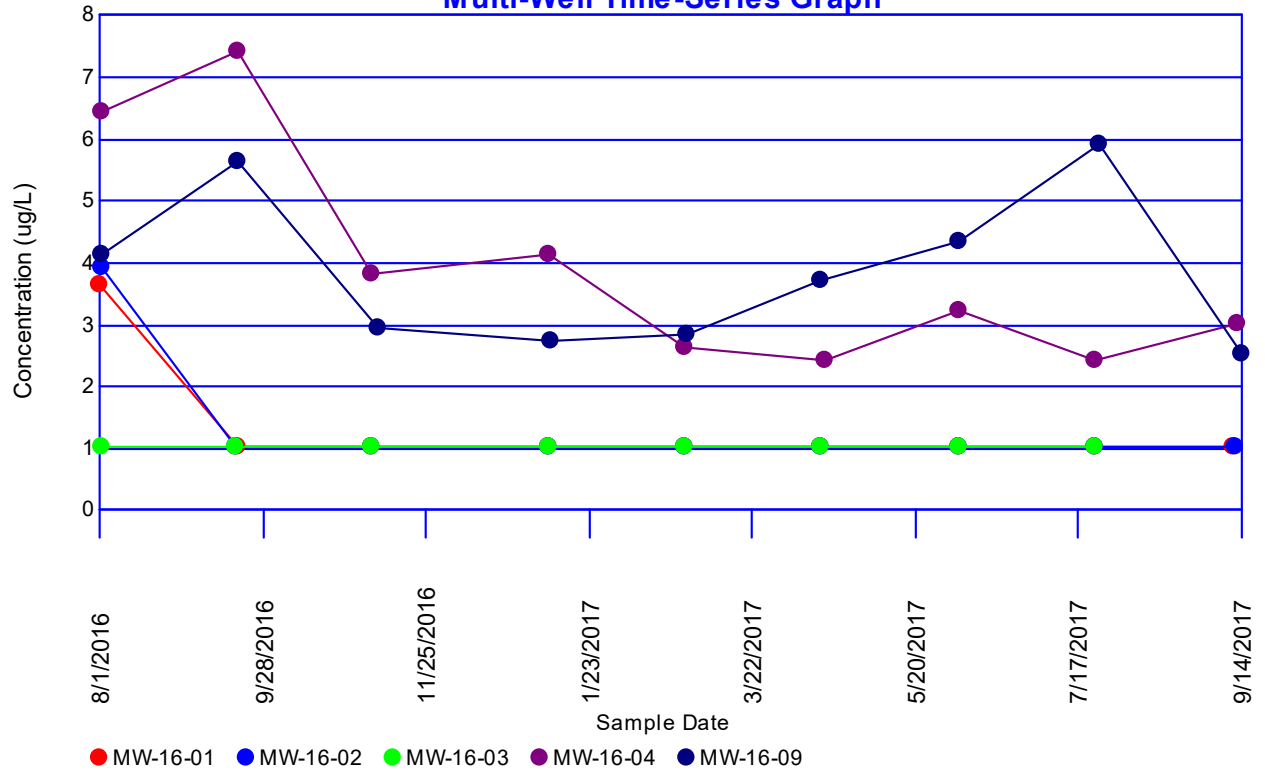


# Chromium Multi-Well Time-Series Graph

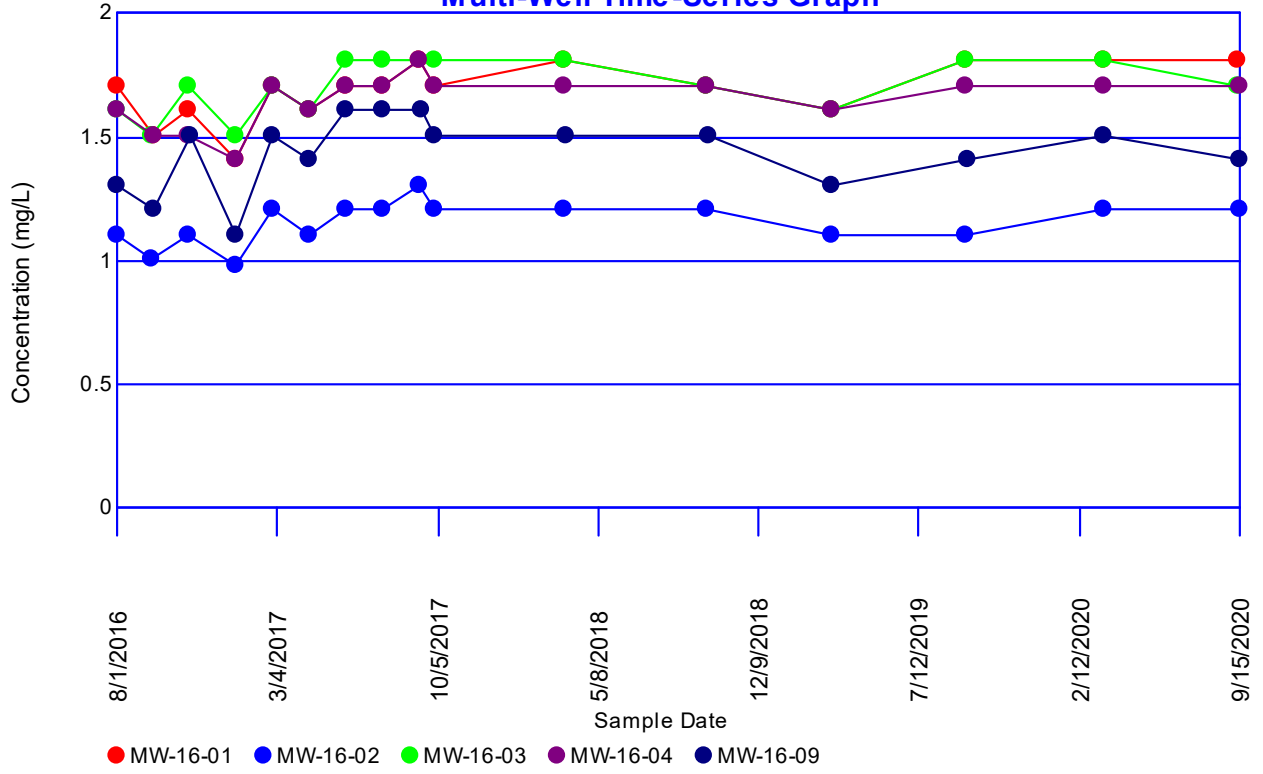


# Cobalt

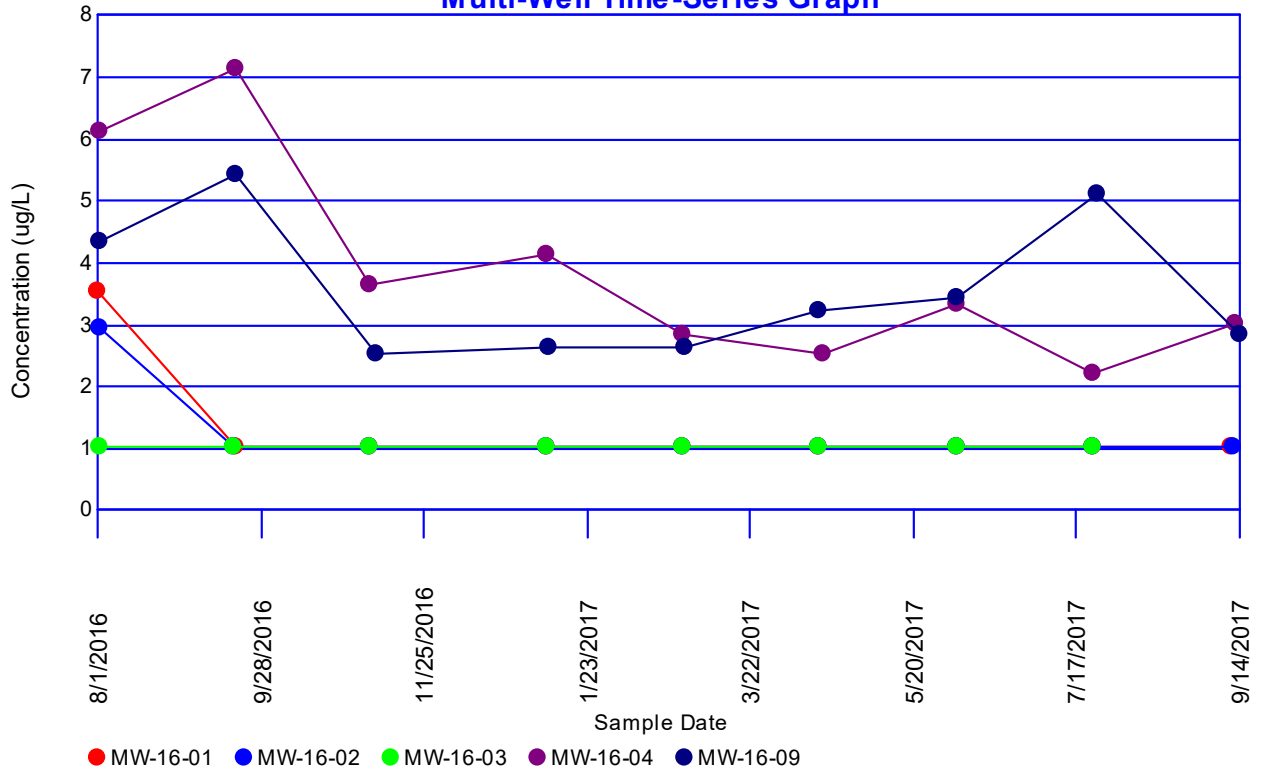
## Multi-Well Time-Series Graph



# Fluoride Multi-Well Time-Series Graph

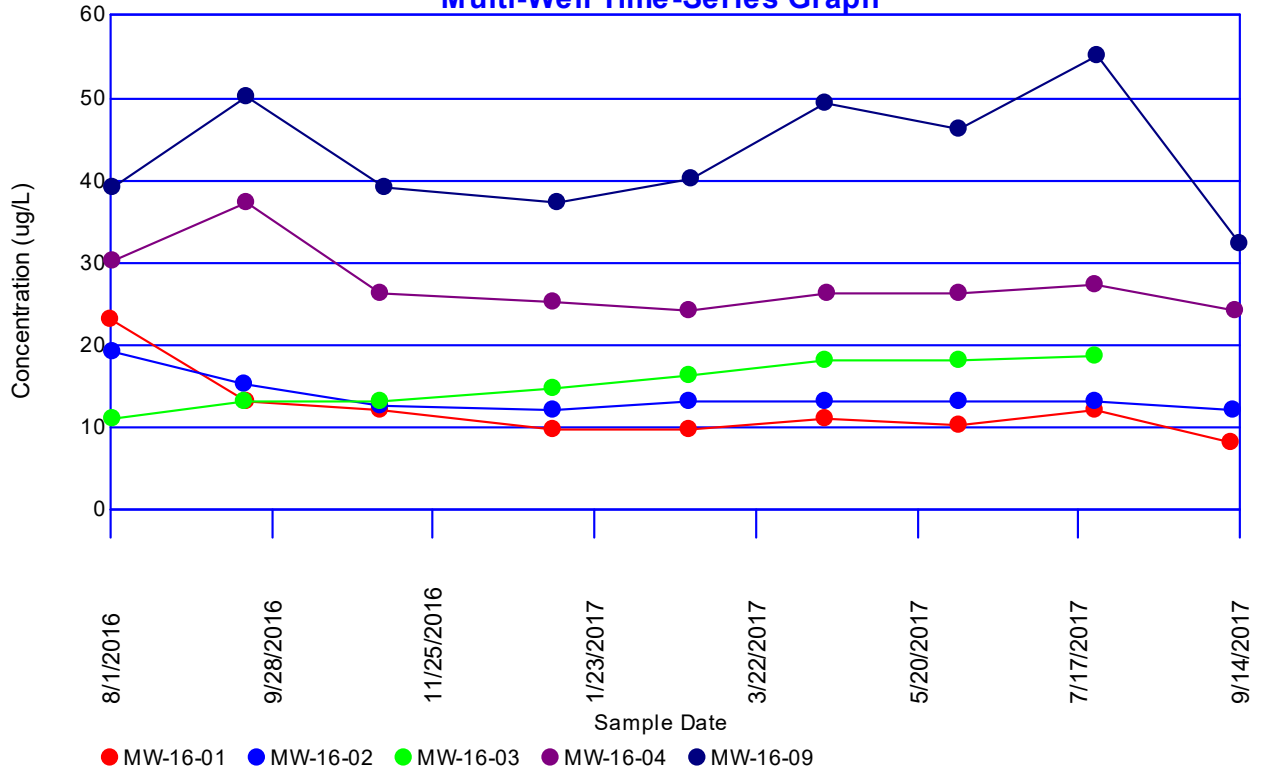


# Lead Multi-Well Time-Series Graph



# Lithium

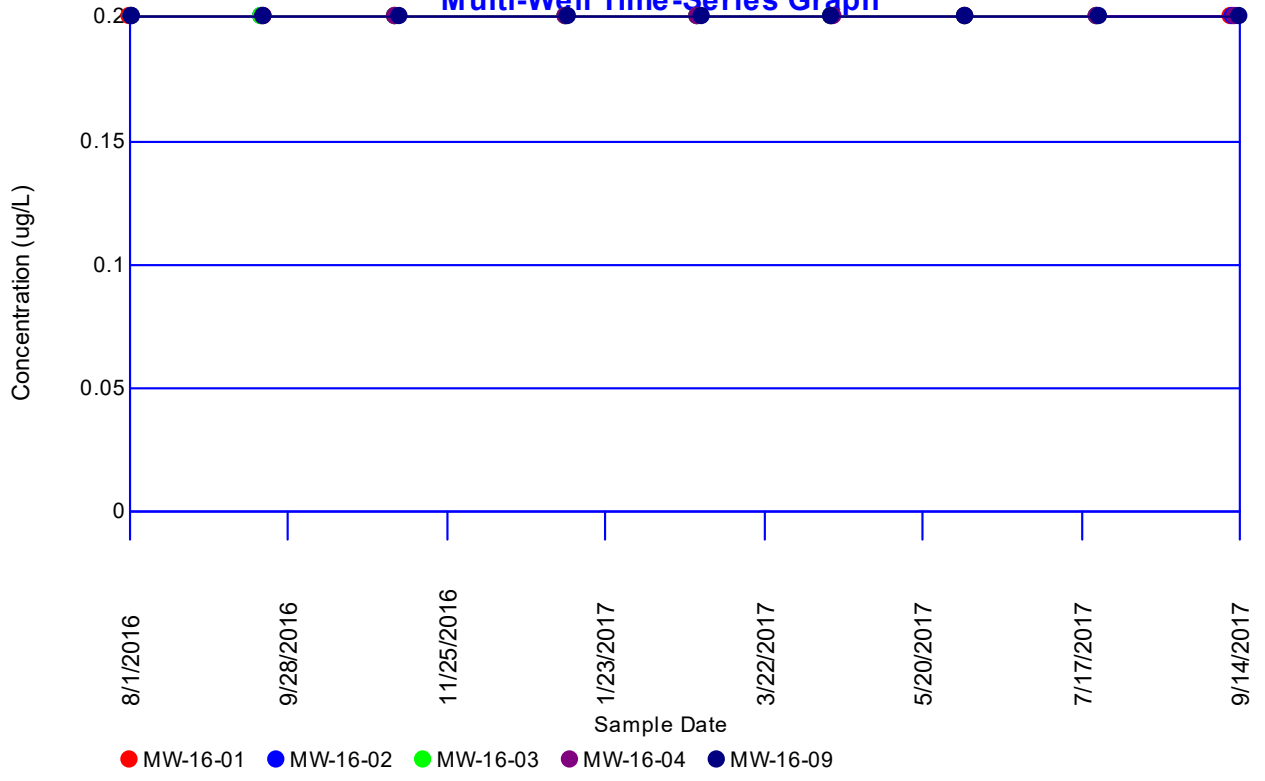
## Multi-Well Time-Series Graph



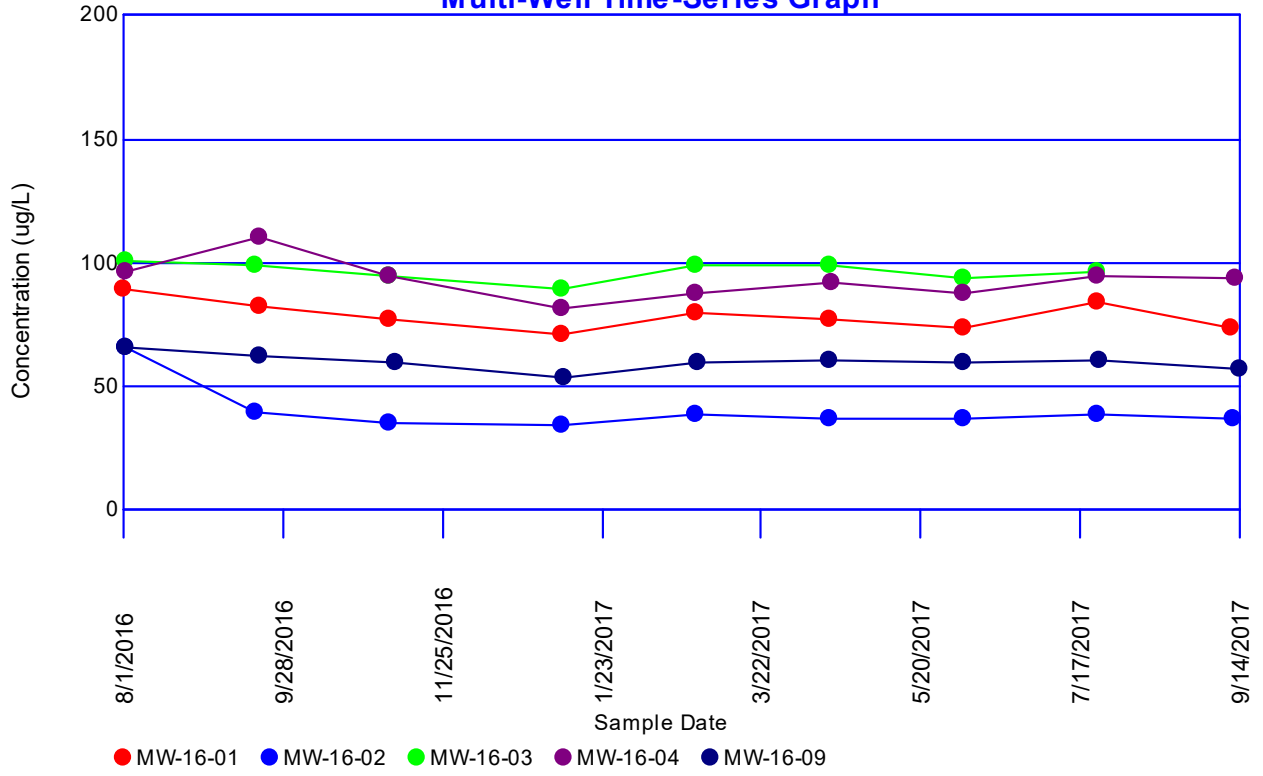


# Mercury

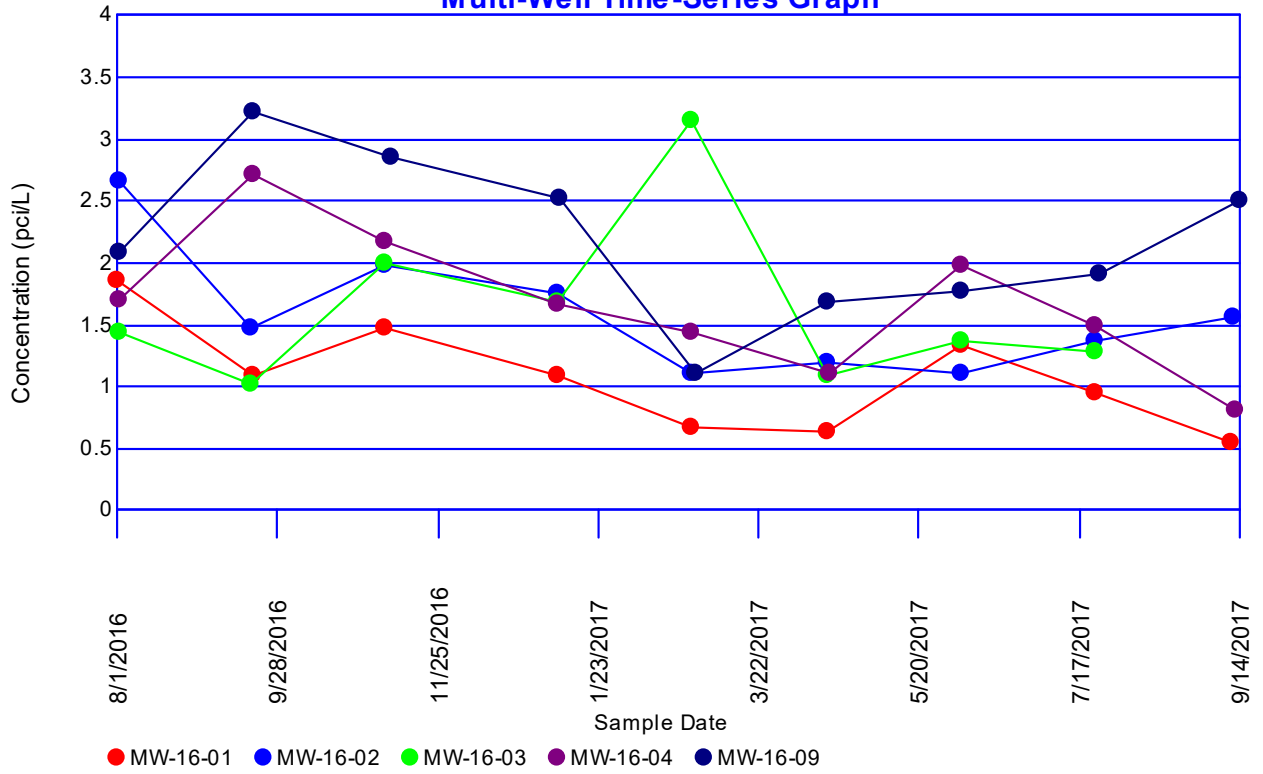
## Multi-Well Time-Series Graph



# Molybdenum Multi-Well Time-Series Graph

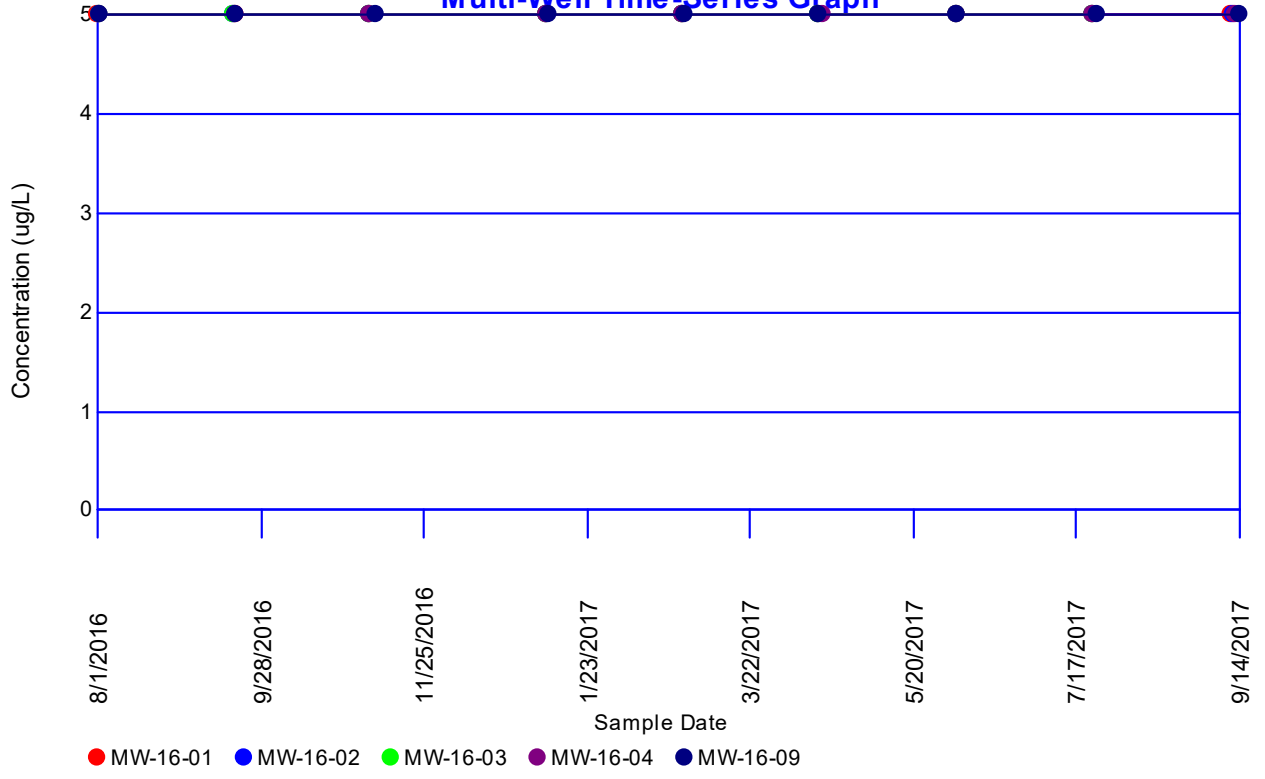


# Radium-226/228 Multi-Well Time-Series Graph



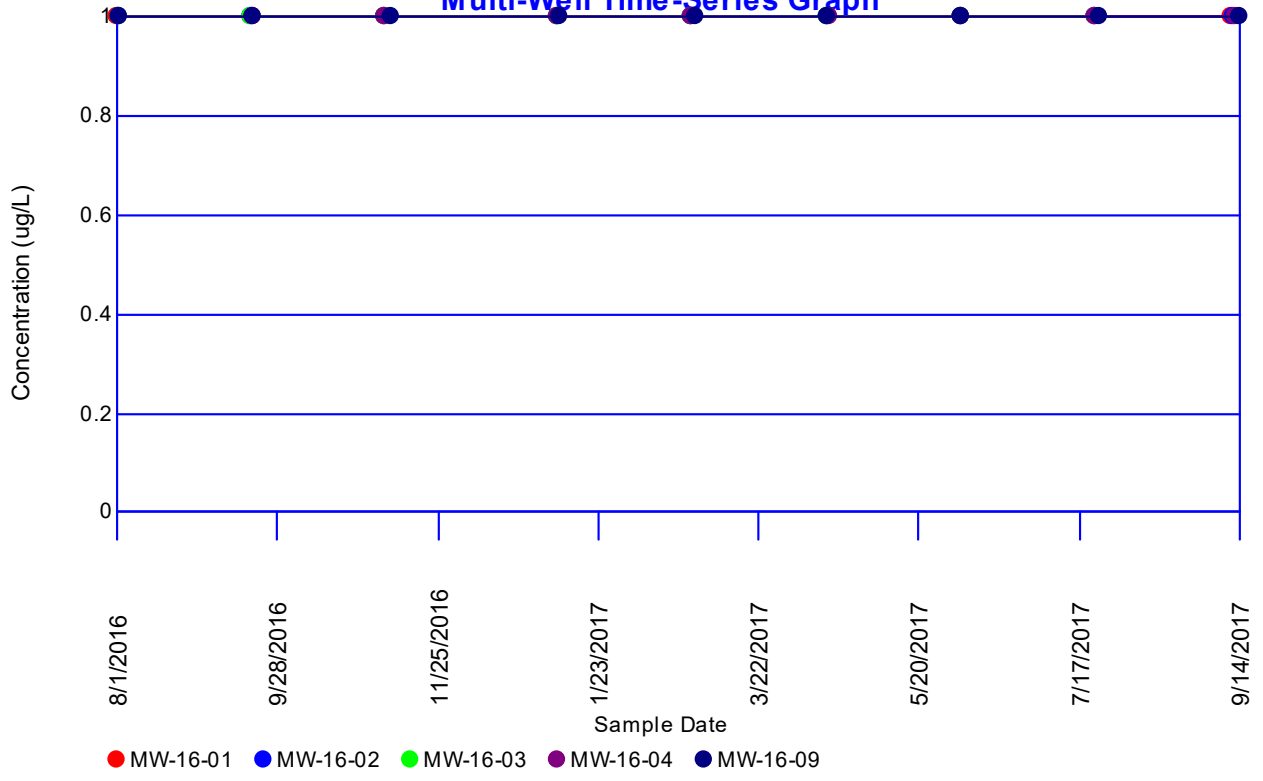
# Selenium

## Multi-Well Time-Series Graph



# Thallium

## Multi-Well Time-Series Graph



## Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	9 (100%)	8/1/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U

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MW-16-02	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U

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MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U

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MW-16-04	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/18/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/13/2017	ND<2 U	ND<2 U

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MW-16-09	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/9/2016	ND<2 U	ND<2 U
			1/10/2017	ND<2 U	ND<2 U
			2/28/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/25/2017	ND<2 U	ND<2 U
			9/14/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 40

Percent Non-Detects: 90.9091%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
MW-16-04	9	7 (77.7778%)	8/2/2016	6	6
			9/20/2016	7	7
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/18/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/13/2017	ND<5 U	ND<5 U
MW-16-09	9	7 (77.7778%)	8/2/2016	7.2	7.2
			9/20/2016	6.9	6.9
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U



There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	300	300
			9/20/2016	260	260
			11/7/2016	240	240
			1/9/2017	250	250
			2/27/2017	240	240
			4/17/2017	240	240
			6/5/2017	240	240
			7/24/2017	250	250
			9/11/2017	240	240
MW-16-02	9	0 (0%)	8/2/2016	330	330
			9/19/2016	320	320
			11/7/2016 ~	270	270
			1/9/2017	290	290
			2/27/2017	280	280
			4/17/2017	270	270
			6/5/2017	280	280
			7/24/2017	270	270
			9/12/2017	280	280
MW-16-03	8	0 (0%)	8/2/2016	300	300
			9/19/2016 ~	290	290
			11/7/2016	270	270
			1/9/2017 ~	305	305
			2/27/2017 ~	300	300
			4/17/2017 ~	300	300
			6/5/2017	310	310
			7/24/2017 ~	300	300
MW-16-04	9	0 (0%)	8/2/2016	390	390
			9/20/2016	440	440
			11/7/2016	340	340
			1/9/2017	360	360
			2/27/2017	330	330
			4/18/2017	330	330
			6/5/2017	330	330
			7/24/2017	340	340
			9/13/2017	340	340
MW-16-09	9	0 (0%)	8/2/2016	280	280
			9/20/2016	280	280
			11/9/2016	250	250
			1/10/2017	270	270
			2/28/2017	290	290
			4/17/2017	290	290
			6/5/2017	310	310
			7/25/2017	290	290
			9/14/2017	290	290
			7/24/2017	310	310

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 41

Percent Non-Detects: 93.1818%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	2.8	2.8
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	2.8	2.8
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U^	ND<1 U^
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	1	1
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U^	ND<1 U^
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			<b>7/24/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U

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MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U

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MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U

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MW-16-04	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U

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MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U

---

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	13	13
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U
MW-16-02	9	8 (88.8889%)	8/2/2016	19	19
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U
MW-16-04	9	0 (0%)	8/2/2016	27	27
			9/20/2016	26	26
			11/7/2016	13	13
			1/9/2017	13	13
			2/27/2017	9.8	9.8
			4/18/2017	8.7	8.7
			6/5/2017	9.5	9.5
			7/24/2017	9.4	9.4
			9/13/2017	10	10
MW-16-09	9	0 (0%)	8/2/2016	15	15
			9/20/2016	17	17
			11/9/2016	9.8	9.8
			1/10/2017	7.6	7.6
			2/28/2017	11	11
			4/17/2017	13	13
			6/5/2017	16	16
			7/25/2017	18	18
			9/14/2017	8	8
			<b>7/24/2017</b>	<b>18</b>	<b>18</b>



There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	8 (88.8889%)	8/1/2016	3.6	3.6
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U

---

MW-16-02	9	8 (88.8889%)	8/2/2016	3.9	3.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U

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MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U

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MW-16-04	9	0 (0%)	8/2/2016	6.4	6.4
			9/20/2016	7.4	7.4
			11/7/2016	3.8	3.8
			1/9/2017	4.1	4.1
			2/27/2017	2.6	2.6
			4/18/2017	2.4	2.4
			6/5/2017	3.2	3.2
			7/24/2017	2.4	2.4
			9/13/2017	3	3

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MW-16-09	9	0 (0%)	8/2/2016	4.1	4.1
			9/20/2016	5.6	5.6
			11/9/2016	2.9	2.9
			1/10/2017	2.7	2.7
			2/28/2017	2.8	2.8
			4/17/2017	3.7	3.7
			6/5/2017	4.3	4.3
			7/25/2017	5.9	5.9
			9/14/2017	2.5	2.5
			<b>7/24/2017</b>	<b>6.3</b>	<b>6.3</b>

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 79

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	16	0 (0%)	8/1/2016	1.7	1.7
			9/20/2016	1.5	1.5
			11/7/2016	1.6	1.6
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/17/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/11/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.8	1.8
			10/1/2018	1.7	1.7
			3/18/2019 ~	1.6	1.6
			9/16/2019 ~	1.8	1.8
			3/17/2020 ~	1.8	1.8
			9/14/2020 ~	1.8	1.8
MW-16-02	16	0 (0%)	8/2/2016	1.1	1.1
			9/19/2016	1	1
			11/7/2016 ~	1.1	1.1
			1/9/2017	0.97	0.97
			2/27/2017	1.2	1.2
			4/17/2017	1.1	1.1
			6/5/2017	1.2	1.2
			7/24/2017	1.2	1.2
			9/12/2017	1.3	1.3
			10/2/2017	1.2	1.2
			3/26/2018	1.2	1.2
			10/1/2018	1.2	1.2
			3/18/2019	1.1	1.1
			9/16/2019	1.1	1.1
3/17/2020	1.2	1.2			
9/15/2020	1.2	1.2			
MW-16-03	15	0 (0%)	8/2/2016	1.6	1.6
			9/19/2016 ~	1.5	1.5
			11/7/2016	1.7	1.7
			1/9/2017 ~	1.5	1.5
			2/27/2017 ~	1.7	1.7
			4/17/2017 ~	1.6	1.6
			6/5/2017	1.8	1.8
			7/24/2017 ~	1.8	1.8
			10/2/2017	1.8	1.8
			3/26/2018	1.8	1.8
			10/1/2018 ~	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.8	1.8
			3/17/2020	1.8	1.8
			9/14/2020	1.7	1.7

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MW-16-04	16	0 (0%)	8/2/2016	1.6	1.6
			9/20/2016	1.5	1.5
			11/7/2016	1.5	1.5
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/18/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/13/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.7	1.7
			10/1/2018	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.7	1.7
			3/17/2020	1.7	1.7
			9/15/2020	1.7	1.7

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MW-16-09	16	0 (0%)	8/2/2016	1.3	1.3
			9/20/2016	1.2	1.2
			11/9/2016	1.5	1.5
			1/10/2017	1.1	1.1
			2/28/2017	1.5	1.5
			4/17/2017	1.4	1.4
			6/5/2017	1.6	1.6
			7/25/2017	1.6	1.6
			9/14/2017	1.6	1.6
			10/3/2017 ~	1.5	1.5
			3/27/2018	1.5	1.5
			10/4/2018	1.5	1.5
			3/20/2019	1.3	1.3
			9/17/2019	1.4	1.4
			3/19/2020	1.5	1.5
			9/15/2020	1.4	1.4
			<b>7/24/2017</b>	<b>1.6</b>	<b>1.6</b>

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There are 0 unused locations

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Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	8 (88.8889%)	8/1/2016	3.5	3.5
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U

---

MW-16-02	9	8 (88.8889%)	8/2/2016	2.9	2.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U

---

MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U

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MW-16-04	9	0 (0%)	8/2/2016	6.1	6.1
			9/20/2016	7.1	7.1
			11/7/2016	3.6	3.6
			1/9/2017	4.1	4.1
			2/27/2017	2.8	2.8
			4/18/2017	2.5	2.5
			6/5/2017	3.3	3.3
			7/24/2017	2.2	2.2
			9/13/2017	3	3

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MW-16-09	9	0 (0%)	8/2/2016	4.3	4.3
			9/20/2016	5.4	5.4
			11/9/2016	2.5	2.5
			1/10/2017	2.6	2.6
			2/28/2017	2.6	2.6
			4/17/2017	3.2	3.2
			6/5/2017	3.4	3.4
			7/25/2017	5.1	5.1
			9/14/2017	2.8	2.8
			<b>7/24/2017</b>	<b>5</b>	<b>5</b>

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 1

Percent Non-Detects: 2.27273%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	1 (11.1111%)	8/1/2016	23	23
			9/20/2016	13	13
			11/7/2016	12	12
			1/9/2017	9.5	9.5
			2/27/2017	9.6	9.6
			4/17/2017	11	11
			6/5/2017	10	10
			7/24/2017	12	12
			9/11/2017	ND<8 U	ND<8 U

---

MW-16-02	9	0 (0%)	8/2/2016	19	19
			9/19/2016	15	15
			11/7/2016 ~	12.5	12.5
			1/9/2017	12	12
			2/27/2017	13	13
			4/17/2017	13	13
			6/5/2017	13	13
			7/24/2017	13	13
			9/12/2017	12	12

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MW-16-03	8	0 (0%)	8/2/2016	11	11
			9/19/2016 ~	13	13
			11/7/2016	13	13
			1/9/2017 ~	14.5	14.5
			2/27/2017 ~	16	16
			4/17/2017 ~	18	18
			6/5/2017	18	18
			7/24/2017 ~	18.5	18.5

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MW-16-04	9	0 (0%)	8/2/2016	30	30
			9/20/2016	37	37
			11/7/2016	26	26
			1/9/2017	25	25
			2/27/2017	24	24
			4/18/2017	26	26
			6/5/2017	26	26
			7/24/2017	27	27
			9/13/2017	24	24

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MW-16-09	9	0 (0%)	8/2/2016	39	39
			9/20/2016	50	50
			11/9/2016	39	39
			1/10/2017	37	37
			2/28/2017	40	40
			4/17/2017	49	49
			6/5/2017	46	46
			7/25/2017	55	55
			9/14/2017	32	32
			7/24/2017	57	57

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	9 (100%)	8/1/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/11/2017	ND<0.2 U	ND<0.2 U

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MW-16-02	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016	ND<0.2 U	ND<0.2 U
			11/7/2016 ~	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/12/2017	ND<0.2 U	ND<0.2 U

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MW-16-03	8	8 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016 ~	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017 ~	ND<0.2 U	ND<0.2 U
			2/27/2017 ~	ND<0.2 U	ND<0.2 U
			4/17/2017 ~	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017 ~	ND<0.2 U	ND<0.2 U

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MW-16-04	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/18/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/13/2017	ND<0.2 U	ND<0.2 U

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MW-16-09	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/9/2016	ND<0.2 U	ND<0.2 U
			1/10/2017	ND<0.2 U	ND<0.2 U
			2/28/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/25/2017	ND<0.2 U	ND<0.2 U
			9/14/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	0 (0%)	8/1/2016	89	89
			9/20/2016	82	82
			11/7/2016	76	76
			1/9/2017	70	70
			2/27/2017	79	79
			4/17/2017	76	76
			6/5/2017	73	73
			7/24/2017	83	83
			9/11/2017	73	73

---

MW-16-02	9	0 (0%)	8/2/2016	65	65
			9/19/2016	39	39
			11/7/2016 ~	34.5	34.5
			1/9/2017	34	34
			2/27/2017	38	38
			4/17/2017	36	36
			6/5/2017	36	36
			7/24/2017	38	38
			9/12/2017	36	36

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MW-16-03	8	0 (0%)	8/2/2016	100	100
			9/19/2016 ~	98.5	98.5
			11/7/2016	94	94
			1/9/2017 ~	89	89
			2/27/2017 ~	98.5	98.5
			4/17/2017 ~	98	98
			6/5/2017	93	93
			7/24/2017 ~	96	96

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MW-16-04	9	0 (0%)	8/2/2016	96	96
			9/20/2016	110	110
			11/7/2016	94	94
			1/9/2017	81	81
			2/27/2017	87	87
			4/18/2017	91	91
			6/5/2017	87	87
			7/24/2017	94	94
			9/13/2017	93	93

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MW-16-09	9	0 (0%)	8/2/2016	65	65
			9/20/2016	62	62
			11/9/2016	59	59
			1/10/2017	53	53
			2/28/2017	59	59
			4/17/2017	60	60
			6/5/2017	59	59
			7/25/2017	60	60
			9/14/2017	56	56
			7/24/2017	66	66

---

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 1

Percent Non-Detects: 2.27273%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	1.84	1.84
			9/20/2016	1.07	1.07
			11/7/2016	1.46	1.46
			1/9/2017	1.08	1.08
			2/27/2017	0.656	0.656
			4/17/2017	0.619	0.619
			6/5/2017	1.32	1.32
			7/24/2017	0.942	0.942
			9/11/2017	0.536	0.536
MW-16-02	9	0 (0%)	8/2/2016	2.65	2.65
			9/19/2016	1.46	1.46
			11/7/2016 ~	1.96	1.96
			1/9/2017	1.73	1.73
			2/27/2017	1.1	1.1
			4/17/2017	1.18	1.18
			6/5/2017	1.1	1.1
			7/24/2017	1.35	1.35
			9/12/2017	1.55	1.55
MW-16-03	8	0 (0%)	8/2/2016	1.43	1.43
			9/19/2016 ~	1.008	1.008
			11/7/2016	1.98	1.98
			1/9/2017 ~	1.66	1.66
			2/27/2017 ~	3.1365	3.1365
			4/17/2017 ~	1.074	1.074
			6/5/2017	1.36	1.36
			7/24/2017 ~	1.26	1.26
MW-16-04	9	1 (11.1111%)	8/2/2016	1.69	1.69
			9/20/2016	2.7	2.7
			11/7/2016	2.16	2.16
			1/9/2017	ND<1.65 U	ND<1.65 U
			2/27/2017	1.43	1.43
			4/18/2017	1.09	1.09
			6/5/2017	1.97	1.97
			7/24/2017	1.47	1.47
			9/13/2017	0.802	0.802
MW-16-09	9	0 (0%)	8/2/2016	2.07	2.07
			9/20/2016	3.2	3.2
			11/9/2016	2.83	2.83
			1/10/2017	2.51	2.51
			2/28/2017	1.1	1.1
			4/17/2017	1.67	1.67
			6/5/2017	1.75	1.75
			7/25/2017	1.9	1.9
			9/14/2017	2.49	2.49
			7/24/2017	1.67	1.67

There are 0 unused locations

---

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
			MW-16-04	9	9 (100%)
9/20/2016	ND<5 U	ND<5 U			
11/7/2016	ND<5 U	ND<5 U			
1/9/2017	ND<5 U	ND<5 U			
2/27/2017	ND<5 U	ND<5 U			
4/18/2017	ND<5 U	ND<5 U			
6/5/2017	ND<5 U	ND<5 U			
7/24/2017	ND<5 U	ND<5 U			
9/13/2017	ND<5 U	ND<5 U			
MW-16-09	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U



There are 0 unused locations

---

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

---

Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U

---

MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U

---

MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U

---

MW-16-04	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U

---

MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U

---

There are 0 unused locations

---

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	251.111	19.6497	1.93433
MW-16-02	9	287.778	22.2361	1.09096
MW-16-03	8	296.875	12.2292	-1.40422
MW-16-04	9	355.556	37.1184	1.50819
MW-16-09	9	283.333	16.5831	-0.562075

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	294.886	41.3084	1.14494

## Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	5.5234	0.0733807	1.85565
MW-16-02	9	5.65966	0.0745478	1.04324
MW-16-03	8	5.69254	0.0424051	-1.4678
MW-16-04	9	5.86924	0.0978708	1.41108
MW-16-09	9	5.64506	0.0596884	-0.725993

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	5.67765	0.133294	0.658393

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	240	300	60	0.5888	35.328
2	240	260	20	0.3244	6.488
3	240	250	10	0.1976	1.976
4	240	250	10	0.0947	0.947
5	240	240	0		
6	250	240	-10		
7	250	240	-10		
8	260	240	-20		
9	300	240	-60		

---

Sum of b values = 44.739

Sample Standard Deviation = 19.6497

W Statistic = 0.647993

**5% Critical value of 0.829 exceeds 0.647993**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.647993**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.48064	5.70378	0.223144	0.5888	0.131387
2	5.48064	5.56068	0.0800427	0.3244	0.0259659
3	5.48064	5.52146	0.040822	0.1976	0.00806643
4	5.48064	5.52146	0.040822	0.0947	0.00386584
5	5.48064	5.48064	0		
6	5.52146	5.48064	-0.040822		
7	5.52146	5.48064	-0.040822		
8	5.56068	5.48064	-0.0800427		
9	5.70378	5.48064	-0.223144		

---

Sum of b values = 0.169285

Sample Standard Deviation = 0.0733807

W Statistic = 0.665248

**5% Critical value of 0.829 exceeds 0.665248**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.665248**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	270	330	60	0.5888	35.328
2	270	320	50	0.3244	16.22
3	270	290	20	0.1976	3.952
4	280	280	0	0.0947	0
5	280	280	0		
6	280	280	0		
7	290	270	-20		
8	320	270	-50		
9	330	270	-60		

---

Sum of b values = 55.5

Sample Standard Deviation = 22.2361

W Statistic = 0.778715

**5% Critical value of 0.829 exceeds 0.778715**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.778715  
Data is normally distributed at 99% level of significance



## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.79909	0.200671	0.5888	0.118155
2	5.59842	5.76832	0.169899	0.3244	0.0551152
3	5.59842	5.66988	0.071459	0.1976	0.0141203
4	5.63479	5.63479	0	0.0947	0
5	5.63479	5.63479	0		
6	5.63479	5.63479	0		
7	5.66988	5.59842	-0.071459		
8	5.76832	5.59842	-0.169899		
9	5.79909	5.59842	-0.200671		

---

Sum of b values = 0.18739

Sample Standard Deviation = 0.0745478

W Statistic = 0.789832

**5% Critical value of 0.829 exceeds 0.789832**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.789832  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	270	310	40	0.6052	24.208
2	290	305	15	0.3164	4.746
3	300	300	0	0.1743	0
4	300	300	0	0.0561	0
5	300	300	0		
6	300	300	0		
7	305	290	-15		
8	310	270	-40		

---

Sum of b values = 28.954

Sample Standard Deviation = 12.2292

W Statistic = 0.800797

**5% Critical value of 0.818 exceeds 0.800797**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.800797  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.73657	0.13815	0.6052	0.0836086
2	5.66988	5.72031	0.0504309	0.3164	0.0159563
3	5.70378	5.70378	0	0.1743	0
4	5.70378	5.70378	0	0.0561	0
5	5.70378	5.70378	0		
6	5.70378	5.70378	0		
7	5.72031	5.66988	-0.0504309		
8	5.73657	5.59842	-0.13815		

---

Sum of b values = 0.0995649

Sample Standard Deviation = 0.0424051

W Statistic = 0.787552

**5% Critical value of 0.818 exceeds 0.787552**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.787552  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	330	440	110	0.5888	64.768
2	330	390	60	0.3244	19.464
3	330	360	30	0.1976	5.928
4	340	340	0	0.0947	0
5	340	340	0		
6	340	340	0		
7	360	330	-30		
8	390	330	-60		
9	440	330	-110		

---

Sum of b values = 90.16

Sample Standard Deviation = 37.1184

W Statistic = 0.737494

**5% Critical value of 0.829 exceeds 0.737494**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.737494**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.79909	6.08677	0.287682	0.5888	0.169387
2	5.79909	5.96615	0.167054	0.3244	0.0541923
3	5.79909	5.8861	0.0870114	0.1976	0.0171934
4	5.82895	5.82895	0	0.0947	0
5	5.82895	5.82895	0		
6	5.82895	5.82895	0		
7	5.8861	5.79909	-0.0870114		
8	5.96615	5.79909	-0.167054		
9	6.08677	5.79909	-0.287682		

---

Sum of b values = 0.240773

Sample Standard Deviation = 0.0978708

W Statistic = 0.756518

**5% Critical value of 0.829 exceeds 0.756518**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.756518**  
**Evidence of non-normality at 99% level of significance**

## Skewness Coefficient

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.33333	4	2.47487
MW-16-02	9	3	6	2.47487
MW-16-03	8	1	0	Div 0
MW-16-04	9	14.0444	7.22947	1.19014
MW-16-09	9	12.8222	3.90697	-0.0757045

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	6.76818	7.36676	1.12792

## Skewness Coefficient

Parameter: Chromium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.284994	0.854983	2.47487
MW-16-02	9	0.32716	0.98148	2.47487
MW-16-03	8	0	0	Div 0
MW-16-04	9	2.54712	0.436647	1.01083
MW-16-09	9	2.50634	0.324454	-0.313661

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.15888	1.30696	0.421281

## Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.7	27	18.3	0.5888	10.775
2	9.4	26	16.6	0.3244	5.38504
3	9.5	13	3.5	0.1976	0.6916
4	9.8	13	3.2	0.0947	0.30304
5	10	10	0		
6	13	9.8	-3.2		
7	13	9.5	-3.5		
8	26	9.4	-16.6		
9	27	8.7	-18.3		

---

Sum of b values = 17.1547

Sample Standard Deviation = 7.22947

W Statistic = 0.703824

**5% Critical value of 0.829 exceeds 0.703824**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.703824**  
**Evidence of non-normality at 99% level of significance**



## Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.16332	3.29584	1.13251	0.5888	0.666824
2	2.24071	3.2581	1.01739	0.3244	0.33004
3	2.25129	2.56495	0.313658	0.1976	0.0619787
4	2.28238	2.56495	0.282567	0.0947	0.0267591
5	2.30259	2.30259	0		
6	2.56495	2.28238	-0.282567		
7	2.56495	2.25129	-0.313658		
8	3.2581	2.24071	-1.01739		
9	3.29584	2.16332	-1.13251		

---

Sum of b values = 1.0856

Sample Standard Deviation = 0.436647

W Statistic = 0.772663

**5% Critical value of 0.829 exceeds 0.772663**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.772663  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.844444	1.03333	2.47487
MW-16-02	9	0.877778	1.13333	2.47487
MW-16-03	8	0.5	0	Div 0
MW-16-04	9	3.92222	1.80401	1.05578
MW-16-09	9	3.83333	1.25996	0.577785

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.02955	1.94321	1.08691

## Skewness Coefficient

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.473805	0.658027	2.47487
MW-16-02	9	-0.464911	0.684708	2.47487
MW-16-03	8	-0.693147	0	Div 0
MW-16-04	9	1.28578	0.411047	0.709812
MW-16-09	9	1.29773	0.318513	0.309567

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.210406	1.02611	0.46083

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	16	1.68125	0.116726	-0.926404
MW-16-02	16	1.14812	0.085574	-0.531685
MW-16-03	15	1.69333	0.109978	-0.534079
MW-16-04	16	1.64375	0.103078	-0.959228
MW-16-09	16	1.43125	0.14477	-0.838747

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
79	1.51734	0.237701	-0.645165

## Skewness Coefficient

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.833333	1	2.47487
MW-16-02	9	0.766667	0.8	2.47487
MW-16-03	8	0.5	0	Div 0
MW-16-04	9	3.85556	1.67415	1.03004
MW-16-09	9	3.54444	1.11816	0.692648

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.93182	1.81554	1.10528

## Skewness Coefficient

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.476935	0.648637	2.47487
MW-16-02	9	-0.49783	0.585953	2.47487
MW-16-03	8	-0.693147	0	Div 0
MW-16-04	9	1.27636	0.392994	0.630363
MW-16-09	9	1.22423	0.298626	0.509869

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.186074	0.997788	0.459565

## Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	11.5667	5.01647	1.09646
MW-16-02	9	13.6111	2.20479	1.83731
MW-16-03	8	15.25	2.80306	-0.163822
MW-16-04	9	27.2222	4.08588	1.69658
MW-16-09	9	43	7.38241	0.201671

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	22.2864	12.8073	0.945088

## Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.36334	0.453983	-0.656345
MW-16-02	9	2.60087	0.144581	<b>1.66952</b>
MW-16-03	8	2.70913	0.190083	-0.33224
MW-16-04	9	3.29525	0.13616	<b>1.51405</b>
MW-16-09	9	3.74805	0.172324	-0.0300527

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.94865	0.568928	-0.0332975



## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	12	19	7	0.5888	4.1216
2	12	15	3	0.3244	0.9732
3	12.5	13	0.5	0.1976	0.0988
4	13	13	0	0.0947	0
5	13	13	0		
6	13	13	0		
7	13	12.5	-0.5		
8	15	12	-3		
9	19	12	-7		

---

Sum of b values = 5.1936

Sample Standard Deviation = 2.20479

W Statistic = 0.693604

**5% Critical value of 0.829 exceeds 0.693604**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.693604**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.48491	2.94444	0.459532	0.5888	0.270573
2	2.48491	2.70805	0.223144	0.3244	0.0723878
3	2.52573	2.56495	0.0392207	0.1976	0.00775001
4	2.56495	2.56495	0	0.0947	0
5	2.56495	2.56495	0		
6	2.56495	2.56495	0		
7	2.56495	2.52573	-0.0392207		
8	2.70805	2.48491	-0.223144		
9	2.94444	2.48491	-0.459532		

---

Sum of b values = 0.35071

Sample Standard Deviation = 0.144581

W Statistic = 0.735502

**5% Critical value of 0.829 exceeds 0.735502**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.735502**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	24	37	13	0.5888	7.6544
2	24	30	6	0.3244	1.9464
3	25	27	2	0.1976	0.3952
4	26	26	0	0.0947	0
5	26	26	0		
6	26	26	0		
7	27	25	-2		
8	30	24	-6		
9	37	24	-13		

---

Sum of b values = 9.996

Sample Standard Deviation = 4.08588

W Statistic = 0.748153

**5% Critical value of 0.829 exceeds 0.748153**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.748153**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	3.17805	3.61092	0.432864	0.5888	0.25487
2	3.17805	3.4012	0.223144	0.3244	0.0723878
3	3.21888	3.29584	0.076961	0.1976	0.0152075
4	3.2581	3.2581	0	0.0947	0
5	3.2581	3.2581	0		
6	3.2581	3.2581	0		
7	3.29584	3.21888	-0.076961		
8	3.4012	3.17805	-0.223144		
9	3.61092	3.17805	-0.432864		

---

Sum of b values = 0.342466

Sample Standard Deviation = 0.13616

W Statistic = 0.790765

**5% Critical value of 0.829 exceeds 0.790765**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.790765  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	77.8889	5.9675	0.522804
MW-16-02	9	39.6111	9.66236	<b>2.33768</b>
MW-16-03	8	95.875	3.6718	-0.738383
MW-16-04	9	92.5556	8.04846	0.881343
MW-16-09	9	59.2222	3.38296	-0.202509

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	72.5114	22.2618	-0.385541

## Skewness Coefficient

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	4.35272	0.0755176	0.407973
MW-16-02	9	3.659	0.198488	<b>2.23139</b>
MW-16-03	8	4.56239	0.0388519	-0.787655
MW-16-04	9	4.52457	0.0846274	0.636649
MW-16-09	9	4.07983	0.0576437	-0.358962

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	4.22828	0.354139	-0.782091

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	34	65	31	0.5888	18.2528
2	34.5	39	4.5	0.3244	1.4598
3	36	38	2	0.1976	0.3952
4	36	38	2	0.0947	0.1894
5	36	36	0		
6	38	36	-2		
7	38	36	-2		
8	39	34.5	-4.5		
9	65	34	-31		

---

Sum of b values = 20.2972

Sample Standard Deviation = 9.66236

W Statistic = 0.55159

**5% Critical value of 0.829 exceeds 0.55159**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.55159**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.52636	4.17439	0.648027	0.5888	0.381558
2	3.54096	3.66356	0.122602	0.3244	0.0397722
3	3.58352	3.63759	0.0540672	0.1976	0.0106837
4	3.58352	3.63759	0.0540672	0.0947	0.00512017
5	3.58352	3.58352	0		
6	3.63759	3.58352	-0.0540672		
7	3.63759	3.58352	-0.0540672		
8	3.66356	3.54096	-0.122602		
9	4.17439	3.52636	-0.648027		

---

Sum of b values = 0.437134

Sample Standard Deviation = 0.198488

W Statistic = 0.606275

**5% Critical value of 0.829 exceeds 0.606275**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.606275**  
**Evidence of non-normality at 99% level of significance**



## Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	1.05811	0.430503	0.444198
MW-16-02	9	1.56444	0.499828	1.14403
MW-16-03	8	1.61356	0.690404	1.45519
MW-16-04	9	1.57078	0.632875	0.379575
MW-16-09	9	2.16889	0.648911	0.00907827

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.59474	0.664125	0.701046

## Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.0193514	0.418258	-0.0790602
MW-16-02	9	0.407617	0.291247	0.68333
MW-16-03	8	0.413581	0.367002	0.909563
MW-16-04	9	0.375802	0.420285	-0.16482
MW-16-09	9	0.730349	0.324062	-0.577924

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.380873	0.42673	-0.220691

# Non-Parametric Tolerance Interval

# MW-16-01

**Parameter: Barium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 300

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-01

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.8

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-01

**Parameter: Chromium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 13

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-01

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.6

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.68125

Background standard deviation = 0.116726

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.97575

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-01

**Parameter: Lead**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.5

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-01

**Parameter: Lithium**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.36334

Background standard deviation = 0.453983

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.73936

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 77.8889

Background standard deviation = 5.9675

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 95.9764

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.05811

Background standard deviation = 0.430503

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.36297

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-02

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 330

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval **MW-16-02**

**Parameter: Beryllium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.8

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval MW-16-02

**Parameter: Chromium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 19

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval MW-16-02

**Parameter: Cobalt**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.9

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-02

**Parameter: Fluoride**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.14812

Background standard deviation = 0.085574

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.36403

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-02

**Parameter: Lead**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.9

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-02

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 19

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-02

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 65

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.407617

Background standard deviation = 0.291247

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 1.29039

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-03

**Parameter: Barium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 8

Maximum Background Concentration = 310

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-03

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15

Background mean = 1.69333

Background standard deviation = 0.109978

One-sided normal tolerance factor (K) at 95% confidence = 2.566

Upper tolerance limit = 1.97554

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 15.25

Background standard deviation = 2.80306

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 24.1862

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 95.875

Background standard deviation = 3.6718

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 107.581

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 0.413581

Background standard deviation = 0.367002

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 1.58358

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-04

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 7

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval **MW-16-04**

**Parameter: Barium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 440

Minimum Coverage = 71.7%

Average Coverage = 90%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Non-Parametric Tolerance Interval MW-16-04

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval MW-16-04

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 27

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Cobalt**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.28578

Background standard deviation = 0.411047

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.53166

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Fluoride**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.64375

Background standard deviation = 0.103078

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.90381

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.27636

Background standard deviation = 0.392994

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.46752

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Non-Parametric Tolerance Interval

MW-16-04

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 37

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Molybdenum**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 92.5556

Background standard deviation = 8.04846

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 116.95

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Radium-226/228**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.57078

Background standard deviation = 0.632875

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.48902

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-09

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 7.2

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 283.333

Background standard deviation = 16.5831

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 333.597

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 12.8222

Background standard deviation = 3.90697

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 24.6643

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Cobalt**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.83333

Background standard deviation = 1.25996

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 7.65227

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.43125

Background standard deviation = 0.14477

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.7965

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Lead**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.54444

Background standard deviation = 1.11816

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 6.93358

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 43

Background standard deviation = 7.38241

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 65.3761

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Molybdenum**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 59.2222

Background standard deviation = 3.38296

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 69.476

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.16889

Background standard deviation = 0.648911

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 4.13574

---

Location	Date	Value	Significant
----------	------	-------	-------------

**Appendix M**  
**Fate and Transport Model Inputs**


# Calculation Package


**COMPUTATION COVER SHEET**

Client:   DTE   Project:   BRPP ALD   Project/  
Proposal No.:   GLP8017    
Task No.


Title of Computations   Vertical Darcy Velocity and Travel Time Calculations  

Computations by: Signature  11/17/2021  
Printed Name   Nick Williams   Date  
Title   Senior Staff Professional  

Assumptions and Procedures Checked by: Signature  11/17/2021  
Printed Name   Jesse Varsho   Date  
(peer reviewer) Title \_\_\_\_\_

Computations Checked by: Signature  11/17/2021  
Printed Name   Isaiah Vaught   Date  
Title \_\_\_\_\_

Computations backchecked by: Signature  11/17/2021  
(originator) Printed Name   Nick Williams   Date  
Title \_\_\_\_\_

Approved by: Signature  11/24/2021  
(pm or designate) Printed Name   Omer Bozok   Date  
Title \_\_\_\_\_

Approval notes: \_\_\_\_\_

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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2. ASSUMPTIONS.....	3
3. SOLUTION .....	3
4. TRAVEL TIME SOLUTION.....	4



## 1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Belle River Power Plant Bottom Ash Basins (BAB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the BABs to the Uppermost Aquifer.

## 2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

## 3. SOLUTION

The Darcy velocity ( $q$ ) through the model lithologies or layers is expressed in m/year =

$$= K(i) = K \left( \frac{H_1 - H_2}{l_1 - l_2} \right)$$

Where,

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$H_1 - H_2$  = difference in hydraulic head between the BAB water level and the upper most aquifer potentiometric surface

$l_1 - l_2$  = distance in direction of flow

Thus:

$K$  = Geomean of Clay with Sand hydraulic conductivity value (data provided in Attachment 1) =  $2.15 \times 10^{-8}$  cm/s

$H_1$  = Total head at the bottom of BAB = 590 ft

$H_2$  = Average water level elevation from monitoring wells (data provided in Attachment 2) =  $574.28^1$  ft

$l_1$  = Bottom of ash pond = 580 ft

$l_2$  = Average elevation of well screen midpoints =  $470.98^1$  ft

$q$  = **Darcy velocity in m/year (= cm/s \* 315360) =  $1.02 \times 10^{-3}$  m/year**

<sup>1</sup> Value is an average taken from all monitoring wells

#### 4. TRAVEL TIME SOLUTION

Travel time ( $T$ ) through the model lithology is expressed in years =

$$T = t / \left( \frac{K * i}{n} \right)$$

Where:

$t$  = minimum model thickness

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$n$  = effective porosity

Thus:

$t$  = Minimum model thickness per EVS model = 26.21 m

$K$  = Hydraulic conductivity =  $2.15 \times 10^{-8}$  cm/s

$i$  = Calculated using variables in Section 3 = 0.15

$n$  = Average of porosity data from Clay with Sand layer, converted to effective porosity using Sara (1994) = 0.34

$T$  = **Travel time in years (= s / 31536000) = 8,762 years**

**Note:** Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of BAB to top of uppermost aquifer.

# Attachment 1

Location ID	Layer	Elevation (ft)	Vertical Hydraulic Conductivity, $k_v$ (cm/s)		Vertical Hydraulic Conductivity, $k_v$ (cm/s)		
			DDW	Site Water	Clay	Clay with Sand	Dike
B1-ST-3 (36-38)	Clay	555.8	2.20E-08		2.20E-08		
	Clay	555.8	2.60E-09		2.60E-09		
B2-ST-2 (7-9)	Dike	584.0	2.10E-08				2.10E-08
	Dike	584.0	1.90E-08				1.90E-08
B2-ST-7 (97-99)	Clay with Sand	494.0	3.30E-08			3.30E-08	
	Clay with Sand	494.0	2.00E-08			2.00E-08	
B3-ST-1 (1-3)	Dike	590.0	9.50E-09				9.50E-09
B4-ST-4 (67-69)	Clay with Sand	518.0	2.80E-08			2.80E-08	
	Clay with Sand	518.0	1.80E-08			1.80E-08	
B5-ST-2 (27-29)	Clay	563.3	3.40E-08		3.40E-08		
	Clay	563.3	2.30E-08		2.30E-08		
B6-ST-4 (47-49)	Clay	541.3	2.50E-08		2.50E-08		
	Clay	541.3	1.80E-08		1.80E-08		
B6-ST-7 (97-99)	Clay with Sand	491.3	2.40E-08			2.40E-08	
	Clay with Sand	491.3	1.20E-08			1.20E-08	
B1-ST-1 (7-9)	Dike	584.8		8.20E-09			8.20E-09
B2-ST-1 (1-3)	Dike	590.0		1.20E-08			1.20E-08
B2-ST-4 (47-49)	Clay	544.0		2.20E-08	2.20E-08		
B3-ST-5 (77-79)	Clay with Sand	514.0		1.90E-08		1.90E-08	
B4-ST-3 (47-49)	Clay	538.0		2.80E-08	2.80E-08		
B5-ST-5 (87-89)	Clay with Sand	503.3		1.50E-08		1.50E-08	
MW-16-01	Clay with Sand	537.2	2.90E-08			2.90E-08	
MW-16-05	Clay with Sand	537.3	2.70E-08			2.70E-08	
MW-16-07	Clay	538.9	2.90E-08		2.90E-08		
MW-16-02	Sand	491.7					
MW-16-03	Sand	453.7					
MW-16-06	Sand	452.5					
MW-16-08	Sand	453.8					
MW-16-09	Sand	449.9					
MW-16-10	Sand	441.8					
MW-16-11A	Sand	450.0					
SB-16-01	Clay	537.7	2.10E-08		2.10E-08		
<b>Statistical Parameter</b>					<b>Clay</b>	<b>Clay with Sand</b>	<b>Dike</b>
<b>Mean</b>					2.25E-08	2.25E-08	1.39E-08
<b>GeoMean</b>					<b>1.94E-08</b>	<b>2.15E-08</b>	<b>1.30E-08</b>
<b>Maximum</b>					3.40E-08	3.30E-08	2.10E-08
<b>Minimum</b>					2.60E-09	1.20E-08	8.20E-09
<b>Count</b>					10	10	5
<b>Standard Deviation</b>					8.37E-09	6.75E-09	5.74E-09

## Attachment 2

Table 1

Summary of Groundwater Elevation Data – March and September 2020  
 Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program  
 China Township, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
Date Installed	3/17/2016		3/15/2016		6/1/2016		3/8/2016		6/2/2016	
TOC Elevation	590.06		588.94		590.66		590.51		590.80	
Geologic Unit of Screened Interval	Sand		Sand		Silty Sand		Sand		Sand	
Screened Interval Elevation	496.3 to 491.3		494.3 to 489.3		456.0 to 451.0		468.5 to 463.5		452.3 to 447.3	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
03/17/2020	15.83	574.23	13.28	575.66	16.13	574.53	16.48	574.03	16.31	574.49
09/14/2020	16.16	573.90	13.58	575.36	16.46	574.20	16.83	573.68	16.60	574.20

**Notes:**

Elevations are reported in feet relative to the North American Vertical Datum of 1988.  
 ft BTOC - feet Below top of casing.

Well ID	MW-06-01	MW-06-02	MW-06-03	MW-06-04	MW-16-09
Screen Mid Point Elevation, $I_2$ (ft)	493.8	491.8	453.5	466	449.8
Aquifer Water Level, $H_2$ (ft)	573.9	575.4	574.2	573.7	574.2
Total Head Difference, $H_1 - H_2$ (ft)	16.1	14.6	15.8	16.3	15.8
Flow Distance, $I_1 - I_2$ (ft)	86.2	88.2	126.5	114	130.2
Gradient, $i$	0.19	0.17	0.12	0.14	0.12

Pond Water Elevation, $H_1$ (ft)	590
Elevation of Pond Outflow, $I_1$ (ft)	580

Average Gradient	0.15
------------------	------

# POLLUTE Model Inputs

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Dist. Coeff.	Dry Density (kg/m <sup>3</sup> )
BAB	Clay	1.02E-03	2.03E-03	12.01	13.99	11.03	25	1.94E-08	0.019	0.02375	0.01425	0.37	0.45	0.28	0	1509.084
	Clay with Sand	1.02E-03	2.03E-03	19.29	23.62	15.18	40	2.15E-08	0.019	0.02375	0.01425	0.34	0.45	0.20	0	1509.084

## Notes:

1. Kv = vertical hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table M-1
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. Kv of Clay with Sand selected for the calculation of the Darcy velocity as the higher and thus more conservative value of the two layers; POLLUTE only allows one input for Darcy velocity
4. CoHD = Coefficient of Hydrodynamic Dispersion
5. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994

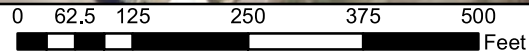
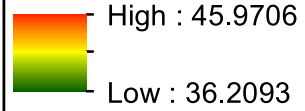


## Model Thickness



**BAB Clay Thickness (ft)**

**Value**



**Bottom Ash Basin  
Clay Thickness**

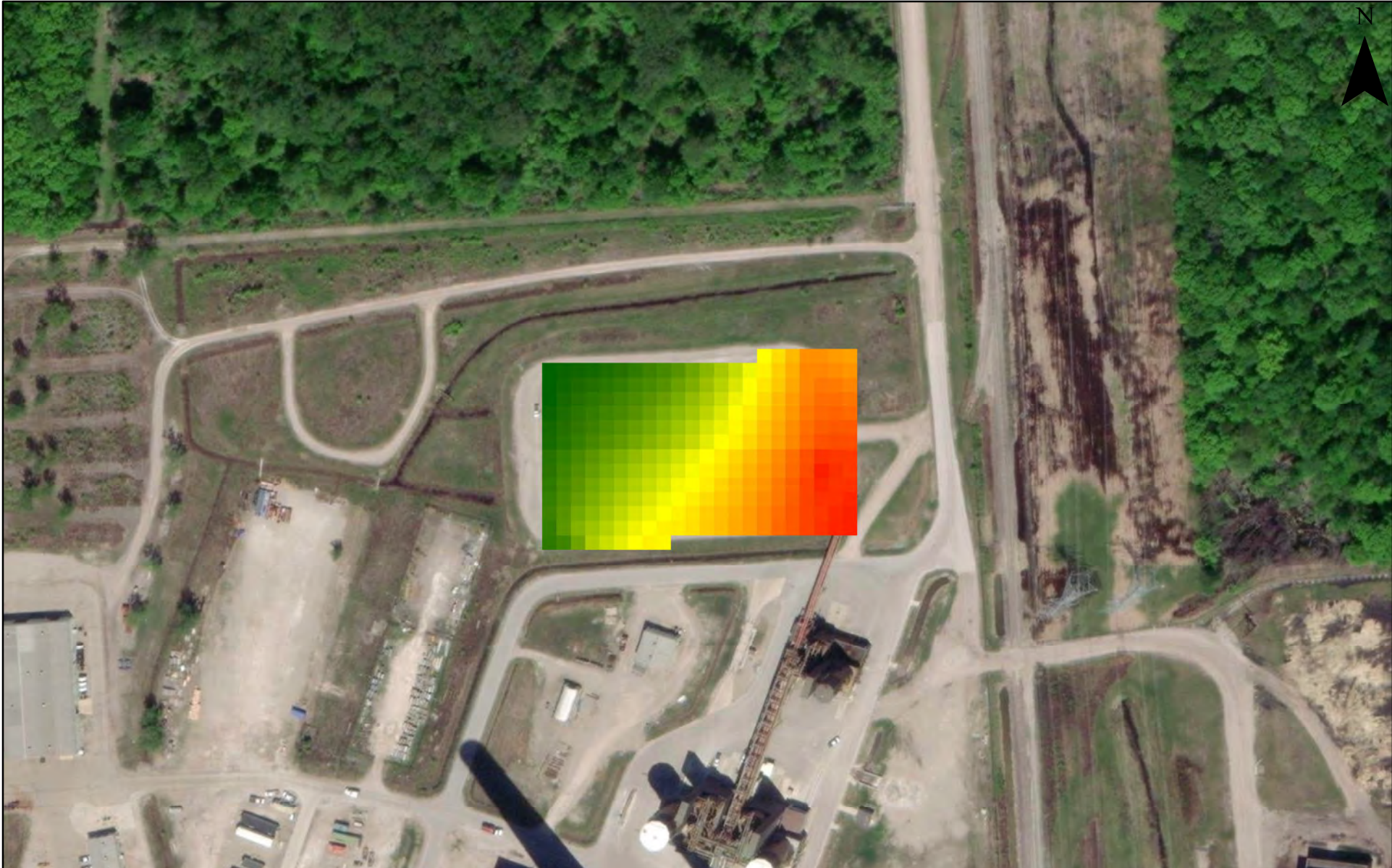


8/9/2021

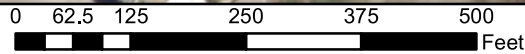
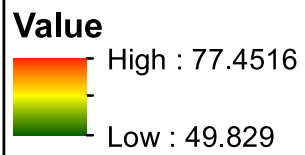
Chicago, IL

**Figure**

**M-1**



**BAB Clay with Sand Thickness**



**Bottom Ash Basin  
Clay with Sand Thickness**



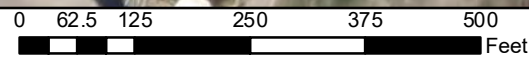
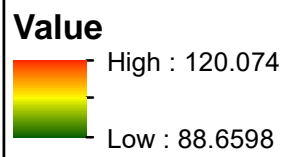
8/9/2021

Chicago, IL

**Figure  
M-2**



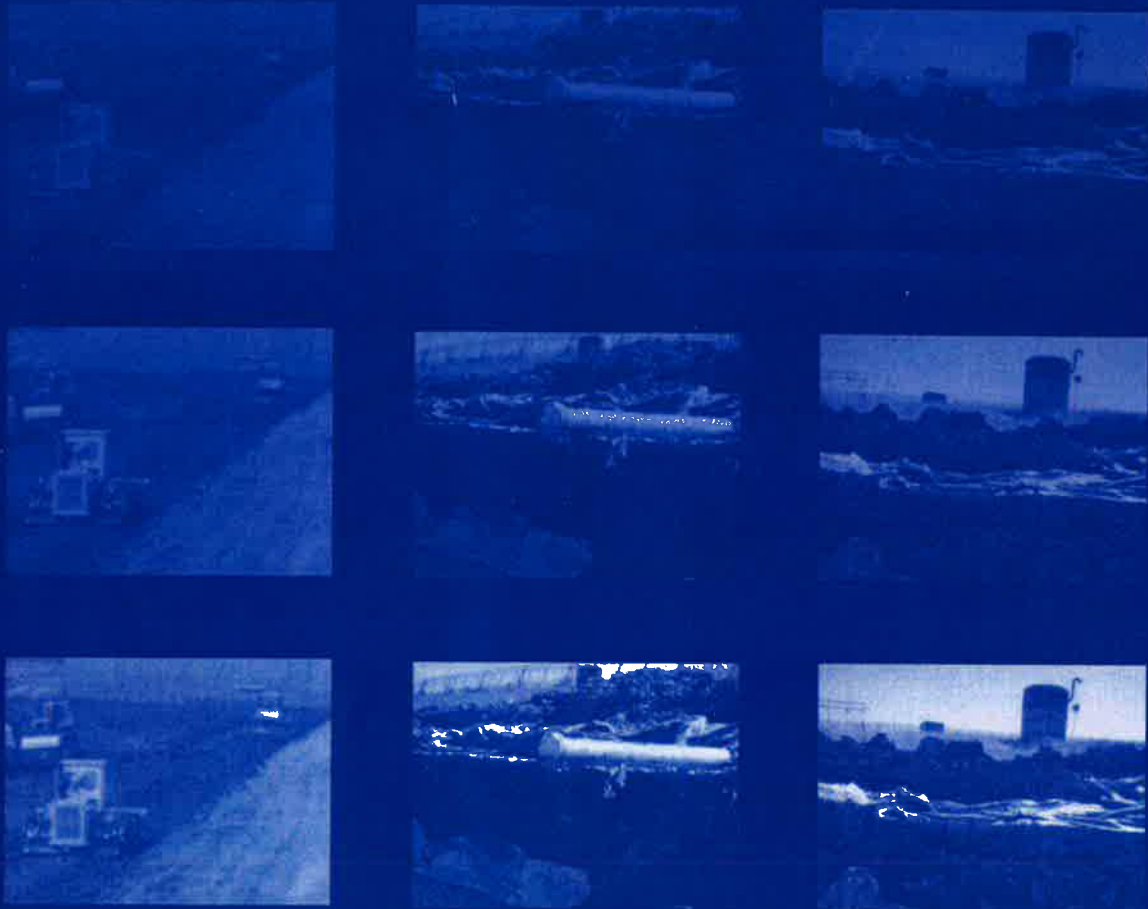
**Model Interval Thickness**



<b>Bottom Ash Basins Model Interval Thickness</b>		<b>Figure M-3</b>
11/11/2021	Chicago, IL	

## Reference Material

 **CRC Press**  
Taylor & Francis Group  
A CHAPMAN & HALL BOOK



# BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES

2ND EDITION

R. Kerry Rowe, Robert M. Quigley,  
Richard W.I. Brachman & John R. Booker

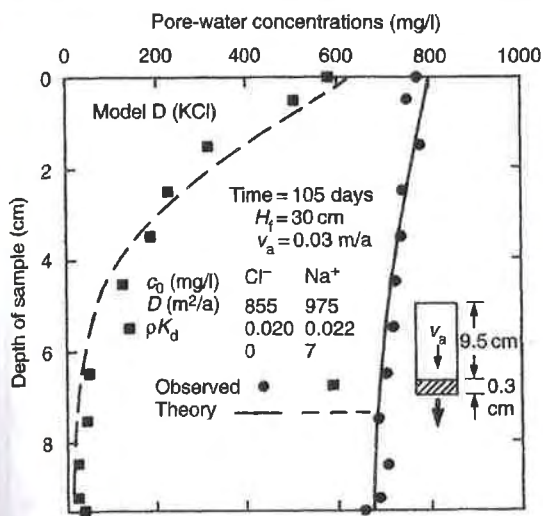


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe et al., 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some con-

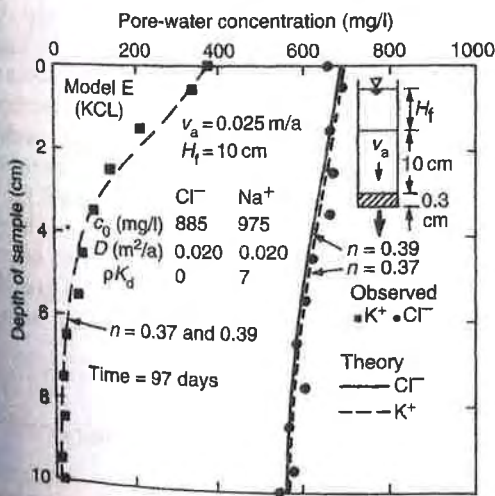


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe et al., 1988).

fidence in the parameters  $D$  and  $\rho K_d$  for the clay and source fluids examined.

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient,  $D$ , for chloride was deduced for each model and ranged between 0.018 and 0.02 m<sup>2</sup>/a with an average value of 0.019 m<sup>2</sup>/a. This small variation in  $D$  does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m<sup>2</sup>/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters  $D$  and  $K_d$ . Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

### 8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection-diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

# SITE ASSESSMENT and REMEDIATION Handbook **Second Edition**

**Martin N. Sara**



 **LEWIS PUBLISHERS**



**Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils**

Texture Class	Sample Size	Total	Residual	Effective
		Porosity ( $\phi$ ) cm <sup>3</sup> /cm <sup>3</sup>	Saturation ( $\phi_r$ ) cm <sup>3</sup> /cm <sup>3</sup>	Porosity ( $\phi_c$ ) cm <sup>3</sup> /cm <sup>3</sup>
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 (0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 (0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value

Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.

**Appendix N**  
**Fate and Transport Model Outputs**

# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## BAB Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.248E+01	2.078E-45
1.296E+01	2.050E-47
1.345E+01	4.107E-49
1.393E+01	1.173E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.248E+01	4.063E-32
	1.296E+01	4.214E-33
	1.345E+01	3.967E-34
	1.393E+01	3.349E-35
	1.441E+01	2.524E-36
	1.489E+01	1.693E-37
	1.538E+01	1.006E-38
	1.586E+01	5.275E-40
	1.634E+01	2.433E-41
	1.682E+01	9.869E-43
	1.730E+01	3.565E-44
	1.779E+01	1.217E-45
	1.827E+01	4.720E-47
	1.875E+01	2.657E-48
	1.923E+01	2.038E-49
	1.972E+01	1.680E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.203E-41 8.647E-43 5.763E-44 3.677E-45 2.449E-46 1.979E-47 2.100E-48 2.648E-49 3.480E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 1.884E-21 2.319E-22 2.563E-23 2.535E-24 2.237E-25 1.762E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.255E-27 8.656E-29 7.250E-30 9.792E-31 1.880E-31 3.915E-32 7.956E-33 1.541E-33 2.829E-34 4.915E-35 8.068E-36 1.250E-36 1.825E-37 2.506E-38 3.236E-39 3.920E-40 4.452E-41 4.741E-42 4.745E-43 4.507E-44 4.172E-45 4.001E-46 4.394E-47 5.936E-48 9.487E-49 1.631E-49 2.821E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16



	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
	1.345E+01	1.382E-20
	1.393E+01	2.335E-21
	1.441E+01	3.635E-22
	1.489E+01	5.194E-23
	1.538E+01	6.795E-24
	1.586E+01	8.122E-25
	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32
	2.020E+01	1.846E-32
	2.068E+01	4.362E-33
	2.116E+01	9.891E-34
	2.165E+01	2.147E-34
	2.213E+01	4.459E-35
	2.261E+01	8.846E-36
	2.309E+01	1.676E-36
	2.357E+01	3.027E-37
	2.406E+01	5.209E-38
	2.454E+01	8.531E-39
	2.502E+01	1.329E-39
	2.550E+01	1.966E-40
	2.599E+01	2.761E-41
	2.647E+01	3.685E-42
	2.695E+01	4.684E-43
	2.743E+01	5.716E-44
	2.791E+01	6.827E-45
	2.840E+01	8.322E-46
	2.888E+01	1.110E-46
	2.936E+01	1.731E-47
	2.984E+01	3.169E-48
	3.033E+01	6.406E-49
	3.081E+01	1.340E-49
	3.129E+01	2.793E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.248E+01	1.217E-17
1.296E+01	3.249E-18
1.345E+01	8.170E-19
1.393E+01	1.931E-19
1.441E+01	4.282E-20
1.489E+01	8.893E-21
1.538E+01	1.727E-21
1.586E+01	3.127E-22
1.634E+01	5.273E-23
1.682E+01	8.262E-24
1.730E+01	1.201E-24
1.779E+01	1.616E-25
1.827E+01	2.017E-26
1.875E+01	2.354E-27
1.923E+01	2.655E-28
1.972E+01	3.184E-29
2.020E+01	4.867E-30
2.068E+01	1.044E-30
2.116E+01	2.756E-31
2.165E+01	7.703E-32
2.213E+01	2.135E-32
2.261E+01	5.747E-33
2.309E+01	1.495E-33
2.357E+01	3.753E-34
2.406E+01	9.078E-35
2.454E+01	2.115E-35
2.502E+01	4.742E-36
2.550E+01	1.022E-36
2.599E+01	2.118E-37
2.647E+01	4.214E-38
2.695E+01	8.043E-39
2.743E+01	1.472E-39
2.791E+01	2.581E-40
2.840E+01	4.333E-41
2.888E+01	6.971E-42
2.936E+01	1.076E-42
2.984E+01	1.601E-43
3.033E+01	2.320E-44
3.081E+01	3.353E-45
3.129E+01	5.038E-46

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
1.056E+01  
1.104E+01  
1.152E+01  
1.200E+01  
1.248E+01  
1.296E+01  
1.345E+01  
1.393E+01  
1.441E+01  
1.489E+01  
1.538E+01  
1.586E+01  
1.634E+01  
1.682E+01  
1.730E+01  
1.779E+01  
1.827E+01  
1.875E+01  
1.923E+01  
1.972E+01  
2.020E+01  
2.068E+01  
2.116E+01  
2.165E+01  
2.213E+01  
2.261E+01  
2.309E+01  
2.357E+01  
2.406E+01  
2.454E+01  
2.502E+01  
2.550E+01  
2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

4.337E-01  
2.346E-01  
1.100E-01  
4.443E-02  
1.538E-02  
4.547E-03  
1.145E-03  
2.451E-04  
4.452E-05  
6.852E-06  
8.927E-07  
9.837E-08  
9.162E-09  
7.219E-10  
4.860E-11  
3.069E-12  
3.171E-13  
9.445E-14  
4.044E-14  
1.740E-14  
7.194E-15  
2.849E-15  
1.083E-15  
4.061E-16  
1.399E-16  
4.591E-17  
1.434E-17  
4.262E-18  
1.203E-18  
3.220E-19  
8.164E-20  
1.958E-20  
4.437E-21  
9.480E-22  
1.907E-22  
3.606E-23  
6.400E-24  
1.065E-24  
1.658E-25  
2.421E-26  
3.336E-27  
4.437E-28  
6.086E-29  
9.850E-30  
2.127E-30  
5.837E-31  
1.773E-31  
5.466E-32  
1.658E-32  
4.894E-33  
1.402E-33  
3.896E-34  
1.049E-34  
2.733E-35  
6.891E-36  
1.681E-36  
3.962E-37

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.023E-38 1.984E-38 4.207E-39 8.605E-40 1.696E-40 3.222E-41 5.901E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 8.607E-16 3.284E-16 1.202E-16 4.218E-17 1.417E-17 4.558E-18 1.401E-18 4.113E-19 1.151E-19 3.072E-20 7.798E-21 1.881E-21 4.308E-22 9.352E-23 1.922E-23 3.734E-24 6.852E-25 1.187E-25 1.945E-26 3.034E-27 4.604E-28 7.193E-29 1.293E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.983E-30 8.642E-31 2.804E-31 9.357E-32 3.096E-32 1.003E-32 3.170E-33 9.752E-34 2.919E-34 8.498E-35 2.405E-35 6.611E-36 1.765E-36 4.574E-37 1.150E-37 2.804E-38 6.625E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 3.512E-15 1.503E-15 6.206E-16 2.471E-16 9.480E-17 3.502E-17 1.245E-17 4.254E-18 1.397E-18 4.400E-19 1.329E-19 3.847E-20 1.066E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.821E-21 7.133E-22 1.720E-22 3.954E-23 8.648E-24 1.798E-24 3.554E-25 6.675E-26 1.195E-26 2.055E-27 3.479E-28 6.139E-29 1.249E-29 3.187E-30 9.940E-31 3.436E-31 1.223E-31 4.333E-32 1.508E-32 5.136E-33 1.709E-33 5.549E-34 1.758E-34 5.433E-35 1.637E-35 4.806E-36 1.375E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.326E-13 1.981E-13 8.651E-14 4.354E-14 2.233E-14 1.078E-14 5.051E-15 2.293E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.008E-15 4.292E-16 1.768E-16 7.039E-17 2.709E-17 1.006E-17 3.609E-18 1.248E-18 4.159E-19 1.334E-19 4.118E-20 1.222E-20 3.481E-21 9.514E-22 2.493E-22 6.255E-23 1.502E-23 3.446E-24 7.553E-25 1.581E-25 3.165E-26 6.081E-27 1.135E-27 2.120E-28 4.221E-29 9.821E-30 2.819E-30 9.560E-31 3.517E-31 1.323E-31 4.953E-32 1.825E-32 6.596E-33 2.334E-33 8.084E-34 2.739E-34 9.072E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09

9.120E+00	5.449E-10
9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.016E-13
1.104E+01	2.215E-13
1.152E+01	9.850E-14
1.200E+01	5.229E-14
1.248E+01	2.697E-14
1.296E+01	1.359E-14
1.345E+01	6.658E-15
1.393E+01	3.172E-15
1.441E+01	1.468E-15
1.489E+01	6.598E-16
1.538E+01	2.878E-16
1.586E+01	1.218E-16
1.634E+01	5.000E-17
1.682E+01	1.988E-17
1.730E+01	7.659E-18
1.779E+01	2.856E-18
1.827E+01	1.030E-18
1.875E+01	3.591E-19
1.923E+01	1.209E-19
1.972E+01	3.932E-20
2.020E+01	1.233E-20
2.068E+01	3.727E-21
2.116E+01	1.085E-21
2.165E+01	3.039E-22
2.213E+01	8.185E-23
2.261E+01	2.118E-23
2.309E+01	5.260E-24
2.357E+01	1.253E-24
2.406E+01	2.864E-25
2.454E+01	6.279E-26
2.502E+01	1.324E-26
2.550E+01	2.703E-27
2.599E+01	5.438E-28
2.647E+01	1.120E-28
2.695E+01	2.536E-29
2.743E+01	6.808E-30
2.791E+01	2.205E-30
2.840E+01	8.115E-31
2.888E+01	3.161E-31
2.936E+01	1.247E-31
2.984E+01	4.888E-32
3.033E+01	1.887E-32
3.081E+01	7.156E-33
3.129E+01	2.662E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB\_ExtendedRun

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.248E+01	2.078E-45
1.296E+01	2.050E-47
1.345E+01	4.107E-49
1.393E+01	1.173E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40
	2.020E+01	1.203E-41
	2.068E+01	8.647E-43
	2.116E+01	5.763E-44
	2.165E+01	3.677E-45
	2.213E+01	2.449E-46
	2.261E+01	1.979E-47
	2.309E+01	2.100E-48
	2.357E+01	2.648E-49
	2.406E+01	3.480E-50
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16
	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
	1.345E+01	1.382E-20
	1.393E+01	2.335E-21
	1.441E+01	3.635E-22
	1.489E+01	5.194E-23
	1.538E+01	6.795E-24
	1.586E+01	8.122E-25
	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.846E-32 4.362E-33 9.891E-34 2.147E-34 4.459E-35 8.846E-36 1.676E-36 3.027E-37 5.209E-38 8.531E-39 1.329E-39 1.966E-40 2.761E-41 3.685E-42 4.684E-43 5.716E-44 6.827E-45 8.322E-46 1.110E-46 1.731E-47 3.169E-48 6.406E-49 1.340E-49 2.793E-50
35	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 7.006E-01 4.337E-01 2.346E-01 1.100E-01 4.443E-02 1.538E-02 4.547E-03 1.145E-03 2.451E-04 4.452E-05 6.852E-06 8.927E-07 9.837E-08 9.162E-09 7.219E-10 4.860E-11 3.069E-12 3.171E-13 9.445E-14 4.044E-14 1.740E-14 7.194E-15 2.849E-15 1.083E-15 4.061E-16 1.399E-16 4.591E-17 1.434E-17 4.262E-18 1.203E-18 3.220E-19

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	8.164E-20 1.958E-20 4.437E-21 9.480E-22 1.907E-22 3.606E-23 6.400E-24 1.065E-24 1.658E-25 2.421E-26 3.336E-27 4.437E-28 6.086E-29 9.850E-30 2.127E-30 5.837E-31 1.773E-31 5.466E-32 1.658E-32 4.894E-33 1.402E-33 3.896E-34 1.049E-34 2.733E-35 6.891E-36 1.681E-36 3.962E-37 9.023E-38 1.984E-38 4.207E-39 8.605E-40 1.696E-40 3.222E-41 5.901E-42
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13

	1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.256E-14 3.501E-14 1.670E-14 7.925E-15 3.512E-15 1.503E-15 6.206E-16 2.471E-16 9.480E-17 3.502E-17 1.245E-17 4.254E-18 1.397E-18 4.400E-19 1.329E-19 3.847E-20 1.066E-20 2.821E-21 7.133E-22 1.720E-22 3.954E-23 8.648E-24 1.798E-24 3.554E-25 6.675E-26 1.195E-26 2.055E-27 3.479E-28 6.139E-29 1.249E-29 3.187E-30 9.940E-31 3.436E-31 1.223E-31 4.333E-32 1.508E-32 5.136E-33 1.709E-33 5.549E-34 1.758E-34 5.433E-35 1.637E-35 4.806E-36 1.375E-36
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04



5.760E+00	1.023E-04
6.240E+00	2.483E-05
6.720E+00	5.421E-06
7.200E+00	1.065E-06
7.680E+00	1.879E-07
8.160E+00	2.981E-08
8.640E+00	4.249E-09
9.120E+00	5.449E-10
9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.016E-13
1.104E+01	2.215E-13
1.152E+01	9.850E-14
1.200E+01	5.229E-14
1.248E+01	2.697E-14
1.296E+01	1.359E-14
1.345E+01	6.658E-15
1.393E+01	3.172E-15
1.441E+01	1.468E-15
1.489E+01	6.598E-16
1.538E+01	2.878E-16
1.586E+01	1.218E-16
1.634E+01	5.000E-17
1.682E+01	1.988E-17
1.730E+01	7.659E-18
1.779E+01	2.856E-18
1.827E+01	1.030E-18
1.875E+01	3.591E-19
1.923E+01	1.209E-19
1.972E+01	3.932E-20
2.020E+01	1.233E-20
2.068E+01	3.727E-21
2.116E+01	1.085E-21
2.165E+01	3.039E-22
2.213E+01	8.185E-23
2.261E+01	2.118E-23
2.309E+01	5.260E-24
2.357E+01	1.253E-24
2.406E+01	2.864E-25
2.454E+01	6.279E-26
2.502E+01	1.324E-26
2.550E+01	2.703E-27
2.599E+01	5.438E-28
2.647E+01	1.120E-28
2.695E+01	2.536E-29
2.743E+01	6.808E-30
2.791E+01	2.205E-30
2.840E+01	8.115E-31
2.888E+01	3.161E-31
2.936E+01	1.247E-31
2.984E+01	4.888E-32
3.033E+01	1.887E-32
3.081E+01	7.156E-33
3.129E+01	2.662E-33

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
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3.265E-01  
2.152E-01  
1.336E-01  
7.805E-02  
4.283E-02  
2.205E-02  
1.064E-02  
4.813E-03  
2.037E-03  
8.062E-04  
2.984E-04  
1.032E-04  
3.337E-05  
1.007E-05  
2.839E-06  
7.470E-07  
1.834E-07  
4.203E-08  
8.987E-09  
1.794E-09  
3.350E-10  
6.126E-11  
1.037E-11  
1.895E-12  
4.859E-13  
2.040E-13  
1.127E-13  
6.674E-14  
3.955E-14  
2.312E-14  
1.328E-14  
7.490E-15  
4.148E-15  
2.255E-15  
1.203E-15  
6.295E-16  
3.231E-16  
1.626E-16  
8.021E-17  
3.877E-17  
1.836E-17  
8.518E-18  
3.868E-18  
1.719E-18  
7.476E-19  
3.180E-19  
1.322E-19  
5.373E-20  
2.133E-20  
8.269E-21  
3.129E-21  
1.155E-21  
4.160E-22  
1.461E-22  
4.996E-23

	2.840E+01	1.665E-23
	2.888E+01	5.401E-24
	2.936E+01	1.706E-24
	2.984E+01	5.243E-25
	3.033E+01	1.569E-25
	3.081E+01	4.573E-26
	3.129E+01	1.302E-26

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB Darcy

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.899E-01
	9.600E-01	3.170E-02
	1.440E+00	1.173E-03
	1.920E+00	1.395E-05

2.400E+00	5.182E-08
2.880E+00	5.999E-11
3.360E+00	1.314E-13
3.840E+00	1.263E-14
4.320E+00	1.064E-15
4.800E+00	6.514E-17
5.280E+00	2.848E-18
5.760E+00	8.699E-20
6.240E+00	1.812E-21
6.720E+00	2.503E-23
7.200E+00	2.229E-25
7.680E+00	1.279E-27
8.160E+00	7.406E-30
8.640E+00	1.881E-31
9.120E+00	8.046E-33
9.600E+00	2.907E-34
1.008E+01	8.446E-36
1.056E+01	1.951E-37
1.104E+01	3.543E-39
1.152E+01	5.008E-41
1.200E+01	5.723E-43
1.248E+01	5.059E-45
1.296E+01	5.171E-47
1.345E+01	1.074E-48
1.393E+01	3.182E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.667E-01
	9.600E-01	1.368E-01
	1.440E+00	2.392E-02
	1.920E+00	2.422E-03
	2.400E+00	1.393E-04
	2.880E+00	4.505E-06
	3.360E+00	8.123E-08
	3.840E+00	8.141E-10
	4.320E+00	4.946E-12
	4.800E+00	1.302E-13
	5.280E+00	2.603E-14
	5.760E+00	5.001E-15
	6.240E+00	8.235E-16
	6.720E+00	1.154E-16
	7.200E+00	1.368E-17
	7.680E+00	1.362E-18
	8.160E+00	1.129E-19
	8.640E+00	7.730E-21
	9.120E+00	4.326E-22
	9.600E+00	1.960E-23
	1.008E+01	7.110E-25
	1.056E+01	2.058E-26
	1.104E+01	4.950E-28
	1.152E+01	1.367E-29
	1.200E+01	9.120E-31
	1.248E+01	9.788E-32
	1.296E+01	1.054E-32
	1.345E+01	1.030E-33
	1.393E+01	9.032E-35
	1.441E+01	7.071E-36
	1.489E+01	4.924E-37
	1.538E+01	3.039E-38
	1.586E+01	1.655E-39
	1.634E+01	7.928E-41
	1.682E+01	3.340E-42
	1.730E+01	1.252E-43
	1.779E+01	4.434E-45
	1.827E+01	1.780E-46
	1.875E+01	1.037E-47
	1.923E+01	8.241E-49
	1.972E+01	7.051E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.613E-01
	9.600E-01	2.330E-01
	1.440E+00	6.923E-02
	1.920E+00	1.443E-02
	2.400E+00	2.080E-03
	2.880E+00	2.056E-04
	3.360E+00	1.385E-05
	3.840E+00	6.325E-07
	4.320E+00	1.954E-08
	4.800E+00	4.085E-10
	5.280E+00	6.240E-12
	5.760E+00	2.330E-13
	6.240E+00	5.558E-14
	6.720E+00	1.544E-14
	7.200E+00	3.900E-15
	7.680E+00	8.876E-16
	8.160E+00	1.814E-16
	8.640E+00	3.318E-17
	9.120E+00	5.408E-18
	9.600E+00	7.826E-19
	1.008E+01	1.001E-19
	1.056E+01	1.125E-20
	1.104E+01	1.106E-21
	1.152E+01	9.464E-23
	1.200E+01	7.294E-24
	1.248E+01	4.610E-25
	1.296E+01	2.503E-26
	1.345E+01	1.199E-27
	1.393E+01	5.909E-29
	1.441E+01	4.600E-30
	1.489E+01	6.445E-31
	1.538E+01	1.082E-31
	1.586E+01	1.772E-32
	1.634E+01	2.722E-33
	1.682E+01	3.890E-34
	1.730E+01	5.160E-35
	1.779E+01	6.341E-36
	1.827E+01	7.203E-37
	1.875E+01	7.548E-38
	1.923E+01	7.281E-39
	1.972E+01	6.450E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.243E-41 3.914E-42 2.708E-43 1.792E-44 1.236E-45 1.032E-46 1.132E-47 1.479E-48 2.017E-49 2.688E-50 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.220E-01 3.097E-01 1.207E-01 3.624E-02 8.296E-03 1.437E-03 1.873E-04 1.830E-05 1.337E-06 7.288E-08 2.960E-09 9.038E-11 2.454E-12 2.092E-13 6.417E-14 2.148E-14 6.709E-15 1.939E-15 5.176E-16 1.273E-16 2.878E-17 5.965E-18 1.131E-18 1.955E-19 3.197E-20 4.532E-21 5.791E-22 6.648E-23 6.829E-24 6.259E-25 5.118E-26



	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.783E-27 2.704E-28 2.336E-29 3.250E-30 6.459E-31 1.395E-31 2.945E-32 5.923E-33 1.129E-33 2.038E-34 3.474E-35 5.590E-36 8.475E-37 1.209E-37 1.621E-38 2.040E-39 2.407E-40 2.662E-41 2.767E-42 2.728E-43 2.618E-44 2.598E-45 2.946E-46 4.109E-47 6.794E-48 1.211E-48 2.174E-49 3.811E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.650E-01 3.710E-01 1.707E-01 6.399E-02 1.936E-02 4.702E-03 9.118E-04 1.407E-04 1.724E-05 1.674E-06 1.286E-07 7.805E-09 3.753E-10 1.488E-11 7.609E-13 1.541E-13 5.784E-14 2.173E-14 7.705E-15 2.568E-15 8.033E-16

	1.056E+01	2.354E-16
	1.104E+01	6.455E-17
	1.152E+01	1.656E-17
	1.200E+01	4.109E-18
	1.248E+01	9.107E-19
	1.296E+01	1.872E-19
	1.345E+01	3.561E-20
	1.393E+01	6.251E-21
	1.441E+01	1.010E-21
	1.489E+01	1.499E-22
	1.538E+01	2.037E-23
	1.586E+01	2.529E-24
	1.634E+01	2.864E-25
	1.682E+01	2.965E-26
	1.730E+01	2.856E-27
	1.779E+01	2.735E-28
	1.827E+01	3.124E-29
	1.875E+01	5.263E-30
	1.923E+01	1.214E-30
	1.972E+01	3.094E-31
	2.020E+01	7.855E-32
	2.068E+01	1.927E-32
	2.116E+01	4.539E-33
	2.165E+01	1.023E-33
	2.213E+01	2.207E-34
	2.261E+01	4.548E-35
	2.309E+01	8.947E-36
	2.357E+01	1.679E-36
	2.406E+01	3.000E-37
	2.454E+01	5.105E-38
	2.502E+01	8.257E-39
	2.550E+01	1.269E-39
	2.599E+01	1.852E-40
	2.647E+01	2.567E-41
	2.695E+01	3.388E-42
	2.743E+01	4.290E-43
	2.791E+01	5.313E-44
	2.840E+01	6.703E-45
	2.888E+01	9.228E-46
	2.936E+01	1.484E-46
	2.984E+01	2.806E-47
	3.033E+01	5.872E-48
	3.081E+01	1.274E-48
	3.129E+01	2.757E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.974E-01
	9.600E-01	4.209E-01
	1.440E+00	2.168E-01
	1.920E+00	9.438E-02
	2.400E+00	3.445E-02
	2.880E+00	1.049E-02
	3.360E+00	2.653E-03
	3.840E+00	5.557E-04
	4.320E+00	9.615E-05
	4.800E+00	1.372E-05
	5.280E+00	1.613E-06

5.760E+00	1.559E-07
6.240E+00	1.239E-08
6.720E+00	8.099E-10
7.200E+00	4.430E-11
7.680E+00	2.413E-12
8.160E+00	3.099E-13
8.640E+00	1.102E-13
9.120E+00	4.621E-14
9.600E+00	1.874E-14
1.008E+01	7.231E-15
1.056E+01	2.649E-15
1.104E+01	9.205E-16
1.152E+01	3.039E-16
1.200E+01	9.825E-17
1.248E+01	2.890E-17
1.296E+01	8.014E-18
1.345E+01	2.093E-18
1.393E+01	5.136E-19
1.441E+01	1.183E-19
1.489E+01	2.551E-20
1.538E+01	5.143E-21
1.586E+01	9.675E-22
1.634E+01	1.694E-22
1.682E+01	2.757E-23
1.730E+01	4.161E-24
1.779E+01	5.817E-25
1.827E+01	7.539E-26
1.875E+01	9.134E-27
1.923E+01	1.067E-27
1.972E+01	1.322E-28
2.020E+01	2.076E-29
2.068E+01	4.582E-30
2.116E+01	1.251E-30
2.165E+01	3.628E-31
2.213E+01	1.044E-31
2.261E+01	2.919E-32
2.309E+01	7.887E-33
2.357E+01	2.056E-33
2.406E+01	5.165E-34
2.454E+01	1.250E-34
2.502E+01	2.910E-35
2.550E+01	6.518E-36
2.599E+01	1.403E-36
2.647E+01	2.899E-37
2.695E+01	5.747E-38
2.743E+01	1.092E-38
2.791E+01	1.990E-39
2.840E+01	3.470E-40
2.888E+01	5.799E-41
2.936E+01	9.295E-42
2.984E+01	1.436E-42
3.033E+01	2.158E-43
3.081E+01	3.230E-44
3.129E+01	5.017E-45

9.600E-01	4.624E-01
1.440E+00	2.586E-01
1.920E+00	1.254E-01
2.400E+00	5.238E-02
2.880E+00	1.876E-02
3.360E+00	5.738E-03
3.840E+00	1.495E-03
4.320E+00	3.312E-04
4.800E+00	6.226E-05
5.280E+00	9.918E-06
5.760E+00	1.337E-06
6.240E+00	1.525E-07
6.720E+00	1.470E-08
7.200E+00	1.199E-09
7.680E+00	8.351E-11
8.160E+00	5.441E-12
8.640E+00	5.737E-13
9.120E+00	1.751E-13
9.600E+00	7.746E-14
1.008E+01	3.448E-14
1.056E+01	1.476E-14
1.104E+01	6.048E-15
1.152E+01	2.380E-15
1.200E+01	9.237E-16
1.248E+01	3.303E-16
1.296E+01	1.125E-16
1.345E+01	3.651E-17
1.393E+01	1.126E-17
1.441E+01	3.301E-18
1.489E+01	9.176E-19
1.538E+01	2.416E-19
1.586E+01	6.019E-20
1.634E+01	1.416E-20
1.682E+01	3.143E-21
1.730E+01	6.567E-22
1.779E+01	1.290E-22
1.827E+01	2.377E-23
1.875E+01	4.107E-24
1.923E+01	6.644E-25
1.972E+01	1.007E-25
2.020E+01	1.441E-26
2.068E+01	1.987E-27
2.116E+01	2.815E-28
2.165E+01	4.682E-29
2.213E+01	1.038E-29
2.261E+01	2.939E-30
2.309E+01	9.246E-31
2.357E+01	2.959E-31
2.406E+01	9.317E-32
2.454E+01	2.857E-32
2.502E+01	8.502E-33
2.550E+01	2.453E-33
2.599E+01	6.858E-34
2.647E+01	1.856E-34
2.695E+01	4.862E-35
2.743E+01	1.232E-35
2.791E+01	3.017E-36

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.136E-37 1.630E-37 3.590E-38 7.628E-39 1.562E-39 3.082E-40 5.863E-41
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.440E-01 4.975E-01 2.962E-01 1.559E-01 7.209E-02 2.917E-02 1.030E-02 3.163E-03 8.434E-04 1.950E-04 3.901E-05 6.753E-06 1.010E-06 1.305E-07 1.455E-08 1.401E-09 1.174E-10 9.096E-12 9.416E-13 2.497E-13 1.121E-13 5.331E-14 2.466E-14 1.104E-14 4.898E-15 2.020E-15 8.002E-16 3.041E-16 1.108E-16 3.866E-17 1.291E-17 4.121E-18 1.256E-18 3.652E-19 1.012E-19 2.667E-20 6.684E-21 1.590E-21 3.584E-22 7.651E-23 1.544E-23 2.943E-24 5.295E-25 9.008E-26 1.458E-26 2.293E-27 3.700E-28 6.834E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.617E-29 4.823E-30 1.619E-30 5.606E-31 1.926E-31 6.481E-32 2.127E-32 6.796E-33 2.113E-33 6.389E-34 1.878E-34 5.363E-35 1.487E-35 4.004E-36 1.046E-36 2.648E-37 6.501E-38
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.614E-01 5.277E-01 3.301E-01 1.852E-01 9.278E-02 4.131E-02 1.631E-02 5.692E-03 1.754E-03 4.762E-04 1.138E-04 2.393E-05 4.420E-06 7.171E-07 1.021E-07 1.275E-08 1.399E-09 1.356E-10 1.219E-11 1.339E-12 3.286E-13 1.473E-13 7.351E-14 3.628E-14 1.782E-14 8.196E-15 3.641E-15 1.561E-15 6.451E-16 2.570E-16 9.857E-17 3.638E-17 1.291E-17 4.401E-18 1.440E-18 4.518E-19 1.358E-19 3.906E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.074E-20 2.821E-21 7.066E-22 1.687E-22 3.832E-23 8.278E-24 1.699E-24 3.314E-25 6.159E-26 1.099E-26 1.927E-27 3.507E-28 7.318E-29 1.914E-29 6.144E-30 2.197E-30 8.112E-31 2.983E-31 1.078E-31 3.814E-32 1.318E-32 4.445E-33 1.463E-33 4.696E-34 1.470E-34 4.482E-35 1.332E-35
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.762E-01 5.539E-01 3.607E-01 2.132E-01 1.139E-01 5.476E-02 2.364E-02 9.143E-03 3.163E-03 9.770E-04 2.693E-04 6.613E-05 1.446E-05 2.816E-06 4.876E-07 7.507E-08 1.027E-08 1.251E-09 1.365E-10 1.391E-11 1.669E-12 4.032E-13 1.809E-13 9.410E-14 4.991E-14 2.502E-14 1.217E-14 5.733E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.617E-15 1.156E-15 4.944E-16 2.044E-16 8.168E-17 3.152E-17 1.174E-17 4.214E-18 1.458E-18 4.859E-19 1.558E-19 4.799E-20 1.420E-20 4.032E-21 1.097E-21 2.860E-22 7.131E-23 1.700E-23 3.870E-24 8.415E-25 1.749E-25 3.488E-26 6.750E-27 1.304E-27 2.672E-28 6.367E-29 1.873E-29 6.539E-30 2.489E-30 9.711E-31 3.774E-31 1.444E-31 5.421E-32 1.993E-32 7.168E-33 2.522E-33 8.679E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.890E-01 5.770E-01 3.885E-01 2.397E-01 1.350E-01 6.913E-02 3.212E-02 1.351E-02 5.140E-03 1.765E-03 5.465E-04 1.525E-04 3.829E-05 8.654E-06 1.759E-06 3.213E-07 5.276E-08 7.783E-09



9.120E+00	1.033E-09
9.600E+00	1.242E-10
1.008E+01	1.410E-11
1.056E+01	1.866E-12
1.104E+01	4.650E-13
1.152E+01	2.121E-13
1.200E+01	1.163E-13
1.248E+01	6.223E-14
1.296E+01	3.253E-14
1.345E+01	1.655E-14
1.393E+01	8.183E-15
1.441E+01	3.931E-15
1.489E+01	1.834E-15
1.538E+01	8.309E-16
1.586E+01	3.651E-16
1.634E+01	1.556E-16
1.682E+01	6.425E-17
1.730E+01	2.570E-17
1.779E+01	9.949E-18
1.827E+01	3.726E-18
1.875E+01	1.349E-18
1.923E+01	4.719E-19
1.972E+01	1.593E-19
2.020E+01	5.190E-20
2.068E+01	1.629E-20
2.116E+01	4.927E-21
2.165E+01	1.433E-21
2.213E+01	4.010E-22
2.261E+01	1.078E-22
2.309E+01	2.781E-23
2.357E+01	6.882E-24
2.406E+01	1.634E-24
2.454E+01	3.720E-25
2.502E+01	8.142E-26
2.550E+01	1.725E-26
2.599E+01	3.592E-27
2.647E+01	7.637E-28
2.695E+01	1.774E-28
2.743E+01	4.871E-29
2.791E+01	1.617E-29
2.840E+01	6.137E-30
2.888E+01	2.475E-30
2.936E+01	1.013E-30
2.984E+01	4.121E-31
3.033E+01	1.652E-31
3.081E+01	6.509E-32
3.129E+01	2.515E-32

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB CoHD High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.02375 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.02375 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	3.338E-01
	9.600E-01	5.164E-02
	1.440E+00	3.400E-03
	1.920E+00	9.115E-05

2.400E+00	9.708E-07
2.880E+00	4.053E-09
3.360E+00	6.926E-12
3.840E+00	6.577E-14
4.320E+00	8.320E-15
4.800E+00	8.803E-16
5.280E+00	7.224E-17
5.760E+00	4.538E-18
6.240E+00	2.150E-19
6.720E+00	7.558E-21
7.200E+00	1.934E-22
7.680E+00	3.527E-24
8.160E+00	4.501E-26
8.640E+00	4.087E-28
9.120E+00	4.009E-30
9.600E+00	1.369E-31
1.008E+01	7.950E-33
1.056E+01	4.144E-34
1.104E+01	1.821E-35
1.152E+01	6.687E-37
1.200E+01	2.121E-38
1.248E+01	5.230E-40
1.296E+01	1.051E-41
1.345E+01	1.722E-43
1.393E+01	2.411E-45
1.441E+01	3.679E-47
1.489E+01	9.715E-49
1.538E+01	3.893E-50
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.997E-01
	9.600E-01	1.729E-01
	1.440E+00	3.985E-02
	1.920E+00	5.964E-03
	2.400E+00	5.711E-04
	2.880E+00	3.462E-05
	3.360E+00	1.320E-06
	3.840E+00	3.151E-08
	4.320E+00	4.703E-10
	4.800E+00	4.698E-12
	5.280E+00	1.268E-13
	5.760E+00	2.655E-14
	6.240E+00	6.112E-15
	6.720E+00	1.249E-15
	7.200E+00	2.249E-16
	7.680E+00	3.552E-17
	8.160E+00	4.899E-18
	8.640E+00	5.867E-19
	9.120E+00	6.067E-20
	9.600E+00	5.382E-21
	1.008E+01	4.067E-22
	1.056E+01	2.600E-23
	1.104E+01	1.395E-24
	1.152E+01	6.249E-26
	1.200E+01	2.446E-27
	1.248E+01	8.159E-29
	1.296E+01	3.510E-30
	1.345E+01	3.160E-31
	1.393E+01	4.157E-32
	1.441E+01	5.497E-33
	1.489E+01	6.749E-34
	1.538E+01	7.602E-35
	1.586E+01	7.830E-36
	1.634E+01	7.355E-37
	1.682E+01	6.283E-38
	1.730E+01	4.867E-39
	1.779E+01	3.410E-40
	1.827E+01	2.155E-41
	1.875E+01	1.229E-42
	1.923E+01	6.370E-44
	1.972E+01	3.102E-45
	2.020E+01	1.571E-46
	2.068E+01	1.002E-47
	2.116E+01	8.801E-49
	2.165E+01	9.189E-50
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.854E-01
	9.600E-01	2.699E-01
	1.440E+00	9.561E-02
	1.920E+00	2.561E-02
	2.400E+00	5.127E-03
	2.880E+00	7.616E-04
	3.360E+00	8.346E-05
	3.840E+00	6.721E-06
	4.320E+00	3.966E-07
	4.800E+00	1.711E-08
	5.280E+00	5.399E-10
	5.760E+00	1.283E-11
	6.240E+00	3.836E-13
	6.720E+00	6.447E-14
	7.200E+00	2.010E-14
	7.680E+00	6.005E-15
	8.160E+00	1.655E-15
	8.640E+00	4.196E-16
	9.120E+00	9.755E-17
	9.600E+00	2.075E-17
	1.008E+01	4.027E-18
	1.056E+01	7.111E-19
	1.104E+01	1.139E-19
	1.152E+01	1.649E-20
	1.200E+01	2.238E-21
	1.248E+01	2.595E-22
	1.296E+01	2.685E-23
	1.345E+01	2.469E-24
	1.393E+01	2.011E-25
	1.441E+01	1.450E-26
	1.489E+01	9.391E-28
	1.538E+01	5.897E-29
	1.586E+01	4.633E-30
	1.634E+01	6.093E-31
	1.682E+01	1.123E-31
	1.730E+01	2.202E-32
	1.779E+01	4.173E-33
	1.827E+01	7.498E-34
	1.875E+01	1.272E-34
	1.923E+01	2.033E-35
	1.972E+01	3.058E-36

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.322E-37 5.730E-38 7.115E-39 8.263E-40 8.963E-41 9.074E-42 8.583E-43 7.635E-44 6.513E-45 5.607E-46 5.374E-47 6.342E-48 9.145E-49 1.458E-49 2.364E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.396E-01 3.430E-01 1.516E-01 5.455E-02 1.585E-02 3.693E-03 6.872E-04 1.018E-04 1.197E-05 1.115E-06 8.214E-08 4.784E-09 2.208E-10 8.406E-12 4.163E-13 8.183E-14 2.952E-14 1.064E-14 3.621E-15 1.158E-15 3.474E-16 9.769E-17 2.570E-17 6.322E-18 1.505E-18 3.188E-19 6.263E-20 1.138E-20 1.910E-21 2.950E-22 4.183E-23

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.432E-24 6.442E-25 6.971E-26 6.899E-27 6.356E-28 5.837E-29 6.430E-30 1.046E-30 2.317E-31 5.653E-32 1.372E-32 3.217E-33 7.239E-34 1.560E-34 3.214E-35 6.328E-36 1.189E-36 2.132E-37 3.641E-38 5.919E-39 9.147E-40 1.343E-40 1.872E-41 2.480E-42 3.128E-43 3.788E-44 4.491E-45 5.435E-46 7.199E-47 1.115E-47 2.028E-48 4.069E-49 8.449E-50 1.748E-50
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.778E-01 3.996E-01 2.024E-01 8.716E-02 3.172E-02 9.700E-03 2.483E-03 5.306E-04 9.442E-05 1.397E-05 1.715E-06 1.746E-07 1.473E-08 1.029E-09 6.011E-11 3.191E-12 2.774E-13 7.725E-14 3.135E-14 1.266E-14 4.884E-15



	1.056E+01	1.794E-15
	1.104E+01	6.266E-16
	1.152E+01	2.085E-16
	1.200E+01	6.811E-17
	1.248E+01	2.024E-17
	1.296E+01	5.686E-18
	1.345E+01	1.509E-18
	1.393E+01	3.777E-19
	1.441E+01	8.901E-20
	1.489E+01	1.972E-20
	1.538E+01	4.099E-21
	1.586E+01	7.982E-22
	1.634E+01	1.453E-22
	1.682E+01	2.468E-23
	1.730E+01	3.905E-24
	1.779E+01	5.745E-25
	1.827E+01	7.851E-26
	1.875E+01	9.990E-27
	1.923E+01	1.197E-27
	1.972E+01	1.403E-28
	2.020E+01	1.790E-29
	2.068E+01	2.963E-30
	2.116E+01	6.749E-31
	2.165E+01	1.840E-31
	2.213E+01	5.246E-32
	2.261E+01	1.479E-32
	2.309E+01	4.057E-33
	2.357E+01	1.076E-33
	2.406E+01	2.759E-34
	2.454E+01	6.825E-35
	2.502E+01	1.629E-35
	2.550E+01	3.746E-36
	2.599E+01	8.299E-37
	2.647E+01	1.770E-37
	2.695E+01	3.630E-38
	2.743E+01	7.155E-39
	2.791E+01	1.355E-39
	2.840E+01	2.462E-40
	2.888E+01	4.293E-41
	2.936E+01	7.183E-42
	2.984E+01	1.154E-42
	3.033E+01	1.788E-43
	3.081E+01	2.691E-44
	3.129E+01	4.007E-45
30	0.000E+00	1.000E+00
	4.800E-01	7.066E-01
	9.600E-01	4.449E-01
	1.440E+00	2.472E-01
	1.920E+00	1.203E-01
	2.400E+00	5.092E-02
	2.880E+00	1.869E-02
	3.360E+00	5.922E-03
	3.840E+00	1.617E-03
	4.320E+00	3.794E-04
	4.800E+00	7.640E-05
	5.280E+00	1.319E-05

5.760E+00	1.950E-06
6.240E+00	2.465E-07
6.720E+00	2.665E-08
7.200E+00	2.463E-09
7.680E+00	1.952E-10
8.160E+00	1.360E-11
8.640E+00	1.019E-12
9.120E+00	1.683E-13
9.600E+00	6.369E-14
1.008E+01	2.830E-14
1.056E+01	1.234E-14
1.104E+01	5.181E-15
1.152E+01	2.096E-15
1.200E+01	8.385E-16
1.248E+01	3.094E-16
1.296E+01	1.093E-16
1.345E+01	3.688E-17
1.393E+01	1.189E-17
1.441E+01	3.658E-18
1.489E+01	1.072E-18
1.538E+01	2.993E-19
1.586E+01	7.941E-20
1.634E+01	2.001E-20
1.682E+01	4.782E-21
1.730E+01	1.082E-21
1.779E+01	2.315E-22
1.827E+01	4.679E-23
1.875E+01	8.914E-24
1.923E+01	1.599E-24
1.972E+01	2.699E-25
2.020E+01	4.284E-26
2.068E+01	6.420E-27
2.116E+01	9.192E-28
2.165E+01	1.305E-28
2.213E+01	2.009E-29
2.261E+01	3.847E-30
2.309E+01	9.682E-31
2.357E+01	2.900E-31
2.406E+01	9.214E-32
2.454E+01	2.930E-32
2.502E+01	9.138E-33
2.550E+01	2.776E-33
2.599E+01	8.202E-34
2.647E+01	2.353E-34
2.695E+01	6.556E-35
2.743E+01	1.772E-35
2.791E+01	4.644E-36
2.840E+01	1.180E-36
2.888E+01	2.904E-37
2.936E+01	6.921E-38
2.984E+01	1.596E-38
3.033E+01	3.560E-39
3.081E+01	7.675E-40
3.129E+01	1.599E-40

9.600E-01	4.821E-01
1.440E+00	2.866E-01
1.920E+00	1.523E-01
2.400E+00	7.192E-02
2.880E+00	3.008E-02
3.360E+00	1.111E-02
3.840E+00	3.615E-03
4.320E+00	1.034E-03
4.800E+00	2.598E-04
5.280E+00	5.721E-05
5.760E+00	1.104E-05
6.240E+00	1.865E-06
6.720E+00	2.755E-07
7.200E+00	3.559E-08
7.680E+00	4.019E-09
8.160E+00	3.973E-10
8.640E+00	3.479E-11
9.120E+00	2.932E-12
9.600E+00	3.622E-13
1.008E+01	1.086E-13
1.056E+01	4.930E-14
1.104E+01	2.334E-14
1.152E+01	1.082E-14
1.200E+01	4.982E-15
1.248E+01	2.138E-15
1.296E+01	8.845E-16
1.345E+01	3.527E-16
1.393E+01	1.354E-16
1.441E+01	5.004E-17
1.489E+01	1.778E-17
1.538E+01	6.069E-18
1.586E+01	1.989E-18
1.634E+01	6.250E-19
1.682E+01	1.882E-19
1.730E+01	5.426E-20
1.779E+01	1.496E-20
1.827E+01	3.939E-21
1.875E+01	9.897E-22
1.923E+01	2.370E-22
1.972E+01	5.403E-23
2.020E+01	1.171E-23
2.068E+01	2.412E-24
2.116E+01	4.713E-25
2.165E+01	8.738E-26
2.213E+01	1.540E-26
2.261E+01	2.593E-27
2.309E+01	4.252E-28
2.357E+01	7.107E-29
2.406E+01	1.329E-29
2.454E+01	3.085E-30
2.502E+01	8.975E-31
2.550E+01	2.980E-31
2.599E+01	1.034E-31
2.647E+01	3.590E-32
2.695E+01	1.226E-32
2.743E+01	4.098E-33
2.791E+01	1.337E-33

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.257E-34 1.321E-34 3.998E-35 1.178E-35 3.383E-36 9.453E-37 2.570E-37
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.477E-01 5.133E-01 3.214E-01 1.826E-01 9.365E-02 4.324E-02 1.792E-02 6.654E-03 2.209E-03 6.550E-04 1.732E-04 4.083E-05 8.570E-06 1.601E-06 2.660E-07 3.929E-08 5.160E-09 6.029E-10 6.312E-11 6.189E-12 7.218E-13 1.710E-13 7.421E-14 3.710E-14 1.889E-14 9.055E-15 4.210E-15 1.897E-15 8.277E-16 3.496E-16 1.429E-16 5.648E-17 2.157E-17 7.954E-18 2.831E-18 9.714E-19 3.212E-19 1.023E-19 3.133E-20 9.223E-21 2.608E-21 7.074E-22 1.839E-22 4.580E-23 1.091E-23 2.485E-24 5.405E-25 1.123E-25

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.230E-26 4.253E-27 7.880E-28 1.462E-28 2.891E-29 6.687E-30 1.908E-30 6.428E-31 2.348E-31 8.767E-32 3.257E-32 1.191E-32 4.272E-33 1.500E-33 5.156E-34 1.733E-34 5.698E-35
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.630E-01 5.400E-01 3.523E-01 2.109E-01 1.154E-01 5.759E-02 2.612E-02 1.075E-02 4.008E-03 1.352E-03 4.124E-04 1.136E-04 2.823E-05 6.328E-06 1.279E-06 2.329E-07 3.820E-08 5.644E-09 7.516E-10 9.065E-11 1.019E-11 1.242E-12 2.549E-13 1.026E-13 5.365E-14 2.780E-14 1.412E-14 6.983E-15 3.360E-15 1.572E-15 7.149E-16 3.158E-16 1.355E-16 5.639E-17 2.277E-17 8.912E-18 3.380E-18 1.241E-18

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.410E-19 1.515E-19 5.033E-20 1.614E-20 4.994E-21 1.490E-21 4.284E-22 1.186E-22 3.156E-23 8.077E-24 1.985E-24 4.685E-25 1.061E-25 2.310E-26 4.850E-27 9.922E-28 2.025E-28 4.329E-29 1.047E-29 3.040E-30 1.045E-30 3.964E-31 1.561E-31 6.177E-32 2.419E-32 9.324E-33 3.530E-33
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.761E-01 5.630E-01 3.799E-01 2.373E-01 1.369E-01 7.266E-02 3.542E-02 1.584E-02 6.480E-03 2.425E-03 8.289E-04 2.586E-04 7.360E-05 1.910E-05 4.514E-06 9.718E-07 1.905E-07 3.399E-08 5.519E-09 8.163E-10 1.104E-10 1.395E-11 1.835E-12 3.569E-13 1.361E-13 6.921E-14 3.720E-14 1.977E-14

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.027E-14 5.210E-15 2.577E-15 1.243E-15 5.838E-16 2.672E-16 1.191E-16 5.167E-17 2.181E-17 8.949E-18 3.569E-18 1.383E-18 5.202E-19 1.899E-19 6.721E-20 2.306E-20 7.662E-21 2.464E-21 7.667E-22 2.306E-22 6.700E-23 1.879E-23 5.084E-24 1.326E-24 3.335E-25 8.084E-26 1.892E-26 4.289E-27 9.516E-28 2.111E-28 4.893E-29 1.265E-29 3.849E-30 1.372E-30 5.406E-31 2.226E-31 9.257E-32
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.874E-01 5.833E-01 4.046E-01 2.619E-01 1.577E-01 8.811E-02 4.559E-02 2.181E-02 9.633E-03 3.924E-03 1.473E-03 5.089E-04 1.618E-04 4.732E-05 1.272E-05 3.140E-06 7.121E-07 1.483E-07

9.120E+00	2.835E-08
9.600E+00	4.975E-09
1.008E+01	8.020E-10
1.056E+01	1.192E-10
1.104E+01	1.664E-11
1.152E+01	2.378E-12
1.200E+01	4.763E-13
1.248E+01	1.661E-13
1.296E+01	8.416E-14
1.345E+01	4.648E-14
1.393E+01	2.562E-14
1.441E+01	1.386E-14
1.489E+01	7.335E-15
1.538E+01	3.796E-15
1.586E+01	1.919E-15
1.634E+01	9.484E-16
1.682E+01	4.577E-16
1.730E+01	2.156E-16
1.779E+01	9.914E-17
1.827E+01	4.447E-17
1.875E+01	1.945E-17
1.923E+01	8.296E-18
1.972E+01	3.447E-18
2.020E+01	1.395E-18
2.068E+01	5.495E-19
2.116E+01	2.106E-19
2.165E+01	7.850E-20
2.213E+01	2.844E-20
2.261E+01	1.001E-20
2.309E+01	3.421E-21
2.357E+01	1.135E-21
2.406E+01	3.649E-22
2.454E+01	1.138E-22
2.502E+01	3.435E-23
2.550E+01	1.004E-23
2.599E+01	2.840E-24
2.647E+01	7.769E-25
2.695E+01	2.055E-25
2.743E+01	5.262E-26
2.791E+01	1.305E-26
2.840E+01	3.153E-27
2.888E+01	7.494E-28
2.936E+01	1.793E-28
2.984E+01	4.499E-29
3.033E+01	1.256E-29
3.081E+01	4.079E-30
3.129E+01	1.528E-30

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## BAB CoHD Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.01425 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.01425 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.131E-01
	9.600E-01	1.205E-02
	1.440E+00	1.567E-04
	1.920E+00	4.396E-07

2.400E+00	2.590E-10
2.880E+00	1.363E-13
3.360E+00	8.267E-15
3.840E+00	4.334E-16
4.320E+00	1.477E-17
4.800E+00	3.176E-19
5.280E+00	4.163E-21
5.760E+00	3.191E-23
6.240E+00	1.370E-25
6.720E+00	3.310E-28
7.200E+00	1.168E-30
7.680E+00	2.505E-32
8.160E+00	5.805E-34
8.640E+00	1.017E-35
9.120E+00	1.315E-37
9.600E+00	1.236E-39
1.008E+01	8.309E-42
1.056E+01	4.014E-44
1.104E+01	1.686E-46
1.152E+01	1.365E-48
1.200E+01	2.308E-50
1.248E+01	0.000E+00
1.296E+01	0.000E+00
1.345E+01	0.000E+00
1.393E+01	0.000E+00
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	3.859E-01
	9.600E-01	7.908E-02
	1.440E+00	8.025E-03
	1.920E+00	3.879E-04
	2.400E+00	8.739E-06
	2.880E+00	9.056E-08
	3.360E+00	4.292E-10
	3.840E+00	1.174E-12
	4.320E+00	5.004E-14
	4.800E+00	7.766E-15
	5.280E+00	1.001E-15
	5.760E+00	1.044E-16
	6.240E+00	8.714E-18
	6.720E+00	5.762E-19
	7.200E+00	2.980E-20
	7.680E+00	1.189E-21
	8.160E+00	3.603E-23
	8.640E+00	8.164E-25
	9.120E+00	1.369E-26
	9.600E+00	1.793E-28
	1.008E+01	3.152E-30
	1.056E+01	1.699E-31
	1.104E+01	1.295E-32
	1.152E+01	8.982E-34
	1.200E+01	5.637E-35
	1.248E+01	2.896E-36
	1.296E+01	1.273E-37
	1.345E+01	4.757E-39
	1.393E+01	1.503E-40
	1.441E+01	3.997E-42
	1.489E+01	9.025E-44
	1.538E+01	1.845E-45
	1.586E+01	4.392E-47
	1.634E+01	1.716E-48
	1.682E+01	9.340E-50
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	4.845E-01
	9.600E-01	1.557E-01
	1.440E+00	3.172E-02
	1.920E+00	3.990E-03
	2.400E+00	3.046E-04
	2.880E+00	1.397E-05
	3.360E+00	3.817E-07
	3.840E+00	6.194E-09
	4.320E+00	6.011E-11
	4.800E+00	5.503E-13
	5.280E+00	5.673E-14
	5.760E+00	1.266E-14
	6.240E+00	2.519E-15
	6.720E+00	4.361E-16
	7.200E+00	6.535E-17
	7.680E+00	8.432E-18
	8.160E+00	9.309E-19
	8.640E+00	8.734E-20
	9.120E+00	6.912E-21
	9.600E+00	4.578E-22
	1.008E+01	2.515E-23
	1.056E+01	1.137E-24
	1.104E+01	4.199E-26
	1.152E+01	1.286E-27
	1.200E+01	3.924E-29
	1.248E+01	1.898E-30
	1.296E+01	1.950E-31
	1.345E+01	2.398E-32
	1.393E+01	2.786E-33
	1.441E+01	2.950E-34
	1.489E+01	2.832E-35
	1.538E+01	2.457E-36
	1.586E+01	1.920E-37
	1.634E+01	1.346E-38
	1.682E+01	8.449E-40
	1.730E+01	4.730E-41
	1.779E+01	2.362E-42
	1.827E+01	1.061E-43
	1.875E+01	4.462E-45
	1.923E+01	1.998E-46
	1.972E+01	1.190E-47

	2.020E+01	9.916E-49
	2.068E+01	9.499E-50
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	5.493E-01
	9.600E-01	2.230E-01
	1.440E+00	6.479E-02
	1.920E+00	1.320E-02
	2.400E+00	1.861E-03
	2.880E+00	1.798E-04
	3.360E+00	1.183E-05
	3.840E+00	5.283E-07
	4.320E+00	1.595E-08
	4.800E+00	3.260E-10
	5.280E+00	4.871E-12
	5.760E+00	1.789E-13
	6.240E+00	4.181E-14
	6.720E+00	1.135E-14
	7.200E+00	2.803E-15
	7.680E+00	6.235E-16
	8.160E+00	1.245E-16
	8.640E+00	2.226E-17
	9.120E+00	3.546E-18
	9.600E+00	5.015E-19
	1.008E+01	6.267E-20
	1.056E+01	6.886E-21
	1.104E+01	6.617E-22
	1.152E+01	5.532E-23
	1.200E+01	4.167E-24
	1.248E+01	2.568E-25
	1.296E+01	1.360E-26
	1.345E+01	6.358E-28
	1.393E+01	3.063E-29
	1.441E+01	2.338E-30
	1.489E+01	3.204E-31

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.248E-32 8.386E-33 1.256E-33 1.750E-34 2.264E-35 2.714E-36 3.006E-37 3.072E-38 2.890E-39 2.497E-40 1.979E-41 1.441E-42 9.725E-44 6.282E-45 4.234E-46 3.460E-47 3.715E-48 4.741E-49 6.309E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 5.960E-01 2.797E-01 1.009E-01 2.754E-02 5.616E-03 8.498E-04 9.486E-05 7.782E-06 4.678E-07 2.056E-08 6.609E-10 1.600E-11 4.860E-13 8.295E-14 2.633E-14 8.017E-15 2.251E-15 5.813E-16 1.377E-16 2.984E-17 5.900E-18

	1.056E+01	1.061E-18
	1.104E+01	1.731E-19
	1.152E+01	2.554E-20
	1.200E+01	3.532E-21
	1.248E+01	4.179E-22
	1.296E+01	4.413E-23
	1.345E+01	4.142E-24
	1.393E+01	3.442E-25
	1.441E+01	2.533E-26
	1.489E+01	1.674E-27
	1.538E+01	1.072E-28
	1.586E+01	8.572E-30
	1.634E+01	1.147E-30
	1.682E+01	2.156E-31
	1.730E+01	4.311E-32
	1.779E+01	8.339E-33
	1.827E+01	1.529E-33
	1.875E+01	2.647E-34
	1.923E+01	4.319E-35
	1.972E+01	6.630E-36
	2.020E+01	9.563E-37
	2.068E+01	1.294E-37
	2.116E+01	1.640E-38
	2.165E+01	1.944E-39
	2.213E+01	2.152E-40
	2.261E+01	2.223E-41
	2.309E+01	2.146E-42
	2.357E+01	1.948E-43
	2.406E+01	1.695E-44
	2.454E+01	1.488E-45
	2.502E+01	1.453E-46
	2.550E+01	1.745E-47
	2.599E+01	2.564E-48
	2.647E+01	4.169E-49
	2.695E+01	6.898E-50
	2.743E+01	1.116E-50
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.315E-01
	9.600E-01	3.276E-01
	1.440E+00	1.369E-01
	1.920E+00	4.544E-02
	2.400E+00	1.187E-02
	2.880E+00	2.425E-03
	3.360E+00	3.852E-04
	3.840E+00	4.743E-05
	4.320E+00	4.514E-06
	4.800E+00	3.314E-07
	5.280E+00	1.874E-08



5.760E+00	8.163E-10
6.240E+00	2.792E-11
6.720E+00	9.915E-13
7.200E+00	1.306E-13
7.680E+00	4.394E-14
8.160E+00	1.533E-14
8.640E+00	5.021E-15
9.120E+00	1.535E-15
9.600E+00	4.375E-16
1.008E+01	1.160E-16
1.056E+01	2.853E-17
1.104E+01	6.501E-18
1.152E+01	1.371E-18
1.200E+01	2.771E-19
1.248E+01	4.928E-20
1.296E+01	8.029E-21
1.345E+01	1.195E-21
1.393E+01	1.621E-22
1.441E+01	1.995E-23
1.489E+01	2.224E-24
1.538E+01	2.238E-25
1.586E+01	2.037E-26
1.634E+01	1.700E-27
1.682E+01	1.387E-28
1.730E+01	1.343E-29
1.779E+01	1.983E-30
1.827E+01	4.131E-31
1.875E+01	9.526E-32
1.923E+01	2.173E-32
1.972E+01	4.763E-33
2.020E+01	9.964E-34
2.068E+01	1.986E-34
2.116E+01	3.765E-35
2.165E+01	6.784E-36
2.213E+01	1.160E-36
2.261E+01	1.882E-37
2.309E+01	2.891E-38
2.357E+01	4.200E-39
2.406E+01	5.766E-40
2.454E+01	7.473E-41
2.502E+01	9.148E-42
2.550E+01	1.060E-42
2.599E+01	1.171E-43
2.647E+01	1.261E-44
2.695E+01	1.385E-45
2.743E+01	1.684E-46
2.791E+01	2.444E-47
2.840E+01	4.209E-48
2.888E+01	7.979E-49
2.936E+01	1.553E-49
2.984E+01	2.986E-50
3.033E+01	0.000E+00
3.081E+01	0.000E+00
3.129E+01	0.000E+00

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
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6.720E+00  
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7.680E+00  
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2.502E+01  
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2.743E+01  
2.791E+01

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2.043E-02  
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1.058E-03  
1.742E-04  
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2.439E-06  
2.067E-07  
1.401E-08  
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3.345E-11  
1.466E-12  
1.778E-13  
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2.935E-15  
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2.912E-16  
8.357E-17  
2.253E-17  
5.901E-18  
1.385E-18  
3.028E-19  
6.159E-20  
1.163E-20  
2.032E-21  
3.279E-22  
4.876E-23  
6.663E-24  
8.350E-25  
9.588E-26  
1.012E-26  
1.003E-27  
1.001E-28  
1.212E-29  
2.138E-30  
5.034E-31  
1.297E-31  
3.329E-32  
8.270E-33  
1.976E-33  
4.529E-34  
9.954E-35  
2.095E-35  
4.219E-36  
8.123E-37  
1.494E-37  
2.621E-38  
4.385E-39  
6.986E-40  
1.060E-40  
1.530E-41  
2.107E-42  
2.779E-43

	2.840E+01	3.559E-44
	2.888E+01	4.552E-45
	2.936E+01	6.138E-46
	2.984E+01	9.363E-47
	3.033E+01	1.678E-47
	3.081E+01	3.422E-48
	3.129E+01	7.443E-49
40	0.000E+00	1.000E+00
	4.800E-01	6.830E-01
	9.600E-01	4.034E-01
	1.440E+00	2.033E-01
	1.920E+00	8.653E-02
	2.400E+00	3.089E-02
	2.880E+00	9.194E-03
	3.360E+00	2.273E-03
	3.840E+00	4.654E-04
	4.320E+00	7.873E-05
	4.800E+00	1.098E-05
	5.280E+00	1.262E-06
	5.760E+00	1.192E-07
	6.240E+00	9.259E-09
	6.720E+00	5.917E-10
	7.200E+00	3.164E-11
	7.680E+00	1.691E-12
	8.160E+00	2.145E-13
	8.640E+00	7.485E-14
	9.120E+00	3.069E-14
	9.600E+00	1.217E-14
	1.008E+01	4.588E-15
	1.056E+01	1.643E-15
	1.104E+01	5.579E-16
	1.152E+01	1.800E-16
	1.200E+01	5.689E-17
	1.248E+01	1.632E-17
	1.296E+01	4.415E-18
	1.345E+01	1.124E-18
	1.393E+01	2.691E-19
	1.441E+01	6.043E-20
	1.489E+01	1.271E-20
	1.538E+01	2.500E-21
	1.586E+01	4.585E-22
	1.634E+01	7.831E-23
	1.682E+01	1.243E-23
	1.730E+01	1.829E-24
	1.779E+01	2.493E-25
	1.827E+01	3.151E-26
	1.875E+01	3.725E-27
	1.923E+01	4.252E-28
	1.972E+01	5.157E-29
	2.020E+01	7.962E-30
	2.068E+01	1.725E-30
	2.116E+01	4.608E-31
	2.165E+01	1.304E-31
	2.213E+01	3.660E-32
	2.261E+01	9.980E-33
	2.309E+01	2.630E-33

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.686E-34 1.638E-34 3.865E-35 8.776E-36 1.917E-36 4.022E-37 8.104E-38 1.567E-38 2.904E-39 5.157E-40 8.771E-41 1.429E-41 2.234E-42 3.366E-43 4.939E-44 7.223E-45 1.098E-45
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.024E-01 4.340E-01 2.331E-01 1.079E-01 4.278E-02 1.445E-02 4.142E-03 1.005E-03 2.060E-04 3.560E-05 5.181E-06 6.341E-07 6.523E-08 5.637E-09 4.099E-10 2.558E-11 1.640E-12 2.339E-13 8.492E-14 3.674E-14 1.551E-14 6.271E-15 2.423E-15 8.963E-16 3.267E-16 1.091E-16 3.467E-17 1.046E-17 2.994E-18 8.118E-19 2.082E-19 5.044E-20 1.153E-20 2.480E-21 5.017E-22 9.522E-23 1.693E-23 2.816E-24

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.377E-25 6.356E-26 8.667E-27 1.130E-27 1.486E-28 2.240E-29 4.483E-30 1.177E-30 3.507E-31 1.072E-31 3.226E-32 9.452E-33 2.685E-33 7.389E-34 1.967E-34 5.066E-35 1.261E-35 3.031E-36 7.035E-37 1.575E-37 3.400E-38 7.071E-39 1.416E-39 2.729E-40 5.062E-41 9.041E-42 1.558E-42
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.190E-01 4.609E-01 2.607E-01 1.292E-01 5.570E-02 2.082E-02 6.720E-03 1.869E-03 4.467E-04 9.164E-05 1.612E-05 2.427E-06 3.126E-07 3.443E-08 3.241E-09 2.616E-10 1.856E-11 1.413E-12 2.363E-13 9.087E-14 4.112E-14 1.827E-14 7.811E-15 3.219E-15 1.312E-15 4.940E-16 1.780E-16 6.132E-17

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.018E-17 6.333E-18 1.895E-18 5.396E-19 1.461E-19 3.758E-20 9.164E-21 2.116E-21 4.622E-22 9.532E-23 1.854E-23 3.394E-24 5.845E-25 9.471E-26 1.448E-26 2.115E-27 3.060E-28 4.793E-29 9.325E-30 2.386E-30 7.279E-31 2.358E-31 7.653E-32 2.436E-32 7.552E-33 2.277E-33 6.668E-34 1.896E-34 5.229E-35 1.399E-35 3.628E-36 9.113E-37 2.217E-37 5.217E-38 1.188E-38 2.613E-39 5.557E-40
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.334E-01 4.848E-01 2.863E-01 1.499E-01 6.931E-02 2.815E-02 1.002E-02 3.114E-03 8.444E-04 1.994E-04 4.094E-05 7.303E-06 1.131E-06 1.520E-07 1.770E-08 1.789E-09 1.574E-10 1.249E-11

9.120E+00	1.129E-12
9.600E+00	2.265E-13
1.008E+01	9.312E-14
1.056E+01	4.385E-14
1.104E+01	2.032E-14
1.152E+01	9.138E-15
1.200E+01	4.074E-15
1.248E+01	1.689E-15
1.296E+01	6.736E-16
1.345E+01	2.581E-16
1.393E+01	9.496E-17
1.441E+01	3.352E-17
1.489E+01	1.134E-17
1.538E+01	3.675E-18
1.586E+01	1.139E-18
1.634E+01	3.375E-19
1.682E+01	9.547E-20
1.730E+01	2.575E-20
1.779E+01	6.617E-21
1.827E+01	1.618E-21
1.875E+01	3.757E-22
1.923E+01	8.282E-23
1.972E+01	1.730E-23
2.020E+01	3.422E-24
2.068E+01	6.401E-25
2.116E+01	1.133E-25
2.165E+01	1.901E-26
2.213E+01	3.055E-27
2.261E+01	4.832E-28
2.309E+01	8.055E-29
2.357E+01	1.590E-29
2.406E+01	4.035E-30
2.454E+01	1.249E-30
2.502E+01	4.222E-31
2.550E+01	1.452E-31
2.599E+01	4.935E-32
2.647E+01	1.642E-32
2.695E+01	5.330E-33
2.743E+01	1.686E-33
2.791E+01	5.191E-34
2.840E+01	1.556E-34
2.888E+01	4.536E-35
2.936E+01	1.286E-35
2.984E+01	3.545E-36
3.033E+01	9.491E-37
3.081E+01	2.467E-37
3.129E+01	6.226E-38

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB ClayPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.786E-01
	9.600E-01	2.926E-02
	1.440E+00	1.040E-03
	1.920E+00	1.187E-05

2.400E+00	4.235E-08
2.880E+00	4.707E-11
3.360E+00	9.937E-14
3.840E+00	9.178E-15
4.320E+00	7.423E-16
4.800E+00	4.365E-17
5.280E+00	1.832E-18
5.760E+00	5.373E-20
6.240E+00	1.074E-21
6.720E+00	1.425E-23
7.200E+00	1.218E-25
7.680E+00	6.713E-28
8.160E+00	3.740E-30
8.640E+00	9.150E-32
9.120E+00	3.757E-33
9.600E+00	1.303E-34
1.008E+01	3.635E-36
1.056E+01	8.061E-38
1.104E+01	1.405E-39
1.152E+01	1.907E-41
1.200E+01	2.287E-43
1.248E+01	1.948E-45
1.296E+01	1.921E-47
1.345E+01	3.851E-49
1.393E+01	1.100E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.487E-01
	9.600E-01	1.264E-01
	1.440E+00	2.123E-02
	1.920E+00	2.064E-03
	2.400E+00	1.140E-04
	2.880E+00	3.540E-06
	3.360E+00	6.129E-08
	3.840E+00	5.898E-10
	4.320E+00	3.444E-12
	4.800E+00	8.769E-14
	5.280E+00	1.686E-14
	5.760E+00	3.109E-15
	6.240E+00	4.915E-16
	6.720E+00	6.615E-17
	7.200E+00	7.529E-18
	7.680E+00	7.195E-19
	8.160E+00	5.727E-20
	8.640E+00	3.763E-21
	9.120E+00	2.022E-22
	9.600E+00	8.792E-24
	1.008E+01	3.062E-25
	1.056E+01	8.509E-27
	1.104E+01	1.966E-28
	1.152E+01	5.237E-30
	1.200E+01	3.684E-31
	1.248E+01	3.813E-32
	1.296E+01	3.954E-33
	1.345E+01	3.722E-34
	1.393E+01	3.141E-35
	1.441E+01	2.368E-36
	1.489E+01	1.588E-37
	1.538E+01	9.434E-39
	1.586E+01	4.947E-40
	1.634E+01	2.282E-41
	1.682E+01	9.255E-43
	1.730E+01	3.343E-44
	1.779E+01	1.141E-45
	1.827E+01	4.427E-47
	1.875E+01	2.493E-48
	1.923E+01	1.912E-49
	1.972E+01	1.576E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.400E-01
	9.600E-01	2.154E-01
	1.440E+00	6.150E-02
	1.920E+00	1.231E-02
	2.400E+00	1.705E-03
	2.880E+00	1.618E-04
	3.360E+00	1.046E-05
	3.840E+00	4.589E-07
	4.320E+00	1.361E-08
	4.800E+00	2.733E-10
	5.280E+00	4.013E-12
	5.760E+00	1.453E-13
	6.240E+00	3.338E-14
	6.720E+00	8.906E-15
	7.200E+00	2.160E-15
	7.680E+00	4.720E-16
	8.160E+00	9.261E-17
	8.640E+00	1.626E-17
	9.120E+00	2.545E-18
	9.600E+00	3.535E-19
	1.008E+01	4.340E-20
	1.056E+01	4.684E-21
	1.104E+01	4.421E-22
	1.152E+01	3.632E-23
	1.200E+01	2.936E-24
	1.248E+01	1.786E-25
	1.296E+01	9.342E-27
	1.345E+01	4.313E-28
	1.393E+01	2.054E-29
	1.441E+01	1.551E-30
	1.489E+01	2.102E-31
	1.538E+01	3.401E-32
	1.586E+01	5.366E-33
	1.634E+01	7.934E-34
	1.682E+01	1.092E-34
	1.730E+01	1.394E-35
	1.779E+01	1.650E-36
	1.827E+01	1.804E-37
	1.875E+01	1.820E-38
	1.923E+01	1.690E-39
	1.972E+01	1.442E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.128E-41 8.111E-43 5.406E-44 3.449E-45 2.298E-46 1.857E-47 1.971E-48 2.485E-49 3.266E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 5.985E-01 2.866E-01 1.073E-01 3.096E-02 6.807E-03 1.132E-03 1.417E-04 1.330E-05 9.329E-07 4.882E-08 1.904E-09 5.584E-11 1.461E-12 1.210E-13 3.575E-14 1.150E-14 3.447E-15 9.567E-16 2.452E-16 5.789E-17 1.256E-17 2.500E-18 4.550E-19 7.567E-20 1.296E-20 1.768E-21 2.176E-22 2.405E-23 2.378E-24 2.099E-25 1.652E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.177E-27 8.120E-29 6.804E-30 9.195E-31 1.766E-31 3.676E-32 7.472E-33 1.447E-33 2.656E-34 4.614E-35 7.574E-36 1.173E-36 1.713E-37 2.352E-38 3.037E-39 3.678E-40 4.178E-41 4.448E-42 4.452E-43 4.229E-44 3.914E-45 3.754E-46 4.124E-47 5.573E-48 8.907E-49 1.531E-49 2.648E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.401E-01 3.435E-01 1.519E-01 5.471E-02 1.591E-02 3.710E-03 6.909E-04 1.024E-04 1.205E-05 1.123E-06 8.284E-08 4.829E-09 2.230E-10 8.496E-12 4.211E-13 8.283E-14 2.990E-14 1.079E-14 3.673E-15 1.175E-15 3.530E-16

	1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.933E-17 2.615E-17 6.467E-18 1.677E-18 3.578E-19 7.082E-20 1.297E-20 2.192E-21 3.412E-22 4.874E-23 6.377E-24 7.621E-25 8.309E-26 8.285E-27 7.691E-28 7.115E-29 7.894E-30 1.293E-30 2.886E-31 7.093E-32 1.734E-32 4.098E-33 9.290E-34 2.017E-34 4.187E-35 8.307E-36 1.573E-36 2.842E-37 4.890E-38 8.009E-39 1.247E-39 1.845E-40 2.592E-41 3.459E-42 4.396E-43 5.364E-44 6.407E-45 7.811E-46 1.042E-46 1.626E-47 2.976E-48 6.016E-49 1.259E-49 2.623E-50
30	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00	1.000E+00 6.716E-01 3.899E-01 1.931E-01 8.077E-02 2.833E-02 8.285E-03 2.013E-03 4.048E-04 6.728E-05 9.220E-06 1.040E-06

5.760E+00	9.658E-08
6.240E+00	7.369E-09
6.720E+00	4.627E-10
7.200E+00	2.431E-11
7.680E+00	1.279E-12
8.160E+00	1.602E-13
8.640E+00	5.502E-14
9.120E+00	2.216E-14
9.600E+00	8.632E-15
1.008E+01	3.198E-15
1.056E+01	1.125E-15
1.104E+01	3.755E-16
1.152E+01	1.199E-16
1.200E+01	4.036E-17
1.248E+01	1.143E-17
1.296E+01	3.053E-18
1.345E+01	7.675E-19
1.393E+01	1.814E-19
1.441E+01	4.021E-20
1.489E+01	8.351E-21
1.538E+01	1.621E-21
1.586E+01	2.936E-22
1.634E+01	4.950E-23
1.682E+01	7.755E-24
1.730E+01	1.127E-24
1.779E+01	1.516E-25
1.827E+01	1.893E-26
1.875E+01	2.209E-27
1.923E+01	2.491E-28
1.972E+01	2.989E-29
2.020E+01	4.572E-30
2.068E+01	9.807E-31
2.116E+01	2.590E-31
2.165E+01	7.239E-32
2.213E+01	2.006E-32
2.261E+01	5.400E-33
2.309E+01	1.405E-33
2.357E+01	3.526E-34
2.406E+01	8.528E-35
2.454E+01	1.987E-35
2.502E+01	4.454E-36
2.550E+01	9.601E-37
2.599E+01	1.989E-37
2.647E+01	3.957E-38
2.695E+01	7.552E-39
2.743E+01	1.382E-39
2.791E+01	2.423E-40
2.840E+01	4.068E-41
2.888E+01	6.544E-42
2.936E+01	1.010E-42
2.984E+01	1.503E-43
3.033E+01	2.178E-44
3.081E+01	3.147E-45
3.129E+01	4.730E-46



9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
1.056E+01  
1.104E+01  
1.152E+01  
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1.248E+01  
1.296E+01  
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1.393E+01  
1.441E+01  
1.489E+01  
1.538E+01  
1.586E+01  
1.634E+01  
1.682E+01  
1.730E+01  
1.779E+01  
1.827E+01  
1.875E+01  
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2.020E+01  
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2.309E+01  
2.357E+01  
2.406E+01  
2.454E+01  
2.502E+01  
2.550E+01  
2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

4.286E-01  
2.305E-01  
1.074E-01  
4.311E-02  
1.483E-02  
4.359E-03  
1.091E-03  
2.321E-04  
4.189E-05  
6.408E-06  
8.297E-07  
9.086E-08  
8.410E-09  
6.586E-10  
4.407E-11  
2.767E-12  
2.845E-13  
8.432E-14  
3.589E-14  
1.534E-14  
6.306E-15  
2.485E-15  
9.481E-16  
3.819E-16  
1.315E-16  
4.316E-17  
1.348E-17  
4.006E-18  
1.130E-18  
3.025E-19  
7.670E-20  
1.839E-20  
4.167E-21  
8.902E-22  
1.791E-22  
3.386E-23  
6.009E-24  
9.994E-25  
1.556E-25  
2.272E-26  
3.131E-27  
4.165E-28  
5.714E-29  
9.252E-30  
1.999E-30  
5.487E-31  
1.666E-31  
5.139E-32  
1.558E-32  
4.600E-33  
1.318E-33  
3.661E-34  
9.852E-35  
2.567E-35  
6.474E-36  
1.579E-36  
3.722E-37

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	8.475E-38 1.863E-38 3.951E-39 8.081E-40 1.593E-40 3.026E-41 5.541E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.168E-01 4.613E-01 2.642E-01 1.336E-01 5.940E-02 2.310E-02 7.832E-03 2.310E-03 5.917E-04 1.313E-04 2.524E-05 4.196E-06 6.026E-07 7.475E-08 8.004E-09 7.402E-10 5.960E-11 4.445E-12 4.480E-13 1.159E-13 5.018E-14 2.293E-14 1.021E-14 4.443E-15 2.038E-15 8.097E-16 3.089E-16 1.130E-16 3.966E-17 1.333E-17 4.285E-18 1.317E-18 3.865E-19 1.082E-19 2.886E-20 7.325E-21 1.767E-21 4.047E-22 8.783E-23 1.805E-23 3.506E-24 6.433E-25 1.114E-25 1.826E-26 2.848E-27 4.322E-28 6.754E-29 1.215E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.804E-30 8.126E-31 2.636E-31 8.798E-32 2.911E-32 9.432E-33 2.980E-33 9.167E-34 2.744E-34 7.987E-35 2.260E-35 6.212E-36 1.659E-36 4.298E-37 1.080E-37 2.634E-38 6.223E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.337E-01 4.895E-01 2.946E-01 1.590E-01 7.652E-02 3.274E-02 1.242E-02 4.163E-03 1.232E-03 3.213E-04 7.375E-05 1.489E-05 2.641E-06 4.114E-07 5.625E-08 6.748E-09 7.108E-10 6.619E-11 5.726E-12 6.120E-13 1.470E-13 6.371E-14 3.064E-14 1.474E-14 7.461E-15 3.306E-15 1.415E-15 5.840E-16 2.325E-16 8.918E-17 3.294E-17 1.171E-17 4.000E-18 1.313E-18 4.136E-19 1.249E-19 3.616E-20 1.001E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.651E-21 6.701E-22 1.616E-22 3.714E-23 8.121E-24 1.689E-24 3.337E-25 6.268E-26 1.122E-26 1.929E-27 3.267E-28 5.766E-29 1.173E-29 2.996E-30 9.348E-31 3.232E-31 1.150E-31 4.075E-32 1.418E-32 4.829E-33 1.607E-33 5.217E-34 1.653E-34 5.107E-35 1.539E-35 4.517E-36 1.292E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.482E-01 5.141E-01 3.221E-01 1.831E-01 9.400E-02 4.344E-02 1.802E-02 6.695E-03 2.224E-03 6.600E-04 1.747E-04 4.120E-05 8.655E-06 1.618E-06 2.690E-07 3.977E-08 5.227E-09 6.113E-10 6.404E-11 6.284E-12 7.335E-13 1.740E-13 7.584E-14 3.858E-14 2.103E-14 1.016E-14 4.757E-15 2.159E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.491E-16 4.039E-16 1.663E-16 6.622E-17 2.548E-17 9.467E-18 3.394E-18 1.174E-18 3.910E-19 1.254E-19 3.871E-20 1.148E-20 3.271E-21 8.940E-22 2.342E-22 5.876E-23 1.411E-23 3.237E-24 7.094E-25 1.485E-25 2.972E-26 5.710E-27 1.066E-27 1.991E-28 3.966E-29 9.232E-30 2.651E-30 8.994E-31 3.309E-31 1.245E-31 4.659E-32 1.717E-32 6.204E-33 2.195E-33 7.602E-34 2.575E-34 8.530E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.607E-01 5.357E-01 3.472E-01 2.060E-01 1.115E-01 5.489E-02 2.451E-02 9.907E-03 3.620E-03 1.194E-03 3.550E-04 9.512E-05 2.294E-05 4.979E-06 9.718E-07 1.705E-07 2.688E-08 3.808E-09

9.120E+00	4.852E-10
9.600E+00	5.604E-11
1.008E+01	6.131E-12
1.056E+01	7.900E-13
1.104E+01	1.942E-13
1.152E+01	8.750E-14
1.200E+01	4.929E-14
1.248E+01	2.542E-14
1.296E+01	1.280E-14
1.345E+01	6.272E-15
1.393E+01	2.987E-15
1.441E+01	1.382E-15
1.489E+01	6.212E-16
1.538E+01	2.709E-16
1.586E+01	1.147E-16
1.634E+01	4.705E-17
1.682E+01	1.871E-17
1.730E+01	7.205E-18
1.779E+01	2.686E-18
1.827E+01	9.686E-19
1.875E+01	3.377E-19
1.923E+01	1.137E-19
1.972E+01	3.696E-20
2.020E+01	1.159E-20
2.068E+01	3.503E-21
2.116E+01	1.020E-21
2.165E+01	2.856E-22
2.213E+01	7.690E-23
2.261E+01	1.990E-23
2.309E+01	4.941E-24
2.357E+01	1.177E-24
2.406E+01	2.690E-25
2.454E+01	5.897E-26
2.502E+01	1.243E-26
2.550E+01	2.539E-27
2.599E+01	5.107E-28
2.647E+01	1.053E-28
2.695E+01	2.383E-29
2.743E+01	6.402E-30
2.791E+01	2.074E-30
2.840E+01	7.636E-31
2.888E+01	2.974E-31
2.936E+01	1.174E-31
2.984E+01	4.599E-32
3.033E+01	1.775E-32
3.081E+01	6.732E-33
3.129E+01	2.504E-33

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# POLLUTEv7

Version 7.13

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## BAB ClayPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.27	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.839E-01
	9.600E-01	3.038E-02
	1.440E+00	1.101E-03
	1.920E+00	1.281E-05



2.400E+00	4.657E-08
2.880E+00	5.275E-11
3.360E+00	1.133E-13
3.840E+00	1.067E-14
4.320E+00	8.793E-16
4.800E+00	5.270E-17
5.280E+00	2.255E-18
5.760E+00	6.740E-20
6.240E+00	1.374E-21
6.720E+00	1.857E-23
7.200E+00	1.619E-25
7.680E+00	9.091E-28
8.160E+00	5.158E-30
8.640E+00	1.285E-31
9.120E+00	5.377E-33
9.600E+00	1.901E-34
1.008E+01	5.406E-36
1.056E+01	1.222E-37
1.104E+01	2.172E-39
1.152E+01	3.003E-41
1.200E+01	2.853E-43
1.248E+01	2.430E-45
1.296E+01	2.395E-47
1.345E+01	4.798E-49
1.393E+01	1.370E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.571E-01
	9.600E-01	1.312E-01
	1.440E+00	2.246E-02
	1.920E+00	2.225E-03
	2.400E+00	1.253E-04
	2.880E+00	3.965E-06
	3.360E+00	6.997E-08
	3.840E+00	6.864E-10
	4.320E+00	4.083E-12
	4.800E+00	1.057E-13
	5.280E+00	2.070E-14
	5.760E+00	3.891E-15
	6.240E+00	6.271E-16
	6.720E+00	8.601E-17
	7.200E+00	9.979E-18
	7.680E+00	9.720E-19
	8.160E+00	7.886E-20
	8.640E+00	5.282E-21
	9.120E+00	2.893E-22
	9.600E+00	1.282E-23
	1.008E+01	4.553E-25
	1.056E+01	1.290E-26
	1.104E+01	3.036E-28
	1.152E+01	8.218E-30
	1.200E+01	4.578E-31
	1.248E+01	4.737E-32
	1.296E+01	4.913E-33
	1.345E+01	4.627E-34
	1.393E+01	3.907E-35
	1.441E+01	2.945E-36
	1.489E+01	1.976E-37
	1.538E+01	1.174E-38
	1.586E+01	6.158E-40
	1.634E+01	2.841E-41
	1.682E+01	1.153E-42
	1.730E+01	4.163E-44
	1.779E+01	1.421E-45
	1.827E+01	5.510E-47
	1.875E+01	3.100E-48
	1.923E+01	2.377E-49
	1.972E+01	1.960E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.500E-01
	9.600E-01	2.235E-01
	1.440E+00	6.504E-02
	1.920E+00	1.327E-02
	2.400E+00	1.872E-03
	2.880E+00	1.811E-04
	3.360E+00	1.194E-05
	3.840E+00	5.337E-07
	4.320E+00	1.614E-08
	4.800E+00	3.302E-10
	5.280E+00	4.940E-12
	5.760E+00	1.816E-13
	6.240E+00	4.249E-14
	6.720E+00	1.155E-14
	7.200E+00	2.856E-15
	7.680E+00	6.361E-16
	8.160E+00	1.272E-16
	8.640E+00	2.277E-17
	9.120E+00	3.632E-18
	9.600E+00	5.143E-19
	1.008E+01	6.435E-20
	1.056E+01	7.080E-21
	1.104E+01	6.813E-22
	1.152E+01	5.699E-23
	1.200E+01	3.653E-24
	1.248E+01	2.223E-25
	1.296E+01	1.163E-26
	1.345E+01	5.370E-28
	1.393E+01	2.554E-29
	1.441E+01	1.926E-30
	1.489E+01	2.607E-31
	1.538E+01	4.218E-32
	1.586E+01	6.657E-33
	1.634E+01	9.846E-34
	1.682E+01	1.355E-34
	1.730E+01	1.731E-35
	1.779E+01	2.049E-36
	1.827E+01	2.242E-37
	1.875E+01	2.262E-38
	1.923E+01	2.101E-39
	1.972E+01	1.793E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.403E-41 1.009E-42 6.725E-44 4.291E-45 2.857E-46 2.307E-47 2.447E-48 3.085E-49 4.054E-50 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.096E-01 2.973E-01 1.135E-01 3.335E-02 7.473E-03 1.267E-03 1.616E-04 1.546E-05 1.105E-06 5.896E-08 2.344E-09 7.005E-11 1.865E-12 1.568E-13 4.717E-14 1.546E-14 4.724E-15 1.336E-15 3.491E-16 8.401E-17 1.859E-17 3.770E-18 6.992E-19 1.180E-19 1.608E-20 2.196E-21 2.703E-22 2.988E-23 2.956E-24 2.610E-25 2.055E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.464E-27 1.010E-28 8.446E-30 1.139E-30 2.186E-31 4.553E-32 9.256E-33 1.793E-33 3.293E-34 5.722E-35 9.395E-36 1.456E-36 2.125E-37 2.920E-38 3.771E-39 4.569E-40 5.190E-41 5.527E-42 5.533E-43 5.256E-44 4.864E-45 4.663E-46 5.119E-47 6.911E-48 1.104E-48 1.898E-49 3.283E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.518E-01 3.563E-01 1.606E-01 5.892E-02 1.746E-02 4.149E-03 7.876E-04 1.190E-04 1.427E-05 1.356E-06 1.019E-07 6.054E-09 2.849E-10 1.106E-11 5.569E-13 1.112E-13 4.089E-14 1.503E-14 5.217E-15 1.702E-15 5.209E-16

	1.056E+01	1.494E-16
	1.104E+01	4.008E-17
	1.152E+01	9.990E-18
	1.200E+01	2.076E-18
	1.248E+01	4.433E-19
	1.296E+01	8.777E-20
	1.345E+01	1.608E-20
	1.393E+01	2.719E-21
	1.441E+01	4.233E-22
	1.489E+01	6.051E-23
	1.538E+01	7.919E-24
	1.586E+01	9.467E-25
	1.634E+01	1.032E-25
	1.682E+01	1.030E-26
	1.730E+01	9.559E-28
	1.779E+01	8.838E-29
	1.827E+01	9.788E-30
	1.875E+01	1.601E-30
	1.923E+01	3.569E-31
	1.972E+01	8.773E-32
	2.020E+01	2.146E-32
	2.068E+01	5.071E-33
	2.116E+01	1.150E-33
	2.165E+01	2.497E-34
	2.213E+01	5.186E-35
	2.261E+01	1.029E-35
	2.309E+01	1.950E-36
	2.357E+01	3.523E-37
	2.406E+01	6.064E-38
	2.454E+01	9.934E-39
	2.502E+01	1.547E-39
	2.550E+01	2.290E-40
	2.599E+01	3.217E-41
	2.647E+01	4.294E-42
	2.695E+01	5.459E-43
	2.743E+01	6.661E-44
	2.791E+01	7.955E-45
	2.840E+01	9.695E-46
	2.888E+01	1.292E-46
	2.936E+01	2.014E-47
	2.984E+01	3.686E-48
	3.033E+01	7.449E-49
	3.081E+01	1.559E-49
	3.129E+01	3.248E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.838E-01
	9.600E-01	4.044E-01
	1.440E+00	2.040E-01
	1.920E+00	8.696E-02
	2.400E+00	3.108E-02
	2.880E+00	9.263E-03
	3.360E+00	2.293E-03
	3.840E+00	4.701E-04
	4.320E+00	7.963E-05
	4.800E+00	1.112E-05
	5.280E+00	1.279E-06

5.760E+00	1.210E-07
6.240E+00	9.412E-09
6.720E+00	6.023E-10
7.200E+00	3.225E-11
7.680E+00	1.725E-12
8.160E+00	2.190E-13
8.640E+00	7.652E-14
9.120E+00	3.141E-14
9.600E+00	1.247E-14
1.008E+01	4.708E-15
1.056E+01	1.688E-15
1.104E+01	5.735E-16
1.152E+01	1.831E-16
1.200E+01	4.985E-17
1.248E+01	1.413E-17
1.296E+01	3.775E-18
1.345E+01	9.496E-19
1.393E+01	2.245E-19
1.441E+01	4.980E-20
1.489E+01	1.035E-20
1.538E+01	2.009E-21
1.586E+01	3.640E-22
1.634E+01	6.140E-23
1.682E+01	9.623E-24
1.730E+01	1.399E-24
1.779E+01	1.883E-25
1.827E+01	2.350E-26
1.875E+01	2.744E-27
1.923E+01	3.094E-28
1.972E+01	3.707E-29
2.020E+01	5.659E-30
2.068E+01	1.212E-30
2.116E+01	3.199E-31
2.165E+01	8.943E-32
2.213E+01	2.479E-32
2.261E+01	6.675E-33
2.309E+01	1.737E-33
2.357E+01	4.361E-34
2.406E+01	1.055E-34
2.454E+01	2.459E-35
2.502E+01	5.513E-36
2.550E+01	1.189E-36
2.599E+01	2.464E-37
2.647E+01	4.902E-38
2.695E+01	9.359E-39
2.743E+01	1.713E-39
2.791E+01	3.004E-40
2.840E+01	5.045E-41
2.888E+01	8.118E-42
2.936E+01	1.253E-42
2.984E+01	1.864E-43
3.033E+01	2.702E-44
3.081E+01	3.904E-45
3.129E+01	5.865E-46

9.600E-01	4.444E-01
1.440E+00	2.434E-01
1.920E+00	1.156E-01
2.400E+00	4.728E-02
2.880E+00	1.658E-02
3.360E+00	4.964E-03
3.840E+00	1.266E-03
4.320E+00	2.745E-04
4.800E+00	5.051E-05
5.280E+00	7.874E-06
5.760E+00	1.039E-06
6.240E+00	1.160E-07
6.720E+00	1.094E-08
7.200E+00	8.733E-10
7.680E+00	5.955E-11
8.160E+00	3.806E-12
8.640E+00	3.966E-13
9.120E+00	1.193E-13
9.600E+00	5.173E-14
1.008E+01	2.254E-14
1.056E+01	9.438E-15
1.104E+01	3.779E-15
1.152E+01	1.432E-15
1.200E+01	4.707E-16
1.248E+01	1.622E-16
1.296E+01	5.325E-17
1.345E+01	1.665E-17
1.393E+01	4.948E-18
1.441E+01	1.397E-18
1.489E+01	3.740E-19
1.538E+01	9.488E-20
1.586E+01	2.276E-20
1.634E+01	5.159E-21
1.682E+01	1.103E-21
1.730E+01	2.219E-22
1.779E+01	4.197E-23
1.827E+01	7.451E-24
1.875E+01	1.240E-24
1.923E+01	1.931E-25
1.972E+01	2.820E-26
2.020E+01	3.886E-27
2.068E+01	5.169E-28
2.116E+01	7.085E-29
2.165E+01	1.145E-29
2.213E+01	2.469E-30
2.261E+01	6.771E-31
2.309E+01	2.056E-31
2.357E+01	6.342E-32
2.406E+01	1.924E-32
2.454E+01	5.680E-33
2.502E+01	1.628E-33
2.550E+01	4.524E-34
2.599E+01	1.218E-34
2.647E+01	3.174E-35
2.695E+01	8.007E-36
2.743E+01	1.953E-36
2.791E+01	4.606E-37



	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.049E-37 2.307E-38 4.893E-39 1.001E-39 1.973E-40 3.750E-41 6.868E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.297E-01 4.783E-01 2.790E-01 1.438E-01 6.511E-02 2.580E-02 8.916E-03 2.680E-03 6.996E-04 1.583E-04 3.100E-05 5.252E-06 7.689E-07 9.721E-08 1.061E-08 1.000E-09 8.205E-11 6.231E-12 6.368E-13 1.670E-13 7.356E-14 3.422E-14 1.545E-14 6.631E-15 2.506E-15 9.963E-16 3.803E-16 1.393E-16 4.889E-17 1.644E-17 5.288E-18 1.626E-18 4.774E-19 1.337E-19 3.568E-20 9.061E-21 2.187E-21 5.009E-22 1.088E-22 2.236E-23 4.345E-24 7.975E-25 1.382E-25 2.265E-26 3.533E-27 5.360E-28 8.369E-29 1.503E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.462E-30 1.002E-30 3.250E-31 1.085E-31 3.590E-32 1.164E-32 3.677E-33 1.132E-33 3.388E-34 9.864E-35 2.792E-35 7.677E-36 2.050E-36 5.314E-37 1.336E-37 3.259E-38 7.701E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.469E-01 5.074E-01 3.110E-01 1.710E-01 8.385E-02 3.656E-02 1.413E-02 4.828E-03 1.456E-03 3.870E-04 9.054E-05 1.863E-05 3.368E-06 5.347E-07 7.452E-08 9.111E-09 9.781E-10 9.283E-11 8.177E-12 8.865E-13 2.155E-13 9.484E-14 4.613E-14 2.175E-14 9.154E-15 4.059E-15 1.738E-15 7.180E-16 2.860E-16 1.098E-16 4.057E-17 1.443E-17 4.932E-18 1.620E-18 5.105E-19 1.543E-19 4.467E-20 1.238E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.278E-21 8.289E-22 2.000E-22 4.597E-23 1.006E-23 2.092E-24 4.135E-25 7.769E-26 1.391E-26 2.392E-27 4.048E-28 7.139E-29 1.450E-29 3.695E-30 1.152E-30 3.981E-31 1.417E-31 5.020E-32 1.748E-32 5.954E-33 1.981E-33 6.435E-34 2.039E-34 6.303E-35 1.899E-35 5.578E-36 1.596E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.615E-01 5.328E-01 3.400E-01 1.969E-01 1.030E-01 4.849E-02 2.049E-02 7.760E-03 2.628E-03 7.946E-04 2.143E-04 5.153E-05 1.103E-05 2.102E-06 3.562E-07 5.367E-08 7.190E-09 8.569E-10 9.149E-11 9.141E-12 1.082E-12 2.590E-13 1.136E-13 5.632E-14 2.575E-14 1.244E-14 5.832E-15 2.649E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.165E-15 4.963E-16 2.045E-16 8.147E-17 3.136E-17 1.166E-17 4.182E-18 1.447E-18 4.823E-19 1.548E-19 4.779E-20 1.418E-20 4.041E-21 1.105E-21 2.896E-22 7.269E-23 1.745E-23 4.006E-24 8.784E-25 1.839E-25 3.682E-26 7.075E-27 1.321E-27 2.466E-28 4.905E-29 1.139E-29 3.266E-30 1.107E-30 4.071E-31 1.532E-31 5.735E-32 2.114E-32 7.641E-33 2.705E-33 9.369E-34 3.175E-34 1.052E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.742E-01 5.551E-01 3.664E-01 2.215E-01 1.221E-01 6.125E-02 2.787E-02 1.148E-02 4.274E-03 1.437E-03 4.354E-04 1.189E-04 2.923E-05 6.465E-06 1.286E-06 2.300E-07 3.695E-08 5.335E-09

9.120E+00	6.929E-10
9.600E+00	8.156E-11
1.008E+01	9.082E-12
1.056E+01	1.185E-12
1.104E+01	2.912E-13
1.152E+01	1.268E-13
1.200E+01	6.022E-14
1.248E+01	3.108E-14
1.296E+01	1.566E-14
1.345E+01	7.681E-15
1.393E+01	3.661E-15
1.441E+01	1.695E-15
1.489E+01	7.623E-16
1.538E+01	3.327E-16
1.586E+01	1.409E-16
1.634E+01	5.784E-17
1.682E+01	2.301E-17
1.730E+01	8.868E-18
1.779E+01	3.308E-18
1.827E+01	1.193E-18
1.875E+01	4.162E-19
1.923E+01	1.402E-19
1.972E+01	4.560E-20
2.020E+01	1.431E-20
2.068E+01	4.325E-21
2.116E+01	1.259E-21
2.165E+01	3.529E-22
2.213E+01	9.507E-23
2.261E+01	2.460E-23
2.309E+01	6.113E-24
2.357E+01	1.457E-24
2.406E+01	3.330E-25
2.454E+01	7.302E-26
2.502E+01	1.540E-26
2.550E+01	3.144E-27
2.599E+01	6.323E-28
2.647E+01	1.302E-28
2.695E+01	2.943E-29
2.743E+01	7.890E-30
2.791E+01	2.552E-30
2.840E+01	9.388E-31
2.888E+01	3.657E-31
2.936E+01	1.443E-31
2.984E+01	5.656E-32
3.033E+01	2.184E-32
3.081E+01	8.285E-33
3.129E+01	3.083E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB SandPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05
	2.400E+00	4.368E-08

2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.139E-43
1.248E+01	1.806E-45
1.296E+01	1.766E-47
1.345E+01	3.509E-49
1.393E+01	0.000E+00
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00
2.984E+01	0.000E+00



	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.057E-30
	1.200E+01	3.442E-31
	1.248E+01	3.531E-32
	1.296E+01	3.631E-33
	1.345E+01	3.389E-34
	1.393E+01	2.837E-35
	1.441E+01	2.120E-36
	1.489E+01	1.410E-37
	1.538E+01	8.304E-39
	1.586E+01	4.318E-40
	1.634E+01	1.975E-41
	1.682E+01	7.941E-43
	1.730E+01	2.844E-44
	1.779E+01	9.624E-46
	1.827E+01	3.702E-47
	1.875E+01	2.067E-48
	1.923E+01	1.572E-49
	1.972E+01	1.285E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00

	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.202E-23
	1.200E+01	2.744E-24
	1.248E+01	1.655E-25
	1.296E+01	8.583E-27
	1.345E+01	3.929E-28
	1.393E+01	1.855E-29
	1.441E+01	1.389E-30
	1.489E+01	1.865E-31
	1.538E+01	2.992E-32
	1.586E+01	4.681E-33
	1.634E+01	6.863E-34
	1.682E+01	9.364E-35
	1.730E+01	1.186E-35
	1.779E+01	1.391E-36
	1.827E+01	1.509E-37
	1.875E+01	1.509E-38
	1.923E+01	1.390E-39
	1.972E+01	1.175E-40
	2.020E+01	9.118E-42

	2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.499E-43 4.295E-44 2.717E-45 1.794E-46 1.438E-47 1.514E-48 1.892E-49 2.466E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.232E-19 8.719E-20 1.210E-20 1.638E-21 1.998E-22 2.190E-23 2.148E-24 1.879E-25 1.467E-26 1.036E-27

	1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.086E-29 5.886E-30 7.886E-31 1.501E-31 3.100E-32 6.247E-33 1.200E-33 2.184E-34 3.761E-35 6.121E-36 9.401E-37 1.361E-37 1.853E-38 2.372E-39 2.849E-40 3.208E-41 3.387E-42 3.361E-43 3.165E-44 2.904E-45 2.762E-46 3.009E-47 4.033E-48 6.392E-49 1.090E-49 1.868E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16 1.135E-16

	1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.005E-17 7.402E-18 1.565E-18 3.312E-19 6.501E-20 1.181E-20 1.979E-21 3.053E-22 4.326E-23 5.612E-24 6.650E-25 7.189E-26 7.108E-27 6.542E-28 6.001E-29 6.600E-30 1.072E-30 2.372E-31 5.781E-32 1.402E-32 3.284E-33 7.382E-34 1.589E-34 3.271E-35 6.435E-36 1.208E-36 2.164E-37 3.692E-38 5.996E-39 9.257E-40 1.358E-40 1.891E-41 2.502E-42 3.153E-43 3.815E-44 4.518E-45 5.462E-46 7.226E-47 1.118E-47 2.030E-48 4.070E-49 8.443E-50 1.744E-50
30	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00	1.000E+00 6.756E-01 3.946E-01 1.966E-01 8.274E-02 2.920E-02 8.592E-03 2.100E-03 4.250E-04 7.107E-05 9.800E-06 1.113E-06 1.039E-07

6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.307E-16
1.152E+01	1.361E-16
1.200E+01	3.765E-17
1.248E+01	1.057E-17
1.296E+01	2.801E-18
1.345E+01	6.983E-19
1.393E+01	1.636E-19
1.441E+01	3.598E-20
1.489E+01	7.409E-21
1.538E+01	1.426E-21
1.586E+01	2.561E-22
1.634E+01	4.282E-23
1.682E+01	6.652E-24
1.730E+01	9.583E-25
1.779E+01	1.279E-25
1.827E+01	1.582E-26
1.875E+01	1.832E-27
1.923E+01	2.048E-28
1.972E+01	2.436E-29
2.020E+01	3.695E-30
2.068E+01	7.860E-31
2.116E+01	2.058E-31
2.165E+01	5.705E-32
2.213E+01	1.567E-32
2.261E+01	4.184E-33
2.309E+01	1.079E-33
2.357E+01	2.686E-34
2.406E+01	6.441E-35
2.454E+01	1.488E-35
2.502E+01	3.307E-36
2.550E+01	7.069E-37
2.599E+01	1.452E-37
2.647E+01	2.864E-38
2.695E+01	5.420E-39
2.743E+01	9.832E-40
2.791E+01	1.709E-40
2.840E+01	2.846E-41
2.888E+01	4.539E-42
2.936E+01	6.946E-43
2.984E+01	1.024E-43
3.033E+01	1.472E-44
3.081E+01	2.109E-45
3.129E+01	3.144E-46

0.000E+00	1.000E+00
4.800E-01	7.006E-01
9.600E-01	4.337E-01

1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.192E-15
1.104E+01	2.844E-15
1.152E+01	1.067E-15
1.200E+01	3.560E-16
1.248E+01	1.216E-16
1.296E+01	3.957E-17
1.345E+01	1.226E-17
1.393E+01	3.612E-18
1.441E+01	1.011E-18
1.489E+01	2.683E-19
1.538E+01	6.746E-20
1.586E+01	1.604E-20
1.634E+01	3.604E-21
1.682E+01	7.634E-22
1.730E+01	1.523E-22
1.779E+01	2.855E-23
1.827E+01	5.024E-24
1.875E+01	8.285E-25
1.923E+01	1.279E-25
1.972E+01	1.852E-26
2.020E+01	2.530E-27
2.068E+01	3.337E-28
2.116E+01	4.540E-29
2.165E+01	7.290E-30
2.213E+01	1.562E-30
2.261E+01	4.252E-31
2.309E+01	1.281E-31
2.357E+01	3.915E-32
2.406E+01	1.177E-32
2.454E+01	3.446E-33
2.502E+01	9.790E-34
2.550E+01	2.697E-34
2.599E+01	7.195E-35
2.647E+01	1.859E-35
2.695E+01	4.648E-36
2.743E+01	1.124E-36
2.791E+01	2.627E-37
2.840E+01	5.931E-38

	2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.293E-38 2.718E-39 5.512E-40 1.077E-40 2.029E-41 3.684E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.686E-14 2.612E-14 1.165E-14 4.955E-15 1.899E-15 7.482E-16 2.831E-16 1.028E-16 3.575E-17 1.191E-17 3.799E-18 1.158E-18 3.370E-19 9.356E-20 2.475E-20 6.228E-21 1.490E-21 3.383E-22 7.281E-23 1.483E-23 2.858E-24 5.199E-25 8.931E-26 1.451E-26 2.244E-27 3.376E-28 5.232E-29 9.334E-30 2.137E-30



	2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.141E-31 1.976E-31 6.538E-32 2.145E-32 6.892E-33 2.159E-33 6.585E-34 1.954E-34 5.641E-35 1.582E-35 4.313E-36 1.142E-36 2.934E-37 7.312E-38 1.767E-38 4.140E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.250E-14 3.485E-14 1.630E-14 6.948E-15 3.054E-15 1.296E-15 5.306E-16 2.095E-16 7.970E-17 2.920E-17 1.029E-17 3.487E-18 1.135E-18 3.546E-19 1.062E-19 3.048E-20 8.370E-21 2.197E-21

	1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.508E-22 1.317E-22 3.001E-23 6.508E-24 1.342E-24 2.629E-25 4.896E-26 8.688E-27 1.482E-27 2.488E-28 4.355E-29 8.790E-30 2.226E-30 6.890E-31 2.363E-31 8.339E-32 2.929E-32 1.011E-32 3.413E-33 1.126E-33 3.624E-34 1.138E-34 3.488E-35 1.042E-35 3.033E-36 8.600E-37
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.325E-13 1.979E-13 8.597E-14 4.230E-14 1.957E-14 9.376E-15 4.355E-15 1.961E-15 8.550E-16

	1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.609E-16 1.474E-16 5.820E-17 2.221E-17 8.182E-18 2.909E-18 9.976E-19 3.296E-19 1.048E-19 3.209E-20 9.438E-21 2.666E-21 7.225E-22 1.877E-22 4.670E-23 1.111E-23 2.529E-24 5.495E-25 1.141E-25 2.263E-26 4.312E-27 7.980E-28 1.479E-28 2.921E-29 6.745E-30 1.922E-30 6.466E-31 2.359E-31 8.801E-32 3.266E-32 1.193E-32 4.276E-33 1.500E-33 5.152E-34 1.730E-34 5.682E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09 5.449E-10

9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.009E-13
1.104E+01	2.201E-13
1.152E+01	9.540E-14
1.200E+01	4.585E-14
1.248E+01	2.345E-14
1.296E+01	1.172E-14
1.345E+01	5.694E-15
1.393E+01	2.690E-15
1.441E+01	1.235E-15
1.489E+01	5.503E-16
1.538E+01	2.381E-16
1.586E+01	9.991E-17
1.634E+01	4.066E-17
1.682E+01	1.603E-17
1.730E+01	6.124E-18
1.779E+01	2.264E-18
1.827E+01	8.096E-19
1.875E+01	2.799E-19
1.923E+01	9.346E-20
1.972E+01	3.013E-20
2.020E+01	9.368E-21
2.068E+01	2.807E-21
2.116E+01	8.103E-22
2.165E+01	2.250E-22
2.213E+01	6.009E-23
2.261E+01	1.542E-23
2.309E+01	3.796E-24
2.357E+01	8.968E-25
2.406E+01	2.032E-25
2.454E+01	4.416E-26
2.502E+01	9.232E-27
2.550E+01	1.869E-27
2.599E+01	3.729E-28
2.647E+01	7.621E-29
2.695E+01	1.712E-29
2.743E+01	4.562E-30
2.791E+01	1.466E-30
2.840E+01	5.355E-31
2.888E+01	2.069E-31
2.936E+01	8.094E-32
2.984E+01	3.145E-32
3.033E+01	1.204E-32
3.081E+01	4.526E-33
3.129E+01	1.670E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB SandPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.20	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	3.094E-43
1.248E+01	2.714E-45
1.296E+01	2.757E-47
1.345E+01	5.691E-49
1.393E+01	1.674E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.072E-30
	1.200E+01	4.978E-31
	1.248E+01	5.304E-32
	1.296E+01	5.665E-33
	1.345E+01	5.493E-34
	1.393E+01	4.776E-35
	1.441E+01	3.708E-36
	1.489E+01	2.562E-37
	1.538E+01	1.568E-38
	1.586E+01	8.470E-40
	1.634E+01	4.025E-41
	1.682E+01	1.682E-42
	1.730E+01	6.258E-44
	1.779E+01	2.200E-45
	1.827E+01	8.783E-47
	1.875E+01	5.088E-48
	1.923E+01	4.018E-49
	1.972E+01	3.411E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00



	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.209E-23
	1.200E+01	3.969E-24
	1.248E+01	2.487E-25
	1.296E+01	1.340E-26
	1.345E+01	6.371E-28
	1.393E+01	3.123E-29
	1.441E+01	2.426E-30
	1.489E+01	3.383E-31
	1.538E+01	5.634E-32
	1.586E+01	9.156E-33
	1.634E+01	1.394E-33
	1.682E+01	1.976E-34
	1.730E+01	2.600E-35
	1.779E+01	3.169E-36
	1.827E+01	3.571E-37
	1.875E+01	3.712E-38
	1.923E+01	3.551E-39
	1.972E+01	3.121E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.516E-41 1.863E-42 1.279E-43 8.406E-45 5.761E-46 4.786E-47 5.224E-48 6.779E-49 9.175E-50 1.213E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.788E-20 1.750E-20 2.460E-21 3.117E-22 3.548E-23 3.615E-24 3.286E-25 2.665E-26

	1.538E+01	1.955E-27
	1.586E+01	1.389E-28
	1.634E+01	1.196E-29
	1.682E+01	1.661E-30
	1.730E+01	3.281E-31
	1.779E+01	7.035E-32
	1.827E+01	1.473E-32
	1.875E+01	2.937E-33
	1.923E+01	5.555E-34
	1.972E+01	9.940E-35
	2.020E+01	1.681E-35
	2.068E+01	2.682E-36
	2.116E+01	4.033E-37
	2.165E+01	5.708E-38
	2.213E+01	7.591E-39
	2.261E+01	9.475E-40
	2.309E+01	1.109E-40
	2.357E+01	1.216E-41
	2.406E+01	1.254E-42
	2.454E+01	1.227E-43
	2.502E+01	1.169E-44
	2.550E+01	1.154E-45
	2.599E+01	1.302E-46
	2.647E+01	1.807E-47
	2.695E+01	2.971E-48
	2.743E+01	5.258E-49
	2.791E+01	9.366E-50
	2.840E+01	1.629E-50
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.007E-17
	1.152E+01	7.542E-18
	1.200E+01	2.263E-18
	1.248E+01	4.973E-19
	1.296E+01	1.014E-19
	1.345E+01	1.912E-20
	1.393E+01	3.328E-21
	1.441E+01	5.333E-22
	1.489E+01	7.849E-23
	1.538E+01	1.058E-23
	1.586E+01	1.302E-24
	1.634E+01	1.462E-25
	1.682E+01	1.502E-26
	1.730E+01	1.436E-27
	1.779E+01	1.367E-28
	1.827E+01	1.558E-29
	1.875E+01	2.620E-30
	1.923E+01	6.011E-31
	1.972E+01	1.521E-31
	2.020E+01	3.830E-32
	2.068E+01	9.322E-33
	2.116E+01	2.177E-33
	2.165E+01	4.868E-34
	2.213E+01	1.041E-34
	2.261E+01	2.128E-35
	2.309E+01	4.152E-36
	2.357E+01	7.727E-37
	2.406E+01	1.370E-37
	2.454E+01	2.312E-38
	2.502E+01	3.709E-39
	2.550E+01	5.654E-40
	2.599E+01	8.183E-41
	2.647E+01	1.125E-41
	2.695E+01	1.473E-42
	2.743E+01	1.852E-43
	2.791E+01	2.277E-44
	2.840E+01	2.855E-45
	2.888E+01	3.911E-46
	2.936E+01	6.265E-47
	2.984E+01	1.178E-47
	3.033E+01	2.450E-48
	3.081E+01	5.278E-49
	3.129E+01	1.133E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.318E-16
1.152E+01	1.405E-16
1.200E+01	5.443E-17
1.248E+01	1.587E-17
1.296E+01	4.364E-18
1.345E+01	1.130E-18
1.393E+01	2.749E-19
1.441E+01	6.277E-20
1.489E+01	1.342E-20
1.538E+01	2.684E-21
1.586E+01	5.007E-22
1.634E+01	8.695E-23
1.682E+01	1.403E-23
1.730E+01	2.100E-24
1.779E+01	2.912E-25
1.827E+01	3.743E-26
1.875E+01	4.500E-27
1.923E+01	5.224E-28
1.972E+01	6.442E-29
2.020E+01	1.011E-29
2.068E+01	2.225E-30
2.116E+01	6.042E-31
2.165E+01	1.739E-31
2.213E+01	4.962E-32
2.261E+01	1.376E-32
2.309E+01	3.688E-33
2.357E+01	9.534E-34
2.406E+01	2.376E-34
2.454E+01	5.701E-35
2.502E+01	1.317E-35
2.550E+01	2.925E-36
2.599E+01	6.243E-37
2.647E+01	1.279E-37
2.695E+01	2.516E-38
2.743E+01	4.744E-39
2.791E+01	8.569E-40
2.840E+01	1.483E-40
2.888E+01	2.457E-41
2.936E+01	3.908E-42
2.984E+01	5.988E-43
3.033E+01	8.937E-44
3.081E+01	1.329E-44
3.129E+01	2.052E-45

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
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1.393E+01  
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2.550E+01  
2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

4.337E-01  
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1.100E-01  
4.443E-02  
1.538E-02  
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7.219E-10  
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1.982E-17  
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4.855E-19  
1.268E-19  
3.131E-20  
7.305E-21  
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3.330E-22  
6.486E-23  
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4.902E-26  
6.956E-27  
9.526E-28  
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2.231E-29  
4.940E-30  
1.393E-30  
4.352E-31  
1.382E-31  
4.316E-32  
1.312E-32  
3.874E-33  
1.109E-33  
3.073E-34  
8.251E-35  
2.144E-35  
5.386E-36  
1.308E-36

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.069E-37 6.952E-38 1.519E-38 3.201E-39 6.502E-40 1.273E-40 2.401E-41
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.616E-14 1.176E-14 5.269E-15 2.745E-15 1.122E-15 4.406E-16 1.660E-16 5.995E-17 2.074E-17 6.865E-18 2.173E-18 6.566E-19 1.893E-19 5.200E-20 1.359E-20 3.378E-21 7.966E-22 1.781E-22 3.770E-23 7.545E-24 1.426E-24 2.545E-25 4.295E-26 6.900E-27 1.078E-27 1.731E-28 3.192E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.545E-30 2.244E-30 7.486E-31 2.572E-31 8.765E-32 2.925E-32 9.520E-33 3.017E-33 9.302E-34 2.790E-34 8.132E-35 2.303E-35 6.335E-36 1.692E-36 4.382E-37 1.101E-37 2.679E-38
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.667E-13 7.269E-14 3.536E-14 1.758E-14 1.004E-14 4.578E-15 2.016E-15 8.564E-16 3.509E-16 1.386E-16 5.269E-17 1.928E-17 6.783E-18 2.292E-18 7.437E-19 2.313E-19 6.895E-20 1.966E-20



	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.362E-21 1.396E-21 3.469E-22 8.210E-23 1.850E-23 3.963E-24 8.067E-25 1.561E-25 2.877E-26 5.095E-27 8.876E-28 1.609E-28 3.354E-29 8.766E-30 2.806E-30 9.974E-31 3.654E-31 1.333E-31 4.779E-32 1.676E-32 5.745E-33 1.922E-33 6.273E-34 1.997E-34 6.198E-35 1.875E-35 5.525E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.328E-13 1.986E-13 8.768E-14 4.623E-14 2.828E-14 1.405E-14 6.770E-15 3.162E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.431E-15 6.267E-16 2.656E-16 1.089E-16 4.312E-17 1.650E-17 6.090E-18 2.168E-18 7.439E-19 2.458E-19 7.811E-20 2.386E-20 7.002E-21 1.971E-21 5.320E-22 1.375E-22 3.400E-23 8.037E-24 1.815E-24 3.913E-25 8.068E-26 1.596E-26 3.067E-27 5.892E-28 1.204E-28 2.867E-29 8.427E-30 2.933E-30 1.109E-30 4.296E-31 1.656E-31 6.285E-32 2.339E-32 8.529E-33 3.043E-33 1.062E-33 3.624E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09

9.120E+00	5.449E-10
9.600E+00	6.332E-11
1.008E+01	6.968E-12
1.056E+01	9.031E-13
1.104E+01	2.247E-13
1.152E+01	1.052E-13
1.200E+01	6.623E-14
1.248E+01	3.513E-14
1.296E+01	1.820E-14
1.345E+01	9.176E-15
1.393E+01	4.497E-15
1.441E+01	2.141E-15
1.489E+01	9.904E-16
1.538E+01	4.447E-16
1.586E+01	1.937E-16
1.634E+01	8.182E-17
1.682E+01	3.350E-17
1.730E+01	1.328E-17
1.779E+01	5.099E-18
1.827E+01	1.893E-18
1.875E+01	6.797E-19
1.923E+01	2.357E-19
1.972E+01	7.892E-20
2.020E+01	2.549E-20
2.068E+01	7.935E-21
2.116E+01	2.379E-21
2.165E+01	6.864E-22
2.213E+01	1.904E-22
2.261E+01	5.075E-23
2.309E+01	1.298E-23
2.357E+01	3.187E-24
2.406E+01	7.502E-25
2.454E+01	1.694E-25
2.502E+01	3.680E-26
2.550E+01	7.735E-27
2.599E+01	1.601E-27
2.647E+01	3.388E-28
2.695E+01	7.856E-29
2.743E+01	2.157E-29
2.791E+01	7.154E-30
2.840E+01	2.703E-30
2.888E+01	1.083E-30
2.936E+01	4.399E-31
2.984E+01	1.775E-31
3.033E+01	7.059E-32
3.081E+01	2.758E-32
3.129E+01	1.057E-32

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# POLLUTEv7

Version 7.13

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## BAB ClayThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	13.99 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	35	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.596E-01	2.074E-01
	1.119E+00	1.110E-02
	1.679E+00	1.326E-04
	2.238E+00	3.313E-07

2.798E+00	1.687E-10
3.358E+00	1.053E-13
3.917E+00	6.573E-15
4.477E+00	3.228E-16
5.036E+00	1.020E-17
5.596E+00	2.009E-19
6.156E+00	2.381E-21
6.715E+00	1.625E-23
7.275E+00	6.112E-26
7.834E+00	1.312E-28
8.394E+00	5.687E-31
8.954E+00	1.289E-32
9.513E+00	2.746E-34
1.007E+01	4.370E-36
1.063E+01	5.094E-38
1.119E+01	4.272E-40
1.175E+01	2.540E-42
1.231E+01	1.092E-44
1.287E+01	4.584E-47
1.343E+01	4.416E-49
1.399E+01	0.000E+00
1.454E+01	0.000E+00
1.509E+01	0.000E+00
1.564E+01	0.000E+00
1.619E+01	0.000E+00
1.675E+01	0.000E+00
1.730E+01	0.000E+00
1.785E+01	0.000E+00
1.840E+01	0.000E+00
1.895E+01	0.000E+00
1.950E+01	0.000E+00
2.005E+01	0.000E+00
2.060E+01	0.000E+00
2.115E+01	0.000E+00
2.171E+01	0.000E+00
2.226E+01	0.000E+00
2.281E+01	0.000E+00
2.336E+01	0.000E+00
2.391E+01	0.000E+00
2.446E+01	0.000E+00
2.501E+01	0.000E+00
2.556E+01	0.000E+00
2.612E+01	0.000E+00
2.667E+01	0.000E+00
2.722E+01	0.000E+00
2.777E+01	0.000E+00
2.832E+01	0.000E+00
2.887E+01	0.000E+00
2.942E+01	0.000E+00
2.997E+01	0.000E+00
3.052E+01	0.000E+00
3.108E+01	0.000E+00
3.163E+01	0.000E+00
3.218E+01	0.000E+00
3.273E+01	0.000E+00
3.328E+01	0.000E+00

0.000E+00	1.000E+00
5.596E-01	3.789E-01
1.119E+00	7.525E-02
1.679E+00	7.293E-03
2.238E+00	3.316E-04
2.798E+00	6.919E-06
3.358E+00	6.539E-08
3.917E+00	2.785E-10
4.477E+00	7.419E-13
5.036E+00	4.038E-14
5.596E+00	6.048E-15
6.156E+00	7.436E-16
6.715E+00	7.356E-17
7.275E+00	5.796E-18
7.834E+00	3.595E-19
8.394E+00	1.732E-20
8.954E+00	6.394E-22
9.513E+00	1.779E-23
1.007E+01	3.669E-25
1.063E+01	5.574E-27
1.119E+01	6.856E-29
1.175E+01	1.410E-30
1.231E+01	8.584E-32
1.287E+01	6.288E-33
1.343E+01	4.094E-34
1.399E+01	2.400E-35
1.454E+01	1.218E-36
1.509E+01	5.299E-38
1.564E+01	1.964E-39
1.619E+01	6.169E-41
1.675E+01	1.637E-42
1.730E+01	3.719E-44
1.785E+01	7.865E-46
1.840E+01	2.059E-47
1.895E+01	8.904E-49
1.950E+01	5.044E-50
2.005E+01	0.000E+00
2.060E+01	0.000E+00
2.115E+01	0.000E+00
2.171E+01	0.000E+00
2.226E+01	0.000E+00
2.281E+01	0.000E+00
2.336E+01	0.000E+00
2.391E+01	0.000E+00
2.446E+01	0.000E+00
2.501E+01	0.000E+00
2.556E+01	0.000E+00
2.612E+01	0.000E+00
2.667E+01	0.000E+00
2.722E+01	0.000E+00
2.777E+01	0.000E+00
2.832E+01	0.000E+00
2.887E+01	0.000E+00
2.942E+01	0.000E+00
2.997E+01	0.000E+00
3.052E+01	0.000E+00
3.108E+01	0.000E+00

	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.596E-01	4.773E-01
	1.119E+00	1.498E-01
	1.679E+00	2.953E-02
	2.238E+00	3.558E-03
	2.798E+00	2.576E-04
	3.358E+00	1.108E-05
	3.917E+00	2.813E-07
	4.477E+00	4.196E-09
	5.036E+00	3.721E-11
	5.596E+00	3.645E-13
	6.156E+00	4.527E-14
	6.715E+00	9.827E-15
	7.275E+00	1.881E-15
	7.834E+00	3.124E-16
	8.394E+00	4.474E-17
	8.954E+00	5.495E-18
	9.513E+00	5.752E-19
	1.007E+01	5.095E-20
	1.063E+01	3.789E-21
	1.119E+01	2.346E-22
	1.175E+01	1.199E-23
	1.231E+01	5.010E-25
	1.287E+01	1.706E-26
	1.343E+01	4.859E-28
	1.399E+01	1.504E-29
	1.454E+01	9.140E-31
	1.509E+01	1.040E-31
	1.564E+01	1.293E-32
	1.619E+01	1.498E-33
	1.675E+01	1.583E-34
	1.730E+01	1.518E-35
	1.785E+01	1.318E-36
	1.840E+01	1.032E-37
	1.895E+01	7.267E-39
	1.950E+01	4.586E-40
	2.005E+01	2.588E-41
	2.060E+01	1.306E-42
	2.115E+01	5.952E-44
	2.171E+01	2.565E-45
	2.226E+01	1.197E-46
	2.281E+01	7.519E-48
	2.336E+01	6.496E-49
	2.391E+01	6.348E-50
	2.446E+01	0.000E+00
	2.501E+01	0.000E+00
	2.556E+01	0.000E+00
	2.612E+01	0.000E+00
	2.667E+01	0.000E+00
	2.722E+01	0.000E+00
	2.777E+01	0.000E+00
	2.832E+01	0.000E+00



	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.596E-01	5.421E-01
	1.119E+00	2.158E-01
	1.679E+00	6.106E-02
	2.238E+00	1.203E-02
	2.798E+00	1.626E-03
	3.358E+00	1.495E-04
	3.917E+00	9.299E-06
	4.477E+00	3.892E-07
	5.036E+00	1.093E-08
	5.596E+00	2.064E-10
	6.156E+00	2.927E-12
	6.715E+00	1.337E-13
	7.275E+00	3.293E-14
	7.834E+00	8.683E-15
	8.394E+00	2.071E-15
	8.954E+00	4.441E-16
	9.513E+00	8.528E-17
	1.007E+01	1.461E-17
	1.063E+01	2.225E-18
	1.119E+01	2.999E-19
	1.175E+01	3.558E-20
	1.231E+01	3.700E-21
	1.287E+01	3.352E-22
	1.343E+01	2.631E-23
	1.399E+01	1.853E-24
	1.454E+01	1.127E-25
	1.509E+01	5.915E-27
	1.564E+01	2.793E-28
	1.619E+01	1.452E-29
	1.675E+01	1.288E-30
	1.730E+01	1.905E-31
	1.785E+01	3.168E-32
	1.840E+01	5.076E-33
	1.895E+01	7.618E-34
	1.950E+01	1.065E-34
	2.005E+01	1.384E-35
	2.060E+01	1.668E-36
	2.115E+01	1.860E-37
	2.171E+01	1.917E-38
	2.226E+01	1.821E-39
	2.281E+01	1.592E-40
	2.336E+01	1.278E-41
	2.391E+01	9.450E-43
	2.446E+01	6.493E-44
	2.501E+01	4.283E-45
	2.556E+01	2.959E-46

	2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.478E-47 2.712E-48 3.513E-49 4.741E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01	1.000E+00 5.888E-01 2.717E-01 9.583E-02 2.541E-02 5.007E-03 7.274E-04 7.749E-05 6.029E-06 3.416E-07 1.406E-08 4.210E-10 9.567E-12 3.244E-13 6.495E-14 2.034E-14 6.012E-15 1.635E-15 4.082E-16 9.326E-17 1.945E-17 3.694E-18 6.365E-19 9.920E-20 1.394E-20 1.831E-21 2.144E-22 2.242E-23 2.087E-24 1.725E-25 1.266E-26 8.420E-28 5.583E-29 4.893E-30 7.155E-31 1.388E-31 2.799E-32 5.436E-33 1.001E-33 1.743E-34 2.861E-35 4.425E-36

	2.336E+01	6.438E-37
	2.391E+01	8.798E-38
	2.446E+01	1.128E-38
	2.501E+01	1.353E-39
	2.556E+01	1.519E-40
	2.612E+01	1.593E-41
	2.667E+01	1.564E-42
	2.722E+01	1.445E-43
	2.777E+01	1.281E-44
	2.832E+01	1.144E-45
	2.887E+01	1.132E-46
	2.942E+01	1.368E-47
	2.997E+01	2.021E-48
	3.052E+01	3.315E-49
	3.108E+01	5.554E-50
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.596E-01	6.244E-01
	1.119E+00	3.189E-01
	1.679E+00	1.306E-01
	2.238E+00	4.230E-02
	2.798E+00	1.073E-02
	3.358E+00	2.116E-03
	3.917E+00	3.229E-04
	4.477E+00	3.800E-05
	5.036E+00	3.439E-06
	5.596E+00	2.388E-07
	6.156E+00	1.271E-08
	6.715E+00	5.187E-10
	7.275E+00	1.668E-11
	7.834E+00	6.215E-13
	8.394E+00	9.993E-14
	8.954E+00	3.402E-14
	9.513E+00	1.157E-14
	1.007E+01	3.683E-15
	1.063E+01	1.093E-15
	1.119E+01	3.016E-16
	1.175E+01	7.728E-17
	1.231E+01	1.835E-17
	1.287E+01	4.026E-18
	1.343E+01	8.160E-19
	1.399E+01	1.582E-19
	1.454E+01	2.787E-20
	1.509E+01	4.506E-21
	1.564E+01	6.663E-22
	1.619E+01	8.985E-23
	1.675E+01	1.102E-23
	1.730E+01	1.224E-24
	1.785E+01	1.231E-25
	1.840E+01	1.123E-26
	1.895E+01	9.463E-28
	1.950E+01	7.936E-29
	2.005E+01	8.177E-30

	2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	1.293E-30 2.780E-31 6.476E-32 1.485E-32 3.273E-33 6.888E-34 1.382E-34 2.641E-35 4.801E-36 8.292E-37 1.360E-37 2.113E-38 3.111E-39 4.332E-40 5.702E-41 7.096E-42 8.367E-43 9.415E-44 1.031E-44 1.147E-45 1.400E-46 2.023E-47 3.476E-48 6.616E-49
35	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01	1.000E+00 6.528E-01 3.592E-01 1.639E-01 6.132E-02 1.864E-02 4.577E-03 9.036E-04 1.430E-04 1.808E-05 1.825E-06 1.467E-07 9.390E-09 4.787E-10 1.990E-11 8.944E-13 1.325E-13 4.698E-14 1.762E-14 6.273E-15 2.103E-15 6.635E-16 1.966E-16 5.461E-17 1.423E-17 3.597E-18 8.374E-19 1.818E-19 3.676E-20 6.904E-21 1.202E-21 1.934E-22

	1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.872E-23 3.924E-24 4.924E-25 5.672E-26 6.026E-27 6.045E-28 6.204E-29 7.879E-30 1.457E-30 3.508E-31 9.122E-32 2.354E-32 5.882E-33 1.414E-33 3.265E-34 7.232E-35 1.536E-35 3.123E-36 6.077E-37 1.131E-37 2.009E-38 3.406E-39 5.508E-40 8.486E-41 1.246E-41 1.745E-42 2.344E-43 3.051E-44 3.952E-45
40	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01	1.000E+00 6.760E-01 3.940E-01 1.953E-01 8.144E-02 2.838E-02 8.217E-03 1.969E-03 3.890E-04 6.327E-05 8.453E-06 9.264E-07 8.319E-08 6.117E-09 3.689E-10 1.870E-11 1.021E-12 1.567E-13 5.753E-14 2.319E-14 8.972E-15 3.297E-15 1.149E-15 3.792E-16 1.187E-16 3.638E-17 1.036E-17

	1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.784E-18 7.049E-19 1.679E-19 3.757E-20 7.879E-21 1.546E-21 2.835E-22 4.844E-23 7.698E-24 1.136E-24 1.556E-25 1.979E-26 2.362E-27 2.740E-28 3.416E-29 5.474E-30 1.220E-30 3.302E-31 9.410E-32 2.656E-32 7.285E-33 1.932E-33 4.948E-34 1.222E-34 2.909E-35 6.671E-36 1.472E-36 3.124E-37 6.372E-38 1.248E-38 2.346E-39 4.229E-40 7.308E-41 1.211E-41
45	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01	1.000E+00 6.955E-01 4.243E-01 2.244E-01 1.020E-01 3.953E-02 1.302E-02 3.626E-03 8.521E-04 1.685E-04 2.801E-05 3.907E-06 4.567E-07 4.472E-08 3.666E-09 2.522E-10 1.499E-11 9.883E-13 1.692E-13 6.491E-14 2.768E-14 1.143E-14

	1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	4.507E-15 1.697E-15 6.112E-16 2.167E-16 7.188E-17 2.269E-17 6.809E-18 1.940E-18 5.238E-19 1.339E-19 3.238E-20 7.391E-21 1.590E-21 3.218E-22 6.120E-23 1.092E-23 1.823E-24 2.849E-25 4.167E-26 5.734E-27 7.567E-28 1.014E-28 1.567E-29 3.213E-30 8.552E-31 2.568E-31 7.889E-32 2.388E-32 7.041E-33 2.014E-33 5.583E-34 1.499E-34 3.894E-35 9.786E-36 2.377E-36 5.579E-37 1.264E-37 2.764E-38 5.826E-39
50	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00	1.000E+00 7.122E-01 4.510E-01 2.514E-01 1.224E-01 5.171E-02 1.888E-02 5.935E-03 1.602E-03 3.707E-04 7.339E-05 1.241E-05 1.792E-06 2.207E-07 2.317E-08 2.073E-09 1.587E-10

	9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	1.078E-11 8.563E-13 1.706E-13 6.908E-14 3.086E-14 1.342E-14 5.604E-15 2.254E-15 8.956E-16 3.349E-16 1.199E-16 4.110E-17 1.346E-17 4.208E-18 1.255E-18 3.565E-19 9.639E-20 2.477E-20 6.041E-21 1.397E-21 3.056E-22 6.322E-23 1.234E-23 2.271E-24 3.937E-25 6.429E-26 9.922E-27 1.466E-27 2.152E-28 3.431E-29 6.790E-30 1.756E-30 5.392E-31 1.756E-31 5.726E-32 1.833E-32 5.720E-33 1.737E-33 5.125E-34 1.469E-34 4.089E-35 1.104E-35 2.894E-36 7.350E-37
55	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00	1.000E+00 7.266E-01 4.748E-01 2.765E-01 1.424E-01 6.459E-02 2.567E-02 8.910E-03 2.695E-03 7.091E-04 1.620E-04 3.209E-05



6.715E+00	5.507E-06
7.275E+00	8.182E-07
7.834E+00	1.052E-07
8.394E+00	1.169E-08
8.954E+00	1.124E-09
9.513E+00	9.404E-11
1.007E+01	7.200E-12
1.063E+01	6.928E-13
1.119E+01	1.641E-13
1.175E+01	7.044E-14
1.231E+01	3.275E-14
1.287E+01	1.486E-14
1.343E+01	6.534E-15
1.399E+01	2.847E-15
1.454E+01	1.173E-15
1.509E+01	4.647E-16
1.564E+01	1.771E-16
1.619E+01	6.485E-17
1.675E+01	2.280E-17
1.730E+01	7.687E-18
1.785E+01	2.484E-18
1.840E+01	7.686E-19
1.895E+01	2.274E-19
1.950E+01	6.431E-20
2.005E+01	1.735E-20
2.060E+01	4.465E-21
2.115E+01	1.094E-21
2.171E+01	2.548E-22
2.226E+01	5.639E-23
2.281E+01	1.184E-23
2.336E+01	2.355E-24
2.391E+01	4.438E-25
2.446E+01	7.918E-26
2.501E+01	1.342E-26
2.556E+01	2.180E-27
2.612E+01	3.493E-28
2.667E+01	5.902E-29
2.722E+01	1.178E-29
2.777E+01	3.009E-30
2.832E+01	9.348E-31
2.887E+01	3.170E-31
2.942E+01	1.095E-31
2.997E+01	3.742E-32
3.052E+01	1.253E-32
3.108E+01	4.093E-33
3.163E+01	1.304E-33
3.218E+01	4.046E-34
3.273E+01	1.223E-34
3.328E+01	3.598E-35

#### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB ClayThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.03 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.412E-01	3.215E-01
	8.824E-01	4.575E-02
	1.324E+00	2.633E-03
	1.765E+00	5.850E-05

2.206E+00	4.895E-07
2.647E+00	1.521E-09
3.088E+00	2.003E-12
3.530E+00	4.222E-14
3.971E+00	5.016E-15
4.412E+00	4.678E-16
4.853E+00	3.324E-17
5.294E+00	1.773E-18
5.736E+00	6.980E-20
6.177E+00	1.991E-21
6.618E+00	4.028E-23
7.059E+00	5.650E-25
7.500E+00	5.417E-27
7.942E+00	3.994E-29
8.383E+00	6.190E-31
8.824E+00	3.037E-32
9.265E+00	1.564E-33
9.706E+00	6.804E-35
1.015E+01	2.455E-36
1.059E+01	7.290E-38
1.103E+01	1.840E-39
1.151E+01	2.481E-41
1.199E+01	2.590E-43
1.248E+01	2.208E-45
1.296E+01	2.166E-47
1.344E+01	4.307E-49
1.392E+01	1.229E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.537E+01	0.000E+00
1.585E+01	0.000E+00
1.633E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.778E+01	0.000E+00
1.826E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.971E+01	0.000E+00
2.019E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.164E+01	0.000E+00
2.212E+01	0.000E+00
2.260E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.405E+01	0.000E+00
2.453E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.598E+01	0.000E+00
2.646E+01	0.000E+00
2.694E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.839E+01	0.000E+00

	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.412E-01	4.894E-01
	8.824E-01	1.623E-01
	1.324E+00	3.496E-02
	1.765E+00	4.767E-03
	2.206E+00	4.050E-04
	2.647E+00	2.121E-05
	3.088E+00	6.802E-07
	3.530E+00	1.329E-08
	3.971E+00	1.585E-10
	4.412E+00	1.392E-12
	4.853E+00	7.583E-14
	5.294E+00	1.717E-14
	5.736E+00	3.657E-15
	6.177E+00	6.840E-16
	6.618E+00	1.117E-16
	7.059E+00	1.586E-17
	7.500E+00	1.946E-18
	7.942E+00	2.051E-19
	8.383E+00	1.846E-20
	8.824E+00	1.407E-21
	9.265E+00	9.019E-23
	9.706E+00	4.821E-24
	1.015E+01	2.134E-25
	1.059E+01	7.805E-27
	1.103E+01	2.554E-28
	1.151E+01	6.681E-30
	1.199E+01	4.060E-31
	1.248E+01	4.193E-32
	1.296E+01	4.353E-33
	1.344E+01	4.103E-34
	1.392E+01	3.468E-35
	1.441E+01	2.618E-36
	1.489E+01	1.758E-37
	1.537E+01	1.046E-38
	1.585E+01	5.493E-40
	1.633E+01	2.537E-41
	1.682E+01	1.031E-42
	1.730E+01	3.727E-44
	1.778E+01	1.272E-45
	1.826E+01	4.919E-47
	1.875E+01	2.757E-48
	1.923E+01	2.110E-49
	1.971E+01	1.740E-50
	2.019E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.164E+01	0.000E+00
	2.212E+01	0.000E+00
	2.260E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00

	2.405E+01	0.000E+00
	2.453E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.598E+01	0.000E+00
	2.646E+01	0.000E+00
	2.694E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.839E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.412E-01	5.768E-01
	8.824E-01	2.583E-01
	1.324E+00	8.750E-02
	1.765E+00	2.204E-02
	2.206E+00	4.077E-03
	2.647E+00	5.499E-04
	3.088E+00	5.374E-05
	3.530E+00	3.791E-06
	3.971E+00	1.925E-07
	4.412E+00	7.018E-09
	4.853E+00	1.842E-10
	5.294E+00	3.785E-12
	5.736E+00	1.736E-13
	6.177E+00	4.277E-14
	6.618E+00	1.291E-14
	7.059E+00	3.616E-15
	7.500E+00	9.282E-16
	7.942E+00	2.178E-16
	8.383E+00	4.658E-17
	8.824E+00	9.057E-18
	9.265E+00	1.596E-18
	9.706E+00	2.540E-19
	1.015E+01	3.637E-20
	1.059E+01	4.672E-21
	1.103E+01	5.578E-22
	1.151E+01	4.581E-23
	1.199E+01	3.249E-24
	1.248E+01	1.980E-25
	1.296E+01	1.037E-26
	1.344E+01	4.794E-28
	1.392E+01	2.277E-29
	1.441E+01	1.706E-30
	1.489E+01	2.301E-31
	1.537E+01	3.721E-32
	1.585E+01	5.875E-33
	1.633E+01	8.695E-34
	1.682E+01	1.198E-34
	1.730E+01	1.531E-35
	1.778E+01	1.813E-36
	1.826E+01	1.985E-37
	1.875E+01	2.005E-38

	1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.863E-39 1.591E-40 1.246E-41 8.970E-43 5.983E-44 3.817E-45 2.539E-46 2.046E-47 2.165E-48 2.727E-49 3.583E-50 0.000E+00
20	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01	1.000E+00 6.323E-01 3.317E-01 1.418E-01 4.872E-02 1.335E-02 2.895E-03 4.948E-04 6.640E-05 6.981E-06 5.736E-07 3.679E-08 1.840E-09 7.234E-11 2.501E-12 1.884E-13 5.423E-14 1.945E-14 6.652E-15 2.134E-15 6.406E-16 1.797E-16 4.699E-17 1.144E-17 2.592E-18 5.655E-19 9.405E-20 1.420E-20 1.941E-21 2.391E-22 2.646E-23 2.620E-24

	1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	2.316E-25 1.826E-26 1.302E-27 8.974E-29 7.485E-30 1.005E-30 1.926E-31 4.010E-32 8.154E-33 1.580E-33 2.903E-34 5.046E-35 8.289E-36 1.285E-36 1.877E-37 2.580E-38 3.334E-39 4.041E-40 4.594E-41 4.895E-42 4.903E-43 4.659E-44 4.312E-45 4.132E-46 4.528E-47 6.103E-48 9.741E-49 1.674E-49 2.895E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00	1.000E+00 6.715E-01 3.890E-01 1.918E-01 7.964E-02 2.766E-02 7.991E-03 1.912E-03 3.778E-04 6.151E-05 8.236E-06 9.055E-07 8.166E-08 6.037E-09 3.664E-10 1.866E-11 1.001E-12 1.444E-13 5.192E-14 2.082E-14 8.030E-15 2.943E-15



	9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.023E-15 3.369E-16 1.053E-16 3.222E-17 7.951E-18 1.827E-18 3.904E-19 7.734E-20 1.418E-20 2.399E-21 3.737E-22 5.345E-23 7.001E-24 8.376E-25 9.142E-26 9.126E-27 8.477E-28 7.835E-29 8.657E-30 1.411E-30 3.141E-31 7.718E-32 1.888E-32 4.463E-33 1.012E-33 2.199E-34 4.568E-35 9.068E-36 1.719E-36 3.106E-37 5.348E-38 8.765E-39 1.366E-39 2.022E-40 2.842E-41 3.795E-42 4.827E-43 5.892E-44 7.037E-45 8.573E-46 1.142E-46 1.777E-47 3.248E-48 6.561E-49
30	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00	1.000E+00 7.010E-01 4.350E-01 2.364E-01 1.116E-01 4.545E-02 1.591E-02 4.769E-03 1.220E-03 2.661E-04 4.935E-05 7.774E-06

5.294E+00	1.039E-06
5.736E+00	1.178E-07
6.177E+00	1.131E-08
6.618E+00	9.212E-10
7.059E+00	6.408E-11
7.500E+00	4.090E-12
7.942E+00	3.816E-13
8.383E+00	1.024E-13
8.824E+00	4.337E-14
9.265E+00	1.880E-14
9.706E+00	7.856E-15
1.015E+01	3.146E-15
1.059E+01	1.211E-15
1.103E+01	4.597E-16
1.151E+01	1.460E-16
1.199E+01	4.382E-17
1.248E+01	1.242E-17
1.296E+01	3.320E-18
1.344E+01	8.353E-19
1.392E+01	1.976E-19
1.441E+01	4.384E-20
1.489E+01	9.113E-21
1.537E+01	1.771E-21
1.585E+01	3.209E-22
1.633E+01	5.417E-23
1.682E+01	8.494E-24
1.730E+01	1.235E-24
1.778E+01	1.664E-25
1.826E+01	2.079E-26
1.875E+01	2.428E-27
1.923E+01	2.738E-28
1.971E+01	3.279E-29
2.019E+01	4.993E-30
2.068E+01	1.067E-30
2.116E+01	2.813E-31
2.164E+01	7.863E-32
2.212E+01	2.179E-32
2.260E+01	5.870E-33
2.309E+01	1.528E-33
2.357E+01	3.837E-34
2.405E+01	9.285E-35
2.453E+01	2.164E-35
2.502E+01	4.854E-36
2.550E+01	1.047E-36
2.598E+01	2.170E-37
2.646E+01	4.319E-38
2.694E+01	8.248E-39
2.743E+01	1.510E-39
2.791E+01	2.649E-40
2.839E+01	4.451E-41
2.887E+01	7.163E-42
2.936E+01	1.106E-42
2.984E+01	1.646E-43
3.032E+01	2.387E-44

8.824E-01  
1.324E+00  
1.765E+00  
2.206E+00  
2.647E+00  
3.088E+00  
3.530E+00  
3.971E+00  
4.412E+00  
4.853E+00  
5.294E+00  
5.736E+00  
6.177E+00  
6.618E+00  
7.059E+00  
7.500E+00  
7.942E+00  
8.383E+00  
8.824E+00  
9.265E+00  
9.706E+00  
1.015E+01  
1.059E+01  
1.103E+01  
1.151E+01  
1.199E+01  
1.248E+01  
1.296E+01  
1.344E+01  
1.392E+01  
1.441E+01  
1.489E+01  
1.537E+01  
1.585E+01  
1.633E+01  
1.682E+01  
1.730E+01  
1.778E+01  
1.826E+01  
1.875E+01  
1.923E+01  
1.971E+01  
2.019E+01  
2.068E+01  
2.116E+01  
2.164E+01  
2.212E+01  
2.260E+01  
2.309E+01  
2.357E+01  
2.405E+01  
2.453E+01  
2.502E+01  
2.550E+01  
2.598E+01  
2.646E+01  
2.694E+01

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2.758E-01  
1.428E-01  
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2.623E-02  
9.240E-03  
2.846E-03  
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1.790E-04  
3.648E-05  
6.461E-06  
9.942E-07  
1.328E-07  
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1.547E-09  
1.356E-10  
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1.145E-15  
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6.260E-29  
1.010E-29  
2.174E-30  
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1.807E-31  
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1.691E-32  
4.993E-33  
1.431E-33  
3.978E-34  
1.071E-34  
2.792E-35  
7.044E-36

	2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.719E-36 4.053E-37 9.234E-38 2.031E-38 4.309E-39 8.817E-40 1.739E-40
40	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01	1.000E+00 7.432E-01 5.047E-01 3.109E-01 1.727E-01 8.609E-02 3.839E-02 1.527E-02 5.405E-03 1.700E-03 4.741E-04 1.172E-04 2.563E-05 4.961E-06 8.486E-07 1.283E-07 1.712E-08 2.019E-09 2.108E-10 1.987E-11 1.909E-12 3.014E-13 1.067E-13 5.108E-14 2.514E-14 1.237E-14 5.322E-15 2.202E-15 8.752E-16 3.341E-16 1.223E-16 4.295E-17 1.444E-17 4.647E-18 1.429E-18 4.197E-19 1.176E-19 3.138E-20 7.971E-21 1.924E-21 4.409E-22 9.578E-23 1.969E-23 3.829E-24 7.031E-25 1.219E-25 1.998E-26 3.118E-27 4.733E-28

	2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	7.388E-29 1.325E-29 3.047E-30 8.810E-31 2.856E-31 9.532E-32 3.155E-32 1.023E-32 3.232E-33 9.946E-34 2.978E-34 8.672E-35 2.455E-35 6.751E-36 1.803E-36 4.674E-37 1.176E-37
45	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01	1.000E+00 7.590E-01 5.319E-01 3.420E-01 2.008E-01 1.072E-01 5.185E-02 2.268E-02 8.947E-03 3.180E-03 1.017E-03 2.920E-04 7.530E-05 1.742E-05 3.613E-06 6.716E-07 1.118E-07 1.667E-08 2.225E-09 2.665E-10 2.905E-11 3.119E-12 4.640E-13 1.457E-13 7.010E-14 3.699E-14 1.753E-14 8.045E-15 3.567E-15 1.527E-15 6.308E-16 2.513E-16 9.644E-17 3.564E-17 1.268E-17 4.334E-18 1.423E-18 4.487E-19 1.356E-19

	1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	3.927E-20 1.088E-20 2.883E-21 7.292E-22 1.760E-22 4.046E-23 8.855E-24 1.843E-24 3.644E-25 6.847E-26 1.226E-26 2.110E-27 3.571E-28 6.297E-29 1.278E-29 3.252E-30 1.013E-30 3.498E-31 1.245E-31 4.411E-32 1.536E-32 5.232E-33 1.741E-33 5.655E-34 1.792E-34 5.540E-35 1.670E-35
50	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01	1.000E+00 7.724E-01 5.555E-01 3.699E-01 2.271E-01 1.281E-01 6.616E-02 3.122E-02 1.344E-02 5.270E-03 1.879E-03 6.089E-04 1.791E-04 4.781E-05 1.157E-05 2.537E-06 5.041E-07 9.069E-08 1.477E-08 2.179E-09 2.915E-10 3.578E-11 4.280E-12 6.459E-13 1.882E-13 9.133E-14 4.559E-14 2.264E-14 1.094E-14

	1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	5.126E-15 2.328E-15 1.024E-15 4.361E-16 1.797E-16 7.157E-17 2.755E-17 1.024E-17 3.674E-18 1.271E-18 4.238E-19 1.360E-19 4.200E-20 1.247E-20 3.553E-21 9.717E-22 2.547E-22 6.395E-23 1.536E-23 3.526E-24 7.734E-25 1.620E-25 3.244E-26 6.235E-27 1.164E-27 2.174E-28 4.323E-29 1.003E-29 2.874E-30 9.731E-31 3.578E-31 1.346E-31 5.039E-32 1.857E-32 6.714E-33 2.377E-33 8.233E-34
55	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00	1.000E+00 7.840E-01 5.762E-01 3.951E-01 2.517E-01 1.485E-01 8.097E-02 4.069E-02 1.881E-02 7.994E-03 3.118E-03 1.115E-03 3.653E-04 1.096E-04 3.009E-05 7.557E-06 1.735E-06 3.641E-07 6.982E-08

8.383E+00	1.223E-08
8.824E+00	1.958E-09
9.265E+00	2.869E-10
9.706E+00	3.888E-11
1.015E+01	5.127E-12
1.059E+01	8.143E-13
1.103E+01	2.354E-13
1.151E+01	1.030E-13
1.199E+01	5.299E-14
1.248E+01	2.734E-14
1.296E+01	1.378E-14
1.344E+01	6.753E-15
1.392E+01	3.218E-15
1.441E+01	1.490E-15
1.489E+01	6.699E-16
1.537E+01	2.924E-16
1.585E+01	1.238E-16
1.633E+01	5.082E-17
1.682E+01	2.022E-17
1.730E+01	7.791E-18
1.778E+01	2.906E-18
1.826E+01	1.048E-18
1.875E+01	3.657E-19
1.923E+01	1.232E-19
1.971E+01	4.007E-20
2.019E+01	1.257E-20
2.068E+01	3.802E-21
2.116E+01	1.107E-21
2.164E+01	3.103E-22
2.212E+01	8.361E-23
2.260E+01	2.164E-23
2.309E+01	5.378E-24
2.357E+01	1.282E-24
2.405E+01	2.931E-25
2.453E+01	6.429E-26
2.502E+01	1.356E-26
2.550E+01	2.770E-27
2.598E+01	5.572E-28
2.646E+01	1.147E-28
2.694E+01	2.593E-29
2.743E+01	6.944E-30
2.791E+01	2.245E-30
2.839E+01	8.253E-31
2.887E+01	3.214E-31
2.936E+01	1.268E-31
2.984E+01	4.970E-32
3.032E+01	1.919E-32

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## BAB SandThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	23.62 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.259E+01	7.107E-46
1.318E+01	3.241E-48
1.377E+01	3.736E-50
1.436E+01	0.000E+00
1.495E+01	0.000E+00
1.554E+01	0.000E+00
1.613E+01	0.000E+00
1.672E+01	0.000E+00
1.731E+01	0.000E+00
1.791E+01	0.000E+00
1.850E+01	0.000E+00
1.909E+01	0.000E+00
1.968E+01	0.000E+00
2.027E+01	0.000E+00
2.086E+01	0.000E+00
2.145E+01	0.000E+00
2.204E+01	0.000E+00
2.263E+01	0.000E+00
2.322E+01	0.000E+00
2.381E+01	0.000E+00
2.440E+01	0.000E+00
2.499E+01	0.000E+00
2.558E+01	0.000E+00
2.617E+01	0.000E+00
2.676E+01	0.000E+00
2.735E+01	0.000E+00
2.794E+01	0.000E+00
2.853E+01	0.000E+00
2.912E+01	0.000E+00
2.971E+01	0.000E+00
3.031E+01	0.000E+00
3.090E+01	0.000E+00
3.149E+01	0.000E+00
3.208E+01	0.000E+00
3.267E+01	0.000E+00
3.326E+01	0.000E+00

	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.259E+01	2.459E-32
	1.318E+01	1.478E-33
	1.377E+01	7.600E-35
	1.436E+01	3.305E-36
	1.495E+01	1.206E-37
	1.554E+01	3.670E-39
	1.613E+01	9.243E-41
	1.672E+01	1.919E-42
	1.731E+01	3.330E-44
	1.791E+01	5.372E-46
	1.850E+01	1.161E-47
	1.909E+01	4.401E-49
	1.968E+01	2.063E-50
	2.027E+01	0.000E+00
	2.086E+01	0.000E+00
	2.145E+01	0.000E+00
	2.204E+01	0.000E+00
	2.263E+01	0.000E+00
	2.322E+01	0.000E+00
	2.381E+01	0.000E+00
	2.440E+01	0.000E+00
	2.499E+01	0.000E+00
	2.558E+01	0.000E+00
	2.617E+01	0.000E+00
	2.676E+01	0.000E+00
	2.735E+01	0.000E+00

	2.794E+01	0.000E+00
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.259E+01	9.949E-26
	1.318E+01	2.533E-27
	1.377E+01	5.772E-29
	1.436E+01	2.084E-30
	1.495E+01	1.787E-31
	1.554E+01	1.921E-32
	1.613E+01	1.935E-33
	1.672E+01	1.755E-34
	1.731E+01	1.424E-35
	1.791E+01	1.031E-36
	1.850E+01	6.623E-38
	1.909E+01	3.765E-39
	1.968E+01	1.886E-40
	2.027E+01	8.306E-42
	2.086E+01	3.225E-43
	2.145E+01	1.133E-44

	2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.993E-46 1.798E-47 1.201E-48 9.812E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 1.188E-21 8.744E-23 5.464E-24 2.882E-25 1.281E-26 4.947E-28

	1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01 2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	2.004E-29 1.417E-30 1.821E-31 2.661E-32 3.707E-33 4.783E-34 5.685E-35 6.207E-36 6.211E-37 5.681E-38 4.738E-39 3.594E-40 2.475E-41 1.548E-42 8.878E-44 4.830E-45 2.759E-46 1.974E-47 1.907E-48 2.173E-49 2.534E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.259E+01	2.667E-19
	1.318E+01	3.555E-20
	1.377E+01	4.211E-21
	1.436E+01	4.412E-22
	1.495E+01	4.069E-23
	1.554E+01	3.287E-24
	1.613E+01	2.316E-25
	1.672E+01	1.424E-26
	1.731E+01	7.810E-28
	1.791E+01	4.310E-29
	1.850E+01	3.416E-30
	1.909E+01	4.775E-31
	1.968E+01	8.465E-32
	2.027E+01	1.507E-32
	2.086E+01	2.543E-33
	2.145E+01	4.029E-34
	2.204E+01	5.975E-35
	2.263E+01	8.278E-36
	2.322E+01	1.070E-36
	2.381E+01	1.287E-37
	2.440E+01	1.439E-38
	2.499E+01	1.492E-39
	2.558E+01	1.433E-40
	2.617E+01	1.274E-41
	2.676E+01	1.049E-42
	2.735E+01	8.085E-44
	2.794E+01	6.002E-45
	2.853E+01	4.627E-46
	2.912E+01	4.213E-47
	2.971E+01	4.915E-48
	3.031E+01	6.838E-49
	3.090E+01	1.007E-49
	3.149E+01	1.466E-50
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06



5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.259E+01	9.092E-18
1.318E+01	1.762E-18
1.377E+01	3.114E-19
1.436E+01	5.009E-20
1.495E+01	7.304E-21
1.554E+01	9.623E-22
1.613E+01	1.141E-22
1.672E+01	1.214E-23
1.731E+01	1.154E-24
1.791E+01	9.778E-26
1.850E+01	7.416E-27
1.909E+01	5.180E-28
1.968E+01	3.764E-29
2.027E+01	3.832E-30
2.086E+01	6.311E-31
2.145E+01	1.295E-31
2.204E+01	2.708E-32
2.263E+01	5.446E-33
2.322E+01	1.040E-33
2.381E+01	1.883E-34
2.440E+01	3.221E-35
2.499E+01	5.206E-36
2.558E+01	7.934E-37
2.617E+01	1.139E-37
2.676E+01	1.538E-38
2.735E+01	1.950E-39
2.794E+01	2.319E-40
2.853E+01	2.585E-41
2.912E+01	2.704E-42
2.971E+01	2.666E-43
3.031E+01	2.514E-44
3.090E+01	2.359E-45
3.149E+01	2.386E-46
3.208E+01	2.876E-47
3.267E+01	4.253E-48
3.326E+01	7.150E-49
3.385E+01	1.250E-49
3.444E+01	2.164E-50
3.503E+01	0.000E+00
3.562E+01	0.000E+00

9.600E-01	4.337E-01
1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.194E-15
1.104E+01	2.849E-15
1.152E+01	1.083E-15
1.200E+01	4.061E-16
1.259E+01	1.094E-16
1.318E+01	2.740E-17
1.377E+01	6.371E-18
1.436E+01	1.372E-18
1.495E+01	2.730E-19
1.554E+01	5.008E-20
1.613E+01	8.445E-21
1.672E+01	1.306E-21
1.731E+01	1.845E-22
1.791E+01	2.376E-23
1.850E+01	2.781E-24
1.909E+01	2.952E-25
1.968E+01	2.841E-26
2.027E+01	2.505E-27
2.086E+01	2.121E-28
2.145E+01	2.010E-29
2.204E+01	2.759E-30
2.263E+01	5.556E-31
2.322E+01	1.299E-31
2.381E+01	3.058E-32
2.440E+01	6.959E-33
2.499E+01	1.516E-33
2.558E+01	3.153E-34
2.617E+01	6.253E-35
2.676E+01	1.181E-35
2.735E+01	2.123E-36
2.794E+01	3.626E-37
2.853E+01	5.880E-38
2.912E+01	9.042E-39
2.971E+01	1.317E-39
3.031E+01	1.816E-40
3.090E+01	2.368E-41
3.149E+01	2.925E-42

	3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.435E-43 3.880E-44 4.339E-45 5.095E-46 6.822E-47 1.094E-47 2.023E-48
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01 1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01 2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 6.958E-16 2.102E-16 5.966E-17 1.588E-17 3.955E-18 9.208E-19 1.999E-19 4.040E-20 7.581E-21 1.318E-21 2.118E-22 3.139E-23 4.279E-24 5.356E-25 6.150E-26 6.513E-27 6.515E-28 6.686E-29 8.541E-30 1.592E-30 3.848E-31 1.001E-31 2.582E-32

	2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	6.442E-33 1.546E-33 3.564E-34 7.878E-35 1.669E-35 3.386E-36 6.570E-37 1.219E-37 2.158E-38 3.647E-39 5.875E-40 9.015E-41 1.318E-41 1.839E-42 2.459E-43 3.192E-44 4.133E-45
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01 1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 2.912E-15 1.015E-15 3.351E-16 1.047E-16 3.092E-17 8.617E-18 2.263E-18 5.590E-19 1.297E-19 2.822E-20 5.745E-21 1.092E-21 1.937E-22

	2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.193E-23 4.888E-24 6.935E-25 9.115E-26 1.113E-26 1.284E-27 1.473E-28 1.929E-29 3.444E-30 8.324E-31 2.301E-31 6.494E-32 1.795E-32 4.808E-33 1.243E-33 3.099E-34 7.443E-35 1.721E-35 3.830E-36 8.192E-37 1.683E-37 3.320E-38 6.281E-39 1.139E-39 1.978E-40 3.292E-41 5.249E-42
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.326E-13 1.981E-13 8.651E-14 4.354E-14 2.233E-14 9.120E-15 3.557E-15 1.323E-15

	1.436E+01	4.690E-16
	1.495E+01	1.582E-16
	1.554E+01	5.074E-17
	1.613E+01	1.545E-17
	1.672E+01	4.463E-18
	1.731E+01	1.221E-18
	1.791E+01	3.160E-19
	1.850E+01	7.724E-20
	1.909E+01	1.780E-20
	1.968E+01	3.864E-21
	2.027E+01	7.881E-22
	2.086E+01	1.508E-22
	2.145E+01	2.704E-23
	2.204E+01	4.533E-24
	2.263E+01	7.097E-25
	2.322E+01	1.037E-25
	2.381E+01	1.418E-26
	2.440E+01	1.838E-27
	2.499E+01	2.349E-28
	2.558E+01	3.286E-29
	2.617E+01	5.910E-30
	2.676E+01	1.434E-30
	2.735E+01	4.132E-31
	2.794E+01	1.247E-31
	2.853E+01	3.733E-32
	2.912E+01	1.089E-32
	2.971E+01	3.084E-33
	3.031E+01	8.451E-34
	3.090E+01	2.241E-34
	3.149E+01	5.746E-35
	3.208E+01	1.424E-35
	3.267E+01	3.406E-36
	3.326E+01	7.864E-37
	3.385E+01	1.751E-37
	3.444E+01	3.758E-38
	3.503E+01	7.769E-39
	3.562E+01	1.546E-39
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.259E+01	2.318E-14
	1.318E+01	9.898E-15
	1.377E+01	4.054E-15
	1.436E+01	1.590E-15
	1.495E+01	5.971E-16
	1.554E+01	2.144E-16
	1.613E+01	7.352E-17
	1.672E+01	2.407E-17
	1.731E+01	7.511E-18
	1.791E+01	2.232E-18
	1.850E+01	6.309E-19
	1.909E+01	1.694E-19
	1.968E+01	4.317E-20
	2.027E+01	1.042E-20
	2.086E+01	2.380E-21
	2.145E+01	5.135E-22
	2.204E+01	1.045E-22
	2.263E+01	2.003E-23
	2.322E+01	3.612E-24
	2.381E+01	6.118E-25
	2.440E+01	9.734E-26
	2.499E+01	1.459E-26
	2.558E+01	2.083E-27
	2.617E+01	2.932E-28
	2.676E+01	4.441E-29
	2.735E+01	8.330E-30
	2.794E+01	2.069E-30
	2.853E+01	6.181E-31
	2.912E+01	1.968E-31
	2.971E+01	6.278E-32
	3.031E+01	1.964E-32
	3.090E+01	5.980E-33
	3.149E+01	1.770E-33
	3.208E+01	5.083E-34
	3.267E+01	1.416E-34
	3.326E+01	3.827E-35
	3.385E+01	1.002E-35
	3.444E+01	2.542E-36
	3.503E+01	6.240E-37
	3.562E+01	1.482E-37

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB SandThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	15.17 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.238E+01	5.794E-45
1.276E+01	1.384E-46
1.314E+01	4.621E-48
1.352E+01	2.432E-49
1.390E+01	1.493E-50
1.428E+01	0.000E+00
1.465E+01	0.000E+00
1.503E+01	0.000E+00
1.541E+01	0.000E+00
1.579E+01	0.000E+00
1.617E+01	0.000E+00
1.655E+01	0.000E+00
1.693E+01	0.000E+00
1.731E+01	0.000E+00
1.769E+01	0.000E+00
1.807E+01	0.000E+00
1.845E+01	0.000E+00
1.883E+01	0.000E+00
1.921E+01	0.000E+00
1.959E+01	0.000E+00
1.996E+01	0.000E+00
2.034E+01	0.000E+00
2.072E+01	0.000E+00
2.110E+01	0.000E+00
2.148E+01	0.000E+00
2.186E+01	0.000E+00
2.224E+01	0.000E+00
2.262E+01	0.000E+00
2.300E+01	0.000E+00
2.338E+01	0.000E+00
2.376E+01	0.000E+00
2.414E+01	0.000E+00
2.452E+01	0.000E+00
2.489E+01	0.000E+00
2.527E+01	0.000E+00
2.565E+01	0.000E+00

	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.238E+01	6.542E-32
	1.276E+01	1.121E-32
	1.314E+01	1.825E-33
	1.352E+01	2.787E-34
	1.390E+01	3.975E-35
	1.428E+01	5.288E-36
	1.465E+01	6.547E-37
	1.503E+01	7.532E-38
	1.541E+01	8.034E-39
	1.579E+01	7.931E-40
	1.617E+01	7.234E-41
	1.655E+01	6.090E-42
	1.693E+01	4.742E-43
	1.731E+01	3.448E-44
	1.769E+01	2.417E-45
	1.807E+01	1.771E-46
	1.845E+01	1.553E-47
	1.883E+01	1.758E-48
	1.921E+01	2.357E-49
	1.959E+01	3.315E-50
	1.996E+01	0.000E+00
	2.034E+01	0.000E+00
	2.072E+01	0.000E+00
	2.110E+01	0.000E+00
	2.148E+01	0.000E+00
	2.186E+01	0.000E+00

	2.224E+01	0.000E+00
	2.262E+01	0.000E+00
	2.300E+01	0.000E+00
	2.338E+01	0.000E+00
	2.376E+01	0.000E+00
	2.414E+01	0.000E+00
	2.452E+01	0.000E+00
	2.489E+01	0.000E+00
	2.527E+01	0.000E+00
	2.565E+01	0.000E+00
	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.238E+01	3.508E-25
	1.276E+01	3.577E-26
	1.314E+01	3.336E-27
	1.352E+01	2.925E-28
	1.390E+01	2.669E-29
	1.428E+01	3.187E-30
	1.465E+01	5.746E-31
	1.503E+01	1.312E-31
	1.541E+01	3.144E-32
	1.579E+01	7.371E-33
	1.617E+01	1.662E-33
	1.655E+01	3.585E-34
	1.693E+01	7.392E-35
	1.731E+01	1.455E-35
	1.769E+01	2.733E-36
	1.807E+01	4.889E-37

	1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	8.326E-38 1.348E-38 2.073E-39 3.025E-40 4.186E-41 5.491E-42 6.840E-43 8.135E-44 9.371E-45 1.081E-45 1.331E-46 1.889E-47 3.186E-48 6.089E-49 1.227E-49 2.484E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 2.908E-21 5.748E-22 1.064E-22 1.843E-23 2.977E-24 4.483E-25

	1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	6.287E-26 8.233E-27 1.019E-27 1.239E-28 1.650E-29 2.838E-30 6.647E-31 1.851E-31 5.392E-32 1.555E-32 4.367E-33 1.188E-33 3.127E-34 7.951E-35 1.953E-35 4.629E-36 1.058E-36 2.333E-37 4.952E-38 1.012E-38 1.989E-39 3.758E-40 6.822E-41 1.190E-41 1.996E-42 3.225E-43 5.053E-44 7.777E-45 1.207E-45 1.974E-46 3.581E-47 7.412E-48 1.715E-48 4.228E-49
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.238E+01	5.333E-19
	1.276E+01	1.521E-19
	1.314E+01	4.137E-20
	1.352E+01	1.072E-20
	1.390E+01	2.642E-21
	1.428E+01	6.189E-22
	1.465E+01	1.376E-22
	1.503E+01	2.898E-23
	1.541E+01	5.780E-24
	1.579E+01	1.090E-24
	1.617E+01	1.941E-25
	1.655E+01	3.267E-26
	1.693E+01	5.218E-27
	1.731E+01	8.006E-28
	1.769E+01	1.223E-28
	1.807E+01	2.025E-29
	1.845E+01	4.106E-30
	1.883E+01	1.075E-30
	1.921E+01	3.337E-31
	1.959E+01	1.103E-31
	1.996E+01	3.669E-32
	2.034E+01	1.200E-32
	2.072E+01	3.837E-33
	2.110E+01	1.195E-33
	2.148E+01	3.625E-34
	2.186E+01	1.070E-34
	2.224E+01	3.070E-35
	2.262E+01	8.565E-36
	2.300E+01	2.322E-36
	2.338E+01	6.114E-37
	2.376E+01	1.563E-37
	2.414E+01	3.875E-38
	2.452E+01	9.319E-39
	2.489E+01	2.173E-39
	2.527E+01	4.907E-40
	2.565E+01	1.073E-40
	2.603E+01	2.274E-41
	2.641E+01	4.668E-42
	2.679E+01	9.294E-43
	2.717E+01	1.800E-43
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.238E+01	1.600E-17
1.276E+01	5.753E-18
1.314E+01	1.993E-18
1.352E+01	6.648E-19
1.390E+01	2.134E-19
1.428E+01	6.586E-20
1.465E+01	1.953E-20
1.503E+01	5.555E-21
1.541E+01	1.516E-21
1.579E+01	3.960E-22
1.617E+01	9.903E-23
1.655E+01	2.367E-23
1.693E+01	5.405E-24
1.731E+01	1.177E-24
1.769E+01	2.446E-25
1.807E+01	4.849E-26
1.845E+01	9.190E-27
1.883E+01	1.678E-27
1.921E+01	3.012E-28
1.959E+01	5.577E-29
1.996E+01	1.161E-29
2.034E+01	2.962E-30
2.072E+01	9.236E-31
2.110E+01	3.241E-31
2.148E+01	1.186E-31
2.186E+01	4.353E-32
2.224E+01	1.576E-32
2.262E+01	5.599E-33
2.300E+01	1.947E-33
2.338E+01	6.621E-34
2.376E+01	2.201E-34
2.414E+01	7.153E-35
2.452E+01	2.271E-35
2.489E+01	7.040E-36
2.527E+01	2.131E-36
2.565E+01	6.292E-37
2.603E+01	1.813E-37
2.641E+01	5.093E-38
2.679E+01	1.395E-38
2.717E+01	3.723E-39



9.600E-01	4.337E-01
1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.194E-15
1.104E+01	2.849E-15
1.152E+01	1.083E-15
1.200E+01	4.061E-16
1.238E+01	1.763E-16
1.276E+01	7.433E-17
1.314E+01	3.040E-17
1.352E+01	1.206E-17
1.390E+01	4.636E-18
1.428E+01	1.726E-18
1.465E+01	6.224E-19
1.503E+01	2.171E-19
1.541E+01	7.321E-20
1.579E+01	2.385E-20
1.617E+01	7.503E-21
1.655E+01	2.277E-21
1.693E+01	6.660E-22
1.731E+01	1.877E-22
1.769E+01	5.089E-23
1.807E+01	1.327E-23
1.845E+01	3.326E-24
1.883E+01	8.007E-25
1.921E+01	1.850E-25
1.959E+01	4.108E-26
1.996E+01	8.783E-27
2.034E+01	1.820E-27
2.072E+01	3.719E-28
2.110E+01	7.773E-29
2.148E+01	1.776E-29
2.186E+01	4.783E-30
2.224E+01	1.548E-30
2.262E+01	5.698E-31
2.300E+01	2.227E-31
2.338E+01	8.837E-32
2.376E+01	3.488E-32
2.414E+01	1.357E-32
2.452E+01	5.194E-33

	2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	1.951E-33 7.190E-34 2.599E-34 9.211E-35 3.200E-35 1.089E-35 3.633E-36
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 1.052E-15 4.981E-16 2.300E-16 1.035E-16 4.535E-17 1.935E-17 8.038E-18 3.248E-18 1.276E-18 4.871E-19 1.806E-19 6.503E-20 2.271E-20 7.691E-21 2.524E-21 8.021E-22 2.467E-22 7.339E-23 2.110E-23 5.860E-24 1.571E-24 4.066E-25 1.015E-25

	2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	2.450E-26 5.728E-27 1.308E-27 2.969E-28 6.941E-29 1.773E-29 5.250E-30 1.827E-30 7.140E-31 2.957E-31 1.247E-31 5.249E-32 2.186E-32 8.978E-33 3.629E-33 1.443E-33 5.641E-34
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 4.191E-15 2.169E-15 1.098E-15 5.439E-16 2.633E-16 1.246E-16 5.761E-17 2.601E-17 1.147E-17 4.934E-18 2.071E-18 8.474E-19 3.380E-19

	1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	1.314E-19 4.971E-20 1.831E-20 6.559E-21 2.285E-21 7.736E-22 2.544E-22 8.120E-23 2.515E-23 7.551E-24 2.198E-24 6.199E-25 1.694E-25 4.487E-26 1.154E-26 2.897E-27 7.168E-28 1.786E-28 4.658E-29 1.342E-29 4.454E-30 1.697E-30 7.096E-31 3.106E-31 1.379E-31 6.110E-32 2.682E-32
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	1.655E+01	3.355E-17
	1.693E+01	1.611E-17
	1.731E+01	7.587E-18
	1.769E+01	3.501E-18
	1.807E+01	1.583E-18
	1.845E+01	7.009E-19
	1.883E+01	3.039E-19
	1.921E+01	1.290E-19
	1.959E+01	5.354E-20
	1.996E+01	2.174E-20
	2.034E+01	8.633E-21
	2.072E+01	3.350E-21
	2.110E+01	1.270E-21
	2.148E+01	4.702E-22
	2.186E+01	1.699E-22
	2.224E+01	5.993E-23
	2.262E+01	2.061E-23
	2.300E+01	6.913E-24
	2.338E+01	2.260E-24
	2.376E+01	7.199E-25
	2.414E+01	2.235E-25
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	2.489E+01	1.997E-26
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	2.565E+01	1.642E-27
	2.603E+01	4.653E-28
	2.641E+01	1.342E-28
	2.679E+01	4.075E-29
	2.717E+01	1.357E-29

### NOTICE

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November 30, 2021

Sent via email

Mr. Michael Regan, EPA Administrator  
United States Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Mail Code 50304-P  
Washington DC, 20460

RE: Preliminary Alternate Liner Demonstration  
DTE Electric Company Belle River Power Plant  
Diversion Basin Coal Combustion Residuals Unit  
4505 King Road, China Township, Michigan

Dear Administrator Regan:

The DTE Electric Company (DTE Electric) is submitting the enclosed preliminary Alternate Liner Demonstration (ALD) to the U.S. Environmental Protection Agency (EPA) as a “place holder” and out of an abundance of caution to meet the November 30, 2021 date for submitting ALDs under the Part B rule.

As EPA has publicly acknowledged, the EPA has experienced unanticipated internal delays in reviewing and making decisions on the Part B applications that were submitted a year ago on November 30, 2020, and that this extended delay has practically eliminated the timeframe contemplated in the Part B rule for facilities to prepare their ALDs. Given this, EPA explains on their CCR Part B Implementation web page that they intend to “take actions to ensure that any facility approved to conduct a demonstration has the same amount of time anticipated by the current regulation to initiate and complete the demonstration after an approval.”

DTE Electric appreciates EPA’s commitment to take this corrective action and believes it is both necessary and appropriate. Regardless of the Agency’s internal delays DTE Electric proceeded expeditiously with the hydrogeological site characterization and laboratory study as detailed in the September 1, 2021 extension request due to analytical limitations. The extension request detailed the compatibility laboratory testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. EPA has not yet responded to the extension request.

The enclosed preliminary ALD prepared by Geosyntec using preliminary data, concludes that the low permeability natural clay soils underlying the Belle River Power Plant Diversion Basin are consistently present across the basin and have sufficiently low hydraulic conductivity to prevent groundwater contamination at the solid waste boundary through the active life of the unit.



As allowed by the agency, electronic files were submitted to Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills via email. If you have any questions regarding this submittal, please contact me at 313.235.0153 or [christopher.scieszka@dteenergy.com](mailto:christopher.scieszka@dteenergy.com)

Sincerely,

A handwritten signature in blue ink, appearing to read "Chris Scieszka", written in a cursive style.

Christopher Scieszka  
Project Manager, Environmental Management and Safety, DTE Energy

Enclosure

cc: Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills



*Prepared for*

**DTE Electric Company**  
One Energy Plaza  
Detroit, Michigan 48226

**PRELIMINARY ALTERNATE LINER  
DEMONSTRATION  
DIVERSION BASIN COAL COMBUSTION  
RESIDUALS UNIT**

**BELLE RIVER POWER PLANT**

**East China Township, Michigan**

*Prepared by*

**Geosyntec**   
consultants

engineers | scientists | innovators

2100 Commonwealth Avenue, Suite 100  
Ann Arbor, Michigan 48105

GLP8017

November 2021

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## 1. INTRODUCTION

This report has been prepared to provide Preliminary Alternative Liner Demonstration (ALD) of Belle River Power Plant Diversion Basin (DB) Coal Combustion Residuals (CCR) Unit, one of two CCR units at the site, in accordance with 40 CFR Part 257 as amended on November 20, 2020 (CCR Rule). **Figure 1-1** provides the site location.

This report concludes that there is no reasonable probability that water from DB will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

### 1.1 Background

DTE Electric Company (DTE) submitted the Alternate Liner Demonstration Application for the DB to the United States Environmental Protection Agency (USEPA) on November 30, 2020 [1] in accordance with the CCR Rule. Soon after, DTE started the field and laboratory investigation studies to meet the requirements of the CCR Rule.

One of the requirements of the CCR rule is to conduct hydraulic conductivity testing using site-specific permeant liquid. The CCR Rule acknowledges that these tests may last long such that the operator of the CCR unit may need to submit an extension request for the laboratory testing program, and submit a preliminary ALD.

DTE submitted an extension request due to “analytical limitation” under a separate cover, dated September 1, 2021 [2]. The extension request detailed the compatibility testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. The EPA has not yet responded to the extension request.

### 1.2 Purpose

The purpose of this report is to provide ALD approach, analysis details, and present results based on available data in accordance with the CCR Rule. Although the Part B Rule does not require the submittal of a preliminary ALD by November 30, 2021 if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A), DTE is providing this preliminary ALD as a “place holder” and out of an abundance of caution and with confidence in the performance of the liner system to comply with the requirement to submit an ALD by November 30, 2021. A final ALD will be submitted in accordance with the schedule expected to be included in the forthcoming EPA decisions.

### 1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific water, and discussion of results.
- Section 4 – provides analysis approach, details, groundwater protection standards, and evaluation of results as to whether or not the DB meets the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification.
- Section 7 – provides references.

#### **1.4 Terms of Reference**

This report was prepared by Mike Coram C.P.G., Omer Bozok P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec.

## 2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

*§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*

*(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*

*(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*

*(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*

*(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*

*(i) Samples are advanced to a depth less than the top of the groundwater table or 20 ft beneath the bottom of the nearest water body, whichever is greater, and/or*

*(ii) Samples are spaced further apart than 200 ft around the impoundment perimeter;*

*(5) A narrative description of site geological history; and*

*(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*

*(i) The relative location of the impoundment with depth of ponded water noted;*

*(ii) Monitoring wells with screening depth noted;*

*(iii) Depiction of the location of other samples used in the development of the model;*

*(iv) The upper and lower limits of the uppermost aquifer across the site;*

*(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and*

*(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.*

## **2.1 Introduction**

This section provides information on site geology and hydrogeology, data used in site characterization, a summary of ALD-specific field and laboratory study, and a conceptual site model built using the Environmental Visualization System (EVS).

## **2.2 Site Geology**

The surficial topography of St. Clair County is characterized by low-relief floodplain, stream terrace, and lakeshore deposits. The subsurface geology of the area is defined by glacial deposits, which range in thickness from 100 to 400 ft. These glacial sediments, including lacustrine, till, and sand and gravel outwash deposits, were deposited on the underlying bedrock. Throughout St. Clair County the underlying bedrock varies but is primarily fine-grained siliclastic rock, mostly shale with some sandstone [1].

The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Shallow regional groundwater flow would be expected to be towards east to the St. Clair River. The DB CCR Unit is located approximately one mile west of the St. Clair River.

### **2.2.1 Diversion Basin Site-Specific Geology**

The geology of St. Clair County consists of approximately 100 to 400 ft of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces. The glacial material underlying the DB appears to be glaciolacustrine clays with local sand lenses. The uppermost aquifer unit appears to be associated with ice contact directly above the bedrock surface (Bedford Shale).

The DB CCR Unit is underlain by 115 to 130 ft of unconsolidated sediments, with the upper aquifer unit directly above the Bedford Shale. The upper aquifer unit is laterally consistent throughout the DB CCR unit. During Geosyntec's ALD investigation in December 2020, cone penetration test (CPT) dissipation tests were completed. The CPT data confirm that the underlying deposits are

consistently low hydraulic conductivity units. Hydraulic conductivity of the underlying clay-rich deposits are summarized in Section 2.5.1.

The uppermost aquifer unit in the DB CCR unit is a confined, silty aquifer that directly overlies the Bedford Shale. It is approximately three to five ft in thickness and is encountered at approximately 115 to 130 ft bgs directly below the bottom of the DB. To the northwest, the silty aquifer transitions into a sandy aquifer and increases in thickness; specifically, in the vicinity of the Bottom Ash Basins (BABs) located to the northwest. For the purposes of this report, the silty aquifer unit within the DB CCR Unit is considered the “uppermost aquifer unit” and is further discussed in **Section 2.6**.

### **2.3 Uppermost Aquifer Field Testing and Hydrogeology**

TRC calculated the hydraulic conductivities within the CCR monitoring wells set within the upper portion of the uppermost aquifer using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 and 2021 by TRC. Test results are provided in **Appendix A** and are included in the EVS model. The monitoring well logs and construction details are presented in **Appendix B**. As calculated by TRC, the hydraulic conductivity of the uppermost aquifer using wells at the BABs CCR Unit area is approximately 0.13 ft/day (4.7E-5 cm/s).

### **2.4 Summary of Data Used for Site Characterization**

A host of data from three separate investigations was used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, all of which are included in the initial ALD Application [1]. Data from the 2020 ALD Investigation performed by Geosyntec was used to augment the data set. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. **Figure 2-1** provides investigation locations.

Boring logs for the 1970s, 2016, and 2020 field investigations are provided in **Appendices C** through **E**, respectively. These investigations extend across the site and include DB and BABs, which is another CCR unit connected to DB (~ 400 ft northwest of DB). Considering the close proximity of both CCR units, field investigation data is used for both CCR units.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and pore pressure dissipation tests (PPDs) at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices F** through **H** for the 1970s, 2016, and 2020 laboratory studies, respectively.

Considering the extent of existing field investigation data, it is Geosyntec’s opinion that the data used in building this model is sufficient to capture the variability that may exist in soil conditions.

## **2.5 ALD-Specific Site Investigation Details**

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling, and advancing a CPT probe through the native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to augment the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted generally at 200-ft intervals but adjusted in the field as necessary to avoid underground utility lines, overhead power lines, and access issues, as needed. Investigations extended down to 100 ft bgs to an elevation approximately 490 ft, which is lower than groundwater level, and 20 ft below the nearest water body that is St. Clair River with a bottom elevation of approximately 525 ft.

The following sections provide a summary of the fieldwork completed during the SI.

### **2.5.1 Cone Penetrometer Tests**

Eight CPTs were completed around the DB in approximate 200 ft intervals along the east and south sides. Due to access issues to the area directly north and west of the DB, additional CPT locations were added to the south and southwest and CPT-08B/C was moved to the first accessible location west/northwest of the DB. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or to approximately 100 ft bgs. Pore pressure dissipation tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted near the sonic borings and at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 12 dissipation tests were completed at CPTs advanced around DB, and 16 dissipation tests were completed at CPTs advanced around BABs. Hydraulic conductivity values were estimated to range between 7.97E-9 cm/s and 1.63E-6 cm/s around DB, and range between 9.76x10<sup>-9</sup> cm/s and 2.81E-6 cm/s around BABs. Hydraulic conductivity values are similar between soils underlying DB and BABs. Results are summarized in **Table 2-2**. These values are consistent with TRC’s 2018 Natural Clay Liner Equivalency Evaluation Report [1]. CPT logs are provided in **Appendix I1**, and PPD tests are provided in **Appendix I2**.

### **2.5.2 Sonic Drilling**

Six soil borings (three around the DB and three around the BABs) were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples for characterization of native soils. Soil samples were collected continuously in two to ten-foot sections from the ground surface to the termination of the soil

boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS). Shelby tubes were collected from the DB embankment soils, and native soils at approximately 20 ft intervals from each of the sonic borings in accordance with ASTM D1587<sup>1</sup>. The soil borings were advanced to depths of approximately 100 ft-bgs. Sonic drilling locations are provided in **Figure 2-1**. Boring logs are provided in **Appendix E**. Soil stratigraphy is discussed in Section 2.6.

### 2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. Fourteen soil samples were collected from six borings for hydraulic conductivity testing from depths between five ft and 90 ft to capture soils conditions ranging from soft to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 24 Moisture Content tests (ASTM D2216)
- 4 Specific Gravity tests (ASTM D854)
- 22 Grain Size Mechanical Sieve tests (ASTM D6913)
- 21 Atterberg Limits tests (ASTM D4318)

Note that these tests quantities are included in **Table 2-1**. Test results are provided in **Appendix H**.

## 2.6 Conceptual Site Model

An EVS model was developed for the site based on data collected during the field investigations from the 1970s, 2016, and 2020. The EVS model centralized all the data to develop a comprehensive Conceptual Site Model (CMS). Based on the EVS model, the overall CMS of the Site lithology is relatively consistent with low hydraulic conductivity clay-rich deposits with non-interconnected sand seams at deeper depths. Within the DB CCR unit, the uppermost aquifer unit sits directly above the bedrock and is relatively consistent at approximately 10 ft thick across the DB CCR unit

Specific to the DB CCR unit, Cross-sections (**Figures 2-2** through **2-5**) were created from the EVS model and analyzed to determine the various changes in lithology within the clay confining unit

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<sup>1</sup> ASTM D1587 – Standard Practice for Thin-walled Tube Sampling for Fine-grained Soils.

directly underlying the DB and the characteristics of the upper aquifer unit which sits directly on the bedrock. Upon review of the transects, the lithology beneath the BABs consists of (from the ground surface down) (1) clay, (2) clay with sand, (3) uppermost aquifer unit, and (4) shale bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]. There were some discrepancies, in that the second clay unit was described as silty instead of sandy. Based on CPT and geotechnical index testing during Geosyntec's 2020 ALD investigation, the lower clay was re-interpreted as "clay with sand" mainly due to sand seams that were encountered. It appears that the clay within the "clay with sand" unit is relatively consistent stiff gray clay. Therefore, the lithology directly underlying the DBs consist of the following:

- (1) Clay – 35 to 40 ft thick directly beneath the DB. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams appear to be interconnected or considered aquifer unit.
- (2) Clay with sand – This unit was encountered at approximately 35 to 40 ft bgs with a thickness of approximately 80 to 90 ft. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 2 ft in thickness and have hydraulic conductivity values greater than  $1 \times 10^{-7}$  cm/s except for one CPT dissipation test location which is discussed in more detail below. None of the sand seams appear to be interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.
- (3) Uppermost Aquifer Unit – This unit was encountered at approximately 115 to 130 ft bgs. The thickness of the unit is relatively consistent at three to five ft thick and directly sits atop the bedrock. This silty unit is wet and considered the uppermost aquifer unit within the DB CCR unit. There is a transition from silty aquifer beneath the DB CCR unit to a thicker sandy aquifer beneath the BABs CCR located to the north/northwest. Both are considered the "uppermost aquifer unit" on the cross-sections and within the EVS model.
- (4) Shale bedrock – This unit was encountered at approximately 100-130 ft bgs.

During Geosyntec's 2020 investigation, CPT tests were conducted and dissipation tests were completed at CPT-08B, CPT-08C, CPT-11, CPT-12 and CPT-13B to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual samples from the three sonic borings around DB for long-term breakthrough potential and is further discussed in Section 3. Based on the review of the CPT dissipation data, values ranged from  $7.97\text{E-}9$  cm/s and  $1.63\text{E-}6$  cm/s around DB. The CPT-derived highest hydraulic conductivity value of  $1.63\text{E-}6$  cm/s was calculated at CPT-13B from a sand seam at 490 ft AMSL



(approximately 100 ft bgs) within the (2) clay with sand unit. Dissipation tests at CPT-13 and CPT-12 located next to CPT-13B indicated hydraulic conductivities less than  $1E-7$  cm/s. Therefore, the (1) clay and (2) clay with sand lithologies beneath the DB have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and it is consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

Below the clay with sand is the uppermost aquifer unit that mainly consists of silt. The hydraulic head in the (3) uppermost aquifer unit associated with the DBs is approximately 575 ft AMSL [1] with a gradient to the west-northwest.

The bottom of the DB is at an elevation of approximately 576 ft and the bottom of the clay underlying the DBs is at an elevation of approximately 450 ft AMSL, thus more than 120 ft of low hydraulic conductivity clay-rich deposits ((1) clay and (2) clay with sand) separate the bottom of the DB CCR unit from the underlying (3) uppermost aquifer unit.

### 3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

*§257.71(d)(ii)(B) Potential for infiltration. A characterization of the potential for infiltration through any soil-based liner components and/or naturally occurring soil that control release and transport of leachate. All samples collected in the field for measurement of saturated hydraulic conductivity must be sent to a certified laboratory for analysis under controlled conditions and analyzed using recognized and generally accepted methodology. Facilities must document how the selected method is designed to simulate on-site conditions. The owner or operator must also provide documentation of the following as part of this line of evidence:*

- (1) The location, number, depth, and spacing of samples relied upon is supported by the data collected in paragraph (d)(1)(ii)(A) of this section and is sufficient to capture the variability of saturated hydraulic conductivity for the soil-based liner components and/or naturally occurring soil;*
- (2) The liquid used to pre-hydrate the samples and measure long-term hydraulic conductivity reflects the pH and major ion composition of the CCR surface impoundment porewater;*
- (3) That samples intended to represent the hydraulic conductivity of naturally occurring soils (i.e., not mechanically compacted) are handled in a manner that will ensure the macrostructure of the soil is not disturbed during collection, transport, or analysis; and*
- (4) Any test for hydraulic conductivity relied upon includes, in addition to other relevant termination criteria specified by the method, criteria that equilibrium has been achieved between the inflow and outflow, within acceptable tolerance limits, for both electrical conductivity and pH.*

#### 3.1 Soil Sample and Site-Specific Water Details

##### 3.1.1 Soil Samples for Hydraulic Conductivity Testing

Fourteen soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs, earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in natural soils.

##### 3.1.2 Site-Specific Water Testing and Results

Site-specific CCR porewater samples were collected from both DB and the BABs for geochemical analyses to determine the representative composition of an “aggressive” solution for use in the

compatibility portion of the hydraulic conductivity testing. Due to the high turbidity of basin waters, samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific water samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All water samples were found to be slightly basic, with pH concentrations ranging from 7.87 to 9.01 SU. TDS concentrations of all three samples are similar, ranging from 200 to 300 mg/L. All three samples have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as “freshwater”. DB and the BABs samples have similar major ion compositions, as illustrated on the Piper diagram in **Figure 3-1**. The anion composition is very similar for all three samples and consists of predominantly sulfate with some alkalinity and very little chloride. The cation composition is predominantly calcium and monovalent cations (potassium/sodium), with a smaller proportion of magnesium. The DB sample has a slightly higher relative percentage of calcium and lower monovalent cations compared to the BABs samples.

The analytical results are provided in **Appendix J** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist’s Workbench (GWB) v12.0.4. The GWB thermodynamic dataset ‘thermo.com.V8.R6\_.tdat’ was used for the calculations in order to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of milligrams per liter (mg/L) and the ionic strength of each sample was calculated in units of molality (m).

Both BAB samples contained similar ionic strength values (0.0088 and 0.0080 m) compared to the slightly higher ionic strength of the DB sample (0.0106 m). Thus, the DB sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

### **3.2 Hydraulic Conductivity Testing Procedure and Termination Criteria**

All 14 soil samples were tested for hydraulic conductivity,  $k$  using deionized water in accordance with ASTM D5084 [3] to establish a baseline  $k$  reading. Then, six of the samples those exhibiting high and low  $k$  values were selected for compatibility testing in accordance with ASTM D7100 [4] using site-specific water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25. The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity determinations fall

within  $\pm 25$  % or better of the mean value for hydraulic conductivity,  $k \geq 3E-8$  cm/s or within  $\pm 50$  % or better for  $k < 1E-8$  cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;

- At least 2 pore volumes (PV) of flow have passed through the sample; and
- pH and electrical conductivity of effluent, is within 10% of that for the influent with no significant increasing or decreasing trends

### 3.3 Hydraulic Conductivity Test Results and Assessment

Preliminary results are provided in **Appendix K** as of August 20, 2021 and summarized in **Table 3-2**. The table provides sample ID, the start date for testing, amount of flow passed through a sample for a given duration of time, hydraulic conductivity values, and projected date for completing 2 PV of flow.

In addition, a set of figures created for each sample providing insight into the progression of:

- PV of flow with time.
- hydraulic conductivity with time.
- hydraulic conductivity with PV;
- pH of inflow and outflow with time; and
- Electrical conductivity (EC) with time.

Progression of different parameters is provided from **Figure 3-2** through **3-31**.

Overall, the hydraulic conductivity,  $k$  value of samples range between  $8.2E-09$  and  $2.8E-08$  (cm/s). The amount of PV of flow that has passed through the samples ranges from 0.8 to 2.3. As of August 20, 2021, two of the samples have reached the 2 PV criteria. The remaining samples are projected to reach 2 PV March 2022; this is based on linear extrapolation between PV at known dates and assumes  $k$  stays relatively constant. Overall, the PV of flow is progressing linearly towards the 2 PV criteria. Hydraulic conductivity values are generally flat and can be considered steady.

pH values are provided in **Table 3-3**. In general, the average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.1 to 8.4. The pH of outflow is within 10 percent of inflow.

EC values are provided in **Table 3-4**. In general, the average EC of inflow ranges from 609 to 680, and the average EC of outflow ranges from 778 to 2146. The EC of outflow are not within the 10 percent of inflow; they are projected to meet the termination criterion by the end of December 2021. This date is based on the convergence of linear extrapolations of the data.

**Table 3-5** summarizes if the sample has reached the termination criterion for PV, pH, EC, and the approximate projected date for reaching the termination criteria. As summarized in the table, samples have not reached all the termination criteria; pH has received termination criterion, and two of the samples have reached the PV criterion; none of the samples have reached the EC criterion. Based on available data, Geosyntec expects the last sample to reach termination criteria by the end of March 23, 2022.

The results do not include inflow vs outflow data. The main reason is that the project team had decided to keep the inflow constant, which provides more stable gradient across the sample, more accurate estimation of  $k$ , faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion would be reached by the time other criteria is reached.

#### 4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

*§257.71(d)(ii) (C) Mathematical model to estimate the potential for releases. Owners or operators must incorporate the data collected for paragraphs (d)(1)(ii)(A) and (d)(1)(ii)(B) of this section into a mathematical model to calculate the potential groundwater concentrations that may result in downgradient wells as a result of the impoundment. Facilities must also, where available, incorporate the national-scale data on constituent concentrations and behavior provided by the existing risk record. Application of the model must account for the full range of site current and potential future conditions at and around the site to ensure that high-end groundwater concentrations have been effectively characterized. All the data and assumptions incorporated into the model must be documented and justified.*

*(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*

*(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*

*(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

##### 4.1 Introduction

A fate and transport model analysis have been performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the DB exceeds the groundwater protection standards (GWPS) at the waste boundary throughout its active life.

The model considers flow of CCR pore water Constituents of Concern (COC) migrating through the bottom of CCR unit down to the uppermost aquifer. The model does not consider additional migration of COC horizontally to the waste management boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COC; consequently, the model presents a conservative assessment. As discussed later in Section 4.6.1 the results of the model predicts COCs concentrations that are very low such that there is no reasonable probability that water from DB will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

## 4.2 Groundwater Protection Standards

Groundwater samples from TRC's 2016 and 2017 sampling events were tested for Appendix IV COCs and represent eight rounds of background groundwater data. The data were used to calculate site-specific background levels (Background) for Appendix IV COCs. **Appendix L** provides the memorandum describing the statistical calculations.

To develop GWPS for the ALD assessment, the federal Maximum Contaminant Level (MCL), Regional Screening Levels, and Background (whichever is higher) were evaluated and the highest value was selected as the GWPS in accordance with the CCR Rule. Where MCL are not available Regional Screening Levels were used. GWPS are provided in **Table 4-1**.

## 4.3 Consideration of Background Groundwater Concentrations

The background has been considered and is a factor when determining if GWPS has been exceeded. At the DB, naturally occurring background concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and peak groundwater background concentrations are further discussed in Section 4.6.1.

## 4.4 Leachate Quality Results

Porewater (i.e. leachate) quality samples from both DB and the BABs were collected in December of 2020 and January of 2021; samples were analyzed for Appendix III and IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest leachate concentration was used as the established concentration of the constituent ( $C_o$ ) when calculating the predicted groundwater concentrations ( $PGC_i$ ), as discussed further in this Section. The leachate quality data is summarized in **Table 4-2**.

In addition to the site-specific leachate concentrations, 90<sup>th</sup> percentile concentrations from the 2014 EPA study [5] were considered in the analysis. This data is summarized in **Table 4-2**.

## 4.5 Fate and Transport Model

### 4.5.1 Analysis Model

A one-dimensional fate and transport model was designed to further understand the potential for contaminant transport from the CCR units to the uppermost aquifer. The model was developed with a contaminant transport process through the clay and clay with sand layers under the DB. Contaminant transport processes are discussed in Section 4.5.2.1 below.

The modeling program POLLUTE [6] was selected for the one-dimensional fate and transport evaluation. The data input for POLLUTE acquires all the input parameters, performs calculations

for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

Model setup and inputs are discussed in detail in the following sections and are summarized via layers in **Figure 4-1**.

## 4.5.2 Proposed Mathematical and Associated Computer Model

### 4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the DB for the various modeled layers include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [7]:

$$\text{Equation No. 1: } n \frac{\delta c}{\delta t} = nD \frac{\delta^2 c}{\delta z^2} - V_{\alpha} \frac{\delta c}{\delta z} - \rho K_d \frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = Coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

K<sub>d</sub> = distribution coefficient

V<sub>α</sub> = Darcy Velocity in the vertical direction

ρ = dry density of soil

λ = decay constant of the contaminant species

t = time

POLLUTE utilizes the transport phenomena as governed by Equation No. 1

### 4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the leachate. The results from the model can thus be used as a prediction factor for estimating the future concentration of any constituent of concern in groundwater. Multiplying the output prediction factor by the initial leachate concentration provides the predicted



groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

$$\textit{Equation No. 2:} \quad \text{PGC}_t = \text{PF}_t * \text{C}_o$$

Where:

$\text{PGC}_t$  = predicted groundwater concentration after t years.

$\text{PF}_t$  = prediction factored after t years, which is the output of the model.

$\text{C}_o$  = established leachate concentration of the constituent of concern.

### 4.5.3 Fate and Transport Model Inputs

#### 4.5.3.1 *Initial Leachate or Source Concentration*

The initial leachate concentration input value used was one (1). This value is unitless because it represents unit leachate concentration of any given constituent. Therefore, the model results represent a fraction of the initial leachate concentration for any constituent.

#### 4.5.3.2 *Number of Layers and Layer Thickness*

Two layers were modeled at the site: the clay layer and the clay with sand layer. At the DB, the clay layer has an average thickness of 36 ft; the clay with sand layer has an average thickness of 84 ft. The average thickness of each layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer, and averaging the difference over the extent of DB footprint; model documentation for the average thickness of each layer can be found in **Appendix L**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The clay layer was divided into 20 sublayers at the DB. The clay with sand layer was divided into 50 sublayers at the DB.

#### 4.5.3.3 *Modeling Period*

The model was run for the operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when CCR unit(s) operations started, to 2034, which is the end of the projected active life of DB.

#### 4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters or they can be selected by the user. The default Talbot parameter were used in this demonstration [8].

#### 4.5.3.5 *Boundary Conditions*

POLLUTE allows the user to select between multiple upper and lower boundary conditions. The top boundary condition typically represents the CCR unit invert, as a potential source. The top boundary can be specified as either zero flux, constant concentration, or finite mass. A constant concentration was assumed as it results in conservative model results since it assumes that the leachate quality will remain constant at the maximum measured values over time.

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used; thus, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the clay with sand layer and the underlying uppermost aquifer.

#### 4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model as a whole. The Darcy velocity was calculated for each basin using a vertical gradient and the vertical hydraulic conductivity of the clay layer. For the DB, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the elevation of the maintained water level within the CCR surface impoundment. These parameters were chosen to produce a conservative value for the Darcy velocity. Darcy velocity value of 2.03E-4 m/year was calculated for the DB as provided in **Appendix L**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing program vertical hydraulic conductivity data.

#### 4.5.3.7 *Hydrodynamic Dispersion Coefficient*

The vertical coefficient of hydrodynamic dispersion is a required input for each layer within the POLLUTE model. The hydrodynamic dispersion coefficient is calculated using Equation No. 3:

$$\text{Equation No. 3: } D = D^* + av$$

Where:

D = the hydrodynamic dispersion coefficient (m<sup>2</sup>/year);

- D\* = the effective diffusion coefficient (m<sup>2</sup>/year).
- a = the dispersivity (m);
- v = the groundwater seepage velocity (m/year).

For this demonstration, the coefficient of hydrodynamic dispersion for chloride was used, as calculated by Rowe et al. [9] a value of 0.019 m<sup>2</sup>/year was input into the model. The coefficient for chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest, thus it is a conservative constituent to model among the constituents of concern.

Due to the low Darcy velocity in the clay and clay with sand units (2.03E-4 m/year), sum of (av) is essentially zero; and therefore, the dominant mechanism for containment transport is diffusion.

#### 4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. The model shows good agreement between porosity values and geologic layers, with the overlying clay unit displaying visibly lower porosities than the underlying clay with sand unit. An average of 46 percent porosity was used for the clay layer, while an average of 42 percent porosity was used for the clay with sand layer.

Based on empirical data provided by Sara (1994) [10], the laboratory porosity data was converted to effective porosities. An effective porosities values of 0.37 and 0.34 for the clay and clay with sand layers were utilized, respectively.

Density values from laboratory testing were also used to determine a suitable model input. The average density of 1,500 kg/m<sup>3</sup> (94.2 pcf) was assessed from the available data; this value was used in the POLLUTE model.

#### 4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of containments in the modeled layers, while degradation simulates the breakdown of contaminants over time. In this model, adsorption and degradation are assumed to be zero, which provides a more conservative model result.

## 4.6 Fate and Transport Analysis Results and Evaluation

### 4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. At the DB, the baseline model calculated a  $PF_t$  of  $8.63E-40$ . With both the  $C_o$  and  $PF_t$  established, the  $PGC_t$  (i.e. predicted concentration) was calculated and compared to the established GWPS for the DB. As provided in **Table 4-2**, the predicted groundwater quality results, and the 90<sup>th</sup> percentile concentrations from the 2014 EPA study [5] are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in 2016-2017 groundwater sampling events, and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Tables 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of DB's active life

The driving mechanism for the transport is chemical diffusion because the advective flow would take more than a thousand years for a water molecule to travel from the bottom of DB to the uppermost aquifer. **Appendix L** provides calculations for the time of travel.

The baseline model outputs for the DB are included in **Appendix M**.

### 4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or  $PF_t$ , given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**. The resulting  $PF_t$  from each sensitivity analysis was compared to a threshold prediction value,  $PF_{\text{threshold}}$ . The  $PF_{\text{threshold}}$  value represents the  $PF_t$  at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the CCR unit; the threshold value is 0.24 for the DB.  $PF_{\text{threshold}}$  is calculated using the Equation No. 4:

$$\text{Equation No. 4: } PF_{\text{threshold}} = \min \left\{ \frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \dots, \frac{GWPS_i}{C_i}, \dots, \frac{GWPS_n}{C_n} \right\}$$

Where:

$PF_{\text{threshold}}$  = Threshold Prediction Factor

$GWPS_i$  = Groundwater Protection Standard for Constituent 'i'

$C_i$  = Maximum porewater concentration of the COC 'i'

#### 4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity changes. A Darcy velocity of 4.07E-4 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

#### 4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing (Rowe et al., 2004) [9], and thus a 25% increase and decrease is considered a satisfactory variation for sensitivity analysis.

#### 4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results.

#### 4.6.2.4 *Layer Thickness*

The isopach maps (**Appendix L**) were used to calculate the maximum and minimum thickness for the clay and clay with sand layers. Using those values as inputs, four additional models were run for each CCR unit to evaluate model sensitivities to layer thickness; in each model only one variable was changed.

#### 4.6.2.5 *Modeling Period*

The modeling period used was 55 years (the “baseline”). To further evaluate the impact of modeling runtime on the resultant PF<sub>t</sub>, one model was run with a modeling period of 85 years, to capture the post-closure care time period, though DTE intends to close the DB by removal.

#### 4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5** using more conservative model input parameters resulted in a PF<sub>t</sub> values ranging from 7.41E-47 to 1.54E-32. This demonstrates that the DB will not impact groundwater quality assuming conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix M**.

### 4.6.3 Reliability of Computer Model

The computer-based transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications (Talbot, 1979 [8]; Rowe, 1987 [11]; Rowe and Booker, 1987 [12]; Rowe, 1988 [7]; and Rowe and Booker, 1989 [13]) lend to the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

### 4.6.4 Degree of Conservativeness in Model Results

Input parameters for the baseline models were based on site-specific data whenever possible. When not possible, input values were derived from an understanding of the site and relevant peer-reviewed literature. If a high degree of uncertainty was present, conservative input values were selected. A summary of the various conservative assumptions is listed below:

- The maximum measured leachate (i.e., porewater) concentration for each constituent was used for the fate and transport model prediction table;
- Constant leachate concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decreased leachate concentrations over time but to be conservative the model considered constant leachate concentration over time;
- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays which would retard or slow down the migration. To be conservative, the model assumed no adsorption would occur over time;
- Degradation of leachate (input values) through either biologic or chemical process was assumed not occur during the modeling period. By assuming no degradation, the model overestimates the predicted groundwater quality over time; and
- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of FAB to the top of the uppermost aquifer; the analysis does not consider a 2-D flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

## 5. SUMMARY

This Preliminary ALD has been prepared to assess if the DB CCR unit meets the ALD requirements per the CCR Rule. The data included comprehensive field and laboratory investigation data collected from the 1970s to 2020. The 2020 field and laboratory investigation studies were conducted specifically to augment the data set and to address the CCR Rule requirements. The data were integrated into an EVS model to create a comprehensive CSM to understand the DB lithology beneath the CCR unit and as a basis for the Fate and Transport analysis.

Site-specific water was collected from DB and BABs and tested to assess which one of the CCR units had the more aggressive water. Water from DB was deemed to be more aggressive and used for compatibility testing to estimate the impacts on hydraulic conductivity of soil samples. The testing program is still underway. The most current results from the testing have been used in this ALD.

A comprehensive subsurface stratigraphy model was created using the augmented data set and processing it through the EVS. Following, Fate and Transport analysis was conducted to assess whether there is a reasonable probability that water from DB may result from releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary.

The Fate and Transport analysis was conducted for the operating time period of 55 years (“baseline”), which captures the amount of time elapsed from the 1980s, when CCR unit operations started, to 2034, which is the end of the projected active life of DB.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than a thousand years for a water molecule to travel from the bottom of DB to uppermost aquifer. Therefore, the analysis results indicate that, due to the low permeability nature of the in-situ unconsolidated materials, chemical diffusion is the dominant transport mechanism as opposed to advection or seepage flow. Hence, the current hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow. It is highly unlikely that running the samples until they achieve termination criteria would change the outcome of this study, and therefore, the tests do not need to extend until March 2022.

The Fate and Transport analysis was augmented with a sensitivity analysis to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The analysis results show that there is no reasonable probability that water from DB will result in releases to

groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

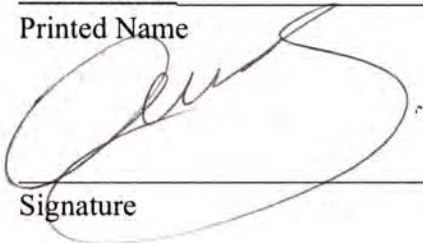


**6. CERTIFICATION**

**CCR Unit:** DTE Electric Company; Belle River Power Plant, Diversion Basin (DB)

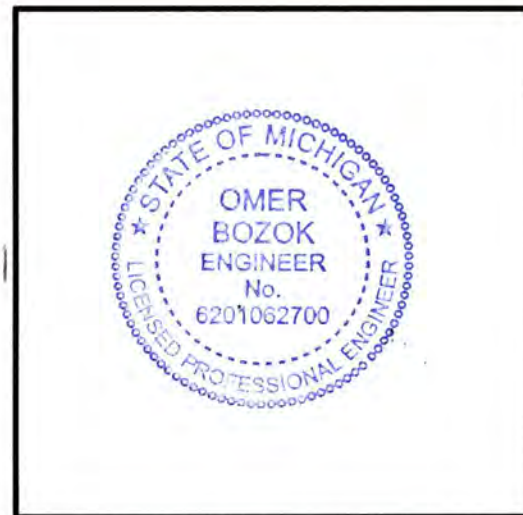
I, Omer Bozok, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify in accordance with the CCR Rule, to the best of my knowledge, information, and belief, that the information contained in this plan has been prepared in accordance with the accepted practice of engineering and that the DB meets the requirements of the Alternative Liner Demonstration per the CCR Rule.

Omer Bozok  
Printed Name

  
Signature

November 30, 2021  
Date

6201062700      Michigan      June 4, 2024  
Registration Number    State      Expiration Date



*Affix Seal*

## REFERENCES

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- [4] A. D7100, "Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions," 2020.
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# **TABLES**

**Table 2-1 – Field and Lab Testing Summary**

<b>Test</b>	<b>Current ASTM</b>	<b>Number Used in Characterization</b>
Pocket Penetrometer	WK27337	194
Slug Test	D4044	4
Grain Size Distribution	D6913	43
Atterberg Limits	D4318	72
Water Content	D2216	96
Unit Weight	D7263	64
Specific Gravity	D854	10
Hydraulic Conductivity	D5084/D7100	12/6
Cone Penetration Test	D3441	16

**Table 2-2 – Dissipation Tests Results**

<b>CPT ID</b>	<b>Lithology Unit</b>	<b>Hydraulic Conductivity (cm/s)</b>
CPT-01B	Clay	1.80E-08
CPT-01B	Clay	3.61E-08
CPT-01B	Seam 2	8.54E-08
CPT-01B	Seam2	5.78E-07
CPT-01B	Seam 3	2.05E-08
CPT-01B	Seam 4	2.57E-08
CPT-03	Clay	9.76E-09
CPT-03	Clay	2.48E-08
CPT-03	Clay with Sand	3.14E-08
CPT-03	Clay with Sand	1.97E-08
CPT-03	Seam 3	2.81E-06
CPT-03	Seam 3	5.19E-07
CPT-03	Clay with Sand	2.96E-08
CPT-06B	Clay	3.33E-08
CPT-06B	Clay with Sand	1.96E-08
CPT-06B	Clay with Sand	2.34E-08
CPT-08B	Clay	1.91E-08
CPT-08B	Clay 2	3.35E-08
CPT-08C	Seam 2	2.97E-08
CPT-08C	Clay with Sand 2	8.03E-08
CPT-08C	Clay with Sand 2	2.97E-08
CPT-11	Clay	1.97E-08
CPT-11	Clay	2.64E-08
CPT-11	Clay with Sand 2	4.68E-08
CPT-11	Clay with Sand 4	3.86E-08
CPT-11	Clay with Sand 4	2.76E-08
CPT-12	Clay	7.97E-09
CPT-13B	Seam 3	1.63E-06

**Table 3-1 – Ionic Strength of Filtered Pore Water**

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	88	60	100
Antimony	mg/L	0.01 U	0.01 U	0.01 U
Arsenic	mg/L	0.0085	0.007	0.0093
Barium	mg/L	0.94	0.58	0.59
Beryllium	mg/L	0.004	0.00216	0.004
Boron	mg/L	0.38	0.83	1.29
Cadmium	mg/L	0.004 U	0.004 U	0.004 U
Calcium	mg/L	83	54	80
Chloride	mg/L	9.0	9.6	14
Chromium	mg/L	0.0087	0.0049	0.01
Cobalt	mg/L	0.01	0.00554	0.0052
Fluoride	mg/L	0.26	0.52	0.31
Iron	mg/L	0.16	1.05	0.34

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Lead	mg/L	0.006	0.0061	0.01
Lithium	mg/L	0.034	0.0174	0.031
Magnesium	mg/L	15.9	13.8	17.5
Manganese	mg/L	0.01	0.0145	0.0137
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	0.035	0.046	0.058
pH	SU	7.87	8.71	9.01
Potassium	mg/L	5.9	7.5	7.6
Selenium	mg/L	0.00582	0.0057	0.0061
Sodium	mg/L	55	86	115
Sulfate	mg/L	100	110	130
Thallium	mg/L	0.01	0.00117	0.00516
Total Dissolved Solids	mg/L	200	220	300
<b>Ionic Strength</b>	<b>molal (m)</b>	<b>0.0088</b>	<b>0.0080</b>	<b>0.0106</b>

Notes:U – Analyzed but not detected above the method detection limit. The method detection limit is shown.



**Table 3-2 – Hydraulic Conductivity Test Results Summary**

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection	Days to Target Pore Volume	Date of Target PV Reached
B1-ST-1 (7-9')	March 22, 2021	7	9.3E-09	0.04340		
	August 20, 2021	151	8.2E-09	0.82670	216	March 23, 2022
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-08	0.00000		
	August 20, 2021	151	1.2E-08	1.50420	50	October 8, 2021
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-08	0.00000		
	August 20, 2021	151	2.2E-08	1.86780	11	August 30, 2021
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-08	0.00000		
	August 20, 2021	151	1.9E-08	2.23830	Complete	August 6, 2021
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-08	0.00000		
	August 20, 2021	151	2.8E-08	2.28070	Complete	August 3, 2021
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-08	0.00000		
	August 20, 2021	151	1.5E-08	1.86670	11	August 30, 2021

**Table 3-3 – Summary of pH Results**

Sample ID	Parameter	pH Inflow	pH Outflow	Is pH of outflow within termination boundaries?
B1-ST-1 (7-9')	Min	8.2	8.1	Yes
	Max	8.6	8.6	
	Average	8.4	8.4	
B2-ST-1 (1-3')	Min	8.0	7.9	Yes
	Max	8.8	8.5	
	Average	8.4	8.2	
B2-ST-4 (47-49')	Min	8.0	8.0	Yes
	Max	8.6	8.4	
	Average	8.3	8.2	
B3-ST-5 (77-79')	Min	8.1	7.8	Yes
	Max	8.8	8.6	
	Average	8.3	8.1	
B4-ST-3 (47-49')	Min	7.7	7.8	Yes
	Max	8.7	8.7	
	Average	8.2	8.1	
B5-ST-5 (87-89')	Min	7.9	8.0	Yes
	Max	8.6	8.5	
	Average	8.4	8.2	

**Table 3-4 – Summary of Electrical Conductivity Results**

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)	Is EC of outflow within termination boundaries?	Approximate Projected Termination Date
B1-ST-1 (7-9')	Min	656	1230	No	November 12, 2021
	Max	660	1614		
	Average	657	1418		
B2-ST-1 (1-3')	Min	560	1764	No	December 23, 2021
	Max	782	3050		
	Average	645	2146		
B2-ST-4 (47-49')	Min	523	933	No	October 12, 2021
	Max	666	1313		
	Average	609	1087		
B3-ST-5 (77-79')	Min	611	816	No	September 12, 2021
	Max	735	1118		
	Average	680	946		
B4-ST-3 (47-49')	Min	518	597	No	September 1, 2021
	Max	730	930		
	Average	625	778		
B5-ST-5 (87-89')	Min	598	1040	No	September 5, 2021
	Max	760	2010		
	Average	678	1341		

**Table 3-5 – Sample Condition as it Relates to Termination Criteria**

Sample ID	Termination Criterion Reached				
	Pore Volumes Passed, PV	pH	Electrical Conductivity, EC	Approximate Projected Termination Date	Date Based On
B1-ST-1 (7-9')	No	Yes	No	March 23, 2022	PV
B2-ST-1 (1-3')	No	Yes	No	December 23, 2021	EC
B2-ST-4 (47-49')	No	Yes	No	October 12, 2021	EC
B3-ST-5 (77-79')	Yes	Yes	No	September 12, 2021	EC
B4-ST-3 (47-49')	Yes	Yes	No	September 1, 2021	EC
B5-ST-5 (87-89')	No	Yes	No	September 5, 2021	EC

**Table 4-1 – Groundwater Protection Standards**

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11/A	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	3.2E-03	<b>6.0E-03</b>
Arsenic	mg/L	Background or MCL	1.0E-02	1.4E-02	<b>1.4E-02</b>	7.5E-03	<b>1.0E-02</b>	1.9E-02	<b>1.9E-02</b>	3.0E-02	<b>3.0E-02</b>	1.1E-02	<b>1.1E-02</b>	2.4E-02	<b>2.4E-02</b>
Barium	mg/L	MCL	2.0E+00	3.7E-01	<b>2.0E+00</b>	3.3E-01	<b>2.0E+00</b>	5.0E-01	<b>2.0E+00</b>	4.9E-01	<b>2.0E+00</b>	2.0E-01	<b>2.0E+00</b>	6.2E-01	<b>2.0E+00</b>
Beryllium	mg/L	MCL	4.0E-03	1.0E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.7E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.3E-03	<b>5.0E-03</b>	1.5E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>
Chromium	mg/L	MCL	1.0E-01	4.7E-02	<b>1.0E-01</b>	1.4E-02	<b>1.0E-01</b>	2.7E-02	<b>1.0E-01</b>	5.5E-02	<b>1.0E-01</b>	3.2E-02	<b>1.0E-01</b>	1.8E-02	<b>1.0E-01</b>
Cobalt	mg/L	Background or RSL	6.0E-03	2.1E-02	<b>2.1E-02</b>	4.7E-03	<b>6.0E-03</b>	1.3E-02	<b>1.3E-02</b>	2.2E-02	<b>2.2E-02</b>	1.7E-02	<b>1.7E-02</b>	7.1E-03	<b>7.1E-03</b>
Fluoride	mg/L	MCL	4.0E+00	1.8E+00	<b>4.0E+00</b>	1.8E+00	<b>4.0E+00</b>	1.7E+00	<b>4.0E+00</b>	1.1E+00	<b>4.0E+00</b>	1.7E+00	<b>4.0E+00</b>	1.7E+00	<b>4.0E+00</b>
Lead	mg/L	Background or RSL	1.5E-02	2.3E-02	<b>2.3E-02</b>	4.4E-03	<b>1.5E-02</b>	1.2E-02	<b>1.5E-02</b>	2.2E-02	<b>2.2E-02</b>	3.5E-02	<b>3.5E-02</b>	7.7E-03	<b>1.5E-02</b>
Lithium	mg/L	Background	4.0E-02	6.7E-02	<b>6.7E-02</b>	5.5E-02	<b>5.5E-02</b>	9.2E-02	<b>9.2E-02</b>	1.1E-01	<b>1.1E-01</b>	1.2E-01	<b>1.2E-01</b>	1.5E-01	<b>1.5E-01</b>
Mercury	mg/L	MCL	2.0E-03	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>
Molybdenum	mg/L	RSL	1.0E-01	4.3E-02	<b>1.0E-01</b>	3.0E-02	<b>1.0E-01</b>	1.0E-01	<b>1.0E-01</b>	6.7E-02	<b>1.0E-01</b>	5.0E-02	<b>1.0E-01</b>	4.9E-02	<b>1.0E-01</b>
Radium-226/228	pCi/L	Background or MCL	5.0E+00	1.3E+00	<b>5.0E+00</b>	4.0E+00	<b>5.0E+00</b>	3.0E+00	<b>5.0E+00</b>	1.2E+00	<b>5.0E+00</b>	2.7E+00	<b>5.0E+00</b>	2.7E+00	<b>5.0E+00</b>
Selenium	mg/L	MCL	5.0E-02	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.3E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>
Thallium	mg/L	Background or MCL	2.0E-03	1.1E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	2.3E-03	<b>2.3E-03</b>	1.3E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-2 – Baseline Fate and Transport Results**

	Constituent	Units	Maximum Observed Concentration	90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer		Most Conservative GWPS	Outcome - Site (Pass/Fail)	Outcome - 90th Percentile (Pass/Fail)
						DB	90th Percentile			
<b>Appendix IV</b>	Antimony	mg/L	1.0E-02	4.0E-02	8.63E-40	8.6E-42	3.5E-41	6.0E-03	PASS	PASS
	Arsenic	mg/L	9.3E-03	7.8E-01	8.63E-40	8.0E-42	6.7E-40	1.0E-02	PASS	PASS
	Barium	mg/L	5.9E-01	2.1E-01	8.63E-40	5.1E-40	1.8E-40	2.0E+00	PASS	PASS
	Beryllium	mg/L	4.0E-03	1.0E-03	8.63E-40	3.5E-42	8.6E-43	4.0E-03	PASS	PASS
	Cadmium	mg/L	4.0E-03	6.0E-02	8.63E-40	3.5E-42	5.2E-41	5.0E-03	PASS	PASS
	Chromium	mg/L	1.0E-02	2.0E-01	8.63E-40	8.6E-42	1.7E-40	1.0E-01	PASS	PASS
	Cobalt	mg/L	5.2E-03	5.0E-02	8.63E-40	4.5E-42	4.3E-41	6.0E-03	PASS	PASS
	Fluoride	mg/L	4.4E-01	2.1E+01	8.63E-40	3.8E-40	1.8E-38	4.0E+00	PASS	PASS
	Lead	mg/L	1.0E-02	1.0E-01	8.63E-40	8.6E-42	8.6E-41	1.5E-02	PASS	PASS
	Lithium	mg/L	6.1E-02	4.5E-01	8.63E-40	5.3E-41	3.9E-40	4.0E-02	PASS	PASS
	Mercury	mg/L	4.0E-04	7.0E-06	8.63E-40	3.5E-43	6.0E-45	2.0E-03	PASS	PASS
	Molybdenum	mg/L	3.0E-01	7.1E+00	8.63E-40	2.6E-40	6.1E-39	1.0E-01	PASS	PASS
	Combined Radium	pCi/L	1.8E+00	-	8.63E-40	1.6E-39	-	5.0E+00	PASS	NA
	Selenium	mg/L	8.7E-03	3.2E-01	8.63E-40	7.5E-42	2.8E-40	5.0E-02	PASS	PASS
	Thallium	mg/L	5.2E-03	3.0E-03	8.63E-40	4.5E-42	2.6E-42	2.0E-03	PASS	PASS

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-05**  
**Background and Maximum Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-05				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.4E-02	6.2E-42	1.4E-02	1.4E-02	Pass
Barium	mg/L	MCL	3.4E-01	3.9E-40	3.4E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.4E-02	6.7E-42	2.4E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.0E-02	3.5E-42	1.0E-02	2.1E-02	Pass
Fluoride	mg/L	MCL	1.3	2.9E-40	1.3	4.0	Pass
Lead	mg/L	Background	1.1E-02	6.7E-42	1.1E-02	2.3E-02	Pass
Lithium	mg/L	Background	6.2E-02	4.1E-41	6.2E-02	6.7E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	4.3E-02	2.0E-40	4.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	4.0E-03	1.2E-39	4.0E-03	5.5E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-06  
Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-06				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.9E-03	6.2E-42	7.9E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0E+00	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.4E-02	6.7E-42	1.4E-02	1.0E-01	Pass
Cobalt	mg/L	RSL	4.9E-03	3.5E-42	4.9E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.3	2.9E-40	1.3E+00	4.0E+00	Pass
Lead	mg/L	RSL	4.8E-03	6.7E-42	4.8E-03	1.5E-02	Pass
Lithium	mg/L	Background	4.9E-02	4.1E-41	4.9E-02	5.5E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.0E-02	2.0E-40	3.0E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.2E-03	1.2E-39	2.2E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter



**Table 4-3 - MW-16-07  
Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-07				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic*	mg/L	Background	1.1E-02	6.2E-42	1.1E-02	1.9E-02	Pass
Barium	mg/L	MCL	4.5E-01	3.9E-40	4.5E-01	2.0E+00	Pass
Beryllium	mg/L	MCL	1.7E-03	2.7E-42	1.7E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.3E-03	2.7E-42	1.3E-03	5.0E-03	Pass
Chromium	mg/L	MCL	5.3E-02	6.7E-42	5.3E-02	1.0E-01	Pass
Cobalt*	mg/L	Background	9.2E-03	3.5E-42	9.2E-03	1.3E-02	Pass
Fluoride	mg/L	MCL	1.2	2.9E-40	1.2E+00	4.0E+00	Pass
Lead*	mg/L	RSL	8.7E-03	6.7E-42	8.7E-03	1.5E-02	Pass
Lithium	mg/L	Background	7.8E-02	4.1E-41	7.8E-02	9.2E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	7.3E-02	2.0E-40	7.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	4.5E-03	1.2E-39	4.5E-03	5.8E-03	Pass
Selenium	mg/L	MCL	5.3E-03	5.8E-42	5.3E-03	5.0E-02	Pass
Thallium	mg/L	Background	2.3E-03	3.5E-42	2.3E-03	2.3E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance

**Table 4-3 - MW-16-08**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-08				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.1E-03	6.7E-42	2.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	2.1E-02	6.2E-42	2.1E-02	3.0E-02	Pass
Barium	mg/L	MCL	4.3E-01	3.9E-40	4.3E-01	2.0E+00	Pass
Beryllium	mg/L	MCL	1.6E-03	2.7E-42	1.6E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.5E-03	2.7E-42	1.5E-03	5.0E-03	Pass
Chromium	mg/L	MCL	4.0E-02	6.7E-42	4.0E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.6E-02	3.5E-42	1.6E-02	2.2E-02	Pass
Fluoride	mg/L	MCL	1.3	2.9E-40	1.3E+00	4.0E+00	Pass
Lead	mg/L	Background	1.6E-02	6.7E-42	1.6E-02	2.2E-02	Pass
Lithium	mg/L	Background	9.6E-02	4.1E-41	9.6E-02	1.1E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	5.8E-02	2.0E-40	5.8E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	5.1E-03	1.2E-39	5.1E-03	7.6E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.3E-03	3.5E-42	1.3E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3 - MW-16-10  
Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-10				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.1E-03	6.7E-42	2.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.1E-02	6.2E-42	1.1E-02	1.1E-02	Pass
Barium	mg/L	MCL	1.5E-01	3.9E-40	1.5E-01	2.0E+00	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.1E-02	6.7E-42	2.1E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.2E-02	3.5E-42	1.2E-02	1.7E-02	Pass
Fluoride	mg/L	MCL	1.2	2.9E-40	1.2E+00	4.0E+00	Pass
Lead	mg/L	Background	7.0E-03	6.7E-42	7.0E-03	3.5E-02	Pass
Lithium*	mg/L	Background	9.1E-02	4.1E-41	9.1E-02	1.2E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.3E-02	2.0E-40	3.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.0E-03	1.2E-39	2.0E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance

**Table 4-3 - MW-16-11/A**  
**Background and Predicted Concentrations Compared against GWPS**

Constituent	Unit	GWPS Selection	MW-16-11/11A				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	3.1E-03	6.7E-42	3.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.7E-02	6.2E-42	1.7E-02	2.4E-02	Pass
Barium	mg/L	MCL	4.8E-01	3.9E-40	4.8E-01	2.0E+00	Pass
Beryllium	mg/L	MCL	1.6E-03	2.7E-42	1.6E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	3.9E-02	6.7E-42	3.9E-02	1.0E-01	Pass
Cobalt*	mg/L	Background	3.4E-03	3.5E-42	3.4E-03	7.1E-03	Pass
Fluoride	mg/L	MCL	1.0	2.9E-40	9.5E-01	4.0E+00	Pass
Lead*	mg/L	RSL	5.2E-03	6.7E-42	5.2E-03	1.5E-02	Pass
Lithium	mg/L	Background	1.1E-01	4.1E-41	1.1E-01	1.5E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.2E-02	2.0E-40	3.2E-02	1.0E-01	Pass
Radium-226/228*	pCi/L	MCL	2.2E-03	1.2E-39	2.2E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance

**Table 4-4 – Sensitivity Analysis Model Inputs**

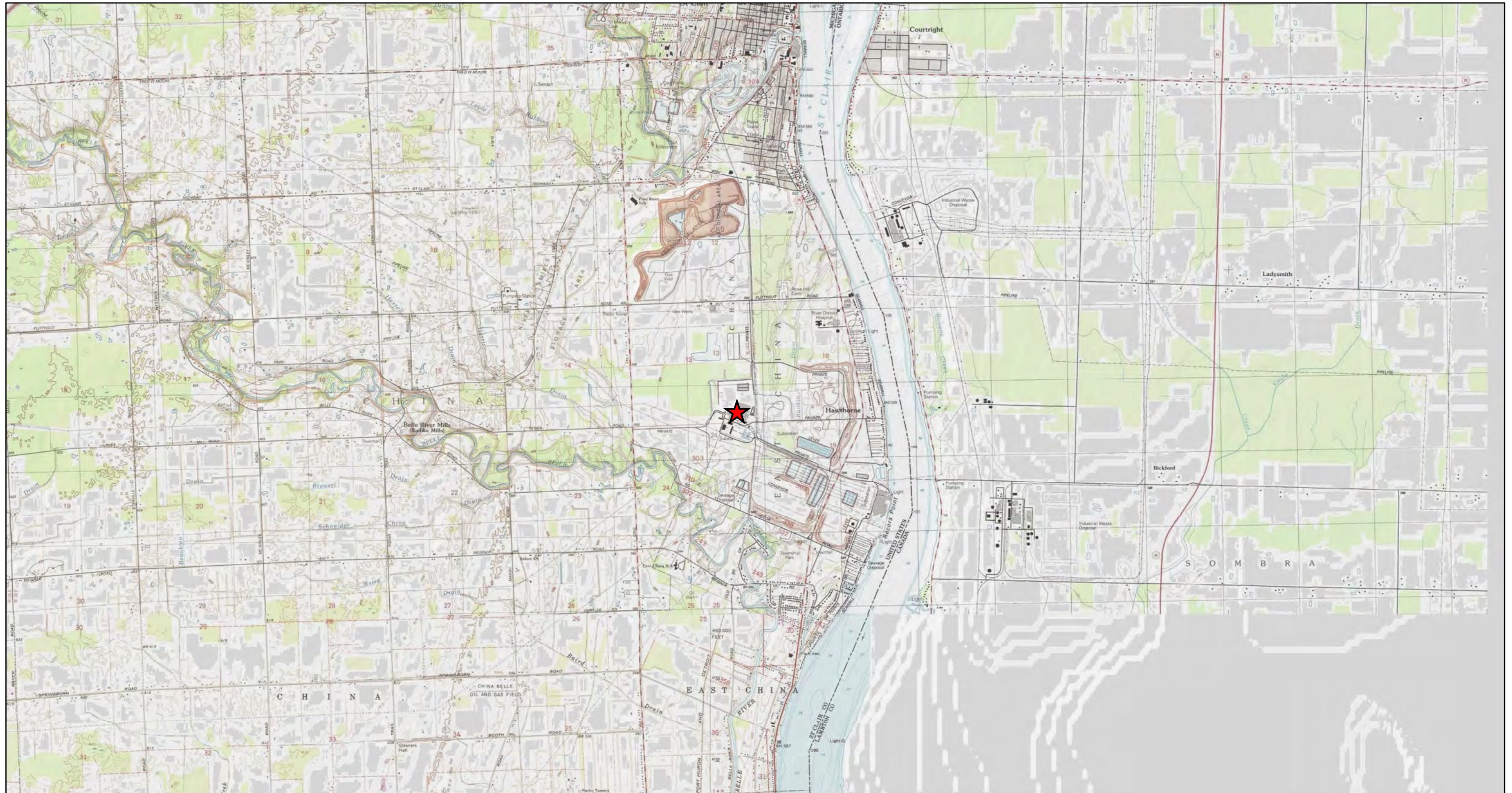
	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis
<i>Layer Properties</i>	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr)	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)
Clay	11.12	12.13	10.70	2.03E-04	4.07E-04	0.019	0.024	0.014	0.46	0.56	0.34	0.37	0.45	0.28	55	110
Clay with Sand	25.66	26.82	24.66	2.03E-04	4.07E-04	0.019	0.024	0.014	0.42	0.55	0.24	0.34	0.45	0.20	55	110

Dv = Vertical Darcy Velocity

CoHD = Coefficient of Hydrodynamic Dispersion


**Table 4-5 – Sensitivity Analysis Results Prediction Factors**

<b>Diversion Basin Sensitivity Analysis</b>			
<b>Model Name</b>	<b>Description</b>	<b>Prediction Factor</b>	<b>Pass?*</b>
DB_Baseline	Baseline model for the Bottom Ash Basins.	8.63E-40	YES
DB_ExtendedRun	Model runtime was extended from 55 years to 85 years.	1.54E-32	YES
DB_Darcy	Darcy velocity was doubled.	1.51E-39	YES
DB_CoHD_High	Coefficient of Hydrodynamic Dispersion was increased by 25%.	1.12E-35	YES
DB_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	7.41E-47	YES
DB_ClayPoro_High	Used the highest effective porosity in clay interval; derived from laboratory data in project database.	9.16E-40	YES
DB_ClayPoro_Low	Used the lowest effective porosity in clay interval; derived from laboratory data in project database.	7.87E-40	YES
DB_SandPoro_High	Used the highest effective porosity in clay with sand interval; derived from laboratory data in project database.	6.77E-40	YES
DB_SandPoro_Low	Used the lowest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.42E-39	YES
DB_ClayThick	Used thickest clay interval seen in boring/well; derived from project database.	5.69E-41	YES
DB_ClayThin	Used thinnest clay interval seen in boring/well; derived from project database.	2.66E-39	YES
DB_SandThick	Used thickest clay with sand interval seen in boring/well; derived from project database.	3.77E-41	YES
DB_SandThin	Used thinnest clay sand interval seen in boring/well; derived from project database.	1.18E-38	YES
* Indicates value less than $PF_{\text{threshold}}$ , as discussed in Section 4.6.2.			



Legend  
 Site Location



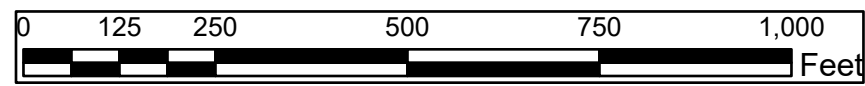
<b>Site Location</b> DTE Energy Belle River Power Plant 4505 King Road China Township, Michigan	
	
Ann Arbor, Michigan	2021/08/09
<b>Figure 1-1</b>	



Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



**Field Investigation Locations  
Bell River Power Plant  
China Township, MI**

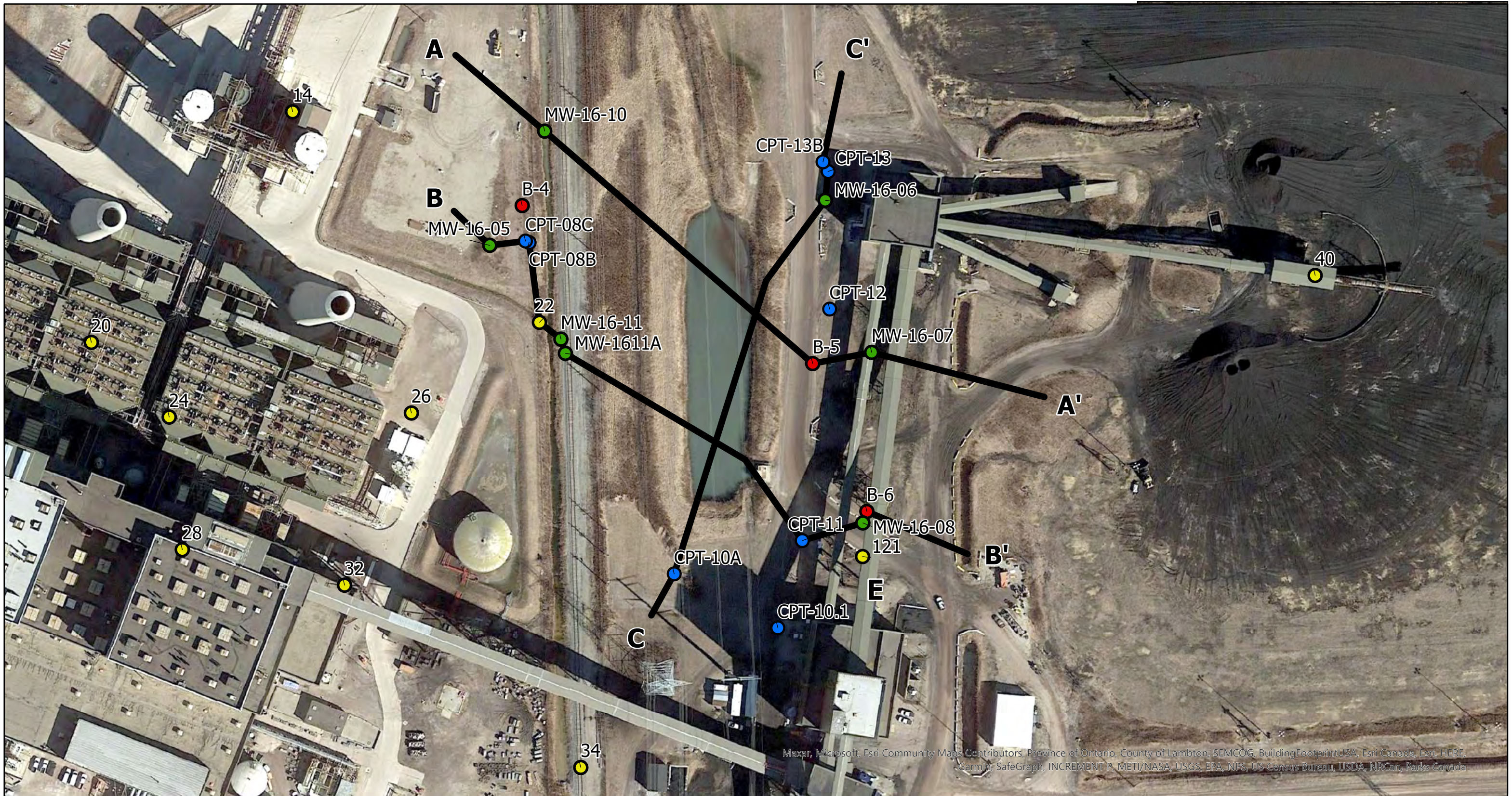
**Geosyntec**  
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August 2021

**Figure  
2-1**

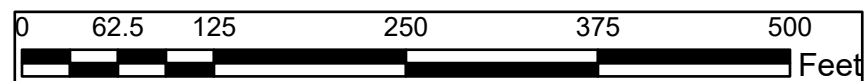




Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



**Cross Section Locations**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**



**Figure**  
**2-2**

GLP8017

August 2021

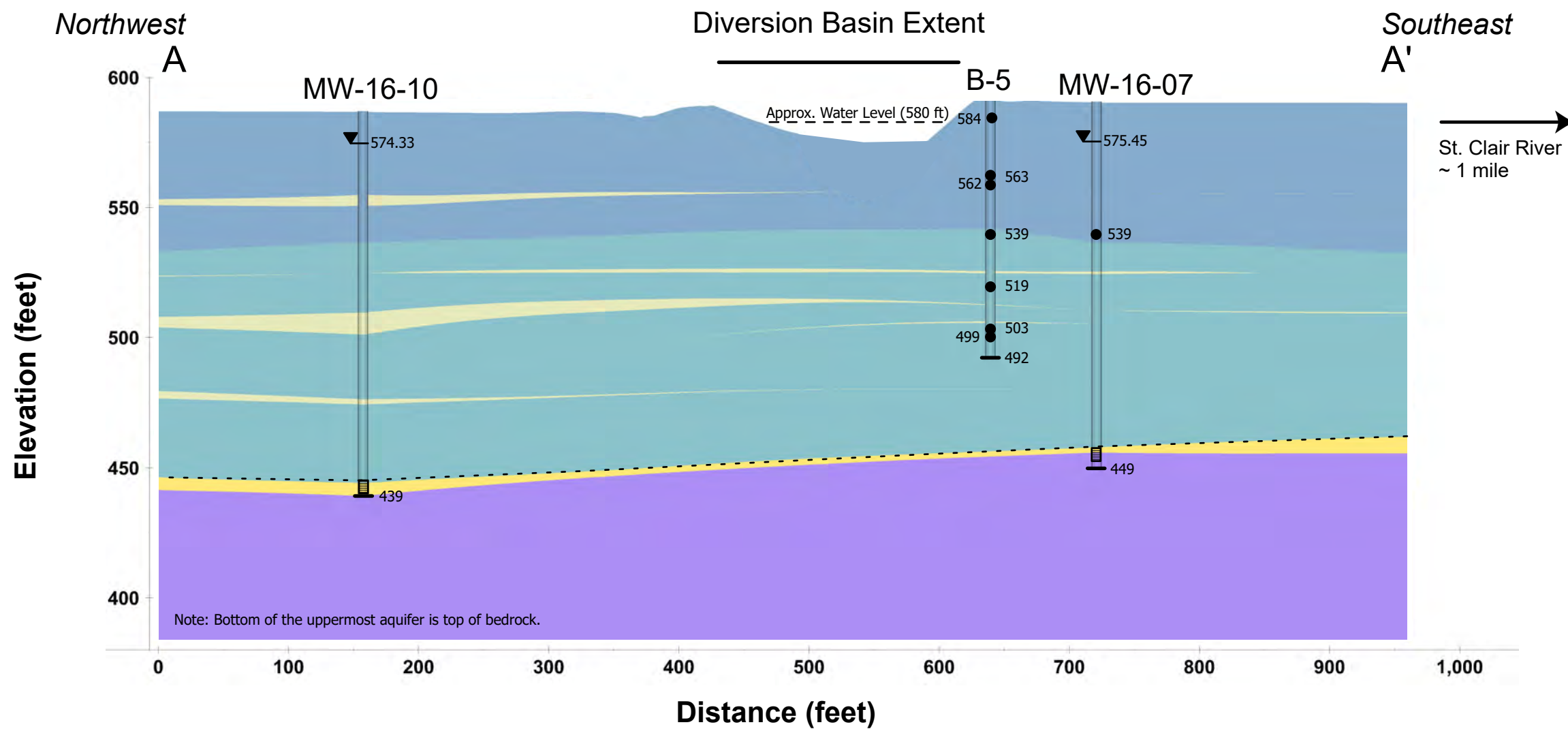


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross-Section A-A'**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**

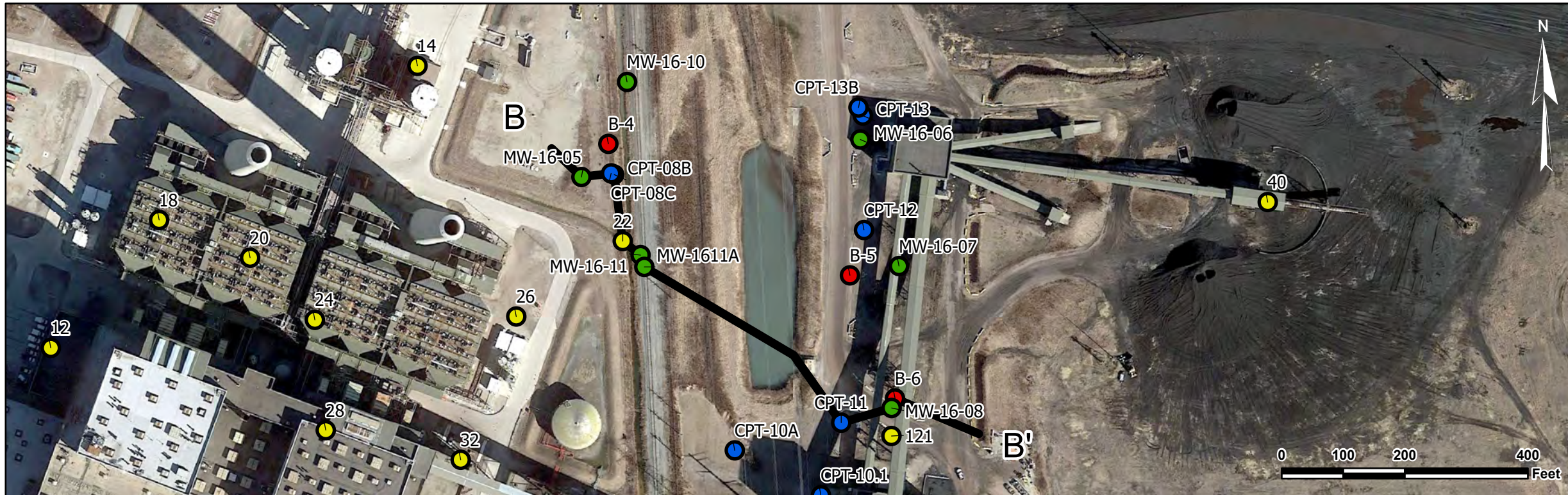
**Geosyntec**  
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**Figure**

**2-3**

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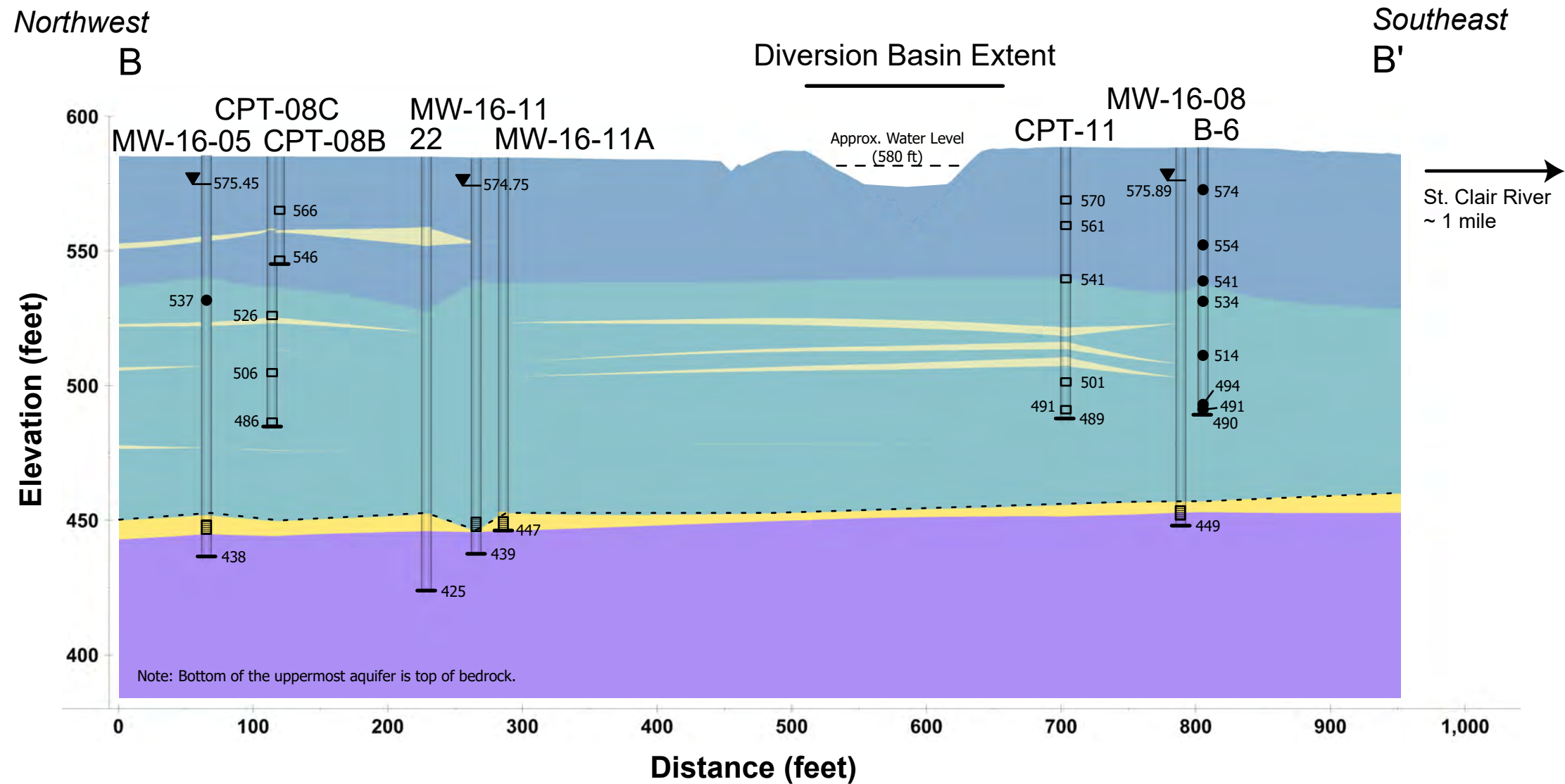


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



**Cross-Section B-B'**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**

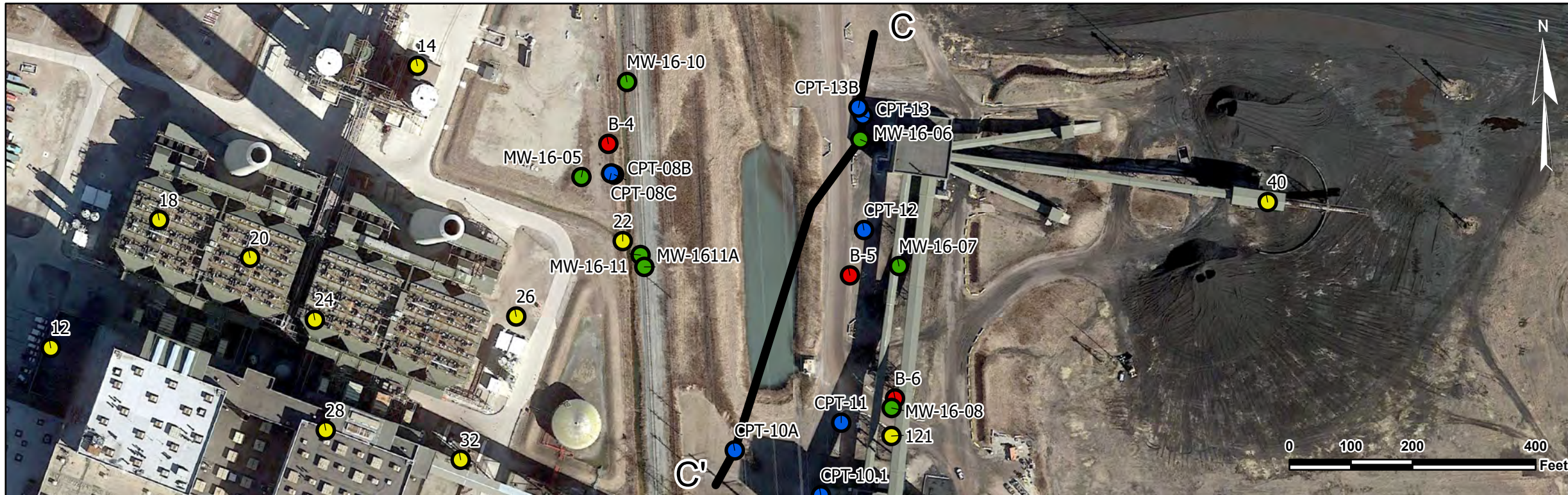
**Geosyntec**  
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**Figure**

**2-4**

GLP8017

August 2021

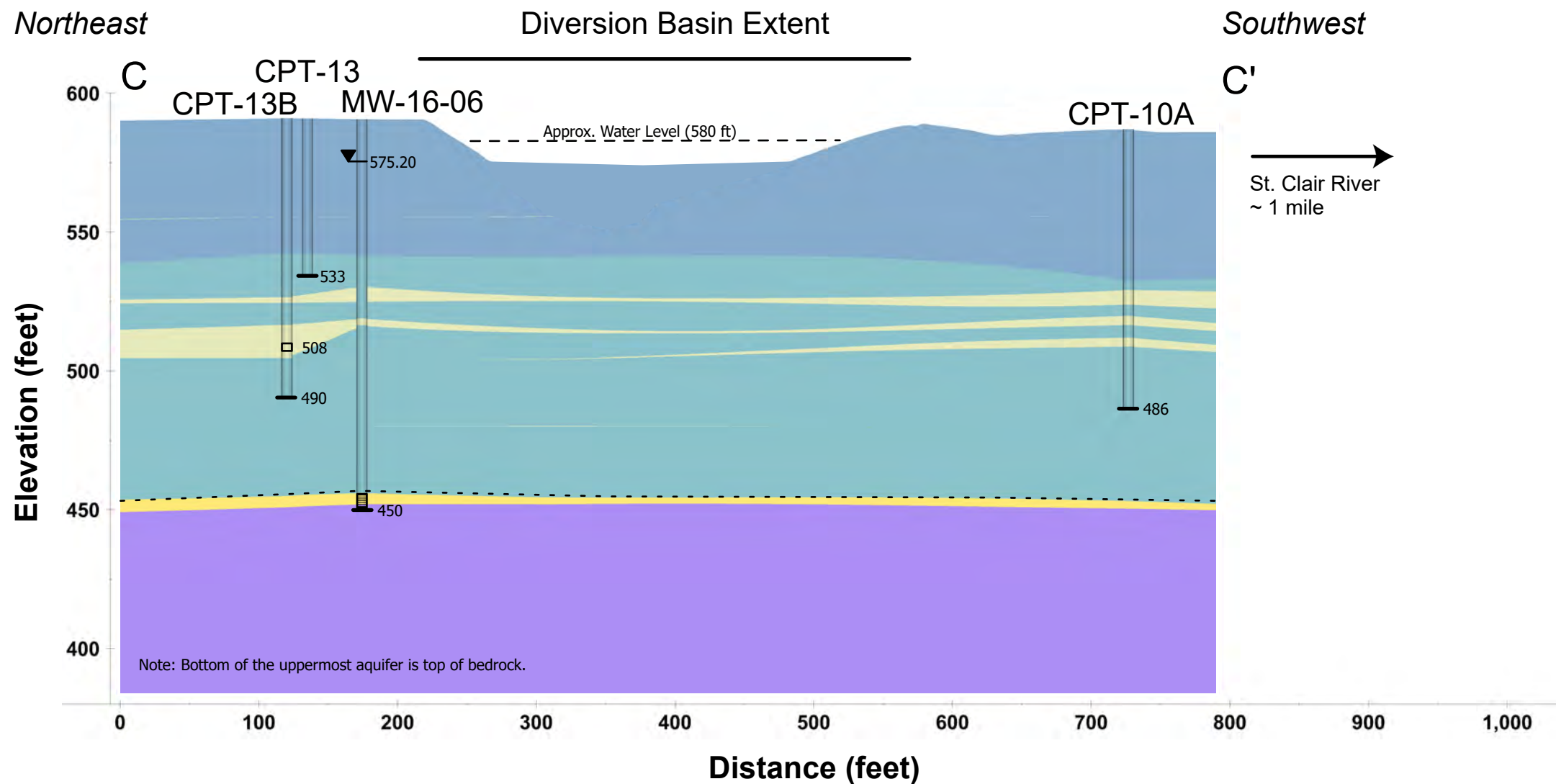


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▣ Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross-Section C-C'**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**

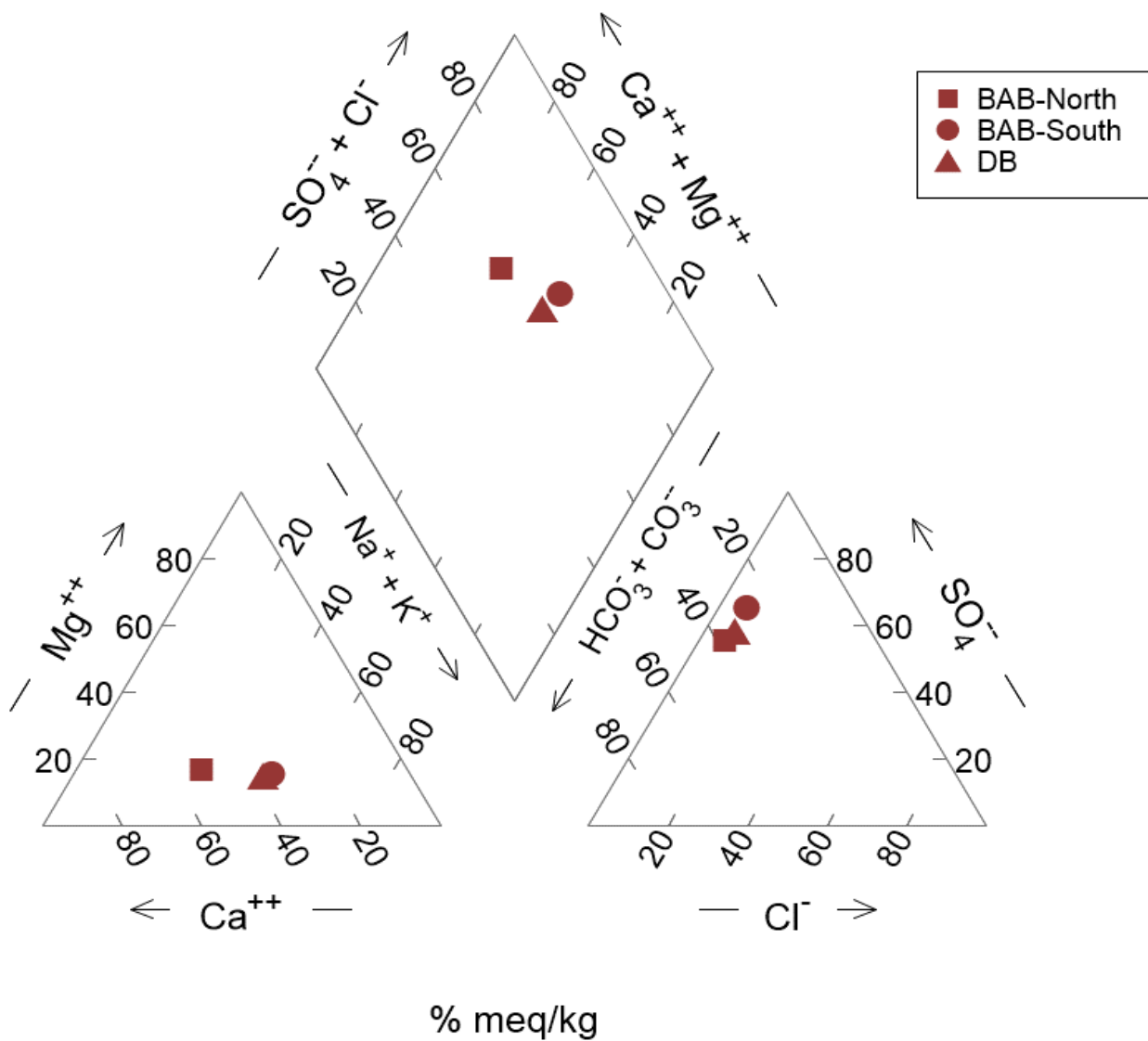
**Geosyntec**  
consultants

**Figure**

**2-5**

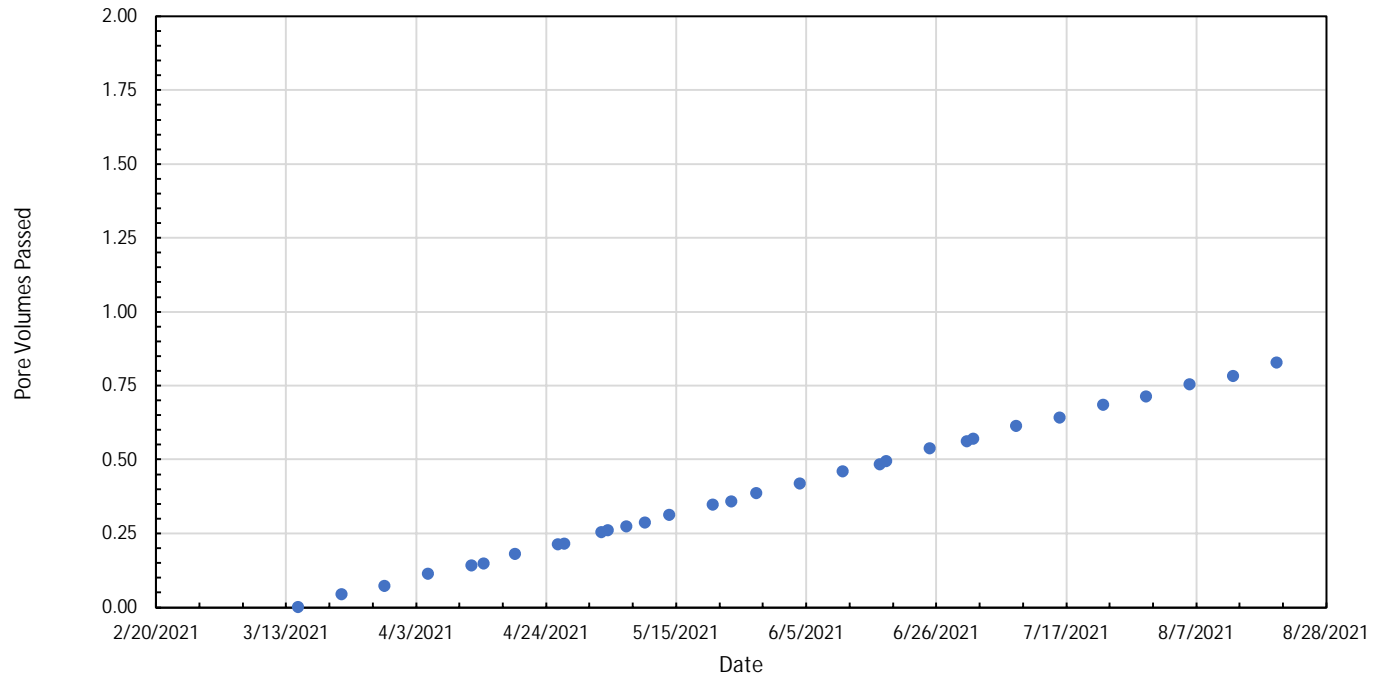
GLP8017

August 2021



**Note:**  
Results are shown in the relative percentage of milliequivalents per kilogram (meq/kg).

<b>Filtered BAB and DB Porewater Sample</b> <b>Piper Diagram</b> Belle River Power Plant St. Clair County, MI		<b>Figure</b>  <b>3-1</b>
GLP8017	August 2021	



**B1-ST-1 (7-9') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

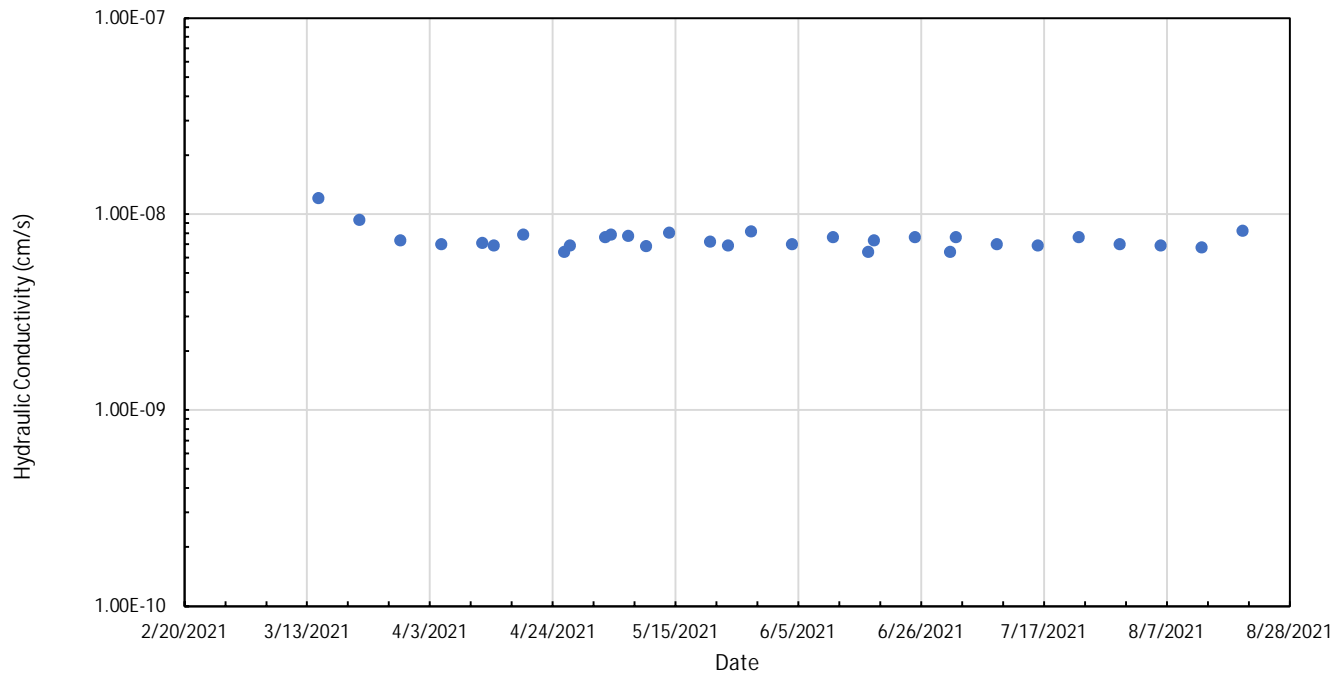


**Figure**

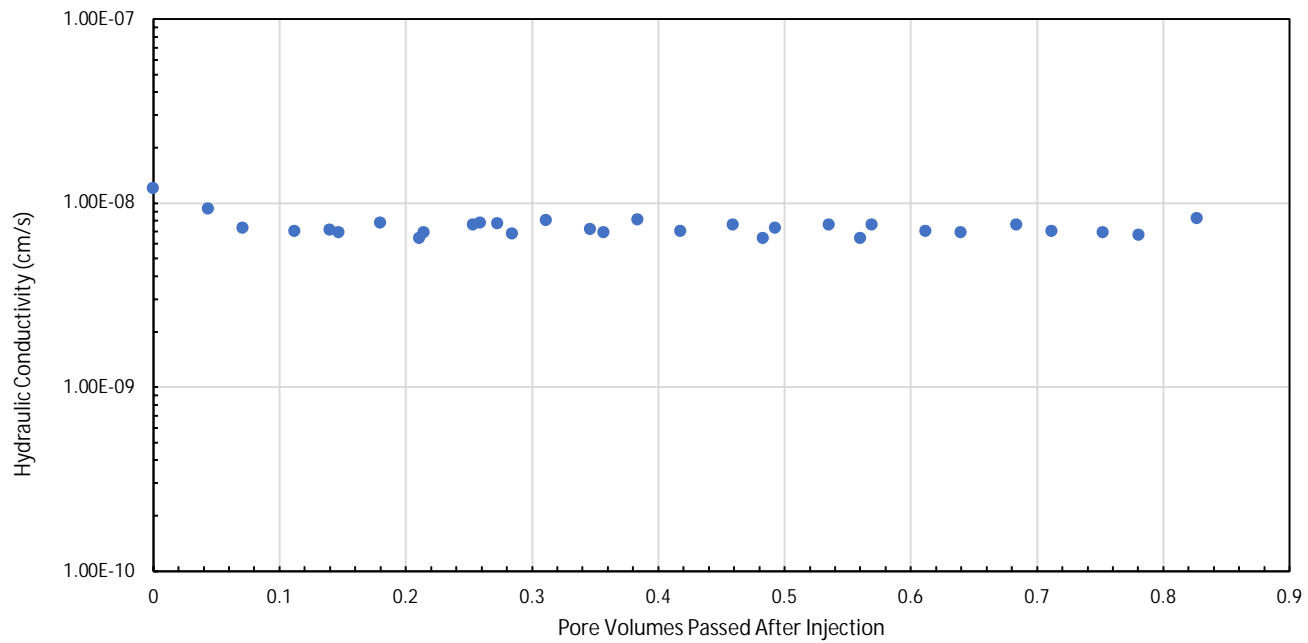
**3-2**

Ann Arbor, MI

September 2021



<b>B1-ST-1 (7-9') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure 3-3</b>
Ann Arbor, MI   September 2021	



**B1-ST-1 (7-9') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



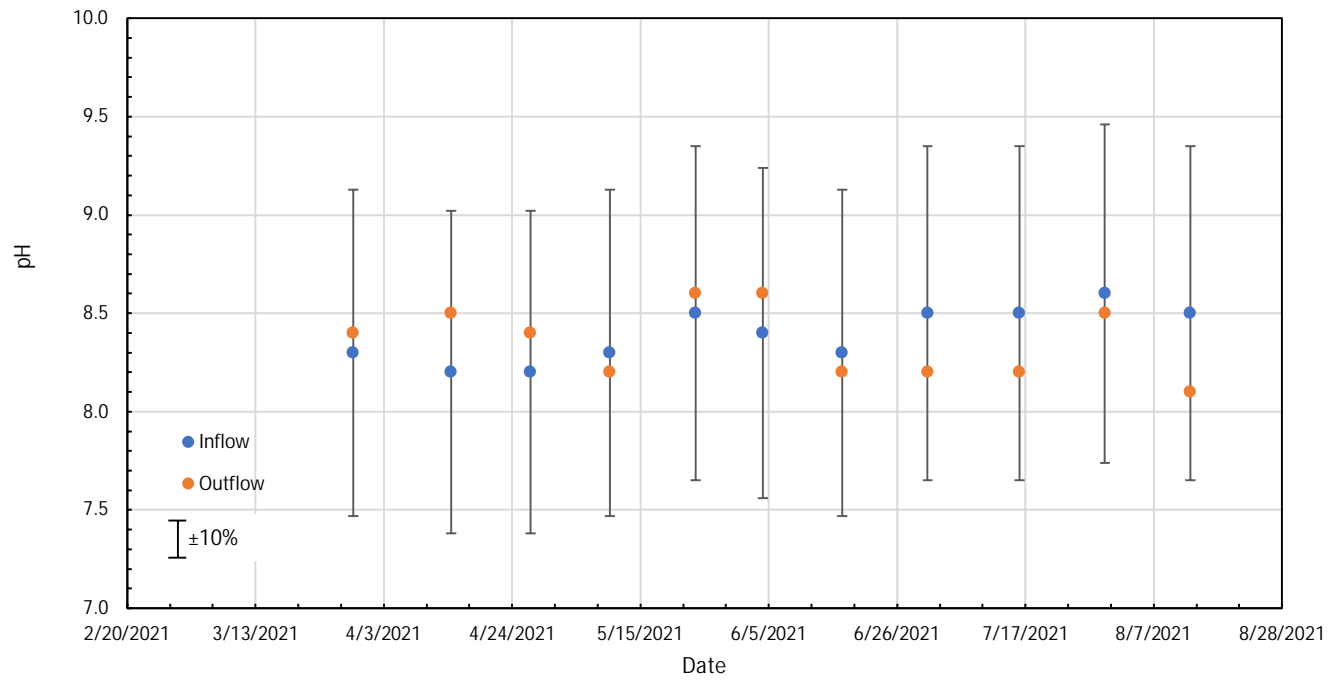
**Figure**

**3-4**

Ann Arbor, MI

September 2021





**B1-ST-1 (7-9') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

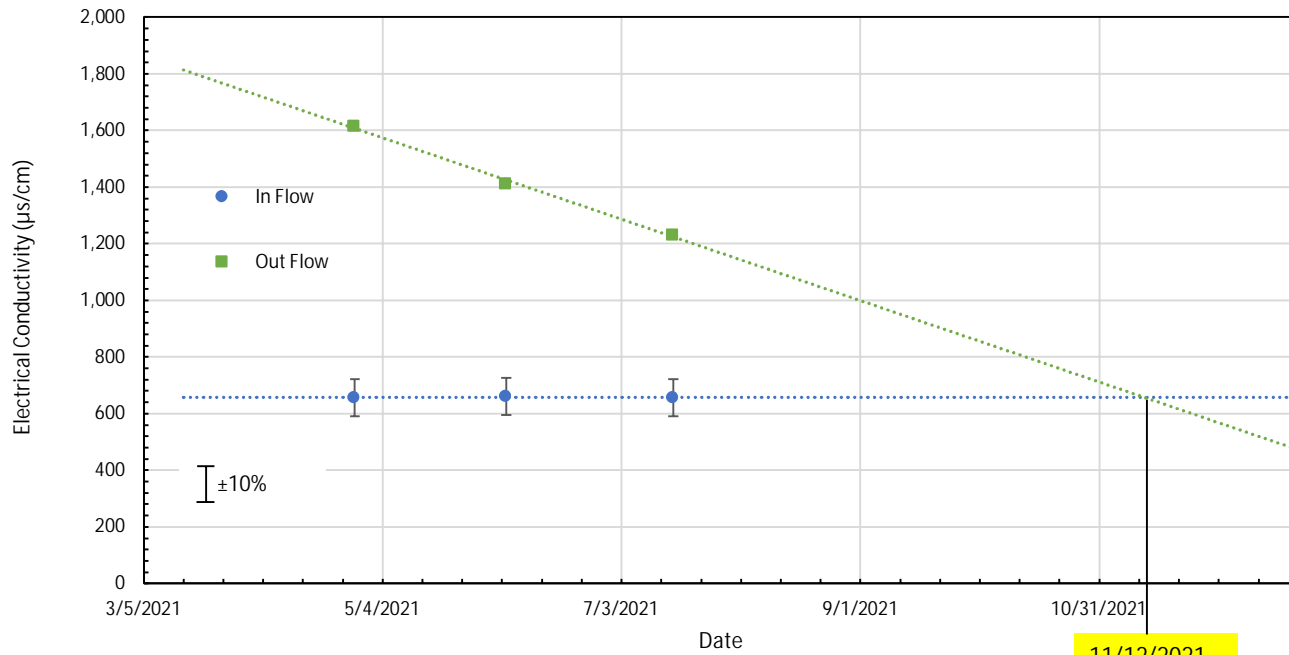


Ann Arbor, MI

September 2021

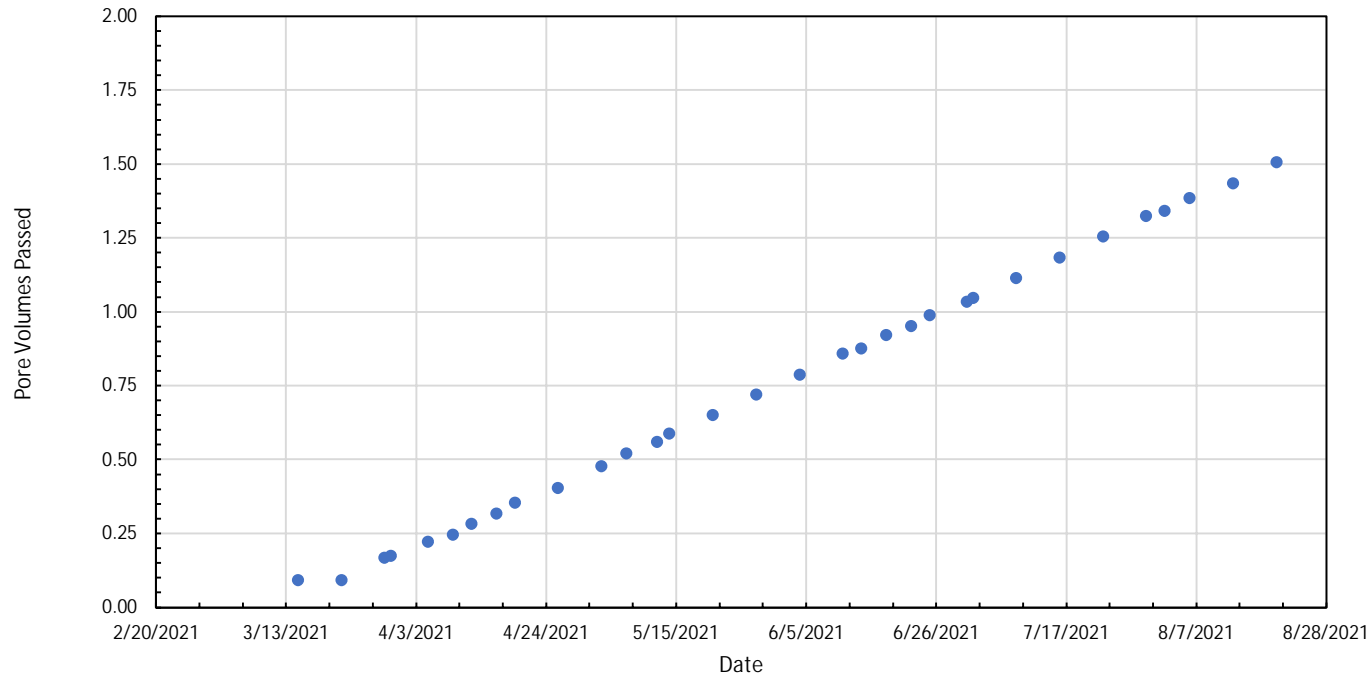
**Figure**

**3-5**



11/12/2021

<b>B1-ST-1 (7-9') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-6</b>	



**B2-ST-1 (1-3') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

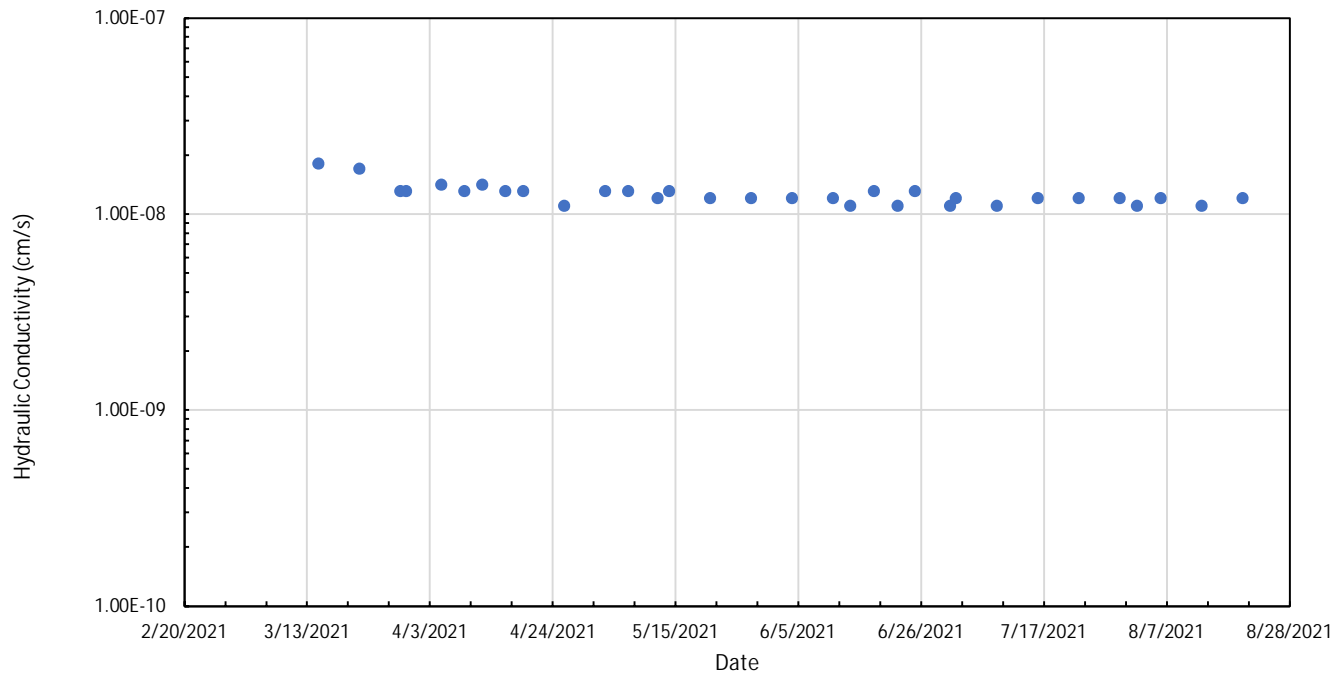


**Figure**

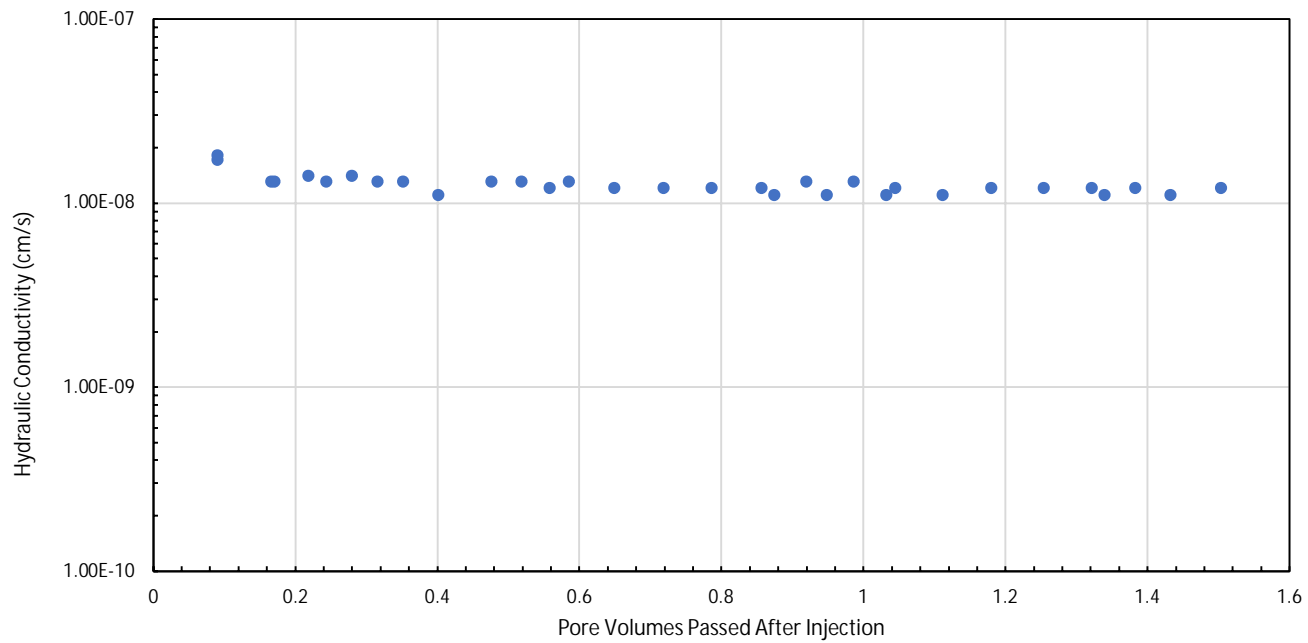
**3-7**

Ann Arbor, MI

September 2021



<b>B2-ST-1 (1-3') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure 3-8</b>
Ann Arbor, MI      September 2021	



**B2-ST-1 (1-3') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

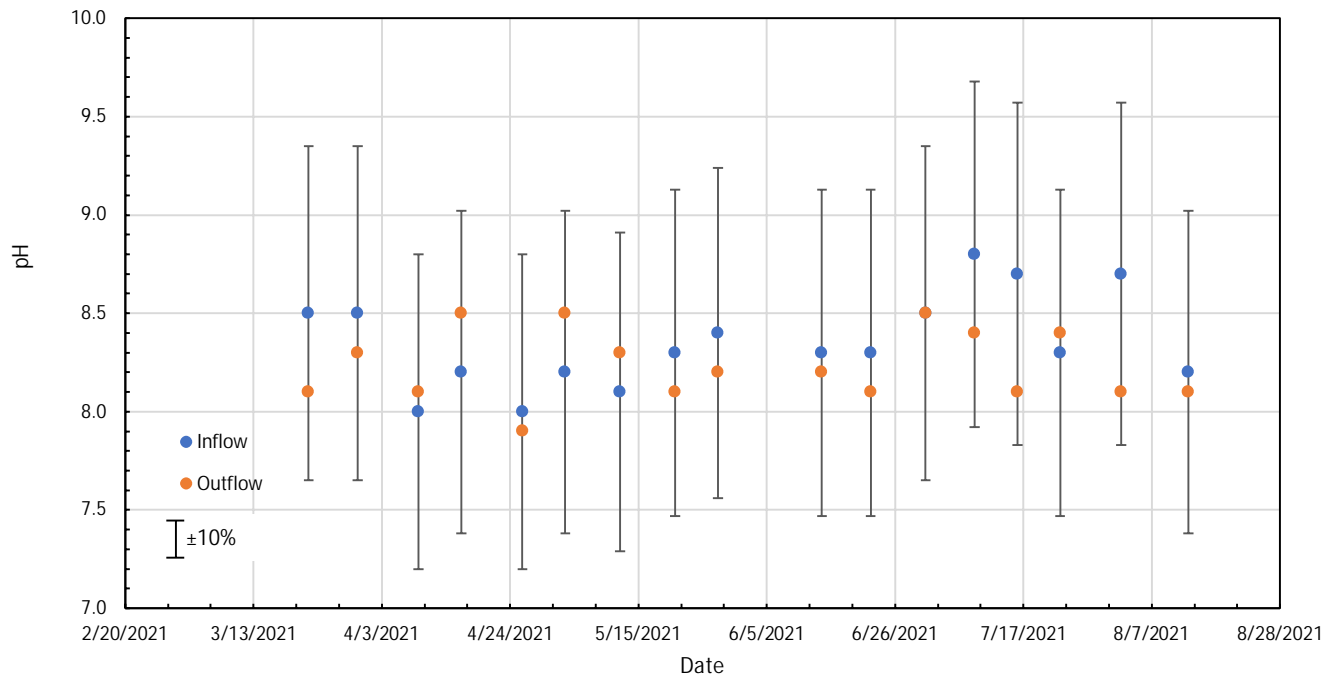


**Figure**

**3-9**

Ann Arbor, MI

September 2021



**B2-ST-1 (1-3') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

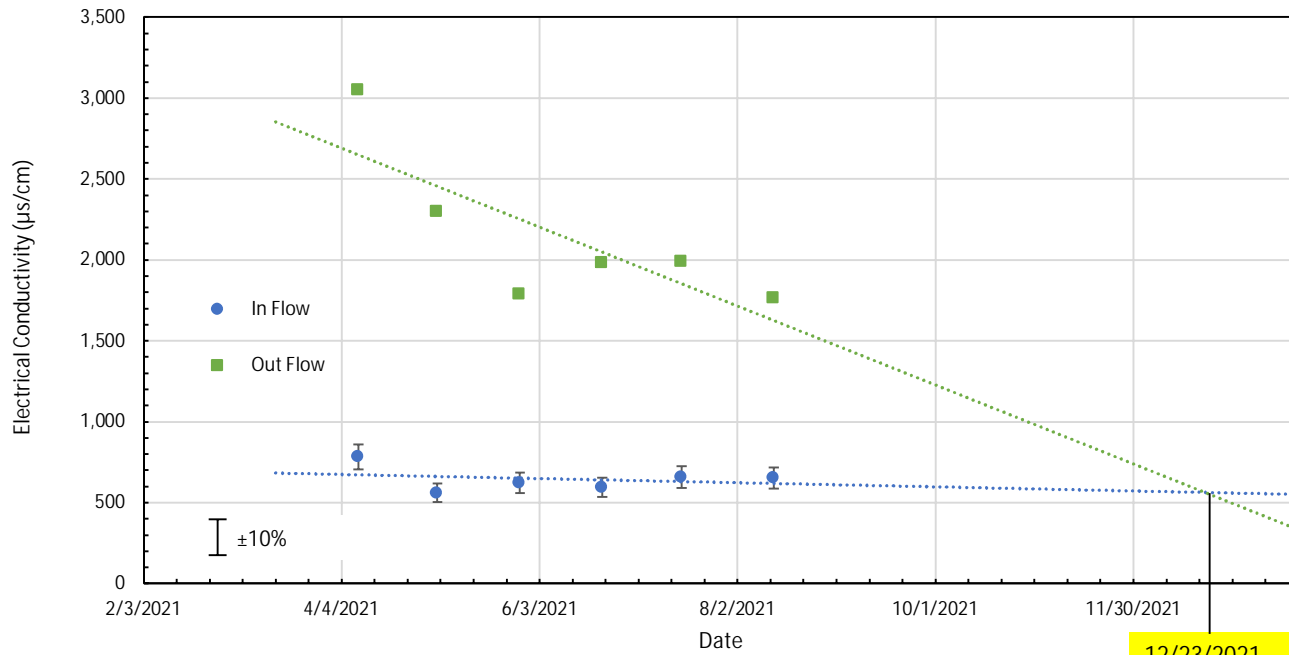


**Figure**

**3-10**

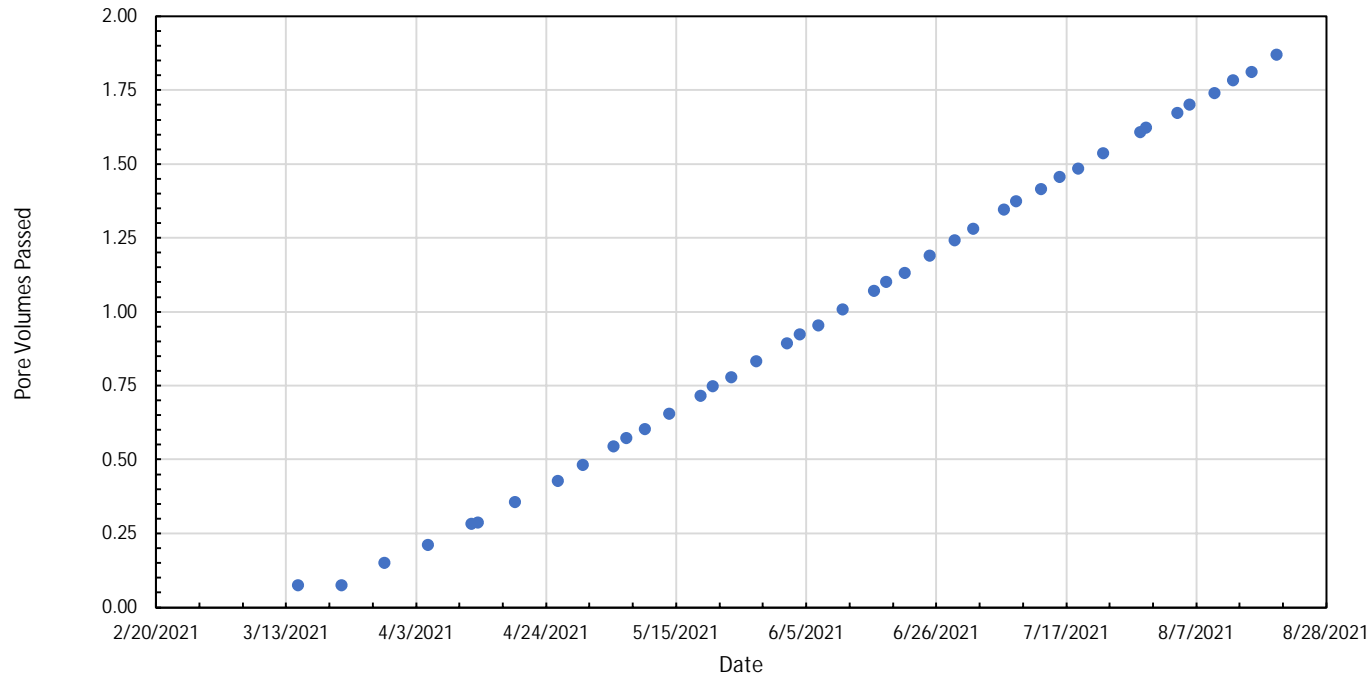
Ann Arbor, MI

September 2021



12/23/2021

<b>B2-ST-1 (1-3') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-11</b>	



**B2-ST-4 (47-49') PV of Flow With Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



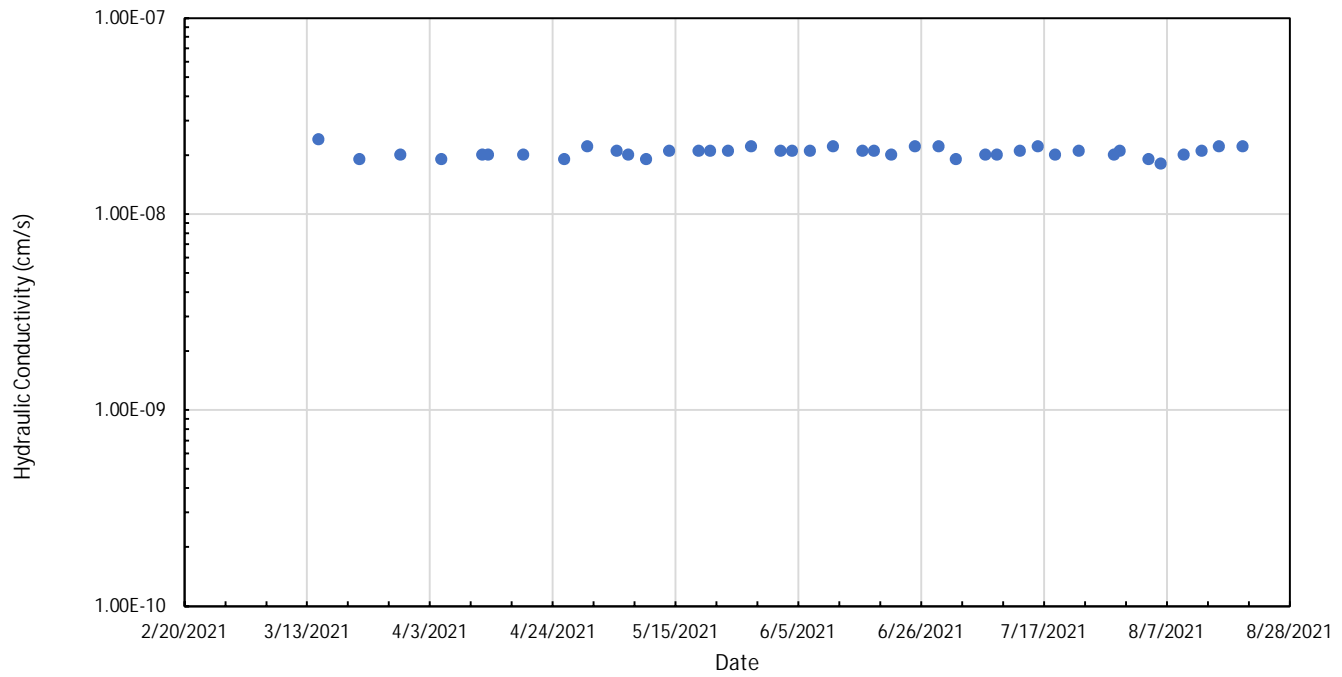
**Figure**

**3-12**

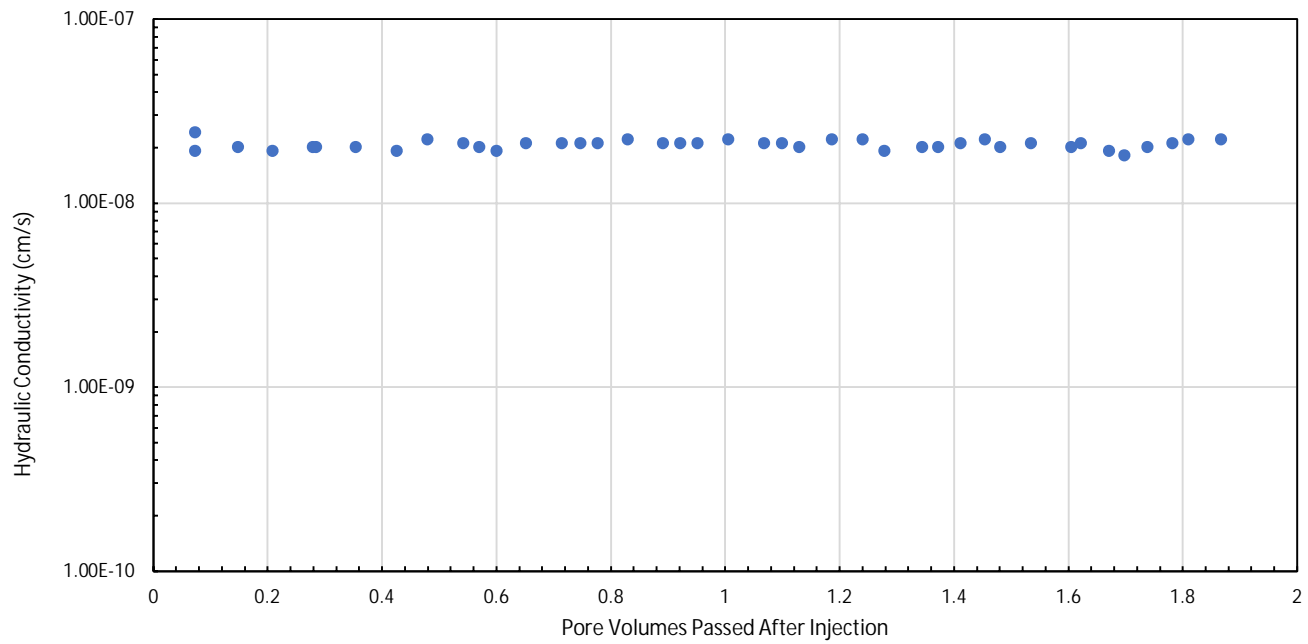
Ann Arbor, MI

September 2021





<b>B2-ST-4 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI      September 2021	<b>3-13</b>



**B2-ST-4 (47-49') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

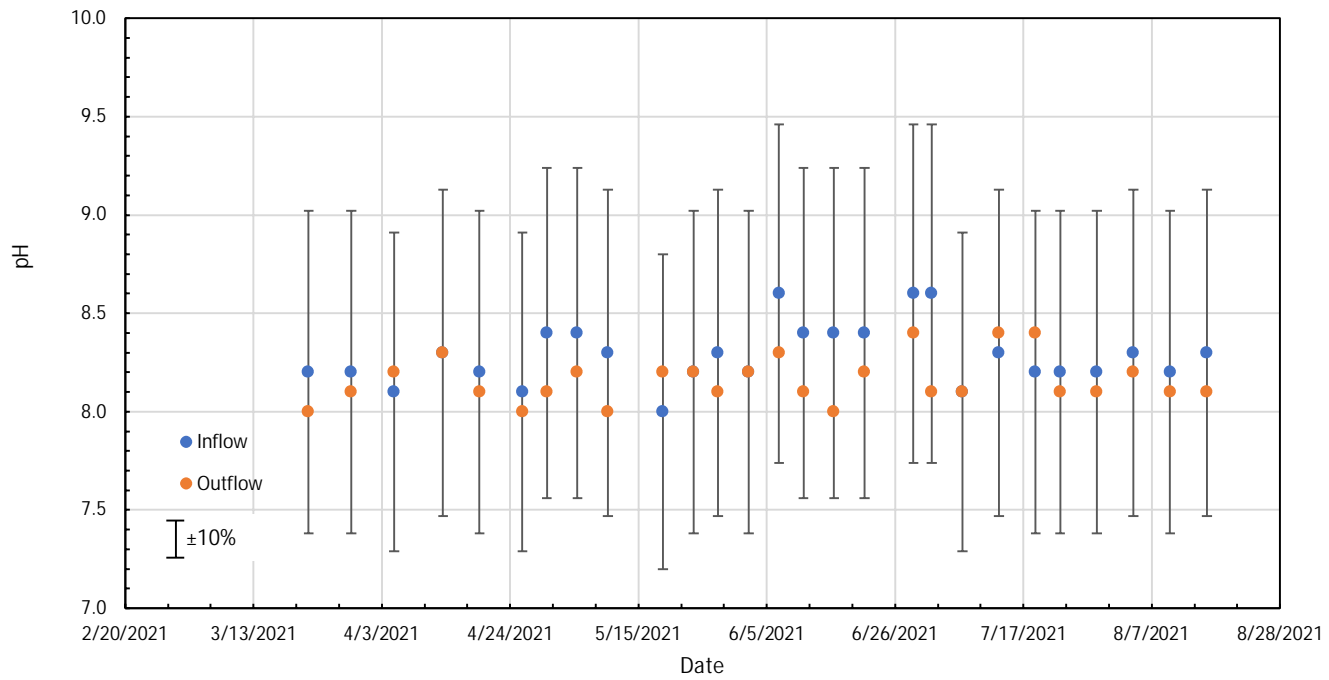


**Figure**

**3-14**

Ann Arbor, MI

September 2021



**B2-ST-4 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

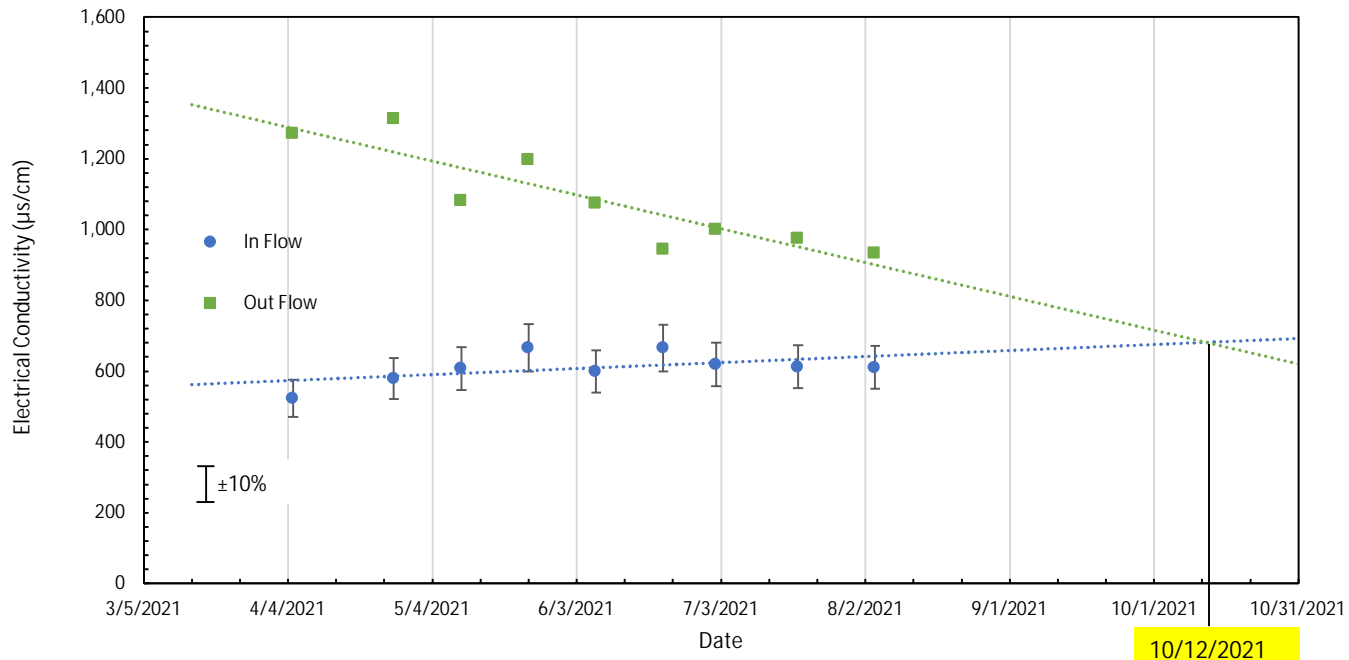


**Figure**

**3-15**

Ann Arbor, MI

September 2021



**B2-ST-4 (47-49') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

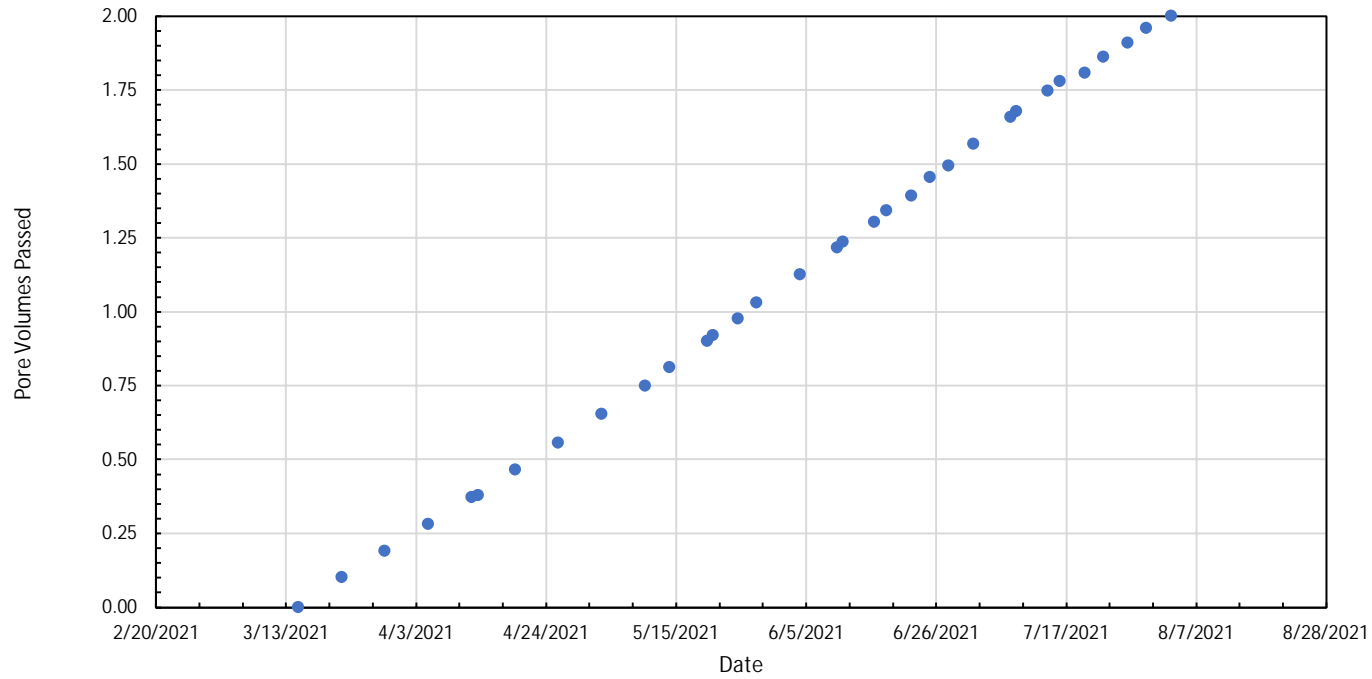


**Figure**

**3-16**

Ann Arbor, MI

September 2021



**B3-ST-5 (77-79') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

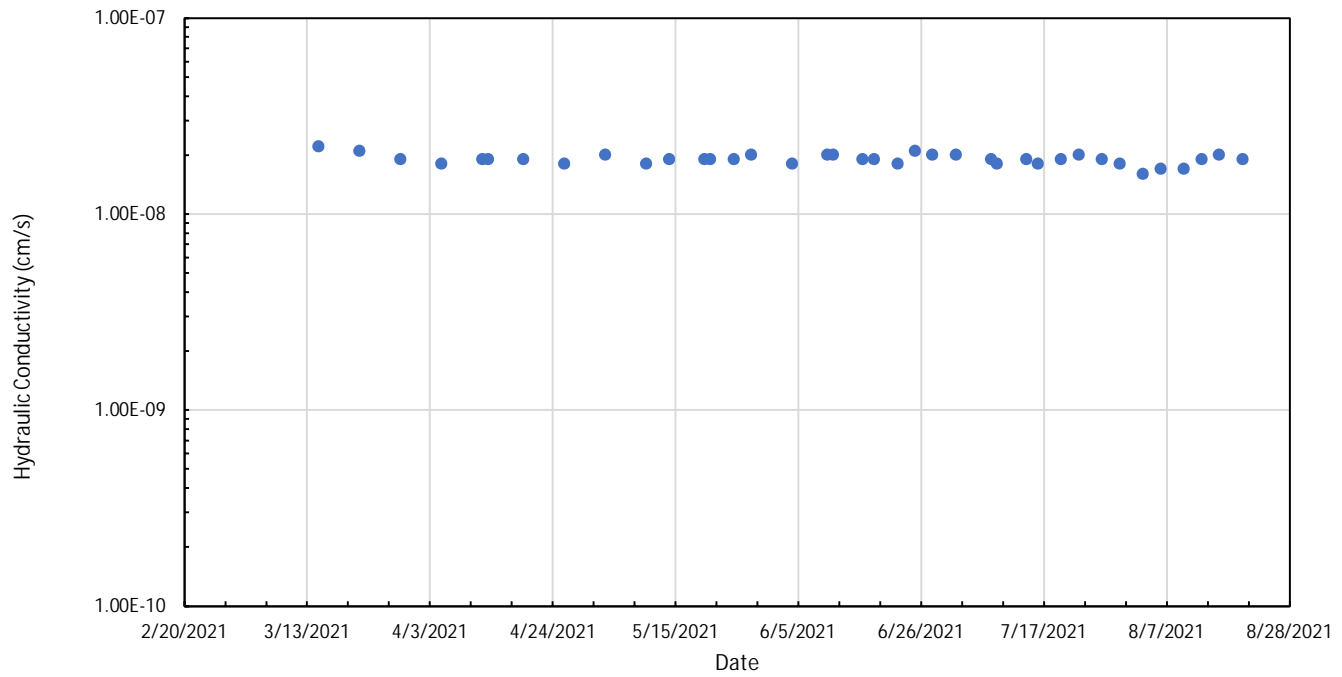


**Figure**

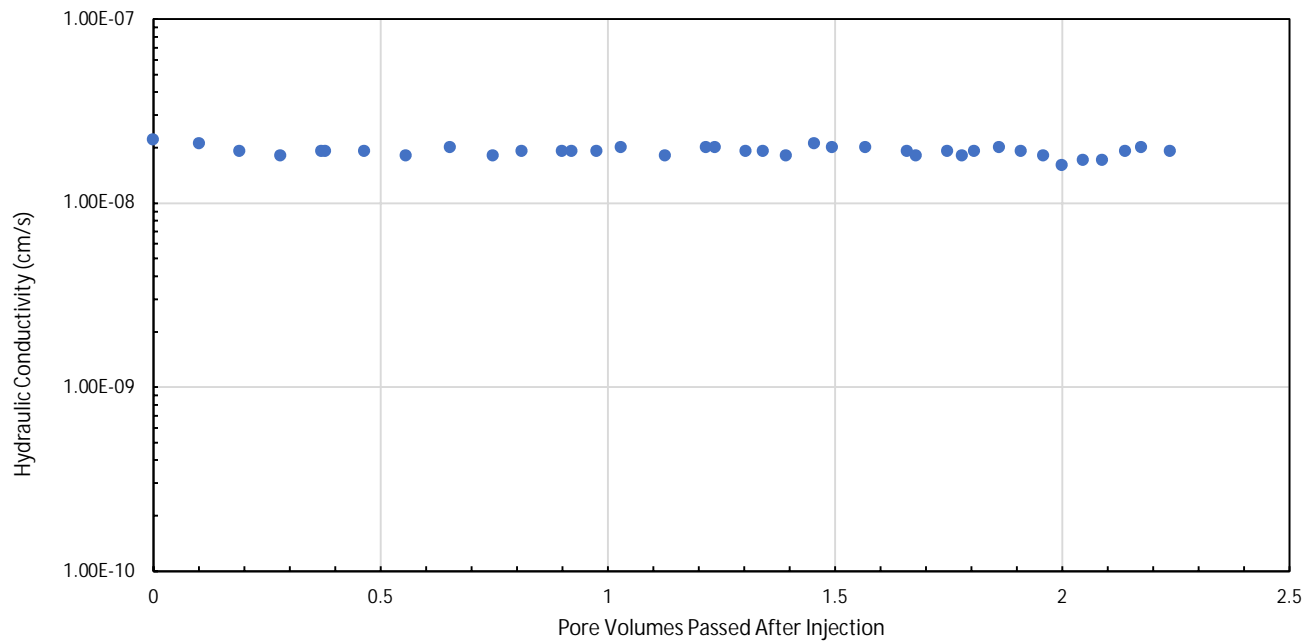
**3-17**

Ann Arbor, MI

September 2021



<b>B3-ST-5 (77-79') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI	<b>3-18</b>
September 2021	



**B3-ST-5 (77-79') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

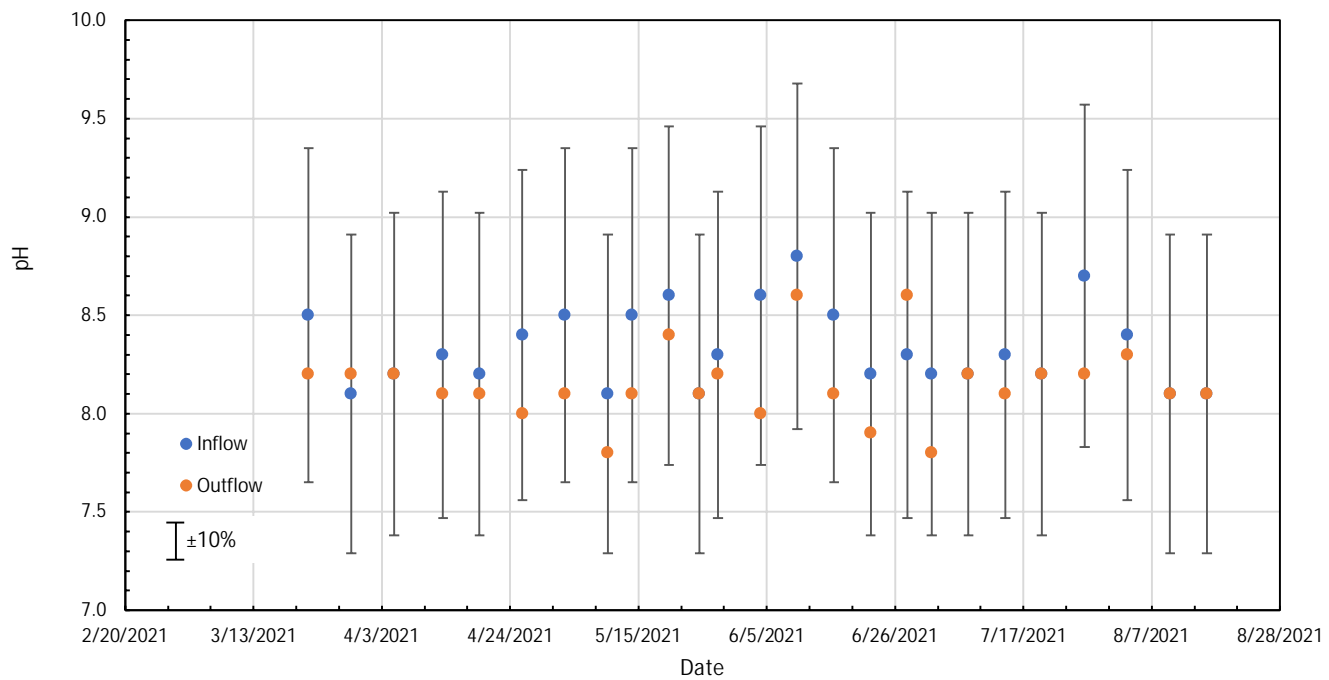


**Figure**

**3-19**

Ann Arbor, MI

September 2021



**B3-ST-5 (77-79') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



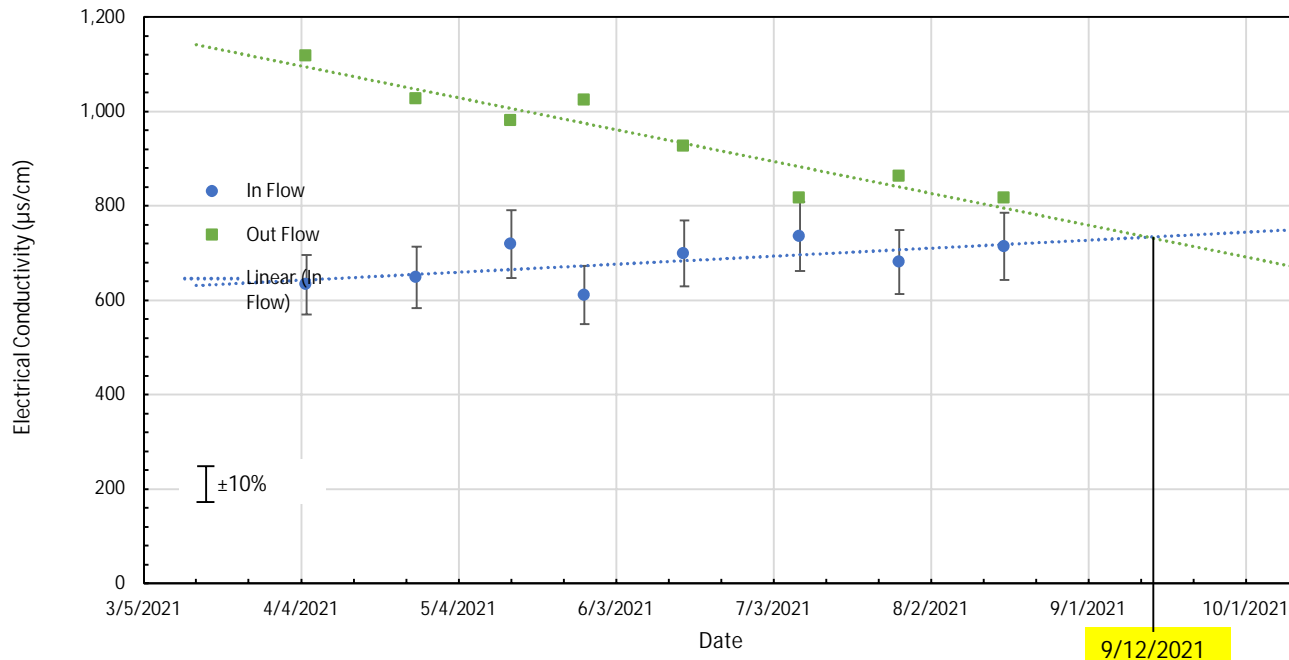
Ann Arbor, MI

September 2021

**Figure**

**3-20**





**B3-ST-5 (77-79') Electrical Conductivity (EC) with Time**

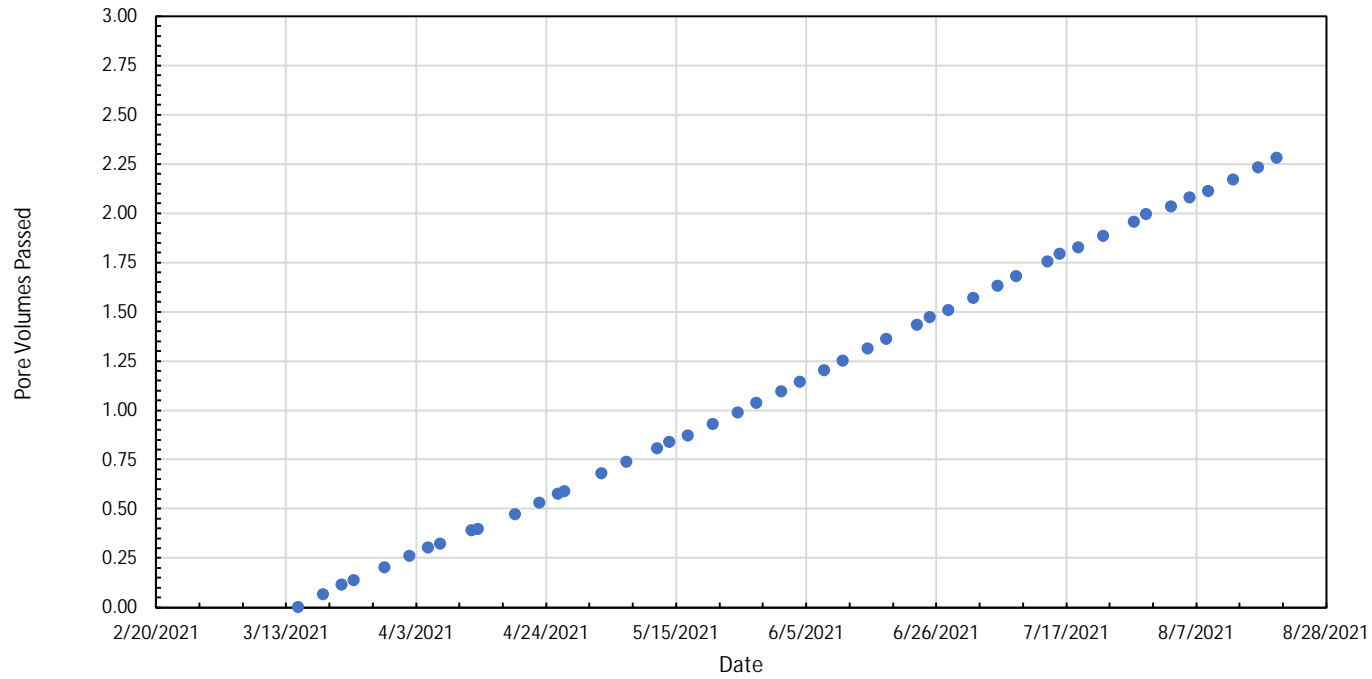
BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



**Figure**  
**3-21**

Ann Arbor, MI

September 2021



**B4-ST-3 (47-49') PV of Flow With Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

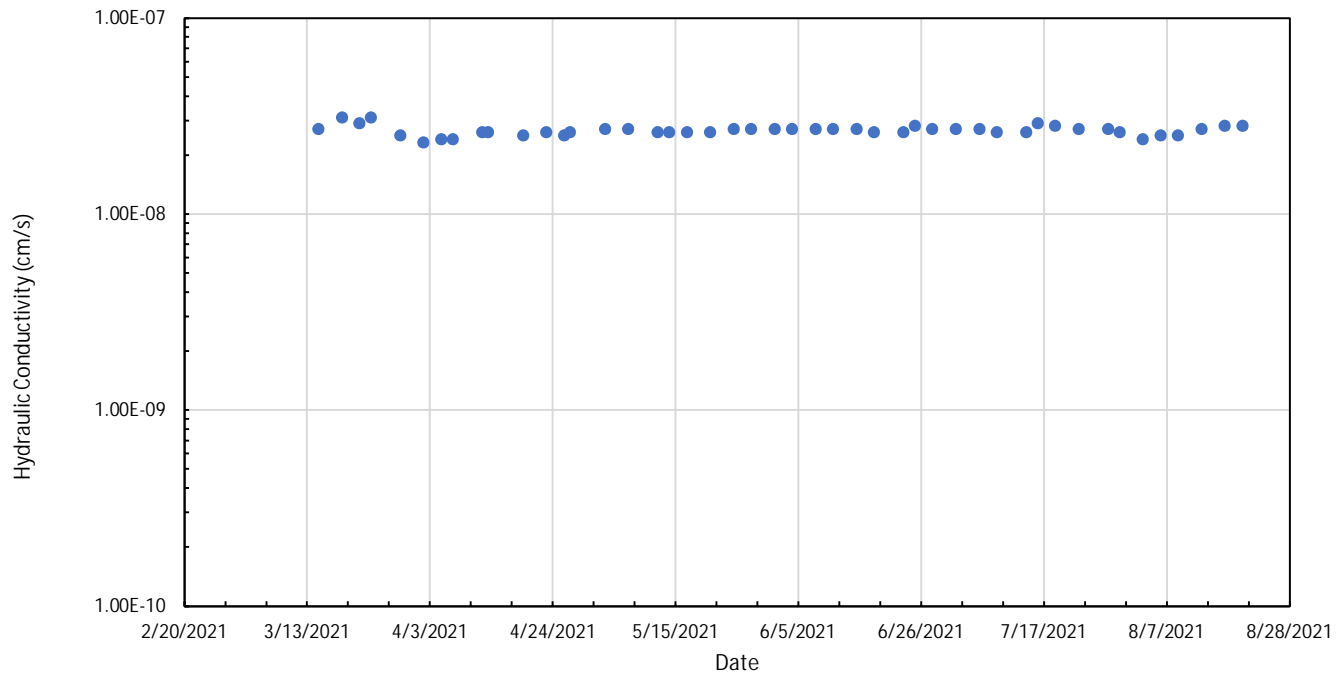


**Figure**

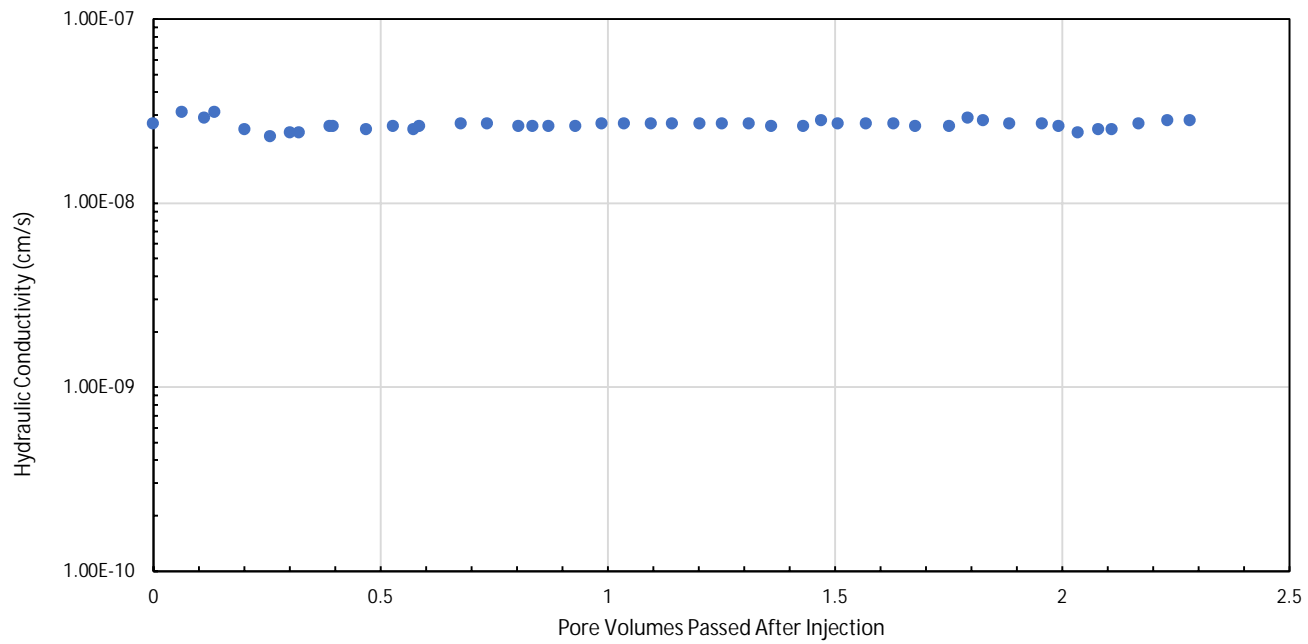
**3-22**

Ann Arbor, MI

September 2021



<b>B4-ST-3 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	<b>Figure</b>
Ann Arbor, MI      September 2021	<b>3-23</b>



**B4-ST-3 (47-49') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

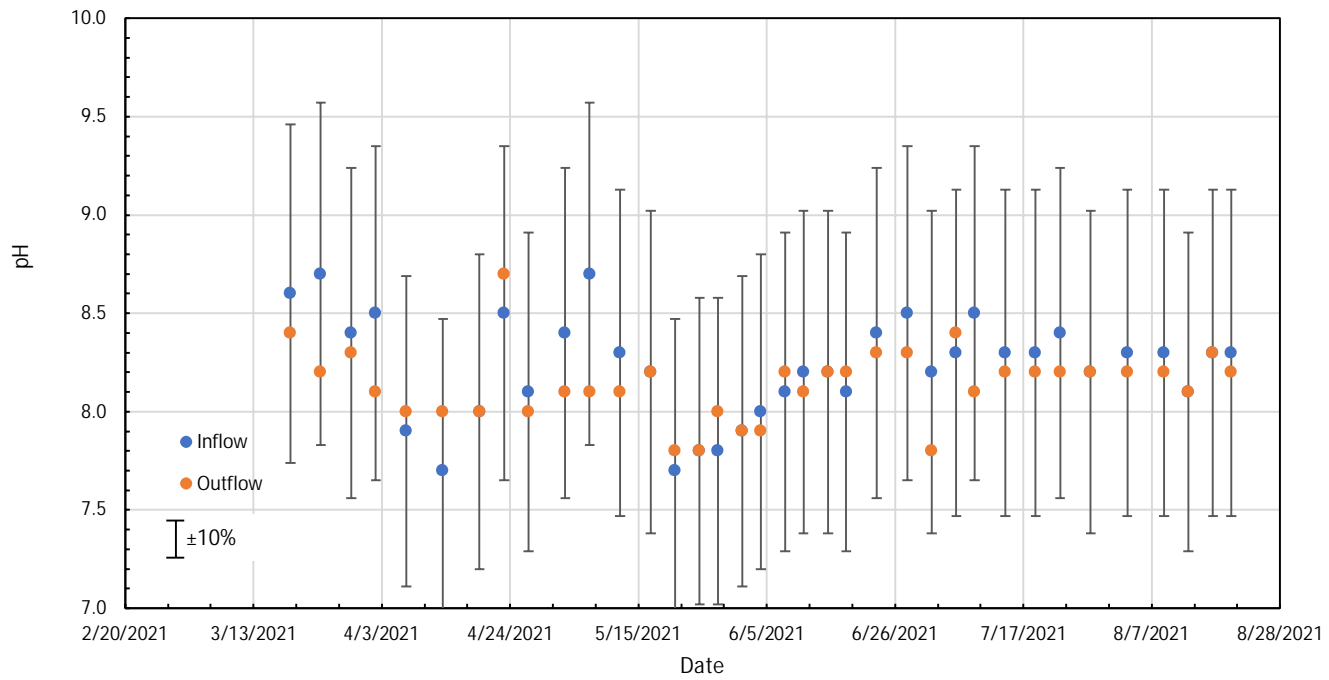


**Figure**

**3-24**

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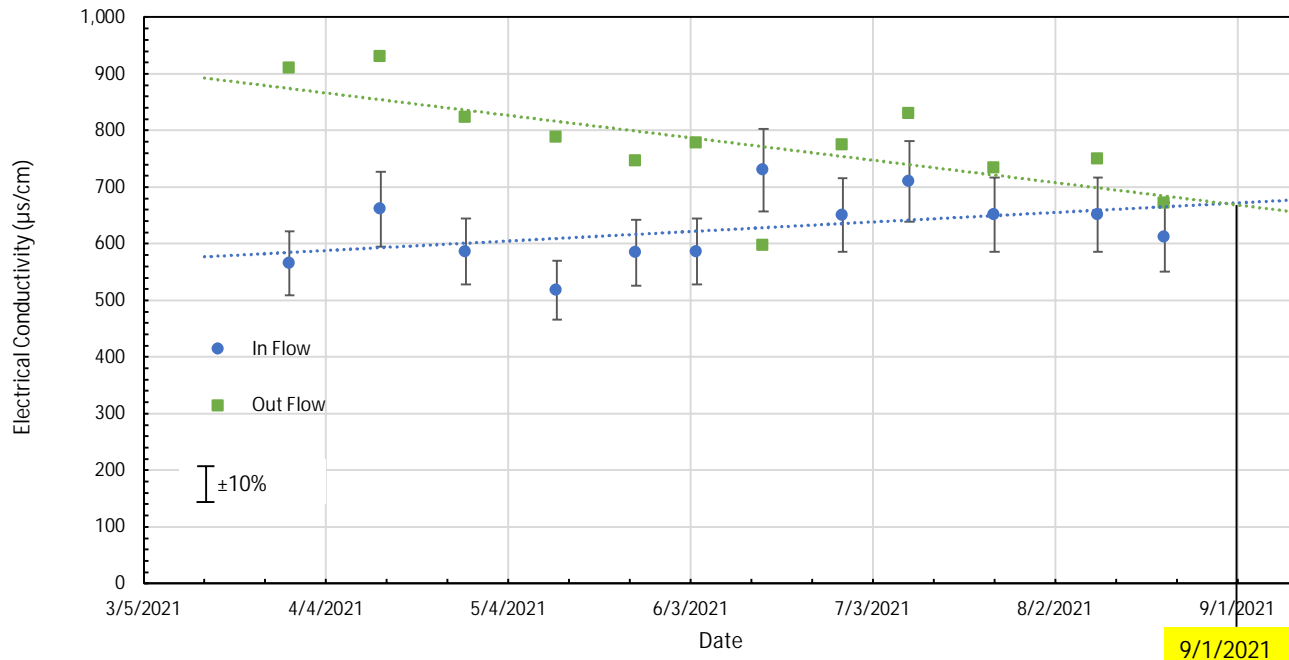
**B4-ST-3 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

**Geosyntec**  
consultants

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**Figure 3-25**



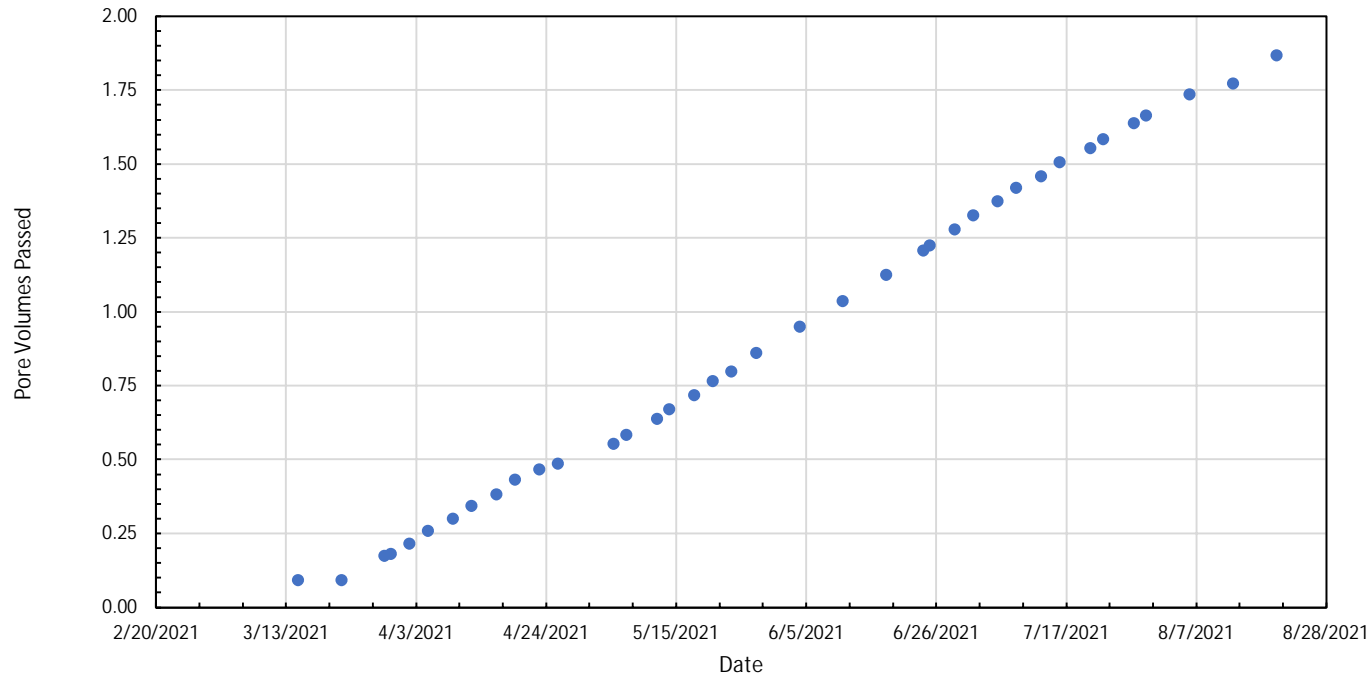
**B4-ST-3 (47-49') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



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**Figure**  
**3-26**



**B5-ST-5 (87-89') PV of Flow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

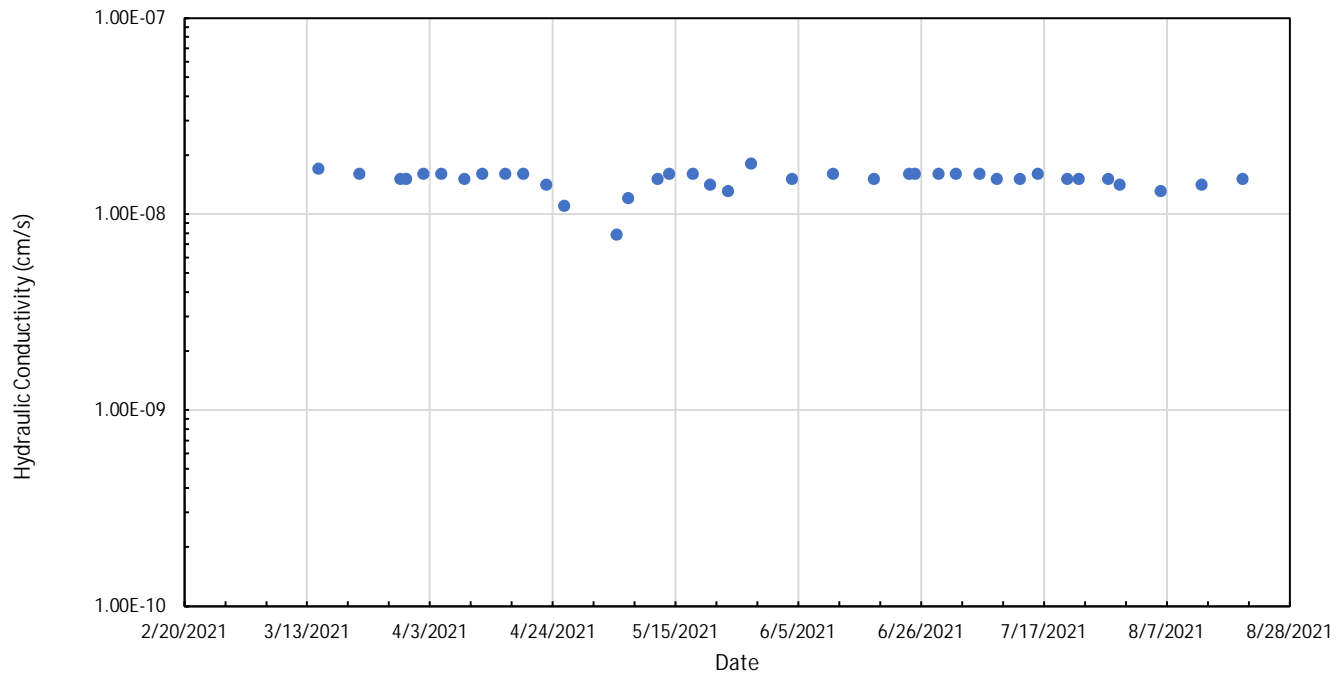


**Figure**

**3-27**

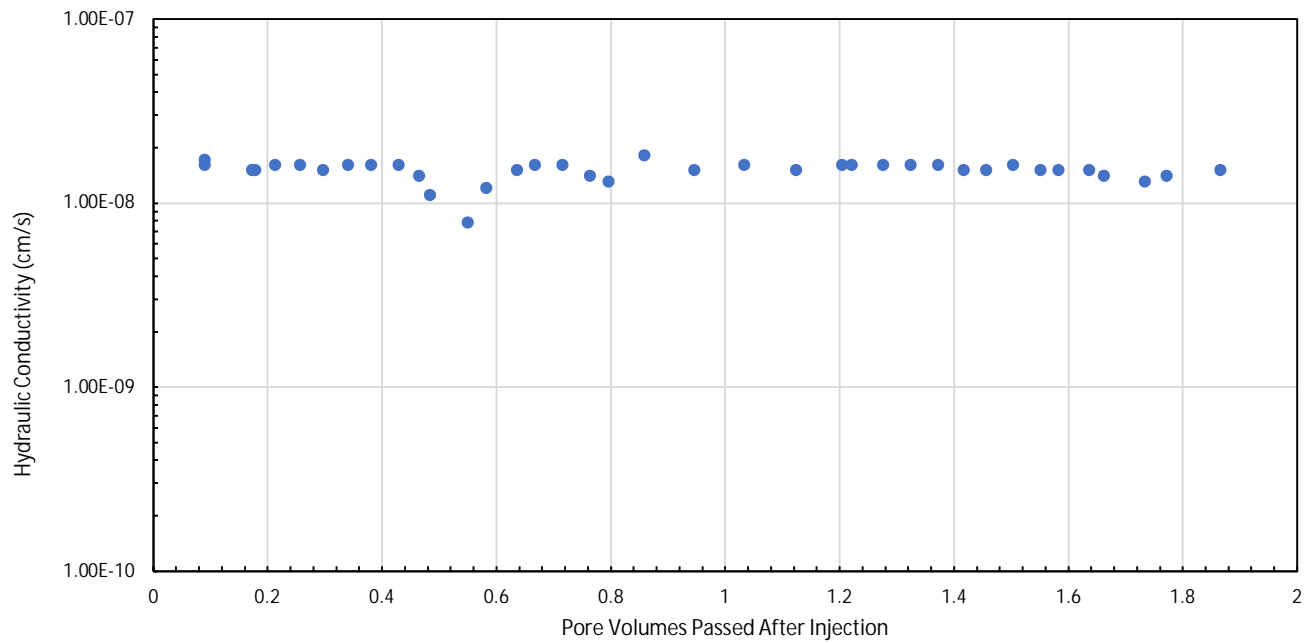
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September 2021



<b>B5-ST-5 (87-89') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
	
Ann Arbor, MI	September 2021
<b>Figure 3-28</b>	





**B5-ST-5 (87-89') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

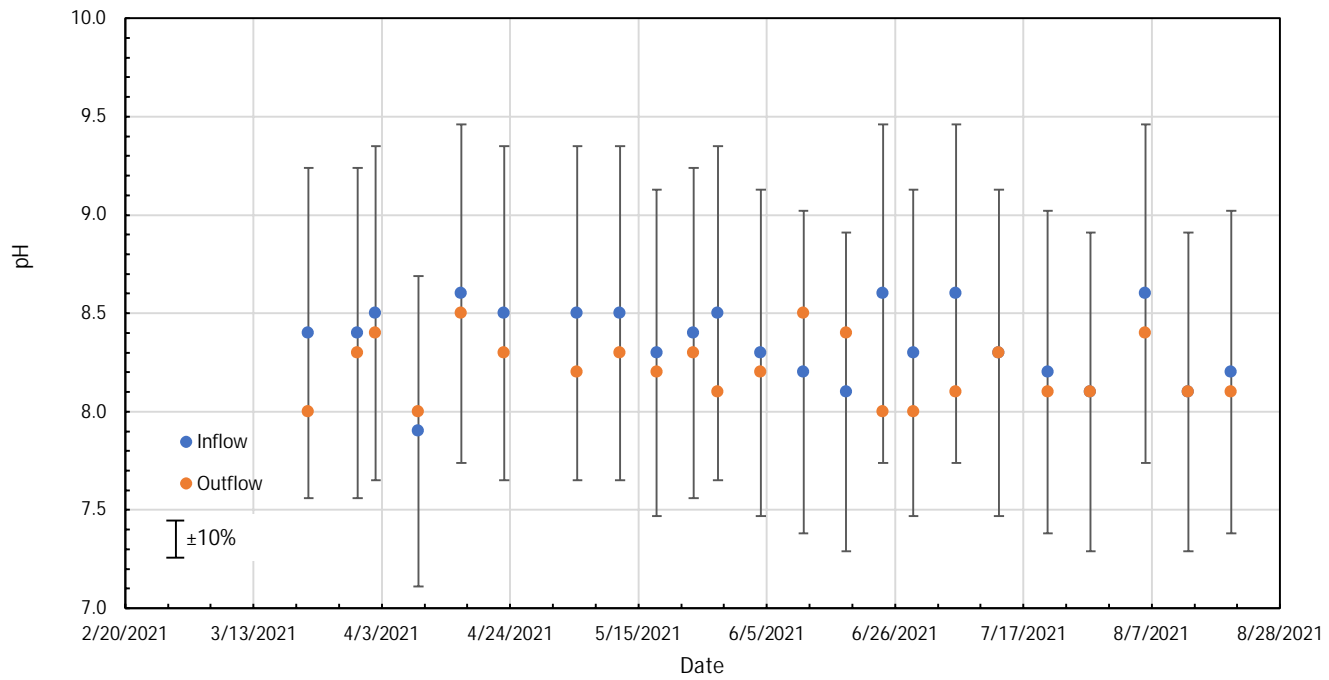


**Figure**

**3-29**

Ann Arbor, MI

September 2021



**B5-ST-5 (87-89') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

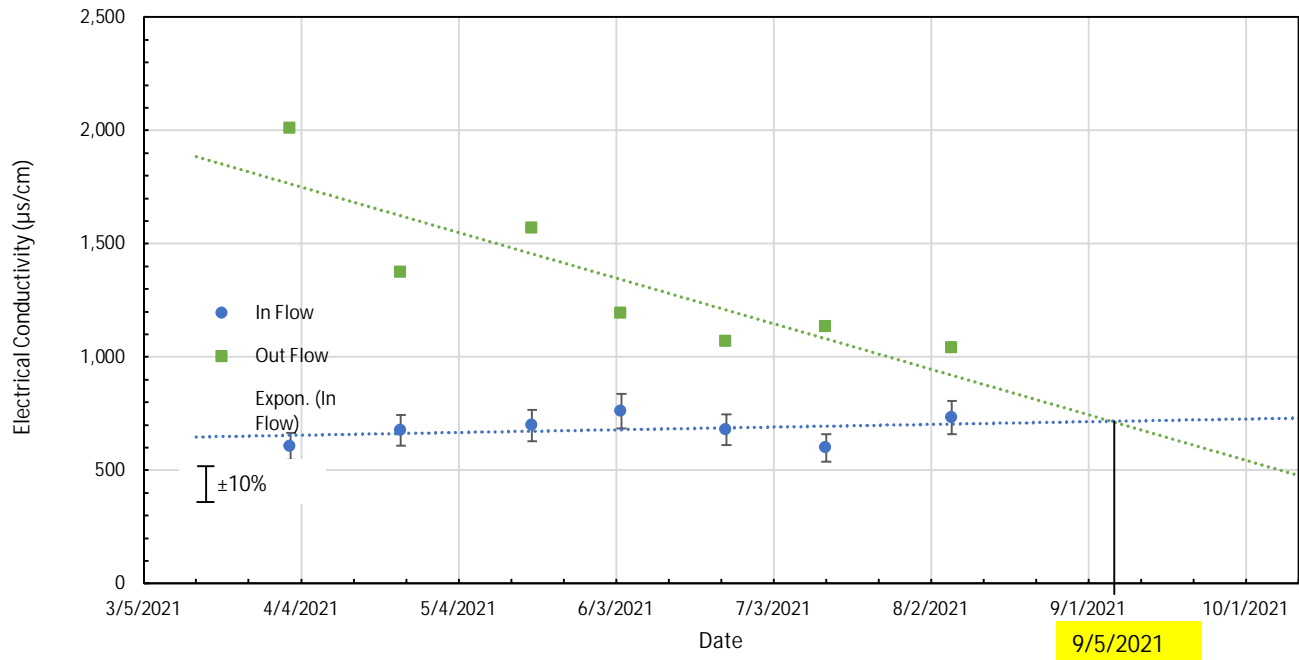


Ann Arbor, MI

September 2021

**Figure**

**3-30**



**B5-ST-5 (87-89') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



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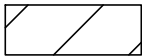
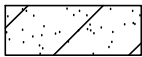

September 2021

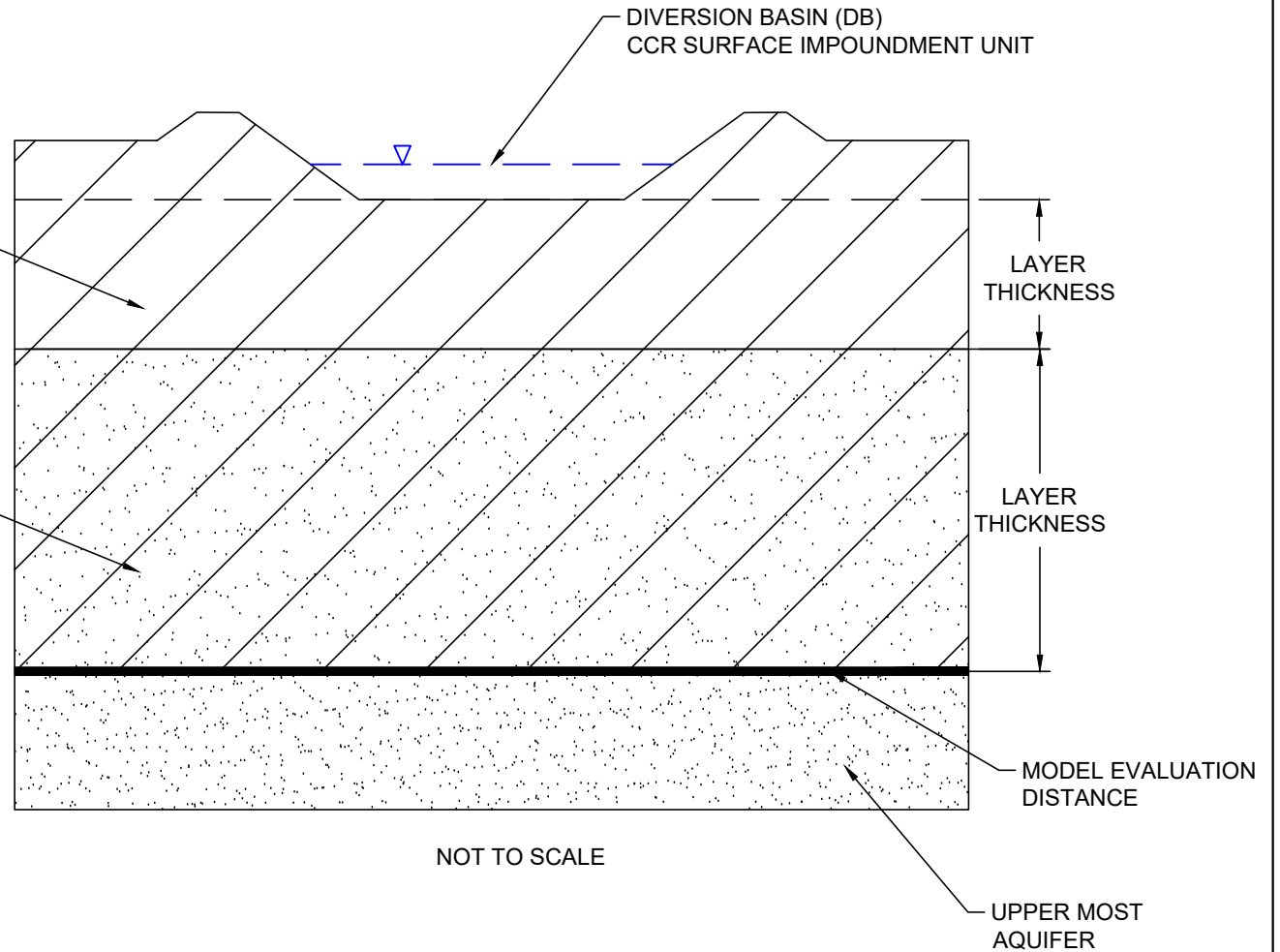
**Figure  
3-31**


CLAY LAYER - LAYER 1		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	11.13
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.42
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>3</sup> /KG	0
DEGRADATION		0

CLAY WITH SAND LAYER - LAYER 2		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	25.66
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.51
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>3</sup> /KG	0
DEGRADATION		0

**LEGEND**

-  CLAY UNIT
-  CLAY WITH SAND UNIT
-  UPPER MOST AQUIFER



<p><b>FIGURE 4-1</b>  <b>FATE AND TRANSPORT</b>  <b>CONCEPTUAL MODEL</b>  <b>BELLE RIVER ALD - DB</b></p>	
	
PROJECT NO: GLP8017	OCTOBER 2021
<p><b>FIGURE</b> <b>4-1</b></p>	

**Appendix A**  
**Monitoring Well Slug Test Results**

## **2016 Slug Test Results**

**Hydraulic Conductivity Results**  
DTE Electric Company Belle River Power Plant  
ChinaTownship, Michigan

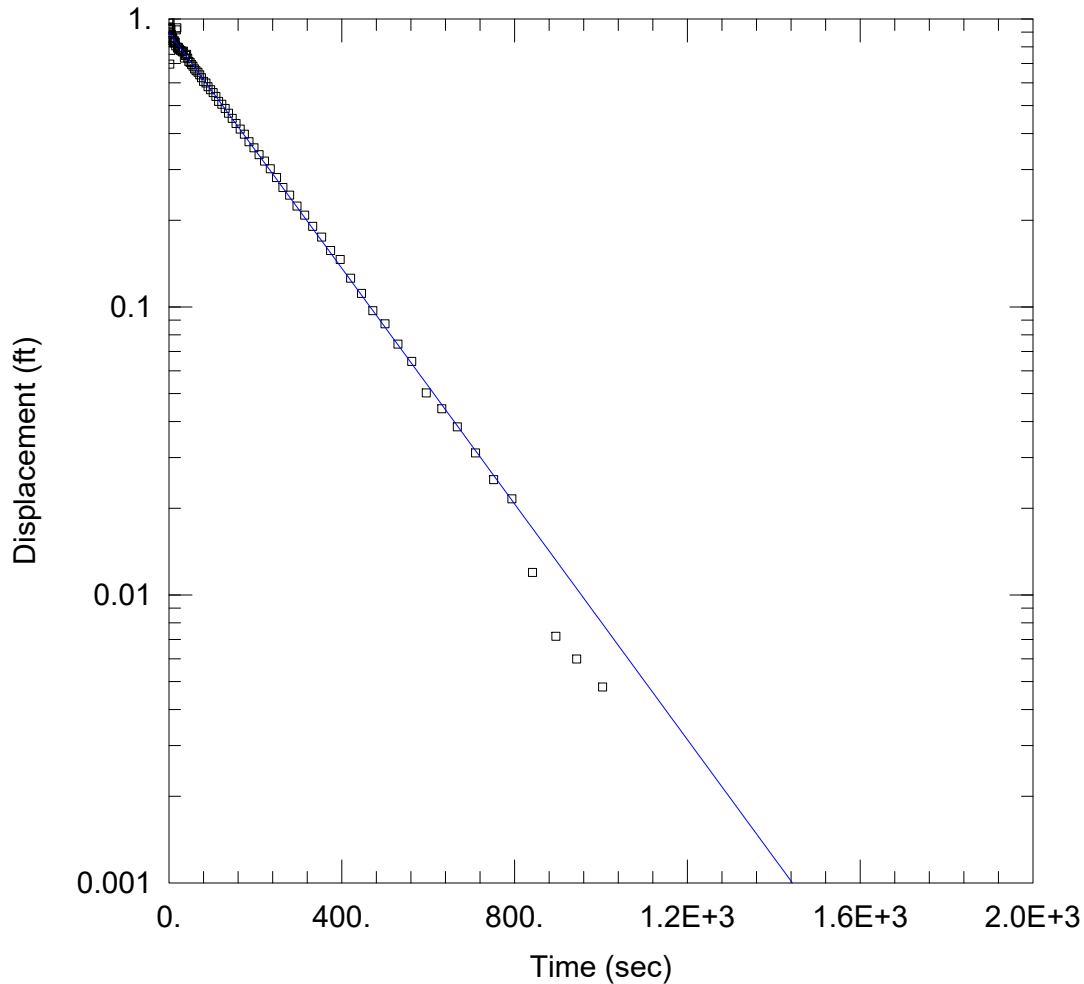
Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01b	3/1/2016	Falling Head	3.58E-04	1.015
		Rising Head	2.72E-04	0.770
		<b>Average</b>	<b>3.15E-04</b>	<b>0.892</b>
MW-16-04	3/1/2016	Falling Head	7.93E-05	0.225
		Rising Head	4.11E-05	0.116
		<b>Average</b>	<b>6.02E-05</b>	<b>0.171</b>
MW-16-05	3/1/2016	Falling Head	4.26E-05	0.121
		Rising Head	2.13E-05	0.060
		<b>Average</b>	<b>3.19E-05</b>	<b>0.090</b>
MW-16-07	3/1/2016	Falling Head	1.24E-04	0.350
		Rising Head	7.21E-05	0.204
		<b>Average</b>	<b>9.79E-05</b>	<b>0.277</b>
<b>Minimum</b>			<b>3.19E-05</b>	<b>9.05E-02</b>
<b>Maximum</b>			<b>3.15E-04</b>	<b>8.92E-01</b>
<b>Geometric Mean</b>			<b>8.77E-05</b>	<b>0.249</b>

**Conversion:**

$$\frac{1 \text{ cm}}{1 \text{ sec}} \times \frac{86,400 \text{ sec}}{1 \text{ day}} \times \frac{1 \text{ ft}}{30.48 \text{ cm}} = 2.83\text{E}+03 \frac{\text{ft}}{\text{day}}$$

**Notes:**

Slug test results calculated using the Bower-Rice (1976) Solution.



MW-16-01 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_IN.aqt  
 Date: 05/22/17

Time: 13:38:07

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-01  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

Initial Displacement: 0.835 ft  
 Total Well Penetration Depth: 84.12 ft  
 Casing Radius: 0.08333 ft

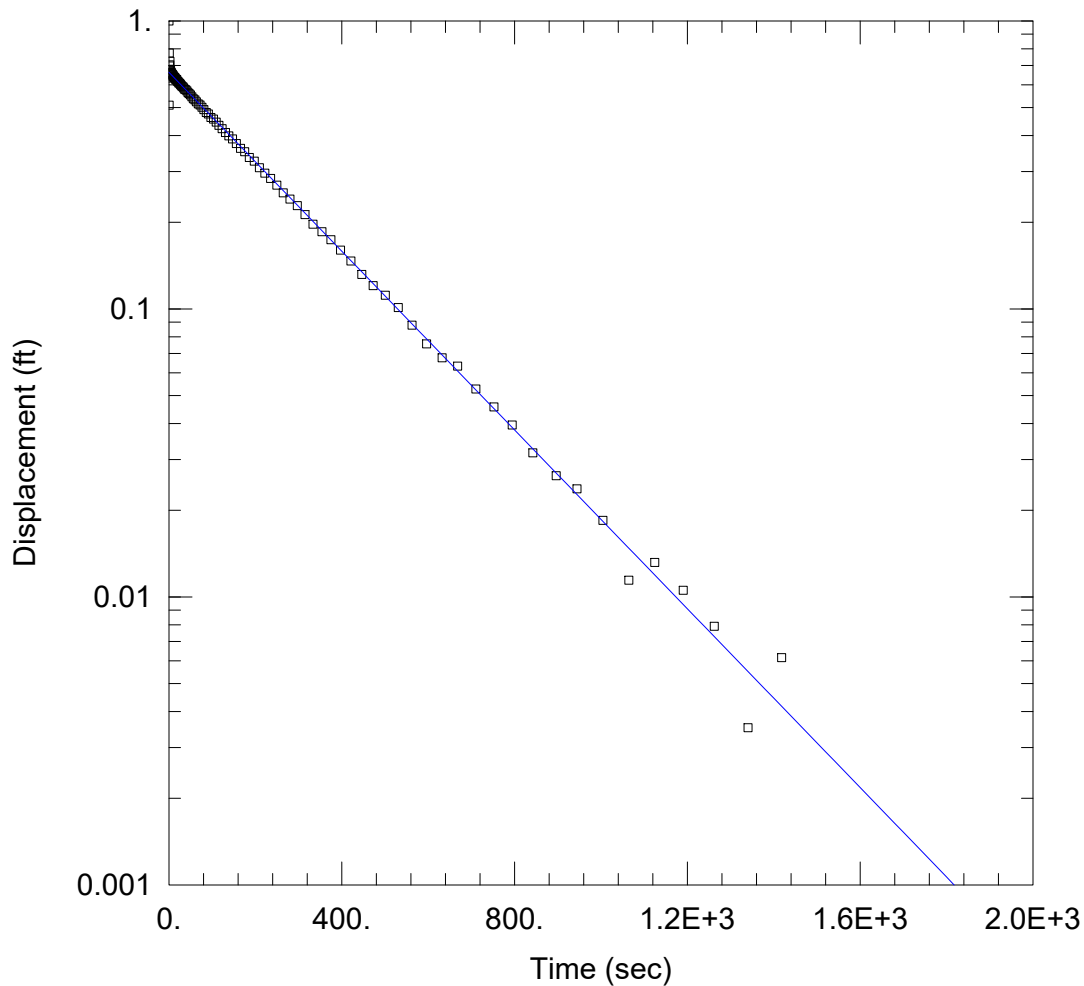
Static Water Column Height: 84.12 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 0.0003581 cm/sec

Solution Method: Bower-Rice  
 y0 = 0.7491 ft





MW-16-01 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_OUT.aqt

Date: 05/22/17

Time: 13:40:08

PROJECT INFORMATION

Company: TRC Environmental Corporation

Client: DTE EC BRPP CCR

Project: 231828.0003.0000

Location: China Township, MI

Test Well: MW-16-01

Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

Initial Displacement: 1.138 ft

Static Water Column Height: 84.07 ft

Total Well Penetration Depth: 84.07 ft

Screen Length: 5. ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

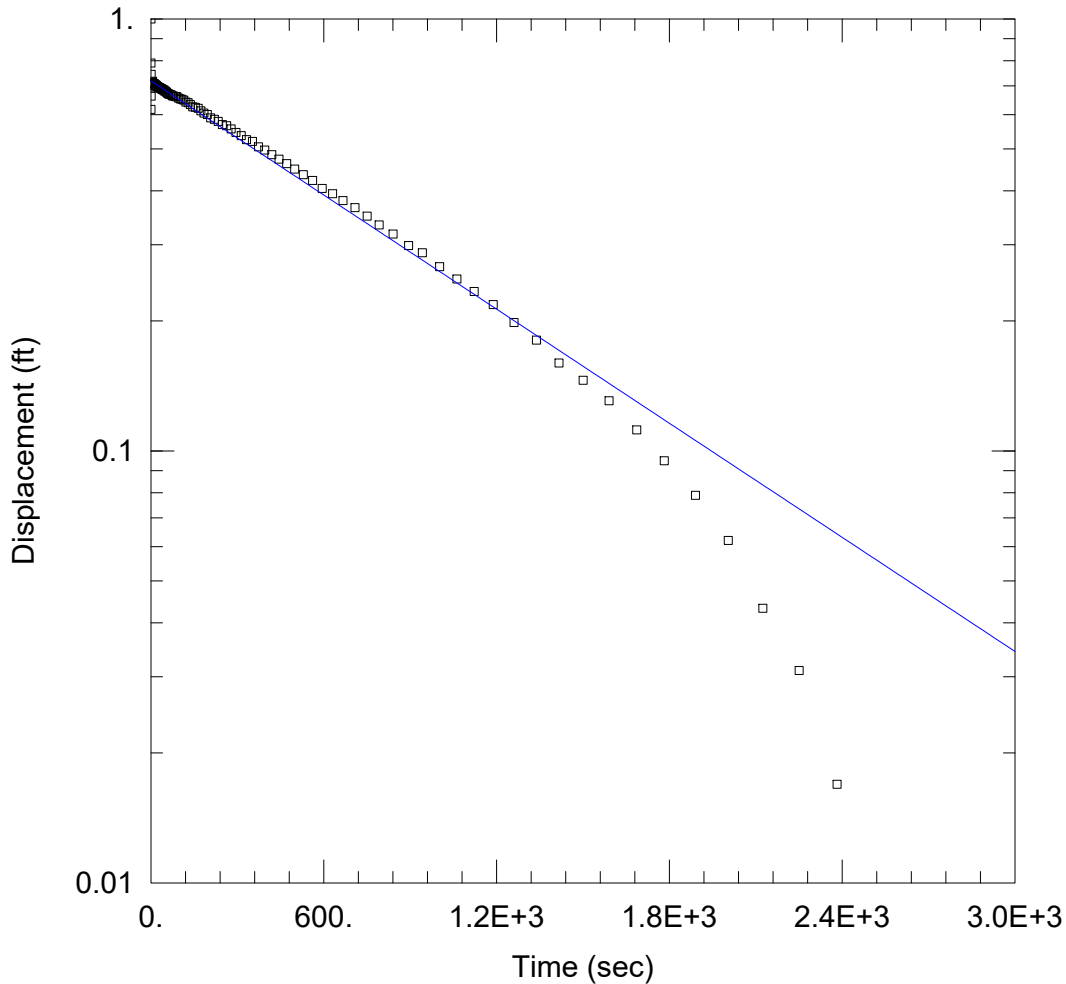
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 0.0002716 cm/sec

y0 = 0.7541 ft



MW-16-04 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_IN.aqt  
 Date: 05/22/17

Time: 13:41:00

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

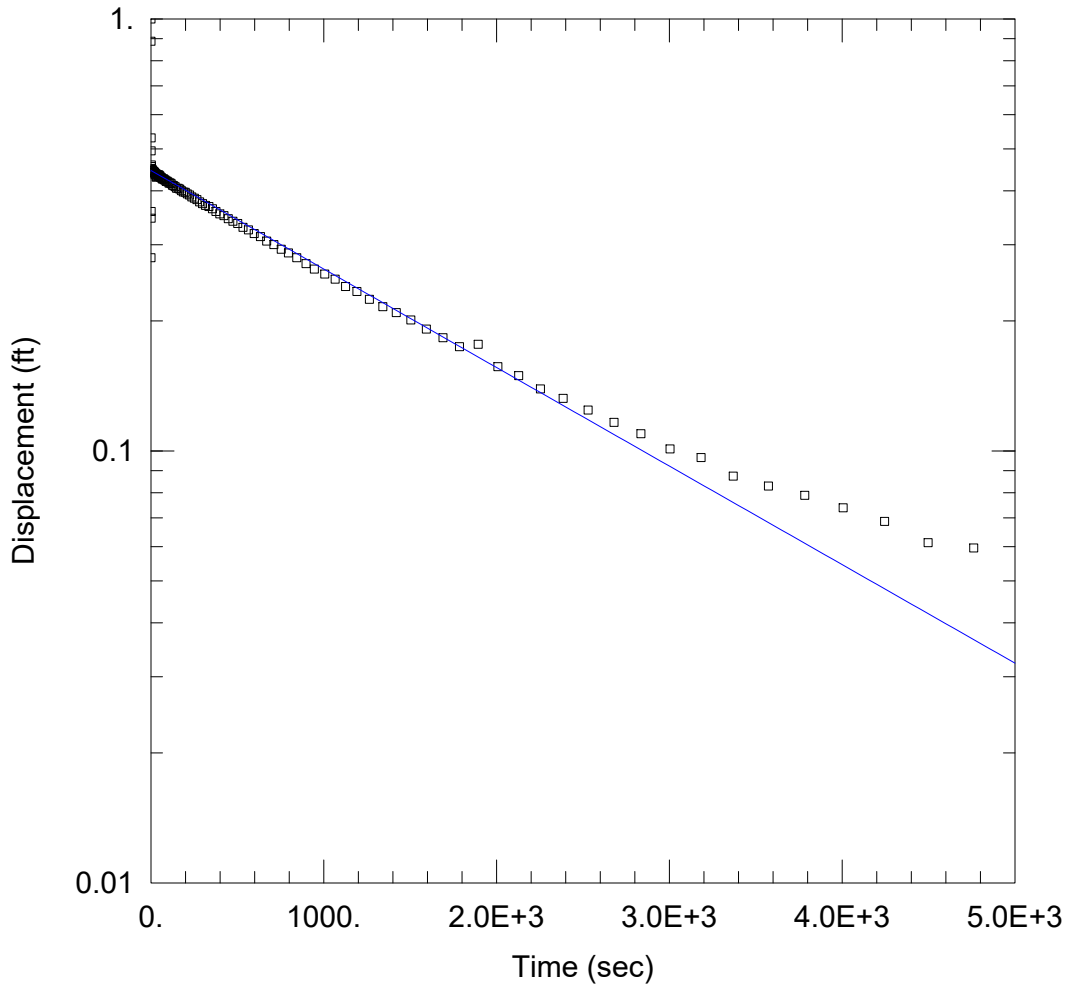
Initial Displacement: 1.064 ft  
 Total Well Penetration Depth: 109.9 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.9 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.93E-5 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.7646 ft



MW-16-04 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_OUT.aqt  
 Date: 05/22/17

Time: 13:42:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

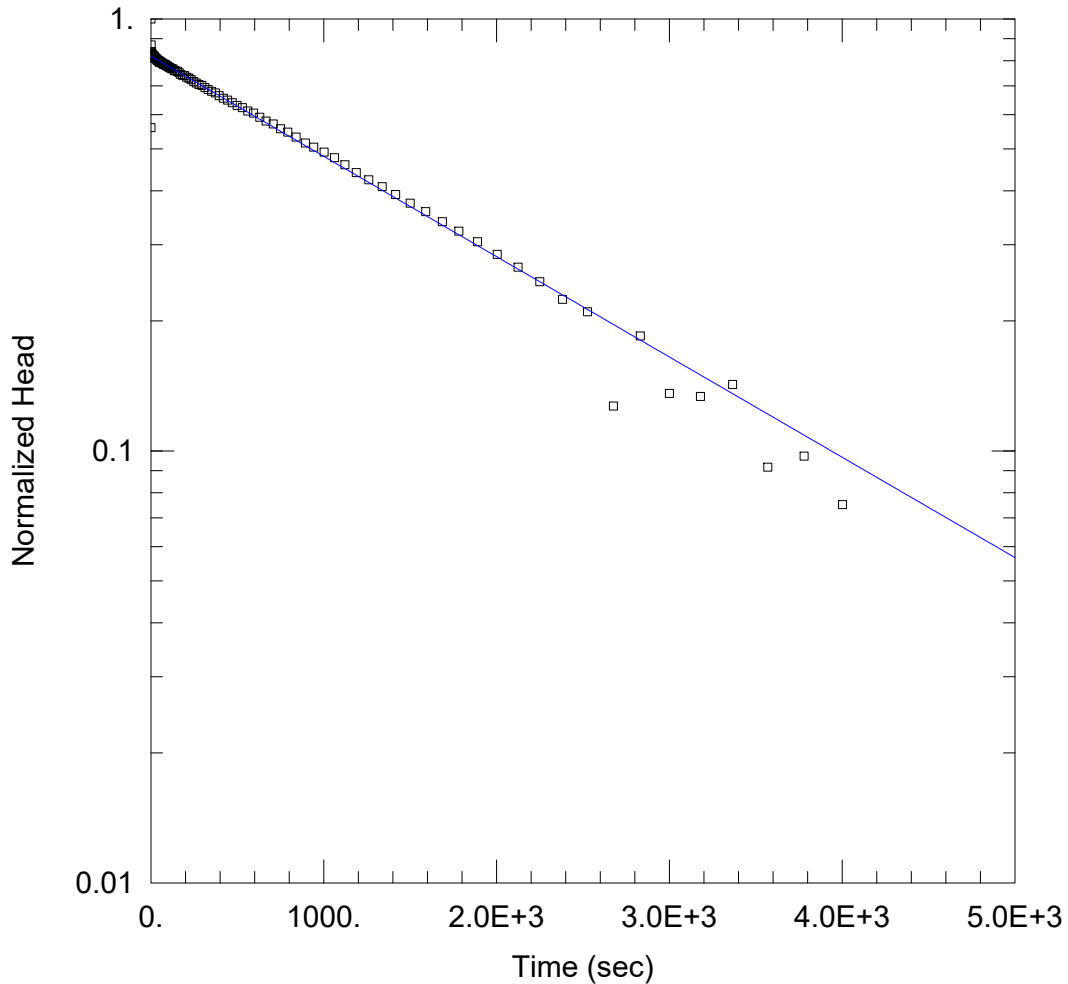
Initial Displacement: 1.761 ft  
 Total Well Penetration Depth: 109.7 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 4.108E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7851 ft



MW-16-05 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-05\_IN.aqt  
 Date: 05/22/17

Time: 13:42:57

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003  
 Location: China Township, MI  
 Test Well: MW-16-05  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

WELL DATA (MW-16-05)

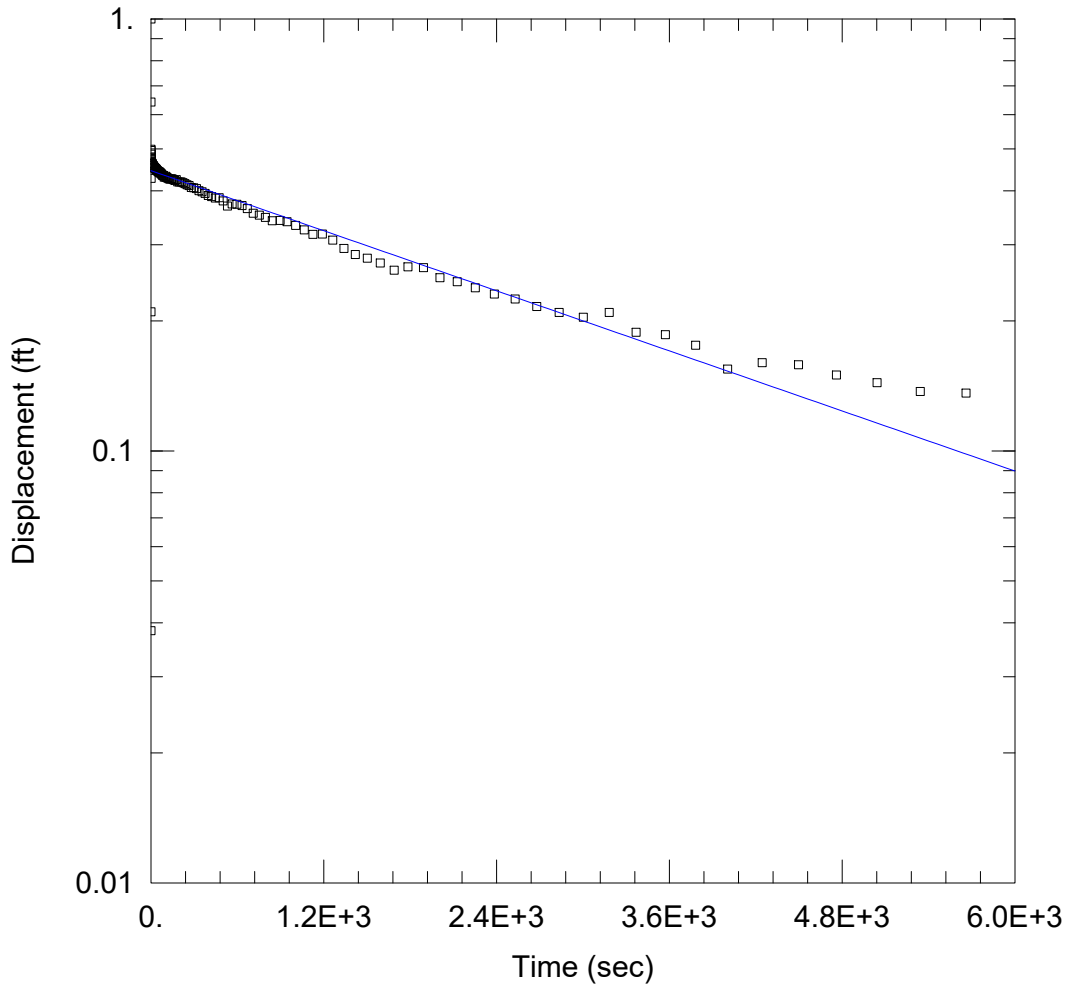
Initial Displacement: 0.905 ft  
 Total Well Penetration Depth: 130.7 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 130.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 4.258E-5 cm/sec

Solution Method: Bowyer-Rice  
 $y_0$  = 0.7426 ft



MW-16-05 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-05\_OUT.aqt  
 Date: 05/22/17

Time: 13:43:26

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-05  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

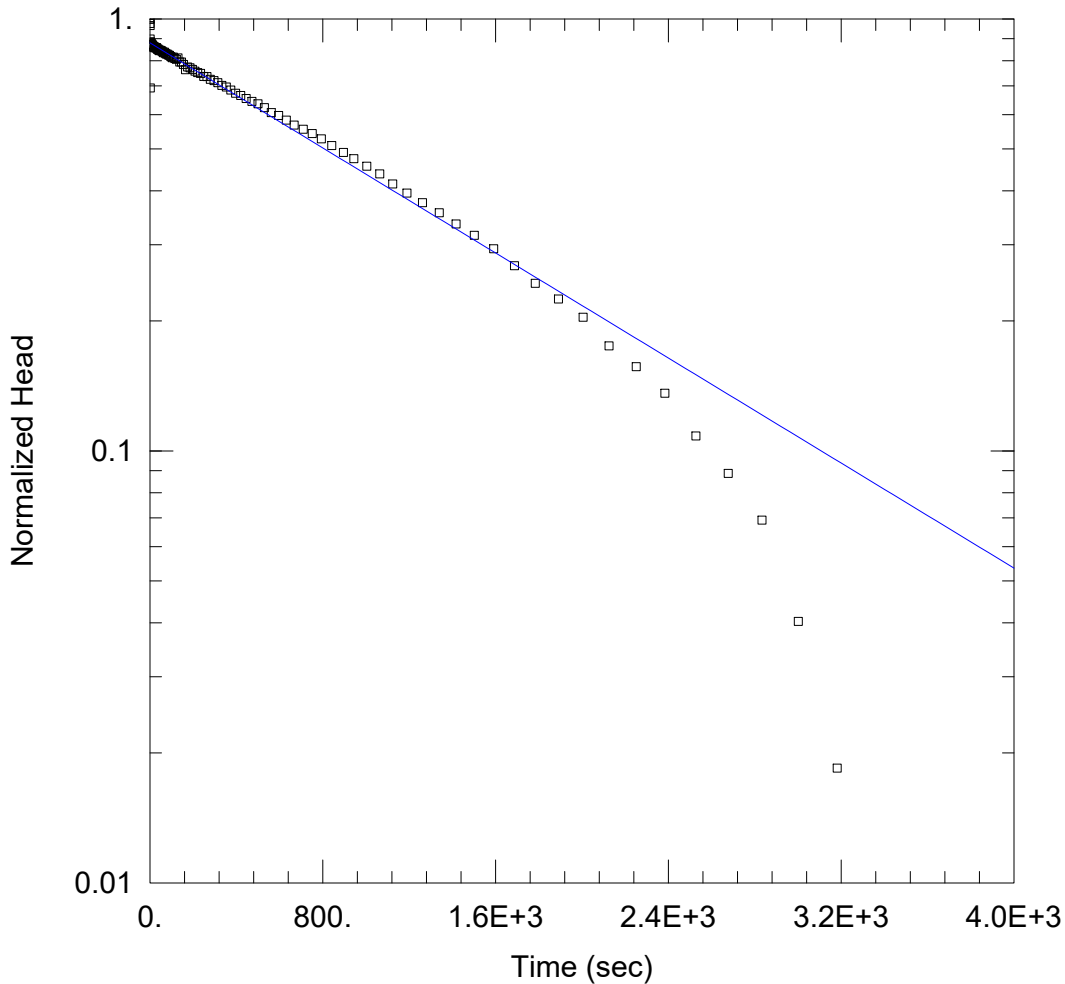
Initial Displacement: 1.668 ft  
 Total Well Penetration Depth: 130.7 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 130.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 2.125E-5 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.743 ft



MW-16-07 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_IN.aqt  
Date: 05/22/17

Time: 13:44:03

PROJECT INFORMATION

Company: TRC Environmental Corporation  
Client: DTE EC BRPP CCR  
Project: 231828.0003  
Location: China Township, MI  
Test Well: MW-16-07  
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

WELL DATA (MW-16-07)

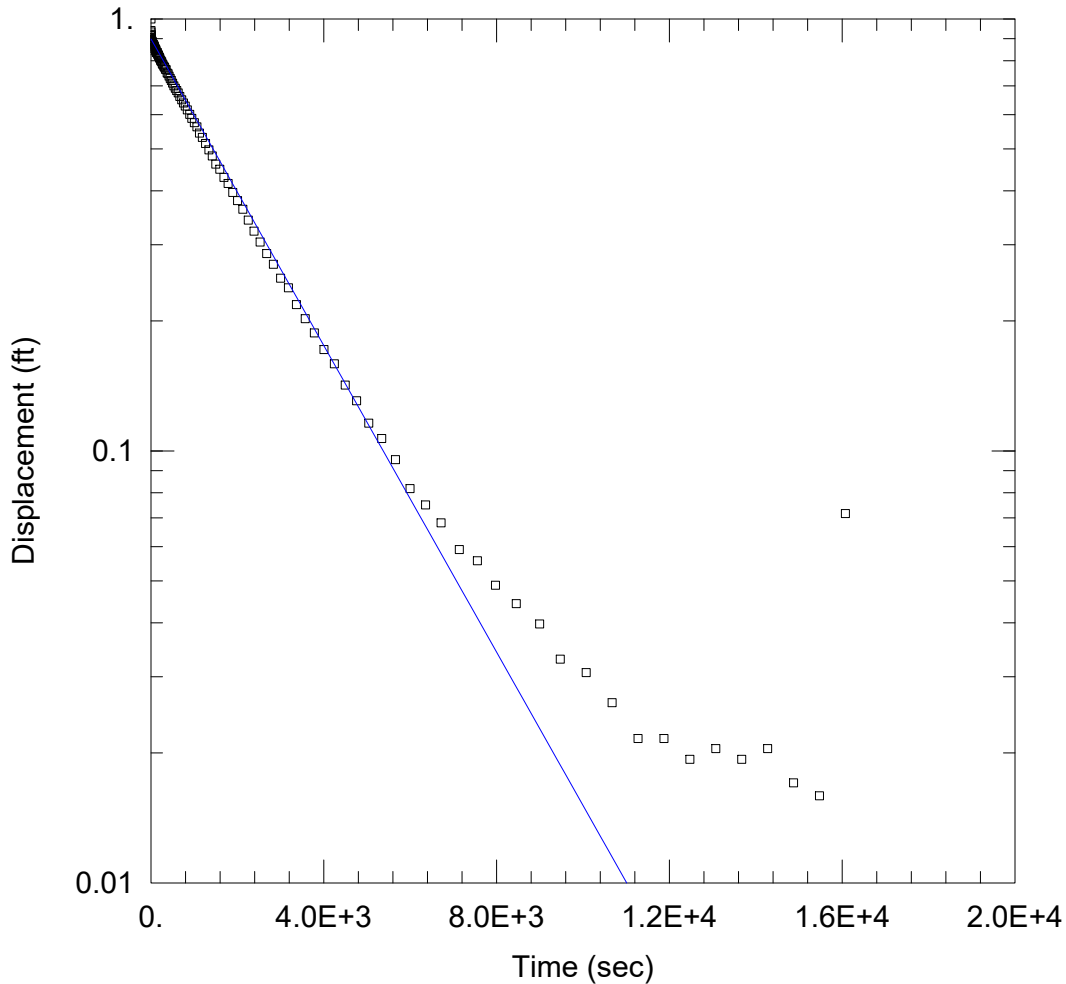
Initial Displacement: 0.868 ft  
Total Well Penetration Depth: 124.9 ft  
Casing Radius: 0.08333 ft

Static Water Column Height: 124.9 ft  
Screen Length: 5. ft  
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
K = 0.0001236 cm/sec

Solution Method: Bower-Rice  
 $y_0$  = 0.7638 ft



MW-16-07 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_OUT.aqt  
 Date: 05/22/17

Time: 13:44:45

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-07  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.88 ft  
 Total Well Penetration Depth: 124.4 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 124.4 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.212E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7909 ft

## **2021 Slug Test Results**



**2021 Hydraulic Conductivity Results Summary**  
**DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin**  
**4505 King Road, China Township, Michigan**

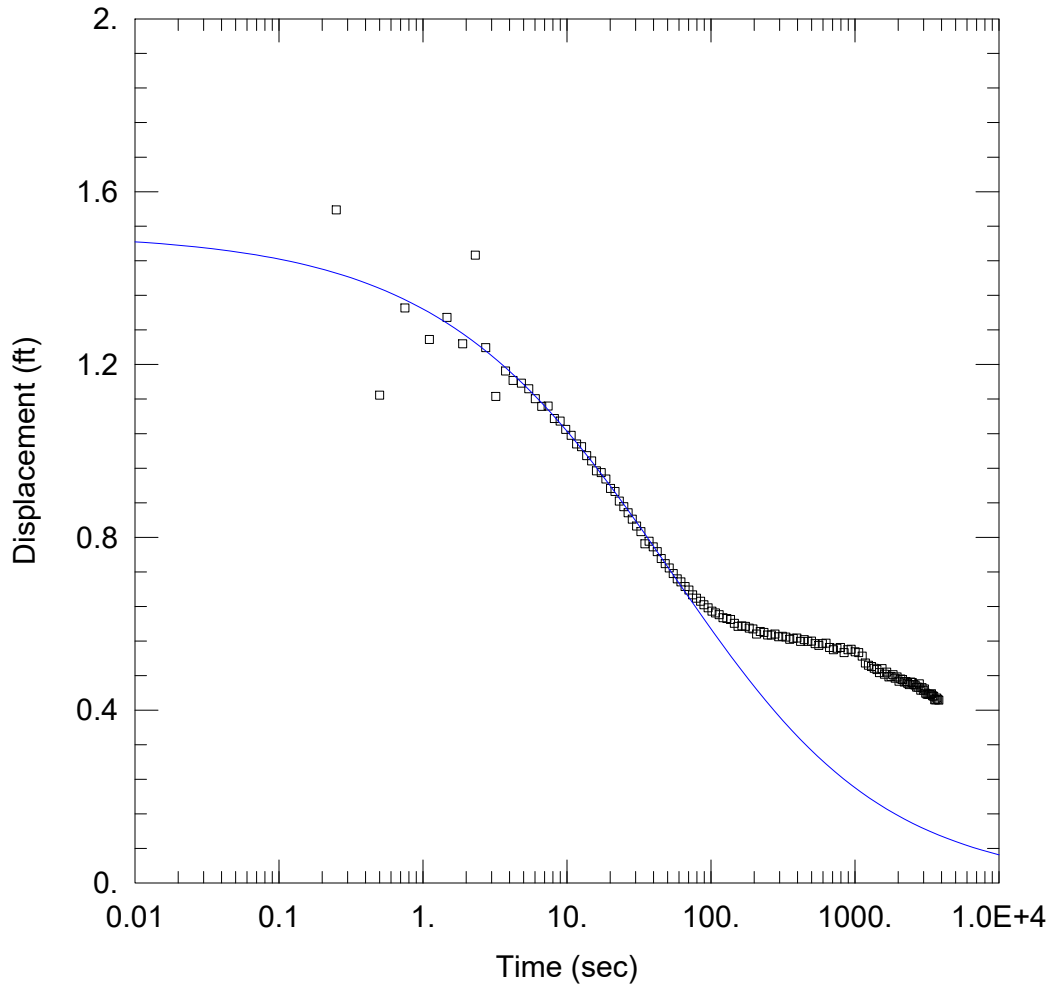
Test	WC (ft)	K (cm/s)	K (ft/day)	Comment/K Geometric mean (cm/s)	K Geometric mean (ft/day)
MW-16-02 Slug In	85.8	NA	NA	Not a good match, use slug out test	NA
MW-16-02 Slug Out	85.8	4.2E-04	1.2	4.2E-04	1.2
MW-16-03 Slug In	123.1	9.8E-03	27.8	9.6E-03	27.4
MW-16-03 Slug Out	123.1	9.5E-03	26.9		
MW-16-06 Slug In	125.6	1.0E-04	0.28	1.0E-04	0.30
MW-16-06 Slug Out	125.6	1.1E-04	0.31		
MW-16-08 Slug In	124.9	1.2E-05	0.03	1.1E-05	0.03
MW-16-08 Slug Out	124.9	1.1E-05	0.03		
MW-16-09 Slug In	126.9	1.5E-04	0.43	1.5E-04	0.43
MW-16-09 Slug Out	126.9	1.5E-04	0.43		
MW-16-10 Slug In	135.3	3.6E-05	0.10	3.6E-05	0.10
MW-16-10 Slug Out	135.3	3.7E-05	0.10		
MW-16-11A Slug In	127.3	6.1E-05	0.17	6.3E-05	0.18
MW-16-11A Slug Out	127.3	6.5E-05	0.18		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A 5' long by 1" diameter slug was utilized to complete slug tests in these wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 In.aqt  
 Date: 10/29/21 Time: 11:44:26

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

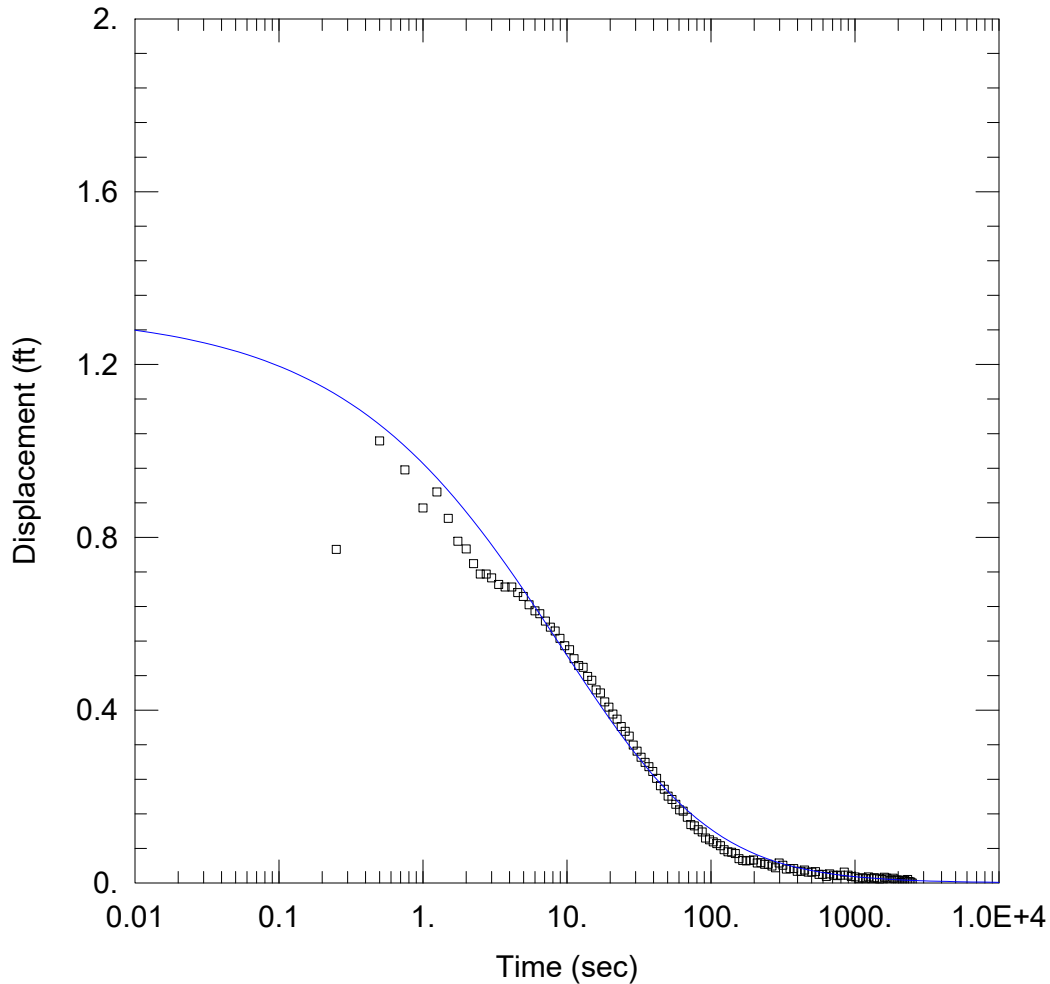
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.503 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.0006905 cm<sup>2</sup>/sec S = 3.692



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 Out.aqt  
 Date: 10/29/21 Time: 11:46:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

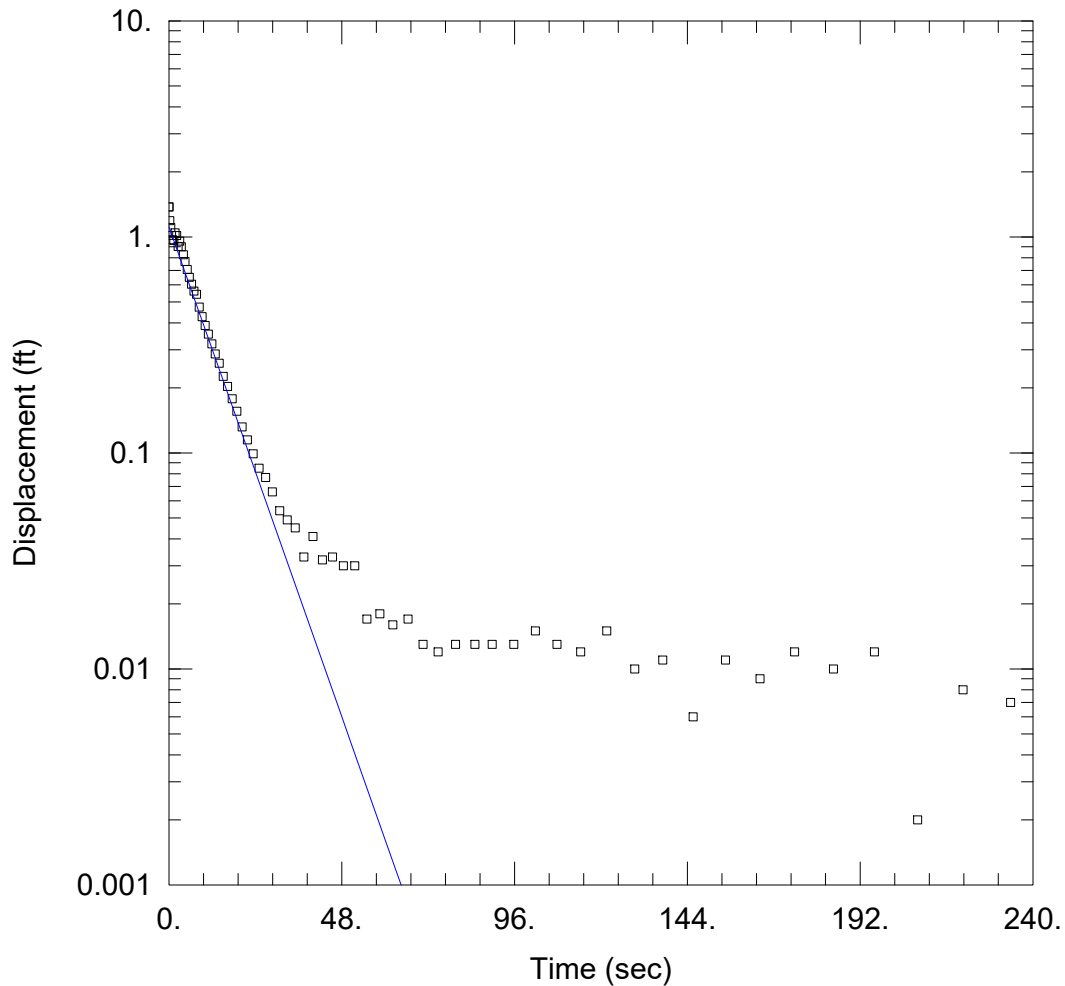
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.32 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.1533 cm<sup>2</sup>/sec S = 0.1



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 In.aqt  
 Date: 10/29/21 Time: 11:52:09

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

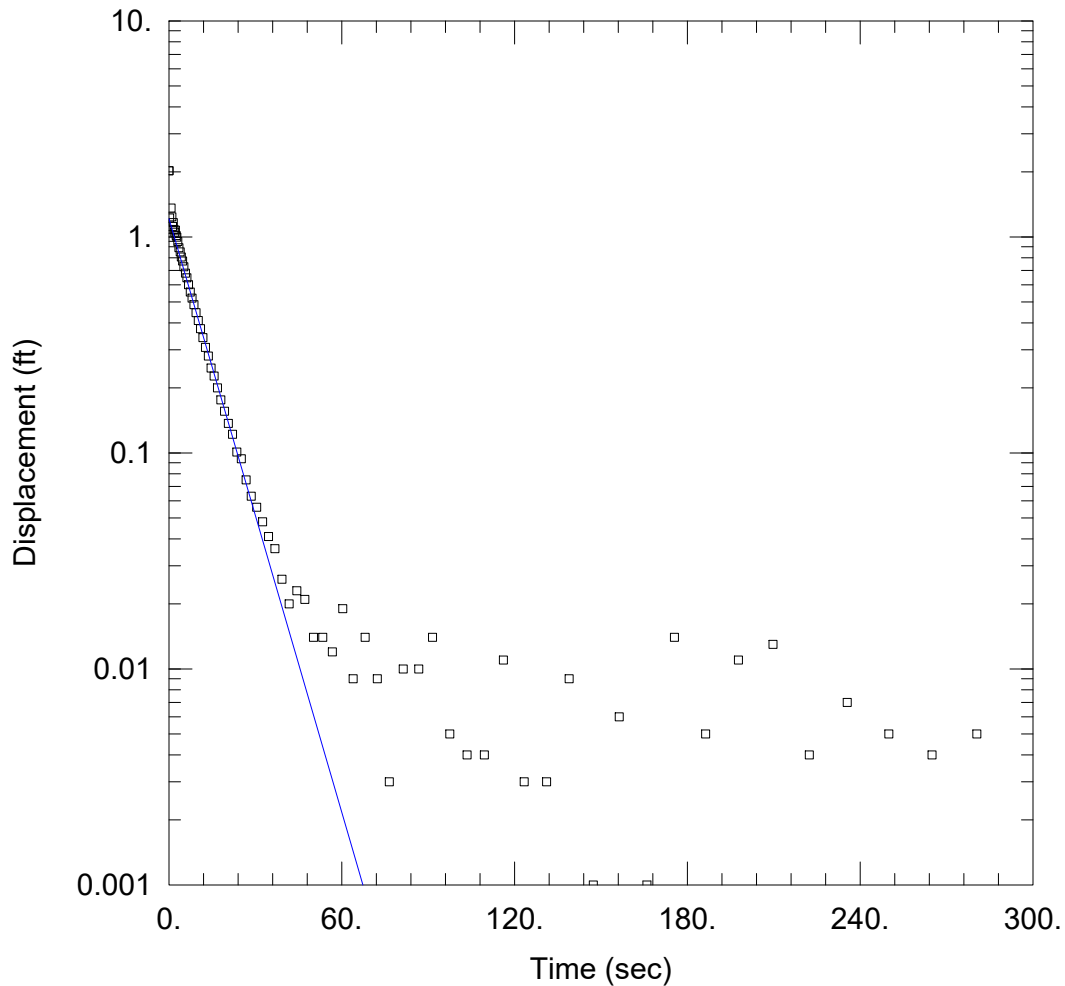
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 1.376 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.009782$  cm/sec  $y_0 = 1.113$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 Out.aqt  
 Date: 10/29/21 Time: 11:53:59

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

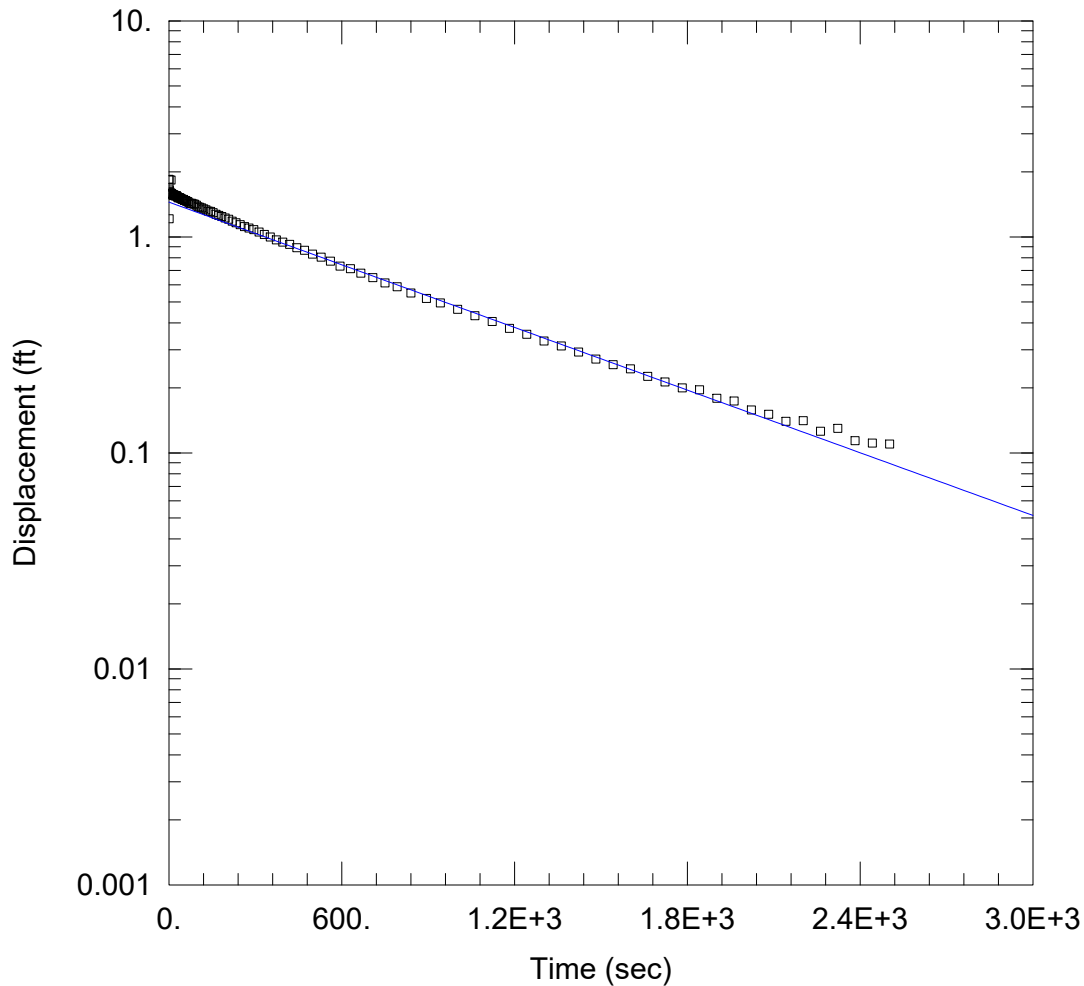
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 2.023 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.009488 cm/sec y0 = 1.215 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 In.aqt  
 Date: 10/29/21 Time: 11:57:18

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

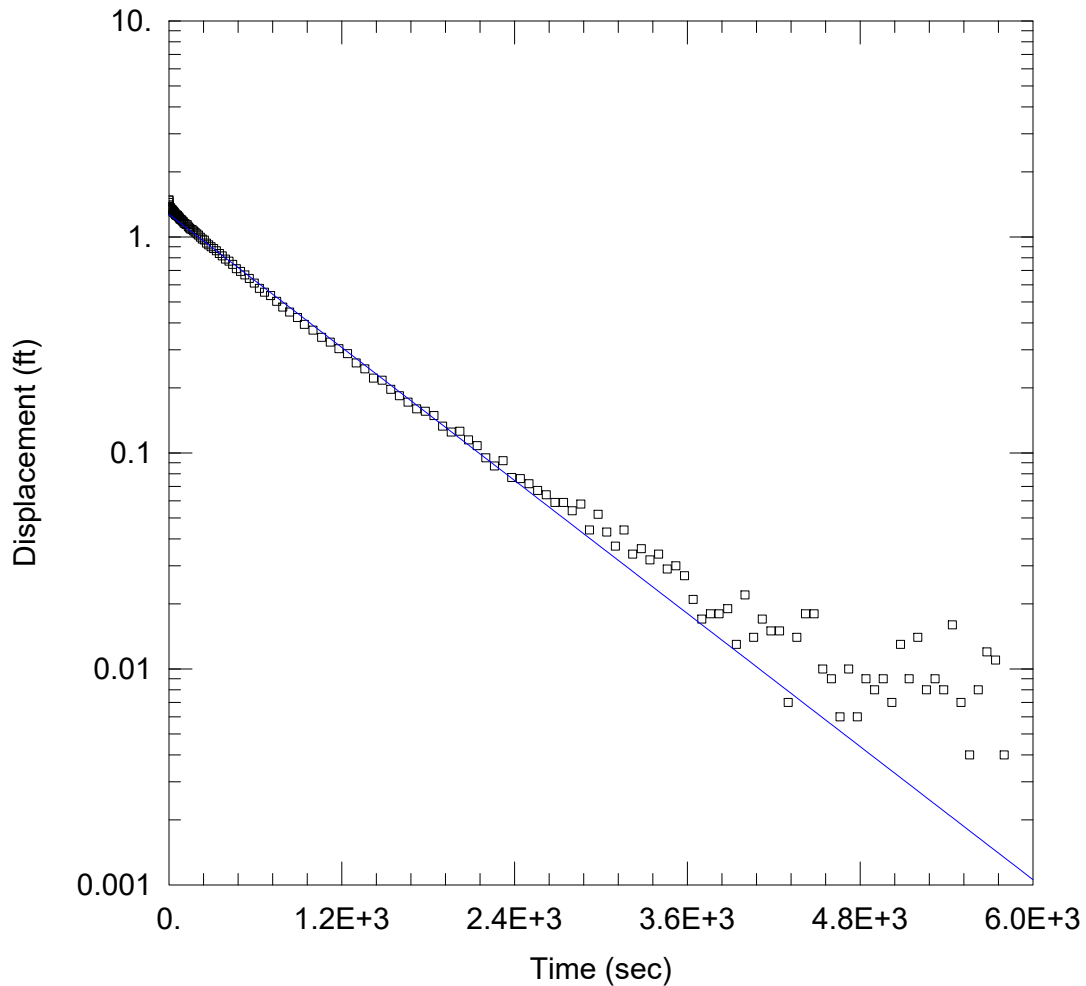
Saturated Thickness: 6. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.847 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.0001002 cm/sec y0 = 1.449 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 Out.aqt  
 Date: 10/29/21 Time: 11:58:41

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

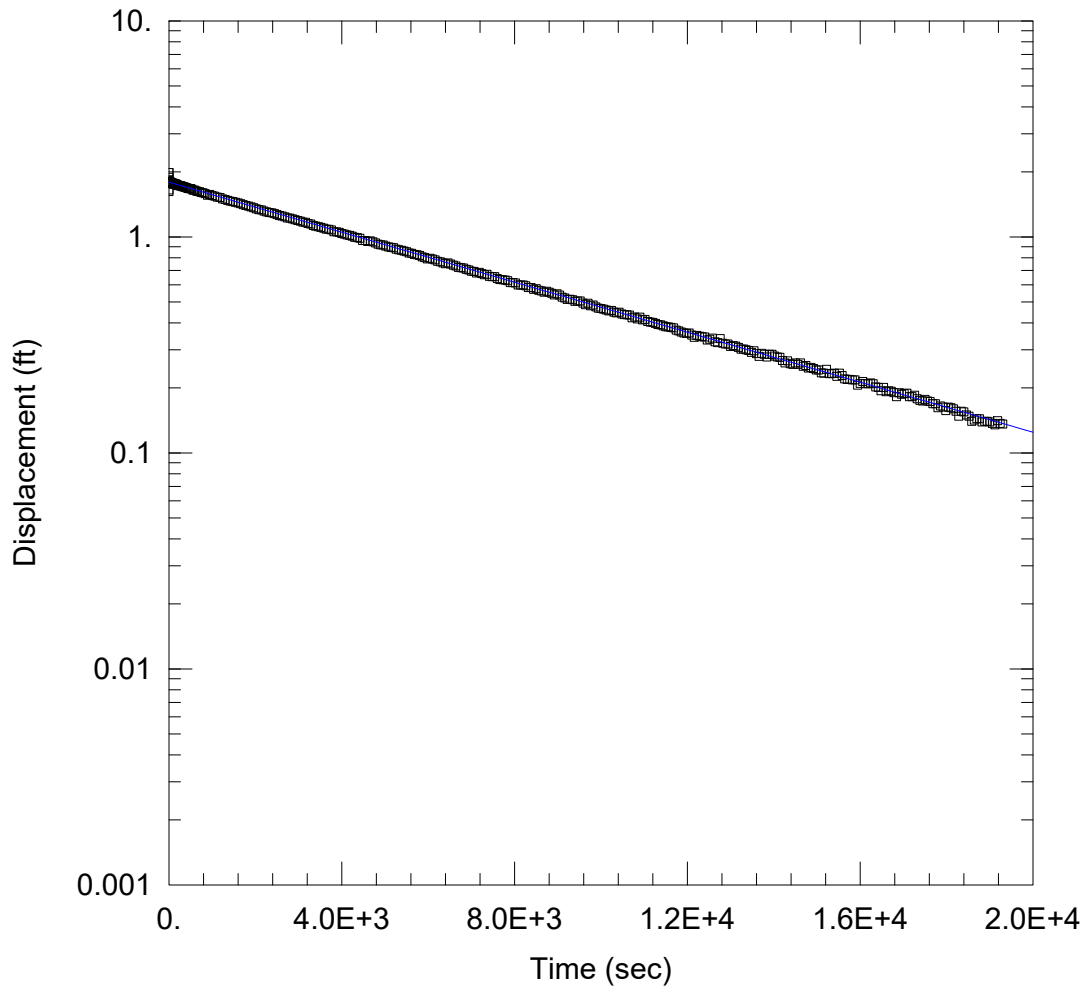
Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.481 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001063$  cm/sec  $y_0 = 1.271$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 In.aqt  
 Date: 10/29/21 Time: 12:36:01

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

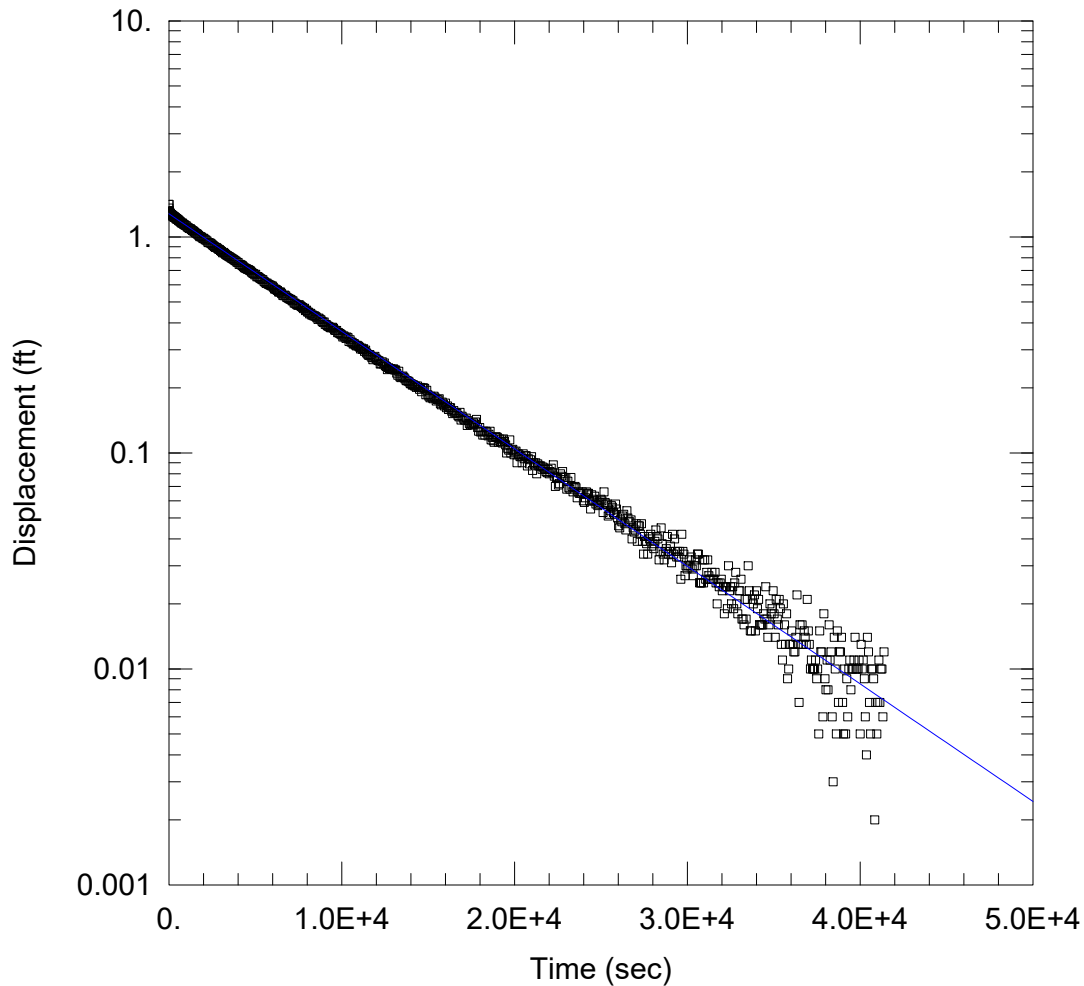
WELL DATA (MW-16-08)

Initial Displacement: 1.987 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 1.199E-5 cm/sec y0 = 1.791 ft





### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 Out.aqt  
 Date: 10/29/21 Time: 12:38:13

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

### AQUIFER DATA

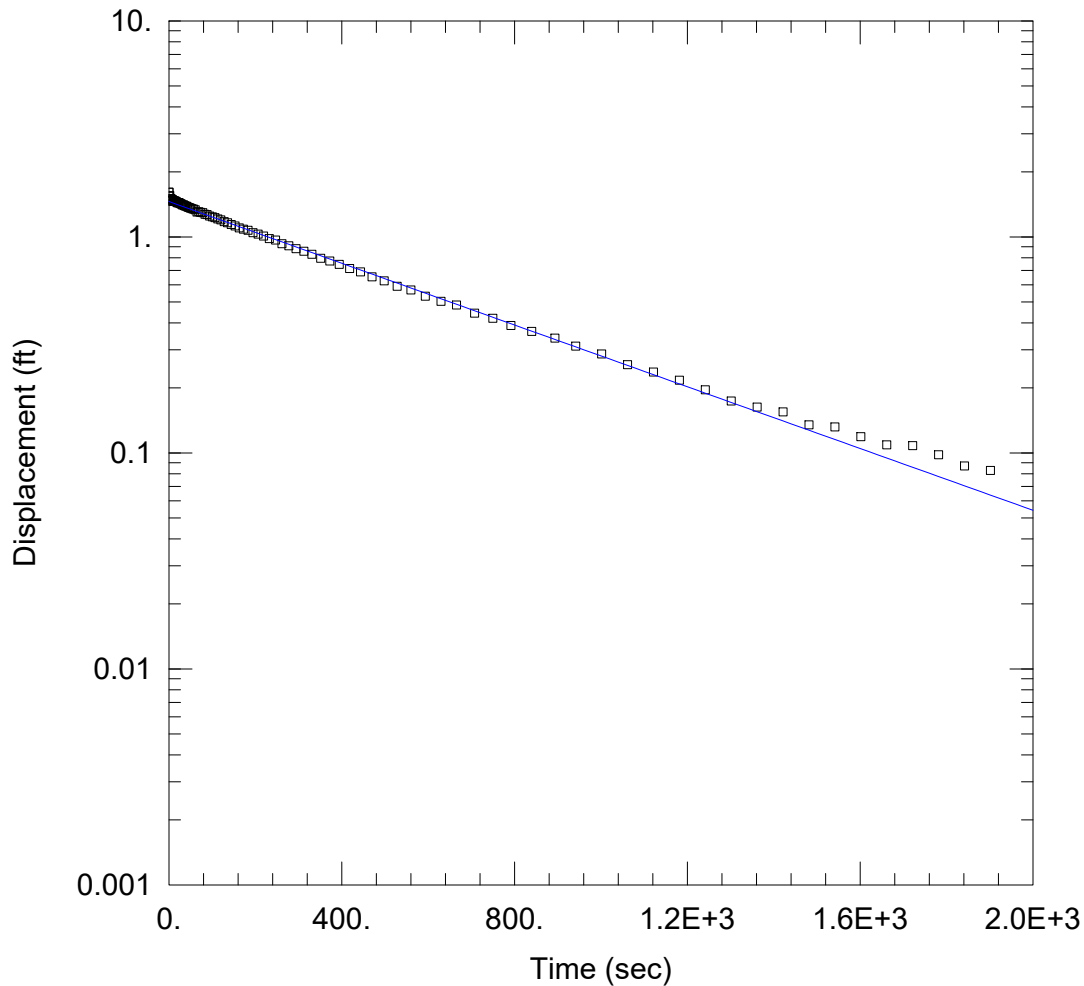
Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-08)

Initial Displacement: 1.415 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 1.127E-5$  cm/sec  $y_0 = 1.279$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 In.aqt  
 Date: 10/29/21 Time: 12:41:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

AQUIFER DATA

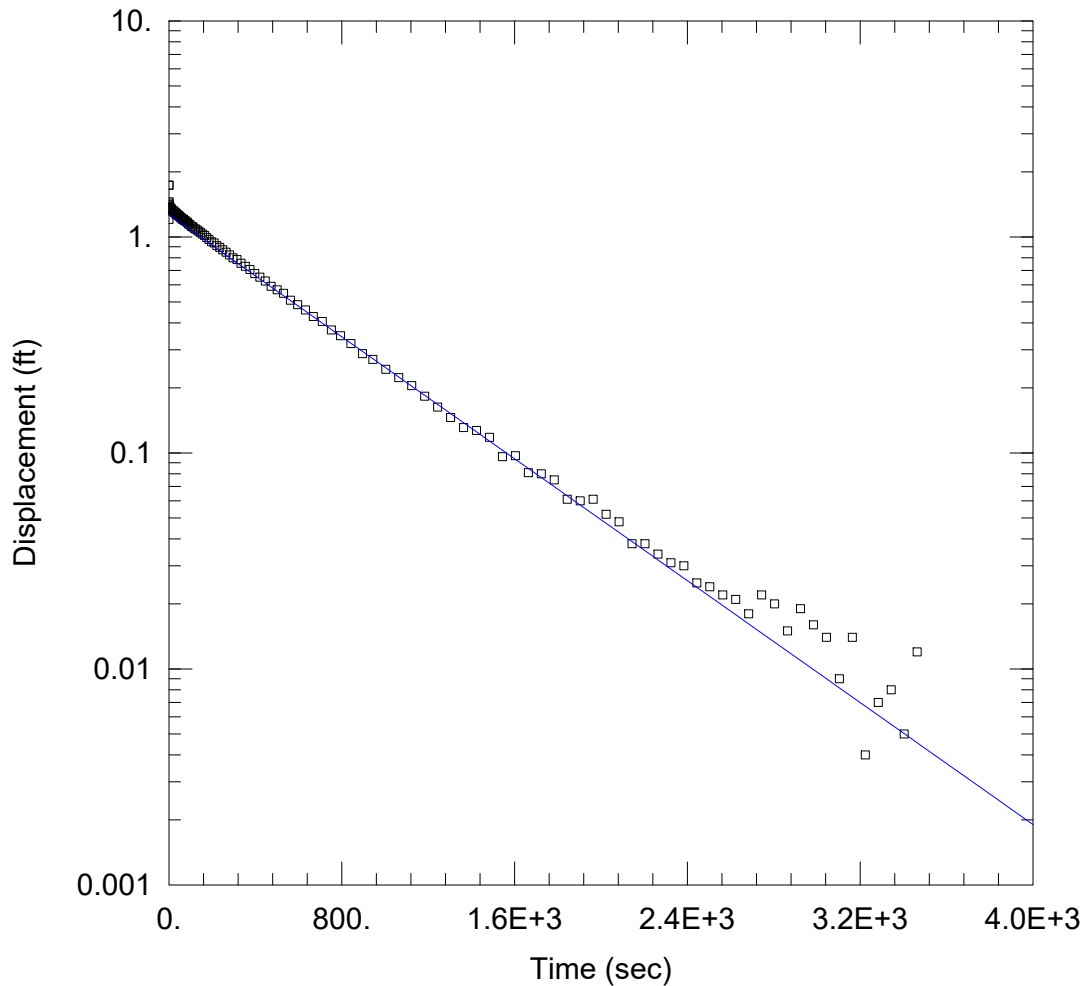
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.611 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.000148 cm/sec y0 = 1.458 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 Out.aqt  
 Date: 10/29/21 Time: 12:43:28

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

### AQUIFER DATA

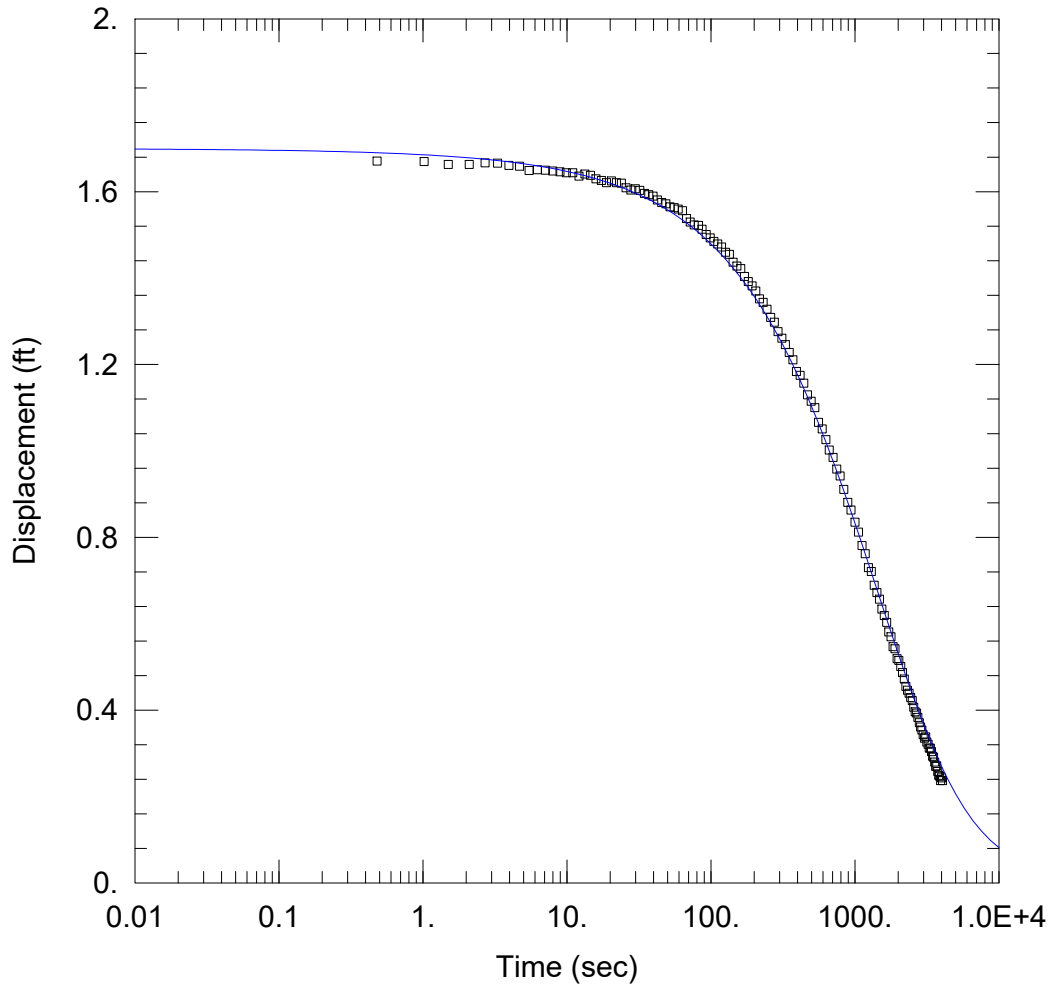
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-09)

Initial Displacement: 1.736 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001461$  cm/sec  $y_0 = 1.265$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 In.aqt  
 Date: 10/29/21 Time: 12:52:23

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

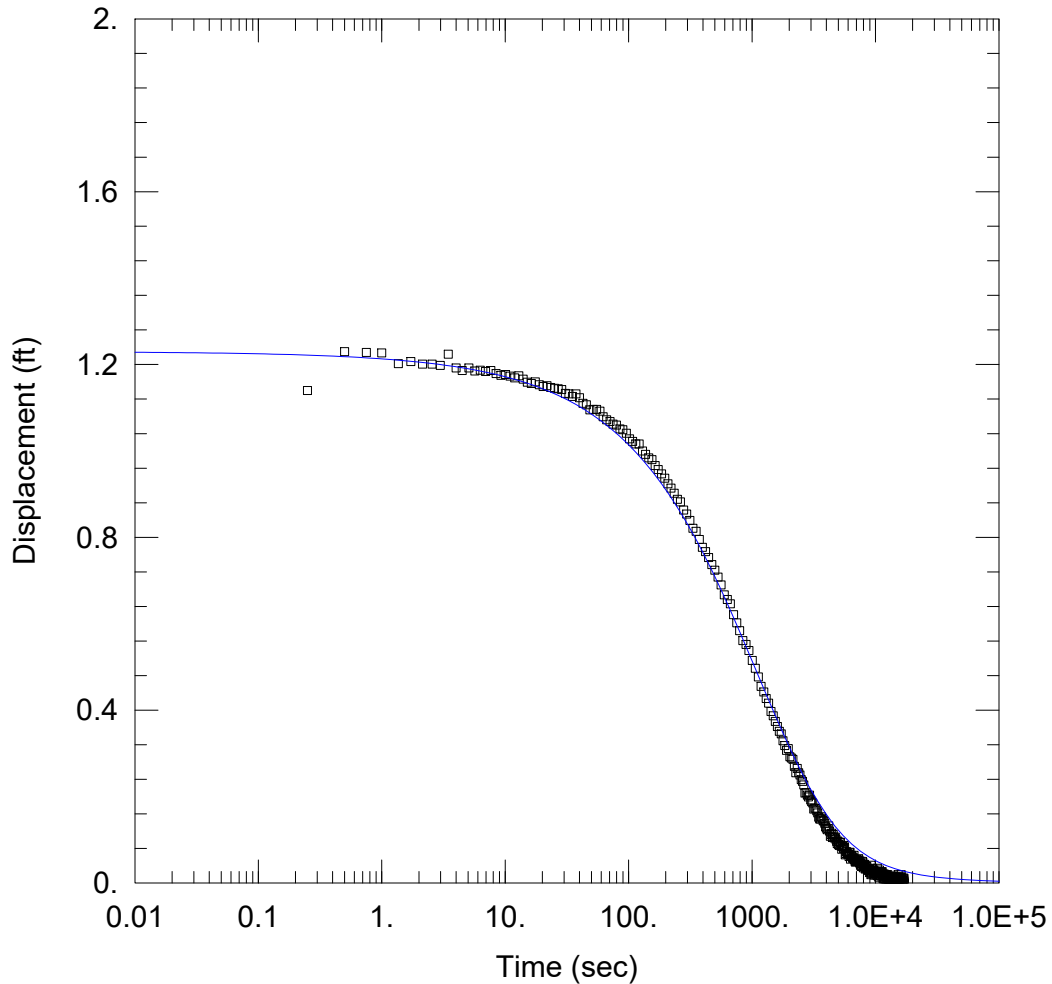
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.7 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005538 cm<sup>2</sup>/sec S = 0.001701



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 Out.aqt  
 Date: 10/29/21 Time: 12:54:58

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

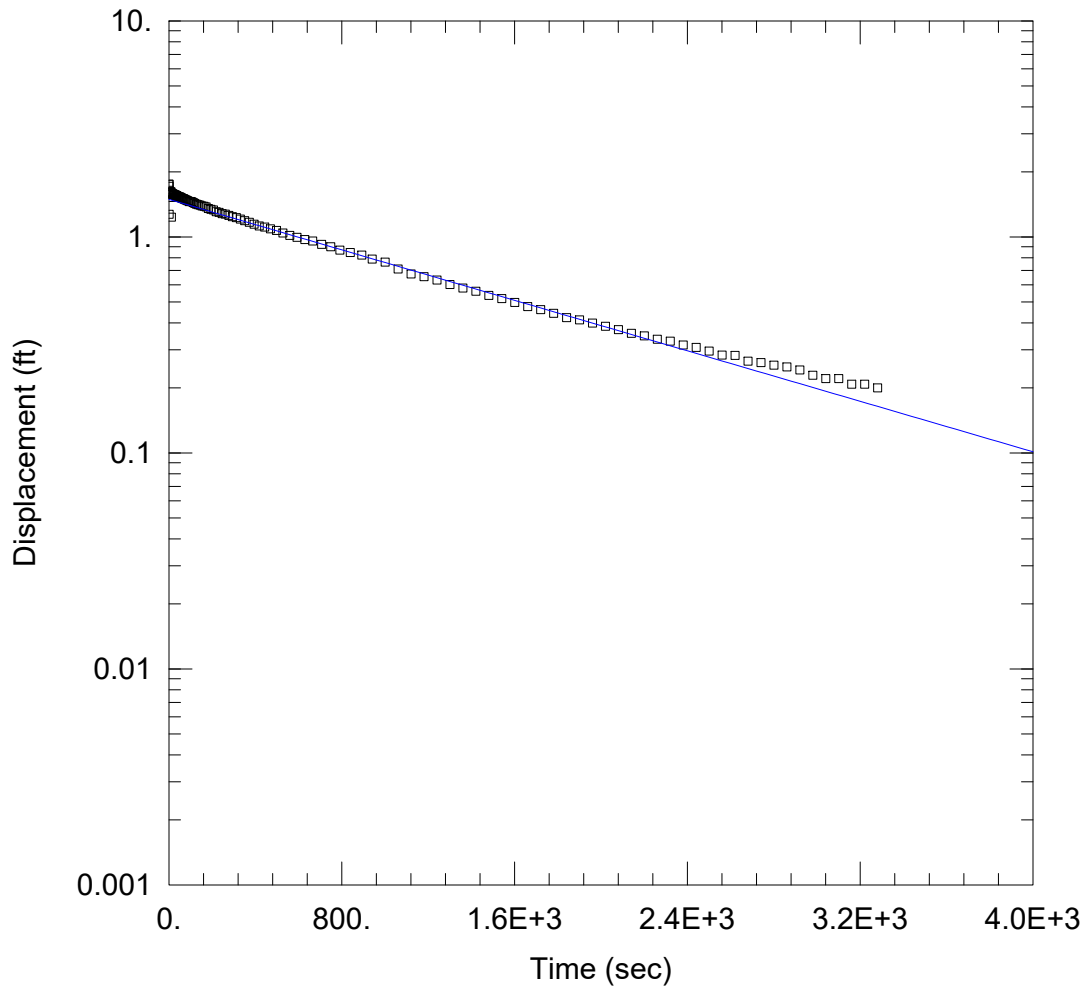
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.23 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005626 cm<sup>2</sup>/sec S = 0.004752



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A In.aqt  
 Date: 10/29/21 Time: 12:59:49

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

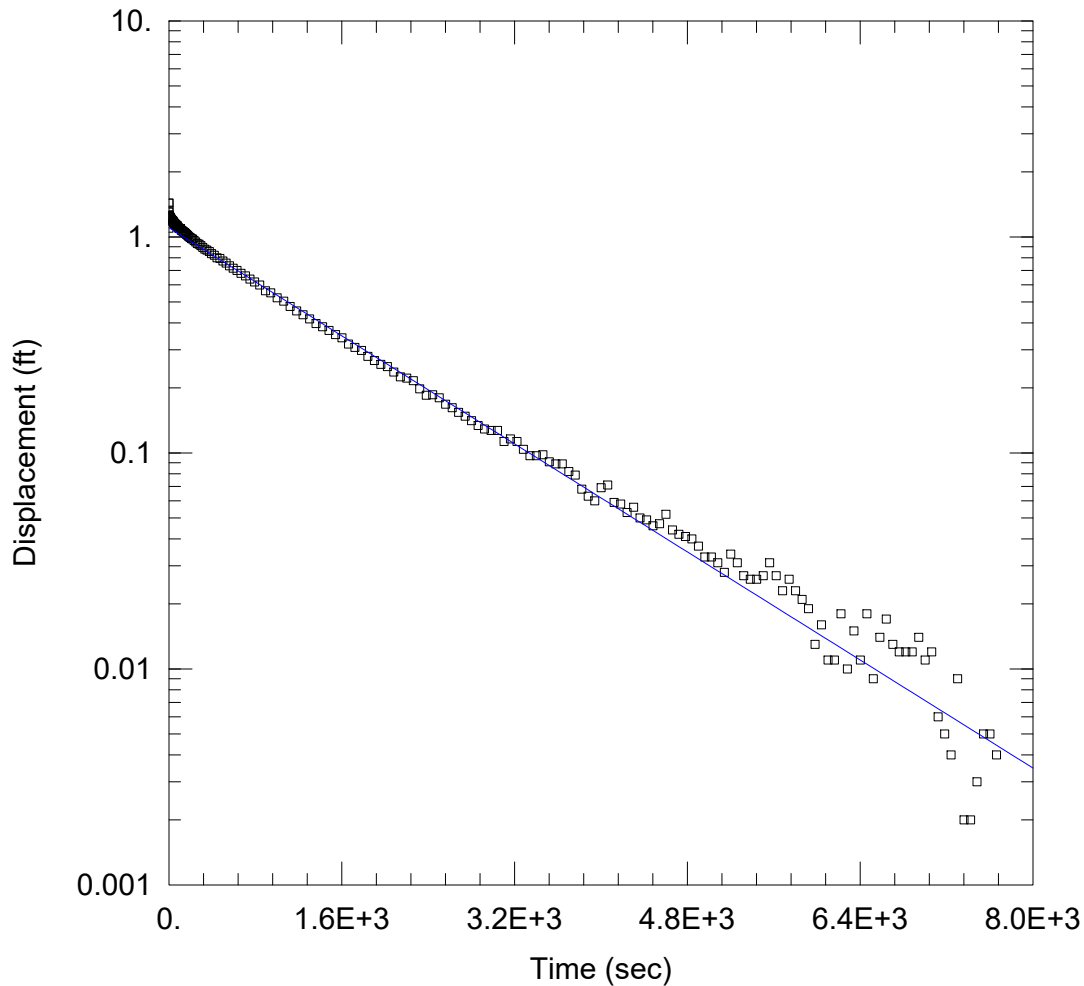
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.753 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 6.051E-5 cm/sec y0 = 1.492 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A Out.aqt  
 Date: 10/29/21 Time: 13:00:15

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.434 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 6.477E-5$  cm/sec  $y_0 = 1.103$  ft

## **Appendix B**

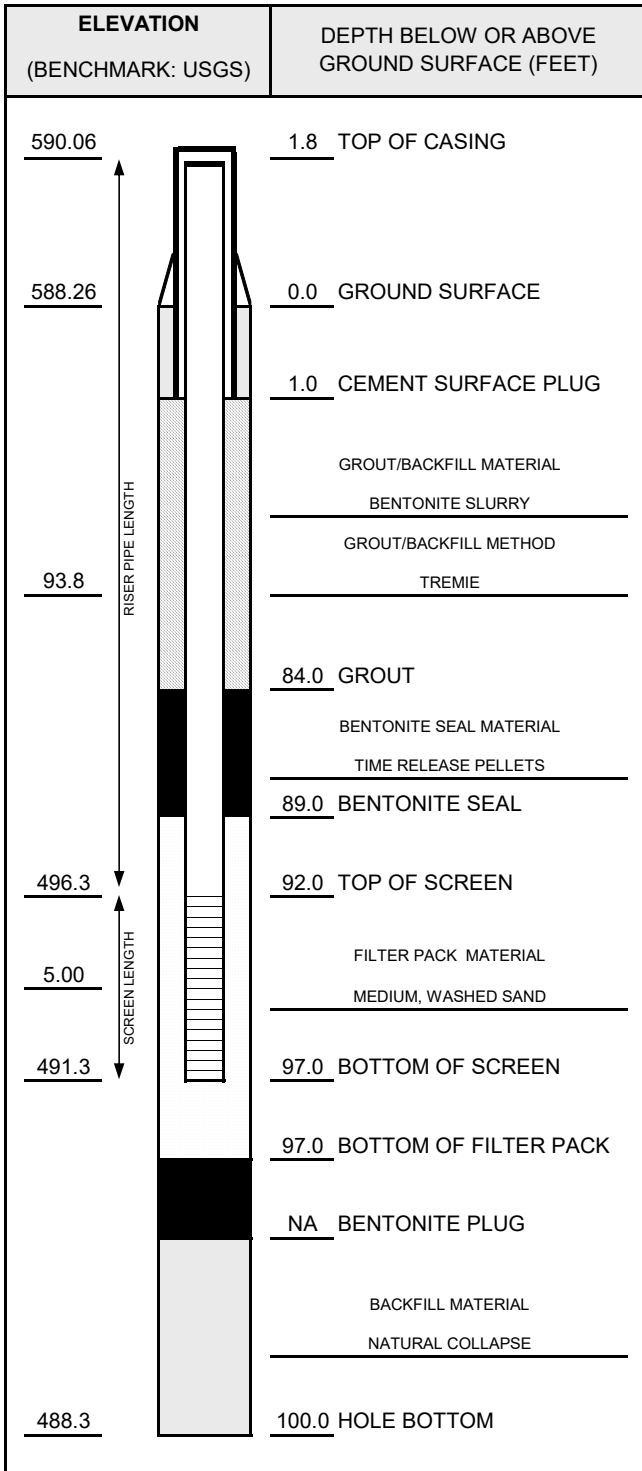
### **Monitoring Well Logs**





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-01</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/17/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	98.20	T/PVC	3/21/2016	--
DTB AFTER DEVELOPING:	100.32	T/PVC	4/13/2016	845
SWL BEFORE DEVELOPING:	12.92	T/PVC	3/21/2016	--
SWL AFTER DEVELOPING:	16.32	T/PVC	4/13/2016	845
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

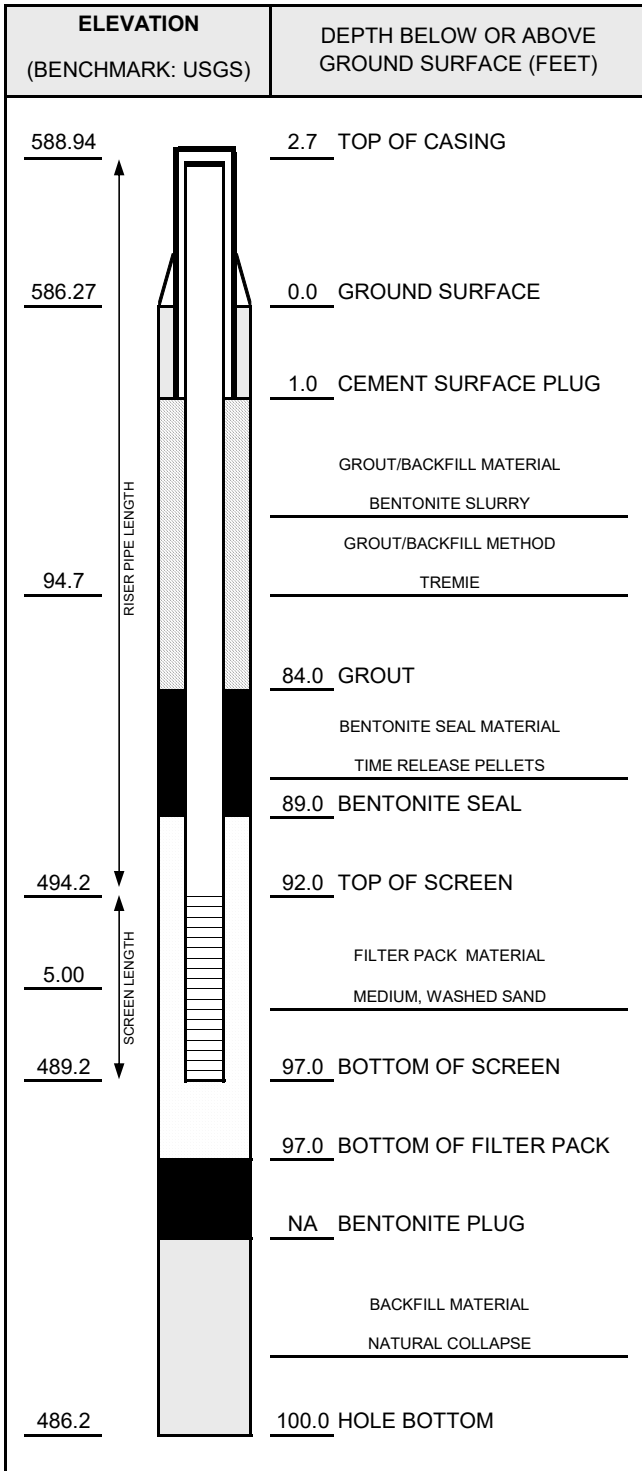
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-02</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
TYPE OF RISER:	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
SCREEN TYPE:	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>460</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
OTHER SWL:		T/PVC		

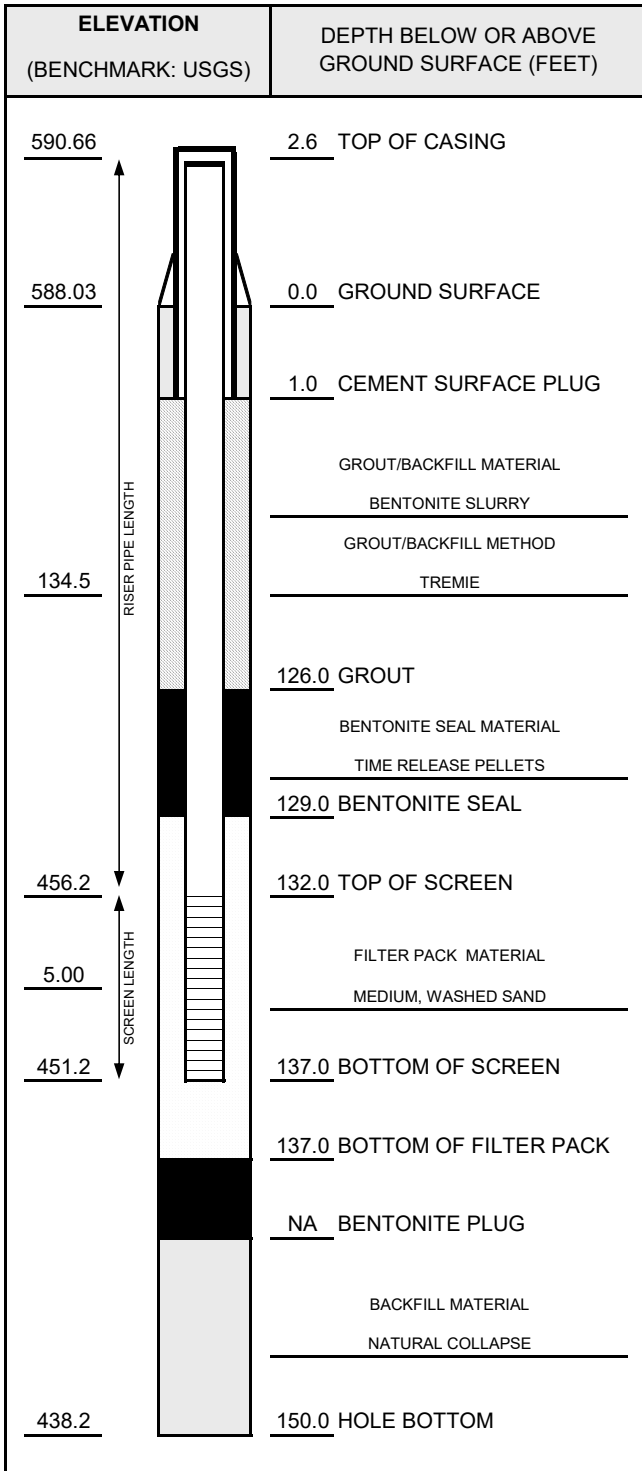
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-03</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>4</u> IN. FROM <u>140</u> TO <u>150</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>60</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>LIGHT GRAY</u>
CLARITY AFTER:	<u>SLIGHTLY TURBID</u>
COLOR AFTER:	<u>VERY LIGHT GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
OTHER SWL:		T/PVC		

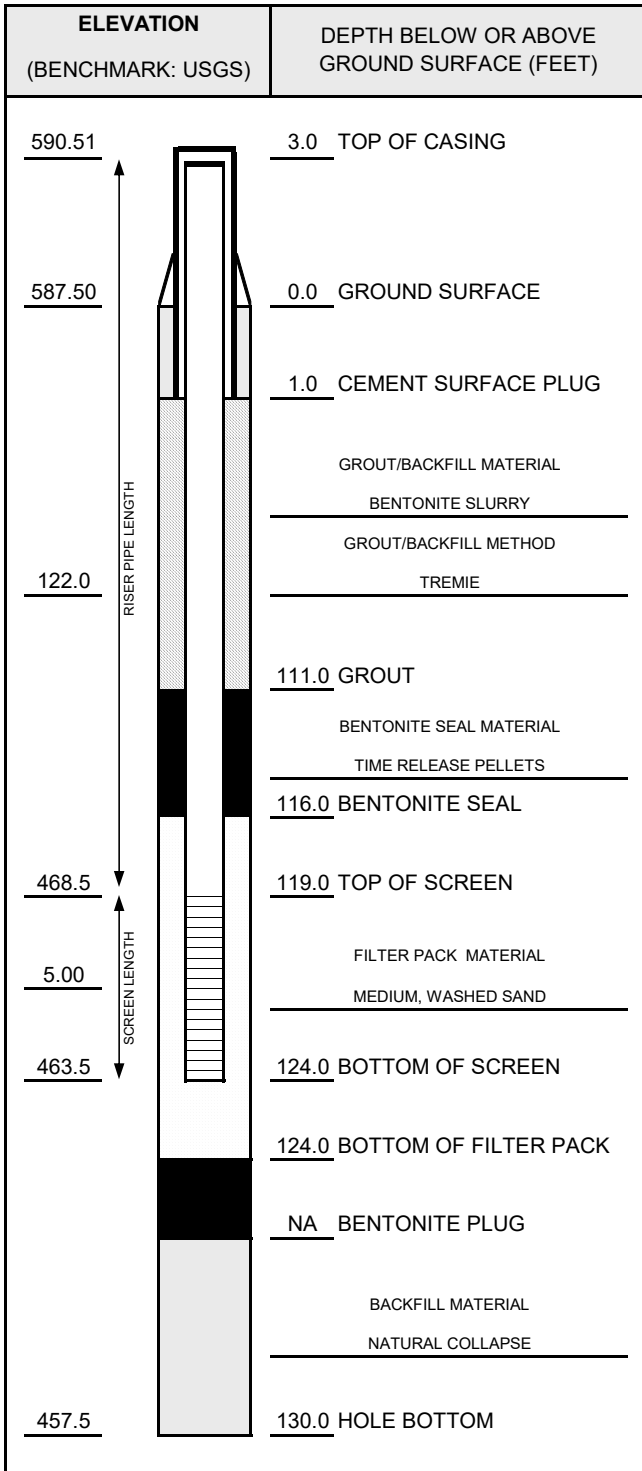
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-04</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>124</u> FT. <u>4</u> IN. FROM <u>124</u> TO <u>130</u> FT.
SURF. CASING DIAMETER:	___ IN. FROM ___ TO ___ FT. ___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>288</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

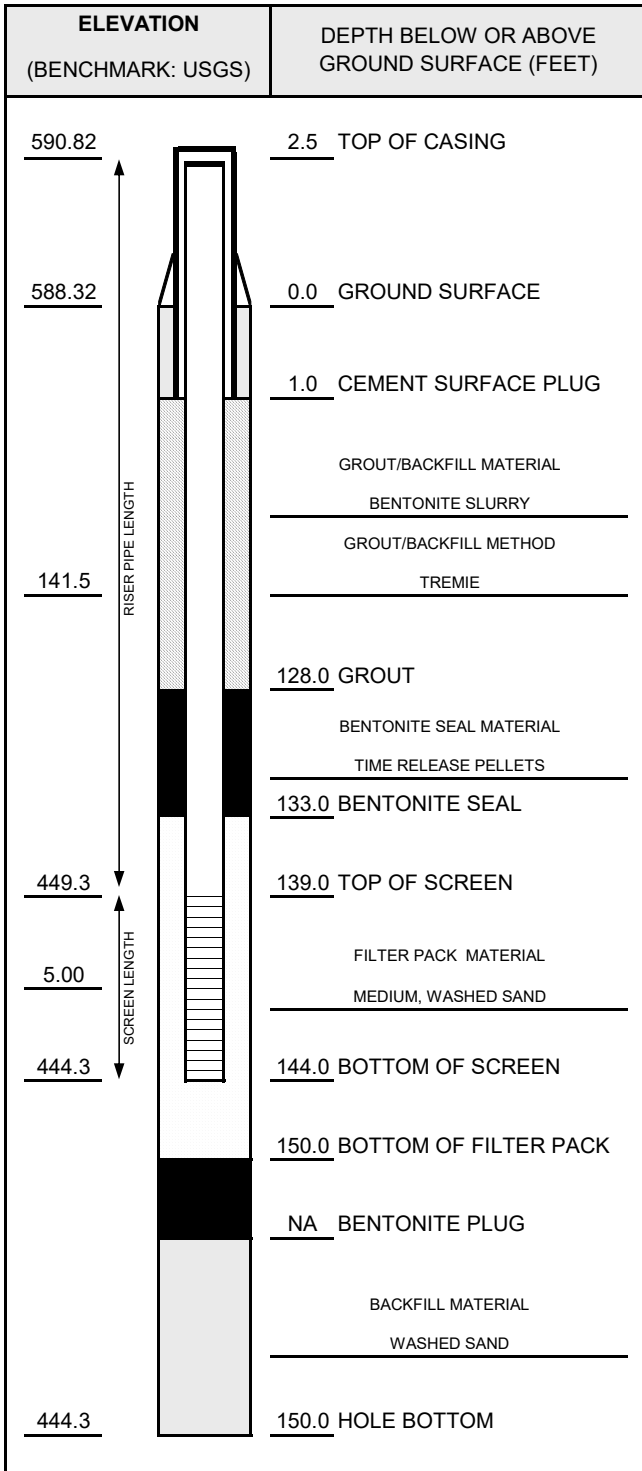
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-05</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>300</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
OTHER SWL:		T/PVC		

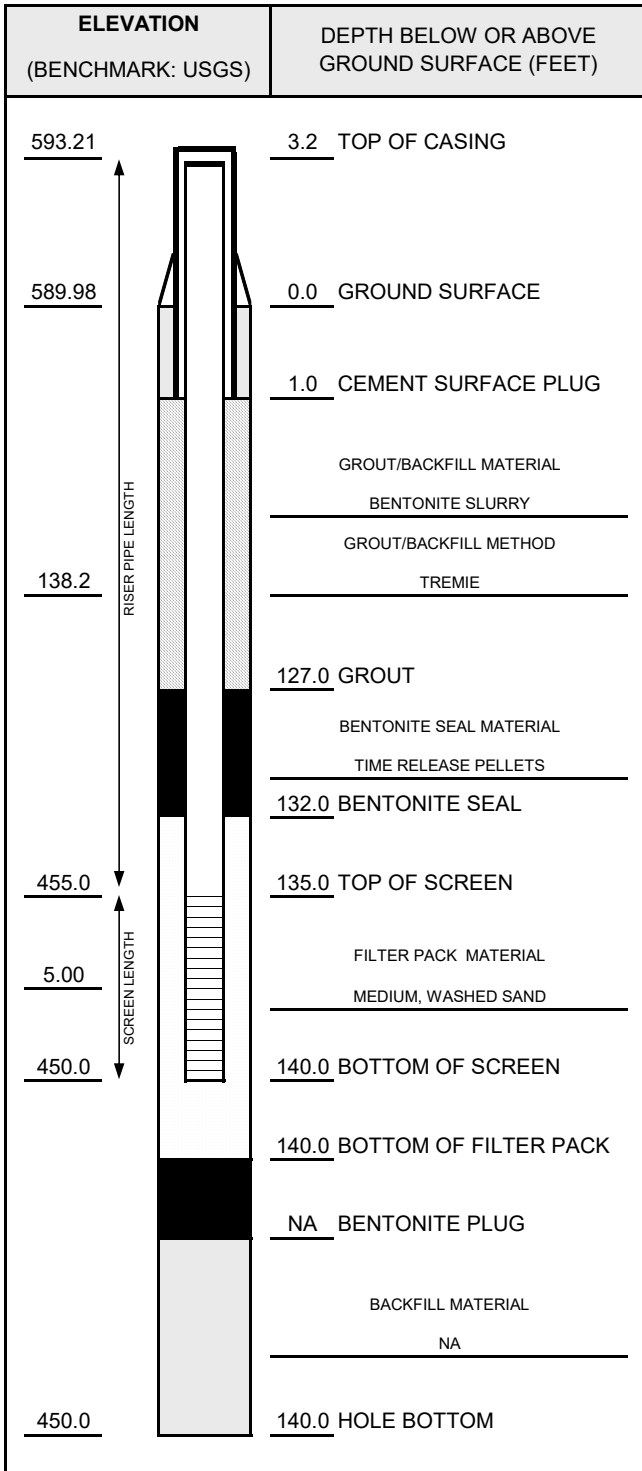
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-06</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016 INSTALLED BY: A. Knutson CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>50</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NOT MEASURED</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
OTHER SWL:		T/PVC		

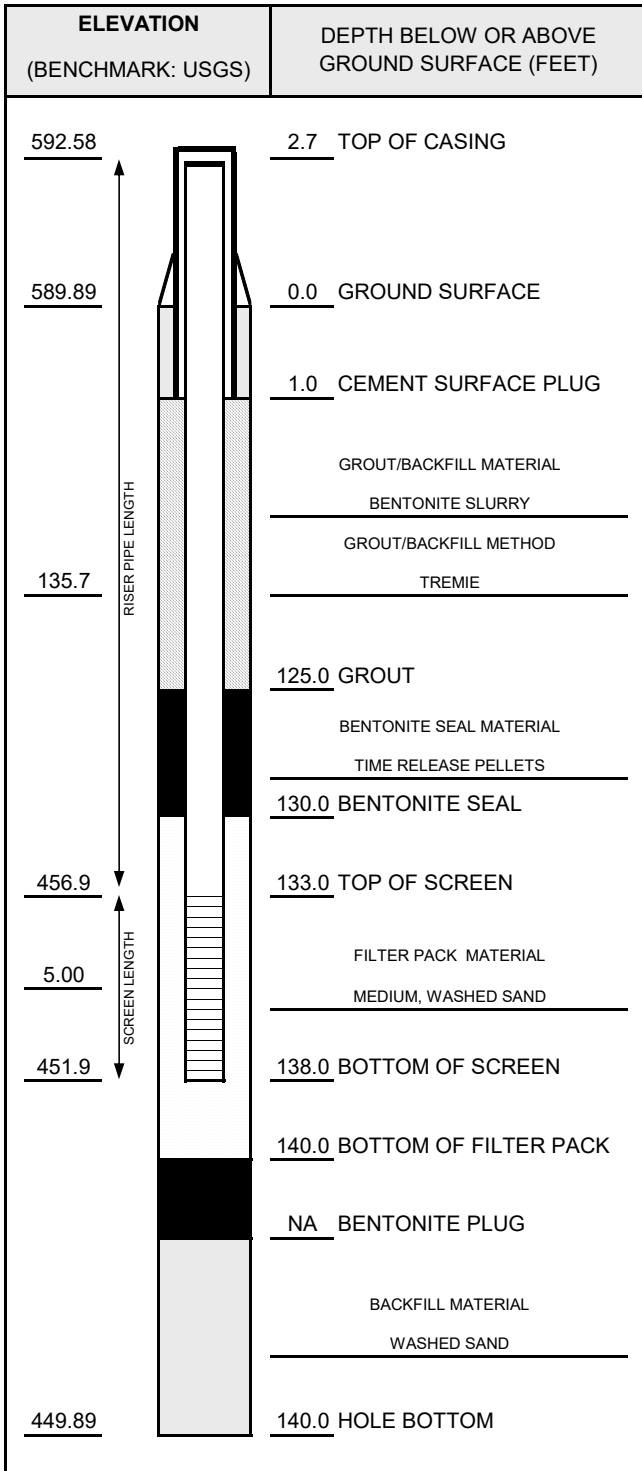
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-07</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
OTHER SWL:		T/PVC		

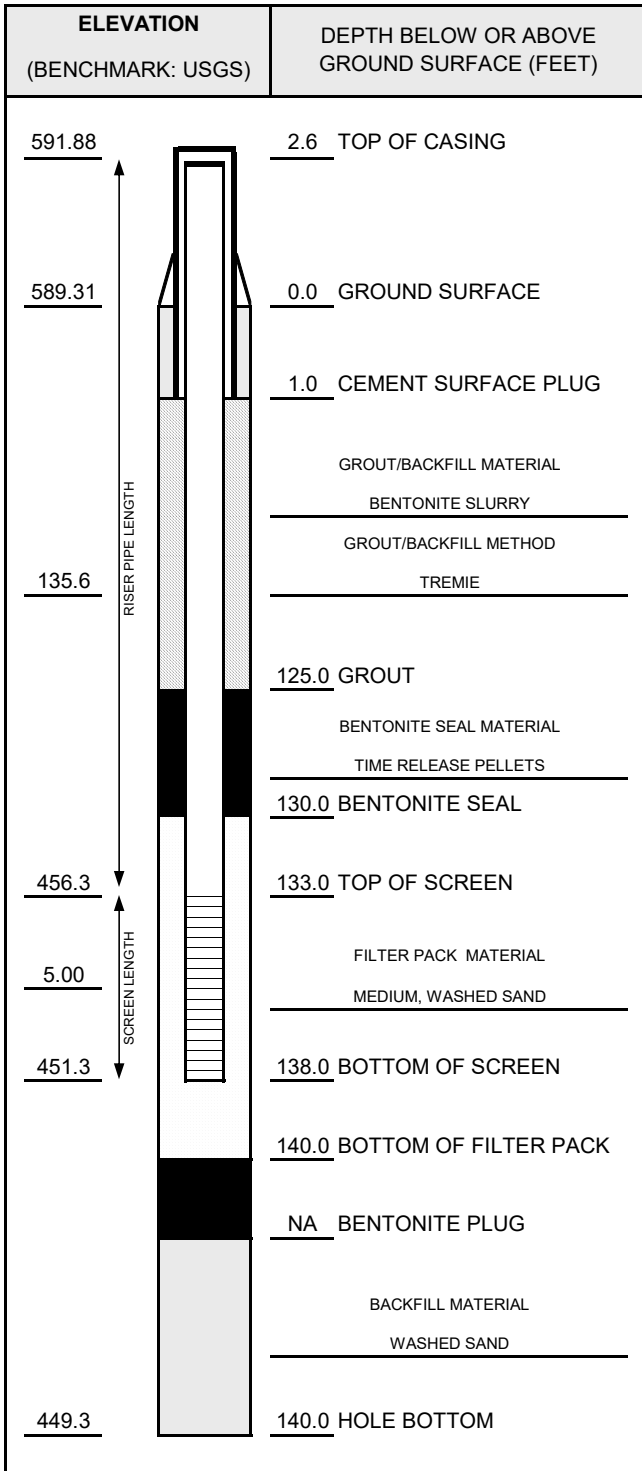
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-08</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016 INSTALLED BY: A. Knutson
CHECKED BY: C. Scieszka	



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>125</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
OTHER SWL:		T/PVC		

NOTES:

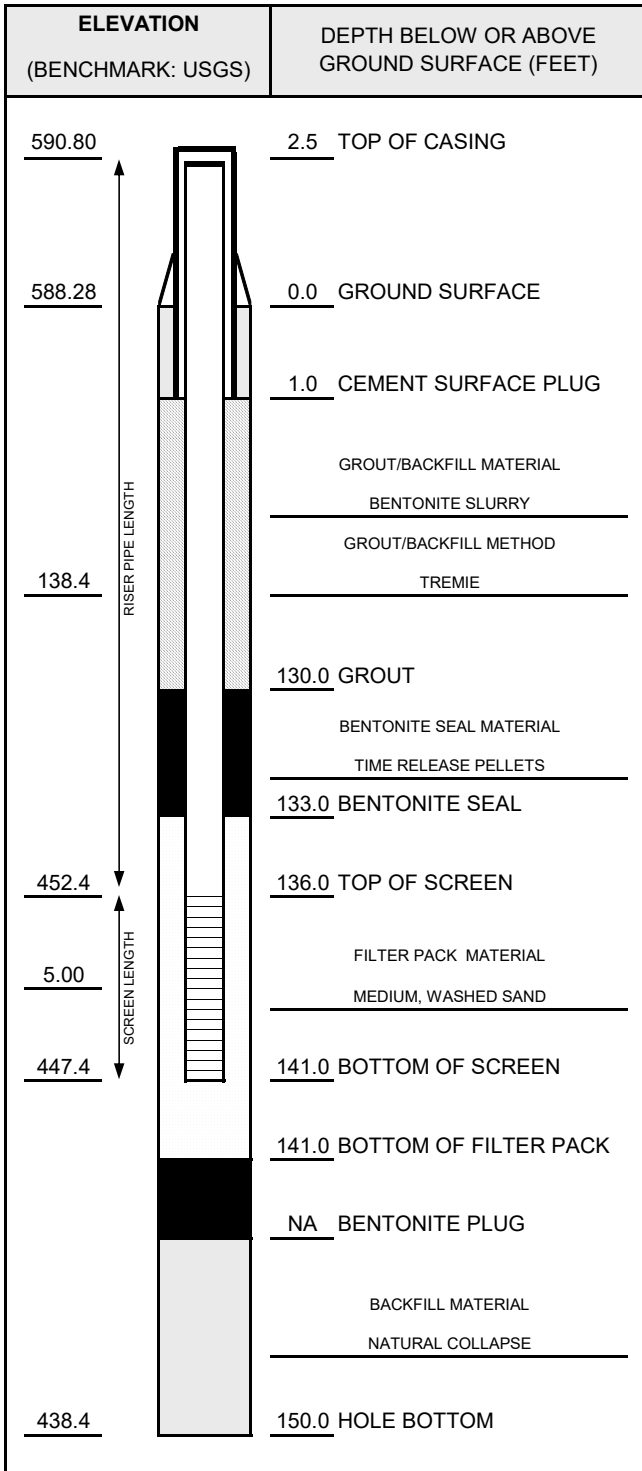
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-09</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>7</u> HOURS
WATER REMOVED:	<u>30</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/7/2016	12:00
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	10:25
SWL BEFORE DEVELOPING:	7.00	T/PVC	6/7/2016	12:00
SWL AFTER DEVELOPING:	117.42	T/PVC	6/8/2016	10:25
OTHER SWL:	16.76	T/PVC	6/9/2016	15:13
OTHER DTB:	144.30	T/PVC	6/9/2016	15:13

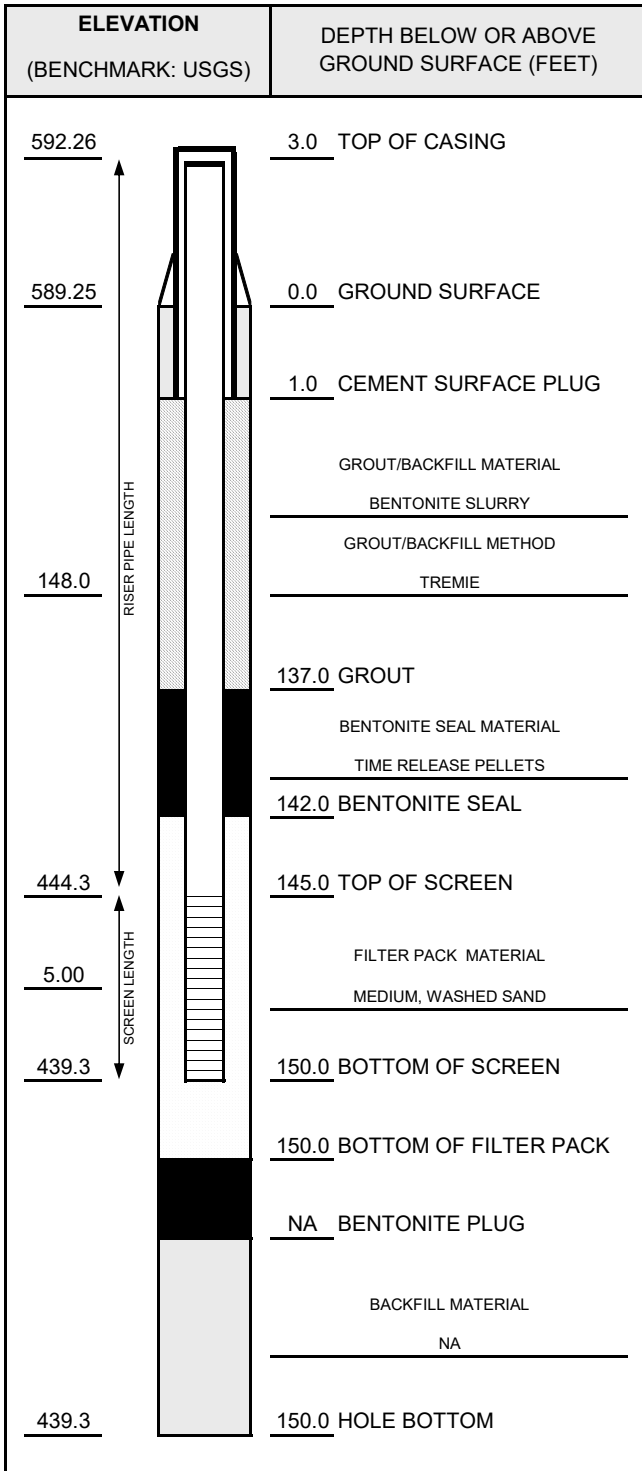
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-10</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/6/2016
INSTALLED BY: J. Reed	CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4.5</u> HOURS
WATER REMOVED:	<u>85</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>DARK GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

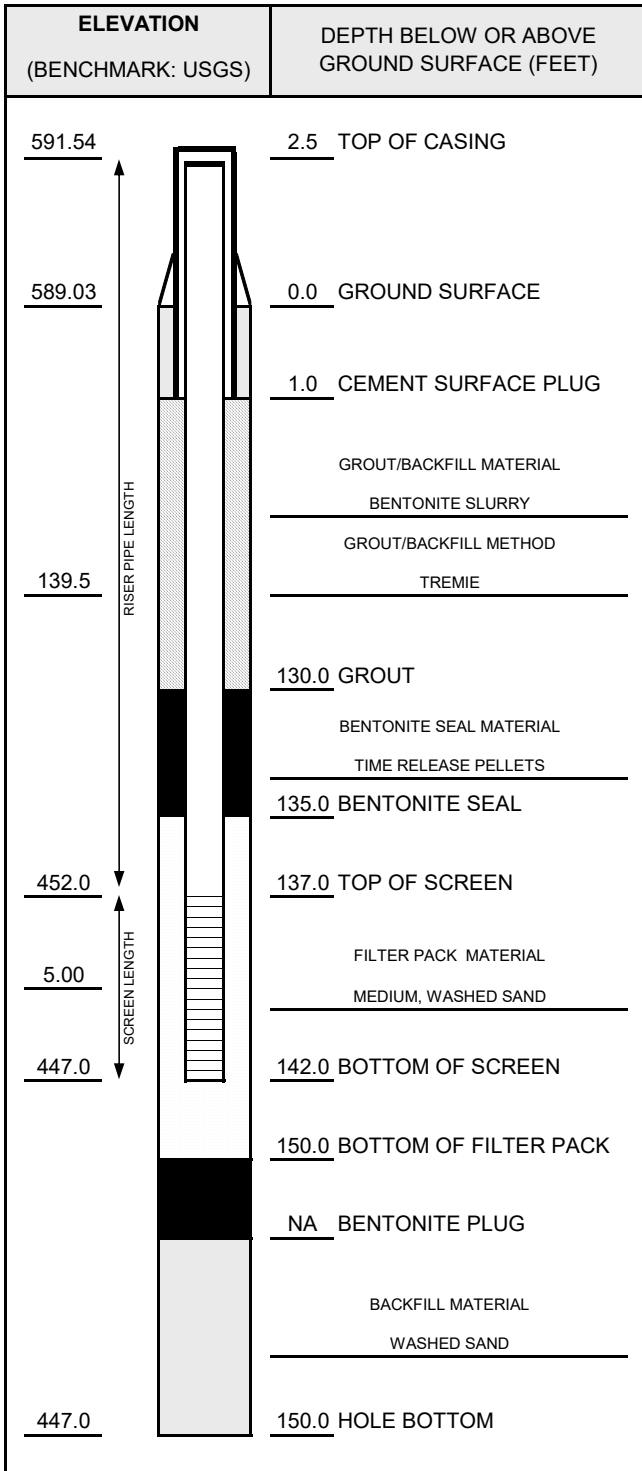
PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>3</u> HOURS
WATER REMOVED:	<u>84</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.36	T/PVC	6/9/2016	12:35
DTB AFTER DEVELOPING:	142.00	T/PVC	6/9/2016	15:45
SWL BEFORE DEVELOPING:	9.65	T/PVC	6/9/2016	12:35
SWL AFTER DEVELOPING:	116.00	T/PVC	6/9/2016	15:45
OTHER SWL:	16.67	T/PVC	6/21/2016	7:45
OTHER SWL:		T/PVC		

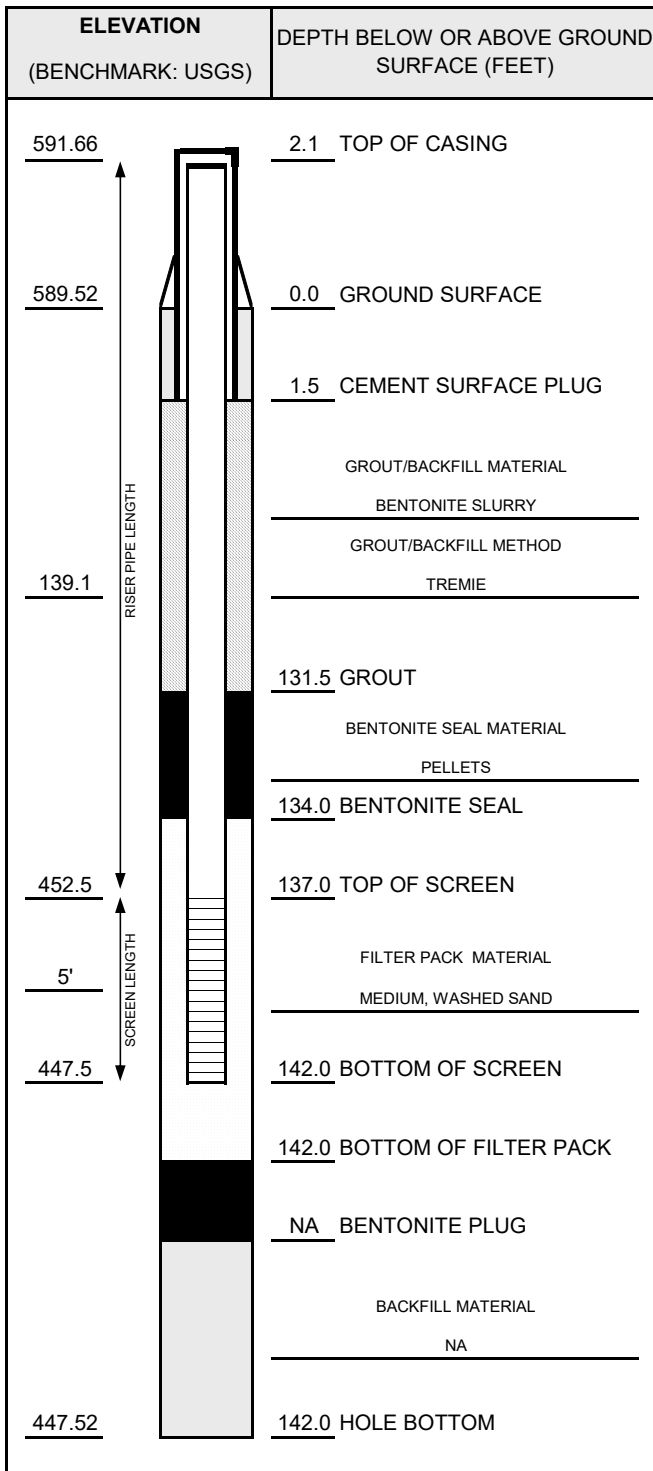
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11A</b>
PROJ. NO: 265996.0003	DATE INSTALLED: 5/12/2017    INSTALLED BY: Jake Krenz    CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER: <u>2-INCH PVC</u>	
PIPE SCHEDULE: <u>40</u>	
PIPE JOINTS: <u>THREADED O-RINGS</u>	
SOLVENT USED? <u>NO</u>	
SCREEN TYPE: <u>2-INCH PVC</u>	
SCR. SLOT SIZE: <u>0.01-INCH</u>	
BOREHOLE DIAMETER: <u>6</u> IN. FROM <u>0</u> TO <u>142</u> FT.	
<u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT.	
SURF. CASING DIAMETER: <u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT.	
<u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT.	

WELL DEVELOPMENT	
DEVELOPMENT METHOD: <u>AIR LIFT</u>	
TIME DEVELOPING: <u>3</u> HOURS	
WATER REMOVED: <u>110</u> GALLONS	
WATER ADDED: <u>0</u> GALLONS	
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE: <u>Very Turbid</u>	
COLOR BEFORE: <u>Dark Gray</u>	
CLARITY AFTER: <u>Very Turbid</u>	
COLOR AFTER: <u>Light Gray</u>	
ODOR (IF PRESENT): <u>None</u>	

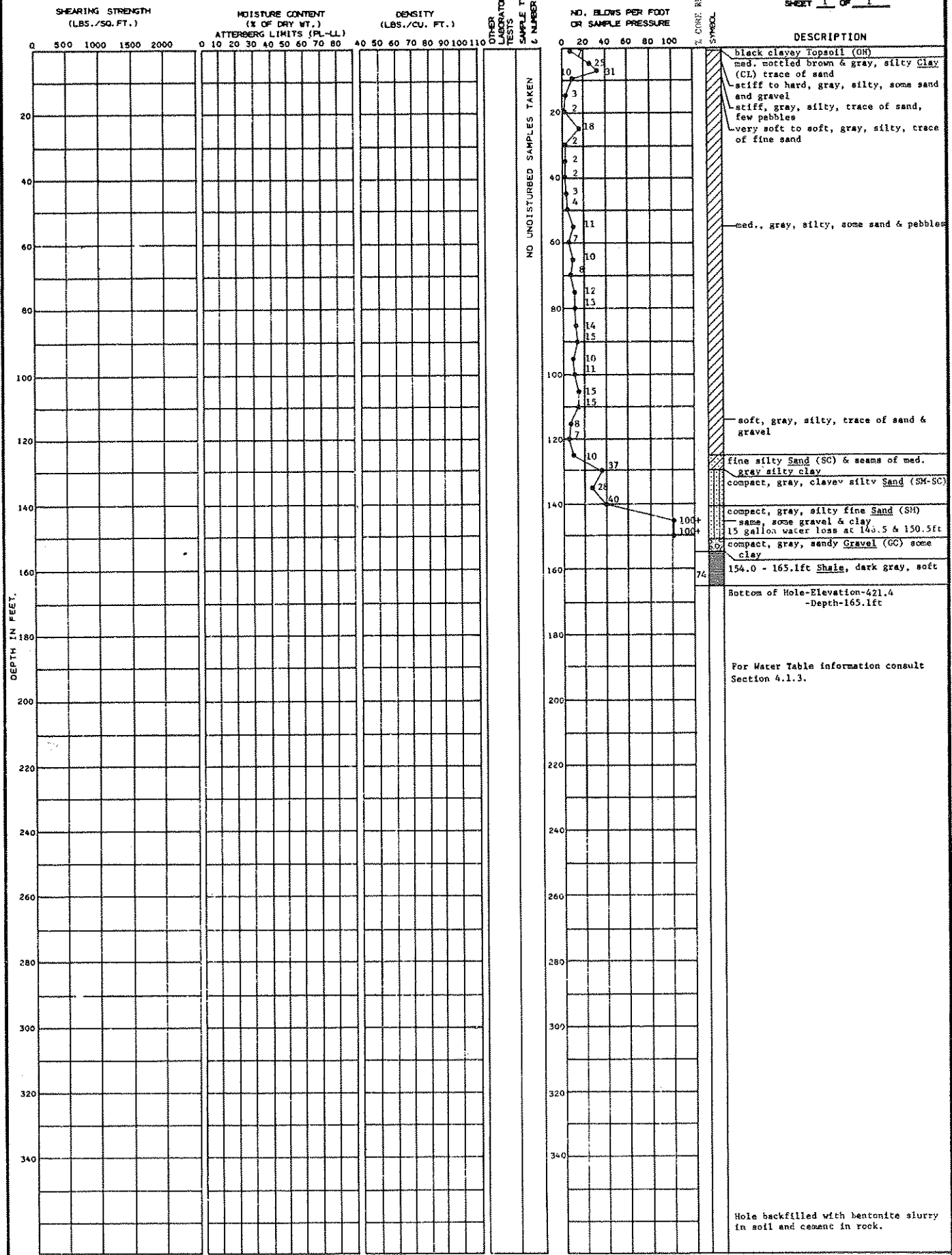
WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	141.98	T/PVC	5/15/2017	0838
DTB AFTER DEVELOPING:	145.45	T/PVC	5/15/2017	1612
SWE BEFORE DEVELOPING:	17.79	T/PVC	5/15/2017	0838
SWE AFTER DEVELOPING:	90.12	T/PVC	5/15/2017	1612
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER: <u>3120</u>	

**Appendix C**  
**1970's Boring Logs**

LOCATION: N 7,495 E 8,304 GROUND ELEVATION 586.5

DATE DRILLED: 11-26-73 12-3-73  
 SHEET 1 OF 1



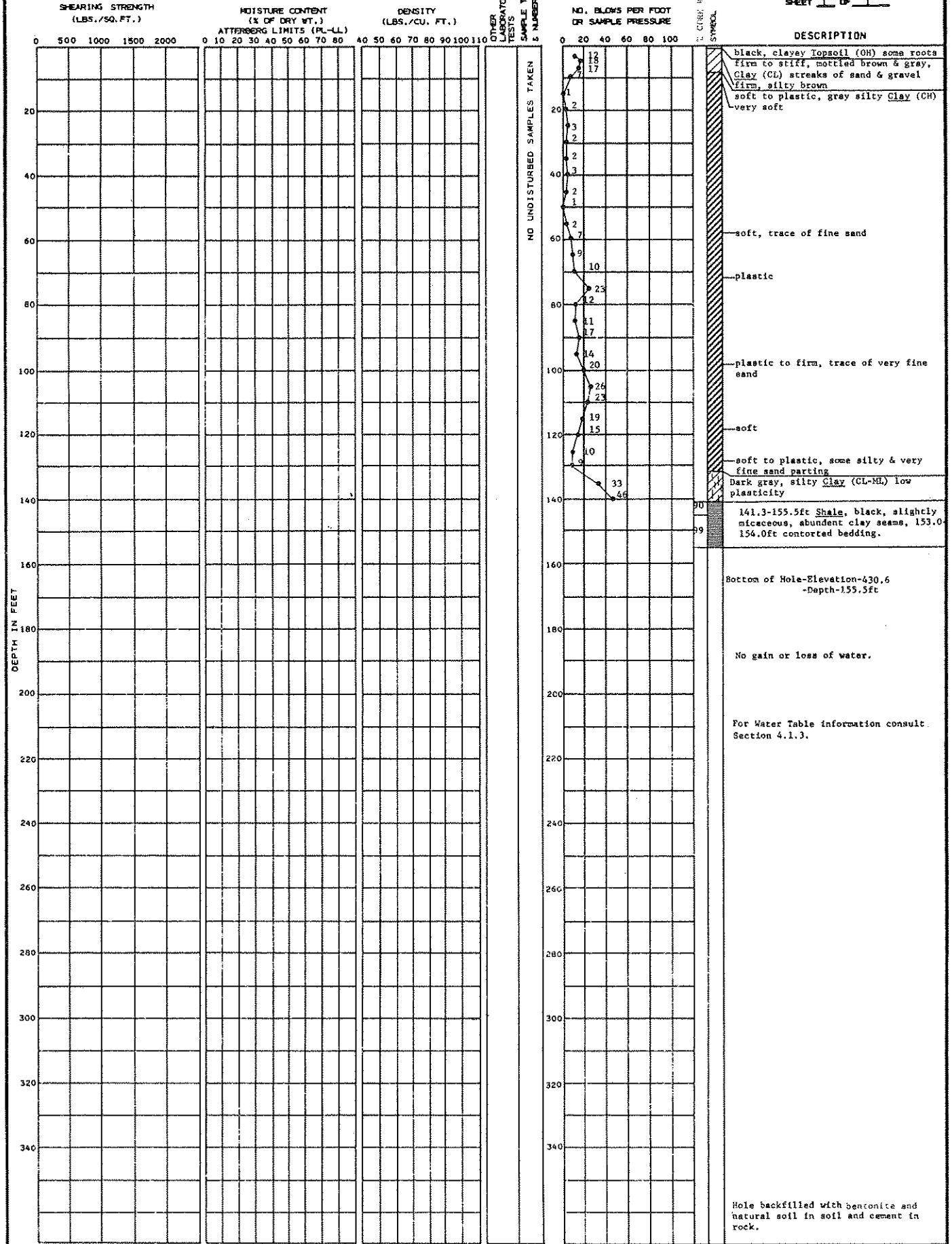
LOCATION: N 8,600  
E 9,965

GROUND ELEVATION

SC9.1

DATE DRILLED: 11-9-73

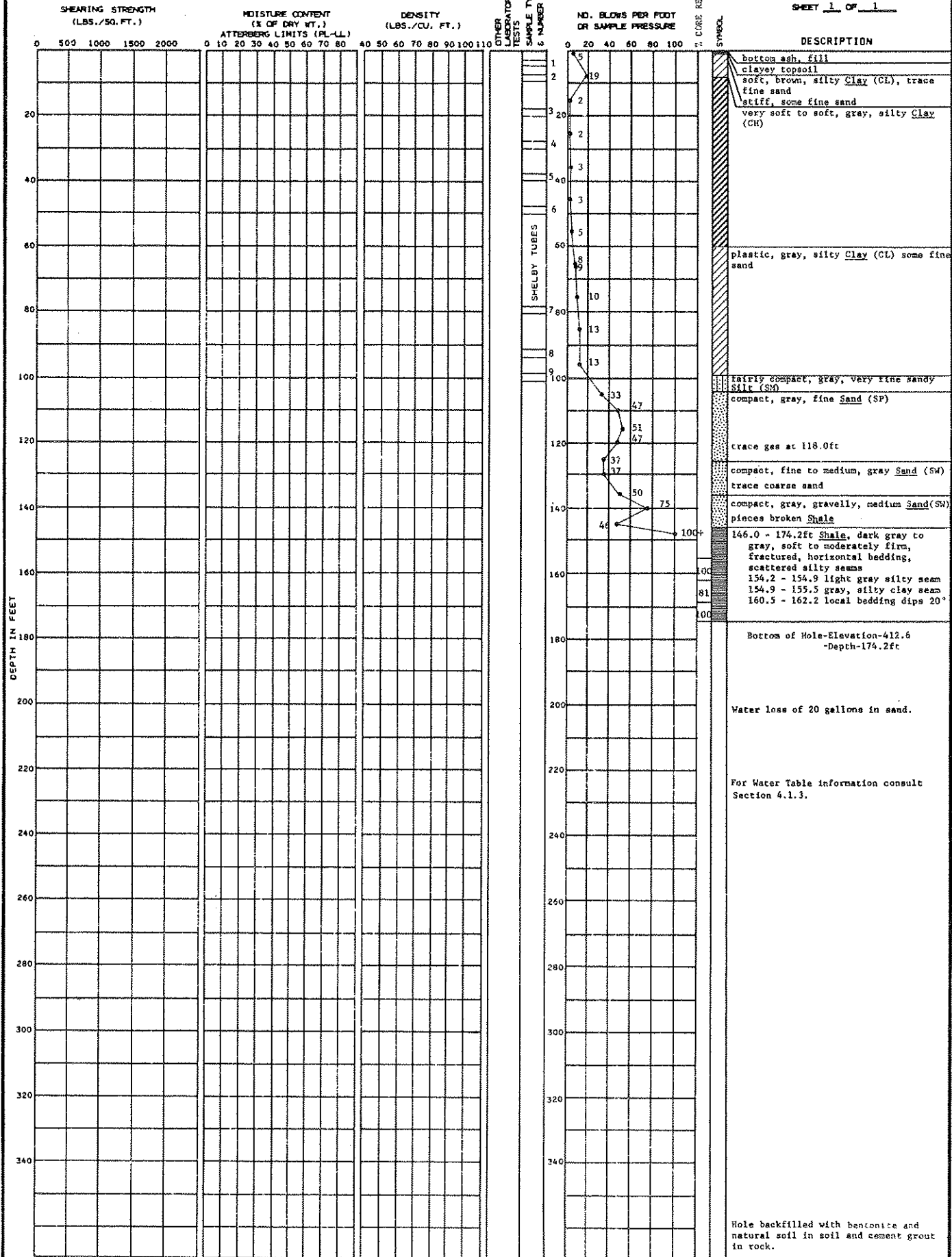
SHEET 1 OF 1



LOCATION: N 7,884 E 9,005 GROUND ELEVATION 586.8

DATE DRILLED: 2-11-74  
2-18-74

SHEET 1 OF 1



SOIL BORING NO. 12

BECHTEL Belle River

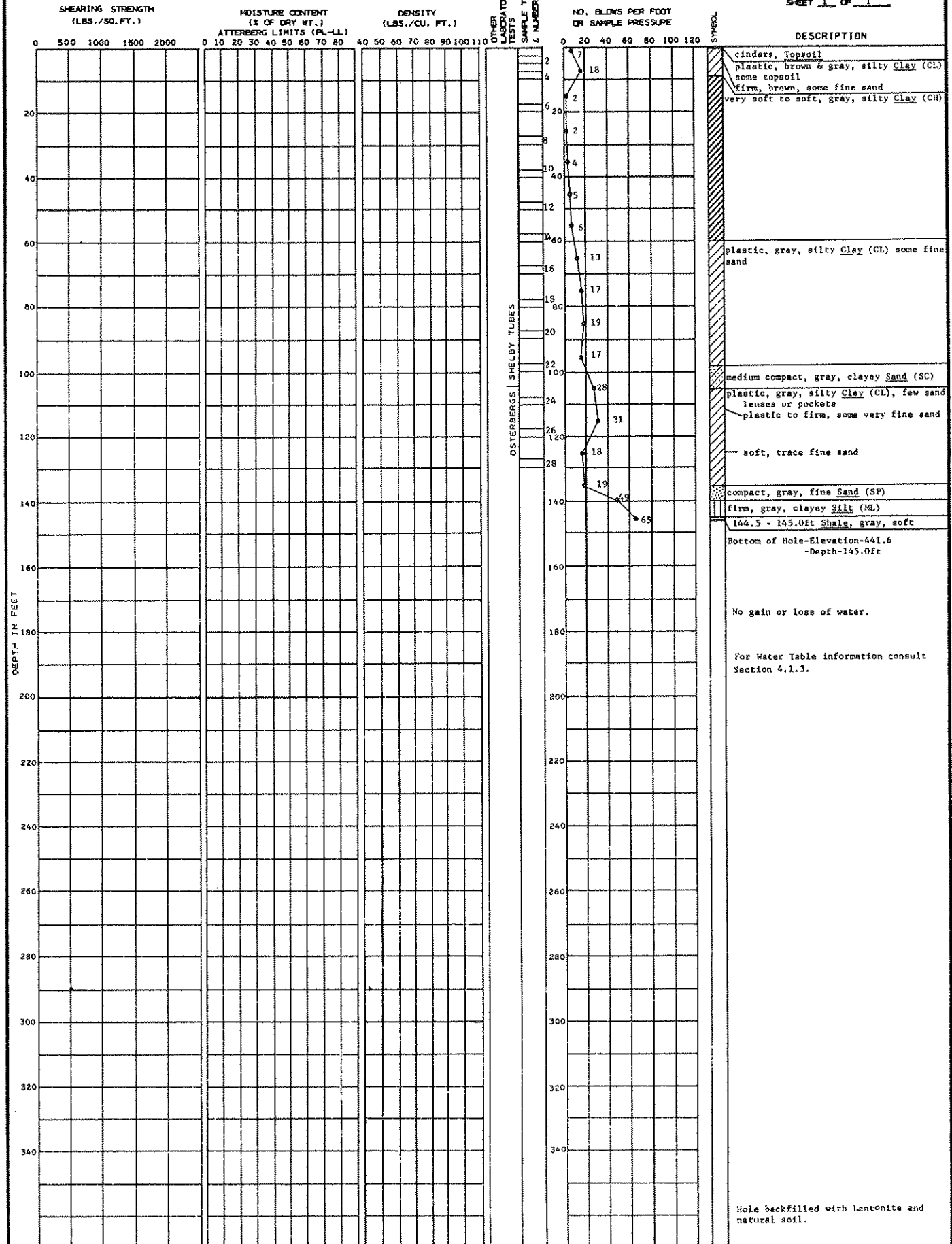


LOCATION: N 8,306  
E 9,627

GROUND ELEVATION 586.6

DATE DRILLED: 1-28-74  
1-31-76

SHEET 1 OF 1



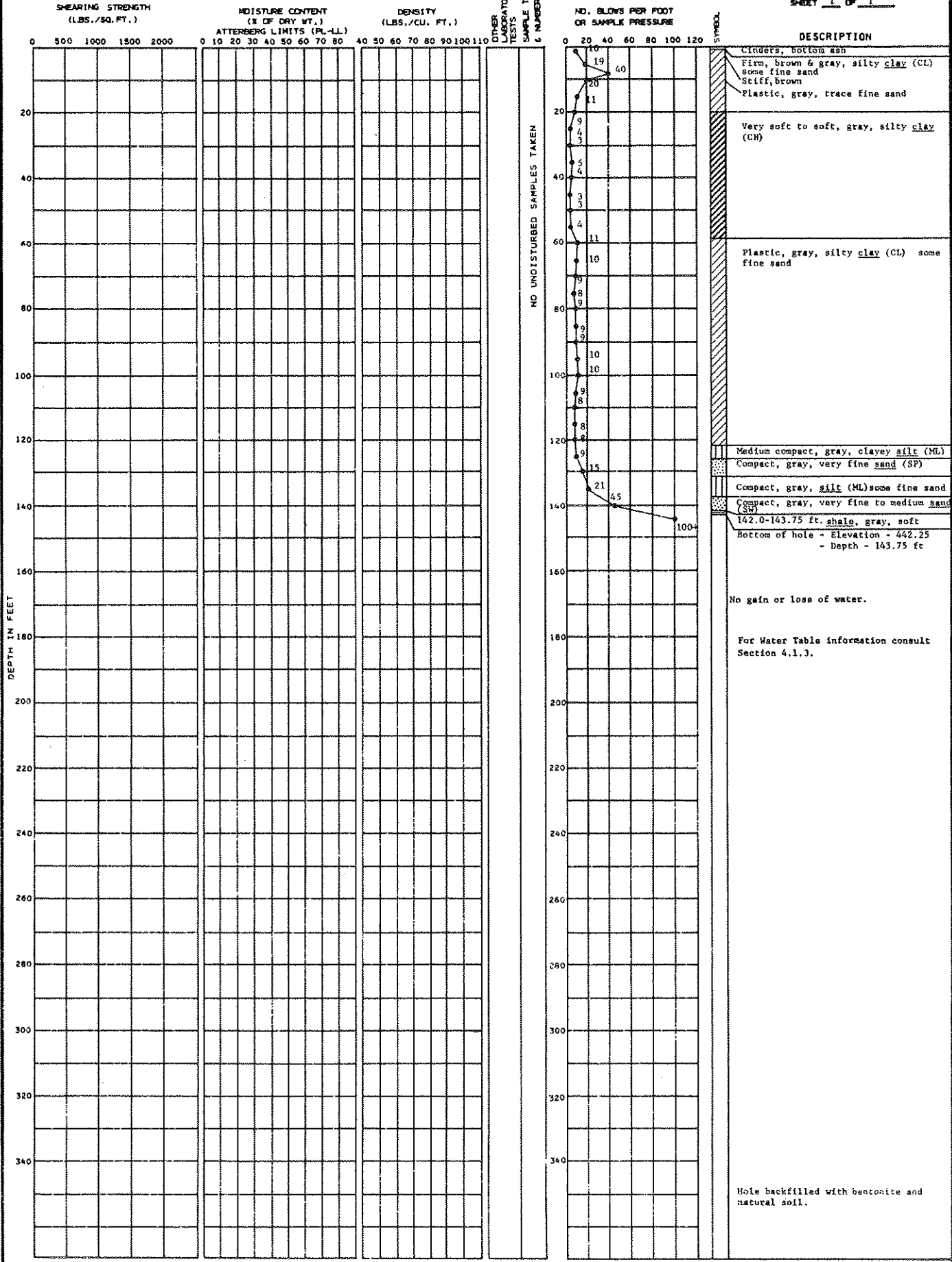
SOIL BORING NO. 14

BECHTEL Belle River

LOCATION: N 7,996 E 8,712 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-16-74

SHEET 1 OF 1



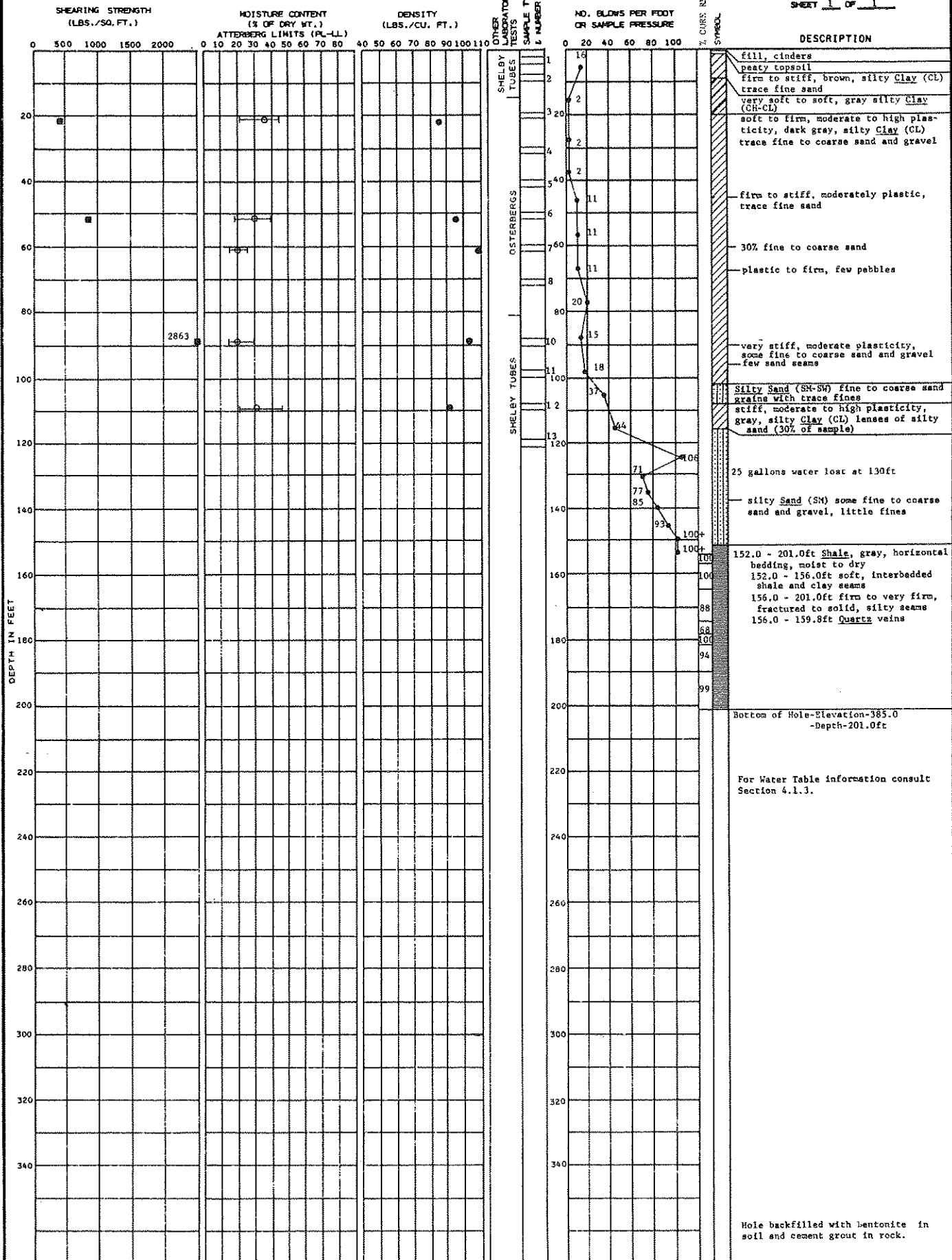
SOIL BORING NO. 16

BECHTEL Belle River

LOCATION: N 8,081 E 9,193 GROUND ELEVATION 586.0

DATE DRILLED: 1-16-74 1-29-74

SHEET 1 OF 1



■ Unconsolidated Undrained    — Atterberg Limits    ○ Moisture Content

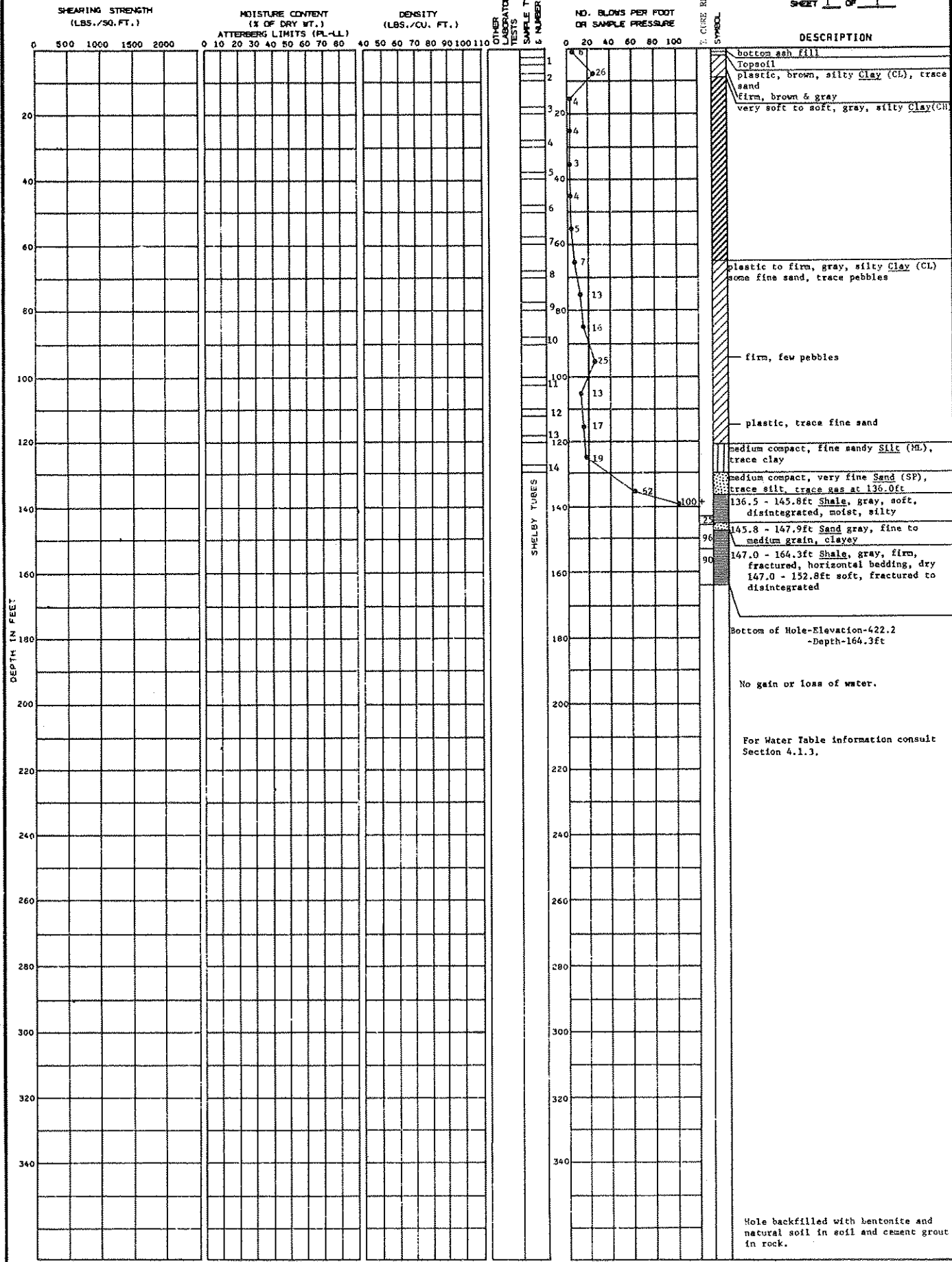
SOIL BORING NO. 18

BECHTEL Belle River

LOCATION: N 9,011 E 9,337 GROUND ELEVATION 586.5

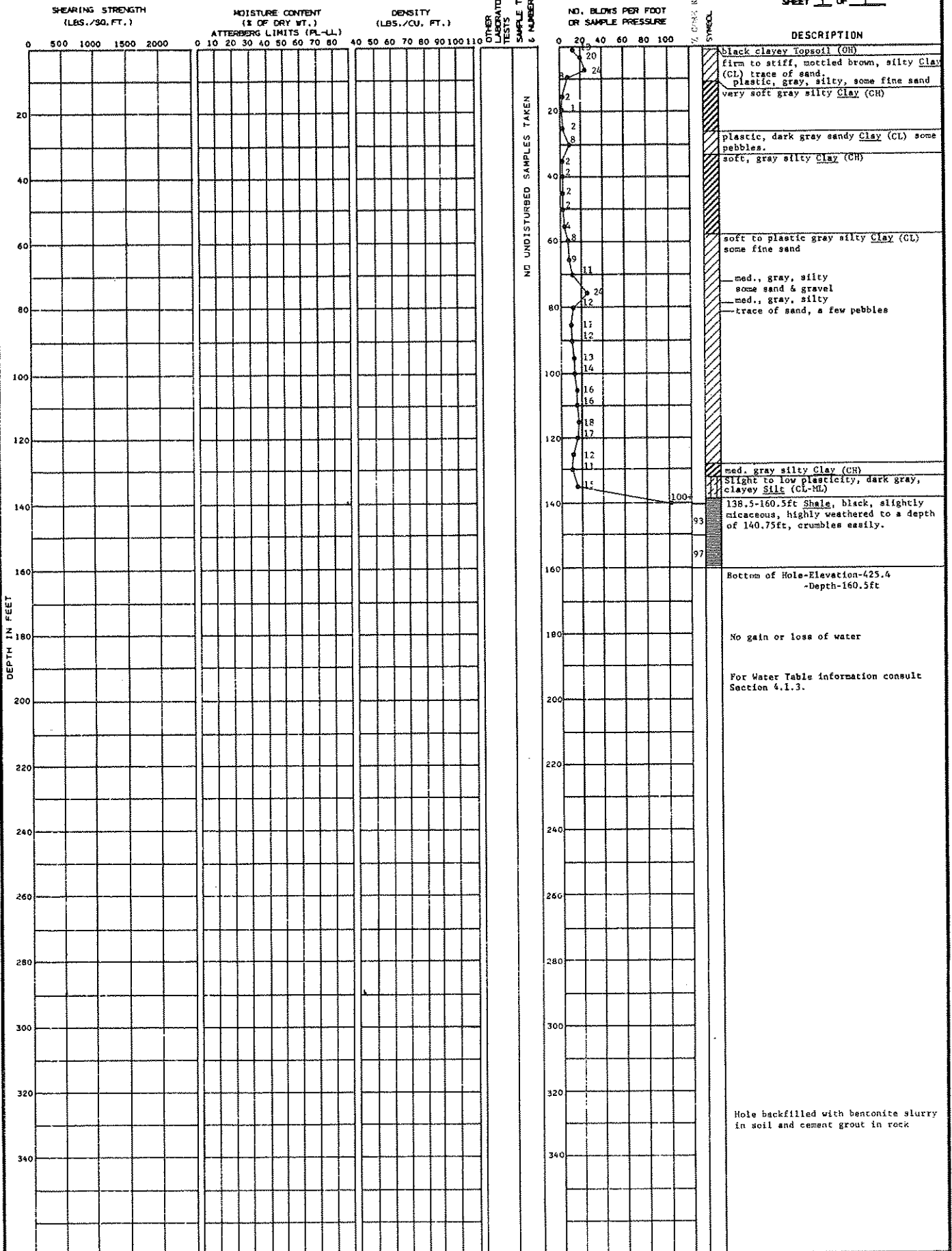
DATE DRILLED: 1-17-74  
1-23-74

SHEET 1 OF 1



LOCATION: N.8,002 E.9,943 GROUND ELEVATION 585.9

DATE DRILLED: 11-20-73 SHEET 1 OF 1

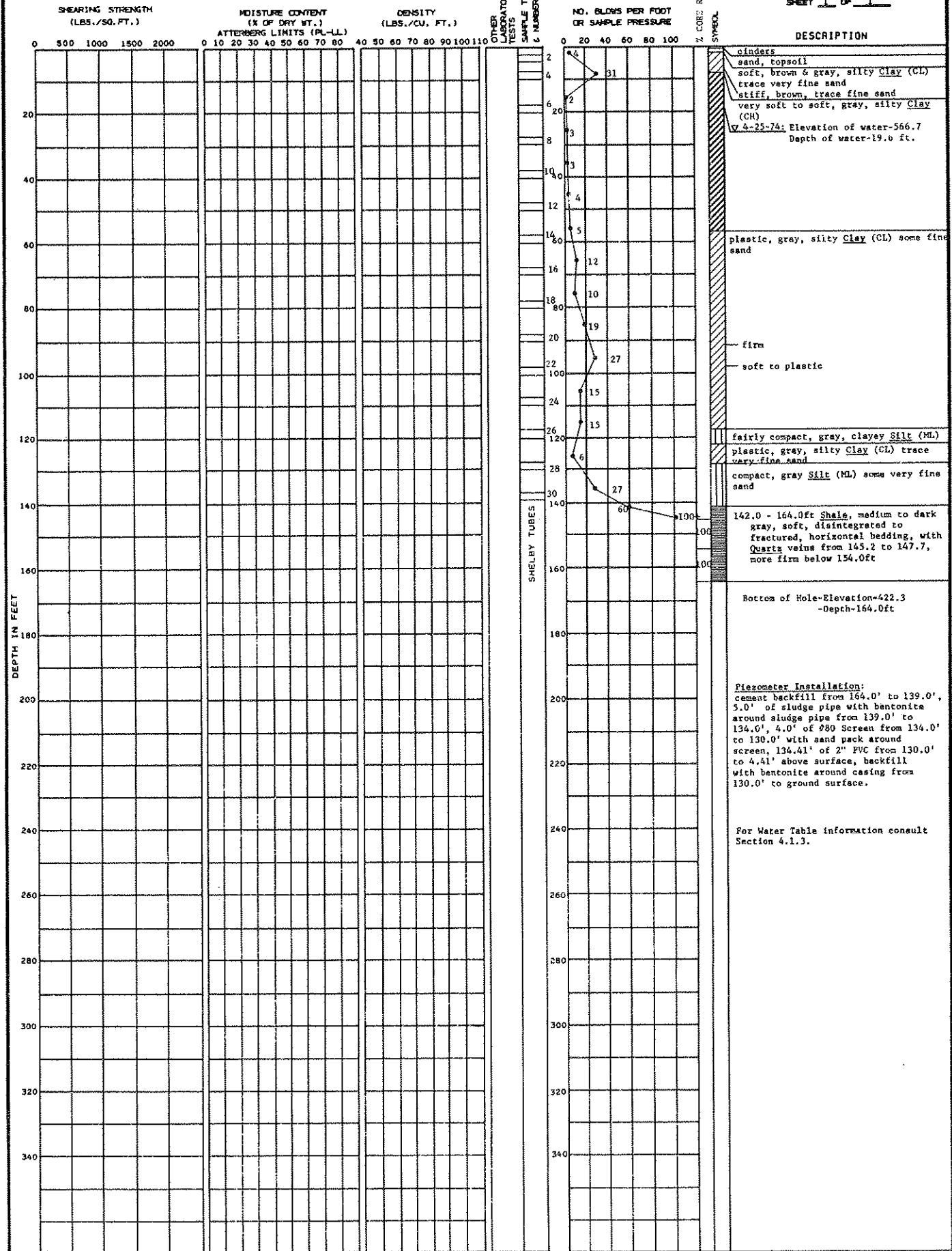


LOCATION: N 7,904  
E 9,436

GROUND ELEVATION 586.3

DATE DRILLED: 1-30-74  
2-5-74

SHEET 1 OF 1



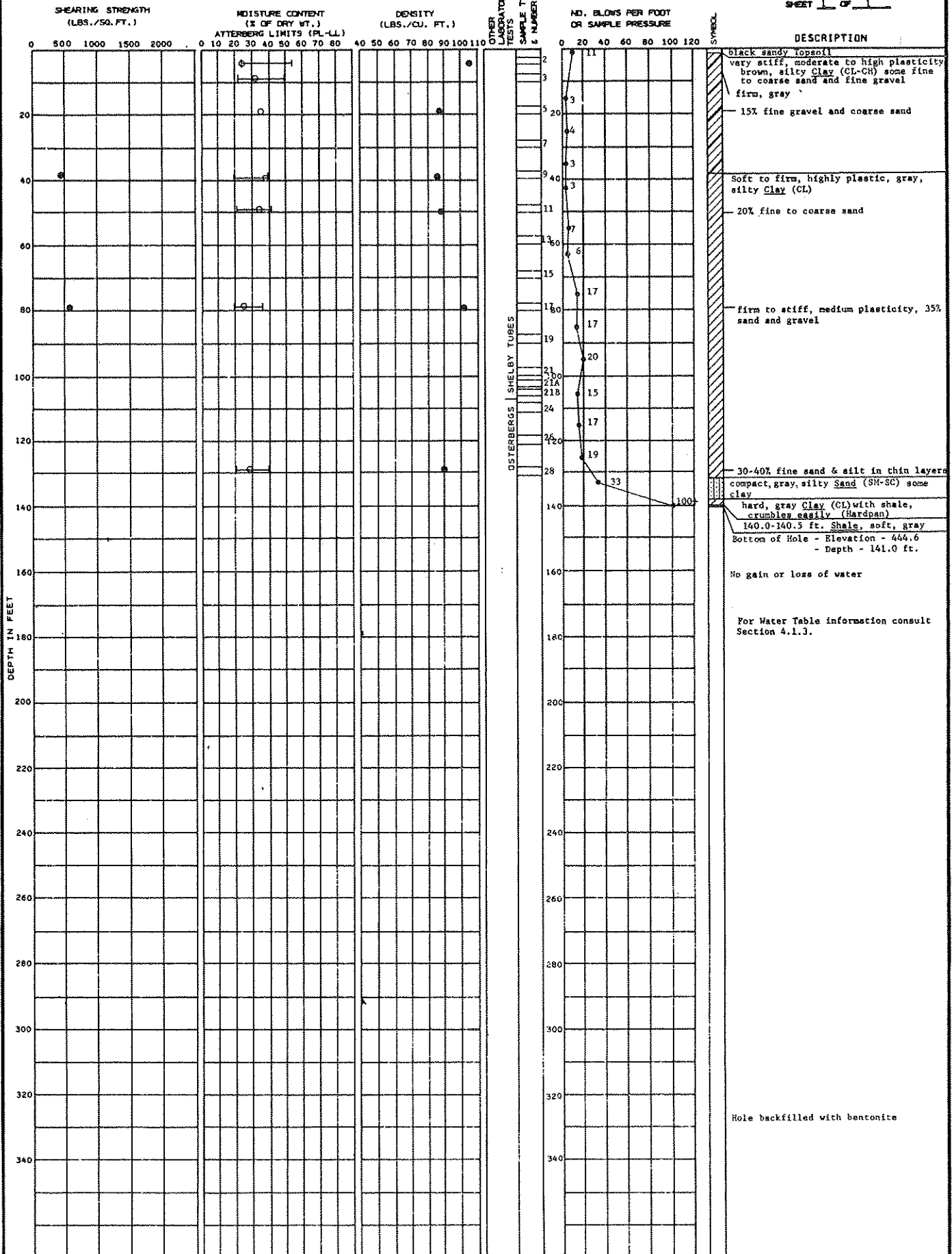
SOIL BORING NO. 24

BECHTEL Belle River

LOCATION: N 7,890 E 9,763 GROUND ELEVATION 585.6

DATE DRILLED: 12-12-73  
12-19-73

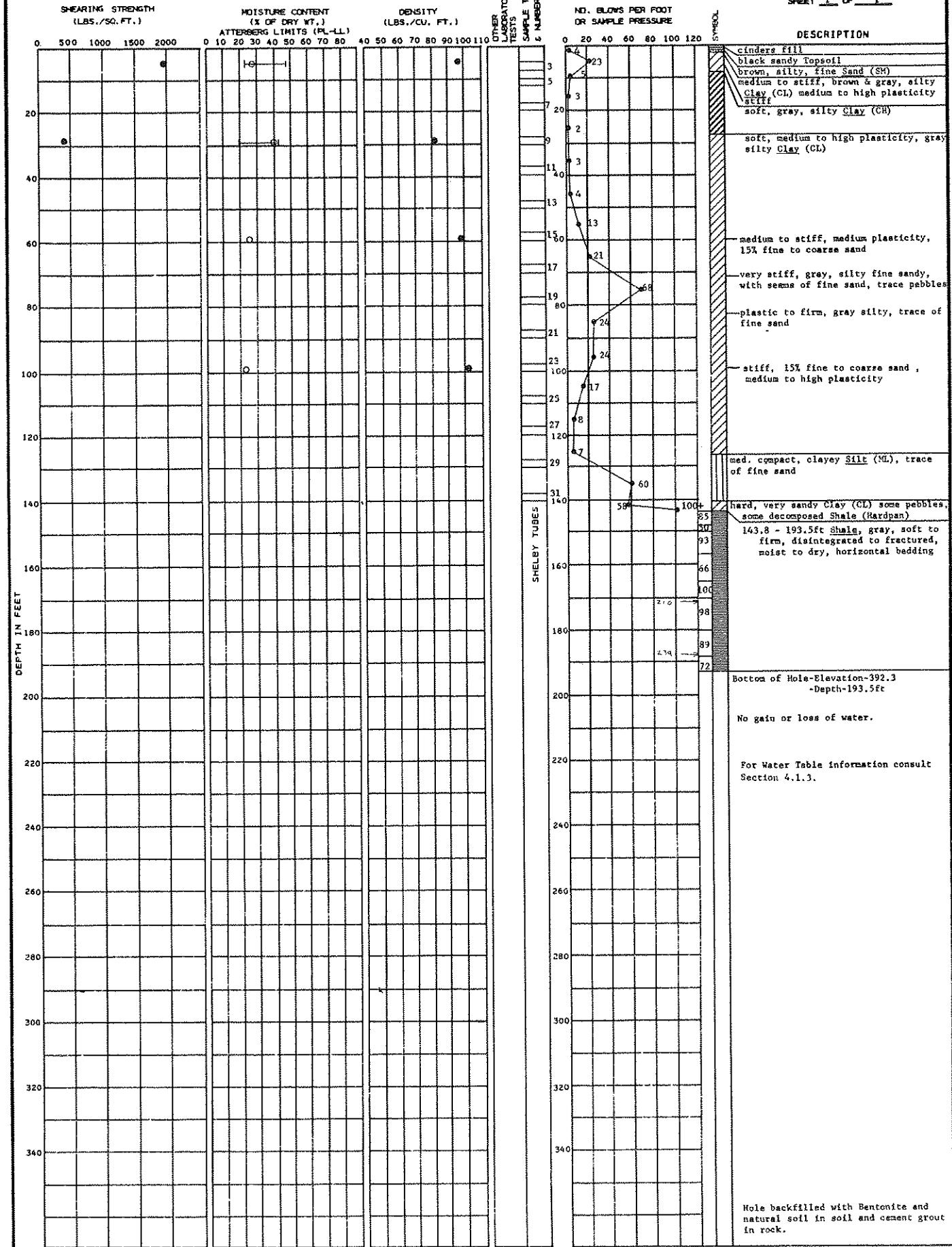
SHEET 1 OF 1



● Unconfined Compression ○ Atterberg Limits ○ Moisture Content

LOCATION: N 7,724 E 9,443 GROUND ELEVATION 585.8

DATE DRILLED: 1-15-74 1-22-74 SHEET 1 OF 1

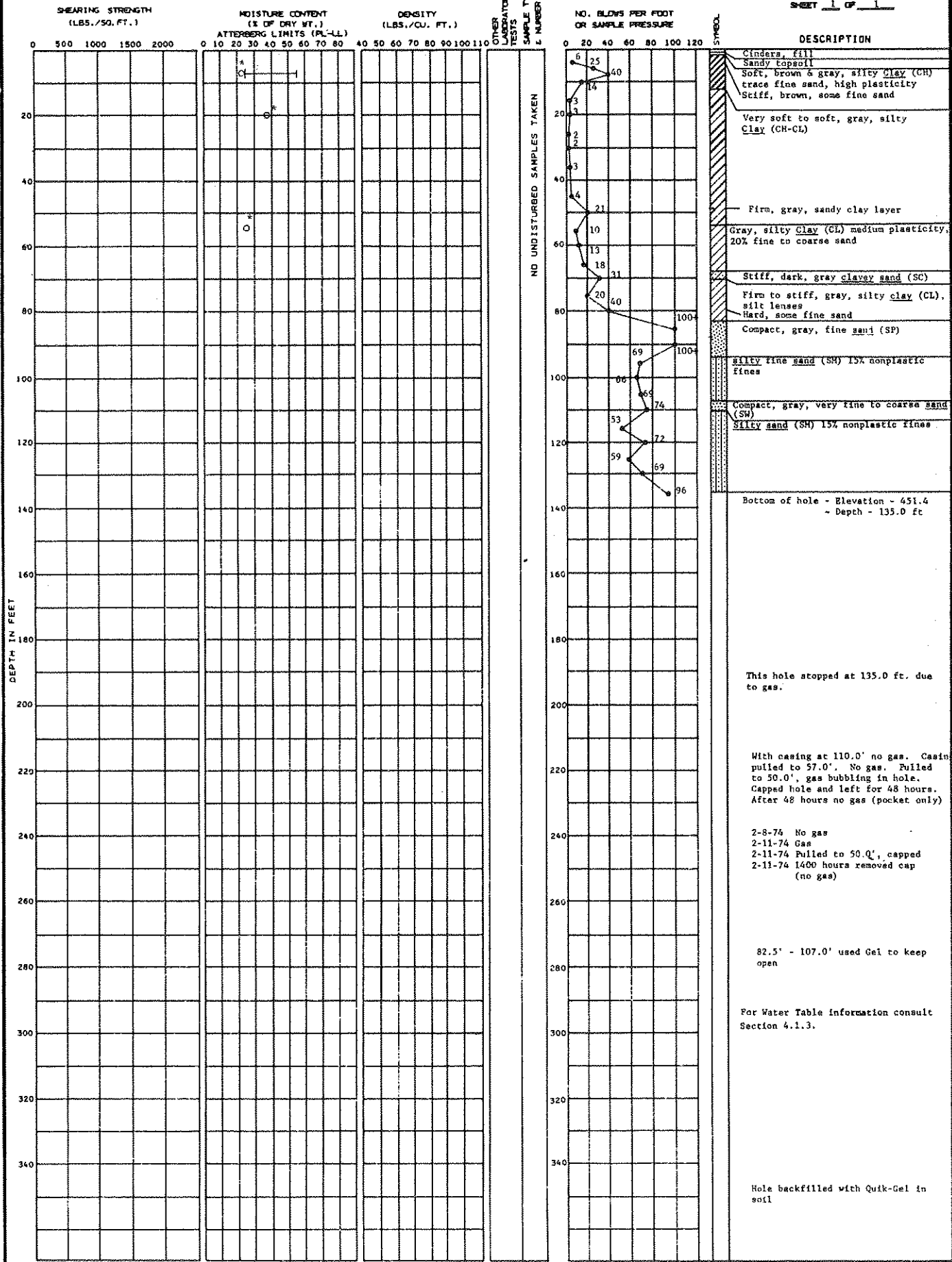


● Unconfined Compression ○ Atterberg Limits ○ Moisture Content

SOIL BORING NO. 28

BECHTEL Belle River





DESCRIPTION

Cinders, fill  
Sandy topsoil  
Soft, brown & gray, silty Clay (CH)  
trace fine sand, high plasticity  
Stiff, brown, some fine sand

Very soft to soft, gray, silty Clay (CH-CL)

Firm, gray, sandy clay layer

Gray, silty Clay (CL) medium plasticity, 20% fine to coarse sand

Stiff, dark, gray clayey sand (SC)

Firm to stiff, gray, silty clay (CL), silt lenses  
Hard, some fine sand

Compact, gray, fine sand (SP)

silty fine sand (SM) 15% nonplastic fines

Compact, gray, very fine to coarse sand (SW)

Silty sand (SM) 15% nonplastic fines

Bottom of hole - Elevation - 451.4  
- Depth - 135.0 ft

This hole stopped at 135.0 ft. due to gas.

With casing at 110.0' no gas. Casing pulled to 57.0'. No gas. Pulled to 50.0', gas bubbling in hole. Capped hole and left for 48 hours. After 48 hours no gas (pocket only)

2-8-74 No gas  
2-11-74 Gas  
2-11-74 Pulled to 50.0', capped  
2-11-74 1400 hours removed cap (no gas)

82.5' - 107.0' used Gel to keep open

For Water Table Information consult Section 4.1.3.

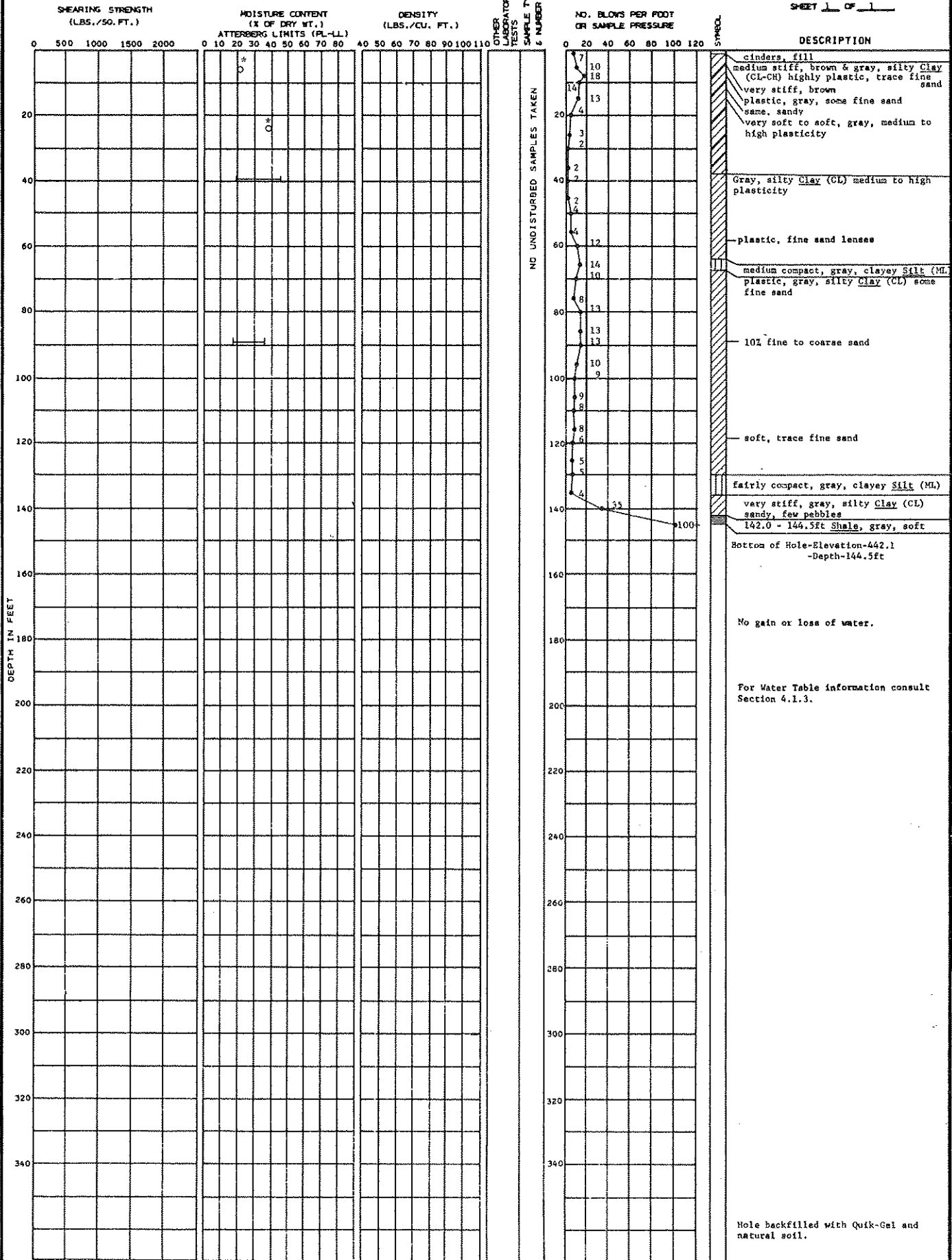
Hole backfilled with Quik-Gel in soil

Atterberg Limits  
O Moisture Content  
\* Sample Jar Unsealed

LOCATION: N 7,663 E 2,659 GROUND ELEVATION 586.6

DATE DRILLED: 2-6-74  
2-12-74

SHEET 1 OF 1

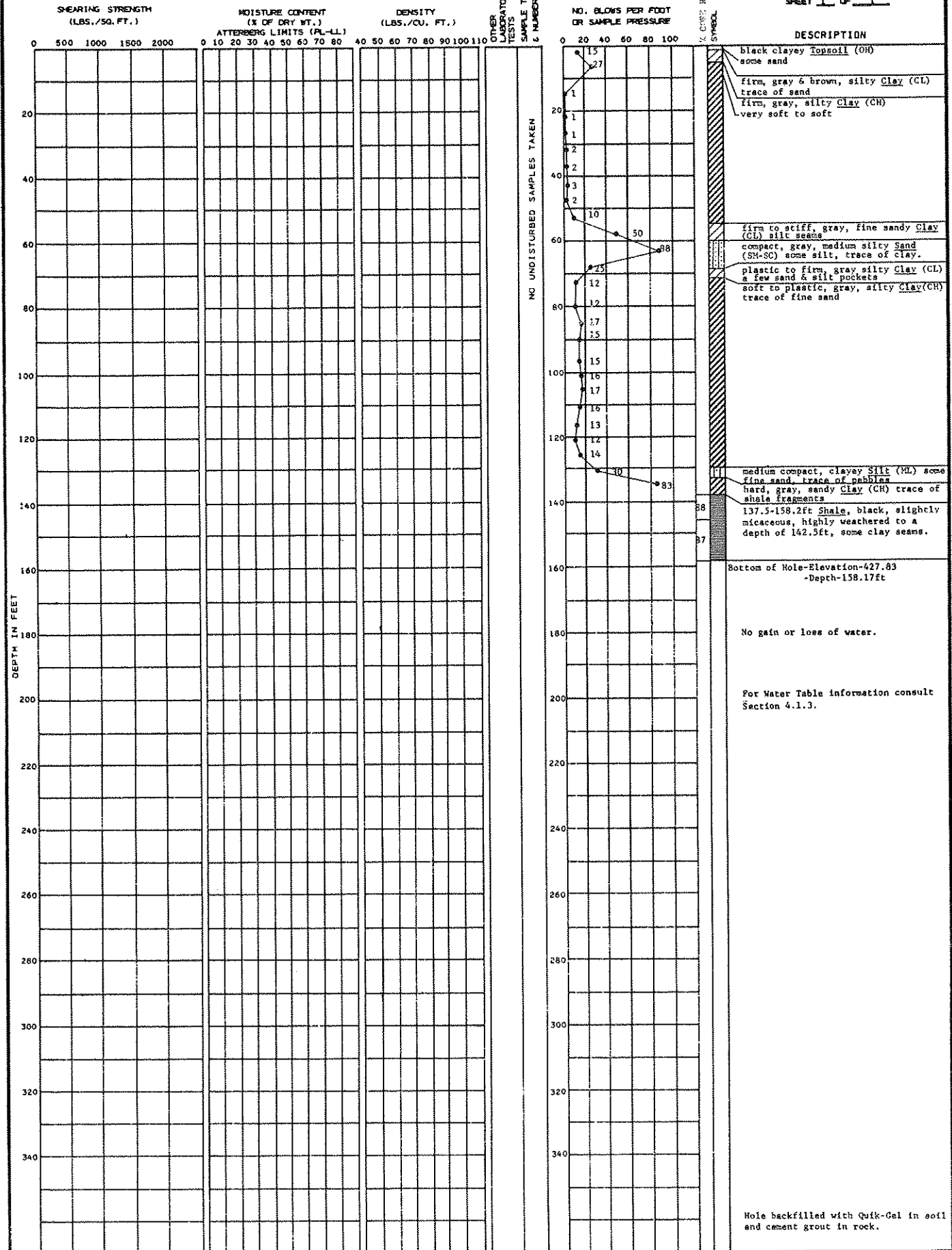


Atterberg Limits  
 ○ Moisture Content  
 \* Sample Jar Unsealed

SOIL BORING NO. 32  
 BECHTEL Belle River B-39

LOCATION: N 7,398 E 9,963 GROUND ELEVATION 586.0

DATE DRILLED: 11-8-73  
SHEET 1 OF 1



SOIL BORING NO. 34

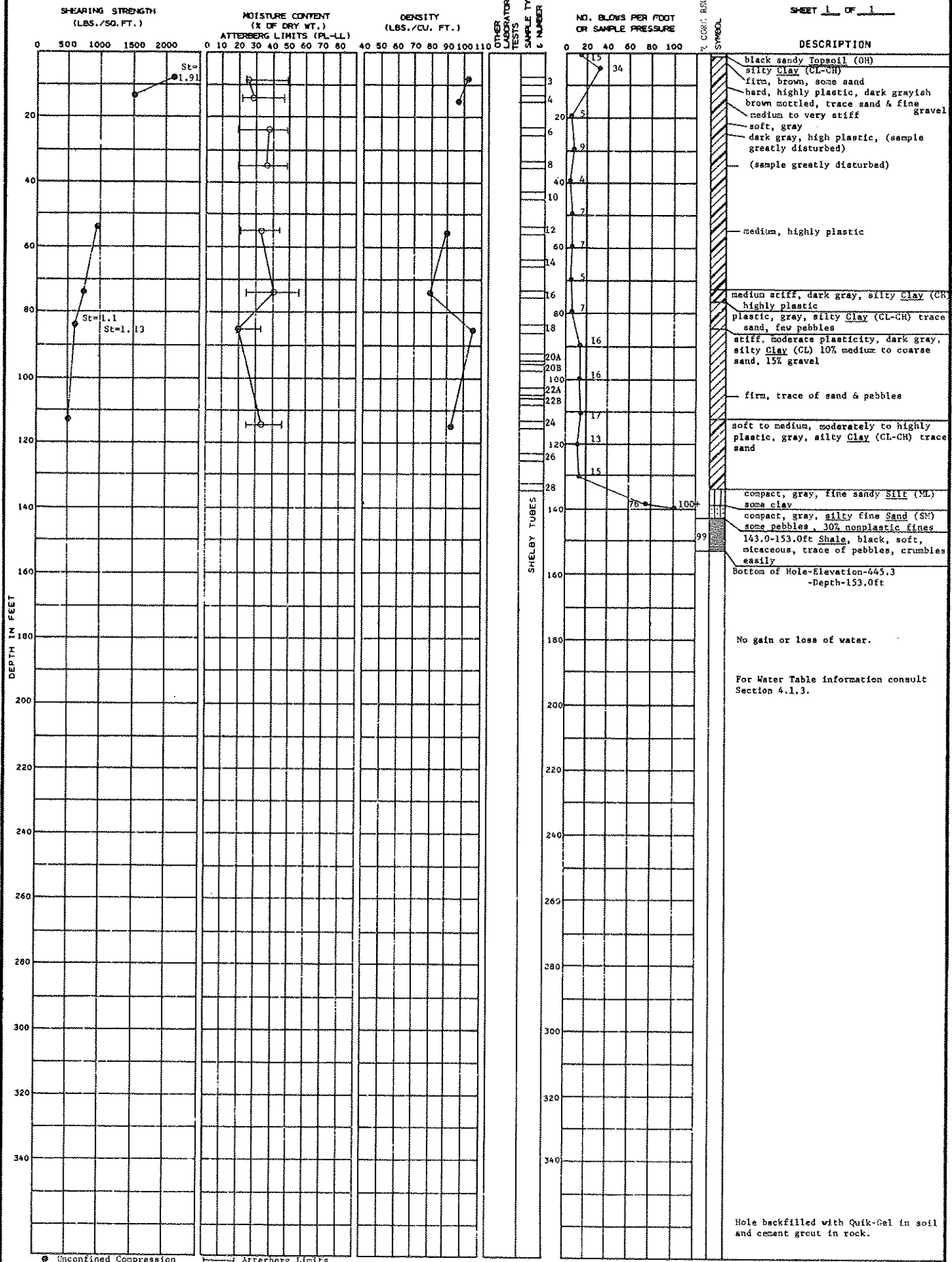
BECHTEL Belle River

LOCATION: N 9,007  
E 13,035

GROUND ELEVATION: 598.3

DATE DRILLED: 12-6-73  
12-12-73

SHEET 1 OF 1



● Unconfined Compression  
St = Sensitivity

○ Atterberg Limits  
Moisture Content

SOIL BORING NO. 38

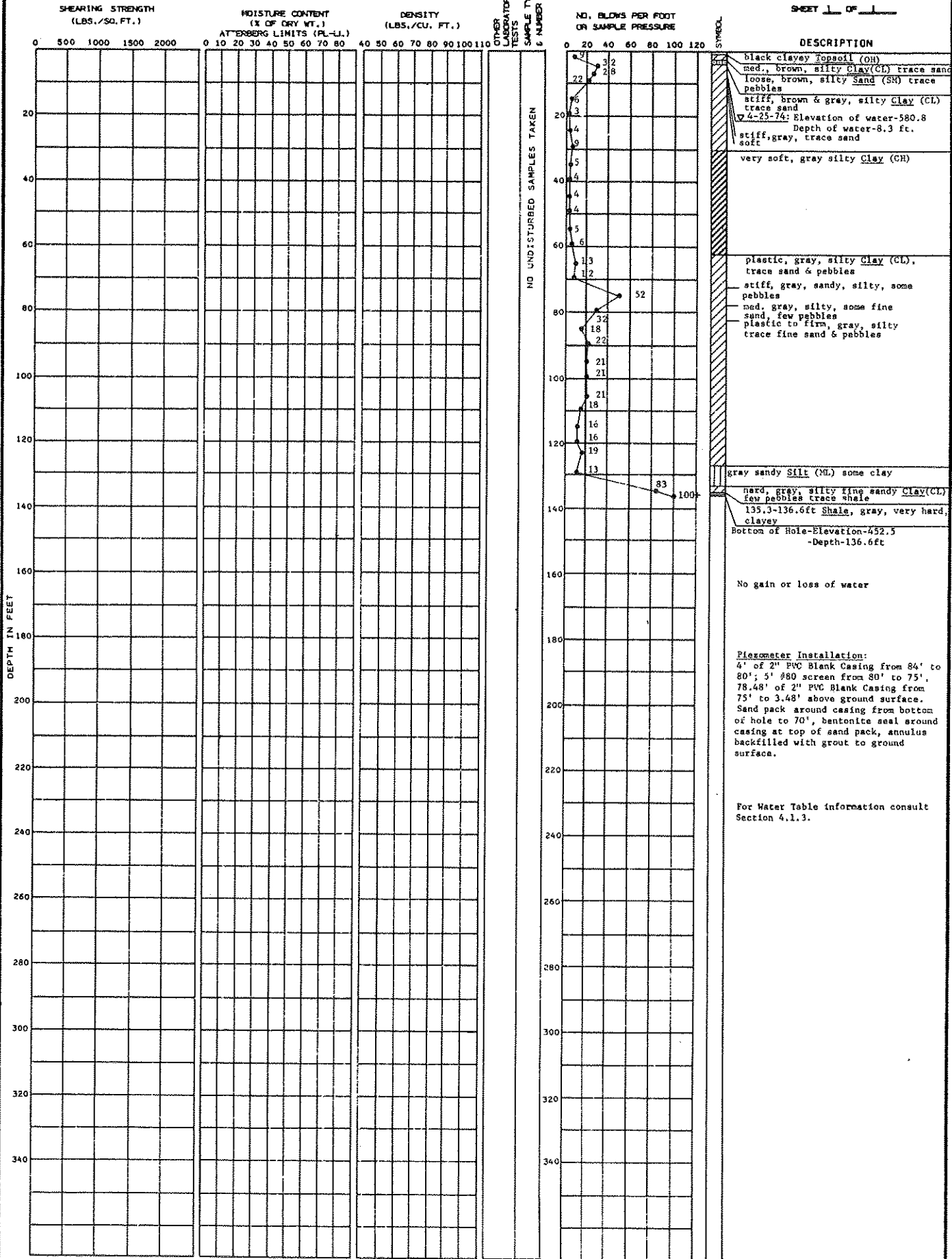
BECHTEL Belle River

B-43

LOCATION: N 8,003 E10,993 GROUND ELEVATION: 589.1

DATE DRILLED: 12-14-73 12-18-73

SHEET 1 OF 1

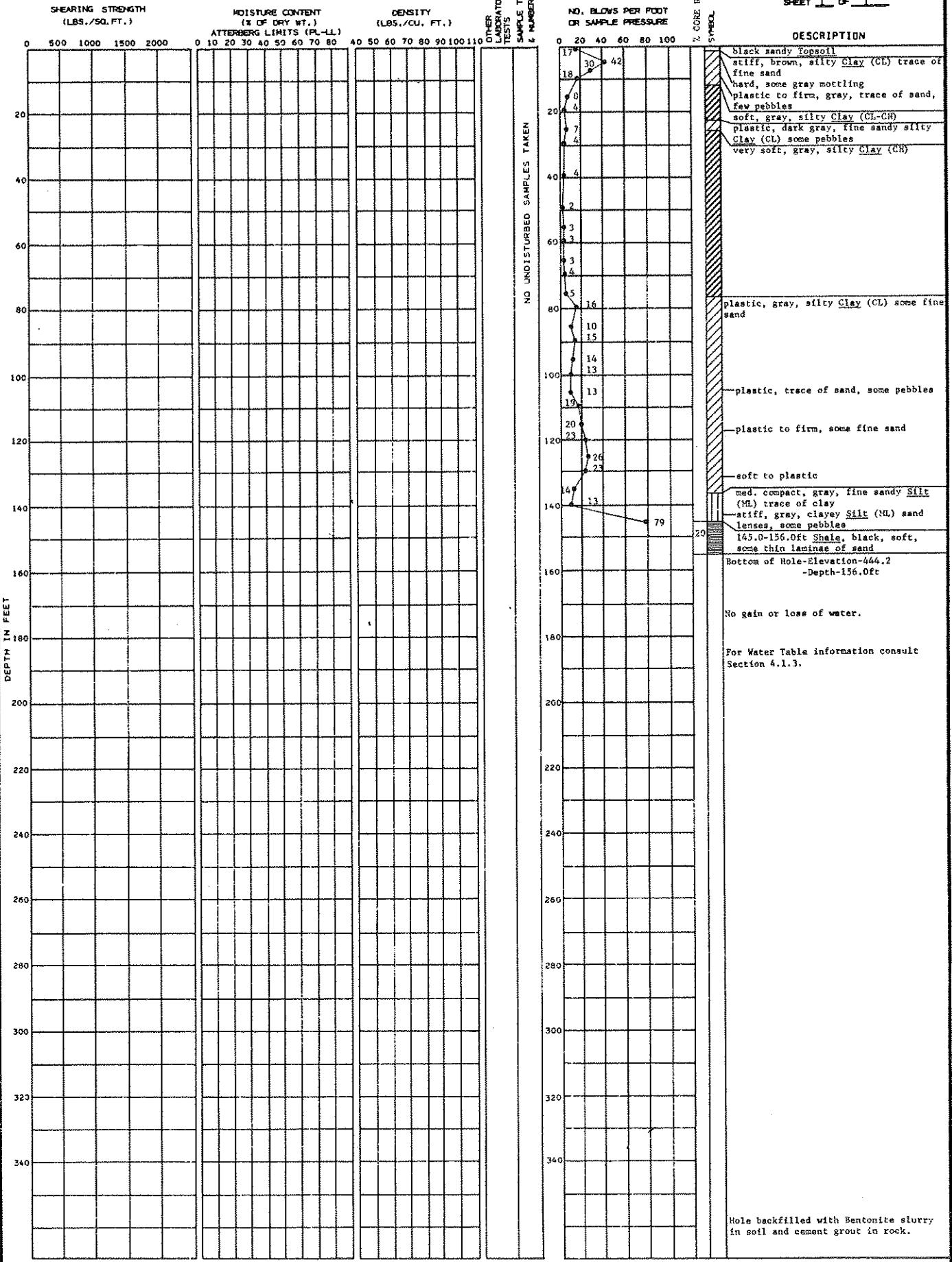


LOCATION: N 8,016  
E 12,991

GROUND ELEVATION 500.2

DATE DRILLED: 11-19-73  
11-21-73

SHEET 1 OF 1

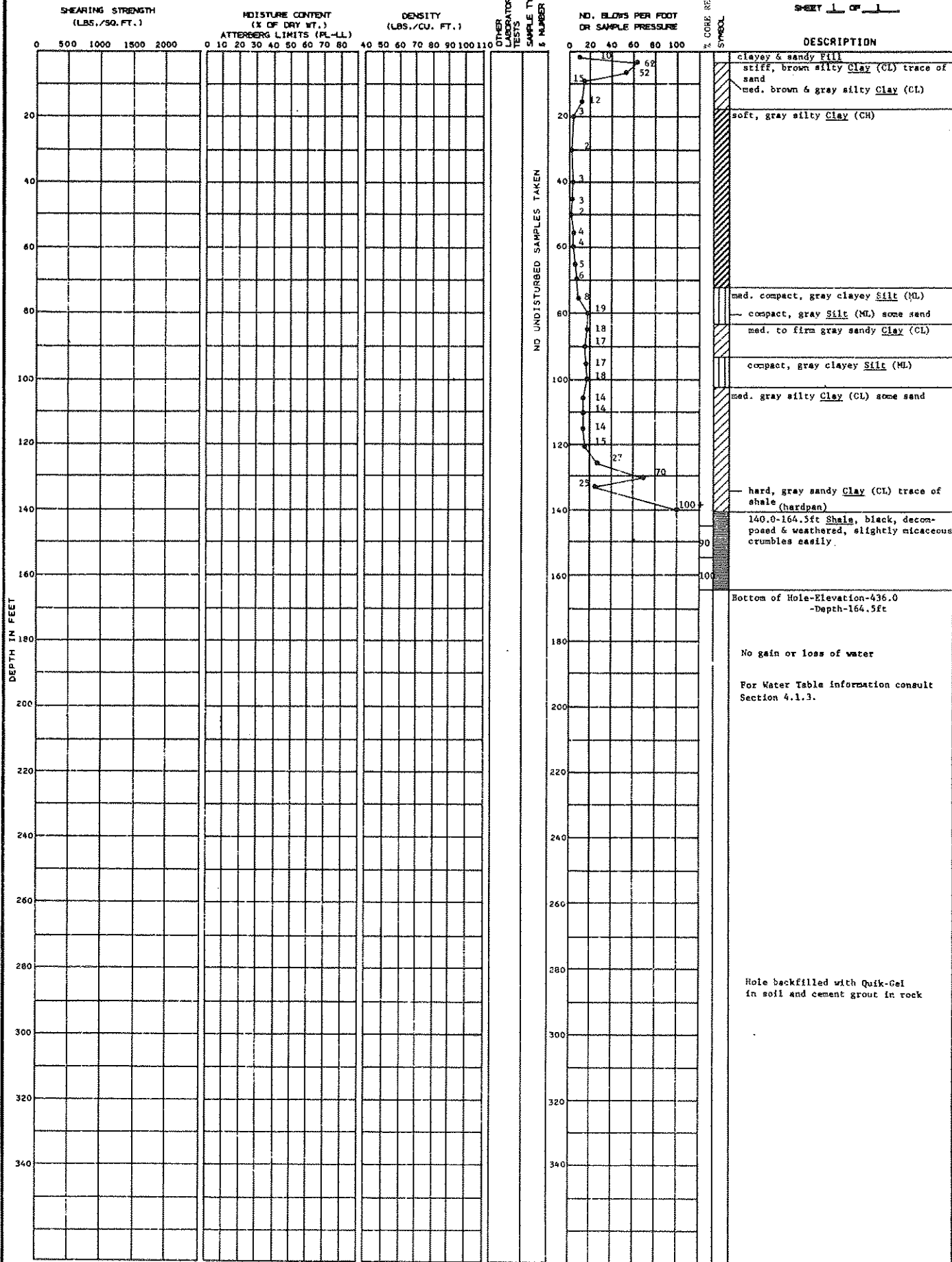


SOIL BORING NO. 42  
BECHTEL Belle River

LOCATION: N 7,004  
E13,000 GROUND ELEVATION 600.5

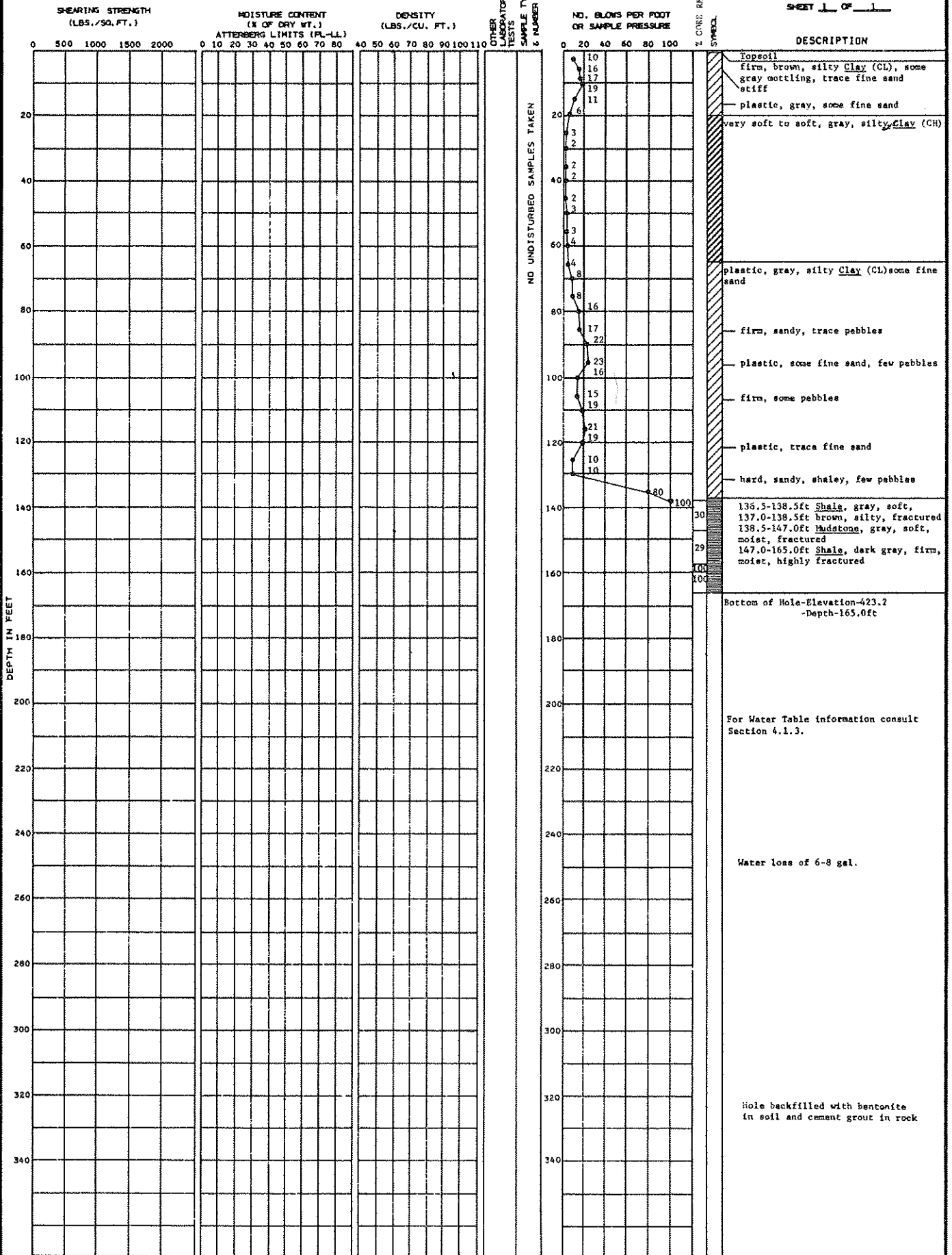
DATE DRILLED: 11-20-73

SHEET 1 OF 1



LOCATION: N 5,344  
E 12,319 GROUND ELEVATION 588.2

DATE DRILLED: 1-22-74  
1-28-74  
SHEET 1 OF 1

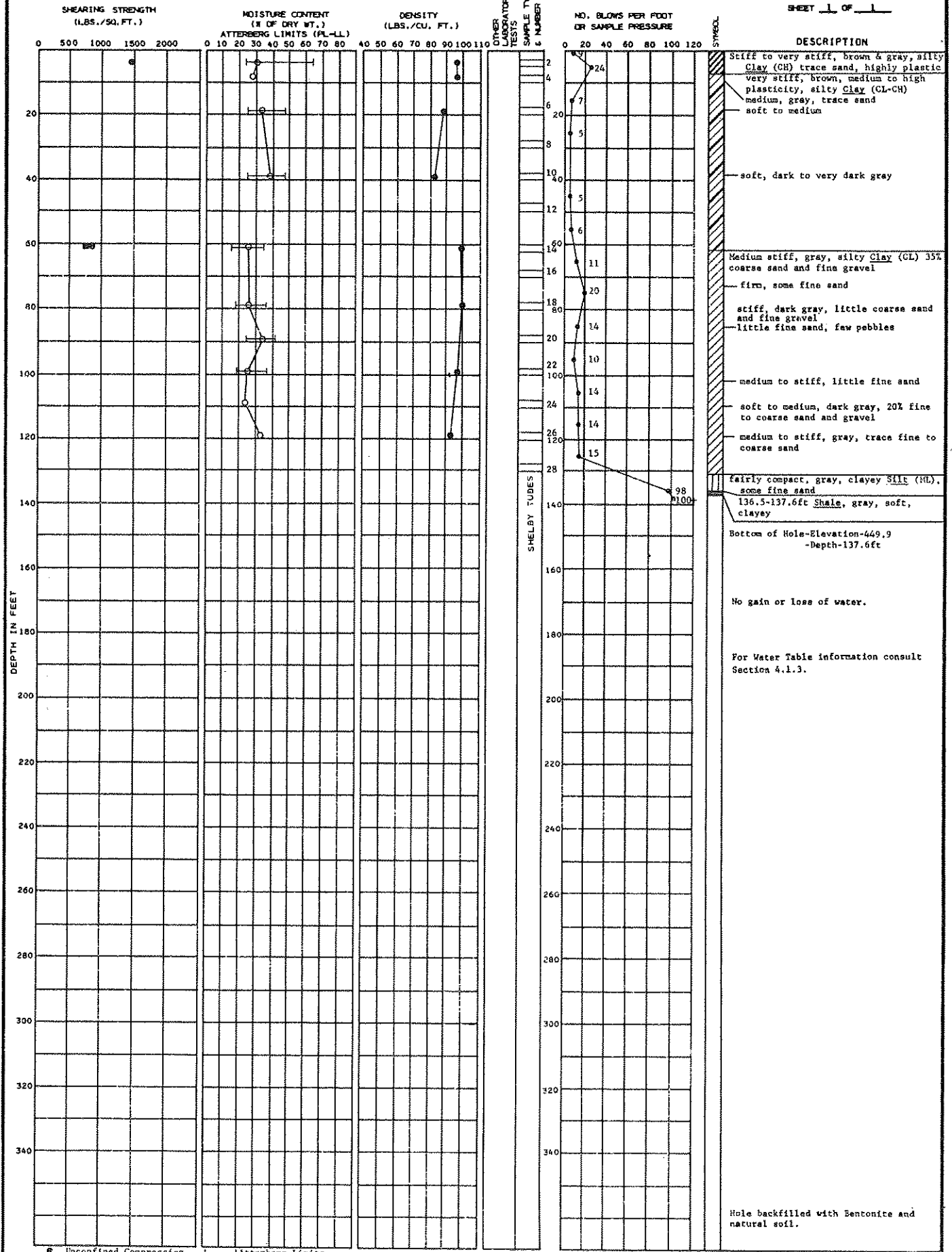




LOCATION: N 3,950 E 12,584 GROUND ELEVATION 587.5

DATE DRILLED: 1-14-74  
1-23-74

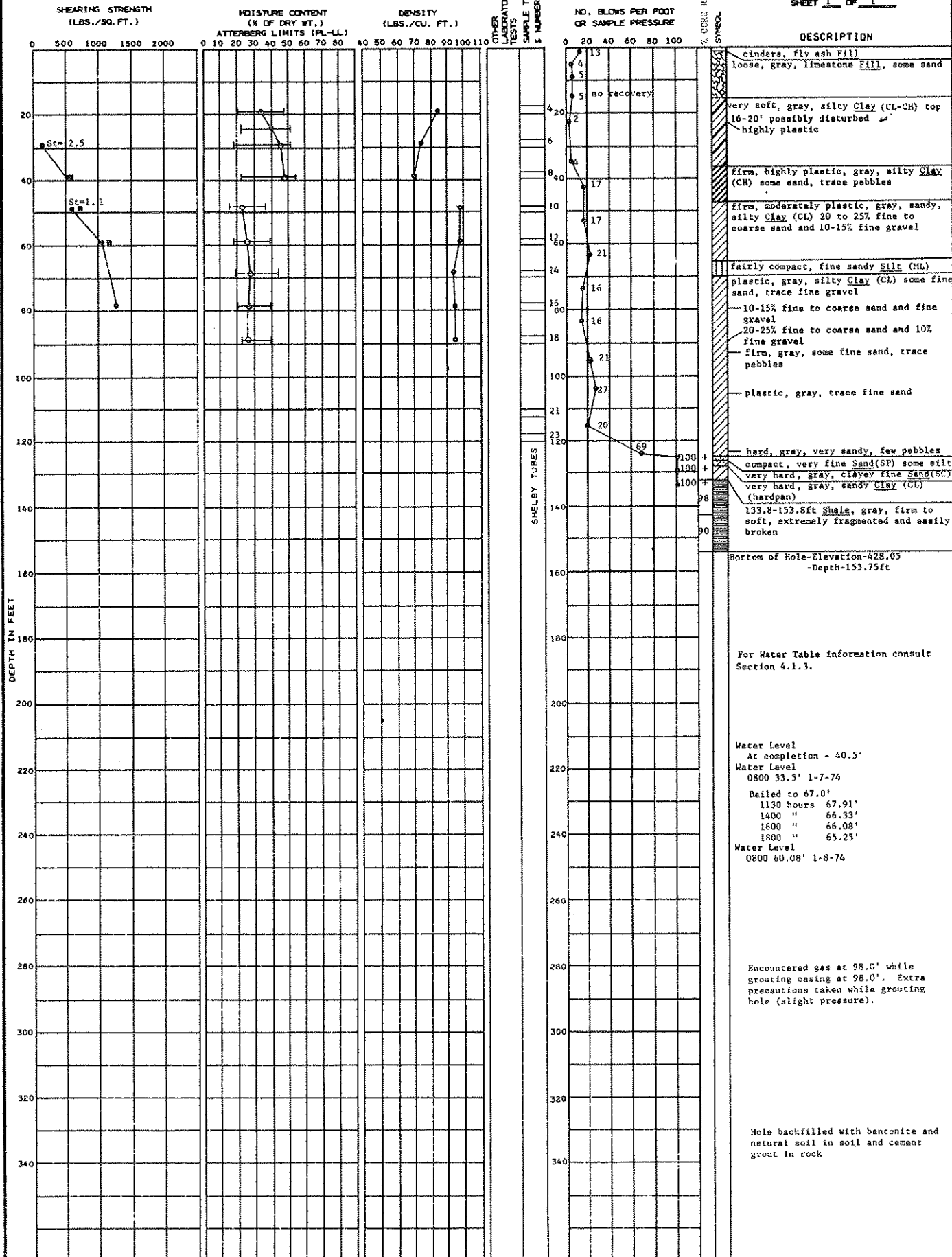
SHEET 1 OF 1



● Unconfined Compression    ○ Atterberg Limits  
 ■ Unconsolidated Undrained    ○ Moisture Content

SOIL BORING NO. 48

BECHTEL Belle River



● Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity  
 ○ Moisture Content  
 — Atterberg Limits

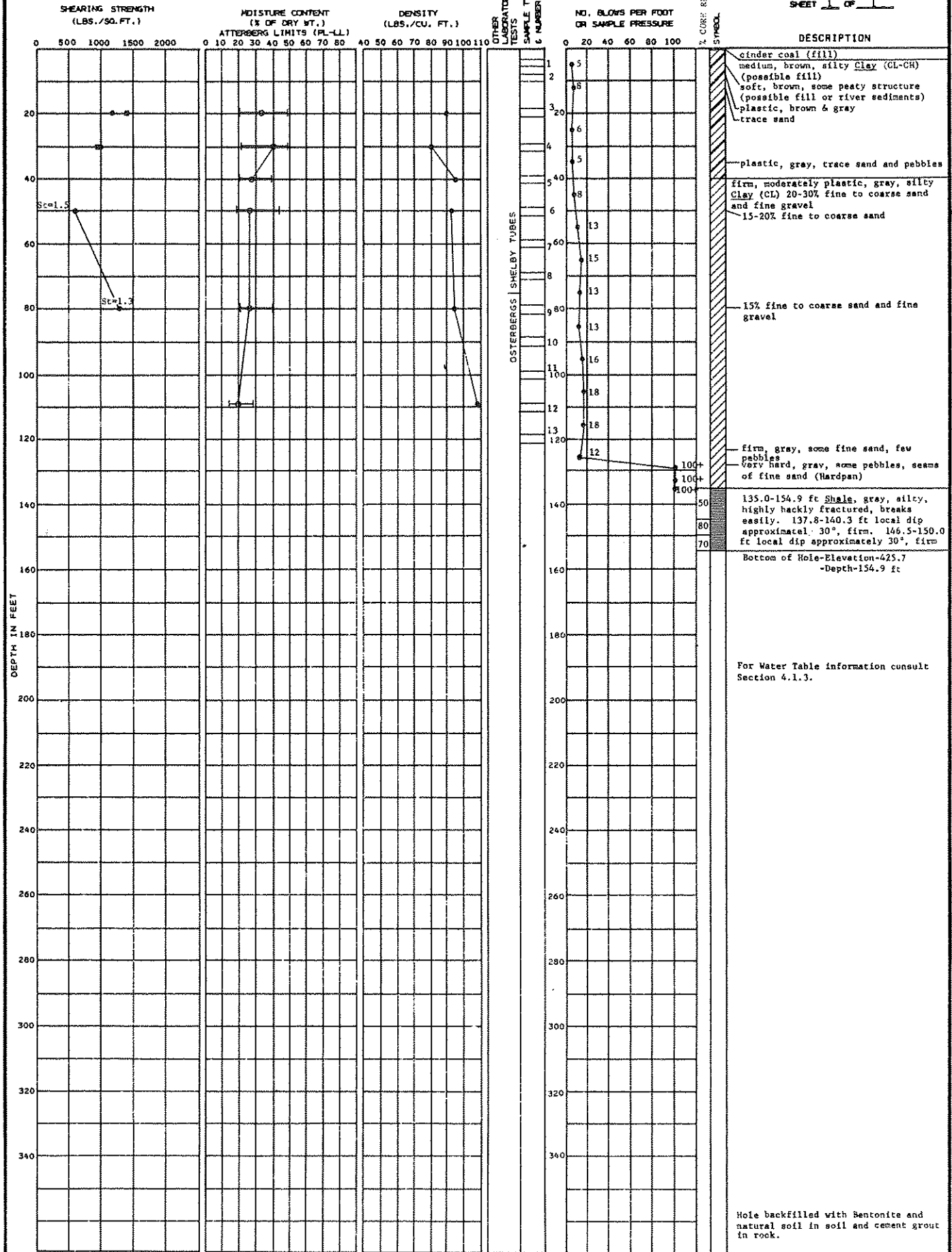
SOIL BORING NO. 50

BECHTEL Belle River

LOCATION: N 2,052 E15,176 GROUND ELEVATION 580.6

DATE DRILLED: 12-21-73  
1-7-76

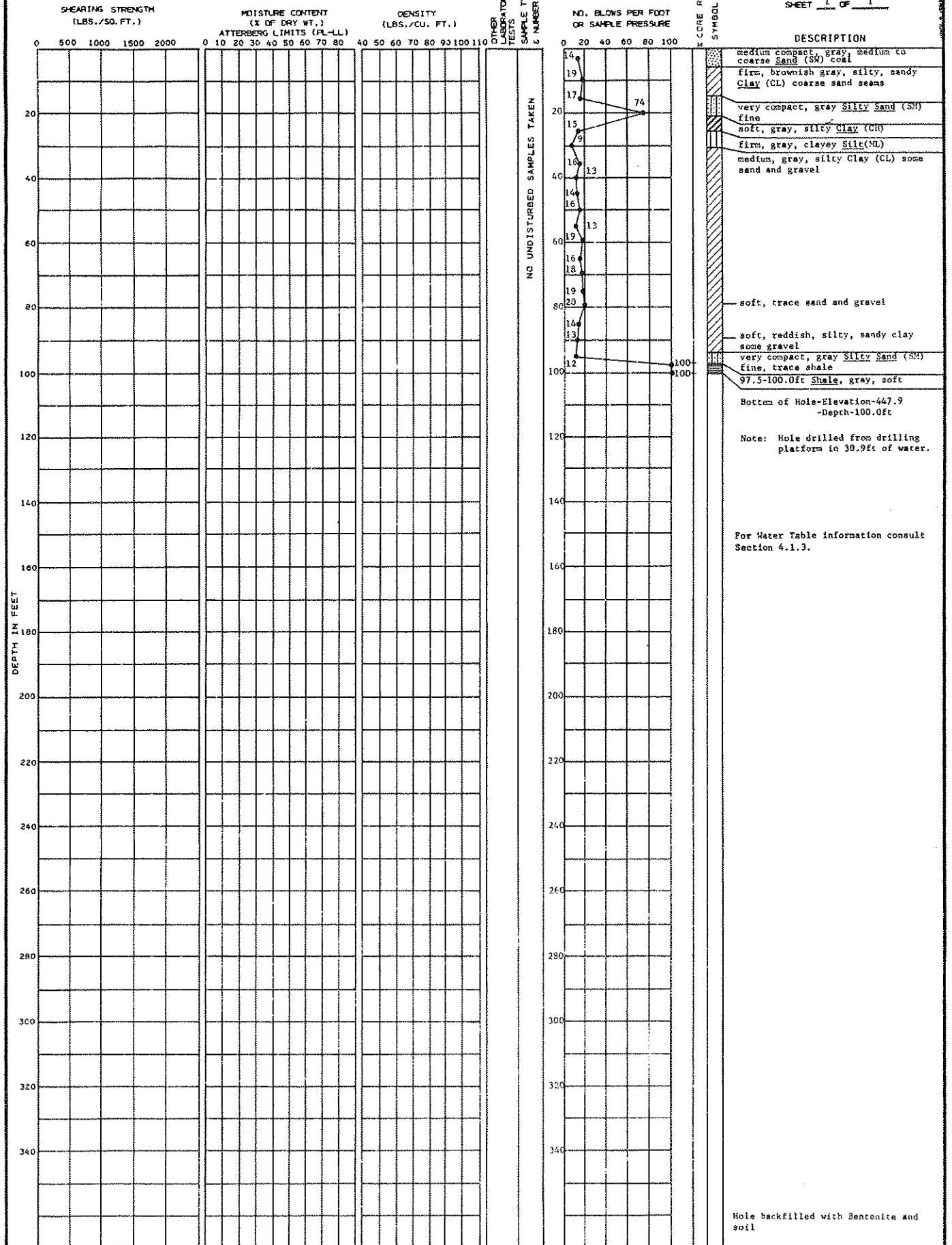
SHEET 1 OF 1



■ Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity  
 ○ Moisture content  
 — Atterberg limits

LOCATION: N 2,645  
E 15,306 GROUND ELEVATION 547.9

DATE DRILLED: 3-29-74  
SHEET 1 OF 1



SOIL BORING NO. 55

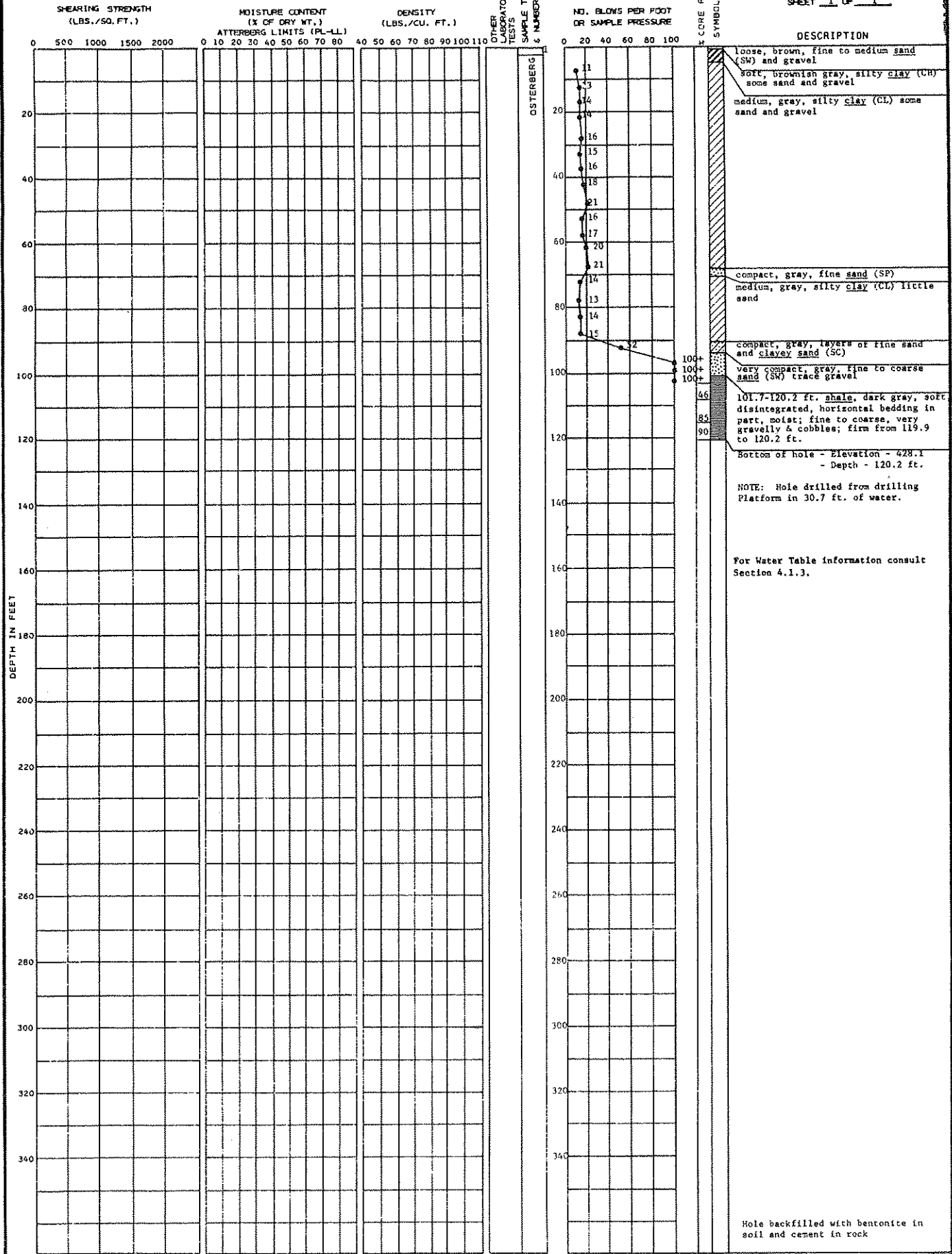
BECHTEL Belle River

LOCATION: N 1,907  
E 15,269

GROUND ELEVATION 543.3

DATE DRILLED: 3-20-74  
3-26-74

SHEET 1 OF 1



Hole backfilled with bentonite in soil and cement in rock

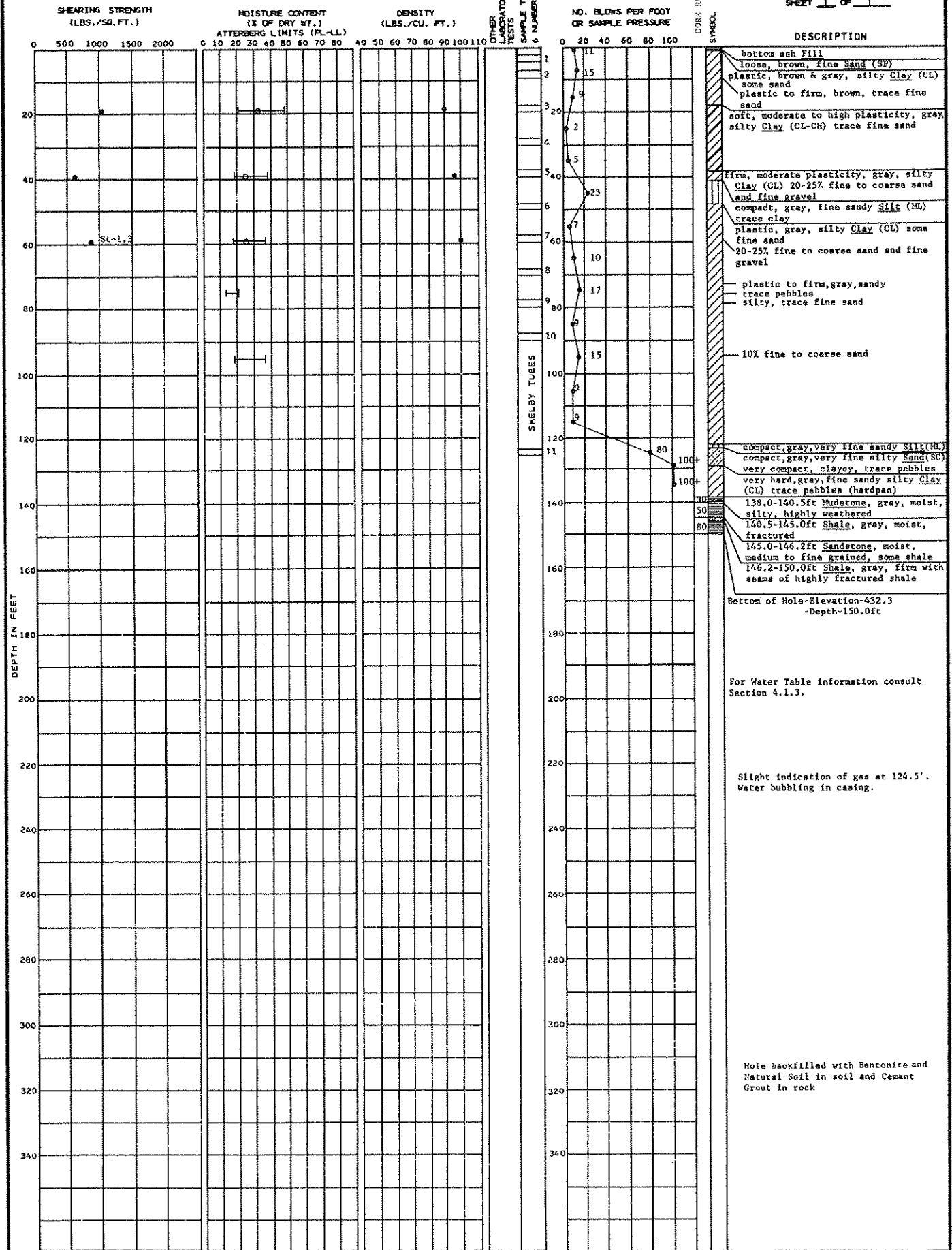
SOIL BORING NO. 57

BECHTEL Belle River

LOCATION: N 2393 E15140 GROUND ELEVATION: 582.3

DATE DRILLED: 1-10-74  
1-16-74

SHEET 1 OF 1



○ Unconfined  
Sr = Sensitivity

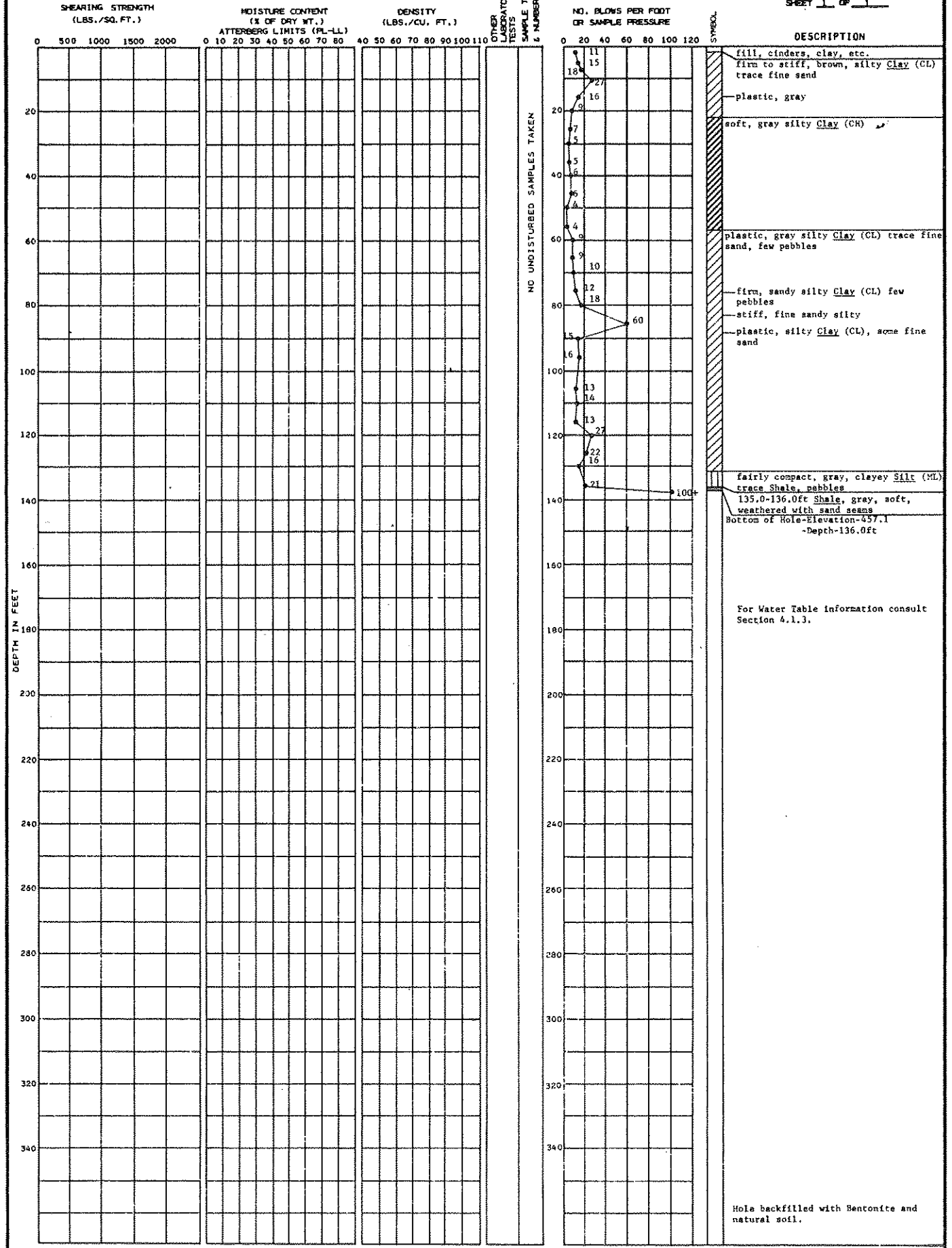
○ Moisture Content  
— Atterberg Limits

LOCATION: N 5,283  
E 14,042

GROUND ELEVATION 593.1

DATE DRILLED: 1-23-74  
1-29-74

SHEET 1 OF 1



fairly compact, gray, clayey Silt (ML) trace Shale, pebbles  
135.0-136.0ft Shale, gray, soft, weathered with sand seams  
Bottom of Hole-Elevation-457.1  
-Depth-136.0ft

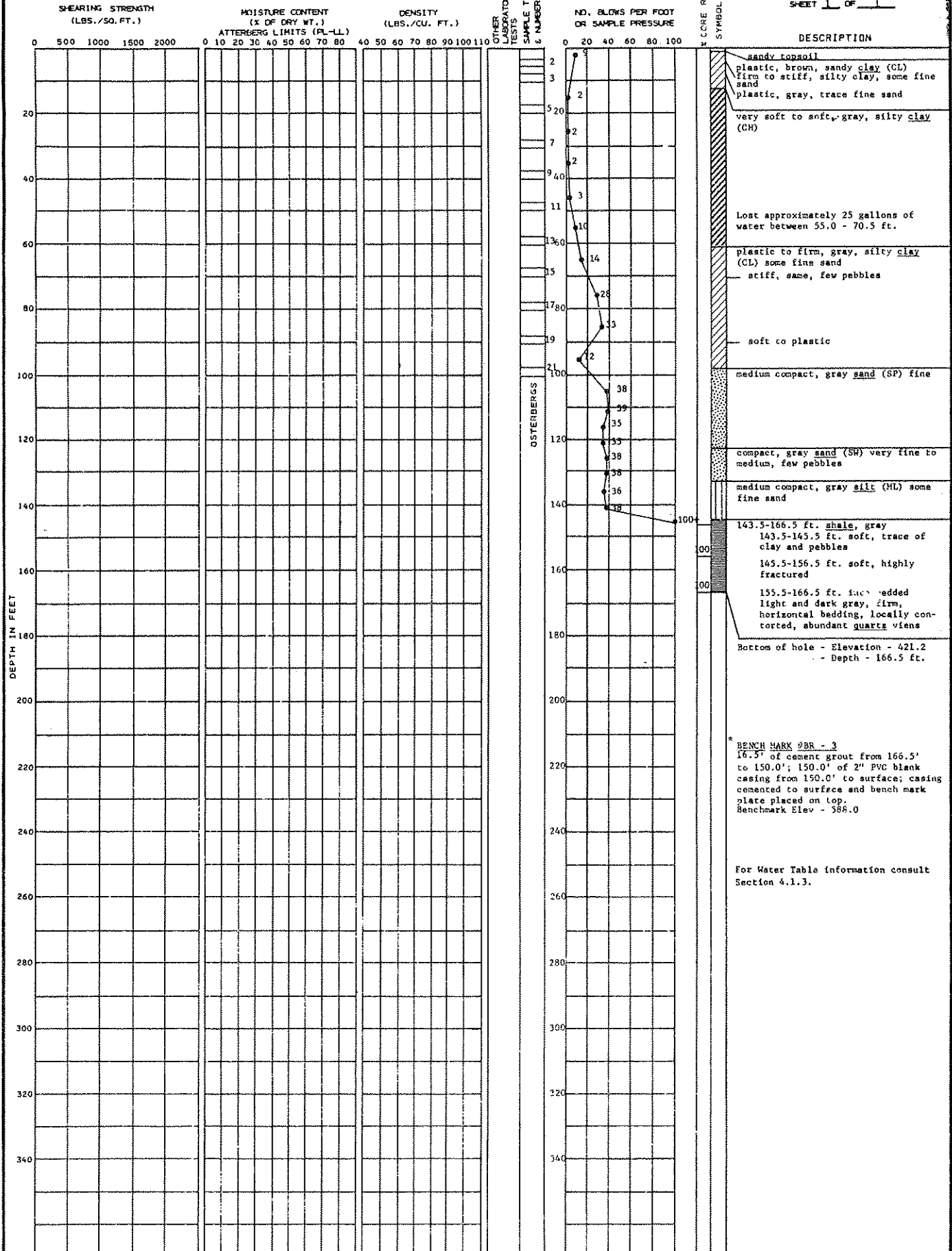
For Water Table Information consult Section 4.1.3.

Hole backfilled with Bentonite and natural soil.

LOCATION: N 9,208.32 GROUND ELEVATION 587.6  
 E 9,376.12

DATE DRILLED: 2-28-74  
 3-7-74

SHEET 1 OF 1

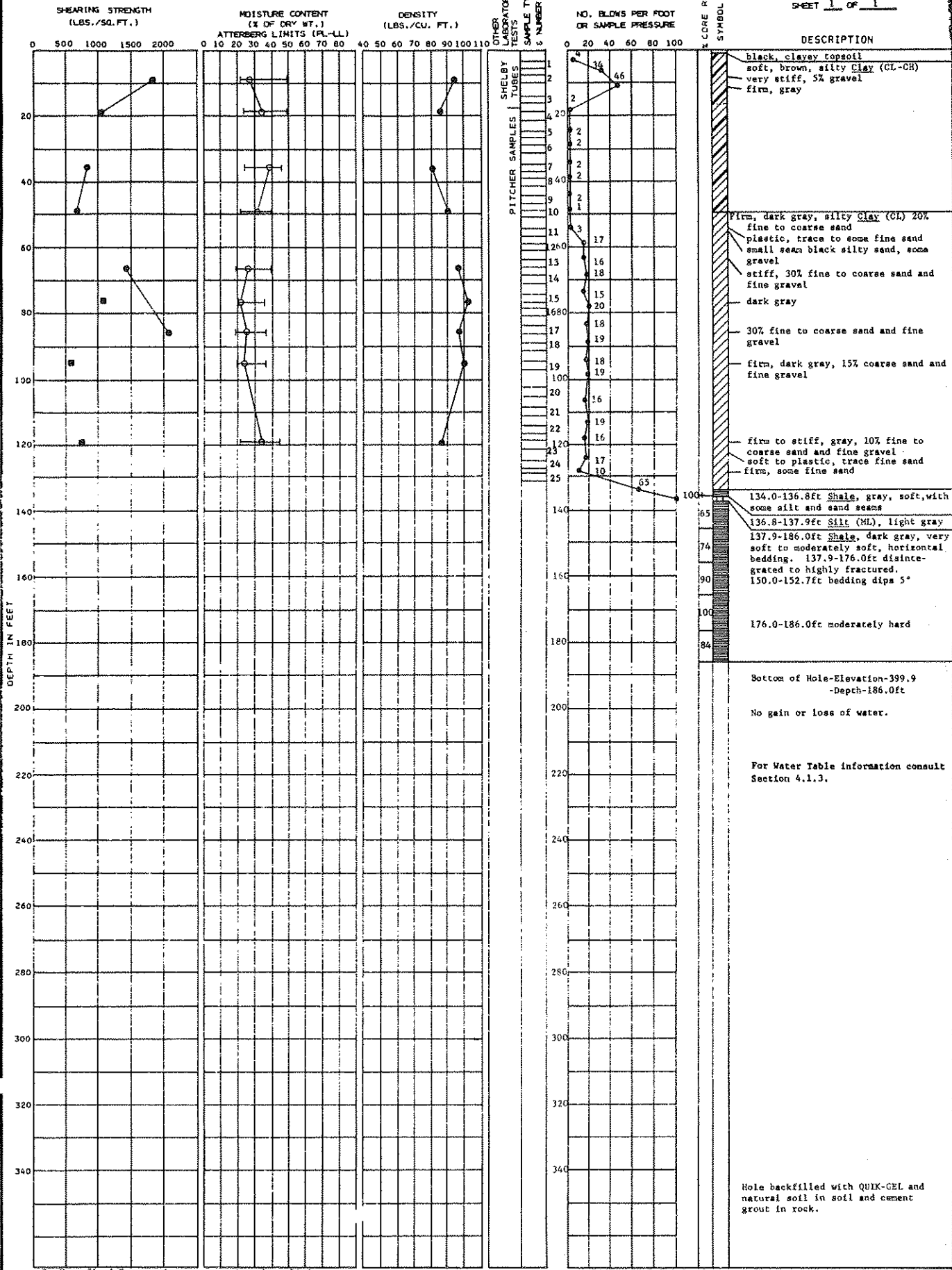




LOCATION: N 3,800 E 12,060 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74 2-26-74

SHEET 1 OF 1



● Unconfined Compression  
 ■ Unconsolidated Undrained  
 — Atterberg Limits  
 ○ Moisture Content

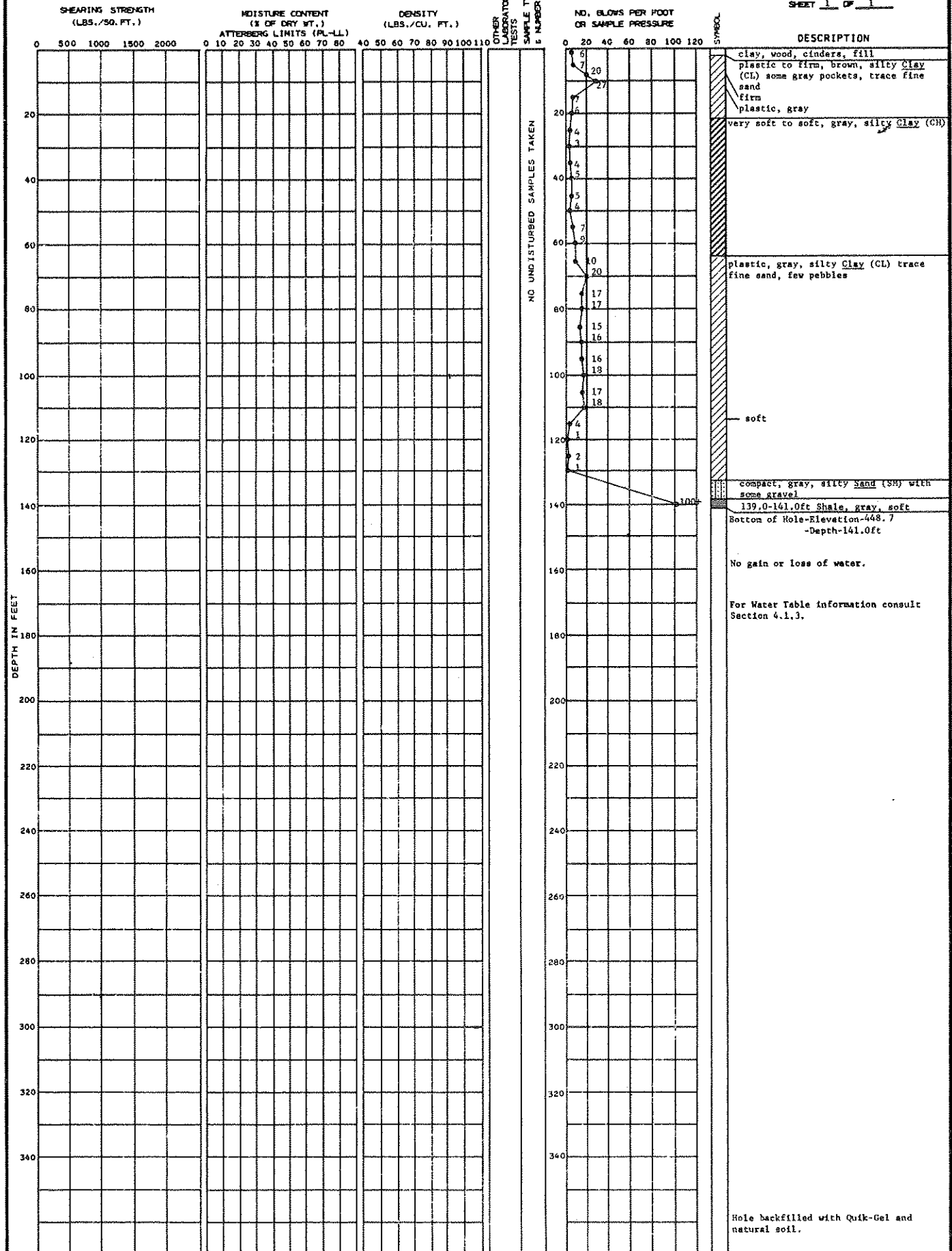
SOIL BORING NO. 101  
BECHTEL Belle River

LOCATION: N 4,435  
E 12,350

GROUND ELEVATION 589.7

DATE DRILLED: 2-5-74  
2-7-74

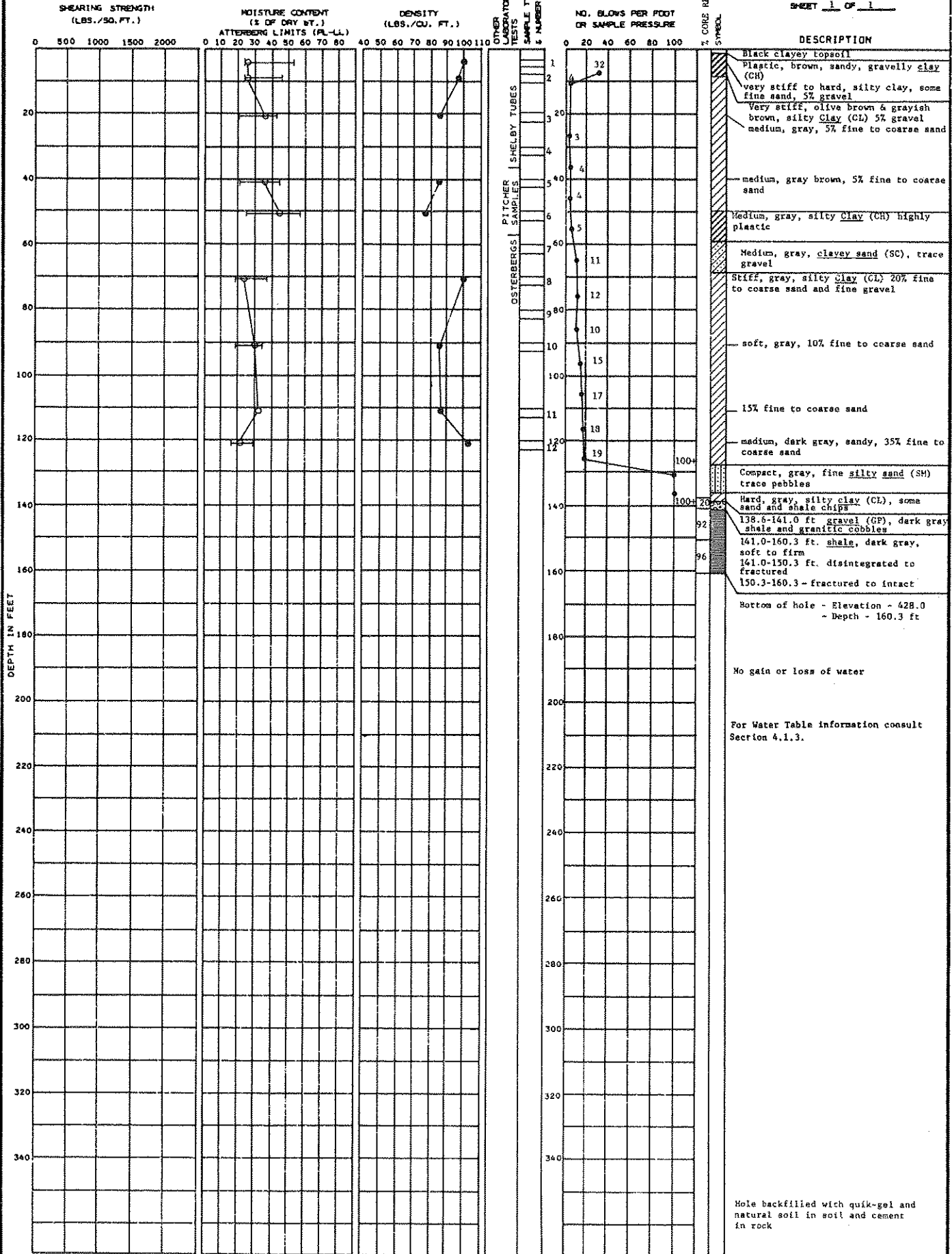
SHEET 1 OF 1



LOCATION: N 5,000 E 11,000 GROUND ELEVATION 588.3

DATE DRILLED: 2-26-74 3-5-74

SHEET 1 OF 1



Atterberg Limits  
 O Moisture Content

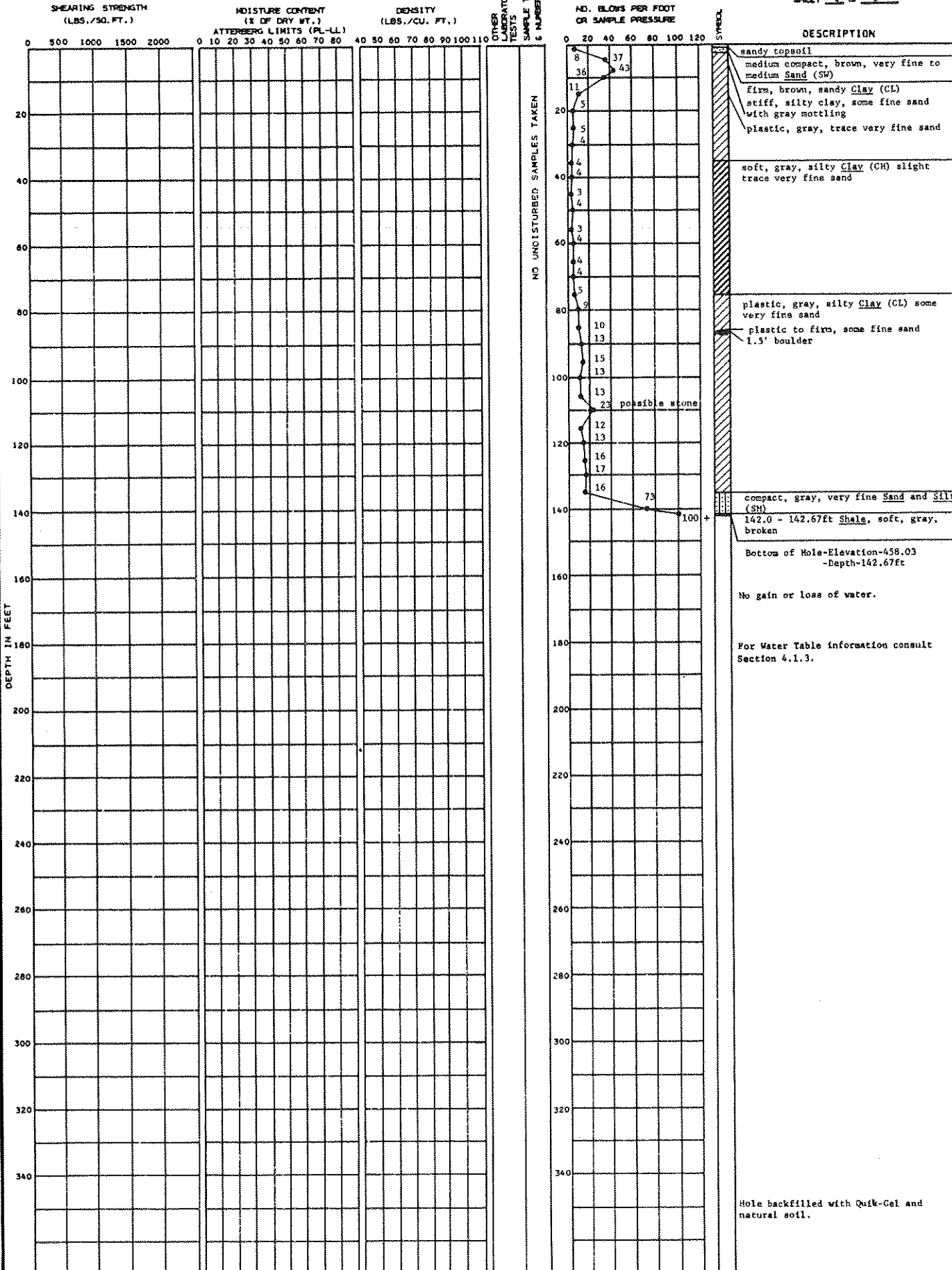
SOIL BORING NO. 105

BECHTEL Belle River

LOCATION: S 6,450 E 13,140 GROUND ELEVATION 600.7

DATE DRILLED: 2-26-74 3-6-74

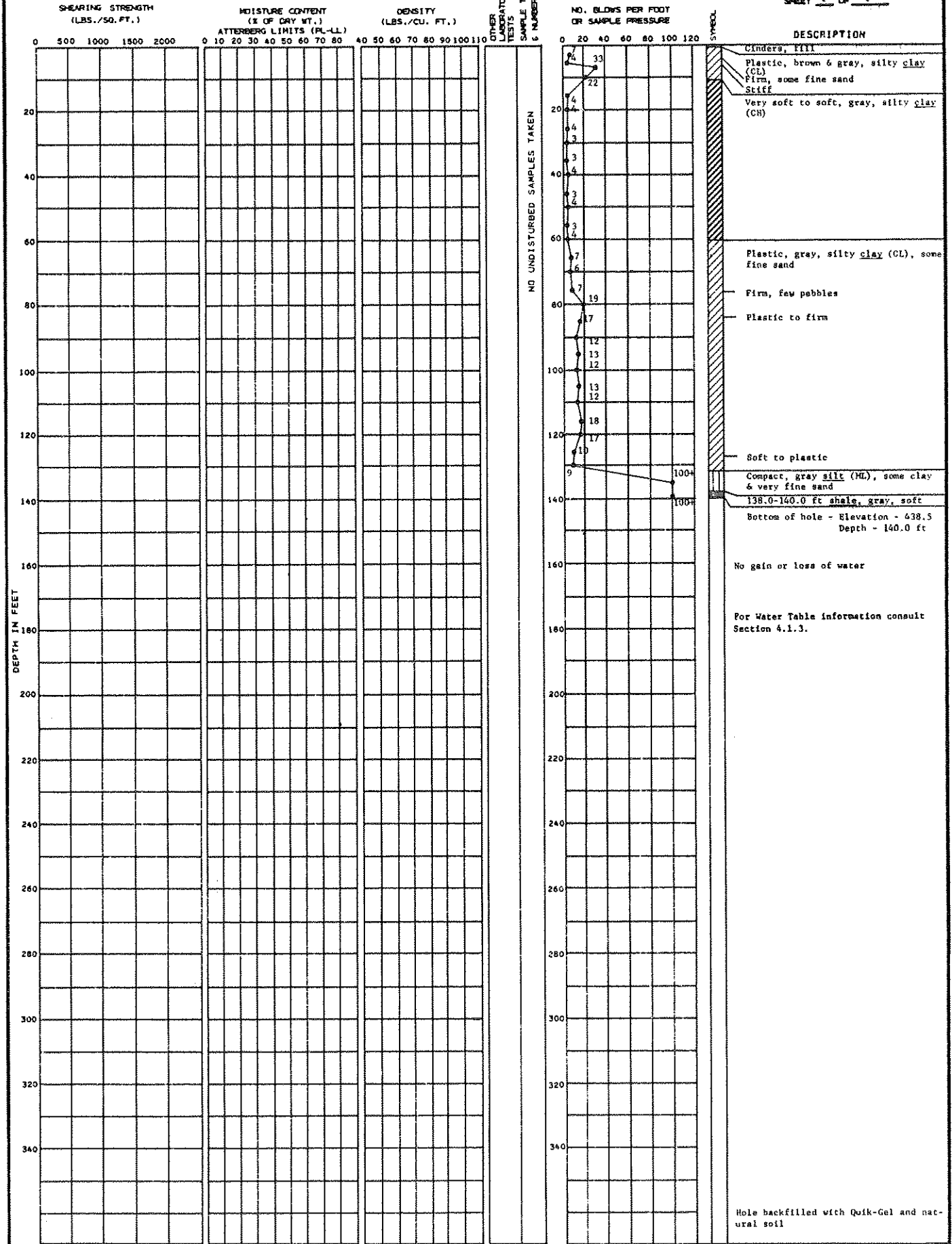
SHEET 1 OF 1



LOCATION: N 6,600 E 11,000 GROUND ELEVATION 588.5

DATE DRILLED: 2-21-74 2-26-74

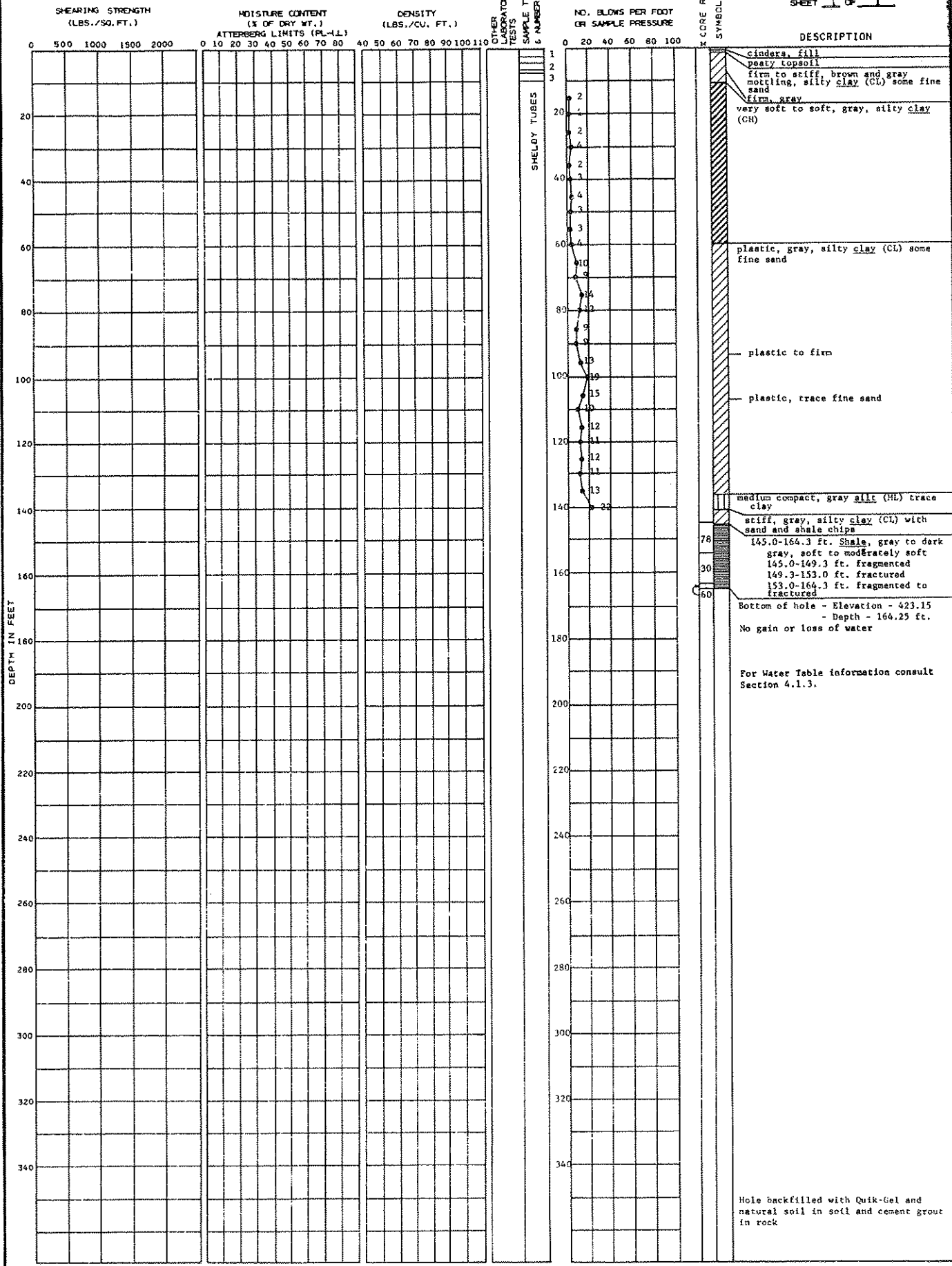
SHEET 1 OF 1



LOCATION: N 6,800 E 9,350 GROUND ELEVATION 587.4

DATE DRILLED: 2-27-74 3-5-74

SHEET 1 OF 1



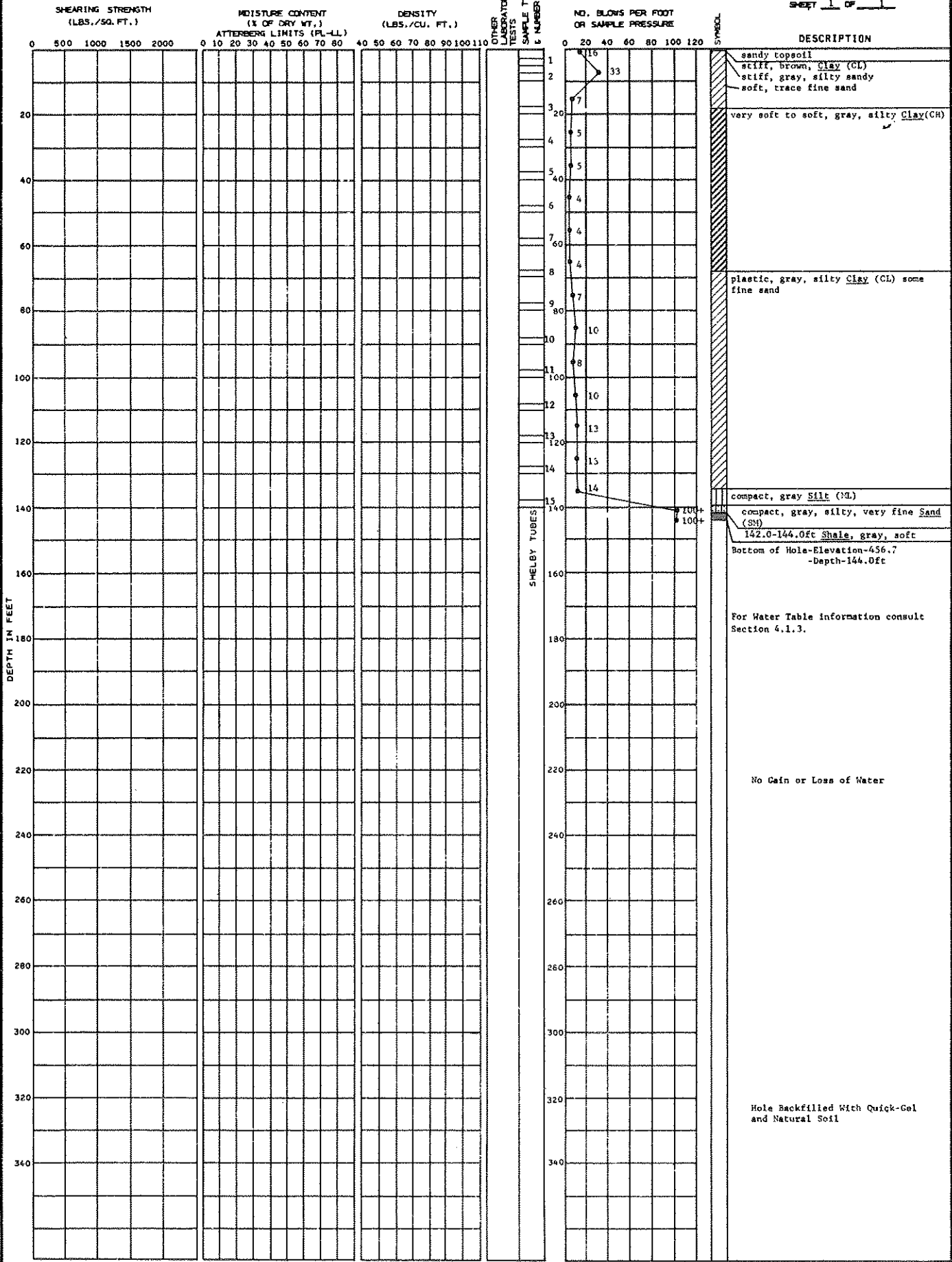
SOIL BORING NO. 113

BECHTEL Belle River

LOCATION: N 7,100 E13,260 GROUND ELEVATION 600.7

DATE DRILLED: 1-30-74 2-6-74

SHEET 1 OF 1

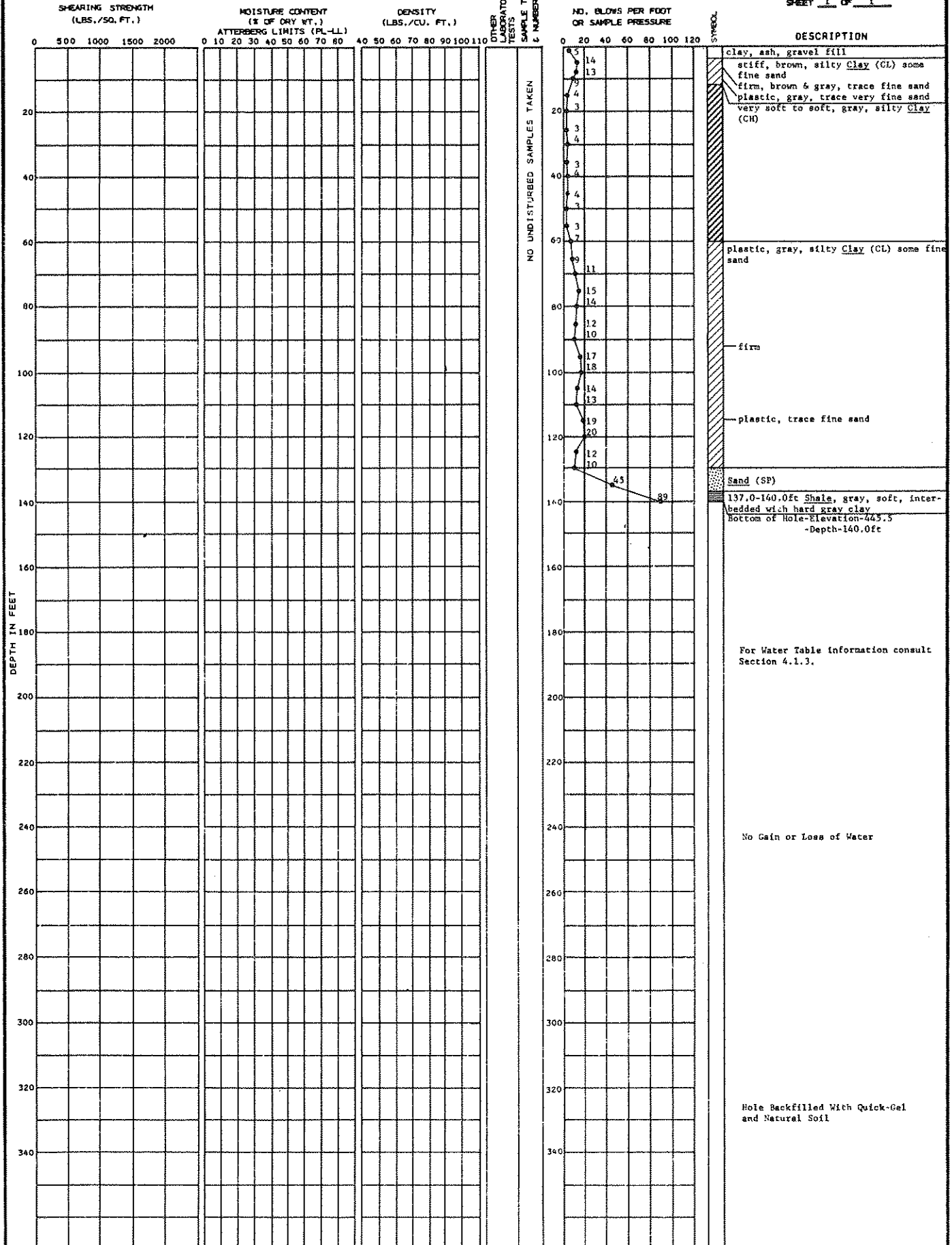


LOCATION: N 7,270  
E 9,360

GROUND ELEVATION 585.5

DATE DRILLED: 2-5-74  
2-12-74

SHEET 1 OF 1

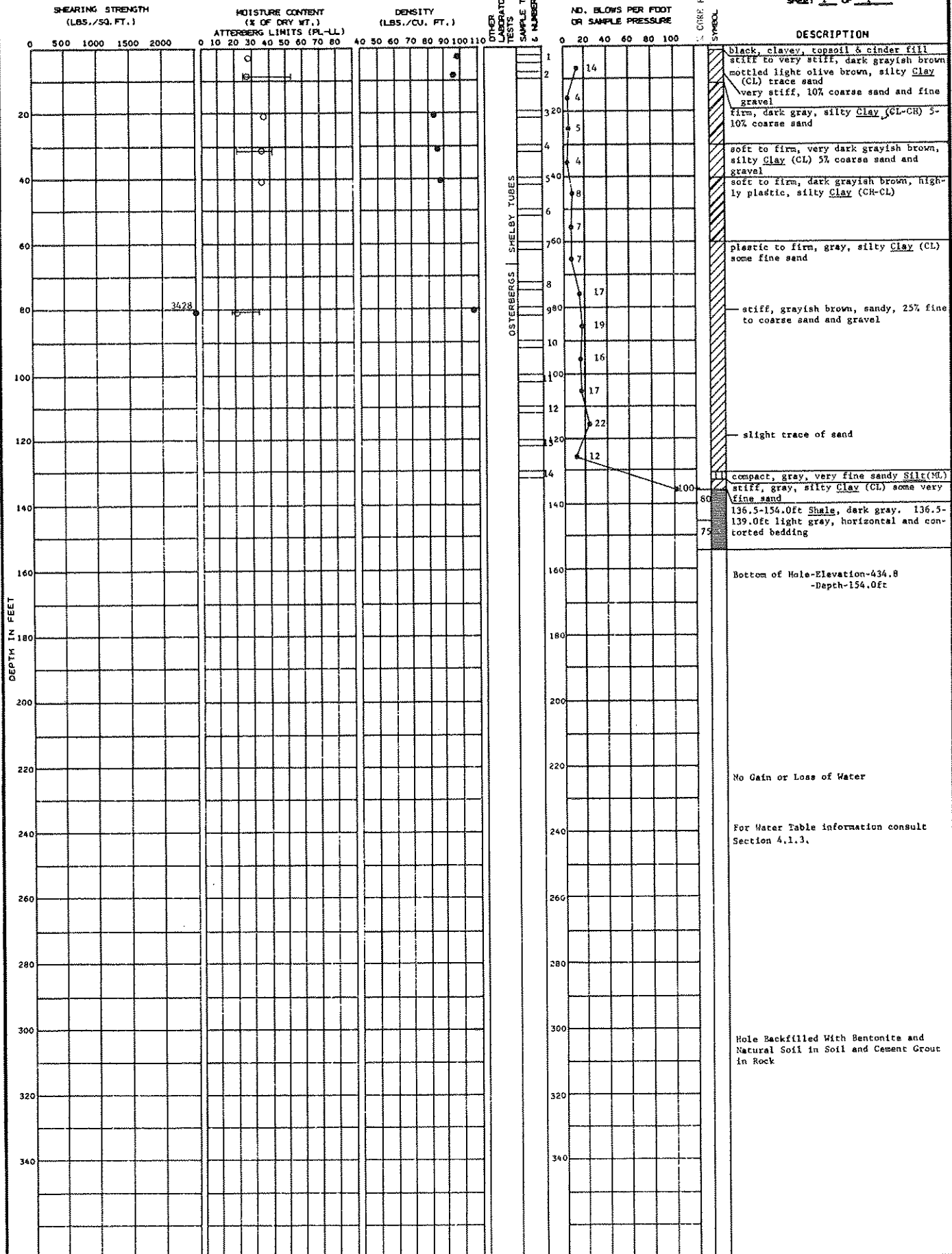




LOCATION: N 7,510  
E11,380 GROUND ELEVATION: 588.8

DATE DRILLED: 1-29-74  
2-5-74

SHEET 1 OF 1



● Unconfined Compression  
○ Atterberg Limits  
○ Moisture Content

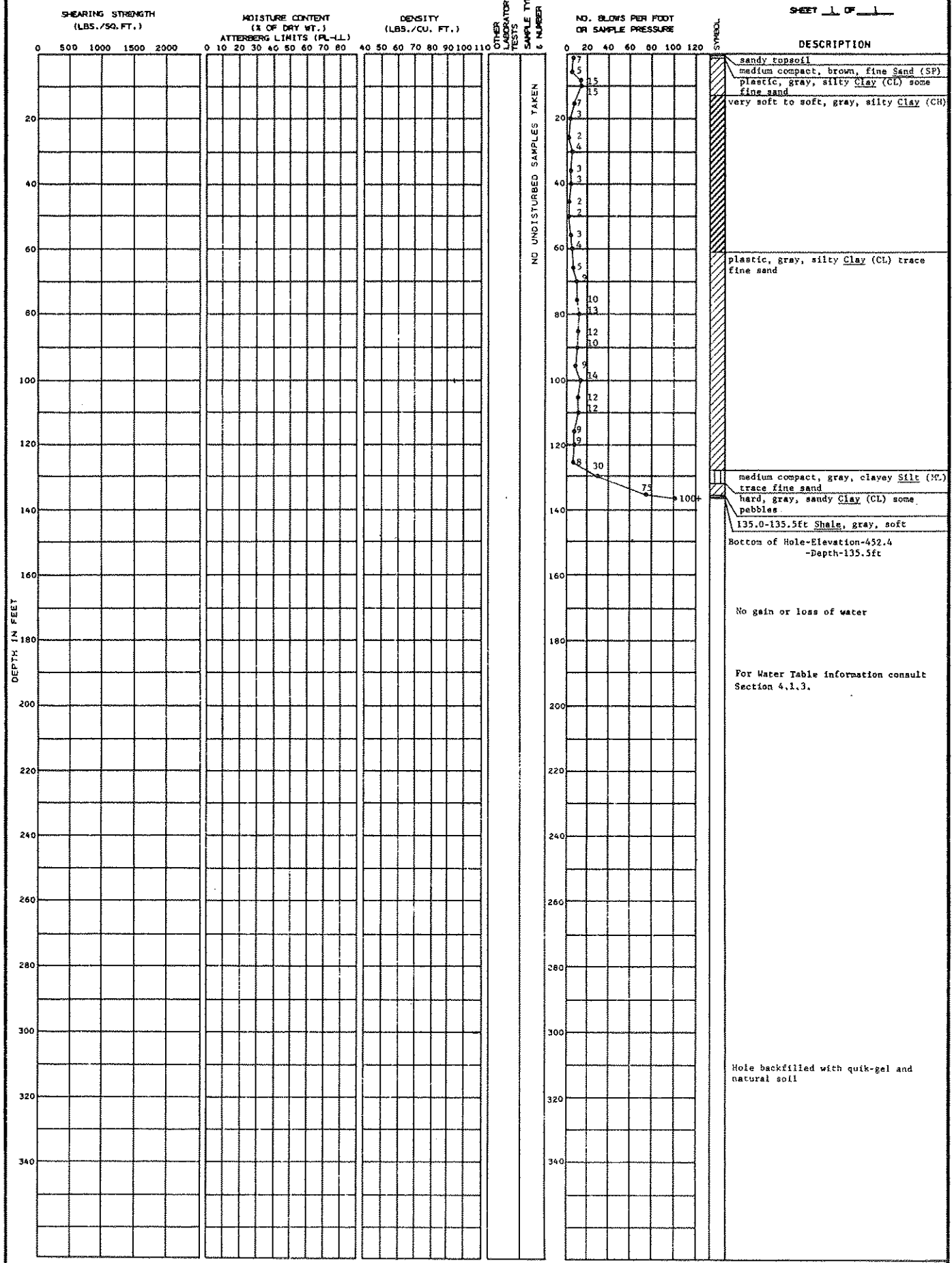
SOIL BORING NO. 119

BECHTEL Belle River

LOCATION: N 7,680 E 10,630 GROUND ELEVATION 587.9

DATE DRILLED: 2-14-74 2-19-74

SHEET 1 OF 1



LOCATION: N 8,017  
E 4,999

GROUND ELEVATION 588.9

DATE DRILLED: 3-25-74

SHEET 1 OF 1

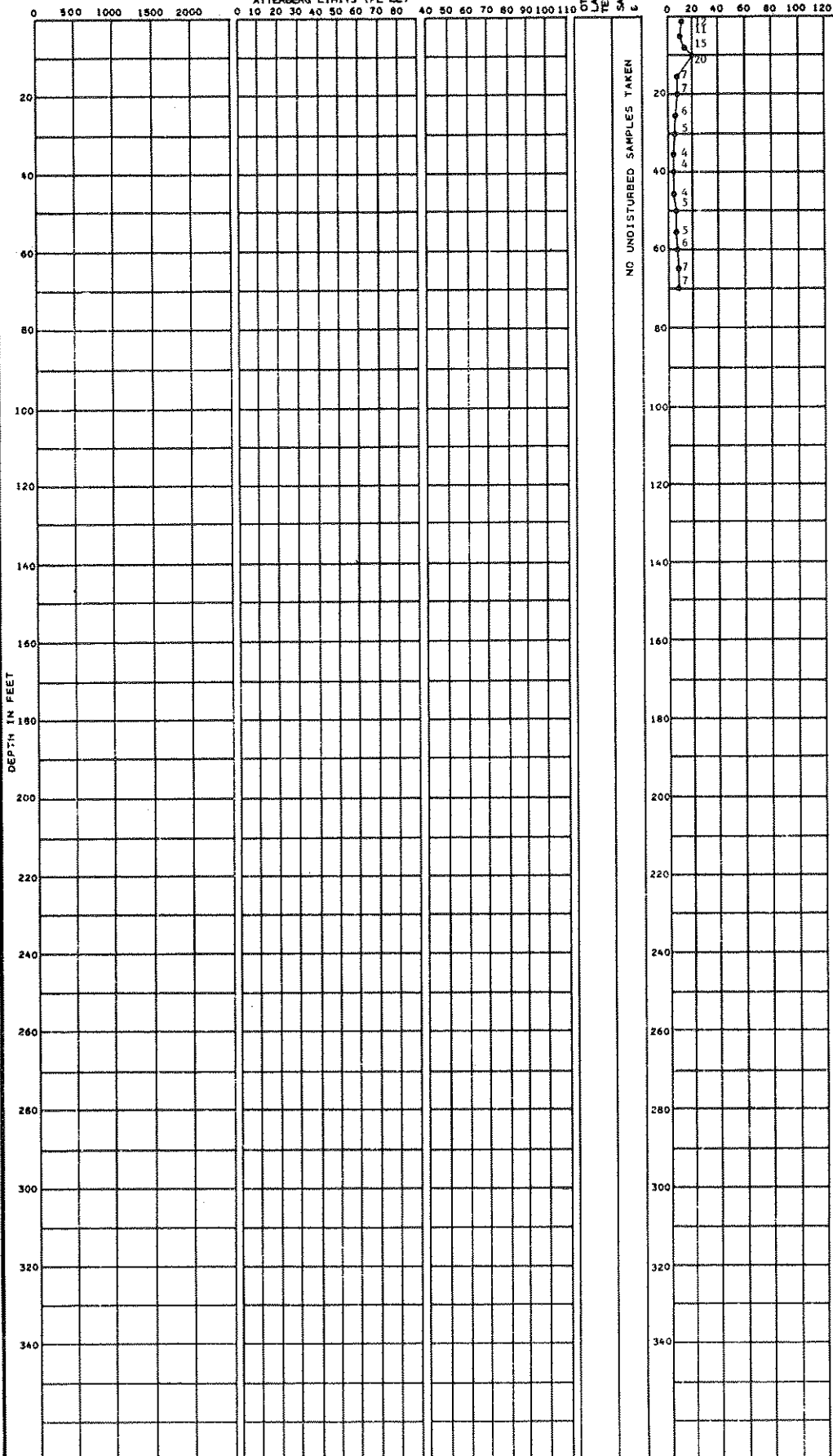
SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

DENSITY  
(LBS./CU. FT.)

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

DESCRIPTION



Gray, silty topsoil  
 Medium, mottled brown & gray, silty sandy clay (CL), trace of pebbles  
 Soft, gray, silty clay (CH), trace of sand

Bottom of hole - Elevation - 518.9  
 - Depth - 70.0 ft

No gain or loss of water

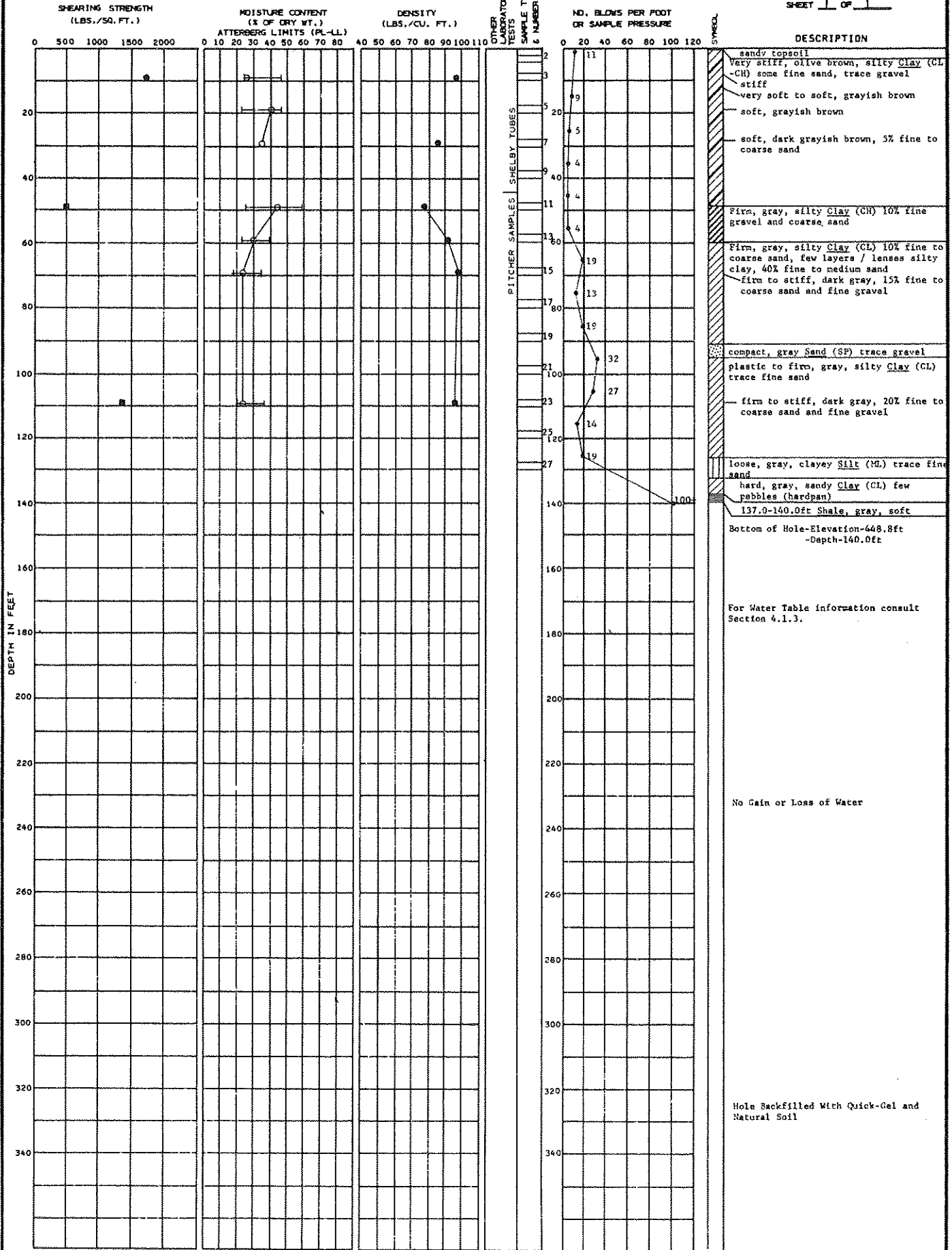
For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

LOCATION: R 7,950 GROUND ELEVATION 588.8  
 E 11,140

DATE DRILLED: 2-1-74  
 2-6-74

SHEET 1 OF 1



● Unconfined Compression  
 ■ Unconsolidated Undrained  
 ○ Atterberg Limits  
 ○ Moisture Content

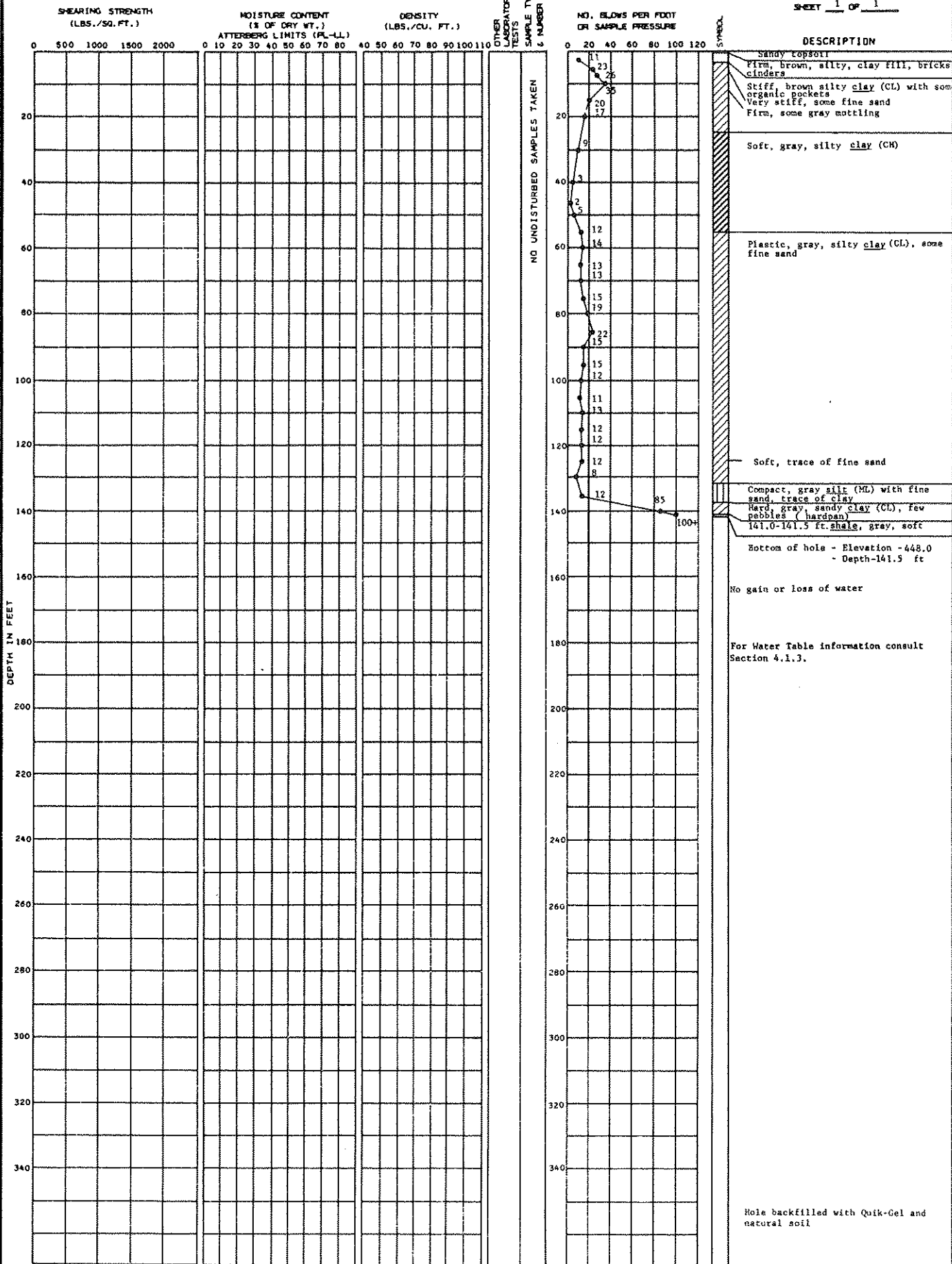
SOIL BORING NO. 126

BECHTEL Belle River

LOCATION: N 3,000  
E 11,000

GROUND ELEVATION 589.5

DATE DRILLED: 2-7-74  
2-13-74  
SHEET 1 OF 1

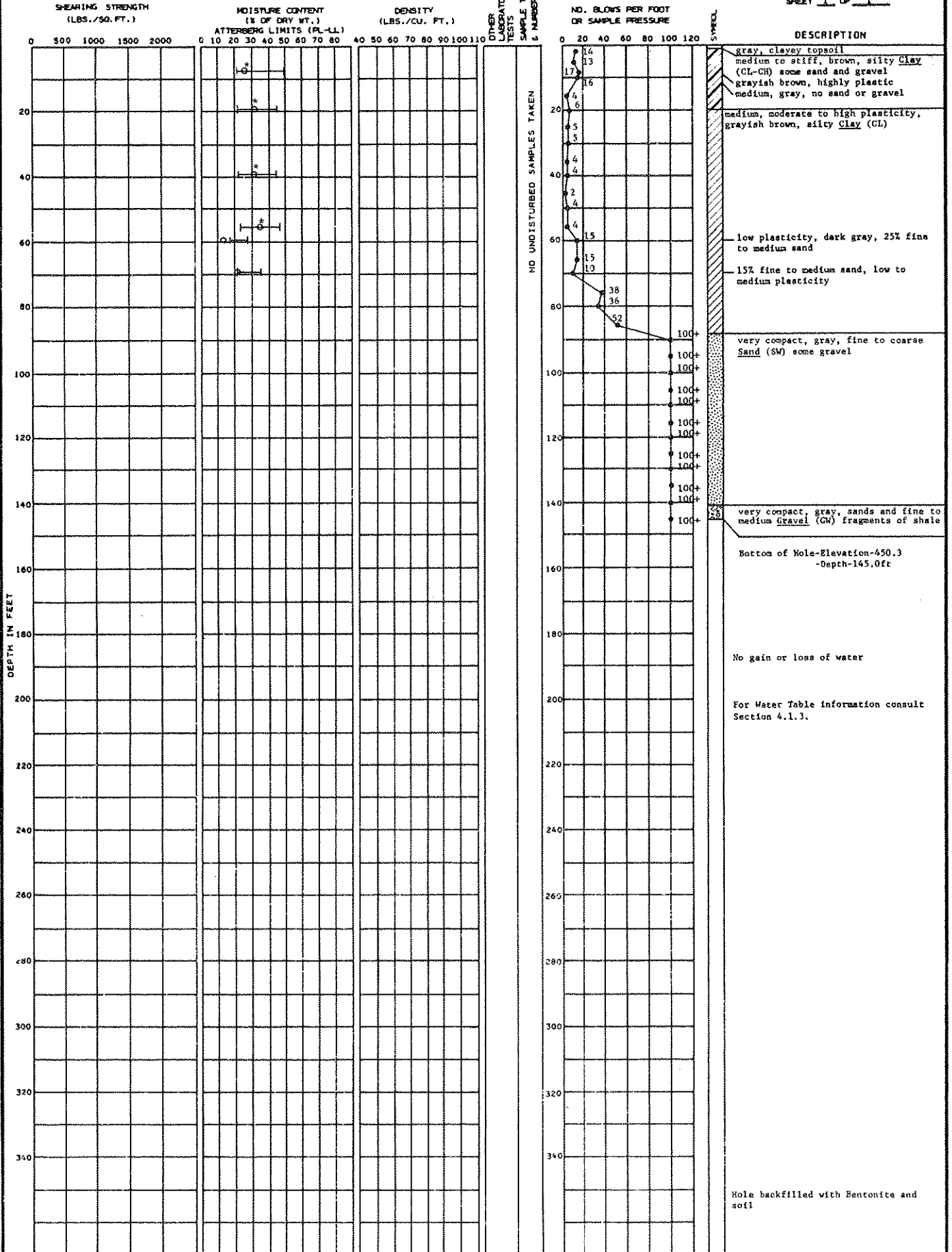


LOCATION: N 9,014 E 4,993 GROUND ELEVATION 595.3

DATE DRILLED: 3-26-74

3-28-74

SHEET 1 OF 1



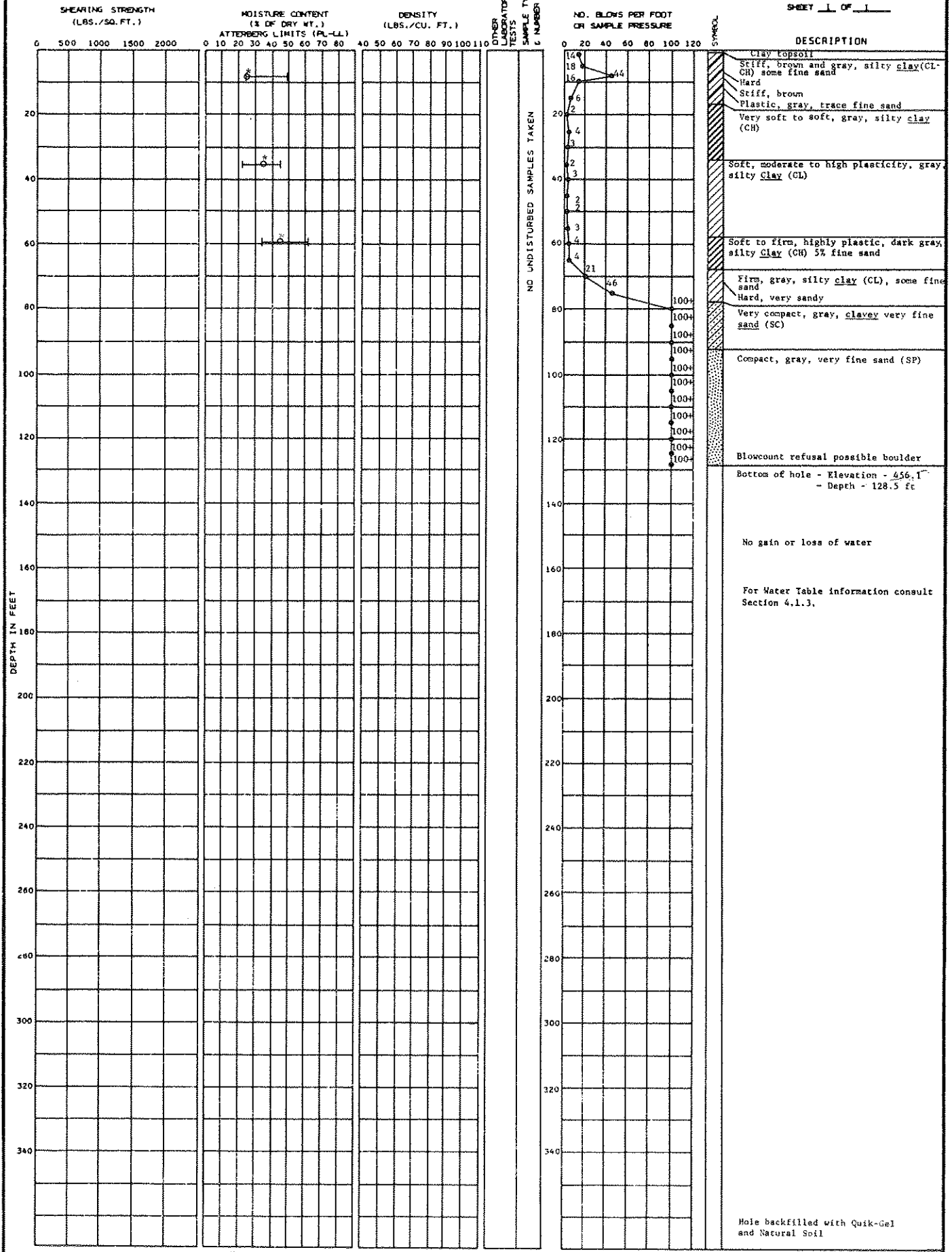
○ Water Content  
 — Atterburg Limiter  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 130

BECHTEL Bella River

LOCATION: N 10,050 E 4,995 GROUND ELEVATION 594.6

DATE DRILLED: 3-5-74 3-7-74 SHEET 1 OF 1

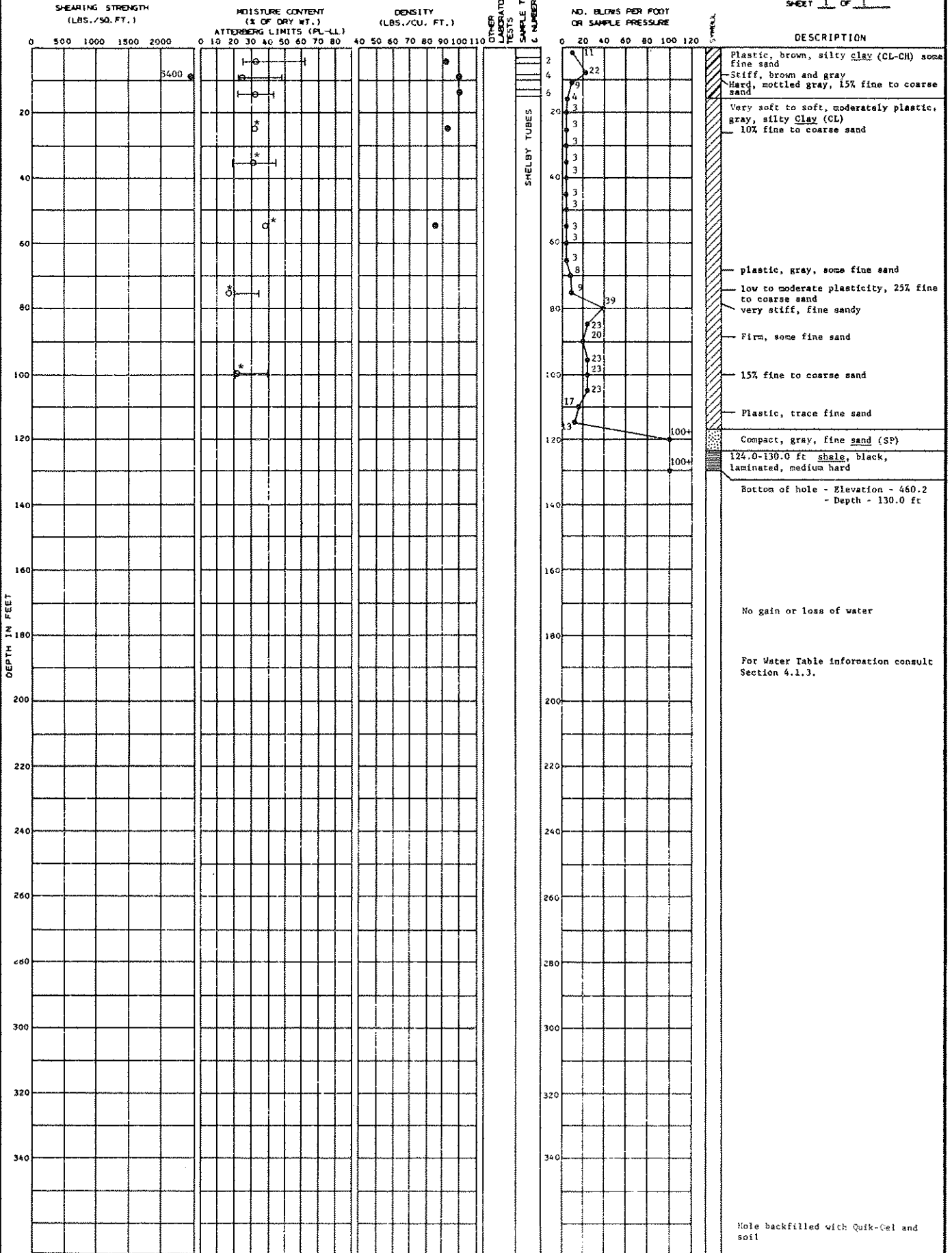


○ Water Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 10,050 E 7,000 GROUND ELEVATION 590.2

DATE DRILLED: 3-8-74  
3-13-74

SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterburg Limits  
\* Water content taken from unsealed jar sample.

SOIL BORING NO. 136  
BECHTEL Belle River R-00



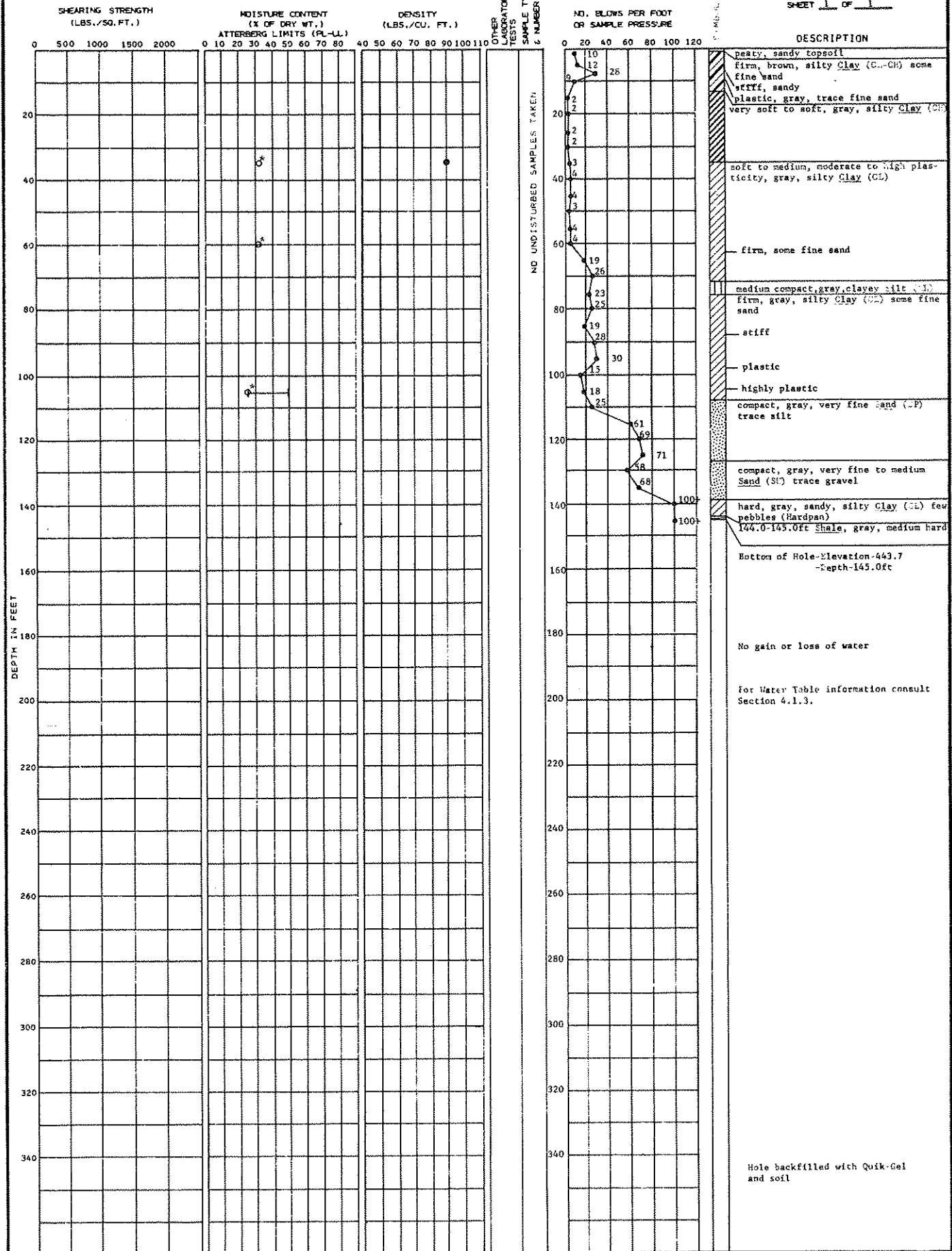
LOCATION: 10,030  
S.977

GROUND ELEVATION

582.7

DATE DRILLED: 3-11-74  
3-14-74

SHEET 1 OF 1



○ Water Content  
Atterburg Limits  
Water content taken from  
unsealed jar sample.

SOIL BORING NO. 138

BECHTEL Belle River

LOCATION: 10,850 GROUND ELEVATION: 592.0

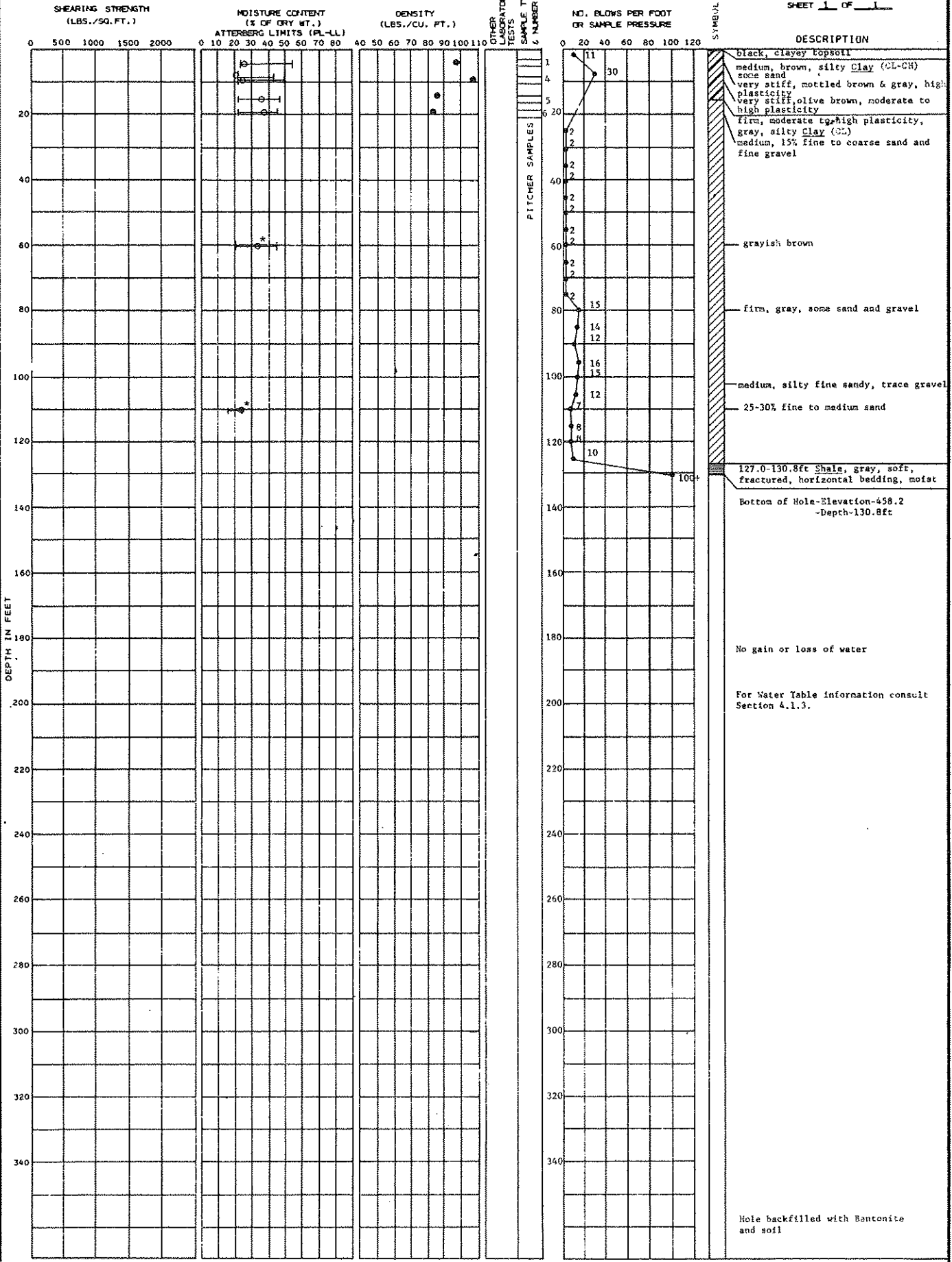
DATE DRILLED: 3-19-74  
3-20-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0					11 31 31		plastic, brown, silty Clay (CL) trace sand stiff, some fine sand
20					5		soft, gray
40					4 4 4		very soft to soft, gray, silty Clay (CH)
60					4 3 2		
80					3 2 2		
100							
120							No gain or loss of water
140							For Water Table information consult Section 4.1.3.
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. 140

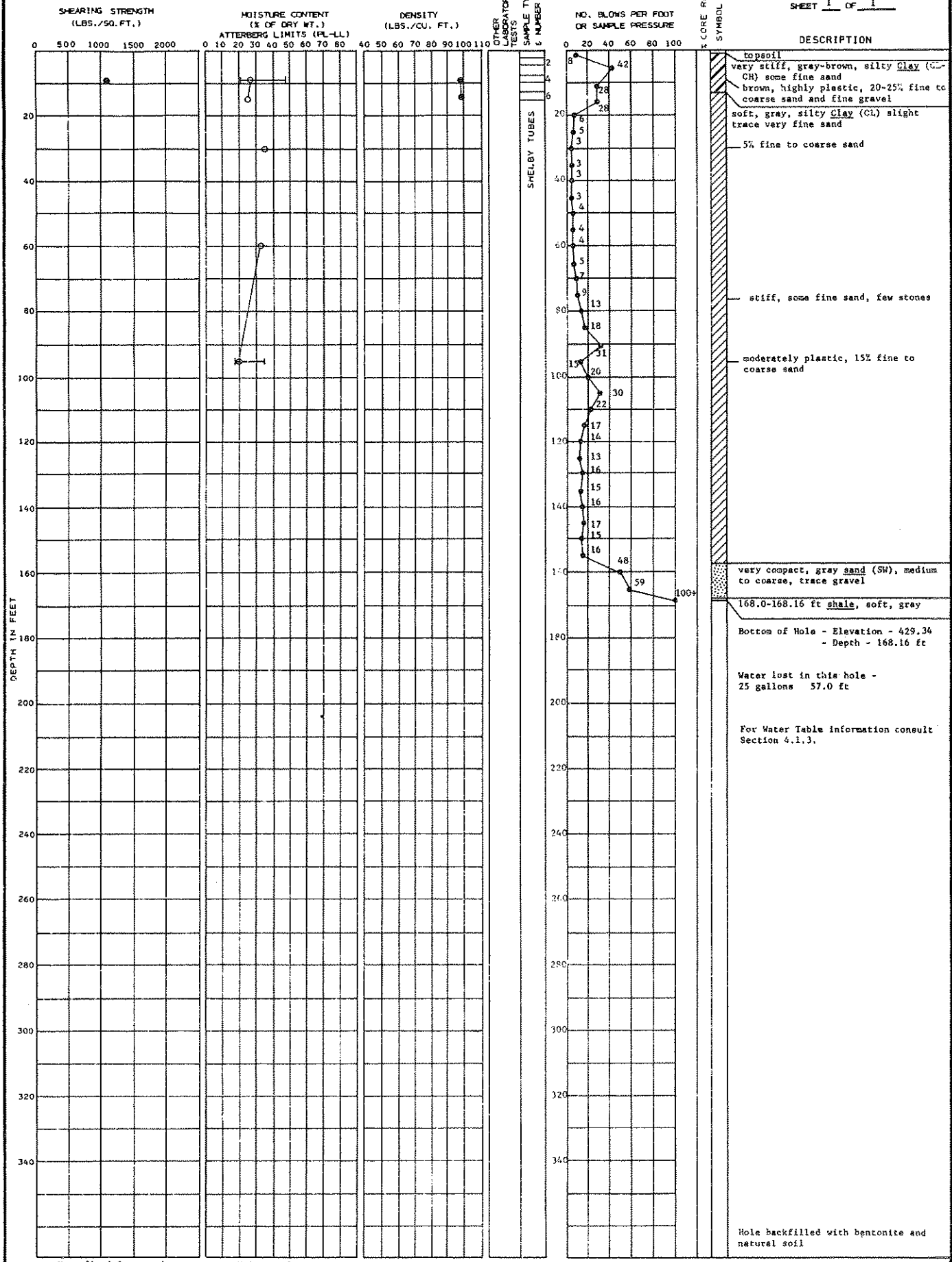
BECHTEL Belle River



○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 12,000 E 5,000 GROUND ELEVATION 597.5

DATE DRILLED: 3-13-74  
3-15-74  
SHEET 1 OF 1



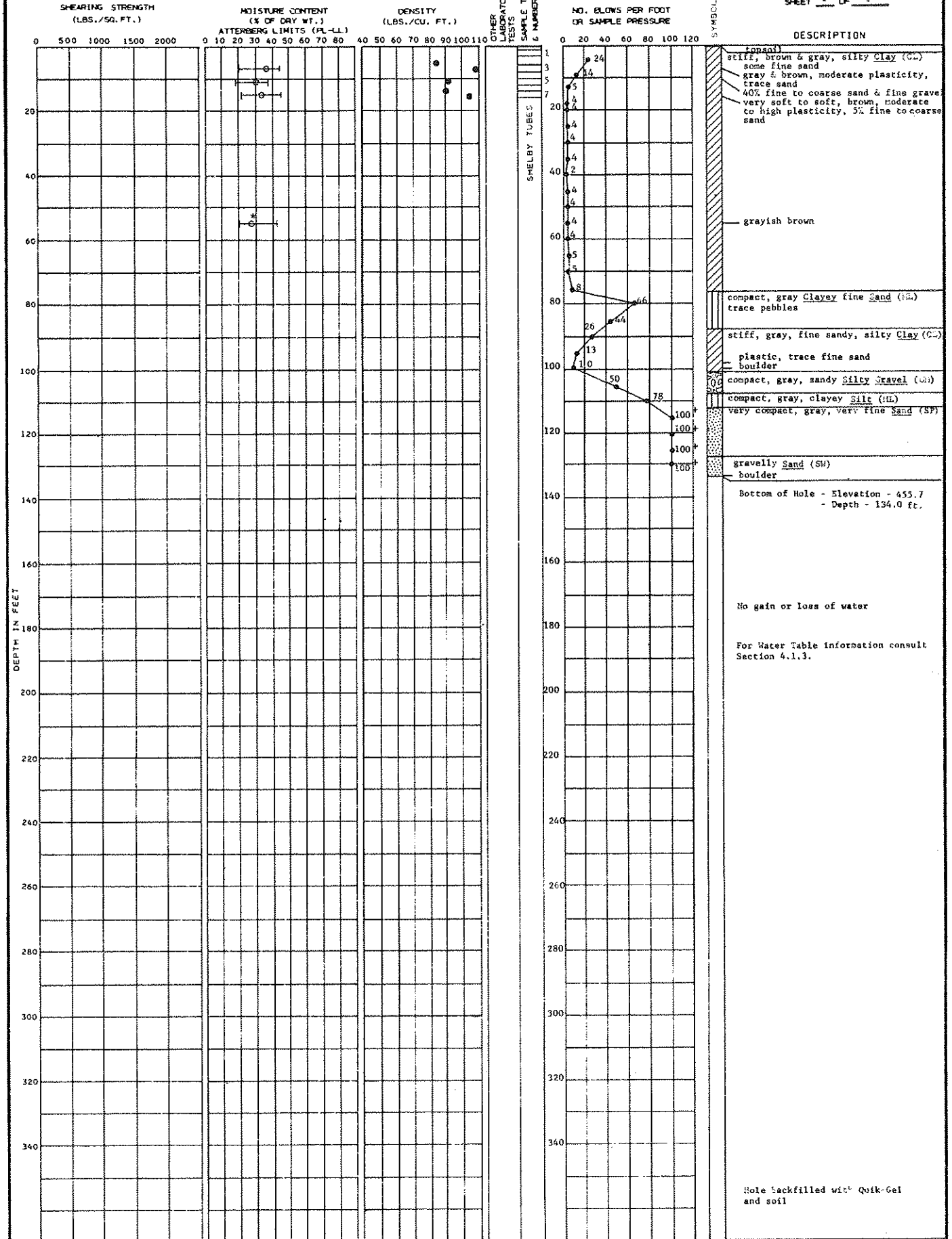
● Unconfined Compression  
○ Moisture Content  
— Atterburg Limits

SOIL BORING NO. 144  
BECHTEL Belle River

LOCATION: N 12,000  
E 7,000 GROUND ELEVATION 589.7

DATE DRILLED: 3-18-74  
3-19-74

SHEET 1 OF 1



Moisture Content  
Atterburg Limits  
\* Water content taken from unsealed jar sample.

LOCATION: N 13,061  
 E 5,006 GROUND ELEVATION 598.6

DATE DRILLED: 3-28-74  
 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)		DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
		ATTERBERG LIMITS (PL-LL)						
	0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80		40 50 60 70 80 90 100 110				
0								Black, clayey topsoil
10								Firm, brown & gray, silty, sandy clay (CL), trace of pebbles
20						11 13 12 15		Soft, gray, silty clay (CH), trace of sand
30						4		
40						4		
50						2		
60						4		
70						2		
80						3		
90						3		
100						2		
110						2		
120						2		
130						2		
140						2		
150						2		
160						2		
170						2		
180						2		
190						2		
200						2		
210						2		
220						2		
230						2		
240						2		
250						2		
260						2		
270						2		
280						2		
290						2		
300						2		
310						2		
320						2		
330						2		
340						2		
350						2		
360						2		
370						2		
380						2		
390						2		
400						2		
410						2		
420						2		
430						2		
440						2		
450						2		
460						2		
470						2		
480						2		
490						2		
500						2		

Bottom of hole - Elevation - 528.6  
 - Depth - 70.0 ft

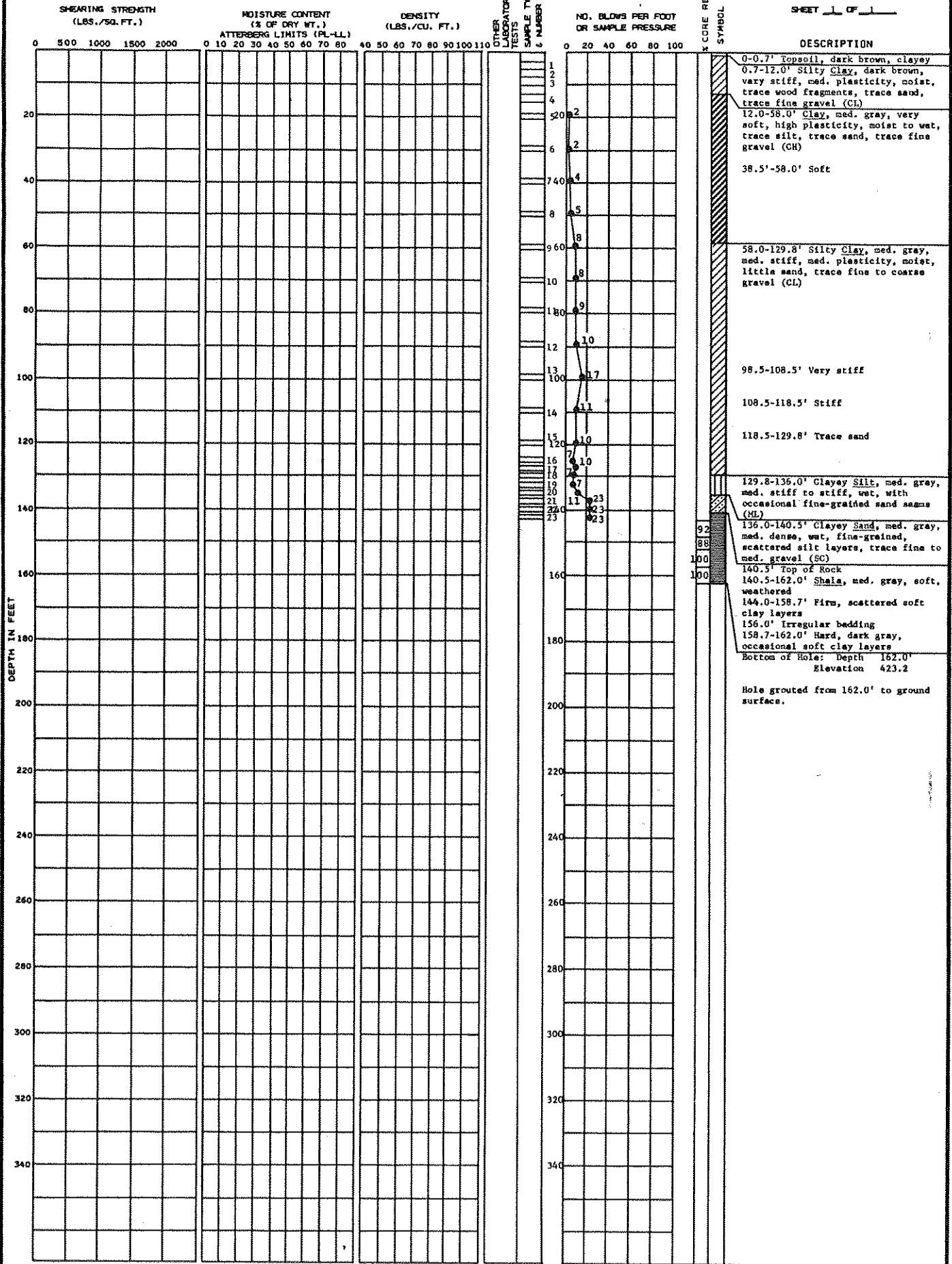
No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

LOCATION: N 7455 E 9535 GROUND ELEVATION 585.2

DATE DRILLED: 9/28/77 9/30/77 SHEET 1 OF 1

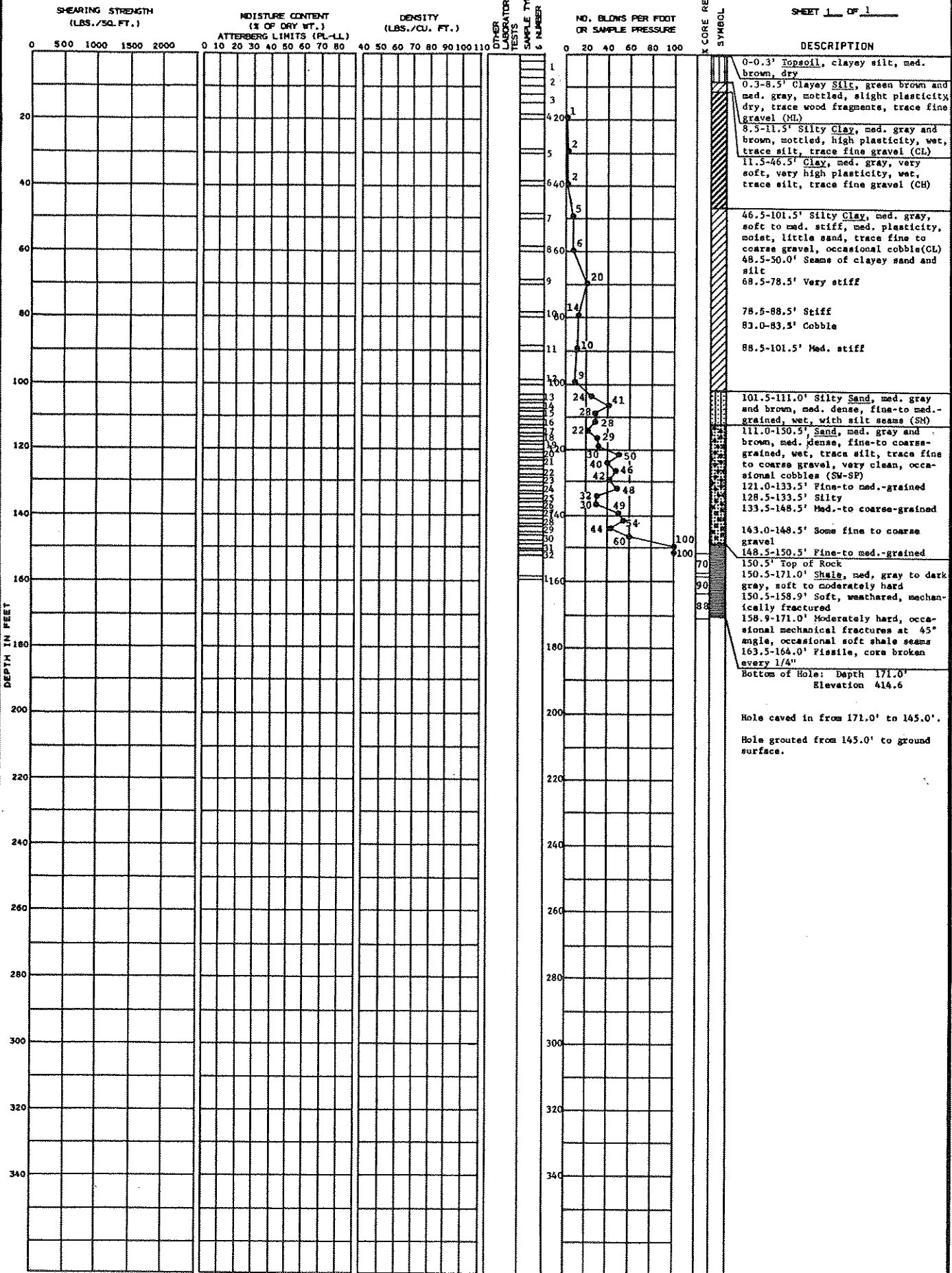


SOIL BORING NO. B-8 BECHTEL Belle River

LOCATION: N 7675 E 9100 GROUND ELEVATION 585.6

DATE DRILLED: 8/8/77 8/11/77

SHEET 1 OF 1



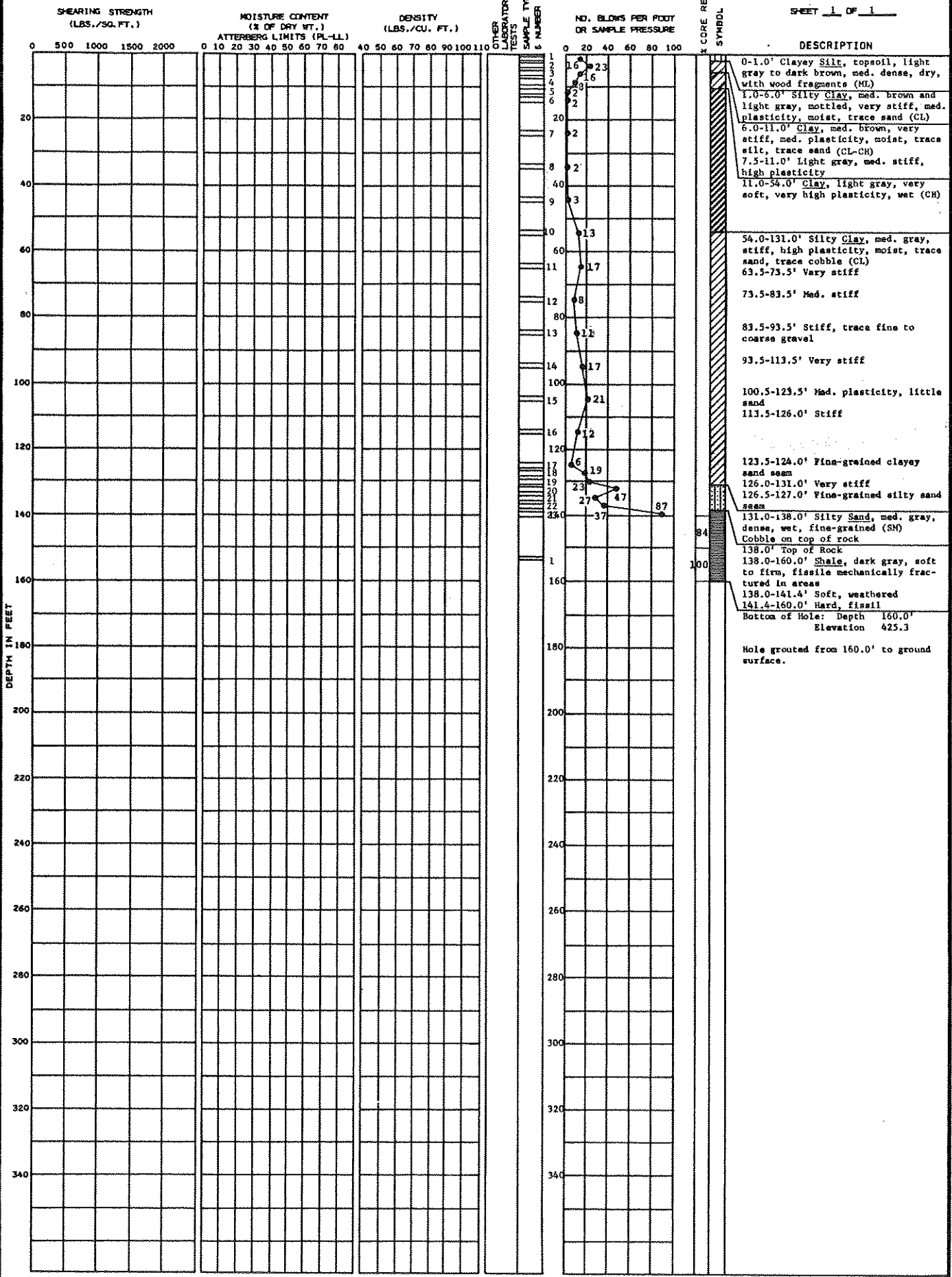
SOIL BORING NO. B-9

BECHTEL Belle River



LOCATION: N 7500 E 9388.7 GROUND ELEVATION 585.3

DATE DRILLED: 7/21/77  
7/23/77  
SHEET 1 OF 1



SOIL BORING NO. B-12  
BECHTEL, Bella River

LOCATION: N 13,000 E 7,000 GROUND ELEVATION 590.6

DATE DRILLED: 3-27-74  
3-28-74

SHEET 1 OF 1

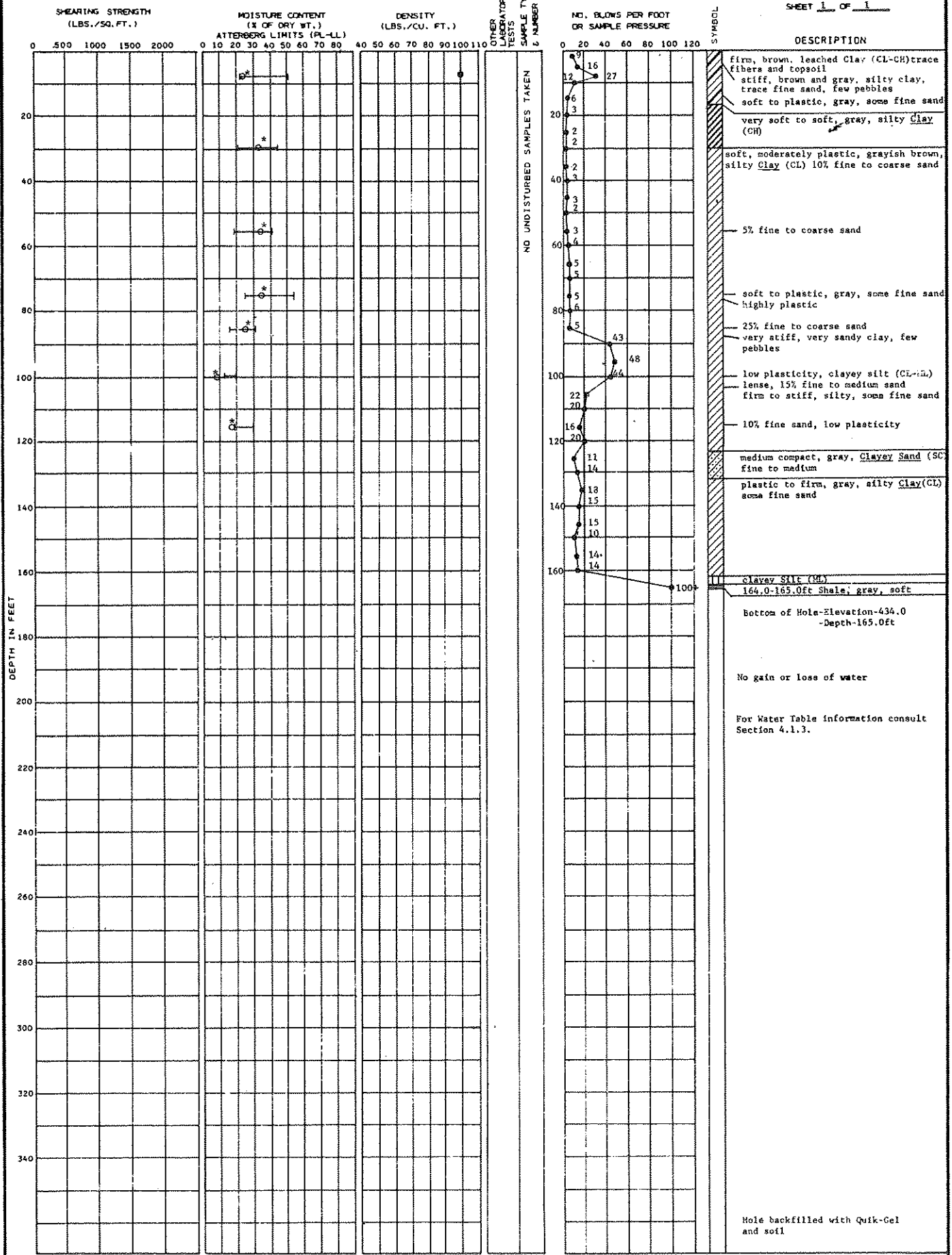
DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0							black, clayey topsoil
0					20		medium, brown, silty Clay (CL) trace of sand and gravel
0					20		
13					13		gray, silty
20					9		
20					7		soft, gray, sandy, silty Clay (CH)
20					2		
20					2		no sand
40					4		
40					3		
40					2		
40					2		
60					2		
60					2		
60					2		
60					2		
60					2		
60					2		
80							Bottom of Hole-Elevation-520.1 -Depth-70.5ft
80							
100							
100							
120							No gain or loss of water
120							
140							For Water Table information consult Section 4.1.3.
140							
160							
160							
180							
180							
200							
200							
220							
220							
240							
240							
260							
260							
280							
280							
300							
300							
320							
320							
340							
340							
340							Hole backfilled with Bentonite and soil

SOIL BORING NO. 150  
BECHTEL Belle River

LOCATION: N 13,785 E 5,006 GROUND ELEVATION 599.0

DATE DRILLED: 3-7-74  
3-14-74

SHEET 1 OF 1



○ Moisture Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,000  
E 8,000

GROUND ELEVATION 591.5

DATE DRILLED: 4-5-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (X OF DRY WT.) ATTENBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0						Consol firm to stiff, brown, silty clay (CL) very stiff, trace gravel plastic to firm, gray
20				14 30 22		soft, gray, silty clay (CH)
40				2		
60				2		
80				2		
100				2		
120				2		
140				2		
160				2		
180				2		
200				2		
220				2		
240				2		
260				2		
280				2		
300				2		
320				2		
340				2		

Bottom of Hole - Elevation - 521.5  
- Depth - 70.0 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

SOIL BORING NO. 157

BECHTEL Belle River

LOCATION: N 14,000 GROUND ELEVATION 591.3  
 E 9,950

DATE DRILLED: 4-3-74

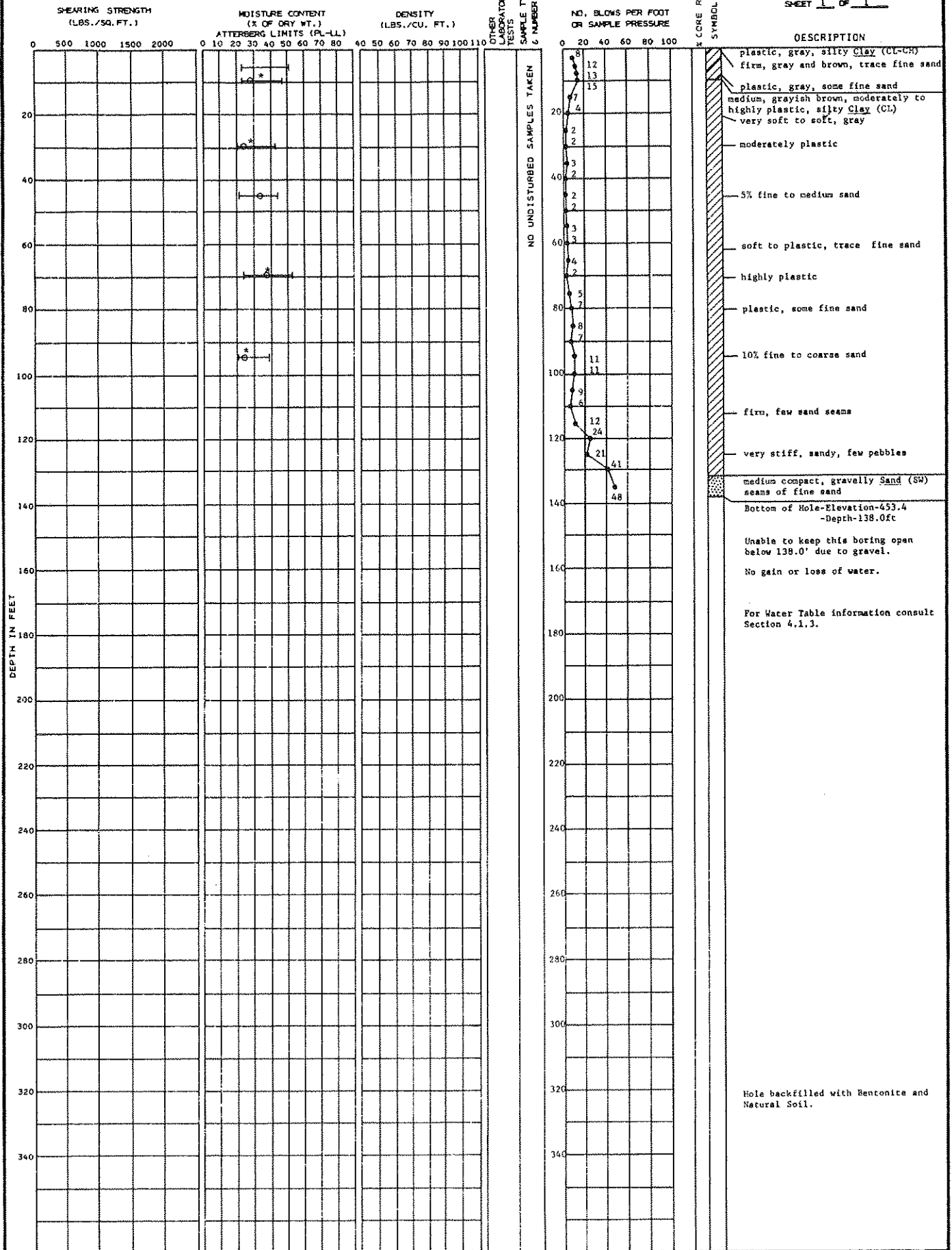
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. OF LABORATORY TESTS	SAMPLE TYPE NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0						0		GRAY SILT (ML)
0						9		loose to medium compact, brown to gray, silty sand (SM) fine to medium
0						17		
0						15		firm, gray, silty clay (CL)
20						4		soft, gray, silty clay (CH)
20						5		
40						2		
40						2		
40						2		
60						3		
60						4		
60						4		
80						5		
80								Bottom of Hole - Elevation - 521.3 - Depth - 70.0 ft.
100								
120								
140								No gain or loss of water
160								For Water Table information consult Section 4.1.3.
180								
200								
220								
240								
260								
280								
300								
320								
340								Hole backfilled with Quik-Gel in soil

LOCATION: N 15,000 E 8,000 GROUND ELEVATION 591.4

DATE DRILLED: 4-8-76

SHEET 1 OF 1

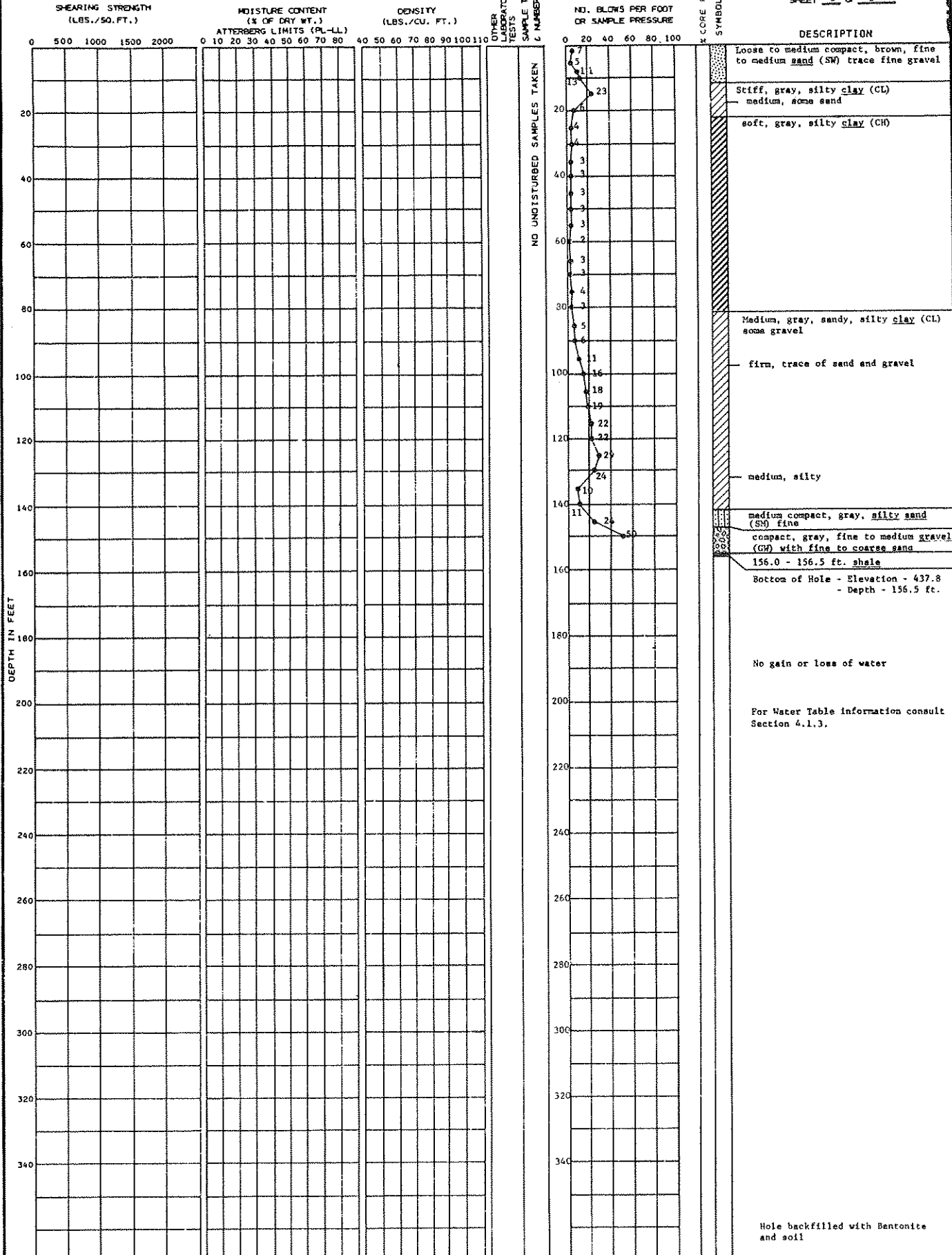


○ Moisture Content  
 — Atterbury Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,830 GROUND ELEVATION 594.3  
 E 9,938

DATE DRILLED: 3-26-74  
 3-27-74

SHEET 1 OF 1

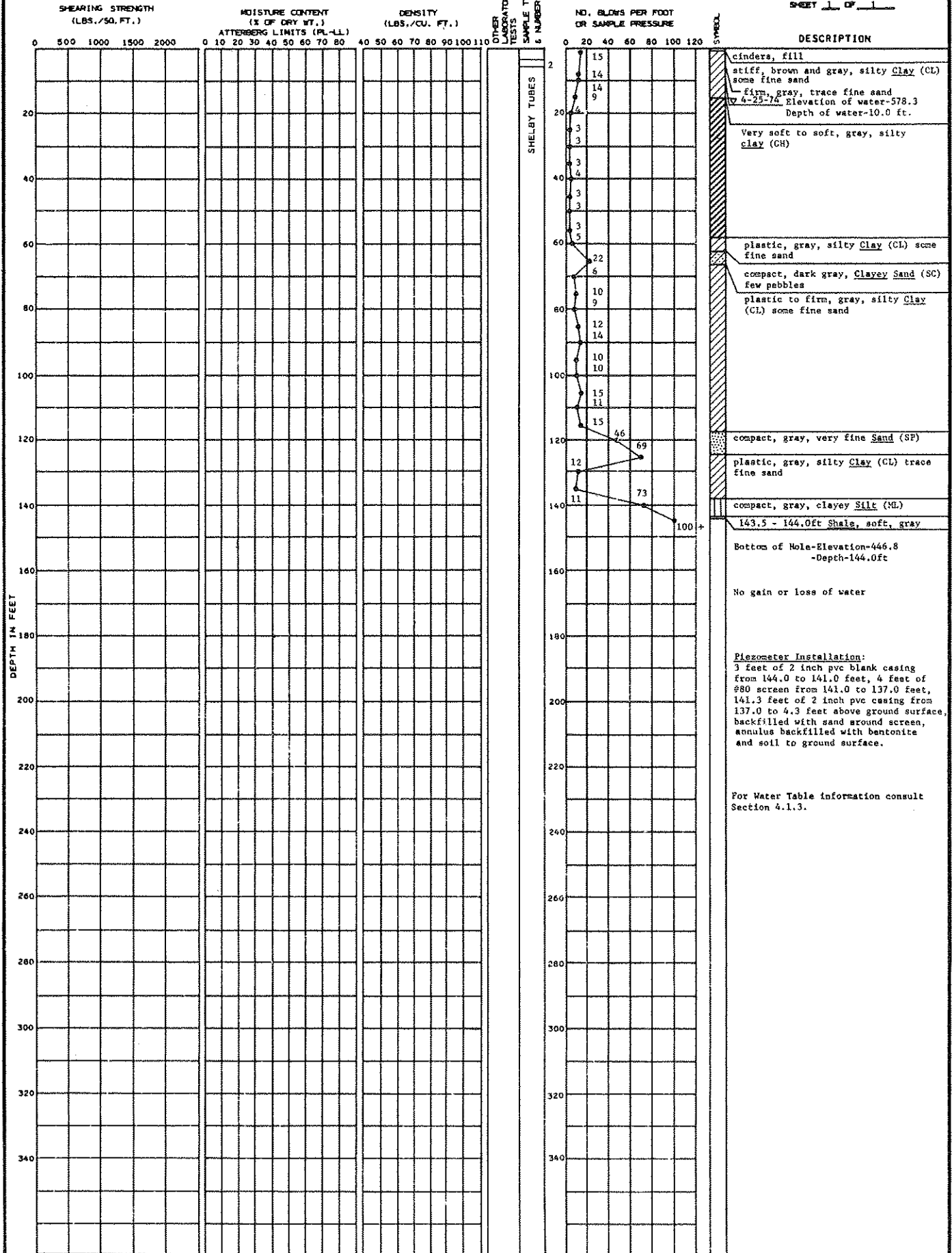


LOCATION: N 3,525  
E 12,533

GROUND ELEVATION 590.8

DATE DRILLED: 3-5-74  
3-7-74

SHEET 1 OF 1



SOIL BORING NO. 181

BECHTEL Belle River

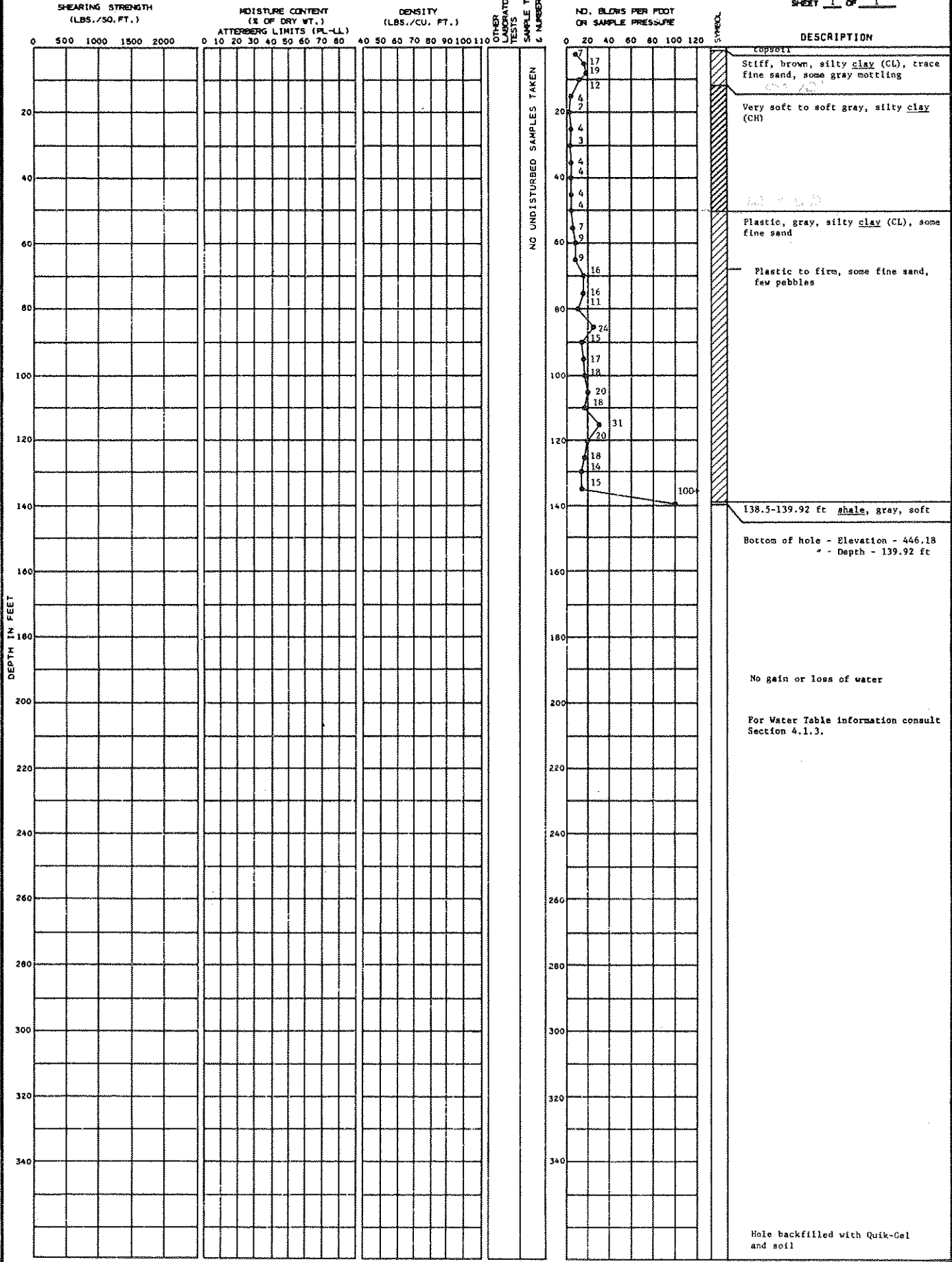
B-125



LOCATION: N 3,556 E 9,564 GROUND ELEVATION 586.1

DATE DRILLED: 3-15-74 3-19-74

SHEET 1 OF 1



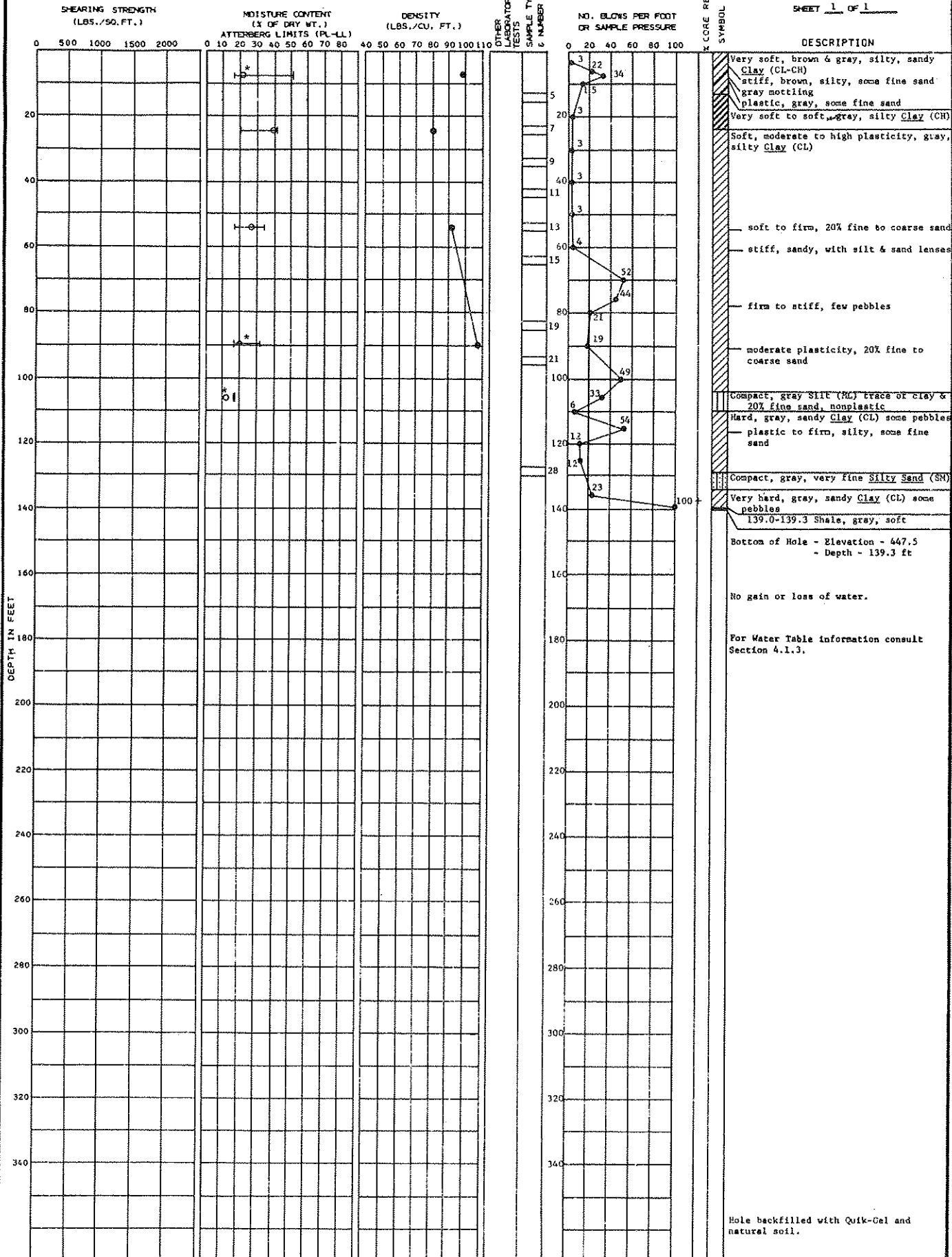
SOIL BORING NO. 184

BECHTEL Belle River

LOCATION: N 5,500  
E 9,797 GROUND ELEVATION: 586.8

DATE DRILLED: 2-26-74  
2-27-74

SHEET 1 OF 1



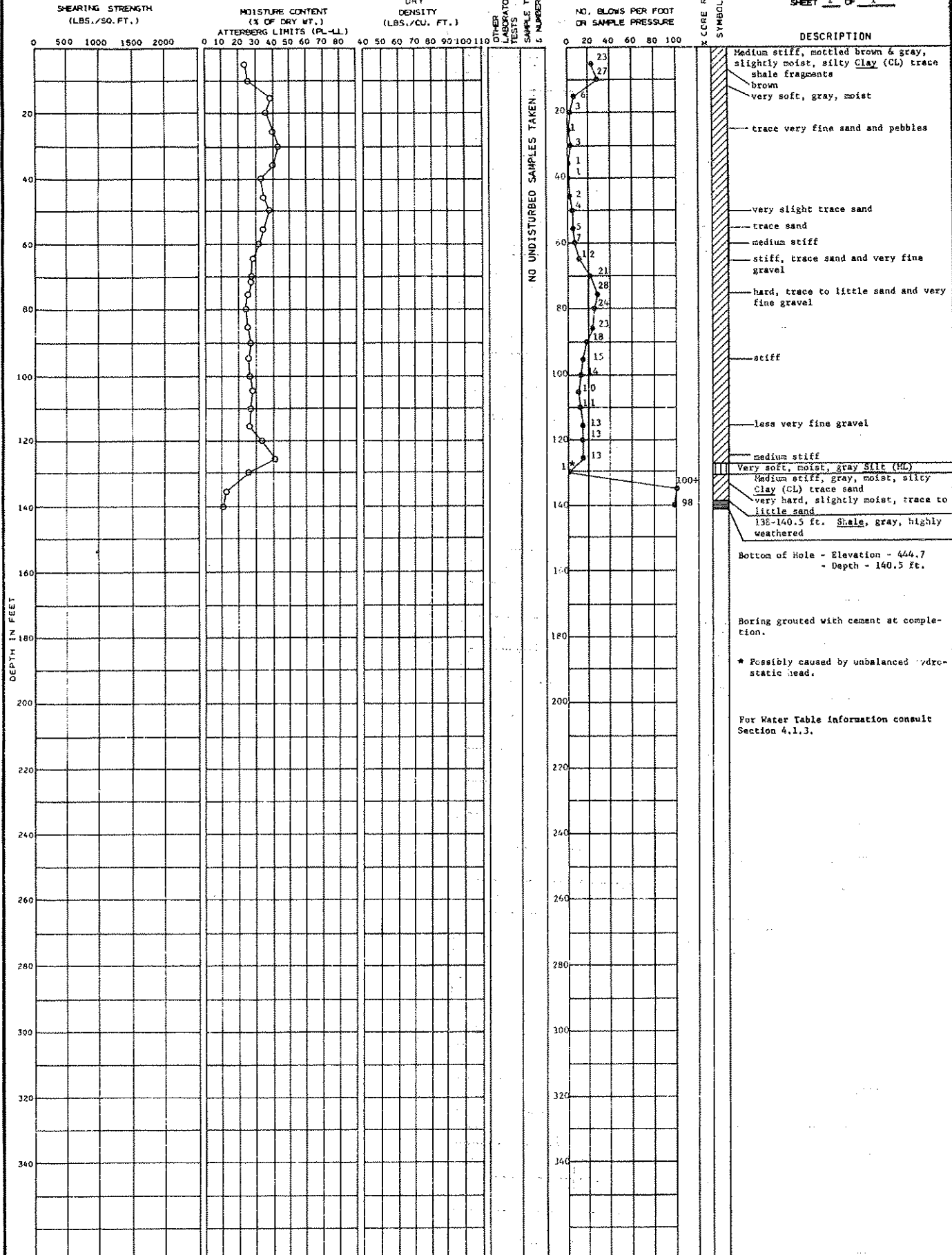
○ Moisture Content  
 ← Atterberg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 186  
 BECHTEL Belle River

LOCATION: N 3500 E 11741 GROUND ELEVATION: 585.2

DATE DRILLED: 8/6/75 8/8/75

SHEET 1 OF 1

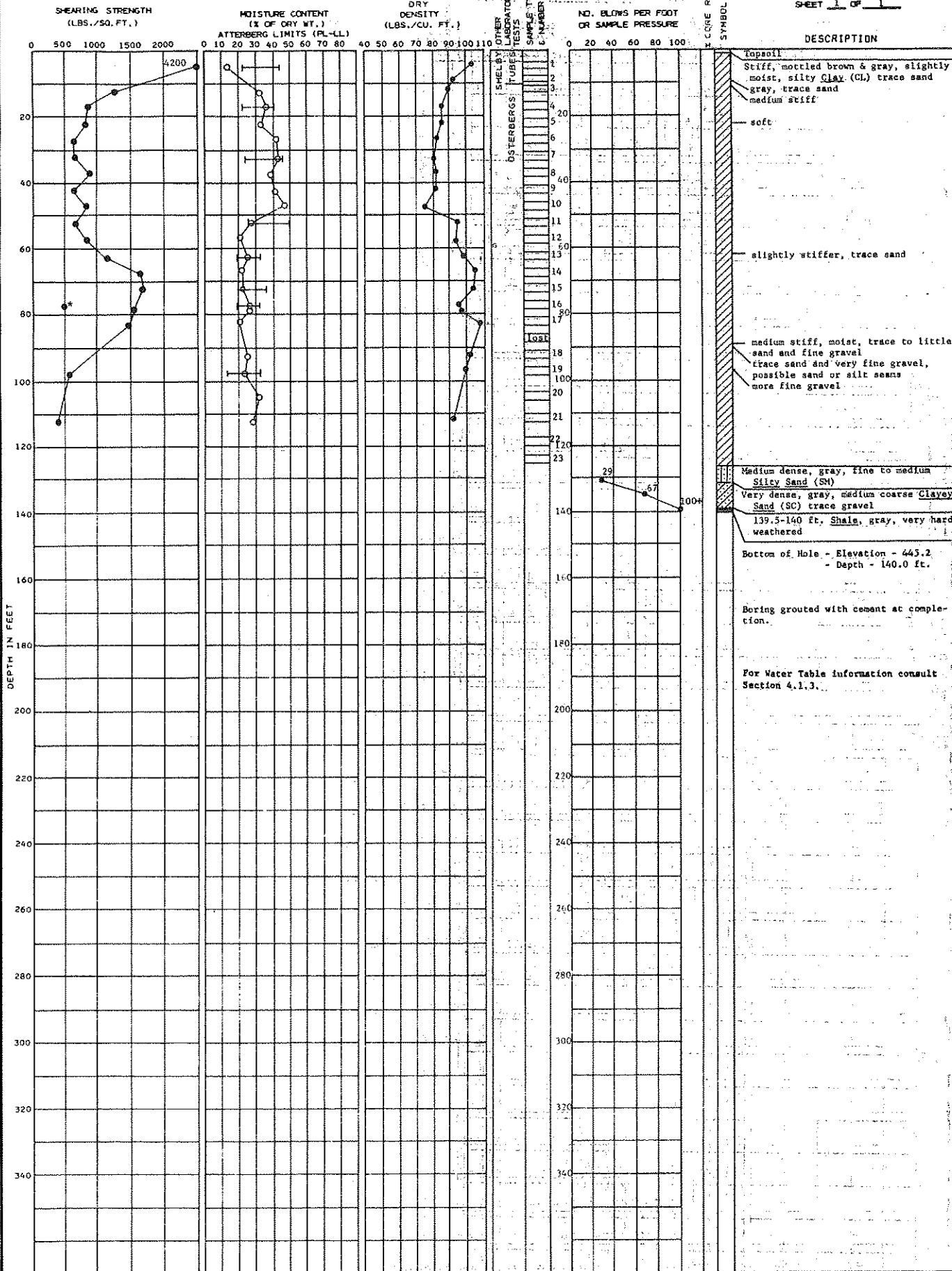


SOIL BORING NO. 191  
BECHTEL BELLE RIVER

H 3558 GROUND ELEVATION 385.2  
 LOCATION: E 11701

DATE DRILLED: 8/11/75  
 8/14/75

SHEET 1 OF 1



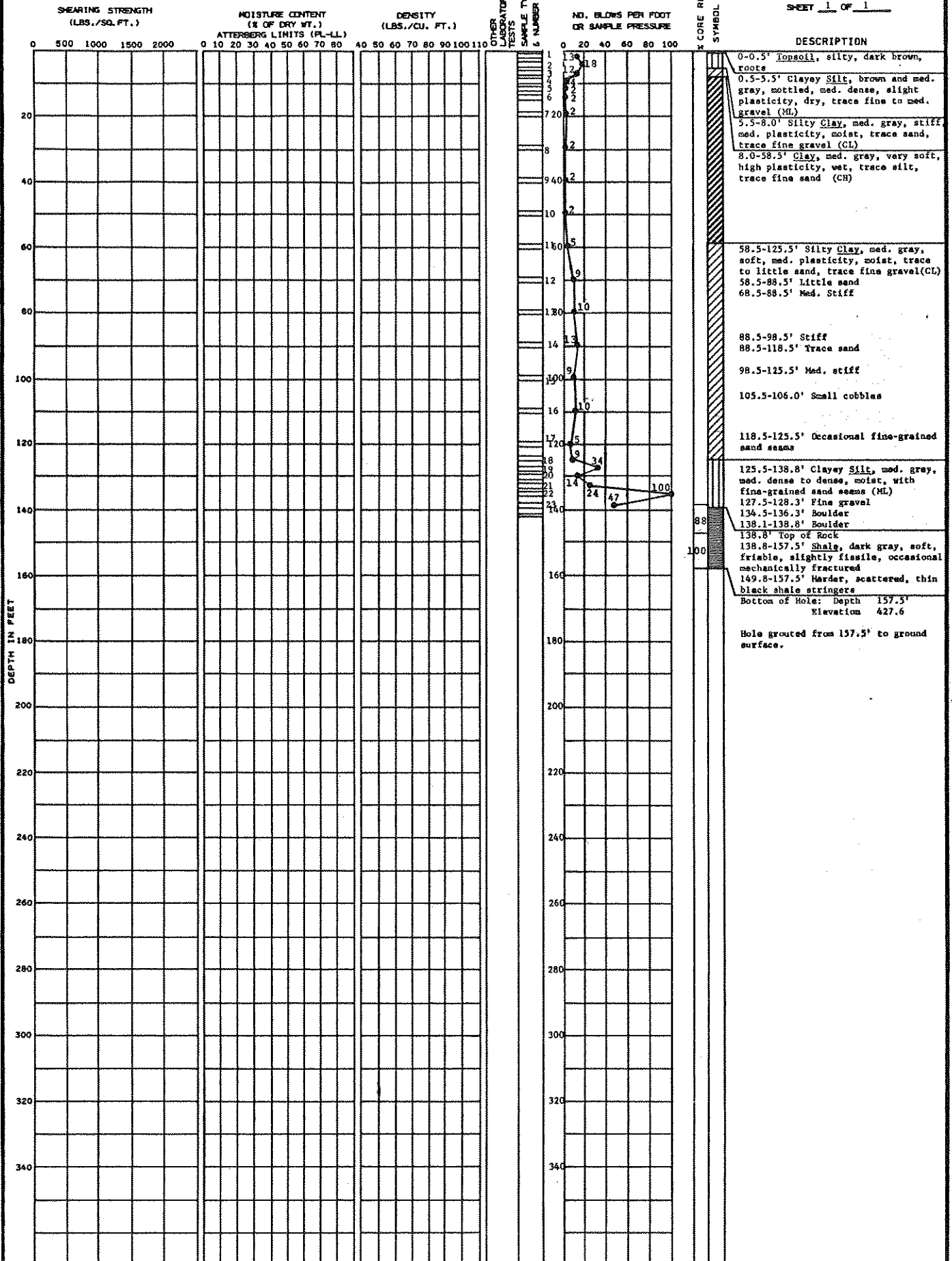
● Unconfined Compression  
 \* Sample contained sand seams  
 ○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 193  
 BECHTEL BELLE RIVER

LOCATION: N 7800 E 9400 GROUND ELEVATION 585.1

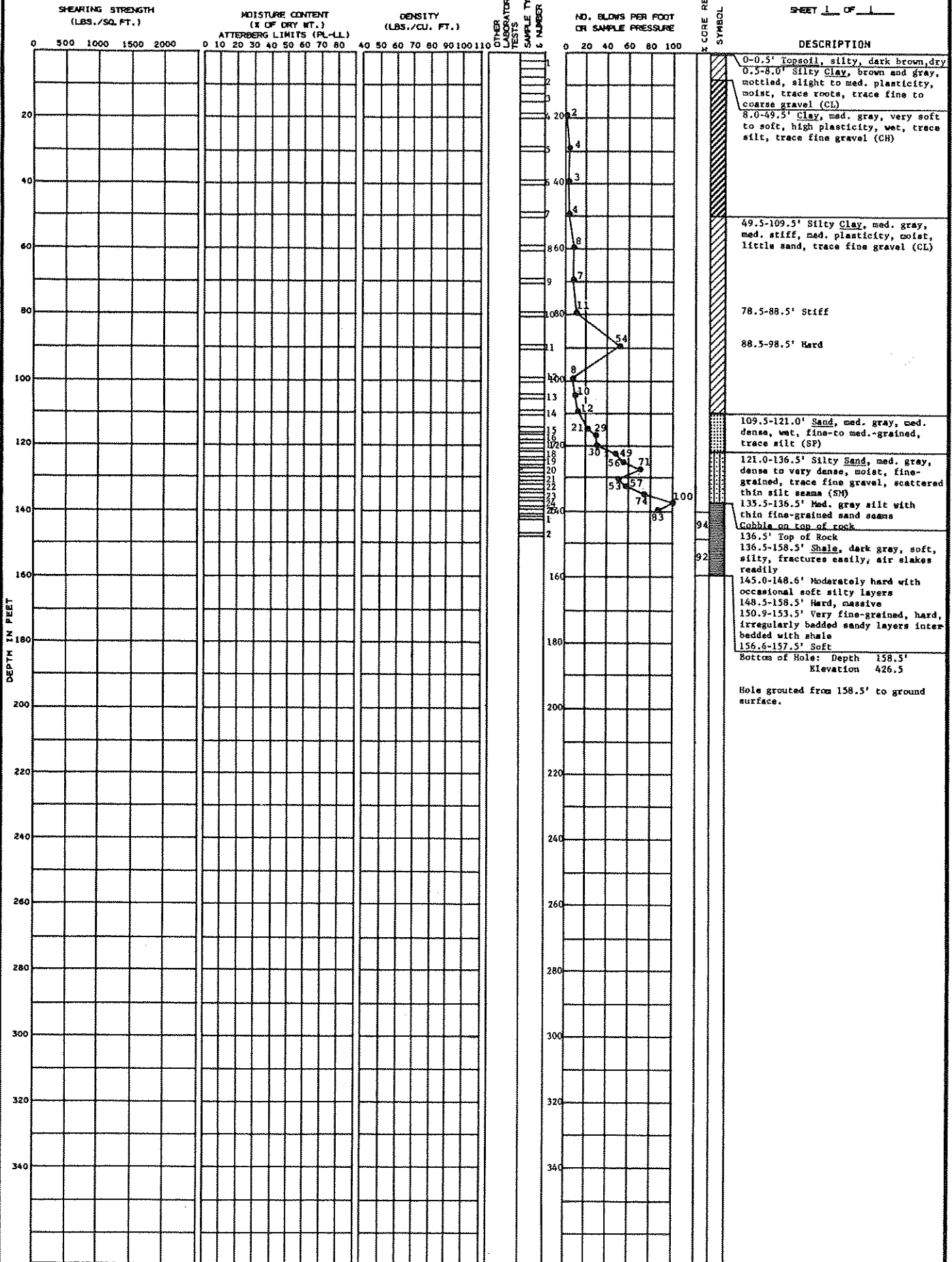
DATE DRILLED: 8/17/77  
8/22/77

SHEET 1 OF 1



LOCATION: N 7500 E 9200 GROUND ELEVATION 585.0

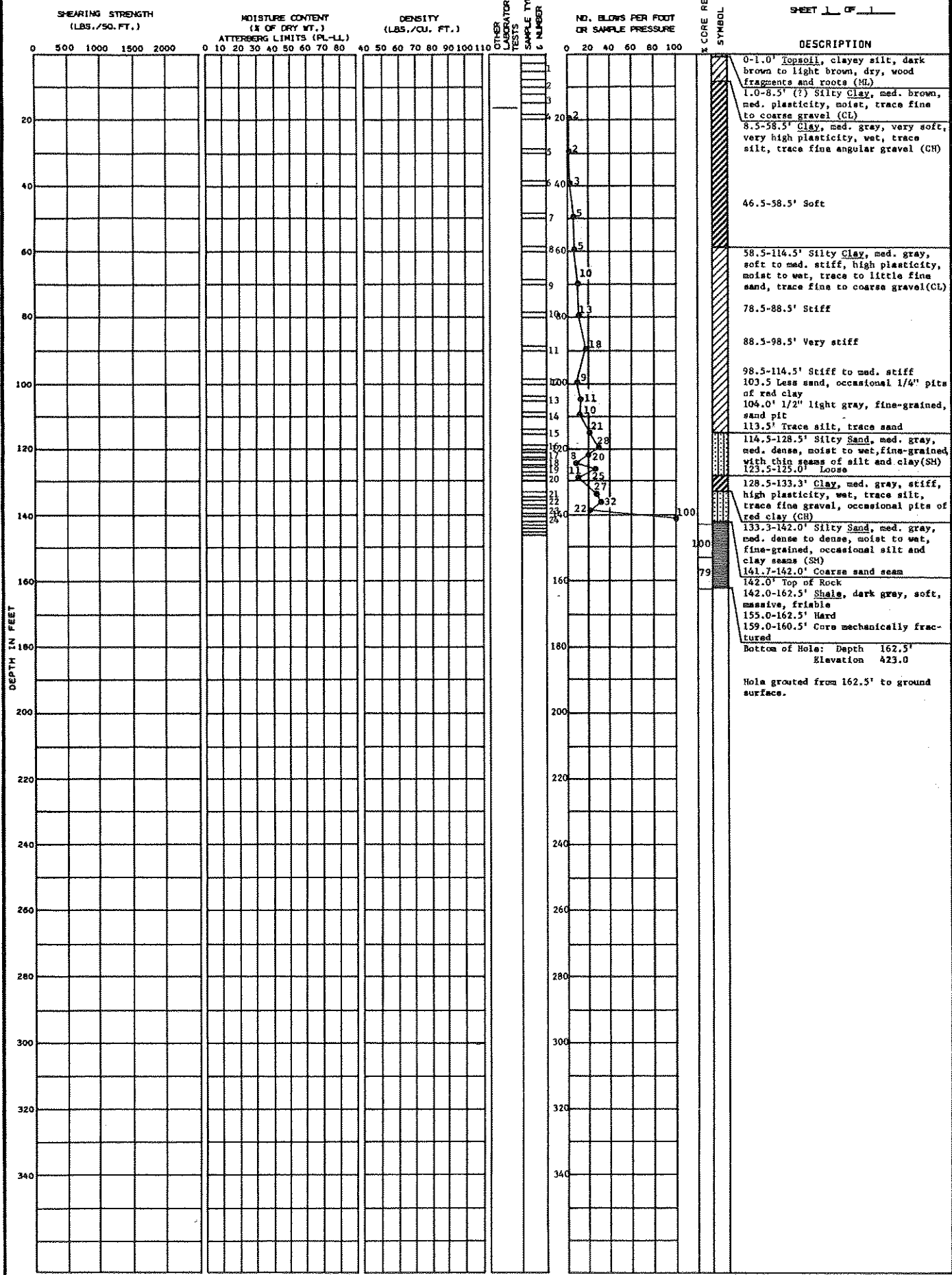
DATE DRILLED: 8/23/77 8/25/77



LOCATION: N 7850 E 9200 GROUND ELEVATION 585.5

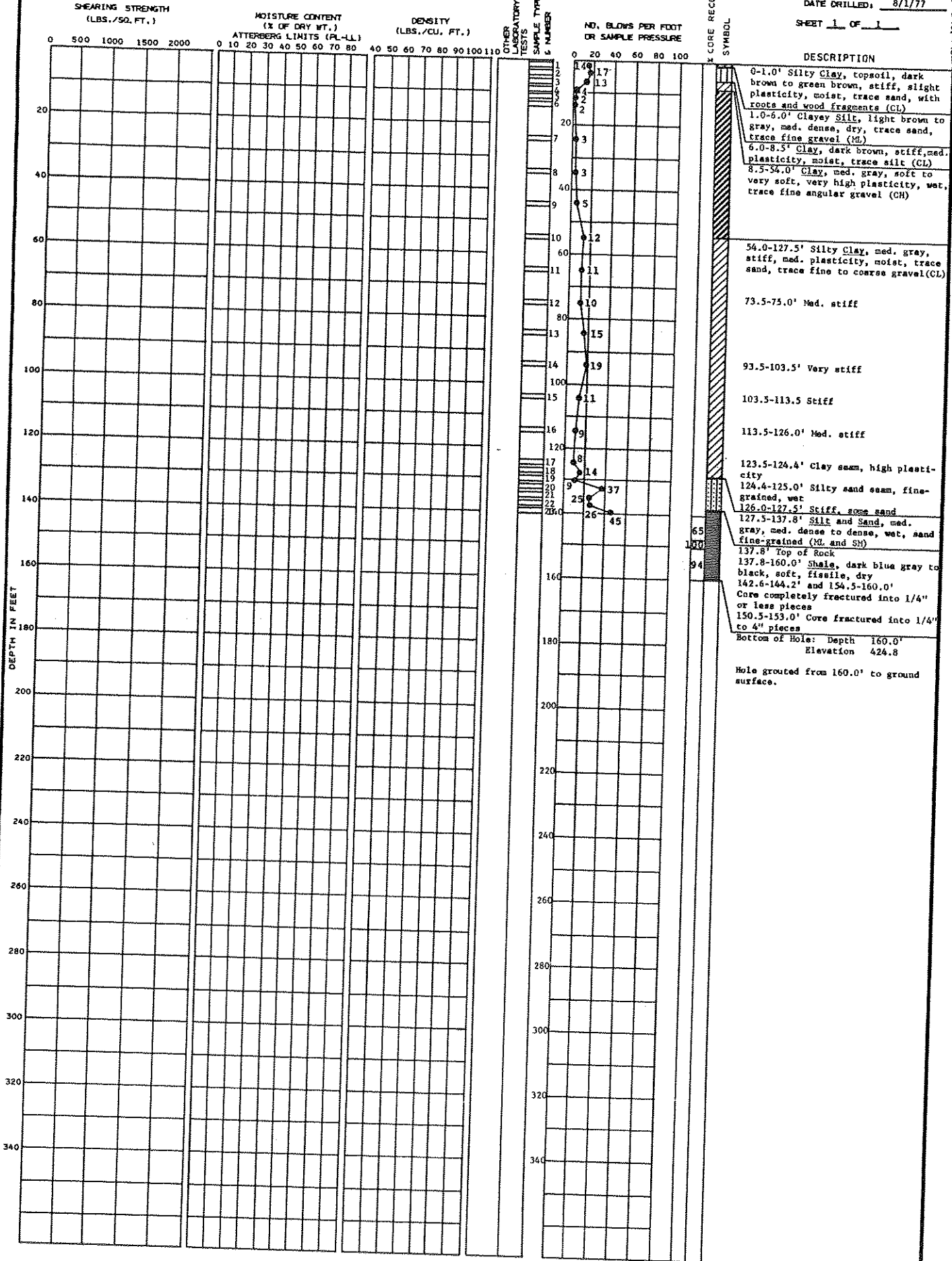
DATE DRILLED: 8/2/77  
8/4/77

SHEET 1 OF 1



LOCATION: N 7600 E 9400 GROUND ELEVATION 584.8

DATE DRILLED: 7/26/77 8/1/77 SHEET 1 OF 1



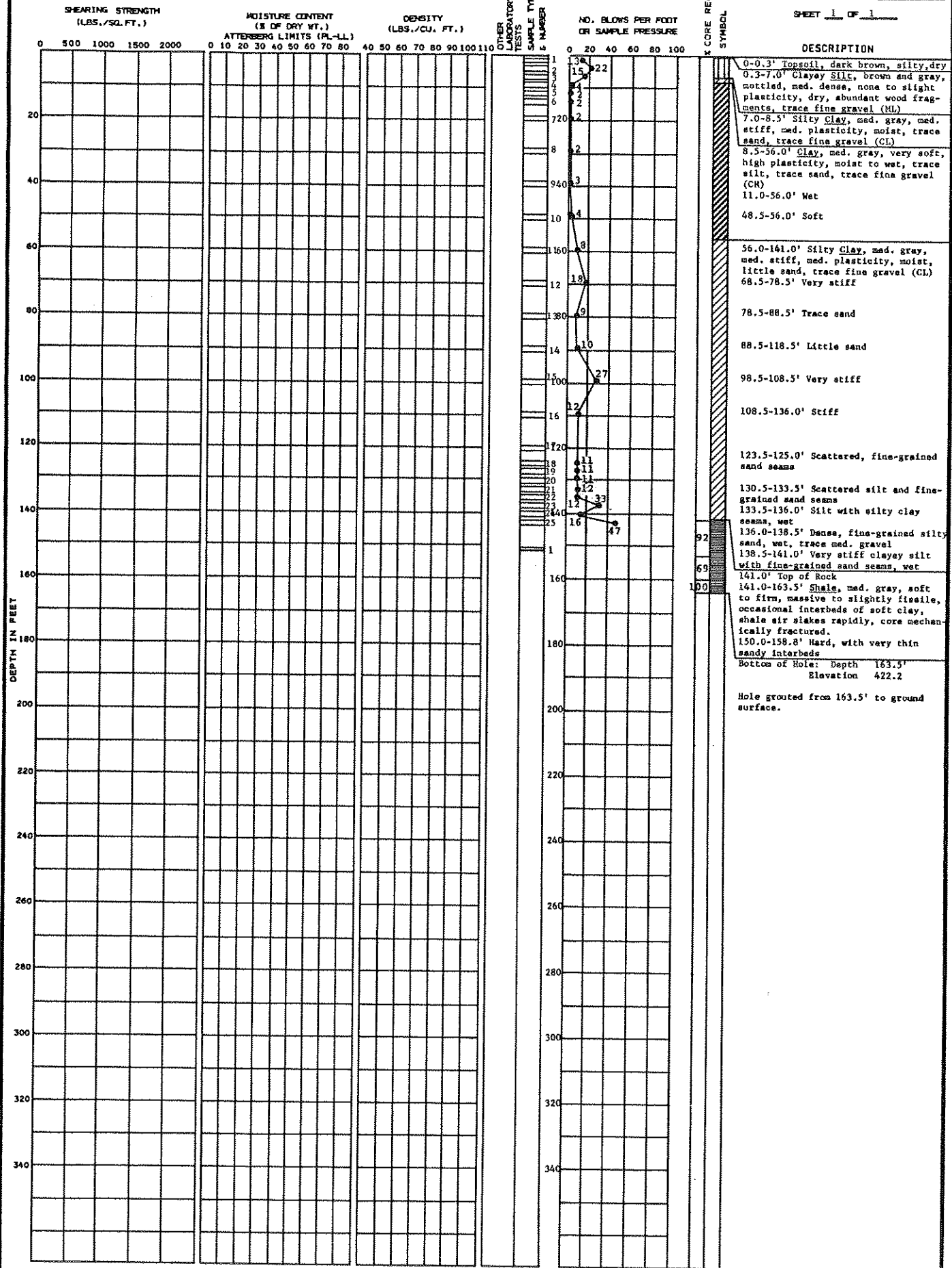
SOIL BORING NO. B-5 BECHTEL Belle River



LOCATION: N 7650 E 9550 GROUND ELEVATION 585.7

DATE DRILLED: 8/25/77 8/31/77

SHEET 1 OF 1



SOIL BORING NO. 8-6 BECHTEL Belle River

LOCATION: N 8180 E 9550 GROUND ELEVATION 585.3

DATE DRILLED: 8/12/77 8/17/77

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

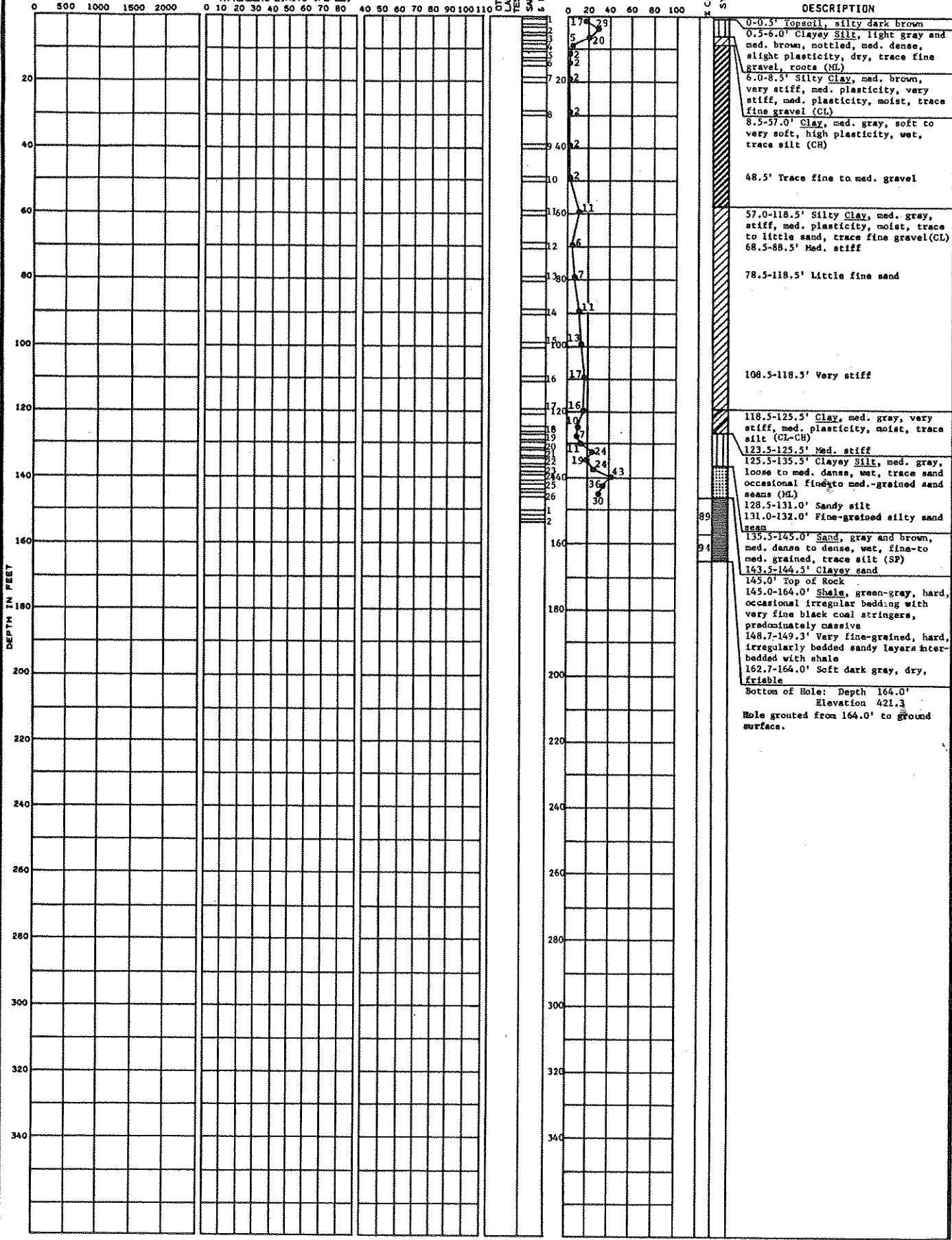
LABORATORY TESTS SAMPLE TYPE NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

CORE RECOVERY SYMBOL

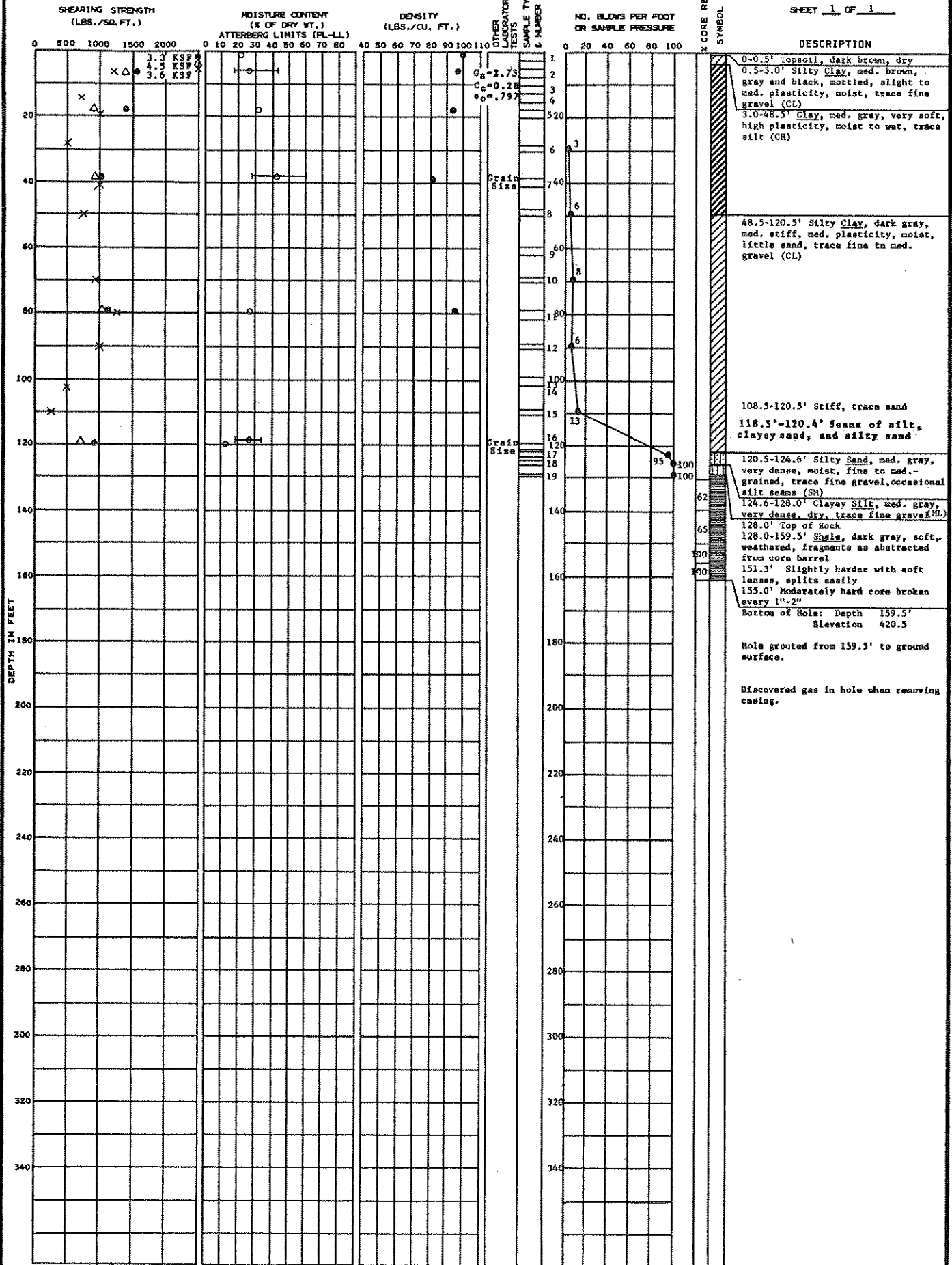
SHEET 1 OF 1

DESCRIPTION



LOCATION: N 5270 E 15660 GROUND ELEVATION: 580.0

DATE DRILLED: 9/7/77  
SHEET 1 OF 1



Δ Torvane  
 ○ Unconsolidated Undrained  
 ⊙ Unconfined Compression  
 — Atterberg Limits  
 G<sub>s</sub> Specific Gravity  
 C<sub>c</sub> Compression Index  
 e<sub>0</sub> Initial Void Ratio  
 × Pocket Penetrometer

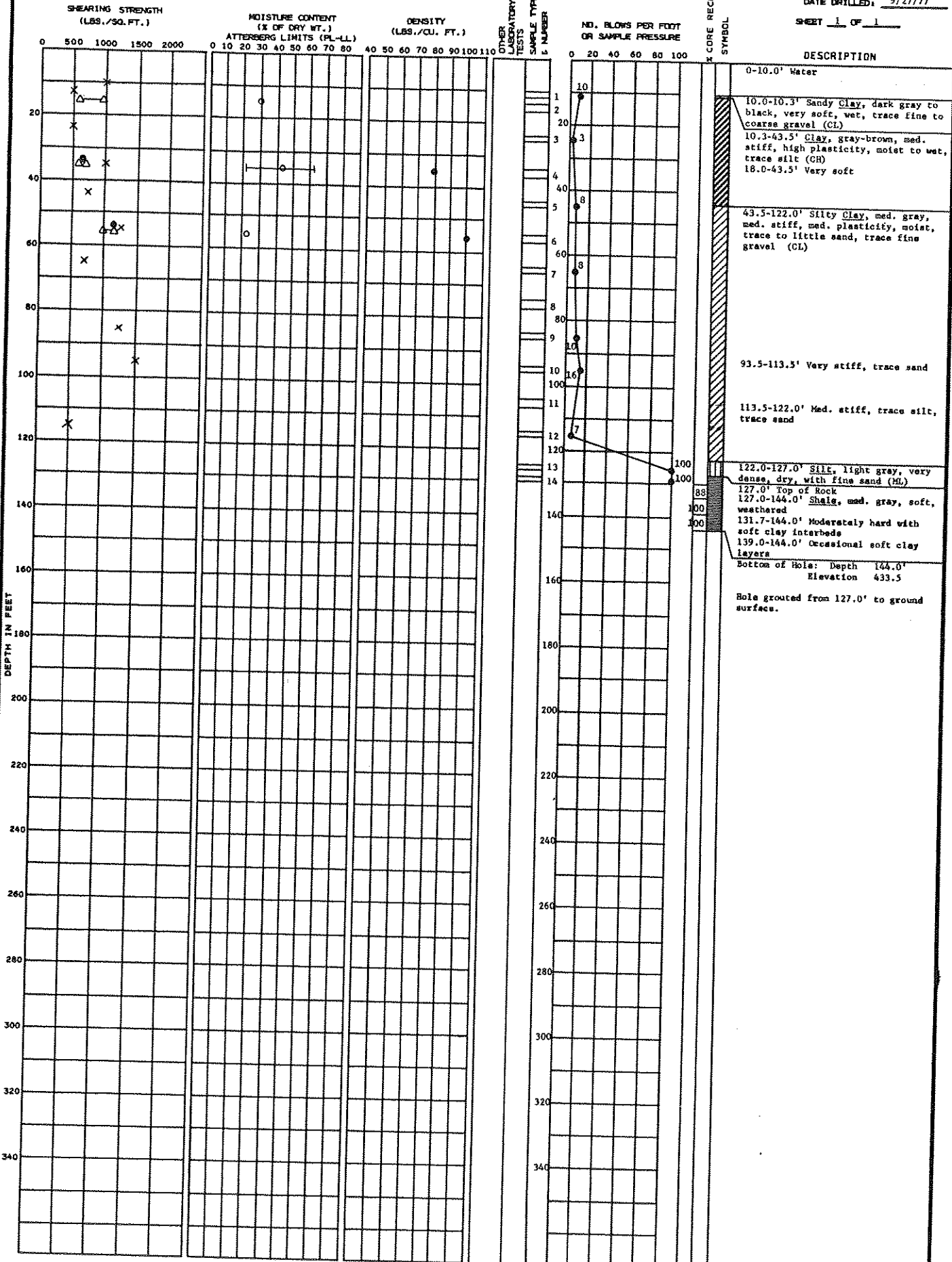
SOIL BORING NO. 8-17  
BECTEL Bells River

LOCATION: N 5163  
E 15744

GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/21/77  
9/27/77

SHEET 1 OF 1



NO. CORE RECOVERY SYMBOL

DESCRIPTION

0-10.0' Water

10.0-10.3' Sandy Clay, dark gray to black, very soft, wet, trace fine to coarse gravel (CL)

10.3-43.5' Clay, gray-brown, med. stiff, high plasticity, moist to wet, trace silt (CH)

18.0-43.5' Very soft

43.5-122.0' Silty Clay, med. gray, med. stiff, med. plasticity, moist, trace to little sand, trace fine gravel (CL)

93.5-113.5' Very stiff, trace sand

113.5-122.0' Med. stiff, trace silt, trace sand

122.0-127.0' Silt, light gray, very dense, dry, with fine sand (ML)

127.0' Top of Rock

127.0-144.0' Shale, med. gray, soft, weathered

131.7-144.0' Moderately hard with soft clay interbeds

139.0-144.0' Occasional soft clay layers

Bottom of Hole: Depth 144.0' Elevation 433.5

Hole grouted from 127.0' to ground surface.

△ Torvane  
 □ Atterberg Limits  
 ● Unconfined Compression  
 ○ Unconsolidated Undrained  
 X Pocket Penetrometer

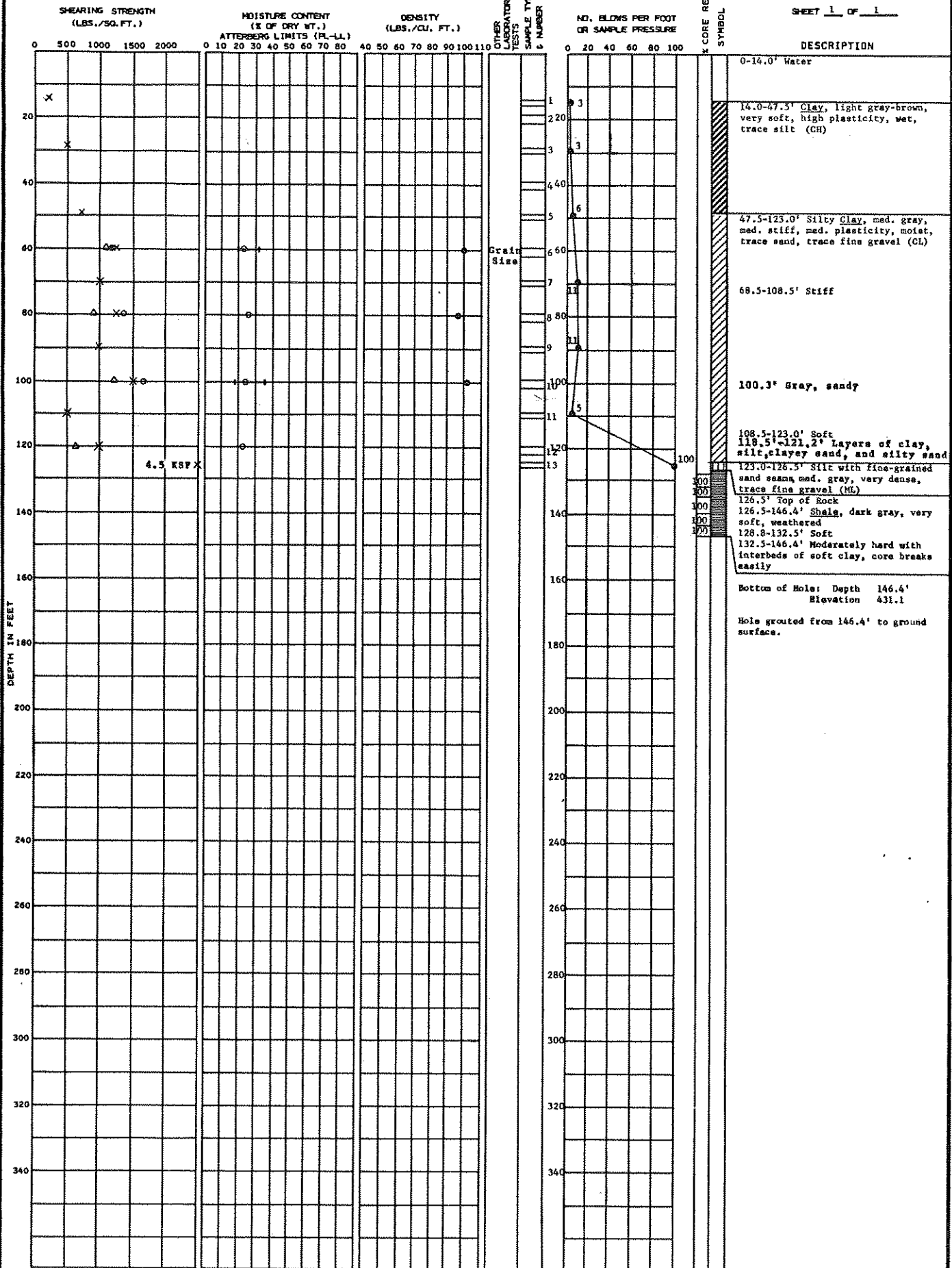
SOIL BORING NO. B-22  
 BECTEL Belle River

LOCATION: N 5364  
E 15750

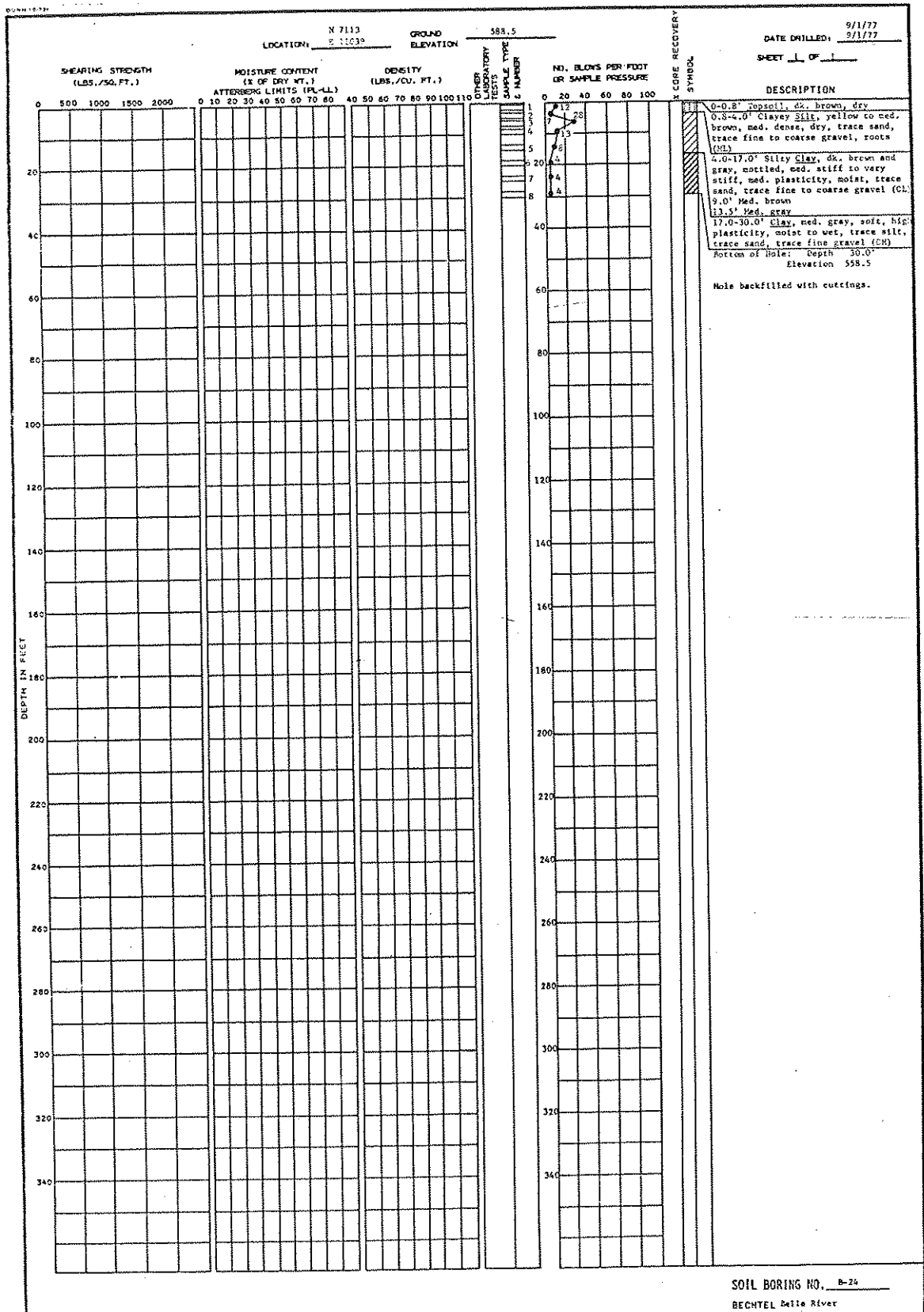
GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/15/77  
9/21/77

SHEET 1 OF 1



Δ Teryans  
 ○ Unconsolidated Undrained  
 □ Unconfined Compression  
 — Atterberg Limits  
 × Pocket Faunometer



LOCATION: H 6921 GROUND ELEVATION 587.5  
 Z 11501

DATE DRILLED: 9/1/77  
 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	DESCRIPTION
0					0-0.7' Topsoil, dk. brown, dry
0.7					0.7-4.5' Silty Sand, tan and yellow, mottled, loose, damp, fine-grained (SM)
4.5					4.5-9.0' Silty Clay, brown and gray, mottled, stiff to very stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CI)
9.0					9.0-30.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace sand, trace fine gravel, trace silt (CH)
30.0					Bottom of Hole: Depth 30.0' Elevation 557.5
					Hole backfilled with cuttings.

LOCATION: N 6730 E 11963 GROUND ELEVATION 588.1

DATE DRILLED, 9/1/77  
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)		DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
		ATTERBERG LIMITS (PL-LL)						
0	0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80	40 50 60 70 80 90 100 110			0 20 40 60 80 100		0-0.7' Topsoil, dr. brown, dry
0.7						11		0.7-4.0' Silty Sand, tan and gold, mottled, med. dense, dry, fine-grained, roots (SM)
4.0						21		4.0-13.5' Silty Clay, gray and brown, mottled, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5						3		6.0' Green brown
30.0						3		13.5-30.0' Clay, med. gray, soft, high plasticity, moist to wet, trace silt, trace fine gravel (CH)
30.0						3		Bottom of Hole: Depth 30.0' Elevation 558.1
340								Hole backfilled with cuttings.



LOCATION: N 6539 E 12425 GROUND ELEVATION 588.2

DATE DRILLED: 9/2/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY	SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, fine to med. gravel, dry (GO)
1				16			1.0-5.0' Clayey Silt, dk. brown, med. dense to dense, dry, trace sand, trace fine gravel (ML)
2				37			
3				21			
4							
5				22			
6				14			5.0-30.0' Silty Clay, dk. brown, hard to very stiff, dry, med. plasticity, trace sand, trace fine to med. gravel (CL)
7				12			
8				7			13.5' Moist, dipping parting in sample med. brown with med. gray filling, with roots
19.0-28.3'							19.0-28.3' Med. gray, stiff
23.5'							23.5' green-brown and gray, mottled
28.5-30.0'							28.5-30.0' Med. gray, med. stiff
							Bottom of Hole: Depth 30.0' Elevation 558.2
							Hole backfilled with cuttings.

LOCATION: N 6348 E 12890 GROUND ELEVATION 600.0

DATE DRILLED: 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, dry, sandy fill with coarse gravel
1							
2							
3							
4							1.0-6.0' Clayey Silt, green brown, med. dense, dry, trace sand (ML)
5							
6							6.0-30.0' Silty Clay, green brown, very stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)
7							13.5' Med. gray, stiff to med. stiff, med. plasticity
8							28.5-30.0' Med. to high plasticity
40							Bottom of Hole: Depth 30.0' Elevation 570.0
60							Hole backfilled with cuttings.
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

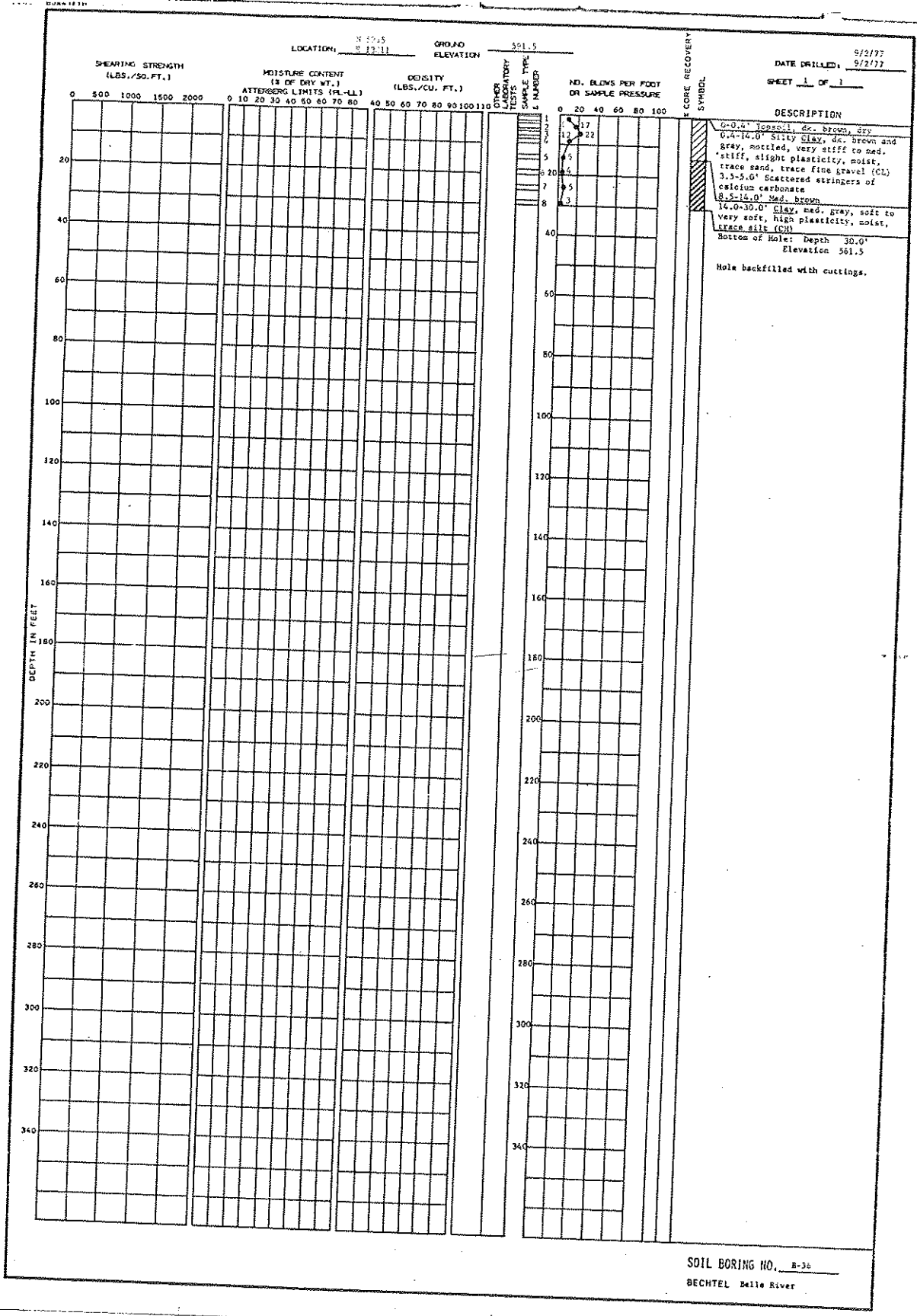
DURN 12-34

LOCATION: N 6156  
E 13309 GROUND ELEVATION 528.8

DATE DRILLED: 9/2/77  
9/2/77  
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTENDING LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLINDS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, dry
1							0.3-3.5' Clayey Silt, light brown and gray, mottled, med. dense, none to slight plasticity, dry, trace sand, trace fine to coarse gravel (G)
2							3.5-23.5' Silty Clay, med. brown and gray, lightly mottled, very stiff to hard, med. plasticity, moist, trace sand, trace fine gravel (CL)
3							23.5-30.0' Med. Gray, med. stiff to very soft, high plasticity, moist, trace silt (CH)
30.0'							Bottom of Hole: Depth 30.0' Elevation 568.8
30.0'							Note backfilled with cuttings.
40							
60							
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. B-34  
BECTEL Belle River



SOIL BORING NO. B-30  
 BECHTEL Belle River

DD FORM 117-71

LOCATION: J 5774 E 14272 GROUND ELEVATION: 591.2

DATE DRILLED: 9/6/77 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	LABORATORY TESTS & SAMPLE NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, moist
0.5							0.5-13.5' Silty clay, med. brown and gray, mottled, med. stiff, med. plasticity, trace sand, trace fine gravel (GL)
6.0							6.0-8.5' Med. brown, very stiff
8.5							8.5-13.5' Med. brown, stiff
13.5							13.5-30.0' Clay, med. gray, med. stiff, high plasticity, moist, trace silt (CH)
23.5							23.5-28.5' Very soft, moist to wet
28.5							28.5-30.0' Soft
							Bottom of Hole: Depth 30.0' Elevation 561.2
							Hole backfilled with cuttings.

SOIL BORING NO. B-39  
BECHTEL Belle River

QUMA 1872A

LOCATION: N 5532 E 14735 GROUND ELEVATION 590.2

DATE DRILLED: 9/6/77 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)	ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT ON SAMPLE PRESSURE	LABORATORY TESTS SAMPLE TYPE & NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0								0-0.4' Topsoil, dk. brown, dry
0.4					21			0.4-13.5' Silty Clay, med. brown, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5					3			13.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist to wet, trace silt (CH)
30.0					4			Bottom of Hole: Depth 30.0' Elevation 560.2
30.0								Hole backfilled with cuttings.
40								
60								
80								
100								
120								
140								
160								
180								
200								
220								
240								
260								
280								
300								
320								
340								

SOIL BORING NO. E-50  
BECHTEL Belle River

LOCATION: N 5355      GROUND ELEVATION: 559.9  
 W 15258

DATE DRILLED: 9/6/77  
 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
	0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80	40 50 60 70 80 90 100 110	0 20 40 60 80 100		
0						0-0.3' Topsoil, dk. brown, dry
0.3-4.0'						Clayey silt, light brown, med. dense, dry, trace sand, trace fine to coarse gravel (G)
4.0-18.5'						Silty clay, med. brown and gray, mottled, very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
18.5-30.0'						Med. stiff clay, med. gray, very soft, high plasticity, moist to wet, trace silt (CH)
30.0-30.0'						Soft
30.0'						Bottom of Hole: Depth 30.0' Elevation 559.9
						Hole backfilled with cuttings.

OTHER LABORATORY TESTS  
 SAMPLE NUMBER

17  
 20  
 23  
 27  
 33  
 44

SOIL BORING NO. 2-62  
 BECHTEL, Balls River

**Appendix D**  
**2016 Boring Logs**





WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 1 of 2

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 2/29/16	Date Drilling Completed: 2/29/16	Project Number: 231828.0003
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.17	TOC Elevation (ft) 591.30	Total Depth (ft bgs) 120.0
Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins. N: 471155.70 E: 13625546.02		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 08:45	
				Depth (ft bgs) 14.52

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	<p><b>SILTY CLAY WITH GRAVEL</b> mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.</p> <p><b>CLAY</b> mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.</p> <p>Change to dark gray (10YR 4/1), very stiff at 5.0 feet.</p> <p>Change to soft at 8.0 feet.</p>	CL-ML			<p>Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.</p> <p>Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.</p>
2 CS	50		10	<p>Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.</p>				
3 CS	100		20	<p>Change to dark gray (10YR 4/1) at 20.0 feet.</p>	CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS						
NUMBER AND TYPE	RECOVERY (%)													
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.	CL									
6 ST	100		50											
7 CS	100		55											
8 CS	80		65											
9 CS	100		75											
10 CS	100		85											
11 CS	100		95						<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP				
			100											
			100						End of boring at 100.0 feet below ground surface.					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

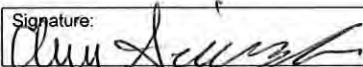
WELL NO. MW-16-02

Page 1 of 2

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/14/16	Date Drilling Completed: 3/15/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 586.27	TOC Elevation (ft) 588.94	Total Depth (ft bgs) 100.0	Borehole Dia. (in) 6/4
Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins. N: 471409.06 E: 13625991.78		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:24		Depth (ft bgs) 16.07

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	CLAY mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			7.0	Change to no gravel at 7.0 feet.				
2 CS	80		10	Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.				
			15					
			25					
3 CS	100		25					
			30					
			35					
4 CS	90		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
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 Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	SILTY CLAY mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.				
7 CS	50		55					
8 CS	100		60					
9 CS	100		65		CL-ML			
10 CS	100		70					
			75					
			80					
			85					
			90	CLAYEY SILT mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	SAND mostly fine to coarse sand, dark gray (10YR 4/1), saturated.				
			96.0	Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>5/25/16</b>	Date Drilling Completed: <b>5/31/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.03</b>	TOC Elevation (ft) <b>590.66</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins. N: 471391.78 E: 13626202.49		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time _____ Depth (ft bgs) _____ After Drilling: Date/Time <b>6/8/16 14:30</b> Depth (ft bgs) <b>12.82</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	100		5	<b>TOPSOIL</b> <b>SILTY CLAY</b> mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10.5	Change to gray (10YR 5/1) at 10.5 feet. <b>CLAY</b> mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
3 CS	100		25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
4 CS	100		41.5	Change to trace fine to coarse sand at 41.5 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 2 of 3

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
6 CS	90		50					
			55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	<b>SANDY CLAY</b> mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			70	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.	CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	<b>SANDY SILT</b> mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
			85	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
			90	Change to medium soft at 90.0 feet.	CL			
			95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
10 CS	100		100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 3 of 3

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11	CS	100	105	CLAY mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12	CS	100	115		CL			
			120					
13	CS	100	125					
			130	<b>SANDY CLAY</b> mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff. <b>SILTY SAND</b> mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	CL SM			
14	CS	90	135	<b>SAND</b> mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
			140	<b>SILTY SAND</b> mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			145	<b>SAND</b> mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
15	CS	100	150	<b>SILT</b> mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense. <b>SHALE</b> weathered shale bedrock, dark gray. End of boring at 150 feet below ground surface.	ML			
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/7/16</b>	Date Drilling Completed: <b>3/8/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>587.50</b>	TOC Elevation (ft) <b>590.51</b>	Total Depth (ft bgs) <b>130.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 200 feet from W corner of road, S of bottom ash basins. N: 470893.74 E: 13625876.34		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 09:31</b>		Depth (ft bgs) Depth (ft bgs) <b>13.91</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.  Change to stiff at 10.5 feet. Change to dark gray (10YR 4/1), very soft at 12.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

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 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka





WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.				
6 CS	100		55					
			60	Change to few coarse gravel at 60.0 feet.				
7 CS	100		65					
			70					
			75	SILTY CLAY mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
8 CS	100		75	SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	SAND mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
			80	SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
			85	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
9 CS	100		85	CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.				
			95		CL-ML			
10 CS	100		95					
			100	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Page 3 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
12 CS	100		115	<b>SILT</b> mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
13 CS	100		125	<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/3/16	Date Drilling Completed: 3/4/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.32	TOC Elevation (ft) 590.82	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W of diversion basin. N: 470378.15 E: 13626342.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55		
			Depth (ft bgs)	Depth (ft bgs) 14.37	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard.</p> <p>Change to no gravel, very stiff at 4.0 feet.</p>	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		15	<p>Change to dark gray (10YR 4/1), very soft at 10.0 feet.</p>				
3 CS	100		25	<p>Change to medium stiff at 26.0 feet.</p> <p>Change to very soft at 28.0 feet.</p>	CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature:

Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

Page 2 of 3

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
				SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
6 ST	100		50	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
7 CS	100		55					
			60	Change to few fine to coarse gravel at 60.0 feet.	CL			
8 CS	100		65	Change to medium stiff at 65.0 feet.				
			67.5	Change to stiff at 67.5 feet.				
			70	SILTY CLAY mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
9 CS	100		75	Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.				
			80		CL-ML			
10 CS	60		85	Change to few to little fine sand at 85.5 feet.				
			90	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			93.5	Change to medium stiff at 93.5 feet.				
11 CS	100		95	Change to soft at 97.5 feet.	CL			
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110-115					
14 CS	100		120-125					
15 CS	100		130-135	<b>CLAYEY SILT</b> mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
16 CS	90		140-145	<b>SHALE</b> dark gray (10YR 4/1), dry.				
			150	End of boring at 150.0 feet below ground surface.				
			155					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-06**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/10/16</b>	Date Drilling Completed: <b>3/11/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.98</b>	TOC Elevation (ft) <b>593.21</b>	Total Depth (ft bgs) <b>140.0</b>
Boring Location: 123 feet S of road connecting to haul road, E of diversion basin. N: 470439.03 E: 13626796.04		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 10:01</b> Depth (ft bgs) <b>14.45</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	GRAVEL WITH SAND mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense. CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to few coarse gravel at 10.0 feet.				
2 CS	100		15	Change to dark gray (10YR 4/1), stiff at 12.0 feet. Change to very soft at 13.0 feet.				
			20					
3 CS	100		25					
			30					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *[Handwritten Signature]* Firm: TRC Environmental Corporation 734.971.7080  
 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022  
 Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
6 CS	100		55		CL			
7 CS	100		65					
			70	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				<b>SAND</b> mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.				
			80		CL-ML			
9 CS	80		85					
			90	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
10 CS	70		95		CL			
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
12 CS	100		110-115					
13 CS	100		125	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
14 CS	100		130-135					
			135	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			140	<b>SHALE</b> dark gray (10YR 4/1), hard, brittle.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					





**WELL CONSTRUCTION LOG**

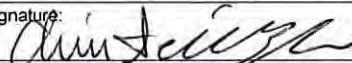
**WELL NO. MW-16-07**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/8/16</b>	Date Drilling Completed: <b>3/9/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.89</b>	TOC Elevation (ft) <b>592.58</b>	Total Depth (ft bgs) <b>140.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: 326 feet S of road connecting to haul road, E of diversion basin. N: 470233.47 E: 13626858.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 11:56</b>		Depth (ft bgs) <b>14.13</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	CLAY mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
			10	Change to dark gray (10YR 4/1) at 11.0 feet.				
			13	▼ Change to moist, very soft at 13.0 feet.				
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		65	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			66	<b>SAND</b> mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
			67	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			70	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.				
9 CS	100		75					
10 CS	100		85		CL-ML			
11 CS	100		95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231825.0003.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		125					
15 CS	100		135					
			130	<b>SILT</b> mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
			135	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/9/16	Date Drilling Completed: 3/10/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.31	TOC Elevation (ft) 591.88	Total Depth (ft bgs) 140.0	Borehole Dia. (in) 6
Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin. N: 470002.90 E: 13626846.85		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 12:00		
			Depth (ft bgs)	Depth (ft bgs) 13.19	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	CLAY WITH GRAVEL mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15	CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
3 CS	100		25		CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		55					
7 CS	80		65					
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
9 CS	100		85					
10 CS	60		95					
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.  Change to few fine sand at 105.5 feet.	CL-ML			
12 CS	100		110	Change to no sand at 110.0 feet.				
13 CS	100		125					
14 CS	100		130	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			135	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-09**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/1/16</b>	Date Drilling Completed: <b>6/1/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.28</b>	TOC Elevation (ft) <b>590.80</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: _____ Date/Time _____ After Drilling: _____ Date/Time <b>6/9/16 15:13</b>		Depth (ft bgs) <b>14.36</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	75		5	<b>TOPSOIL</b> <b>SILTY CLAY</b> mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.				
2 CS	85		15					
3 CS	100		25		CL			
4 CS	100		35	Change to trace to few fine gravel at 30.0 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



# WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5	CS	100	45	CLAY mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
			50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6	CS	100	70	Change to soft at 70.0 feet.				
			75		CL			
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
			90					
			95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16





WELL CONSTRUCTION LOG

WELL NO. MW-16-09

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
8 CS	75		105	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.				
9 CS	80		110					
			115					
			120		CL			
			125					
10 CS	100		130					
			135					
			140	<b>SAND</b> mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
			145	<b>SAND WITH GRAVEL</b> mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
11 CS	80		150	<b>SHALE</b> weathered, gray (10YR 5/1), brittle.				
			155	End of boring at 150.0 feet below ground surface.				



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 6/2/16	Date Drilling Completed: 6/3/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.25	TOC Elevation (ft) 592.26	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W/NW of diversion basin. N: 470532.54 E: 13626417.00		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 6/9/16 07:45		Depth (ft bgs) Depth (ft bgs) 15.30

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	TOPSOIL CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	90		15	Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
3 CS	95		25	Change to soft at 25.0 feet.				
4 CS	100		35	Change to few fine to coarse sand, medium stiff at 30.0 feet. Change to dark gray (10YR 4/1) at 32.0 feet. Change to soft at 35.0 feet.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *M. Powers* Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
6 CS	100		55		CL			
7 CS	100		65					
8 CS	100		75	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.  Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
9 CS	100		85	<b>CLAYEY SAND</b> mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.  <b>SAND</b> mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SC SP			
10 CS	100		95	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			100	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100		115	<b>SAND</b> mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			120	<b>CLAY</b> mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		125					
			130		CL			
14 CS	95		135					
			140					
15 CS	50		145	<b>GRAVELLY SILT</b> mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
			150	<b>SILTY CLAY</b> hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	<b>SHALE</b> dark gray. End of boring at 150.0 feet below ground surface.				
			155					
			160					



**WELL CONSTRUCTION LOG**

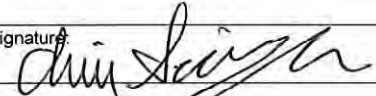
**WELL NO. MW-16-11**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/3/16</b>	Date Drilling Completed: <b>6/6/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.03</b>	TOC Elevation (ft) <b>591.54</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: S of haul road, W of diversion basin. N: 470251.34 E: 13626438.92		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>6/21/16 07:45</b>		Depth (ft bgs) Depth (ft bgs) <b>14.47</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	<b>TOPSOIL</b> CLAY mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to trace gravel at 8.0 feet.				
2 CS	70		15	Change to gray (10YR 5/1) at 12.0 feet. Change to no gravel at 13.0 feet.				
			20	Change to medium stiff at 21.0 feet.	CL			
3 CS	90		25					
			30					
4 CS	90		35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022  
 Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	90		45	CLAY mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			50	Change to medium stiff at 49.0 feet.				
6 CS	100		55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.				
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	85		105	<p>CLAY mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.</p> <p>Change to medium stiff at 110.0 feet.</p>	CL			
12 CS	80		115					
13 CS	85		125					
14 CS	90		135					
15 CS	90		145					
			140	<p>SANDY CLAY mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.</p> <p>CLAY mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.</p> <p>SHALE dark gray.</p>	CL			
			150	End of boring 150.0 feet below ground surface.				
			155					



# WELL CONSTRUCTION LOG

## WELL NO. MW-16-11A

Page 1 of 2

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>5/11/17</b>	Date Drilling Completed: <b>5/12/17</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.5</b>	TOC Elevation (ft) <b>591.66</b>	Total Depth (ft bgs) <b>142.0</b>
Boring Location: <b>North of fuel oil tank number 2, between berm and fence.</b>		Personnel Logged By - <b>J. Krenz</b> Driller - <b>A. Goldsmith</b>		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time <b>5/15/17 08:38</b> Depth (ft bgs) <b>17.79</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90			<b>CLAY</b> mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.  Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60							
3 CS	70							
4 CS	70							
5 CS	100							
6 CS	100							
7								

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 8/21/17

Signature: Firm: TRC Environmental Fax

Checked By: C. Scieszka





WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 8/21/17

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS		
NUMBER AND TYPE	RECOVERY (%)									
CS	100			CLAY mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.	CL					
			70	Change to few fine to coarse gravel at 70.0 feet.						
8 CS	100									
			80	Change to trace fine sand at 80.0 feet.						
9 CS	90									
			90							
10 CS	70									
			100							
11 CS	100									
			110							
12 CS	100									
			120							
13 CS	100			Change to trace medium to coarse gravel at 126.0 feet.						
			130							
14 CS	60			SILT mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.				ML		
			140	SILTY CLAY mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML					
15 CS	100			BEDROCK shale, weathered, gray (10YR 4/1). End of boring at 142.0 feet below ground surface.						
			150							



**SOIL BORING LOG**

**BORING NO. SB-16-01**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/1/16</b>	Date Drilling Completed: <b>3/1/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.69</b>	TOC Elevation (ft) <b>---</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: <b>Corner of E connecting road off haul road, E of bottom ash basins.</b>		Personnel Logged By - <b>A. Knutson</b> Driller - <b>A. Goldsmith</b>		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>		County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time
				Depth (ft bgs) Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p>	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
			10	Change to stiff at 10.0 feet.			
2 CS	100		15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
3 CS	100		25				
4 CS	100		35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP\_GDT 7/14/16

Signature: 	Firm: <b>TRC Environmental Corporation</b> 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
Checked By: <b>M. Powers</b>		



SOIL BORING LOG

BORING NO. SB-16-01

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
			60	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
				<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		65	<b>SANDY SILT</b> mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
			70	<b>CLAY</b> mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
				Change to no gravel, soft at 72.5 feet.			
9 CS	100		75				
			80	Change to few coarse gravel at 80.0 feet.			
10 CS	100		85		CL		
			90				
11 CS	100		95				
			100				



SOIL BORING LOG

BORING NO. SB-16-01

Page 3 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
12 CS	100		105	CLAY mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		120				
15 CS	100		125	SILT mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
16 CS	100		130				
			135	SHALE dark gray (10YR 4/1), dry.			
			140				
			145	End of boring at 150.0 feet below ground surface.			
			150				
			155				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

**Appendix E**  
**2020 Boring Logs**

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.8			Lean CLAY - brown, hard, dry	4.5	Gravel road at surface
		6/7'	B-1-1 (3')			
5	587.8		B-1-2 (6')	Gravelly SAND - brown, poorly graded, fine gravel, coarse sand, silt, dry		
		100%	B-1-ST-1	Lean CLAY - brown, hard, dry		
10	582.8	3/3'	B-1-3 (10')	Same as above	4.5	
		6/7'	B-1-4 (15')	Very stiff from 14 to 16 ft.	2.5	
				Lean CLAY - Gray, soft - medium stiff, moist	0.5	
20	572.8	100%	B-1-ST-2			
		6/6'	B-1-5 (22')	Same as above	0.5	
25	567.8		B-1-6 (25')			

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.8	4/9'	B-1-7 (34')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
35	557.8	75%	B-1-ST-3		< 0.5	
40	552.8	4/8'	B-1-8 (40')	Same as above		
45	547.8	2/4'	B-1-9 (48')	Same as above	< 0.5	

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	542.8	4'7'	B-1-10 (52')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
55	537.8		B-1-ST-4			
60	532.8	50%	B-1-11 (59')	Same as above	0.5	
		6'6'	B-1-12 (63')	Same as above	0.5	
65	527.8					
70	522.8	2'10'	B-1-13 (74')	Consistency increases to stiff	1.0	
75	517.8	1'5'	B-1-14 (80')	Lean CLAYwith Sand - Gray, medium stiff - stiff, moist	0.5	
						1.5



**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.8	25%	B-1-ST-5	Lean CLAY with Sand - Gray, medium stiff - stiff, moist		
			B-1-15 (82')	Becomes very stiff, trace coarse-fine gravel	2.0	
85	507.8	3/6'	B-1-16 (85')			
			B-1-17 (87')	Becomes stiff, no gravel	1.5	
90	502.8	2/8'			1	
			B-1-18 (94')		1	
95	497.8	0%				Shelby tube sample attempted, near zero recovery
		100%	B-1-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
100	492.8			Boring Terminated @ 100'		

Boring B-2					
Drilling Start Date:	12/9/2020	Boring Depth (ft):	99		
Drilling End Date:	12/10/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	592.0		
Logged By:	Brian Ares	Northing, Easting (MI State Plane)	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-2-1 (1')	Fat CLAY - brown, hard, some fine gravel and coarse sand, dry	4.5+	Gravel road at surface
		100%	B-2-ST-1			
				Becomes lean	4.5	
5	587.0	4/4'	B-2-2 (5')		4.5	
		100%	B-2-ST-2			
				Same as above		
10	582.0	3/3'	B-2-3 (10')			
			B-2-4 (12')	Lean CLAY - gray, very stiff, dry	2.0	
15	577.0	8/8'				
			B-2-5 (18')			
20	572.0			Becomes soft - medium stiff, moist	0.5	
					0.5	
25	567.0	7/7'	B-2-6 (24')		0.5	
		100%	B-2-ST-3			

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.0	8'8"	B-2-7 (32')	Lean CLAY - gray, soft, wet	< 0.5	
35	557.0				< 0.5	
40	552.0	10'10"	B-2-8 (40')	Becomes moist	< 0.5	
45	547.0				< 0.5	
			B-2-9 (46')	Becomes soft-stiff	1.0	
		100%	B-2-ST-4		< 0.5	
50	542.0	4'4"	B-2-10 (50')		1.0	
					0.5	

Boring B-2				
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0	
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
55	537.0	8'8"	B-2-11 (54')	Sandy Lean CLAY - gray, stiff, moist	1.0	
60	532.0		B-2-12 (60')	Same as above	1.0	
65	527.0	6'6"	B-2-13 (64')		1.0	
		100%	B-2-ST-5		1.5	
70	522.0	6'6"	B-2-14 (70')	Some coarse gravel (69' - 74')	1.0 1.5	
75	517.0		B-2-15 (75')	Lean CLAY with Sand - gray, stiff, moist	1.0	
80	512.0	8'8"	B-2-16 (80')		1.0	

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	507.0	4'4'	B-2-17 (86')	Lean CLAY with Sand - gray, stiff, moist	1.0	
		100%	B-2-ST-6		1.0	
90	502.0	5'5'	B-2-18 (91')	Becomes very stiff	2	
					2	
95	497.0	3'3'	B-2-19 (96')	Same as above	2.5	
					2.5	
99	493.0	100%	B-2-ST-7	Boring Terminated @ 99'		

Boring B-3				
<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0	
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-3-1 (1')	GRAVELY SAND - tan, well graded, mostly coarse to fine gravel and coarse sand		Gravel road at surface
		100%	B-3-ST-1			
5	587.0	4/4'	B-3-2 (5')	Lean CLAY - brown, trace fine gravel, hard, dry	4.5	
		100%	B-3-ST-2			
10	582.0	7/7'	B-3-3 (10')	Becomes very stiff	2.5	
			Becomes medium stiff	2.5		
			0.5			
			0.5			
15	577.0		B-3-4 (15')	Transition to moist	0.5	
20	572.0	6/6'	B-3-5 (20')		0.5	
					0.5	
					0.5	
25	567.0	5/5'	B-3-6 (25')		0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-3-ST-3	Lean CLAY - gray, medium stiff, moist		
30	562.0	4 1/4'	B-3-7 (30')		0.5	
				Same as above	0.5	
35	557.0	8 7/8'	B-3-8 (35')		0.5	
				Same as above	0.5	
40	552.0		B-3-9 (40')		0.5	
				Same as above	0.5	
45	547.0	6 1/6'	B-3-10 (45')		0.5	
				Same as above	0.5	
		100%	B-3-ST-4			
50	542.0	7 1/7'	B-3-11 (50')		0.5	
				Same as above	0.5	
55	537.0		B-3-12 (55')		0.5	
				Same as above	0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	532.0	8/8'	B-3-13 (60')	CLAY - gray, medium stiff, moist	0.5	
					0.5	
					0.5	
65	527.0	4/4'	B-3-14 (67')	Sandy Lean CLAY - gray, very fine - fine sand and silt, some fine gravel, moderate grading, moist		
		0%				Shelby tube sample attempted - no recovery
70	522.0	3/3'	B-3-15 (70')	Lean CLAY with Sand - gray, stiff - very stiff, moist	2.0	
					1.5	
75	517.0	4/4'	B-3-16 (75')	Same as above	1.5	
		100%	B-3-ST-5			



**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.0	9'9"	B-3-17 (80')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
85	507.0	5'5"	B-3-18 (85')	Same as above	1.5	
					2.0	
90	502.0	4'4"	B-3-19 (90')	Same as above	2.0	
					2.0	
95	497.0	100%	B-3-20 (95')	Boring Terminated @ 99'	2.0	
					1.5	
99	493.0		B-3-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	586.0	0/1'		Lean CLAY - brown, very stiff, dry		
		0%				Shelby tube sample attempted from 1-3', no recovery
				Same as above	2.5	Very little recovery. This assessment comes from verbal description from drilling crew
5	581.0	0.5/4'				
		100%	B-4-ST-1			
				Becomes hard	4.5	
10	576.0		B-4-1 (10)	Lean CLAY - gray, stiff, dry	1	
		6/6'	B-4-2 (12)		1	
				Becomes medium stiff, moist	0.5	
15	571.0		B-4-3 (15)		0.5	
		6/6'			0.5	
					0.5	
20	566.0		B-4-4 (20)			
				Same as above	0.5	
		6/6'			0.5	
25	561.0		B-4-5 (25)		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-4-ST-2	Lean CLAY - gray, medium stiff, moist		
30	556.0		B-4-6 (30)	Same as above	0.5	
		6'6"	B-4-7 (34)		0.5	
					0.5	
35	551.0		B-4-8 (36)	SILTY SAND - gray, mostly very fine - fine sand and silt, some fine gravel, well graded, moist		
		6'6"	B-4-9 (40)	Lean CLAY - gray, medium stiff, moist	0.5	
40	546.0			Same as above	0.5	
		6'6"	B-4-10 (45')		0.5	
45	541.0			Same as above		
		100%	B-4-ST-3			
50	536.0		B-4-11 (50')	Same as above	0.5	
		7'7"			0.5	
55	531.0		B-4-12 (55')		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - gray, medium stiff, moist	0.5	
60	526.0	6'6"	B-4-13 (60')		0.5	
				Same as above	0.5	
65	521.0	5'5"	B-4-14 (65')		0.5	
		100%	B-4-ST-4			
70	516.0		B-4-15 (70')			
		8'8"		Same as above		
75	511.0		B-4-16 (75')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
80	506.0	5'5"	B-4-17 (80')		2.0	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	501.0	5'5'	B-4-18 (85')	Lean CLAY with Sand - gray, stiff - very stiff, dry	1.5	
		100%	B-4-ST-5		2.0	
90	496.0	5'5'	B-4-19 (90')	Same as above	1.0	
95	491.0	3'3'	B-4-20 (95')	Same as above	1.5	
99	487.0	100%	B-4-ST-6	Boring Terminated @ 99'	1.5	Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-5					
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99		
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3		
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	591.3	0.75/1'		Lean CLAY - light brown, little gravel, little sand, hard, moist	4.0	
		50%	B-5-ST-1	Lean CLAY - gray, very stiff - hard, moist	2.0	
					3.5	
5	586.3	4/4'			> 4.5	
			B-5-1 (7')		2.5	
				Fat CLAY - gray to brown, some fine gravel, medium stiff - very stiff	0.5	
10	581.3	7/7'			0.5	
					1.0	
15	576.3		B-5-2 (14')		0.5	
		7/7'		Lean CLAY - gray, medium stiff, moist	0.5	
20	571.3				0.5	
			B-5-3 (21')		0.5	
				Same as above	0.5	
25	566.3				0.5	
					0.5	
		100%	B-5-ST-2		0.5	

Boring B-5			
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99
Drilling End Date:	12/14/2020	Boring Diameter (in.)	4.25
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324 13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	561.3		B-5-4 (29')	Lean CLAY - gray, medium stiff - stiff, moist	1.0	
		7/7'	B-5-5 (32')		1.0	
35	556.3			Same as above	1.0	
		5/5'	B-5-6 (37')		0.5	
40	551.3			Same as above	1.0	
		6/6'	B-5-7 (42')		1.0	
45	546.3		B-5-8 (46')		1.0	
		100%	B-5-ST-3		1.0	
50	541.3			color transition to darker gray	0.5	
		4/4'				1 cm sand seam observed
			B-5-9 (52')	Becomes stiff	1.5	

Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
55	536.3	8'8'	B-5-10 (57')	Lean CLAY - dark gray, medium stiff - stiff, moist	1.0	Some fine black gravel observed	
							0.5
60	531.3	6'6'	B-5-11 (62')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, medium stiff - stiff, moist	1.0		
							0.5
							1.0
65	526.3	100%	B-5-12 (66')		1.5		
							1.5
			B-5-ST-4		1.0		
70	521.3	9'9'	B-5-13 (72')	Same as above	1.5		
							1.0
75	516.3		B-5-14 (77')		1.0		
					1.5		



Boring B-5				
<b>Drilling Start Date:</b>	12/14/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	591.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane)</b>	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
80	511.3	9/9'	B-5-15 (82')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, stiff - very stiff, moist	1.0		
					2.0		
85	506.3	100%	B-5-16 (86')		1.0		
			B-5-ST-5		1.5		
90	501.3	8/8'	B-5-17 (92')		Same as above		2.5
					2.5		
95	496.3		B-5-18 (96')	2.0			
		100%	B-5-ST-6 B-5-19 (99')	Boring Terminated @ 99'	2.0	Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite	
99	492.3						

Boring B-6				
Drilling Start Date:	12/15/2020	Boring Depth (ft):	99	
Drilling End Date:	12/15/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	589.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane):	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	589.3	1/1'		GRAVEL - light gray to gray, mostly coarse and fine gravel and sand		
		50%	B-6-ST-1	Lean CLAY - gray to brown, trace gravel, very stiff - hard, moist		
5	584.3	3.5/4'	B-6-1 (5')		3.0 4.5 3.5 3.0	
		100%	B-6-ST-2	Lean CLAY - gray, very stiff, moist	3.0	
10	579.3	7/7'	B-6-2 (10')	Becomes medium stiff - stiff	3.0 1.0 0.5	
15	574.3		B-6-3 (15')	Same as above	0.5	
		4/4'			0.5	
20	569.3		B-6-4 (20')	Same as above	0.5	
		7/7'			1.0 0.5	
25	564.3		B-6-5 (25')		0.5 1.0	

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-6-ST-3	Lean CLAY - gray, medium stiff - stiff, moist		
30	559.3		B-6-6 (30')	Same as above	0.5	
		9/9'			0.5	
35	554.3		B-6-7 (35')		1.0	
					0.5	
40	549.3		B-6-8 (40')	Same as above	0.5	
		9/9'			0.5	
45	544.3		B-6-9 (45')		0.5	
					1.0	
		100%	B-6-ST-4			

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.):</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	539.3	9/9'	B-6-10 (50')	Lean CLAY - gray, medium stiff - stiff, moist Color transition to darker gray	1.0	
55	534.3	9/9'	B-6-11 (55')		1.0	
					Lean CLAY with Sand - gray, stiff, moist	
60	529.3	9/9'	B-6-12 (60')		1.0	
					Same as above	
65	524.3	100%	B-6-13 (65')		1.5	
			B-6-ST-5			
70	519.3	9/9'	B-6-14 (70')		1.0	
					Same as above	
75	514.3	9/9'	B-6-15 (75')		1.5	

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	509.3	9'9"	B-6-16 (80')	Lean CLAY with Sand - gray, stiff, moist	1.5	
85	504.3		B-6-17 (85')	Becomes very stiff	2.0	
		100%	B-6-ST-6			
90	499.3	8'8"	B-6-18 (90')	Becomes stiff	1.5	
95	494.3		B-6-19 (95')	Some gravel observed	1.5	
99	490.3	100%	B-6-ST-7 B-6-20 (99')	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

**Appendix F**  
**1970's Lab Test Results**

4-9-5-2

# **SUBSURFACE INVESTIGATION AND FOUNDATION REPORT**

THE DETROIT



EDISON COMPANY

## **BELLE RIVER UNITS 1 & 2 JOB 10539 VOLUME 2 OF 2**

**GEOLOGY AND SOIL PROPERTIES**

P. H. COOK

AUG 31 1978

**AUGUST 1976**

**BECHTEL  
ANN ARBOR, MICHIGAN**



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## Appendix C

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ____ OF ____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B7/28	Jar Sample Clayey SILT; dark gray, low plasticity (CL-ML)	129.5 to 131.0	64								
			H64.1								See plot
B7/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	138.88 to 140.33	65								
			S/H								
			65.1								See plot

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u>													
TABLE <u>        </u> SUMMARY OF LABORATORY TEST RESULTS DATE <u>Jan. 1974</u> SHEET <u>        </u> OF <u>        </u>													
IDENTIFICATION				TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
B10/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)		141.3	66									
				SH 66.1									See plot

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
15/2	1.6' Recovery; say 3.0' to 4.6' depth	3.0-5.0	119								
		3.3-3.6	Saved								
	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL)	3.6-3.7	W119.1	25.5		97					
		3.7	TV								TV=1.00tsf
		3.7-4.1	W119.01	25.4		101		UU	8.0	2386	σ <sub>c</sub> =475 psf
		3.7-4.1	L119.1	23.6	45	21					
		4.1-4.2	W119.2	25.3		97					
		4.2	TV								TV=1.20tsf
		4.2-4.5	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
15/4	1.3' Recovery: say 8.0' to 9.3' depth	8.0-10.0	120									
		8.1-8.4	saved									
	Silty CLAY, dark gray, stiff consistency, moderate to highly plastic (CL)	8.4	TV									TV=0.70 tsf
		8.4-8.6	W120.1			90						
		8.6-8.9	U120.1			93		U	6.0	1257		
		8.6-8.9	L120.1			44	19					
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)	8.9	TV									TV=0.61 tsf
		9.0-9.4	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
15/6	1.2' Recovery; say 18.0' to 19.2' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to highly plastic (CL)	18.0-									
		20.0	121								
		18.1-	L121.1	35.0	42	20					
		18.1-									
		18.4	J121.1	34.1			87	U	15.0	508	@20% strain s= 546 psf
		18.4-									
		18.5	W121.1	36.1			83				
		18.5	TV								TV=0.28tsf
		18.8-									
		18.9	W121.2	36.3			83				
	18.9	TV								TV=0.22tsf	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
15/14	2.5' Recovery; say 58.0' to 60.5' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Void occurs along outside edge of upper 1.3' of sample	58.0 - 60.5	125									
		58.3 -	Saved									
		58.7 -	W125.1									
		58.9 -	TV									TV = 0.46tsf
		58.9 -	Saved									
		59.2 -	W125.1									@ 20% strain s = 1260 psf
		59.6 -	L125.1		22.5	104	15.2	1067				
		59.6 -	W125.2		22.6	18						
		59.6 -	TV		34							TV = 0.61tsf
		59.7 -	Saved		22.4	103						
		60.0 -										
		60.4 -										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/3	2.4' Recovery; say 20.0' to 22.4' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to high plasticity (CL)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	20.0 - 22.5	—									
		20.1 - 20.4	176									
		20.4 - 20.6	WI76.1	39.1	82							
		20.6	TV									TV=0.26tsf
		20.6 - 20.9	WI76.0.1	39.9	83			UU 9.0	411			σ <sub>c</sub> -2448psf
		20.6 - 20.9	L176.1	38.3	44	21						
		20.9 - 21.2	Saved									
		21.2 - 21.4	WI76.2	32.1	88							TV=0.26tsf
		21.4	TV									
		21.7 - 22.0	Saved									
		22.0 - 22.4	Saved									



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/6	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	—									
		50.0 to 52.5	345								
		50.3 to 50.5	W345.1	35.8							
		50.5	TV								TV=0.38tsf
		50.5 to 50.8	345.1								
		51.2 to 51.4	W345.1	24.6	98						
		51.4	TV								TV=0.50tsf
		51.4 to 51.7	1345.0.1	31.0	92	UU	3.0	827			
		51.4 to 51.7	1345.1	29.6	39	18					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974  
SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
18/7	2.4' Recovery; say 60.0' to 62.4' depth		60.0 62.5	346								
	Silty CLAY, Sandy, dark gray, firm to stiff consistency, moderate plasticity (CL)		60.6- 61.0	TV saved								TV=0.46 tsf
	Sample includes about 30% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)		61.0 61.3	L346.1	20.2	26	16					
			61.4- 61.6	W346.2	19.9	109						
			61.6	TV								TV=0.65 tsf
			61.6- 62.0	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
18/10	1.3' Recovery; say 88.0' to 89.3' depth		88.0-90.0	179									
	Silty CLAY, sandy, gray, very stiff consistency, moderate plasticity (CL)		88.4	TV									TV=1.3 tsf
	Sample includes about 25% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)		88.4-88.7	W179.1	22.9	99							
			88.7-88.8	W179.2	21.9	98							
			88.8	TV									TV=1.1 tsf
			88.8-90.1	L179.1	17.3	29	15						
			88.8-90.1	U179.01	17.3	110		UU	15.0	2863			σ <sub>c</sub> =6336 psf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub> c <sub>c</sub>	
18/11	Jar Sample	—								
	Silty SAND, subrounded to subangular fine to coarse Sand grains with about 10% non-plastic fines (SM-SW)	103.5-105.0								
		430								
		S430.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
18/12	1.7' Recovery; say 108.0' to 109.7' depth	108.0-110.0	181										
		108.2-108.5	1181.1	34.2	46 22								
	Silty CLAY, grey, stiff consistency, moderate to highly plastic (CL)	108.2-108.5	1181.1.1	34.5		87	CU	5.9	1952		σ <sub>c</sub> =3744psf		
		108.5-108.6	1181.1	32.3		90					TV=0.71tsf		
		108.6	TV										
	Sample includes lenses/layers below 108.9' depth consisting of Silty Sand, subrounded to subangular fine to medium Sand grains with about 40% non-plastic fines (SM)	108.6-108.9	1181.1.2	31.0		92	CU	6.2	2601		σ <sub>c</sub> =7488psf		
		108.6-108.9	1181.1.3	30.7		92	CU	6.8	4088		σ <sub>c</sub> =15120psf		
		108.9-109.3	Saved										
		109.3-109.4	1181.2	26.8		94							
	Layers/lenses comprise ±30% of total sample below 108.9' depth	109.4	TV								TV=0.51tsf		

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
18/16	Jar Sample	139.5 - 141.0	431									
	Silty SAND, gravelly; about 25% hard subrounded to subangular gravel size particles (3/4" max. size), subrounded to subangular fine to coarse Sand grains, about 15% non-plastic fines (SM)		S431.1								See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
19/1	Silty CLAY, dark greyish brown, very stiff consistency moderate to high plasticity (CL-CH)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	3.0-5.0	290									
		3.4-3.6	W290.1	25.7	95							
		3.6	TV									TV=1.15tsf
		3.6-3.9	Saved									
		3.9-4.2	Saved									
		4.2-4.3	W290.2	31.4	87							
		4.3	TV									TV=1.13tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
19/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0-20.0	292										
		18.1-18.5	L292.1	40.2	49	24							
	Silty CLAY, gray, soft to firm consistency moderate to high plasticity (CL-OH)	18.5-18.6	W292.1	39.1			85						
		18.6	TV									TV=0.27 tsf	
		18.6-19.0	saved										
		19.1-19.3	W292.2		35.3			83					
		19.3	St									TV=0.23 tsf	
		19.4-19.7	saved										



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		c <sub>c</sub>
19/8	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	—	68.0-70.0								
		297	68.4-68.5	23.1		1.03					
		TV	68.5							TV=0.80tsf	
		Saved	68.5-68.8								
		W297.2	69.2-69.3	22.2		1.03					
		TV	69.3							TV=0.73tsf	
		Saved	69.3-69.7								

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
19/9	1.9' Recovery; say 78.0' to 79.9' depth		---								
			78.0-80.0								
			78.2-78.6	saved							
			78.6-78.7	W298.1	21.4	106					
			78.7	TV							TV=0.63 tsf
			78.7-79.0	L298.1	24.4	33	17				
			79.0-79.5	saved							
			79.6-79.7	W298.2	24.9	101					
			79.7	TV							TV=0.67 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)							
19/11	1.8' Recovery; say 100.0' to 101.8' depth	100.0-102.0							
		100.5							TV-0.43tsf
	Silty CLAY, grey, firm consistency, moderate plasticity (CL)	100.5							
		100.6	W300.1	22.7		100			
		100.6	Saved						
		101.3	W300.2	27.3		94			
	Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	101.4							
		101.4	TV						TV=0.42 tsf
		101.4	Saved						
		101.7							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT WATER CONTENT (%)			ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
19/12	1.9' Recovery; say 118.0' to 119.9' depth		118.0-120.0	30J								
			118.4									
	Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL)		118.5	W30L1	35.1		86					
				118.5	TV							TV=0.55tsf
	Sample includes few thin lenses/layers of SILT, sandy (ML) comprising ±5% of total		118.5	Saved								
			119.2									
			119.3	W30L2	80	41.4						
			119.3	TV								TV=0.68tsf
			119.3	Saved								
			119.6									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE          SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET          OF         

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B22/29	Jar Sample Clayey SILT; dark gray, slight to low plasticity (CL-ML)	133.5 to 135.5 S/H 67.1									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		c <sub>c</sub>
25/1	Silly CLAY, grayish brown, very stiff consistency, highly plastic (CH)  Sample includes about 5% hard subrounded gravel size particles  Note: upper 1.0' of sample disturbed (Wash?)	3.0 to 5.0	266								
		4.0	TV								TV=0.4tsf
		4.0 to 4.3	save 266.1								
		4.3 to 4.5	W266.1			100					
		4.5 to 4.8	U266.1			108		5.0	3456		
		4.5 to 4.8	U266.1								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE: SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
25/3	1. 9' Recovery; say 18.0' to 19.9' depth, upper 0.8' disturbed (WASH??) Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)		18.0-20.0	268									
			18.8-19.2	Saved									
			19.2-19.3	W268.1	39.1			80					
			19.3	TV									TV=0.30tsf
			19.3-19.6	Saved									
			19.6-19.7	W268.2	38.1			81					
			19.7	TV									TV=0.27tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
25/4	Silty CLAY, Sandy, dark grey, soft to firm consistency, moderately plastic (CL)  Sample includes about 30% fine to coarse SAND and fine Gravel size particles (sub-rounded to subangular in shape)  few thin lenses/layers of Silty CLAY (CL-CH) throughout comprising ±10% of total  Note: Entire sample slightly disturbed	28.0-30.0	—								
		28.1-28.5	269								
		28.5-28.7	W269.1		18.1		111				
		28.7	TV								TV=0.27tsf
		28.7-29.1	Saved								
		29.1-29.3	W269.2		22.6		102				
		29.3	TV								TV=0.25 tsf
		29.3-29.7	W269.1		31.0	25	16				



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)	
25/6	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	48.0-50.0	271							
		48.3-48.7	saved							
		48.7-48.8	W271.1	80						
		48.8	TV							TV=0.37 tsf
		48.8-49.2	saved							
		49.2-49.4	W271.2	82						
		49.4	TV							TV=0.30 tsf
		49.4-49.8	L271.1		38.0	39	19			

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	c <sub>c</sub>	
25/7	Silty CLAY, grey, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	58.0-								
		60.0 272								
		58.4-								
		58.5 W272.1	24.1		98					
		58.5 TV								TV=0.45 tsf
		58.5-								
		58.8 Saved								
		59.2-								
		59.3 W272.1	24.4		99					
		59.3 TV								TV=0.58tsf
		59.3-								
		59.6 Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
25/10	1.8' Recovery; Say 88.0' to 89.8' depth	88.0 to 90.0	275								
		88.1 to 88.4	save 275.1								
		88.4 to 88.6	WZ75.1	19.7	106						
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	88.6	TV								TV=0.74tsf
		88.6 to 88.9	save 275.2								
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	88.9 to 89.2	TZ75.0	22.5	104	UU	11.0	2213			
		88.9 to 89.2	I275.1	21.4	36	19					
		89.2 to 89.4	WZ75.2	22.3	103						TV=0.80tsf
		89.4	TV								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
25/12	2.4' Recovery; say 118.0' to 120.4' depth  Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	118.0-120.5	277									
		118.6-118.7	W277.1	77								
		118.7	TV									TV=0.70tsf
		118.7-119.0	Saved									
		119.0-119.4	Saved									
		119.4-119.5	W277.2	82	36.4							
		119.8	TV									TV=0.68tsf

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DATE Jan. 1974

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE        SUMMARY OF LABORATORY TEST RESULTS SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B26/2	Recovery 1.6', say 3.5' to 5.1' depth	1										
		TV	25.4								TV=0.88 tsf	
	Silty CLAY, grayish brown, moderate to high plasticity, very stiff consistency (CL-CH) Includes about 15% subangular to subrounded fine gravel and coarse sand particles	WL.1	25.4									
		save										
		1.1										
		TV		23.9								TV=1.4 tsf
		WL.2		23.9								
		TL.1.1		23.0		104	CU	15.0	1100			
		LL.1.		23.0	53 24							TV=1.13 tsf
		TV										
		TL.1.2		23.9		103	CU	15.0	1725			TV= 1.3 tsf
		TV		21.9								
	WL.3		21.9									
	TL.1.3		22.3		108	CU	15.0	2400				

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$c_c$
B26/3	1.5' Recovery; say 8.0' to 9.5' depth	8.0 to 10.0	2									
		8.2	TV	31.5							TV=0.9 tsf	
	Silty CLAY; dark gray, moderately to highly plastic, firm consistency (CL-CH).  Includes about 10% subangular to subrounded fine gravel size particles and $\pm 5\%$ fine to coarse sand size particles.	8.2	W2.1	31.5								
		8.3 to 8.7	save 2.1									
		8.7	TV	33.0								TV=0.6 tsf
		8.7	W2.2	33.0								
		8.8 to 8.9	L2.1	32.0	50	22						
		8.9 to 9.2	save 2.2									
		9.2	TV	32.7								TV=0.4 tsf
		9.2	W2.3	32.7								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	
B26/5	1.2' Recovery; say 18.0' to 19.2' depth	3								
		T3.13	35.7		86	CU	15.2	2175		
	Silty CLAY, gray, soft consistency, highly plastic (CL-CH)	TV	35.9							TV=0.17 tsf
		W3.1	35.9							
		T3.12	35.3		86	CU	10.7	839		
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	T3.11	35.4		89	CU	15.1	676		
		TV	35.6							TV=0.24 tsf
		W3.2	35.6							

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B26/9	1.9' Recovery; say 38.0' to 39.9' depth	38.0 to 40.0	5								
		38.4	TV	40.6							TV=0.20 tsf
	Silty CLAY; gray, soft to firm consistency, highly plastic (CL)	38.4 to 38.5	W5.1	40.6							
		38.5 to 38.8	save 5.1								
		38.8	TV	39.5							TV=0.23 tsf
		38.8 to 38.9	W5.2	39.5							
		38.9 to 39.3	save 5.2								
		39.3	TV	36.0							TV=0.34 tsf
		39.3 to 39.4	W5.3	36.0							
		39.4 to 39.8	U5.1	36.6		86	U	1.6	443		
		39.4 to 39.8	L.5.1	36.6	38	20					



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_o$	$c_c$
B26/11	Silty CLAY: dark gray, firm consistency, highly plastic (CL)  Sample includes about 20% coarse to fine sand grains (subangular to subrounded in shape)	48.0 to 50.0										
		48.0 to 48.3	save 6.1									
		48.3	TV	31.0								TV=0.28 tsf
		48.3 to 48.4	W6.1	31.0								
		48.4 to 48.7	save 6.2									
		48.7	TV									TV=0.32 tsf
		48.7 to 49.0	T6.1.3	30.0		93	CU	4.6	2206			
		49.0	TV	36.3								TV=0.29 tsf
		49.0 to 49.1	W6.2	36.3								
		49.1 to 49.4	T6.1.2	36.5		86	CU	3.9	1222			
		49.4	TV	34.5								TV=0.33 tsf
		49.4 to 49.5	W6.3	34.5								
	49.5 to 49.8	T6.1.1	36.1		88	CU	3.8	896				
	49.5 to 49.8	L6.1	36.1	41	21							

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>				
B26/17	1.0' Recovery; say 78.0' to 79.0' depth  Silty CLAY, dark gray, firm to stiff consistency, highly plastic (CL)  Includes about 35% subangular to subrounded fine Gravel and coarse Sand particles	78.0 to 80.0	9										
		78.2	TV		25.1						TV=0.46		
		78.2	W9.1		25.1								
		78.2 to 78.5	U9.1	101	24.8			U	12.0	580			
		78.2 to 78.5	L9.1		24.8	36	20						
		78.5	TV		25.8						TV=0.52 tsf		
		78.5 to 78.6	W9.2		25.8								
		78.6 to 78.9	save 9.1										
		78.9	TV		25.0						TV=0.38 tsf		
		78.9 to 79.0	W9.3		25.0								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
26/28	Recovery 2.4'; say 128.0' to 130.4' depth  Silty CLAY, dark grey firm to stiff consistency, moderate to highly plastic (CL)  Bottom third of sample includes 30 to 40% fine Sand and non-plastic Silt particles occurring in thin layers (1/16" to 1/4" thick)	—									
		128.0-									
		131.0	13								
		128.0-									
		128.3	TI3.1.3	34.0		90	CU	3.4	4652		$\bar{\sigma}_c=16,704$ psf
		128.4-									
		128.8	TI3.1.2	35.6		86	CU	4.5	2442		$\bar{\sigma}_c=8352$ psf
		128.4-									
		128.8	LI3.1	35.4	39	21					
		128.8-									
		128.9	WI3.2	32.1							
		128.8-									
		128.9	TV	32.1							TV=0.60tsf
	129.7	TV	27.5							TV=0.50tsf	
	129.7-										
	129.8	WI3.3	27.5								
	129.8-										
	130.2	TI3.1.1	22.9		96	CU	15.0	4500		$\bar{\sigma}_c=4176$ psf	

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
27/2	1. 4' Recovery; say 3.5' to 4.9' depth  Silty CLAY; greyish brown, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% coarse sand and fine gravel sized particles (subrounded to subangular in shape)	3.5-5.5										
		3.6-4.0										
		4.0-4.2	W302.1	24.2		99						
		4.2	TV									TV=0.87 tsf
		4.2-4.5										
		4.5-4.8	T302.2	24.9		103	UU	8.0	2099			
		4.5-4.8	I302.1	23.1	48	24						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
27/4	1.7' Recovery; Say 8.0' to 9.7' depth	8.0 to 10.0	303								
		8.1 to 8.4	save 303.1								
		8.4 to 8.6	W303.1	31.5		88					
		8.6	TV								TV=0.66tsf
		8.6 to 8.9	U303.1	30.6		94	U	20.0	1772		@15.0% strain s=1722psf
		8.6 to 8.9	L303.1	30.4	51	23					
		8.9 to 9.2	save 303.2								
		9.2 to 9.4	W303.2	33.5		87					
		9.4	TV								TV=0.47tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
27/10	2.4' Recovery; Say 33.0' to 35.4' depth	33.0 to 35.5	306								
		33.1 to 33.4	save 306.1								
		33.4 to 33.6	W306.1	37.9	84						
	Silty CLAY, gray, firm consistency, moderately plastic (CL)	33.6	st								TV=0.3ltsf TVR=0.09tsf
		34.0 to 34.3	C306.1	38.6					1.016	.44	
		34.0 to 34.3	L306.1	37.4	41	22					
		34.0 to 34.3	SC306.1								
		34.3 to 34.6	save 306.2								
		34.6 to 34.8	W306.2	36.3	86						specific gravity=2.73
		34.8 to 35.2	save 306.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
27/14	1.9' Recovery; say 53.0' to 54.9' depth	308										
	Silty CLAY, Sandy, very dark gray, stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)  At 53.9' change to Silty CLAY, gray, firm consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	53.1-53.5 saved										
		53.6-53.7 W308.1	13.0			120						
		53.7 TV										
		54.0-54.4 saved										
		54.4-54.5 W308.2	25.9			98						
		54.5-54.7 I308.1	24.2	32	17							
		54.7 TV									TV=0.34 tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
27/17	Jar Sample	68.5-70.0	432								
	Clayey SILT, Sandy, dark gray, low plasticity (CL-ML)		S/H 432.1								See plot
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)										



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TABLE: SUMMARY OF LABORATORY TEST RESULTS

DATE: April 1974  
SHEET: \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
27/24	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.0 to 105.5 313								
		103.2 to save 103.5 313.1								
		103.5 TV								TV=0.61tsf
	Sample includes about 25% coarse to fine sand grains and fine gravel sized particles (subrounded to subangular in shape)	103.5 to 103.7 W3B.1	27.4		98					
		103.7 to save 104.1 313.2								
		104.2 to 104.5 C3B.1	33.9						0.90	.30
		104.2 to 104.5 L3B.1	31.1	43 25						
		104.2 to 104.5 SC3B.1								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
27/26	1.5' Recovery; say 113.0' to 114.5' depth  Silty CLAY, gray, soft consistency, moderate plasticity (CL) Sample includes few thin lenses/layers of Silty SAND (± 1/8" thick) comprising ± 10% of total  At 113.6' change to - Silty fine SAND, uniform fine Sand grains with about 10% non-plastic fines (SM-SP)	113.0-	---								
		115.0	314								
		113.1	TV								TV=0.16 tsf
		113.1-									
		113.5	W314.1	89							
		113.6-									
		114.4	S314.1	21.4						See plot	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
27/30	2.4' Recovery; say 129.0' to 131.4' depth; upper 0.8' possibly disturbed	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)	129.0-											
			131.5	315										
			129.1-	Saved										
			129.4											
	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)	Sample includes Silty fine Sand lenses/layers throughout comprising about 10% of total sample	129.5-											
			129.6	W315.1	84								Clay portion	
			129.9-											
			130.1	L315.1		40	21							TV=0.75tsf
			130.2	TV										
			130.2-											
			130.6	Saved										
			130.6-											
			131.1	Saved										
			131.1-											
			131.3	W315.2		24.1	99							Silty Sand and Clay portion

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
28/3	1.2' Recovery; say 5.0' to 6.2' depth		5.0-7.0	183										
	Silty CLAY, dark gray, very stiff consistency, moderate to high plasticity (CL)		5.0-5.3	saved										
			5.3-5.5	WI183.1	33.3		95							
			5.5	TV									TV=1.30 tsf	
			5.5-5.8	saved										
			5.8-6.1	UI183.1	25.3		100		U	4.0	1981			
			5.8-6.1	LI183.1	25.5	47	23							

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
28/9	Silly CLAY, dark gray, soft consistency, moderate to highly plastic (CL)	28.0-30.0								
		186								
		28.1-28.4	saved							
		28.4-28.5	WI86.1	40.0	80					
		28.5	TV							TV=0.20 tsf
		28.5-28.8	saved							
		28.8-29.1	UI86.1	38.0	84	U	7.0	425		
		28.8-29.1	LI86.1	39.2	42	20				
		29.1-29.3	WI86.2	41.4	78					
		29.3	TV							TV=0.20 tsf
		29.3-29.6	saved							

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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE: SUMMARY OF LABORATORY TEST RESULTS

PROPERTIES

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
28/15	2.1' Recovery: say 58.0' to 60.1' depth		189								
	Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)		saved								
			WI89.1	25.5		98					TV=0.38 tsf
			TV								
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)		saved								
			WI89.2	25.1		99					TV=0.43 tsf
			saved								
			TV								

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SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
28/23	2.1' Recovery, say 98.0' to 100.1' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL)  Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	98.0-100.0	193									
		98.1-98.4	saved									
		98.4-98.5	W193.1		23.0	104						
		98.5	TV									TV=0.71 tsf
		98.5-98.9	saved									
		99.2-99.3	W193.2		23.8	98						
		99.3	TV									TV=0.93 tsf
		99.3-99.6	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT.* WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
30/3	Jar Sample	6.0-7.5	433								
	Silty CLAY, dark grayish brown, high plasticity (CH)		L433.1	22.4*	55   25						

\*Note: Water content taken from unsealed jar sample



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TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub> c <sub>c</sub>	
30/6	Jar Sample Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)	— 434 W434.1	 37.7	 *						

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
30/12	Jar Sample	53.5 - 55.0	435									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subangular to subrounded in shape)  *Note: Water content taken from unsealed jar sample		W435.1	*								

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
30/15	Jar Sample	68.5-70.0	436								
	Silty CLAY, Sandy, gray moderate plasticity (CL)		S/H								See plot
	Sample includes about 25% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)		436.1								

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$e_o$	
BORING SAMPLE									
30/21	Jar Sample	—	98.5 - 100.0						
	Silty fine SAND, uniform fine Sand grains with about 15% non plastic fines (SM)	437							See plot
		S437.1							

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_0$	
30/25	Jar Sample	438	118.5 120.0							
	Silty SAND, subrounded to subangular fine to medium Sand grains, about 15% non-plastic fines (SM)	S438.1								See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
32/3	Jar Sample	—							
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)  *Note: Water content taken from unsealed jar sample	6.0-7.5							
		439							
		W499.1	20.3*						

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TABLE \_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/7	Jar Sample	23.5-25.0	440								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-GH)		W440.1	37.9*							
	*Note: Water content taken from unsealed jar sample										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/10	Jar Sample	38.5-40.0	441								
	Silty CLAY, gray, moderate to high plasticity (CL)		L441.1	44	19						



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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
32/20	Jar Sample	88.5 - 90.0	—									
	Silty CLAY, gray, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		442									
				L4421	36	17						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
33/3*	1.4' Recovery; say 8.0' to 9.4' depth	280								
	Silty CLAY, dark grey, firm to stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (sub-rounded to subangular in shape)  *Note: This sample labeled B33/2, 8'-10'6"	8.0-10.5								
		8.1-8.4	Saved							
		8.4-8.5	W280.1	30.6		92				
		8.5	TV							TV = 0.78tsf
		8.5-8.8	Saved							
		8.8	TV							TV = 0.68tsf
		8.8-9.2	L280.1	31.6	48	25				
		9.2-9.3	W280.2	33.3		89				

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IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
33/5	<p>Silly CLAY, gray, firm consistency, moderate to high plasticity (CL)</p> <p>Sample includes about 5% fine to coarse Sand grains (sub-rounded to subangular in shape)</p> <p>Note: This sample and 33/9 labeled B33/5, 38-40'6"</p>	18.0-18.5	—									
		18.2-18.5	282									
		18.5-18.6	Saved									
			W282.1	86								
			18.6	TV								TV=0.29 tsf
			18.6-19.0	L282.1	37.6	43	23					
			19.7-19.8	W282.1	36.2		84					
			19.8	TV								TV=0.32 tsf
			19.8-20.3	Saved								

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
33/7*	2.1' Recovery, say 28.0' to 30.1' depth		28.0-30.5	281								
	Silty CLAY, gray, soft to firm consistency, moderate to high plasticity (CL)		28.1-28.4	save								
			28.4-28.6	W281.1	40.3	81						
			28.6	TV								TV=0.20 tsf
			28.6-28.9	T281.11	39.0	82		CU	13.4	739		$\bar{\sigma}_c=1440$ psf
			28.9-29.3	T281.12	39.7	82		CU	4.6	966		$\bar{\sigma}_c=2880$ psf
	Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)		29.3-29.4	W281.1	37.7	83						
			29.4	TV								TV=0.26 tsf
			29.4-29.7	T281.13	38.3	84		CU	6.3	1521		$\bar{\sigma}_c=5760$ psf
	* Note: This sample labeled B33/4, 28'-30'6"		29.4-29.7	L281.1	38.7	46	22					

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IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
33/9*	2.1' Recovery; say 38.0' to 40.1' depth	38.0-40.5	283								
		38.3-38.6	Saved								
	Silty CLAY, grey, soft to firm consistency, moderate to high plasticity (CL)	38.6-38.7	W283.1	36.8		85					
		38.7	TV								TV = 0.27tsf
		38.7-									
		39.1	T283.1.1	37.4		83	CU	6.9	798		$\bar{\sigma}_c = 1728 \text{psf}$
		38.7-									
		39.1	T283.1.2	37.1		85	CU	5.5	1081		$\bar{\sigma}_c = 3456 \text{psf}$
		39.1-									
	* Note: This sample labeled B33/5, 38'-40'6"	39.5	T283.1.3	36.2		86	CU	5.2	1662		$\bar{\sigma}_c = 6912 \text{psf}$
		39.1-									
		39.5	L283.1	37.2	43	23					
		39.5-									
		39.6	W283.2	37.3		85					
		39.6	TV								TV = 0.28tsf
		39.6-									
		39.9	Saved								
		39.9	St								TV = 0.35tsf TV <sub>r</sub> = 0.09tsf

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SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
33/11*	1.9' Recovery; say 48.0' to 49.9' depth	48.0-50.5	284								
		48.1-48.4	saved								
	Silty CLAY, dark gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W284.1	45.1		76					
		48.5	TV								TV = 0.30 tsf
		48.5-48.8	saved								
	Sample contains about 10% fine to coarse SAND grains (subrounded to subangular in shape)	48.8-49.0	L284.1	41.8	48	25					
		49.0-49.3	saved								
	* Note: This sample labeled B33/6 48'-50'6"	49.3-49.4	W284.2	34.5		81					

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	C <sub>c</sub>
B38/3	Silty CLAY; dark grayish brown mottled with blue gray, highly plastic; hard consistency with a blocky structure.  Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape) (CL-GH)	8.0 to 10.0										
		17										
		W17.1	8.5	25.3								
		TV	8.5	25.3								TV=2.4 tsf
		L17.1	8.6 to 8.9	24.9	49	24						
		U17.1	8.6 to 8.9	24.3		102	U	3.0	212.3			
		UR17.1	8.6 to 8.9	24.2		103	UR	7.0	761			see plot
		H17.1	8.6 to 8.9									
		W17.2	9.0	26.3								
		ST	9.0	26.3								TV=2.1 tsf TV <sub>P</sub> =1.1
		save	9.1 to 9.5									
		17.1										
	W17.3	9.6	27.3									
	TV	9.9	27.3								TV-2.1 tsf	

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>			
B38/4	1.8' Recovery; say 13.5' to 15.3' depth; upper 0.2' disturbed	13.5 to 15.5	18												
		13.8 to 14.2	save 18.1												
		14.2	W18.1	28.6											
	Silty CLAY; dark grayish brown, highly plastic, stiff to very stiff consistency.	14.2	TV	28.6							TV=1.1 tsf				
		14.3 to 14.6	UI8.1	28.5		96	U	4.0	1506						
	Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	14.3 to 14.6	L18.1	28.5	46	22									
	(CL-CH)	14.6	H18.1								see plot				
		14.6	C18.1	29.0						.770	specific gravity=2.71				
		14.6	SG18.1												
		14.7	W18.2	28.8											
		14.7	TV	28.8							TV=0.9 t sf				
		14.8 to 15.2	save 18.2												



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IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	TEST TYPE %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	cc	
B38/6	Recovery 0.7'; say 23.5' to 24.2' depth	23.5 to 25.5 23.7 to 24.1	— 19 19.1							
	Silty CLAY, dark gray, highly plastic (CL-CH)	24.1	W19.1							
	Note: Entire sample greatly disturbed									

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	e <sub>0</sub>	
B38/8	0.8' Recovery; say 33.5' to to 34.3' depth	20								
		W20.1	35.7							
		L20.1	36.3	48   20						
	Silty CLAY, dark gray, highly plastic (CL-CH)									
	Note: Entire sample greatly disturbed									

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	
B38/12	1.8' Recovery; say 53.5' to 55.3'	22								
		W22.1	33.7							
		TV	33.7							IV=0.36 tsf
		save								
		22.1								
		W22.2	33.1							
		TV	33.1							IV=0.41 tsf
		54.1 to 54.4								
		U22.1	33.4		90	U	5.0	985		
		54.1 to 54.4								
		54.4	32.9	44	21					
		54.1 to 54.4								See plot
		H22.1								
		54.5	33.5							
		W22.3	33.5							
		54.5	33.5							
		5.45 to 54.9								IV=0.44 tsf
		22.2								

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B38/16	0.6' Recovery; say 73.5' to 74.1' depth	73.5 to 75.5	24									
		73.6	TV	43.5							TV=0.27 tsf	
	Silty CLAY, dark gray, highly plastic, soft to firm consistency (CH)	73.6	W24.1	43.5								
		73.7 to 74.0	U24.1	41.3	79	U	4.8	704				
		73.7 to 74.0	L24.1	41.3	55	24						
		73.7 to 74.0	H24.1								See plot	
		74.0 to 74.1	C24.1	36.0					.935	.33	specific gravity=2.72	
		74.0 to 74.1	SC24.1									
		74.0 to 74.1	W24.2	40.7								

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TABLE

IDENTIFICATION

TEST NO.

PROPERTIES

DRY UNIT WEIGHT (PCF)

TEST TYPE

STRENGTH

MAX. SHEAR STRESS (PSF)

CONSOLIDATION

OTHER TESTS AND REMARKS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	NAT. WATER CONTENT (%)	ATTERBERG LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	STRENGTH	CONSOLIDATION		OTHER TESTS AND REMARKS
					w <sub>L</sub>	w <sub>p</sub>				e <sub>0</sub>	c <sub>c</sub>	
B38/18	1.5' Recovery; say 83.5' to 85.0' depth  Silty CLAY; gravelly dark gray, moderate plasticity, stiff consistency (CL)  Includes ±10 % medium to coarse Sand and ±15% sub-angular to subrounded Gravel size particles (1/4" to 1" size)	83.5 to 85.5	25									
		83.7	TV	14.4								TV=0.78 tsf
		83.7	W25.1	14.4								
		83.7 to 84.1	save 25.1									
		84.1	TV	17.8								TV=0.82 tsf
		84.1	W25.2	17.8								
		84.2 to 84.6	save 25.2									
		84.6	St	22.8								
		84.6	W25.3	22.8								
		84.6 to 85.0	U25.1	22.2			104	U	14.0	603		
		84.6 to 85.0	U25.1	22.2			105	Ur	17.4	548		
		84.6 to 85.0	L25.1	22.2	33	19						
	84.6 to 85.0	H25.1									See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B38/24	1.9' Recovery; say 113.0' to 114.9' depth  Silty CLAY; gray, moderately to highly plastic, soft to firm consistency (CL-CH) Includes about 5% fine Sand size particles		113.0 to 115.0	26									
			113.3	TV			34.5						TV=0.32 tsf
			113.3	W26.1			34.5						
			113.3 to 113.7	save 26.1									
			113.7	TV			32.2						TV=0.48 tsf
			113.7	W26.2			32.2						
			113.7 to 114.1	save 26.2									
			114.1	TV			33.1						TV=0.44 tsf
			114.1	W26.3			33.1						
			114.1 to 114.6	U26.1			31.9		92	U	6.0	500	
			114.1 to 114.6	L26.1			31.9	45 25					
			114.1 to 114.6	H26.1									See plot
			114.6	TV									TV=0.52 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS										
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_0$		CC									
B38/30	Jar Sample Silty SAND; subrounded to subangular fine to coarse Sand grains, about 30% non-plastic fines (SM)	—																See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/2	1.1' Recovery; say 4.0' to 5.1' depth	4.0 to 6.0	28								
		4.1	W28.1	33.6							
	Silty CLAY; olive gray mottled with yellowish brown, highly plastic, very stiff consistency throughout	4.1	TV	33.6							TV=1.0 tsf
		4.1 to 4.4	save 28.1								
		4.4	W28.2	31.1							
	Soil includes 2 to 5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	4.4	TV	31.1							TV=1.1 tsf
		4.5 to 4.8	U28.1	29.4		94	U	5.0	1024		
		4.5 to 4.8	Up28.1	29.4		95	Up	9.0	974		
	(CH)	4.5 to 4.8	L28.1	29.4	63	28					
		4.5 to 4.8	H28.1								See plot
		4.8	W28.3	39.5							
		4.8	ST	39.5							TV=1.4 tsf TV <sub>R</sub> =1.0 tsf
		4.9 to 5.1	save 28.2								



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B41/5	1.2' Recovery: say 10.0' to 11.2' depth	10.0 to 12.0	29								
		10.3	TV	29.0							TV=1.25 tsf
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	10.3	W29.1	29.0							
		10.3 to 10.7	save 29.1								
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	10.7	TV	27.5							TV=1.43 tsf
		10.7 to 10.8	W29.2	27.5							
		10.8 to 11.0	C29.1	29.5						.799	.23
		10.8 to 11.0	I29.1	29.5	46	23					
		11.1 to 11.2	W29.3	28.9							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B 41/7	Silty CLAY, dark gray, highly plastic; soft to firm consistency throughout (CL-CH)	20.0 to 22.0	30									
		20.5	W30.1	39.7								
		20.5	TV	39.7								TV=0.28 tsf
		20.6 to 20.9	U30.1	39.2			83	3.0	338			
		20.6 to 20.9	L30.1	39.2	47	24						
		20.6 to 20.9	H30.1									See plot
		21.0 to 21.1	C30.1	38.1						1.055	.34	Specific gravity=2.70
		21.0 to 21.1	SG30.1									
		21.1	W30.2	39.4								TV=0.30 tsf
		21.1	TV	39.4								
		21.1 to 21.5	save 30.1									
		21.5	W30.3	38.2								
		21.5	TV	38.2								TV=0.30 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/9	1.7' Recovery; say 30.0' to 31.7' depth		30.0 to 32.0	31								TV=0.30 tsf
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)		30.4 to 30.5	TV	36.6							
	Includes about 5% subangular to subrounded coarse Sand particles		30.4 to 30.5	W31.1	36.6							
	Note: Upper 0.4' of sample disturbed		30.5 to 30.8	save 31.1								
			30.8	TV	35.6							TV=0.28 tsf
			30.8 to 30.9	W31.2	35.6							
			30.9 to 31.2	U31.1	36.9	86	U	15.0	696			
			30.9 to 31.2	L31.1	36.9	45	21					
			31.2	TV	36.1							TV=0.32 tsf
			31.2 to 31.3	W31.3	36.1							
			31.3 to 31.6	save 31.2								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

SHEET \_\_\_ OF \_\_\_

TABLE \_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>		
B41/11	1.1' Recovery; say 40.0' to 41.1' depth  Silty CLAY, sandy, very dark gray, about 35% fine to coarse Sand, ±10% sub-angular to subrounded fine Gravel size particles, fines of low plasticity  (CL-SC)	40.0 to 42.0	32									
		40.2	TV		16.8							TV=0.30 tsf
		40.2	W32.1		16.8							
		40.2 to 40.6	save 32.1									
		40.6	ST		16.5							TV=0.34 tsf TV=0.28 tsf
		40.6	W32.2		16.5							
		40.6 to 41.0	U32.1		16.0		118	U 20.0	884			@15.0% strain s = 648 psf
		40.6 to 41.0	L32.1		16.0	20	12					
		40.6 to 41.0	S/H 32.1									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET 1 OF 1	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$	
B41/13	1.5' Recovery; say 52.0' to 53.5' depth; upper 0.3' disturbed	52.0 to 54.0	33										
		52.3	TV	47.5							TV=0.21 tsf		
		52.3 to 52.4	W33.1	47.5									
	Silty CLAY, gray, soft to firm consistency, highly plastic (CL-CH)	52.4 to 52.7	save 33.1			76							
		52.7	TV	45.5							TV=0.23 tsf		
		52.7 to 52.8	W33.2	45.5									
		53.0 to 53.2	C33.1	46.5					1.235	.35			
		53.0 to 53.2	L33.1	46.5	52	25					TV=0.27 tsf TVR=0.16 tsf		
		53.2	ST	44.1									
		53.2 to 53.3	W33.3	44.1									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 10, 1971  
SHEET 1 OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc	
B41/17	1.0' Recovery; say 72.5' to 73.5' depth; upper 0.1' is 'wash' disturbed sample (?)		72.5 to 74.5	35								
	Silty CLAY, sandy, dark gray, soft to firm consistency; sand occurs primarily as pockets of Silty fine Sand (±30% of sample) (CL-SC)		72.8	TV	17.1							TV=0.15 tsf
			72.9 to 73.2	T35.0	19.6		105	UU	14.0	454		
			72.9 to 73.2	L35.1	19.6	25	15					
			72.9 to 73.2	S/H 35.1								See plot
	Also 5% to 10% Gravel size particles throughout		73.3	C35.1	26.7					697	.21	Specific Gravity=2.68
			73.3	SG35.1								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B41/23	Silty CLAY, dark gray, moderate plasticity, firm consistency (CL); includes 10% to 15% fine to coarse Sand and fine Gravel size particles	101.0 to 103.0										
		101.3	TV	23.2								TV=0.46 tsf
		101.3	W37.1	23.2								
		101.3 to 101.8	save 37.1									
		101.8	TV	25.4								TV=0.62 tsf
		101.8	W37.2	25.4								
		101.9 to 102.3	U37.1	26.4		99	U	10.0	534			
		101.9 to 102.3	L37.1	26.4	34	20						
		101.9 to 102.3	HB7.1									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B41/25	1.7 Recovery; say 112.0' to 113.7' depth	112.0 to 114.0	38								
		112.3	TV	20.9							TV=0.65 tsf
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	112.3 to 112.4	W38.1	20.9							
		112.4 to 112.7	save 38.1								
		112.7	TV	24.0							TV=0.60 tsf
	Includes about 35% subrounded to subangular fine Gravel and coarse Sand particles	112.7 to 112.8	W38.2	24.0							
		113.0 to 113.2	C38.1	24.2					.642	.18	
		113.0 to 113.2	L38.1	24.2	29	19	104				
		113.2	TV	19.4							TV=1.0 tsf
		113.2 to 113.3	W38.3	19.4							
		113.3 to 113.7	save 38.2								



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/29	1.1' Recovery; say 130.0' to 131.1' depth	130.0 to 132.0	40								
	Clayey SAND, gravelly, dark gray; about 35% fine to coarse Sand particles and ±10% sub-rounded Gravel size particles; fines of low plasticity (GC-SC)	130.2	TV	14.7							TV=0.50 tsf
		130.2	W40.1	14.7							
		130.2 to 130.6	save								
		130.6	40.1								
		130.6	W40.2	10.9							
		130.6 to 130.9	U40.1	13.8		124	8.0	1749			
		130.6 to 130.9	L40.1	13.8	25	17					
		130.6 to 130.9	S/H								See plot
		130.9 to 131.1	40.1								
		130.9 to 131.1	C40.1	11.3					.370	.09	Specific Gravity = 2.69
		130.9 to 131.1	SC40.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B48/2	0.9' Recovery; say 3.0' to 3.9' depth	3.0 to 5.0	198									
		3.1	TV	32.4							TV=0.68 tsf	
	Silty CLAY, dark grayish brown mottled light gray, stiff to very stiff consistency, highly plastic (CH)  Sample includes 5-10% medium to coarse Sand grains (subrounded to sub-angular in shape)	3.1 to 3.2	W198.1	32.4								
		3.2 to 3.5	L198.1	27.3	63	24						
		3.2 to 3.5	U198.1	27.3			97	U	3.2	1466		TV=1.18 tsf
			3.5	TV								
			3.5 to 3.9	save 198.1								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$	$C_c$
B48/4	Silty CLAY; dark grayish brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	8.0 to 10.0										
		8.5 to 8.7										See plot
		8.7	TV	27.5								TV=1.23 tsf
		8.7 to 8.8	W199.1	27.5								
		8.8 to 9.1	save 199.1			97						
		9.1	TV	28.9								TV=1.23 tsf
		9.1 to 9.2	W199.2	28.9								
		9.2 to 9.5	save 199.2									
		9.5	TV									TV=1.43 tsf
		9.5 to 9.9	save 199.3									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	cc
B48/6	Recovery 2.3'; say 18.0' to 20.3' depth; upper 0.4' disturbed	18.0 to 20.0	200									
	<p>Silty CLAY; dark gray, firm consistency, highly plastic (CL-GH)</p> <p>Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)</p>	18.3	TV	34.4							TV=0.26 tsf	
		18.3 to 18.4	W200.1		34.4							
		18.4 to 18.7	save 200.1									
		18.7	TV									TV=0.49 tsf
		18.7 to 19.1	T200.1.1		32.8		90	CU	6.5	928		
		18.7 to 19.1	L200.1		34.3	47 25						
		19.1	TV		32.7							
		19.1 to 19.2	W200.2		32.7							
		19.2 to 19.5	T200.1.2		34.2		89	CU	4.5	1304		
		19.5	TV		34.1							TV=0.38 tsf
		19.5 to 19.6	W200.3		34.1							
		19.6 to 19.9	T200.1.3		35.6		88	CU	10.6	1579		

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/10	1.5' Recovery; say 38.0' to 39.5' depth; Upper 1.0' disturbed	38.0 to 40.0	202								
		38.4	TV	40.4							TV = 0.10 tsf
		38.4 to 38.5	W202.1	40.4							
		39.0	TV								TV = 0.15 tsf
		39.0 to 39.2	save 202.1								
		39.2 to 39.4	C202.1	38.8					1.027	.33	
		39.2 to 39.4	L202.1	38.8	47	24					
		39.2 to 39.4	SC202.1								
		39.2 to 39.4	Y202.1	38.8			82				Specific Gravity=2.73
		39.4	TV	40.0							TV = 0.25 tsf
		39.4 to 39.5	W202.2	40.0							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE

SUMMARY OF LABORATORY TEST RESULTS

DATE

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/14	2.0' Recovery; say 60.0' to 62.6' depth. Upper 0.4' depth disturbed	— 204								
		60.0 to 62.6								
		60.4 to 60.7								
		204.1								
		TV	26.0							TV = 0.34 tsf
		60.7								
		60.7 to 60.8								
		W204.1	26.0							
		60.8 to 61.1	26.3	34	16					
		L204.1								
		UU								
		60.8 to 61.1	26.3		99	UU	15.0	746		TV = 0.42 tsf
		204.1								
		TV	25.8							
		61.1 to 61.2	25.8							
		W204.2								
		61.2 to 61.5	25.2		100	U	15.0	745		
		U204.1								
		TV	25.3							TV = 0.38 tsf
		61.5 to 61.6	25.3							
		W204.3								
		61.6 to 61.9								
		204.2								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1971									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B48/18	1.5' Recovery: say 78.0' to 79.5' depth	78.0 to 80.0	206								
		78.1	TV	25.6							TV=0.56 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)  Sample includes about 15% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	78.1 to 78.2	W206.1	25.6							
		78.2 to 78.5	save 206.1								
		78.5 to 78.6	L206.1		25.6	36	18				
		78.6	TV		25.6						TV=0.70 tsf
		78.6 to 78.7	W206.2		25.6						
		78.7 to 79.0	save 206.2				100				
		79.0	TV		26.0						TV=0.73 tsf
		79.0 to 79.1	W206.3		26.0						
		79.1 to 79.4	save 206.3								
		79.4	TV								TV=0.63 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
B48/20	1. 3' Recovery; say 88.0' to 89.3' depth	88.0 to 90.0	207							
	88.2 to 88.3	88.2 to 88.3	W207.1	44.51						
	Silty CLAY, dark gray, very soft consistency, highly plastic (CL-CH)	88.9 to 89.0	W207.2	30.2						
		89.0 to 89.2	L207.1	28.2	41	25				
	Sample includes ±10% coarse Sand or fine Gravel size particles (subrounded to subangular)									
	Note: Entire sample much disturbed									



PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974
IDENTIFICATION												SHEET OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
B48/22	2.0' Recovery; say 98.0' to 100.0' depth, upper 0.4' disturbed	98.0 to 100.0	208									
		98.4	TV	27.5								TV=0.45 tsf
		98.4 to 98.5	W208.1	27.5								
	Silty CLAY; dark gray, firm to stiff consistency, moderately to highly plastic (CL)	98.5 to 98.9	T208.1	27.6		97	CU	11.4	4410			TV=0.54 tsf
		98.9	TV									
		98.9 to 99.2	T208.1	26.8		99	CU	11.5	2017			
	Sample includes 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	98.9 to 99.2	L208.1	26.8	36	19						
		99.2	TV	26.1								
		99.2 to 99.3	W208.2	26.1								
		99.3 to 99.6	T208.1	26.0		96	CU	11.8	2880			TV=0.52 tsf
		99.6	TV	24.0								
		99.6 to 99.7	W208.3	24.0								
		99.7 to save	208.1									
		100.0										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
48/24	Silty CLAY; dark gray, soft to medium consistency, moderately plastic (CL)  Sample contains ±20% coarse to fine Sand and fine Gravel particles (subrounded to sub-angular in shape)  Note: Entire sample thoroughly disturbed	108.0 to 110.0	209								
		108.6	TV		25.6						TV=0.26 tsf
		108.6 to 108.7	W209.1		25.6						
		108.7 to 109.1	save 209.1								
		109.1	TV		23.0						TV=0.31 tsf
		109.1 to 109.2	W209.2		23.0						
		109.6 to 110.0	save 209.2								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET \_\_\_\_\_ OF \_\_\_\_\_ DATE \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B48/26	SOIL DESCRIPTION 2.1' Recovery; say 118.0' to 120.1' depth Silty CLAY, gray, medium to stiff consistency, moderate to highly plastic (CL) Sample includes about 5% fine to coarse Sand sized particles (subrounded to subangular in shape)	118.0 to 120.5	210	TV	33.2					TV = 0.43 tsf	
		118.1	TV	33.2							
		118.1 to 118.2	W210.1	33.2							
		118.2 to save	210.1								
		118.5	210.1								
		118.5 to save	210.2								
		118.9	210.2								
		118.9	TV	32.8							TV = 0.51 tsf
		118.9 to 119.0	W210.2	32.8							
		119.0 to 119.4	W210.1	32.9		91					
		119.0 to 119.4	S/H 210.1								See Plot
		119.4	TV	33.0							TV = 0.60 tsf
		119.4 to 119.5	W210.3	33.0							
		119.5 to save	210.3								
		119.9	210.3								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS													
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> / w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc											
B49/2	2.1' Recovery; say 6.0' to 8.1' depth	132																					
		TV	29.3																				TV=1.6 tsf
		W132.1	29.3																				
		TV	28.8																				TV=1.4 tsf
		W132.2	28.8																				
		Y132.1	28.0		95																		
		TV																					TV=1.85 tsf
		L132.1	26.2	50	17																		
		M132.1	28.1																				γ <sub>dry</sub> Max=116 W <sub>opt</sub> =16.5

Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)

Sample includes about 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/3	Silty CLAY; dark grayish brown, firm to stiff consistency, highly plastic (CL-CH)	13.0 to 15.0	133								
		13.2	TV	29.0							TV=0.73tsf
		13.2 to 13.3	MB3.1	29.0							
		13.3 to 13.7	save 133.1			92					
		13.7	TV								TV=0.53tsf
		13.7 to 14.0	CB3.1	33.3					.823	.26	
		13.7 to 14.0	133.1	31.8	47	23					
		13.7 to 14.0	SG33.1								
		14.0	TV	31.3							TV=0.42tsf
		14.0 to 14.1	MB3.2	31.3							
		14.1 to 14.4	save 133.2								
		14.4	TV	30.4							TV=0.45tsf
		14.4 to 14.5	MB3.3	30.4							
		14.5 to 14.9	save 133.3								

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE: SUMMARY OF LABORATORY TEST RESULTS										DATE Jan. 1974	
IDENTIFICATION										SHEET	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/4	1.9' Recovery; say 23.0 to 24.9' depth	23.0 to 25.0	134								
		23.1	TV	32.2							TV=0.34 tsf
		23.1 to 23.2	W134.1	32.2							
	Silty CLAY; grayish brown, firm consistency, moderately to highly plastic (CL)	23.2 to 23.5	save 134.1								
		23.5	TV								TV=0.37 tsf
		23.5 to 23.9	save 134.2								
		23.9	TV	34.0							TV=0.41 tsf
		23.9 to 24.0	W134.2	34.0							
		24.0 to 24.3	U134.1	34.0	90		U	6.0	1028		
		24.0 to 24.3	L134.1	32.8	42	22					
		24.4	TV								TV=0.42 tsf
		24.4 to 24.8	save 134.3								
		24.8	TV	34.0							TV=0.37 tsf
		24.8 to 24.9	W134.3	34.0							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
49/6	1.9' Recovery; say 43.0' to 44.9' depth	43.0-45.0	136							
	Silty CLAY; dark greyish brown, firm consistency, highly plastic (CH-CL)	43.1-43.2	WI36.1	39.9						
		43.5	TV							TV=0.42tsf
		43.8-43.9	WI36.2	35.2						
	Sample includes ±5% coarse Sand grains (subrounded to subangular in shape)	43.9-44.2	TI36.12	46.3		75	CU	2.9	1356	σ <sub>c</sub> =3744psf
		43.9-44.2	LI36.1	45.5	53	22				
	Lower portions of sample appear to be "sensitive", i.e. became soft and sticky on remolding	44.2-44.3	TV	45.7						TV=0.37tsf
		44.2-44.3	WI36.3	45.7						
		44.3-44.7	TI36.11	43.5		78	CU	5.8	921	σ <sub>c</sub> =1872psf
		44.3-44.7	TI36.13	44.9		77	CU	4.7	1928	σ <sub>c</sub> =7488psf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
B49/7	1.9' Recovery; say 53.0' to 54.6' depth  Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand particles (subrounded to subangular in shape)	53.0 to 55.0	—									
		53.2	TV	25.9								TV = 0.34 tsf
		53.2 to 53.3	W	137.1	25.7							
		53.3 to 53.7	save	137.1								
		53.7 to 54.1	$\gamma$	137.1	25.0		97					
		54.1 to 54.4	S/H	137.1								See Plot
		54.4	TV	TV	25.9							TV = 0.65 tsf
		54.4 to 54.6	W	137.2	25.9							
		54.6 to 54.9	save	137.1								



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/9	1.5' Recovery; say 73.0' to 74.5' depth	73.0 to 75.0	139								
		73.1	TV	25.7							TV=0.68 tsf
	Silty CLAY, sandy; dark gray, stiff consistency, moderately plastic (CL)	73.1 to 73.2	W139.1	25.7							
		73.2 to 73.5	save 139.1			99					
		73.5	TV	24.1							TV=0.75 tsf
	Sample includes ±30% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	73.5 to 73.6	W139.2	24.1							
		73.6 to 73.9	save 139.2								
		73.9	TV								TV=0.80 tsf
		73.9 to 74.3	U139.1	25.6		100		U	20.0	2513	@ 15% strain s=2254 psf
		73.9 to 74.3	L139.1	18.2	33	22					
		74.3	TV	22.8							TV=0.76 tsf
		74.3 to 74.4	W139.3	22.8							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____ SHEET _____ OF _____								
IDENTIFICATION		TEST NO.	PROPERTIES	STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	cc	
B49/11	1.5' Recovery; say 93.0' to 94.5' depth	93.0 to 95.0								
		93.1	26.6							TV = 0.62 tsf
	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	93.1 to 93.2	26.6							
		93.2 to 93.5			98					
		93.5	26.2							TV = 0.70 tsf
		93.5 to 93.6		26.2						
		93.8 to 94.0		28.6				0.70	0.20	
	Sample includes ±20% coarse Sand and fine Gravel size particles (subangular to subrounded in shape)	93.8 to 94.0	24.3	37	22					
		93.8 to 94.0								
		94.0	27.0							Specific Gravity=2.68
		94.0 to 94.1		27.0						TV = 0.68 tsf
		94.1 to 94.5								

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B49/13	1.6' Recovery; say 113.0' to 114.6' depth  Silty CLAY: sandy, dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 25% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	113.0 to 115.0	—								
		113.1 TV									
		113.1 to 113.2									
		113.2 to 113.5									
		113.5 TV									
		113.5 to 113.8									
		113.8 TV									
		113.8 to 113.9									
		113.9 to 114.2									
		113.9 to 114.2									
		114.2 TV									
		114.2 to 114.3									
		114.3 to 114.6									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
50/4	SOIL DESCRIPTION	DEPTH (FEET)	—									
	1.5' Recovery; say 18.0' to 19.5' depth - disturbed	18.0 to 20.0	84									
	_____	18.7 to 19.0	saved									
	Silty CLAY, gray, moderate to high plasticity (CL)	19.0 to 19.1	W84.1	34.6		84						
	Note: Entire sample disturbed	19.1	TV									TV = 0.13tsf
		19.1 to 19.4	L84.1	34.6	45	20						

PROJECT: BELLE RIVER PLANT UNITS I & II													FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS													DATE July 1974	
IDENTIFICATION													SHEET ___ OF ___	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>			
				w <sub>L</sub>	w <sub>P</sub>									
50/5	Jar Sample	23.5- 25.0	453											
	Silty CLAY, gray, high plasticity (CH-CL)		L453.1	39.8	52	22								

\*Note: Water content taken from unsealed jar sample

PROJECT: GREENWOOD ENERGY CENTER UNITS 2 & 3

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/6	1.9' Recovery; say 28.0' to 29.9' depth		28.0 to 30.0	85								
			28.1 to 28.3	V85.1	35.2			VS	443			St = 2.1
	Silty CLAY, gray, firm consistency, moderate plasticity (CL)		28.3 to 28.5	k85.1	37.2		84			1.002		hydrometer - see plot
			28.5 to 28.6	W85.1	35.2							
			28.6 to 28.9	T85.1	33.0		88	CU	13.1	842		σ <sub>c</sub> = 1440 psf
			28.6 to 28.9	T85.12	33.1		90	CU	14.5	1050		σ <sub>c</sub> = 2880 psf
			29.0	W85.2	34.3							TV = 0.28 tsf
			29.1 to 29.4	L85.2	34.3	39	18					
	Note: Below 29.4' depth sample becomes softer, more sensitive on remolding		29.1 to 29.4	T85.13	34.3		86	CU	14.0	1718		σ <sub>c</sub> = 5760 psf
			29.4 to 29.7	U85.1	45.8		75	U	2.4	197		
			29.4 to 29.7	L85.1	45.7	51	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE SHEET OF										
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BDRING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$		
50/8	2.0' Recovery	38.0 to 40.0										
	Silty CLAY, gray, firm consistency, highly plastic (CH)	38.1 to 38.4	46.2		74	UU	4.0	643			$\sigma_c = 3456$ psf	
		38.4 to 38.5	47.6		71							
		38.5										
		38.5 to 38.9		51.6						1.383	0.55	TV = 0.39 tsf
		38.9 to 39.2		51.3		70	U	2.0	550			Specific Gravity = 2.75
		38.9 to 39.2		51.2	55 23							
		39.2 to 39.3		48.6		71						
		39.3 to 39.6										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
50/10	1.8' Recovery; say 48.0' to 49.8' depth	48.0 to 50.0 48.1 to 48.4	87									
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)  Sample includes 20 to 25% fine to coarse Sand particles and 10 to 15% subrounded to subangular Gravel size particles to 1/2 inch maximum	48.5	W87.1	25.9	96						St = 1.1	
		48.6 to 48.8	k87.1	26.9	97				.730		sieve/hydrometer see plot	
		48.9	W87.2	24.2	97							
		48.9	TV	24.2							TV = 0.41 tsf	
		49.0 to 49.3	U87.1	23.6	99	U	15.0	527				
		49.0 to 49.3	L87.1	23.4	36	16						
		49.3 to 49.6	T87.0.1	23.2	100	UU	15.0	721			σ <sub>c</sub> = 4320	



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/12	1.9' Recovery; say 58.0' to 59.9' depth	58.0 to 60.0	88								
		58.1 to 58.5	saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.5	W88.1	23.8		99					
		58.5	TV	23.8							TV = 0.53 tsf
		58.6 to 58.9	U88.1	25.8		99	U	9.0	1008		
	Sample includes about 20% fine to coarse Sand particles and about 10% subrounded to subangular Gravel particles to 1/2 inch maximum size	58.6 to 58.9	L88.1	24.2	39	18					
		59.0	W88.2	24.8		97					
		59.0	TV	24.8							TV = 0.54 tsf
		59.1 to 59.4	T88.0.1	24.3		101	UU	10.0	1132		σ <sub>c</sub> = 4608 psf
		59.4 to 59.8	saved								

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL / wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/14	1.9' Recovery; say 68.0' to 69.9' depth	89									
		saved									
	Silty CLAY, sandy; gray, firm to stiff consistency, moderately plastic (CL)	W89.1	27.3		93						
		TV	27.3								IV = 0.48 tsf
		saved									
	Sample includes 20 to 25% fine to coarse Sand particles and subrounded to subangular Gravel size particles	L89.1	27.9	43	18						
		W89.2	29.5		94						
		TV	29.5								IV = 0.54 tsf
		saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
50/16	1.9' Recovery; say 78.0' to 79.9' depth	78.0 to 80.0	90								
		78.2 to 78.5	saved								
		78.5	W90.1	27.7		95					
		78.5	IV	27.7							TV = 0.56 tsf
		78.6 to 78.9	U90.1	27.9		95					
		78.6 to 78.9	L90.1	27.9	39	20	U	10.0	1271		
		79.0	W90.2	27.8		92					
		79.0	IV	27.8							TV = 0.63 tsf
		79.1 to 79.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE								
		SHEET OF								
BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
50/18	1.9' Recovery, say 88.0' to 89.9' depth; upper 0.3' disturbed	91								
		T9L1.1	28.0		97	CU	14.6	1923		$\bar{\sigma}_c = 3456$ psf
		W9L1.1	27.6		95					
		TV	27.6							TV = 0.59 tsf
	Silty CLAY, sandy, gray, firm to stiff consistency, moderate plasticity (CL)	T9L1.2	27.6		97	CU	11.7	2590		$\bar{\sigma}_c = 6912$ psf
		L9L1.1	29.5	39	23					
		W9L1.2	27.0		95					
	Sample includes 20 to 25% fine to coarse Sand size particles and about 10% subrounded to subangular Gravel size particles	TV	27.0							TV = 0.69 tsf
		T9L1.3	27.6		96	CU	11.8	3989		$\bar{\sigma}_c = 13,824$ psf
		saved								

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET \_\_\_\_\_ OF \_\_\_\_\_ DATE \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/3	2.3' Recovery; say 20.0' to 22.3' depth	108								
		saved								
	Silty CLAY; gray, very stiff consistency, moderate to high plasticity (CL - CH)	W108.1	31.1		92					TV = 1.2 tsf
		TV								
		U108.1	30.3		92	U	4.0	2737		
		U108.1	30.9	49	20					
		W108.2	30.4		92					
		T								
		U108.0.1	31.1		92	UU	8.0	1591		σ <sub>c</sub> = 2016 psf
		W108.3	31.4		91					
		TV								TV = 0.7 tsf
		saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
52/4	2.5' Recovery; say 28.0' to 30.5' depth	28.0 to 30.5	109								
	28.2 to 28.5 saved										
	Silty CLAY, gray, firm consistency, of moderate plasticity (CL)	28.5 to 28.6	W109.1	32.5		89					
		28.6 to 28.9	U109.1	31.8		94	U	9.0	489		
	Sample includes lenses or layers of non-plastic sandy silt (about 15% of total sample)	28.6 to 28.9	L109.1	29.4	35	18					
		28.9 to 29.2	V109.1	30.5			VS		568		St = 2.1
		29.2 to 29.3	W109.2	30.5		89			277		
	Note change in physical properties of soil below 29.5' depth - is Silty CLAY (CL-CH)	29.3 to 29.4									
		29.4 to 29.7	saved								
		29.8 to 29.9	W109.3	41.3		79					
		29.9 to 30.2	C109.1	40.5						1.013	0.45
		30.2 to 30.2	SG109.1								Specific Gravity = 2.70
		29.9 to 30.2	L109.2	40.5	49	20					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE	SHEET OF							
IDENTIFICATION		TEST NO.								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
52/6	2.4' Recovery; say 48.0' to 50.4' depth	48.0 to 50.5								
		48.1 to 48.4	22.1		101	CU	10.2	15159		$\bar{\sigma}_c = 2160$ psf
	SILT, dark gray, firm consistency, non-plastic to slightly plastic (ML)	48.4	22.9		99					
		48.4	22.9							TV = 0.27 tsf
		48.5 to 48.8	22.7		99	CU	15.0	17508		$\bar{\sigma}_c = 4320$ psf
		48.8 to 49.1	22.1		104	CU	13.3	27777		$\bar{\sigma}_c = 8640$ psf
	Becomes more plastic with depth,	49.1	21.5		103					
		49.1	21.5							TV = 0.35 tsf
	At ±49.5' depth-change to Silty CLAY, sandy; dark gray, stiff consistency; moderately plastic (CL)	49.2 to 49.5	25.2		100	U	2.5	317		
		49.2 to 49.5	25.2	22	18					
	Includes 15 to 20% fine to coarse Sand size particles with less than 5% fine Gravel size pieces to 1/4 inch maximum size	49.5	23.6		101					
		49.5	23.6							TV = 0.73 tsf
		49.6 to 49.8	23.6			VS		2160		
			23.6			FVS		1950		St = 1.1

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE \_\_\_\_\_

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OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/7	2.4' Recovery; say 58.0' to 60.4' depth	112								
		saved								
	Silty CLAY; sandy, very dark gray, very stiff consistency, moderate plasticity (CL)	W1121	16.0		112					
		TV								TV = 1.10 tsf
		U112.1	15.1					0.411		sieve/hydro-meter see plot
	Sample includes about 30 - 35% fine to coarse subrounded to rounded Sand grains; also about 10 - 15% Gravel pieces (subrounded to subangular, 1-1/2" max. size)	U1121	13.0		116	U	6.0	1799		
		L1121	12.9	23	14					
		saved								
		W1122	14.6		115					
		TV								TV = 1.20 tsf



BDRING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	$c_c$	
52/8	1.5' Recovery; say 68.0' to 69.5' depth		68.0 to 69.5'	113								
			68.2	W113.1	14.5		111					
			68.2	TV								TV = 1.0 tsf
			68.2 to 68.5	U113.1	14.2		115	U	13.0	1677		
			68.2 to 68.5	L113.1	13.8	24	14					
			68.6	W113.2	14.3							
			68.6	TV								TV = 1.2 tsf
			69.0 to 69.4	T								
			69.4	113.0.1	16.2		111	UU	15.0	1891		$\sigma_c = 5184$ psf
			69.4	W113.3	19.4							
			69.4	TV								TV = 0.8 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/9	2.5' Recovery; say 78.0' to 80.5' depth		78.0 to 80.5'	114								
	Silty CLAY; gray, stiff consistency, moderately plastic (CL)		78.2 to 78.5'	saved								
			78.5 to 78.6'	W114.1	23.3		105					
			78.6 to 78.6'	TV								TV = 0.5 tsf
			78.6 to 78.9'	T								
			78.6 to 78.9'	114.0.1	21.8		105	UU	14.0	1157		σ <sub>c</sub> = 5760 psf
			78.9 to 79.0'	L114.1	23.5	35 18						
			79.0 to 79.0'	W114.2	22.1		106					
			79.0 to 79.0'	TV								TV = 0.8 tsf
			79.0 to 79.3'	saved								
			79.3 to 79.7'	saved								
			79.7 to 79.8'	W114.3	21.9		103					
			79.8 to 79.8'	TV								TV = 0.95 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/10	2.5' Recovery; say 88.0' to 90.5' depth		88.0 to 90.5	115								
			88.2 to 88.5	saved								
	Silty CLAY; sandy, gray, stiff consistency, moderate plasticity (CL)		88.5	W115.1	26.7		97					
			88.6 to 88.9	U115.1	27.2		97	U	8.0	2435		
			88.6 to 88.9	L115.1	26.4	39	18					
	Sample includes 25 to 30% fine to coarse Sand size particles and subrounded to subangular Gravel particles		89.0	W115.2	26.4		96					
			89.1 to 89.4	V115.1	26.4			VS		1662		
			89.5 to 89.8	saved				rVS		1529		St = 1.1
			89.8	W115.3	27.0		95					
			89.9 to 90.3	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/12	2.5' Recovery; say 108.0' to 110.5' depth	108.0 - 110.5	117								
		108.1 - 108.5	saved								
	Silty CLAY; gray, medium to stiff consistency, moderate to high plasticity (CL)	108.5	W117.1	29.7		83					TV = 0.55 tsf
		108.5	TV								
		108.5 - 108.8	saved								
	Sample includes about 10% fine to coarse subrounded to rounded Sand grains	108.8 - 109.1	saved								
		109.1	W117.2	35.1							
		109.1	TV								TV = 0.35 tsf
		109.3 - 109.6'	T 117.0.1	35.8		87		UU	3.0	1596	$\sigma_c = 7632$ psf
		109.3 - 109.6	L117.1	36.2	46	22					
		109.6 - 109.9	saved								
		110.0	W117.3	35.5		87					
		110.0	TV								TV = 0.51 tsf

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> DATE <u>July 1974</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS SHEET <u>      </u> OF <u>      </u>													
IDENTIFICATION			TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>		
52/12	Jar Sample	115.5	567										
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)		L567.1	34	18								

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
53/3	1.7' Recovery; say 19.0' to 20.7' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL-CH)	19.0 to 21.0	96									
		19.2 to 19.5	saved									
		19.5	W96.1	32.0	87							
		19.5	TV									
		19.6 to 19.9	U96.1	31.8	88	U	5.0	1156				TV = 0.58 tsf
		19.6 to 19.9	L96.1	31.7	49	20						
		20.0	W96.2	32.1	87							
		20.0	TV									
		20.1 to 20.4	T96.0.1	32.2	91	UU	8.9	1425				TV = 0.65 tsf c <sub>c</sub> = 2405 psf

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
53/4	1.8' Recovery; say 29.0' to 30.8' depth	29.0 to 31.0 29.1 to 29.4	— 97 saved								
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	29.5	W97.1	42.5	77						
		29.5	TV	42.5							
		29.6 to									
		29.9	U97.1	40.7	80	U	5.0	1006			TV = 0.53 tsf
		29.6 to									
		29.9	L97.1	41.1	49	22					
		30.0	W97.2	38.8	91						
		30.0	TV	38.8							TV = 0.47 tsf
		30.1 to									
		30.4	T97.0.1	34.2	88	UU	2.4	973			σ <sub>c</sub> = 3024 psf
		30.4 to									
		30.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET DATE OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
53/5	1.7' Recovery; say 39.0' to 40.7' depth  Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes 20 to 30% coarse to fine Sand and fine Gravel size particles (subrounded to subangular in shape)		39.0 to 41.0	98										
			39.1 to 39.4	saved										
			39.4 to 39.5	W98.1	26.3	97								
			39.5	TV	26.3								TV = 0.49 tsf	
			39.5 to 39.8	C98.1	30.9									
			39.5 to 39.8	CG98.1									0.872	0.35
			39.5 to 39.8	L98.1	30.5	39	20							Specific Gravity = 2.72
			39.5 to 39.8	k98.1	30.2								0.732	Sieve Hydro-meter seepbt
			39.8 to 40.1	saved										
			40.1 to 40.2	W98.2	29.6	92								
			40.2	TV	29.6									TV = 0.34 tsf
			40.2 to 40.6	saved										



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
53/6	1.5' Recovery; say 49.0' to 50.5' depth	49.0-51.0	99									
	Silty CLAY, grey, soft to firm consistency, moderately plastic (CL)  Sample includes 15 to 20% fine to coarse Sand size particles and subrounded to subangular gravel size pieces  Sample slightly disturbed throughout	49.1	W99.1	36.2		89						
		49.2	U99.1	27.9		94	14.9	561				
		49.2	L99.1	27.8	43	18						
		49.6	W99.2	27.3		94						
		49.7	V99.1	27.3					540			
		50.0	V99.1	27.3					340			
		50.0-50.3	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
53/9	2.5' Recovery; say 79.0' to 81.5' depth	79.0 to 81.5	101									
	Silty CLAY; mottled gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel size particles	79.4	W10L1	27.6		97						
		79.5 to 79.8	V10L1	27.9		95	VS	1371				
		80.1 to 80.4	U01.1	27.9		95	rVS	1025			St = 1.3	
		80.1 to 80.4	L10L1	28.0	39	21	U	6.0	1275			
		80.5 to 80.8	saved									
		80.9 to 81.2	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II														FILE NO. 1255	
TABLE: SUMMARY OF LABORATORY TEST RESULTS														DATE	
IDENTIFICATION														SHEET	OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS			
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$					
53/12	2.5' Recovery; say 109.0' to 111.5' depth	109.0 - 111.5'	104												
		109.2 -	saved												
		109.5 -													
	Silty CLAY; dark gray, stiff consistency, moderate plasticity (CL)	109.7 -	W1041	20.0		108							TV = 0.68 tsf		
		109.7	TV												
		109.7 -													
	Sample includes about 15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	110.0 -	11041	20.5	29	15									
		110.0 -	saved												
		110.4 -													
		110.4 -	W1042	20.1		107							TV = 0.85 tsf		
		110.5	TV												
		110.5 -	saved												
		110.8													

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	
53/12	Jar Sample	568								
	Silty CLAY, grey, moderate plasticity (CL)	L568.1		36 19						
	Sample includes about 15% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
54/4	1.8' Recovery, say 53.0' to 54.8' depth	397									
		T397.1.1	23.6		102	CU	10.7	488			$\bar{\sigma}_c = 2160$ psf
	Clayey SILT, dark gray, firm consistency, slightly plastic to non-plastic (CL - ML)	T397.0.1	24.4		99	UU	15.0	533			$\bar{\sigma}_c = 4320$ psf
		L397.1	22.8	21	17						
	@± 53.5' depth, change to Silty CLAY sandy very dark gray, firm to stiff consistency, moderately plastic (CL)	W397.1	25.7								
		TV									TV = 0.36 tsf
		T397.1.4	22.6		101	CU	14.9	1430			$\bar{\sigma}_e = 2160$ psf
	Sample includes few lenses/ layers of clayey SILT; also about 15% fine to coarse sand size particles and subrounded to subangular gravel size pieces	T397.1.2	23.2		102	CU	14.8	2022			$\bar{\sigma}_c = 4320$ psf
		T397.1.3	23.2		102	CU	13.8	3867			$\bar{\sigma}_c = 8640$ psf
		W397.2	23.3								
		T397.1.5	24.0		100	CU	10.6	2805			$\bar{\sigma}_c = 6480$ psf
		L397.2	24.0	31	18						
		TV									TV = 0.47 tsf

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> / w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
54/5	2.0' Recovery	—									
			58.5 to 60.5								
			58.6 to 58.9								
			58.9	25.2	93						
			58.9	25.2							TV = 0.44 tsf
			59.0 to 59.3	25.4							
			59.3 to 59.6	25.8	99	UU	15.0	768			σ <sub>c</sub> = 4464 psf
			59.3 to 59.6	26.2	99	U	11.0	557			
			59.6	27.5	17						
			59.6	27.5							
			59.7 to 60.0	27.5	92						
			60.0 to 60.3			VS		1100			TV = 0.55 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/6	2.0' Recovery	63.0 to 65.0	399									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 25% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	63.1 to 63.4	T399.0.1	26.1		98	UU	13.0	796		$\bar{\sigma}_c = 5040$ psf	
		63.4 to 63.5	W399.1	24.3		92						
		63.5	TV	24.3							TV = 0.46 tsf	
		63.5 to 63.8	C399.1	26.0						0.696	0.24	
		63.5 to 63.8	SG399.1									Specific Gravity = 2.71 Sieve/hydrometer See plot
		63.5 to 63.8	k399.1	27.2		98				.724		
		63.5 to 63.8	L399.1	26.0	36	18						
		63.8 to 64.1	T399.1.1	26.4		98	CU	12.0	1362			$\bar{\sigma}_c = 2448$ psf
		64.1 to 64.2	W399.2	25.0		98						TV = 0.52 tsf
		64.2	TV	25.0								TV = 0.52 tsf
		64.2 to 64.5	T399.1.2	25.2		98	CU	12.1	2008			$\bar{\sigma}_c = 4896$ psf
		64.5 to 64.8	T399.1.3	25.8		98	CU	11.6	2929			$\bar{\sigma}_c = 2792$ psf
	64.8	TV									TV = 0.48 tsf	

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$
54/7	2.0' Recovery	400									
	Silty CLAY, sandy, gray, stiff consistency, moderately plastic (CL)  Sample includes 30 to 40% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	68.0 to 70.0									
		68.1 to 68.4	V400.1	26.3			VS		1300		
		68.4 to 68.5	W400.1	26.3		96	VS		840		St = 1.5
		68.5 to 68.5	TV	26.3							TV = 0.58 tsf
		68.5 to 68.8	U400.1	25.9		98	U	8.9	788		
		68.8 to 68.8	L400.1	26.2	37	18					
		68.8 to 69.1	P400.0.1	25.9		98	UU	12.0	1148		$\sigma_c = 5112$ psf
		69.1 to 69.2	W400.2	22.5		102					
		69.2 to 69.2	TV	22.5							TV = 0.54 tsf
		69.2 to 69.8	saved								
	69.8	TV								TV = 0.56 tsf	



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/8	2.0' Recovery	73.0 to 75.0	401								
	Silty CLAY, gray, stiff consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains and silty fine Sand lenses	73.0 to 73.3	saved								
		73.3 to 73.4	W40L.1	81							
		73.4	TV								TV = 0.54 tsf
		73.4 to 73.7	saved								
		73.7 to 74.0	C40L.1						0.982	0.41	
		73.7 to 74.0	SC40L.1								Specific Gravity=2.73
		73.7 to 74.0	L40L.1		31.6	45	21				
		73.7 to 74.0	K40L.1		31.6						see hydrometer see plot
		74.0 to 74.1	W40L.2		30.0						
		74.1	TV		30.0						TV = 0.50 tsf
	74.1 to 74.7	saved									

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u>		FILE NO. <u>1255</u>									
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS		DATE <u>July 1974</u>									
IDENTIFICATION		SHEET <u>      </u> OF <u>      </u>									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
58/2	Jar Sample Silty CLAY, dark greyish brown, moderate to high plasticity (CL)	6.0'	562		42    19						
			L562.1								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET      OF     

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	TEST TYPE	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	Cc	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)							
58/6	Jar Sample	25.0'							
	Silty CLAY, grey, moderate to high plasticity (CL-CH)		48	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 FILE NO. 1255  
 DATE July 1974  
 SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
58/10	Jar Sample	45.0'	564									
	Silty CLAY, Sandy, low to moderate plasticity (CL) Sample includes about 35% fine Sand grains		1564.1		27	19						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
58/13	Jar Sample Silty CLAY, Sandy, gray, moderately plastic (CL) Sample includes about 45% fine to coarse Sand grains (Subrounded to subangular in shape)	565	60.0'								
		L565.1		34	17						

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
58/17	Jar Sample Silty CLAY, dark gray, moderate to high plasticity (CL)	80.0'	566		43    20						

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS											
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>									
B59/3	1.8' Recovery; say 18.0' to 19.8' depth	76	18.0 to 20.0																		
		saved	18.1 to 18.4																		
		W76.1	18.4 to 18.5	32.1		83															
		TV	18.5	32.1																	TV = 0.58 tsf
		V76.1	18.5 to 18.8	32.8				VS		1260											
		U76.1	18.8 to 19.1	32.8		90		U	6.9	1056											
		L76.1	18.8 to 19.1	32.7	48	20															
		W76.1	19.1 to 19.3	31.6		90															
		TV	19.3	31.6																	TV = 0.56 tsf
		saved	19.3 to 19.7																		

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FILE NO. 1255

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
59/5	1.9' Recovery; say 38.0' to 39.9' depth; upper 0.5' disturbed	78								
		W78.1	26.7		94					
		TV	26.7							TV = 0.46 tsf
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)	U78.1	26.2		99	U	14.9	626		
		L78.1	26.2	38	18					
		saved								
	Sample includes 20 to 25% fine to coarse Sand and fine Gravel size particles, subrounded to subangular in shape	W78.2	25.6		96					
		TV	25.6							TV = 0.47 tsf
		V78.1	25.6			VS		637		



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
59/7	1.5' Recovery; say 58.0' to 59.5' depth	58.0 to 60.0	80								
		58.1 to 58.4	saved								
		58.4 to 58.6	W80.1	25.0		100					
	Silty CLAY, sandy, dark gray, firm to stiff consistency, moderately plastic (CL)	58.6	TV	25.0							TV = 0.49 tsf
		58.6 to 58.9	U80.1	26.3		98		U 8.0	835		
	Sample includes 20 to 25% coarse to fine Sand and fine Gravel size particles	58.6 to 58.9	L80.1	24.5	36	18					
	(subrounded to subangular in shape)	58.9 to 59.0	W80.2	24.1		102					
		59.0	TV	24.1							TV = 0.51 tsf
		59.0 to 59.3	V80.1	24.1				VS	734		
								rVS	(969)		

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
59/9	Jar Sample	75.0	569								
	Clayey SAND, subrounded to subangular fine to coarse Sand and fine Gravel size particles with 35 to 40% low to moderately plastic fines (SC)		L569.1	22	14						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST $\epsilon$ TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
59/11	Jar Sample	95.0	570								
	Silly CLAY, grey, moderate plasticity (CL)		L570.1	37	19						
	Sample includes about 10% fine to coarse Sand size particles (subrounded to sub-angular in shape)										

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
B60/1	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	5.0 to 6.5	70		50 20					
			L70.1	27.3						
			H70.1							See plot
B60/2	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	10.0 to 12.5	71		44 19					
			L71.1	28.0						
			H71.1							See plot
B60/3	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	19.0 to 20.5	72		43 19					
			L72.1	30.3						
			H72.1							See plot
B60/5	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	27.0 to 28.5	73		48 20					
			L73.1	34.3						
			H73.1							See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/2	Silty CLAY; grayish brown, stiff to very stiff consistency, highly plastic (CL-CH)		8.0 to 10.0	42								
			8.0 to 8.3	save 42.1								
			8.3	TV	28.3							TV=1.1tsf
			8.3 to 8.4	W42.1	28.3							
			8.4 to 8.7	save 42.2								
			8.7 to 9.0	T42.1.3	28.9		96	CU	5.3	1336		
			8.7 to 9.0	T42.1.3	28.9		98	CU <sub>p</sub>	11.6	1751		Remolded sample
			9.0	TV	29.0							TV=0.88tsf
			9.0 to 9.1	W42.2	29.0							
			9.1 to 9.4	T42.1.2	29.3		95	CU	5.2	882		Remolded sample
			9.1 to 9.4	T42.1.2	29.3		99	CU <sub>p</sub>	10.8	1244		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		94	CU	3.6	530		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		96	CU <sub>p</sub>	15.0	875		Remolded sample
			9.7	TV	29.7							TV=1.1tsf
			9.7 to 9.8	W42.3	29.7							
			9.8 to 10.0	C42.1	30.0							Specific Gravity=2.71
			9.8 to 10.0	L42.1	29.7	53	26					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/3	2.0 Recovery; say 17.0' to 19.0' depth. Upper 0.5' disturbed	17.0 to 19.0	43								
		17.5	TV	29.9							TV=0.27 tsf
		17.5 to 17.6	W43.1	29.9							
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)	17.6 to 18.0	U43.1	24.3		105	U	20.0	1143		@15.0% strain s=1029 psf
		17.6 to 18.0	Ur43.1	24.3		103	Ur	20.0	1053		@15.0% strain s=879 psf
	Sample includes about 10% fine to coarse Sand grains (sub-rounded to subangular in shape)	17.6 to 18.0	L43.1	24.3	39	21					
		18.0	TV	19.2							TV=0.87 tsf
		18.0 to 18.1	W43.2	19.2							
		18.1 to 18.3	L43.1	26.1							
		18.1 to 18.3	H43.1								See plot
		18.6	TV	19.5							TV=0.46 tsf
		18.6 to 18.7	W43.3	19.5							
		18.7 to 19.0	save 43.1								

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FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
B60/4	1.8' Recovery; say 21.0' to 22.8' depth  Silty CLAY, grayish brown, stiff consistency, highly plastic (CL-CH)  Includes about 5% coarse Sand and fine Gravel particles	21.0 to 23.0	44										
		21.1	TV	31.8									TV=0.52 tsf
		21.1 to 21.2	W44.1		31.8								
		21.2 to 21.5	T44.1.3		31.0		94	CU	3.8	2658			
		21.8	TV		30.9								TV=0.71 tsf
		21.8 to 21.9	W44.2		30.9								
		21.9 to 22.3	T44.1.1		30.4		94	CU	6.7	1389			
		21.9 to 22.3	I44.1		30.4	43	17						
		22.3	TV		29.9								TV=0.68 tsf
		22.3 to 22.4	W44.3		29.9								
		22.4 to 22.8	T44.1.4		30.6		95	CU	7.6	1588			

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
B60/5	1.9' Recovery; say 25.0' to 26.9' depth  Silty CLAY; gray, moderate to high plasticity, firm to stiff consistency (CH-CL)	25.0 to 27.0	45									
		25.1	TV		34.8							TV=0.53 tsf
		25.1	W45.1		34.8							
		25.2 to 25.6	save 45.1									
		25.6	TV		35.5							TV=0.55 tsf
		25.6	W45.2		35.5							
		25.7 to 26.1	U45.1		36.8	86	U	4.0	1002			
		25.7 to 26.1	save 45.1		36.8	51	22					
		26.2	TV		36.3							
		26.2	W45.3		36.3							
		26.2 to 26.5	save 45.2									
		26.5	TV									TV=0.50 tsf



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
60/6	Silty CLAY, gray, firm to stiff consistency, high plasticity (CL-CH)	30.0-	—										
		32.0	46										
		30.1-	Saved										
		30.4	W46.1	40.4	81								
		30.4	TV										TV=0.47tsf
		30.5-	U46.1	35.0	88		U	3.7	1577				
		30.5-	L46.1	34.7	48	25							
		31.0	V46.1	34.0			VS		1000				
		31.3	TV				rVS		550				TV=0.40tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$	$c_c$
B60/8	1.7' Recovery; say 40.0' to 41.7' depth  Silty CLAY; dark gray, moderate to high plasticity, firm consistency (CL-GH)  Includes about 10% Silty fine Sand occurring as pockets or lenses 1/8" to 3/8" long	40.0 to 42.0										
		40.1	TV	23.6								TV=0.46 tsf
		40.1 to 40.2	W48.1	23.6								
		40.2 to 40.6	save 48.1									
		40.6	TV	33.7								TV=0.40 tsf
		40.6	W48.2	33.7								
		40.7 to 41.1	U48.1	39.7		83	U	3.0	338			
		40.7 to 41.1	L48.1	39.7	47	25						
		41.1	TV	41.4								TV=0.40 tsf
		41.1	W48.3	41.4								
		41.1 to 41.5	save 48.2									
		41.5	TV									TV=0.33 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET      OF     

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/9	1.9' Recovery; say 45.0' to 46.9' depth	45.0 to 47.0	49								
		45.1	TV	25.9							TV=0.45tsf
	Silty CLAY, sandy, dark gray, firm to stiff consistency, highly plastic (CL) includes about 30% subangular to subrounded fine Gravel to coarse Sand size particles	45.1 to 45.2	W49.1	25.9							
		45.2 to 45.5	T49.1.3	26.0	102	CU	8.5	2510			
		45.5 to 45.8	T49.1.2	27.0	98	CU	8.2	1499			TV=0.50tsf
		45.8	TV	25.4							
		45.8 to 45.9	W49.2	25.4							
		45.9 to 46.3	T49.1.1	26.6	99	CU	12.9	1267			
		45.9 to 46.3	L49.1	24.8	38	16					
		46.3	TV	25.3							TV=0.52tsf
		46.3 to 46.4	W49.3	25.3							
		46.4 to 46.7	save 49.1								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
60/10	1.7' Recovery; say 50.0' to 51.7' depth; upper 0.5' disturbed	—								
		50								
		W50.1	29.3							
		saved								
	Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)	TV								TV=0.36 tsf
		U50.1	25.5		100	U	15.2	1255		@20% strain s=1367 psf
		L50.1	25.7	34	16					
	Sample includes about 10% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	W50.2	25.9		97					
		TV								TV=0.42 tsf
		V50.1				VS		1950		
						rVS		1050		
	Few thin (± 1/16" thick) lenses / layers of SILT, grey, non-plastic (ML) appear throughout comprising 5% of total sample									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE March 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B60/11	1.8' Recovery; say 55.0' to 56.8' depth	55.0 to 57.0	51								
		55.1	TV	25.9							TV=0.33 tsf
	Silty CLAY, dark gray, moderate plasticity, firm to stiff consistency (CL)	55.1 to 55.2	W51.1	25.9							
		55.2 to 55.5	save 51.1								
		55.5	TV	24.8							TV=0.63 tsf
		55.5 to 55.9	U51.1	24.8		103	U	24.0	1407		@15.0% strain s=1299 psf
		55.5 to 55.9	J <sub>r</sub> 51.1	24.8		103	U <sub>r</sub>	20.0	1002		@15.0% strain s=817 psf
		55.5 to 55.9	L51.1	24.8	33	18					
		56.0	TV	25.9							TV=0.50 tsf
		56.0	W51.2	25.9							
		56.1 to 56.4	K51.1	25.5							
		56.1 to 56.4	S/H 51.1								See plot
		56.4	TV	25.9							TV=0.46 tsf
		56.4	W51.3	25.9							
		56.4 to 56.7	save 51.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B60/12	0.5' Recovery; say 60.0' to 60.5' depth	52									
		W52.2	28.9								
	Silty CLAY, dark gray, moderate plasticity (CL) Entire sample disturbed	W52.1	27.9								
		60.2 to 60.4	152.1	27.9	36	18					

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B60/13	1.9' Recovery; say 67.0' to 68.9' depth	67.0 to 69.0	53									
		67.1	TV	24.7								TV=0.63 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	67.1 to 67.2	W53.1	24.7								
	Sample includes zones of Silty CLAY, gravelly, stiff to very stiff consistency, moderately plastic (CL) and Clayey GRAVEL, sandy, slightly plastic (GC)	67.2 to 67.5	T53.1.4	15.5		114	CU	12.9	4613			
		67.2 to 67.5	T53.1.5	21.0		104	CU	11.9	3178			TV=0.95 tsf
		67.5	TV	16.4								
		67.5 to 67.6	W53.2	16.4								
		67.6 to 67.9	T53.1.3	19.7		104	CU	15.0	4060			TV=0.48tsf
		67.9	TV									
		67.9 to 68.3	L53.1	29.4	40	19						
		68.3 to 68.6	T53.1.1	23.6		104	CU	15.0	1945			
		68.3 to 68.6	T53.1.2	31.9		91	CU	6.2	1723			TV=0.50 tsf
		68.6	TV									
		68.6 to 68.7	W53.3	33.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$			
B60/14	2.2' Recovery; say 74.0' to 76.2' depth	74.0 to 76.5	54												
		74.4	TV	25.9							TV=0.54tsf				
	Silty CLAY, dark gray, moderately to highly plastic, medium consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	74.4	W54.1	25.9											
		74.5 to 75.0	save 54.1												
		75.0	TV	26.8								TV=0.70tsf			
		75.0	W54.2	26.8											
		75.1 to 75.6	U54.1	26.9	97			U	5.0	652					
		75.1 to 75.6	L54.1	26.9	40	20									
		75.6	TV	26.0								TV=0.70tsf			
		75.6	W54.3	26.0											
		75.6 to 76.0	save 54.2												
		76.0	TV									TV=0.63tsf			



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TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B60/16	2.4' Recovery; say 84.0' to 86.4' depth	84.0 to 86.5	56.0									
	Silty CLAY, dark gray, moderate to high plasticity, firm consistency (CL)  Includes about 20% fine to coarse sand particles and ±15% subangular to subrounded Gravel particles	84.2	TV	27.4							TV=0.62 tsf	
		84.2	W56.1		27.4							
		84.2 to 84.6	save 56.1									
		84.6	TV		26.7							TV=0.73 tsf
		84.6	W56.2		26.7							
		84.7 to 85.1	save 56.2									
		85.2 to 85.4	C56.1		27.9					.744	.27	
		85.2 to 85.4	L56.1		26.9	40	19					Specific Gravity=2.73
		85.2 to 85.4	SC56.1									TV=0.65 tsf
		85.6	TV		26.1							
	85.6	W56.3		26.1								
	85.6 to 86.1	k56.1		29.1								
	85.6 to 86.1	S/H 56.1									See plot	
	86.1	TV									TV=0.65 tsf	

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		c <sub>c</sub>
B60/19	2.5' Recovery; say 99.0' to 101.5' depth	99.0 to 101.5									
		99.5	27.6							TV=0.61 tsf	
	Silty CLAY; dark gray, highly plastic, firm to stiff consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	99.5	27.6								
		99.5 to 99.9									
		99.9		26.9							TV=0.80 tsf
		99.9		26.9							
		100.0 to 100.4		27.1		101	U	7.0			
		100.0 to 100.4		27.1	38 20						
		100.4		26.8							TV=0.80 tsf
		100.4		26.8							
		100.5 to 100.9									
		100.9									TV=0.66 tsf
	100.9										
	100.9 to 101.4										

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
B60/23	2.3' Recovery; say 119.0' to 121.3' depth	119.0 to 121.5	63								
		119.6	TV	32.9							TV=0.35 tsf
	Silty CLAY, gray mottled reddish brown, low plasticity, soft consistency; includes about 40% fine to coarse Sand grains (subrounded to subangular) (CL-ML) At 120.0' change to Clayey SAND about 10% hard, subrounded to subangular Gravel particles, about 15% plastic and non-plastic fines (SC)	119.6	W63.1	32.9							
		120.0	U63.1	15.4	115	U	6.0	335			
		119.6 to 120.0	L63.1	15.4	17	11					
		120.0	TV	12.9							TV=0.10 test performed on sand lens
		120.0	W63.2	12.9							
		120.1 to 120.5	save 63.1								
		120.5	TV	17.2							TV=0.21 tsf
		120.5	W63.3	17.2							
		120.5 to 121.0	save 63.2								

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IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
101/2	Silty CLAY, olive brown very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard, subrounded to rounded gravel size particles	8.0 to 10.0	349									
		8.1 to 8.7	save 349.1									sample used for T466.1, 2, 3
		8.7 to 8.9	W349.1	27.7	94							
		8.9 to 9.2	U349.1	27.8	96			U	2.4	1828		
		8.9 to 9.2	L349.1	27.8	50	22						
		9.2	TV									
		9.2 to 10.0	save 349.2									TV=1.8tsf sample used for T466.1, 2, 3

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/4	2.3' Recovery; Say 19.0' to 21.3' depth	19.0 to 21.5	351								
		19.0 to 19.3	save 351.1								
		19.3 to 19.5	W351.1	33.3		89					
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	19.5	TV								TV=0.48tsf
		19.5 to 19.9	save 351.2								
		19.9 to 20.2	U351.1	35.8		86	U	6.0	1014		
		19.9 to 20.2	L351.1	35.8	49	24					
		20.2 to 20.4	W351.2	35.0		88					
		20.4	TV								TV=0.38tsf
		20.4 to 20.8	save 351.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS W <sub>L</sub> W <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub> c <sub>c</sub>	
101/7	2.1' Recovery; Say 34.0' to 36.1' depth	34.0 to 36.5								
		34.1 to save								
		34.4								
		34.4 to 34.6	39.9		81					
	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL-CH)	34.6								
		34.6 to 34.9								TV=0.27tsf
		34.9 to 35.2								
		35.2	40.0		81	U	2.4	796		
		34.9 to 35.2	37.8	46 24						
		35.2 to 35.4	38.6		83					
		35.4								TV=0.34tsf
		35.4 to 35.7								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/10	2.4' Recovery; Say 49.0' to 51.4' depth	49.0 to 51.6	357								
		49.1 to 49.4	save 357.1								
		49.4 to 49.6	W357.1	33.0		88					
	Silty CLAY; dark gray, firm consistency, moderately plastic (CL)	49.6	TV								TV=0.32tsf
		46.6 to 49.9	save 357.2								
	Sample includes about 20% coarse to fine sand grains (subrounded to subangular in shape)	50.1 to 50.4	U357.1	32.8		90					
		50.1 to 50.4	U357.1	31.0	40	22					
		50.4	TV								TV=0.44tsf
		50.6 to 50.8	W357.2	28.8		93					
		50.8	TV								TV=0.30tsf
		50.8 to 51.2	save 357.3								

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/13	2.4' Recovery; say 64.0' to 66.4' depth	64.0 to 66.5	360								
		64.6 to save									
		64.9	360.1								
	Silty CLAY; sandy, gray, stiff consistency, moderately plastic (CL)	64.9	TV								TV=0.49tsf
		64.9 to 65.1	W360.1	26.3	97						
		65.2 to 65.6	UB60.1	26.6	97						@15.0%strain s=1337 psf
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	65.2 to 65.6	360.1	26.6	39 19			U 20.0	1430		
		65.6 to 65.8	W360.2	26.2	96						
		65.8	TV								TV=0.52tsf
		65.8 to 66.1	save								
		66.1	360.2								



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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE      SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)								
101/15	1.0' Recovery; Say 74.0' to 75.0' depth	74.0 to 76.5								
		74.1 to 74.4								
		74.4 to 74.6	24.5	99						
	Silty CLAY; sandy, dark gray, stiff consistency, moderately plastic (CL)	74.6								TV=0.69tsf
		74.6 to 74.9	22.8	105		UU	17.0	1098		@15.0% strain s=1054 psf
	Sample includes about 30% coarse sand and fine gravel size particles (subrounded to subangular in shape)	74.6 to 74.9	22.8	36	21					

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
101/17	2.3' Recovery; Say 84.0' to 86.3' depth	—									
		84.0 to 86.5									
		84.1 to save									
		84.4 to 364.1									
		84.4 to 364.1									
		84.6 to W364.1	23.9		98						
	Silty CLAY; sandy, dark gray, stiff consistency. moderately plastic (CL)	TV									TV=0.60tsf
		84.6 to save									
		84.9 to 364.2									
	Sample includes about 30% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	UB364.1	25.2		97	U	20.0	2072			@15.0% strain s=1923 psf
		85.2 to 85.5									
		85.2 to 364.1		37	19						
		85.5 to 85.7	25.2		99						
		85.5 to 364.2	26.2								TV=0.57tsf
		85.7 to TV									
		85.7 to save									
		86.1 to 364.3									

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IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
101/19	1.3' Recovery; say 94.0' to 95.3' depth; upper 0.9' disturbed (Wash?)	94.0 to 96.5	366								
		94.9	TV								TV=0.36tsf @15.0%strain s=548 psf
		94.9 to 95.3	366.0.1			100		20.0	572		
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	94.9 to 95.3	1366.1			36	20				
	Sample includes about 15% coarse sand and fine gravel size particles (subrounded to subangular in shape)										

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE April 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
101/23	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 10% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	119.0 to 121.5	370									
		119.1 to 119.4	370.1									
		119.4 to 119.5	W370.1	91								
		119.5 to 119.8	TV									TV=0.42 tsf
		119.8 to 120.2	U370.0.1	85					UU	8.0	721	
		120.2 to 120.4	L370.1		44	22						
		120.4 to 120.7	W370.2	88								
		120.7 to 121.1	TV									TV=0.55tsf
			120.4 to 120.7	370.3								
			120.7 to 121.1	370.4								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE April 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	C <sub>c</sub>
105/1	Silty CLAY; olive brown and grayish brown, very stiff to hard consistency, highly plastic (CH)  Sample includes about 5% hard, rounded gravel sized particles	4.0 to 6.0									
		373									
		4.2 to 4.5	save 373.1								
		4.5 to 4.7	W373.1	23.4	100						
		4.7 to 5.0	save 373.2								
		5.0	TV								TV=2.00tsf
		5.1 to 5.4	C373.1	23.6					.642	.10	
		5.1 to 5.4	L373.1	23.6	53 24						
		5.1 to 5.4	SC373.1								specific gravity=2.72
		5.4 to 5.6	W373.2	24.2	101						
		5.6 to 5.9	save 373.3								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/2	<p>Silty CLAY, olive brown and greyish brown, very stiff consistency, moderate to highly plastic (CL)</p> <p>Sample includes about 5% hard subrounded gravel particles to 3/4" max. size</p> <p>Note: Saved material used as part of MC466.1 and T466.1.1, 2, 3 test series</p>	9.0-11.0	—									
		9.1-9.4	T374.14	27.7		98	CU	5.8	1189			$\bar{\sigma}_c = 864 \text{ psf}$
		9.4-9.7	L374.1	27.6	46	24						
		9.7-9.9	W374.1	26.1		100						
		9.9-10.2	T374.1.1	26.3		97	CU	3.0	1273			$\bar{\sigma}_c = 576 \text{ psf}$
		10.2	TV									TV-1.1tsf
		10.2-10.6	T374.1.2	26.4		99	CU	4.4	1227			$\bar{\sigma}_c = 1152 \text{ psf}$
		10.6-10.9	T374.1.3	26.9		96	CU	10.5	2191			$\bar{\sigma}_c = 2304 \text{ psf}$

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		cc <sup>*</sup>
105/3	Silty CLAY, grey, medium consistency, moderately plastic (CL)  Sample includes about 5% fine to coarse Sand grain (subrounded to subangular in shape)	—	20.0-22.0									
		375	20.1-20.4									
		Saved	20.4-20.6	36.0		85						
		W375.1	20.6									TV-0.39tsf
		TV	20.6-20.9									
		Saved	20.9-21.2									
		L375.1	21.2-21.4	33.4	42	20						
		W375.2	21.4	33.3		86						TV=0.41tsf
		TV	21.4-21.7									
		Saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July, 1974  
 SHEET      OF

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1971

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/4	SOIL DESCRIPTION		30.0- 32.0	—								
	1.1' Recovery; say 30.0' to 31.1' depth		30.7- 31.0	376								
	Silty CLAY, grey, moderately plastic (CL)			Saved								
	Note: Entire Sample much disturbed.											



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/5	2.2' Recovery; say 40.0' to 42.2' depth	40.0-42.5	377								
		40.1-40.4	T377.1A	39.2		84	CU	7.6	1902		$\bar{\sigma}_c = 7200$ psf
		40.4	TV								TV=0.35 tsf
		40.4-									
		40.6	W377.1	35.7							
		40.6-41.0	T377.1I	35.9		84	CU	5.9	1068		$\bar{\sigma}_c = 1800$ psf
		40.6-									
		41.0	L377.1	35.9	44	21					
		41.0-41.3	T377.1J	35.9		85	CU	3.1	1376		$\bar{\sigma}_c = 3600$ psf
		41.3-									
		41.5	W377.2	34.9		86					
		41.5	TV								TV=0.37 tsf
		41.5-41.8	T377.1K	35.1		85	CU	3.8	1830		$\bar{\sigma}_c = 7200$ psf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
105/6	1.7' Recovery; say 50.0' to 51.7' depth	378								
	Silty CLAY, grey, medium consistency, highly plastic (CH)	50.0-52.5								
		50.0-50.3	Saved							
		50.3-50.5	W378.1	42.8	76					
		50.5	TV							TV=0.35tsf
		50.5-50.8	Saved							
		50.8-51.1	L378.2	46.2	57	25				
		51.1-51.3	W378.2	41.2	78					
		51.3	TV							TV=0.33tsf

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
IDENTIFICATION										SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
105/8	2.3' Recovery; say 70.0' to 72.3' depth	70.0-72.5	380								
		70.1-70.4	Saved								
	Silty CLAY, dark grey, stiff consistency, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	70.4-70.6	W380.1	23.9		100					
		70.6	TV								TV=0.65tsf
		70.6-70.9	Saved								
		70.9-71.2	C380.1	23.7					0.625	.21	
		70.9-71.2	L380.1	23.8	37	19					
		70.9-71.2	SG 380.1								Specific Gravity-2.70
		71.3-71.5	W380.2	23.5			100				
		71.5	TV								TV=0.70tsf
		71.5-71.8	Saved								
		71.8-72.2	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_o$	$c_c$		
105/10	1.6' Recovery; say 90.0' to 91.6' depth	90.0-92.0	382									
		90.5-90.6	W382.1	31.0		84						
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)	90.6	TV								TV=0.17tsf	
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	90.6-90.9	L382.1	29.4	34	19						
		90.9-91.2	Saved									
		91.2-91.3	W382.2	30.3			88					
		91.3	TV									TV=0.18tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/11	1.7' Recovery; say 110.0' to 111.7' depth; upper 0.7' disturbed, WASH? ?	110.0- 111.5	383									
		110.7- 110.9	W383.1	31.7		86						
	Silly CLAY, grey, soft consistency, moderately plastic (CL)	110.9	TV								TV-0.25tsf	
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire Sample disturbed.	110.9-										
		111.3	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET      OF     

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
105/12	SOIL DESCRIPTION	DEPTH (FEET)	—								
	0.7' Recovery; say 120.0' to 120.7' depth	120.0-122.5	384								
		120.2-120.3	W384.1	22.1		102					
	Silty CLAY, Sandy, dark gray, medium consistency, moderate plasticity (CL)	120.3-120.6	saved								
	Sample includes about 35% fine to coarse SAND grains (subrounded to subangular in shape)	120.6-120.7	I-384.1	20.4	29	17					
	Note: Entire sample slightly disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
118/1	2.1' Recovery; say 3.0' to 5.1' depth; upper 1.0' disturbed (WASH??)  Silty CLAY, greyish brown, hard consistency, moderate to highly plastic (CL-CH)	3.0-	---								
		5.0	252								
		4.0-	L252.1	21.4	49	26					
		4.3									
		4.4-									
		4.5	W252.1	22.3			101				
		4.5									
		4.6-	TV								
		5.0	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL	PL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
118/2	1.5' Recovery; say 8.0' to 9.5' depth	8.0 - 10.0'	253								
		8.1'	W253.1	23.8							
	Silty CLAY, dark grayish brown, very stiff to hard consistency, highly plastic (CL - CH)	8.2 - 8.5'	T253.21	23.0		107	CD	4.3	754		$\bar{\sigma}_c = 576$ psf
		8.2 - 8.5'	L253.1	23.3	49	23					
		8.5'	W253.2	21.5							
		8.6 - 8.9'	T253.22	23.3			105	CD	3.6	1248	
	Sample includes ±5% coarse Sand and fine Gravel size particles	8.9 - 9.2'	T253.23	24.2		103	CD	2.2	2156		$\bar{\sigma}_c = 2304$ psf
		9.2 - 9.5'	Saved								



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
118/3	2.1' Recovery; say 18.0' to 20.1' depth; upper 0.5' disturbed	—										
			254									
	Silly CLAY, grey, firm consistency, moderate to high plasticity (CL)	18.0 - 20.0										
		18.7 - 18.9	W254.1	35.5		84						
		18.9	TV								TV=0.37tsf	
		18.9 - 19.3	Saved									
		19.3 - 19.5	W254.2	31.6		89						
		19.5	TV								TV=0.40tsf	
		19.5 - 19.9	L254.1	35.3	45	23						

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>		
118/4	21.4' Recovery; say 28.0' to 30.1' depth	28.0-30.0 28.5-28.6	— 255 W255.1										
	Silty CLAY, gray, mottled very dark gray, firm to stiff consistency, moderate plasticity (CL)	28.6	TV									TV = 0.28 tsf	
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	28.6-28.9 28.9-29.3	saved saved										
	Note: Upper 1.3' of sample slightly disturbed	29.3-29.4	W255.2			103						TV = 0.64 tsf	
		29.4	TV										
		29.4-29.8	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
118/5	Silty CLAY, greyish brown, firm consistency, moderately plastic (CL)		38.0-40.0	256									
			38.1-38.4	Saved									
			38.4	TV									TV=0.34tsf
			38.4-										
			38.6	W256.1	36.9			85					
			38.6-										
			38.9	Saved									
			38.9-										
			39.3	C256.1	36.9							0.969	0.39
			38.9-										
			39.3	I256.1	36.9	41	22						Specific Gravity-2.70
			39.3	256.1									TV-0.35tsf
			39.3	TV									
			39.3-										
	39.5	W256.2	36.6			86							
	39.5-												
	39.8	Saved											

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
118/6	2.1' Recovery; say 48.0' to 50.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes few thin lenses/layers of SILT, Sandy (ML) comprising ±5% of total	48.0-50.0	—									
		48.4-	257									
		48.5	W257.1	42.6	76							
		48.5	TV									TV=0.30tsf
		48.5-48.8	Saved									
		48.8-	Saved									
		49.2	Saved									
		49.2-49.3	W257.2	43.9	76							
		49.3	TV									TV=0.43tsf

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
118/9	1.9' Recovery; say 78.0' to 79.9' depth; upper 0.3' disturbed	78.0-80.0	260								
		78.1-78.4	Saved								
	Silty CLAY; dark grey, stiff consistency, moderately plastic (CL)	78.4-78.7	W260.1	22.1		103					TV=0.68tsf
		78.7	TV								
		78.7-									
		79.0	C260.1	27.8					0.741	.24	
	Sample includes about 20% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	78.7-79.0	L260.1	25.3	42	23					
		78.7-	SG								Specific Gravity -2.70
		79.0	260.1								
	Note: Proportions of Sand and fine Gravel increase with depth approaching 40% near bottom of sample.	79.0-79.4	Saved								
		79.4-									
		79.7	W260.2	13.1		123					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET _____ OF _____								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
B119/1	0.8' Recovery; say 3.0' to 3.8' depth	3.0 to 5.0	331							
		3.1	TV	32.4						TV=1.0 tsf
	Silty CLAY; dark grayish brown mottled light olive brown, stiff to very stiff consistency, moderately to highly plastic (CL)	3.1	W33L1	32.4						
		3.1 to 3.4	save 33L1							
		3.4	TV	25.4						TV=1.34 tsf
		3.4 to 3.8	Y33L1	25.4		98				

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B119/2	Recovery 2.2'; say 8.0' to 10.2' depth	8.0 to 10.0	332								
	Silty CLAY, dark, grayish brown, very stiff consistency, moderately to highly plastic (CL)	8.2	TV								TV=1.25 tsf
	Sample includes about 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	8.2 to 8.3	W332.1	28.4							
		8.3 to 8.6	T332.1.3	27.9	98	CU	2.2	2012			
		8.6	TV								TV=1.43 tsf
		8.6 to 9.0	T332.1.4	29.2	94	CU	1.5	1240			
		9.0	TV								TV=1.43 tsf
		9.0 to 9.1	W332.2	27.5							
		9.1 to 9.4	T332.1.1	28.3	95	CU	2.2	887			
		9.4	TV								TV=1.50 tsf
		9.4 to 9.5	W332.3	29.2							
		9.5 to 9.7	L332.1	30.8	53	26					
	9.7 to 10.1	save 332.1									

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE Jan. 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
B119/3	1.9' Recovery; say 20.0' to 21.9' depth; upper 0.3' disturbed	333									
		St	37.3								
	Silty CLAY: dark gray, firm consistency, highly plastic (CL-CH)	W333.1	37.3								
		20.4 to save									TV=0.31 tsf
		20.7 333.1									TV <sub>R</sub> =0.17 tsf
		20.7 TV									
		20.7 to save									
	Sample includes about 5 to 10% coarse Sand grains (subrounded to subangular in shape)	21.1 333.2									
		21.1 TV	37.2								
		21.1 to									
		21.2 W333.2	37.2								
		21.2 to save									
		21.5 333.3									
		21.5 TV									
		21.5 to									
		21.9 W333.1	36.3	83							



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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		Cc
B119/4	Silty CLAY: very dark grayish brown, soft to firm consistency, highly plastic (CL)  Sample includes ±5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	30.0 to 32.0										
		30.1	35.4									TV=0.24 tsf
		30.1 to 30.2	35.4									
		30.2 to 30.5										
		30.5										TV=0.26 tsf
		30.5 to 30.8	35.3			87	CU	5.6	1655			TV=0.29 tsf
		30.8	37.8									TV=0.11 tsf
		30.8 to 30.9	37.8									
		30.9 to 31.2	38.5			85	CU	1.5	1229			
		31.2										TV=0.30 tsf
		31.2 to 31.6	36.9			86	CU	1.5	985			
		31.2 to 31.6	36.4	41	22							
		31.6 to 31.9										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B119/5	Silty CLAY: dark grayish brown, soft to firm consistency, highly plastic (CL-CH)	40.0 to 42.5	335								
		40.2	TV								TV=0.26 tsf
		40.2 to 40.5	335.1		35.4	88					
		40.5	TV		35.6						TV=0.27 tsf
		40.5 to 40.6	W335.1		35.6						
		40.6 to 40.9	save 335.1								
		40.9	TV								TV=0.29 tsf
		40.9 to 41.3	save 335.2								
		41.3	St		36.0						TV=0.27 tsf
		41.3 to 41.4	W335.2		36.0						TV <sub>R</sub> =0.14 tsf
		41.4 to 41.7	save 335.3								
		41.7	TV								TV=0.31 tsf
		41.7 to 42.1	save 335.4								
		42.1	TV								TV=0.30 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L      w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
B119/9	2.1' Recovery; say 80.0' to 82.1' depth	80.0 to 82.5	339								
		80.1	TV	22.4							TV = 0.90 tsf
		80.1 to 80.2	W339.1	22.4							
		80.2 to 80.5	save 339.1								
		80.5 to 80.8	W339.1			107					
		80.5 to 80.8	save 339.2	21.6							
		80.8	TV	21.0							TV = 1.0 tsf
		80.8 to 80.9	W339.2	21.0							
		80.9 to 81.2	save 339.3								
		81.2 to 81.5	save 339.4								
		81.5	TV	22.1							TV = 0.73 tsf
		81.5 to 81.6	W339.1	22.1							
		81.6 to 81.9	U339.1	20.7		107					@15% Strain s = 3072 psf
		81.6 to 81.9	L339.1	20.7	33	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
126/3	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard subrounded to subangular gravel particles	8.0 to 10.0								
		8.2 to 8.6	26.2	99	U	2.4	1735			
		8.2 to 8.6	26.6	47	24					
		8.6 to 8.8	27.1	97						
		9.1	TV							TV=1.12tsf
		9.4 to 9.6	W24.2	27.0	96					
		9.6 to 9.9	save 241.2							

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS      DATE <u>April 1974</u> SHEET <u>      </u> OF <u>      </u>												
BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
126/5	1.9' Recovery: Say 18.0' to 19.9' depth		18.0 to 20.0	242								
			18.4 to 18.5	W242.1	49.3							
			19.2 to 19.3	W242.2	34.7							
	Silty CLAY, grayish brown soft consistency, moderately to highly plastic (CL-CH)		19.6 to 19.8	L242.1	35.6	47 23						
	Note: Entire sample disturbed											

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE April 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET

OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/7	Silty CLAY, dark grayish brown, soft consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse to fine sand grains (subrounded to subangular in shape)  Note: Entire sample disturbed	28.0 to 30.0									
		28.5	TV								
		28.5 to 28.7	W2431	35.4	86						TV=0.18tsf
		29.0 to 29.3	save 243.1								
		29.3 to 29.5	W243.2	34.9	86						
		29.5	TV								
		29.5 to 29.9	save 243.2								TV=0.19tsf

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE: <u>SUMMARY OF LABORATORY TEST RESULTS</u> DATE <u>April 1974</u> SHEET <u>OF</u>												
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
126/11	2.3' Recovery; Say 48.0' to 50.3' depth	—	48.0 to 50.5									
			48.2 to 48.5									
			48.5 to 48.7									
			48.7	46.3		76						
	Silty CLAY, gray, firm consistency, highly plastic (CH)		48.7									TV=0.35tsf
			48.7 to 49.1									
			49.1 to 49.4									
	Sample includes about 10% fine gravel and coarse sand size particles (subrounded to subangular in shape)		49.4	41.1		81	UU	4.0	498			
			49.1 to 49.4									
			49.4 to 49.6									
			49.6	41.4		80						TV=0.40tsf
			49.6 to 49.9									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/13	Silty CLAY, dark grey, firm consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  few layers/lenses ±1" thick of Silty CLAY, Sandy, very stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to medium Sand grains (subrounded to subangular in shape)	58.0-60.5										
		58.2-58.5	246									
		58.5-58.7	W246.1	38.8		79						Silty Clay Portion
		58.7	TV									TV=0.32tsf
		59.0-59.3	L246.1	32.9	40	23						
		59.9-60.0	W246.2	22.1		104						Silty clay, Sandy layer
		60.0	TV									TV=0.46tsf
		60.0-60.3	Saved									



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/15	2.4' Recovery; say 68.0' to 70.4' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel sized particles (sub-rounded to subangular in shape)	68.0-70.5										
		68.3-68.7	247									
		68.7-68.8	W247.1	24.1		99						
		68.8	TV									TV=0.50tsf
		68.8-69.3	L247.1	23.2	34	18						
		69.6-69.9	Saved									
		70.1-70.2	W247.2	24.0		100						
		70.2	TV									TV=0.47tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/23	Silty CLAY; dark gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	108.0 to 110.0	251									
		108.1 to 108.4	save 251.1									
		108.4 to 108.6	W251.1		25.1		97					
		108.6	TV									TV=0.48tsf
		108.6 to 108.9	I251.0.1		25.3		96					@15.0%strain
		108.6 to 108.9	I251.1		23.6	36 20						s=1339 psf
		109.2 to 109.4	W251.2		24.2		97					
		109.4	TV									TV=0.48 tsf
		109.4 to 109.8	save 251.3									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
127/2	1.4' Recovery; Say 3.5' to 4.9' depth	302									
		save 302.1									
	Silty CLAY; grayish brown, stiff consistency, moderately to highly plastic (CL-CH)	W302.1	24.2		99						
		TV									TV=0.87tsf
		save 302.2									
		I302.0.1	24.9		103	UU	8.0	2099			
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	I302.1	23.1	48	24						

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
127/3	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL-CH) @ 5.2' change to - Clayey SAND, dark grey, fine to coarse Sand grains with about 40% moderately plastic fines (SC) roots and fibers evident @5.6' change to - Silty CLAY, olive grey, firm to stiff consistency, moderate to high plasticity (CL-CH) Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)		5.0-7.0	—									
			416										
			5.1	TV									TV=1.20tsf
			5.4-										
			5.5	W416.1	29.3			77					
			5.0-5.2	MC									
			5.6-7.0	416.1									See plot
			5.9	TV									TV=0.68tsf
			6.2-										
			6.3	W416.2	27.0			94					
			6.6	TV									TV=1.1tsf
			6.6-										
	7.0	L416.1	25.8	49	22								
	6.6-												
	7.0	W416.1	13.5			113		rU	3.2	9403	Test at 95% of MC 416.1		

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/4	1.6' Recovery; Say 8.0' to 9.6' depth		8.0 to 10.0	417								sample used for T466.1, 2, 3
			8.1 to 8.7	save 417.1								
			8.7 to 8.9	W417.1	21.9	107						sample used for T466.1, 2, 3
	Silty CLAY, olive brown mottled grayish brown, very stiff to hard consistency, moderately to highly plastic (CL-CH)		8.9 to 9.6	save 417.2								TV=2.0 tsf
	Sample includes about 20% coarse to fine sand and fine gravel size particles (sub-rounded to subangular in shape)		9.1	TV								

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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
127/8	2.1' Recovery; say 16.0' to 18.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes lenses/layers which contain about 20% fine to coarse Sand grains (sub-rounded to subangular in shape)	16.0-18.0										
		16.2-16.5	421									
		16.6-16.7	W421.1	28.0		91						
		16.7	TV									TV=0.77tsf
		16.7-17.0	Saved									
		17.0-17.3	Saved									
		17.3-17.4	W421.2	30.7		93						
		17.4	TV									TV=0.40tsf
		17.4-17.7	Saved									

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 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
127/11	Jar Sample	28.5 - 30.0	456									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  *Note: Water content taken from unsealed jar sample		W456.1	22.8	*							

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/13	Jar Sample	38.0-40.0	457								
	Silty CLAY, grey, moderate plasticity (CL)		W457.1	21.4							
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>	
BORING SAMPLE													
127/14	Jar Sample	—	43.5-45.0										
	Silty CLAY, dark grey, moderate plasticity (CL)	L458.1			32    18								
	Sample includes < 5% fine to coarse Sand grains (subrounded to subangular in shape)												

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/15	Jar Sample	48.5-50.0	459								
	Silty CLAY, dark grey, moderate plasticity (CL)		W459.1	20.6							
	Sample includes 10 to 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/18	Jar Sample	—								
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10 to 15% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)  *Note: Water content taken from unsealed jar sample	63.5-								
		65.0	*							
			W460.1	20.3						

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
127/19	Jar Sample	—									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	68.5-									
		70.0	461								
			L461.1		33	16					

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>	
127/24	Jar Sample	93.5 - 95.0	462									
	SILT, grey, non-plastic (ML)		W462.1	24.9*								
	Sample includes about 25% fine Sand grains											

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
127/29	Jar Sample	—									
	Silty CLAY, dark gray, moderate plasticity (CL)	113.5									
		115.0									
	Sample includes 5 to 10% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	L463.1		41	21						

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
										SHEET ___ OF ___	
IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
127/32	Jar Sample	128.5-130.0									
	Silty CLAY, dark gray, moderate plasticity (CL)		30.9*								

\*Note: Water content taken from unsealed jar sample.

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE April 1974  
SHEET 01 OF 01

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
129/3	1.1' Recovery; Say 8.0' to 9.1' depth; upper 0.3' disturbed (Wash?)	386									
		save 386.1									
		TV									TV = 1.5tsf
	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)	8.6 to 8.7	22.9		108						
		8.7 to 9.0	22.3		108	UU	6.0	3381			
		8.7 to 9.0	22.9	48	23						



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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE: July 1974										
IDENTIFICATION		SHEET: OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
129/5	2.1' Recovery; say 18.0' to 20.1' depth	18.0-21.0	387									
		18.1-	Saved									
		18.4-										
	Silty CLAY, greyish brown, stiff consistency, moderate to highly plastic (CL-CH)	18.4-	I387.1.1	33.5		90	CU	6.8	11.02		σ <sub>c</sub> =1152psf	
		18.7-	I387.1	30.8	48	21						
		18.7-	W387.1	31.7								
		18.8	TV								TV=0.63tsf	
		18.8-	I387.1.4	33.1			90	CU	9.7	1276		σ <sub>c</sub> =2304psf
		19.1-	I387.1.3	31.9			90	CU	3.6	2087		σ <sub>c</sub> =4608psf
		19.4-	W387.2	33.1			89					
		19.6	TV									TV=0.53tsf
	19.6-20.0	Saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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SHEET 1 OF 2

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	$c_c$	
129/7	2.0' Recovery; Say 28.0' to 30.0' depth	28.0 to 30.5	388									
		28.3 to 28.4	W388.1	35.8		88						
		28.4 to 28.6	L388.1	35.6	45	20						
	Silty CLAY, gray, moderately to highly plastic (CL-CH)											
	Note: Entire sample highly disturbed											

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 DATE April 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/9	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL)	38.0 to 40.5	389								
		38.1 to 38.4	save 389.1								
		38.4 to 38.6	W389.1	87							
		38.6	TV								TV=0.29tsf
		38.6 to 38.9	save 389.2								
		39.1 to 39.3	L389.1		41	22					
		39.1 to 39.3	C389.1						1.083	.39	
		39.1 to 39.3	SC389.1								specific gravity=2.73
		39.3 to 39.6	save 389.3								
		39.6	TV								TV=0.31tsf
		39.6 to 39.8	W389.2	88							
		39.8 to 40.0	save 389.4								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
129/11	1.8' Recovery; say 48.0' to 49.81' depth	390									
	Silty CLAY, grey, soft consistency, moderate to highly plastic (CL)	48.0-50.5									
		48.2-48.5	Saved								
	Note: Sample much disturbed below 48.8' depth	48.5									
		48.5-48.6	TV W390.1	45.2		77					TV=0.28tsf

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SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
129/13	0.6' Recovery; say 58.5' to 59.1' depth  Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire sample slightly disturbed	58.5-60.5	391									
		58.6-58.7	W391.1		25.7	97						
		58.7-58.9	L391.1		31.7	35	18					
		58.9-59.1	Saved									

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
129/15	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse sand and fine gravel sized particles (subrounded to subangular in shape)  Note: Upper 0.8' of sample disturbed (Wash?)	DEPTH (FEET)	—									
			73.0 to 75.5	392								
			73.8 to 74.0	W392.1	24.6	99						
			74.0 to 74.3	L392.1	22.8	36	21					
			74.0 to 74.3	T392.01	24.8	101		UU	7.0	954		
			74.3 to 74.7	save 392.1								
			74.7 to 74.9	W392.2	23.2	102						TV=0.68tsf
			74.9	TV								
			74.9 to 75.2	save 392.2								

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
129/19	1.8' Recovery; say 93.0' to 94.8' depth		93.0-95.5 93.1-93.4 93.1-93.4	— 394 T394.1.1 L394.1								
	Silty CLAY, grey, firm to stiff consistency, moderate to high plasticity (CL)		93.4	TV		41	21					TV=0.50tsf
			93.4-93.5	W394.1								
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)		93.5-93.8	T394.1.2								$\bar{\sigma}_c=6480psf$
			93.8-94.1	I394.1.3								$\bar{\sigma}_c=12960psf$
			94.1-94.3	W394.2								
			94.3	TV								TV=0.44tsf
			94.3-94.6	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/21	2.2' Recovery; Say 103.0' to 105.2' depth		103.0 to 105.5	395								
			103.2 to 103.5	save 395.1								
			103.5 to 103.7	W395.1	27.3		97					
	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)		103.7	TV								TV=0.68tsf
			103.7 to 104.0	C395.1	28.0					.703	.23	
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)		103.7 to 104.0	SC395.1								specific gravity=2.71
			104.0	L395.1	26.1		39 21					
			104.1 to 104.4	save 395.2								
			104.4 to 104.6	W395.2	25.1		102					
			104.6	TV								TV=0.51tsf
			104.6 to 104.9	save 395.3								



BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
129/22	Jar Sample	108.5 110.0	— 465									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (sub-angular to subrounded in shape)  *Note: Water content taken from unsealed jar sample		W465.1	26.6	*							
			L465.1	39	19							

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
129/24	1.8' Recovery; Say 123.0' to 124.8' depth; upper 0.5' disturbed (Wash?)	123.0 to 125.5									
		123.5 to 123.9									
		123.5									IV=0.36tsf
		123.5 to 123.9									
	Silty CLAY, gray, stiff consistency, moderately to highly plastic (CL-CH)	124.1 to 124.4	32.4		90						
		124.1 to 124.4	30.6		95						
		124.1 to 124.4	30.2	46 22		UU	8.0	679			
	Sample includes about 10% hard subrounded gravel size particles	124.4									IV=0.34tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
130/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)		7.5'	571								
				L571.1	24.9*	49	21					
130/SS6	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		20.0'	572								
				L572.1	30.1*	44	22					
130/SS10	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		40.0'	573								
				L573.1	30.7*	44	23					
130/SS13	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		55.0'	574								
				L574.1	34.3*	46	23					

\*Not: Water content taken from unsealed jar sample

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DATE 12/74

SUMMARY OF LABORATORY TEST RESULTS

SHEET

OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
130/SS14	Jar Sample Silty CLAY, dark gray, low plasticity (CL)	60	13.5	26 17							
	Sample includes ±25% fine to medium Sand size particles										
130/SS16	Jar Sample Silty CLAY, dark gray, low to moderate plasticity (CL)	70	20.8	34 21							
	Sample includes about 15% fine to medium Sand size particles										

\*Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
134/SS4	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	578	8.5- 10.0'							
		L578.1		24.2*	49	24				
134/SS9	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	579	33.5- 35.0'							
		L579.1		34.5*	45	22				
134/SS14	Jar Sample Silty CLAY, dark gray, highly plastic (CH) Sample includes ±5% fine Sand	580	58.5- 60.0'							
		L580.1		44.1*	52	33				

\*Note: Water content taken from unsealed jar sample

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TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Nov., 1974 SHEET        OF       

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B136/2	1.9' Recovery; say 3.0' to 4.9' depth	3.0-5.0'	525								
		3.1-3.4'	MC								
		3.4-3.5'	W525.1	36.2							
		3.5'	TV								Used for processor. See plot
		3.5-4.2'	MC								
		4.2-4.3'	W525.2	29.8							TV = 1.28 tsf
		4.3'	TV			92					Used for processor. See plot
		4.3-4.9'	MC								
		3.0-4.9'	I525.1		62	25					TV = 1.62 tsf
											Used for processor. See plot

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
B136/4	SOIL DESCRIPTION	DEPTH (FEET)	—									
	1.8' Recovery; say 8.0' to 9.8' depth	8.0'-10.0'	526									
		8.5'-8.8'	saved									
	Silty CLAY, mottled gray, gray-brown and yellow brown, hard consistency, moderate to high plasticity (CL-CH)	8.8'-9.2'	U526.1	24.3		102	U	3.0	5446			
		8.8'-9.2'	L526.1	25.1	48 22							
		9.2'-9.3'	W526.2	25.7		98						
	Upper 0.5' of sample includes about ±15% fine to coarse Sand size particles (subrounded to subangular in shape)	9.3'	TV									TV > 2.5 tsf
		9.3'-9.6'	saved									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
136/6	1.6' Recovery; say 13.0' to 14.6' depth		13.0-15.0'	527								
			13.1-13.5'	rC / rU								
	Silty CLAY, grayish-brown, stiff consistency, moderately plastic (CL)		13.5'	W527.1	31.5		90					used for compacted C/U
			13.5'	TV								TV = 0.62 tsf used for compacted C/U
			13.6-14.1'	rC / rU								
			14.1'	TV								TV = 0.67 tsf used for compacted C/U
			14.1-14.6'	rC / rU								
			13.0-14.6'	L527.1	43	22						
			13.0-14.6'	C527.1	17.3		101			0.675	.15	
			13.0-14.6'	U1527.1	17.5		100	rU	2.0	2763		
			13.0-14.6'	SC527.1								Specific Gravity=2.74



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 TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_  
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BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
136/SS9	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±10% fine to coarse Sand size particles (CL)	23.5 - 25.0'	581								
			W5811	31.1*		93*					
136/SS11	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	33.5 - 35.0'	582								
			L5821	31.9* 43	19						
136/SS15	Jar Sample Silty CLAY, gray-brown, moderate plasticity (CL)	53.5 - 55.0'	583								
			W5831	38.5*		85*					
136/SS19	Jar Sample Silty CLAY dark gray, of low to moderate plasticity. Sample includes about 25% fine to coarse Sand size particles (CL)	73.5 - 75.0'	584								
			L5841	17.0* 34	21						

\* Water content taken from unsealed jar samples

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: \_\_\_\_\_  
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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_o$	
136/SS24	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)  Sample includes $\pm 15\%$ fine to coarse Sand size particles	98.5-								
		100.0'	585							
		L585.1	21.0%	40	21					

\*Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
137/SS1	Jar Sample Silty CLAY, yellow-brown, moderately to highly plastic (CL-CH)	—	1.5 to 3.0								
		586									
		S/H									
		586.1									See plot
137/SS3	Sample includes ±15% fine to coarse Sand size particles	—									
	Jar Sample										
	Silty CLAY, yellow-brown, highly plastic (CH)	587	9.5 to 11.0								
		1587.1		24.8*	53	24					

Note: Water content taken from unsealed jar sample

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
138/SS4	Jar Sample Silty CLAY, dark gray, moderate to high plasticity. Sample includes about 10% fine to coarse Sand size particles occurring as pockets (CL-CH)	588	8.5 - 10.0'								
138/SS9	Jar Sample Silty CLAY, light gray-brown, moderate to high plasticity (CL)	W589.1	33.5 - 35.0'	32.0*	90						
138/SS14	Jar Sample Silty CLAY, dark gray-brown, high plasticity (CL-CH)	W590.1	58.5 - 60.0'	31.9*							
138/SS23	Jar Sample Silty CLAY, dark gray, high plasticity (CL-CH)	W591.1	103.5 - 105.0'	26.7*	49	25					

\* Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE _____ OF _____	
IDENTIFICATION		TEST NO.		PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>
139/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CH-CL) Sample includes ±5% fine to medium Sand size particles	6.5- 8.0'	593	23.5*	50 24						
139/SS8	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	29.5- 31.0'	594	25.2*	42 22						
139/SS12	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	49.5- 51.0'	595	31.4*	43 20						
139/SS22	Jar Sample GRAVEL, subangular to sub-rounded Gravel particles, 1/2" to 1-1/2" in size with about 15% fine to coarse Sand, less than 10% non-plastic fines (GP)	99.5- 101.0'	596								
			596.1								See plot

\*Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
B141/1	1.9' Recovery; say 3.0' to 4.9' depth  Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH)  Includes ±5% Gravel size pieces (subrounded to sub-angular in shape)  Breaks vertical and laterally in a blocky manner	3.0-5.0'									
		3.1-3.4'									
		3.4-3.5'	W5281	28.9		90					
		3.5'	TV								Used for processor. See plot
		3.5-4.1'	MC								
		4.1-4.2'	W5282	25.7		88					TV=1.50 tsf Used for processor. See plot
		4.2-4.5'	MC								
		4.5'	TV								Used for processor. See plot
		4.5-4.9'	MC								
		3.0-4.9'	W5281		56	23					TV -1.00 tsf Used for processor. See plot

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
141/2	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH-CL)  Sample includes ±20% fine to coarse Sand size particles		8.0-10.0'	529									
			8.1-8.7'	rU									Used for compacted U
			8.7'	W529.1	26.3	95							
			8.7'	TV									TV = 1.77 tsf Used for compacted U
			8.8-9.2'	rU									
			9.2'	W529.2	25.0	95							
			9.2'	TV									
			9.3-10.0'	rU									
			8.0-10.0'	U529.1			49	23					
			8.0-10.0'	U529.1	17.5	103			rU	2.0	5558		

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	$c_c$	
B141/4	1.9' Recovery, say 18.0 to 19.9' depth  Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)  Sample includes $\pm 5\%$ fine to coarse Sand grains and fine subangular to subrounded Gravel pieces (1/4" max. size)		18.1-20.1	531								
			18.0-18.3	Saved								
			18.3-18.4	W531.1		35.3	86					
			18.4	TV								TV=0.37 tsf.
			18.4-									
			18.7	T531.1		35.5	87		CU	3.2	1393	$\bar{\sigma}_c = 2304$ psf
			18.4-18.7	L531.1		35.2	45	21				
			18.7-19.1	T531.1		36.3	86		CU	3.0	1040	$\bar{\sigma}_c = 1152$ psf
			19.1-19.2	W531.2		36.6	85					
			19.2	TV								TV=0.32 tsf
			19.2-19.5	T531.1	b	37.3	84		CU	9.6	1626	$\bar{\sigma}_c = 46.37$ psf
			19.5-19.9	T531.1	a	35.1	85		CU	4.2	1625	$\bar{\sigma}_c = 46.08$ psf



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PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
141/SS4	Jar Sample Silty CLAY, brown, moderate to high plasticity (CL)	29.5- 31.0'	597								
			L597.1	33.8*	47 21						
141/SS10	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	59.5- 61.0'	598								
			L598.1	30.2*	41 19						
141/SS21	Jar Sample Sandy GRAVEL, hard sub-angular to subrounded Gravel size particles to 3/4" maximum about 30% fine to coarse Sand and 20% non-plastic fines (GM)	114.5- 116.0'	599								
			S599.1								See plot
141/SS27	Jar Sample Sandy CLAY, gray, low plasticity; about 45% fine to coarse Sand and fine Gravel size particles to 1/4" max. size (SM-SC)	144.5- 146.0'	600								
			S600.1								See plot

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B142/1	0.9'	Recovery; say 3.0' to 3.9' depth	532								
	3.0-5.5'										
	3.0-3.4'		MC								
	3.4-3.5'		W532.1	28.9		98					
	3.5'	Silty CLAY, mottled brown and gray, very stiff consistency high plasticity (CH)	TV								Used for processor. See plot
	3.5-3.7'		MC								
	3.7-3.8'	Includes $\pm 10\%$ subrounded to subangular fine to coarse Sand grains	W532.2	25.1		97					TV=1.53 tsf Used for processor. See plot
	3.8'		TV								
	3.8-3.9'		MC								TV=1.58 tsf Used for processor. See plot
	3.0-3.9'		L532.1		54	23					

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE: <u>SUMMARY OF LABORATORY TEST RESULTS</u> DATE <u>Nov. 1974</u> SHEET <u>    </u> OF <u>    </u>											
BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B142/4	0.7' Recovery; say 8.0' to 8.6' depth	8.0'-10.5'	533	22.8		106					
		8.0'-8.3'	L533.2	21.4	42	22					
		8.3'-8.4'	W533.1	24.8							
	Silty CLAY, olive brown to dark brown with layers of Sandy CLAY; very stiff consistency, moderate to high plasticity (CL)	8.4'	TV								
	at 8.3'	8.4'-8.6'	L533.1	24.5	49	22					
	<u>CHANGE TO:</u>										
	Olive-gray/brown Silty CLAY, very stiff consistency, highly plastic (CL-CH)										
	Sample includes ±10% fine to coarse Sand and Gravel size particles (subrounded to sub-angular in shape; 1/2 inch maximum size)										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: \_\_\_\_\_  
 SHEET: \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
142/5	2.1' Recovery: say 14.0' to 16.1' depth	—									
	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)	534									
		14.1' - 14.4' CU									
		14.4' W534.1	36.5			82					Used for compacted CU
		14.4' TV									
		14.5' - 15.1' CU									TV = 0.35 tsf
		15.1' W534.2	34.0			86					Used for compacted CU
		15.1' TV									
		15.2' - 15.6' CU									TV = 0.40 tsf
		15.6' W534.3	35.1			88					Used for compacted CU
		15.6' TV									
		15.7' - 16.1' CU									TV = 0.41 tsf
		14.0' - 16.1' L534.1			47 22						Used for compacted CU
		14.0' - 16.1' T534.1.2	15.3			105	CU	15.0	1475		$\bar{\sigma}_c = 1872$ psf
	14.0' - 16.1' T534.1.3	15.1			105	CU	15.0	2625		$\bar{\sigma}_c = 3600$ psf	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B142/6	2.3' Recovery; say 19.0' to 21.4' depth	19.0'- 21.5'	535								
		19.2'	TV								TV = 0.30 tsf
		19.2'- 19.5'	saved								
	Silty CLAY, gray-brown, medium consistency, moderate to high plasticity (CL)	19.5'- 19.6'	W535.1	38.5							
		19.6	TV								TV = 0.32 tsf
	Sample includes ±15% fine to coarse Sand and fine Gravel size pieces (1/2 inch maximum size)	19.6'- 19.9'	saved								
		20.1'- 20.5	C535.1	38.2					1.019	.41	Specific gravity = 2.69
		20.1'- 20.5'	SC535.1								
		20.1'- 20.5'	L535.1	37.9	45	22					
		20.5'- 20.6'	W535.2	37.7			83				
		20.6'	TV								TV = 0.36 tsf
		20.6'- 20.9'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
142/SS14	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	601		44 20						
		1601.1	34.3*							
142/SS24	Jar Sample Silty CLAY, sandy, gray, of low plasticity (CL-ML)  Sample includes 25-30% fine to medium Sand size particles	602								
		1602.1	22.0*	23 16						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE: SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
143/SS2	Jar Sample Silty CLAY, yellow-brown, of moderate to high plasticity (CL)	6.0'	603								
			L603.1	23.1*	45	20					
143/SS4	Jar Sample Silty CLAY, gray, moderately plastic (CL)	16.0'	604								
			L604.1	26.7*	43	22					
143/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	36.0'	605								
			L605.1	36.1*	46	23					
143/SS11	Jar Sample Silty CLAY, grayish-brown, of moderate plasticity (CL)	51.0'	606								
			L606.1	31.6	43	22					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
143/SS15	Jar Sample Silty CLAY, grayish-brown, highly plastic (CL-CH)	71.0'	607								
			L607.1	29.9*	48 21						
143/SS20	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes 20-25% fine to coarse Sand size particles	96.0'	608								
			L608.1	19.3*	38 20						
143/SS27	Jar Sample Sandy CLAY, gray, of low plasticity (SC) Sample includes ±35% fine to coarse Sand and ±5% fine Gravel size particles to 1/4" maximum	131.0'	609								
			L609.1	14.7*	27 17						

\*Note: Water content taken from unsealed jar sample



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SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B144/4	2' Recovery; say 8.0' to 10.0'	8.0-10.0'	537								
		8.2'	TV								TV = 1.80 tsf
		8.2-8.5'	saved								
	Silty CLAY, brown, hard consistency, highly plastic (CL-CH)	8.5-8.8'	U537.1	26.3		97	U	1.7	861		
		8.5-8.8'	U537.1	24.1		99	U	15.0	1482		
	Includes about 20 - 25% fine to coarse Sand and fine Gravel size pieces (sub-rounded to subangular in shape; 1/2 inch max. size)	8.5-8.8'	L537.1	27.3	48 21						
		8.8-8.9'	W537.1	28.1							
		8.9'	TV								TV = 1.70 tsf
	Entire sample slightly disturbed?	8.9-9.2'	U537.2	24.1		100	U	3.0	1002		
		9.2-9.3'	W537.2	27.1							

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
B144/6	1.7' Recovery; say 13.0' to 14.7' depth  Silty CLAY, brown and gray- ish brown, very stiff consistency, moderate to high plasticity (CL)  Sample includes 15 to 20% fine to coarse Sand size particles	13.0-	—								
		15.0'	538	25.7	99						
		13.3-									
		13.7'	saved								
		13.7-									
		13.8'	W538.1	25.7							
		13.8'	TV								TV = 1.53 tsf
		14.1'	S/H538.1								sieve/hydro-meter. See plot
		14.1-									
		14.2'	W538.2	25.7							
		14.2'	TV								TV = 1.88 tsf
		14.5'	saved								

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
144/SS10	Jar Sample	Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±5% fine to coarse sand size particles (CL)	28.5 to 30	610									
				W610.1									
144/SS16	Jar Sample	Silty CLAY, gray-brown, moderate to high plasticity (CL)	58.5 to 60	611									
				W611.1									
144/SS23	Jar Sample	Silty CLAY, gray, moderate plasticity (CL) Sample includes 15% fine to coarse sand size particles	93.5 to 95	612									
				I612.1		19.8	35	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B146/3	1.8' Recovery: say 6.0' to 7.8' depth	6.0 - 8.0'	540									
	Silty CLAY, brown & gray mottled, very stiff to hard consistency, moderate plasticity (CL)  Sample includes ±5% fine to medium Sand size particles (subangular to subrounded in shape)	6.1 - 6.4'	r CU								Used for compacted CU	
		6.4 - 6.5'	W540.1	84								TV = 2.03 tsf
		6.5'	TV									Used for compacted CU
		6.5' - 6.9'	r CU									TV = 2.03 tsf
		6.9 - 7.0'	W540.2	83								Used for compacted CU
		7.0'	TV									TV = 2.03 tsf
		7.0 - 7.3'	r CU									Used for compacted CU
		7.4 - 7.5'	L540.1	21	37.2	44	21					Used for compacted CU
		7.5 - 7.8'	r CU									Used for compacted CU
		6.0 - 7.8'	T540.1.2		14.4		108	CU	15.0	2163		$\bar{\sigma}_c = 1872$ psf
	6.0 - 7.8'	T540.1.3		14.2		108	CU	10.9	3173		$\bar{\sigma}_c = 3888$ psf	

PROJECT: BELLE RIVER PLANT UNITS I & II

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B146/5	SOIL DESCRIPTION	DEPTH (FEET)	—								
	1.6' Recovery; say 10.0' to 11.6' depth	10.0-12.0'	541								
		10.1-10.4'	MC								Used for proc-tor. See plot
	Silty CLAY, mottled brown and gray, firm consistency, moderate plasticity (CL) includes $\pm 10\%$ fine to coarse Sand size particles	10.4'	W541.1	33.9		90					
		10.4'	TV								TV = 0.67 tsf
		10.5-11.0'	MC								Used for proc-tor. See plot
		11.0'	W541.1	27.5		92					
	@ $\pm 11.1'$ depth changes to Silty CLAY, Sandy, firm consistency, moderately plastic (CL) Includes $\pm 40\%$ fine to coarse Sand and Gravel size pieces	11.0'	TV								TV = 0.73 tsf
		11.1-11.6'	MC								Used for proc-tor. See plot
		10.0-11.6'	L541.1		38 19						

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION				WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
146/7	2.1' Recovery; say 14.0' to 16.1' depth  Silty CLAY, brown, firm to stiff consistency, moderate to high plasticity (CL)  Sample includes ±5% fine to coarse Sand size particles		14.0-16.0'	—									
				14.1'-14.5'	542 rC rU								
				14.5'	W542.1	32.2		88					used for compacted C/U
				14.5'	TV								
				14.6'-15.1'	rC rU								TV = 0.48 tsf used for compacted C/U
				15.1'	W542.2	33.3		90					
				15.1'	TV								
				15.2'-15.6'	rC rU								TV = 0.50 tsf used for compacted C/U
				15.6'	W542.3	34.0		85					
				15.6'	TV								
				15.7'-16.1'	rC rU								TV = 0.49 tsf used for compacted C/U
				14.0'-16.1'	L542.1		46	22					
				14.0'-16.1'	C542.1	15.9		103			(.679)	.15	
				14.0'-16.1'	U542.1	16.6		104	rU	2.0	3282		
				14.0'-16.1'	S0542.1								Specific Gravity = 2.75

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 00 OF 00

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε    %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub> c <sub>c</sub>	
146/SS16	Jar Sample	—								
	Silty CLAY, grayish-brown, moderately to highly plastic (CL)	53.5-								
		55.0'	614							
			L64.1	28.7*	43    20					

\*Note: Water content taken from unsealed jar sample

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	Cc	
147/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH) Sample includes ±10% fine to coarse Sand size particles	624		58 24						
147/SS7	Jar Sample Silty CLAY, gray, of moderate to high plasticity (CL) Sample includes ±5% fine to coarse Sand size particles	616 L66.1	31.9*	46 23						

\*Note: Water content taken from unsealed jar sample



PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Nov. 1974

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B151A/2	1.2' Recovery; say 7.5' to 8.7' depth	7.5'-10.0'	544								
		7.7'-8.0'	544 S/H								
	Silty CLAY, mottled yellow-brown and gray, very stiff consistency, moderate to high plasticity	8.0'	W544.1	25.0		94					
		8.0'	TV								TV = 1.40 tsf
		8.1'-8.4'	saved								
	Sample includes 5-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape- to 1/2 inch maximum size)	8.5'	W544.2	24.8		98					TV = 1.40 tsf
		8.5'	TV								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Nov. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B151A/3	1.2' Recovery; say 12.5' to 13.7' depth	—									
		545									
		saved									
	Silty CLAY, gray, very stiff consistency, highly plastic (CL-CH)	W345.1	27.5		94						
		TV									TV = 1.13 tsf
		T									
	Sample includes 10-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/4 inch maximum size)	545.0.1	28.3		95	UU	10.0	2325			σ <sub>c</sub> - 1555 psf
		L545.1	27.7	48	20						
		saved									
		W345.2	31.5		93						TV = 0.55 tsf
		TV									

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
154/SS3	Jar Sample Silty CLAY, yellow brown, highly plastic (CH-CL) Sample includes ±10% fine to coarse Sand size particles	6.0'- 7.5'	617								
			L617.1	23.2*	51	23					
			W617.1				100				
154/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±10% fine to coarse Sand size particles	28.5'- 30.0'	618								
			L618.1	33.3*	44	21					
154/SS13	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to coarse Sand size particles	53.5'- 55.0'	619								
			L619.1	33.4*	40	19					
154/SS17	Jar Sample Silty CLAY, gray, highly plastic (CH)	73.5'- 75.0'	620								
			L620.1	33.1*	54	25					

Note: Water content taken from unsealed jar sample

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %		MAX. SHEAR STRESS (PSF)	e <sub>o</sub>
154/SS19	Jar Sample Silty CLAY, Sandy, dark gray, of low to moderate plasticity (CL)	621	83.5-85.0'	25.7*	31 16						
	Sample includes ±25% fine to coarse Sand size particles										
154/SS22	Jar Sample Clayey SILT, gray, of low plasticity (CL-ML)	622	98.5-100.0'	9.6*	20 13						
	Sample includes ±15% fine to medium Sand size particles										
154/SS25	Jar Sample Silty CLAY, gray, of low plasticity, (CL)	623	113.5-115.0'	18.4*	30 19						
	Sample includes ±10% fine Sand size particles										

Note: Water content taken from unsealed jar sample

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PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
158/2	2.2' Recovery; say 7.5' to 9.7' depth; upper 1.5' disturbed	7.5-10.0'	548								
		7.6-8.1'	rU								used for compacted U
		8.1'	W548.1	29.0		94					
		8.2-8.5'	rU								used for compacted U
		8.5'	W548.2	28.2		95					used for compacted U
		8.6-8.9'	rU								used for compacted U
		9.0'	W548.3	24.3							
		9.0'	TV								
		9.1-9.4'	rU								used for compacted U
		9.4'	W548.4	21.6		101					
		9.4'	TV								
		9.5-9.7'	rU								used for compacted U
		7.5-9.7'	L548.1	50	21						
		7.5-9.7'	Ur548.1	16.8		104	rU	2.0	347		

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TABLE: SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub> c <sub>c</sub>		
B158/4	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)  Sample includes 5-10% fine to coarse Sand size particles	17.5-20.0'									
		17.5-17.8'	saved								
		17.9'	W550.1	36.2	84						
		17.9'	TV								TV = 0.34 tsf
		18.0-18.5'	saved								
		18.5'	W550.2	37.8	83						
		18.5'	TV								TV = 0.37 tsf
		18.6-18.9'	I550.1.1	37.5		83	CU	3.2	885		σ <sub>c</sub> = 1080 psf
		18.6-18.9'	I550.1		46	19					
		19.0-19.3'	I550.1.2	33.5		87	CU	5.1	971		σ <sub>c</sub> = 2160 psf
		19.3-19.6'	I550.1.3	37.1		83	CU	5.7	1297		σ <sub>c</sub> = 4320 psf
		19.8	W550.3	37.2							

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
163/SS2	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH-CL) Sample includes ±5% fine to coarse Sand size particles	3.5-5.0'	615		51      24						
163/SS4	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	8.5-10.0'	625		47      23						
163/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	28.5-30.0'	626								
163/SS11	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to medium Sand size particles	43.5-45.0'	627								
			L626.1	23.9*	42      20						
			L627.1	33.5	45      21						

\*Note: Water content taken from unsealed jar sample

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
163/SS16	Jar Sample Silty CLAY, grayish-brown, highly plastic (CH)	68.5- 70.0'	628		52    24						
163/SS21	Jar Sample Silty CLAY, gray, moderately plastic (CL)	93.5- 95.0'	629								
	Sample includes ±10% fine to coarse Sand size particles		L629.1	22.3*	39    20						

\*Note: Water content taken from unsealed jar sample



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	Cc	
B185/3	2.7' Recovery; say 6.0' to 8.7' depth	6.0' 9.0'	552								
		6.5'- 6.8'	saved								
	Silty CLAY, mottled gray-brown and brown, very stiff to hard consistency, highly plastic (CL-CH)	6.8'	W552.1	25.2		99					
		6.9'- 7.2'	saved								
		7.5'- 7.8'	U552.1	23.9		104	U	4.0	2948		
		7.5'- 7.8'	I552.1	24.7	50	23					
	Sample includes <5% fine to coarse Sand and Gravel particles (subrounded to subangular in shape- to 1" maximum size)	7.8'	W552.2	26.9		99					
		7.8'	TV								TV = 1.75 tsf
		7.9'- 8.1'	C552.1	29.1						.757	0.18
		7.9'- 8.1'	SG552.1								Specific Gravity = 2.72
		8.2'- 8.5'	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	cc	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)								
B185/7	2.7' Recovery; say 18.0' to 20.7' depth  Silty CLAY, gray, medium consistency, highly plastic (CL-CH)  Sample includes less than 5% fine Sand size particles	18.0-21.0'								
		18.2-18.5'								
		18.5-18.8'	U554.1	39.3	81	U	2.4	416		
		18.5-18.8'	L554.1	39.0	49	22				
		18.9'	W554.1	38.8	81					TV = 0.35 tsf
		18.9'	TV							
		19.2-19.8'	saved							
		19.9'	W554.2	35.4	82					
		19.9'	TV							TV = 0.32 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS		TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>	
					w <sub>L</sub>	w <sub>P</sub>					
B185/B3	2.8' Recovery; say 48.0' to 50.8' depth	48.0-51.0'	556								
		48.2-48.5'	saved								
	Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)	48.5'	W556.1	34.7			85				TV = 0.44 tsf
		48.5'	TV								
	Sample includes varying amounts of fine to medium sand, ±10% at top of sample to ±40% near bottom; less than 5% subangular to subrounded gravel particles to 1/4" size occur throughout	48.6-48.9'	L556.1	37.1	47	22					
		49.4'	W556.2	31.5			87				
		49.5-49.9'	L556.2	25.9	28	17					

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
186/3	Jar Sample	6.0	---	443									
	Silty CLAY, dark greyish brown, high plasticity (CH-CL)	7.5	L443.1		52	18							
			W443.1		21.5*		99						

\*Note: Water content taken from unsealed jar sample

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
186/7	0.8' Recovery; say 23.0' to 23.8' depth	23.0 - 25.0	423								
	Silty CLAY, grey, soft consistency, moderate to high plasticity (CL)  Note: Entire sample much disturbed	23.0 - 23.3	I423.1	40.5	42	21					
		23.3 - 23.5	W423.1	39.0	80						
		23.5 - 23.8	Saved								

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
186/13	SOIL DESCRIPTION 1.5' Recovery; say 53.0' to 54.5' depth  Silty CLAY, grey, soft to firm consistency, moderate plasticity (CL)  below 53.8' depth, sample includes about 20% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	—									
		53.0-55.0	426								
		53.2-53.5	Saved								
		53.5-53.6	W426.1	40.7	80						
		53.6	TV								TV = 0.28tsf
		53.6-54.0	Saved								
		54.0-54.3	L426.1	27.0	33	17					
		54.3-54.4	W426.2	28.6		92					
		54.4	TV								TV = 0.21tsf

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
186/20	Jar Sample	88.5-90.0	444								
	Silty CLAY, grey, moderate plasticity (CL)		W444.1	20.2*		107					
			L444.1		32 17						
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974  
SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
186/23	Jar Sample	103.5 - 105.0	— 445								
	SILT, grey, non-plastic (ML)		W445.1	12.0 *							
	Sample includes about 20% fine Sand grains		L445.1		18	18					

\*Note: Water content taken from unsealed jar sample



**PROJECT: BELLE RIVER PLANT UNITS I & II**  
**TABLE SUMMARY OF LABORATORY TEST RESULTS**

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BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	* ATTERBERG LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
				w <sub>L</sub>	w <sub>P</sub>							
187/6	Jar Sample	18.5-20.0	446									
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)		W446.1	35.9	*							
	*Note: Water content taken from unsealed jar sample											

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SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
187/7	Jar Sample	447							
	Silty CLAY, gray, moderate to high plasticity (CL-CH)	1447.1	37.9*	47 20					
	*Note: Water content taken from unsealed jar sample								

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SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT* WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
187/13	Jar Sample	53.5 - 55.0	448								
	Silty CLAY, grey, moderate to high plasticity (CL)		W448.1	39.5*							
	*Note: Water content taken from unsealed jar sample										

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CONSOLIDATION

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION

TEST NO.

DEPTH (FEET)

SOIL DESCRIPTION

BORING SAMPLE

NAT. WATER CONTENT (%)

ATTERBERG LIMITS

WL Wp

DRY UNIT WEIGHT (PCF)

TEST TYPE

ε %

MAX. SHEAR STRESS (PSF)

e<sub>0</sub>

c<sub>c</sub>

OTHER TESTS AND REMARKS

58.5-  
60.0

Jar Sample  
Clayey SILT, Sandy, gray,  
low to moderate plasticity  
(CL-ML)  
Sample includes about 45%  
fine to coarse Sand and fine  
Gravel size particles  
(subrounded to subangular  
in shape)

187/14

449

S/H  
449.1

See plot

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
187/17	Jar Sample		73.5- 75.0	450								
	Silty CLAY, dark grey, moderate plasticity (CL)			W450.1	25.6							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)											
	*Note: Water content taken from unsealed jar sample											

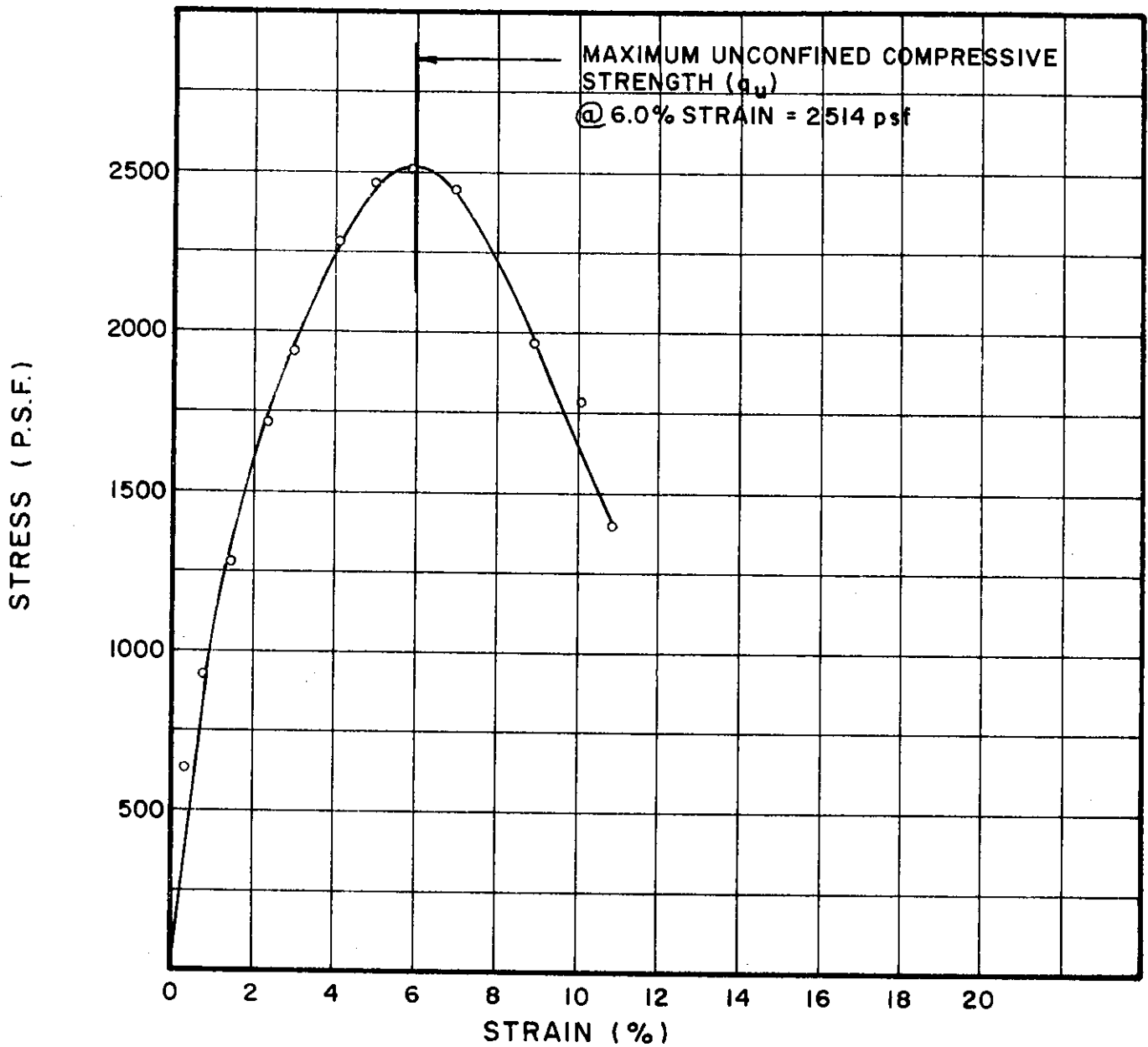
IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	
187/22	Jar Sample	451	98.5-100.0						
	Silty CLAY, dark grey, moderate plasticity (CL)	W45L1		24.1					
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)								
	*Note: Water content taken from unsealed jar sample								

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
187/23	Jar Sample	103.5 105.0	— 452								
	Silty CLAY, gray, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		1452.1	28.8	34	19					

\*Note: Water content taken from unsealed jar sample



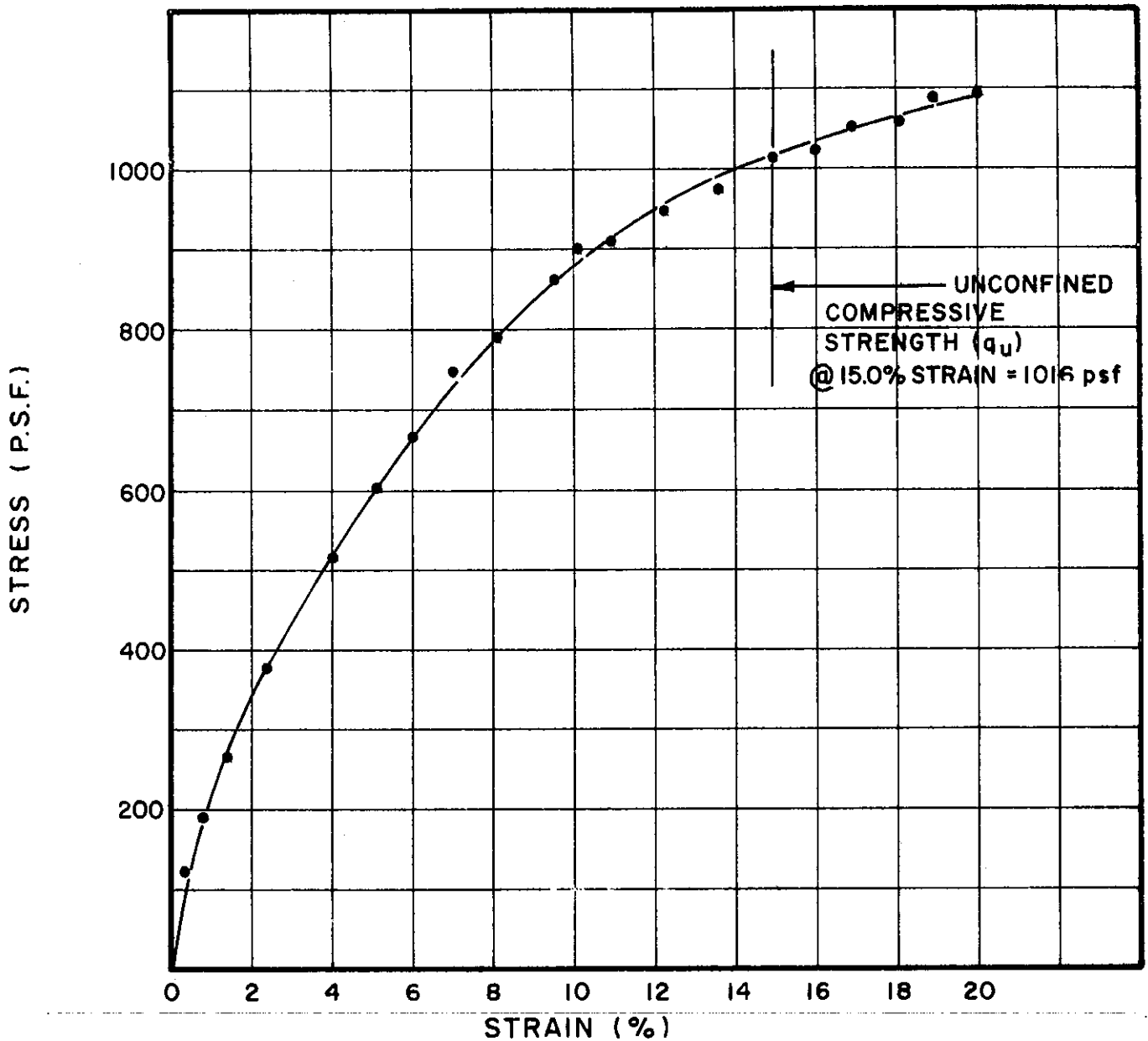
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI20.2	1.40	3.50	0.26	31.6	93	44	19	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





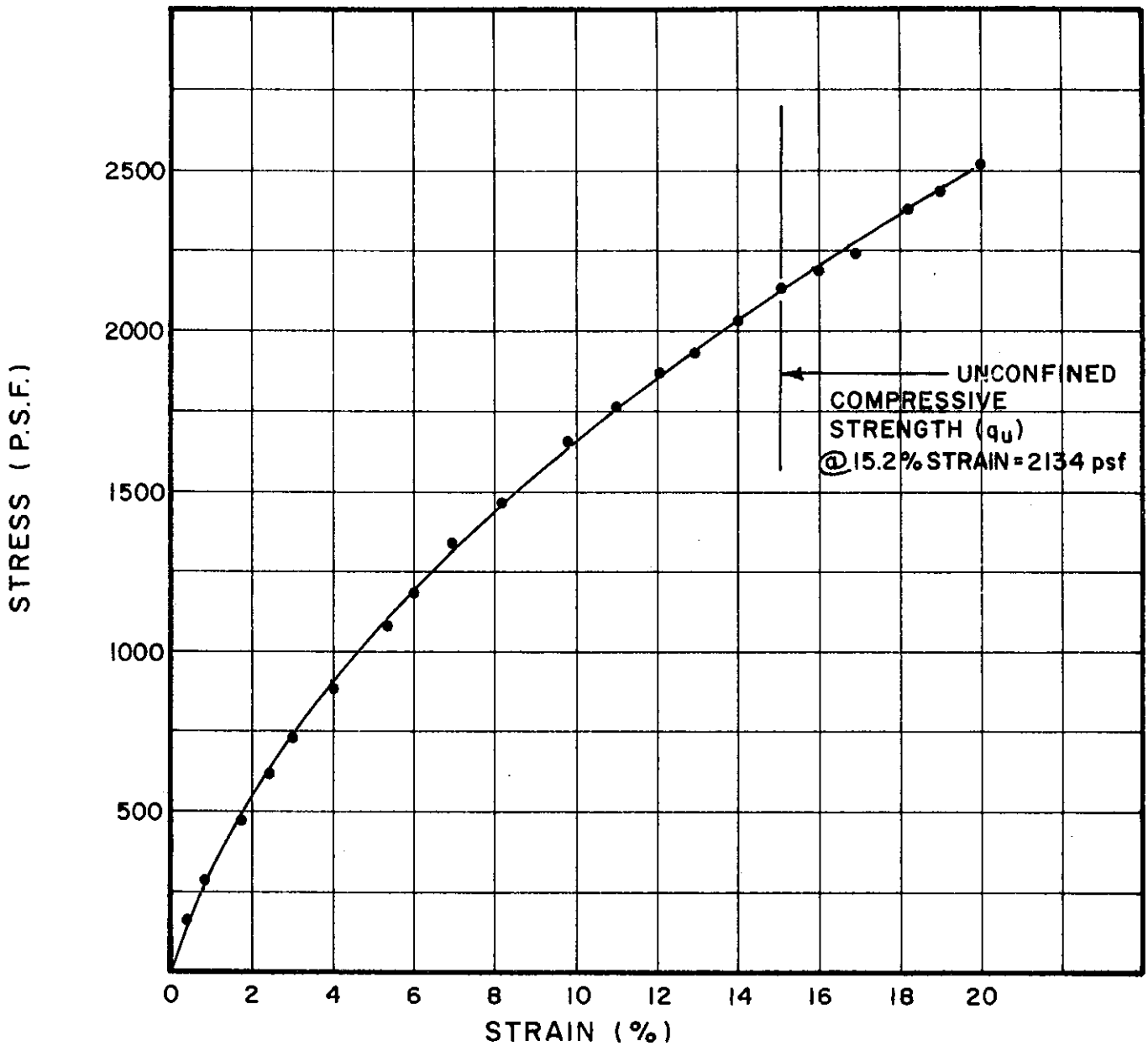
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
UI21.1	1.40	3.50	0.26	34.1	87	42	20	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 6  
 DEPTH 18.1' TO 18.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

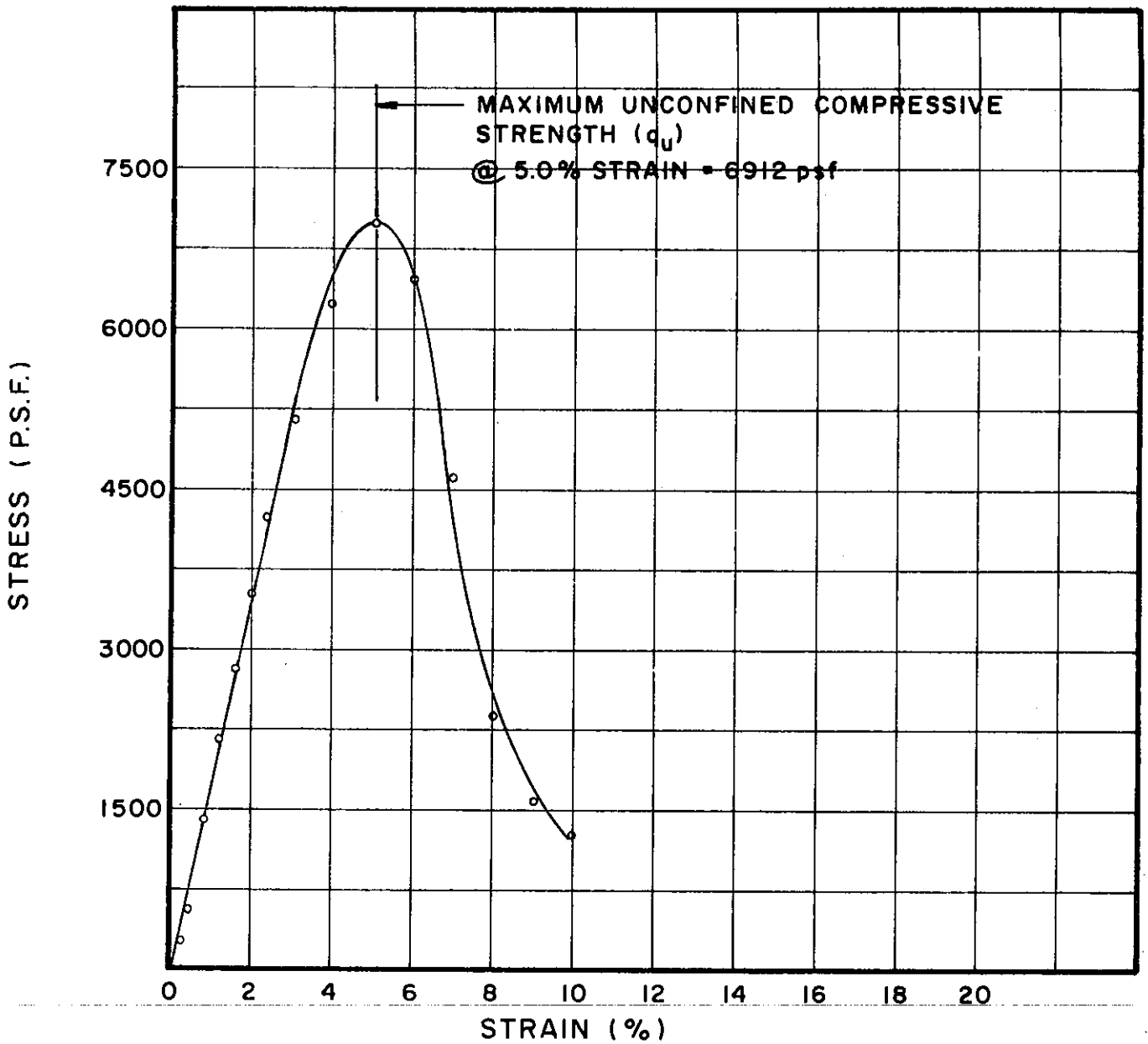


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI25.1	1.40	3.50	0.26	22.5	104	34	18	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 14  
 DEPTH 59.2' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U266.1	1.44	3.46	.260	22.4	108	59	23	SILTY CLAY (CH)

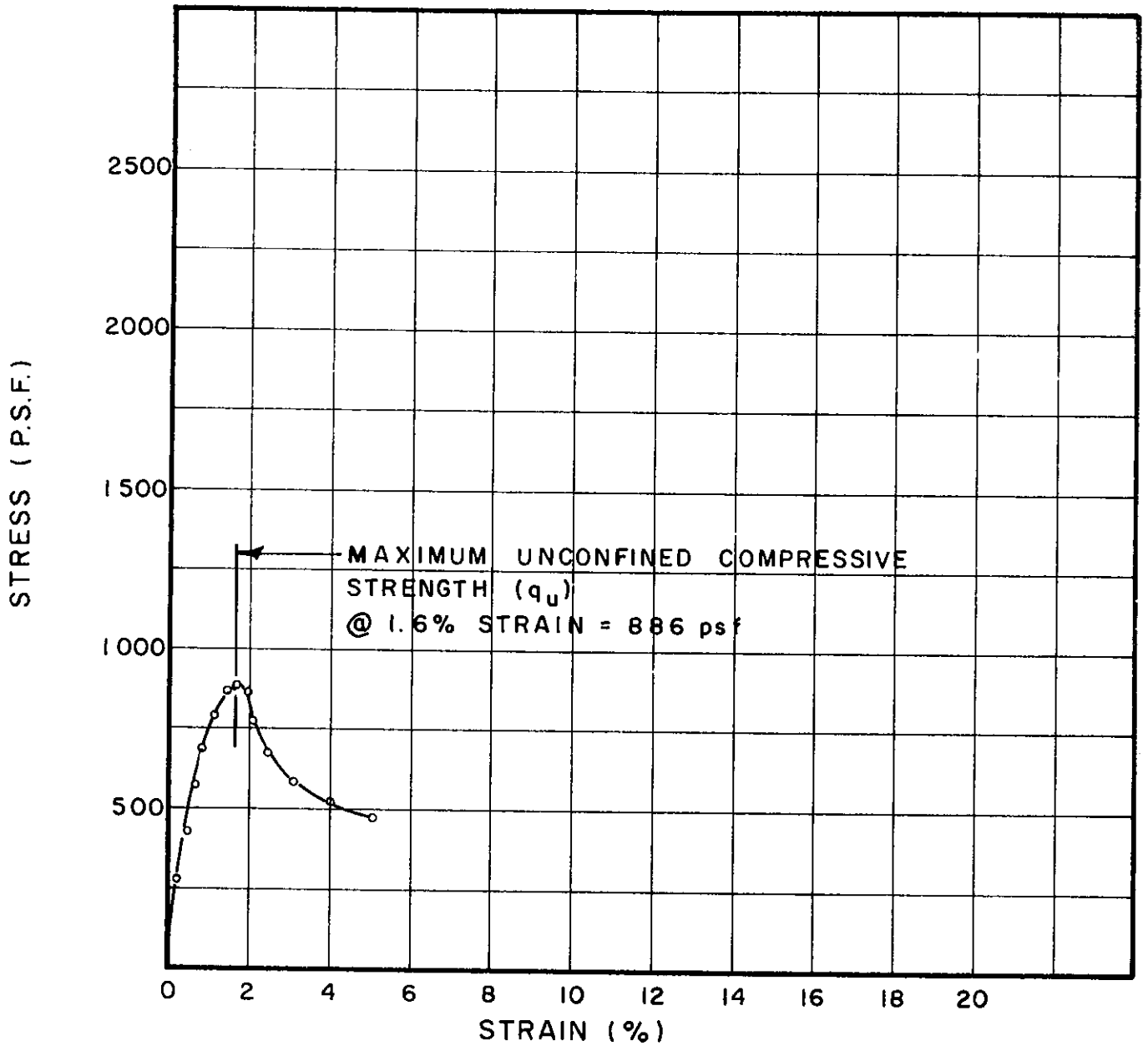
BORING NO. 25

SAMPLE NO. 1

DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

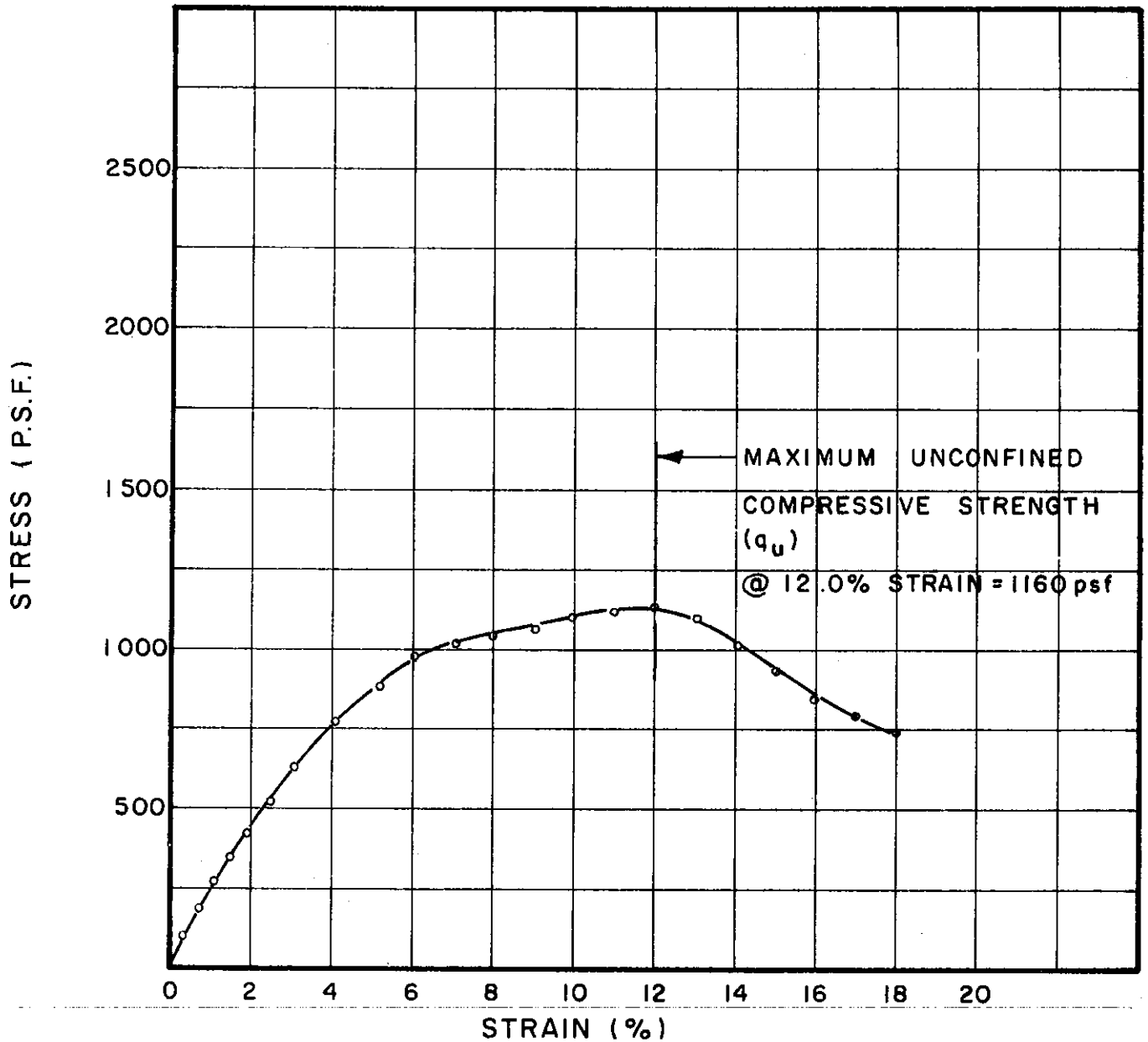


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U5.1	1.41	3.50	.257	36.6	86	38	20	SILTY CLAY (CL)

BORING NO. 26  
 SAMPLE NO. 9  
 DEPTH 39.4' TO 39.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U9.1	1.41	3.45	.261	24.8	101	36	20	SILTY CLAY, SANDY (CL)

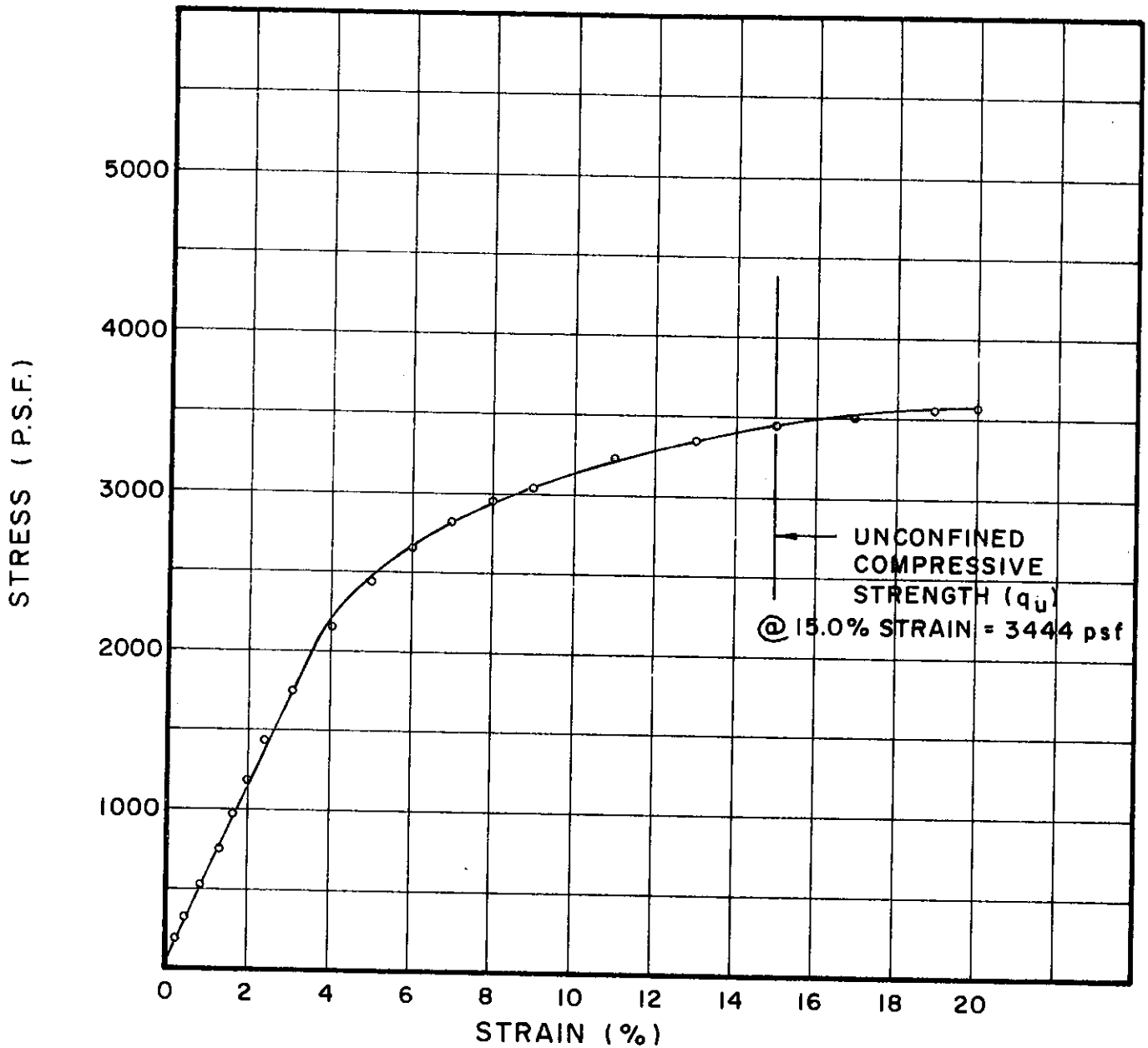
BORING NO. 26

SAMPLE NO. 17

DEPTH 78.2' TO 78.5'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

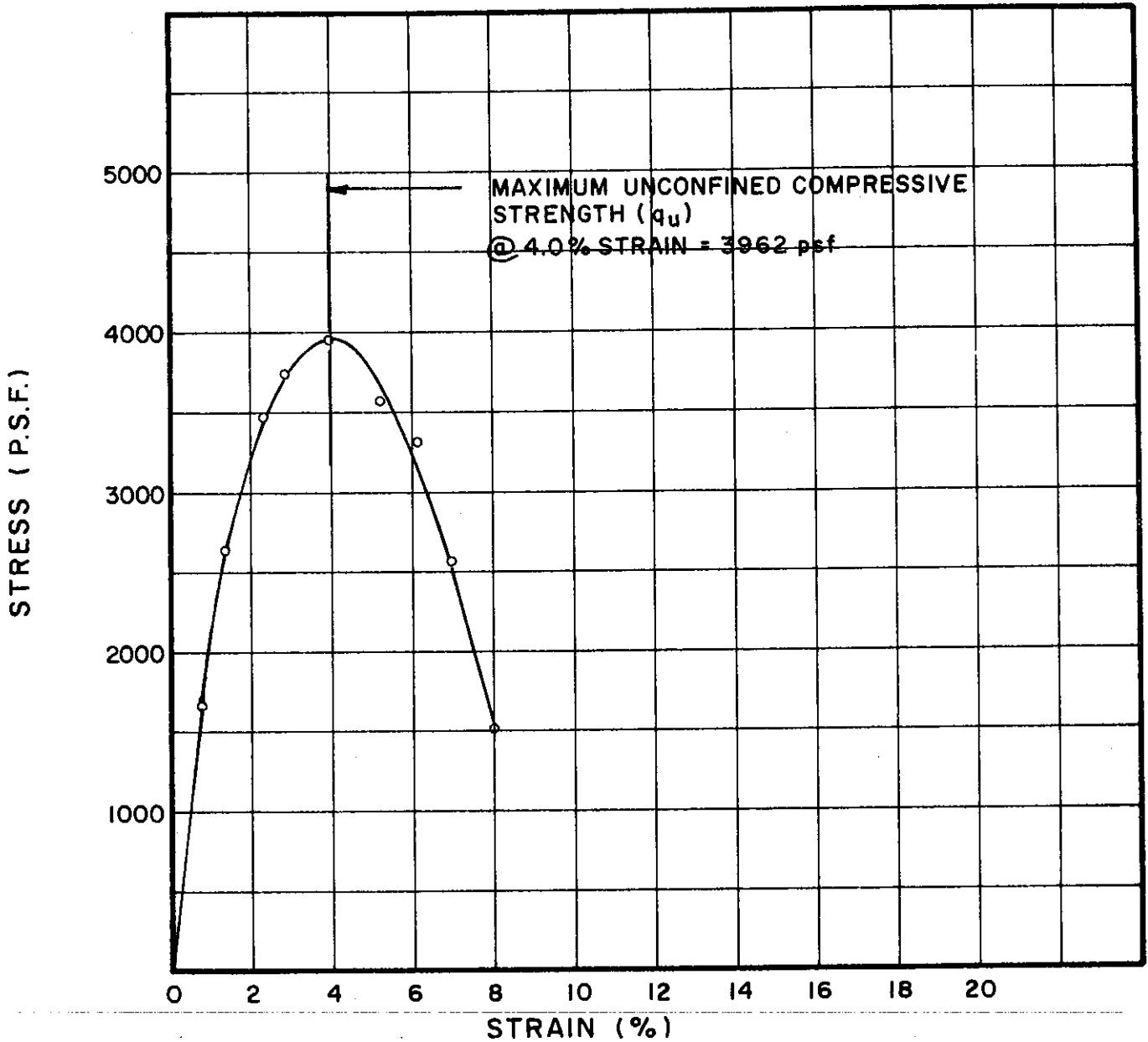


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U303.1	1.41	3.45	.261	30.6	94	51	23	SILTY CLAY (CL-CH)

BORING NO. 27  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U183.1	1.39	3.49	0.26	25.3	100	47	23	SILTY CLAY (CL)

BORING NO. 28

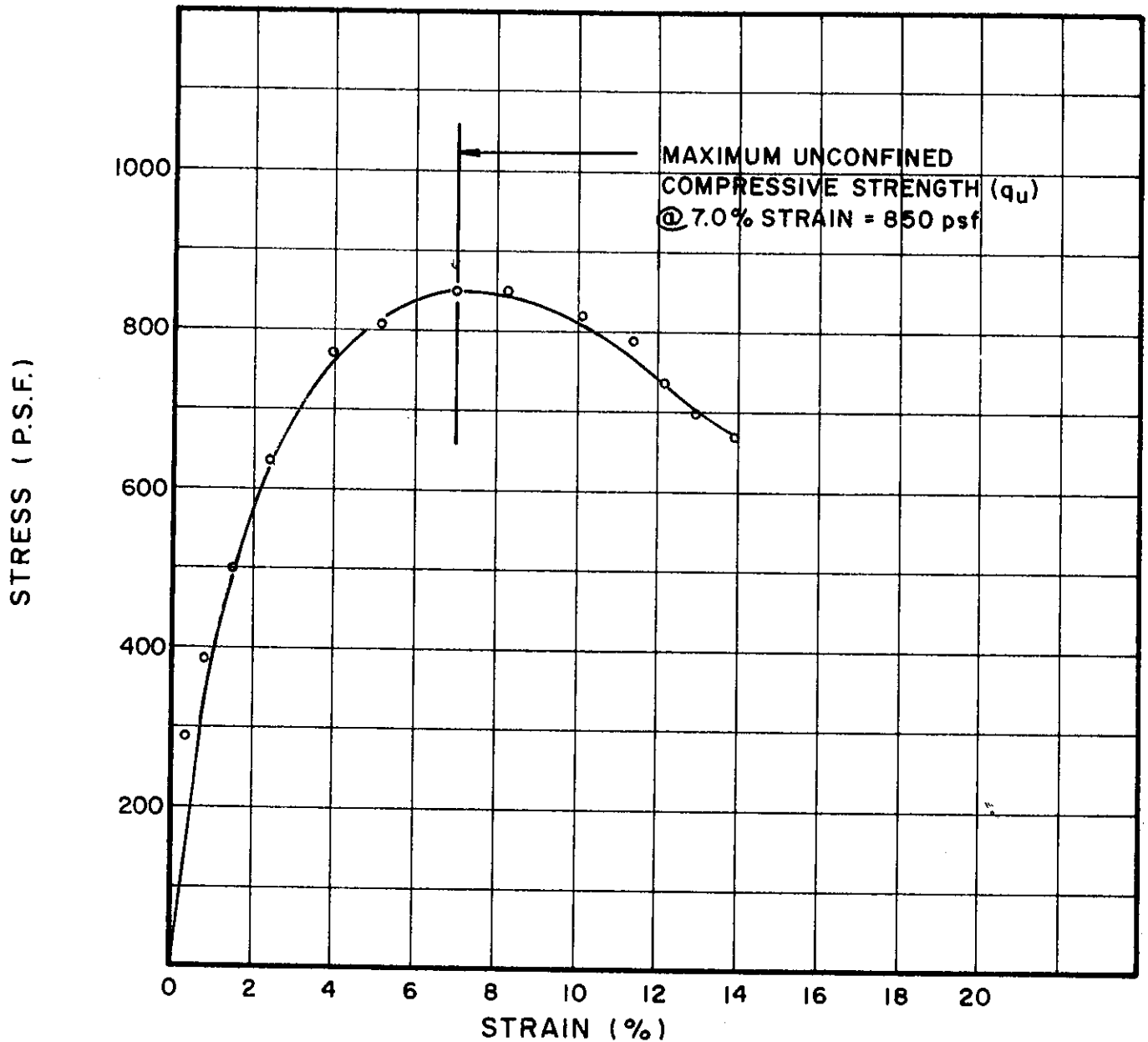
SAMPLE NO. 3

DEPTH 5.8' TO 6.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
UI86.2	1.40	3.50	0.26	38.0	84	42	20	SILTY CLAY (CL)

BORING NO. 28

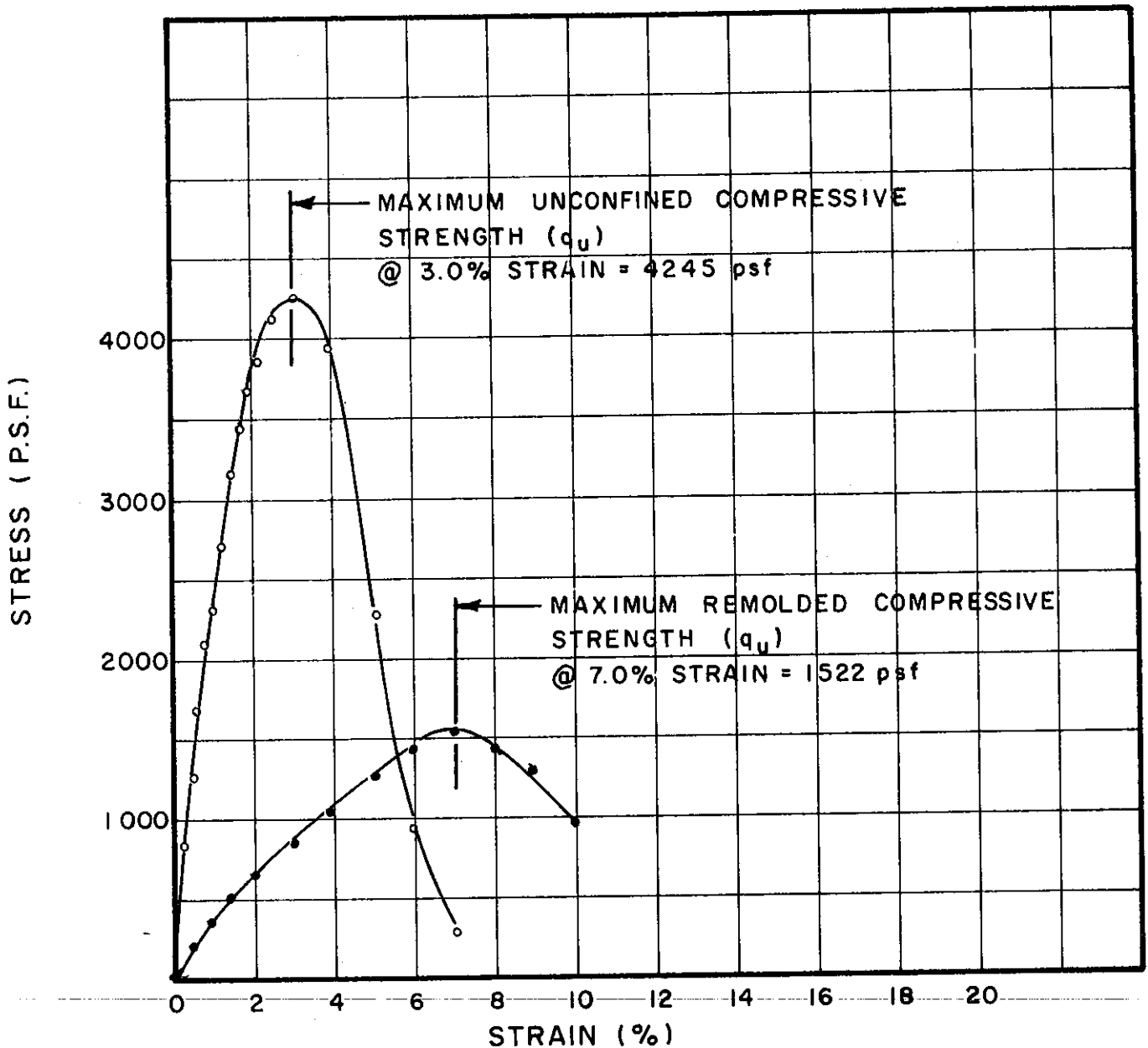
SAMPLE NO. 9

DEPTH 28.8' TO 29.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





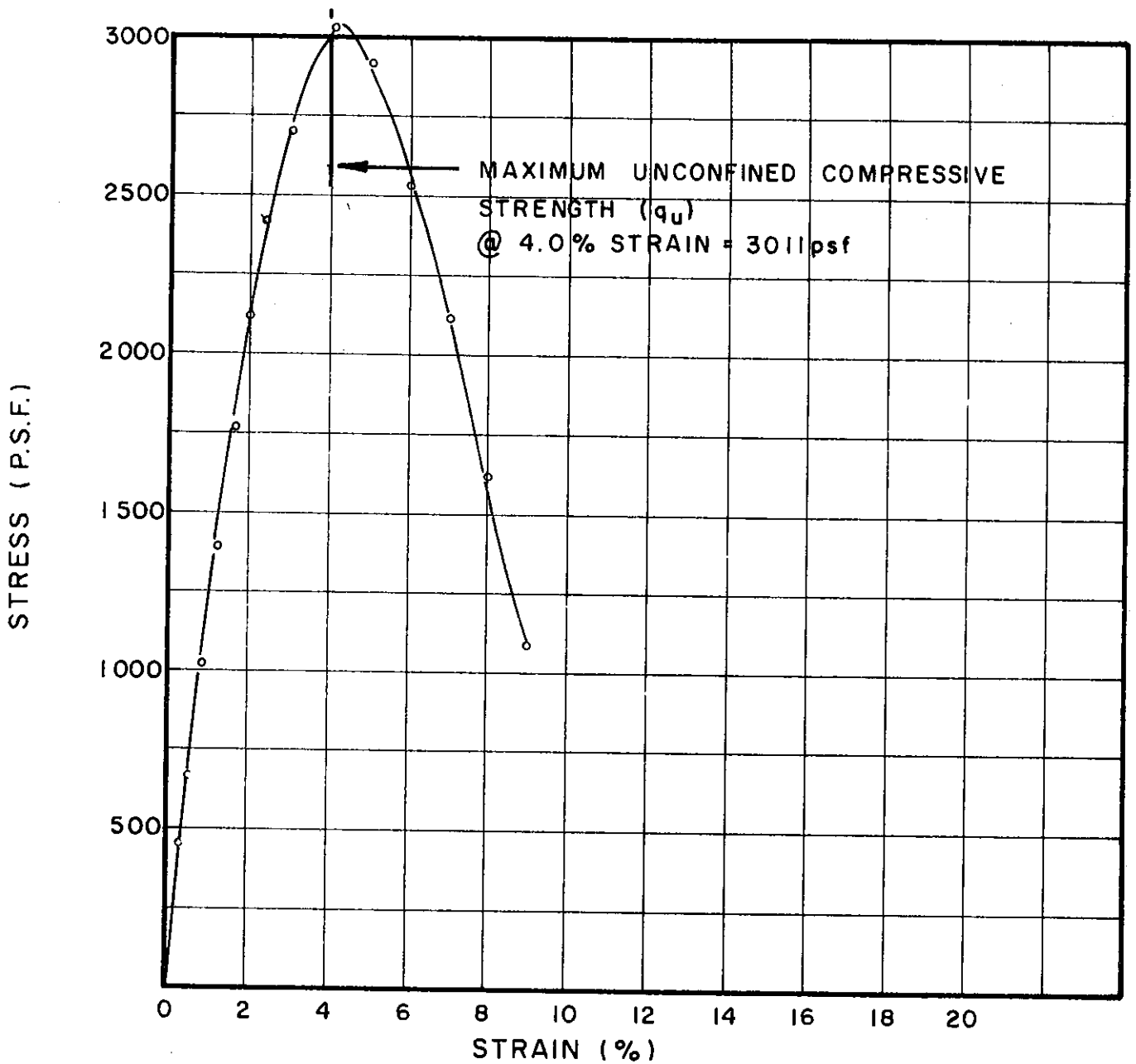
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI7.1	1.44	3.54	.254	24.3	102	49	24	SILTY CLAY (CL-CH)
UI7.1	1.40	3.50	.257	24.3	103	49	24	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 3  
 DEPTH 8.7' TO 9.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

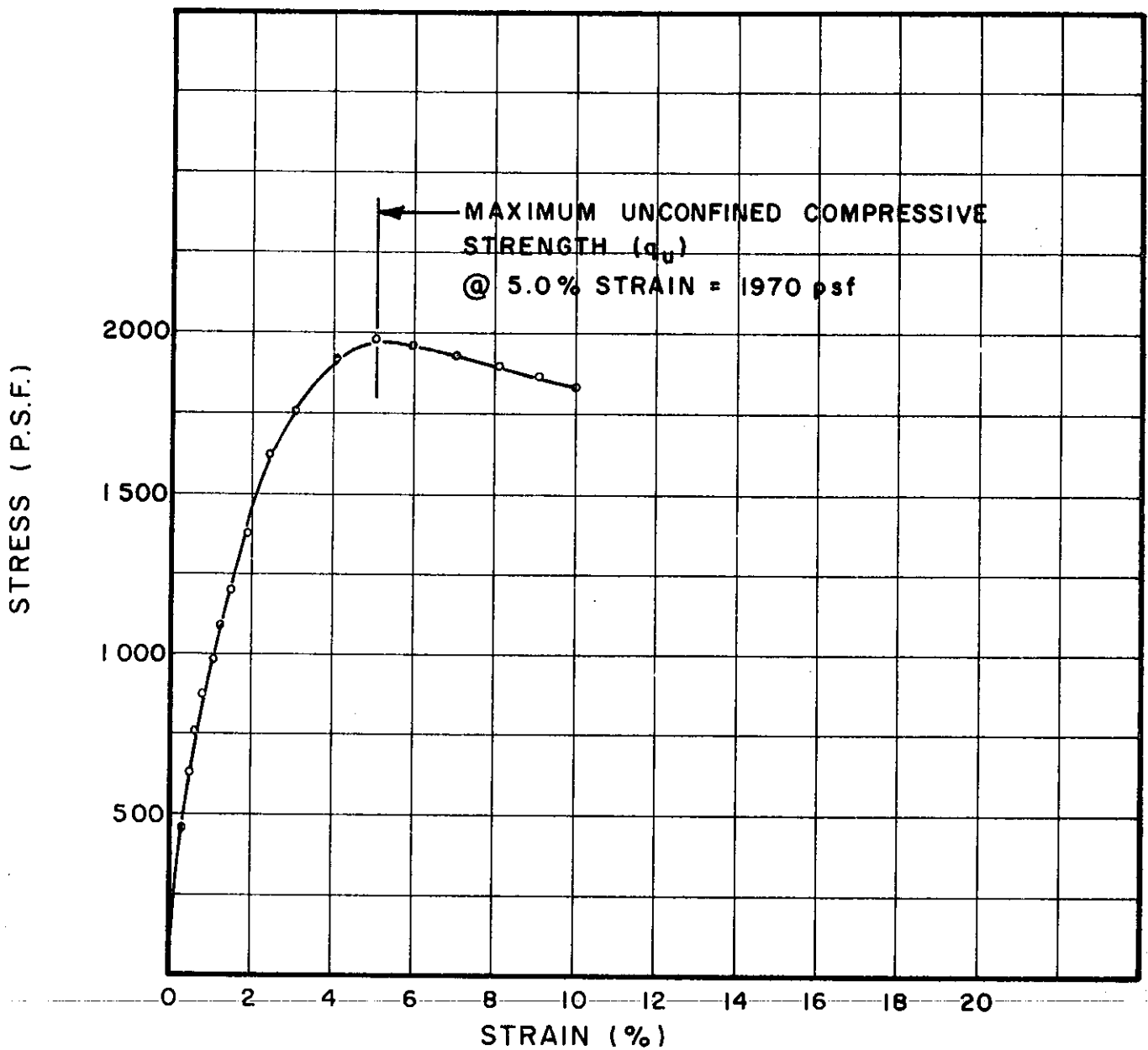


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI8.1	1.42	3.50	.257	28.5	96	46	22	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.3' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U22.1	1.41	3.50	.257	33.4	90	44	21	SILTY CLAY (CL-CH)

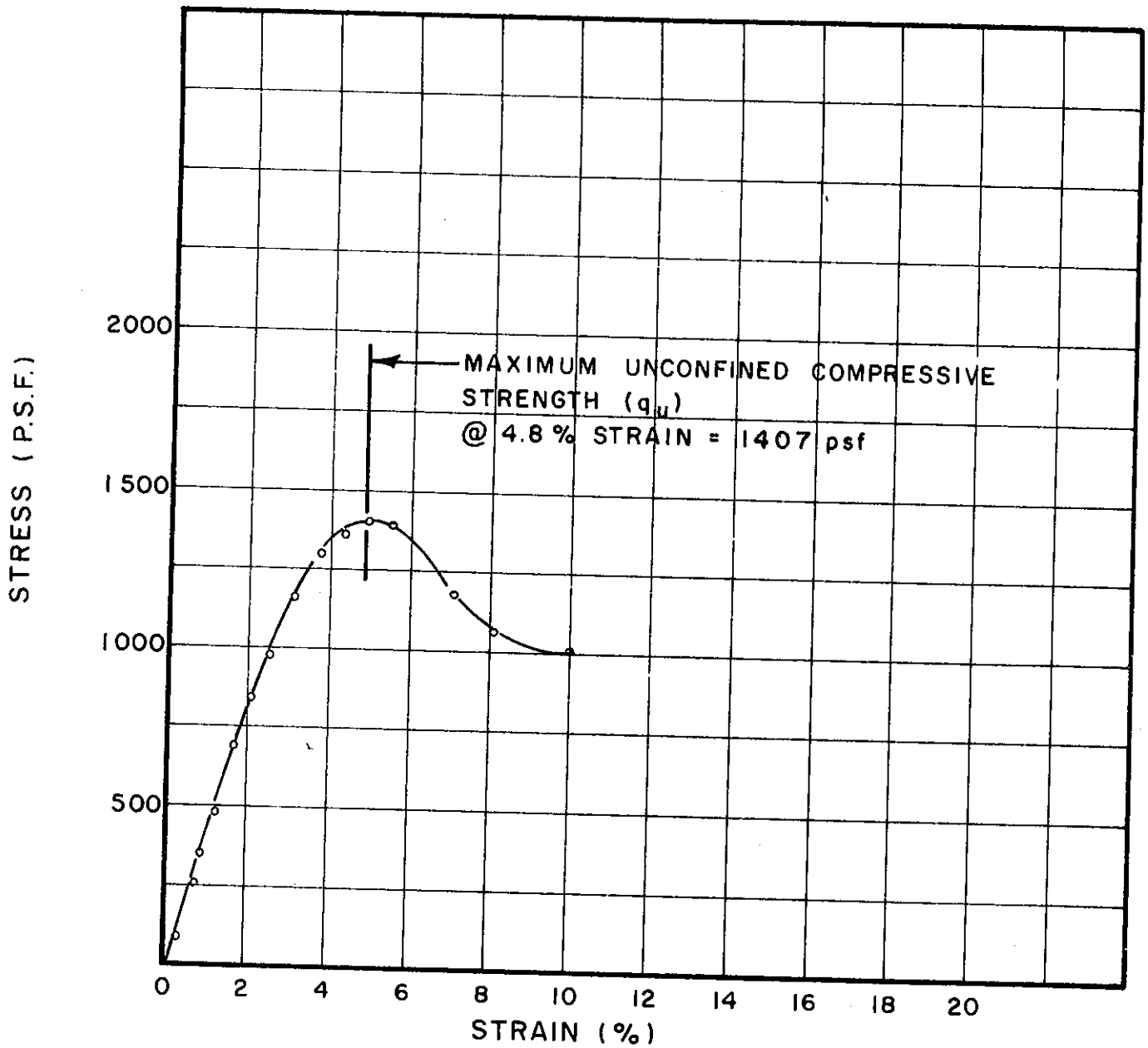
BORING NO. 38

SAMPLE NO. 12

DEPTH 54.2' TO 54.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U24.1	1.40	3.50	.257	41.3	79	55	24	SILTY CLAY (CL-CH)

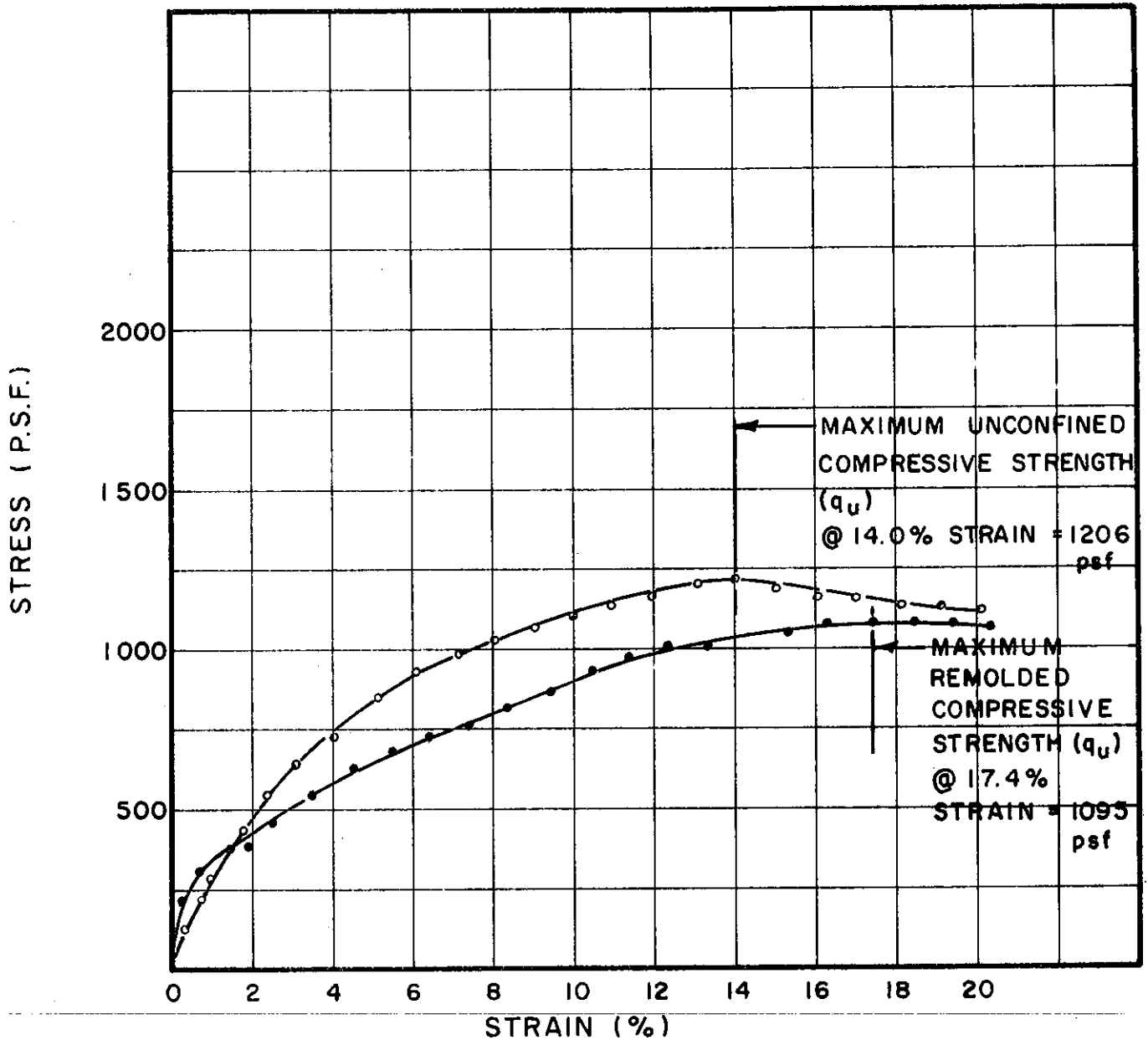
BORING NO. 38

SAMPLE NO. 16

DEPTH 73.7' TO 74.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U25.1	1.41	3.50	.257	22.2	104	33	19	SILTY CLAY GRAVELLY (CL)
U <sub>r</sub> 25.1	1.40	3.52	.256	22.2	105	33	19	SILTY CLAY GRAVELLY (CL)

BORING NO. 38

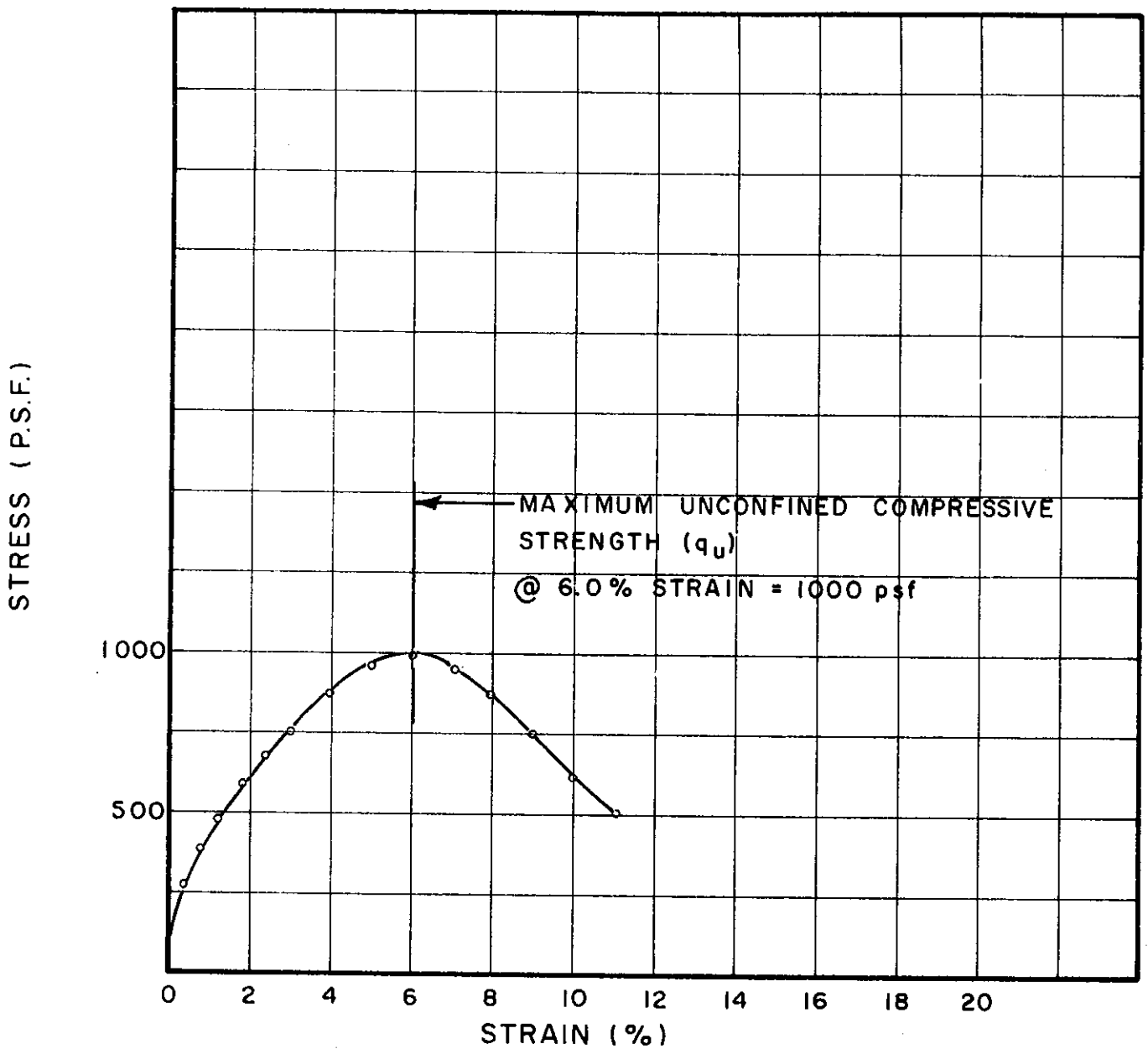
SAMPLE NO. 18

DEPTH 84.6' TO 84.9'

## UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

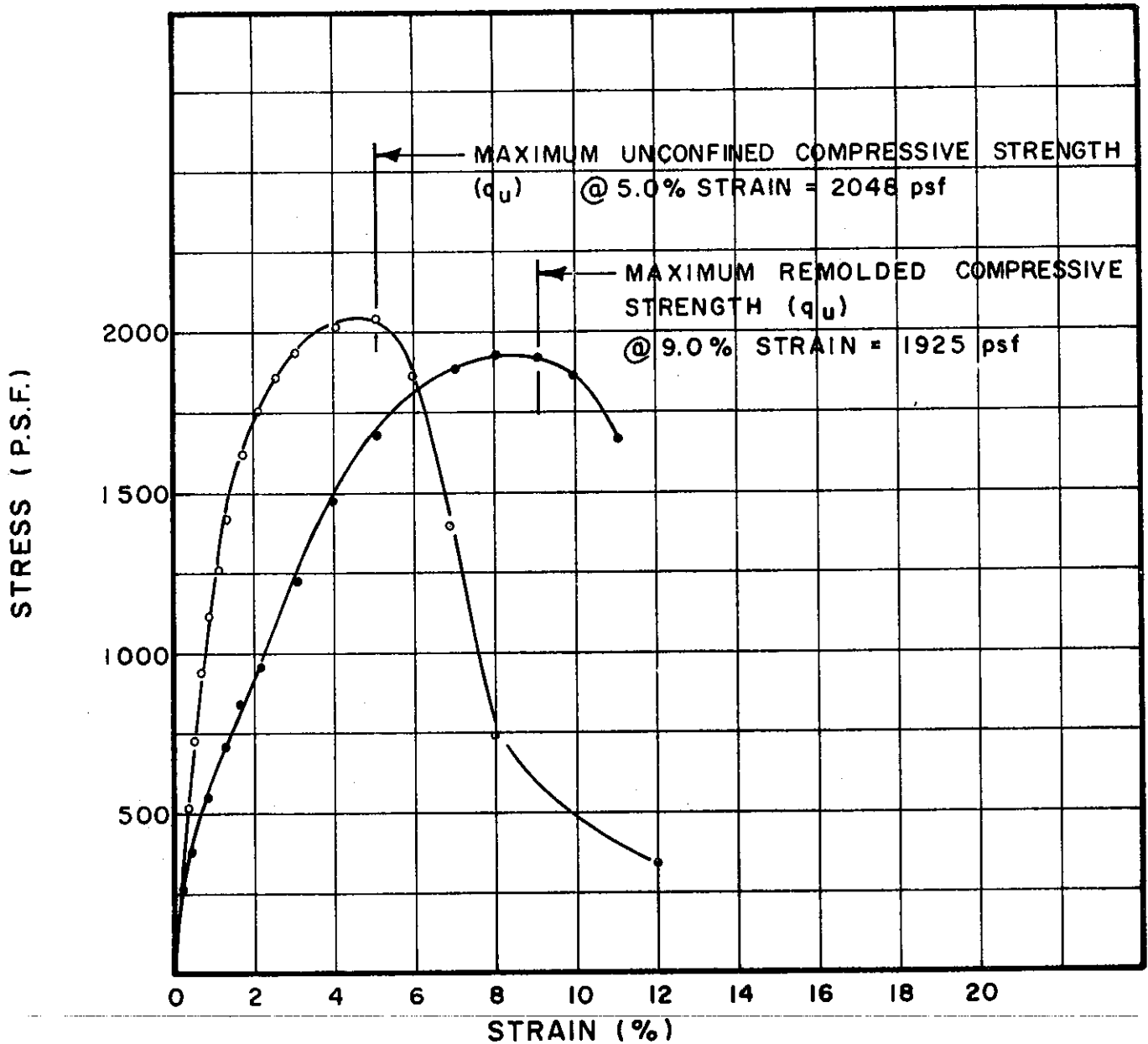


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U26.1	1.42	3.50	.257	31.9	92	45	25	SILTY CLAY (CL)

BORING NO. 38  
 SAMPLE NO. 24  
 DEPTH 114.2' TO 114.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



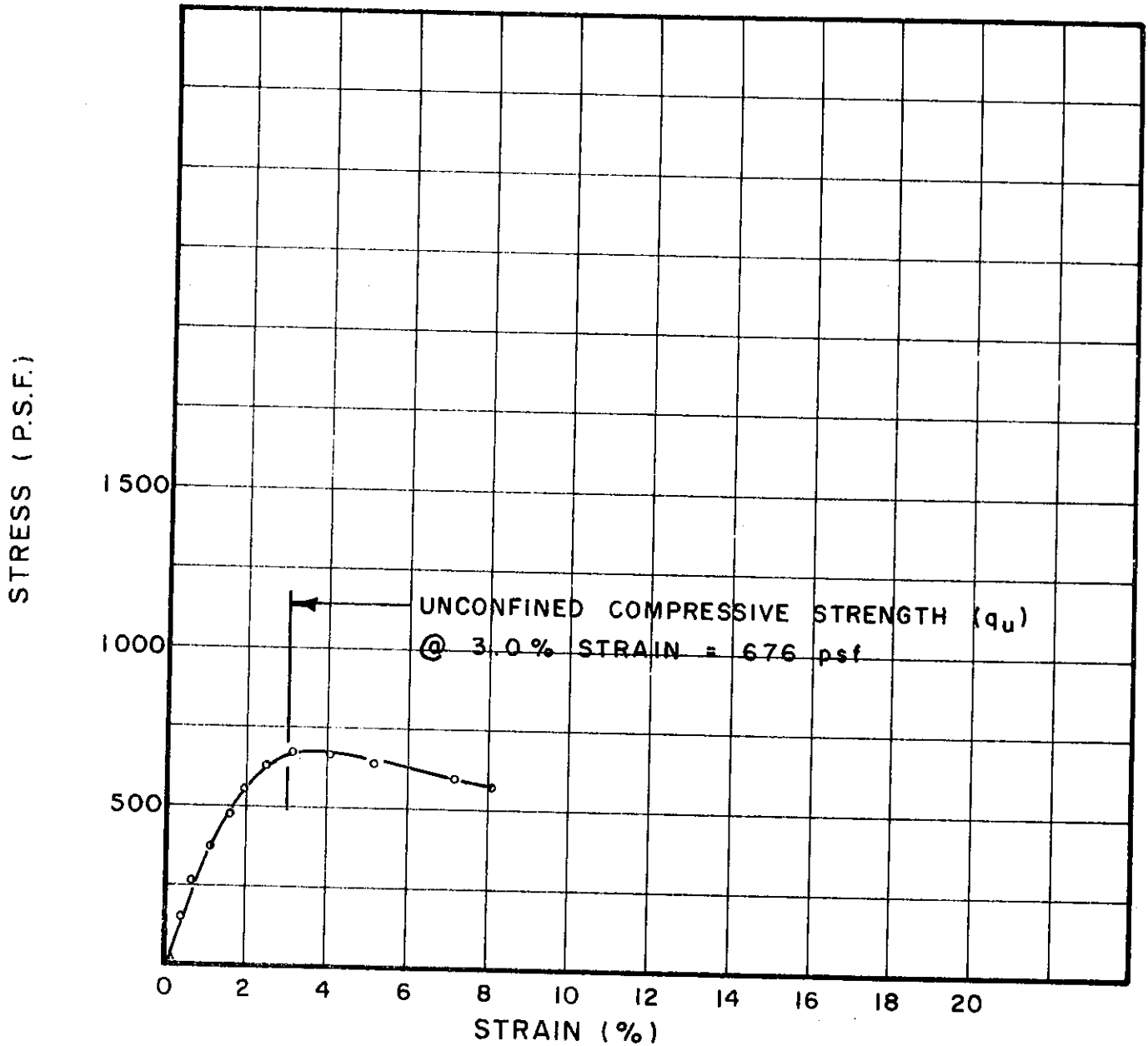
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U28.1	1.43	3.50	.257	29.4	94	63	28	SILTY CLAY (CH)
U <sub>r</sub> 28.1	1.40	3.38	.266	29.4	95	63	28	SILTY CLAY (CH)

BORING NO. 41  
 SAMPLE NO. 2  
 DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



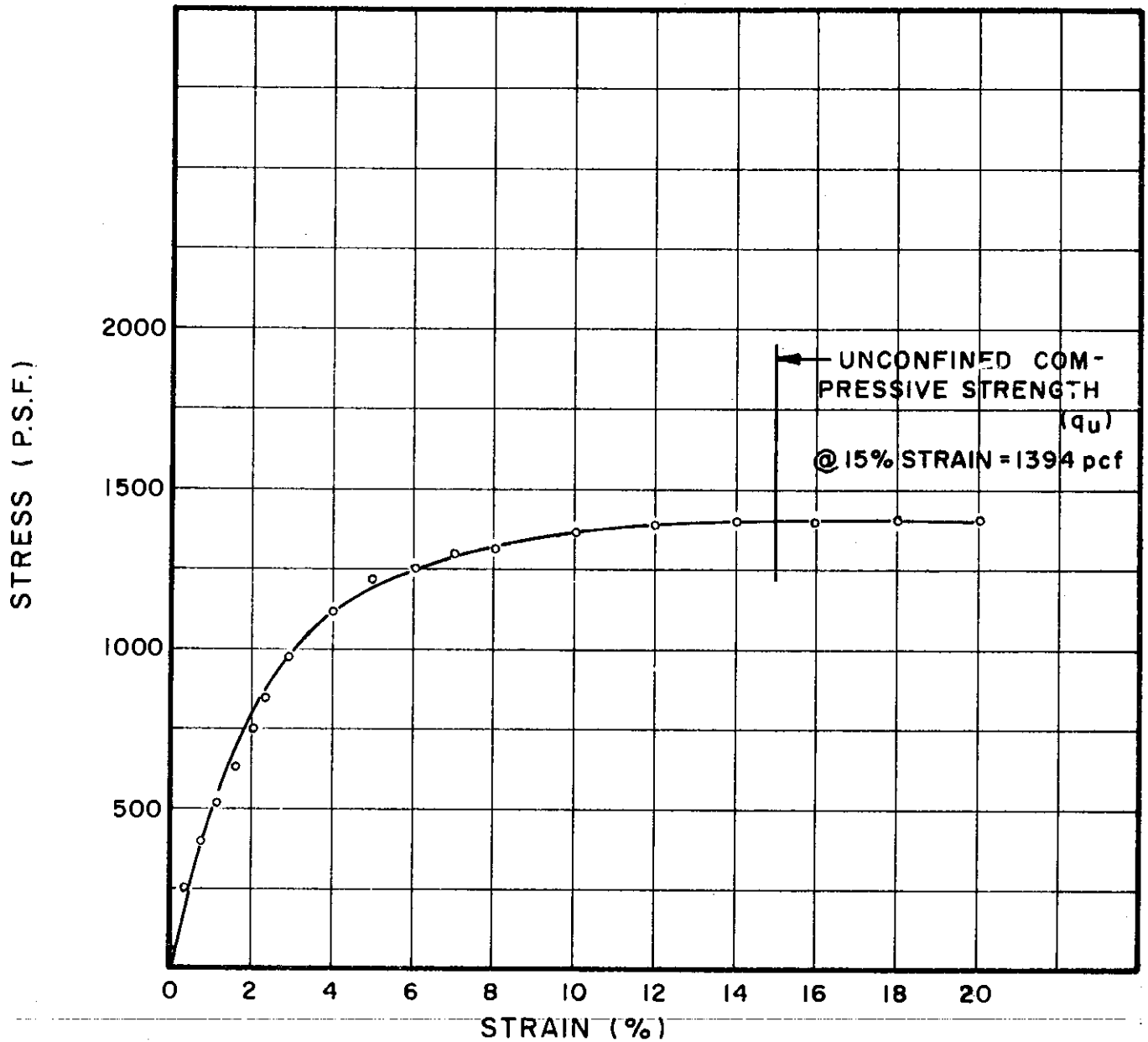
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U30.1	1.42	3.50	.257	39.2	83	47	24	SILTY CLAY (CL-CH)

BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 20.6' TO 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





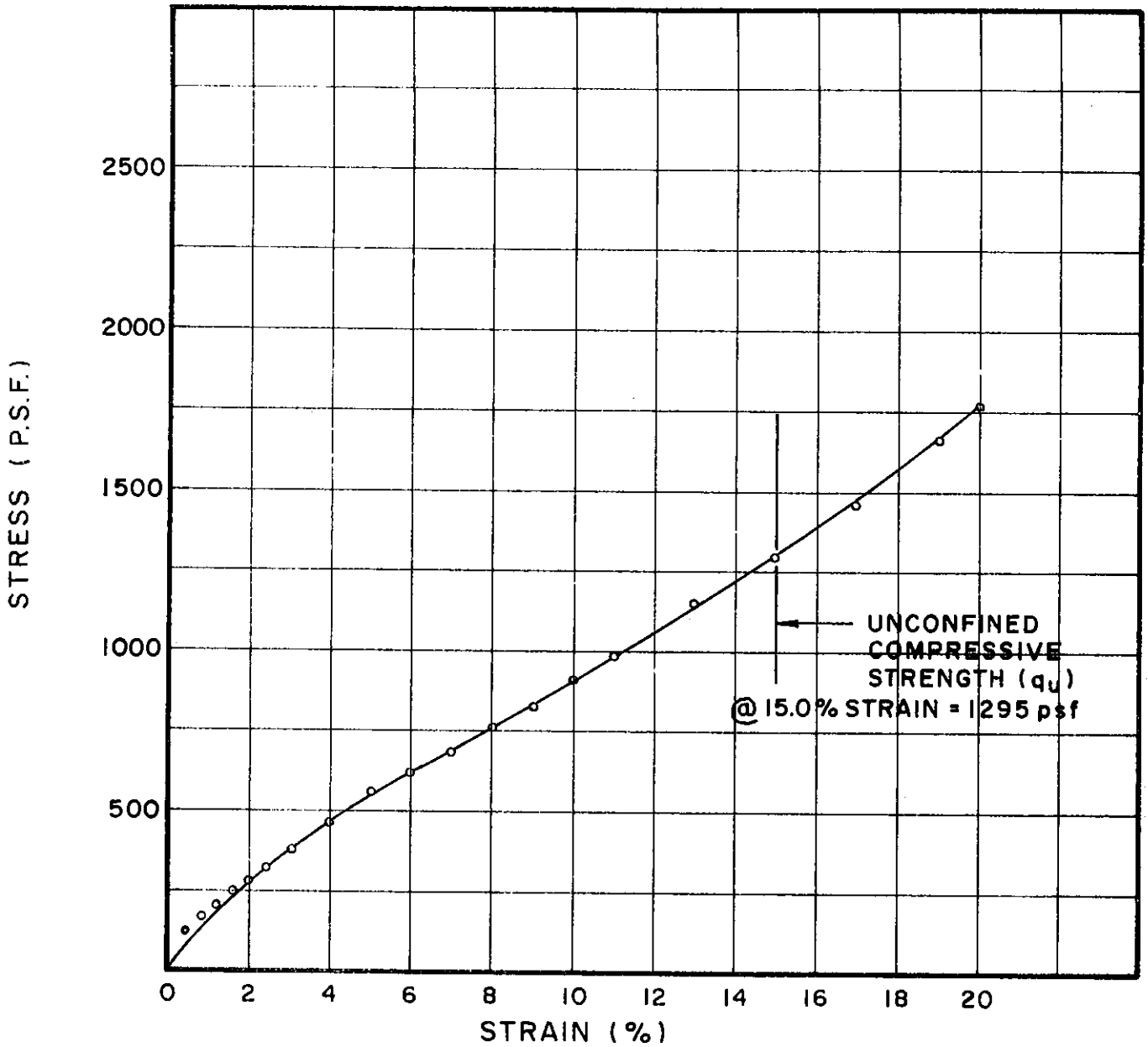
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U31.1	1.40	3.50	.257	36.9	86	45	21	SILTY CLAY, (CL-CH)

BORING NO. 41  
 SAMPLE NO. 9  
 DEPTH 30.9' TO 31.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

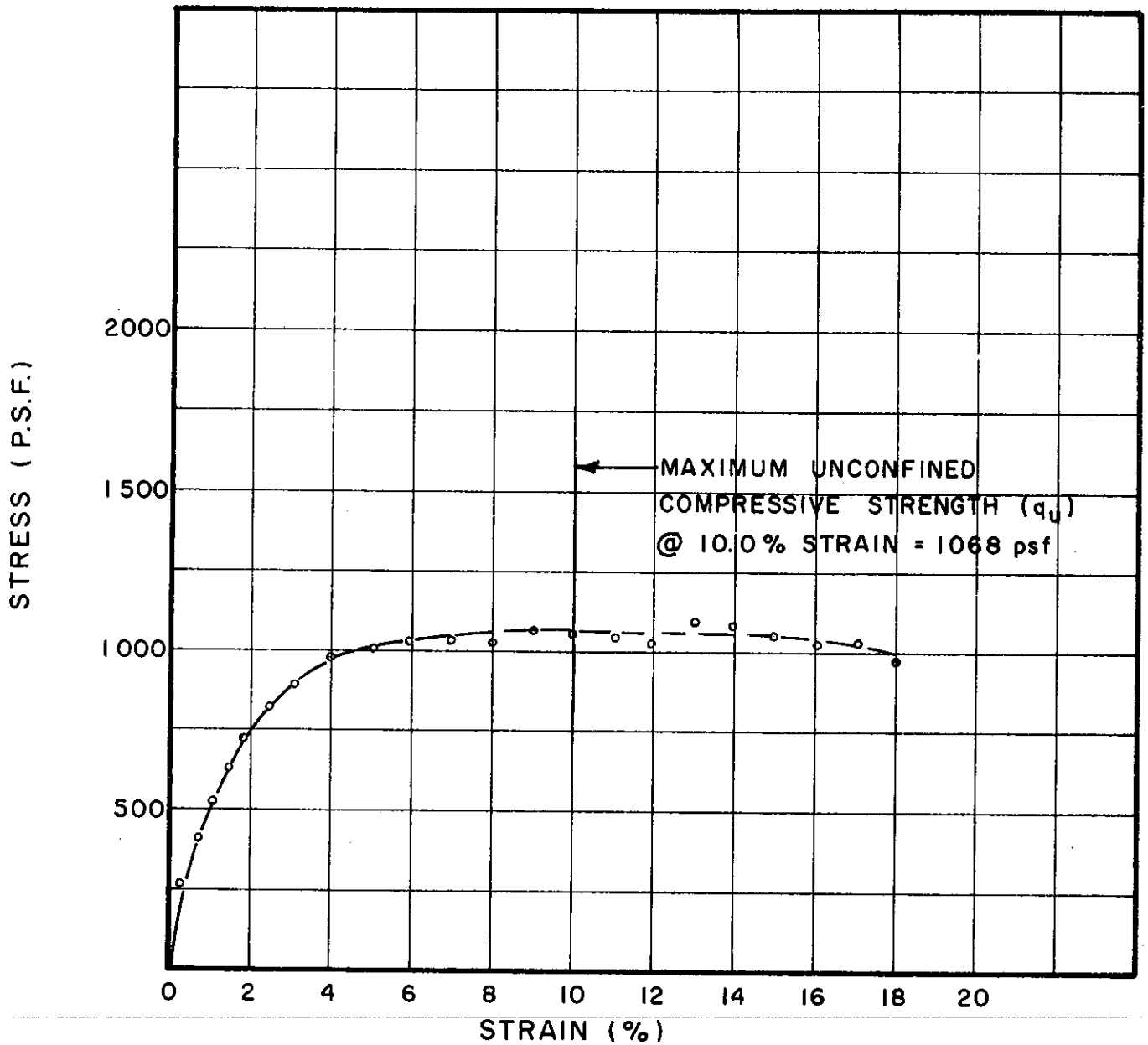


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U32.1	1.37	3.45	.260	16.0	118	20	12	SILTY CLAY, SANDY (CL-SC)
								(SAMPLE SLIGHTLY DISTURBED)

BORING NO. 41  
 SAMPLE NO. 11  
 DEPTH 40.6' TO 41.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

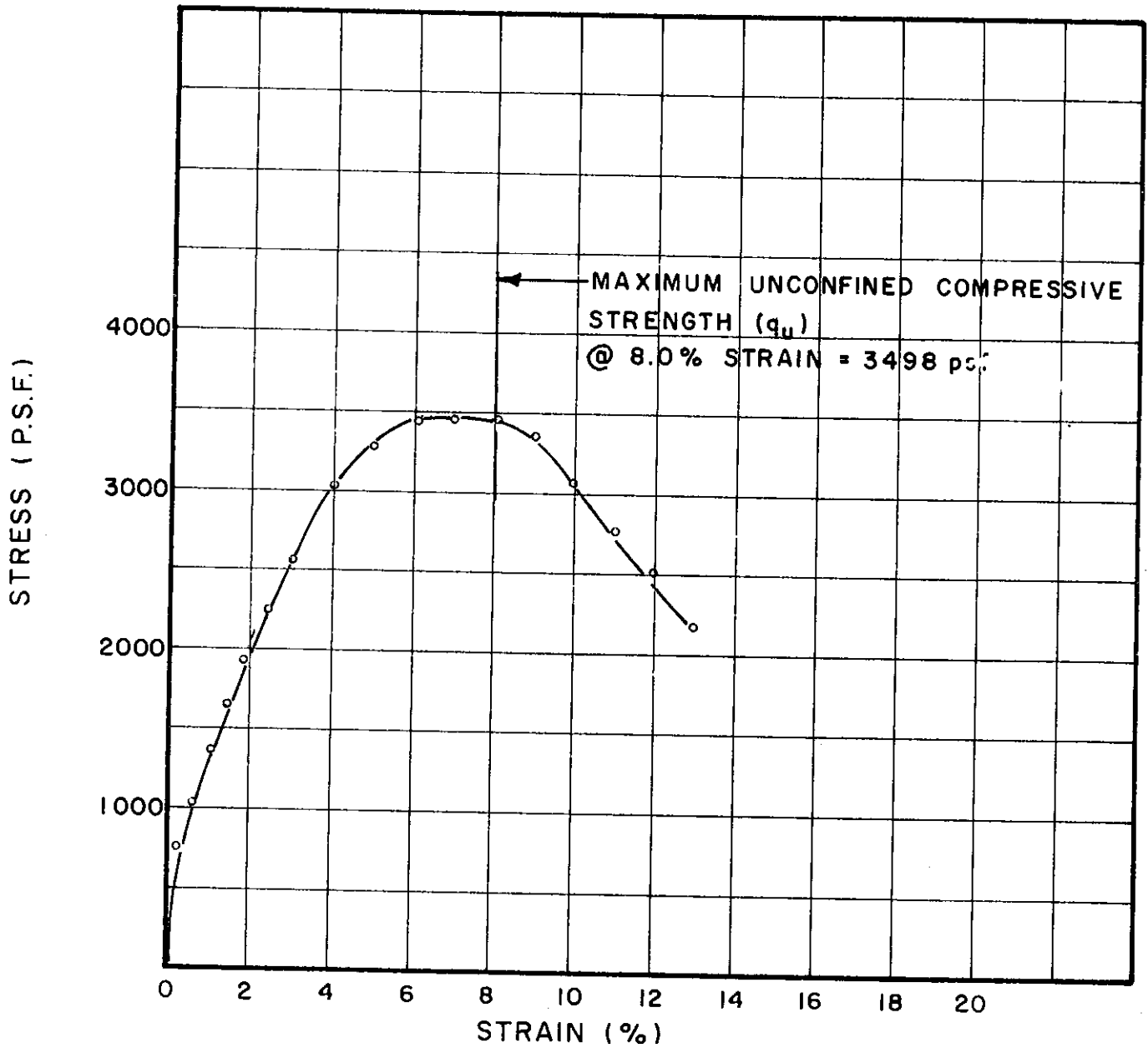


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U37.1	1.41	3.47	.259	26.4	99	34	20	SILTY CLAY, SANDY (CL)

BORING NO. 41  
 SAMPLE NO. 23  
 DEPTH 101.8' TO 102.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

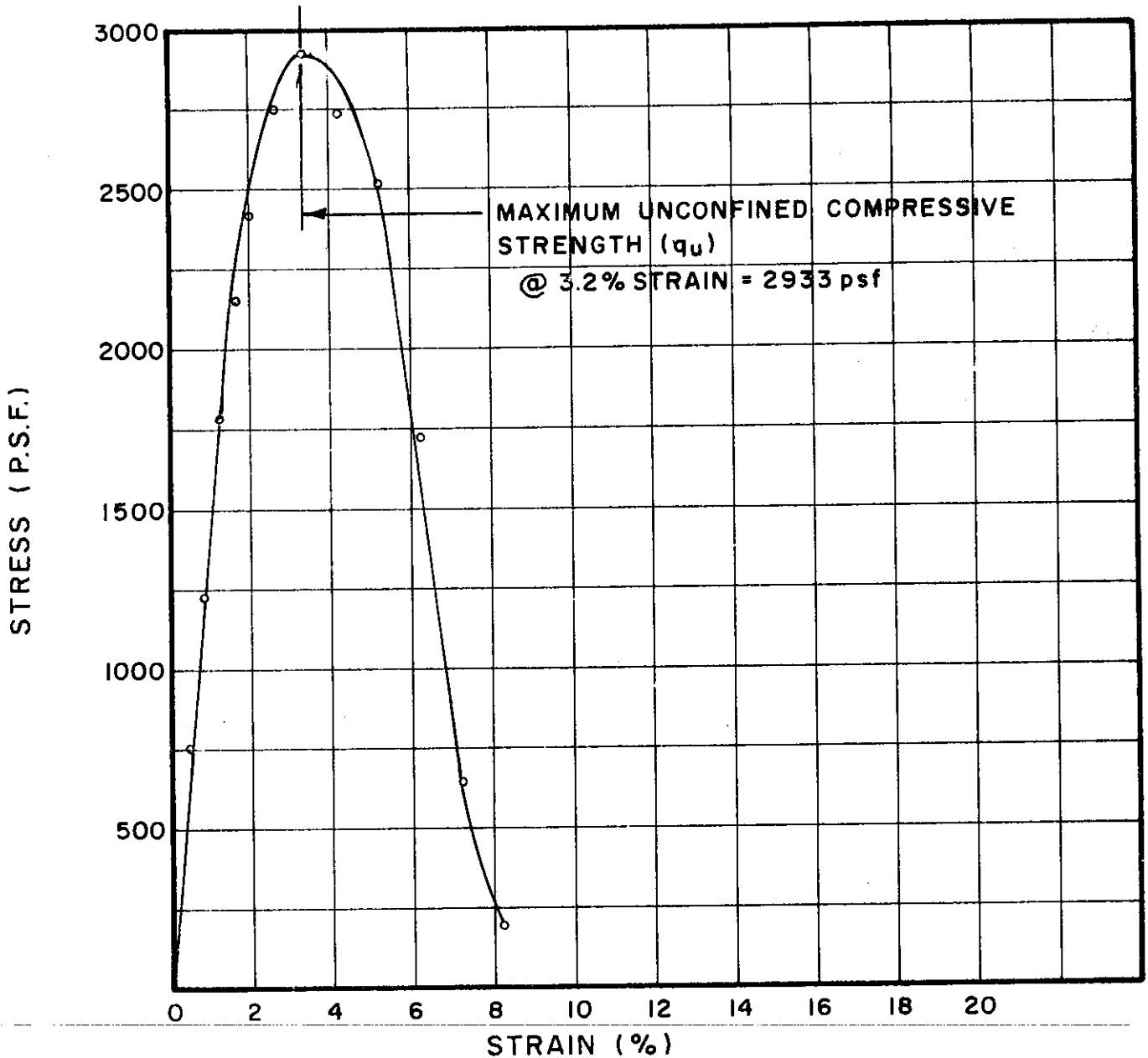


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U40.1	1.44	3.13	.29	13.8	124	25	17	CLAYEY SAND (GC-SC)

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.7' TO 131.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI98.1	1.43	3.50	.257	27.3	97	63	24	SILTY CLAY (CH)

BORING NO. 48

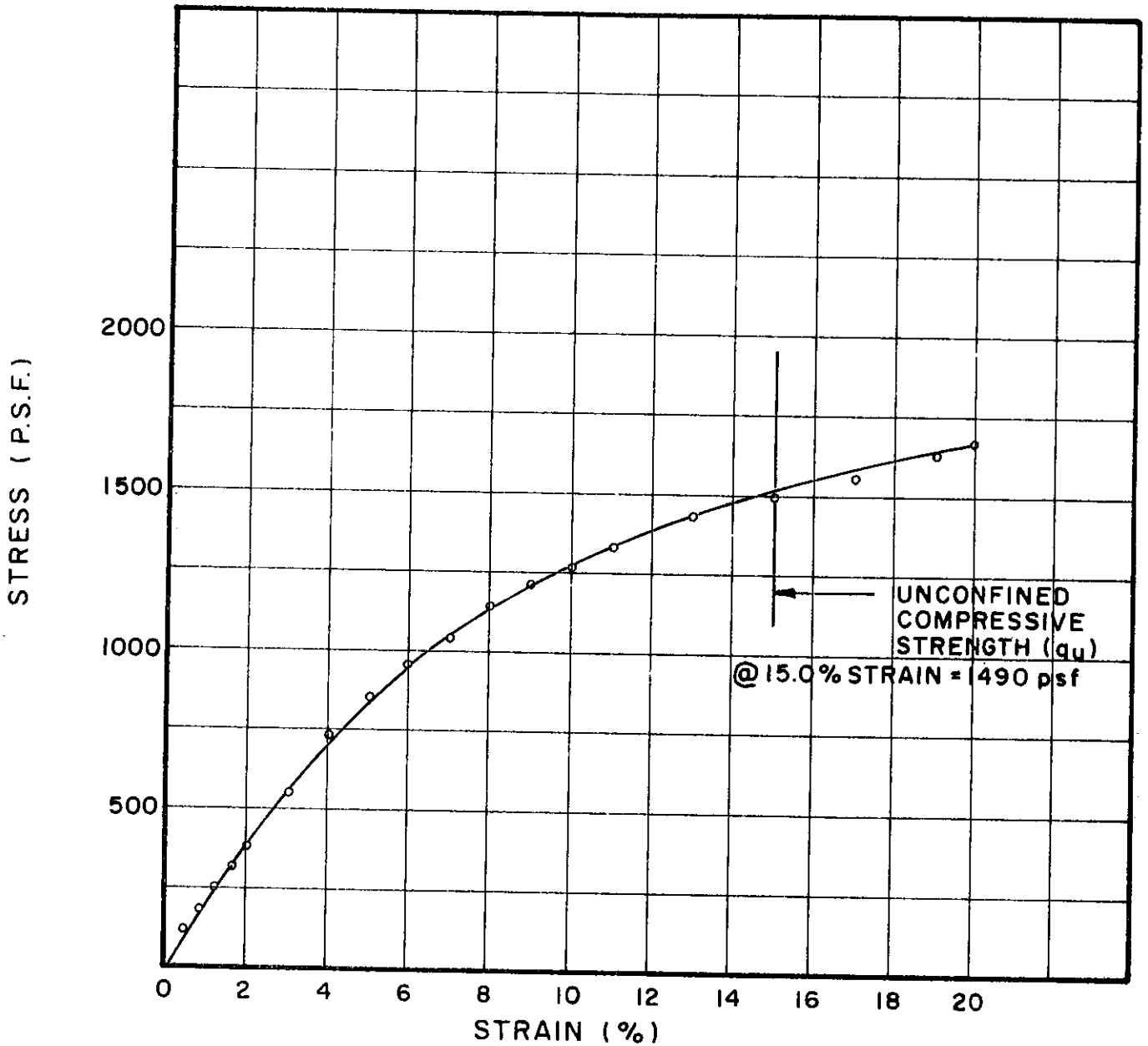
SAMPLE NO. 2

DEPTH 3.2' TO 3.5'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

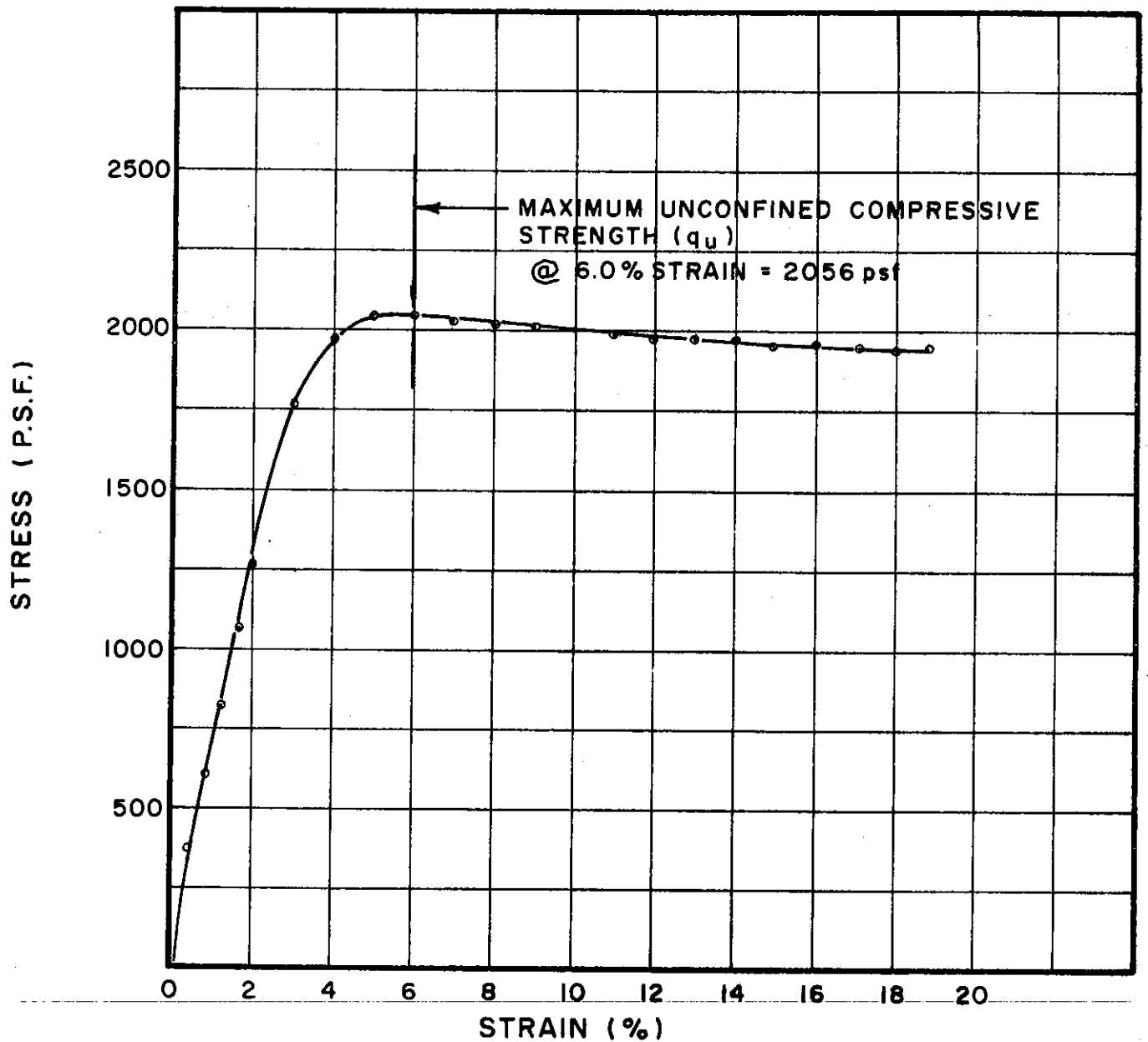


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U204.1	1.41	3.41	.264	25.2	100	34	16	SILTY CLAY, SANDY (CL)

BORING NO. 48  
 SAMPLE NO. 14  
 DEPTH 61.2' TO 61.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U134.1	1.41	3.51	.256	34.0	90	42	22	SILTY CLAY (CL)

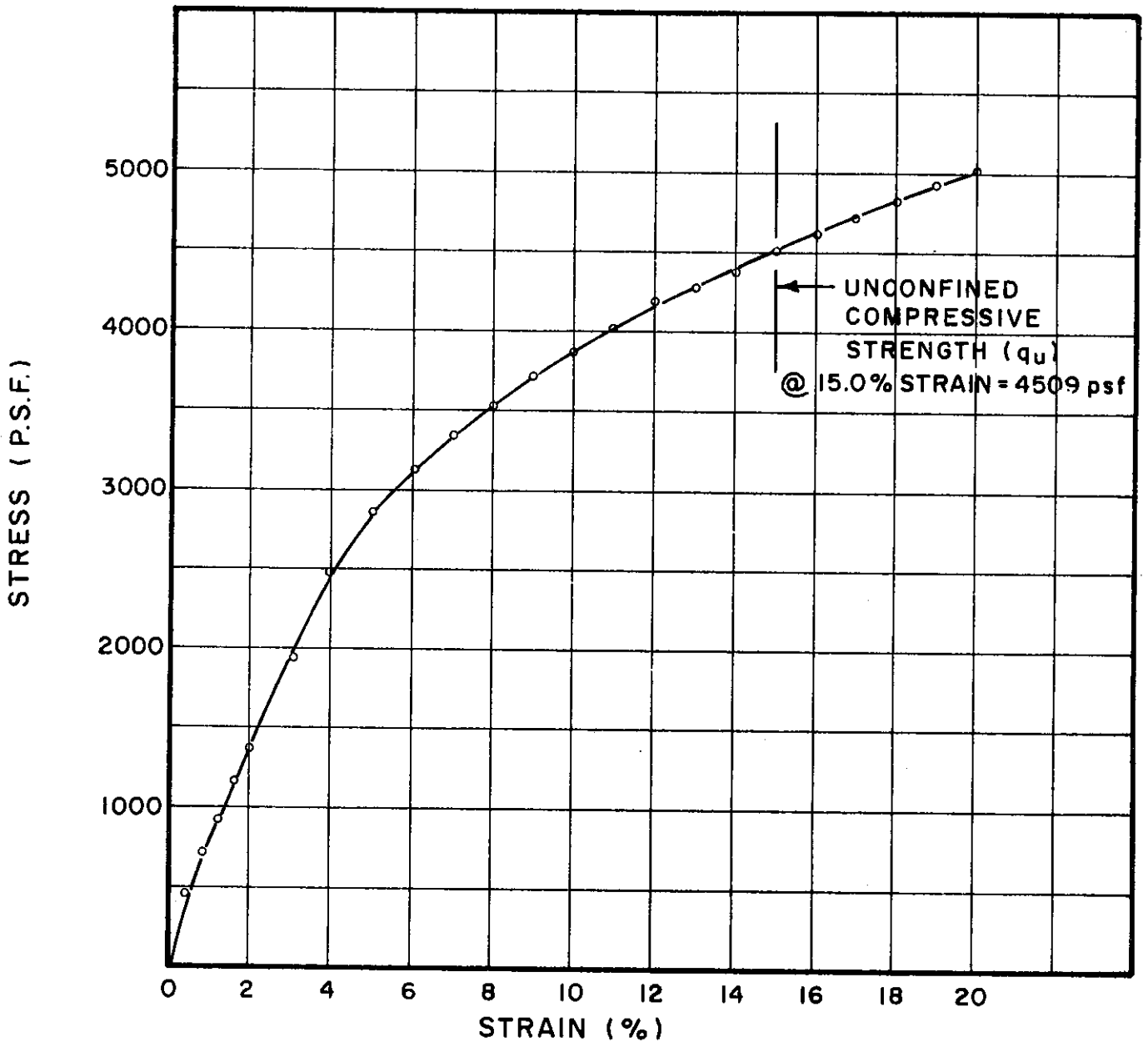
BORING NO. 49

SAMPLE NO. 4

DEPTH 24.0' TO 24.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI39.1	1.41	3.36	.268	25.6	100	33	22	SILTY CLAY; SANDY
								(CL)

BORING NO. 49

SAMPLE NO. 9

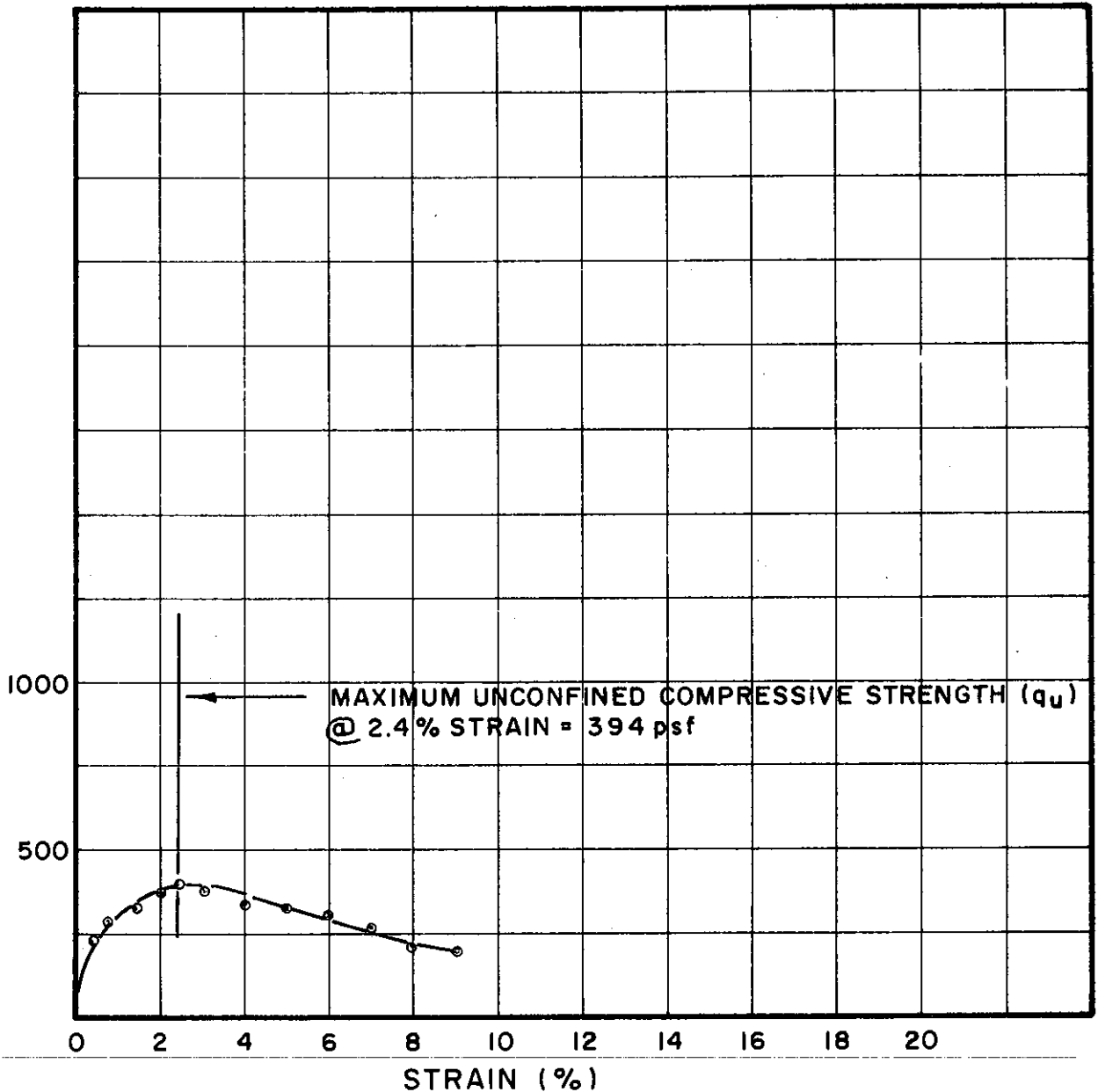
DEPTH 73.9' TO 74.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



STRESS (PSF)



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U85.1	1.39	3.21	.25	45.8	75	51	18	SILTY CLAY (CH-CL)

BORING NO. 50

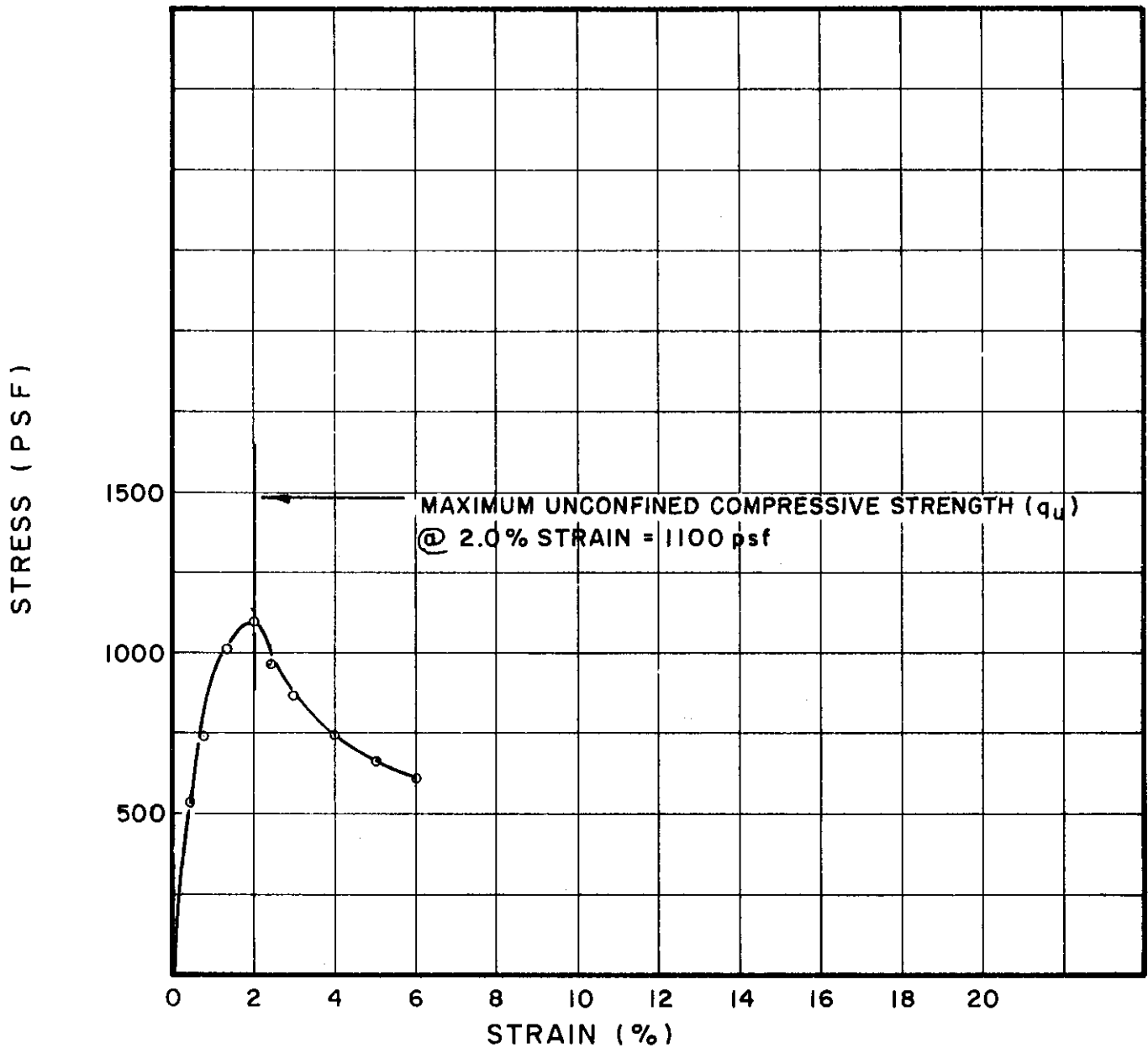
SAMPLE NO. 6

DEPTH 29.3' TO 29.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

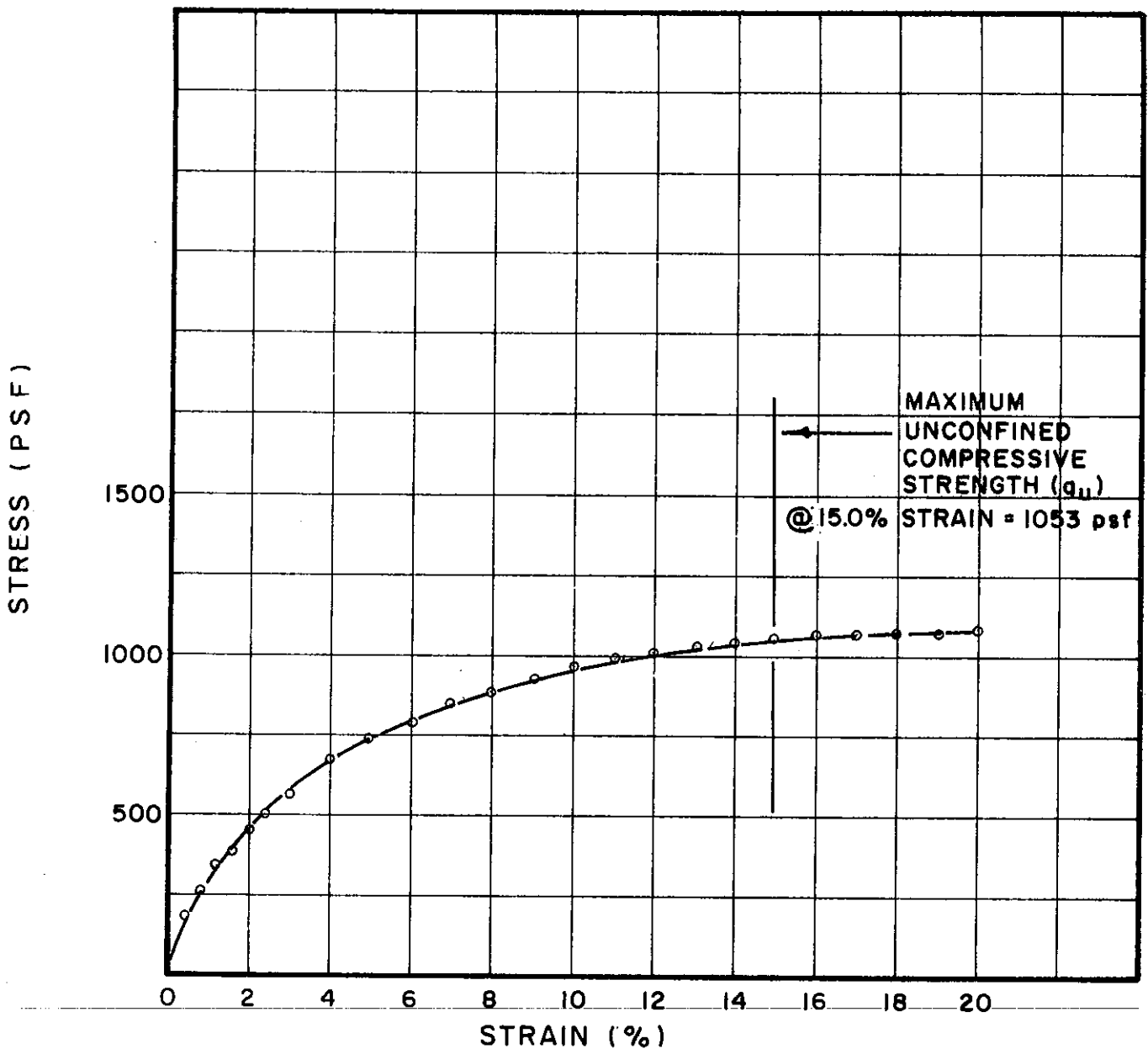


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U86.1	1.40	3.27	0.25	51.3	70	55	23	SILTY CLAY (CH)

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.9' TO 39.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U87.1	1.40	3.25	.25	23.6	99	36	16	SILTY CLAY, SANDY (CL)

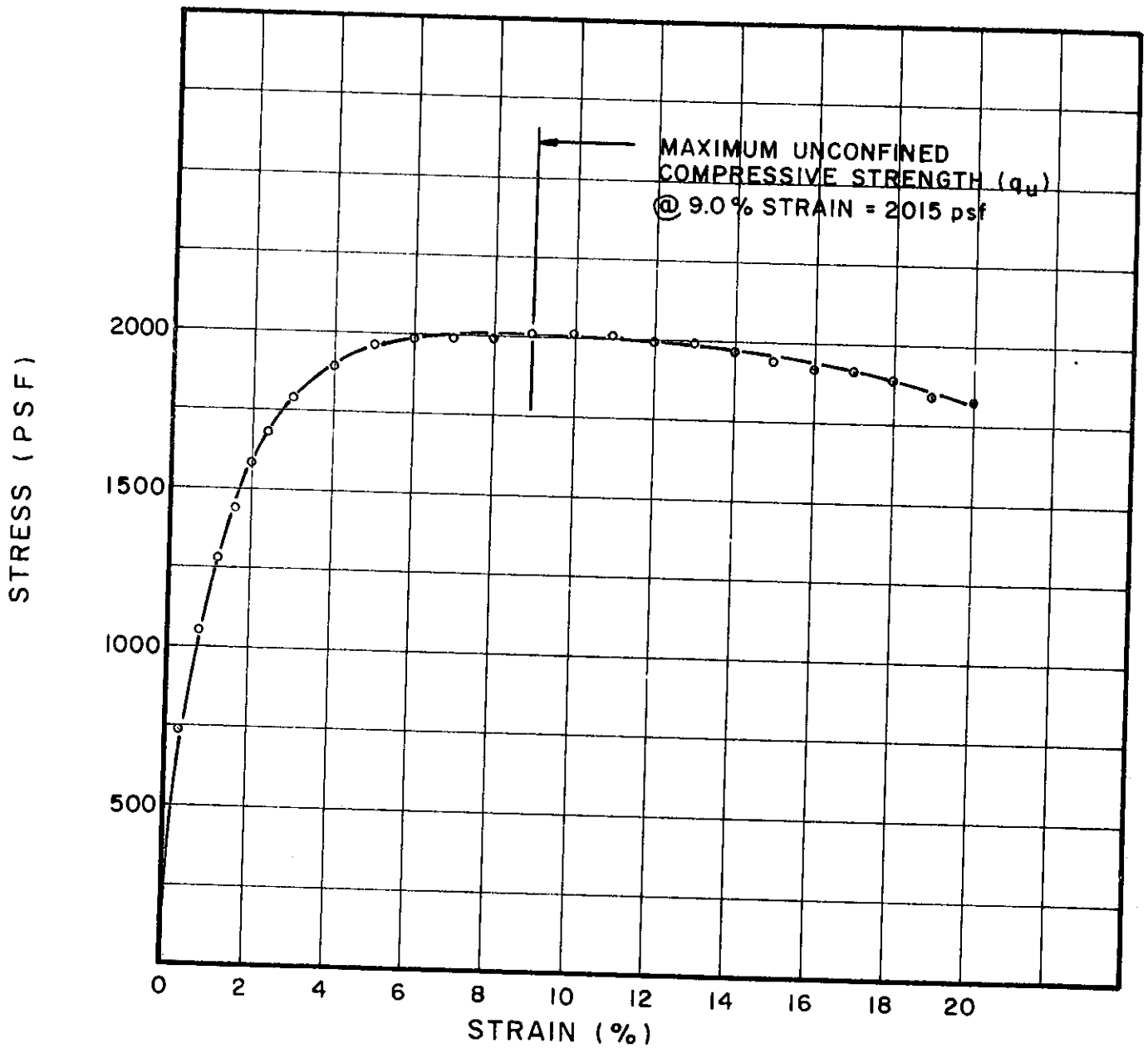
BORING NO. 50

SAMPLE NO. 10

DEPTH 49.0' TO 49.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U88.1	1.38	3.20	.25	25.8	99	39	18	SILTY CLAY (CL)

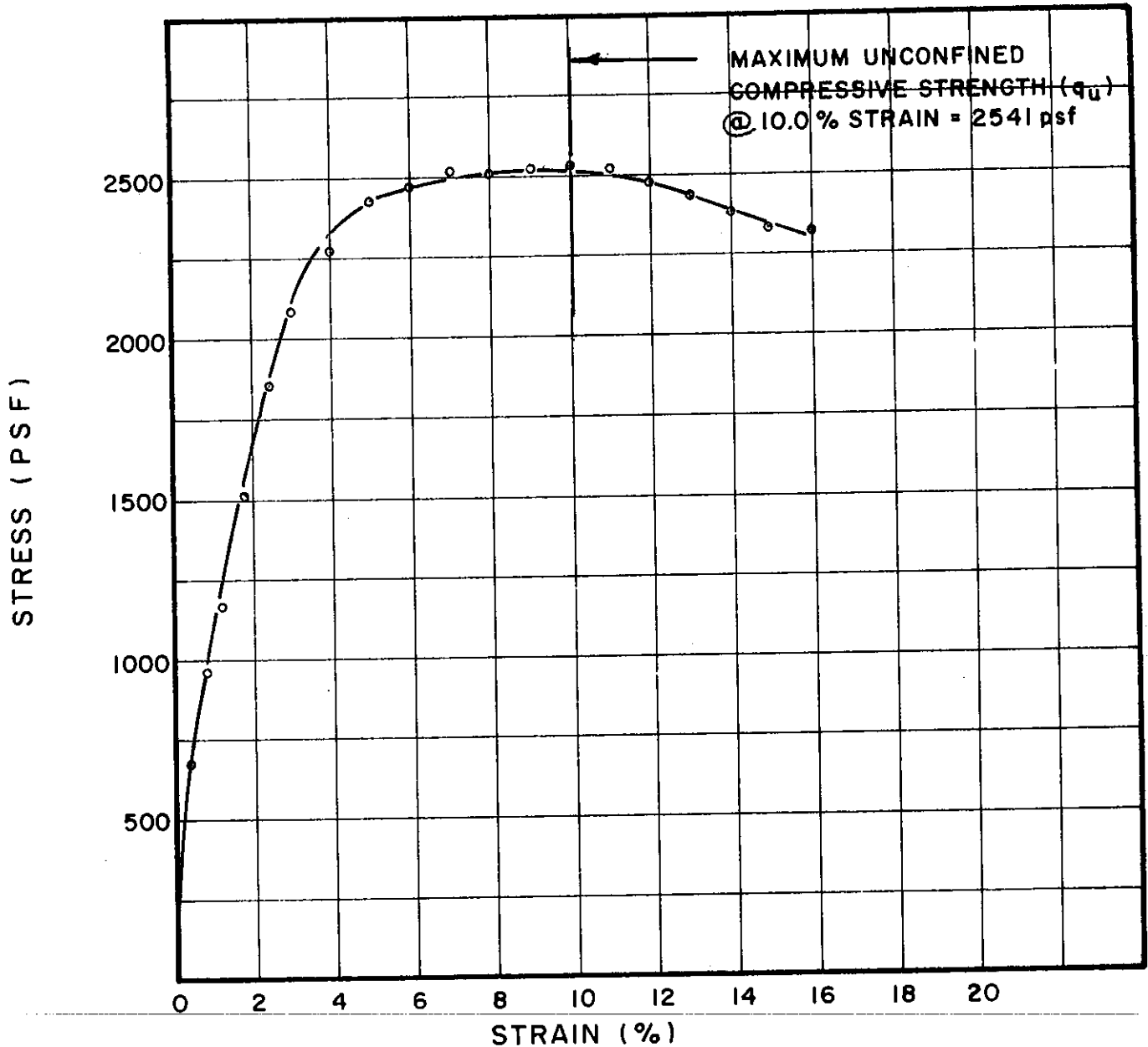
BORING NO. 50

SAMPLE NO. 12

DEPTH 58.6' - 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U90.1	1.39	3.20	.25	27.9	95	39	20	SILTY CLAY (CL)

BORING NO. 50

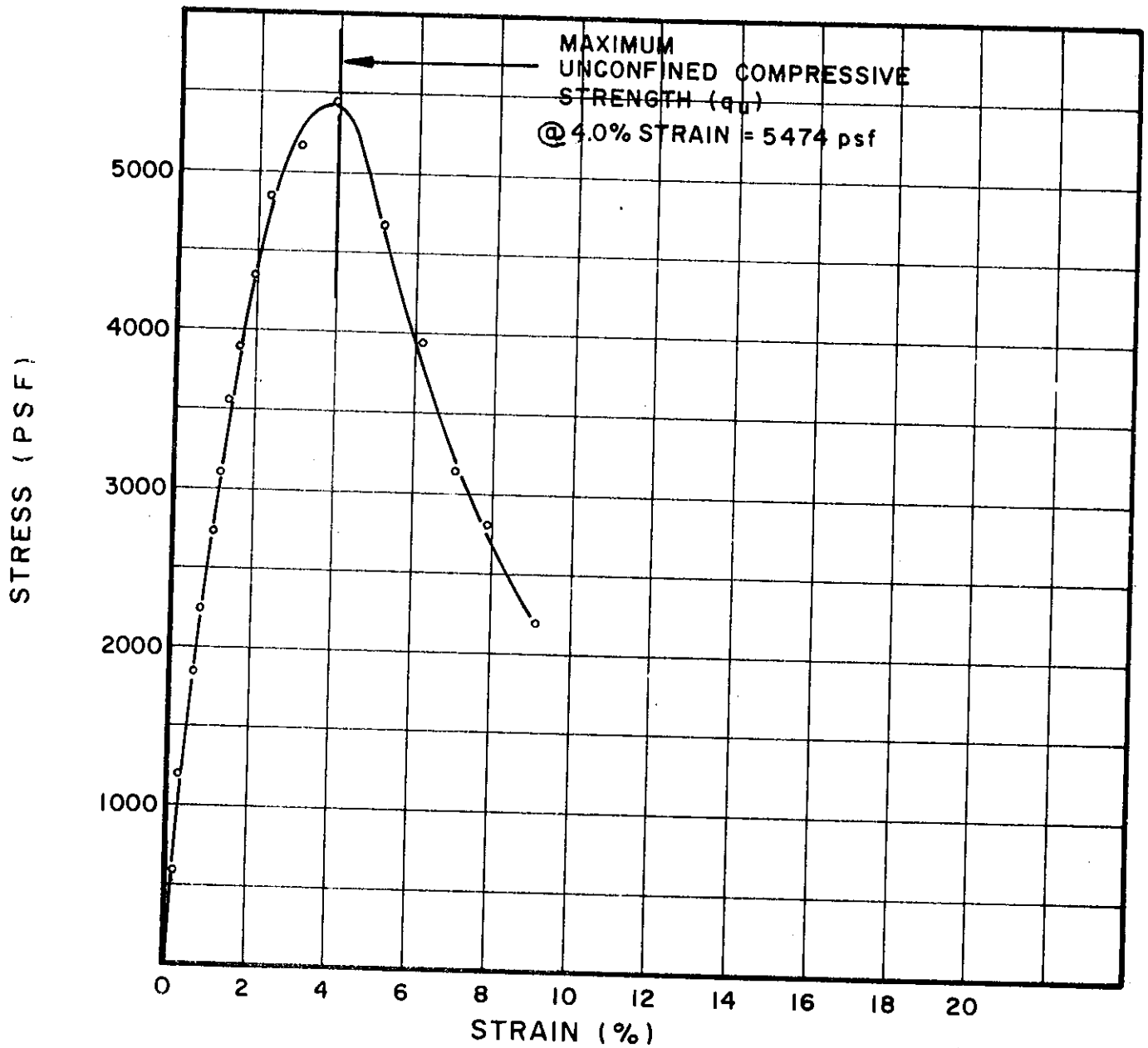
SAMPLE NO. 16

DEPTH 78.6' - 78.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI08.1	1.37	3.48	.25	30.3	92	49	20	SILTY CLAY (CL-CH)

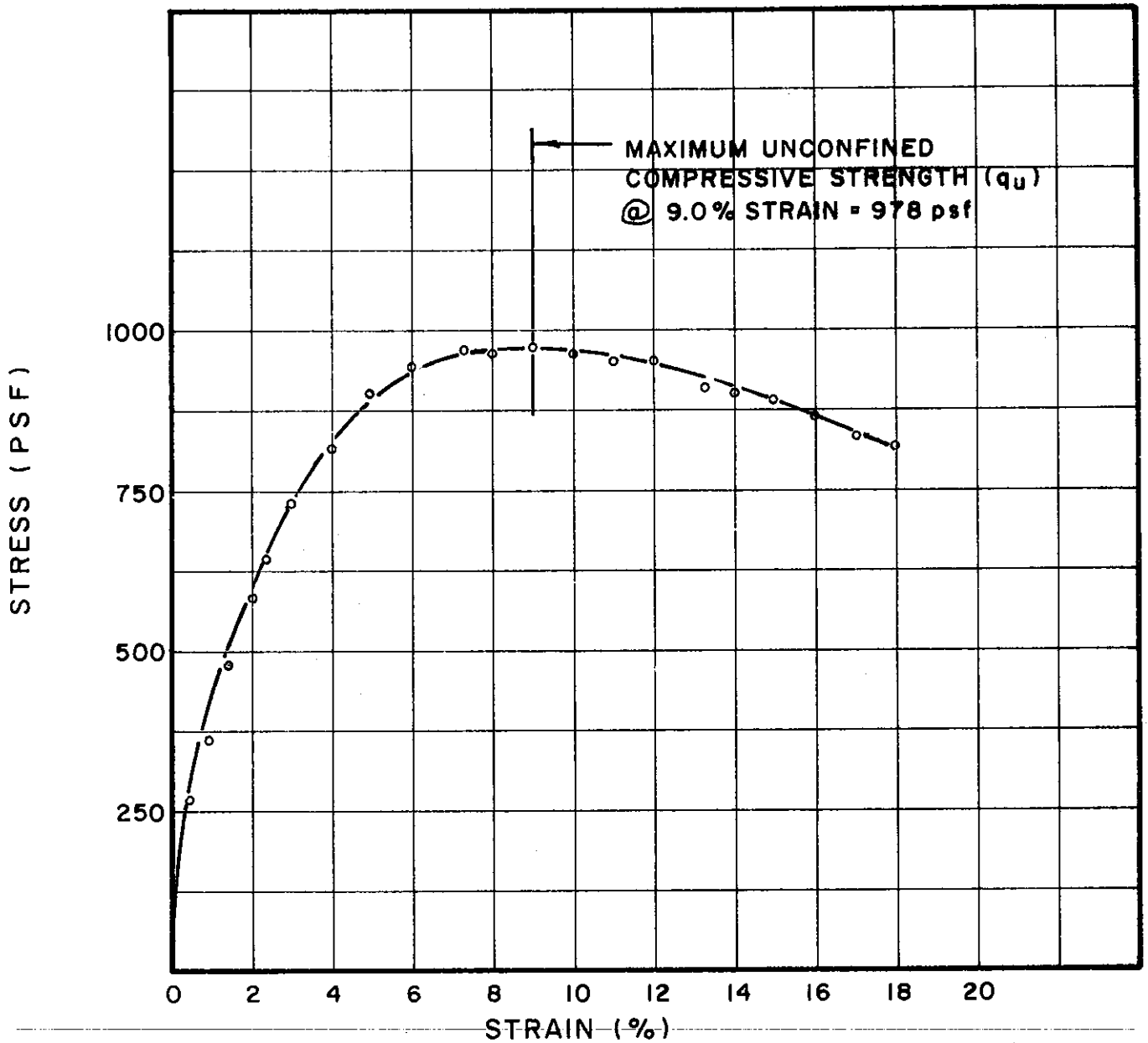
BORING NO. 52

SAMPLE NO. 3

DEPTH 20.5' - 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
UI09.1	1.37	3.25	.25	31.8	94	35	18	SILTY CLAY (CL)

BORING NO. 52

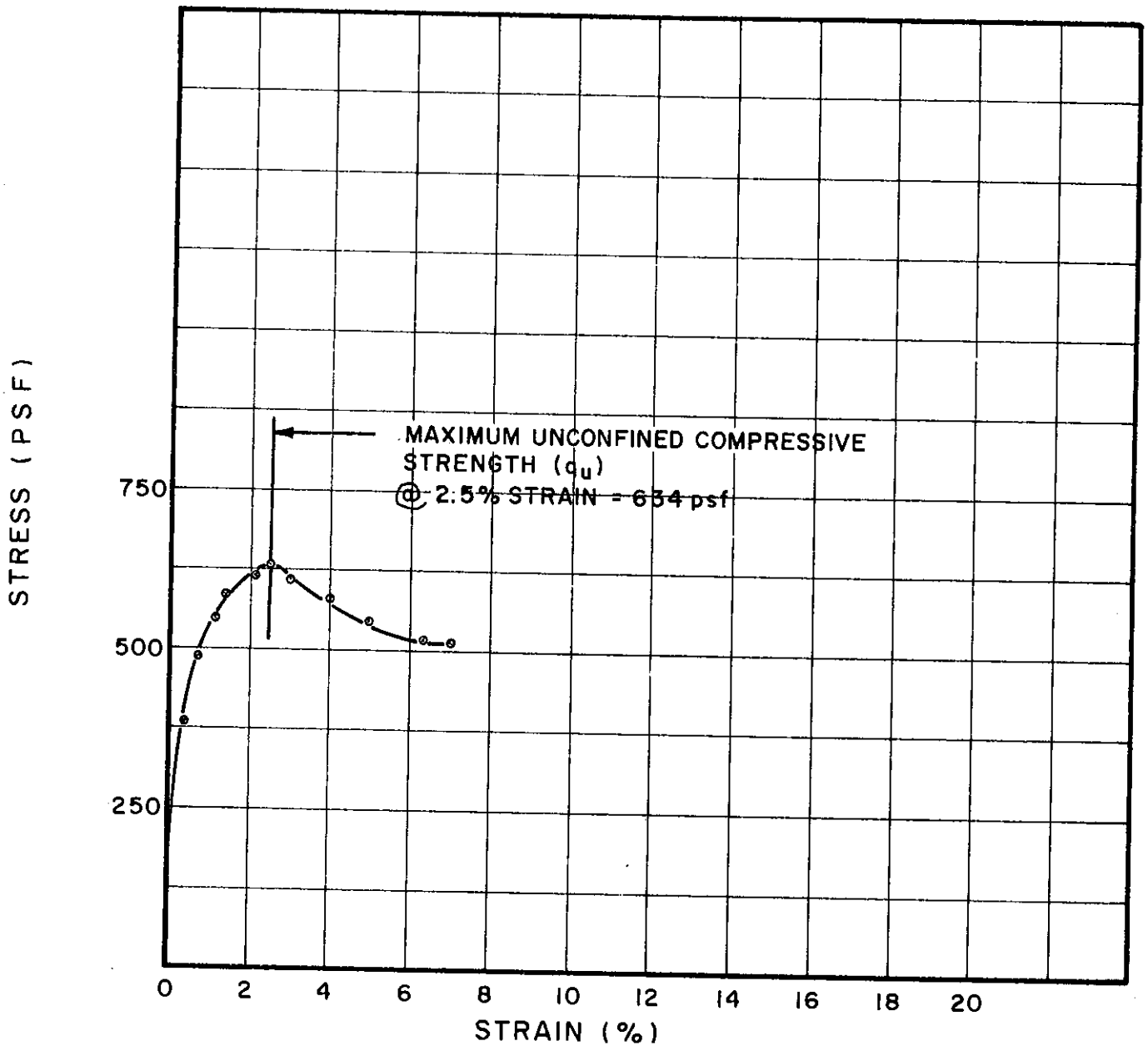
SAMPLE NO. 4

DEPTH 28.6' TO 28.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U111.1	1.38	3.02	.29	25.2	100	22	18	SILTY CLAY (CL-ML)

BORING NO. 52

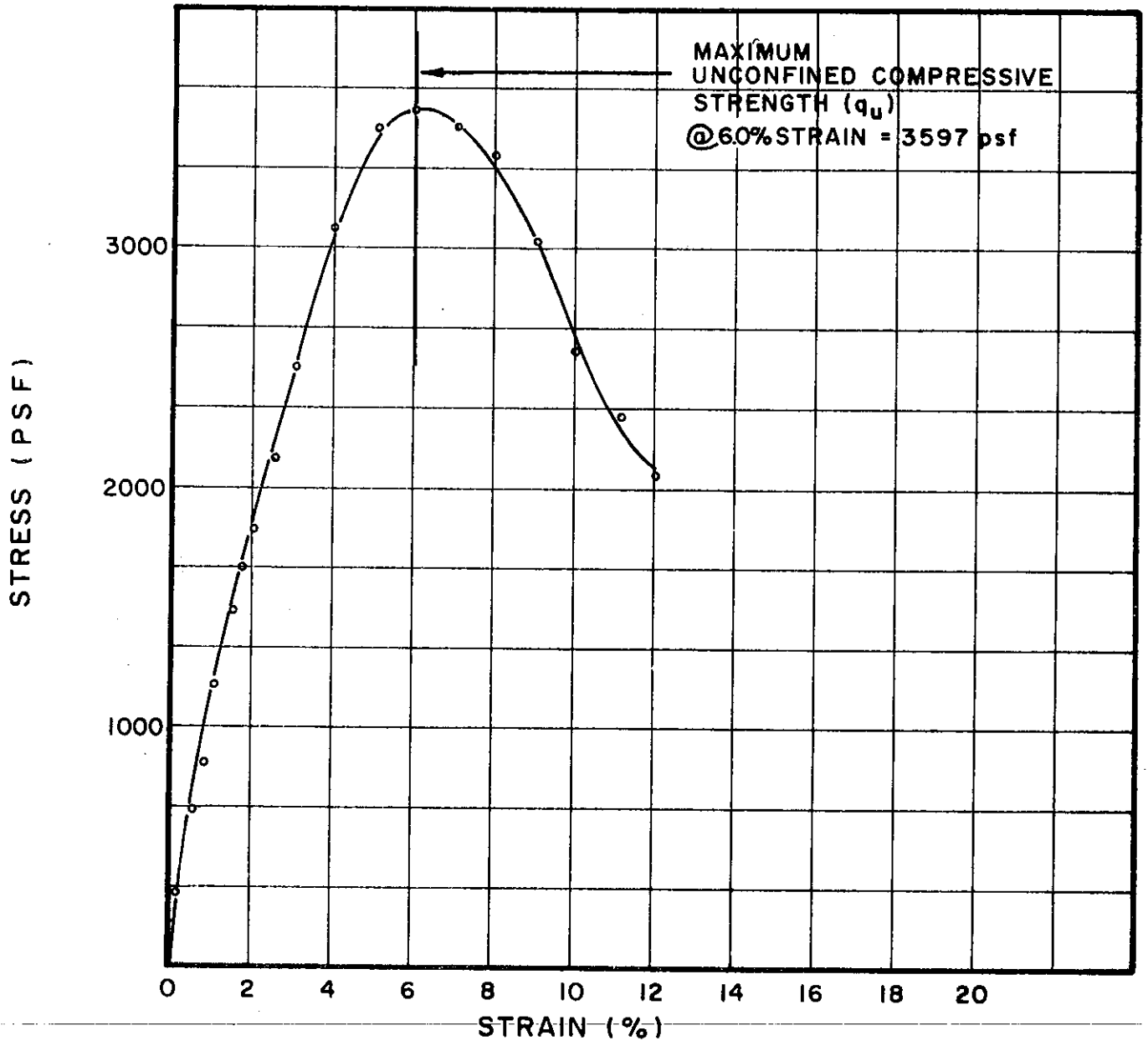
SAMPLE NO. 6

DEPTH 49.2' - 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U112.1	1.36	3.37	.25	13.0	116	23	14	SILTY CLAY, SANDY
								(CL)

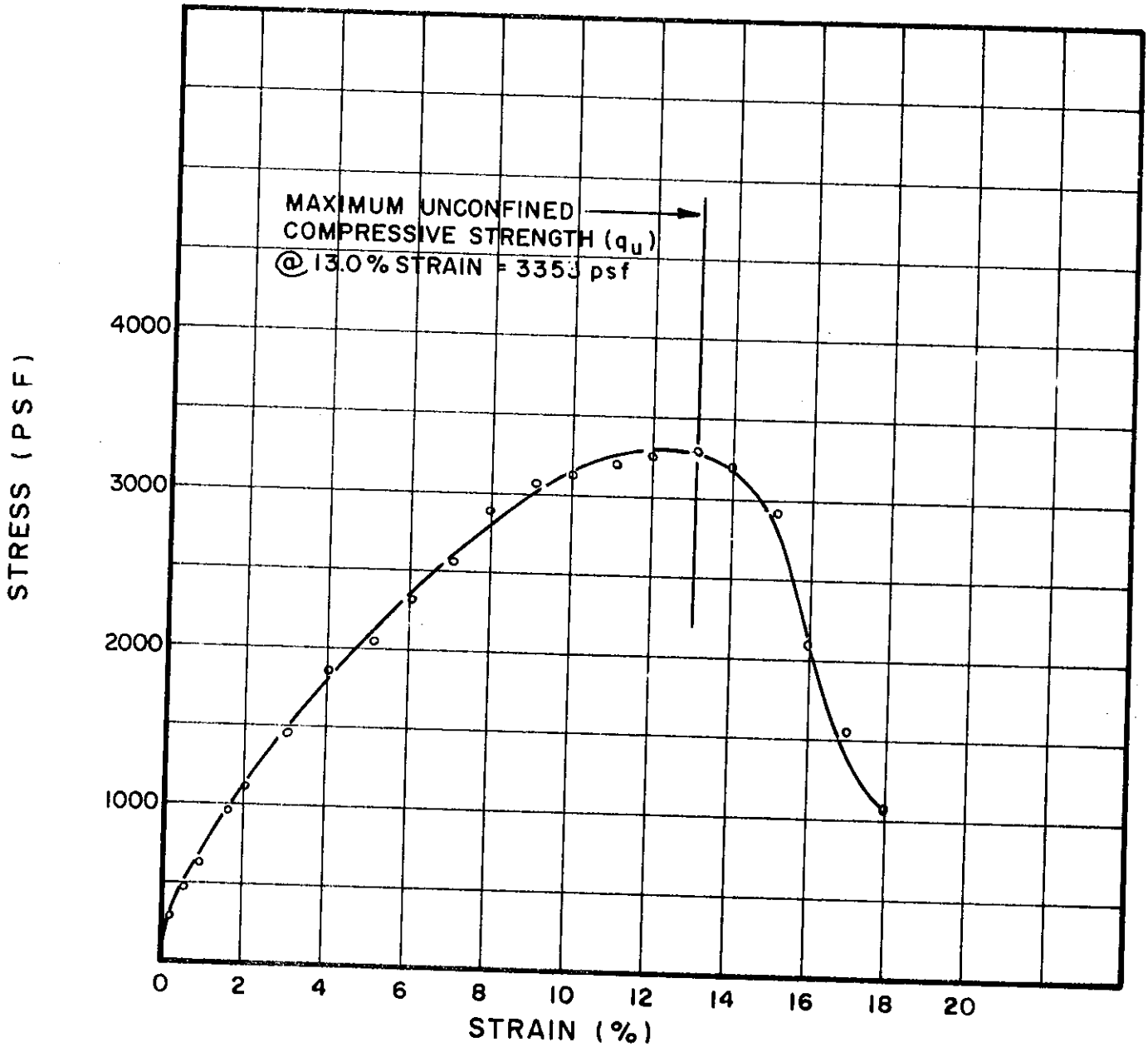
BORING NO. 52

SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U113.1	1.34	3.50	.25	14.2	115	24	14	SILTY CLAY, SANDY
								(CL)

BORING NO. 52  
 SAMPLE NO. 8  
 DEPTH 68.2' TO 68.5'

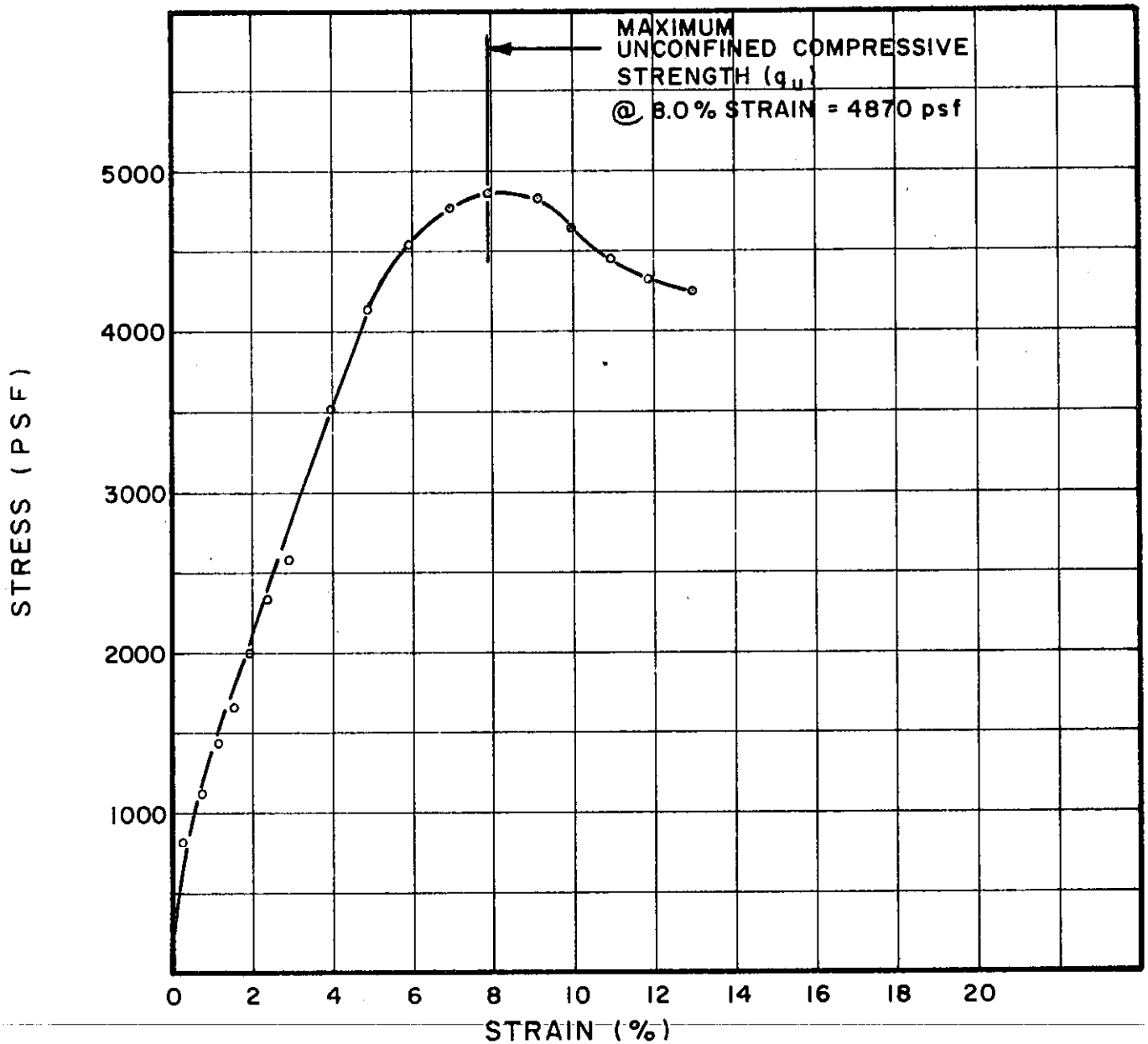
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-305



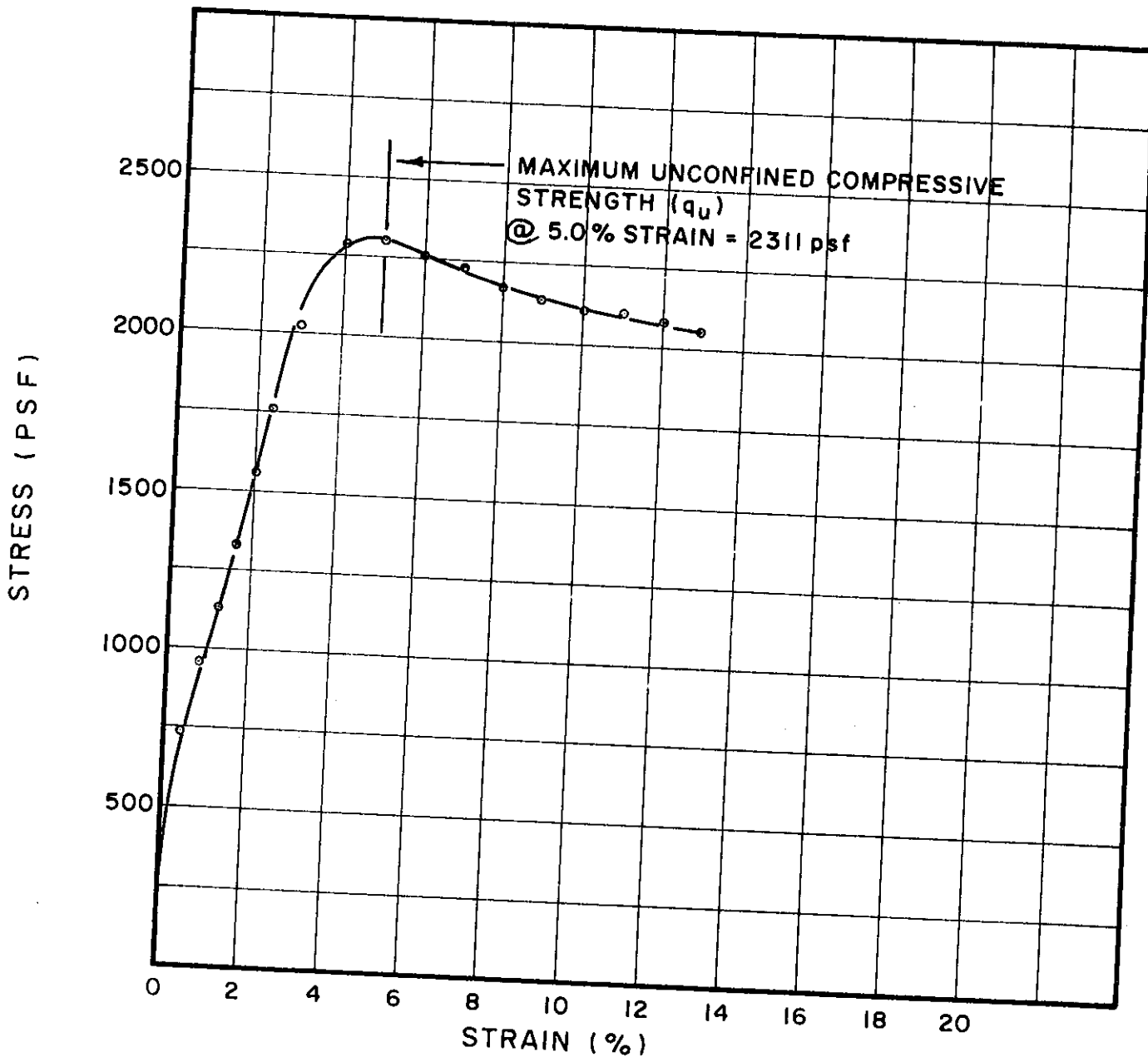
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U115.1	1.39	3.27	.28	27.2	97	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 88.6' - 88.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U96.1	1.40	3.20	.25	31.8	88	49	20	SILTY CLAY (CL-CH)

BORING NO. 53  
 SAMPLE NO. 3  
 DEPTH 19.6' TO 19.9'

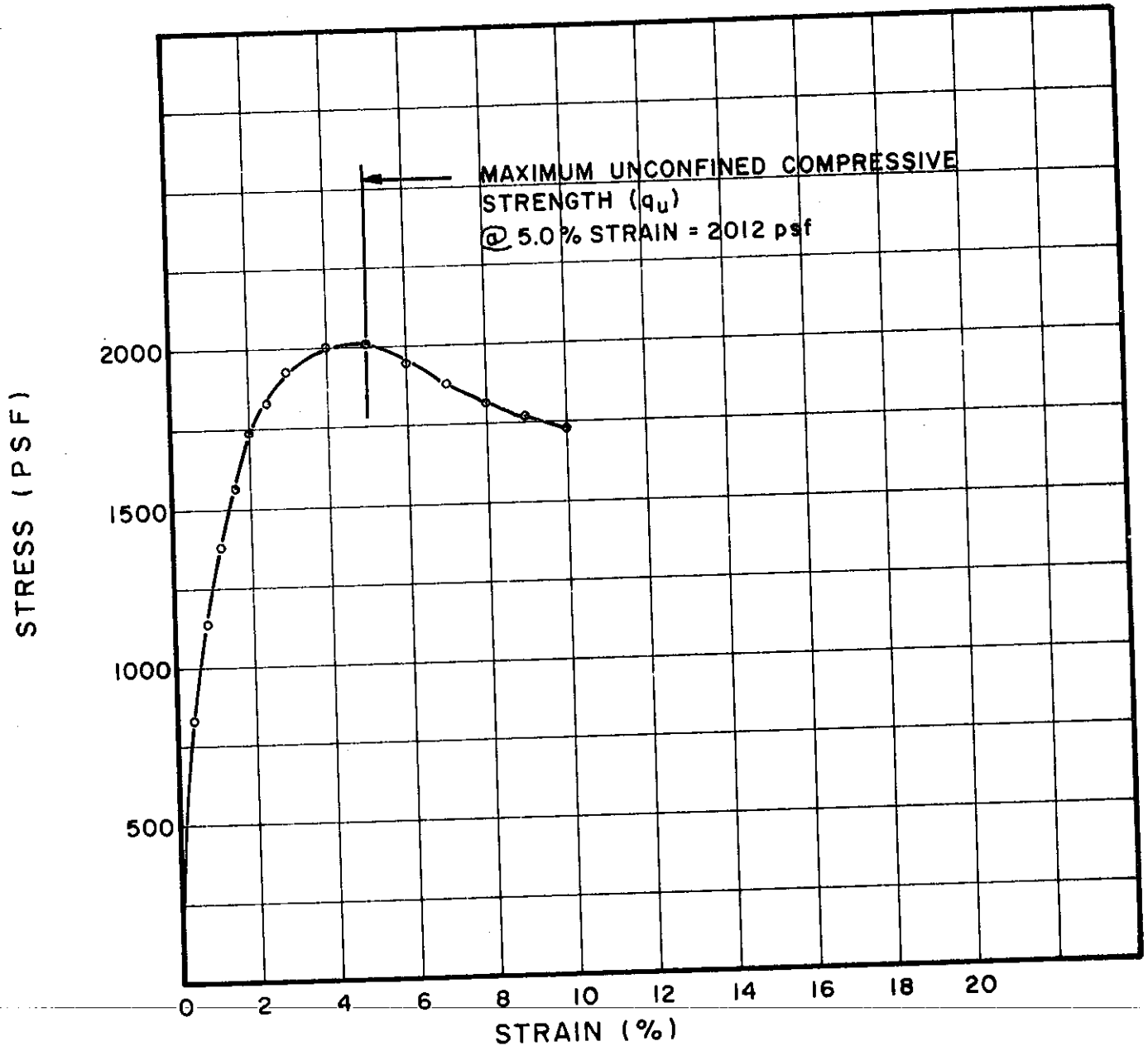
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-307



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U97.1	1.38	3.24	.25	40.7	80	49	22	SILTY CLAY (CL-CH)

BORING NO. 53

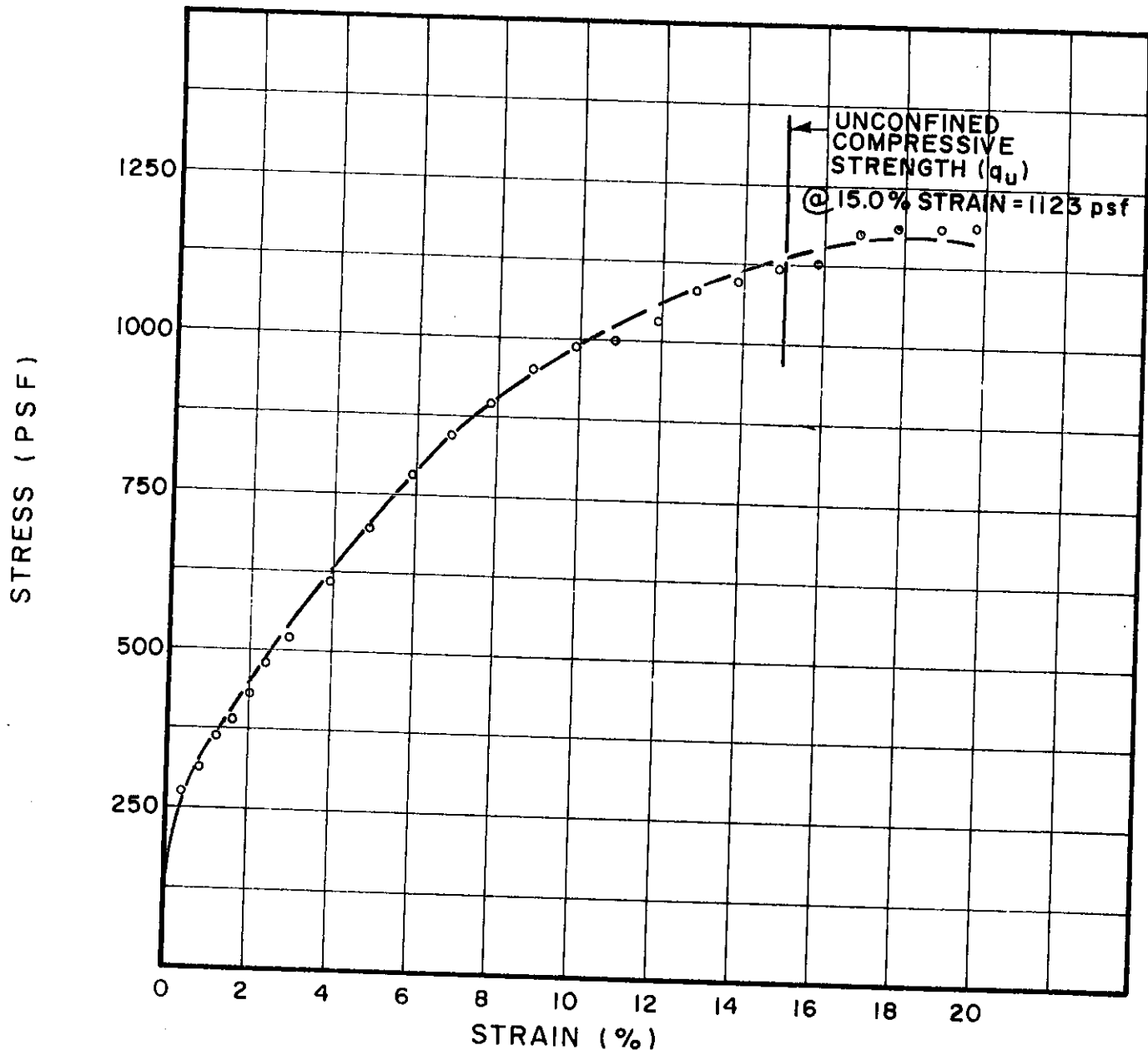
SAMPLE NO. 4

DEPTH 29.6' - 29.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U99.1	1.37	3.17	.25	27.9	94	43	18	SILTY CLAY (CL)

BORING NO. 53

SAMPLE NO. 6

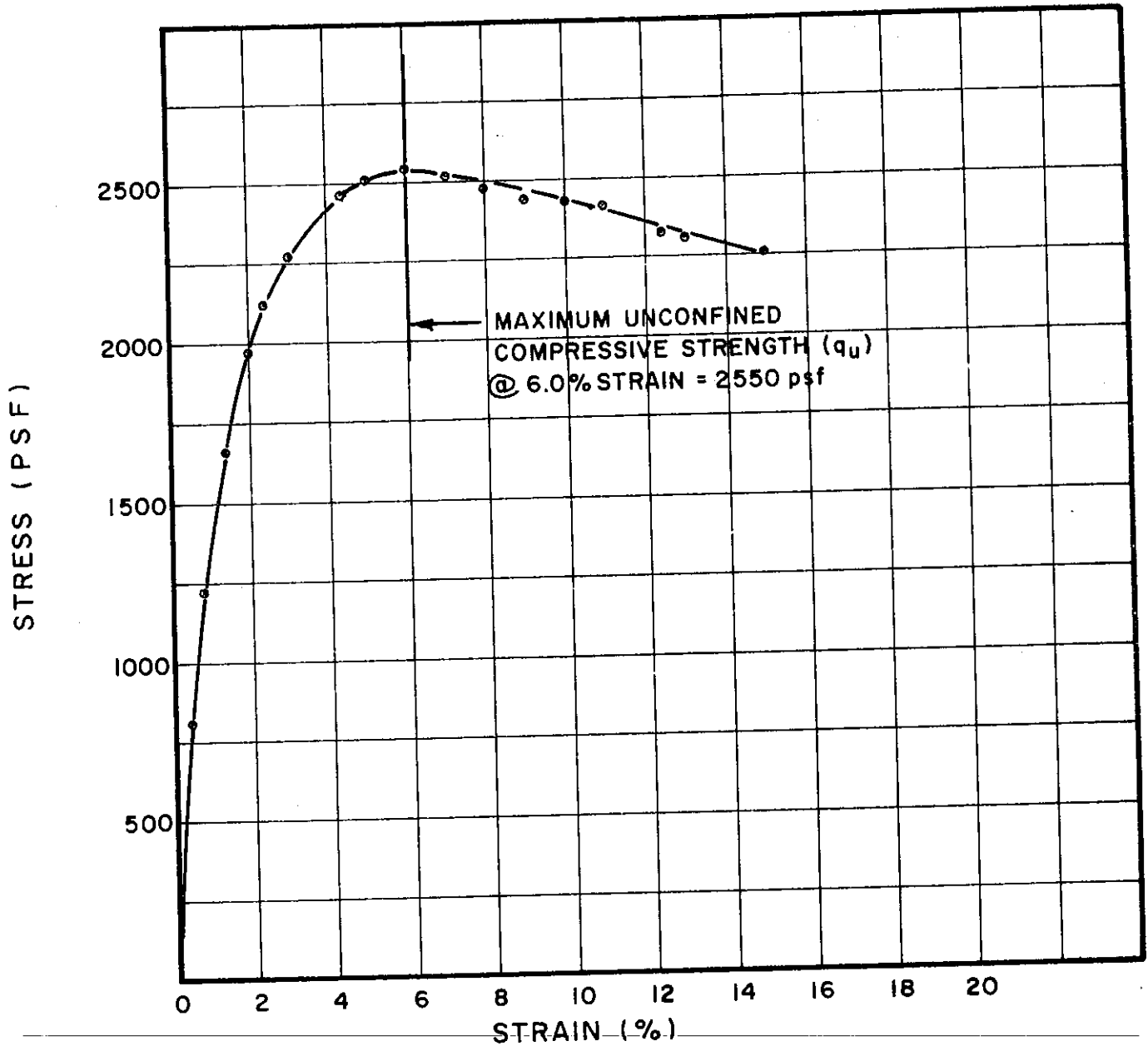
DEPTH 49.2' TO 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-309



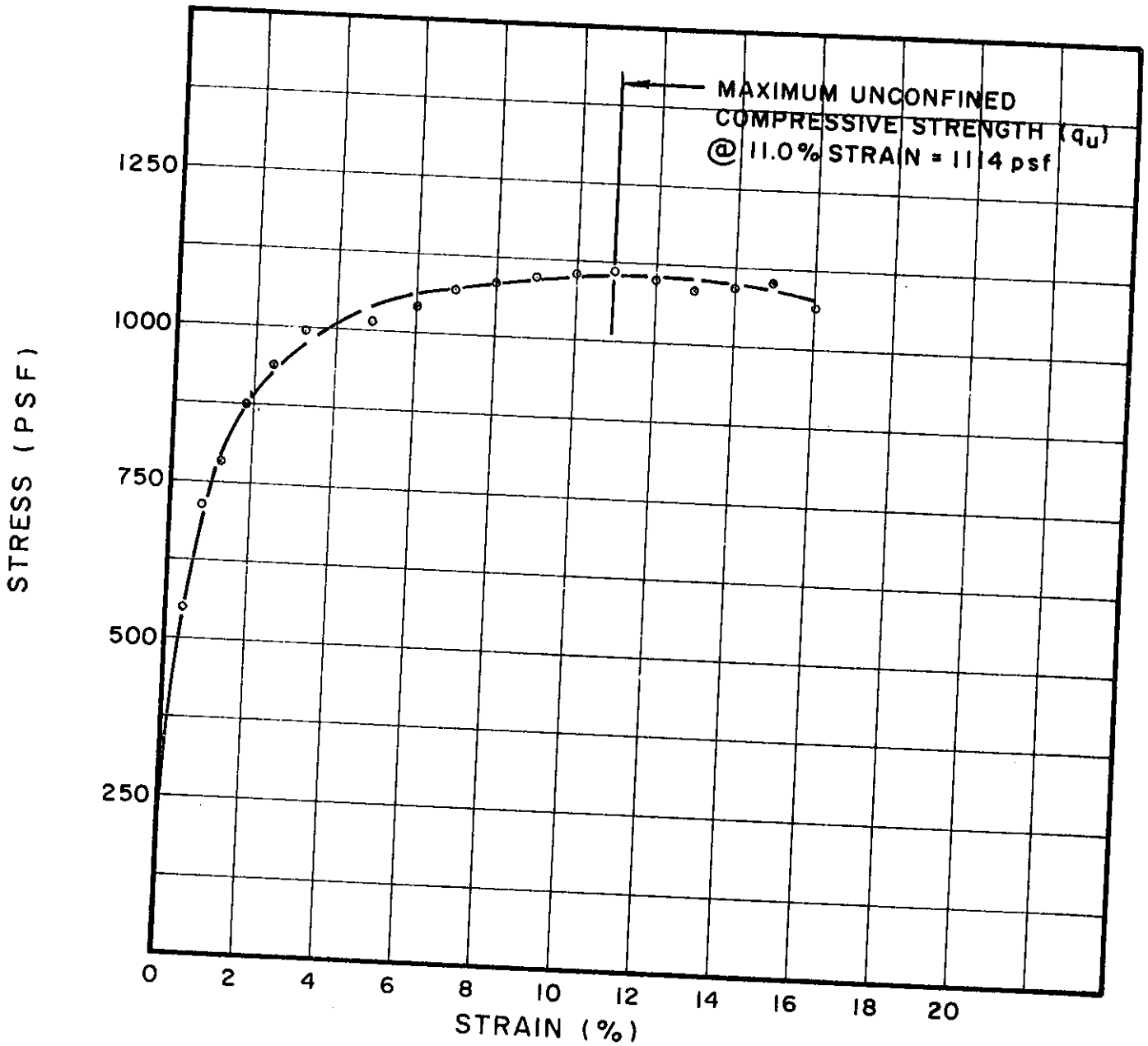
TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U101.1	1.40	3.20	.25	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 80.1' - 80.4'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



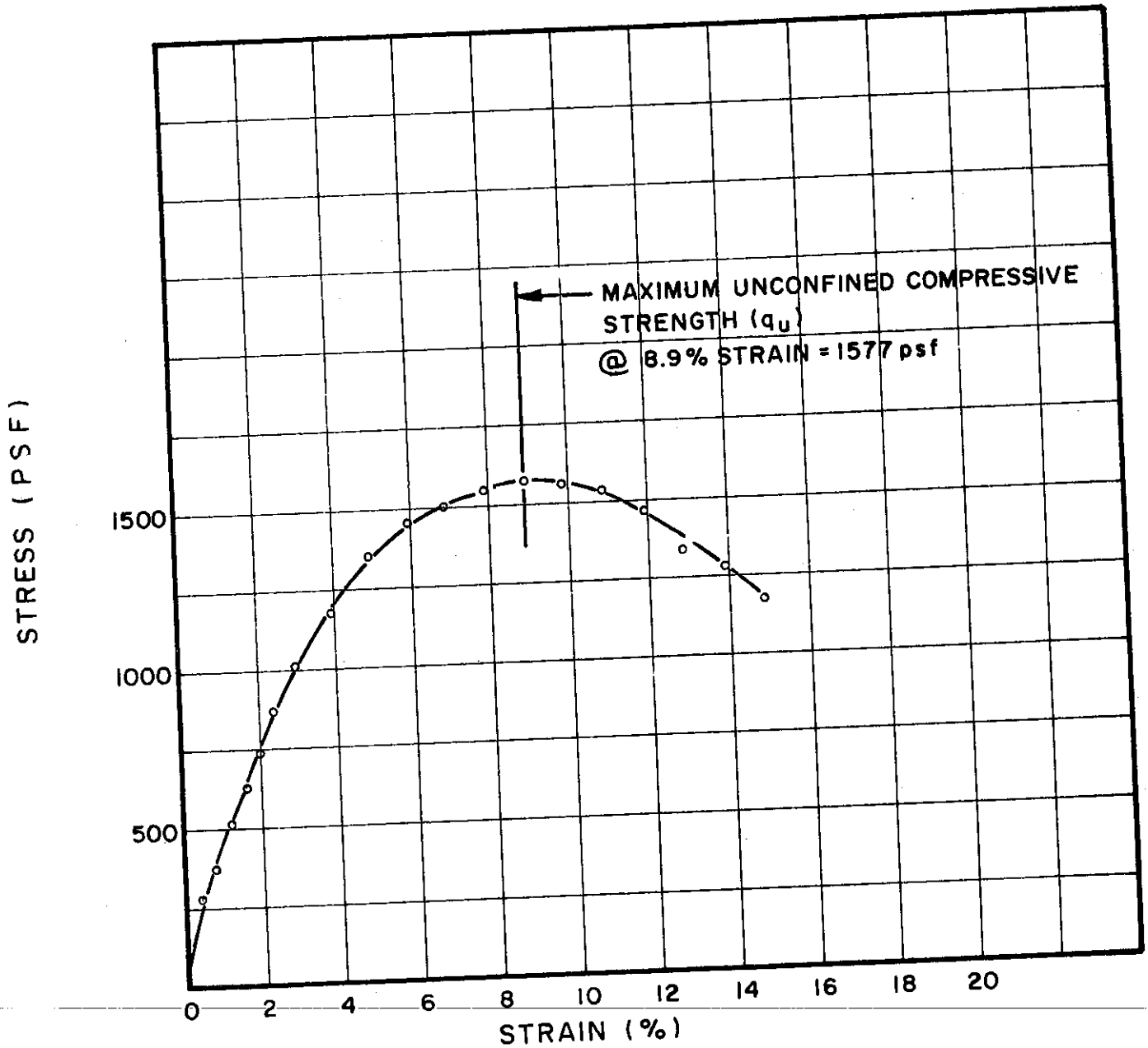
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U398.1	1.38	3.25	.25	25.8	99	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 5  
 DEPTH 59.3' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





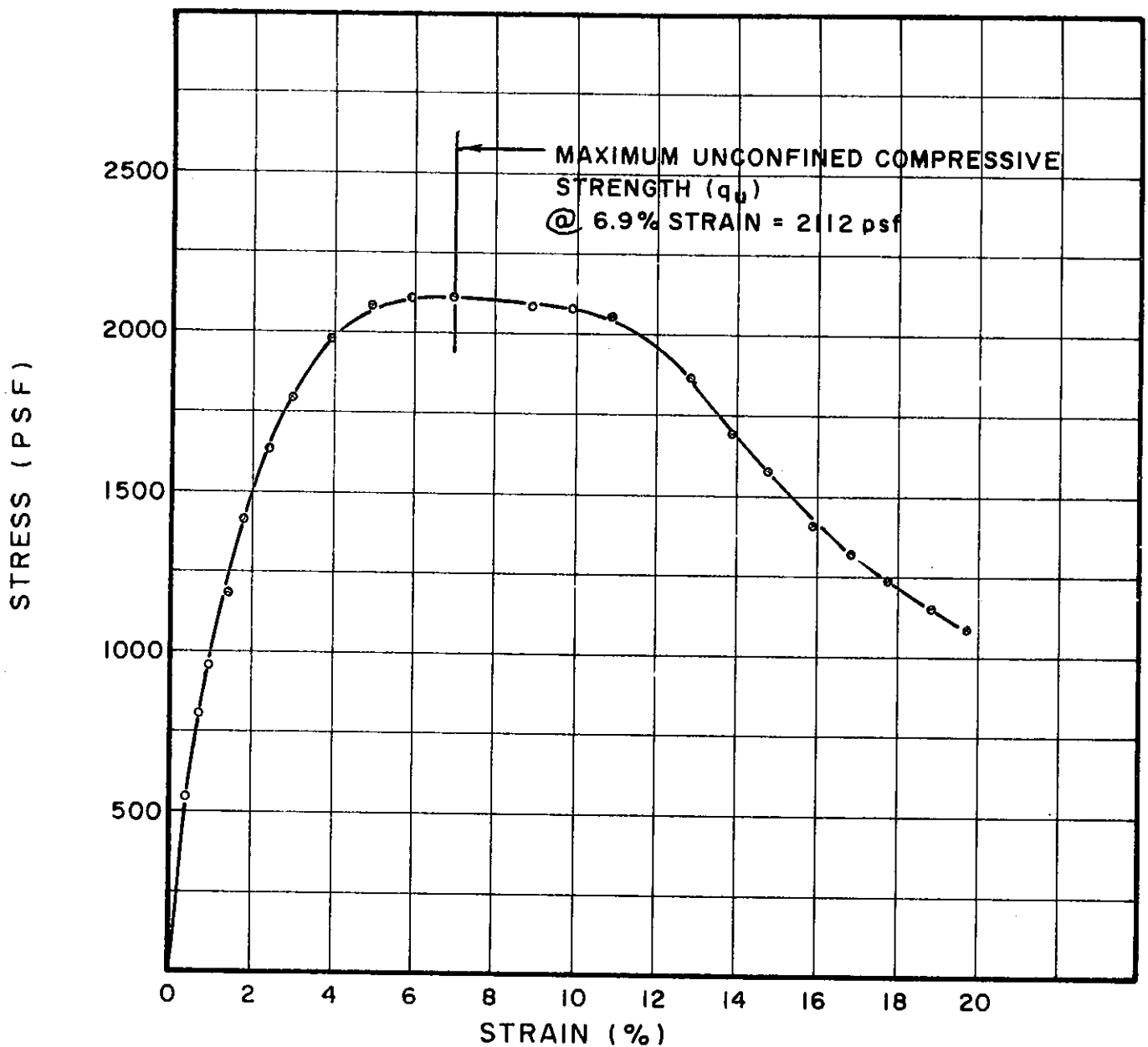
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U400.1	1.39	3.17	.25	25.9	98	37	18	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 7  
 DEPTH 68.5' TO 68.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

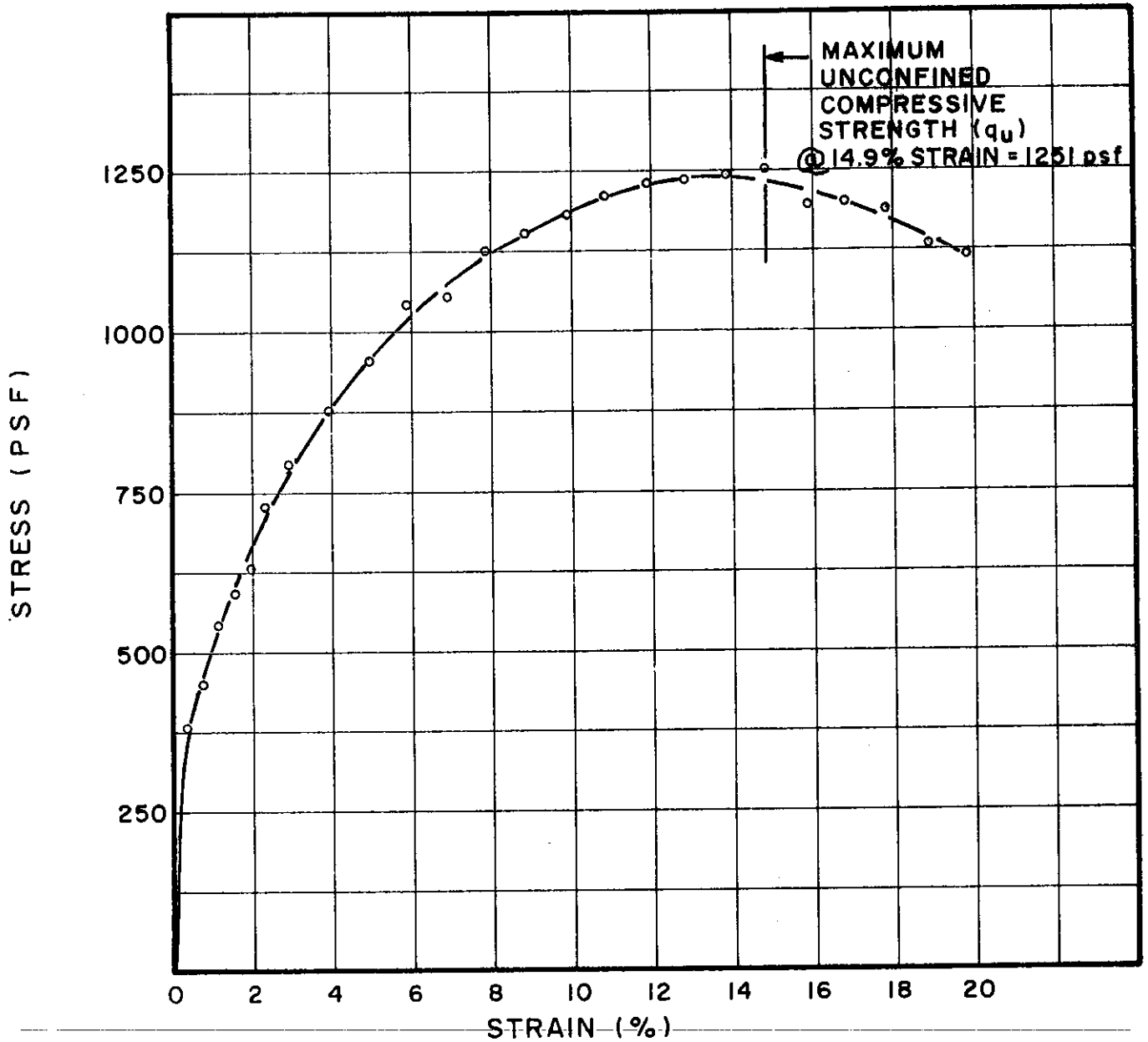


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U76.1	1.38	3.22	.25	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.8' TO 19.1'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U78.1	1.38	3.27	.25	26.2	99	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

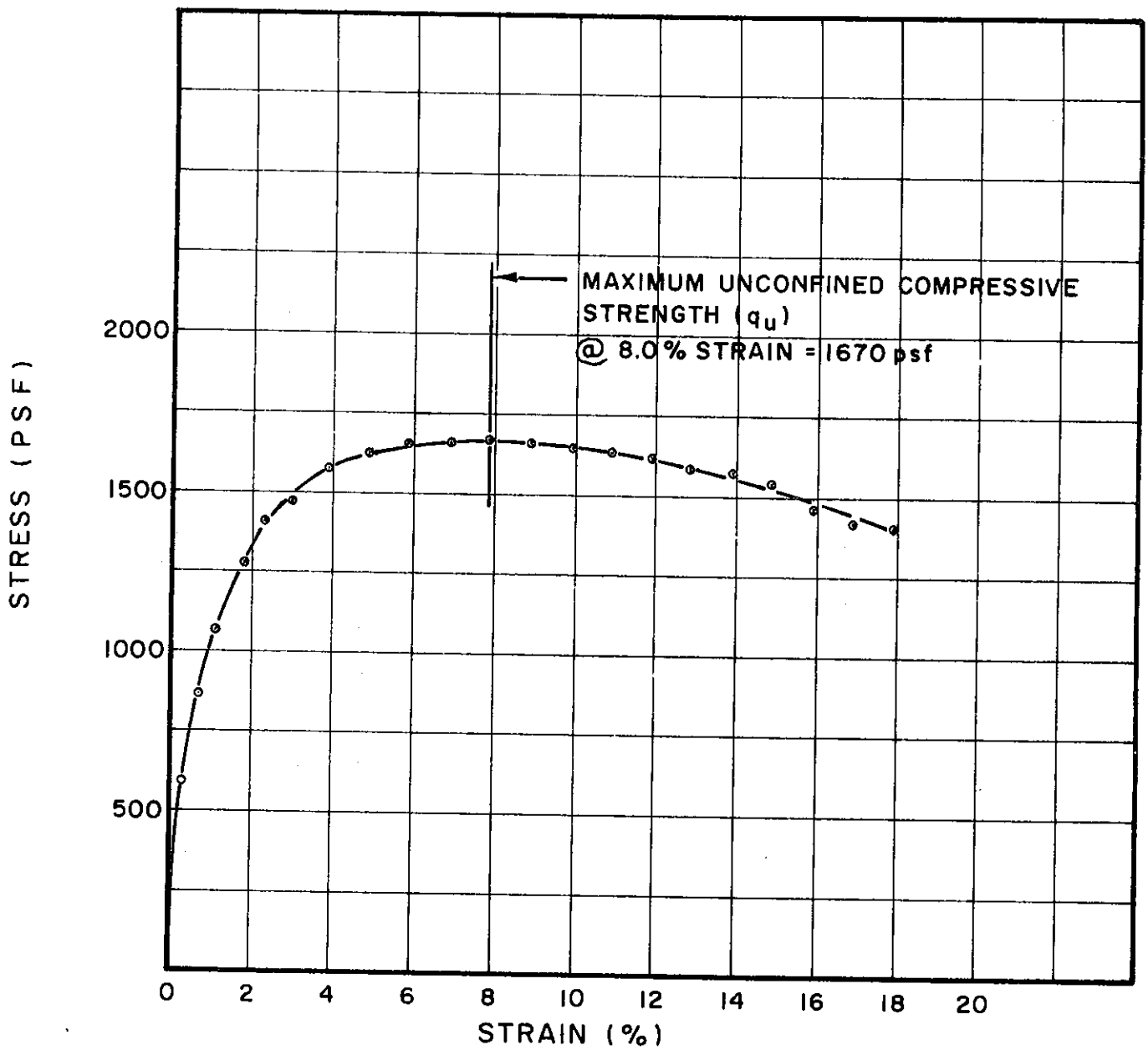
SAMPLE NO. 5

DEPTH 38.7' TO 39.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U80.1	1.38	3.26	.25	26.3	98	36	18	SILTY CLAY, SANDY (CL)

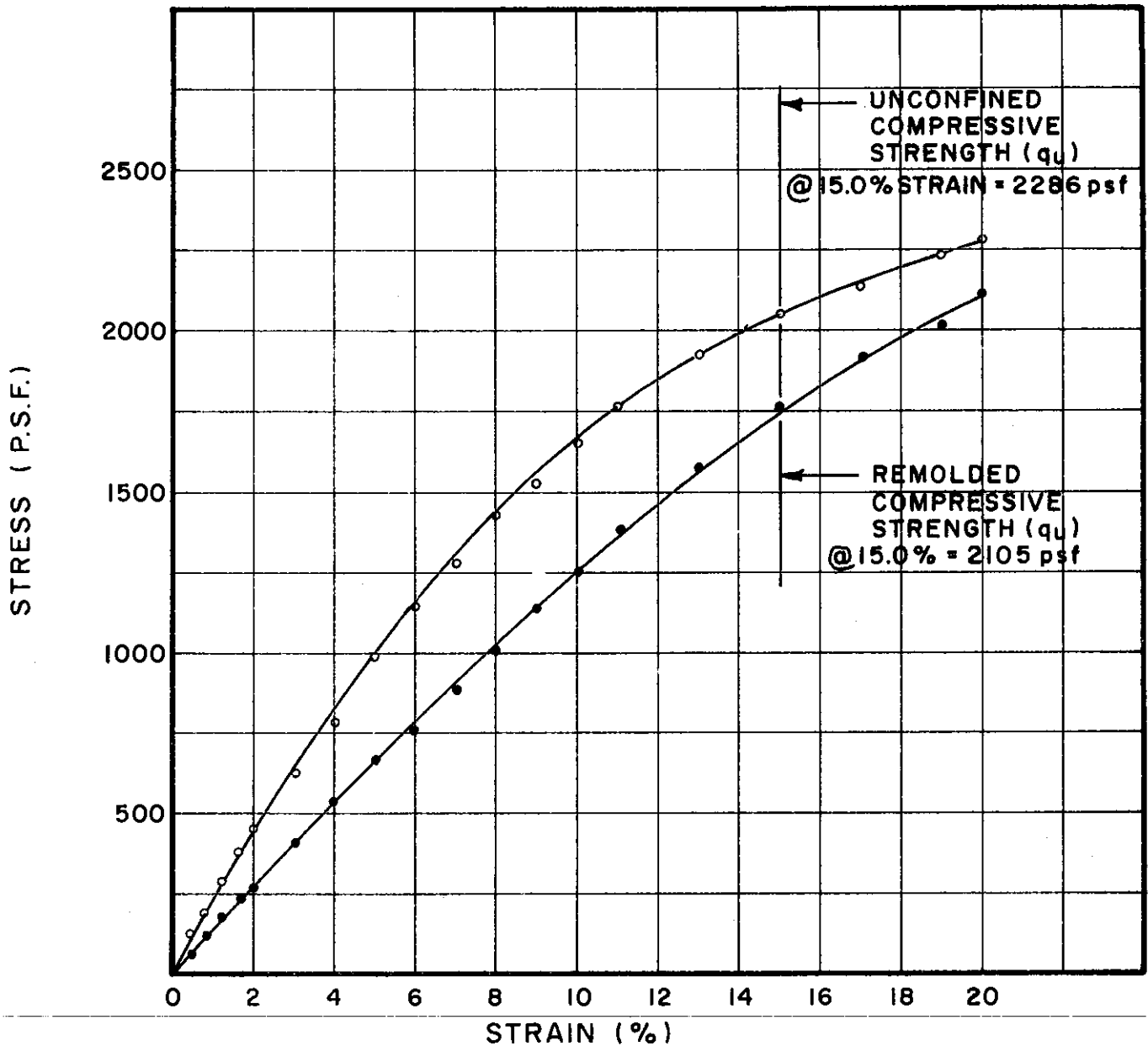
BORING NO. 59

SAMPLE NO. 7

DEPTH 58.6' TO 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



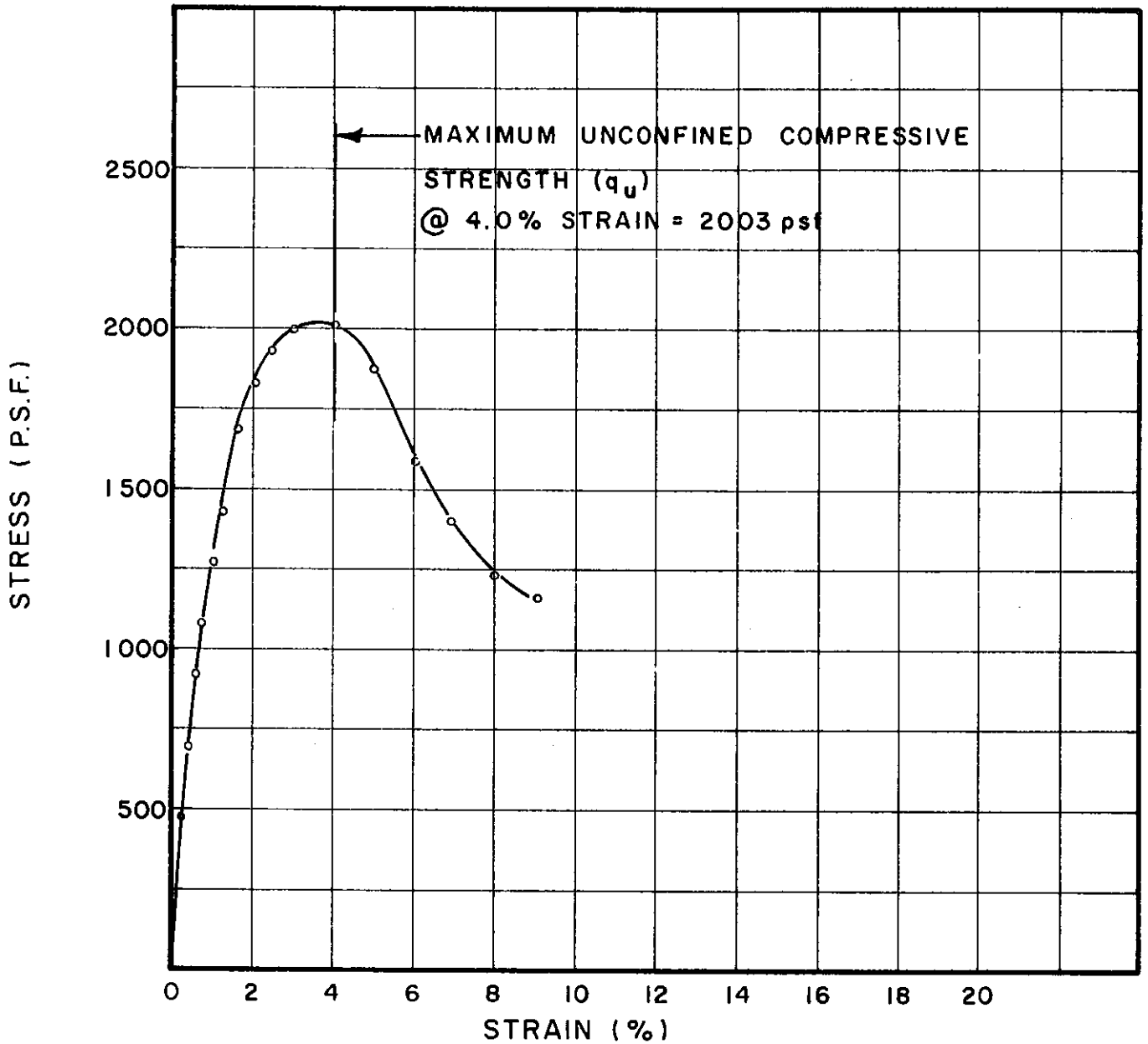
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U43.1	1.40	2.85	.316	24.3	105	39	21	SILTY CLAY (CL)
U <sub>R</sub> 43.1	1.44	2.70	.333	24.3	103	39	21	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 3  
 DEPTH 17.6' TO 18.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U45.1	1.43	3.50	.257	36.8	86	51	22	SILTY CLAY (CH)

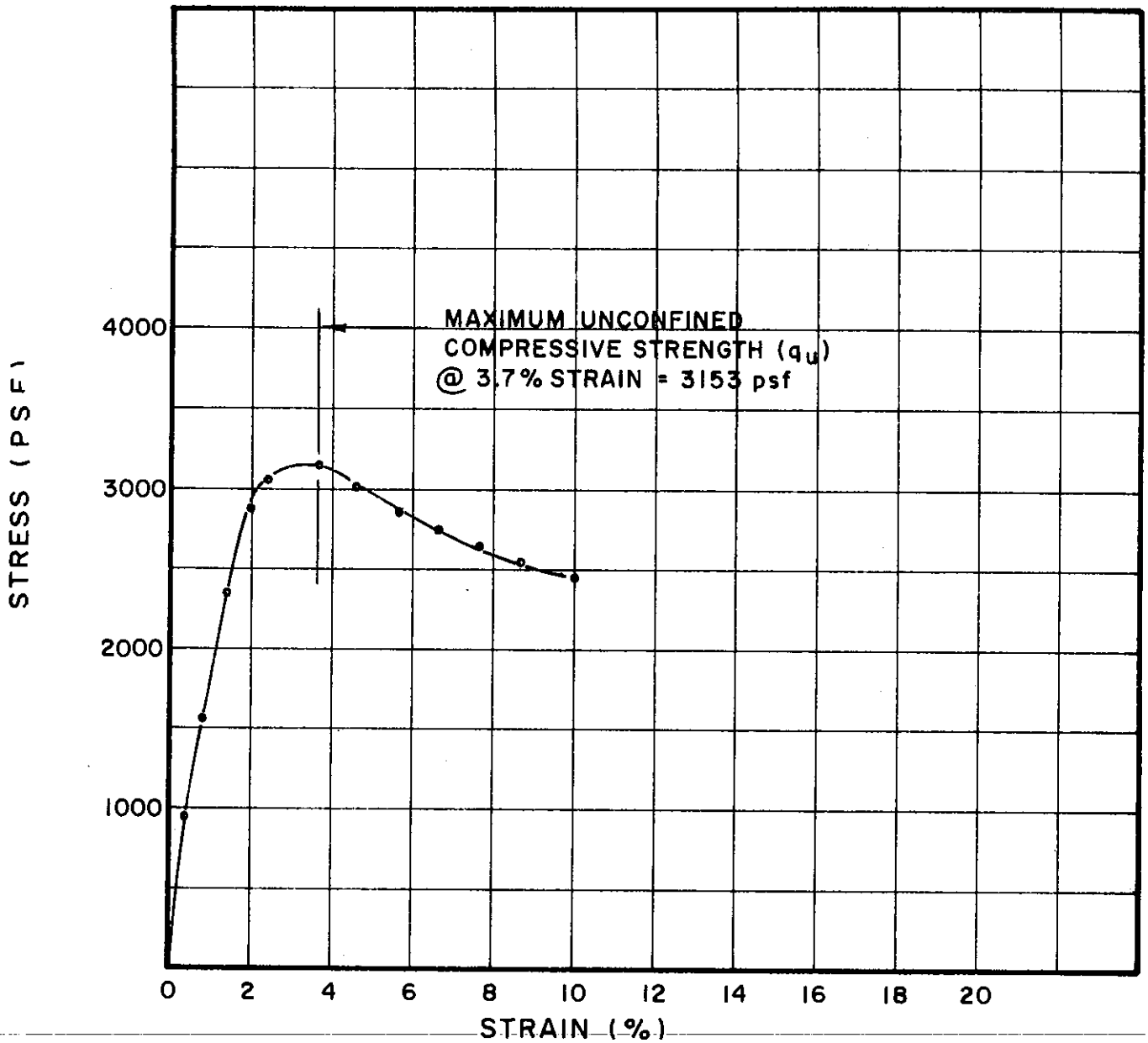
BORING NO. 60

SAMPLE NO. 5

DEPTH 25.6' TO 25.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



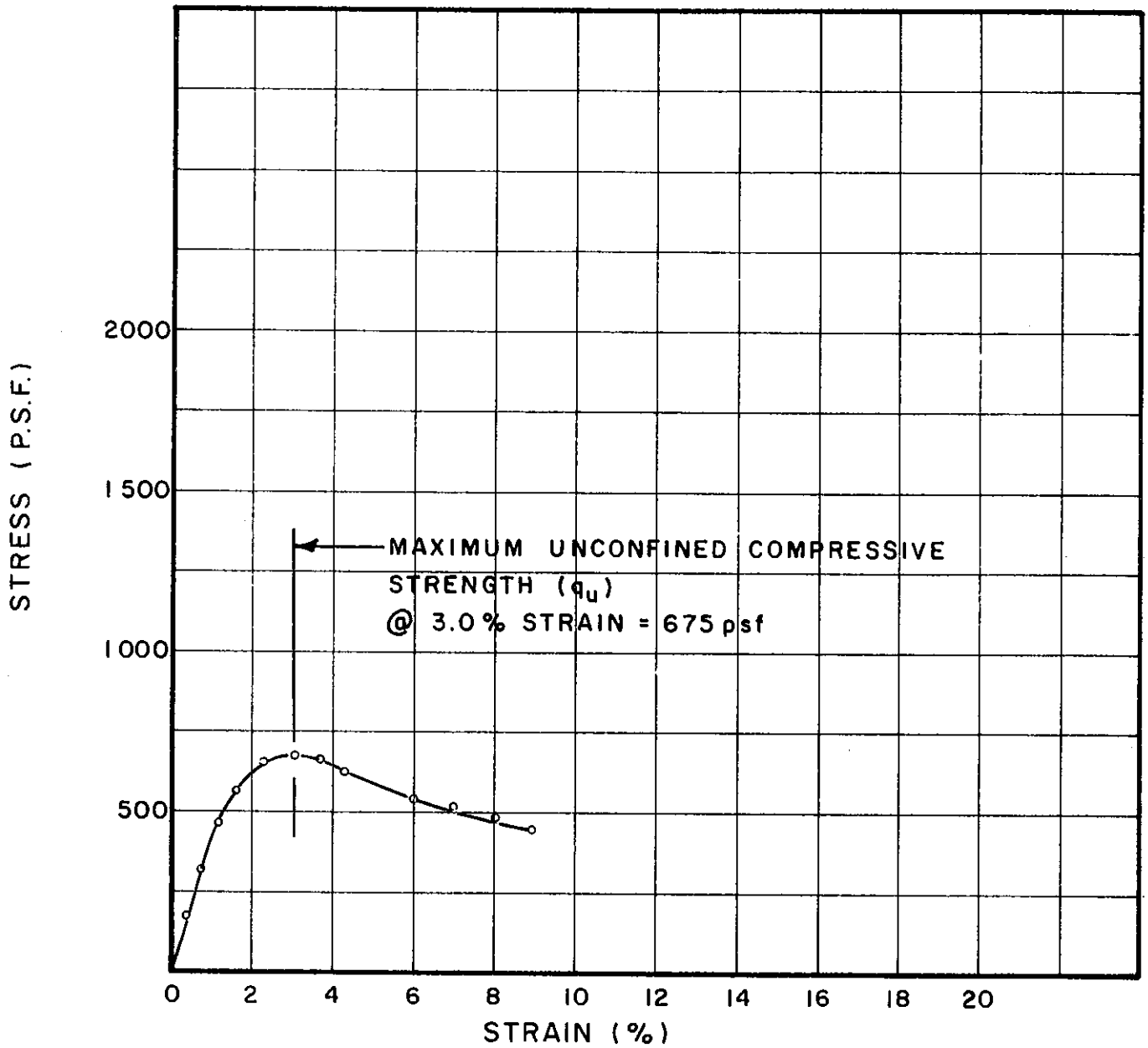
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U46.1	1.41	3.06	.26	35.0	88	48	25	SILTY CLAY (CL-CH)

BORING NO. 60  
 SAMPLE NO. 6  
 DEPTH 30.5' TO 30.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



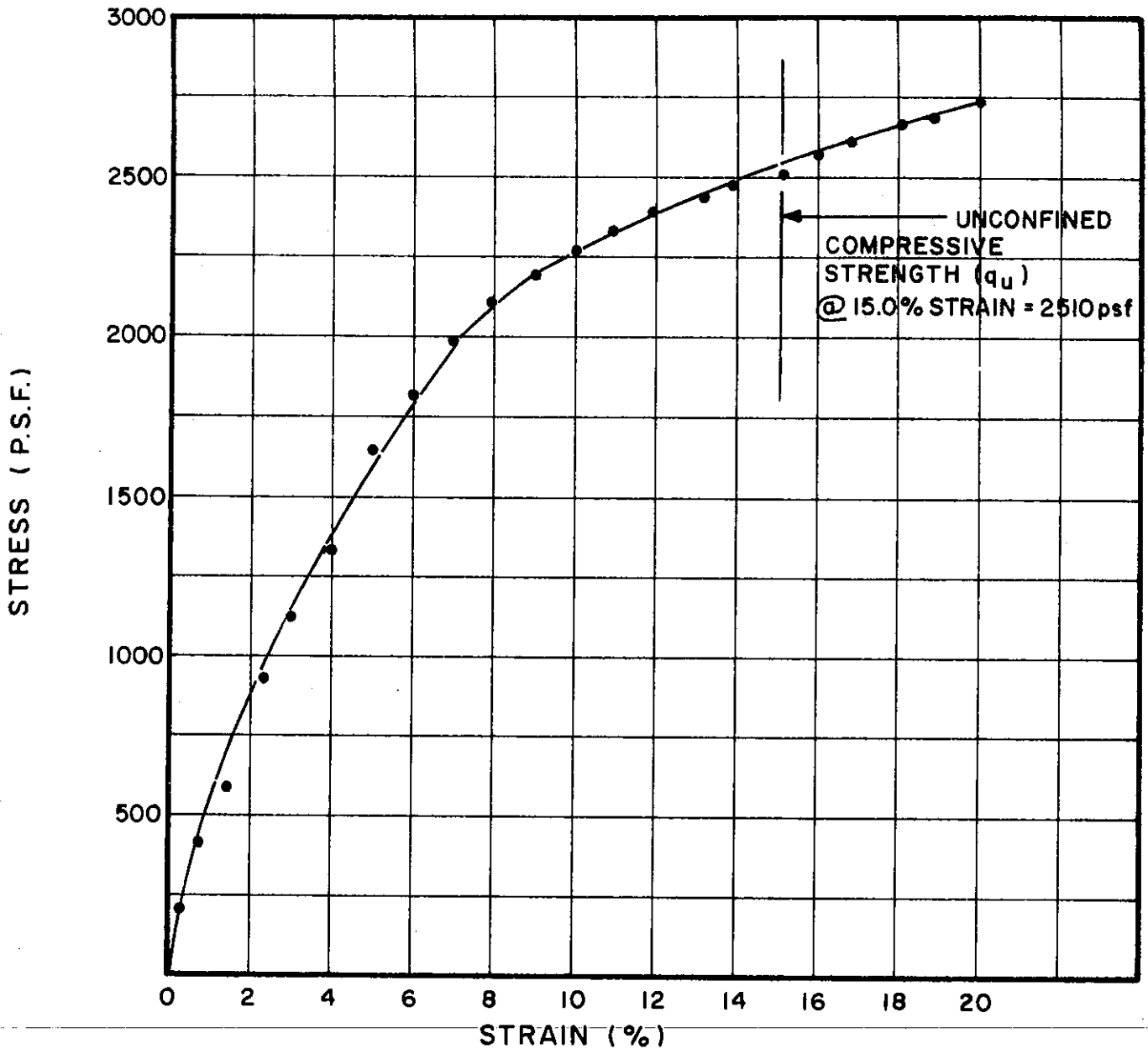
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U48.1	1.41	3.50	.257	39.7	83	47	25	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 8  
 DEPTH 40.6' TO 41.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



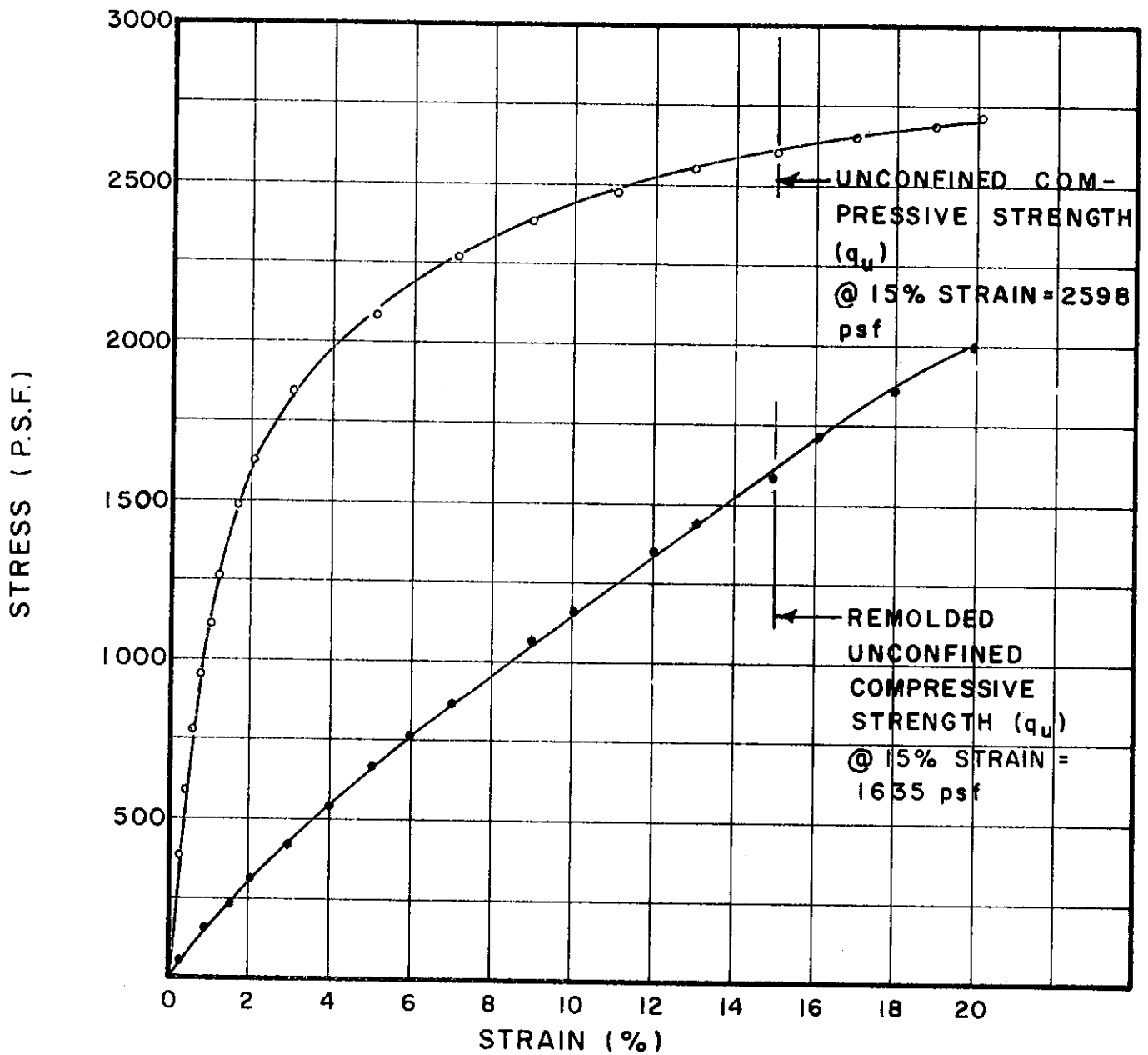


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U50.1	1.40	3.50	0.26	25.5	100	34	16	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 10  
 DEPTH 50.9' TO 51.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

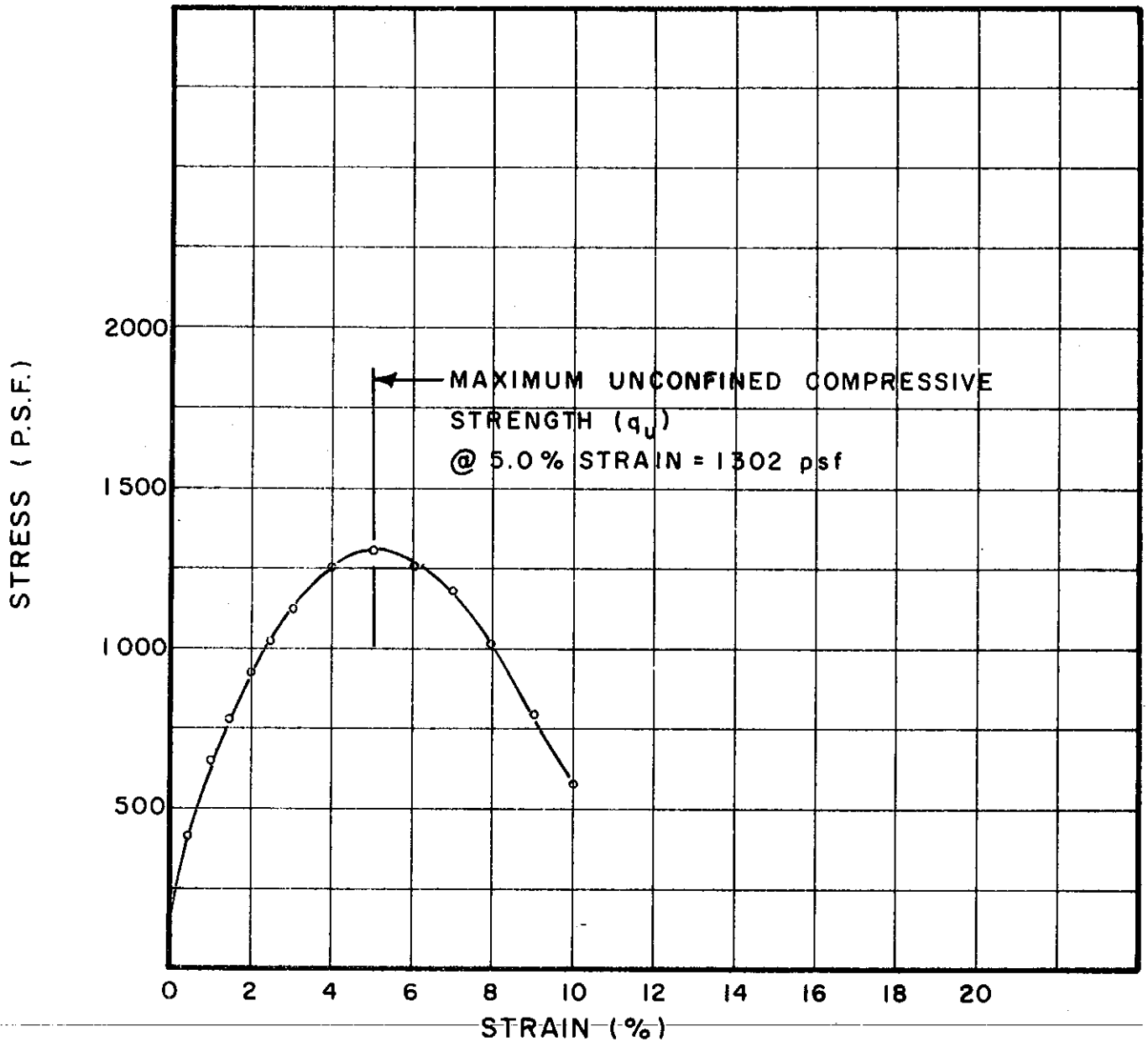


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U51.1	1.41	3.49	.258	24.8	103	33	18	SILTY CLAY, SANDY (CL)
U51.1	1.41	3.30	.273	24.8	103	33	18	SILTY CLAY, SANDY (CL)

BORING NO. 60  
 SAMPLE NO. 11  
 DEPTH 55.6' TO 56.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U54.1	1.42	3.50	.257	26.9	97	40	20	SILTY CLAY (CL)

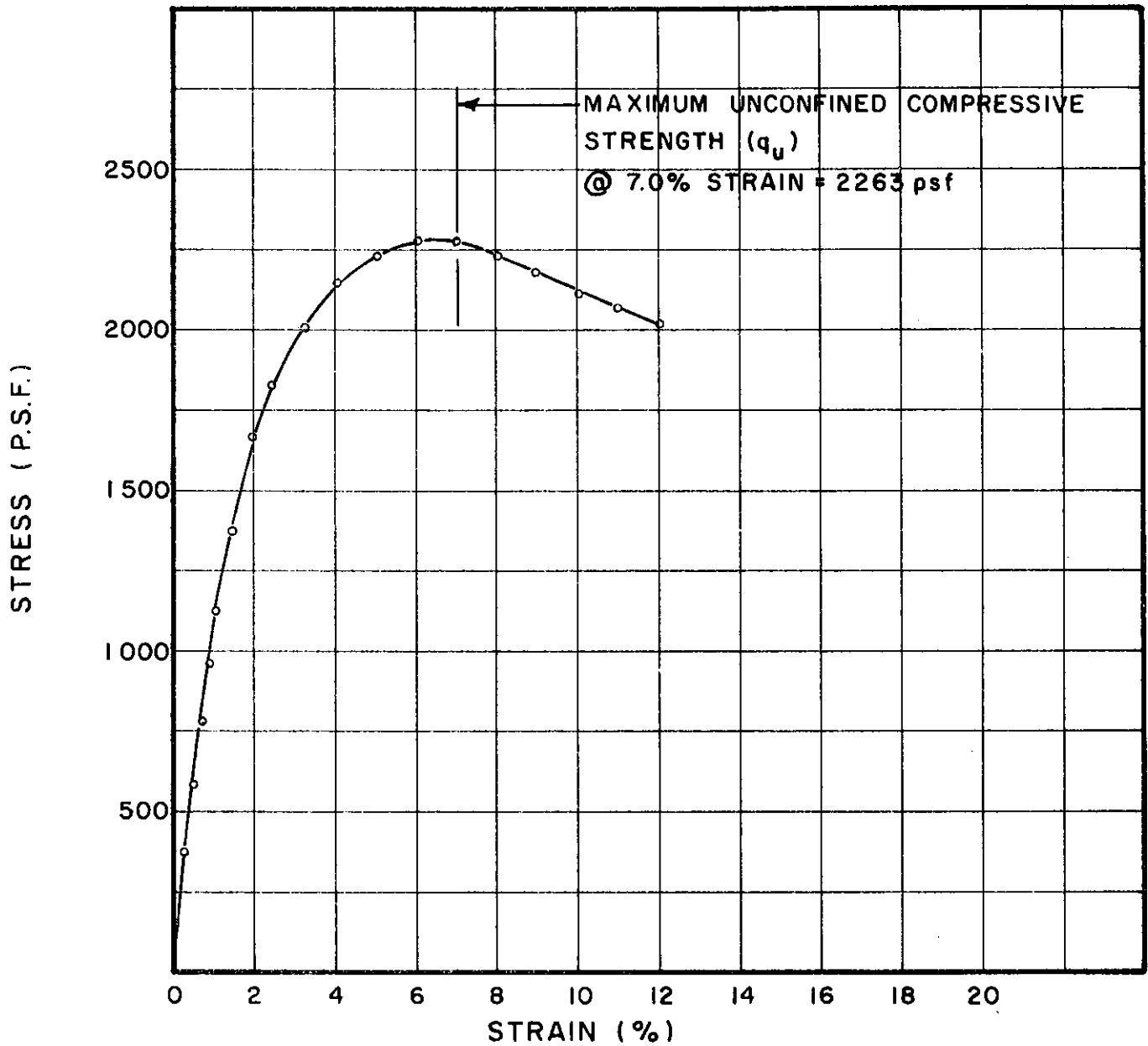
BORING NO. 60

SAMPLE NO. 14

DEPTH 75.1' TO 75.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U59.1	1.41	3.50	.257	27.1	101	38	20	SILTY CLAY SANDY (CL)

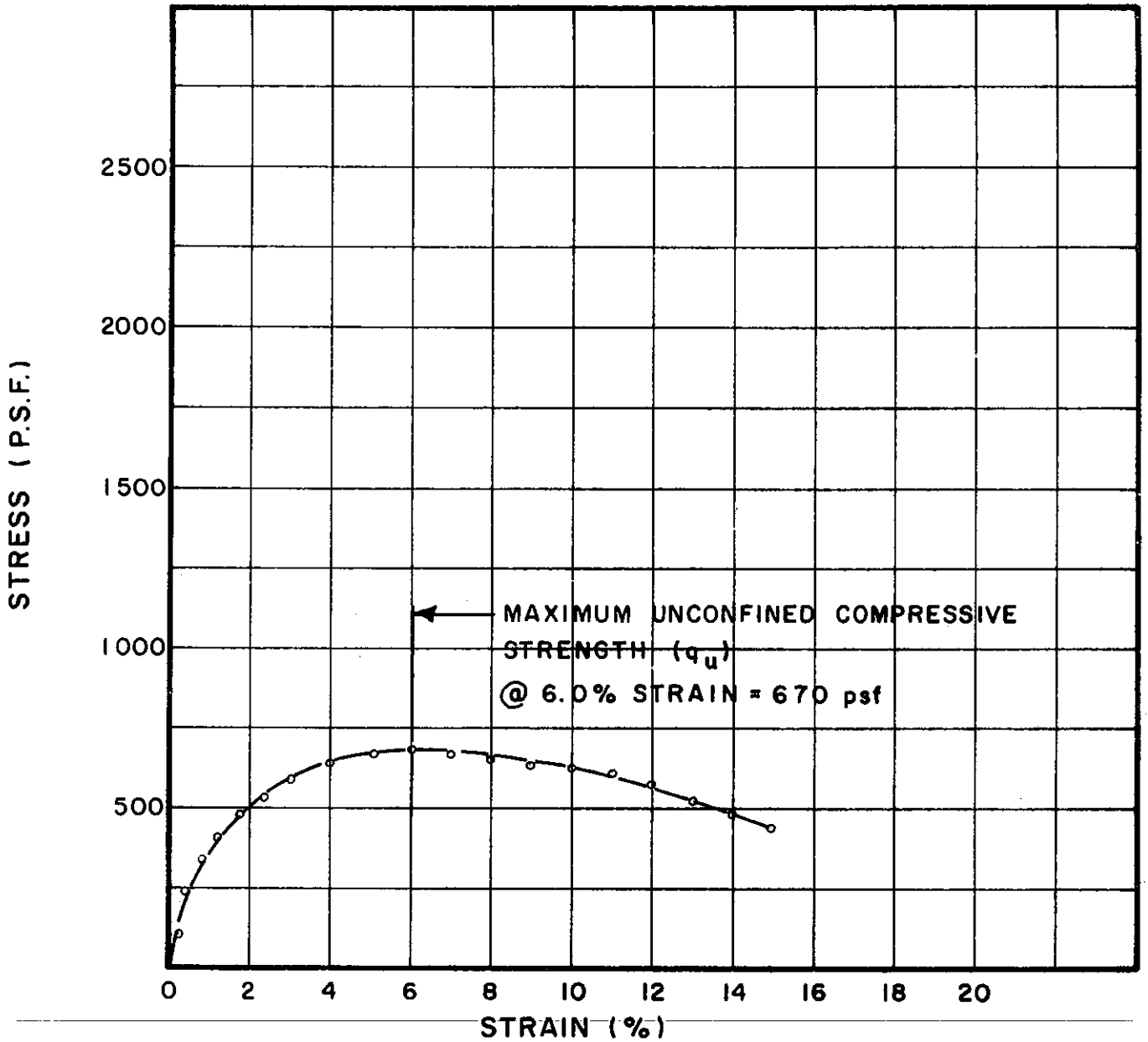
BORING NO. 60

SAMPLE NO. 19

DEPTH 100.1' TO 100.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



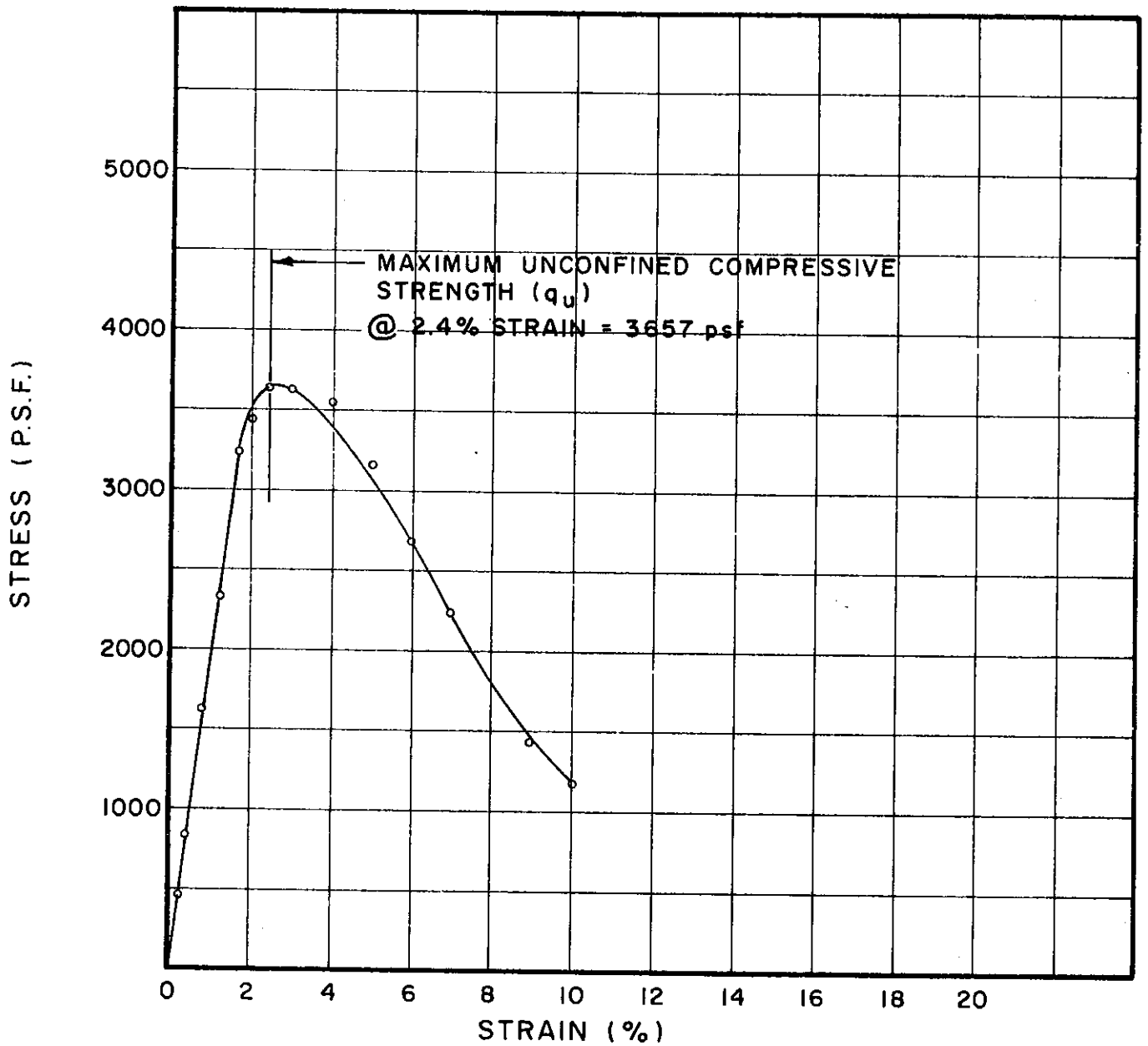
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U63.1	1.44	3.50	.257	15.4	115	17	11	SILTY CLAY, SANDY (CL - ML)

BORING NO. 60  
 SAMPLE NO. 23  
 DEPTH 119.6' TO 120.0

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

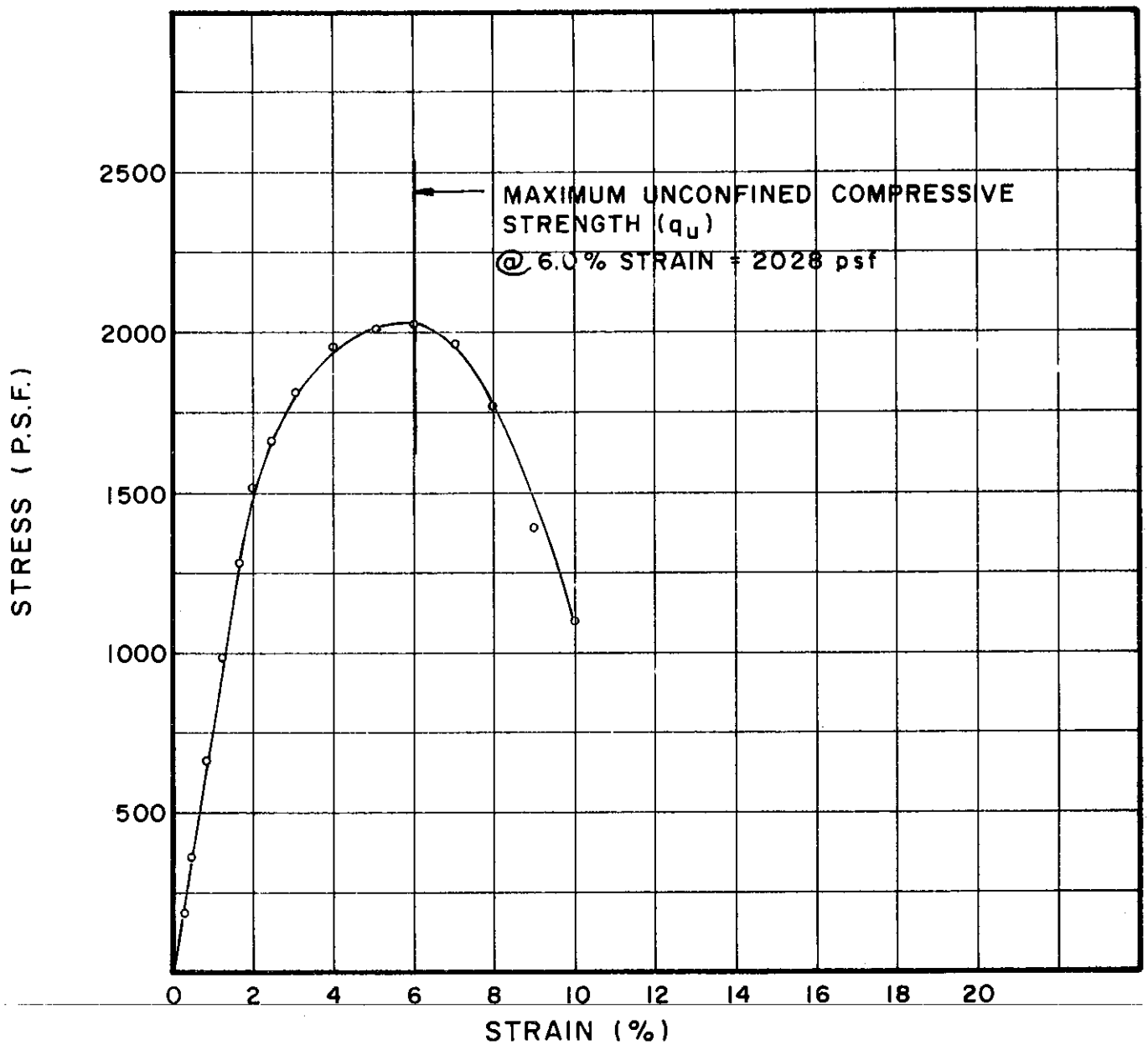


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U349.1	1.44	3.15	.286	27.8	96	50	22	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 2  
 DEPTH 8.9' TO 9.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



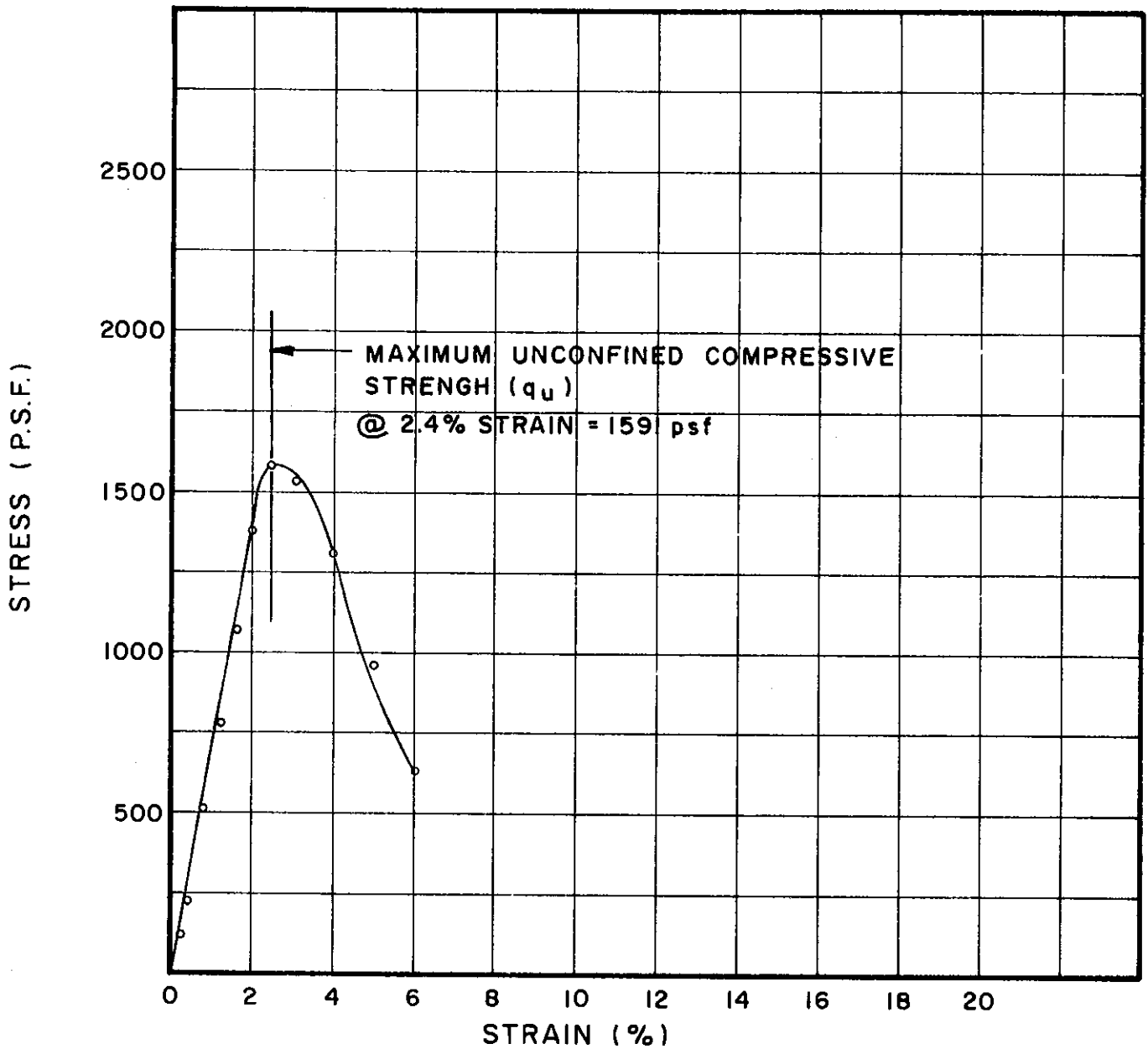
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U351.1	1.41	3.29	.274	35.8	86	49	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 4  
 DEPTH 19.9' TO 20.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



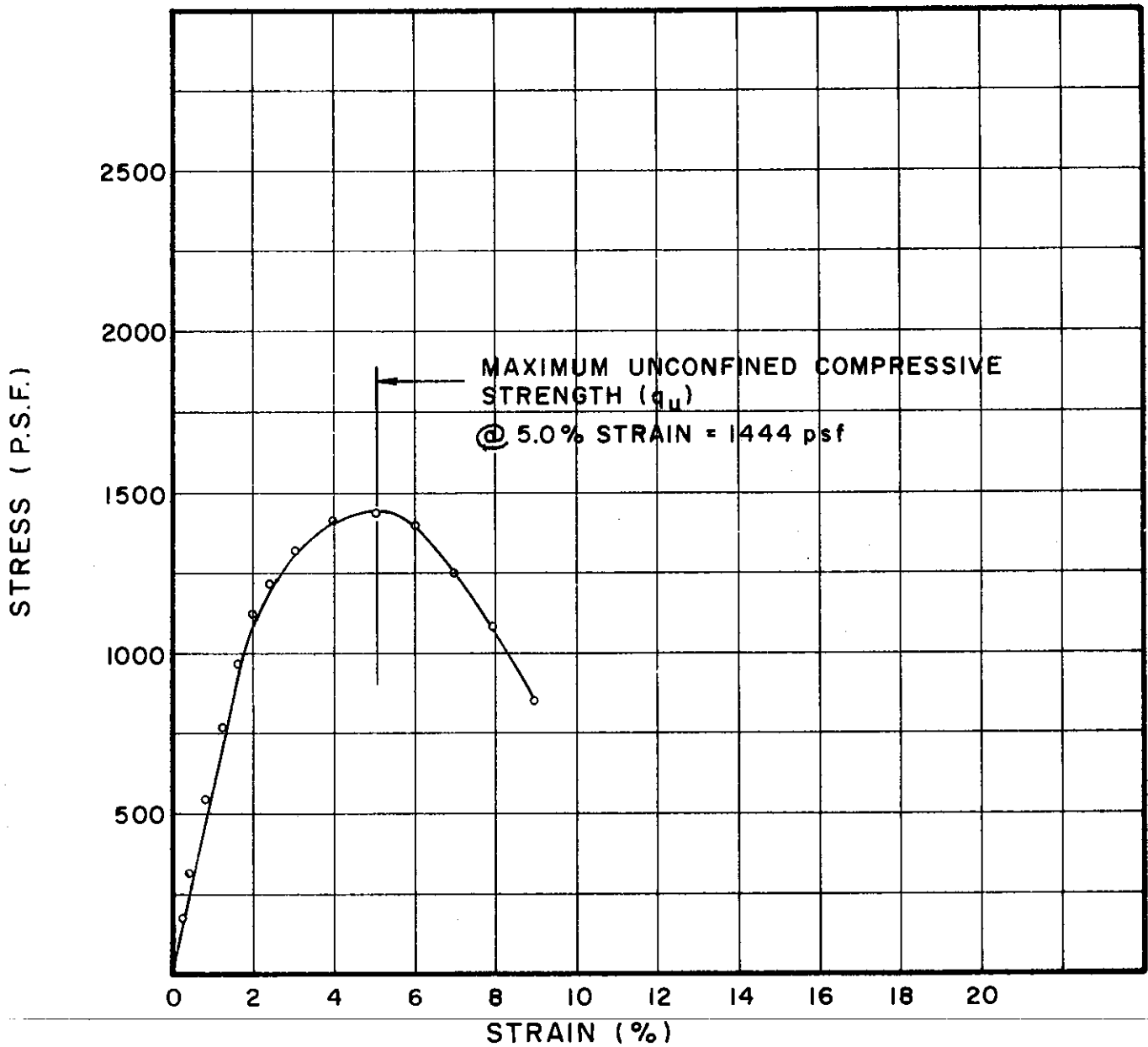
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U354.1	1.41	3.37	.267	40.0	81	46	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 7  
 DEPTH 34.9' TO 35.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U357.1	1.40	3.30	.273	32.8	90	40	22	SILTY CLAY (CL-CH)

BORING NO. 101

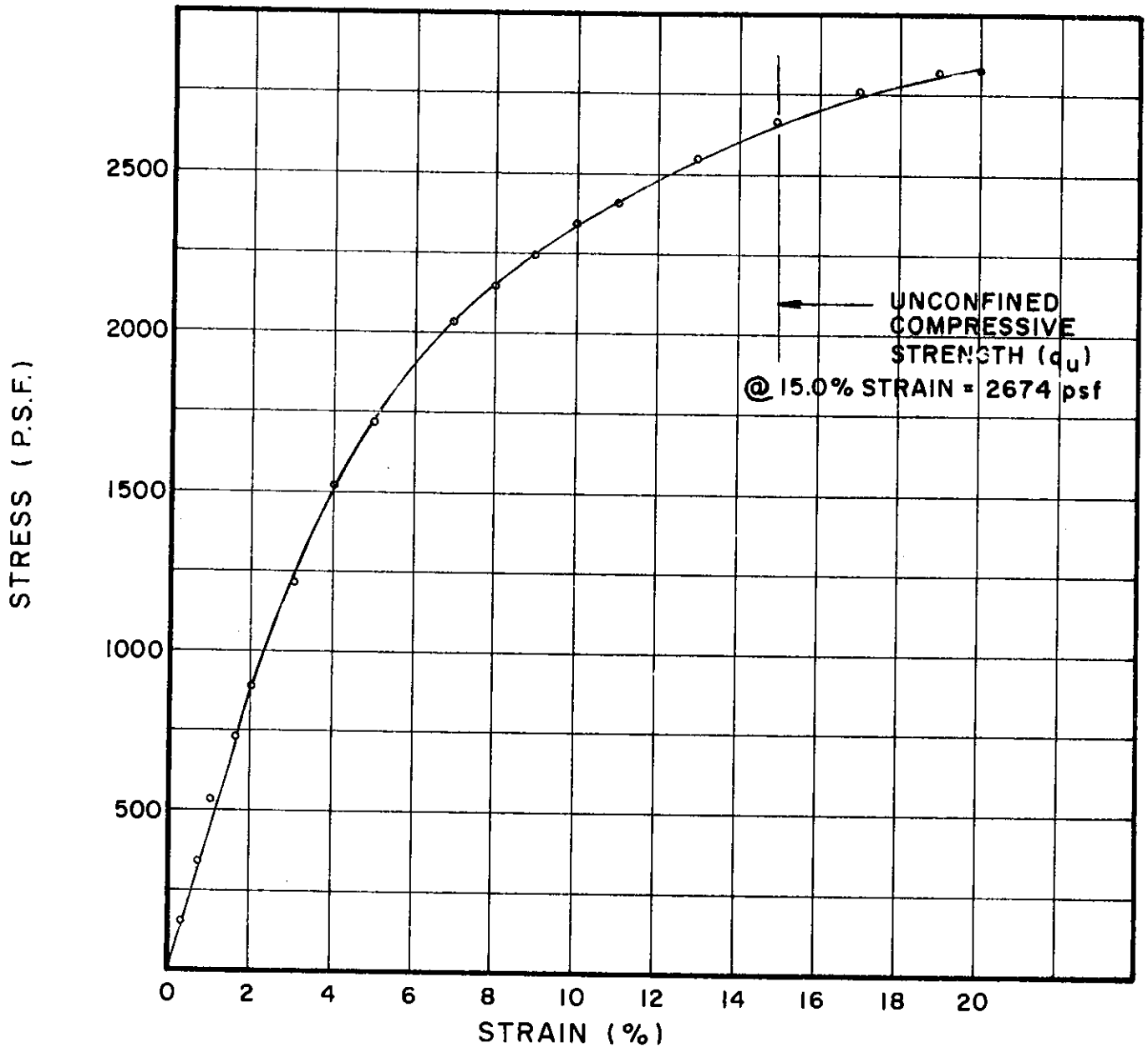
SAMPLE NO. 10

DEPTH 50.1' TO 50.4'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

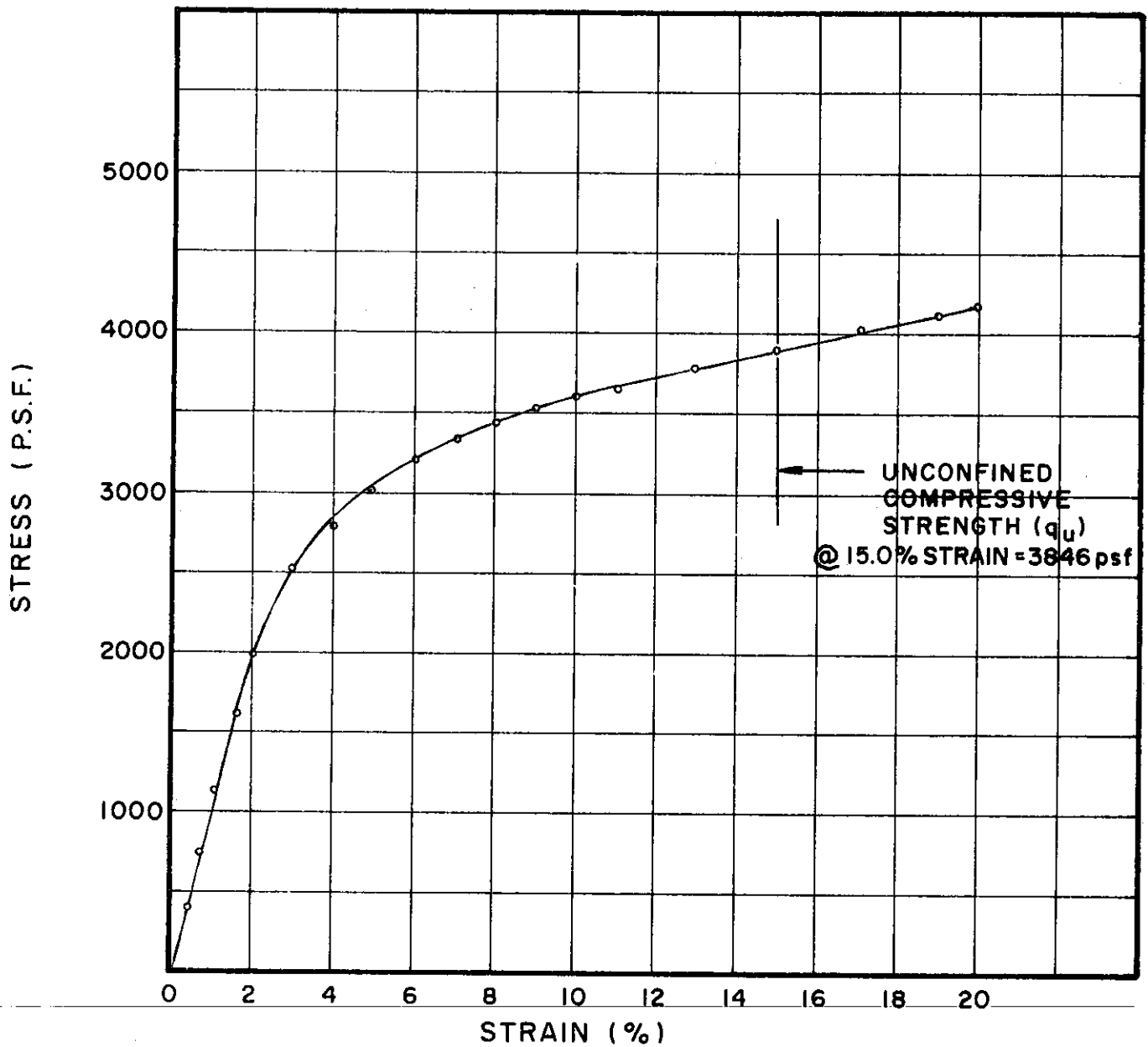


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U360.1	1.39	3.28	.274	26.6	97	36	19	SILTY CLAY, SANDY (CL)

BORING NO. 101  
 SAMPLE NO. 13  
 DEPTH 65.2' TO 65.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U364.1	1.41	3.35	.269	25.2	97	37	19	SILTY CLAY, SANDY (CL)

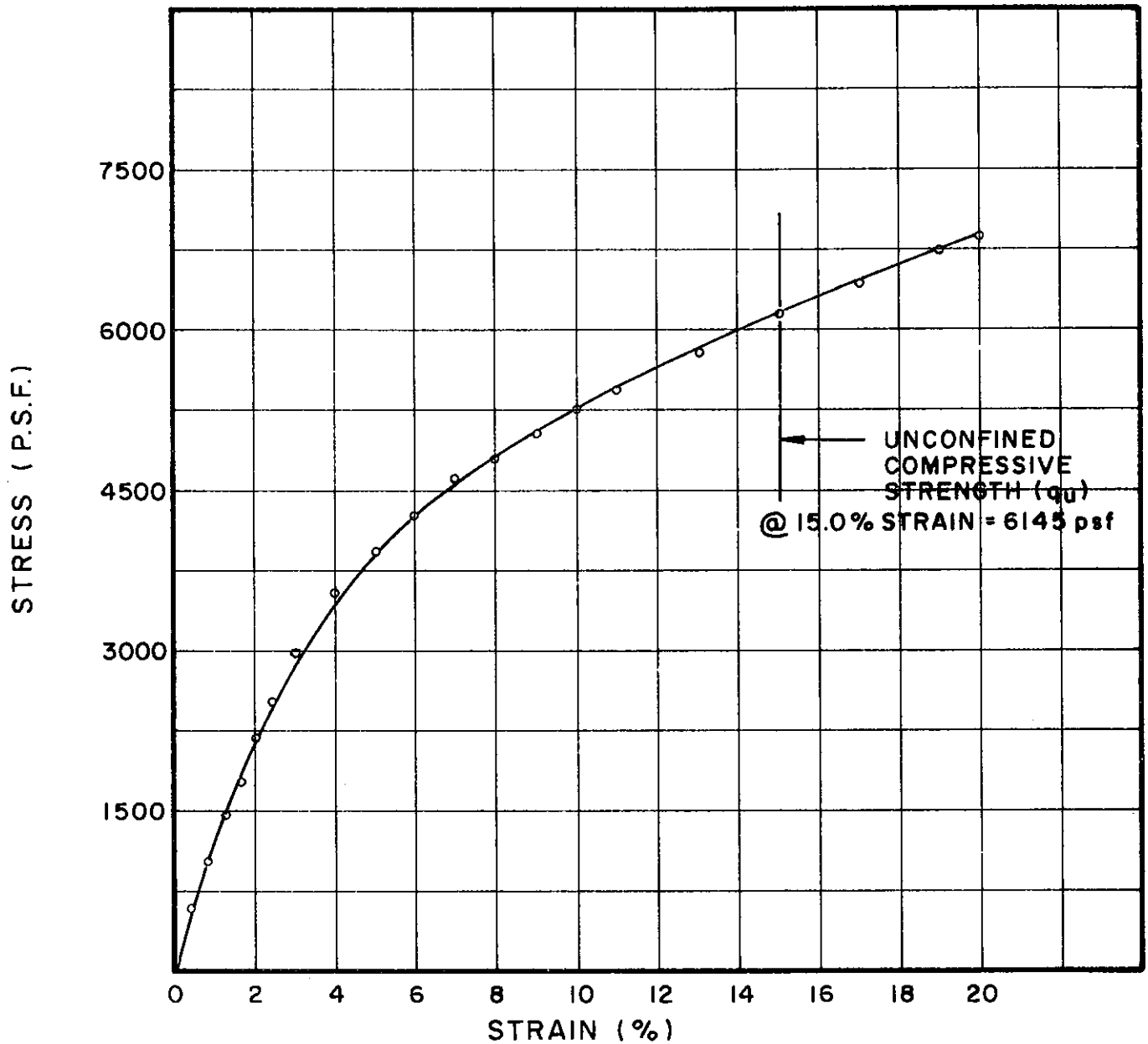
BORING NO. 101

SAMPLE NO. 17

DEPTH 85.2' TO 85.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U339.1	1.41	3.35	.268	20.7	107	33	20	SILTY CLAY, SANDY (CL)

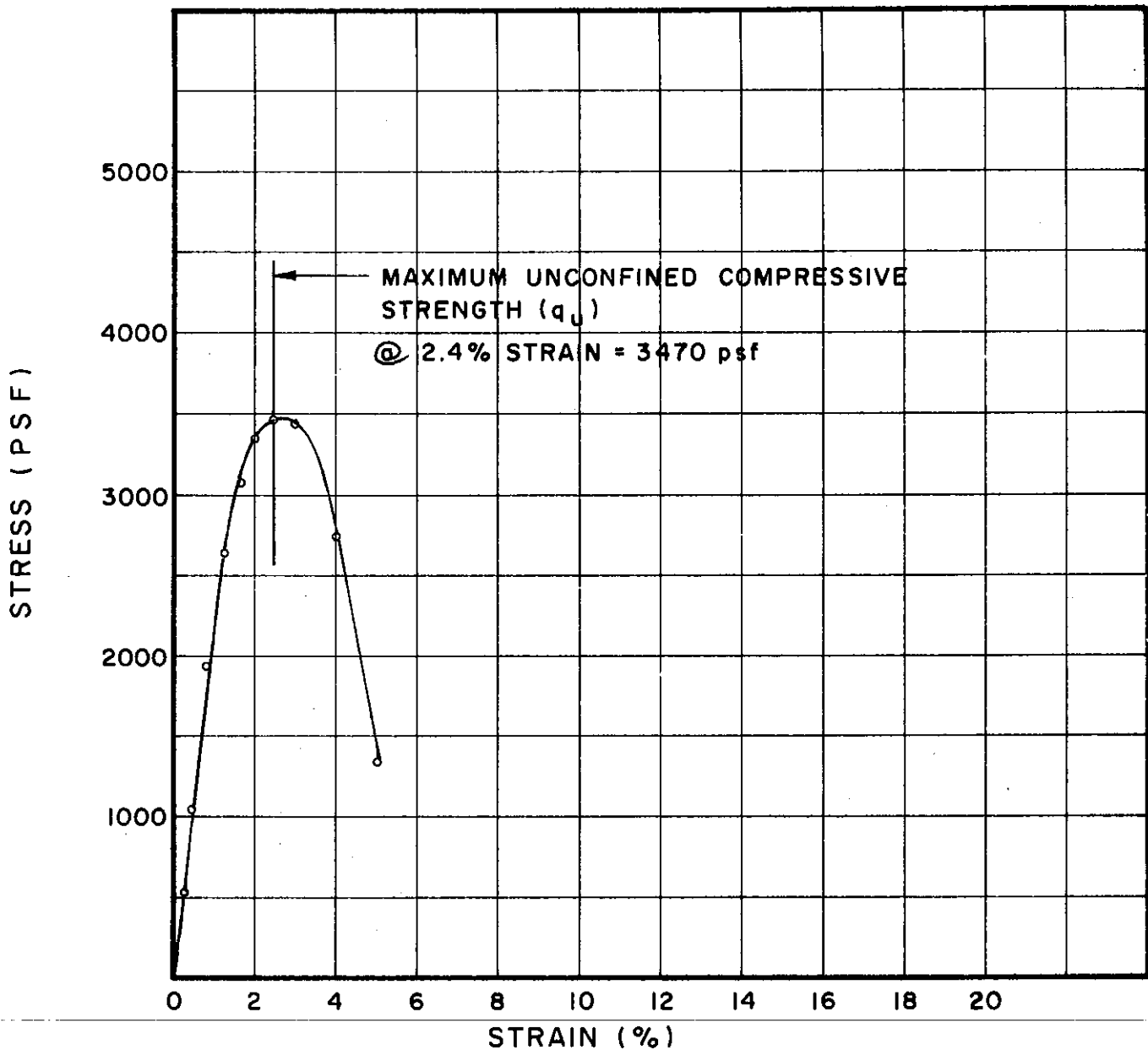
BORING NO. 119

SAMPLE NO. 9

DEPTH 81.6' TO 81.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

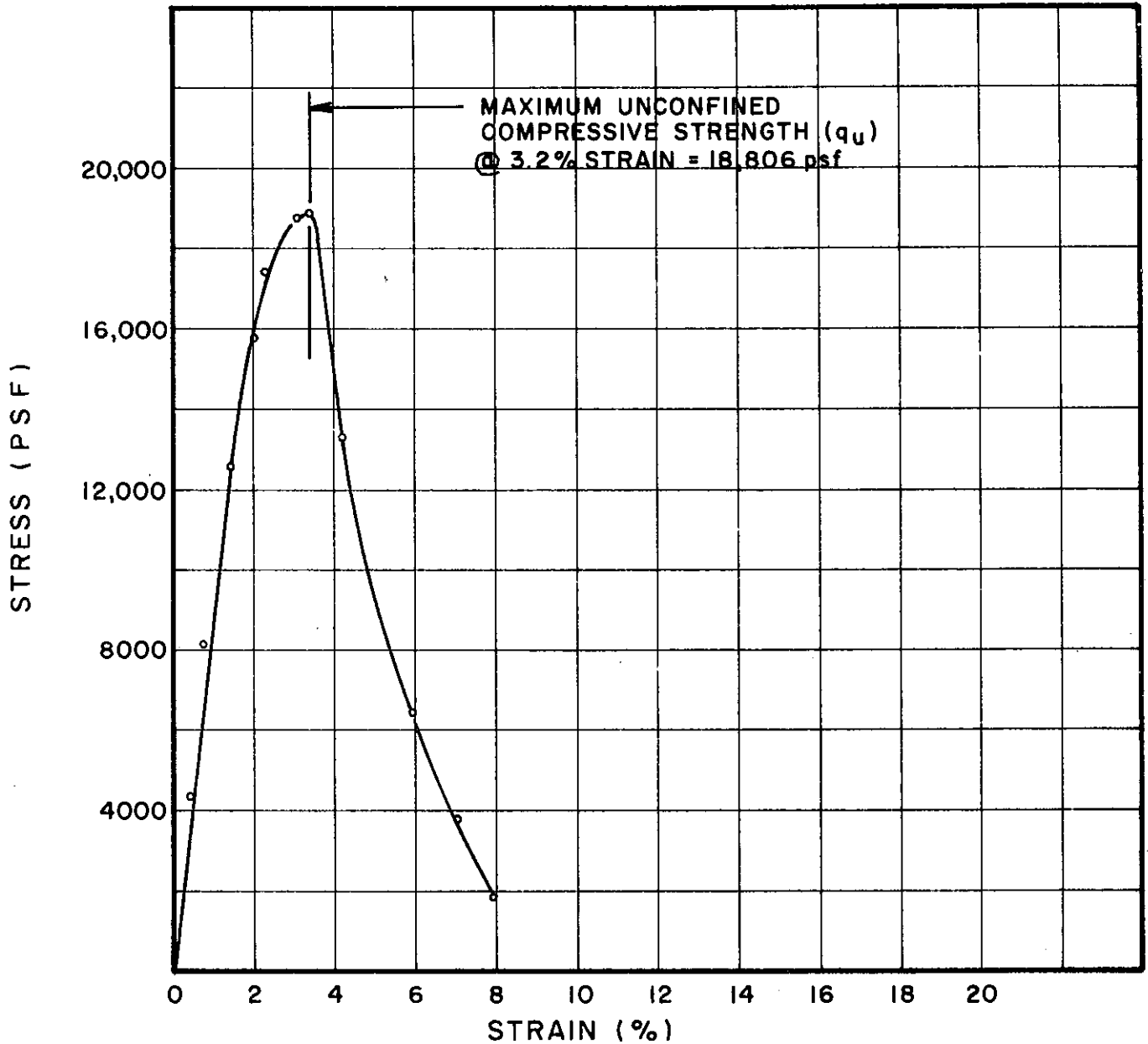


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U241.1	1.46	3.50	.257	26.2	99	47	24	SILTY CLAY (CL-CH)

BORING NO. 126  
 SAMPLE NO. 3  
 DEPTH 8.2' TO 8.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

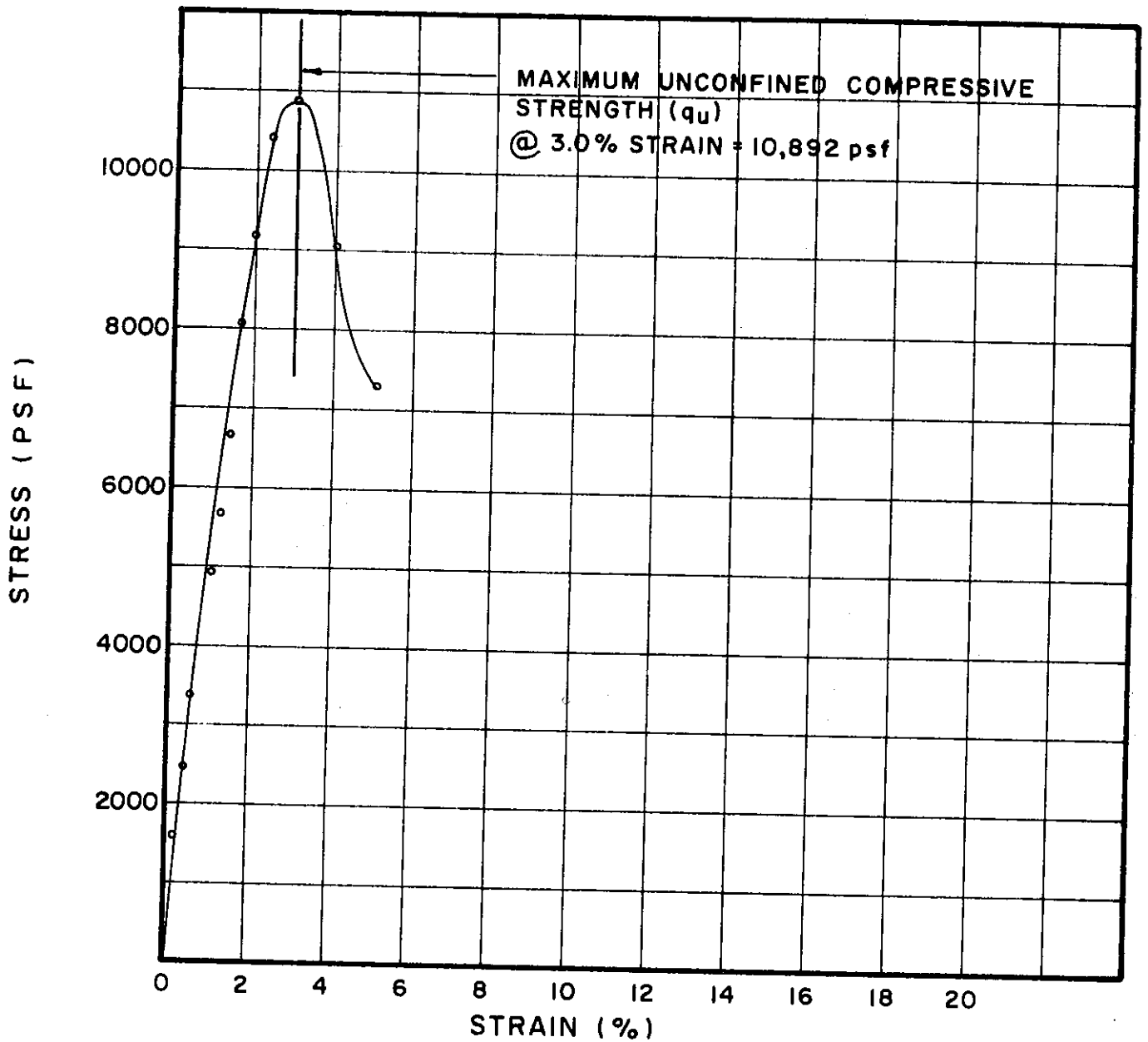


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U416.2	1.42	3.55	0.26	13.5	113	49	22	SILTY CLAY (CL-CH)
								"COMPACTED SAMPLE"

BORING NO. 127  
 SAMPLE NO. 3  
 DEPTH 5.6' TO 7.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U526.1	1.42	3.46	0.25	24.3	102	48	22	SILTY CLAY (CL-CH)

BORING NO. 136

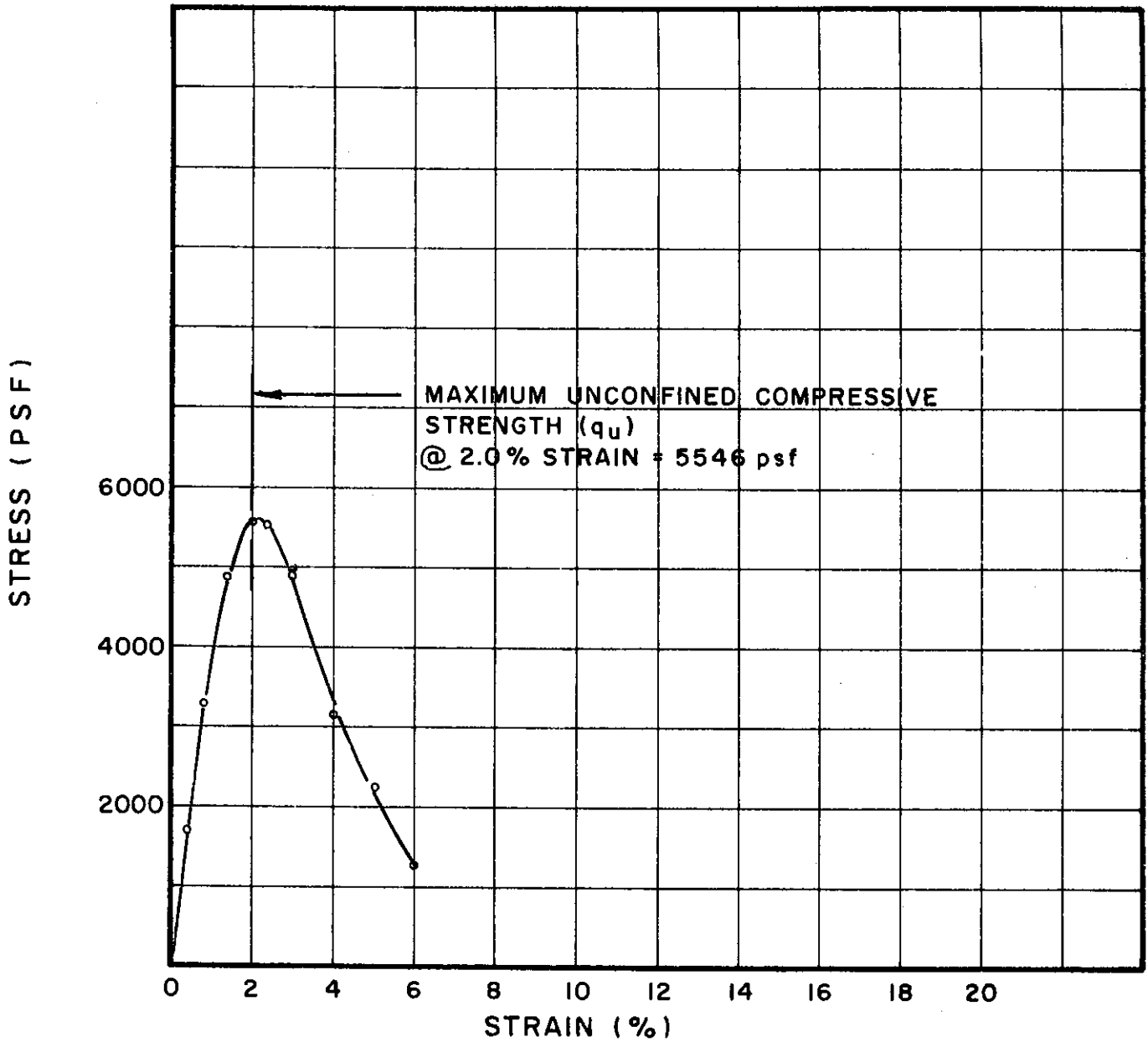
SAMPLE NO. 4

DEPTH 8.8' TO 9.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



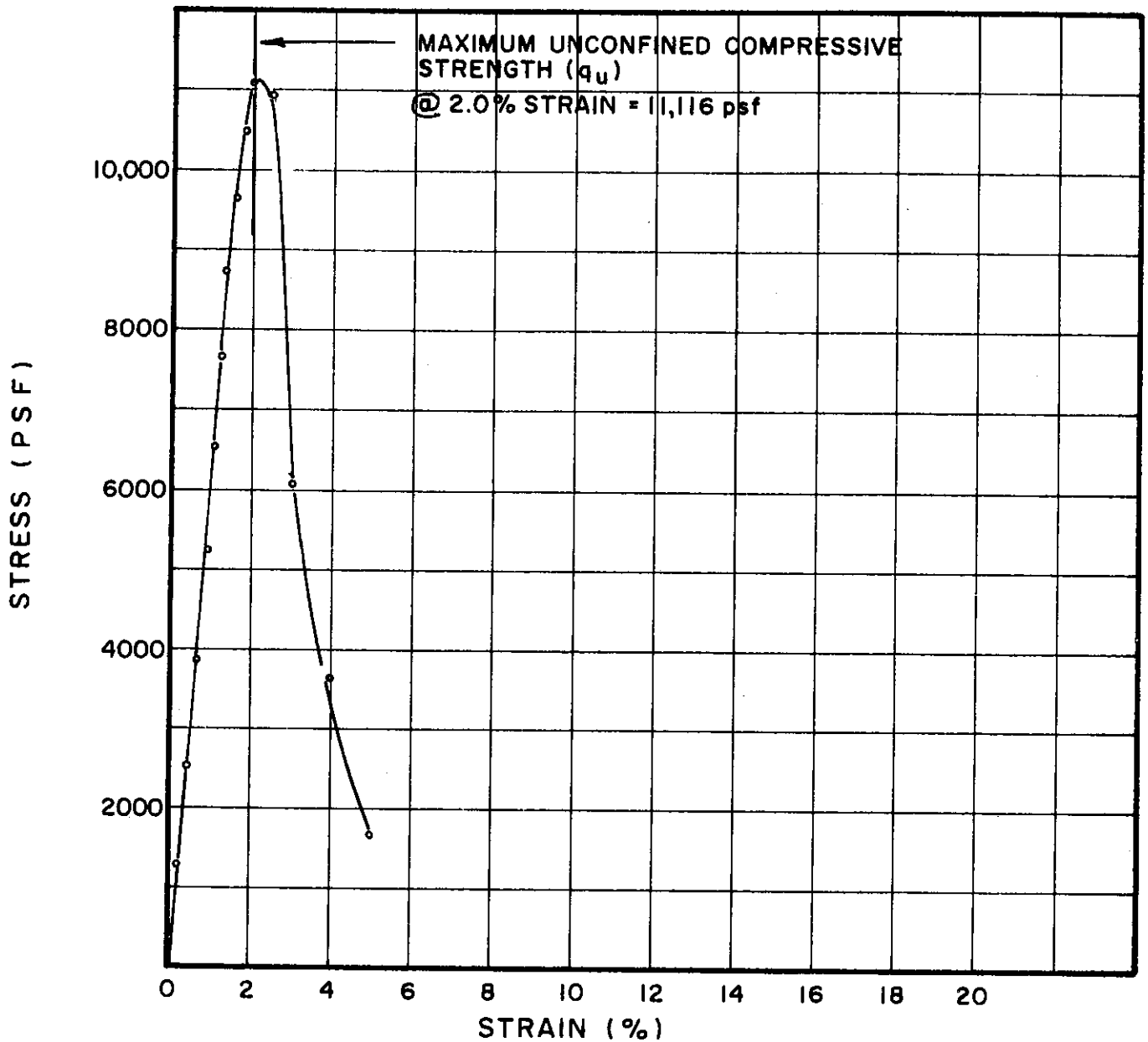
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>p</sub> 527.1	1.40	3.28	.274	17.5	100	43	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U529.1	1.41	3.05	.28	17.5	103	49	23	SILTY CLAY (CL-CH)

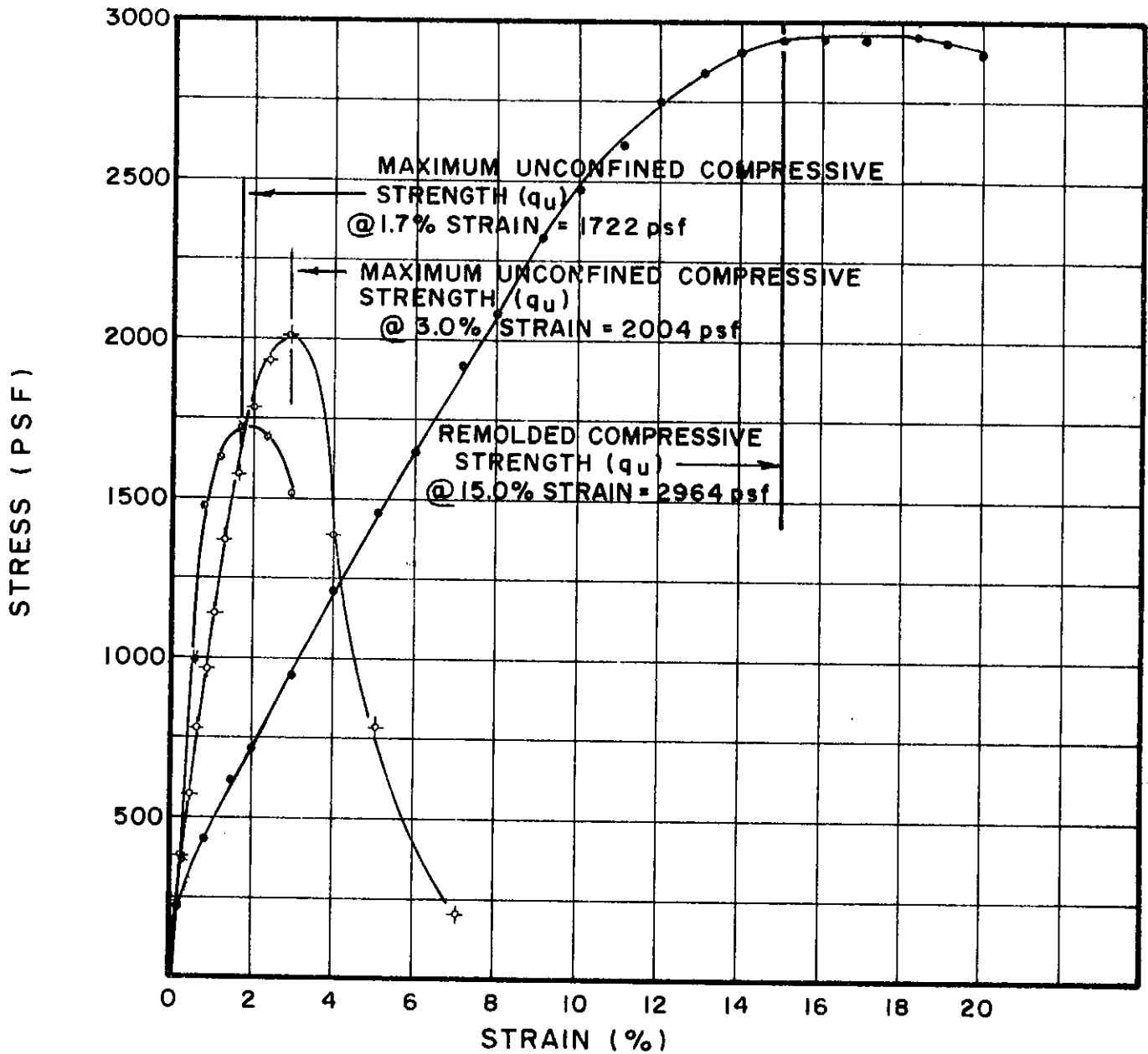
BORING NO. 141

SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

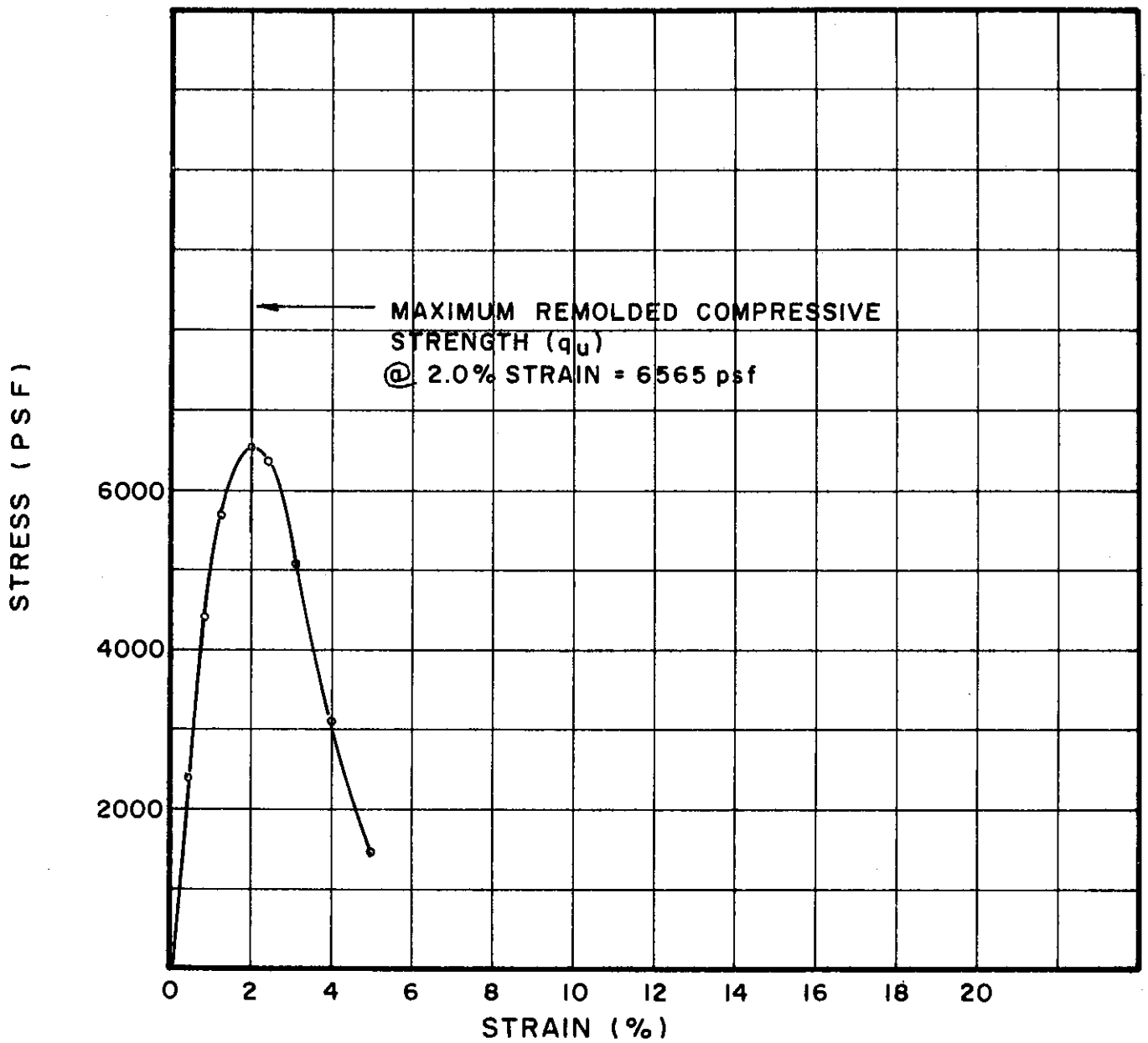


TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%) PL(%)	
U537.1	1.41	3.24	.28	26.3	97	48 21	SILTY CLAY (CL-CH)
U537.2	1.39	3.23	.28	24.1	99		
rU537.1	1.42	3.15	.28	24.1	100		

BORING NO. 144  
 SAMPLE NO. 4  
 DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U <sub>r</sub> 542.1	1.40	3.18	.283	16.6	104	46	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 146

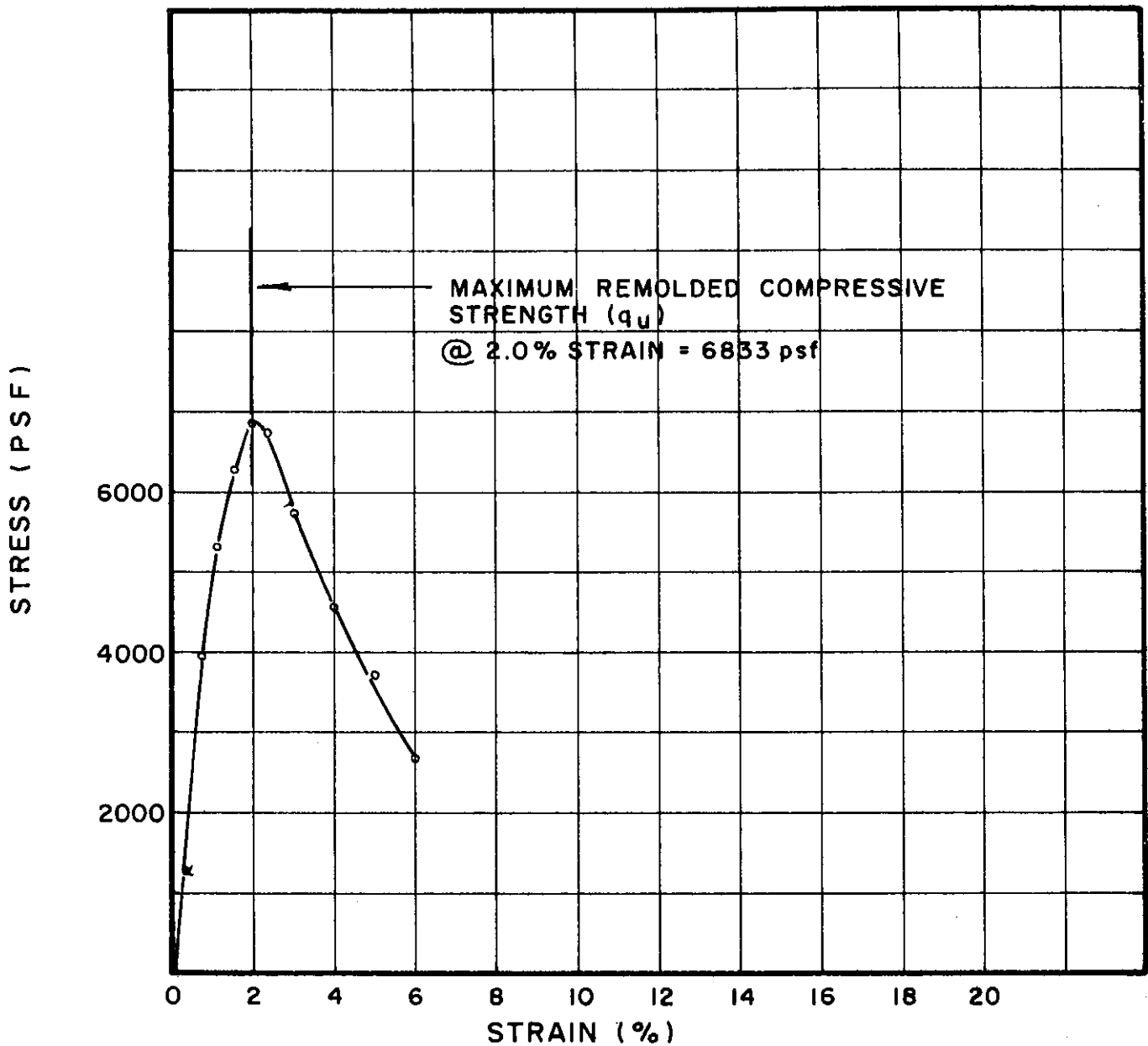
SAMPLE NO. ST 7

DEPTH 14.0' TO 16.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

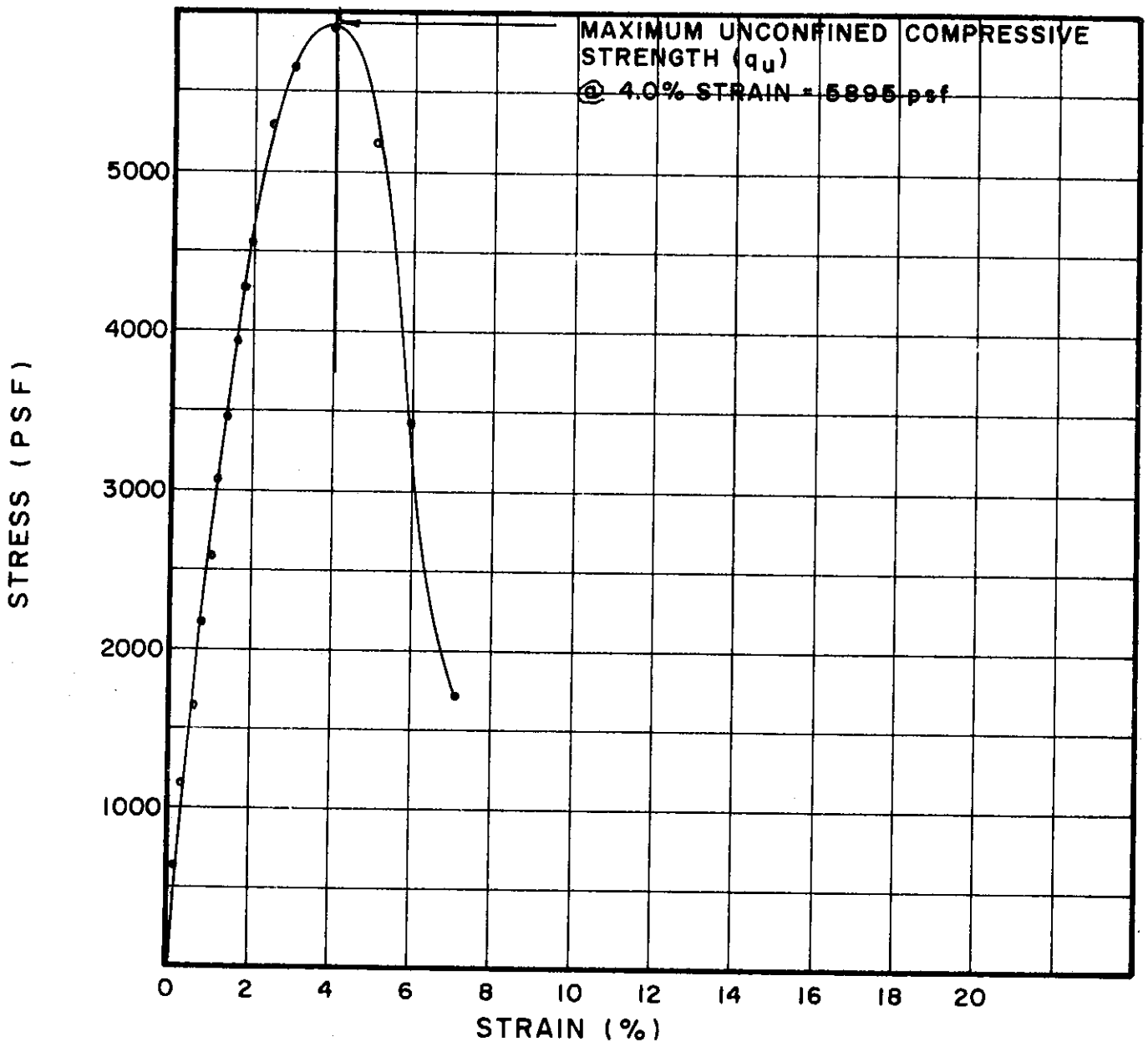


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>r</sub> 548.1	1.37	3.20	.281	16.8	104	50	21	SILTY CLAY (CL-CH)
								COMPACTED SAMPLE

BORING NO. 158  
 SAMPLE NO. ST 2  
 DEPTH 7.5' TO 9.7'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U552.1	1.40	3.43	0.25	23.9	104	50	23	SILTY CLAY (CL-CH)

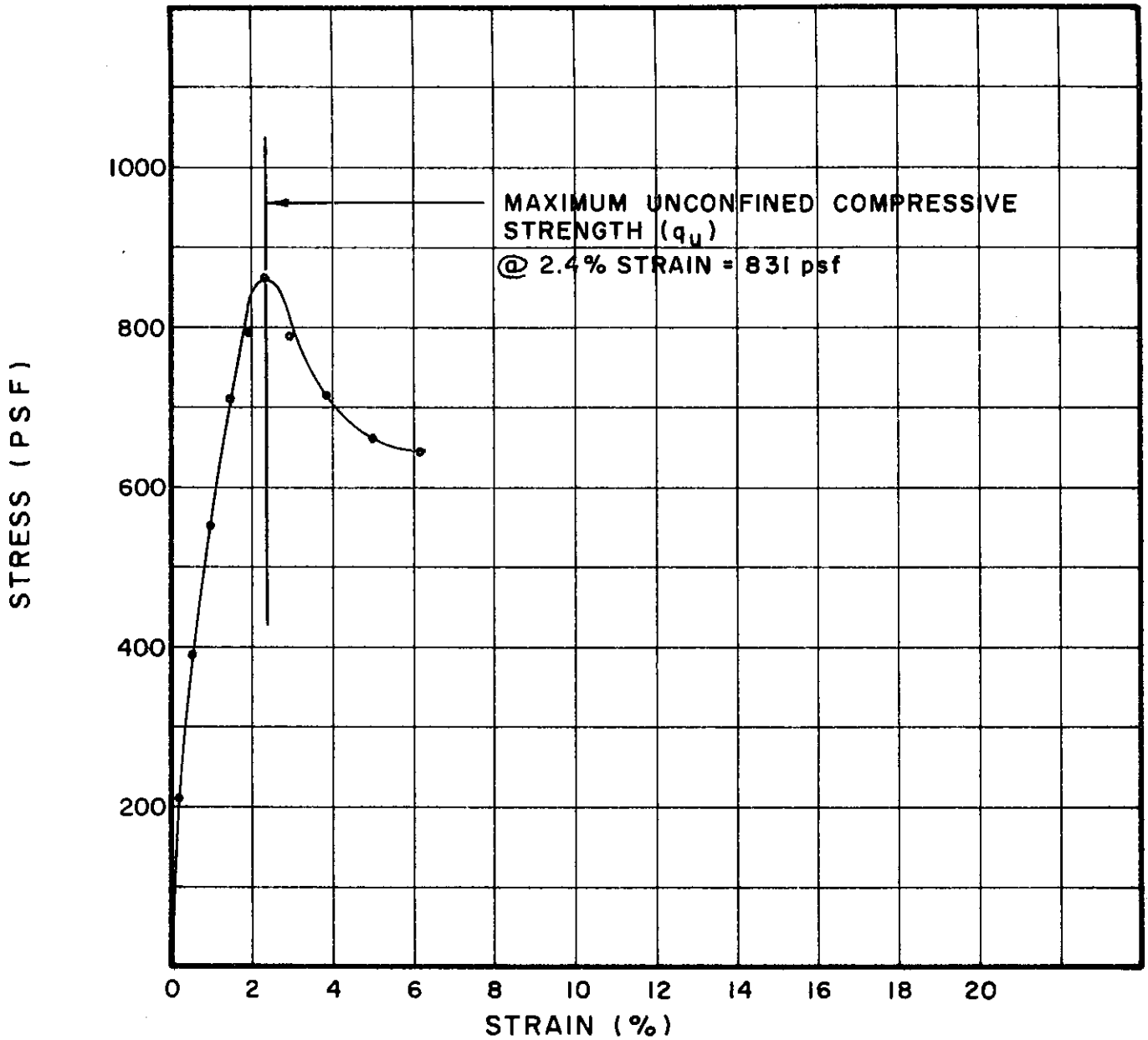
BORING NO. 185

SAMPLE NO. 3

DEPTH 7.5' TO 7.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



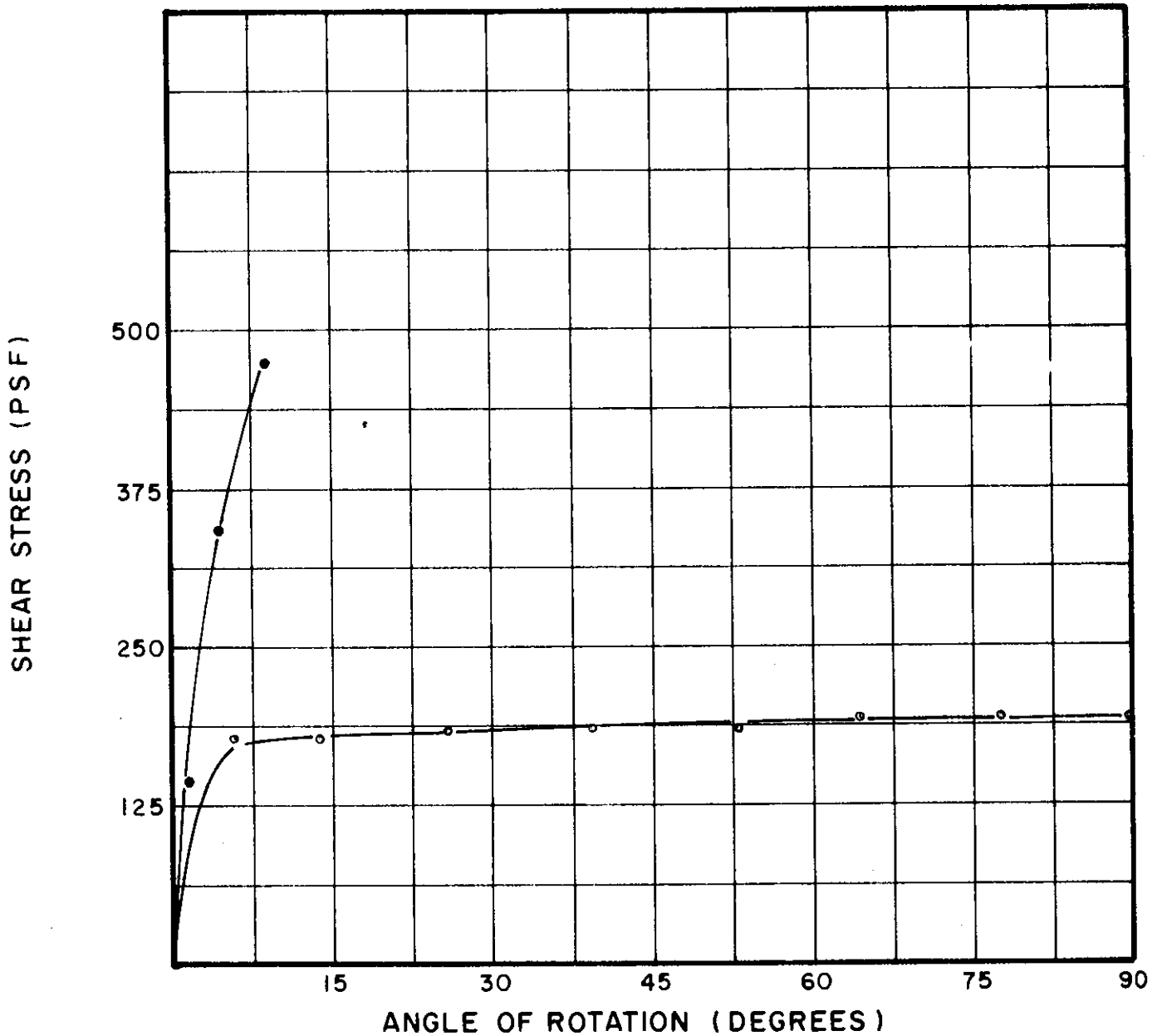
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U554.1	1.41	3.33	0.25	39.3	81	49	22	SILTY CLAY (CL-CH)

BORING NO. 185  
 SAMPLE NO. 7  
 DEPTH 18.5' TO 18.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)

BORING NO. 50

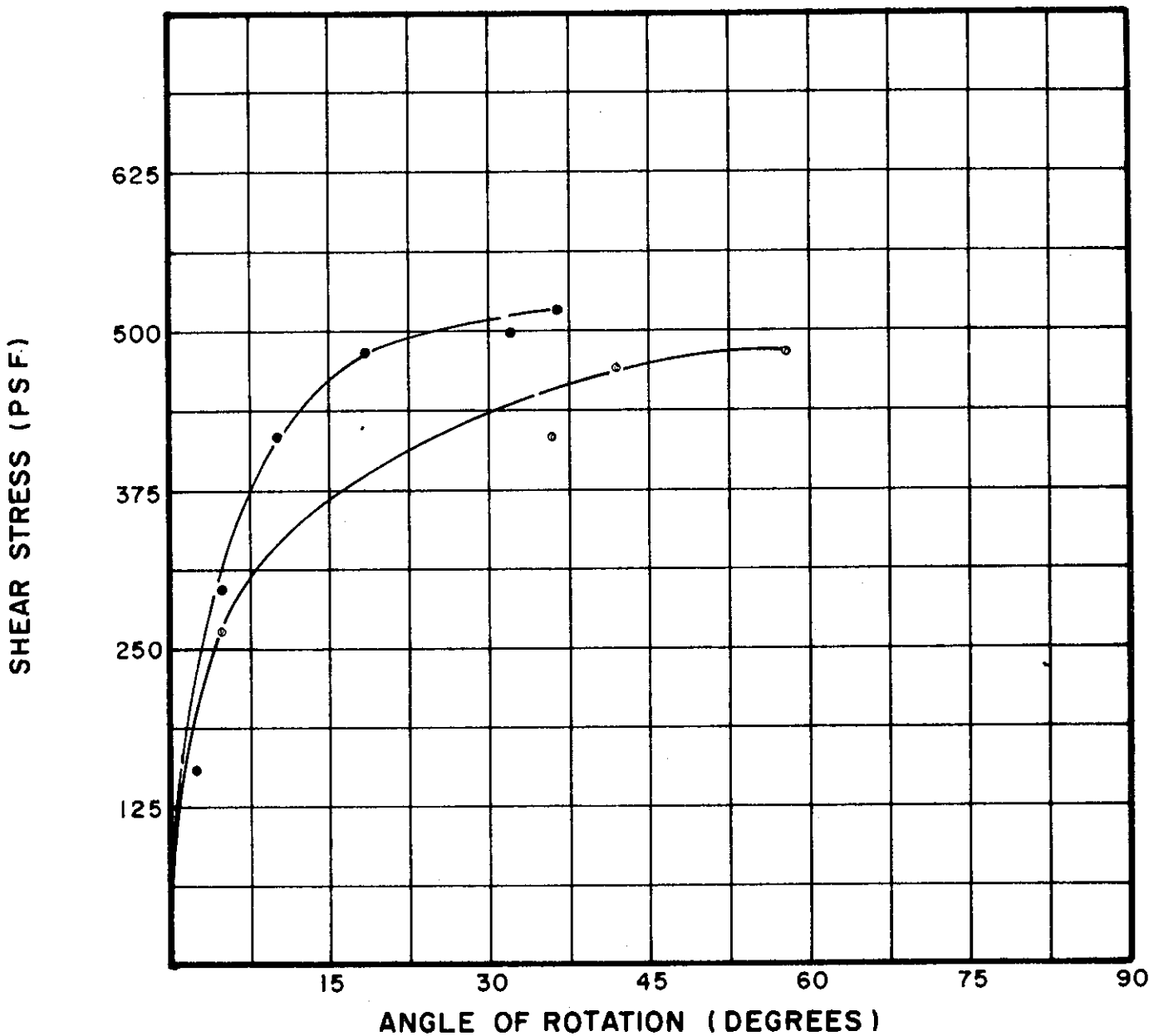
SAMPLE NO. 6

DEPTH 28.1' - 28.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



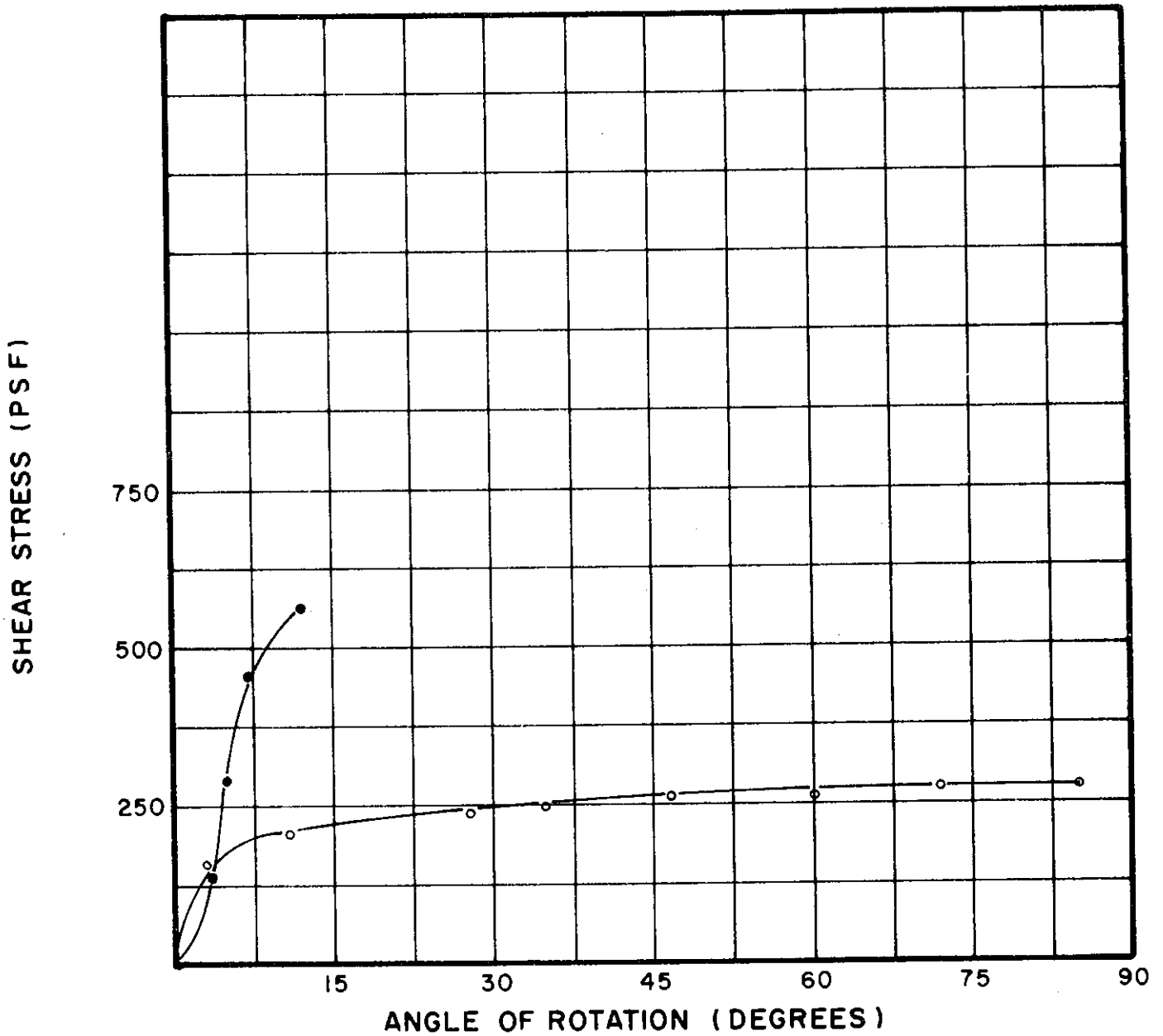


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.1' - 48.4'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

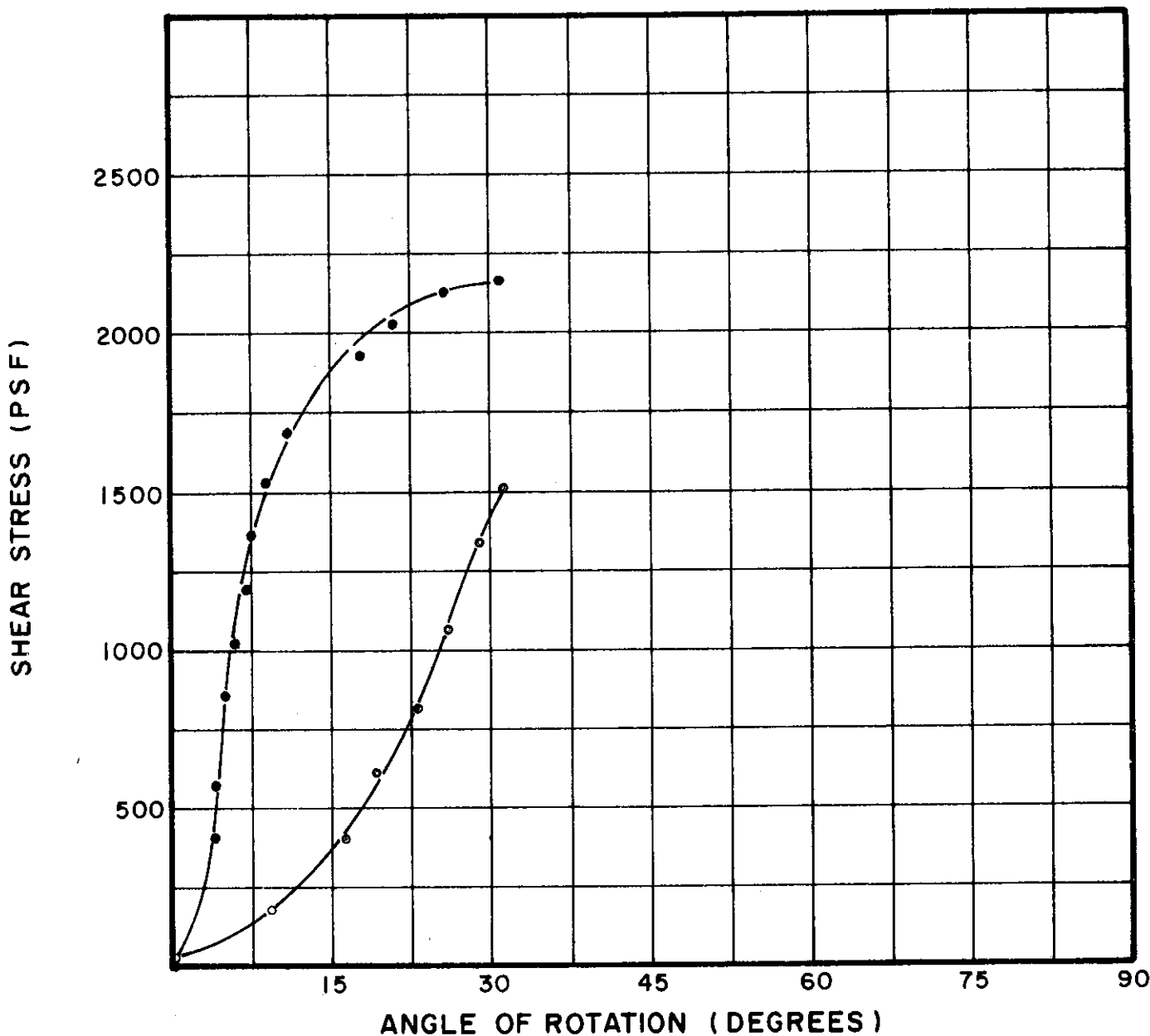


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VSI09.1 ●	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)
rVSI09.1 ○	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 28.9' - 29.2'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%) PL (%)	
VS111.1 ●	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)
VS111.1 ○	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)

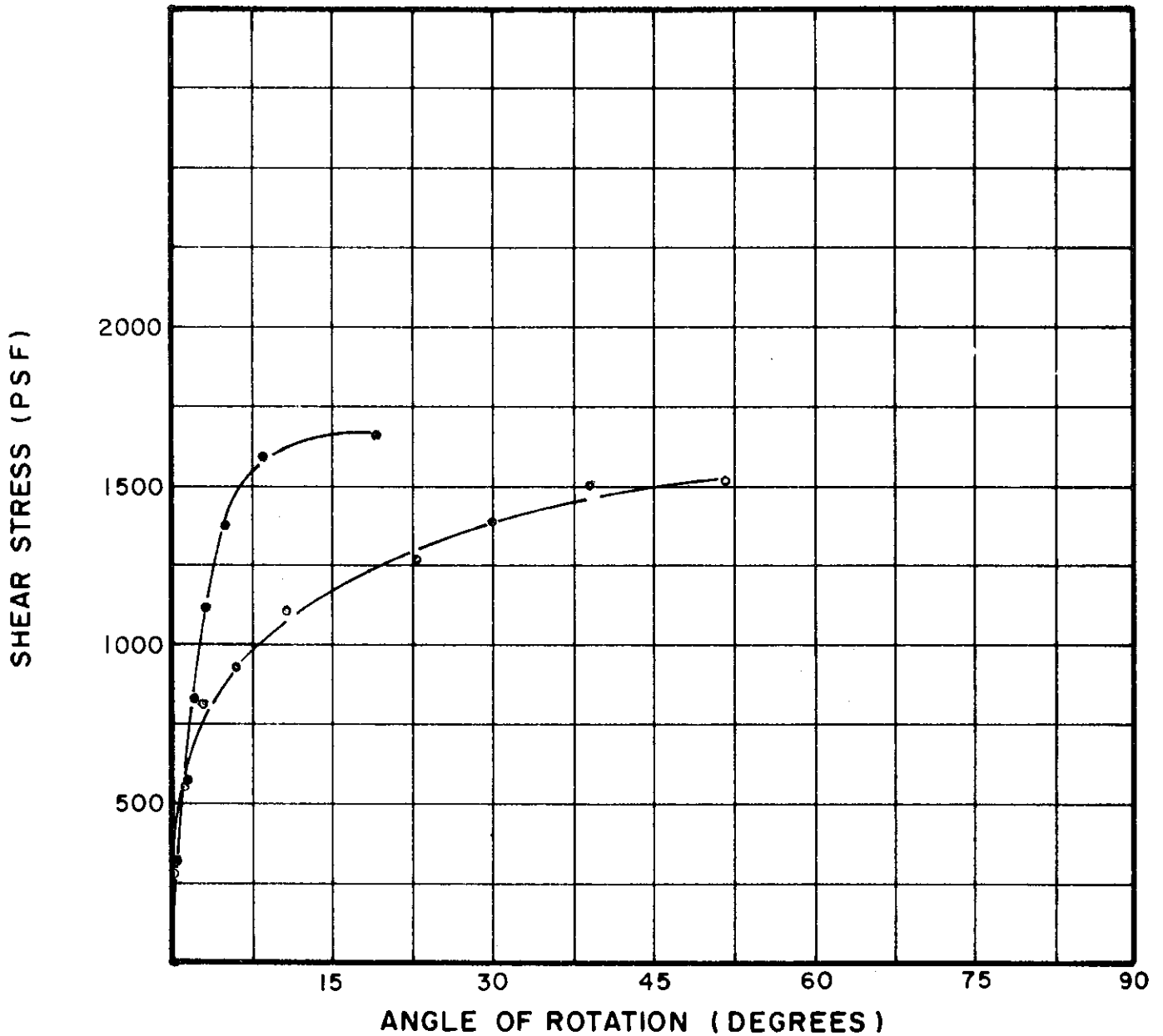
BORING NO. 52

SAMPLE NO. 6

DEPTH 49.6' - 49.8'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

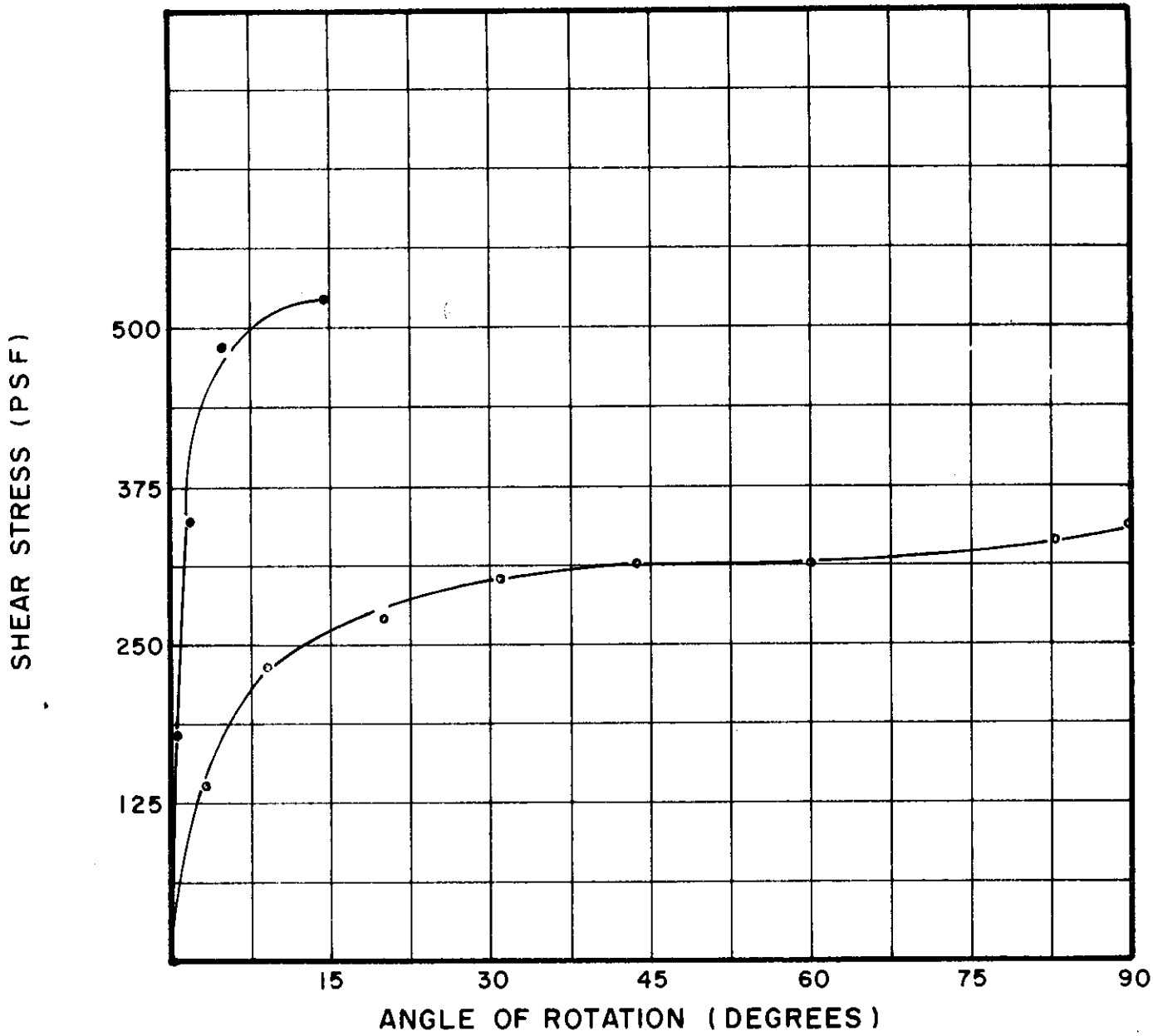


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 89.1' - 89.4'

**LABORATORY VANE SHEAR TESTS**

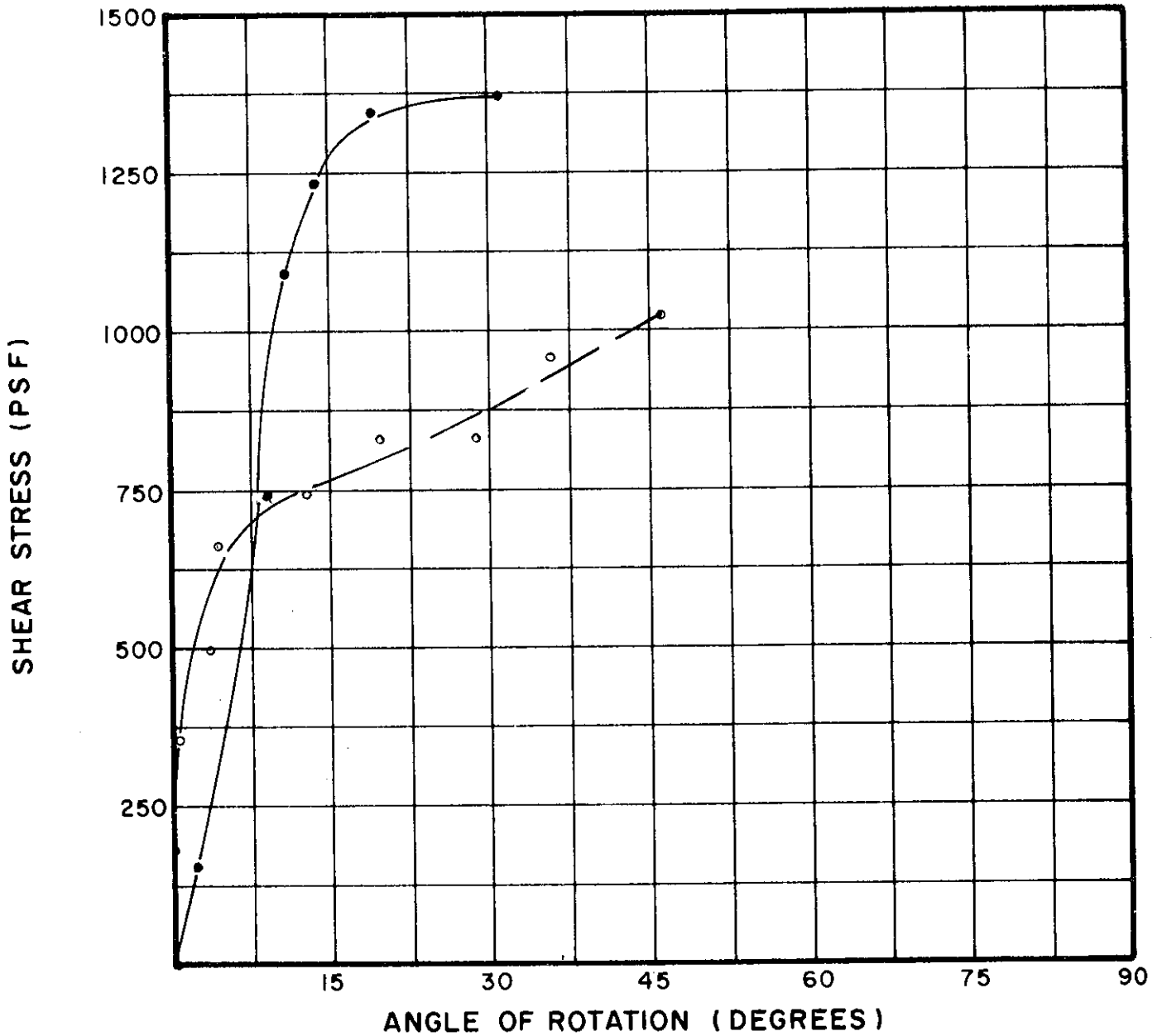
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS99.2 ●	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)
rVS99.2 ○	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 6  
 DEPTH 49.7' - 50.0'

LABORATORY VANE SHEAR TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

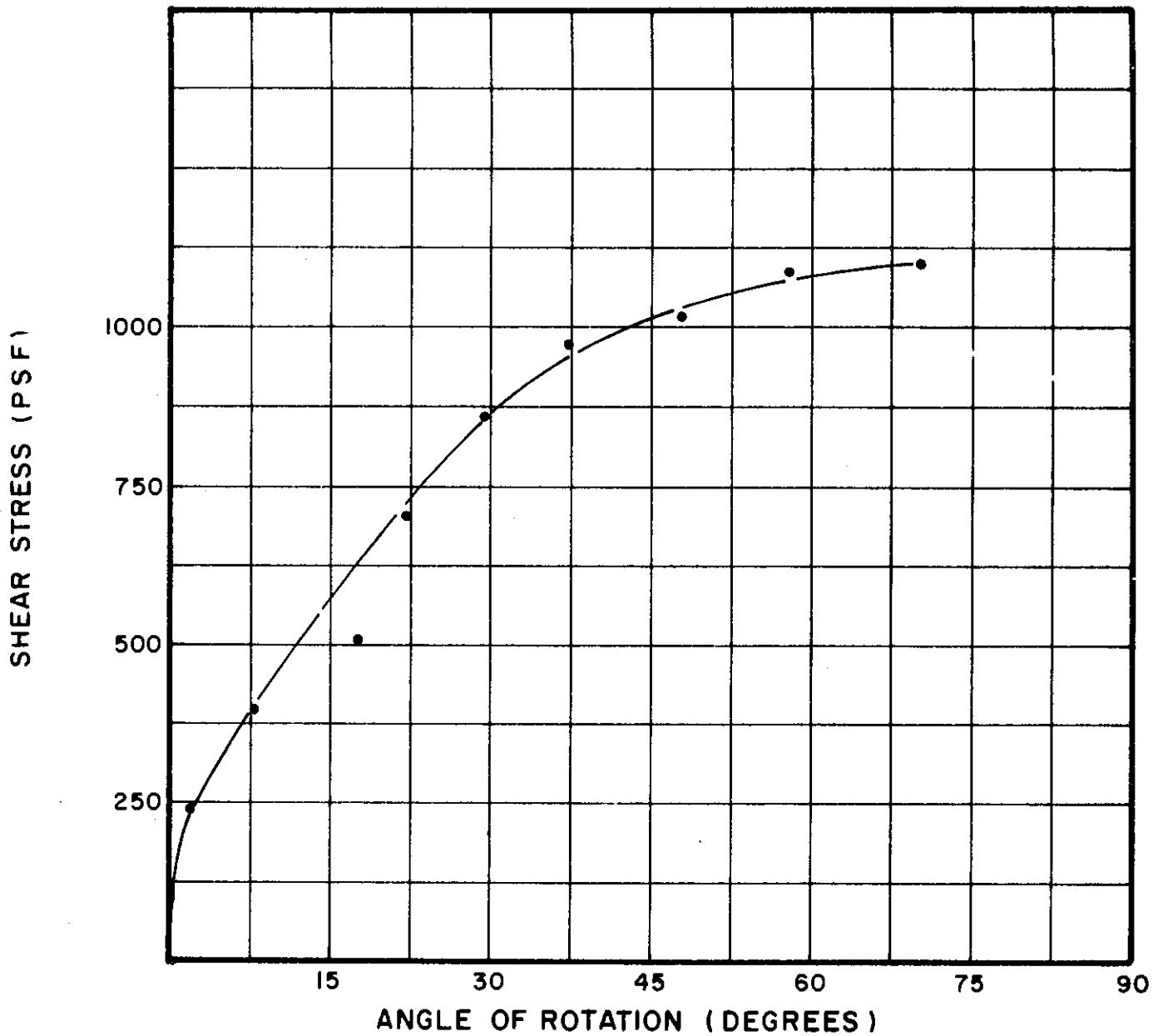


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 79.5' - 79.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS398.1	.50	.25	6.0	27.5	92	38	17	SILTY CLAY, SANDY (CL)

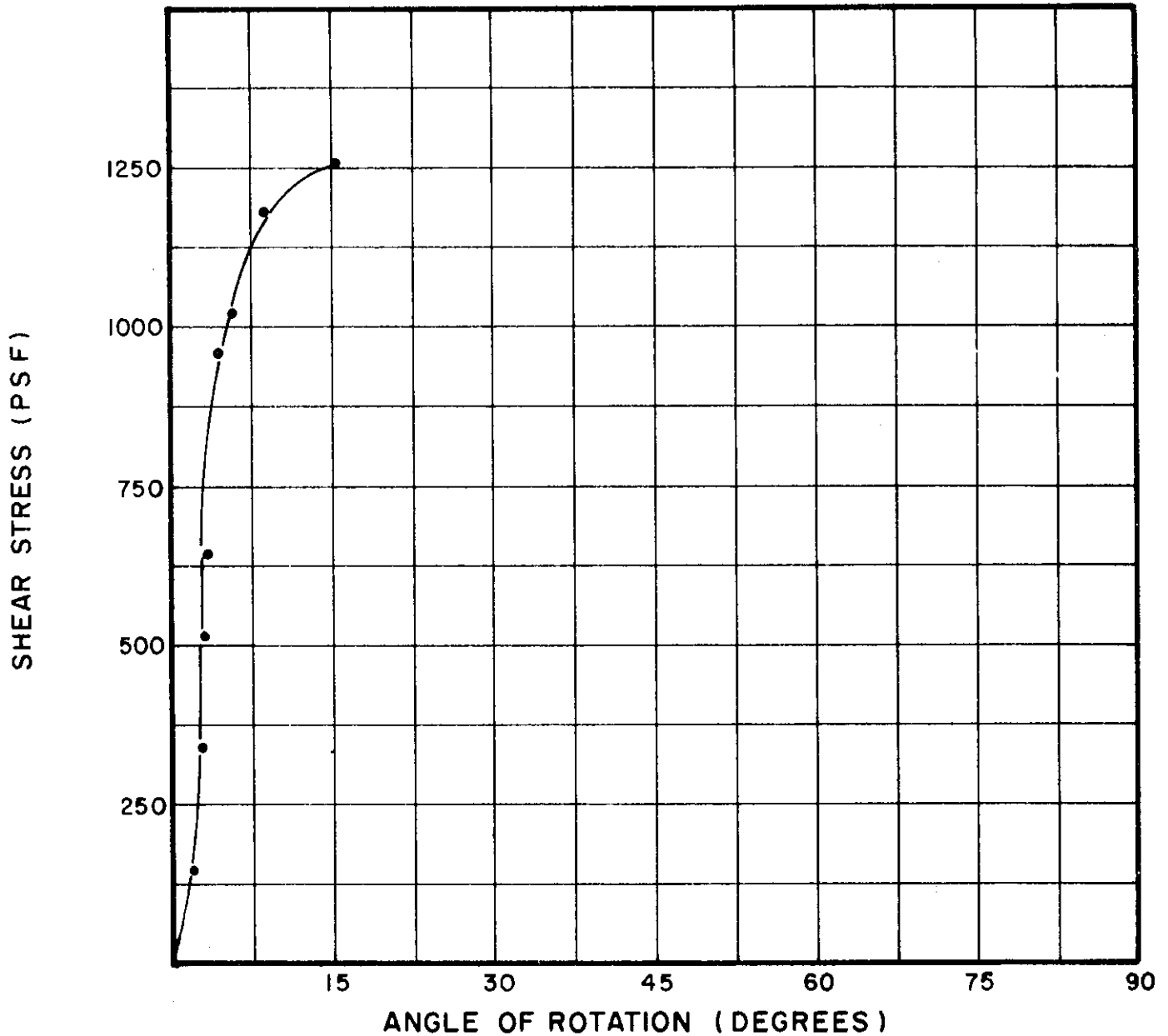
BORING NO. 54

SAMPLE NO. 5

DEPTH 59.7' - 60.0'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



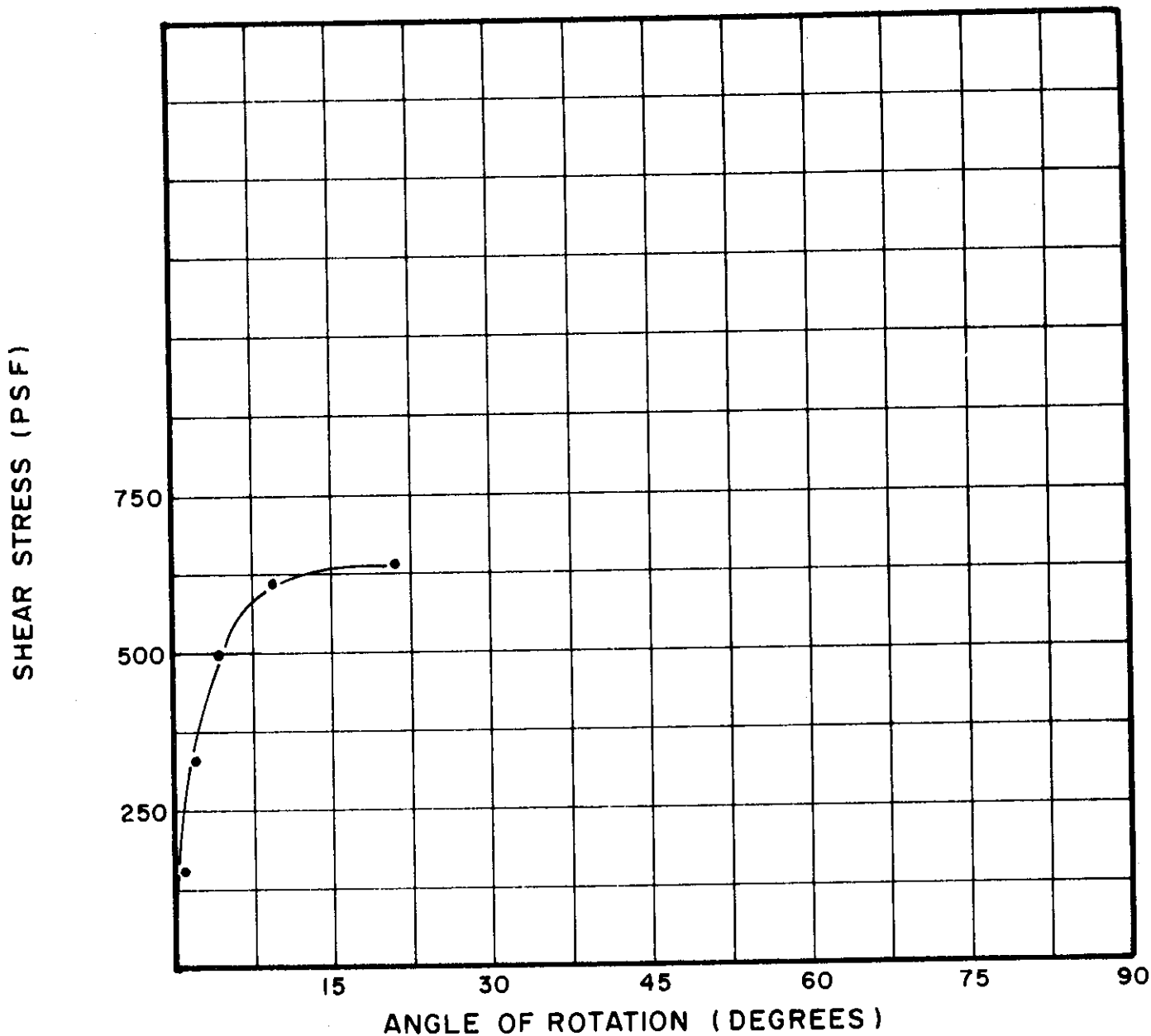
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS76.1	.50	.25	6.0	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.5' - 18.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



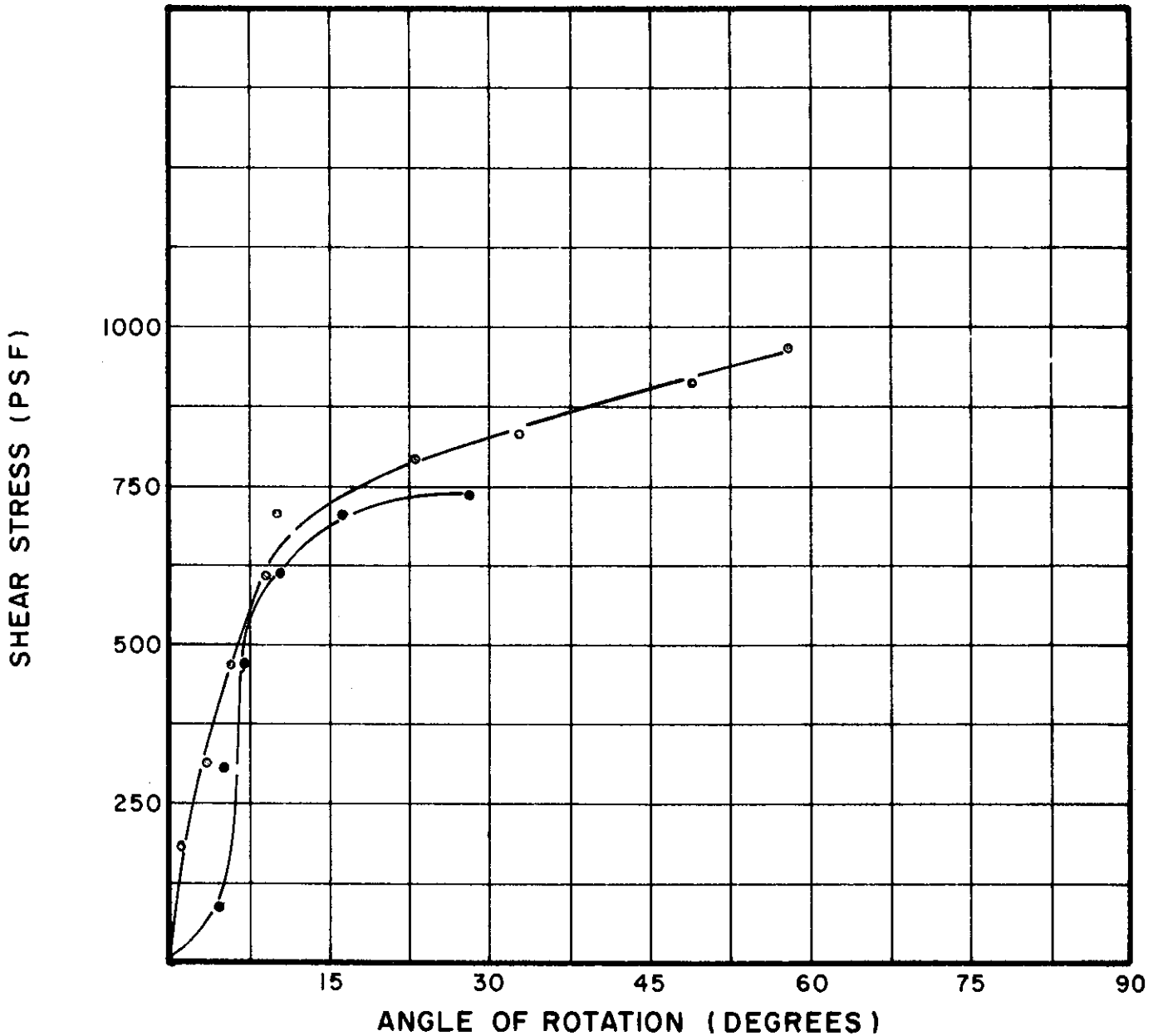


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS78.1	.50	.25	6.0	25.6	96	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59  
 SAMPLE NO. 5  
 DEPTH 39.4' - 39.7'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)
rVS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

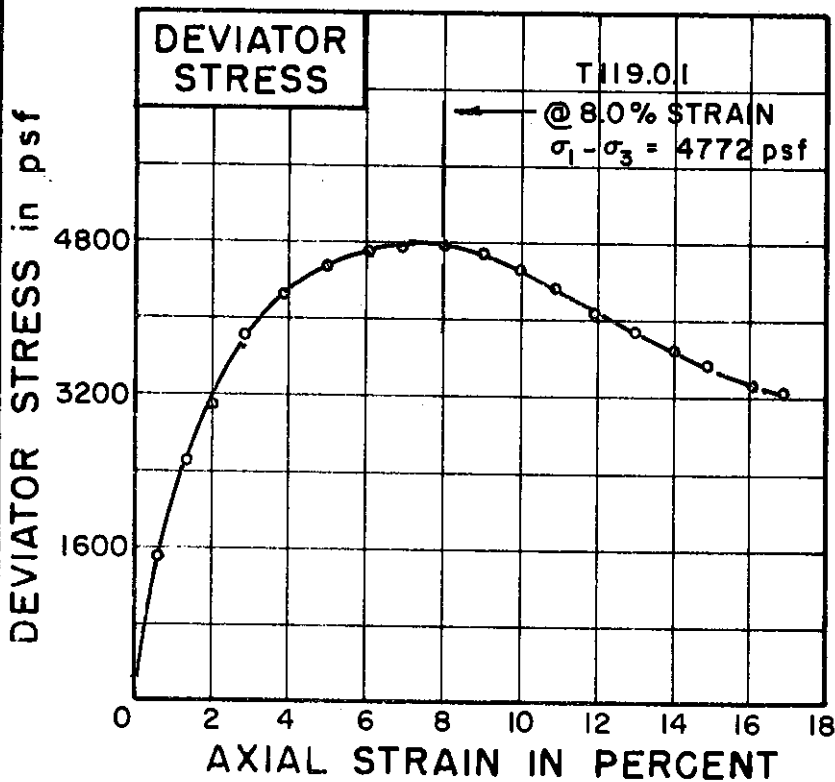
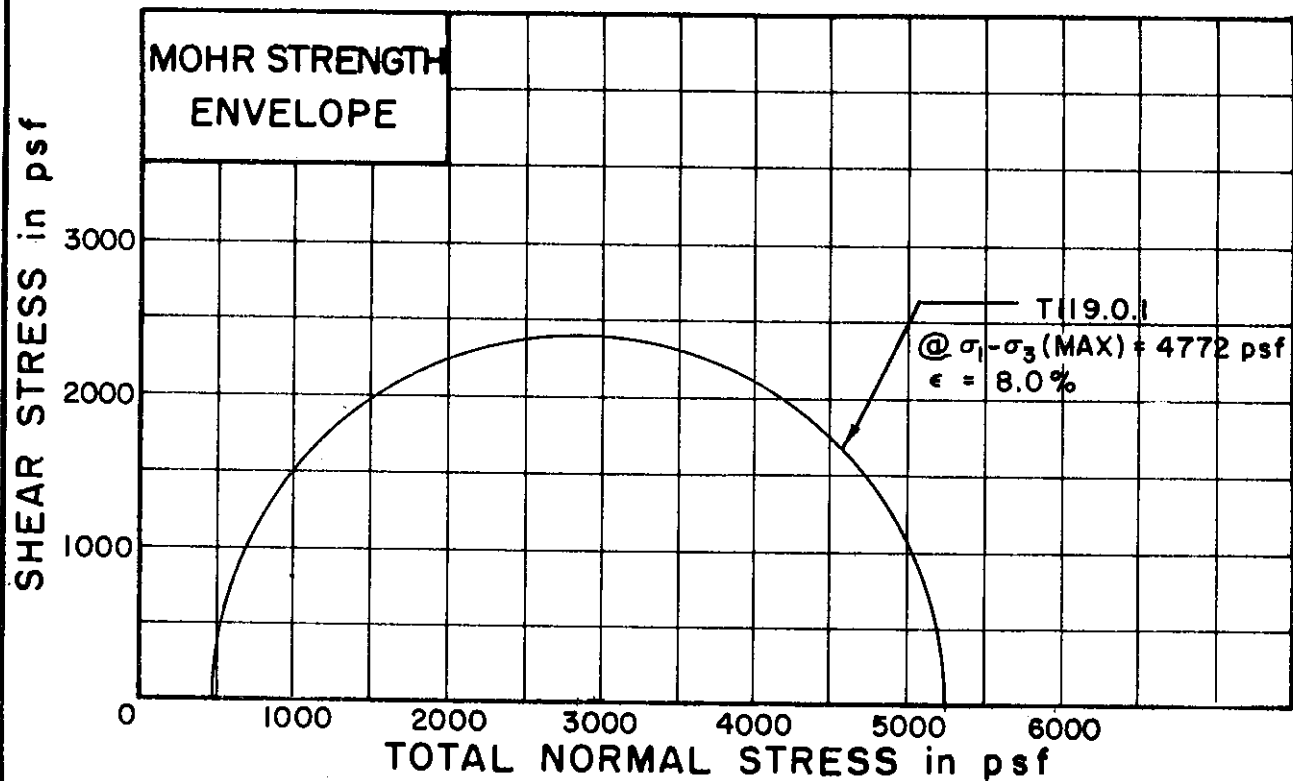
SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T119.01		
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	101	
SAMPLE DIAMETER in.	$D_o$	1.40	
SAMPLE HEIGHT in.	$H_o$	3.41	

CONFINING PRESSURE psf	$\sigma_3$	475	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	25.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 15

SAMPLE NO. 2

DEPTH 3.7' TO 4.1'

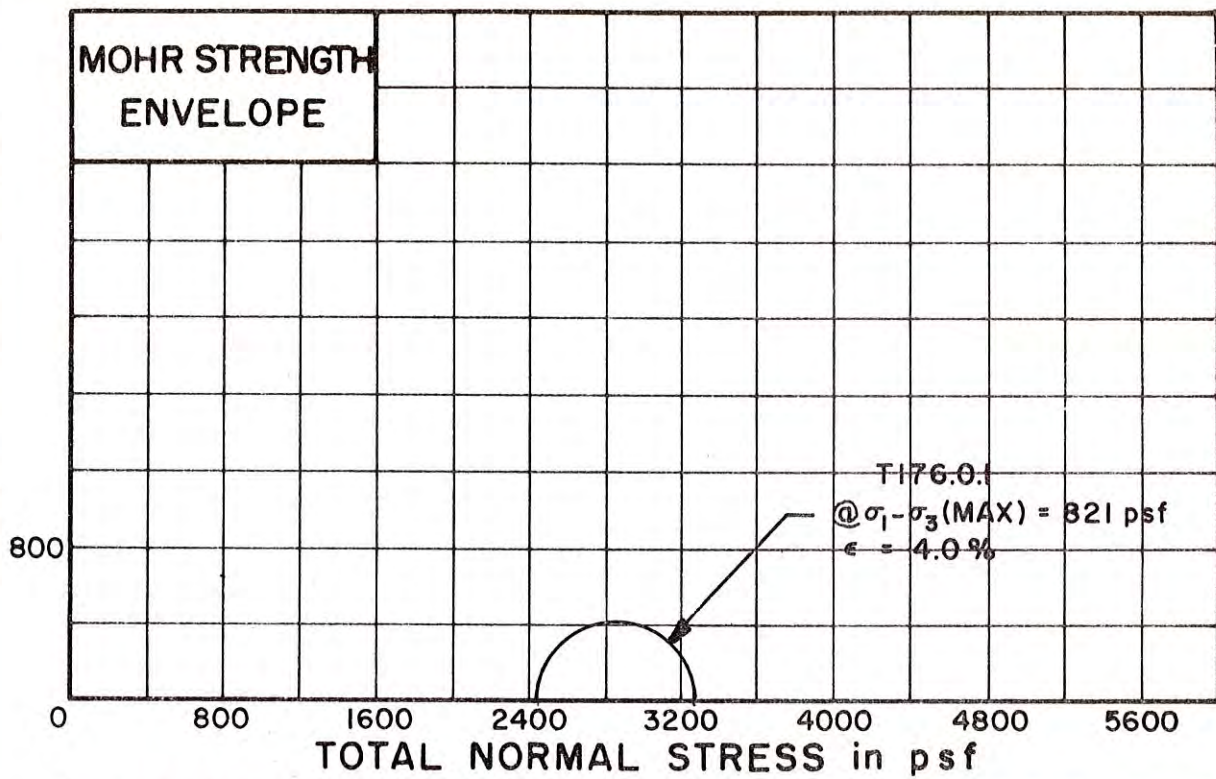
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

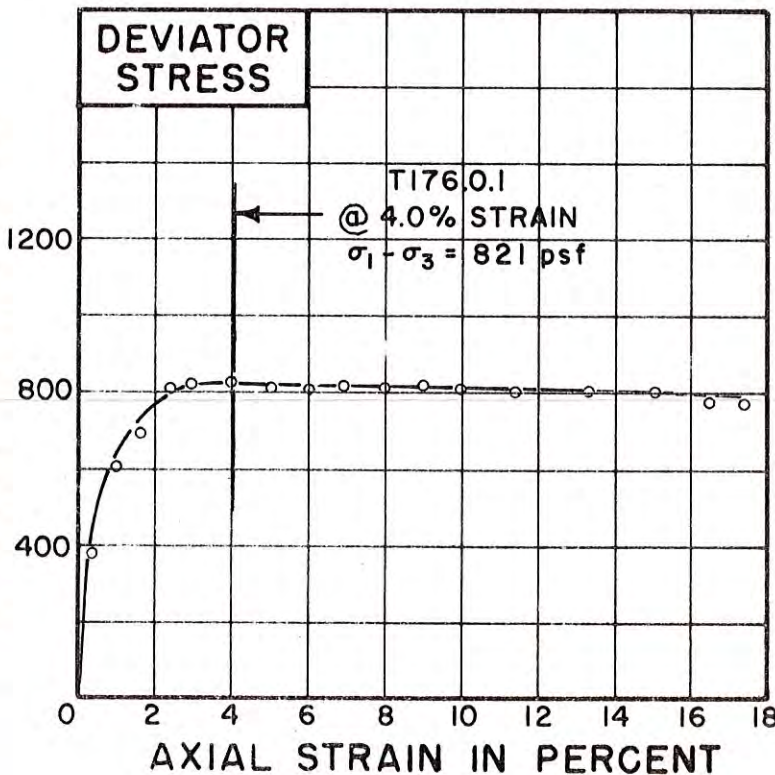
UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T176.0.1
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INITIAL WATER CONTENT	$w_o$	399%
DRY DENSITY $\rho_{cf}$	$\gamma_d$	83
SAMPLE DIAMETER, in.	$D_o$	1.37
SAMPLE HEIGHT in.	$H_o$	3.29

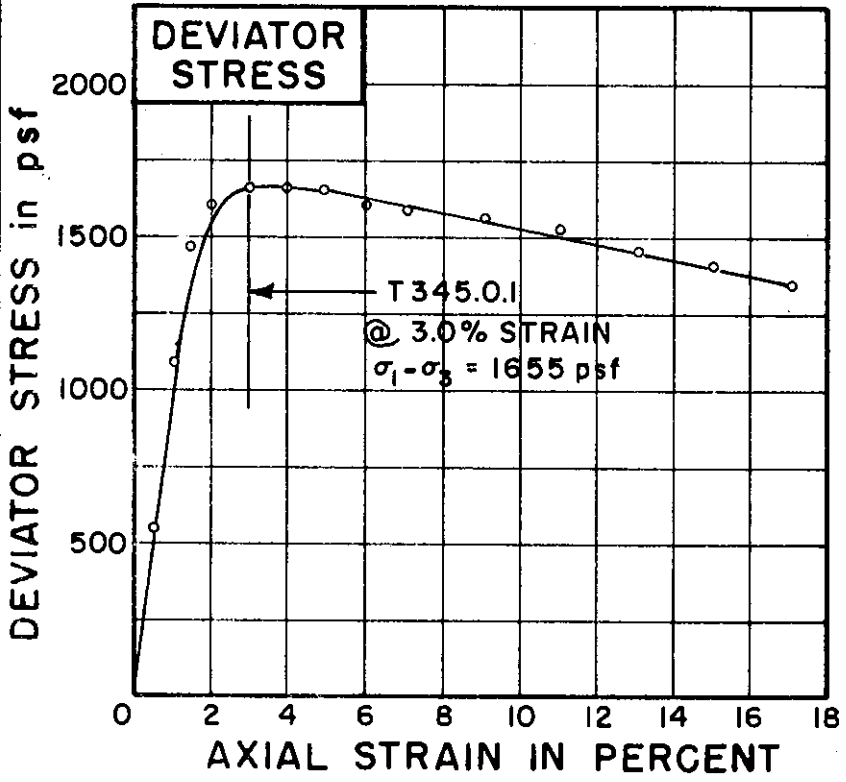
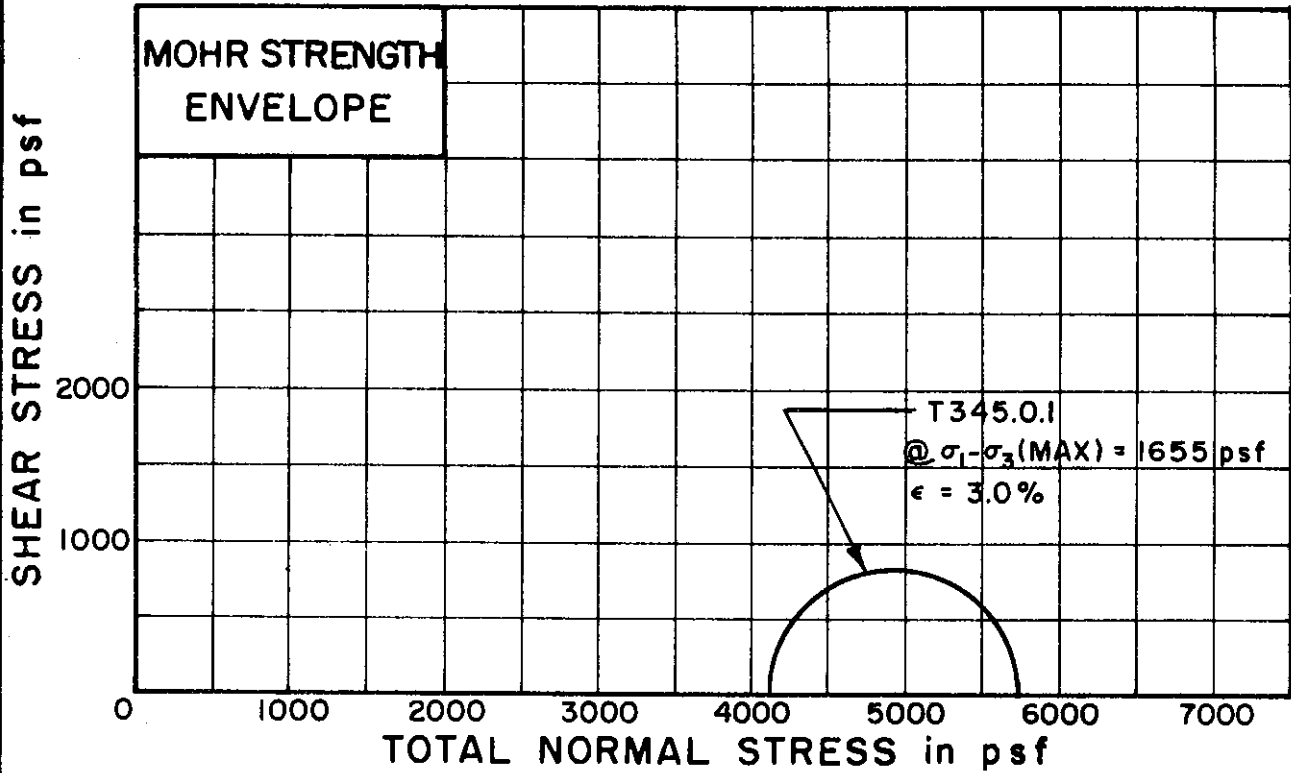
CONFINING PRESSURE $\rho_{sf}$	$\sigma_3$	2448
RATE OF STRAIN PERCENT/MINUTE		0.26

FINAL WATER CONTENT	$w_f$	39.8%
SKETCH OF SAMPLE AT END OF TEST		

BORING NO. 18  
 SAMPLE NO. 3  
 DEPTH 20.6' TO 20.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T345.0.1		
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INITIAL WATER CONTENT	$w_0$	31.0%		
DRY DENSITY pcf	$\gamma_d$	92		
SAMPLE DIAMETER in.	$D_0$	1.41		
SAMPLE HEIGHT in.	$H_0$	3.34		

CONFINING PRESSURE psf	$\sigma_3$	4104		
RATE OF STRAIN PERCENT/MINUTE		0.27		

FINAL WATER CONTENT	$w_f$	30.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 6

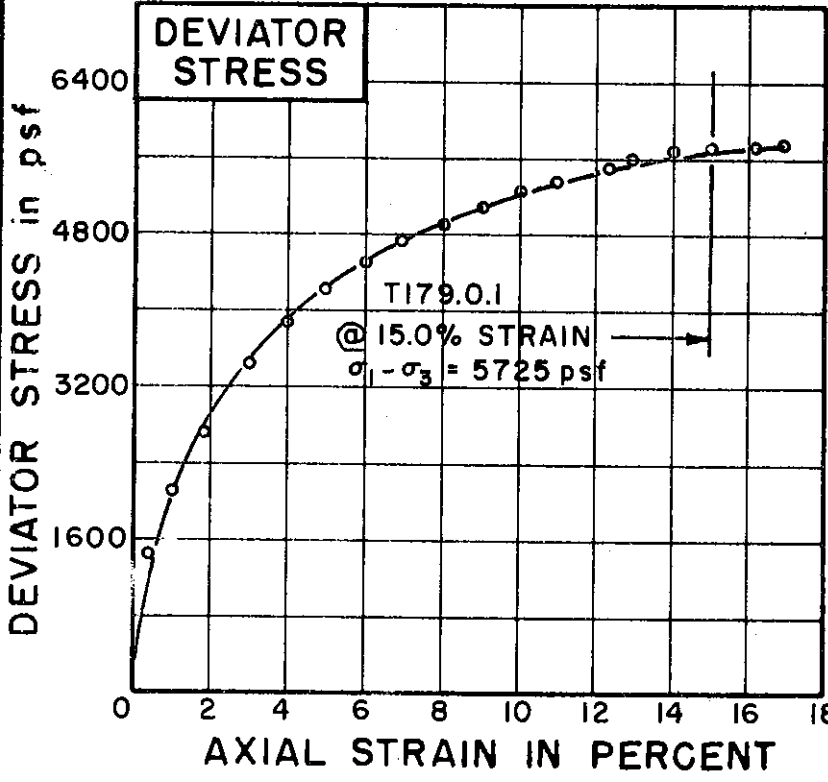
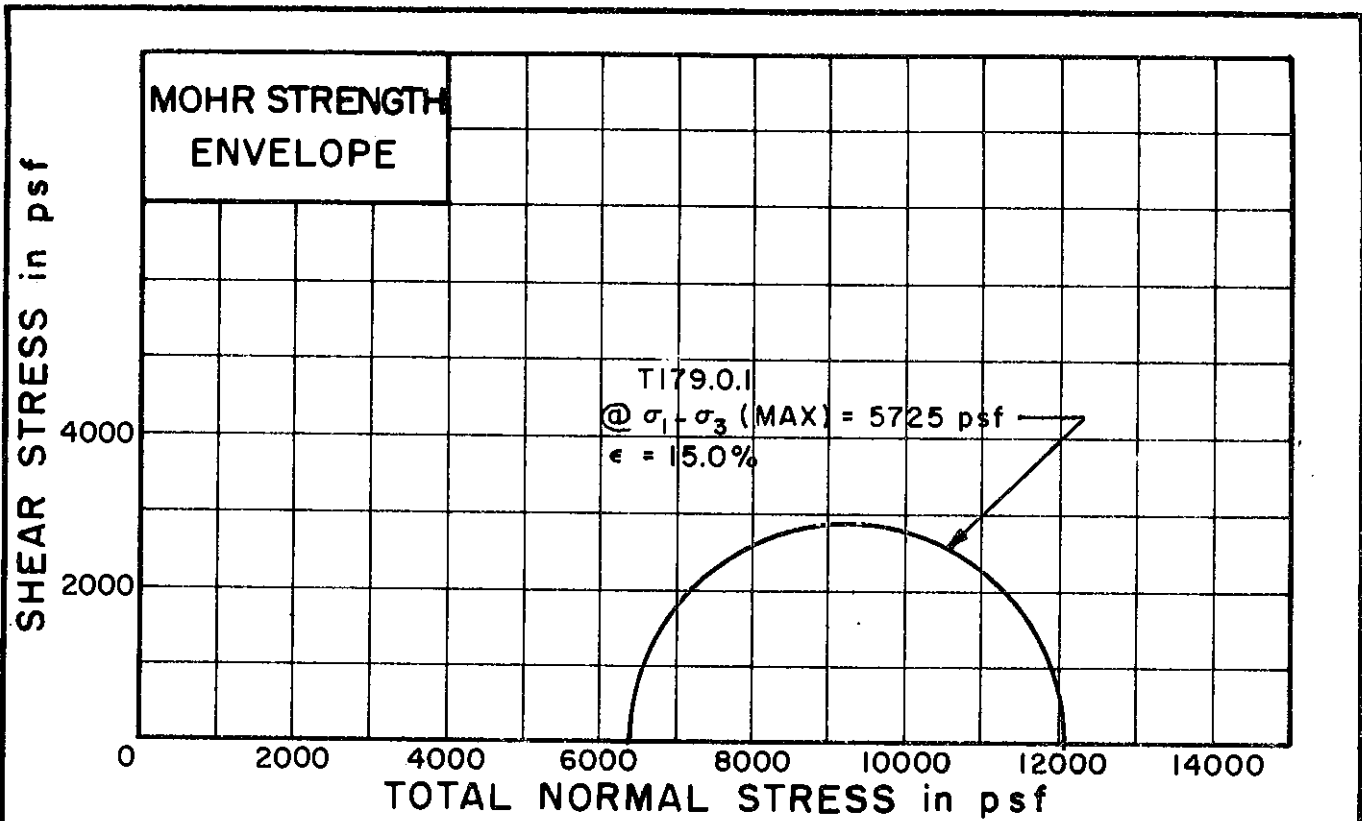
DEPTH 51.4' TO 51.7'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T179.0.1		
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INITIAL WATER CONTENT	$w_0$	17.3%	
DRY DENSITY	$\rho_d$	111	
SAMPLE DIAMETER	$D_0$	1.36	
SAMPLE HEIGHT	$H_0$	3.22	

CONFINING PRESSURE	$\sigma_3$	6336	
RATE OF STRAIN		0.26	

FINAL WATER CONTENT	$w_f$	17.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 18

SAMPLE NO. 10

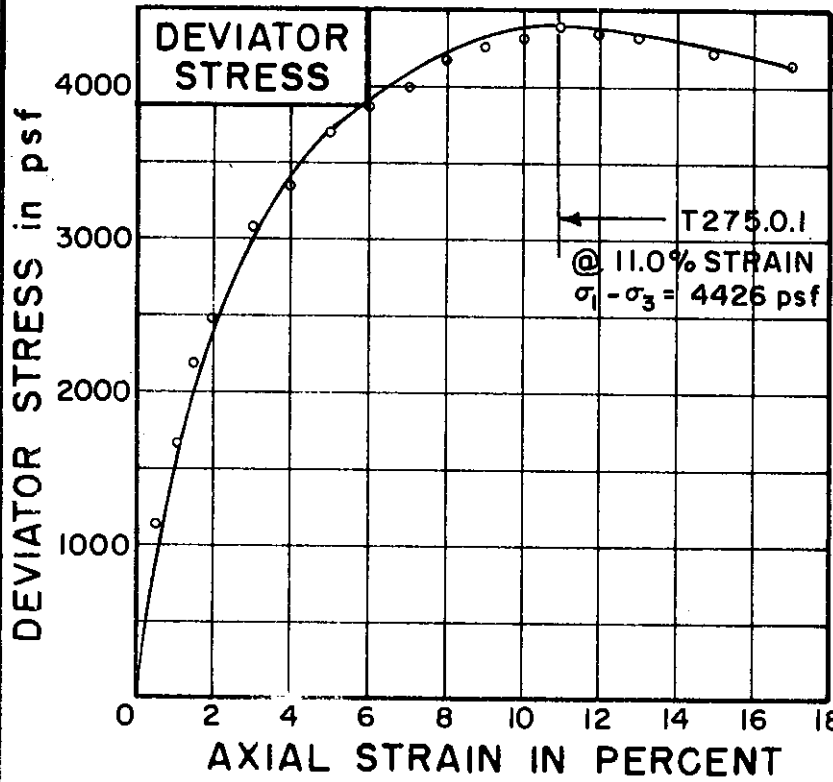
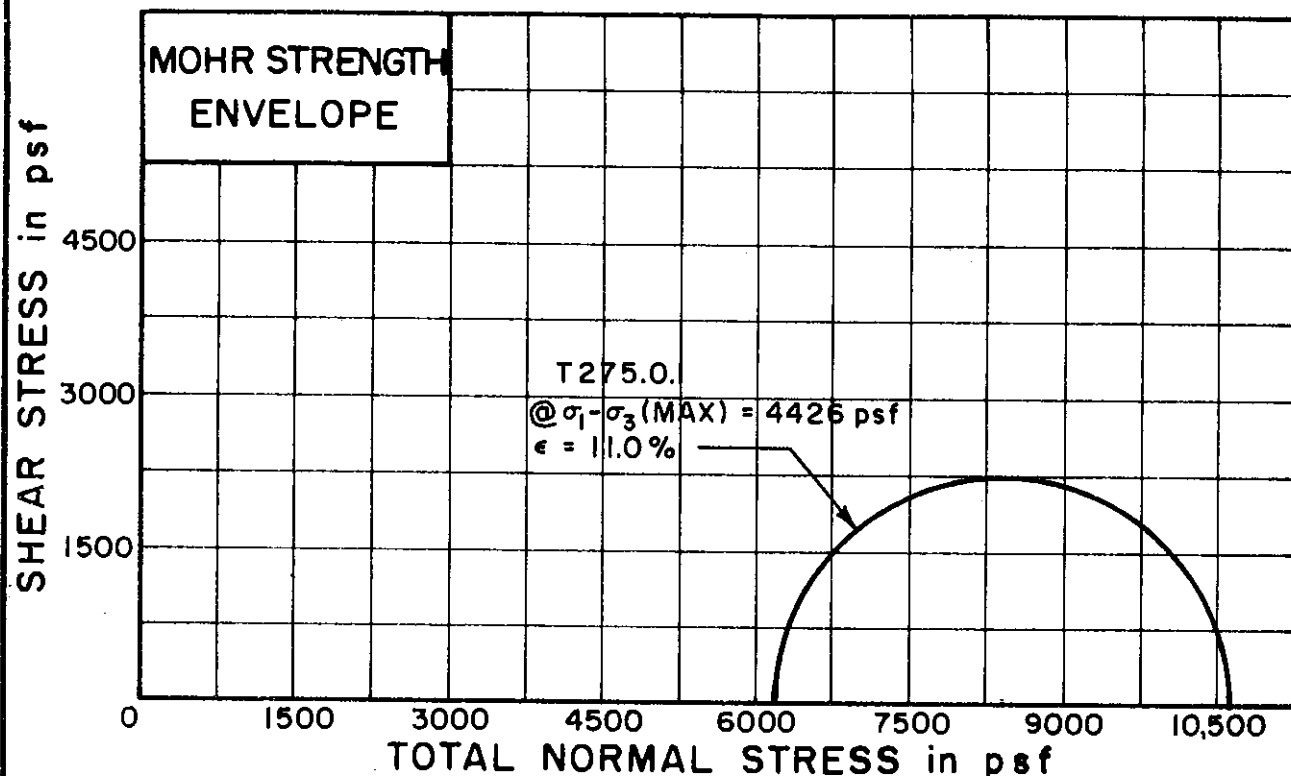
DEPTH 88.8' TO 90.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 29 PLASTIC LIMIT 15

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T275.0		
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INITIAL WATER CONTENT	$w_o$	22.5%	
DRY DENSITY pcf	$\gamma_d$	104	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.35	

CONFINING PRESSURE psf	$\sigma_3$	6192	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	22.4%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 25

SAMPLE NO. 10

DEPTH 88.9' TO 89.2'

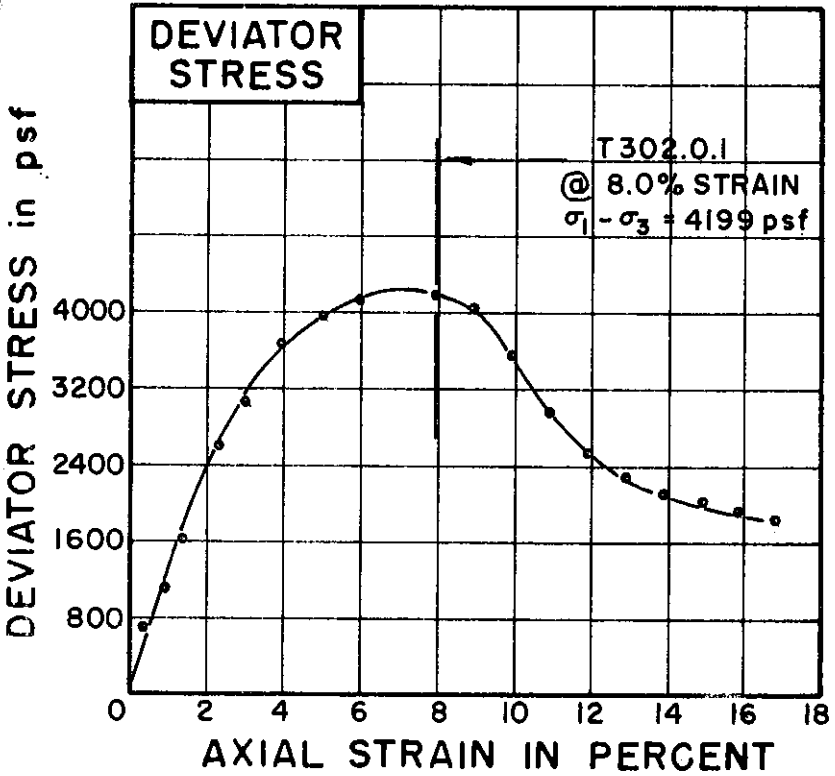
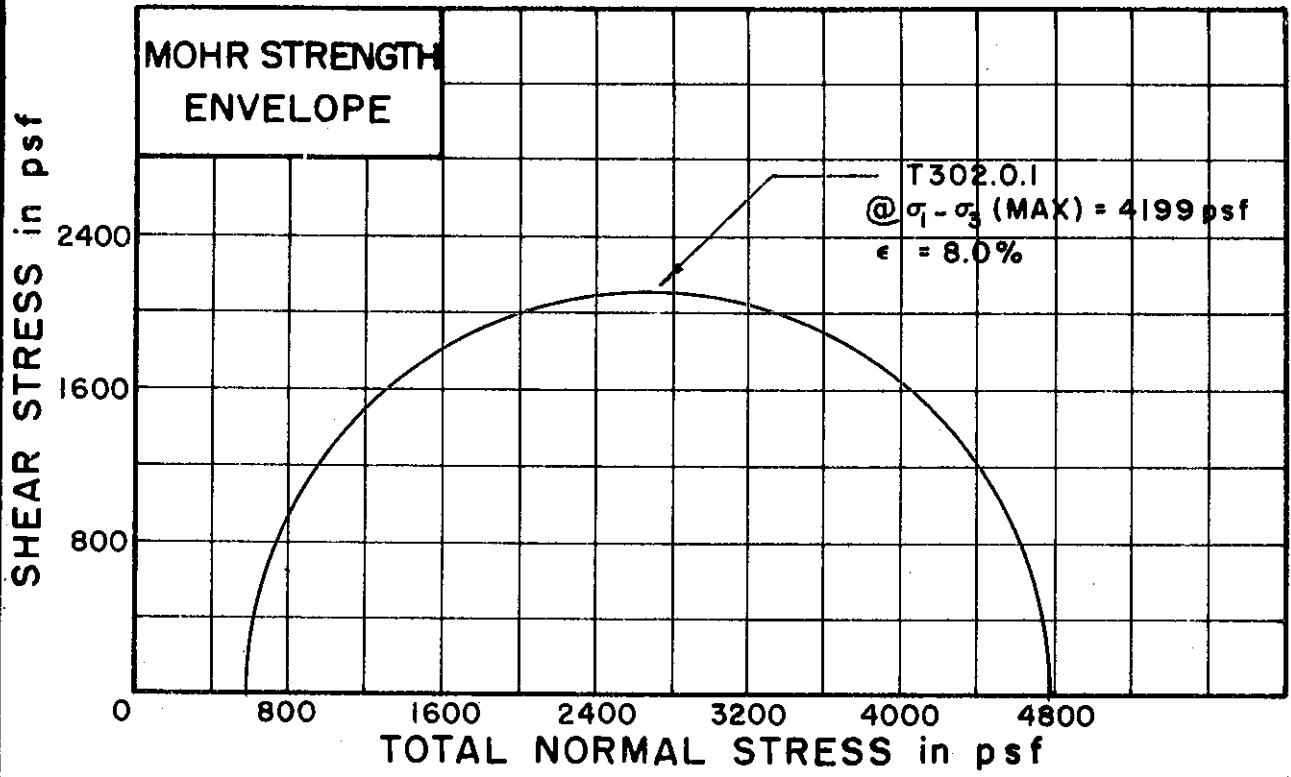
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 19

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T302.0.		
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INITIAL WATER CONTENT	$w_o$	24.9%		
DRY DENSITY	$\gamma_d$ pcf	103		
SAMPLE DIAMETER	$D_o$ in.	1.40		
SAMPLE HEIGHT	$H_o$ in.	3.33		

CONFINING PRESSURE	$\sigma_3$ psf	576		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	24.7%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 27

SAMPLE NO. 2

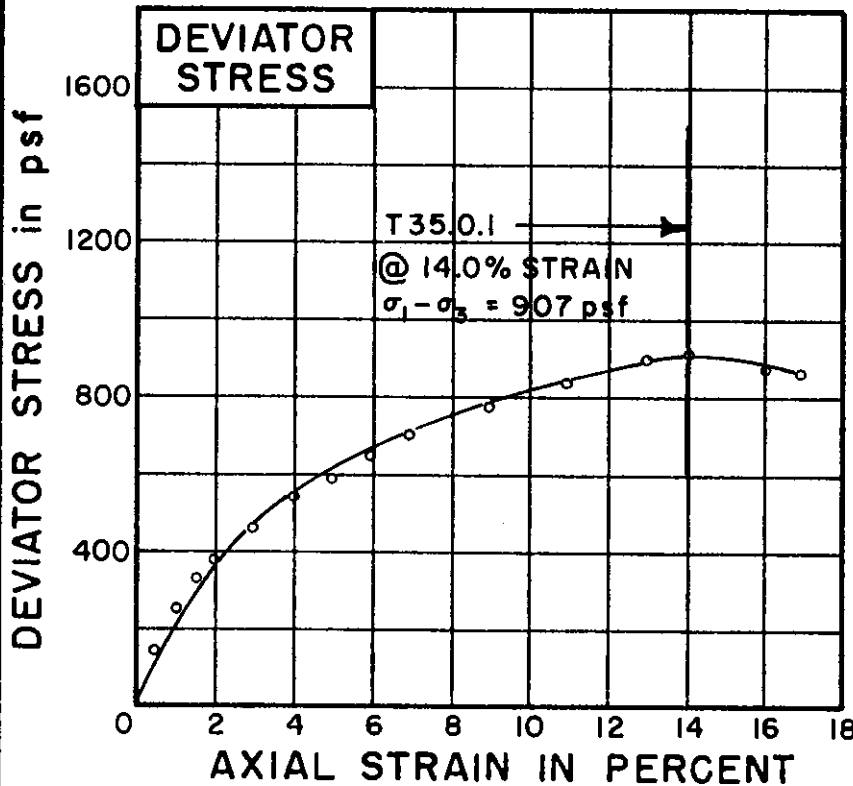
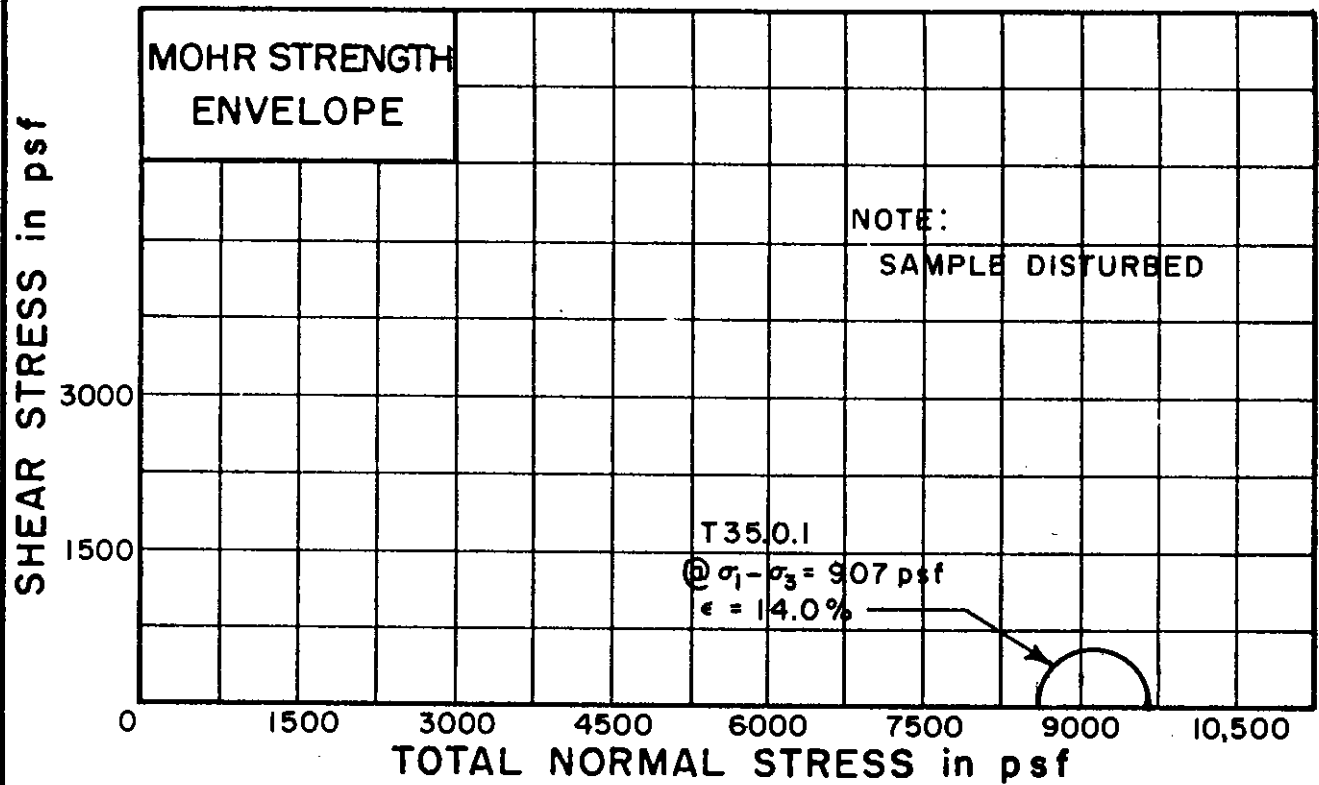
DEPTH 4.5' TO 4.8'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 24

**UNCONSOLIDATED UNDRAINED  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T35.0.1		
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INITIAL WATER CONTENT	$w_o$	19.6%	
DRY DENSITY pcf	$\gamma_d$	105	
SAMPLE DIAMETER in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	8654	
RATE OF STRAIN PERCENT/MINUTE		0.26	

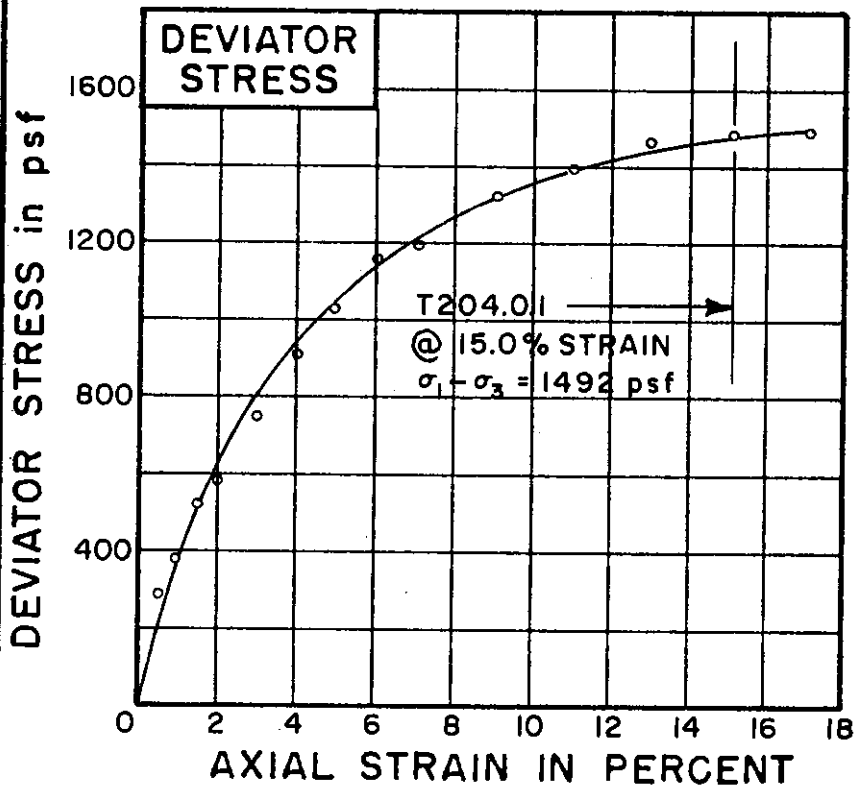
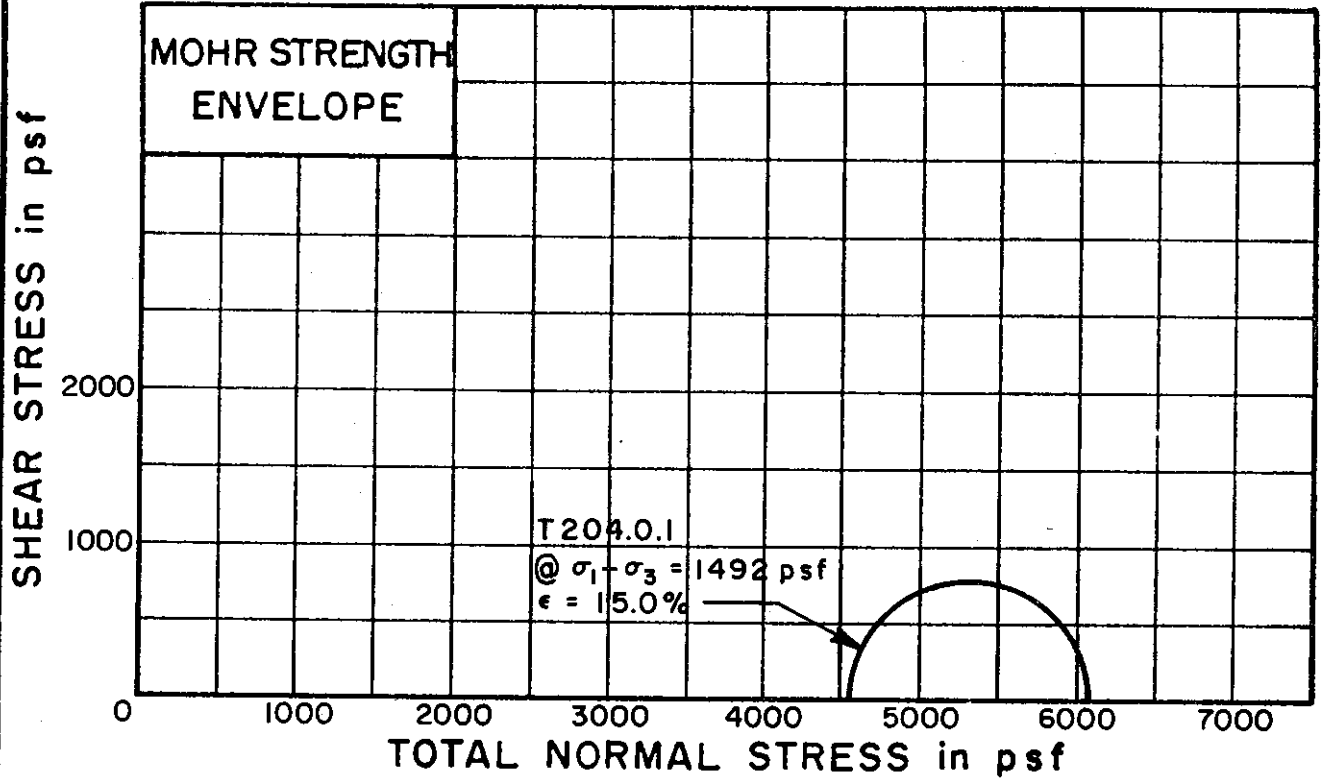
FINAL WATER CONTENT	$w_f$	19.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 72.9' TO 73.2'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T204.0.1		
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INITIAL WATER CONTENT	$w_0$	26.3%	
DRY DENSITY	$\gamma_d$ pcf	99	
SAMPLE DIAMETER	$D_0$ in.	1.40	
SAMPLE HEIGHT	$H_0$ in.	3.43	

CONFINING PRESSURE	$\sigma_3$ psf	4608	
RATE OF STRAIN	PERCENT/MINUTE	0.26	

FINAL WATER CONTENT	$w_f$	25.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 48

SAMPLE NO. 14

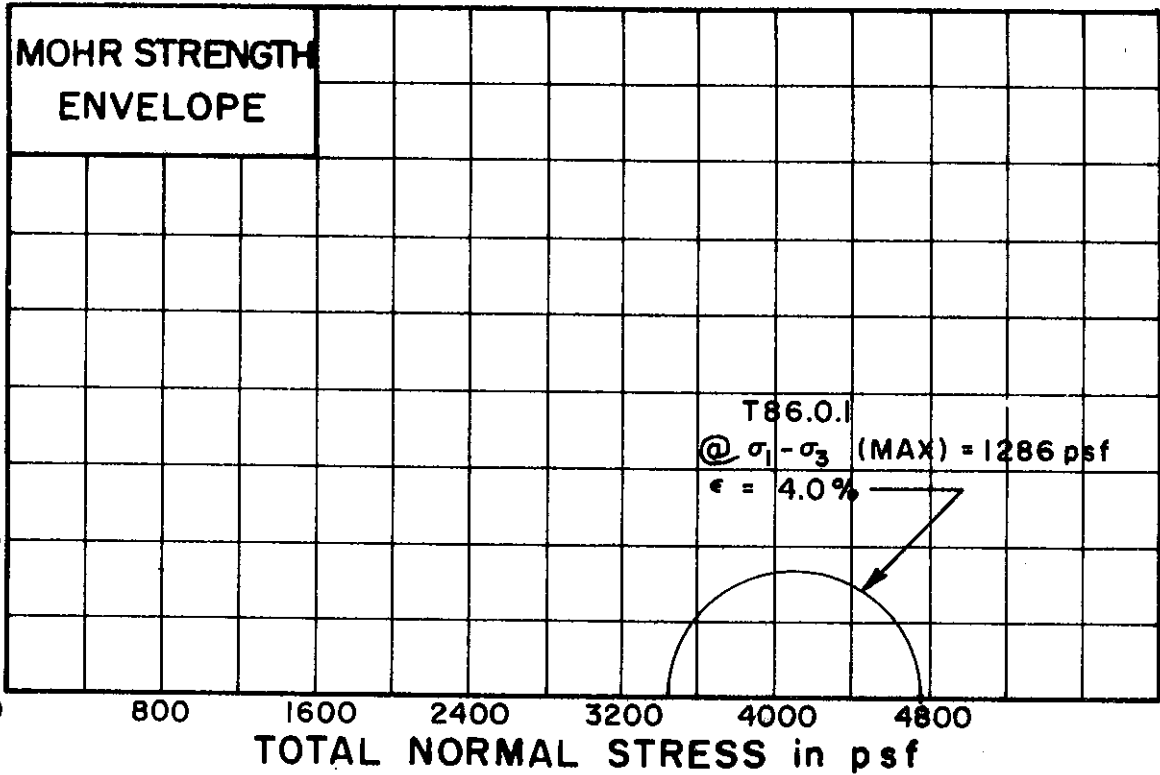
DEPTH 60.8' TO 61.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 34% PLASTIC LIMIT 16%

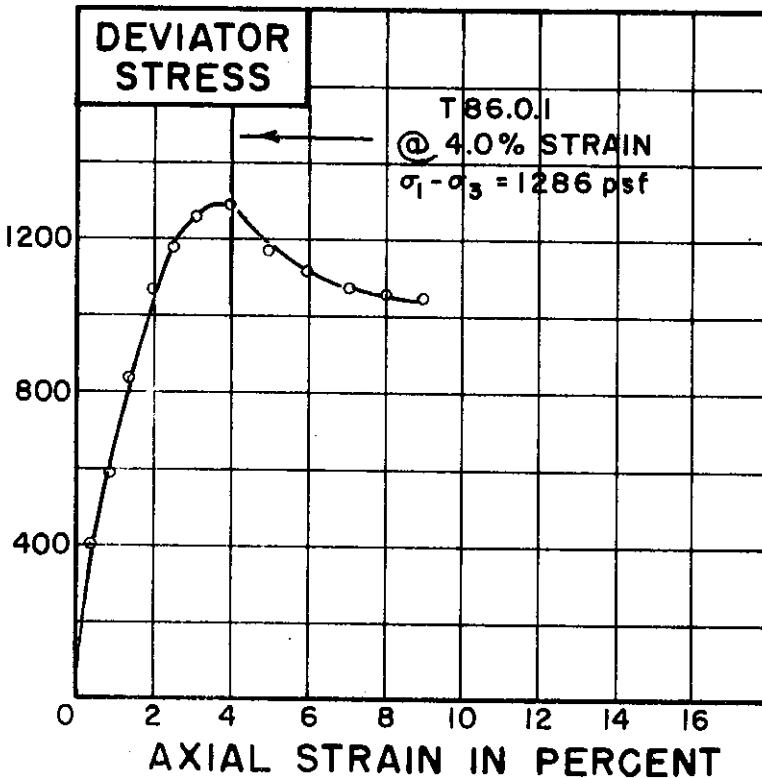
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T86.0.1	
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INITIAL WATER CONTENT	w <sub>o</sub>	46.2%
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DRY DENSITY pcf	γ <sub>d</sub>	74
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SAMPLE DIAMETER in.	D <sub>o</sub>	1.40
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SAMPLE HEIGHT in.	H <sub>o</sub>	3.27
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CONFINING PRESSURE psf	σ <sub>3</sub>	3456
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RATE OF STRAIN PERCENT/MINUTE		.25
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FINAL WATER CONTENT	w <sub>f</sub>	46.3%
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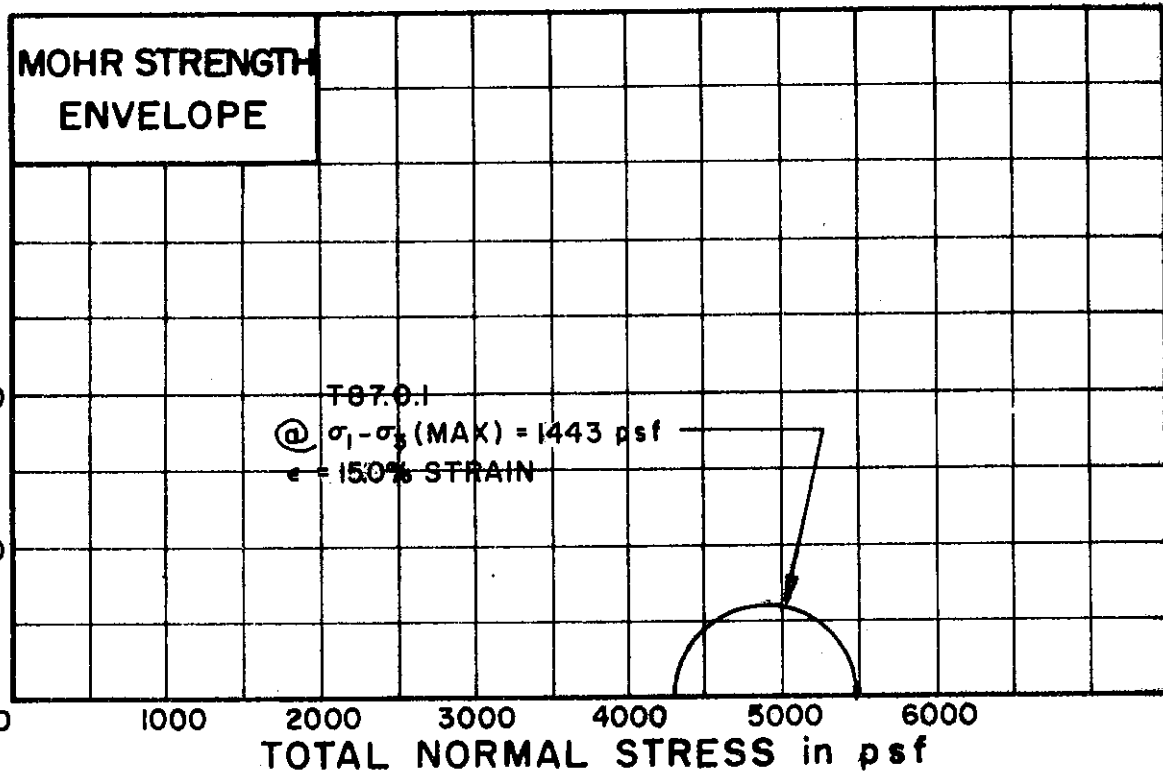
SKETCH OF SAMPLE AT END OF TEST		
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BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.1' TO 38.4'  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 LIQUID LIMIT 55 PLASTIC LIMIT 23

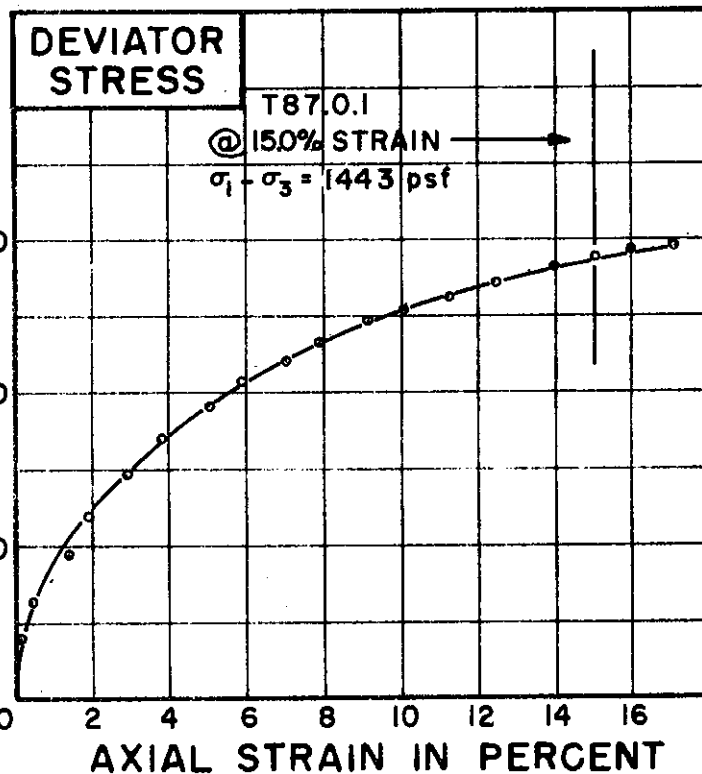
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T87.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	23.2	
DRY DENSITY	γ <sub>d</sub>	100	
SAMPLE DIAMETER	D <sub>o</sub>	1.40	
SAMPLE HEIGHT	H <sub>o</sub>	3.12	

CONFINING PRESSURE	σ <sub>3</sub>	4320	
RATE OF STRAIN		.25	

FINAL WATER CONTENT	w <sub>f</sub>	23.0	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 10

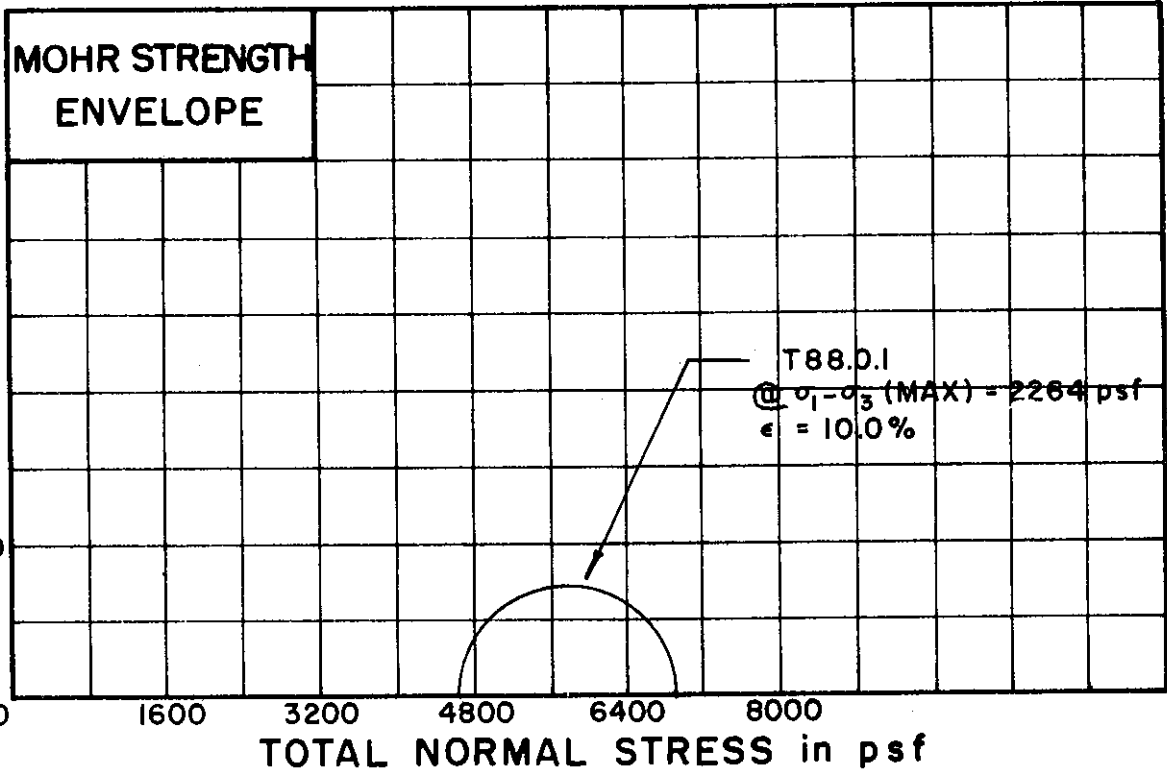
DEPTH 49.3' TO 49.6'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 16 (CL)

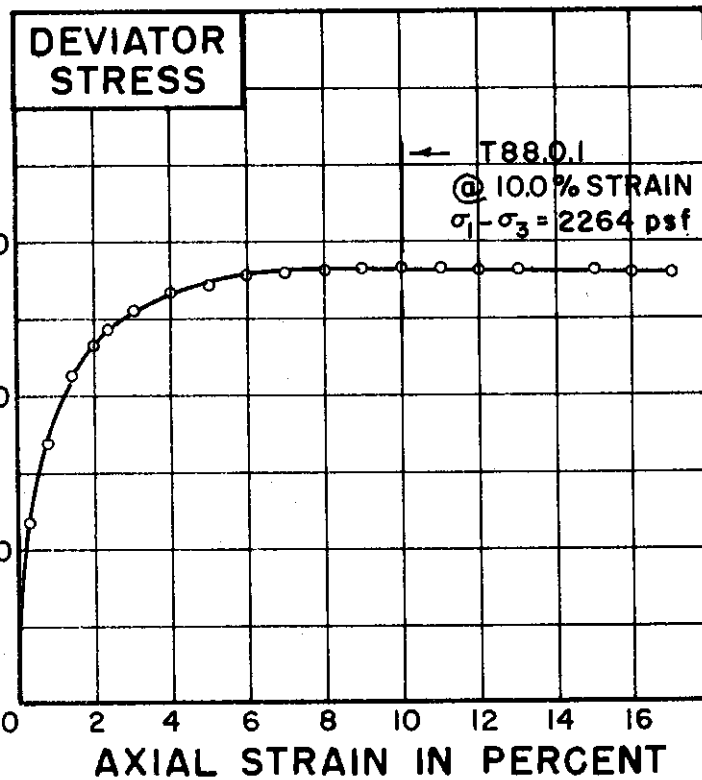
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T88.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	24.3	
DRY DENSITY pcf	γ <sub>d</sub>	101	
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38	
SAMPLE HEIGHT in.	H <sub>o</sub>	3.11	

CONFINING PRESSURE psf	σ <sub>3</sub>	4608	
RATE OF STRAIN PERCENT/MINUTE		.26	

FINAL WATER CONTENT	w <sub>f</sub>	23.5	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 12

DEPTH 59.1' TO 59.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

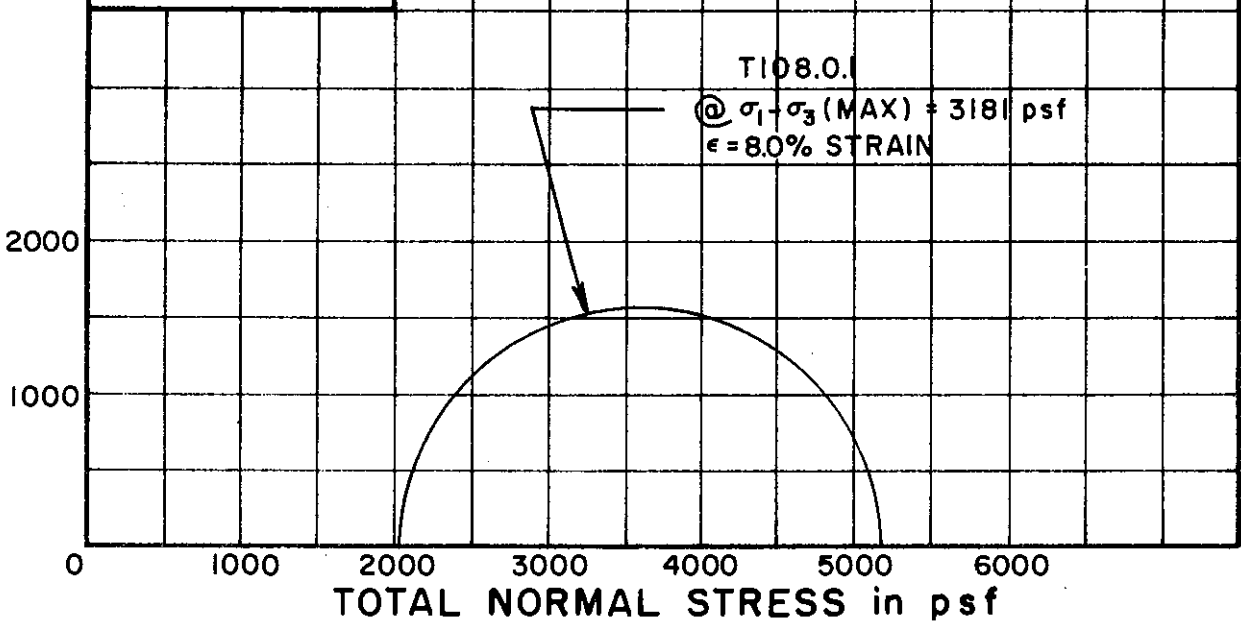
LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
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TESTS**

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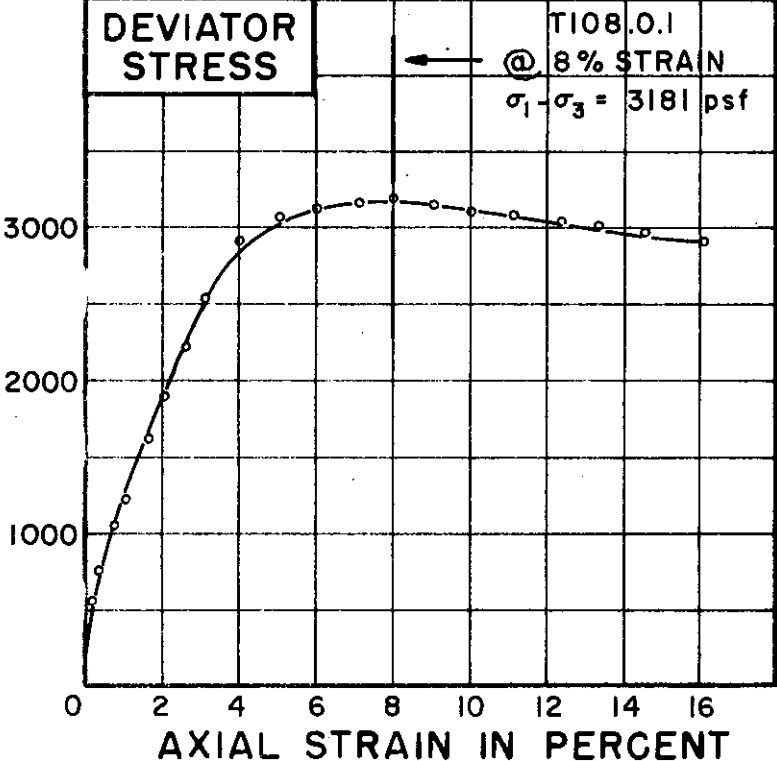
SHEAR STRESS in psf

**MOHR STRENGTH ENVELOPE**



DEVIATOR STRESS in psf

**DEVIATOR STRESS**



TEST NO./SYMBOL	T108.0.1		
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INITIAL WATER CONTENT	$w_o$	31.1		
DRY DENSITY $\rho_{cf}$	$\gamma_d$	92		
SAMPLE DIAMETER in.	$D_o$	1.41		
SAMPLE HEIGHT in.	$H_o$	3.25		

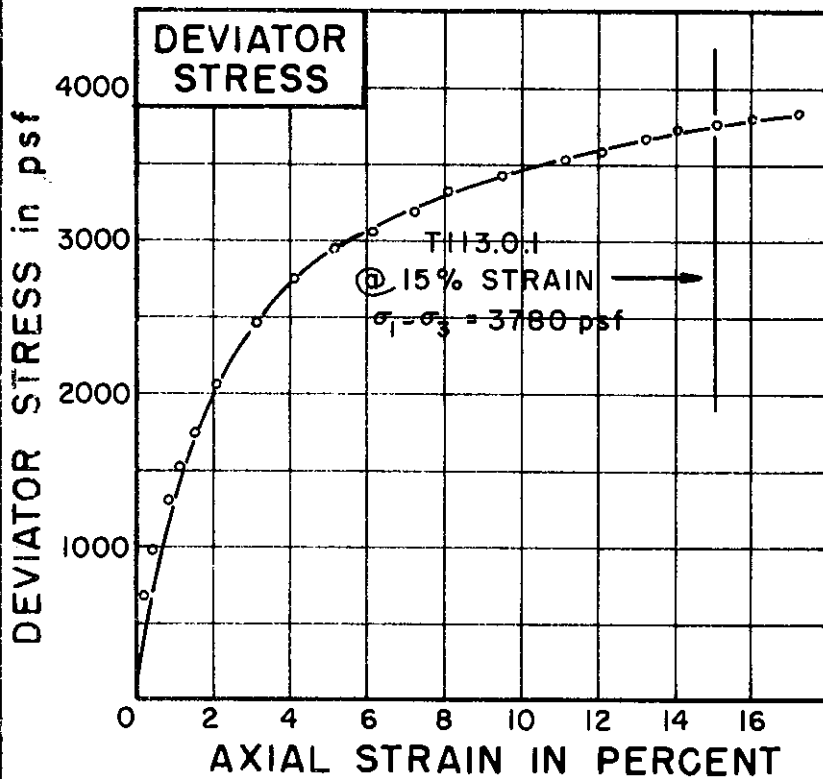
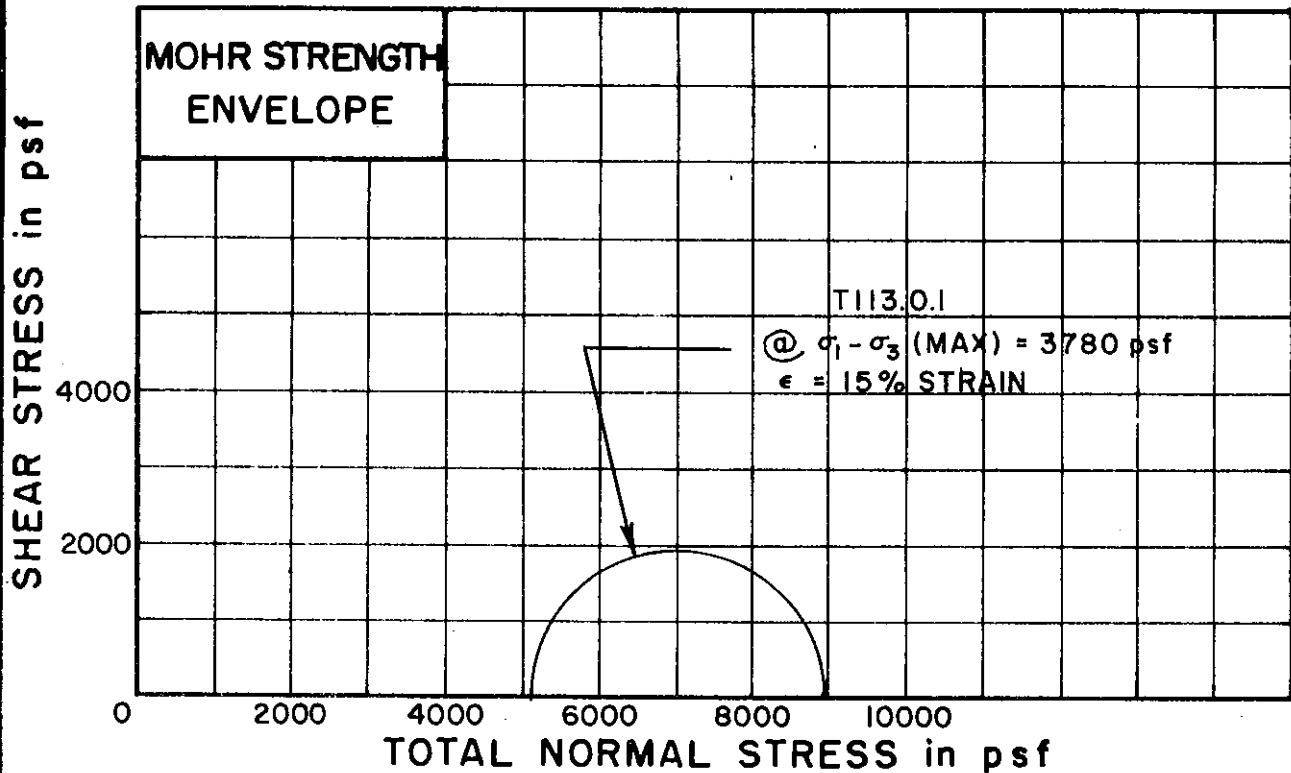
CONFINING PRESSURE $\rho_{sf}$	$\sigma_3$	2016		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	30.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 3  
 DEPTH 21.2' TO 21.5'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T113.0.1		
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INITIAL WATER CONTENT	$w_0$	16.2		
DRY DENSITY pcf	$\gamma_d$	111		
SAMPLE DIAMETER, in.	$D_0$	1.38		
SAMPLE HEIGHT in.	$H_0$	3.18		

CONFINING PRESSURE psf	$\sigma_3$	5184		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	16.1		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

SAMPLE NO. 8

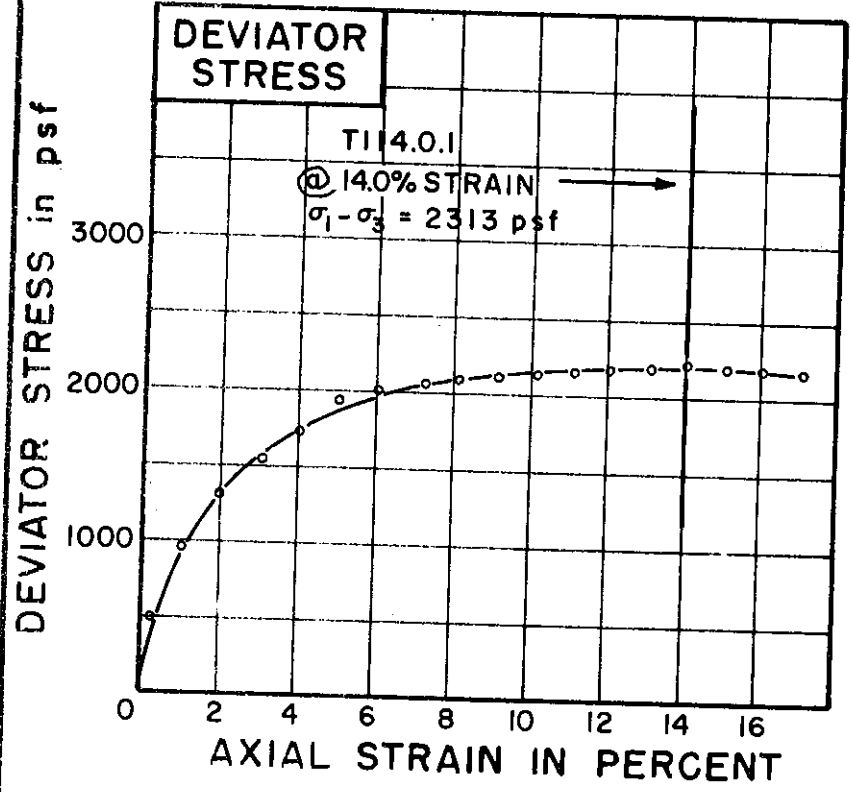
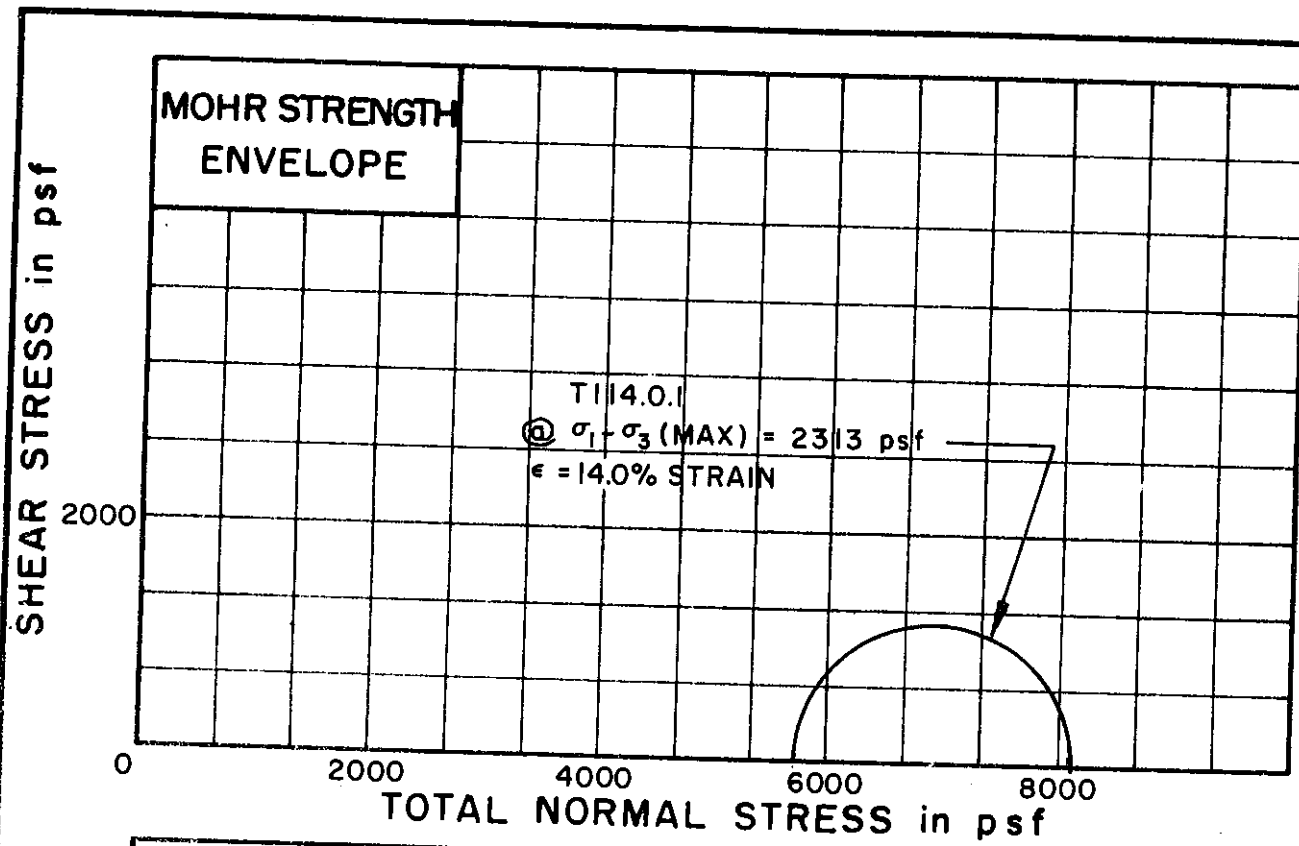
DEPTH 69.0 TO 69.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 24 PLASTIC LIMIT 14 (CL)

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T114.0.1		
INITIAL WATER CONTENT	$w_o$	21.8	
DRY DENSITY	$\gamma_d$ pcf	105	
SAMPLE DIAMETER	$D_o$ in.	1.38	
SAMPLE HEIGHT	$H_o$ in.	3.31	
CONFINING PRESSURE	$\sigma_3$ psf	5760	
RATE OF STRAIN	PERCENT/MINUTE	.25	
FINAL WATER CONTENT	$w_f$	21.7	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 52

SAMPLE NO. 9

DEPTH 78.6' TO 78.9'

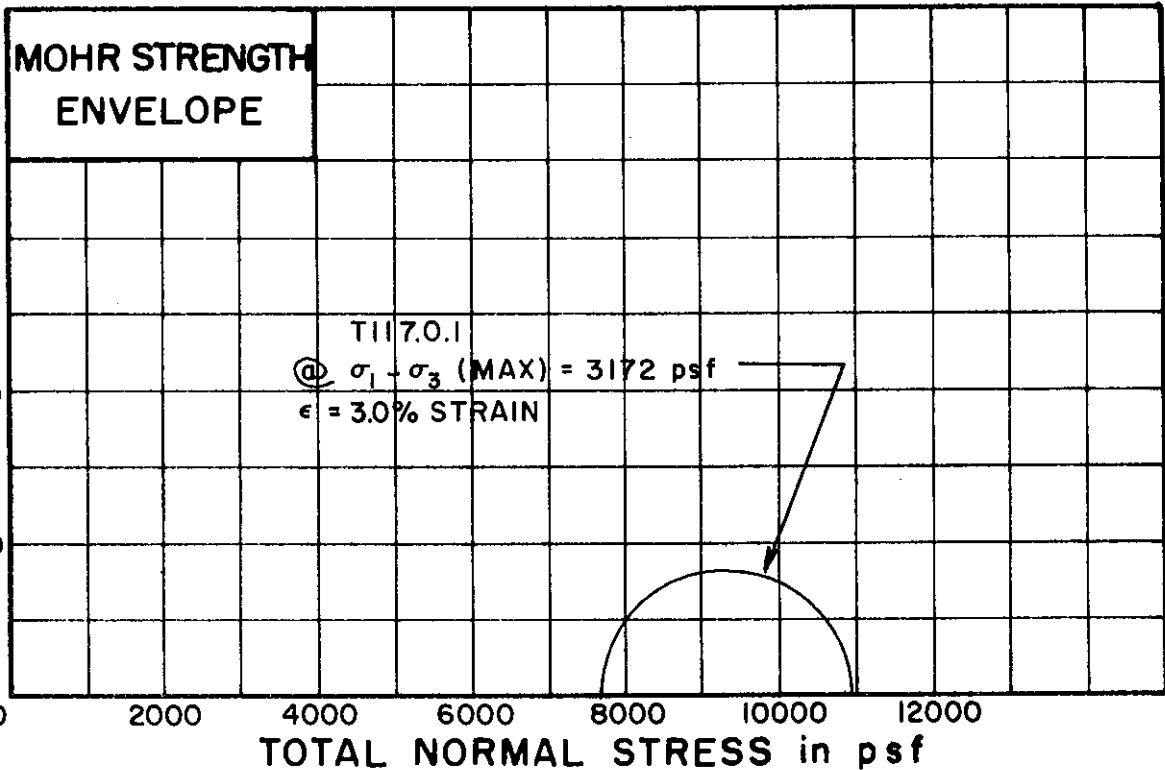
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 35 PLASTIC LIMIT 18

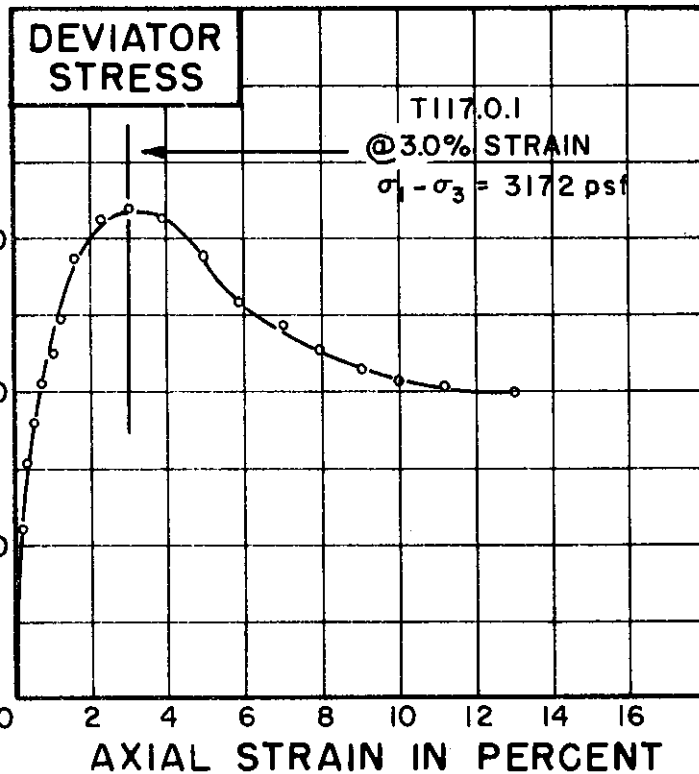
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T117.0.1		
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INITIAL WATER CONTENT	$w_o$	35.8		
DRY DENSITY pcf	$\gamma_d$	87		
SAMPLE DIAMETER in.	$D_o$	1.38		
SAMPLE HEIGHT in.	$H_o$	3.45		

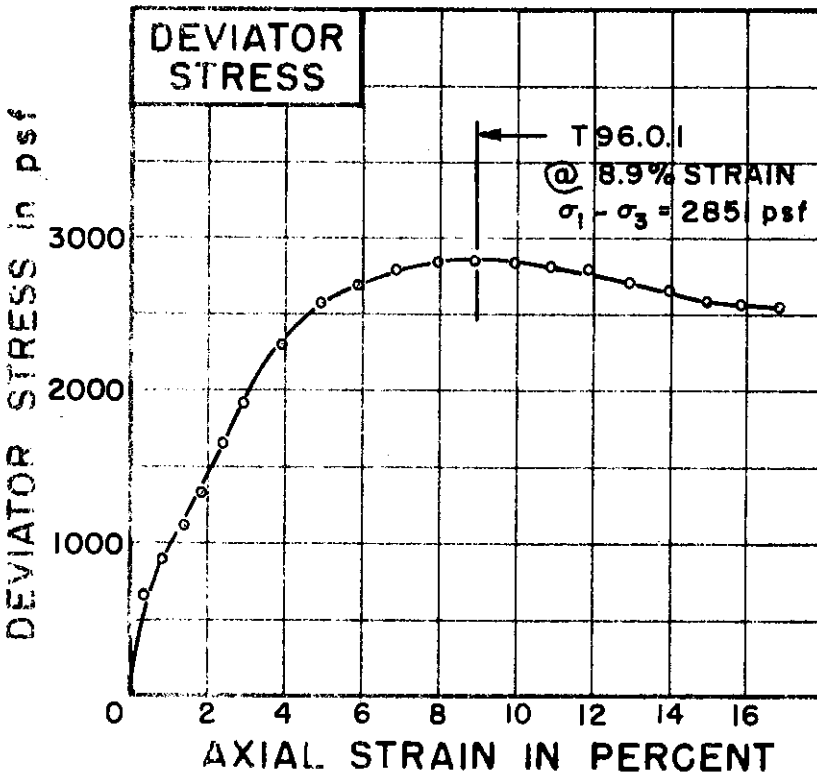
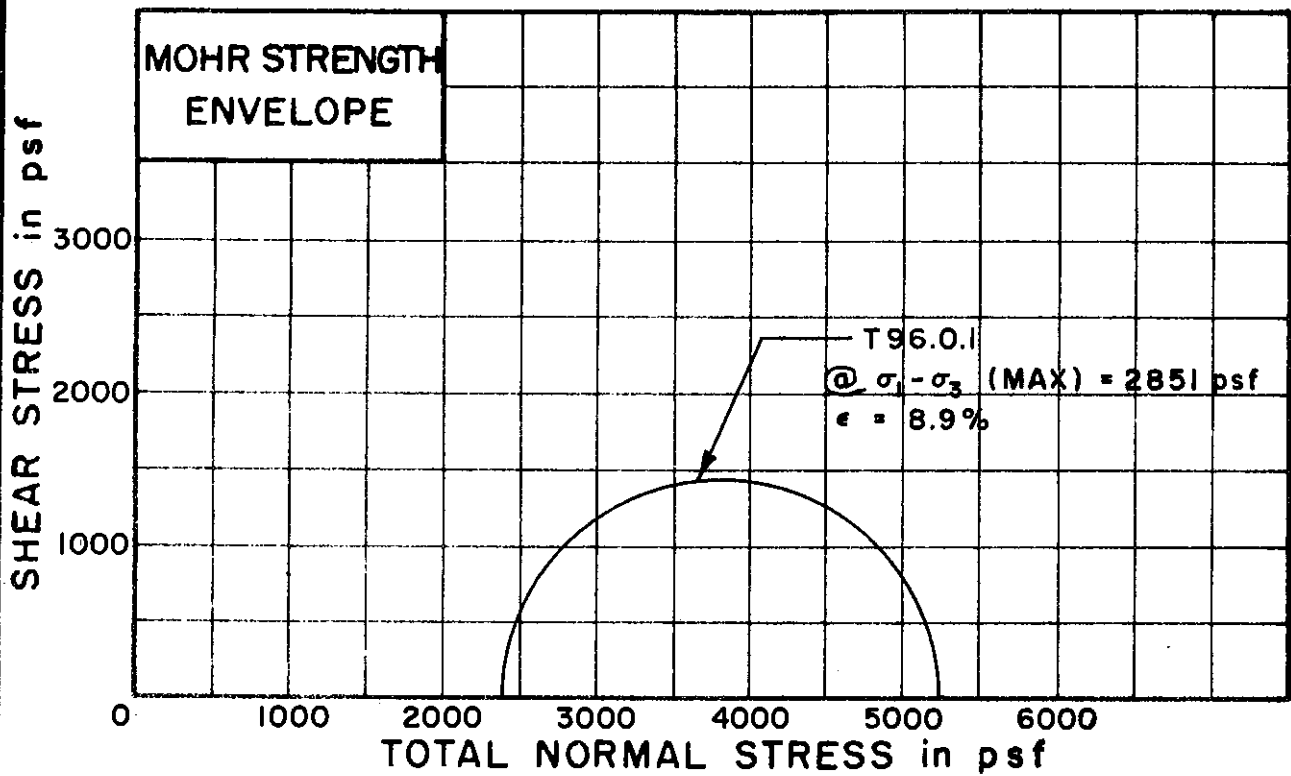
CONFINING PRESSURE psf	$\sigma_3$	7632		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	35.7		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 12  
 DEPTH 109.3' TO 109.6'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T96.0.1		
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INITIAL WATER CONTENT	$w_0$	32.2%		
DRY DENSITY pcf	$\gamma_d$	91		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.26		

CONFINING PRESSURE psf	$\sigma_3$	2405		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	31.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 53

SAMPLE NO. 3

DEPTH 20.1' TO 20.4'

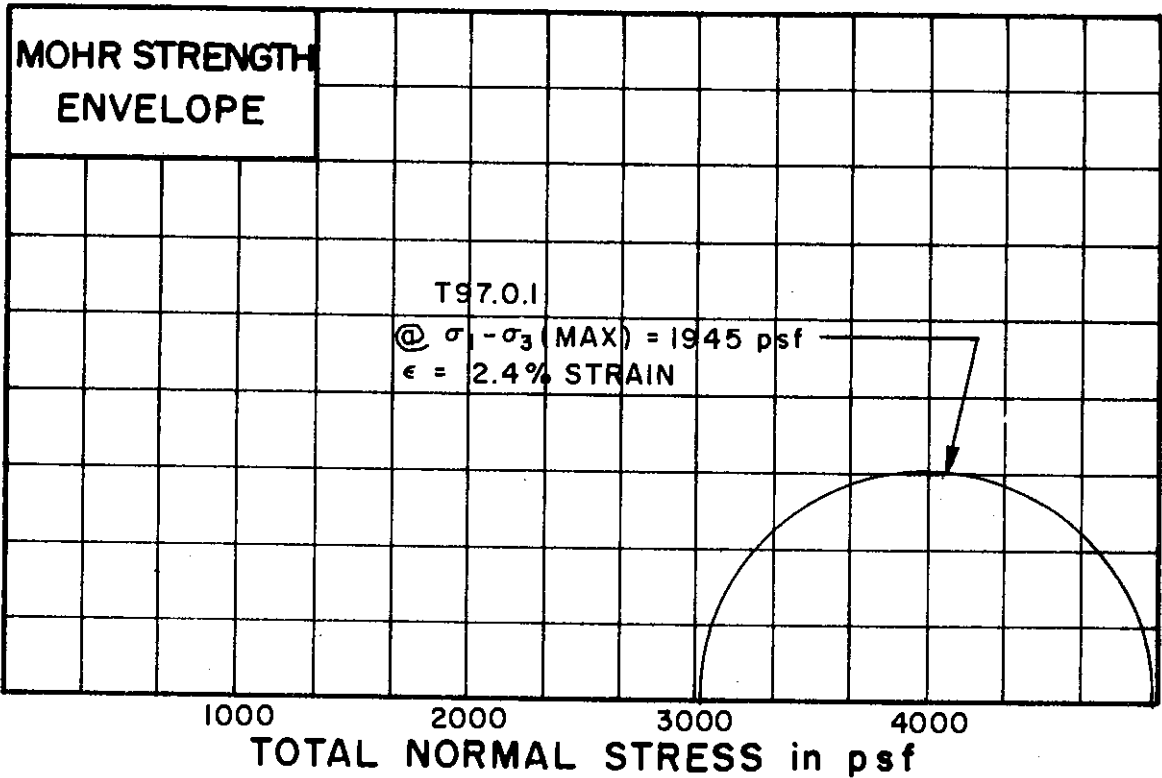
SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 20

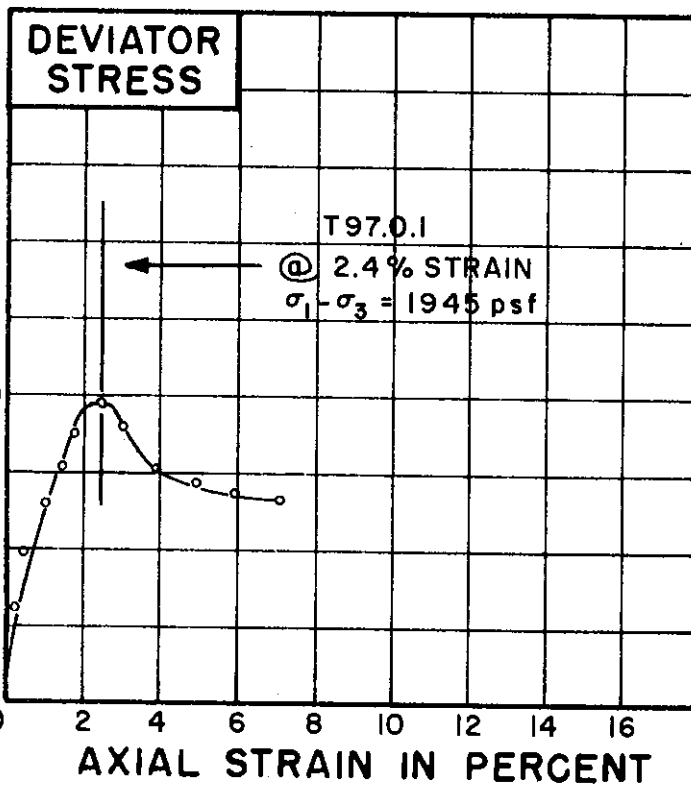
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T97.0.1		
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INITIAL WATER CONTENT	w <sub>0</sub>	34.0		
DRY DENSITY	pcf	γ <sub>d</sub>	88	
SAMPLE DIAMETER	in.	D <sub>0</sub>	1.39	
SAMPLE HEIGHT	in.	H <sub>0</sub>	3.21	

CONFINING PRESSURE	psf	σ <sub>3</sub>	3024	
RATE OF STRAIN	PERCENT/MINUTE		.25	

FINAL WATER CONTENT	w <sub>f</sub>	3.42		
SKETCH OF SAMPLE AT END OF TEST				

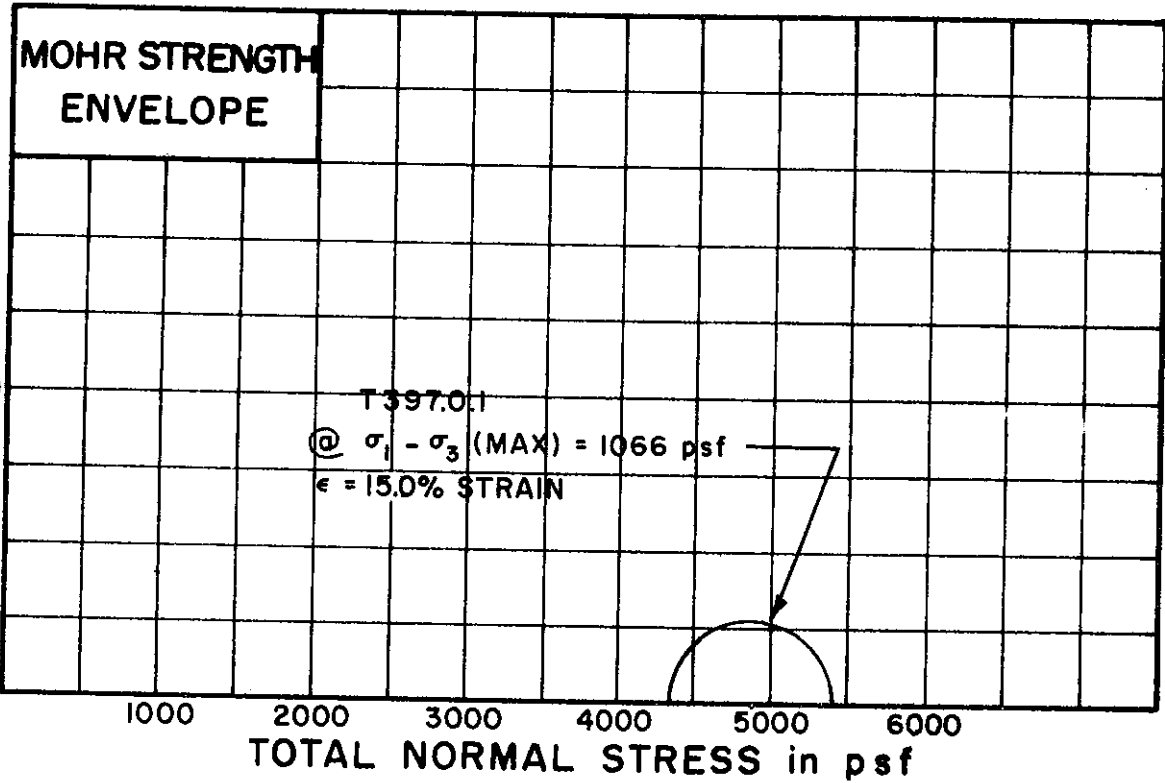
BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 30.1' TO 30.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 22

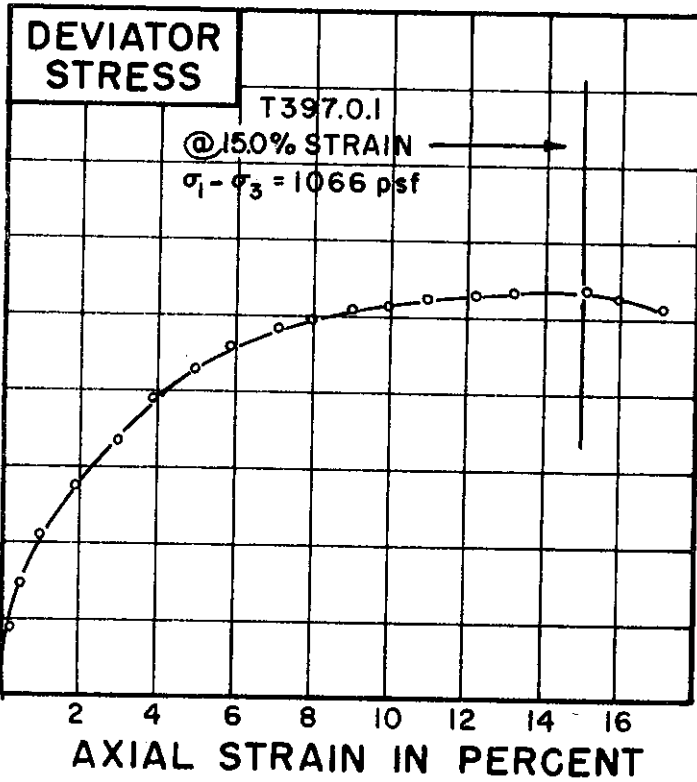
**UNCONSOLIDATED UNDRAINED  
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 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T397.0.1		
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INITIAL WATER CONTENT	$w_0$	24.4		
DRY DENSITY	$\gamma_d$ pcf	99		
SAMPLE DIAMETER	$D_0$ in.	1.39		
SAMPLE HEIGHT	$H_0$ in.	3.24		

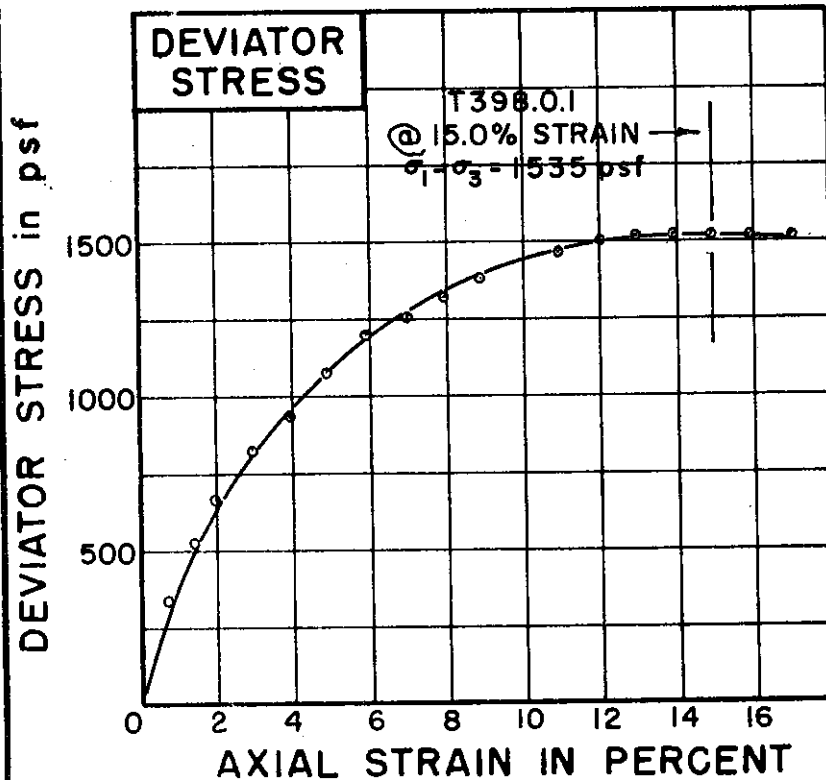
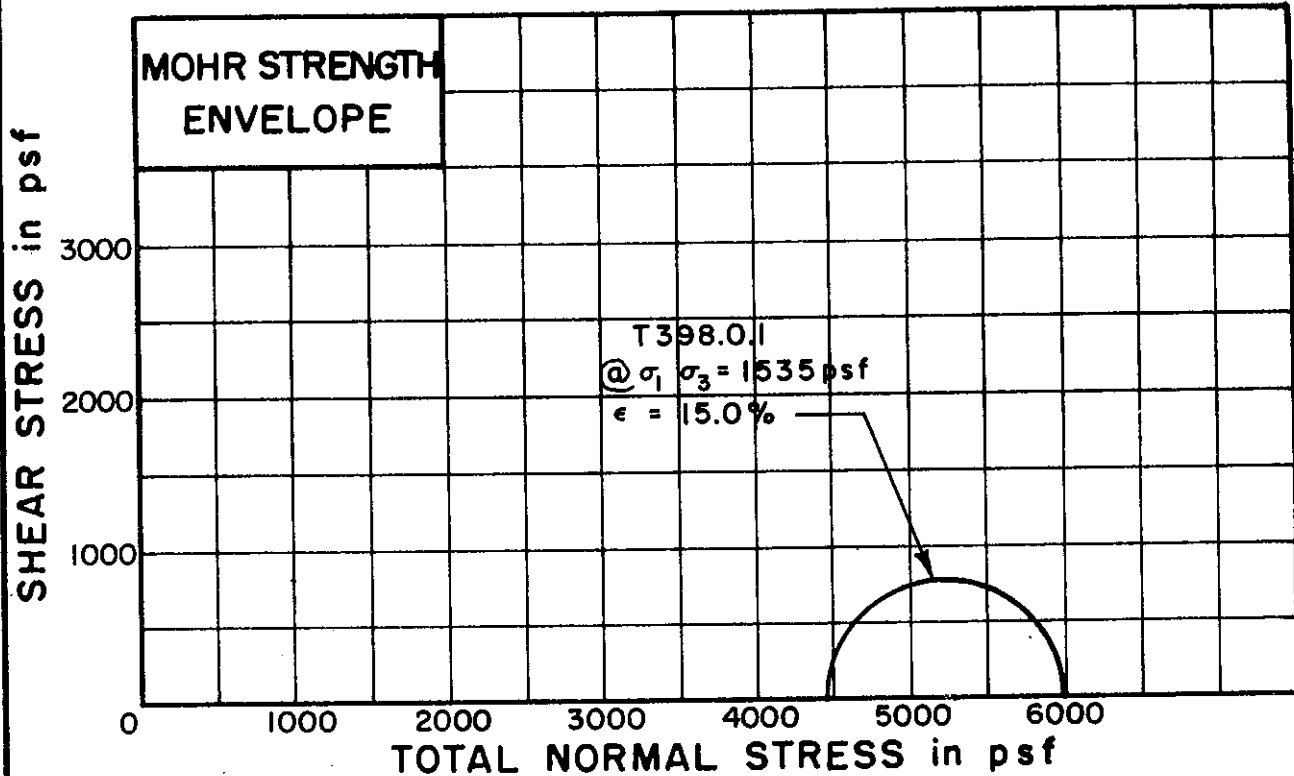
CONFINING PRESSURE	$\sigma_3$ psf	4320		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	23.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.2' TO 53.5'  
 SOIL DESCRIPTION: CLAYEY SILT (ML-CL)  
 LIQUID LIMIT 21 PLASTIC LIMIT 17

**UNCONSOLIDATED UNDRAINED  
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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T398.0.1	
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.38	
SAMPLE HEIGHT in.	$H_o$	3.26	

CONFINING PRESSURE psf	$\sigma_3$	4464	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 5

DEPTH 59.0' TO 59.3'

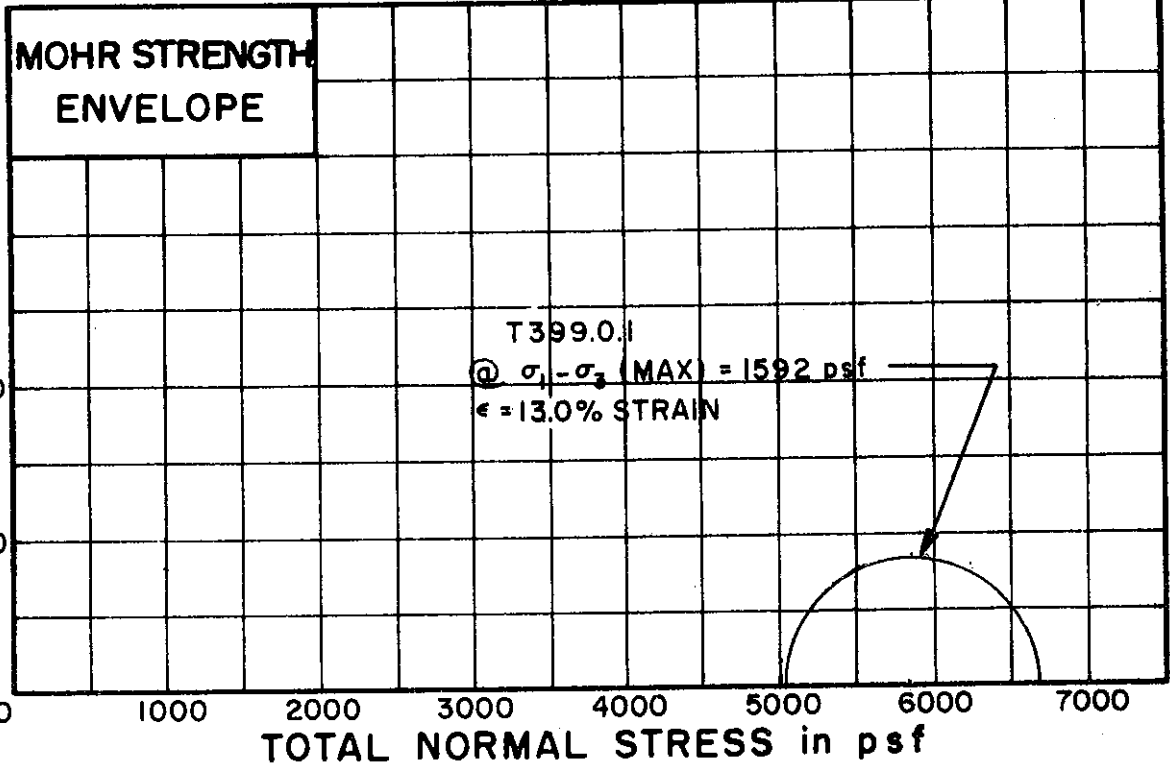
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 17

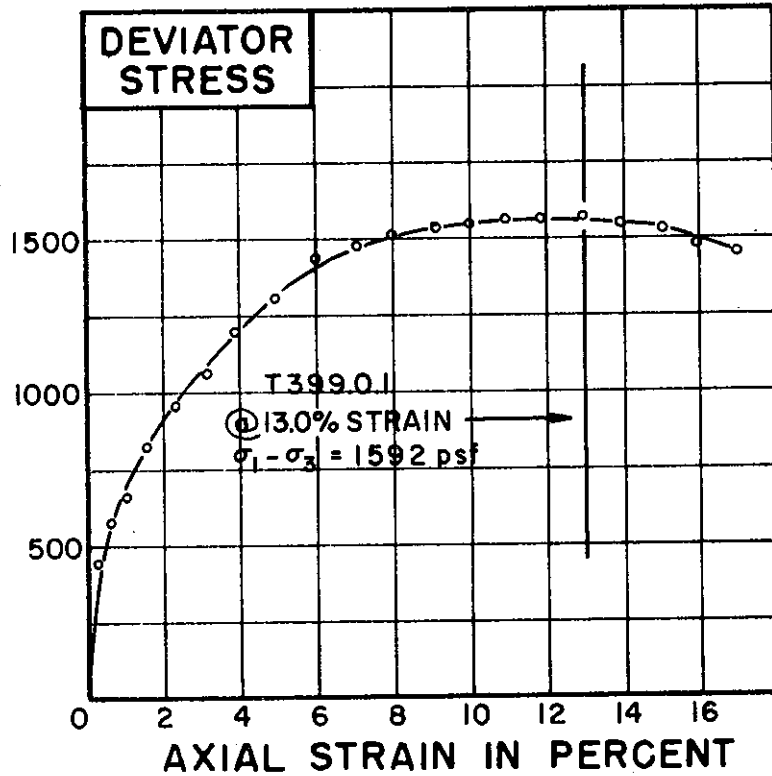
**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T399.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	26.1	
DRY DENSITY pcf	γ <sub>d</sub>	98	
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38	
SAMPLE HEIGHT in.	H <sub>o</sub>	3.33	

CONFINING PRESSURE psf	σ <sub>3</sub>	5040	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	w <sub>f</sub>	25.8	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

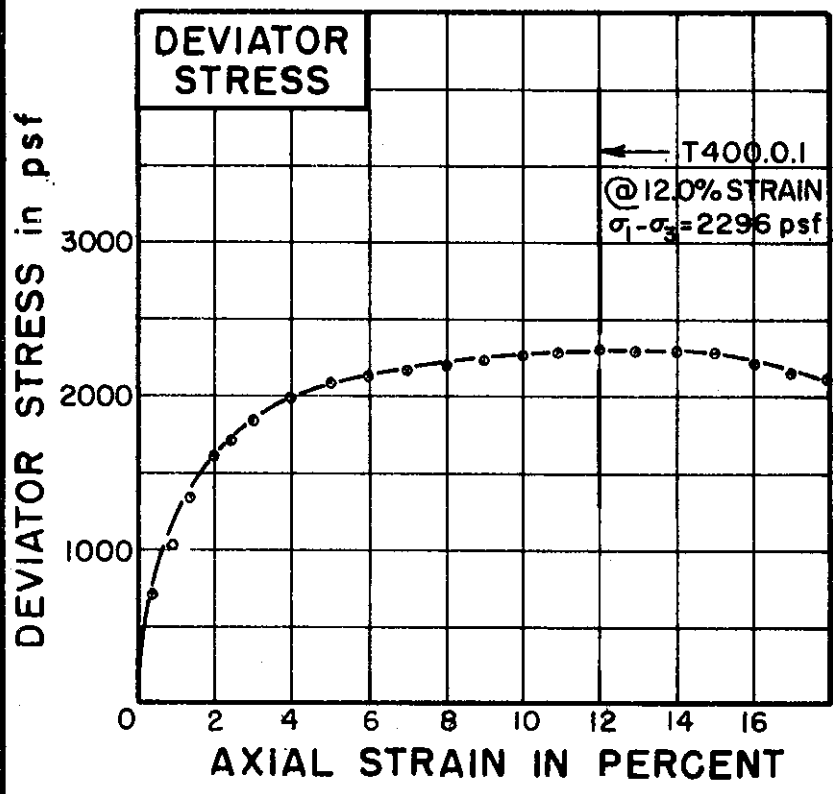
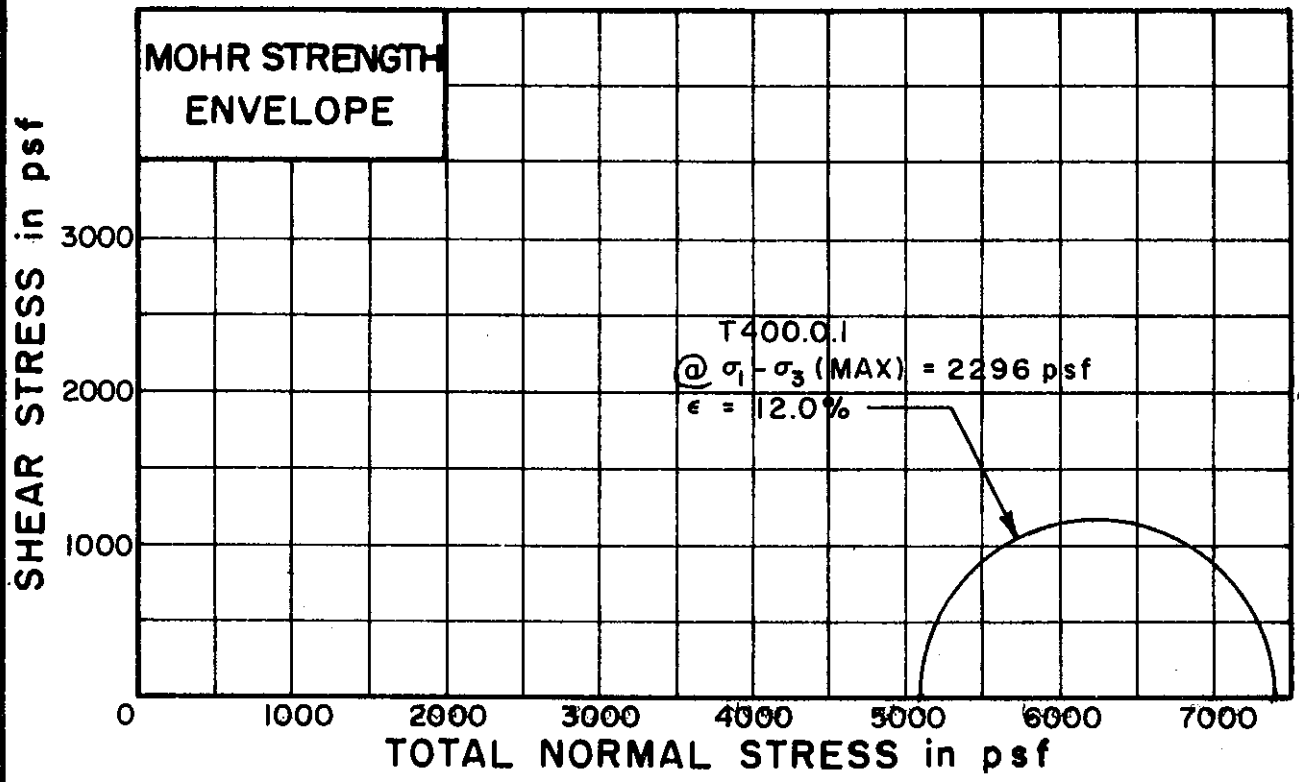
SAMPLE NO. 6

DEPTH 63.1' TO 63.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 18 (CL)

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T400.0.		
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INITIAL WATER CONTENT	$w_0$	25.9%		
DRY DENSITY pcf	$\gamma_d$	98		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.25		

CONFINING PRESSURE psf	$\sigma_3$	5112		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	25.5%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

SAMPLE NO. 7

DEPTH 68.8' TO 69.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

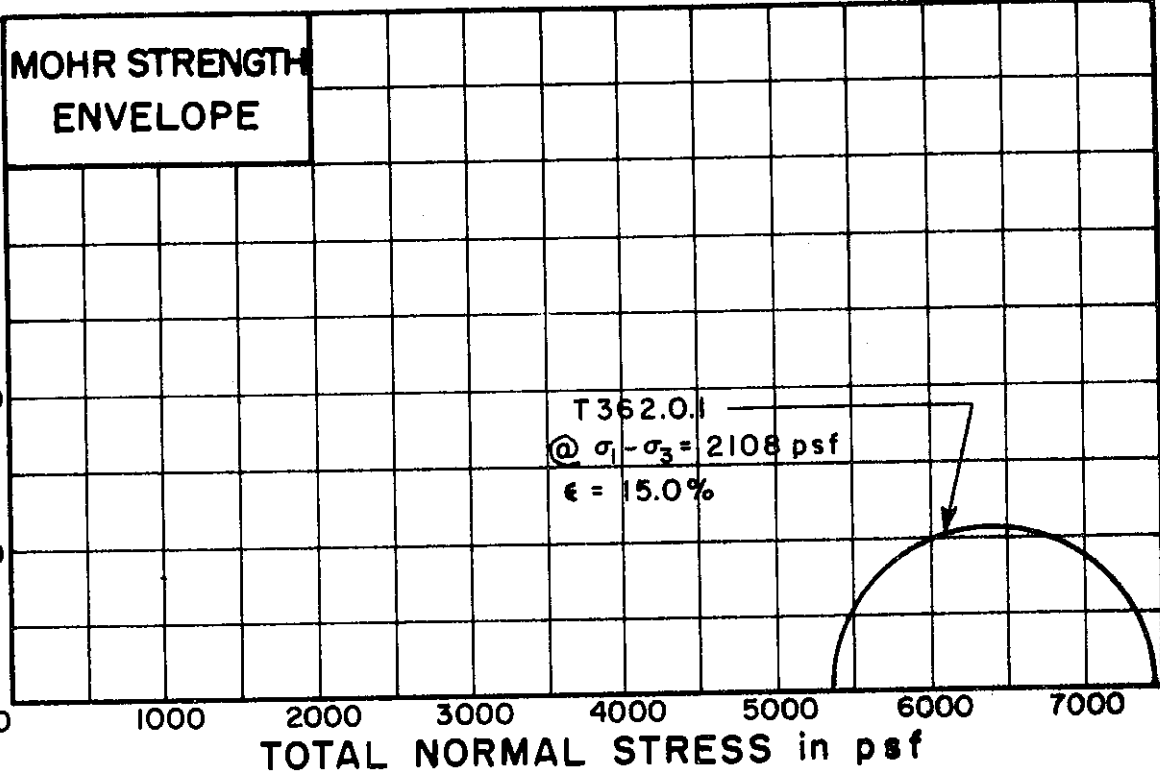
LIQUID LIMIT 37 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

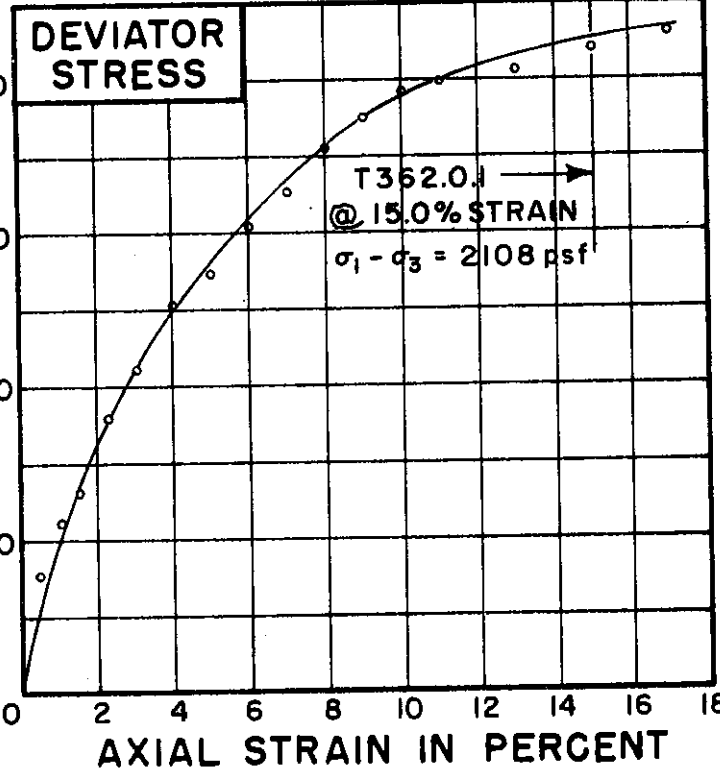
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T362.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	22.6%	
DRY DENSITY	pcf	γ <sub>d</sub>	105
SAMPLE DIAMETER	in.	D <sub>o</sub>	1.40
SAMPLE HEIGHT	in.	H <sub>o</sub>	3.31

CONFINING PRESSURE	psf	σ <sub>3</sub>	5328
RATE OF STRAIN	PERCENT/MINUTE		0.27

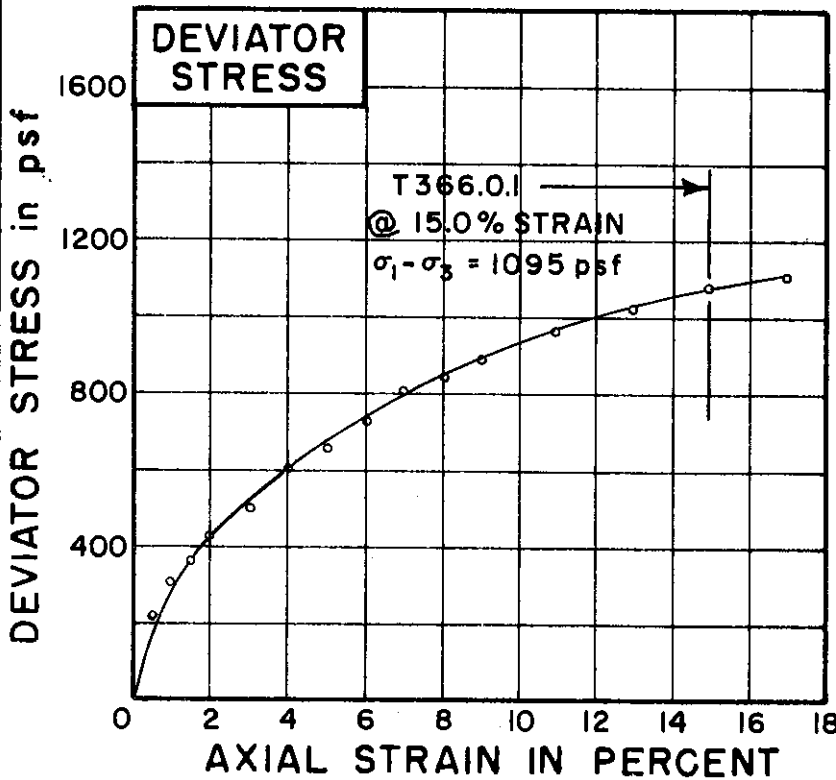
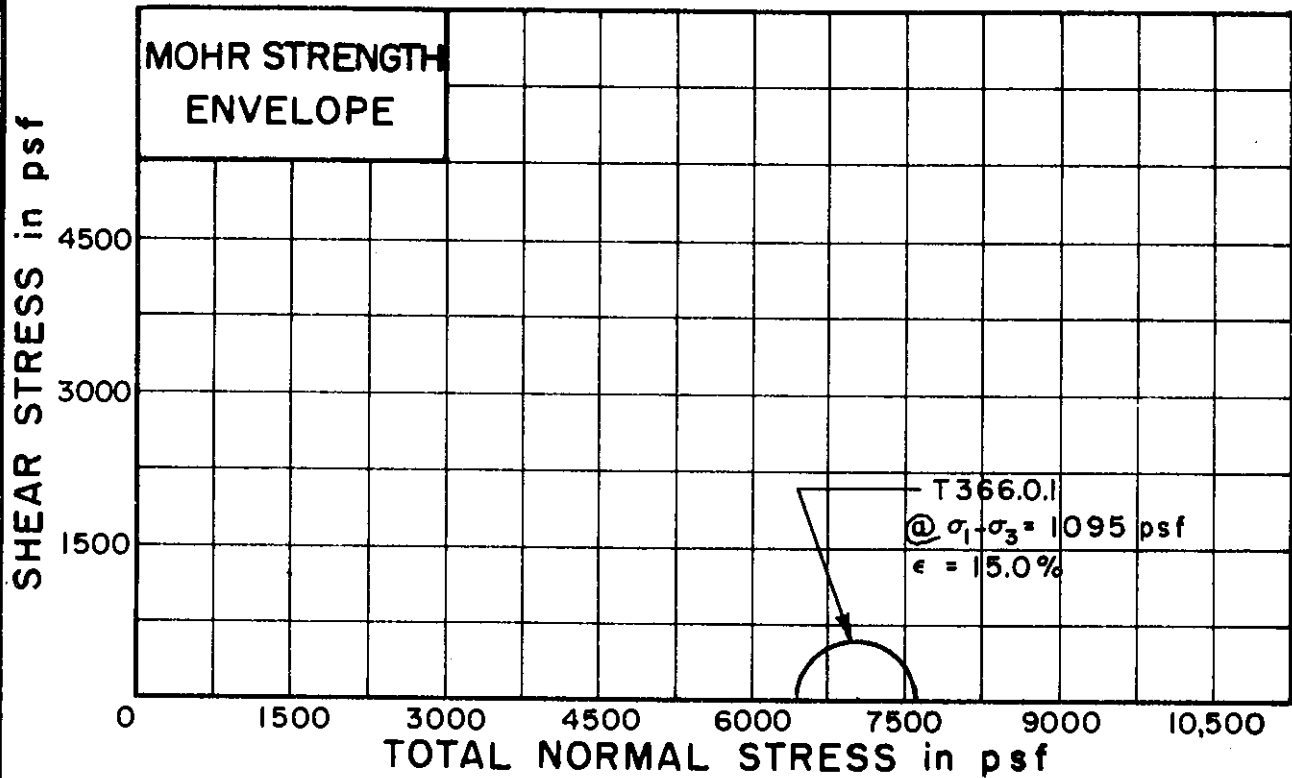
FINAL WATER CONTENT	w <sub>f</sub>	22.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 15  
 DEPTH 74.6' TO 74.9'  
 SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO./SYMBOL	T366.0.1		
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INITIAL WATER CONTENT	$w_0$	24.5%	
DRY DENSITY pcf	$\gamma_d$	100	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.27	

CONFINING PRESSURE psf	$\sigma_3$	6480	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_1$	24.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 19

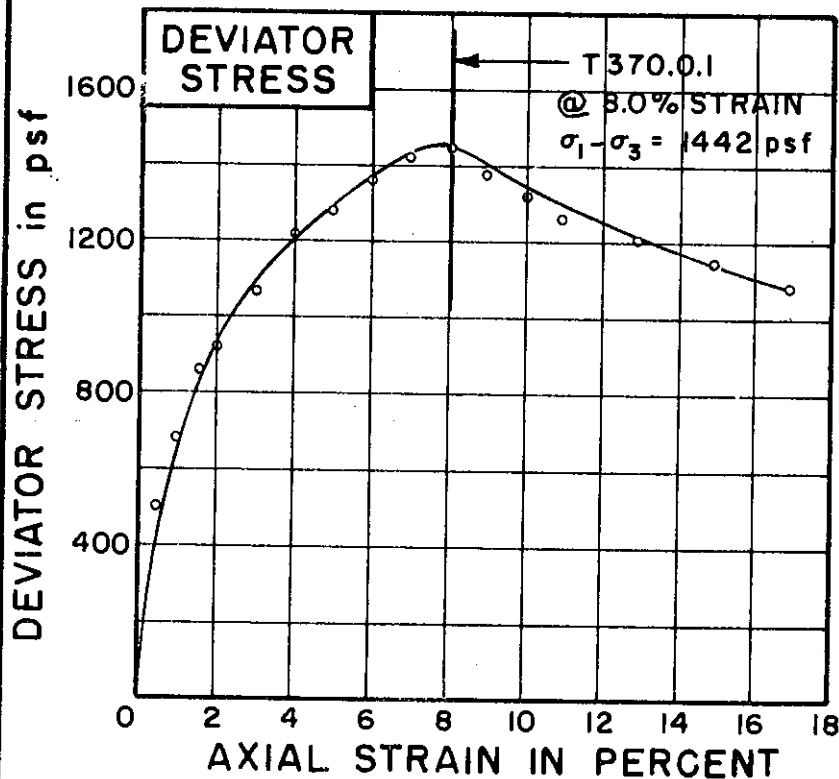
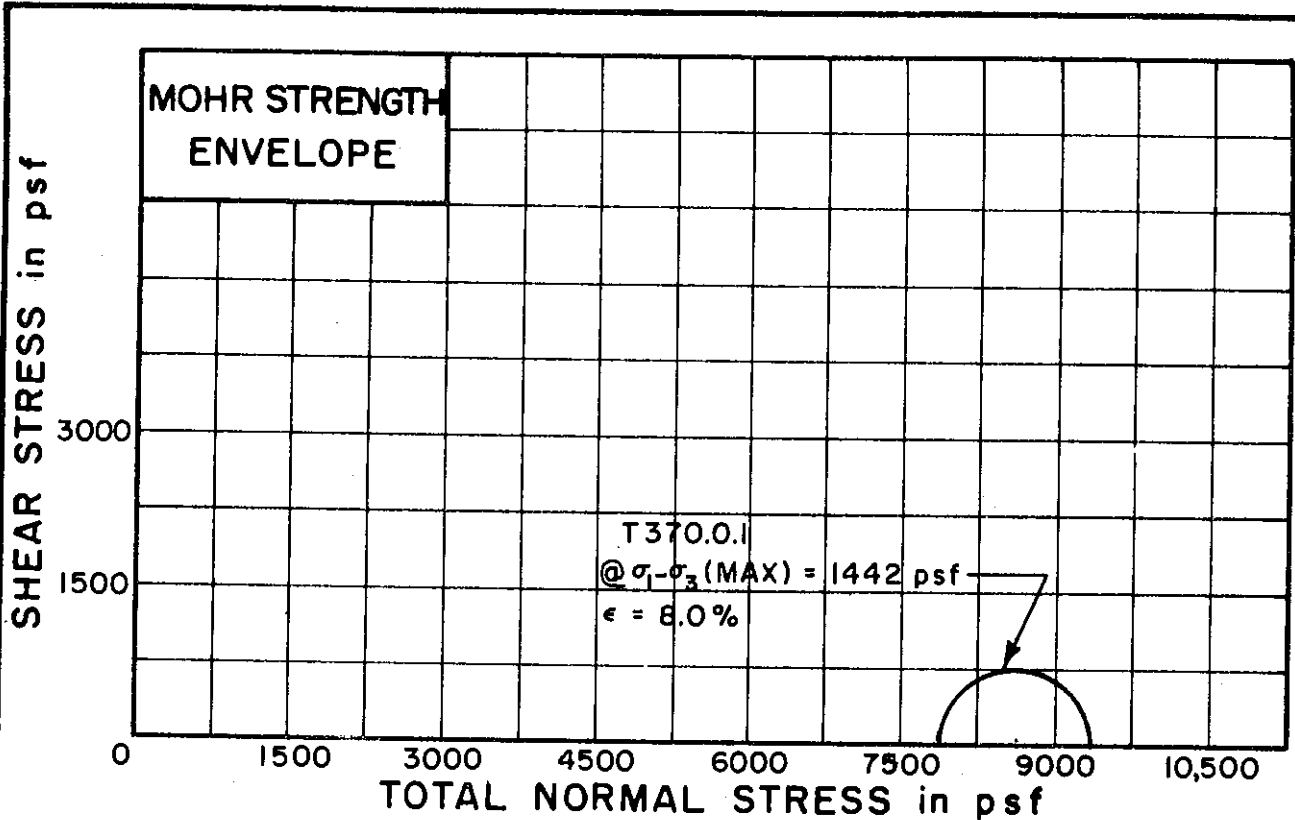
DEPTH 94.9' TO 95.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T370.0.1		
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INITIAL WATER CONTENT	$w_0$	37.2%	
DRY DENSITY $\rho_{cf}$	$\gamma_d$	85	
SAMPLE DIAMETER, in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.23	

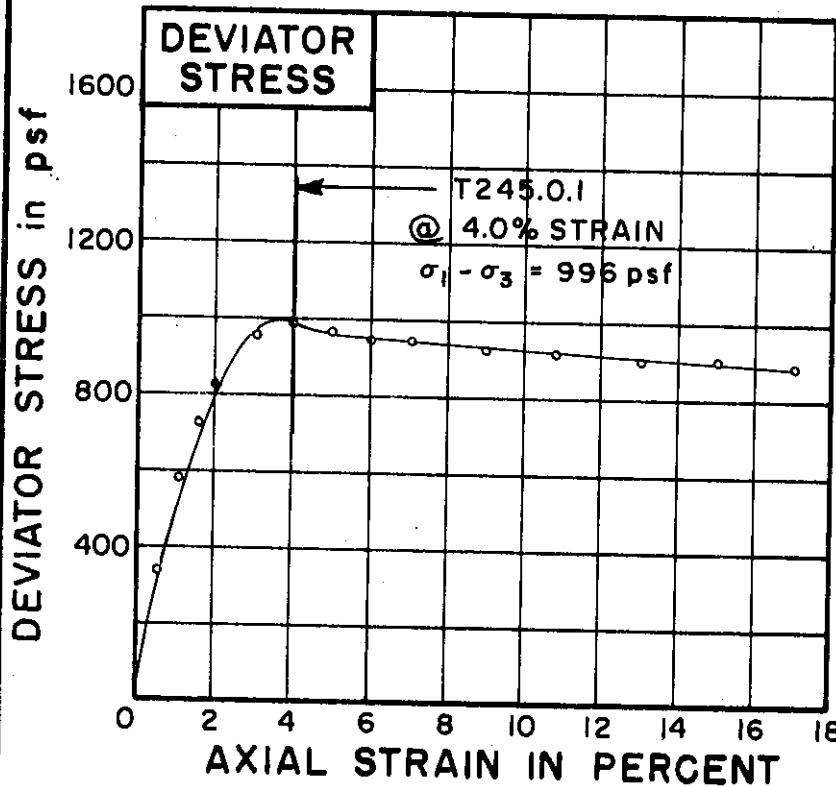
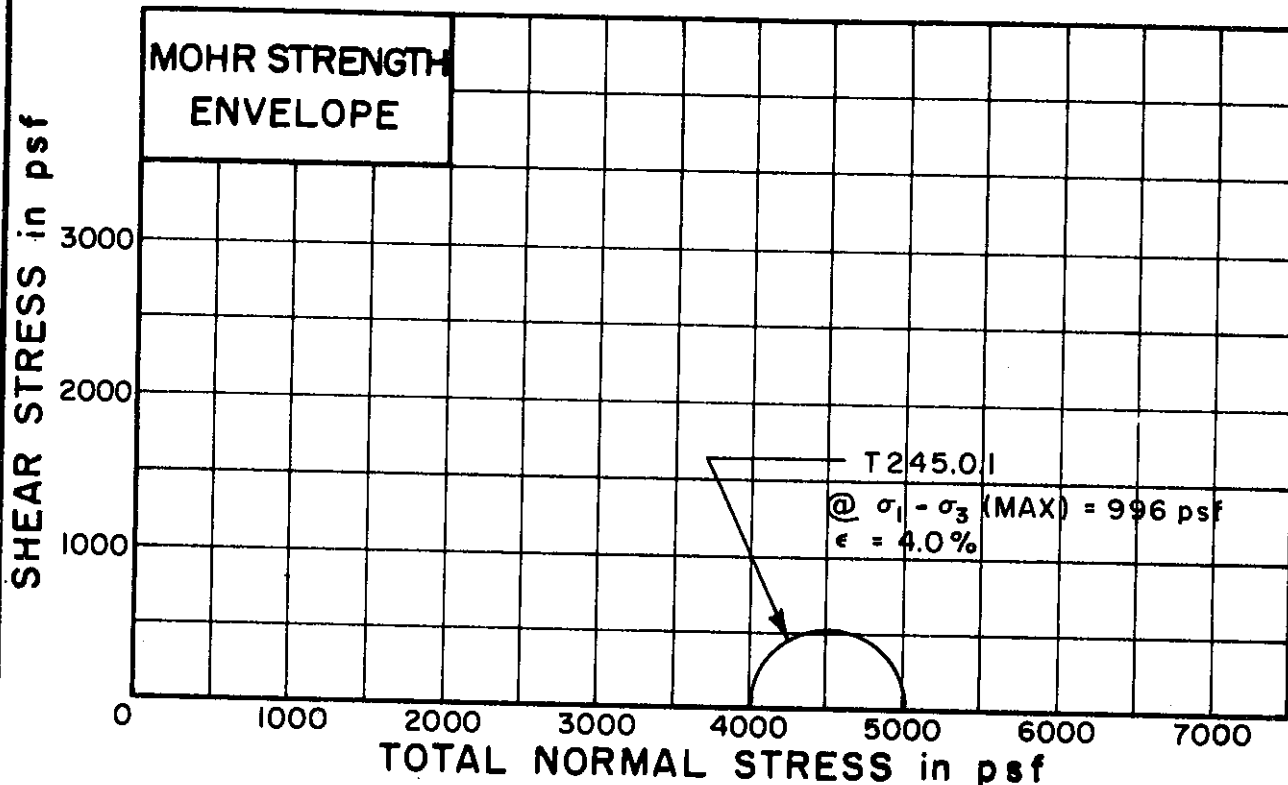
CONFINING PRESSURE $\rho_{cf}$	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	36.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 23  
 DEPTH 119.8' TO 120.2'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T245.0.1		
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INITIAL WATER CONTENT	$w_0$	41.1%	
DRY DENSITY psf	$\gamma_d$	81	
SAMPLE DIAMETER in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.25	

CONFINING PRESSURE psf	$\sigma_3$	4032	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	40.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126

SAMPLE NO. 11

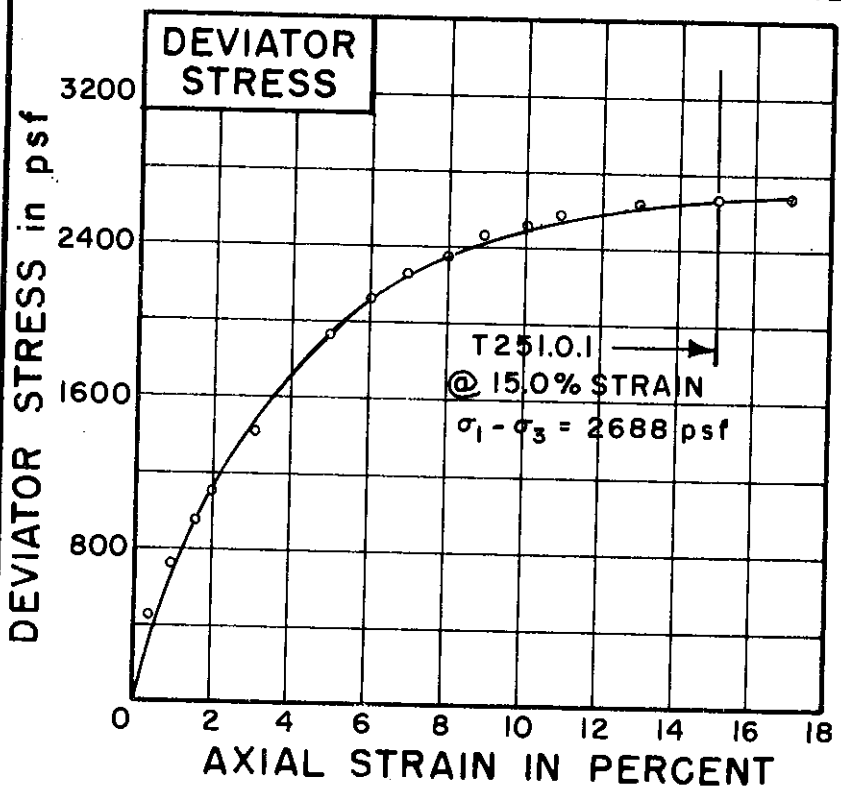
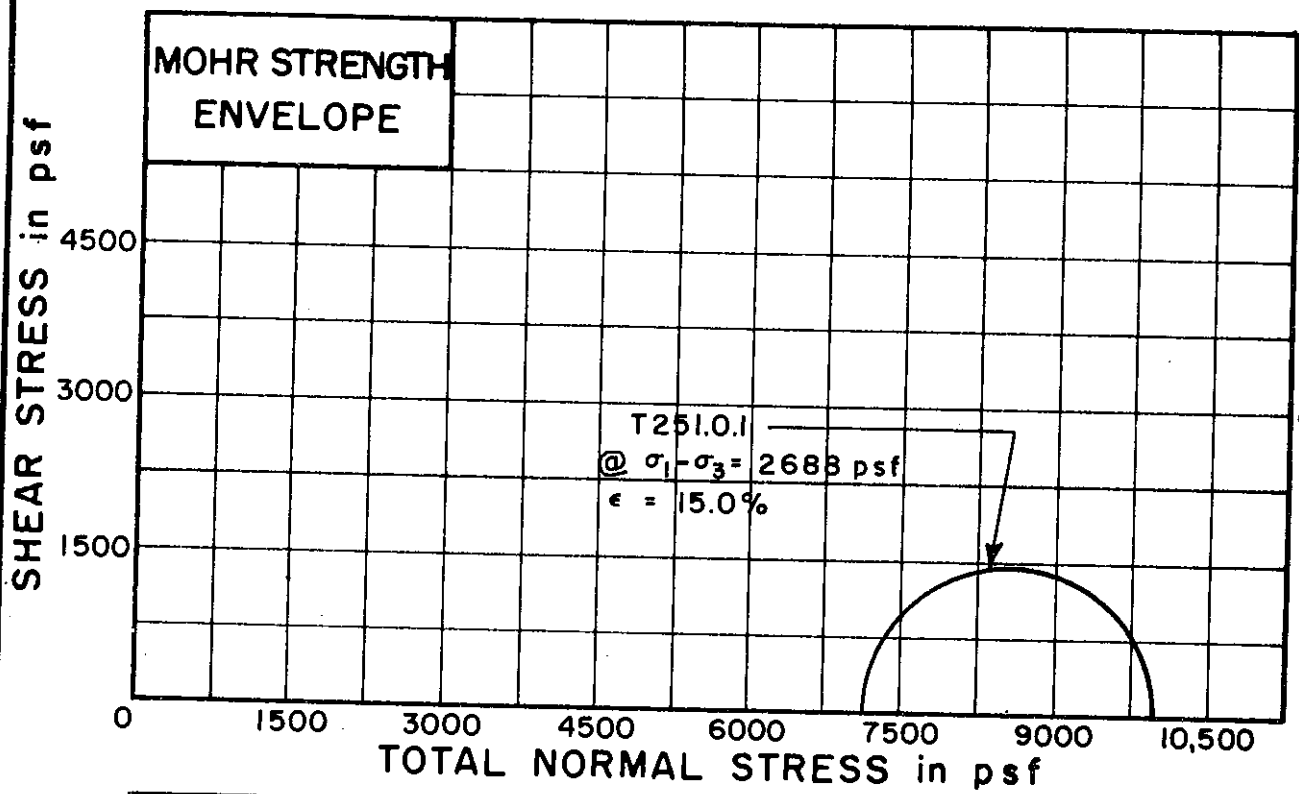
DEPTH 49.1' TO 49.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 59 PLASTIC LIMIT 25

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T251.0.1		
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INITIAL WATER CONTENT	$w_0$	25.3%	
DRY DENSITY pcf	$\gamma_d$	96	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.33	

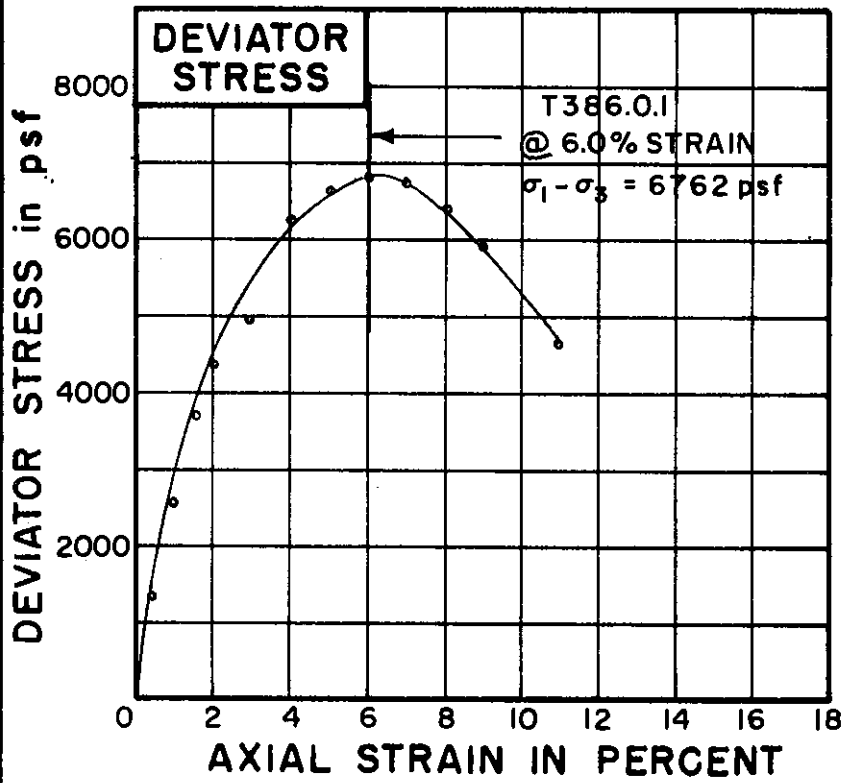
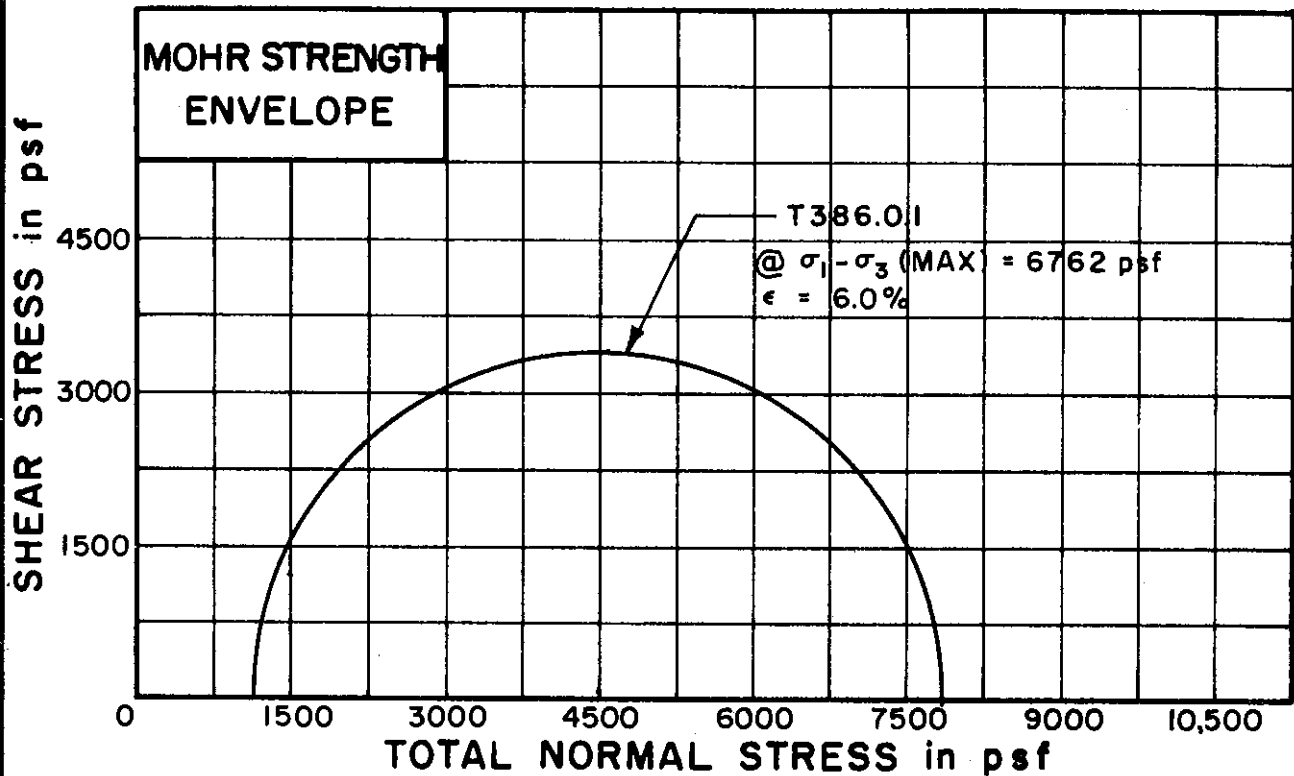
CONFINING PRESSURE psf	$\sigma_3$	7200	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	25.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126  
 SAMPLE NO. 23  
 DEPTH 108.6' TO 108.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T386.0.1		
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INITIAL WATER CONTENT	$w_0$	22.3%	
DRY DENSITY pcf	$\gamma_d$	108	
SAMPLE DIAMETER in.	$D_0$	1.45	
SAMPLE HEIGHT in.	$H_0$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	1080	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	22.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 3

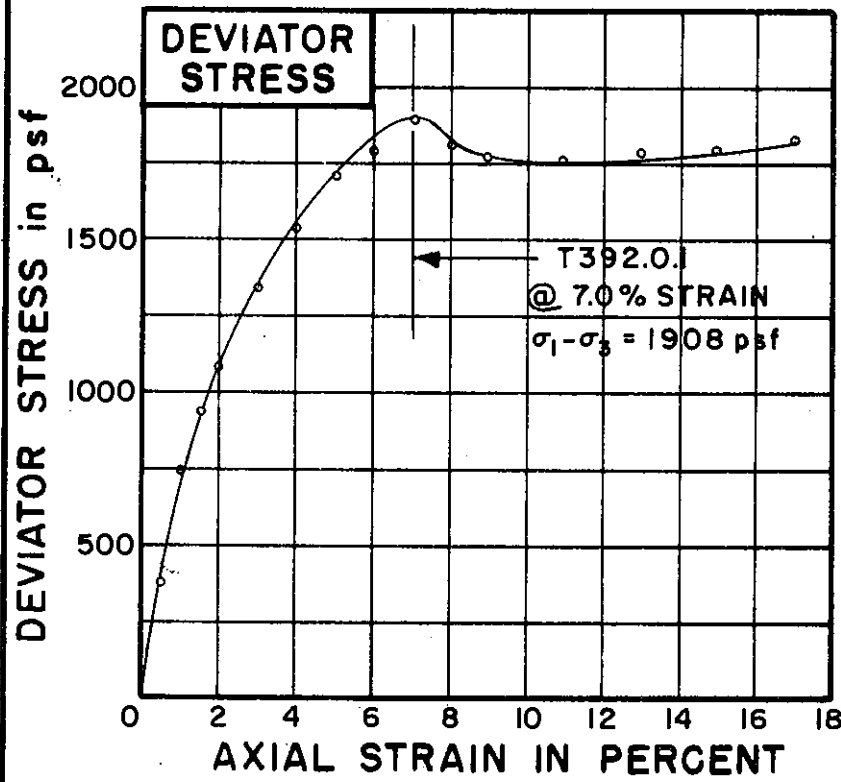
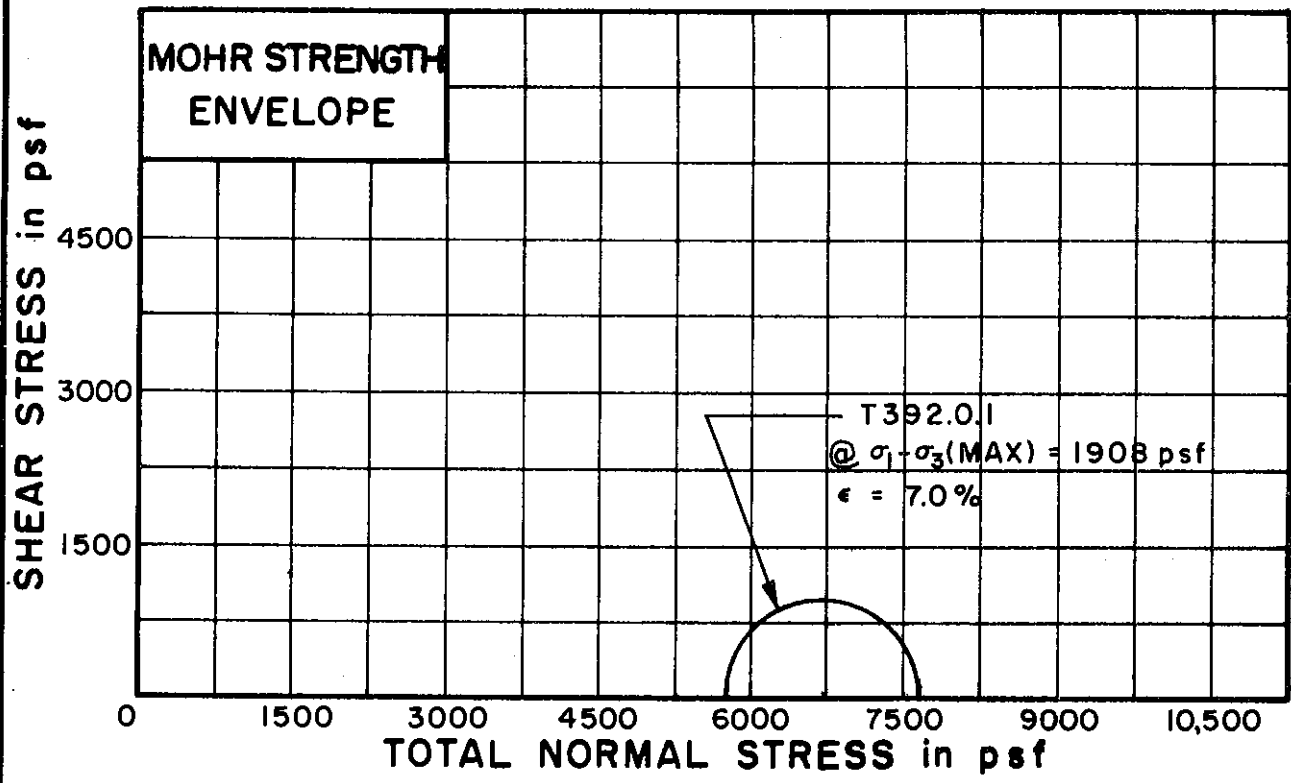
DEPTH 8.7' TO 9.0'


SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 23

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T392.0.1		
INITIAL WATER CONTENT	w <sub>o</sub> 24.8%		
DRY DENSITY pcf	$\gamma_d$ 101		
SAMPLE DIAMETER in.	D <sub>o</sub> 1.41		
SAMPLE HEIGHT in.	H <sub>o</sub> 3.35		
CONFINING PRESSURE psf	$\sigma_3$ 5760		
RATE OF STRAIN PERCENT/MINUTE	0.27		
FINAL WATER CONTENT	w <sub>f</sub> 24.6%		
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 15

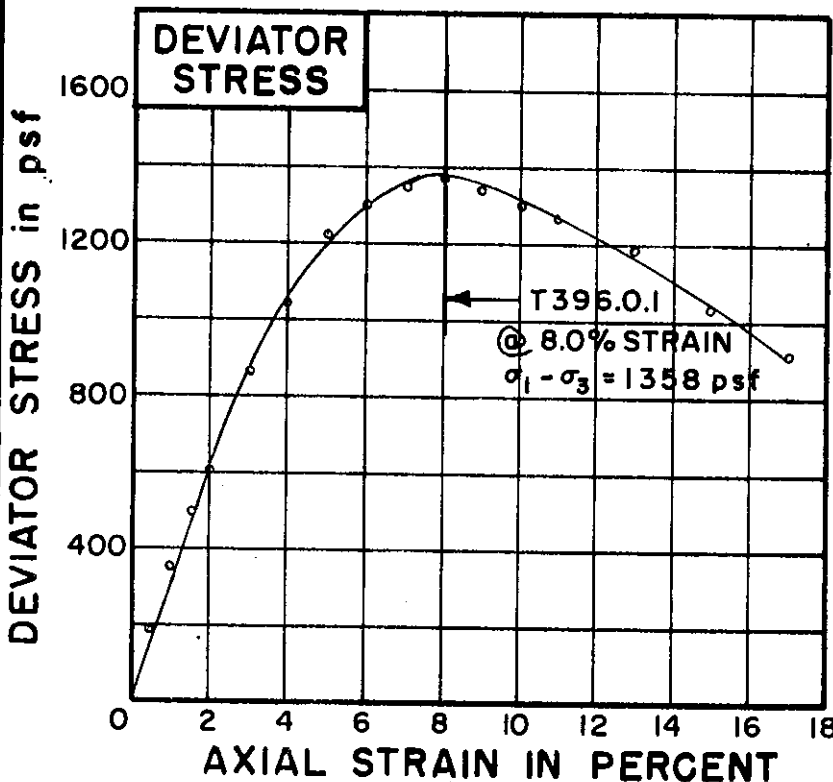
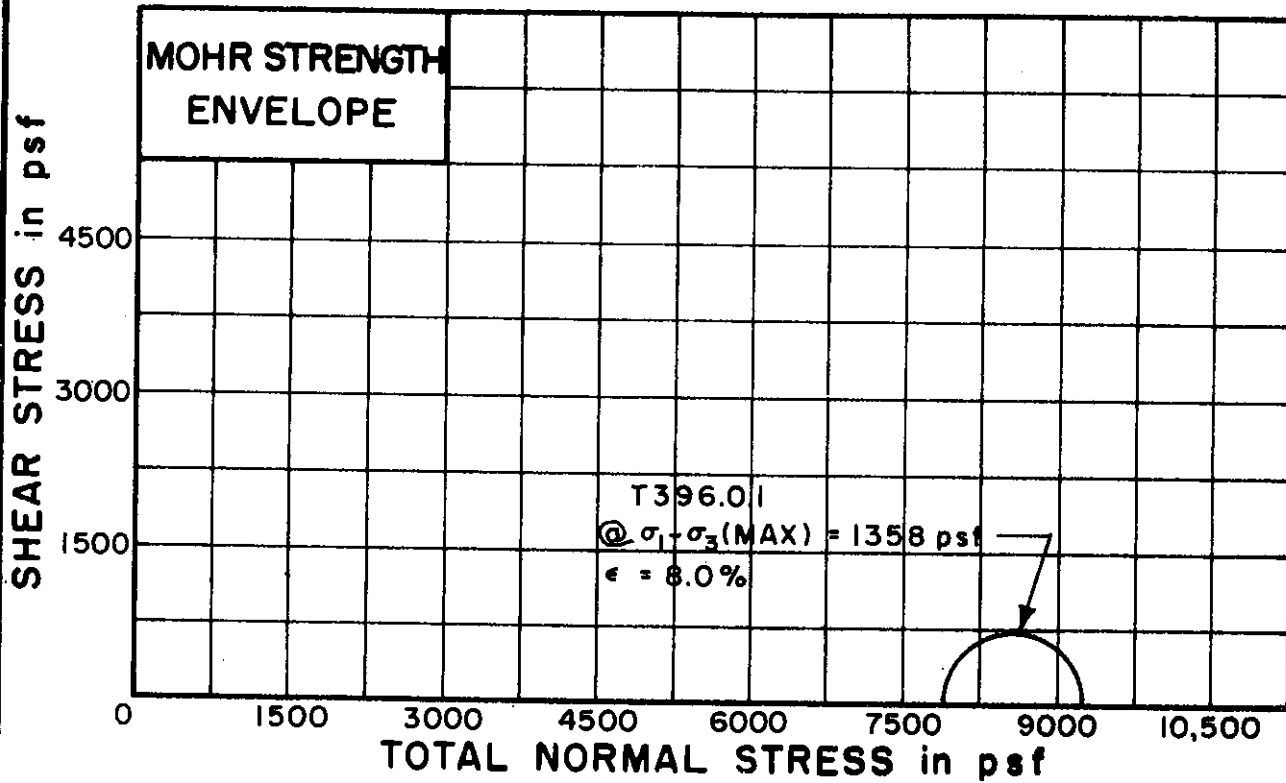
DEPTH 74.0' TO 74.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T396.0.1		
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INITIAL WATER CONTENT	$w_0$	30.6%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER, in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.20	

CONFINING PRESSURE psf	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.28	

FINAL WATER CONTENT	$w_f$	30.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 24

DEPTH 124.1' TO 124.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

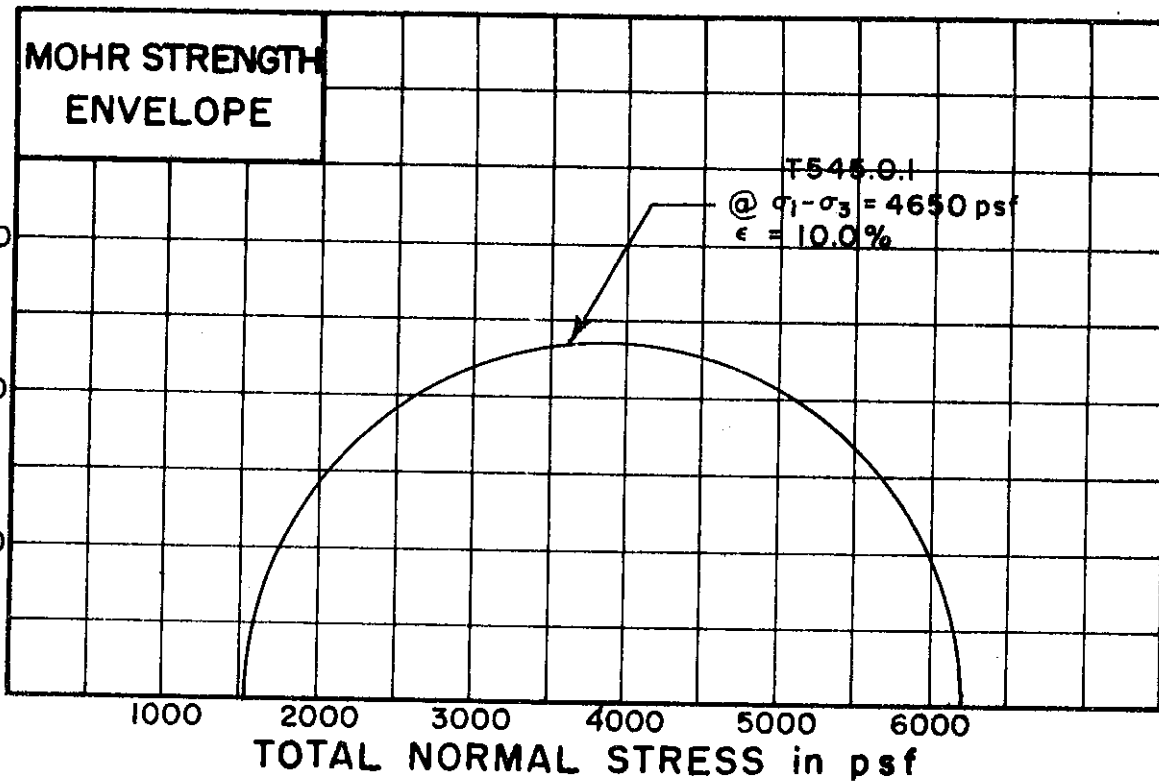
LIQUID LIMIT 46 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

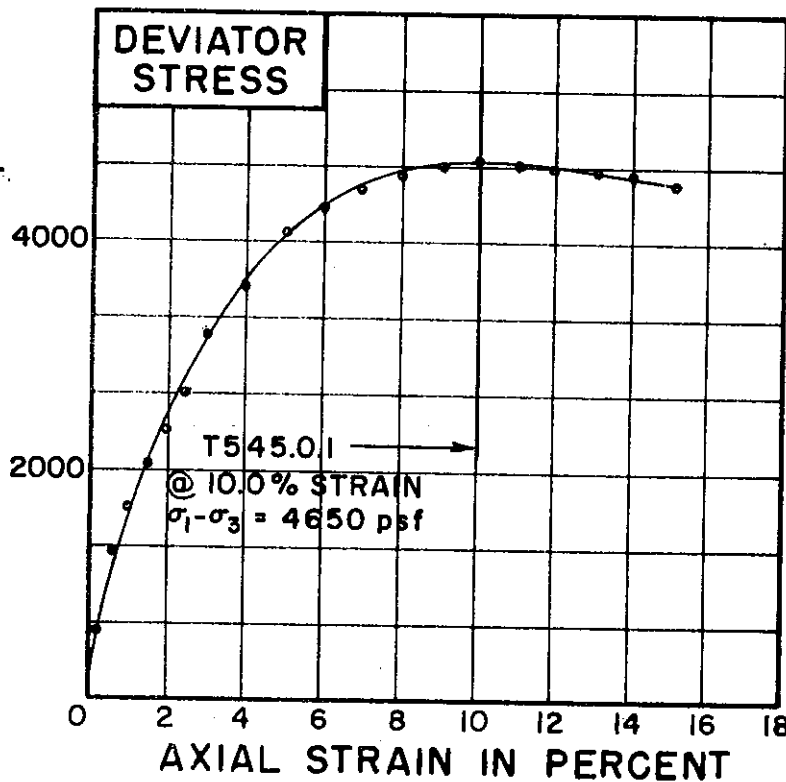
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T545.0.1		
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INITIAL WATER CONTENT	$w_o$	28.3%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.32	

CONFINING PRESSURE psf	$\sigma_3$	1555	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	28.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 151A

SAMPLE NO. 3

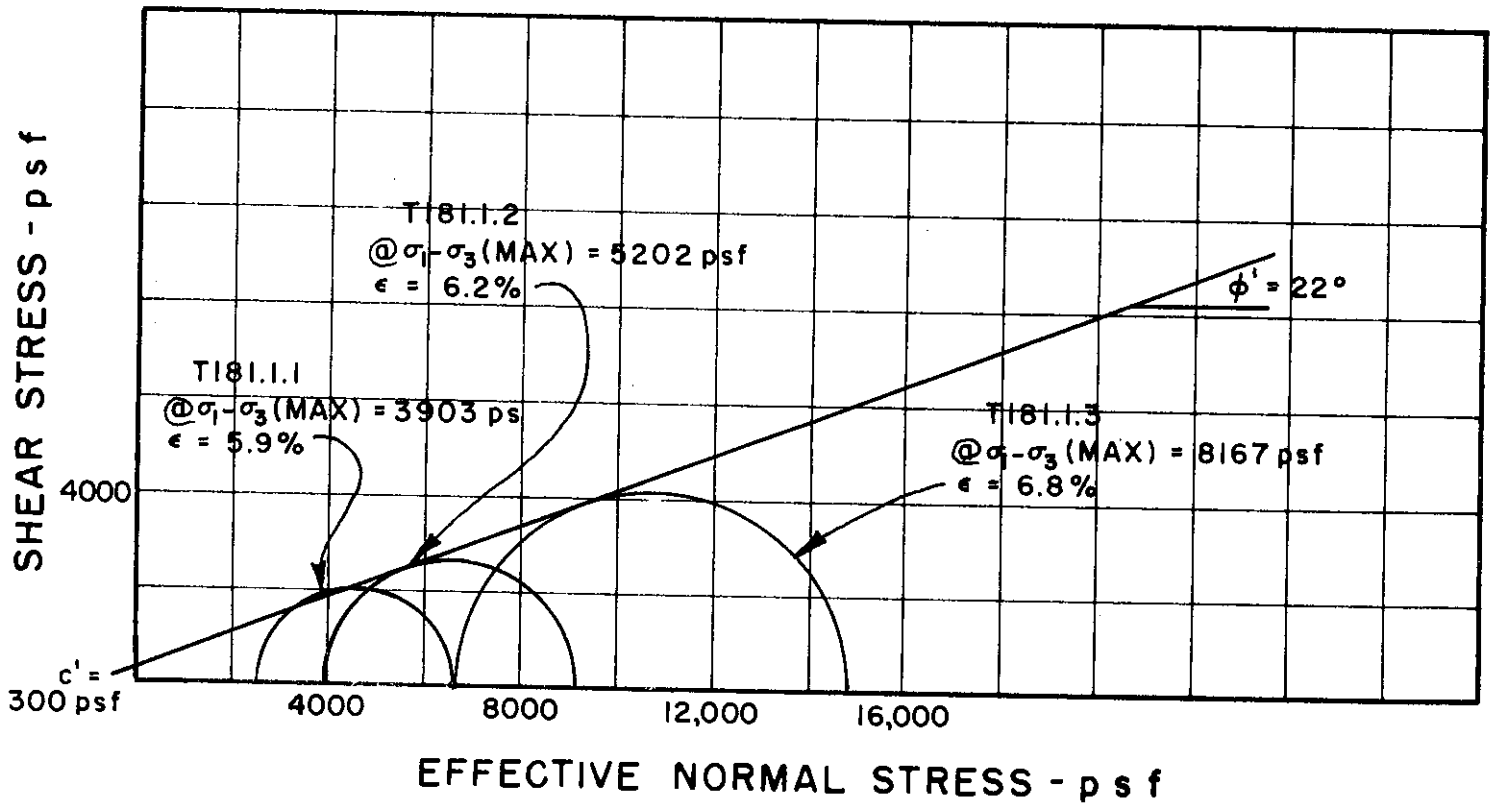
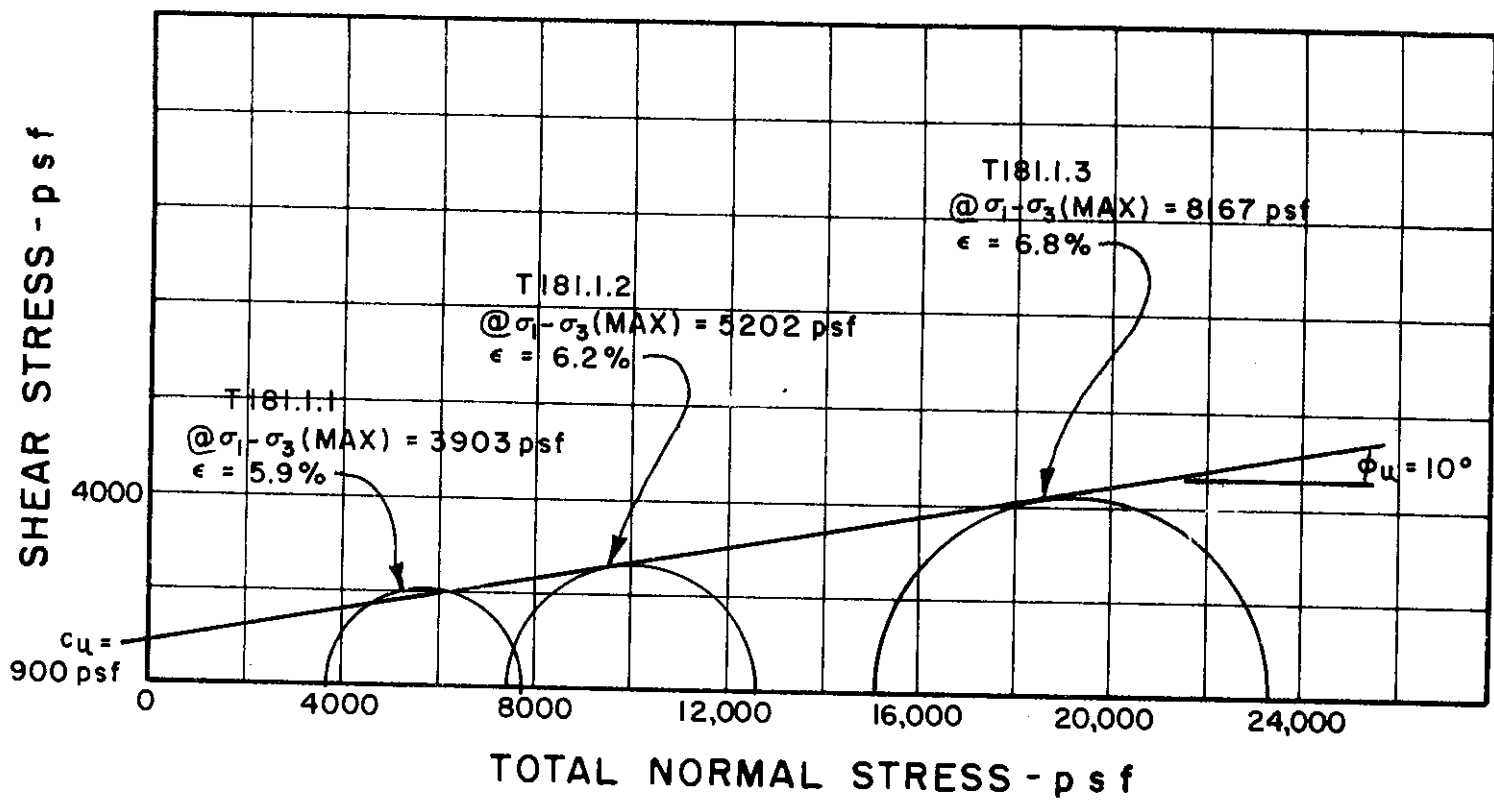
DEPTH 13.0' TO 13.3'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 18

SAMPLE NO. 12

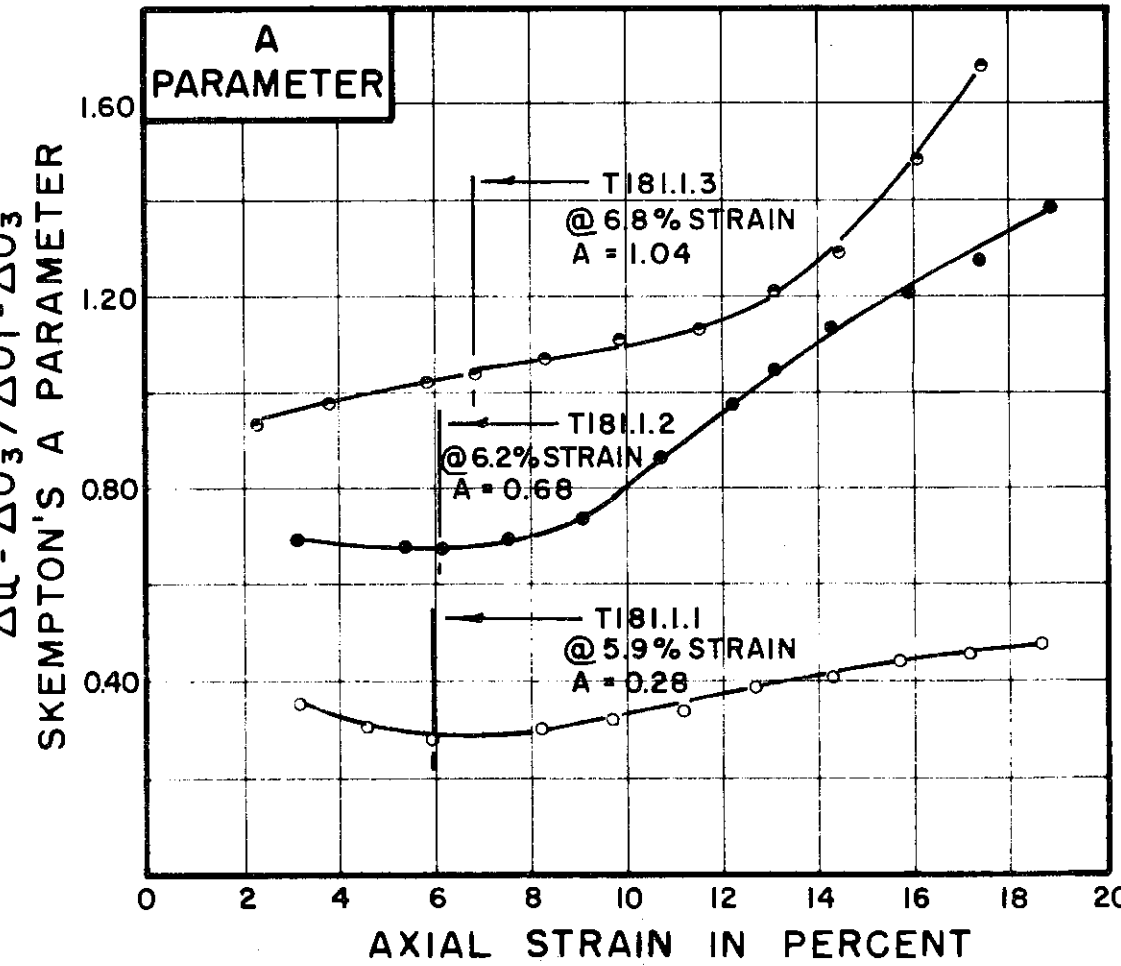
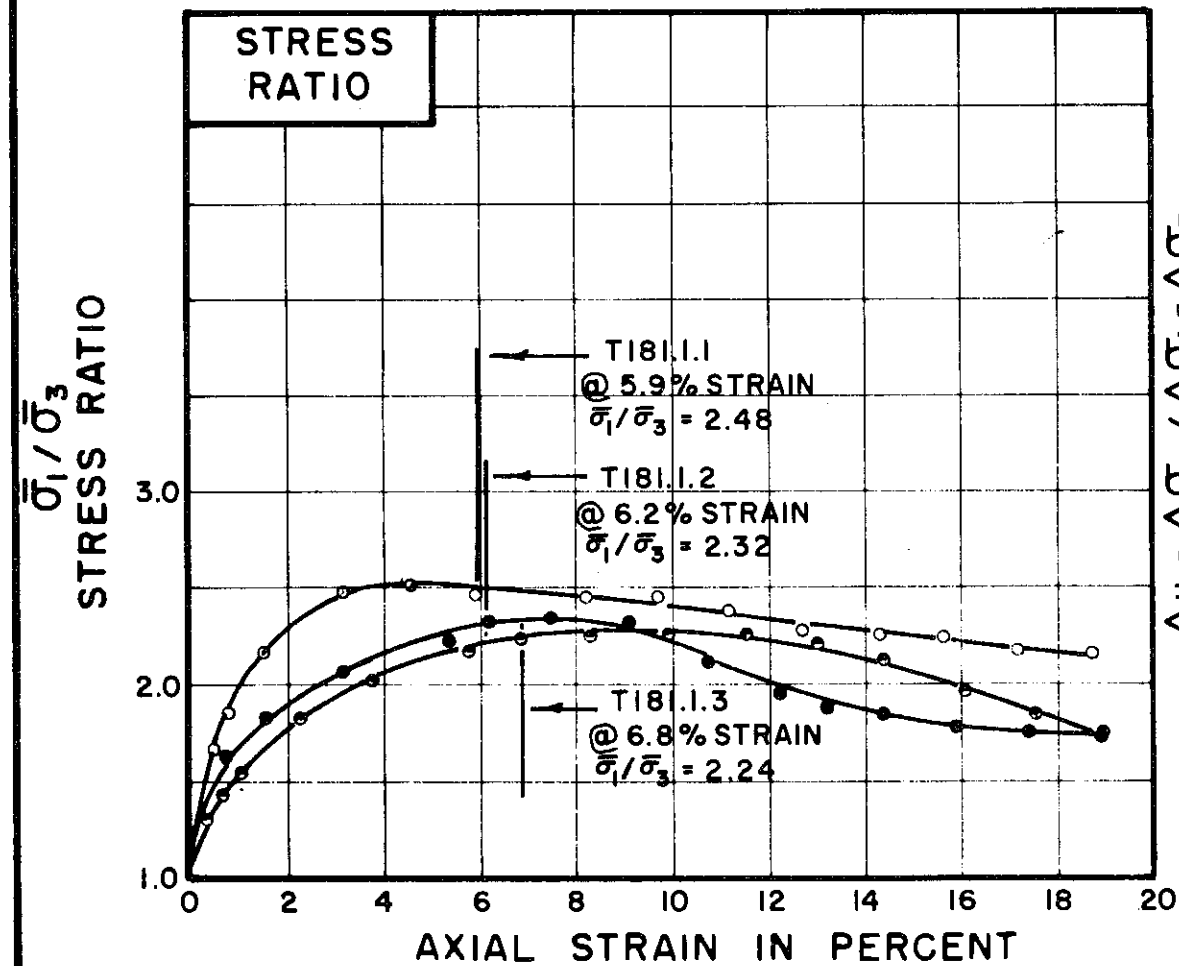
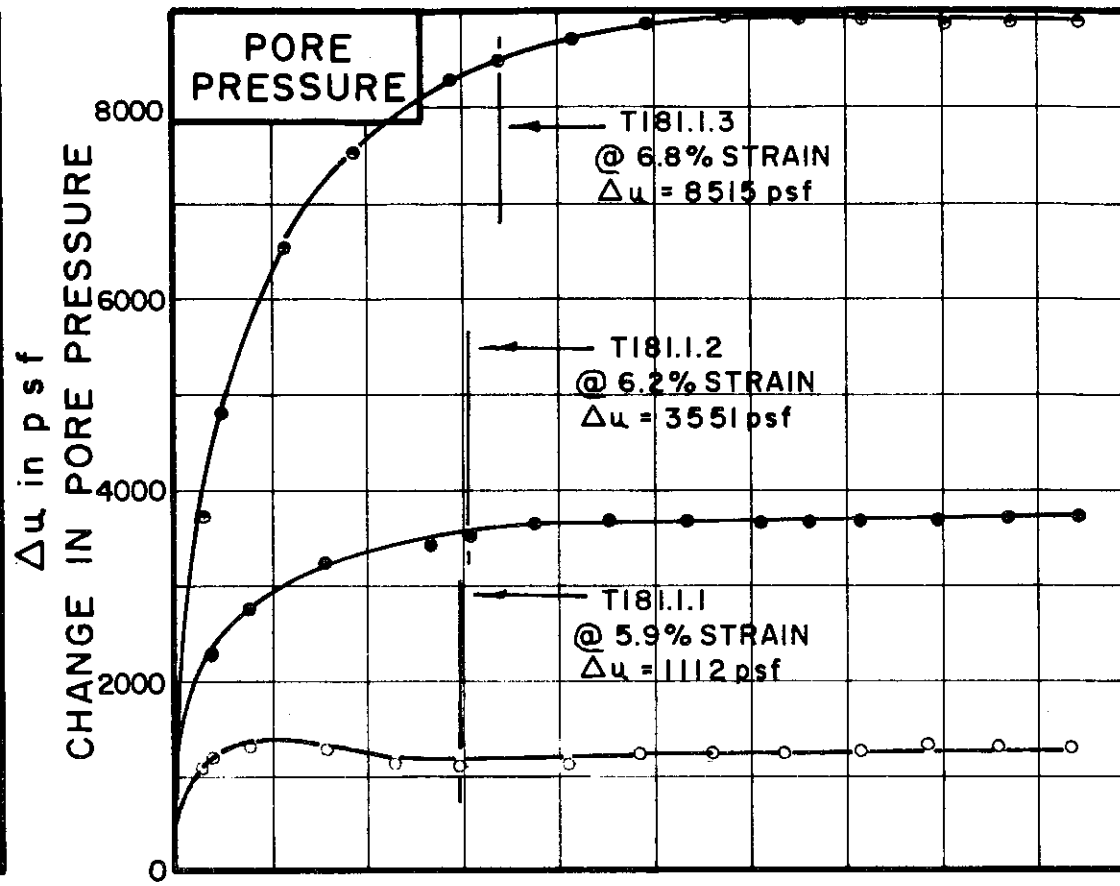
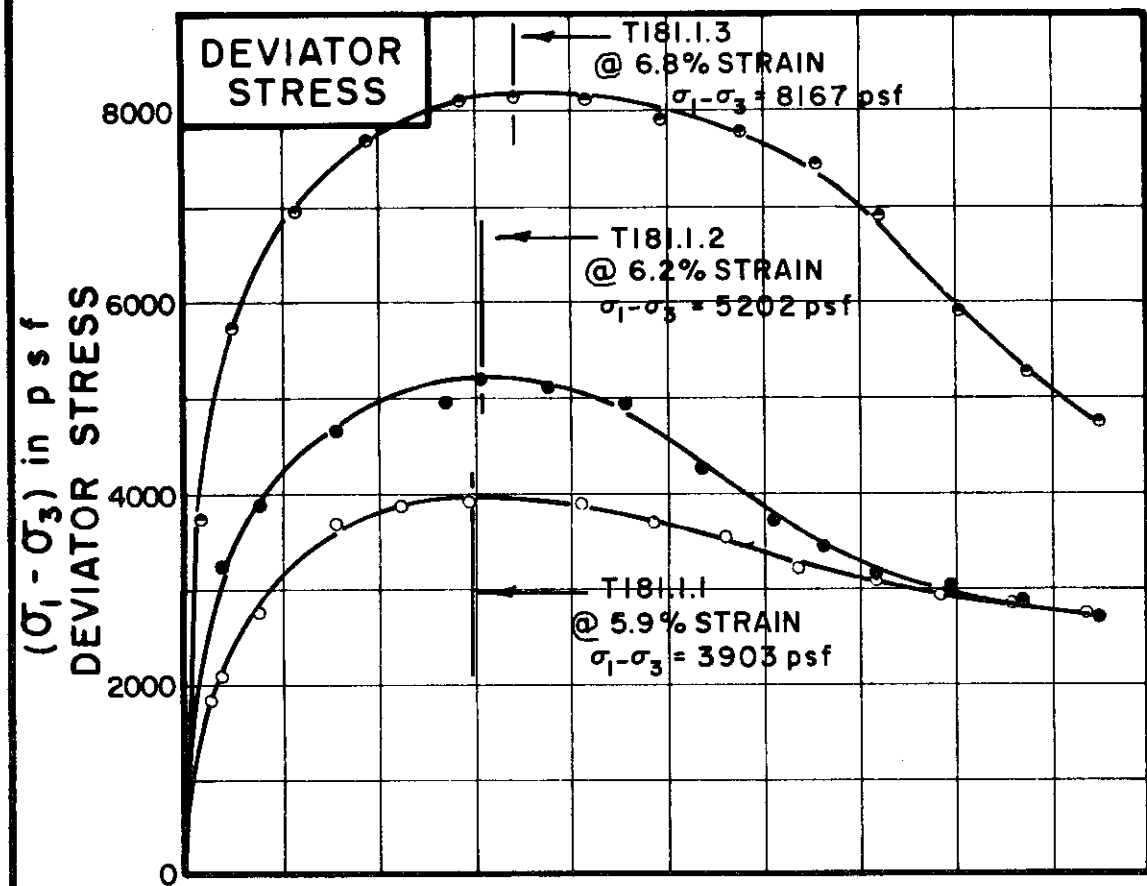
DEPTH 108.0' TO 110.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



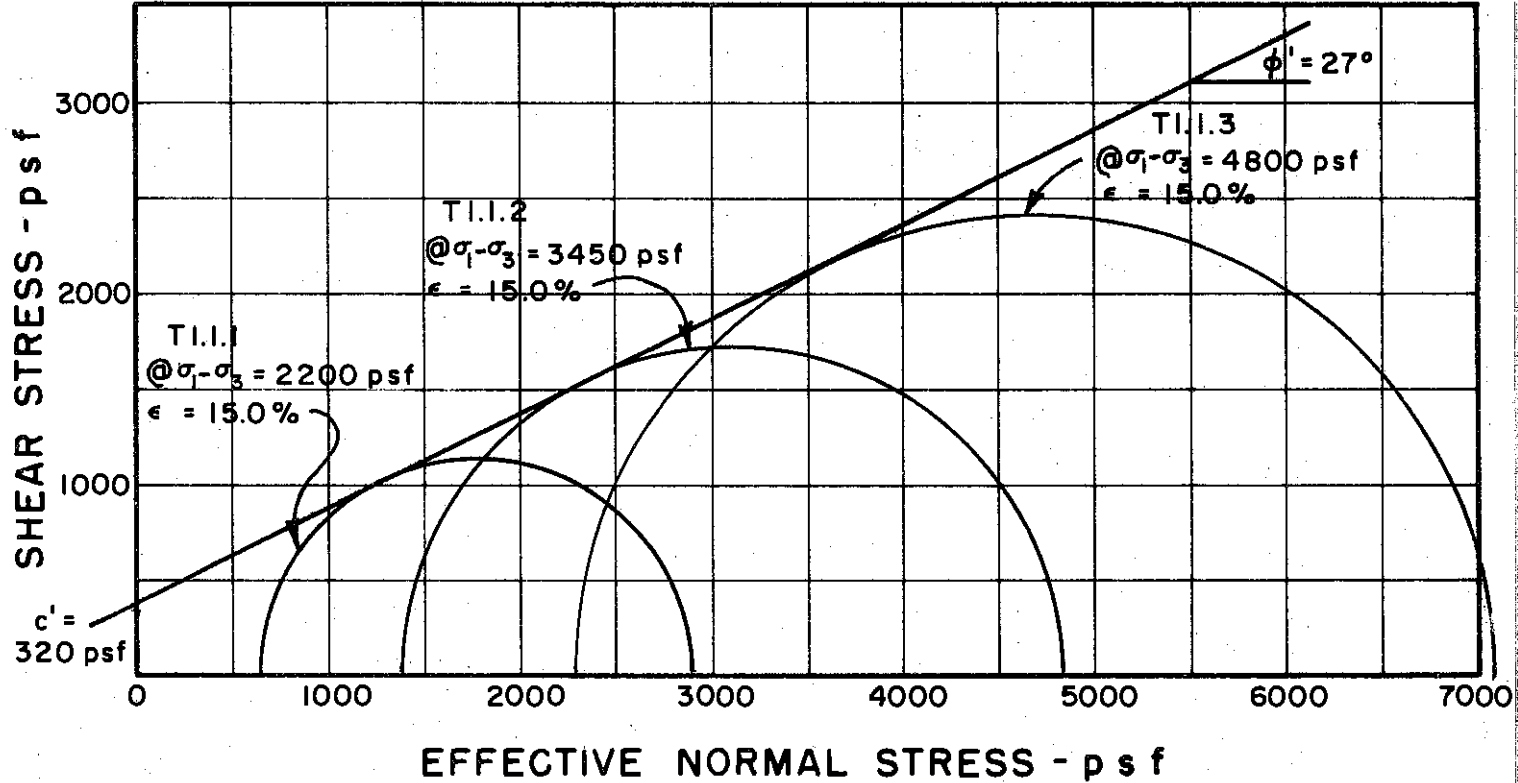
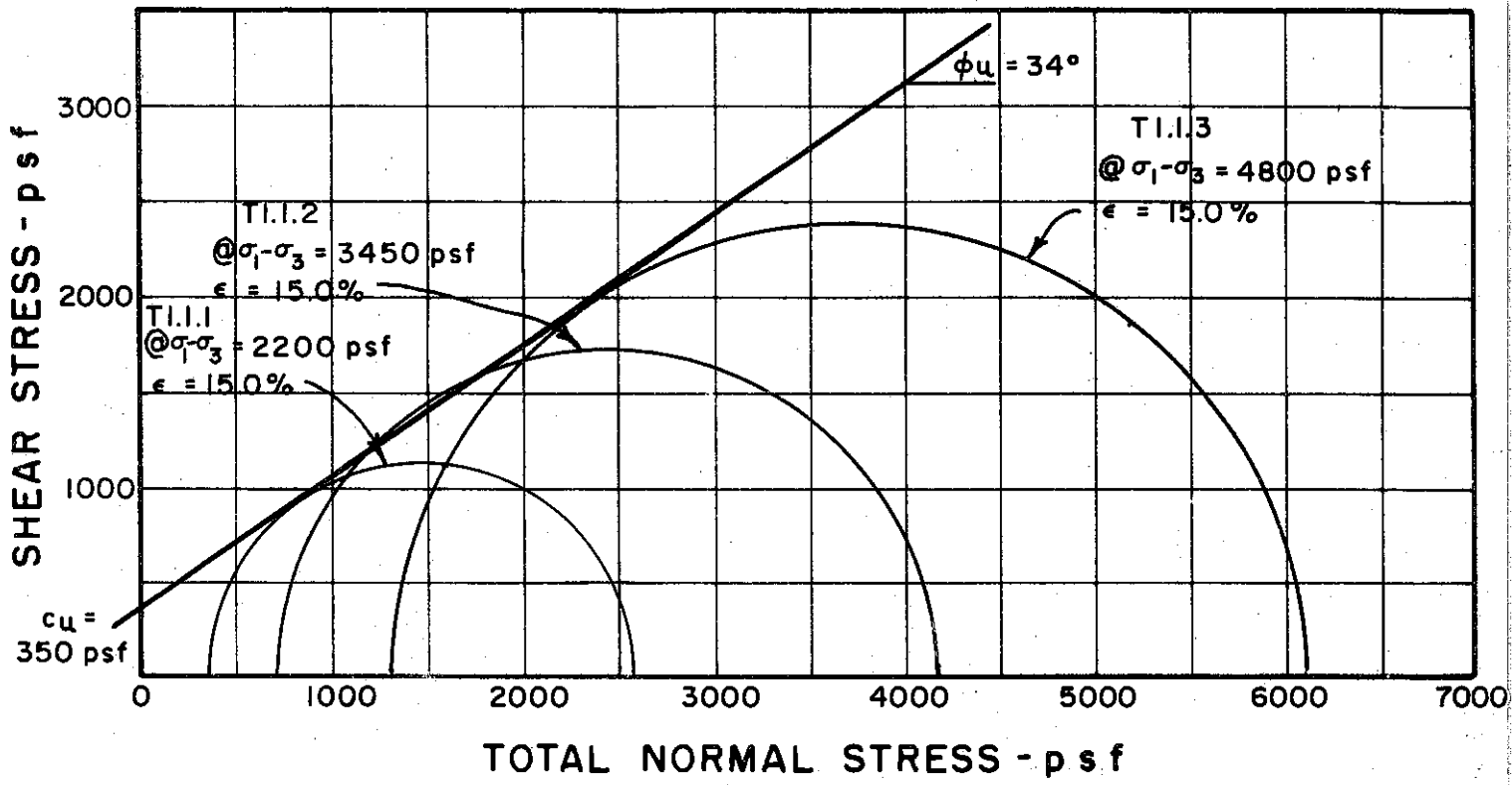
TEST NO. / SYMBOL	T181.1.1	T181.1.2	T181.1.3
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	34.5%	31.0%	30.7%
	DRY DENSITY	$\gamma_d$	87	92	92
	SAMPLE DIAMETER	$D_0$	1.40	1.39	1.37
	SAMPLE HEIGHT	$H_0$	3.37	3.35	3.37
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	10080	7200	6480
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	3744	7488	15120
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.32%	4.19%	6.61%
PORE PRESSURE RESPONSE		95%	97%	93%	
FINAL CONDITIONS	WATER CONTENT	$w_f$	33.7%	29.3%	27.7%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 18  
 SAMPLE NO. 12  
 DEPTH 108.0' TO 110.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255

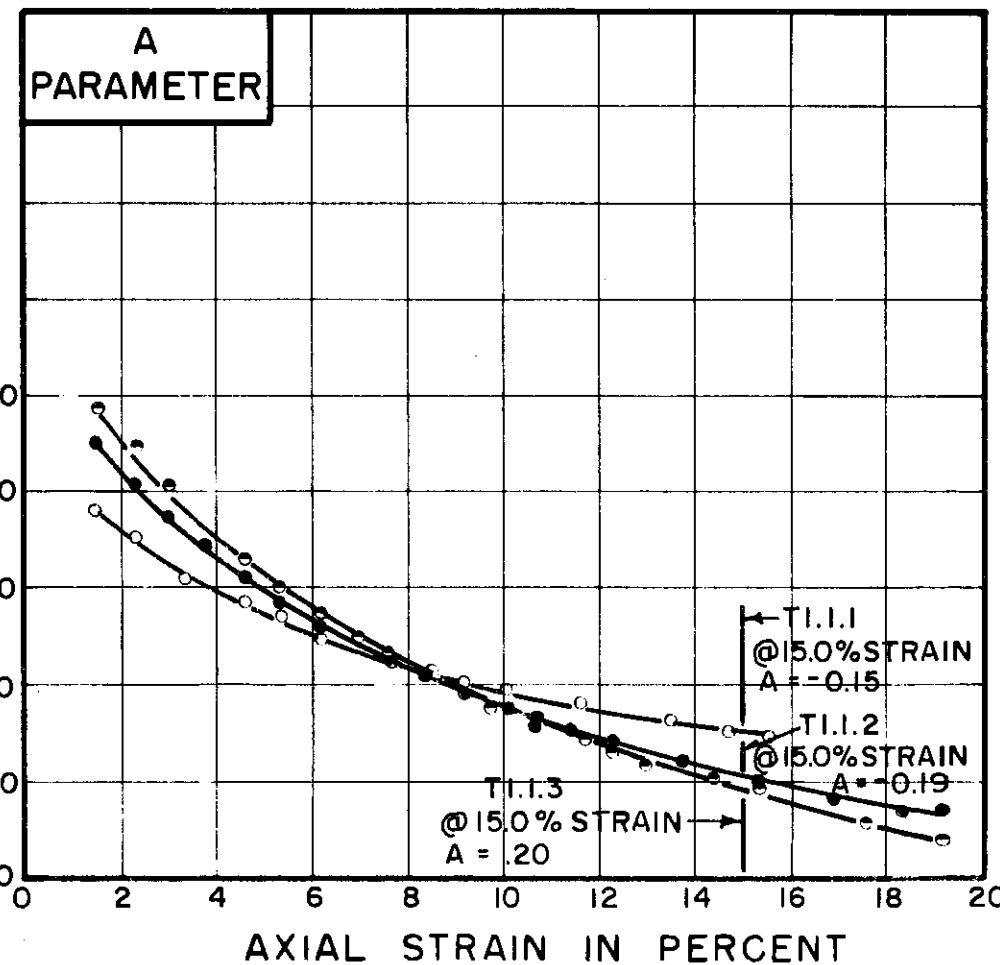
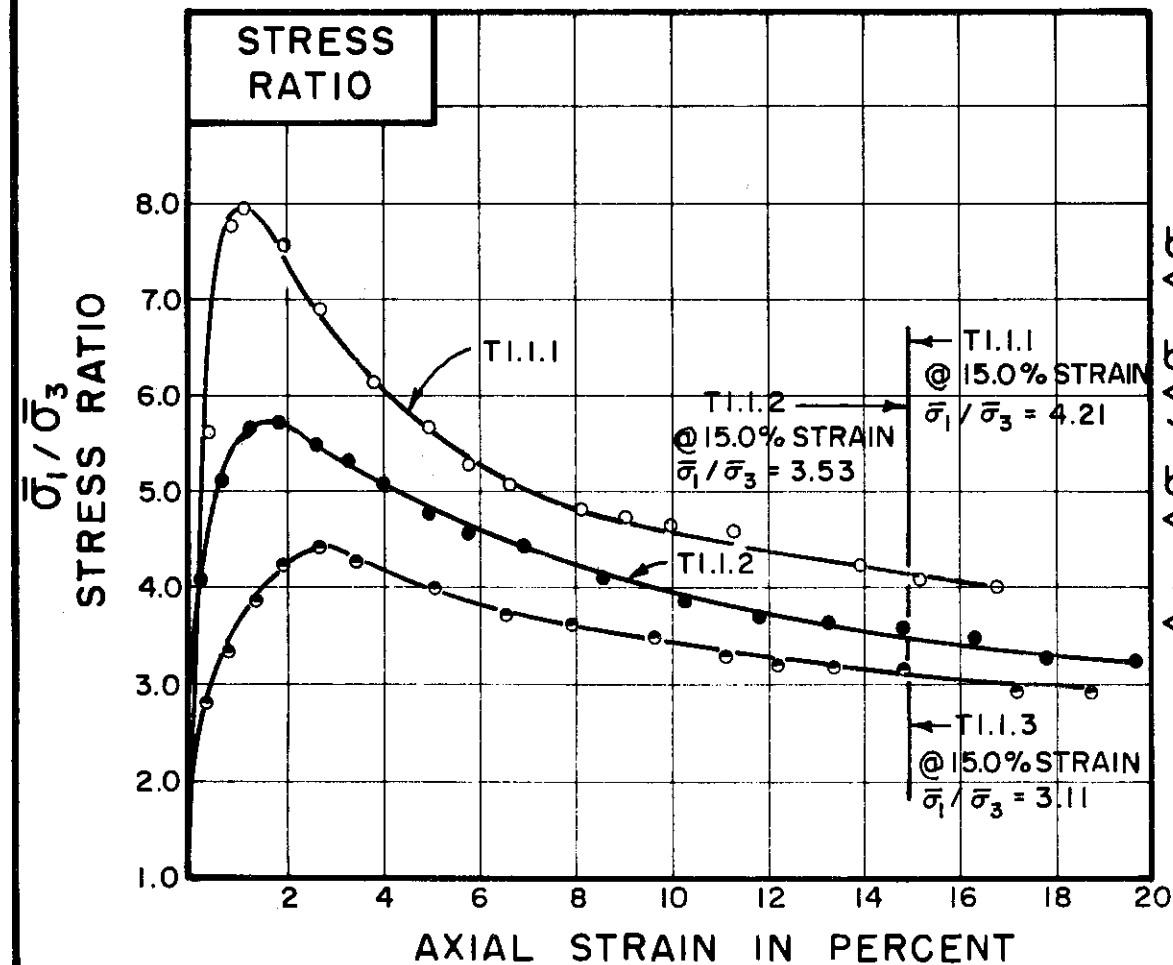
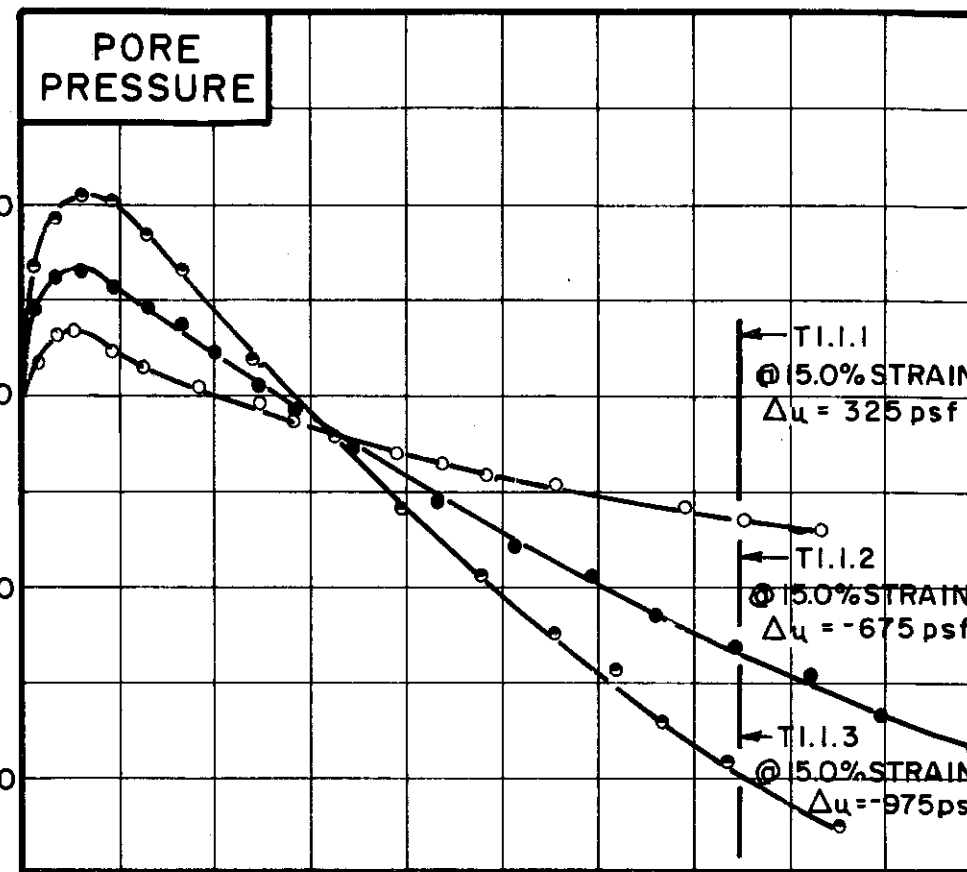
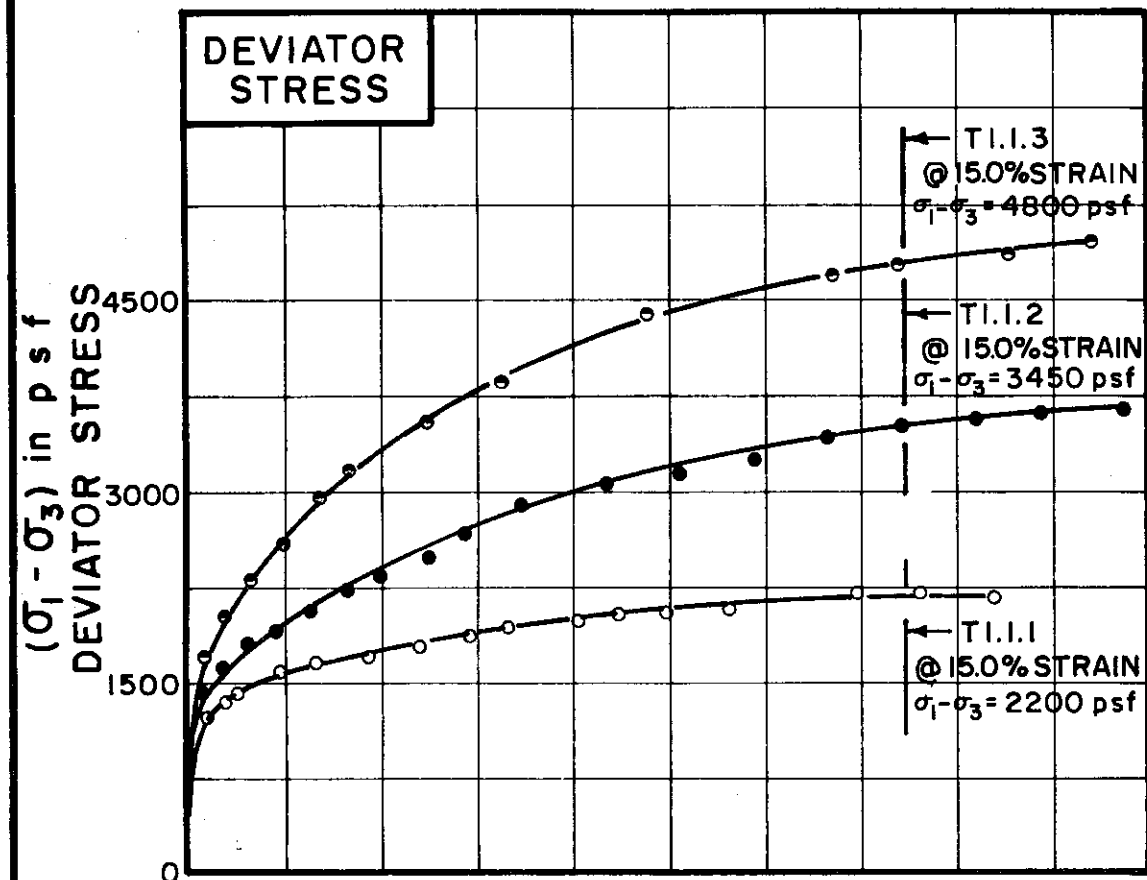


BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-387



TEST NO. / SYMBOL	T1.1.1	T1.1.2	T1.1.3
	○	●	○

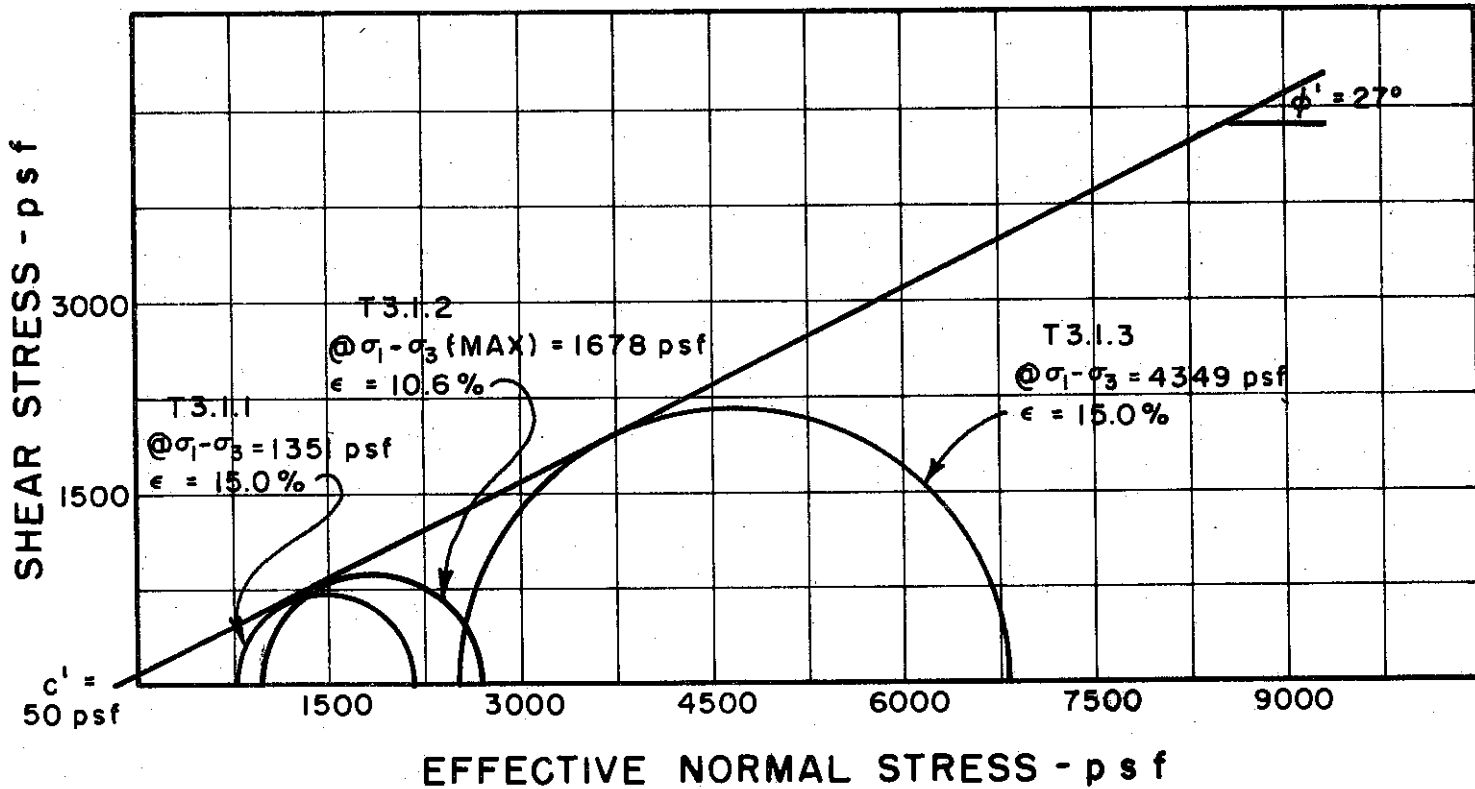
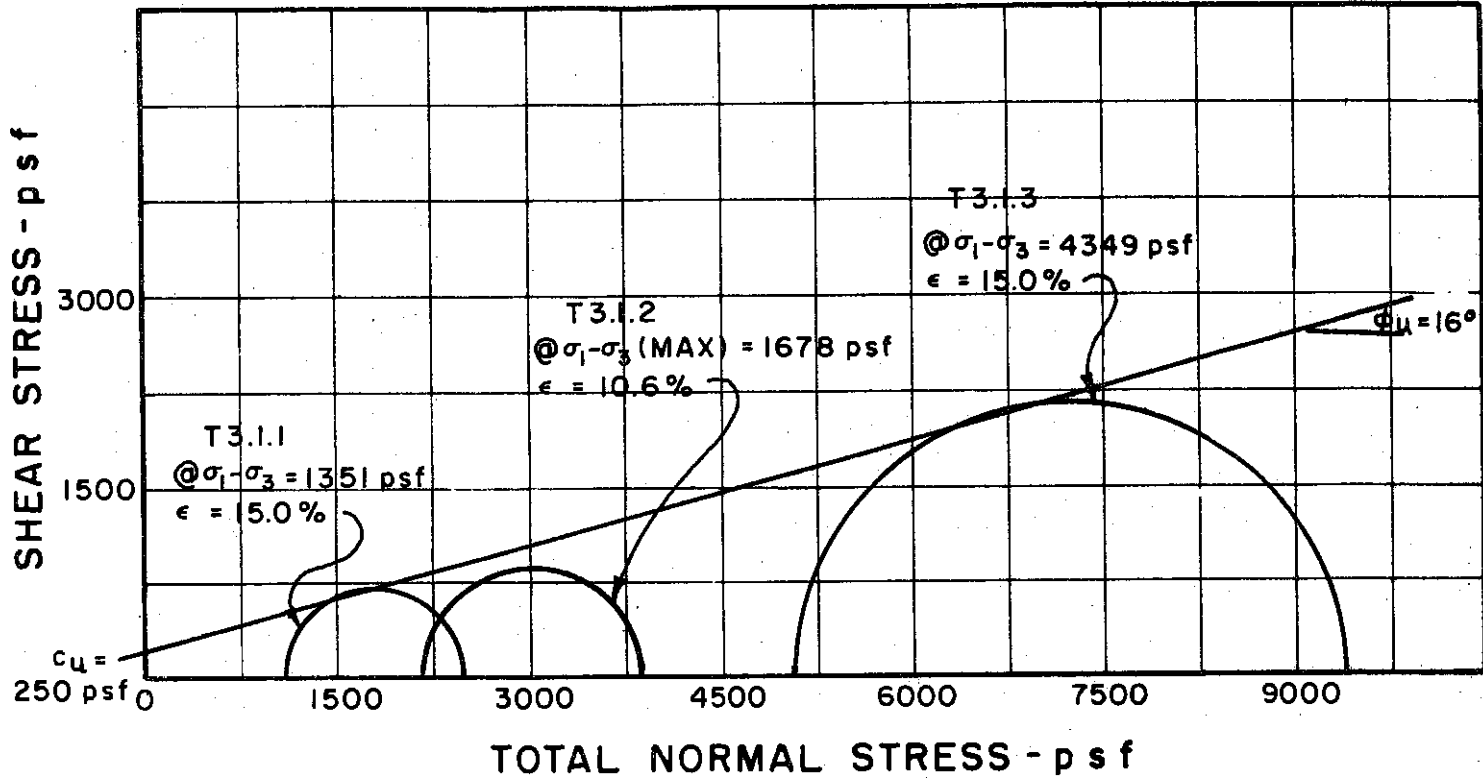
INITIAL CONDITIONS		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_0$	23.0%	23.9%	22.3%
DRY DENSITY	$\gamma_d$ pcf	104	103	108
SAMPLE DIAMETER	$D_0$ in.	1.39	1.39	1.47
SAMPLE HEIGHT	$H_0$ in.	3.22	3.25	3.26
FINAL CONDITIONS BEFORE SHEAR		T1.1.1	T1.1.2	T1.1.3
FINAL BACK PRESSURE	$u_0$ psf	8740	8352	8410
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$ psf	360	691	1296
VOLUMETRIC STRAIN	$\epsilon_{vol}$	.4%	1.0%	1.4%
PORE PRESSURE RESPONSE		100%	98%	94%
FINAL CONDITIONS AFTER SHEAR		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_f$	26.7%	26.7%	25.3%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

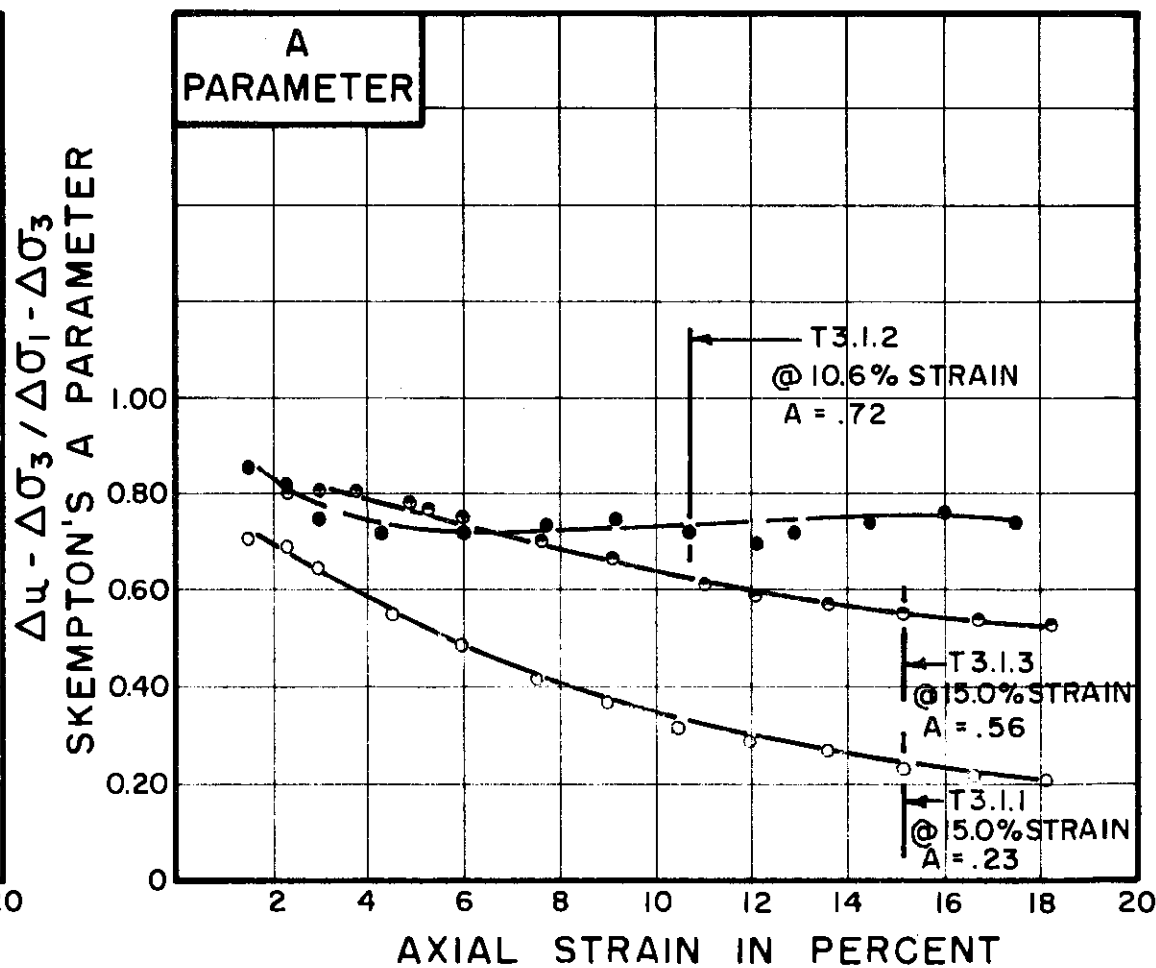
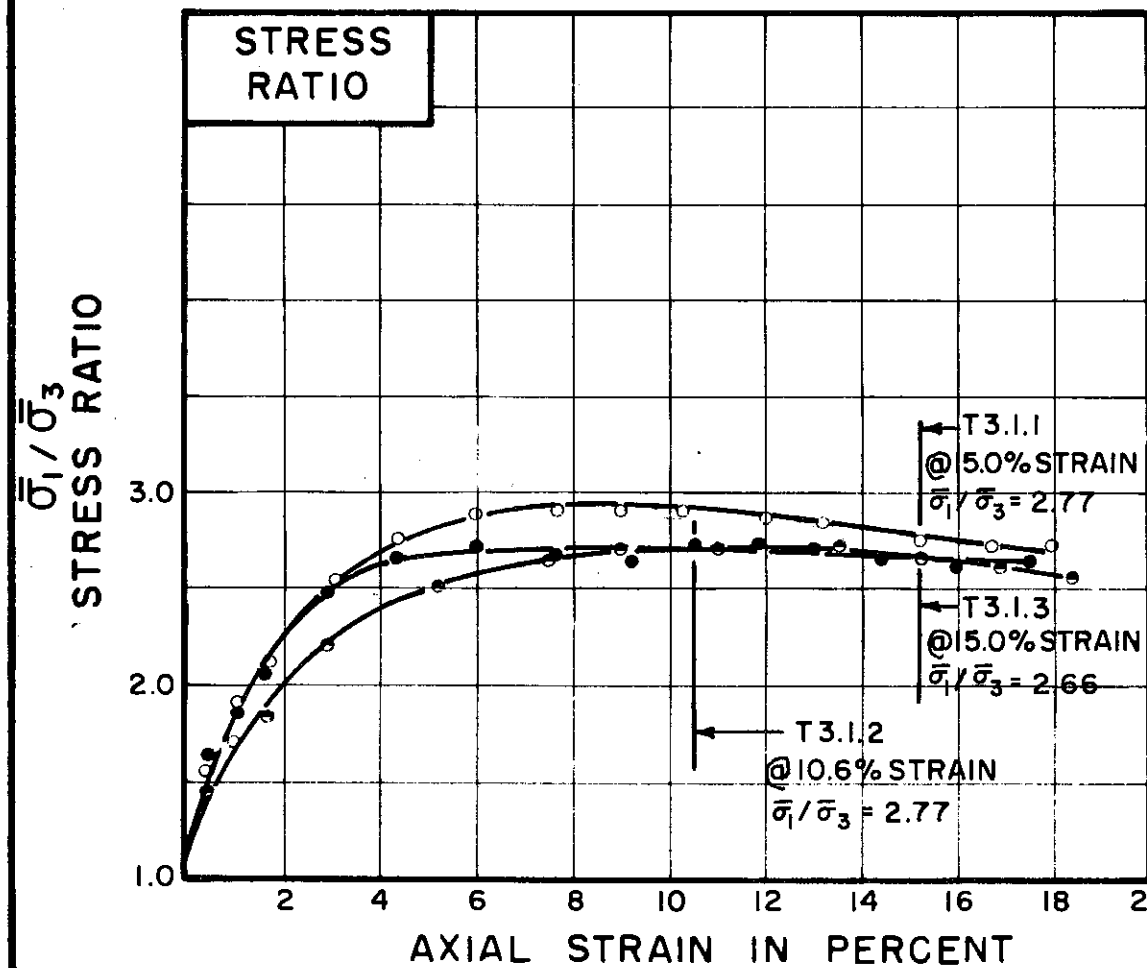
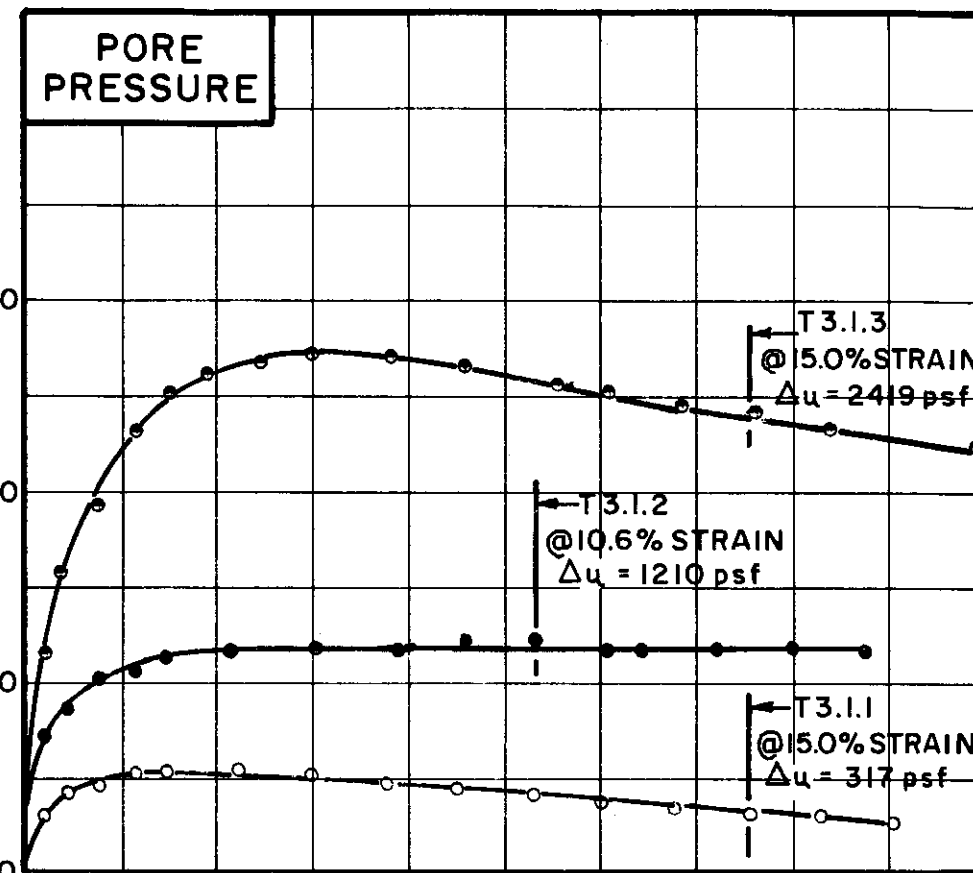
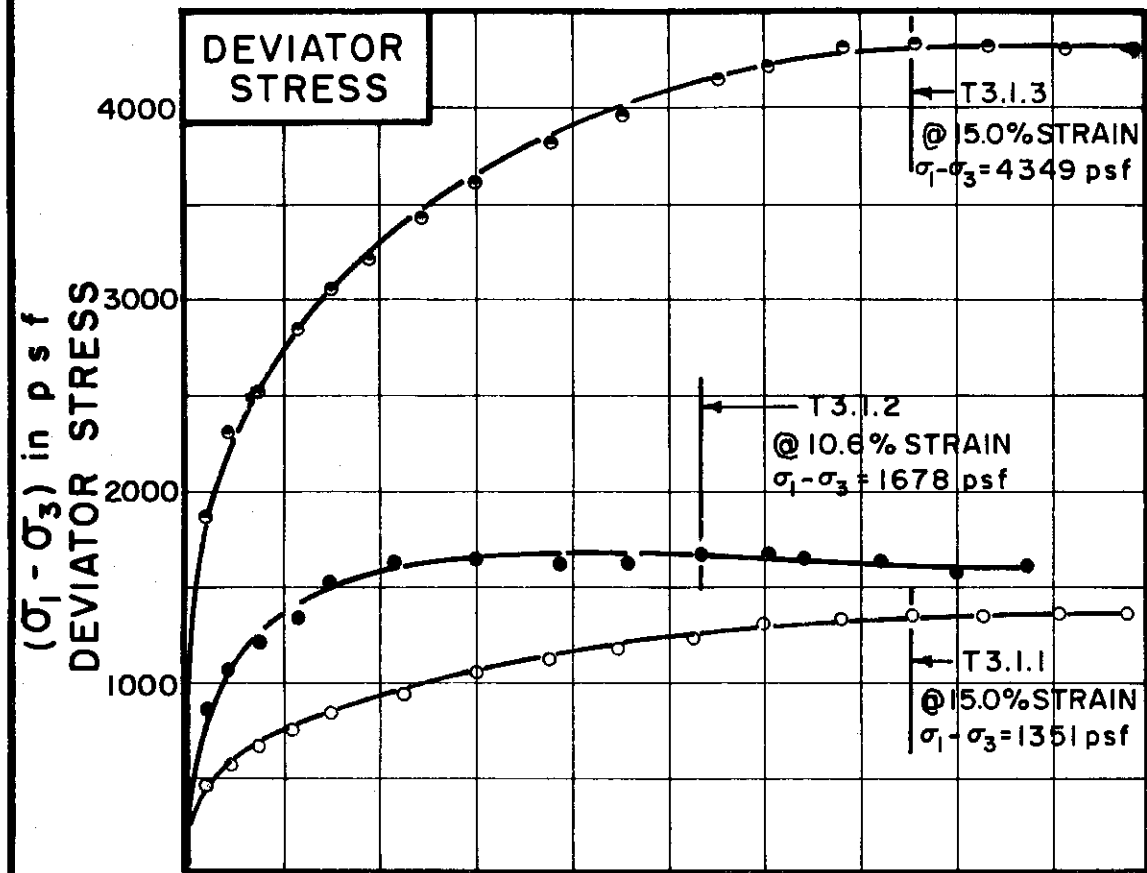
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T3.1.1 ○	T3.1.2 ●	T3.1.3 ◉
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INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	35.4%	35.3%	35.7%	
DRY DENSITY		pcf	γ <sub>d</sub>	89	86	86	
SAMPLE DIAMETER		in.	D <sub>0</sub>	1.40	1.40	1.41	
SAMPLE HEIGHT		in.	H <sub>0</sub>	3.36	3.35	3.35	
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	psf	u <sub>0</sub>	7200	7200	10800
		INITIAL EFFECTIVE STRESS	psf	$\bar{\sigma}_1 / \bar{\sigma}_3$	1080	2160	5040
		VOLUMETRIC STRAIN	ε <sub>vol</sub>	5.3%	6.2%	8.7%	
		PORE PRESSURE RESPONSE		100%	98%	95%	
FINAL CONDITIONS		WATER CONTENT	w <sub>f</sub>	31.1%	30.8%	28.4%	
SKETCH OF SAMPLE AT END OF TEST							

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

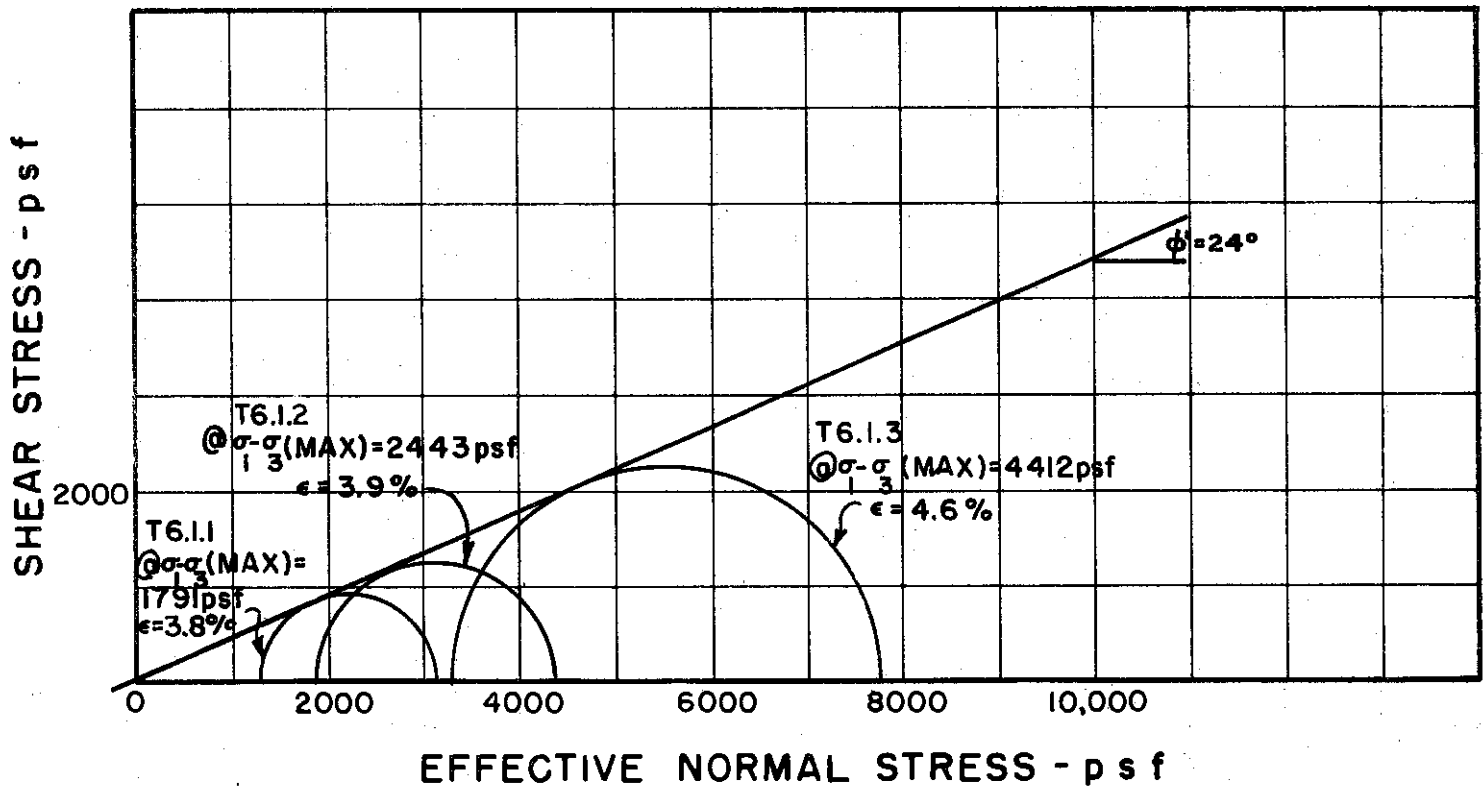
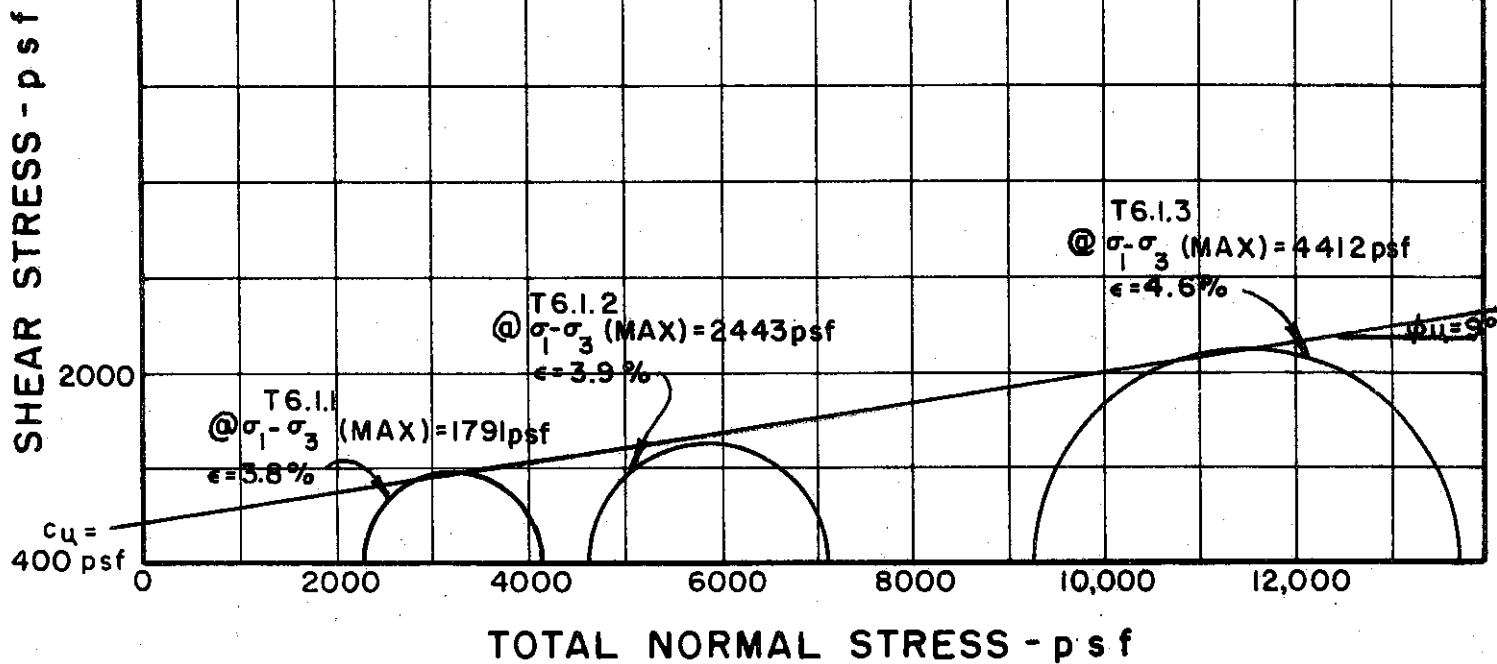
SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 26

SAMPLE NO. 11

DEPTH 48.0 TO 50.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS

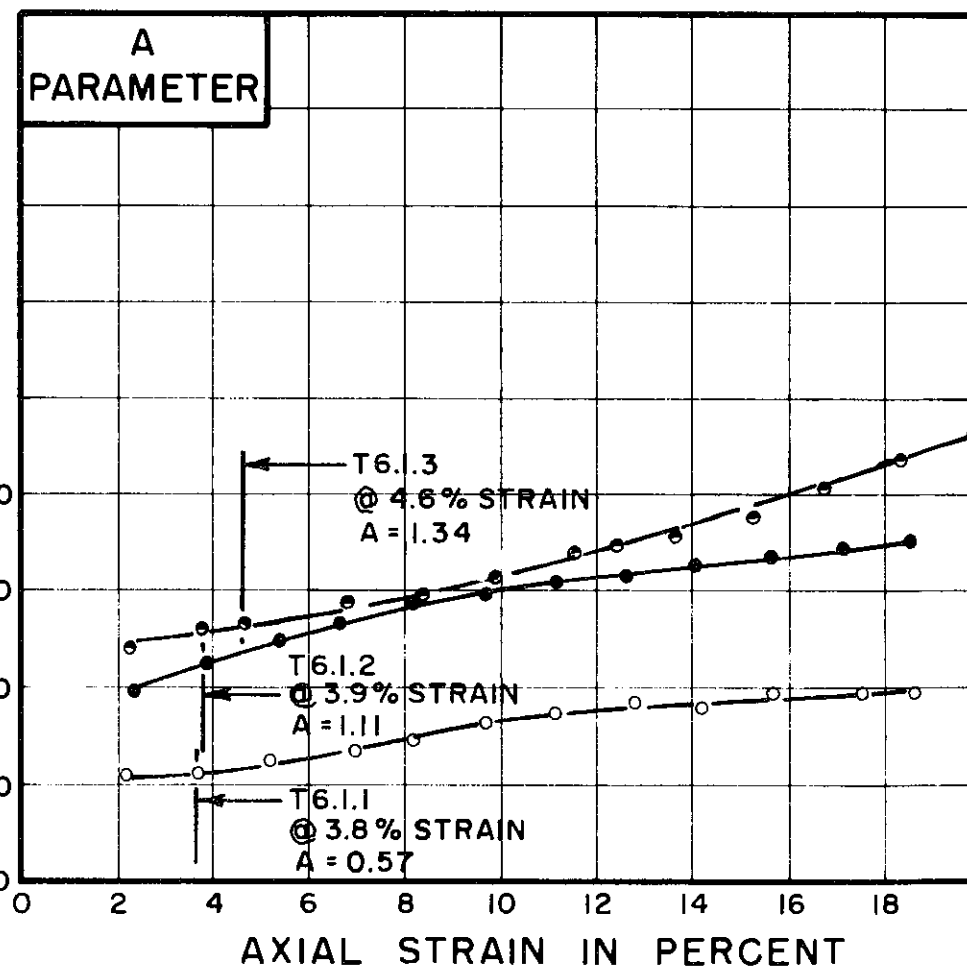
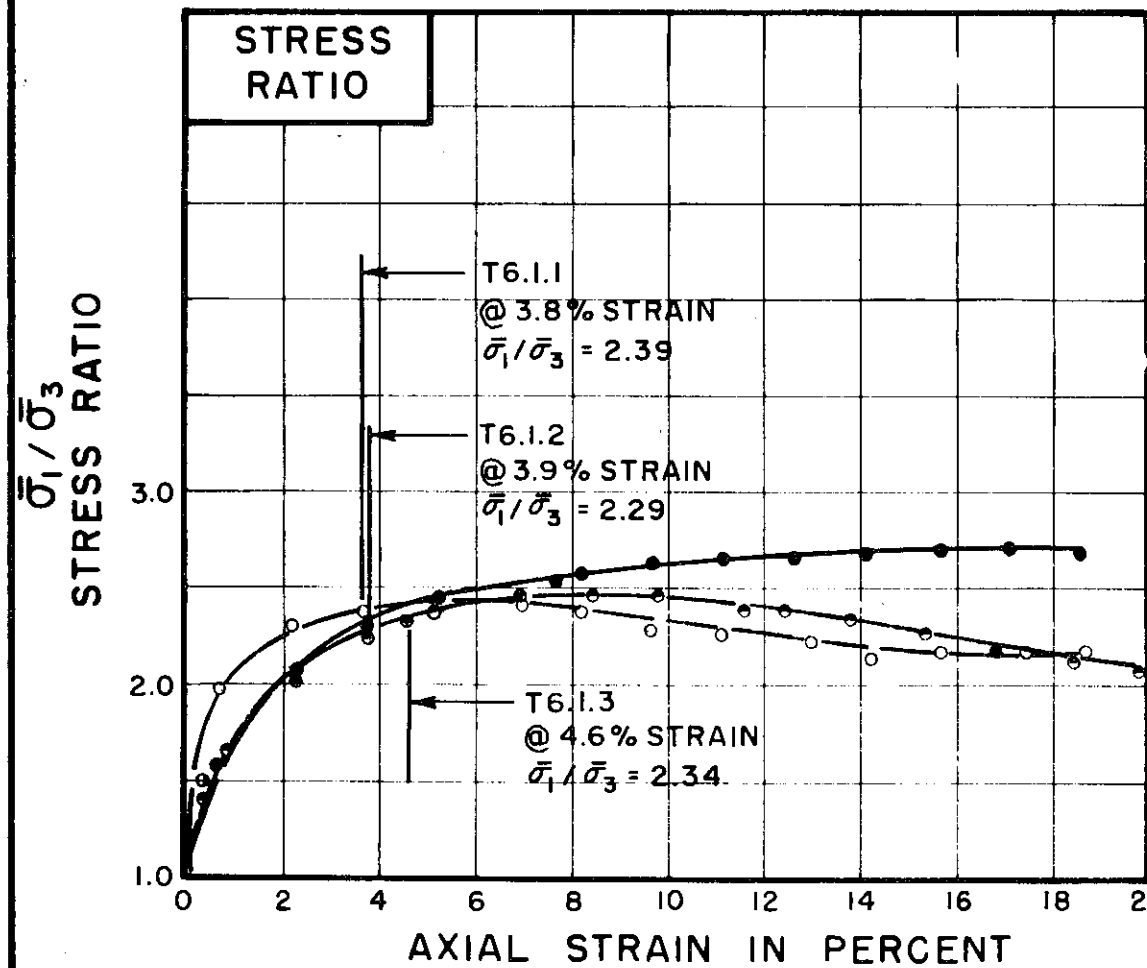
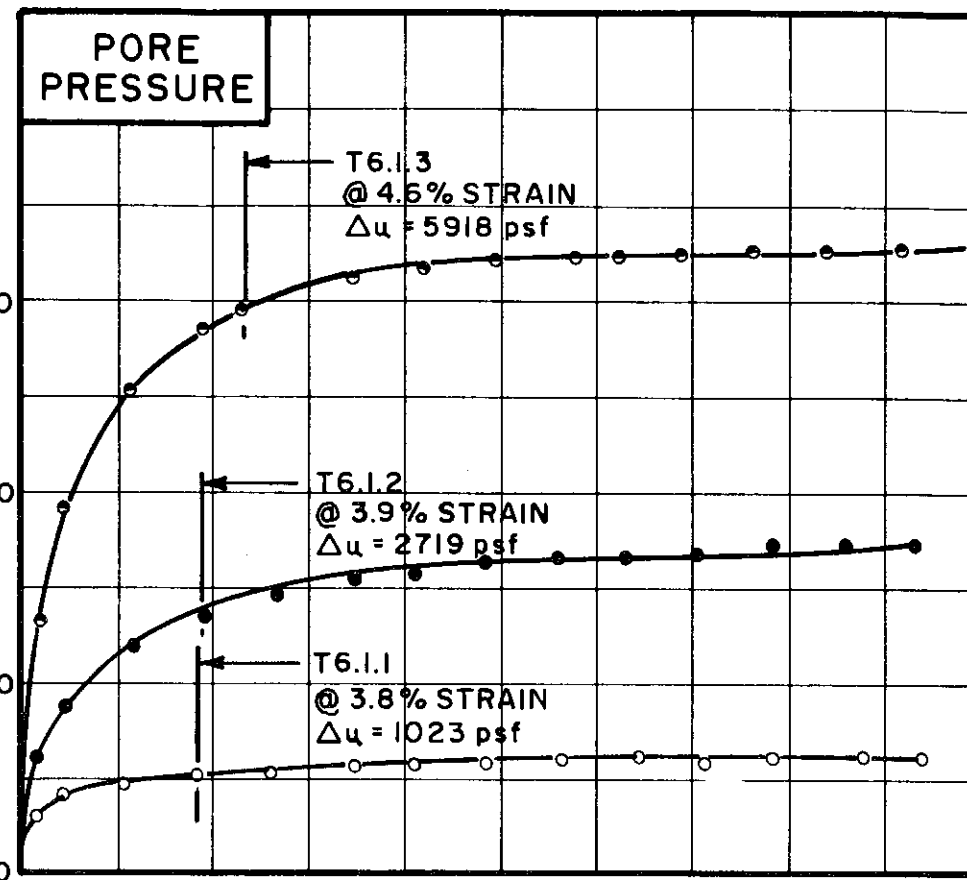
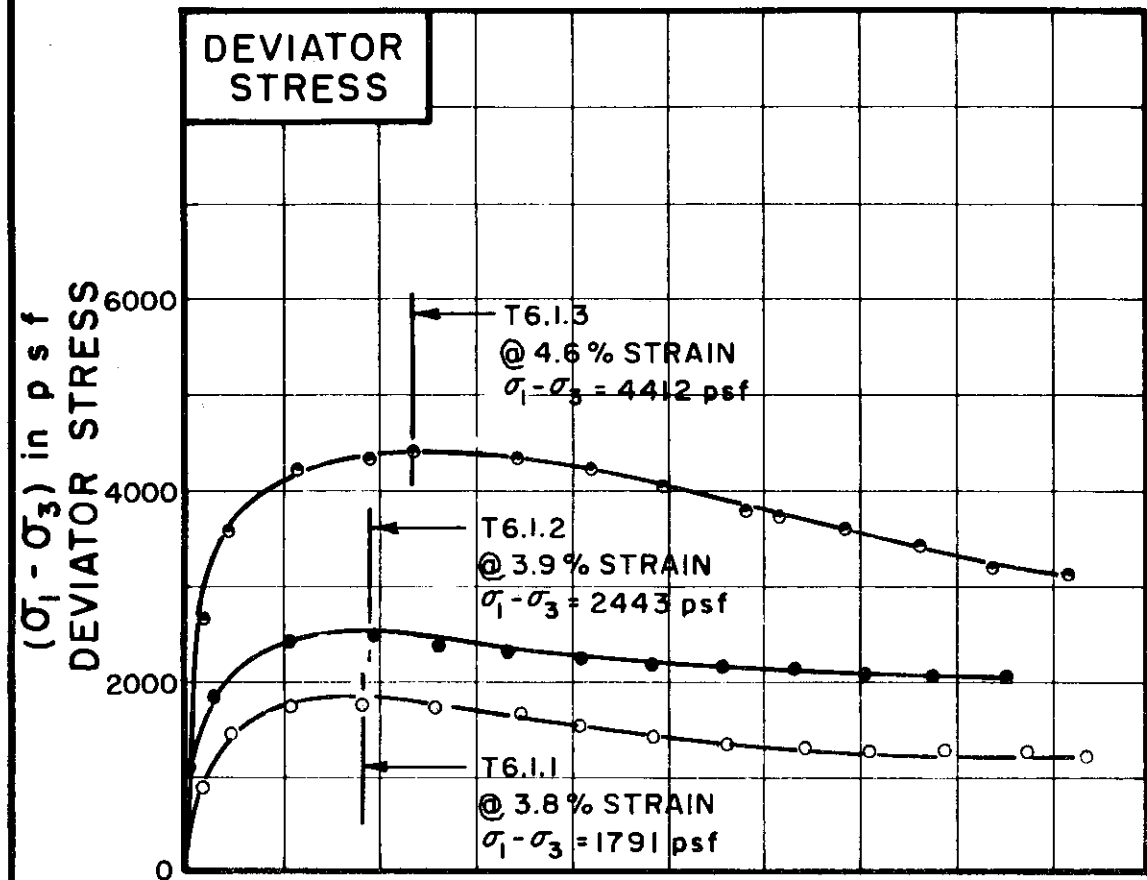
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255





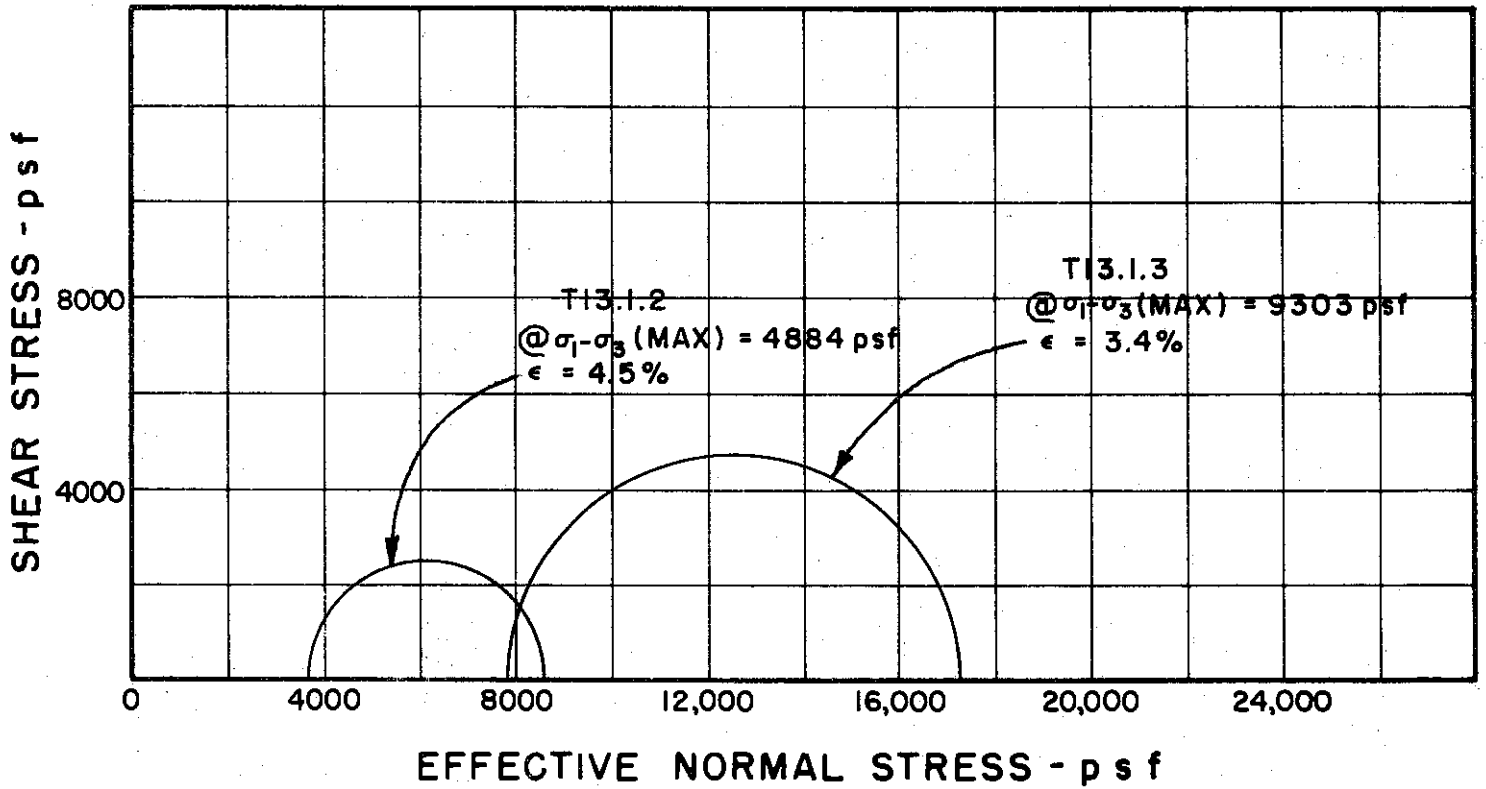
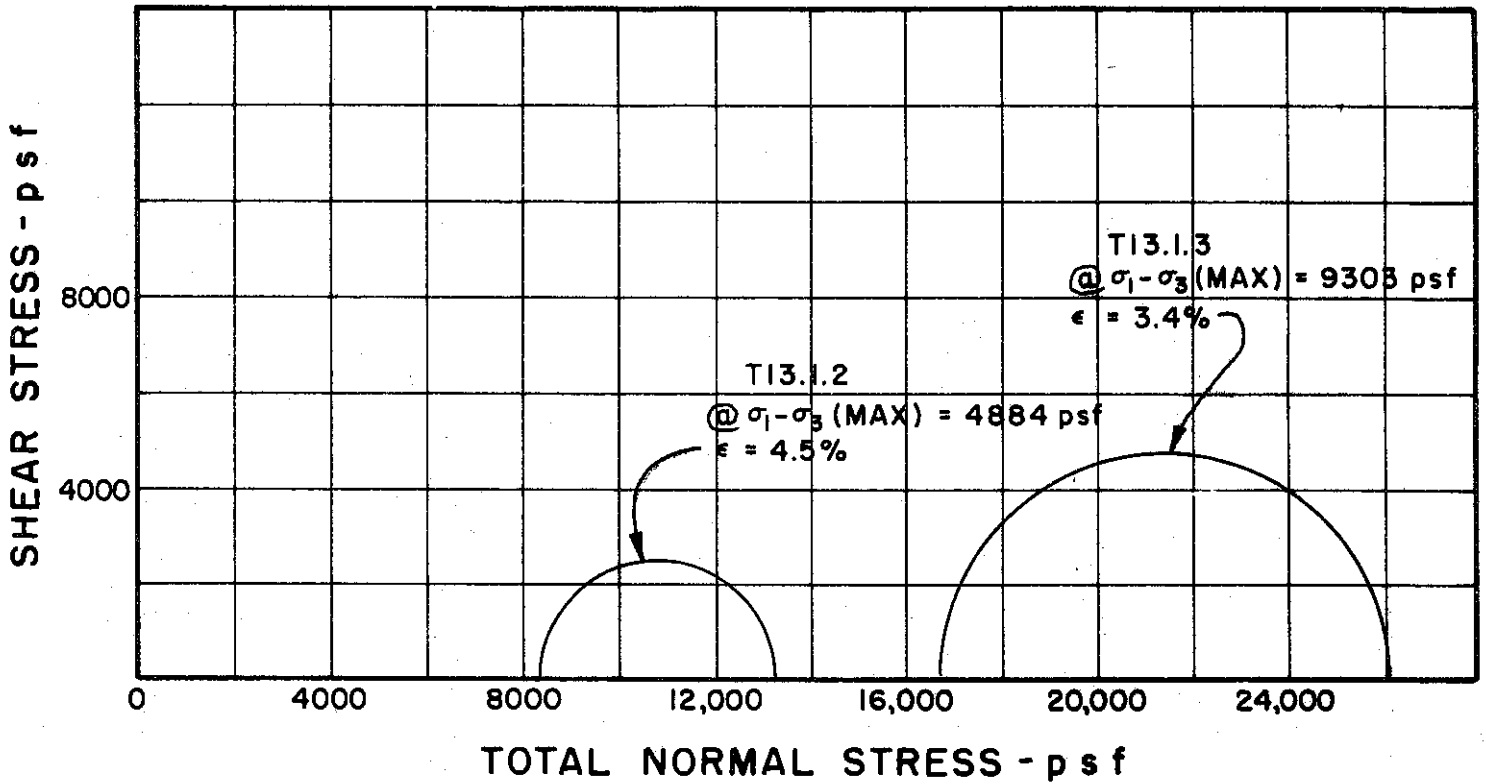
TEST NO. / SYMBOL	T6.1.1	T6.1.2	T6.1.3
	○	●	○

INITIAL CONDITIONS			T6.1.1	T6.1.2	T6.1.3
WATER CONTENT	w <sub>0</sub>		36.1%	36.5%	30.0%
DRY DENSITY	γ <sub>d</sub>	pcf	88	86	93
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.35	3.40	3.36
FINAL CONDITIONS BEFORE SHEAR			T6.1.1	T6.1.2	T6.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	psf	5760	7200	7200
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	psf	2304	4608	9216
VOLUMETRIC STRAIN	ε <sub>vol</sub>		2.0%	4.8%	8.5%
PORE PRESSURE RESPONSE			99%	95%	100%
WATER CONTENT		w <sub>f</sub>	34.3%	32.9%	23.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025
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BORING NO. 26  
 SAMPLE NO. 11  
 DEPTH 48.0 TO 50.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

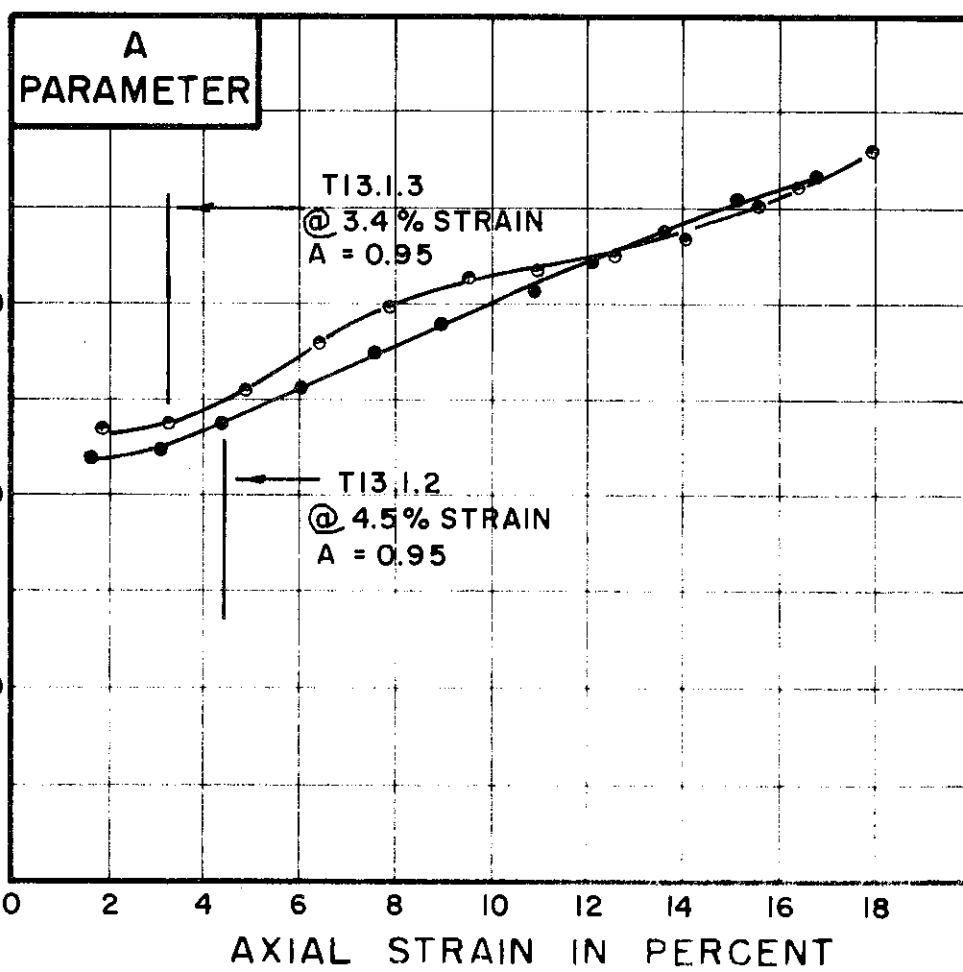
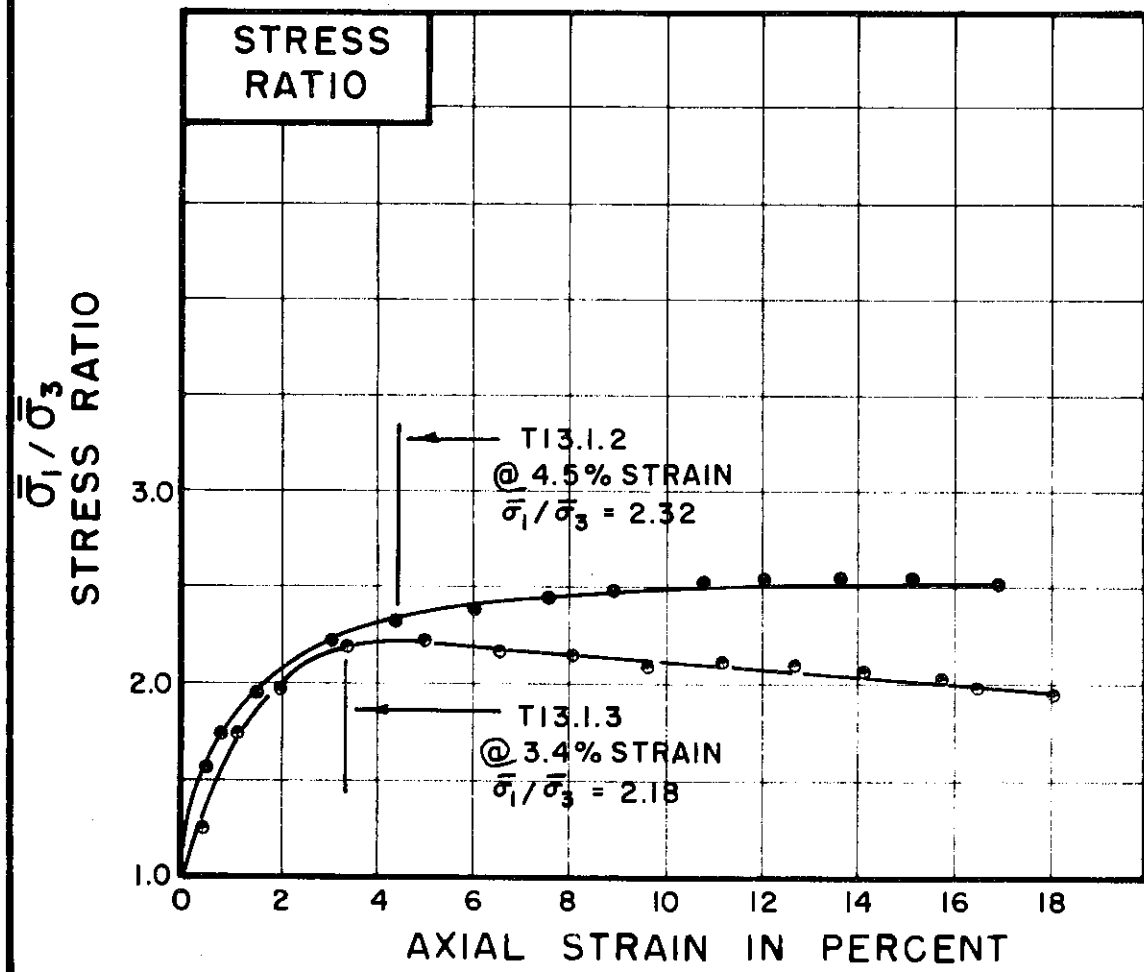
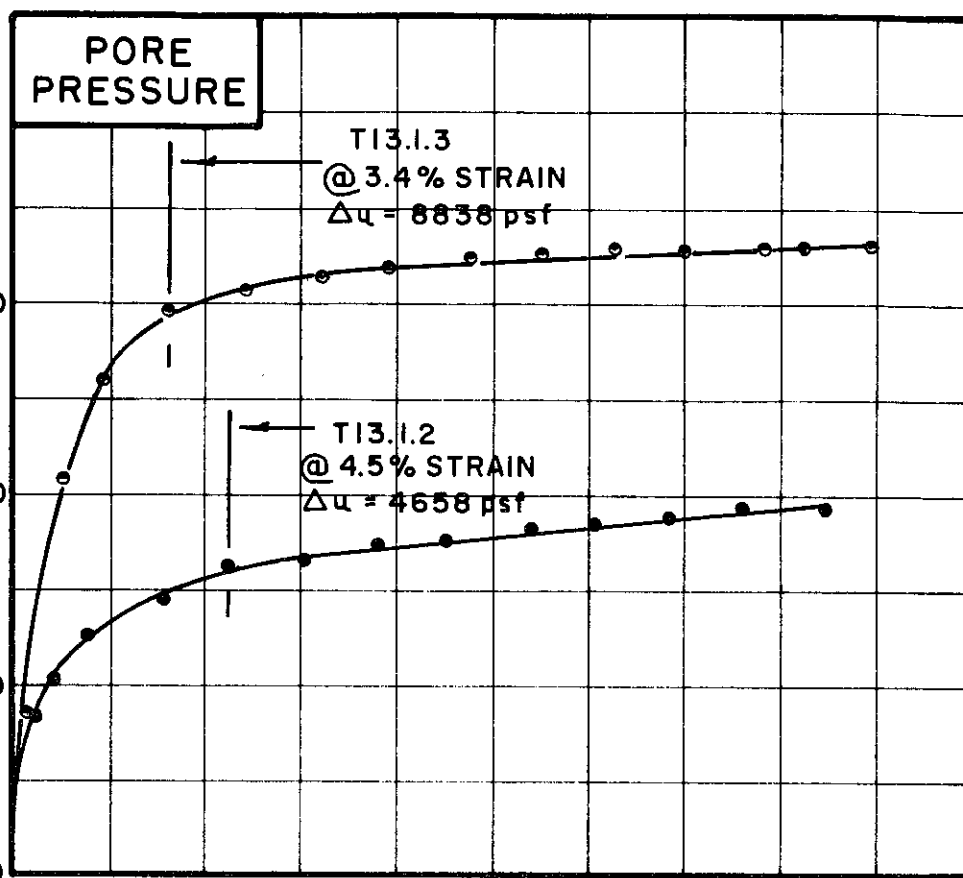
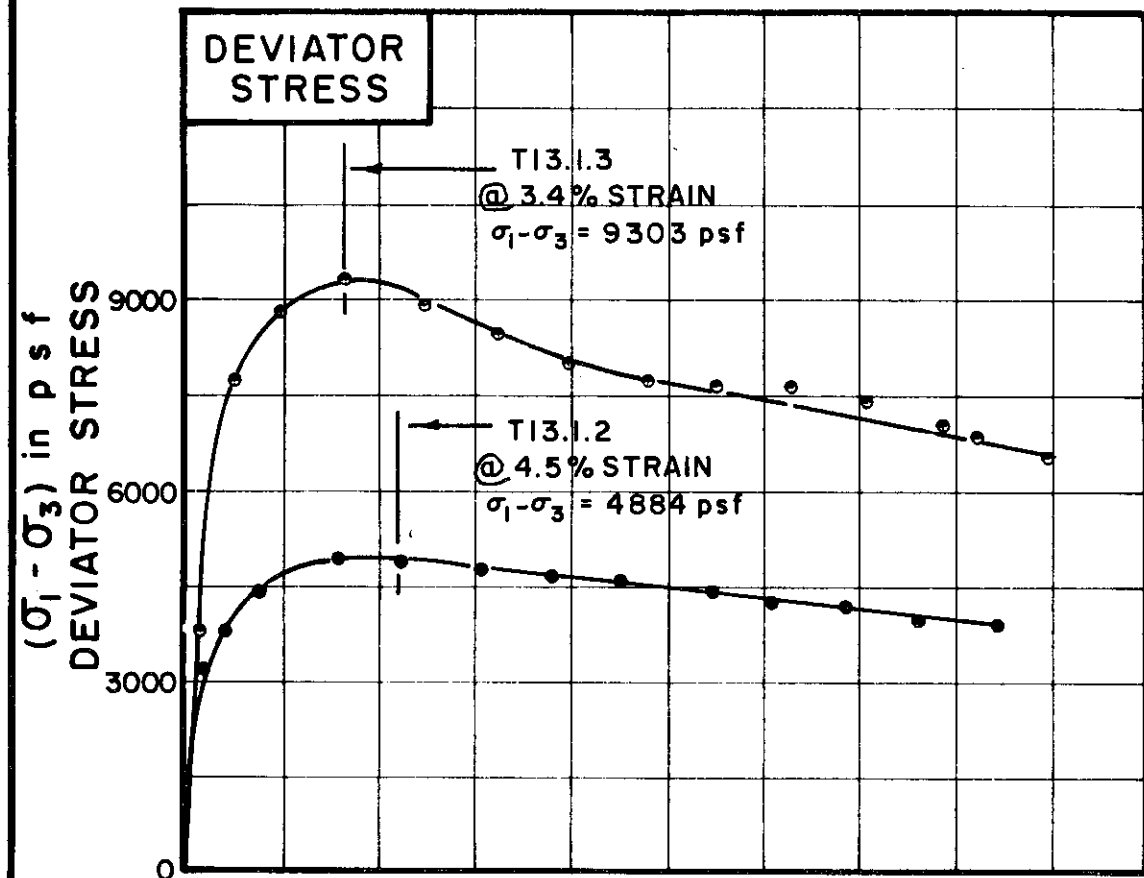
DEPTH 128.0' TO 130.0'

REMARKS SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



TEST NO. / SYMBOL	T13.1.2	T13.1.3
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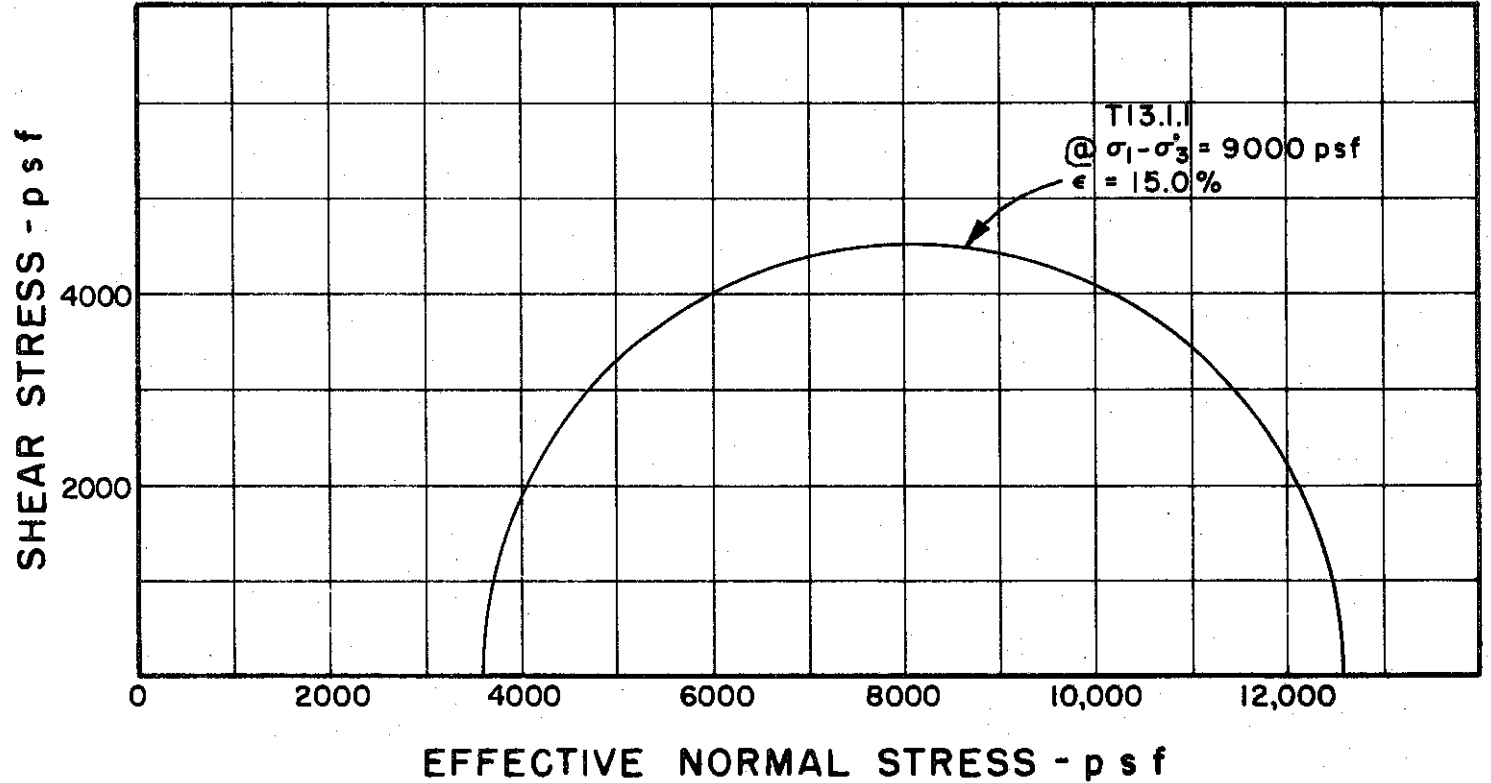
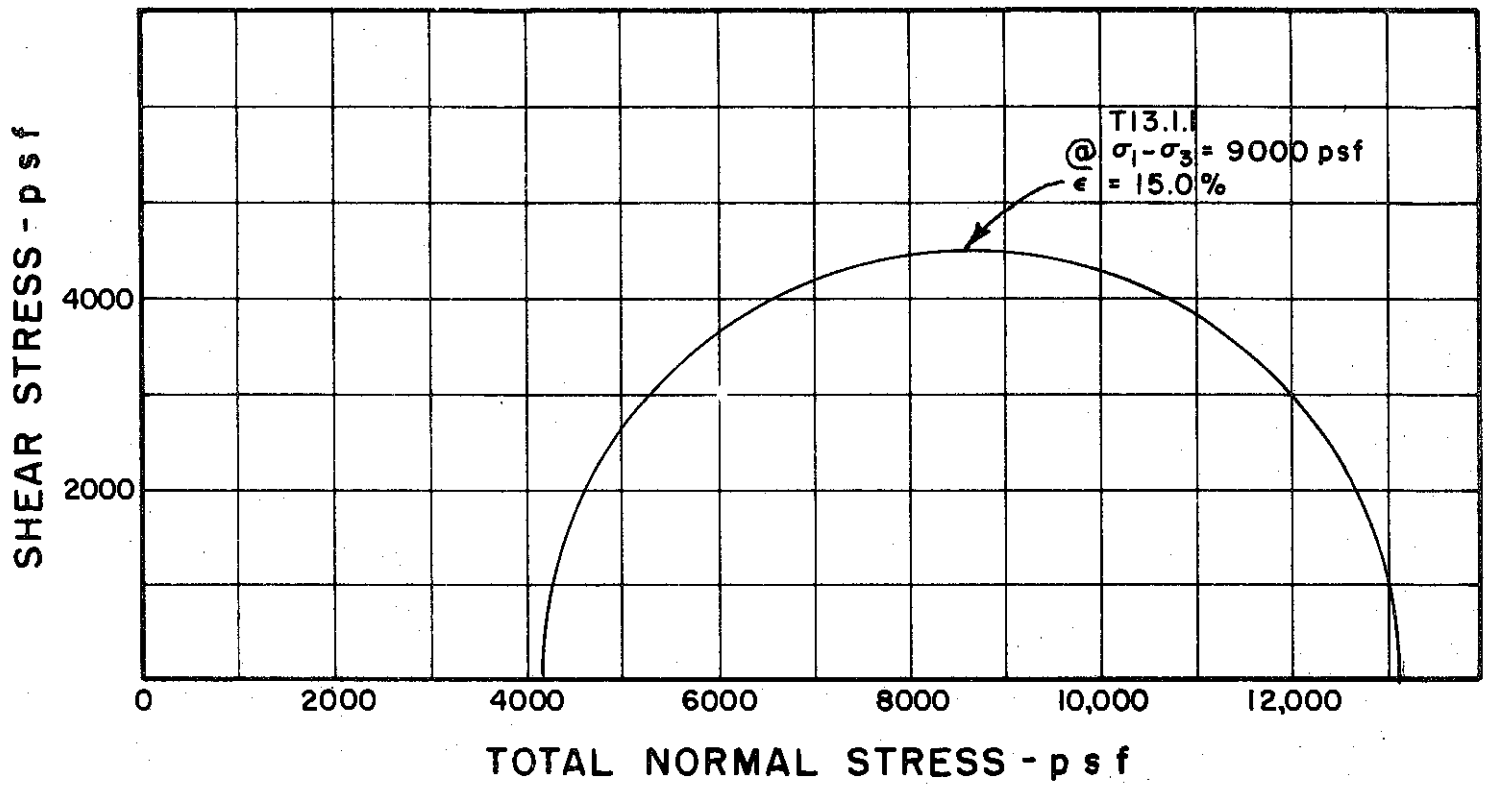
INITIAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_0$		35.6%	34.0%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	86	90	
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	
SAMPLE HEIGHT	$H_0$	in.	3.35	3.38	
FINAL CONDITIONS BEFORE SHEAR			T13.1.2	T13.1.3	
FINAL BACK PRESSURE	$u_0$	psf	6480	8640	
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1$ $\bar{\sigma}_3$	psf	8352	16704	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		60.9%	10.9%	%
PORE PRESSURE RESPONSE			98%	98%	
FINAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_f$		31.4%	27.6%	%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025
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BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 21  
 NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

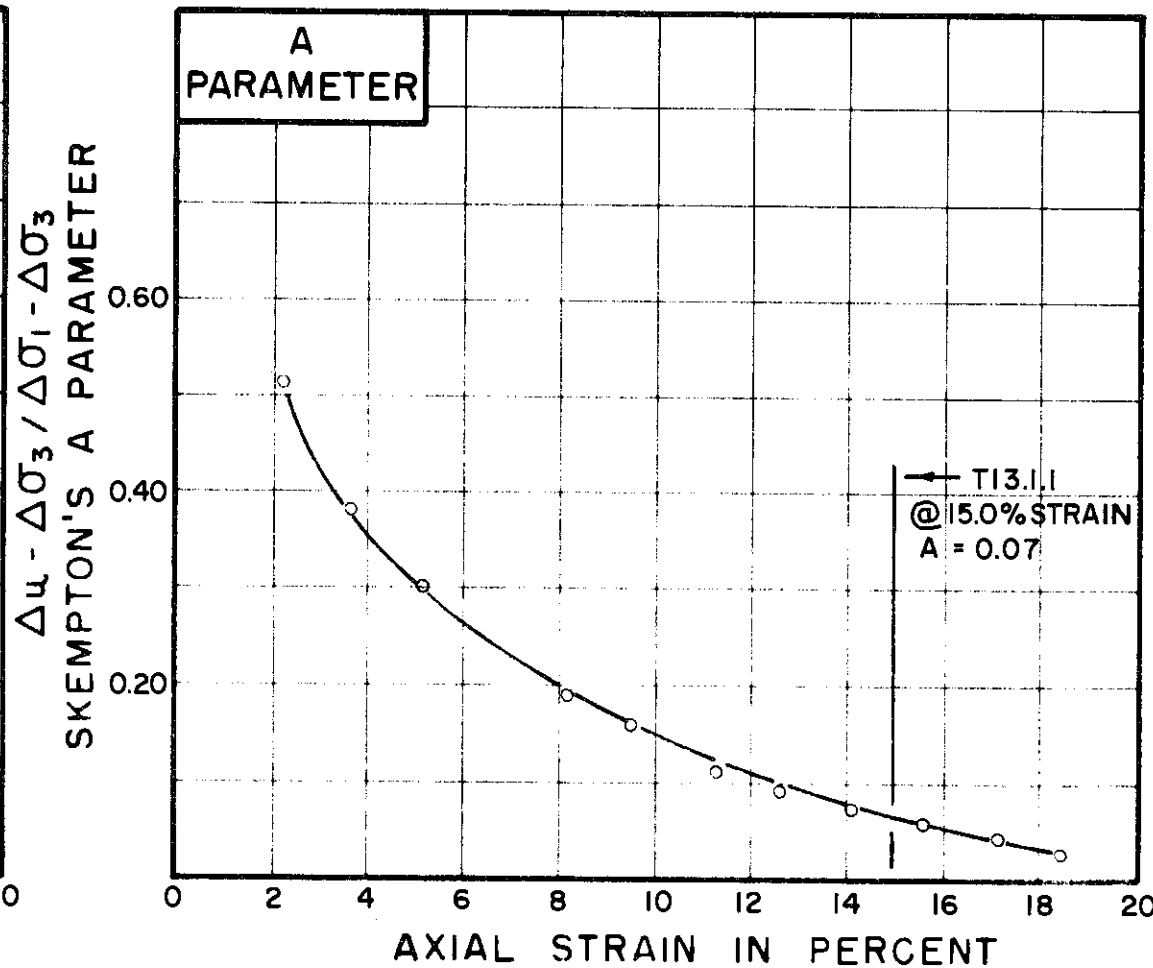
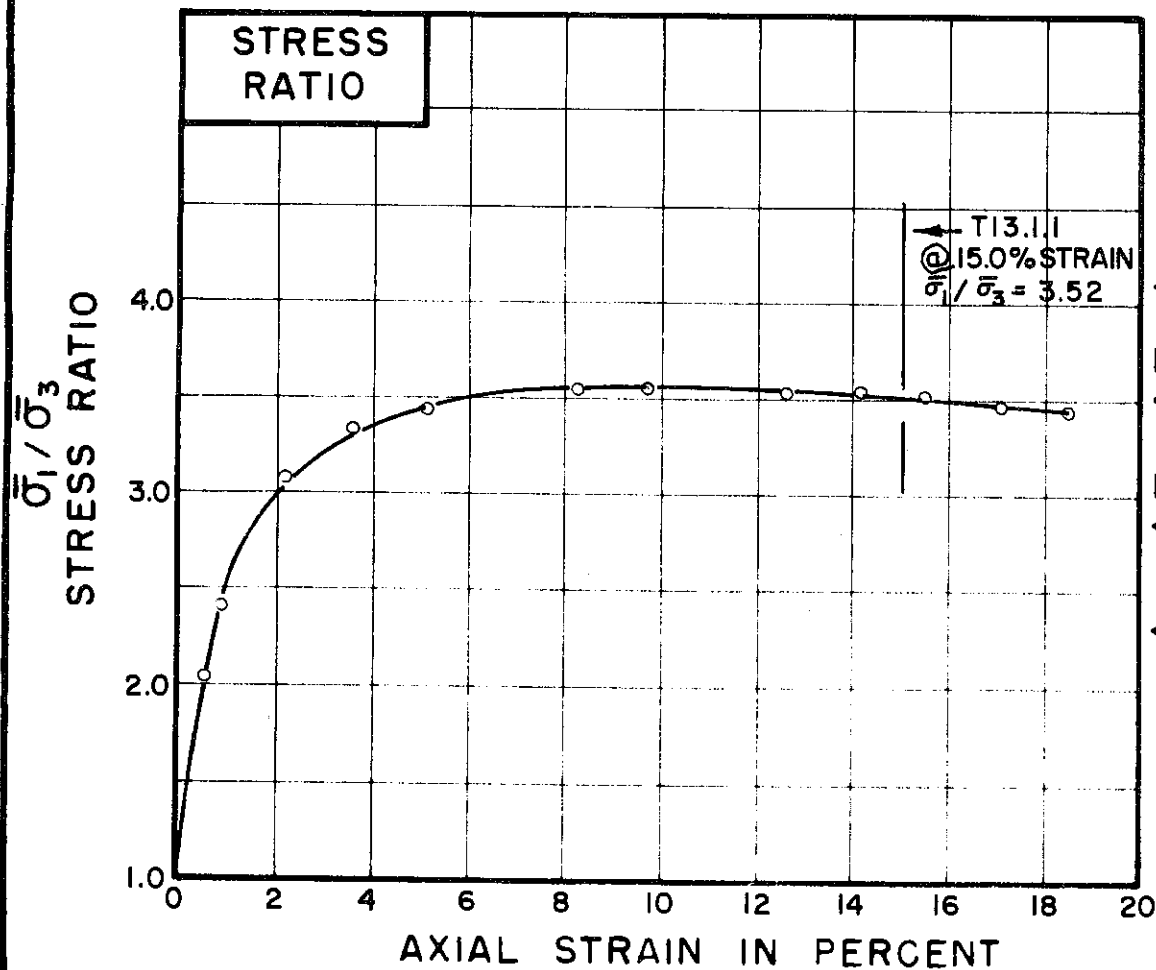
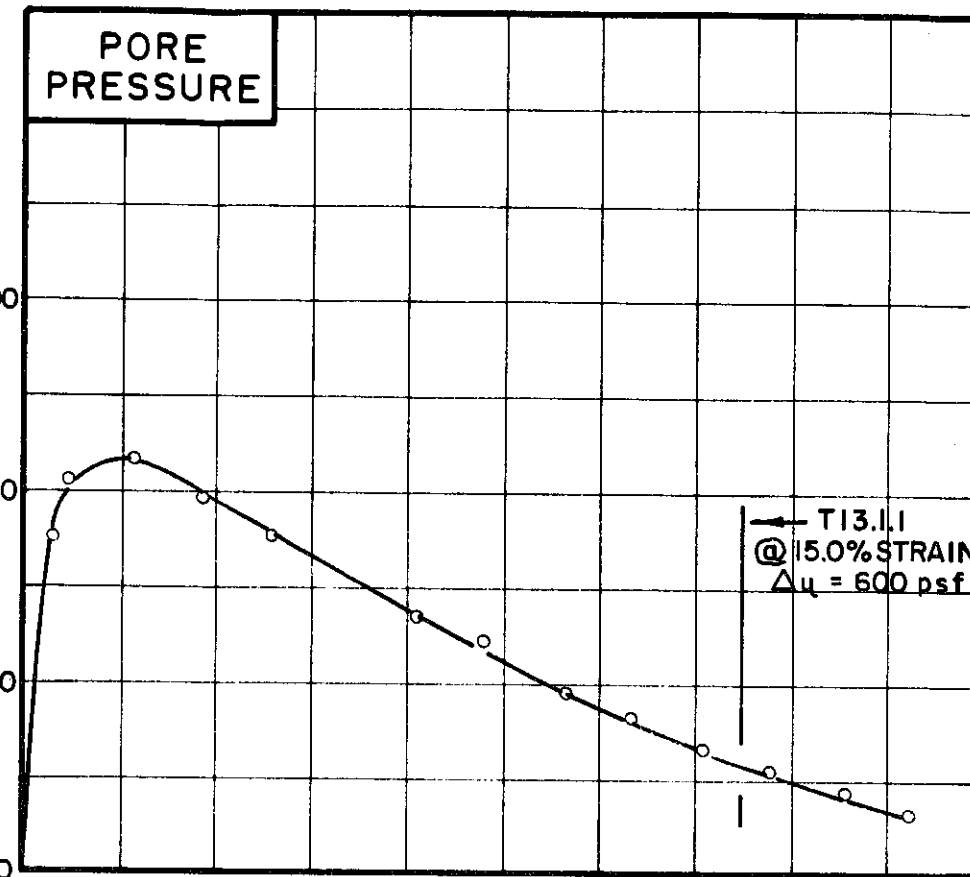
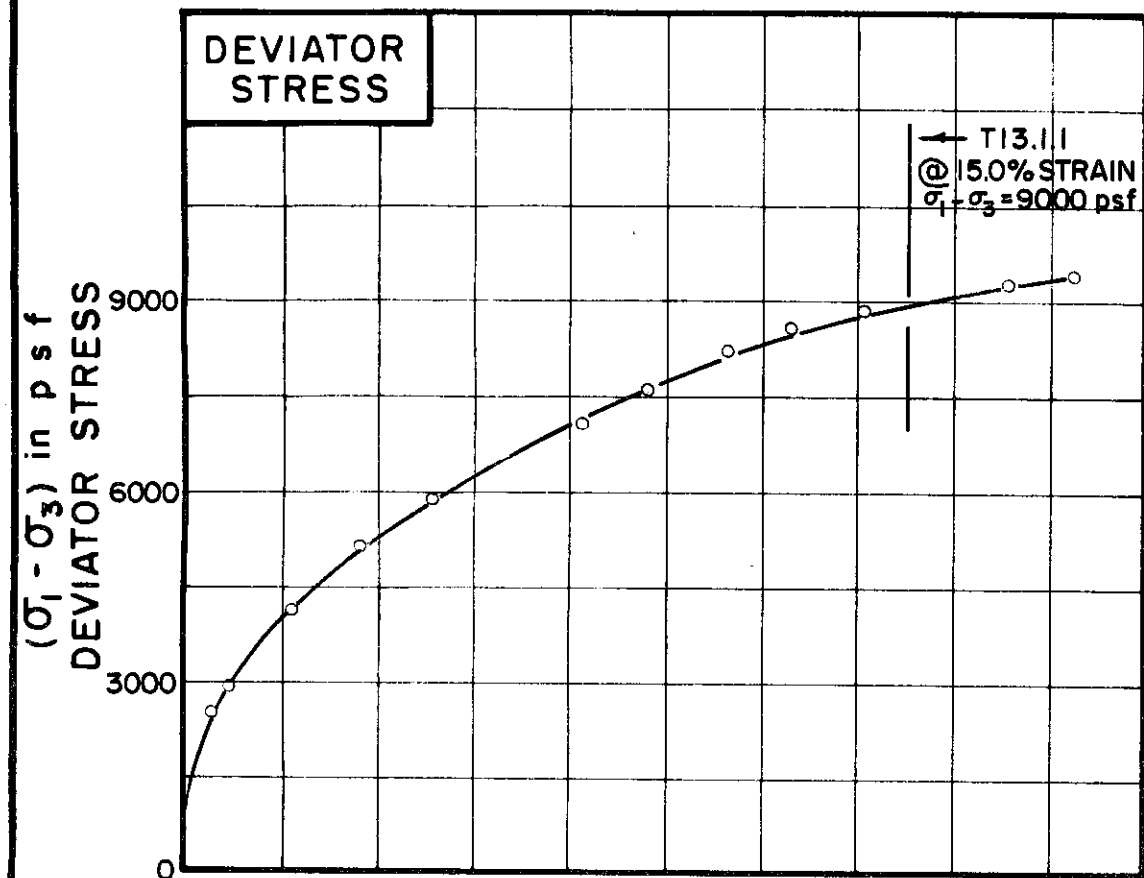
REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.2 & T13.1.3

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-395



TEST NO. / SYMBOL T13.1.1

INITIAL CONDITIONS	WATER CONTENT	w <sub>o</sub>	22.9%	%	%
	DRY DENSITY	γ <sub>d</sub>	96		
	SAMPLE DIAMETER	D <sub>o</sub>	1.40		
	SAMPLE HEIGHT	H <sub>o</sub>	3.38		
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	u <sub>o</sub>	6480		
	INITIAL EFFECTIVE STRESS	σ <sub>1</sub> / σ <sub>3</sub>	4176		
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	1.77%	%	%
	PORE PRESSURE RESPONSE		96%		
FINAL CONDITIONS	WATER CONTENT	w <sub>f</sub>	22.9%	%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE .024

BORING NO. 26

SAMPLE NO. 28

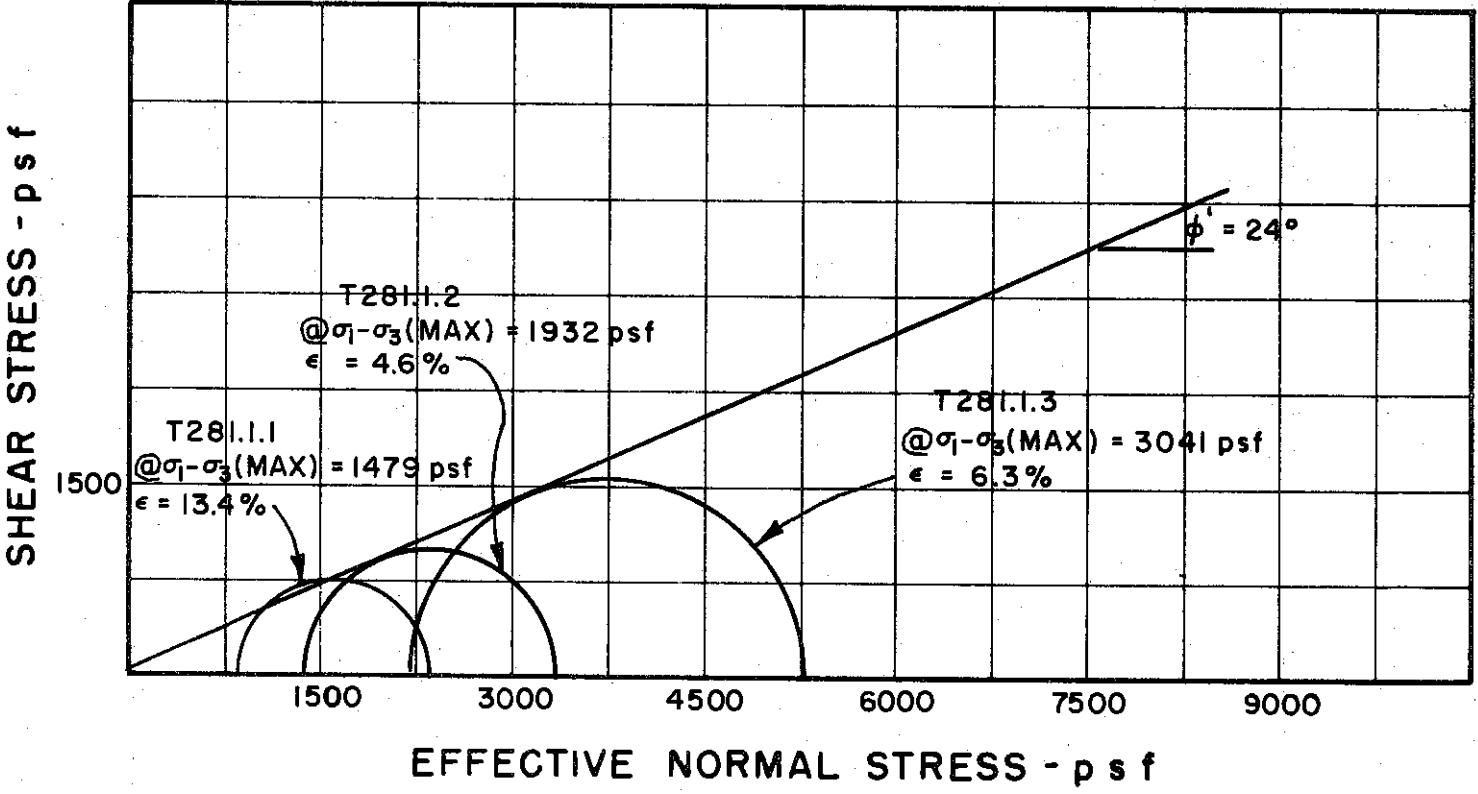
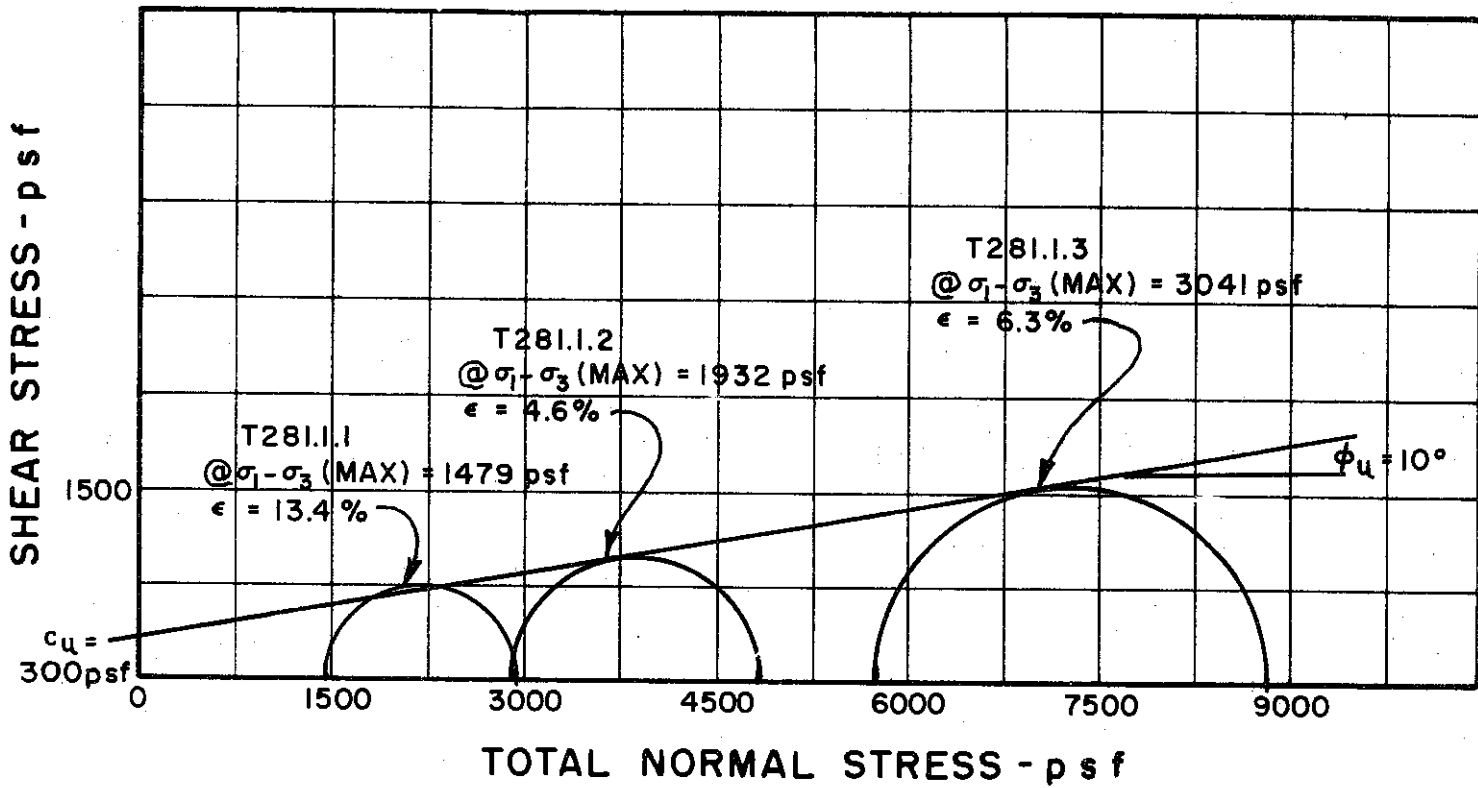
DEPTH 128.0' TO 130.0'

SOIL DESCRIPTION SILTY CLAY WITH LAYERS OF FINE SAND & SILT

LIQUID LIMIT — PLASTIC LIMIT —

NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 7

DEPTH 28.0' TO 30.5'

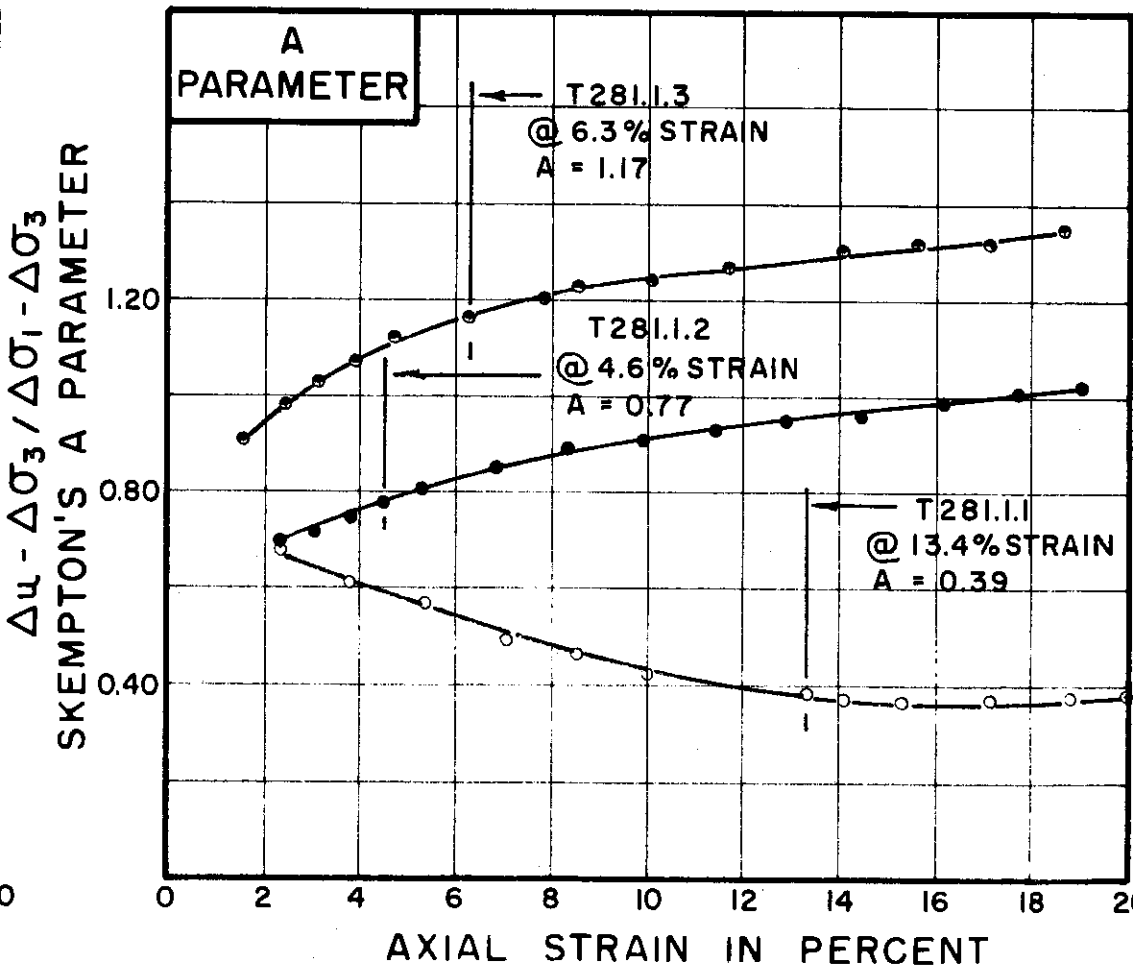
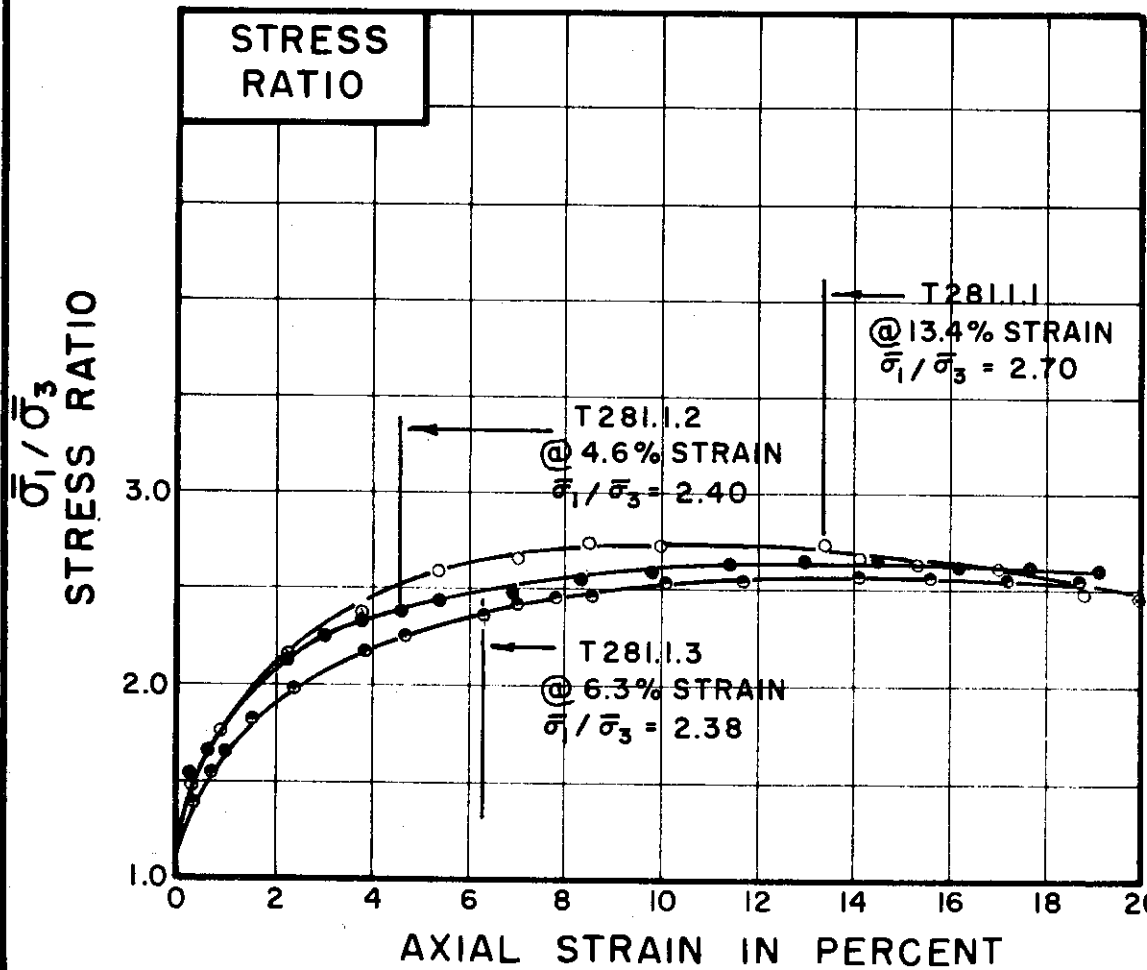
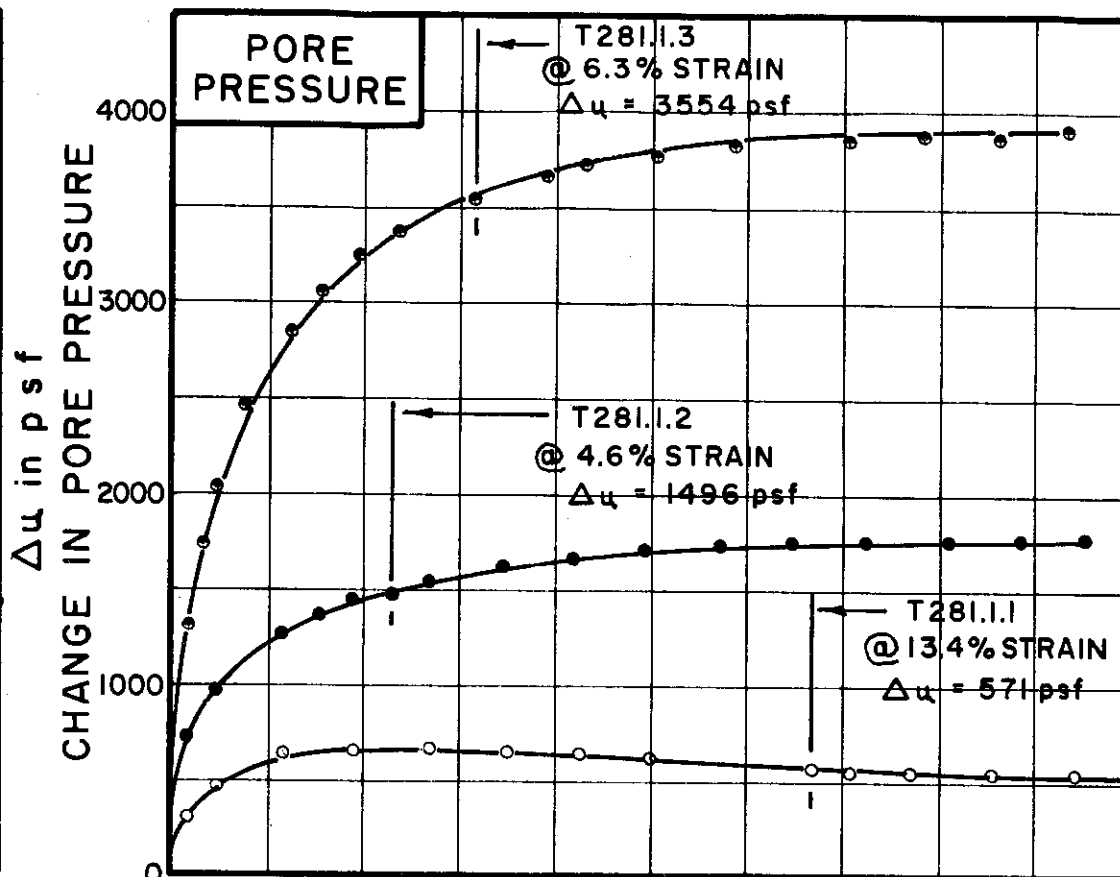
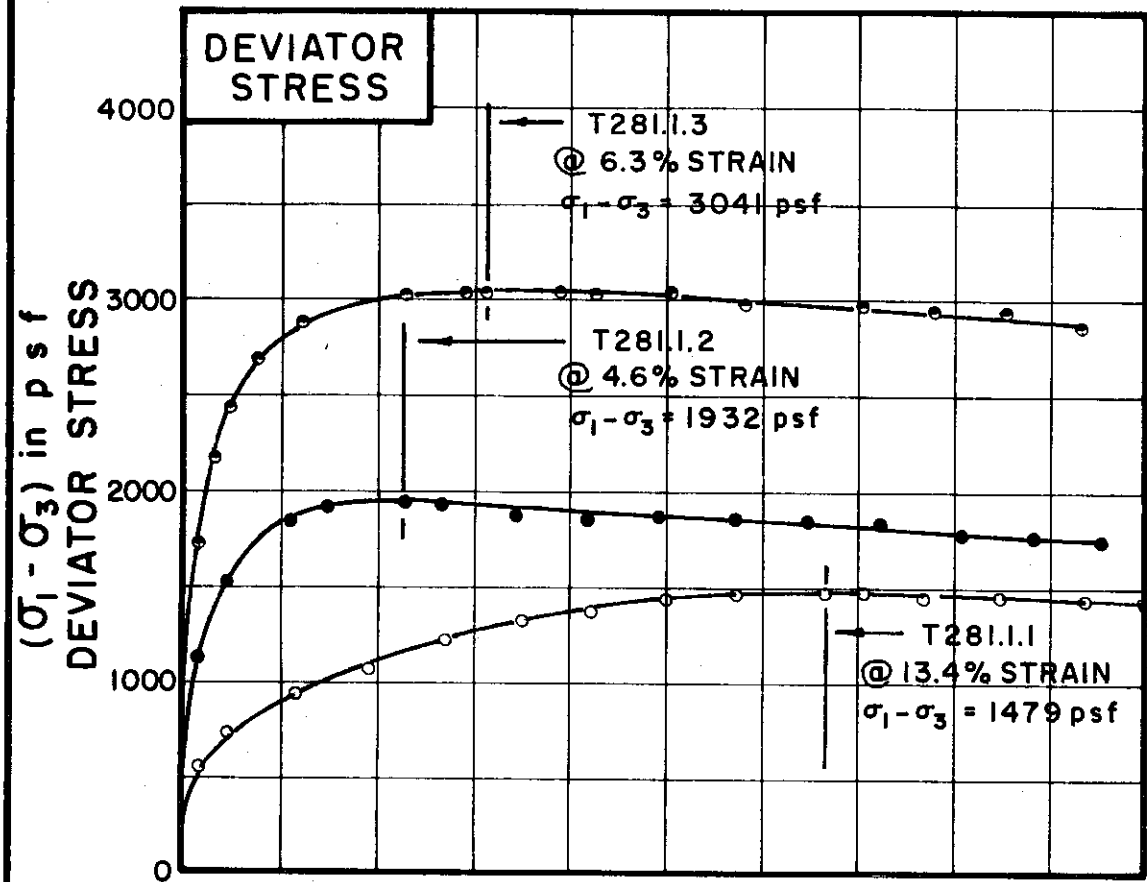
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



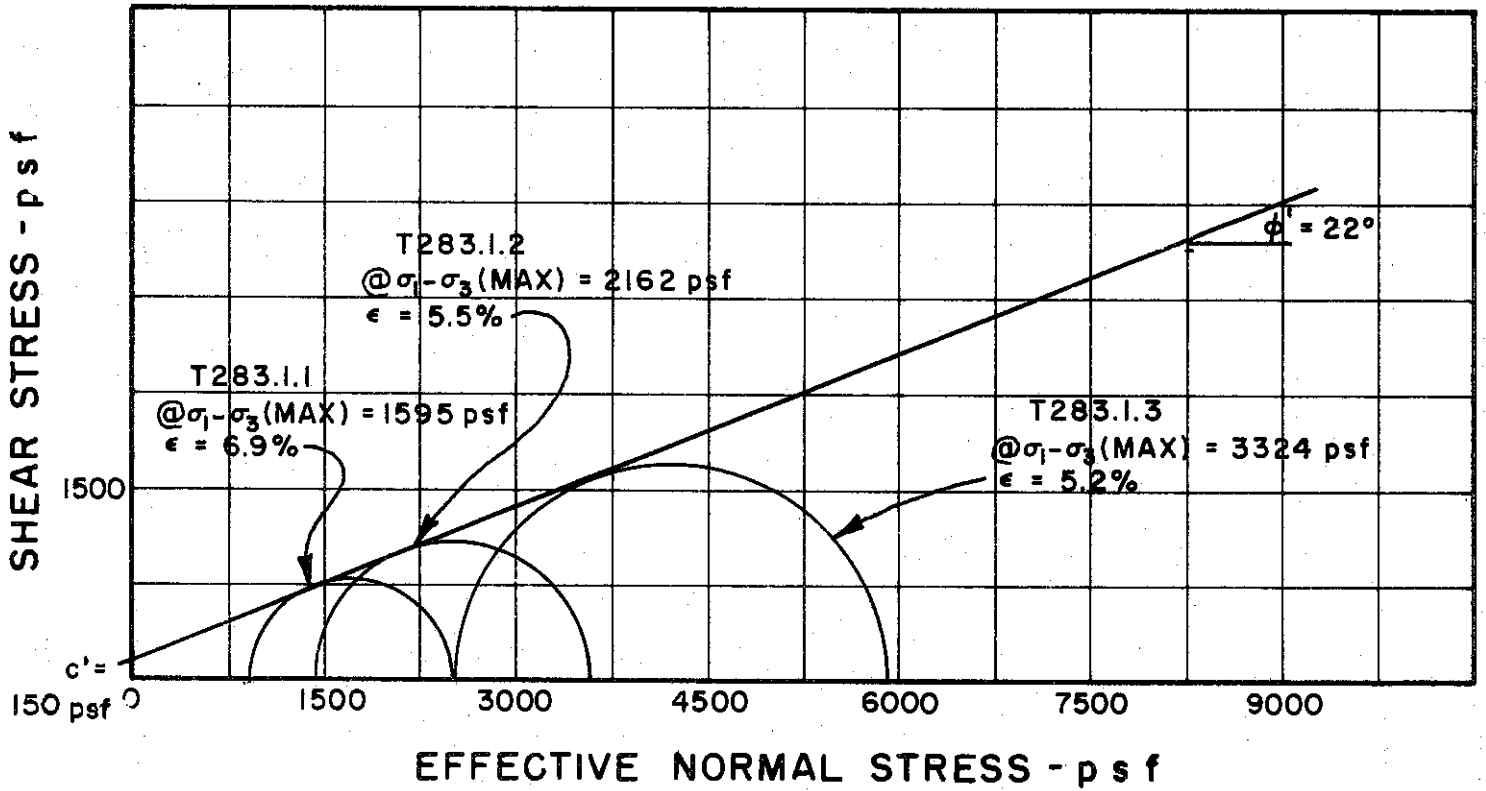
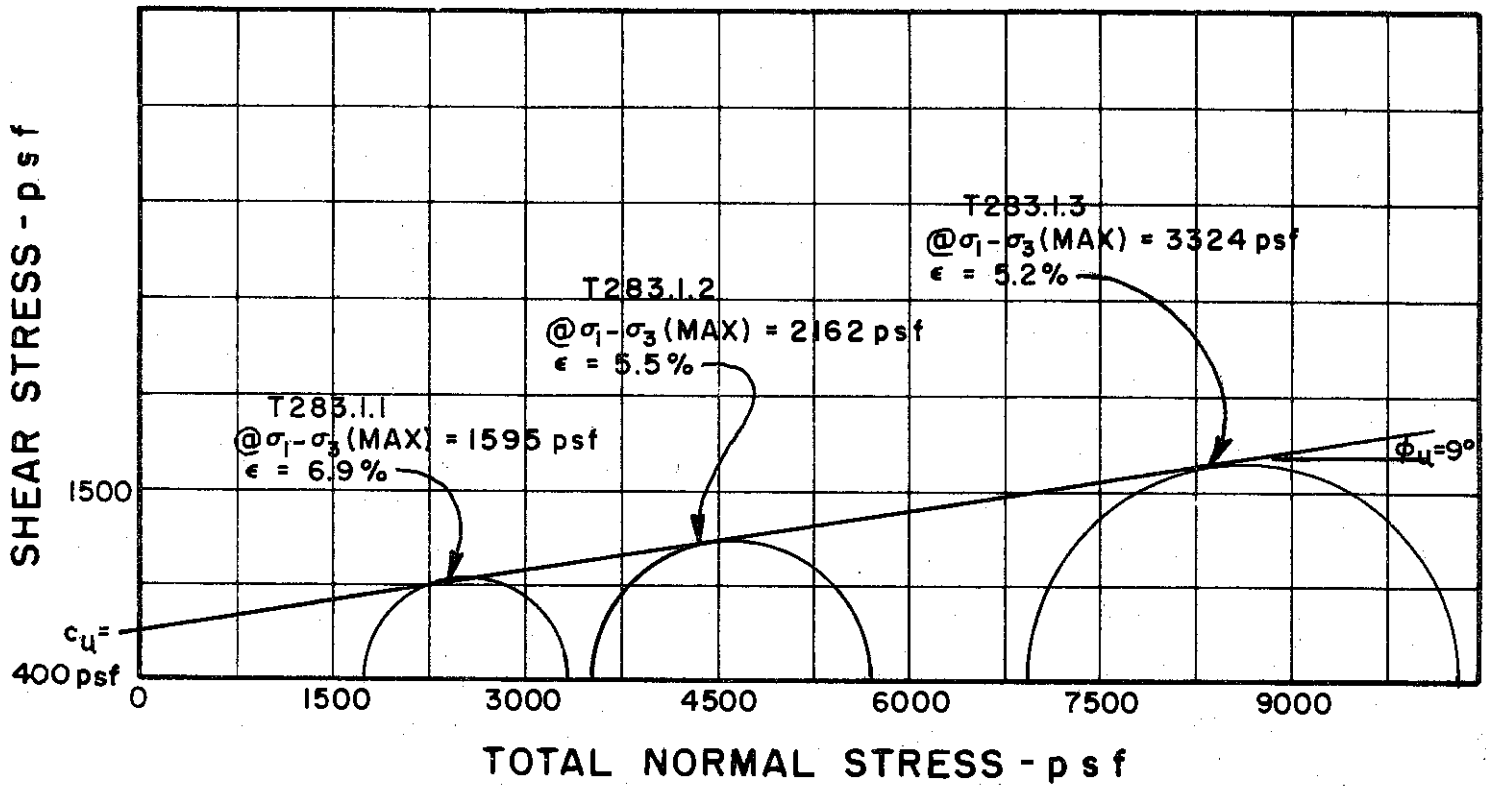
TEST NO. / SYMBOL	T281.1.1	T281.1.2	T281.1.3
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INITIAL CONDITIONS			T281.1.1	T281.1.2	T281.1.3
WATER CONTENT	$w_0$		39.0%	39.7%	38.3%
DRY DENSITY	$\gamma_d$	lb/cu ft	82	82	84
SAMPLE DIAMETER	$D_0$	in.	1.38	1.38	1.38
SAMPLE HEIGHT	$H_0$	in.	3.28	3.27	3.28
CONDITIONS BEFORE SHEAR			T281.1.1	T281.1.2	T281.1.3
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$		1440	2880	5760
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.96%	4.10%	7.21%
PORE PRESSURE RESPONSE			98%	98%	96%
FINAL CONDITIONS			T281.1.1	T281.1.2	T281.1.3
WATER CONTENT	$w_f$		37.3%	36.6%	31.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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BORING NO. 33  
 SAMPLE NO. 7  
 DEPTH 28.0' TO 30.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 9

DEPTH 38.0' TO 40.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

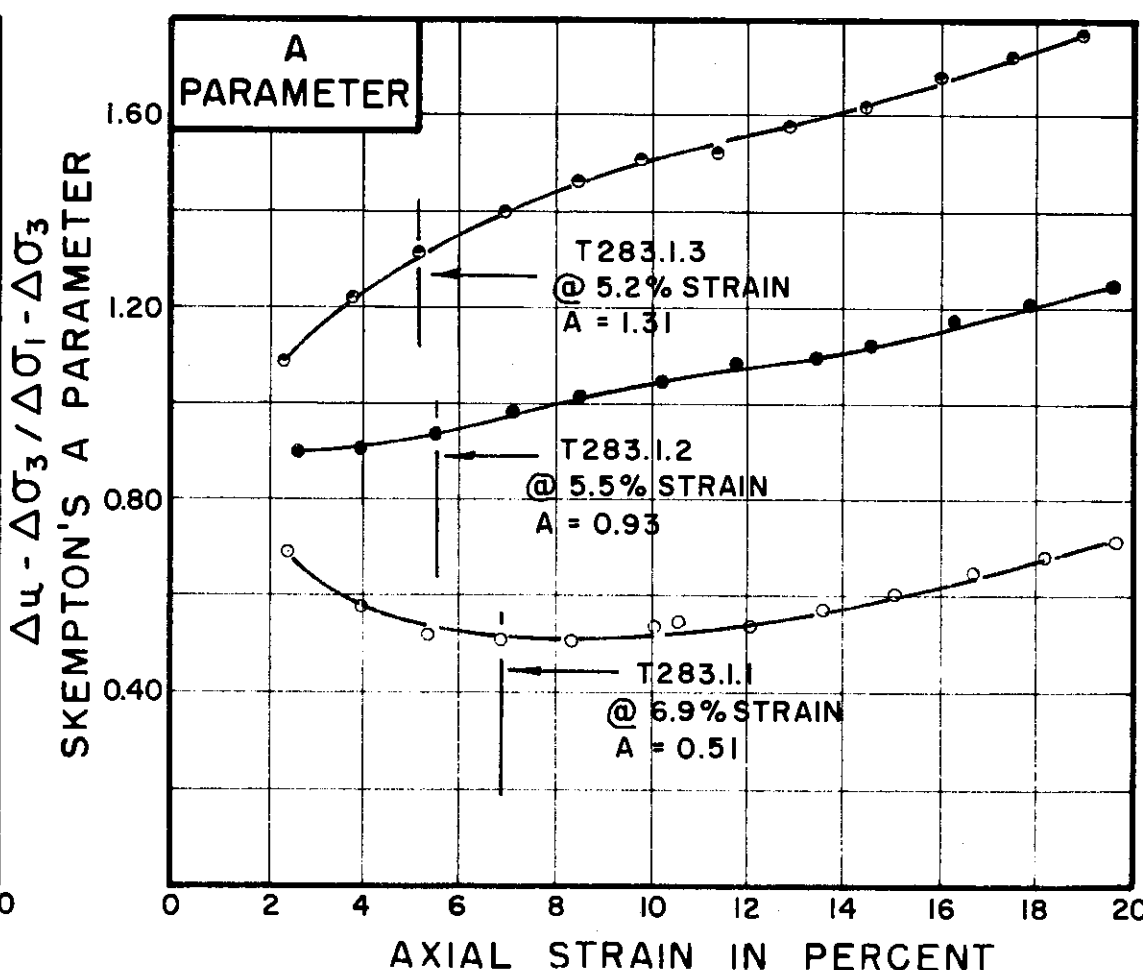
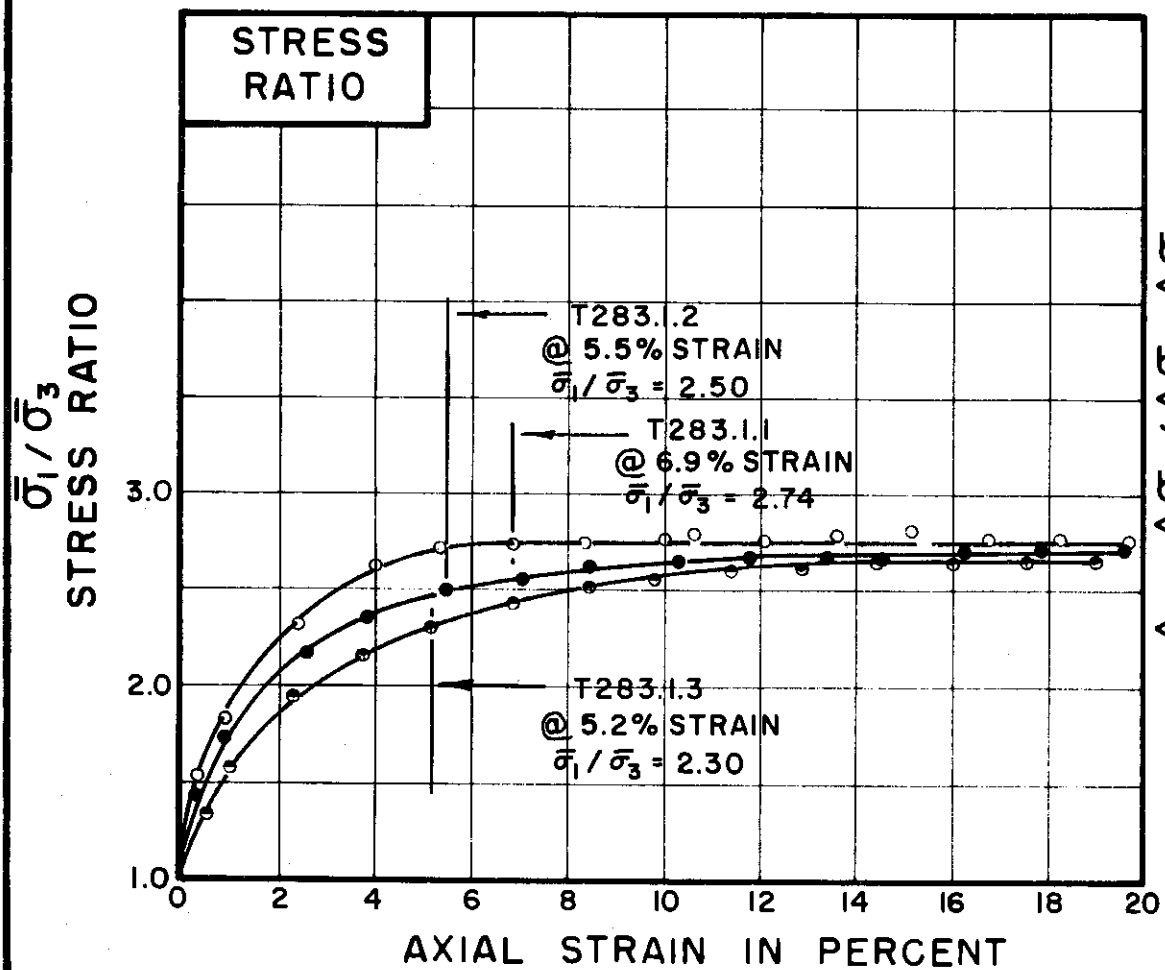
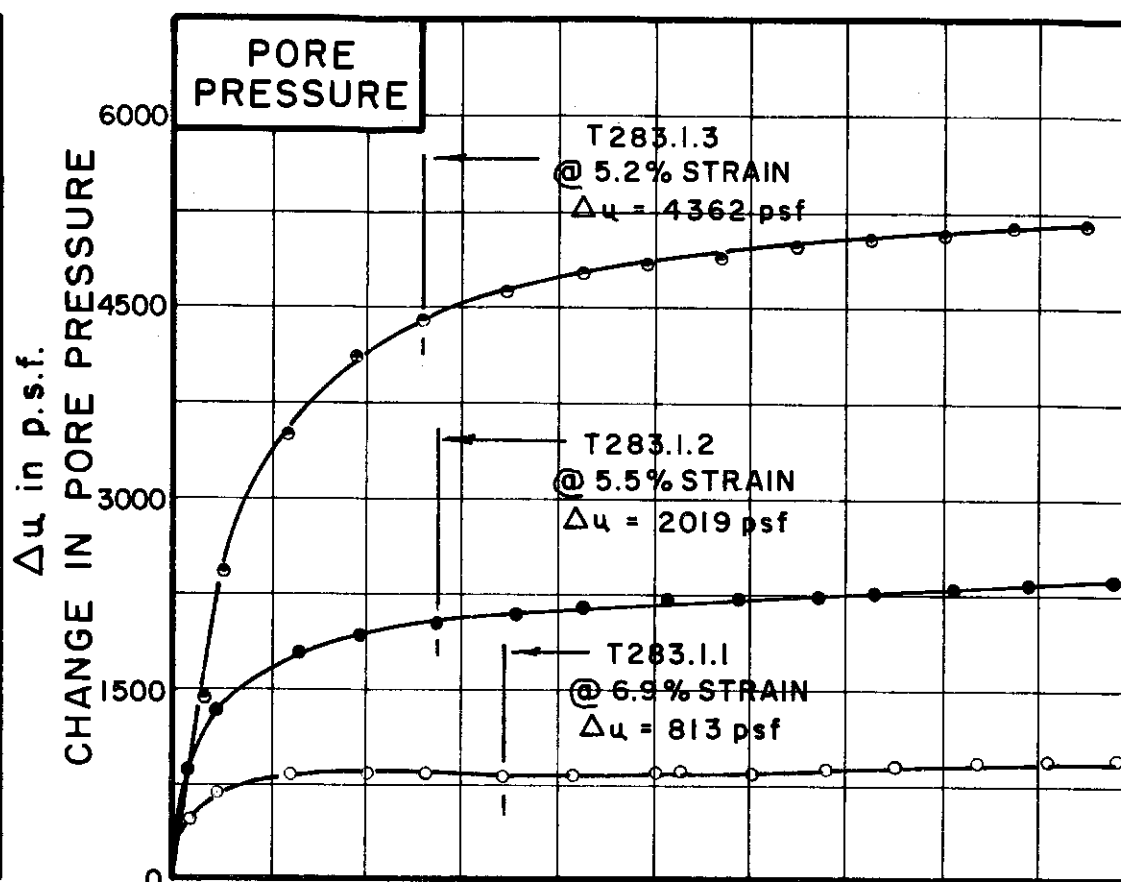
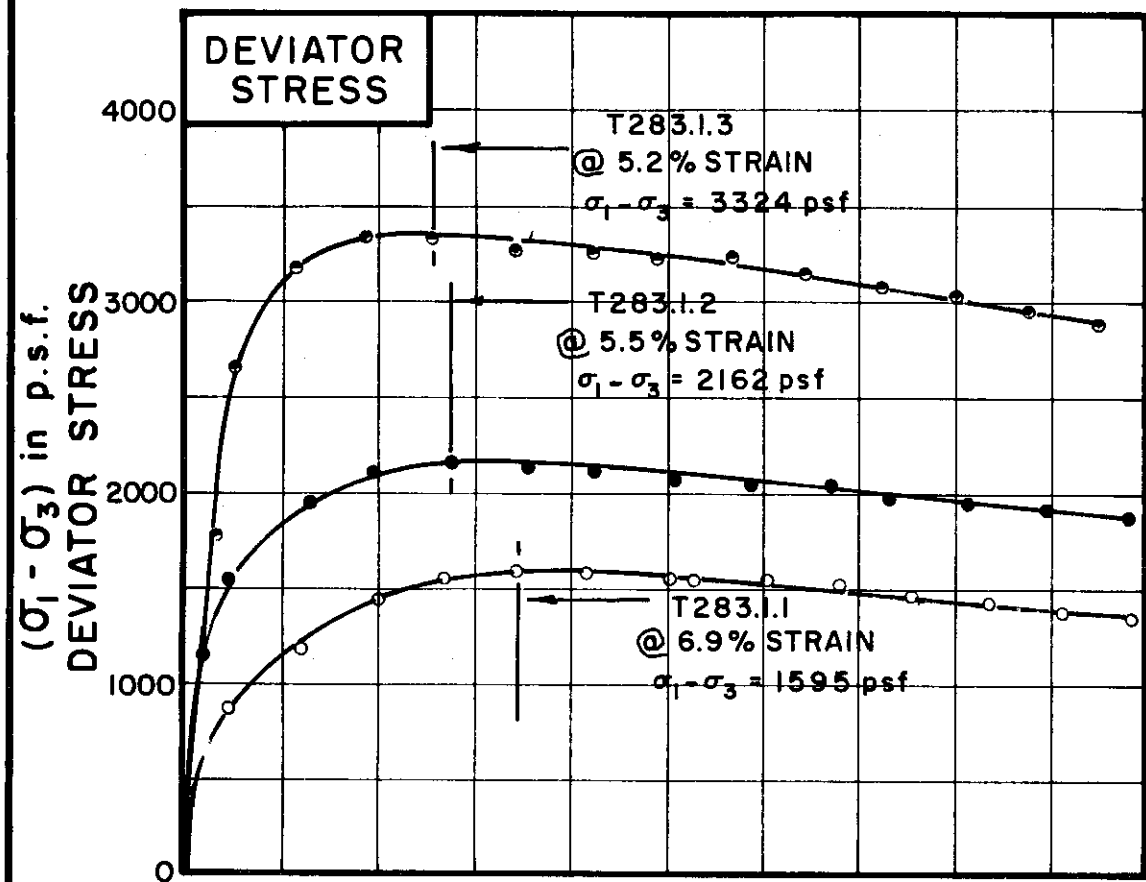
MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-399





TEST NO. / SYMBOL	T283.1.1	T283.1.2	T283.1.3
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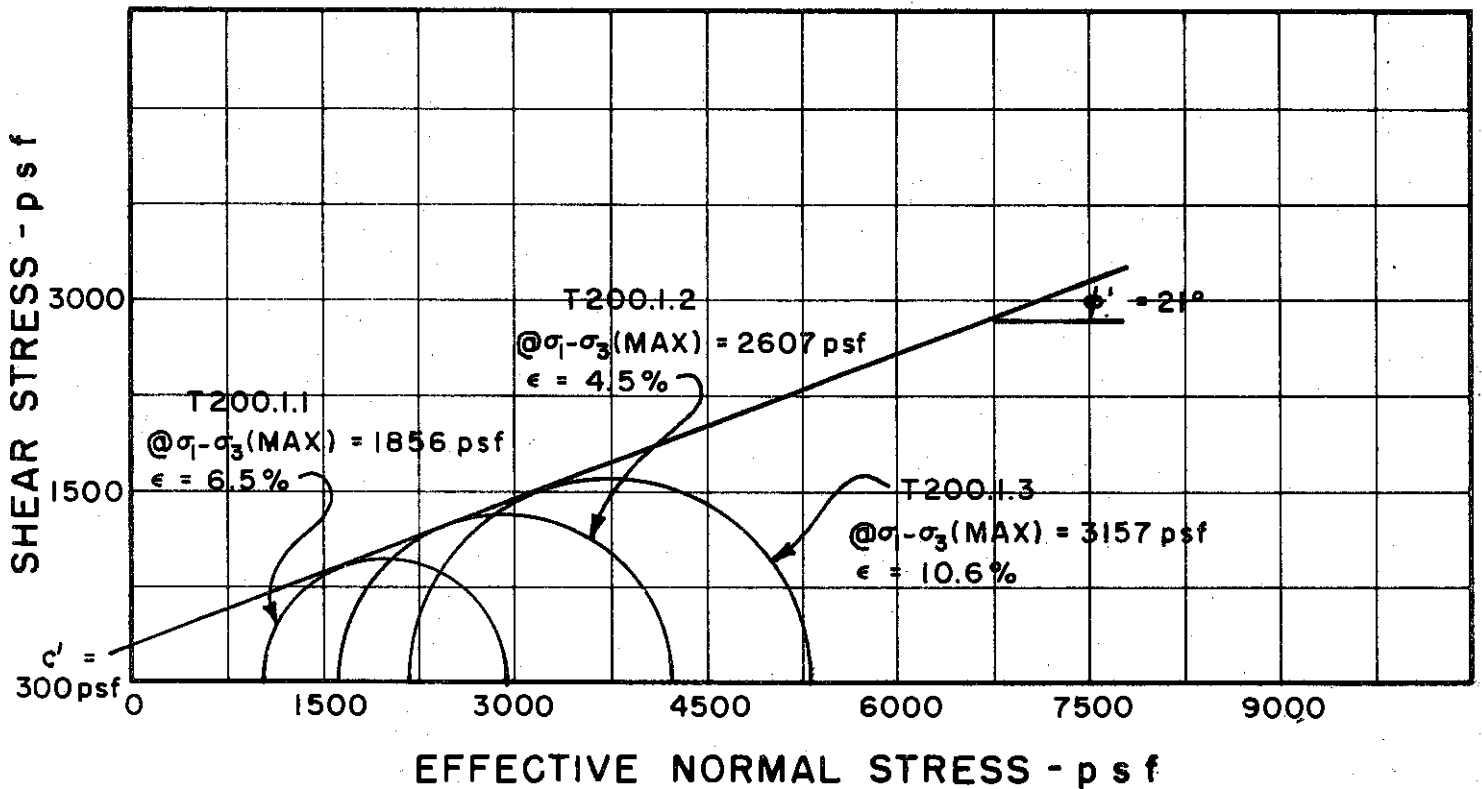
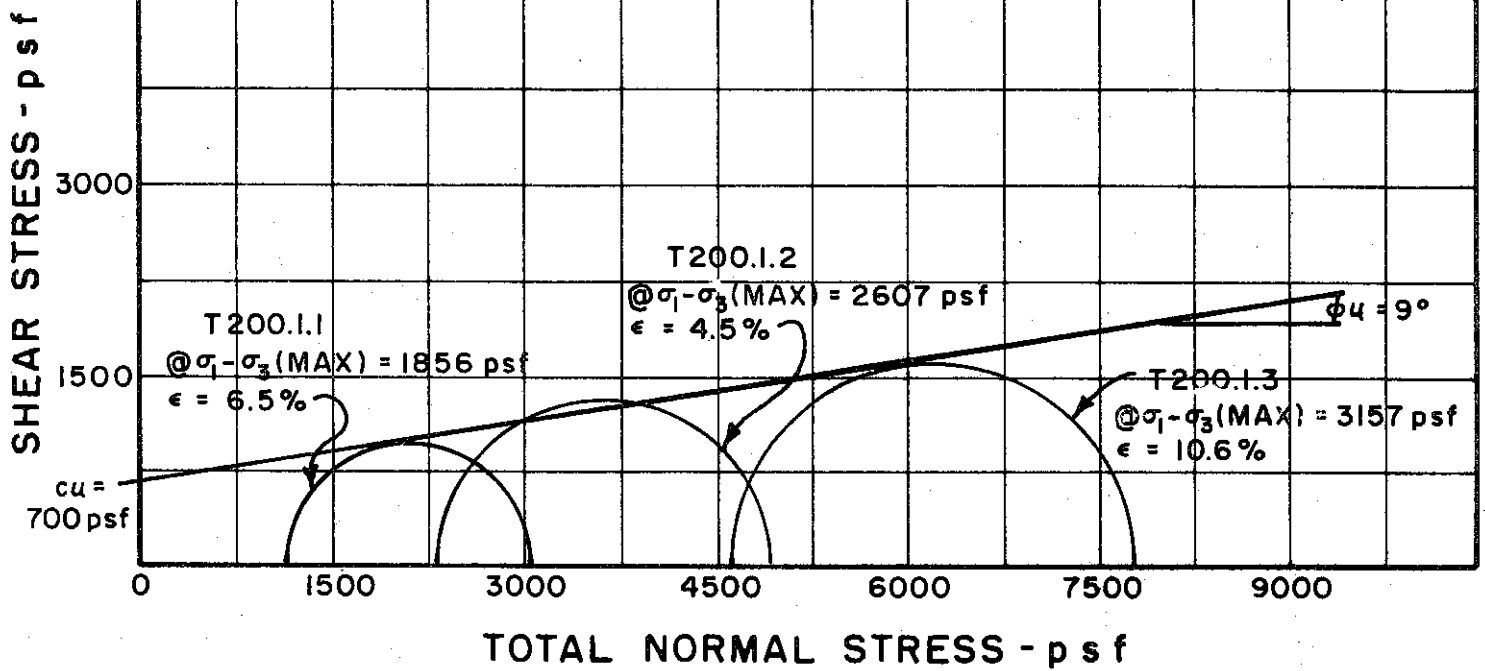
INITIAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_0$		37.4%	37.1%	36.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	85	86
SAMPLE DIAMETER	$D_0$	in.	1.40	1.39	1.39
SAMPLE HEIGHT	$H_0$	in.	3.31	3.25	3.32
CONDITIONS BEFORE SHEAR			T283.1.1	T283.1.2	T283.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	12960
INITIAL EFFECTIVE STRESS	$\frac{\bar{\sigma}_1}{\bar{\sigma}_3}$	p.s.f.	1728	3456	6912
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.35%	5.16%
PORE PRESSURE RESPONSE			96%	98%	95%
FINAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_f$		35.5%	33.6%	30.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025	.024
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BORING NO. 33  
 SAMPLE NO. 9  
 DEPTH 38.0' TO 40.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 43 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0

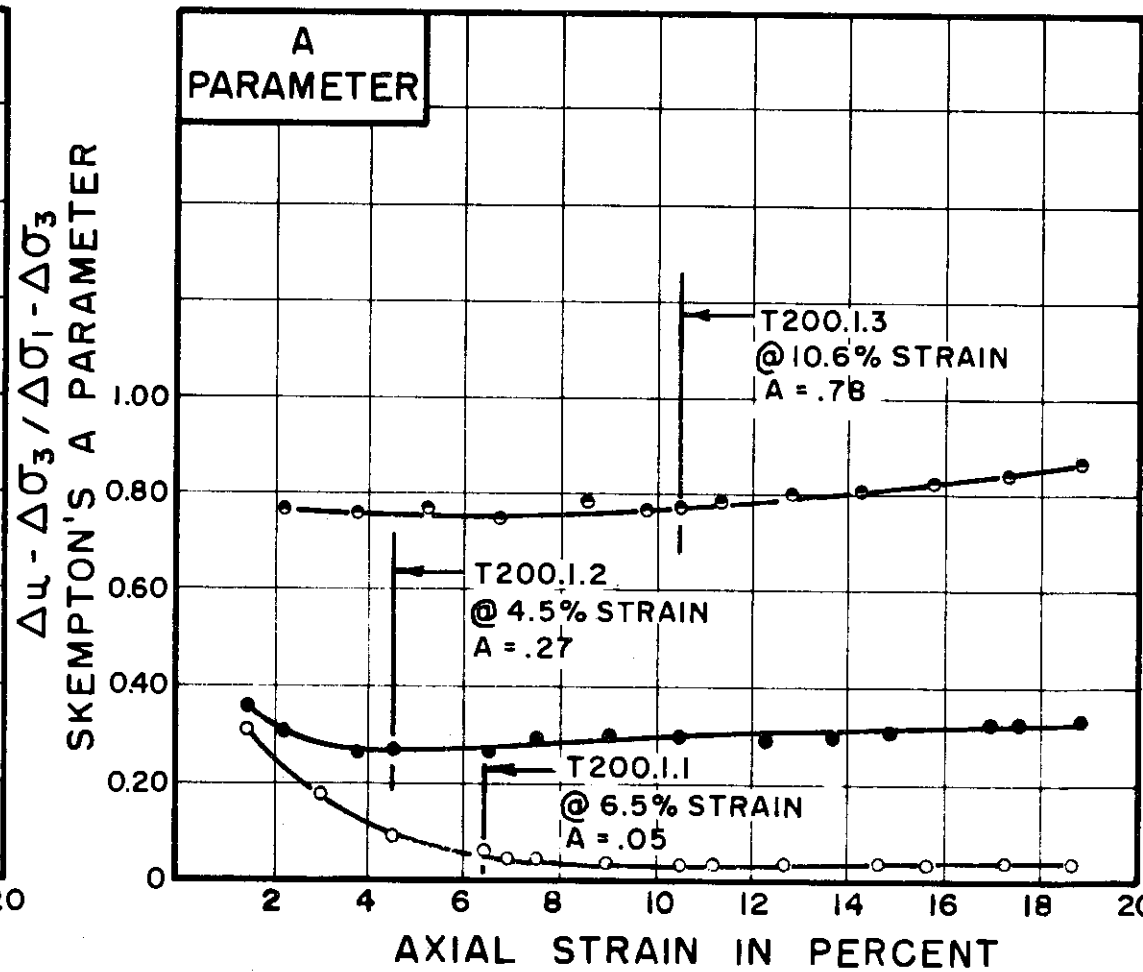
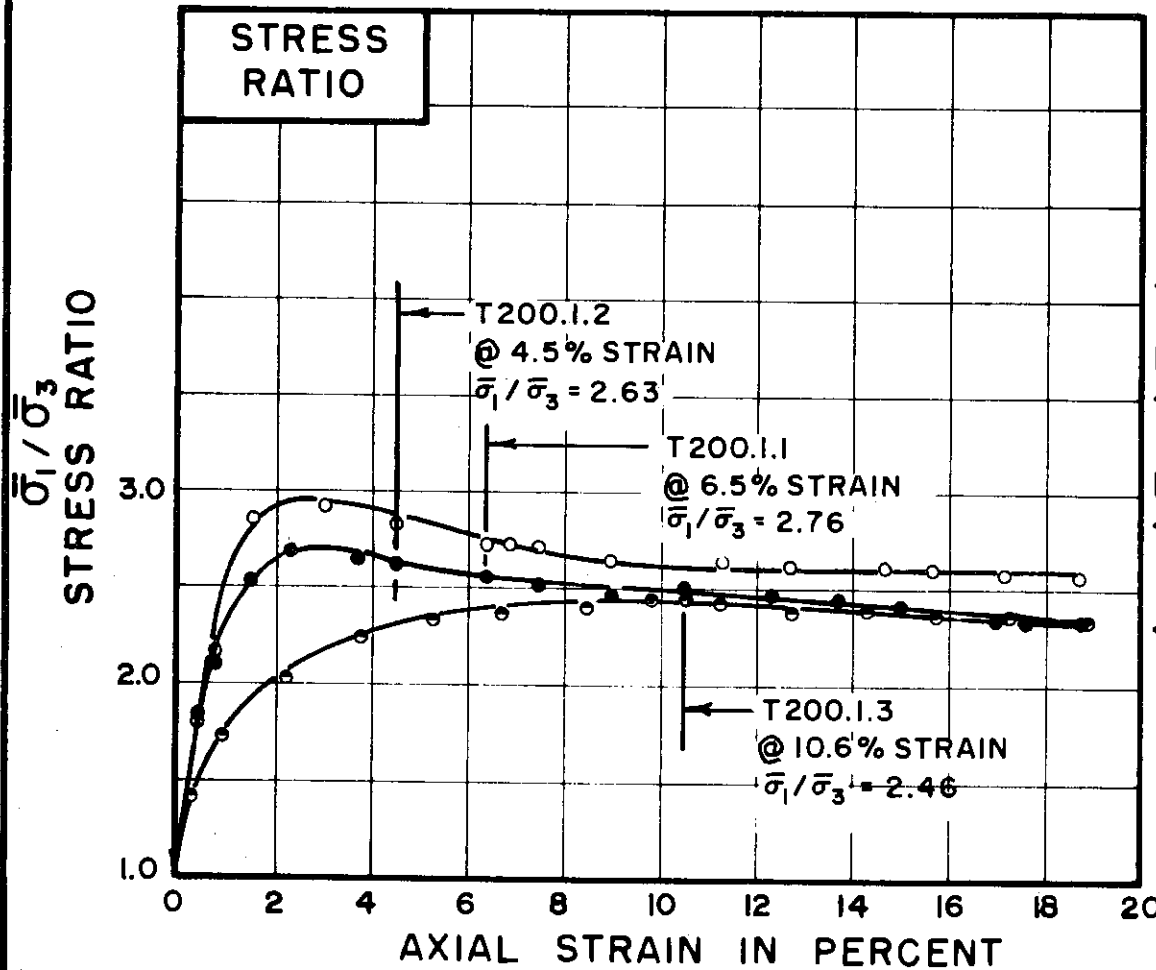
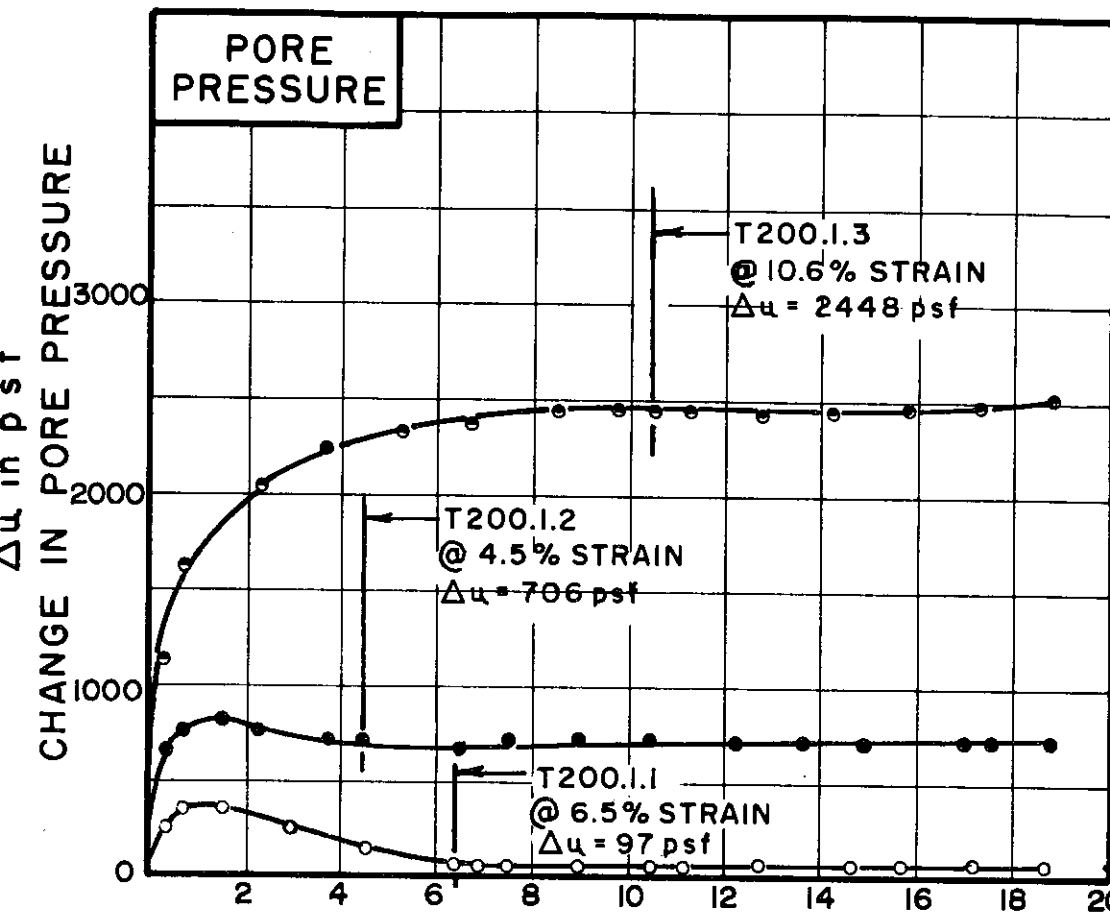
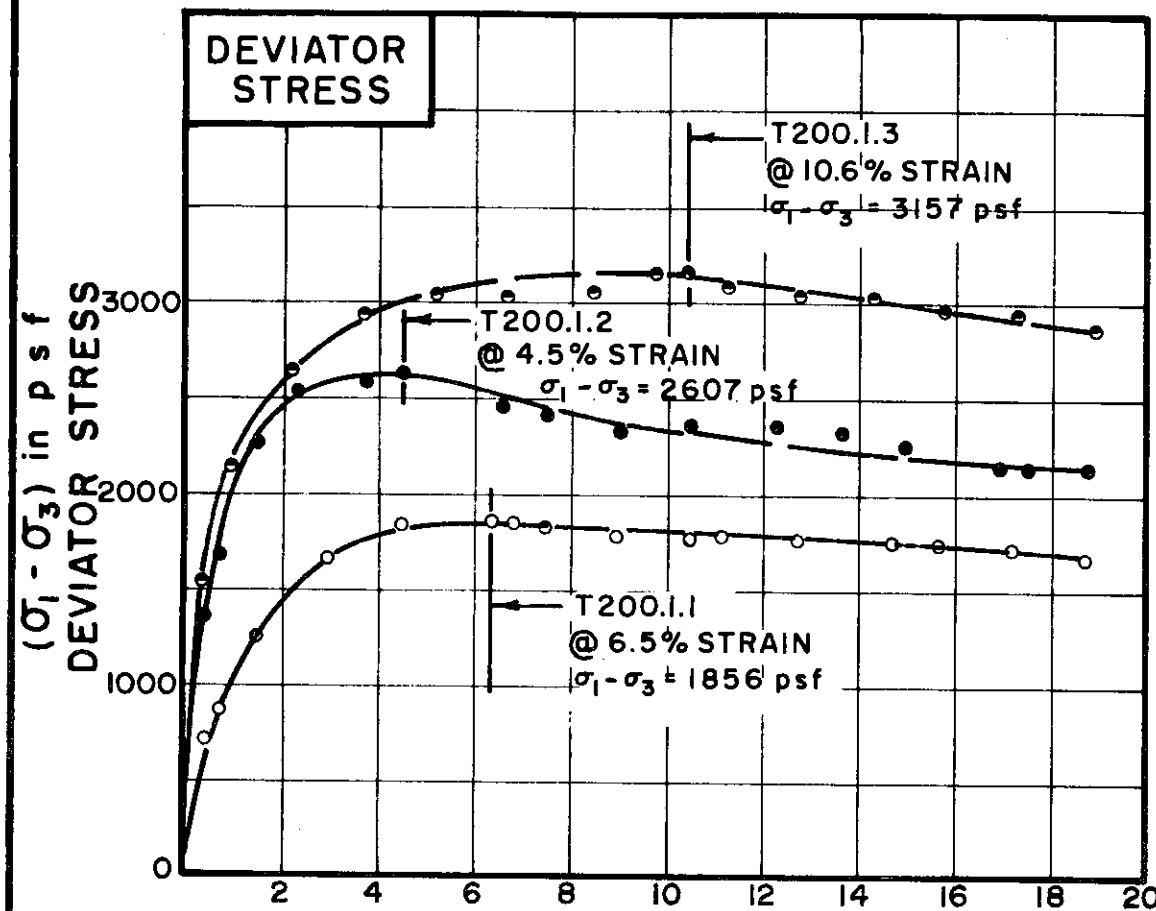
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255



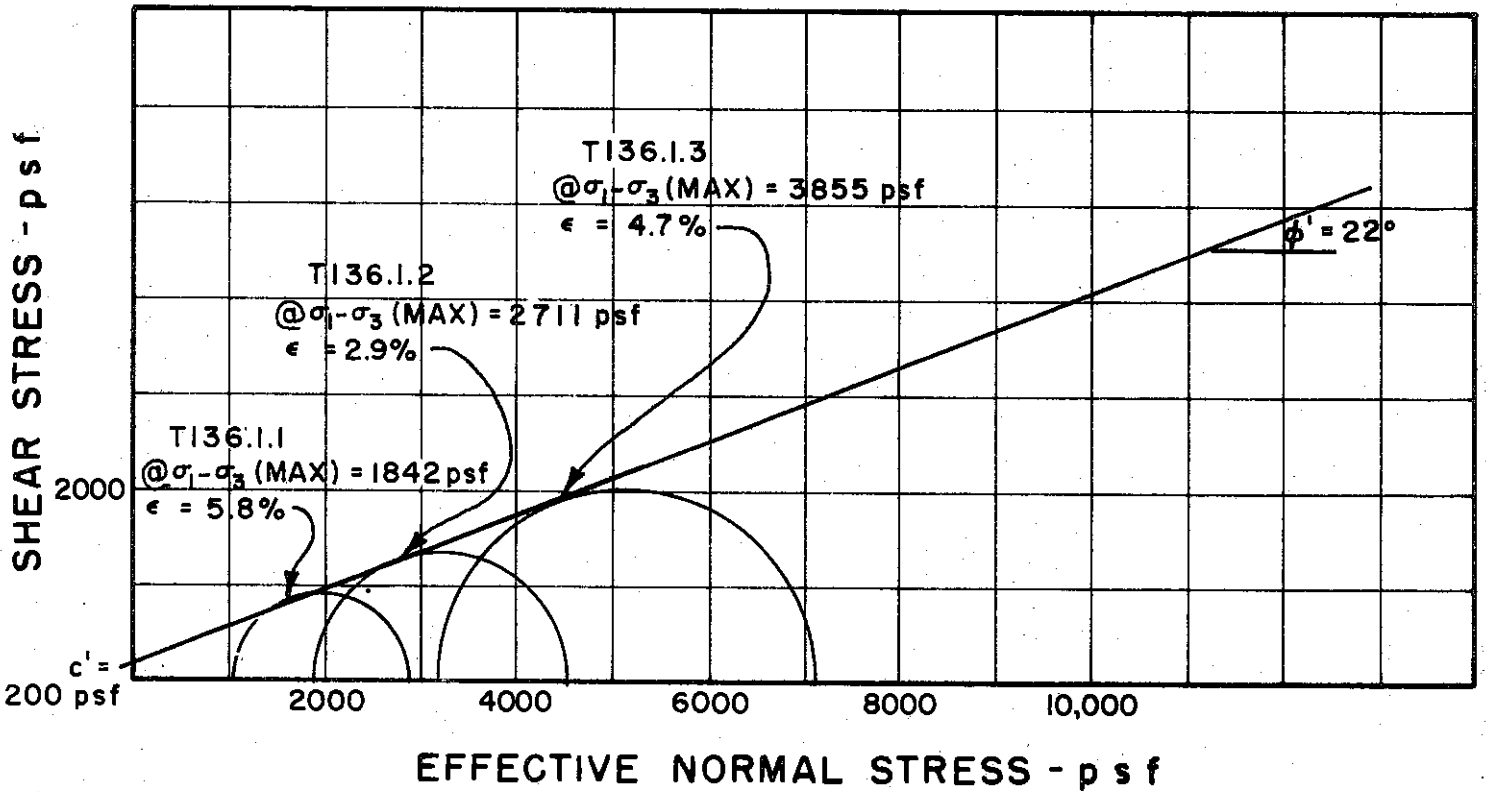
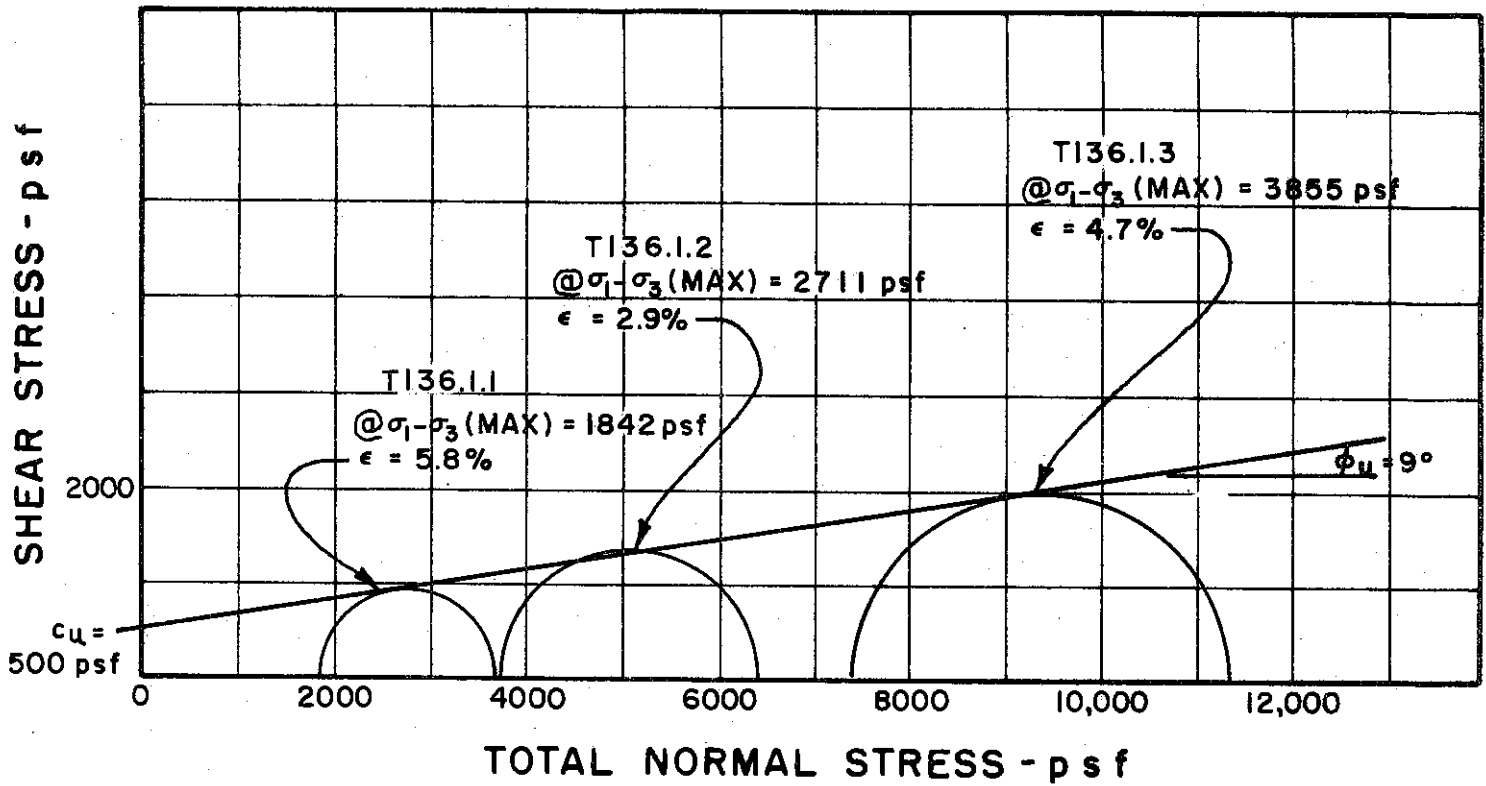
TEST NO. / SYMBOL	T200.1.1	T200.1.2	T200.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	w <sub>0</sub>	32.8%	34.2%	35.6%
	DRY DENSITY	γ <sub>d</sub>	90	89	88
	SAMPLE DIAMETER	D <sub>0</sub>	1.41	1.41	1.41
	SAMPLE HEIGHT	H <sub>0</sub>	3.35	3.35	3.38
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	u <sub>0</sub>	8640	8640	8640
	INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	1152	2304	4608
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	1.6 %	2.7 %	5.9 %
PORE PRESSURE RESPONSE			96%	99%	100%
FINAL CONDITIONS	WATER CONTENT	w <sub>f</sub>	32.1%	33.4%	31.0%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0  
 SOIL DESCRIPTION SILTY CLAY, (CL-CH)  
 LIQUID LIMIT 47 PLASTIC LIMIT 25

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 49

SAMPLE NO. 6

DEPTH 43.0' TO 45.0'

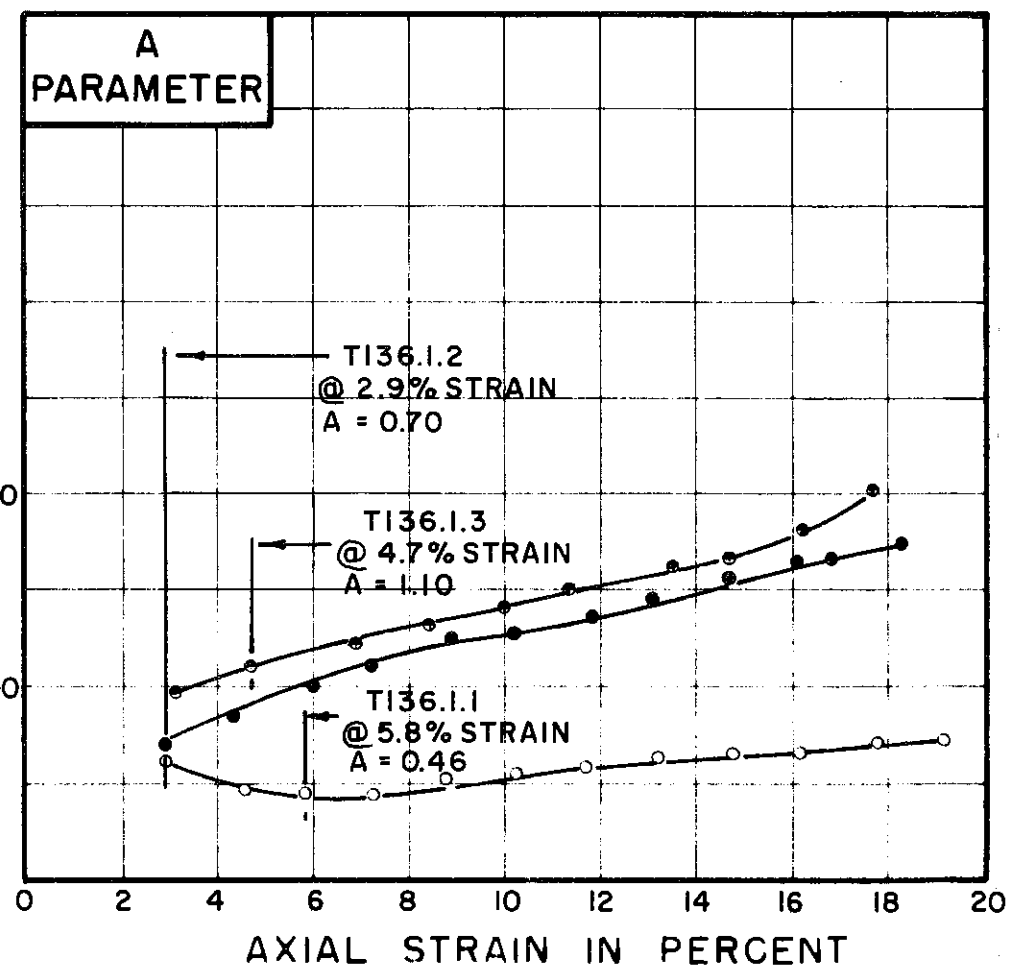
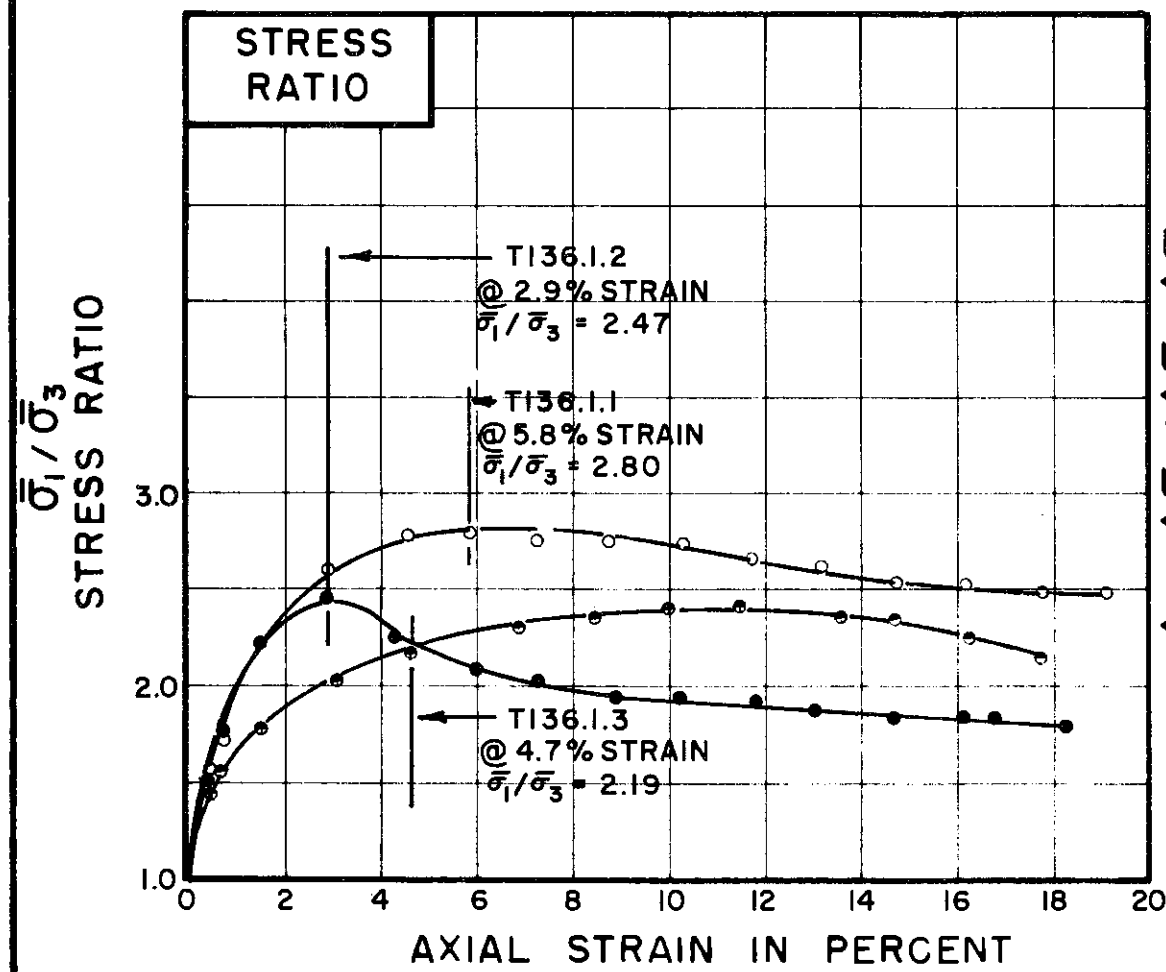
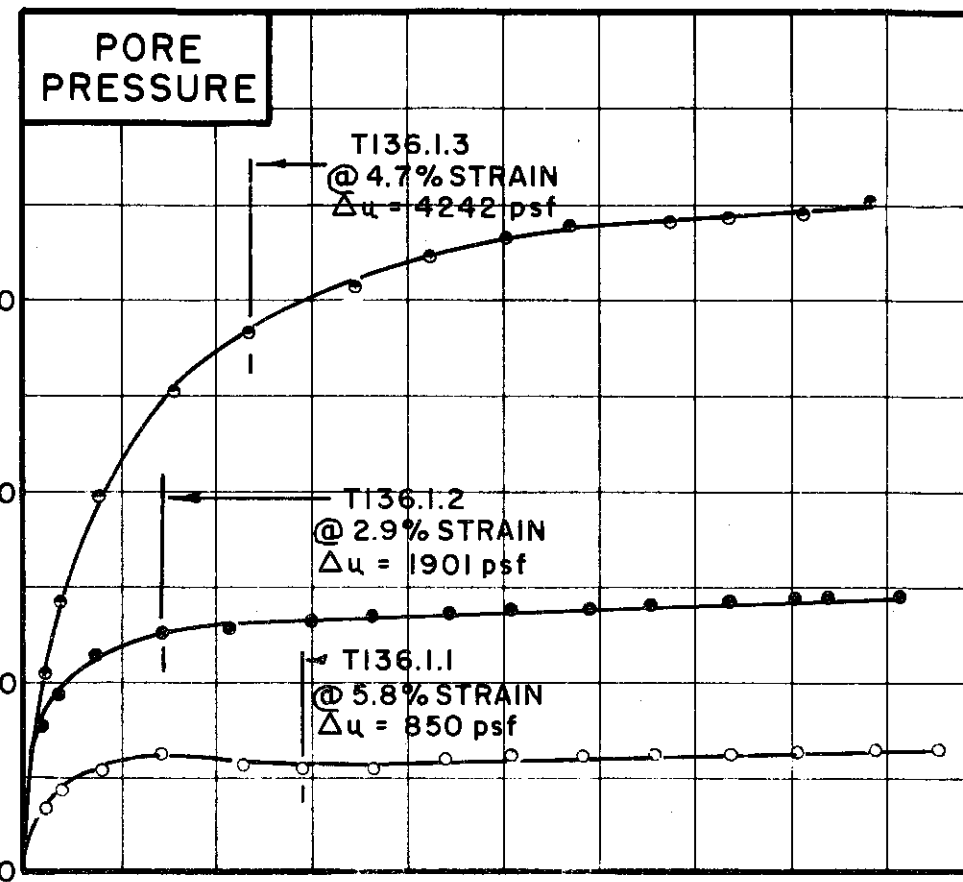
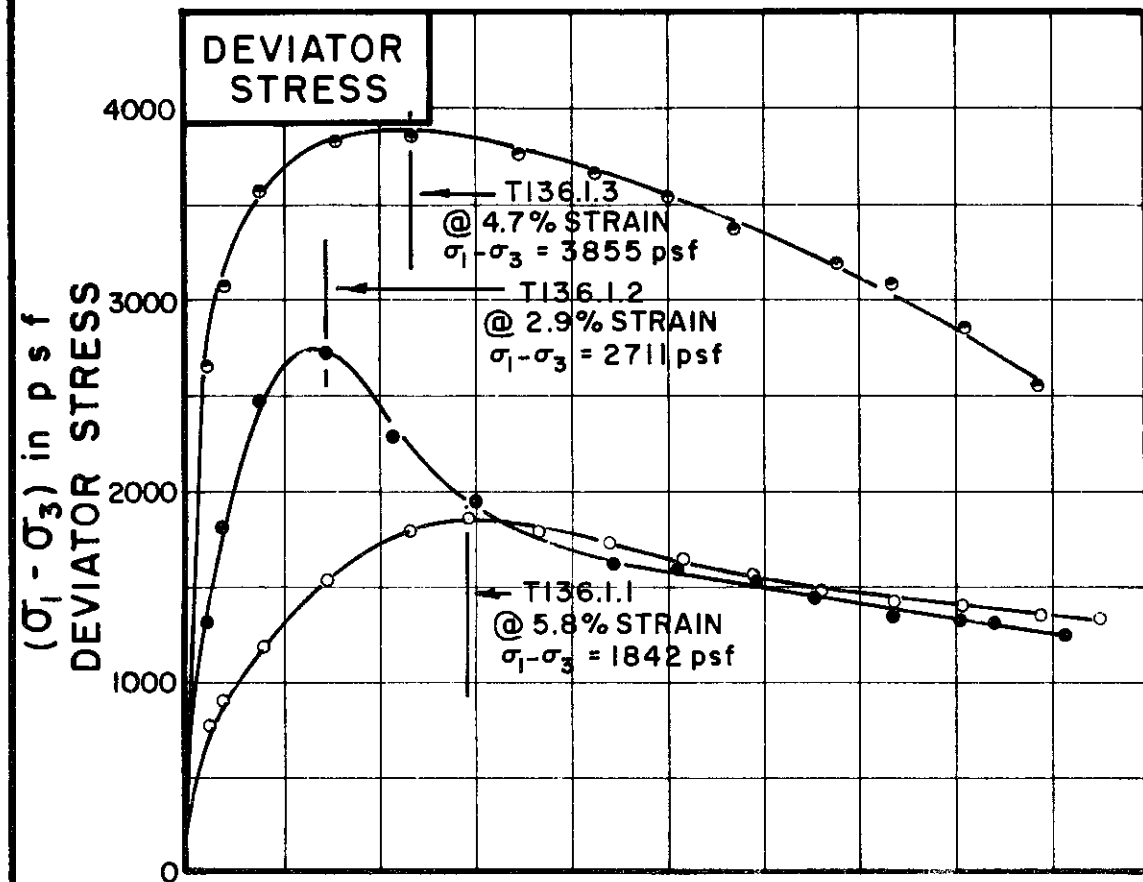
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T136.1.1	T136.1.2	T136.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	$w_0$	43.5%	46.3%	44.9%
		DRY DENSITY lb/cu ft	$\gamma_d$	78	75
	SAMPLE DIAMETER in.	$D_0$	1.40	1.40	1.41
	SAMPLE HEIGHT in.	$H_0$	3.43	3.45	3.34
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	11520	8640	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1, \bar{\sigma}_3$	1872	3744	7488
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.55%	2.88%	8.59%
	PORE PRESSURE RESPONSE		98%	100%	96%
FINAL CONDITIONS	WATER CONTENT	$w_f$	41.5%	44.7%	38.5%
	SKETCH OF SAMPLE AT END OF TEST				

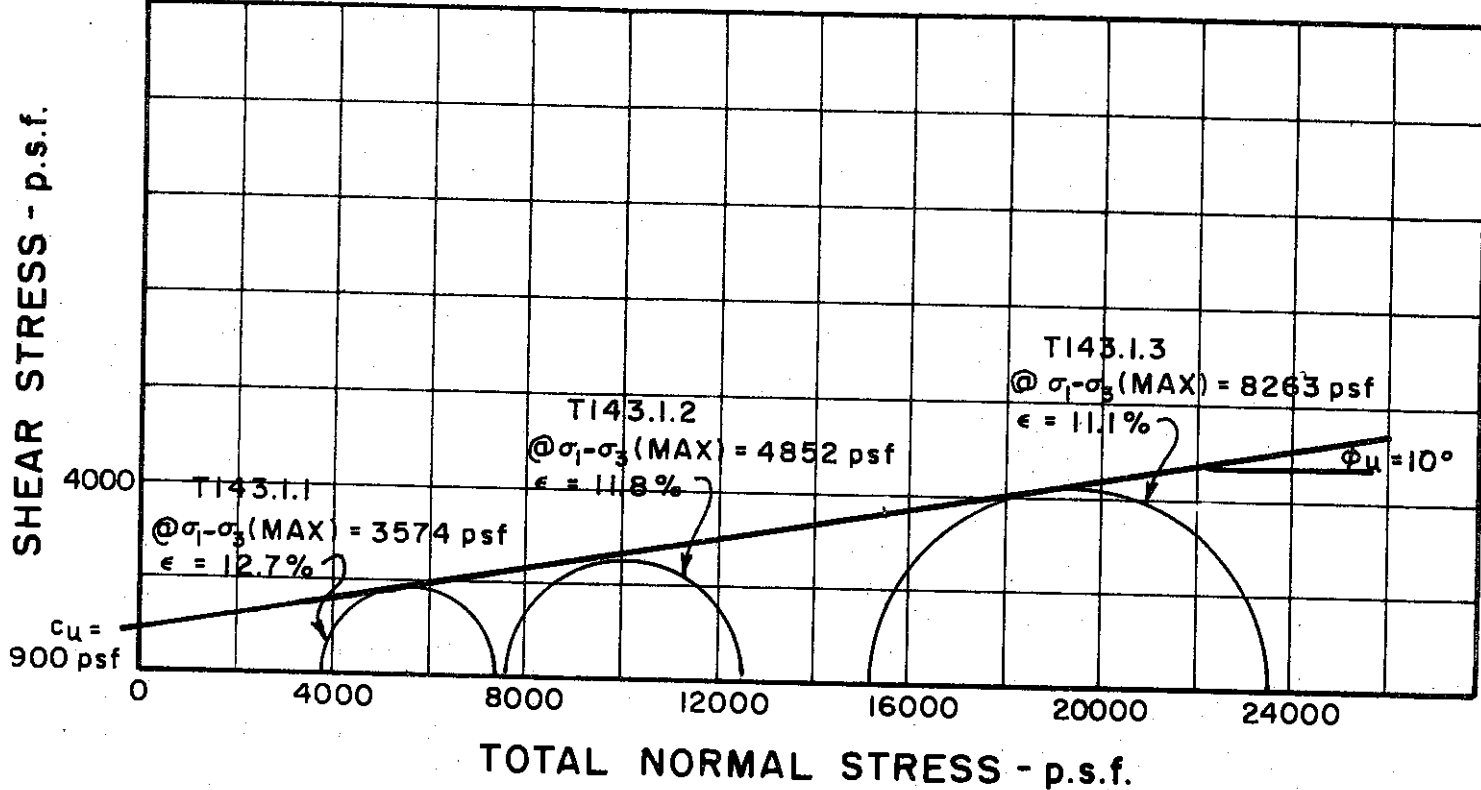
RATE OF STRAIN PERCENT/MINUTE	.024	.023	.025
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BORING NO. 49  
 SAMPLE NO. 6  
 DEPTH 43.0' TO 45.0'  
 SOIL DESCRIPTION SILTY CLAY (CH-CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 22

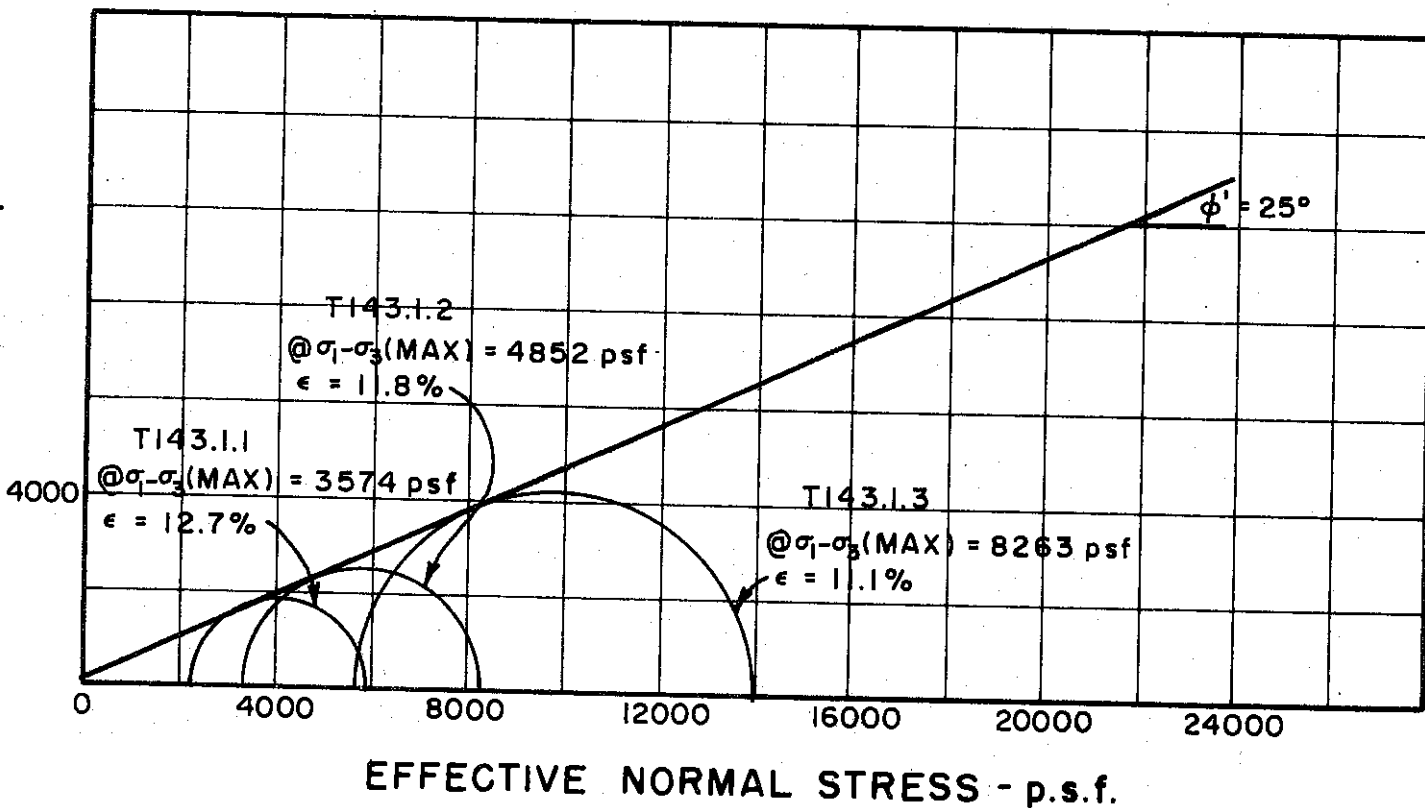
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p.s.f.



SHEAR STRESS - p.s.f.



BORING NO. 49

SAMPLE NO. 13

DEPTH 113.0' TO 115.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

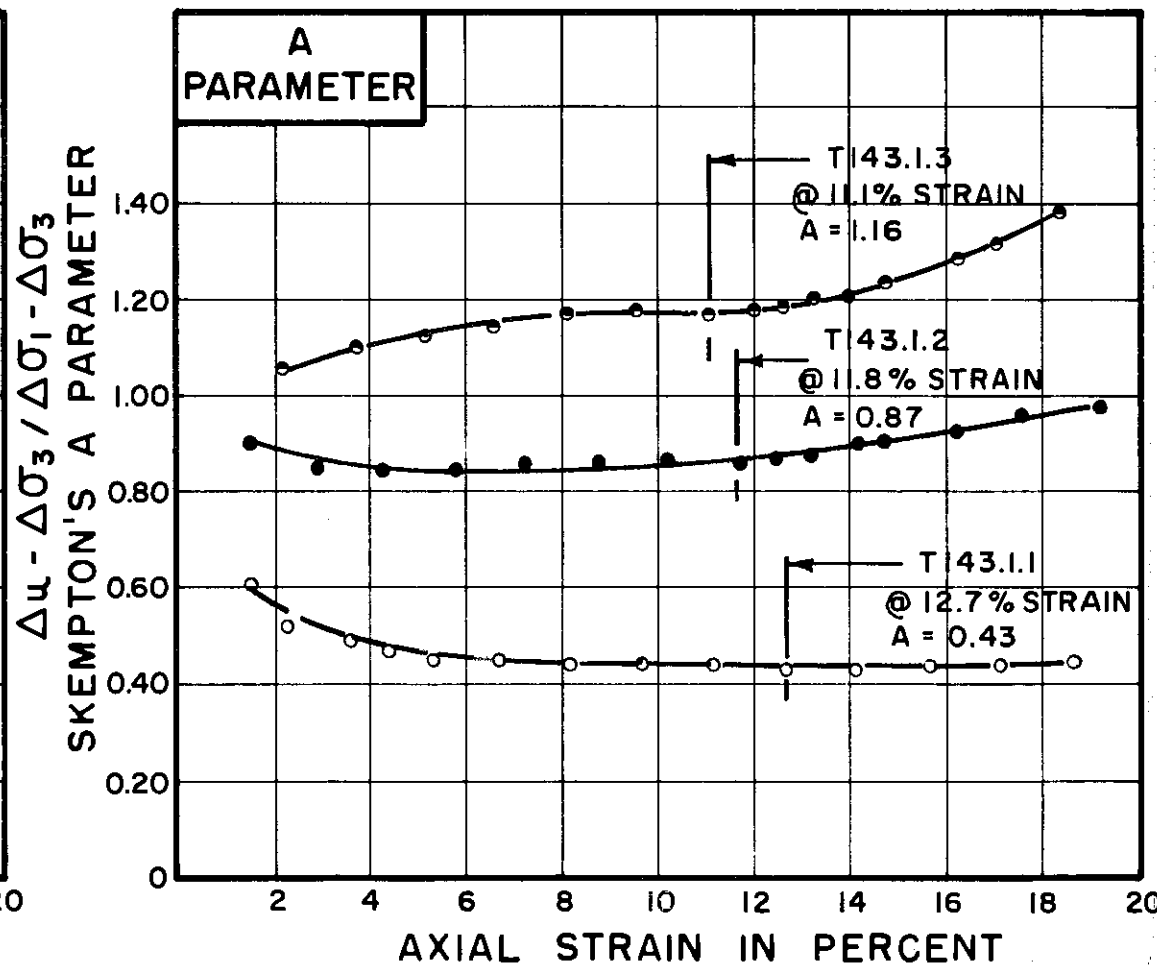
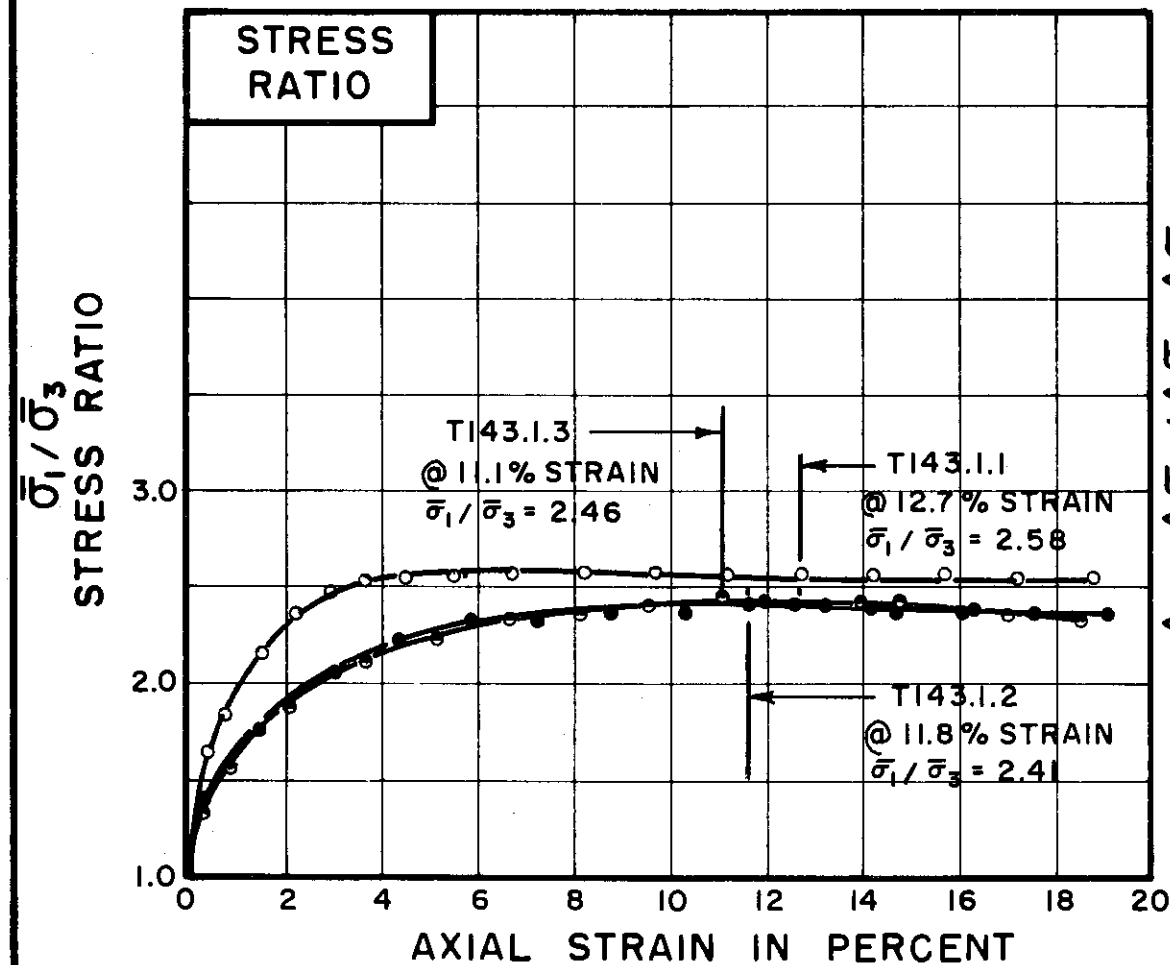
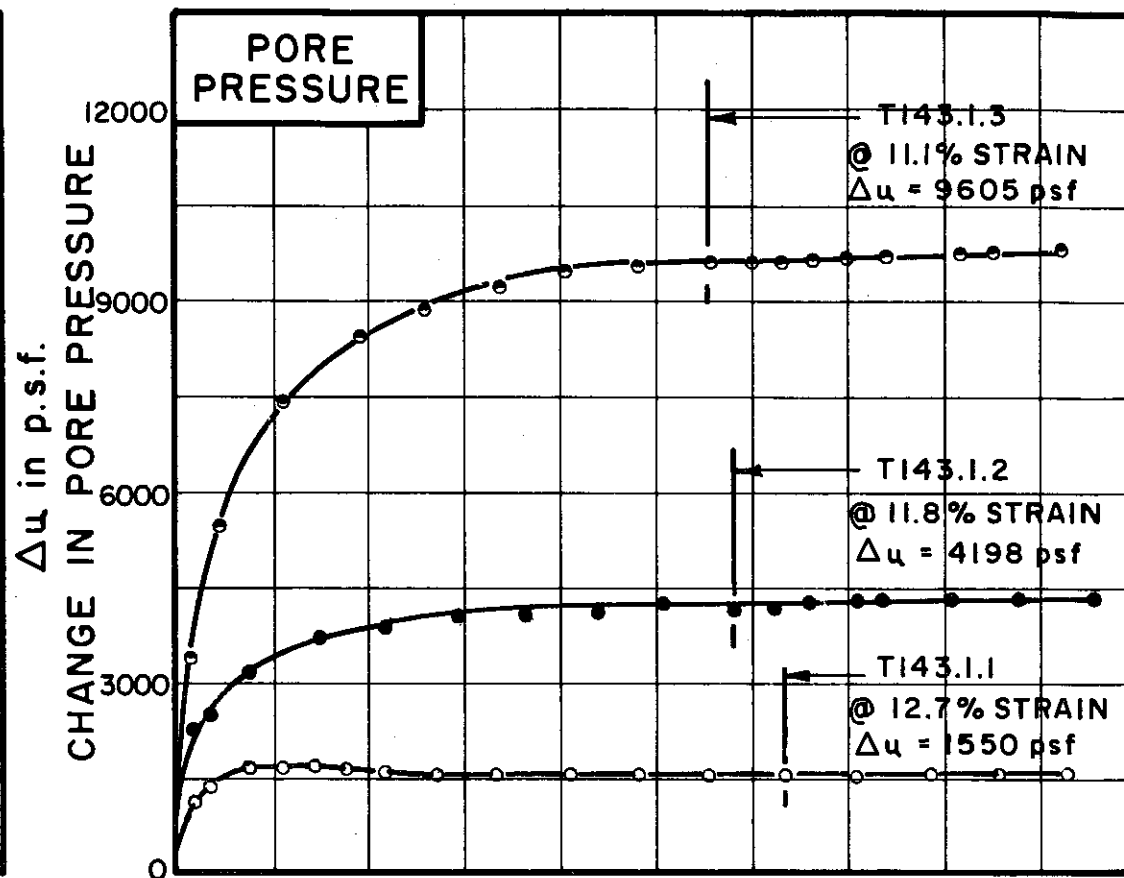
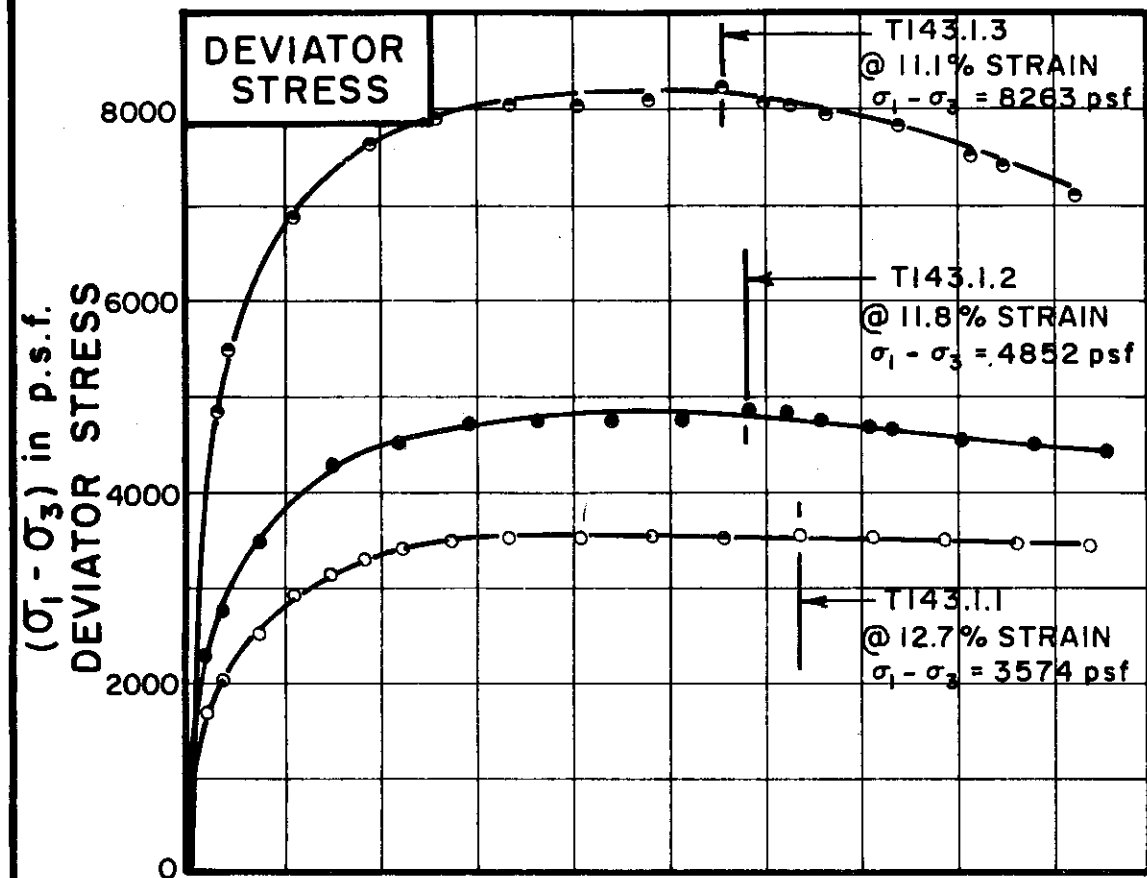
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-405



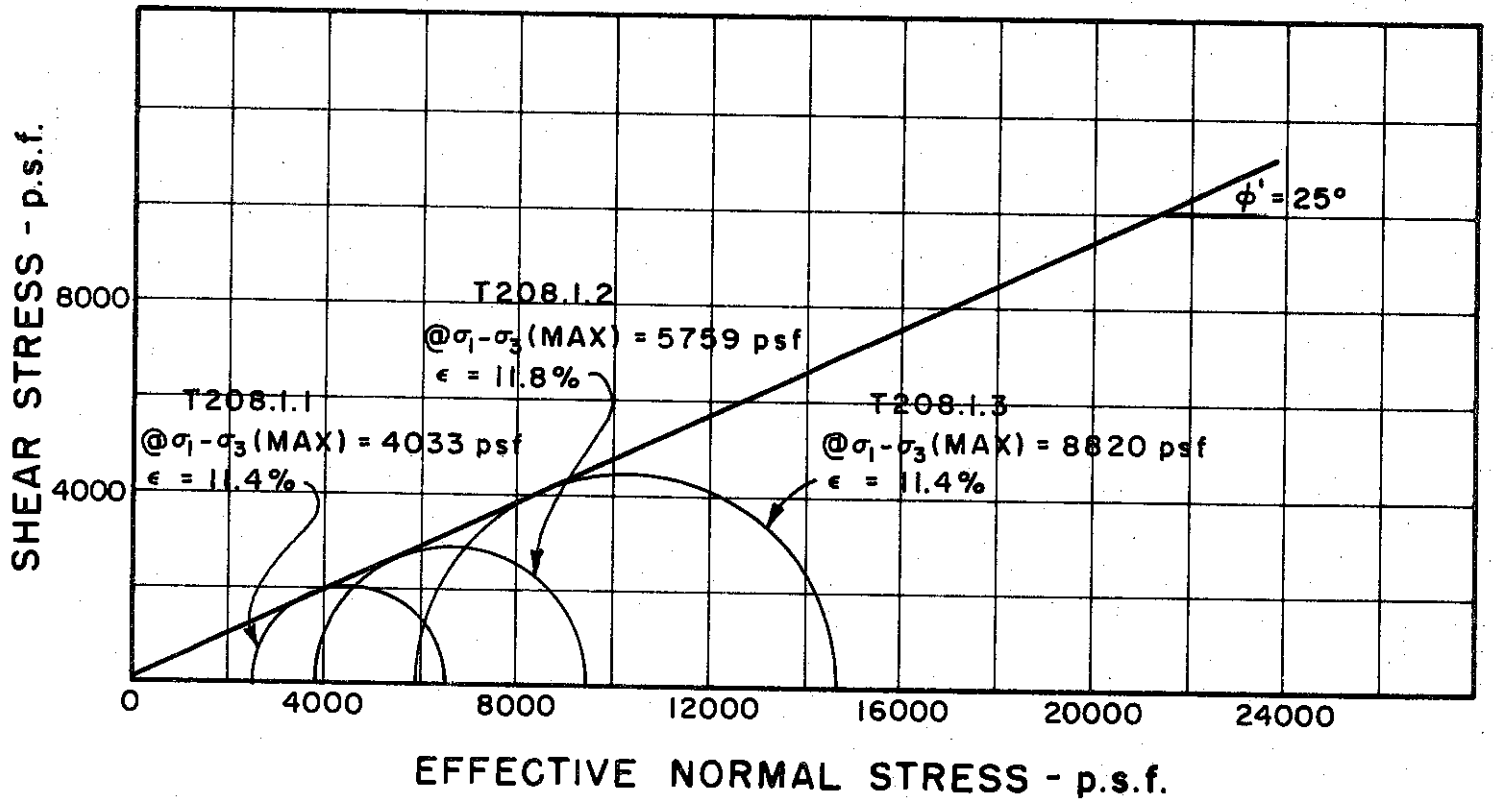
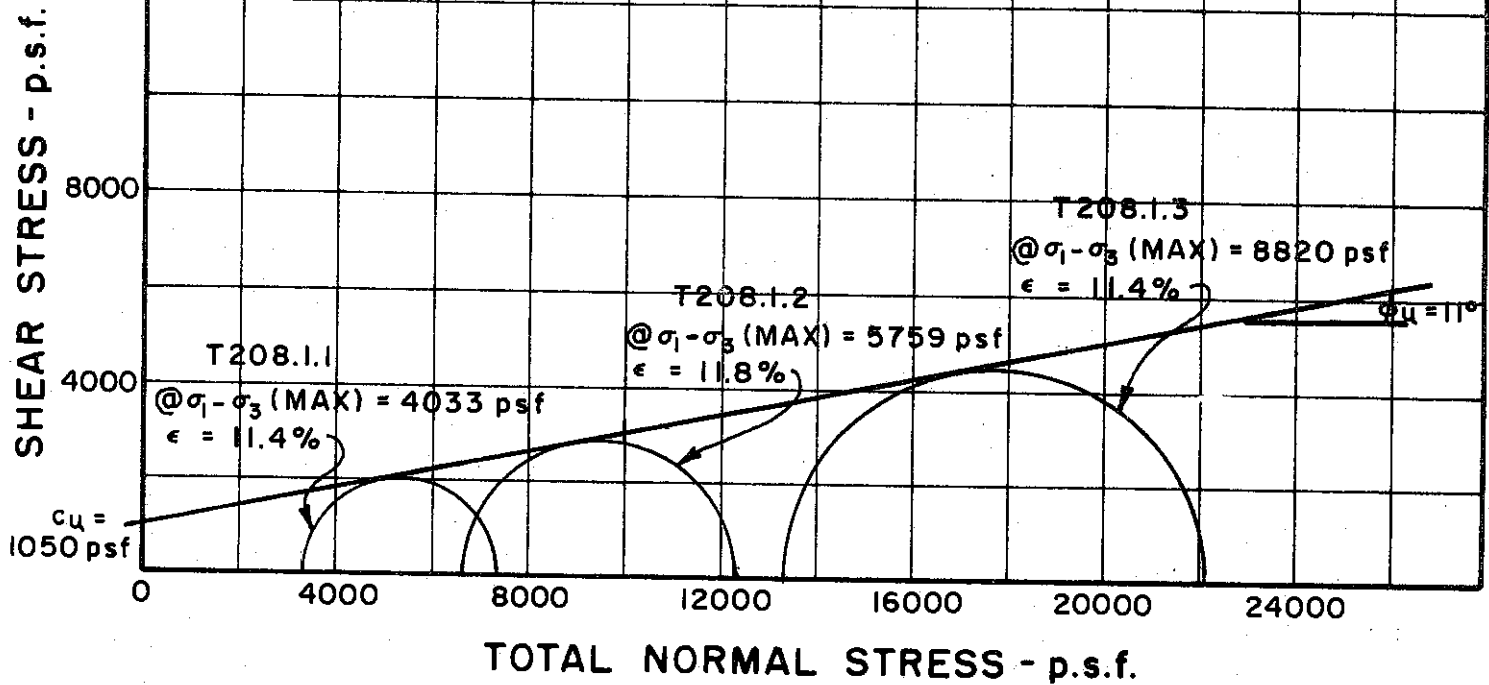
TEST NO. / SYMBOL	T143.1.1	T143.1.2	T143.1.3
	○	●	○

INITIAL CONDITIONS			T143.1.1	T143.1.2	T143.1.3
WATER CONTENT	$w_0$		24.0%	28.7%	29.2%
DRY DENSITY	$\gamma_d$	pcf	100	95	93
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.41
SAMPLE HEIGHT	$H_0$	in.	3.37	3.46	3.44
FINAL CONDITIONS BEFORE SHEAR			T143.1.1	T143.1.2	T143.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	11520	7200	7200
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	p.s.f.	3816	7632	15264
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.6%	5.1%	6.3%
PORE PRESSURE RESPONSE			95	100	100
WATER CONTENT	$w_f$		23.1%	26.5%	24.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 49  
 SAMPLE NO. 13  
 DEPTH 113.0' TO 115.0'  
 SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 33 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48

SAMPLE NO. 22

DEPTH 98.0' TO 100.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

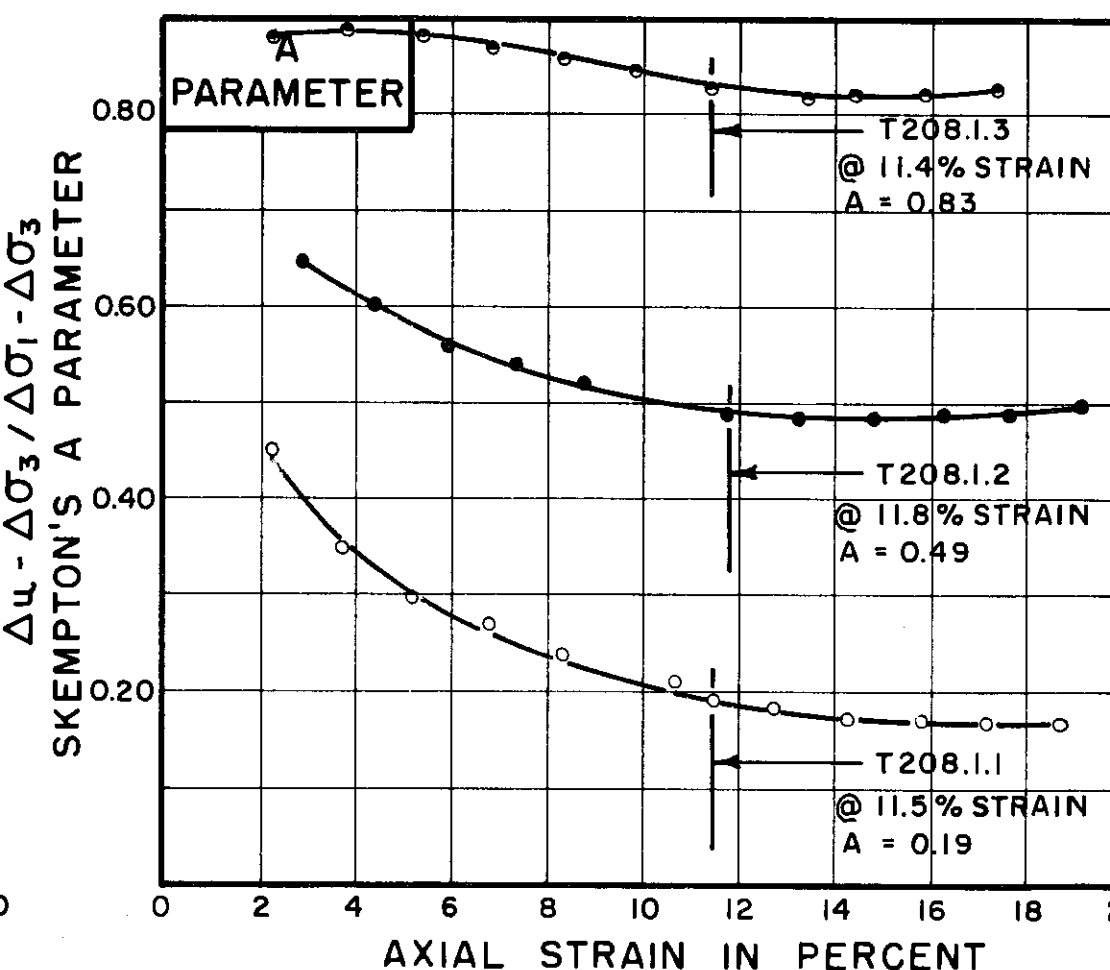
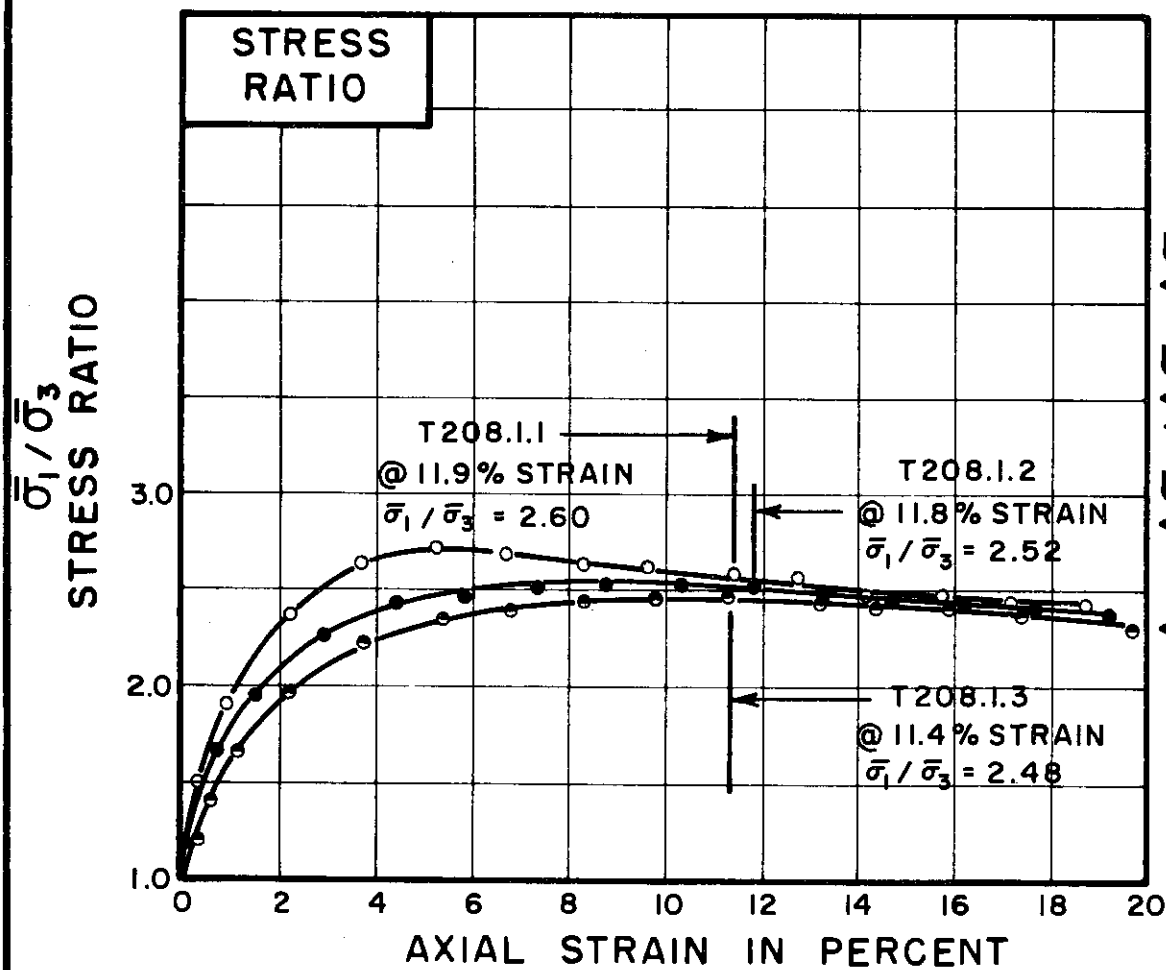
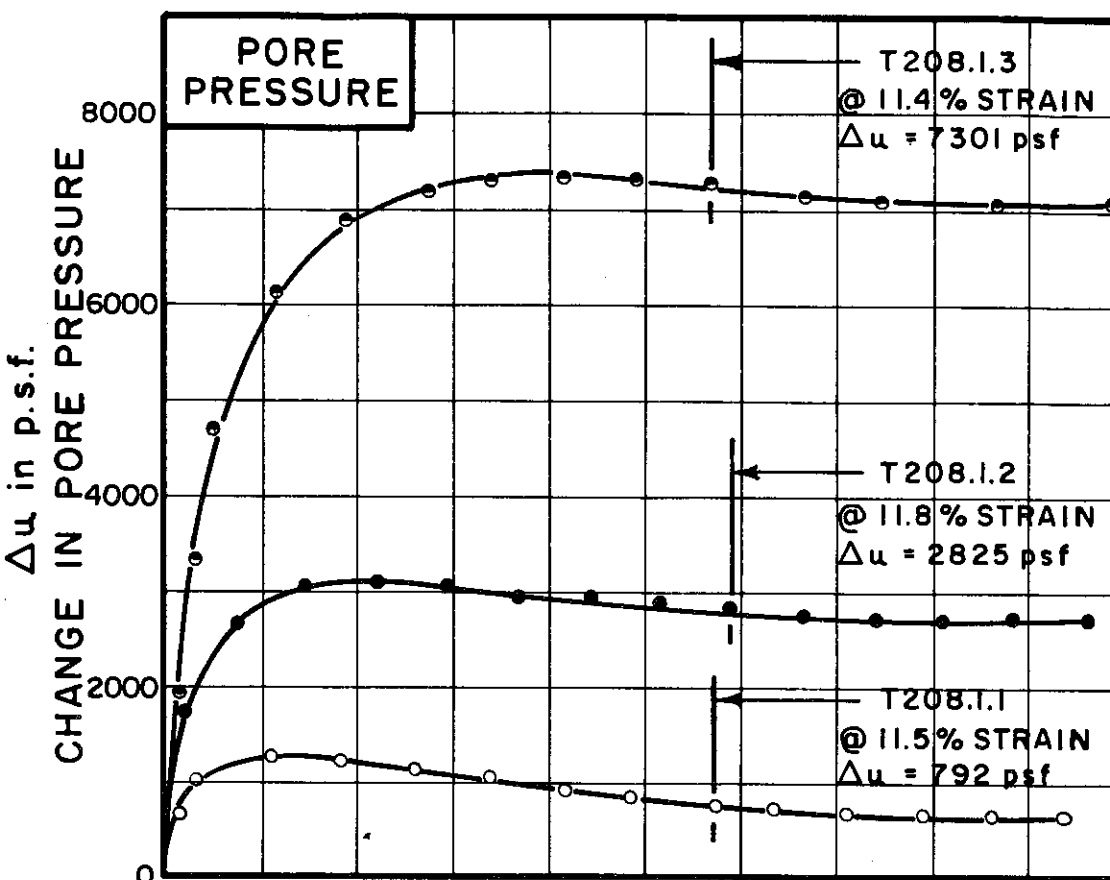
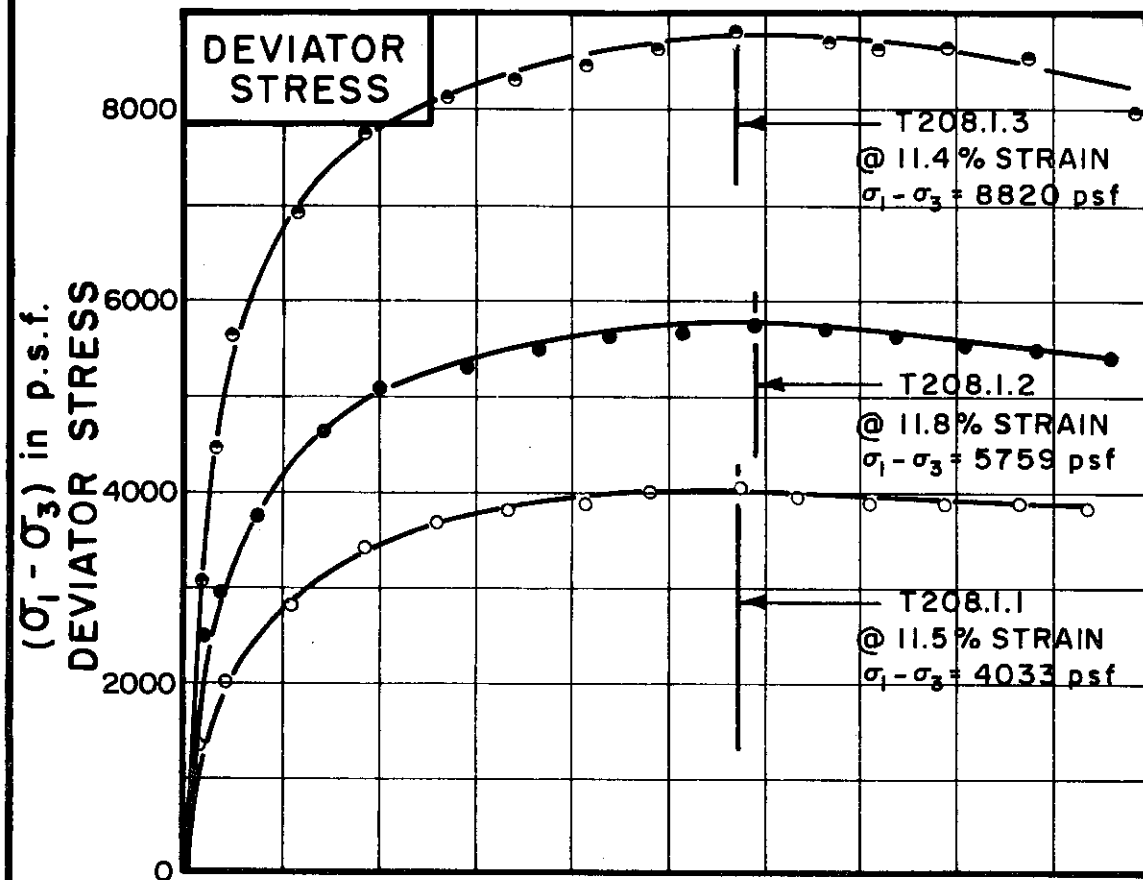
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO. / SYMBOL	T208.1.1	T208.1.2	T208.1.3
	○	●	○

INITIAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>0</sub>		26.8%	26.0%	27.6%
DRY DENSITY	γ <sub>d</sub>	pcf	99	96	97
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.36	3.44	3.32
FINAL CONDITIONS BEFORE SHEAR			T208.1.1	T208.1.2	T208.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	8640	11520	7200
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	p.s.f.	3312	6624	13248
VOLUMETRIC STRAIN	ε <sub>vol</sub>		3.0%	5.2%	7.8%
PORE PRESSURE RESPONSE			95%	94%	98%
FINAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>f</sub>		25.3%	23.7%	22.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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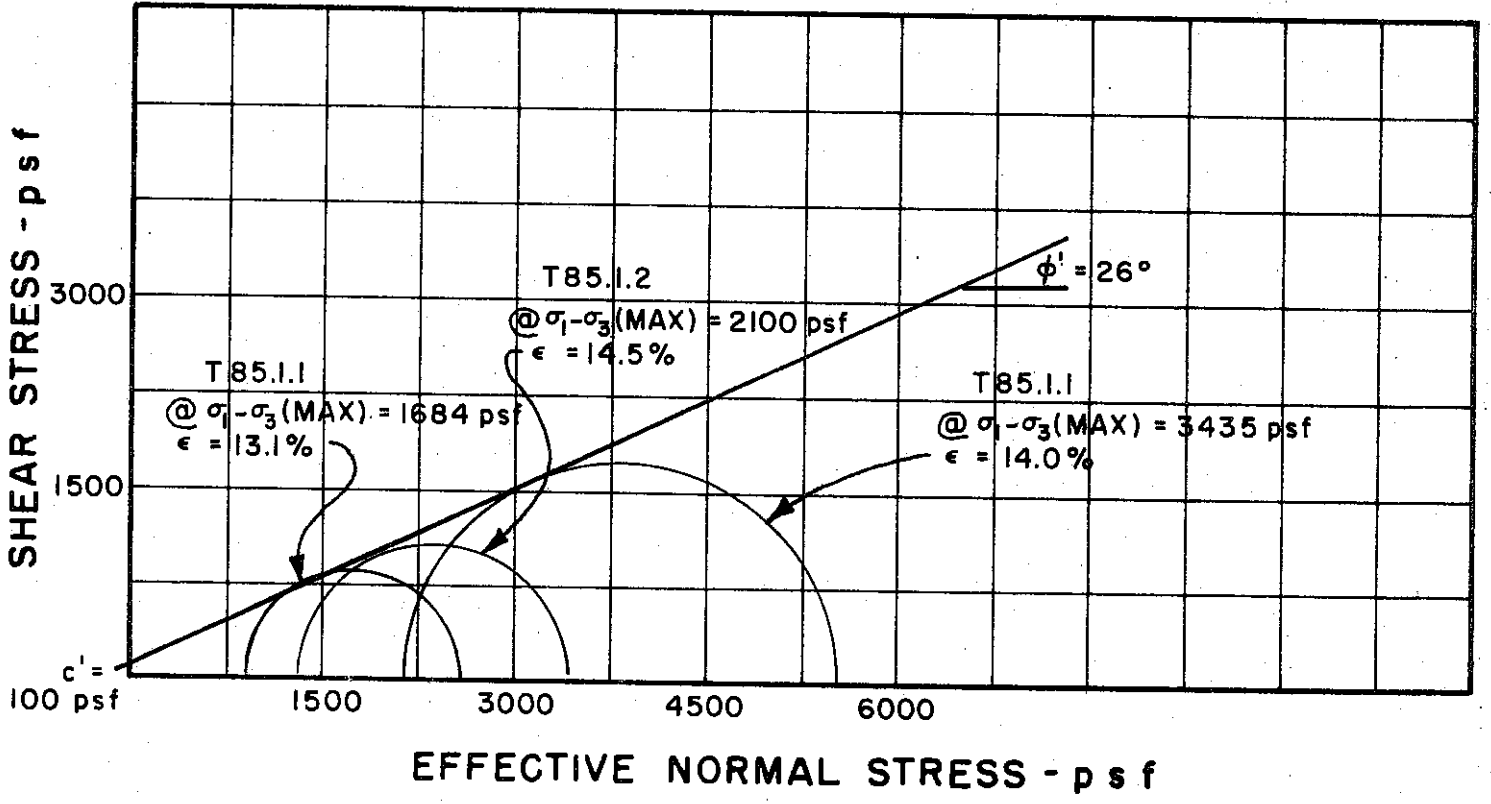
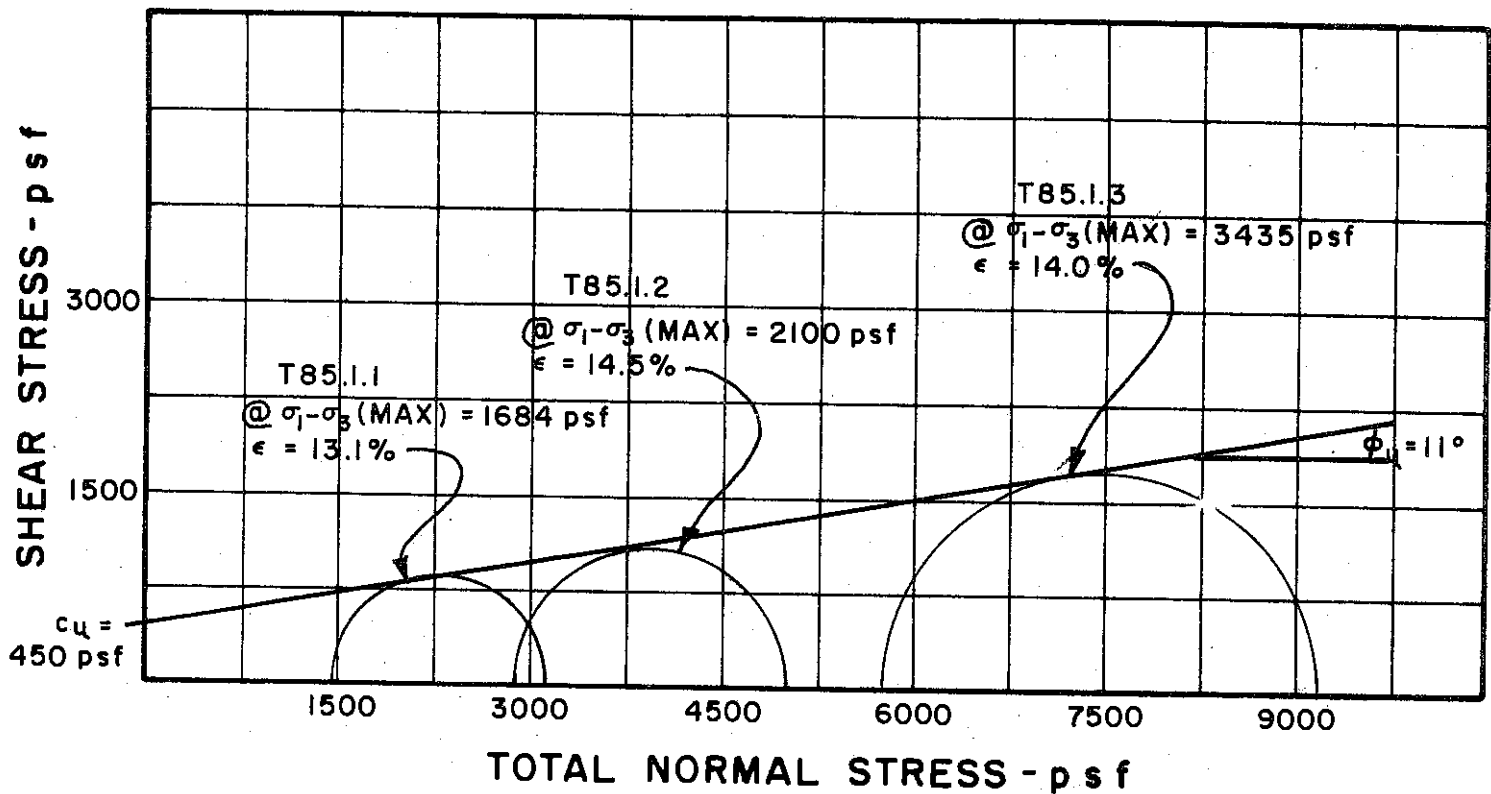
BORING NO. 48  
 SAMPLE NO. 22  
 DEPTH 98.0' TO 100.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-408

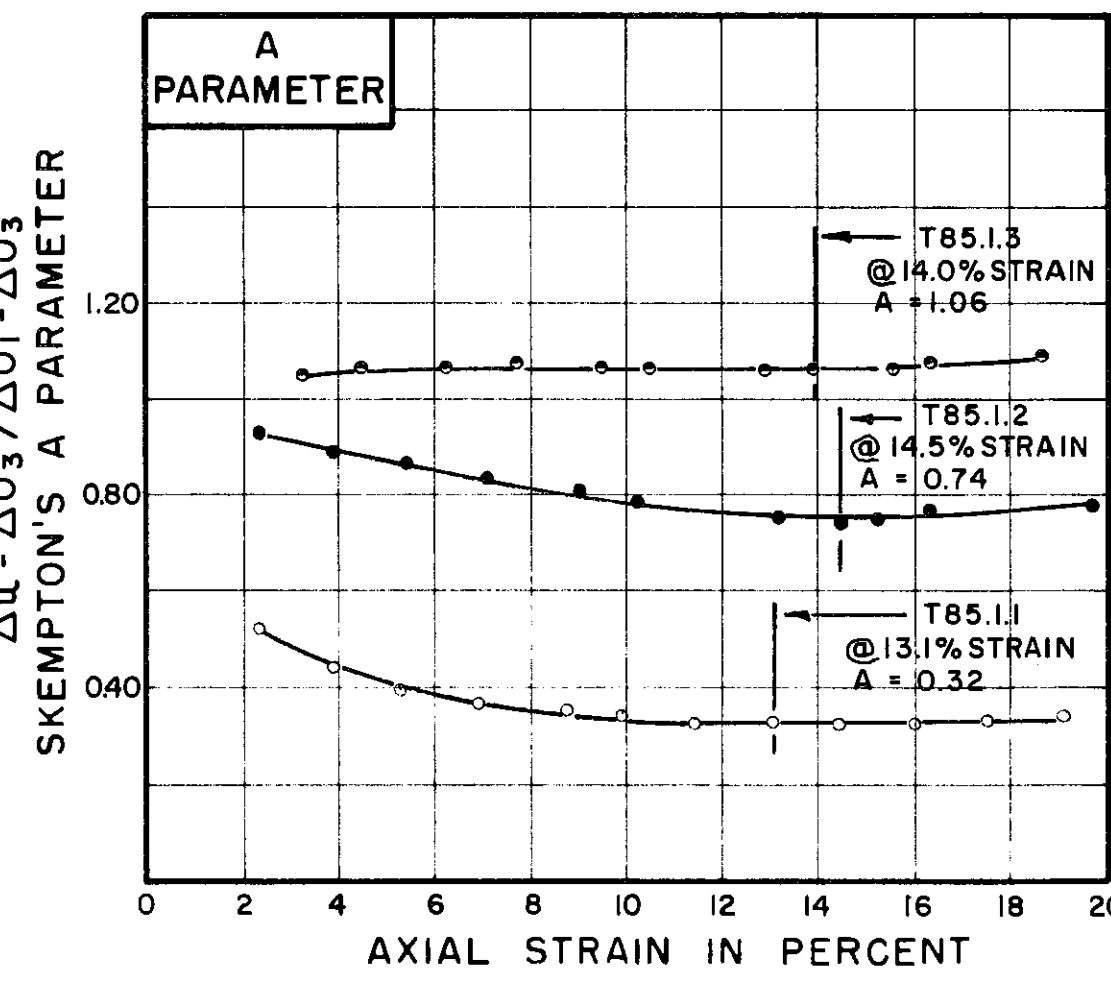
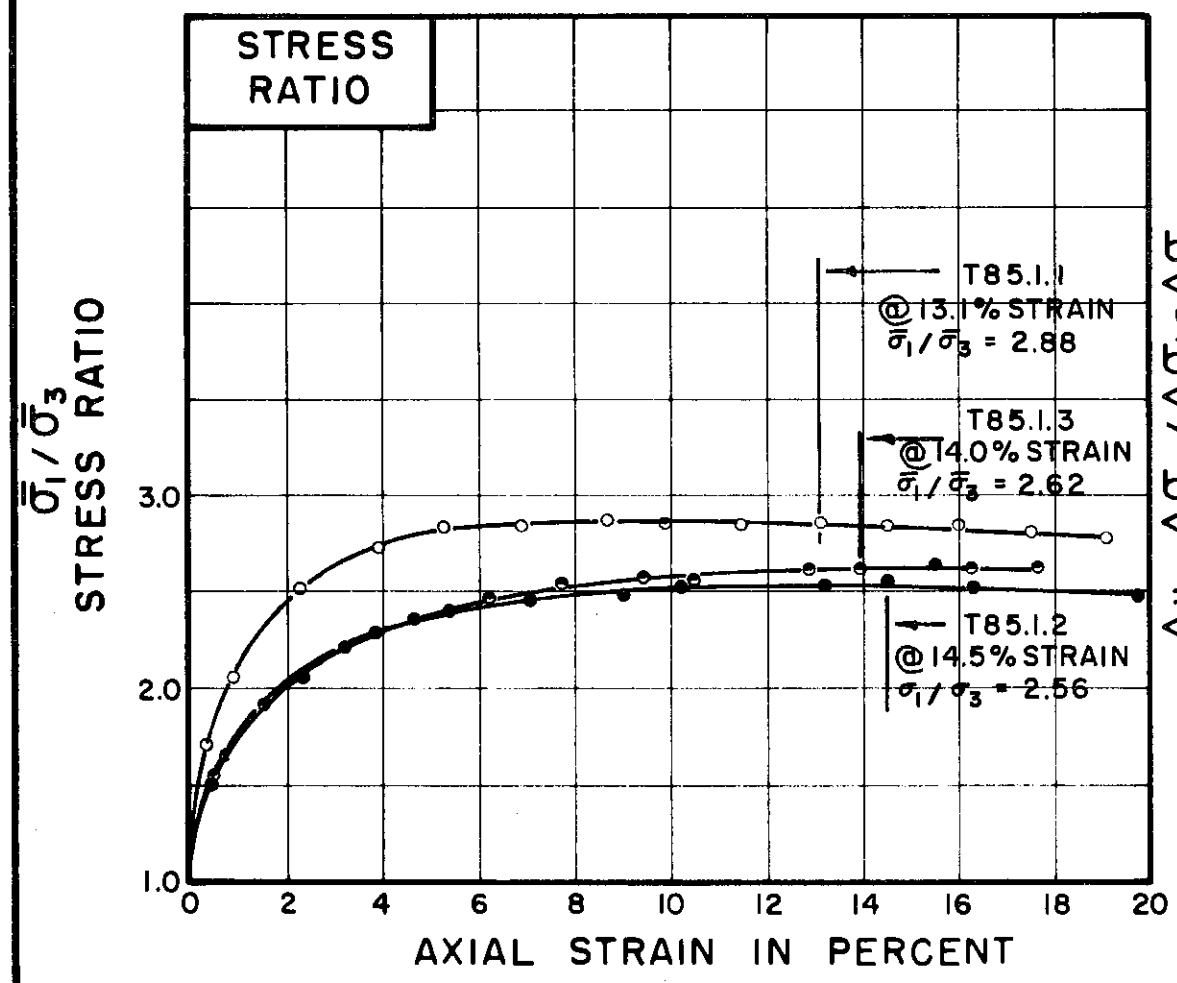
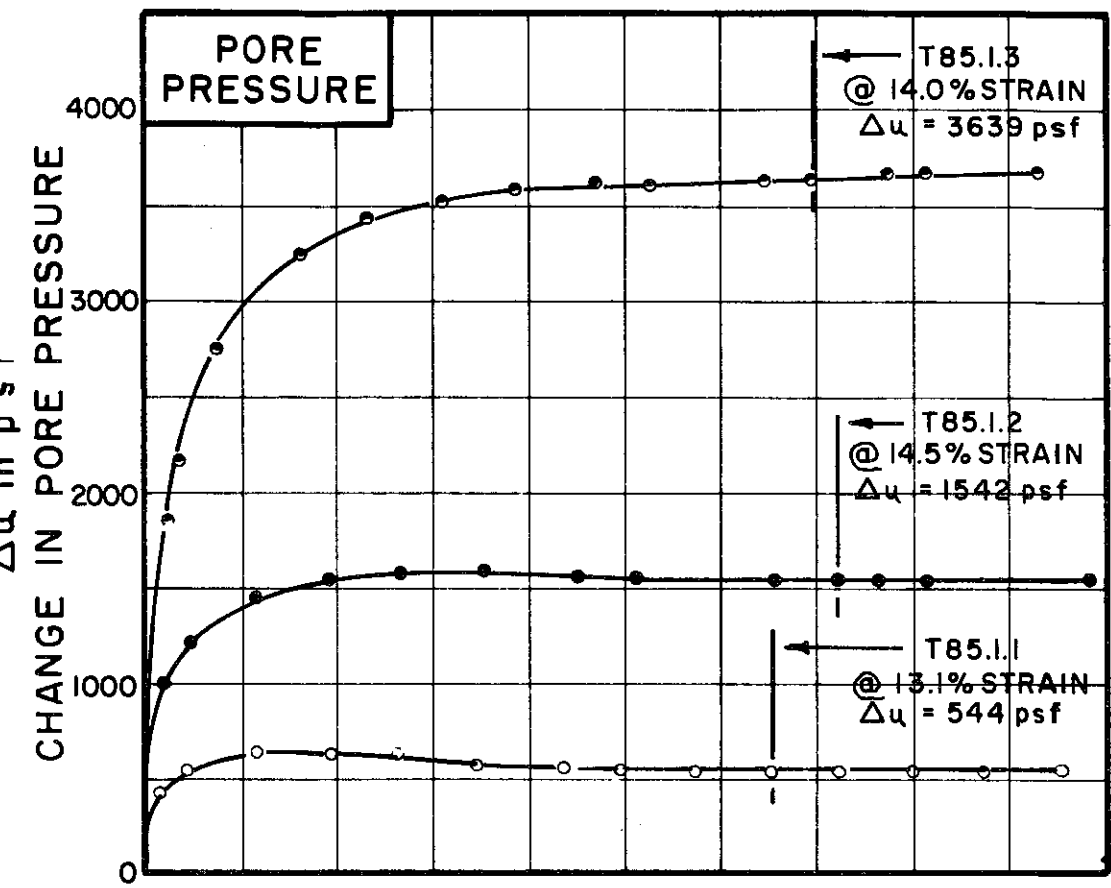
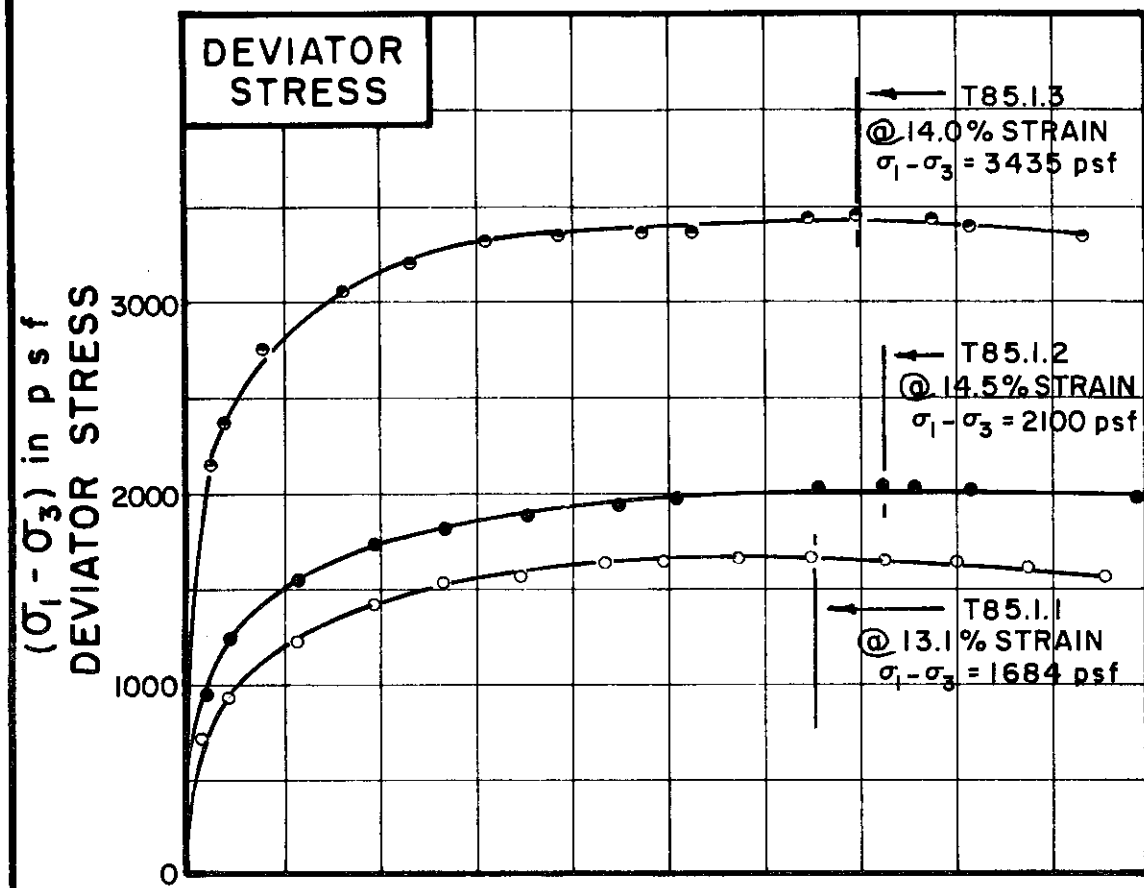


BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 \_\_\_\_\_  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-409



TEST NO. / SYMBOL	T85.1.1	T85.1.2	T85.1.3
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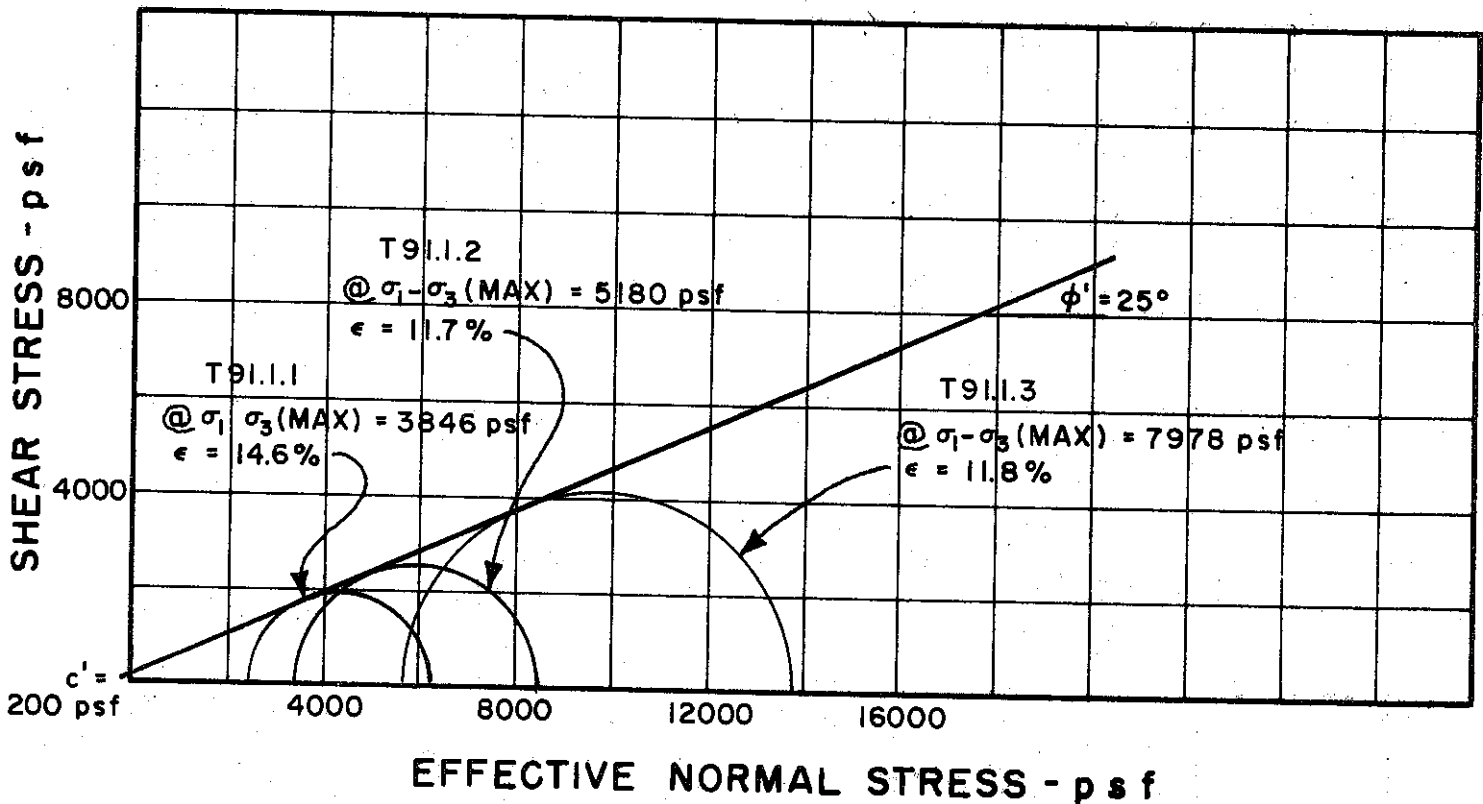
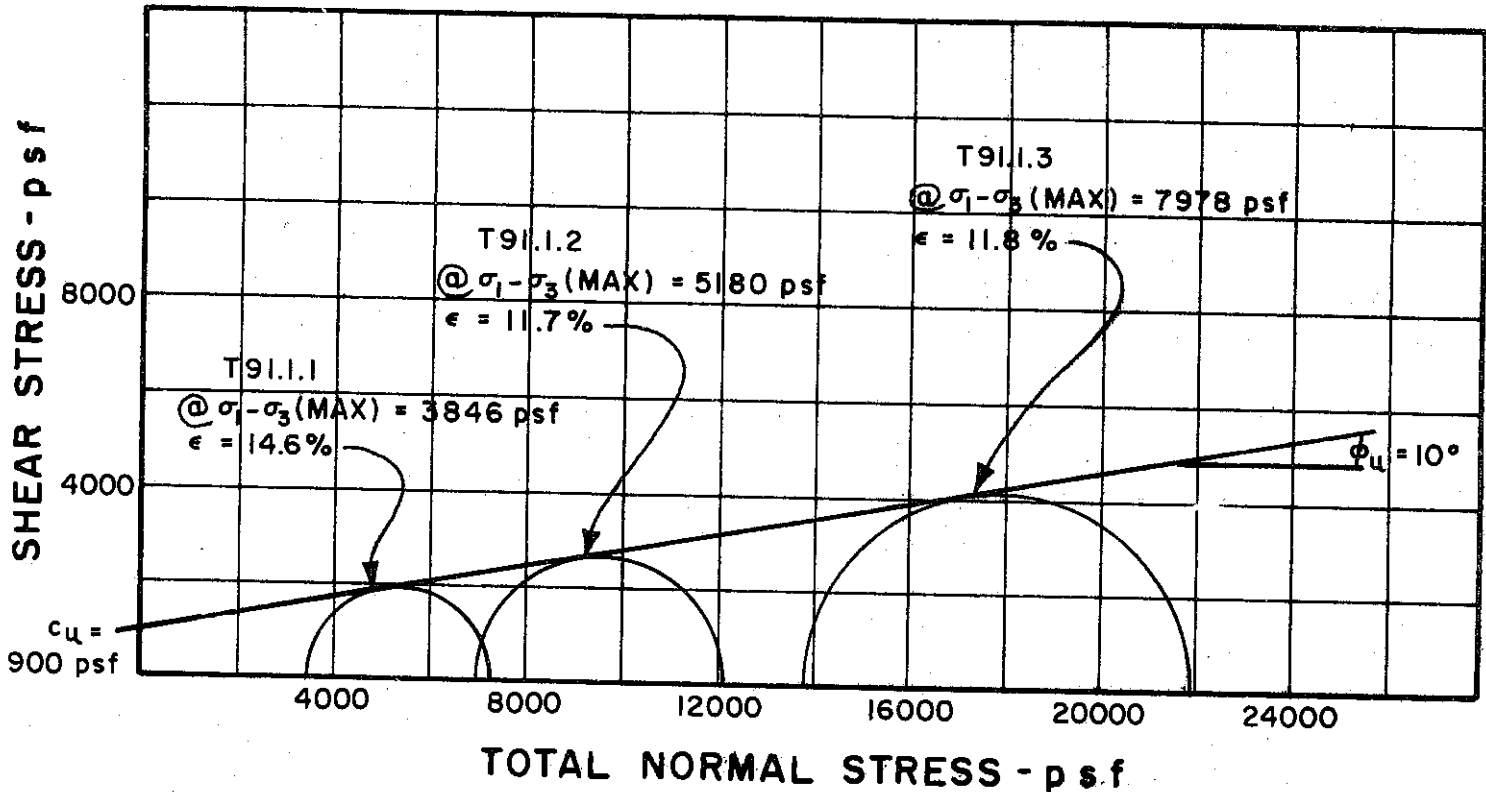
INITIAL CONDITIONS	WATER CONTENT	$w_0$	33.0%	33.1%	34.3%
	DRY DENSITY lb/cu ft	$\gamma_d$	88	90	86
SAMPLE DIAMETER in.	$D_0$	1.38	1.39	1.39	
SAMPLE HEIGHT in.	$H_0$	3.30	3.25	3.27	
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1, \bar{\sigma}_3$	1440	2880	5760
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.58%	3.18%	4.86%
	PORE PRESSURE RESPONSE	96%	95%	100%	
FINAL CONDITIONS	WATER CONTENT	$w_f$	31.5%	27.3%	28.5%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.024
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BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 39 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

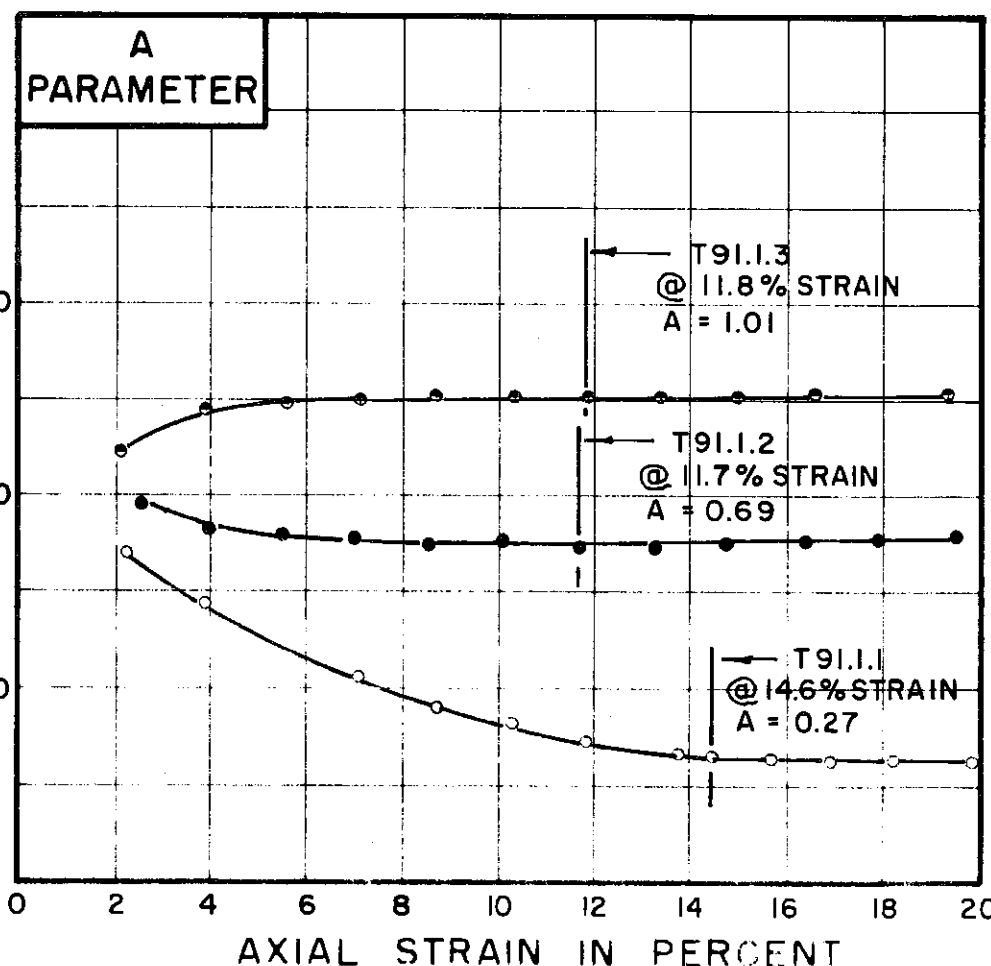
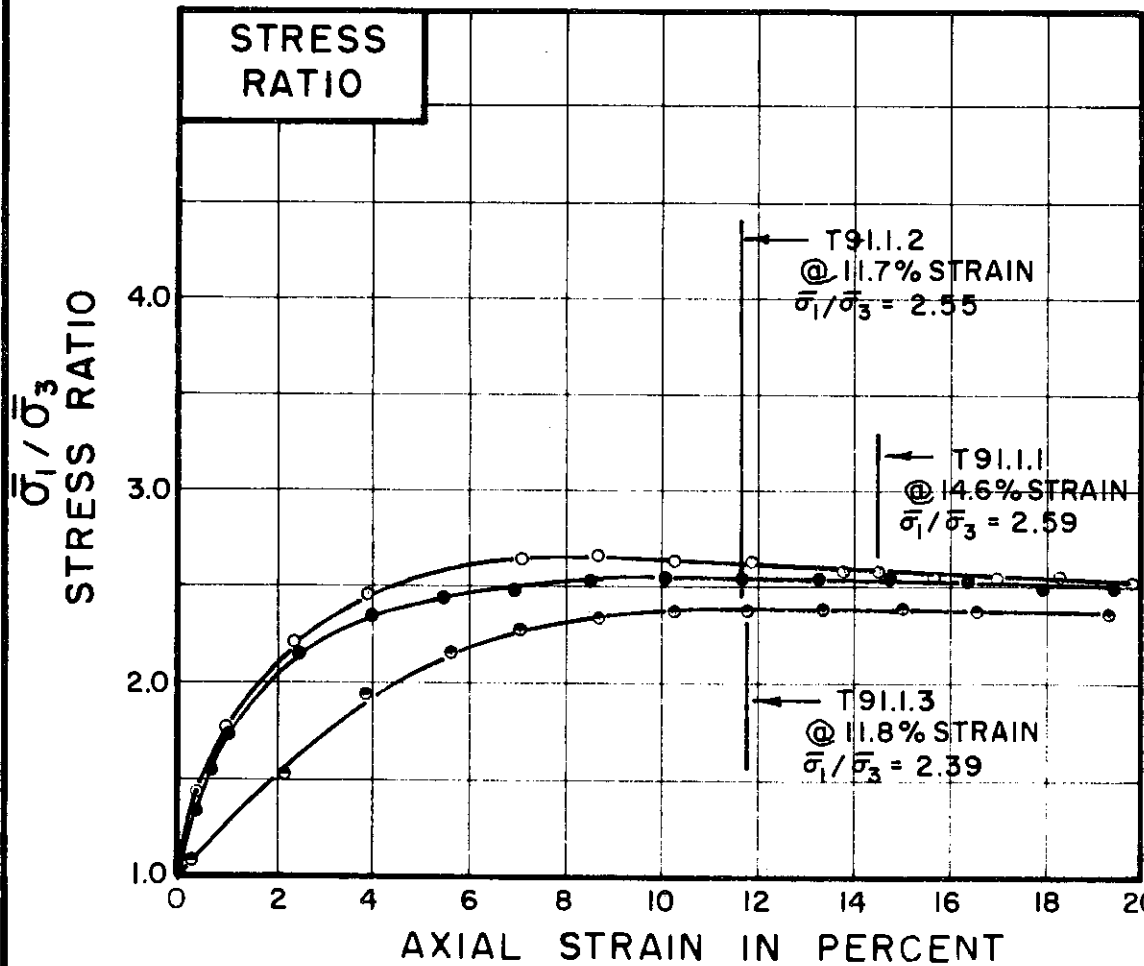
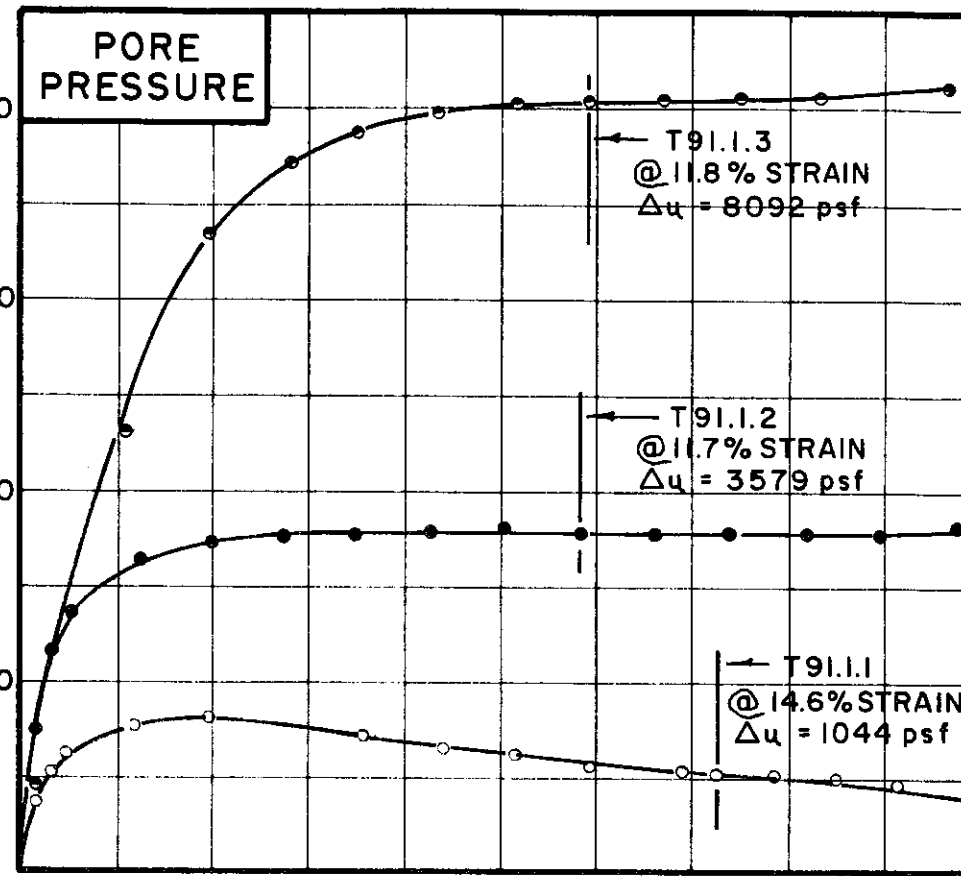
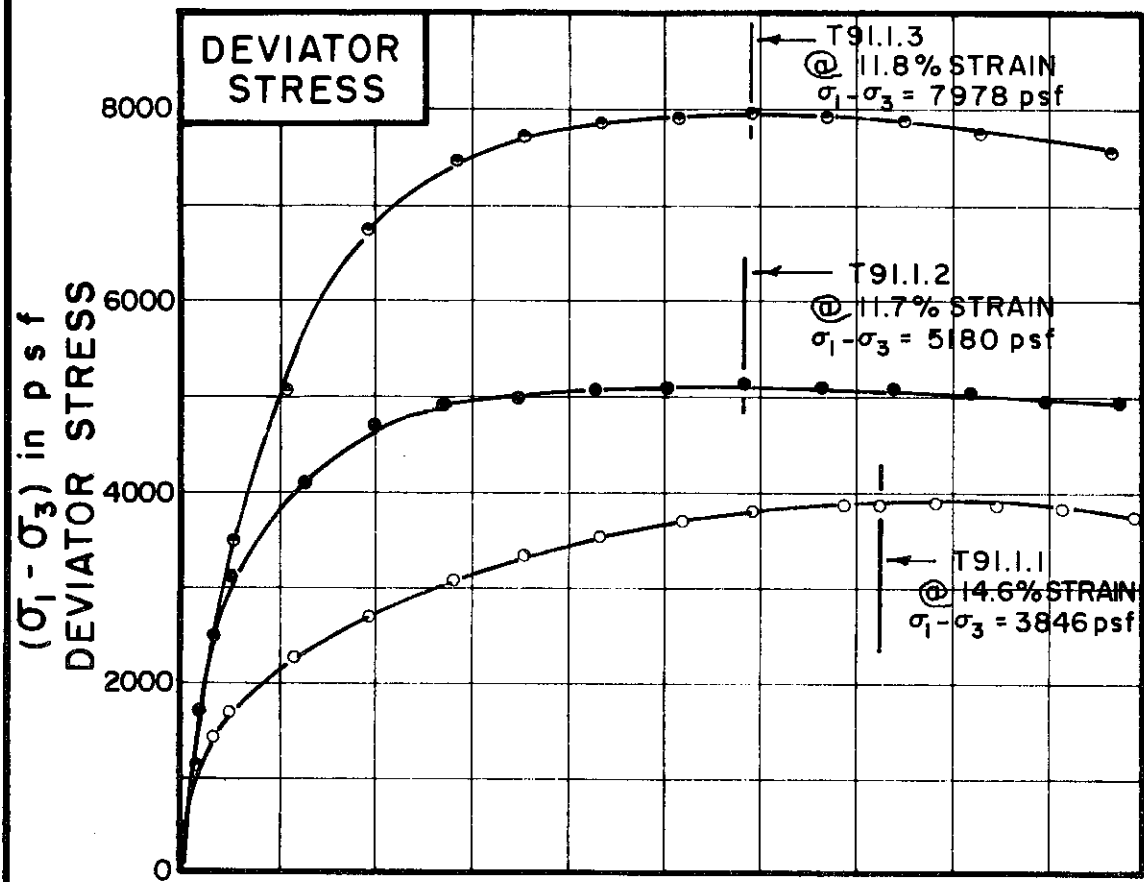


BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-411



TEST NO. / SYMBOL	T91.1.1	T91.1.2	T91.1.3
	○	●	○

INITIAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_0$		28.0%	27.6%	27.6%
DRY DENSITY	$\gamma_d$	lb/cu ft	97	97	96
SAMPLE DIAMETER	$D_0$	in.	1.37	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.18	3.25	3.25
FINAL CONDITIONS BEFORE SHEAR			T91.1.1	T91.1.2	T91.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	8640	12960
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	3456	6912	13824
VOLUMETRIC STRAIN	$\epsilon_{vol}$		3.54%	4.24%	6.87%
PORE PRESSURE RESPONSE			96%	95%	96%
FINAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_f$		25.5%	26.0%	22.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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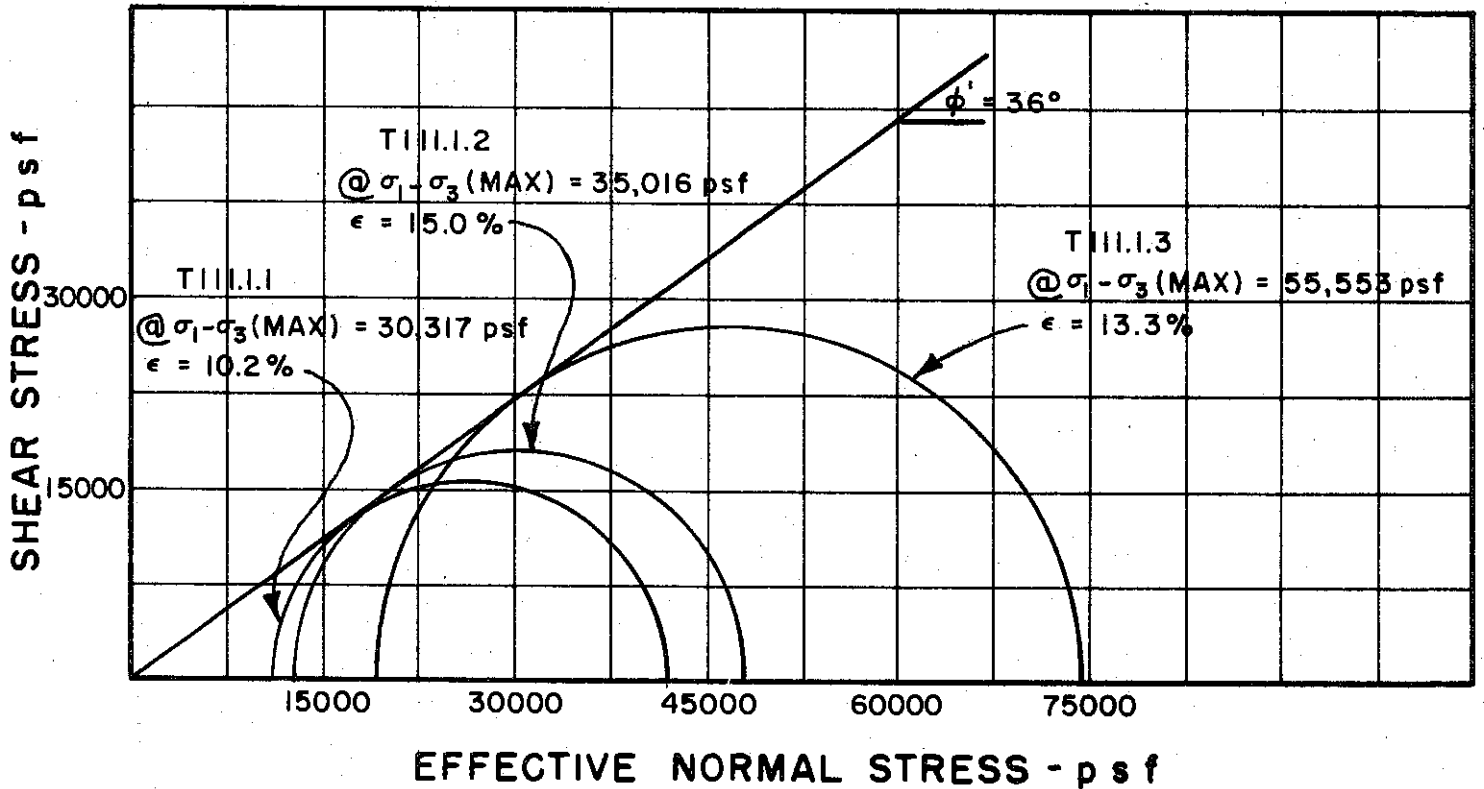
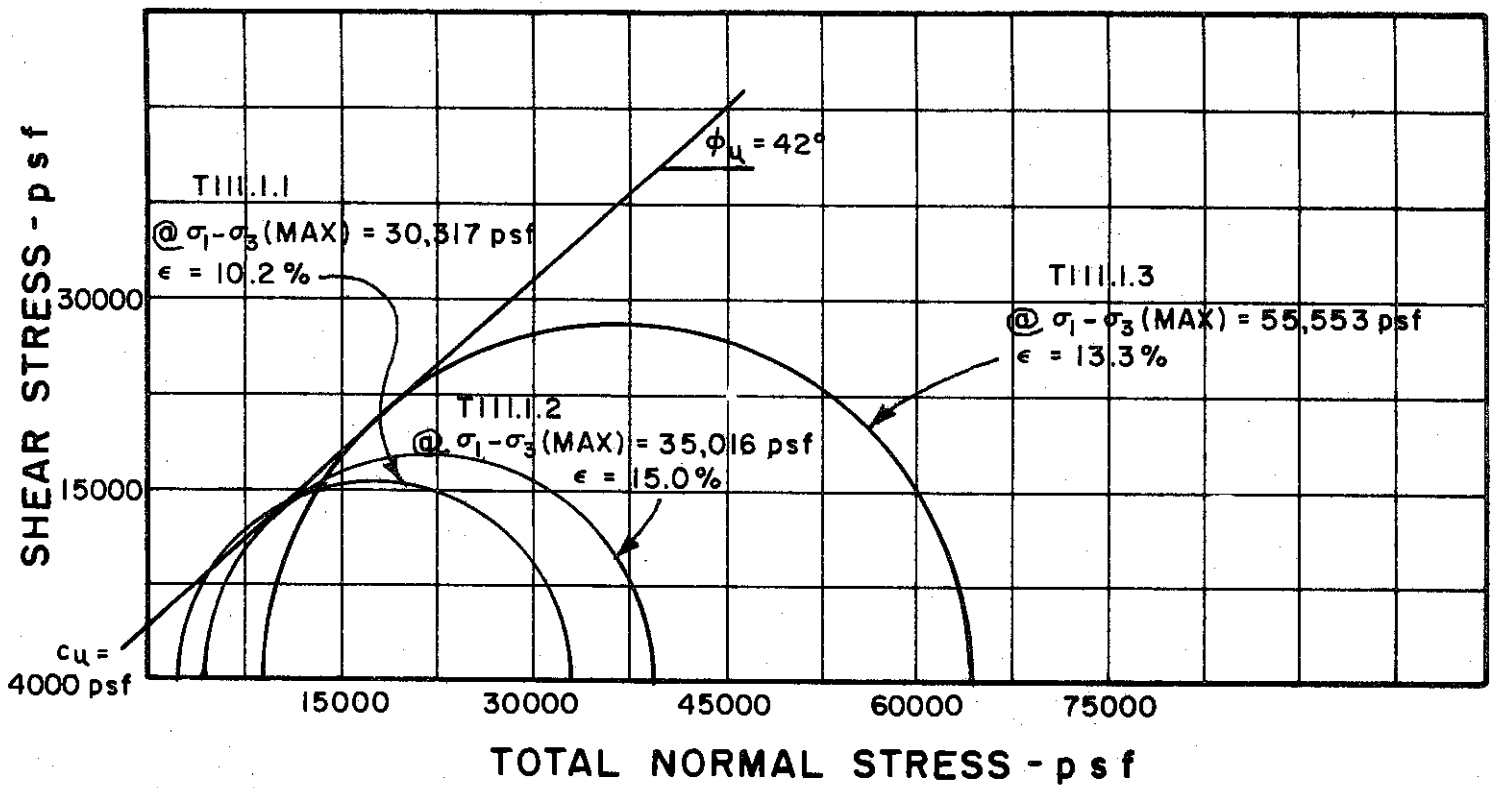
BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 52

SAMPLE NO. 6

DEPTH 48.0' TO 50.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

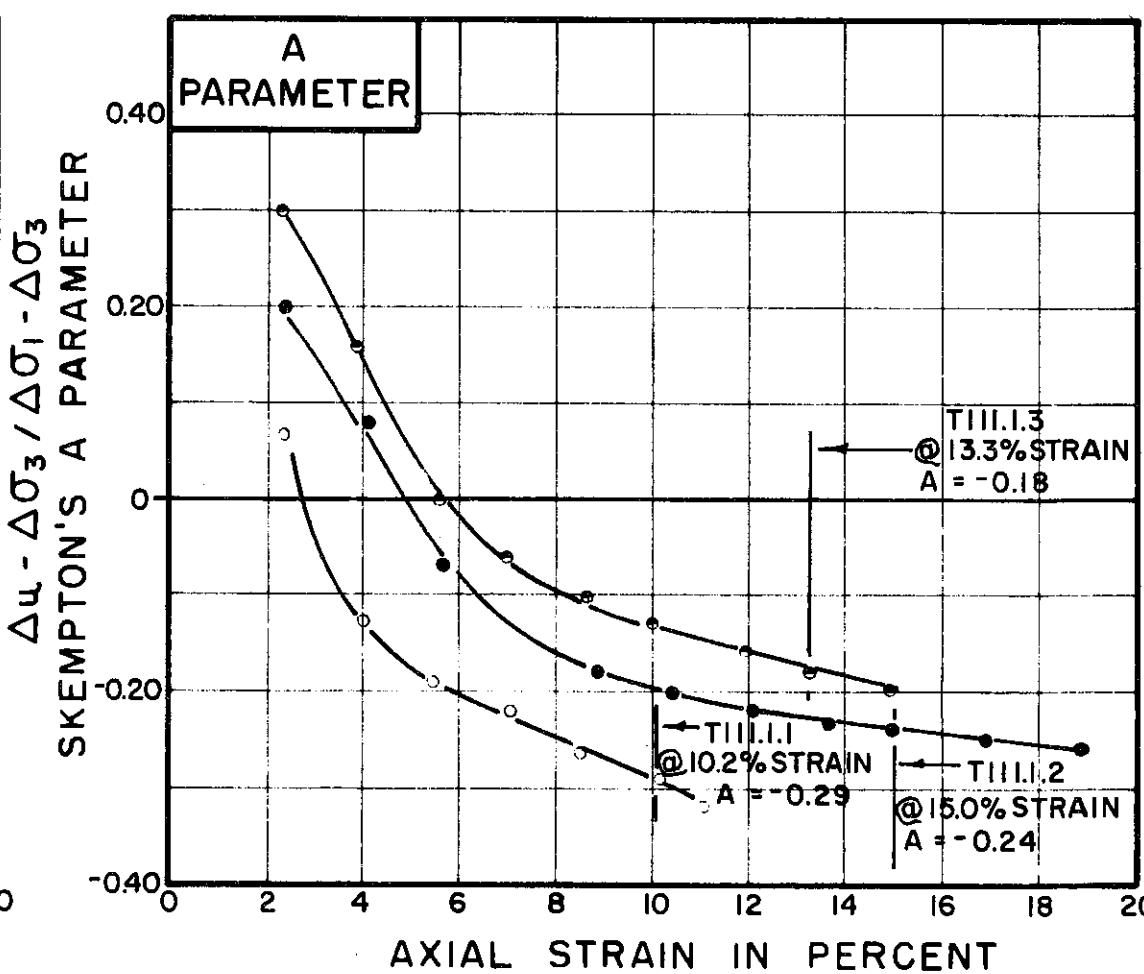
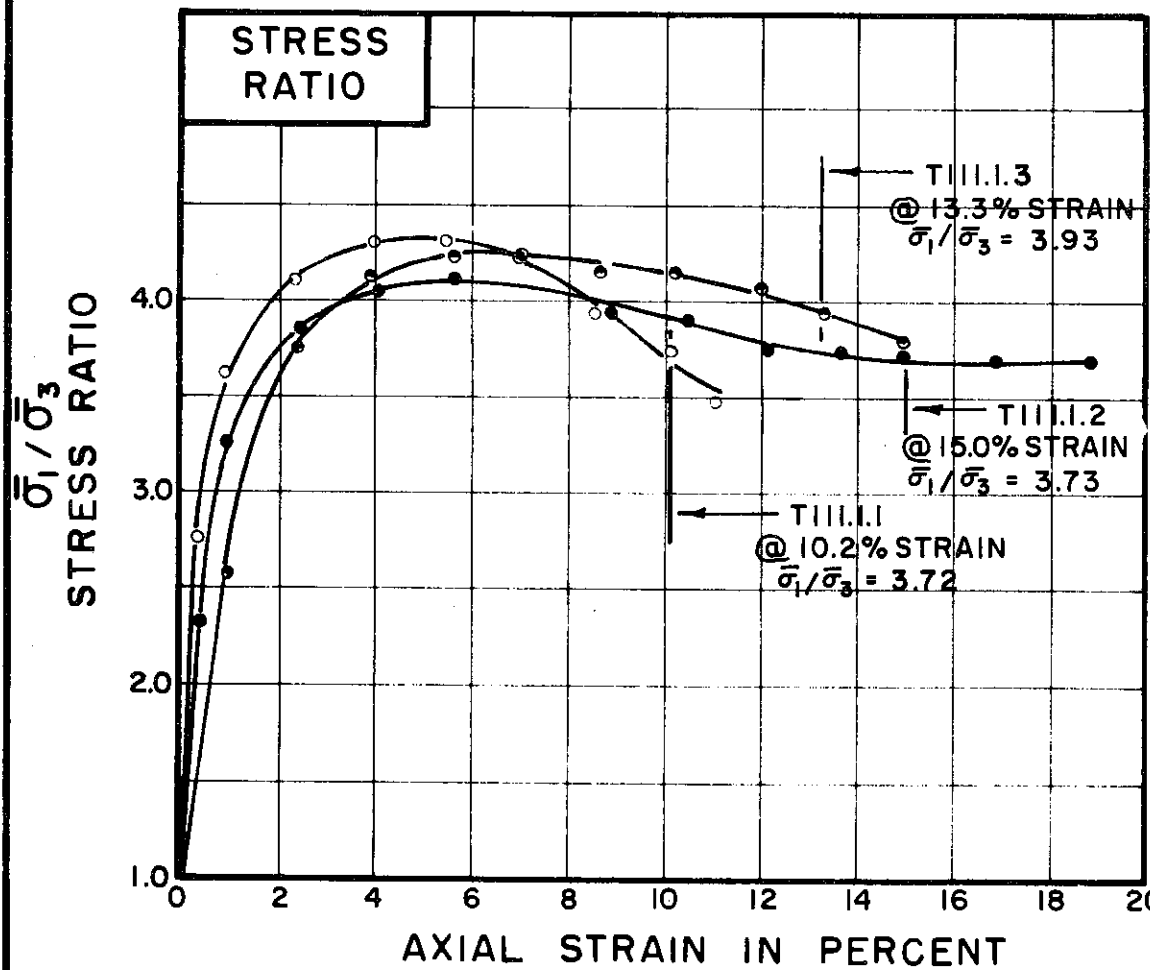
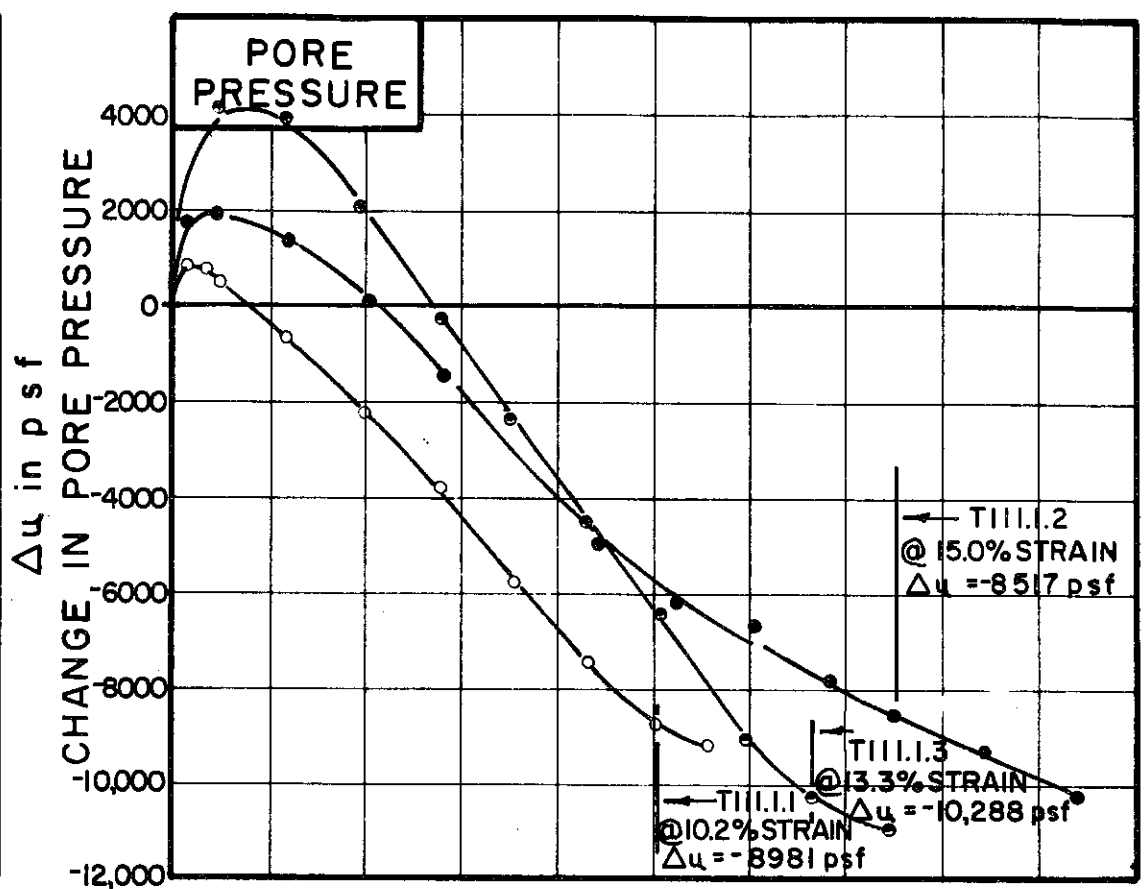
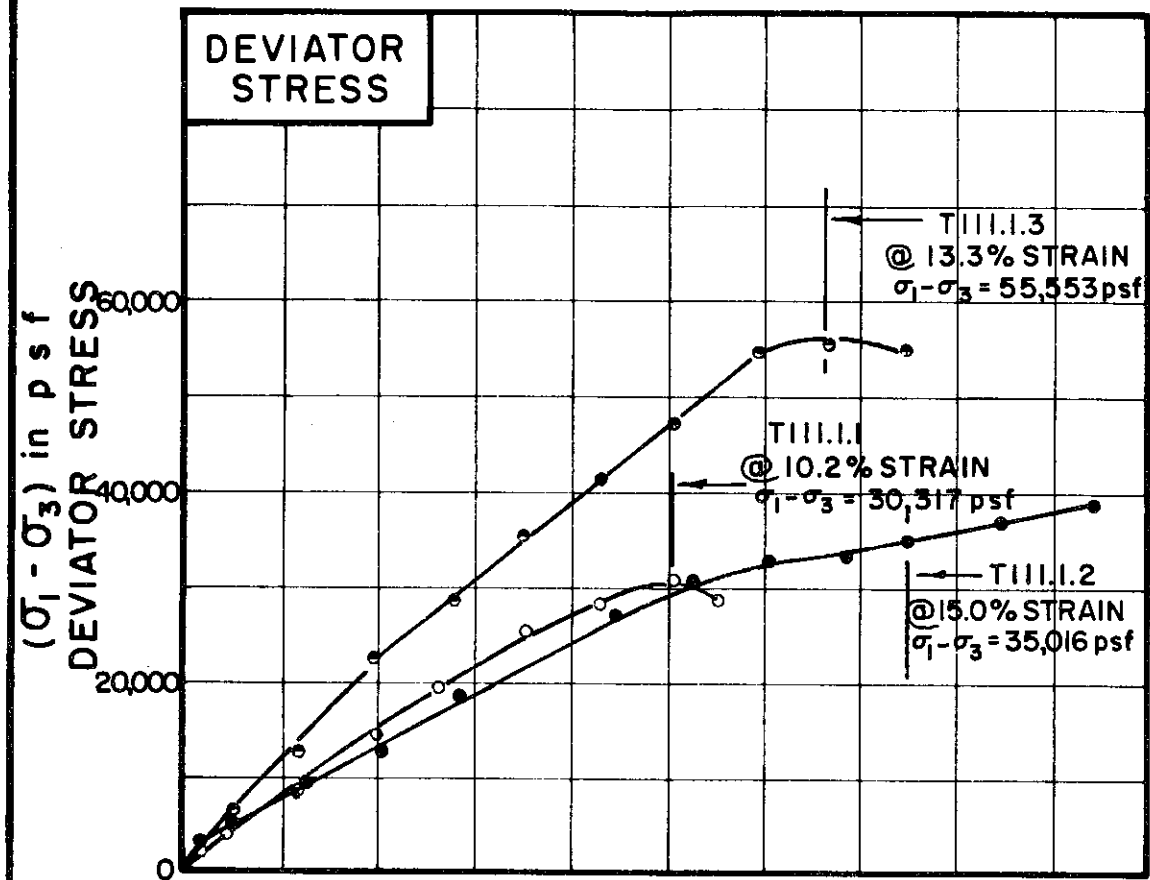
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-413



TEST NO. / SYMBOL	TIII.I.1	TIII.I.2	TIII.I.3
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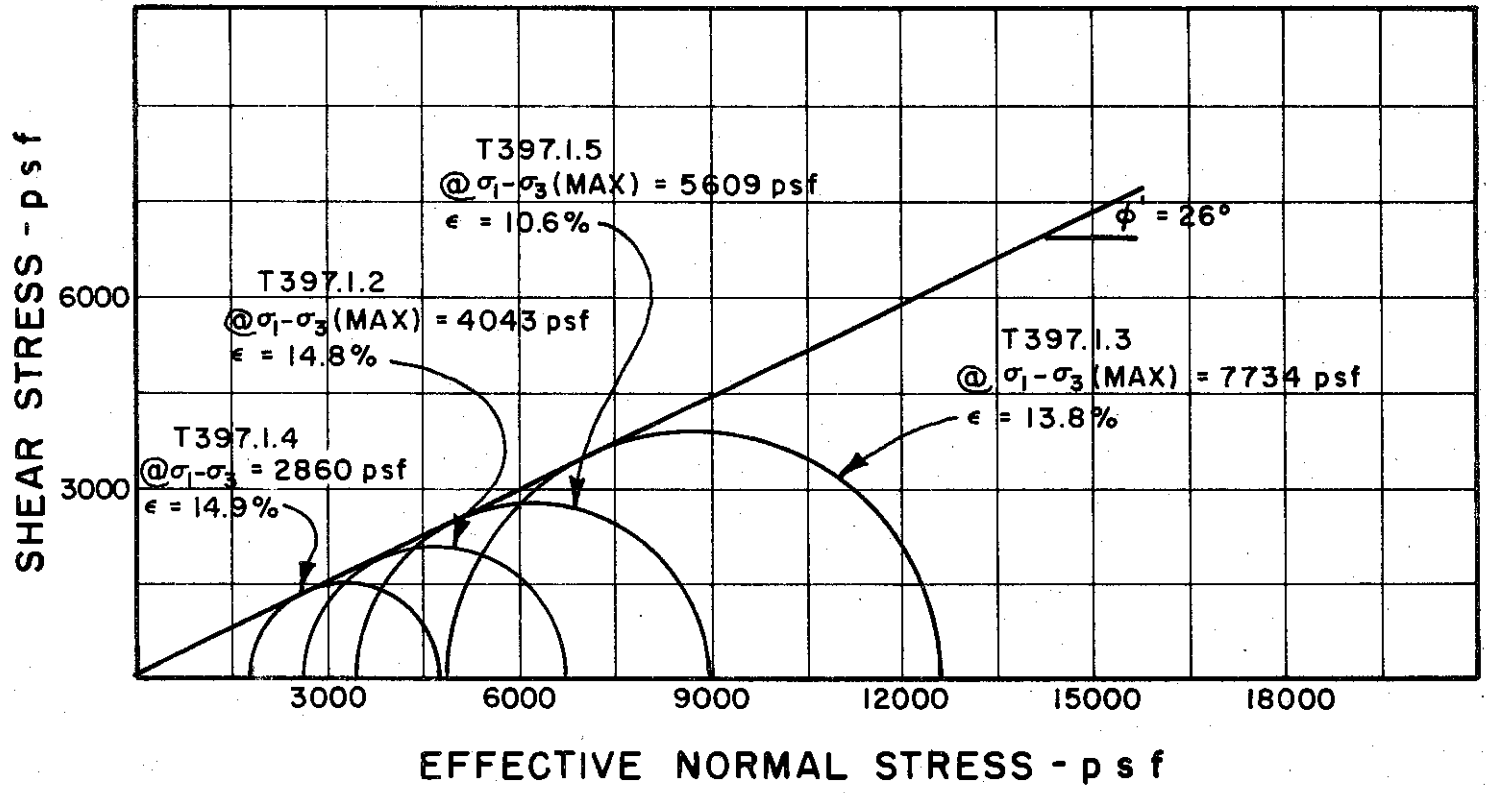
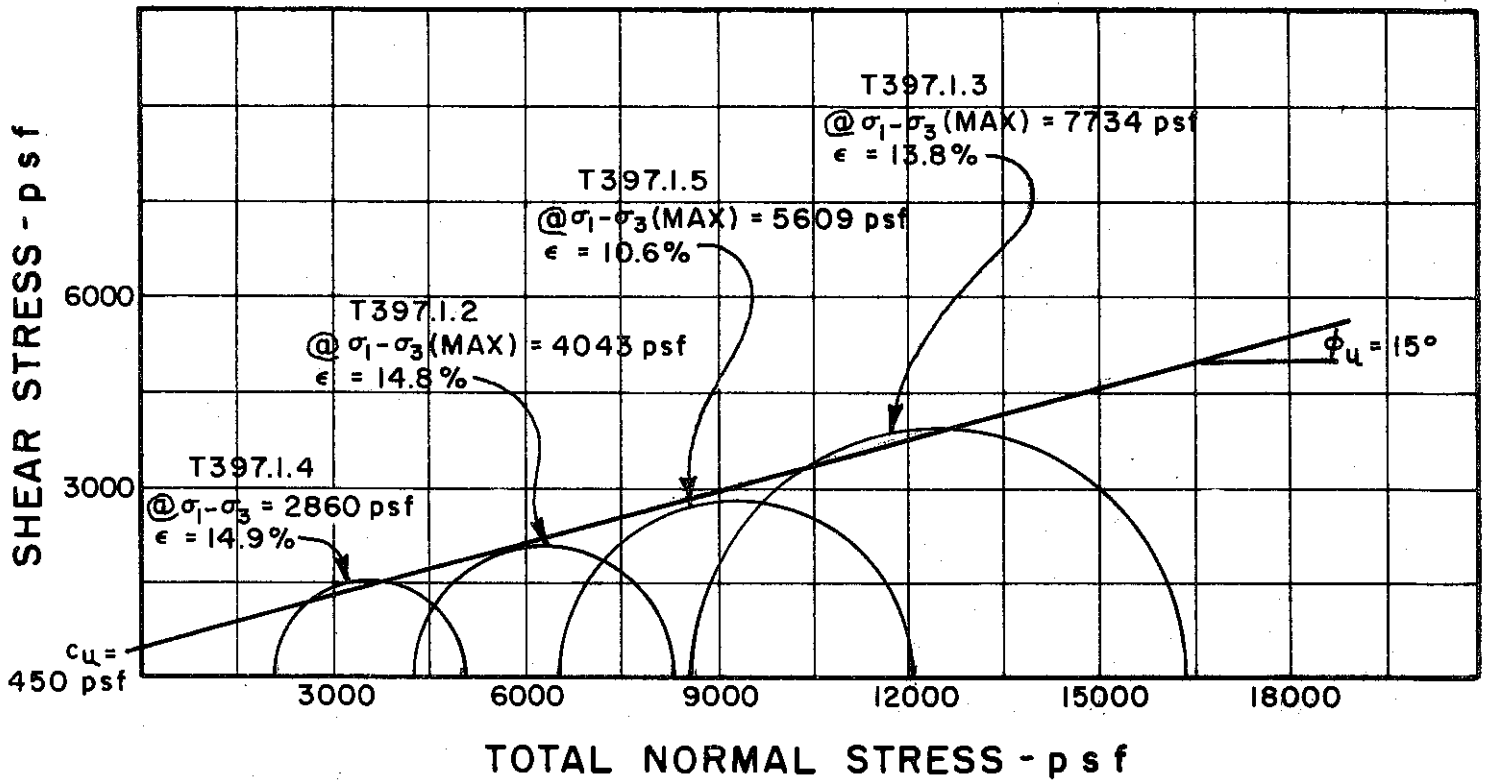
INITIAL CONDITIONS		TIII.I.1	TIII.I.2	TIII.I.3
WATER CONTENT	$w_0$	22.1%	22.7%	22.1%
DRY DENSITY	$\gamma_d$ lb/cu ft	101	99	104
SAMPLE DIAMETER	$D_0$ in.	1.39	1.38	1.38
SAMPLE HEIGHT	$H_0$ in.	3.20	3.10	3.21
FINAL CONDITIONS BEFORE SHEAR		TIII.I.1	TIII.I.2	TIII.I.3
FINAL BACK PRESSURE	$u_0$ psf	9360	11,520	11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$ psf	2160	4320	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.62%	1.22%	1.78%
PORE PRESSURE RESPONSE		99%	97%	97%
FINAL CONDITIONS		TIII.I.1	TIII.I.2	TIII.I.3
WATER CONTENT	$w_f$	21.8%	21.8%	21.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.026	.025
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BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 48.0' TO 50.5'  
 SOIL DESCRIPTION SILT (ML)  
 LIQUID LIMIT NON-PLASTIC  
 PLASTIC LIMIT PLASTIC LIMIT

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



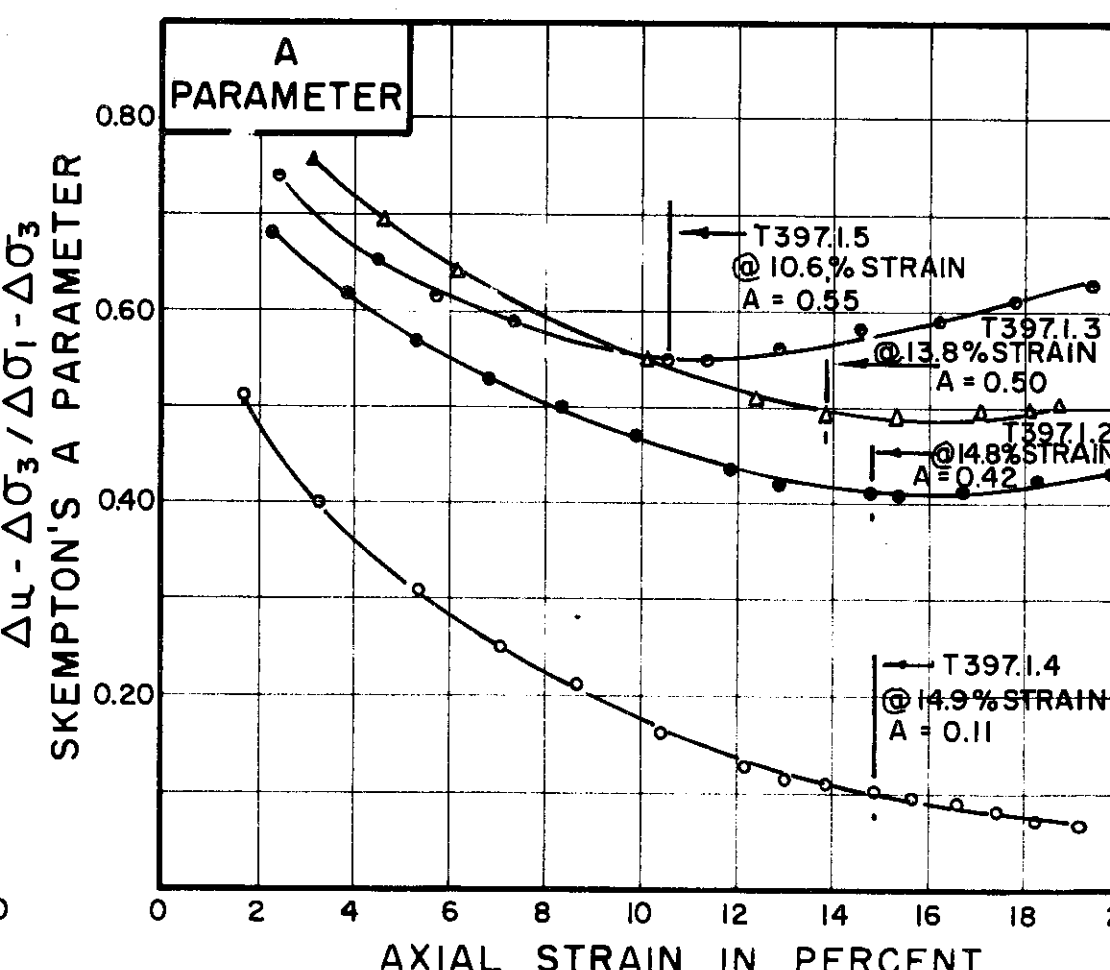
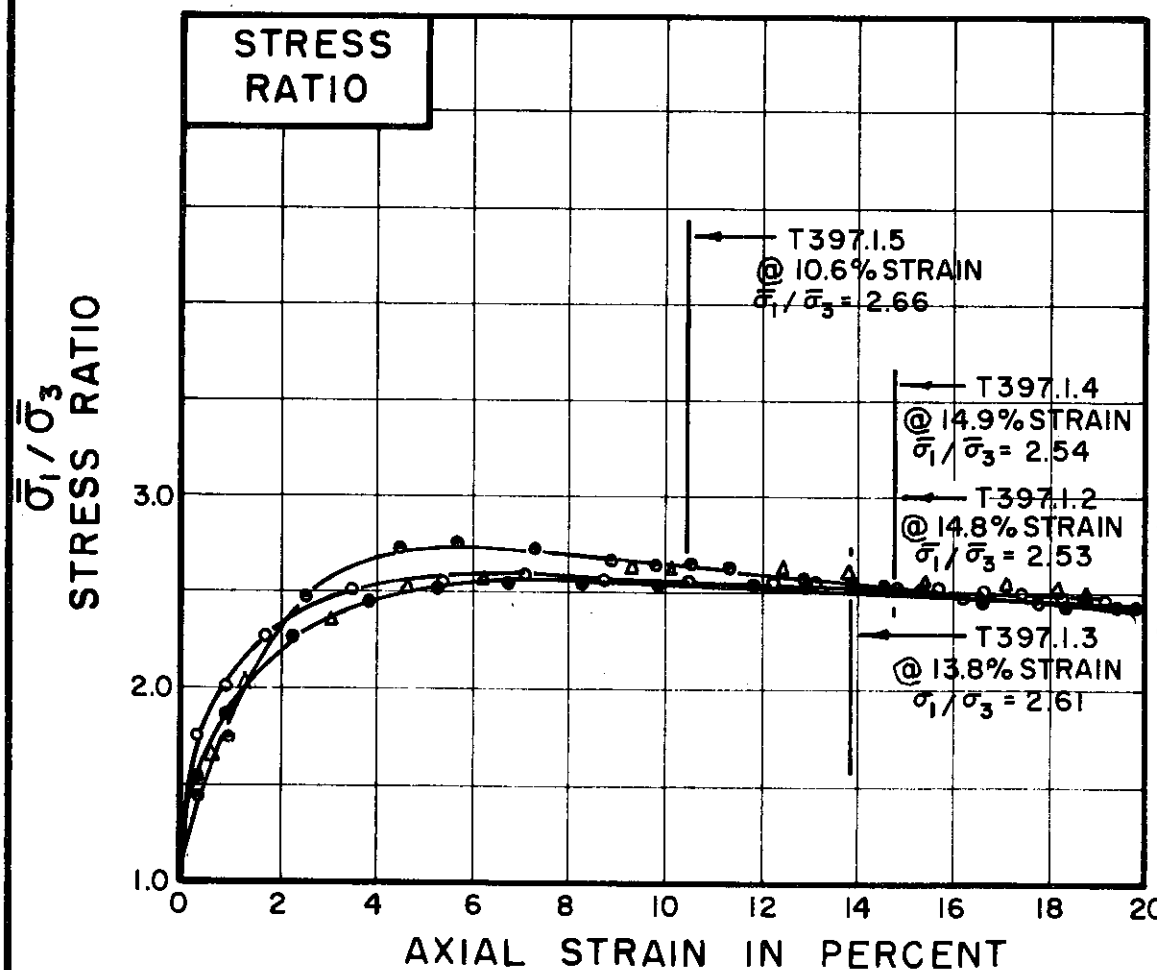
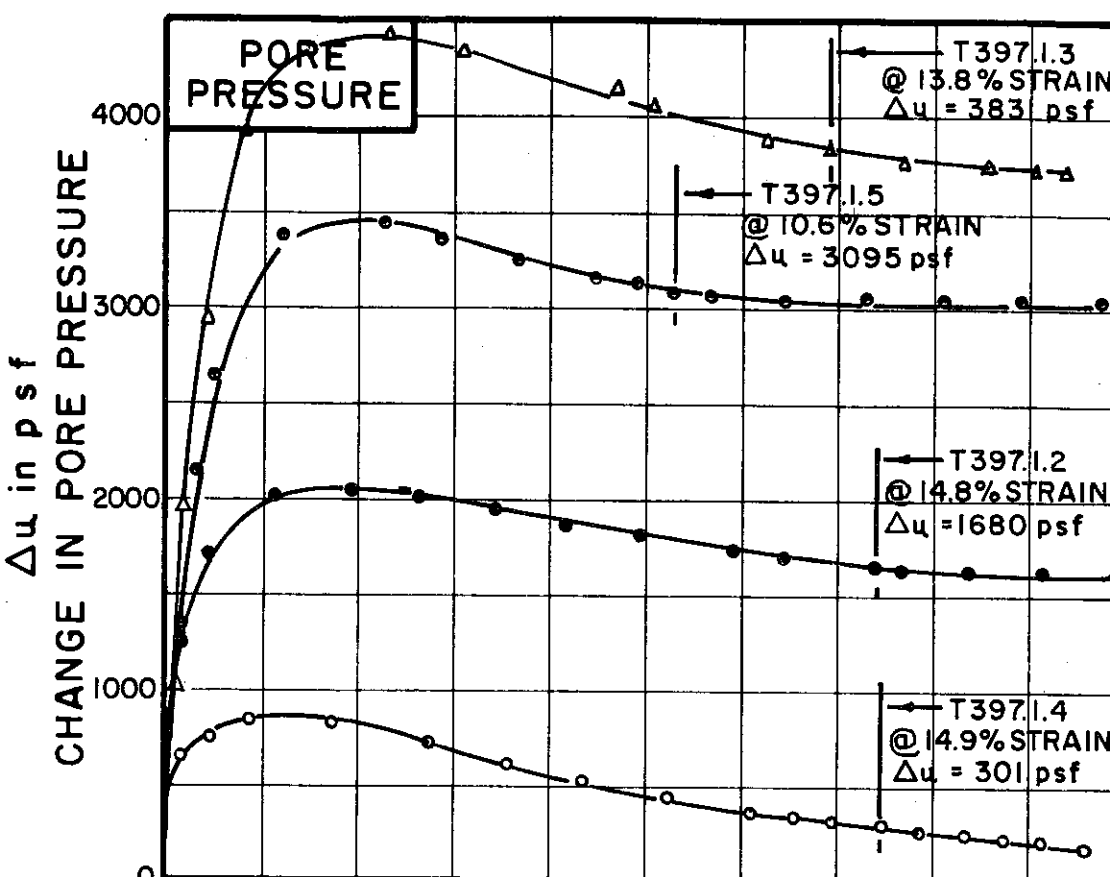
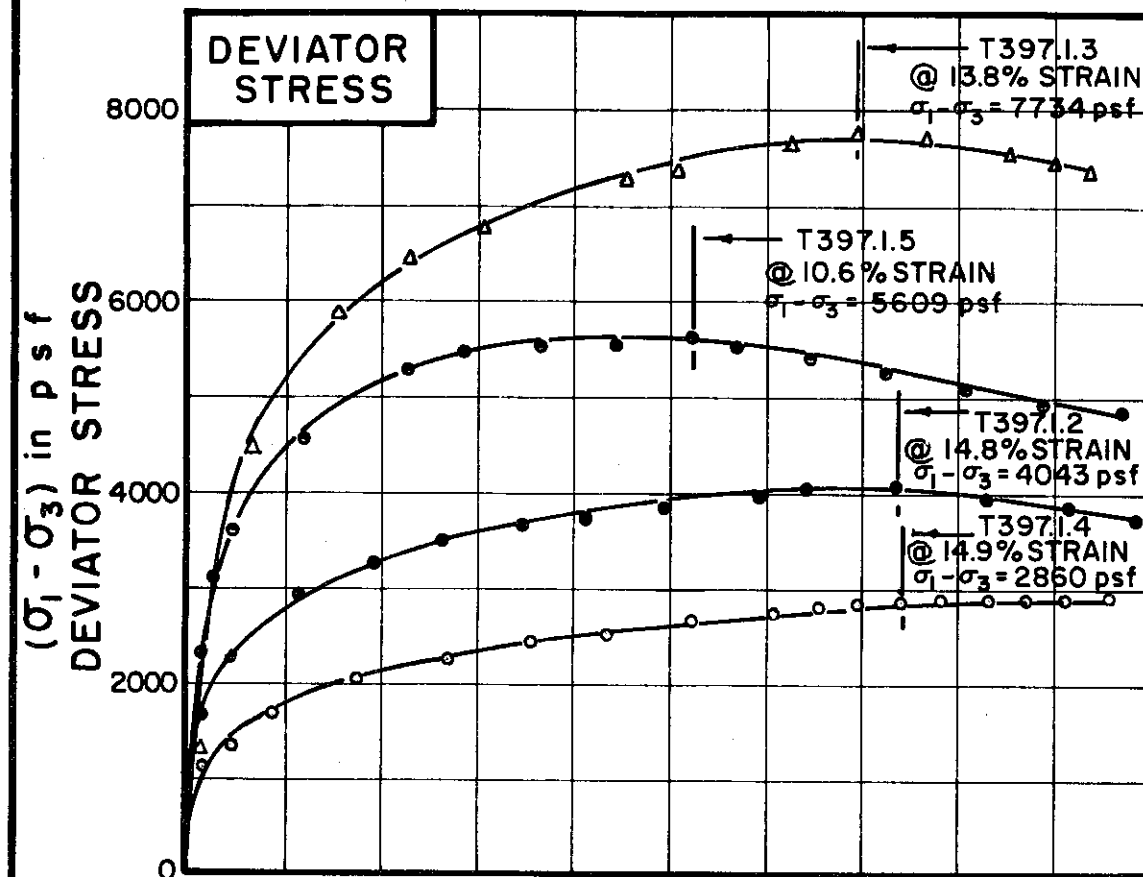
BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-415





TEST NO. / SYMBOL	T397.1.4	T397.1.2	T397.1.5	T397.1.3
	○	●	●	△

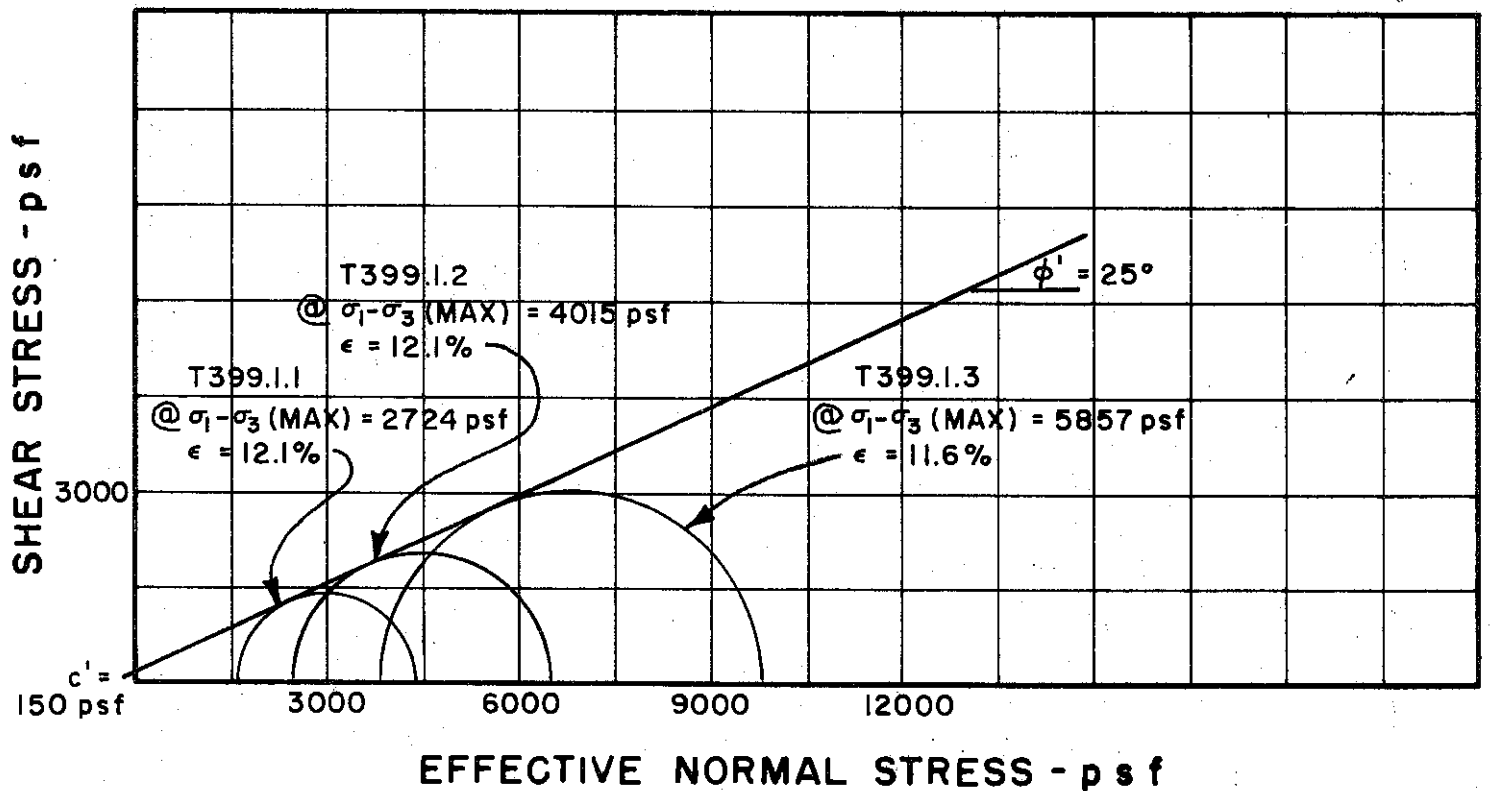
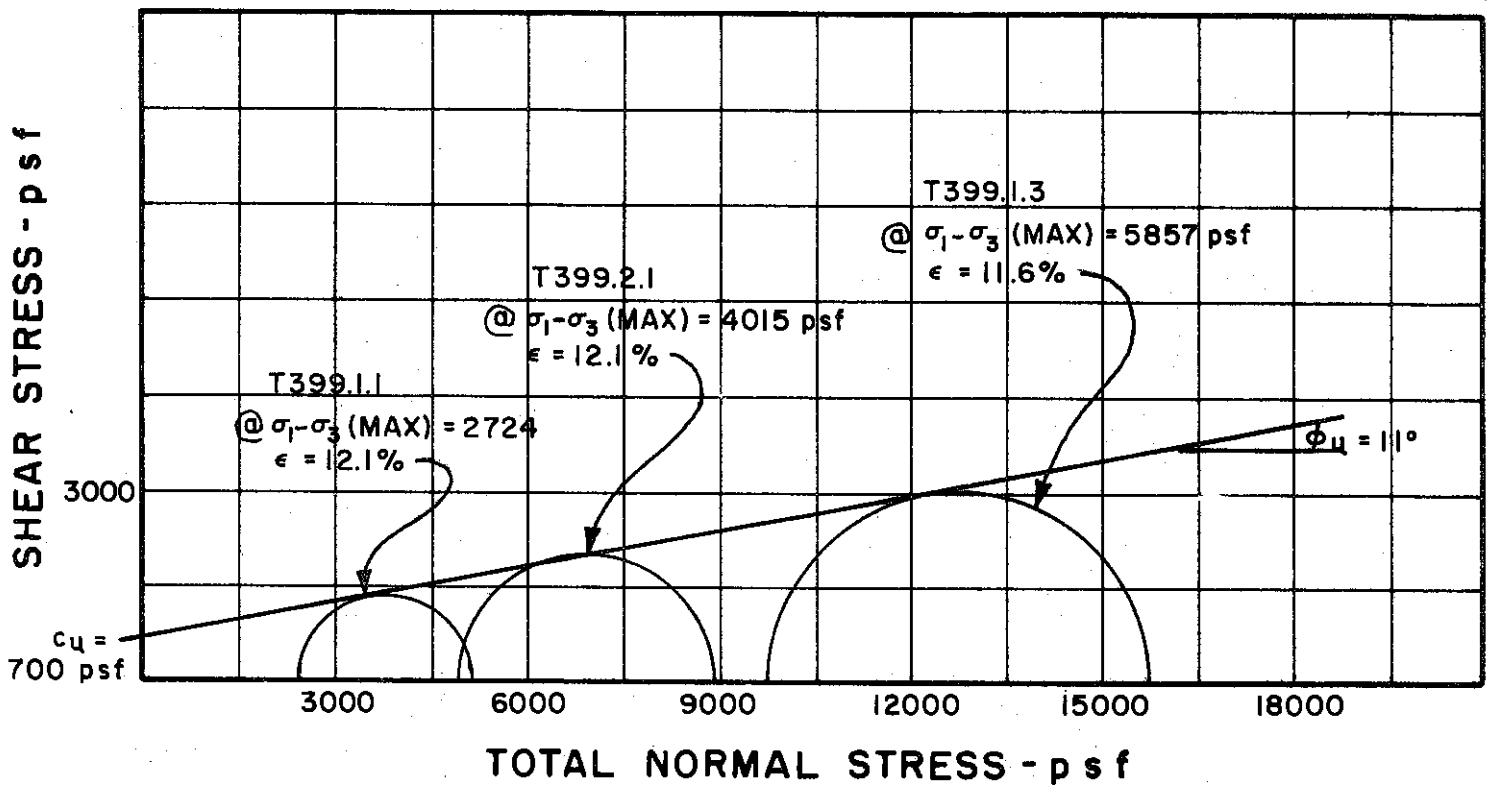
INITIAL CONDITIONS		TEST NO. / SYMBOL	T397.1.4	T397.1.2	T397.1.5	T397.1.3
WATER CONTENT	$w_0$		22.6%	23.2%	24.0%	23.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	101	102	100	102
SAMPLE DIAMETER	$D_0$	in.	1.37	1.37	1.37	1.38
SAMPLE HEIGHT	$H_0$	in.	2.88	3.30	3.12	3.30
FINAL CONDITIONS BEFORE SHEAR						
FINAL BACK PRESSURE	$u_0$	psf	7200	10080	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	psf	2160	4320	6480	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.68%	1.94%	3.33%	4.95%
FINAL CONDITIONS AFTER SHEAR						
PORE PRESSURE RESPONSE			95%	96%	98%	95%
FINAL CONDITIONS						
WATER CONTENT	$w_f$		21.5%	21.3%	19.9%	19.8%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT / MINUTE	.028	.024	.026	.025
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BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 31 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

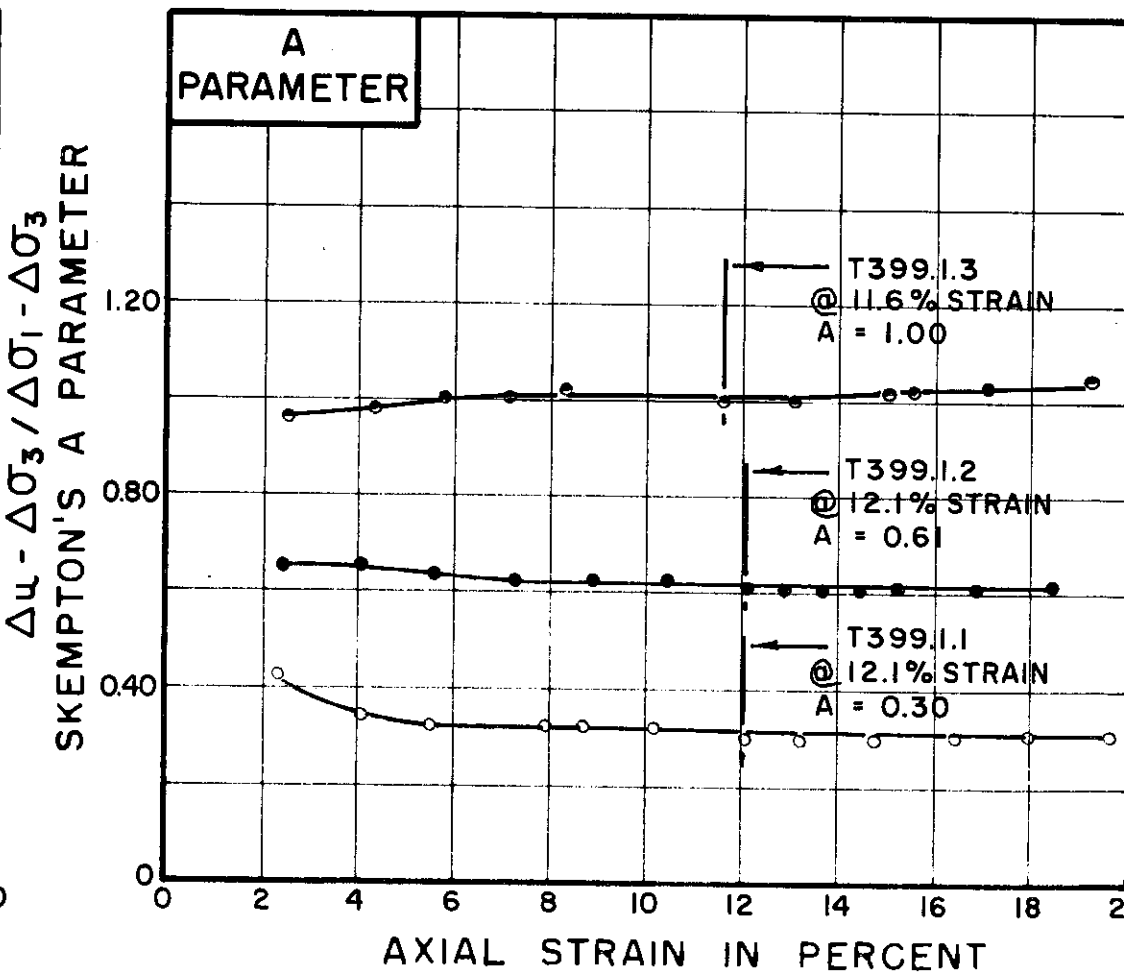
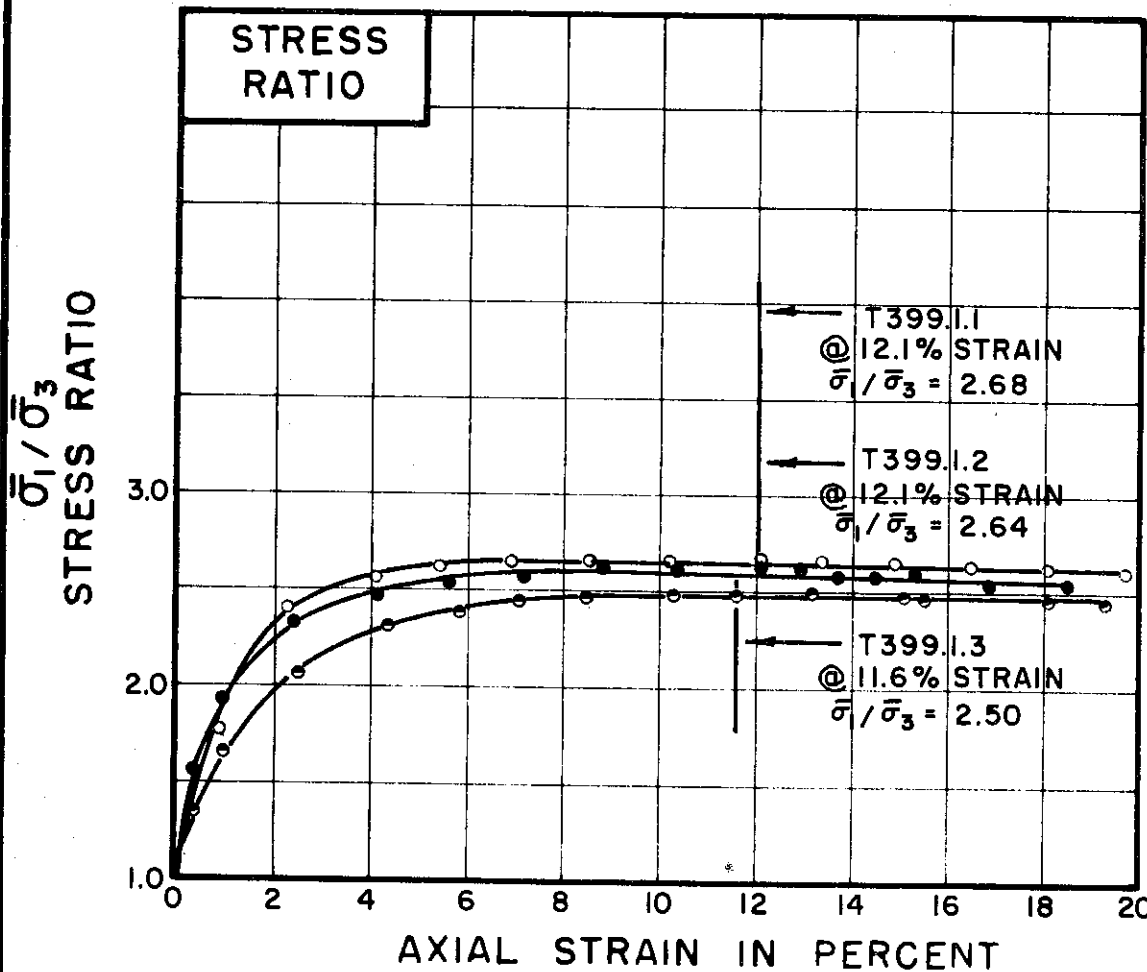
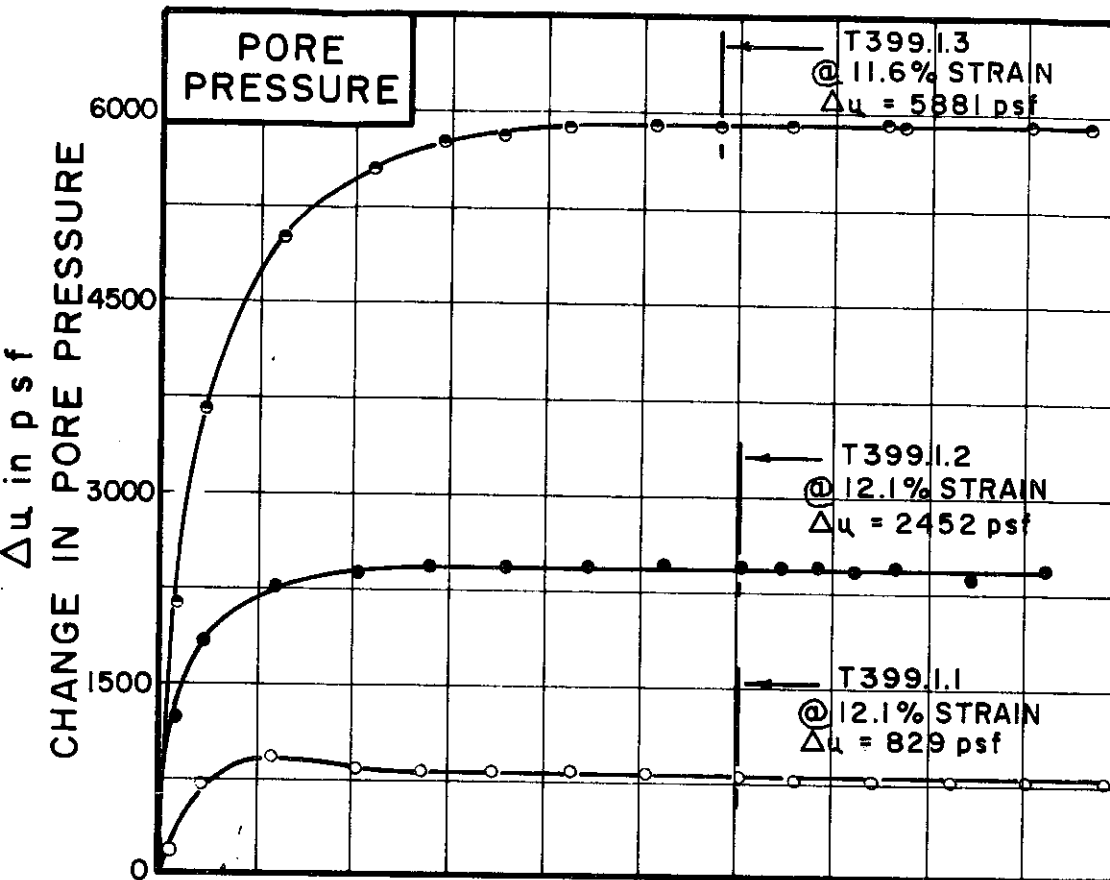
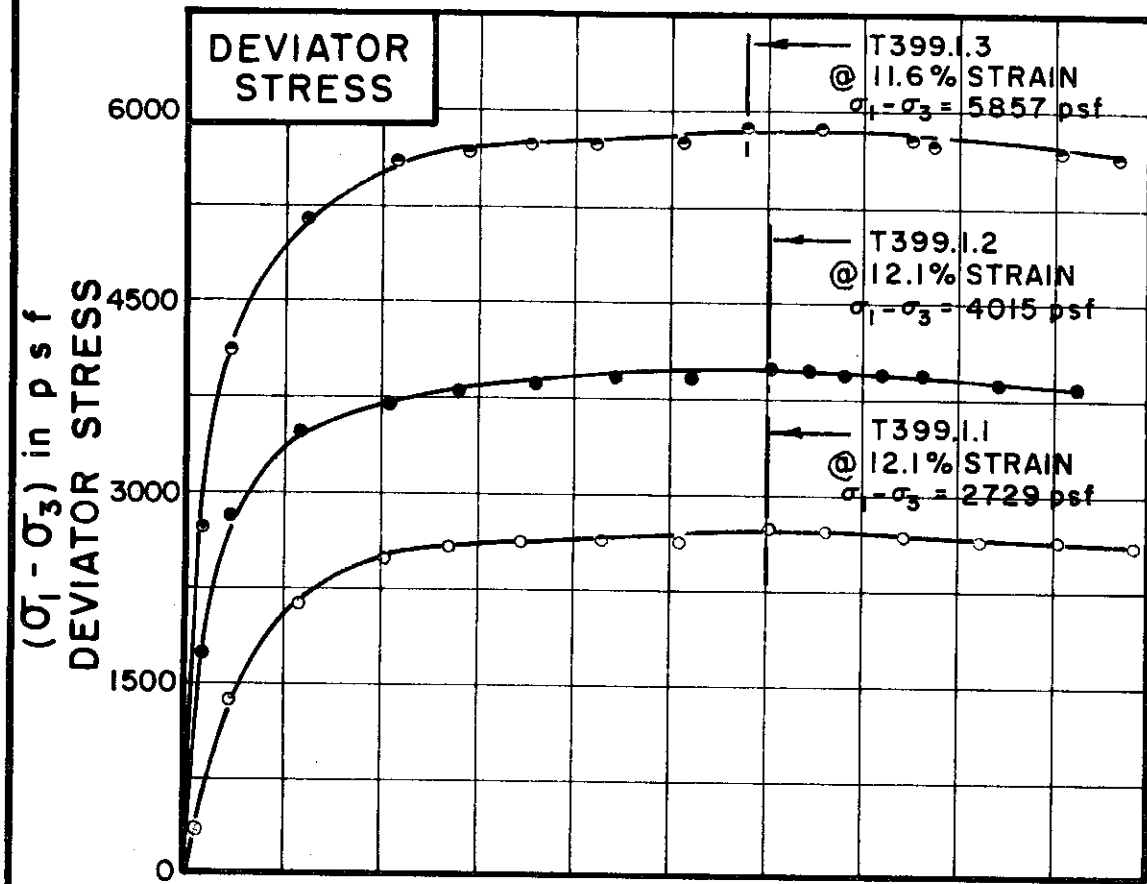
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-417



TEST NO. / SYMBOL	T399.1.1	T399.1.2	T399.1.3
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INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	26.4%	25.2%	25.8%
DRY DENSITY	lb/cu ft	γ <sub>d</sub>	98	98	98	98
SAMPLE DIAMETER	in.	D <sub>0</sub>	1.39	1.38	1.39	1.39
SAMPLE HEIGHT	in.	H <sub>0</sub>	3.20	3.14	3.29	3.29
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	u <sub>0</sub>	10,080	10,080	10,080
INITIAL EFFECTIVE STRESS	psf	σ <sub>1</sub> / σ <sub>3</sub>	2448	4896	9792	9792
VOLUMETRIC STRAIN	ε <sub>vol</sub>		1.77%	3.48%	5.79%	5.79%
PORE PRESSURE RESPONSE			96%	95%	98%	98%
FINAL CONDITIONS AFTER SHEAR		WATER CONTENT	W <sub>f</sub>	25.5%	22.8%	22.2%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT / MINUTE	.025	.026	.025
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BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

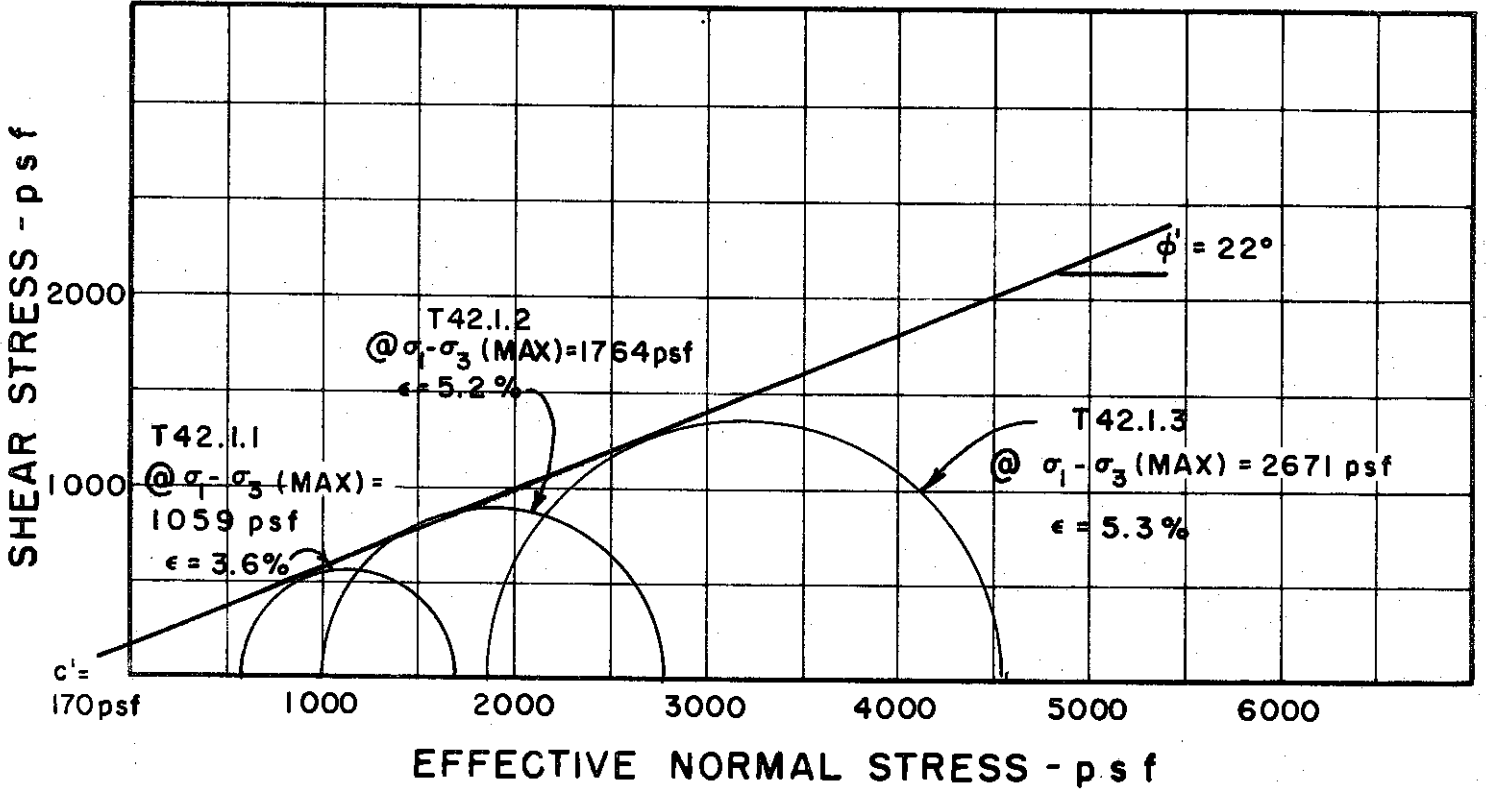
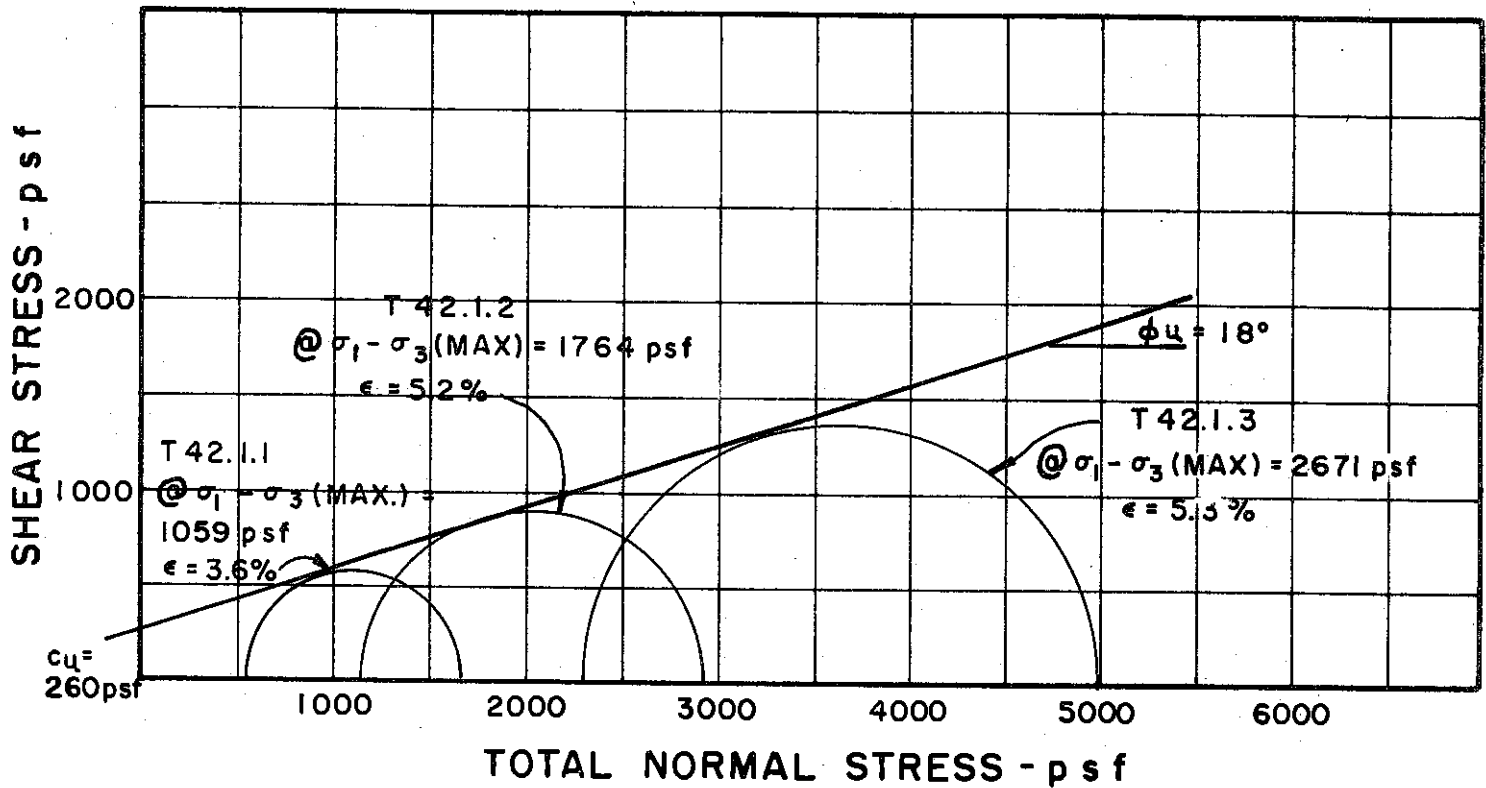
LIQUID LIMIT 36 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-418



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

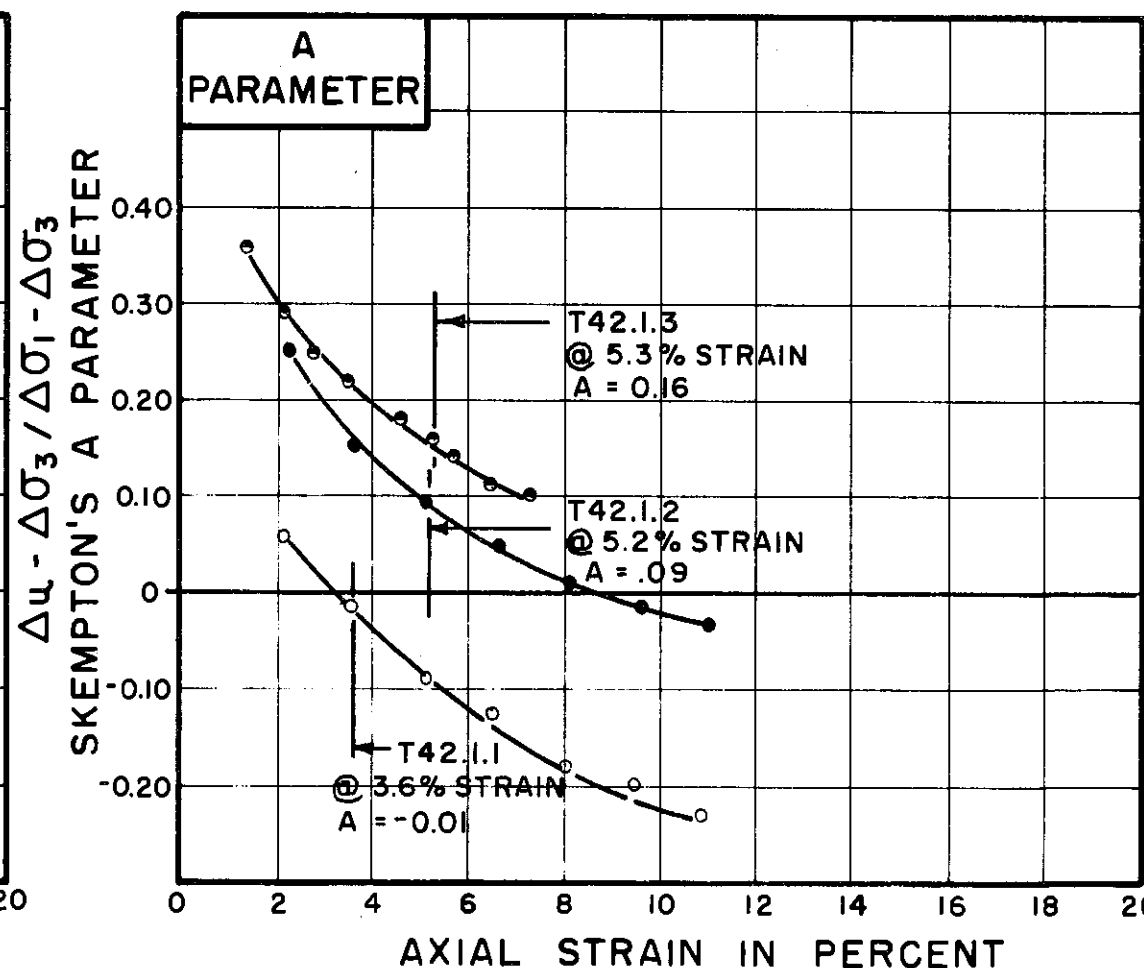
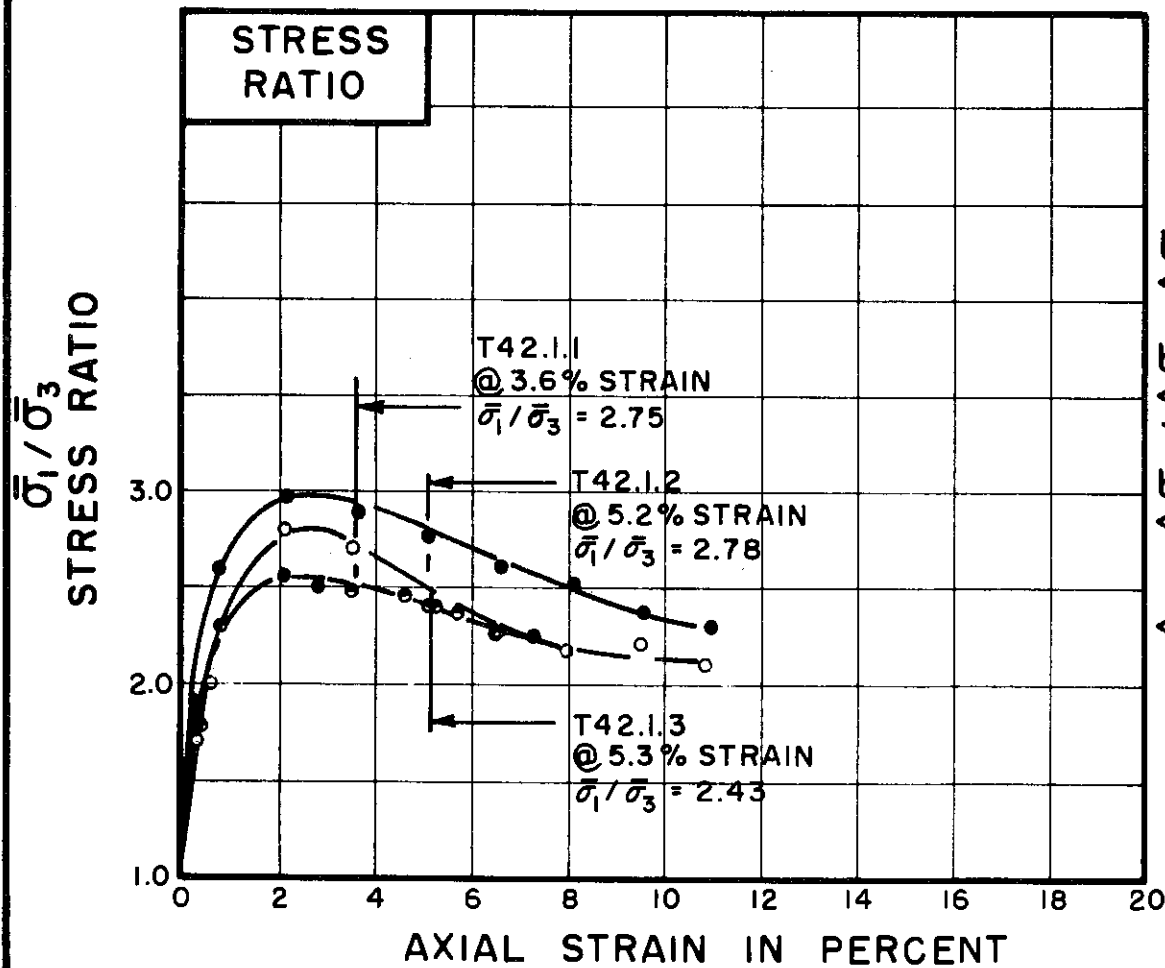
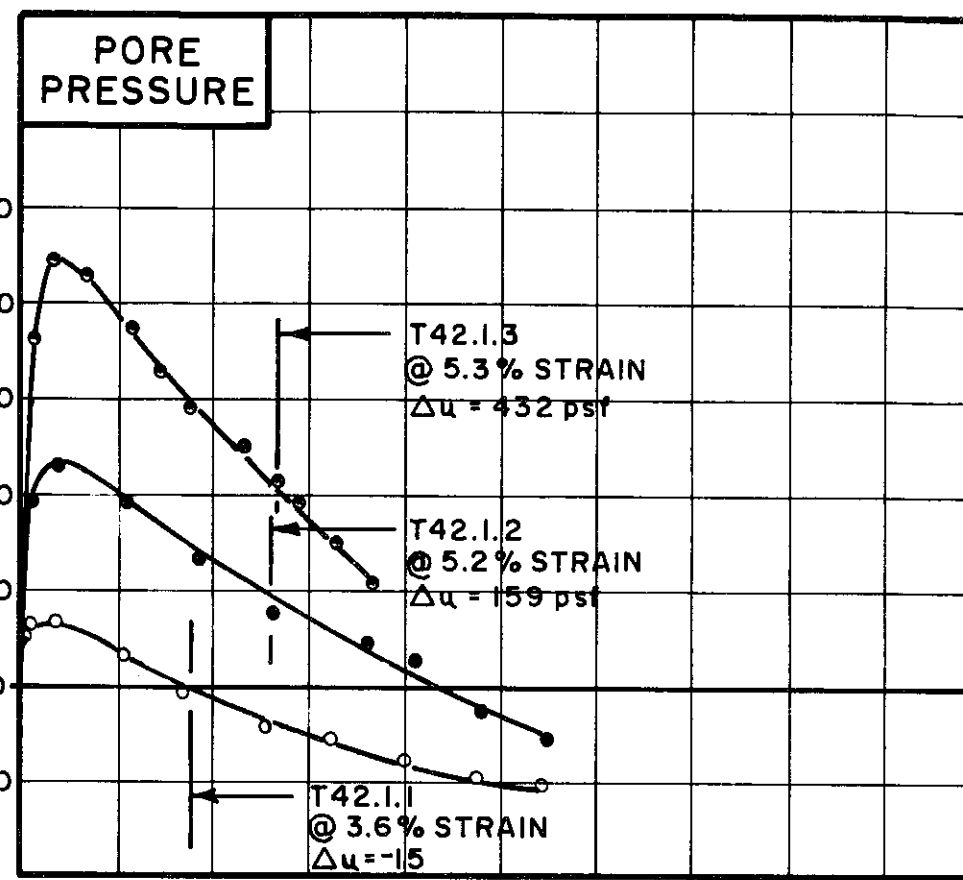
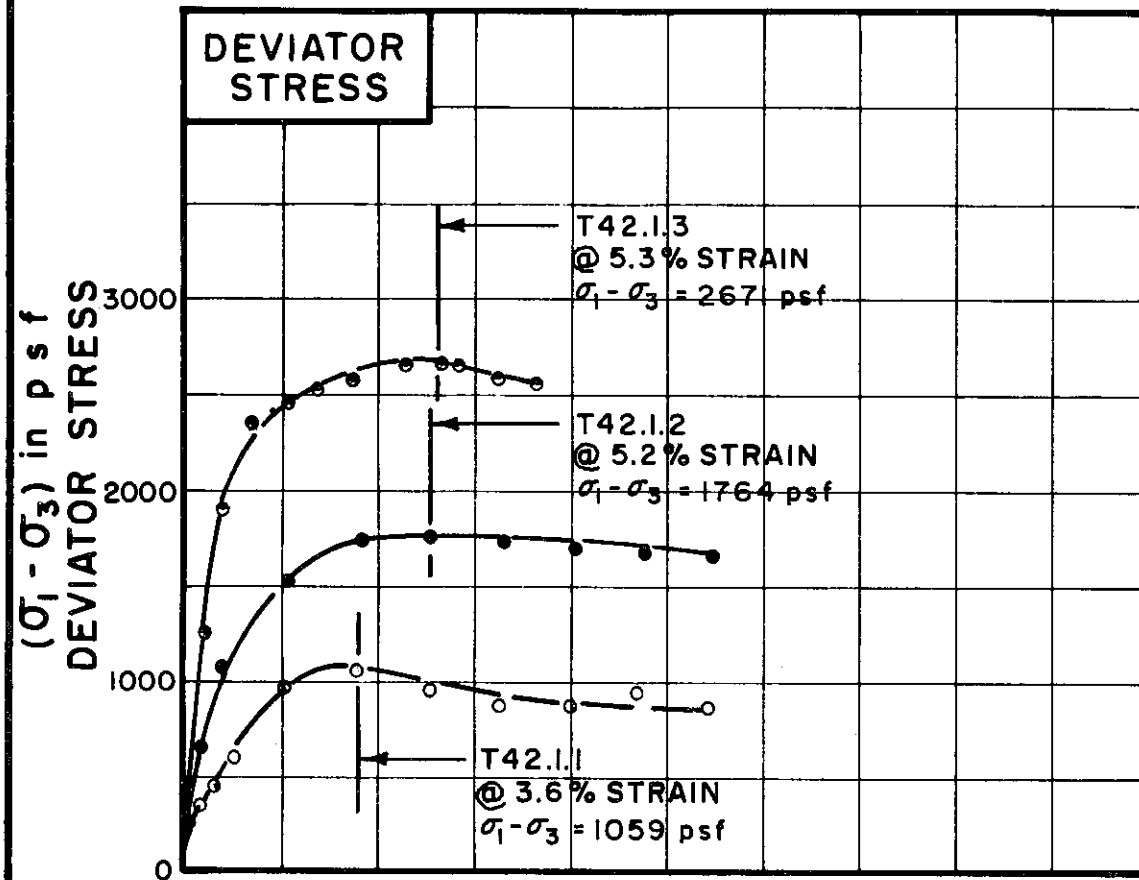
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T42.1.1	T42.1.2	T42.1.3
	○	●	○

INITIAL CONDITIONS			T42.1.1	T42.1.2	T42.1.3
WATER CONTENT	$w_0$		29.8%	29.3%	28.9%
DRY DENSITY	$\gamma_d$	pcf	94	95	96
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.43	3.40	3.42
FINAL CONDITIONS BEFORE SHEAR			T42.1.1	T42.1.2	T42.1.3
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	8784
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	psf	590	1152	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.2%	1.6%	1.4%
PORE PRESSURE RESPONSE			98%	99%	98%
FINAL CONDITIONS			T42.1.1	T42.1.2	T42.1.3
WATER CONTENT	$w_f$		32.3%	30.9%	29.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.023
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BORING NO. 60

SAMPLE NO. 2

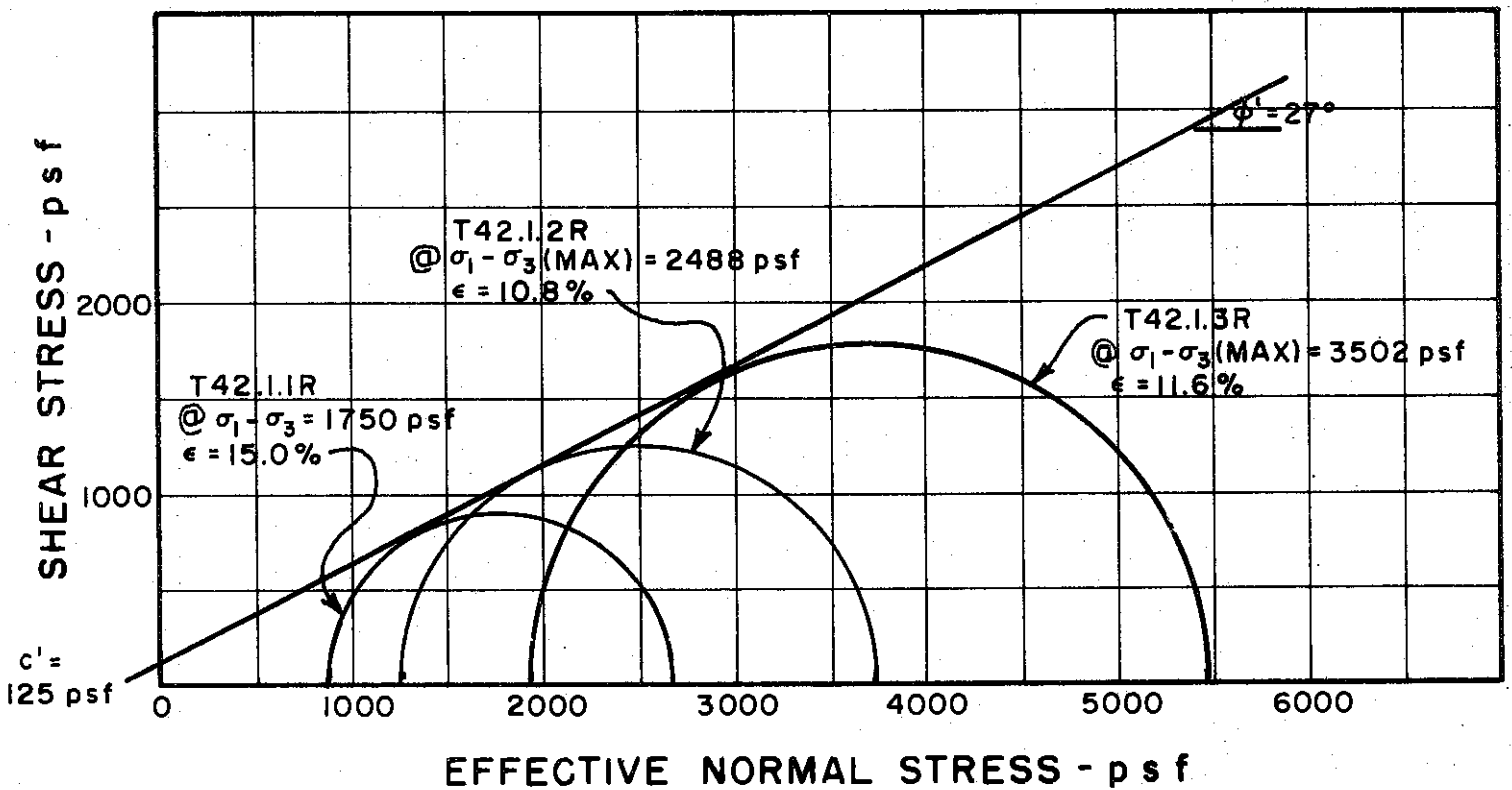
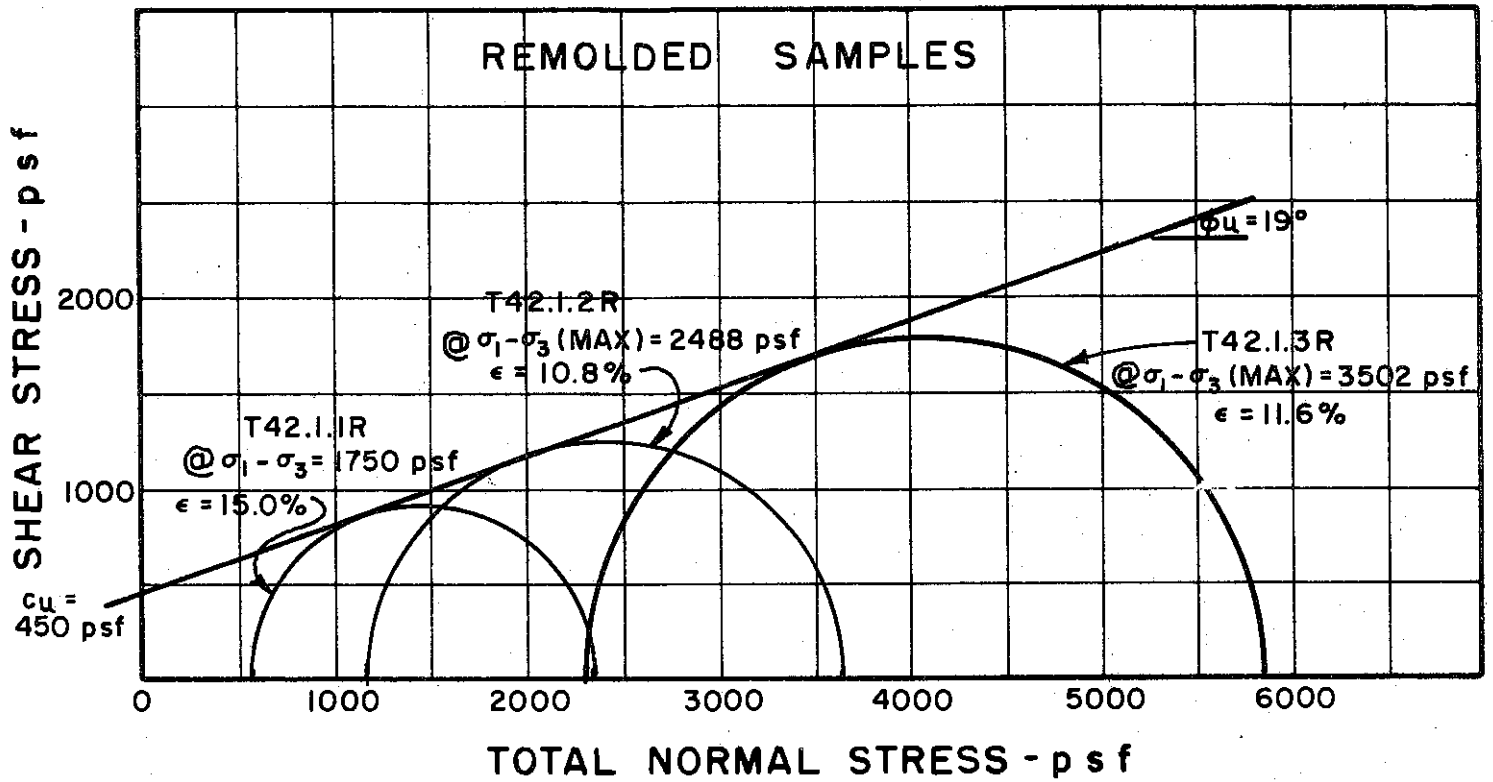
DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CH)

LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

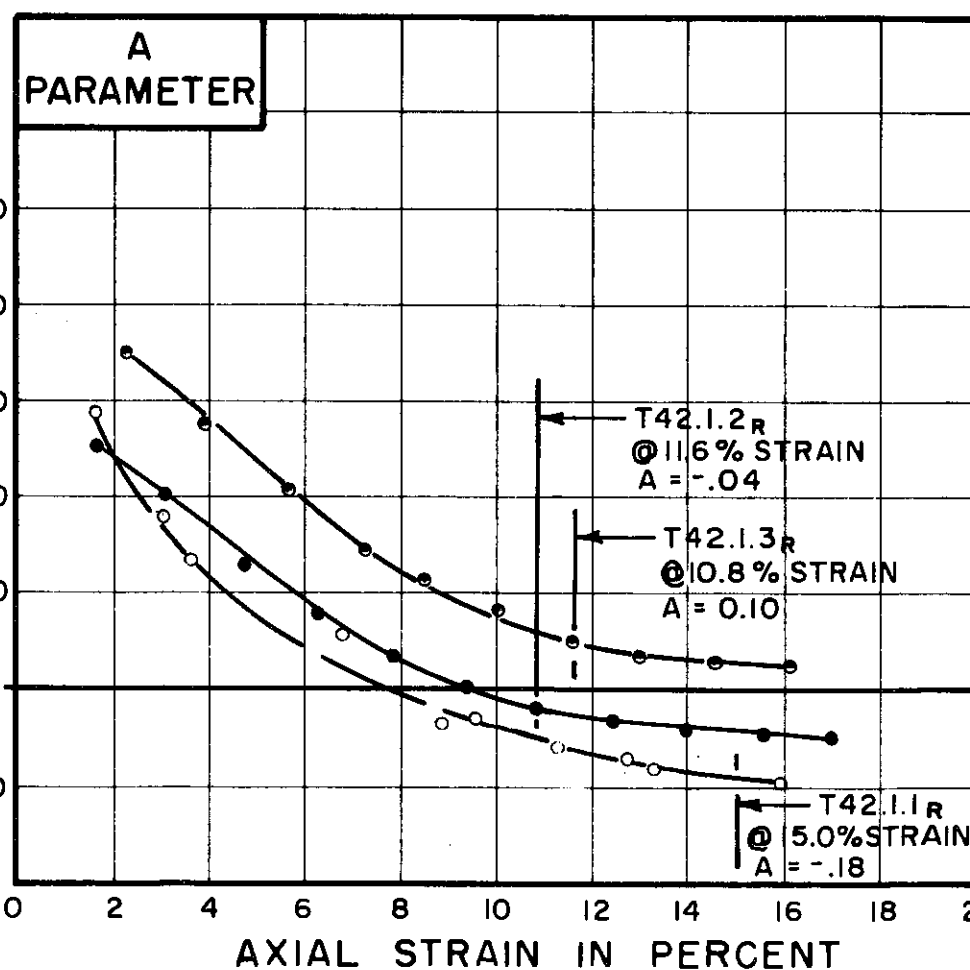
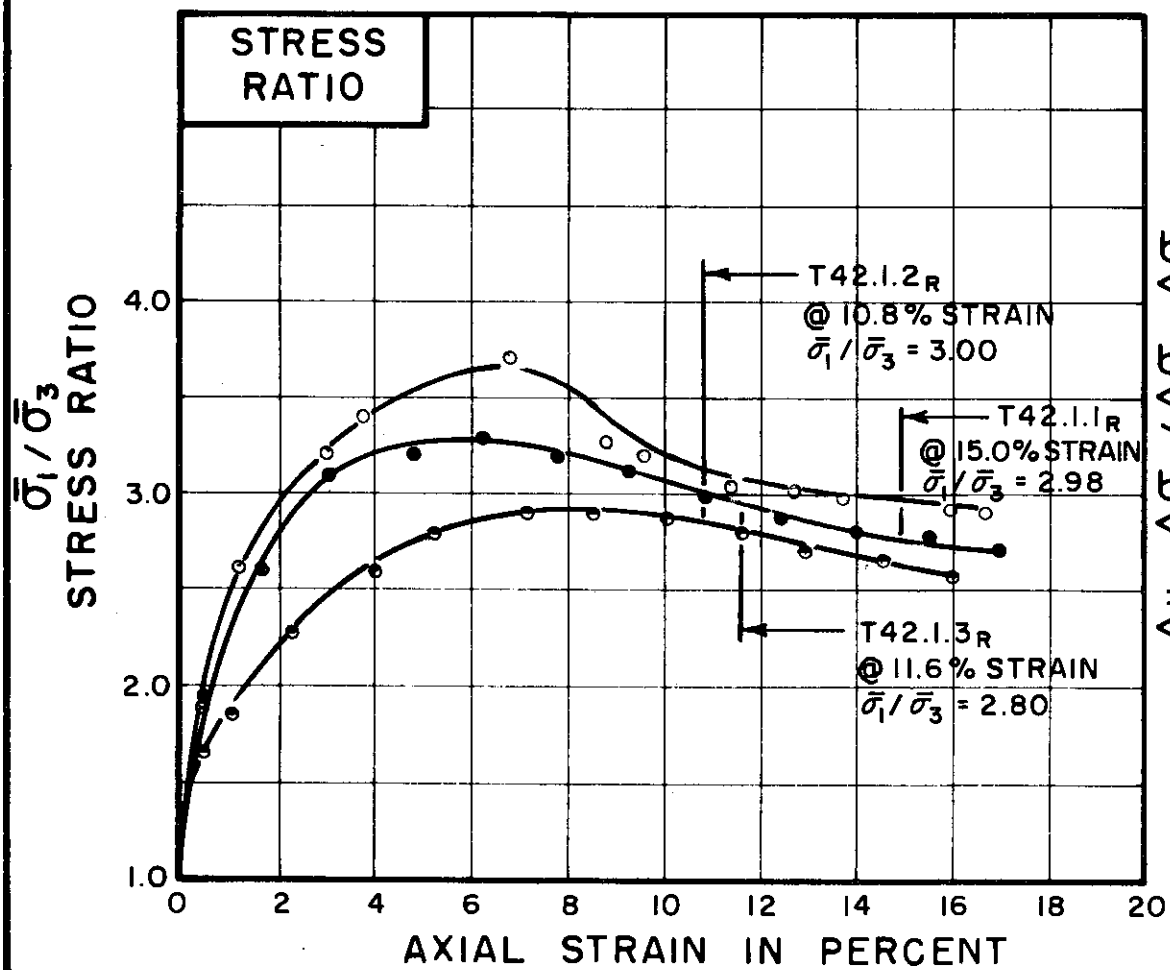
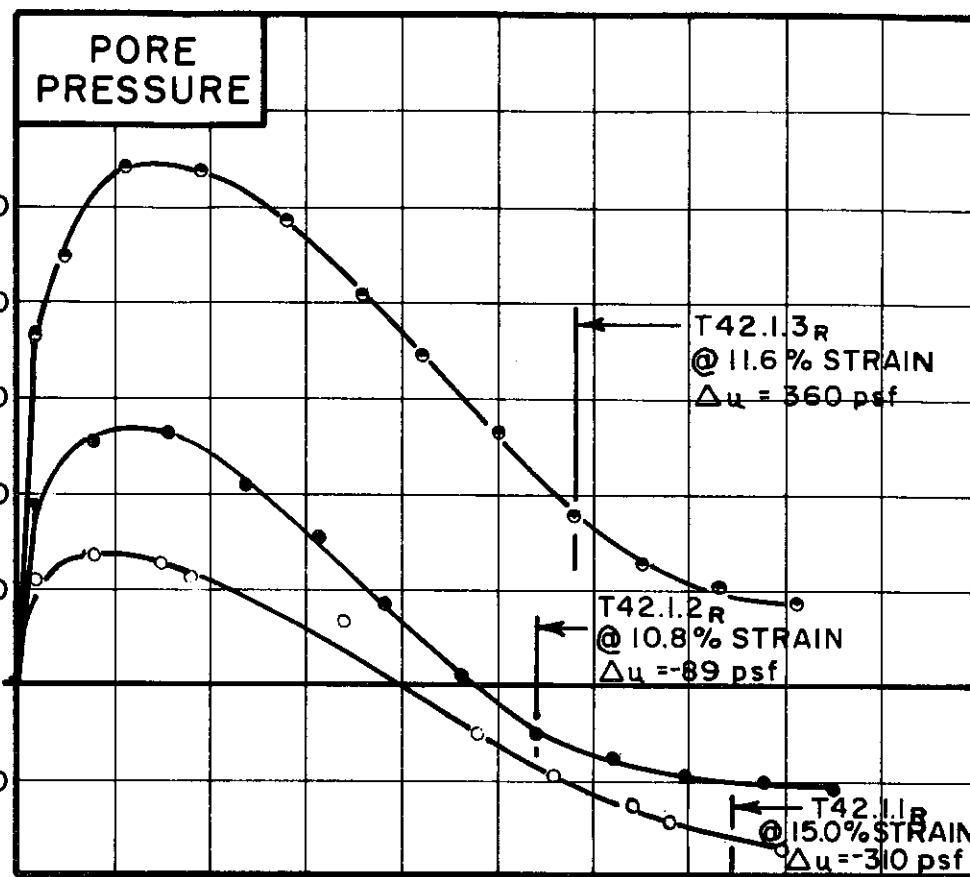
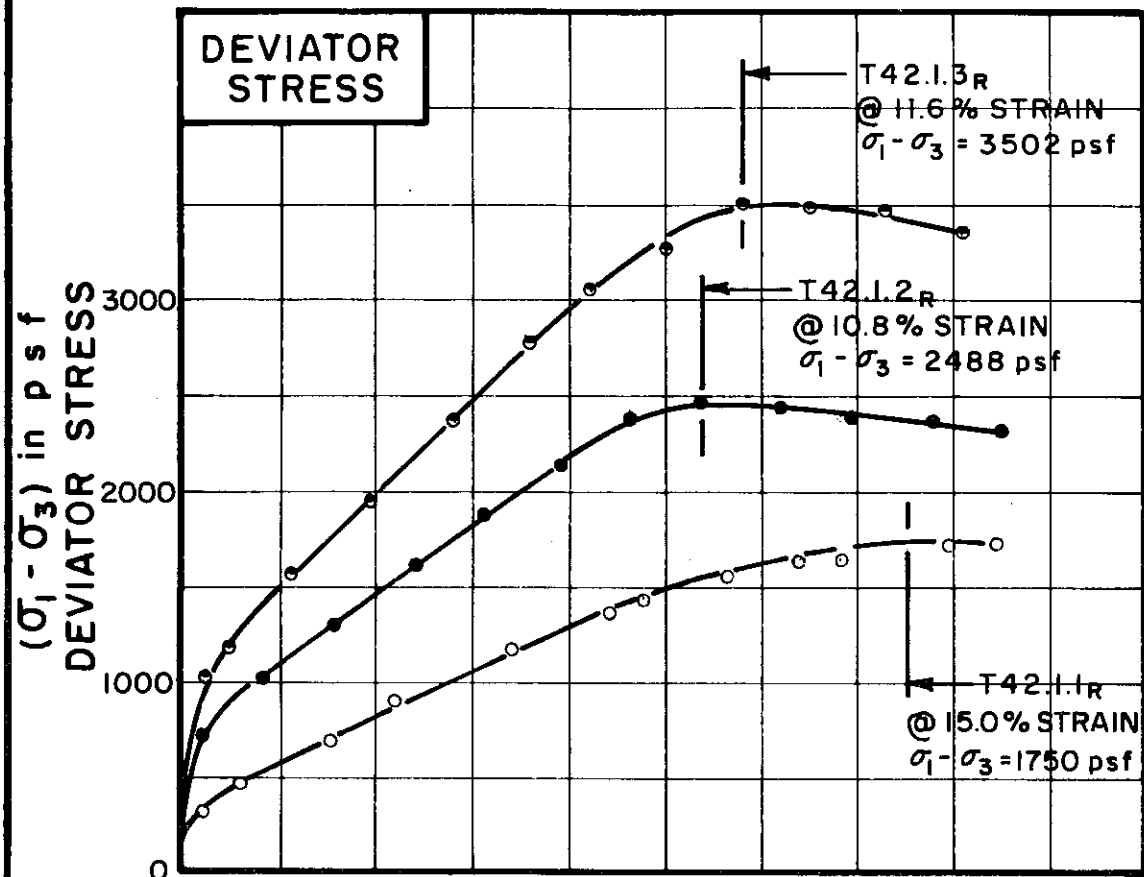
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

**MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-421



TEST NO. / SYMBOL	T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
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INITIAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_0$	29.3%	29.3%	29.3%
DRY DENSITY	$\gamma_d$	96	99	98
pcf				
SAMPLE DIAMETER	$D_0$	1.40	1.40	1.40
in.				
SAMPLE HEIGHT	$H_0$	3.30	3.25	3.29
in.				
FINAL CONDITIONS BEFORE SHEAR		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
FINAL BACK PRESSURE	$u_0$	8640	8640	8640
psf				
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1152	2304
psf				
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.7%	2.4%	3.3%
PORE PRESSURE RESPONSE		97%	97%	97%
FINAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_f$	29.0%	26.1%	25.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.025	.025
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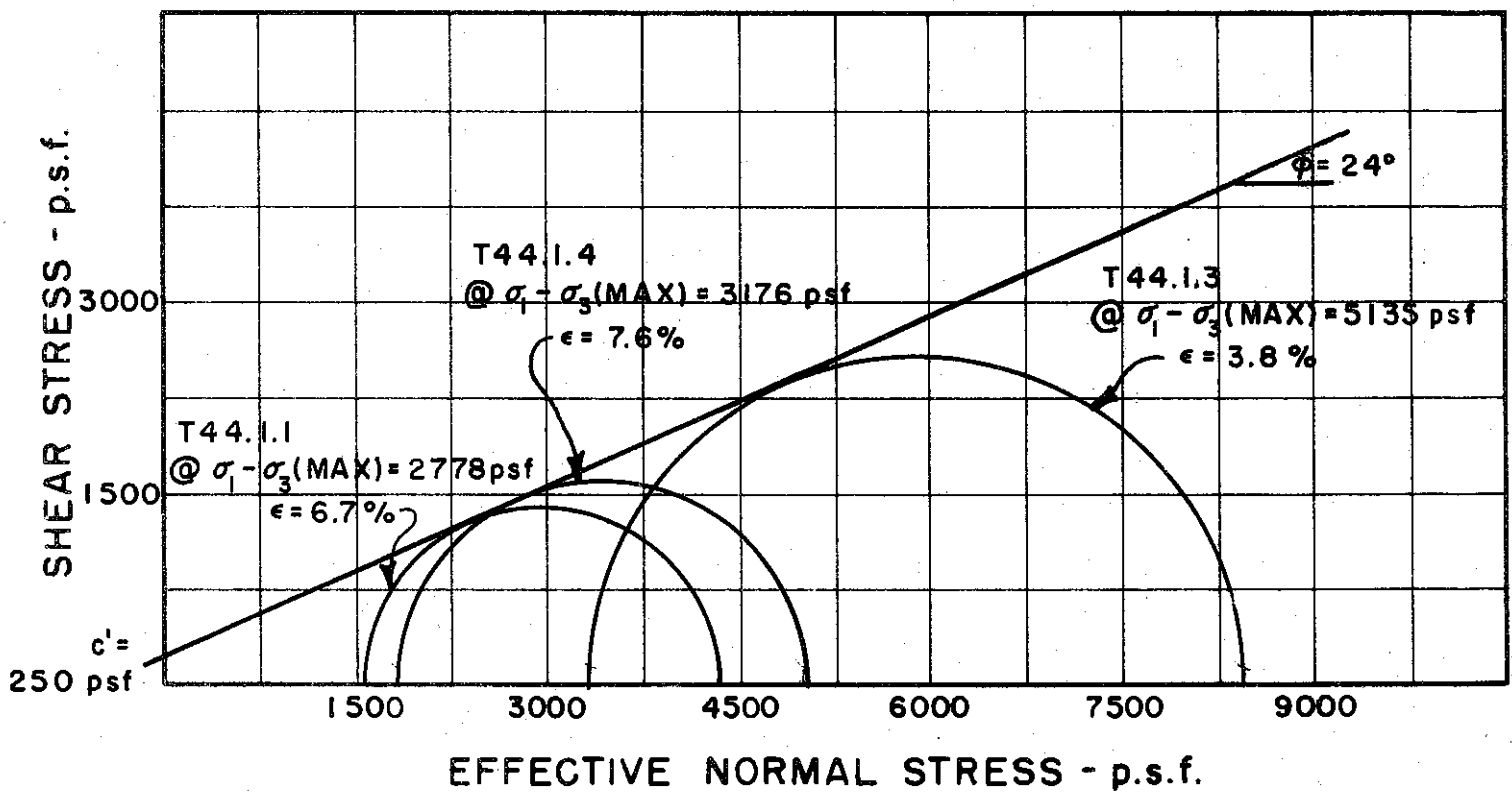
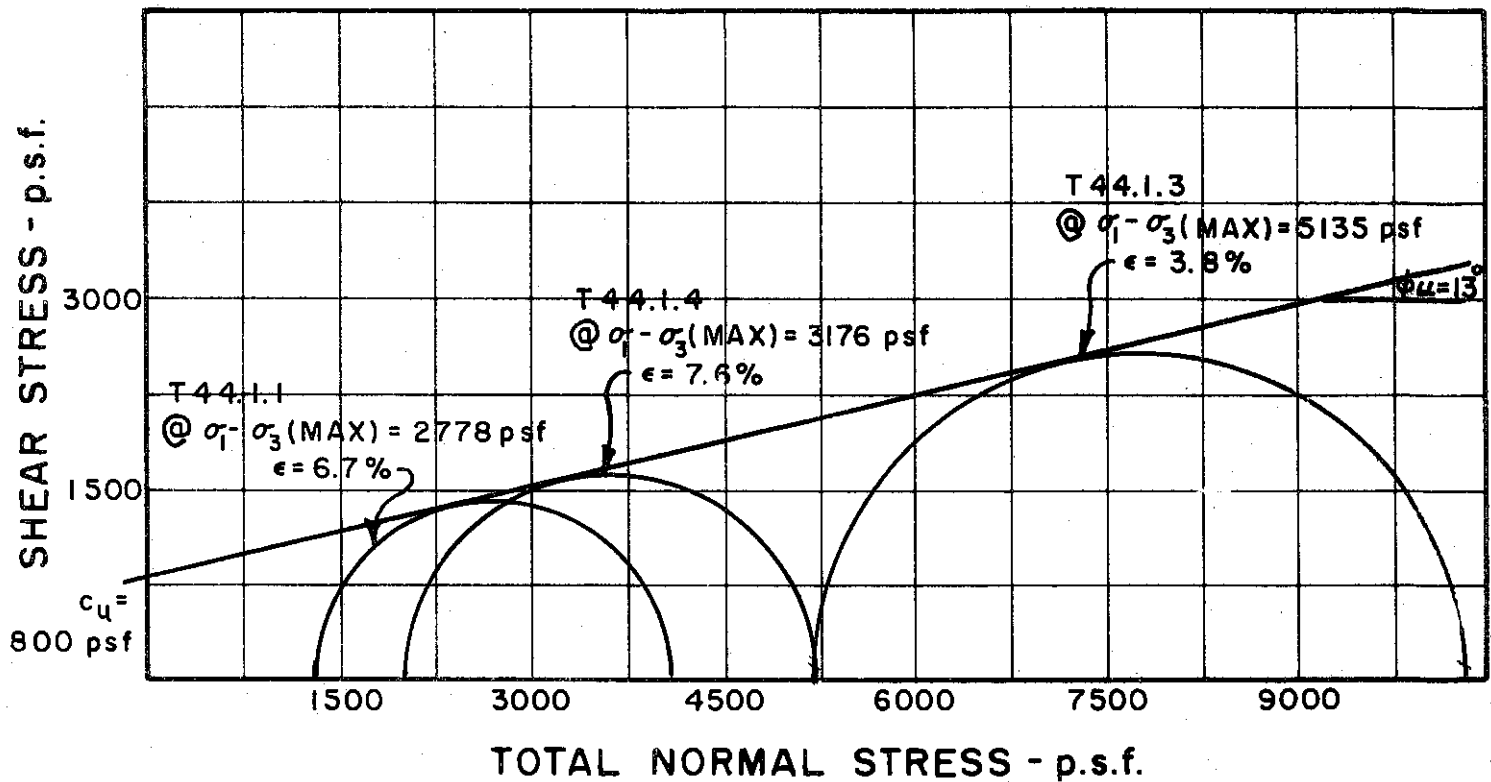
BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 53 PLASTIC LIMIT 26

REMOLDED SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60  
 SAMPLE NO. 4  
 DEPTH 21.0 TO 23.0

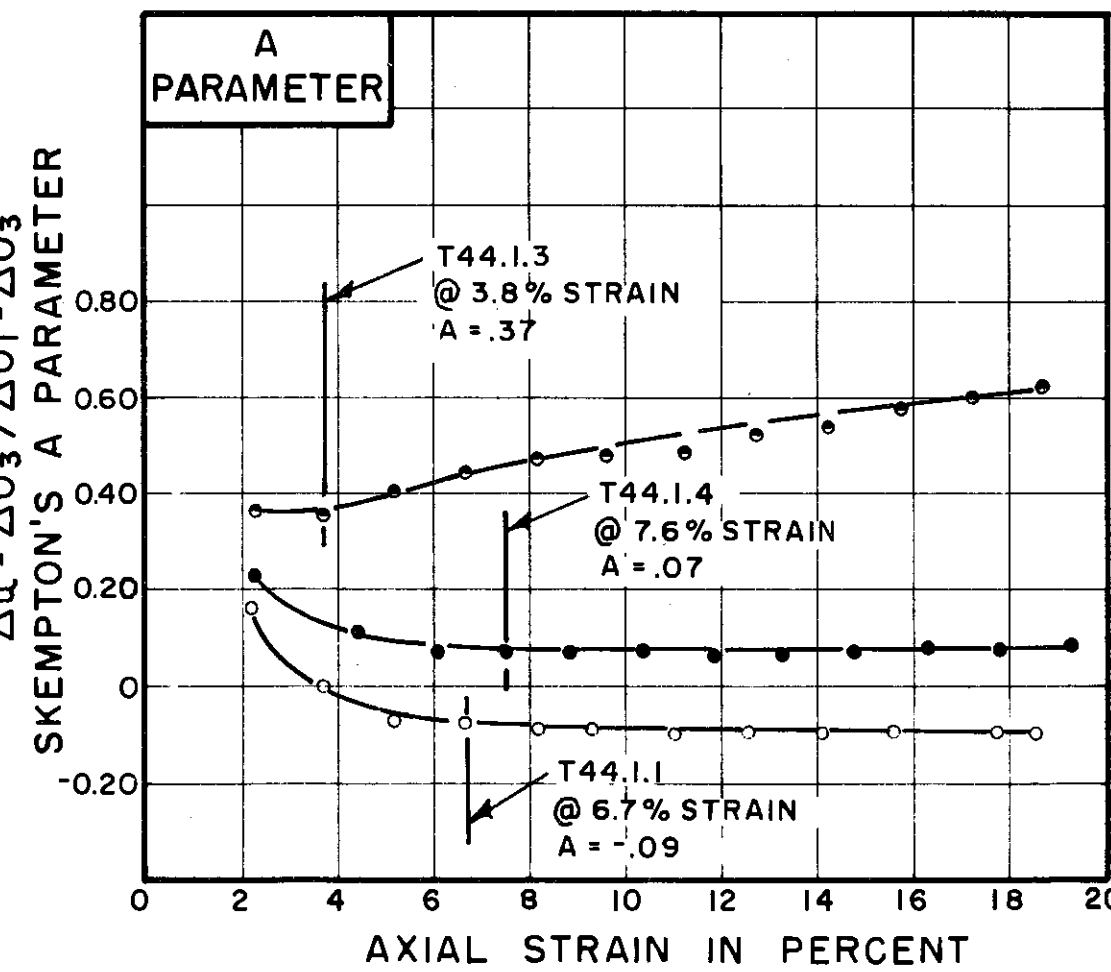
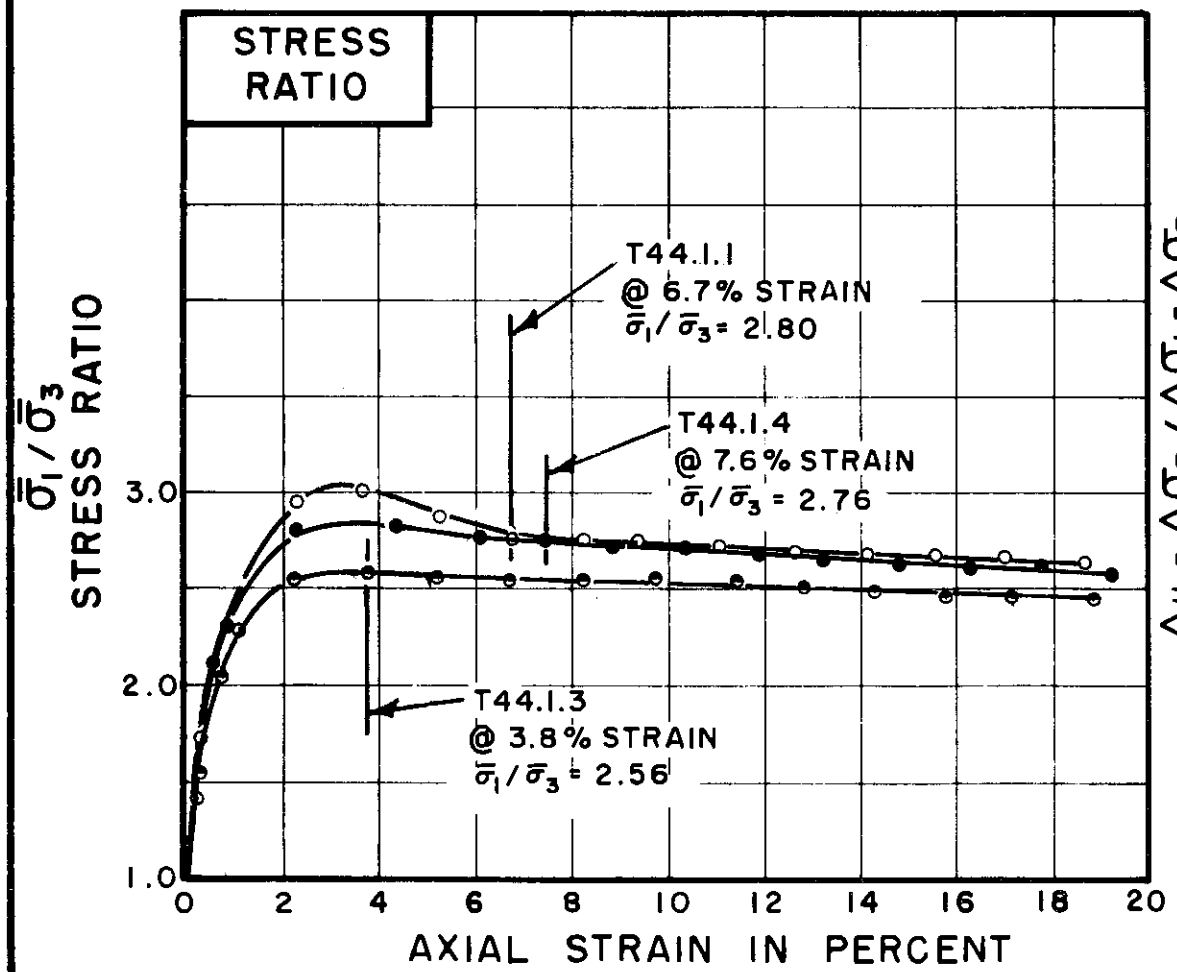
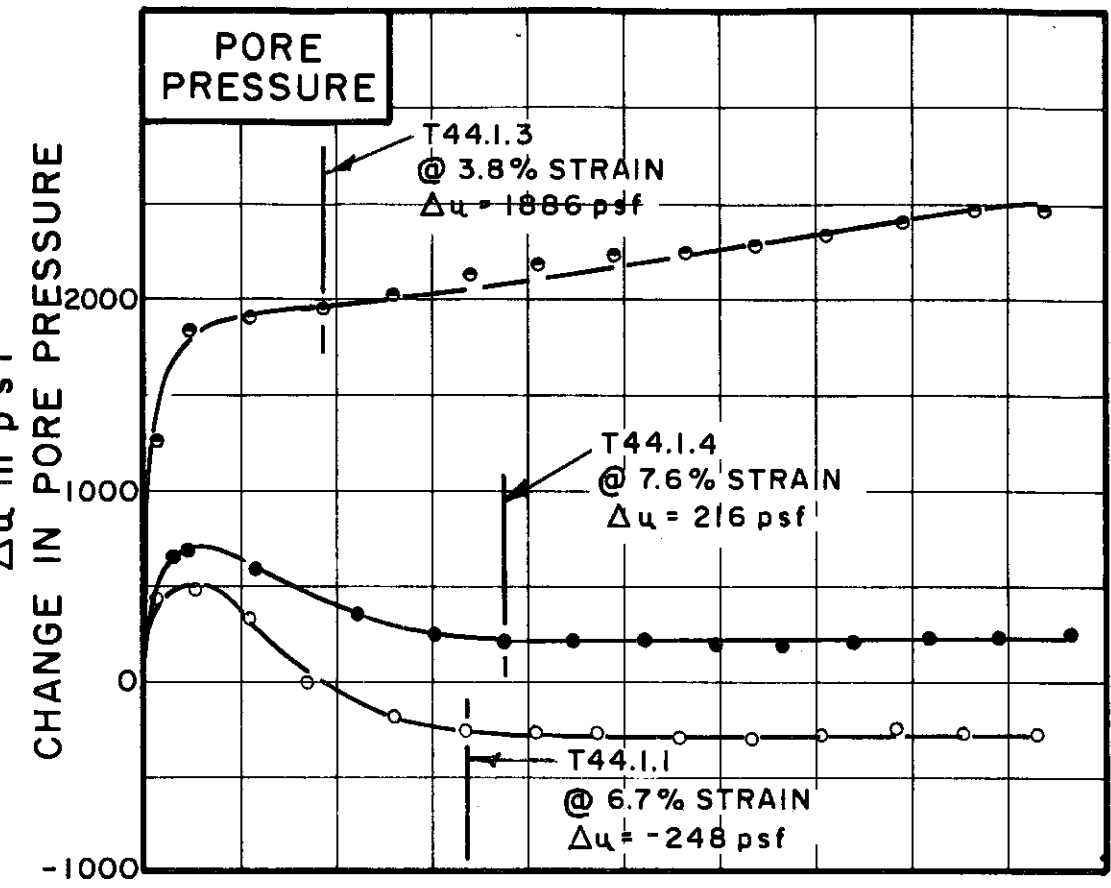
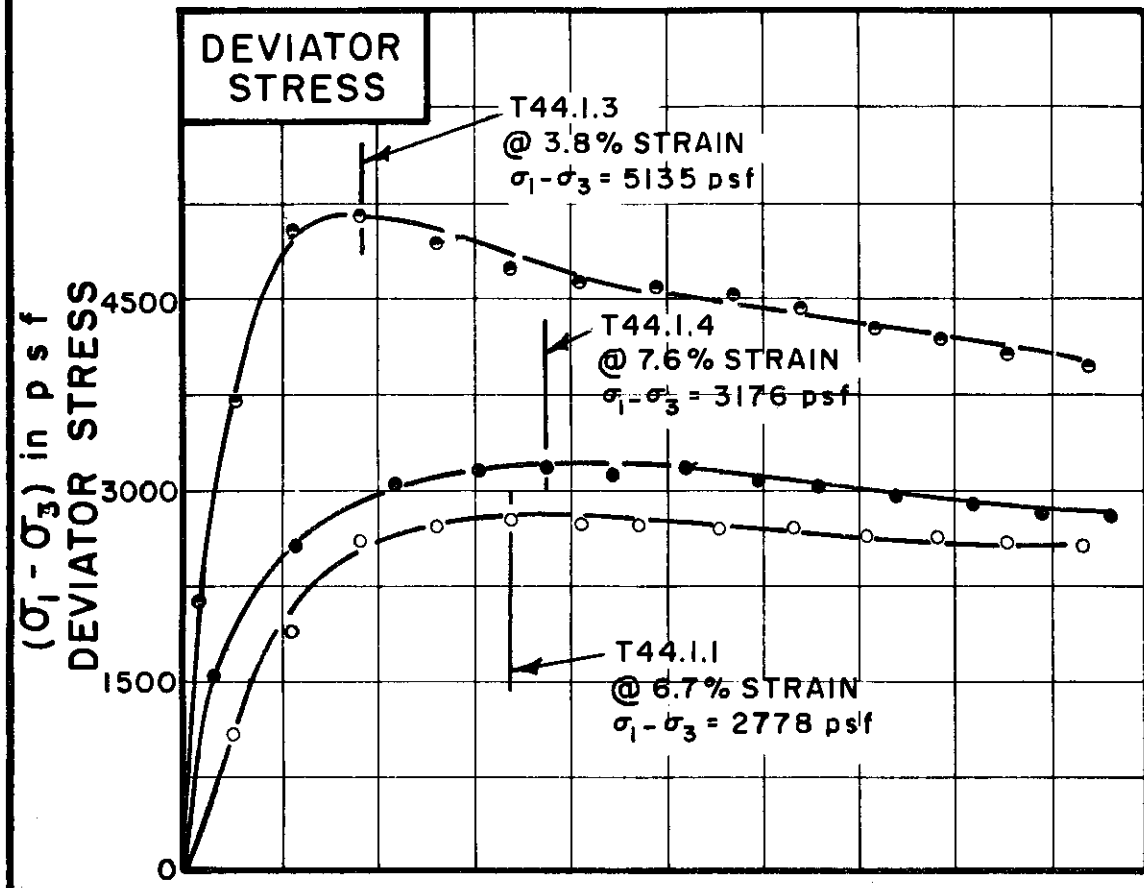
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO. / SYMBOL	T44.1.1	T44.1.4	T44.1.3
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INITIAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_0$		30.4%	30.6%	31.0%
DRY DENSITY	$\gamma_d$	pcf	94	95	94
SAMPLE DIAMETER	$D_0$	in.	1.43	1.42	1.43
SAMPLE HEIGHT	$H_0$	in.	3.37	3.40	3.36
CONDITIONS BEFORE SHEAR			T44.1.1	T44.1.4	T44.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	8640	10080
INITIAL EFFECTIVE STRESS	$\sigma'_{1,0}$ $\sigma'_{3,0}$	psf	1296 5184	2016 5184	5184
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.5%	3.6%	3.8%
PORE PRESSURE RESPONSE			98%	97%	96%
FINAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_f$		31.2%	30.1%	29.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024
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BORING NO. 60

SAMPLE NO. 4

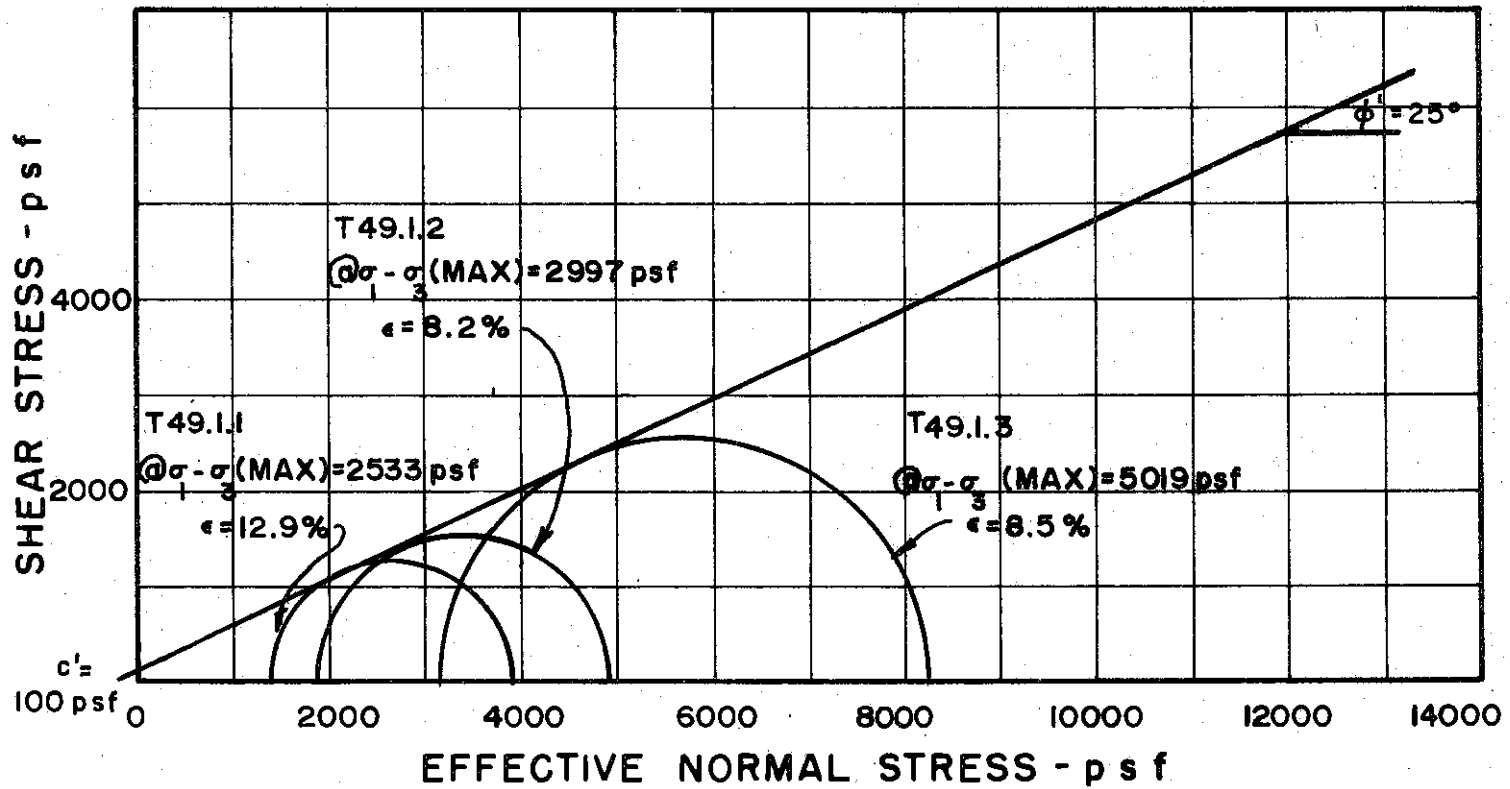
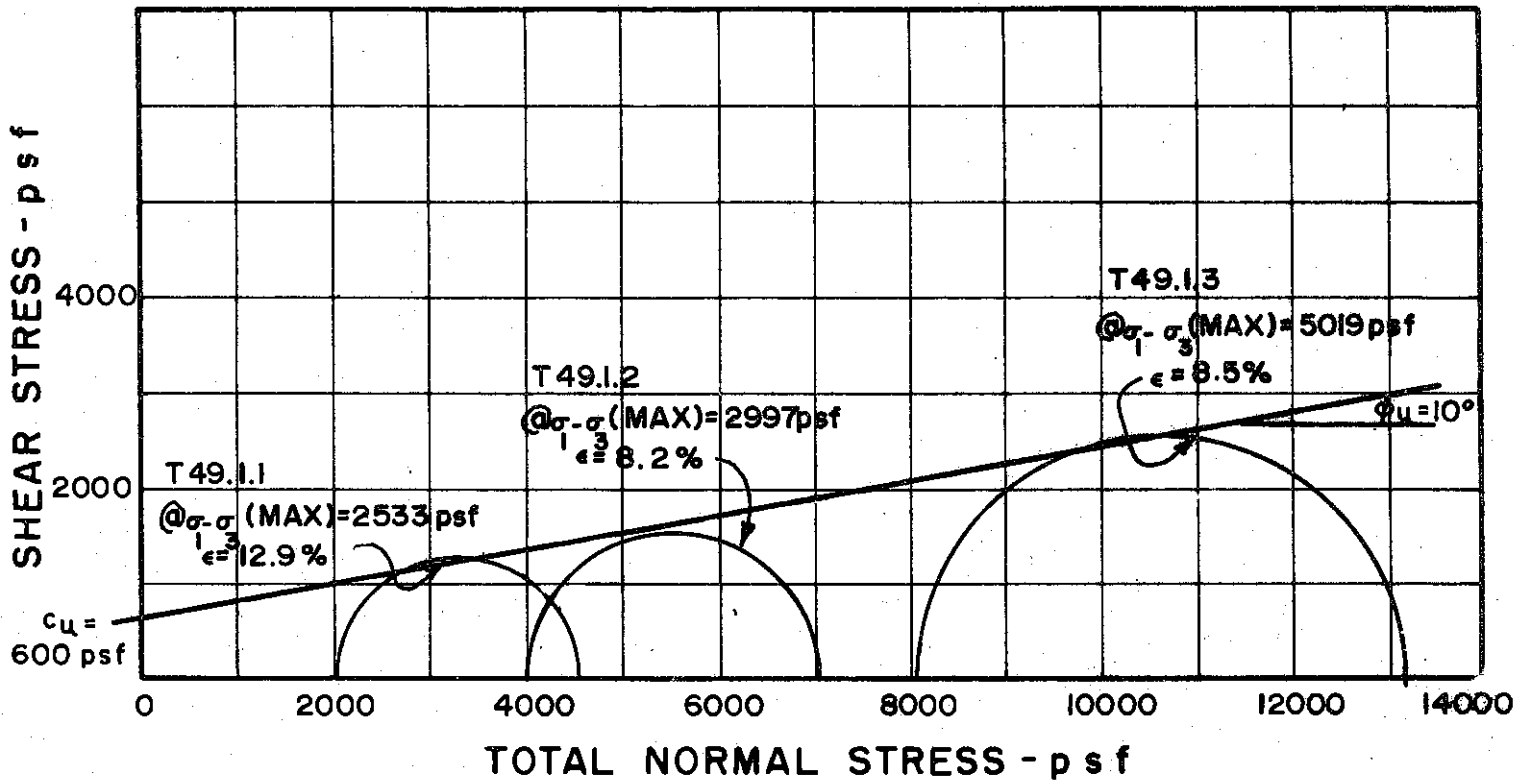
DEPTH 21.0 TO 23.0

SOIL DESCRIPTION SILTY CLAY, (CL)

LIQUID LIMIT 43 PLASTIC LIMIT 17

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

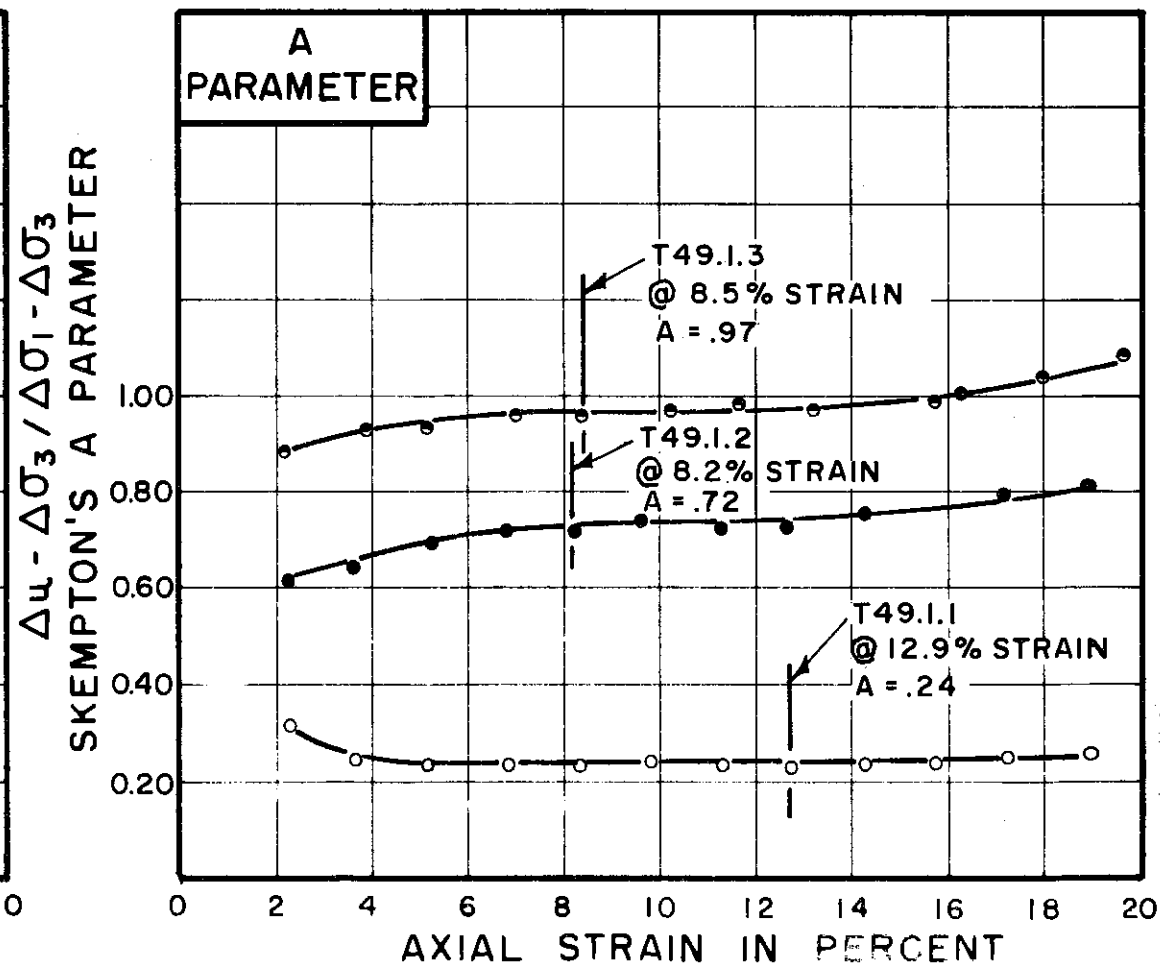
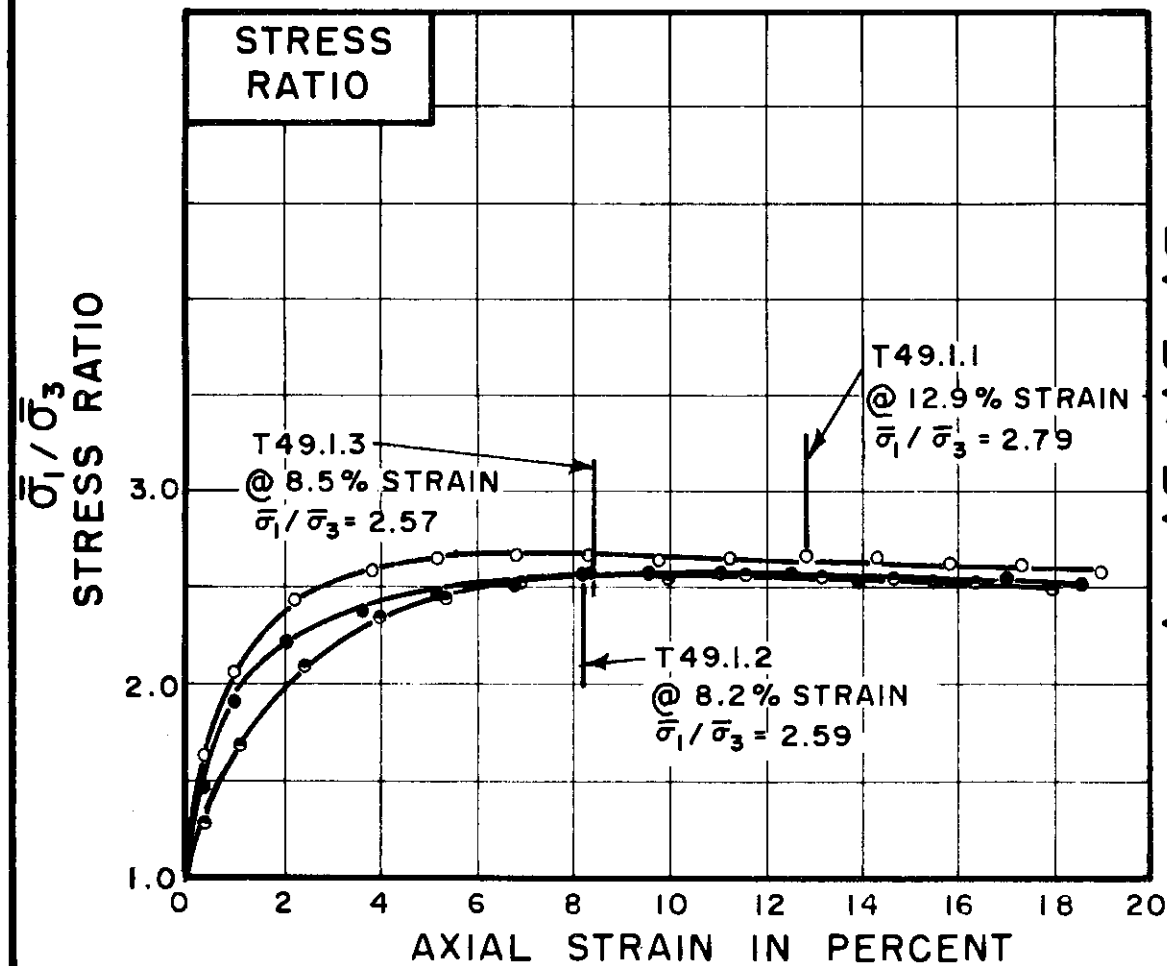
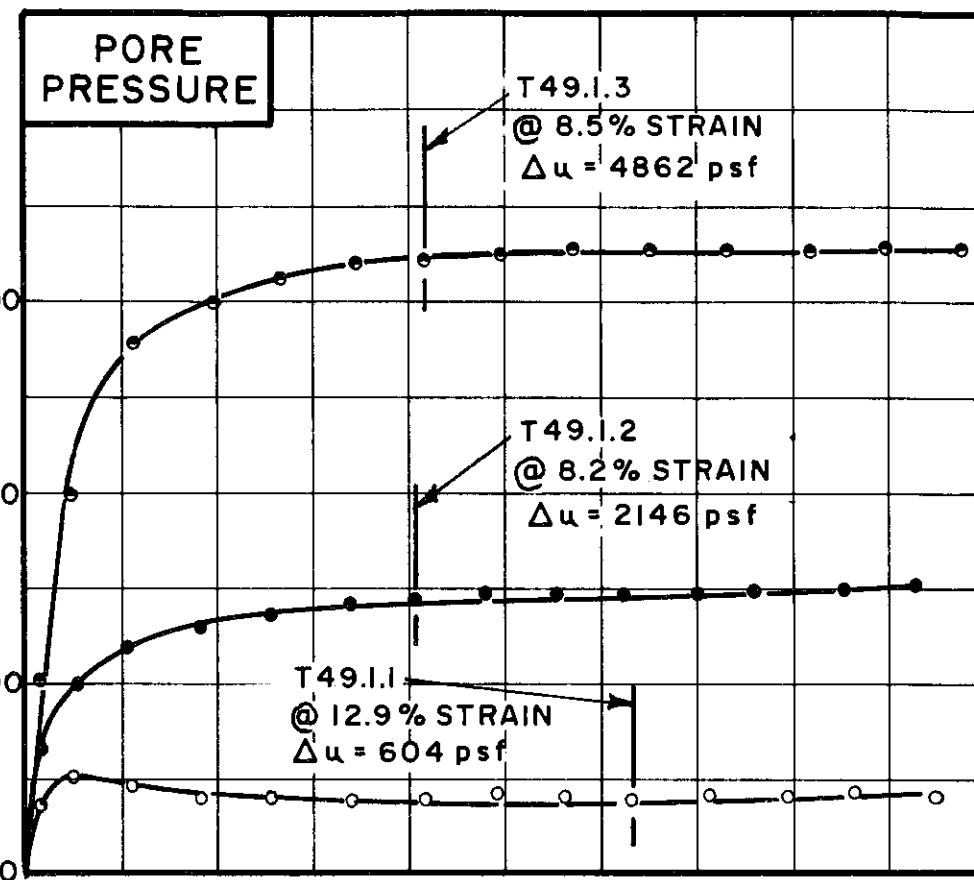
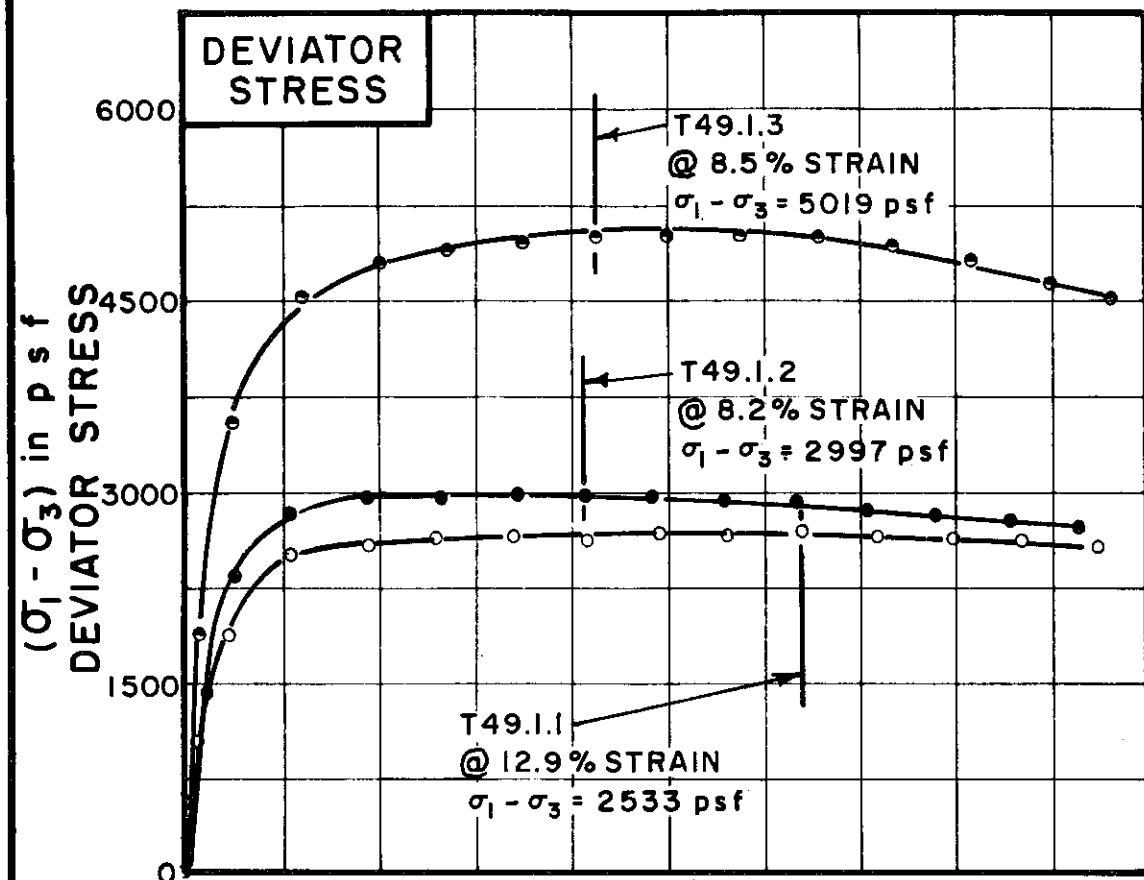
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-425



TEST NO. / SYMBOL	T49.1.1	T49.1.2	T49.1.3
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INITIAL CONDITIONS			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_0$		26.6%	27.0%	26.0%
DRY DENSITY	$\gamma_d$	pcf	99	98	102
SAMPLE DIAMETER	$D_0$	in.	1.42	1.40	1.39
SAMPLE HEIGHT	$H_0$	in.	3.32	3.40	3.26
FINAL CONDITIONS BEFORE SHEAR			T49.1.1	T49.1.2	T49.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	10080	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	2016	4032	8064
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.9%	3.5%	5.7%
PORE PRESSURE RESPONSE			97%	96%	91%
FINAL CONDITIONS AT END OF TEST			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_f$		26.0%	25.5%	22.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.025
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BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

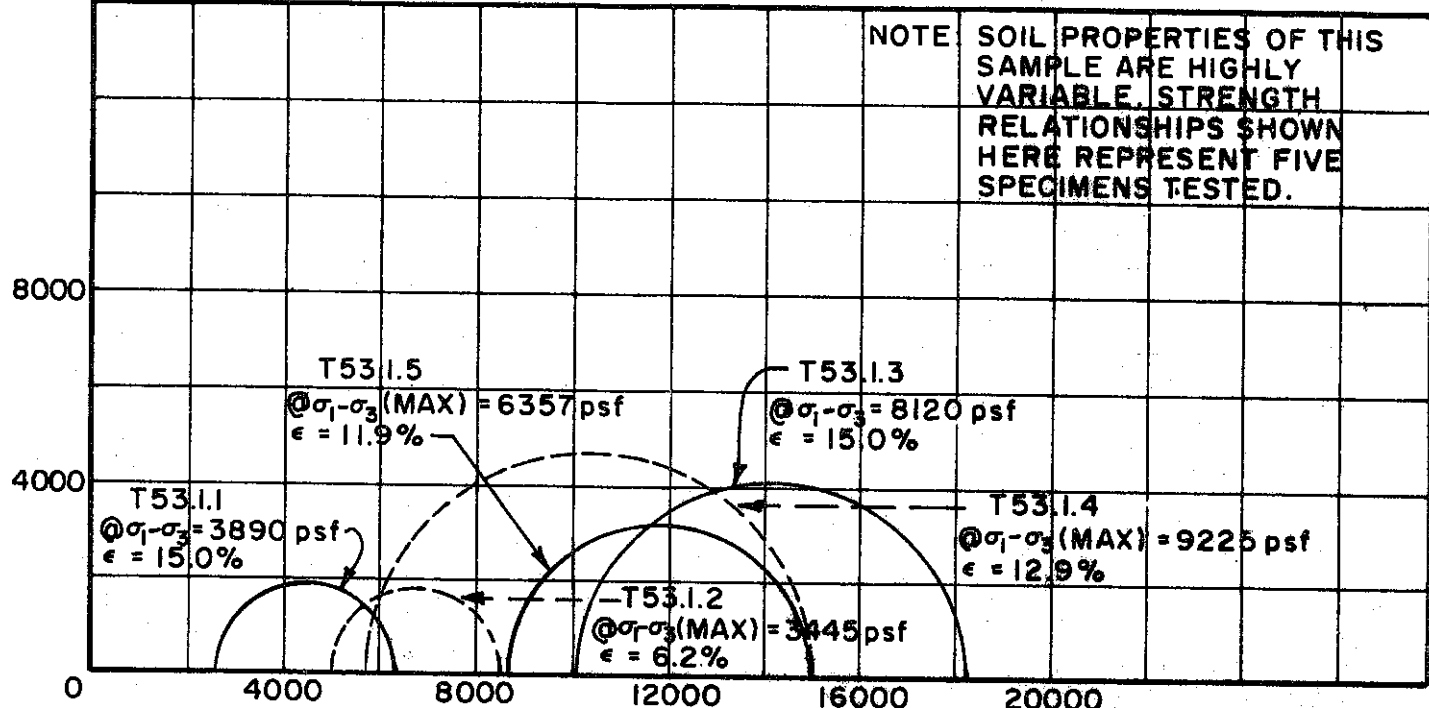
LIQUID LIMIT 38 PLASTIC LIMIT 16

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

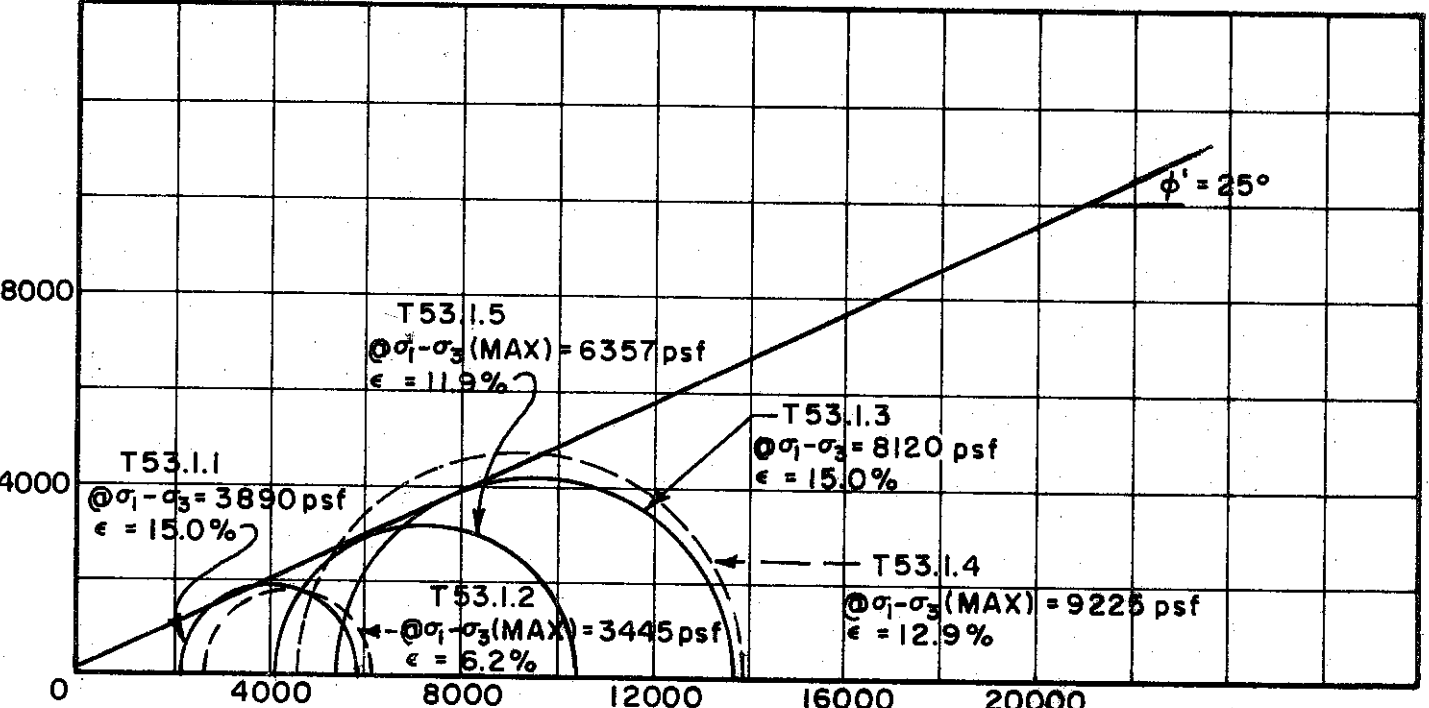
NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE. STRENGTH RELATIONSHIPS SHOWN HERE REPRESENT FIVE SPECIMENS TESTED.

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f

SHEAR STRESS - p s f



EFFECTIVE NORMAL STRESS - p s f

BORING NO. 60

SAMPLE NO. 13

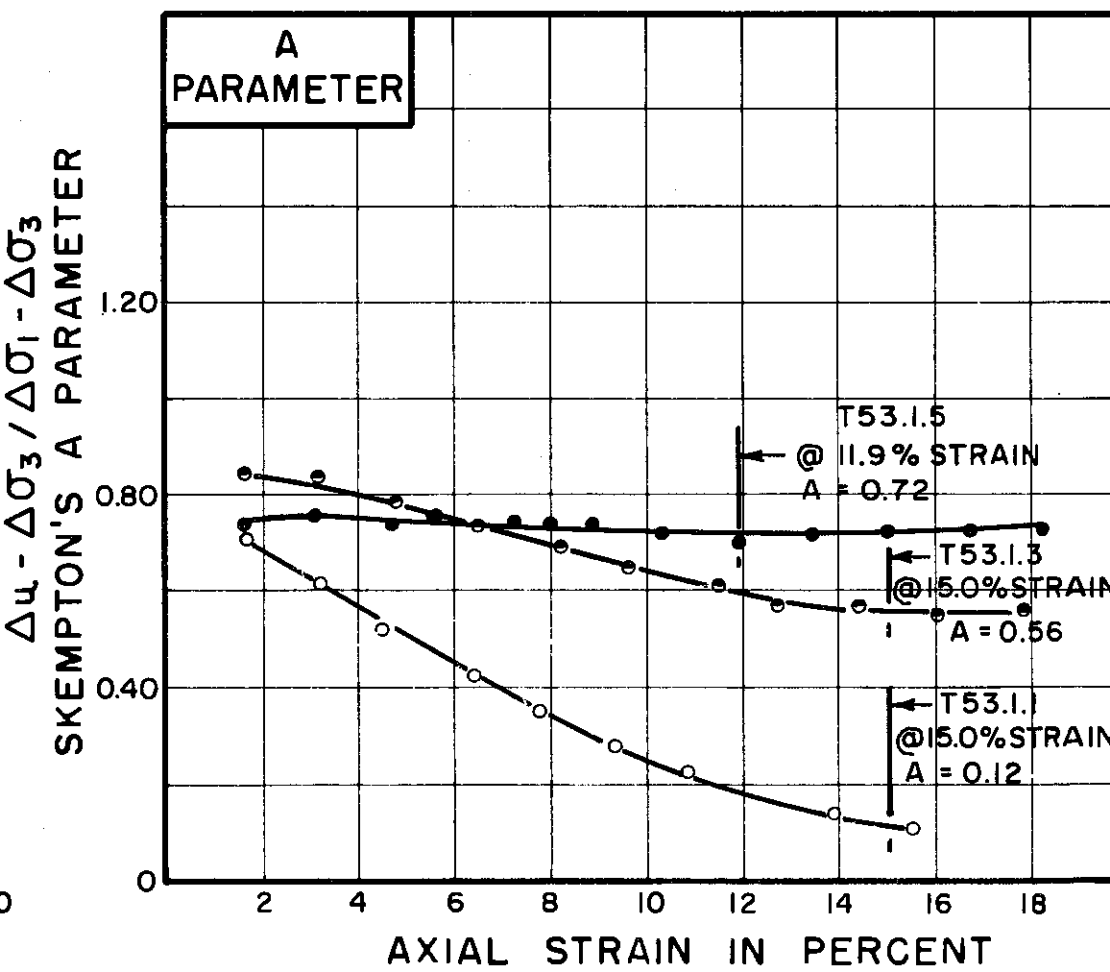
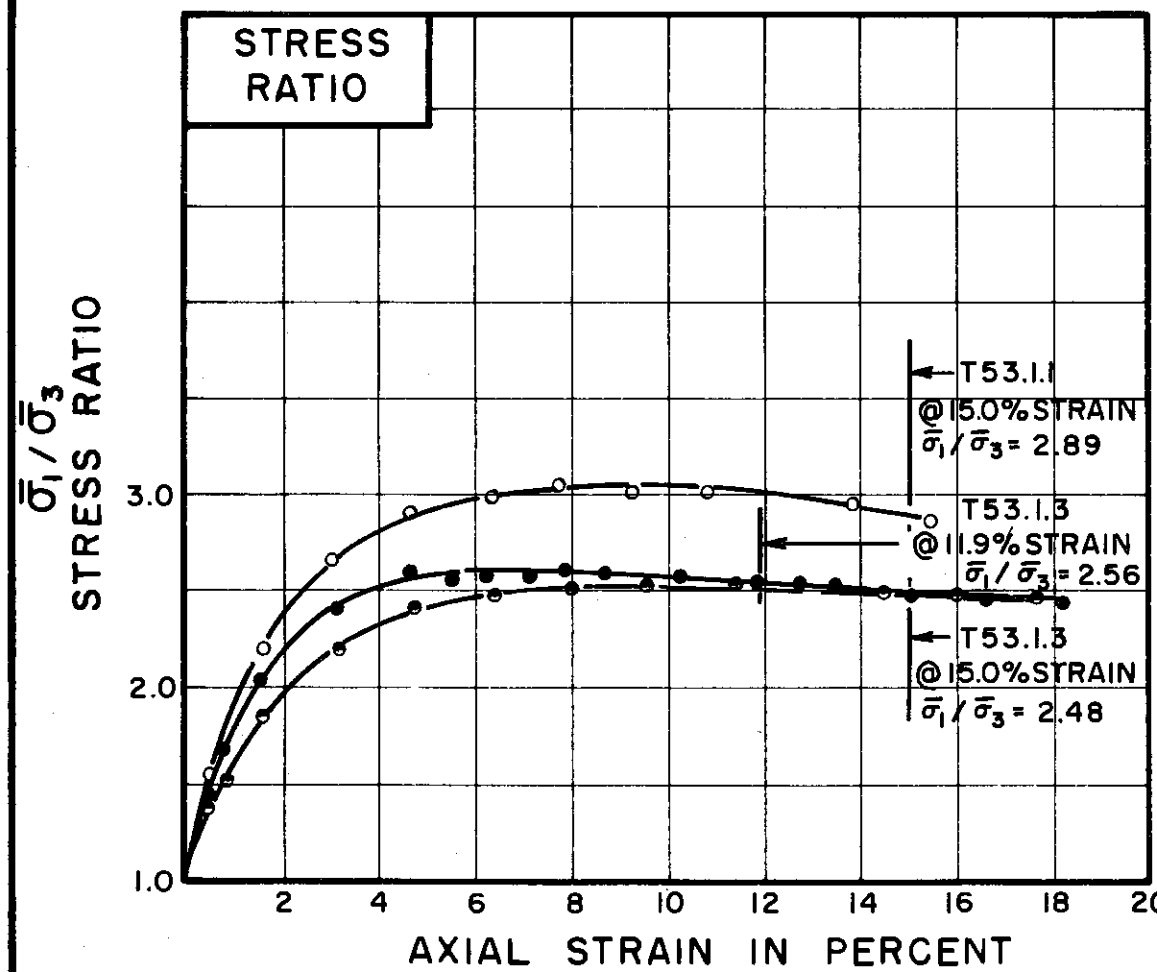
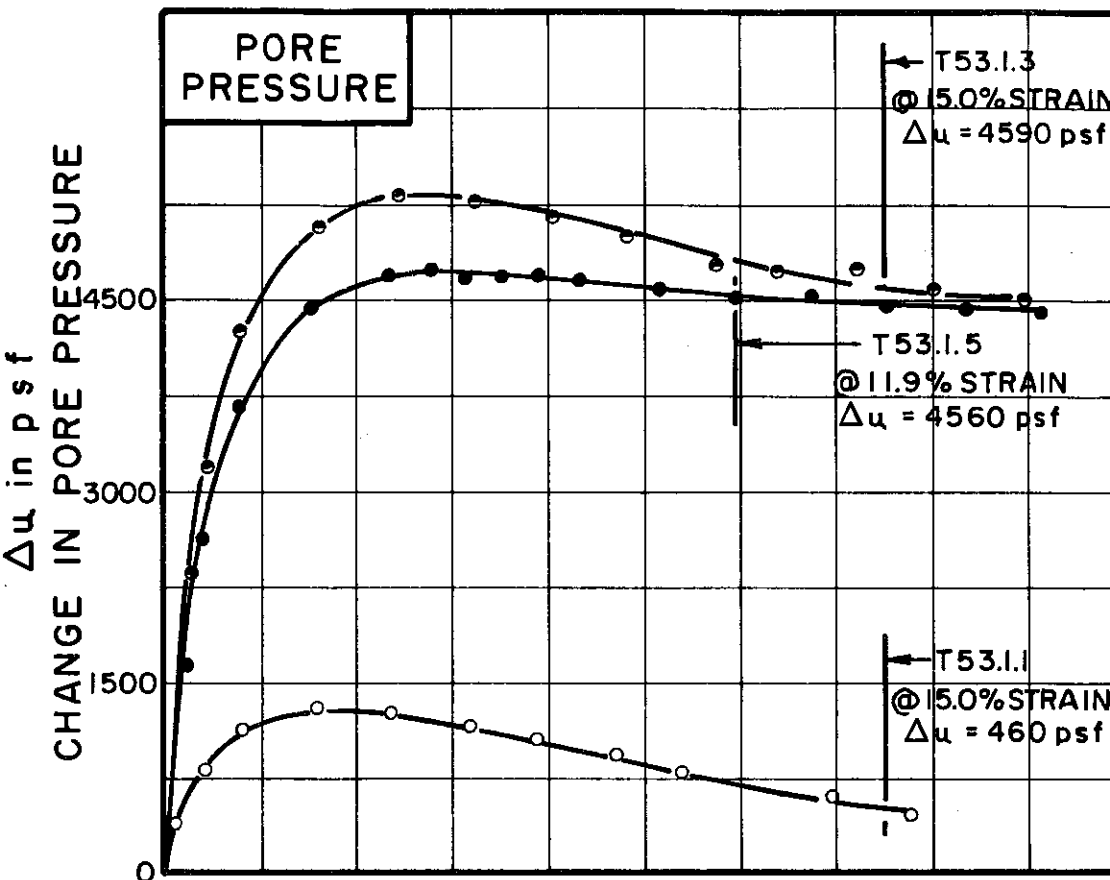
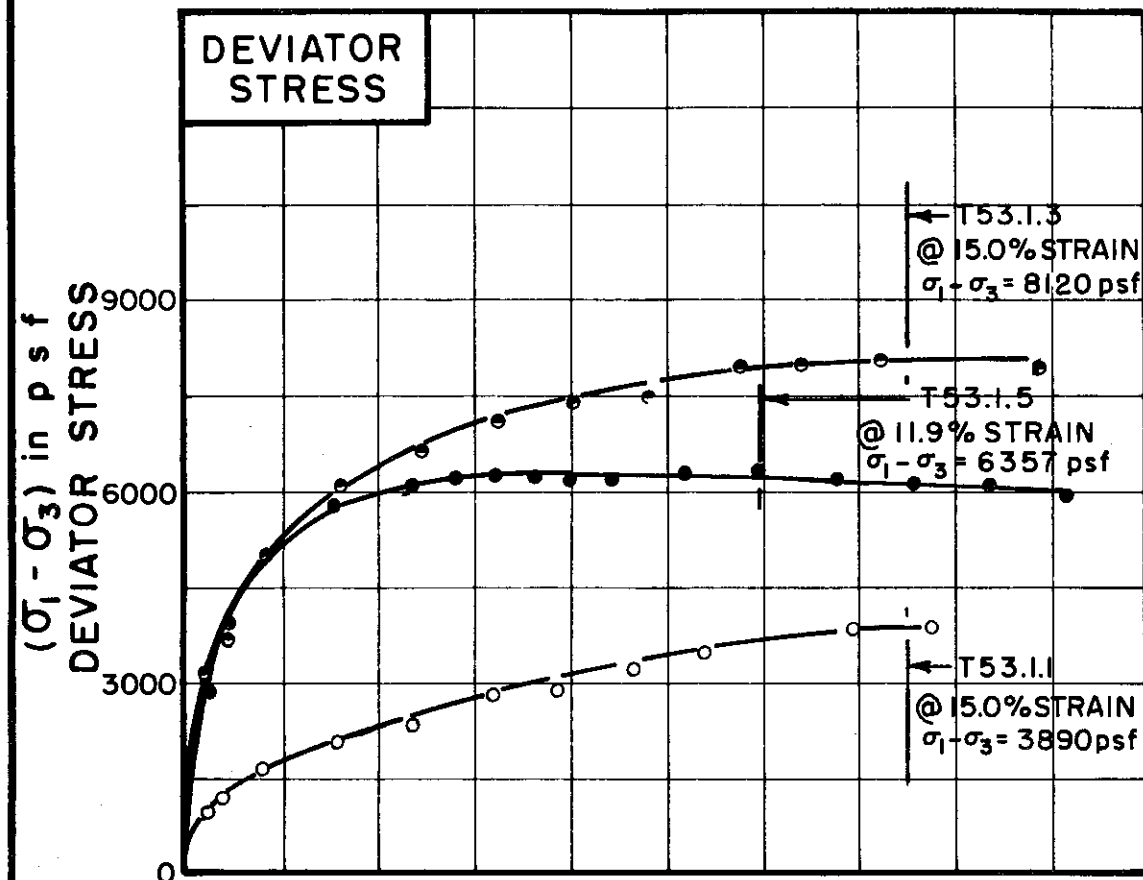
DEPTH 67.0' TO 69.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



TEST NO.*/SYMBOL	T53.1.1	T53.1.5	T53.1.3
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INITIAL CONDITIONS		T53.1.1	T53.1.5	T53.1.3
WATER CONTENT	$w_0$	23.6%	21.0%	19.7%
DRY DENSITY	$\gamma_d$ pcf	103	104	104
SAMPLE DIAMETER	$D_0$ in.	1.42	1.42	1.41
SAMPLE HEIGHT	$H_0$ in.	3.25	3.19	3.20
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$ p.s.f.	7200	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$ p.s.f.	2520	8640	10080
VOLUMETRIC STRAIN	$\epsilon_{vol}$	3.0%	5.0%	6.1%
PORE PRESSURE RESPONSE		97%	100%	100%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	21.7%	18.9%	17.6%
SKETCH OF SAMPLE				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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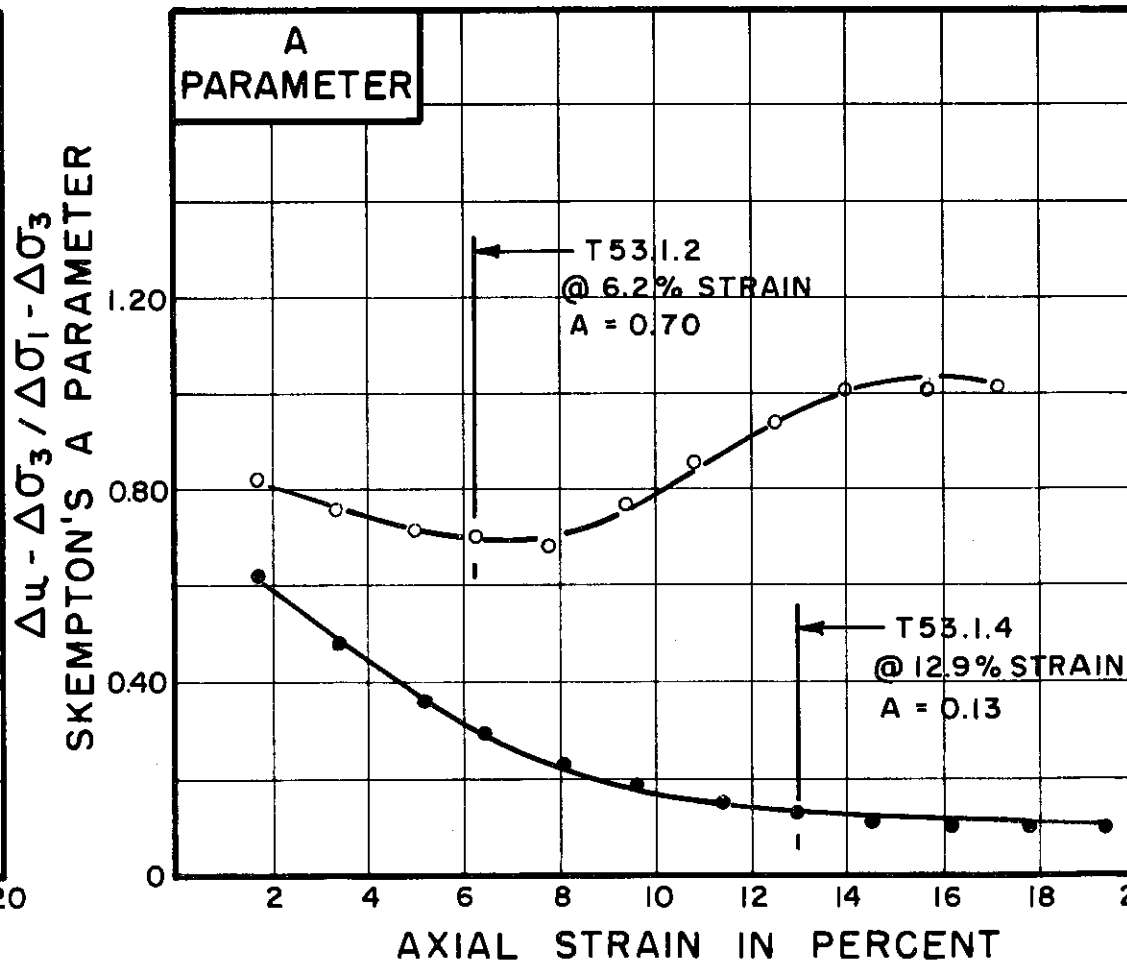
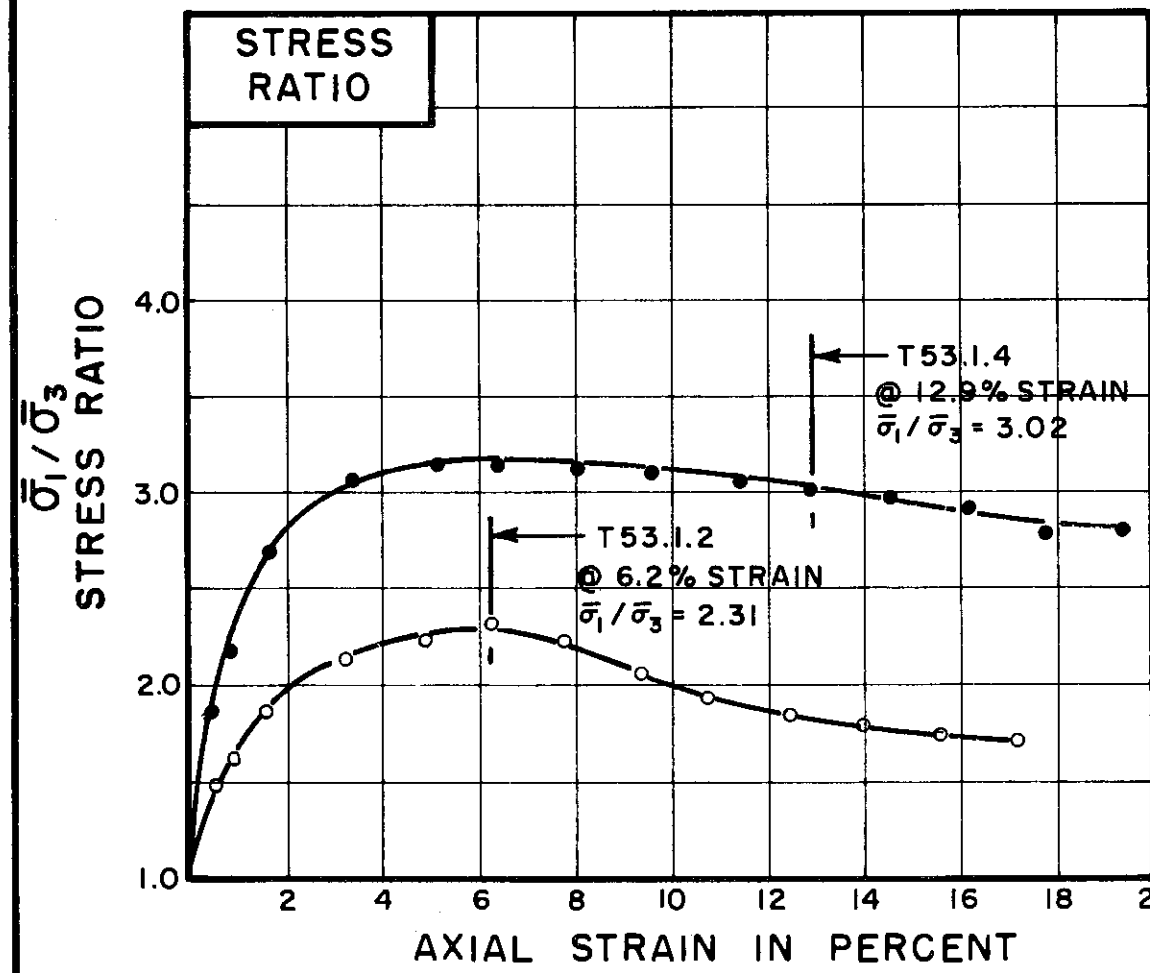
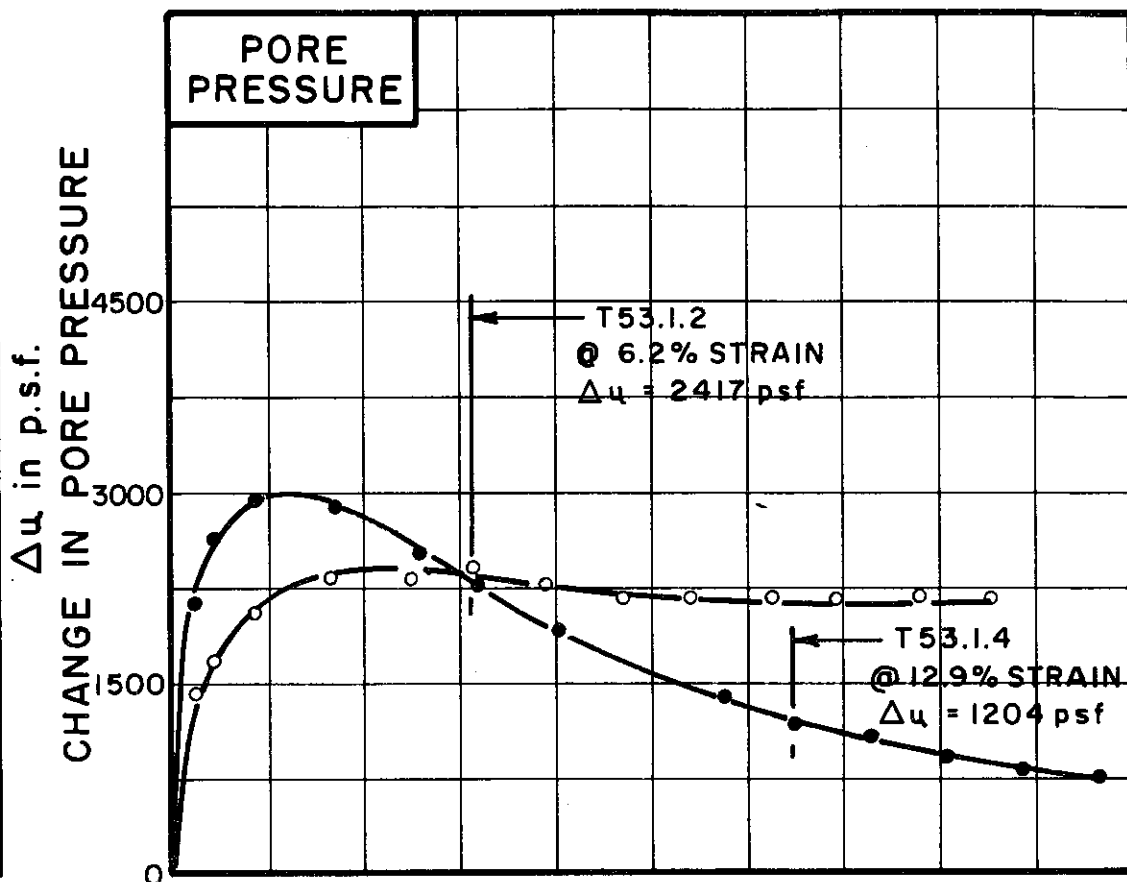
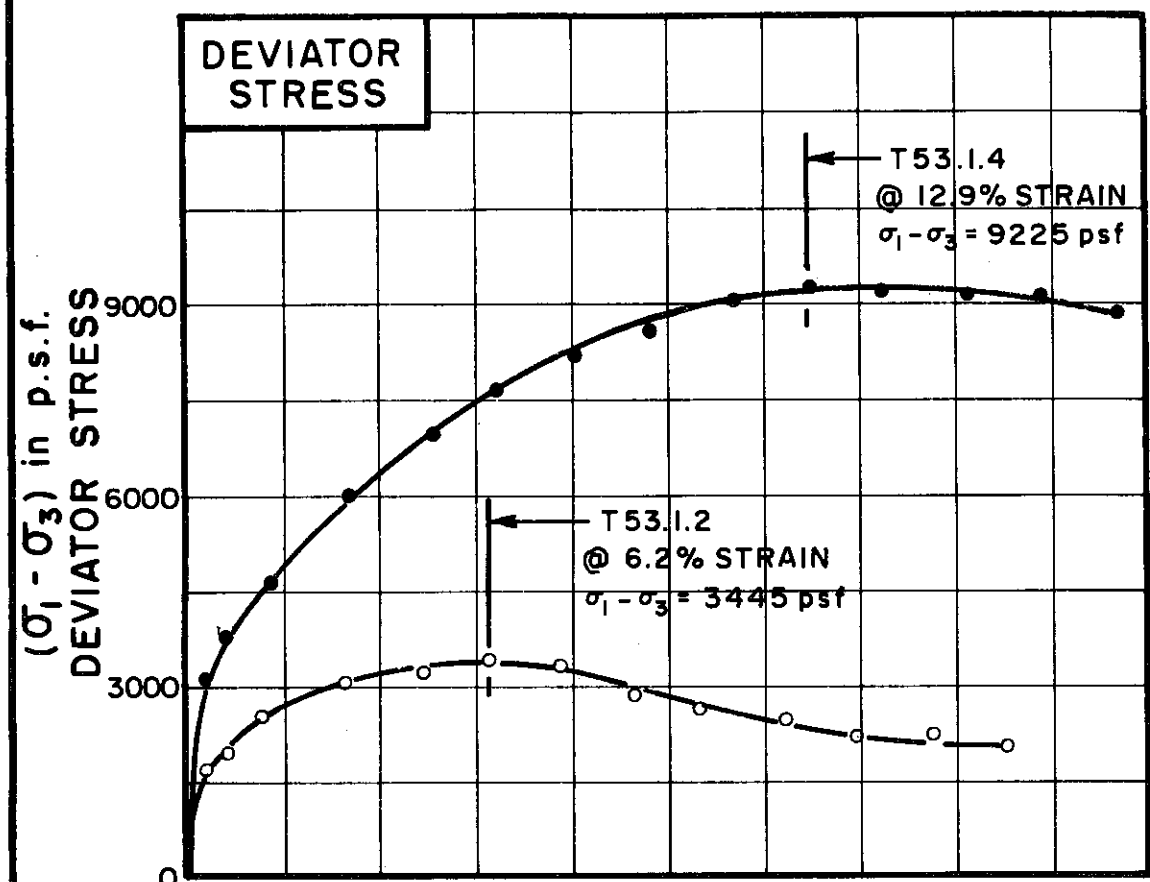
BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

SOIL DESCRIPTION SILTY CLAY, GRAVELLY  
 (CL-ML)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE-SEE DATA FOR TESTS T53.1.2 AND T53.1.4

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO. SYMBOL	T53.1.2	T53.1.4
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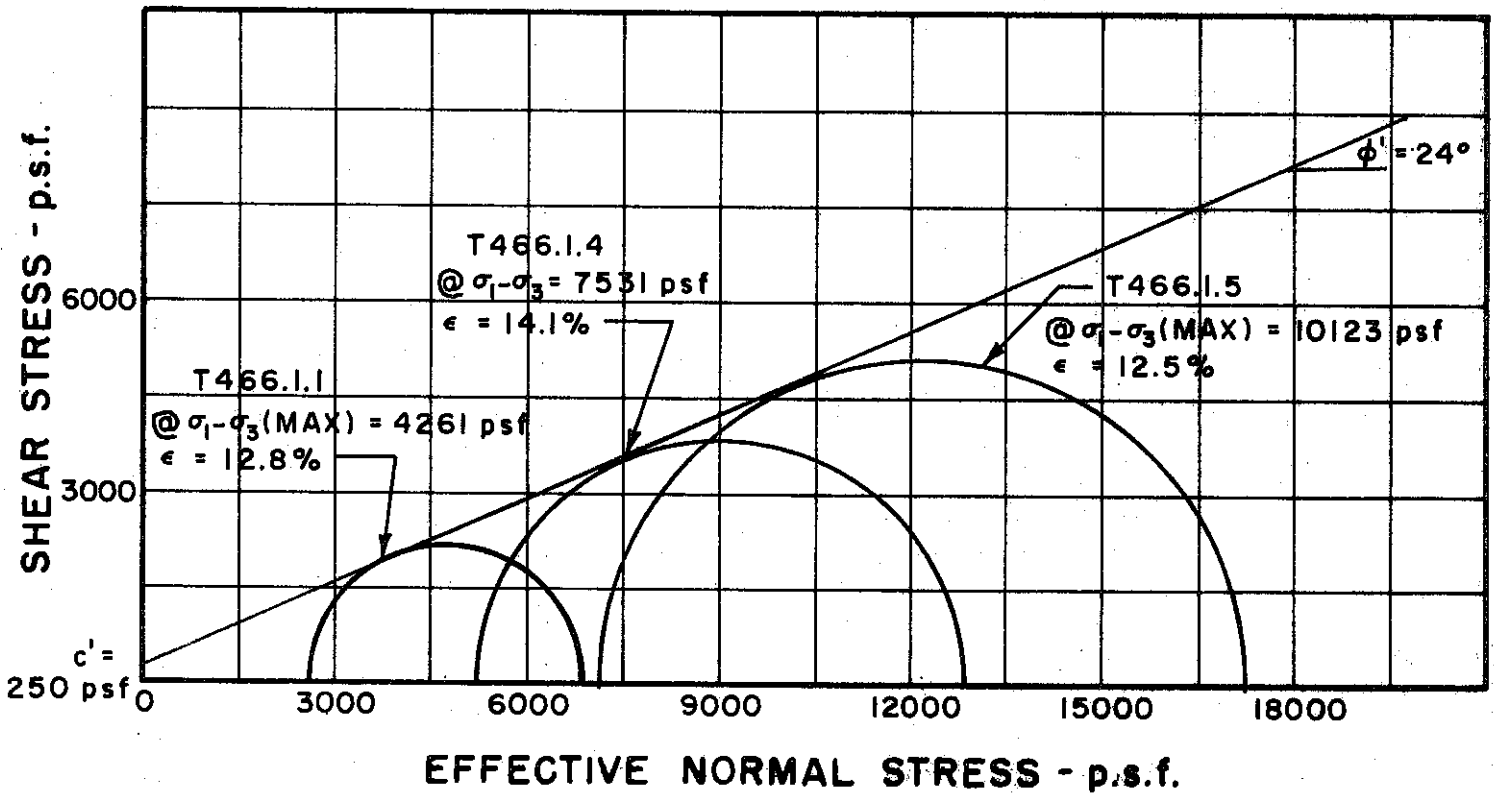
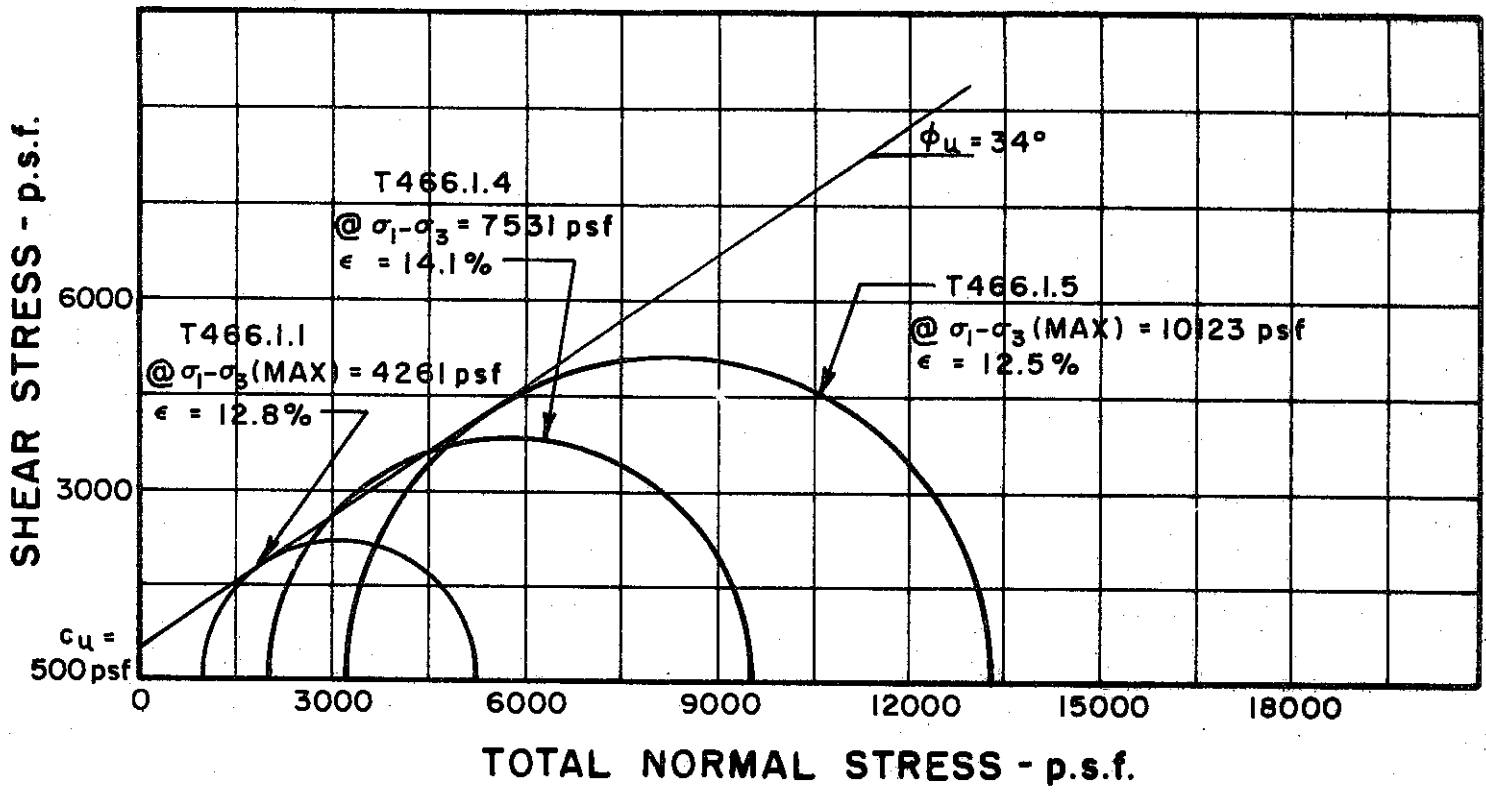
INITIAL CONDITIONS			
WATER CONTENT	$w_0$	31.9%	% 15.5%
DRY DENSITY	$\gamma_d$	91	114
SAMPLE DIAMETER	$D_0$	1.41	1.40
SAMPLE HEIGHT	$H_0$	3.28	3.15
FINAL CONDITIONS BEFORE SHEAR			
FINAL BACK PRESSURE	$u_0$	8640	11,520
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	5040	5760
VOLUMETRIC STRAIN	$\epsilon_{vol}$	5.3%	% 2.4%
PORE PRESSURE RESPONSE		97%	93%
FINAL CONDITIONS			
WATER CONTENT	$w_f$	28.4%	% 14.9%
SKETCH OF SAMPLE AT END OF TEST			

RATE OF STRAIN PERCENT/MINUTE	.025	.026
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BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'  
 SOIL DESCRIPTION T53.1.2-CLAYEY GRAVEL(GC)  
T53.1.4-SILTY CLAY(CL)

LIQUID LIMIT (40) PLASTIC LIMIT (19)  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR T53.1.1, T53.1.3 AND T53.1.5

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

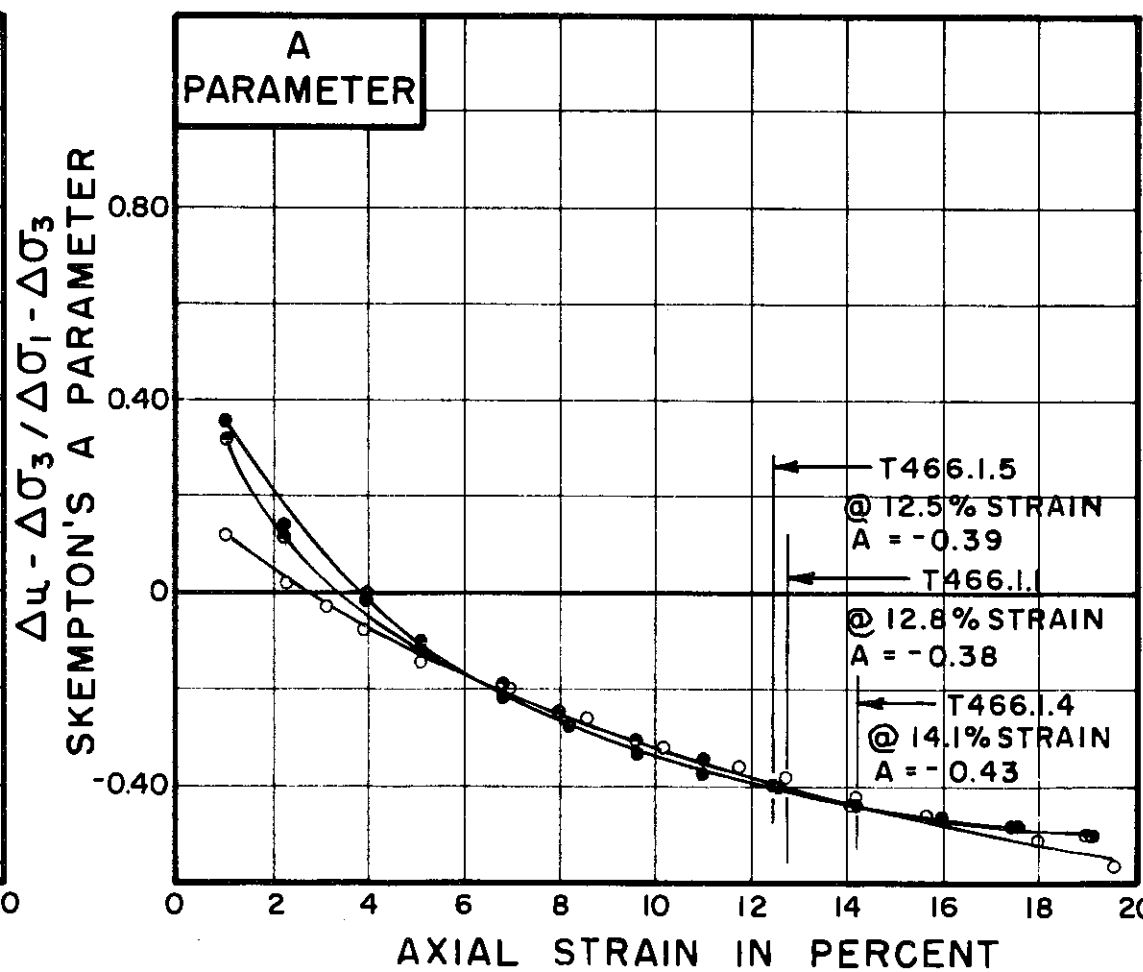
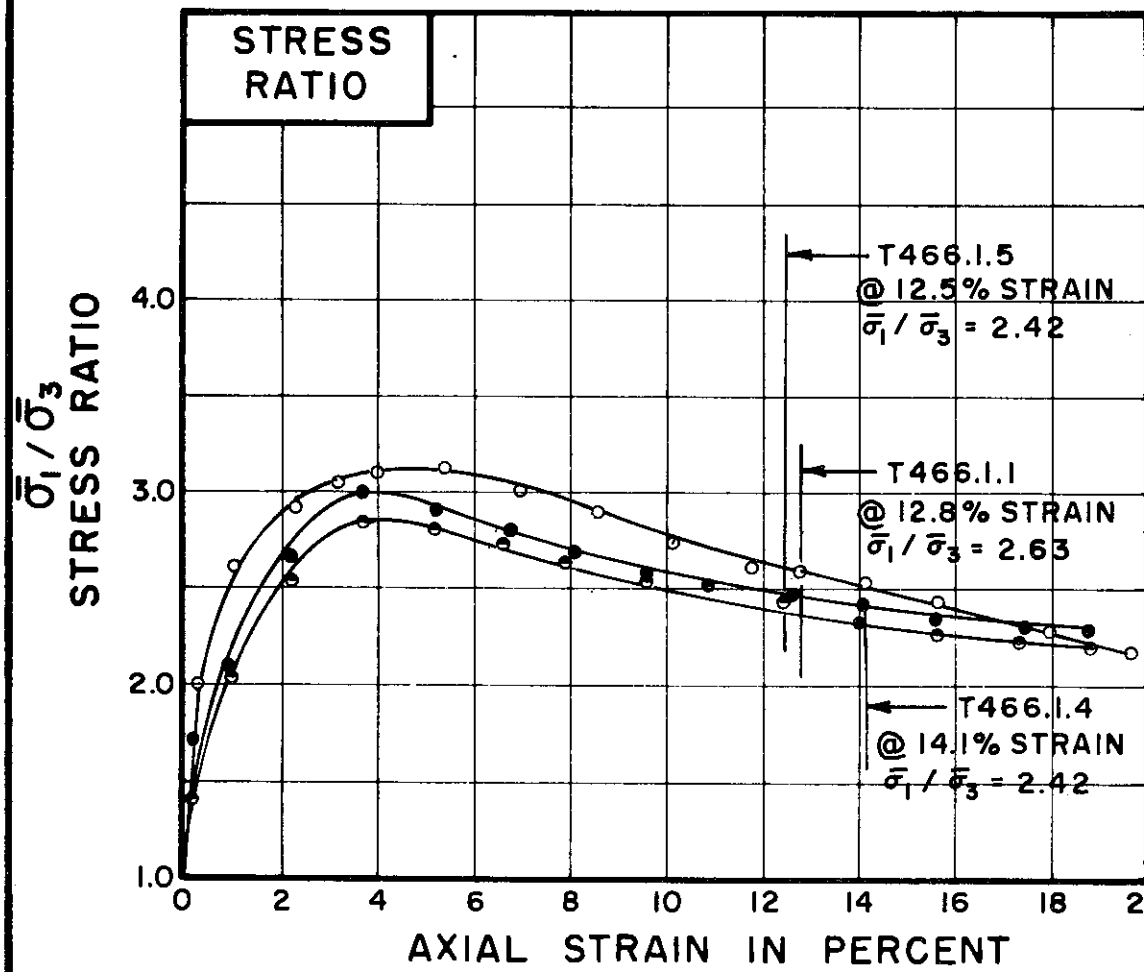
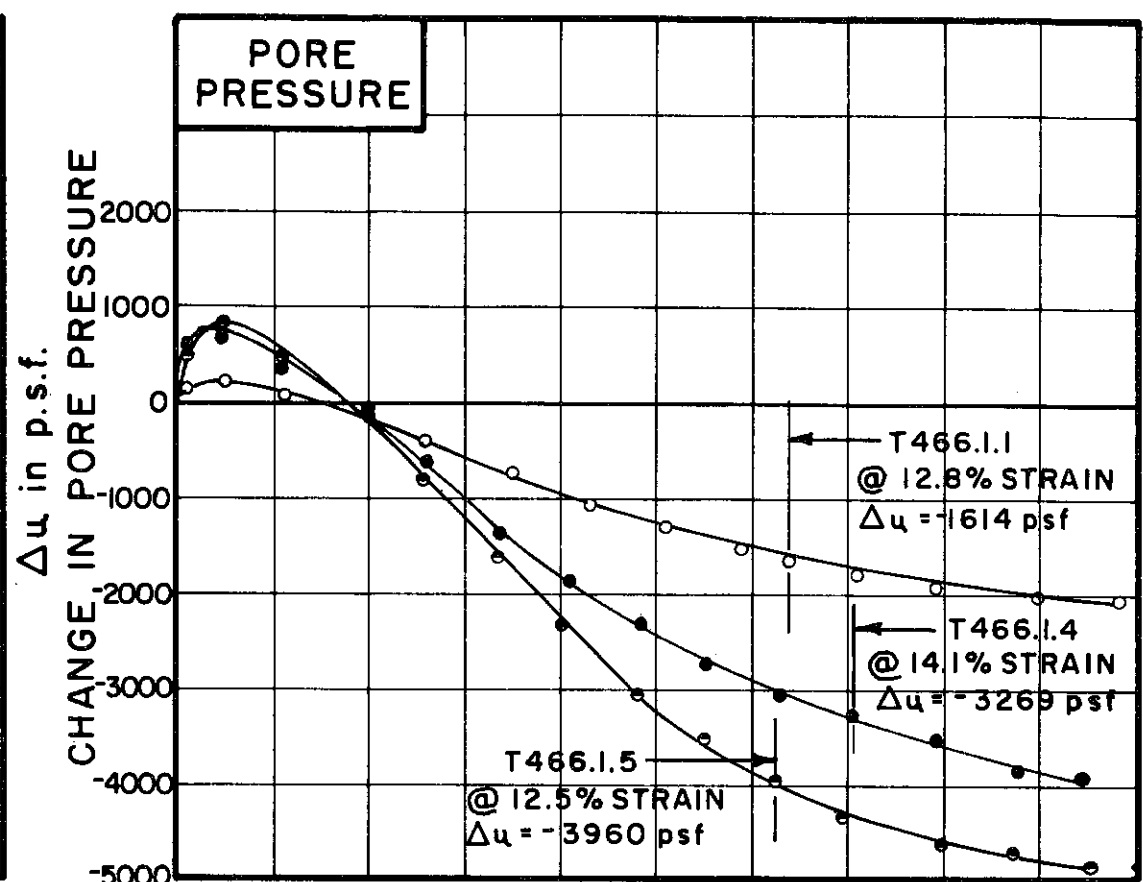
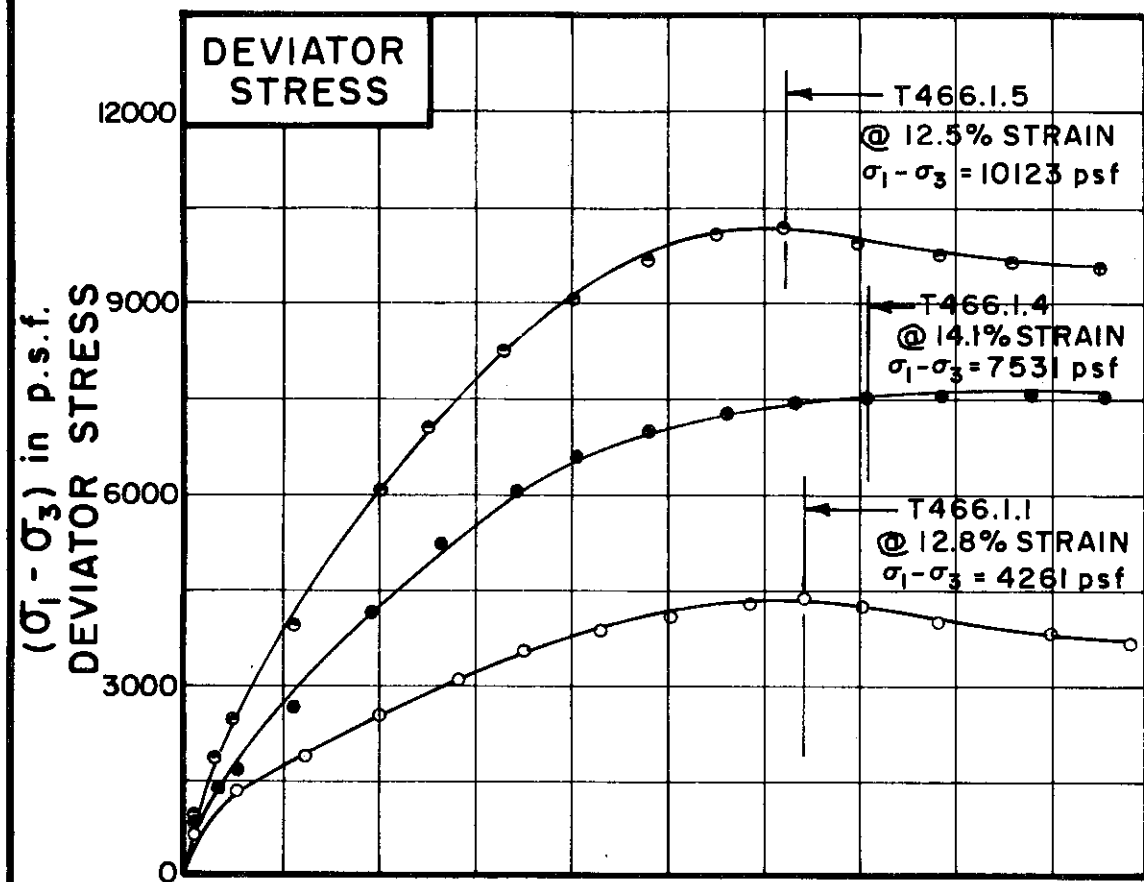


BORING NO. 101,105,127,128,180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-430



TEST NO. / SYMBOL	T466.1.1	T466.1.4	T466.1.5
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	15.3%	15.5%	15.9%
	DRY DENSITY	$\gamma_d$	113	114	114
	SAMPLE DIAMETER	$D_0$	1.38	1.39	1.40
CONDITIONS BEFORE SHEAR	SAMPLE HEIGHT	$H_0$	3.19	3.36	3.44
	FINAL BACK PRESSURE	$u_0$	7200	7200	7200
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	1008	2016	3168
FINAL CONDITIONS	VOLUMETRIC STRAIN	$\epsilon_{vol}$	— %	.14 %	.14 %
	PORE PRESSURE RESPONSE		98%	99%	98%
	WATER CONTENT	$w_f$	21.3%	19.1%	18.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.024	.023
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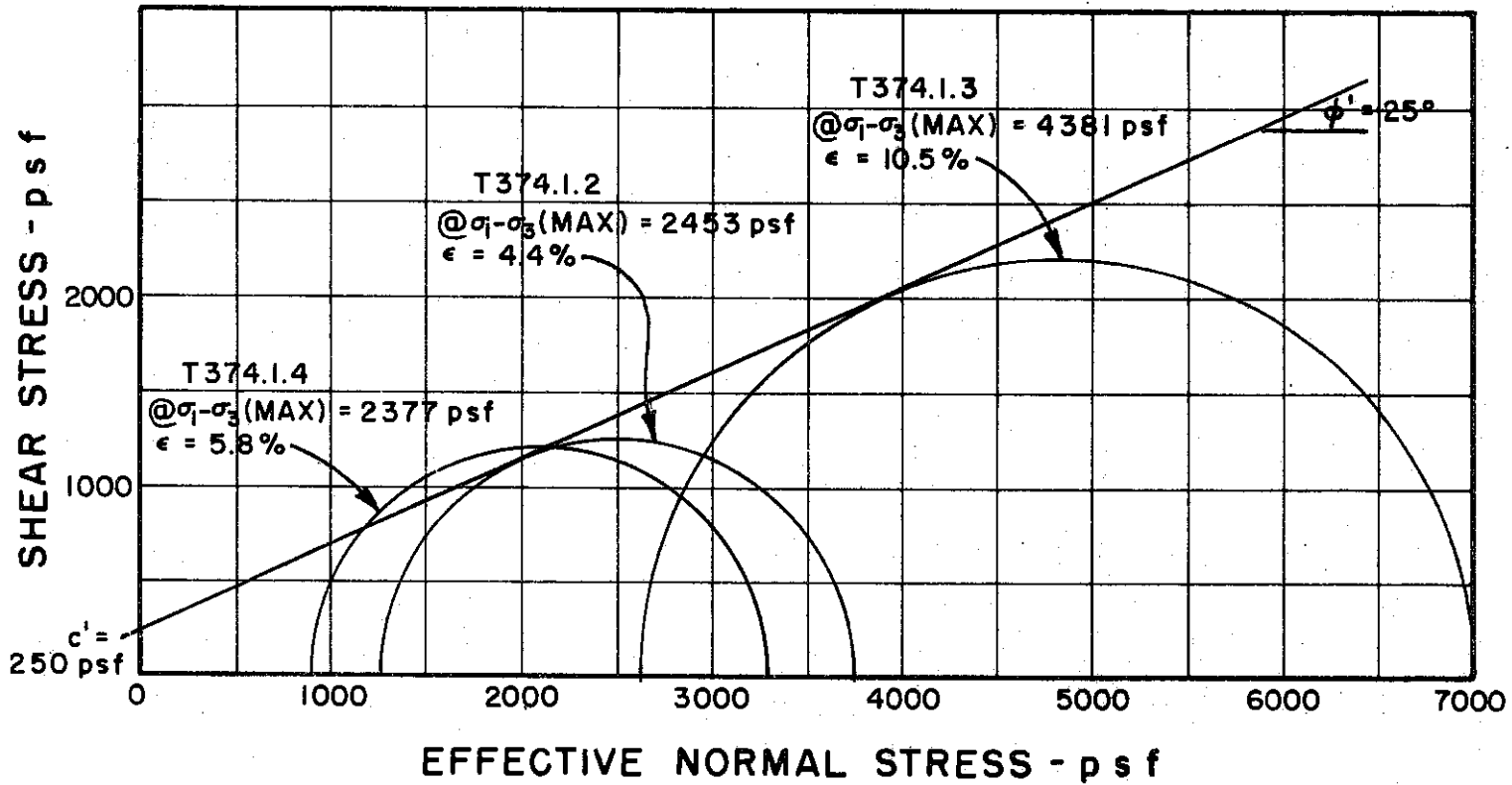
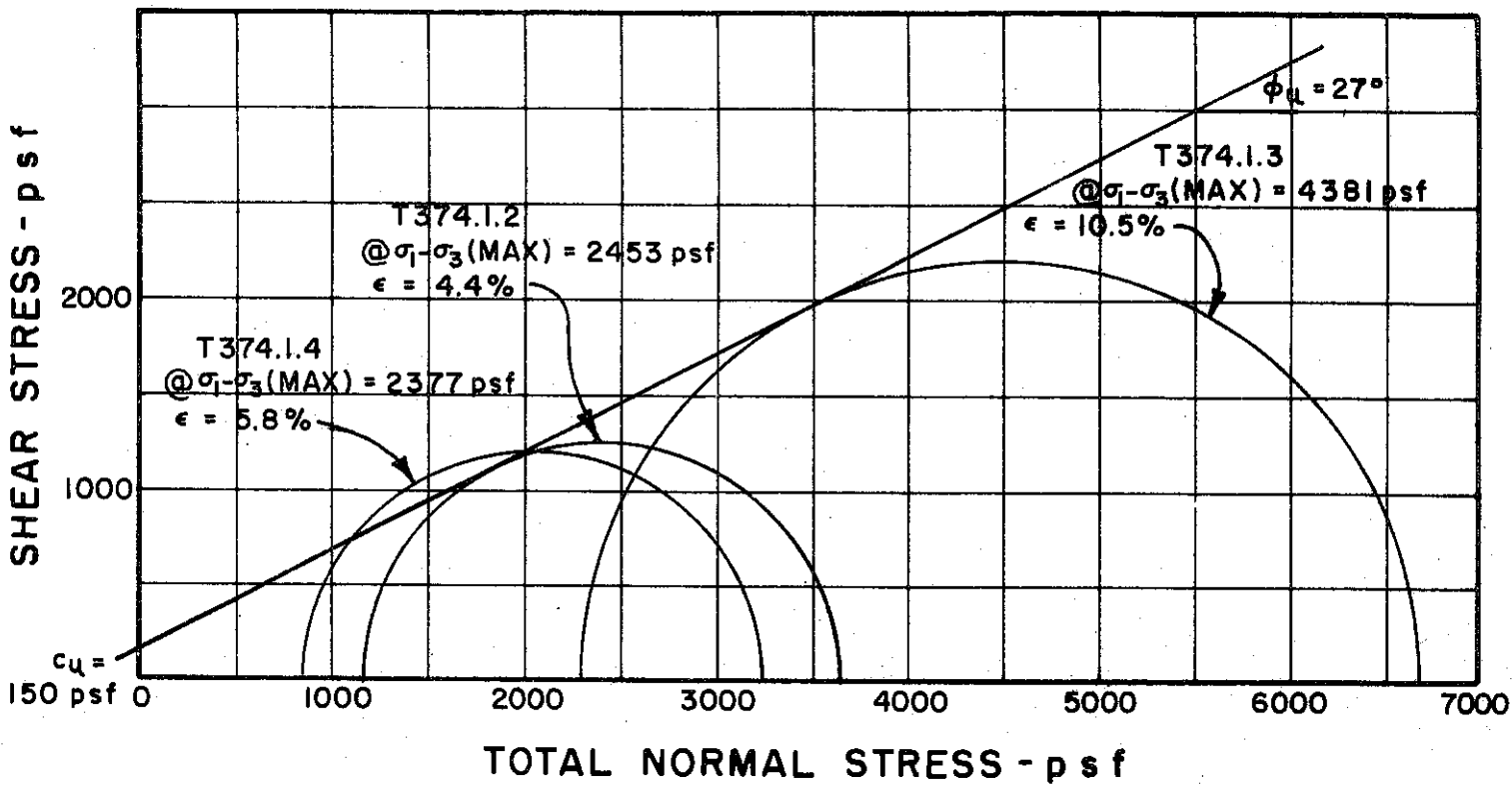
BORING NO. 101, 105, 127, 128, 180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 SEE DATA FOR INDIVIDUAL SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 105

SAMPLE NO. 2

DEPTH 9.0' TO 11.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

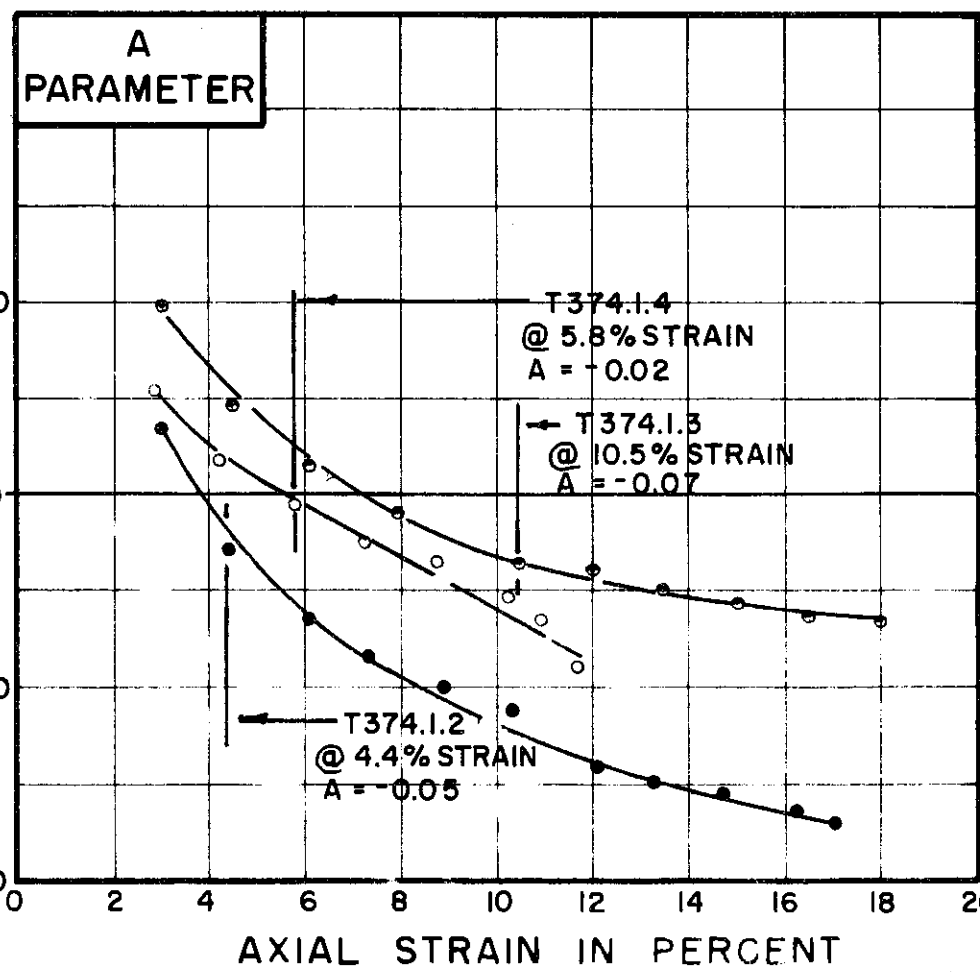
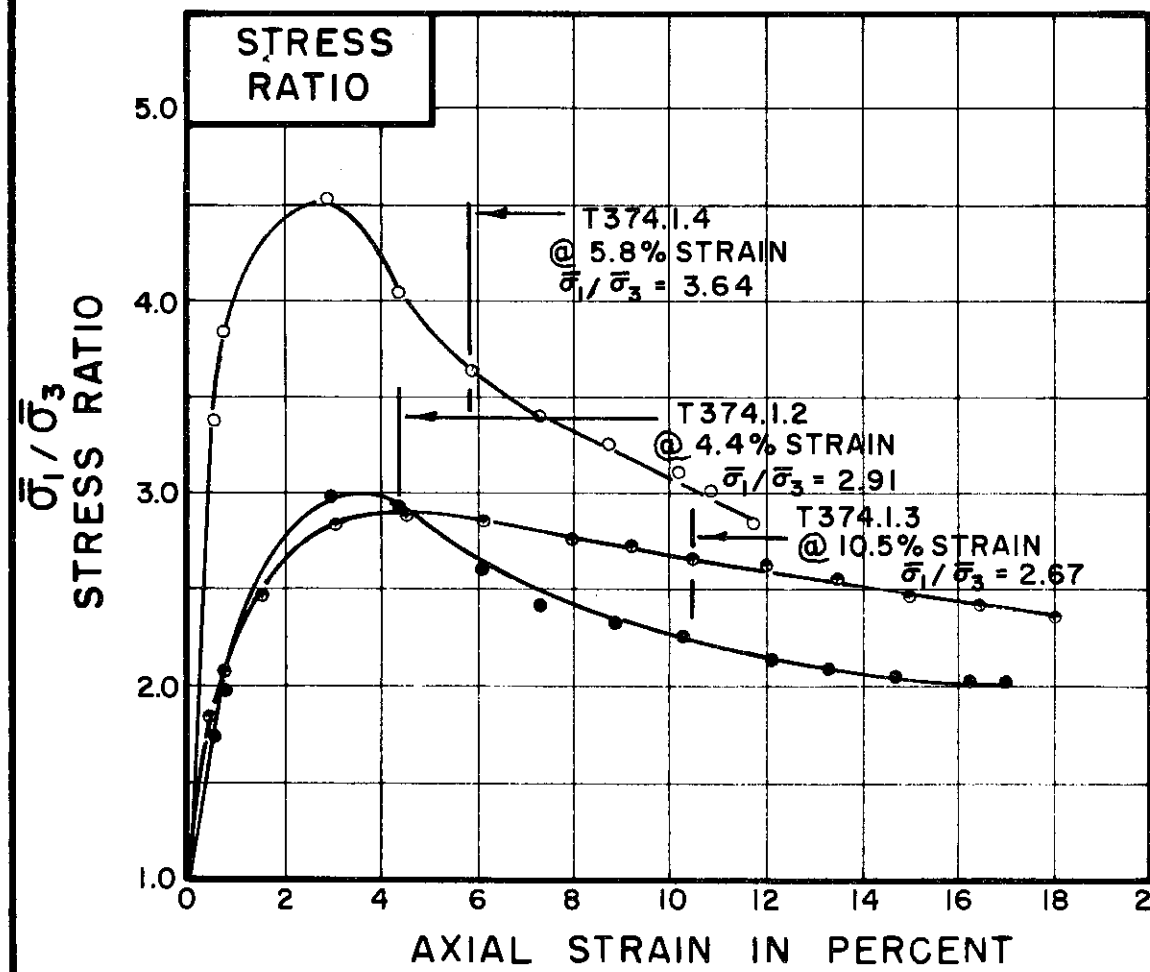
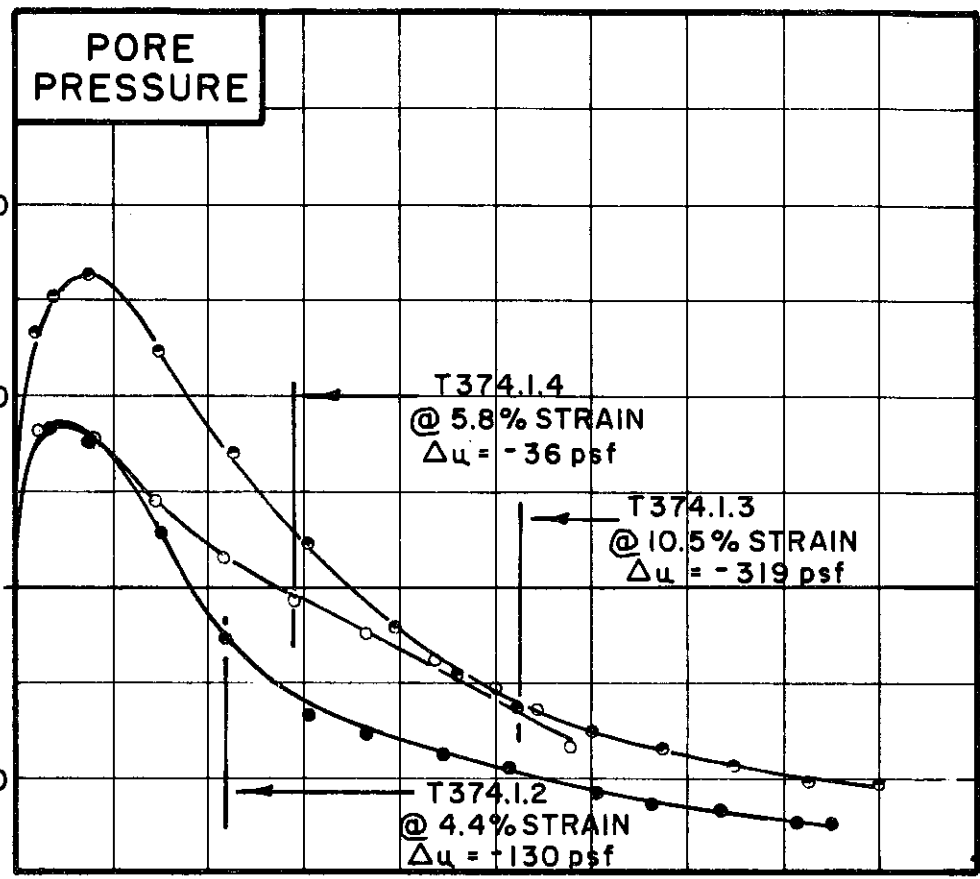
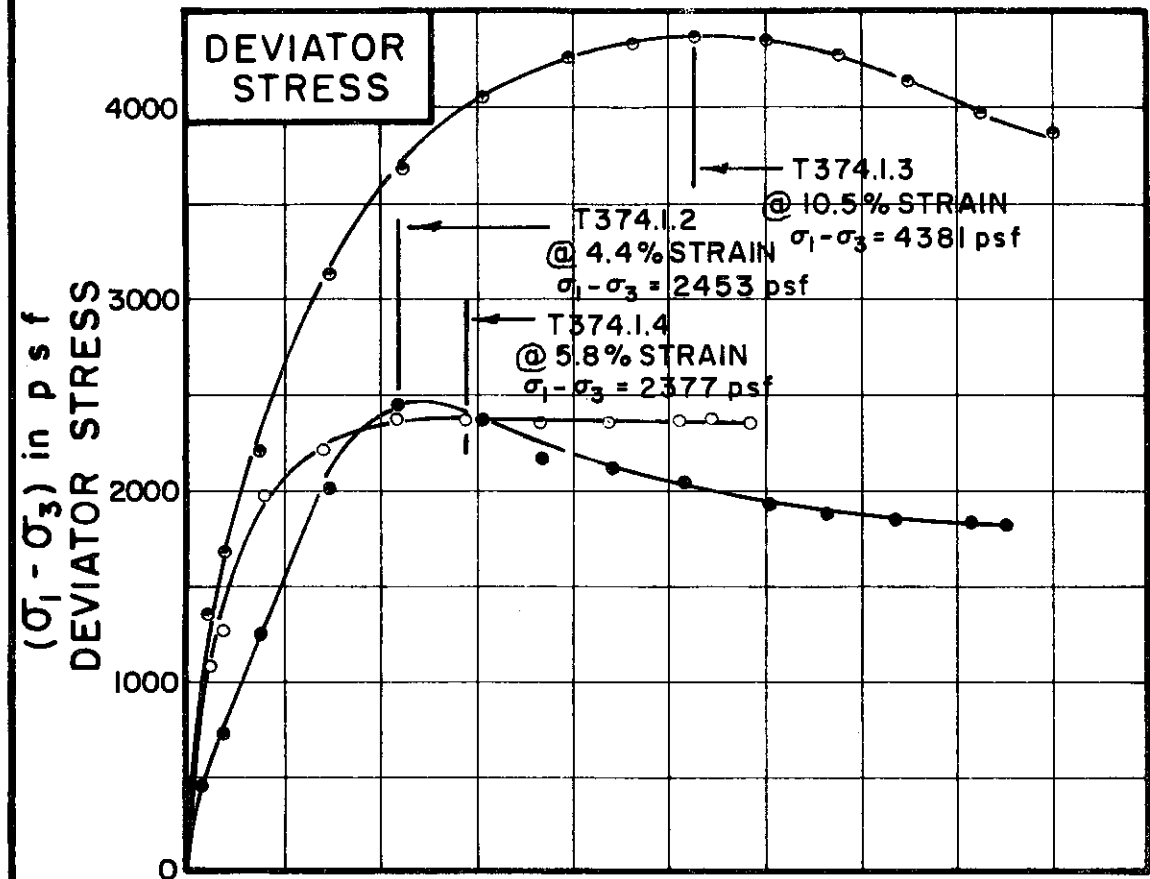
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-432



TEST NO. / SYMBOL	T374.1.4	T374.1.2	T374.1.3
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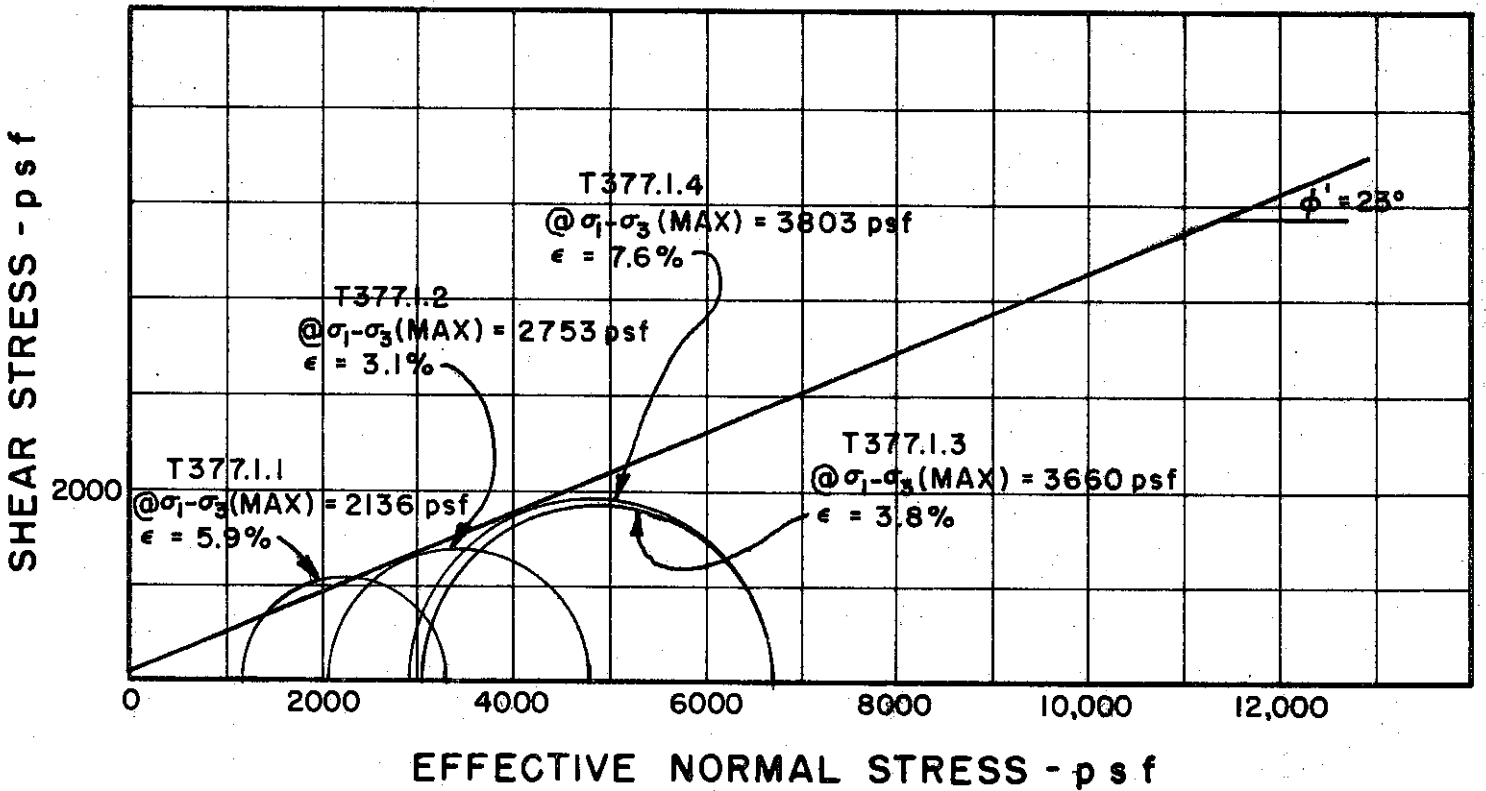
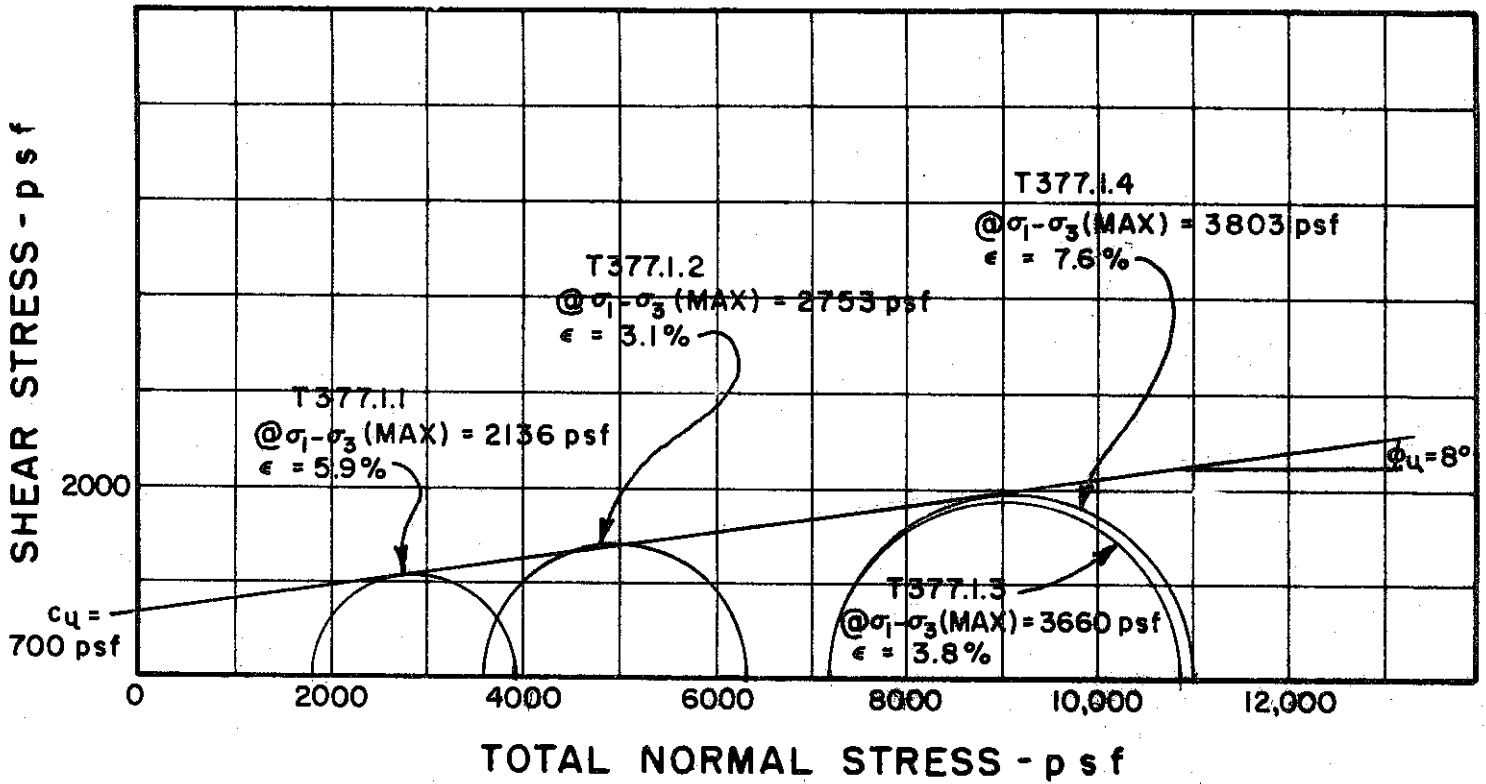
INITIAL CONDITIONS		W <sub>0</sub>	27.7%	26.4%	26.9%
WATER CONTENT	W <sub>0</sub>				
DRY DENSITY	γ <sub>d</sub>	98	99	96	
SAMPLE DIAMETER	D <sub>0</sub>	1.42	1.40	1.38	
SAMPLE HEIGHT	H <sub>0</sub>	3.44	3.39	3.35	
FINAL CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	u <sub>0</sub>	5760	6480	7200	
INITIAL EFFECTIVE STRESS	$\sigma_1 = \sigma_3$	864	1152	2304	
VOLUMETRIC STRAIN	ε <sub>vol</sub>	0.60%	0.50%	1.35%	
PORE PRESSURE RESPONSE		98%	95%	95%	
FINAL CONDITIONS					
WATER CONTENT	W <sub>f</sub>	28.5%	27.7%	27.6%	
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.024
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BORING NO. 105  
 SAMPLE NO. 2  
 DEPTH 9.0' TO 11.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 5

DEPTH 40.0' TO 42.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

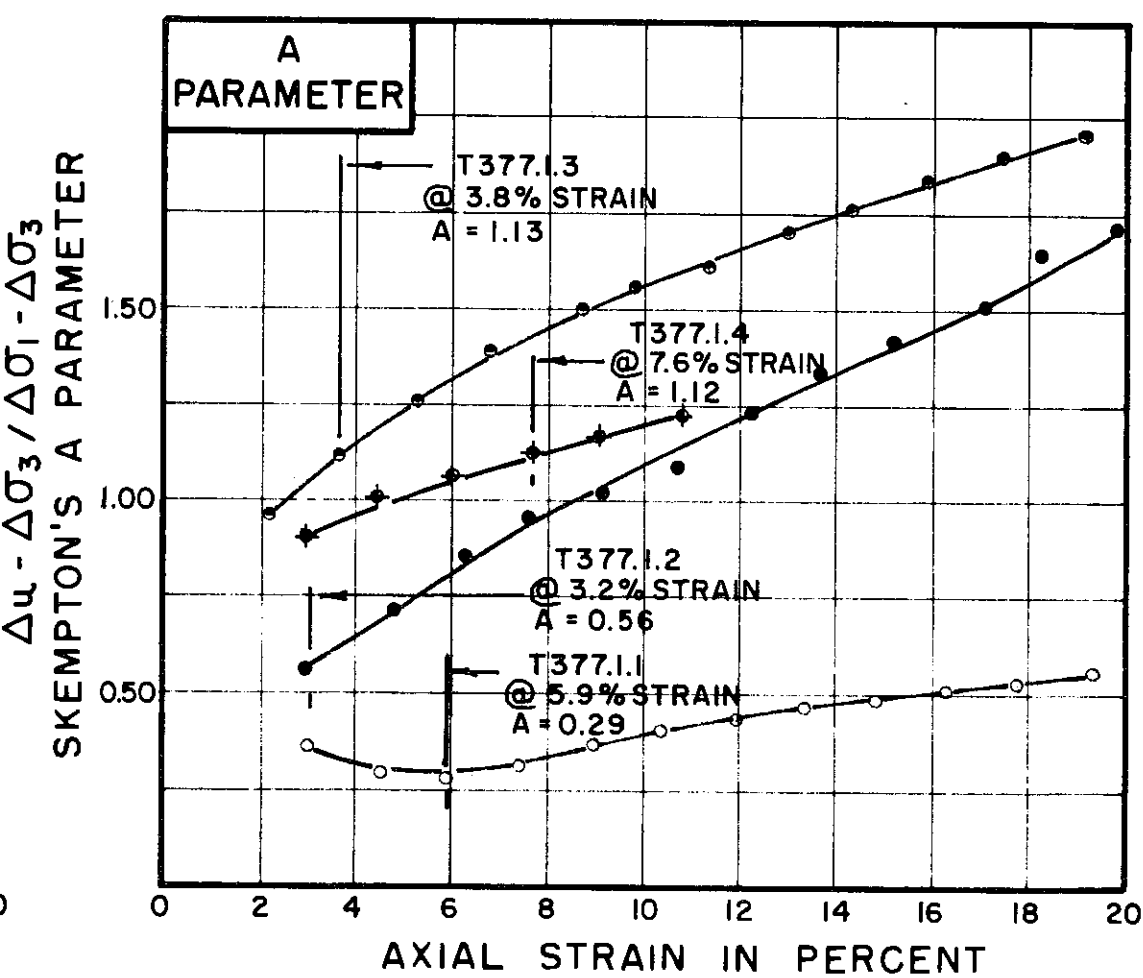
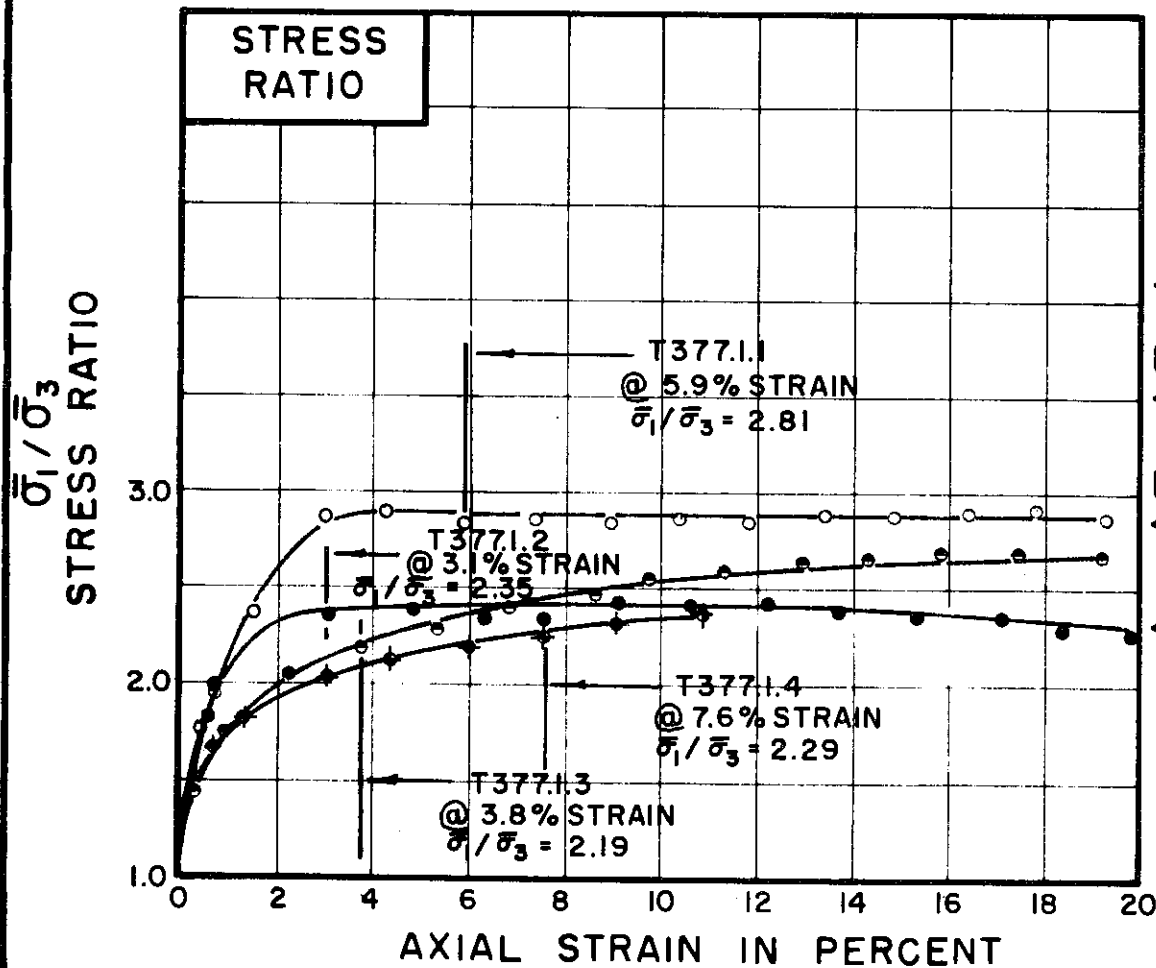
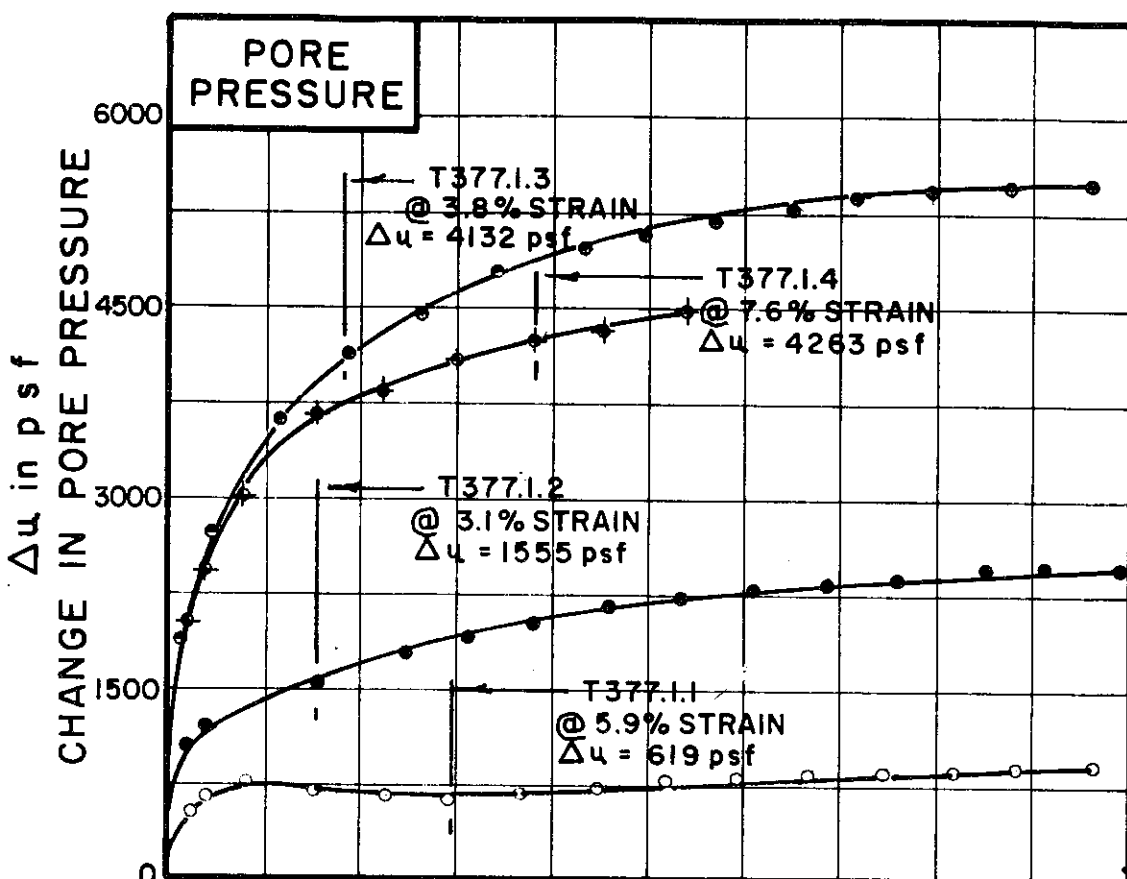
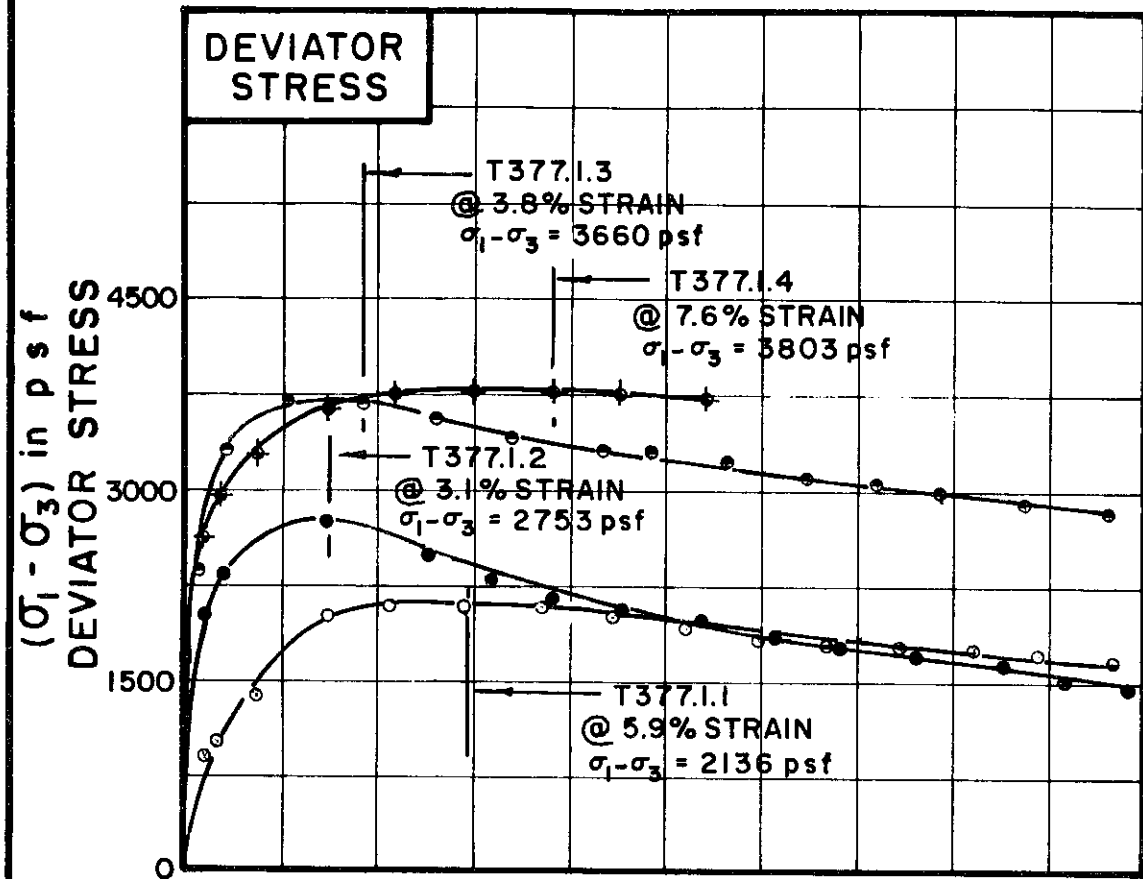
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-434



TEST NO. / SYMBOL	T377.1.1	T377.1.2	T377.1.3	T377.1.4
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INITIAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_0$		35.9%	35.9%	35.1%	39.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	84	85	85	84
SAMPLE DIAMETER	$D_0$	in.	1.39	1.42	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.38	3.30	3.34	3.37
CONDITIONS BEFORE SHEAR			T377.1.1	T377.1.2	T377.1.3	T377.1.4
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\sigma_1 / \sigma_3$	psf	1800	3600	7200	7200
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.49%	2.38%	4.36%	7.47%
PORE PRESSURE RESPONSE			97%	96%	96%	96%
FINAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_f$		35.3%	34.1%	30.9%	33.4%
SKETCH OF SAMPLE AT END OF TEST						

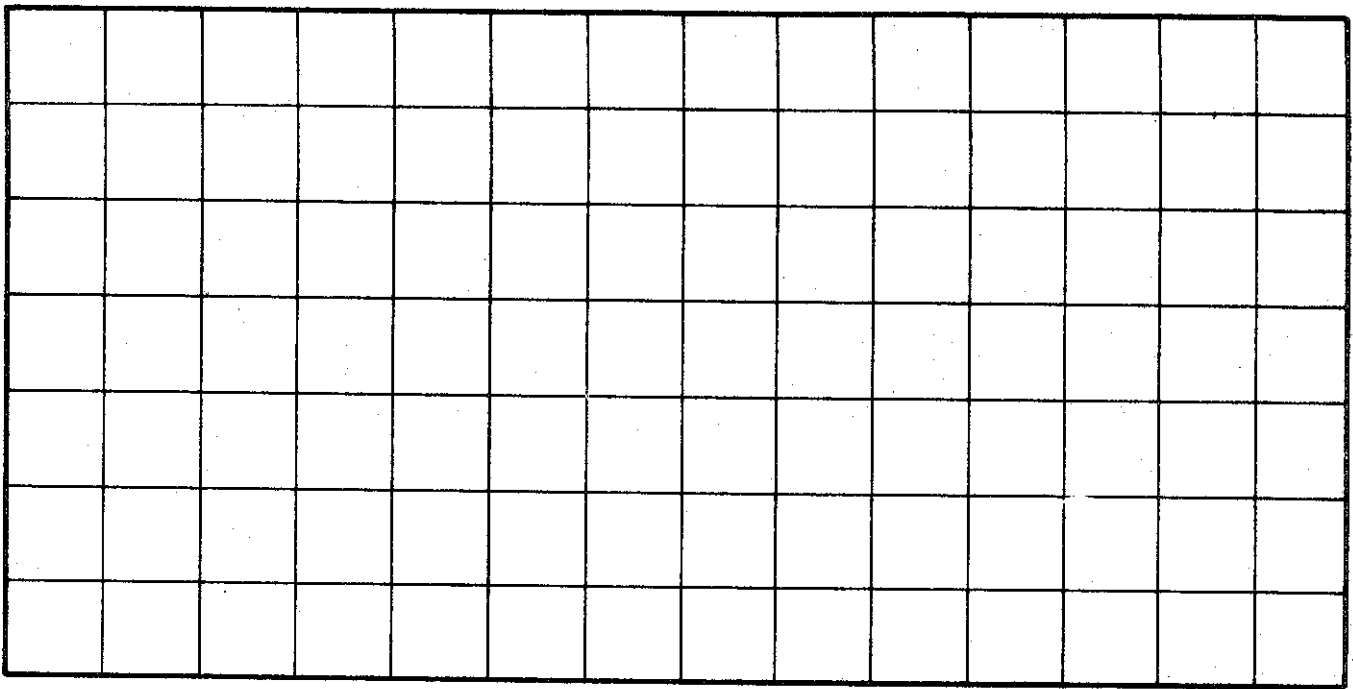
RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024	.024
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BORING NO. 105  
 SAMPLE NO. 5  
 DEPTH 40.0' TO 42.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

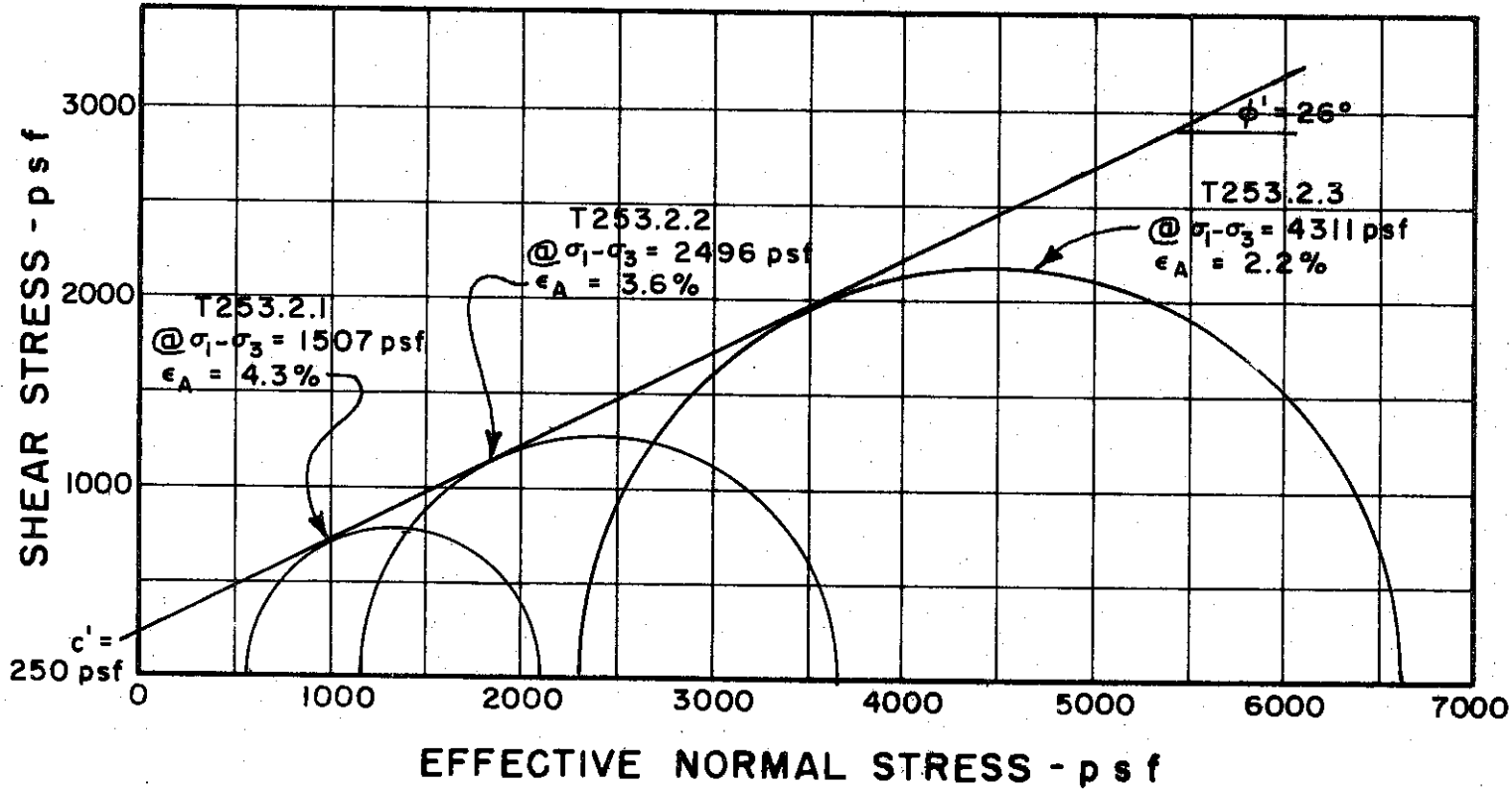
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f



BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

REMARKS \_\_\_\_\_

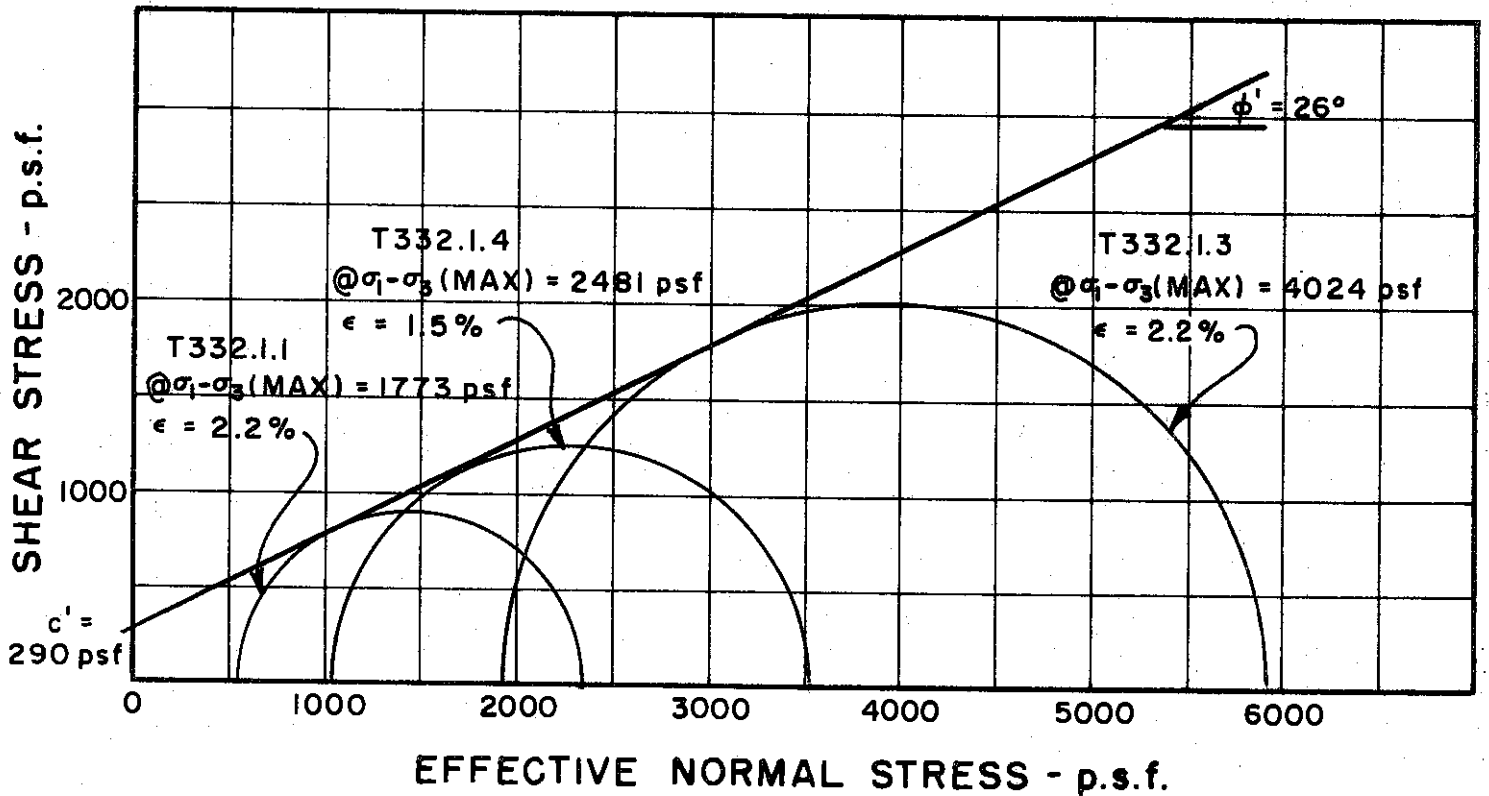
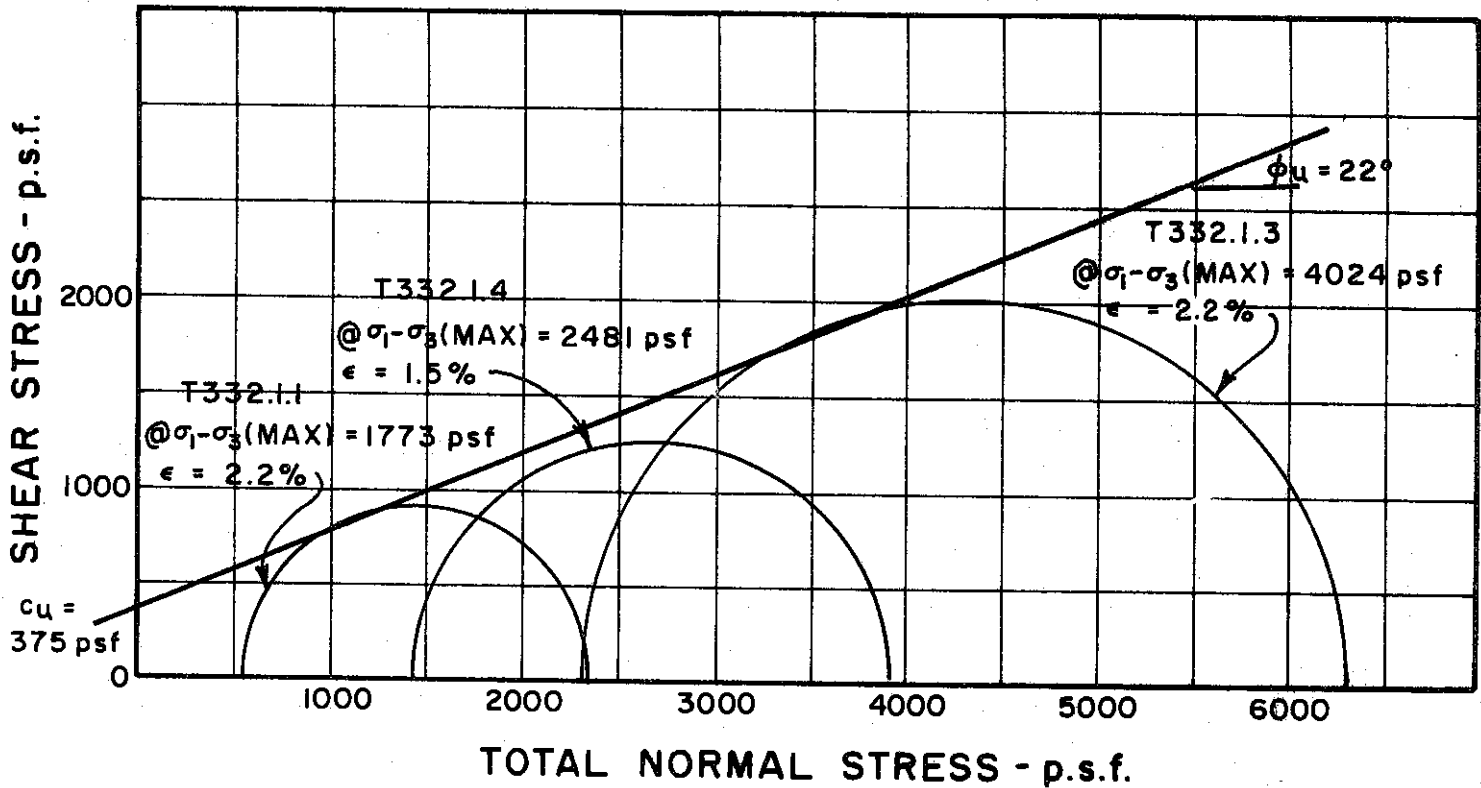
MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-436



BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

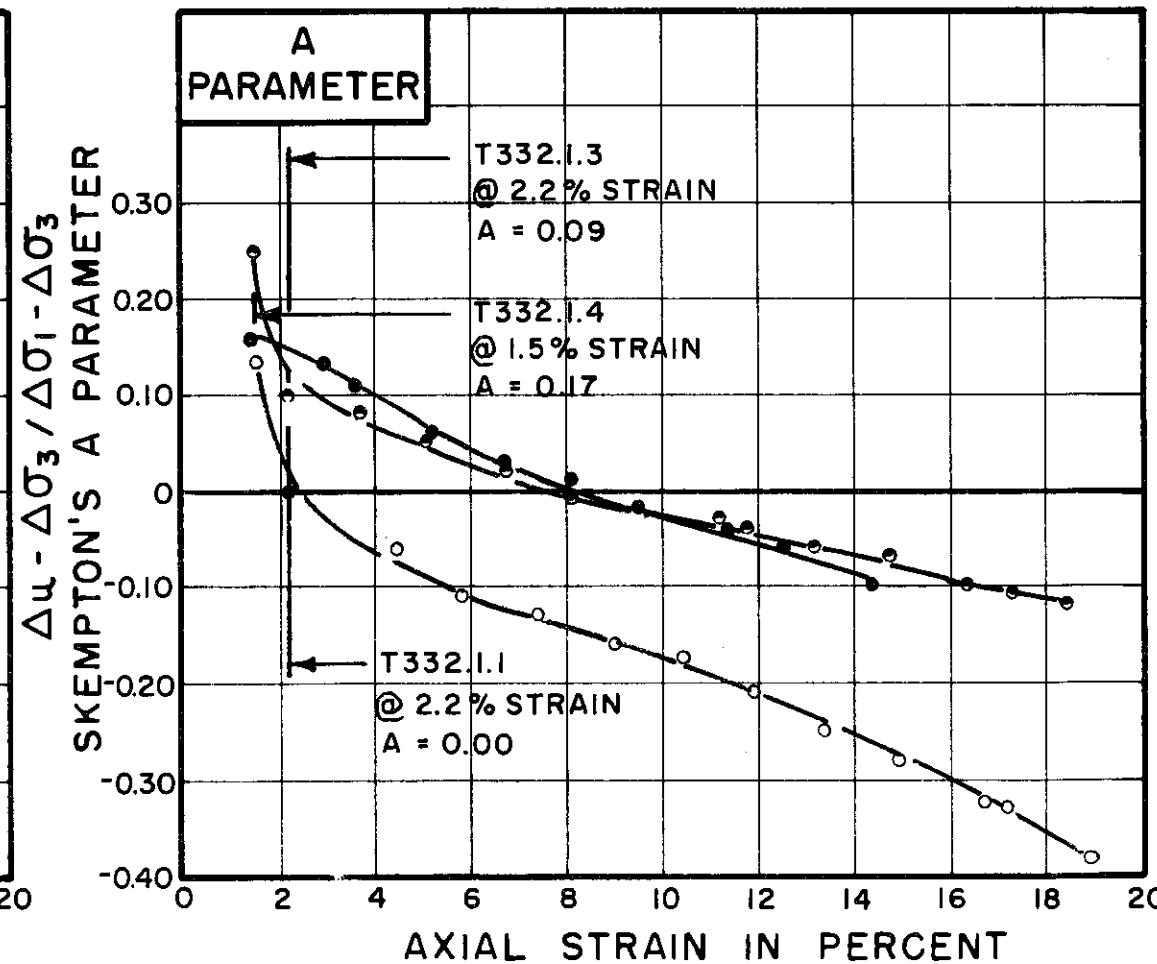
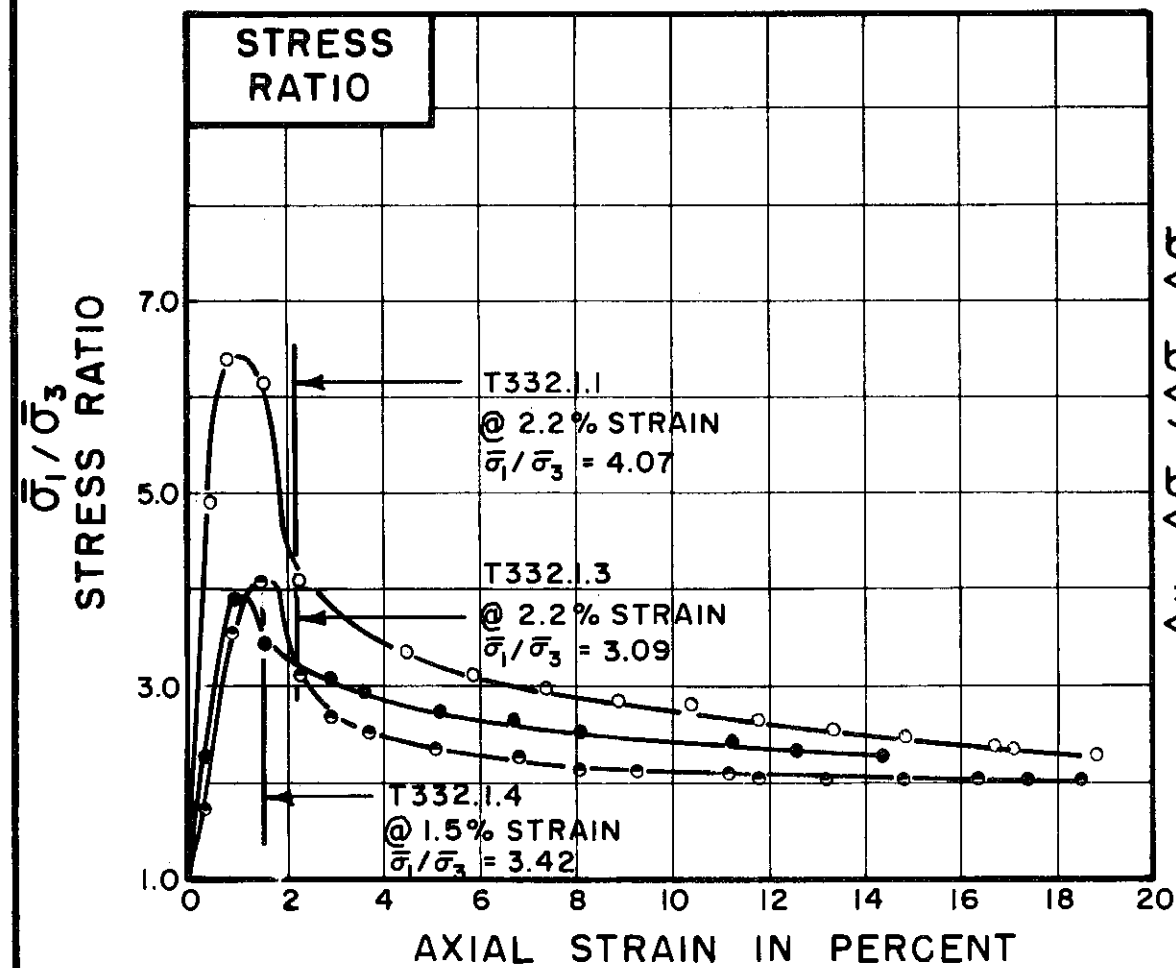
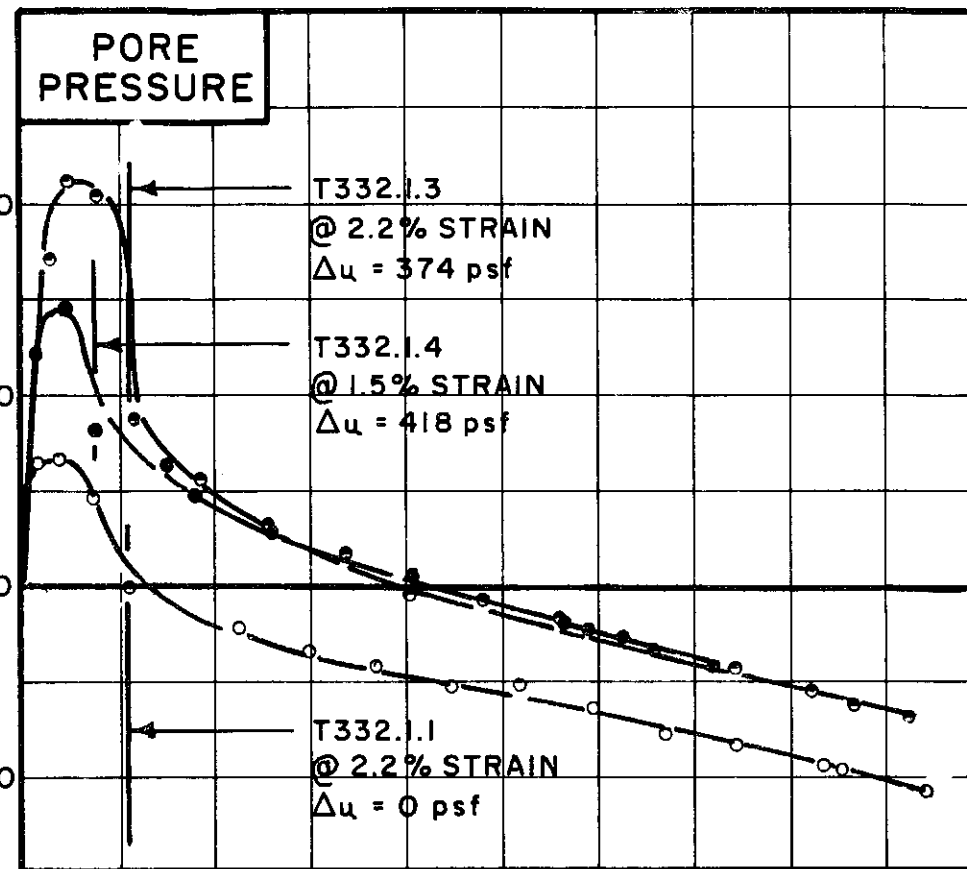
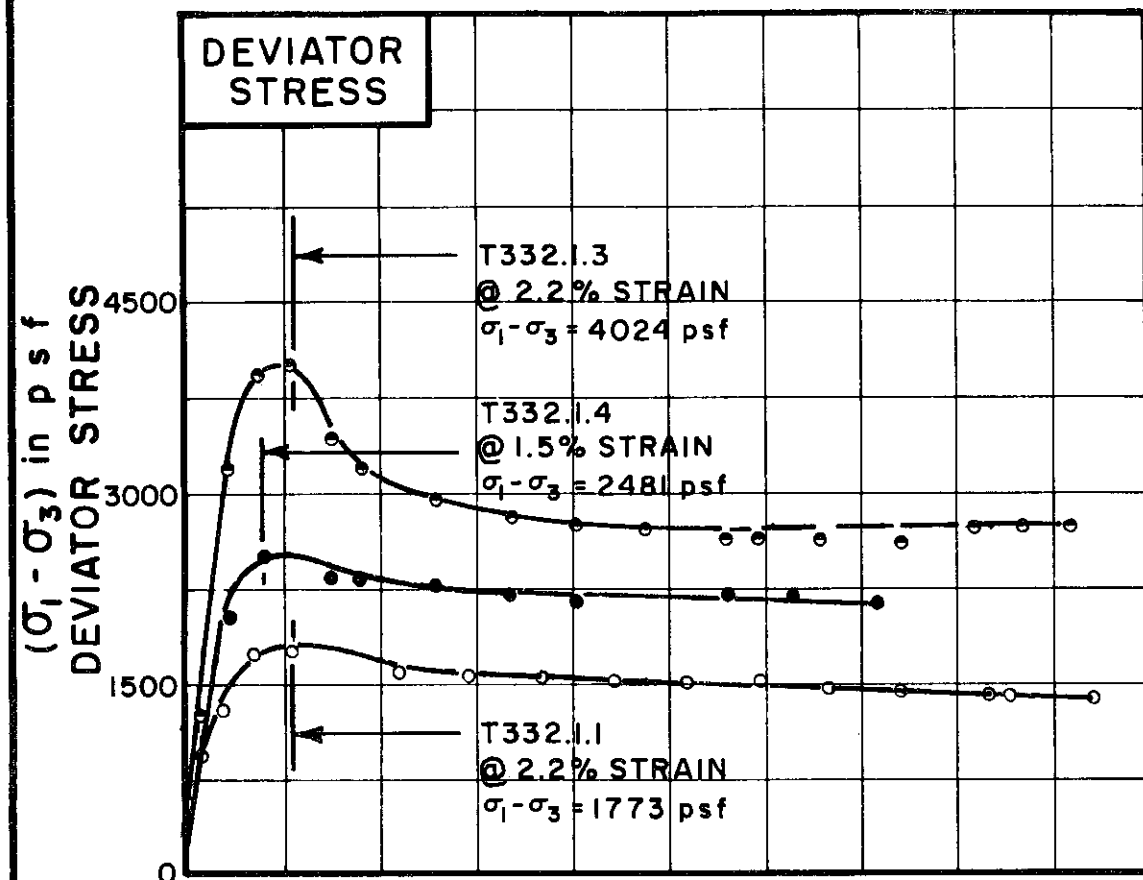
REMARKS ENVELOPE IS INTERPRETIVE  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-437



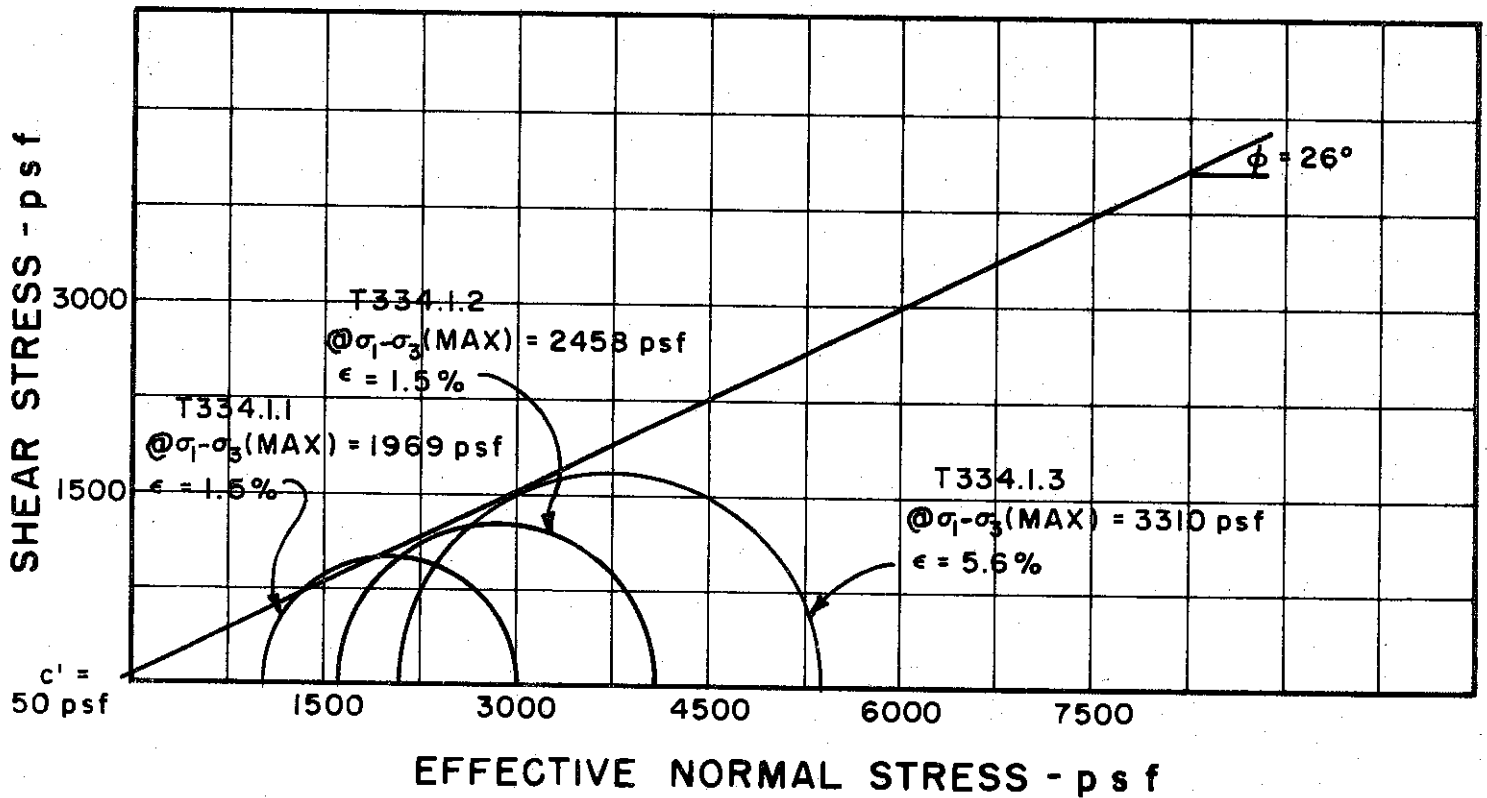
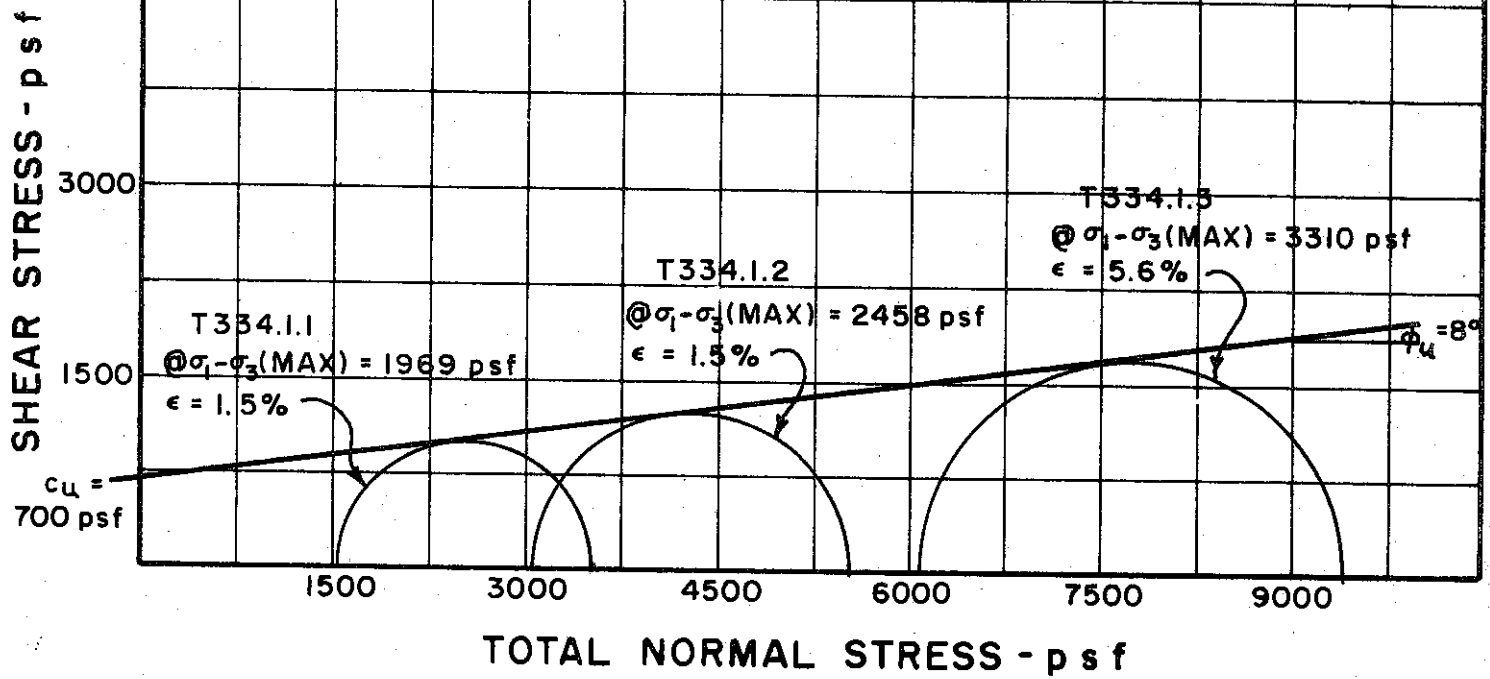
TEST NO. / SYMBOL	T332.1.1	T332.1.4	T332.1.3
	○	●	●

INITIAL CONDITIONS			T332.1.1	T332.1.4	T332.1.3
WATER CONTENT	$w_0$		28.3%	29.2%	27.9%
DRY DENSITY	$\gamma_d$	pcf	95	94	99
SAMPLE DIAMETER	$D_0$	in.	1.42	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.36	3.38	3.40
FINAL CONDITIONS BEFORE SHEAR			T332.1.1	T332.1.4	T332.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	7200	8640
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	576	1440	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.4%	1.7%	1.9%
PORE PRESSURE RESPONSE			98%	98%	99%
FINAL CONDITIONS AFTER SHEAR			T332.1.1	T332.1.4	T332.1.3
WATER CONTENT	$w_f$		29.4%	29.5%	27.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 119

SAMPLE NO. 4

DEPTH 30.0 TO 32.0

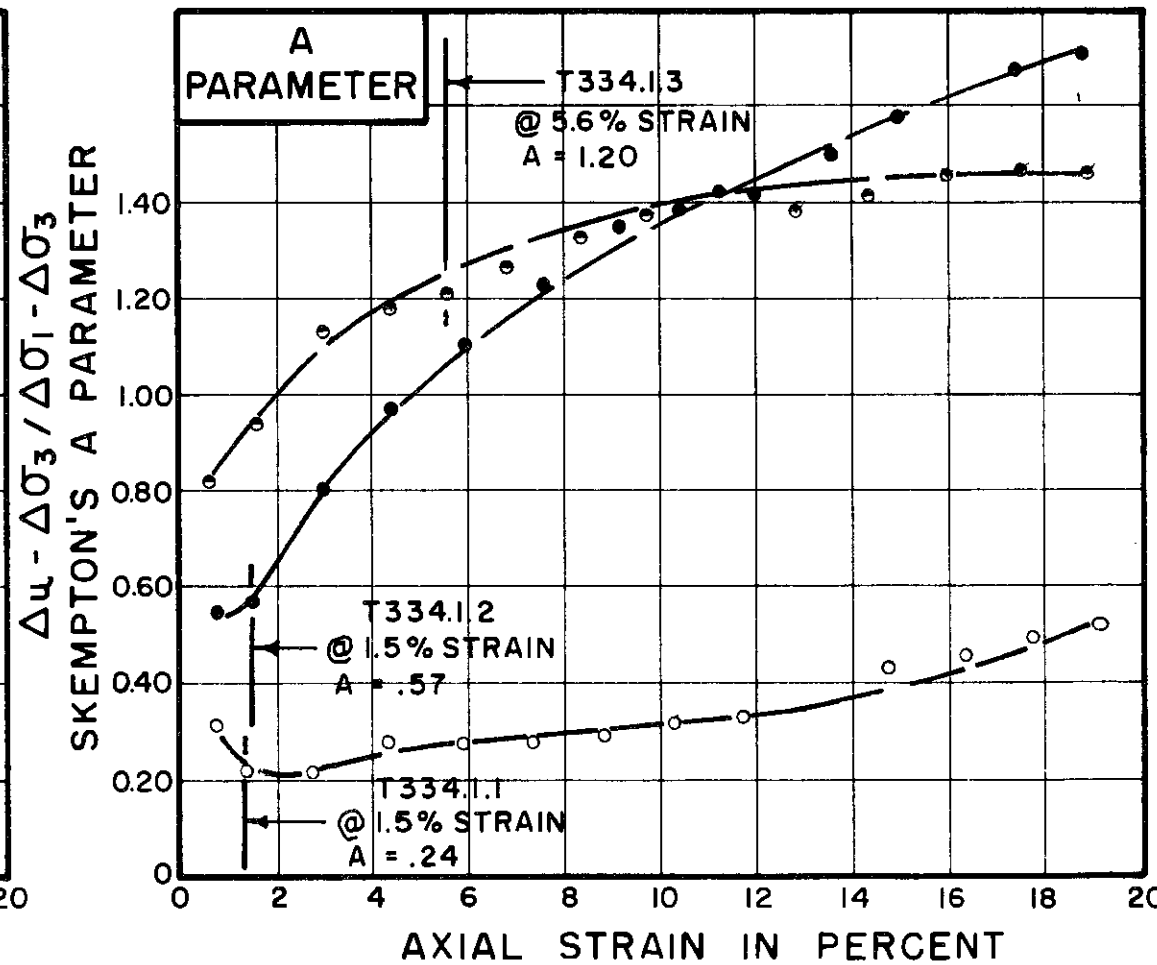
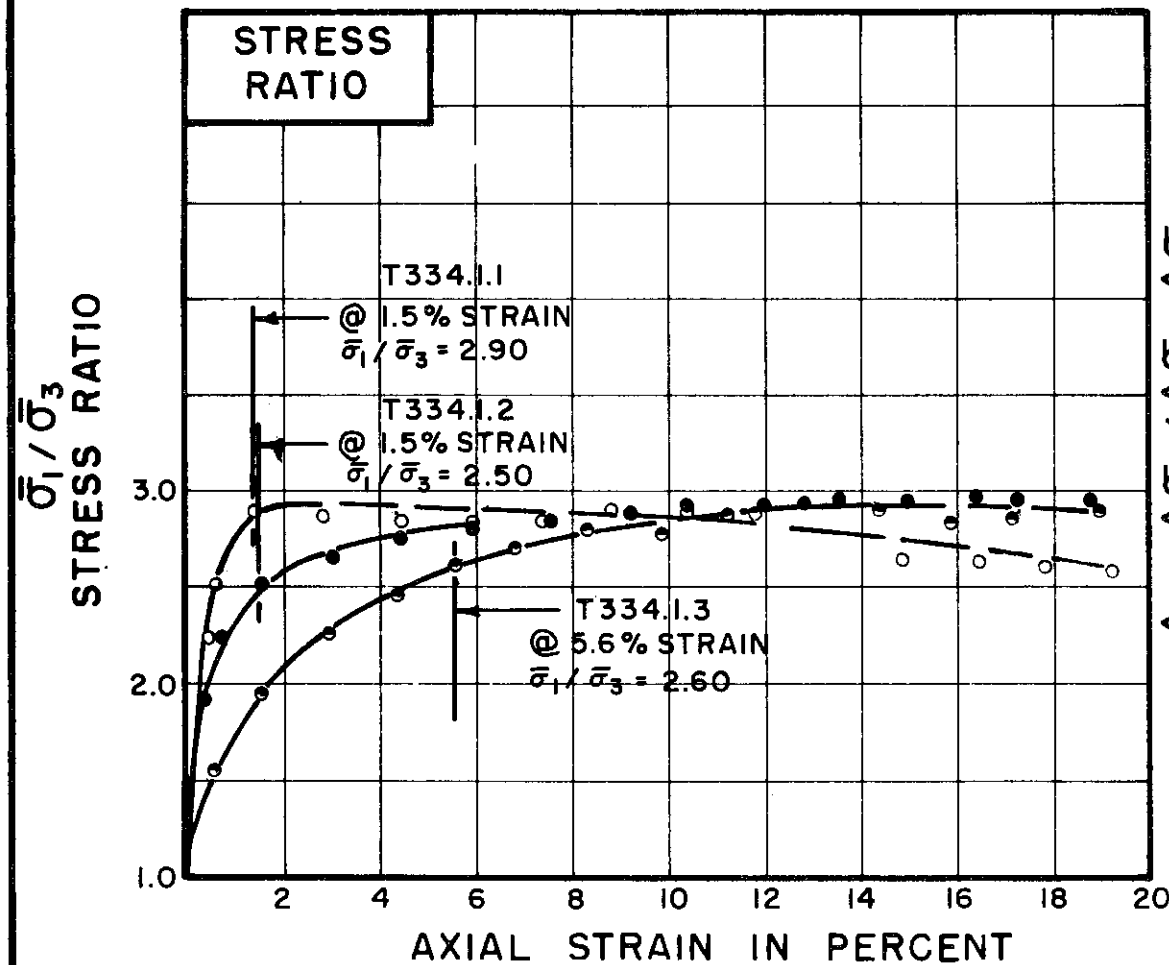
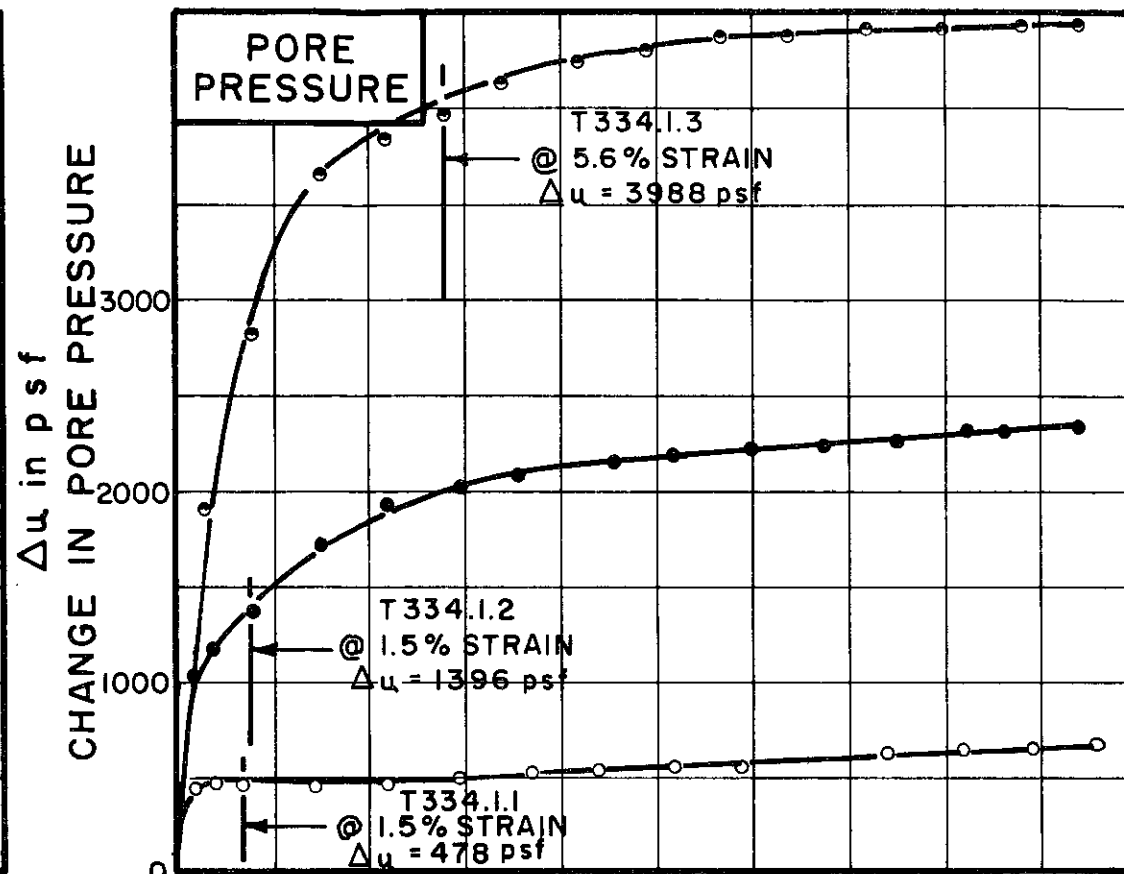
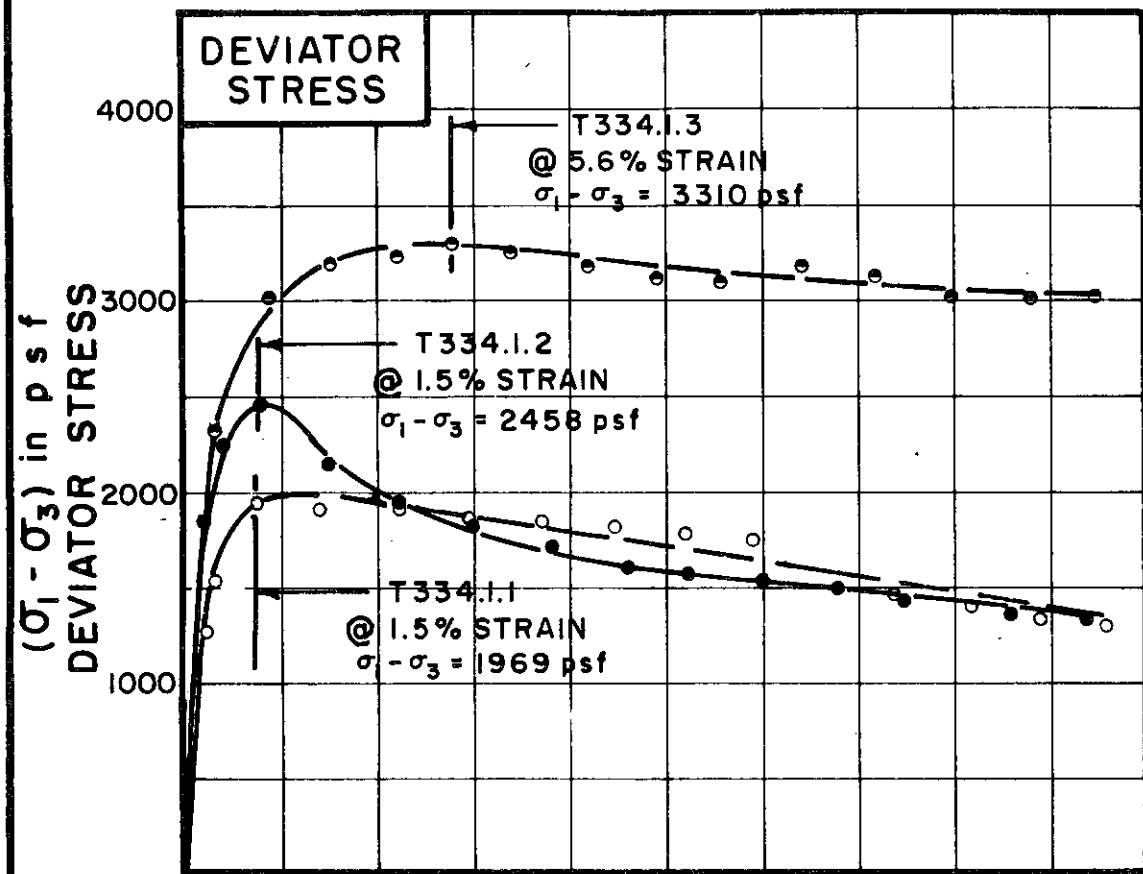
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-439





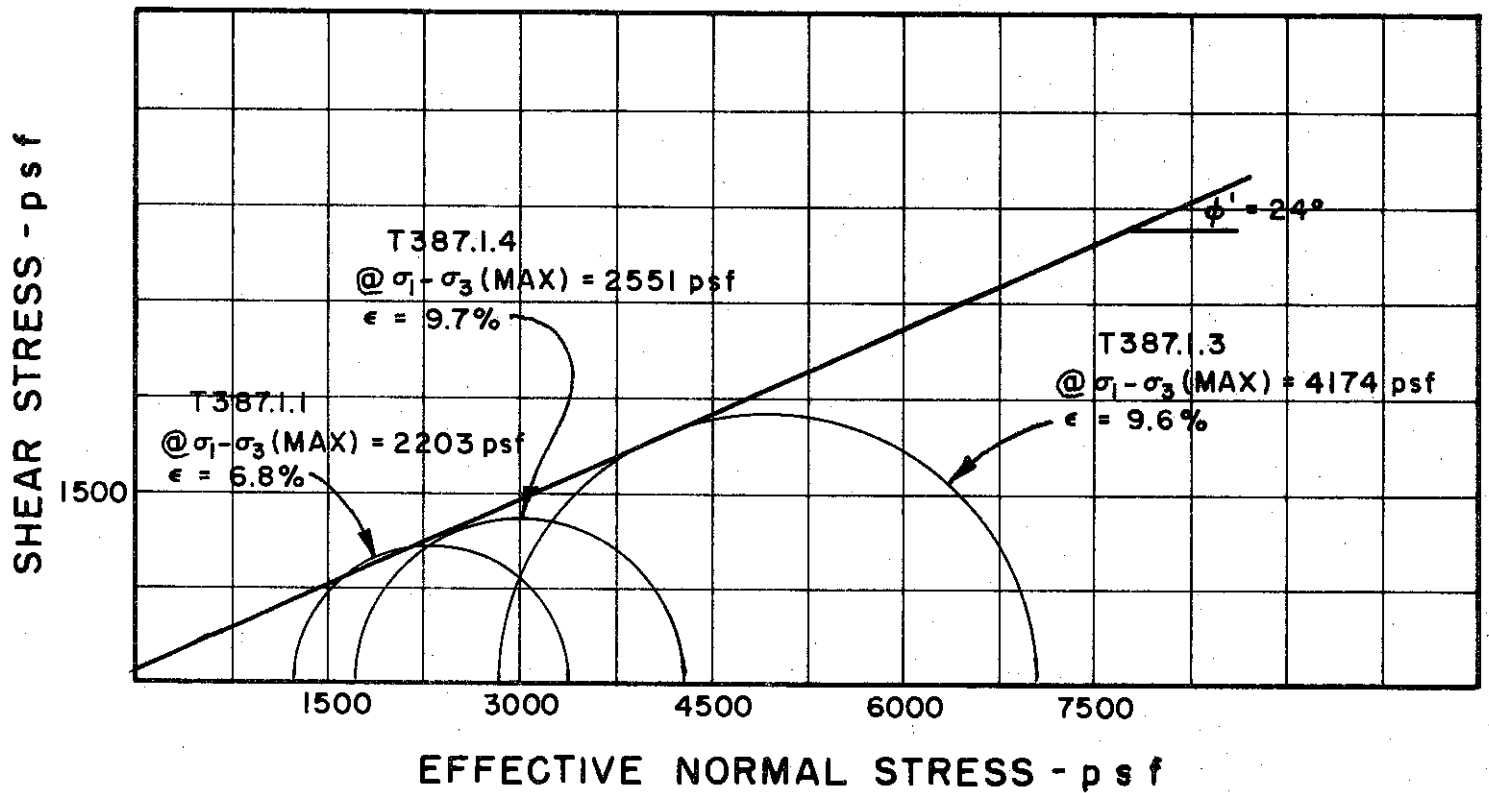
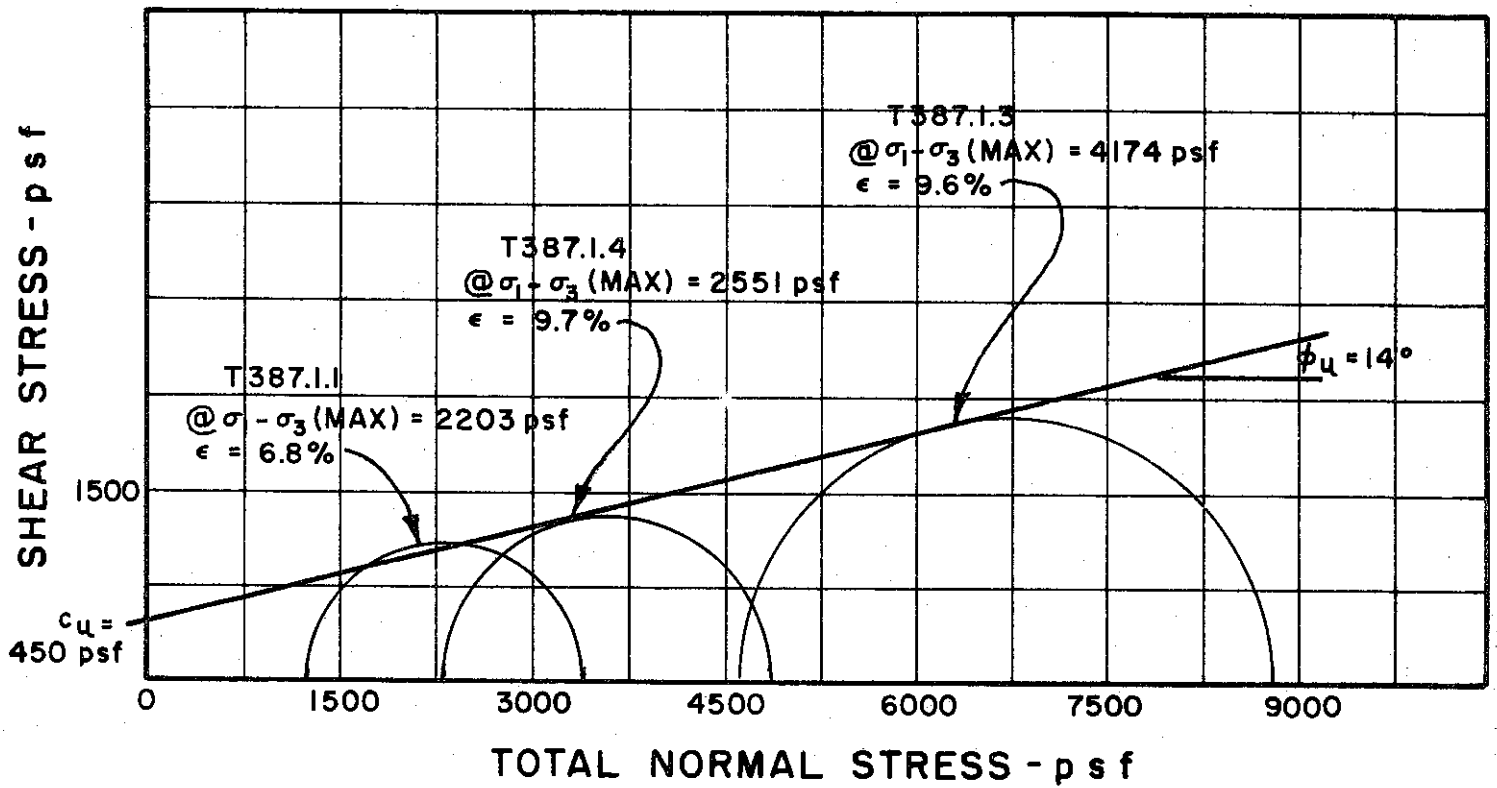
TEST NO. / SYMBOL	T334.1.1	T334.1.2	T334.1.3
	○	●	○

INITIAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_0$		36.9%	38.5%	35.3%
DRY DENSITY	$\gamma_d$	pcf	86	85	87
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.35	3.36
FINAL CONDITIONS BEFORE SHEAR			T334.1.1	T334.1.2	T334.1.3
FINAL BACK PRESSURE	$u_0$	psf	11520	7200	11520
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	1512	3024	6048
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.7%	6.4%
PORE PRESSURE RESPONSE			95%	99%	100%
FINAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_f$		35.2%	36.1%	29.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 4  
 DEPTH 30.0 TO 32.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

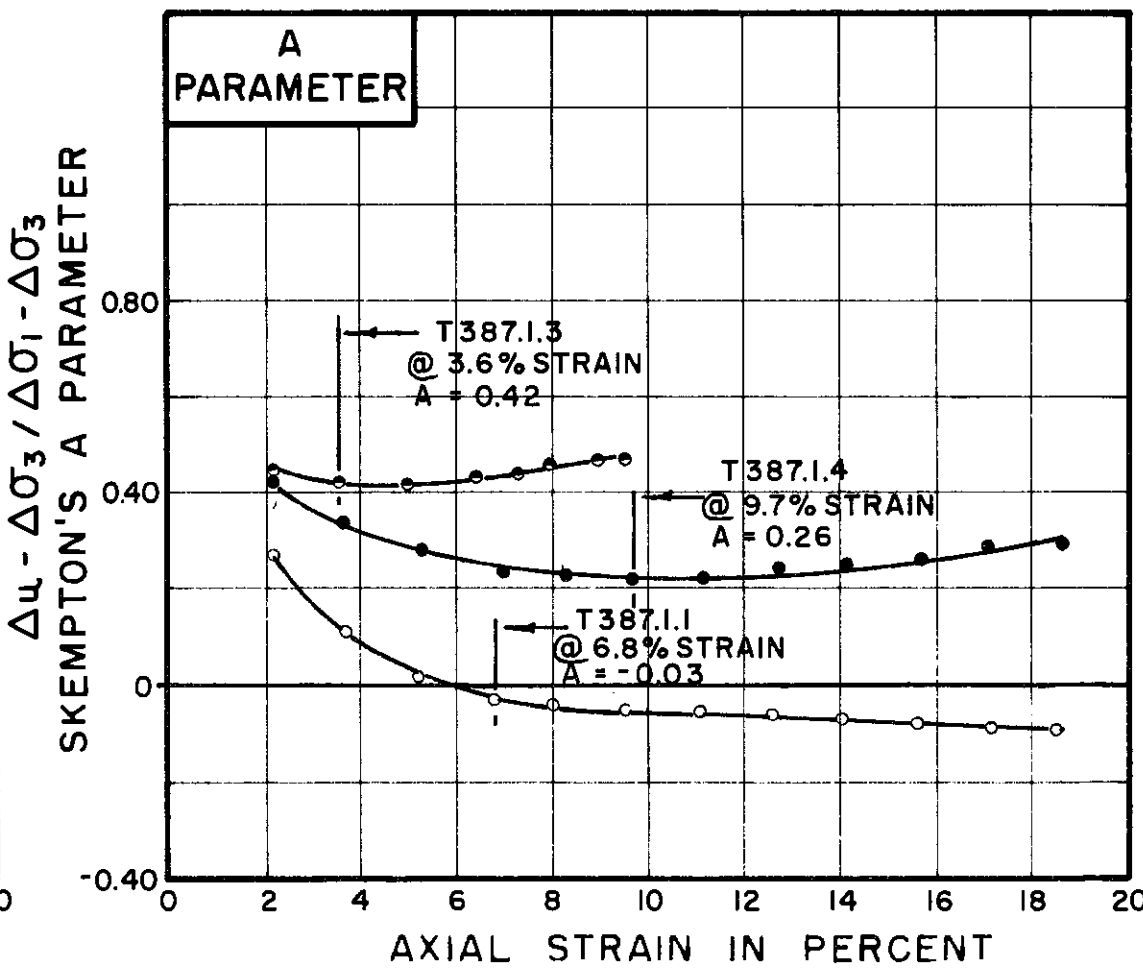
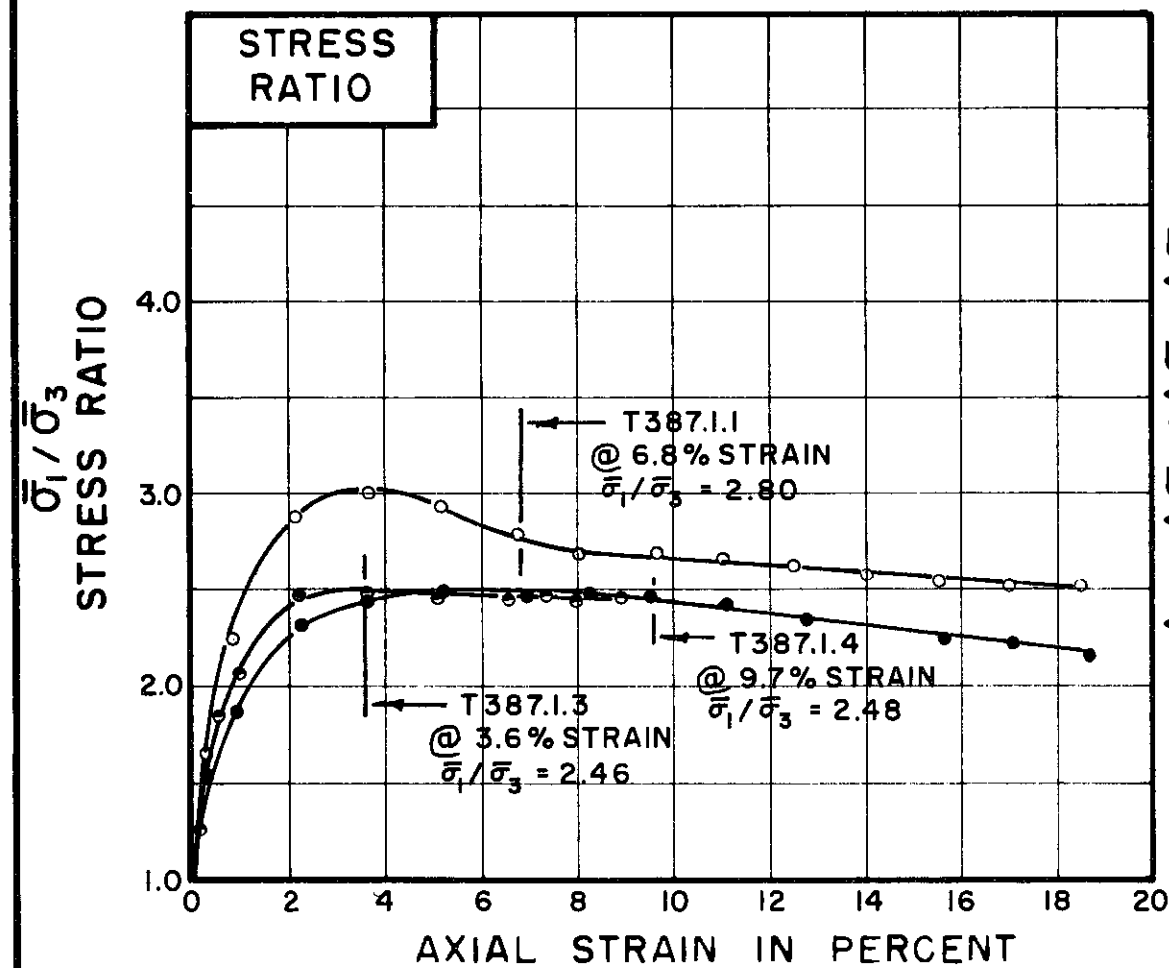
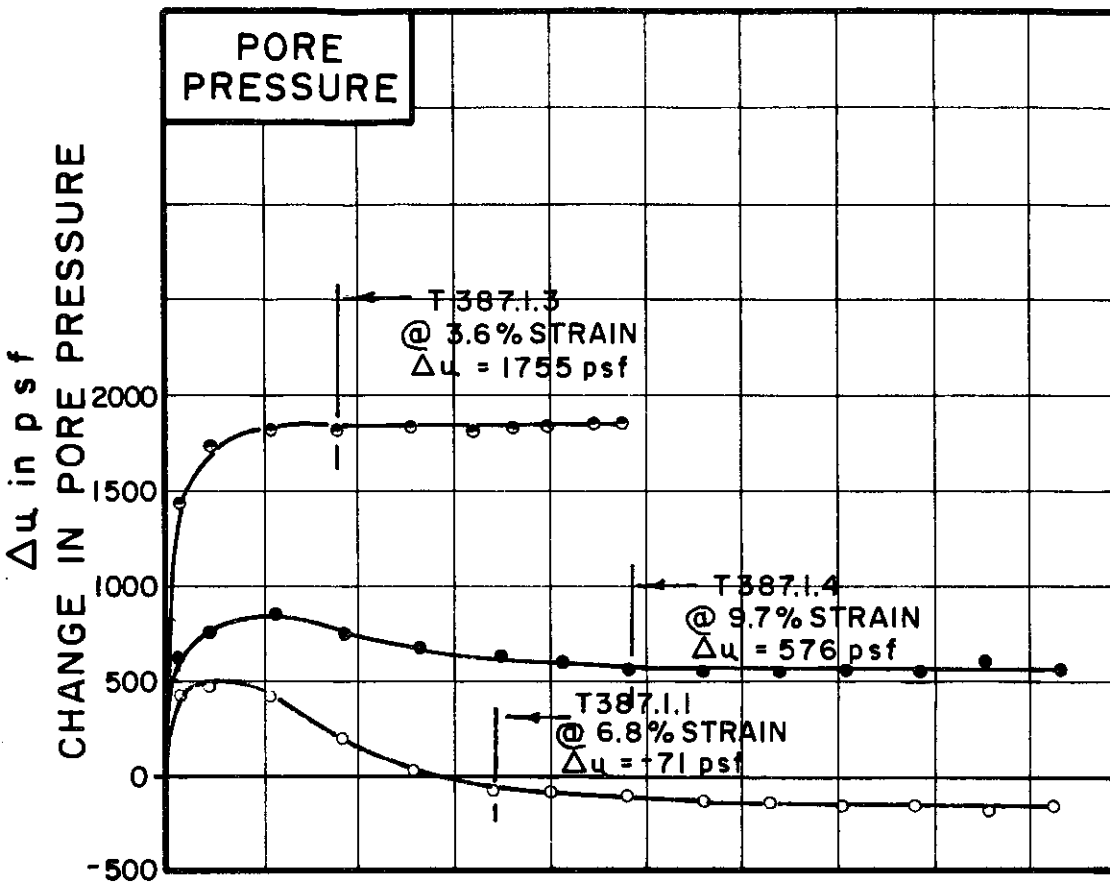
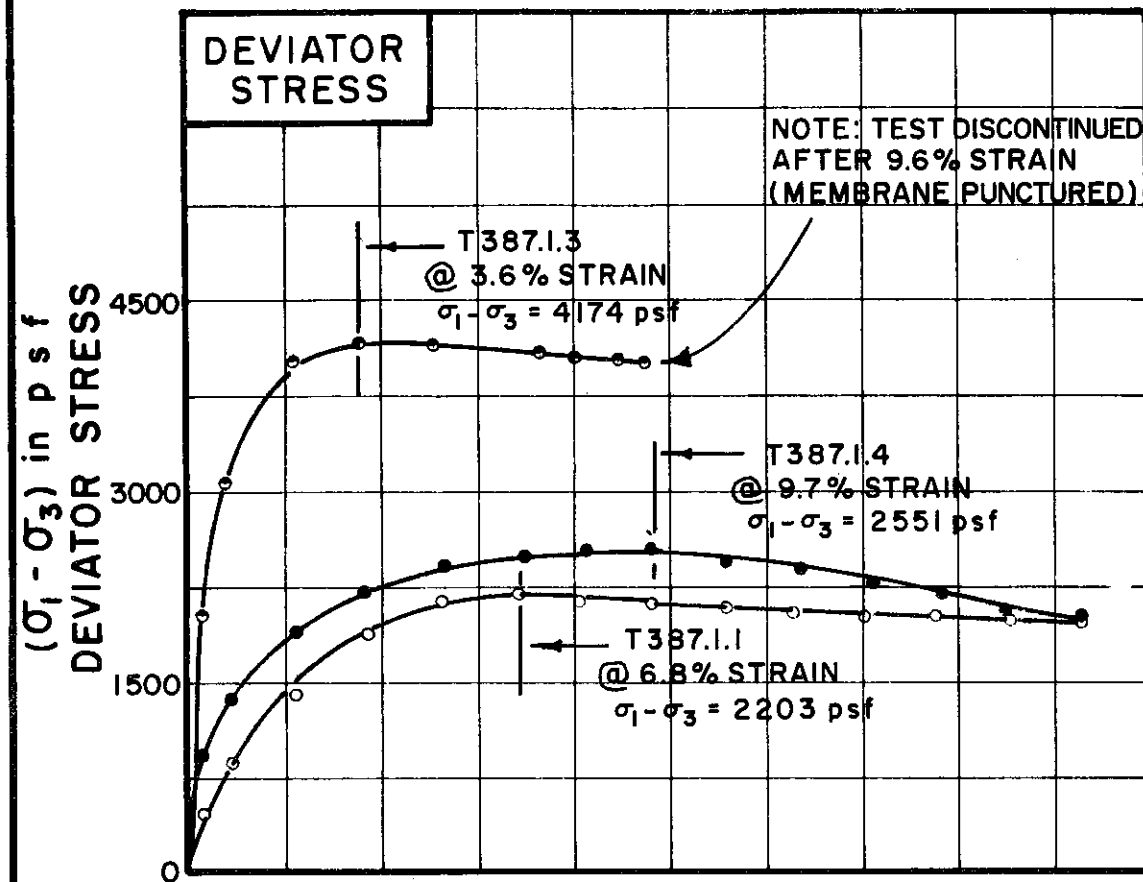
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-441



TEST NO. / SYMBOL	T387.1.1	T387.1.4	T387.1.3
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INITIAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_0$		33.5%	33.1%	31.9%
DRY DENSITY	$\gamma_d$	lb/cu ft	90	90	90
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.38	3.45
FINAL CONDITIONS BEFORE SHEAR			T387.1.1	T387.1.4	T387.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	6480	5760	6480
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	p.s.f.	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.31%	2.94%	3.20%
PORE PRESSURE RESPONSE			98%	99%	97%
FINAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_f$		33.4%	31.9%	—%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.023
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BORING NO. 129

SAMPLE NO. 5

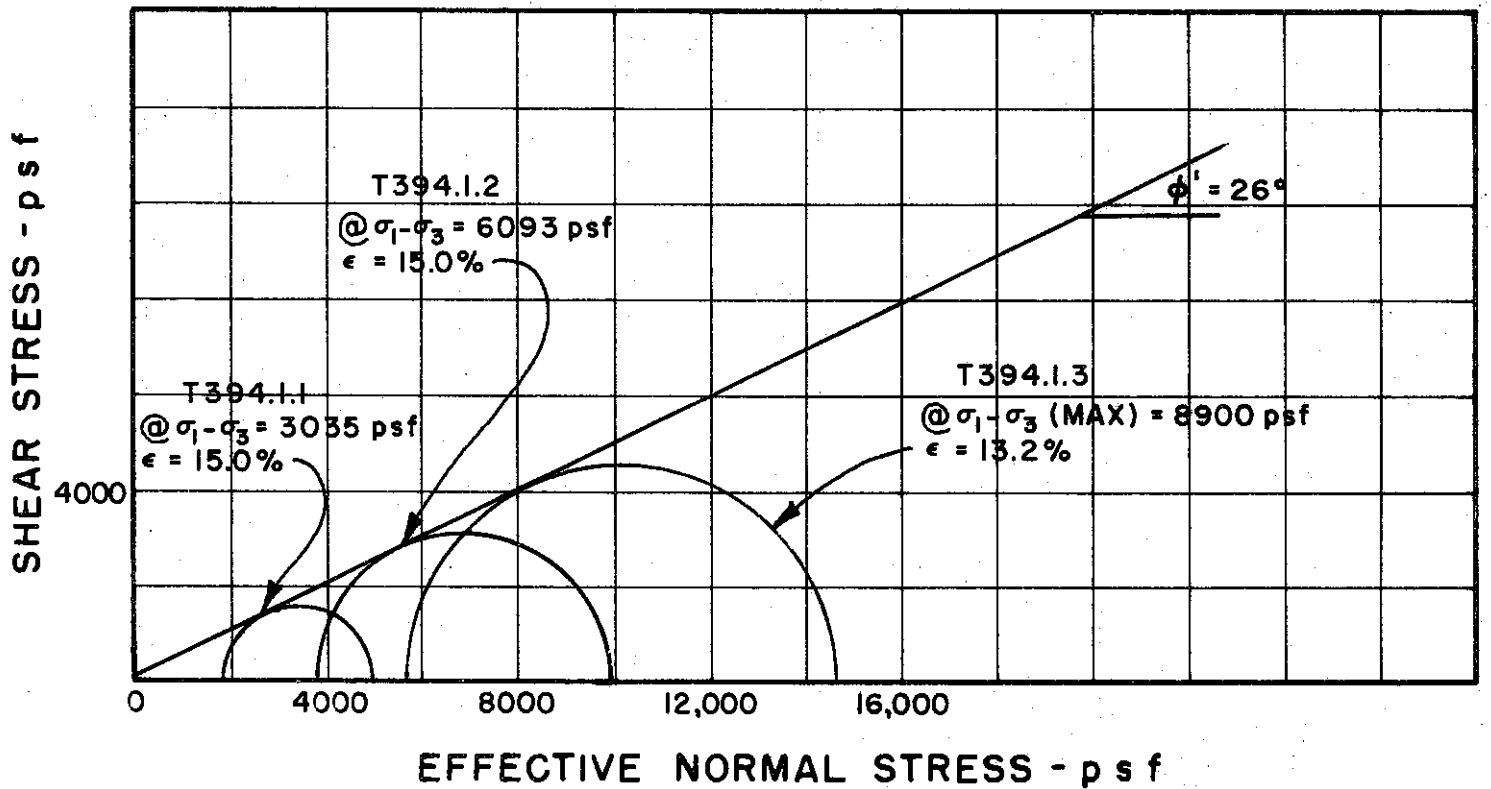
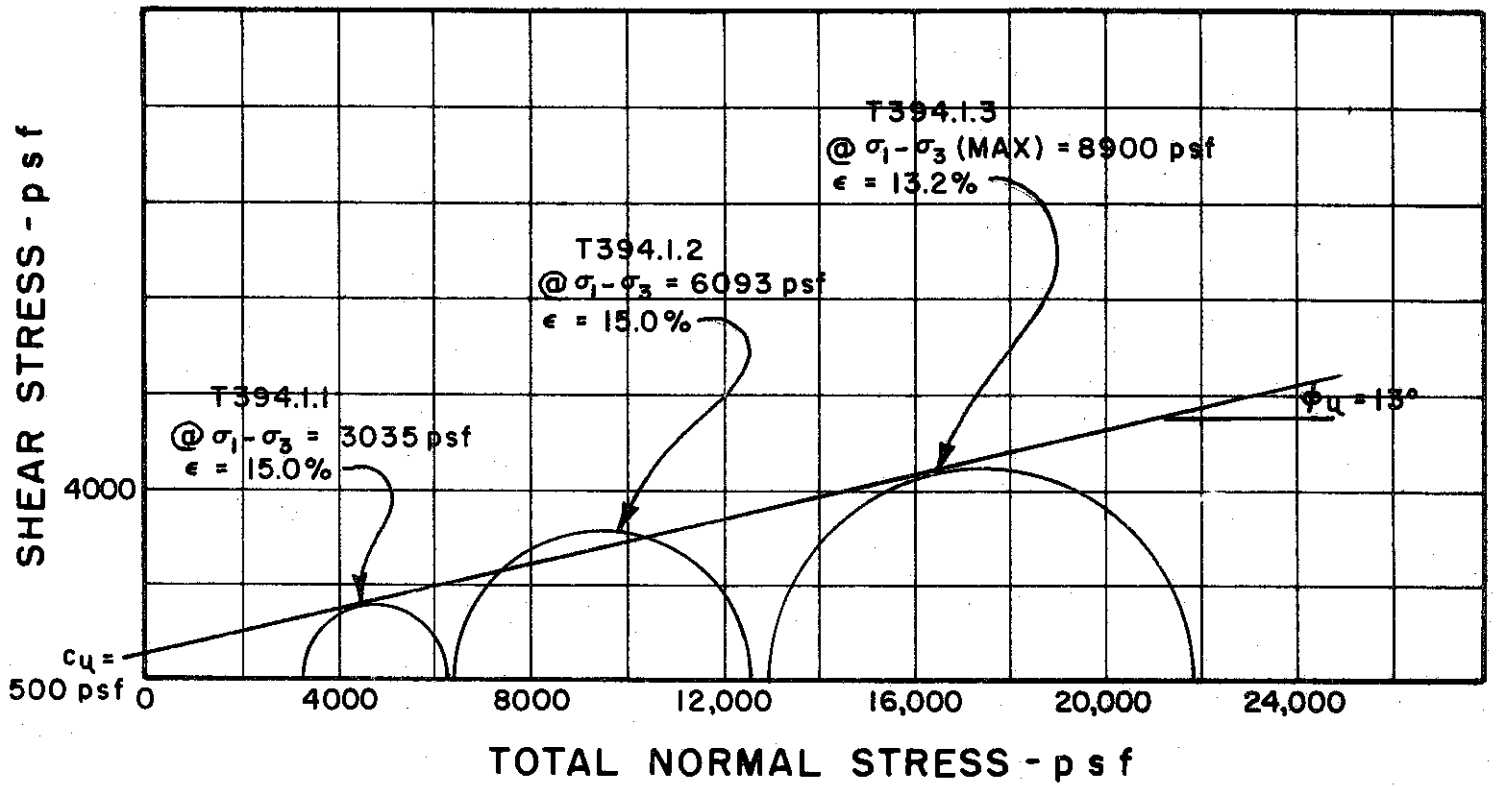
DEPTH 18.0' TO 21.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 19

DEPTH 93.0' TO 95.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

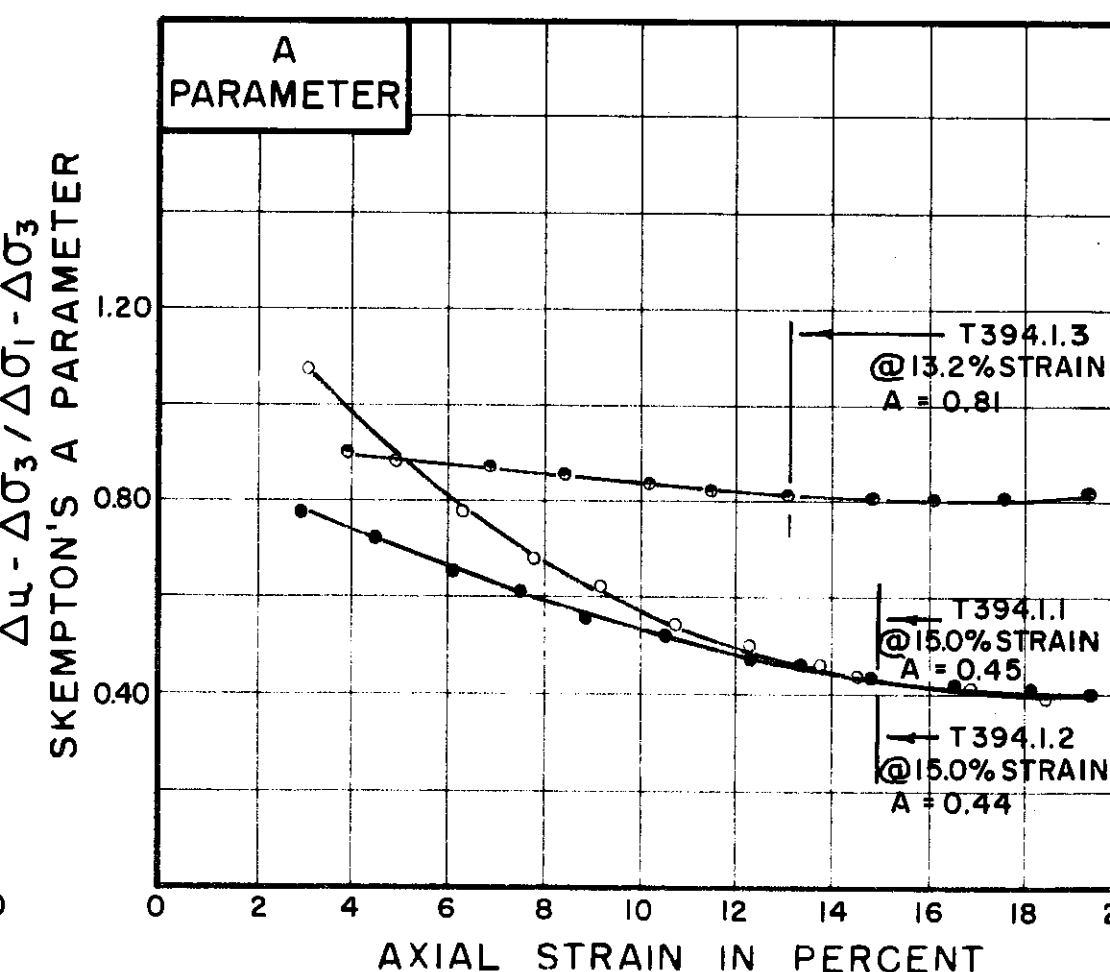
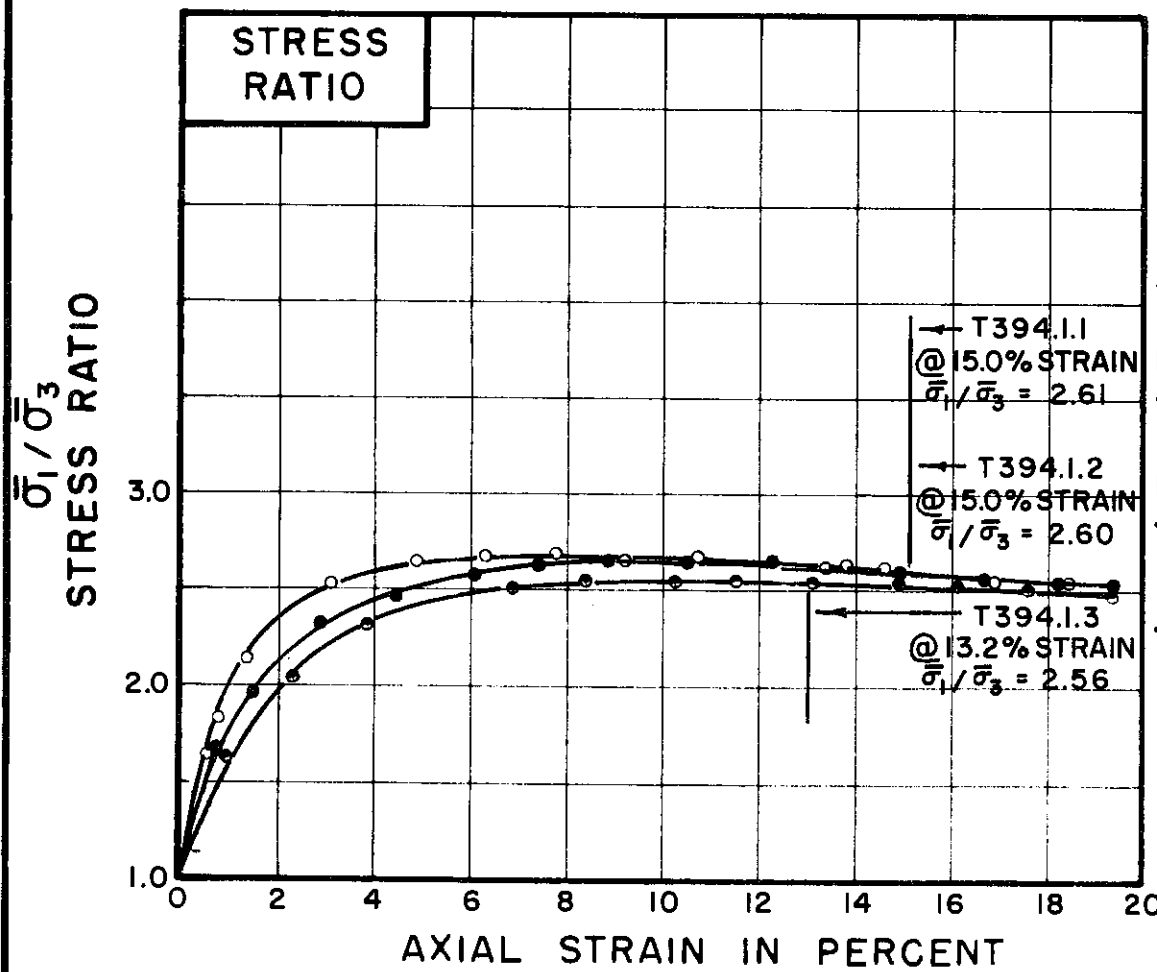
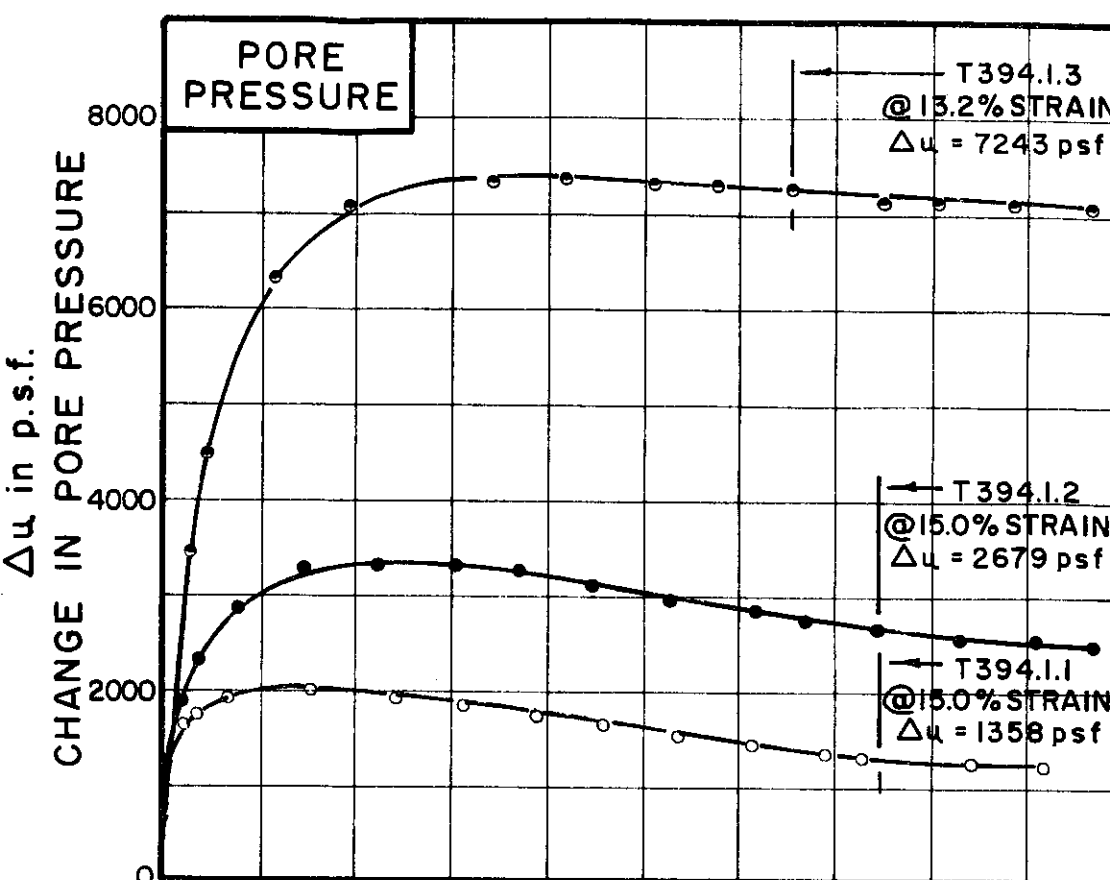
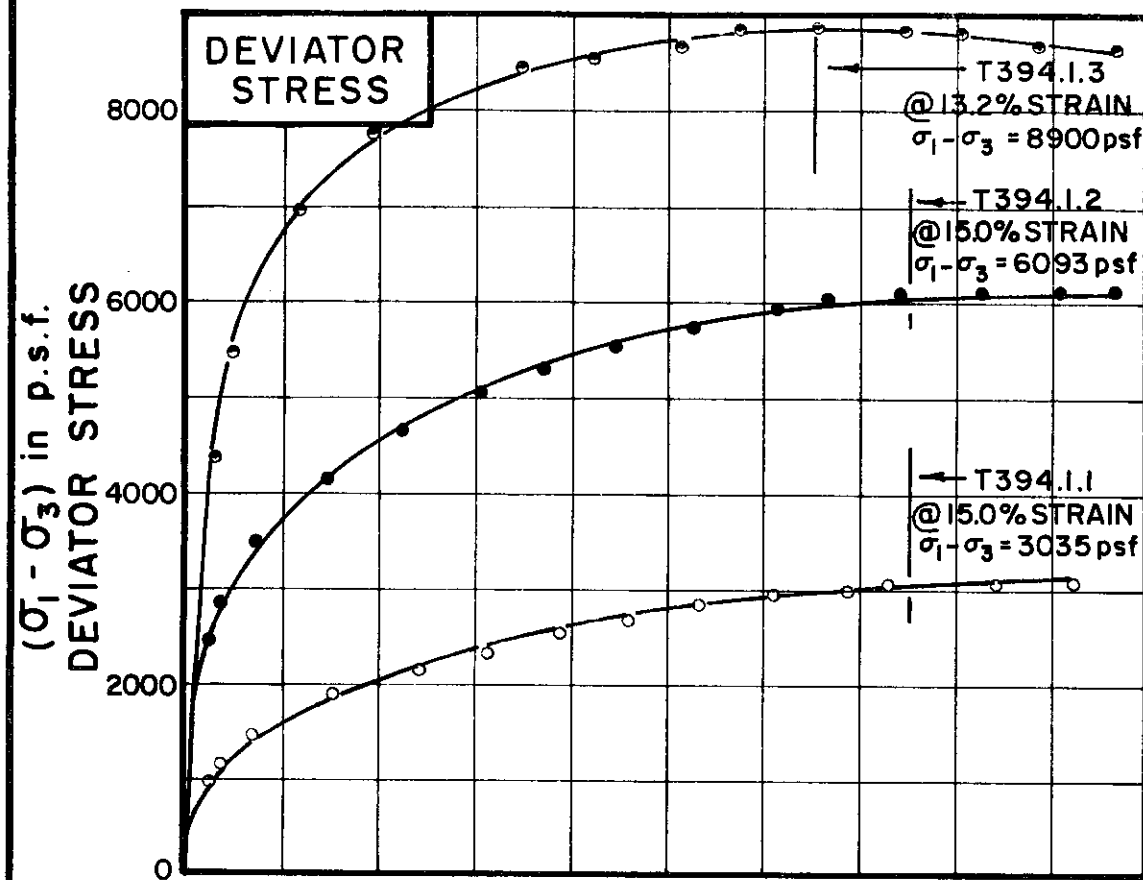
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-443



TEST NO. / SYMBOL	T394.1.1	T394.1.2	T394.1.3
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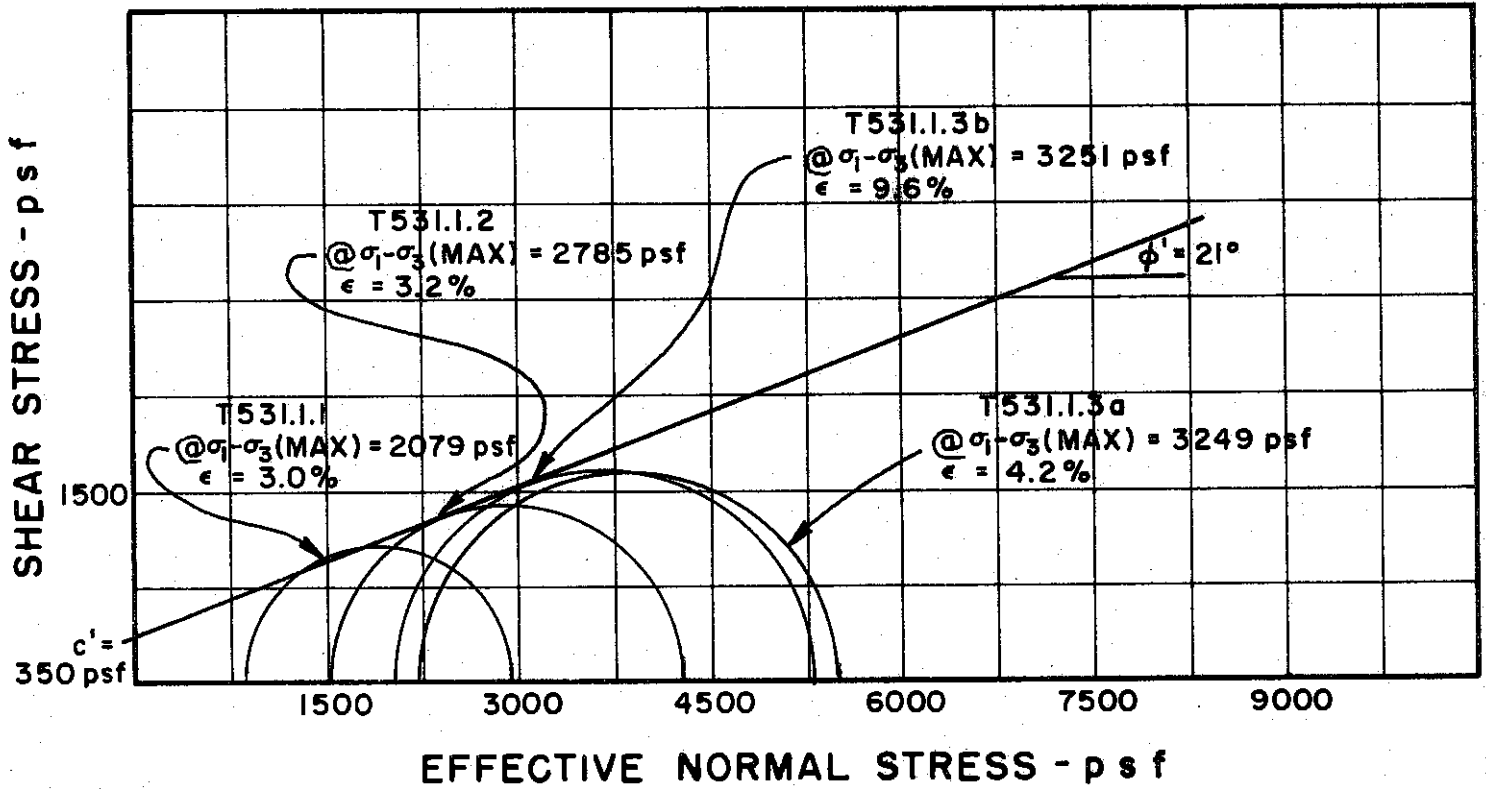
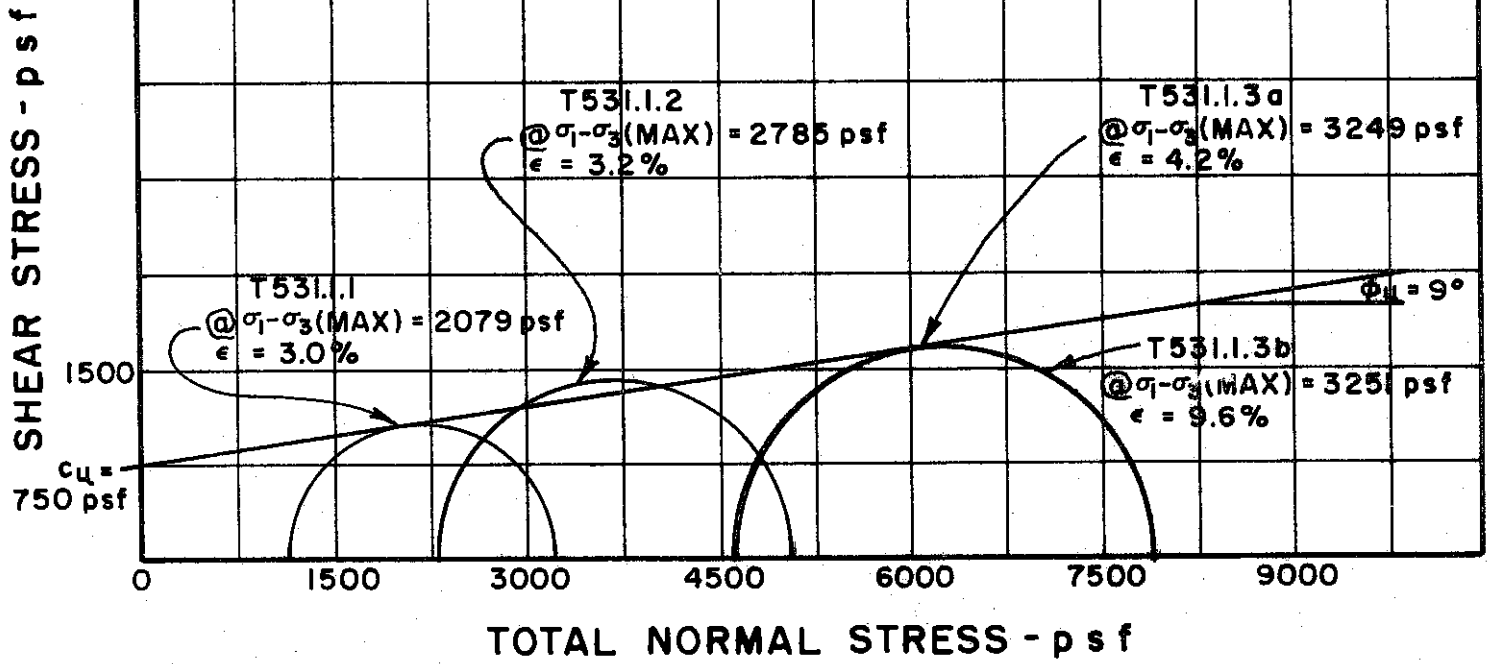
INITIAL CONDITIONS			T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_0$		23.7%	25.9%	27.0%
DRY DENSITY	$\gamma_d$	lb/cu ft	99	99	99
SAMPLE DIAMETER	$D_0$	in.	1.39	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.27	3.38	3.32
FINAL CONDITIONS BEFORE SHEAR			T394.1.1	T394.1.2	T394.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	p.s.f.	3240	6480	12960
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.73%	2.61%	5.03%
PORE PRESSURE RESPONSE			99%	98%	98%
FINAL CONDITIONS AT END OF TEST			T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_f$		22.2%	22.7%	21.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.024	.025
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BORING NO. 129  
 SAMPLE NO. 19  
 DEPTH 93.0' TO 95.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 141  
 SAMPLE NO. 4  
 DEPTH 18.0' TO 20.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

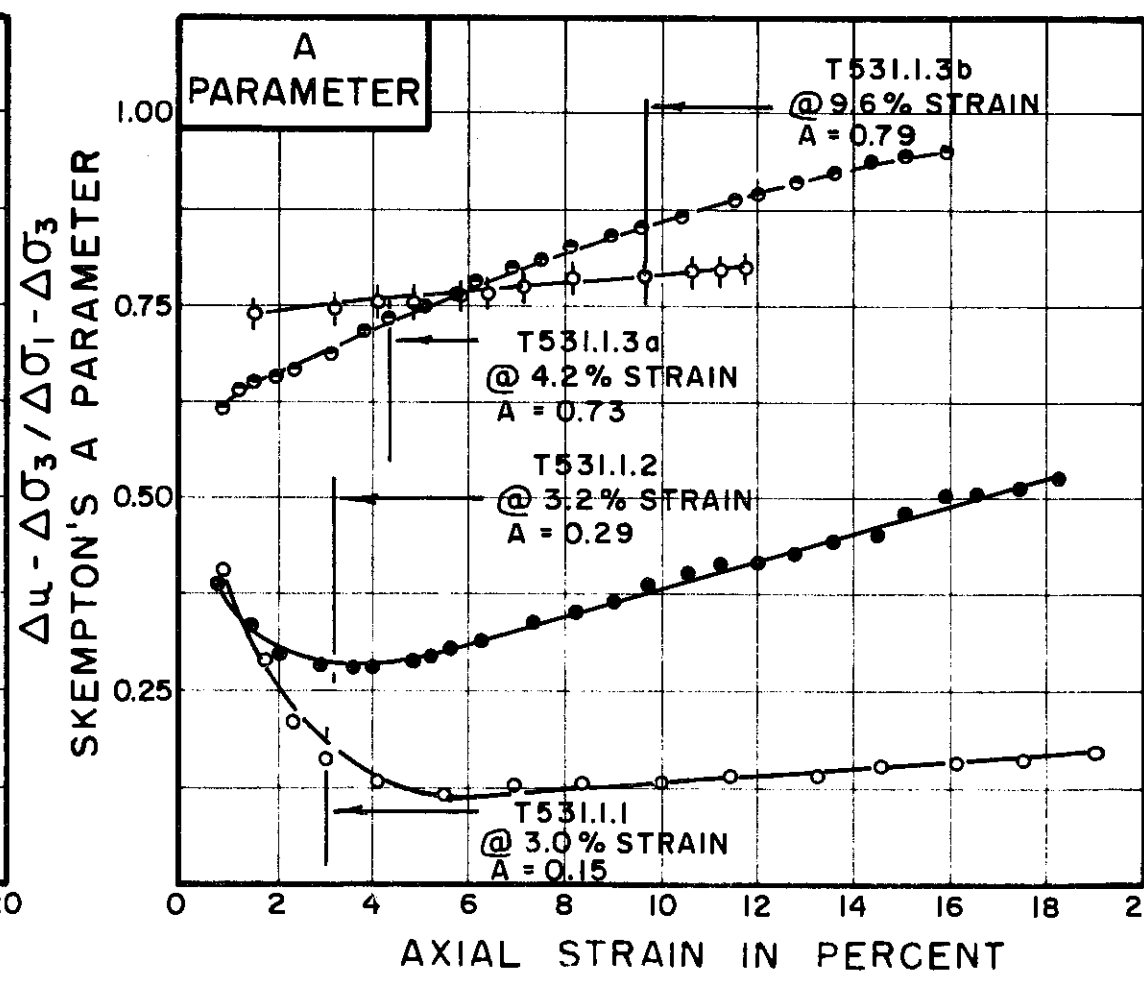
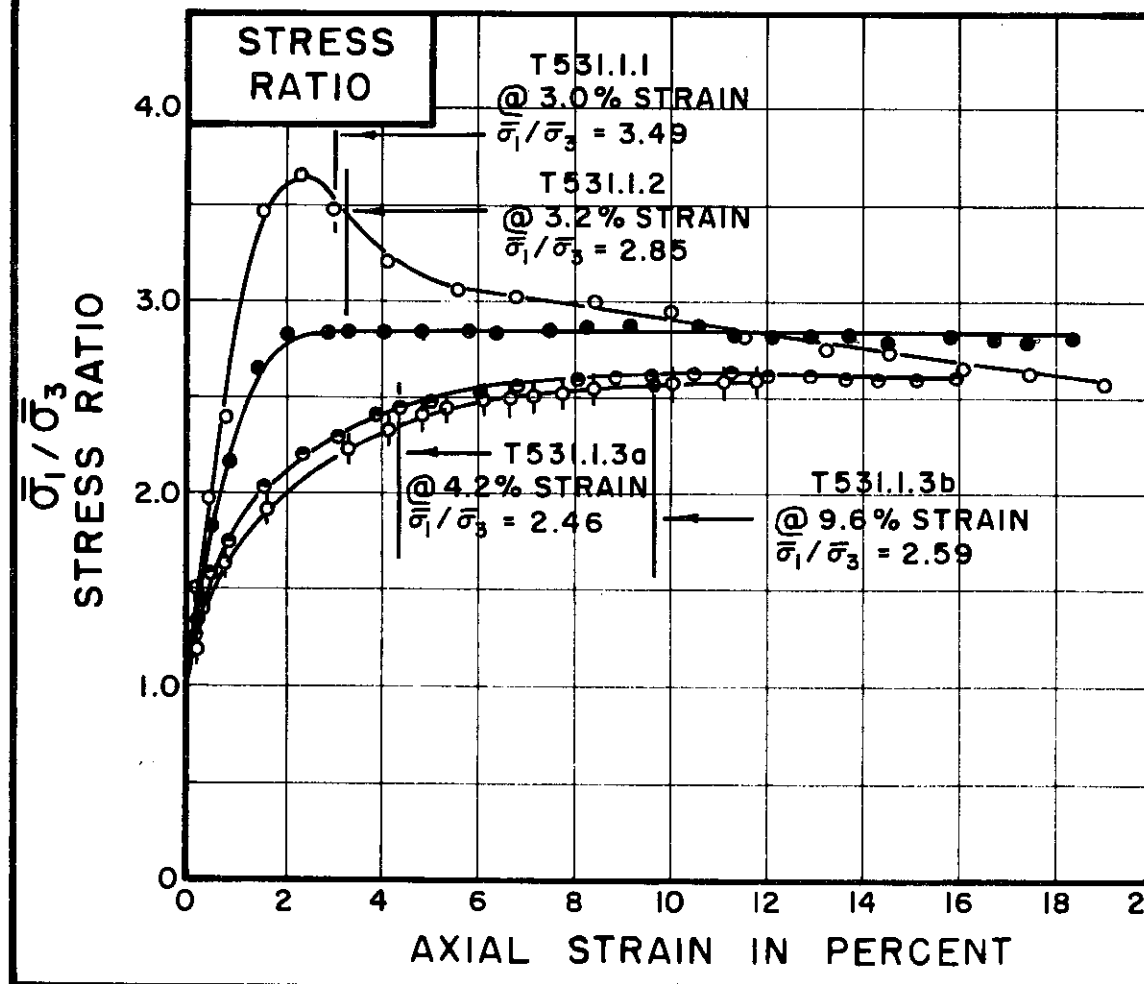
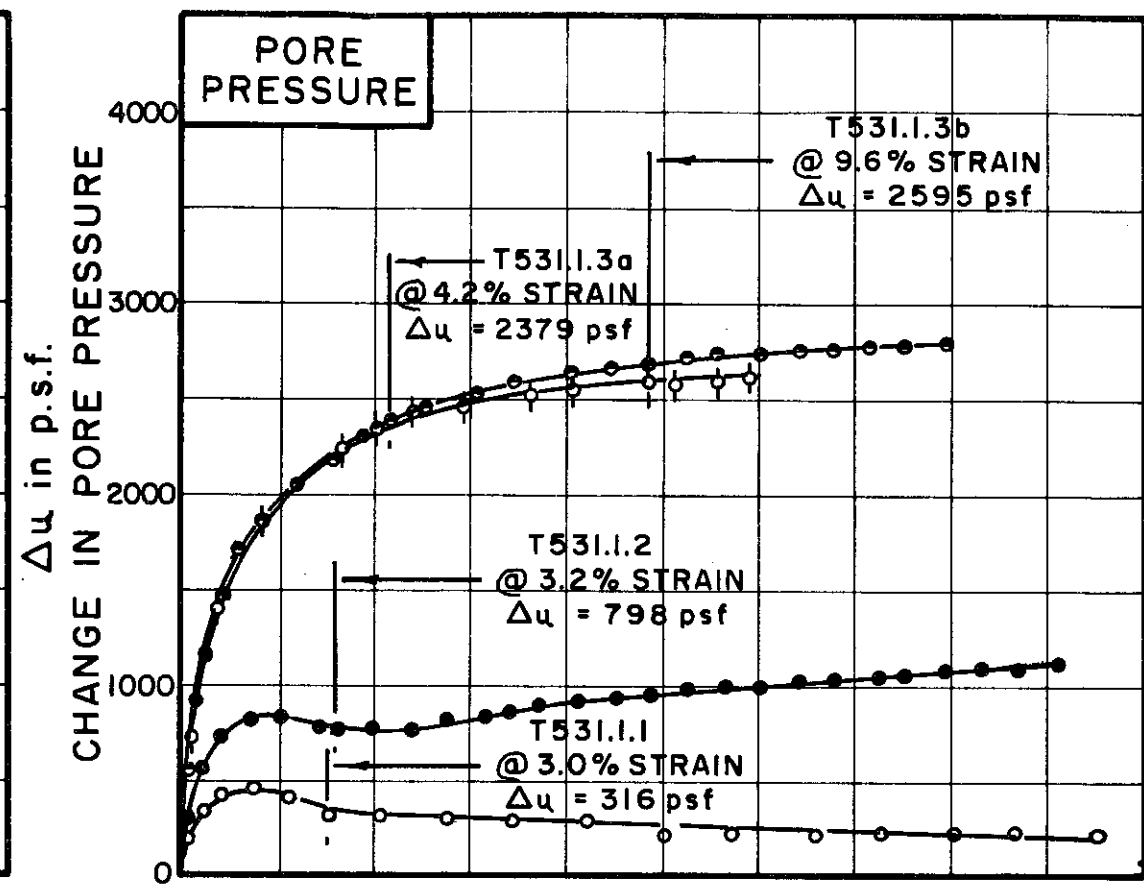
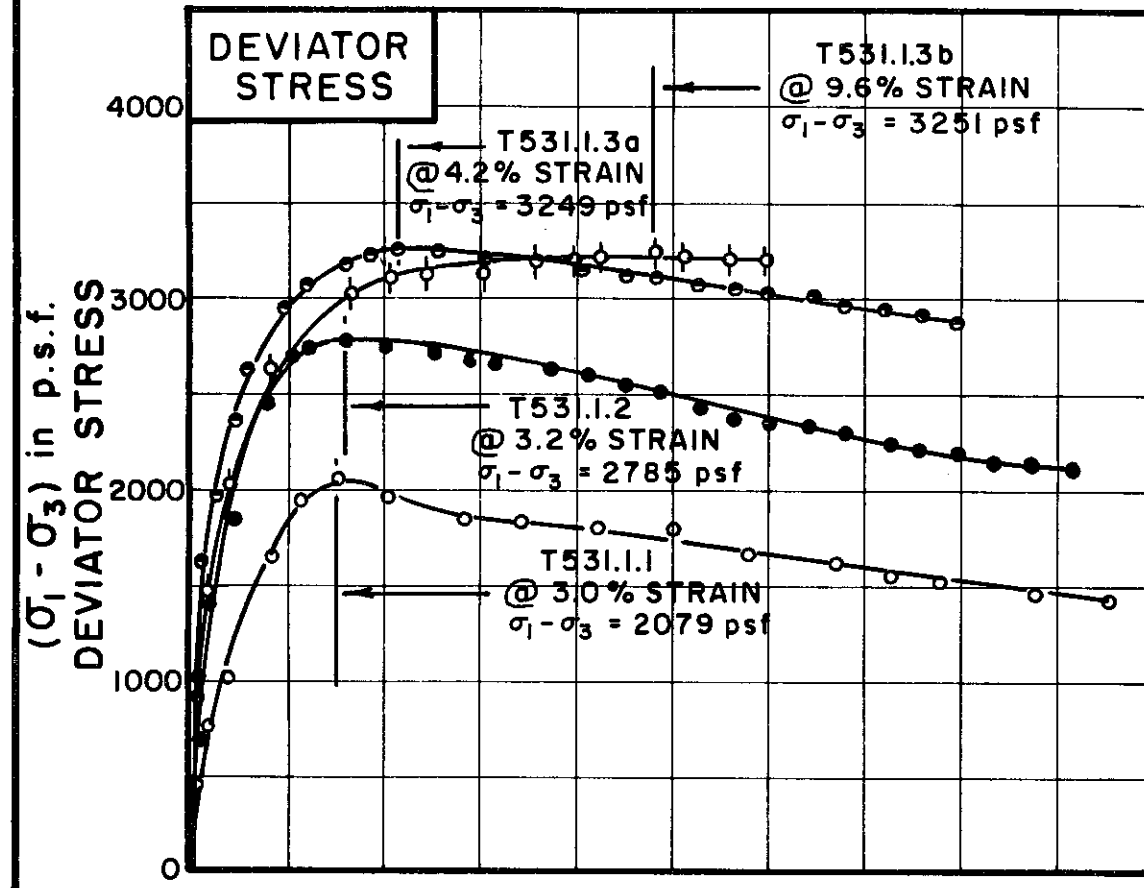
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-445

TEST NO. / SYMBOL	T531.1.1	T531.1.2	T531.1.3a	T531.1.3b
	○	●	◊	◐



INITIAL CONDITIONS	WATER CONTENT $w_0$	36.3%	35.5%	35.1%
				37.3%
	DRY DENSITY $\gamma_d$ lb/cu ft	86	87	85
				84
SAMPLE DIAMETER in.	$D_0$	1.39	1.40	1.41
SAMPLE HEIGHT in.	$H_0$	3.30	3.20	3.33
				3.28
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	$u_0$	10080	8640
				11520
	INITIAL EFFECTIVE STRESS p.s.f.	$\sigma_1', \sigma_3'$	1152	2304
				4608
				4637
VOLUMETRIC STRAIN $\epsilon_{vol}$		0.9%	1.2%	4.3%
				5.1%
PORE PRESSURE RESPONSE		96%	95%	96%
				91%
FINAL CONDITIONS	WATER CONTENT $w_f$	35.5%	34.5%	30.9%
				34.4%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	0.24	.010	.010
			.007

BORING NO. 141

SAMPLE NO. 4

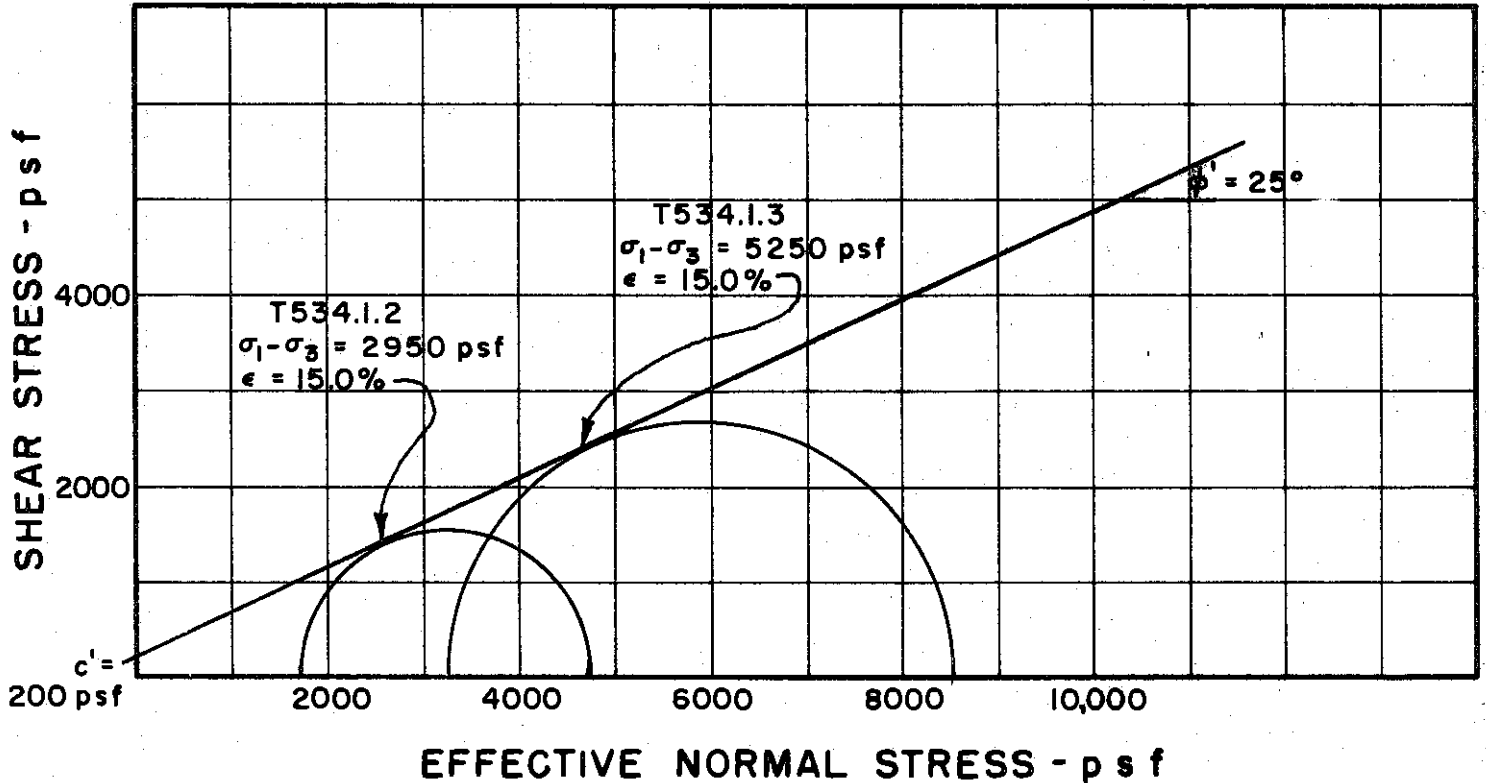
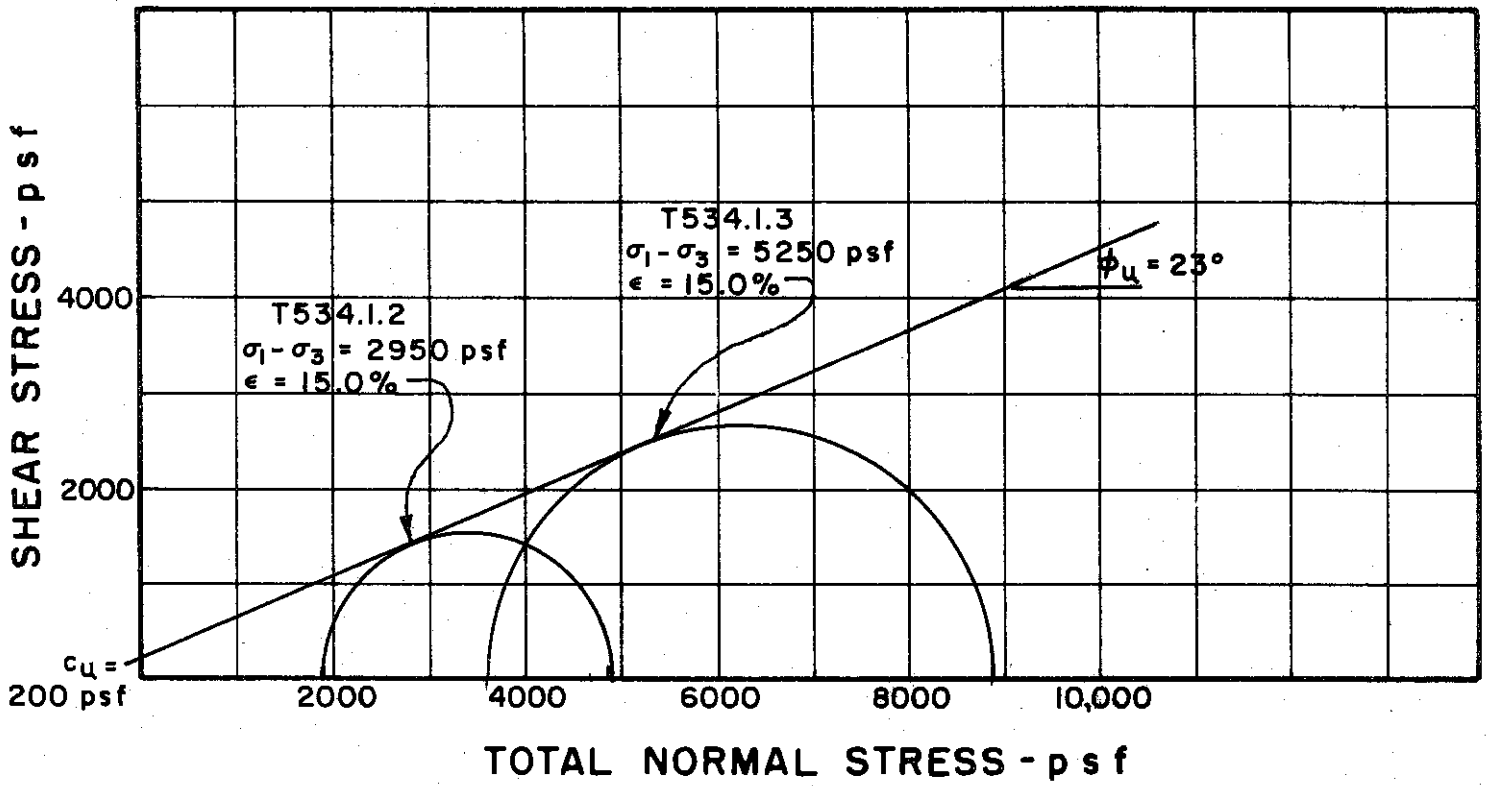
DEPTH 18.0' TO 20.0'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'

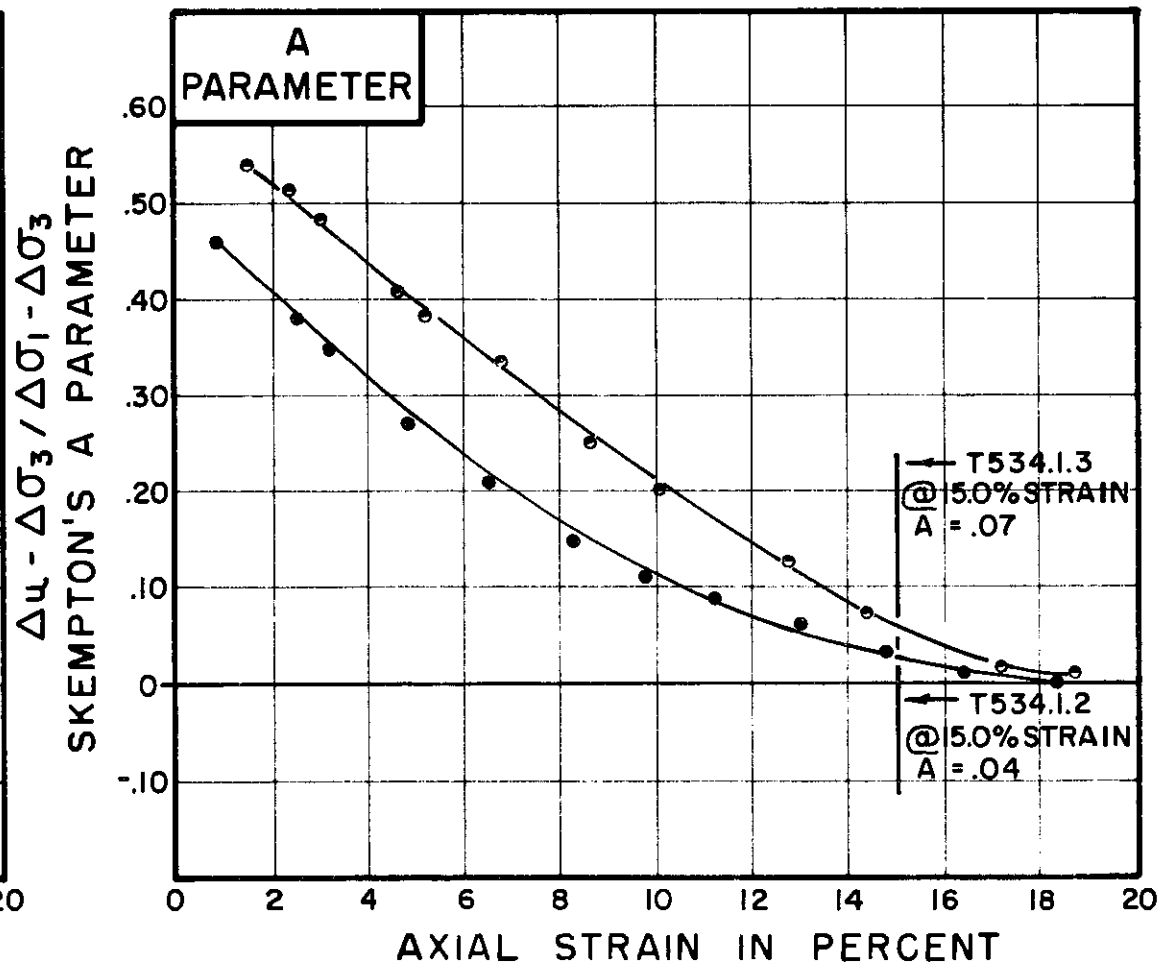
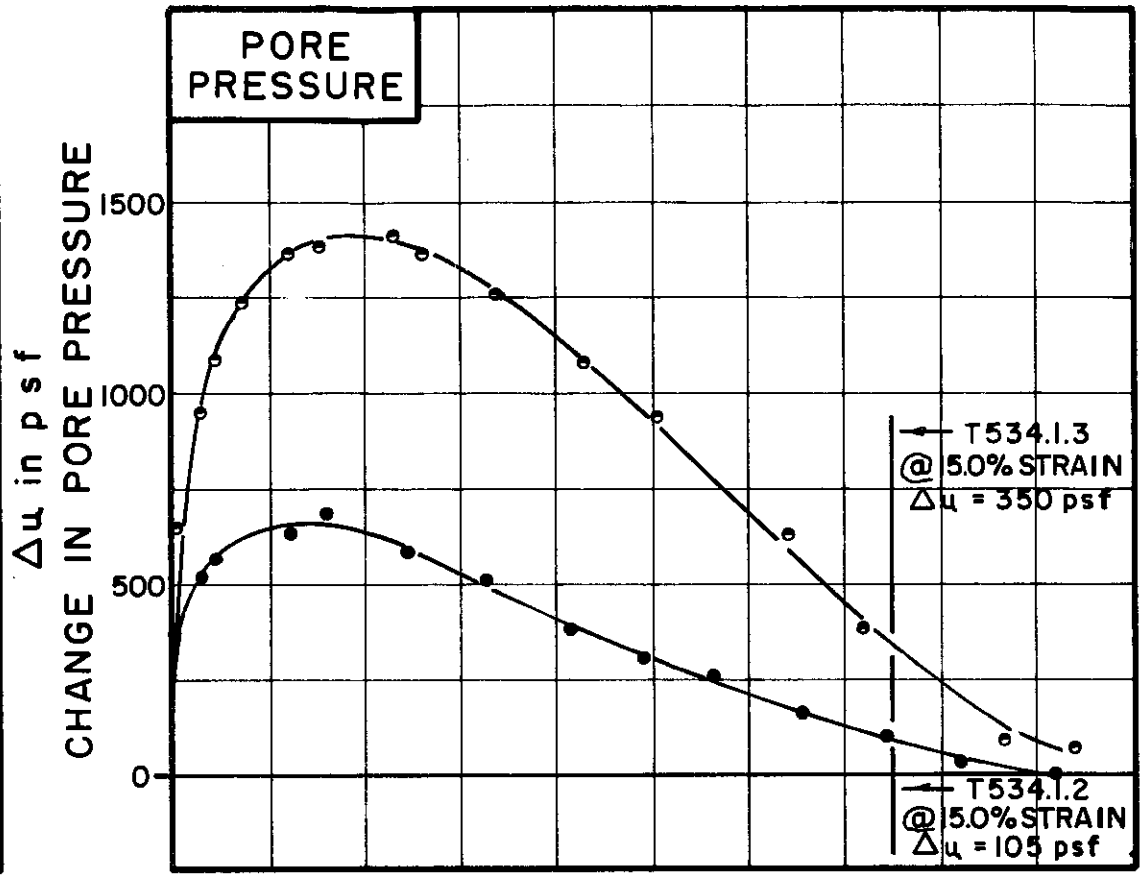
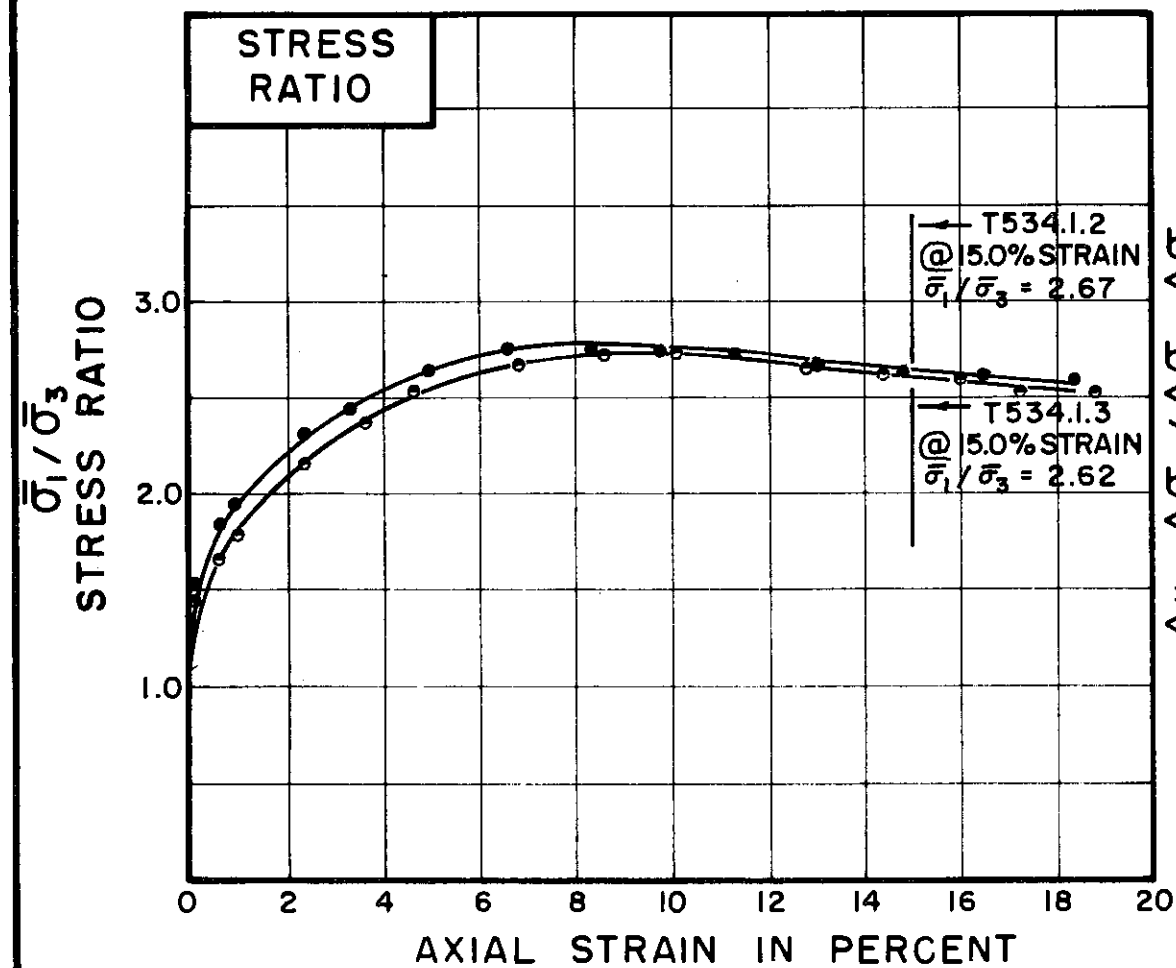
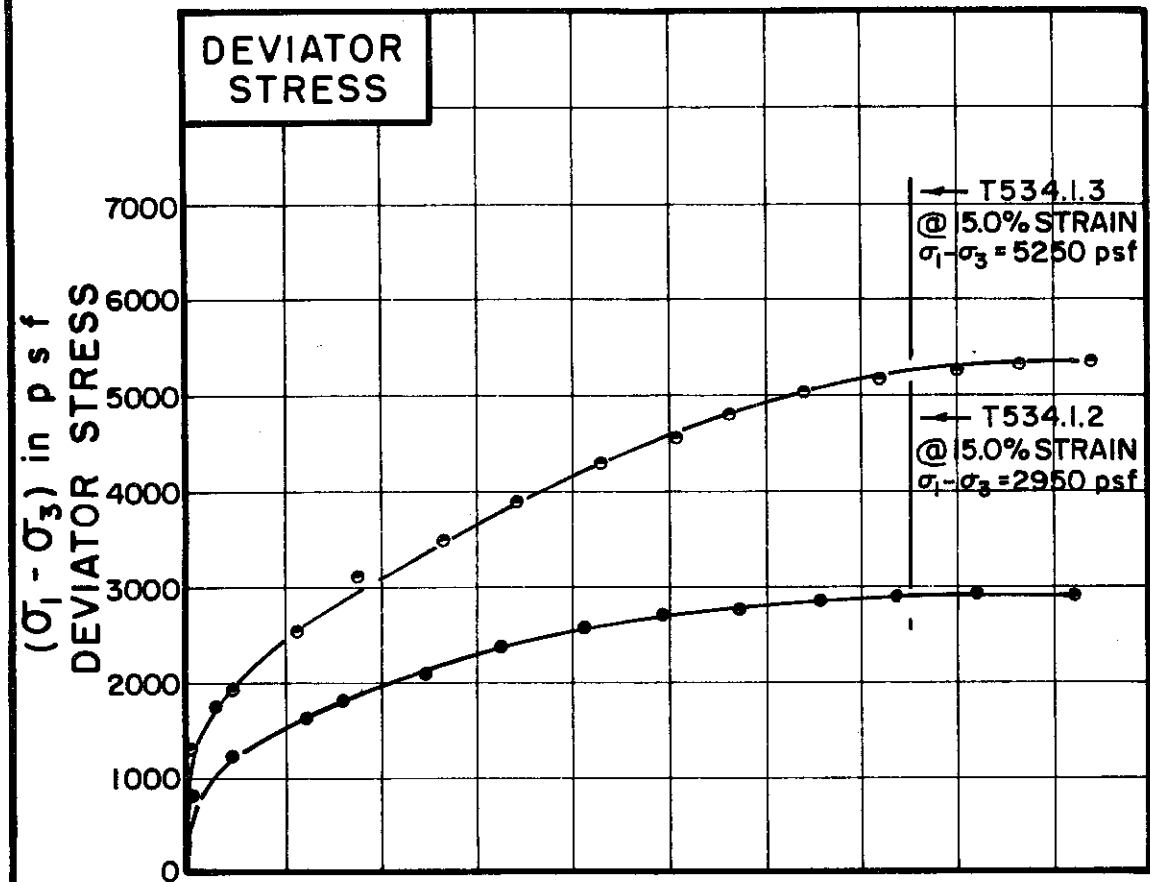
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO. / SYMBOL	T534.1.2	T534.1.3
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INITIAL CONDITIONS			T534.1.2	T534.1.3	
WATER CONTENT	$w_0$		15.3%	15.1%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	105	105	
SAMPLE DIAMETER	$D_0$	in.	1.385	1.37	
SAMPLE HEIGHT	$H_0$	in.	3.05	3.31	
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	20160	23155	
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	psf	1872	3600	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.13%	0.13%	%
PORE PRESSURE RESPONSE			97%	94%	
FINAL CONDITIONS					
WATER CONTENT	$w_f$		29.0%	24.1%	%
SKETCH OF SAMPLE AT END OF TEST					

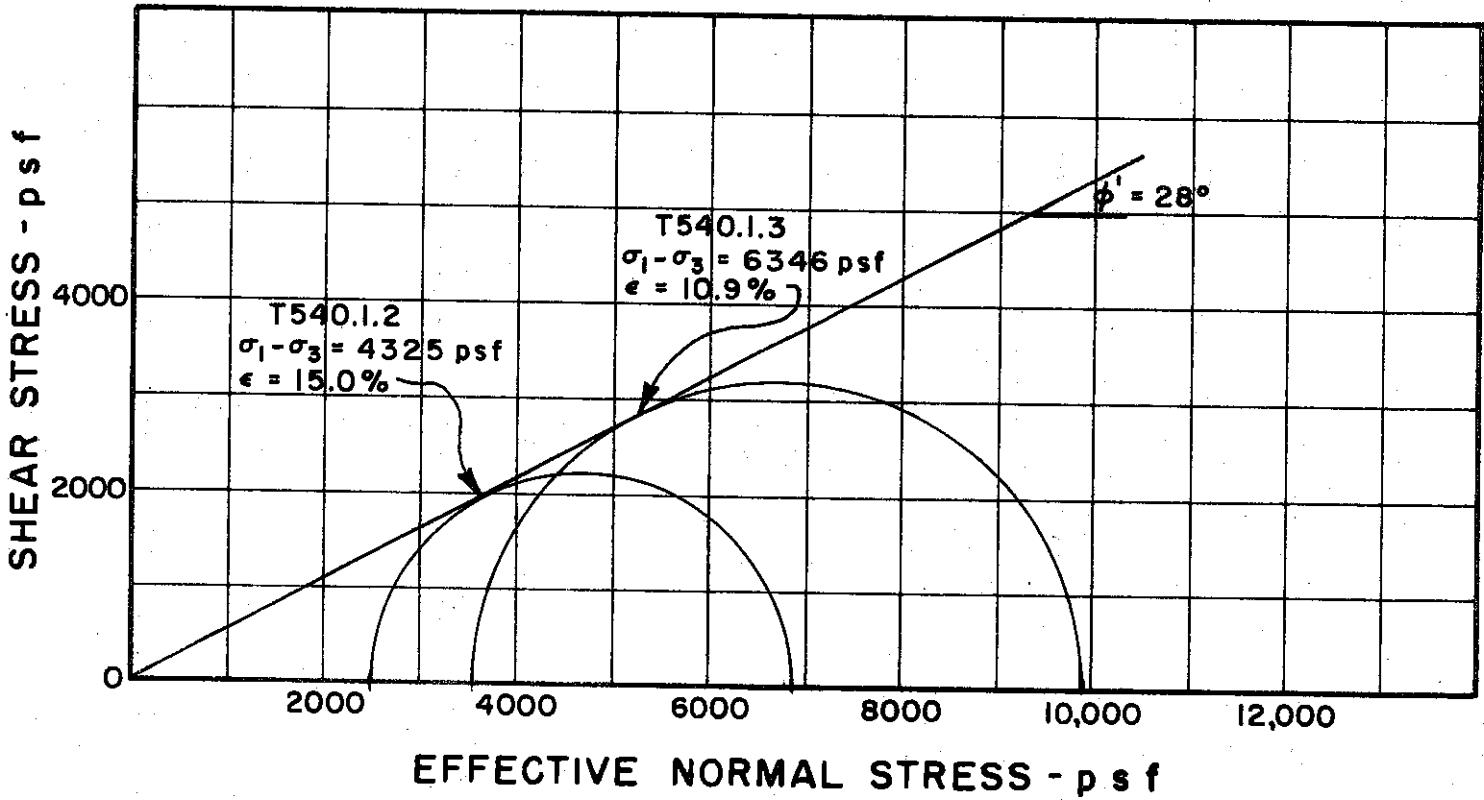
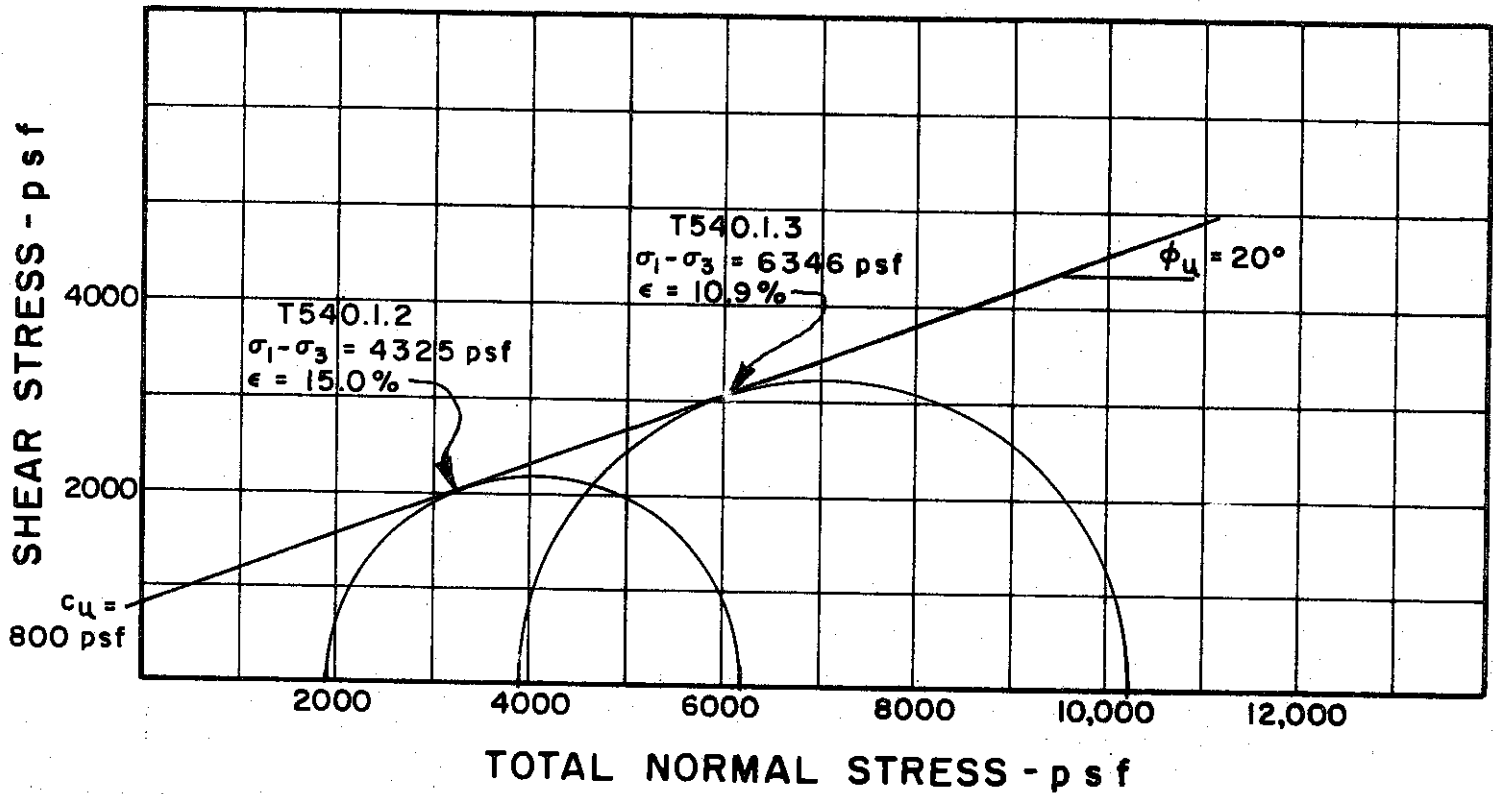
RATE OF STRAIN PERCENT / MINUTE	.0078	.0072
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BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 47 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 146

SAMPLE NO. ST 3

DEPTH 6.0' TO 7.8'

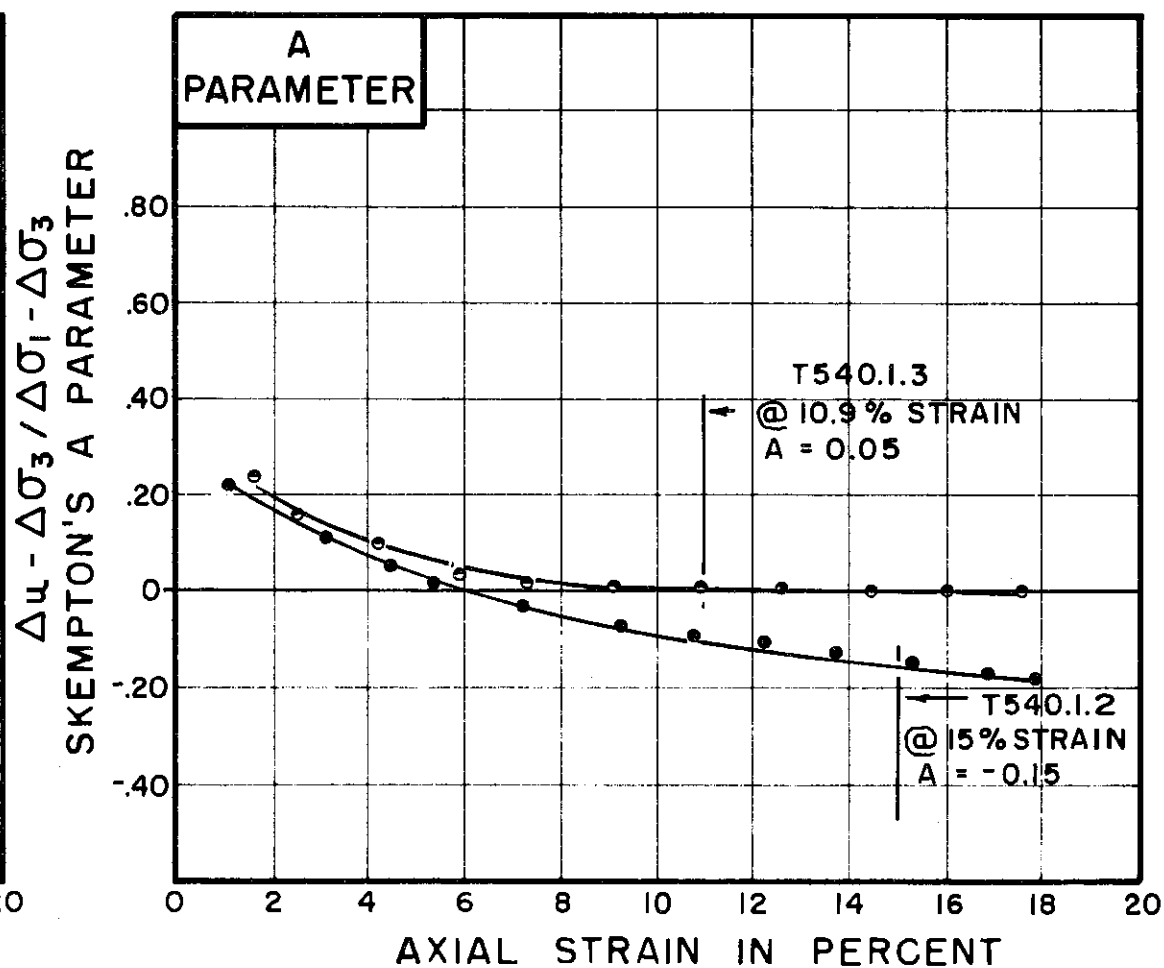
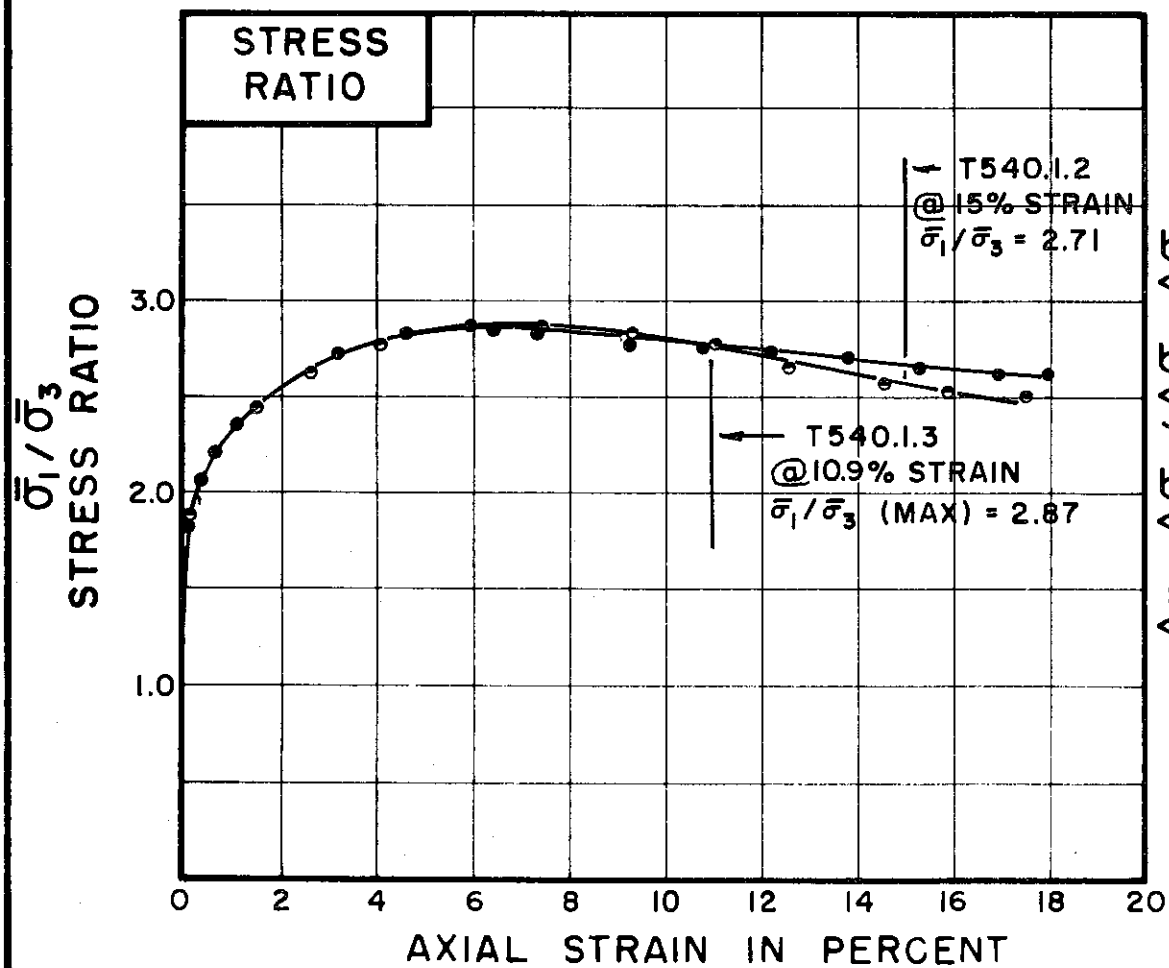
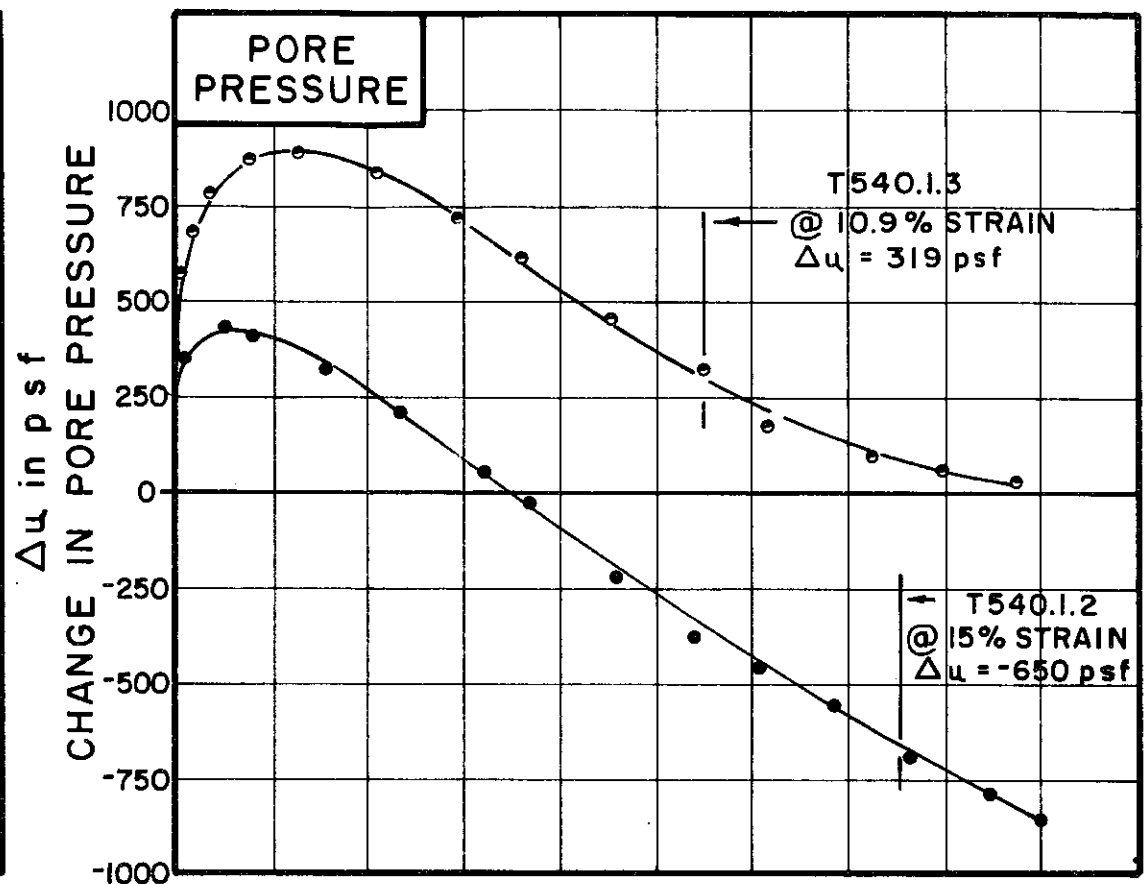
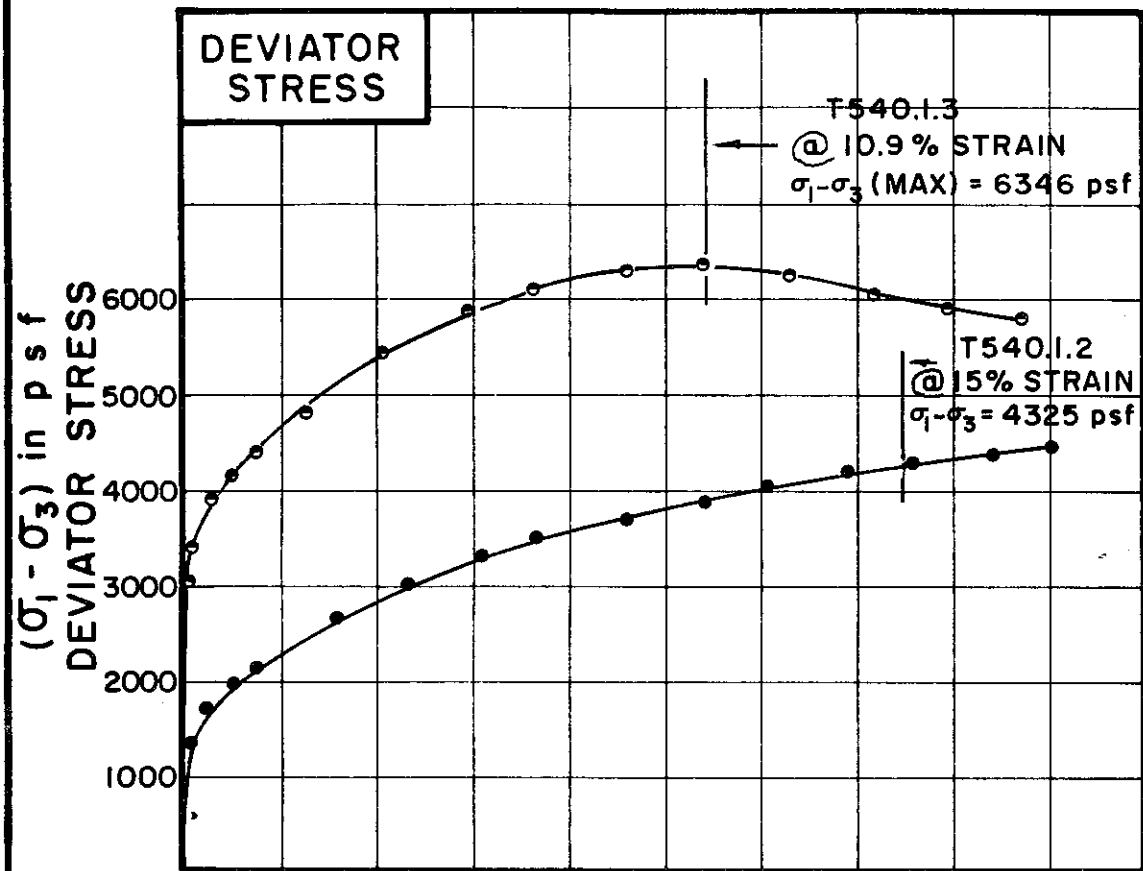
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T540.1.2	T540.1.3
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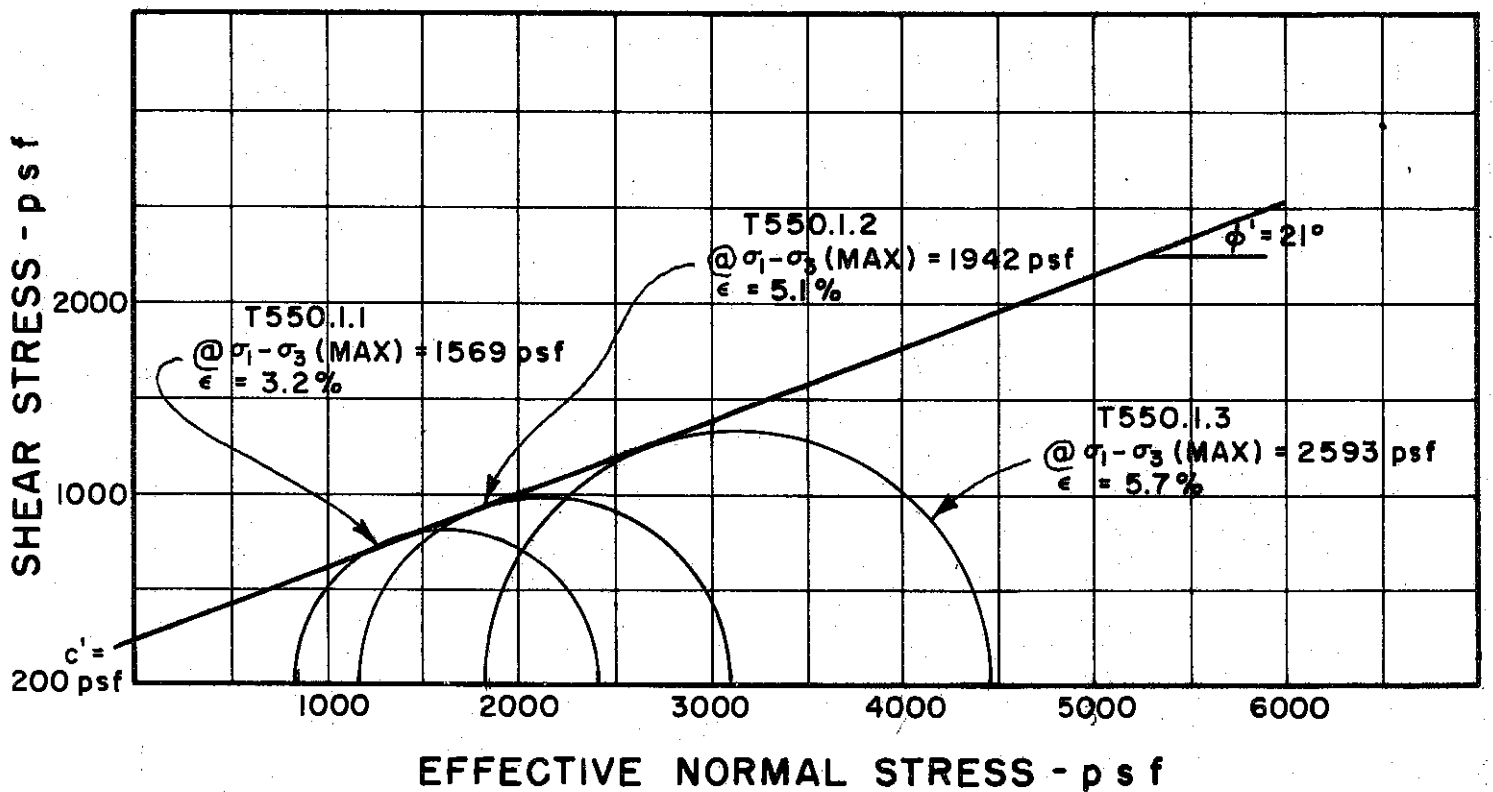
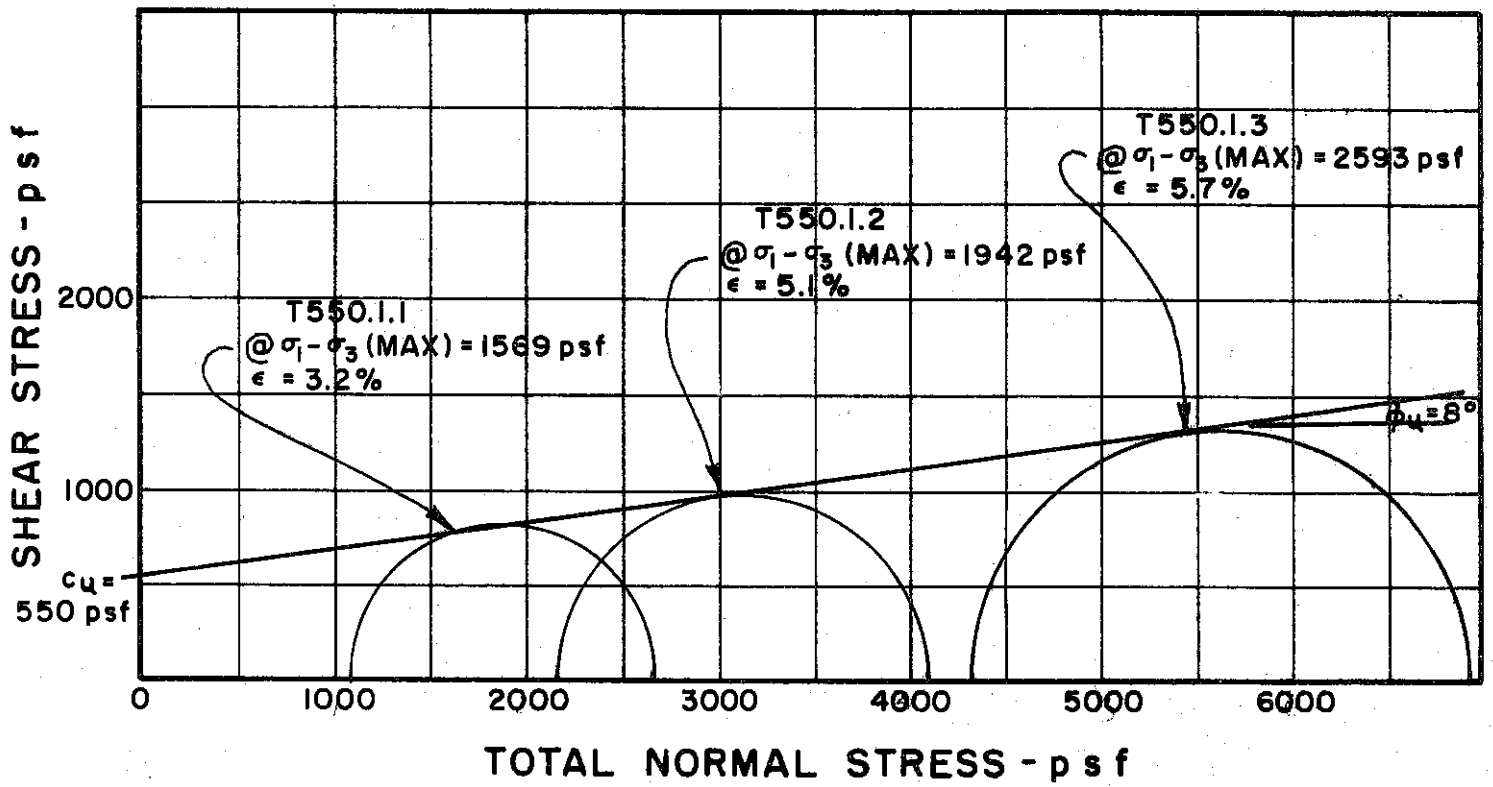
INITIAL CONDITIONS		T540.1.2	T540.1.3	UNIT
WATER CONTENT	$w_0$	14.4%	14.2%	%
DRY DENSITY	$\gamma_d$	108	108	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.35	1.37	in.
SAMPLE HEIGHT	$H_0$	3.27	3.02	in.
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	25344	25344	psf
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	1872	3888	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.82%	4.12%	%
PORE PRESSURE RESPONSE		97%	96%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	24.4%	23.2%	%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.0073	.0079
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BORING NO. 146  
 SAMPLE NO. ST 3  
 DEPTH 6.0' TO 7.8'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

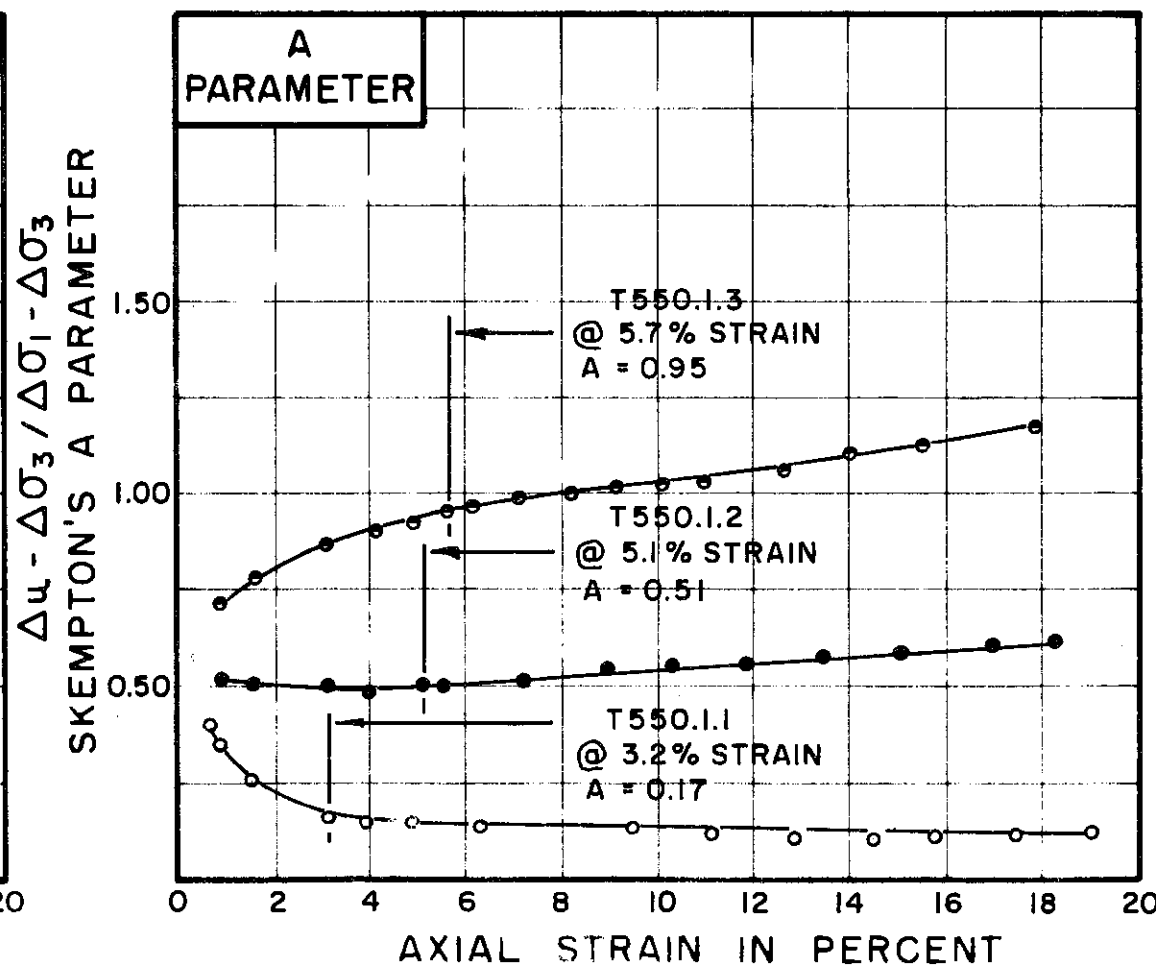
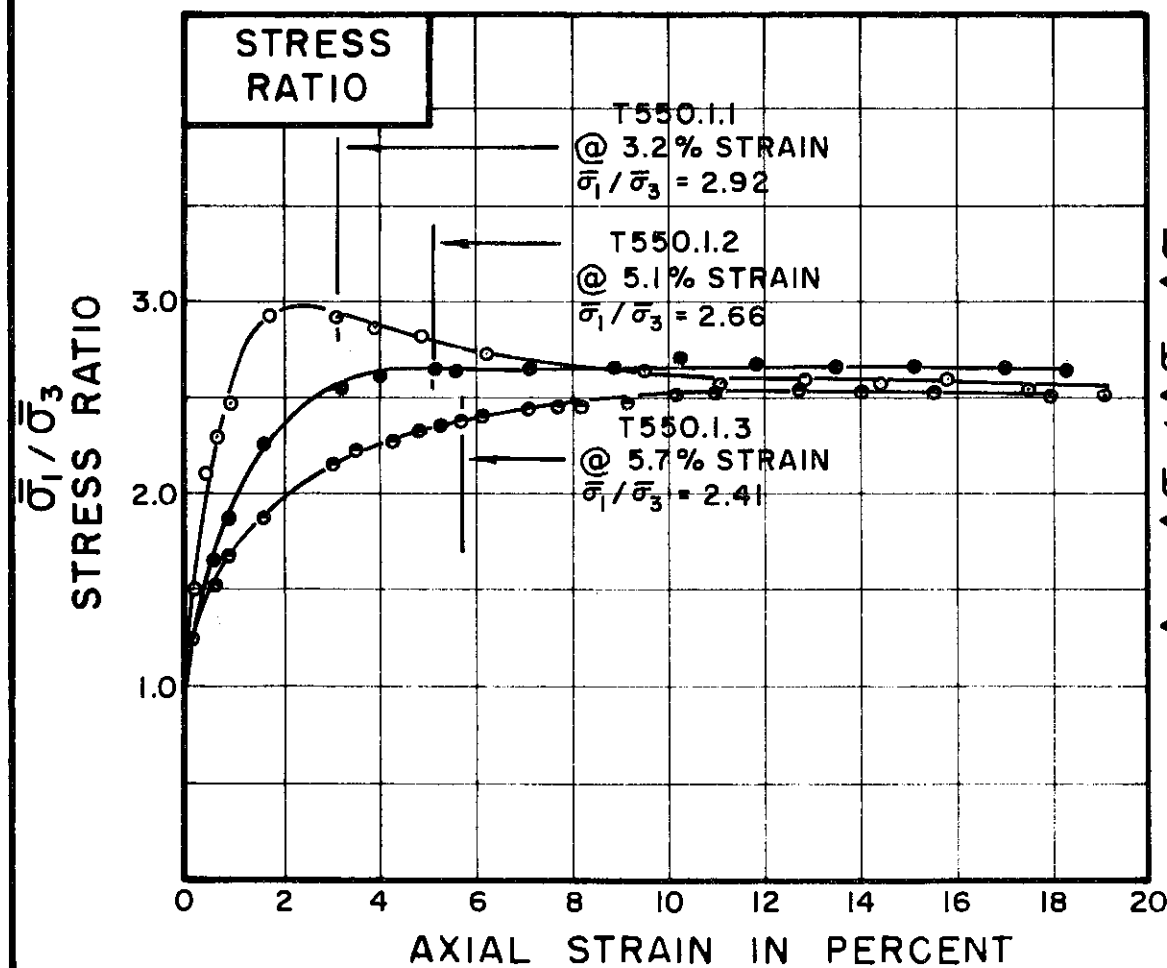
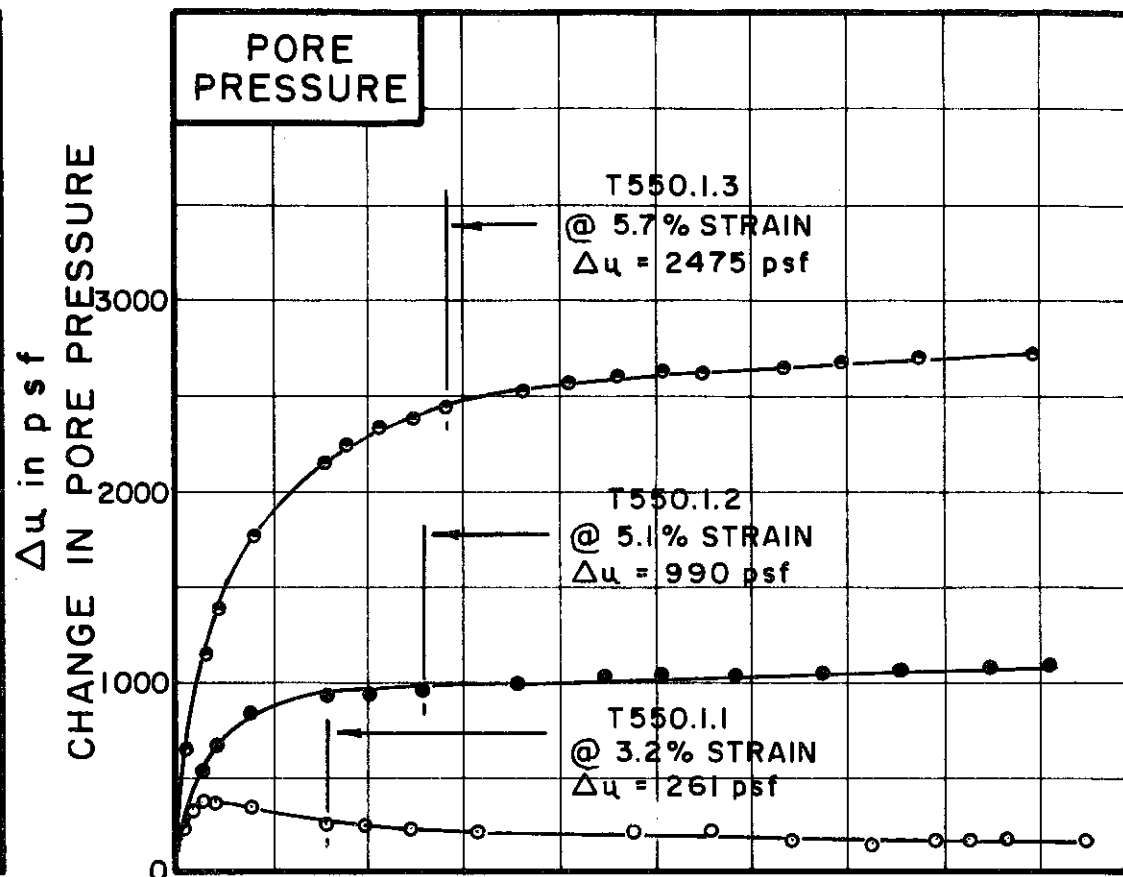
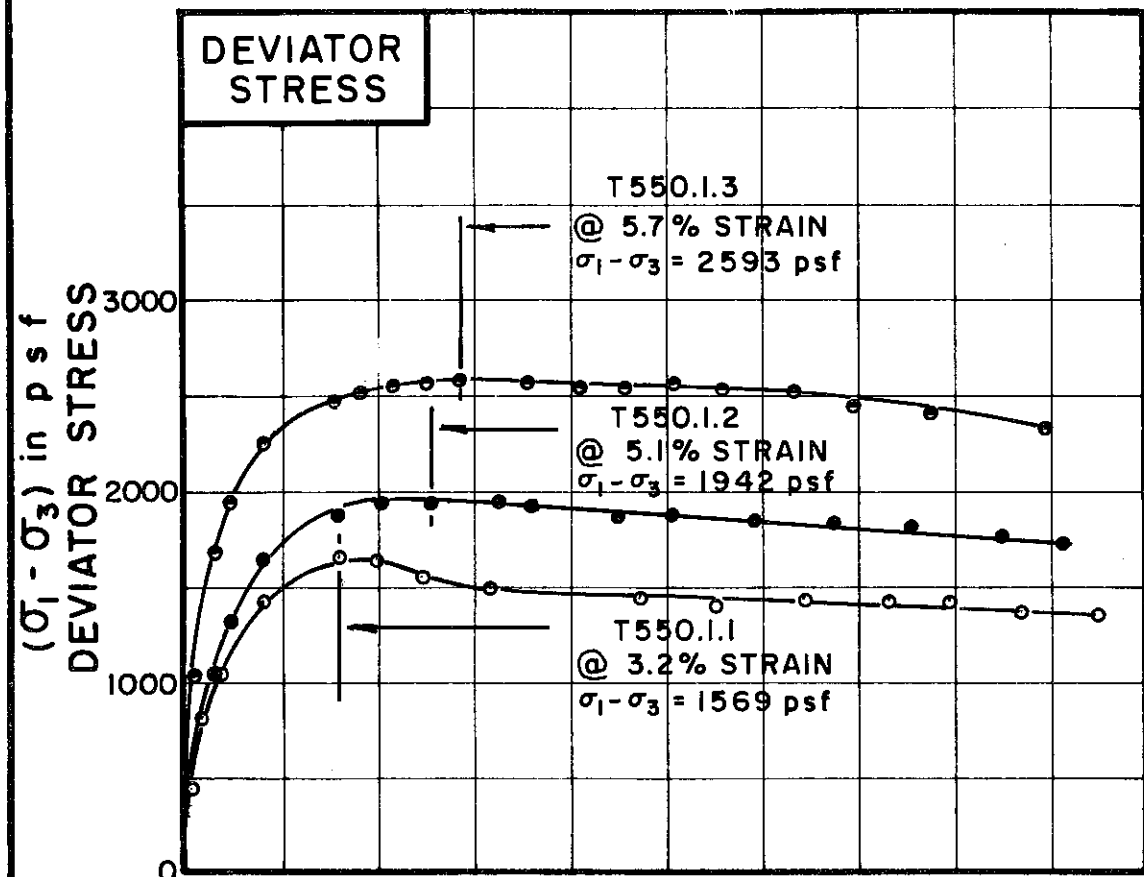
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T550.1.1	T550.1.2	T550.1.3
	○	●	●

INITIAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	w <sub>0</sub>		37.5%	33.5%	37.1%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	83	87	83
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.16	3.18	3.19
FINAL CONDITIONS BEFORE SHEAR			T550.1.1	T550.1.2	T550.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	psf	8640	10080	15840
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	psf	1080	2160	4320
VOLUMETRIC STRAIN	ε <sub>vol</sub>		1.4%	2.4%	4.2%
PORE PRESSURE RESPONSE			95%	95%	96%
FINAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	w <sub>f</sub>		37.4%	32.2%	33.4%
SKETCH OF SAMPLE AT END OF TEST					

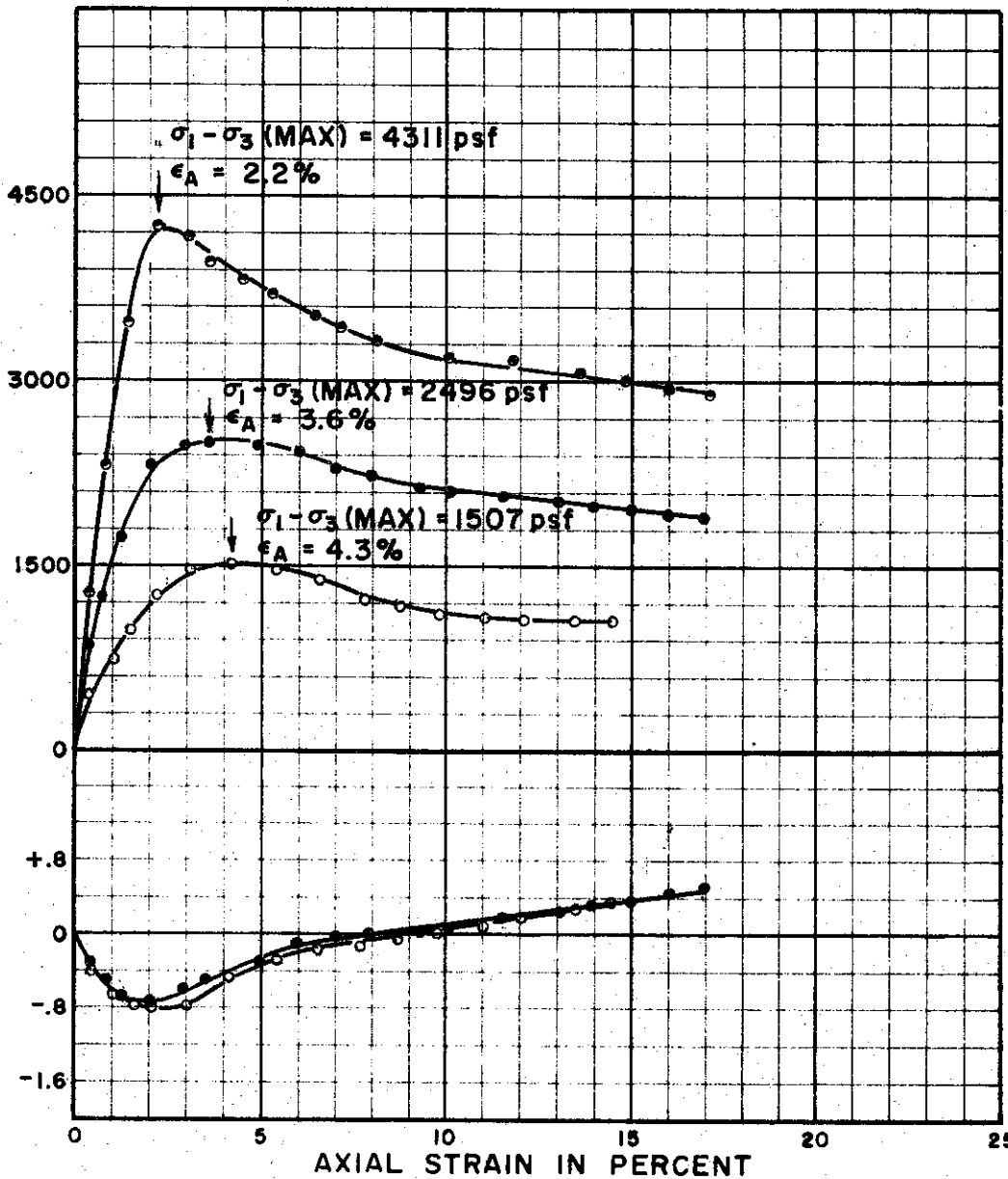
RATE OF STRAIN PERCENT/MINUTE	.025	.025	.008
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BORING NO. 158  
 SAMPLE NO. 4  
 DEPTH 17.5' TO 20.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

DEVIATOR STRESS,  $\sigma_1 - \sigma_3$  IN psf

VOLUMETRIC STRAIN,  $\Delta V/V_0$  IN PERCENT



SKETCHES AT FAILURE



TEST NO. 253.23



TEST NO. 253.22



TEST NO. 253.21

TEST NO./SYMBOL		253.21	253.22	253.23
INITIAL CONDITIONS	INITIAL WATER CONTENT %	$w_0$ 23.0	23.3	24.2
	INITIAL UNIT WEIGHT pcf	$\gamma_d$ 107	105	103
	SAMPLE HEIGHT & DIAMETER in	$D_0$ 1.39	1.39	1.41
		$H_0$ 3.51	3.46	3.43
CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS psf	$\sigma_1 = \sigma_3$ 576	1152	2304
	FINAL BACK PRESSURE psf	$u_0$ 7776	8352	7776
	VOLUMETRIC STRAIN %	$\epsilon_{vol}$ .94	1.28	2.74
	PORE PRESSURE RESPONSE %	99	97	96
FINAL CONDITIONS	FINAL WATER CONTENT %	$w_f$ 26.8	26.1	25.8
	FINAL UNIT WEIGHT pcf	$\gamma_d$ 107	106	—
RATE OF STRAIN PERCENT PER MINUTE		.002	.002	.002

BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)

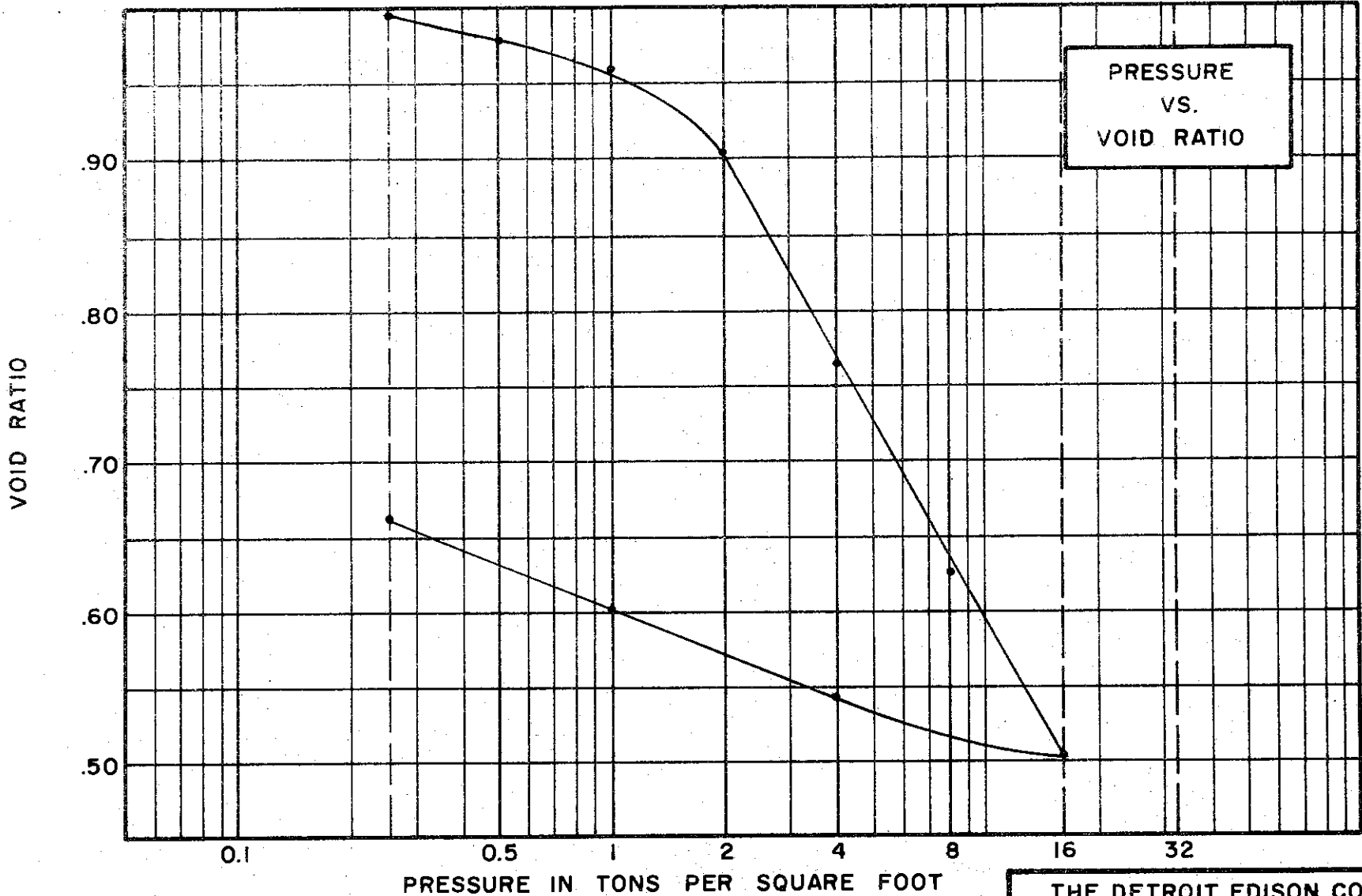
LIQUID LIMIT 49 PLASTIC LIMIT 23

### CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.6% FINAL 27.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

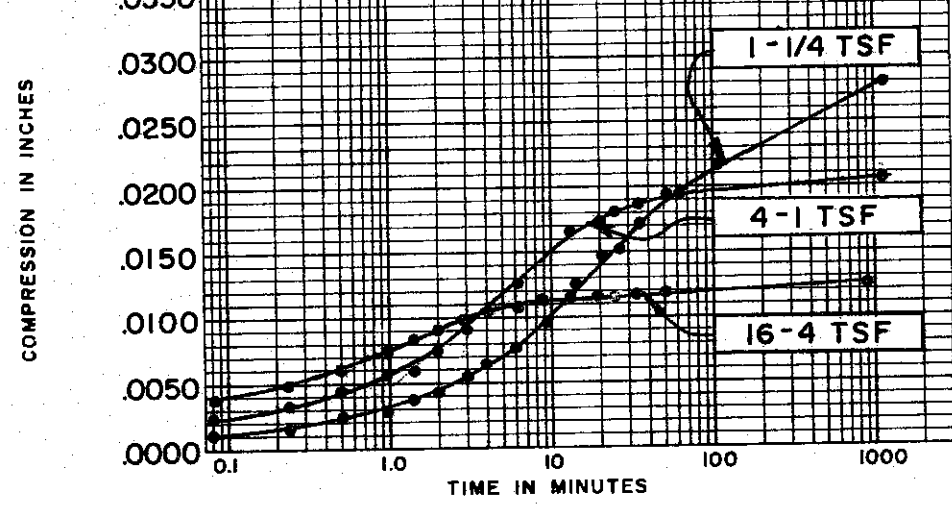
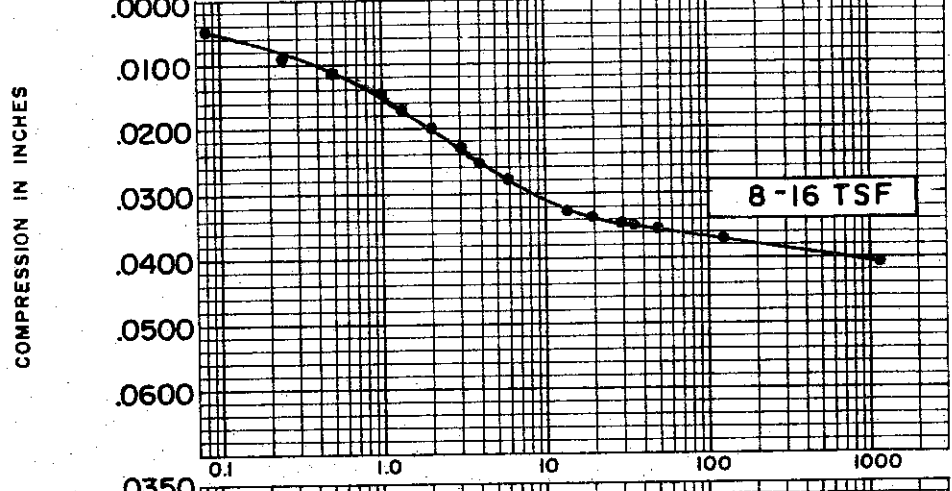
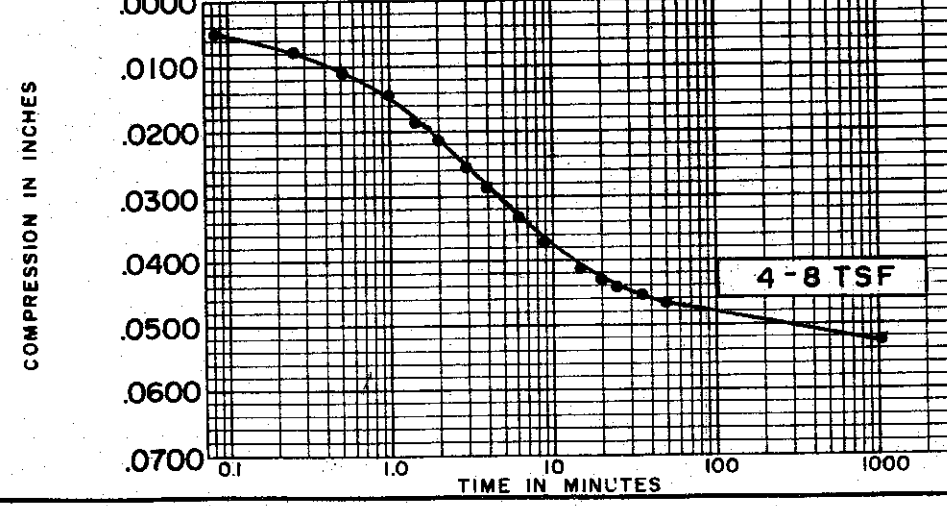
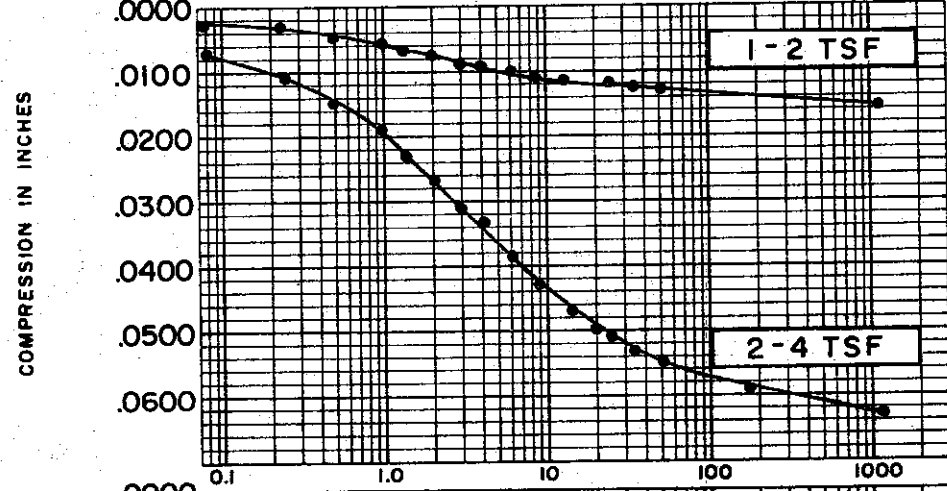
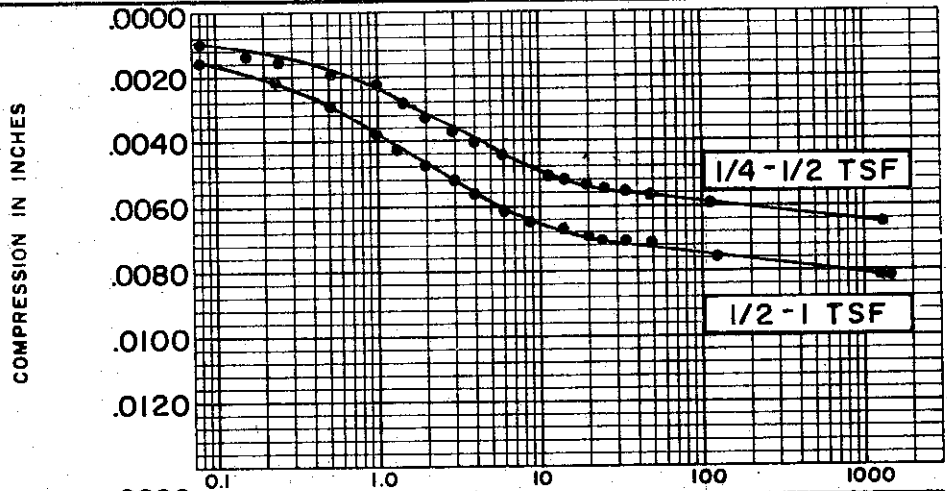
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C306.1  
 SAMPLE NO. 10 DATE APRIL 74  
 DEPTH 34.0' TO 34.3'

C-455





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.73  
INITIAL WATER CONTENT 38.6%  
FINAL WATER CONTENT 27.9%

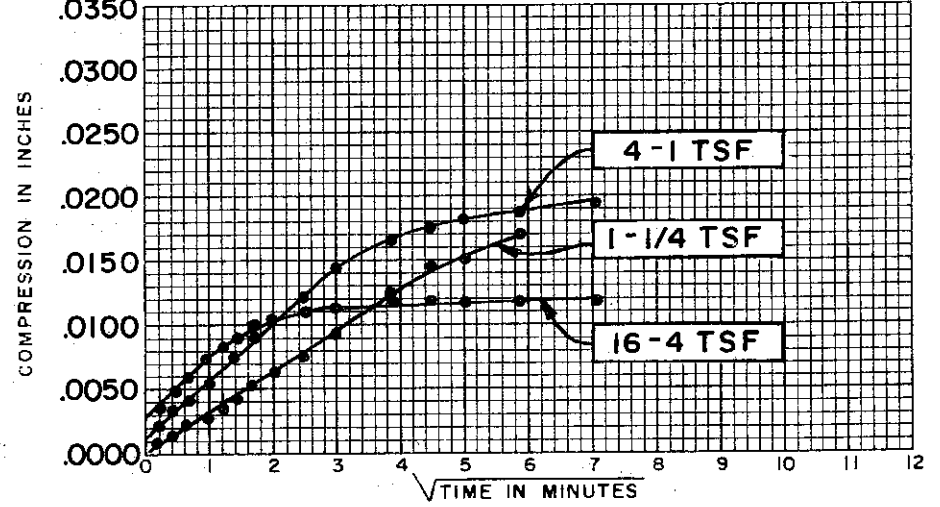
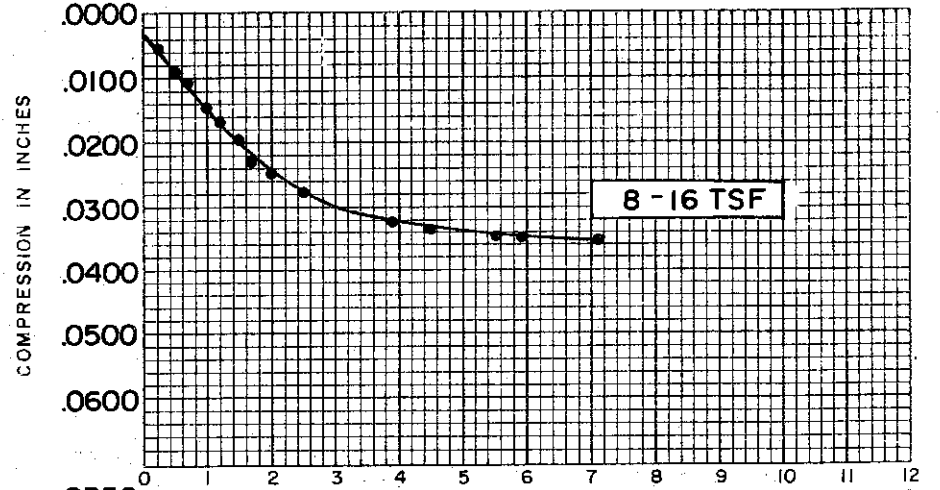
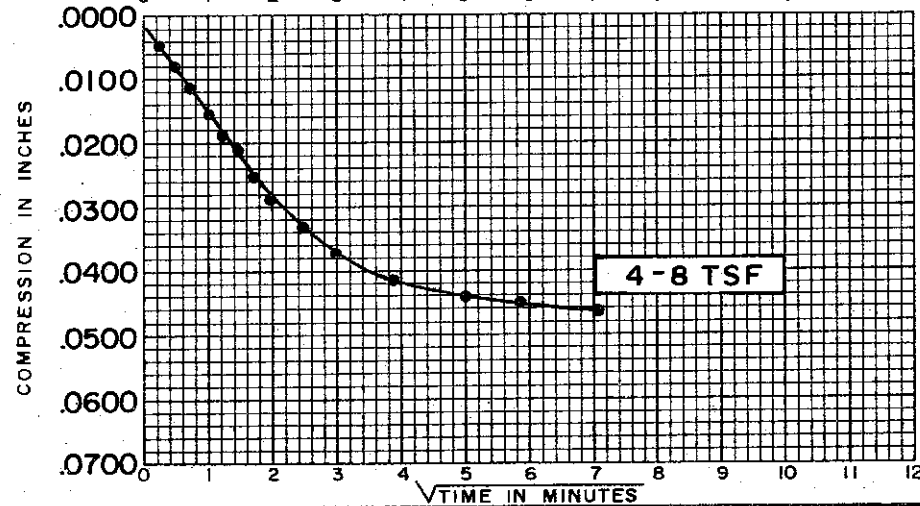
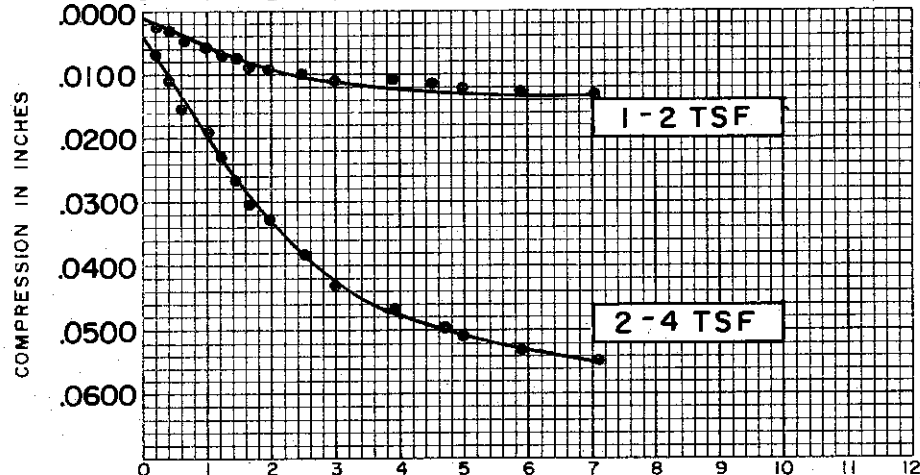
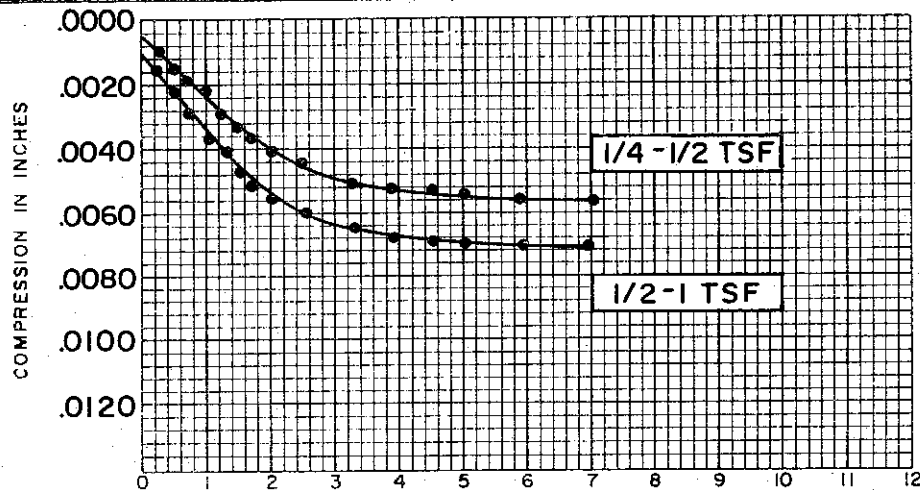
BORING NO. 27  
SAMPLE NO. 10  
DEPTH 34.0' TO 34.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.016

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

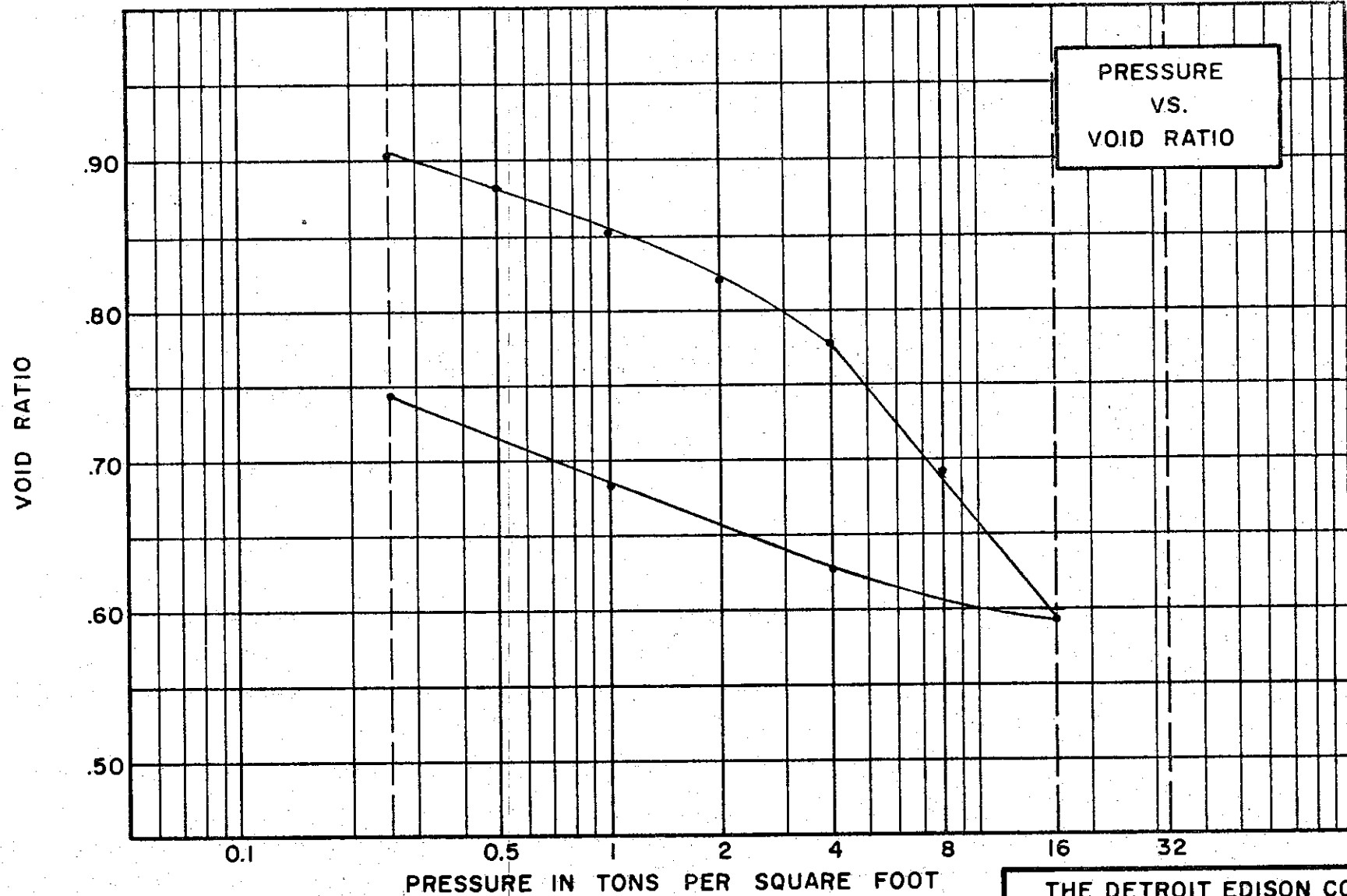


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.6%
FINAL WATER CONTENT	27.9%
BORING NO.	27
SAMPLE NO.	10
DEPTH	34.0' TO 34.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.016

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-457



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 339% FINAL 300%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 25 %

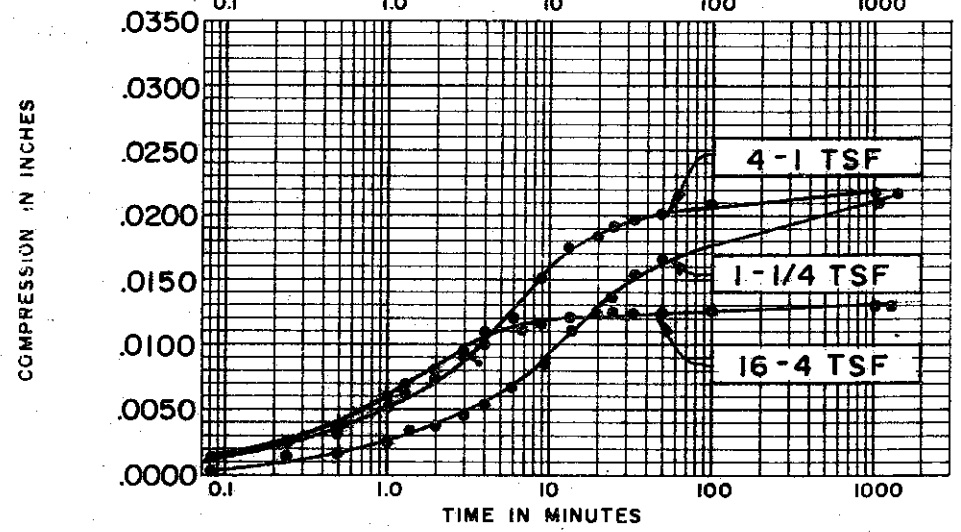
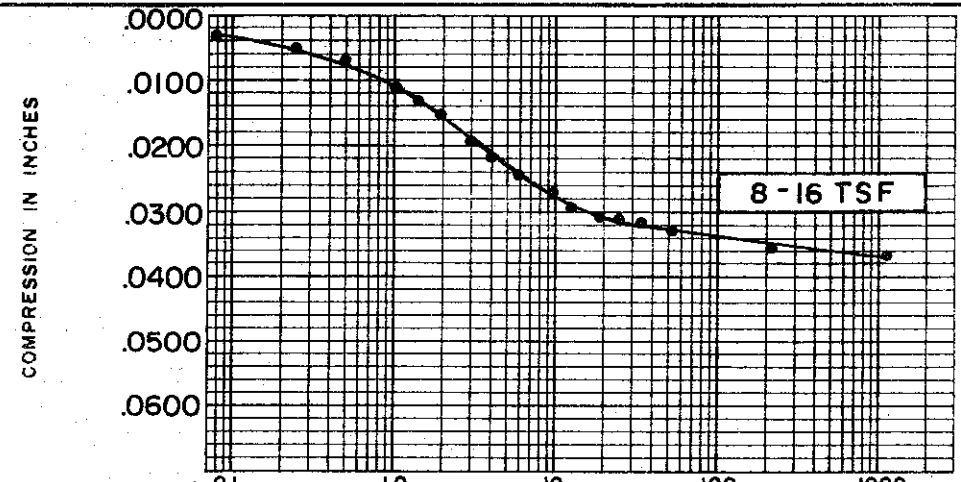
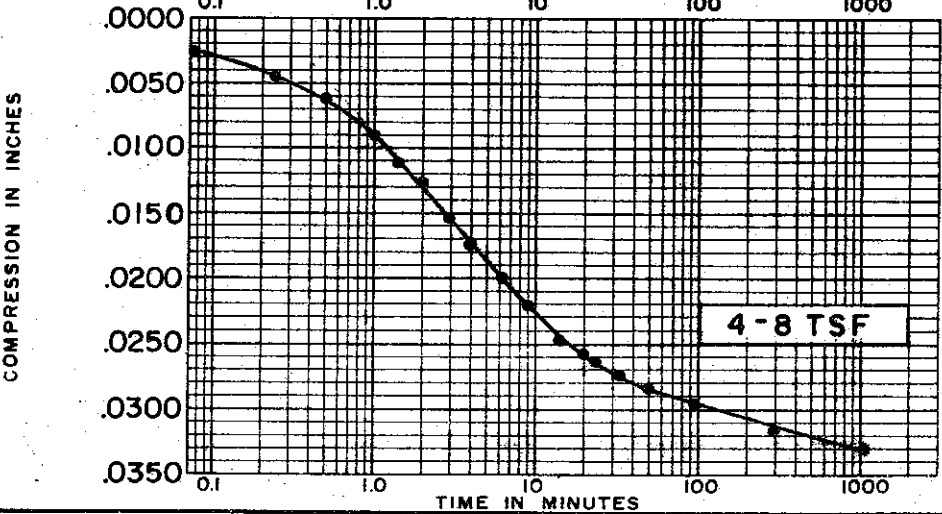
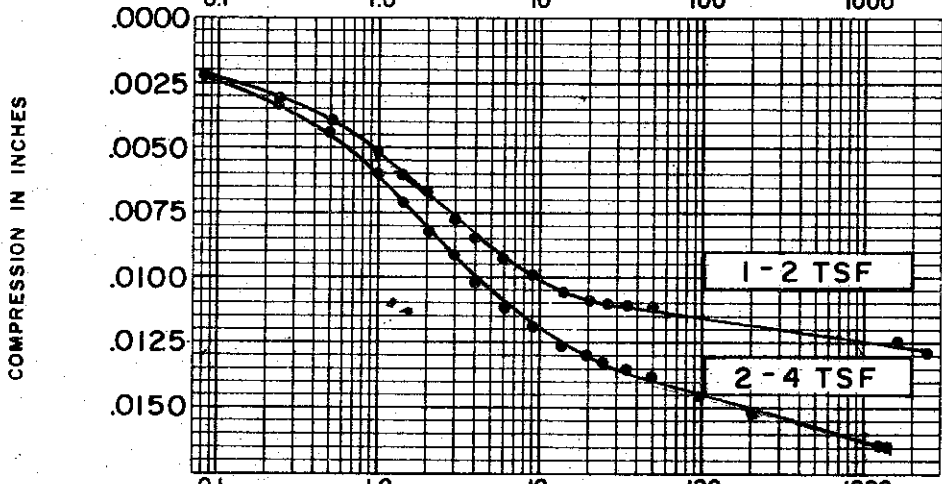
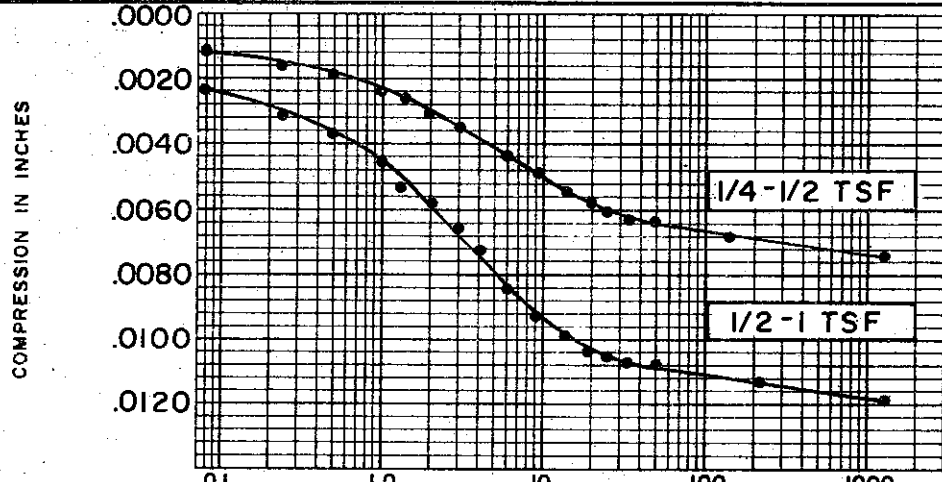
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

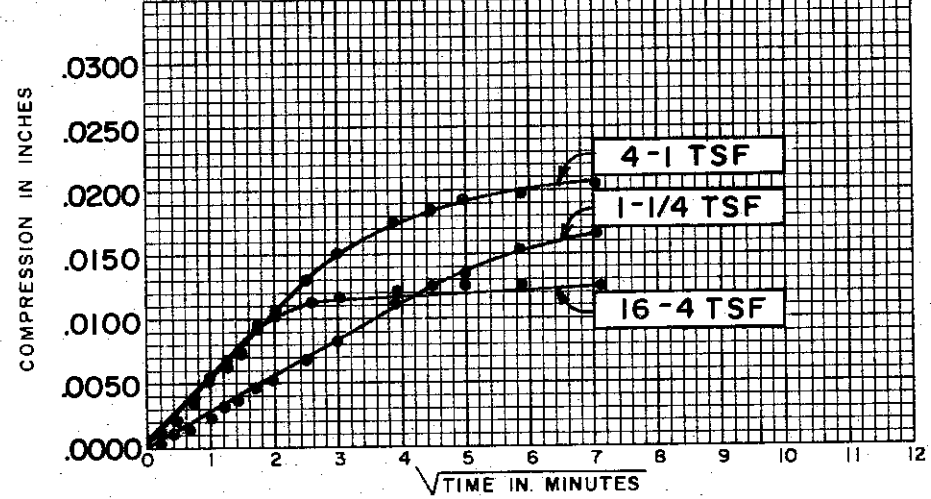
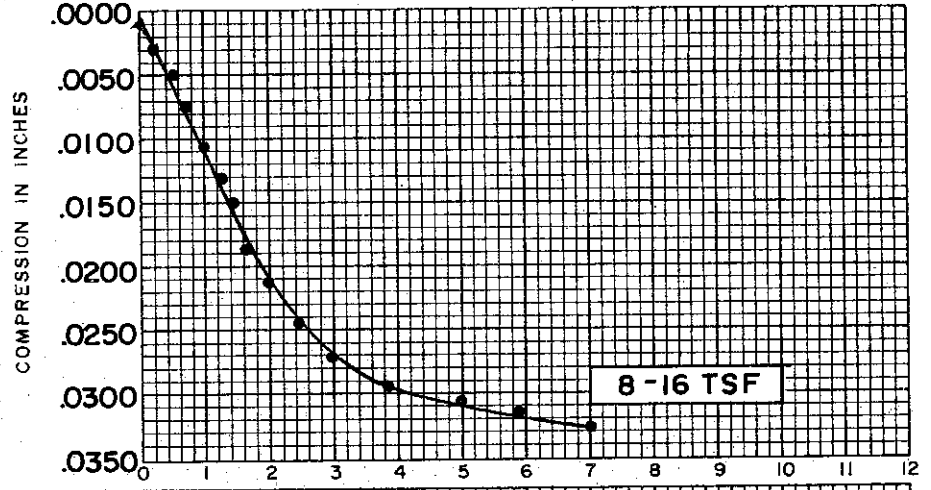
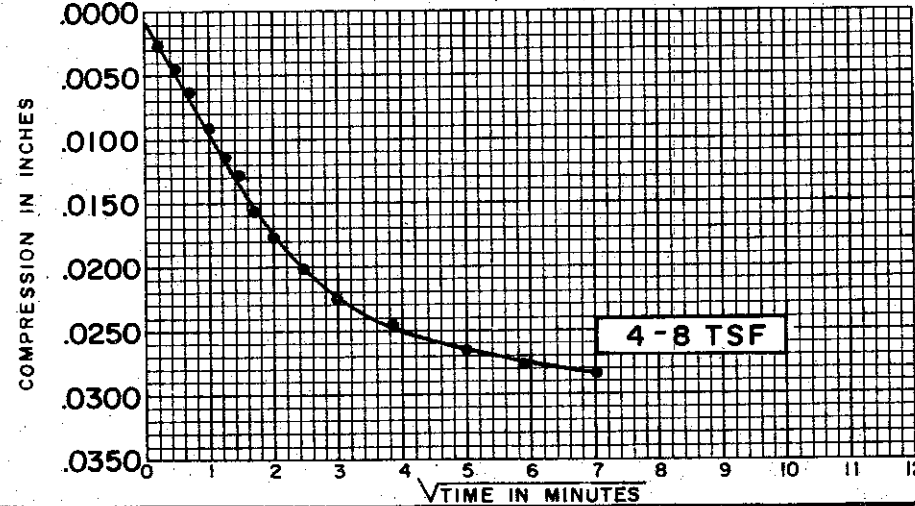
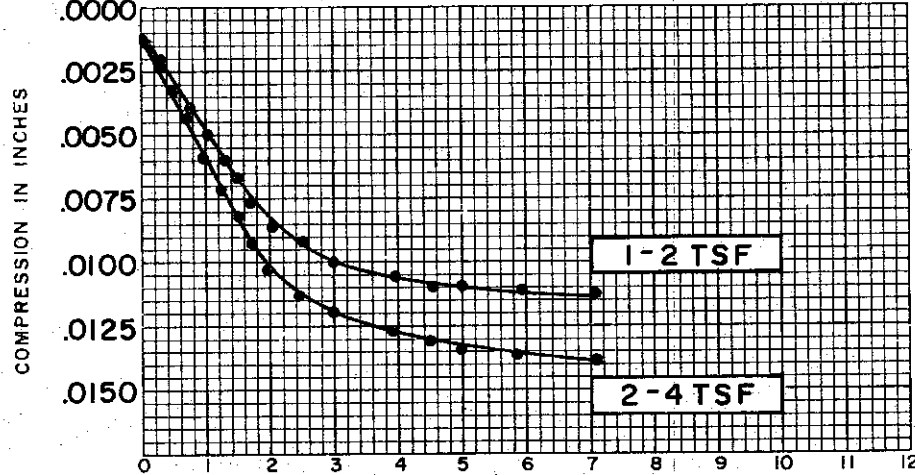
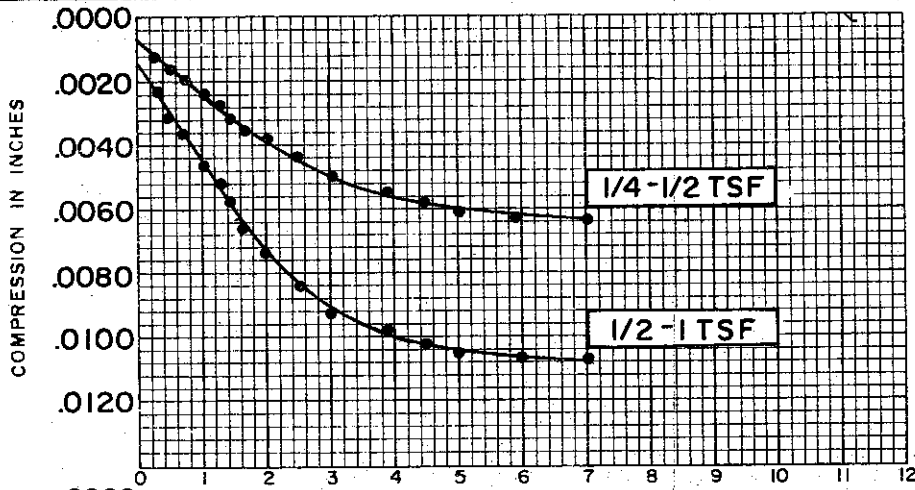
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C313.1  
 SAMPLE NO. 24 DATE APRIL 74  
 DEPTH 104.2' TO 104.5'



SOIL PROPERTIES		BORING NO.	27
SOIL DESCRIPTION:	SILTY CLAY; SANDY (CL)	SAMPLE NO.	24
SPECIFIC GRAVITY	2.74	DEPTH	104.2' TO 104.5'
INITIAL WATER CONTENT	33.9%		
FINAL WATER CONTENT	30.0%		
TEST DATA			
INITIAL SAMPLE HEIGHT	0.75"		
INITIAL SAMPLE DIAMETER	2.50"		
INITIAL VOID RATIO	0.910		
		CONSOLIDATION TEST	
		TIME VS. COMPRESSION CURVE:	
		THE DETROIT EDISON COMPANY	
		BELLE RIVER PLANT UNITS I & II	
		FILE 1255	

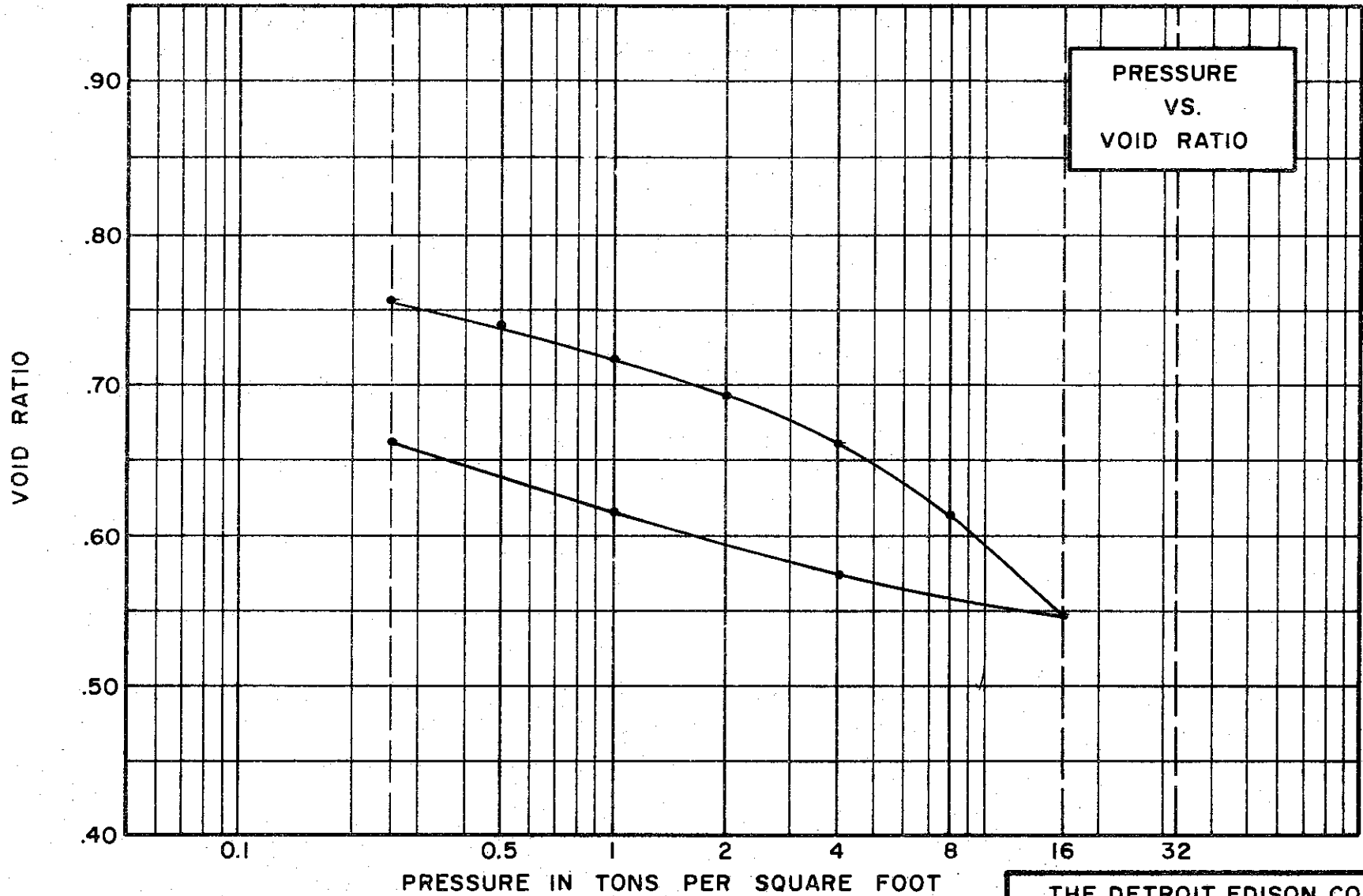
C-459



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY	2.74
INITIAL WATER CONTENT	33.9%
FINAL WATER CONTENT	30.0%
BORING NO.	27
SAMPLE NO.	24
DEPTH	104.2' TO 104.5'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.910

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 29.0% FINAL 28.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

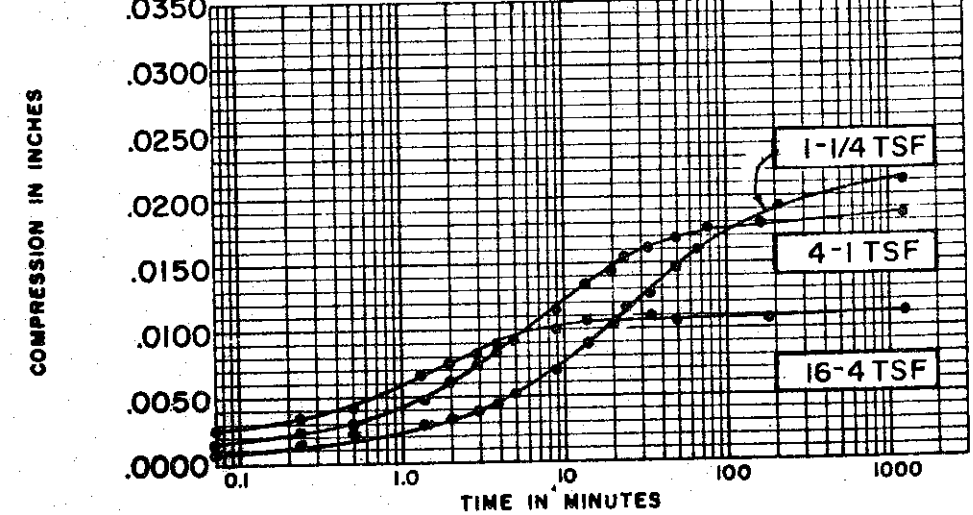
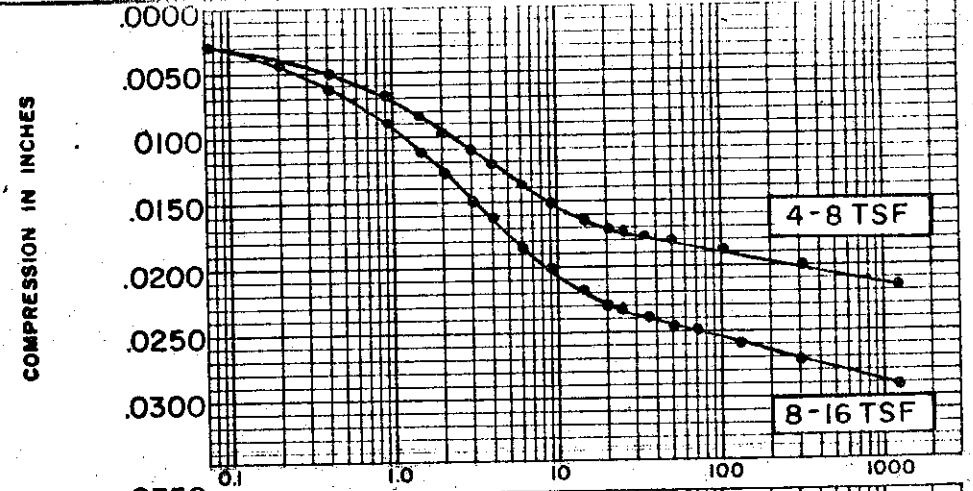
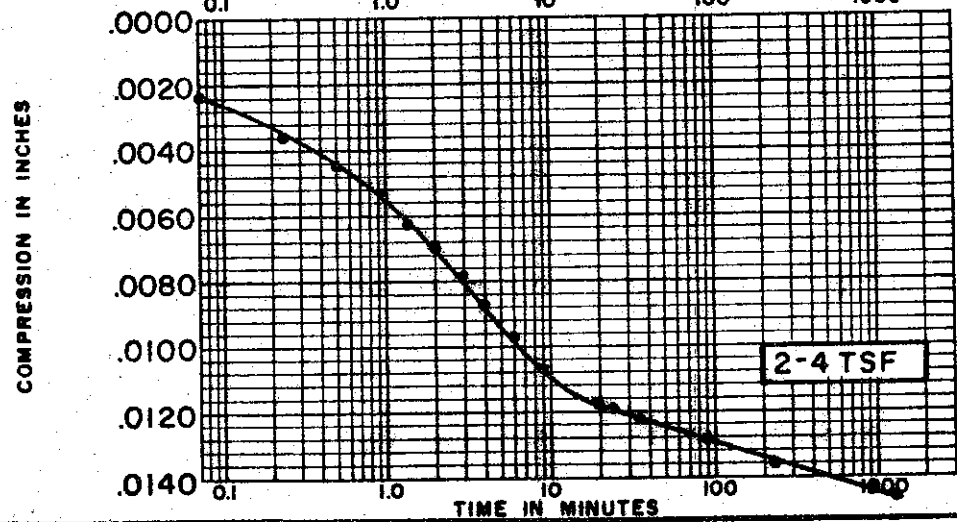
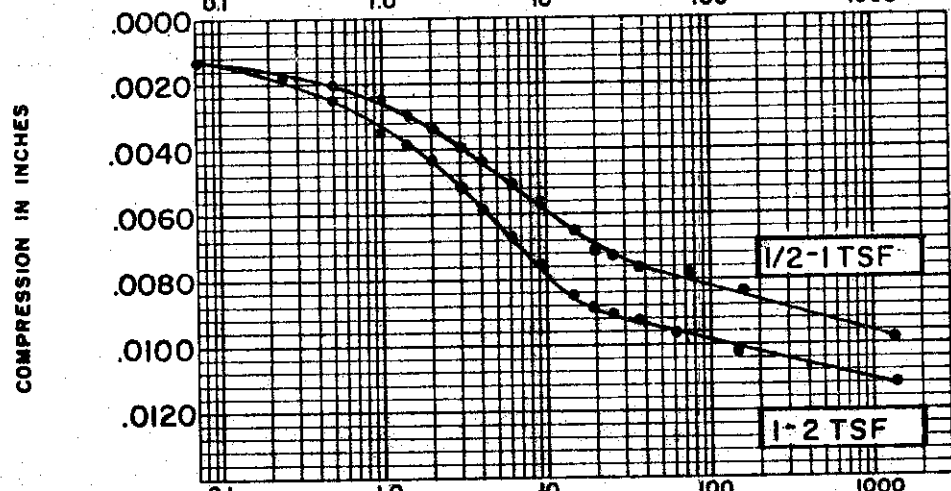
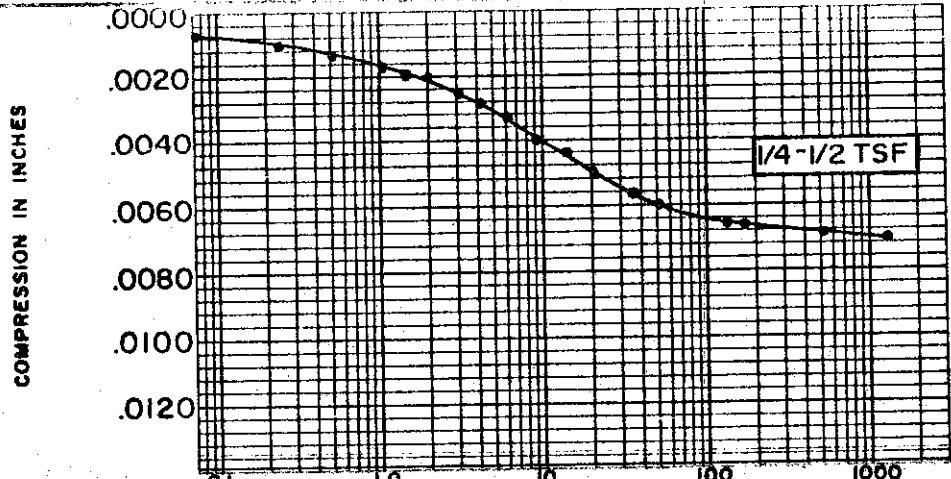
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C18.1  
 SAMPLE NO. 4 DATE JAN. 1974  
 DEPTH 14.6' TO 14.7'

T94-C-461



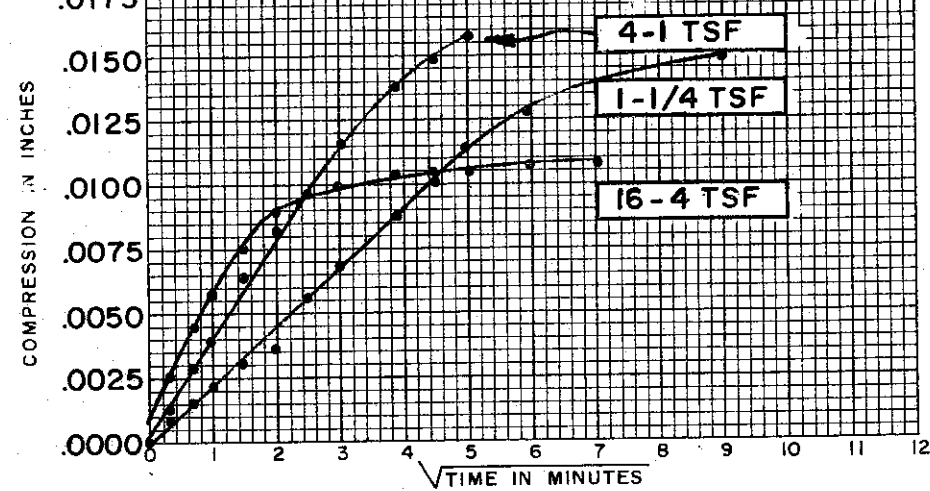
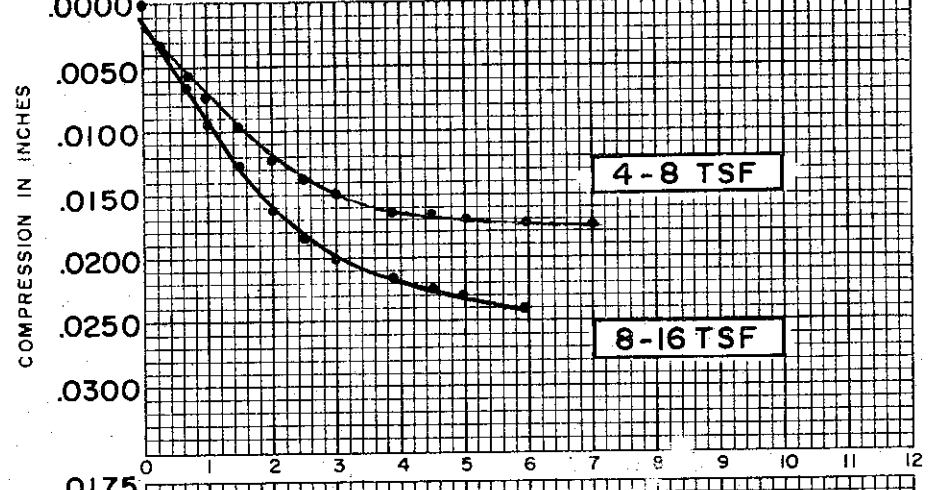
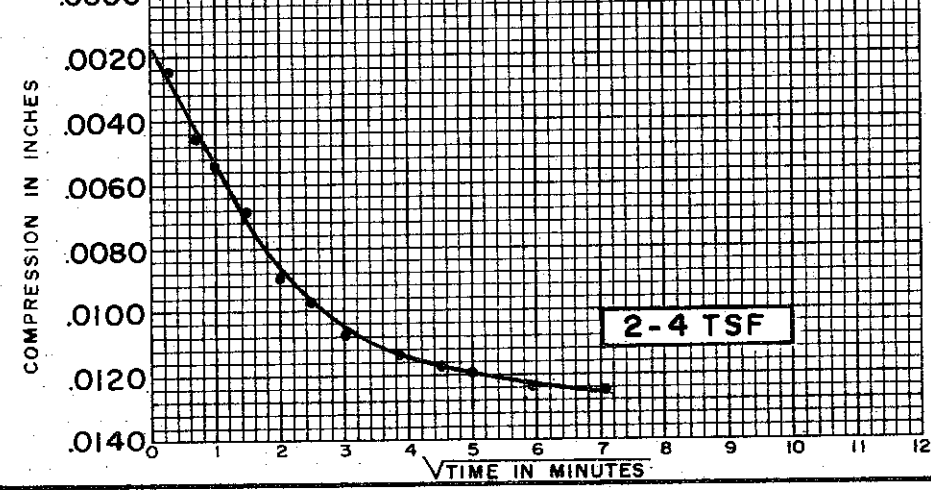
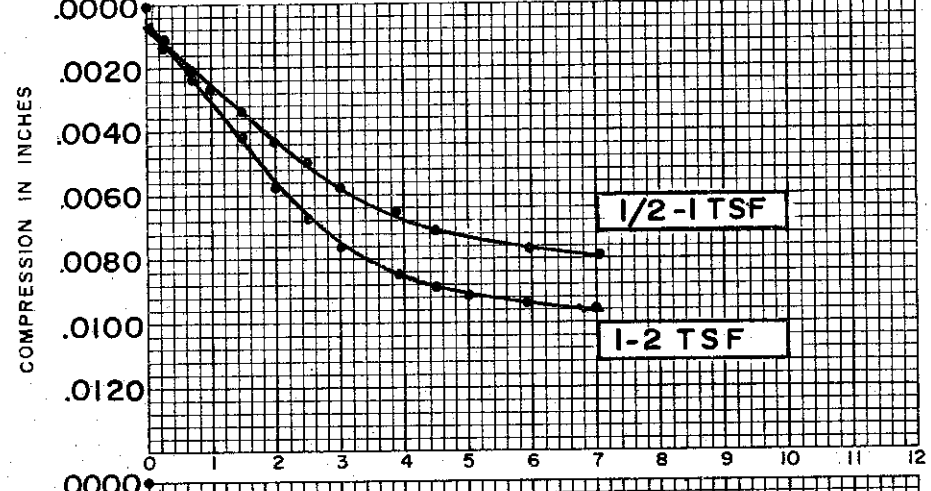
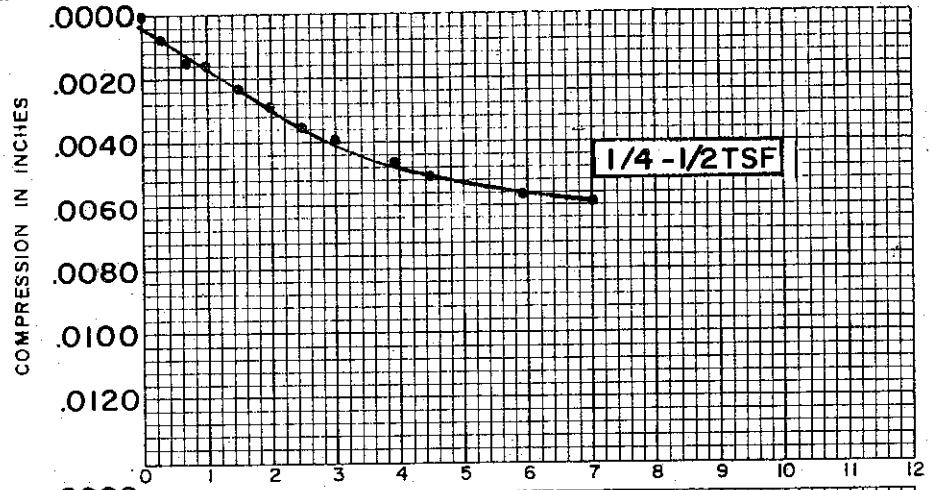
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 29.0%  
 FINAL WATER CONTENT 28.0%

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' TO 14.7'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.800"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVE**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-463



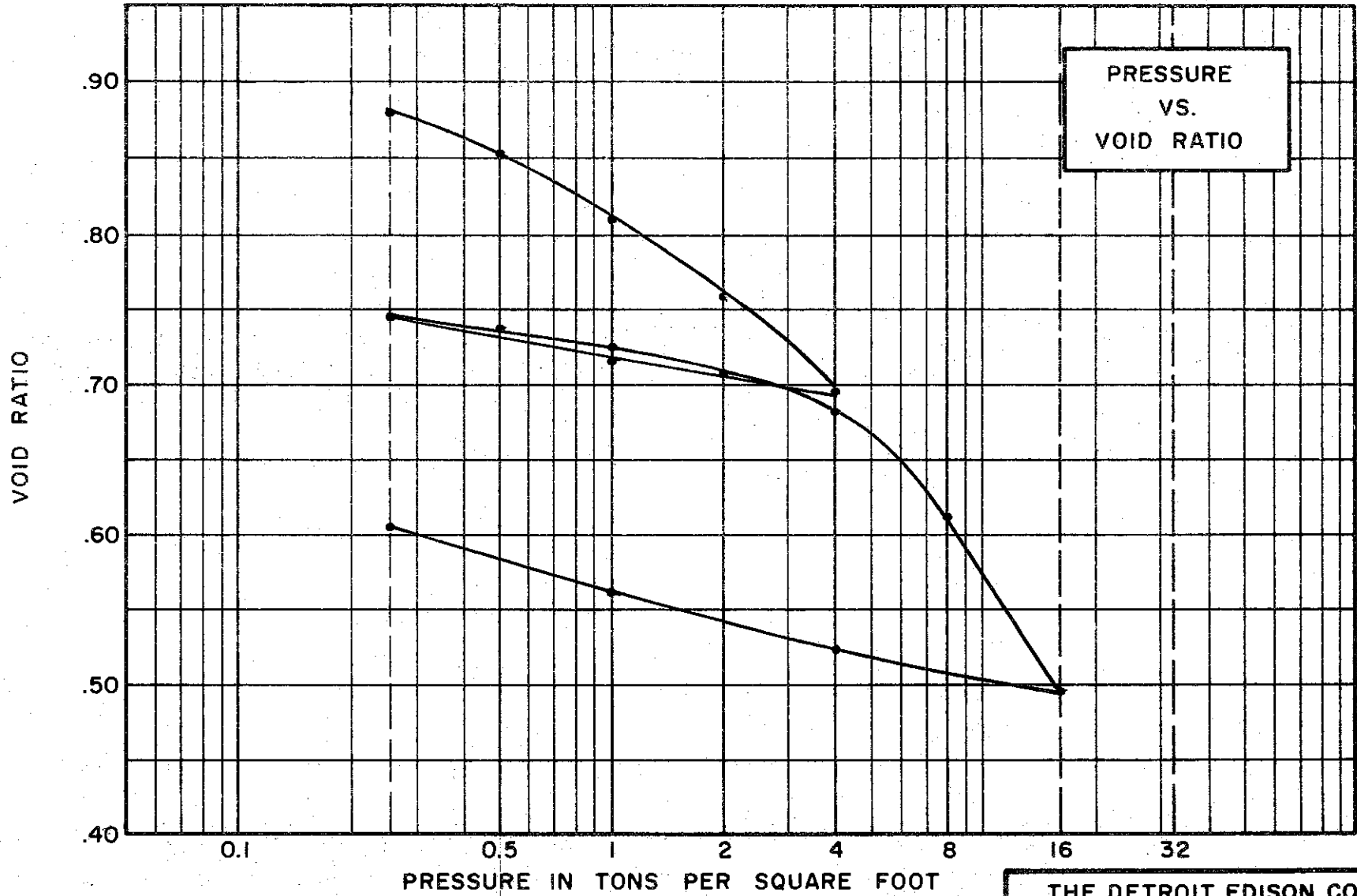
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	29.0 %
FINAL WATER CONTENT	28.0 %
BORING NO.	38
SAMPLE NO.	4
DEPTH	14.6' TO 14.7'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.770

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 36.0% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55% PLASTIC LIMIT 24%

**TEST DATA**

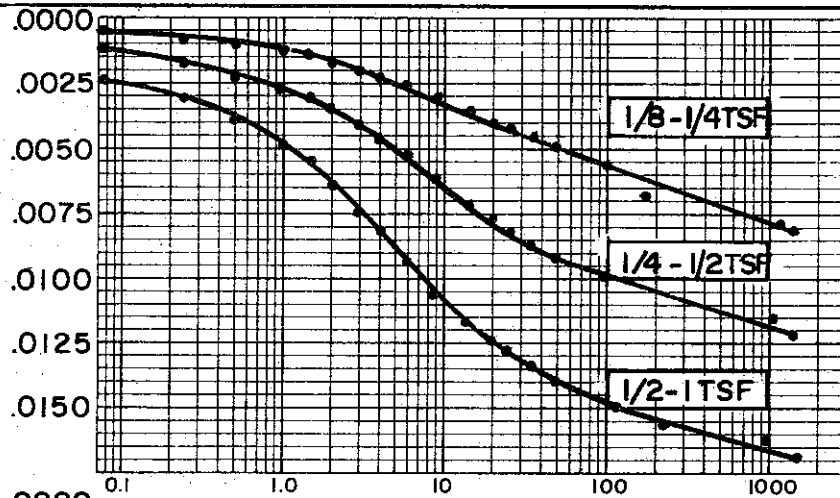
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

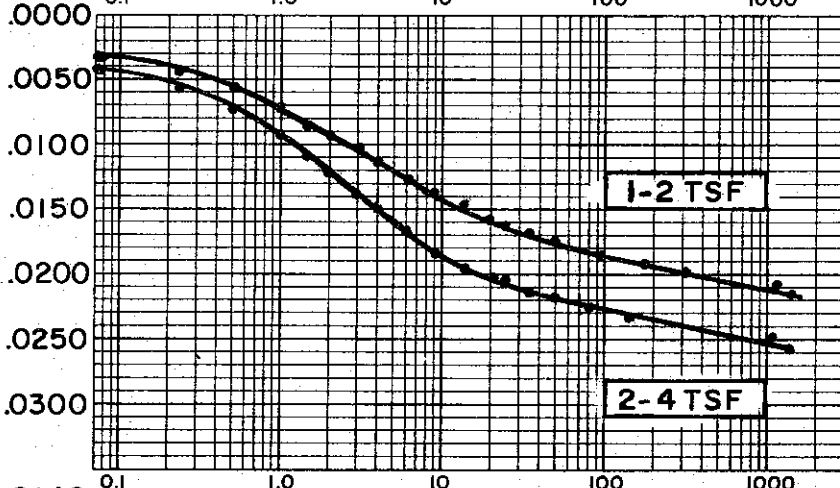
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C24.1  
 SAMPLE NO. 16 DATE JAN. 1974  
 DEPTH 74.0' TO 74.1'

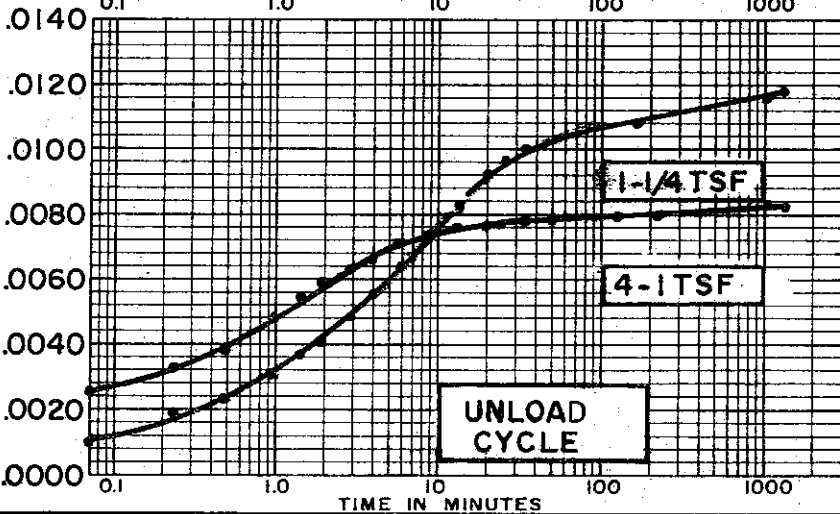
COMPRESSION IN INCHES



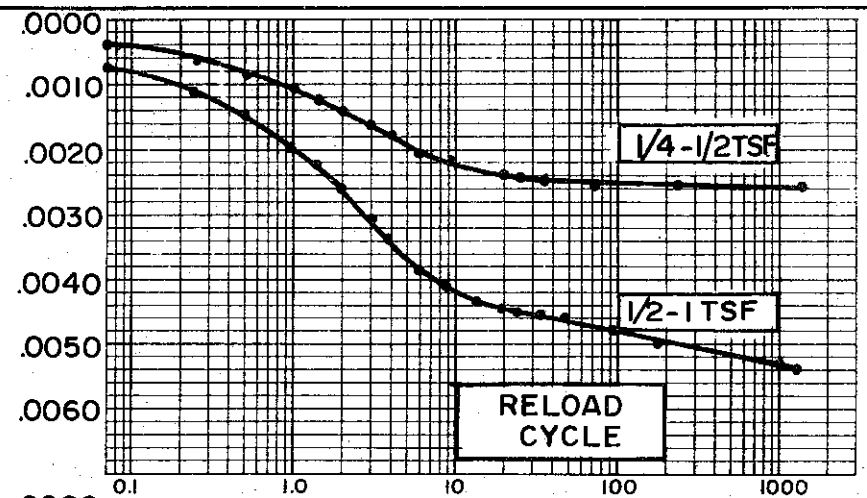
COMPRESSION IN INCHES



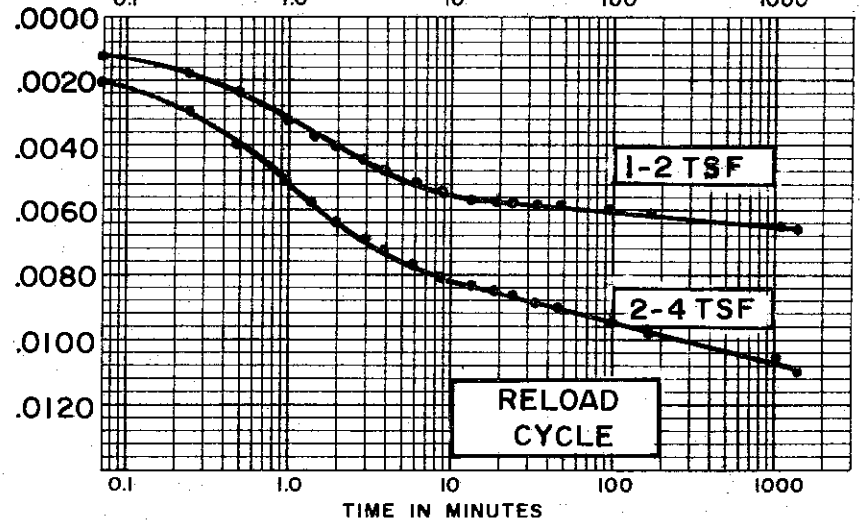
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 36.0%  
 FINAL WATER CONTENT 27.0%

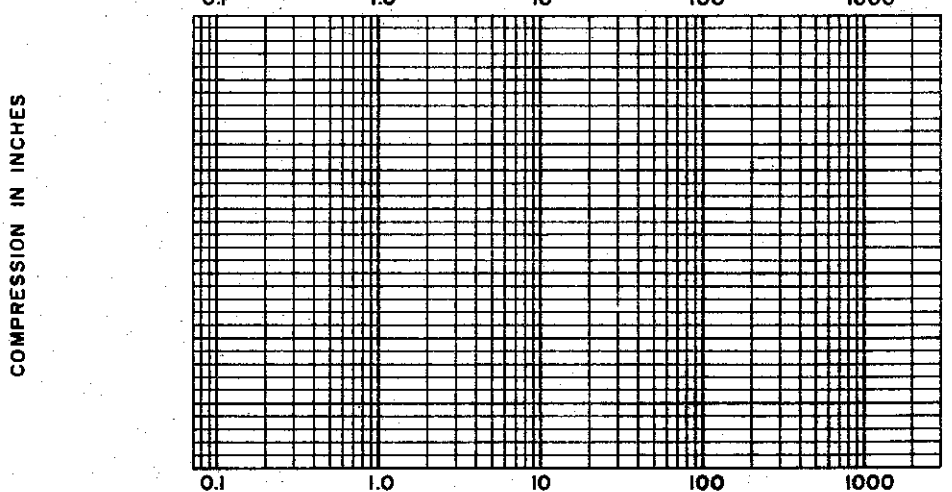
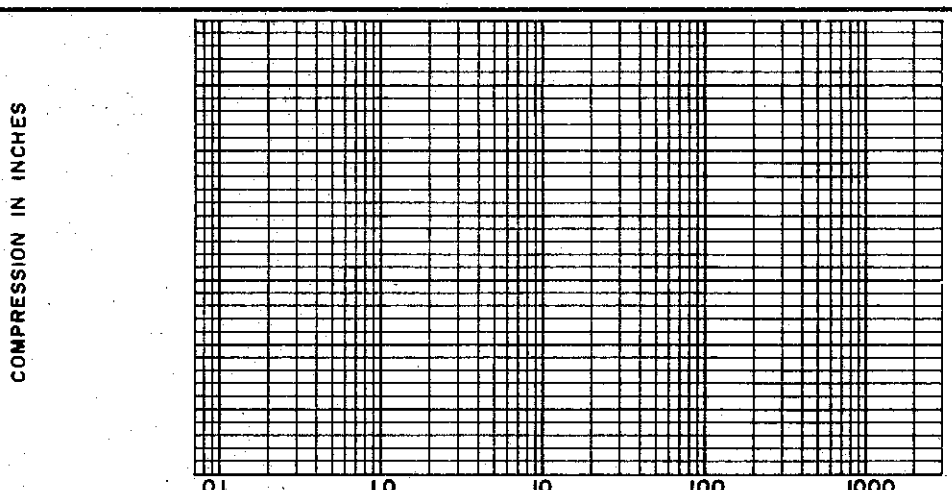
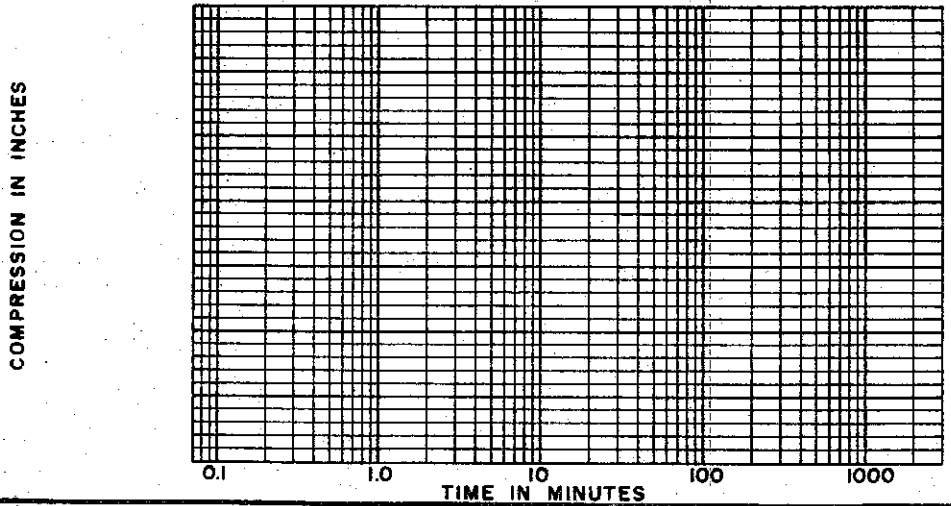
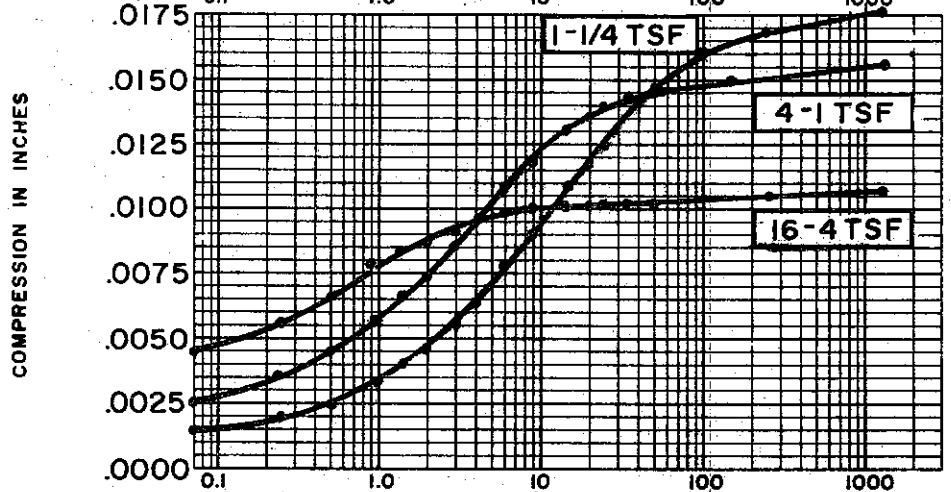
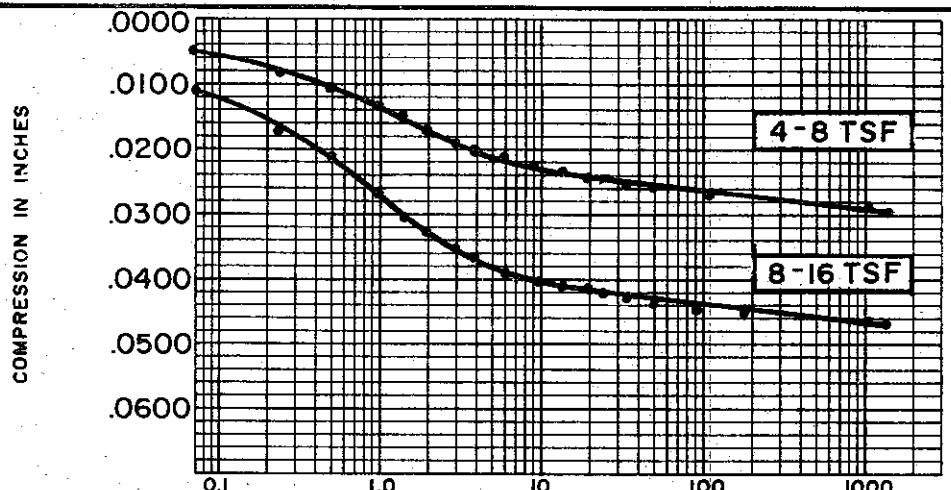
BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' TO 74.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

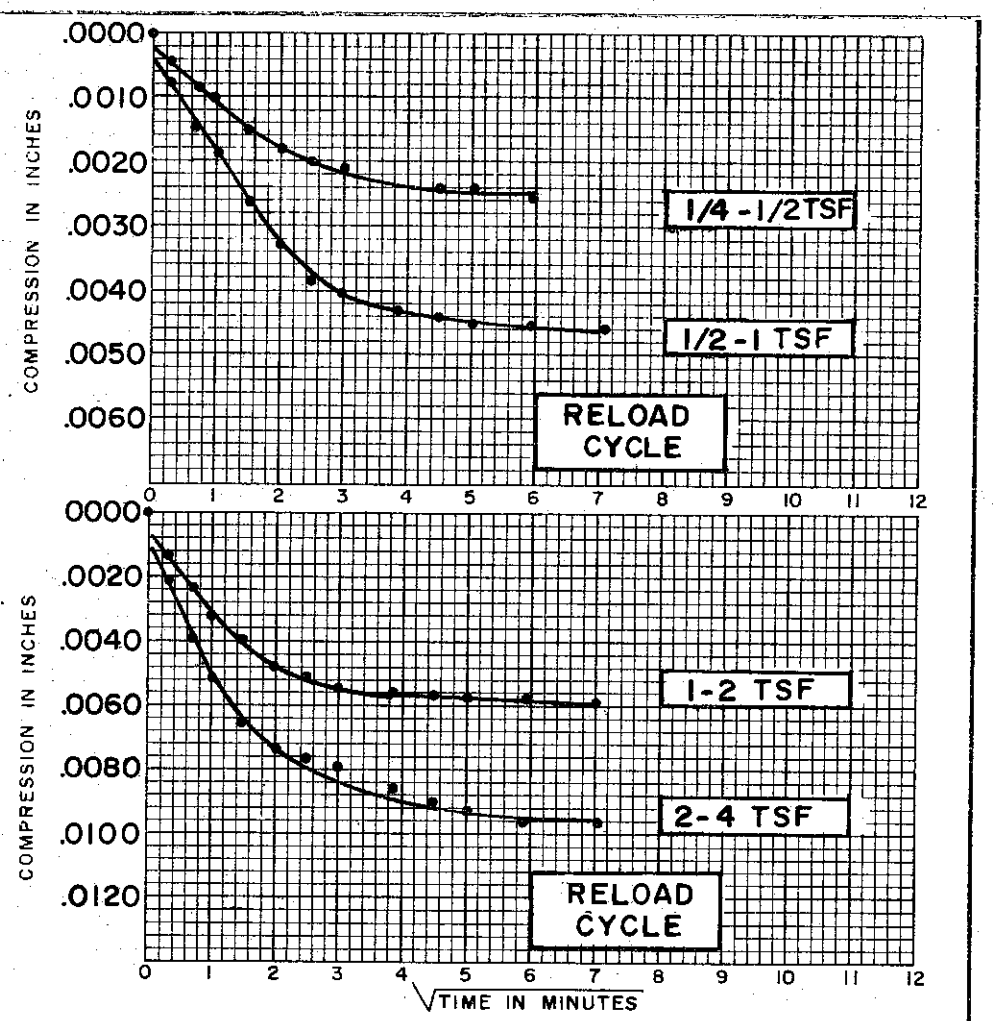
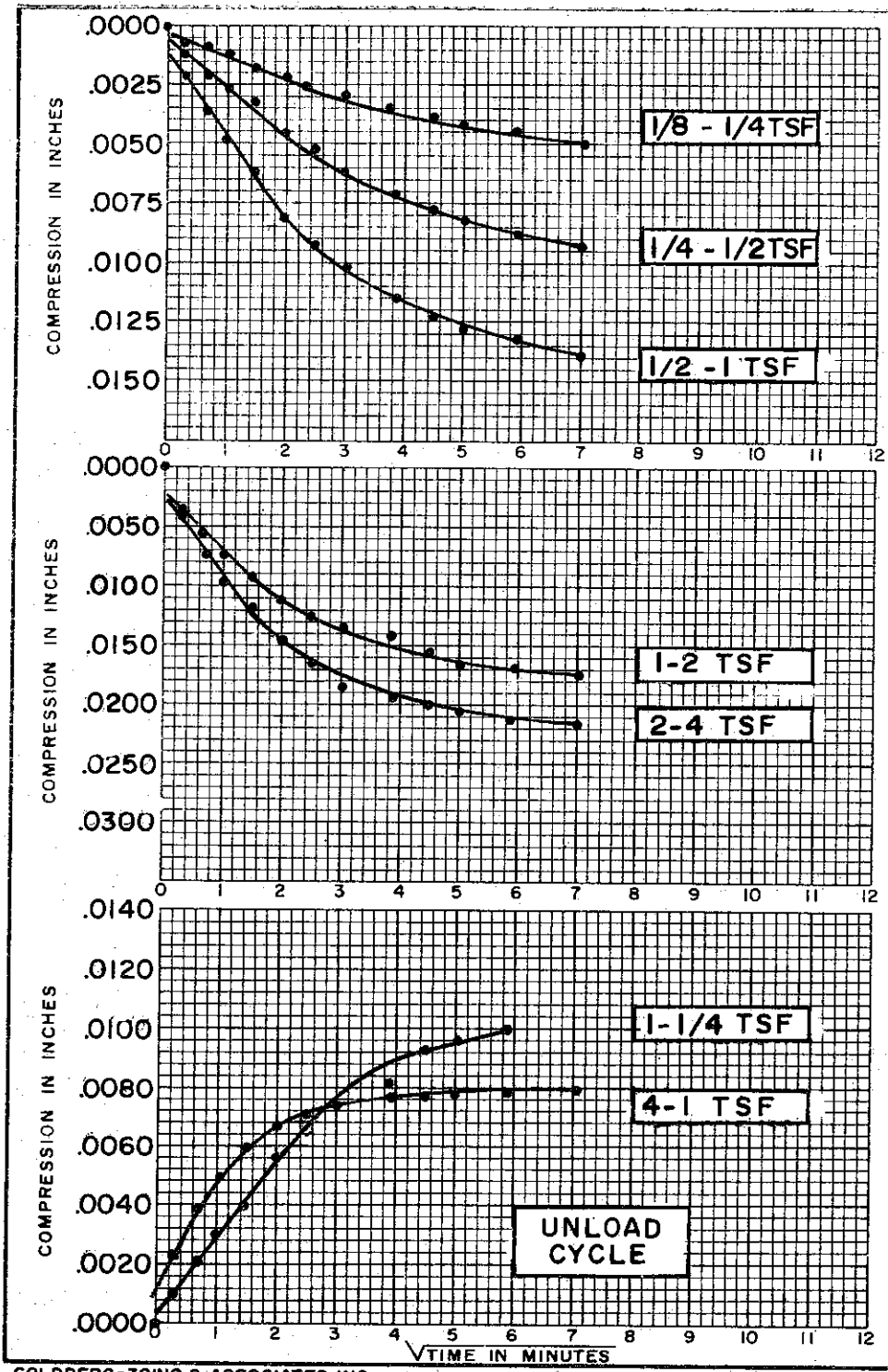


TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	36.0%
FINAL WATER CONTENT	27.7%
BORING NO.	38
SAMPLE NO.	16
DEPTH	74.0 TO 74.1

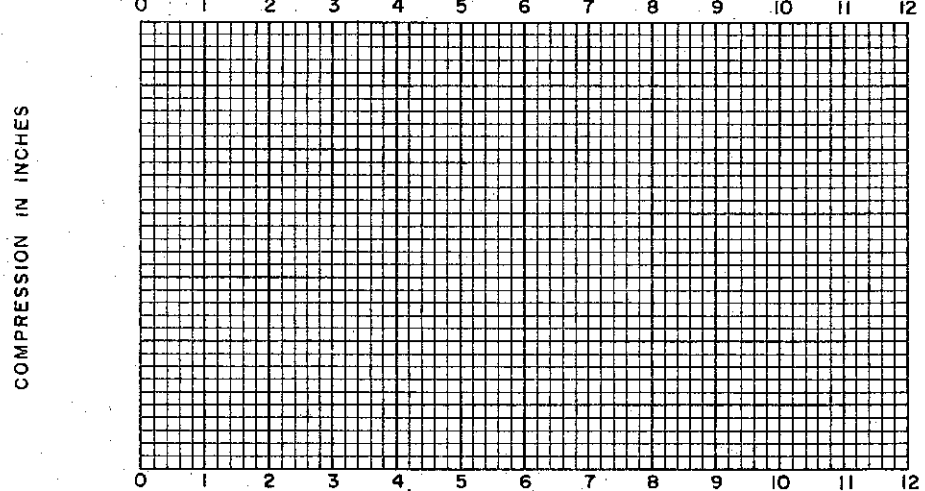
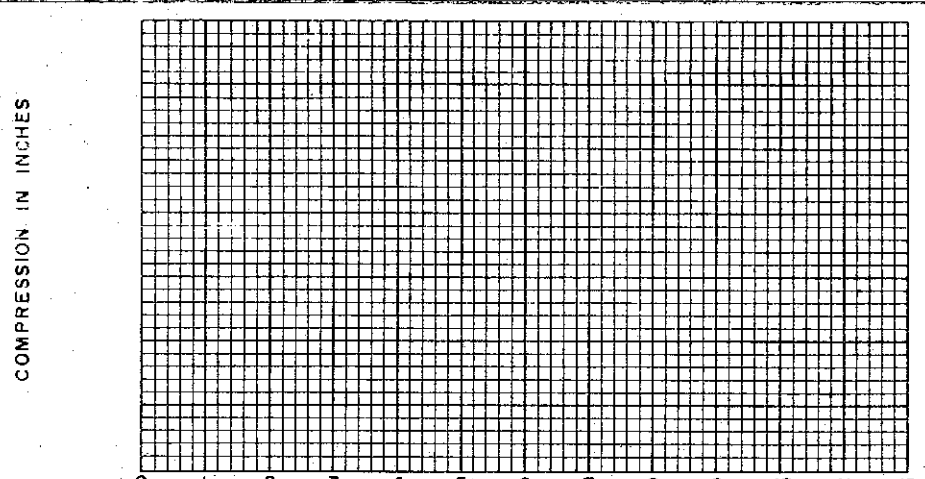
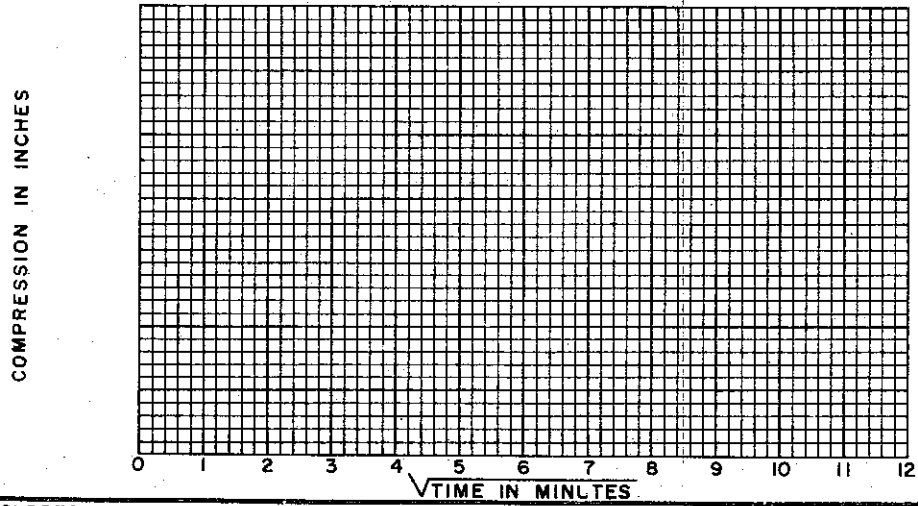
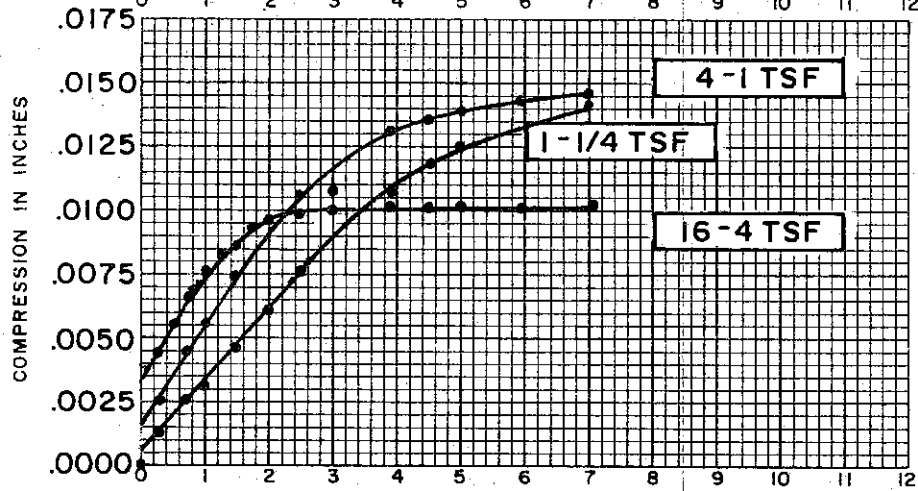
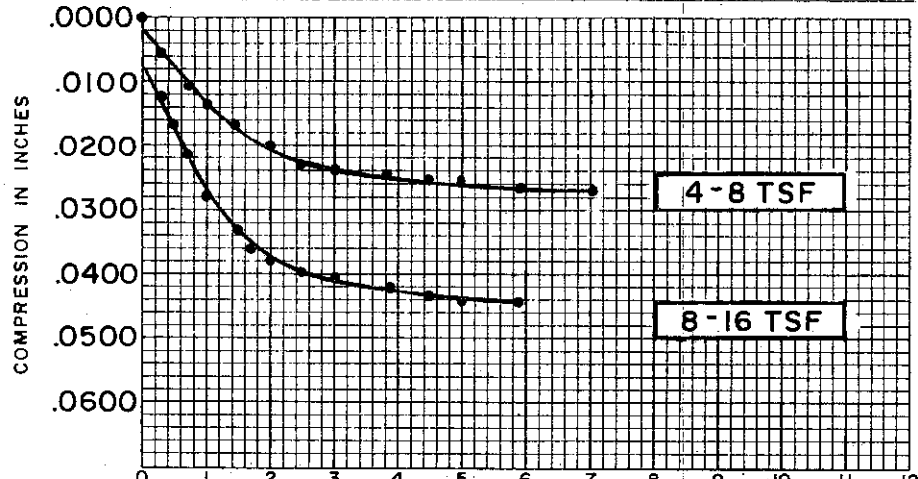
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.935

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	SILTY CLAY (CH)	SAMPLE NO. <u>16</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>74.0' TO 74.1'</u>
INITIAL WATER CONTENT	<u>36.0%</u>	
FINAL WATER CONTENT	<u>27.7%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.935</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY		
BELLE RIVER PLANT UNITS I & II		

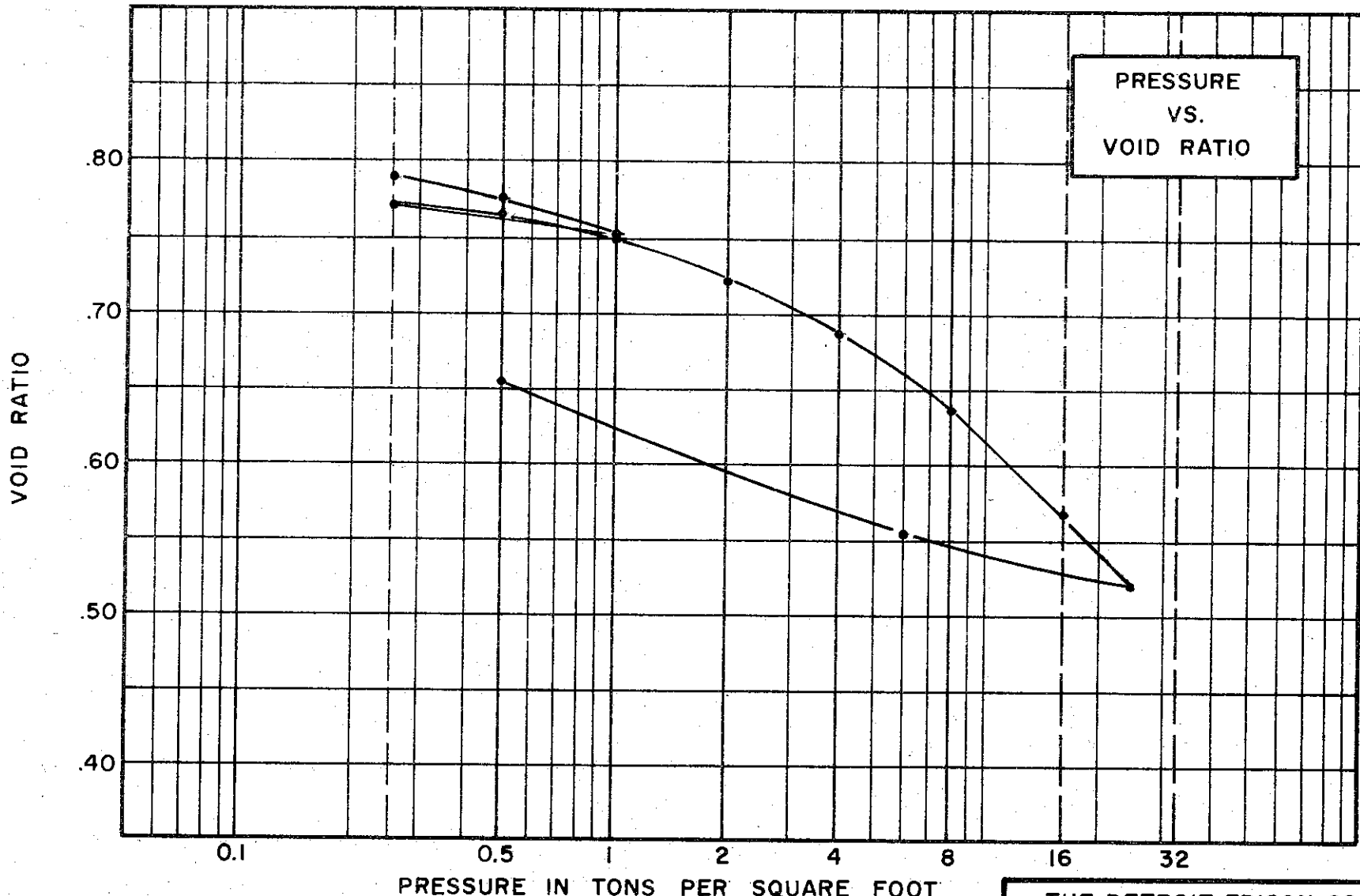
C-467



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	36.0%
FINAL WATER CONTENT	27.7%
BORING NO.	38
SAMPLE NO.	16
DEPTH	74.0 TO 74.1

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.935

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
SPECIFIC GRAVITY 2.72  
WATER CONTENT, INITIAL 29.5% FINAL 27.7%  
ATTERBERG LIMITS:  
LIQUID LIMIT 46% PLASTIC LIMIT 23%

**TEST DATA**

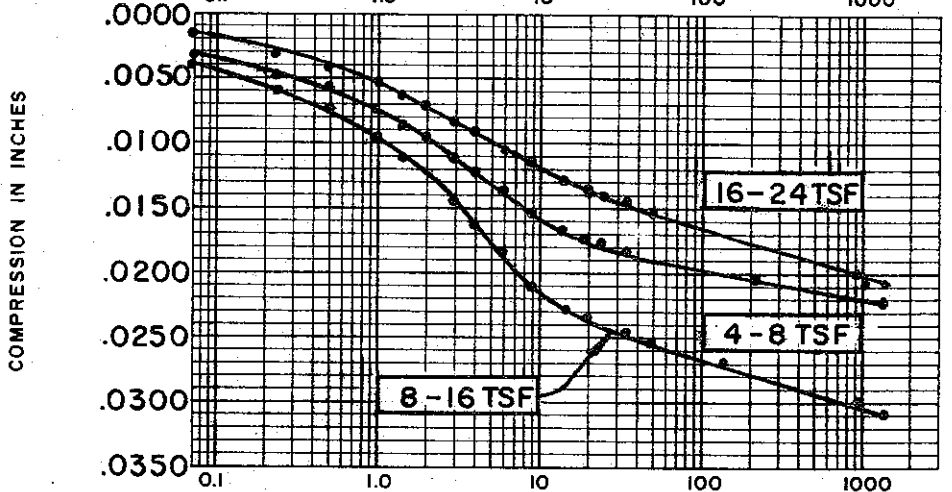
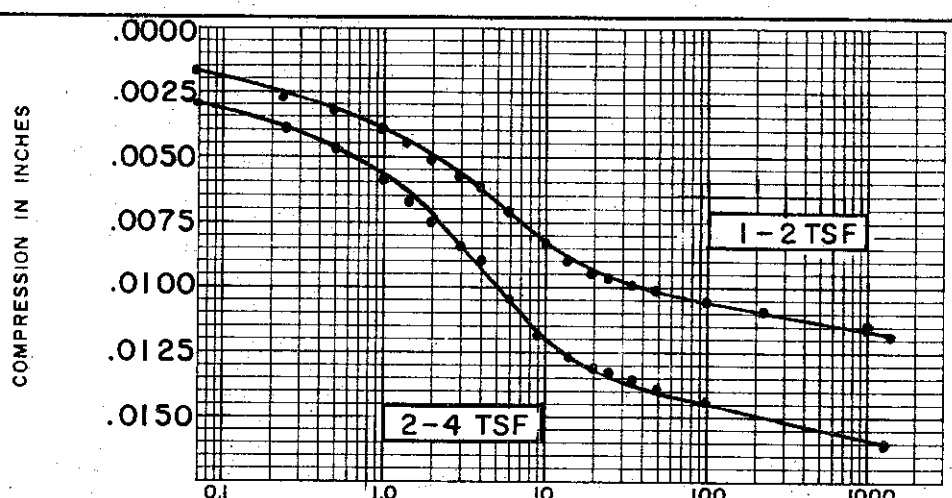
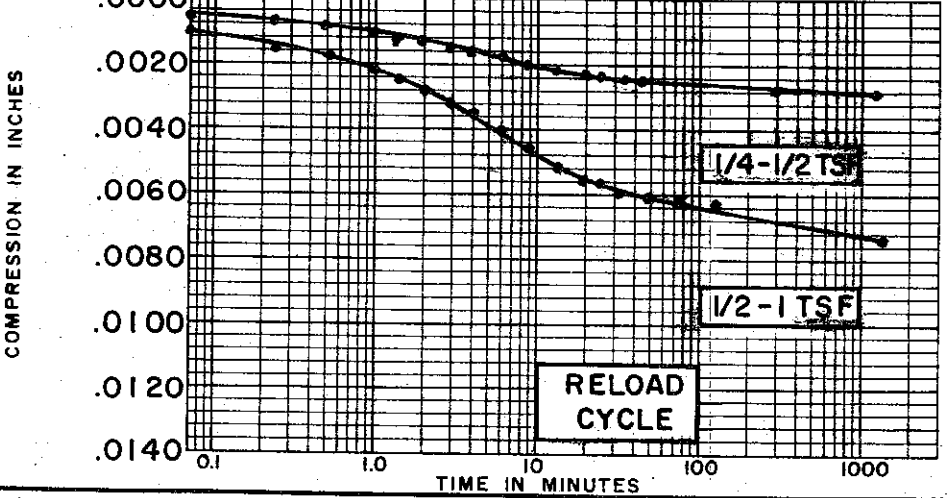
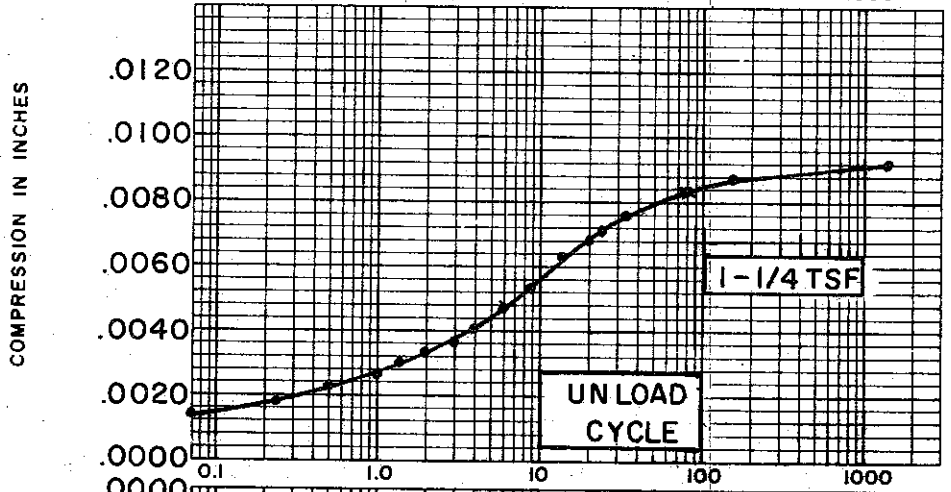
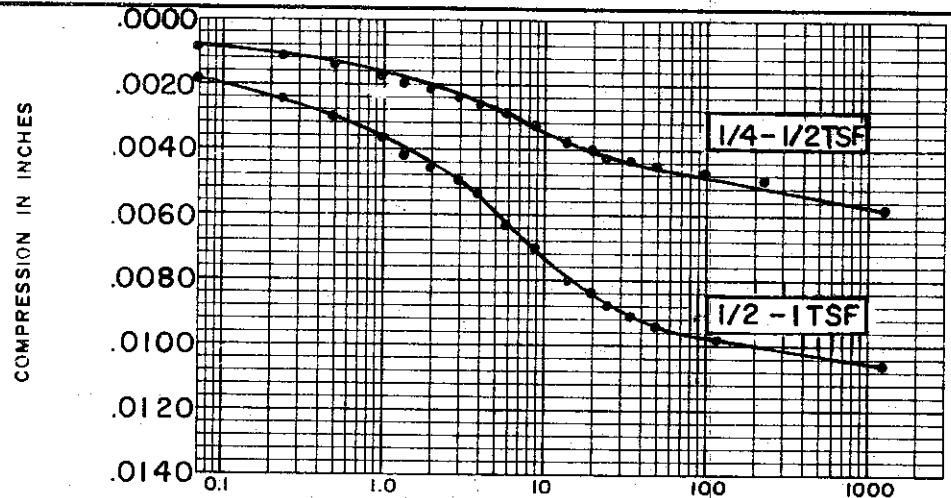
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.799

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C29.1  
SAMPLE NO. 5 DATE JAN 74  
DEPTH 10.8'

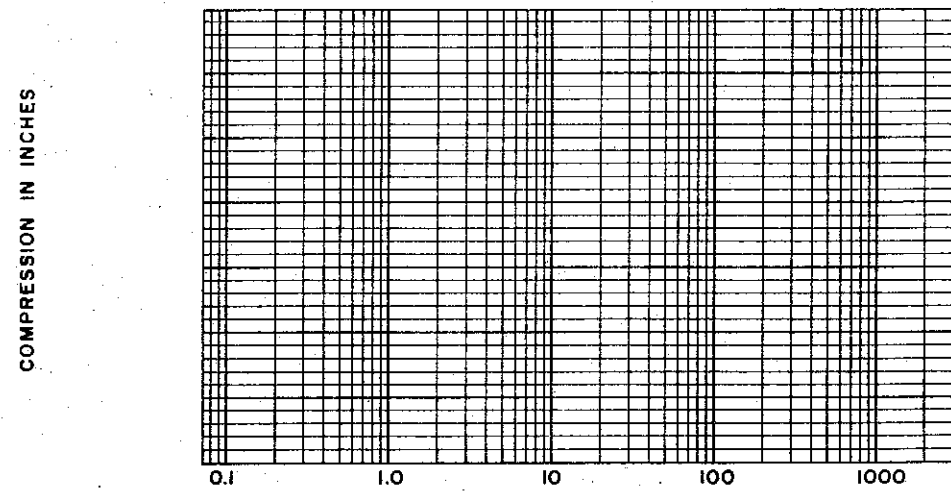
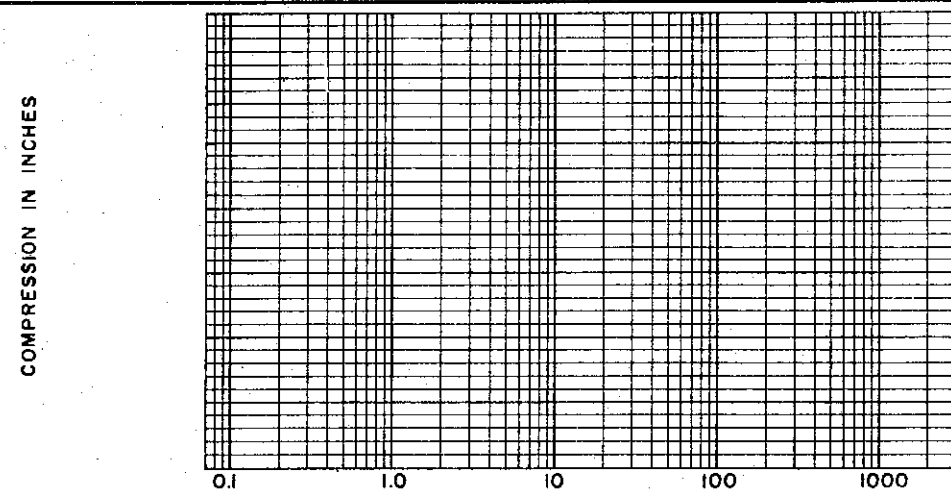
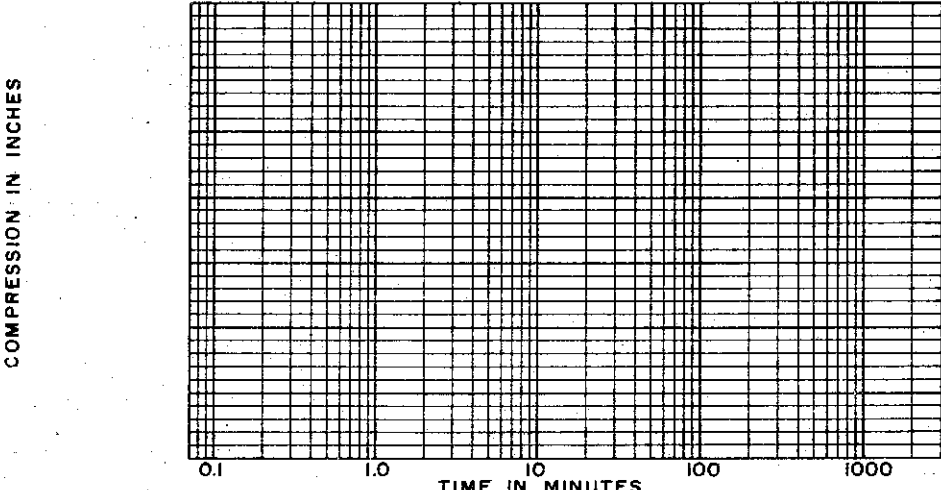
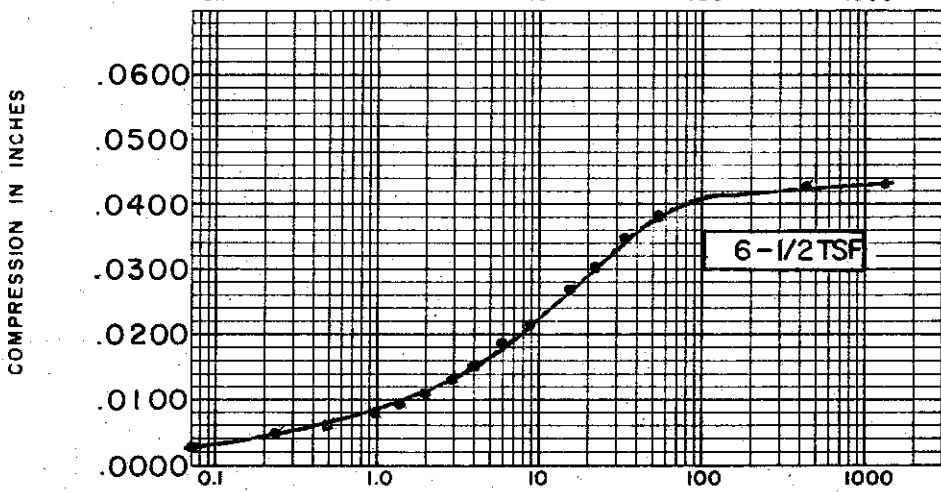
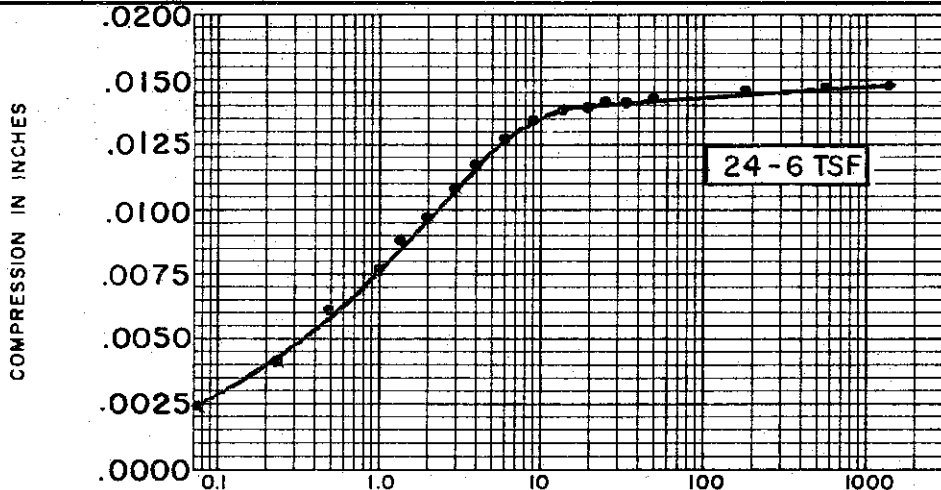
C-469



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	23.5 %
FINAL WATER CONTENT	27.7 %
BORING NO.	41
SAMPLE NO.	5
DEPTH	10.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.799

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	29.5 %
FINAL WATER CONTENT	27.7 %
BORING NO.	41
SAMPLE NO.	5
DEPTH	10.6'

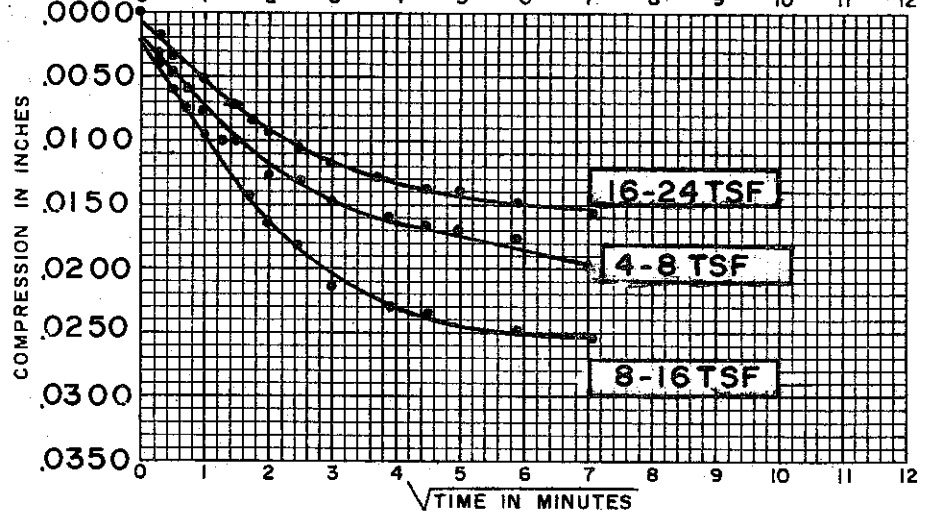
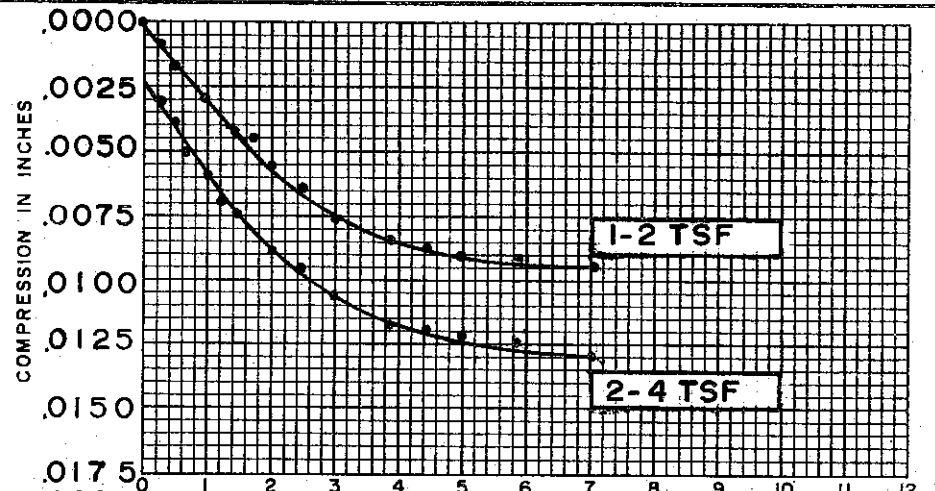
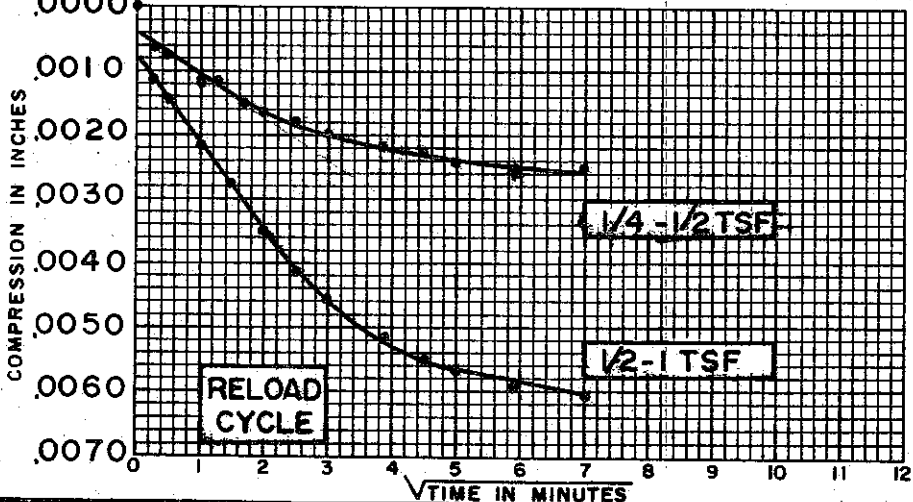
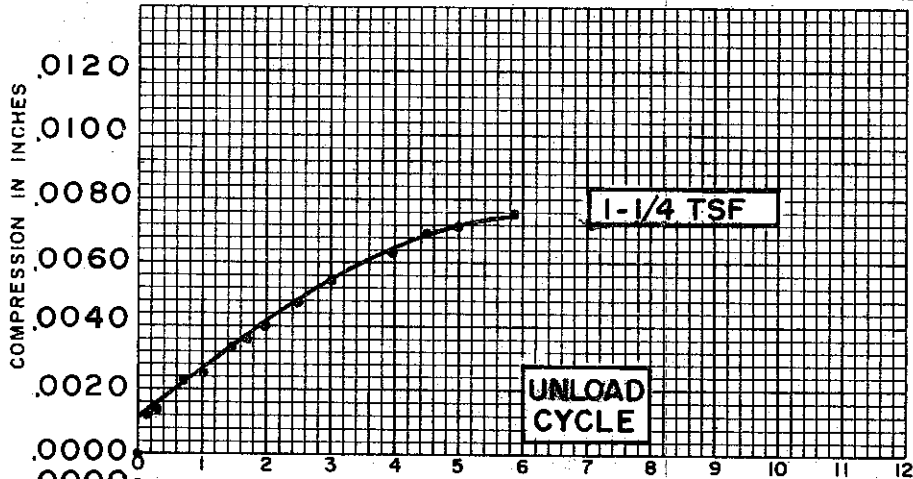
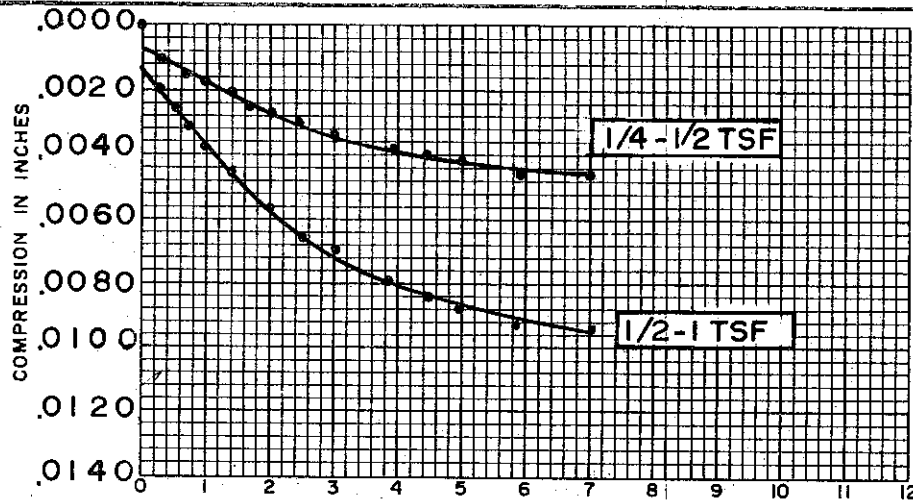
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.799

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.72  
INITIAL WATER CONTENT 29.5%  
FINAL WATER CONTENT 27.7%

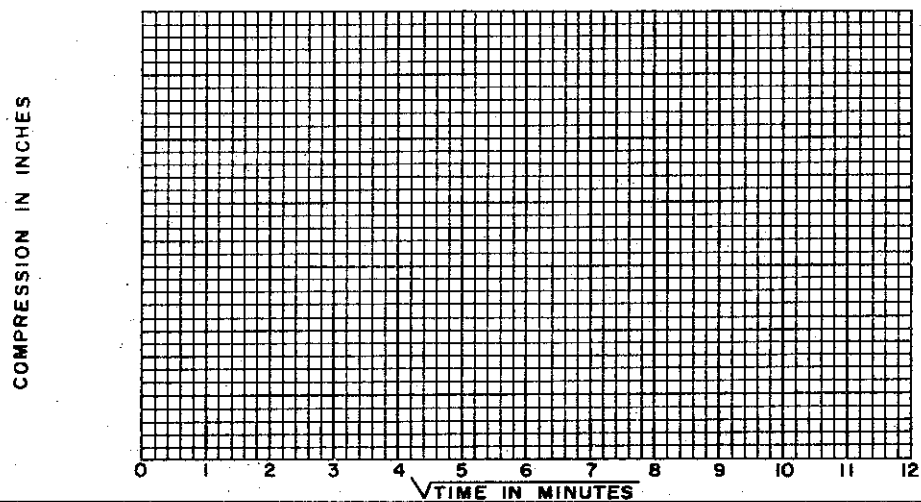
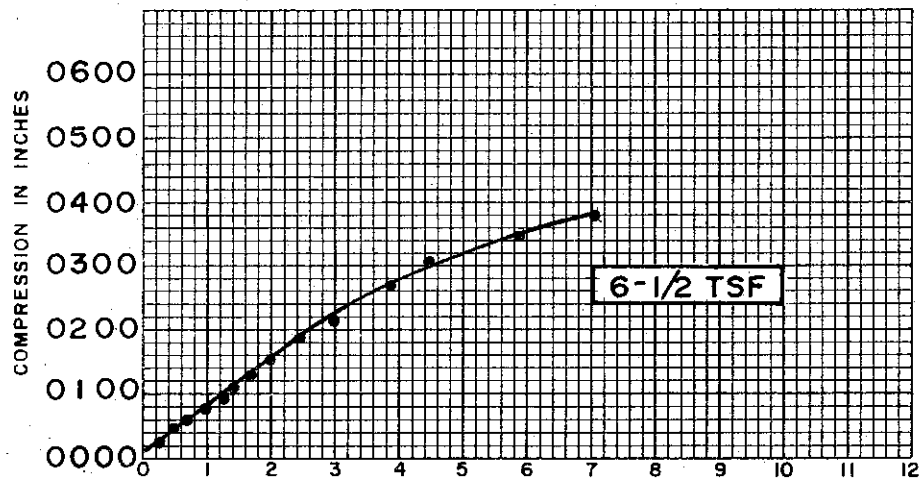
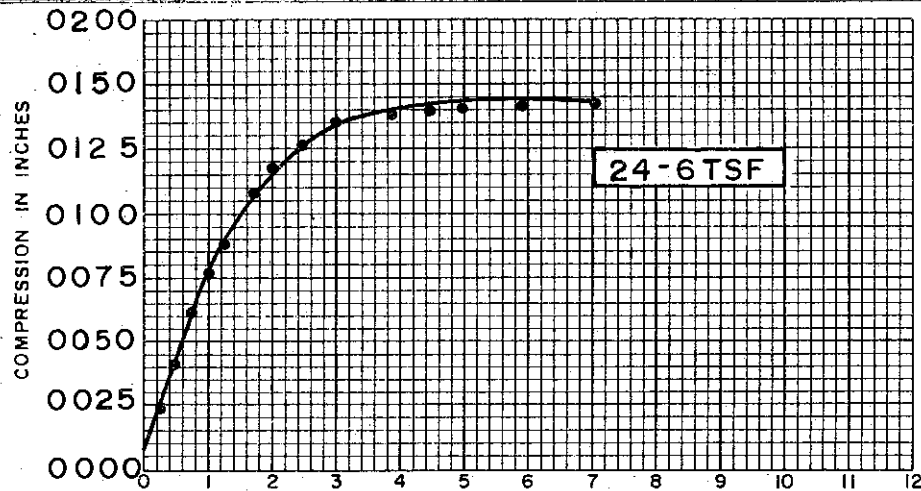
BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.789

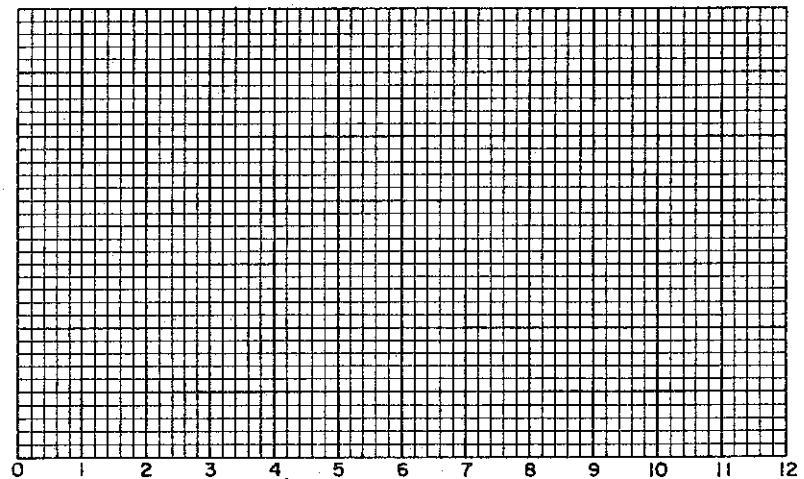
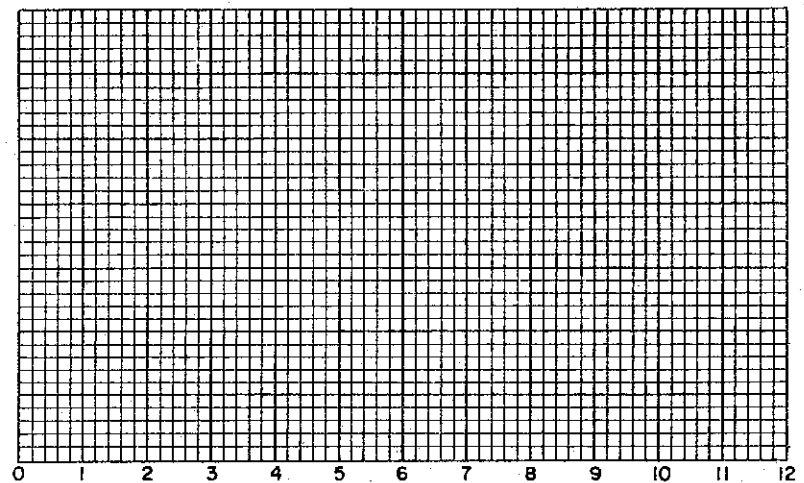
**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5 %  
 FINAL WATER CONTENT 27.7 %

BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.8'

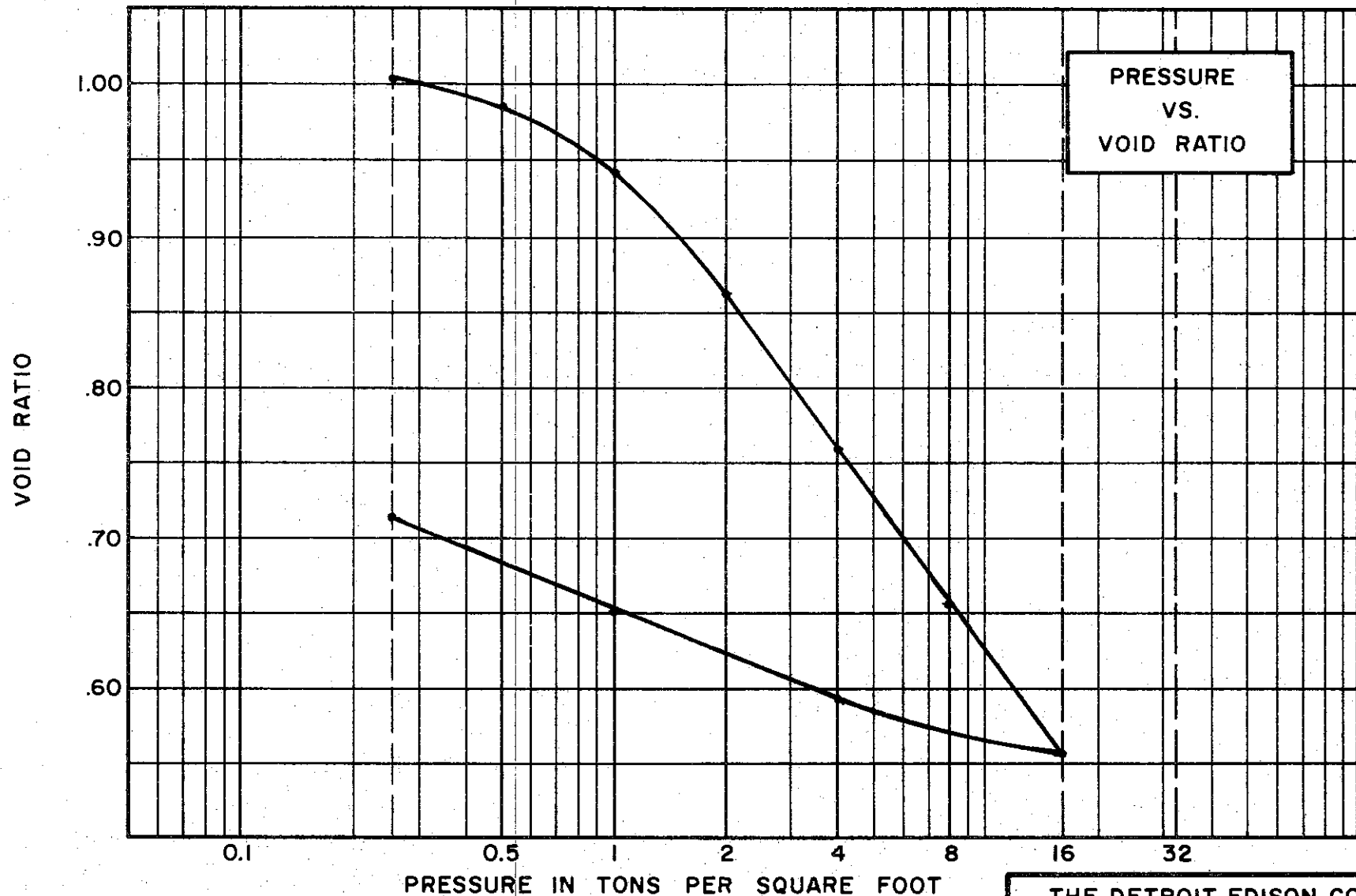
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .799

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
SPECIFIC GRAVITY 2.70  
WATER CONTENT, INITIAL 38.1% FINAL 30.1%  
ATTERBERG LIMITS:  
LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

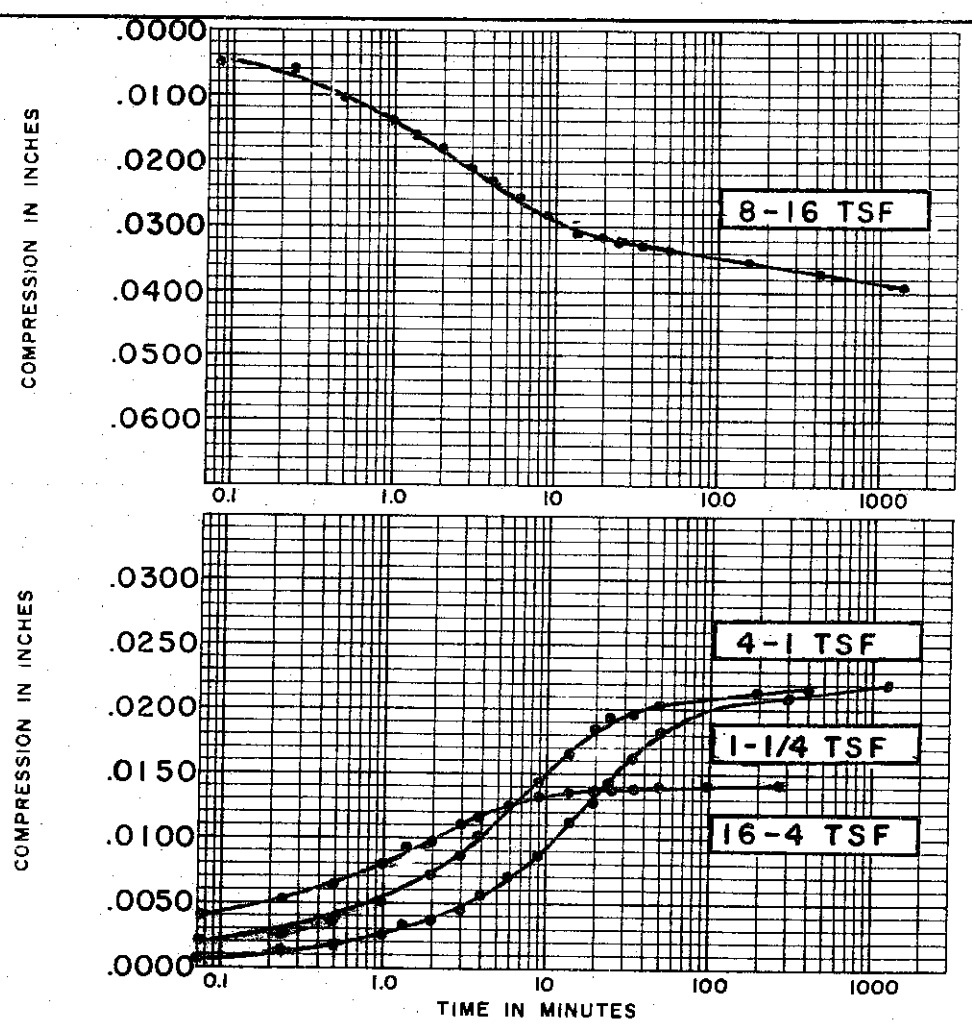
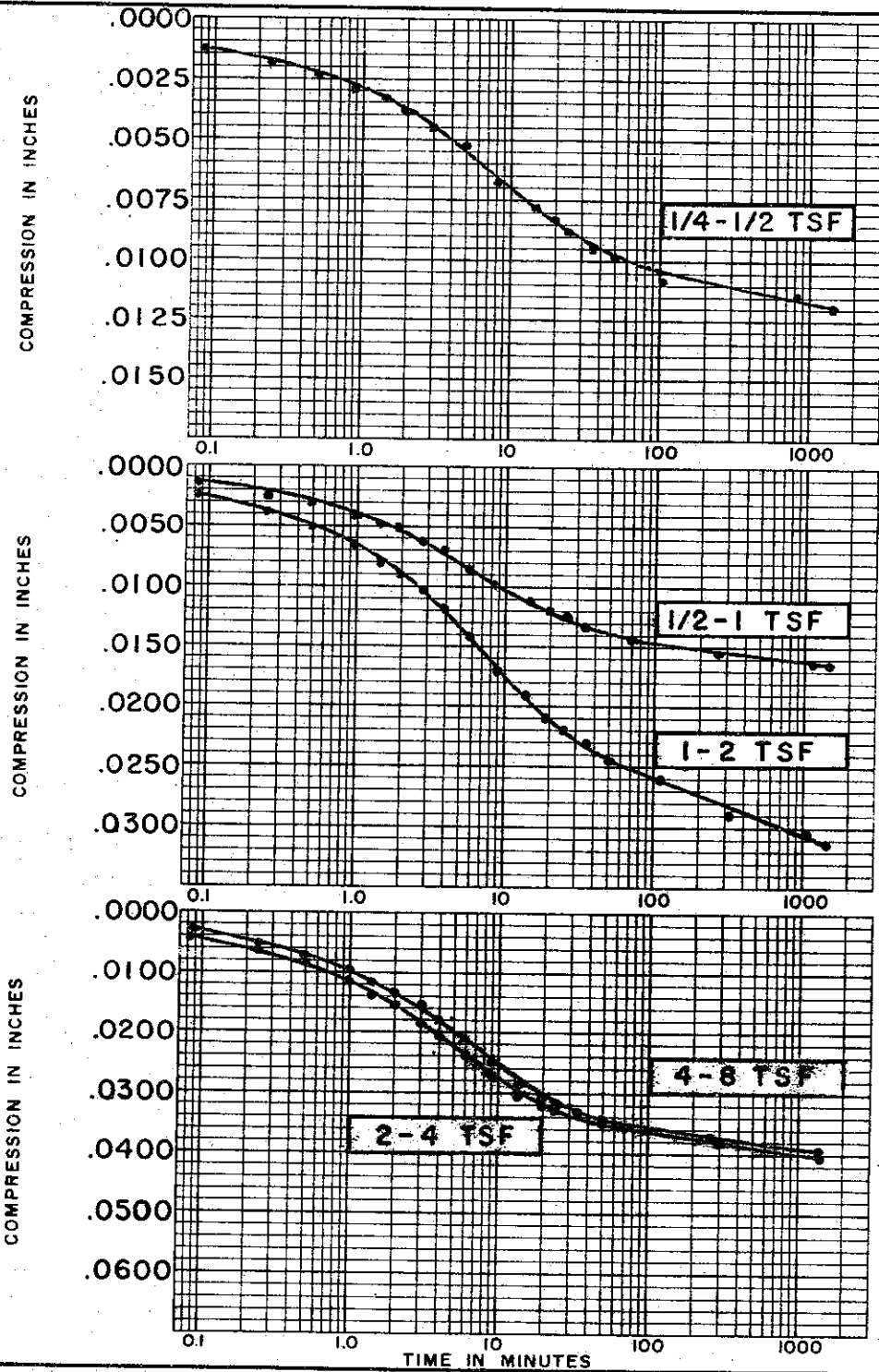
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.055

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C 30.1  
SAMPLE NO. 7 DATE FEB 74  
DEPTH 21.0' TO 21.1'

C-475



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

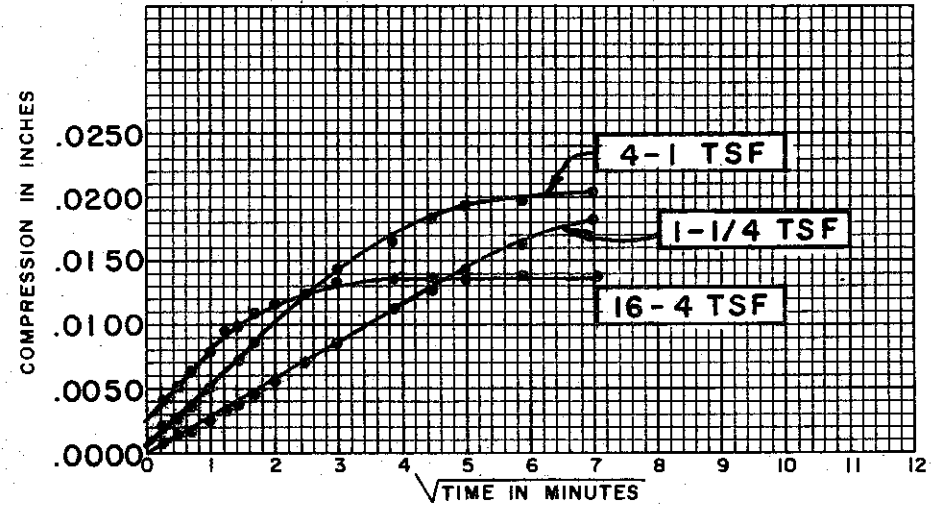
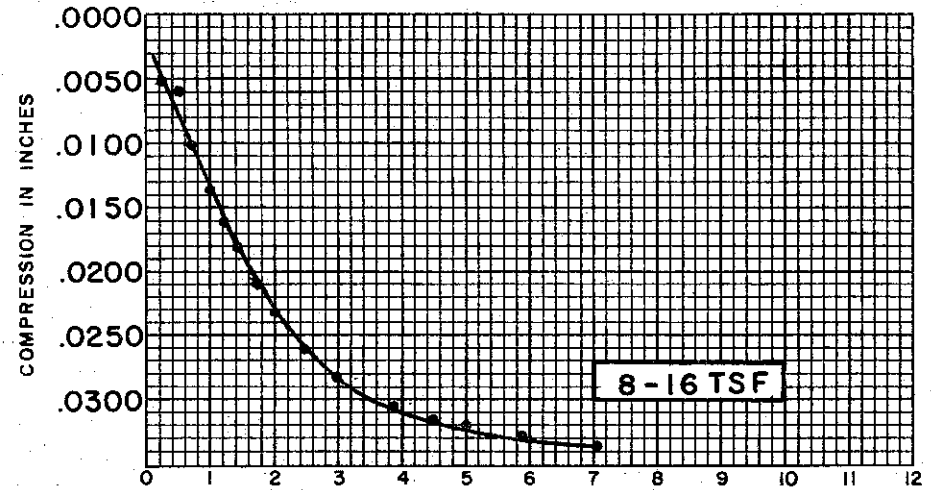
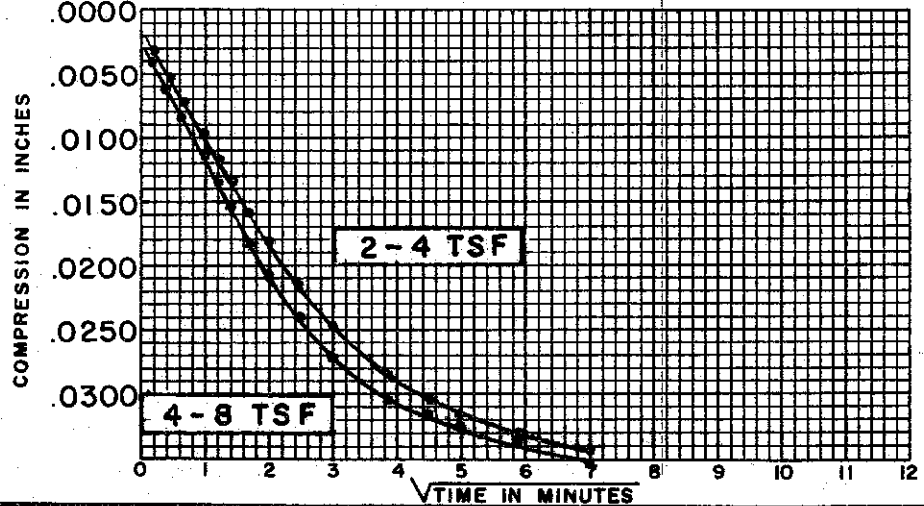
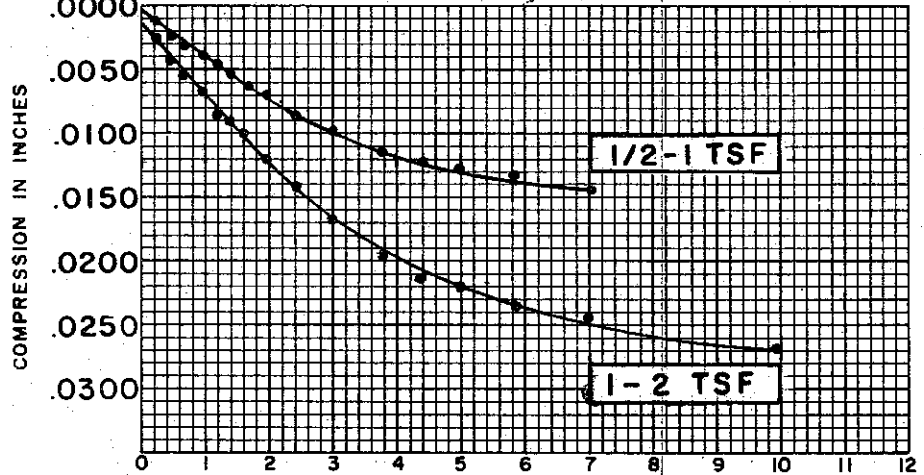
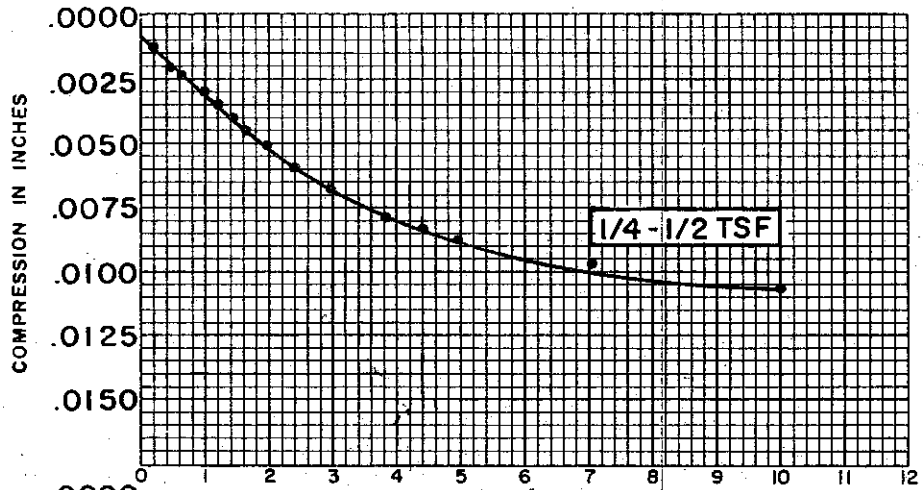
BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.1

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

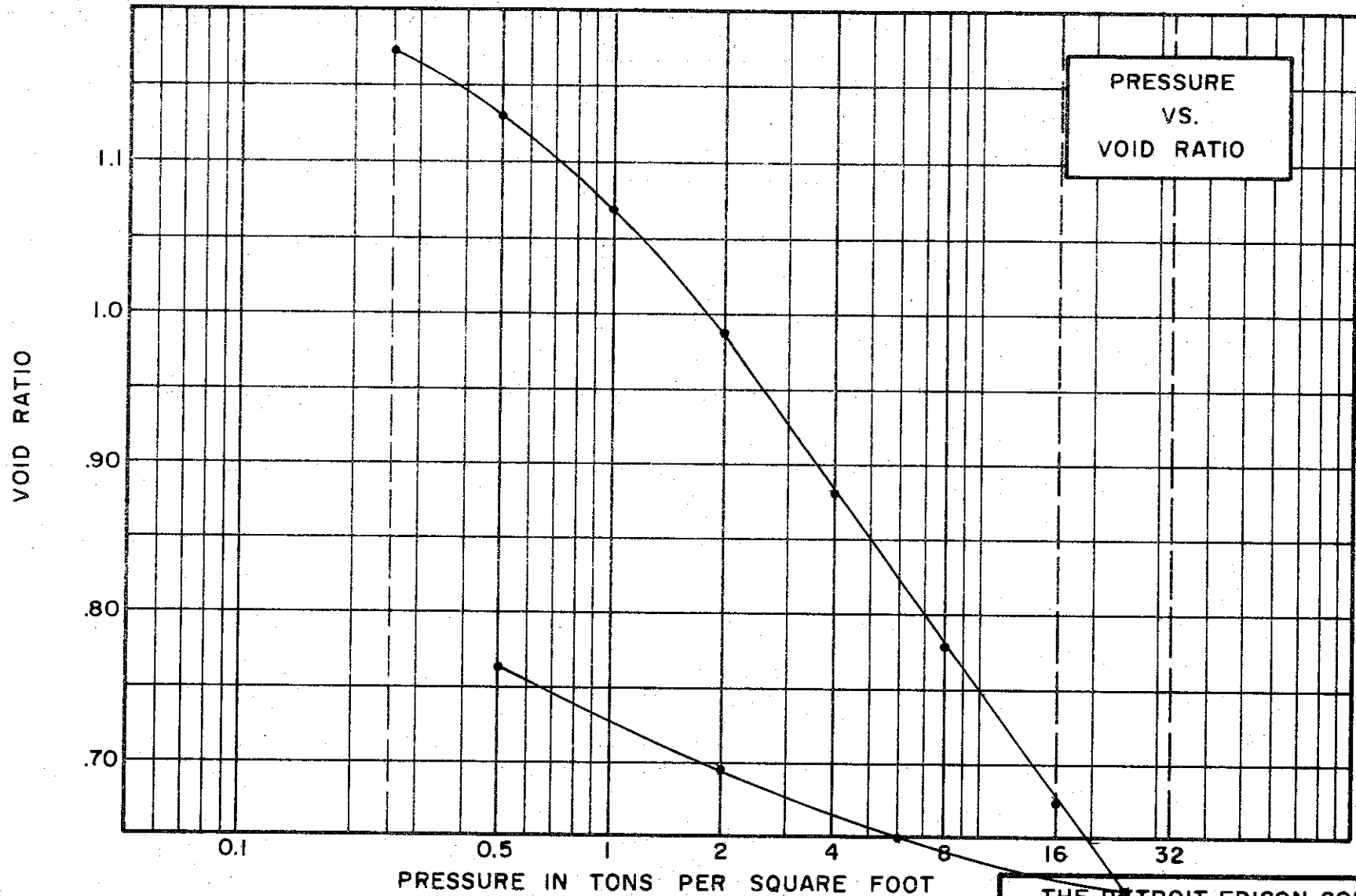
BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.0

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 46.5% FINAL 31.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 52% PLASTIC LIMIT 25%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

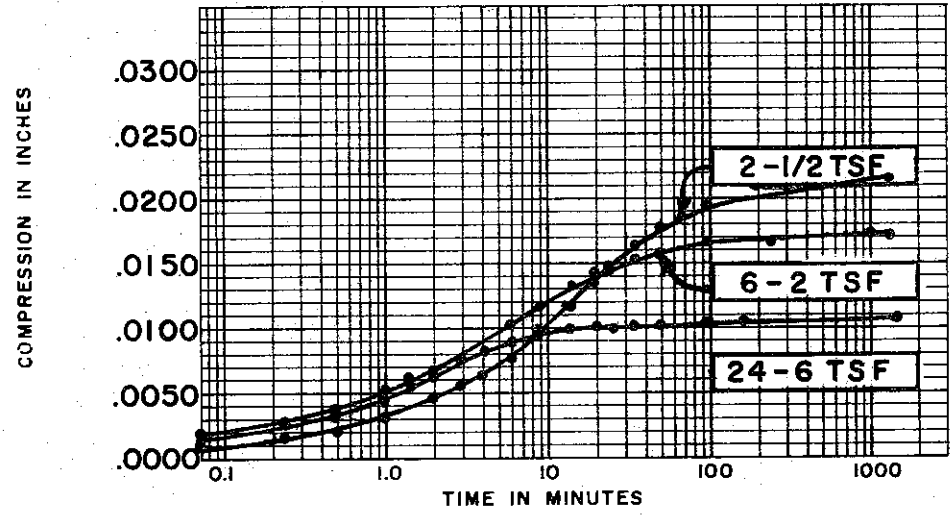
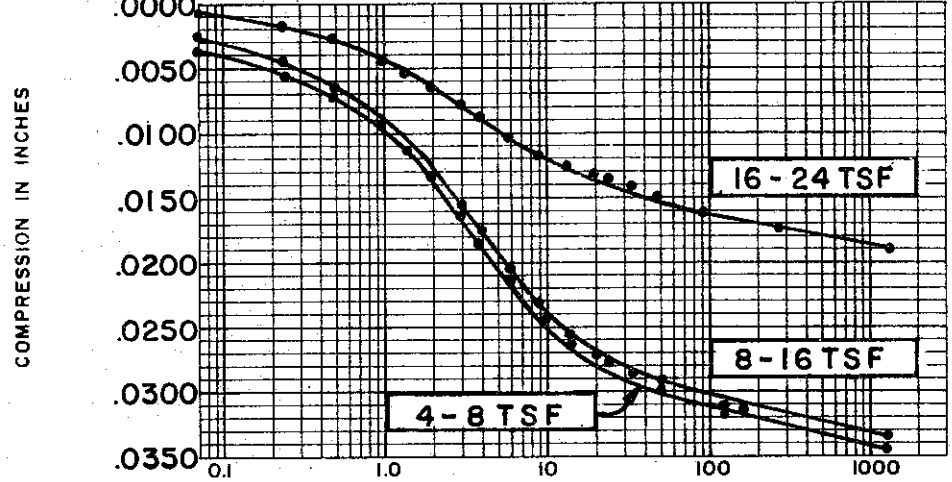
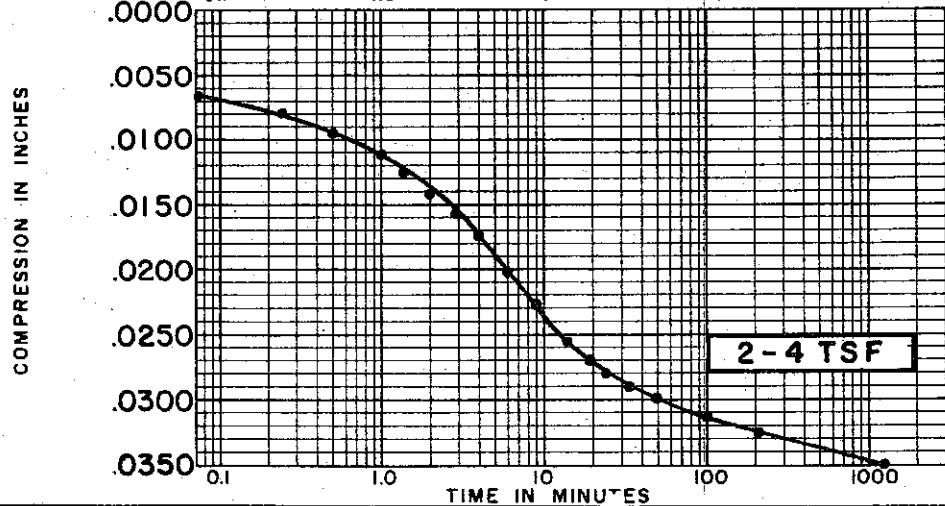
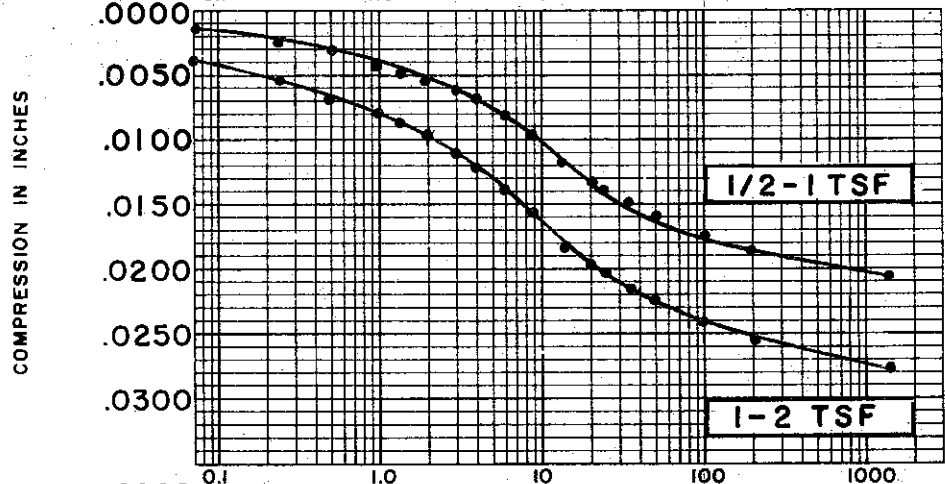
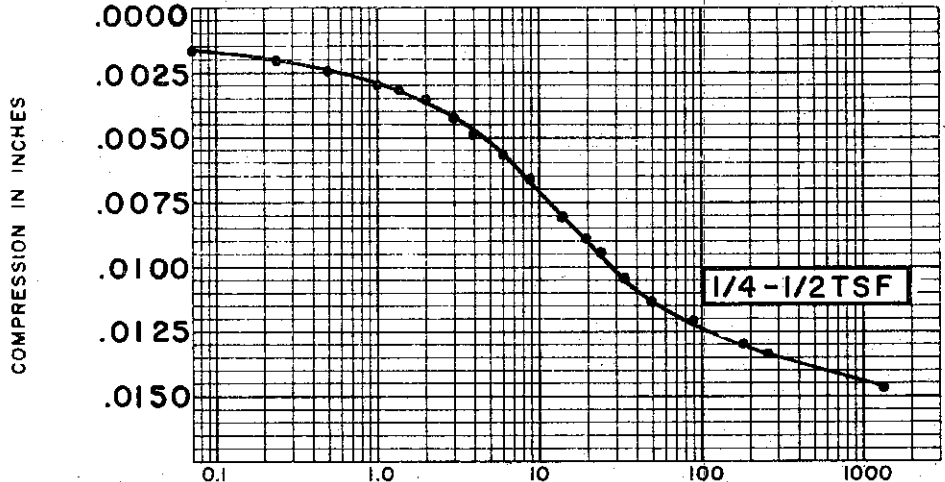
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C33.1  
 SAMPLE NO. 13 DATE JAN. 1974  
 DEPTH 53'

C-477

0-7-0



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL - CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 43.5 %  
 FINAL WATER CONTENT 31.9 %

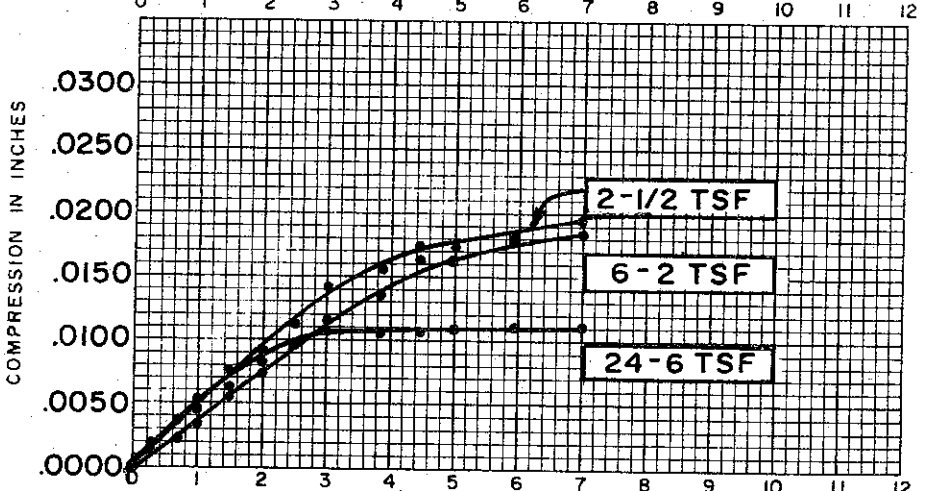
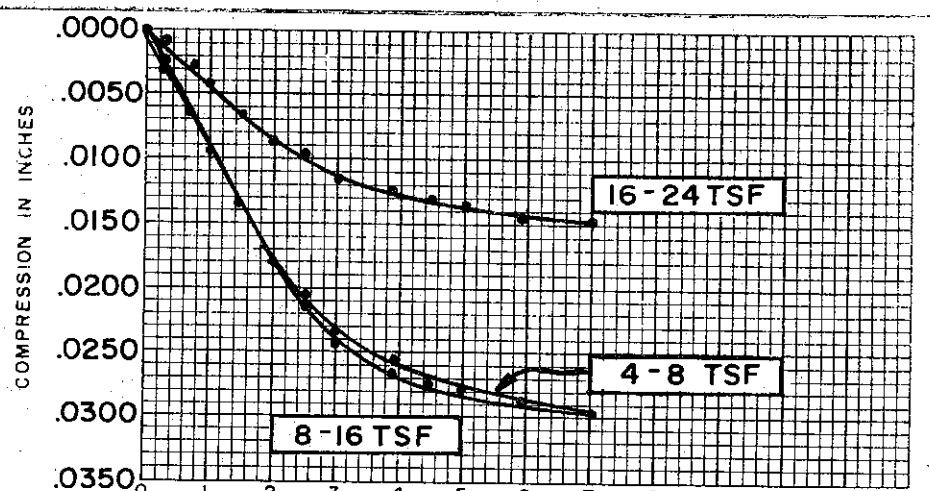
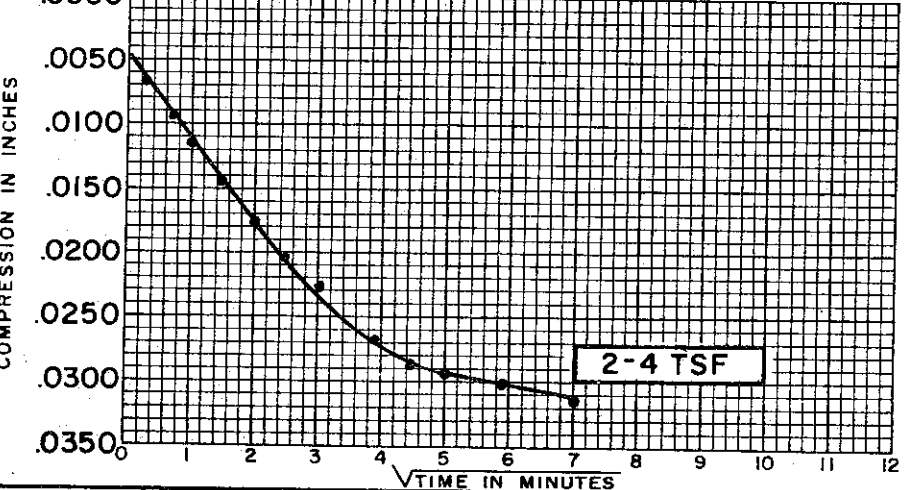
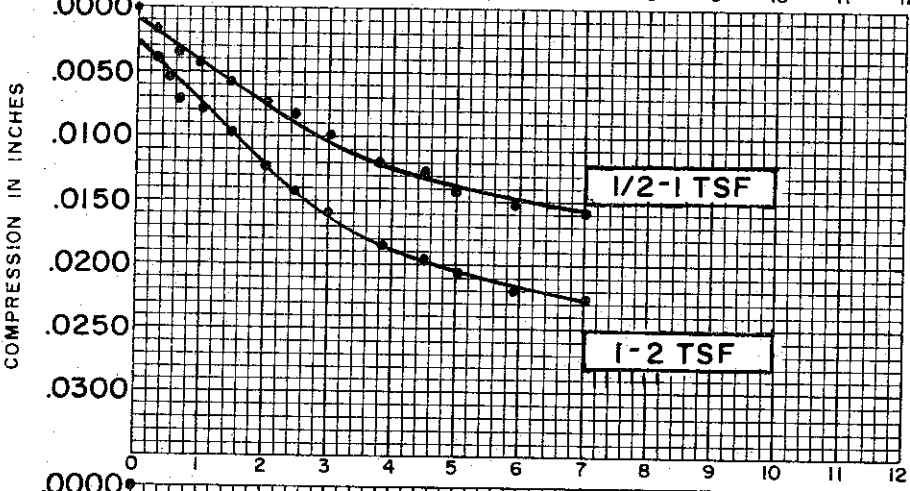
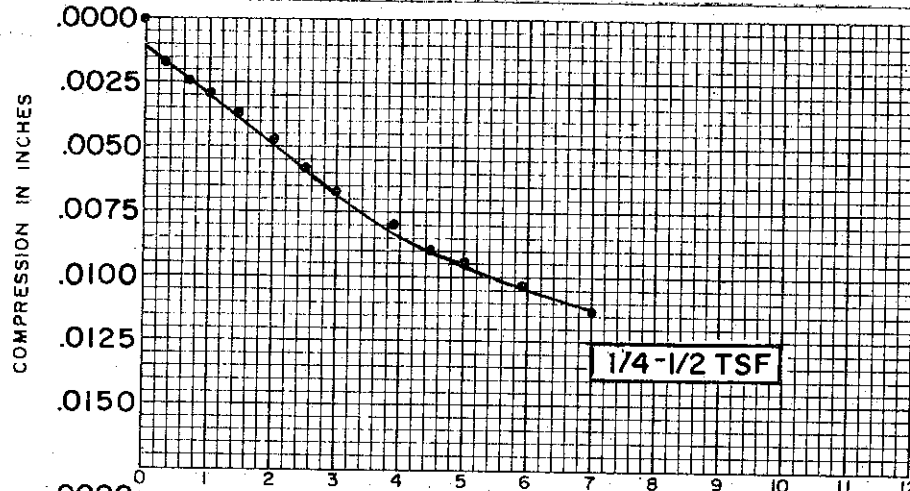
BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 46.5%  
 FINAL WATER CONTENT 31.9%

BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

**TEST DATA**

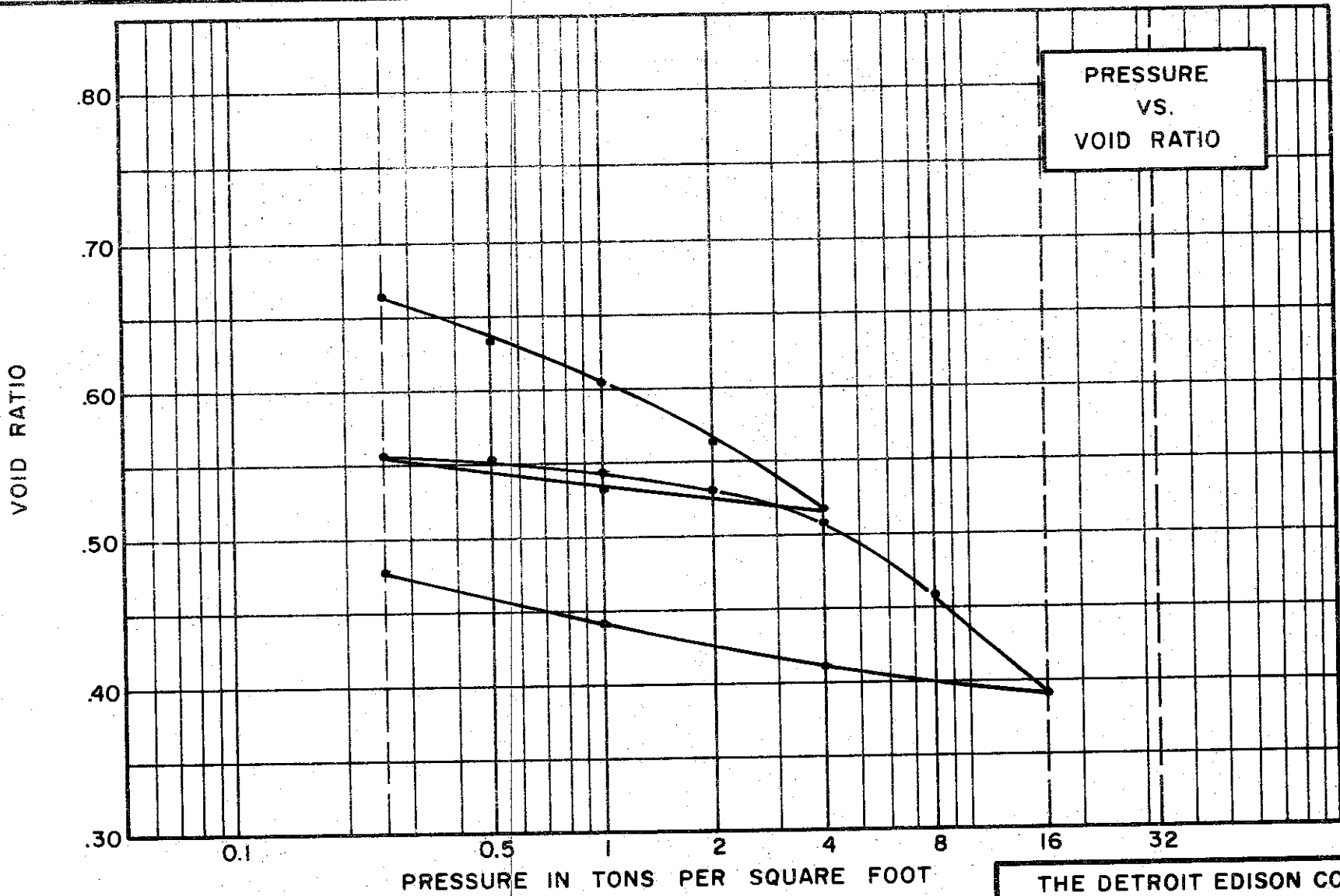
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C35.1  
 SAMPLE NO. 17 DATE JAN. 1974  
 DEPTH 73.5'

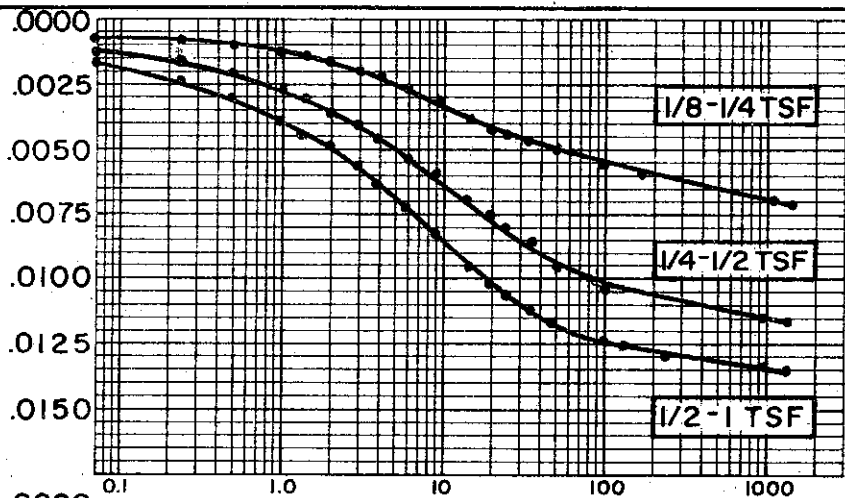
**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY;  
SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 WATER CONTENT, INITIAL 26.7% FINAL 19.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

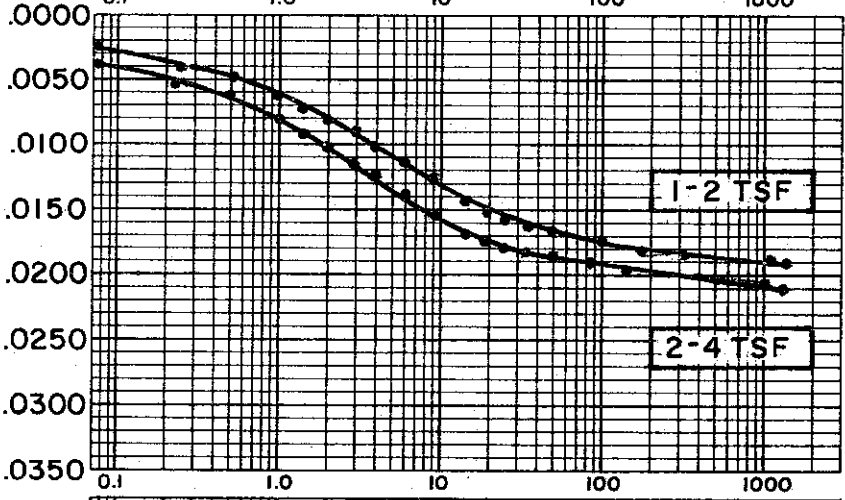
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.697

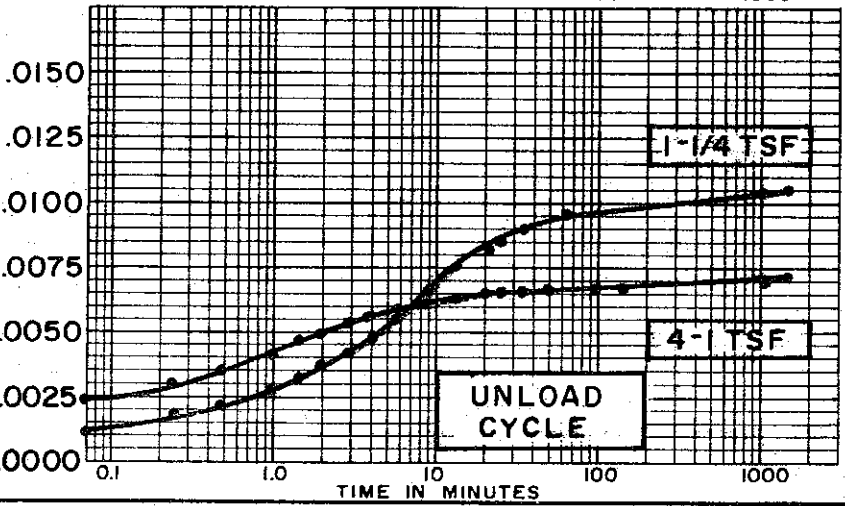
COMPRESSION IN INCHES



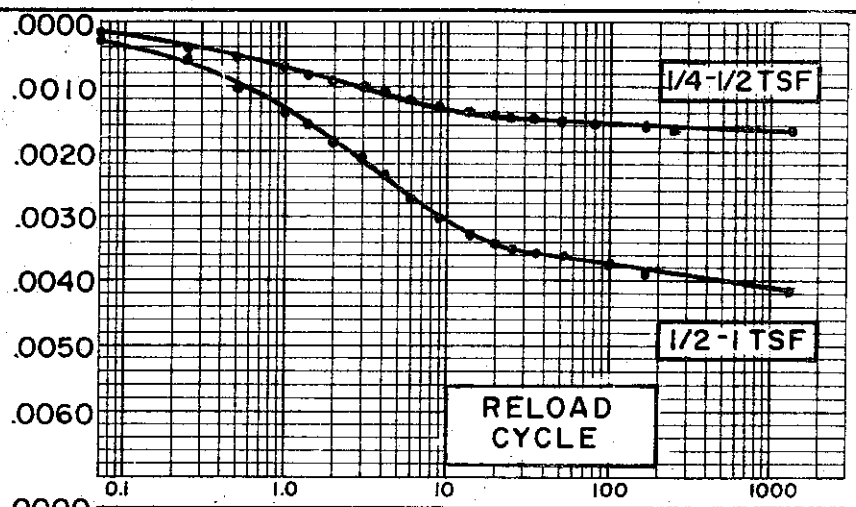
COMPRESSION IN INCHES



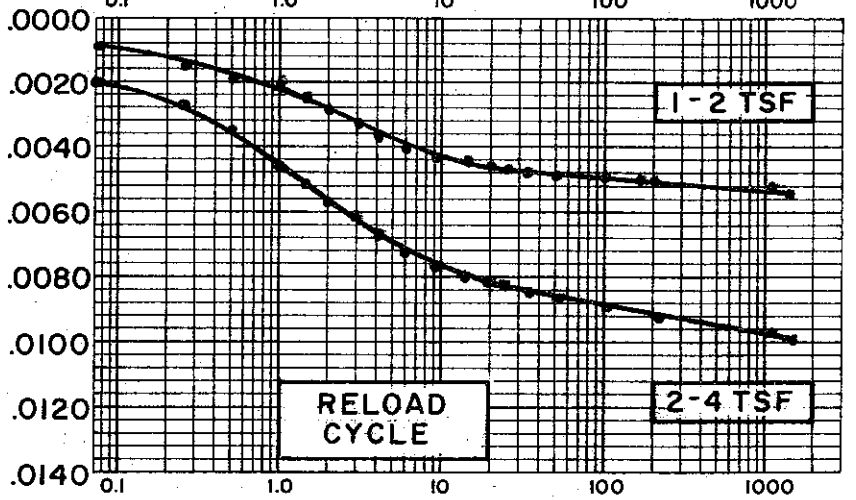
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7%  
 FINAL WATER CONTENT 19.7%

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5'

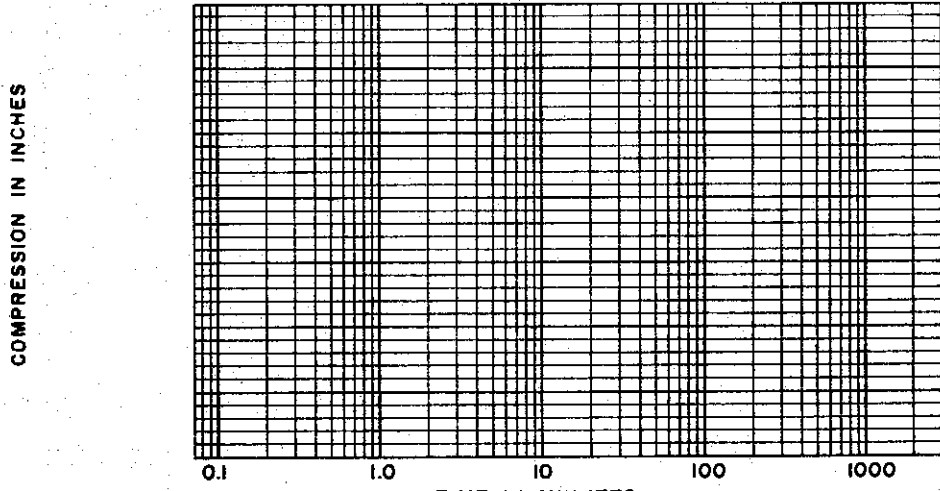
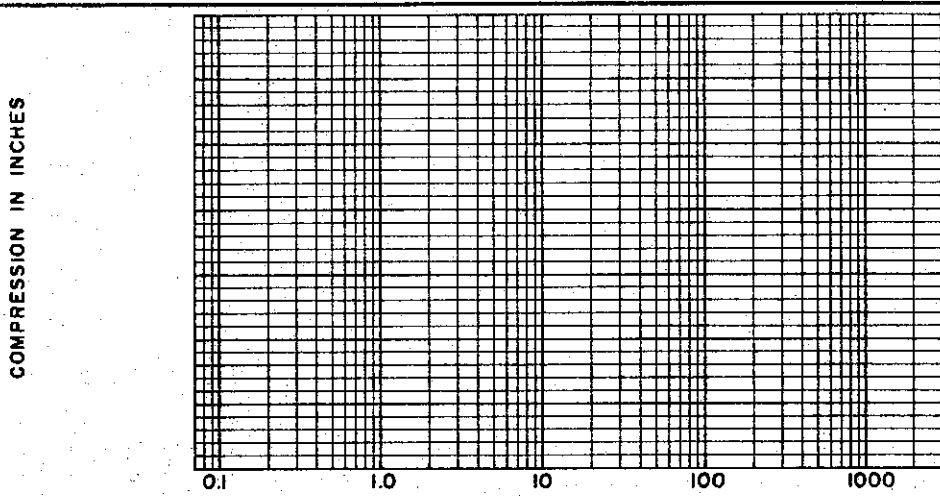
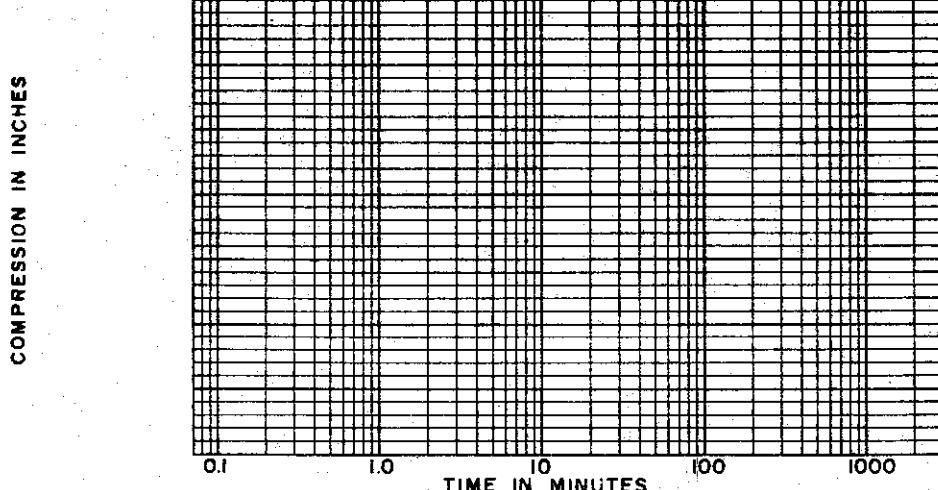
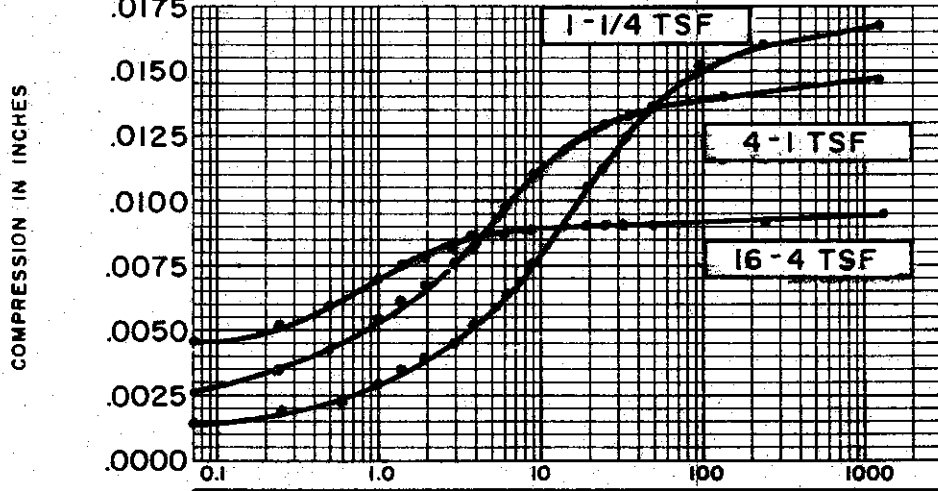
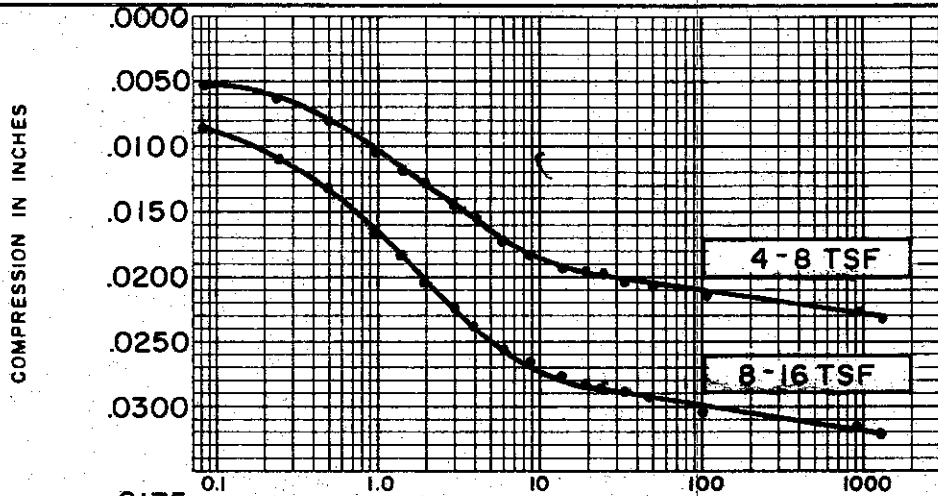
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DI. METER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-481

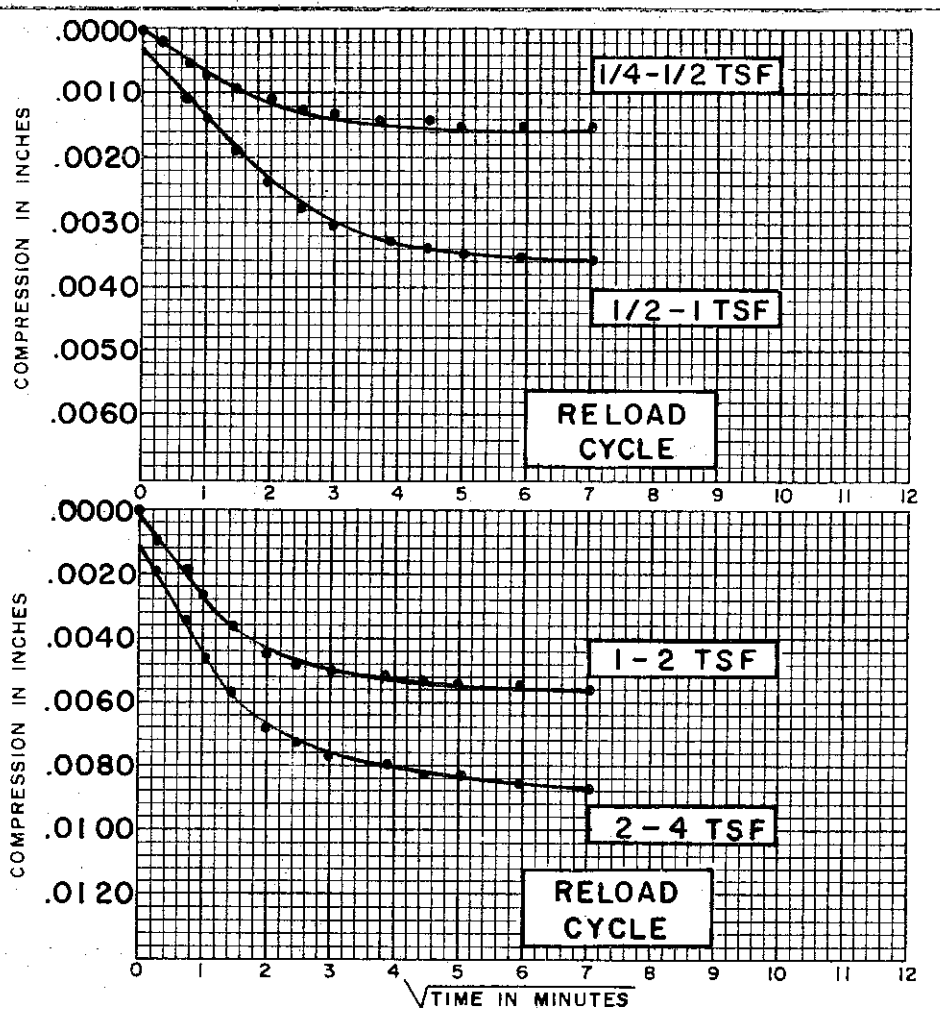
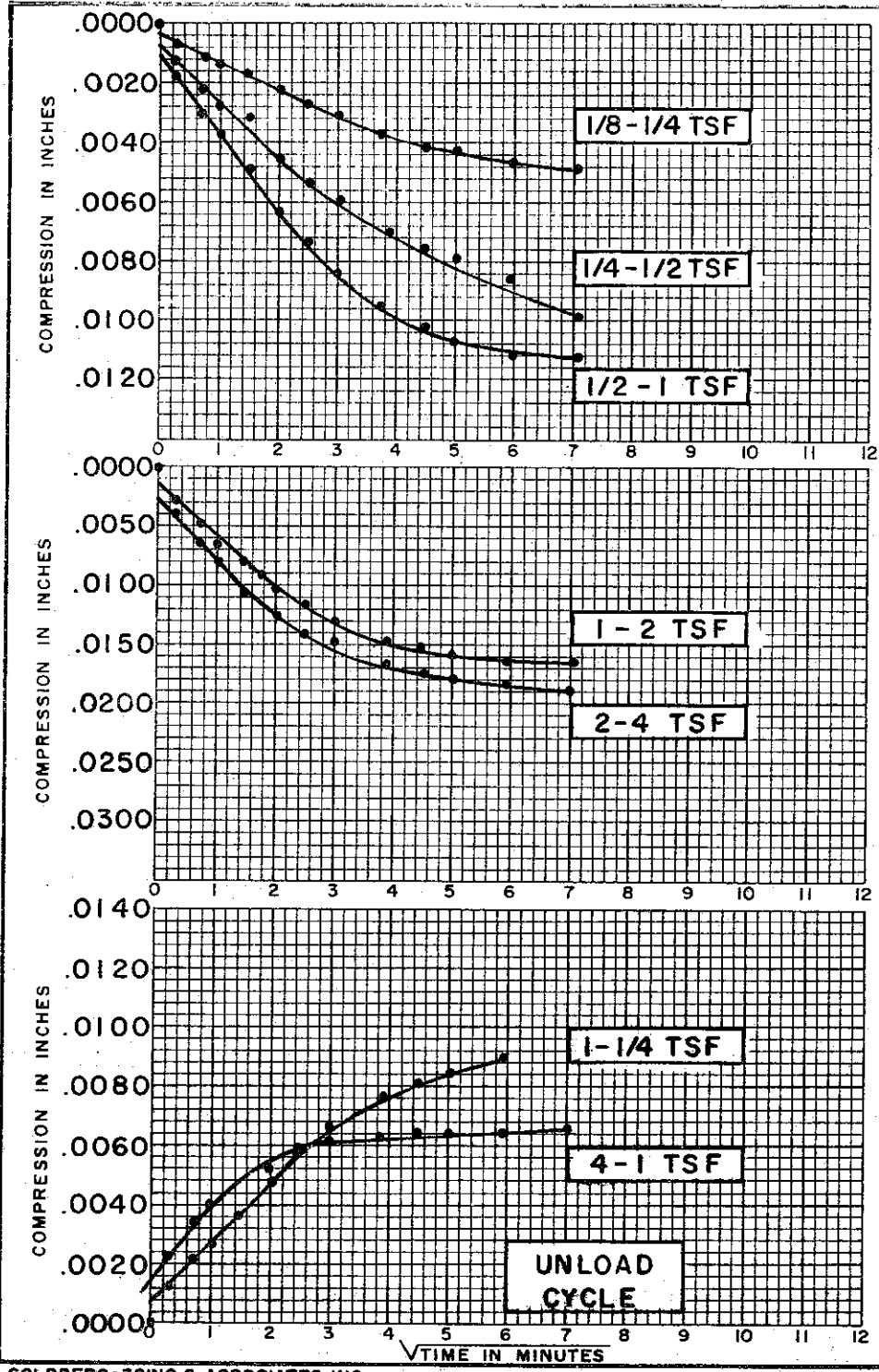


TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5

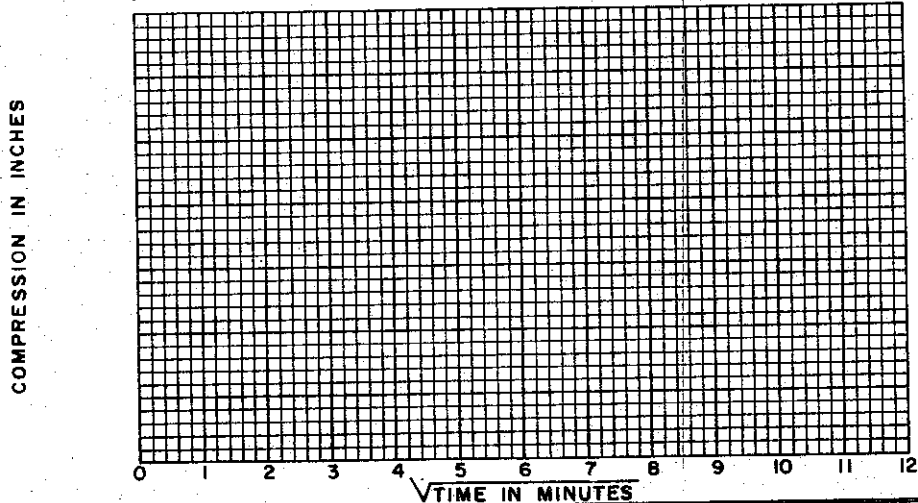
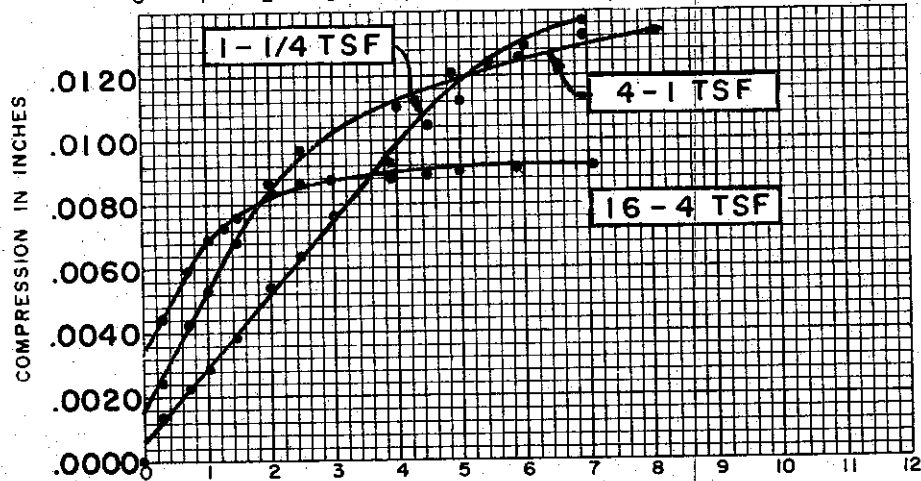
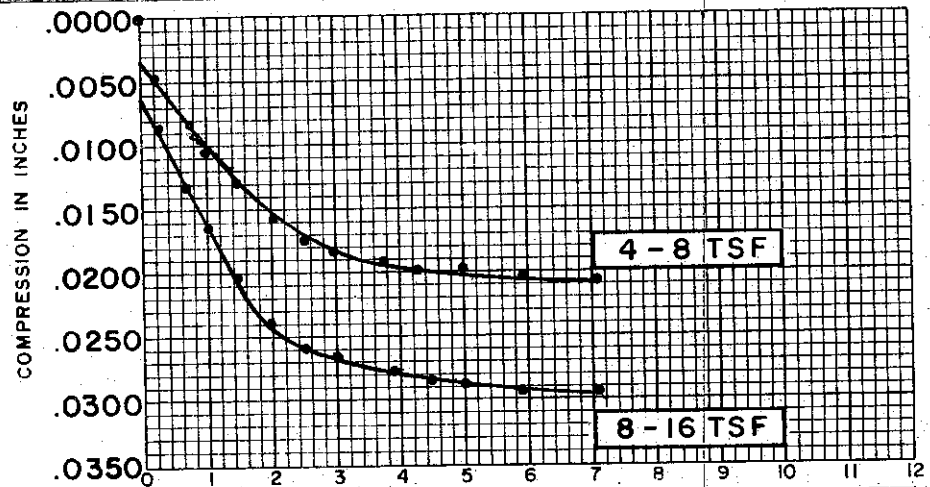
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

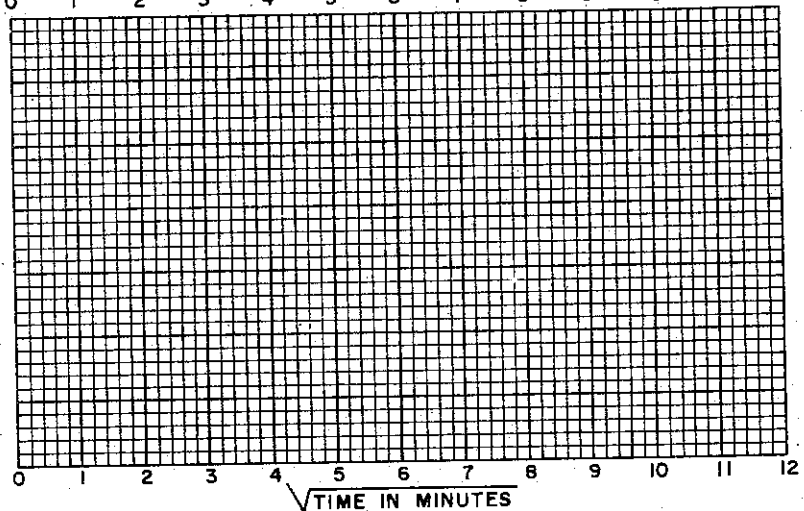
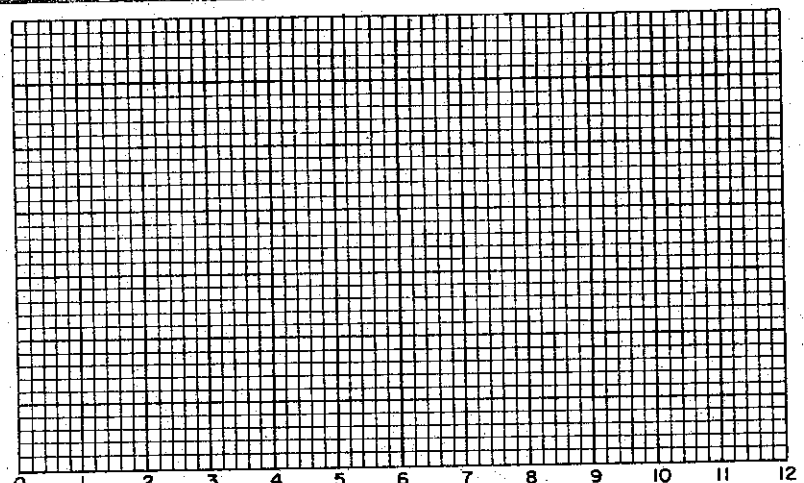
C-483

787-484



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7 %  
 FINAL WATER CONTENT 19.7 %

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5

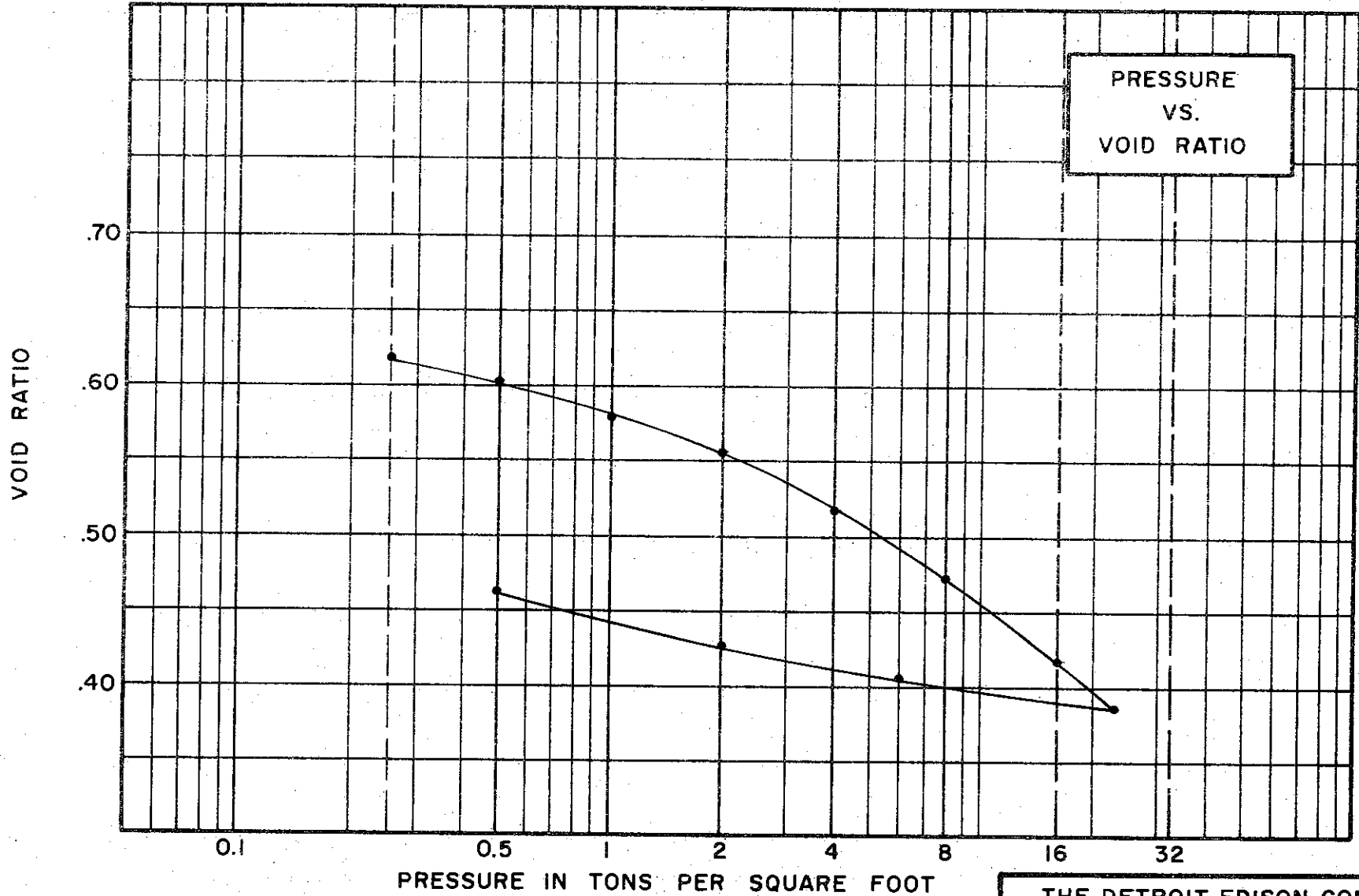
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 24.2% FINAL 19.4%  
ATTERBERG LIMITS:  
LIQUID LIMIT 29% PLASTIC LIMIT 19%

**TEST DATA**

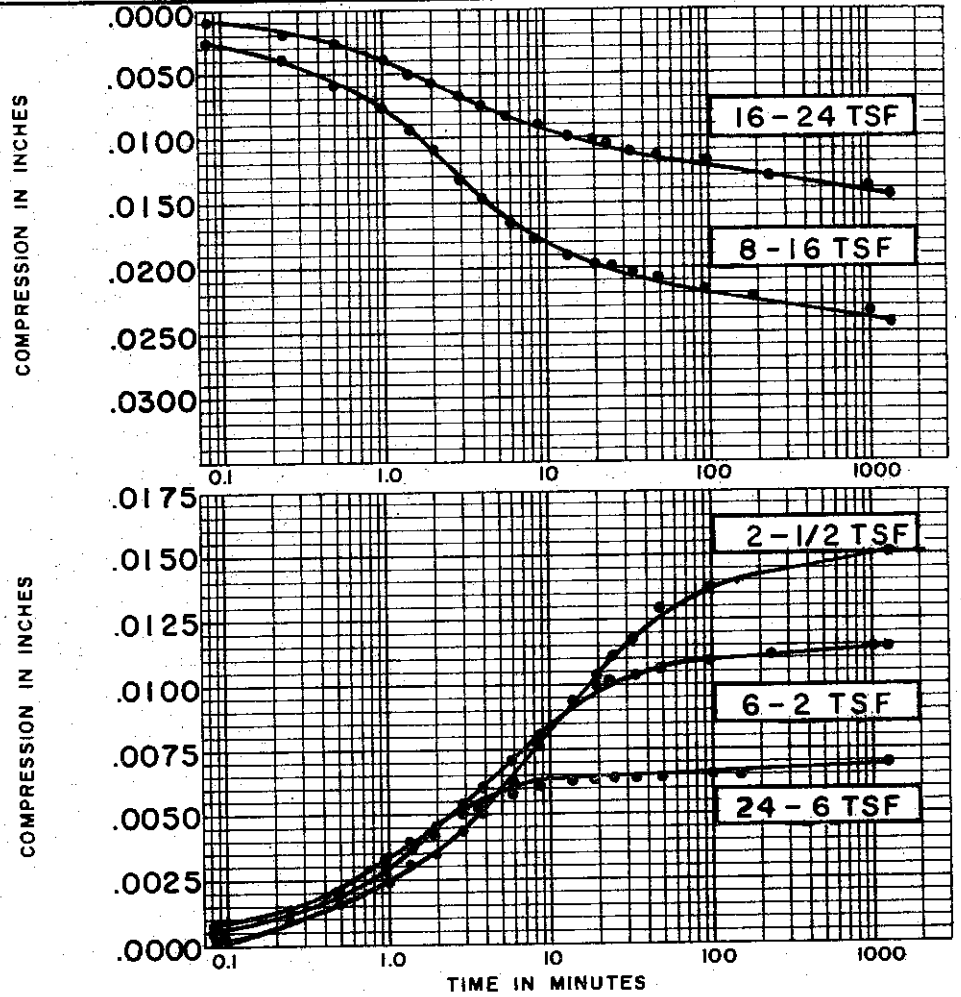
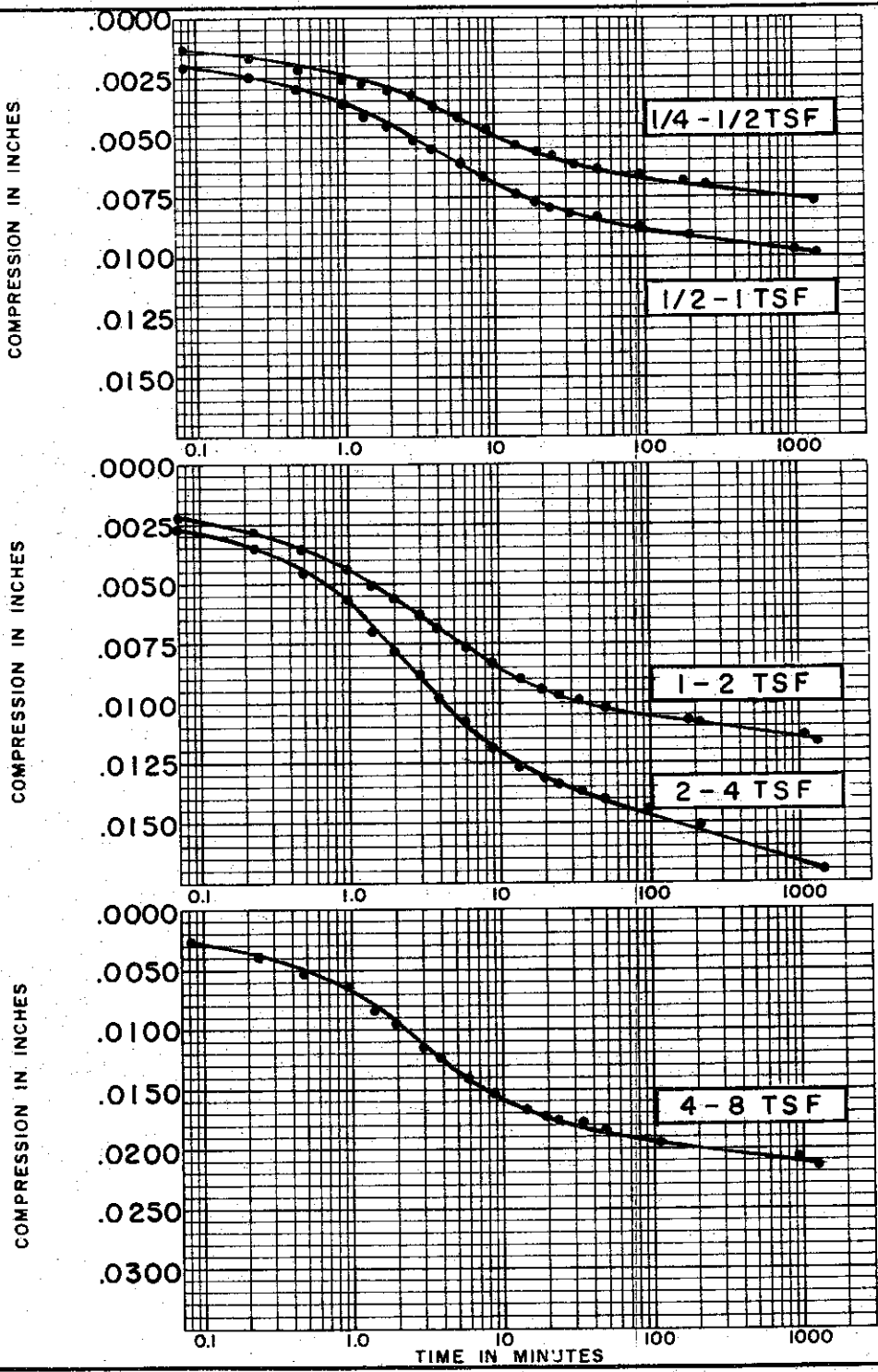
INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C38.1  
SAMPLE NO. 25 DATE JAN. 1974  
DEPTH 113'

C-485



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

INITIAL WATER CONTENT 24.2 %

FINAL WATER CONTENT 19.4 %

BORING NO. 41

SAMPLE NO. 25

DEPTH 113'

**TEST DATA**

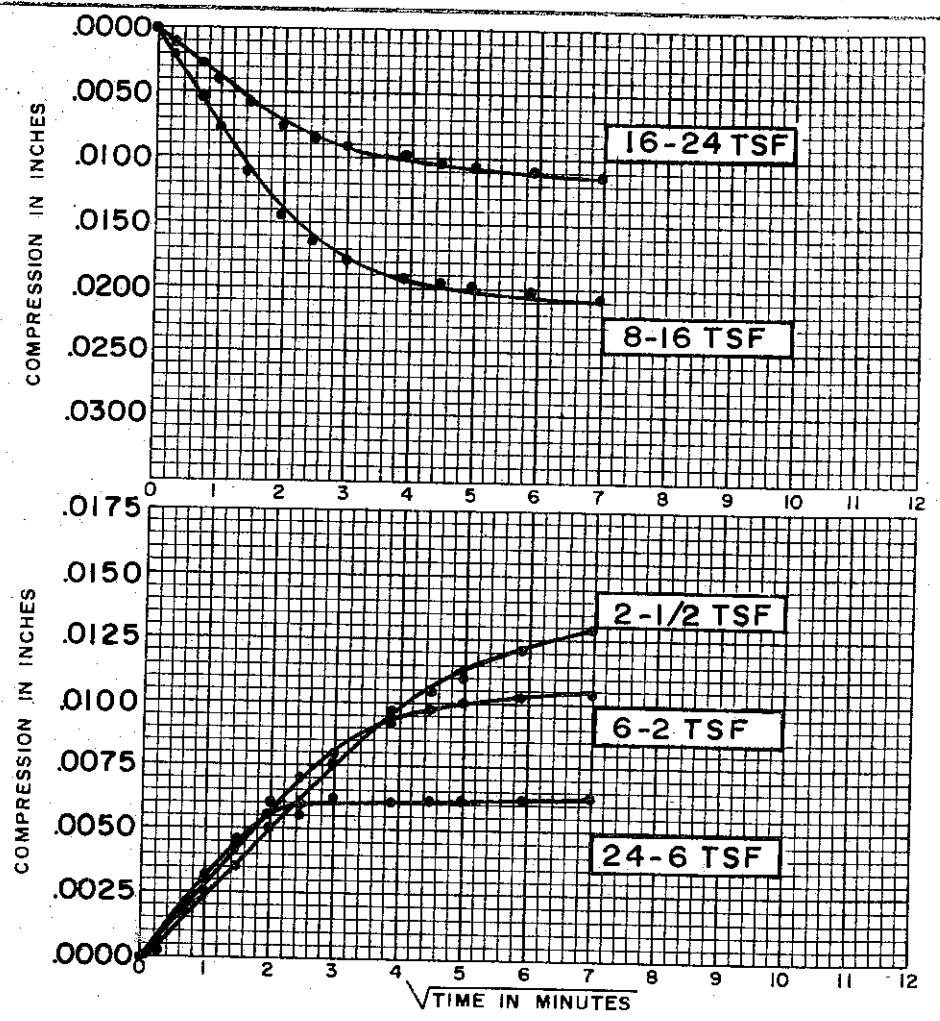
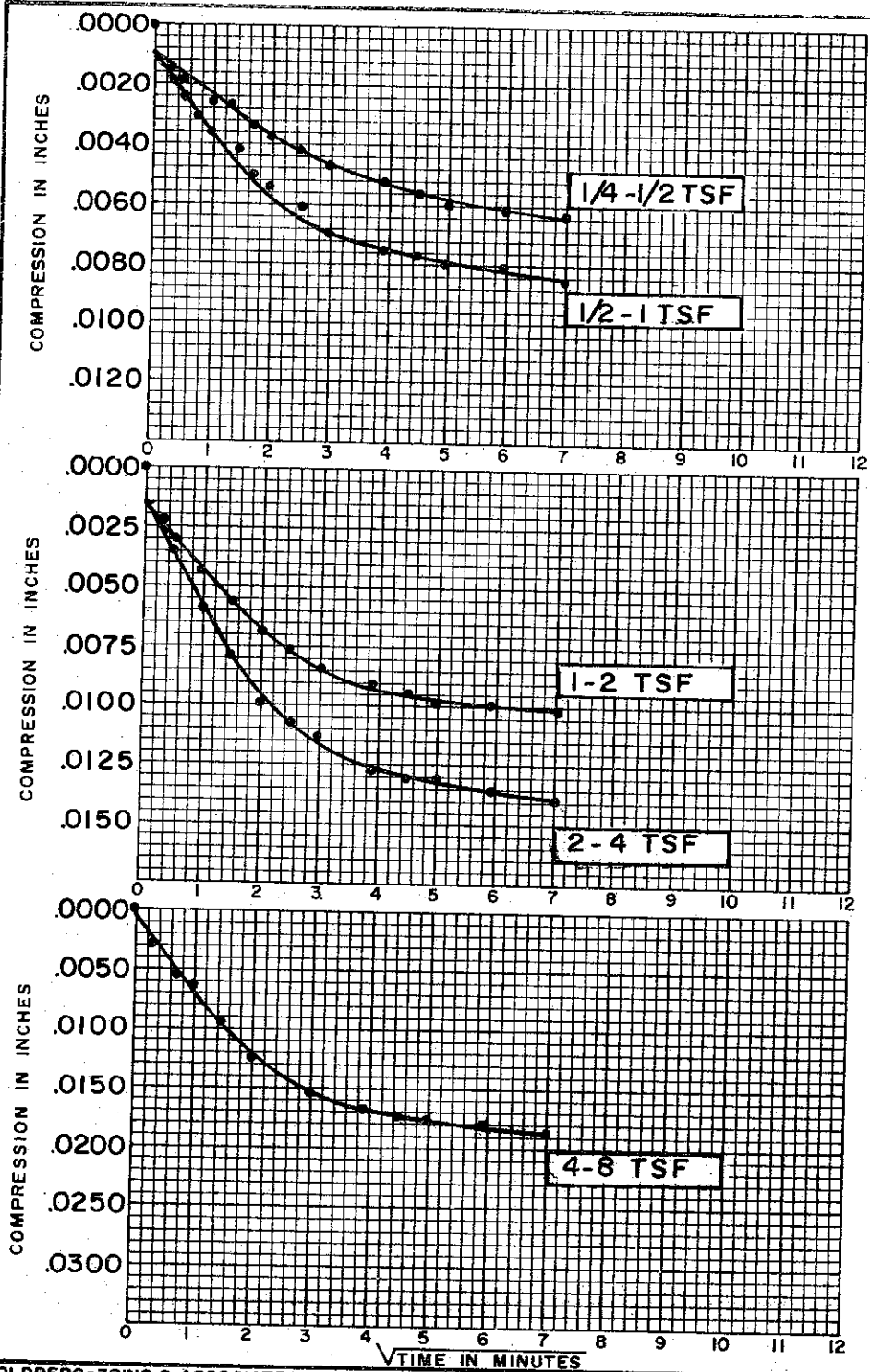
INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 24.2%  
 FINAL WATER CONTENT 19.4%

BORING NO. 41  
 SAMPLE NO. 25  
 DEPTH 113'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

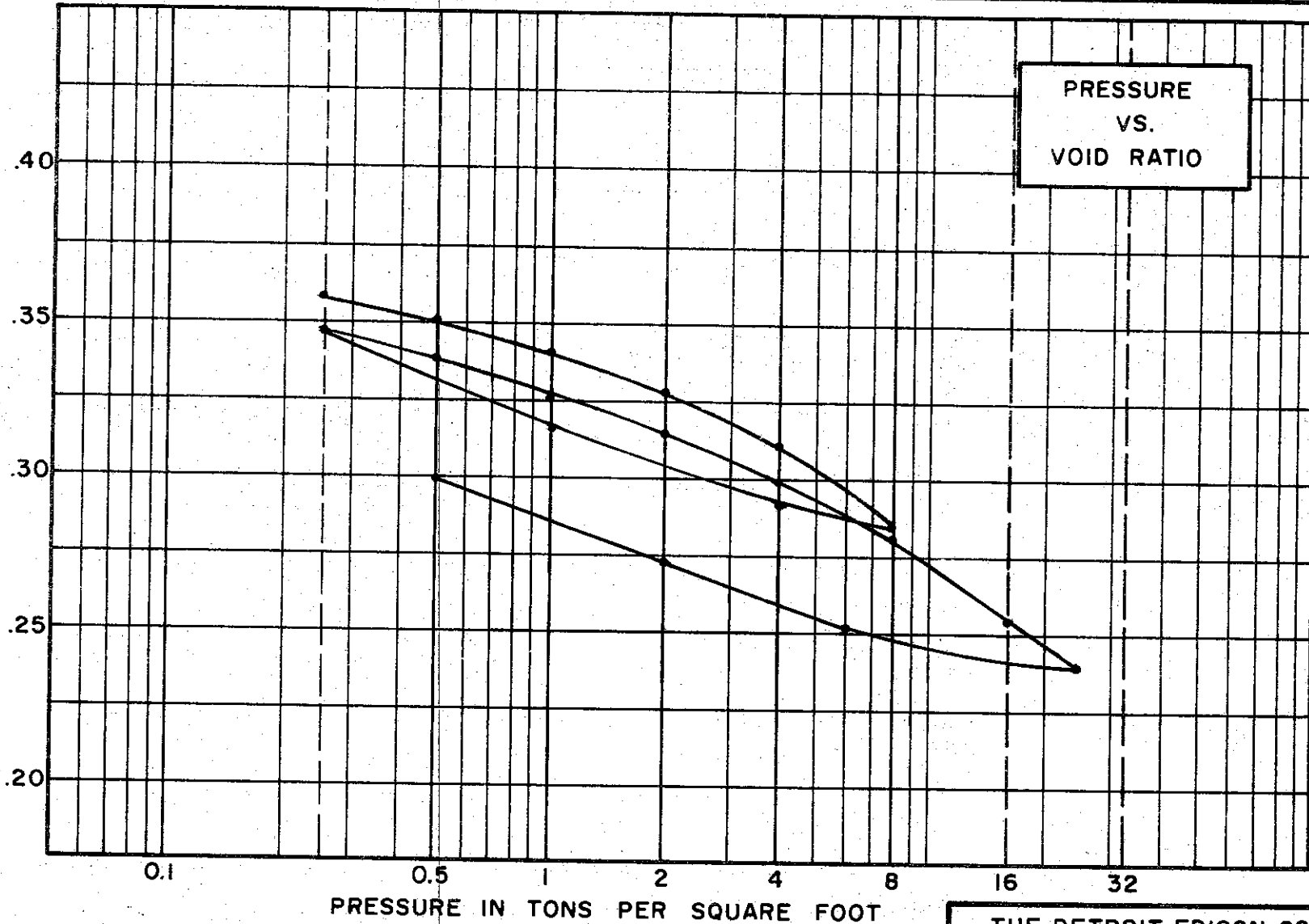
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

G-487



VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 WATER CONTENT, INITIAL 11.3% FINAL 12.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

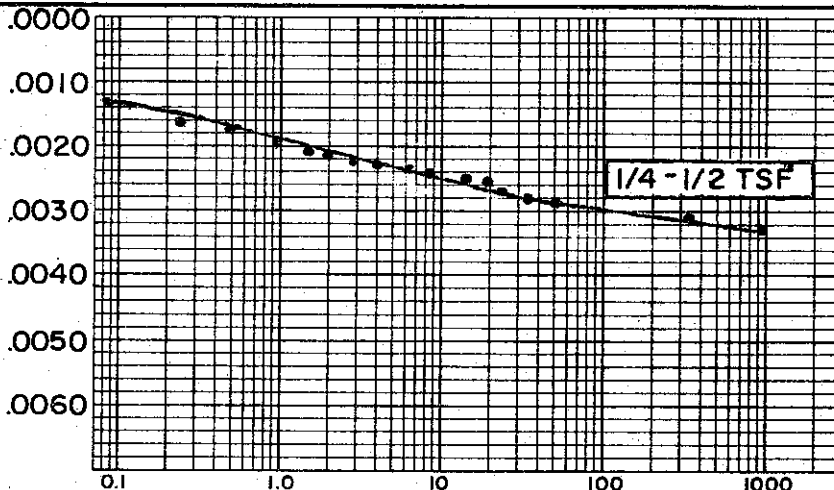
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.370

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

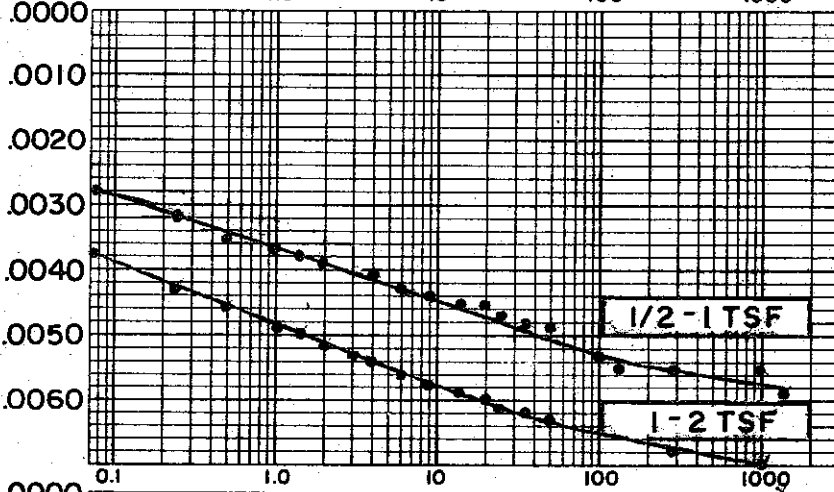
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C4C.1  
 SAMPLE NO. 29 DATE FEB. 1974  
 DEPTH 130.8'

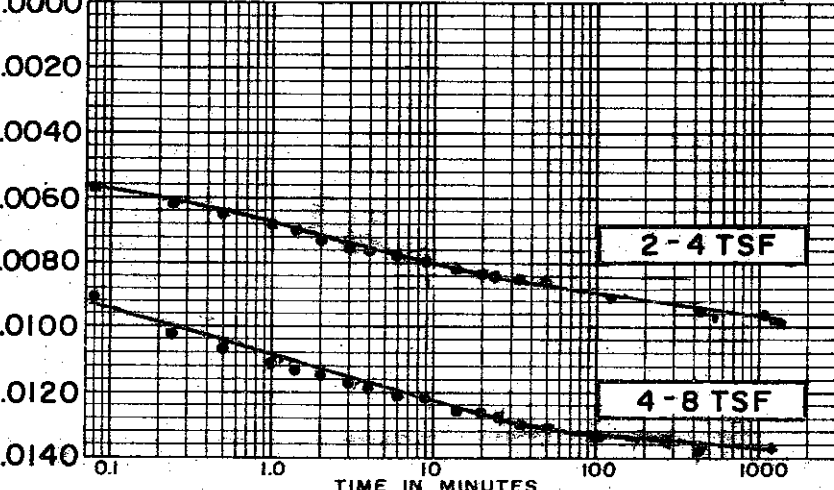
COMPRESSION IN INCHES



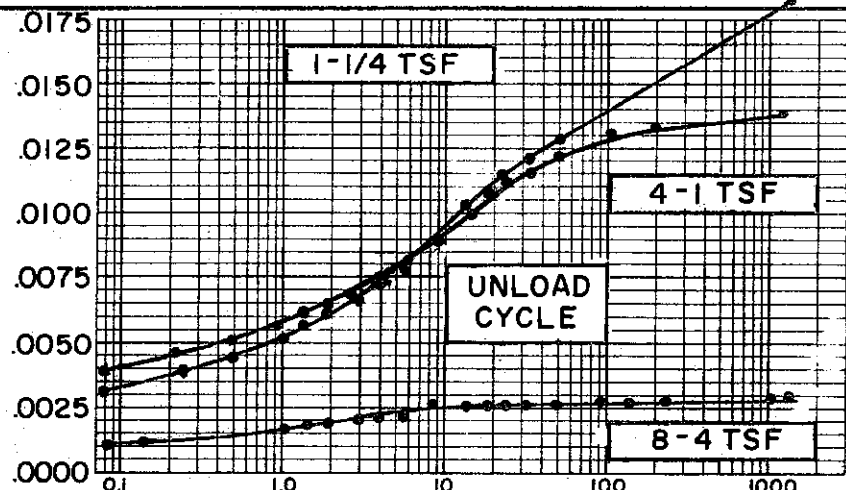
COMPRESSION IN INCHES



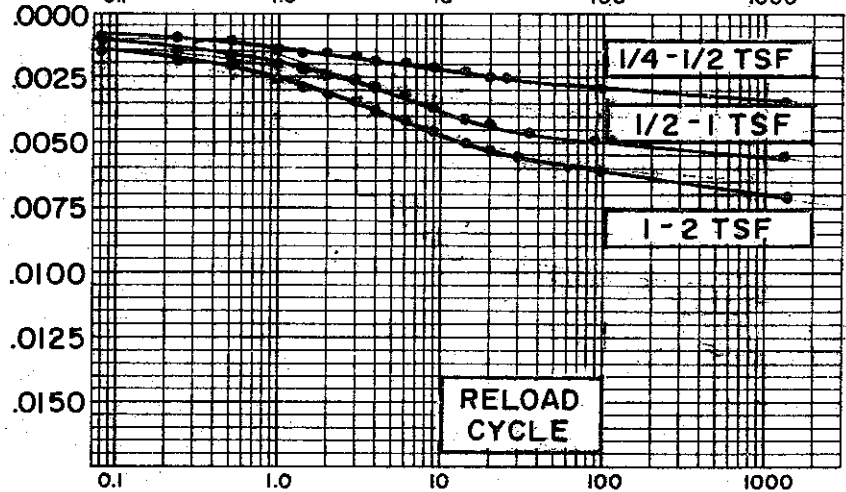
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



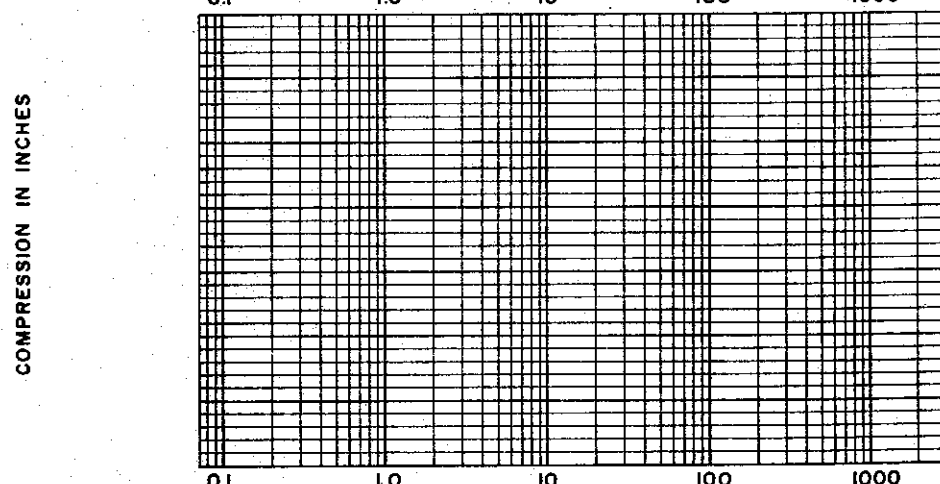
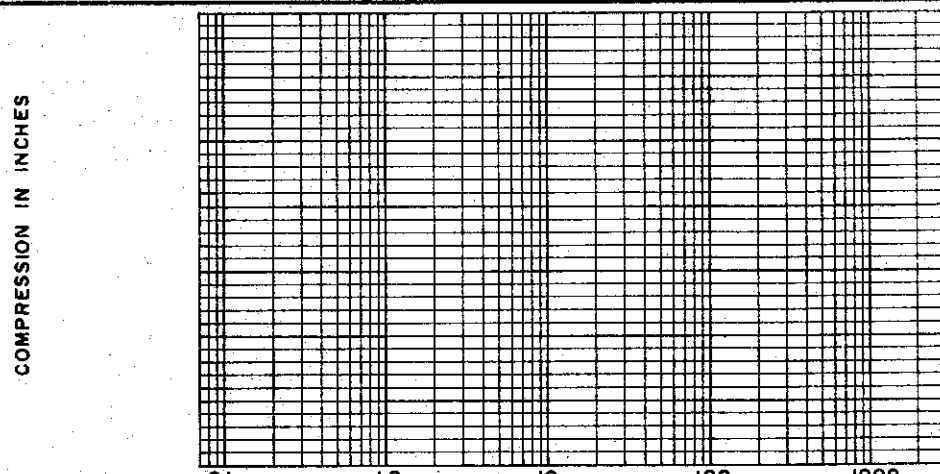
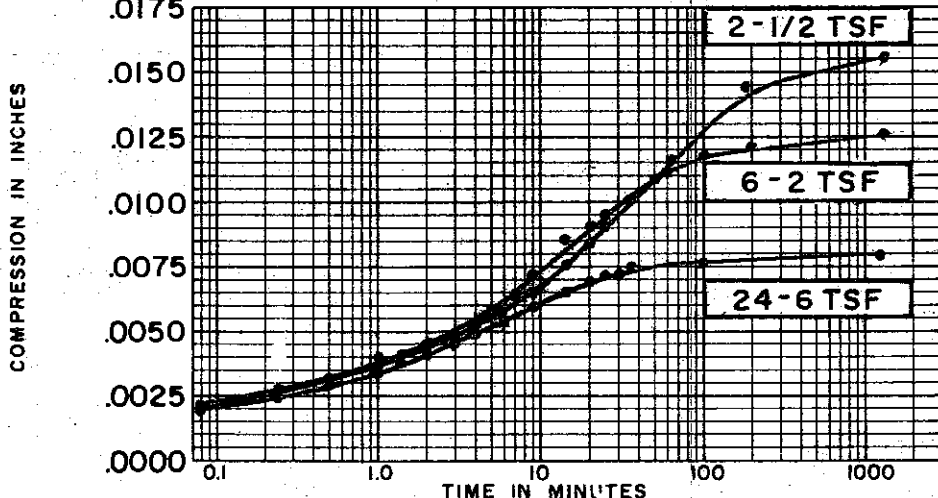
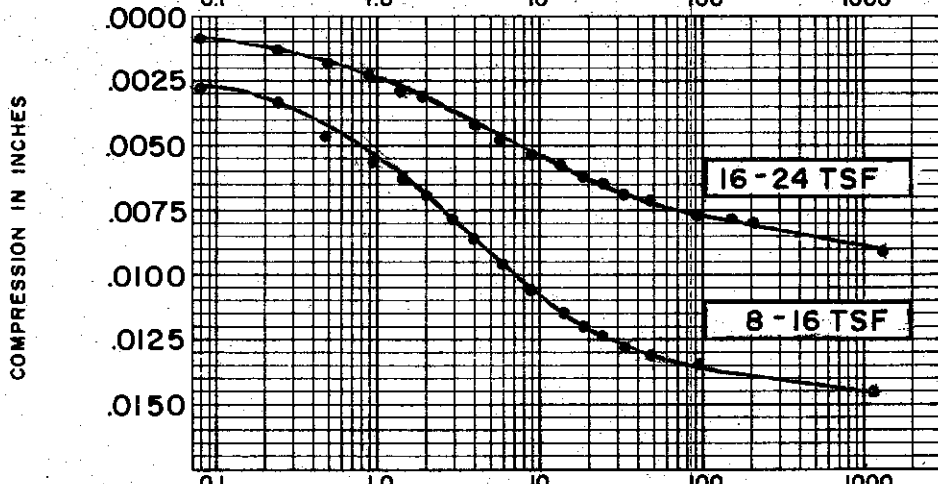
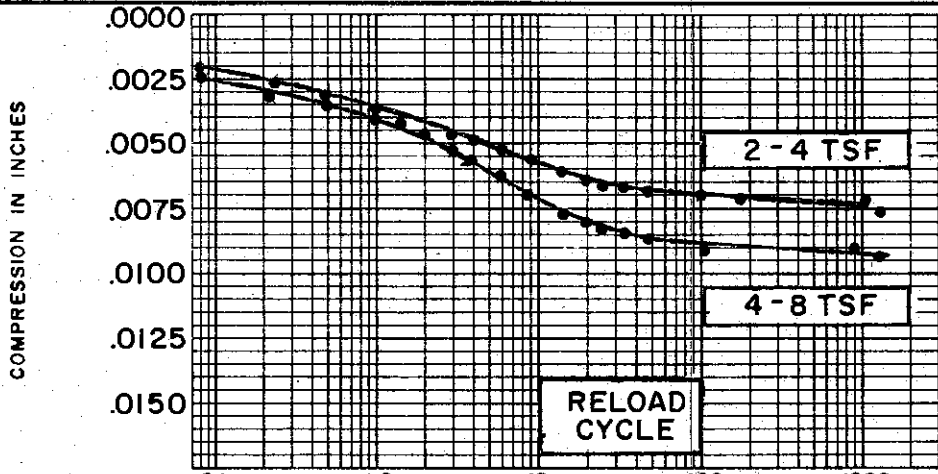
TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-489



**SOIL PROPERTIES**

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 INITIAL WATER CONTENT 11.3%  
 FINAL WATER CONTENT 12.0%

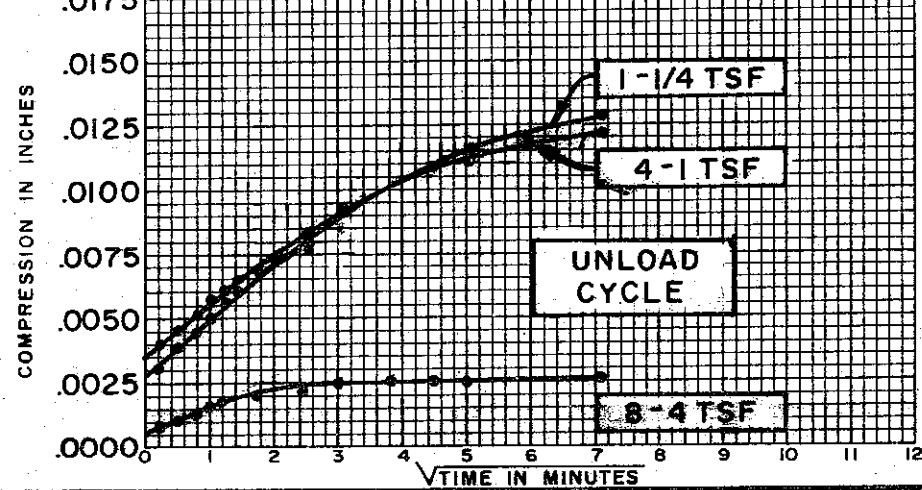
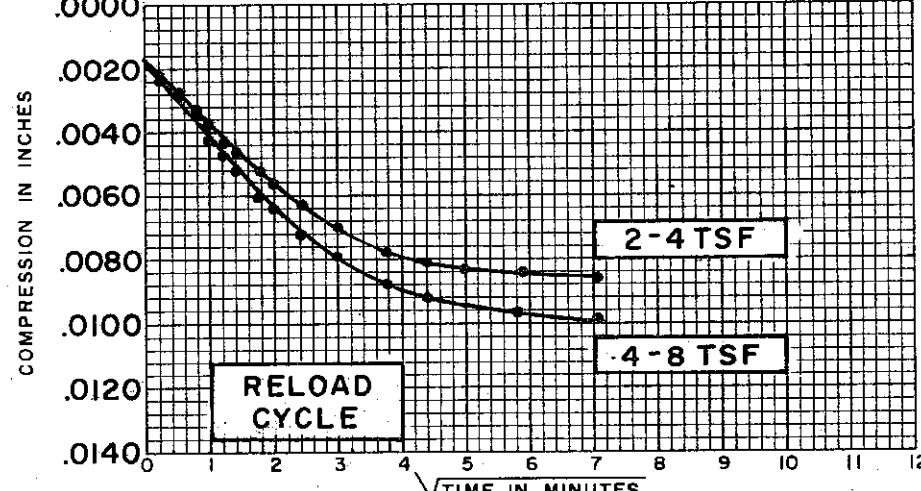
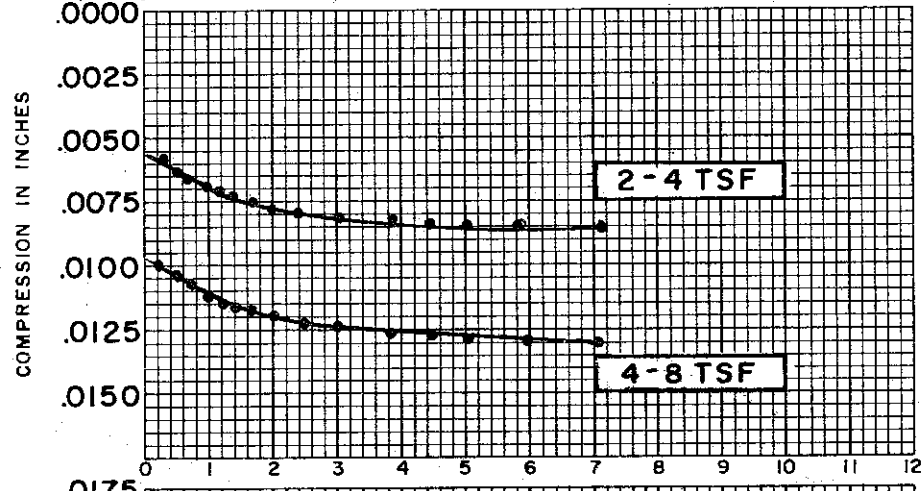
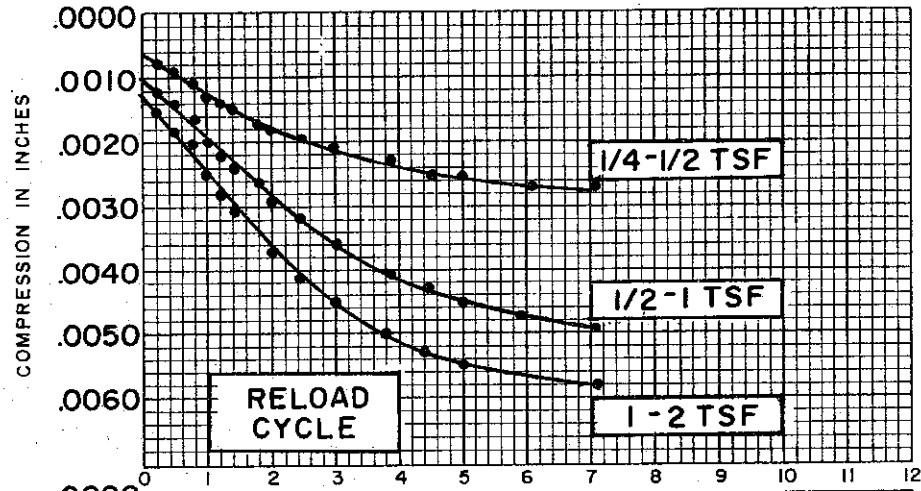
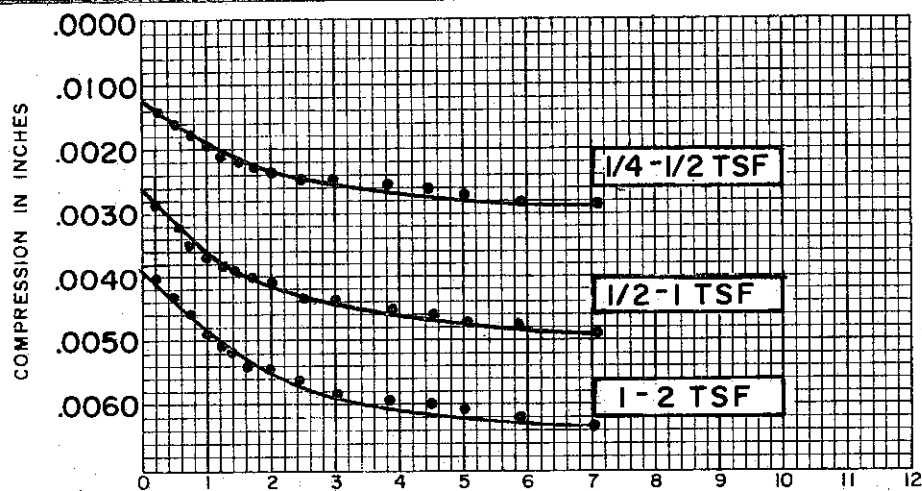
BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.8'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .370

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

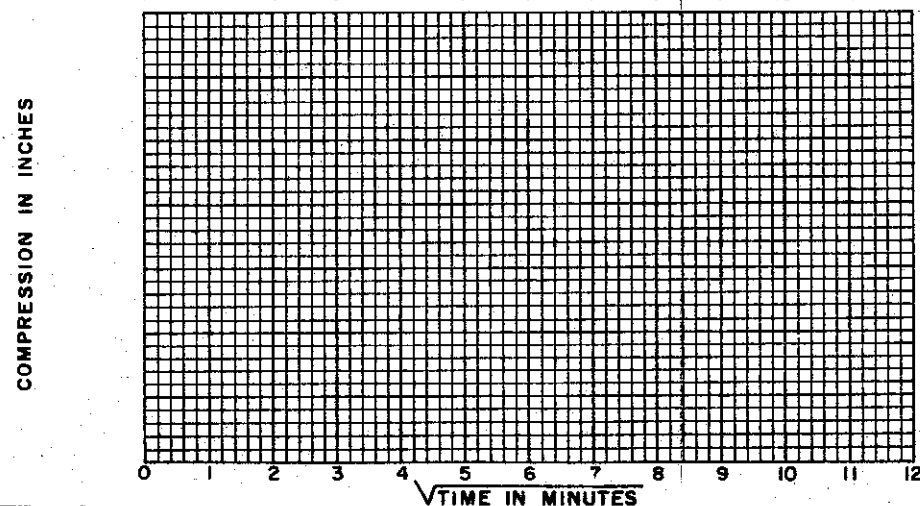
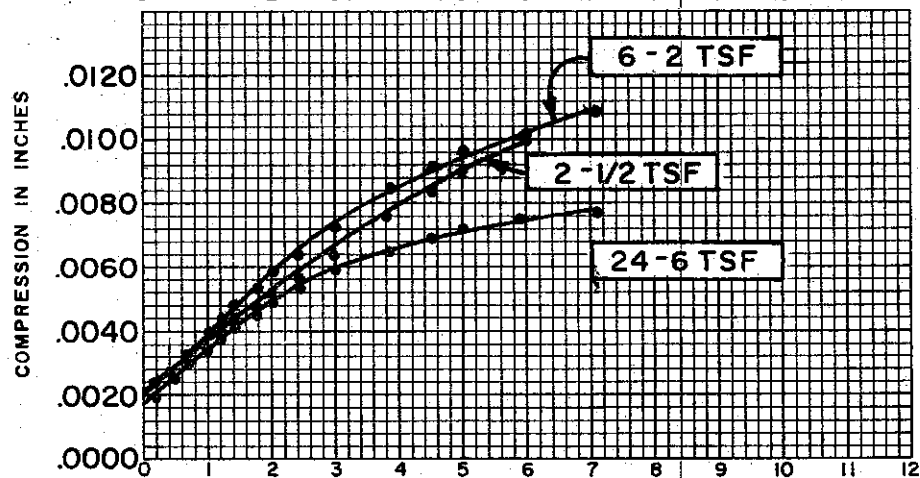
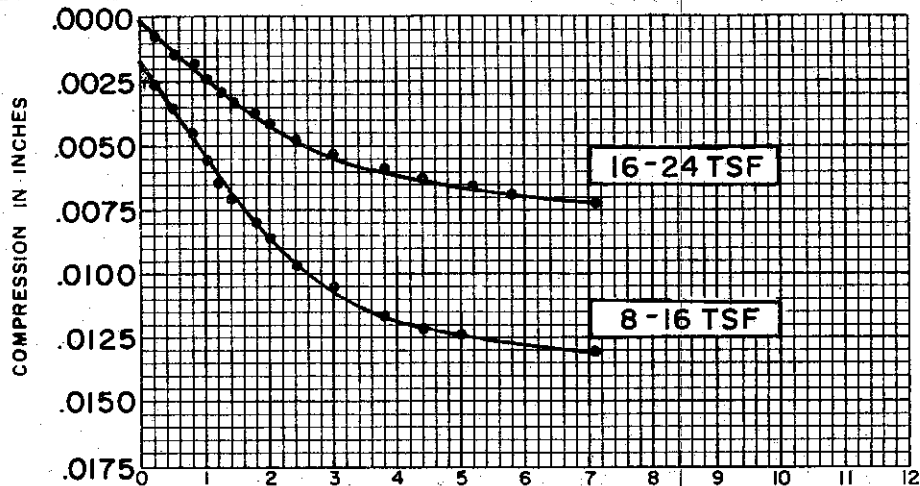
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

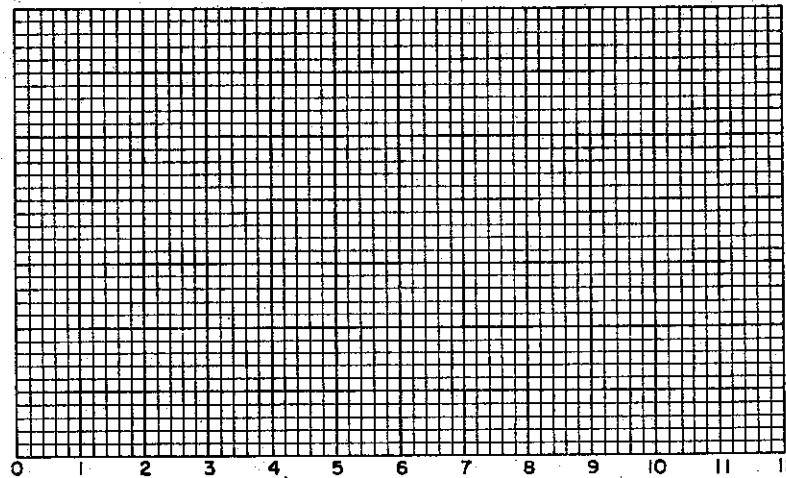
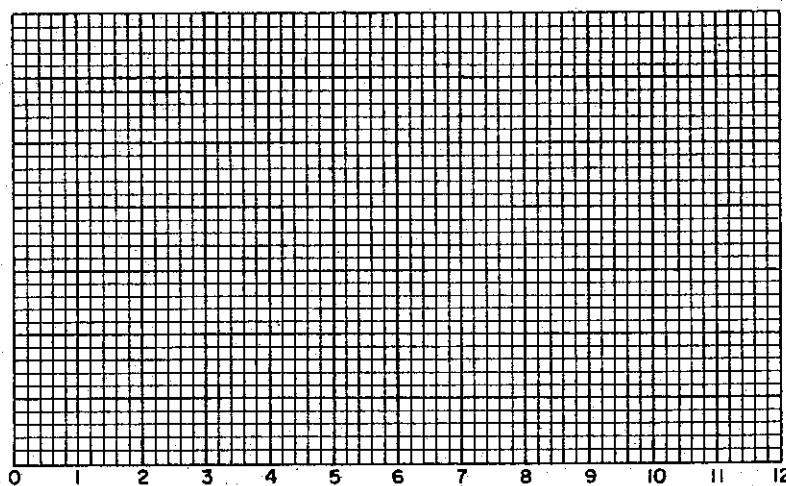
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



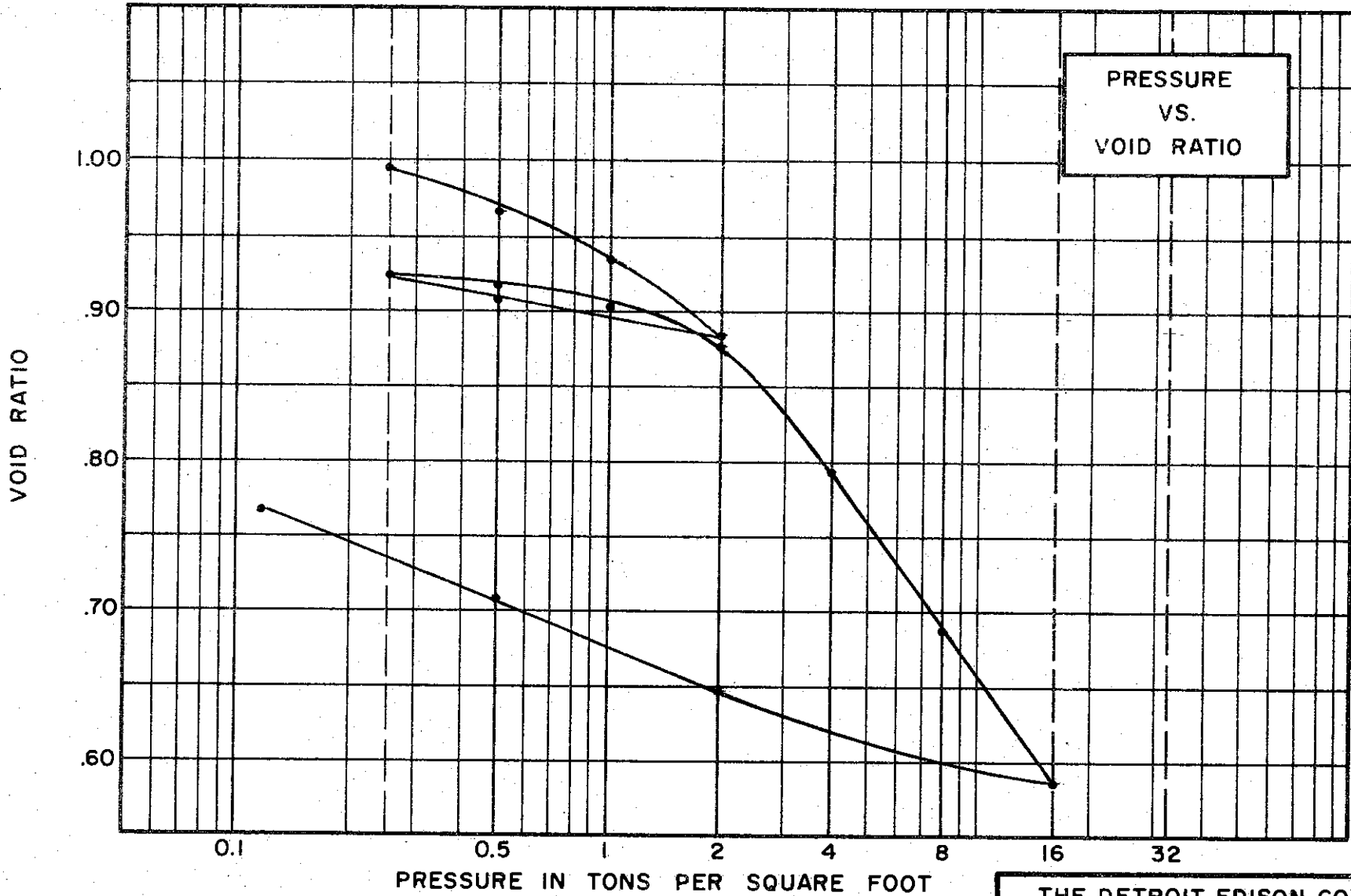
√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.5%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.8% FINAL 31.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

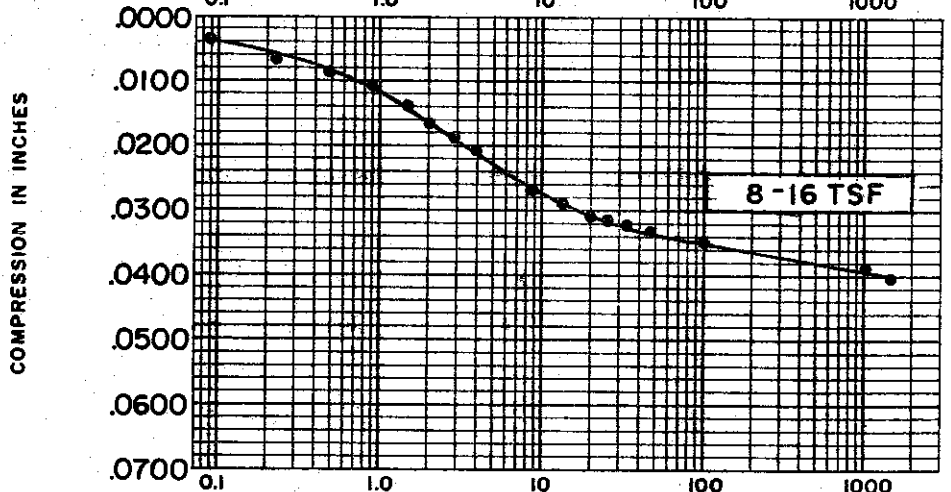
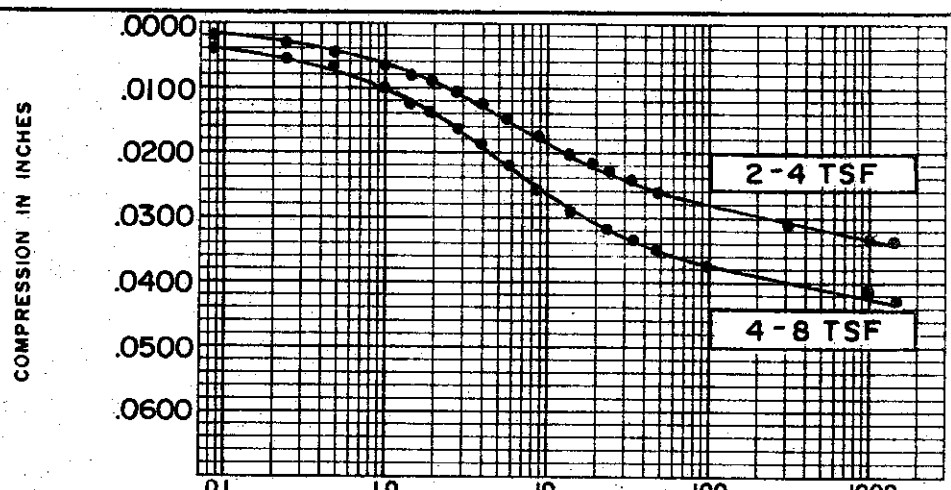
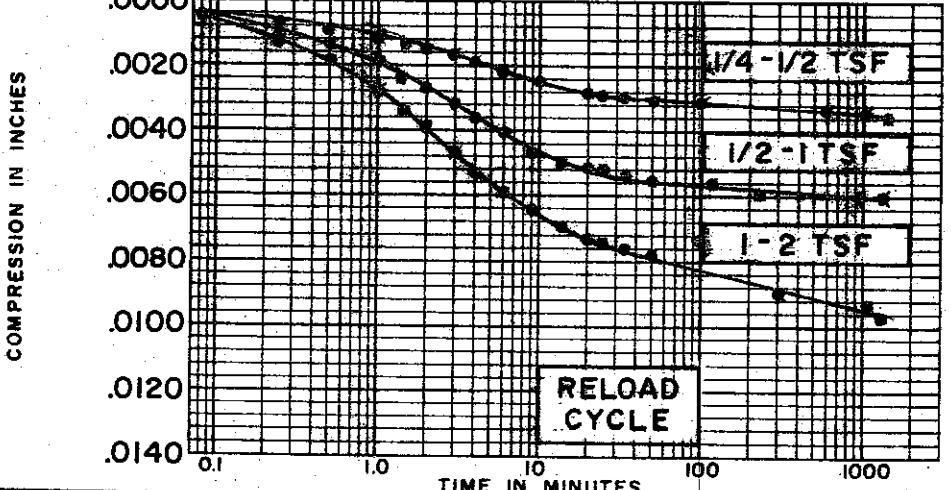
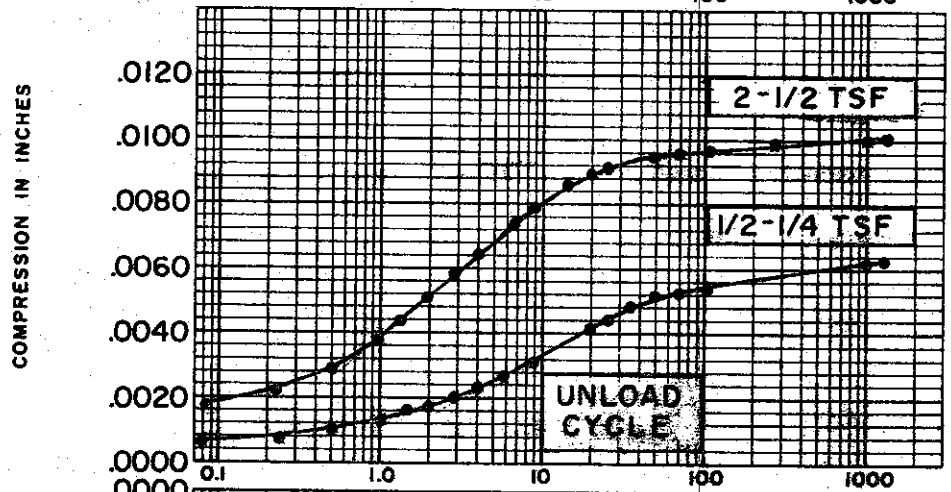
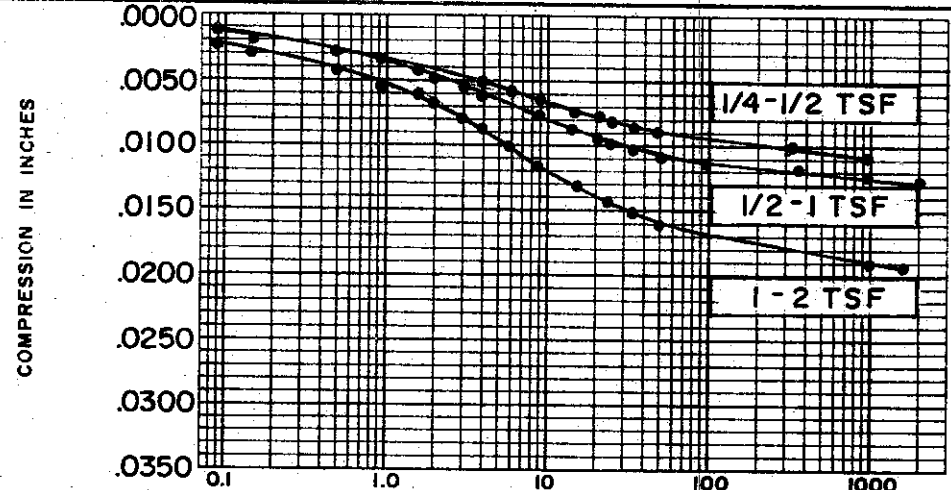
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 48 TEST NO. C202.1  
 SAMPLE NO. 10 DATE MARCH 74  
 DEPTH 39.2' TO 39.4'

C-493



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	29.8%
FINAL WATER CONTENT	31.5%
BORING NO.	48
SAMPLE NO.	10
DEPTH	39.2' TO 39.4'

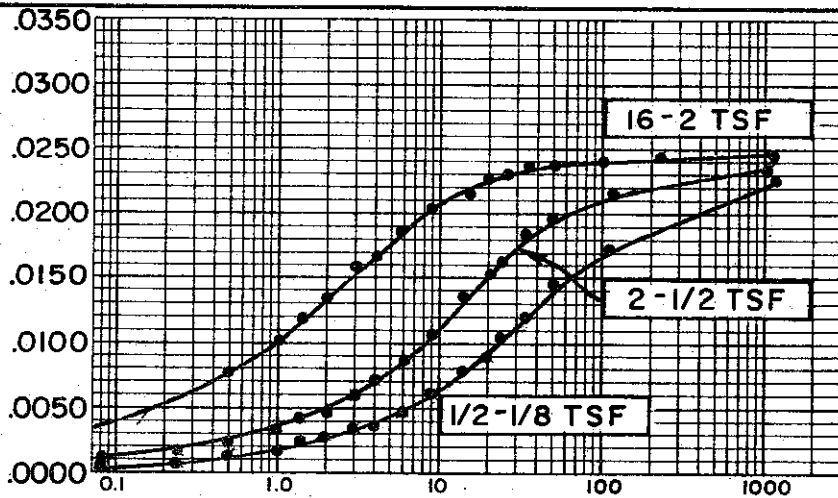
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.027

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

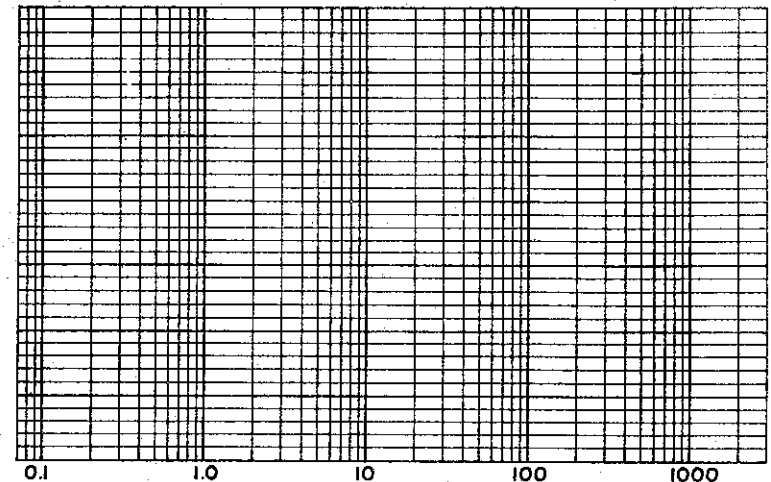
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-495

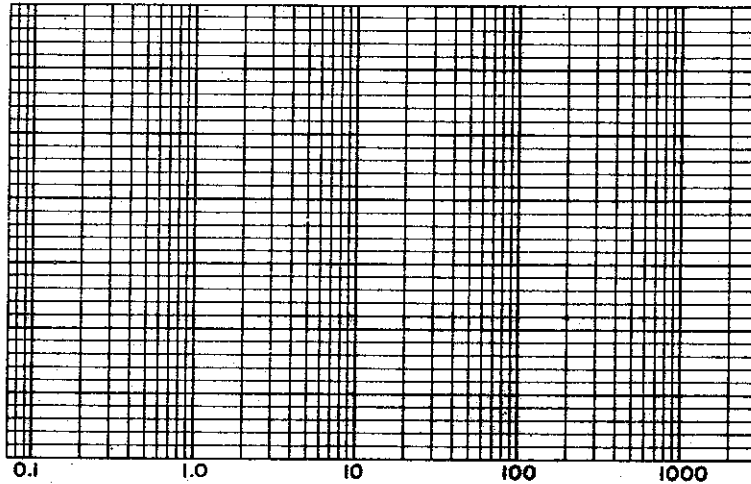
COMPRESSION IN INCHES



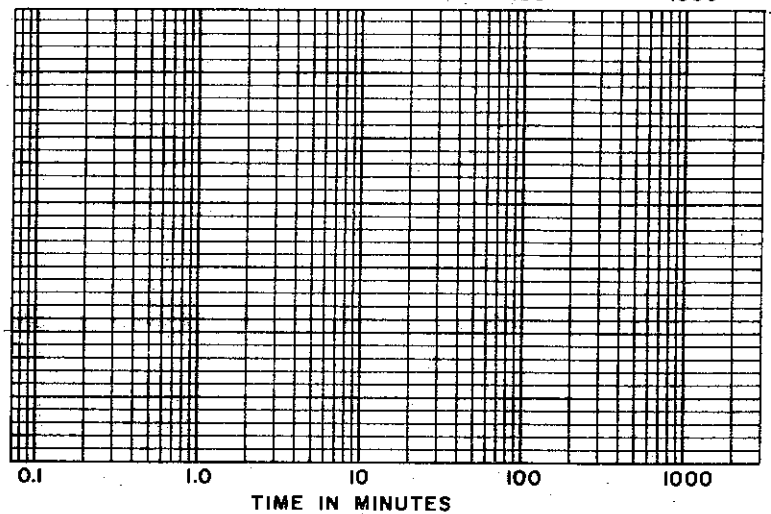
COMPRESSION IN INCHES



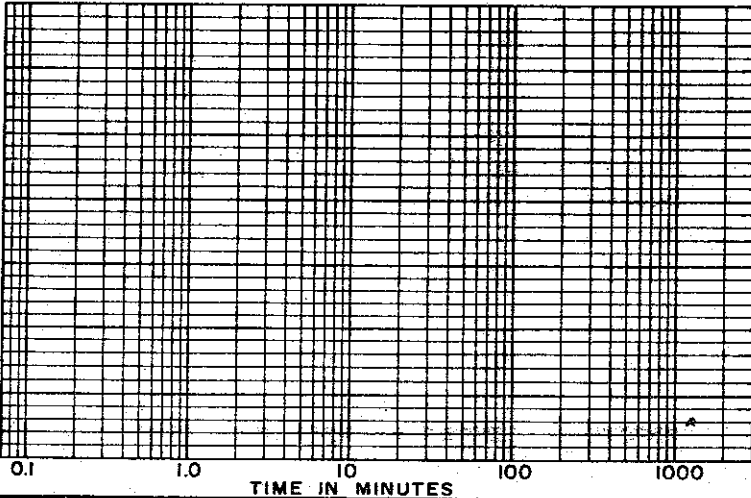
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.7'

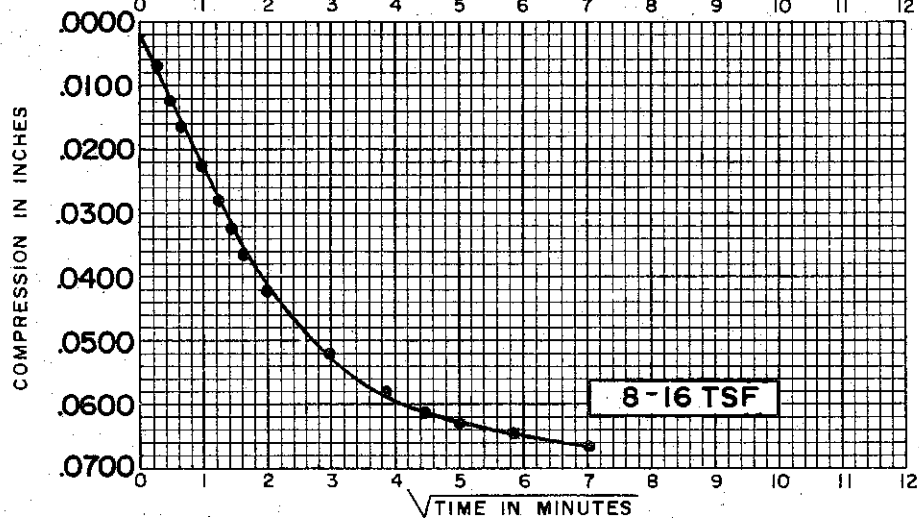
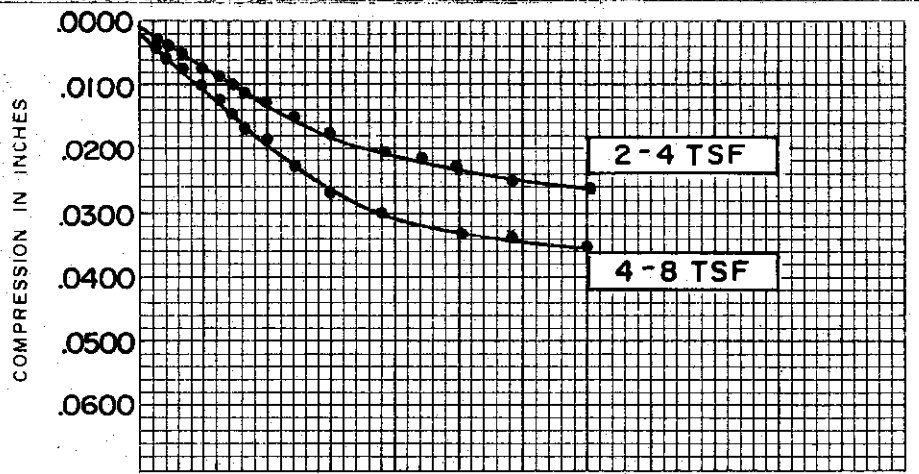
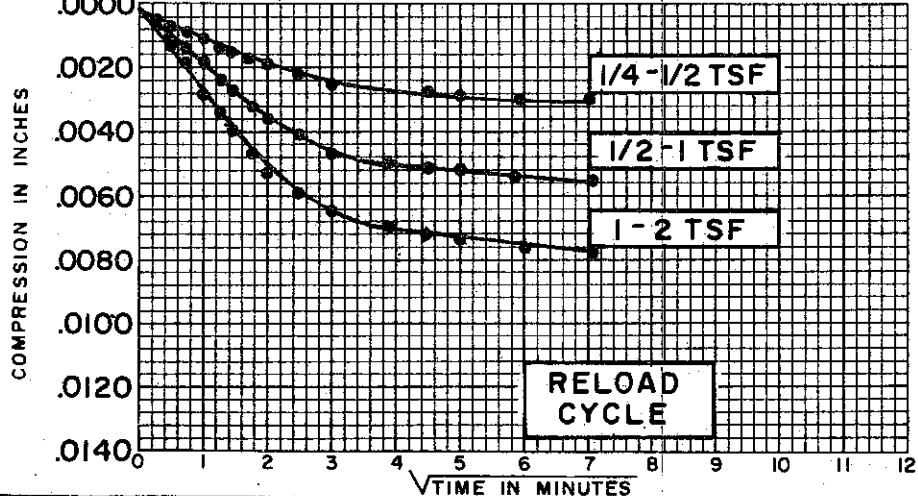
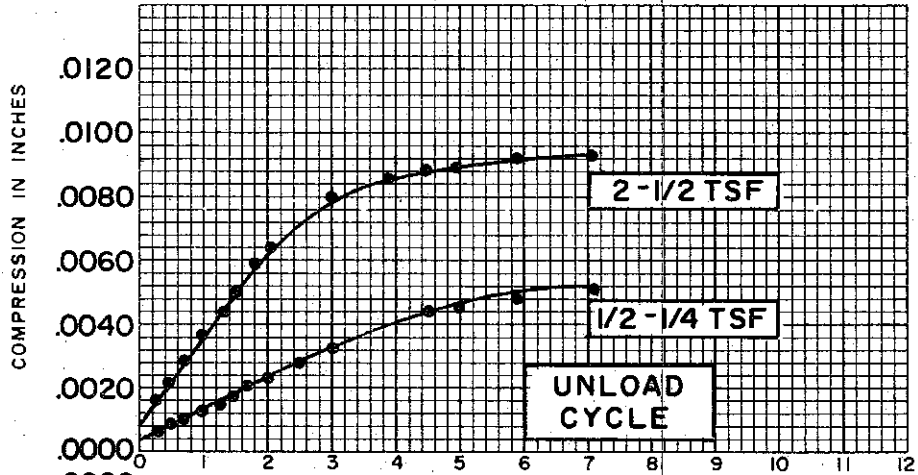
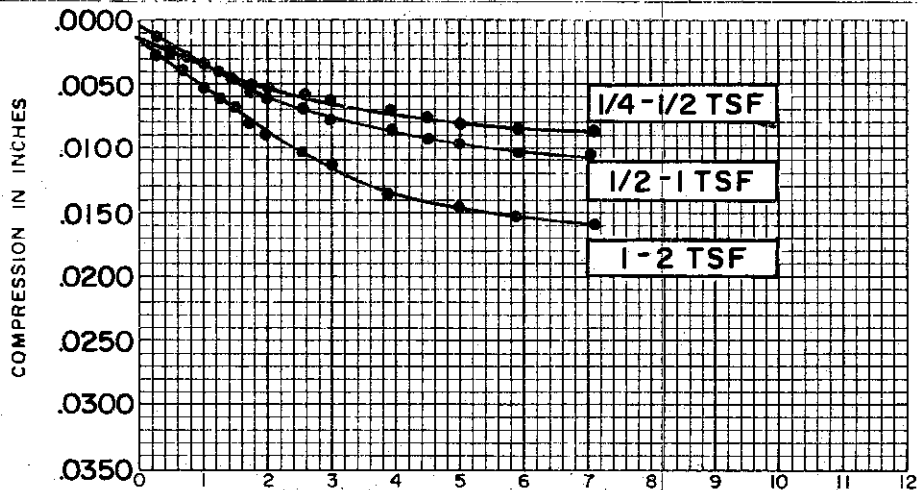
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

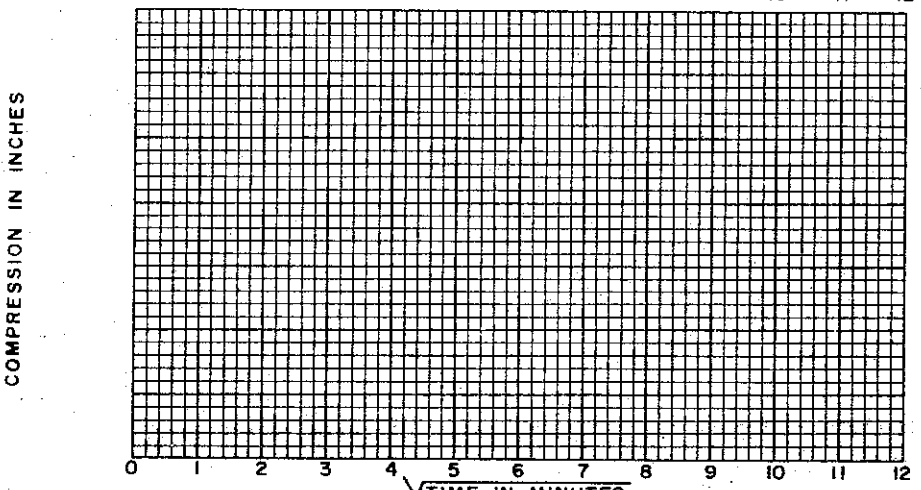
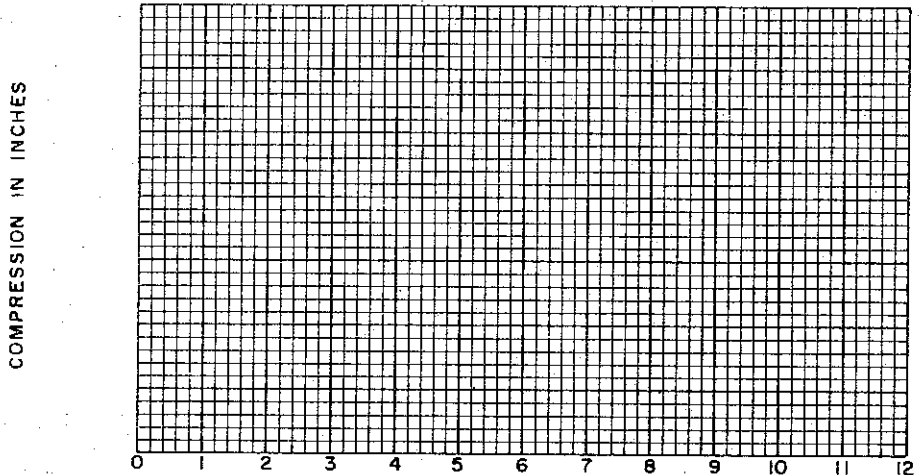
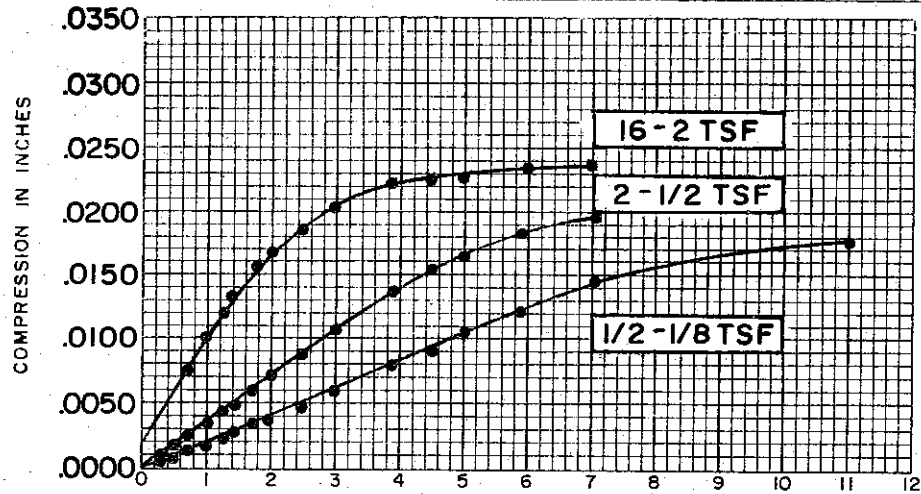
BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

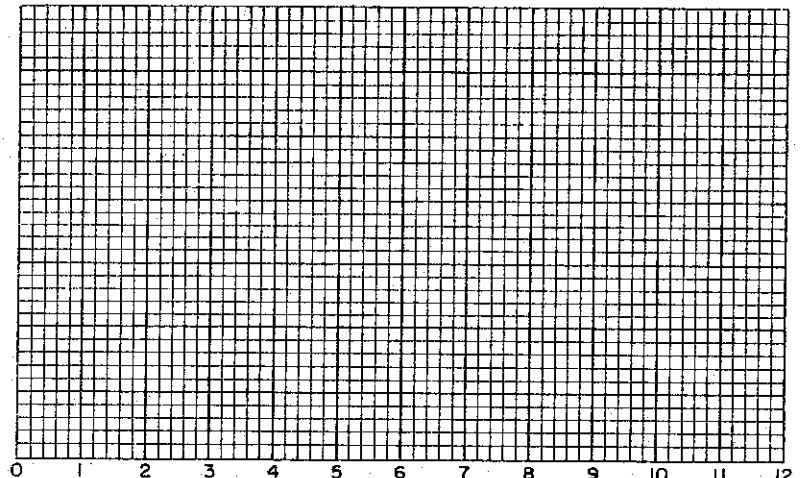
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

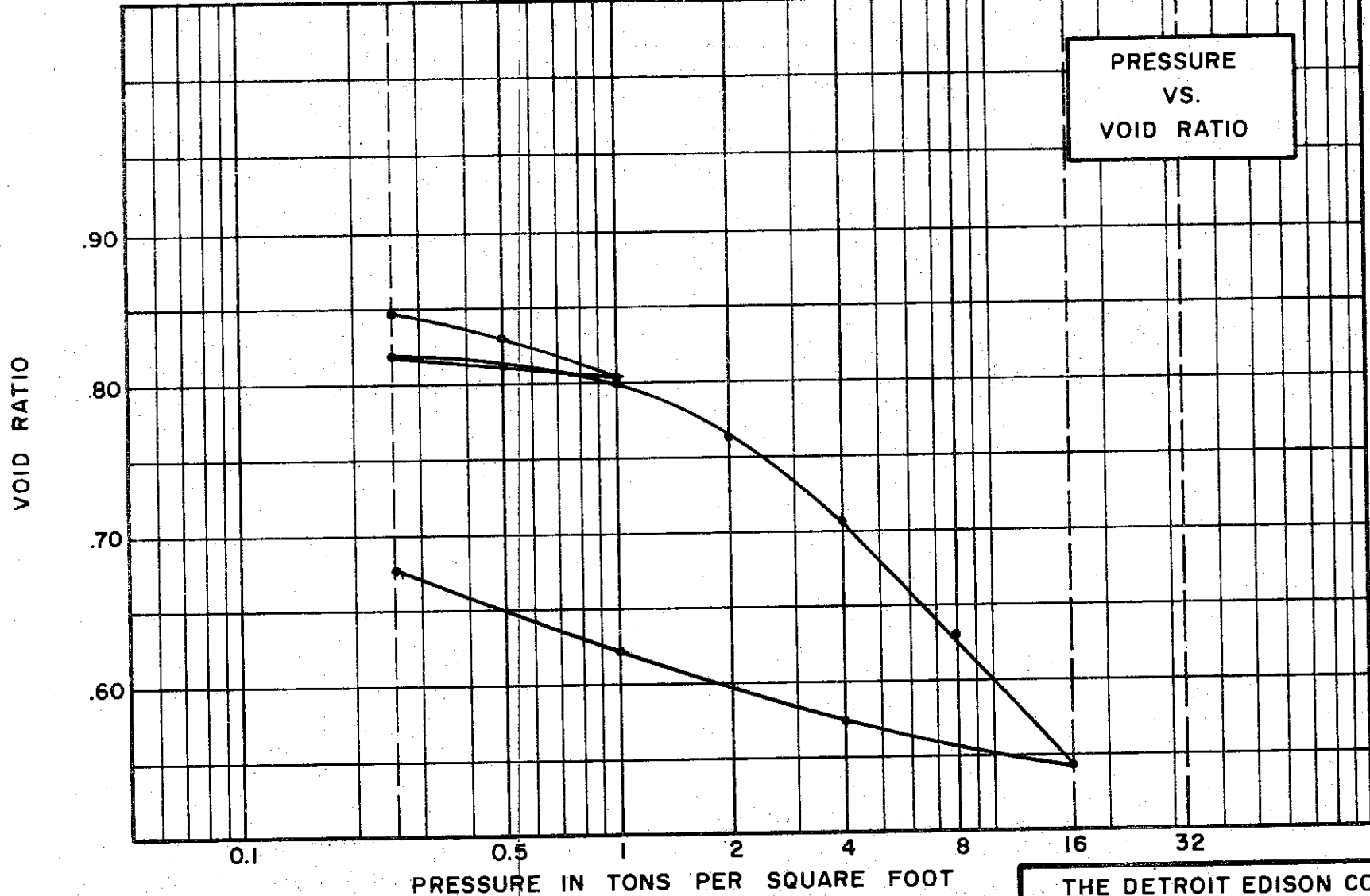
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-497

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 33.3% FINAL 28.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 23%

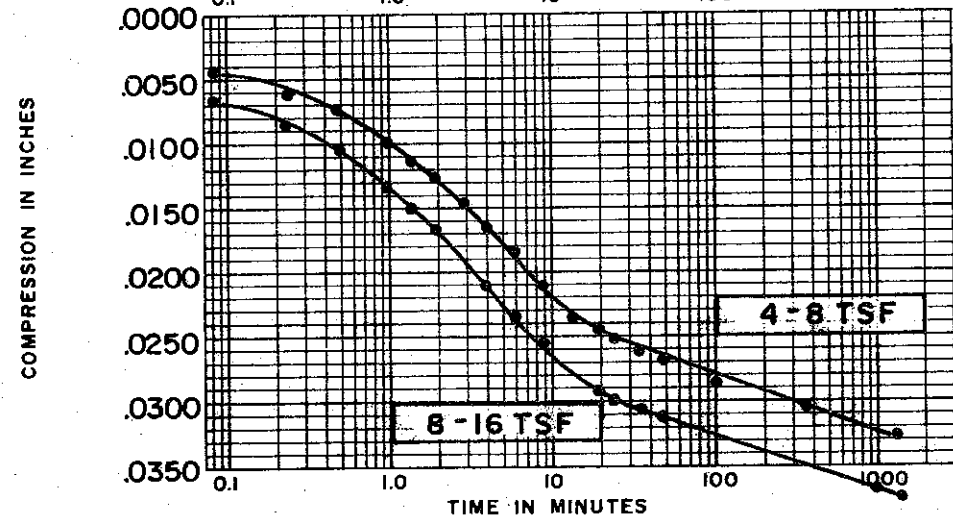
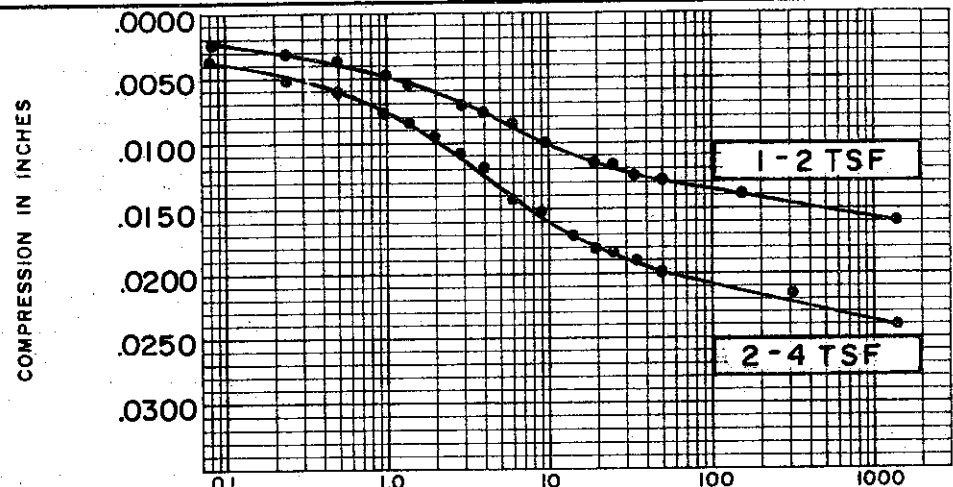
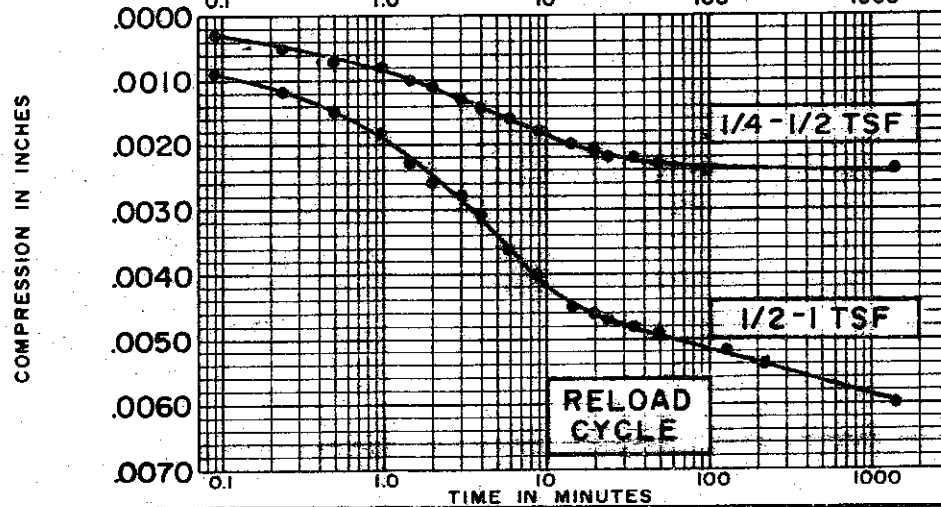
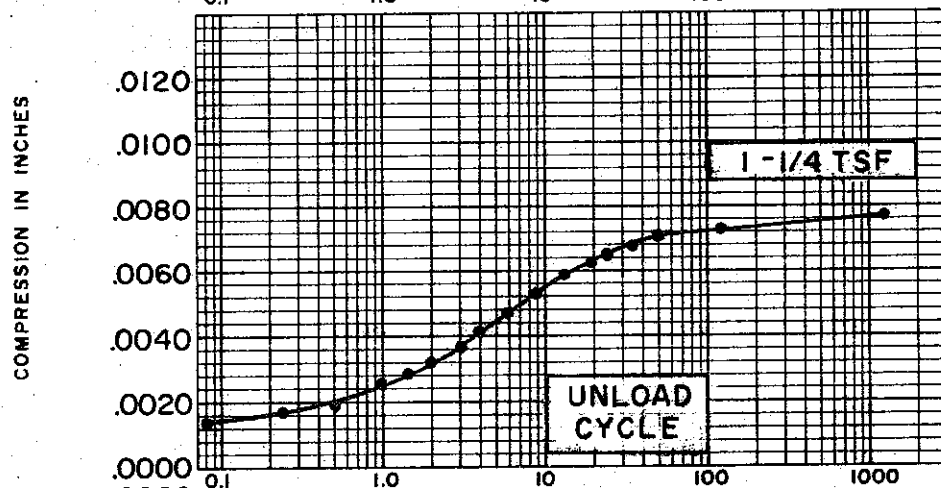
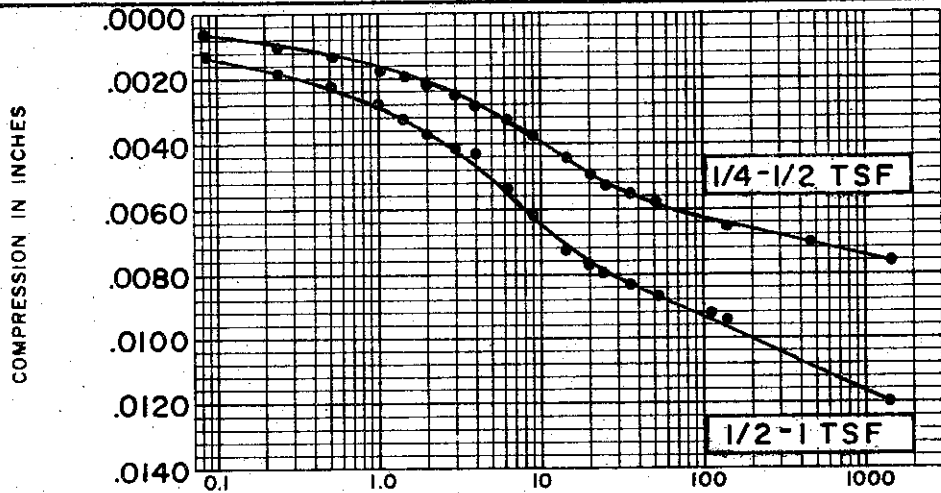
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 49 TEST NO. C133.1  
 SAMPLE NO. 3 DATE FEB. 1974  
 DEPTH 13.7' TO 14.0'



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

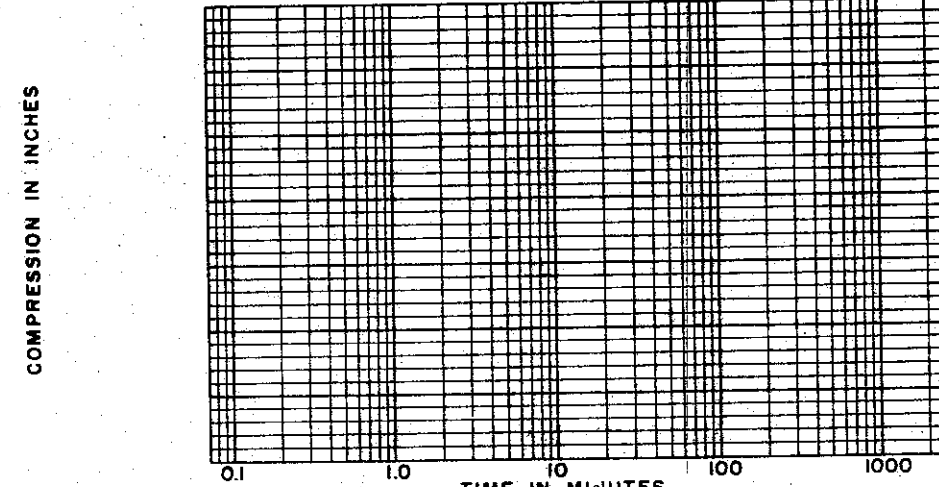
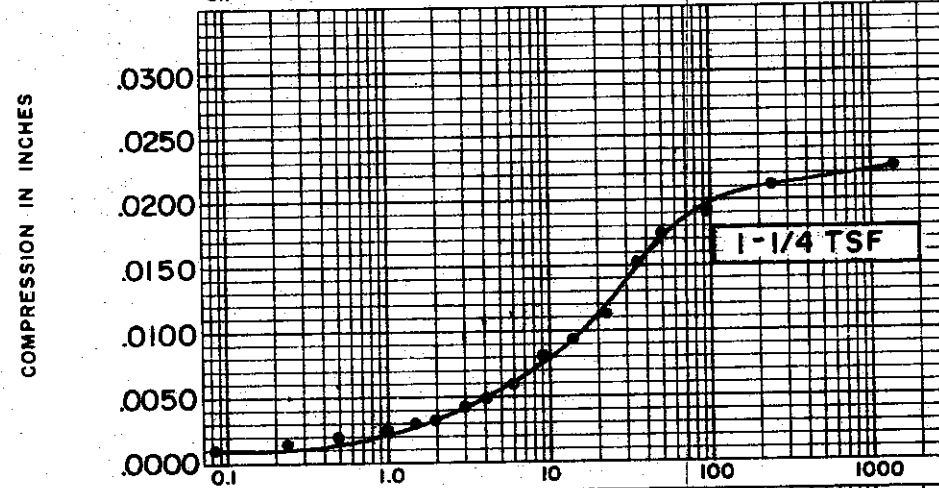
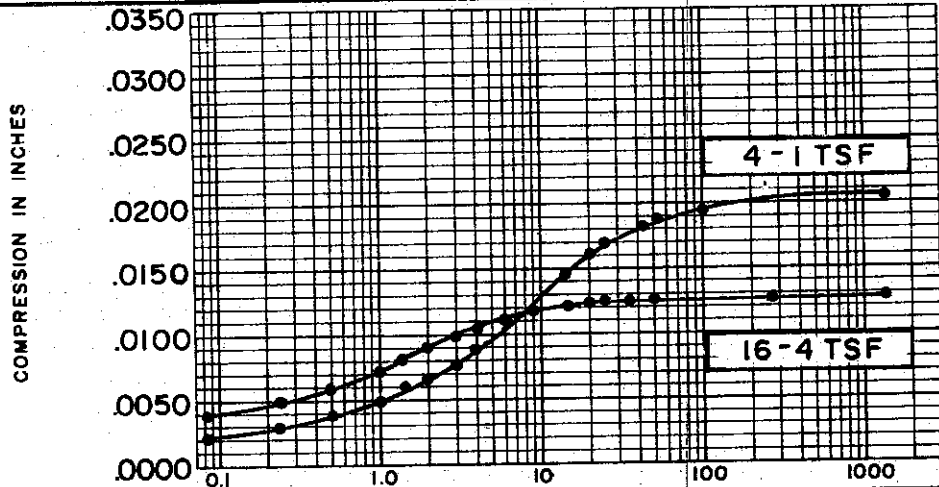
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

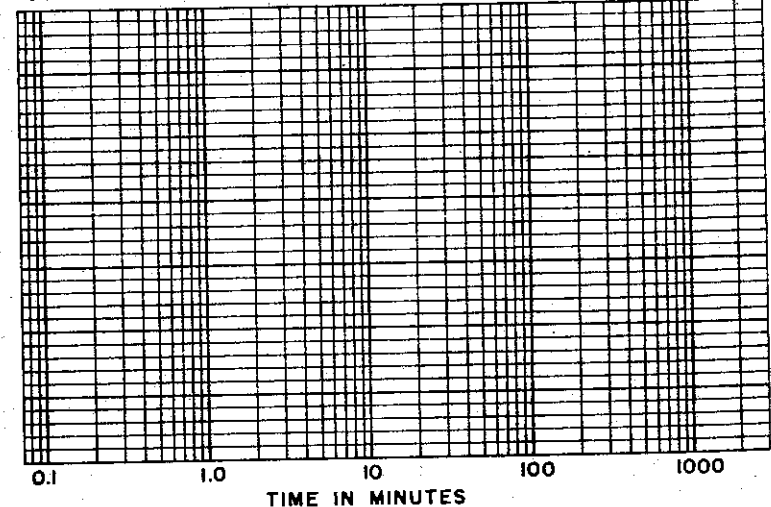
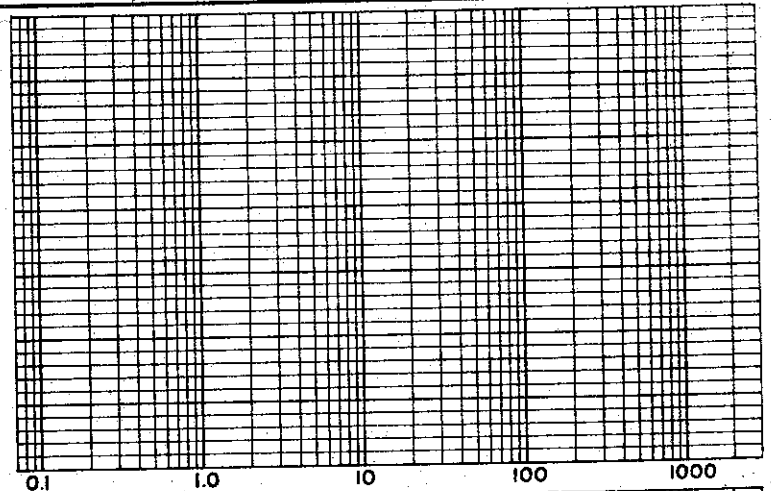
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-499



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

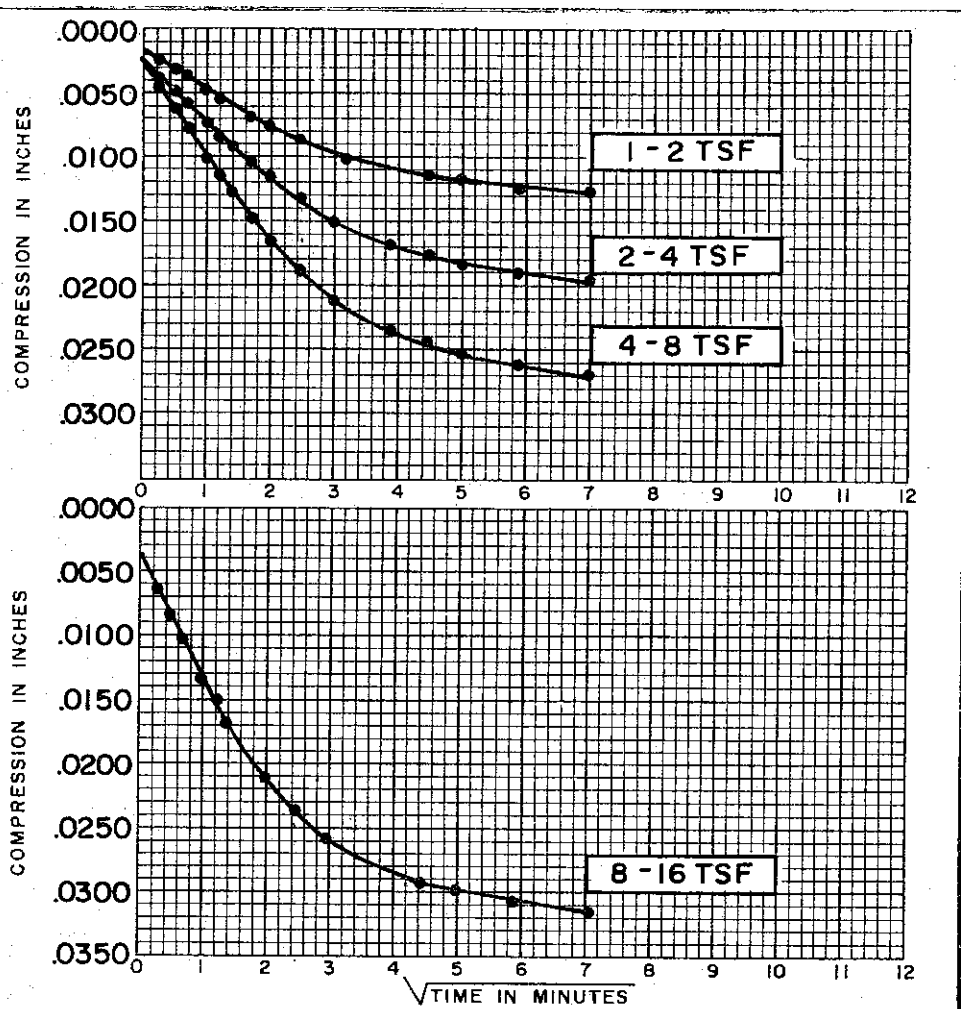
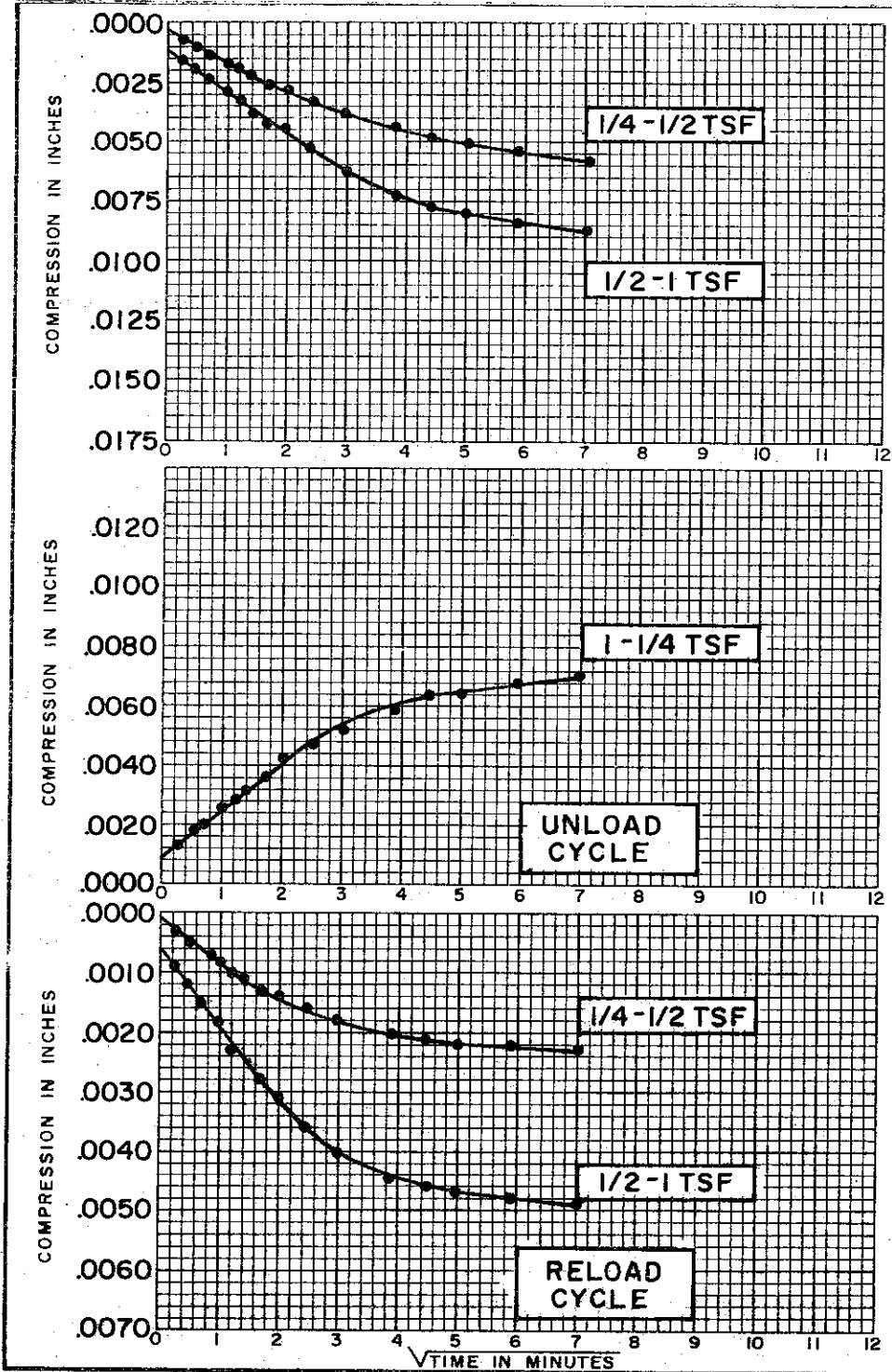
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.80"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

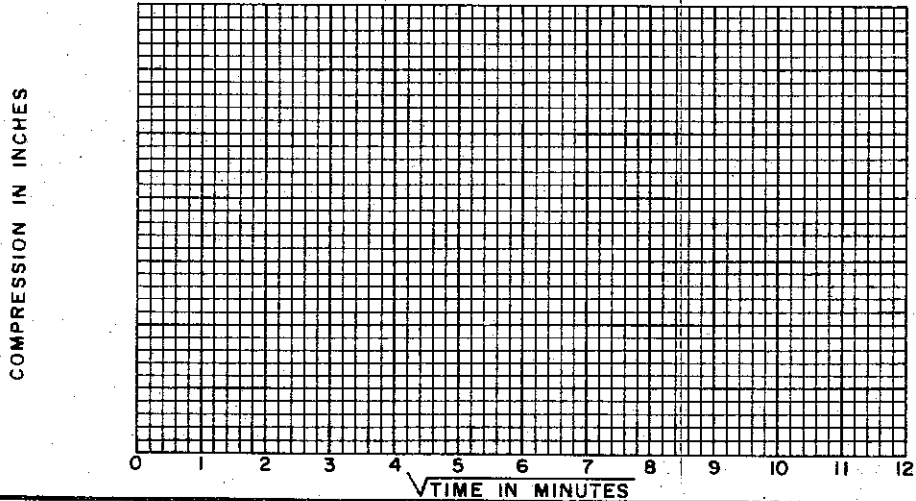
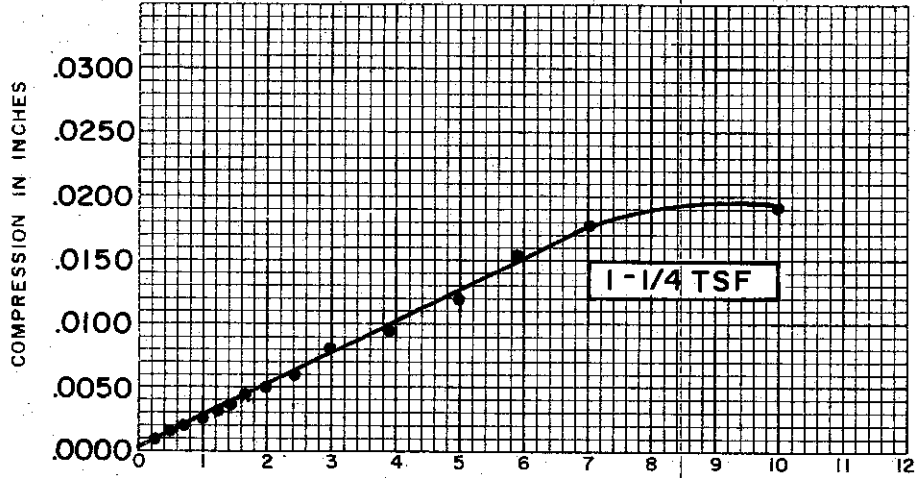
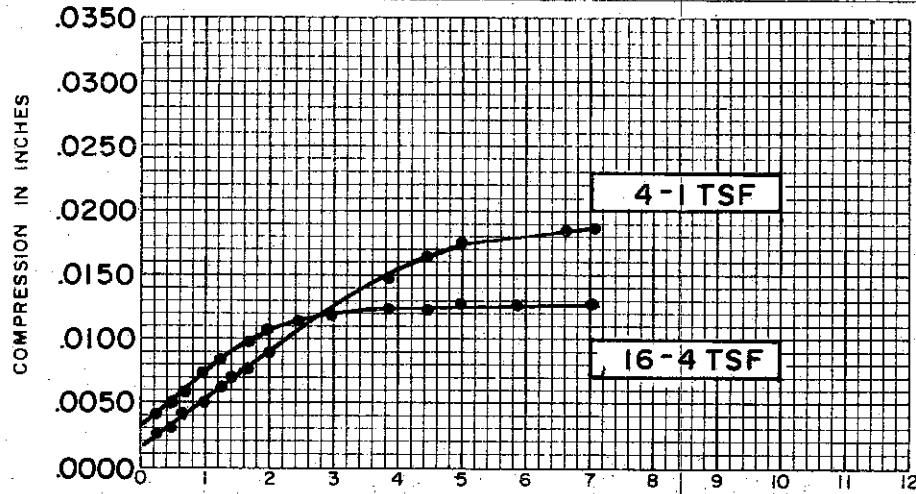
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-501



SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>3</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>13.7' TO 14.0'</u>
INITIAL WATER CONTENT	<u>33.3%</u>	
FINAL WATER CONTENT	<u>28.5%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.60"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.863</u>	
<b>CONSOLIDATION TEST</b>		
<b>TIME VS. COMPRESSION CURVES</b>		
THE DETROIT EDISON COMPANY		
BELLE RIVER PLANT UNITS I & II		

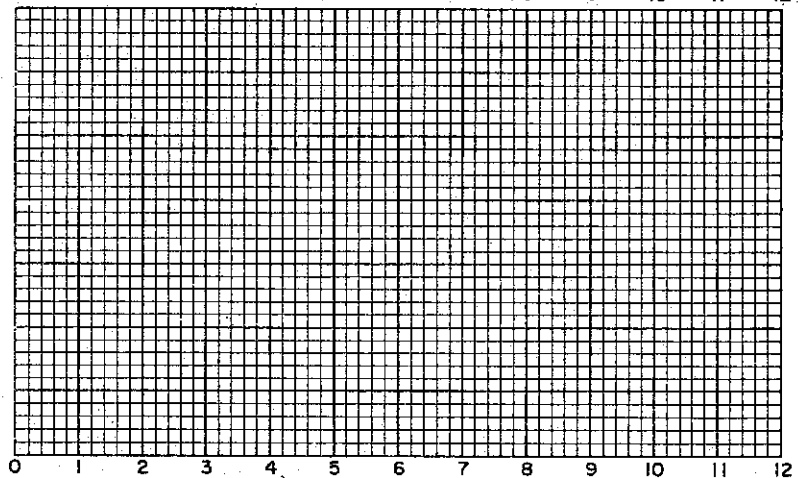
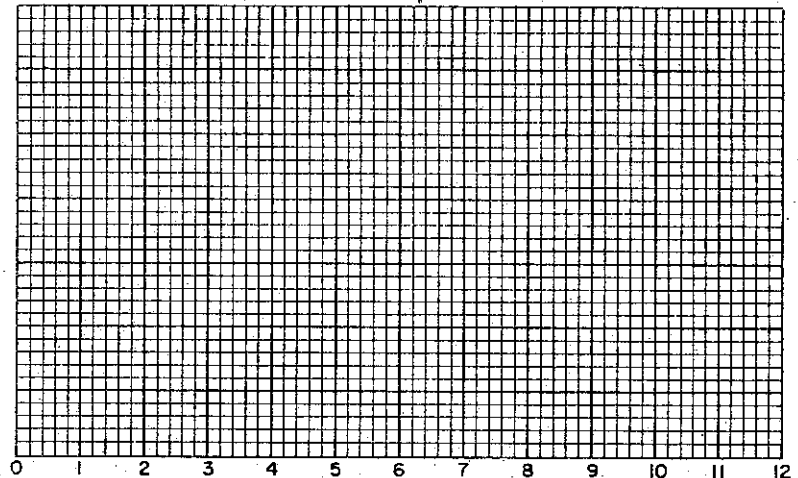
GOLDBERG-ZOINO & ASSOCIATES, INC.  
SOIL AND FOUNDATION ENGINEERS



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

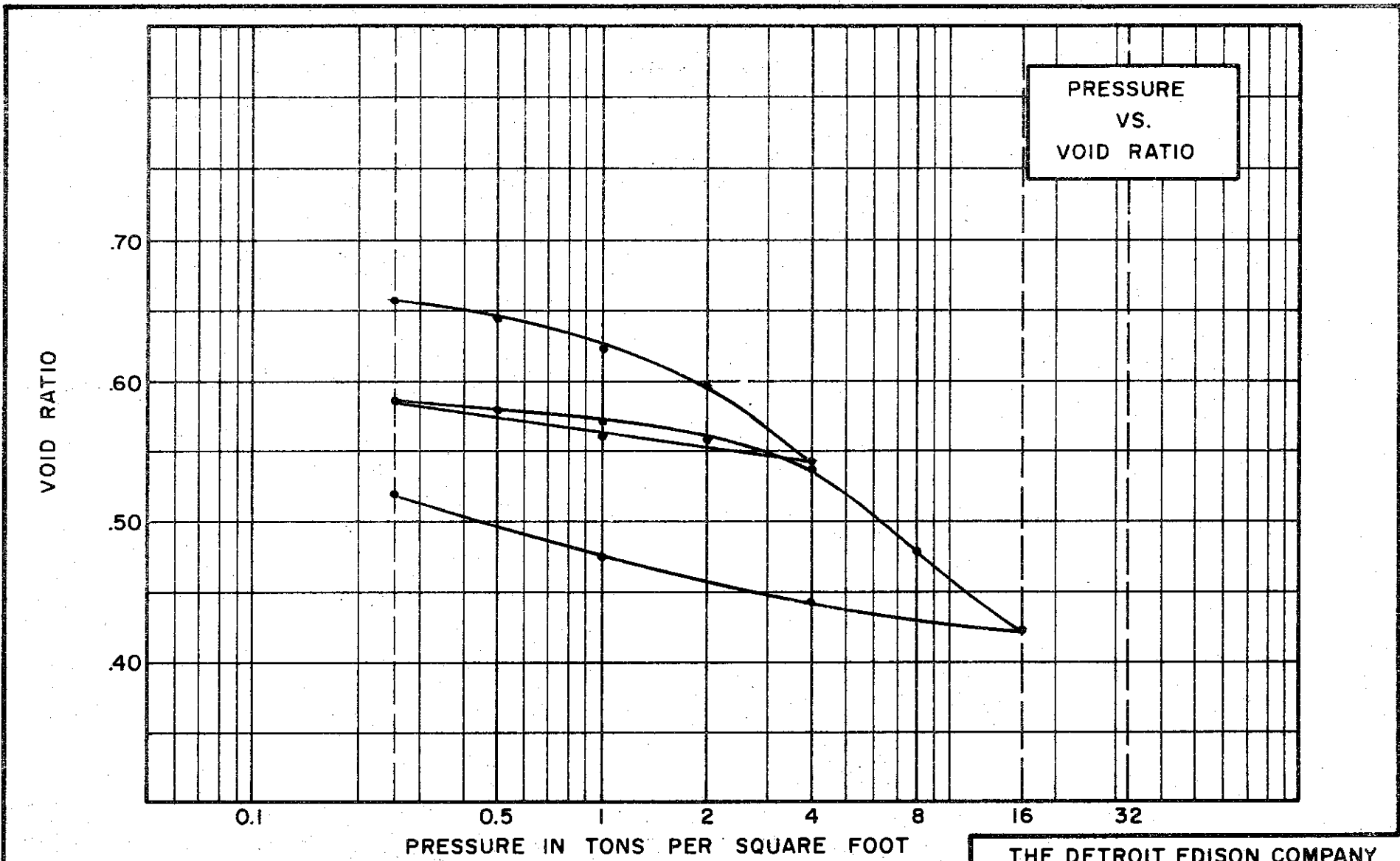
BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 28.6% FINAL 24.4%

ATTERBERG LIMITS:  
 LIQUID LIMIT 37% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.701

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

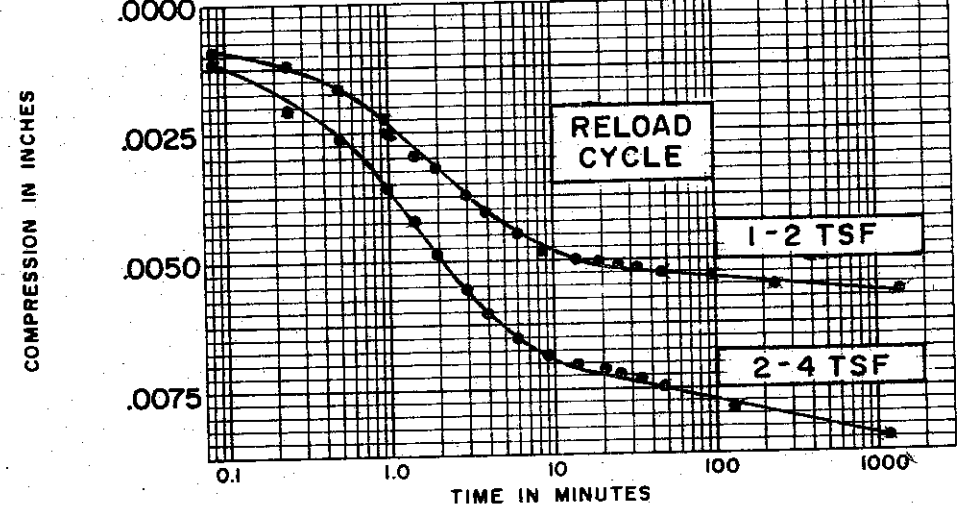
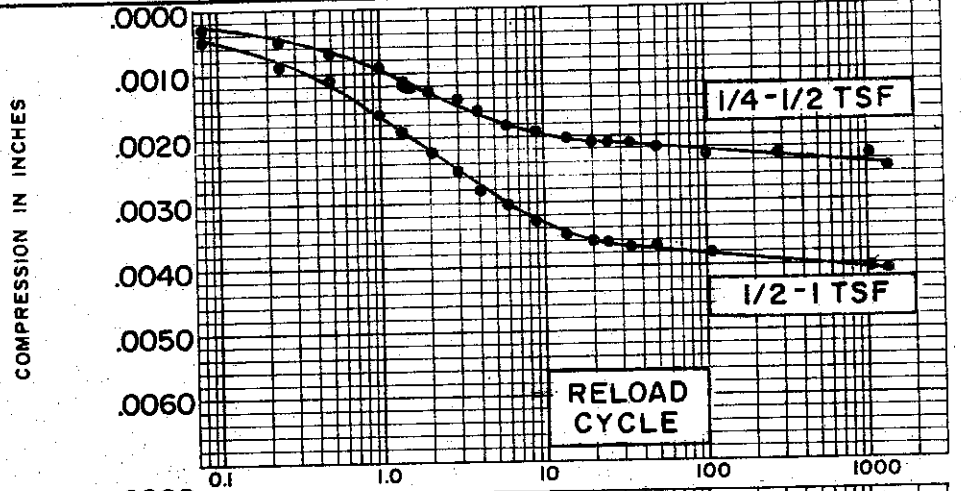
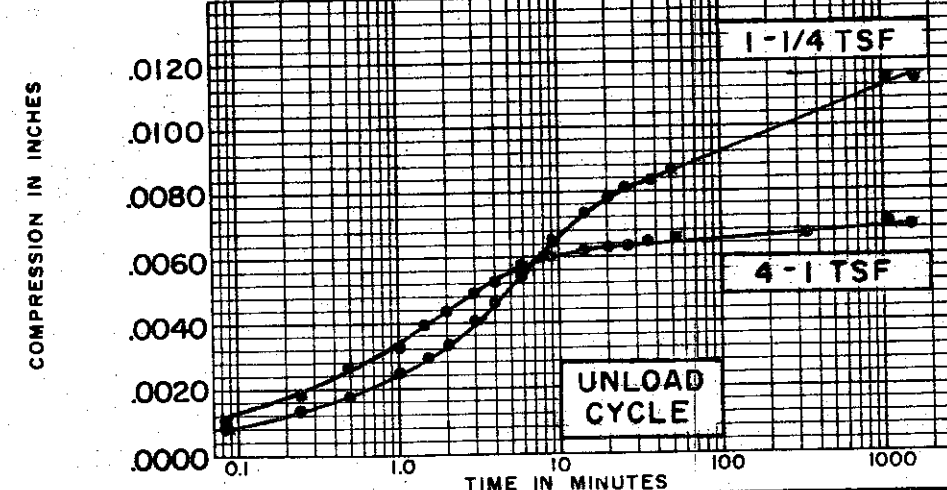
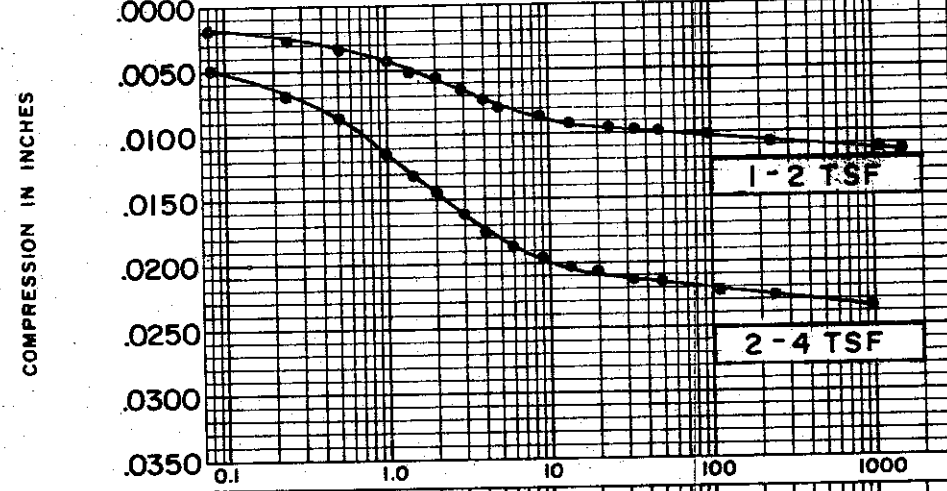
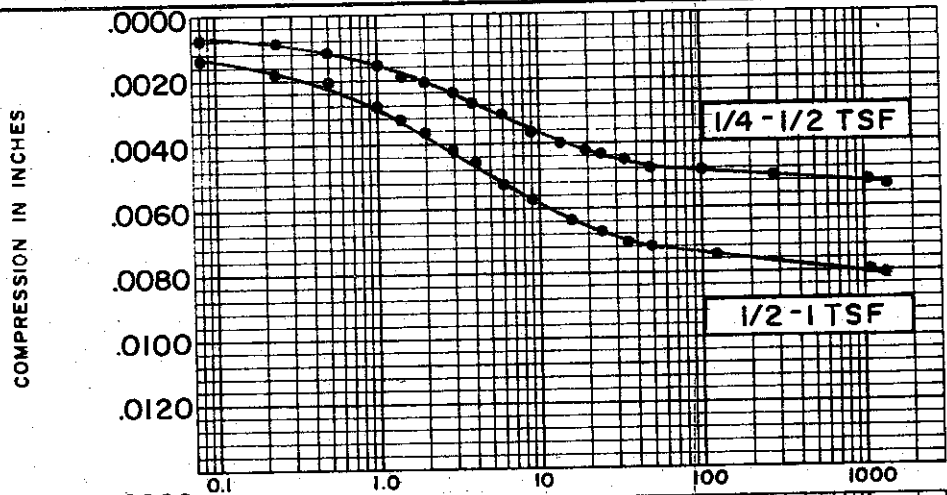
**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 49 TEST NO. C141.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 93.8' TO 94.0'

C-503



C-504



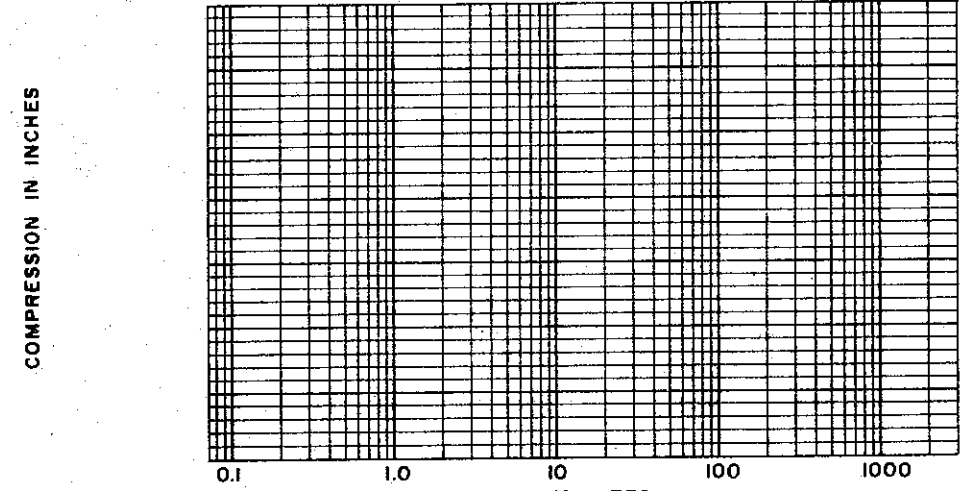
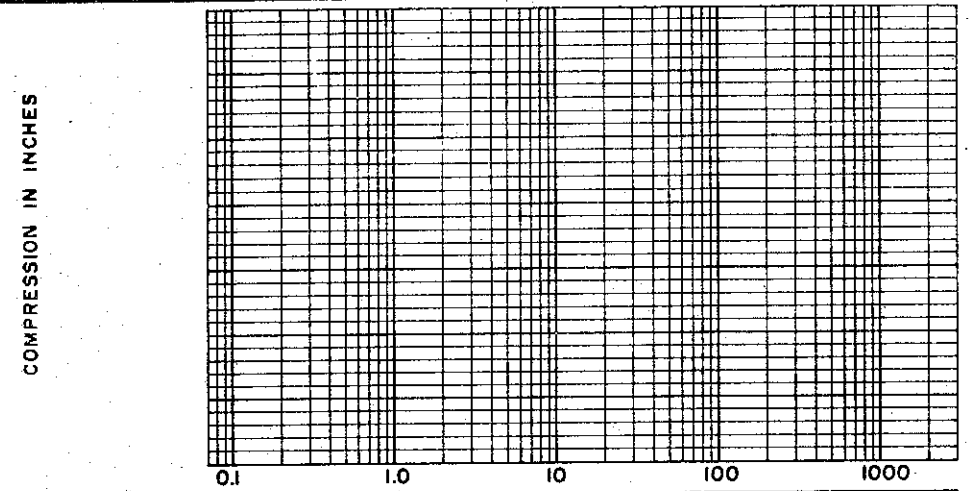
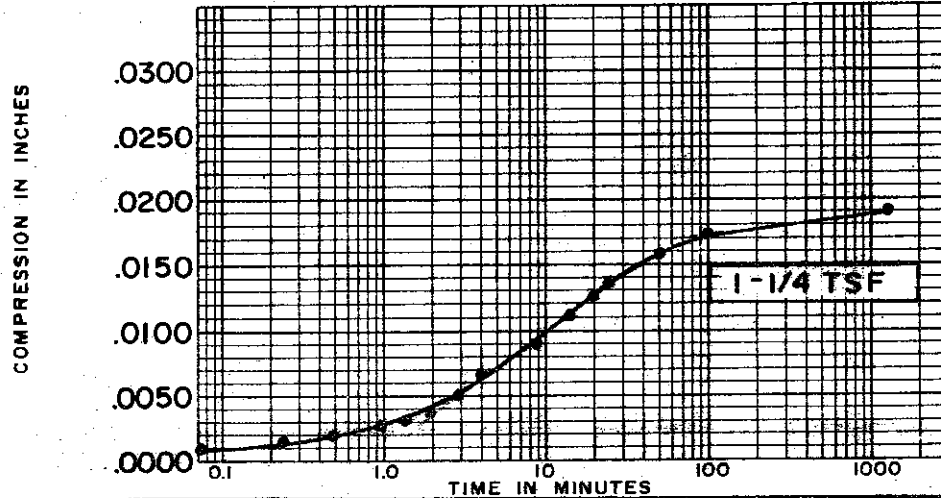
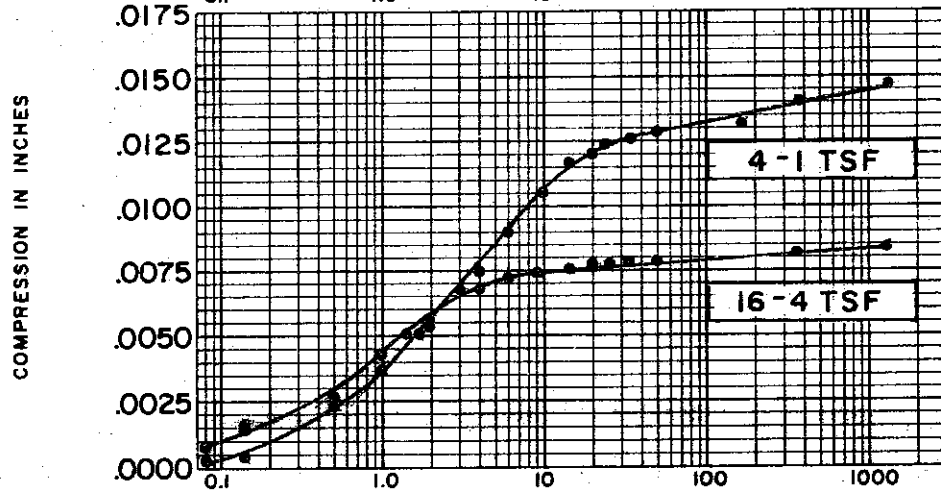
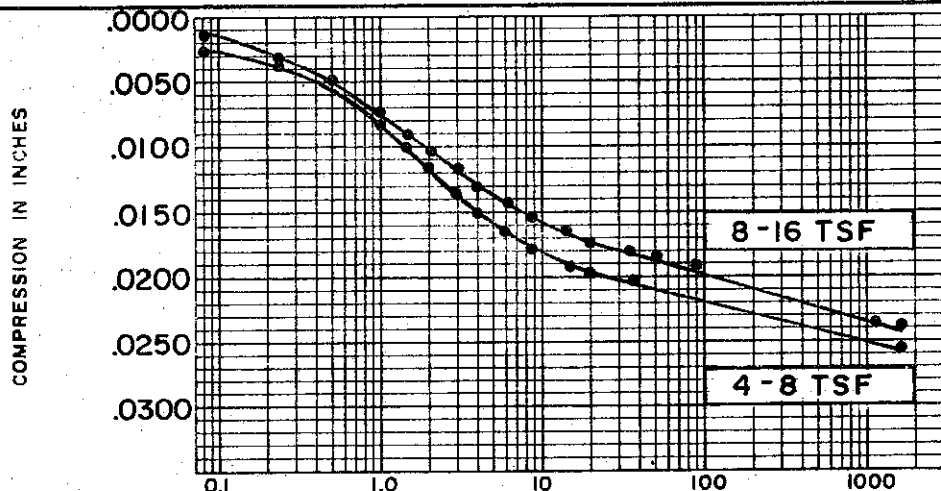
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 28.6%  
 FINAL WATER CONTENT 24.4%

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

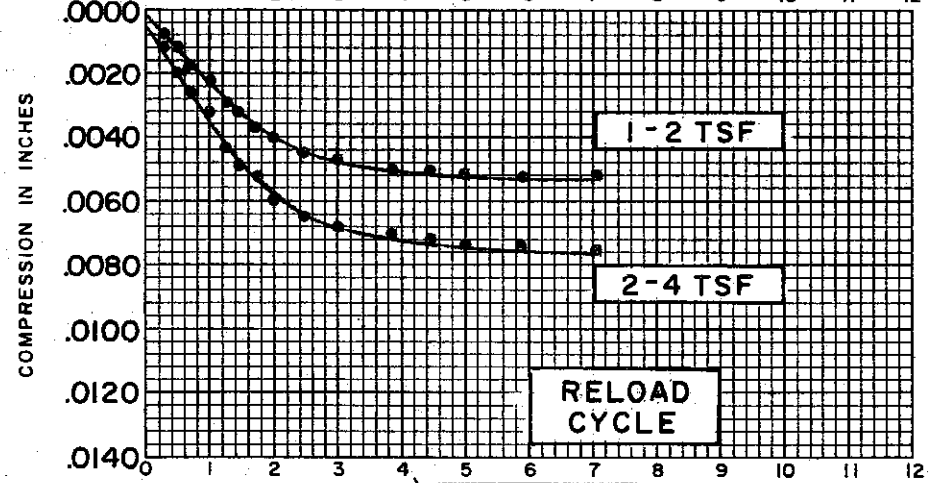
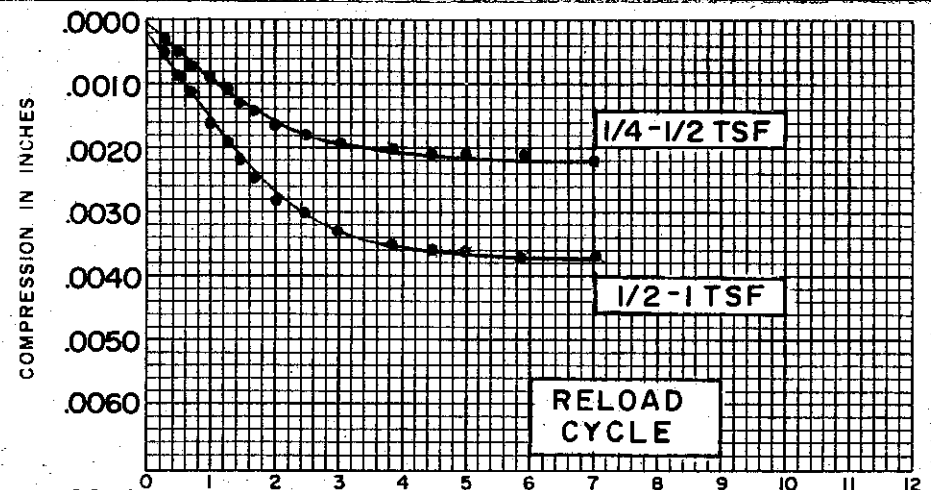
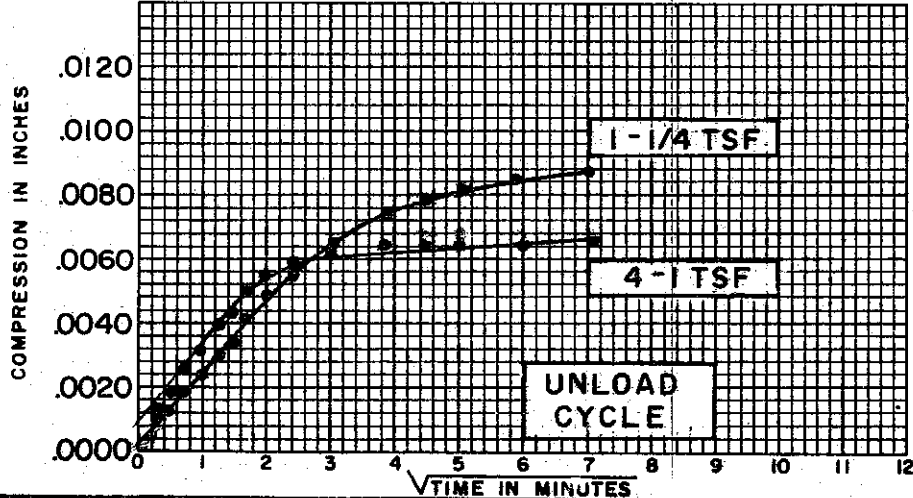
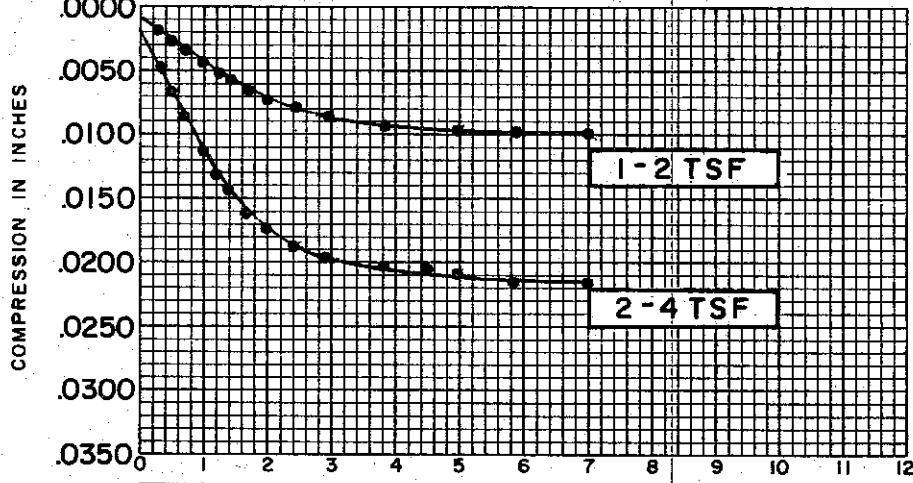
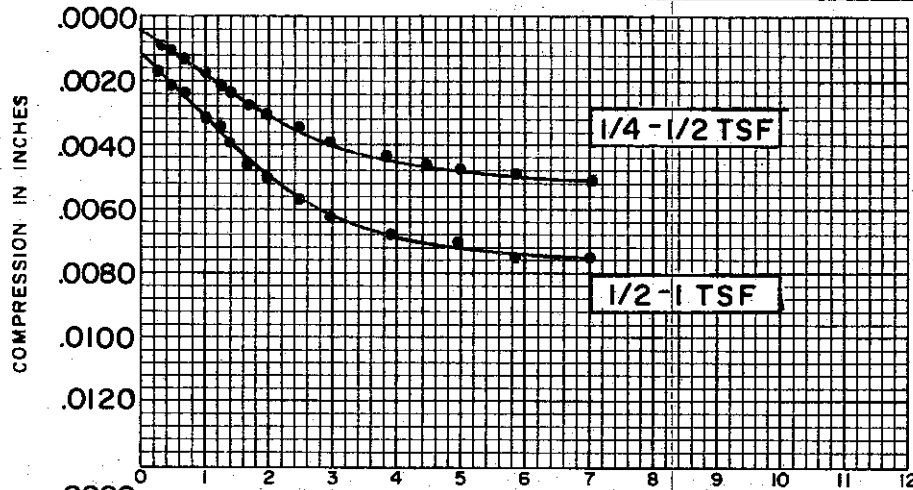
**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.701

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-505



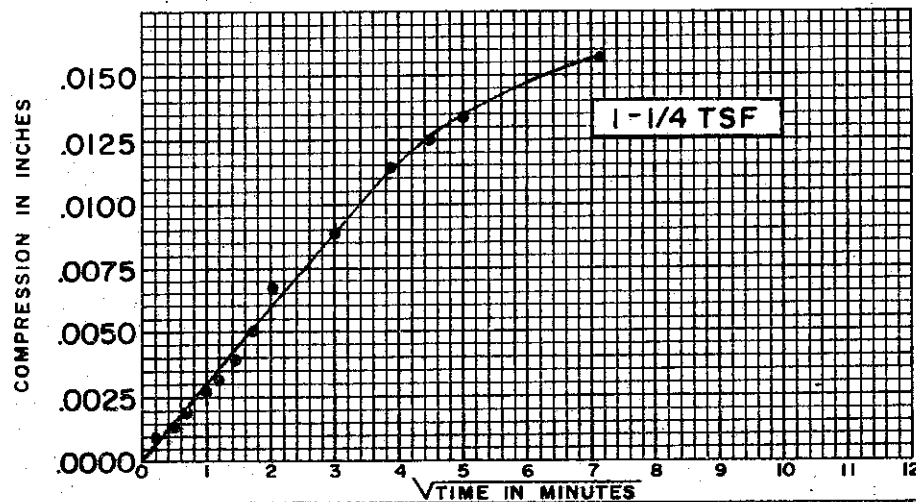
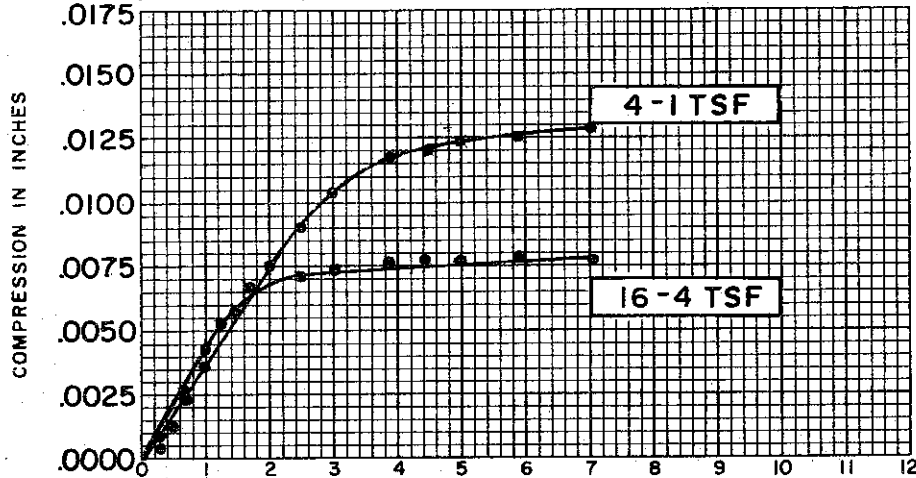
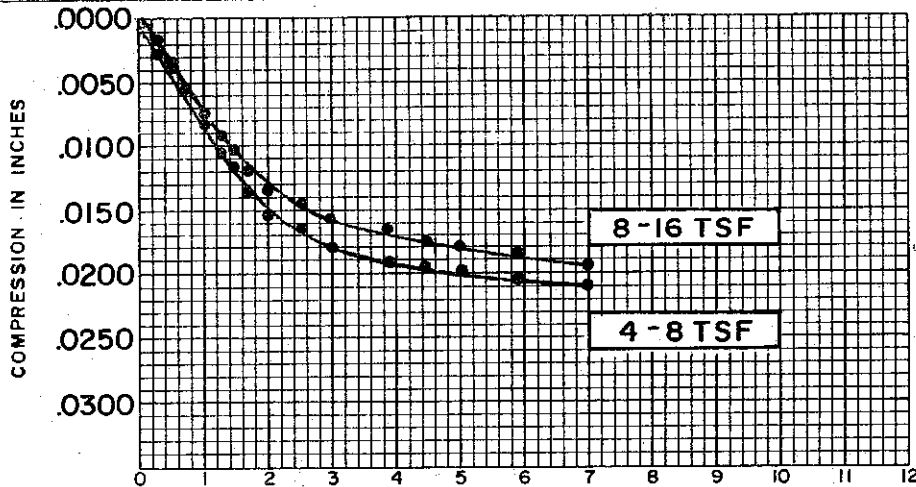
SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.75"</u>	<b>CONSOLIDATION TEST</b> <b>TIME VS. COMPRESSION CURVE</b> THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.701</u>	



SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	

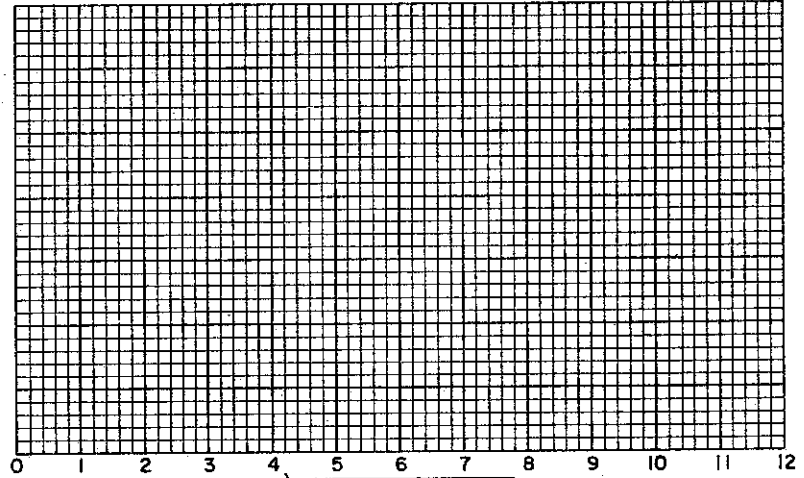
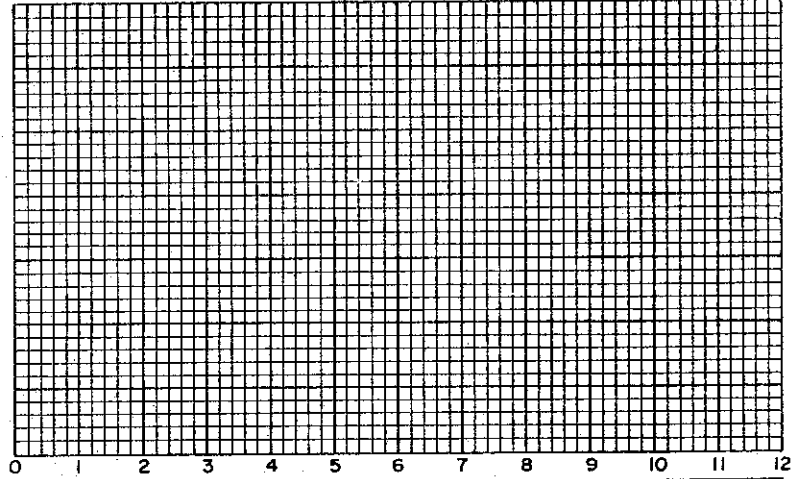
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.701</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



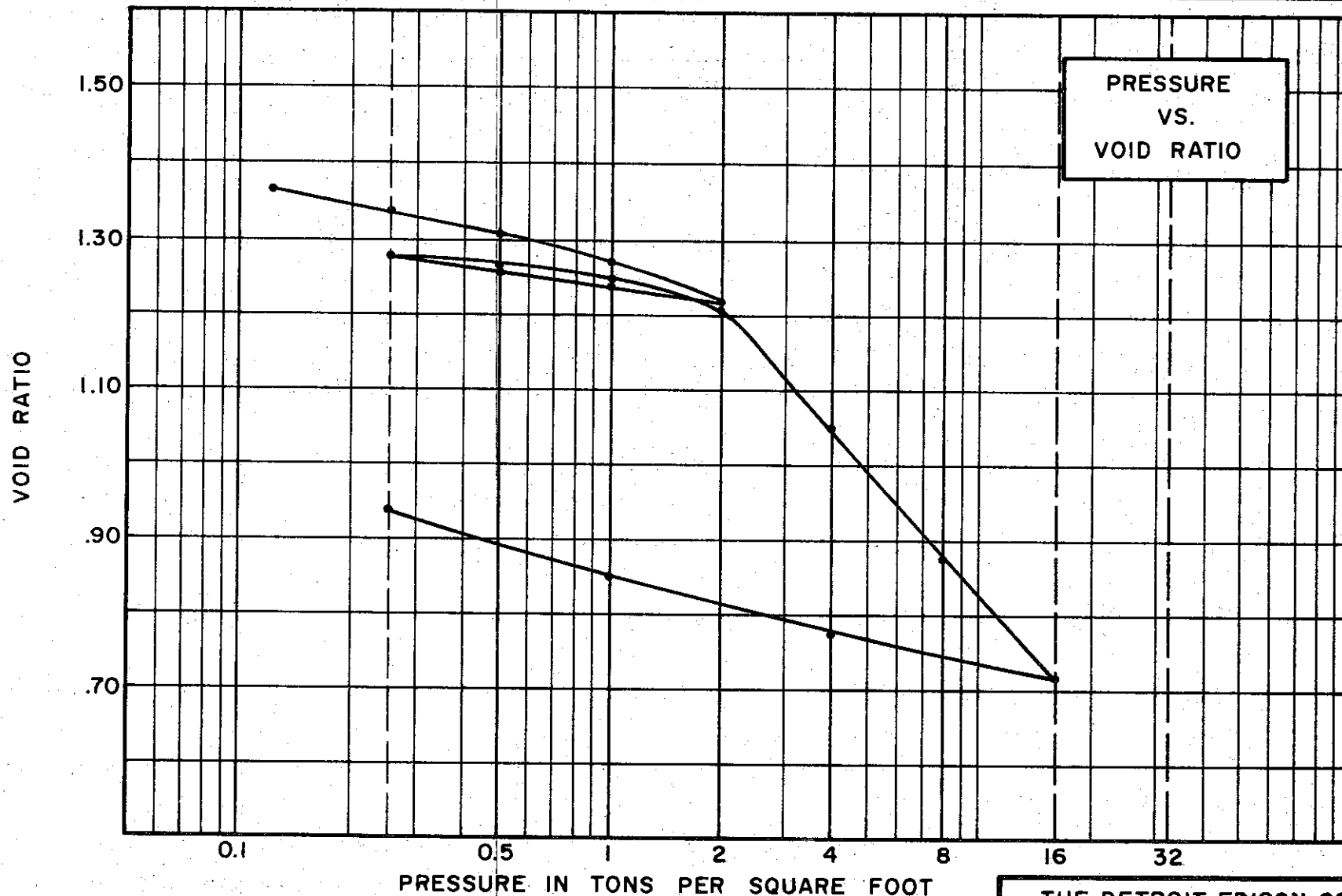
√TIME IN MINUTES

SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.701</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-507



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 51.6% FINAL 39.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

**TEST DATA**

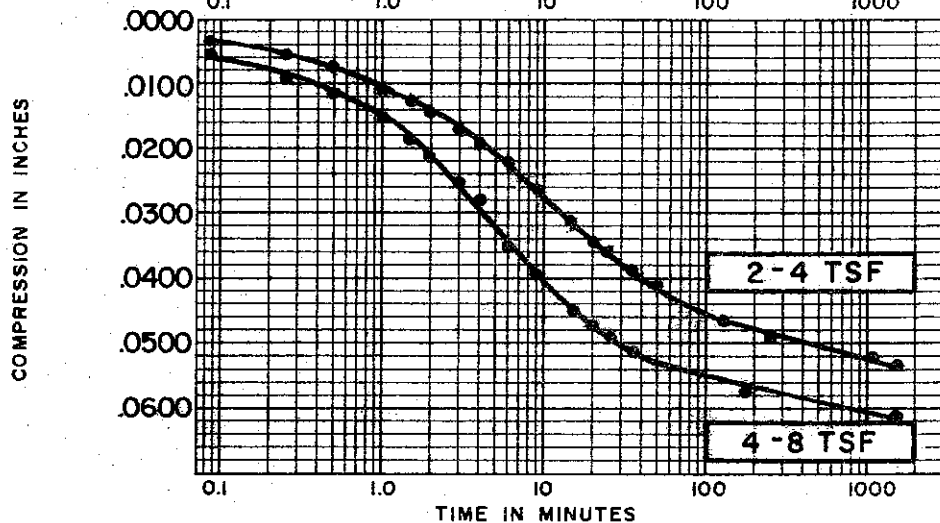
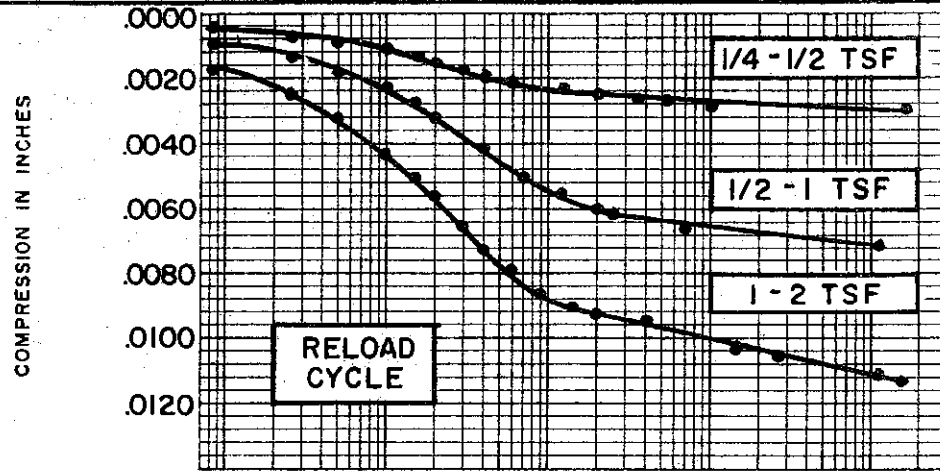
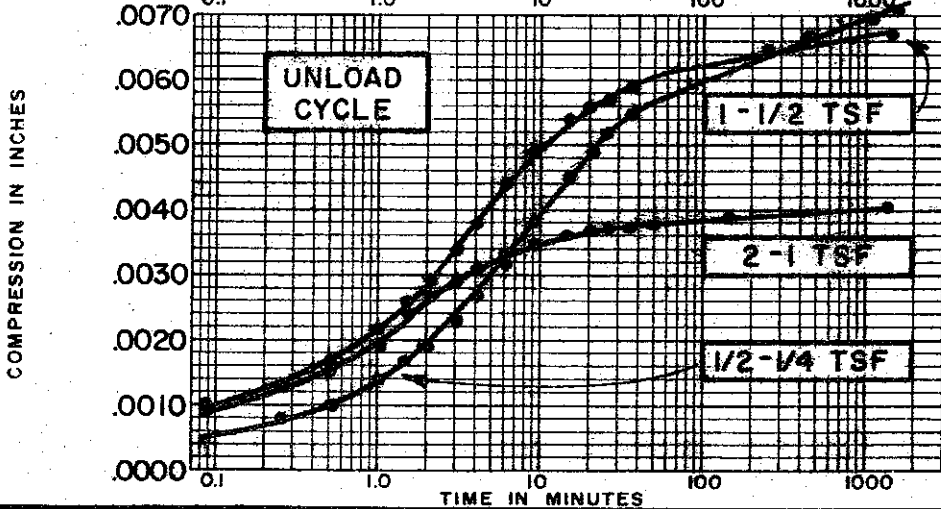
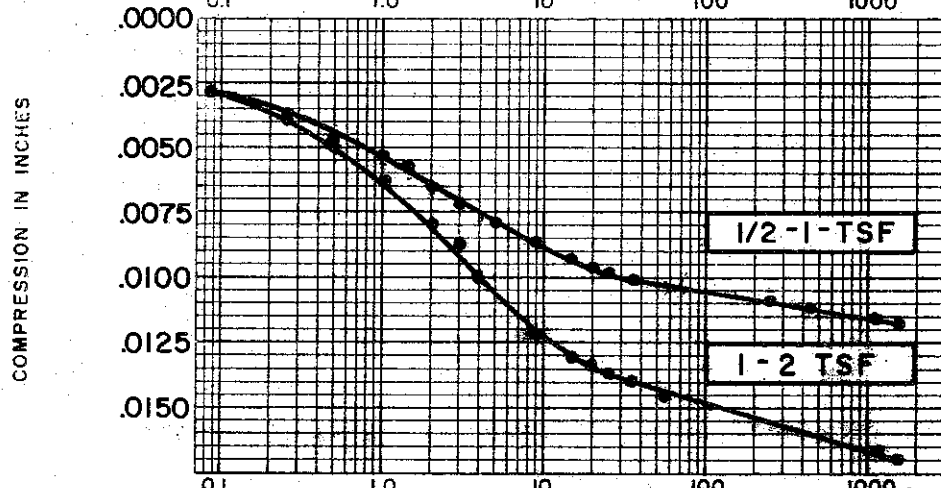
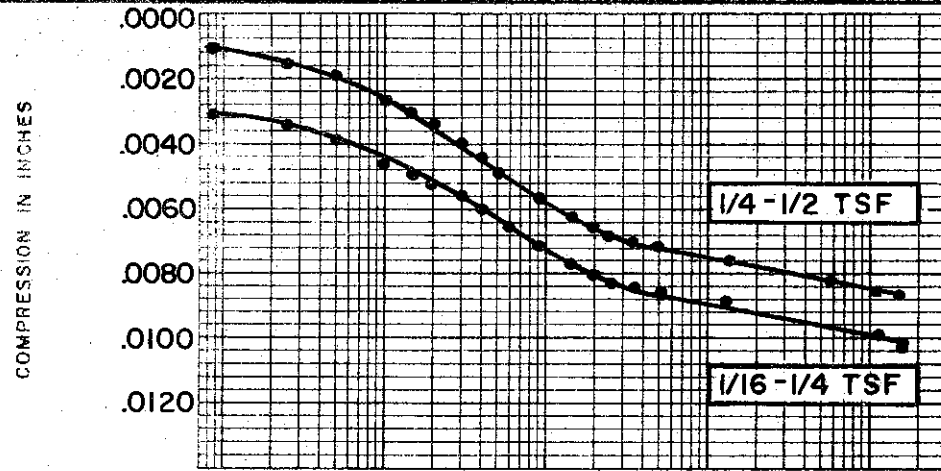
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 50 TEST NO. C86.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 38.5' TO 38.9'

C-509



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

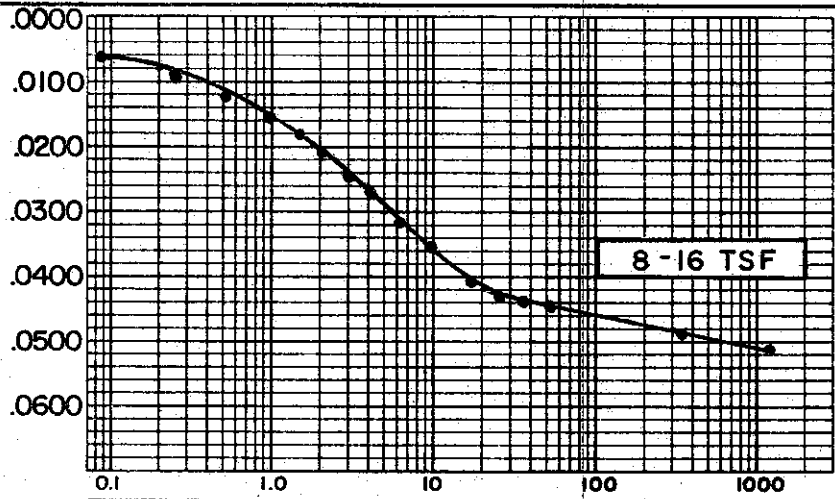
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE D. AMETER 2.50"  
 INITIAL VOID RATIO 1.383

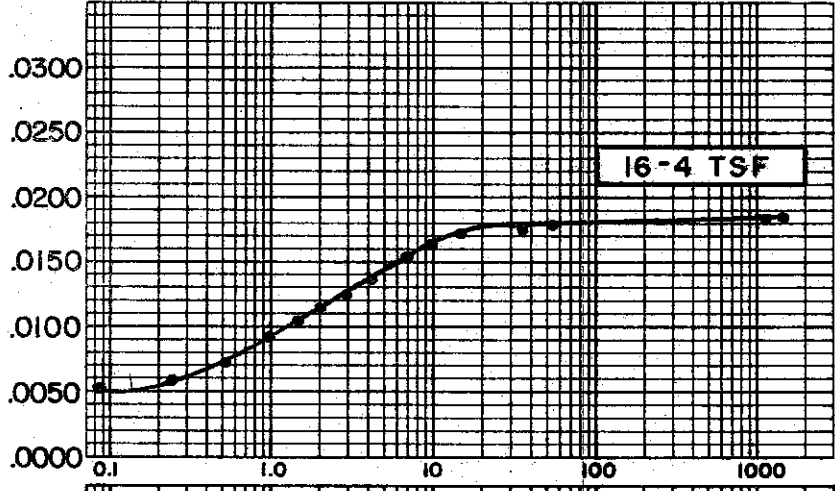
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

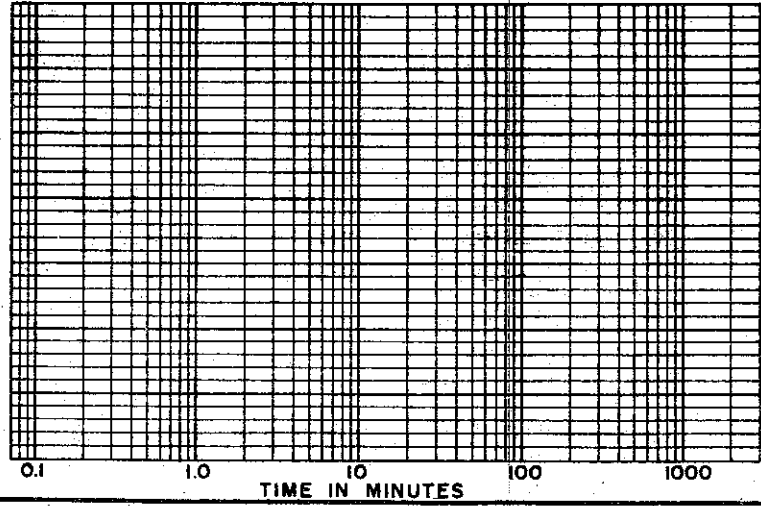
COMPRESSION IN INCHES



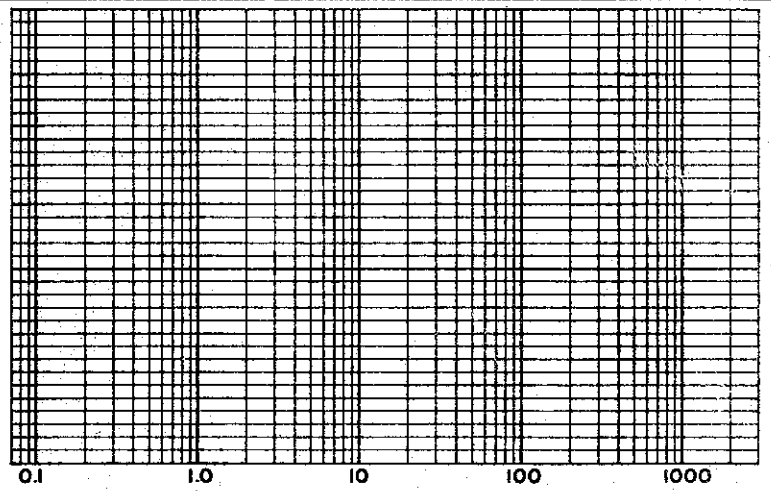
COMPRESSION IN INCHES



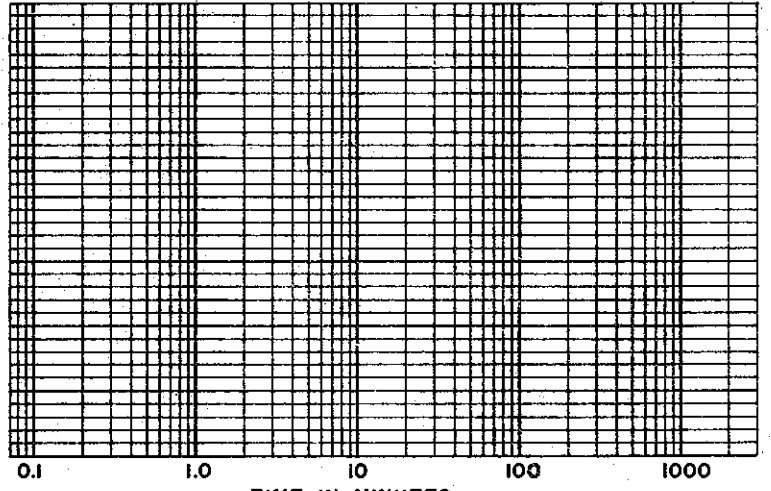
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

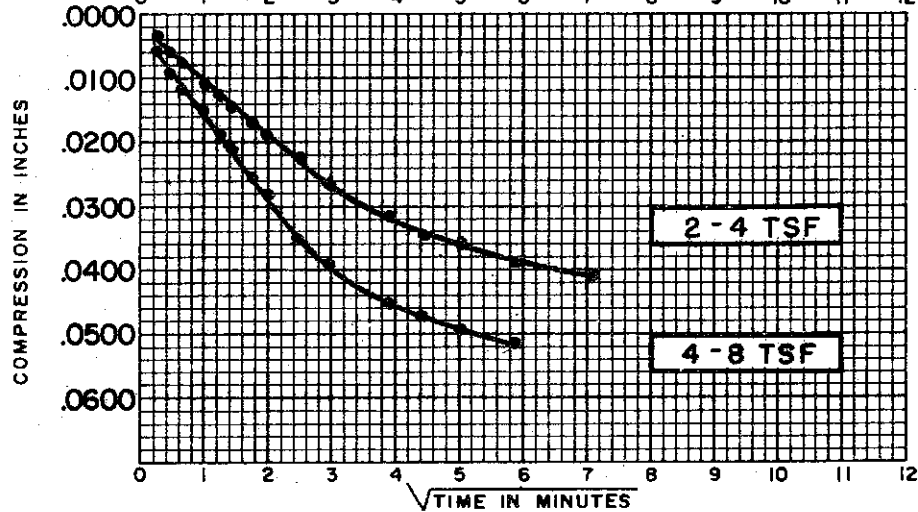
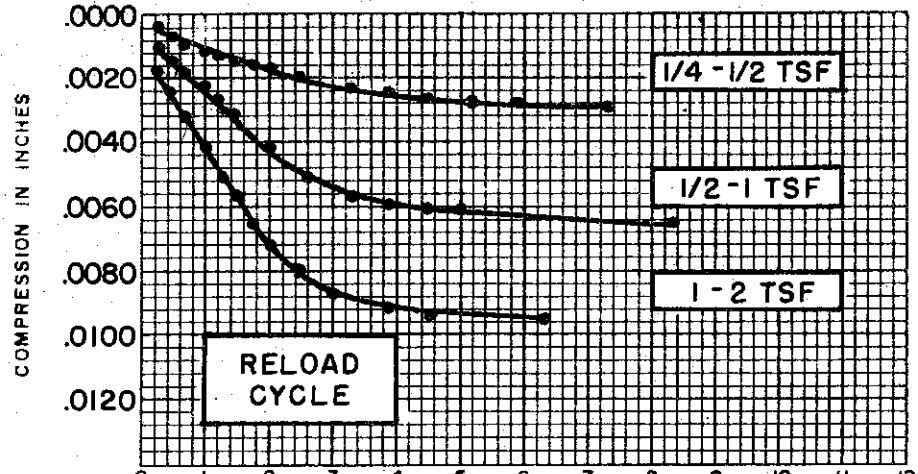
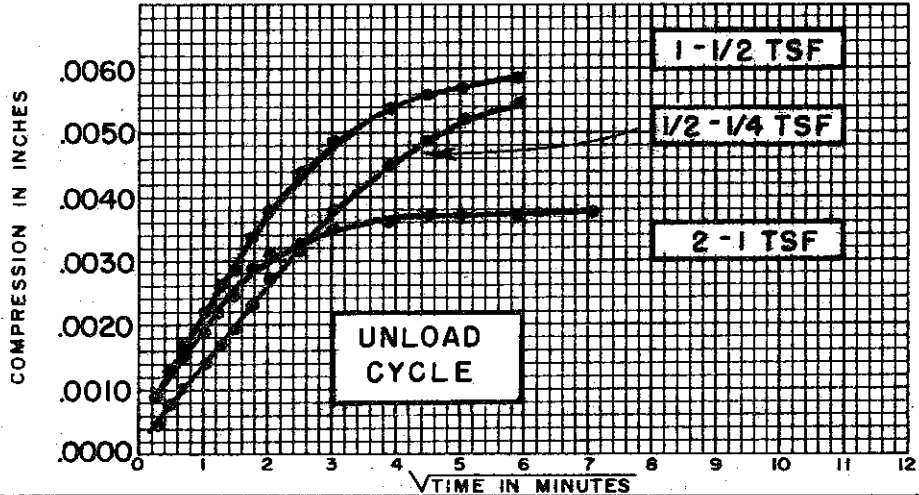
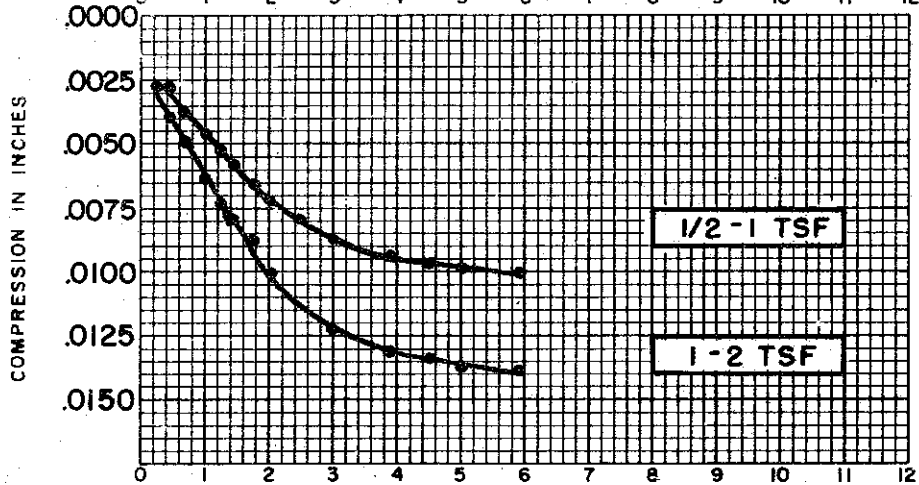
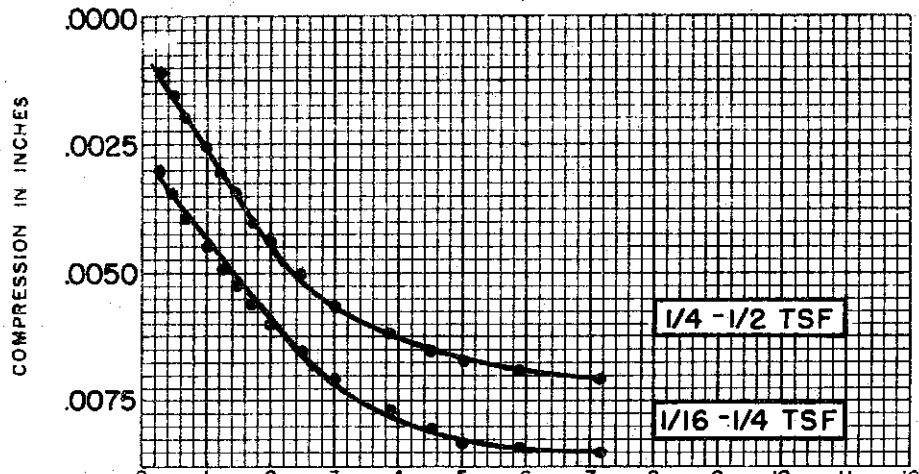
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-511



**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

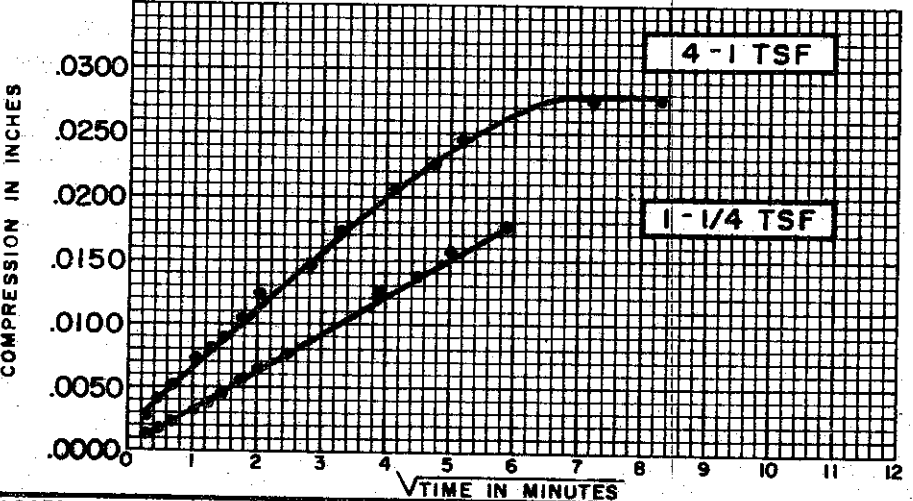
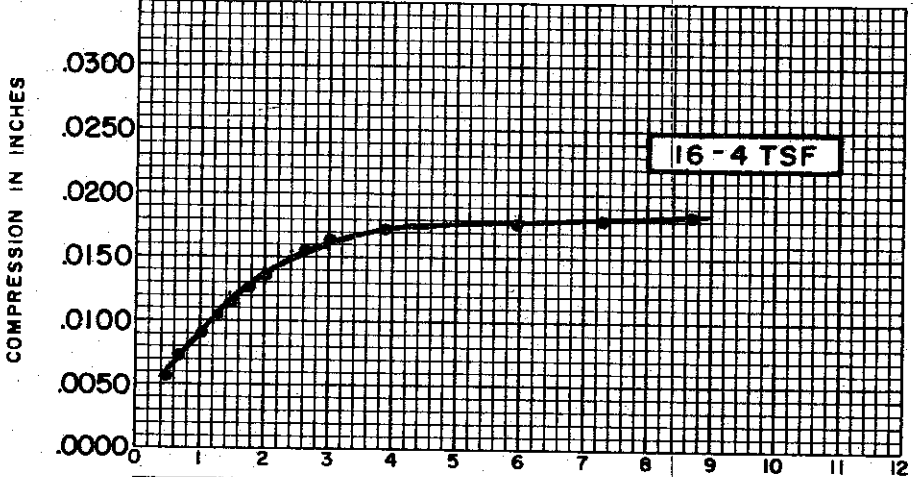
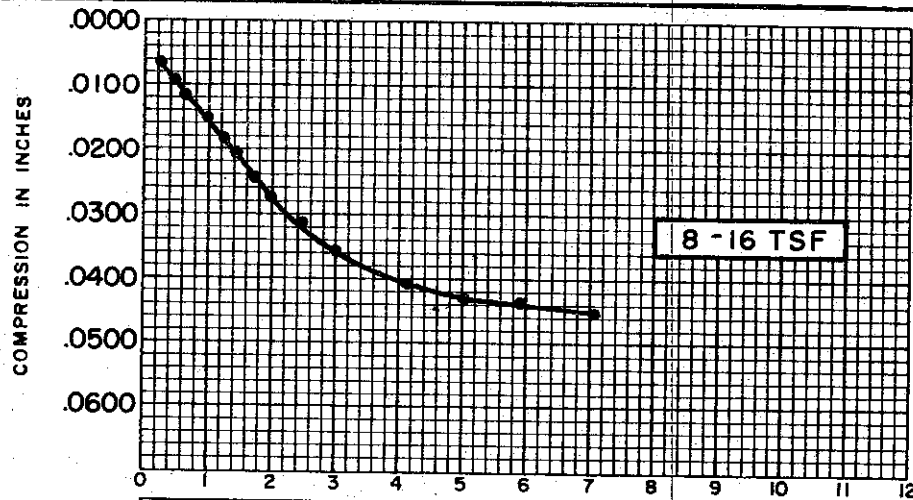
BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

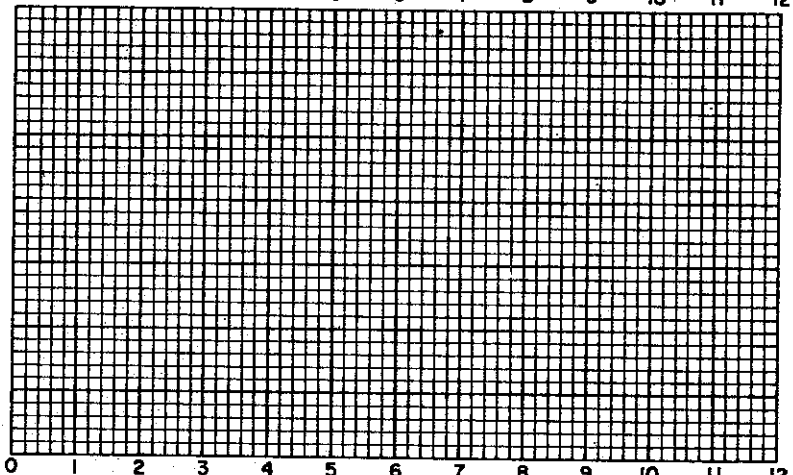
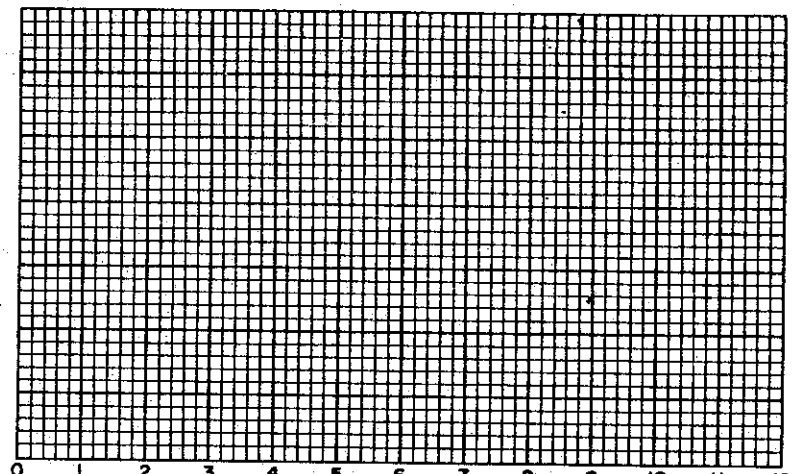
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





COMPRESSION IN INCHES

COMPRESSION IN INCHES



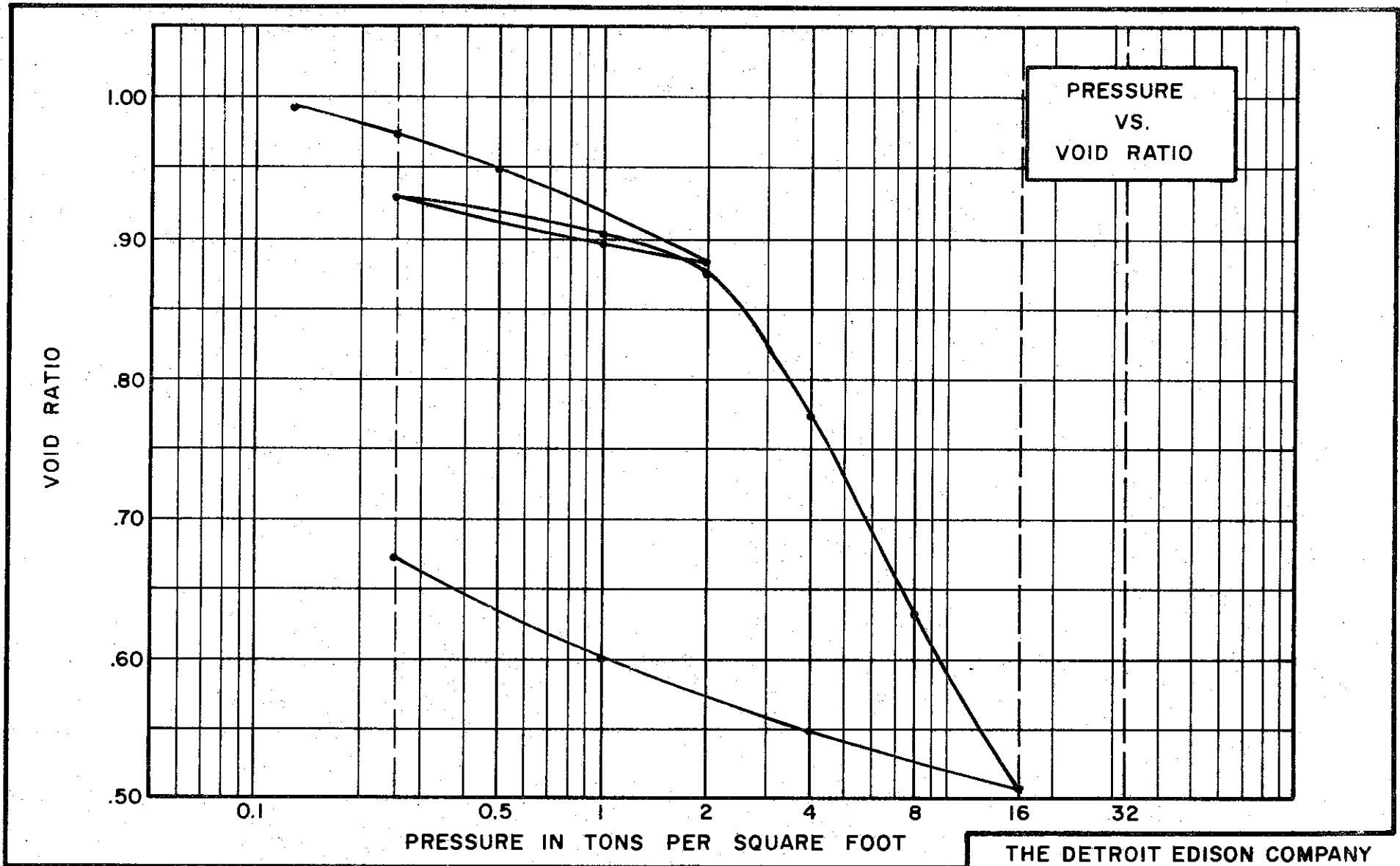
√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.75
INITIAL WATER CONTENT	51.6 %
FINAL WATER CONTENT	39.9 %
BORING NO.	50
SAMPLE NO.	8
DEPTH	38.5'-38.9'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.383

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 40.5% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

**TEST DATA**

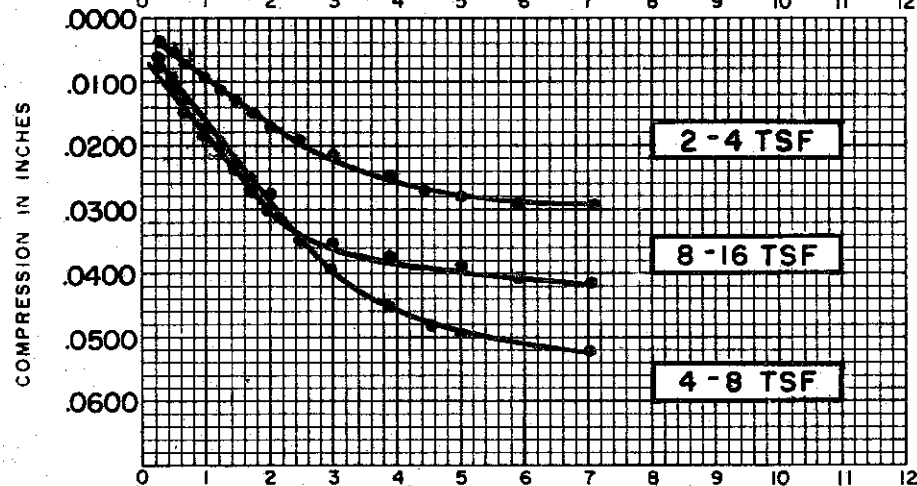
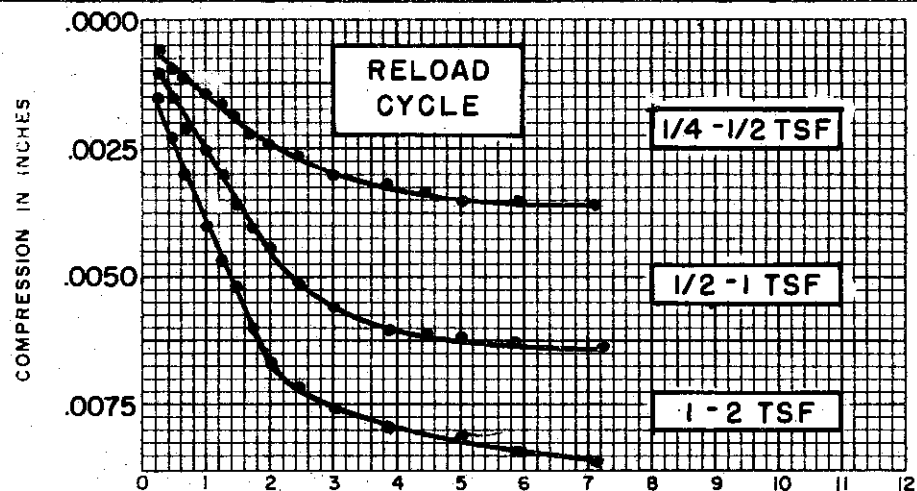
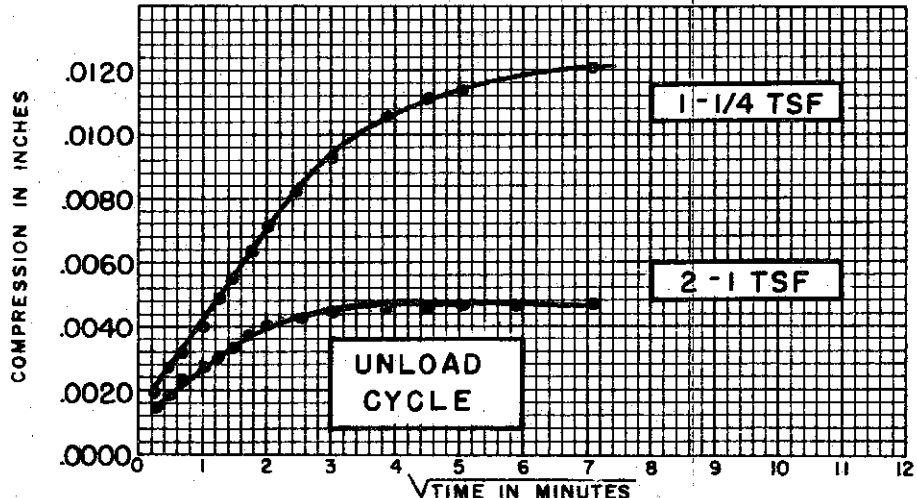
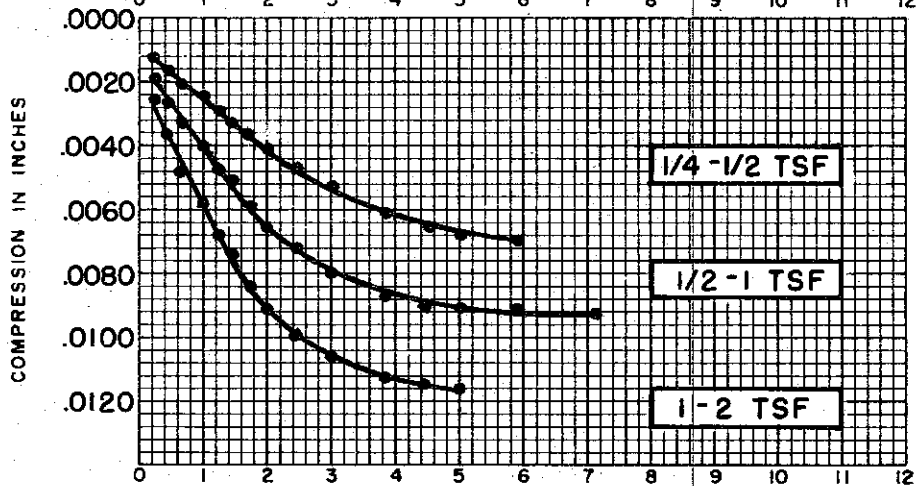
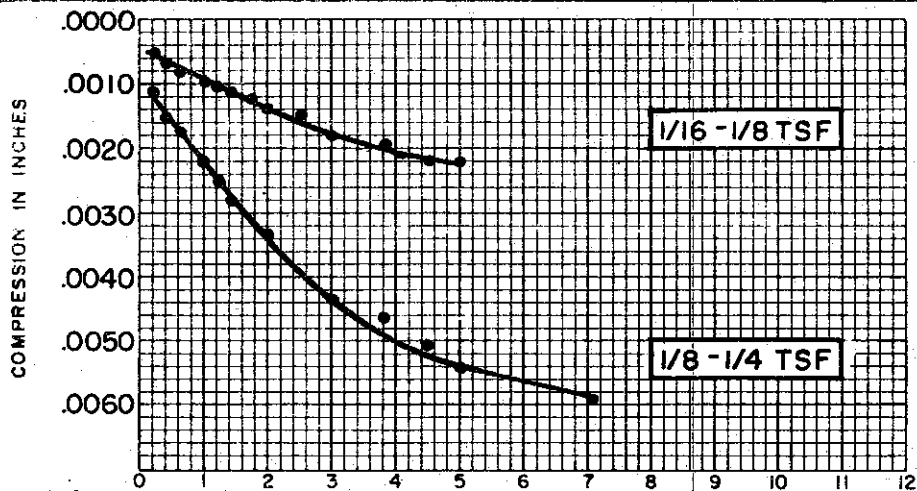
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 52 TEST NO. C109.1  
 SAMPLE NO. 4 DATE JULY 1974  
 DEPTH 29.9' TO 30.2'

C-513

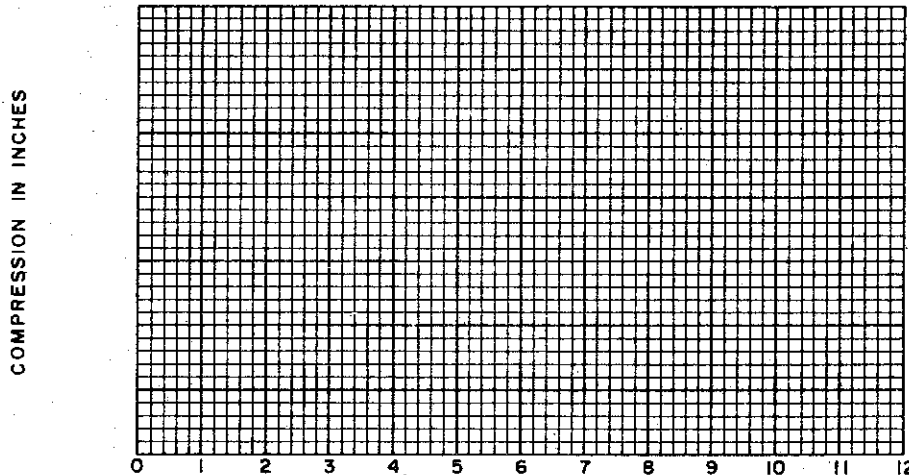
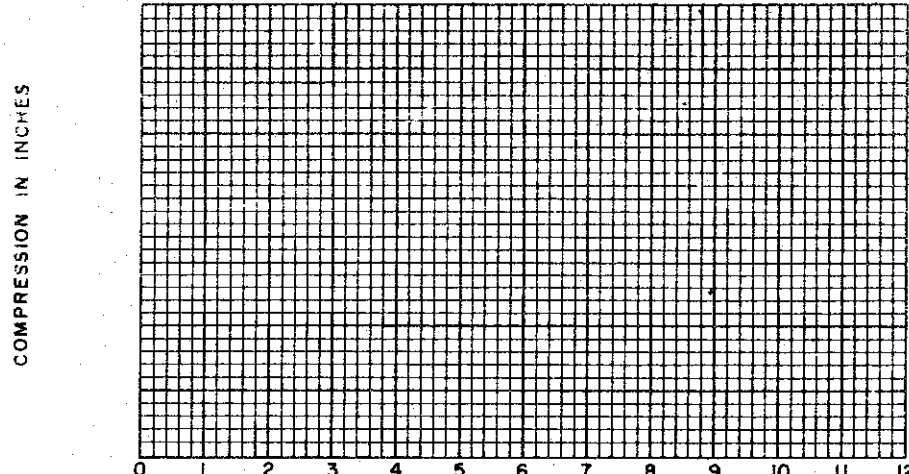
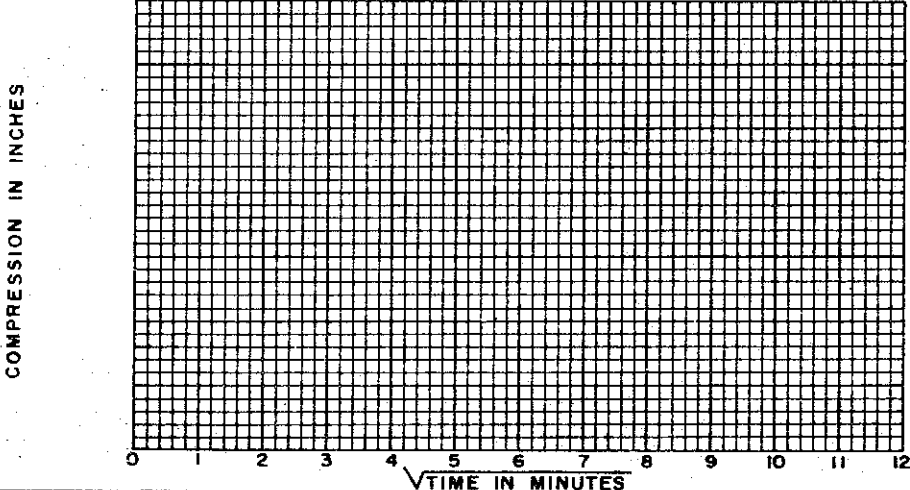
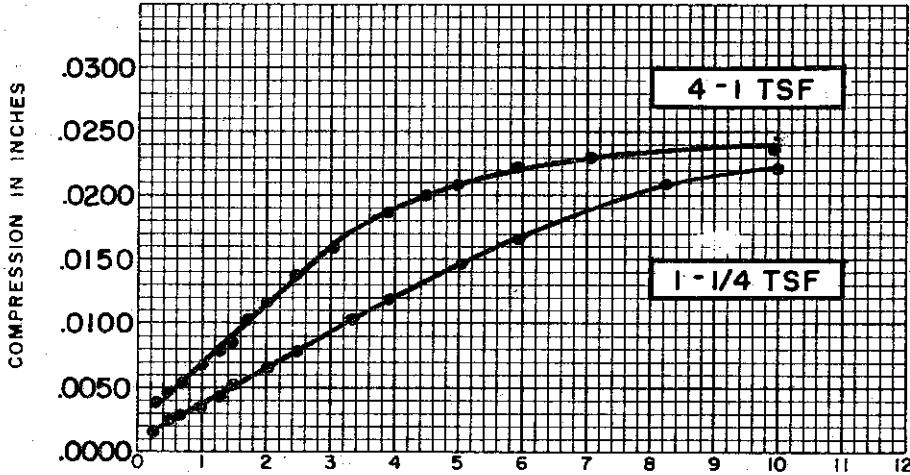
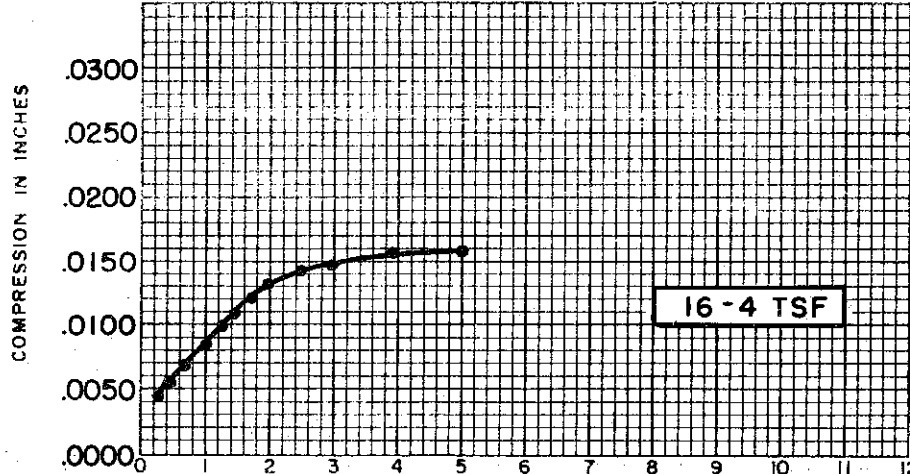


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	40.5 %
FINAL WATER CONTENT	28.9 %
BORING NO.	52
SAMPLE NO.	4
DEPTH	29.9' - 30.2'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.013

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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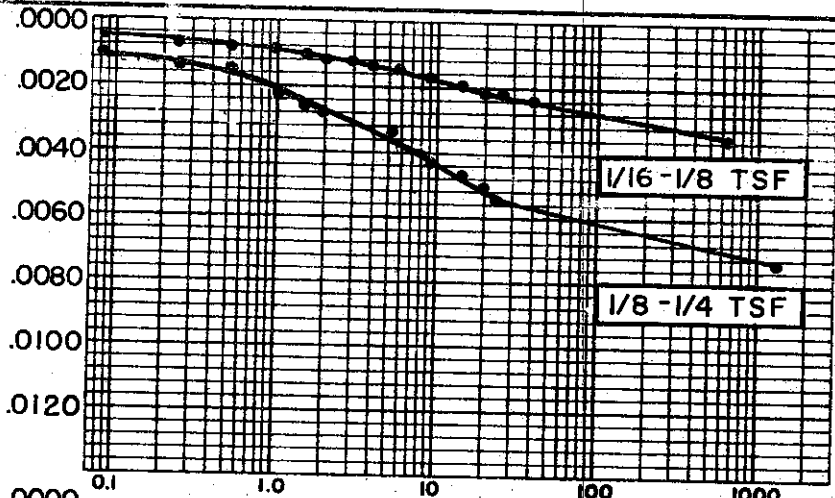


SOIL PROPERTIES		BORING NO.	52
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	4
SPECIFIC GRAVITY	2.70	DEPTH	29.9'-30.2'
INITIAL WATER CONTENT	40.5 %		
FINAL WATER CONTENT	28.9 %		

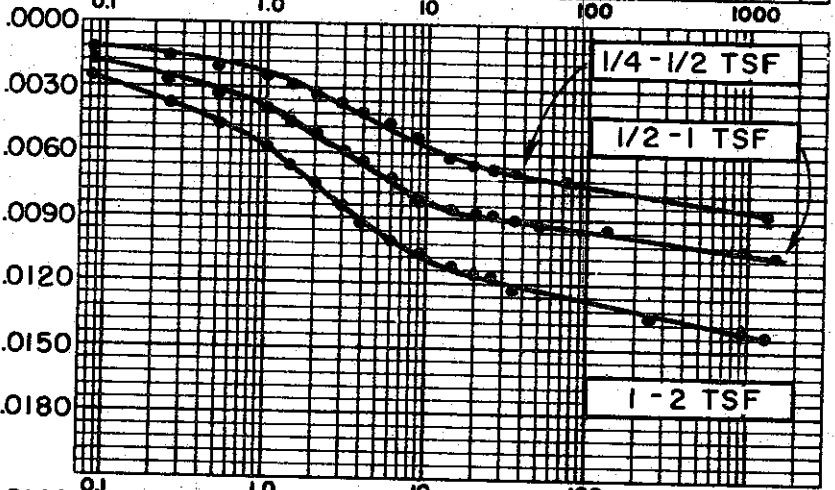
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.013

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

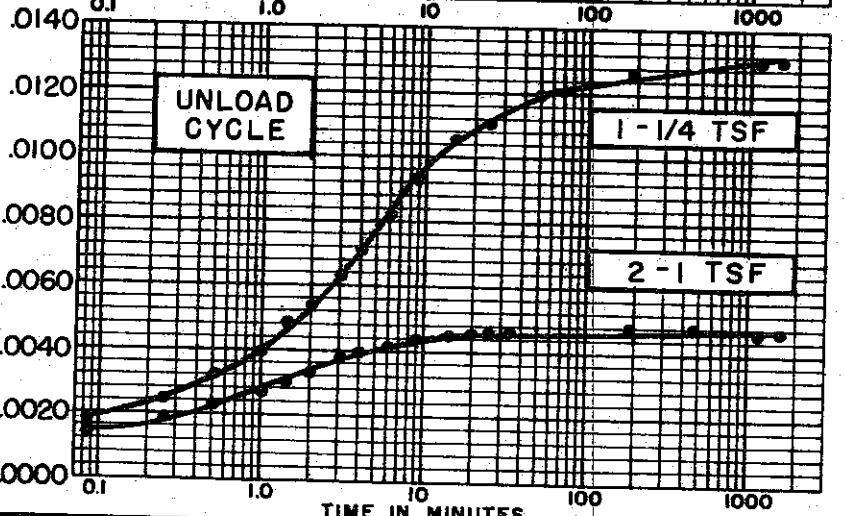
COMPRESSION IN INCHES



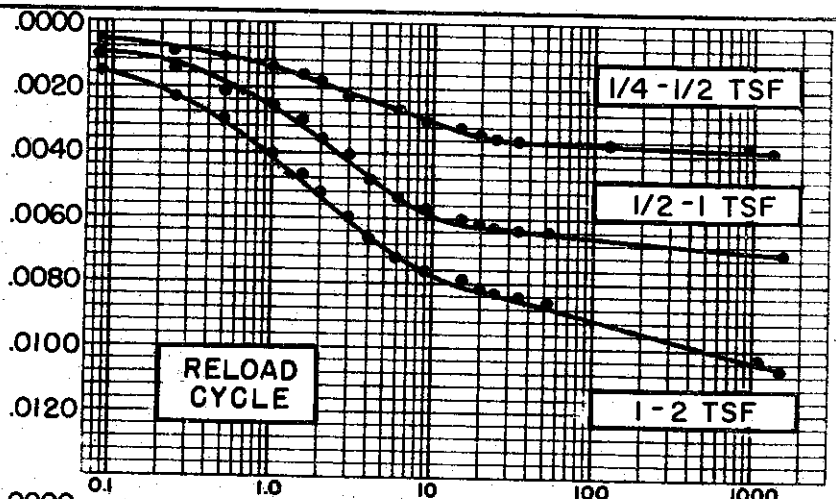
COMPRESSION IN INCHES



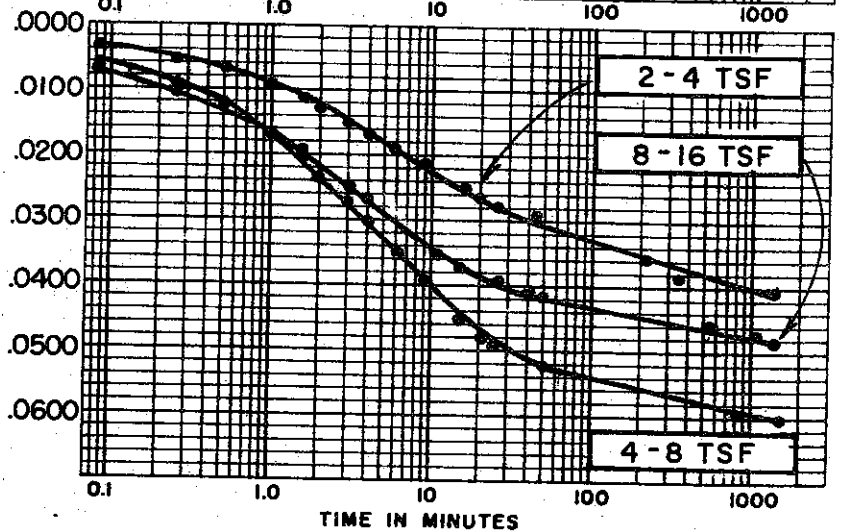
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

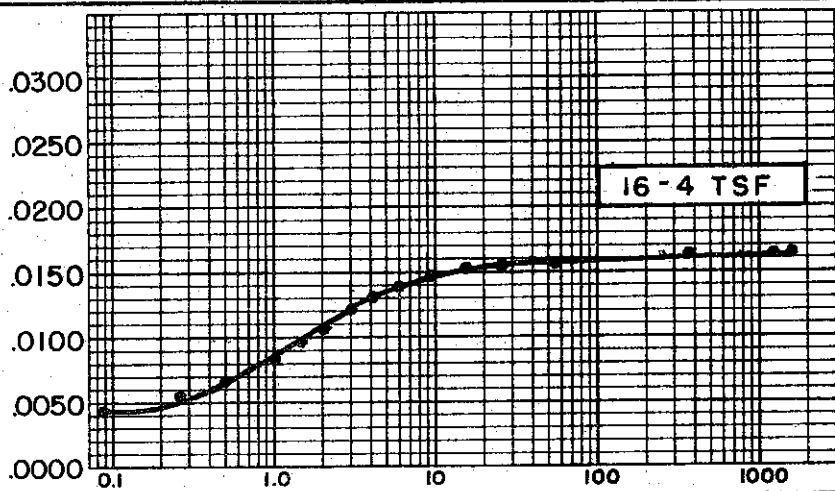
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

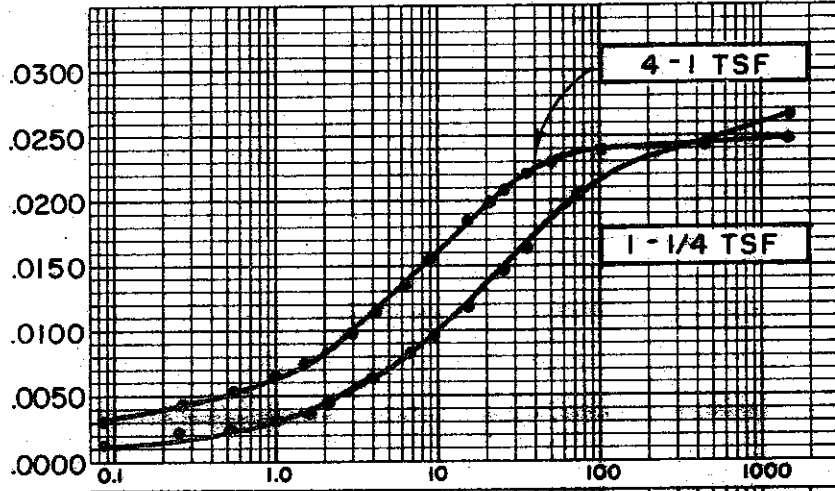
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

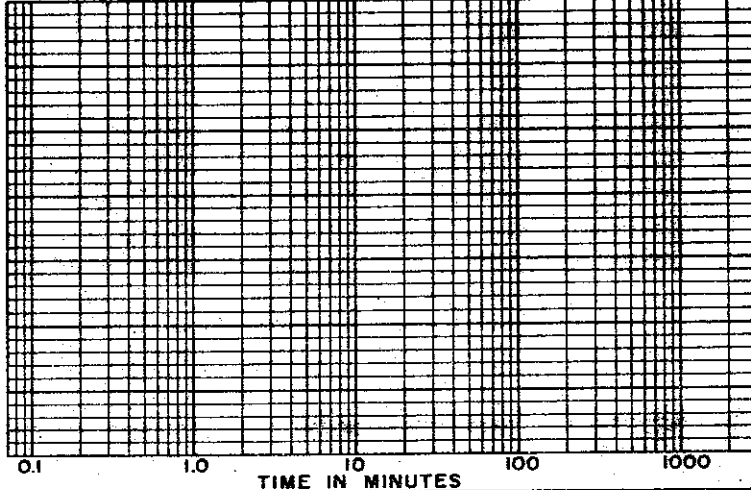
COMPRESSION IN INCHES



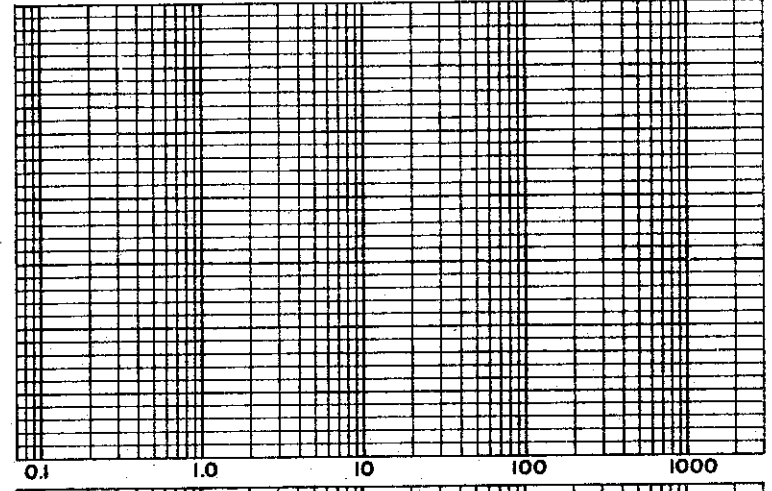
COMPRESSION IN INCHES



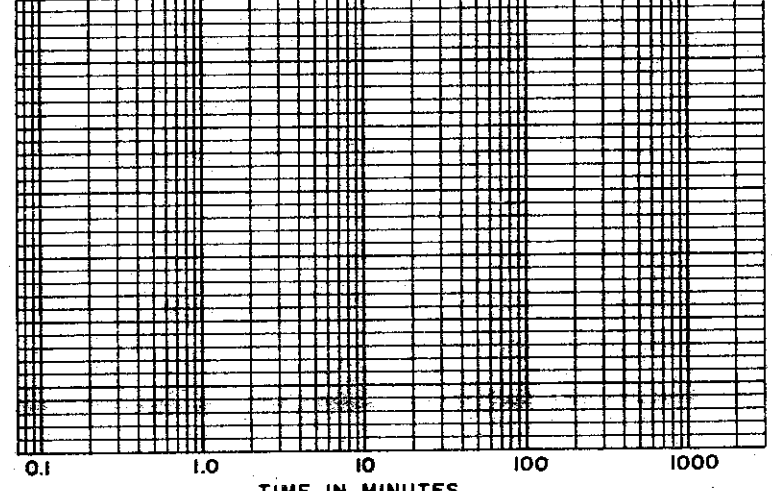
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

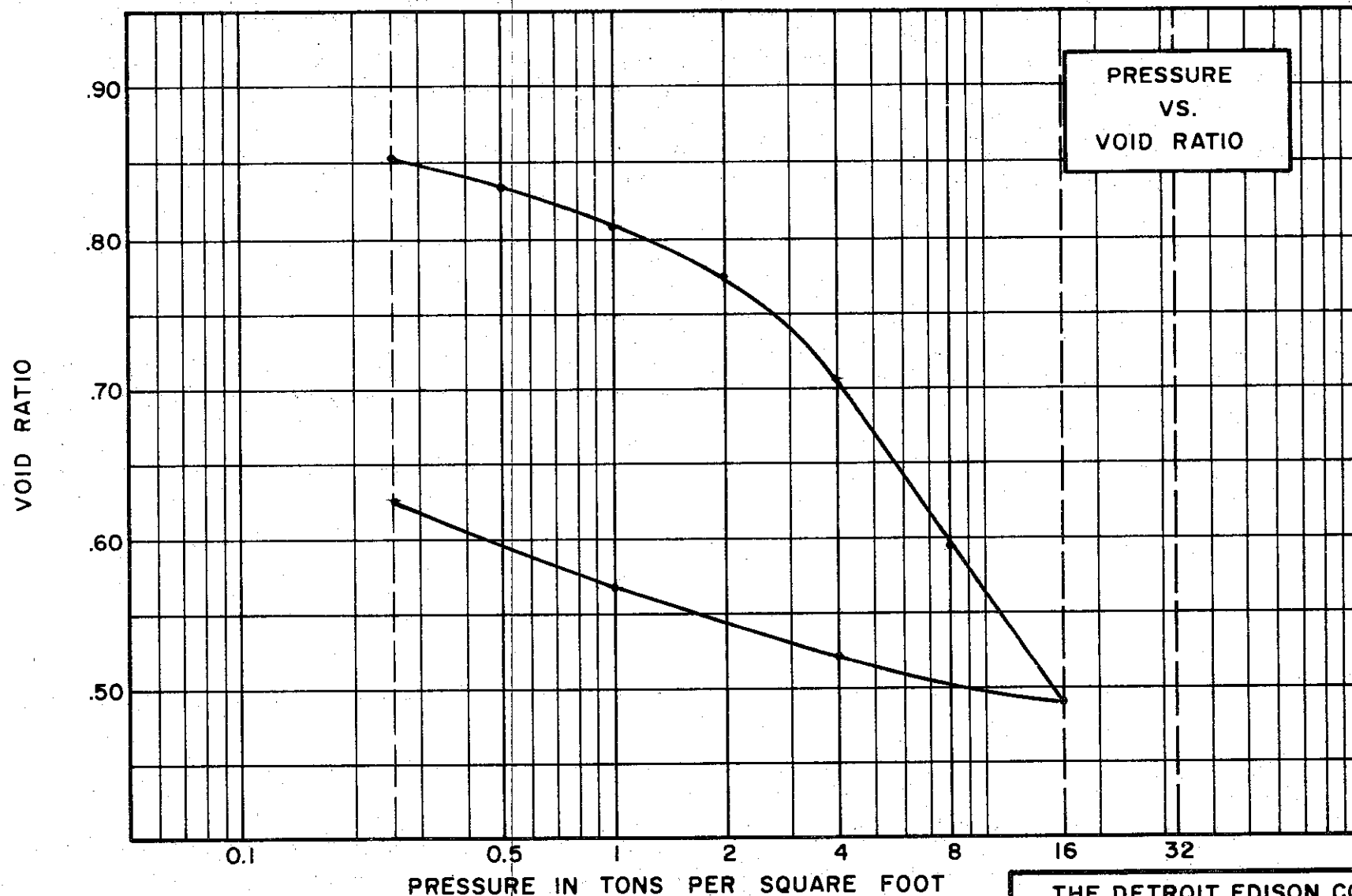
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 0.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY,  
SANDY (CL)  
SPECIFIC GRAVITY 2.72  
WATER CONTENT, INITIAL 30.9% FINAL 22.7%  
ATTERBERG LIMITS:  
LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

**TEST DATA**

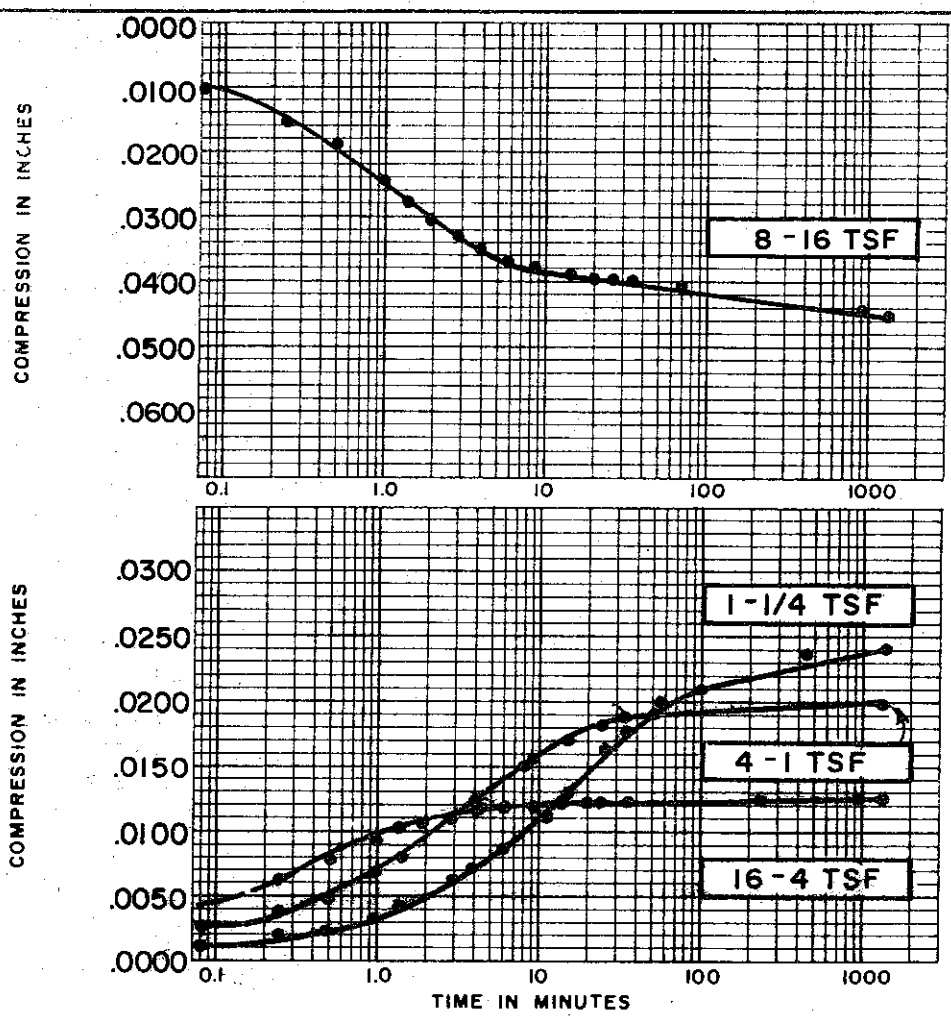
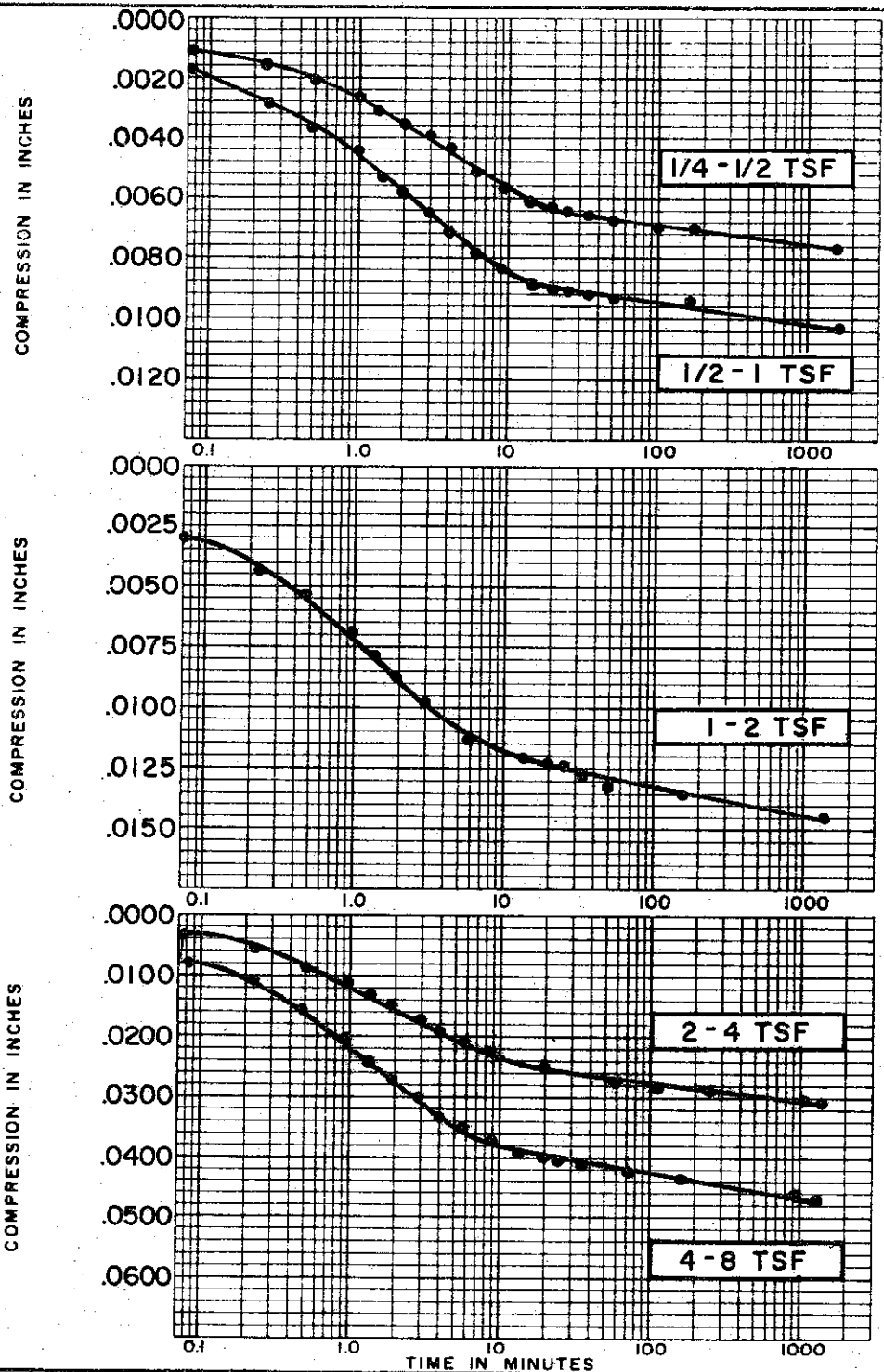
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.872

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 53 TEST NO. C98.1  
SAMPLE NO. 5 DATE JULY 1974  
DEPTH 39.5' TO 39.8'

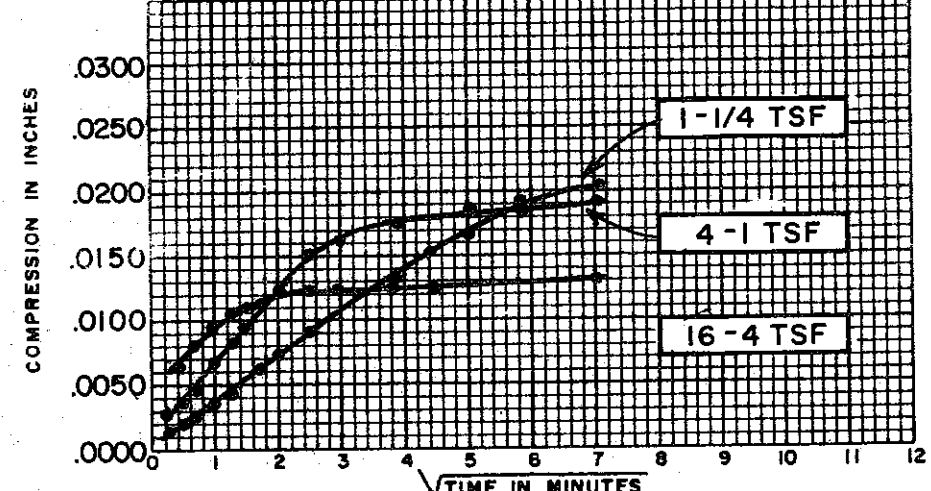
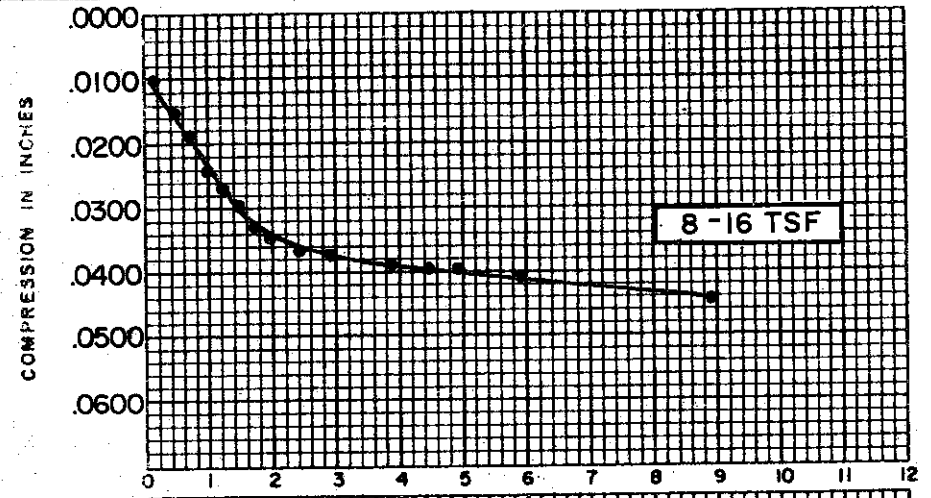
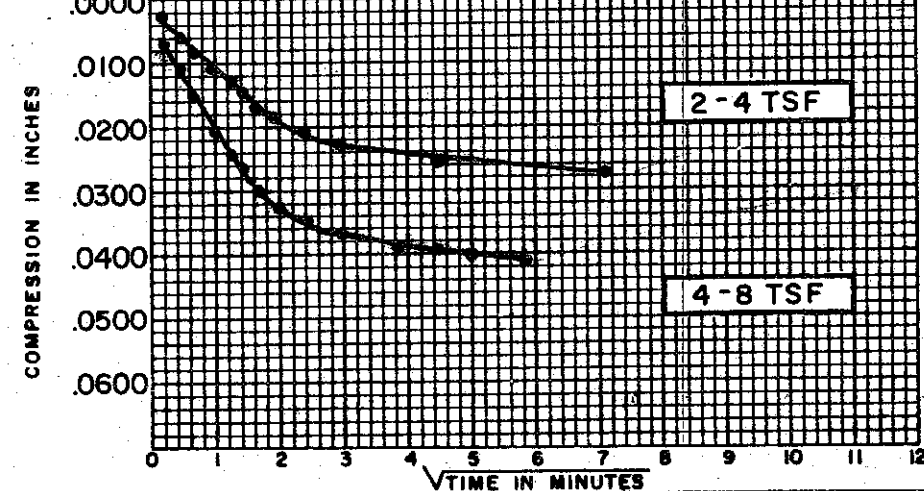
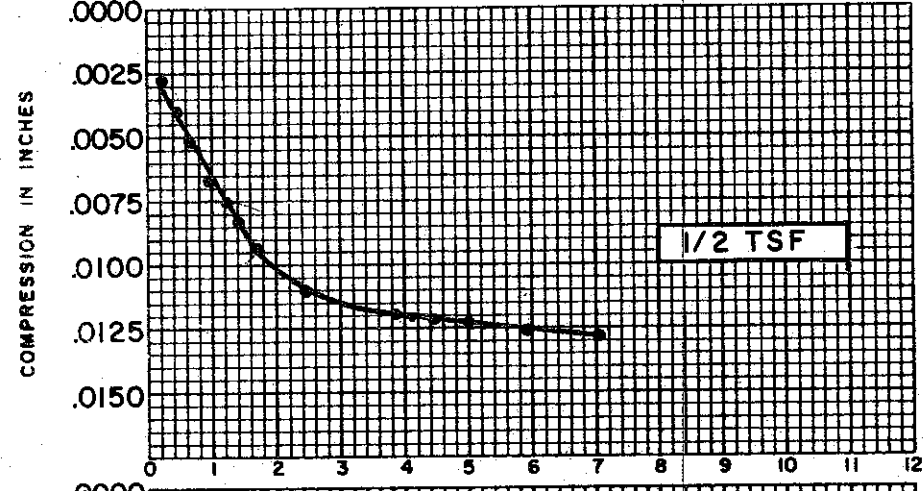
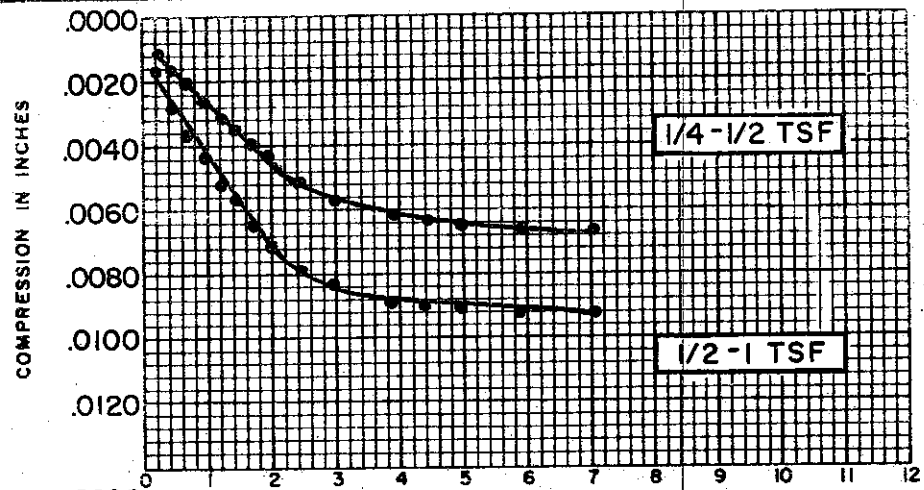
C-519



<b>SOIL PROPERTIES</b>		BORING NO. <u>53</u>
SOIL DESCRIPTION: <u>SILTY CLAY, SANDY (CL)</u>		SAMPLE NO. <u>5</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>39.5' - 39.8'</u>
INITIAL WATER CONTENT	<u>30.9 %</u>	
FINAL WATER CONTENT	<u>22.7 %</u>	
<b>TEST DATA</b>		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.872</u>	
<b>CONSOLIDATION TEST TIME VS. COMPRESSION CURVES</b>		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		



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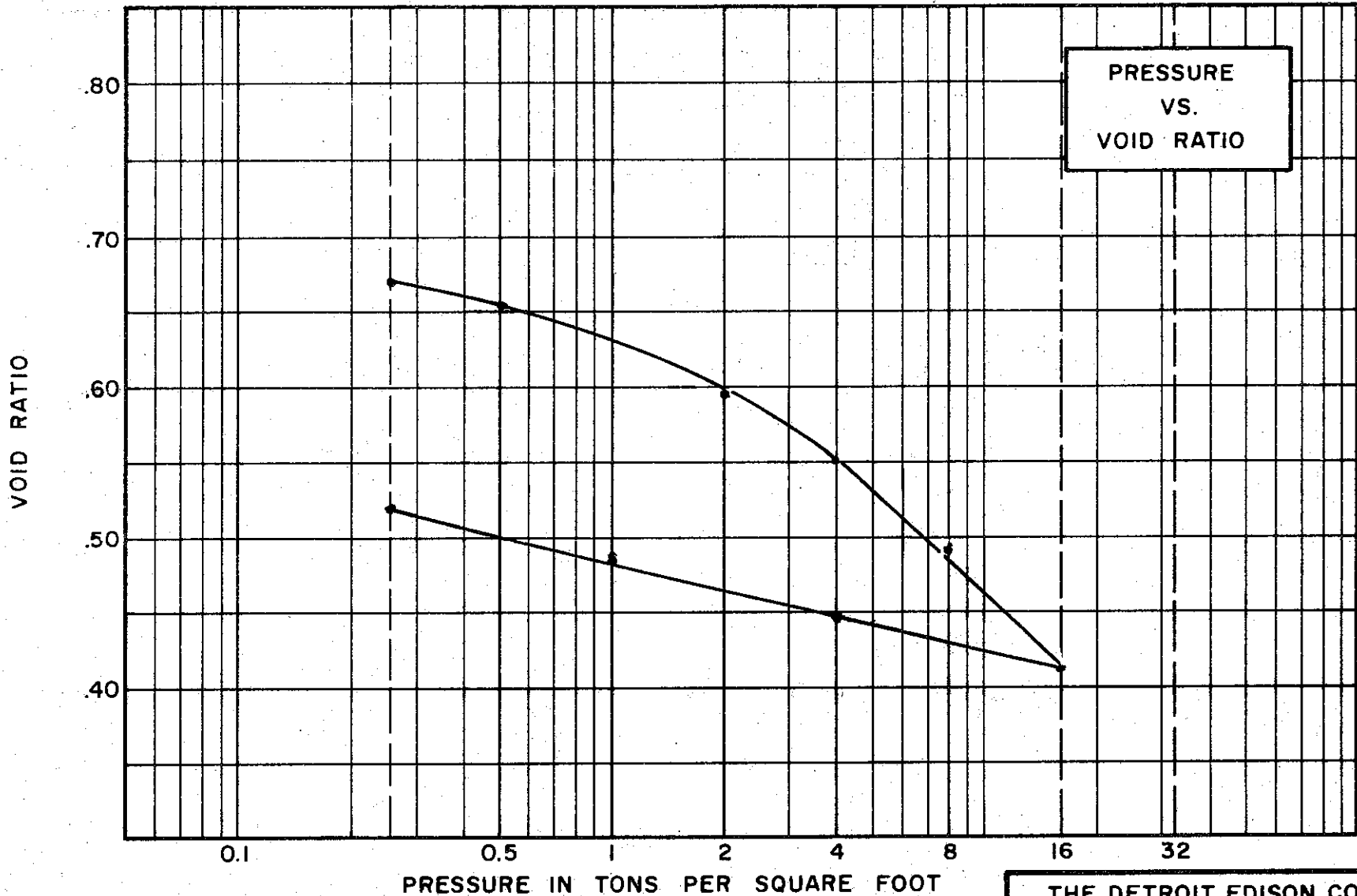


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	30.9%
FINAL WATER CONTENT	22.7%
BORING NO.	53
SAMPLE NO.	5
DEPTH	39.5'-39.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.872

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**PRESSURE  
VS.  
VOID RATIO**



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY  
(CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 260% FINAL 220%  
ATTERBERG LIMITS:  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

**TEST DATA**

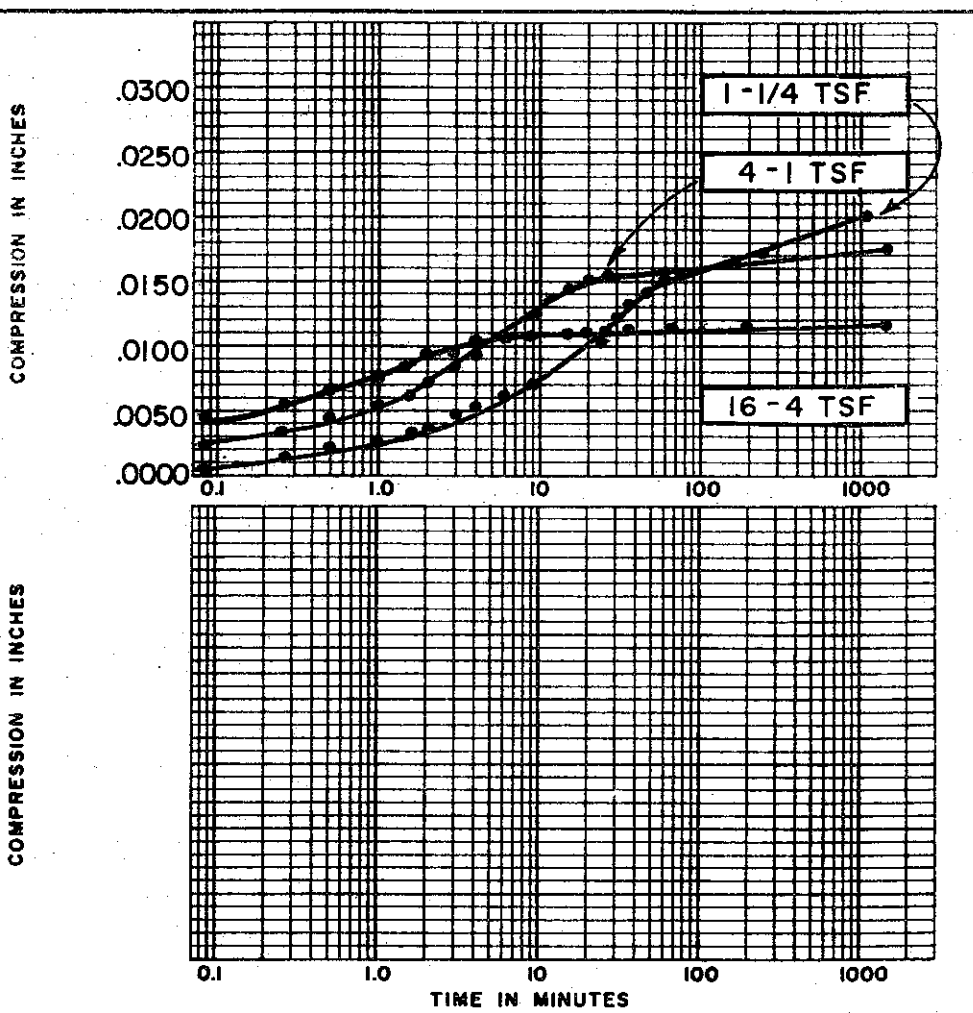
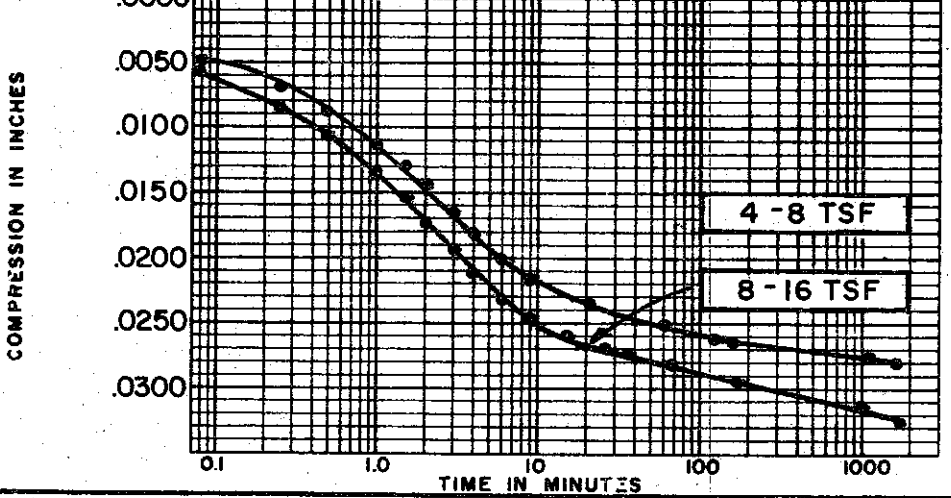
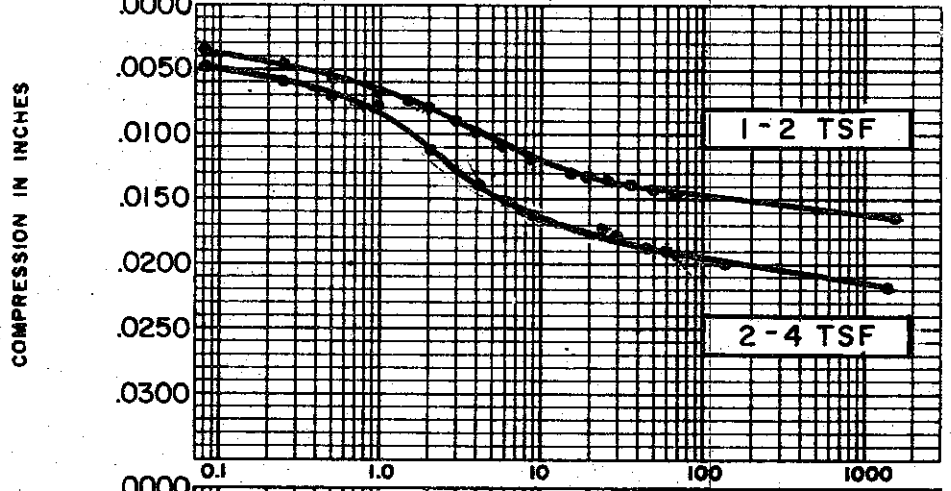
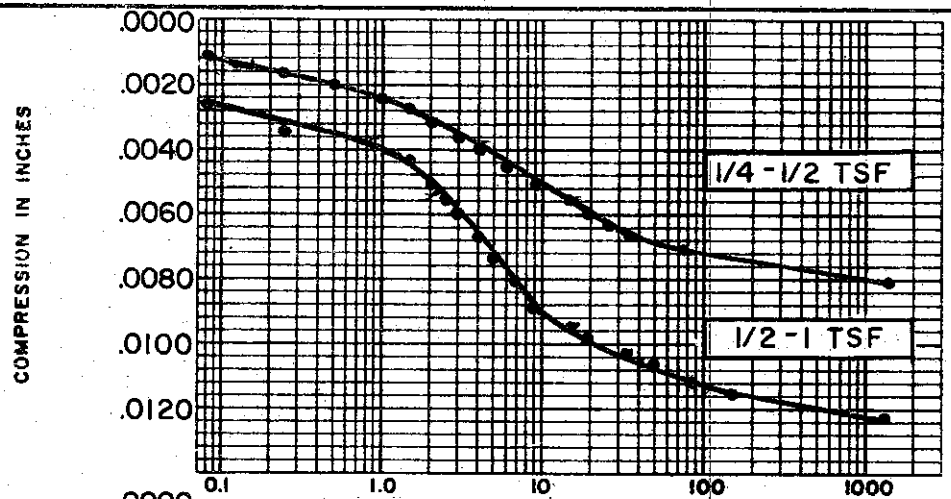
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.696

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 54 TEST NO. C399.1  
SAMPLE NO. 6 DATE JULY 1974  
DEPTH 63.5' TO 63.8'

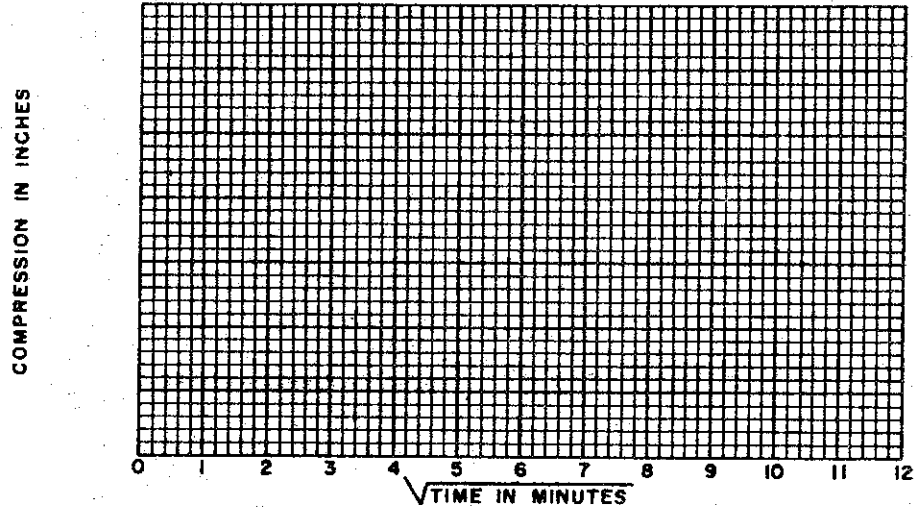
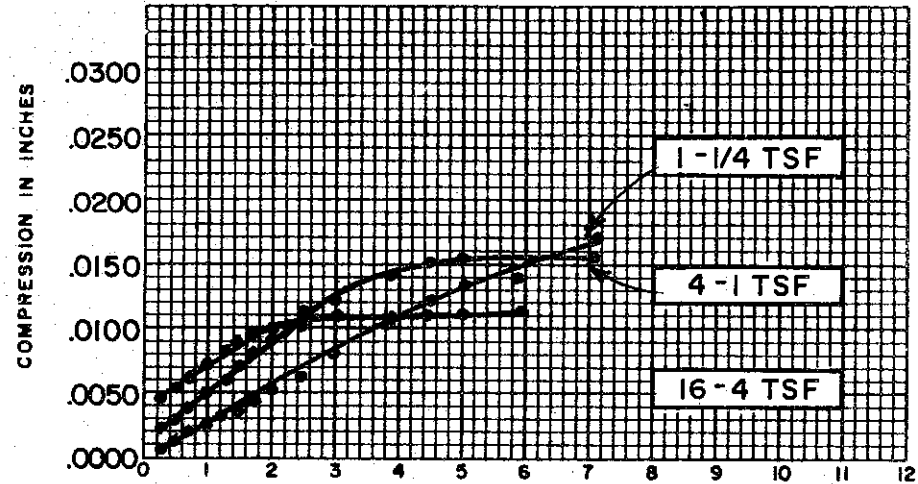
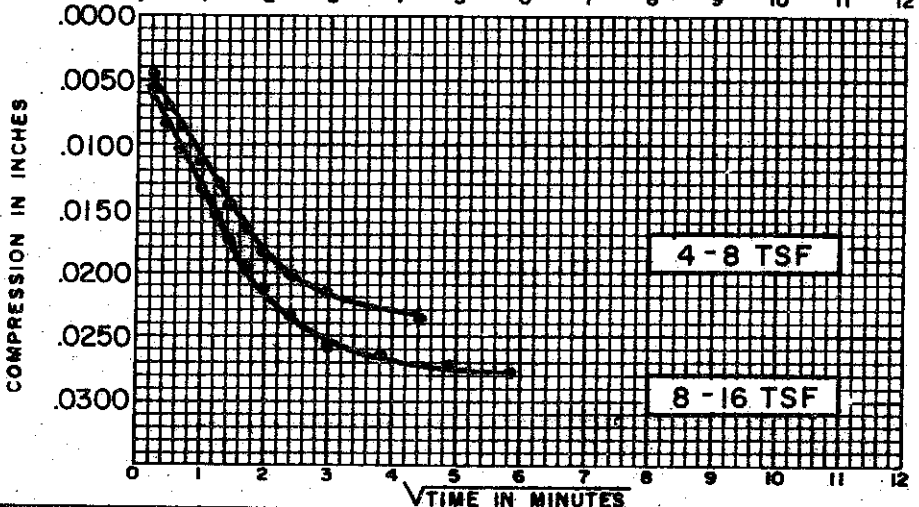
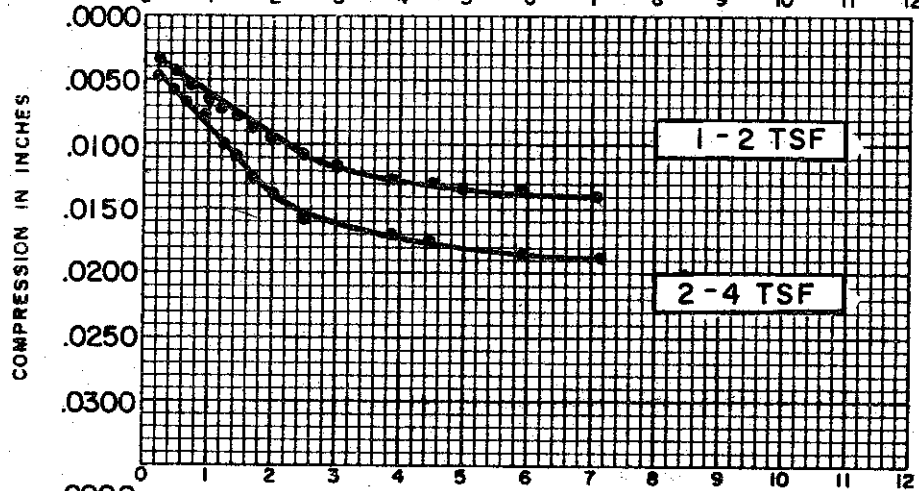
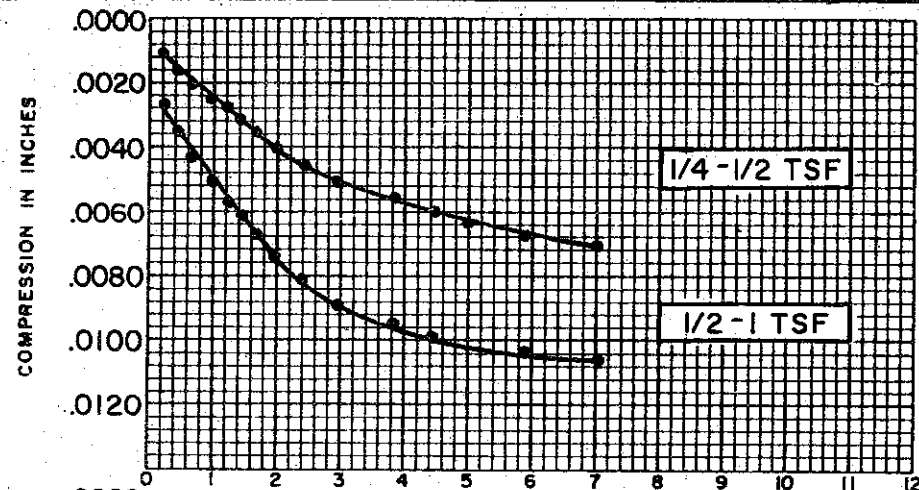
C-521



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	20.0 %
FINAL WATER CONTENT	22.0 %
BORING NO.	54
SAMPLE NO.	6
DEPTH	63.5' - 63.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.696

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 26.0%  
 FINAL WATER CONTENT 22.0%

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5'-63.8'

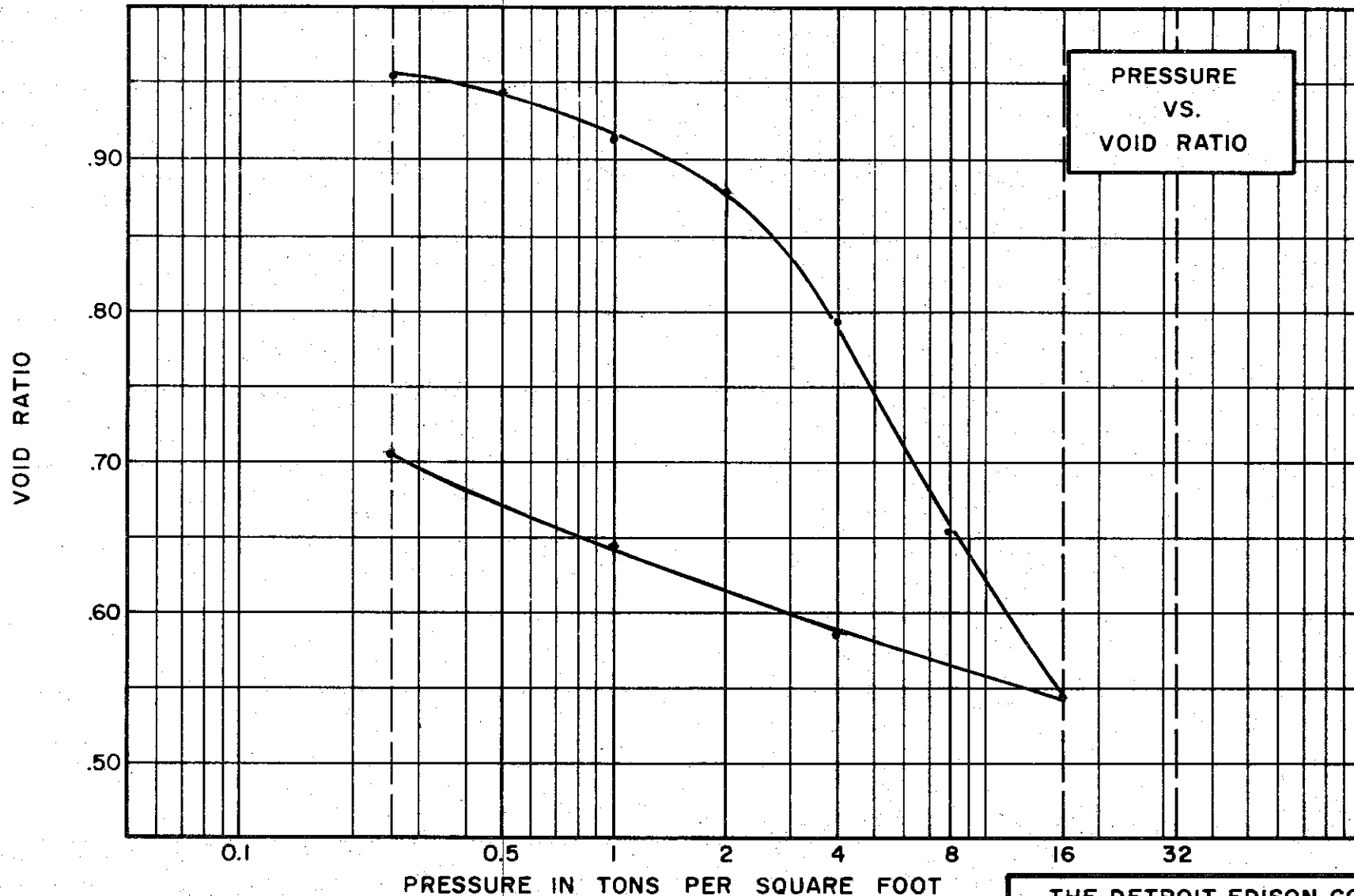
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.696

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-523



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.3% FINAL 30.6%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**

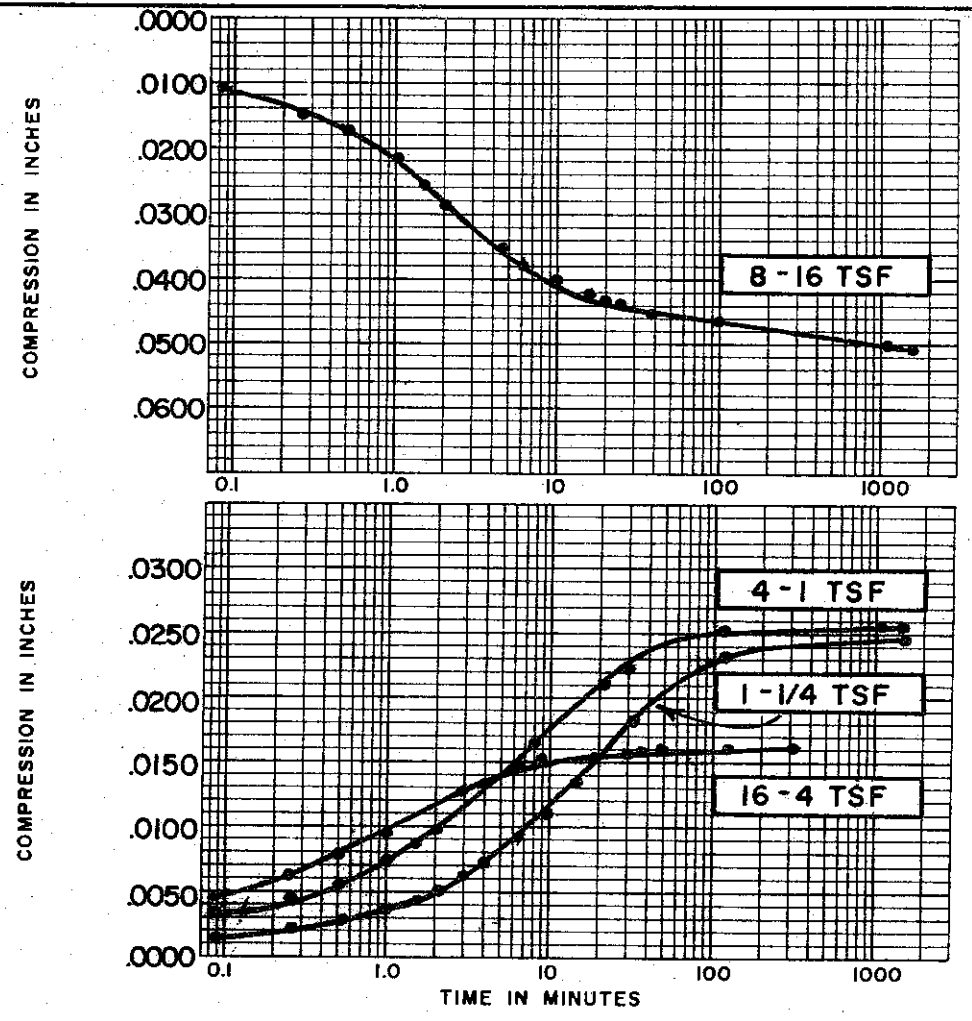
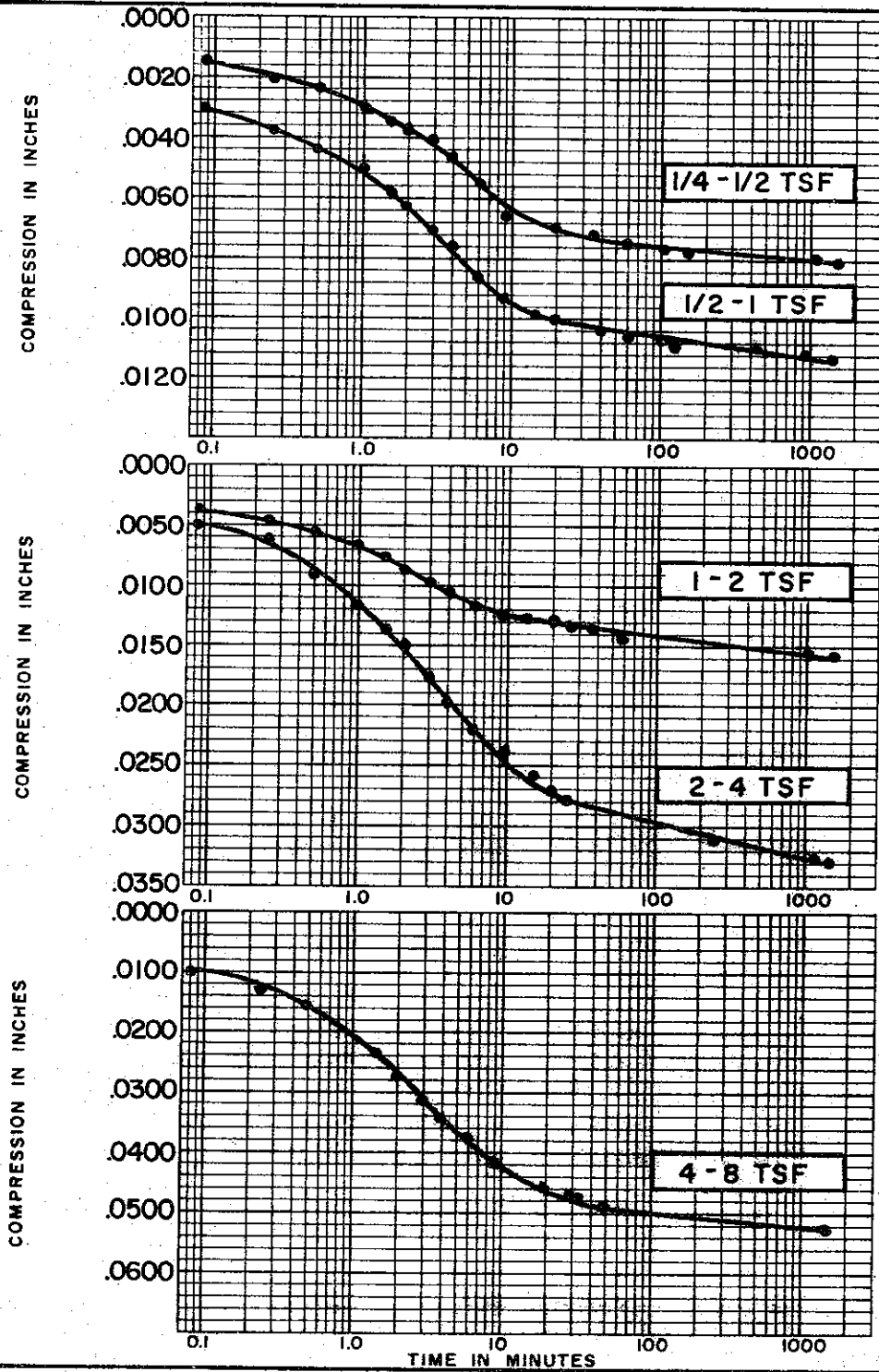
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 54 TEST NO. C401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7' TO 74.0'

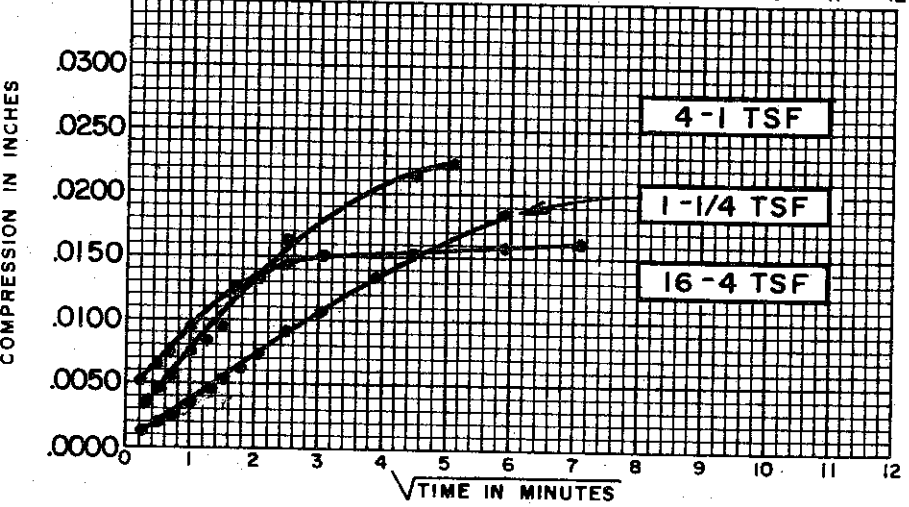
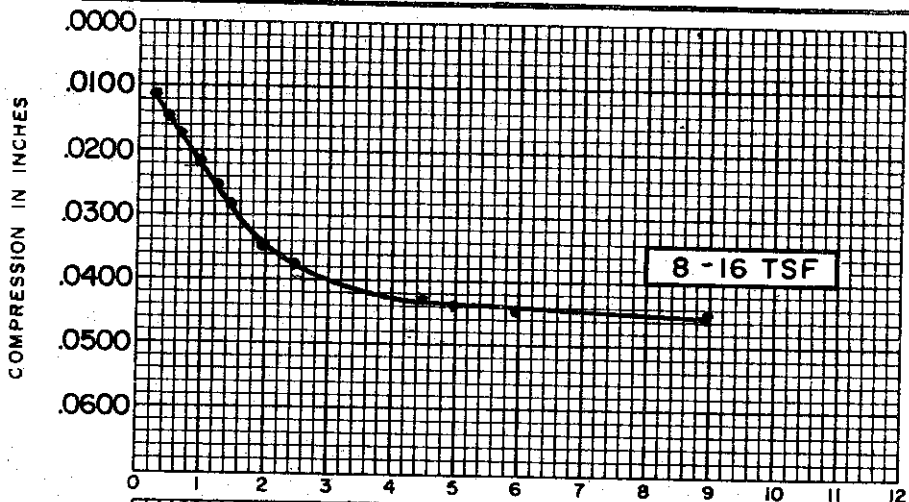
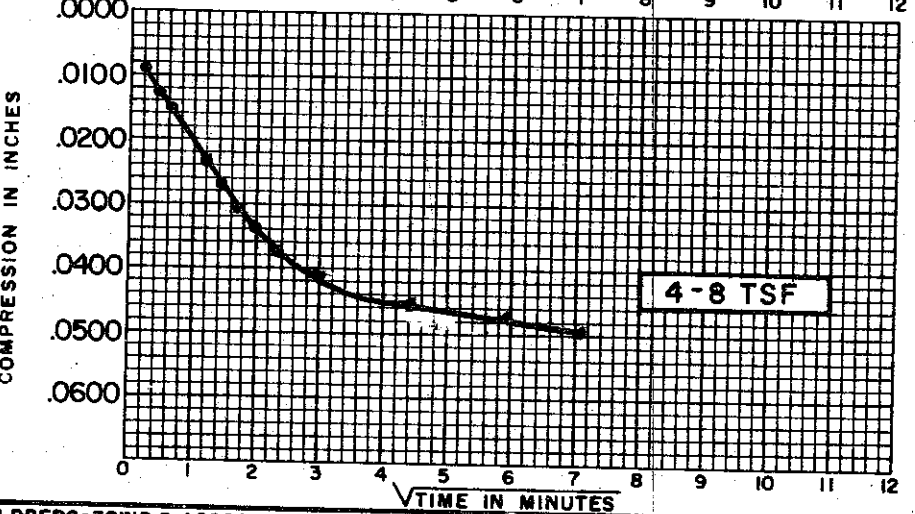
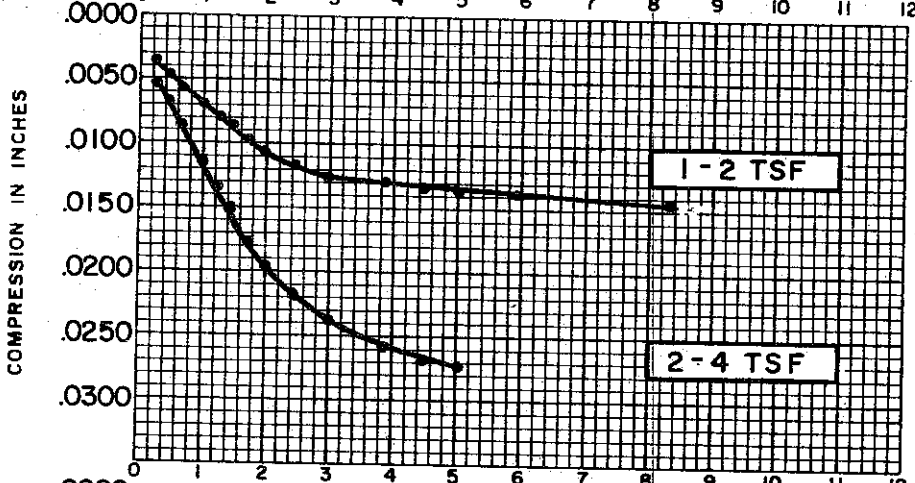
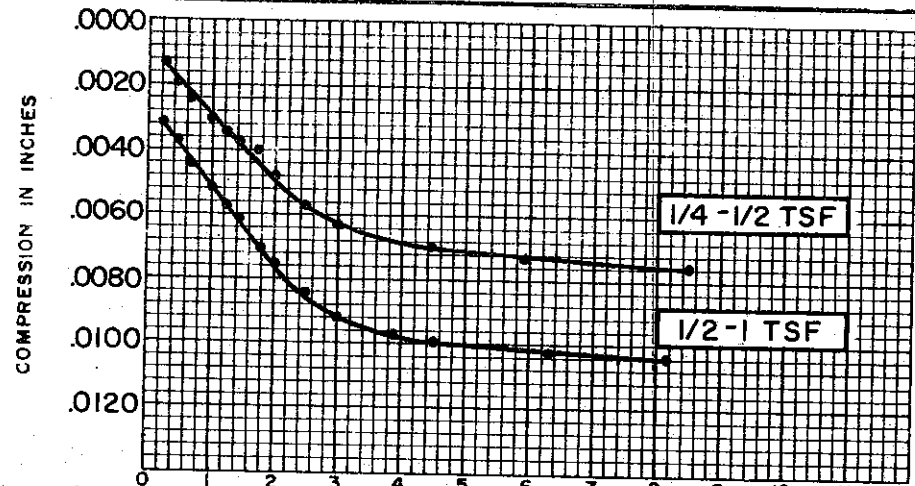
C-525



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.3 %
FINAL WATER CONTENT	30.6 %
BORING NO.	54
SAMPLE NO.	8
DEPTH	73.7'-74.0'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.962

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)

SPECIFIC GRAVITY 2.73

INITIAL WATER CONTENT 38.3 %

FINAL WATER CONTENT 30.6 %

BORING NO. 54

SAMPLE NO. 8

DEPTH 73.7' - 74.0'

**TEST DATA**

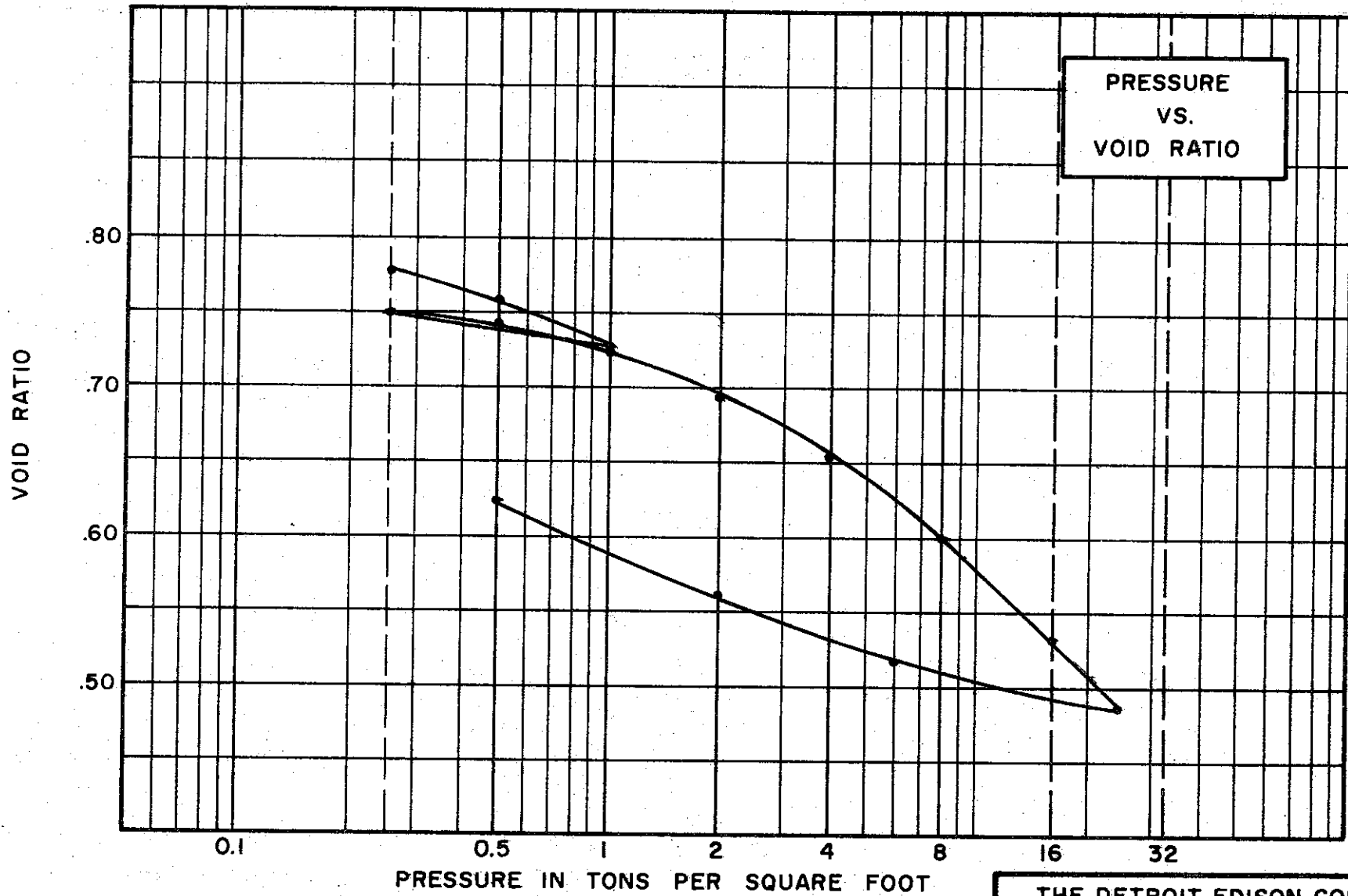
INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.982

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 30.0% FINAL 28.8%  
ATTERBERG LIMITS:  
LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

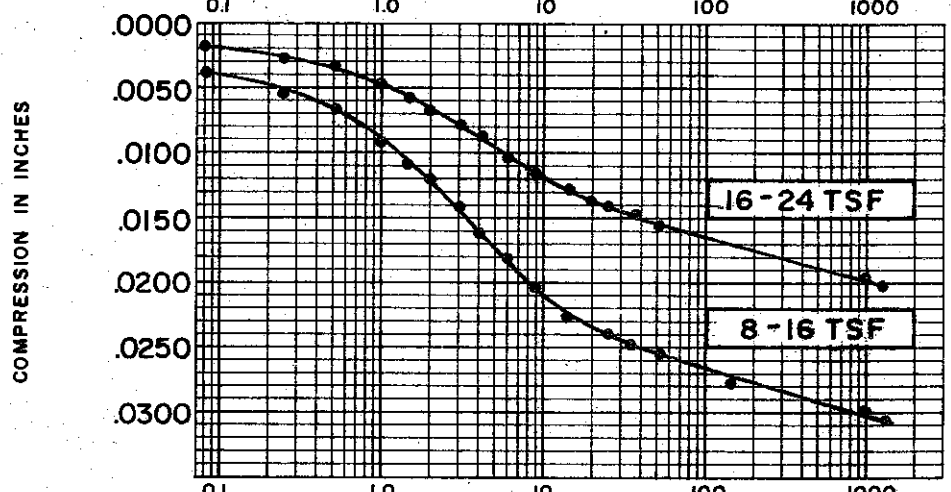
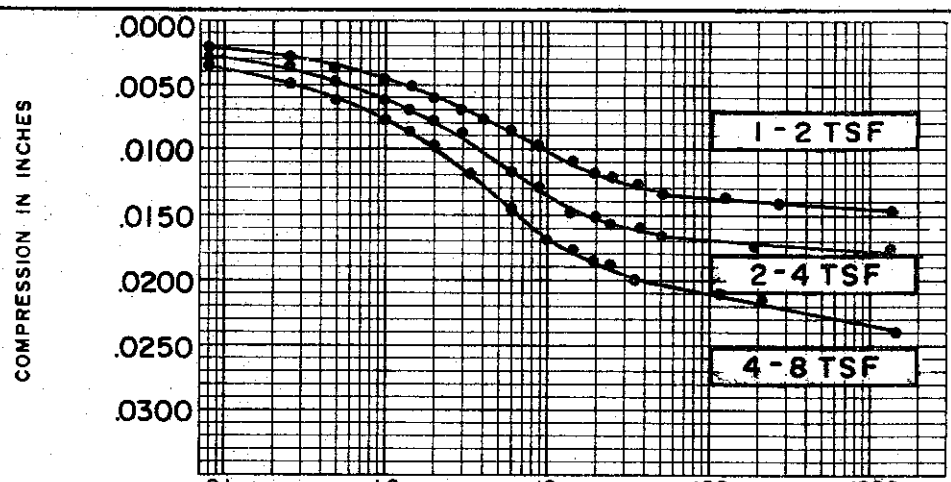
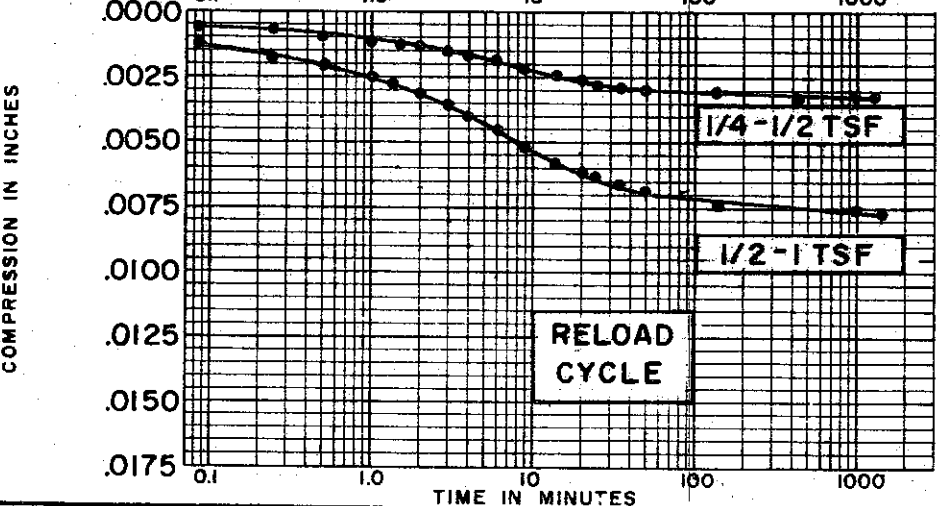
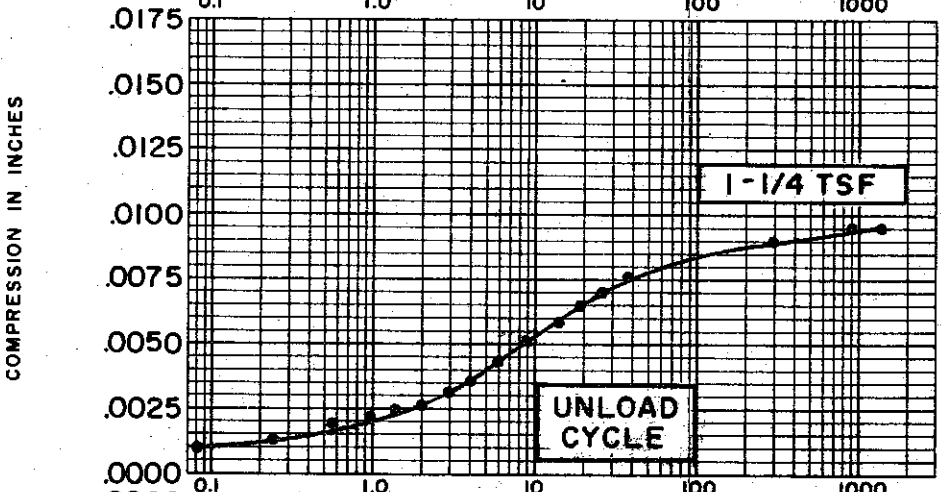
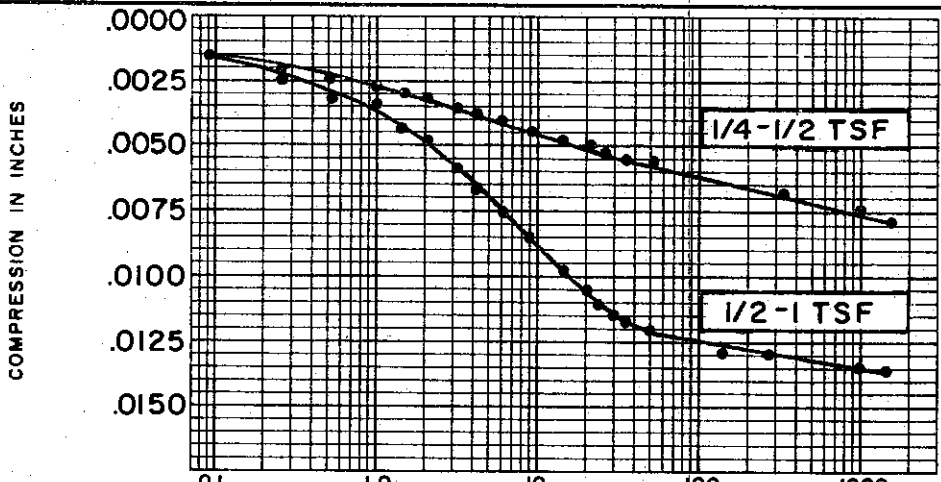
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.787

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**  
BORING NO. 60 TEST NO. C42.1  
SAMPLE NO. 2 DATE FEB. 1974  
DEPTH 9.8' TO 10.0'

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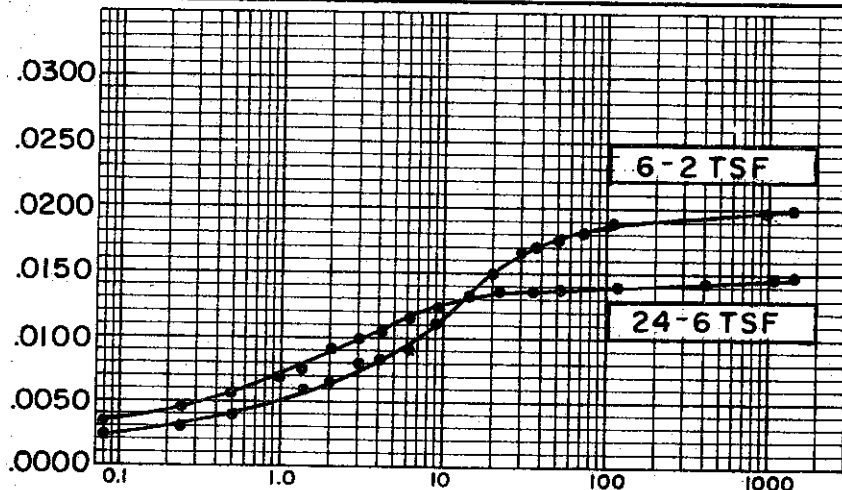
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	10.0%
FINAL WATER CONTENT	28.8%
BORING NO.	60
SAMPLE NO.	2
DEPTH	9.8' TO 10.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

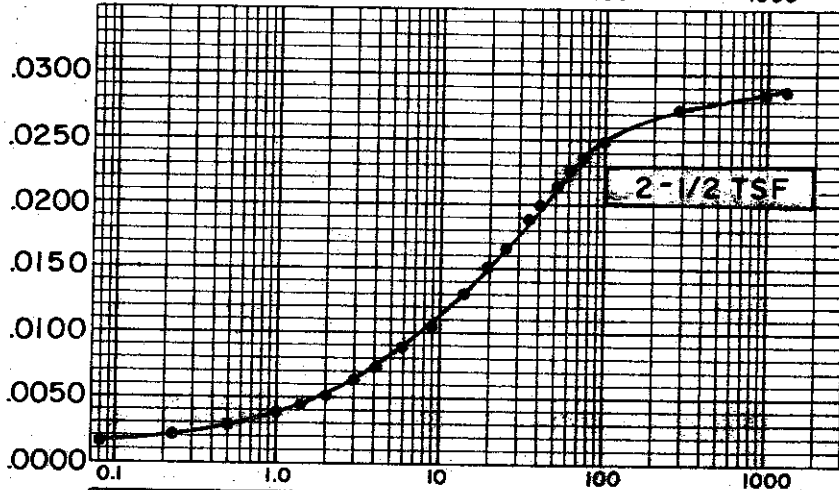
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-529

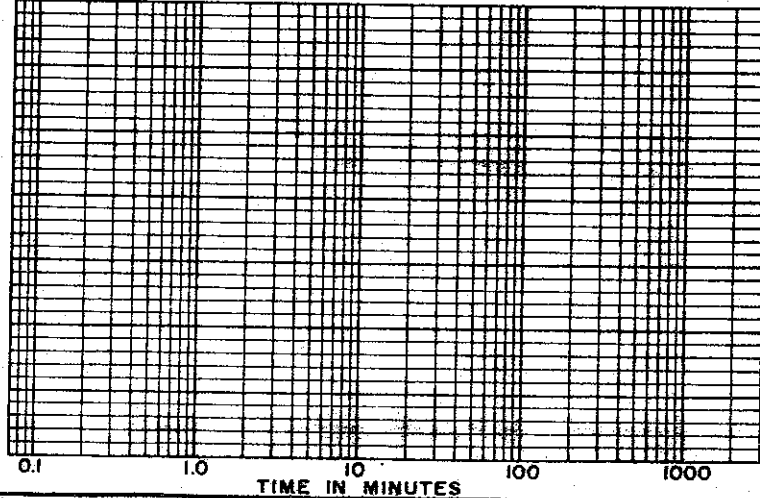
COMPRESSION IN INCHES



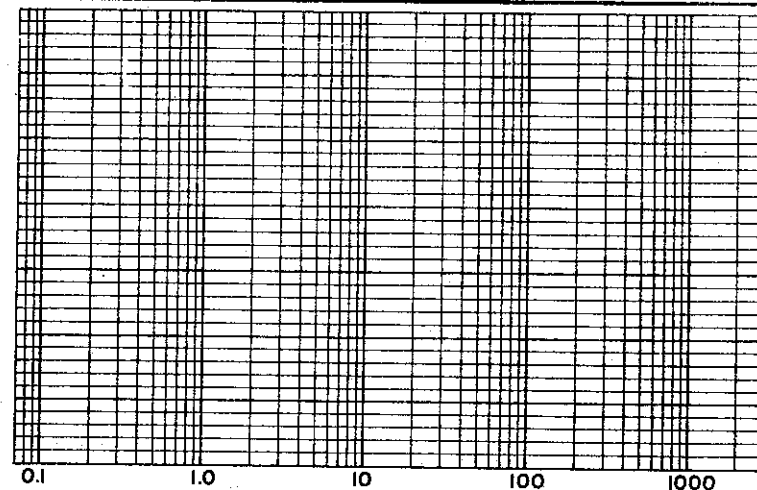
COMPRESSION IN INCHES



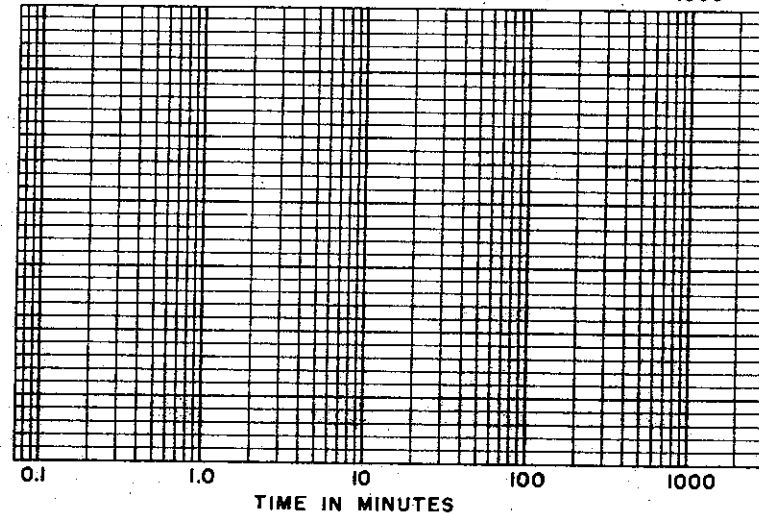
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CM)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

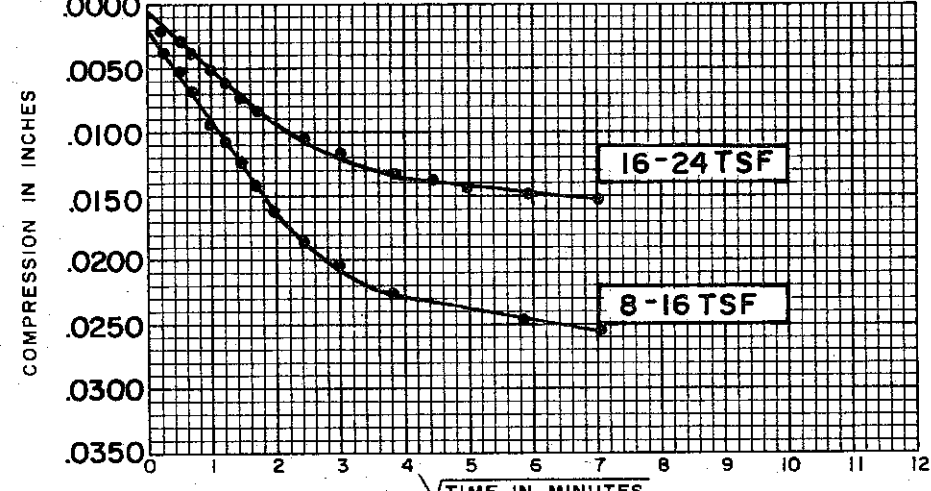
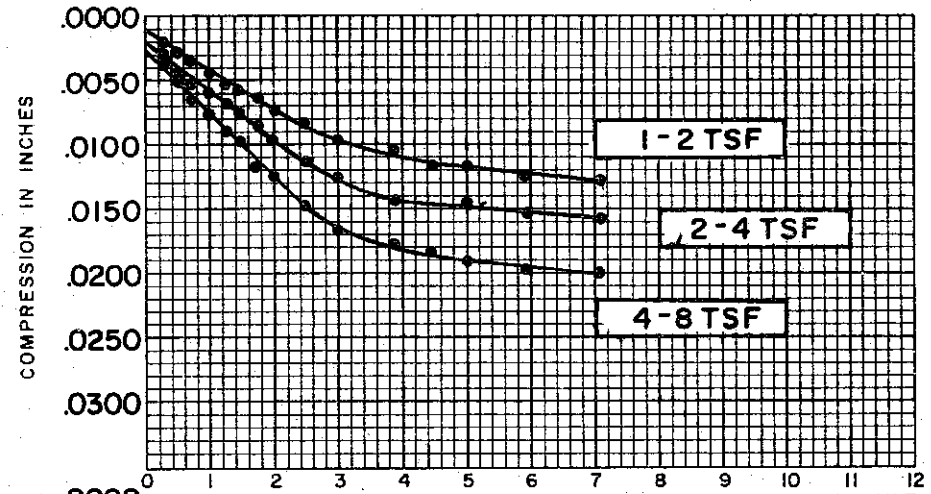
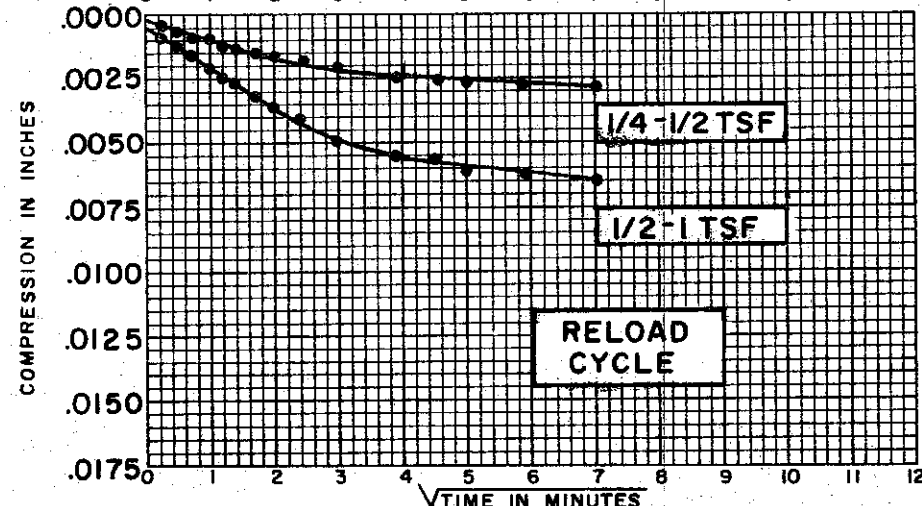
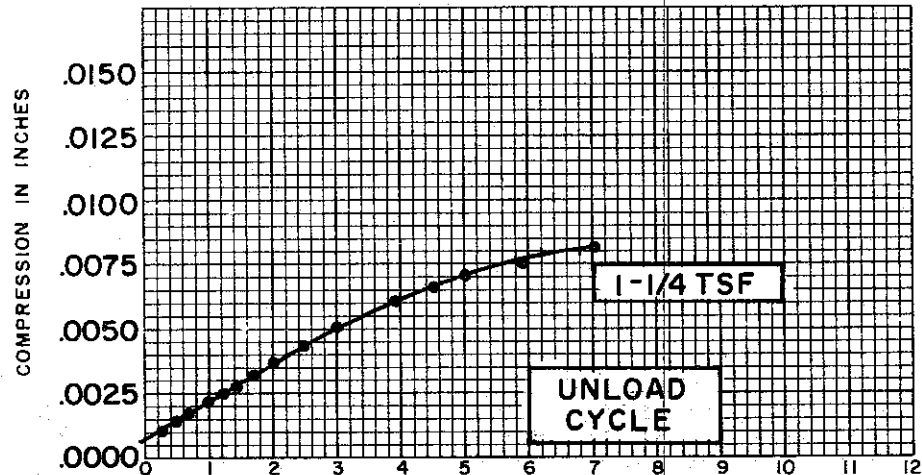
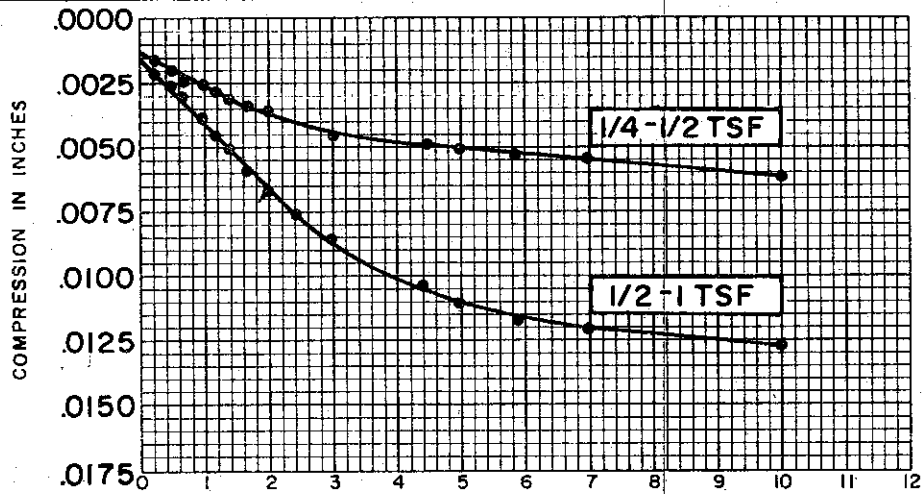
BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.60"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

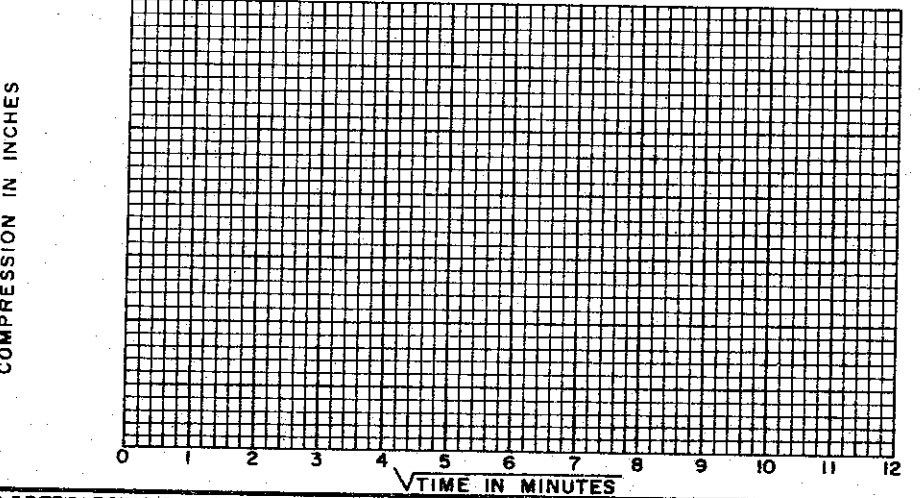
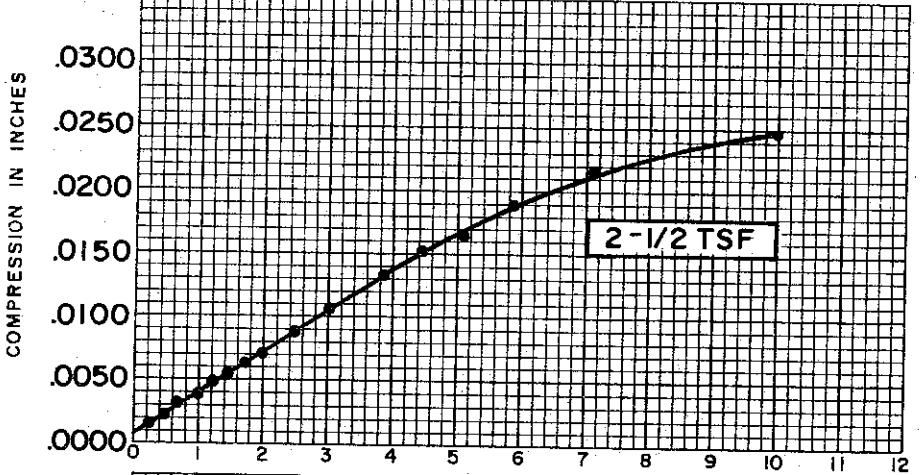
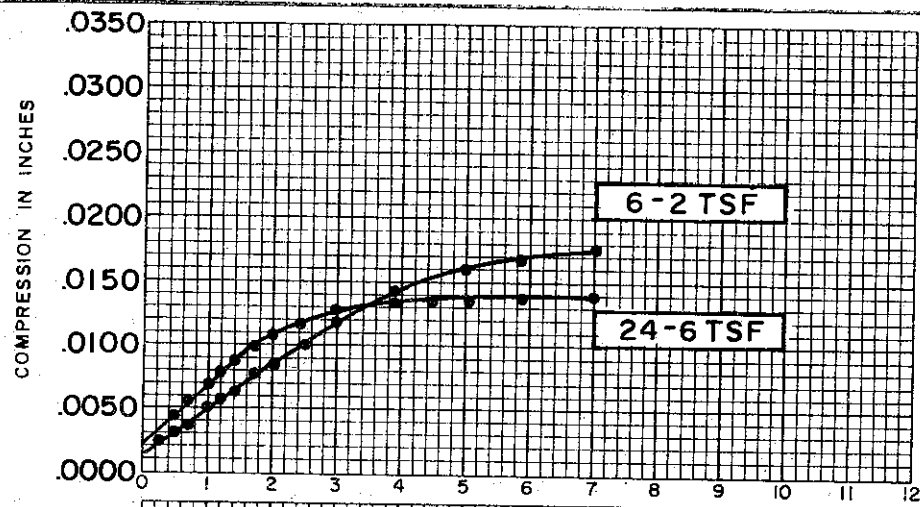
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO. <u>60</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>2</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>9.8' TO 10.0'</u>
INITIAL WATER CONTENT	<u>30.0%</u>	
FINAL WATER CONTENT	<u>28.8%</u>	

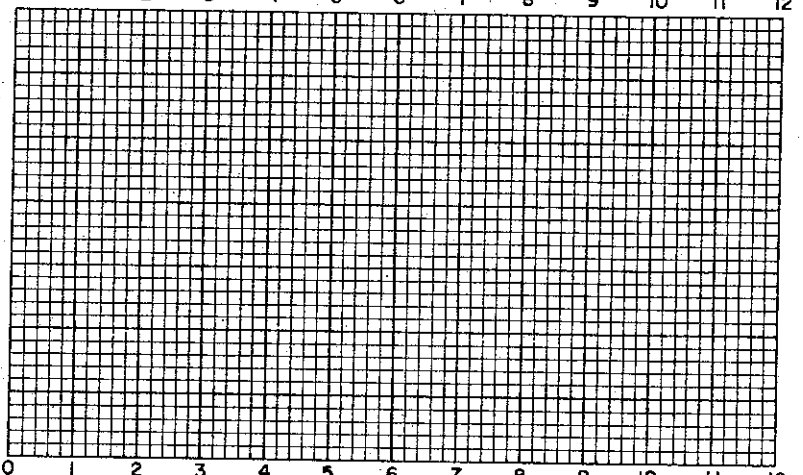
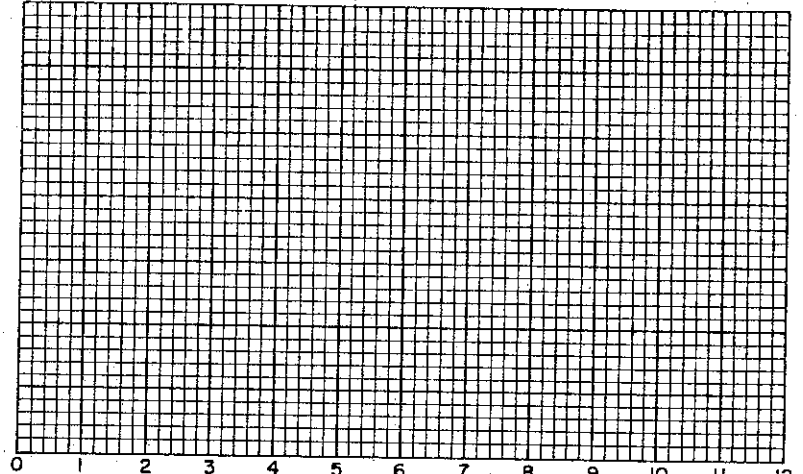
TEST DATA		CONSOLIDATION TEST
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	TIME VS. COMPRESSION CURVES
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.787</u>	

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

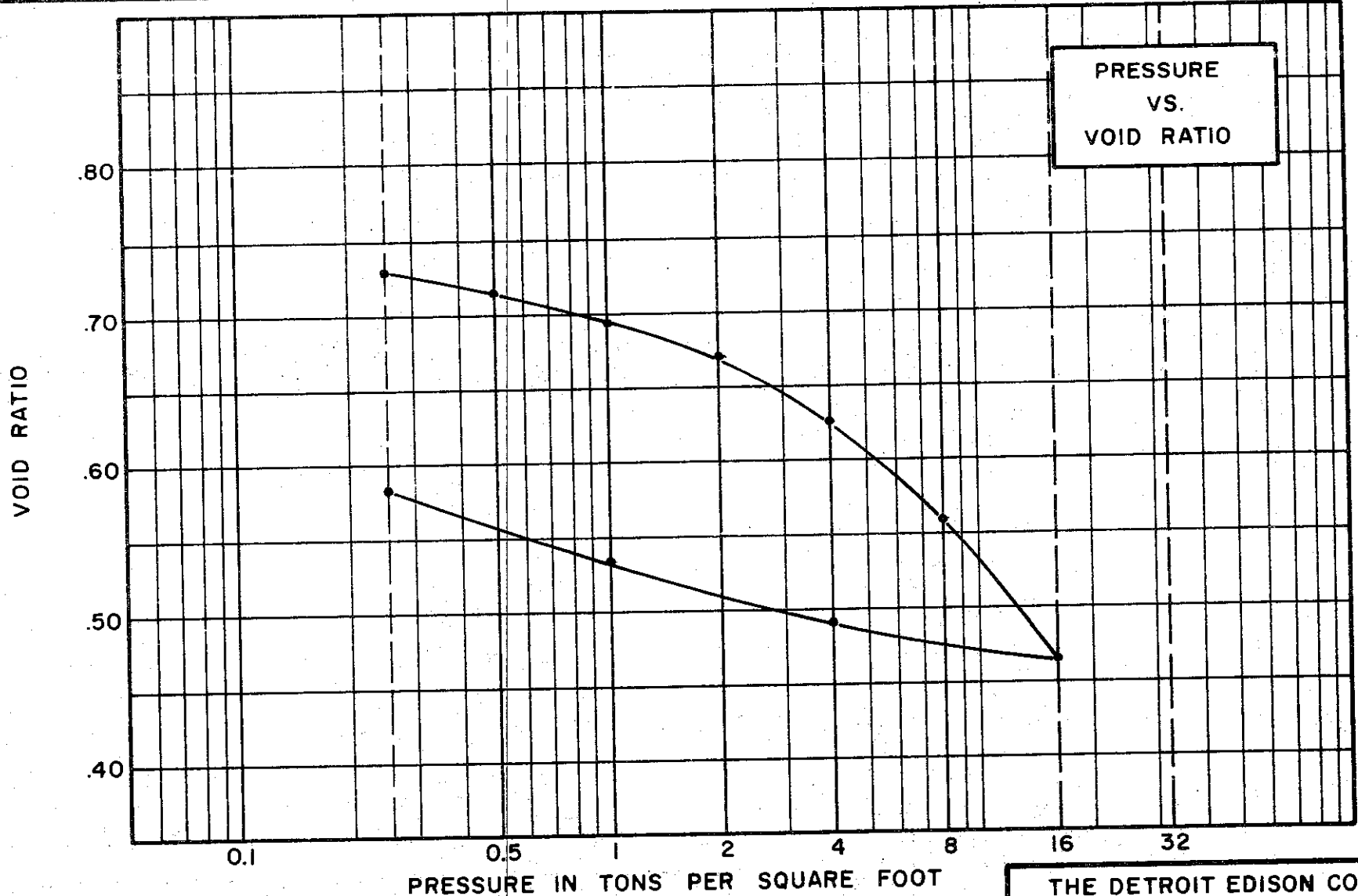
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-531



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL)  
SPECIFIC GRAVITY 2.73  
WATER CONTENT, INITIAL 27.9% FINAL 25.5%  
ATTERBERG LIMITS:  
LIQUID LIMIT 40% PLASTIC LIMIT 19%

**TEST DATA**

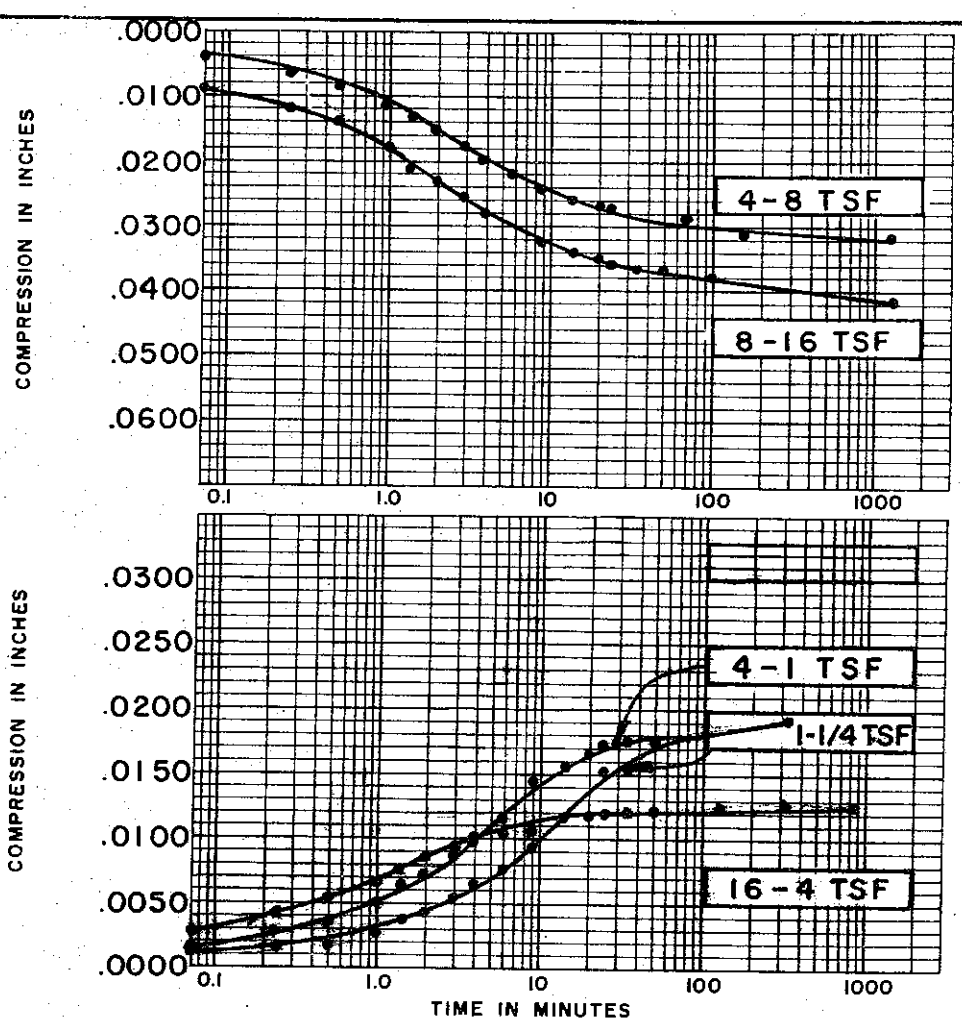
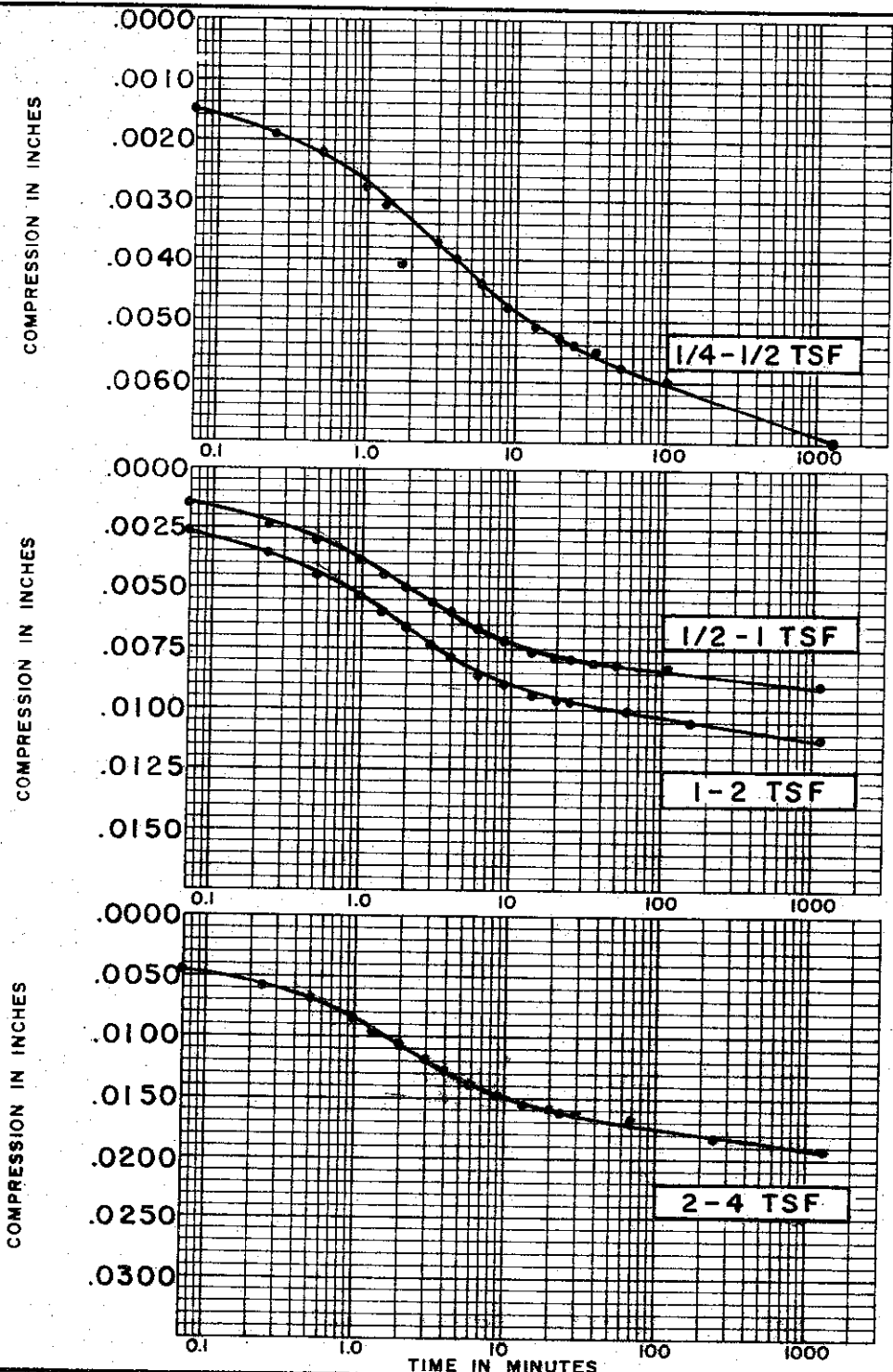
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.744

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 60 TEST NO. C56.1  
SAMPLE NO. 16 DATE JAN. 1974  
DEPTH 85.5'

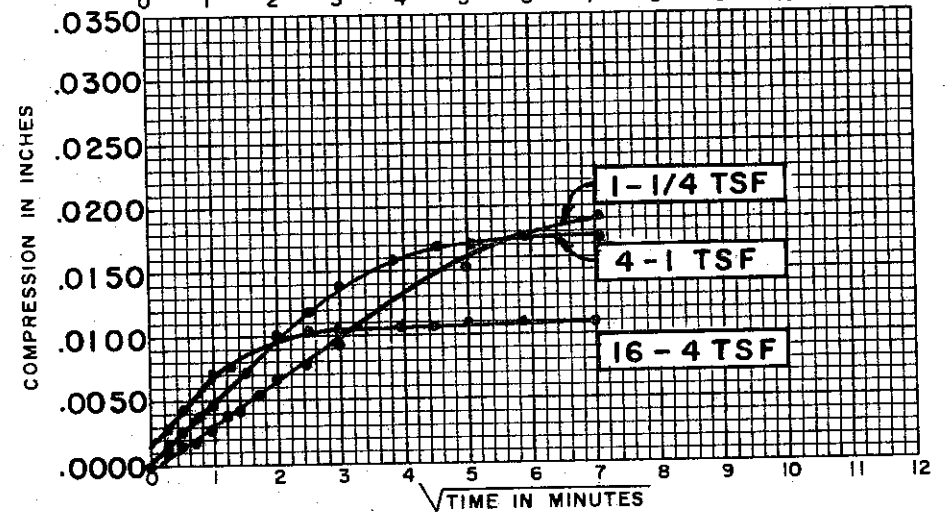
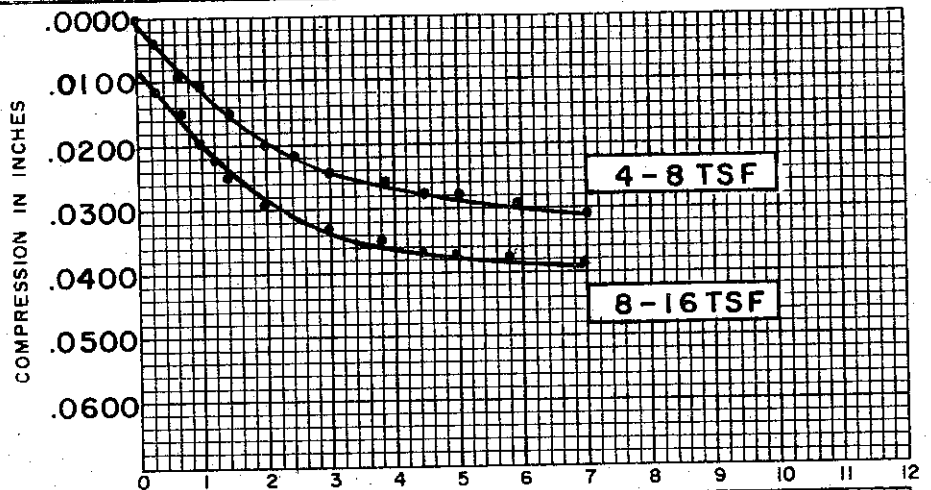
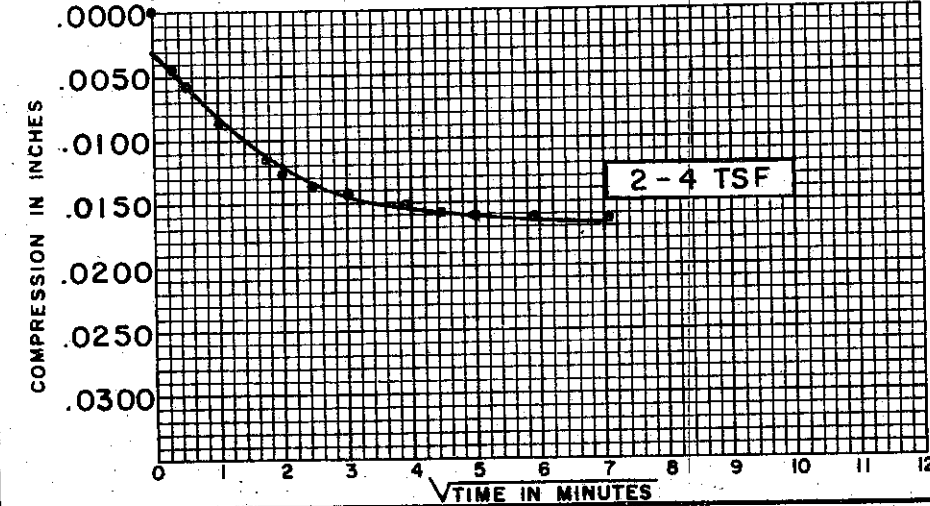
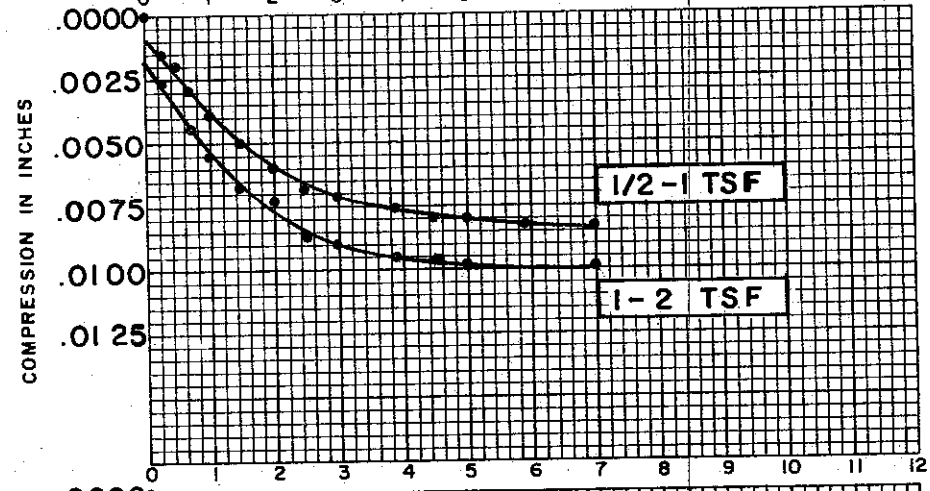
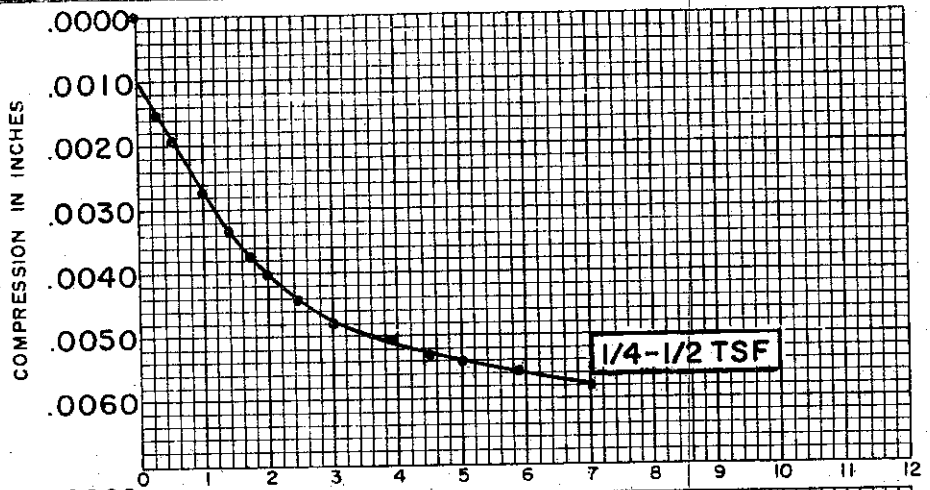
C-533



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	27.9 %
FINAL WATER CONTENT	25.5 %
BORING NO.	60
SAMPLE NO.	16
DEPTH	85.5'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 27.9 %  
 FINAL WATER CONTENT 25.5 %

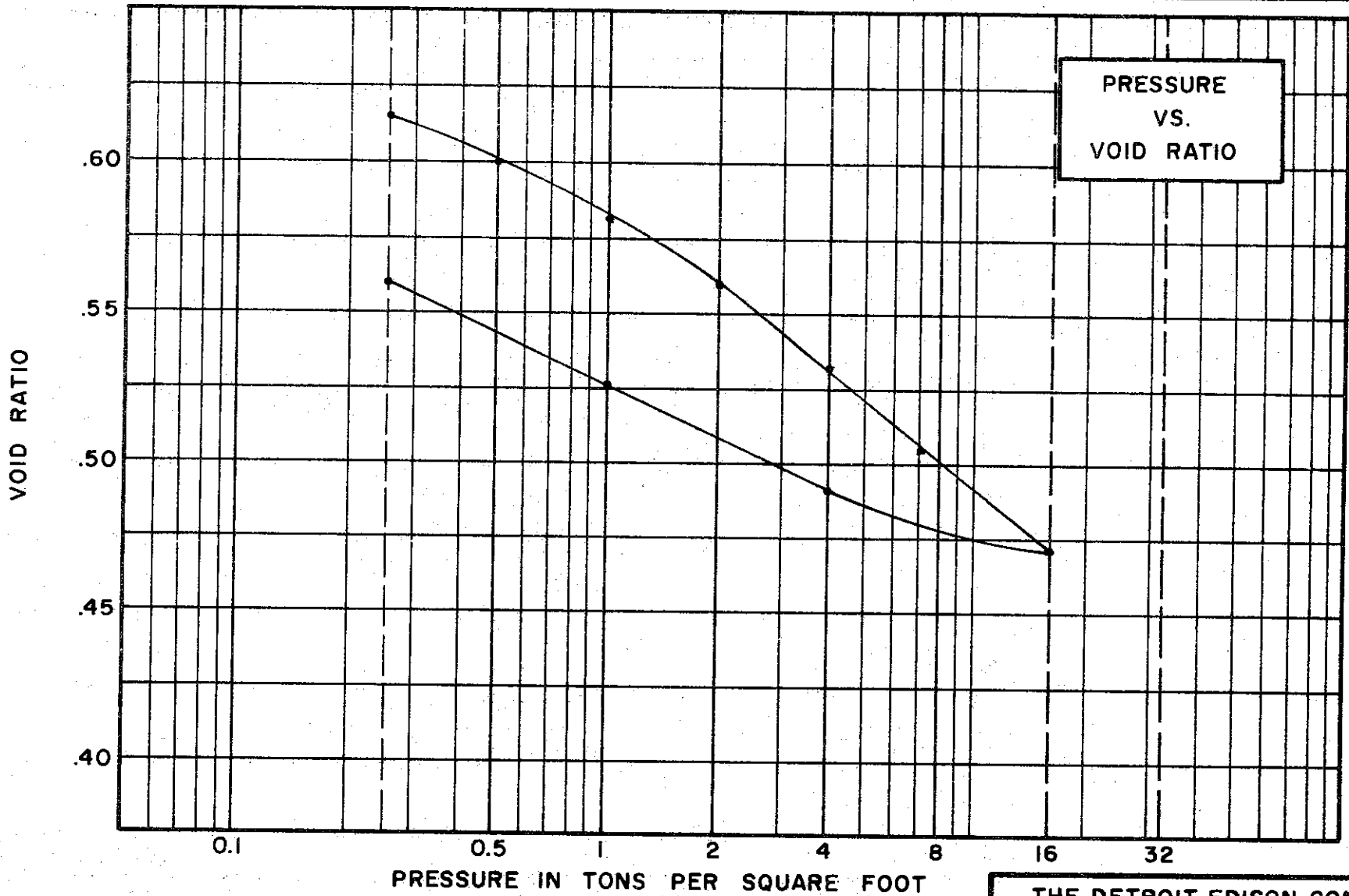
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.5'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.744

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 23.6% FINAL 23.4%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 53% PLASTIC LIMIT 24%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

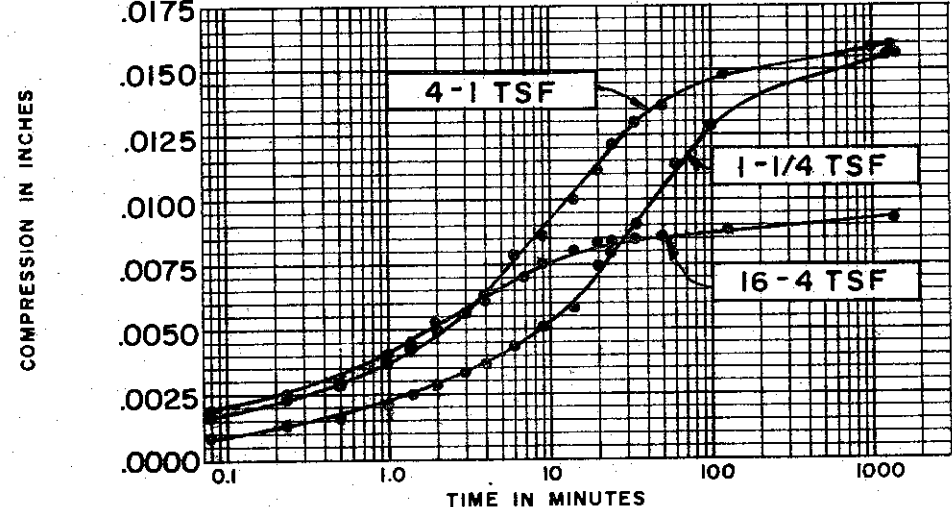
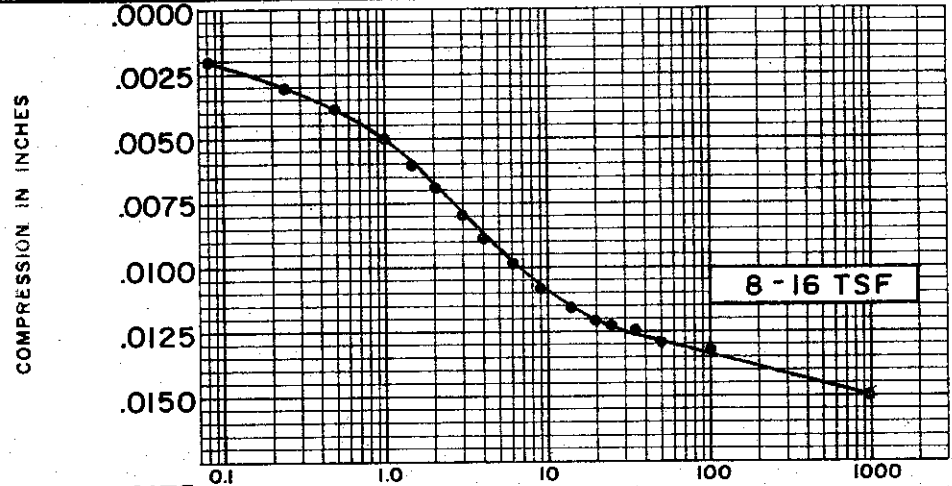
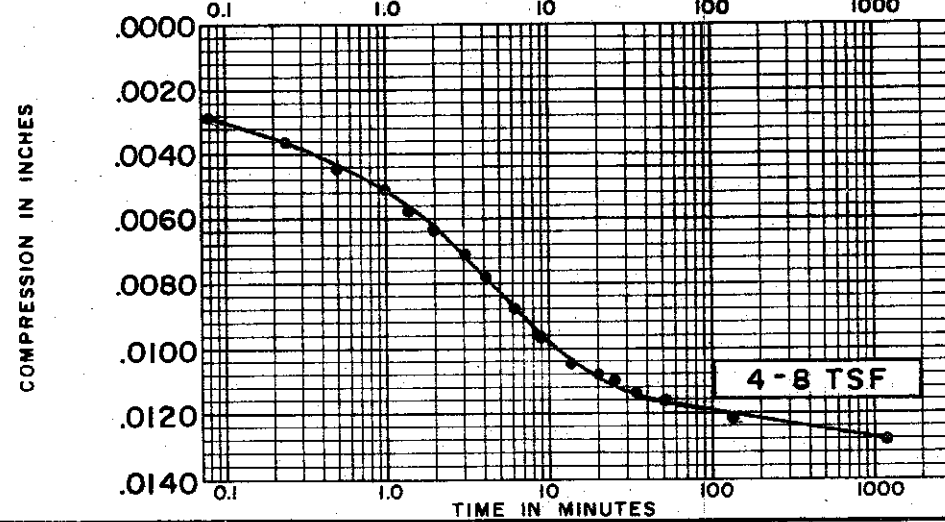
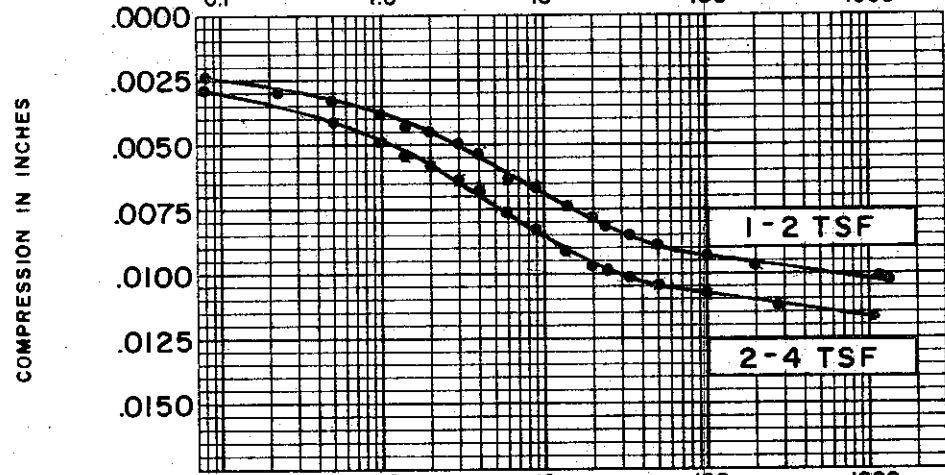
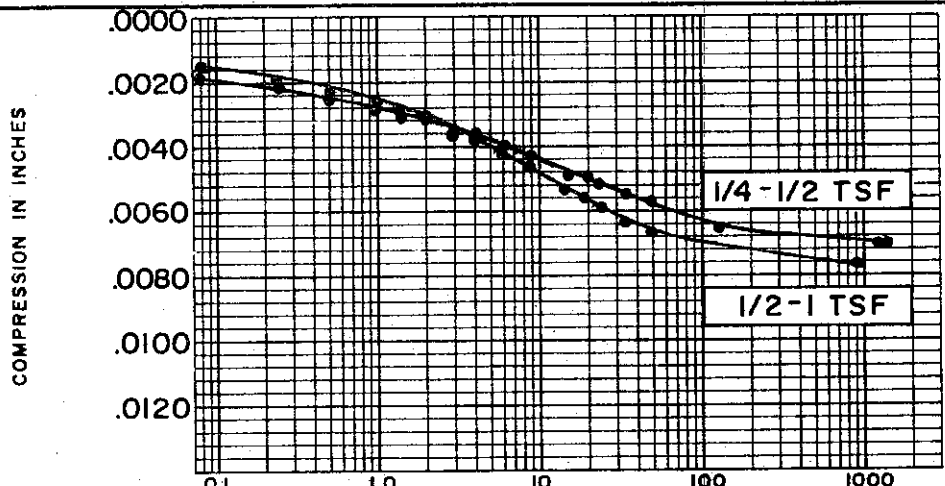
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 105 TEST NO. C373.1  
 SAMPLE NO. 1 DATE APRIL 74  
 DEPTH 5.1' TO 5.4'

C-535



C-536



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

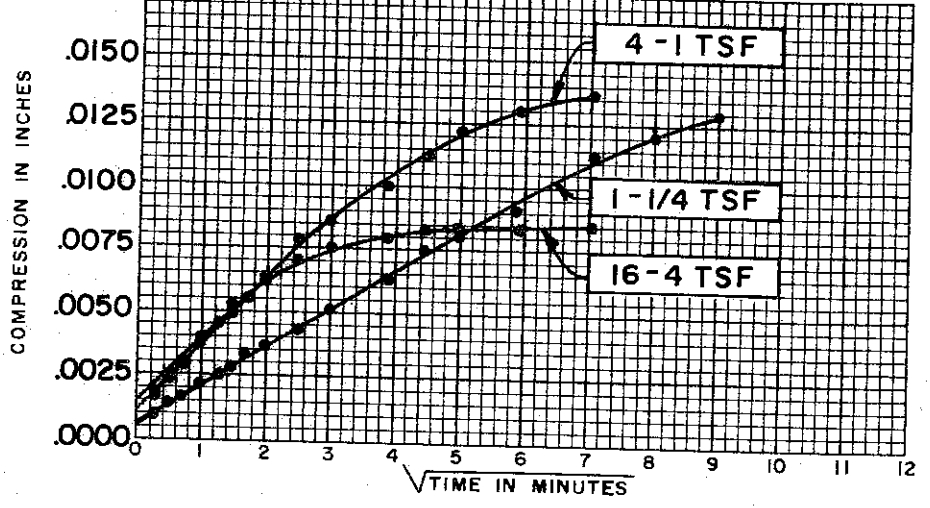
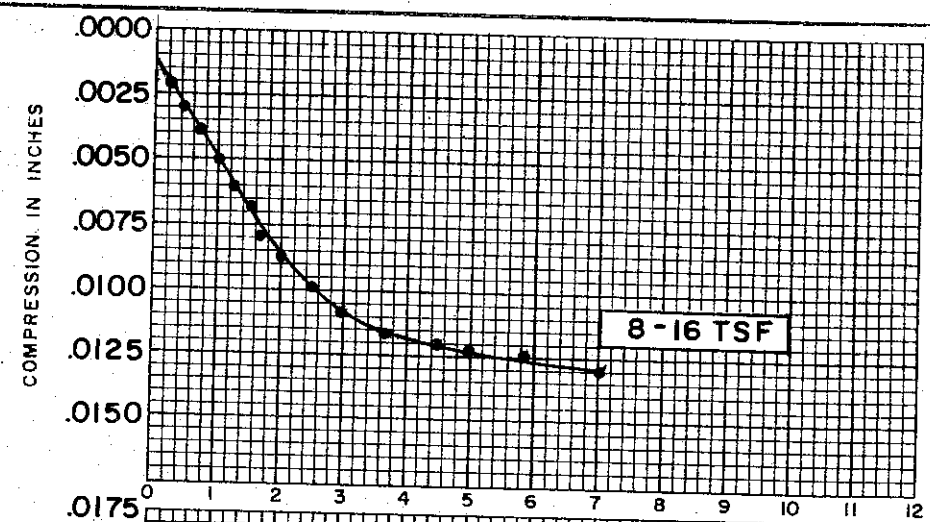
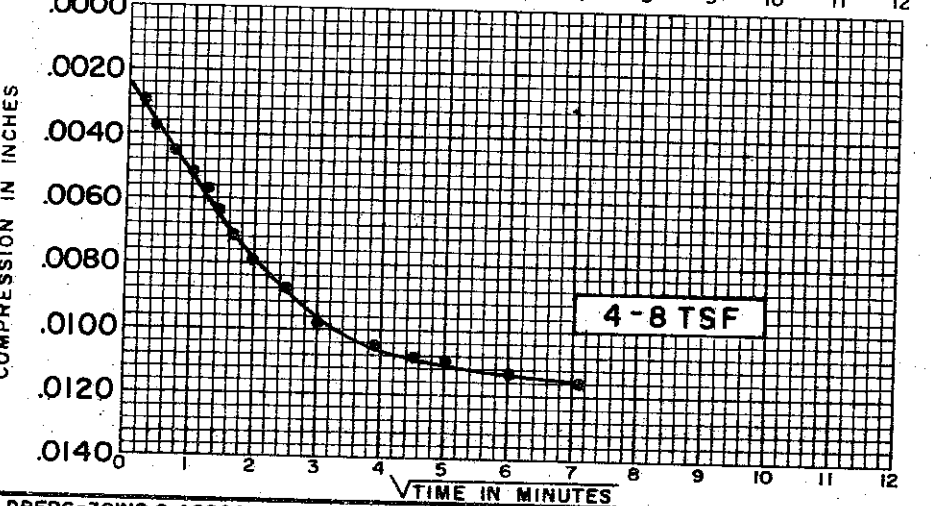
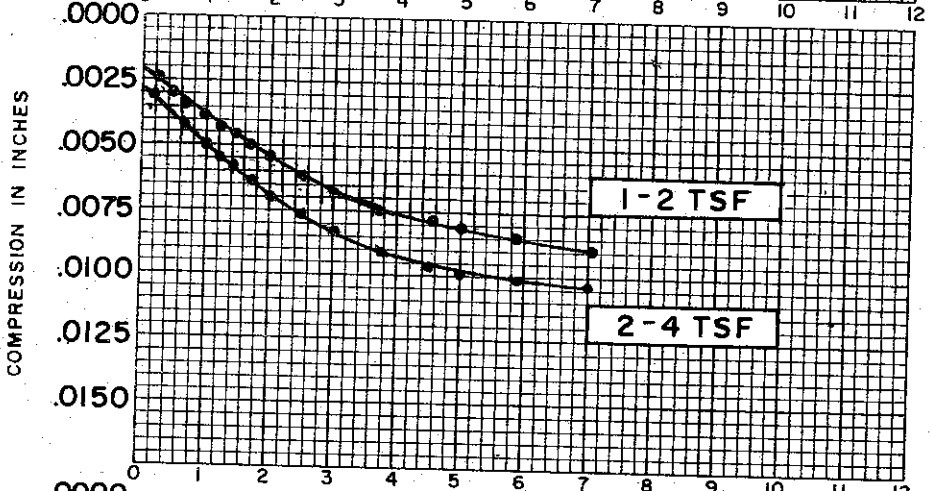
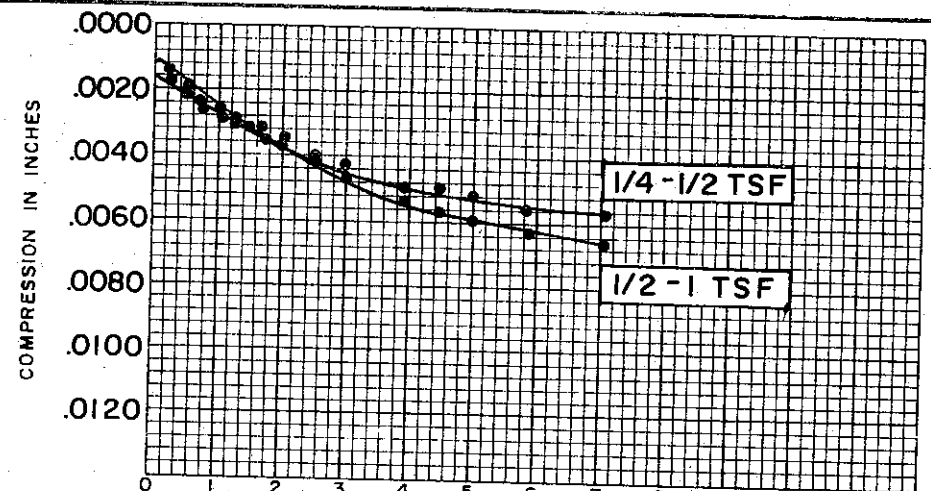
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

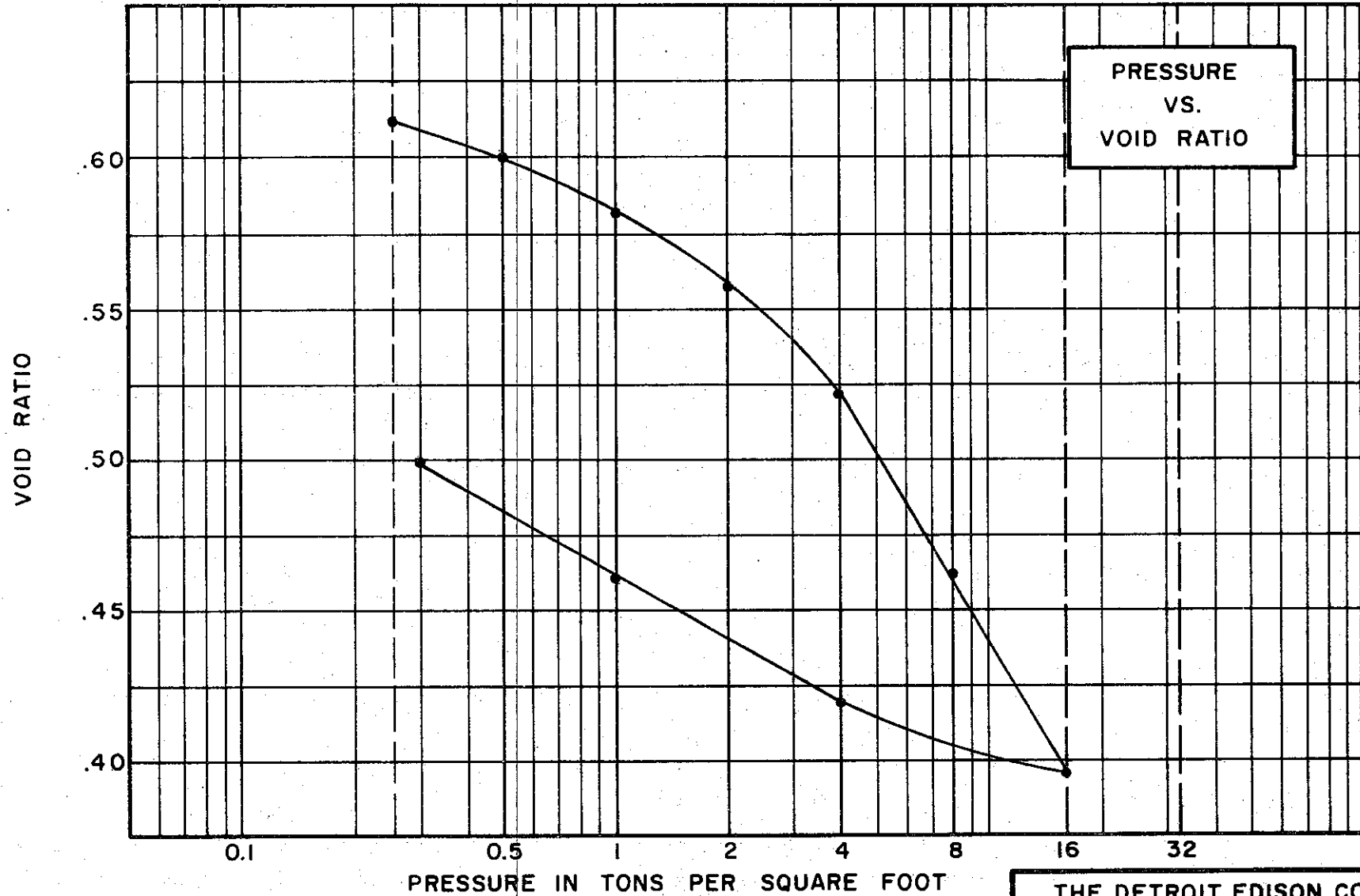
BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 23.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

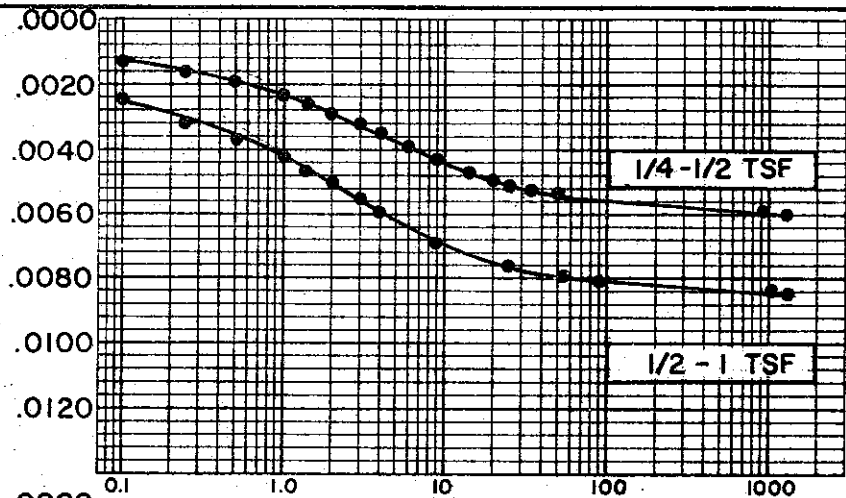
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

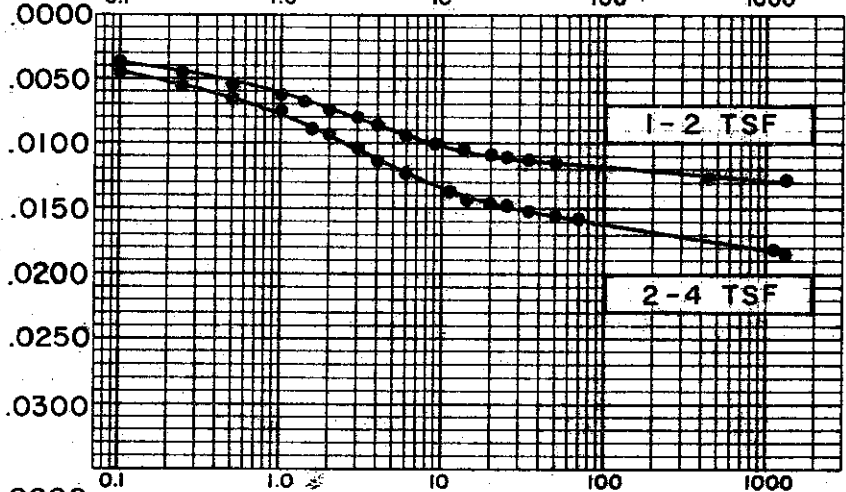
BORING NO. 105 TEST NO. C380.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 70.9' TO 71.2'

C-539

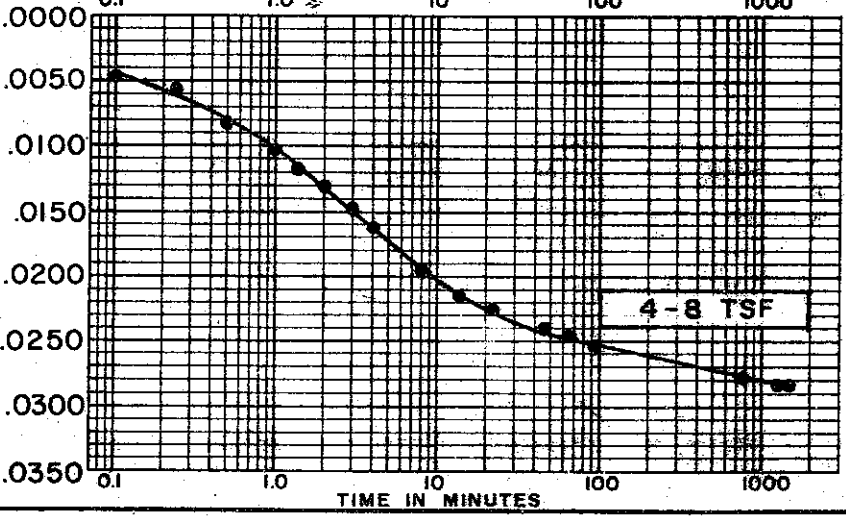
COMPRESSION IN INCHES



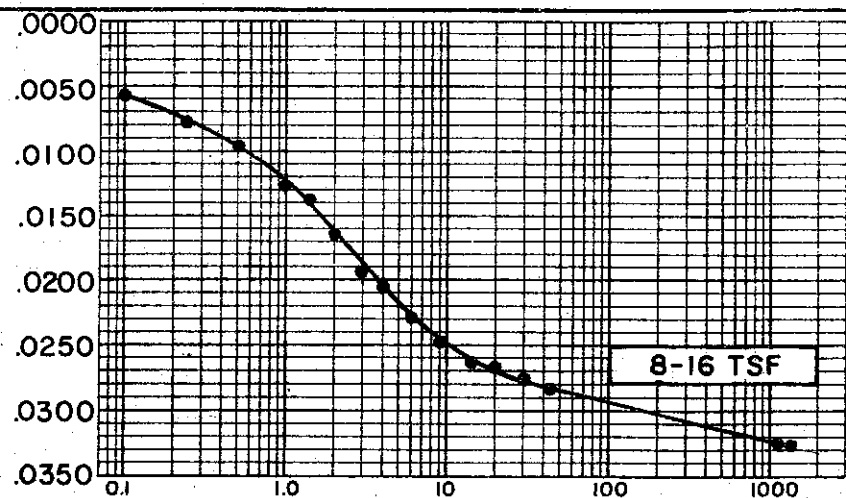
COMPRESSION IN INCHES



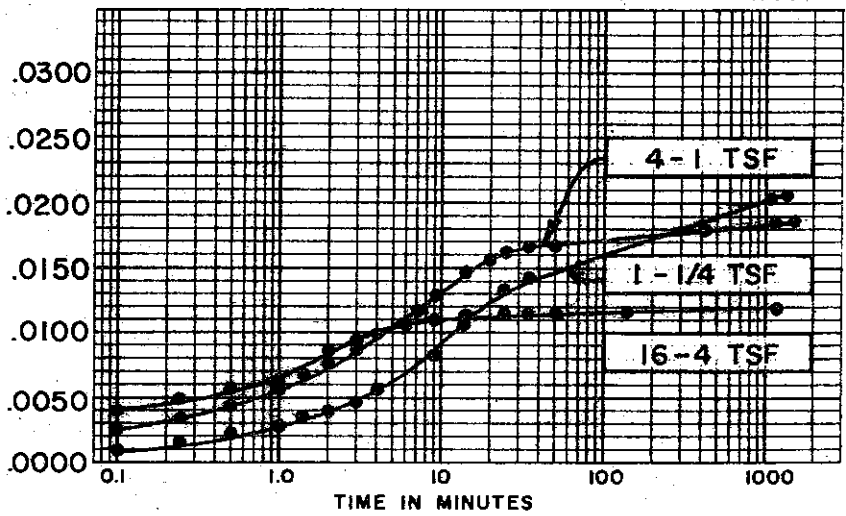
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 23.7 %  
 FINAL WATER CONTENT 22.5 %

BORING NO. 105  
 SAMPLE NO. 8  
 DEPTH 70.9' TO 71.2'

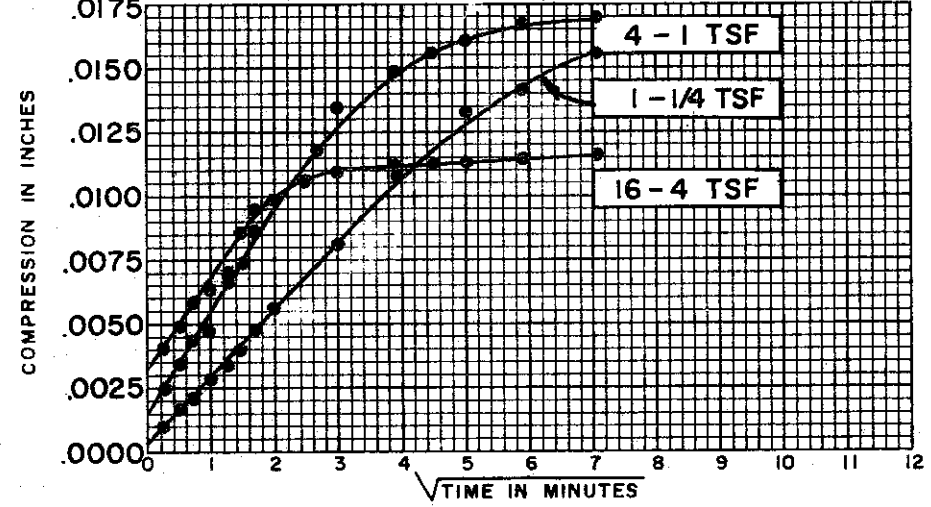
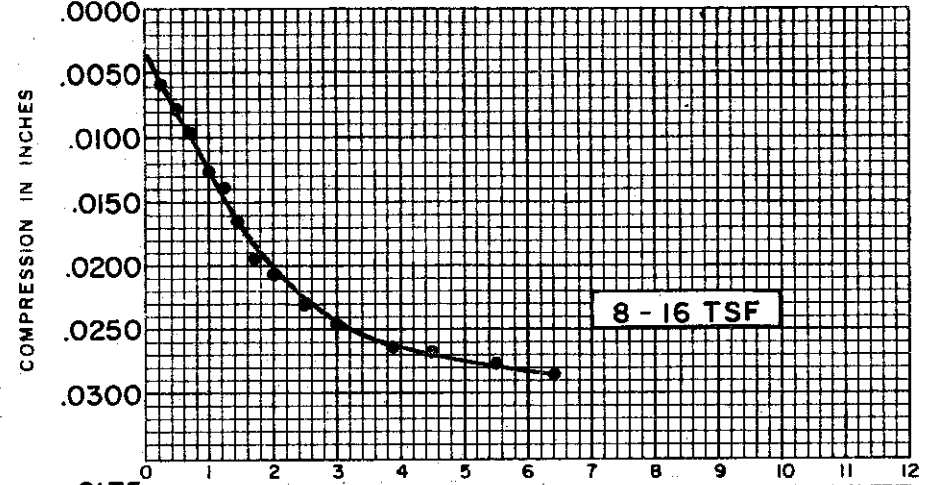
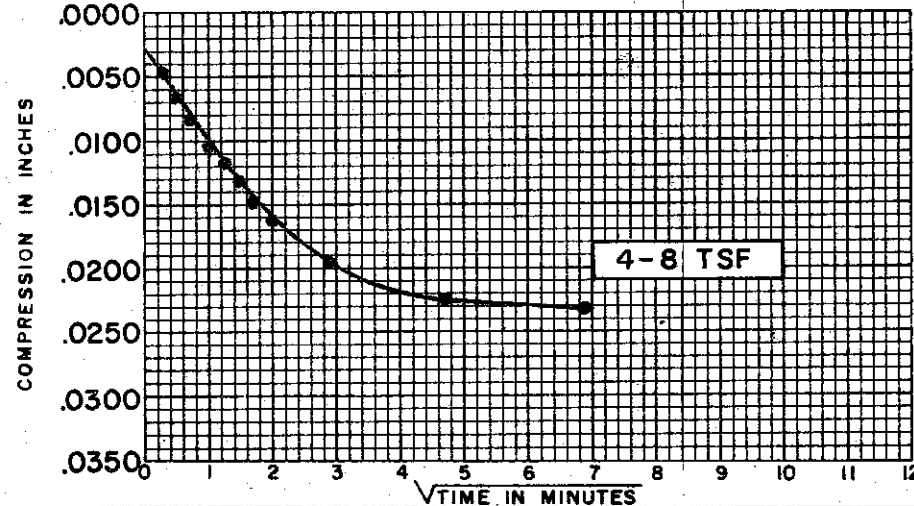
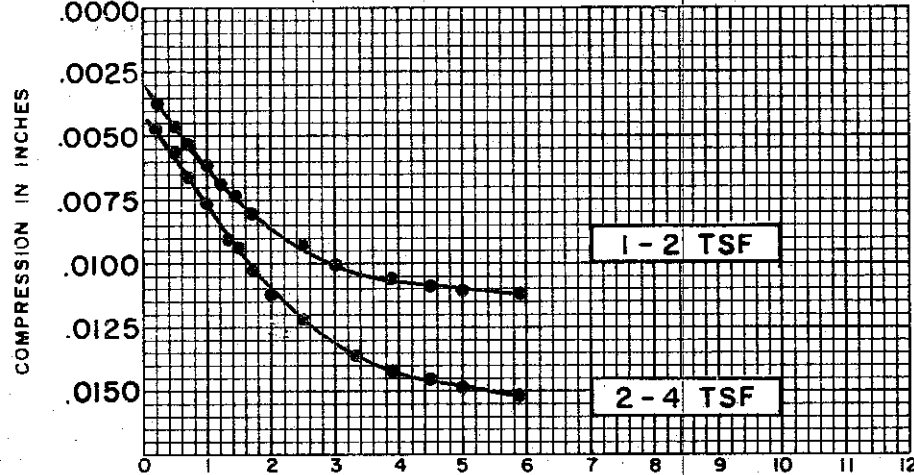
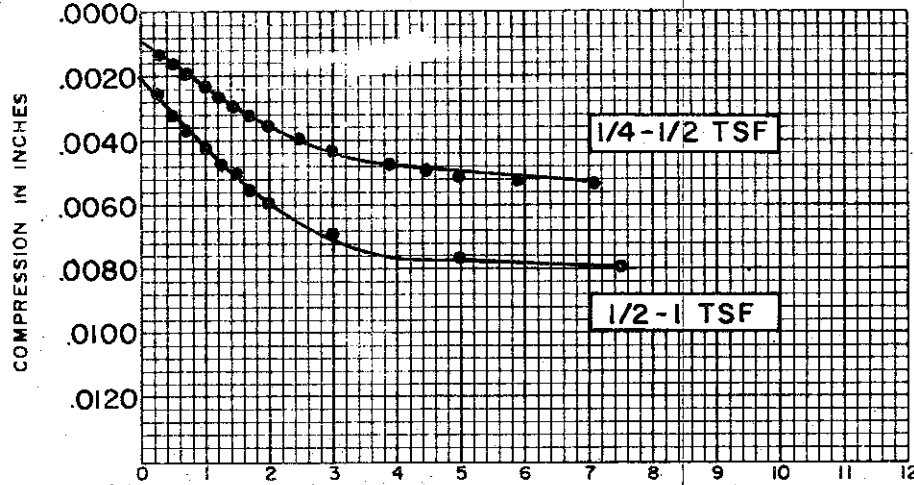
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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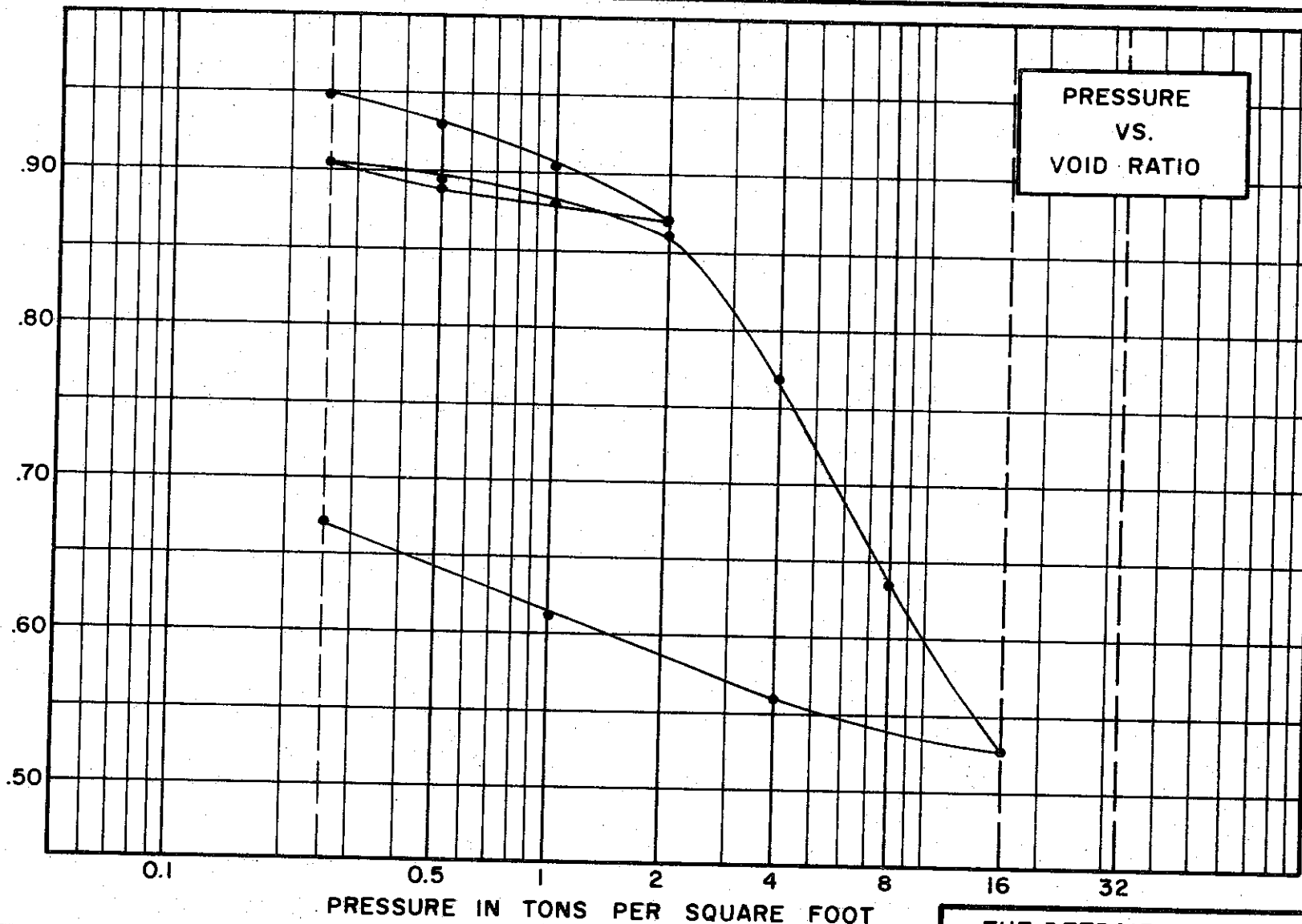


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	23.7 %
FINAL WATER CONTENT	22.5 %
BORING NO.	105
SAMPLE NO.	8
DEPTH	70.9' TO 71.2'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.625

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 36.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

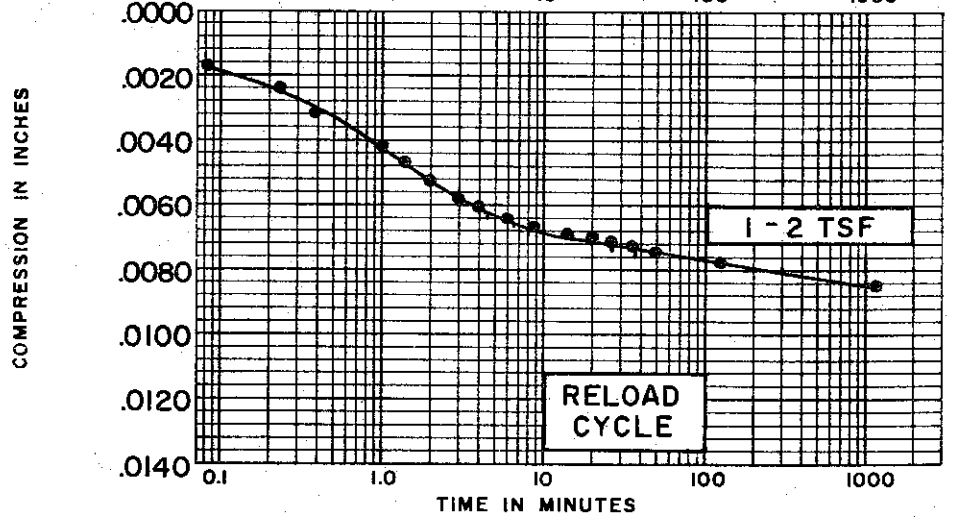
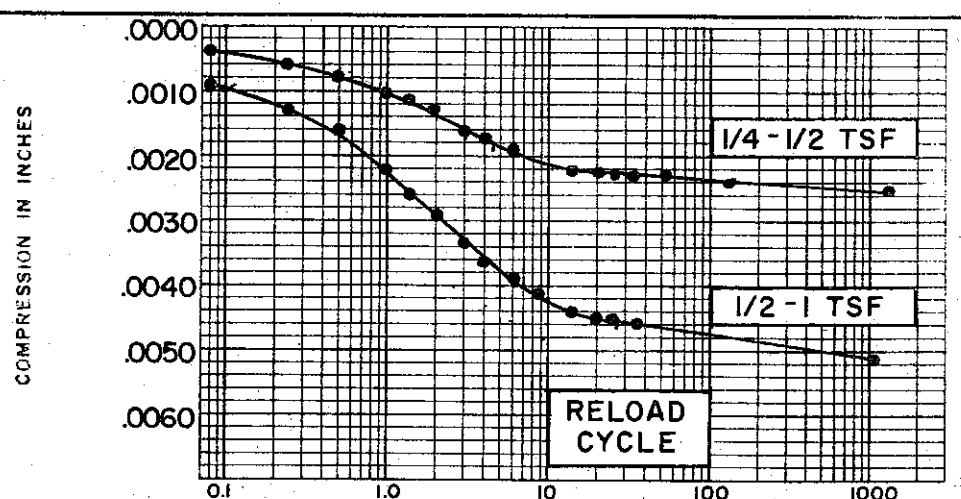
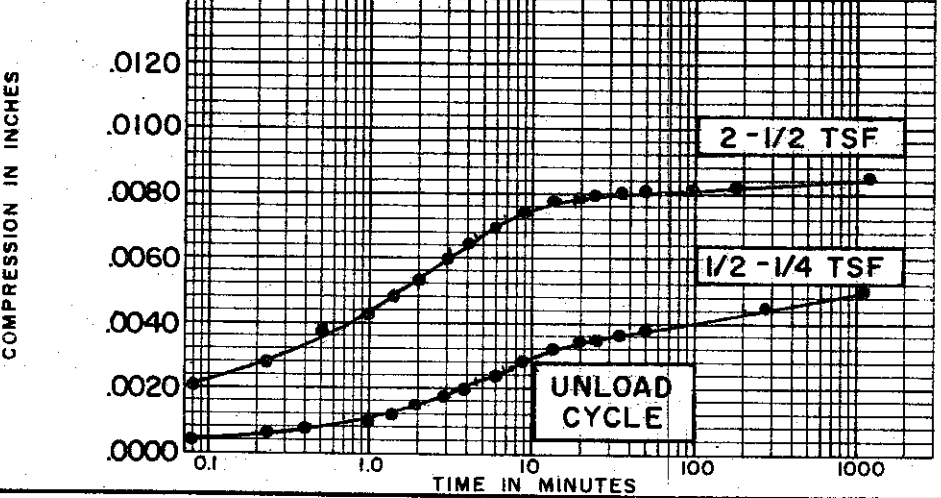
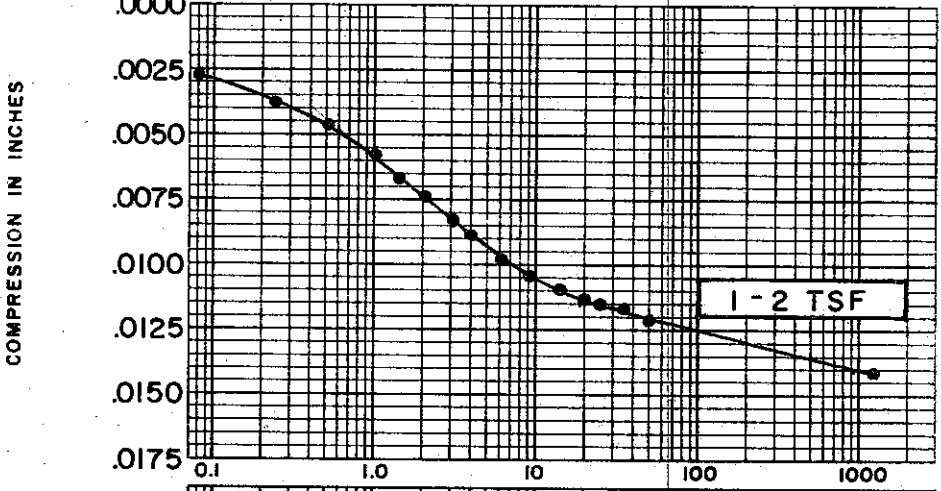
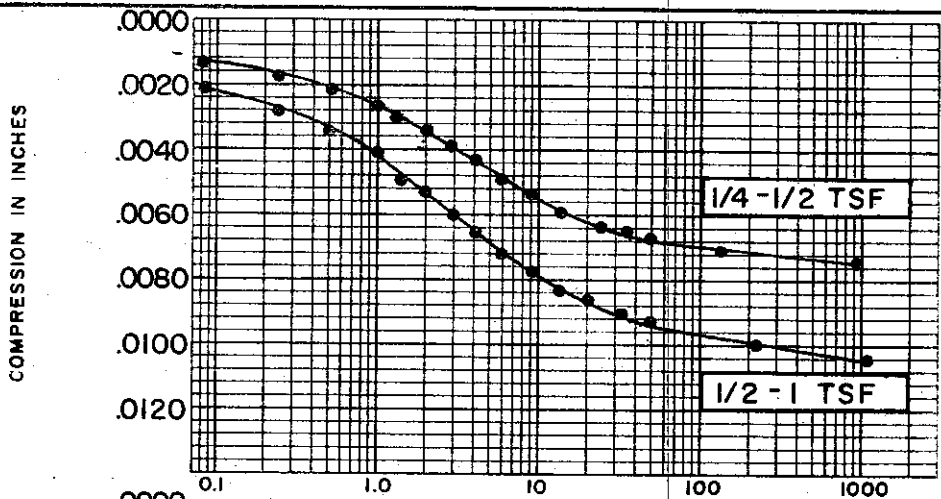
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C256.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 38.6' TO 38.9'

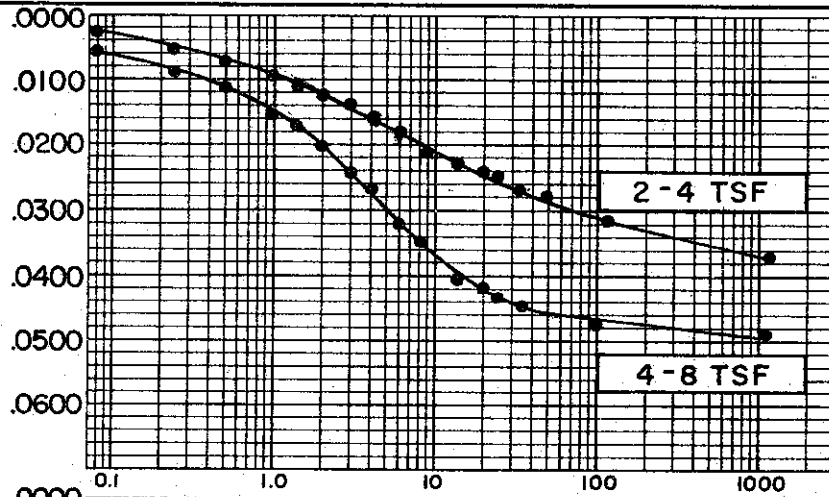
GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

C-541

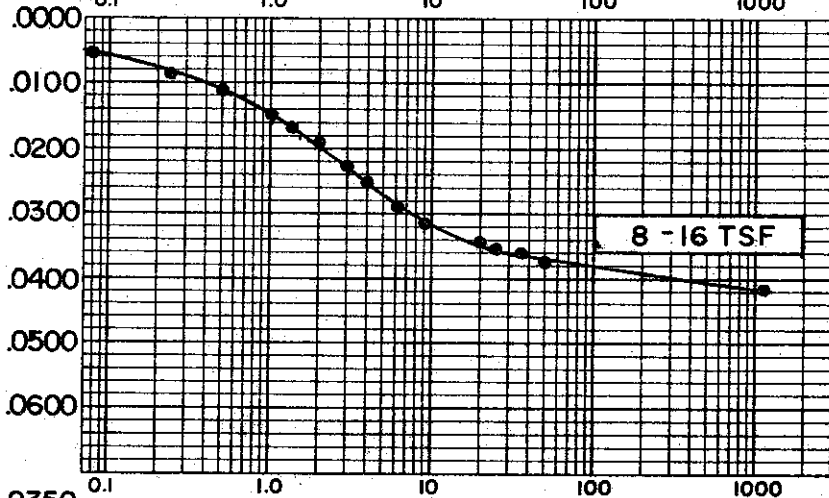


SOIL PROPERTIES		BORING NO.	118
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	5
SPECIFIC GRAVITY	2.70	DEPTH	38.6' TO 38.9'
INITIAL WATER CONTENT	36.9 %		
FINAL WATER CONTENT	%		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	0.80"	TIME VS. COMPRESSION CURVE	
INITIAL SAMPLE DIAMETER	2.50"	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	0.969	BELLE RIVER PLANT UNITS I & II	
		FILE 1255	

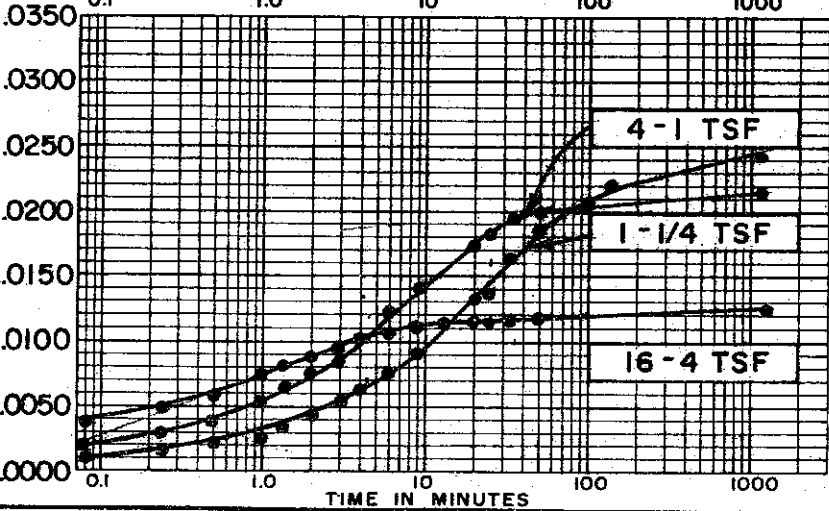
COMPRESSION IN INCHES



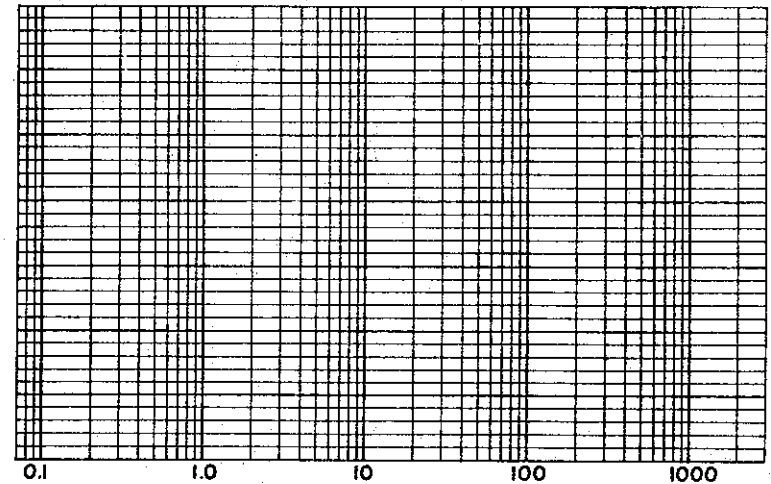
COMPRESSION IN INCHES



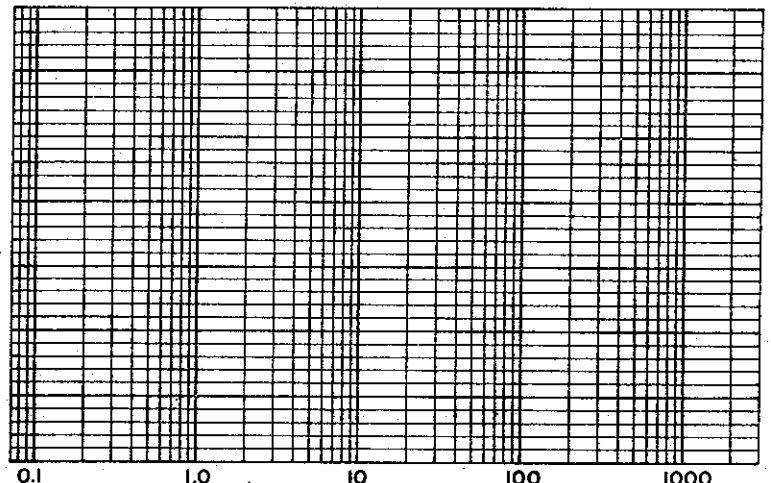
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT     %

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

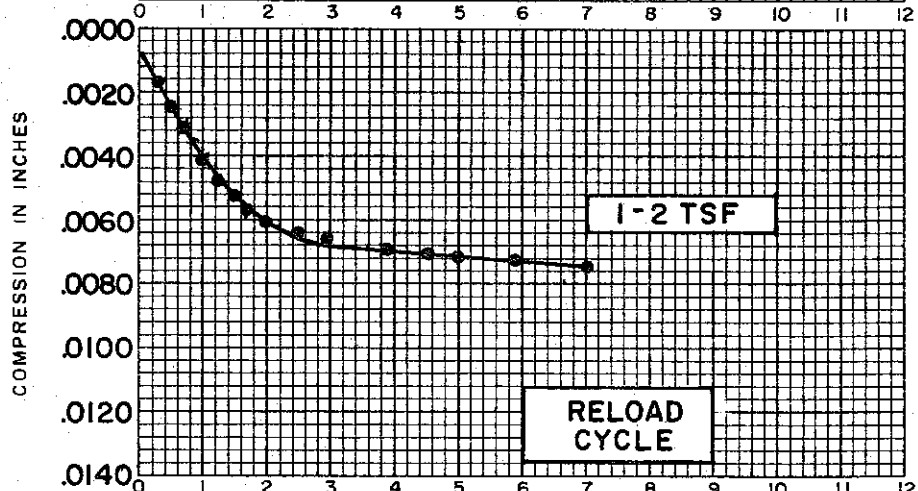
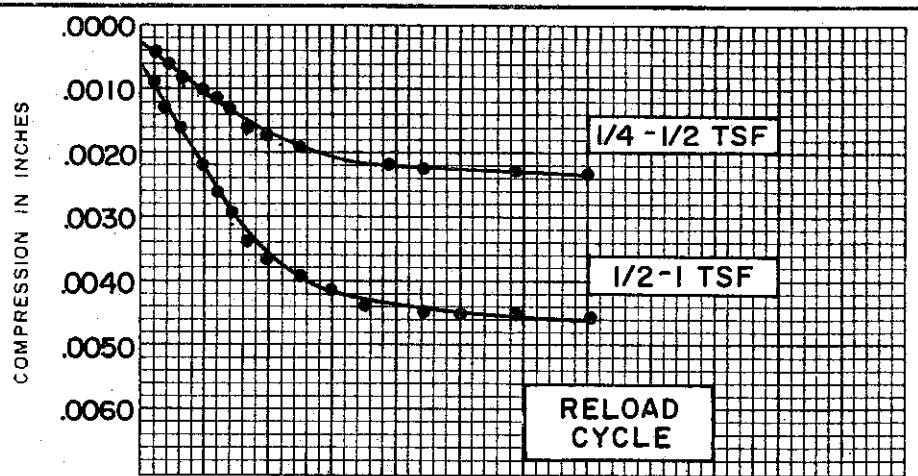
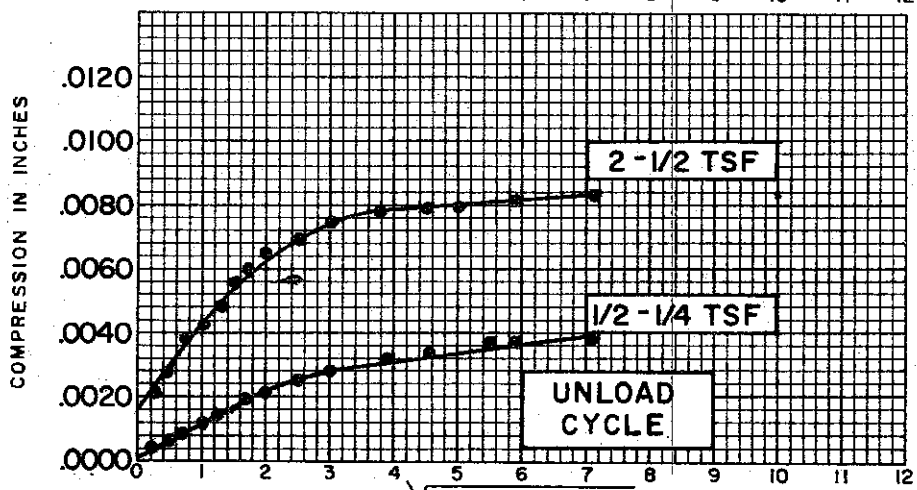
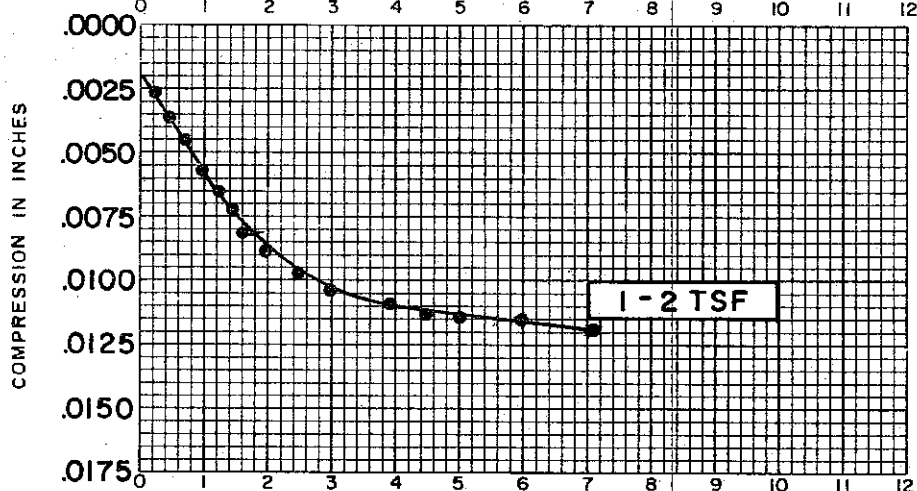
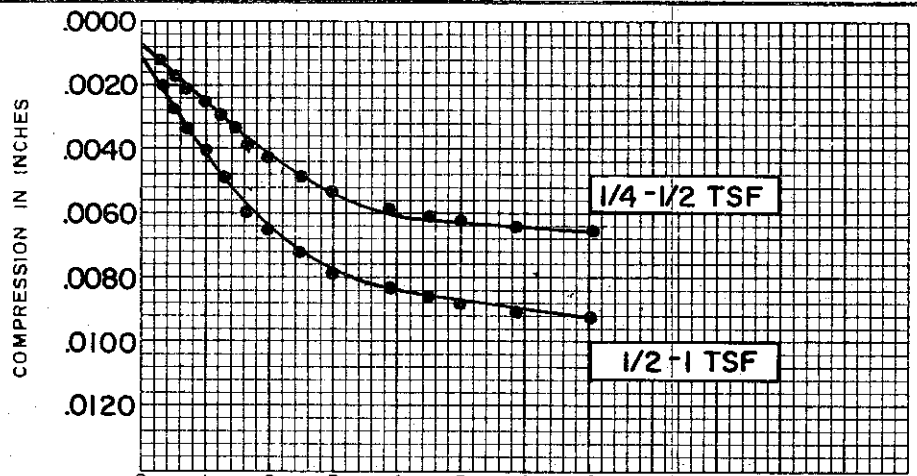
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-543

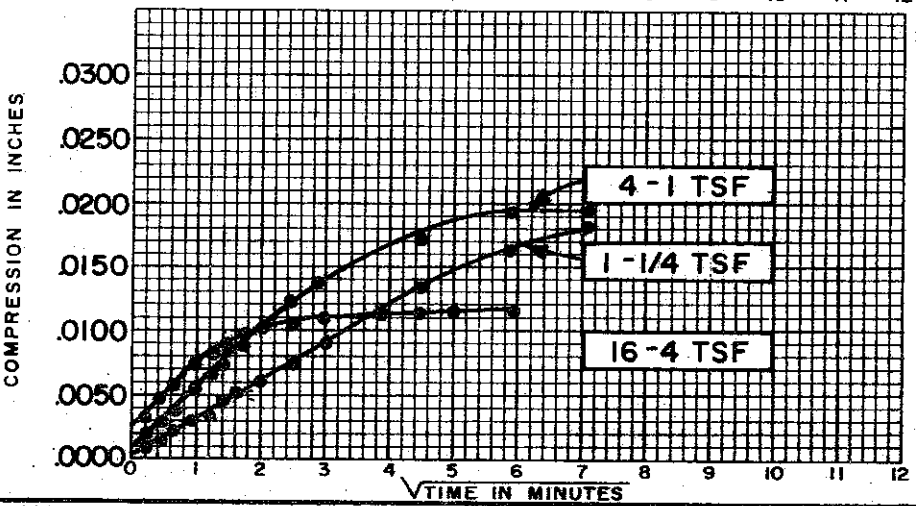
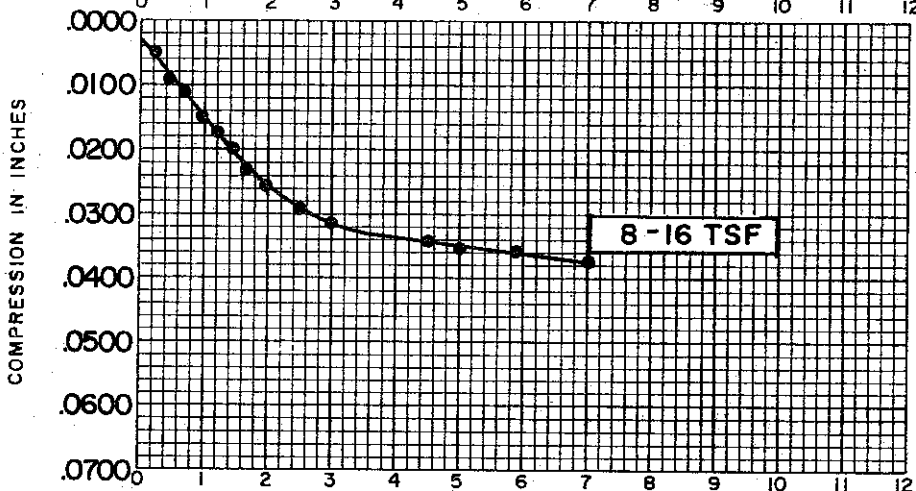
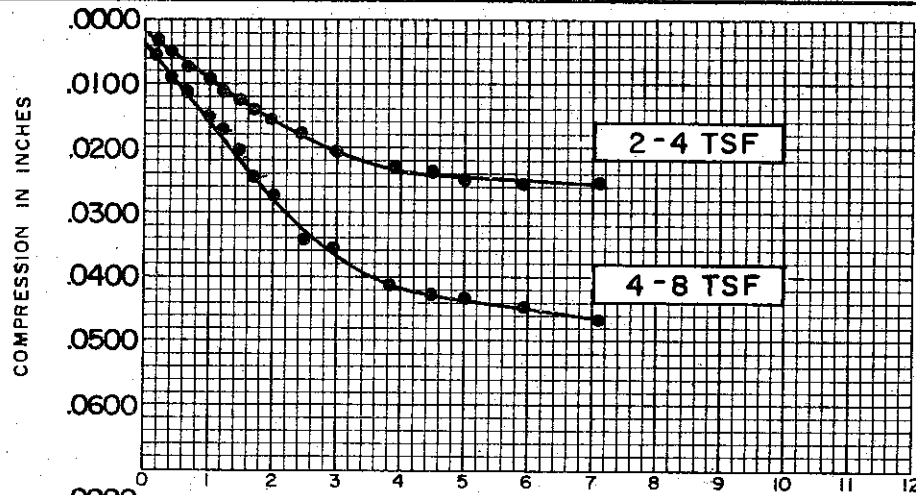




SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	36.9 %
FINAL WATER CONTENT	%
BORING NO.	118
SAMPLE NO.	5
DEPTH	38.6' TO 38.9'

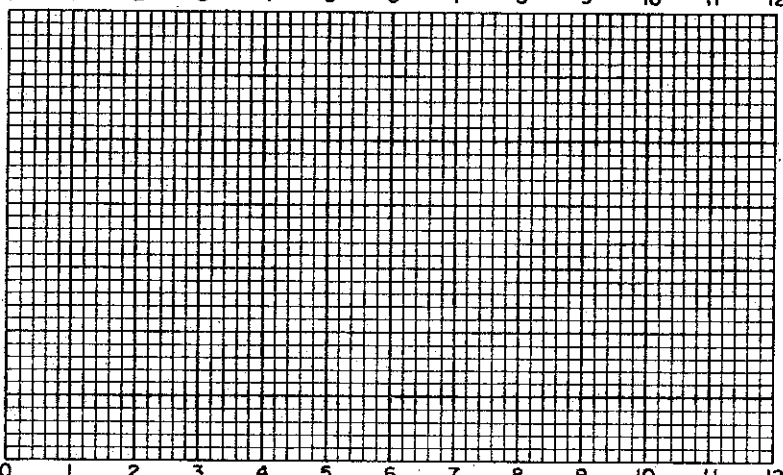
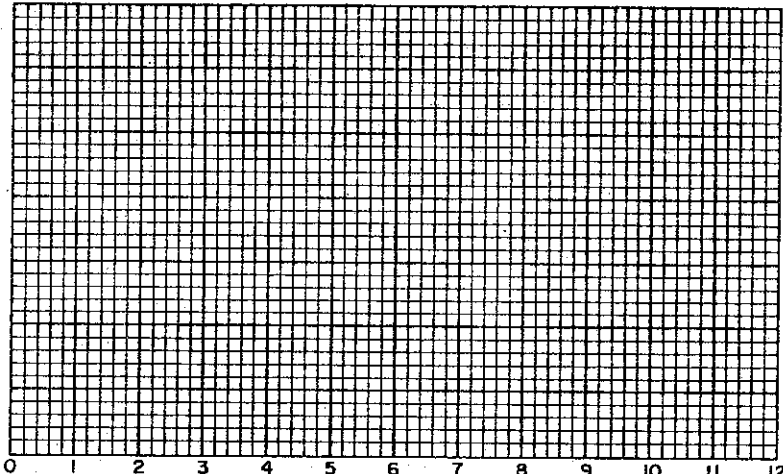
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.969

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT       %      

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

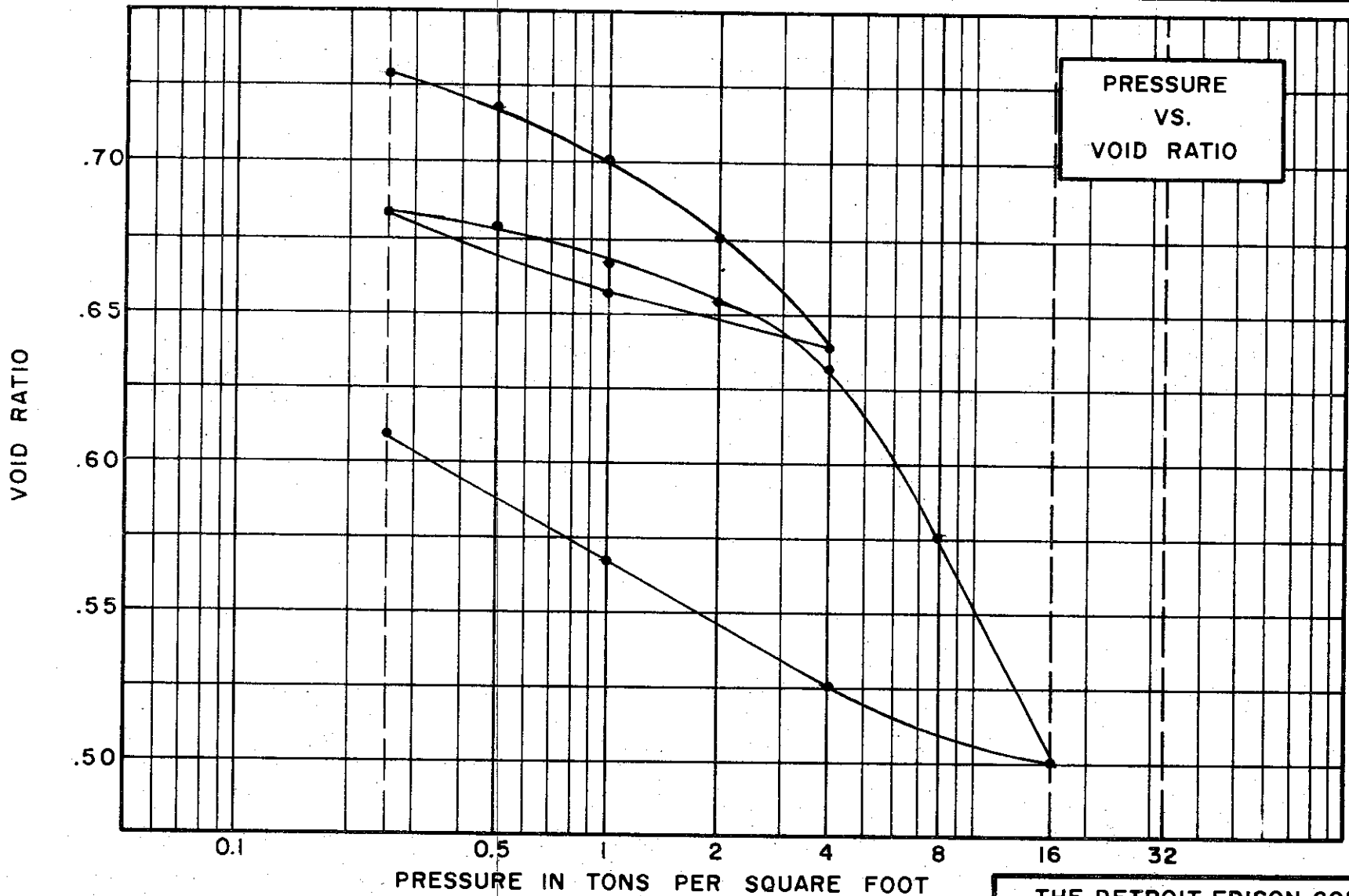
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 27.8%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

**TEST DATA**

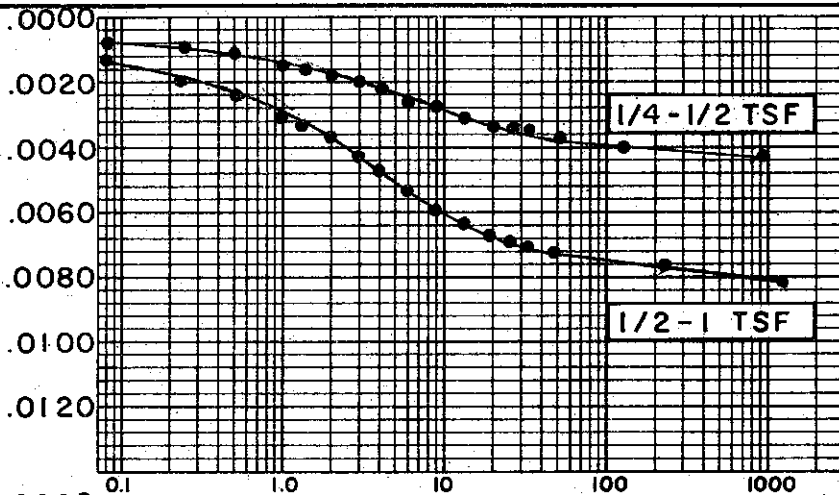
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

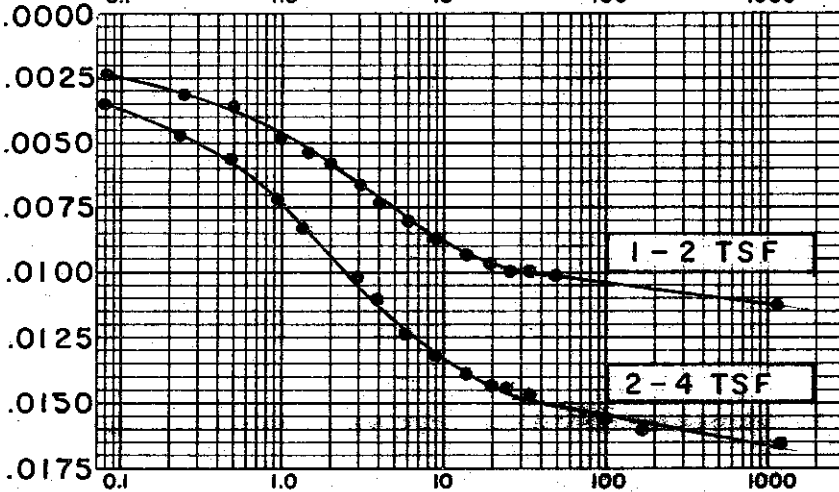
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C260.1  
 SAMPLE NO. 9 DATE JULY 1974  
 DEPTH 78.7' TO 79.0'

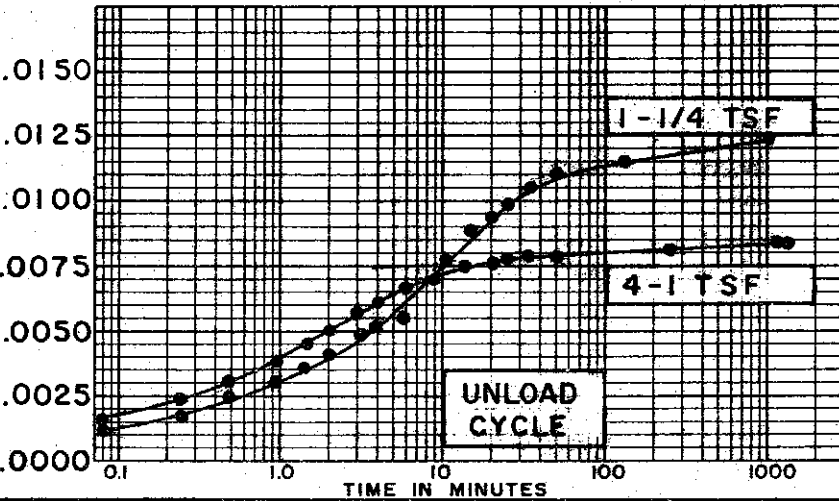
COMPRESSION IN INCHES



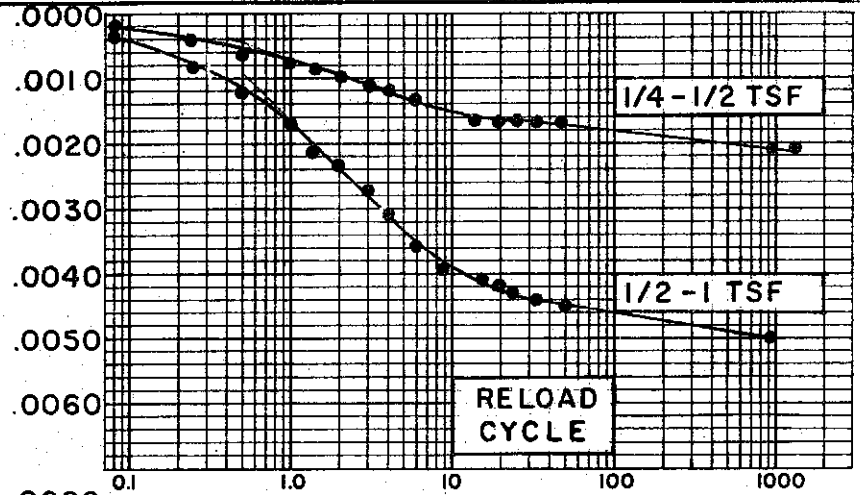
COMPRESSION IN INCHES



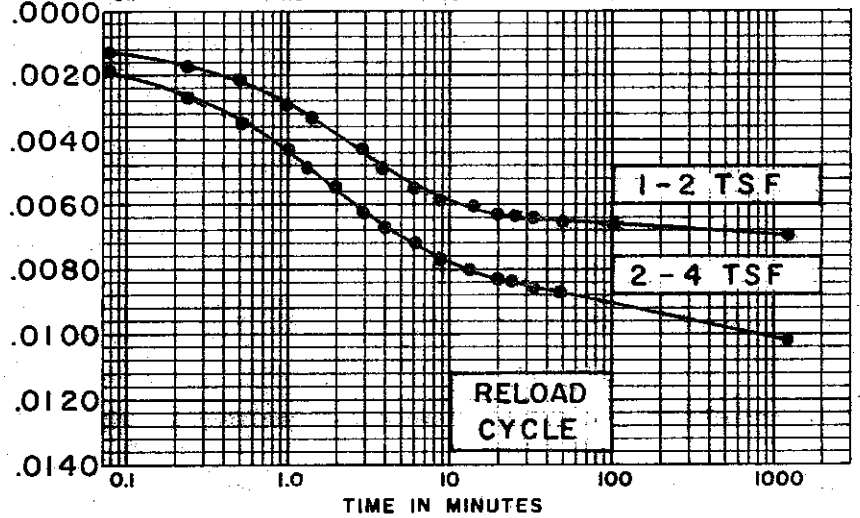
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

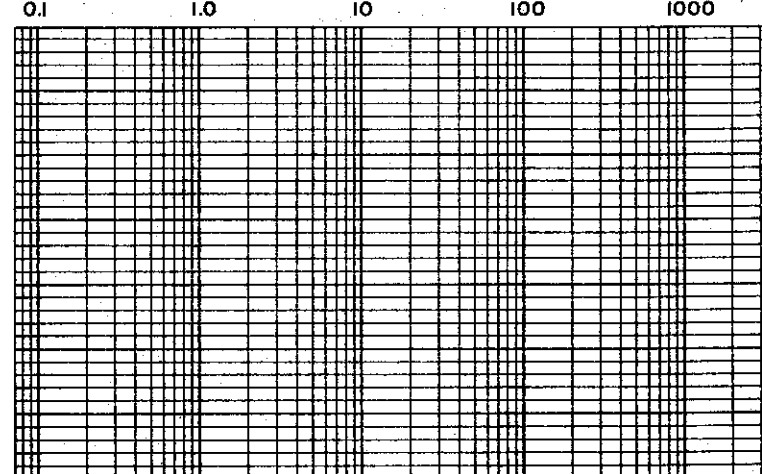
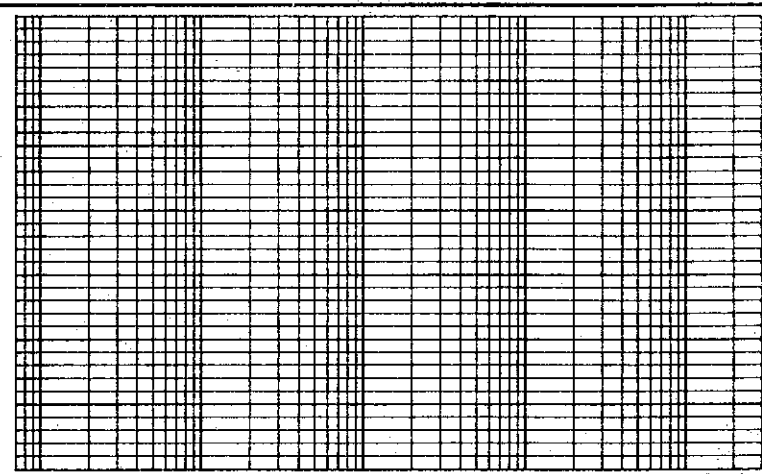
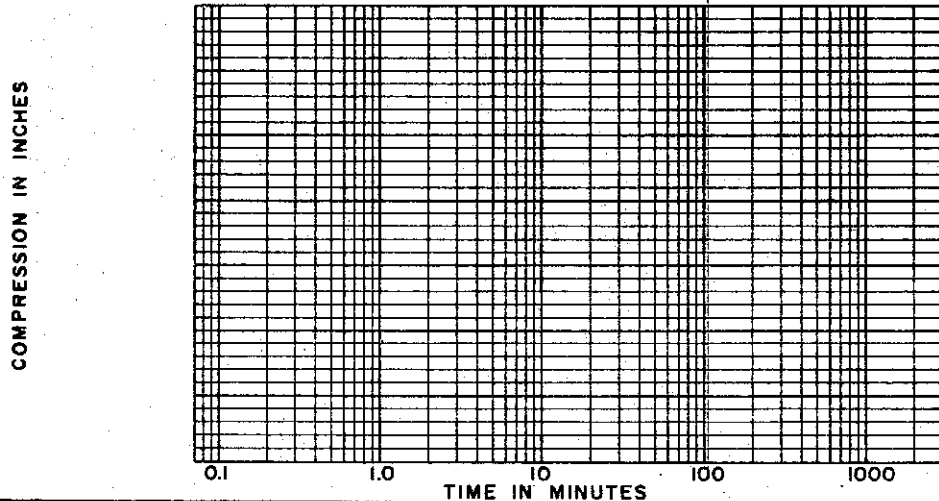
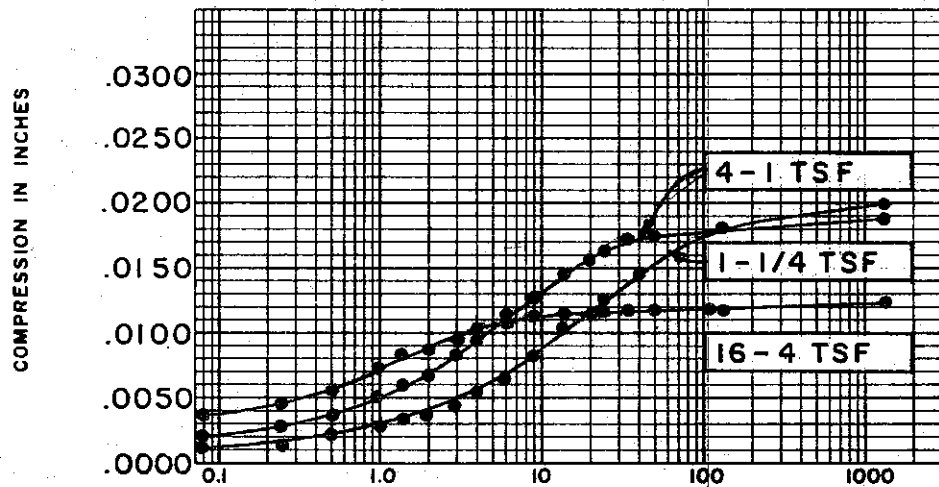
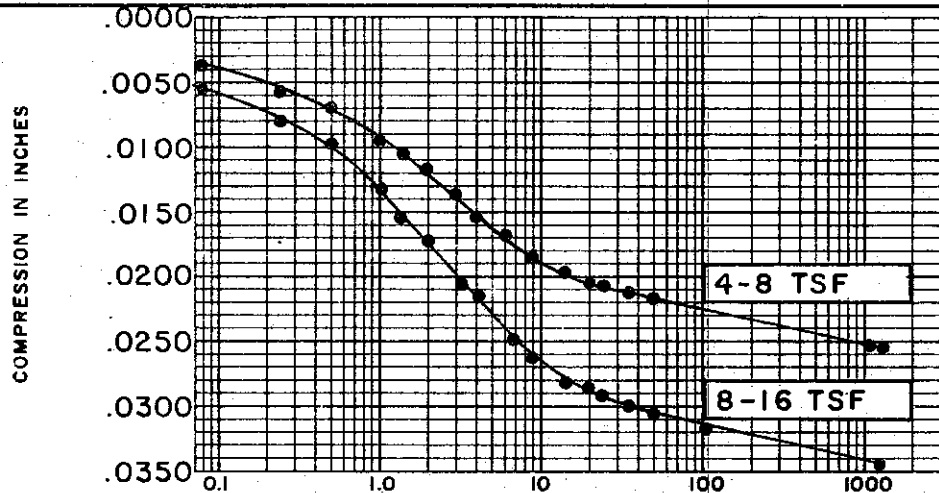
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

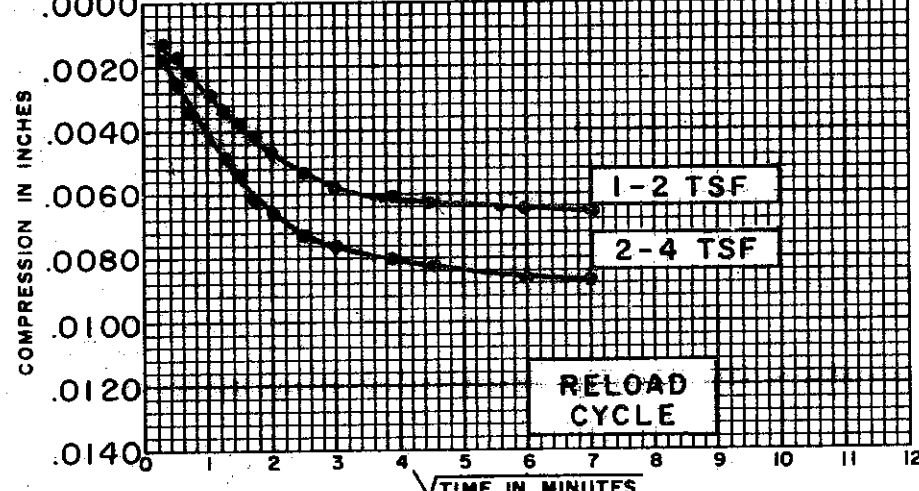
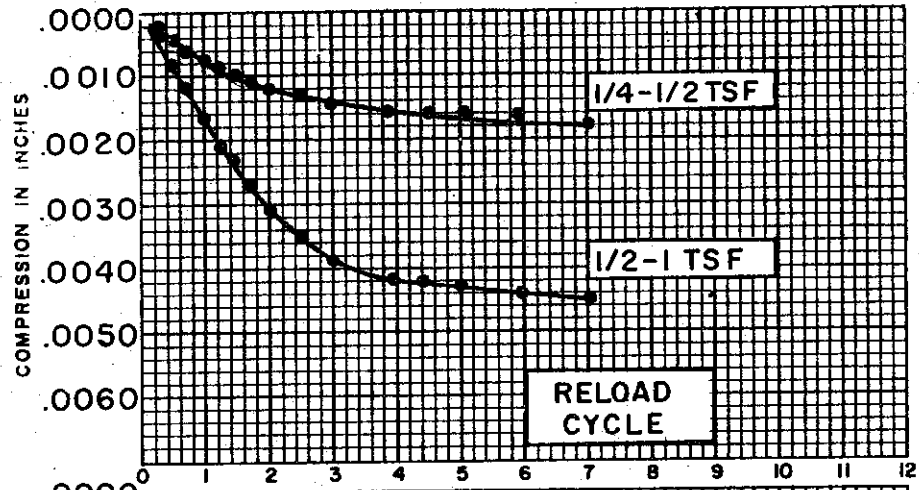
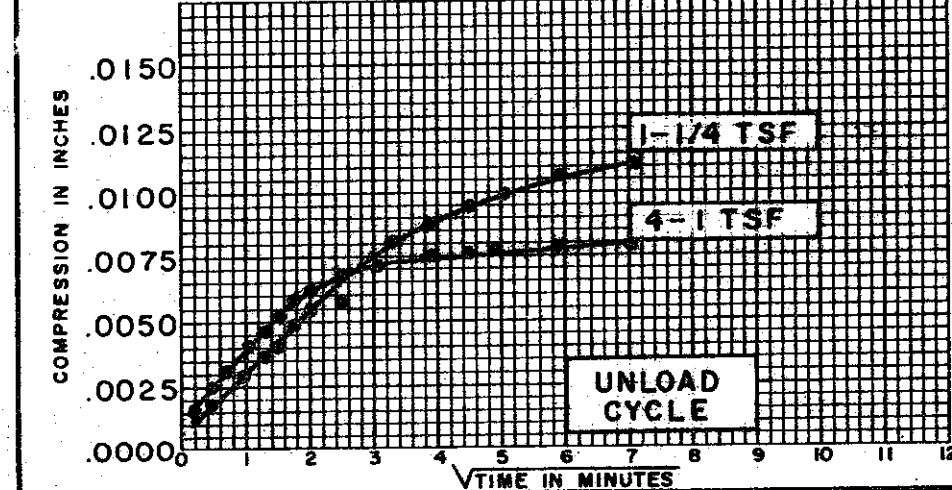
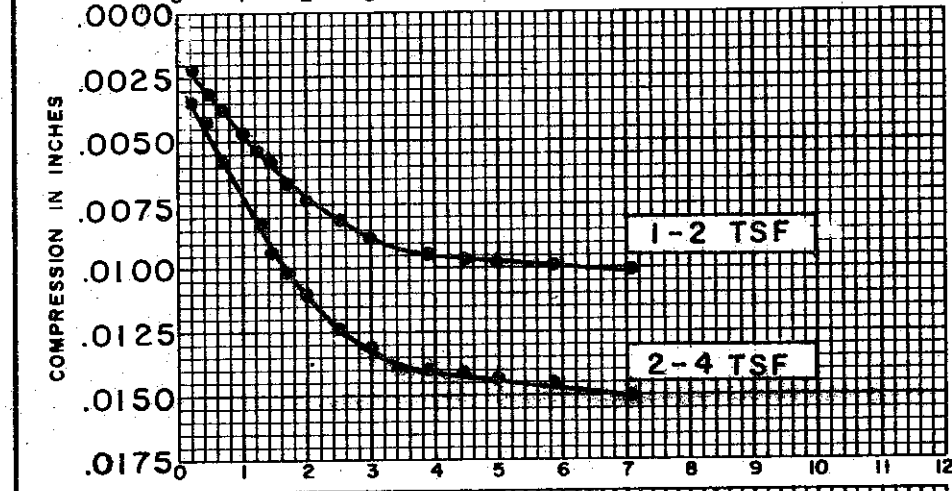
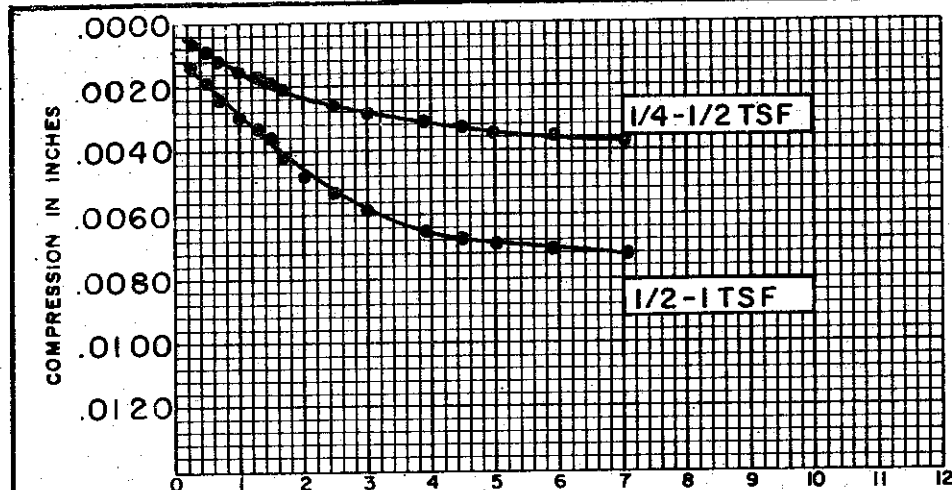
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



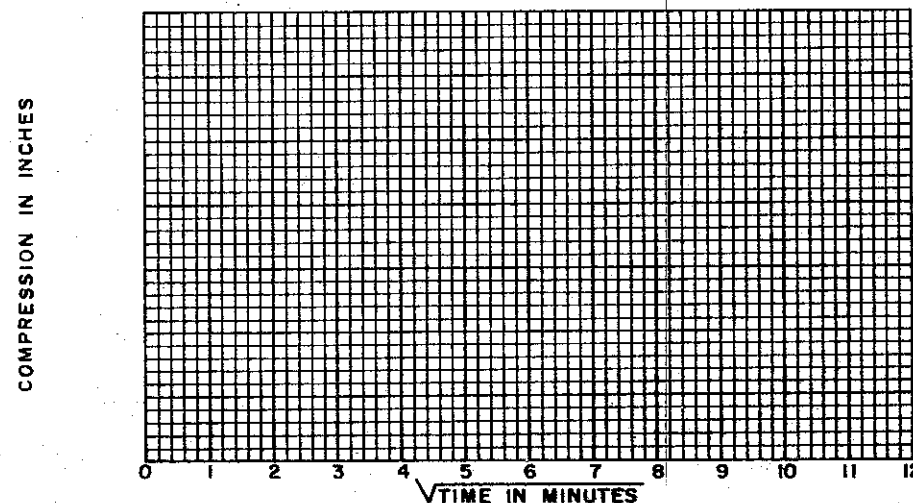
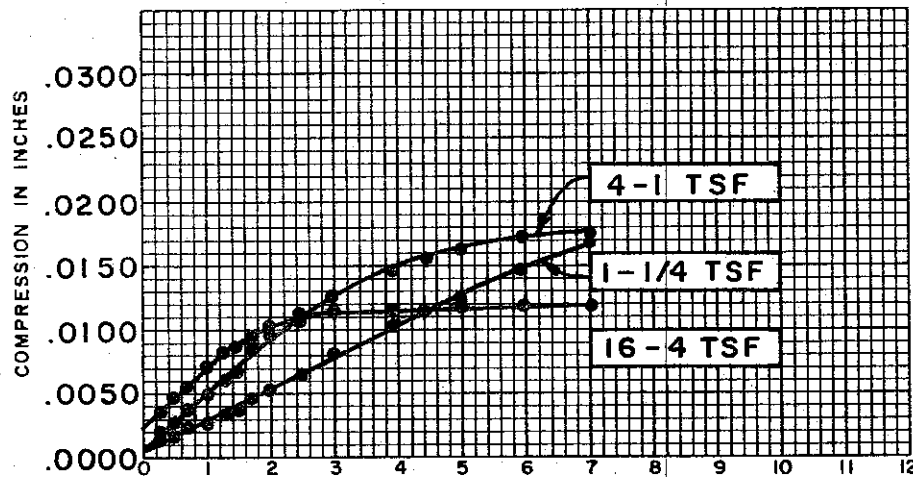
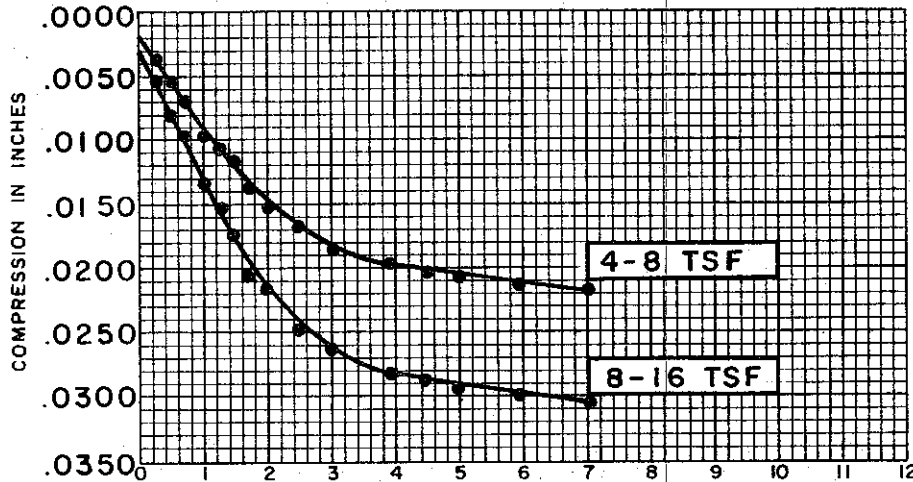
TIME IN MINUTES

SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, (CE)</u>	SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.30"</u>	
INITIAL VOID RATIO	<u>0.741</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		



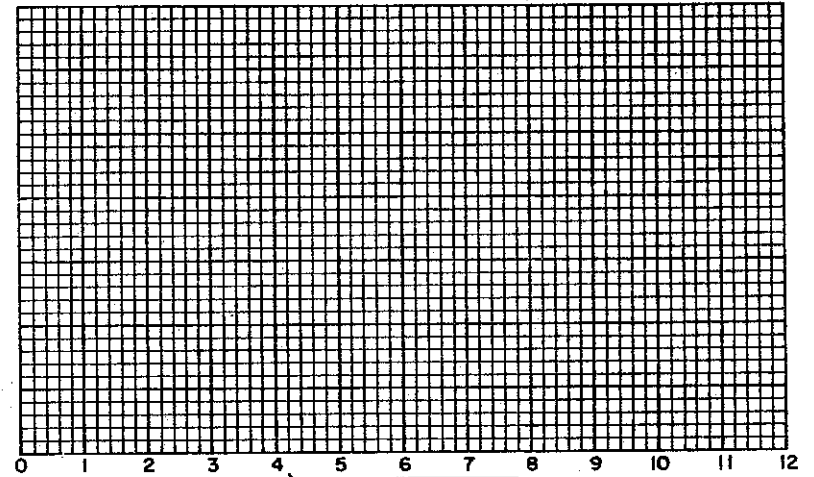
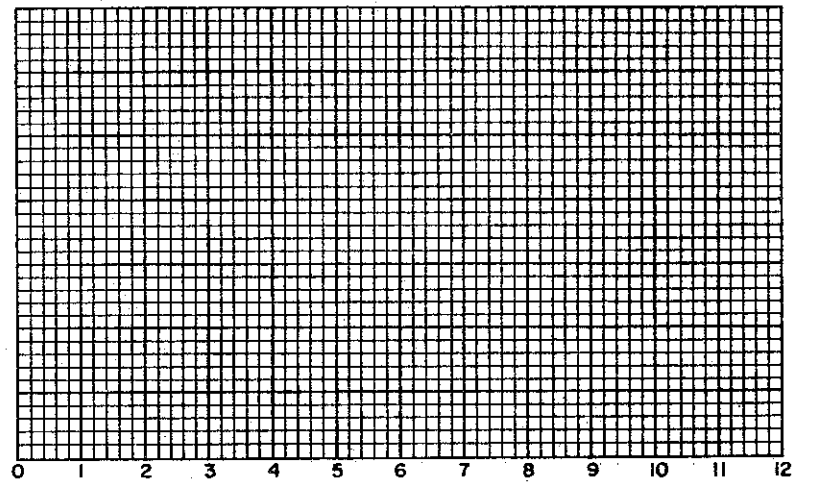
SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION: <u>SILTY CLAY, (CL)</u>		SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.741</u>	
		<b>CONSOLIDATION TEST</b>
		<b>TIME VS. COMPRESSION CURVES</b>
		THE DETROIT EDISON COMPANY
		BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

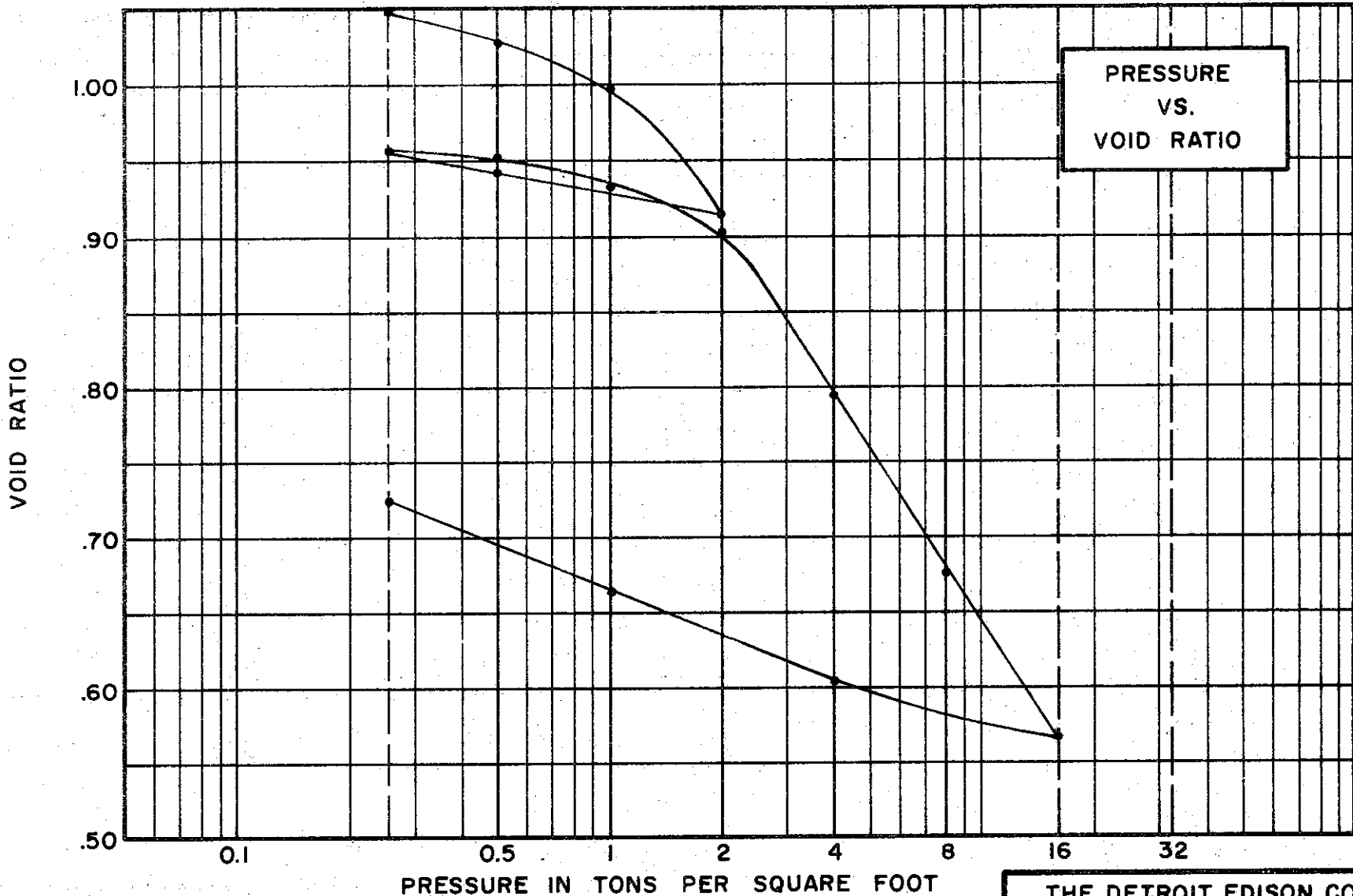
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 402% FINAL 300%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

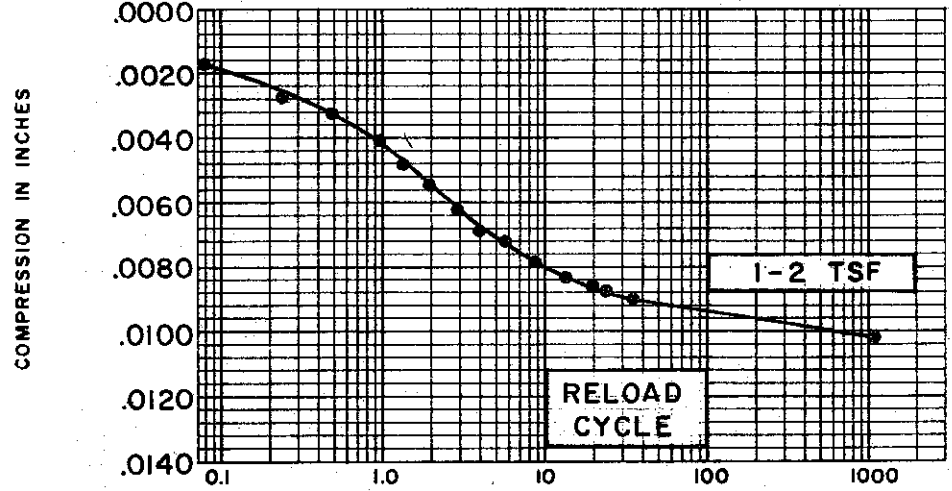
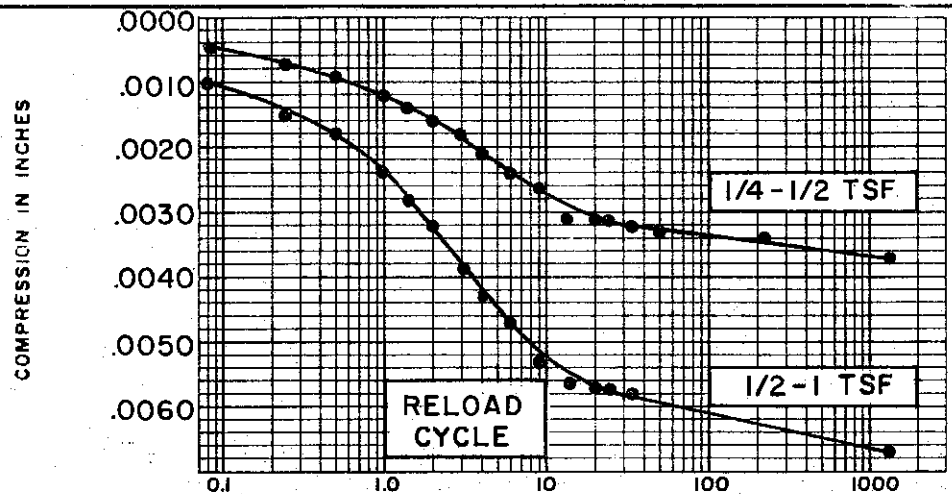
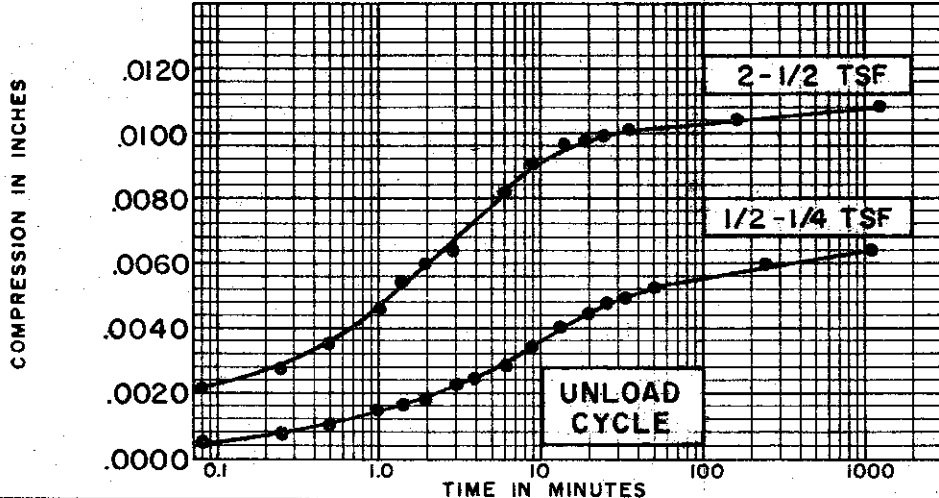
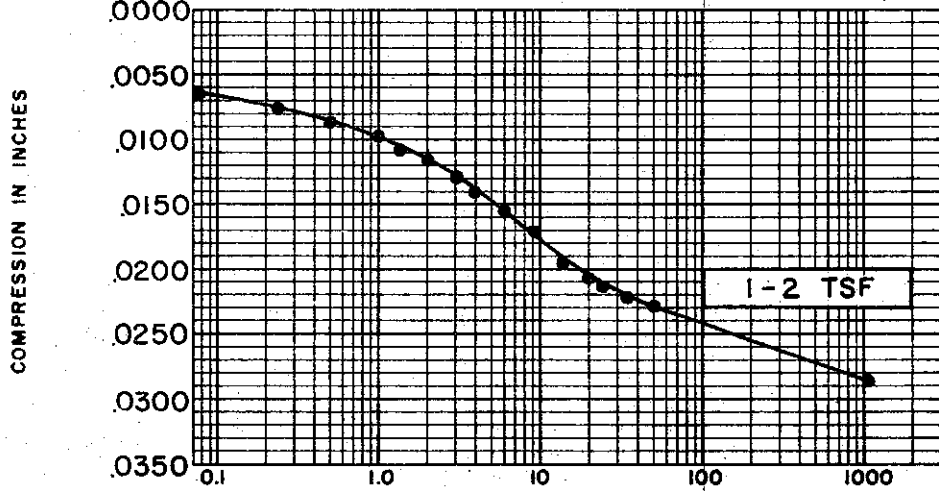
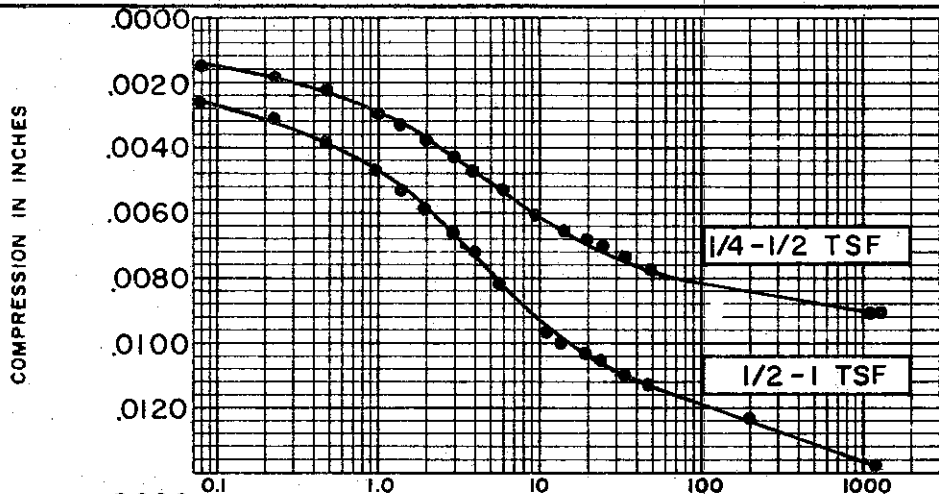
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C389.1  
 SAMPLE NO. 9 DATE APRIL 74  
 DEPTH 39.1' TO 39.3'

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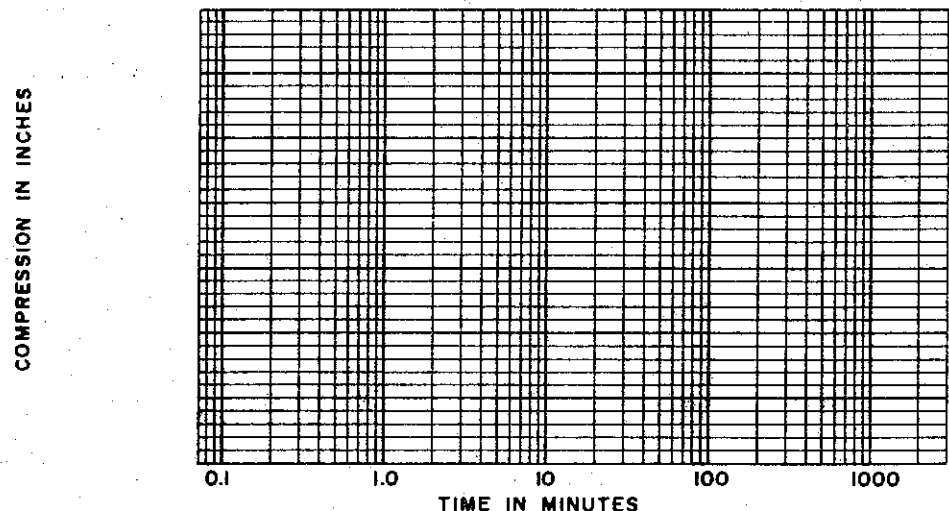
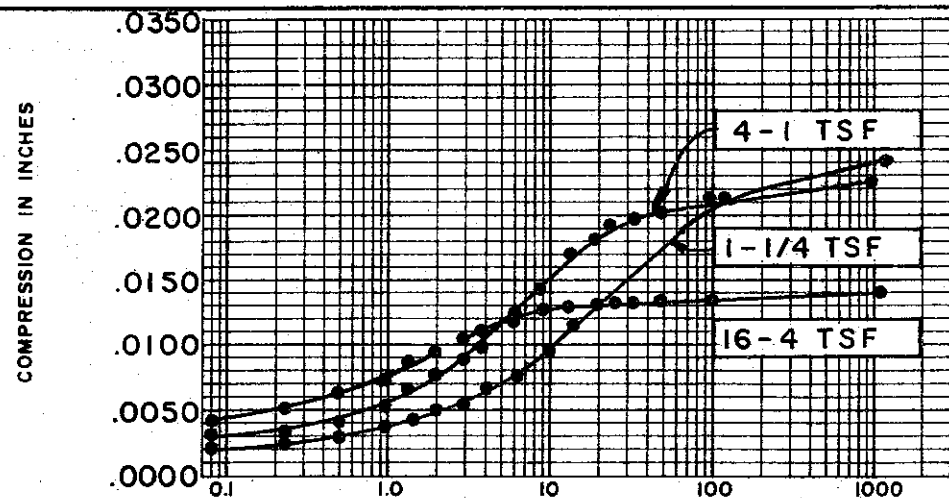
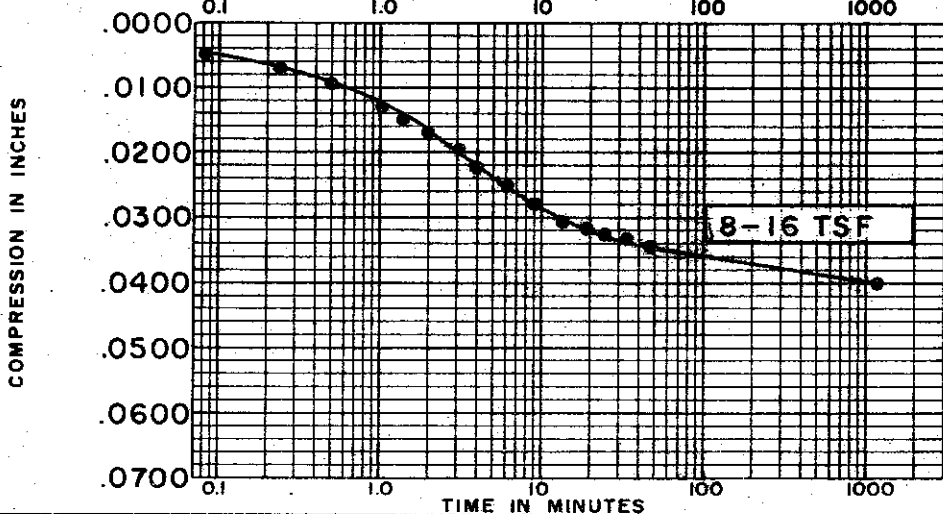
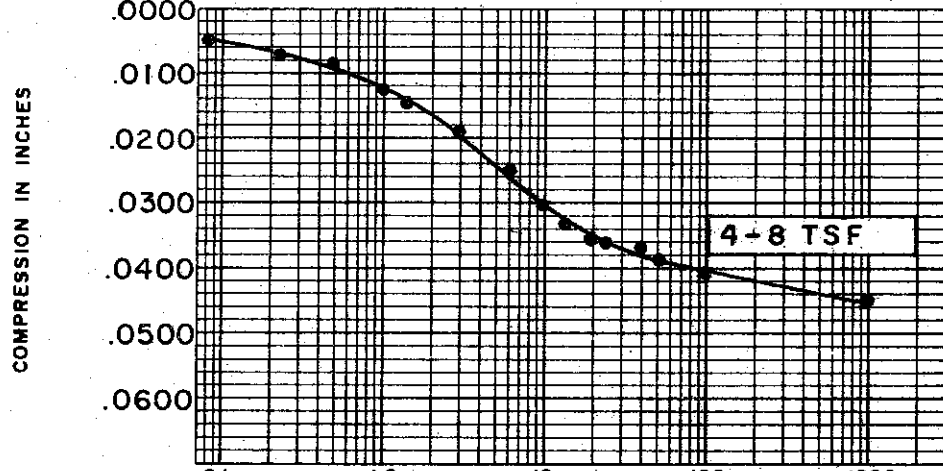
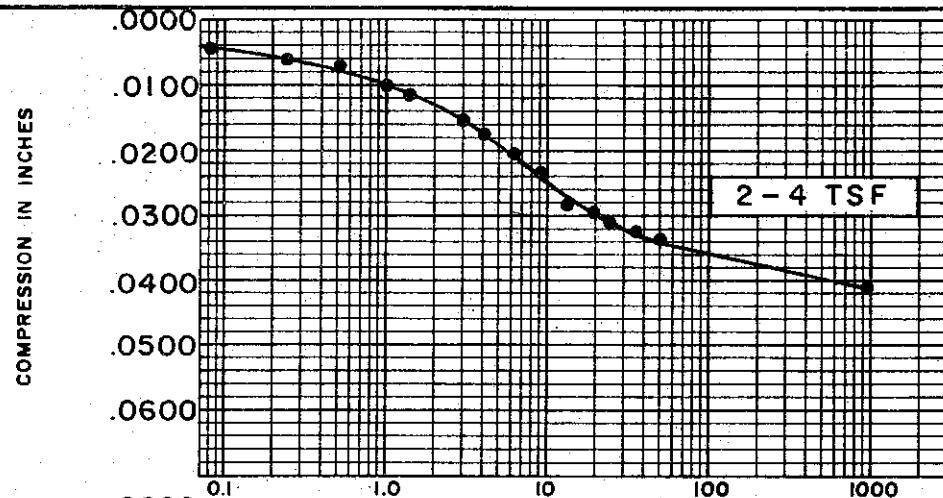
GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS



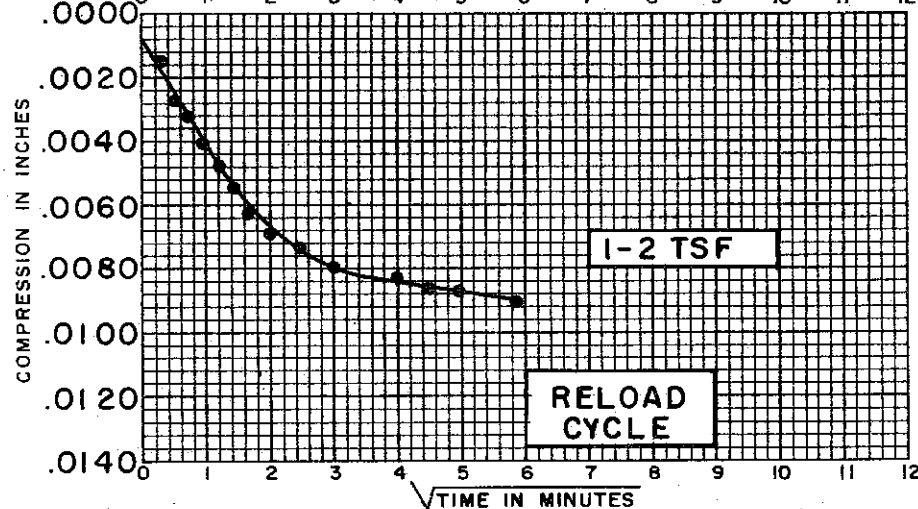
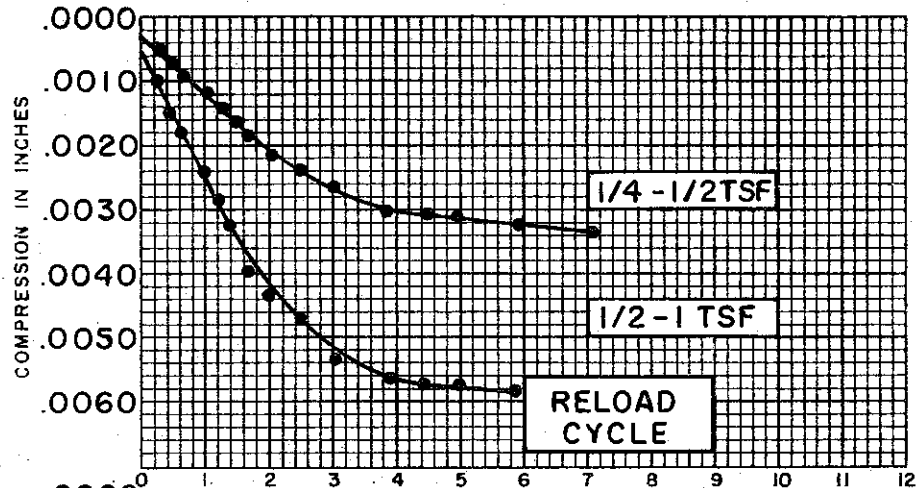
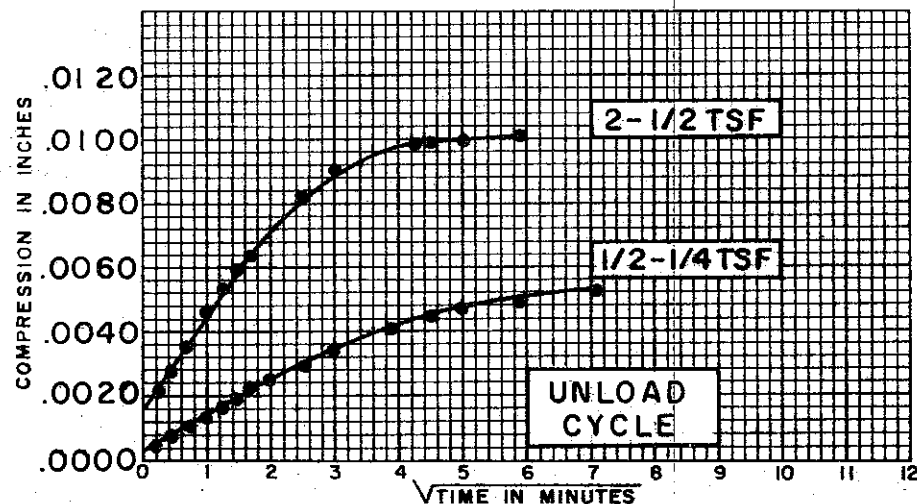
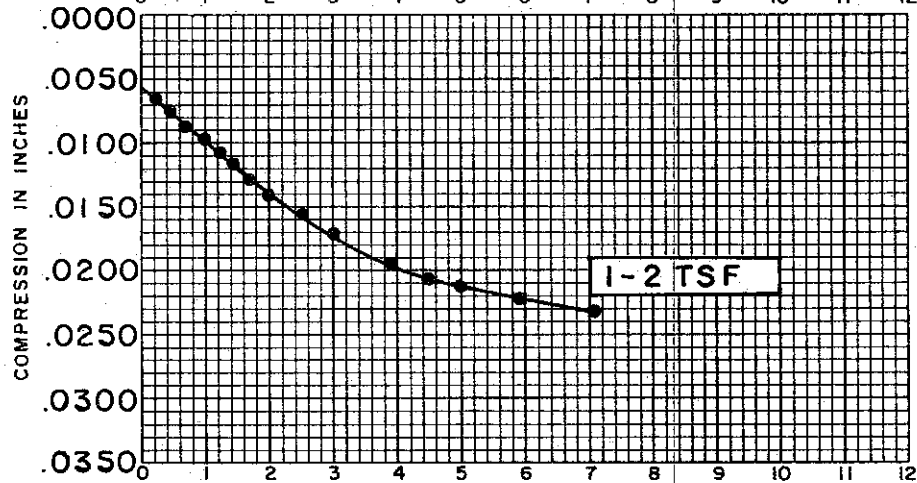
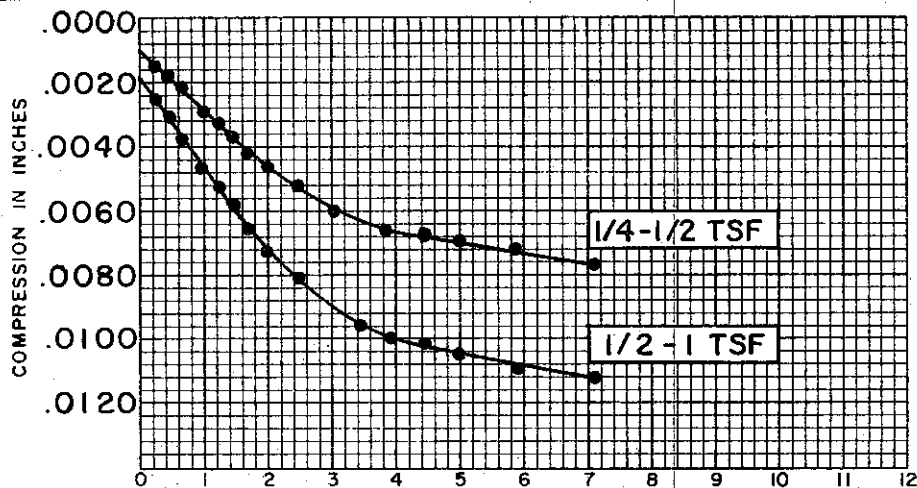


SOIL PROPERTIES		BORING NO. 129	
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	9
SPECIFIC GRAVITY	2.73	DEPTH	39.1' TO 39.3'
INITIAL WATER CONTENT	40.2 %		
FINAL WATER CONTENT	30.0 %		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	0.80"	TIME VS. COMPRESSION CURVES	
INITIAL SAMPLE DIAMETER	2.50"	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	1.075	BELLE RIVER PLANT UNITS I & II	

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SOIL PROPERTIES		BORING NO.	129
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO.	9
SPECIFIC GRAVITY	2.73	DEPTH	39.1' TO 39.3'
INITIAL WATER CONTENT	40.2 %		
FINAL WATER CONTENT	30.0 %		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	0.80"	TIME VS. COMPRESSION CURVE	
INITIAL SAMPLE DIAMETER	2.50"	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	1.075	BELLE RIVER PLANT UNITS I & II	



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 40.2 %  
 FINAL WATER CONTENT 30.0 %

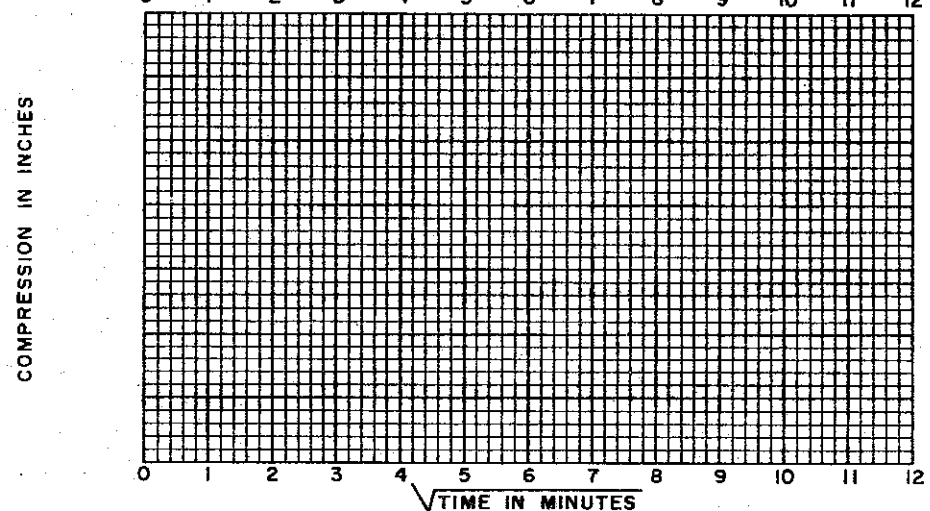
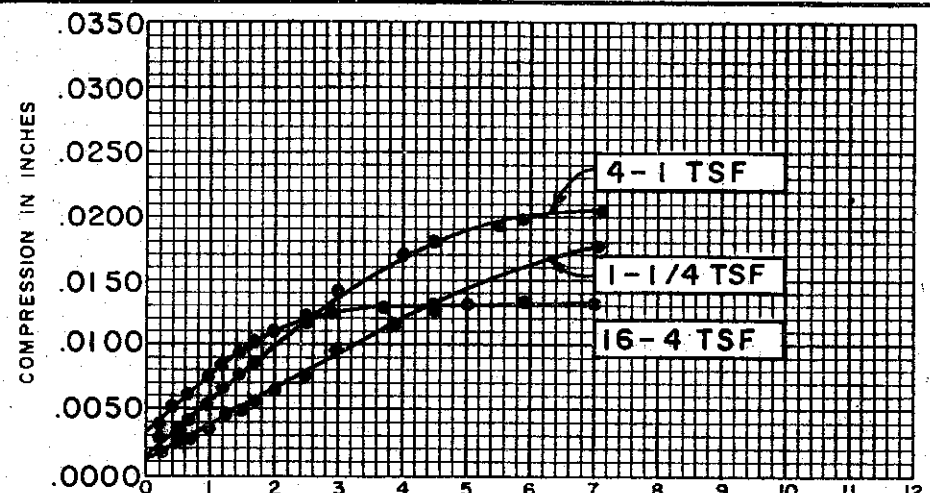
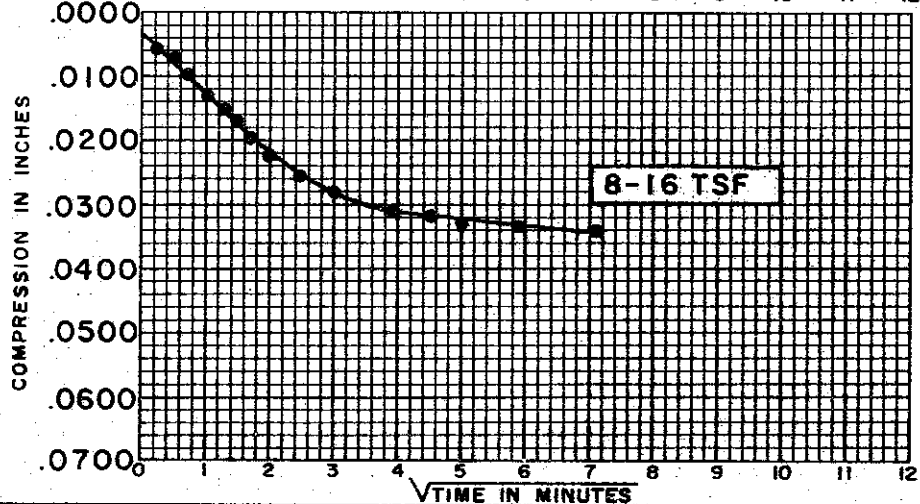
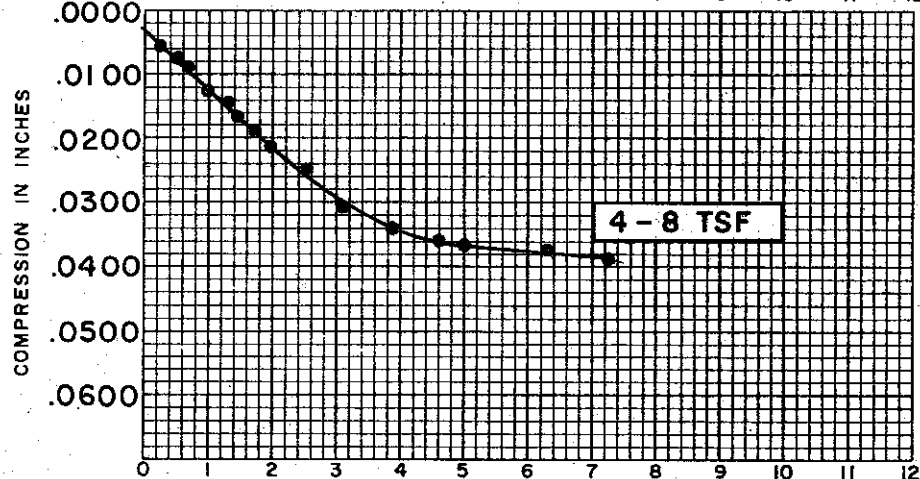
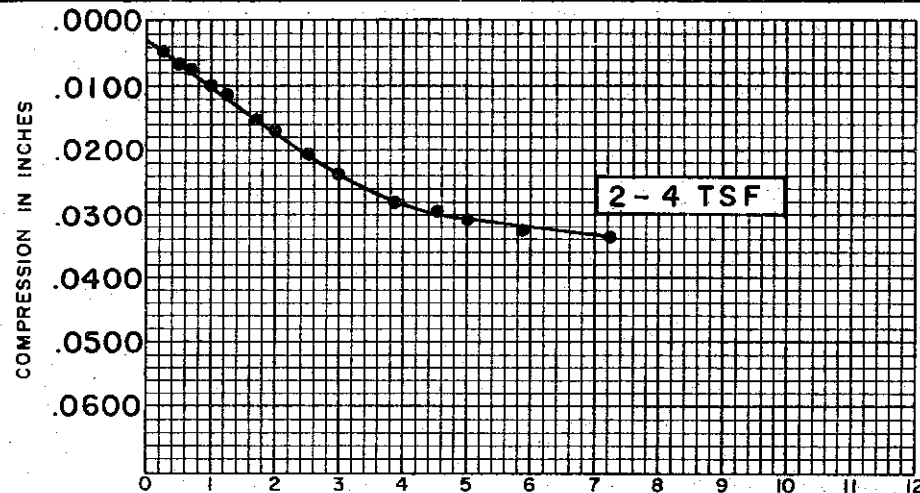
BORING NO. 129  
 SAMPLE NO. 9  
 DEPTH 39.1' TO 39.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

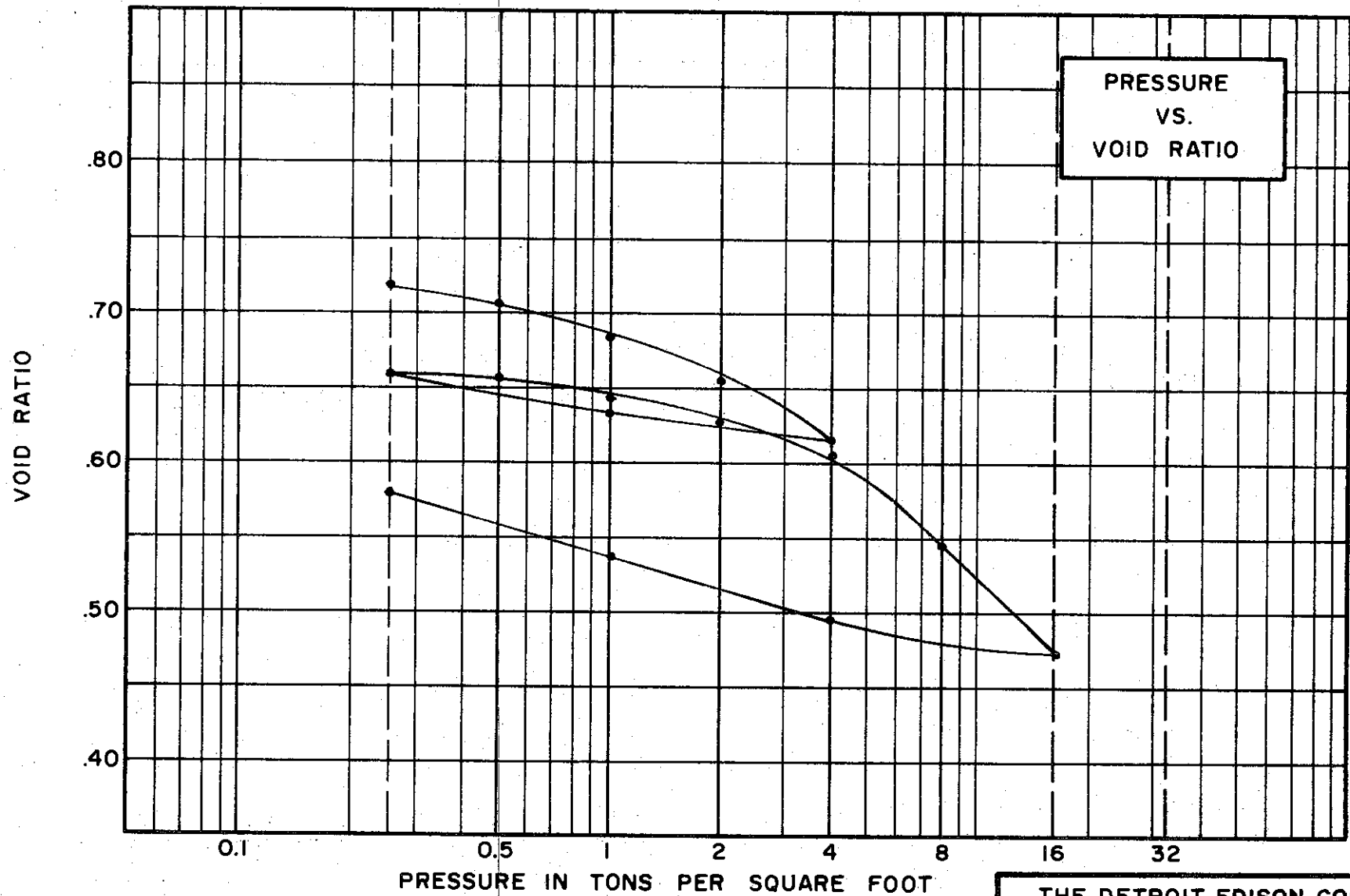


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	40.2 %
FINAL WATER CONTENT	30.0 %
BORING NO.	129
SAMPLE NO.	9
DEPTH	39.1' TO 39.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 28.0% FINAL 24.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**

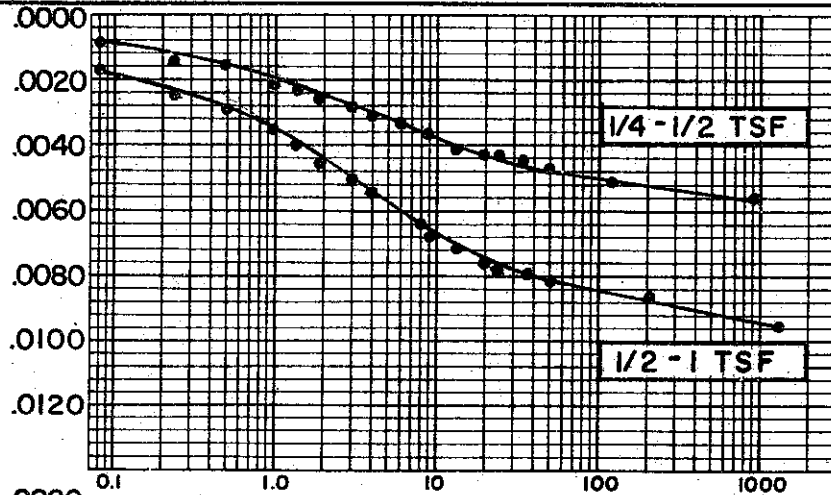
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.703

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

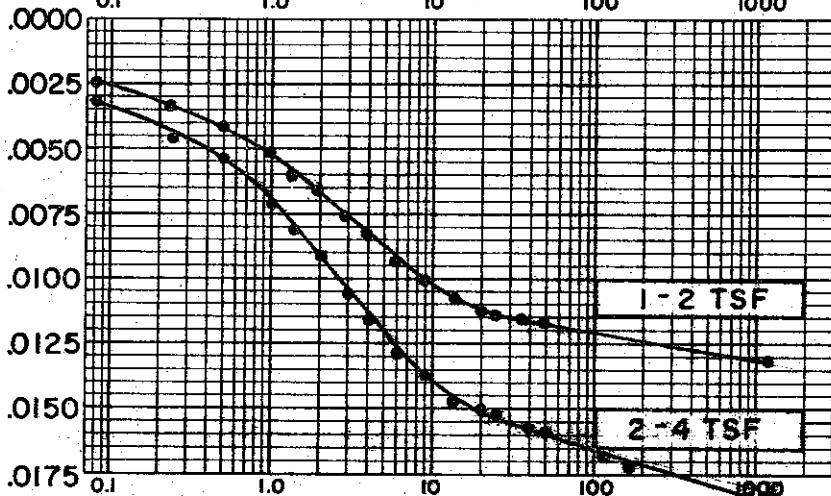
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C395.1  
 SAMPLE NO. 21 DATE APRIL 74  
 DEPTH 103.7' TO 104.0'

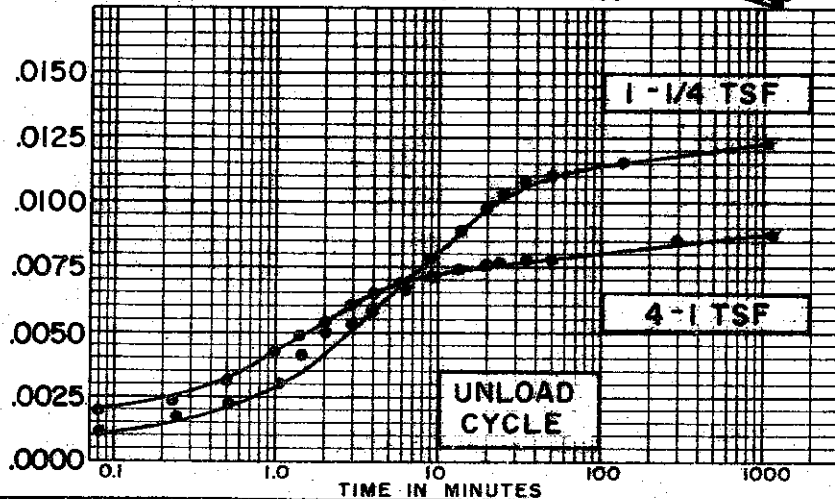
COMPRESSION IN INCHES



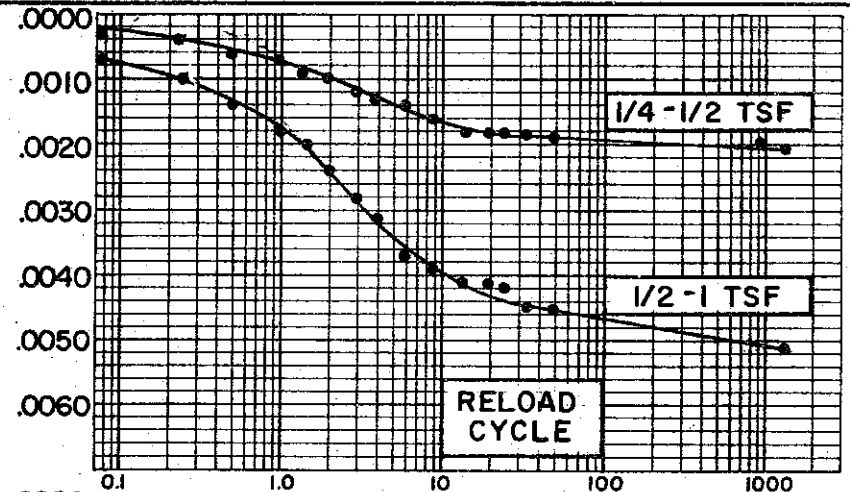
COMPRESSION IN INCHES



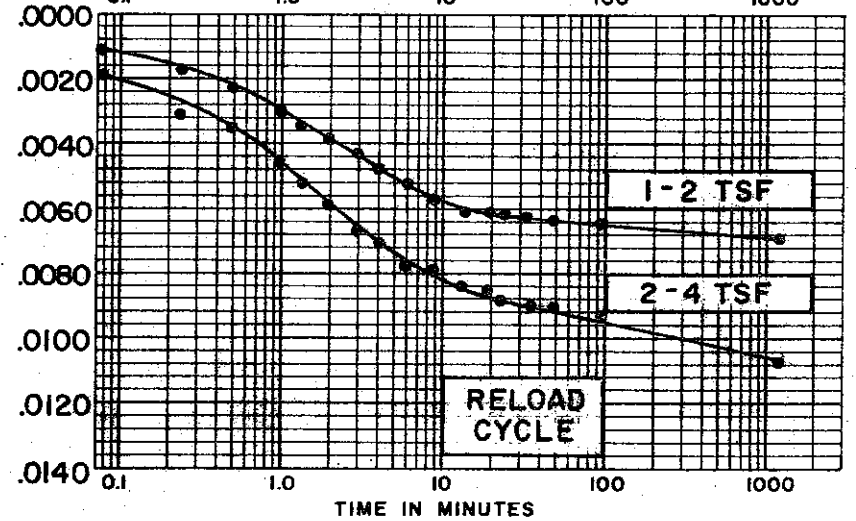
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

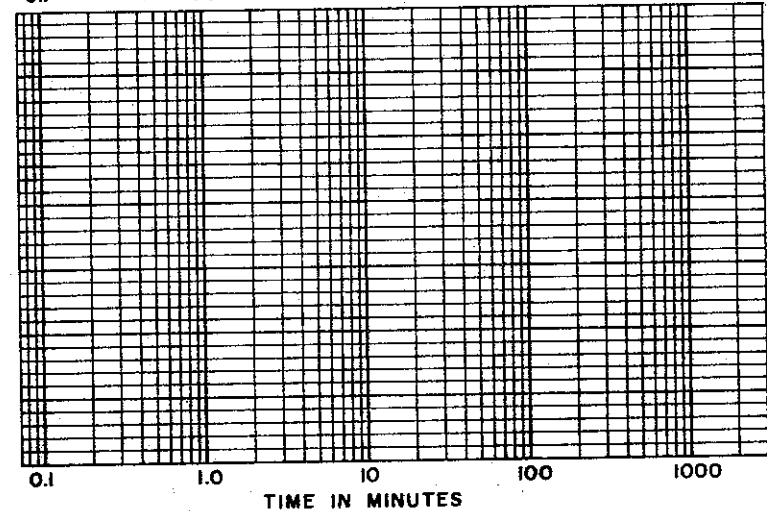
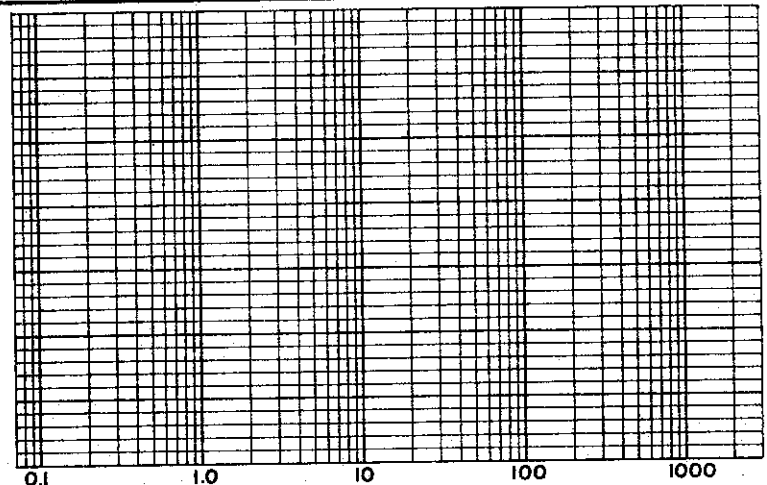
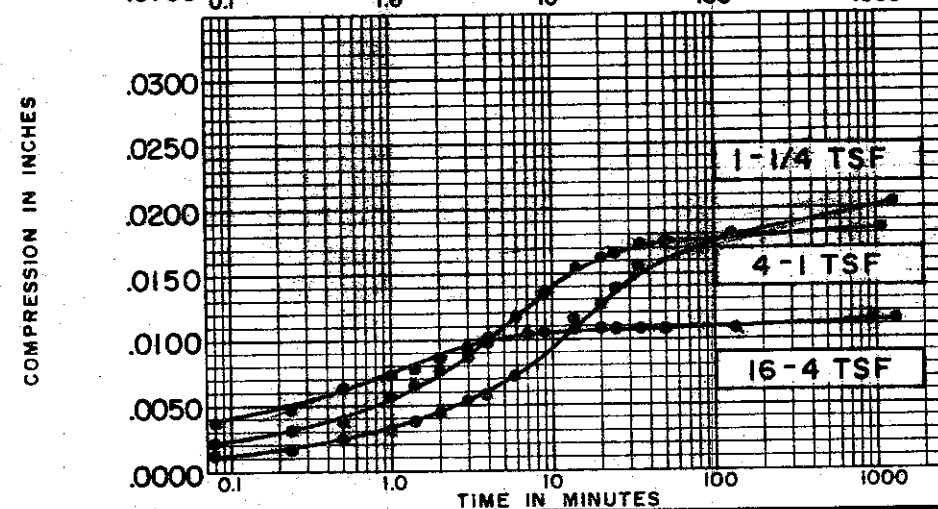
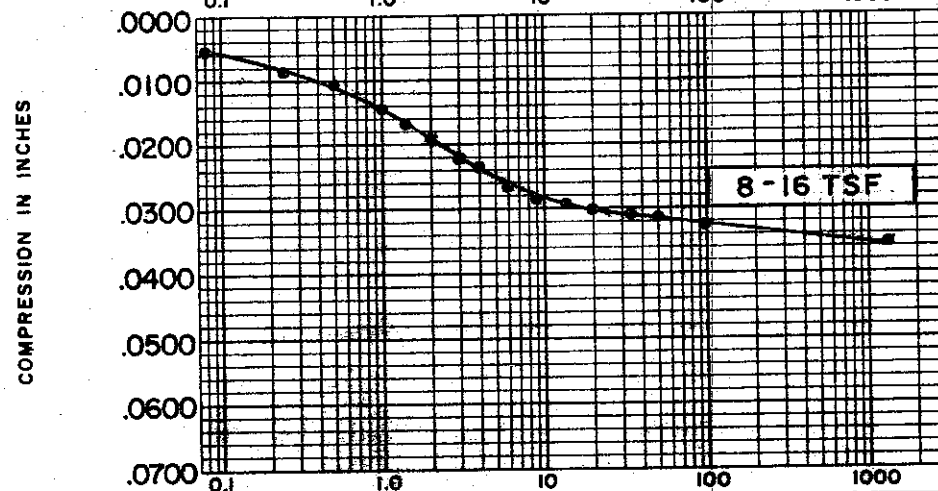
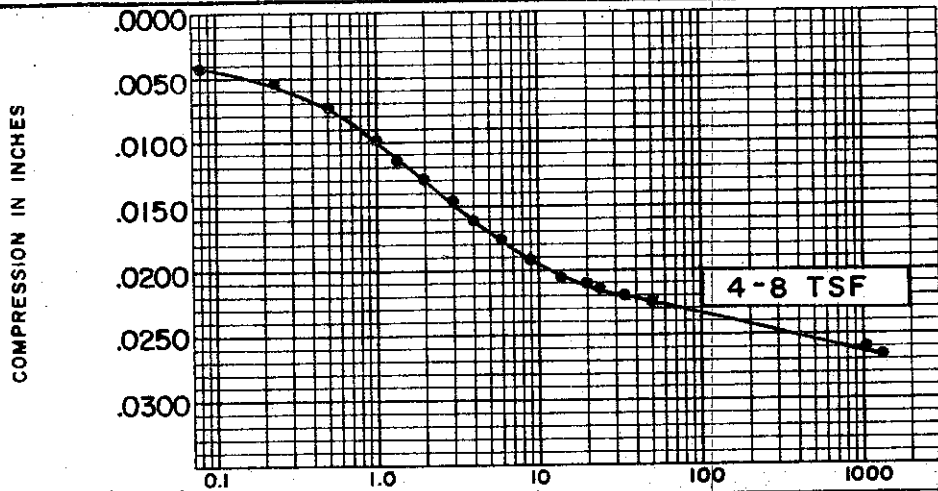
BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE.**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
INITIAL WATER CONTENT 28.0 %  
FINAL WATER CONTENT 24.5 %

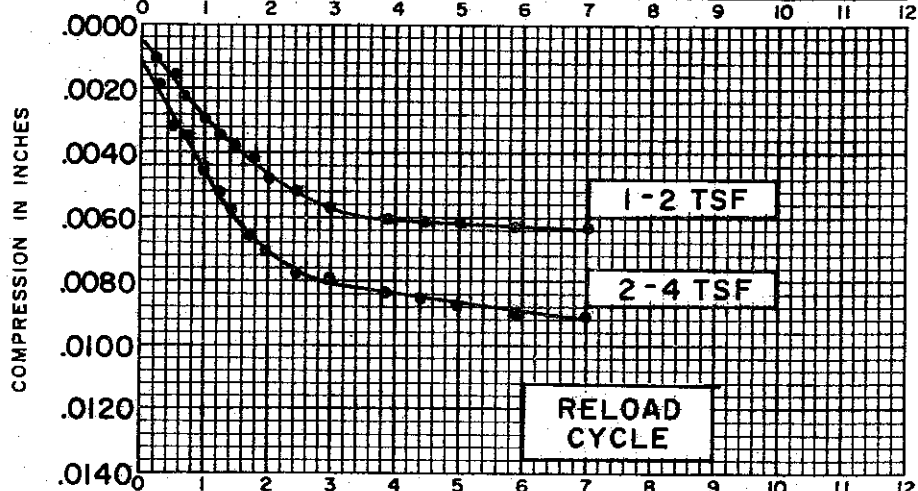
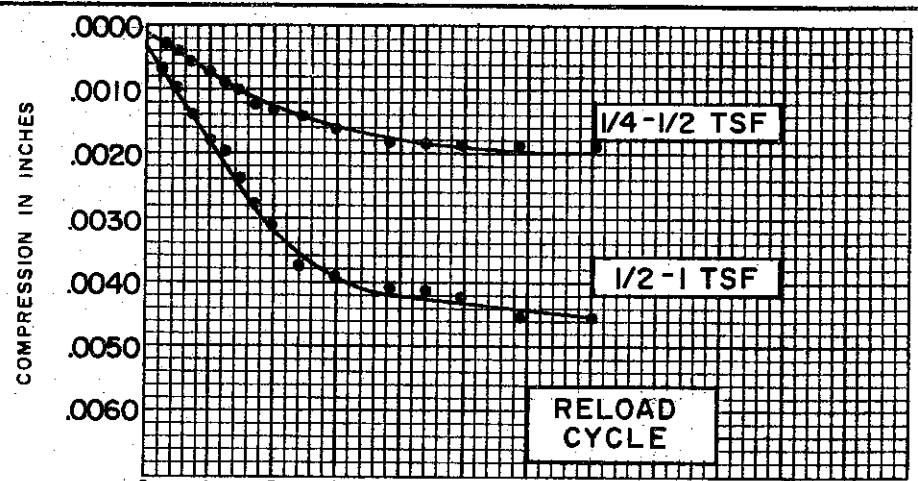
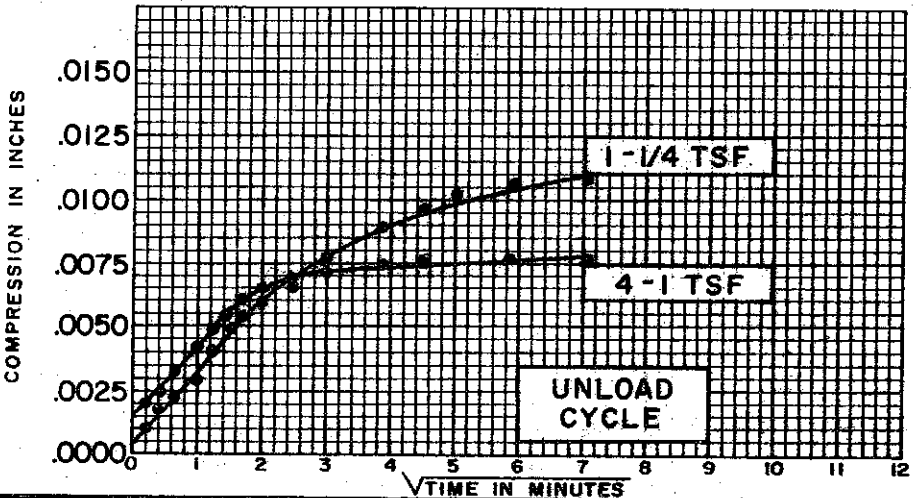
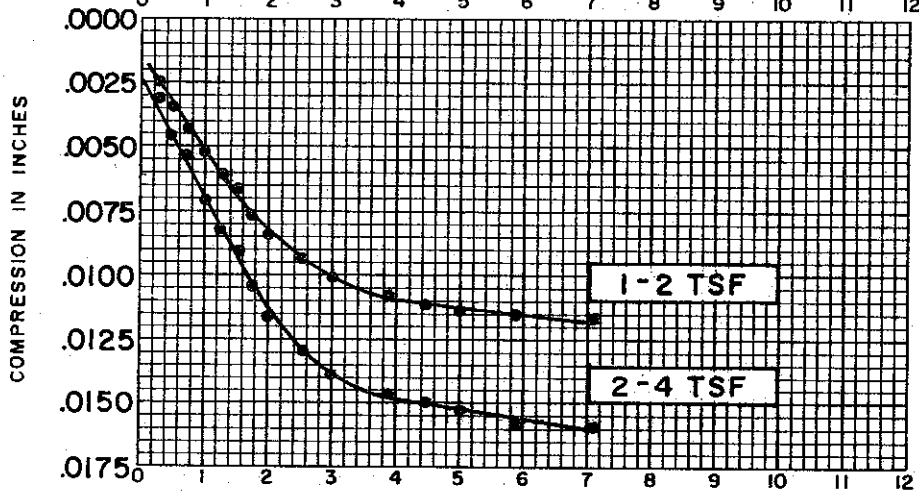
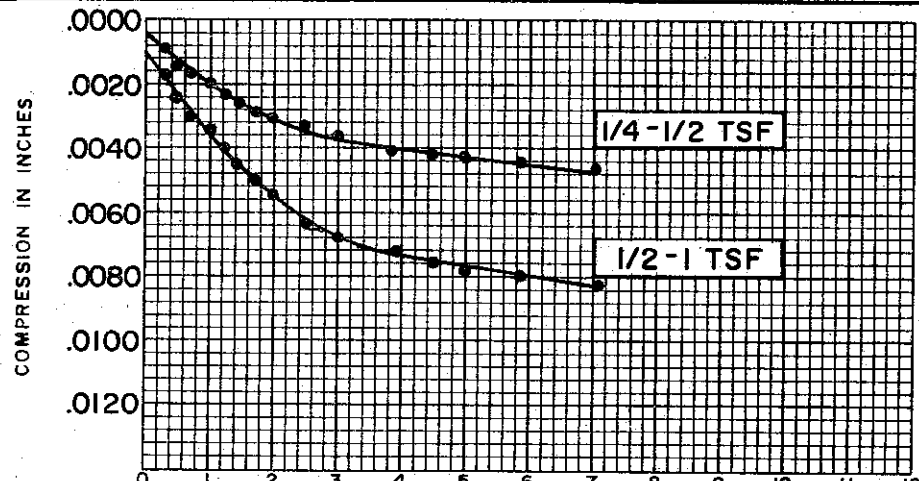
BORING NO. 129  
SAMPLE NO. 21  
DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	28.0 %
FINAL WATER CONTENT	24.5 %
BORING NO.	129
SAMPLE NO.	21
DEPTH	103.7' TO 104.0'

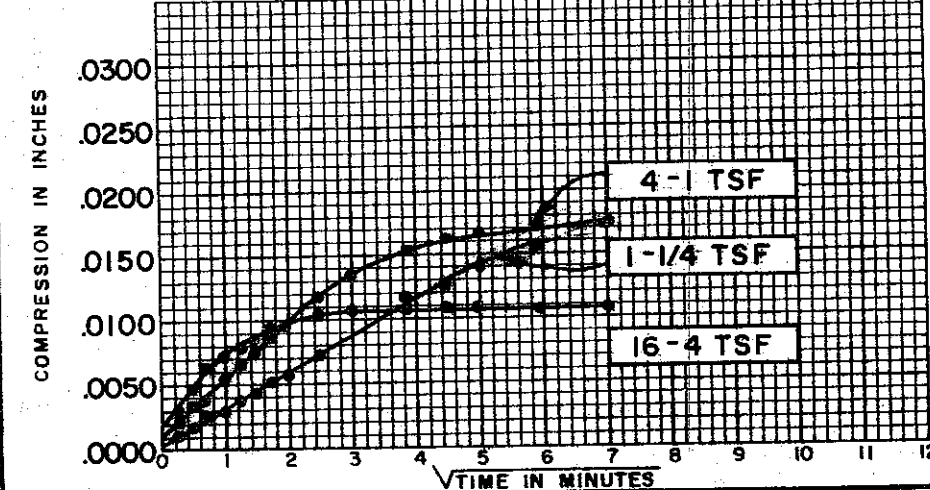
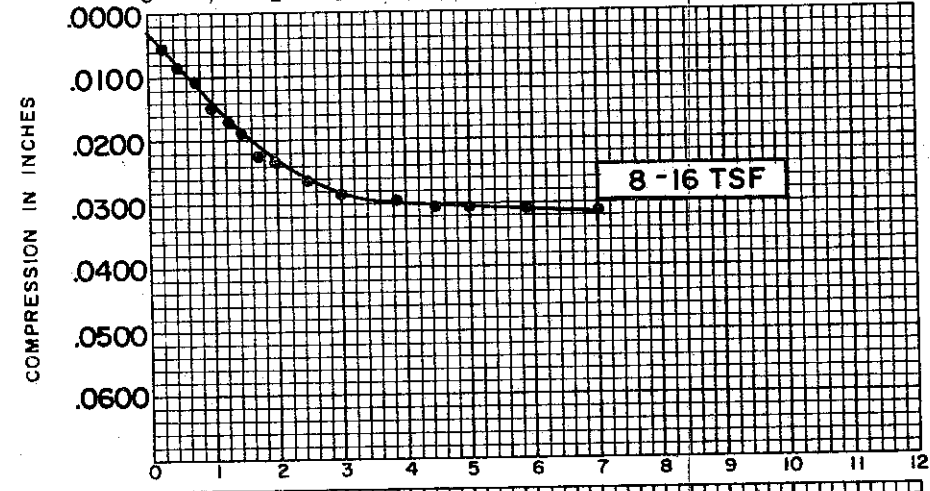
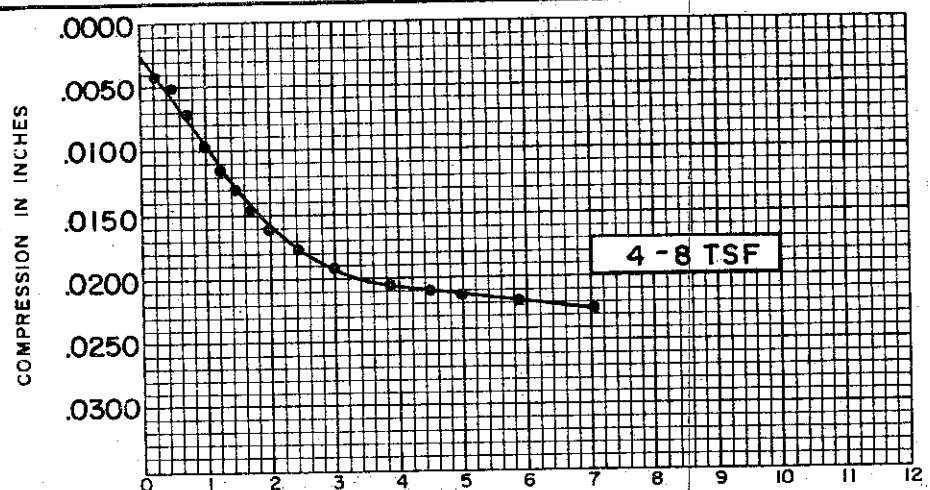
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.730

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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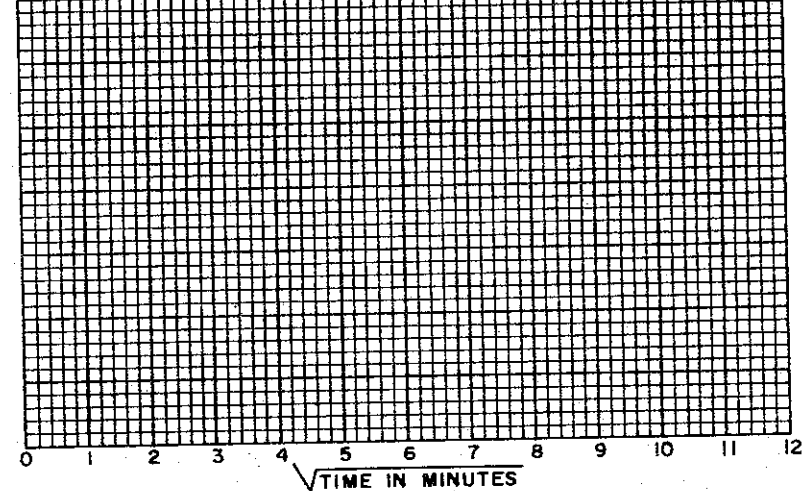
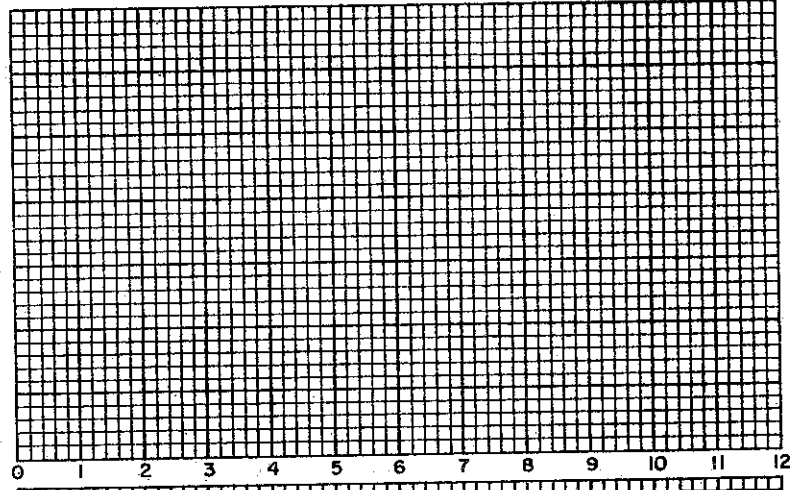


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COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

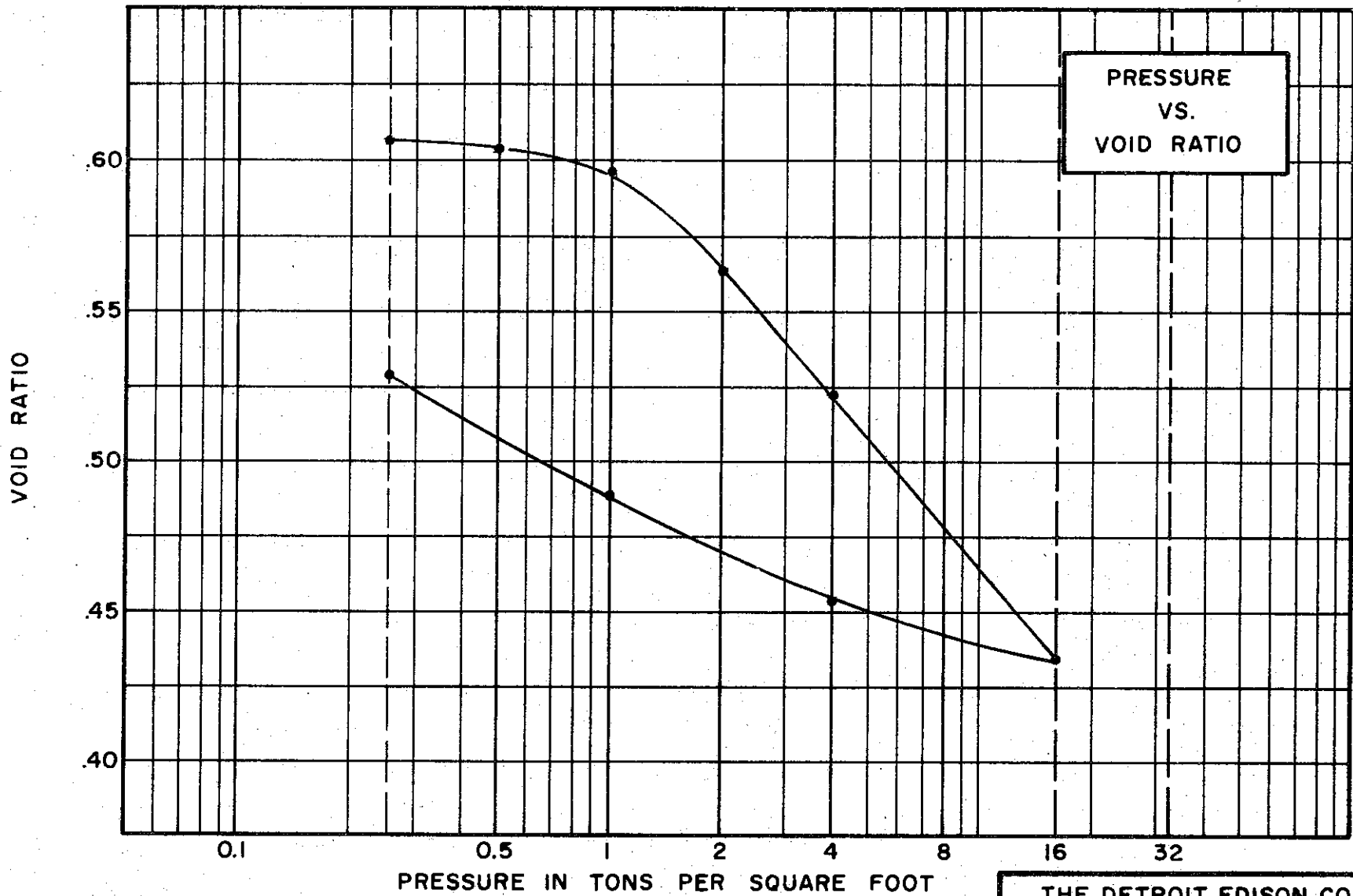
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL (17.3%) FINAL 21.3%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**

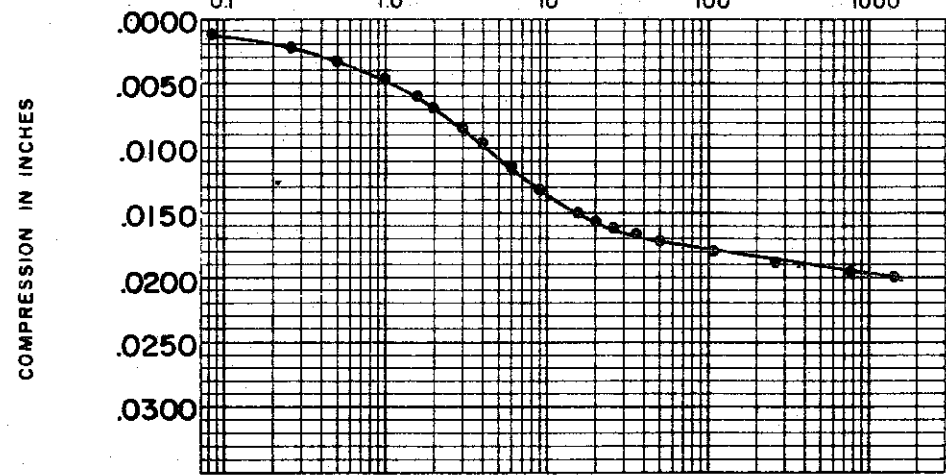
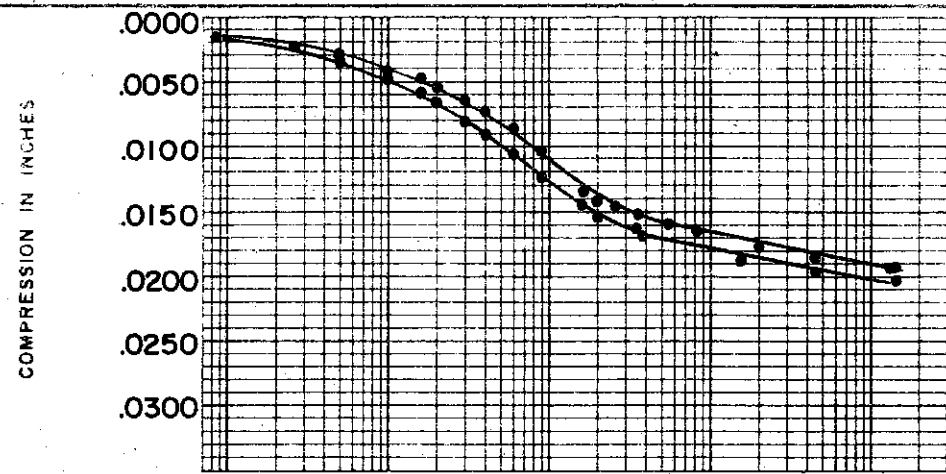
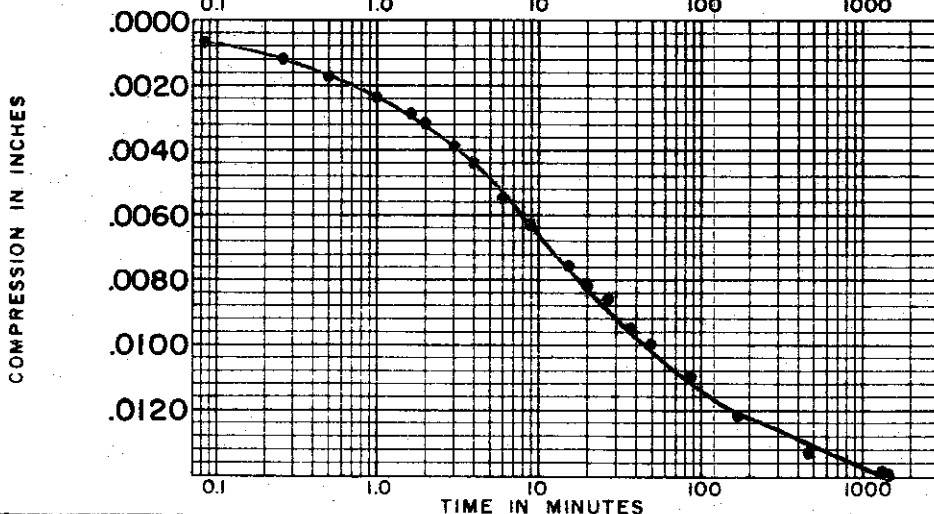
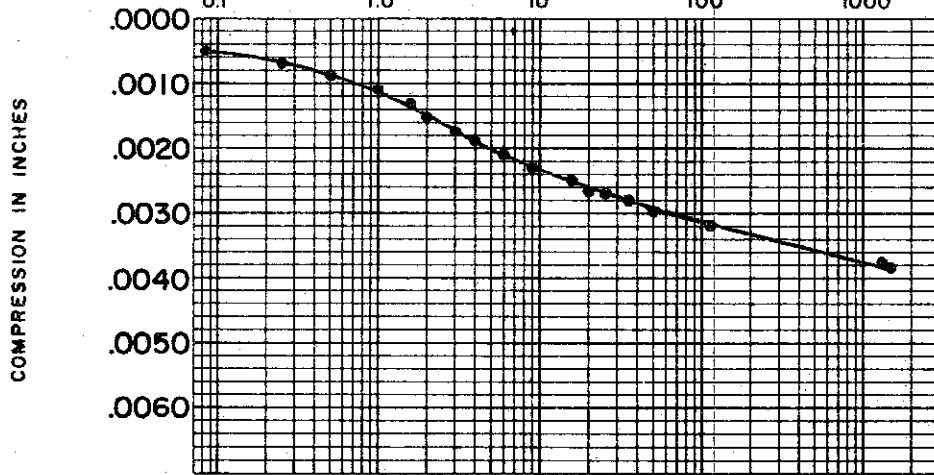
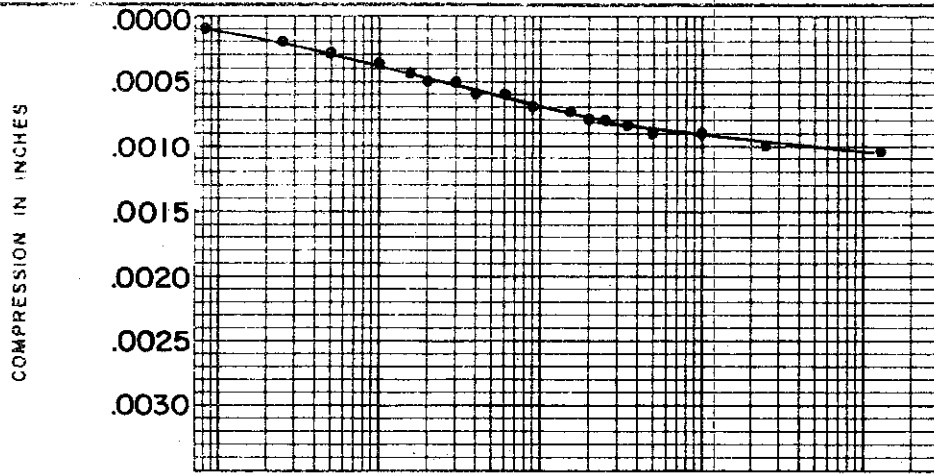
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.448"  
 INITIAL VOID RATIO (0.675) AS COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 136 TEST NO. C527.1  
 SAMPLE NO. ST6 DATE DEC. 1974  
 DEPTH 13.0' TO 14.6'

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**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

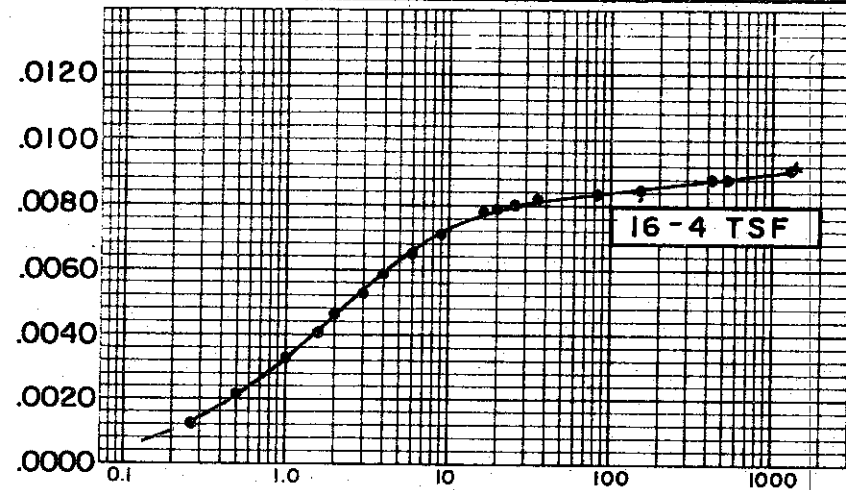
BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

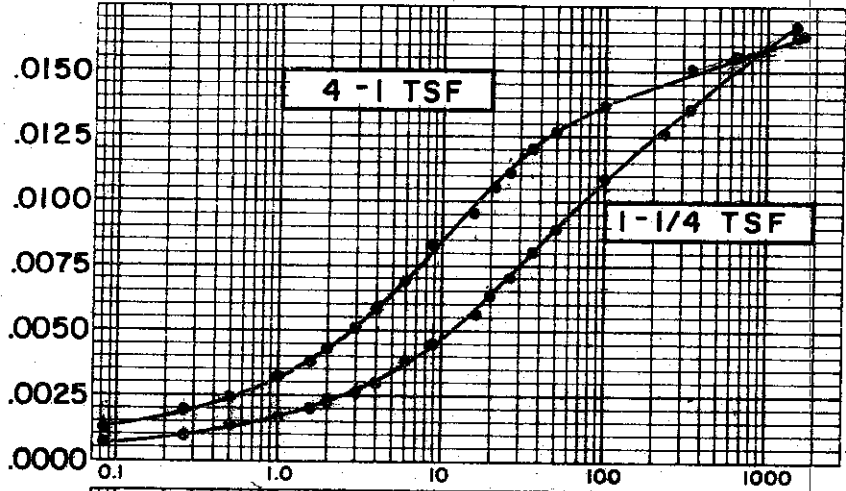
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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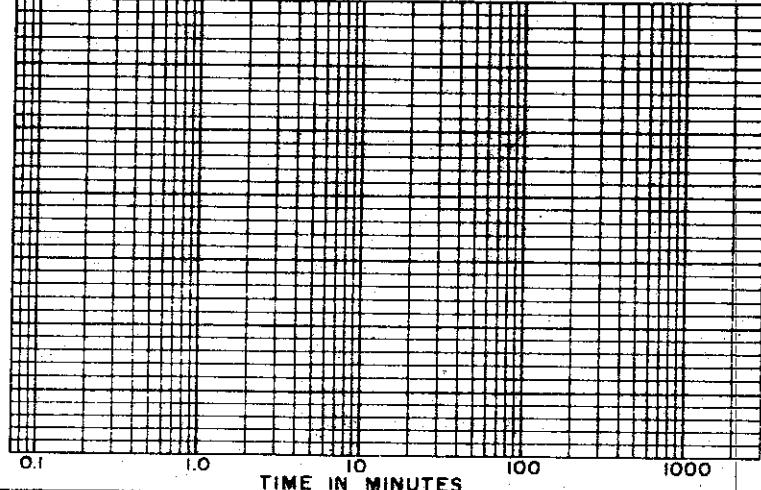
COMPRESSION IN INCHES



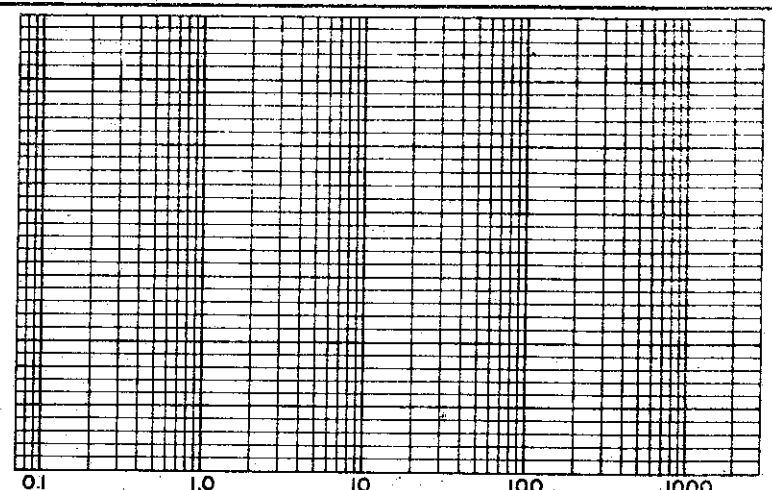
COMPRESSION IN INCHES



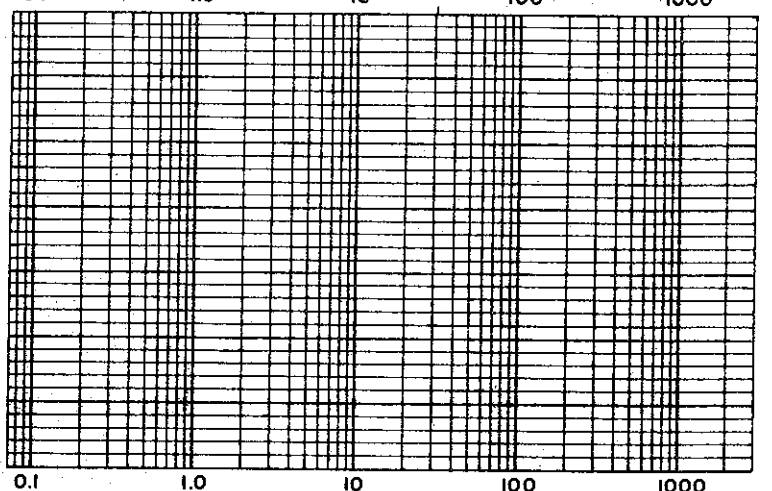
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

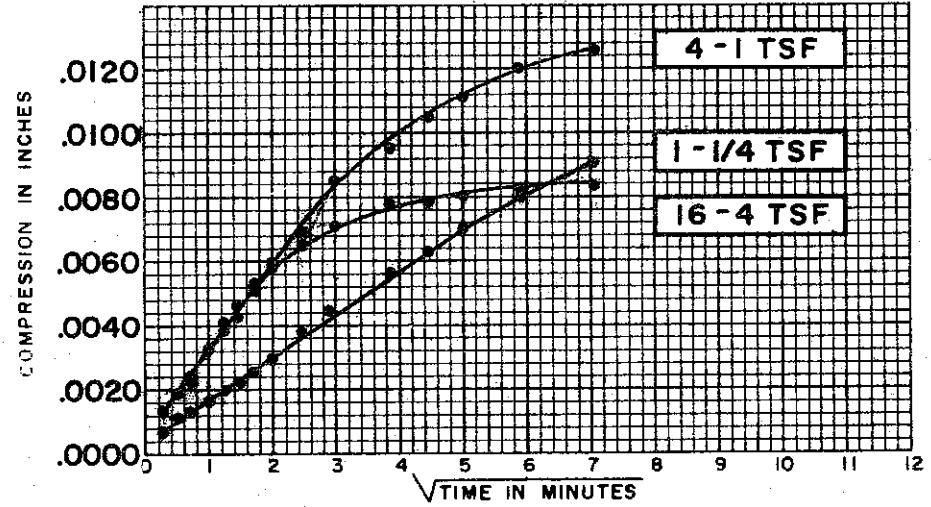
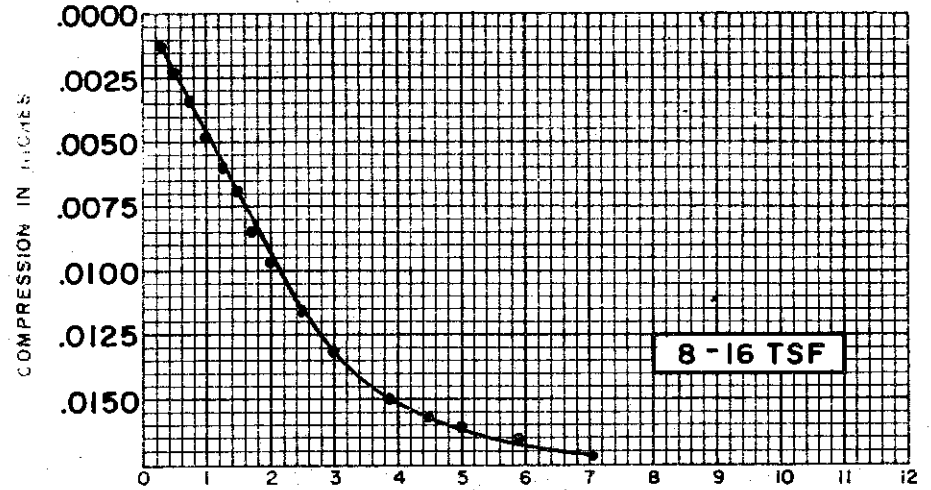
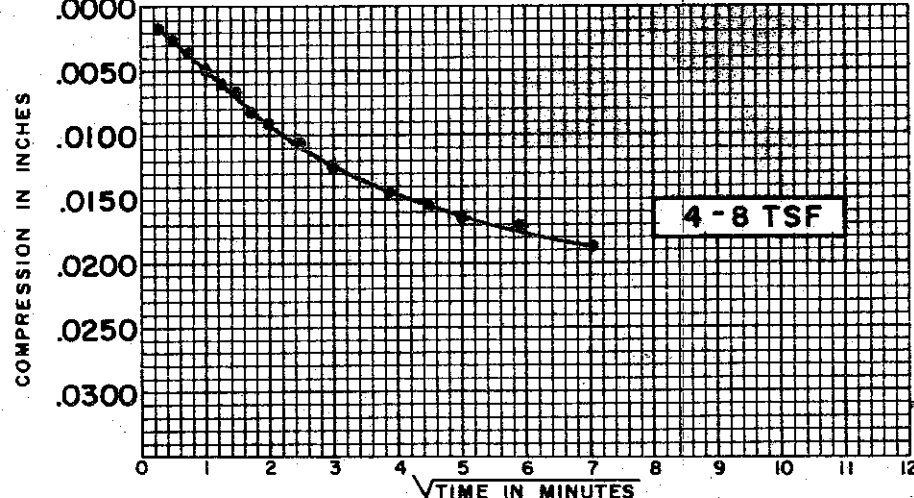
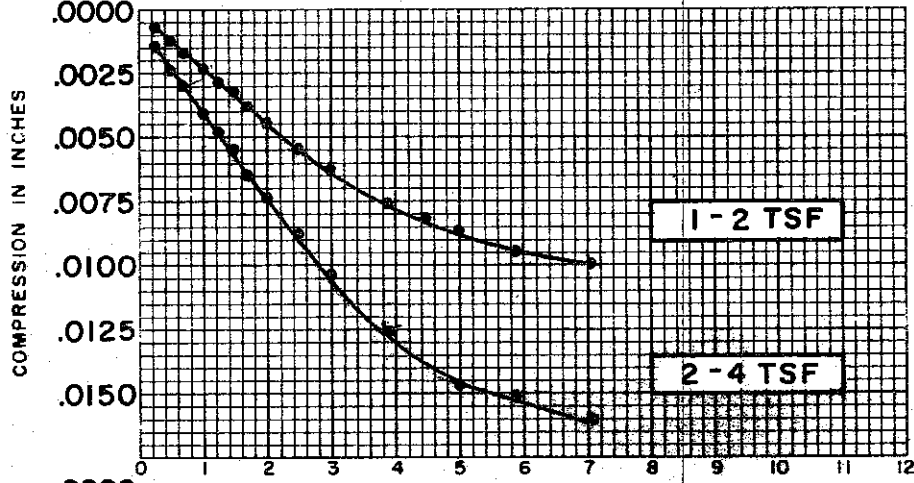
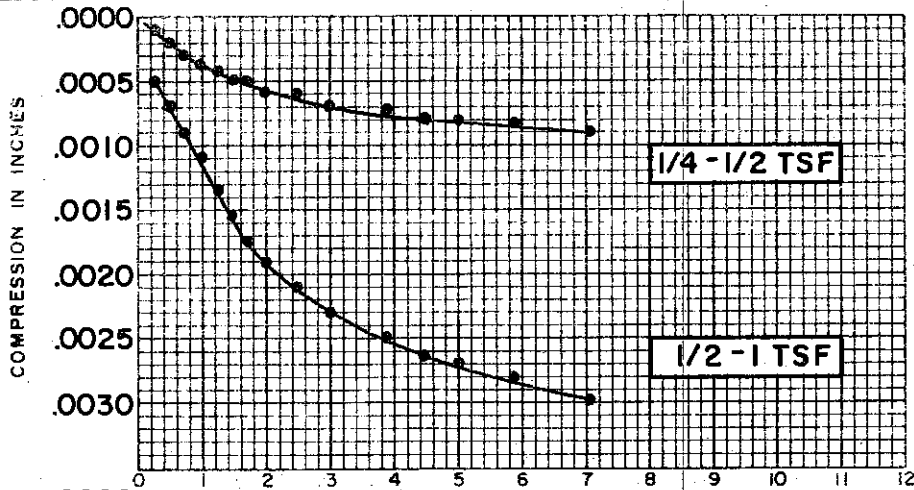
BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

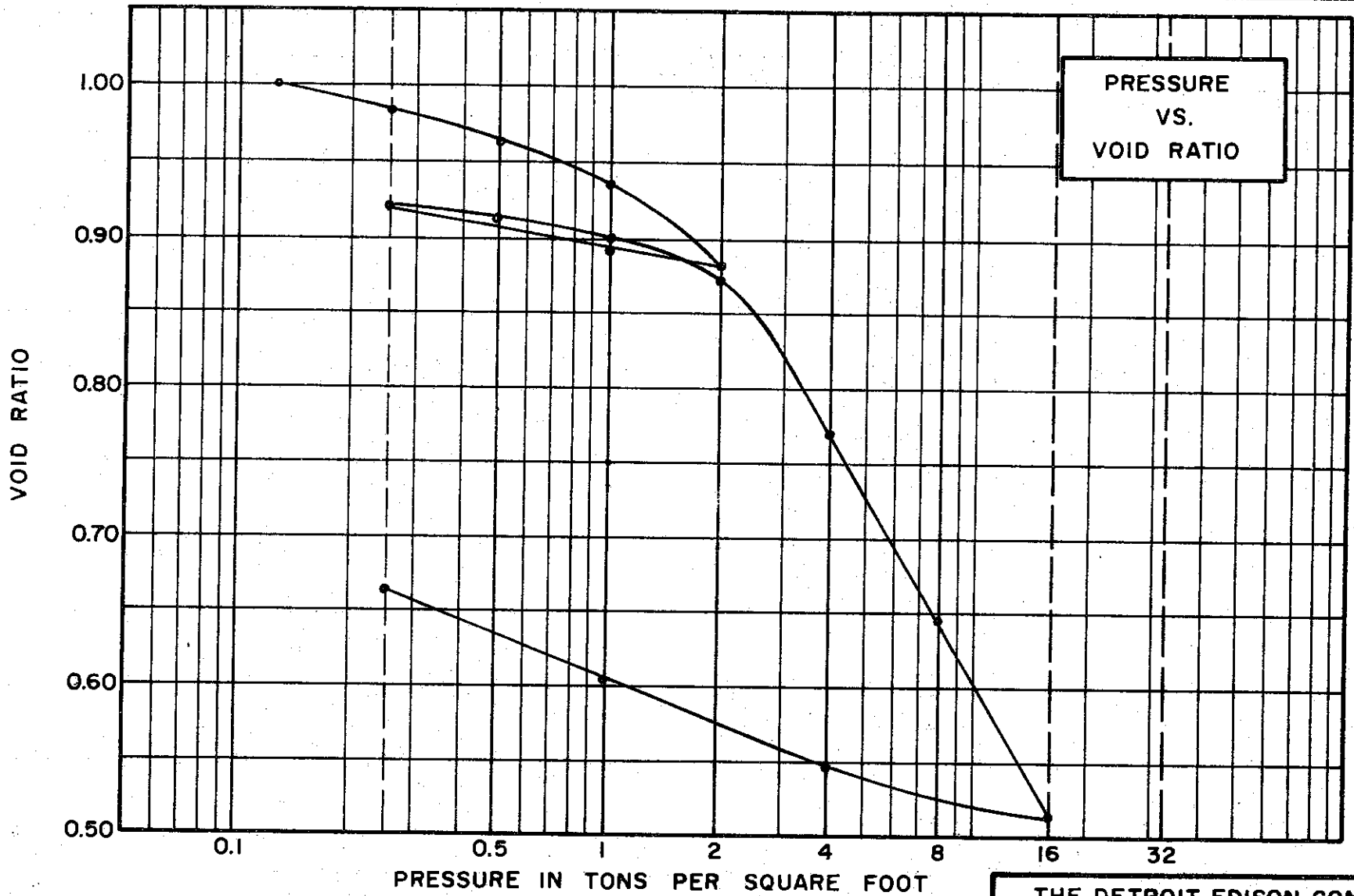
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 BORING NO. 136  
 SAMPLE NO. ST 6  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 DEPTH 13.0' TO 14.6'  
 FINAL WATER CONTENT 21.3 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.2% FINAL 30.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.019

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

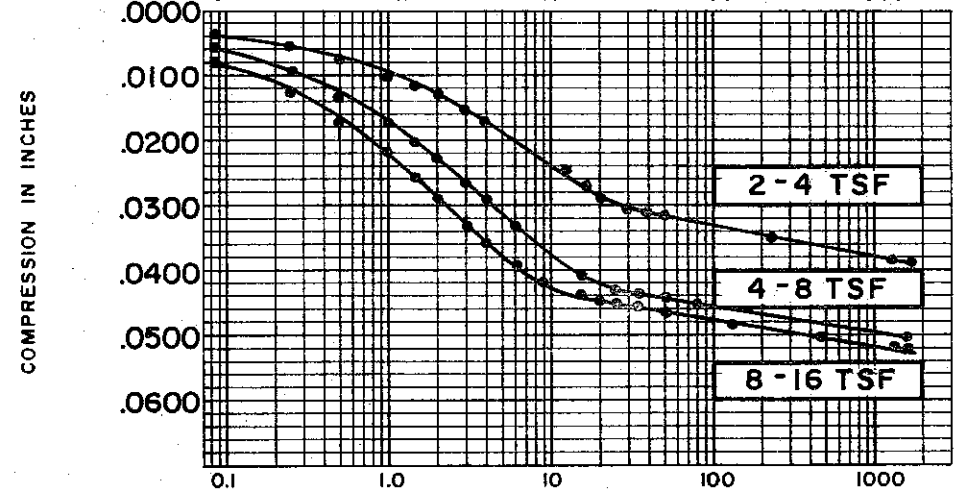
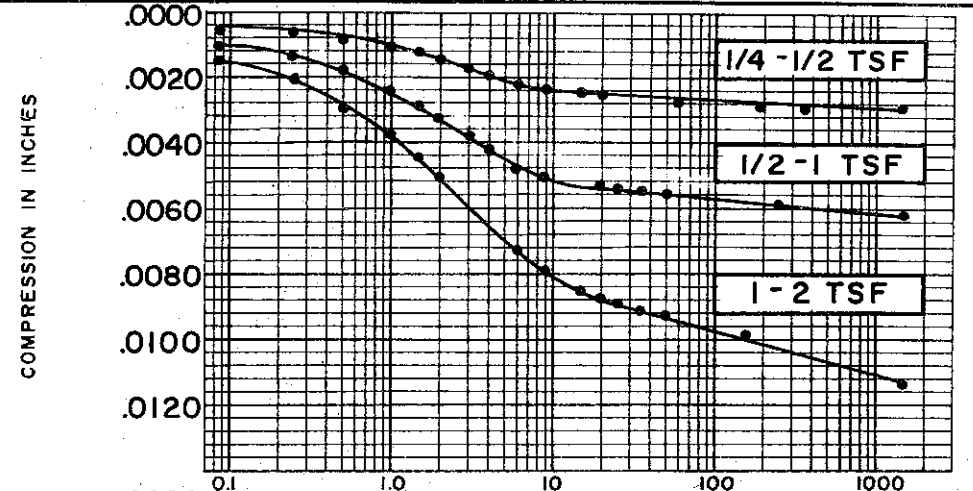
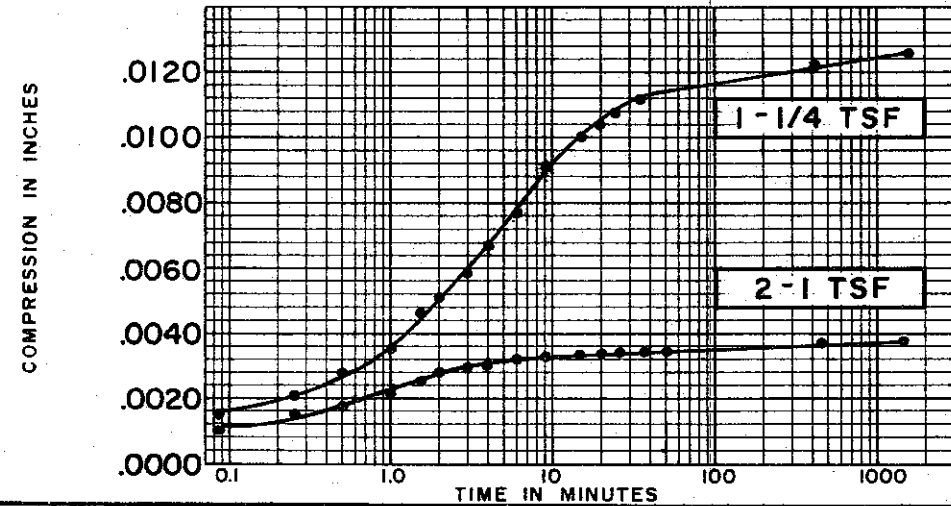
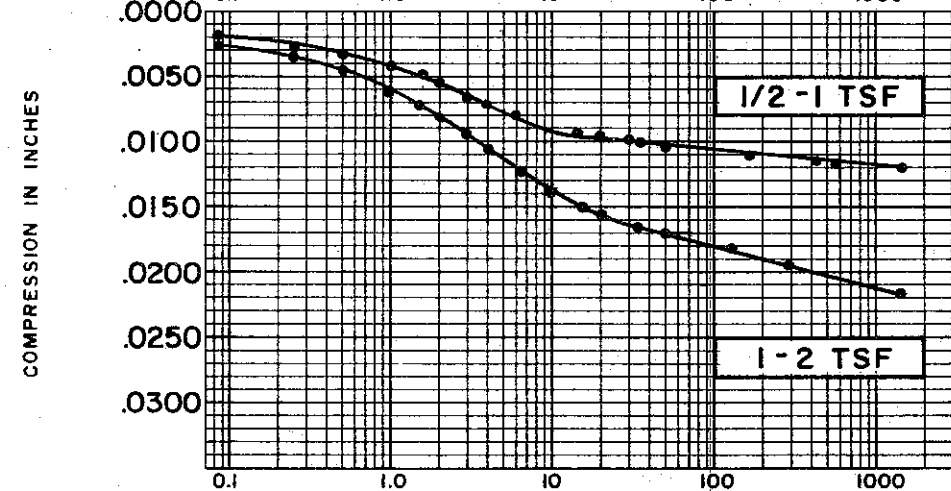
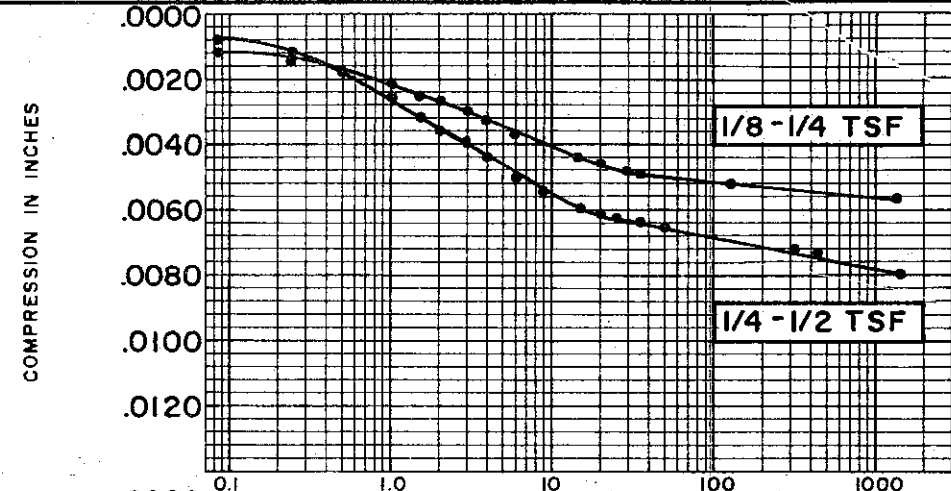
**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 142 TEST NO. C535.1

SAMPLE NO. 6 DATE NOV. 1974

DEPTH 20.1' TO 20.5'

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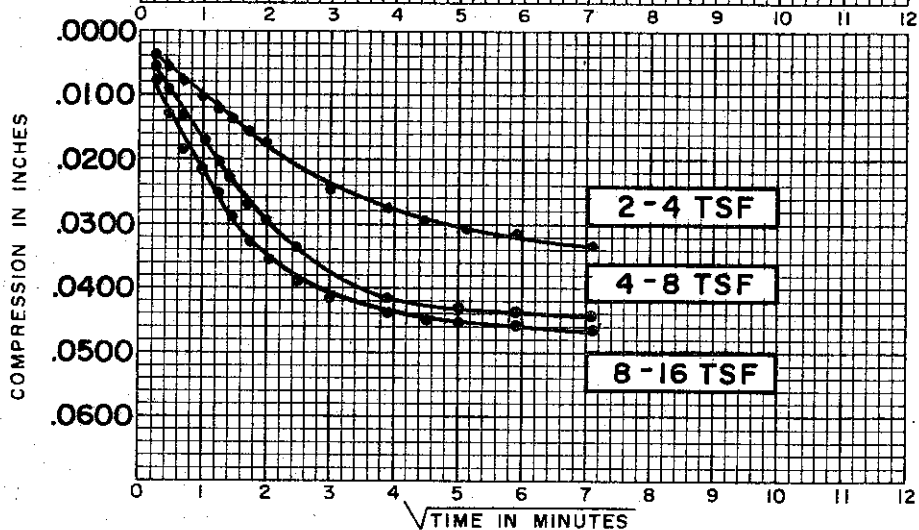
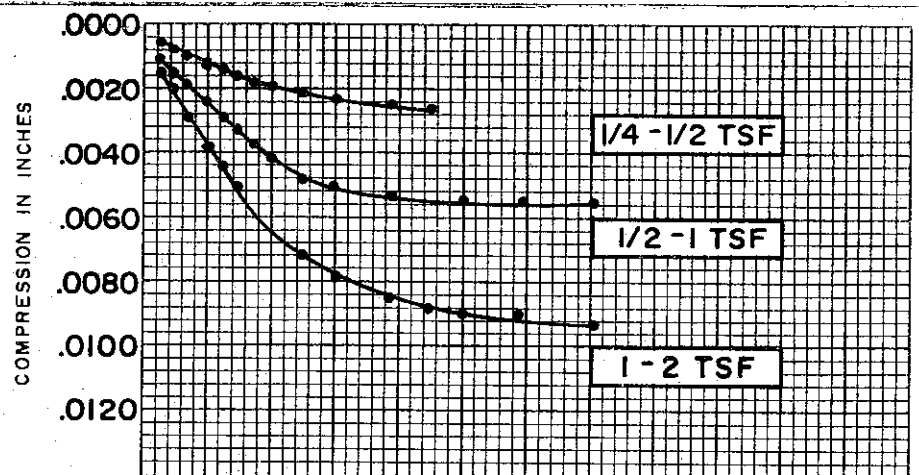
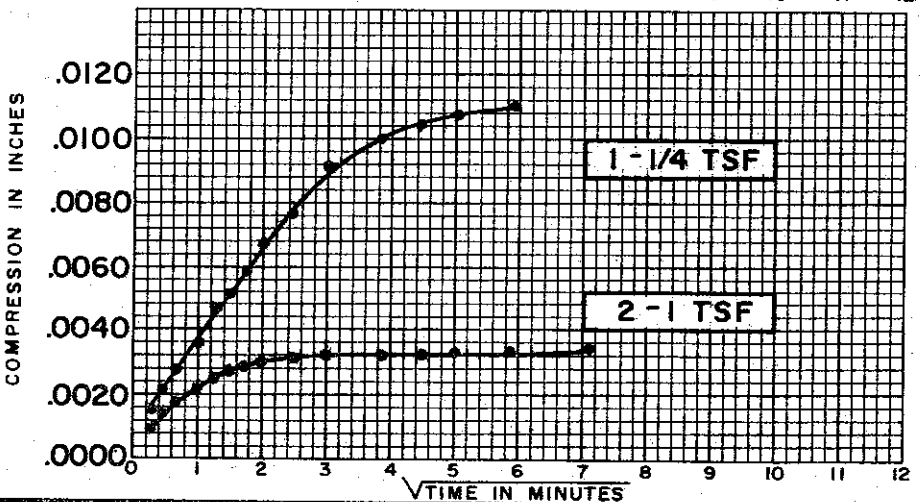
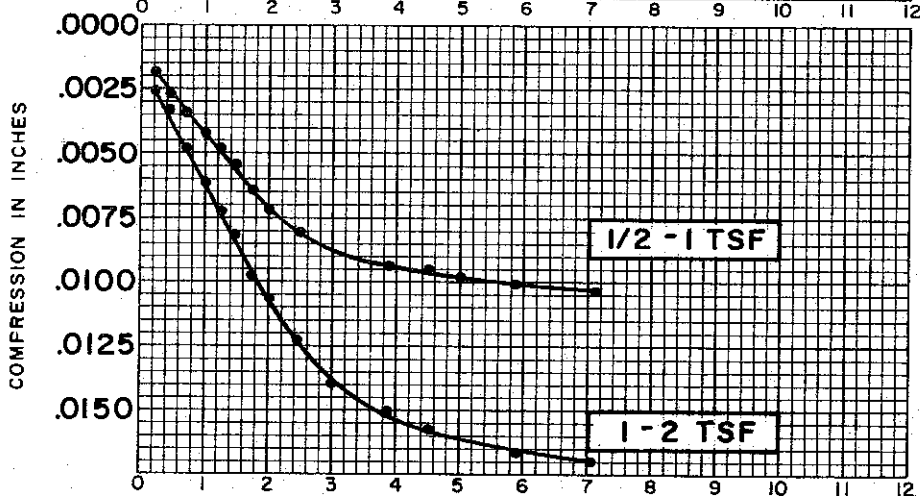
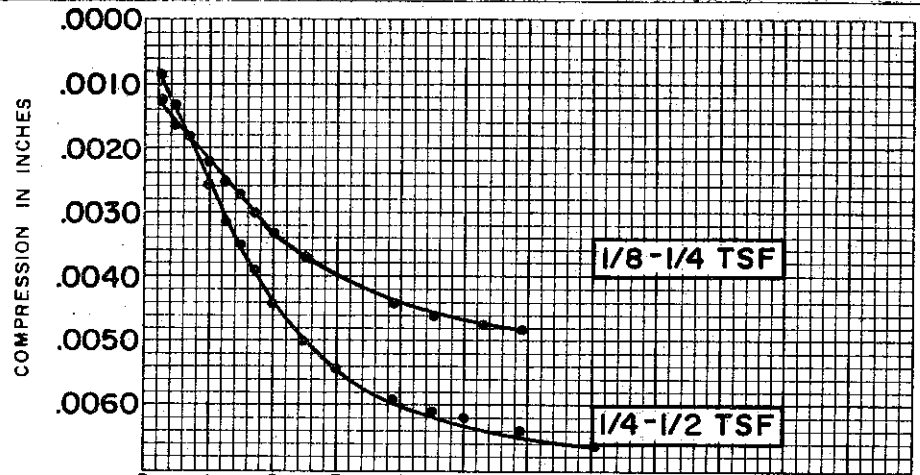


SOIL PROPERTIES		BORING NO. <u>142</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>6</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>20.1' TO 20.5'</u>
INITIAL WATER CONTENT	<u>38.2%</u>	
FINAL WATER CONTENT	<u>30.5%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>1.019</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2 %  
 FINAL WATER CONTENT 30.5 %

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

**TEST DATA**

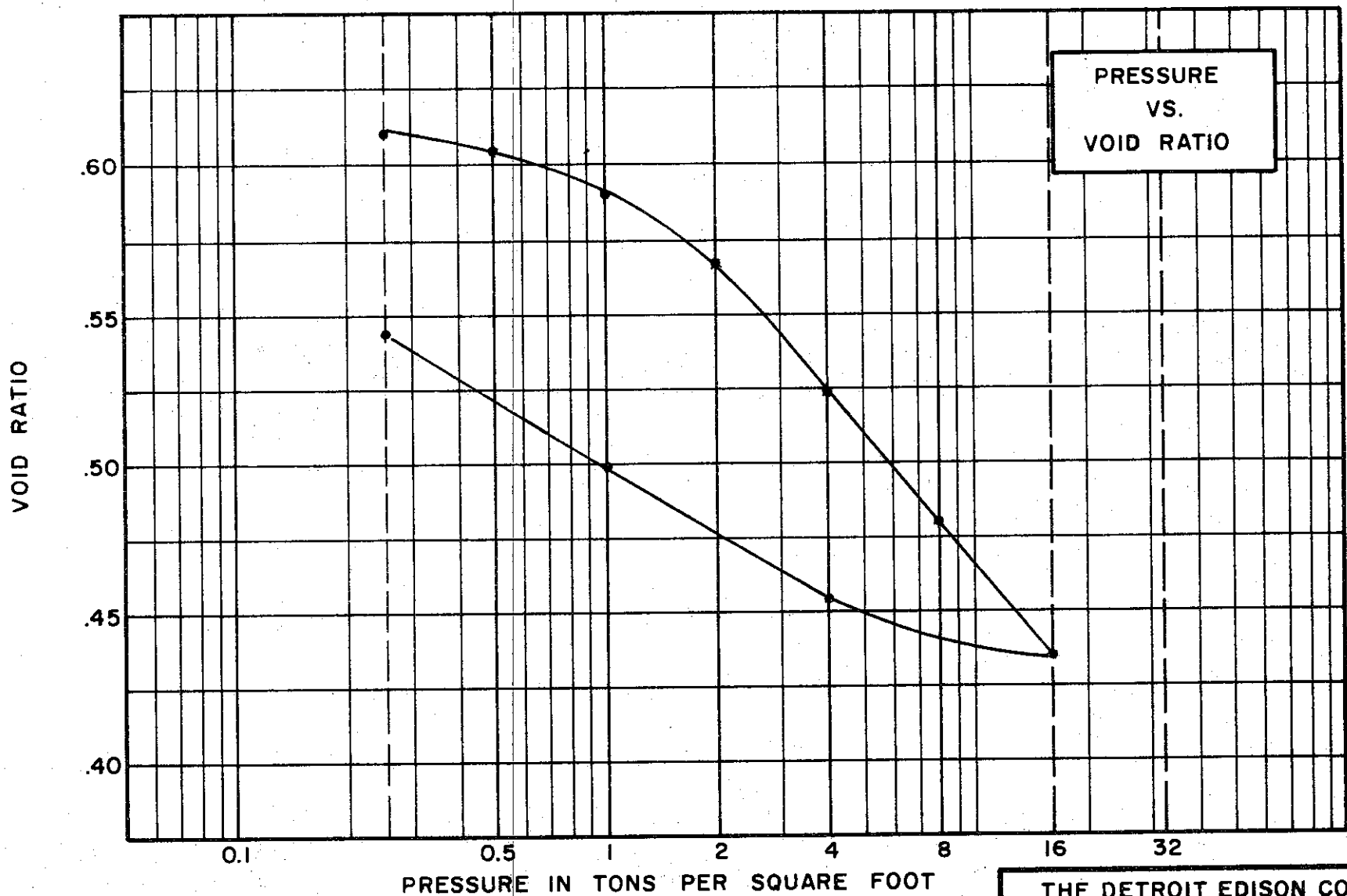
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 5.9% FINAL 22.2%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

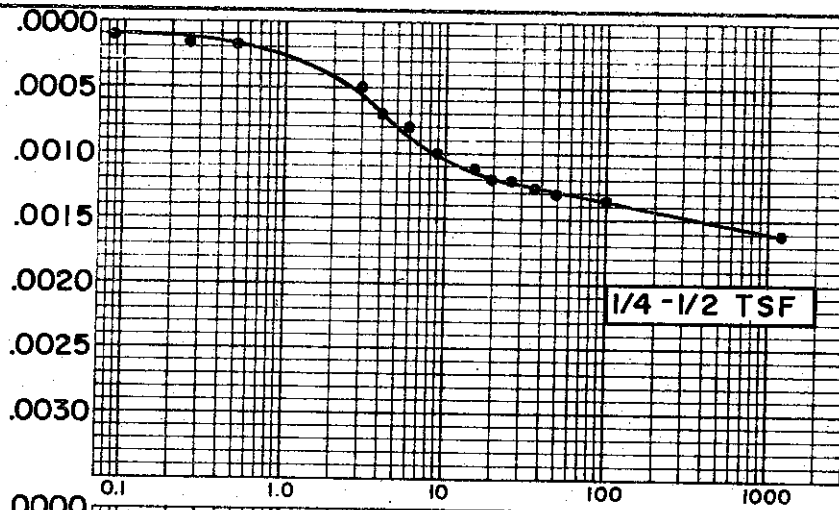
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.447"  
 INITIAL VOID RATIO (0.679) AS COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

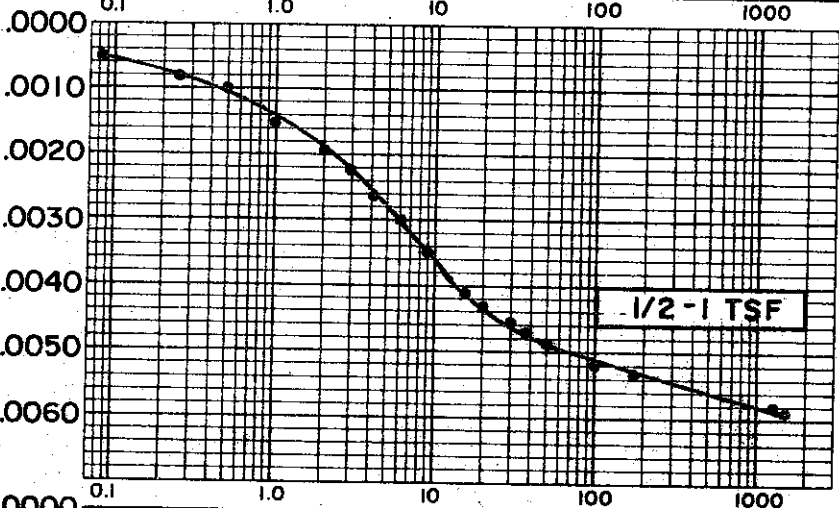
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 146 TEST NO. C542.1  
 SAMPLE NO. 7 DATE DEC. 1974  
 DEPTH 14.0' TO 16.1'

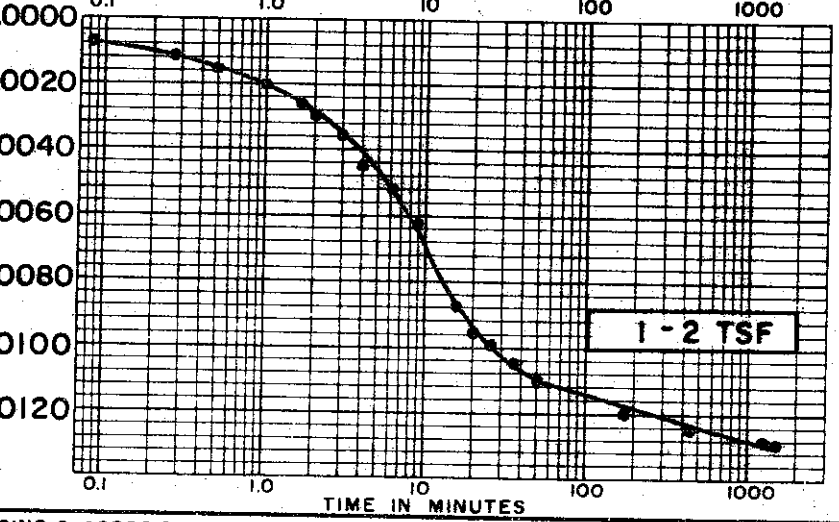
COMPRESSION IN INCHES



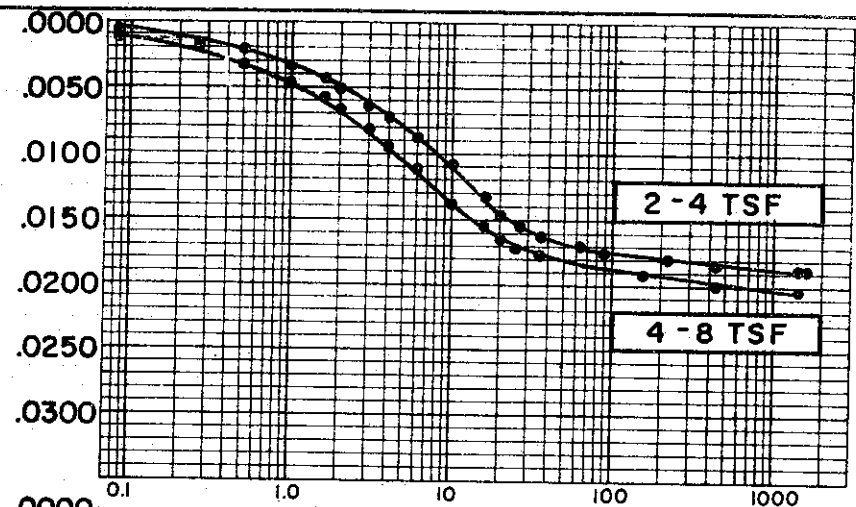
COMPRESSION IN INCHES



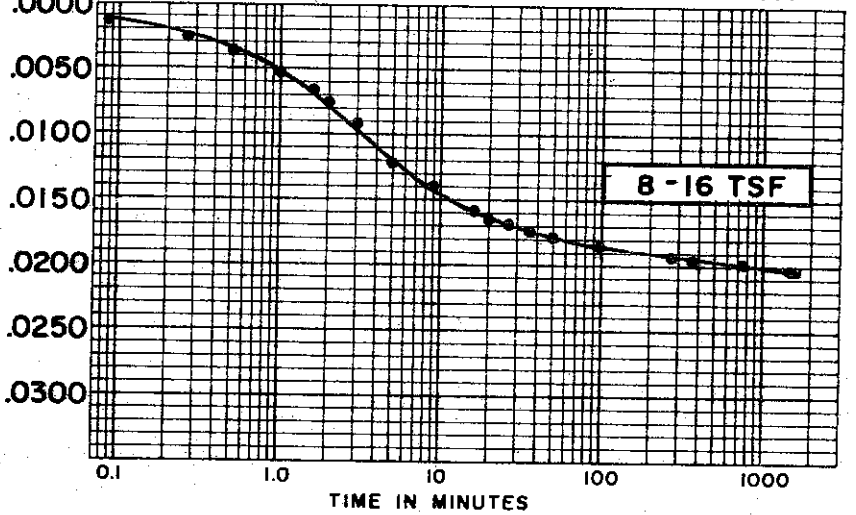
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9)%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

TEST DATA

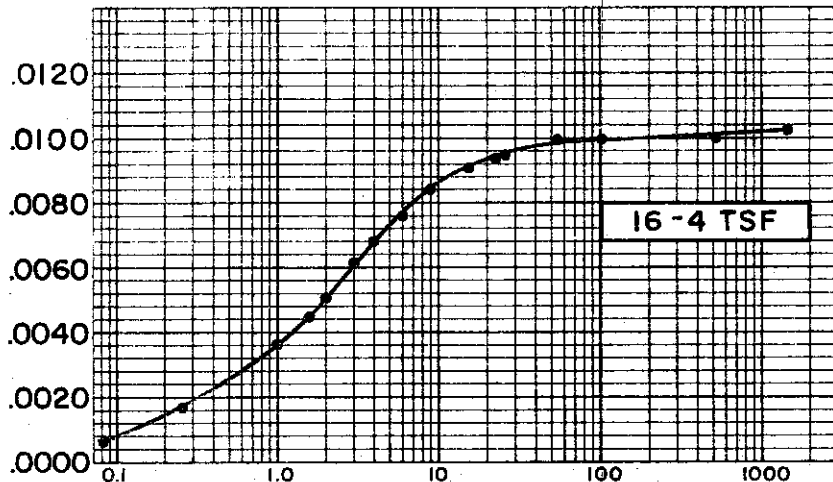
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

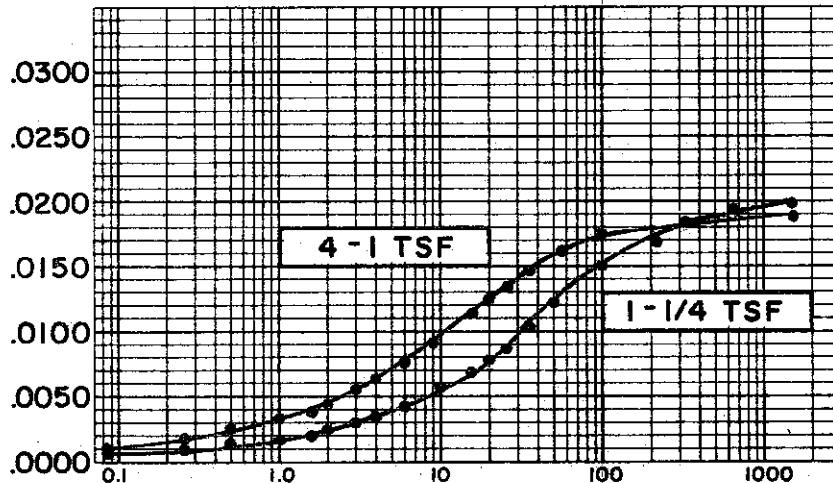
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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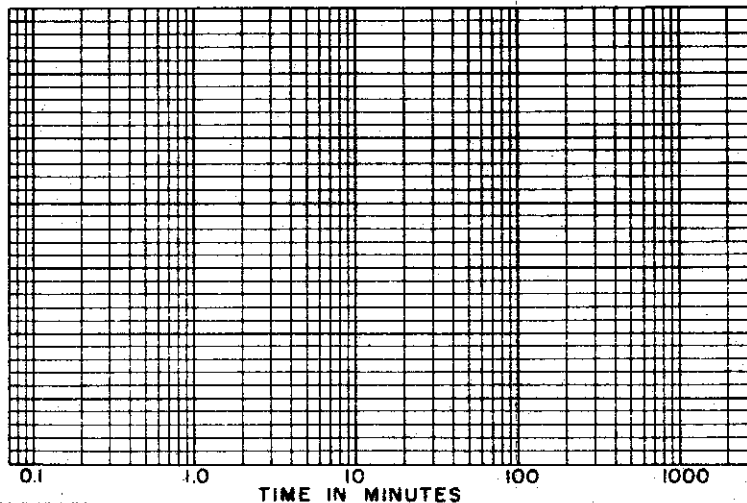
COMPRESSION IN INCHES



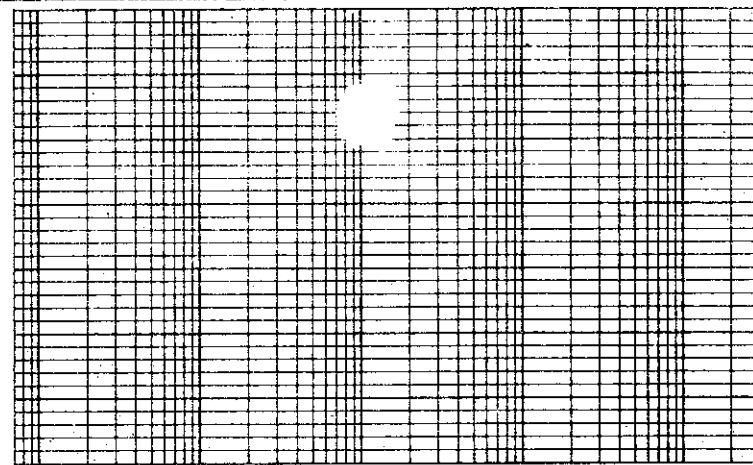
COMPRESSION IN INCHES



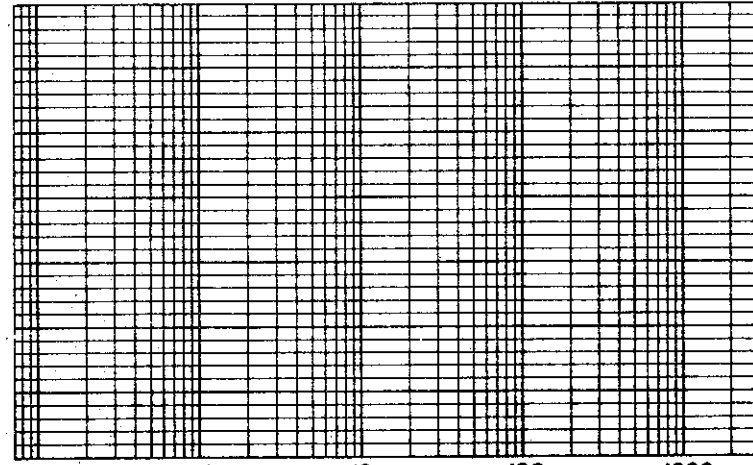
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.75  
INITIAL WATER CONTENT (15.9)%  
FINAL WATER CONTENT 22.2%

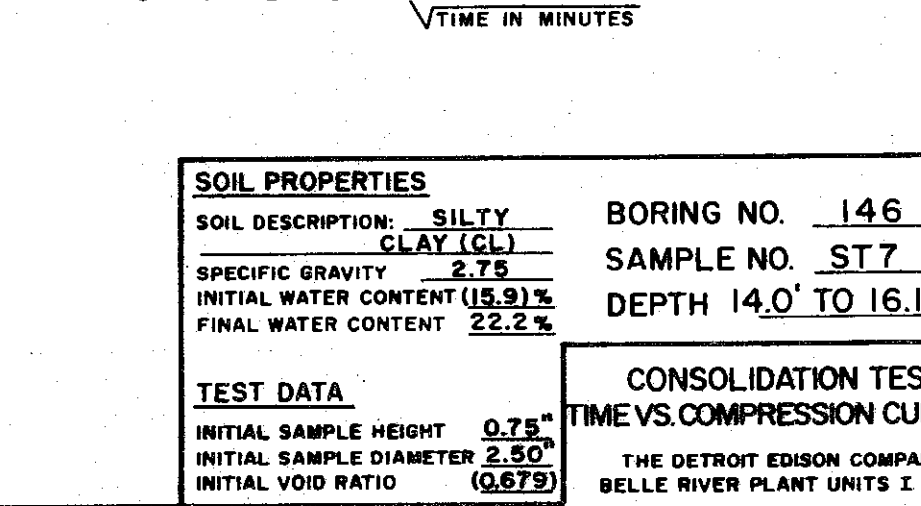
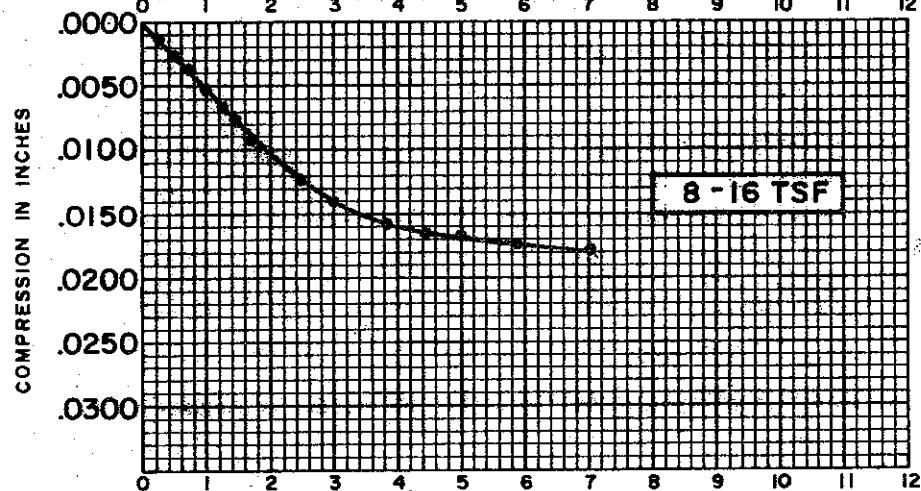
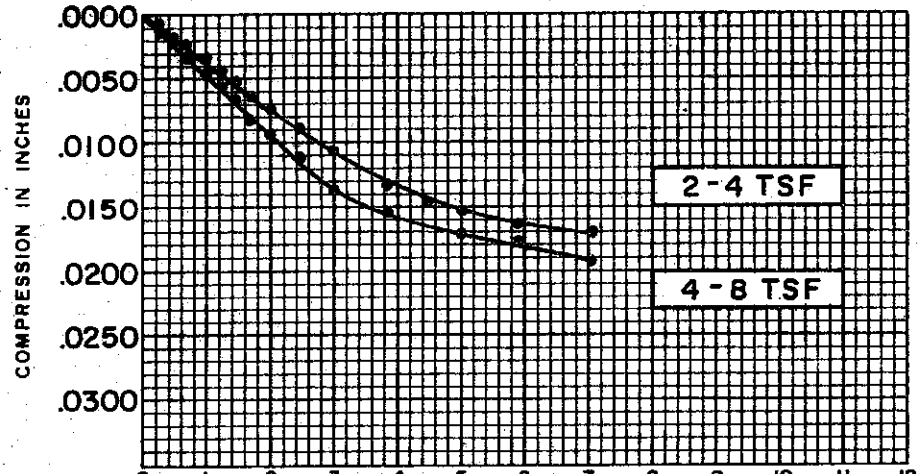
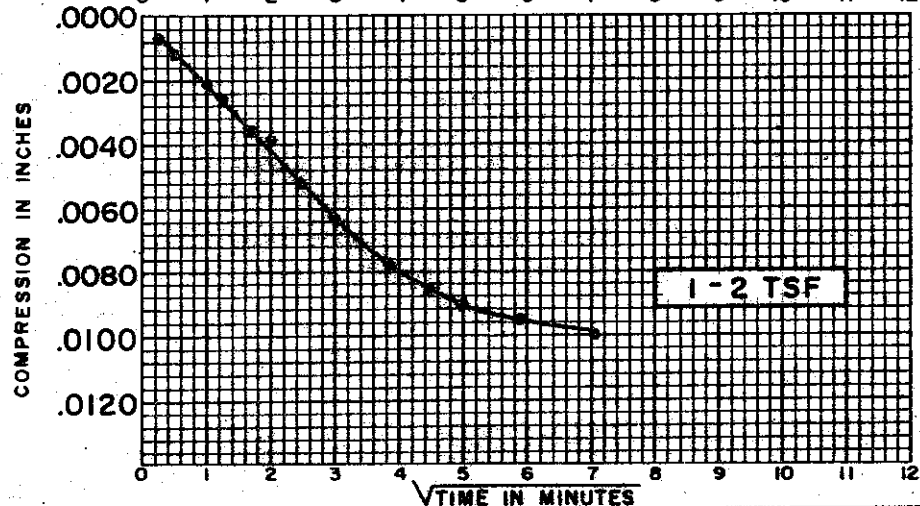
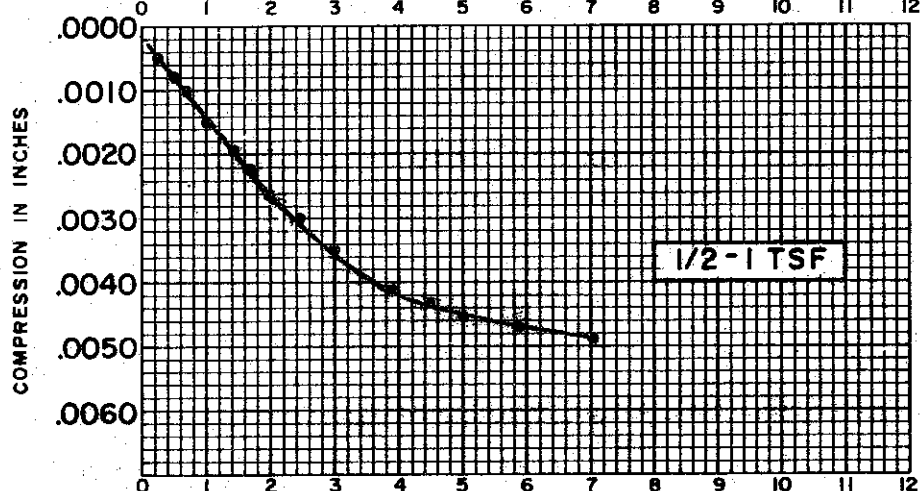
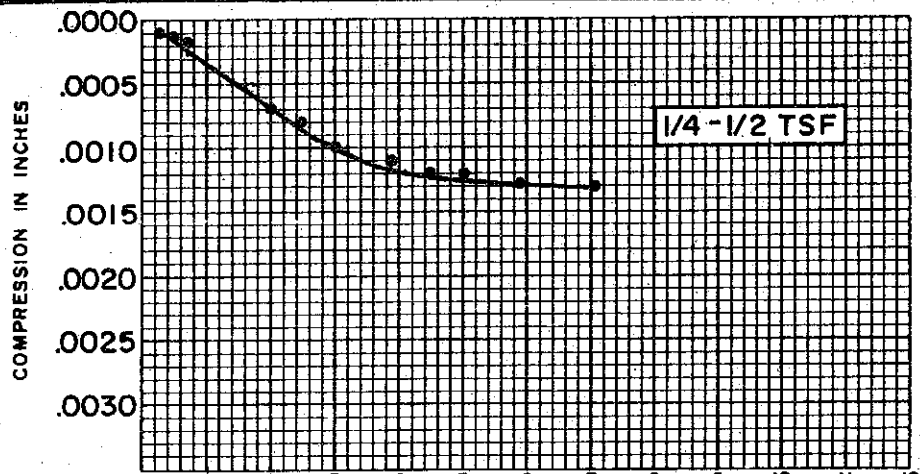
BORING NO. 146  
SAMPLE NO. ST 7  
DEPTH 14.0' TO 16.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9) %  
 FINAL WATER CONTENT 22.2 %

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

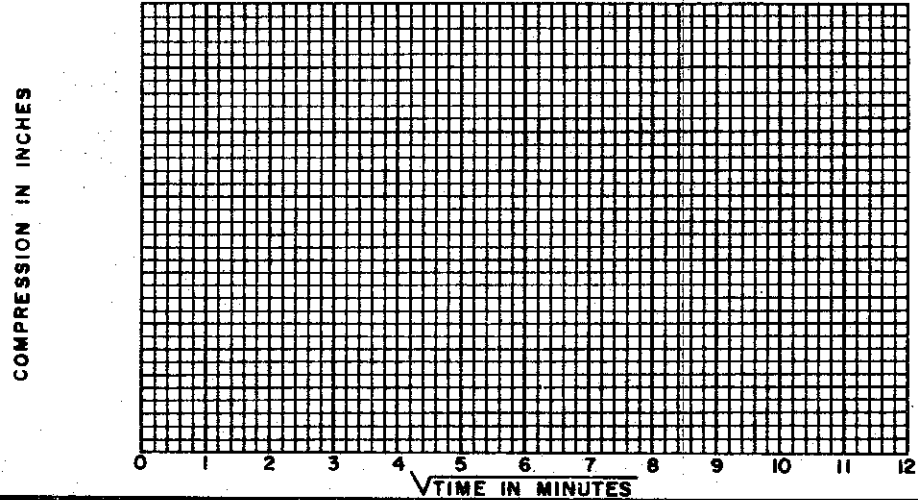
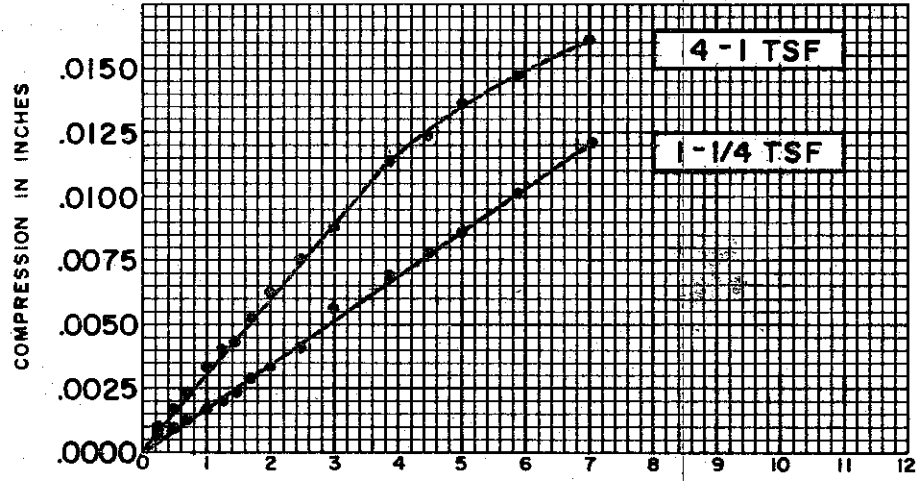
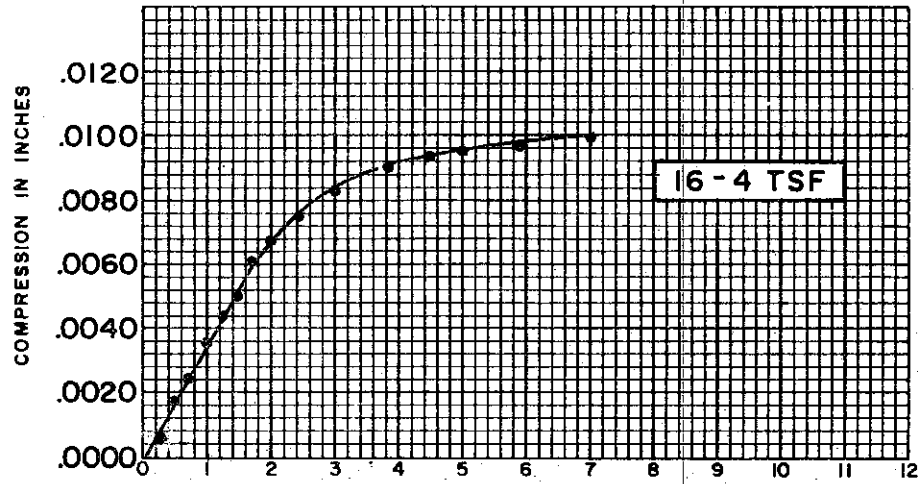
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

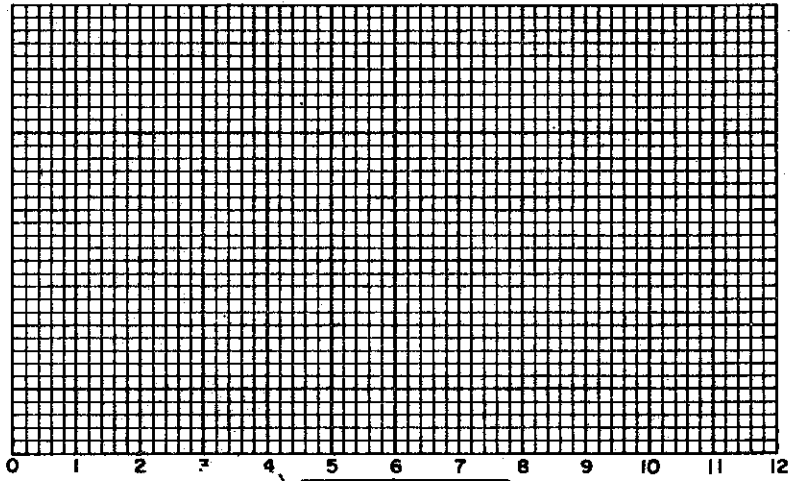
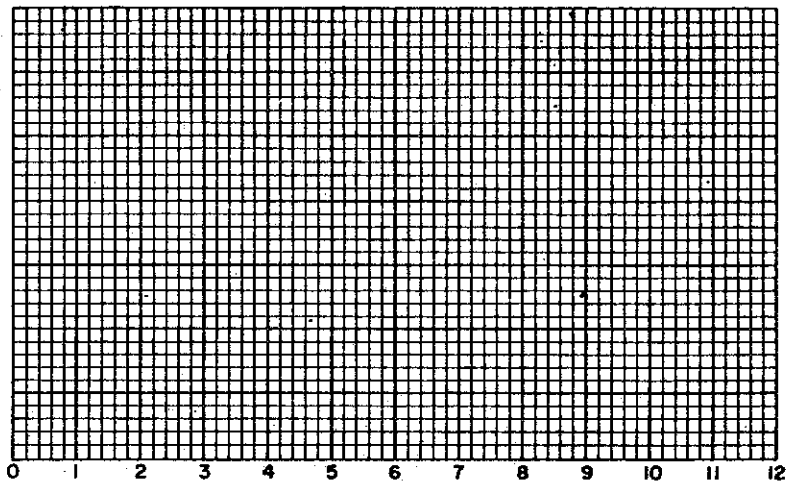
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 15.9%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

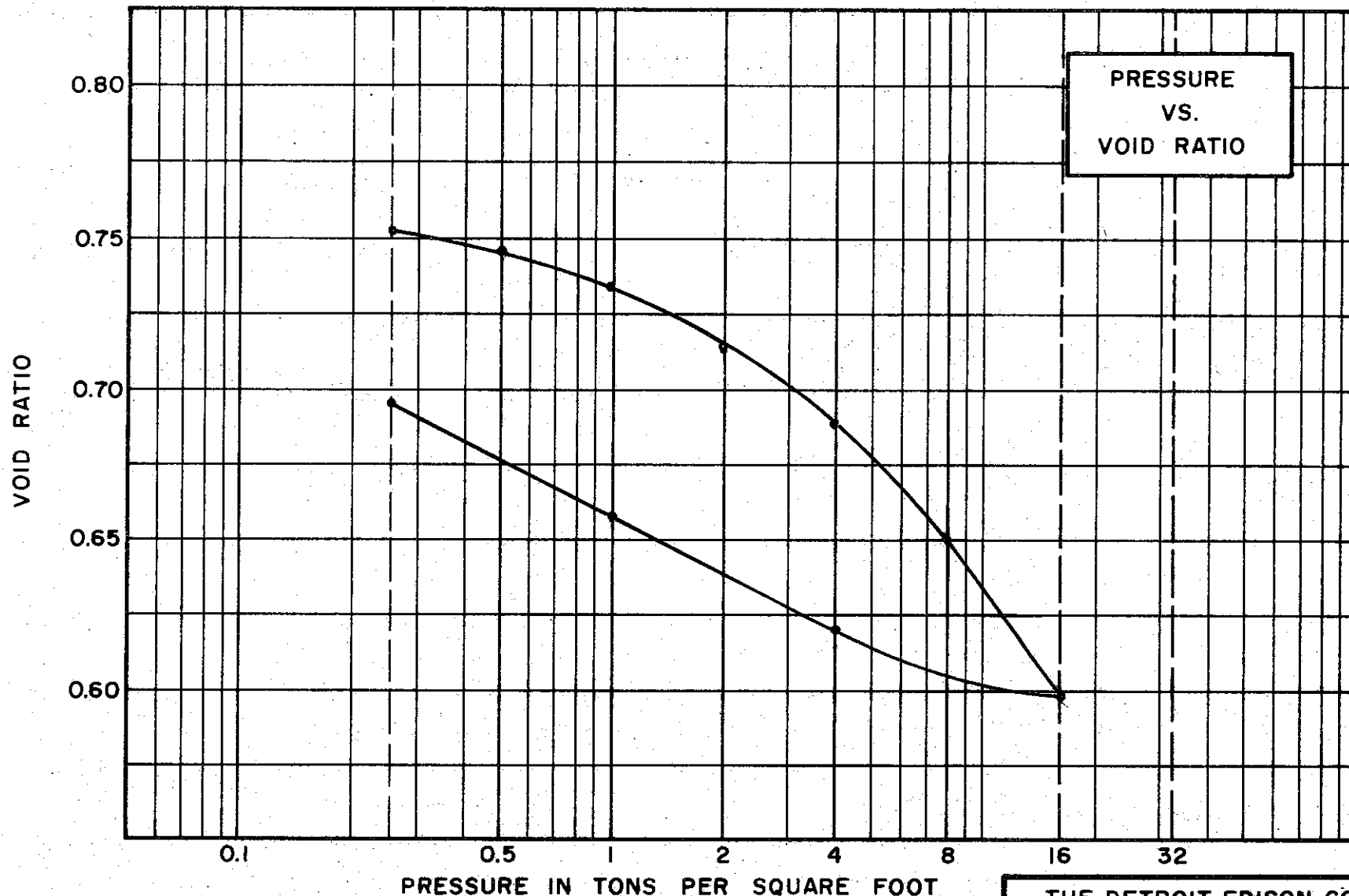
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.1% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

**TEST DATA**

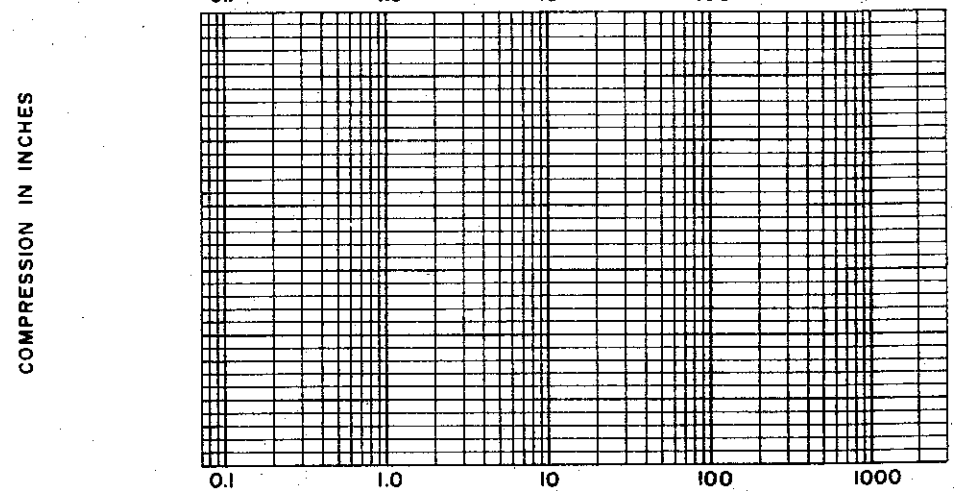
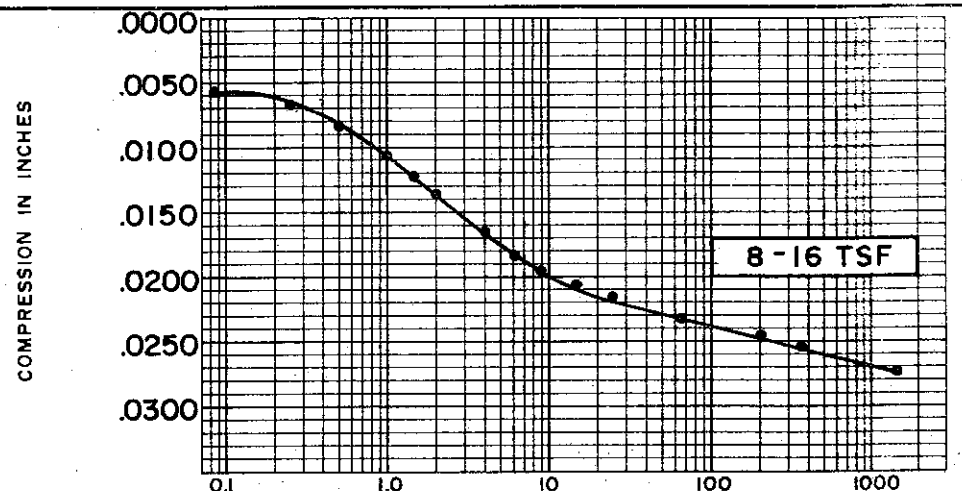
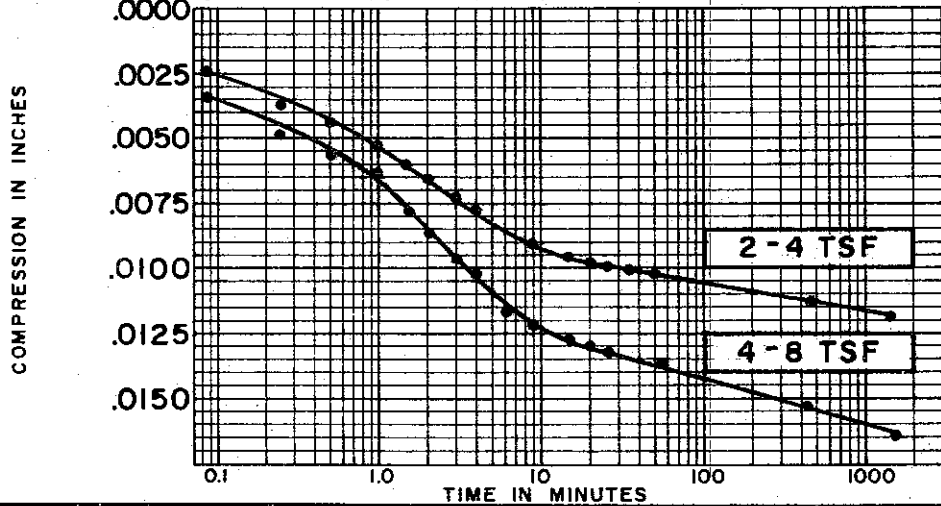
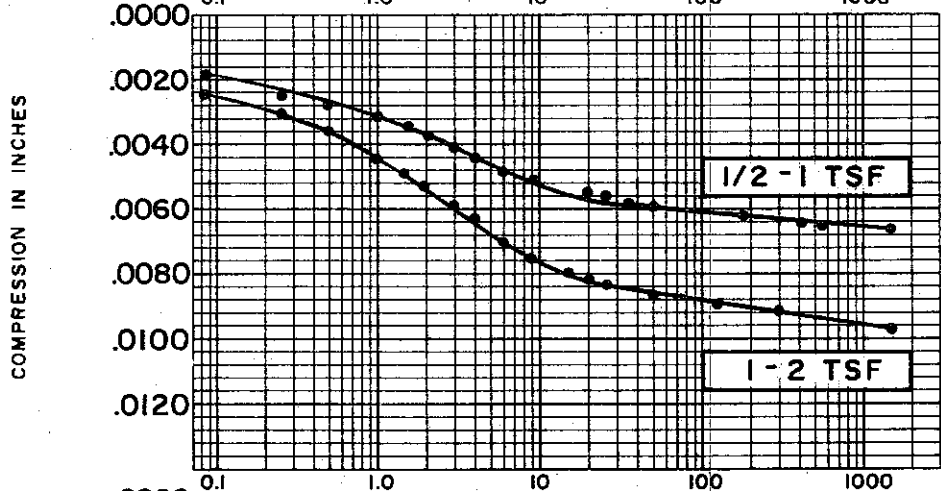
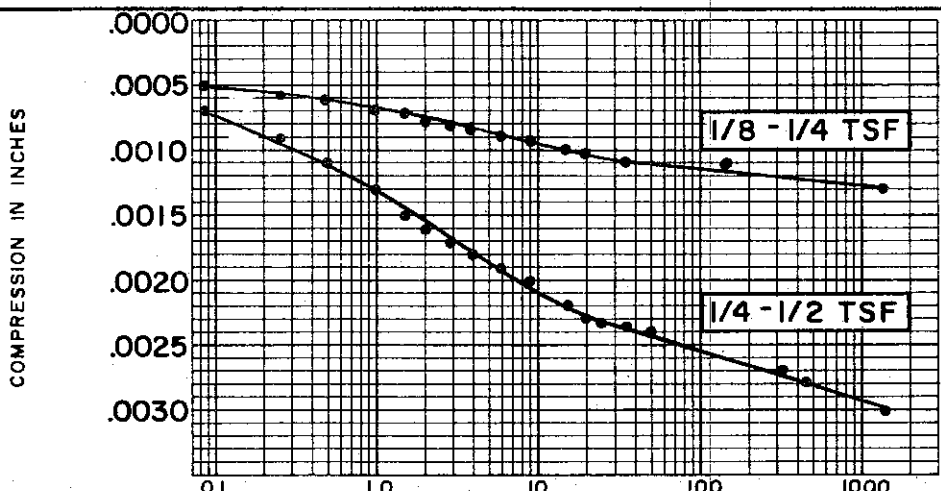
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.757

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 185 TEST NO. C552.1  
 SAMPLE NO. 3 DATE NOV. 1974  
 DEPTH 7.9' TO 8.1'

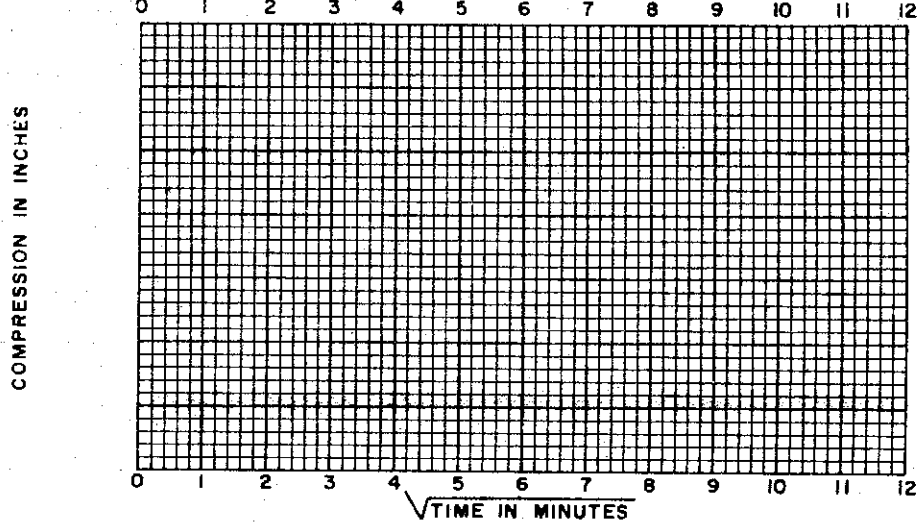
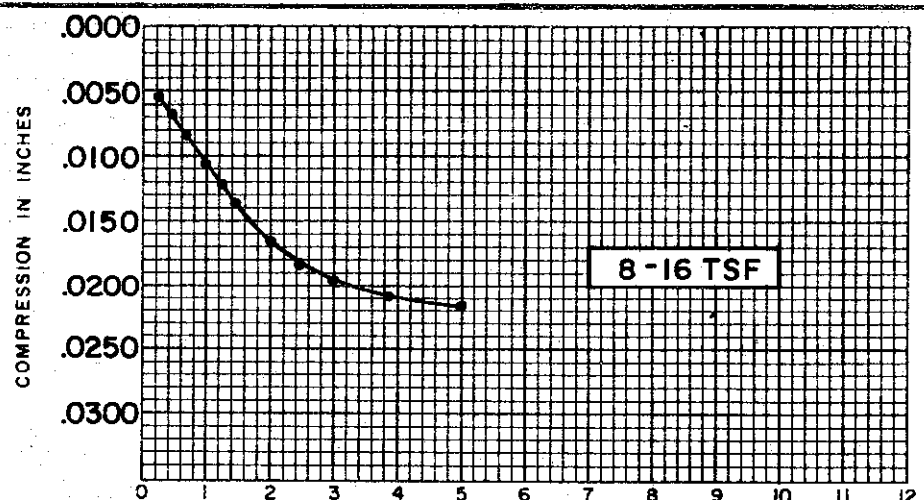
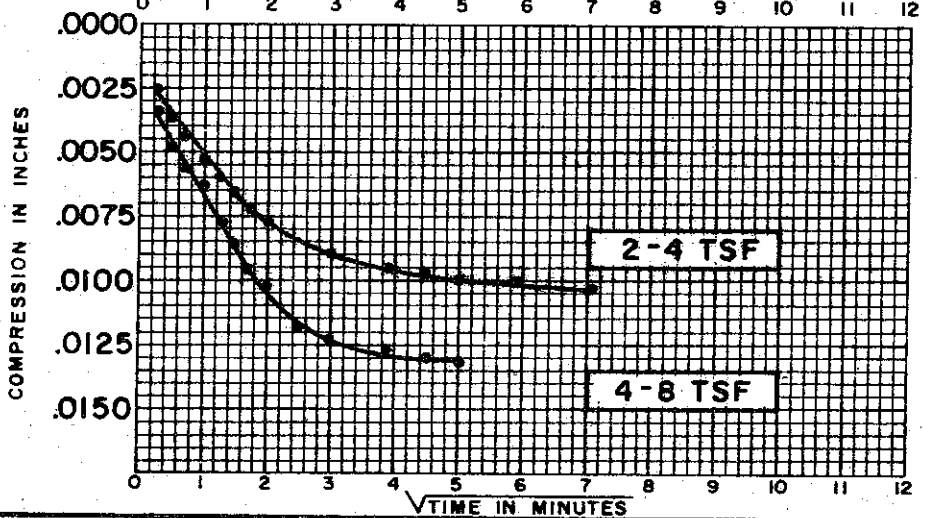
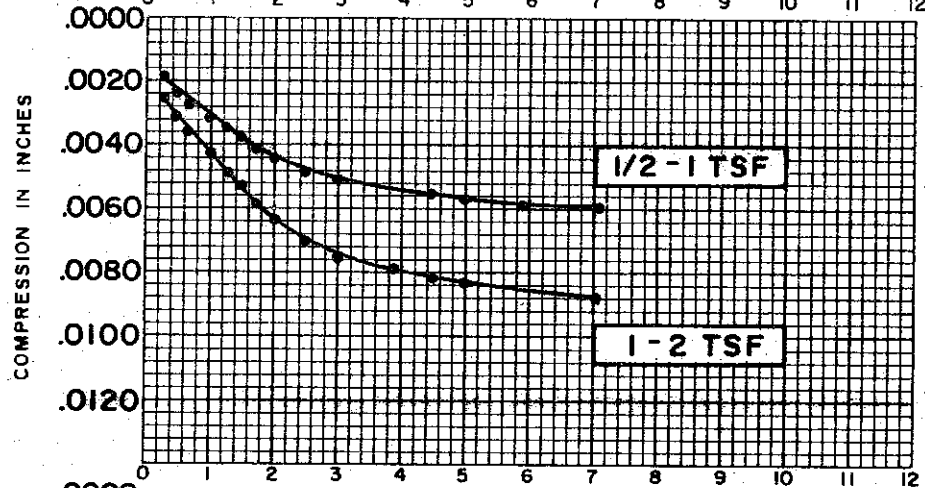
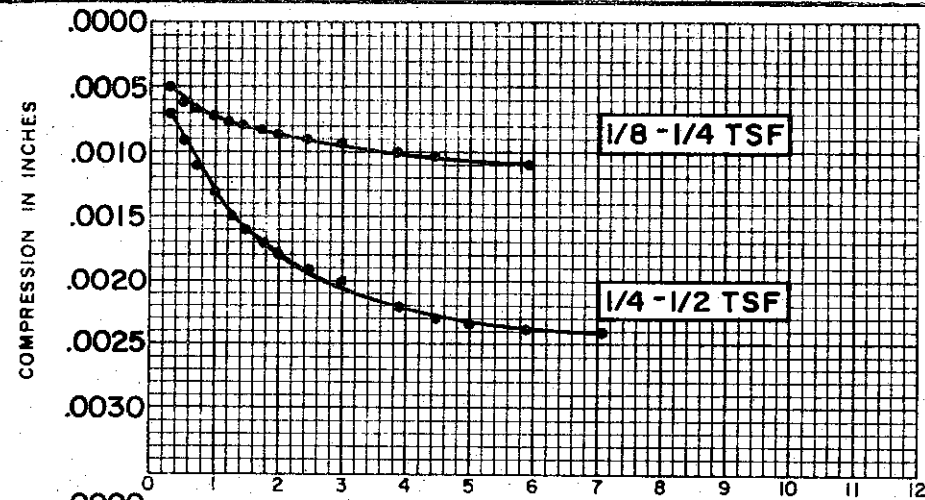
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SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>
SPECIFIC GRAVITY	<u>2.72</u>
INITIAL WATER CONTENT	<u>29.1 %</u>
FINAL WATER CONTENT	<u>28.9 %</u>
BORING NO.	<u>185</u>
SAMPLE NO.	<u>3</u>
DEPTH	<u>7.9' TO 8.1'</u>

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.757</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO.	185
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	3
SPECIFIC GRAVITY	2.72	DEPTH	7.9' TO 8.1'
INITIAL WATER CONTENT	29.1%		
FINAL WATER CONTENT	28.9%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.757

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	738	.11	.0012	300	.07	.0007
1/2 - 1	612	.13	.0014	180	.10	.0011
1 - 2	540	.14	.0015	138	.13	.0014
2 - 4	378	.19	.0020	78	.21	.0023
4 - 8	468	.15	.0016	108	.15	.0016
8 - 16	378	.17	.0018	108	.19	.0015
16 - 4	174	.36	.0039	60	.24	.0026
4 - 1	1164	.06	.0006	240	.07	.0007
1 - 1/4	3024	.02	.0002	900	.02	.0002

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' to 14.7'  
 TEST NO. C18.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .770 C<sub>c</sub> .19

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/8 - 1/4	960	.08	.0009	---	---	----
1/4 - 1/2	612	.12	.0013	180	.10	.0011
1/2 - 1	468	.16	.0017	156	.11	.0012
1 - 2	378	.19	.0020	120	.13	.0014
2 - 4	288	.22	.0024	90	.17	.0018
4 - 1	135	.46	.0050	54	.27	.0029
1 - 1/4	912	.07	.0008	216	.07	.0007
1/4 - 1/2	264	.25	.0027	102	.15	.0016
1/2 - 1	438	.15	.0016	84	.18	.0019
1 - 2	173	.37	.0040	48	.31	.0033
2 - 4	135	.46	.0050	36	.40	.0043
4 - 8	216	.27	.0029	48	.28	.0030
8 - 16	192	.27	.0029	42	.29	.0031
16 - 4	138	.36	.0039	33	.34	.0037
4 - 1	576	.09	.0010	150	.08	.0009
1 - 1/4	1380	.04	.0004	450	.03	.0003

BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' to 74.1'  
 TEST NO. C24.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CH)  
 INITIAL WATER CONTENT 36.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .935 C<sub>c</sub> .33

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	168	.11	.0012
1/2 - 1	408	.20	.0021	180	.10	.0011
1 - 1/4	1164	.07	.0007	312	.06	.0006
1/4 - 1/2	438	.18	.0019	120	.15	.0016
1/2 - 1	822	.09	.0010	180	.10	.0011
1 - 2	378	.20	.0022	132	.13	.0014
2 - 4	408	.18	.0019	120	.14	.0015
4 - 8	408	.17	.0018	102	.16	.0017
8 - 16	540	.11	.0012	120	.13	.0014
24 - 6	138	.42	.0046	45	.31	.0033
6 - 1/2	1218	.06	.0006	450	.04	.0004

BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8' to 11.0'  
TEST NO. C29.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 29.5 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 23 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.799 C<sub>c</sub> 0.23

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	614	.12	.0013	240	.07	.0008
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	614	.11	.0012	225	.07	.0008
2 - 4	778	.08	.0009	210	.07	.0007
4 - 8	614	.09	.0010	162	.08	.0009
8 - 16	406	.12	.0013	96	.12	.0013
16 - 4	194	.24	.0026	54	.20	.0022
4 - 1	1110	.05	.0005	240	.05	.0005
1 - 1/4	3024	.02	.0002	720	.02	.0002

BORING NO. 41  
SAMPLE NO. 7  
DEPTH 21.0' to 21.1'  
TEST NO. C30.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 38.1 %  
ATTERBERG LIMITS  
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 1.055 C<sub>c</sub> 0.34

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	1500	.05	.0005	420	.04	.0004	DEPTH <u>53.0' to 53.2'</u>
1/2 - 1	1056	.06	.0006	300	.05	.0005	TEST NO. <u>C33.1</u>
1 - 2	738	.08	.0009	240	.06	.0006	<b>SOIL PROPERTIES</b>
2 - 4	696	.07	.0008	228	.06	.0006	SOIL DESCRIPTION: _____
4 - 8	540	.09	.0010	150	.07	.0008	<u>Silty CLAY (CL-CH)</u>
8 - 16	504	.08	.0009	108	.09	.0010	INITIAL WATER CONTENT <u>46.5 %</u>
24 - 6	378	.10	.0011	90	.10	.0011	ATTERBERG LIMITS
6 - 2	912	.05	.0005	192	.05	.0005	LIQUID LIMIT <u>52 %</u> PLASTIC LIMIT <u>25 %</u>
2 - 1/2	1500	.03	.0003	480	.02	.0002	<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.75 IN 1.905 CM.</u>
							INITIAL VOID RATIO <u>1.235</u> C <sub>c</sub> <u>0.35</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/8 - 1/4	1500	.06	.0006	360	.05	.0005	DEPTH <u>73.3'</u>
1/4 - 1/2	696	.11	.0012	240	.07	.0008	TEST NO. <u>C35.1</u>
1/2 - 1	696	.10	.0011	180	.09	.0010	<b>SOIL PROPERTIES</b>
1 - 2	468	.15	.0016	168	.10	.0011	SOIL DESCRIPTION: <u>Silty</u>
2 - 4	318	.21	.0023	120	.13	.0014	<u>CLAY, sandy (CL)</u>
4 - 1	240	.27	.0029	45	.33	.0036	INITIAL WATER CONTENT <u>26.7%</u>
1 - 1/4	1008	.07	.0007	228	.07	.0007	ATTERBERG LIMITS
1/4 - 1/2	264	.26	.0028	60	.26	.0028	LIQUID LIMIT <u>25 %</u> PLASTIC LIMIT <u>15 %</u>
1/2 - 1	504	.13	.0014	102	.15	.0016	<b>TEST DATA</b>
1 - 2	174	.38	.0041	78	.20	.0021	INITIAL SAMPLE HEIGHT <u>0.80 IN 2.03 CM.</u>
2 - 4	216	.30	.0032	54	.28	.0030	INITIAL VOID RATIO <u>.697</u> C <sub>c</sub> <u>0.21</u>
4 - 8	348	.18	.0019	96	.15	.0016	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>
8 - 16	348	.17	.0018	72	.19	.0020	
16 - 4	138	.40	.0043	36	.35	.0038	
4 - 1	438	.13	.0014	54	.24	.0026	
1 - 1/4	2382	.03	.0003	660	.02	.0002	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.13	.0014	210	.07	.0008
1/2 - 1	408	.17	.0018	132	.12	.0013
1 - 2	378	.18	.0019	114	.13	.0014
2 - 4	408	.16	.0017	108	.13	.0014
4 - 8	408	.15	.0016	114	.12	.0013
8 - 16	408	.14	.0015	96	.13	.0014
24 - 6	216	.24	.0026	54	.22	.0024
6 - 2	822	.07	.0007	168	.07	.0008
2 - 1/2	1686	.04	.0004	348	.04	.0004

BORING NO. 41  
SAMPLE NO. 25  
DEPTH 113'  
TEST NO. C38.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 24.2 %  
ATTERBERG LIMITS  
LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.642 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	240	.33	.0036	108	.17	.0018
1/2 - 1	216	.36	.0039	120	.15	.0016
1 - 2	318	.24	.0026	90	.20	.0021
2 - 4	240	.32	.0034	108	.16	.0017
4 - 8	240	.31	.0033	108	.16	.0017
8 - 4	174	.41	.0044	54	.31	.0033
4 - 1	780	.09	.0010	276	.07	.0007
1 - 1/4	1380	.06	.0006	276	.07	.0007
1/4 - 1/2	348	.22	.0024	150	.12	.0013
1/2 - 1	540	.14	.0015	174	.10	.0011
1 - 2	780	.09	.0010	150	.11	.0012
2 - 4	654	.11	.0012	108	.16	.0017
4 - 8	468	.15	.0016	150	.16	.0017
8 - 16	378	.19	.0020	120	.13	.0014
24 - 6	540	.12	.0013	150	.10	.0011
6 - 2	960	.07	.0008	540	.03	.0003
2 - 1/2	1272	.06	.0006	960	.02	.0002

BORING NO. 41  
SAMPLE NO. 29  
DEPTH 130.9' to 131.1'  
TEST NO. C40.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Clayey SAND, gravelly (GC-SC)  
INITIAL WATER CONTENT 11.3%  
ATTERBERG LIMITS  
LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.370 C<sub>c</sub> 0.09

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>48</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	438	.18	.0019	180	.10	.0011	DEPTH <u>39.2' to 39.4'</u>
1/2 - 1	540	.14	.0015	210	.08	.0009	TEST NO. <u>C202.1</u>
1 - 2	654	.11	.0012	156	.10	.0011	<b>SOIL PROPERTIES</b>
2 - 1/2	504	.13	.0014	114	.14	.0015	
1/2 - 1/4	1500	.05	.0005	390	.05	.0005	<u>Silty CLAY (CL-CH)</u>
1/4 - 1/2	576	.13	.0014	138	.12	.0013	INITIAL WATER CONTENT <u>38.8 %</u>
1/2 - 1	468	.15	.0016	138	.12	.0013	ATTERBERG LIMITS
1 - 2	504	.14	.0015	108	.15	.0016	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>24 %</u>
2 - 4	696	.09	.0010	300	.05	.0005	<b>TEST DATA</b>
4 - 8	654	.09	.0010	174	.08	.0009	
8 - 16	504	.10	.0011	144	.08	.0009	INITIAL VOID RATIO <u>1.027</u> C <sub>c</sub> <u>0.33</u>
16 - 2	438	.12	.0013	108	.11	.0012	
2 - 1/2	2232	.03	.0003	540	.11	.0002	
1/2 - 1/8	4440	.01	.0001	1020	.01	.0001	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>49</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	470	.17	.0018	240	.07	.0008	DEPTH <u>13.7' to 14.0'</u>
1/2 - 1	540	.14	.0015	162	.11	.0012	TEST NO. <u>C133.1</u>
1 - 1/4	738	.10	.0011	210	.08	.0009	<b>SOIL PROPERTIES</b>
1/4 - 1/2	264	.29	.0031	126	.14	.0015	
1/2 - 1	540	.14	.0015	120	.15	.0016	<u>Silty CLAY (CL-CH)</u>
1 - 2	540	.14	.0015	156	.11	.0012	INITIAL WATER CONTENT <u>33.3 %</u>
2 - 4	540	.13	.0014	156	.10	.0011	ATTERBERG LIMITS
4 - 8	504	.13	.0014	126	.12	.0013	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>23 %</u>
8 - 16	318	.19	.0020	108	.13	.0014	<b>TEST DATA</b>
16 - 4	318	.18	.0019	66	.20	.0021	
4 - 1	1320	.05	.0005	330	.05	.0005	INITIAL VOID RATIO <u>0.863</u> C <sub>c</sub> <u>0.26</u>
1 - 1/4	4620	.01	.0001	1140	.01	.0001	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							SOIL PROPERTIES SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							TEST DATA INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 49 SAMPLE NO. _____ 11 DEPTH _____ 93.8' to 94.0' TEST NO. _____ C141.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	504	.13	.0014	174	.09	.0010	SOIL PROPERTIES SOIL DESCRIPTION: _____ Silty CLAY (CL)
1/2 - 1	504	.13	.0014	132	.11	.0012	INITIAL WATER CONTENT <u>28.6</u> %
1 - 2	348	.19	.0020	96	.16	.0017	ATTERBERG LIMITS
2 - 4	192	.32	.0034	57	.25	.0027	LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>22</u> %
4 - 1	264	.22	.0024	48	.29	.0031	TEST DATA
1 - 1/4	780	.07	.0008	168	.08	.0009	INITIAL SAMPLE HEIGHT <u>0.75</u> IN <u>1.905</u> CM.
1/4 - 1/2	288	.22	.0023	66	.22	.0023	INITIAL VOID RATIO <u>0.701</u> C <sub>c</sub> <u>0.20</u>
1/2 - 1	318	.20	.0021	84	.17	.0018	
1 - 2	264	.23	.0025	84	.17	.0018	
2 - 4	240	.25	.0027	60	.23	.0025	
4 - 8	264	.22	.0023	72	.19	.0020	
8 - 16	264	.20	.0021	60	.21	.0022	
16 - 4	156	.33	.0035	39	.30	.0032	
4 - 1	738	.07	.0008	120	.10	.0011	
1 - 1/4	2016	.03	.0003	420	.03	.0003	

CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/16 - 1/4	438	.18	.0019	174	.10	.0011
1/4 - 1/2	540	.14	.0015	138	.13	.0014
1/2 - 1	438	.18	.0019	84	.20	.0022
1 - 2	438	.17	.0018	84	.20	.0022
2 - 1	264	.27	.0029	60	.28	.0030
1 - 1/2	576	.13	.0014	156	.11	.0012
1/2 - 1/4	1272	.06	.0006	240	.07	.0008
1/4 - 1/2	240	.31	.0033	60	.29	.0031
1/2 - 1	468	.16	.0017	120	.14	.0015
1 - 2	408	.18	.0019	60	.28	.0030
2 - 4	960	.07	.0007	360	.05	.0005
4 - 8	698	.08	.0009	240	.06	.0006
8 - 16	612	.07	.0008	156	.07	.0007
16 - 4	288	.15	.0016	90	.11	.0012
4 - 1	2538	.02	.0002			
1 - 1/4	4338	.01	.0001			

BORING NO. _____ 50
SAMPLE NO. _____ 8
DEPTH _____ 38.5 - 38.9
TEST NO. _____ C86.1
<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ Silty CLAY (CH) INITIAL WATER CONTENT <u>51.6</u> % ATTERBERG LIMITS LIQUID LIMIT <u>55</u> % PLASTIC LIMIT <u>23</u> % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.383</u> C <sub>c</sub> <u>0.55</u>

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %  <u>TEST DATA</u> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 52 SAMPLE NO. _____ 4 DEPTH _____ 29.9' - 30.2' TEST NO. _____ C109.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/16 - 1/8	378	.21	.0023	150	.12	.0013	<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL-CH)</u>  INITIAL WATER CONTENT <u>40.5</u> % ATTERBERG LIMITS LIQUID LIMIT <u>49</u> % PLASTIC LIMIT <u>20</u> %  <u>TEST DATA</u> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.013</u> C <sub>c</sub> <u>0.45</u>
1/8 - 1/4	690	.11	.0012	210	.08	.0009	
1/4 - 1/2	576	.13	.0014	168	.10	.0011	
1/2 - 1	378	.20	.0021	90	.20	.0021	
1 - 2	288	.25	.0027	72	.24	.0026	
2 - 1	288	.25	.0027	51	.33	.0035	
1 - 1/4	780	.09	.0010	144	.12	.0013	
1/4 - 1/2	348	.21	.0023	114	.15	.0016	
1/2 - 1	504	.15	.0016	108	.16	.0017	
1 - 2	378	.19	.0020	60	.28	.0030	
2 - 4	648	.10	.0011	156	.10	.0011	
4 - 8	540	.11	.0012	156	.08	.0009	
8 - 16	624	.07	.0008	120	.09	.0010	
16 - 4	318	.15	.0016	84	.13	.0014	
4 - 1	1164	.05	.0005	312	.04	.0004	
1 - 1/4	3744	.02	.0002	840	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	504	.16	.0017	72	.25	.0027
1/2 - 1	438	.18	.0019	114	.16	.0017
1 - 2	288	.26	.0028	43	.40	.0043
2 - 4	240	.29	.0031	60	.27	.0029
4 - 8	264	.24	.0026	45	.33	.0035
8 - 16	240	.23	.0025	36	.35	.0038
16 - 4	138	.38	.0041	18	.68	.0073
4 - 1	654	.08	.0009	144	.09	.0010
1 - 1/4	2616	.02	.0002	600	.02	.0002

BORING NO. 53

SAMPLE NO. 5

DEPTH 39.5'-39.8'

TEST NO. C98.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, Sandy (CL)

INITIAL WATER CONTENT 30.9%

ATTERBERG LIMITS

LIQUID LIMIT 39% PLASTIC LIMIT 20%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO .872 C<sub>c</sub> 0.35

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_

SAMPLE NO. \_\_\_\_\_

DEPTH \_\_\_\_\_

TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**

SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_%

ATTERBERG LIMITS

LIQUID LIMIT \_\_\_\_\_% PLASTIC LIMIT \_\_\_\_\_%

**TEST DATA**

INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.

INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	216	.08	.0009
1/2 - 1	438	.18	.0019	216	.08	.0009
1 - 2	540	.14	.0015	132	.13	.0014
2 - 4	438	.16	.0017	114	.14	.0015
4 - 8	408	.16	.0017	84	.18	.0019
8 - 16	348	.18	.0019	84	.17	.0018
16 - 4	348	.17	.0018	27		
4 - 1	1008	.06	.0006	144	.10	.0011
1 - 1/4	2304	.03	.0003	540	.03	.0003

BORING NO. 54  
SAMPLE NO. 6  
DEPTH 63.5' - 63.8'  
TEST NO. C399.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 26.0 %  
ATTERBERG LIMITS  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.696 C<sub>c</sub> 0.24

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	156	.12	.0013
1/2 - 1	540	.14	.0015	102	.18	.0019
1 - 2	408	.19	.0020	96	.18	.0019
2 - 4	348	.20	.0022	108	.15	.0016
4 - 8	438	.14	.0015	120	.12	.0013
8 - 16	318	.17	.0018	96	.13	.0014
16 - 4	216	.23	.0025	45	.26	.0028
4 - 1	576	.09	.0010	240	.06	.0006
1 - 1/4	2160	.03	.0003	570	.03	.0003

BORING NO. 54  
 SAMPLE NO. 8  
 DEPTH 73.7' - 74.0'  
 TEST NO. C401.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 INITIAL WATER CONTENT 38.3 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.982 C<sub>c</sub> 0.41

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	348	.23	.0025	114	.16	.0017	SAMPLE NO. <u>2</u>
1/2 - 1	654	.12	.0013	216	.08	.0009	DEPTH <u>9.8' to 10.0'</u>
1 - 1/4	1560	.05	.0005	330	.06	.0006	TEST NO. <u>C42.1</u>
1/4 - 1/2	318	.24	.0026	180	.10	.0011	<b>SOIL PROPERTIES</b>
1/2 - 1	774	.10	.0011	270	.07	.0007	SOIL DESCRIPTION: _____
1 - 2	468	.16	.0017	180	.09	.0010	<u>Silty CLAY (CL-CH)</u>
2 - 4	576	.12	.0013	168	.10	.0011	INITIAL WATER CONTENT <u>30.0%</u>
4 - 8	540	.12	.0013	156	.10	.0011	ATTERBERG LIMITS
8 - 16	318	.20	.0021	132	.11	.0012	LIQUID LIMIT <u>53%</u> PLASTIC LIMIT <u>26%</u>
24 - 6	318	.18	.0019	72	.19	.0020	<b>TEST DATA</b>
6 - 2	1218	.05	.0005	420	.04	.0004	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
2 - 1/2	3378	.02	.0002	960	.02	.0002	INITIAL VOID RATIO <u>0.787</u> C <sub>c</sub> <u>0.23</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	240	.33	.0035	90	.20	.0022	SAMPLE NO. <u>16</u>
1/2 - 1	240	.33	.0035	78	.23	.0025	DEPTH <u>85.2' to 85.4'</u>
1 - 2	192	.39	.0042	54	.33	.0035	TEST NO. <u>C56.1</u>
2 - 4	264	.28	.0030	72	.23	.0025	<b>SOIL PROPERTIES</b>
4 - 8	264	.26	.0028	84	.19	.0020	SOIL DESCRIPTION: _____
8 - 16	348	.18	.0019	84	.17	.0018	<u>Silty CLAY (CL)</u>
16 - 4	156	.37	.0040	51	.26	.0028	INITIAL WATER CONTENT <u>27.9%</u>
4 - 1	864	.07	.0008	210	.07	.0007	ATTERBERG LIMITS
1 - 1/4	2400	.03	.0003	450	.04	.0004	LIQUID LIMIT <u>40%</u> PLASTIC LIMIT <u>19%</u>
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
							INITIAL VOID RATIO <u>0.744</u> C <sub>c</sub> <u>0.27</u>

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							INITIAL WATER CONTENT _____ %			
							ATTERBERG LIMITS			
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.			
							INITIAL VOID RATIO _____ C <sub>c</sub> _____			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	408	.20	.0021	138	.14	.0014	105	8	70.9 - 71.2	C380.1
1/2 - 1	318	.24	.0026	96	.19	.0020				
1 - 2	318	.24	.0026	102	.17	.0018				
2 - 4	408	.18	.0019	90	.19	.0020				
4 - 8	438	.16	.0017	114	.14	.0015				
8 - 16	318	.20	.0021	96	.15	.0016				
16 - 4	318	.20	.0021	72	.20	.0021				
4 - 1	774	.08	.0008	180	.09	.0009				
1 - 1/4	2454	.03	.0003	480	.03	.0003				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							Silty CLAY (CL)			
							INITIAL WATER CONTENT <u>23.7</u> %			
							ATTERBERG LIMITS			
							LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>19</u> %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.			
							INITIAL VOID RATIO <u>0.625</u> C <sub>c</sub> <u>0.21</u>			
							<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>			
							THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118 SAMPLE NO. _____ 5 DEPTH _____ 38.9' - 39.3' TEST NO. _____ C256.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	156	.13	.0013	<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ Silty CLAY (CL) INITIAL WATER CONTENT <u>36.9</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>0.969</u> C <sub>c</sub> <u>0.39</u>
1/2 - 1	378	.21	.0022	108	.17	.0018	
1 - 2	264	.28	.0030	84	.21	.0022	
2 - 1/2	264	.28	.0030	72	.24	.0026	
1/2 - 1/4	468	.16	.0017	132	.13	.0014	
1/4 - 1/2	240	.31	.0034	78	.22	.0024	
1/2 - 1	318	.24	.0025	72	.24	.0026	
1 - 2	174	.42	.0045	45	.38	.0041	
2 - 4	576	.12	.0013	192	.09	.0009	
4 - 8	654	.10	.0010	138	.11	.0011	
8 - 16	378	.14	.0014	102	.12	.0013	
16 - 4	102	.51	.0053	42	.28	.0030	
4 - 1	816	.07	.0007	240	.05	.0005	
1 - 1/4	2856	.02	.0002	780	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							INITIAL WATER CONTENT _____ %			
							ATTERBERG LIMITS			
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.			
							INITIAL VOID RATIO _____ C <sub>c</sub> _____			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	540	.15	.0016	186	.11	.0011	118	9	78.7' - 79.0'	C260.1
1/2 - 1	540	.15	.0016	138	.13	.0014				
1 - 2	378	.20	.0022	114	.16	.0017				
2 - 4	348	.21	.0023	96	.18	.0019				
4 - 1	318	.22	.0025	72	.23	.0025				
1 - 1/4	1008	.08	.0008	288	.06	.0006				
1/4 - 1/2	240	.31	.0034	78	.22	.0024				
1/2 - 1	288	.26	.0028	84	.21	.0022				
1 - 2	408	.19	.0020	108	.16	.0017				
2 - 4	264	.28	.0030	66	.25	.0027				
4 - 8	264	.26	.0028	90	.18	.0019				
8 - 16	348	.20	.0022	96	.17	.0017				
16 - 4	216	.28	.0031	48	.30	.0032				
4 - 1	738	.09	.0009	228	.07	.0007				
1 - 1/4	3198	.02	.0002	630	.03	.0003				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							Silty CLAY (CL)			
							INITIAL WATER CONTENT <u>27.8%</u>			
							ATTERBERG LIMITS			
							LIQUID LIMIT <u>42%</u> PLASTIC LIMIT <u>23%</u>			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT <u>0.80 IN 2.03 CM.</u>			
							INITIAL VOID RATIO <u>0.741</u> C <sub>c</sub> <u>0.24</u>			
<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>										
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II										

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							BORING NO. _____ 129 SAMPLE NO. _____ 9 DEPTH _____ 39.1' - 39.3' TEST NO. _____ C389 <b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL)</u> INITIAL WATER CONTENT <u>40.2</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.083</u> C <sub>c</sub> <u>0.39</u>
1/4 - 1/2	540	.14	.0015	180	.11	.0011	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
1/2 - 1	468	.16	.0017	156	.12	.0012	
1 - 2	780	.10	.0010	216	.08	.0008	
2 - 1/2	438	.16	.0017	96	.17	.0018	
1/2 - 1/4	1110	.07	.0007	270	.07	.0007	
1/4 - 1/2	540	.13	.0014	144	.12	.0012	
1/2 - 1	318	.22	.0024	102	.16	.0017	
1 - 2	264	.26	.0028	78	.20	.0022	
2 - 4	738	.09	.0009	186	.08	.0008	
4 - 8	738	.08	.0008	168	.08	.0008	
8 - 16	540	.10	.0010	132	.09	.0009	
16 - 4	288	.17	.0018	72	.15	.0016	
4 - 1	1056	.05	.0005	264	.05	.0005	
1 - 1/4	2779	.02	.0002	840	.01	.0001	

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	348	.22	.0024	108	.17	.0018
1/2 - 1	378	.20	.0022	120	.15	.0016
1 - 2	318	.23	.0026	96	.19	.0020
2 - 4	438	.17	.0018	96	.18	.0019
4 - 1	288	.24	.0027	51	.32	.0035
1 - 1/4	540	.14	.0015	192	.09	.0009
1/4 - 1/2	288	.26	.0028	78	.22	.0024
1/2 - 1	432	.17	.0018	96	.22	.0024
1 - 2	240	.30	.0033	72	.23	.0025
2 - 4	240	.29	.0032	60	.28	.0030
4 - 8	438	.16	.0016	90	.18	.0019
8 - 16	288	.21	.0023	78	.19	.0020
16 - 4	120	.48	.0053	30	.47	.0050
4 - 1	780	.09	.0009	186	.08	.0008
1 - 1/4	2265	.02	.0002	480	.03	.0003

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7 - 104.0  
 TEST NO. C395.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY, Sandy (CL)  
 INITIAL WATER CONTENT 28.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.730 C<sub>c</sub> .23

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	135		.0052	72		.0023
1/2 - 1	317		.0022	102		.0016
1 - 2	1009		.0007	348		.0005
2 - 4	913		.0007	270		.0006
4 - 8	738		.0008	216		.0007
8 - 16	778		.0007	180		.0007
16 - 4	346		.0016	66		.0020
4 - 1	960		.0006	330		.0004
1 - 1/4	4338		.0001	1440		.0001

BORING NO. 136  
SAMPLE NO. ST6  
DEPTH 13.0' to 16.0'  
TEST NO. C527.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 17.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 3.28 IN 8.33 CM.  
INITIAL VOID RATIO (0.675) C<sub>c</sub> 0.15

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4-1/2	378	.21	.0022	84	.21	.0023
1/2-1	504	.15	.0016	114	.17	.0017
1 - 2	576	.14	.0014	150	.12	.0012
2 - 1	812	.09	.0009	180	.10	.0010
1 - 1/4	72	1.0	.0105	36	.50	.0050
1/4-1/2	288	.25	.0027	108	.17	.0017
1/2-1	345	.21	.0022	108	.17	.0017
1 - 2	318	.23	.0024	102	.17	.0017
2 - 4	696	.10	.0010	186	.09	.0009
4 - 8	378	.17	.0017	108	.13	.0013
8 - 16	290	.19	.0020	72	.17	.0017

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' to 20.5'  
 TEST NO. C535.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 \_\_\_\_\_  
 INITIAL WATER CONTENT 38.2%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45% PLASTIC LIMIT 22%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 1.019 C<sub>c</sub> 0.41

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/2 - 1	540	.12	.0013	228	.07	.0007
1 - 2	1440	.05	.0005	408	.04	.0004
2 - 4	1272	.05	.0005	306	.05	.0005
4 - 8	612	.09	.0010	216	.07	.0007
8 - 16	540	.10	.0011	150	.08	.0009
16 - 4	438	.12	.0013	96	.13	.0014
4 - 1	1752	.03	.0003	450	.03	.0003
1 - 1/4				1560	.01	.0001

BORING NO. 146  
SAMPLE NO. 7  
DEPTH 14.0' to 16.0'  
TEST NO. C542.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 15.9 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.679 C<sub>c</sub> 0.14

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.
1/4-1/2	194	.43	.0045	72	.26	.0028
1/2- 1	317	.25	.0027	96	.20	.0021
1 - 2	378	.21	.0022	96	.19	.0020
2 - 4	345	.23	.0024	72	.24	.0026
4 - 8	378	.19	.0020	84	.21	.0022
8-16	324	.20	.0021	108	.16	.0016

BORING NO. 185  
 SAMPLE NO. 3  
 DEPTH 7.9' to 8.1'  
 TEST NO. C552.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL-CH)

INITIAL WATER CONTENT 29.1%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 50% PLASTIC LIMIT 23%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.757 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_

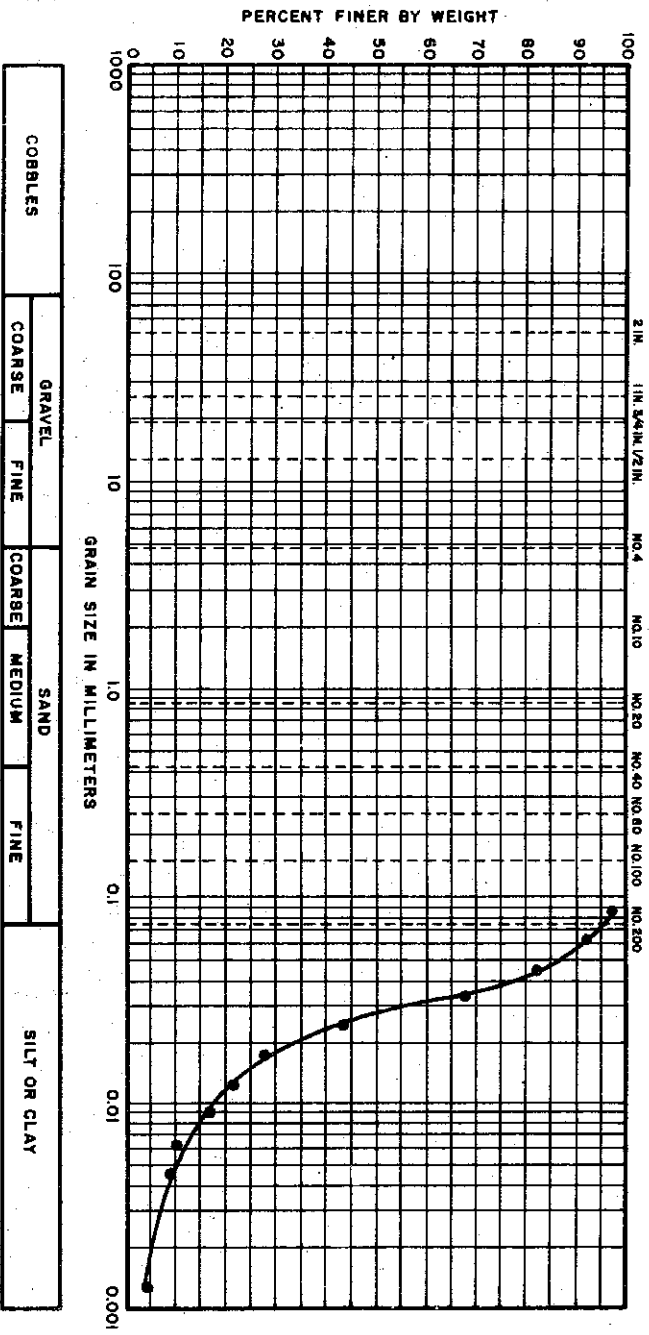
INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

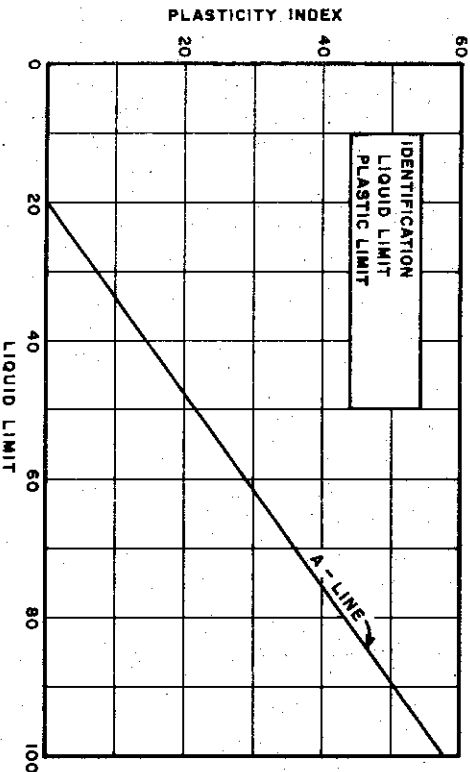
**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)

EXPLORATION: BORING 7

SAMPLE : SS28

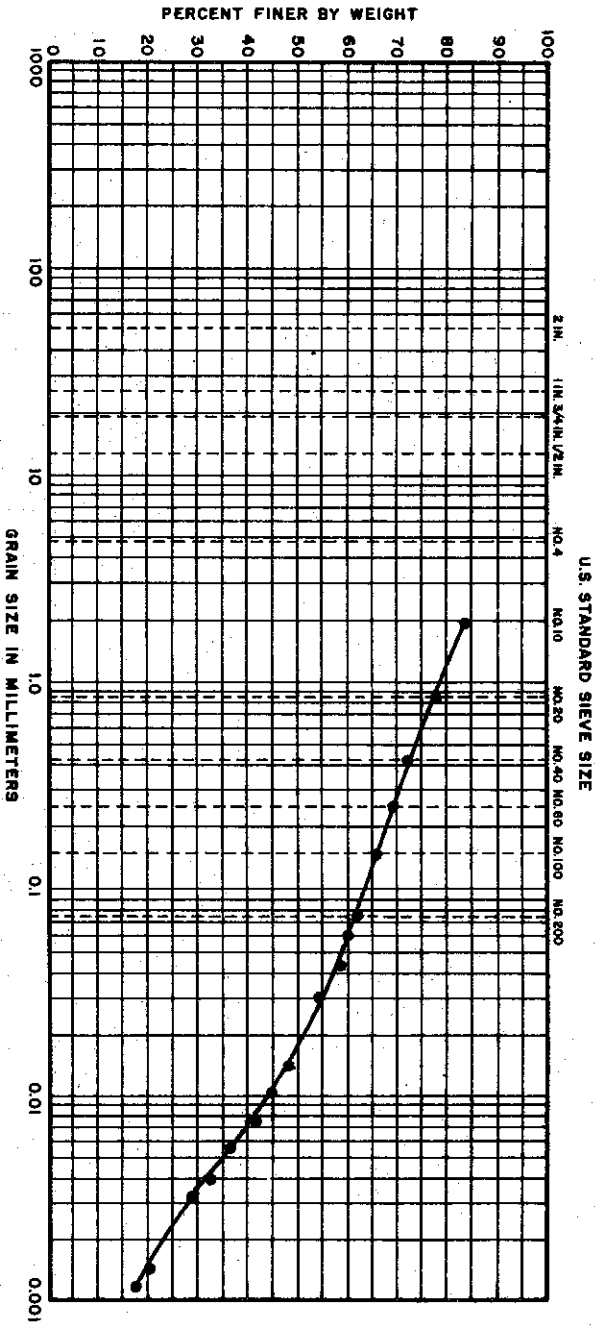
DEPTH : 129.6' TO 131.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

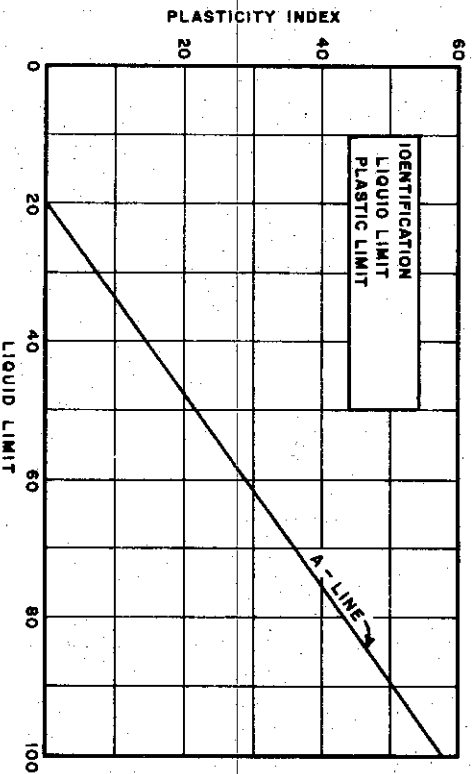
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 7  
 SAMPLE : S630  
 DEPTH : 136.8' TO 140.3'  
 SPECIFIC GRAVITY : USED 2.70

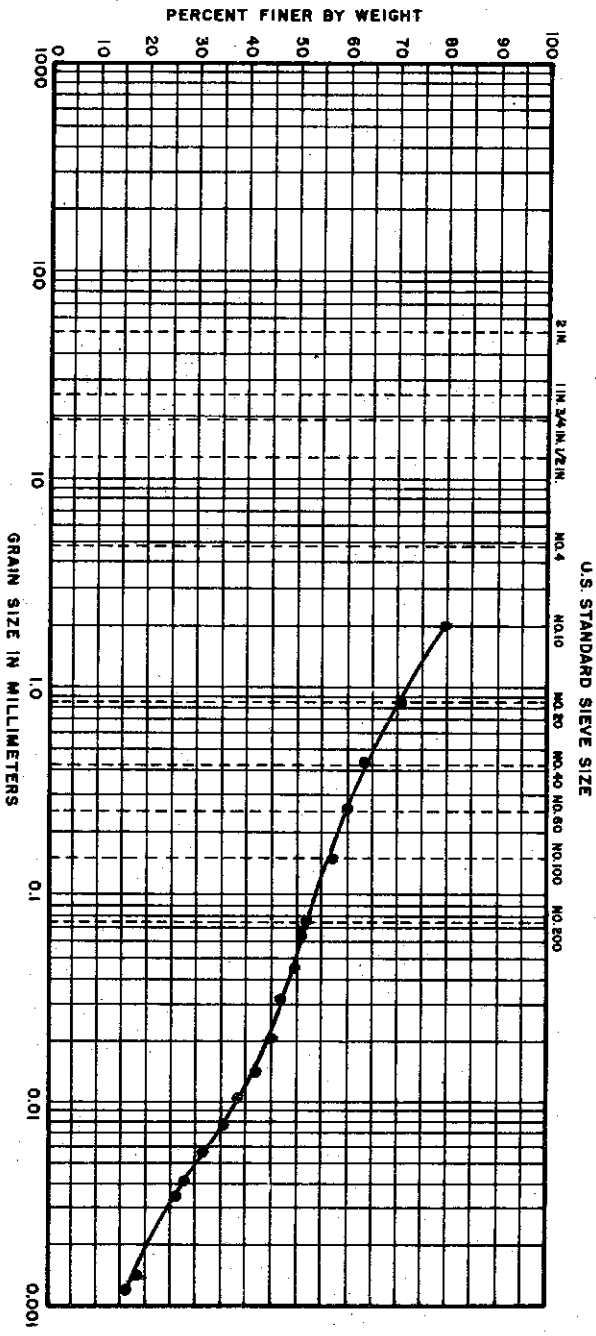
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-598

FILE NO. 1255

DATE JAN. 74

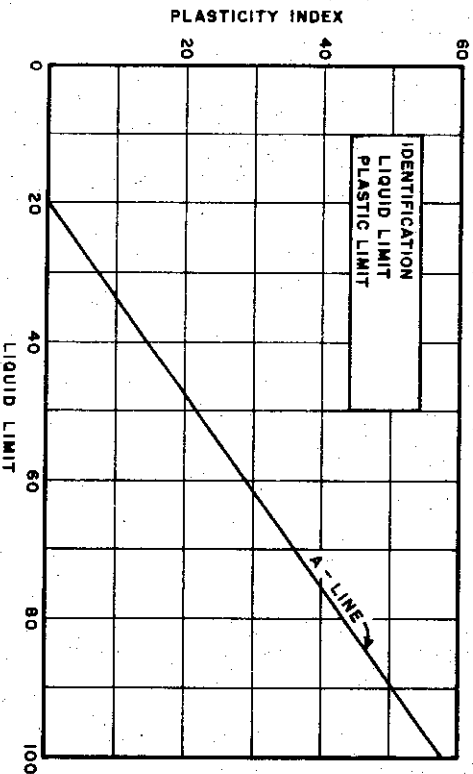
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)

EXPLORATION: BORING 10

SAMPLE : SS30

DEPTH : 141'

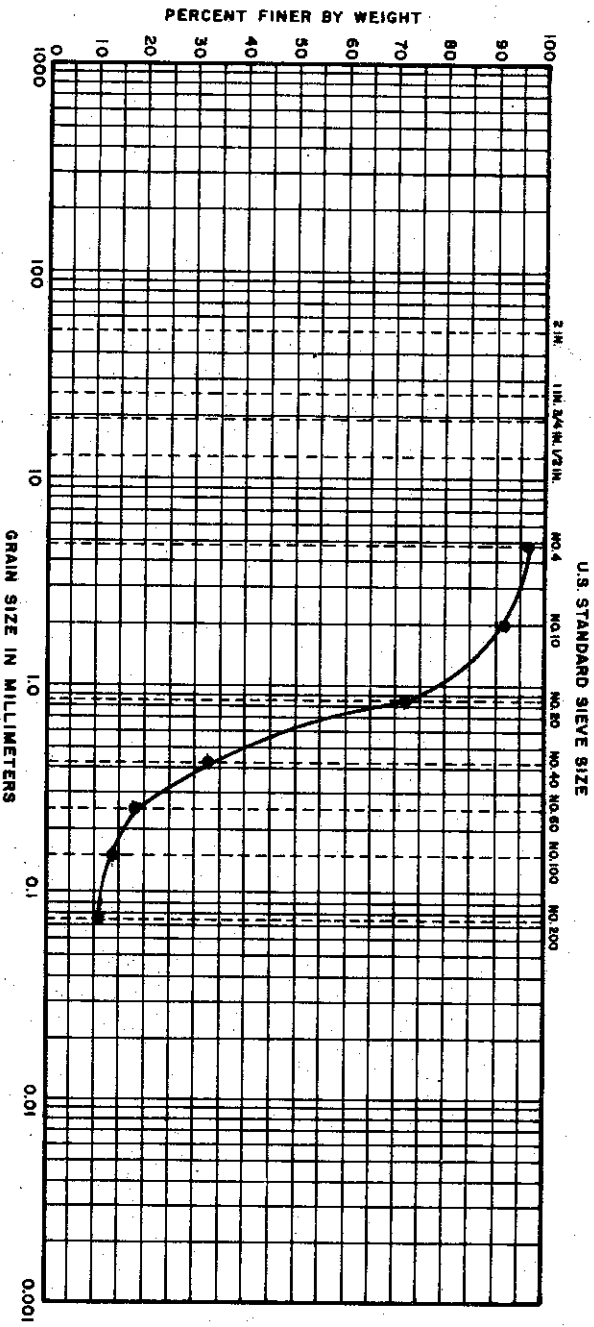
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74



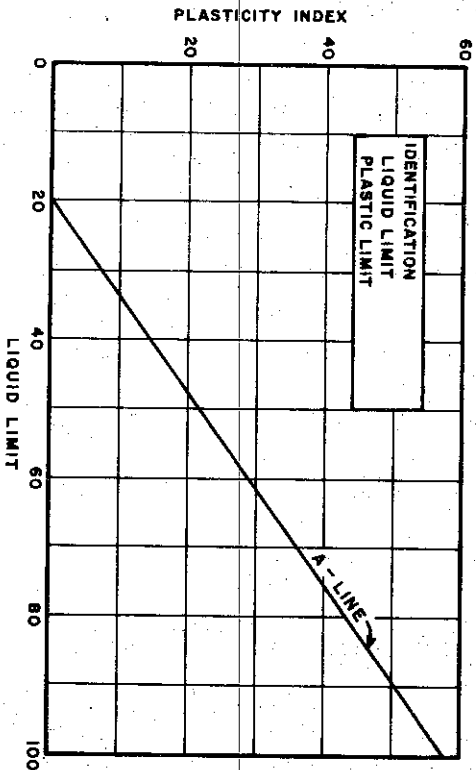
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY SAND (SM-SW)  
 EXPLORATION: BORING 18  
 SAMPLE : 11  
 DEPTH : 103.5' TO 105.0'  
 SPECIFIC GRAVITY: USED 2.70

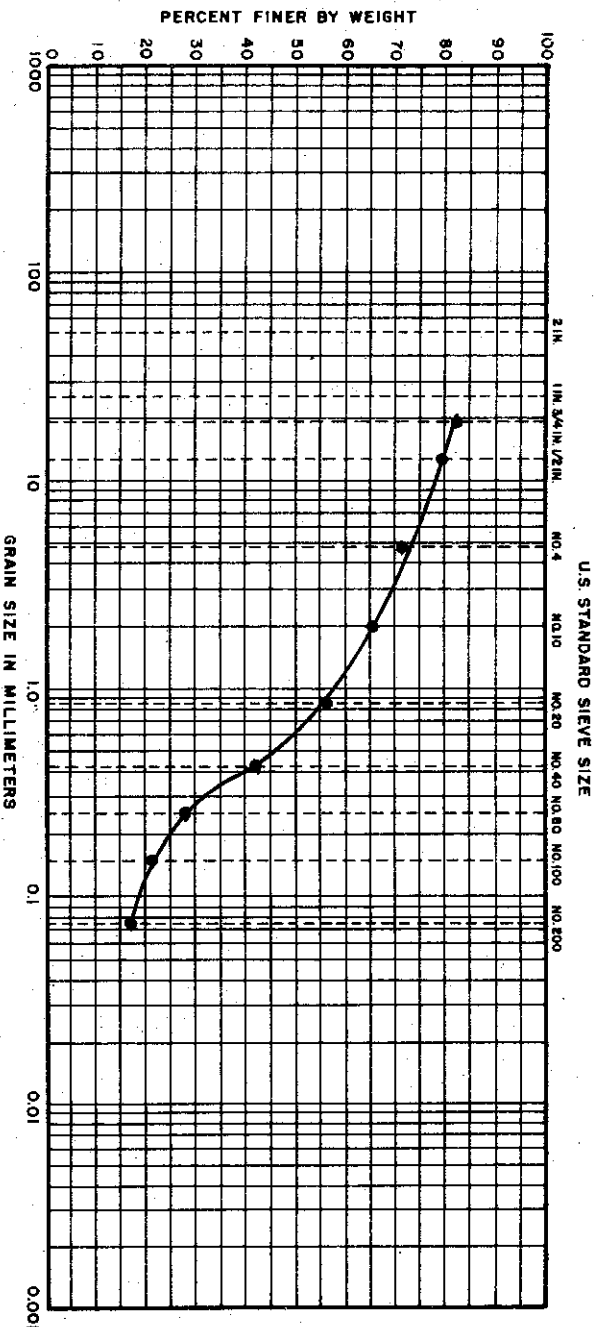
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-600

FILE NO. 1255

DATE JULY 1974

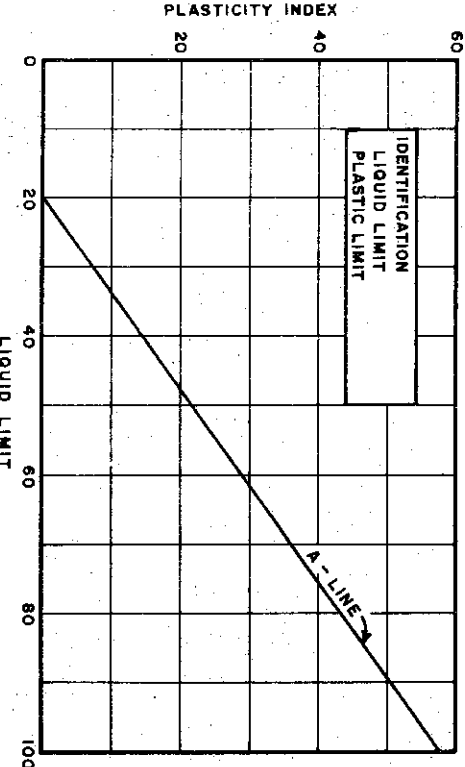
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

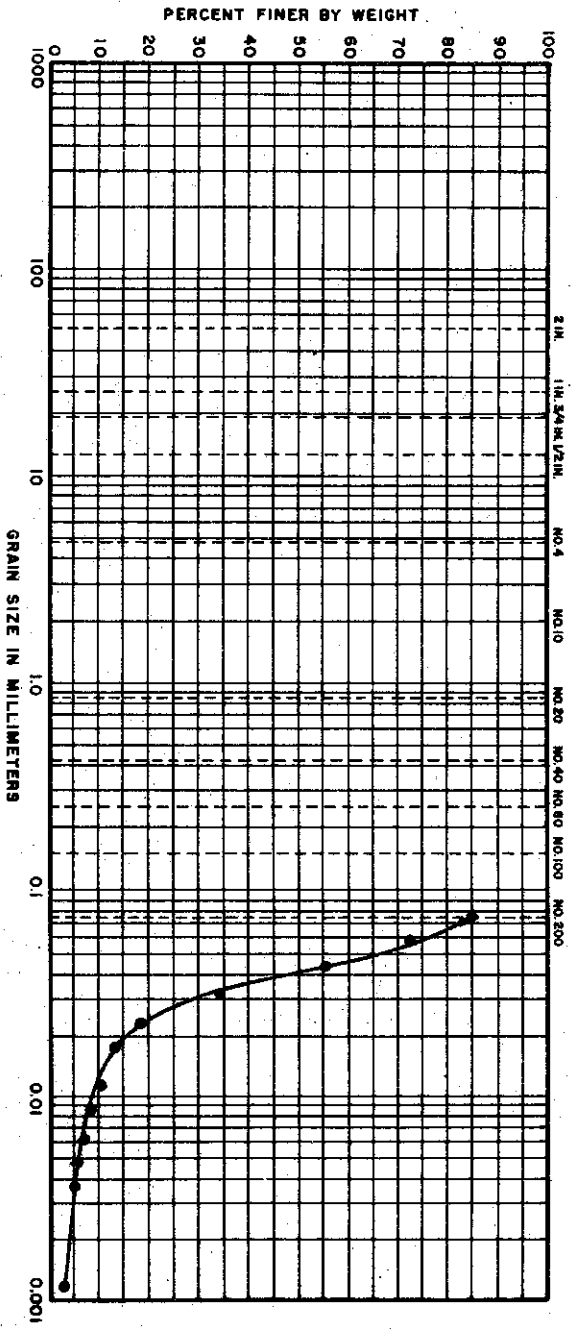
IDENTIFICATION: SILTY SAND, GRAVELLY (SM)  
 EXPLORATION: BORING 18  
 SAMPLE: 16  
 DEPTH: 139.6' TO 141.0'  
 SPECIFIC GRAVITY: USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

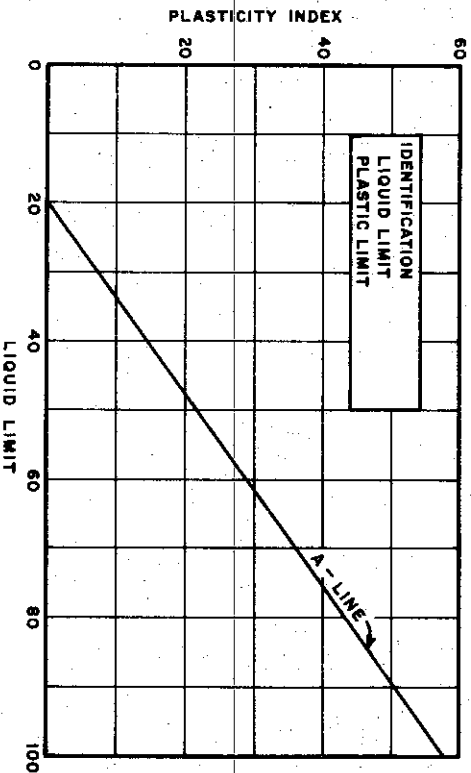
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

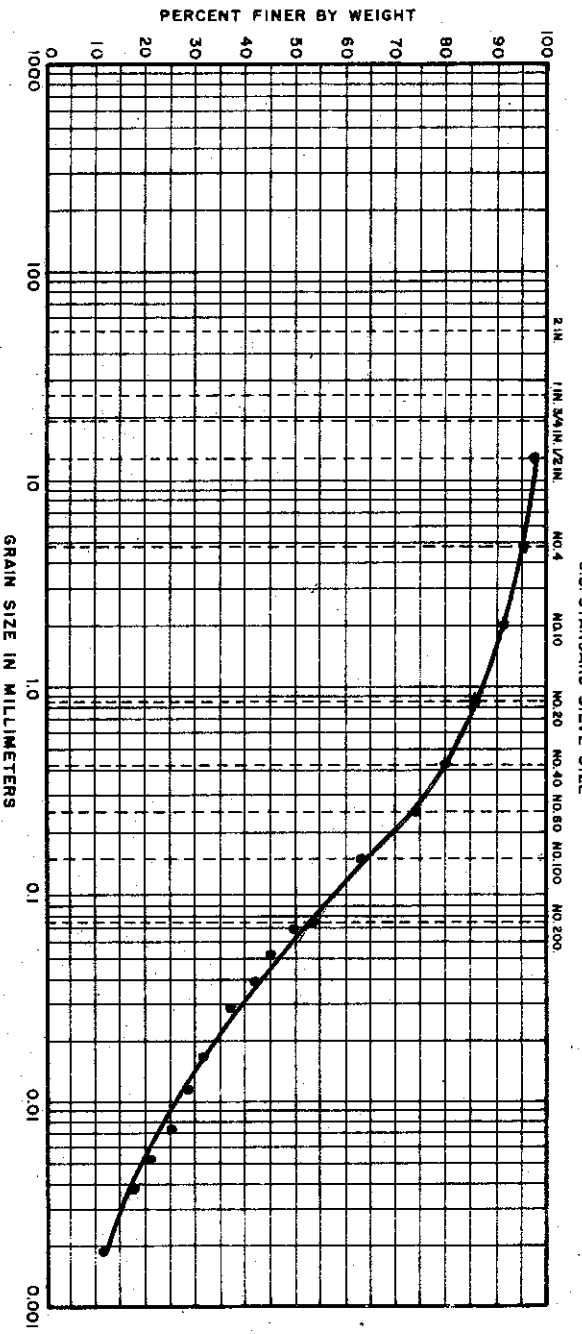
IDENTIFICATION : CLAYEY SILT (CL-ML)  
 EXPLORATION: BORING 22  
 SAMPLE : SS29  
 DEPTH : 133.5' TO 135.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-602

FILE NO. 1255 DATE JAN. 74

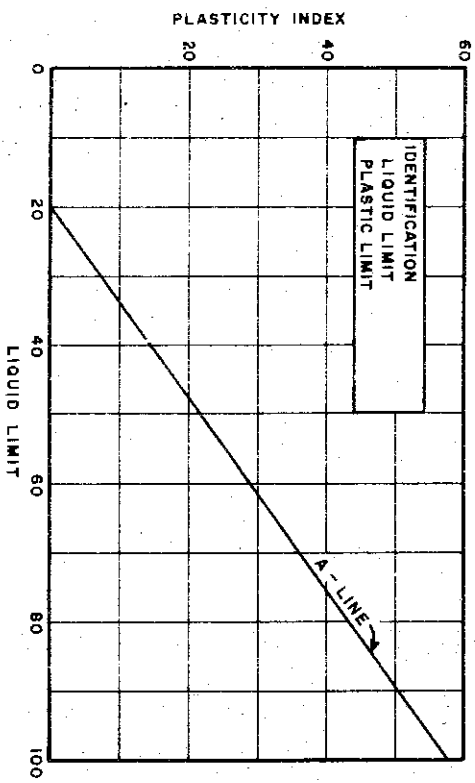
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



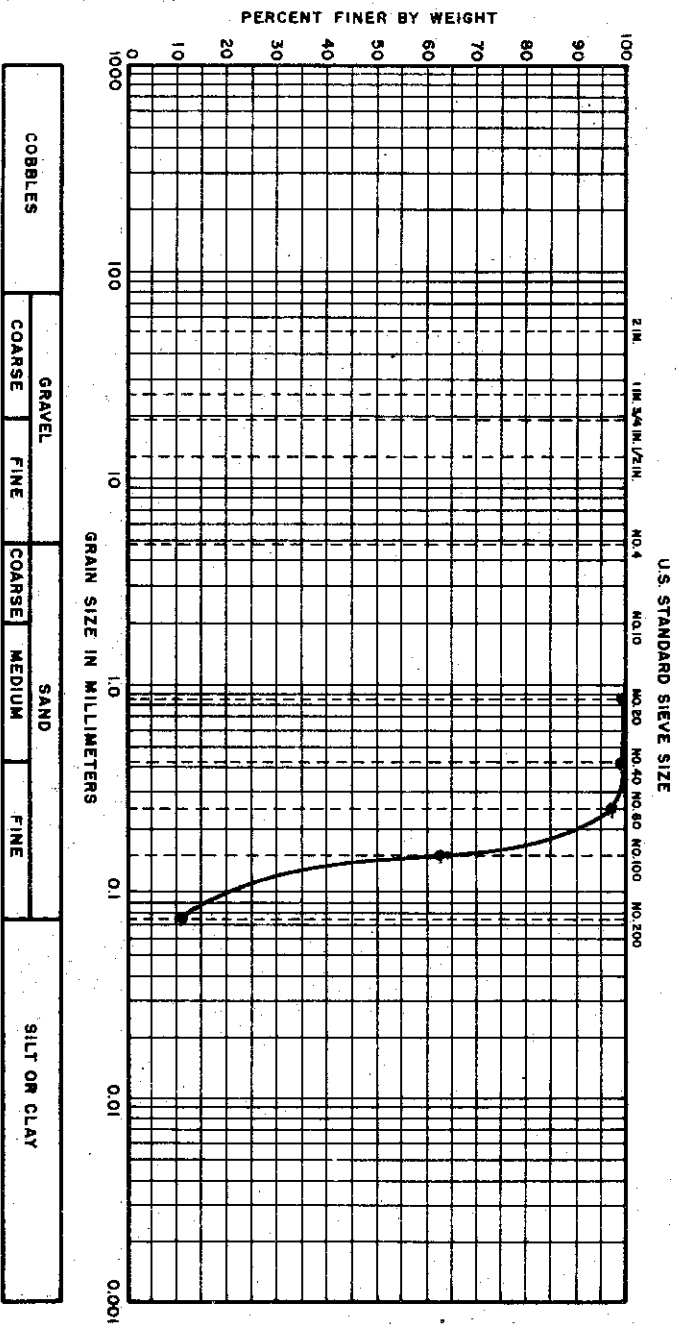
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)  
 EXPLORATION: BORING 27  
 SAMPLE : SS17  
 DEPTH : 68.5' TO 70.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

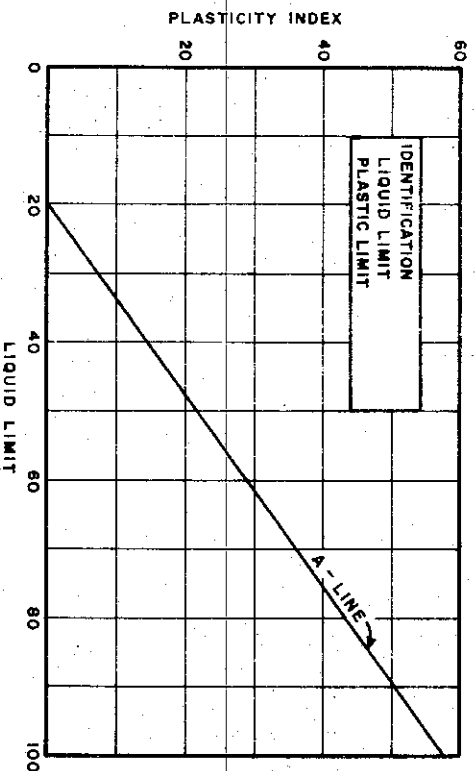
FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART

(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY FINE SAND (SM-SP)  
 EXPLORATION: BORING 27  
 SAMPLE: 26  
 DEPTH: 113.6' TO 114.4'  
 SPECIFIC GRAVITY: USED 2.70

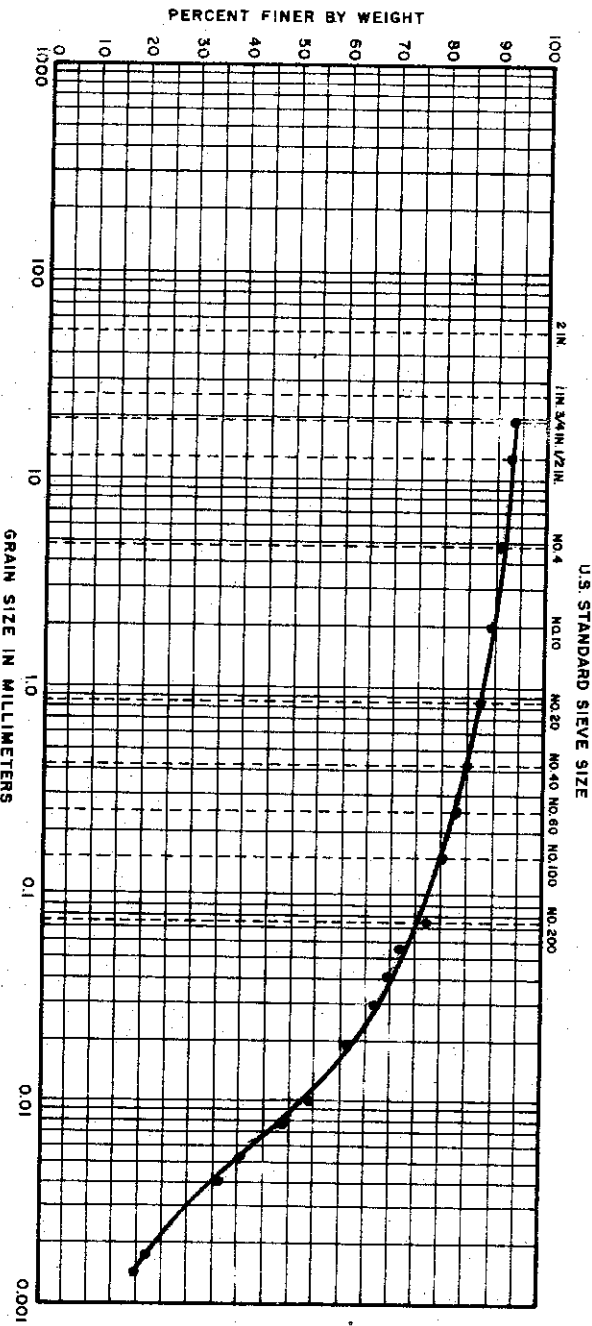
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-604

FILE NO. 1255

DATE JULY 1974

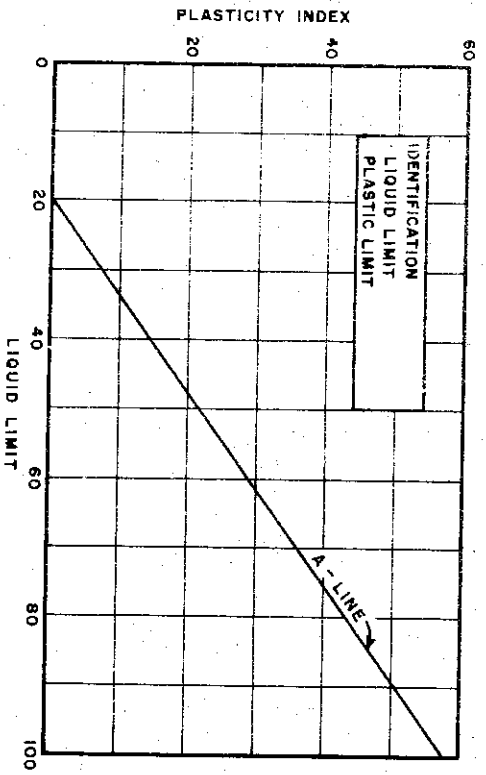
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

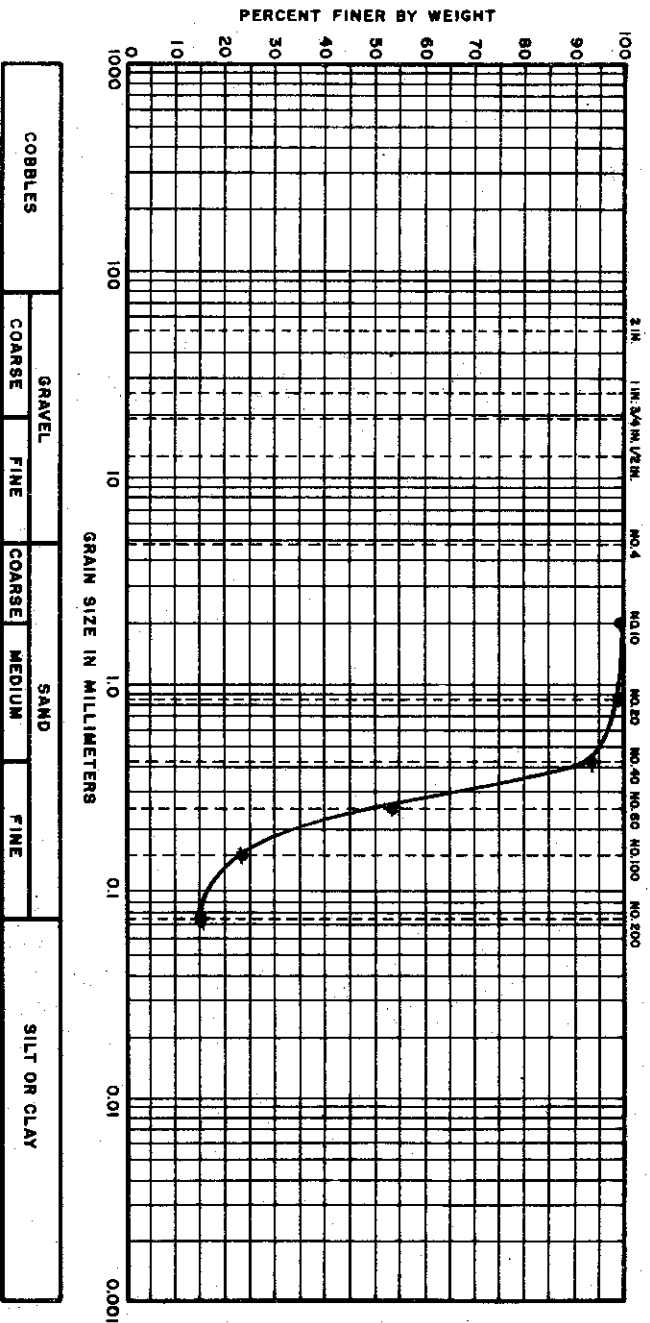
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 30  
 SAMPLE: SS15  
 DEPTH: 68.5' TO 70.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

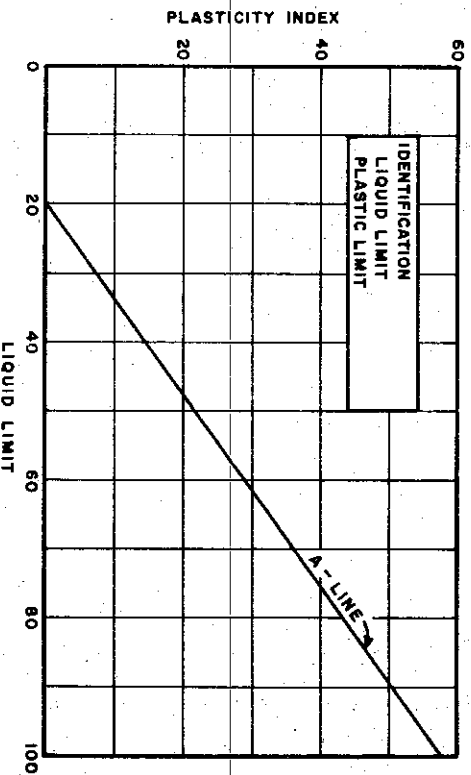
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 21  
 DEPTH : 98.5' TO 100.0'  
 SPECIFIC GRAVITY: USED 2.70

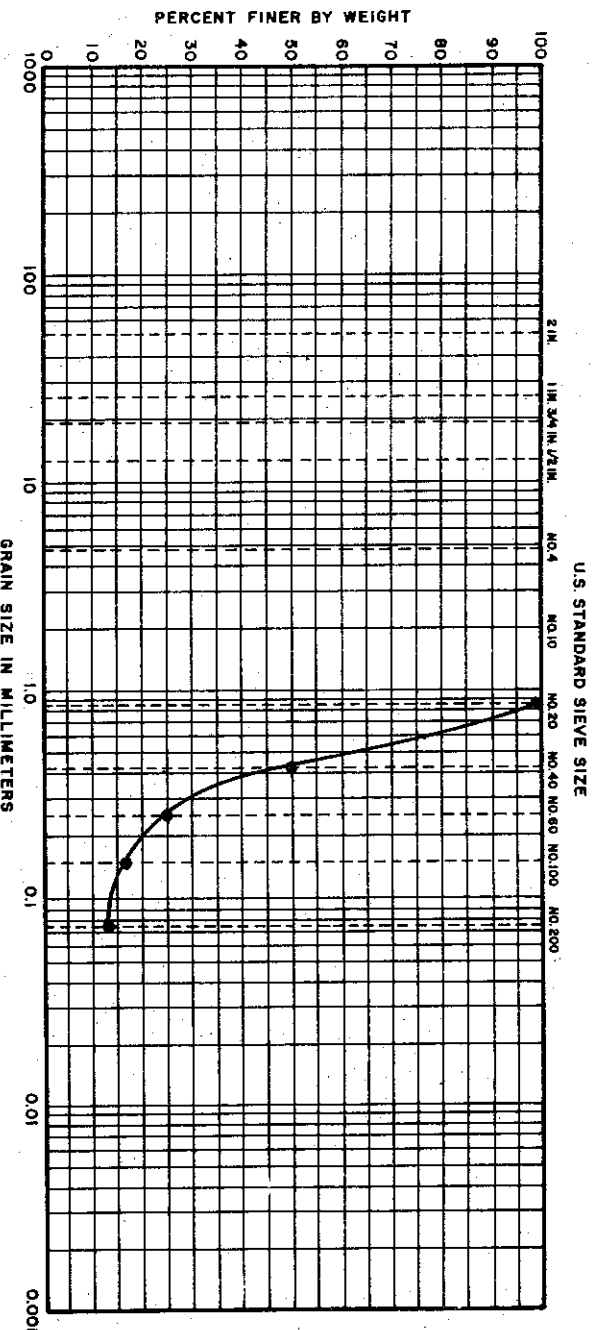
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-606

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974

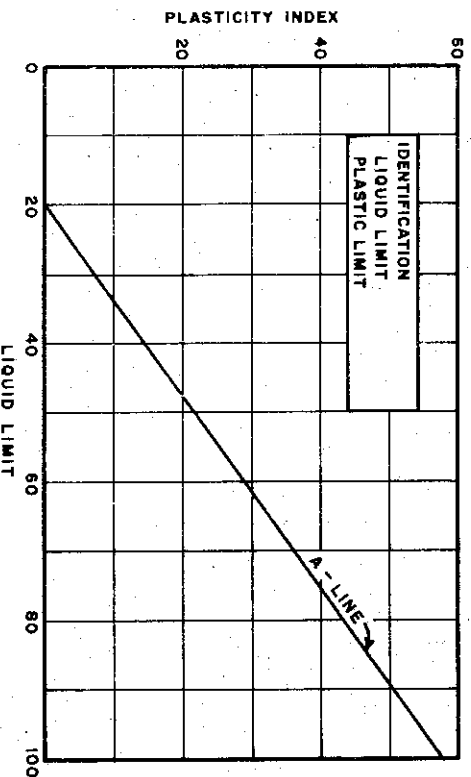
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 25  
 DEPTH : 118.5' TO 120.0'  
 SPECIFIC GRAVITY: USED 2.70

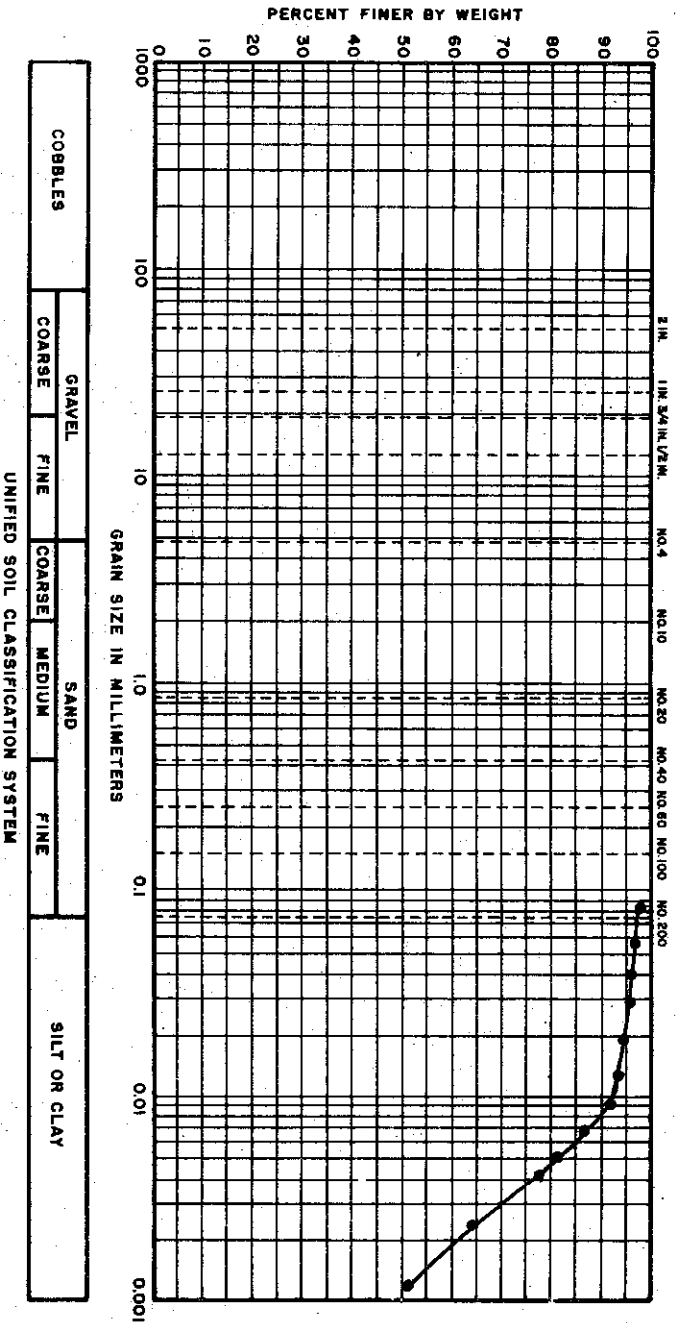
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

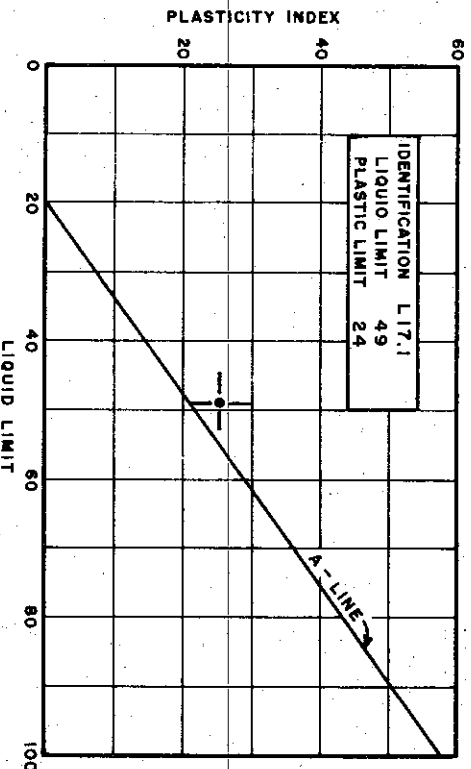


### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

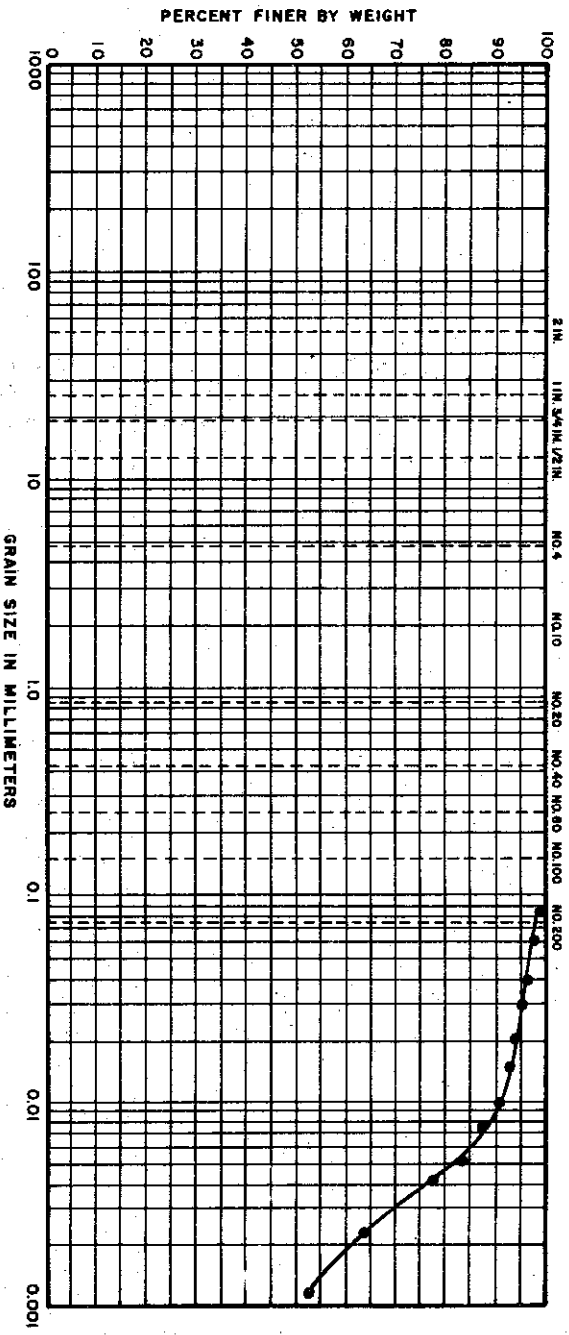
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 38  
 SAMPLE : 5  
 DEPTH : 8.7' TO 9.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-608

### GRAIN SIZE DISTRIBUTION

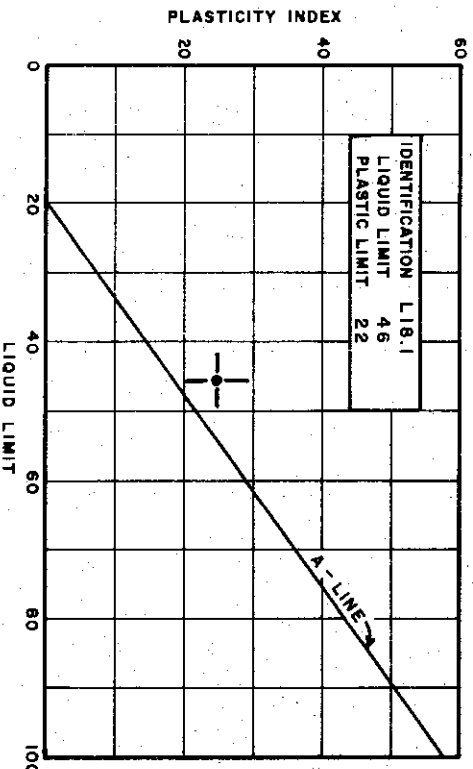
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)

EXPLORATION: BORING 3B

SAMPLE : 4

DEPTH : 14.3' TO 14.6'

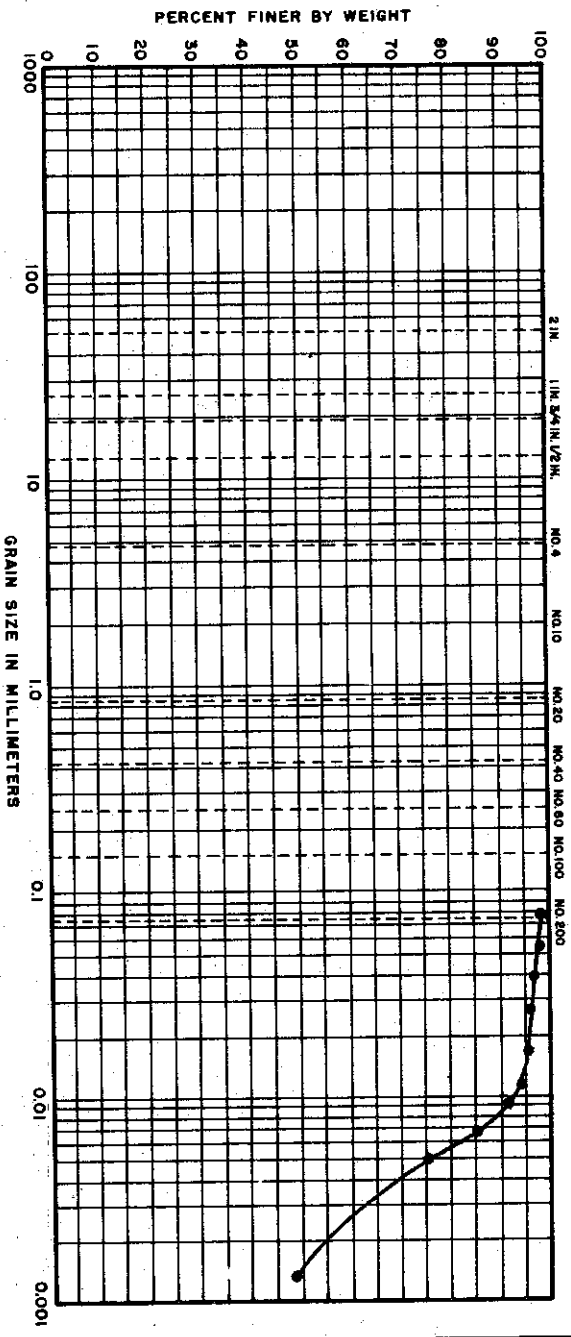
SPECIFIC GRAVITY = 2.71

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

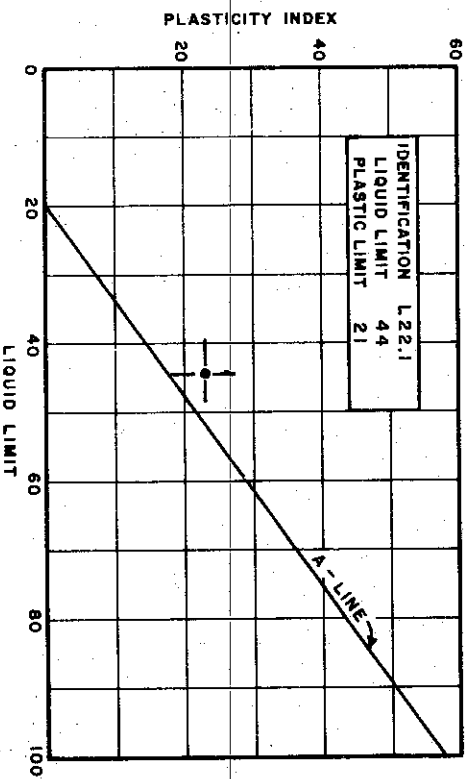
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE: 12  
 DEPTH: 54.1' TO 54.5'  
 SPECIFIC GRAVITY: USED 2.70

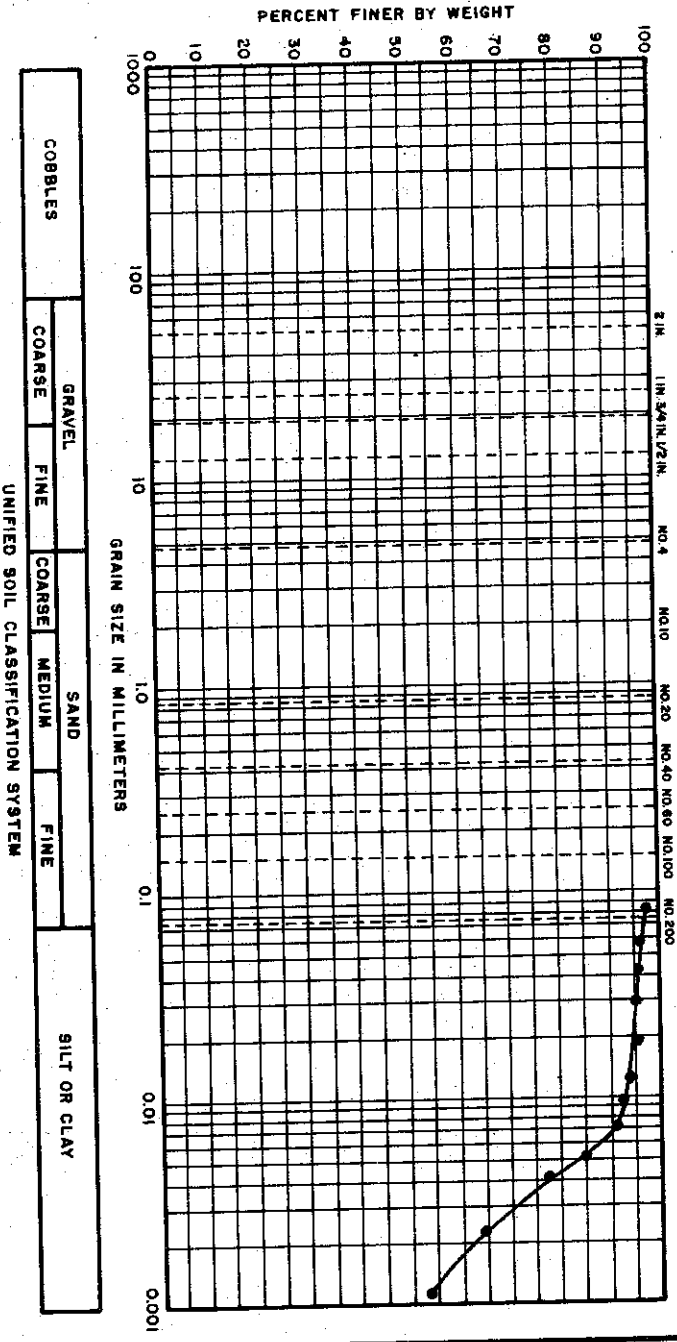
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-610

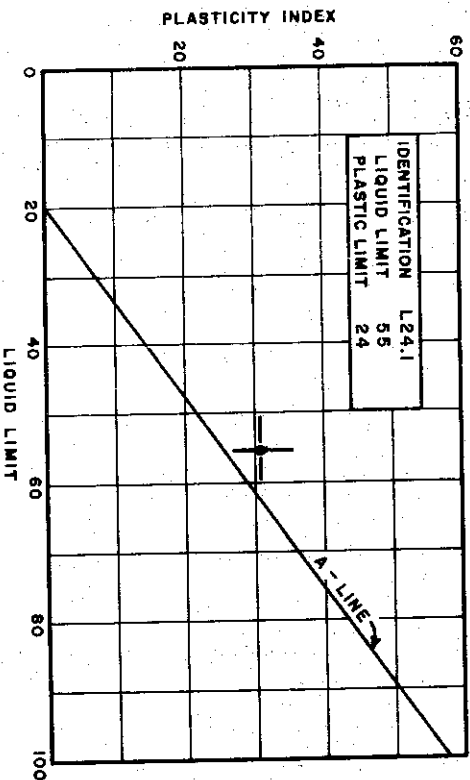
FILE NO. 1255 DATE JAN 74

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

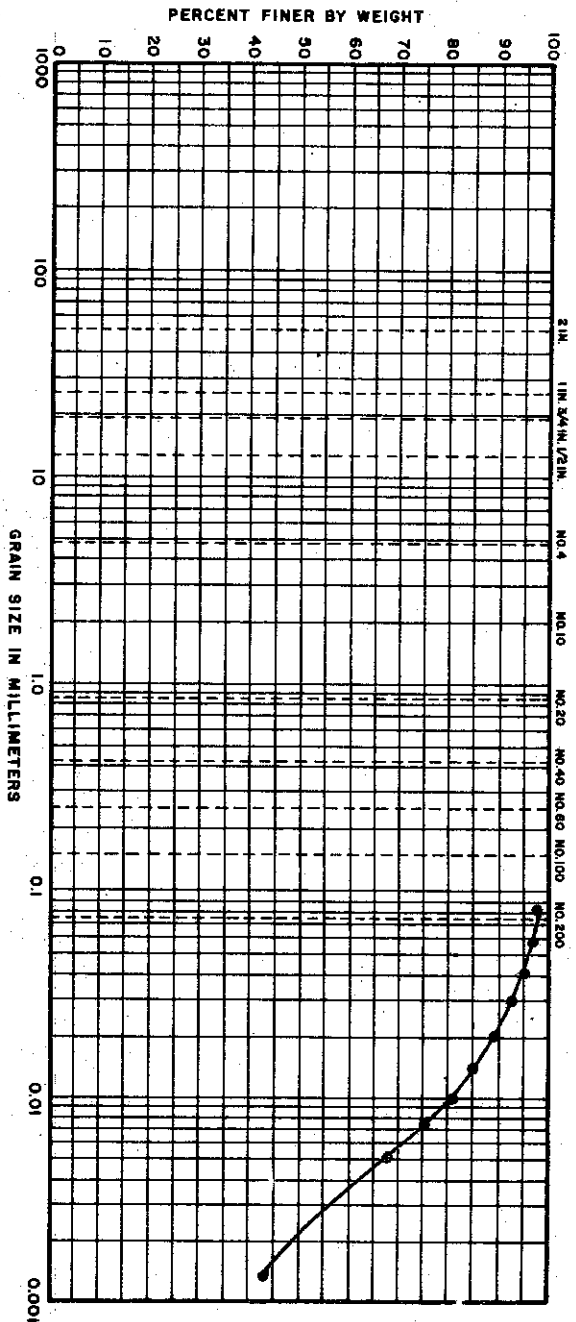
IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 38  
 SAMPLE : 16  
 DEPTH : 74.0' TO 74.1'  
 SPECIFIC GRAVITY = 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

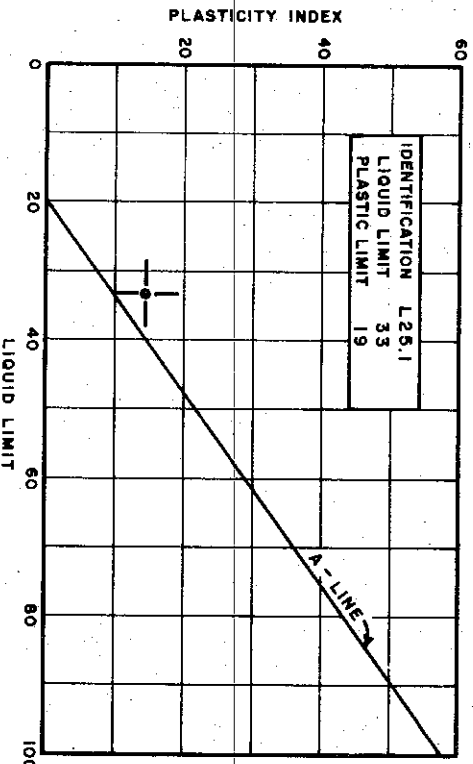
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART  
(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 3B  
 SAMPLE: 18  
 DEPTH: 84.6' TO 84.9'

SPECIFIC GRAVITY: USED 2.70

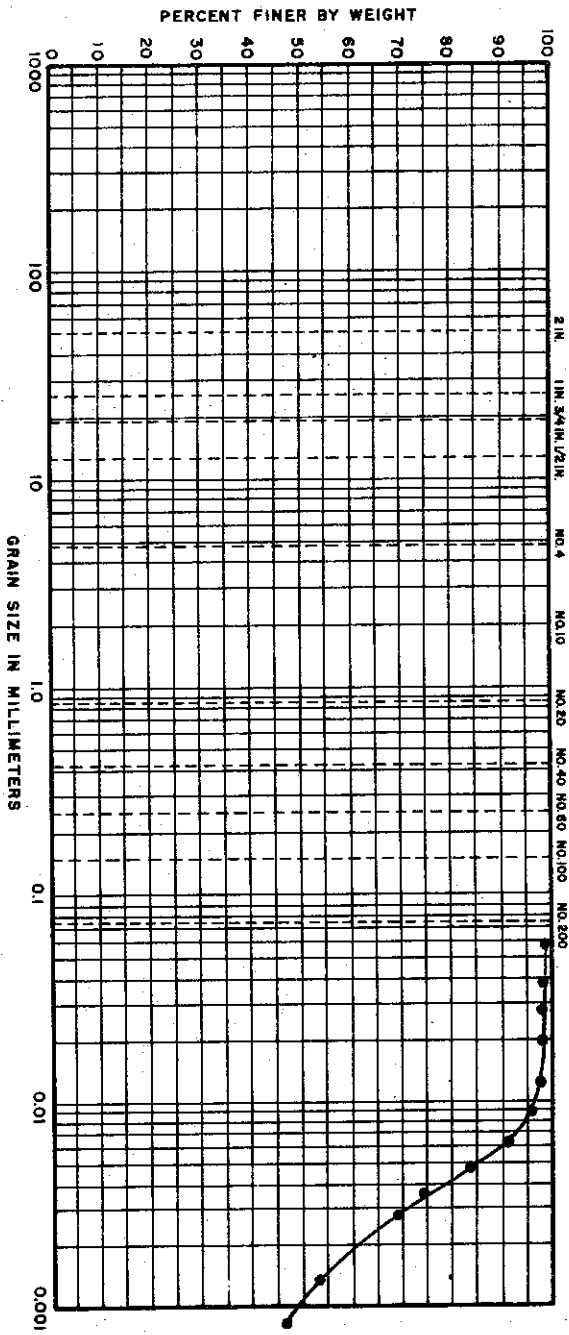
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-612

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

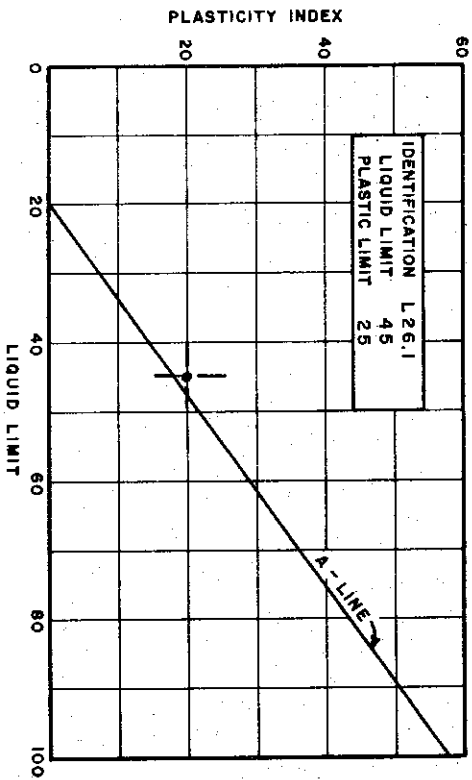
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



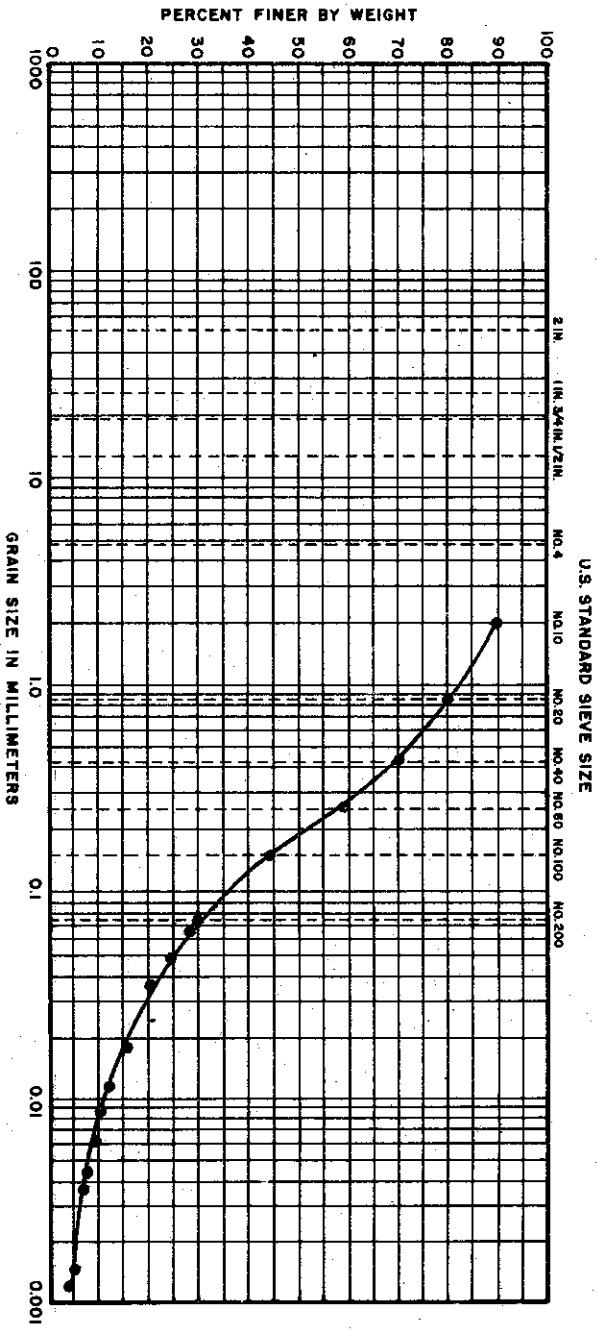
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE : 24  
 DEPTH : 114.2' TO 114.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

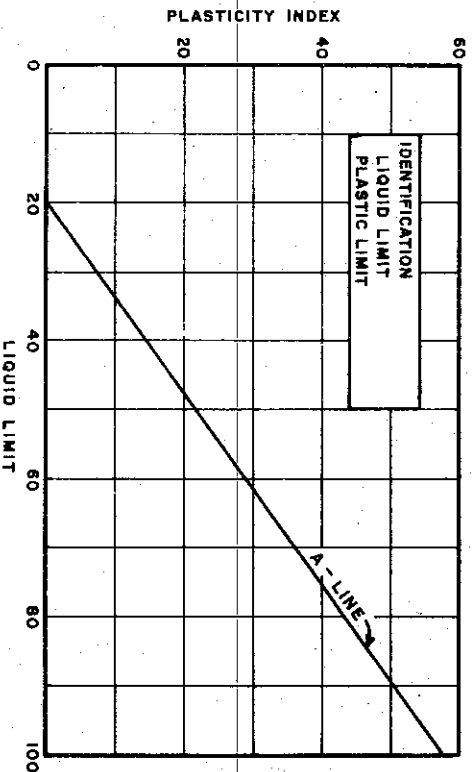
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

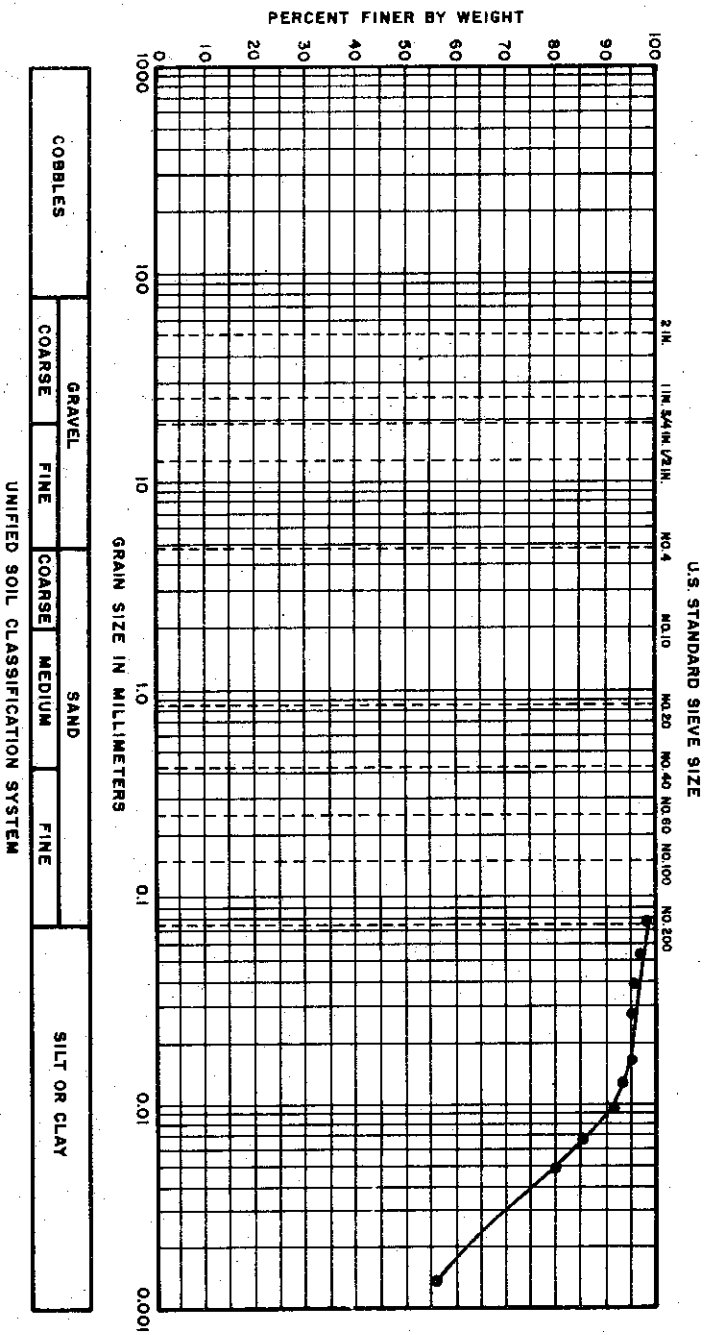
IDENTIFICATION : SILTY SAND (SM)  
 EXPLORATION: BORING 38  
 SAMPLE : SS30  
 DEPTH : 138.5' TO 140.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

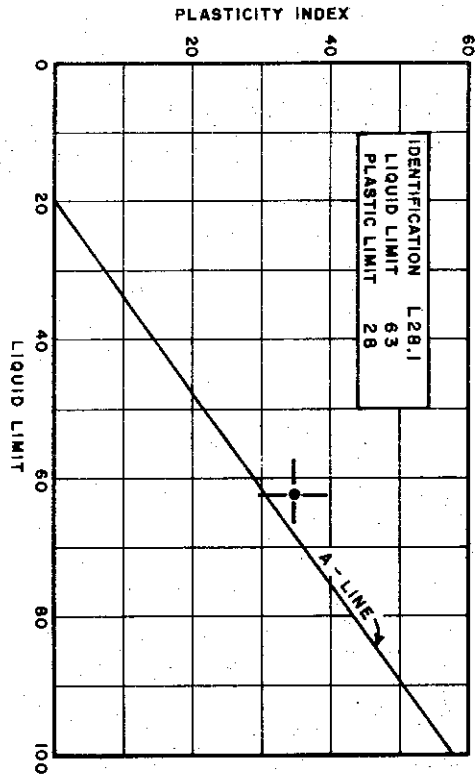
C-614

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

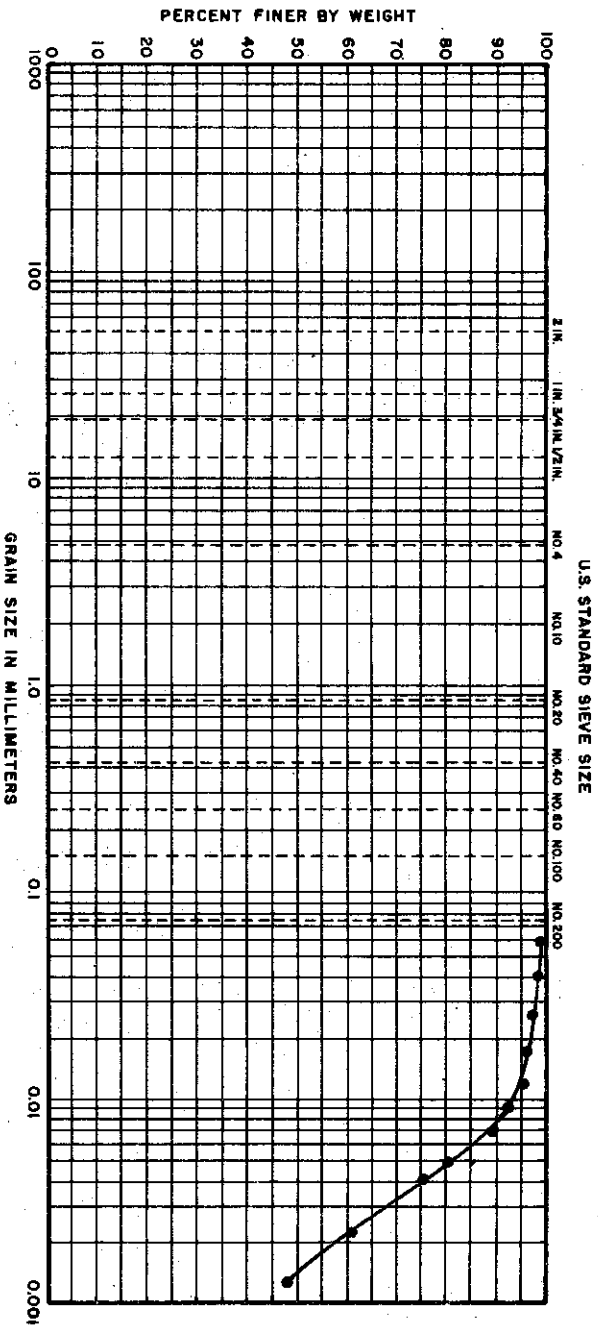
IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 41  
 SAMPLE : 2  
 DEPTH : 4.5' TO 4.8'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

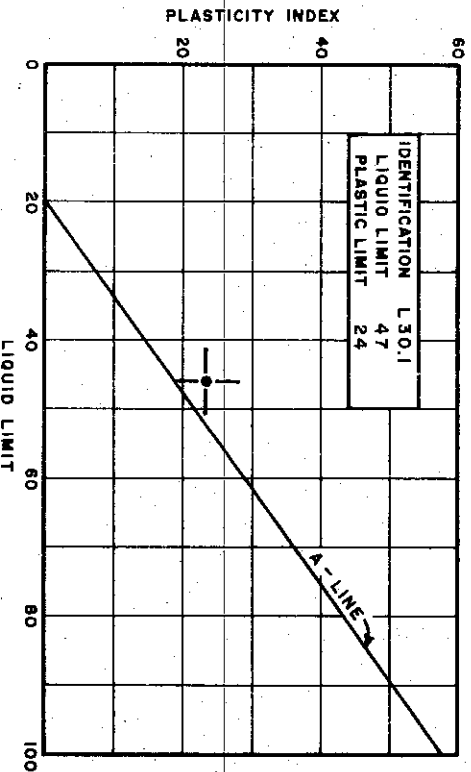
FILE NO. 1255 DATE JAN. 74



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

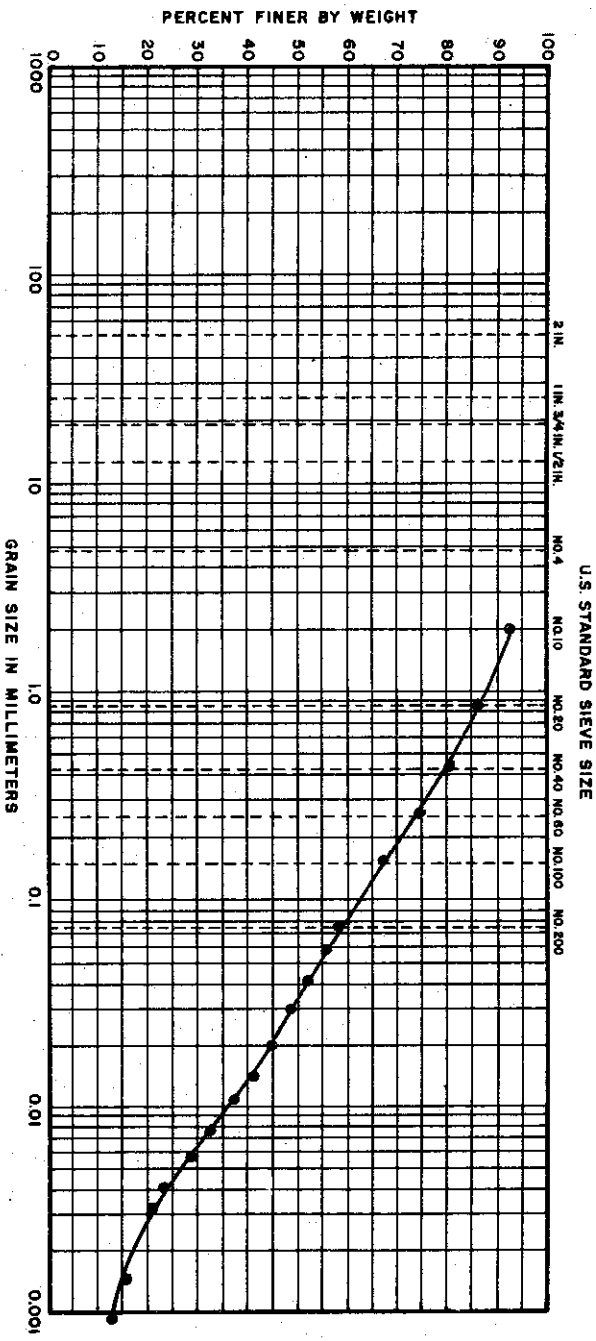
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 7  
 DEPTH : 20.6' TO 21.0'  
 SPECIFIC GRAVITY = 2.66

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-616

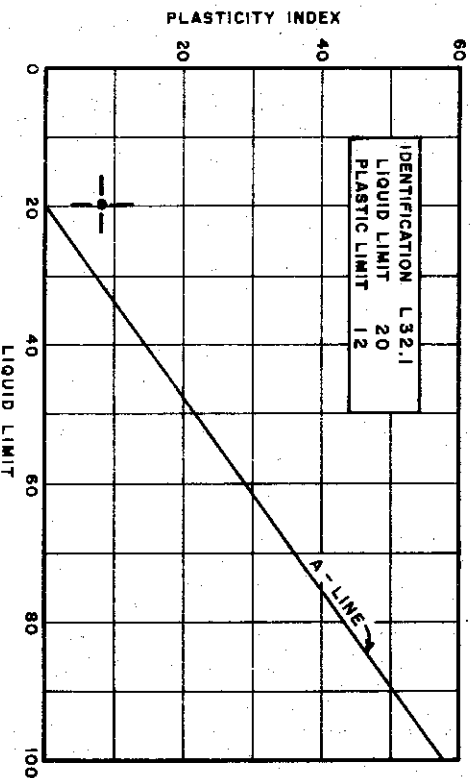
# GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## PLASTICITY CHART (COHESIVE SOIL ONLY)



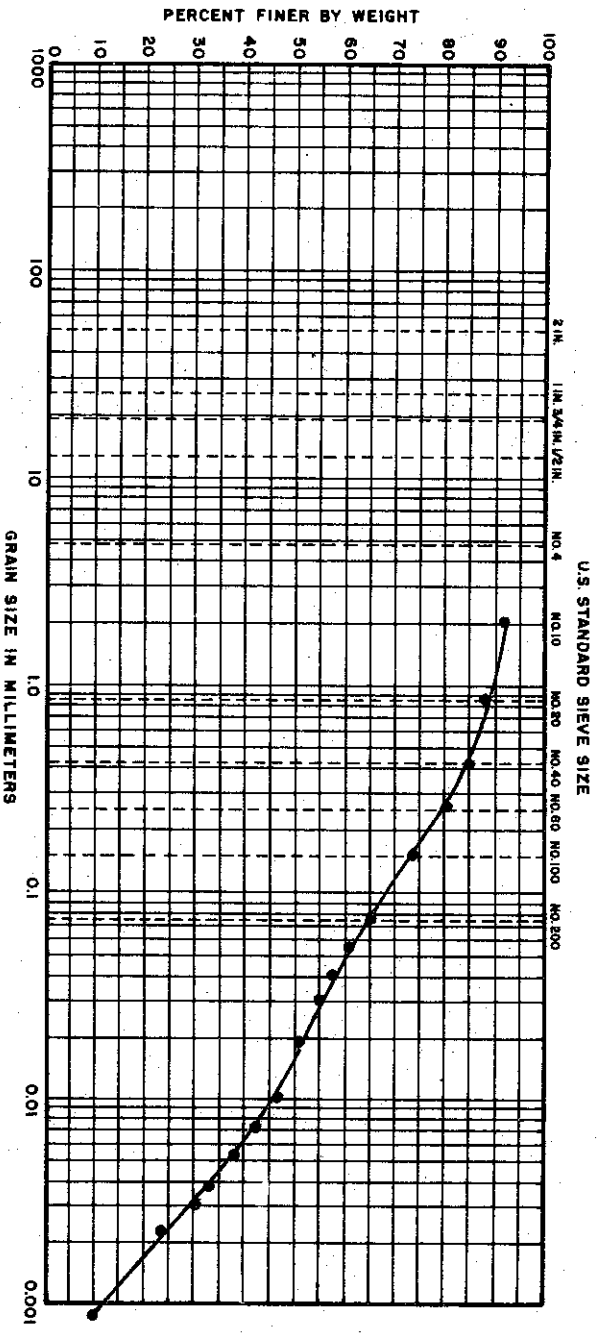
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (SC)  
 EXPLORATION: BORING 41  
 SAMPLE : II  
 DEPTH : 40.7' TO 41.0'  
 SPECIFIC GRAVITY : USED 2.70

**THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS**

FILE NO. 1255      DATE JAN. 74

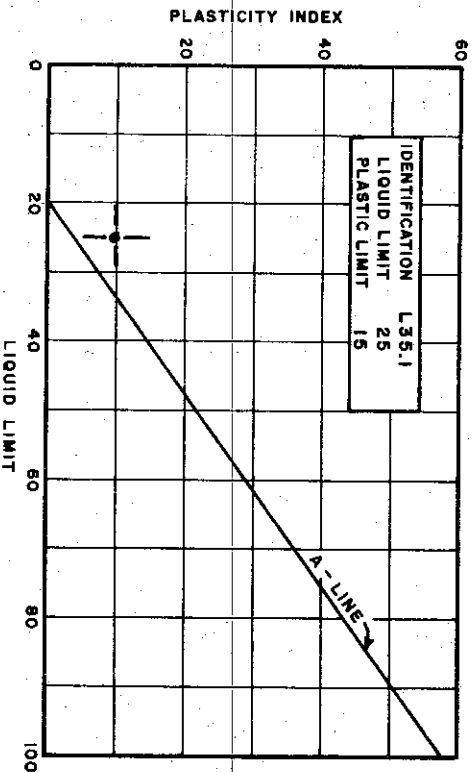
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L35.1  
LIQUID LIMIT 25  
PLASTIC LIMIT 15

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY; ZONES OF SAND (CL-SC)  
EXPLORATION: BORING 4I  
SAMPLE : 17  
DEPTH : 72.9' TO 73.2'  
SPECIFIC GRAVITY = 2.68

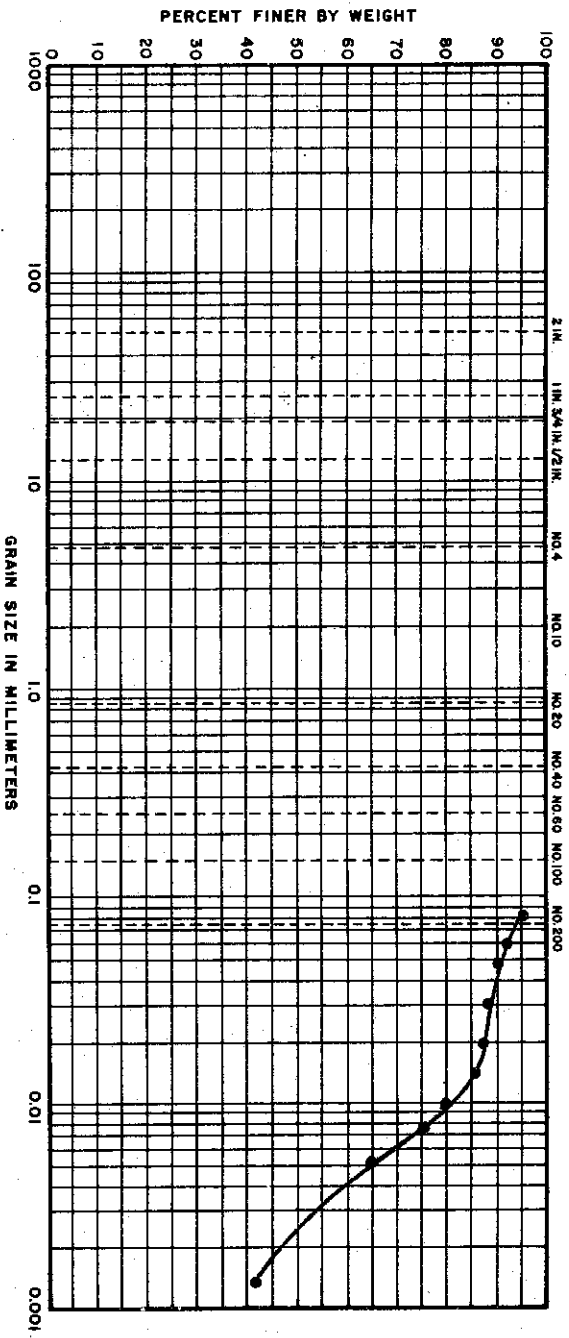
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-618

### GRAIN SIZE DISTRIBUTION

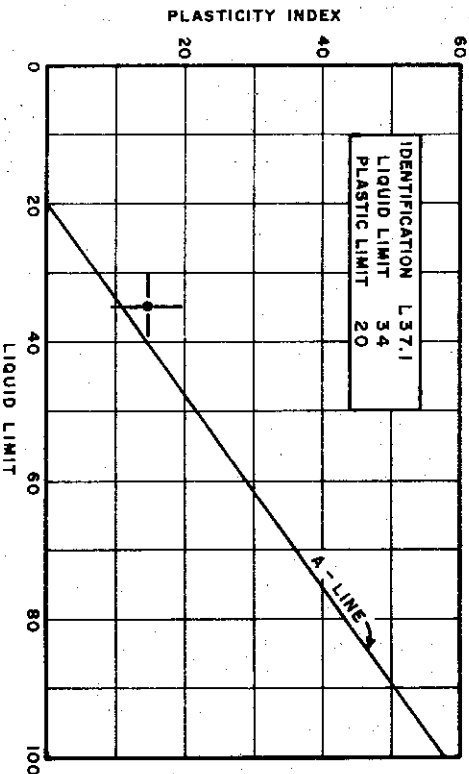
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



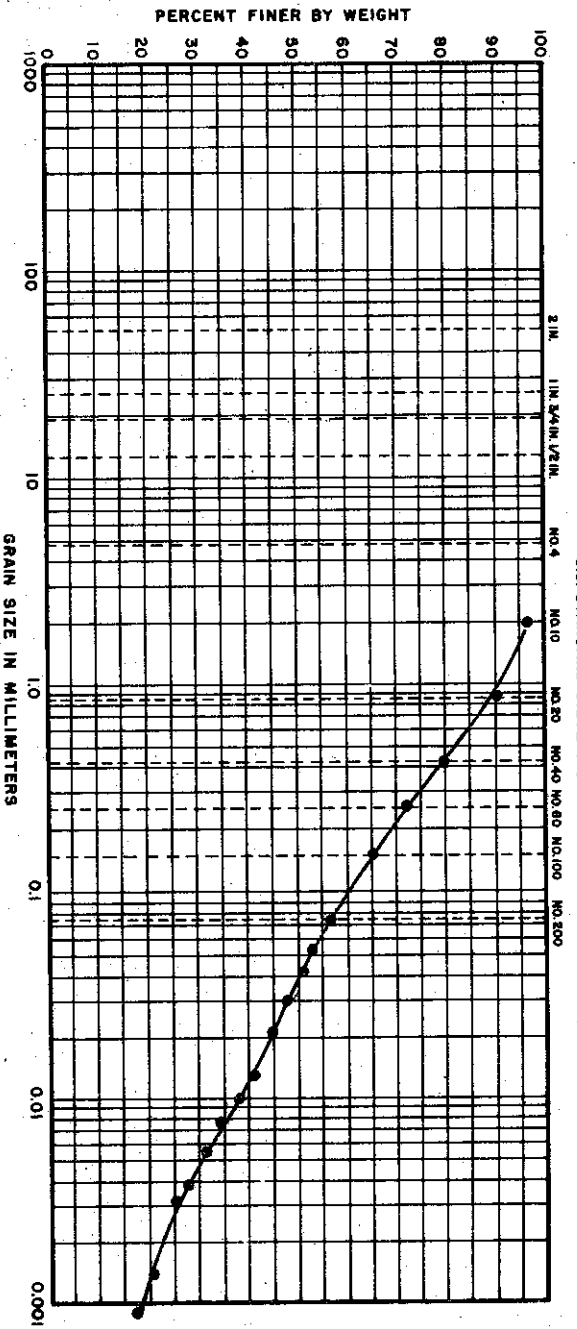
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 23  
 DEPTH : 101.9' TO 102.2'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

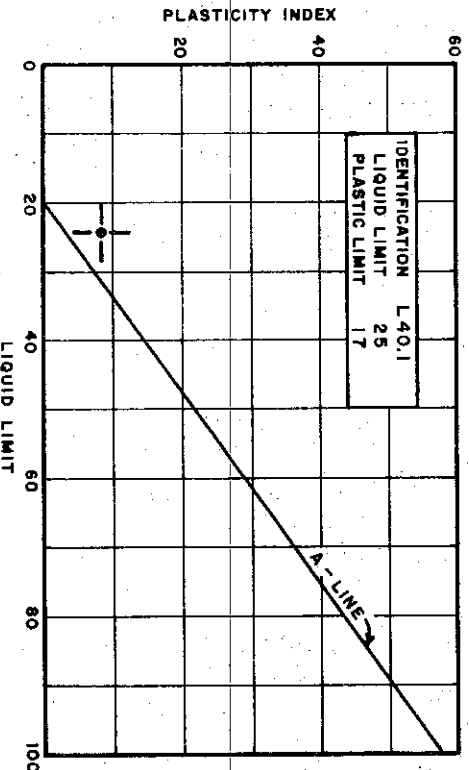
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (GC-SC)  
EXPLORATION: BORING 41  
SAMPLE : 29  
DEPTH : 130.7' TO 130.9'  
SPECIFIC GRAVITY = 2.69

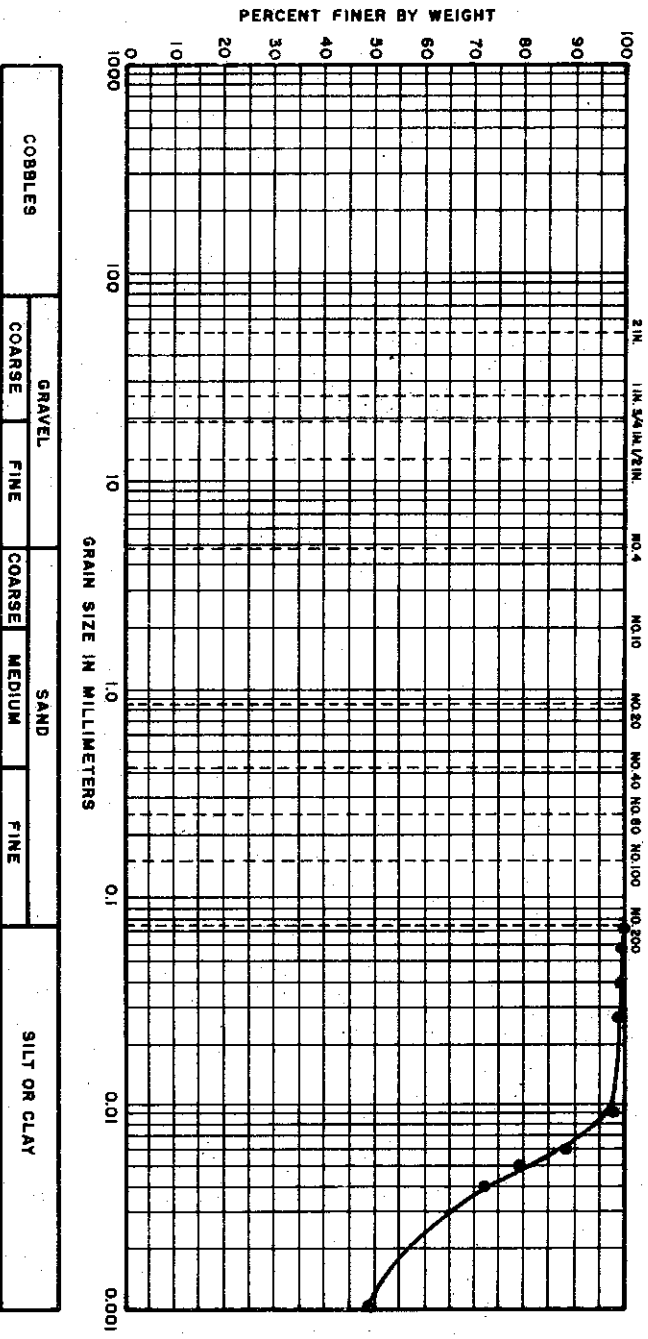
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-620

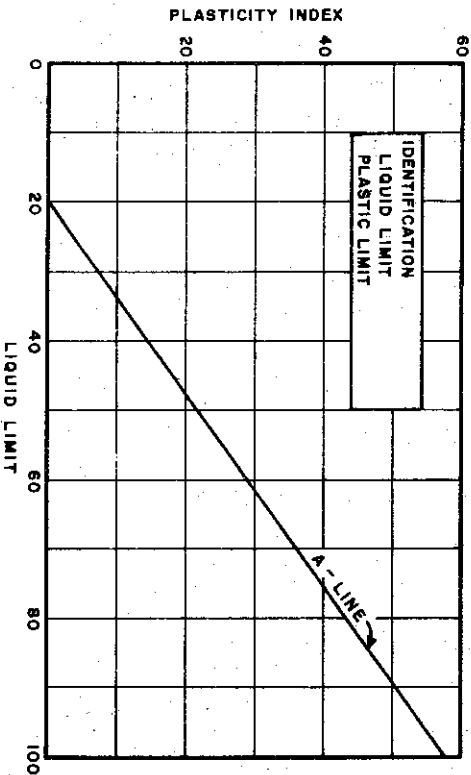
FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



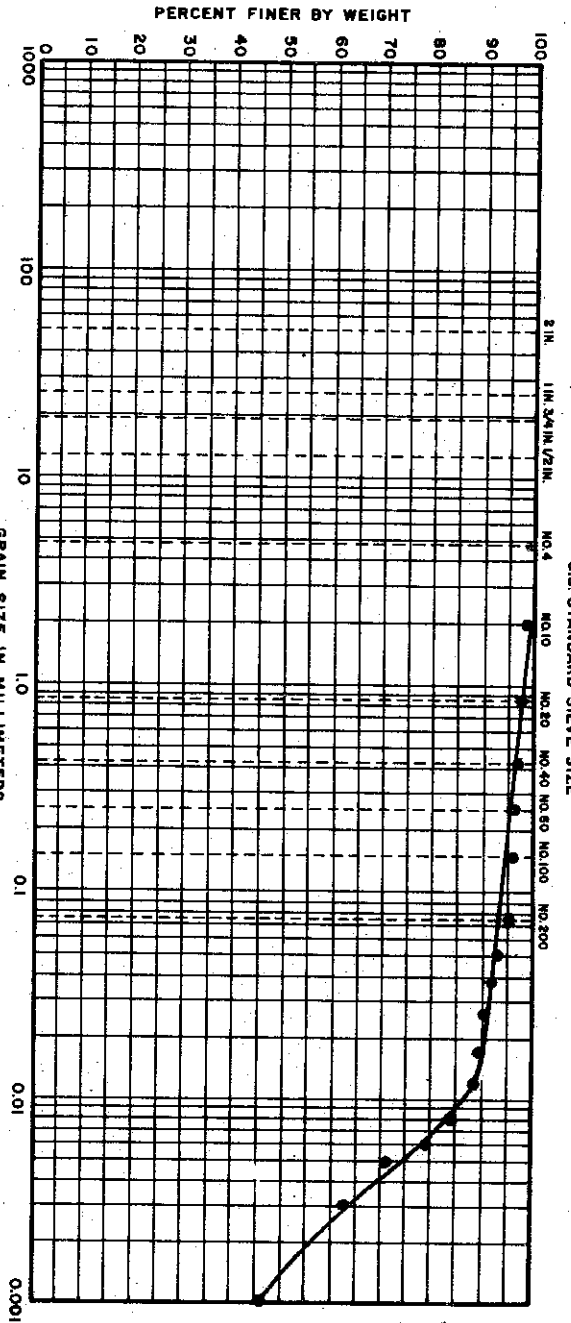
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 48  
 SAMPLE : 4  
 DEPTH : 8' - 10'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

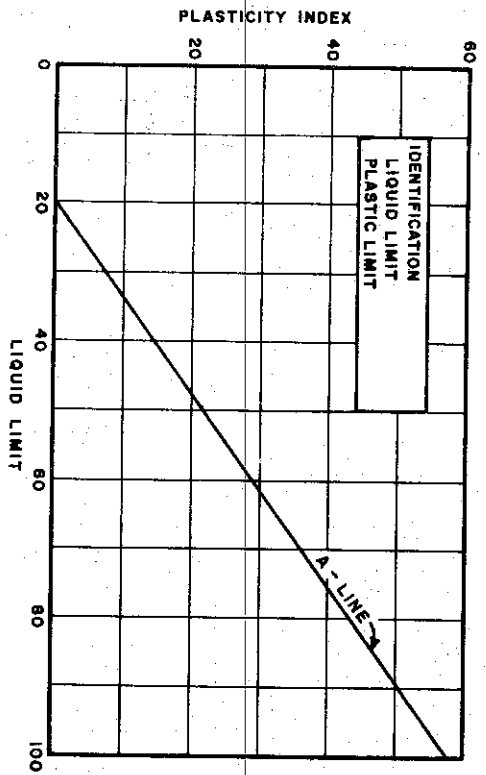
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 48  
 SAMPLE : 26  
 DEPTH : 118' - 120.6'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

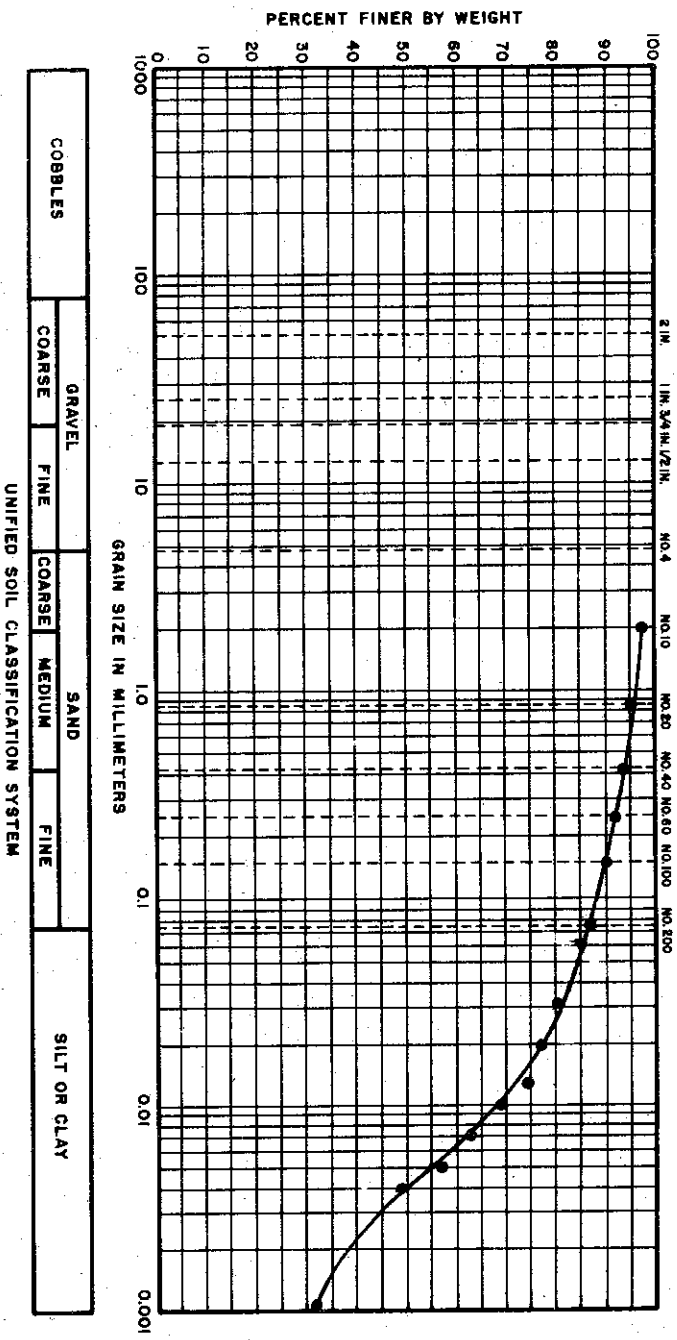
C-622

FILE NO. 1255

DATE MARCH 74

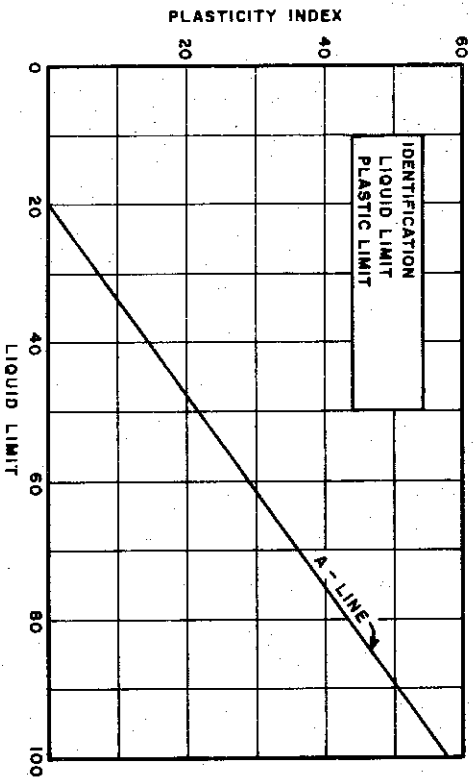
### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART

(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

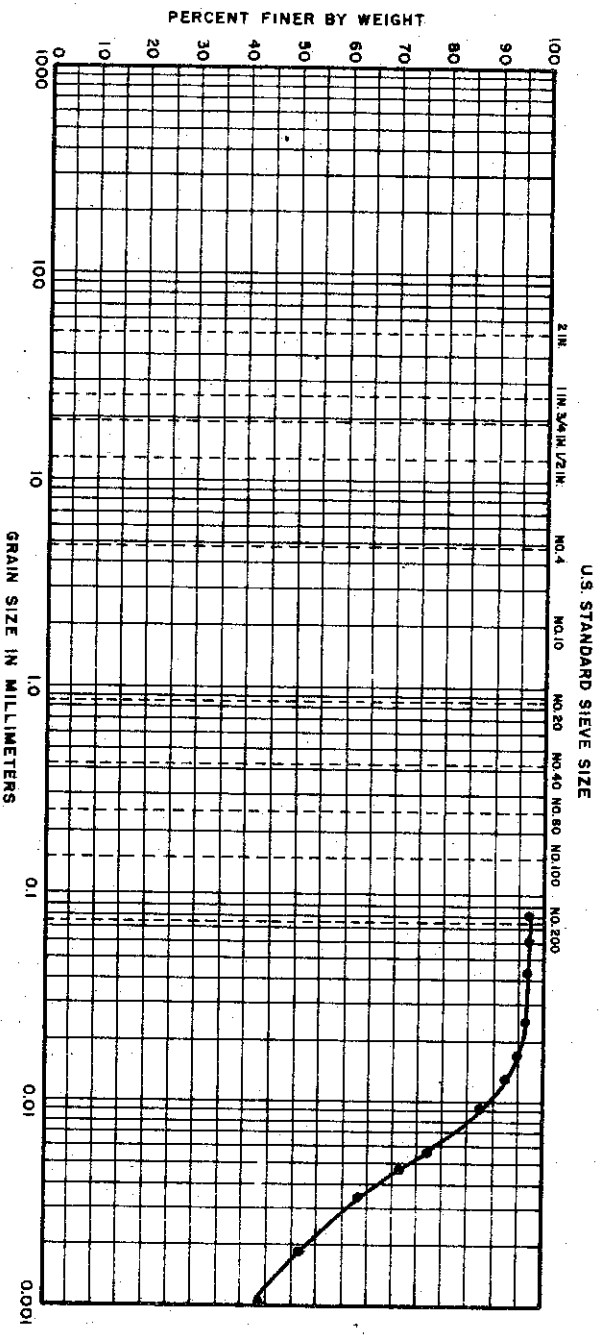
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 49  
 SAMPLE: 7  
 DEPTH: 53' - 55'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74



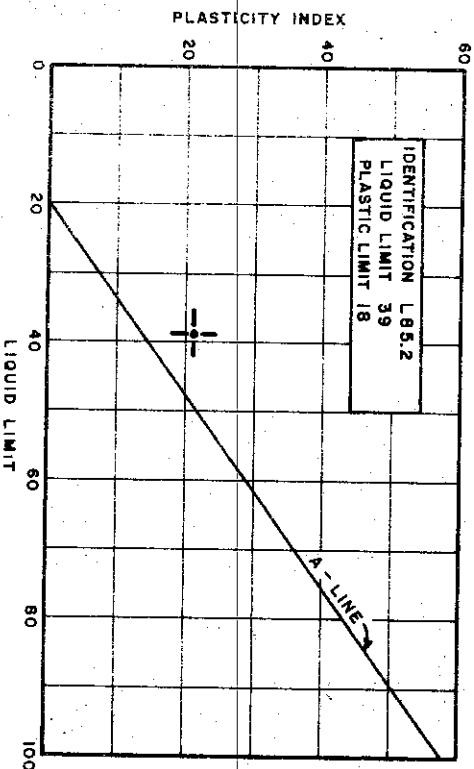
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



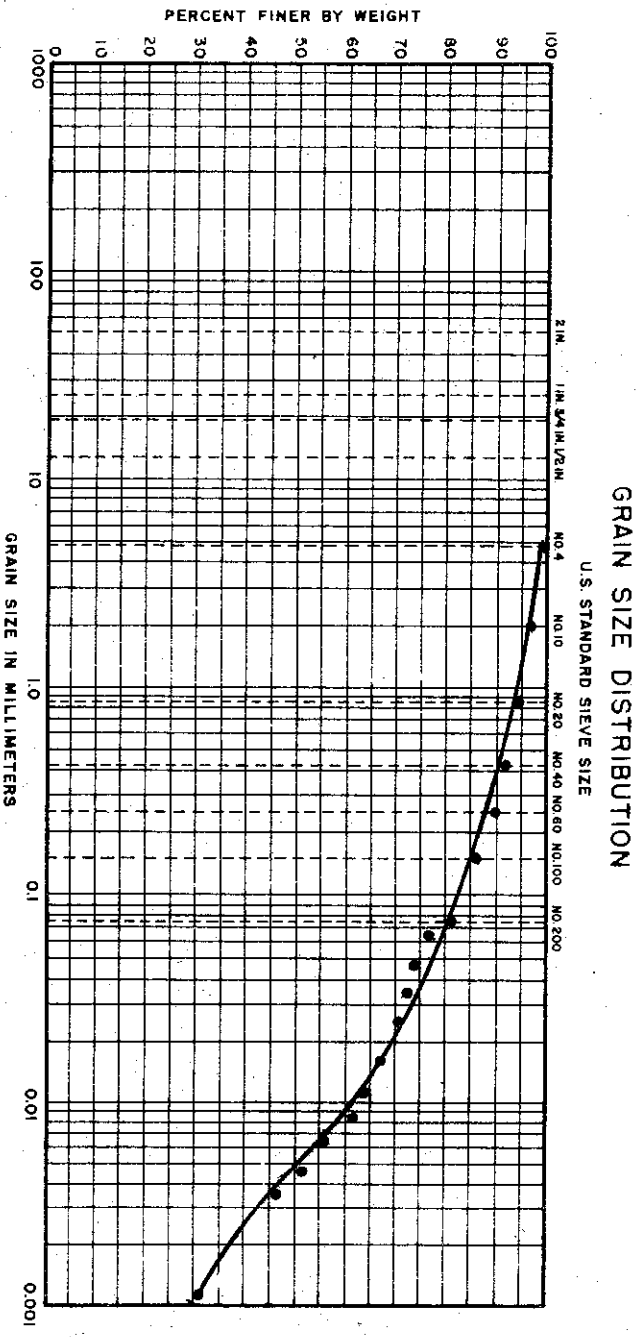
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 6  
 DEPTH: 28.3' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-624

FILE NO. 1255 DATE JULY 1974

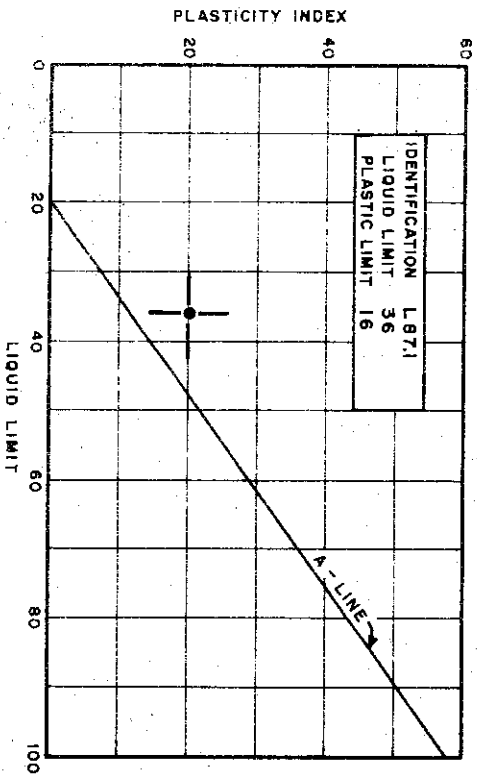


COBBLES	GRAVEL				SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	MEDIUM	FINE	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART

(COHESIVE SOIL ONLY)



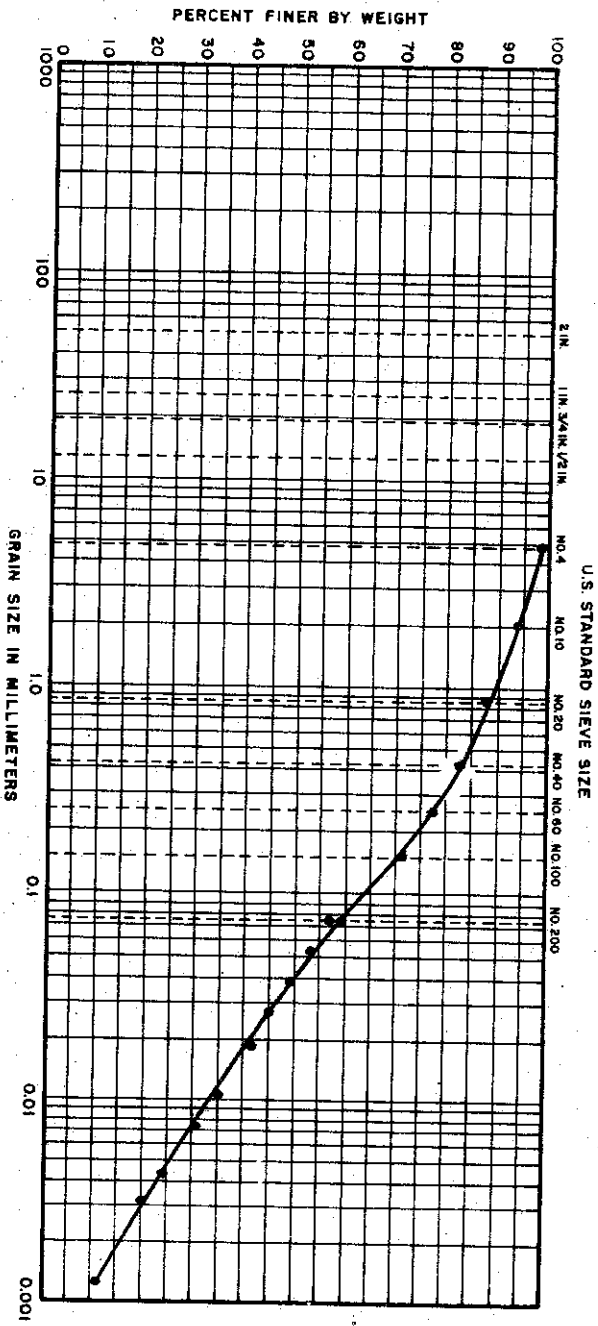
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE : 10  
 DEPTH : 48.6' TO 48.8'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255      DATE JULY 1974

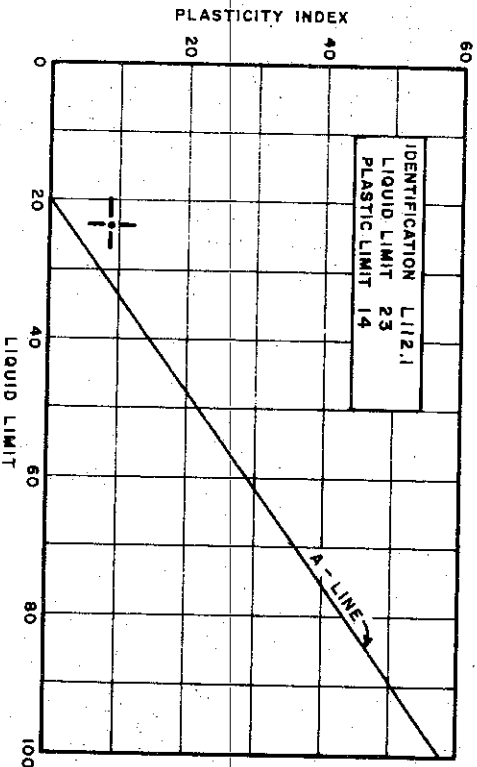
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL.)  
 EXPLORATION: BORING 52  
 SAMPLE : 7  
 DEPTH : 58.6' TO 58.9'  
 SPECIFIC GRAVITY: USED 2.70

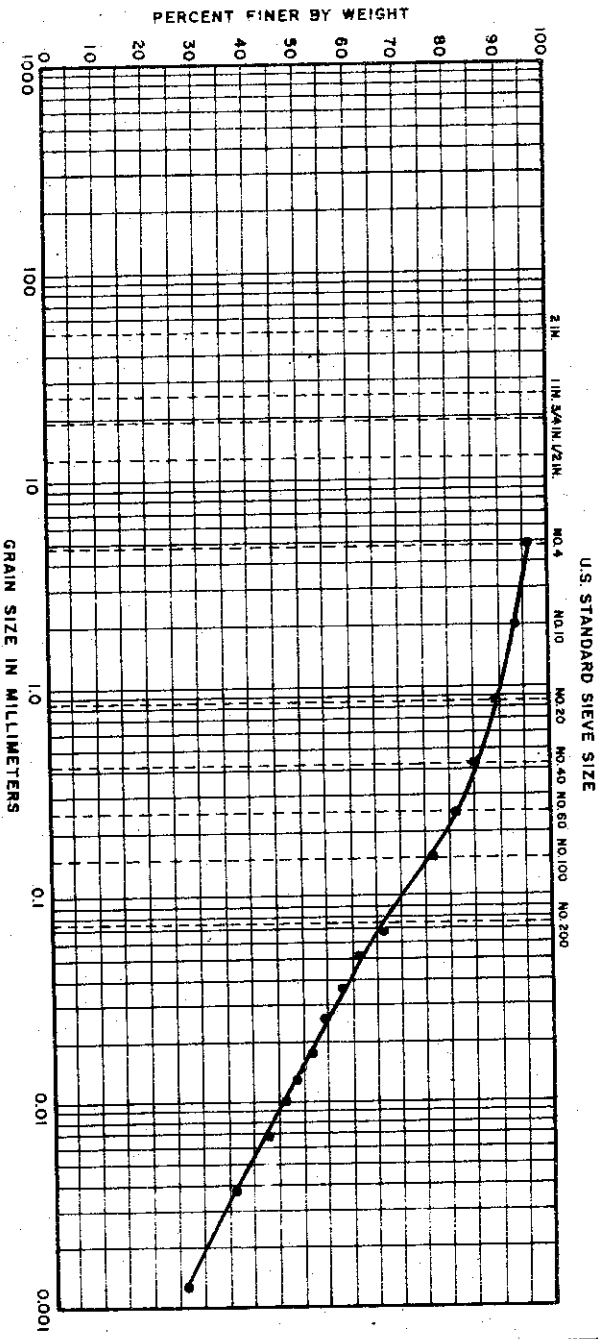
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-626

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974

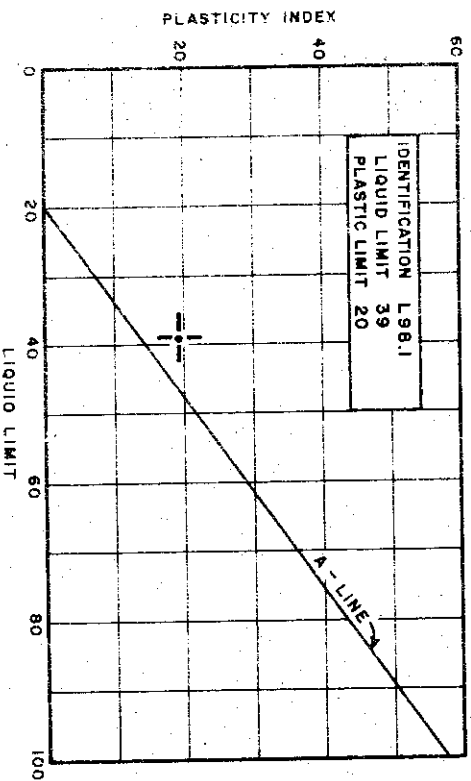
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



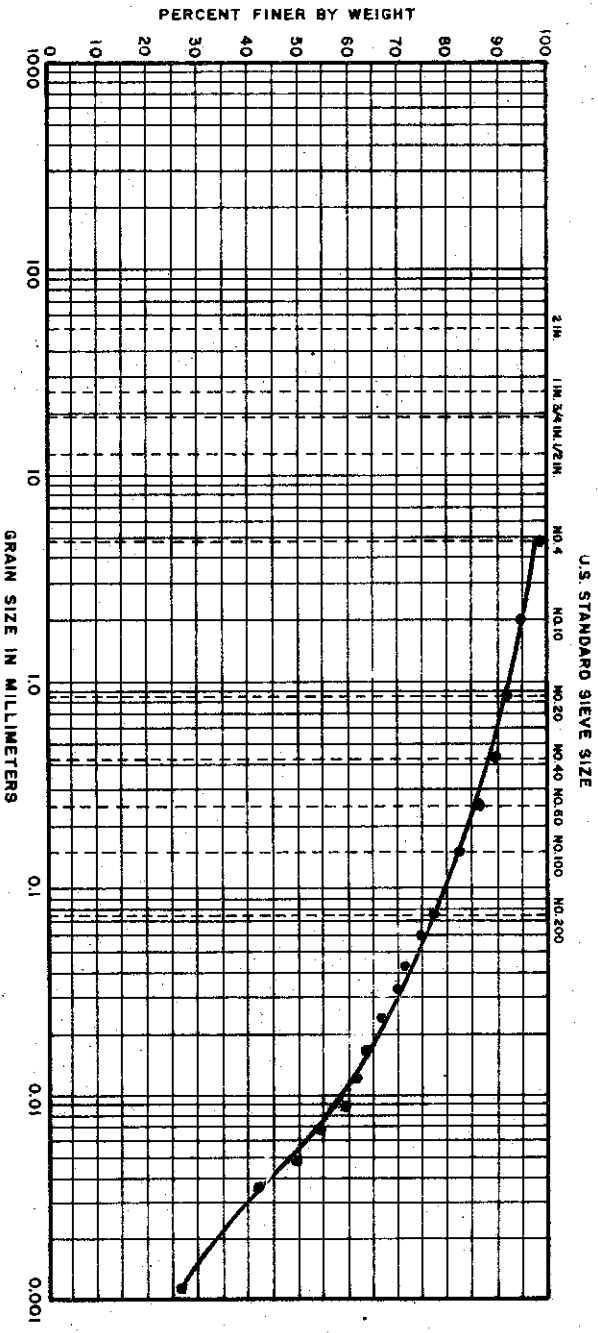
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING: 53  
 SAMPLE: 5  
 DEPTH: 39.8' TO 39.8'  
 SPECIFIC GRAVITY: 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

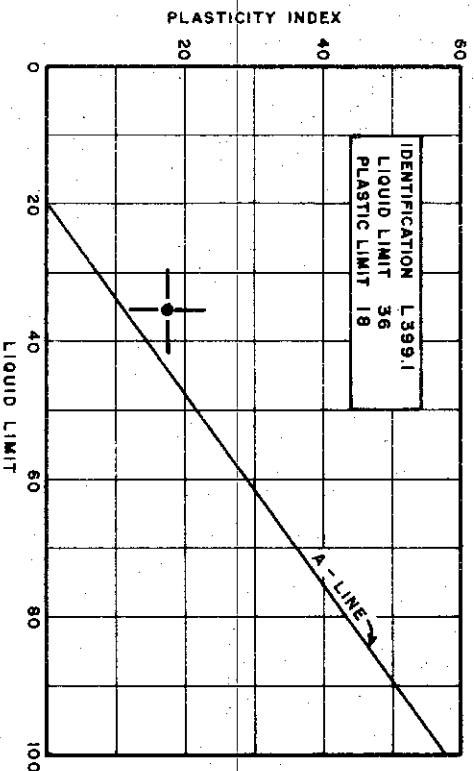
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)

EXPLORATION: BORING 54

SAMPLE: 6

DEPTH: 63.5' TO 63.8'

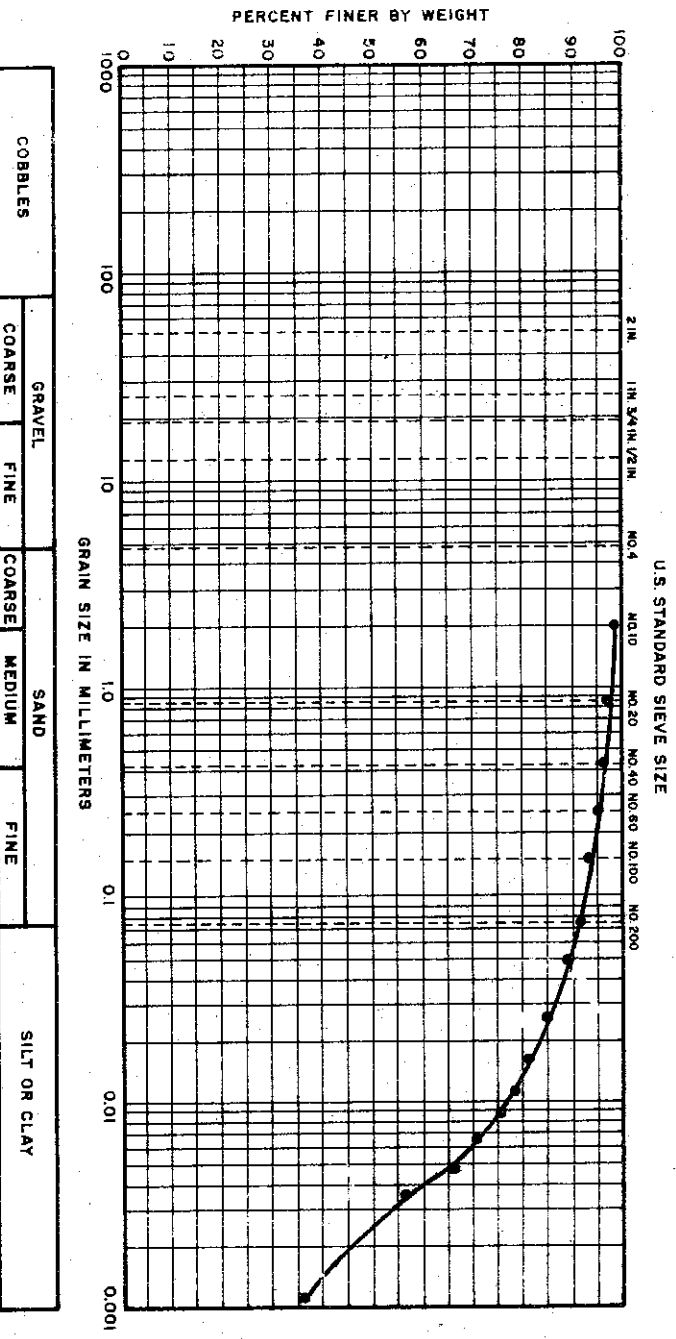
SPECIFIC GRAVITY: 2.71

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

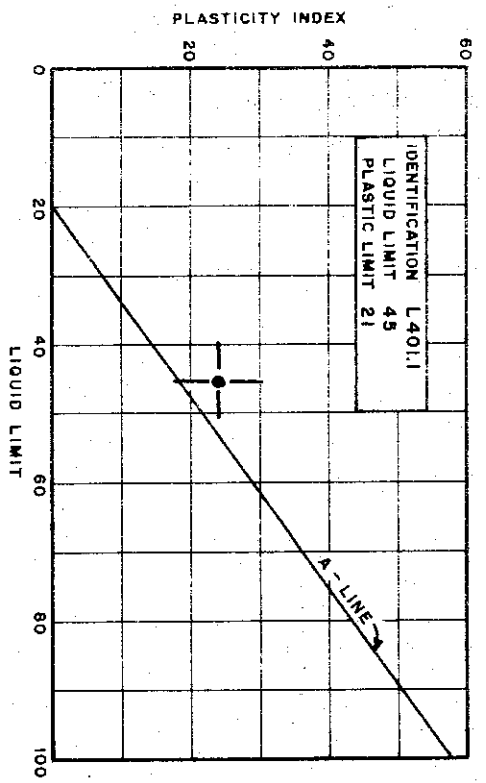
C-628

FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



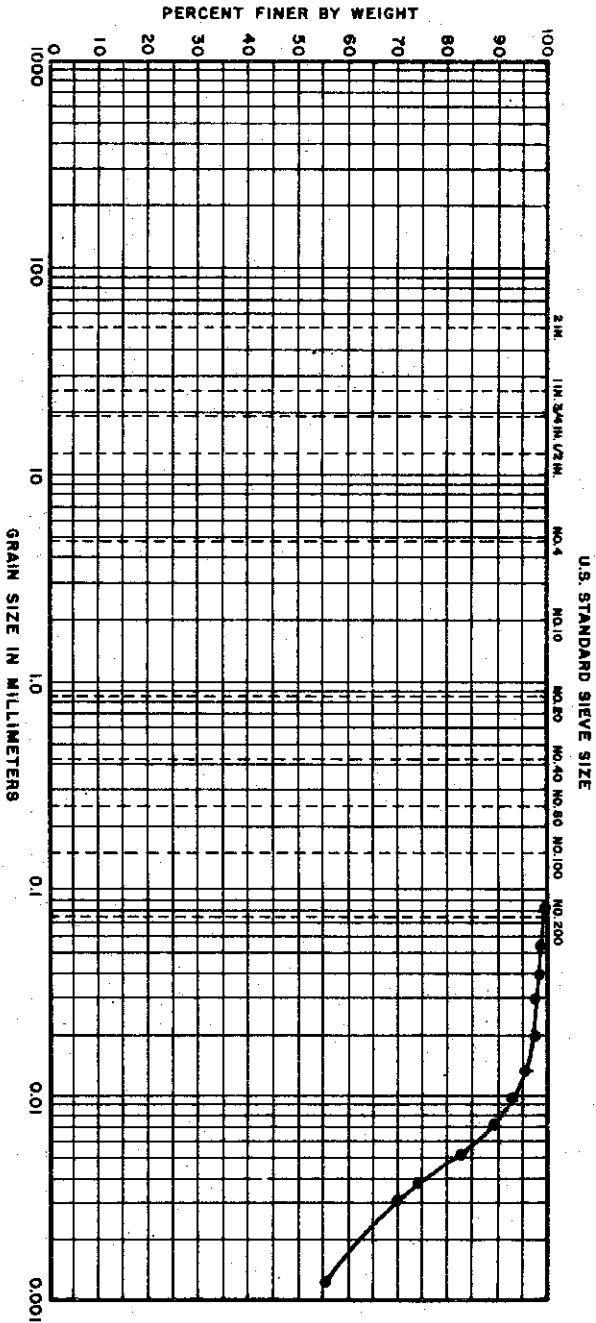
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 54  
 SAMPLE: 8  
 DEPTH: 73.7' TO 74.0'  
 SPECIFIC GRAVITY: 2.73

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

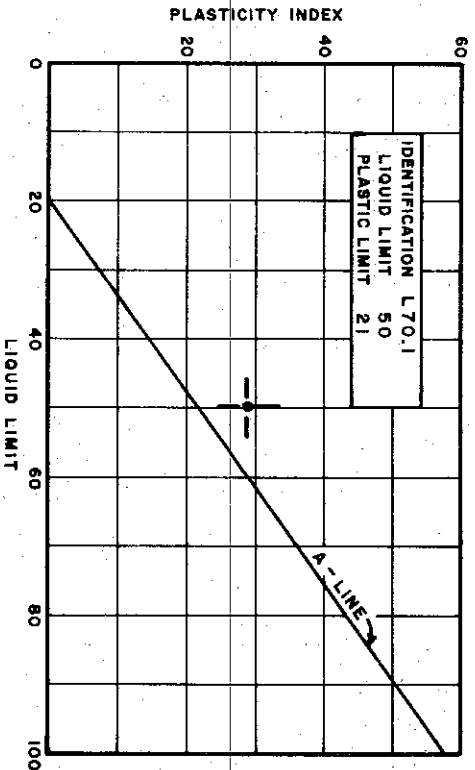
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART  
(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL - CH)  
EXPLORATION: BORING 60  
SAMPLE : SS1  
DEPTH : 5.0' TO 6.5'  
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

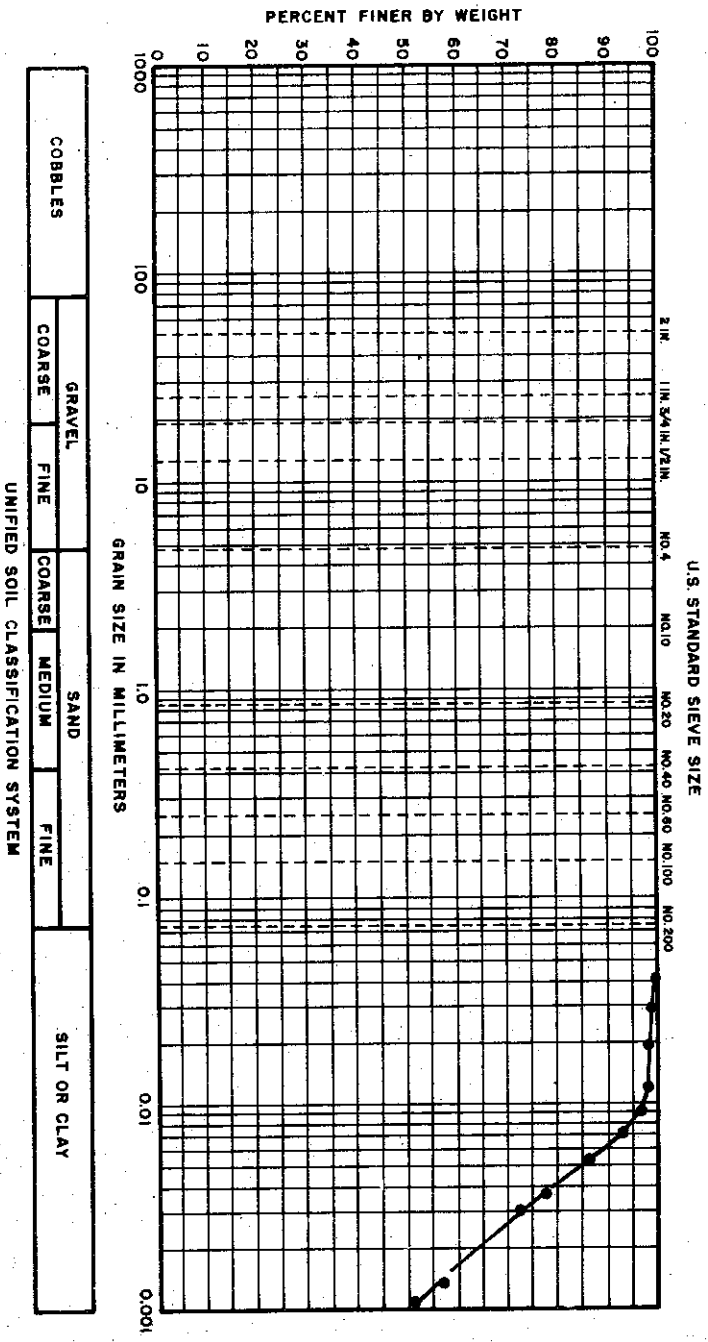
C-630

GOLDBERG - ZOINO & ASSOCIATES  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

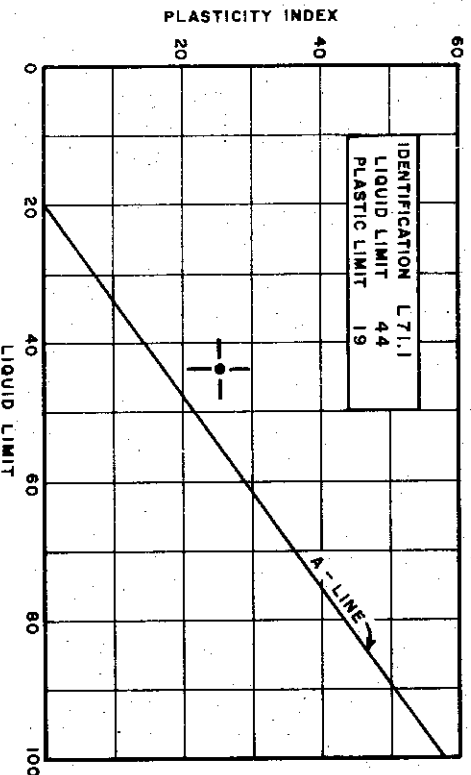
FILE NO. 1255

DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)

EXPLORATION: BORING 60

SAMPLE : SS2

DEPTH : 10' TO 12.5'

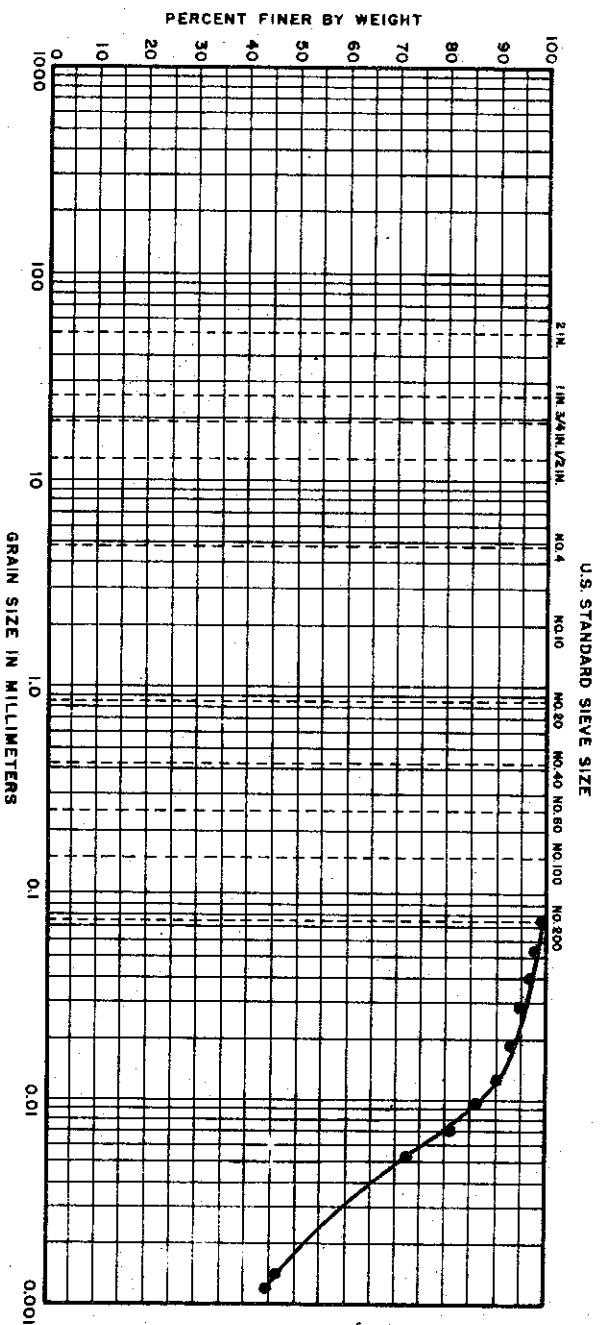
SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74



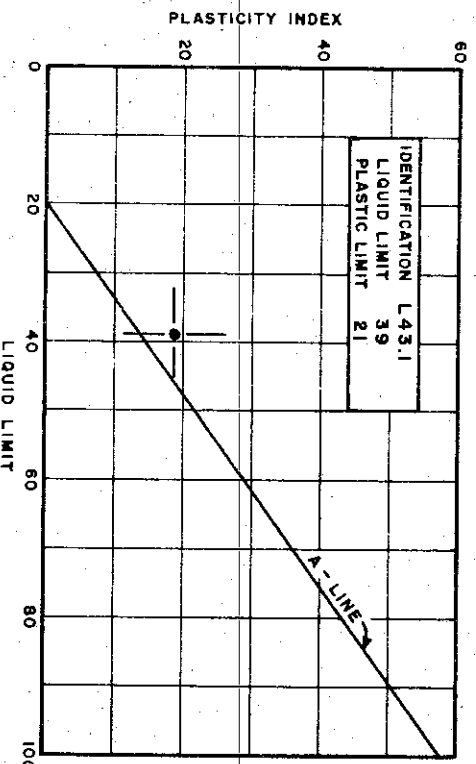
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 3  
 DEPTH : 18.1' TO 18.3'

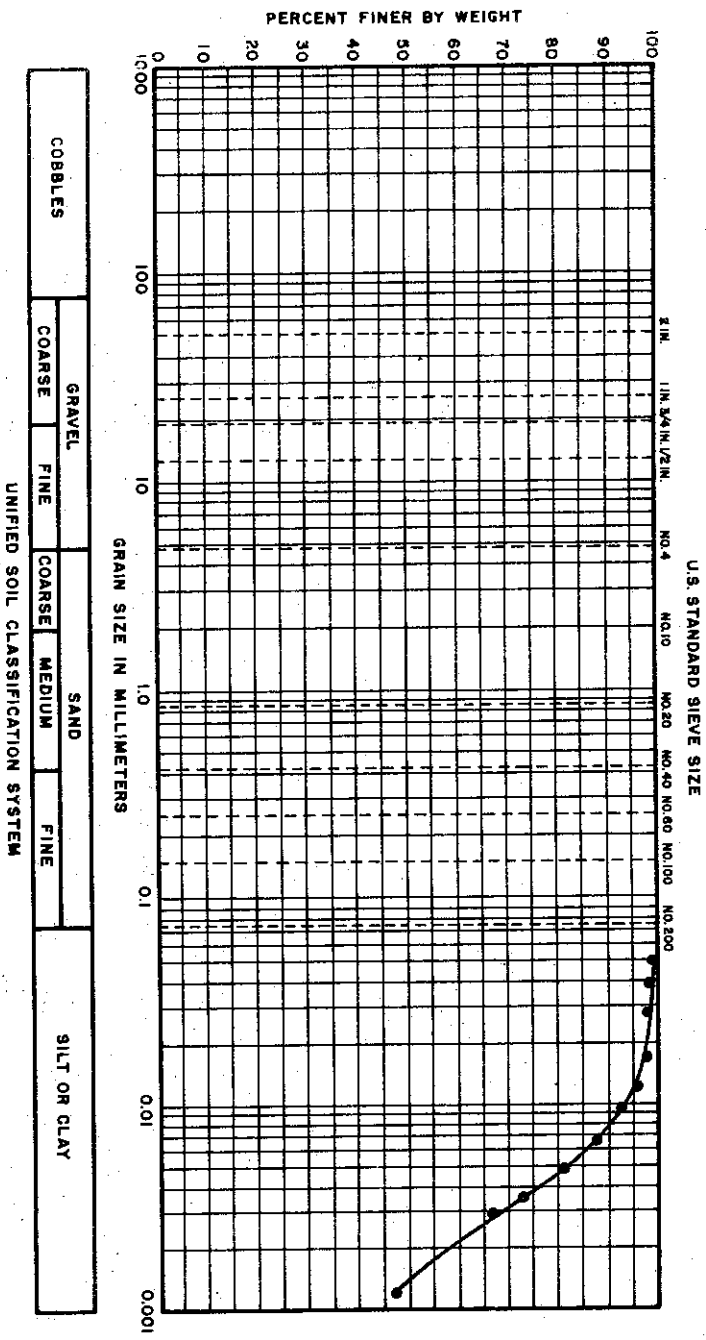
SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

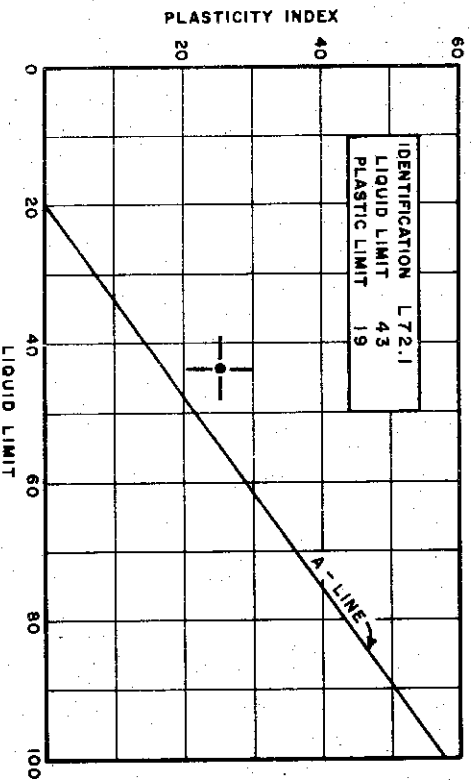
C-632

FILE NO. 1255 DATE MARCH 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

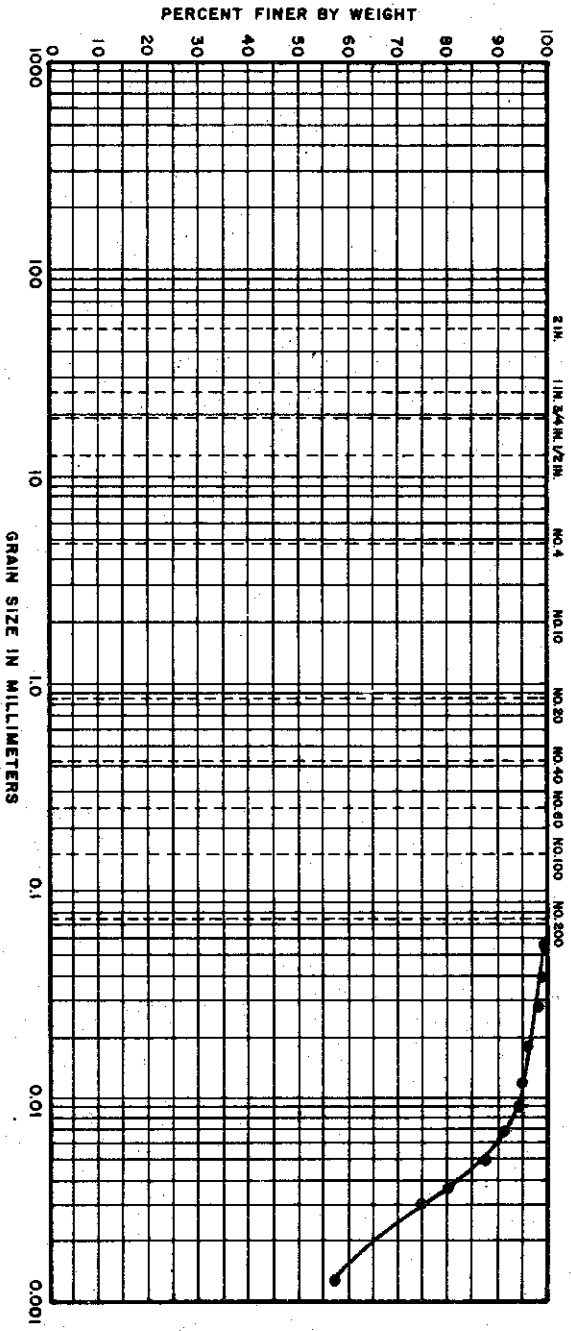
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 553  
 DEPTH : 19' TO 20.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

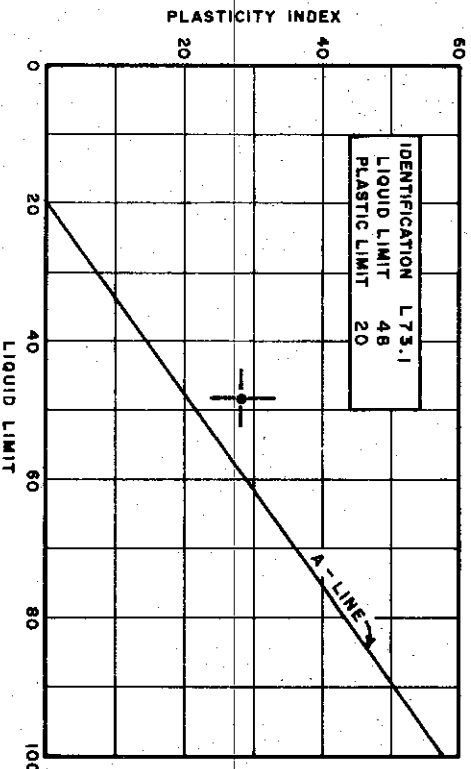
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

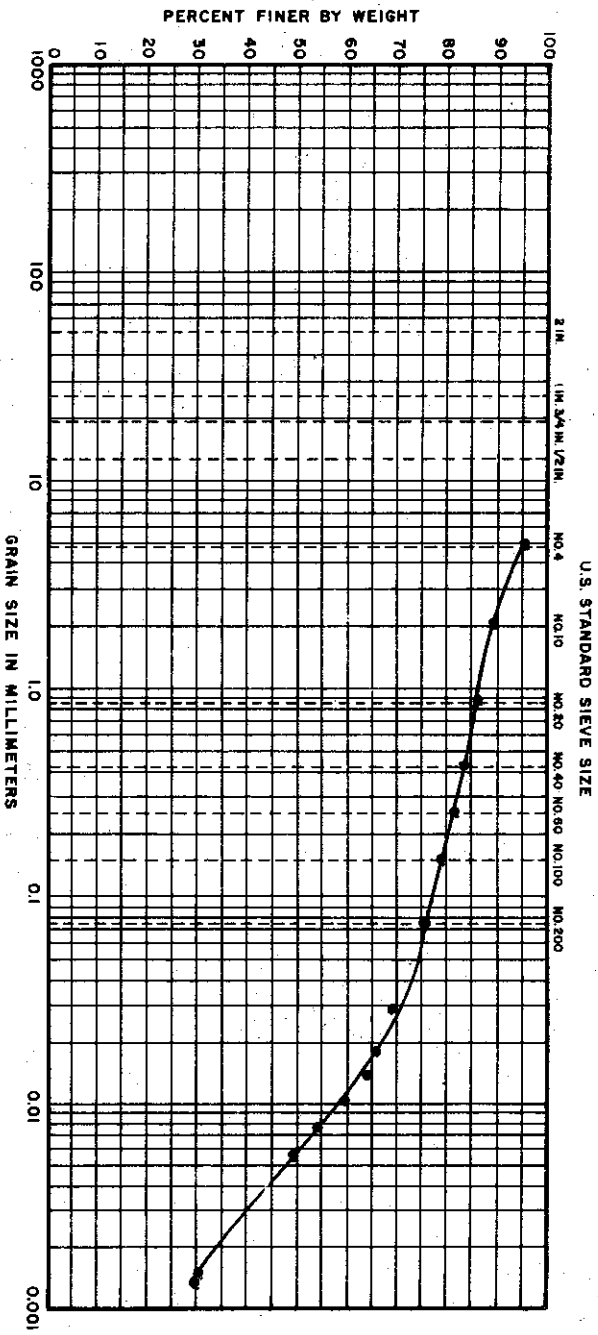
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS 5  
 DEPTH : 27' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-634

FILE NO. 1255 DATE JAN. 74

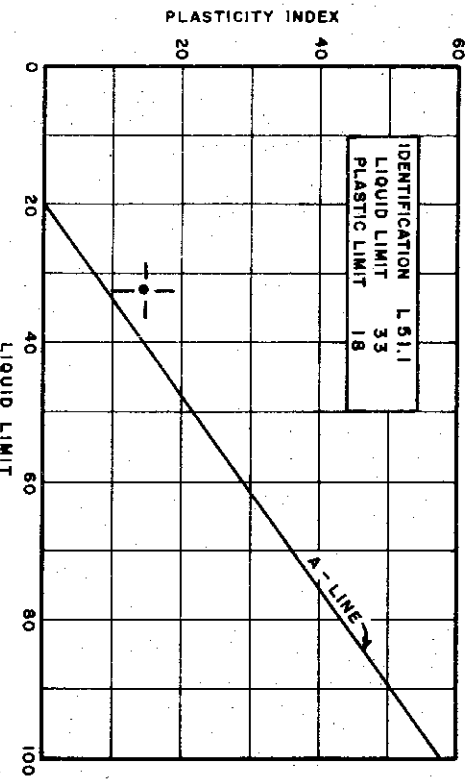
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



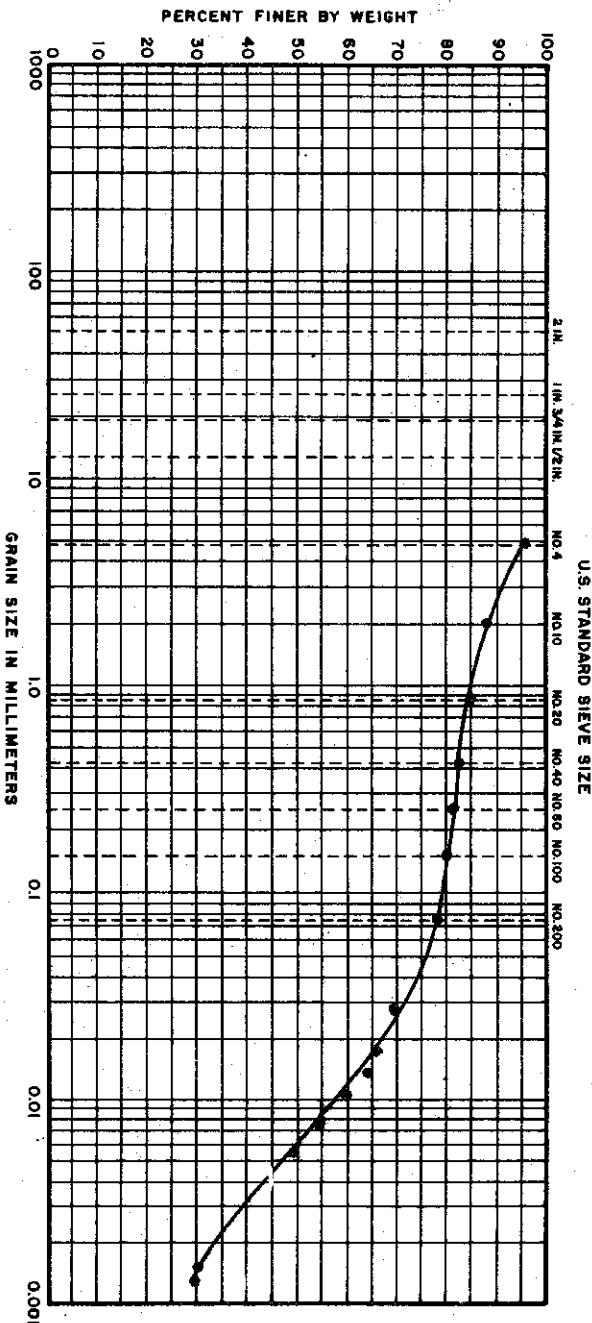
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 11  
 DEPTH : 56.1' TO 56.4'  
 SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE MARCH 74

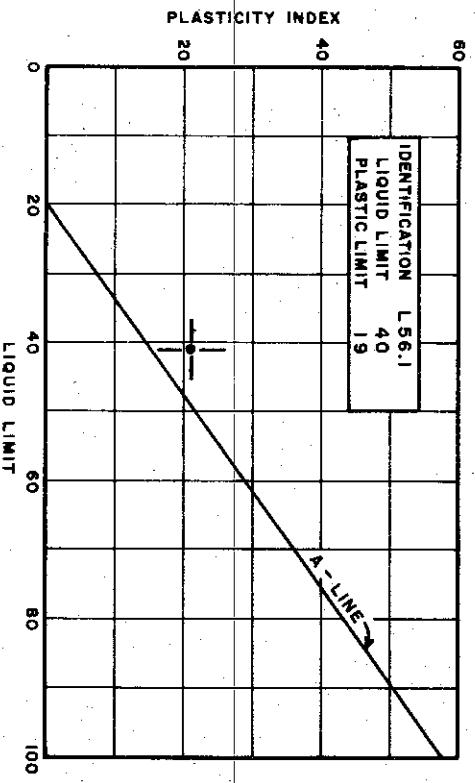
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 16  
 DEPTH : 85.6' TO 86.1'  
 SPECIFIC GRAVITY 2.73

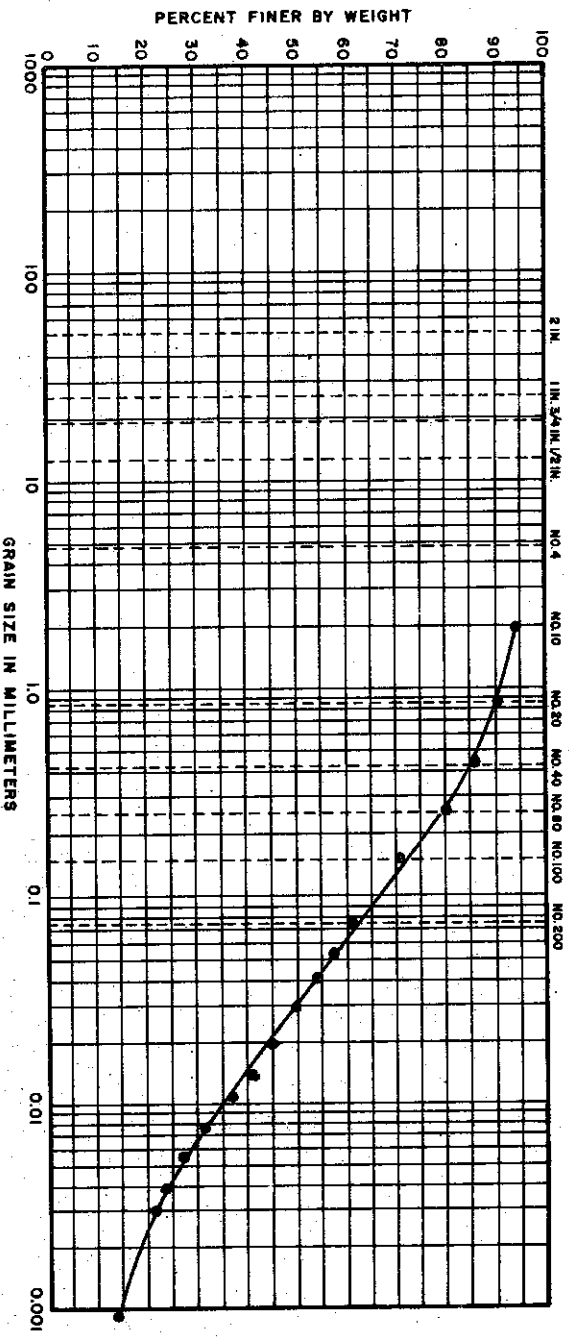
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-636

FILE NO. 1255 DATE MARCH 74

### GRAIN SIZE DISTRIBUTION

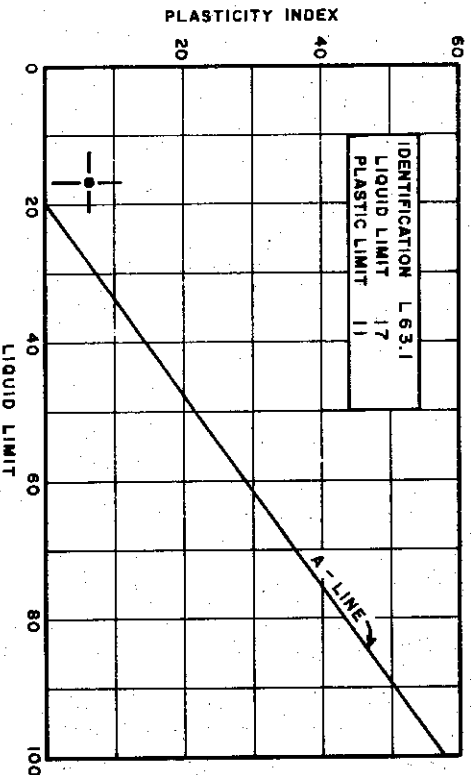
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)

EXPLORATION: BORING 60

SAMPLE : 23

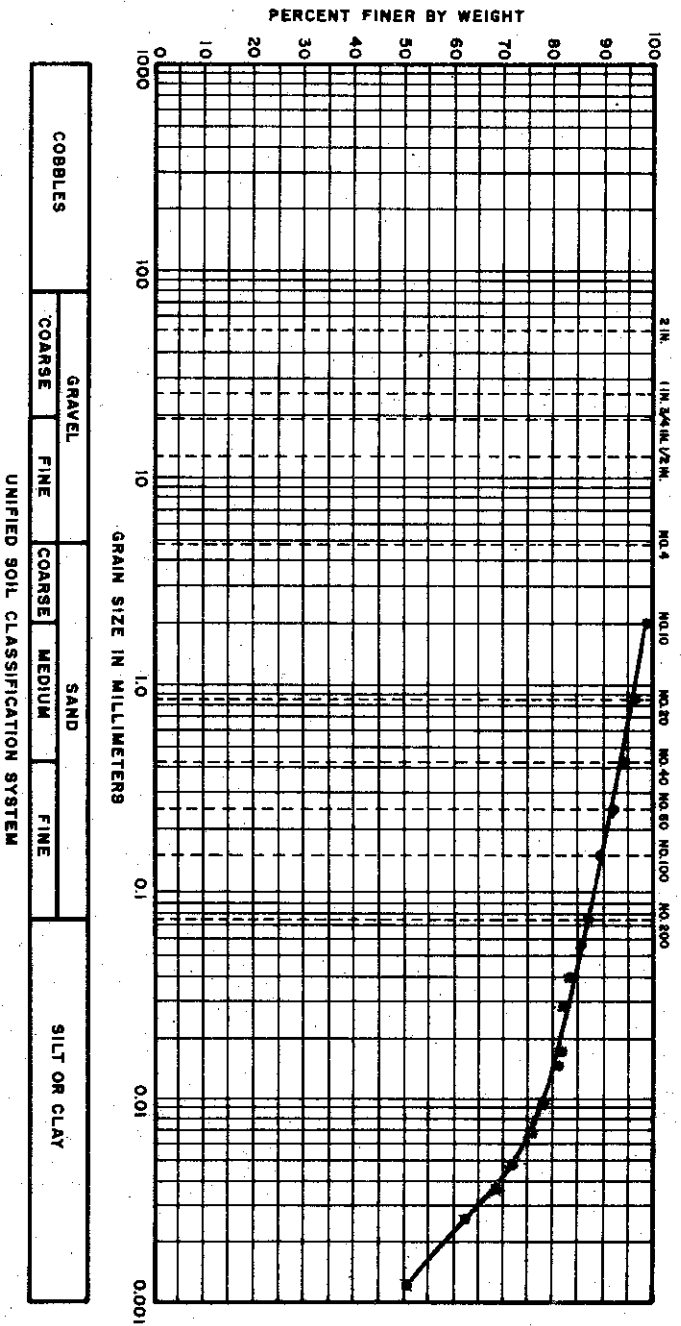
DEPTH : 119.5' TO 119.9'

SPECIFIC GRAVITY : USED 2.70

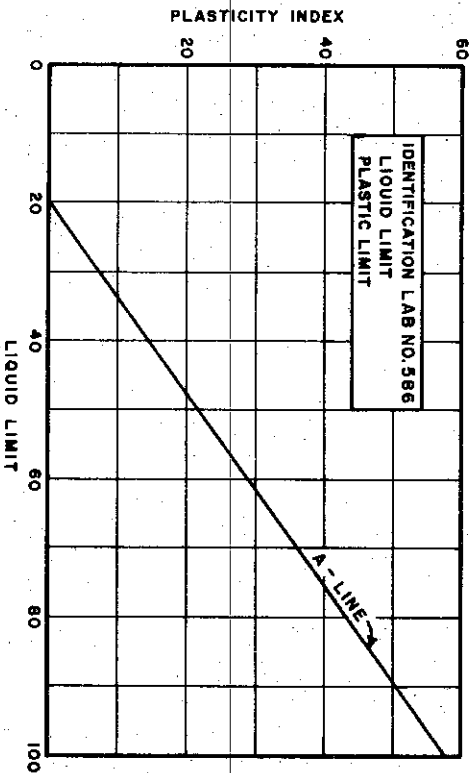
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

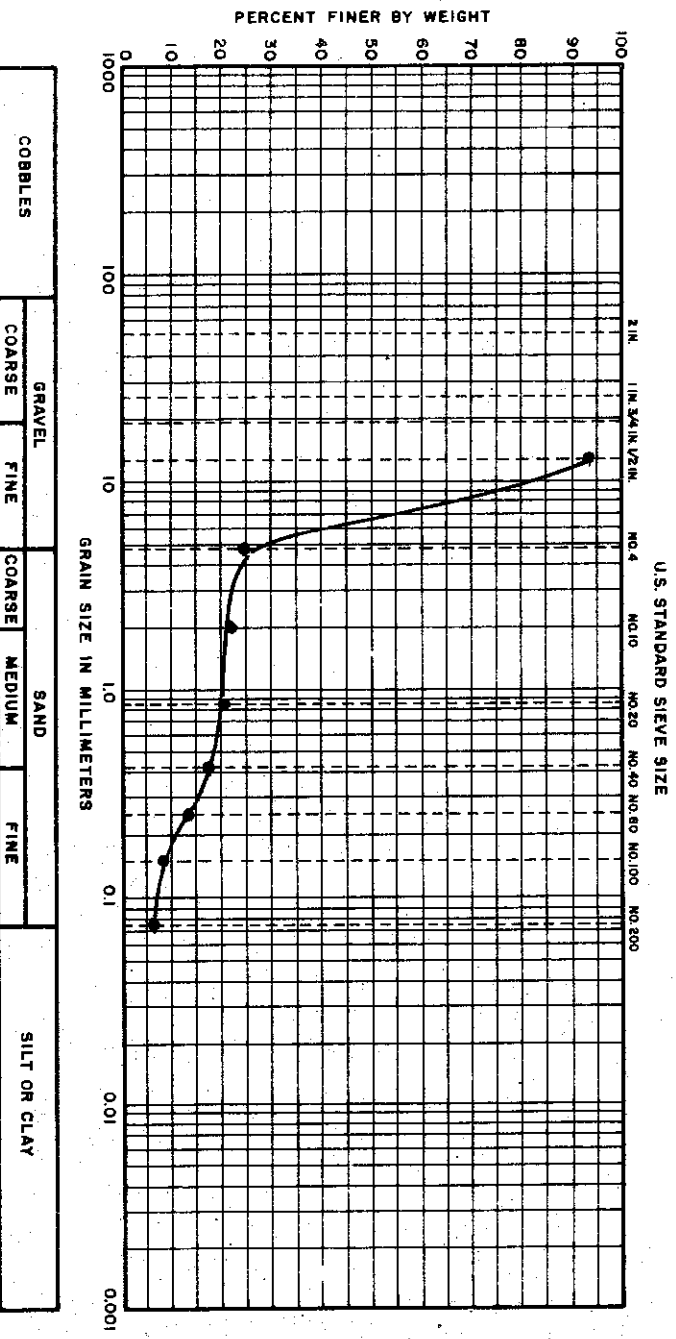
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 137  
 SAMPLE : SS1  
 DEPTH : 1.5' TO 3.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

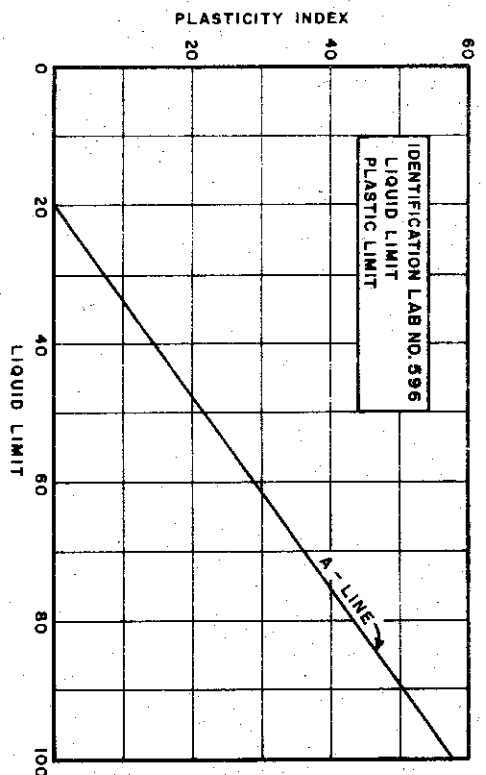
C-638

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION



PLASTICITY CHART  
(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : GRAVEL (GP)  
 EXPLORATION: BORING 139  
 SAMPLE : SS22  
 DEPTH : 99.5' TO 101.0'

SPECIFIC GRAVITY

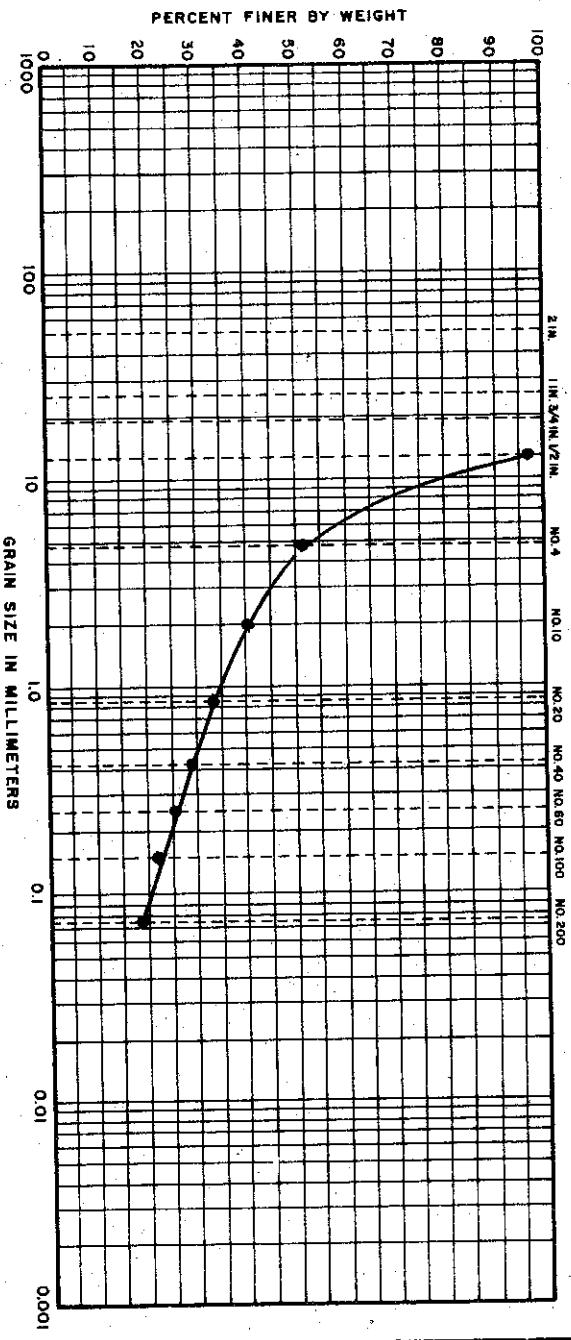
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974



### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE

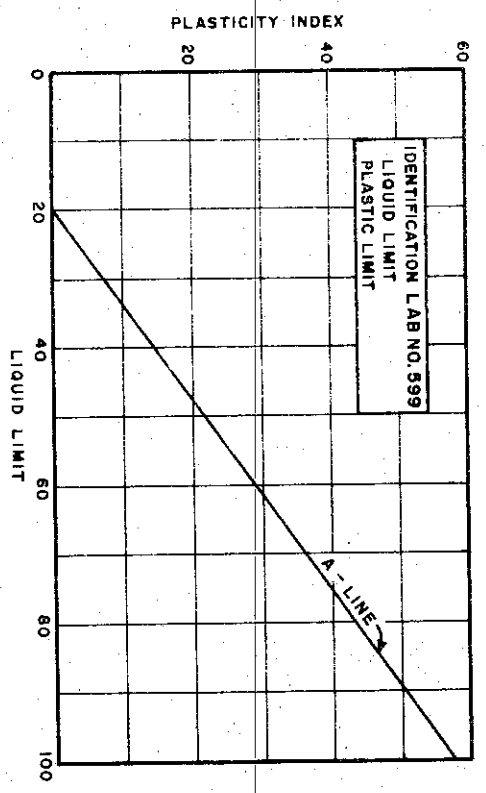


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART

(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SANDY GRAVEL (GM)  
 EXPLORATION: BORING 141  
 SAMPLE : SS21  
 DEPTH : 114.6' TO 116.0'  
 SPECIFIC GRAVITY

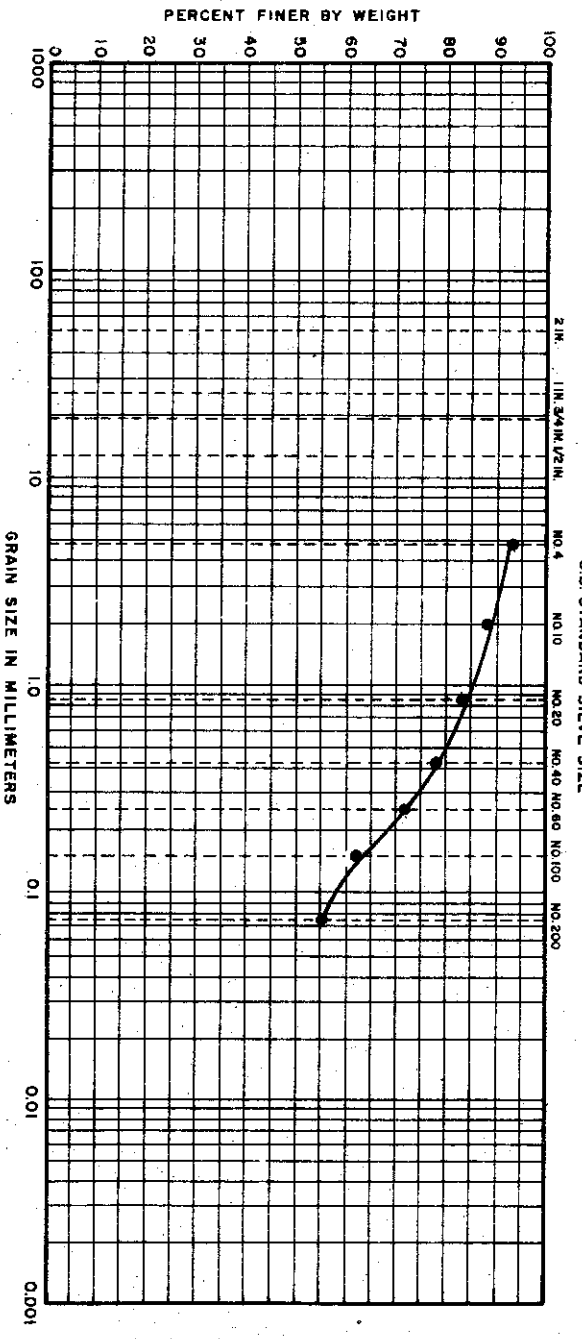
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-640

FILE NO. 1255

DATE NOV. 1974

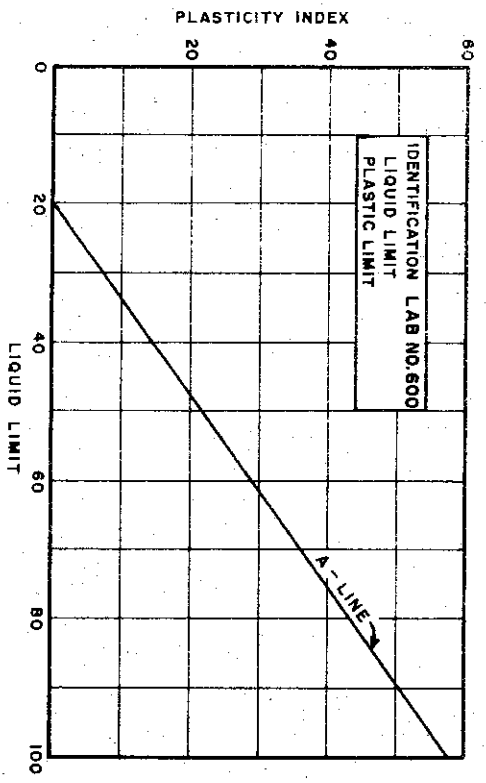
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION LAB NO. 600  
LIQUID LIMIT  
PLASTIC LIMIT

### MATERIAL SOURCE

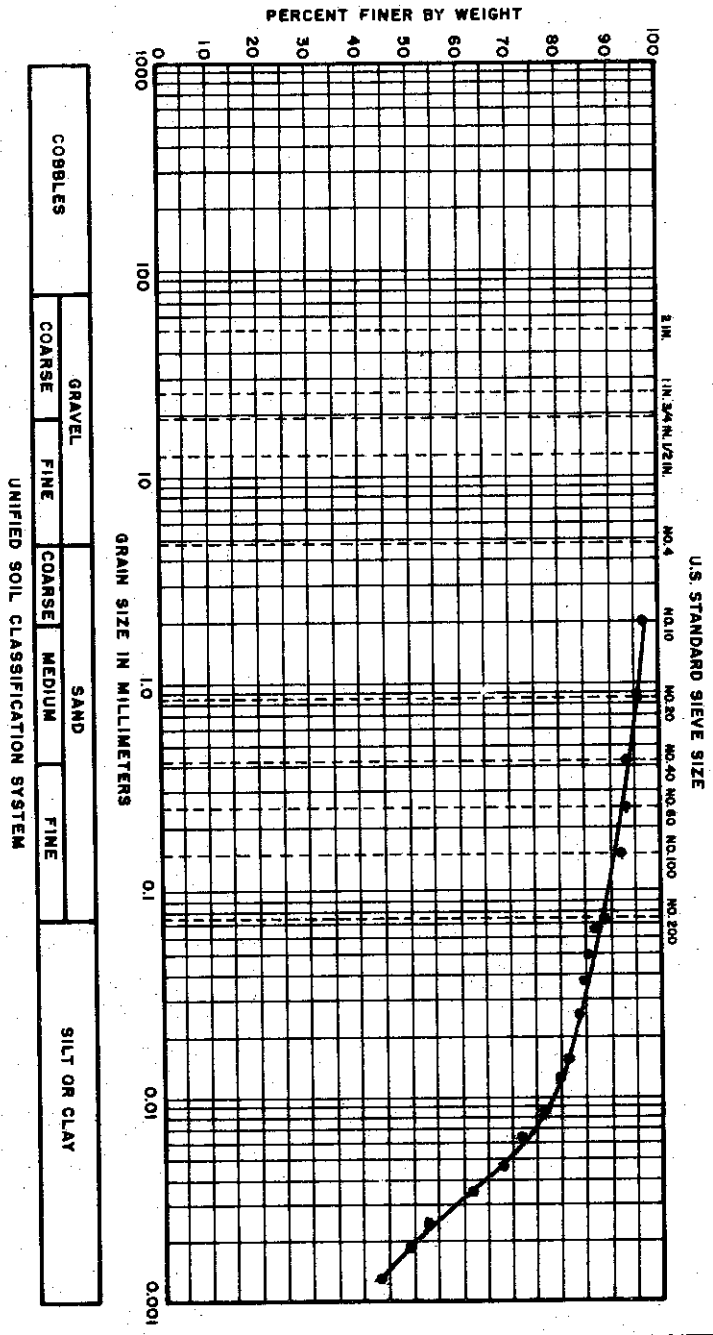
IDENTIFICATION: SANDY CLAY (SM-SC)  
EXPLORATION: BORING 141  
SAMPLE: SS27  
DEPTH: 144.5' TO 146.0'

SPECIFIC GRAVITY

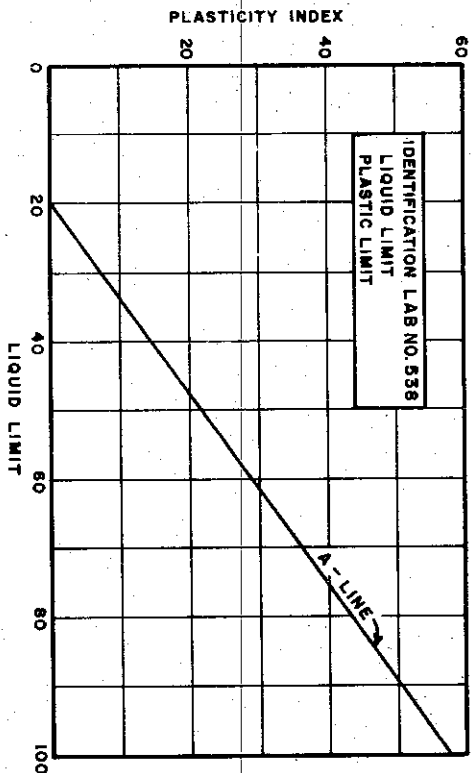
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255  
DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 144

SAMPLE : 6

DEPTH : 13.8' TO 14.1'

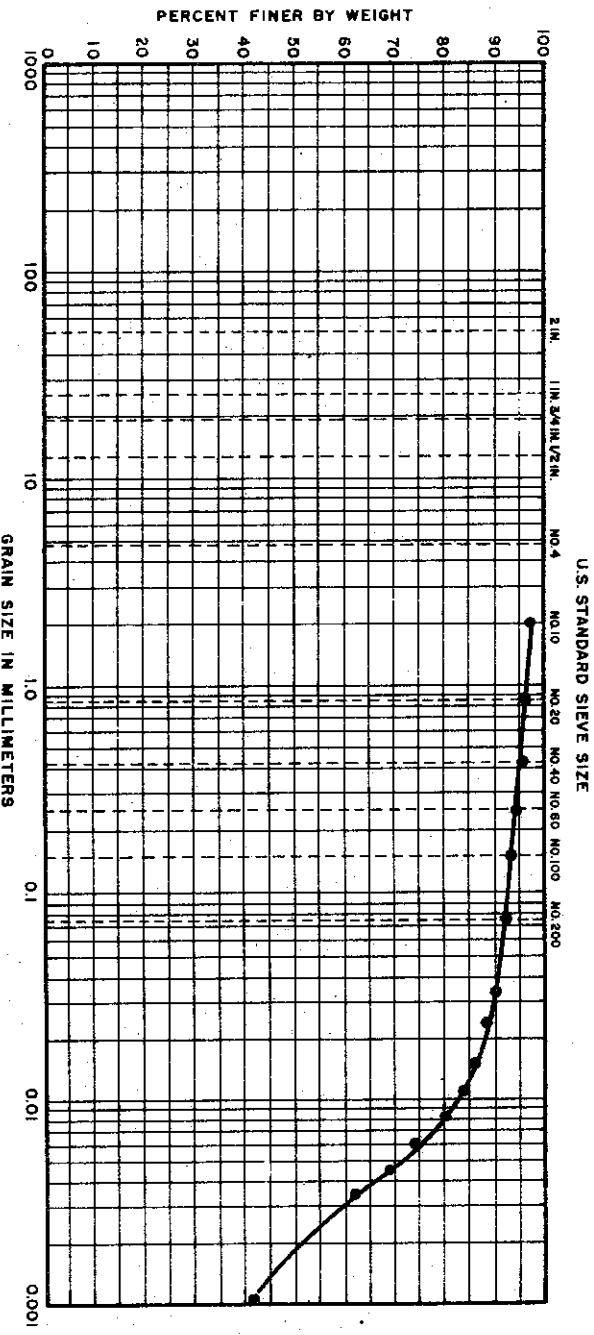
SPECIFIC GRAVITY: USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

C-642

FILE NO. 1255 DATE NOV. 1974

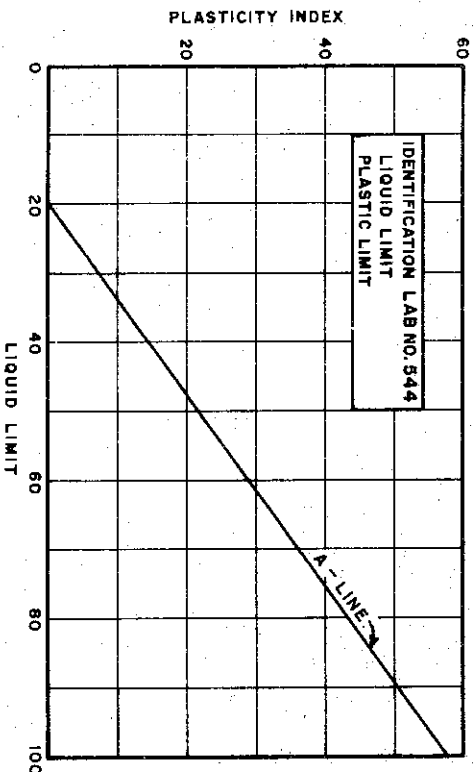
# GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)

EXPLORATION: BORING 151A

SAMPLE : 2

DEPTH : 7.7' TO 8.0'

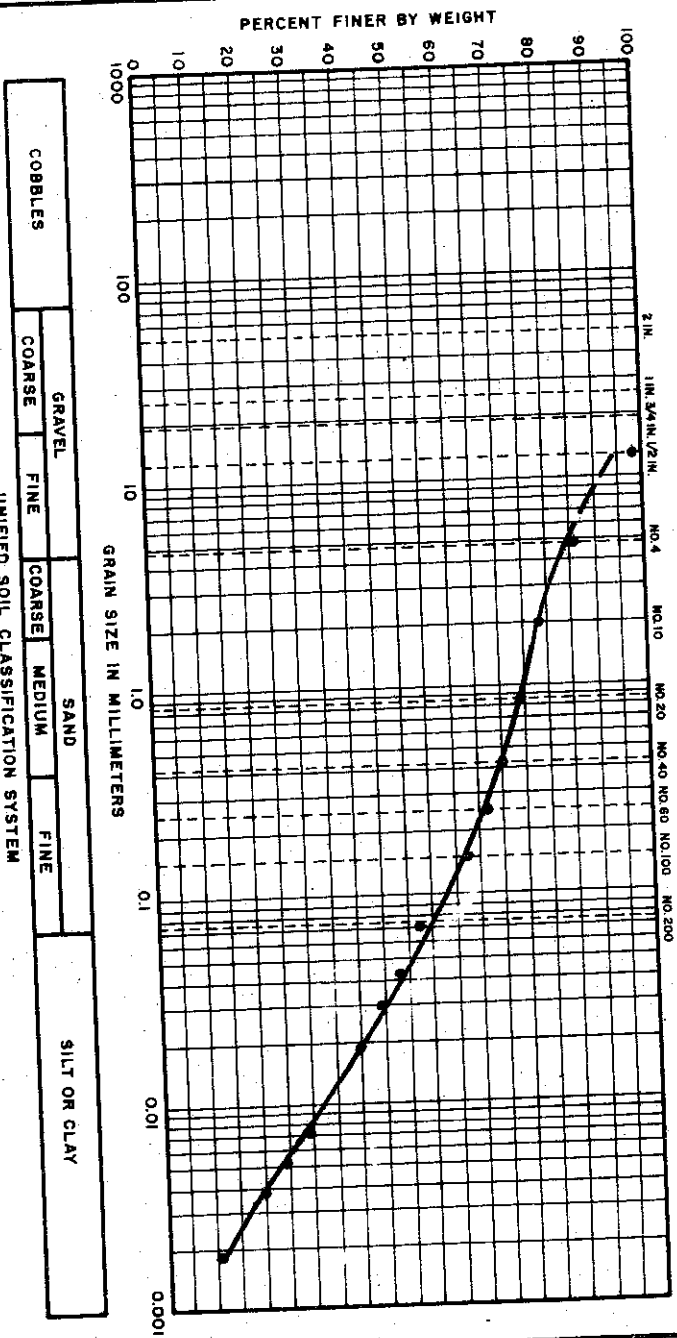
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

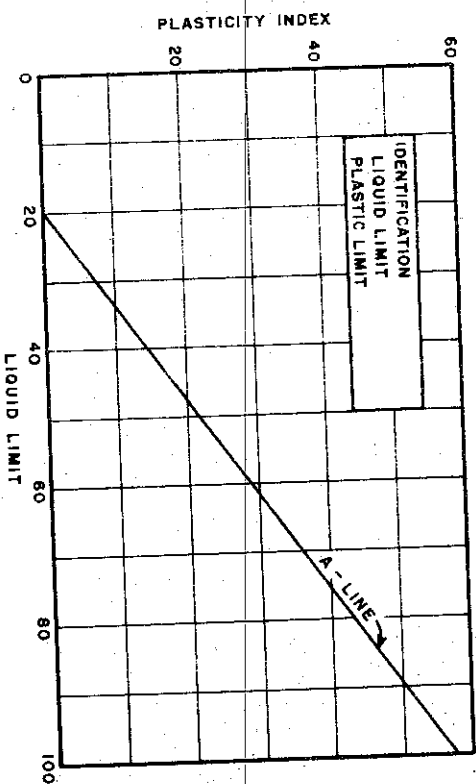
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

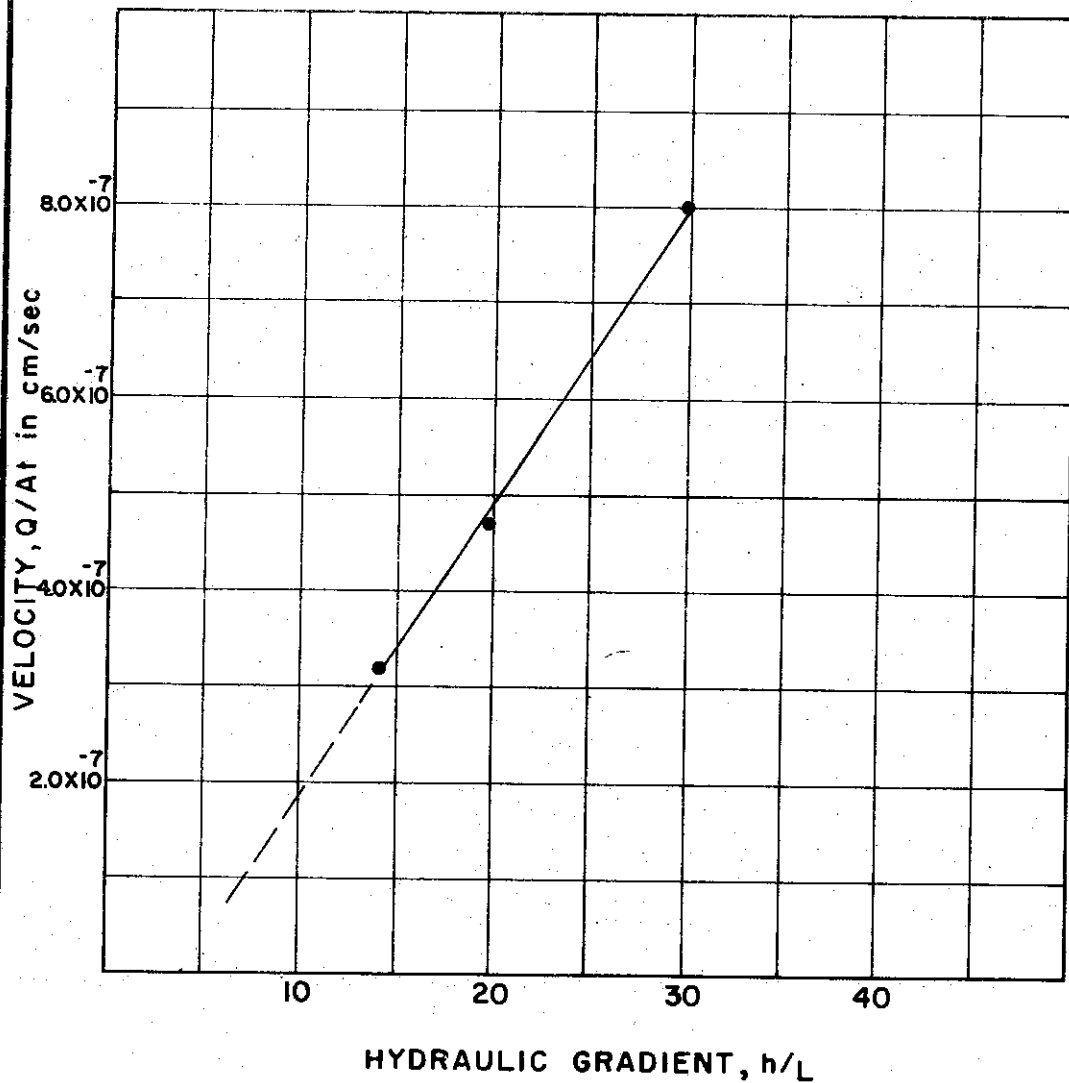


### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)  
 EXPLORATION: BORING 187  
 SAMPLE : SS14  
 DEPTH : 59.5' TO 60.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.875

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 84 pcf  
 INITIAL WATER CONTENT 37.2 % INITIAL VOID RATIO 1.002  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
				1.50	1.50	1.50
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		1.50	1.50	1.50	1.50
BACK PRESSURE TOP $\frac{kg}{cm^2}$	$u_{top}$			2.841	2.854	2.876
BACK PRESSURE BOTTOM $\frac{kg}{cm^2}$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.39	2.39	2.39	2.39
HYDRAULIC GRADIENT	i			14.72	20.6	29.44
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.94	4.00	6.85
TIME OF DISCHARGE sec	t			190,800	266,400	270,000
PERMEABILITY $cm/sec$	k			$2.18 \times 10^{-8}$	$2.30 \times 10^{-8}$	$2.72 \times 10^{-8}$

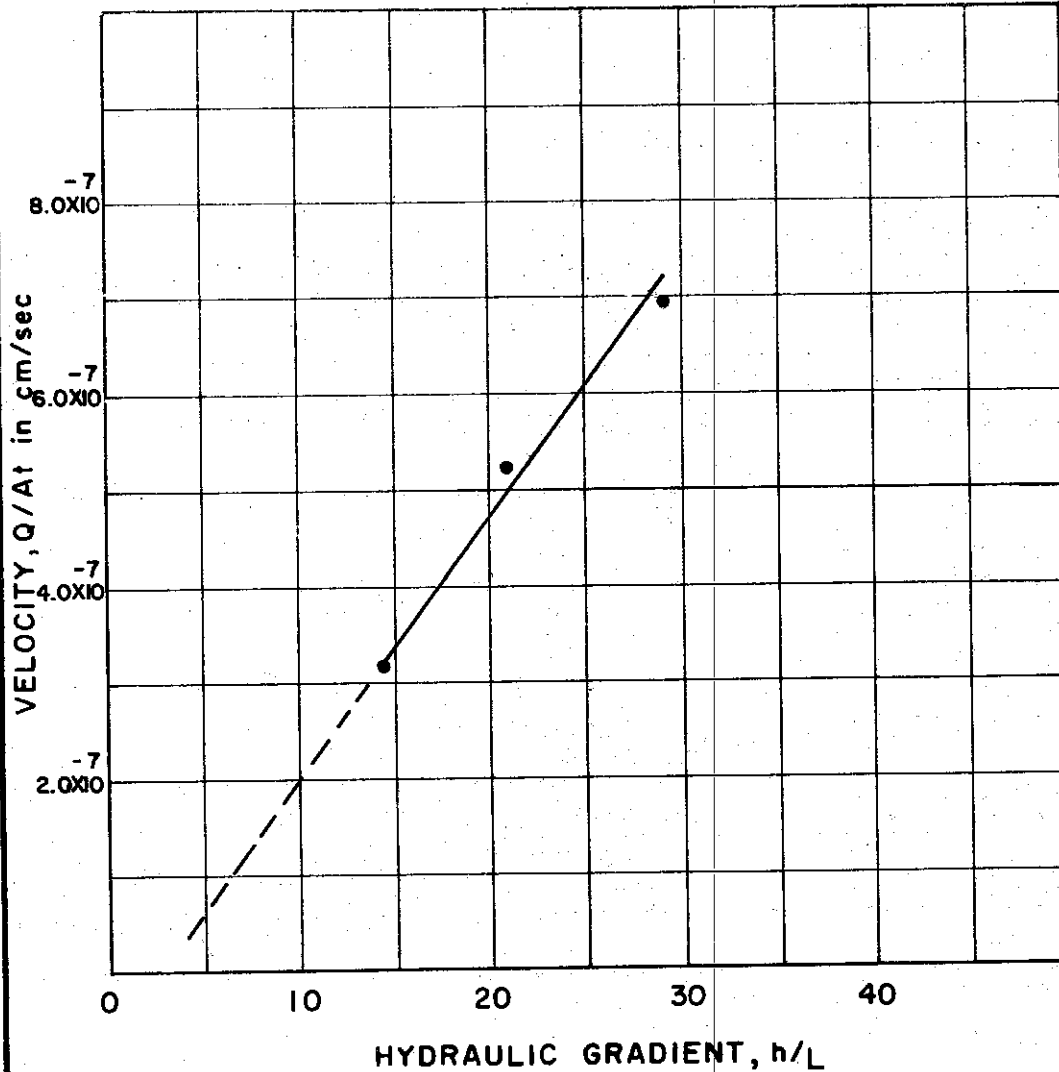
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.3' TO 28.5'

TEST NO. k 85.1  
 DATE JULY 74

FILE 1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.645

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 97 pcf  
 INITIAL WATER CONTENT 26.9 % INITIAL VOID RATIO 0.730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 16 %

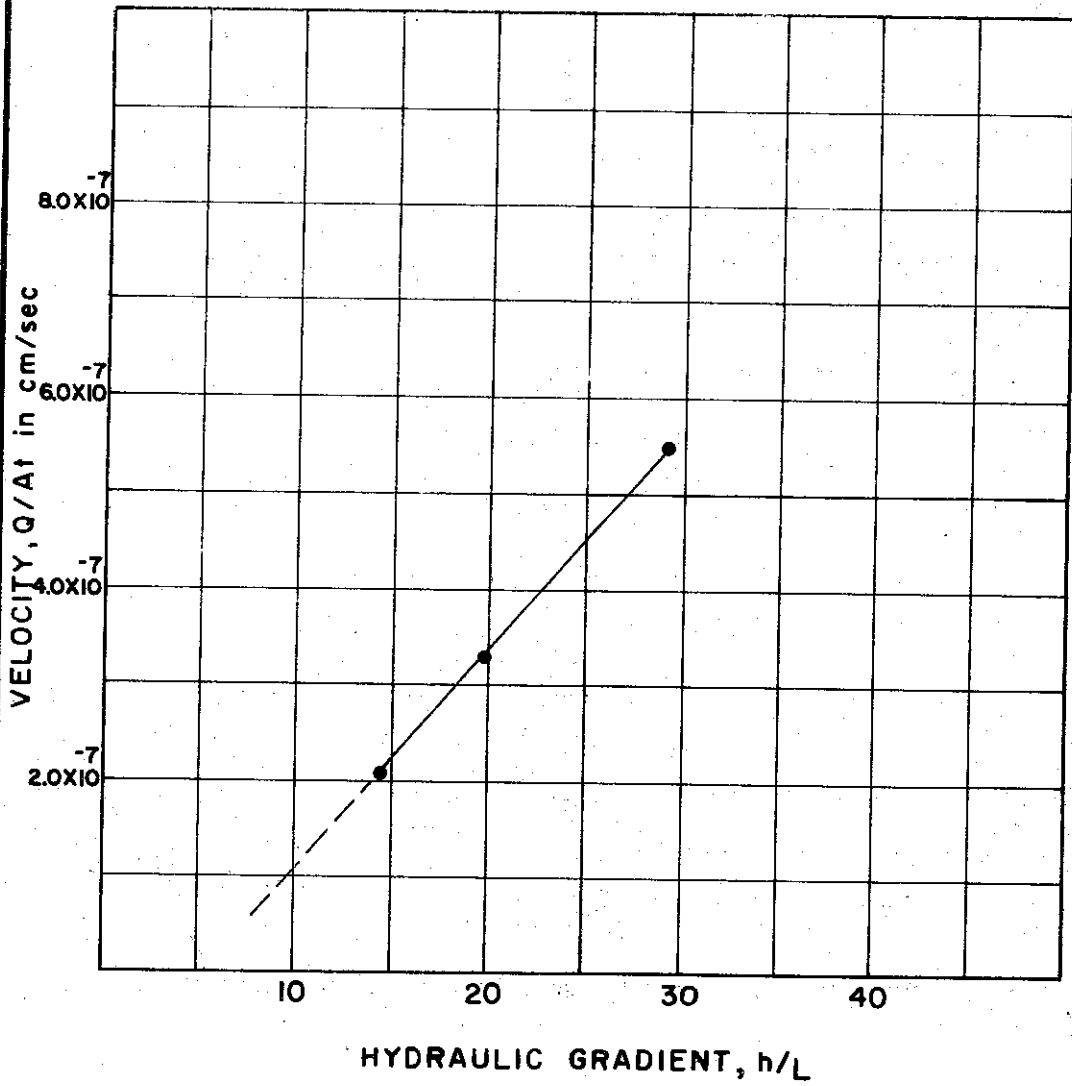
**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_1$ kg/cm <sup>2</sup>			2.00	2.00	2.00	2.00
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.31	29.00
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.94	1.38	1.66
TIME OF DISCHARGE sec. t				93,600	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.18x10	<sup>-8</sup> 2.58x10	<sup>-8</sup> 2.39x10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.6 TO 48.8'

TEST NO. K 87.1  
 DATE JULY 1974



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.374

C-647

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 119 pcf  
 INITIAL WATER CONTENT 15.1 % INITIAL VOID RATIO 0.411  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 23 % PLASTIC LIMIT 14 %

**TEST DATA**

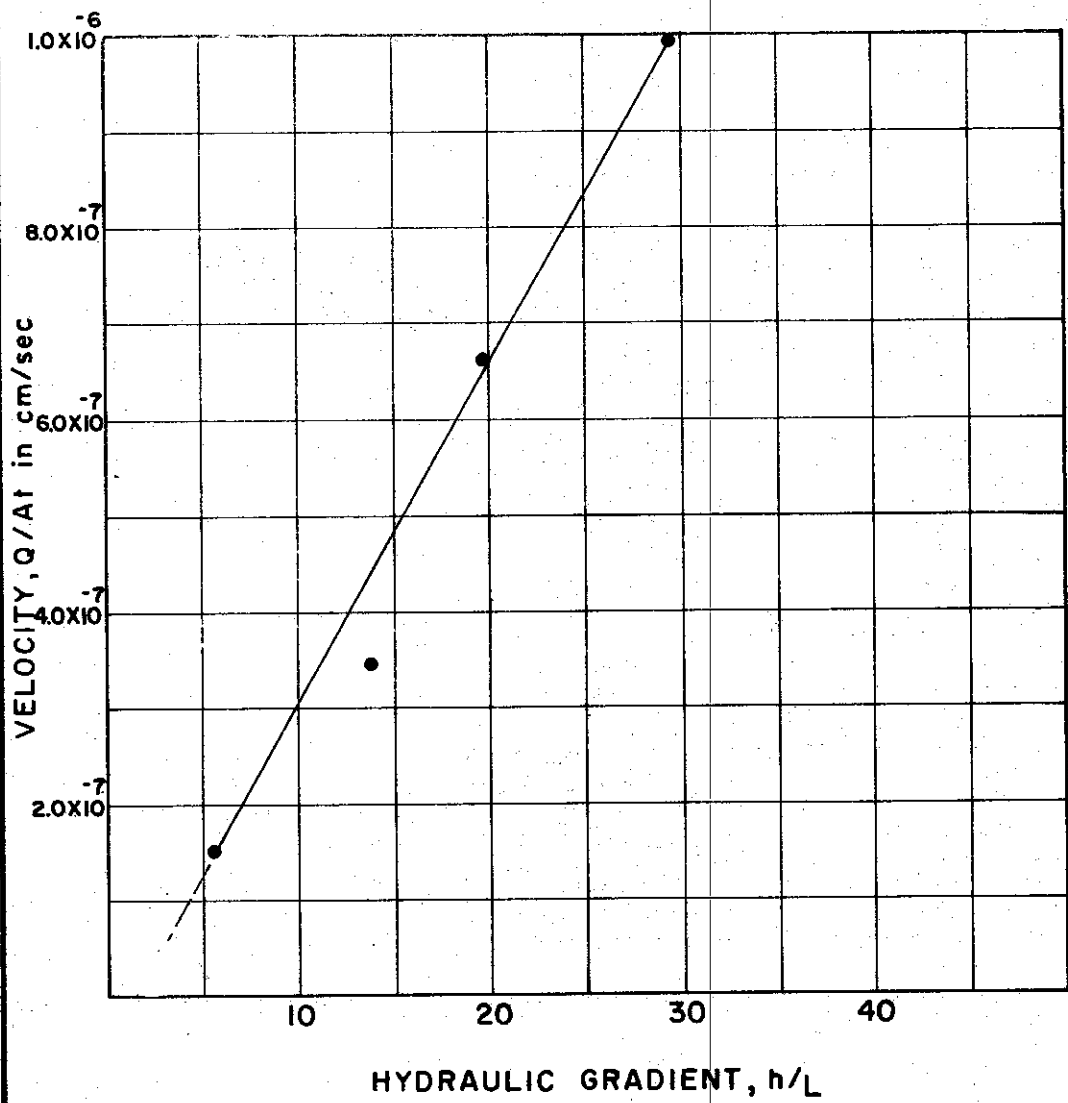
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		2.30	2.30	2.30	2.30
BACK PRESSURE TOP $\frac{kg}{cm^2}$ $u_{top}$				2.841	2.854	2.876
BOTTOM $\frac{kg}{cm^2}$ $u_{bot}$				2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.47	2.47	2.47	2.47
HYDRAULIC GRADIENT	i			14.20	19.87	28.40
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $\frac{cm^3}{cm}$	Q			1.26	3.38	3.40
TIME OF DISCHARGE $sec$	t			190,800	320,400	198,000
PERMEABILITY $\frac{cm}{sec}$	k			<sup>-8</sup> 1.46 x 10	<sup>-8</sup> 1.68 x 10	<sup>-8</sup> 1.91 x 10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 52  
 SAMPLE NO. 7  
 DEPTH 58.6' TO 58.9'

TEST NO. k112.1  
 DATE JULY 74





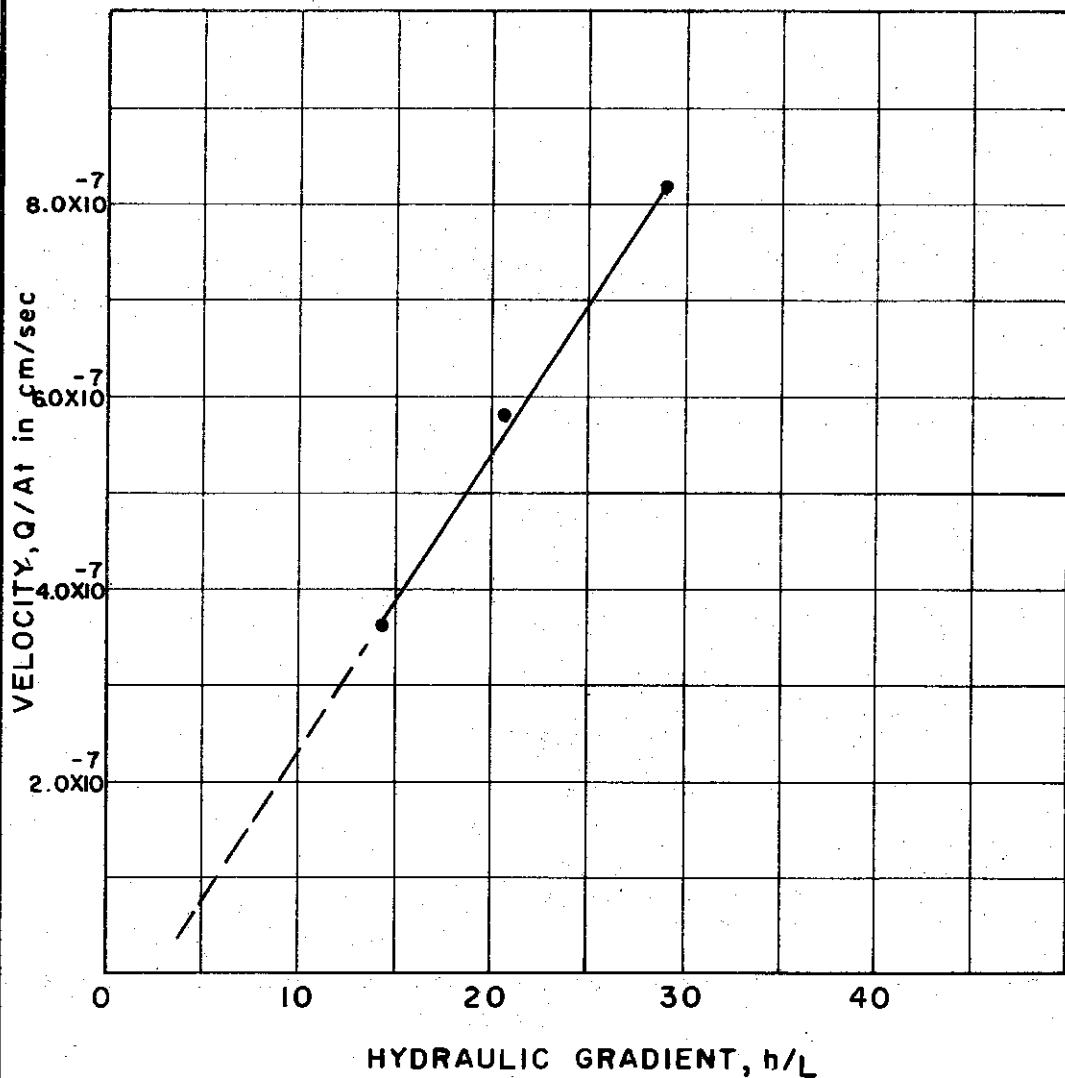
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.685

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
DRY UNIT WEIGHT	104 pcf
INITIAL WATER CONTENT	30.2 %
INITIAL VOID RATIO	0.732
ATTERBERG LIMITS:	
LIQUID LIMIT	39 %
PLASTIC LIMIT	20 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			1.74	1.74	1.74	1.74	1.74
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.810	2.841	2.854	2.876
BACK PRESSURE BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.806	2.806	2.806	2.806
DIFFERENTIAL HEAD cm. h				14.06	35.16	49.21	70.31
SAMPLE LENGTH cm. L		2.54	2.49	2.49	2.49	2.49	2.49
HYDRAULIC GRADIENT i				5.64	14.11	19.75	28.22
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				1.22	2.30	5.89	8.50
TIME OF DISCHARGE sec. t				248,400	212,400	277,200	270,000
PERMEABILITY cm/sec k				2.75 × 10 <sup>-8</sup>	2.42 × 10 <sup>-8</sup>	3.40 × 10 <sup>-8</sup>	3.52 × 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 53 TEST NO. k 98.1  
 SAMPLE NO. 5 DATE JULY 74  
 DEPTH 39.5' TO 39.8'



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE=0.641

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2 % INITIAL VOID RATIO 0.724  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.40	2.40	2.40	2.40
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BACK PRESSURE BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.33	29.0
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				1.08	1.52	1.76
TIME OF DISCHARGE sec t				93,800	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.52X10	<sup>-8</sup> 2.85X10	<sup>-8</sup> 2.53X10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

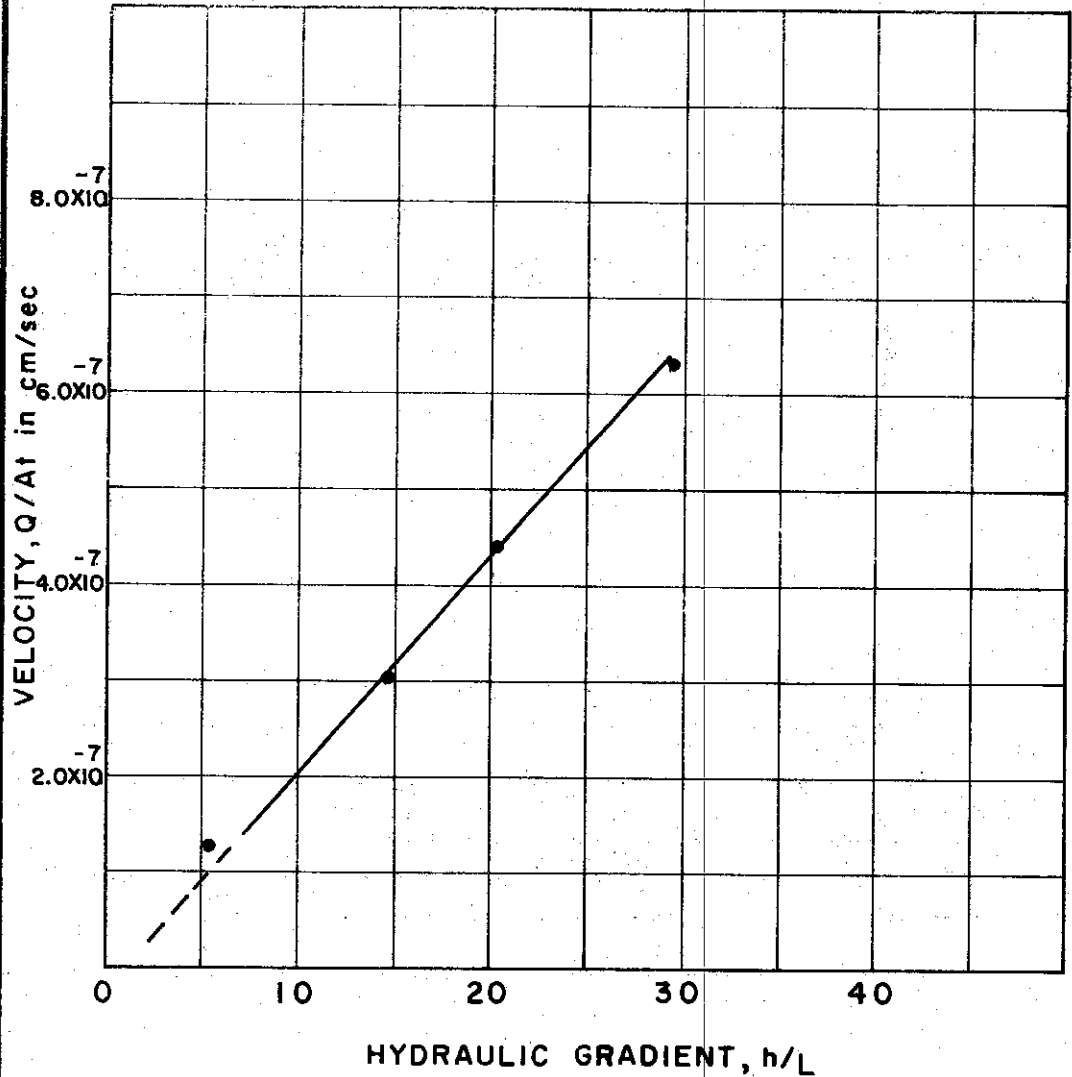
## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5' TO 63.8'

TEST NO. K 399.1  
 DATE JULY 1974

FILE 1255

C-650



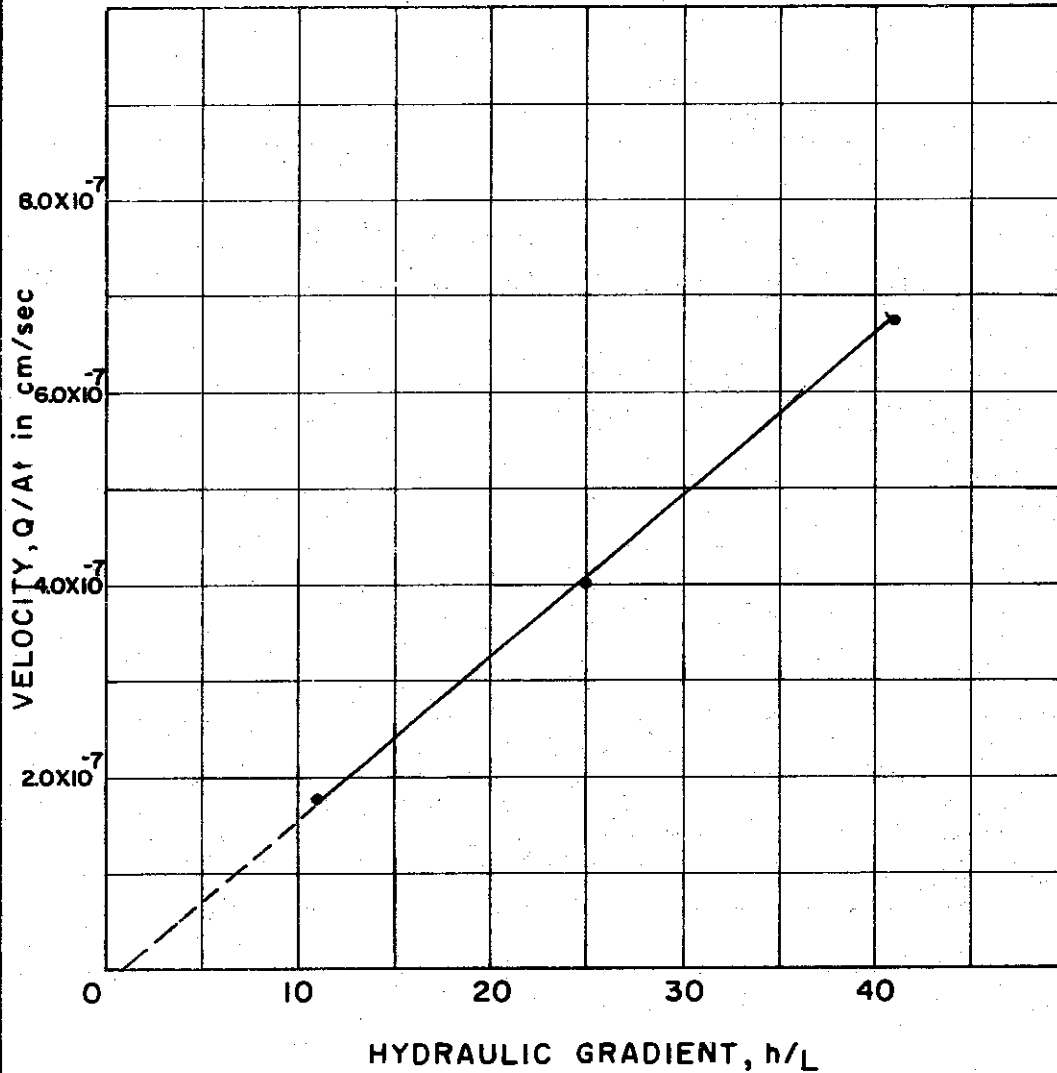
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.72

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
DRY UNIT WEIGHT	90 pcf
INITIAL WATER CONTENT	31.6 %
INITIAL VOID RATIO	0.851
ATTERBERG LIMITS:	
LIQUID LIMIT	45 %
PLASTIC LIMIT	21 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\sigma$		2.71	2.71	2.71	2.71	2.71
BACK PRESSURE TOP $\frac{kg}{cm^2}$	$u_{top}$			2826	2847	2862	2883
BOTTOM $\frac{kg}{cm^2}$	$u_{bot}$			2812	2812	2812	2812
DIFFERENTIAL HEAD cm.	h			14.06	35.15	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.376	2.376	2.376	2.376	2.376
HYDRAULIC GRADIENT	i			5.92	14.80	20.71	29.50
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			0.48	0.88	1.10	1.39
TIME OF DISCHARGE $sec$	t			108,000	90,000	79,200	75,600
PERMEABILITY $cm/sec$	k			$2.37 \times 10^{-8}$	$2.09 \times 10^{-8}$	$2.18 \times 10^{-8}$	$2.00 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 54 TEST NO. K 401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7 TO 74.0'



REMARKS:

C-651

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 103 pcf  
 INITIAL WATER CONTENT 26.1 % INITIAL VOID RATIO 0.707  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

### TEST DATA

	S Y M	INITIAL	CONSOL. STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			1.05	1.05	1.05	1.05
BACK PRESSURE TOP $u_{top}$ kg/cm <sup>2</sup>				2.488	2.521	2.565
BACK PRESSURE BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.460	2.460	2.460
DIFFERENTIAL HEAD cm. h				27.7	63.0	103.8
SAMPLE LENGTH cm. L		6.48	6.40	6.40	6.40	6.40
HYDRAULIC GRADIENT i				11.0	25.0	41.2
SAMPLE AREA cm <sup>2</sup> A		11.37	11.37	11.37	11.37	11.37
WATER DISCHARGED cm <sup>3</sup> Q				.13	.29	.58
TIME OF DISCHARGE sec t				72,000	72,000	86,000
PERMEABILITY cm/sec k				1.60 x 10 <sup>-8</sup>	1.61 x 10 <sup>-8</sup>	1.63 x 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

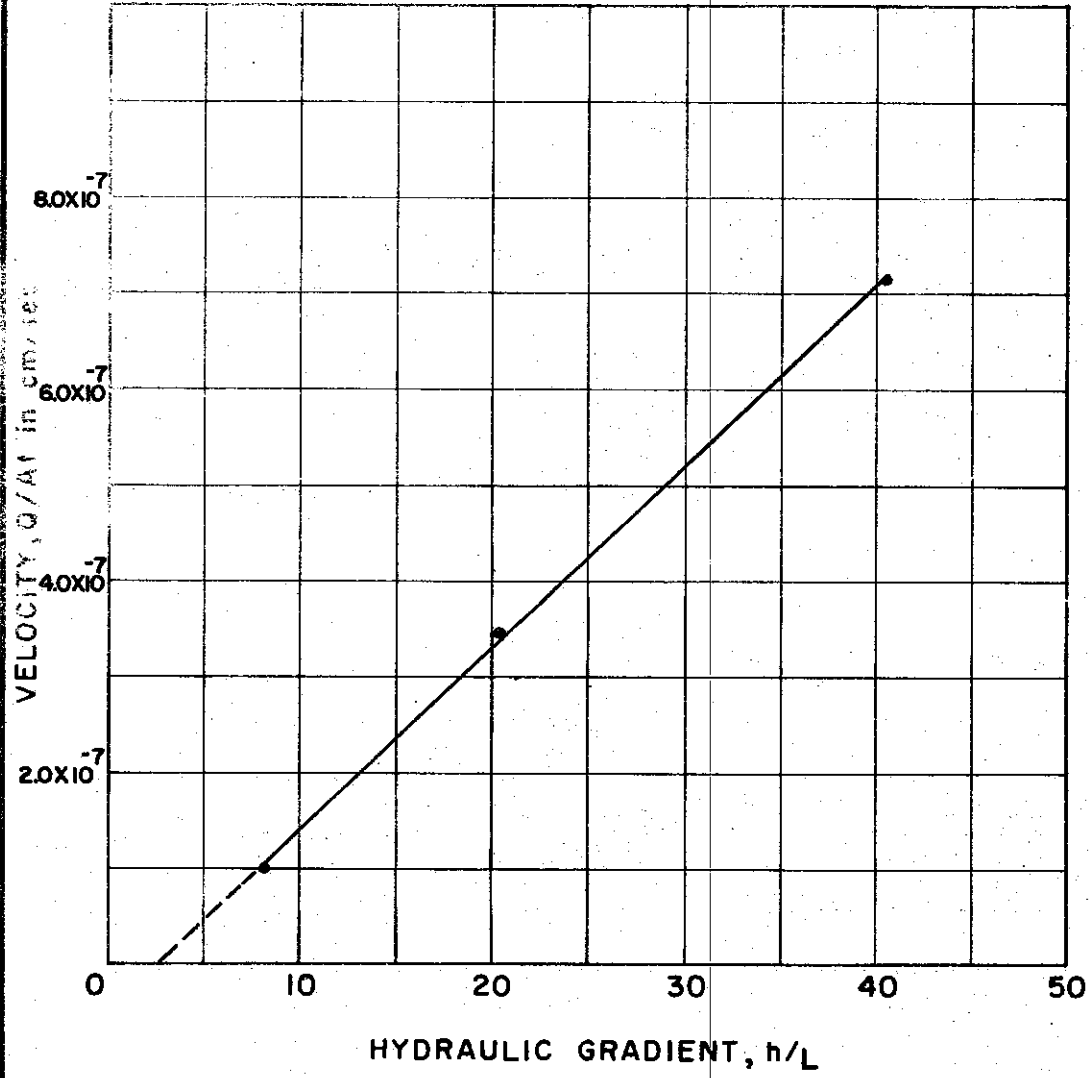
## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 60  
 SAMPLE NO. 3  
 DEPTH 18.1' TO 18.3'

TEST NO. k43.1  
 DATE MARCH 74

FILE 1255

C-652



REMARKS:

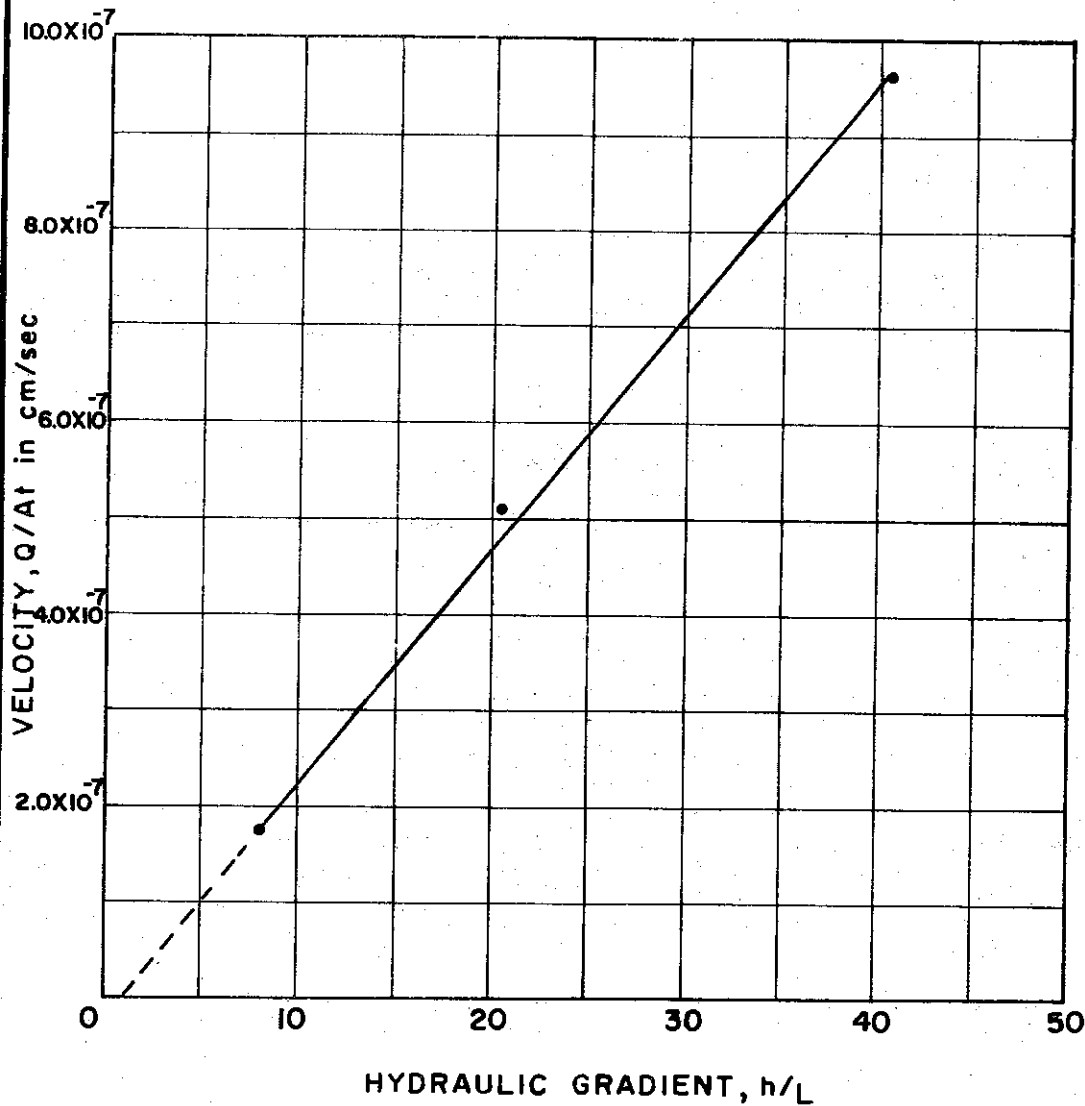
**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY ≈ 2.70 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2% INITIAL VOID RATIO .730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 33 % PLASTIC LIMIT 18 %

**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\text{kg/cm}^2$	$\sigma$		2.20	2.20	2.20	2.20
BACK PRESSURE TOP $\text{kg/cm}^2$	$u_{top}$			2.826	2.847	2.882
BOTTOM $\text{kg/cm}^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	h			14.06	35.16	70.30
SAMPLE LENGTH cm.	L	1.90	1.73	1.73	1.73	1.73
HYDRAULIC GRADIENT	i			8.13	20.32	40.63
SAMPLE AREA $\text{cm}^2$	A	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $\text{cm}^3$	Q			.21	.66	.23
TIME OF DISCHARGE sec	t			66,600	59,400	10,200
PERMEABILITY $\text{cm/sec}$	k			$1.25 \times 10^{-8}$	$1.75 \times 10^{-8}$	$1.76 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**  
 BORING NO. 60 TEST NO. k51.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 56.1' TO 56.4'



REMARKS:

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 96 pcf  
 INITIAL WATER CONTENT 29.1 % INITIAL VOID RATIO .753  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $kg/cm^2$	$\sigma$		3.00	3.00	3.00	3.00
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.836	2.847	2.882
BOTTOM $kg/cm^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	$h$			14.06	35.16	70.30
SAMPLE LENGTH cm.	$L$	1.90	1.74	1.74	1.74	1.74
HYDRAULIC GRADIENT	$i$			8.08	20.20	40.40
SAMPLE AREA $cm^2$	$A$	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $cm^3$	$Q$			.34	.97	.31
TIME OF DISCHARGE $sec$	$t$			63,000	59,400	10,200
PERMEABILITY $cm/sec$	$k$			$2.10 \times 10^{-8}$	$2.55 \times 10^{-8}$	$2.37 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

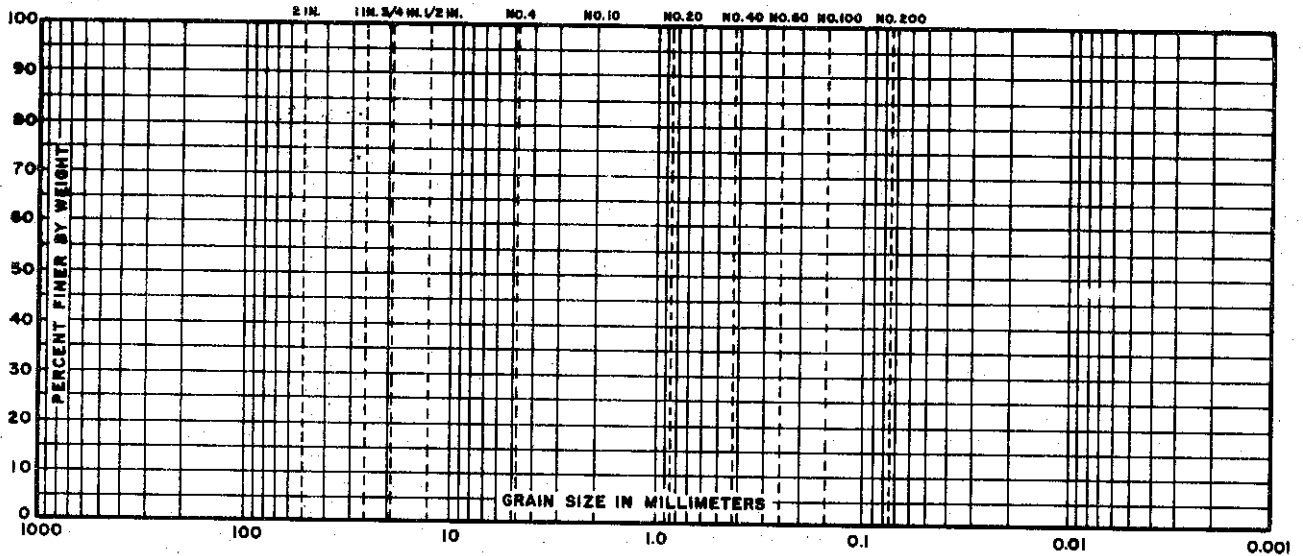
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.6' TO 86.1'

TEST NO. k 56.1  
 DATE MARCH 74

FILE 1255

# GRAIN SIZE DISTRIBUTION

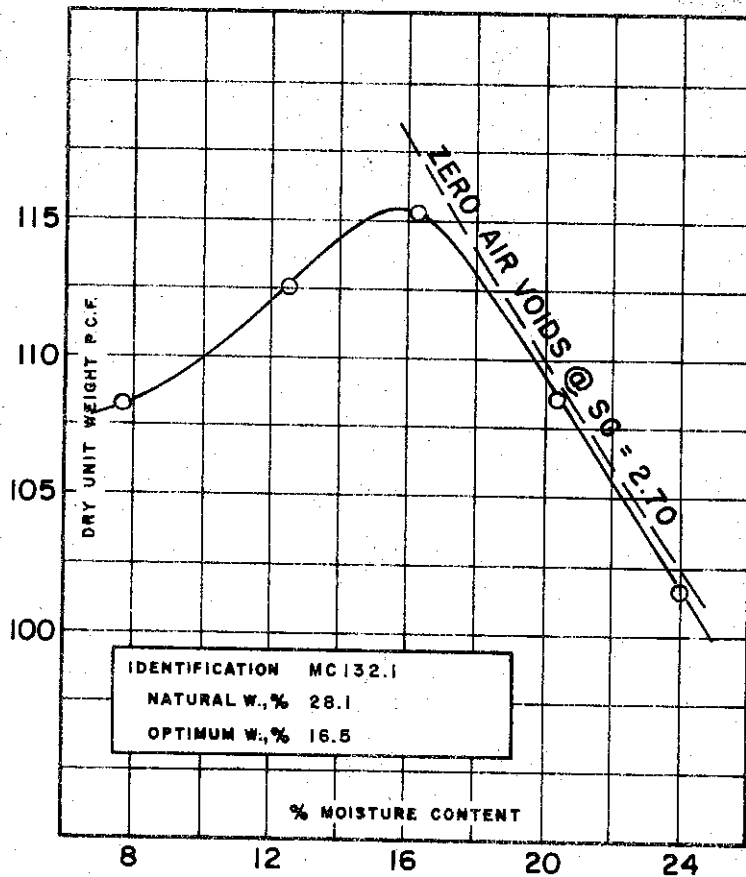
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 50  
 PLASTIC LIMIT 17

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 49  
 SAMPLE 2  
 DEPTH 6.0' TO 8.1'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

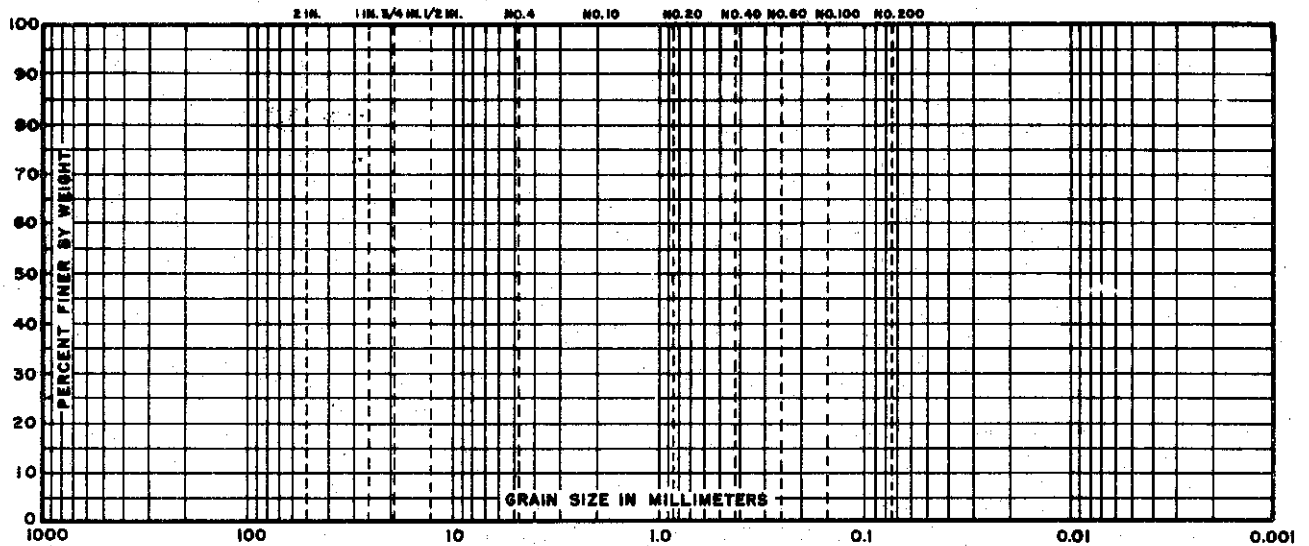
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE MARCH 74

# GRAIN SIZE DISTRIBUTION

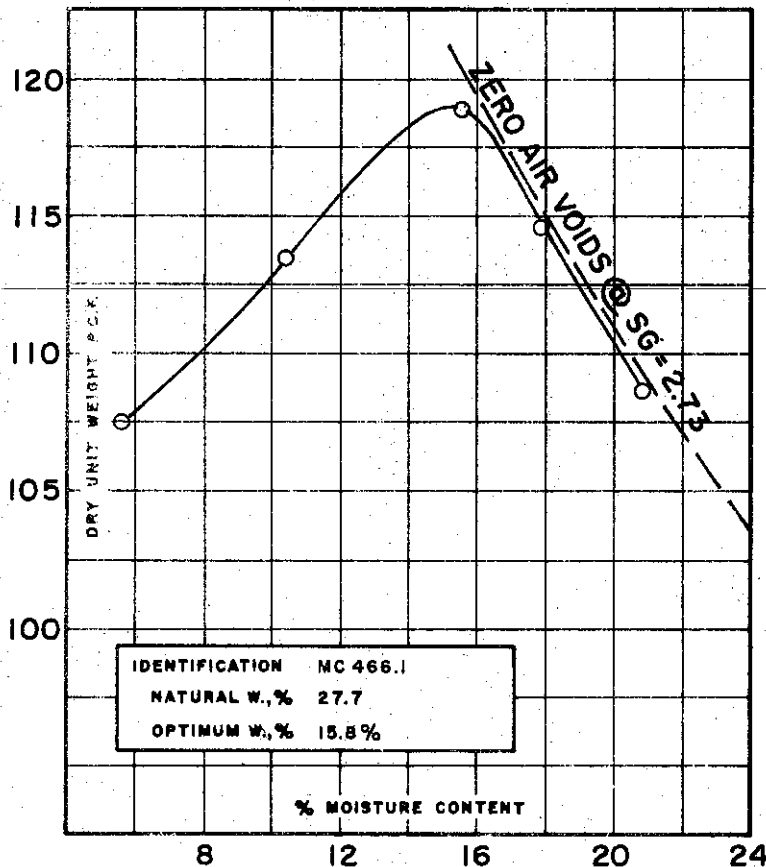
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION	MC 466.1
NATURAL W, %	27.7
OPTIMUM W, %	15.8%

## ATTERBERG LIMITS

IDENTIFICATION SEE DATA FOR  
 LIQUID LIMIT INDIVIDUAL  
 PLASTIC LIMIT SAMPLES

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 101, 105, 127, 128, 180 & 183  
 SAMPLE COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

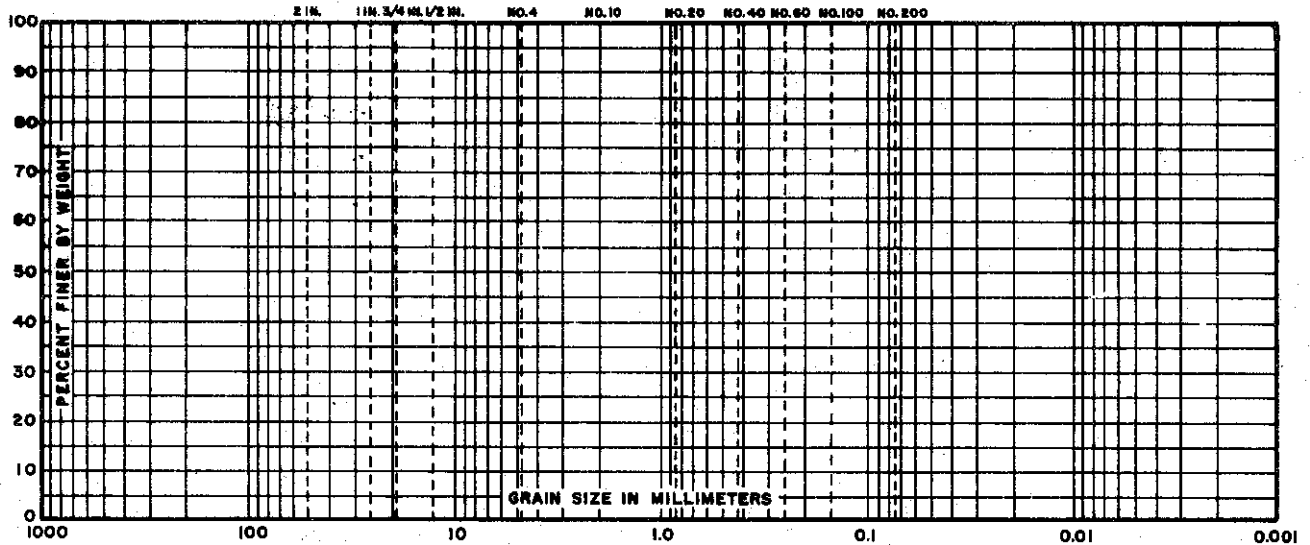
C-656

FILE NO. 1255 DATE APRIL 74



# GRAIN SIZE DISTRIBUTION

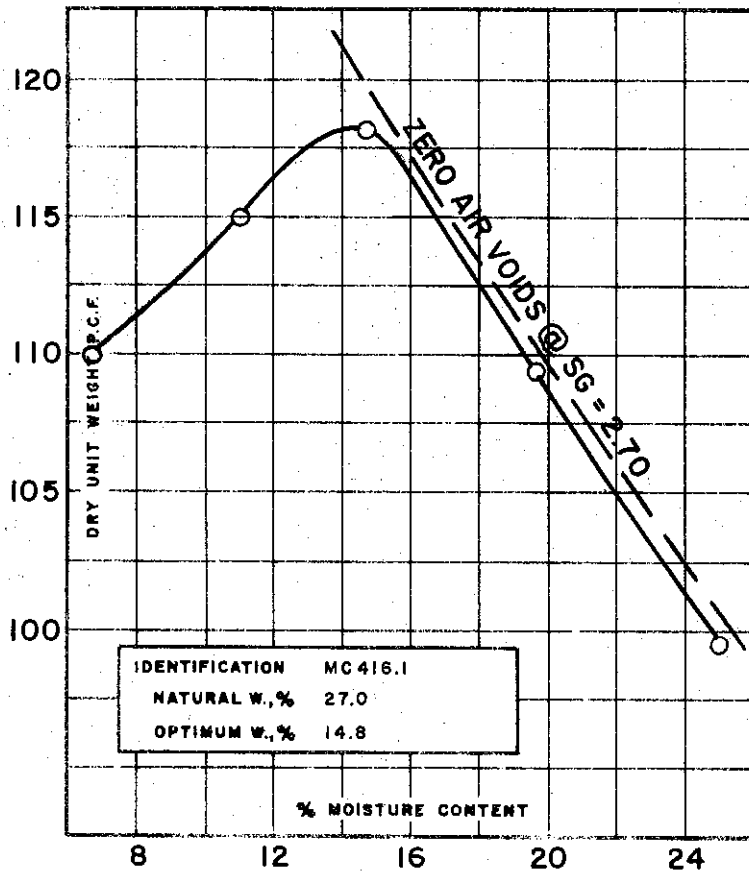
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 416.1  
 NATURAL W.,% 27.0  
 OPTIMUM W.,% 14.8

## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49  
 PLASTIC LIMIT 22

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 127  
 SAMPLE 3  
 DEPTH 5.6' TO 7.0'

## COMPACTION METHOD

ASTM TEST 01557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.56", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

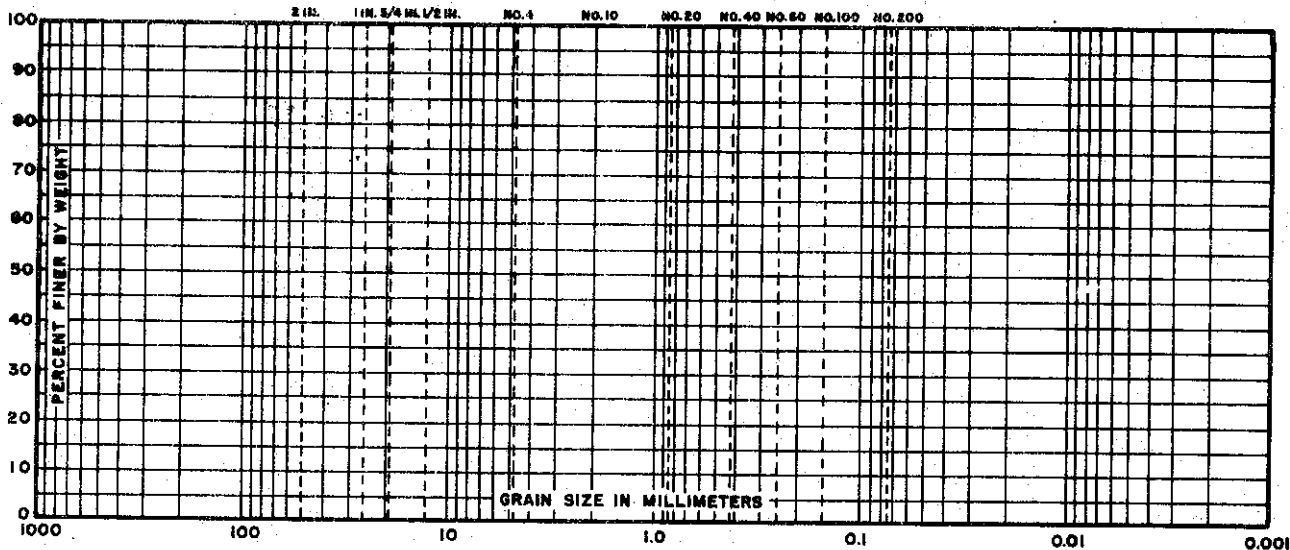
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE JULY 74

# GRAIN SIZE DISTRIBUTION

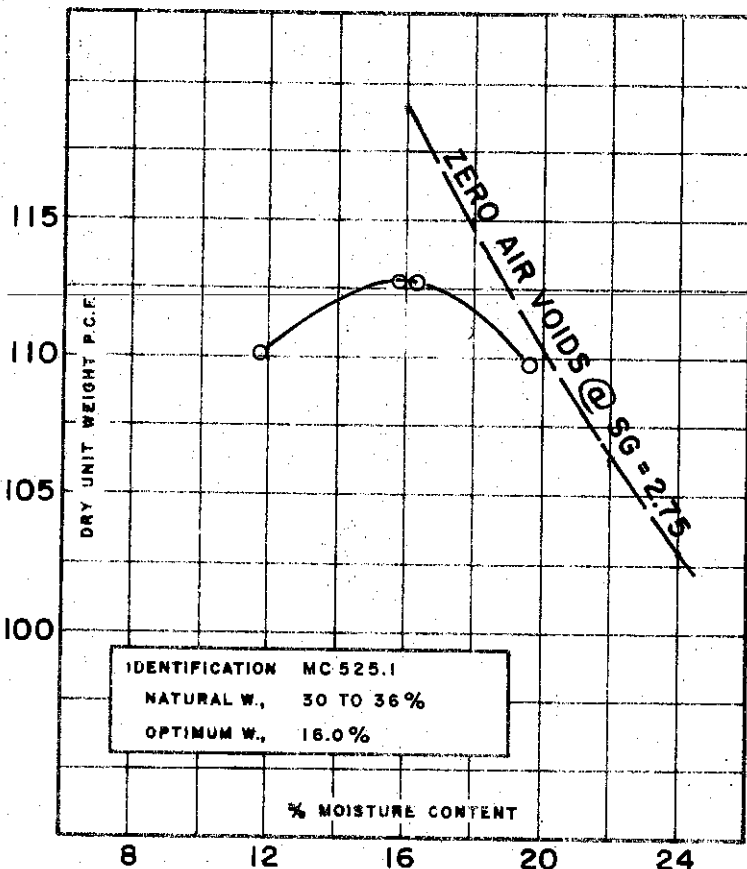
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 525.1  
 NATURAL W., 30 TO 36%  
 OPTIMUM W., 16.0%

## ATTERBERG LIMITS

IDENTIFICATION  
 LIQUID LIMIT  
 PLASTIC LIMIT

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 136  
 SAMPLE 2  
 DEPTH 3:0' TO 5:0'

## COMPACTION METHOD

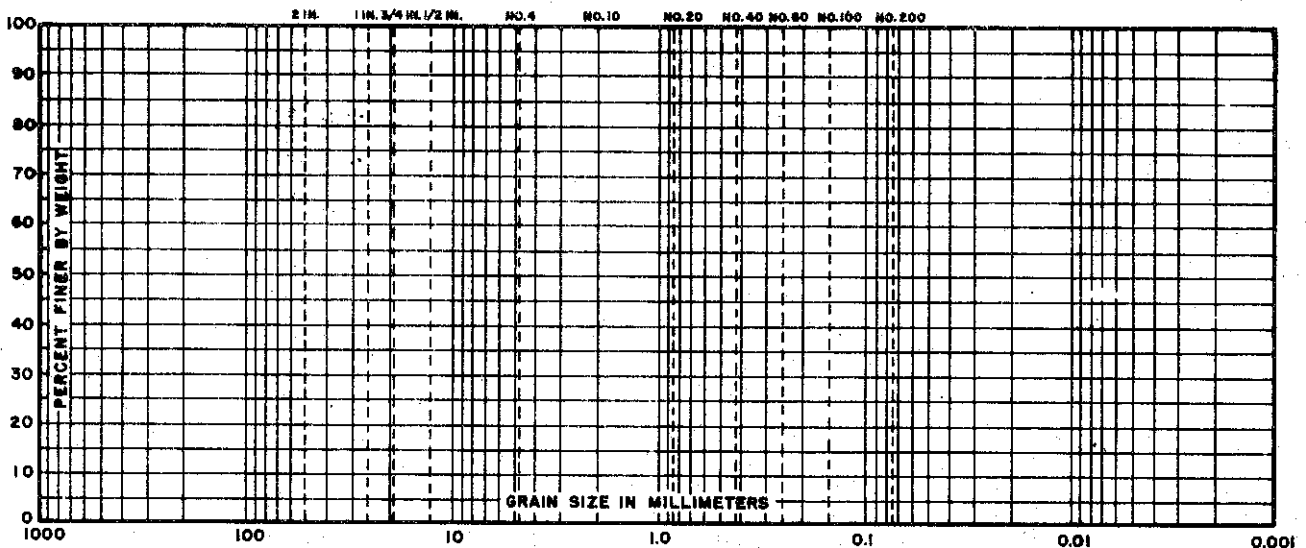
ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

# GRAIN SIZE DISTRIBUTION

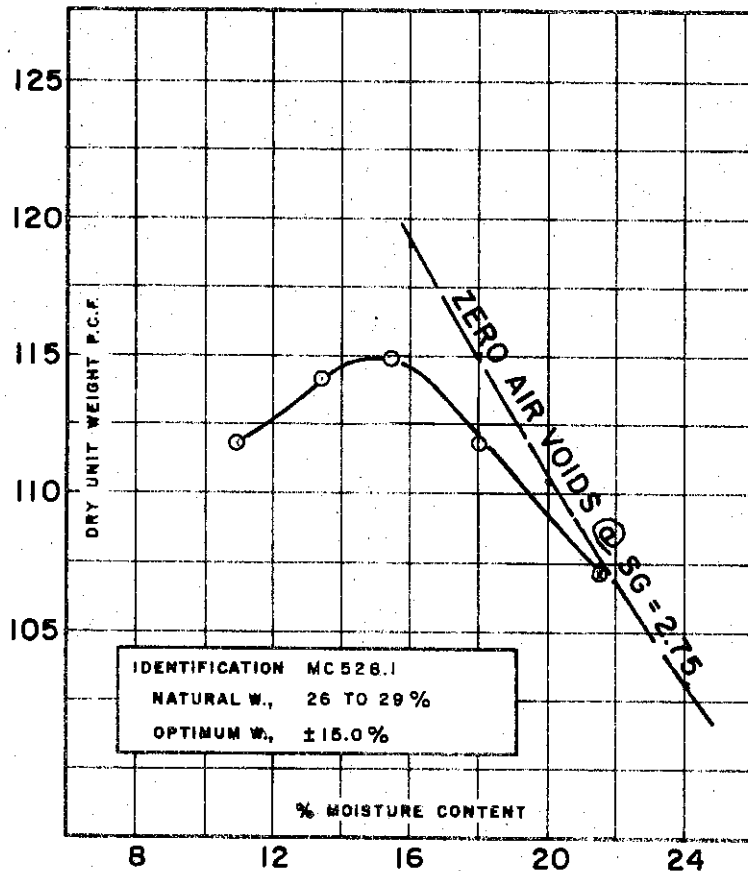
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 528.1  
 LIQUID LIMIT 56  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 141  
 SAMPLE 1  
 DEPTH 3.0' TO 5.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C.  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

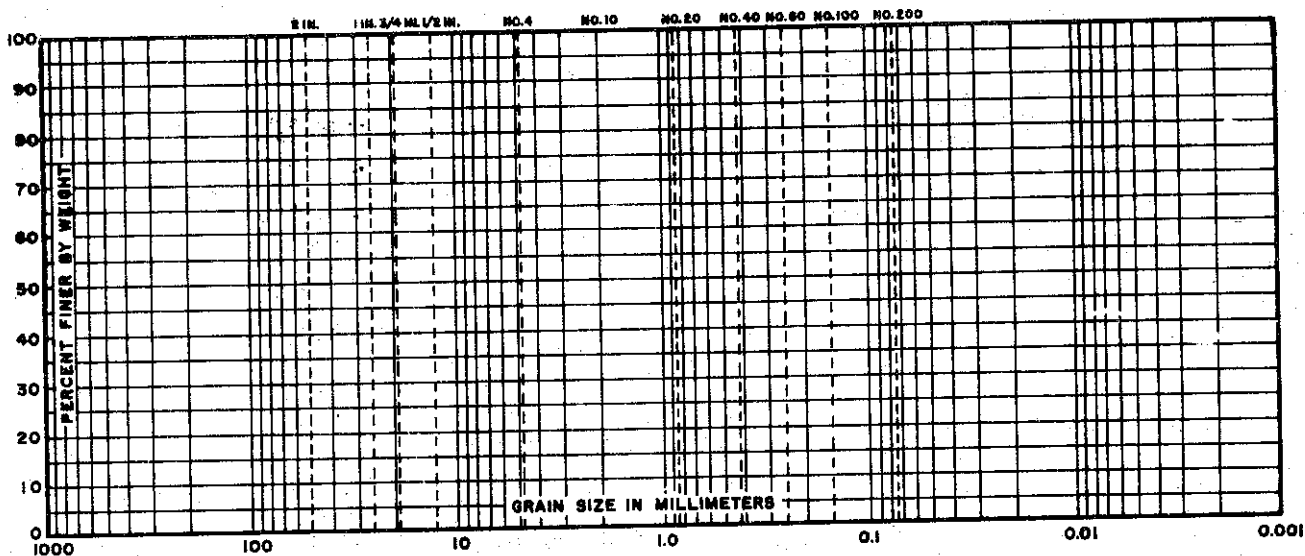
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

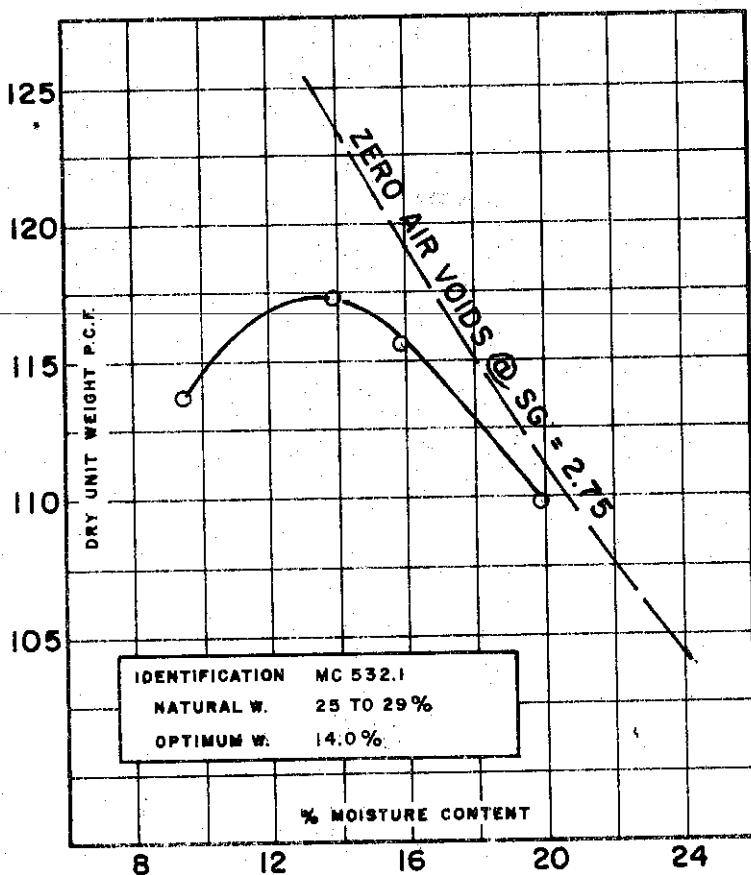
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 532.1  
 LIQUID LIMIT 54  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 142  
 SAMPLE 1  
 DEPTH 3.0' TO 5.5'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

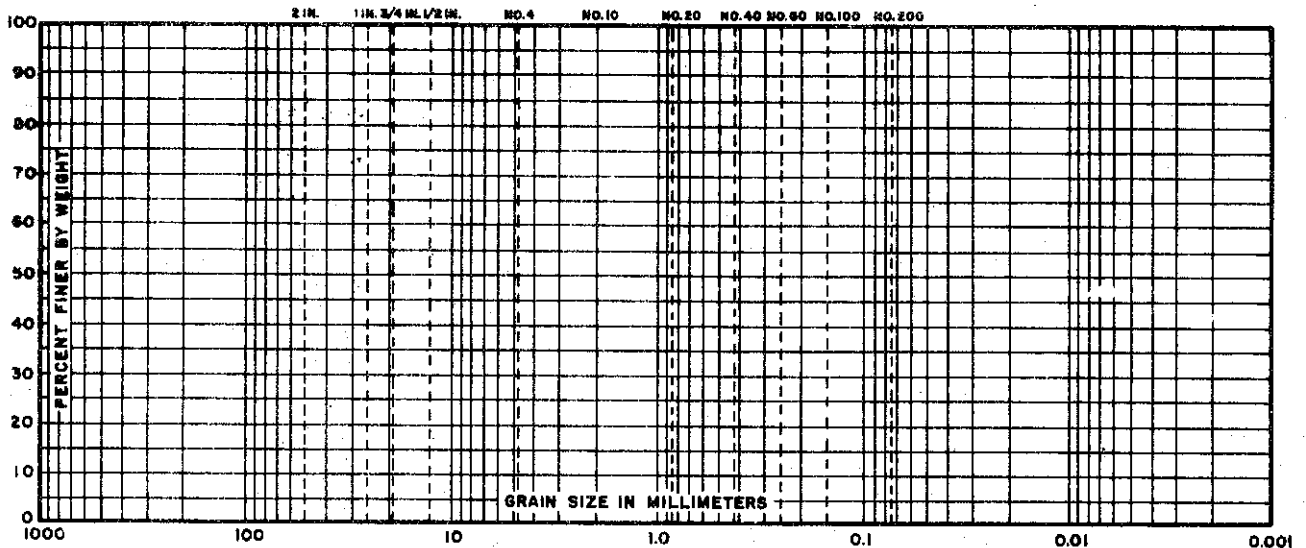
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

C-660

# GRAIN SIZE DISTRIBUTION

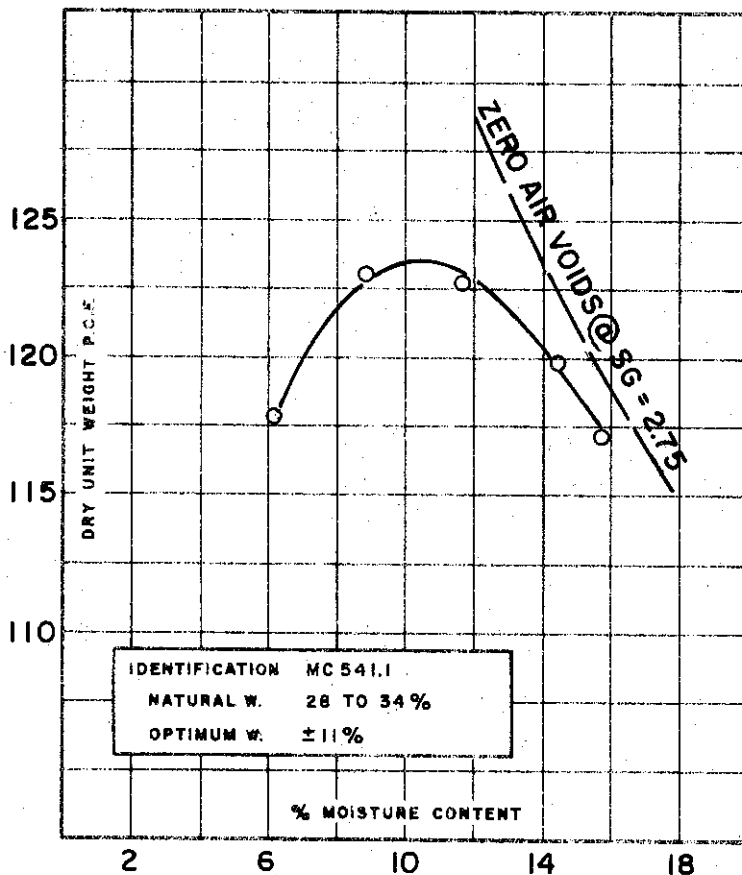
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 541.1  
 NATURAL W. 28 TO 34%  
 OPTIMUM W. ±11%

## ATTERBERG LIMITS

IDENTIFICATION L 541.1  
 LIQUID LIMIT 38  
 PLASTIC LIMIT 19

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING 146  
 SAMPLE 5  
 DEPTH 10.0' TO 12.0'

## COMPACTION METHOD

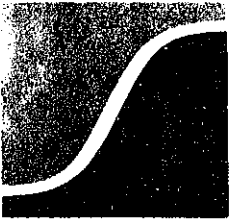
ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

## Appendix D



U.W. STOLL AND ASSOCIATES soil mechanics and foundation consultants  
 111 WEST KINGSLEY STREET ANN ARBOR, MICHIGAN 48103 (313) 994-5055

ULRICH W. STOLL  
 GARRETT EVANS  
 IN-KUIN KIM

September 8, 1975

Mr. Sherif Afifi  
 Bechtel Power Corporation  
 P. O. Box 1000  
 777 East Eisenhower Parkway  
 Ann Arbor, Michigan 48106

SUBJECT: Soil Testing  
 Hopper Investigation  
 Belle River Coal Handling  
 Detroit Edison Company  
 Technical Specification, 10539-3-C-13  
 REFERENCE: Purchase Order No. AA2184

Dear Sir:

Enclosed herewith is the summary of laboratory testing conducted on soil samples received from the subject site, as authorized by the referenced purchase order. The laboratory testing was performed in accordance with your technical specification 10539-3-C-13 and included the following tests:

	<u>Pages</u>
30 Visual Classification and In-Situ Moistures	B-1, B-2, B-9
10 Atterberg Limits	B-3, B-4, B-5
30 Unconfined Compression	B-6 through B-28
2 In-Situ Moisture and Density	B-6, B-8
5 Mechanical Analysis	B-29, B-30

We appreciate the opportunity of serving you and trust that this work has been performed to your satisfaction.

Very truly yours,

U. W. STOLL AND ASSOCIATES

In-Kuin Kim, P.E.

IKK/jb

Enclosures

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-1	23.2	GRAY-BROWN MOTTLED CLAY
	S-2	25.6	BROWN LAYERED CLAY
	S-3	38.6	GRAY CLAY WITH DRILL WASH
	S-4	35.9	GRAY CLAY WITH DRILL WASH
	S-5	39.6	GRAY CLAY WITH DRILL WASH
	S-6	43.1	GRAY CLAY WITH DRILL WASH
	S-7	39.4	GRAY CLAY
	S-8	32.5	GRAY CLAY
	S-9	34.6	GRAY CLAY
	S-10	37.1	GRAY CLAY
	S-11	33.4	GRAY CLAY
	S-12	30.7	GRAY CLAY WITH DRILL WASH
	S-13	28.7	GRAY CLAY WITH TRACE OF DRILL WASH
	S-14	27.2	GRAY CLAY WITH TRACE OF DRILL WASH
	S-15	27.1	GRAY CLAY
	S-16	24.2	GRAY CLAY
	S-17	24.0	GRAY CLAY
	S-18	24.8	GRAY CLAY
	S-19	26.8	GRAY CLAY WITH TRACE OF DRILL WASH
	S-20	25.4	GRAY CLAY
	S-21	25.9	GRAY CLAY
	S-22	27.8	GRAY CLAY
	S-23	26.7	GRAY CLAY
	S-24	25.9	GRAY CLAY
	S-25	32.2	GRAY CLAY



U. W. STILL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-26	40.6	GRAY CLAY
	S-27	25.7	WET CLAYEY SILT
	S-28	12.6	SANDY SILT
	S-29	10.2	DECOMPOSED SHALE



**U. W. STOLL and ASSOCIATES**  
 SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: LABORATORY TEST DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH OF SAMPLE (FT.)	MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION (% OF TEST SAMPLE)							ATTERBERG LIMITS			STRENGTH TESTS				
			NATURAL MOISTURE (% OF DRY WTS.)	NATURAL DRY DENSITY (LBS/CU.FT.)	COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	TYPE OF TEST	MAX. PRINCIPAL STRESS (KG/SQ.CM.)	MIN. PRINCIPAL STRESS (KG/SQ.CM.)	AXIAL STRAIN AT FAILURE (%)	SHEAR STRENGTH (PSF)
B-193	ST-1	6	13.4	103.6									44	21		UNCONF.		5%	4200
	ST-4	18.5	36.3	85.5									40	18		UNCONF.		3%	870
	ST-7	33.5	42.6	80.5									45	21		UNCONF.		3%	690
	ST-11	51.5	27.5	95.5									49	23		UNCONF.		6%	680
	ST-13	61.5	25.7	99.3									33	14		UNCONF.		16%	1190
	ST-15	72.5	22.2	103.6									36	16		UNCONF.		14%	1690
	ST-16	77.0	26.9	95.5									32	13		UNCONF.		5%	500
	ST-16	78.0	26.3	96.1												UNCONF.		4%	1560
	ST-19	98.0	23.6	99.3									33	13		UNCONF.			590
B-192	ST-1	20.0	31.9	88.7									39	18		UNCONF.		8%	460
	ST-4	35.0	33.1	88.0									48	22		UNCONF.		2%	710
	ST-6	45.0	39.2	78.7												UNCONF.		1%	630
	ST-7	52.0	34.5	87.4												UNCONF.		4%	660

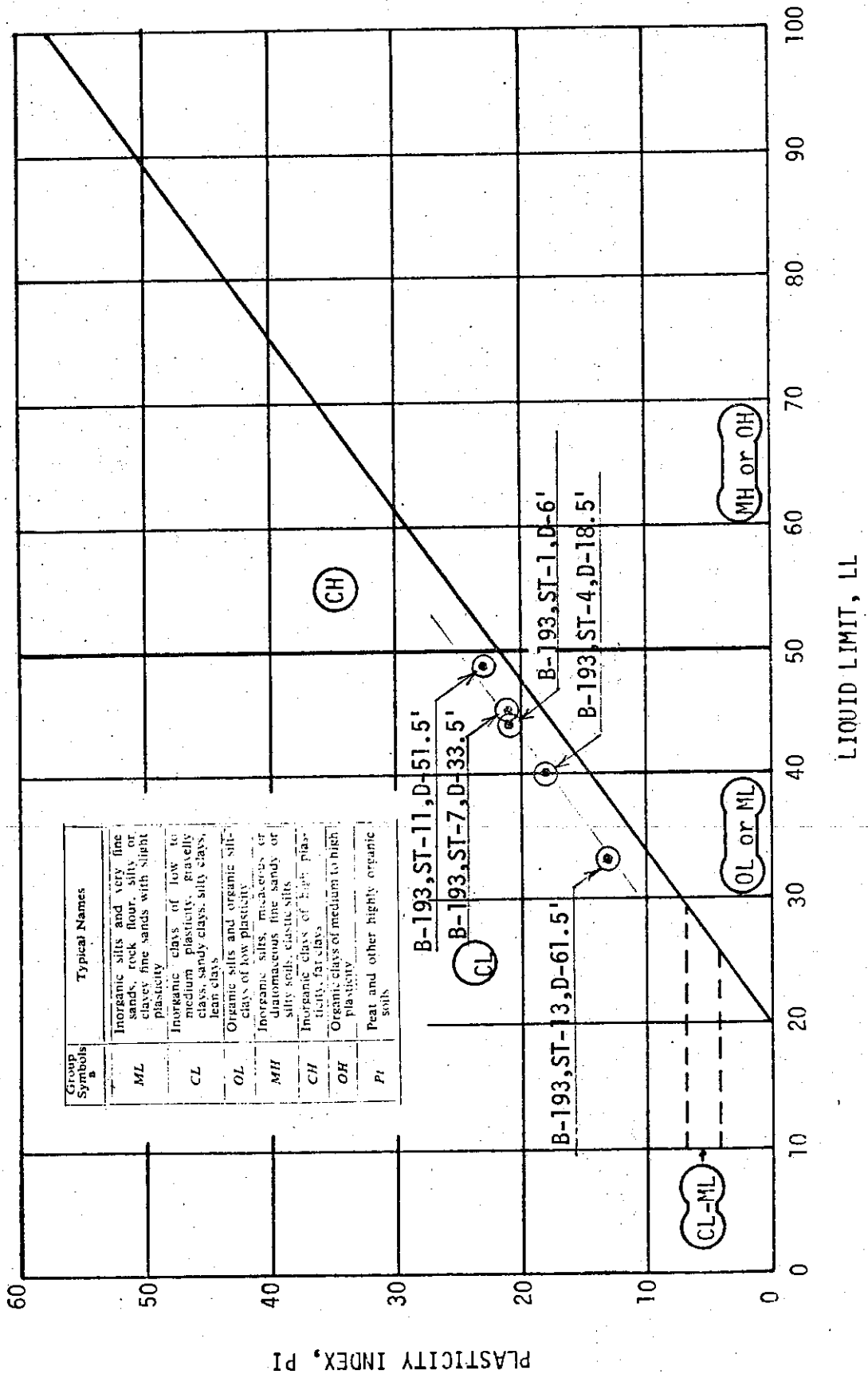


# U. W. STOLL and ASSOCIATES

SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: PLASTICITY CHART



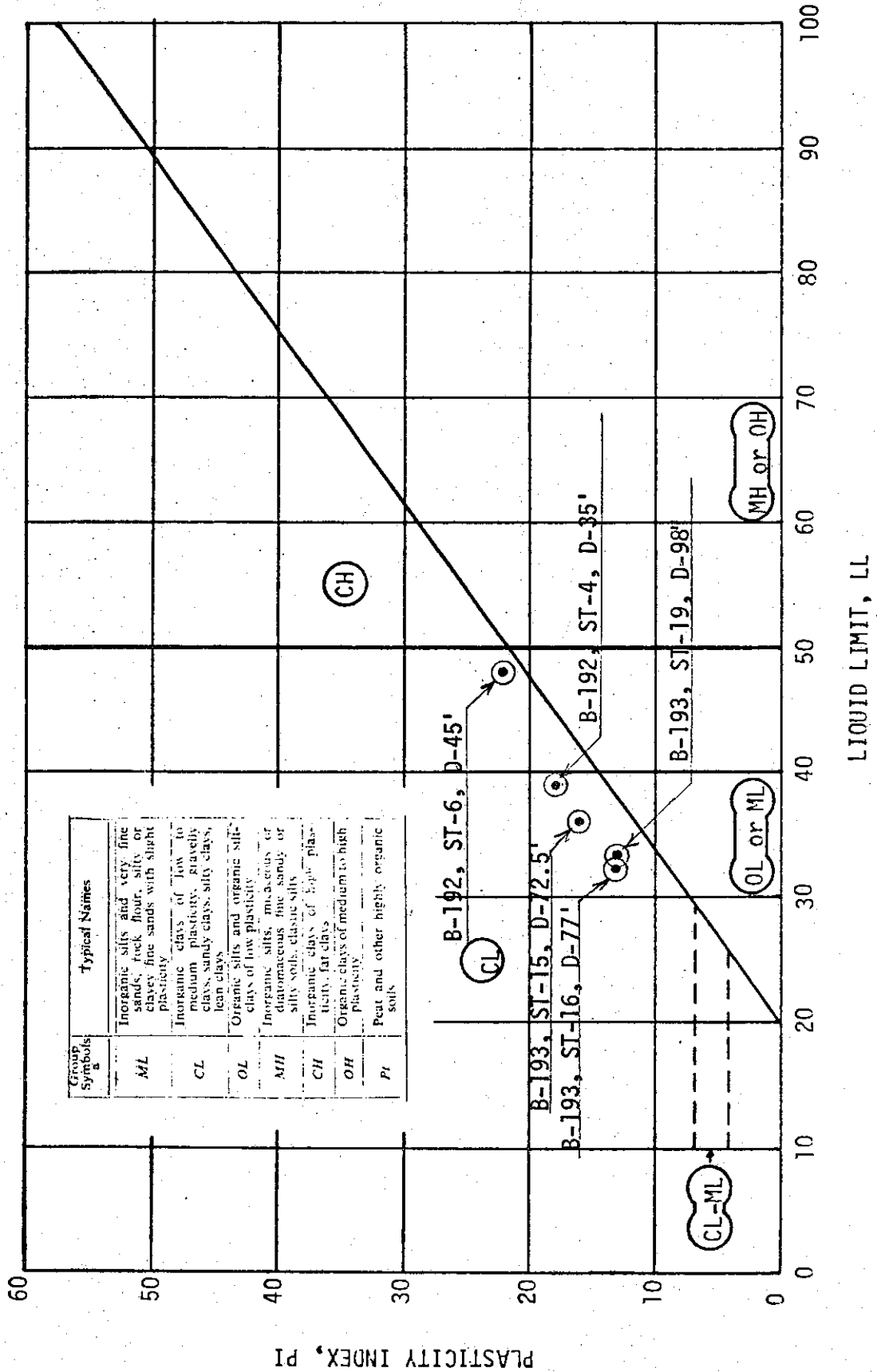


# U. W. STOLL and ASSOCIATES

SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: PLASTICITY CHART



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION BLOW	DEPTH				STRENGTH UNDIST	MOISTURE
							REMOLD	DRY DENS
							(KN/SQ.M)	(MG/CU.M)
B-193	6.0			STIFF BROWN SILT	UNCF		201.0	13.4%
ST-1	-6.0	PUSHED		CLAY WITH PEBBLE	72.0	5%		1.66
		\$		QU=4.5 TSF				
B-193	10.0			BROWN MOTTLED	NONE			30.0%
ST-2	-10.0	PUSHED		CLAY WITH PEBBLE	72.5			1.49
				SAMPLING DISTURBED				
				QU=1.75 TSF				
B-193	12.8			SOFT GRAY, CLAY	UNCF		61.3	32.6%
ST-3	-12.8	PUSHED		WITH SEAM OF SILTY	72.5	4%		1.44
				DARK GRAY SANDY				
				CLAY, TV=.57 TSF				
B-193	18.5			TAN GRAY SOFT	UNCF		41.8	36.3%
ST-4	-18.5	PUSHED		SILTY CLAY	72.5	3%		1.37
				(LACUSTRINE)				
				TV=.32 TSF				
B-193	23.5			TAN GRAY SOFT	UNCF		39.3	32.8%
ST-5	-23.5	PUSHED		PLASTIC CLAY	72.5	2%		1.38
				(LACUSTRINE)				
				TV=.29 TSF				
B-193	28.5			TAN GRAY SOFT	UNCF		29.6	41.4%
ST-6	-28.5	PUSHED		PLASTIC CLAY	72.0	2%		1.32
				(LACUSTRINE)				
				TV=.27 TSF				
B-193	33.5			TAN GRAY SOFT	UNCF		32.9	42.6%
ST-7	-33.5	PUSHED		PLASTIC CLAY	72.1	3%		1.29
				(LACUSTRINE)				
				TV=.27 TSF				

UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA			LABORATORY DATA				
BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW DEPTH	LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST ----- REMOLD (KN/SQ.M)	NATURAL MOISTURE ----- DRY DENS (MG/CU.M)
B-193	38.5	PUSHED	TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.37TSF	UNCF	3%	42.9	38.4%
ST-8	-38.5		72.9			1.33	
B-193	41.5	PUSHED	TAN GRAY SOFT LACUSTRINE CLAY TV=0.35TSF	UNCF	2%	31.6	40.6%
ST-9	-41.5		72.3			1.30	
B-193	46.5	PUSHED	REDDISH-GRAY SOFT CLAY (LACUSTRINE) TV=0.35TSF	UNCF	2%	40.4	46.5%
ST-10	-46.5		72.2			1.21	
B-193	51.5	PUSHED	SOFT GRAY MOTTLED LACUSTRINE CLAY TV=.29TSF	UNCF	6%	32.4	27.5%
ST-11	-51.5		72.3			1.53	
B-193	56.5	PUSHED	SOFT GRAY PEBBLY SANDY CLAY TV=.41TSF	UNCF	16%	41.1	20.6%
ST-12	-56.5		72.3			1.52	
B-193	61.5	PUSHED	PLASTIC GRAY SILTY CLAY WITH PEBBLES TV=.5 TSF	UNCF	16%	56.9	25.7%
ST-13	-61.5		72.5			1.59	

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT:

FIELD DATA      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
						STRENGTH UNDIST	MOISTURE
						REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	66.0		FIRM GRAY SILTY CLAY	UNCF		78.9	22.3%
ST-14	-66.0	PUSHED	WITH PEBBLES TV= 0.63 TSF	72.3	20%		1.67
B-193	72.5		GRAY SILTY CLAY	UNCF		80.8	22.2%
ST-15	-72.5	PUSHED	WITH PEBBLES TV=.67-.78 TSF	72.4	14%		1.66
B-193	77.0		FIRM V. SILTY GRAY CLAY	UNCF		24.1	26.9%
ST-16	-77.0	PUSHED	SAND SEAMS TV=.65 TSF	72.9	5%		1.53
B-193	78.0		GRAY SILTY CLAY	UNCF		74.9	26.3%
ST-16	-78.0	PUSHED	WITH PEBBLES TV= .77 TSF	72.1	4%		1.54
B-193	82.0		GRAY SILTY CLAY	UNCF		70.8	20.4%
ST-17	-82.0	PUSHED	WITH PEBBLES TV= .85 TSF	72.2	14%		1.72
B-193	93.5		GRAY SILTY CLAY	NONE			25.5%
ST-18	-93.5	PUSHED	WITH PEBBLES DRILL WASH	71.1			1.62

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
 SUBJECT:

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR STRENGTH		NATURAL
						UNDIST	REMOLD	MOISTURE
						(KN/SQ.M)	(MG/CU.M)	DRY DENS
B-193	98.0		GRAY SILTY CLAY WITH SOME PEBBLES & MOTTLE	UNCF	20%	28.0		23.6%
ST-19	-98.0	PUSHED	TV=.45 TSF	72.4				1.59
B-193, ST-20		PUSHED	GRAY SILTY CLAY WITH PEBBLES & DRILL WASH	NO TEST				31.1%
B-193	112.0		SOFT GRAY SILTY CLAY WITH PEBBLES	UNCF	20%	19.1		28.5%
ST-21	-112.0	PUSHED	TV=0.22 TSF	72.7				1.47
B-193, ST-22		}	NO TESTS DUE TO DRILL WASH					
B-193, ST-23								



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JOB LOCATION BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD	DRY DENS
							(KN/SQ.M)	(MG/CU.M)
B-192	20.0			GRAYISH BROWN	UNCF		22.1	31.9%
		PUSHED		PLASTIC SOFT		8%		
ST-1	-20.0			LACUSTRINE CLAY	72.7			1.42
				TV=.27 TSF				
B-192	25.0			GRAYISH BROWN	UNCF		27.8	35.6%
		PUSHED		SOFT PLASTIC		4%		
ST-2	-25.0			LACUSTRINE CLAY	72.2			1.37
				TV=.27 TSF				
B-192	30.0			GRAYISH BROWN	UNCF		27.7	41.8%
		PUSHED		PLASTIC SOFT		3%		
ST-3	-30.0			LACUSTRINE CLAY	72.3			1.28
				TV=.25 TSF				
B-192	35.0			GRAYISH BROWN	UNCF		34.2	33.1%
		PUSHED		SOFT PLASTIC		2%		
ST-4	-35.0			CLAY(LACUSTRINE)	72.5			1.41
				TV=.28 TSF				
B-192	40.0			GRAYISH BROWN	UNCF		40.5	36.4%
		PUSHED		PLASTIC SOFT		2%		
ST-5	-40.0			LACUSTRINE CLAY	72.4			1.31
				TV=.28 TSF				
B-192	45.0			BROWNISH GRAY	UNCF		30.2	39.2%
		PUSHED		PLASTIC LACUSTRI		1%		
ST-6	-45.0			CLAY (MOTTLED)	72.3			1.26
				TV=.32 TSF				
B-192	52.0			FIRM GRAY	UNCF		31.4	34.5%
		PUSHED		SILTY CLAY		4%		
ST-7	-52.0			WITH PEBBLES	72.3			1.40
				TV= 0.26 TSF				

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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F I E L D      D A T A                      L A B O R A T O R Y      D A T A

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-192	55.0			SOFT GRAY SILTY CLAY	UNCF		36.8	27.8%
		PUSHED				10%		
ST-8	-55.0			WITH PEBBLES TV=0.40 TSF	72.5			1.54
B-192	80.0			SOFT GRAY SILTY CLAY WITH	UNCF		84.5	26.6%
		PUSHED				7%		
ST-11	-80.0			FINE SAND LAYERS TV=.52 TSF	72.5			1.55
B-192	60.0			PLASTIC GRAY SILTY CLAY	UNCF		46.0	26.5%
		PUSHED				16%		
ST-9	-60.0			WITH PEBBLES TV=0.50 TSF	72.5			1.57
B-192	70.0			FIRM GRAY SILTY CLAY	UNCF		85.2	24.3%
		PUSHED				20%		
ST-10	-70.0			WITH PEBBLES TV=0.82 TSF	72.3			1.64

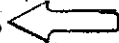
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SAMPLE IDENTIFICATION: B-193, ST-1, D-6

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.50	.0	.00	119.33
2.00	5.0	.33	1064.92
2.50	11.0	.66	2192.85
3.00	16.5	.98	3219.35
3.50	21.0	1.31	4051.68
4.00	25.0	1.64	4785.06
4.50	28.5	1.97	5420.41
5.00	31.8	2.29	6014.33
5.50	35.0	2.62	6585.65
6.00	37.5	2.95	7024.04
6.50	39.8	3.28	7422.60
7.00	41.8	3.60	7763.41
7.50	43.5	3.93	8047.02
8.00	44.9	4.26	8274.00
8.50	45.6	4.59	8372.46
9.00	45.9	4.91	8397.85
9.50	45.9	5.24	8368.92
10.00	44.0	5.57	7999.41
10.50	39.0	5.90	7078.55



SAMPLE IDENTIFICATION: B-193, ST-3, D-12.8

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	117.69
1.50	113.0	.35	595.39
2.00	222.0	.71	1052.83
2.50	332.0	1.06	1511.20
3.00	422.0	1.41	1882.54
3.50	485.0	1.77	2138.56
4.00	527.0	2.12	2305.42
4.50	558.0	2.48	2425.46
5.00	578.0	2.83	2499.18
5.50	590.0	3.18	2539.42
6.00	597.5	3.54	2560.86
6.50	600.0	3.89	2561.68
6.80	600.0	4.10	2556.02
7.00	599.0	4.24	2548.19
7.50	596.0	4.60	2526.63
8.00	593.0	4.95	2505.15



SAMPLE IDENTIFICATION: B-193, ST-4, D-18.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
6.50	.0	.00	117.69
7.00	87.0	.33	485.48
7.50	160.0	.67	791.74
8.00	230.0	1.00	1083.33
8.50	290.0	1.34	1331.04
9.00	336.0	1.67	1518.59
9.50	366.0	2.00	1638.26
10.00	385.0	2.34	1711.47
10.50	395.0	2.67	1746.94
11.00	396.5	3.01	1747.13
11.50	388.0	3.34	1706.22
12.00	364.0	3.67	1600.15

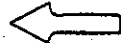


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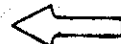
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SAMPLE IDENTIFICATION;		B-193, ST-5, D-23.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.50	.0	.00	117.69
5.00	80.0	.33	455.87
5.50	175.0	.66	855.09
6.00	272.0	.99	1260.05
6.50	337.0	1.32	1528.21
7.00	363.0	1.65	1631.69
7.30	366.0	1.85	1640.91
7.50	355.0	1.98	1592.92
8.00	323.0	2.31	1454.83
8.50	310.0	2.64	1396.17



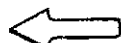
SAMPLE IDENTIFICATION;		B-193, ST-6, D-28.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.33
1.00	124.0	.64	649.00
1.50	200.0	.96	970.96
2.00	250.0	1.28	1180.32
2.50	264.0	1.60	1235.80
3.00	265.0	1.92	1236.00
4.00	260.0	2.56	1206.94
5.00	250.0	3.21	1157.33
6.00	244.0	3.85	1124.83



SAMPLE IDENTIFICATION;		B-193, ST-7, D-33.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
2.00	.0	.00	119.00
3.00	89.0	.65	497.86
4.00	177.0	1.30	867.51
5.00	260.0	1.95	1211.21
6.00	300.5	2.60	1372.55
7.00	290.0	3.25	1319.78
8.00	272.0	3.90	1236.66
9.00	262.0	4.55	1187.32



SAMPLE IDENTIFICATION;		B-193, ST-8, D-38.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
1.50	85.0	.35	471.73
2.00	138.0	.70	691.11
2.50	198.0	1.04	938.03
3.00	267.0	1.39	1220.47
3.50	331.0	1.74	1480.26
4.00	376.0	2.09	1660.05
4.50	400.0	2.44	1752.48
5.00	411.0	2.79	1791.13
5.50	412.5	3.13	1790.82
6.00	408.0	3.48	1766.14
6.50	399.0	3.83	1723.42



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SAMPLE IDENTIFICATION:		B-193, ST-9, D-41.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	91.0	.32	505.25
1.00	151.0	.64	758.14
1.25	179.0	.81	875.50
1.50	203.0	.97	975.56
1.75	224.0	1.13	1062.62
2.00	244.0	1.29	1145.18
2.50	272.0	1.61	1259.07
3.00	288.0	1.93	1321.94
3.50	288.0	2.26	1317.60
3.80	286.0	2.45	1306.66
4.30	281.0	2.77	1281.59
4.50	278.0	2.90	1267.45
5.00	270.0	3.22	1230.19



SAMPLE IDENTIFICATION:		B-193, ST-10, D-46.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.25	69.0	.16	413.41
.50	116.0	.33	613.30
.75	160.0	.49	799.74
1.00	205.0	.66	989.82
1.25	245.0	.82	1158.03
1.50	285.0	.99	1325.68
2.00	349.0	1.32	1591.68
2.50	373.0	1.64	1687.44
3.00	358.0	1.97	1618.84
4.00	325.0	2.63	1470.41



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SAMPLE IDENTIFICATION;		B-193, ST-11, D-51.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	118.35
1.25	38.0	.17	280.13
1.50	60.0	.33	373.29
2.00	100.0	.66	541.71
2.50	138.0	.99	700.54
3.00	176.0	1.32	858.31
3.50	205.0	1.65	977.21
4.00	232.0	1.98	1086.93
4.50	252.0	2.31	1166.68
5.00	266.0	2.64	1220.93
5.50	277.0	2.97	1262.36
6.00	284.5	3.30	1289.03
6.50	290.5	3.63	1309.31
7.00	295.0	3.96	1323.28
7.50	299.0	4.29	1335.07
8.00	302.0	4.62	1342.68
8.50	303.5	4.95	1344.12
9.00	306.0	5.28	1349.56
9.50	307.5	5.61	1350.90
10.00	309.0	5.94	1352.20
10.50	309.5	6.27	1349.45
11.00	310.2	6.61	1347.49
11.50	310.9	6.94	1345.50
12.00	311.3	7.27	1342.31
12.50	311.6	7.60	1338.72
13.00	311.7	7.93	1334.32
13.50	311.7	8.26	1329.54
14.50	310.5	8.92	1315.30
15.00	310.0	9.25	1308.59



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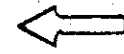
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SAMPLE IDENTIFICATION;  
DIAL GAGE      LOAD GAGE

B-193,ST-12,D-56.5

STRAIN      STRESS  
%      (PSF)

.00	.0	.00	118.35
.25	44.0	.16	305.71
.50	63.0	.33	386.06
.75	81.0	.49	461.89
1.00	96.0	.66	524.75
1.75	135.0	1.15	686.75
2.00	150.0	1.32	748.81
2.50	177.0	1.64	859.69
3.00	204.0	1.97	969.82
3.50	227.0	2.30	1062.51
4.00	249.0	2.63	1150.39
4.50	268.0	2.96	1225.22
5.00	284.0	3.29	1287.14
6.00	309.0	3.95	1380.91
7.00	329.0	4.61	1452.91
8.00	345.0	5.26	1507.61
9.00	358.5	5.92	1551.37
10.00	369.5	6.58	1584.40
11.00	379.0	7.24	1610.86
12.00	387.5	7.89	1632.87
13.00	395.0	8.55	1650.49
14.00	401.5	9.21	1663.81
16.00	413.0	10.53	1683.63
17.00	418.0	11.18	1690.21
18.00	422.5	11.84	1694.63
19.00	428.0	12.50	1702.53
20.00	432.5	13.16	1706.41
21.00	437.0	13.82	1710.04
22.00	441.0	14.47	1711.60
24.00	449.5	15.79	1715.82
25.00	453.5	16.45	1716.69
27.00	461.0	17.76	1715.99
28.00	465.0	18.42	1716.19
29.00	468.0	19.08	1712.72
30.40	471.5	20.00	1705.18

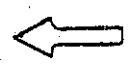


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SAMPLE IDENTIFICATION;		B-193, ST-13, D-61.5	
DIAL GAGE	LOAD GAGE	STRAIN	STRESS
		%	(PSF)
1.00	.0	.00	117.69
1.50	76.0	.33	438.93
2.00	113.0	.67	593.53
2.50	48.0	1.00	318.30
3.00	182.0	1.33	878.63
3.50	218.0	1.66	1025.99
4.00	255.0	2.00	1176.49
4.50	292.0	2.33	1325.94
5.00	323.0	2.66	1449.55
5.50	353.0	2.99	1568.17
6.00	378.0	3.33	1665.41
6.50	398.0	3.66	1741.49
7.00	414.0	3.99	1800.71
7.50	429.0	4.32	1855.40
8.00	443.0	4.66	1905.63
8.50	456.0	4.99	1951.42
9.00	467.5	5.32	1990.82
9.50	478.0	5.66	2025.89
10.00	487.0	5.99	2054.67
10.50	496.0	6.32	2083.20
11.00	504.5	6.65	2109.50
12.00	520.0	7.32	2155.46
13.00	534.0	7.98	2194.68
14.00	547.0	8.65	2229.24
15.00	558.0	9.31	2255.36
16.00	569.0	9.98	2280.86
17.00	579.5	10.65	2303.84
18.00	588.5	11.31	2320.58
19.00	597.0	11.98	2334.94
20.00	604.5	12.64	2345.11
21.00	612.0	13.31	2354.86
22.00	619.0	13.97	2362.35
23.00	626.5	14.64	2371.27
24.00	633.0	15.30	2376.16
25.00	639.0	15.97	2378.90
26.00	644.0	16.63	2377.77
27.00	648.5	17.30	2374.59
28.00	653.0	17.96	2371.16
29.00	657.0	18.63	2365.75
30.00	660.5	19.29	2358.40
31.06	664.0	20.00	2349.68





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SAMPLE IDENTIFICATION;		B-193, ST-14, D-66	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	105.0	.68	562.77
2.00	205.0	1.37	980.01
3.00	300.0	2.05	1370.48
4.00	382.0	2.74	1701.42
5.00	446.0	3.42	1953.33
6.00	495.0	4.11	2140.09
7.00	535.0	4.79	2287.40
8.00	570.0	5.48	2412.19
9.00	598.0	6.16	2506.89
10.00	625.0	6.85	2595.98
11.00	651.0	7.53	2679.54
12.00	675.0	8.22	2753.74
13.00	697.0	8.90	2818.76
14.00	717.0	9.59	2874.77
15.00	736.0	10.27	2925.78
16.00	755.0	10.96	2975.68
17.00	773.0	11.64	3020.69
18.00	788.0	12.33	3053.42
19.00	804.0	13.01	2088.99
20.00	818.0	13.70	3116.25
21.00	834.0	14.38	3150.01
22.00	848.0	15.07	3175.58
23.00	861.0	15.75	3196.73
24.00	875.0	16.44	3220.69
25.00	887.0	17.12	3236.75
26.00	900.0	17.81	3255.62
27.00	911.0	18.49	3266.77
28.00	923.0	19.18	3280.73
29.00	935.0	19.86	3293.99
29.20	937.0	20.00	3295.19
30.00	947.0	20.55	3306.54
31.00	958.0	21.23	3315.03

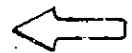


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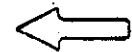
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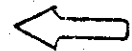
SAMPLE IDENTIFICATION:		B-193, ST-15, D-72.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	80.0	.62	455.81
2.00	130.0	1.24	663.23
3.00	180.0	1.86	868.02
4.00	230.0	2.47	1070.18
5.00	290.0	3.09	1310.96
6.00	355.0	3.71	1569.09
7.00	418.0	4.33	1815.64
8.00	476.0	4.95	2038.64
9.00	529.0	5.57	2238.48
11.00	620.0	6.80	2570.27
12.00	659.0	7.42	2706.94
13.00	692.0	8.04	2818.07
14.00	722.0	8.66	2915.80
15.00	751.0	9.28	3008.08
16.00	776.0	9.89	3083.49
17.00	798.0	10.51	3146.15
18.00	818.0	11.13	3200.08
19.00	838.0	11.75	3252.97
20.00	857.0	12.37	3301.06
22.00	890.0	13.61	3375.86
24.00	902.5	14.84	3372.86
26.00	880.0	16.08	3243.47
28.00	850.0	17.32	3090.05



SAMPLE IDENTIFICATION:		B-193, ST-16, D-77	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
2.00	88.0	.61	483.01
3.00	145.0	1.22	716.51
4.00	187.0	1.83	885.24
5.00	210.0	2.44	973.98
7.00	217.0	3.66	990.13
8.00	222.0	4.27	1003.96
10.00	226.0	5.49	1007.05
11.00	225.0	6.10	996.61



SAMPLE IDENTIFICATION:		B-193, ST-16, D-78	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.00
1.00	250.0	.53	1186.01
2.00	420.0	1.06	1901.79
3.00	535.0	1.59	2377.45
4.00	610.0	2.12	2679.78
5.00	663.0	2.66	2886.75
6.00	698.0	3.19	3016.48
7.00	722.0	3.72	3099.14
8.00	733.0	4.25	3127.27

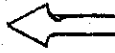


U. W. STOLL AND ASSOCIATES  
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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
 SUBJECT:

SAMPLE IDENTIFICATION:		B-193, ST-17, D-82	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.00	.0	.00	118.67
4.50	105.0	.28	566.65
5.00	138.0	.56	705.57
6.00	192.0	1.11	930.26
7.00	242.0	1.67	1135.54
8.00	289.0	2.22	1325.88
9.00	333.0	2.78	1501.50
10.00	374.0	3.33	1662.61
11.00	412.0	3.89	1809.42
12.00	447.0	4.44	1942.15
13.00	481.0	5.00	2069.15
14.00	510.0	5.56	2174.32
15.00	538.0	6.11	2274.08
16.00	565.0	6.67	2368.52
17.00	590.0	7.22	2453.73
18.00	611.0	7.78	2521.95
19.00	634.0	8.33	2597.03
20.00	655.0	8.89	2663.21
22.00	692.0	10.00	2773.30
24.00	724.0	11.11	2860.85
26.00	751.0	12.22	2926.56
28.00	768.0	13.33	2952.59
30.00	780.0	14.44	2958.69
32.00	786.0	15.56	2941.96
34.00	789.5	16.67	2915.74
35.00	793.0	17.22	2908.70
36.00	796.0	17.78	2899.74



B-193, ST-1B      NO STRENGTH TEST      DUE TO DRILL WASH

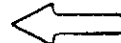
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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
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CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-19, D-98	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	23.0	.66	214.53
2.00	49.0	1.32	322.35
3.00	68.0	1.97	399.51
4.00	85.0	2.63	467.31
5.00	98.0	3.29	517.68
6.00	112.0	3.95	571.41
7.00	124.0	4.61	616.24
8.00	136.0	5.26	660.40
9.00	147.0	5.92	699.87
10.00	158.0	6.58	738.73
11.00	169.0	7.24	776.98
12.00	179.0	7.89	810.68
13.00	188.0	8.55	839.94
14.00	198.0	9.21	872.55
15.00	207.0	9.87	900.77
16.00	215.0	10.53	924.67
17.00	224.0	11.18	951.90
18.00	233.0	11.84	978.64
19.00	241.0	12.50	1001.14
20.00	250.0	13.16	1026.89
21.00	257.0	13.82	1044.80
22.00	265.0	14.47	1065.95
23.00	272.0	15.13	1083.05
24.00	279.0	15.79	1099.75
25.00	285.0	16.45	1112.51
26.00	292.0	17.11	1128.45
27.00	297.0	17.76	1137.00
28.00	302.0	18.42	1145.27
29.00	307.0	19.08	1153.27
30.00	311.5	19.74	1159.27
30.40	316.0	20.00	1170.80



B-193, ST-20 No STRENGTH TEST DUE TO DRILL WASH  
(W<sub>m</sub> = 31.1%)

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BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-21, D-112	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
1.00	10.0	.65	158.23
2.00	28.0	1.31	232.21
3.00	45.0	1.96	301.05
4.00	58.0	2.62	352.50
5.00	70.0	3.27	399.15
6.00	80.0	3.92	437.02
7.00	90.0	4.58	474.34
8.00	98.0	5.23	503.10
9.00	105.0	5.89	527.45
10.00	112.0	6.54	551.41
11.00	119.0	7.19	574.98
12.00	126.0	7.85	598.17
13.00	132.0	8.50	617.11
14.00	138.0	9.16	635.71
15.00	144.0	9.81	653.99
16.00	148.0	10.46	664.37
17.00	153.0	11.12	678.28
18.00	158.0	11.77	691.92
19.00	163.0	12.43	705.28
20.00	168.0	13.08	718.37
21.00	172.0	13.73	727.53
22.00	177.0	14.39	740.09
23.00	180.0	15.04	745.20
24.00	185.0	15.70	757.26
25.00	188.0	16.35	761.99
26.00	192.0	17.00	770.05
27.00	195.0	17.66	774.41
28.00	198.0	18.31	778.61
29.00	202.0	18.97	786.06
30.00	205.0	19.62	789.90
31.00	210.0	20.27	800.31
32.00	212.0	20.93	800.42
30.60	208.0	20.01	796.18



B-193    ST-22 }  
B-193    ST-23 } No TEST DUE TO DRILL WASH

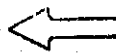
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CLIENT: BECHTEL POWER CORPORATION

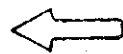
BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-192, ST-1, D-20	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
.40	11.5	.26	165.17
.80	20.0	.52	200.45
1.20	28.0	.79	233.44
1.60	35.0	1.05	262.07
2.00	42.0	1.31	290.55
2.40	50.0	1.57	323.03
2.80	57.0	1.83	351.18
3.20	65.0	2.10	383.32
3.60	73.0	2.36	415.28
4.00	81.0	2.62	447.07
4.40	90.0	2.88	482.77
4.80	99.0	3.14	518.28
5.20	108.0	3.41	553.59
5.60	118.0	3.67	592.77
6.80	147.0	4.45	704.94
7.20	157.0	4.72	743.24
7.60	166.0	4.98	777.31
8.00	174.0	5.24	807.18
8.40	181.0	5.50	832.88
8.80	187.0	5.76	854.45
9.20	192.0	6.02	871.92
9.60	197.0	6.29	889.27
10.00	200.0	6.55	898.63
10.40	203.0	6.81	907.91
10.80	206.0	7.07	917.13
11.20	208.0	7.33	922.38
11.60	209.0	7.60	923.67
12.00	210.0	7.86	924.94



SAMPLE IDENTIFICATION:		B-192, ST-2, D-25	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.50	27.0	.33	233.50
1.00	51.0	.66	334.80
1.50	78.0	.99	448.15
2.00	105.0	1.32	560.73
2.50	135.0	1.65	685.17
3.00	165.0	1.98	808.78
3.50	192.0	2.31	918.98
4.00	213.0	2.64	1003.41
4.50	229.0	2.97	1066.48
5.00	242.0	3.30	1116.67
5.50	250.0	3.63	1145.87
6.00	255.0	3.96	1162.51
6.50	256.0	4.29	1162.61
7.00	251.0	4.62	1138.18



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SAMPLE IDENTIFICATION:		B-192, ST-3, D-30	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	45.0	.32	309.47
1.00	83.0	.65	469.65
1.50	118.0	.97	616.10
2.00	157.0	1.30	778.43
2.50	193.0	1.62	927.07
3.00	222.0	1.95	1045.42
3.50	241.0	2.27	1121.23
4.00	250.0	2.60	1154.93
4.30	251.0	2.79	1156.77
4.50	250.0	2.92	1151.08
5.00	247.0	3.25	1134.84



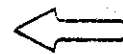
SAMPLE IDENTIFICATION:		B-192, ST-4, D-35	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	136.0	.65	690.61
2.00	275.0	1.31	1268.54
2.80	315.0	1.83	1428.53
4.00	254.0	2.62	1164.87



SAMPLE IDENTIFICATION:		B-192, ST-5, D-40	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
.50	86.0	.33	482.60
1.00	147.0	.66	739.02
1.50	205.0	.99	981.08
2.00	263.0	1.32	1221.51
2.50	313.0	1.65	1426.81
3.00	354.0	1.98	1593.15
3.50	377.0	2.31	1683.47
3.70	379.5	2.44	1691.58
4.10	372.0	2.70	1655.94
4.50	336.0	2.97	1502.71
5.00	310.0	3.30	1390.55



SAMPLE IDENTIFICATION:		B-192, ST-6, D-45	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	111.0	.33	590.33
1.00	194.0	.66	940.43
1.50	249.0	.99	1169.84
2.00	272.0	1.31	1262.87
2.15	272.0	1.41	1261.61
2.50	266.0	1.64	1233.47
3.00	254.0	1.97	1179.12
3.50	247.0	2.30	1145.97



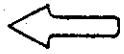
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

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JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION;		B-192, ST-7, D-52	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	100.0	.71	541.43
2.00	170.0	1.42	832.16
3.00	224.0	2.14	1051.79
4.00	262.0	2.85	1201.77
5.00	285.0	3.56	1287.67
6.00	293.0	4.27	1310.87
7.00	270.0	4.98	1207.81



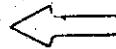


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CLIENT: BECHTEL POWER CORPORATION

BY: IKK                      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION;		B-192, ST-8, D-55	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	103.0	.62	551.62
2.00	165.0	1.23	808.20
3.00	132.0	1.85	665.62
4.00	195.0	2.47	922.33
5.00	247.0	3.09	1130.48
6.00	282.0	3.70	1266.39
7.00	305.0	4.32	1351.71
8.00	322.0	4.94	1411.61
9.00	334.0	5.56	1450.56
11.00	352.0	6.79	1502.84
12.00	358.0	7.41	1516.48
13.00	363.0	8.02	1525.90
14.00	367.5	8.64	1533.11
15.00	370.0	9.26	1532.38
16.00	373.5	9.88	1535.35
18.00	379.0	11.11	1535.08
19.00	381.0	11.73	1531.92
20.00	382.0	12.35	1524.93
21.00	383.0	12.96	1517.88
22.00	384.0	13.58	1510.79
23.00	384.0	14.20	1500.00
24.00	383.5	14.81	1487.40
25.00	381.0	15.43	1467.64



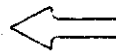
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DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	70.0	.63	412.31
2.00	130.0	1.26	661.26
3.00	185.0	1.89	886.18
4.00	235.0	2.52	1087.46
5.00	280.0	3.14	1265.51
6.00	317.0	3.77	1408.47
7.00	347.0	4.40	1521.04
8.00	371.0	5.03	1607.81
9.00	389.0	5.66	1669.27
10.00	404.0	6.29	1717.83
11.00	417.0	6.92	1757.68
12.00	429.0	7.55	1792.91
13.00	439.0	8.18	1819.70
14.00	447.0	8.81	1838.22
16.00	463.0	10.06	1873.96
17.00	471.0	10.69	1891.20
18.00	476.0	11.32	1896.70
19.00	482.0	11.95	1905.68
20.00	488.0	12.58	1914.34
21.00	493.0	13.21	1919.00
D-28 22.00	497.0	13.84	1919.73

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BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

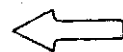
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
24.00	505.0	15.09	1920.54
25.00	509.0	15.72	1920.63
26.00	512.0	16.35	1916.95
27.00	516.0	16.98	1916.64
28.00	519.0	17.61	1912.62
29.00	523.0	18.24	1911.90
30.00	525.0	18.87	1904.09
31.80	530.5	20.00	1896.20



SAMPLE IDENTIFICATION:

B-192, ST-10, D-70

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	30.0	.16	246.05
.50	60.0	.31	373.36
.75	90.0	.47	500.27
1.00	117.0	.62	614.05
1.50	164.0	.93	810.94
2.00	209.0	1.24	998.14
2.50	252.0	1.55	1175.75
3.00	295.0	1.86	1352.21
3.50	336.0	2.17	1519.18
4.00	377.0	2.48	1685.06
4.50	417.0	2.80	1845.71
5.00	450.0	3.11	1976.33
5.50	482.0	3.42	2101.96
6.00	512.0	3.73	2218.52
6.50	537.0	4.04	2313.79
7.00	560.0	4.35	2400.23
7.50	582.0	4.66	2482.00
8.00	603.0	4.97	2559.12
9.00	639.0	5.59	2687.51
10.00	672.0	6.21	2801.97
11.00	702.0	6.83	2902.75
12.00	727.0	7.45	2982.19
13.00	751.0	8.07	3056.37
14.00	773.0	8.70	3121.48
15.00	792.0	9.32	3173.81
16.00	810.0	9.94	3221.29
17.00	827.0	10.56	3263.99
18.00	844.0	11.18	3305.79
19.00	859.0	11.80	3339.16
20.00	874.0	12.42	3371.74
22.00	900.0	13.66	3419.75
24.00	926.0	14.91	3465.01
26.00	949.0	16.15	3496.77
28.00	971.0	17.39	3522.56
30.00	992.0	18.63	3542.54
32.20	1014.0	20.00	3558.20
34.00	1037.0	21.12	3585.93



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BY: IKK DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

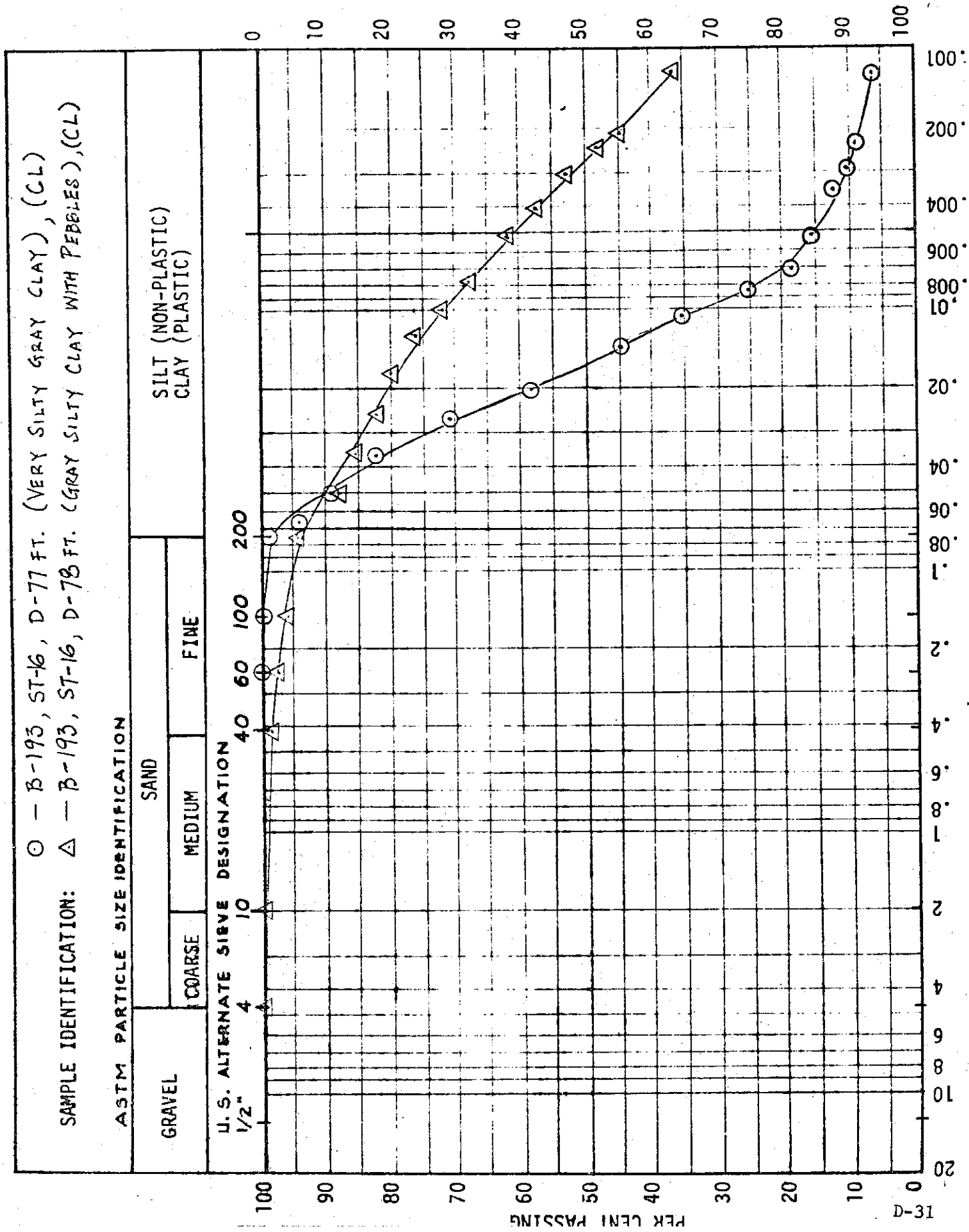
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DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
.25	42.0	.16	295.57
.50	92.0	.31	506.76
.75	137.0	.47	696.15
1.00	177.0	.62	863.86
1.25	216.0	.78	1026.83
1.50	253.0	.93	1180.87
1.75	288.0	1.09	1326.02
2.00	324.0	1.24	1474.90
2.25	360.0	1.40	1623.31
2.50	395.0	1.55	1767.07
3.00	460.0	1.86	2032.36
3.50	522.0	2.17	2283.48
4.00	578.0	2.48	2508.12
4.50	622.0	2.79	2681.75
5.00	664.0	3.10	2846.00
5.50	696.0	3.41	2968.13
6.00	726.0	3.72	3081.24
6.50	752.0	4.03	3177.26
7.00	774.0	4.34	3256.35
7.50	795.0	4.65	3330.81
8.00	810.0	4.96	3380.51
8.50	826.0	5.27	3433.83
9.00	838.0	5.58	3470.69
9.50	848.0	5.89	3499.25
10.00	856.0	6.20	3519.58
11.00	864.5	6.82	3529.93
11.50	850.0	7.13	3461.00
12.00	820.0	7.44	3331.54
12.50	795.0	7.75	3222.46



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY  
DATE: 9/75



PARTICLE DIAMETER IN MILLIMETERS

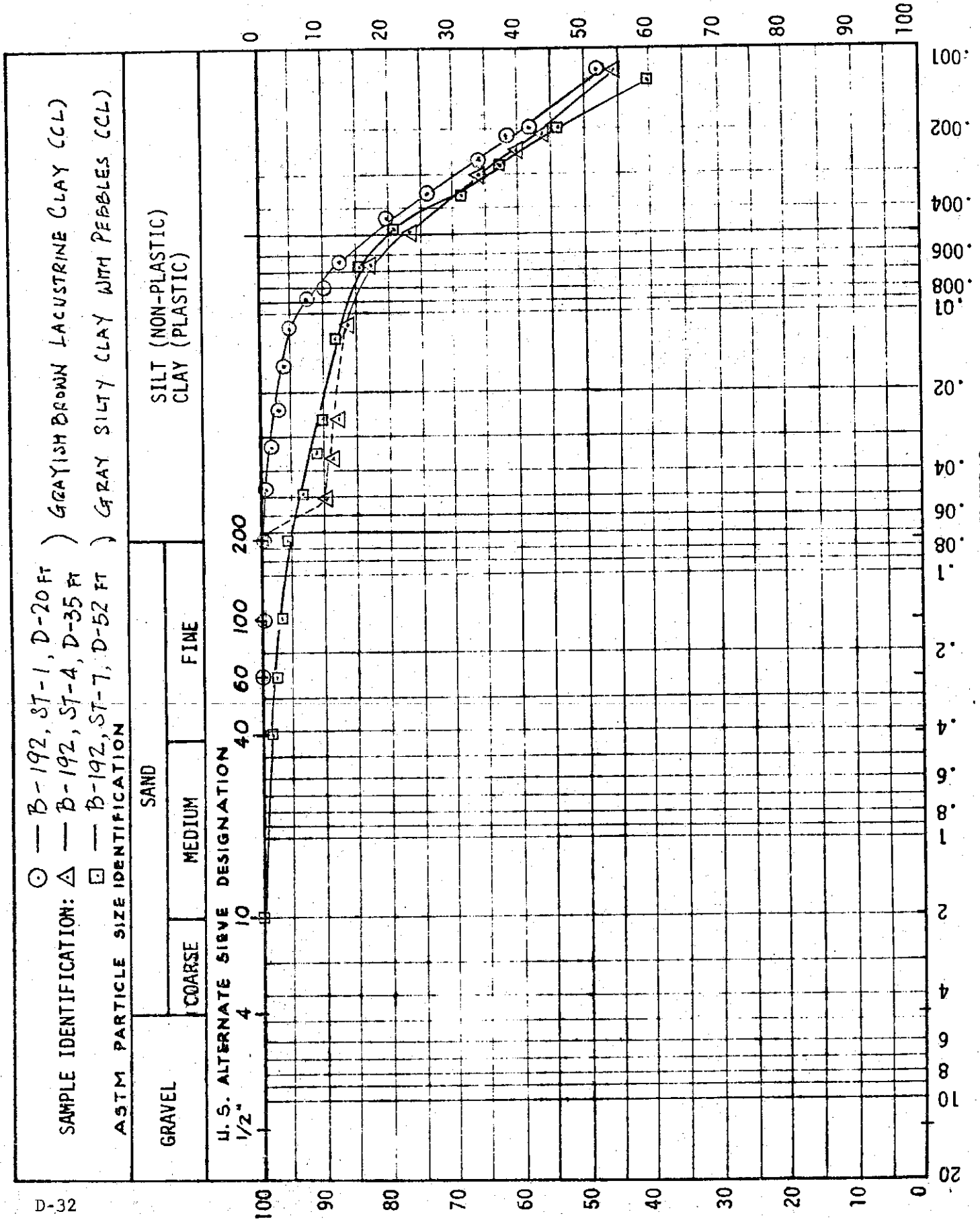
**U. W. STOLL AND ASSOCIATES**  
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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
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DATE: 9/75

SUBJECT: PARTICLE SIZE DISTRIBUTION  
 ANALYSIS SUMMARY



**Appendix G**  
**2016 Lab Test Results**

TRC Environmental Corporation													QC:	JPH				
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH				
Project Name: DTE - BRPP BAB and DB						Cell #:						8						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-01, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray lean clay						Average Kv =						2.9E-08 cm/s						
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.87		2.87		Permeant: Water												
Sample Ht. (in)		3.02		3.02		Permeant Specific Gravity: 1.00												
Tare & Wet (g)		775.10		649.20		Sample Specific Gravity: 2.70 Est.												
Tare & Dry (g)		562.60		471.50		Confining Pressure (psi): 100.0												
Tare (g)		88.86		88.64		Burette Diameter (in): 0.250												
Sample Wt. (g)		563.65		560.56		Burette Zero (cm): 100.0												
Moisture (%)		44.9		46.4		Maximum Gradient: 7.0												
Wet Density (pcf)		109.9		109.5		Average Gradient: 6.5												
Dry Density (pcf)		75.9		74.8		Max. Effect. Stress (psi): 5.7												
Saturation (%)		99.2		100.0		Min. Effect. Stress (psi): 4.3												
						Ave. Effect. Stress (psi): 4.8												
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1	
1	2016	3	15	8	10.00	0.0	95	95	55.40		3.45		102.60					
2	2016	3	15	11	15.00	11100	23.0	95	95	56.10	0.70	4.05	0.60	101.30	1.30	-36.8	4.7E-08	
3	2016	3	15	14	16.00	10860	23.0	95	95	57.00	0.90	4.75	0.70	100.60	0.70	0.0	3.6E-08	
4	2016	3	15	18	15.00	14340	23.0	95	95	57.75	0.75	5.55	0.80	99.75	0.85	-3.0	3.3E-08	
5	2016	3	16	4	55.00	38400	22.0	95	95	59.30	1.55	7.65	2.10	97.50	2.25	-3.4	3.4E-08	
6	2016	3	16	8	38.00	13380	23.0	95	95	59.80	0.50	8.35	0.70	96.80	0.70	0.0	3.2E-08	
7	2016	3	16	11	56.00	11880	23.0	95	95	60.35	0.55	9.05	0.70	96.30	0.50	16.7	3.1E-08	
8	2016	3	16	15	1.00	11100	23.0	95	95	60.40	0.05	9.60	0.55	95.70	0.60	-4.3	3.2E-08	
9	2016	3	17	5	14.00	51180	22.0	95	95	61.30	0.90	12.10	2.50	93.20	2.50	0.0	3.2E-08	
10	2016	3	17	8	17.00	10980	24.0	95	95	62.05	0.75	12.65	0.55	92.75	0.45	10.0	3.0E-08	
11	2016	3	17	12	19.00	14520	23.0	95	95	62.15	0.10	13.25	0.60	92.05	0.70	-7.7	3.0E-08	
12	2016	3	17	17	49.00	19800	23.0	95	95	62.60	0.45	14.15	0.90	91.30	0.75	9.1	2.9E-08	
13	2016	3	18	5	23.00	41640	22.0	95	95	63.15	0.55	16.00	1.85	89.40	1.90	-1.3	3.3E-08	
14	2016	3	18	8	58.00	12900	24.0	95	95	63.60	0.45	16.55	0.55	88.90	0.50	4.8	3.0E-08	
15	2016	3	18	12	55.00	14220	23.0	95	95	63.80	0.20	17.10	0.55	88.30	0.60	-4.3	3.0E-08	
16	2016	3	18	16	30.00	12900	23.0	95	95	64.10	0.30	17.65	0.55	87.90	0.40	15.8	2.8E-08	
17	2016	3	21	4	58.00	217680	22.0	95	95	67.20	3.10	25.35	7.70	80.20	7.70	0.0	3.1E-08	
18	2016	3	21	8	1.00	10980	24.0	95	95	67.60	0.40	25.70	0.35	79.85	0.35	0.0	3.1E-08	
19	2016	3	21	12	10.00	14940	23.0	95	95	67.60	0.00	26.15	0.45	79.40	0.45	0.0	3.0E-08	
20	2016	3	21	15	12.00	10920	23.0	95	95	67.70	0.10	26.40	0.25	79.15	0.25	0.0	2.3E-08	1
21	2016	3	21	19	36.00	15840	23.0	95	95	68.30	0.60	26.90	0.50	78.70	0.45	5.3	3.1E-08	1
22	2016	3	21	21	31.00	6900	23.0	95	95	68.10	-0.20	27.10	0.20	78.50	0.20	0.0	3.0E-08	1
23	2016	3	22	5	52.00	30060	25.0	95	95	68.90	0.80	28.05	0.95	77.65	0.85	5.6	3.1E-08	1
24	2016	3	22	10	31.00	16740	23.0	95	95	68.85	-0.05	28.45	0.40	77.20	0.45	-5.9	2.8E-08	1
25	2016	3	22	15	59.00	19680	24.0	95	95	69.40	0.55	29.00	0.55	76.70	0.50	4.8	2.9E-08	1
26	2016	3	22	22	32.00	23580	24.0	95	95	69.80	0.40	29.55	0.55	76.10	0.60	-4.3	2.7E-08	1
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.9E-08 cm/s			
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.					

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-05, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.7E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.84		Permeant: Water											
Sample Ht. (in)		3.25		3.20		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		536.11		691.40		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		403.90		517.10		Confining Pressure (psi): 100.0											
Tare (g)		93.83		91.24		Burette Diameter (in): 0.250											
Sample Wt. (g)		610.40		600.16		Burette Zero (cm): 100.0											
Moisture (%)		42.6		40.9		Maximum Gradient: 7.3											
Wet Density (pcf)		110.6		112.8		Average Gradient: 6.9											
Dry Density (pcf)		77.5		80.0		Max. Effect. Stress (psi): 6.1											
Saturation (%)		98.2		100.0		Min. Effect. Stress (psi): 4.6											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	25.20		1.95		101.75				
2	2016	3	15	11	15.00	0.0	95	95	27.70		1.80		99.60				
3	2016	3	15	14	17.00	10920	23.0	95	95	29.40	1.70	2.00	0.20	98.65	0.95	-65.2	3.2E-08
4	2016	3	15	18	16.00	14340	23.0	95	95	30.65	1.25	2.40	0.40	97.60	1.05	-44.8	3.1E-08
5	2016	3	16	4	56.00	38400	22.0	95	95	32.20	1.55	3.85	1.45	95.40	2.20	-20.5	3.1E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	32.40	0.20	4.40	0.55	94.85	0.55	0.0	2.6E-08
7	2016	3	16	11	57.00	11880	23.0	95	95	33.85	1.45	4.95	0.55	94.40	0.45	10.0	2.7E-08
8	2016	3	16	15	2.00	11100	23.0	95	95	34.00	0.15	5.35	0.40	93.90	0.50	-11.1	2.7E-08
9	2016	3	17	5	15.00	51180	22.0	95	95	35.20	1.20	7.35	2.00	91.80	2.10	-2.4	2.8E-08
10	2016	3	17	8	17.00	10920	24.0	95	95	35.80	0.60	7.80	0.45	91.45	0.35	12.5	2.5E-08
11	2016	3	17	12	20.00	14580	23.0	95	95	35.90	0.10	8.30	0.50	89.85	1.60	-52.4	5.1E-08
12	2016	3	17	17	50.00	19800	23.0	95	95	36.40	0.50	9.10	0.80	89.25	0.60	14.3	2.6E-08
13	2016	3	18	5	23.00	41580	22.0	95	95	37.00	0.60	10.65	1.55	88.60	0.65	40.9	2.0E-08
14	2016	3	18	8	58.00	12900	24.0	95	95	37.50	0.50	11.15	0.50	88.15	0.45	5.3	2.7E-08
15	2016	3	18	12	55.00	14220	23.0	95	95	37.70	0.20	11.65	0.50	87.60	0.55	-4.8	2.8E-08
16	2016	3	18	16	31.00	12960	23.0	95	95	38.00	0.30	12.10	0.45	87.20	0.40	5.9	2.5E-08
17	2016	3	21	4	59.00	217680	22.0	95	95	41.00	3.00	19.25	7.15	79.85	7.35	-1.4	3.0E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	41.40	0.40	19.55	0.30	79.60	0.25	9.1	2.4E-08
19	2016	3	21	12	10.00	14880	23.0	95	95	41.40	0.00	19.95	0.40	79.15	0.45	-5.9	2.8E-08
20	2016	3	21	15	13.00	10980	23.0	95	95	41.60	0.20	20.25	0.30	78.85	0.30	0.0	2.7E-08
21	2016	3	21	19	37.00	15840	23.0	95	95	42.00	0.40	20.80	0.55	78.55	0.30	29.4	2.7E-08
22	2016	3	21	21	32.00	6900	23.0	95	95	41.80	-0.20	20.90	0.10	78.30	0.25	-42.9	2.6E-08
23	2016	3	22	5	53.00	30060	25.0	95	95	42.75	0.95	21.75	0.85	77.55	0.75	6.3	2.6E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	42.75	0.00	22.20	0.45	77.10	0.45	0.0	2.8E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	43.25	0.50	22.75	0.55	76.65	0.45	10.0	2.7E-08
26	2016	3	22	22	33.00	23580	24.0	95	95	43.60	0.35	23.35	0.60	76.10	0.55	4.3	2.6E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.7E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				



TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray sandy lean clay, with gravel						Average Kv =						2.9E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.86		2.83		Permeant: Water											
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity: 2.68 Est.											
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi): 100.0											
Tare (g)		92.18		89.22		Burette Diameter (in): 0.250											
Sample Wt. (g)		666.40		648.58		Burette Zero (cm): 100.0											
Moisture (%)		42.2		40.1													
Wet Density (pcf)		112.9		112.9													
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi): 6.2											
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.0											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	4	21	11	16.00	0.0	95	95	16.80		2.50		102.25				
2	2016	4	21	20	32.00	33360	27.0	95	95	27.60	10.80	1.25	-1.25	96.40	5.85	-154.3	4.1E-08
3	2016	4	22	9	22.00	46200	24.0	95	95	32.50	4.90	2.40	1.15	93.40	3.00	-44.6	3.0E-08
4	2016	4	22	12	18.00	10560	24.0	95	95	33.50	1.00	2.85	0.45	92.90	0.50	-5.3	3.1E-08
5	2016	4	22	18	33.00	22500	25.0	95	95	35.05	1.55	3.80	0.95	91.95	0.95	0.0	2.9E-08
6	2016	4	25	11	30.00	233820	23.0	95	95	44.30	9.25	12.75	8.95	83.10	8.85	0.6	3.1E-08
7	2016	4	25	17	41.00	22260	24.0	95	95	45.35	1.05	13.50	0.75	82.40	0.70	3.4	2.9E-08
8	2016	4	25	20	39.00	10680	24.0	95	95	45.30	-0.05	13.80	0.30	82.00	0.40	-14.3	3.0E-08
9	2016	4	25	23	15.00	9360	24.0	95	95	45.35	0.05	14.10	0.30	81.70	0.30	0.0	3.0E-08
10	2016	4	26	4	59.00	20640	25.0	95	95	46.00	0.65	14.75	0.65	81.00	0.70	-3.7	3.0E-08
11	2016	4	26	8	19.00	12000	24.0	95	95	45.95	-0.05	15.10	0.35	80.60	0.40	-6.7	3.0E-08
12	2016	4	26	13	18.00	17940	24.0	95	95	46.40	0.45	15.70	0.60	80.10	0.50	9.1	3.0E-08
13	2016	4	27	4	57.00	56340	23.0	95	95	47.60	1.20	17.40	1.70	78.60	1.50	6.2	2.9E-08
14	2016	4	27	12	47.00	28200	23.0	95	95	47.95	0.35	18.20	0.80	77.90	0.70	6.7	2.8E-08
15	2016	4	27	15	8.00	8460	23.0	95	95	47.90	-0.05	18.45	0.25	77.65	0.25	0.0	3.2E-08
16	2016	4	28	5	1.00	49980	22.0	95	95	48.80	0.90	19.80	1.35	76.35	1.30	1.9	3.0E-08
17	2016	4	28	8	5.00	11040	24.0	95	95	49.40	0.60	20.15	0.35	76.15	0.20	27.3	2.8E-08
18	2016	4	28	14	56.00	24660	23.0	95	95	49.60	0.20	20.75	0.60	75.55	0.60	0.0	2.8E-08
19	2016	4	28	20	48.00	21120	23.0	95	95	49.90	0.30	21.30	0.55	75.10	0.45	10.0	2.8E-08
20	2016	4	29	5	31.00	31380	26.0	95	95	51.05	1.15	22.10	0.80	74.35	0.75	3.2	2.8E-08
21	2016	4	29	10	27.00	17760	23.0	95	95	50.90	-0.15	22.50	0.40	73.90	0.45	-5.9	3.0E-08
22	2016	4	29	14	41.00	15240	23.0	95	95	51.25	0.35	22.90	0.40	73.60	0.30	14.3	2.9E-08
23	2016	4	29	18	0.00	11940	23.0	95	95	51.55	0.30	23.20	0.30	73.40	0.20	20.0	2.7E-08
24	2016	5	1	16	23.00	166980	22.0	95	95	54.25	2.70	26.95	3.75	70.05	3.35	5.6	3.0E-08
25	2016	5	2	4	58.00	45300	23.0	95	95	55.05	0.80	27.85	0.90	69.25	0.80	5.9	2.9E-08
26	2016	5	2	8	4.00	11160	23.0	95	95	55.30	0.25	28.10	0.25	69.05	0.20	11.1	3.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.				
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation												QC:	JPH					
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)												QA:	JPH					
Project Name: DTE - BRPP BAB and DB						Cell #:						9						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray sandy lean clay, with gravel																		
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.86		2.83		Permeant:						Water						
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity:						1.00						
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity:						2.68 Est.						
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi):						100.0						
Tare (g)		92.18		89.22		Burette Diameter (in):						0.250						
Sample Wt. (g)		666.40		648.58		Burette Zero (cm):						100.0						
Moisture (%)		42.2		40.1		Maximum Gradient:						3.8						
Wet Density (pcf)		112.9		112.9		Average Gradient:						3.6						
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi):						5.2						
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi):						4.6						
						Ave. Effect. Stress (psi):						4.9						
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1	
1	2016	5	2	8	4.00	0.0	95	95	55.30		28.10		69.05					
2	2016	5	2	13	15.00	18660	23.0	95	95	55.65	0.35	28.50	0.40	68.80	0.25	23.1	2.8E-08	
3	2016	5	2	20	45.00	27000	26.0	95	95	56.30	0.65	29.00	0.50	68.35	0.45	5.3	2.6E-08	
4	2016	5	3	4	50.00	29100	23.0	95	95	56.00	-0.30	29.50	0.50	67.75	0.60	-9.1	3.1E-08	
5	2016	5	3	8	0.00	11400	25.0	95	95	56.35	0.35	29.70	0.20	67.60	0.15	14.3	2.5E-08	
6	2016	5	3	11	10.00	11400	23.0	95	95	56.30	-0.05	29.90	0.20	67.35	0.25	-11.1	3.4E-08	
7	2016	5	3	14	12.00	10920	23.0	95	95	56.40	0.10	30.15	0.25	67.25	0.10	42.9	2.8E-08	
8	2016	5	3	19	36.00	19440	24.0	95	95	57.20	0.80	30.55	0.40	67.05	0.20	33.3	2.6E-08	
9	2016	5	4	5	24.00	35280	23.0	95	95	57.60	0.40	31.15	0.60	66.50	0.55	4.3	2.9E-08	
10	2016	5	4	9	48.00	15840	23.0	95	95	57.60	0.00	31.40	0.25	66.25	0.25	0.0	2.9E-08	
11	2016	5	4	14	50.00	18120	23.0	95	95	57.70	0.10	31.70	0.30	66.00	0.25	9.1	2.8E-08	
12	2016	5	4	20	0.00	18600	25.0	95	95	58.25	0.55	32.10	0.40	65.80	0.20	33.3	2.9E-08	
13	2016	5	5	5	24.00	33840	24.0	95	95	58.35	0.10	32.60	0.50	65.30	0.50	0.0	2.8E-08	1
14	2016	5	5	10	25.00	18060	24.0	95	95	58.60	0.25	32.90	0.30	65.10	0.20	20.0	2.7E-08	1
15	2016	5	5	14	42.00	15420	24.0	95	95	58.90	0.30	33.20	0.30	64.85	0.25	9.1	3.5E-08	1
16	2016	5	6	4	52.00	51000	23.0	95	95	59.50	0.60	34.00	0.80	64.25	0.60	14.3	2.8E-08	1
17	2016	5	6	9	32.00	16800	23.0	95	95	59.70	0.20	34.25	0.25	64.05	0.20	11.1	2.9E-08	1
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
**A zero in this column starts a series of measurements.												*Average Kv for those rows with a 1 in the Ave. column.		2.9E-08 cm/s				
(Termination determined by stable Kv and low flow differential.)												***Kv adjusted for temperature.						

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						10					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: SB-16-01, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.1E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.82		Permeant: Water											
Sample Ht. (in)		2.88		2.86		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		534.46		607.60		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		400.40		448.80		Confining Pressure (psi): 100.0											
Tare (g)		98.45		86.36		Burette Diameter (in): 0.250											
Sample Wt. (g)		532.36		521.24		Burette Zero (cm): 100.0											
Moisture (%)		44.4		43.8		Maximum Gradient: 8.9											
Wet Density (pcf)		109.0		111.0		Average Gradient: 8.4											
Dry Density (pcf)		75.5		77.2		Max. Effect. Stress (psi): 6.1											
Saturation (%)		97.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	24.00		1.65		102.30				
2	2016	3	15	11	16.00	0.0	95	95	27.35		1.15		99.70				
3	2016	3	15	14	17.00	0.0	95	95	29.50		1.15		98.60				
4	2016	3	15	18	17.00	14400	23.0	95	95	30.90	1.40	1.35	0.20	97.50	1.10	-69.2	2.5E-08
5	2016	3	16	4	56.00	38340	22.0	95	95	34.75	3.85	2.00	0.65	95.00	2.50	-58.7	2.4E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	35.00	0.25	2.50	0.50	94.55	0.45	5.3	2.0E-08
7	2016	3	16	11	58.00	11940	23.0	95	95	35.45	0.45	3.00	0.50	94.10	0.45	5.3	2.3E-08
8	2016	3	16	15	3.00	11100	23.0	95	95	35.80	0.35	3.35	0.35	93.60	0.50	-17.6	2.2E-08
9	2016	3	17	5	15.00	51120	22.0	95	95	38.75	2.95	4.55	1.20	91.10	2.50	-35.1	2.2E-08
10	2016	3	17	8	18.00	10980	24.0	95	95	38.25	-0.50	5.25	0.70	90.95	0.15	64.7	2.3E-08
11	2016	3	17	12	21.00	14580	23.0	95	95	38.60	0.35	5.65	0.40	90.35	0.60	-20.0	2.1E-08
12	2016	3	17	17	51.00	19800	23.0	95	95	38.50	-0.10	6.45	0.80	89.85	0.50	23.1	2.1E-08
13	2016	3	18	5	24.00	41580	22.0	95	95	40.80	2.30	7.40	0.95	87.95	1.90	-33.3	2.3E-08
14	2016	3	18	8	59.00	12900	24.0	95	95	40.40	-0.40	8.05	0.65	87.70	0.25	44.4	2.3E-08
15	2016	3	18	12	56.00	14220	23.0	95	95	40.70	0.30	8.40	0.35	87.25	0.45	-12.5	1.9E-08
16	2016	3	18	16	32.00	12960	23.0	95	95	40.70	0.00	8.95	0.55	86.90	0.35	22.2	2.4E-08
17	2016	3	21	4	59.00	217620	22.0	95	95	45.25	4.55	15.10	6.15	80.30	6.60	-3.5	2.2E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	45.25	0.00	15.50	0.40	80.10	0.20	33.3	2.2E-08
19	2016	3	21	12	11.00	14940	23.0	95	95	45.40	0.15	15.90	0.40	79.65	0.45	-5.9	2.4E-08
20	2016	3	21	15	13.00	10920	23.0	95	95	45.70	0.30	16.10	0.20	79.35	0.30	-20.0	1.9E-08
21	2016	3	21	19	38.00	15900	23.0	95	95	45.70	0.00	16.65	0.55	79.10	0.25	37.5	2.1E-08
22	2016	3	21	21	33.00	6900	23.0	95	95	46.10	0.40	16.70	0.05	78.80	0.30	-71.4	2.2E-08
23	2016	3	22	5	53.00	30000	25.0	95	95	47.20	1.10	17.35	0.65	78.00	0.80	-10.3	2.0E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	47.10	-0.10	17.80	0.45	77.60	0.40	5.9	2.2E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	47.40	0.30	18.35	0.55	77.15	0.45	10.0	2.2E-08
26	2016	3	22	22	34.00	23640	24.0	95	95	47.10	-0.30	19.10	0.75	76.80	0.35	36.4	2.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.1E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

**Appendix H**  
**2020 Lab Test Results**



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

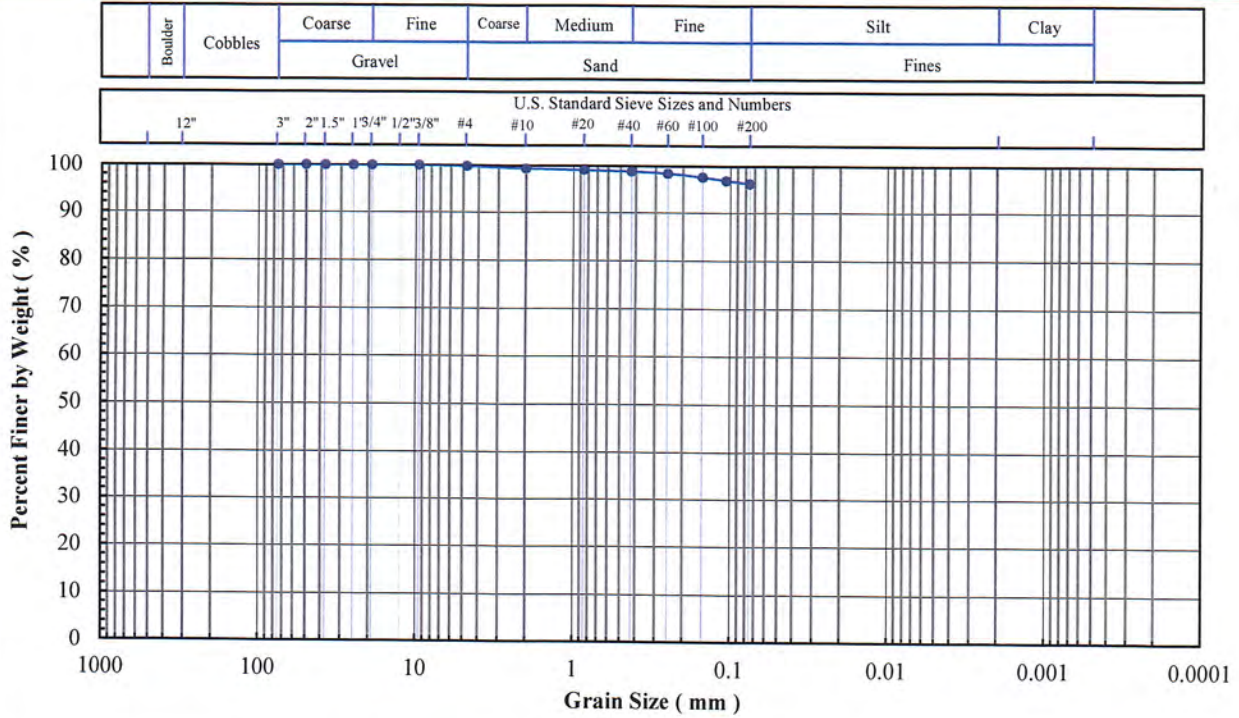
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-1 (3')  
Lab Sample No: 20L186

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

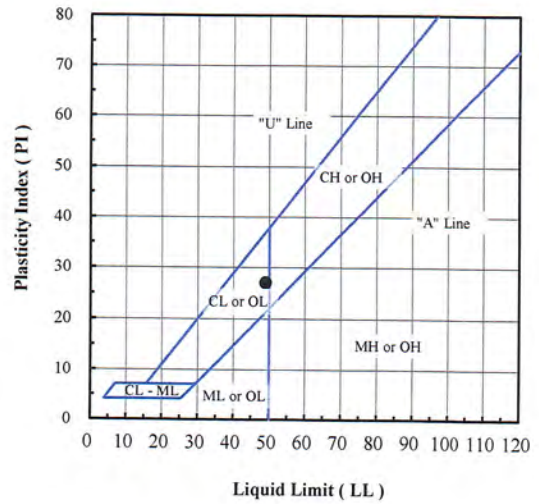


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	99.0
#40	0.425	98.7
#60	0.250	98.3
#100	0.150	97.5
#140	0.106	96.8
#200	0.075	96.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	3.7
Fines (%):	96.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-1 (3')	20L186	22.6	96.1	49	22	27	CL - Lean clay

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

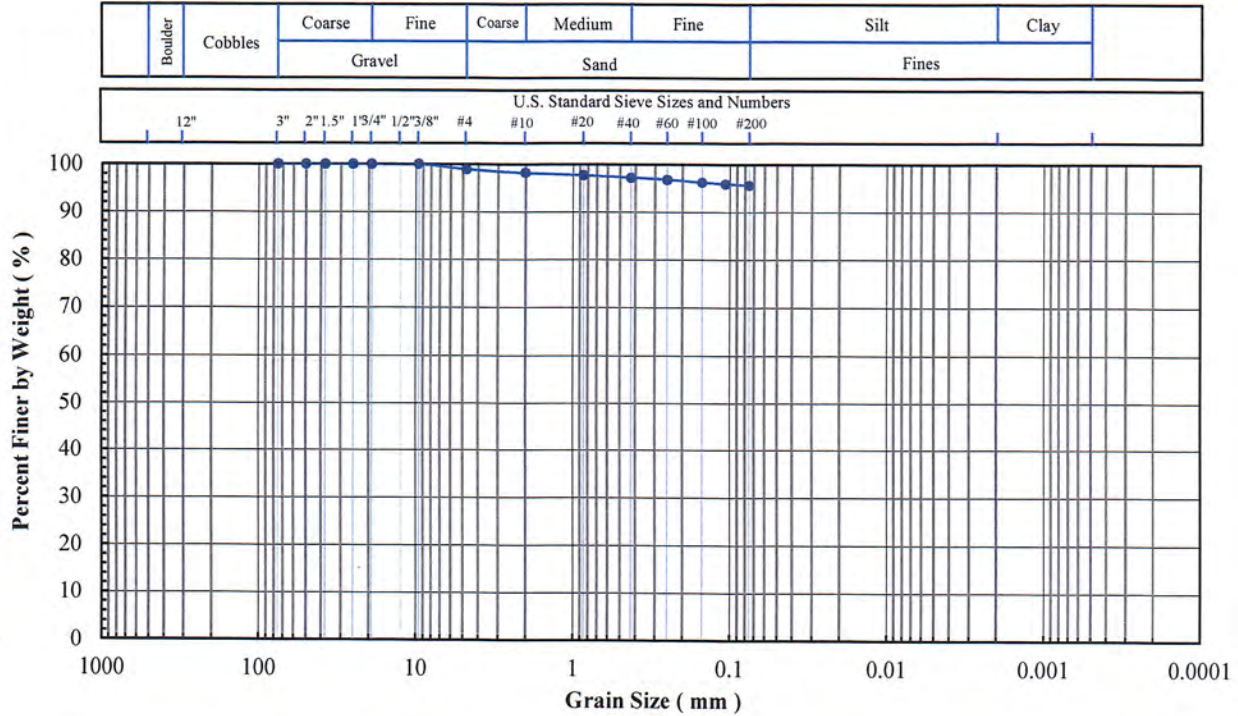
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B1-6 (25')  
Lab Sample No: 20L191

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

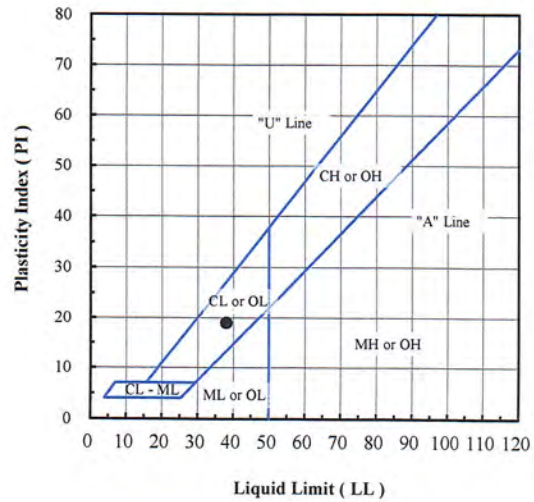


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	98.2
#20	0.850	97.7
#40	0.425	97.2
#60	0.250	96.8
#100	0.150	96.2
#140	0.106	95.9
#200	0.075	95.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	3.3
Fines (%):	95.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-6 (25')	20L191	35.5	95.6	38	19	19	CL - Lean clay

Note(s):

01-26-2021  
AAi NSR



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

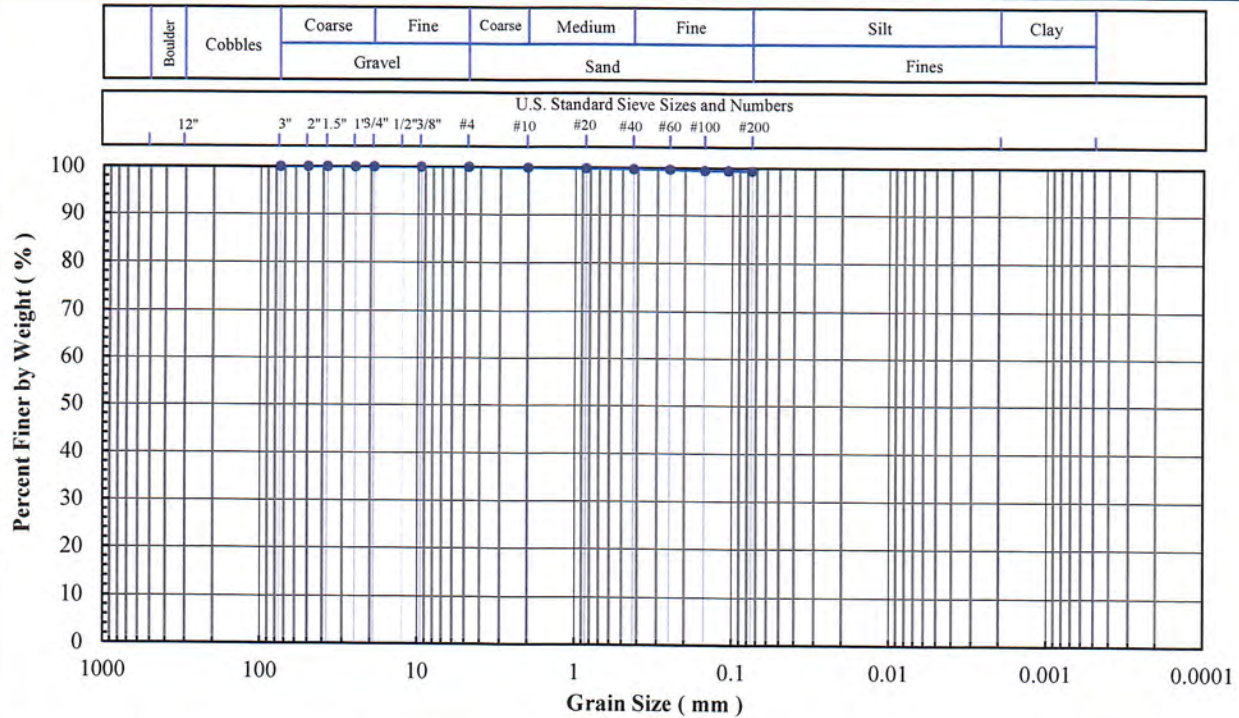
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-9 (48')  
 Lab Sample No: 20L194

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

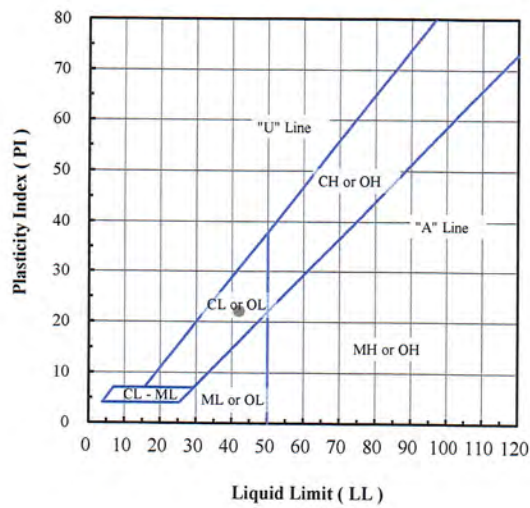


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.6
#100	0.150	99.4
#140	0.106	99.4
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-9 (48')	20L194	39.5	99.3	42	20	22	CL - Lean clay

Note(s):

01-21-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

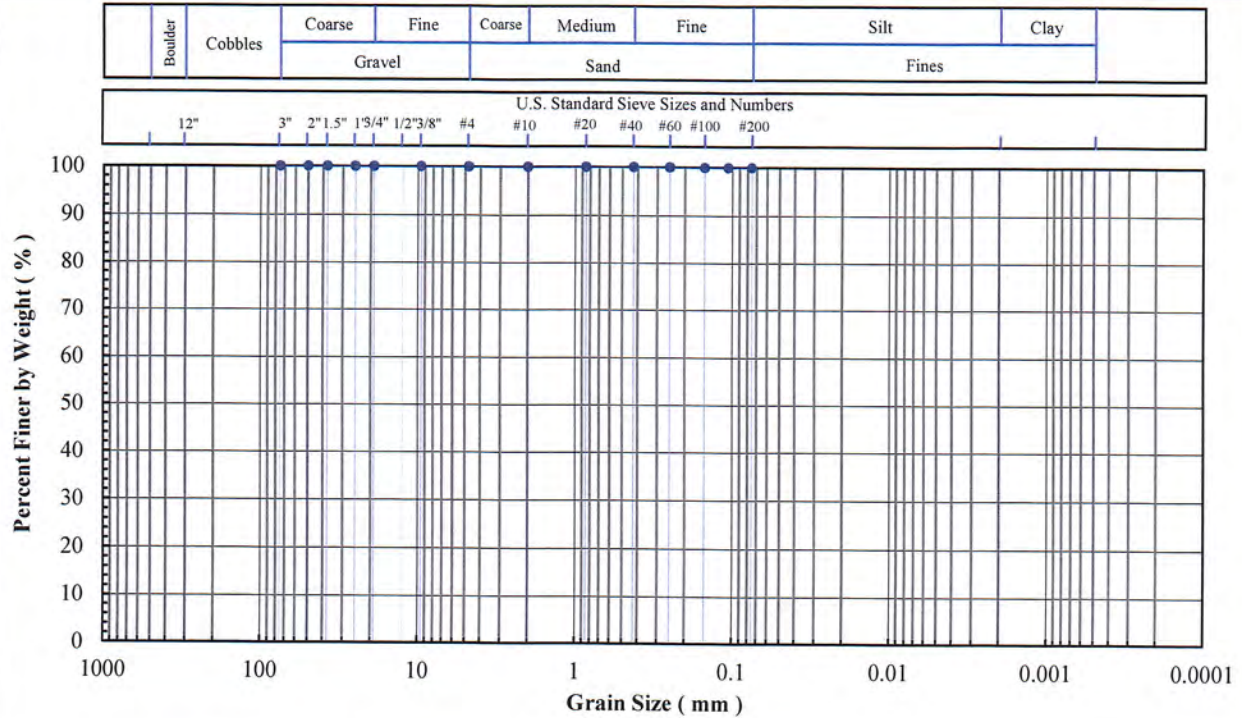
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-11 (59')  
Lab Sample No: 20L196

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

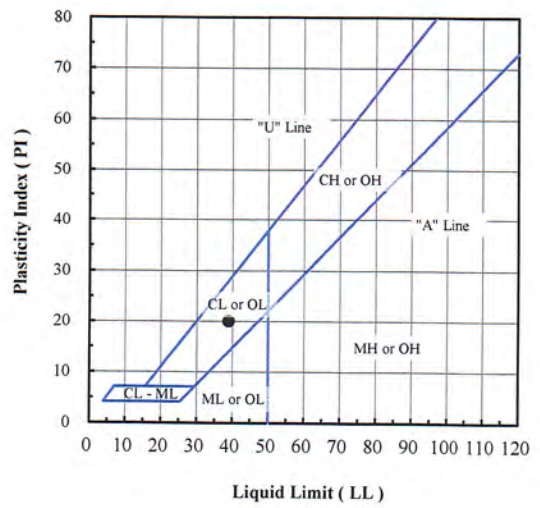


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	100.0
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-11 (59')	20L196	36.8	99.9	39	19	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, NSR





**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

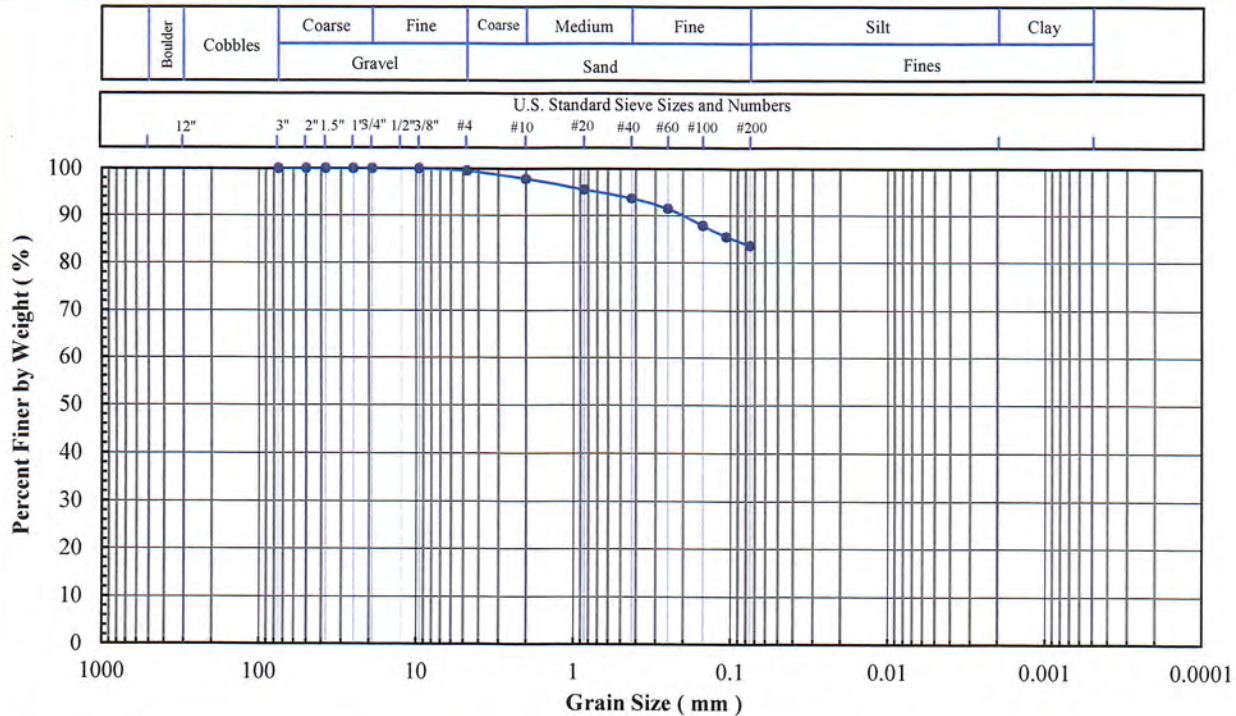
Client Sample ID: B1-14 (80')

Lab Sample No: 20L199

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

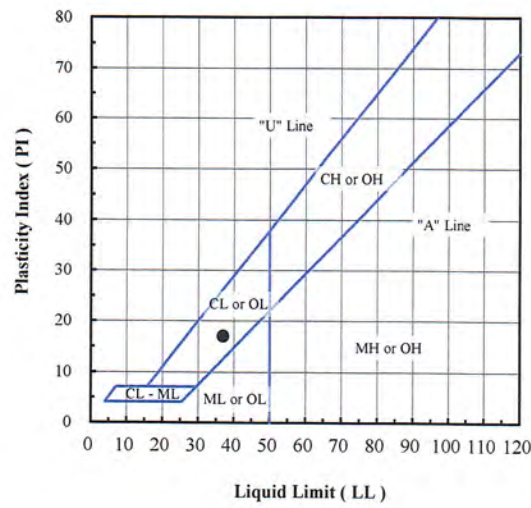


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.8
#20	0.850	95.5
#40	0.425	93.6
#60	0.250	91.4
#100	0.150	87.8
#140	0.106	85.4
#200	0.075	83.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	16.0
Fines (%):	83.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-14 (80')	20L199	24.6	83.5	37	20	17	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

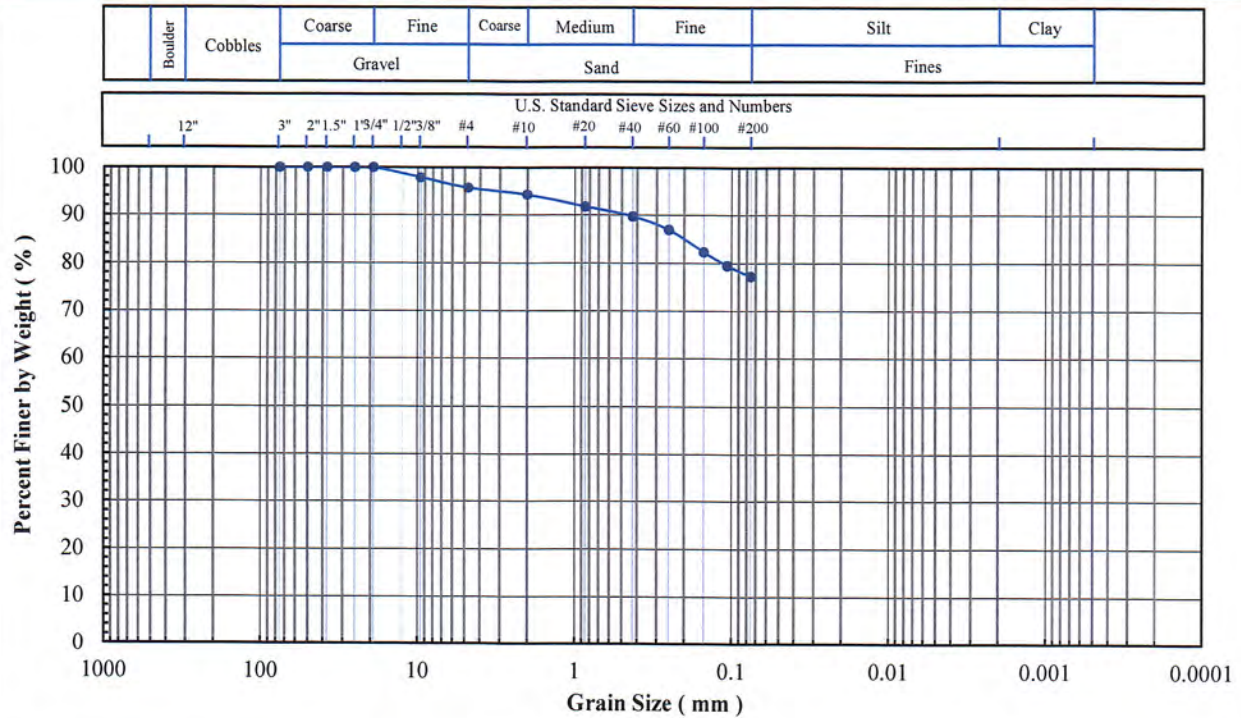
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-16 (85')  
 Lab Sample No: 20L201

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

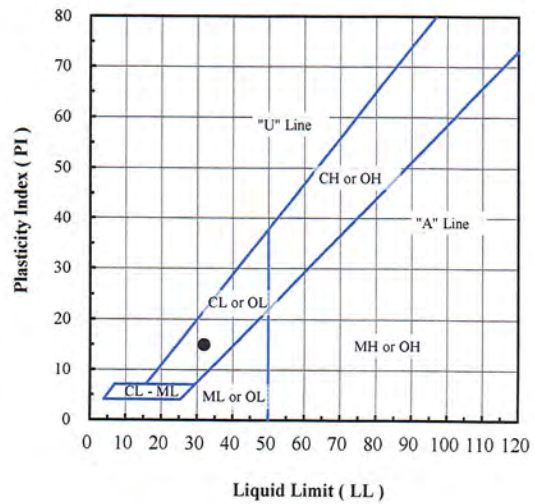


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	96
#10	2.00	94
#20	0.850	92
#40	0.425	90
#60	0.250	87
#100	0.150	82
#140	0.106	79
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	19
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-16 (85')	20L201	19.5	77	32	17	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
 AA1NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

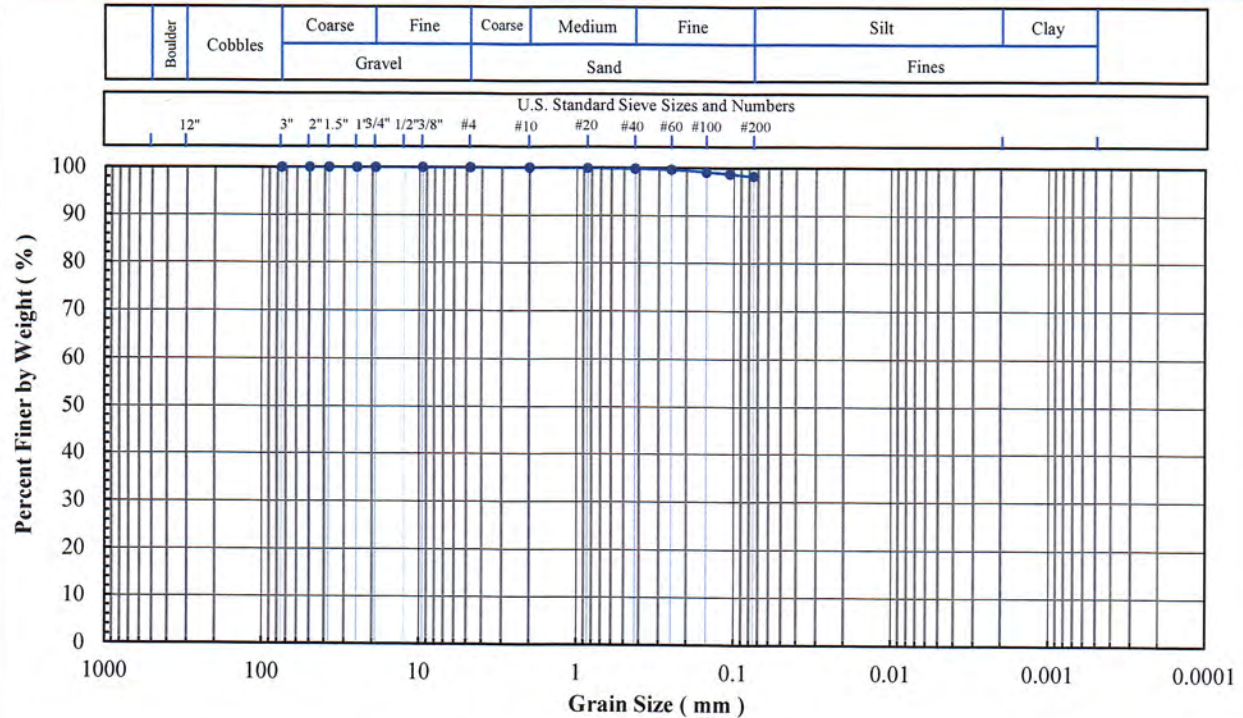
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-ST-1 (7-9)  
Lab Sample No: 20L143

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

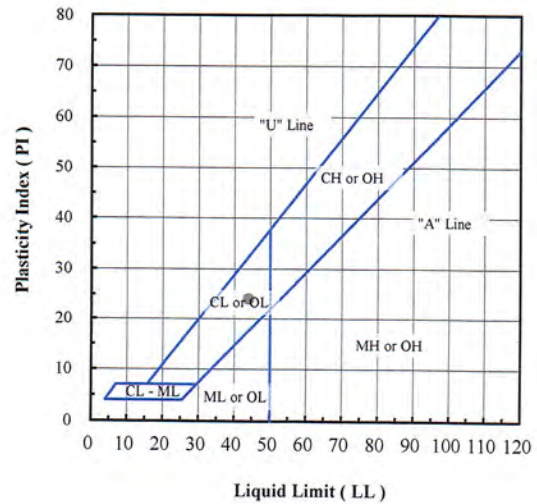


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	99.1
#140	0.106	98.7
#200	0.075	98.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	1.8
Fines (%):	98.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-1 (7-9)	20L143	22.7	98.2	44	20	24	CL - Lean clay

Note(s):

*02-01-2021  
A.A. NSR*



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

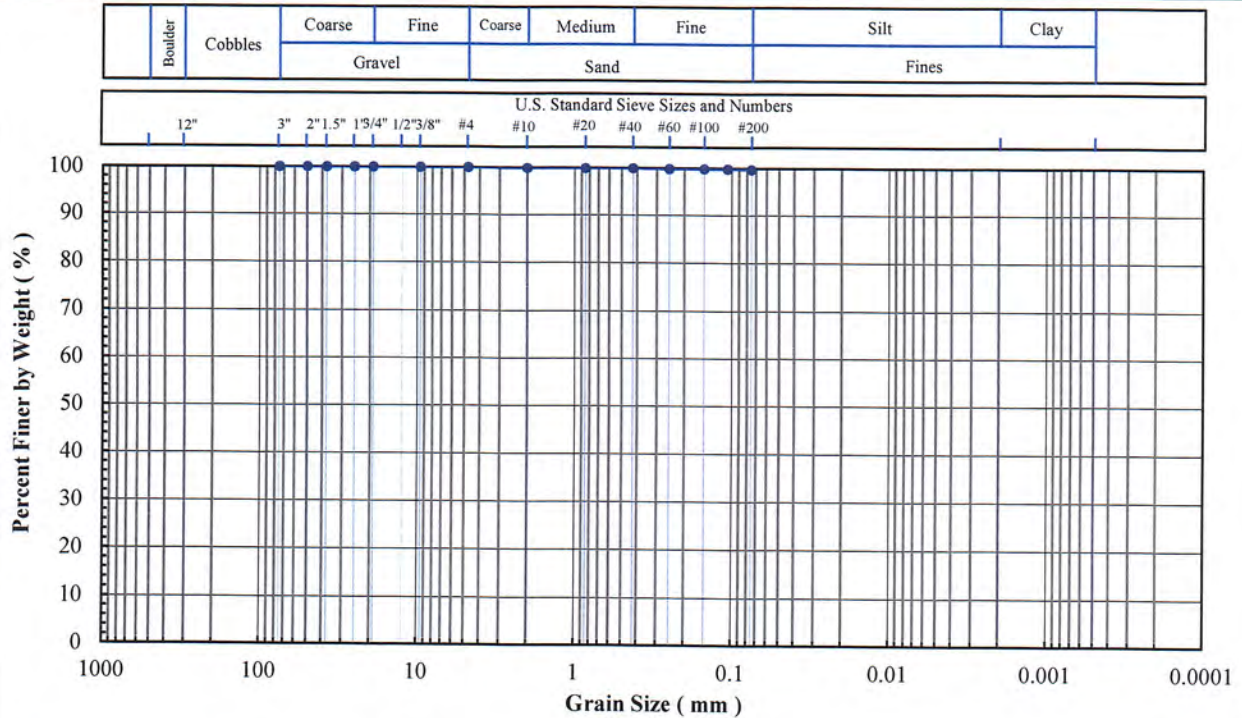
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B1-ST-3 (36-38')  
**Lab Sample No:** 20L145

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

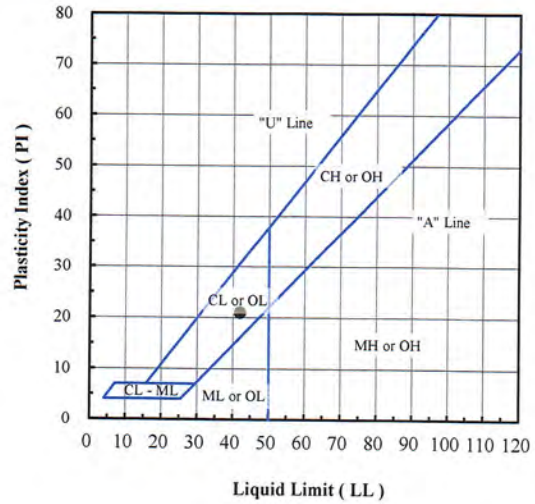


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.9
#40	0.425	99.9
#60	0.250	99.8
#100	0.150	99.8
#140	0.106	99.8
#200	0.075	99.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.3
Fines (%):	99.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (36-38')	20L145	35.2	99.7	42	21	21	CL - Lean clay

Note(s):

02-01-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
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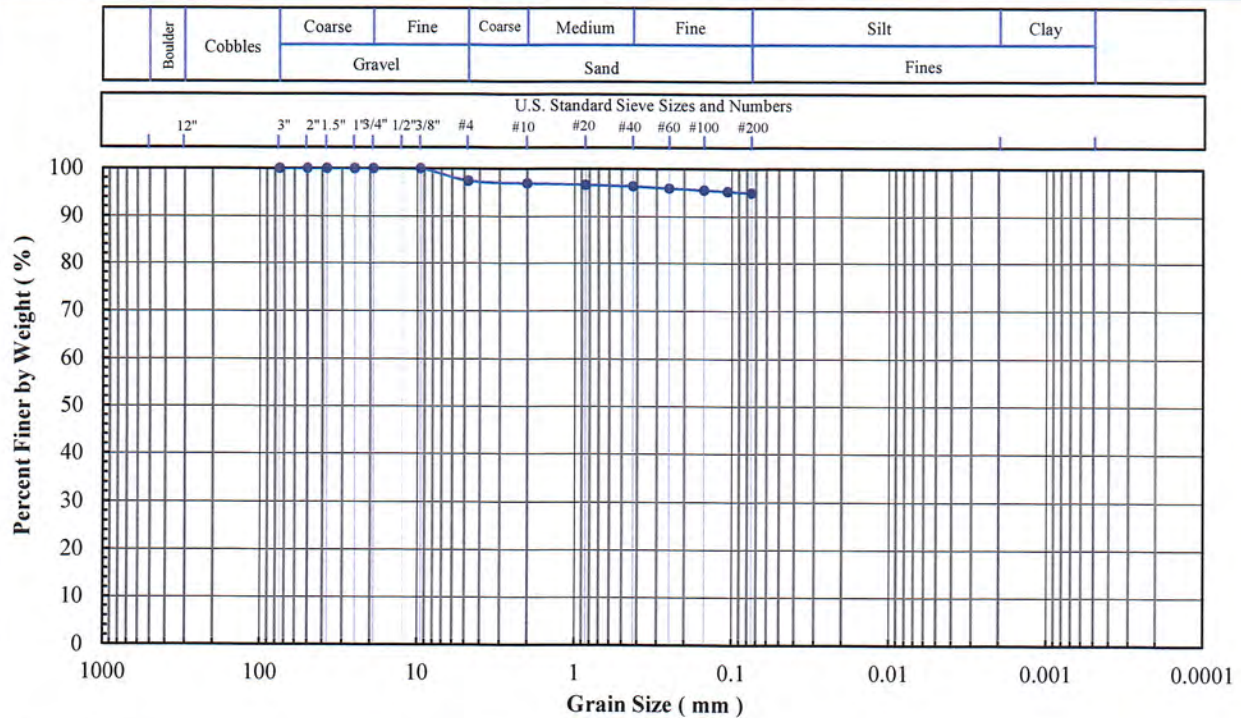
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-2 (5')  
Lab Sample No: 20L205

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

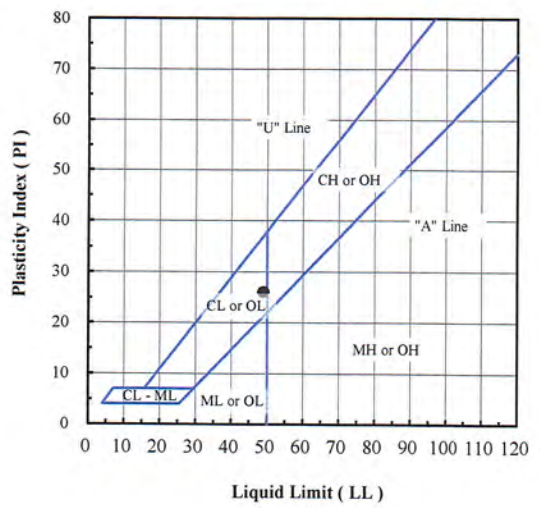


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	96.9
#20	0.850	96.6
#40	0.425	96.3
#60	0.250	95.9
#100	0.150	95.5
#140	0.106	95.2
#200	0.075	94.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	2.5
Fines (%):	94.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-2 (5')	20L205	26.9	94.9	49	23	26	CL - Lean clay

Note(s):

01-25-2021  
AA1NSR



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953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

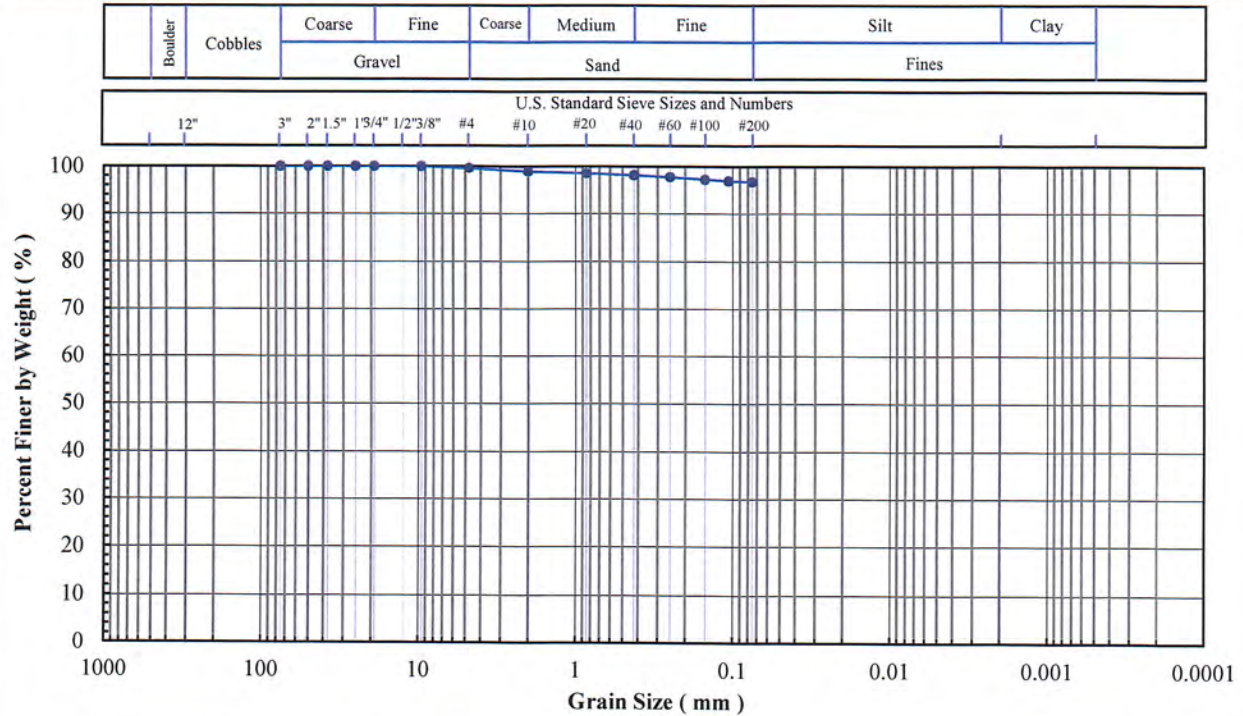
Client Sample ID: B2-5 (18')

Lab Sample No: 20L208

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

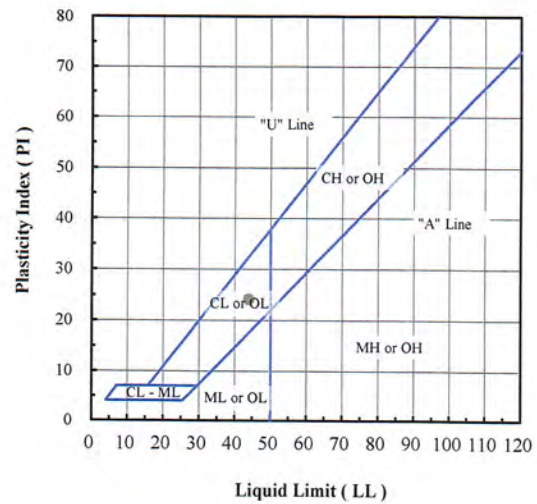


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	98.5
#40	0.425	98.1
#60	0.250	97.7
#100	0.150	97.2
#140	0.106	96.9
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	2.9
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-5 (18')	20L208	36.3	96.7	44	20	24	CL - Lean Clay

Note(s):

01-25-2021  
AA, N5R



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

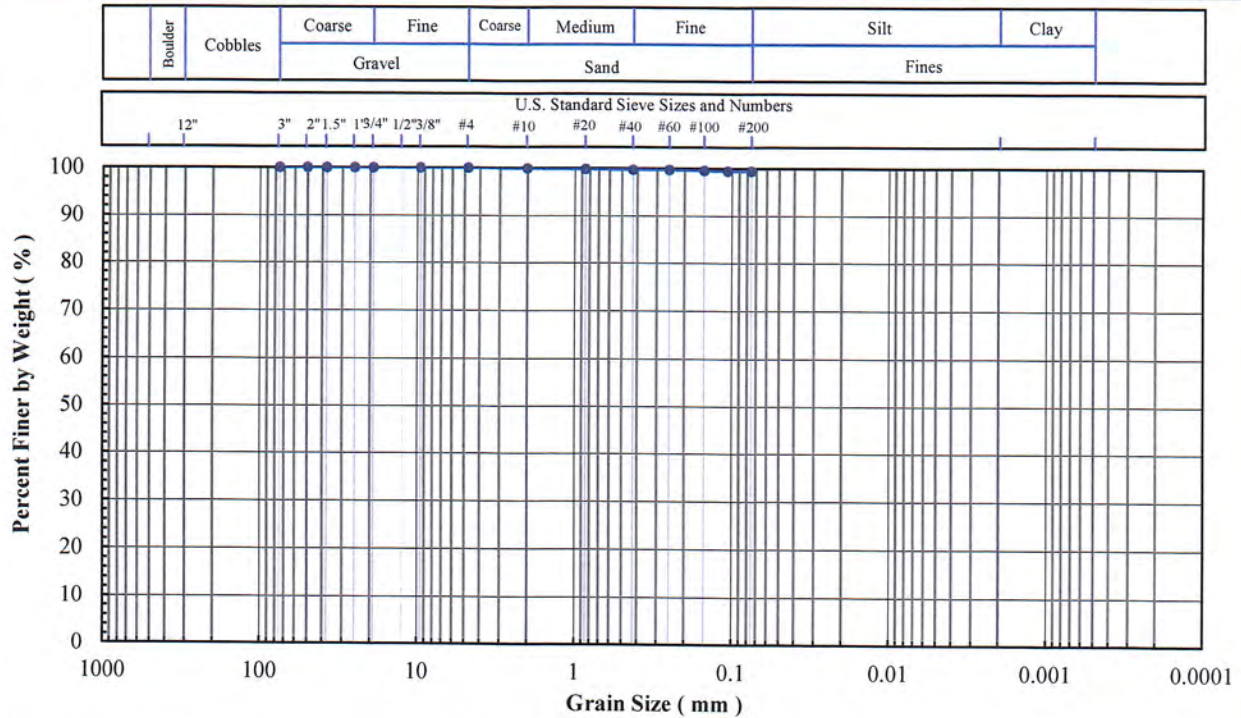
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-8 (40')  
Lab Sample No: 20L211

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

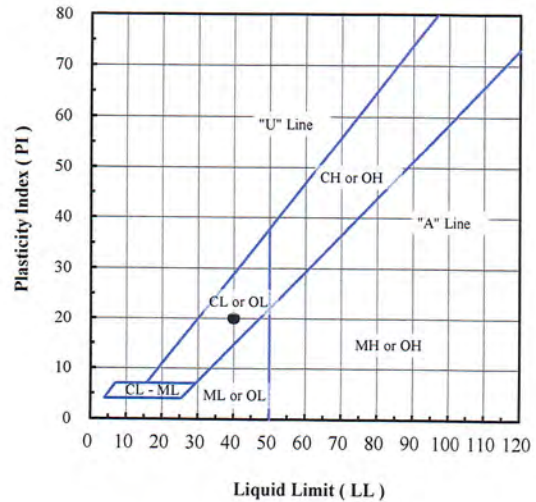


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.5
#140	0.106	99.4
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-8 (40')	20L211	37.5	99.4	40	20	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

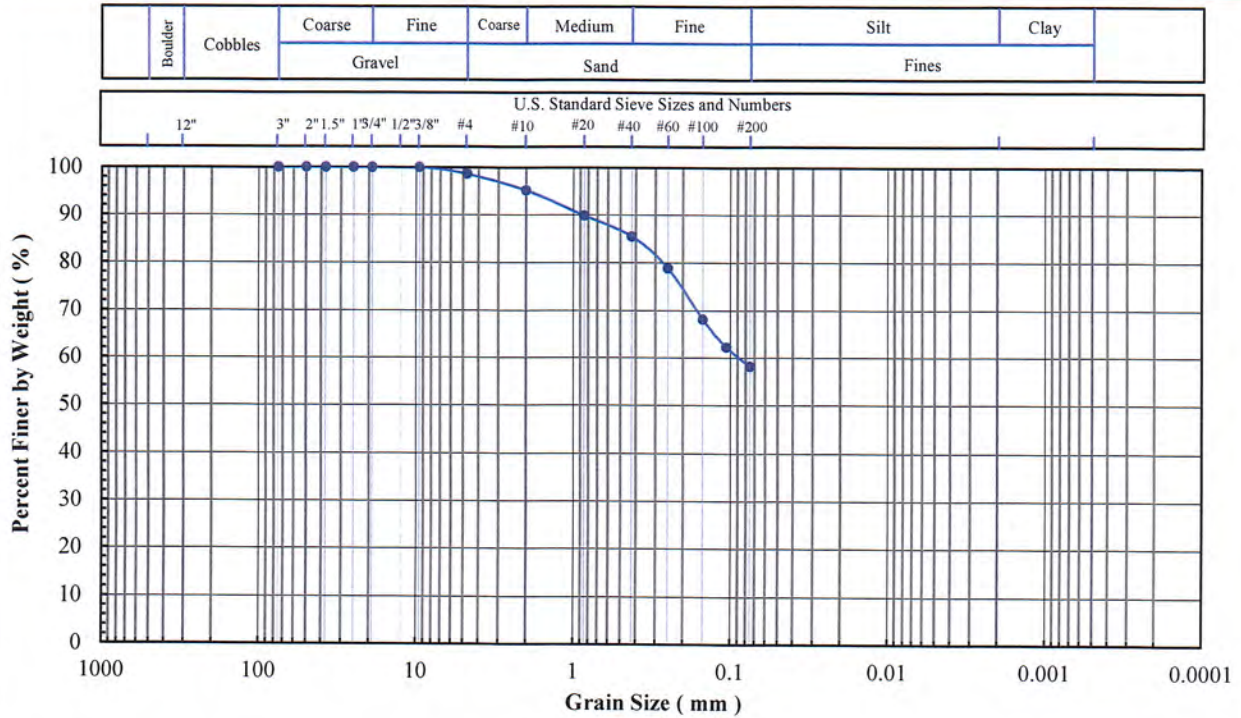
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B2-12 (60')  
**Lab Sample No:** 20L215

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

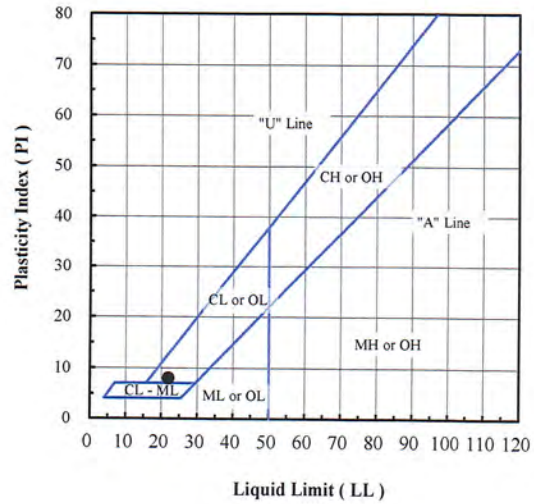


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	95.1
#20	0.850	89.8
#40	0.425	85.4
#60	0.250	78.8
#100	0.150	68.1
#140	0.106	62.2
#200	0.075	58.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	40.5
Fines (%):	58.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-12 (60')	20L215	17.4	58.1	22	14	8	CL - Sandy lean clay

Note(s):

01-25-2021  
 AA, NSR





**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

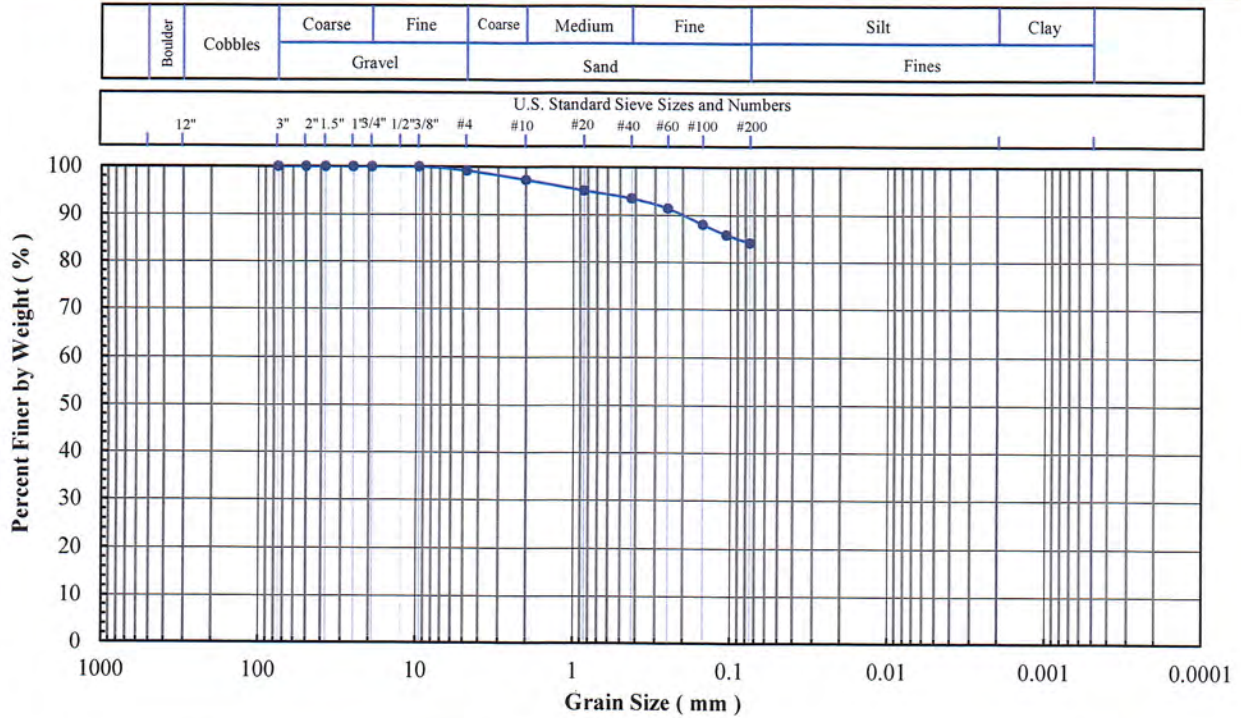
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-16 (80')  
 Lab Sample No: 20L219

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

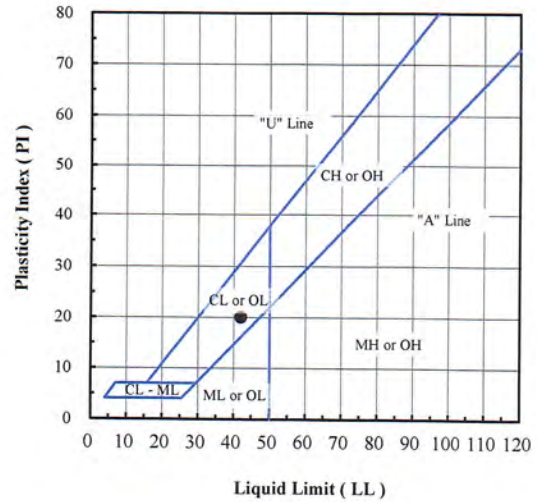


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	95.1
#40	0.425	93.5
#60	0.250	91.4
#100	0.150	88.0
#140	0.106	85.8
#200	0.075	84.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	15.1
Fines (%):	84.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-16 (80')	20L219	25.2	84.1	42	22	20	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

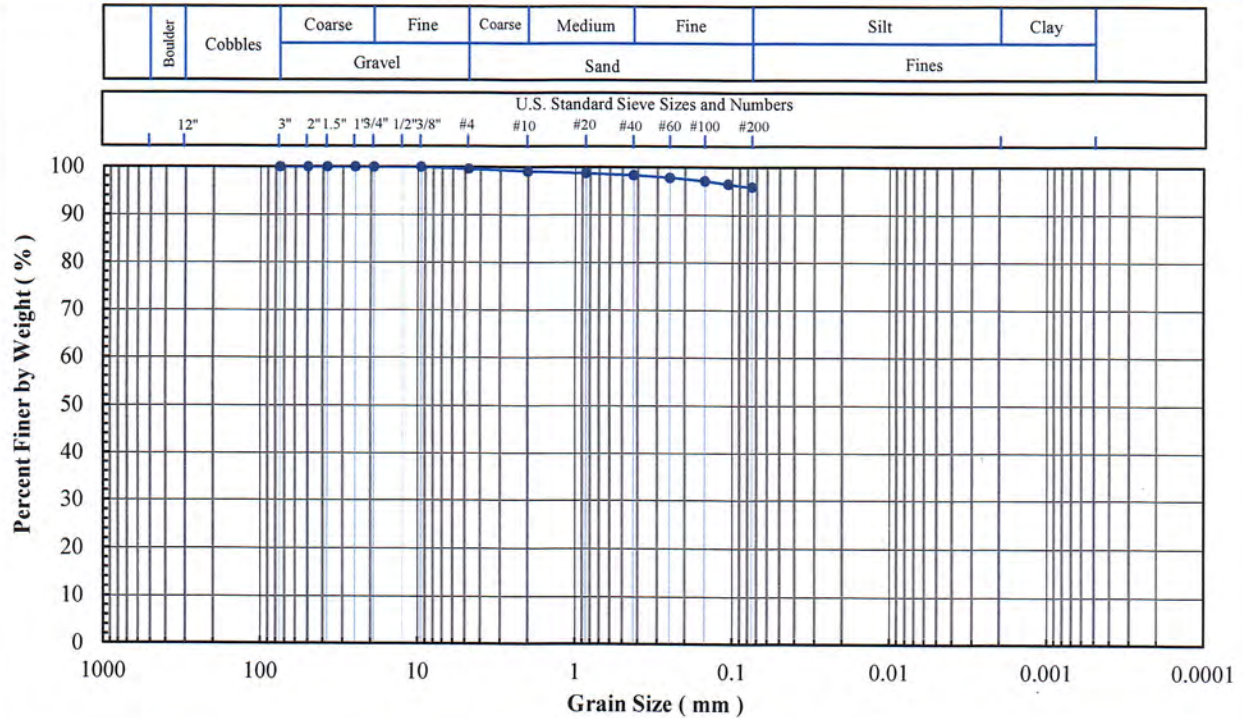
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-ST-1 (1-3')  
 Lab Sample No: 20L149

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

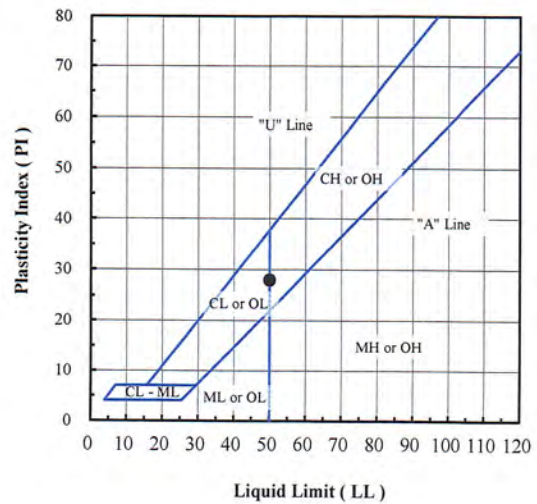


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	99.1
#20	0.850	98.7
#40	0.425	98.3
#60	0.250	97.8
#100	0.150	97.1
#140	0.106	96.4
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	3.8
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-ST-1 (1-3')	20L149	23.0	95.8	50	22	28	CL - Lean clay

Note(s):

02-01-2021  
 AA1NSA



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

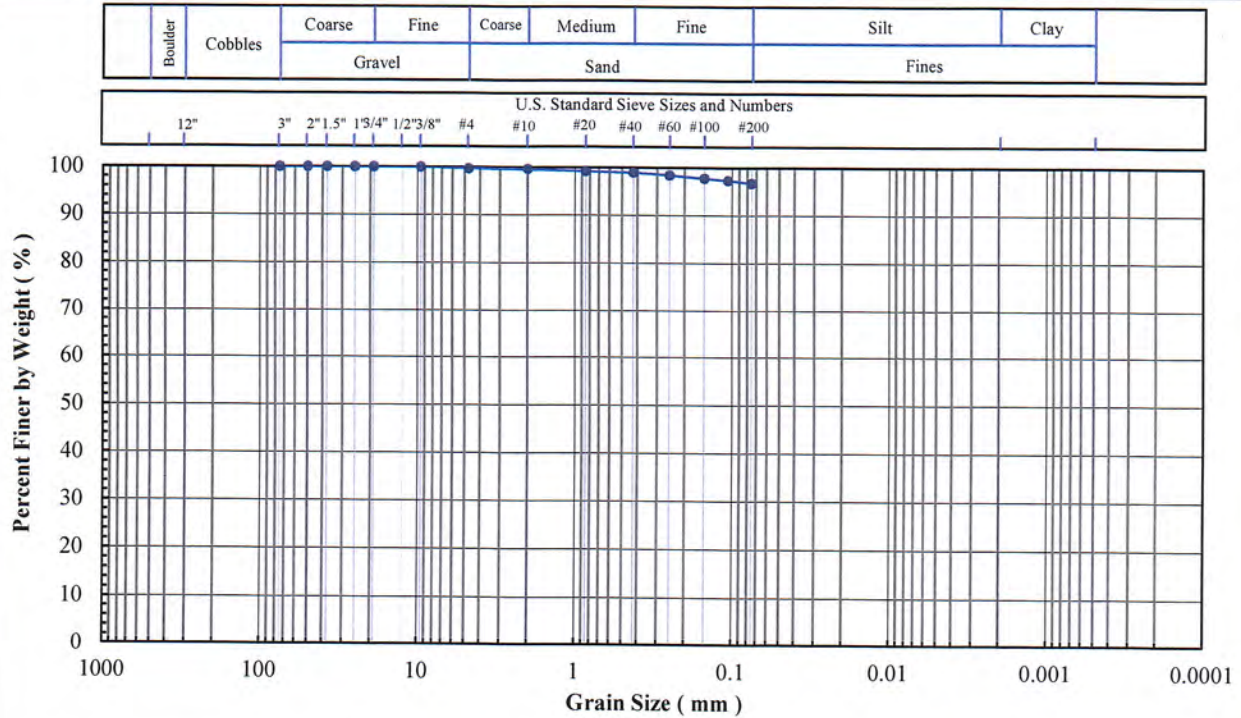
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-2 (5')  
 Lab Sample No: 20L224

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

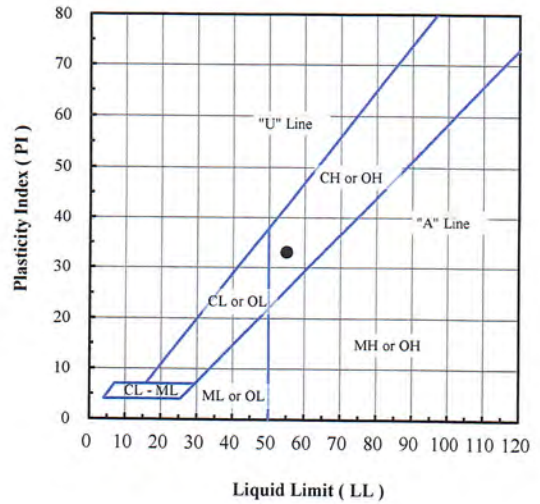


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.6
#20	0.850	99.2
#40	0.425	98.9
#60	0.250	98.4
#100	0.150	97.7
#140	0.106	97.3
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	3.0
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-2 (5')	20L224	24.1	96.7	55	22	33	CH - Fat clay

Note(s):

*01-25-2021  
AA, MSR*



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

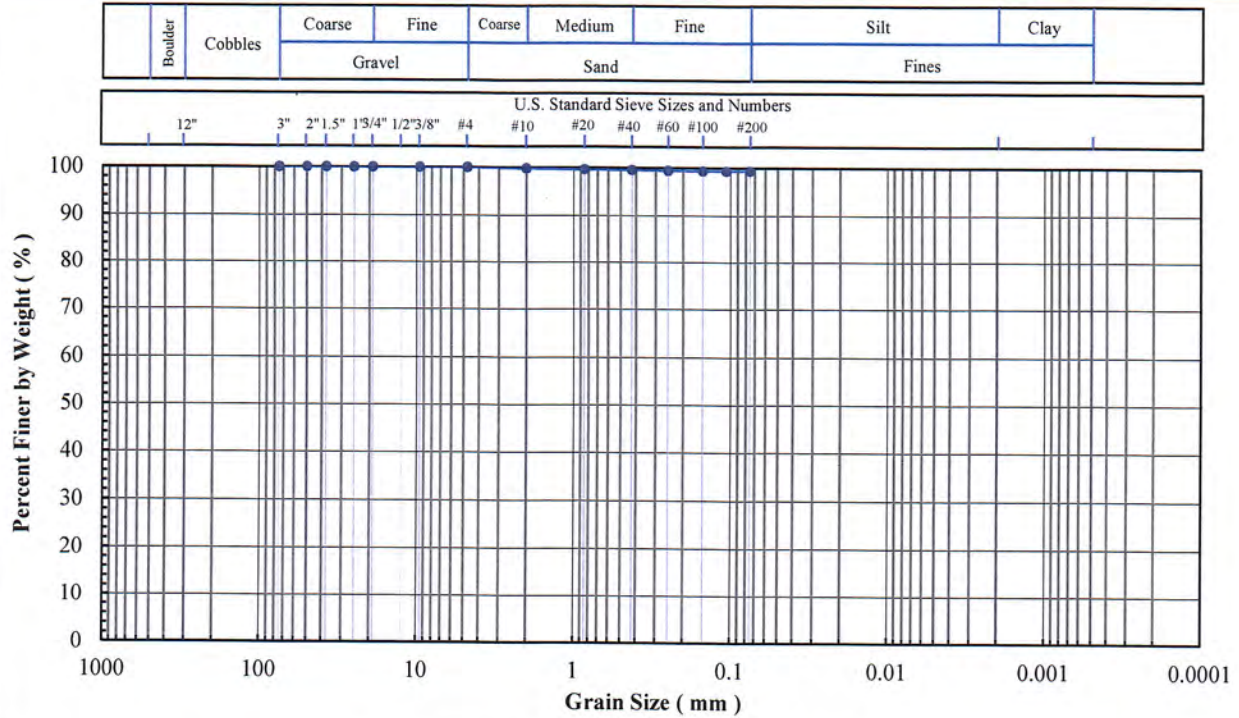
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-6 (25')  
 Lab Sample No: 20L228

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

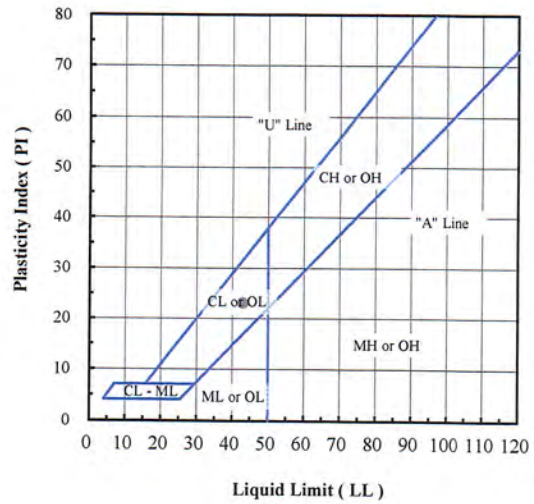


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.6
#40	0.425	99.5
#60	0.250	99.4
#100	0.150	99.3
#140	0.106	99.3
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (25')	20L228	37.7	99.3	43	20	23	CL - Lean clay

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

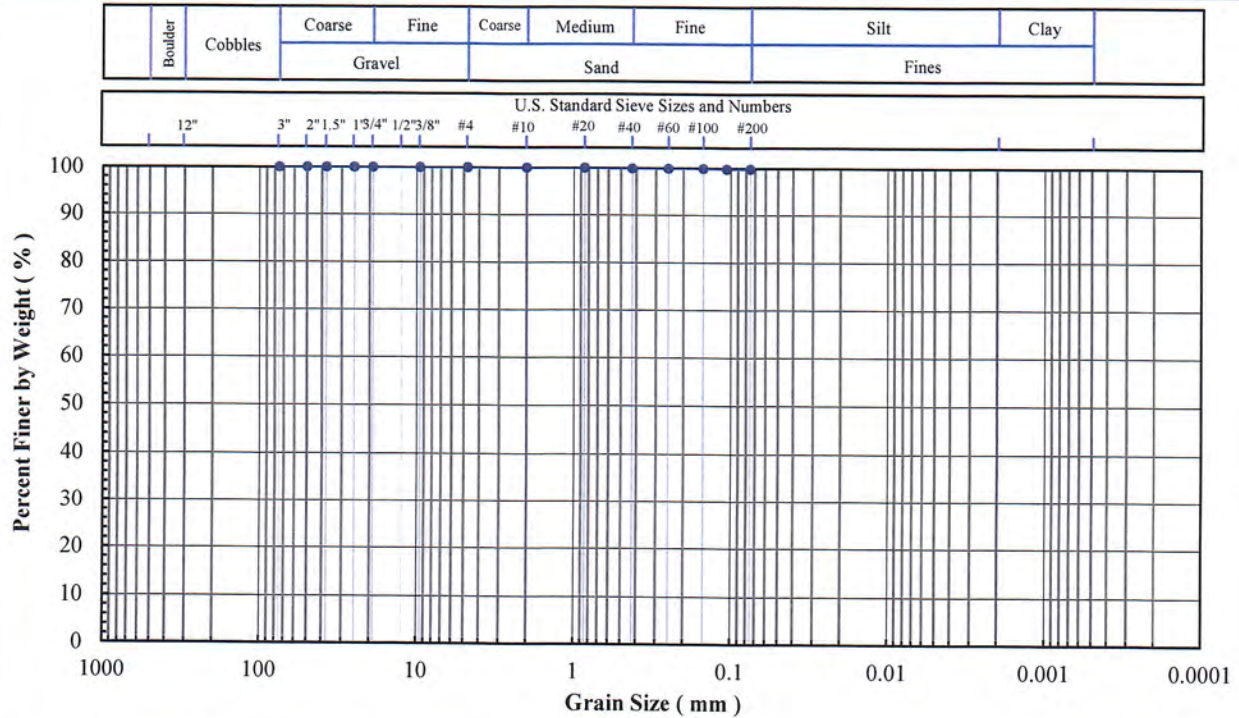
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-10 (45')  
Lab Sample No: 20L232

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

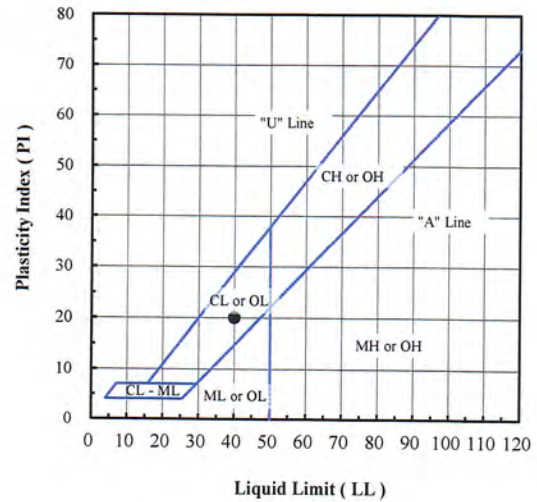


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.8
#200	0.075	99.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.2
Fines (%):	99.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-10 (45')	20L232	36.5	99.8	40	20	20	CL - Lean clay

Note(s):

*01-25-2021  
AA, NSK*



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

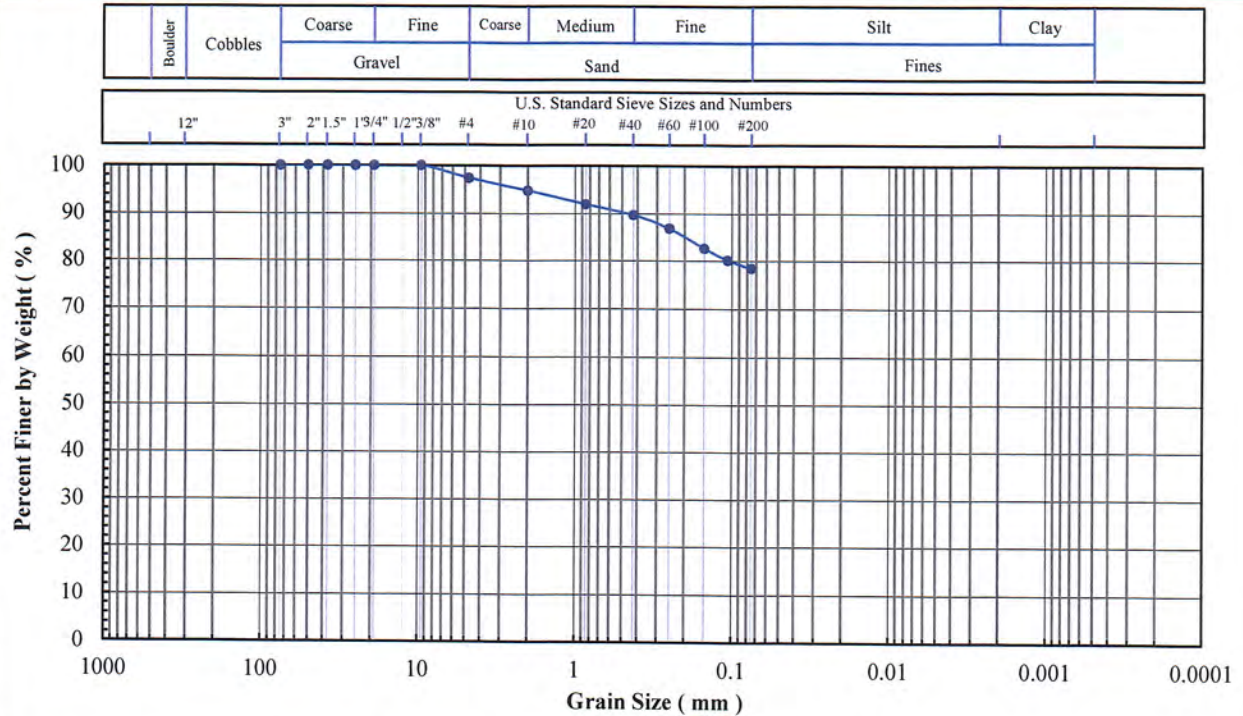
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-18 (85')  
Lab Sample No: 20L240

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

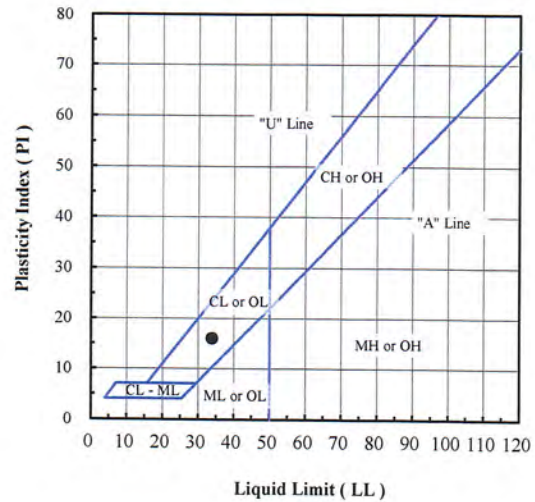


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	94.8
#20	0.850	91.9
#40	0.425	89.7
#60	0.250	86.8
#100	0.150	82.6
#140	0.106	80.1
#200	0.075	78.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	19.0
Fines (%):	78.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-18 (85')	20L240	21.9	78.4	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1159



**Excel Geotechnical Testing, Inc.**  
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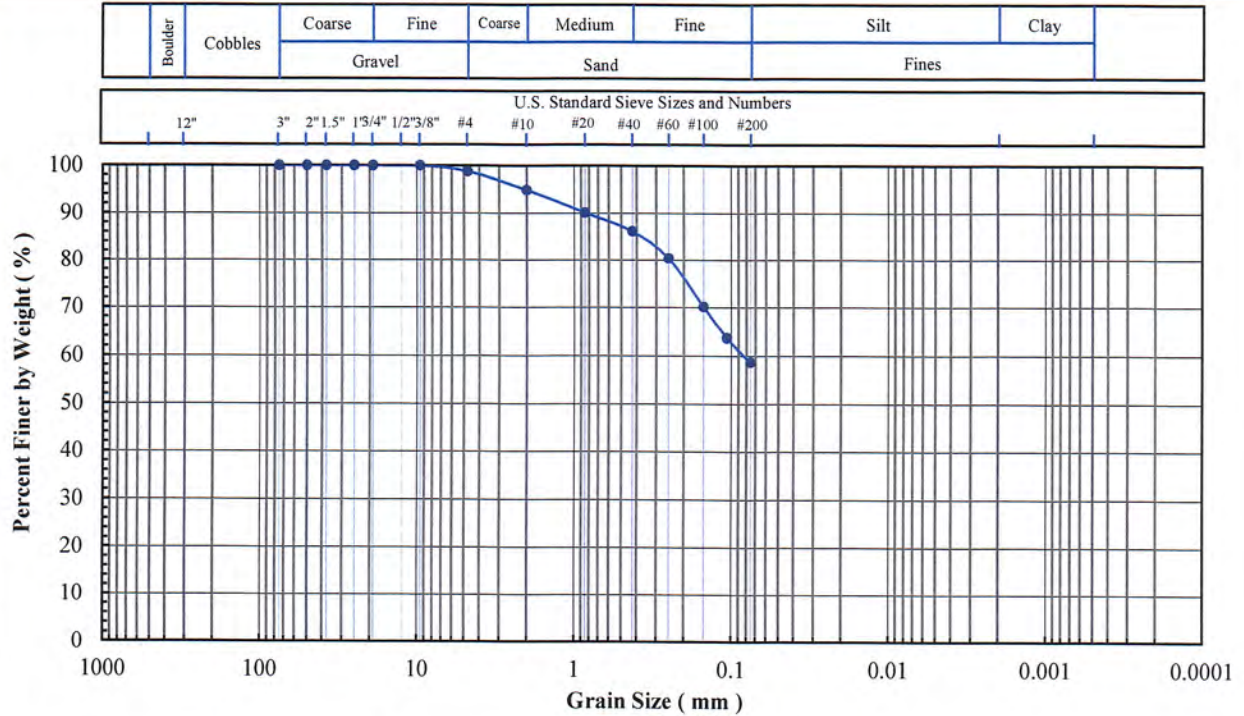
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-14 (67')  
 Lab Sample No: 20L236

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

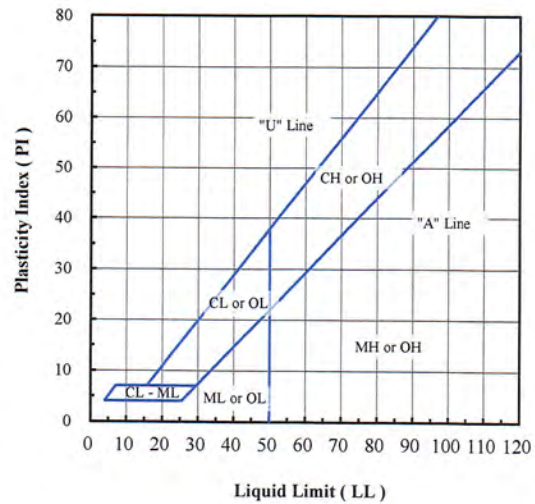


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	94.9
#20	0.850	90.1
#40	0.425	86.2
#60	0.250	80.4
#100	0.150	70.1
#140	0.106	63.7
#200	0.075	58.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	40.2
Fines (%):	58.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-14 (67')	20L236	15.2	58.6				

Note(s):

02-03-2021  
 AA, NSF



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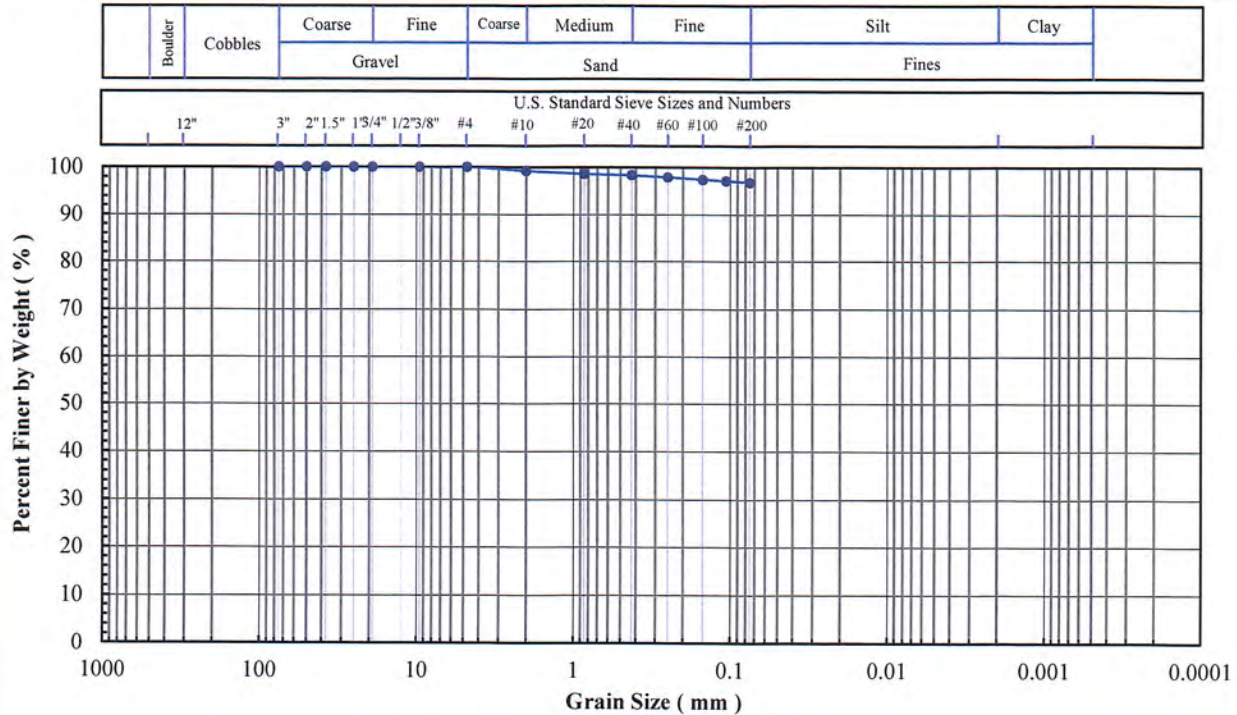
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-1 (10')  
Lab Sample No: 20L243

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

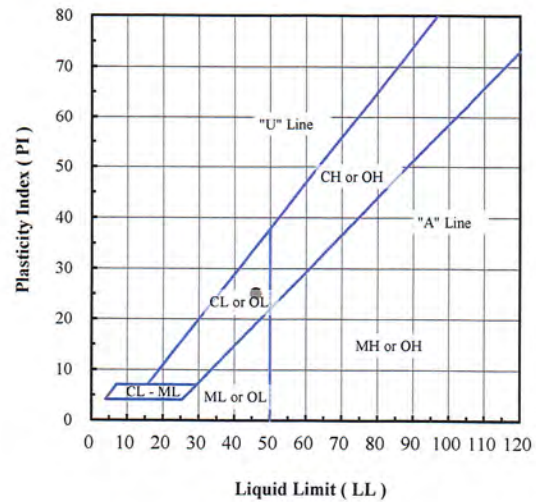


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.2
#20	0.850	98.6
#40	0.425	98.3
#60	0.250	97.9
#100	0.150	97.4
#140	0.106	97.1
#200	0.075	96.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	3.2
Fines (%):	96.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (10')	20L243	25.6	96.8	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, NSR





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Project Name: Belle River ALD Support

Project No: PN1017

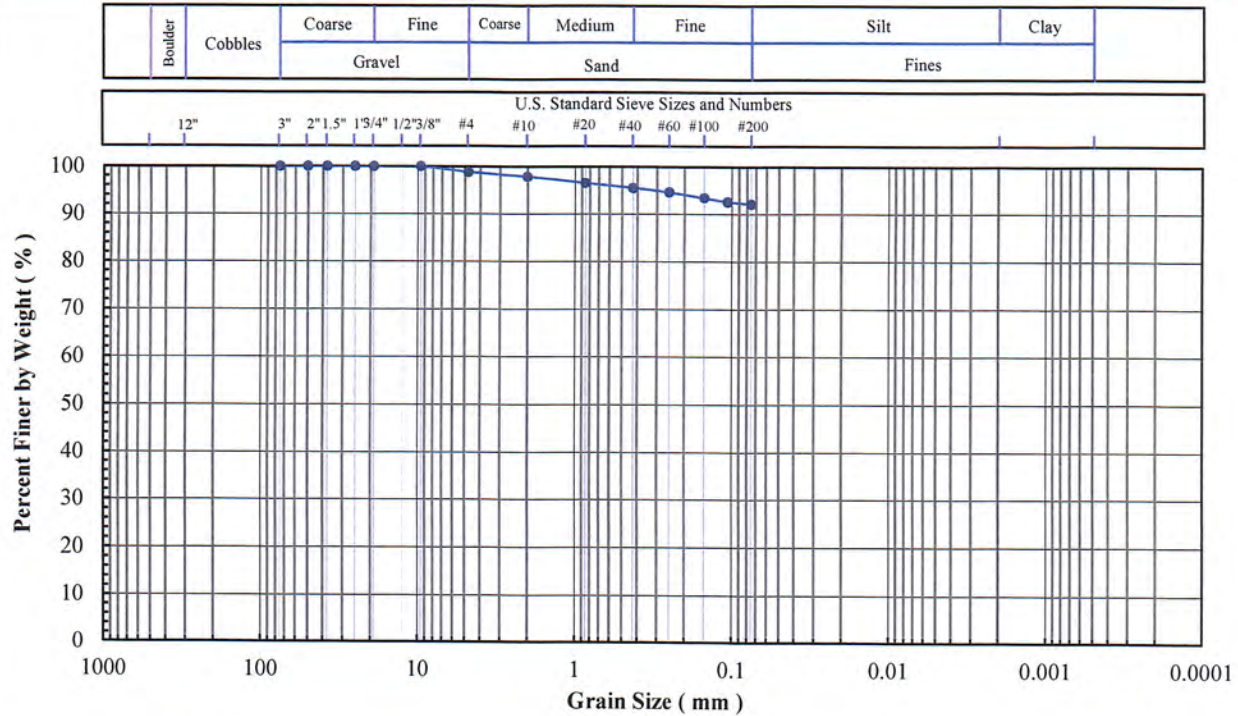
Client Sample ID: B4-7 (34')

Lab Sample No: 20L249

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

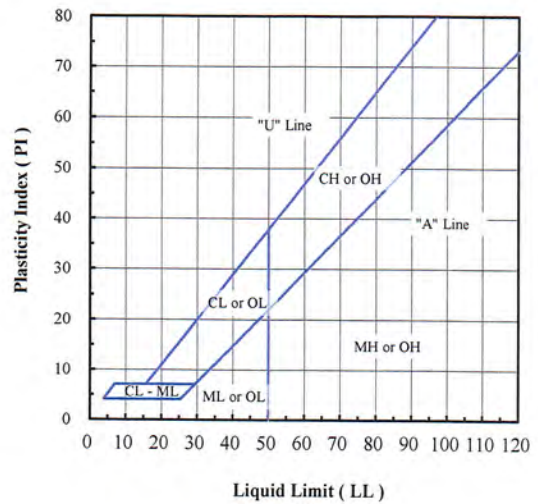


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.8
#20	0.850	96.4
#40	0.425	95.4
#60	0.250	94.5
#100	0.150	93.3
#140	0.106	92.5
#200	0.075	92.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	6.8
Fines (%):	92.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-7 (34')	20L249	33.9	92.0				

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
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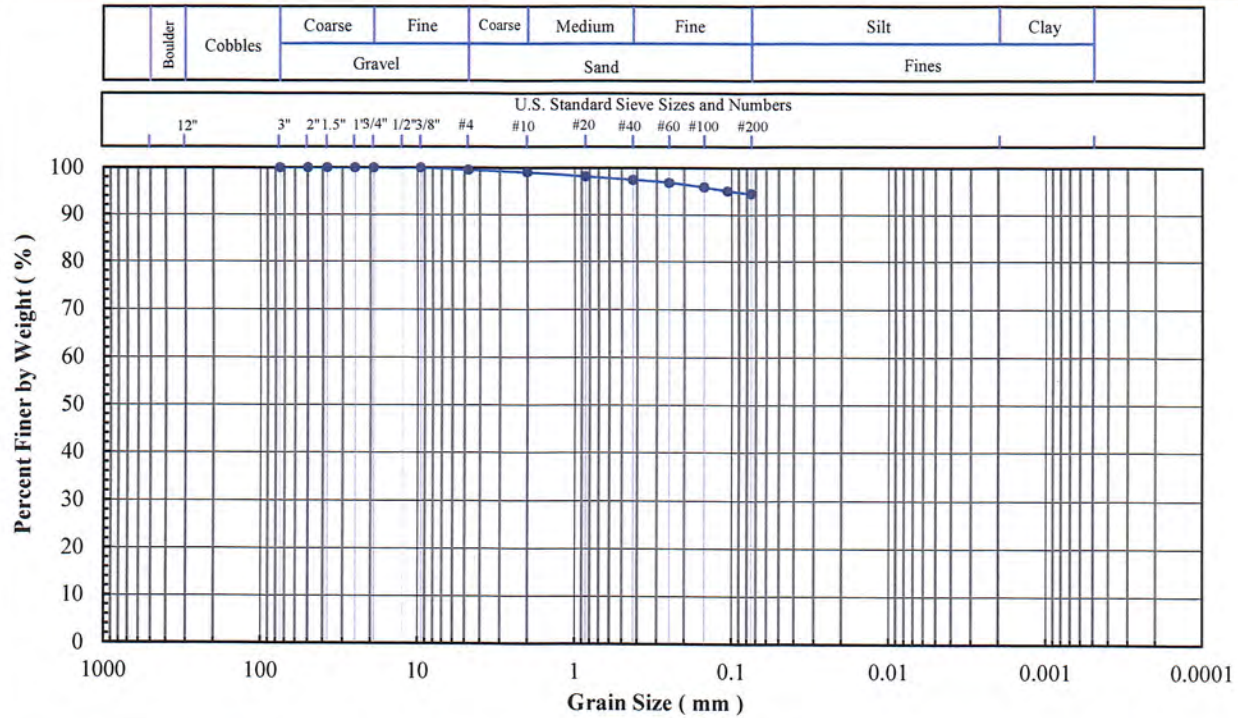
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-12 (55')  
Lab Sample No: 20L254

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

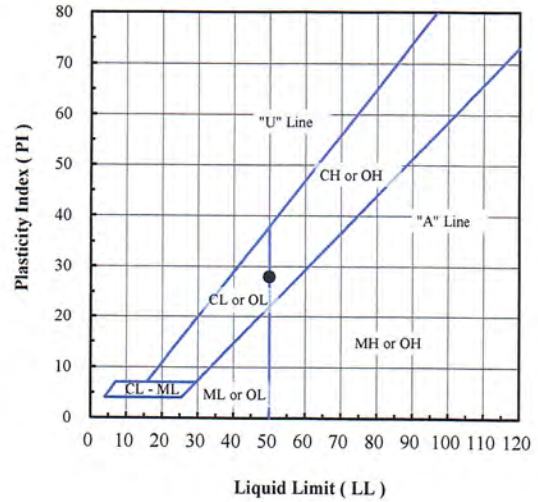


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	97.4
#60	0.250	96.8
#100	0.150	95.8
#140	0.106	95.0
#200	0.075	94.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	5.1
Fines (%):	94.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (55')	20L254	41.4	94.4	50	22	28	CH - Fat clay

Note(s):

01-25-2021  
AA1NSR



**Excel Geotechnical Testing, Inc.**  
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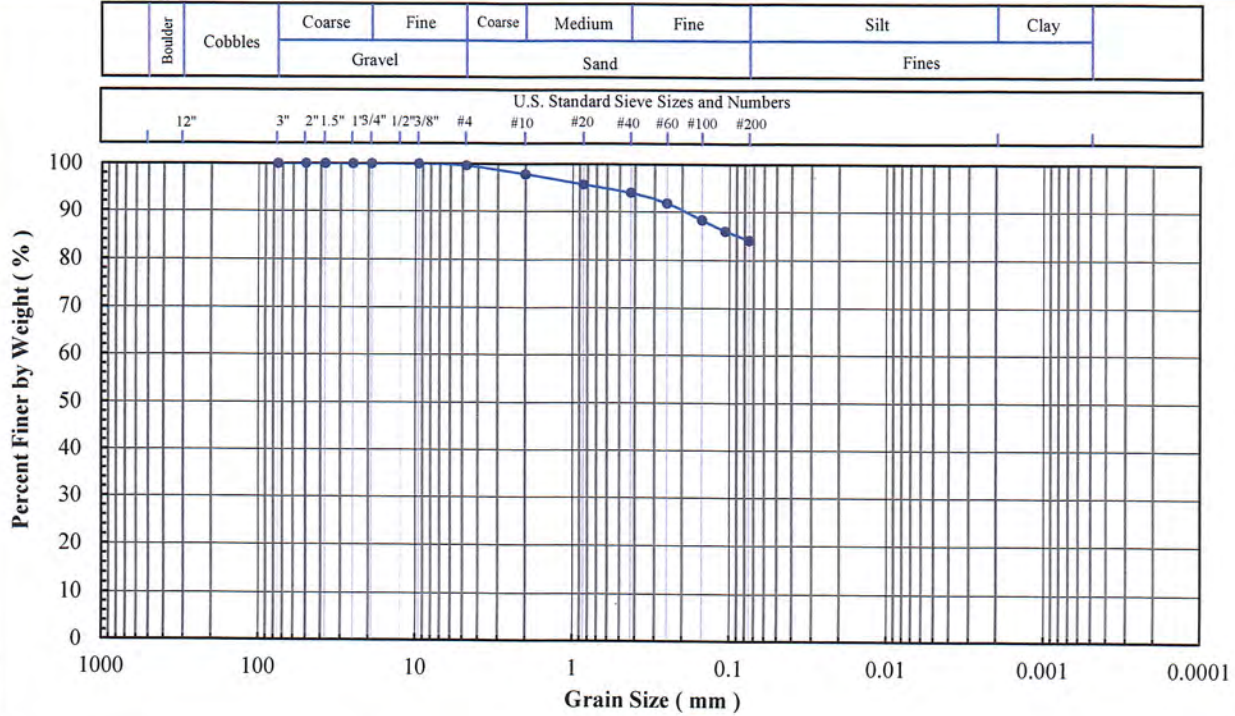
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-16 (75')  
Lab Sample No: 20L258

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

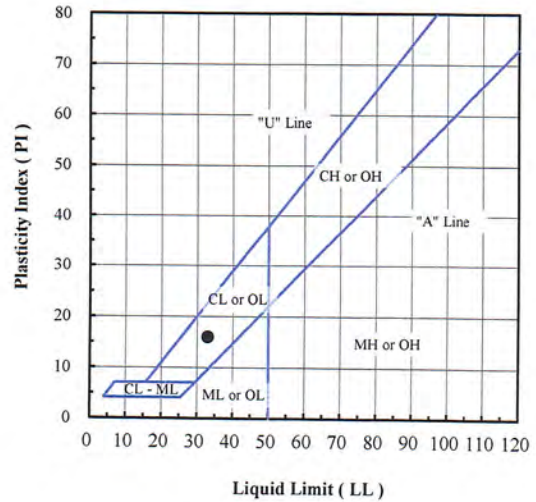


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	97.8
#20	0.850	95.6
#40	0.425	93.9
#60	0.250	91.7
#100	0.150	88.2
#140	0.106	85.9
#200	0.075	84.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	15.6
Fines (%):	84.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-16 (75')	20L258	24.0	84.0	33	17	16	CL - Lean clay with sand

Note(s):

*01-25-2021  
AA, NJSR*



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953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

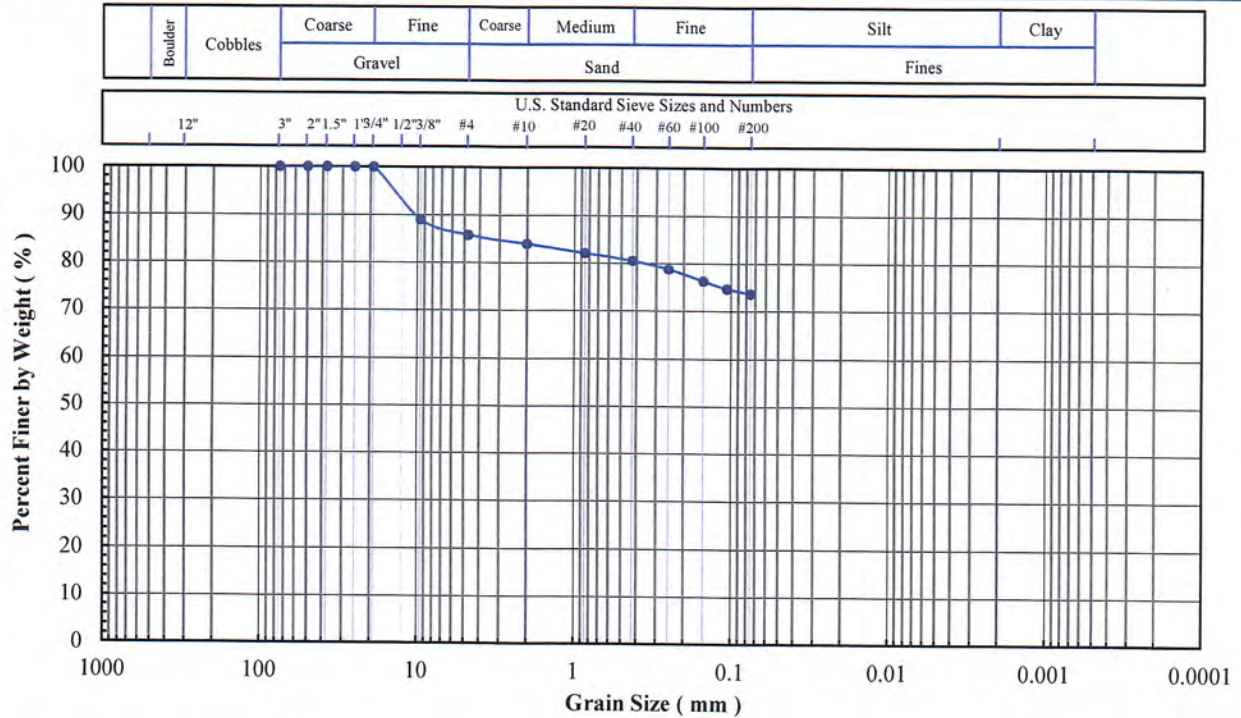
Client Sample ID: B4-20 (95')

Lab Sample No: 20L262

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

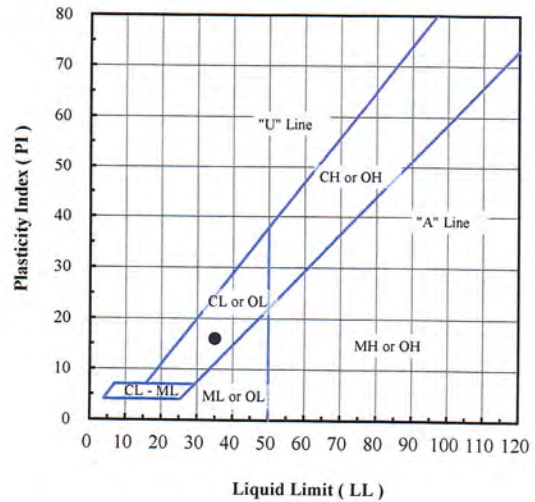


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	89
#4	4.75	86
#10	2.00	84
#20	0.850	82
#40	0.425	81
#60	0.250	79
#100	0.150	76
#140	0.106	75
#200	0.075	74

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	14
Sand (%):	12
Fines (%):	74
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-20 (95')	20L262	21.7	74	35	19	16	CL - Lean clay with gravel

Note(s): Sieve specimen was undersized.

01-25-2021  
AA1 NSR



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953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

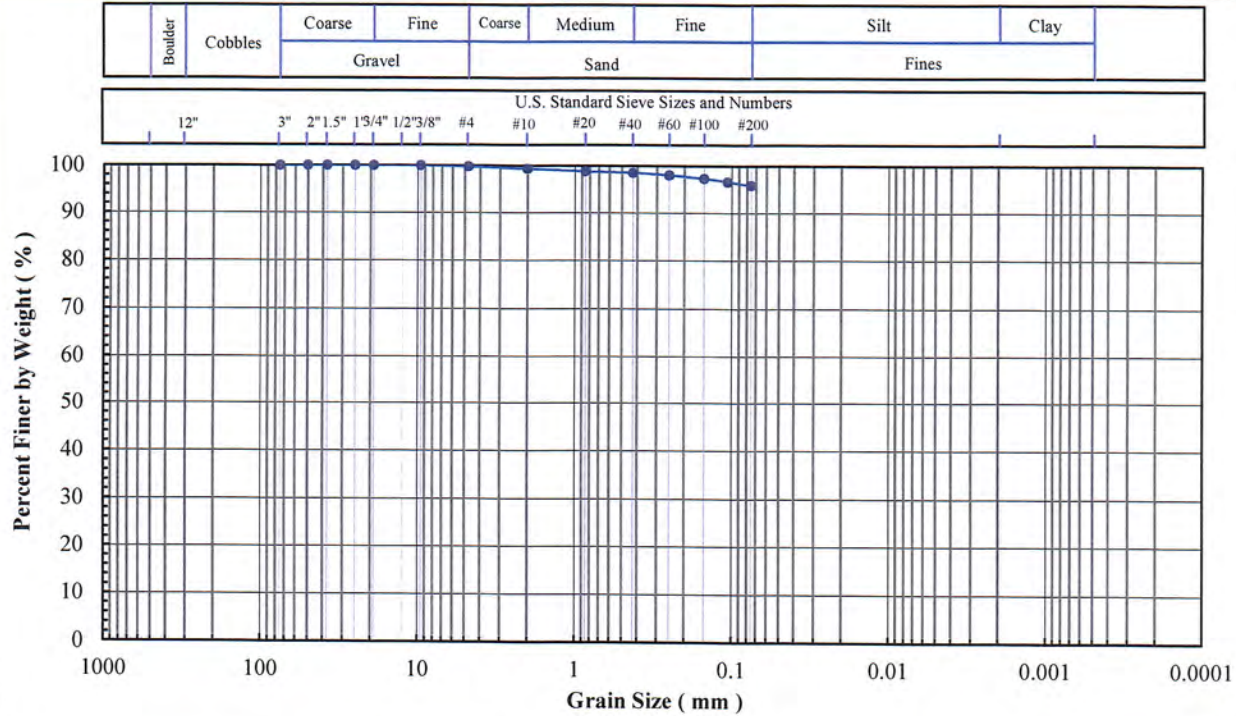
Client Sample ID: B5-1 (7')

Lab Sample No: 20L263

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

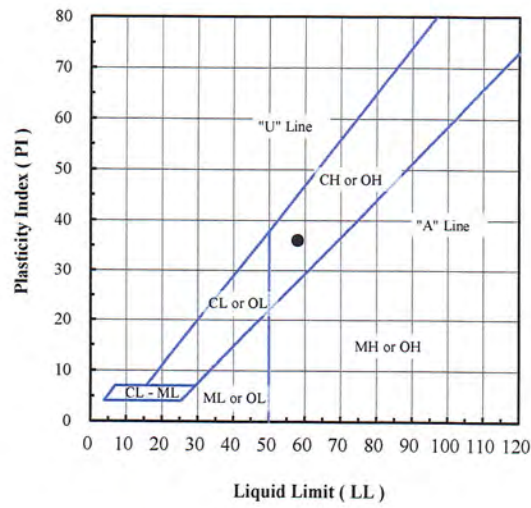


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	98.8
#40	0.425	98.5
#60	0.250	98.0
#100	0.150	97.3
#140	0.106	96.6
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	4.0
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-1 (7')	20L263	35.7	95.8	58	22	36	CH - Fat clay

Note(s):

01-25-2021  
AA, NSR



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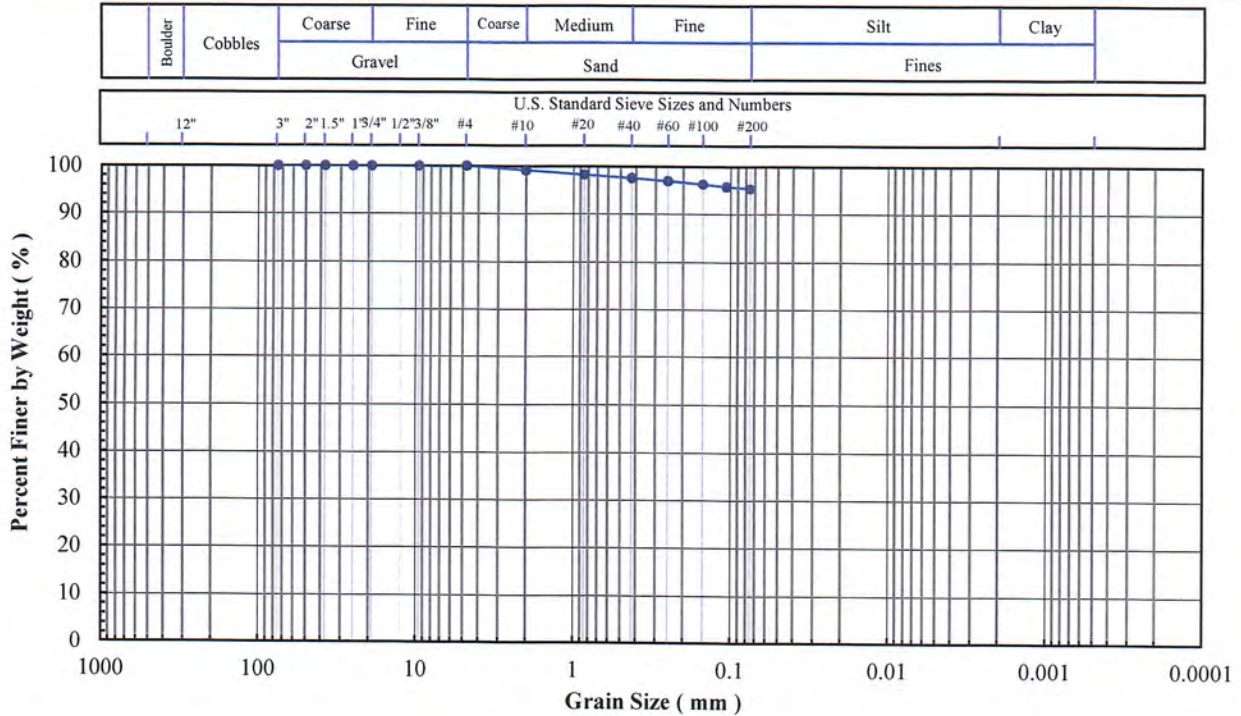
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-4 (29')  
Lab Sample No: 20L266

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

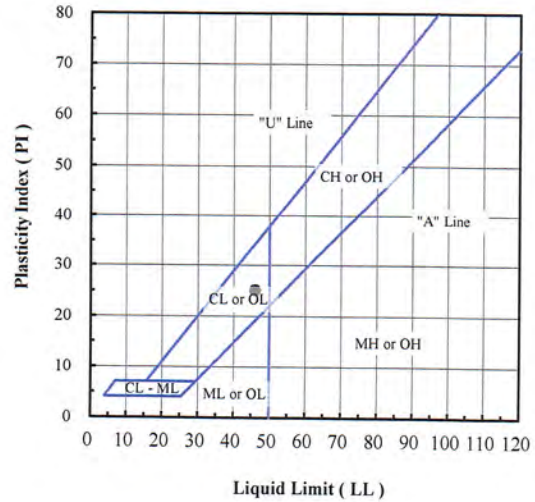


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.1
#20	0.850	98.2
#40	0.425	97.5
#60	0.250	96.9
#100	0.150	96.2
#140	0.106	95.7
#200	0.075	95.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	4.7
Fines (%):	95.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-4 (29')	20L266	39.1	95.3	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR



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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

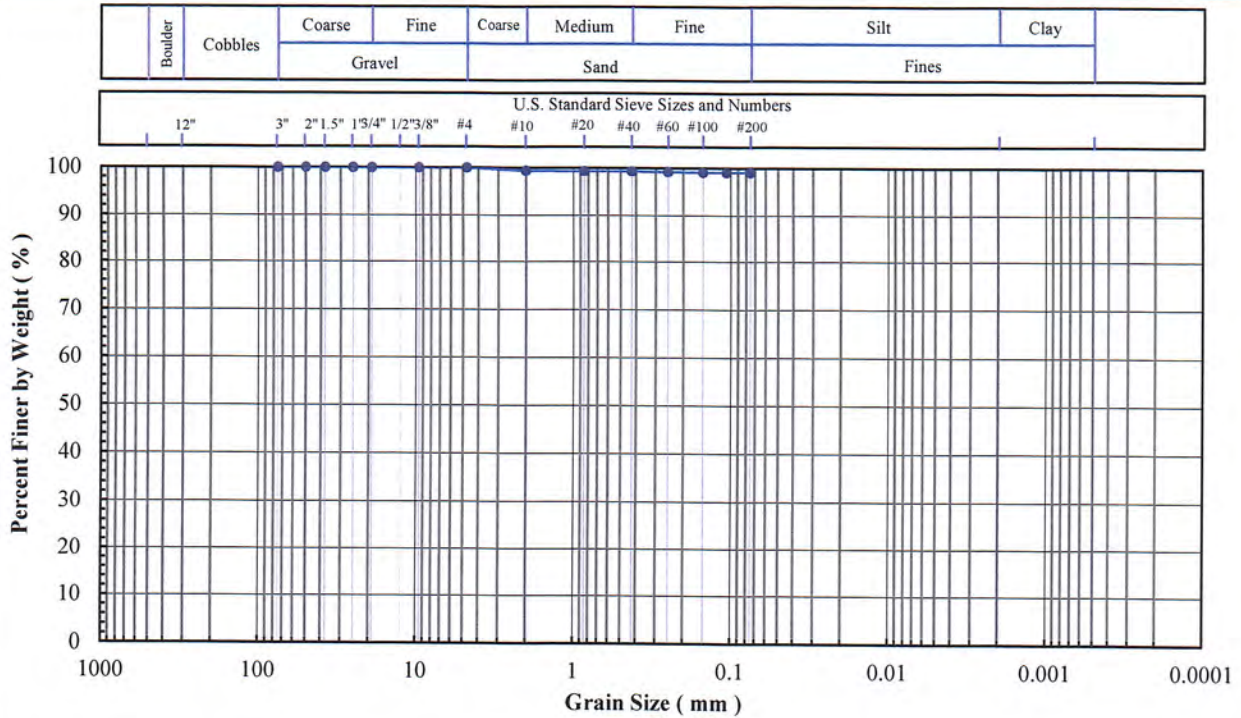
Client Sample ID: B5-9 (52')

Lab Sample No: 20L271

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

## SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

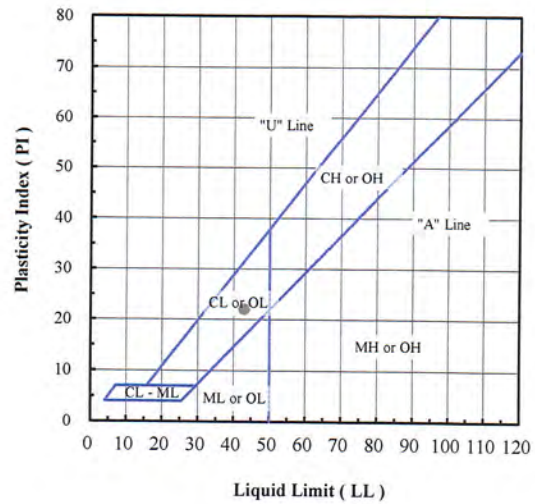


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.4
#20	0.850	99.3
#40	0.425	99.3
#60	0.250	99.2
#100	0.150	99.1
#140	0.106	99.1
#200	0.075	99.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.9
Fines (%):	99.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-9 (52')	20L271	40.2	99.1	43	21	22	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

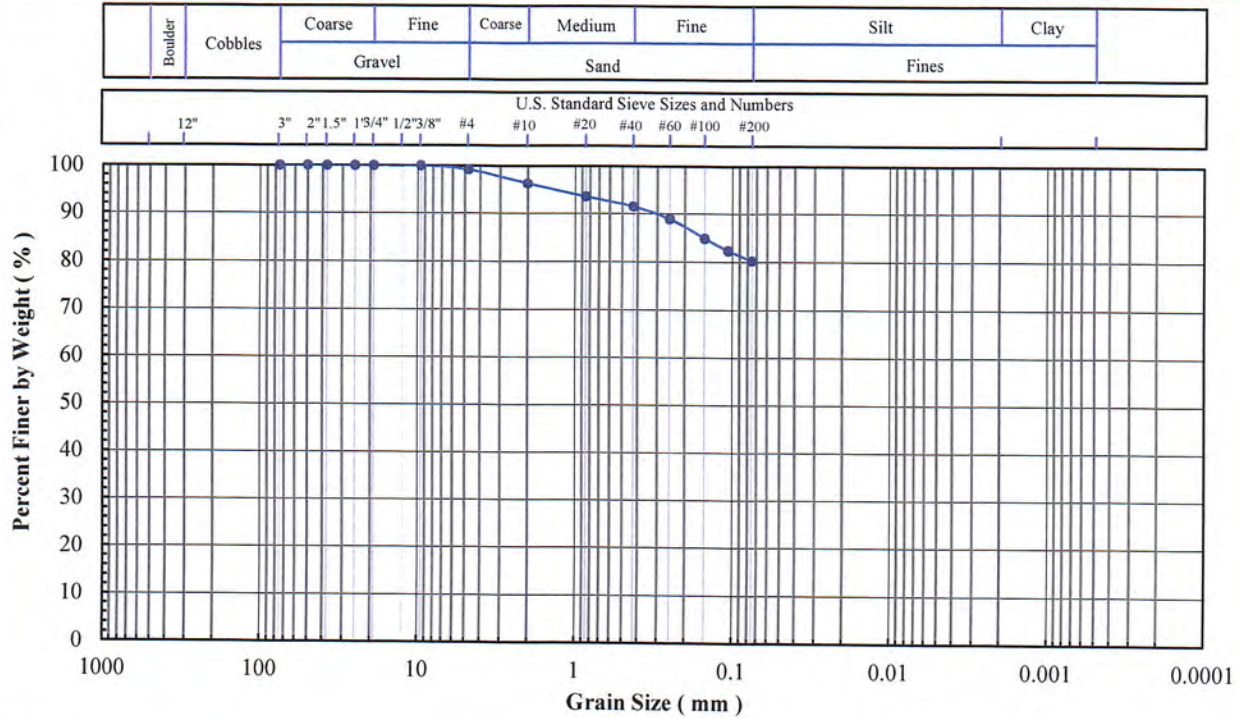
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-13 (72')  
Lab Sample No: 20L275

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

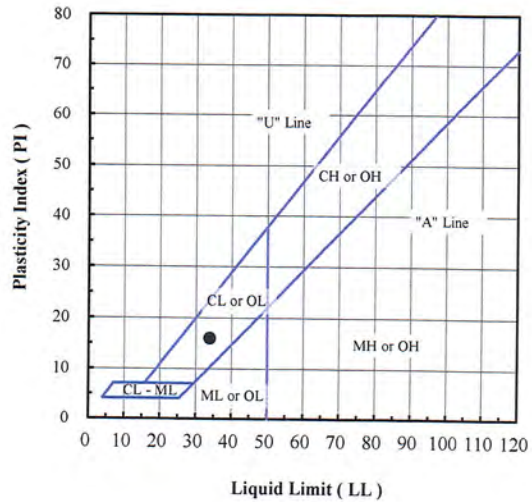


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	93.5
#40	0.425	91.4
#60	0.250	88.8
#100	0.150	84.8
#140	0.106	82.3
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	19.0
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-13 (72')	20L275	27.1	80.2	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1, NSR





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Project Name: Belle River ALD Support

Project No: PN1017

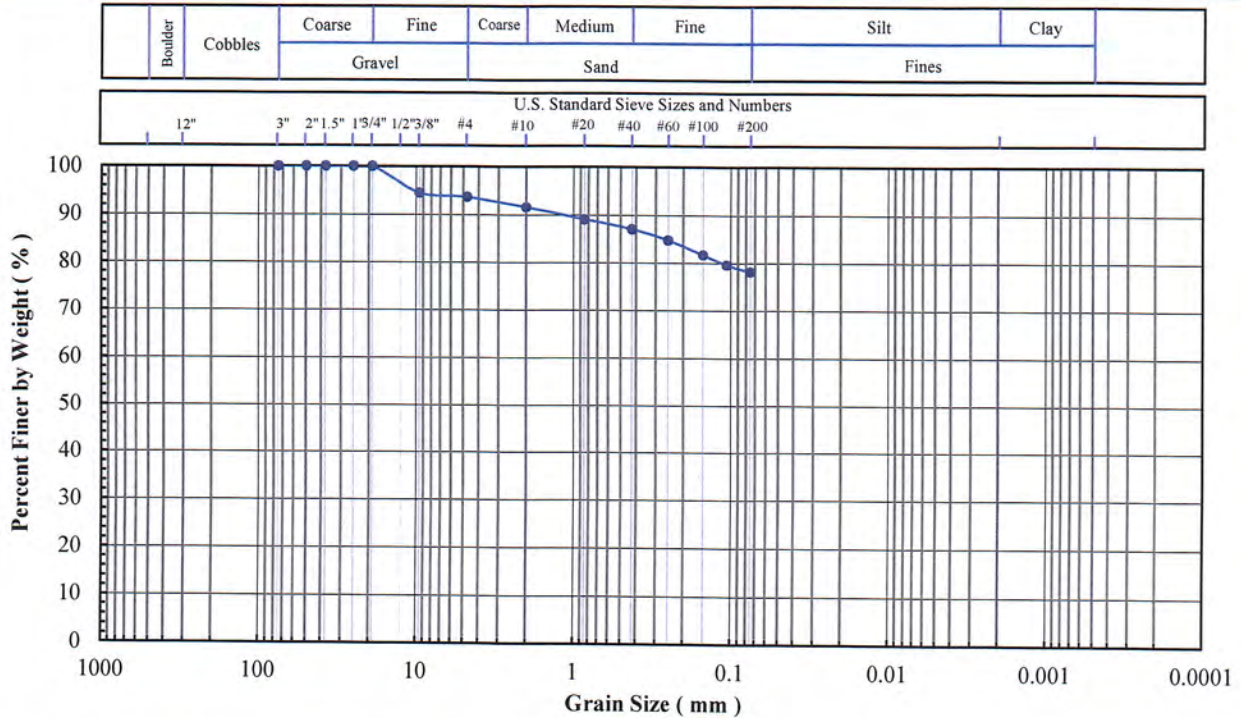
Client Sample ID: B5-17 (92')

Lab Sample No: 20L279

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

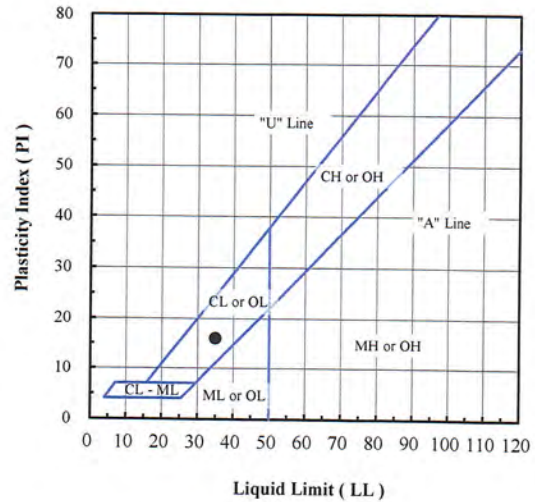


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	92
#20	0.850	89
#40	0.425	87
#60	0.250	85
#100	0.150	82
#140	0.106	80
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	16
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-17 (92')	20L279	22.0	78	35	19	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

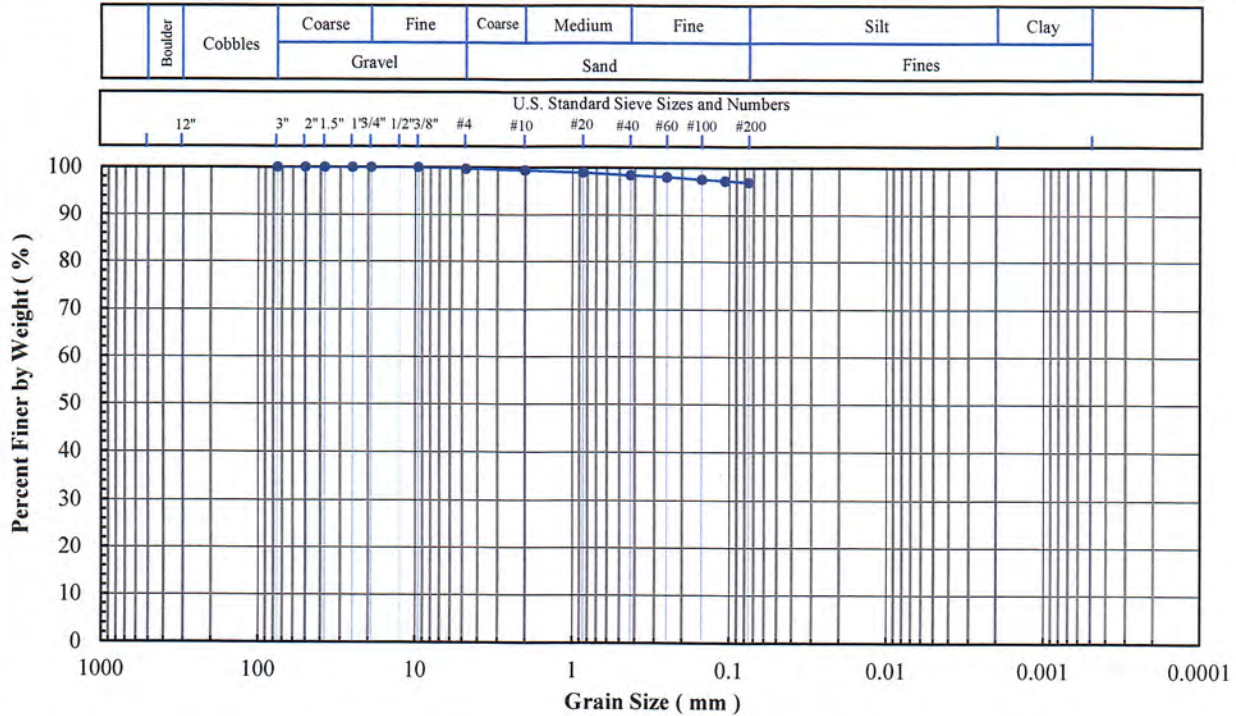
Client Sample ID: B6-3 (15')

Lab Sample No: 20L284

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

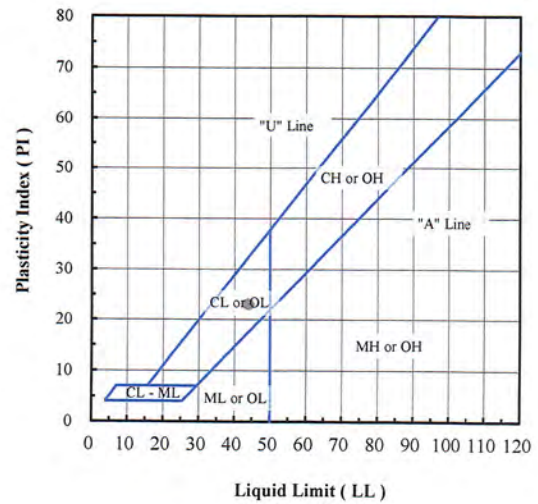


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.4
#20	0.850	98.9
#40	0.425	98.4
#60	0.250	98.0
#100	0.150	97.5
#140	0.106	97.2
#200	0.075	96.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	2.8
Fines (%):	96.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-3 (15')	20L284	36.7	96.9	44	21	23	CL - Lean clay

Note(s):

*01-26-2021  
AA, NSR*



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Project Name: Belle River ALD Support

Project No: PN1017

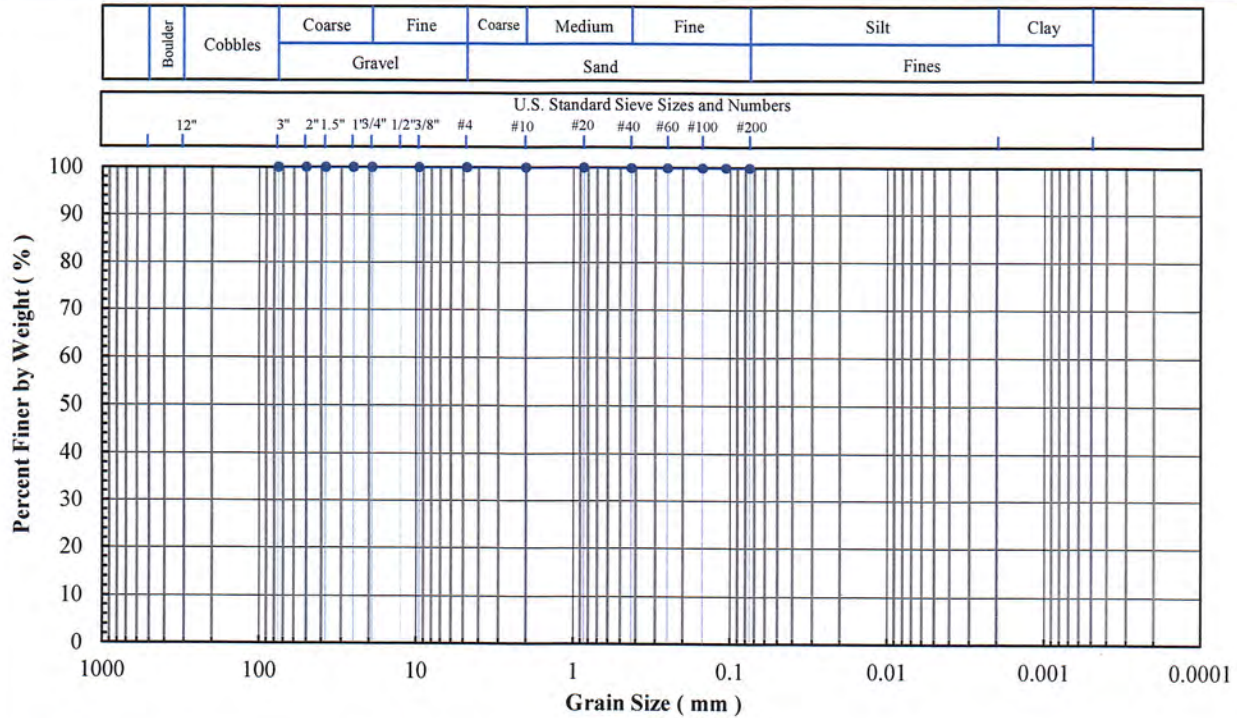
Client Sample ID: B6-7 (35')

Lab Sample No: 20L288

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

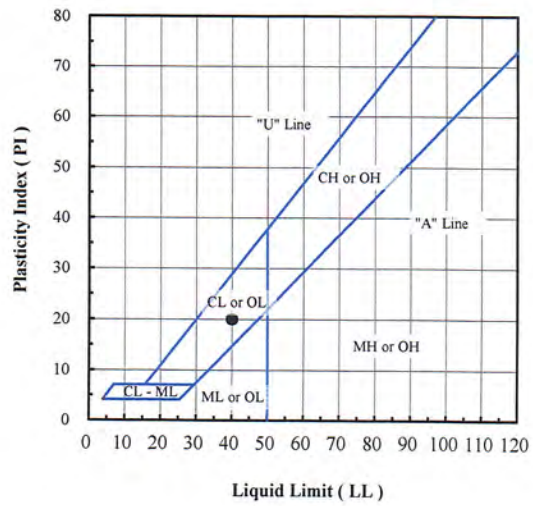


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (35')	20L288	37.8	99.9	40	20	20	CL - Lean clay

Note(s):

01-26-2021  
AAI/NSR



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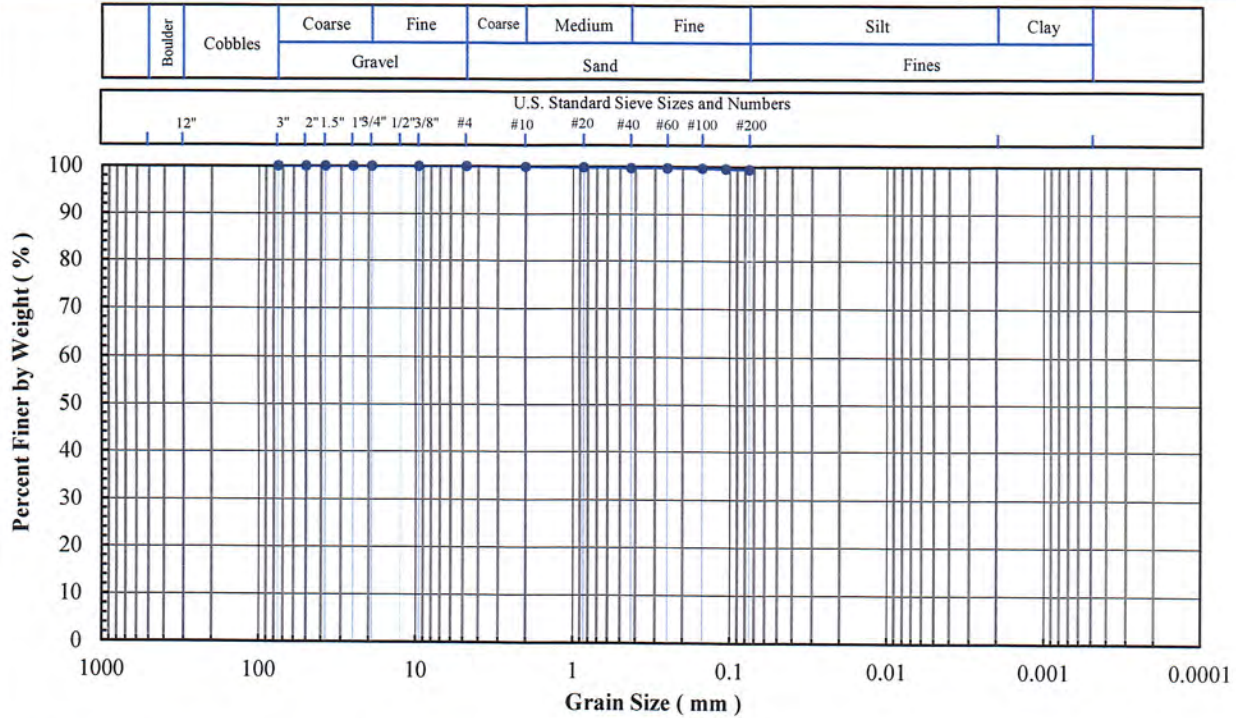
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B6-11 (55')  
 Lab Sample No: 20L292

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

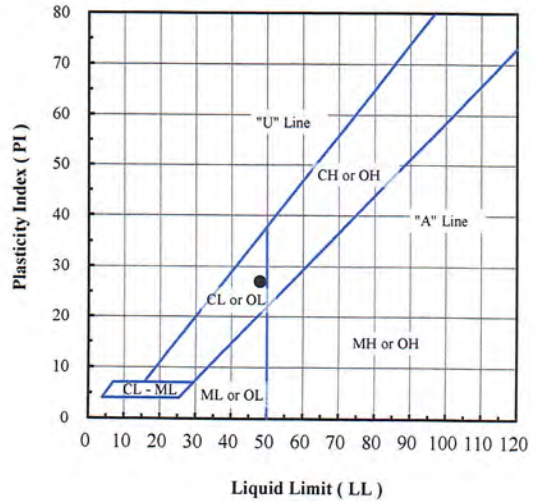


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.6
#140	0.106	99.5
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-11 (55')	20L292	38.7	99.4	48	21	27	CL - Lean Clay

Note(s):

01-26-2021  
 AA, NSR



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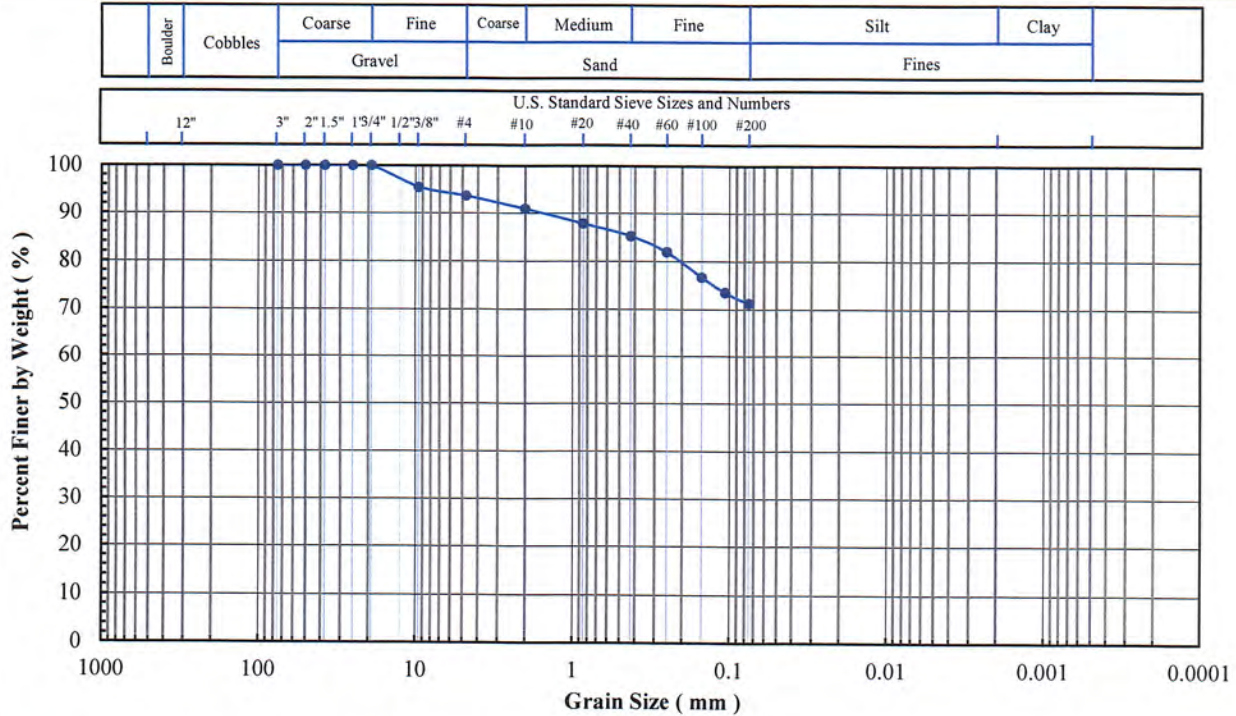
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B6-15 (75')  
 Lab Sample No: 20L296

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

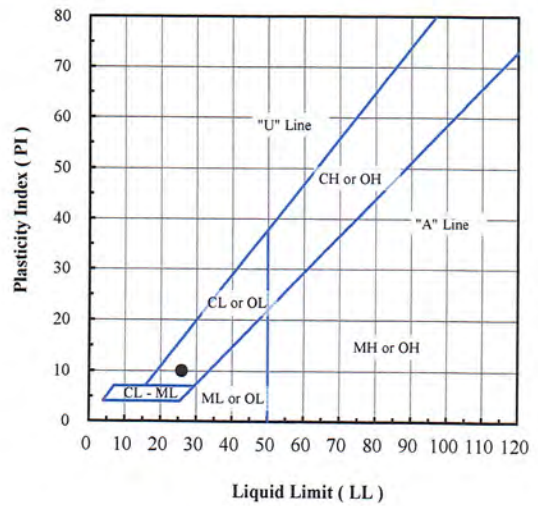


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	91
#20	0.850	88
#40	0.425	85
#60	0.250	82
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	23
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-15 (75')	20L296	20.5	71	26	16	10	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
AA, MSR



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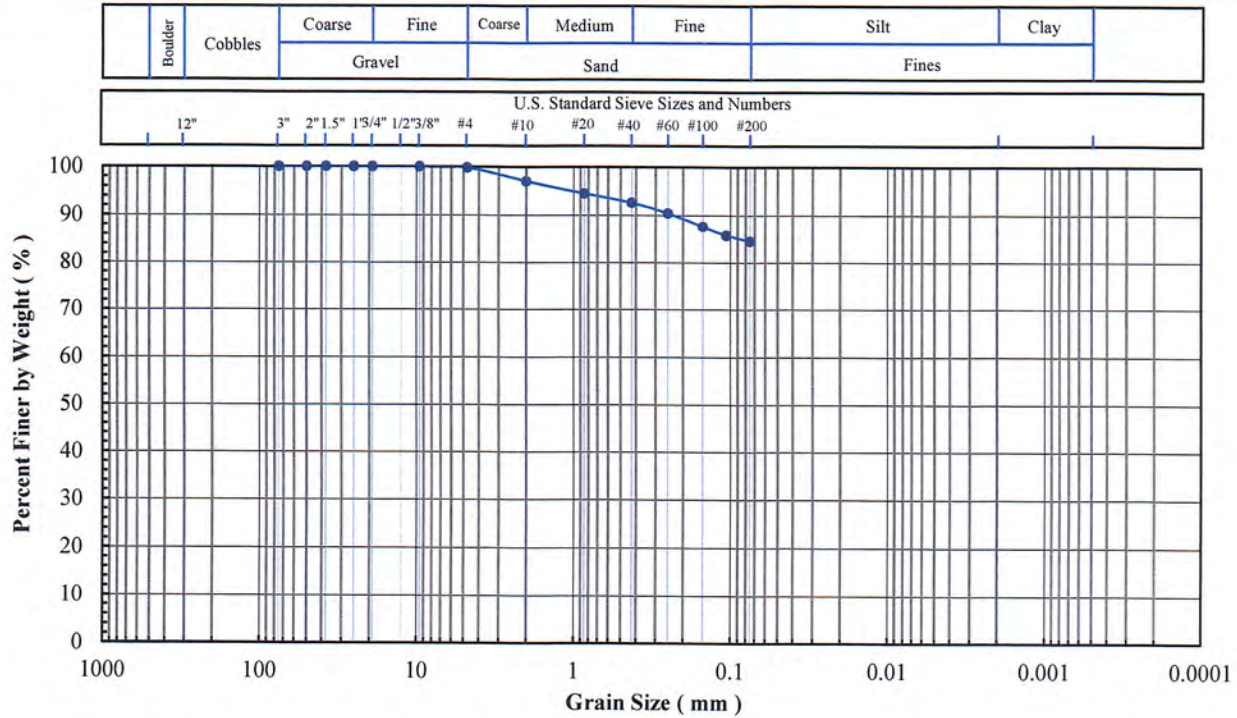
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-19 (95')  
Lab Sample No: 20L300

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

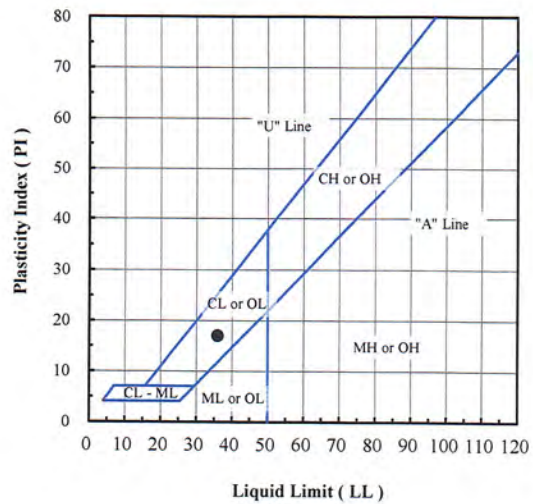


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	97.0
#20	0.850	94.5
#40	0.425	92.6
#60	0.250	90.4
#100	0.150	87.6
#140	0.106	85.8
#200	0.075	84.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	15.2
Fines (%):	84.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-19 (95')	20L300	26.5	84.6	36	19	17	CL - Lean clay with sand

Note(s):

*01-26-2021  
AAI, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B1-ST-3 (36-38')
<b>Lab Sample Number:</b>	20L145
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.43	7.37	89.5	35.0	53.0	50.0	3.0	DDW	12	2.2E-8
	3.47	7.04	97.4	27.6	63.00	50.0	13.0	DDW	10	2.7E-9

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 ATK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-2 (7-9')
<b>Lab Sample Number:</b>	20L150
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.54	7.22	98.2	26.8	53.0	50.0	3.0	DDW	12	2.1E-8
	3.54	7.20	98.8	26.4	54.00	50.0	4.0	DDW	12	2.0E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, NSP*





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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L155
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.24	110.9	20.3	53.0	50.0	3.0	DDW	3	3.3E-8
	3.50	7.16	114.2	18.5	77.00	50.0	27.0	DDW	6	2.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

\* Deviations:

Laboratory temperature at 22±3 °C.

*7-21-2021  
APK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B3-ST-1 (1-3')
<b>Lab Sample Number:</b>	20L156
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/8/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.17	111.4	19.1	53.0	50.0	3.0	DDW	8	9.6E-9
	3.62	7.29	104.7	22.7						

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
APK, WSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B4-ST-4 (67-69')
<b>Lab Sample Number:</b>	20L165
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.23	129.8	11.6	53.0	50.0	3.0	DDW	5	2.8E-8
	3.55	7.21	129.5	11.1	69.00	50.0	19.0	DDW	10	1.8E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, MSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B5-ST-2 (27-29')
<b>Lab Sample Number:</b>	20L169
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.34	85.9	36.8	53.0	50.0	3.0	DDW	9	3.4E-8
	3.48	7.02	93.4	30.7	60.00	50.0	10.0	DDW	4	2.1E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, ASR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-4 (47-49')
<b>Lab Sample Number:</b>	20L177
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.32	86.6	38.3	53.0	50.0	3.0	DDW	5	2.5E-8
	3.45	7.16	93.3	29.6	65.00	50.0	15.0	DDW	10	1.8E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 AFK, NSB*



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L180
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.29	104.1	23.5	53.0	50.0	3.0	DDW	4	2.4E-8
	3.51	7.18	108.3	21.0	76.00	50.0	26.0	DDW	9	1.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, MSK*



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953 Forrest Street, Roswell, Georgia 30075

Tel: (770) 910 7537 Fax: (770) 910 7538

# LAST PAGE

## **Test Applicability and Limitations:**

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

## **Storage Policy:**

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of \$1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of \$1.30 per sample per day will be applied after the initial 3 months storage.

# **Appendix I1**

## **CPT Logs**





GeoSyntec

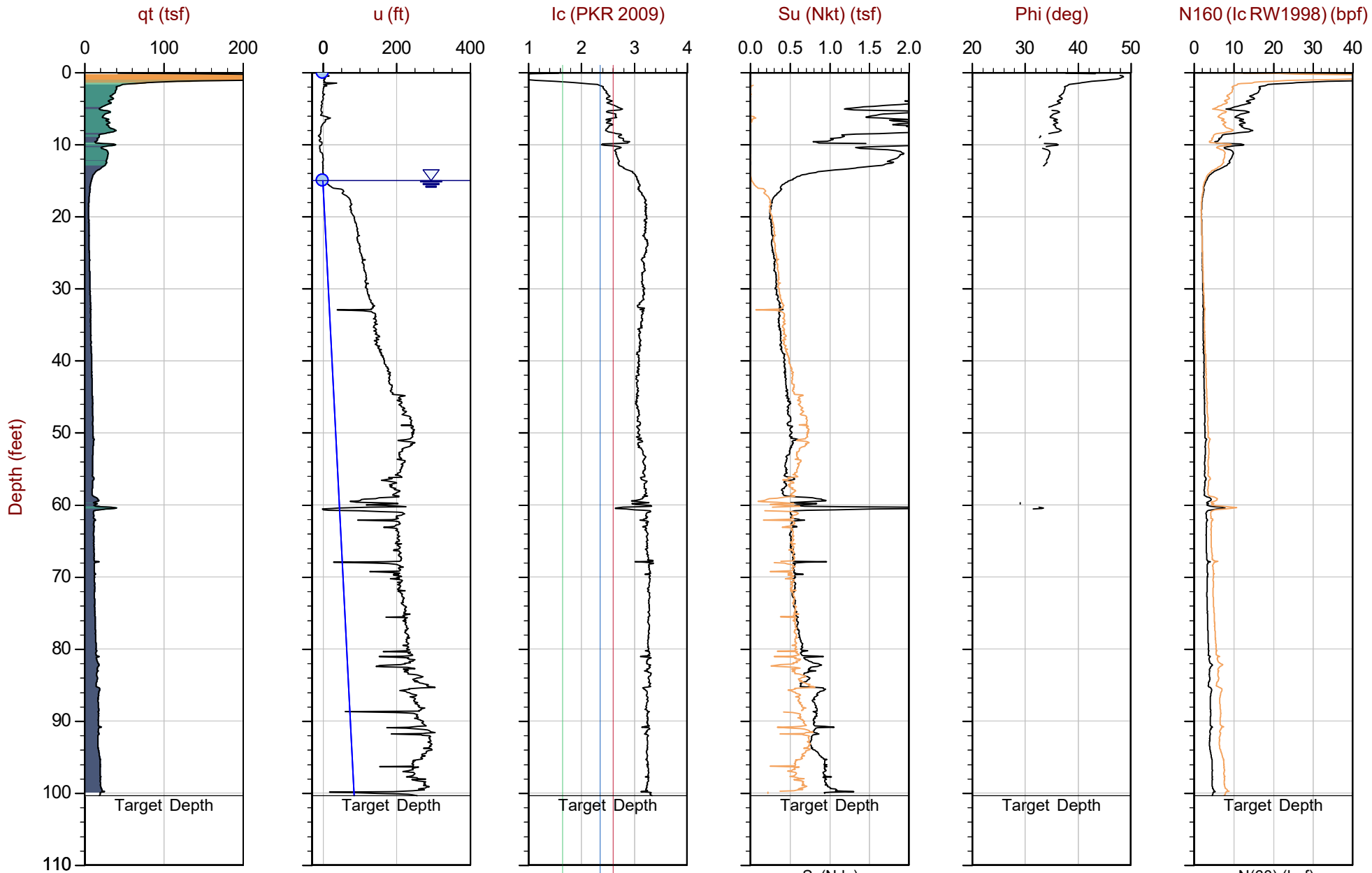
Job No: 20-61-21681

Date: 2020-12-10 14:55

Site: DTE Belle River Power Plant

Sounding: CPT20-01

Cone: 551:T1500F15U500



Max Depth: 30.600 m / 100.39 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP01.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470985ft E: 13625925ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

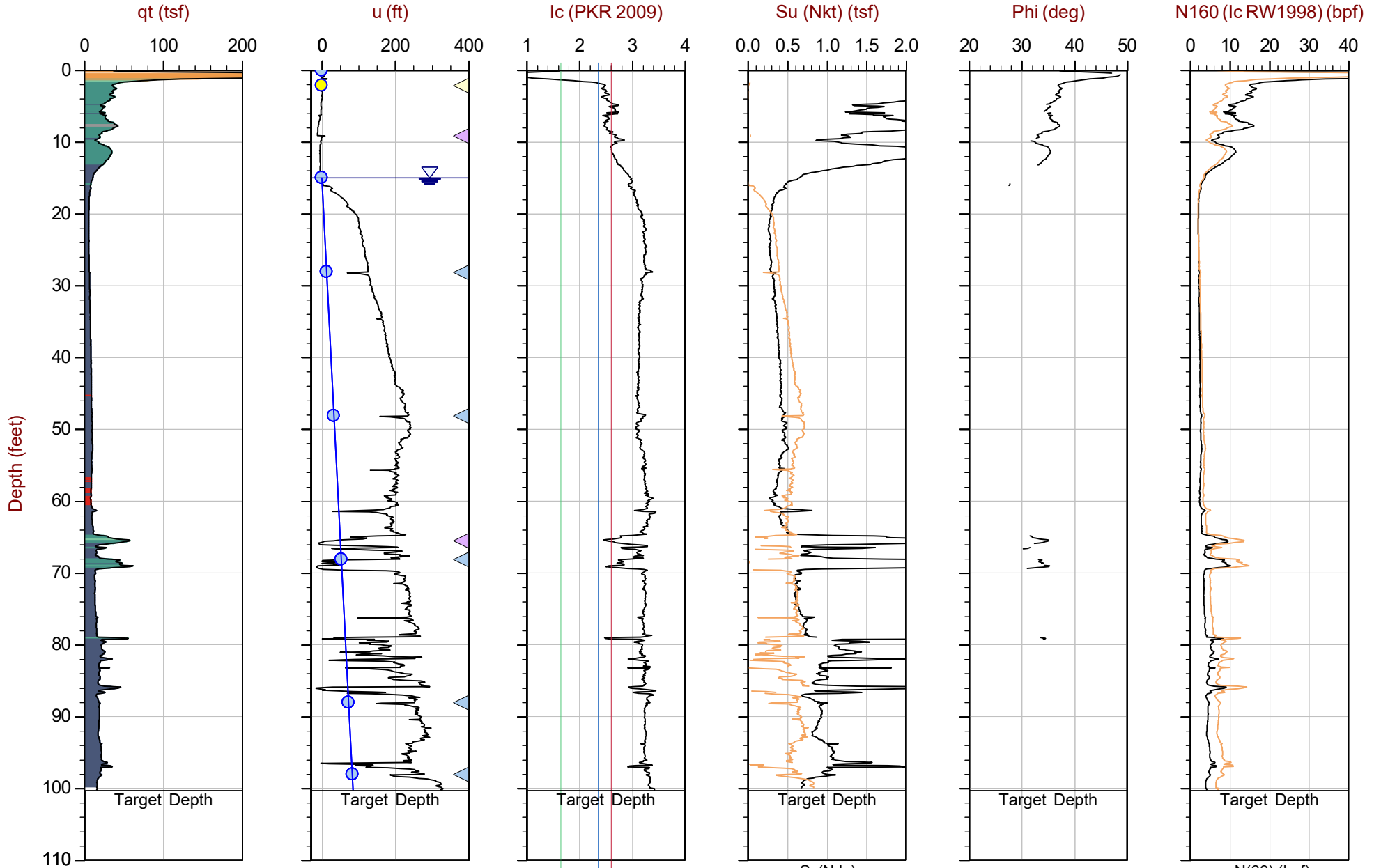
Job No: 20-61-21681

Date: 2020-12-11 08:28

Site: DTE Belle River Power Plant

Sounding: CPT20-01B

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP01B.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470980ft E: 13625906ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

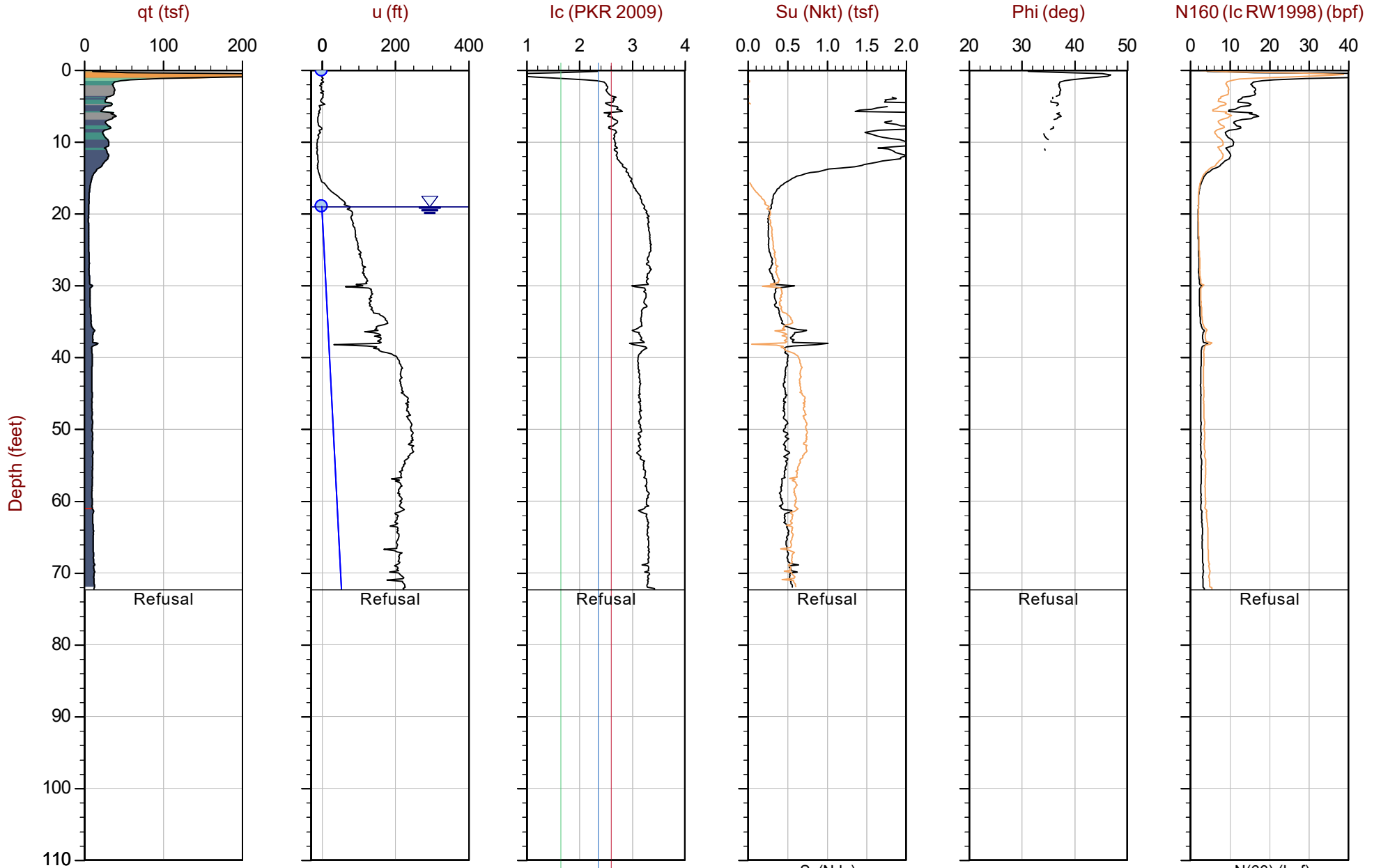
Job No: 20-61-21681

Date: 2020-12-09 12:28

Site: DTE Belle River Power Plant

Sounding: CPT20-02

Cone: 513:T1500F15U500



Max Depth: 22.050 m / 72.34 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP02.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470997ft E: 13626119ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

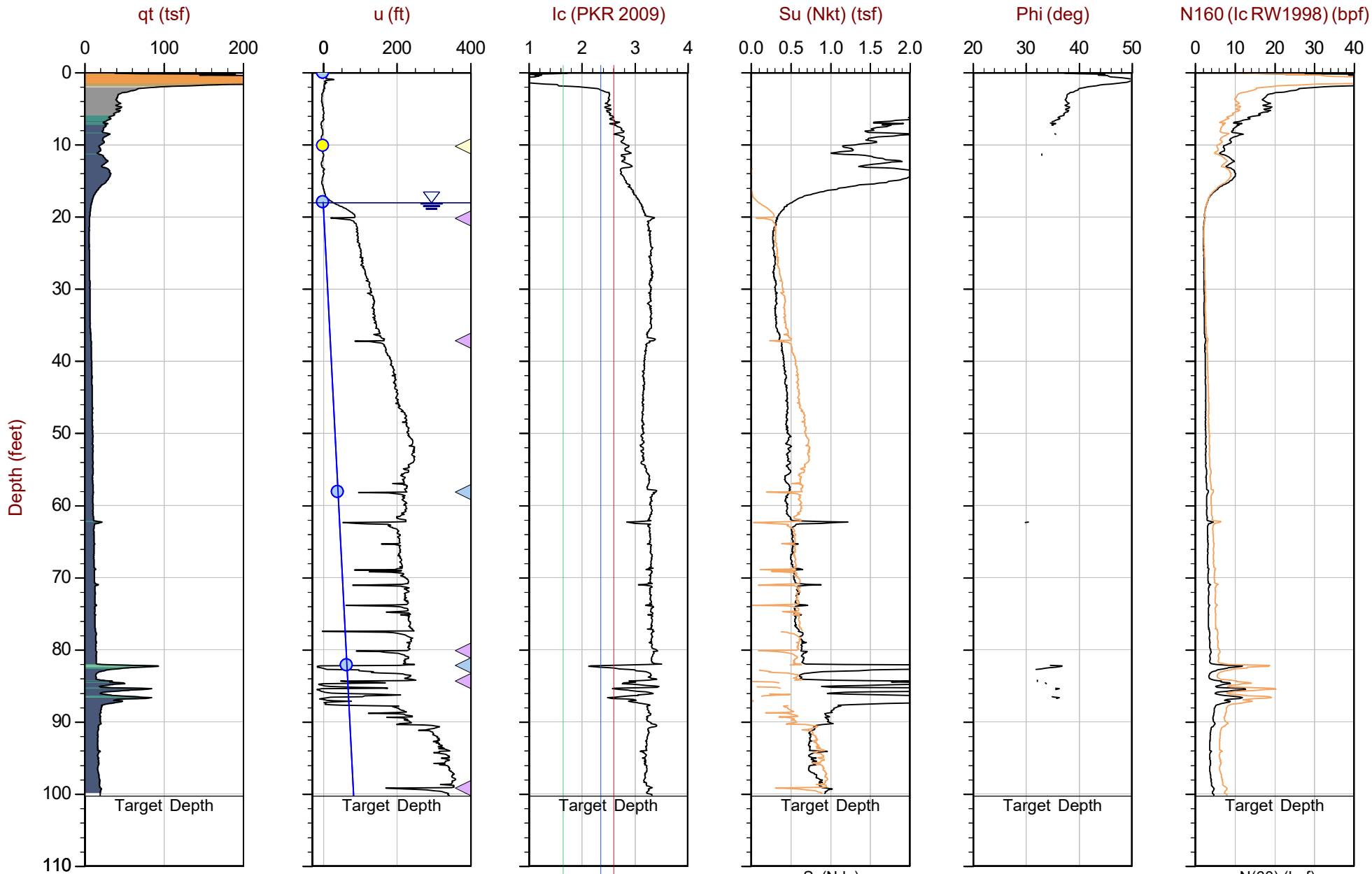
Job No: 20-61-21681

Date: 2020-12-09 14:00

Site: DTE Belle River Power Plant

Sounding: CPT20-03

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP03.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471039ft E: 13626171ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

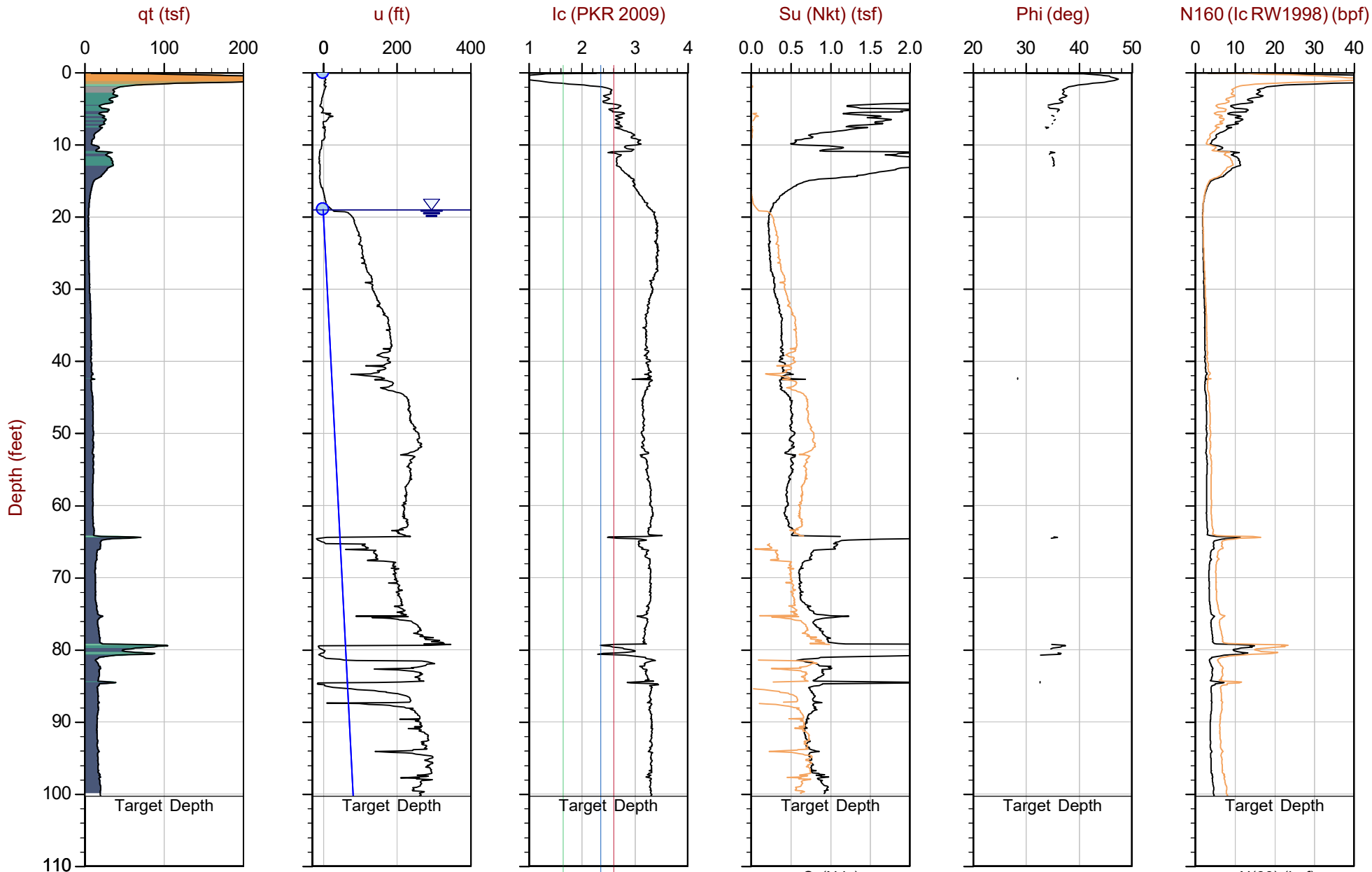
Job No: 20-61-21681

Date: 2020-12-09 11:05

Site: DTE Belle River Power Plant

Sounding: CPT20-04

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP04.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471237ft E: 13626152ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

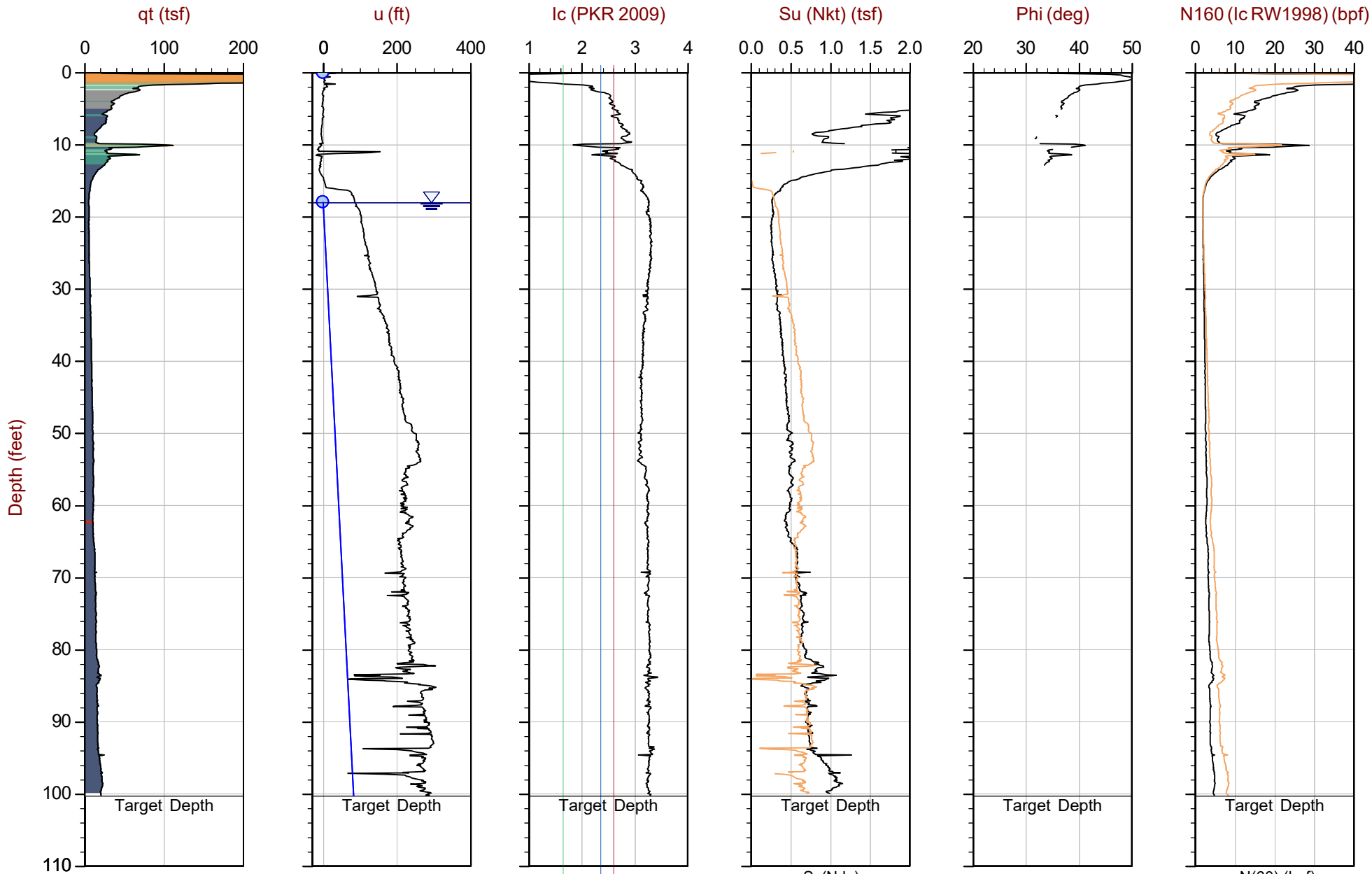
Job No: 20-61-21681

Date: 2020-12-09 12:02

Site: DTE Belle River Power Plant

Sounding: CPT20-05

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP05.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471243ft E: 13625954ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

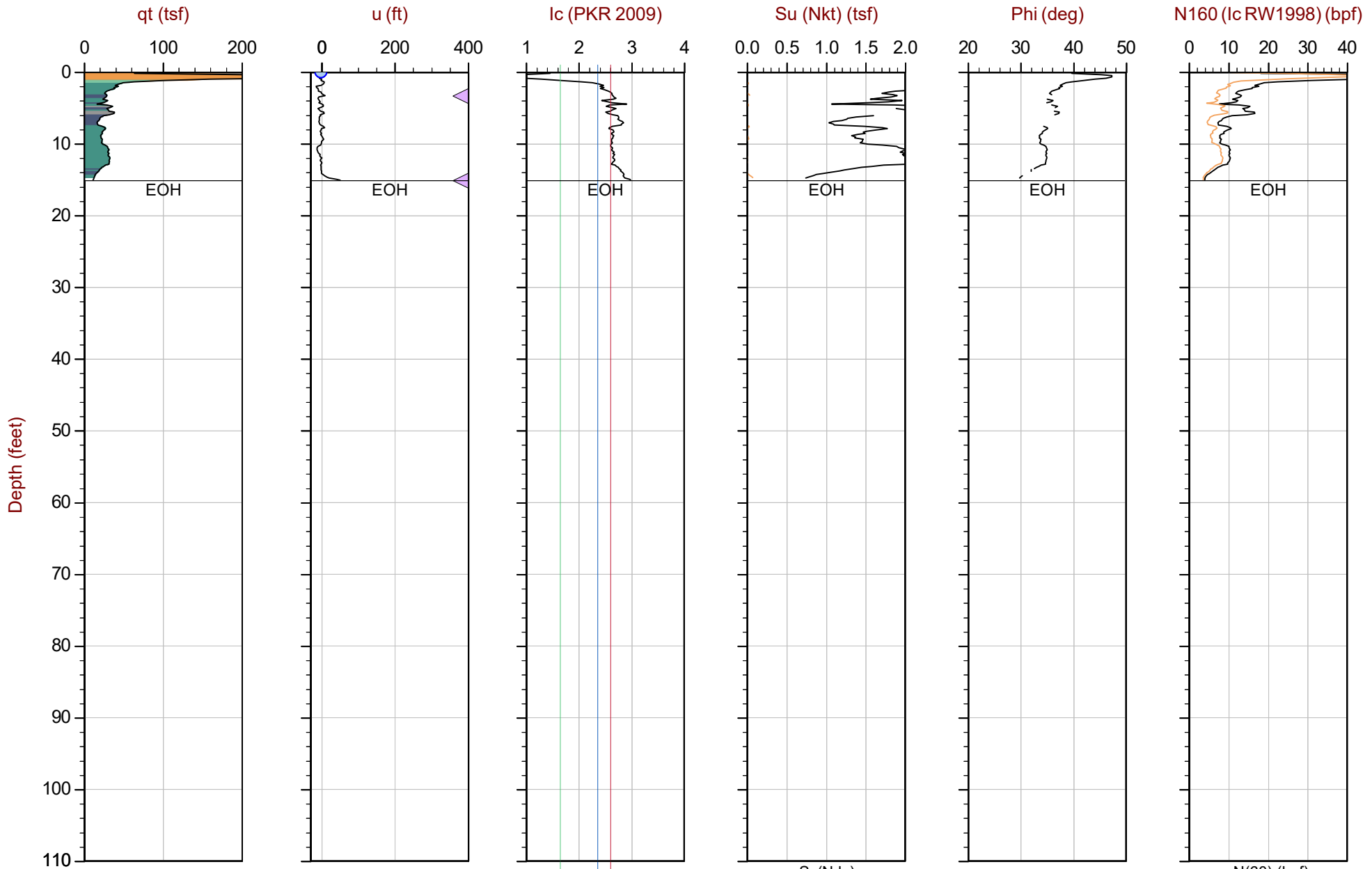
Job No: 20-61-21681

Date: 2020-12-09 13:54

Site: DTE Belle River Power Plant

Sounding: CPT20-06

Cone: 513:T1500F15U500



Max Depth: 4.600 m / 15.09 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471221ft E: 13625753ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

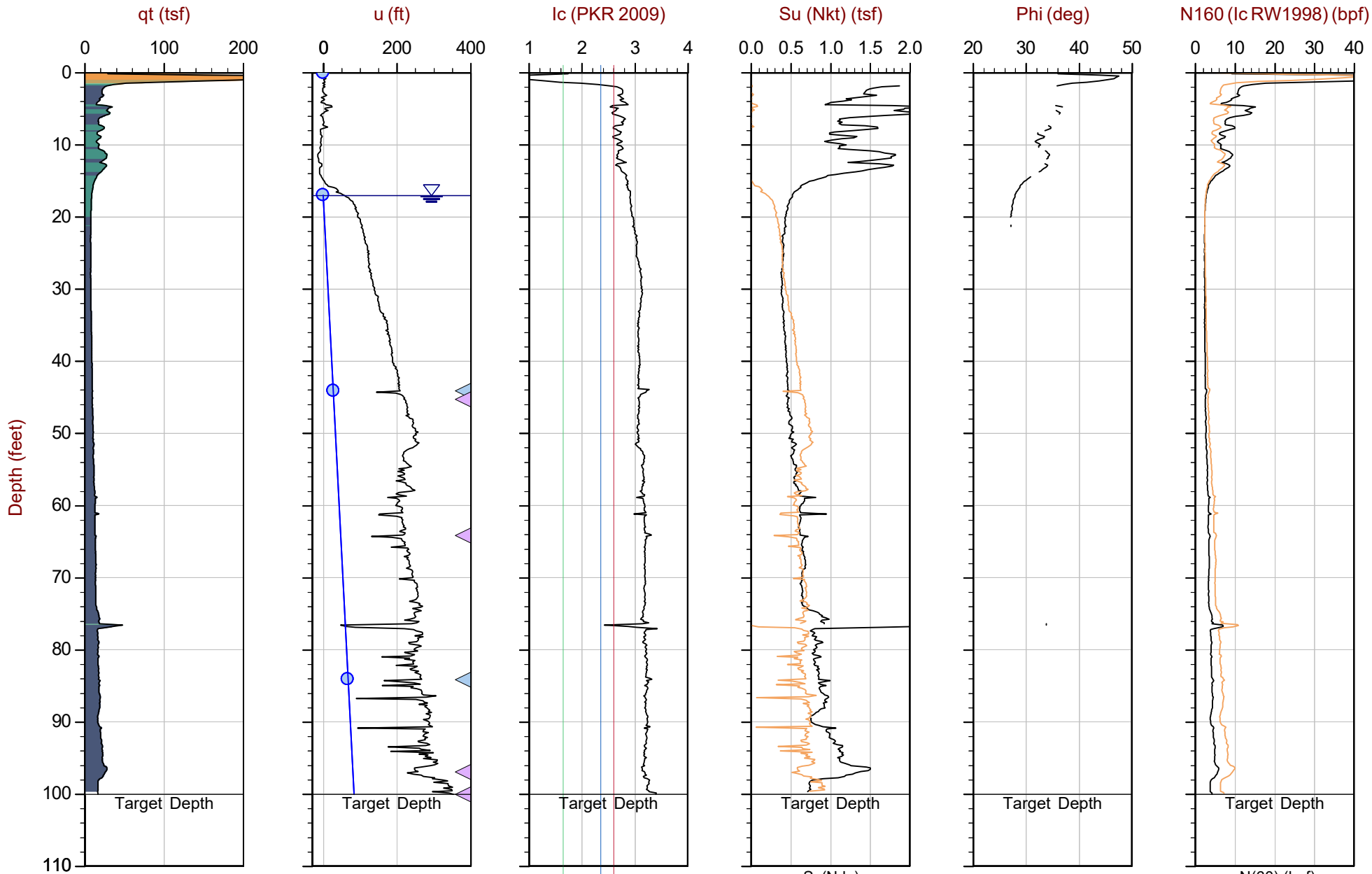
Job No: 20-61-21681

Date: 2020-12-10 08:43

Site: DTE Belle River Power Plant

Sounding: CPT20-06B

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06B.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471216ft E: 13625742ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

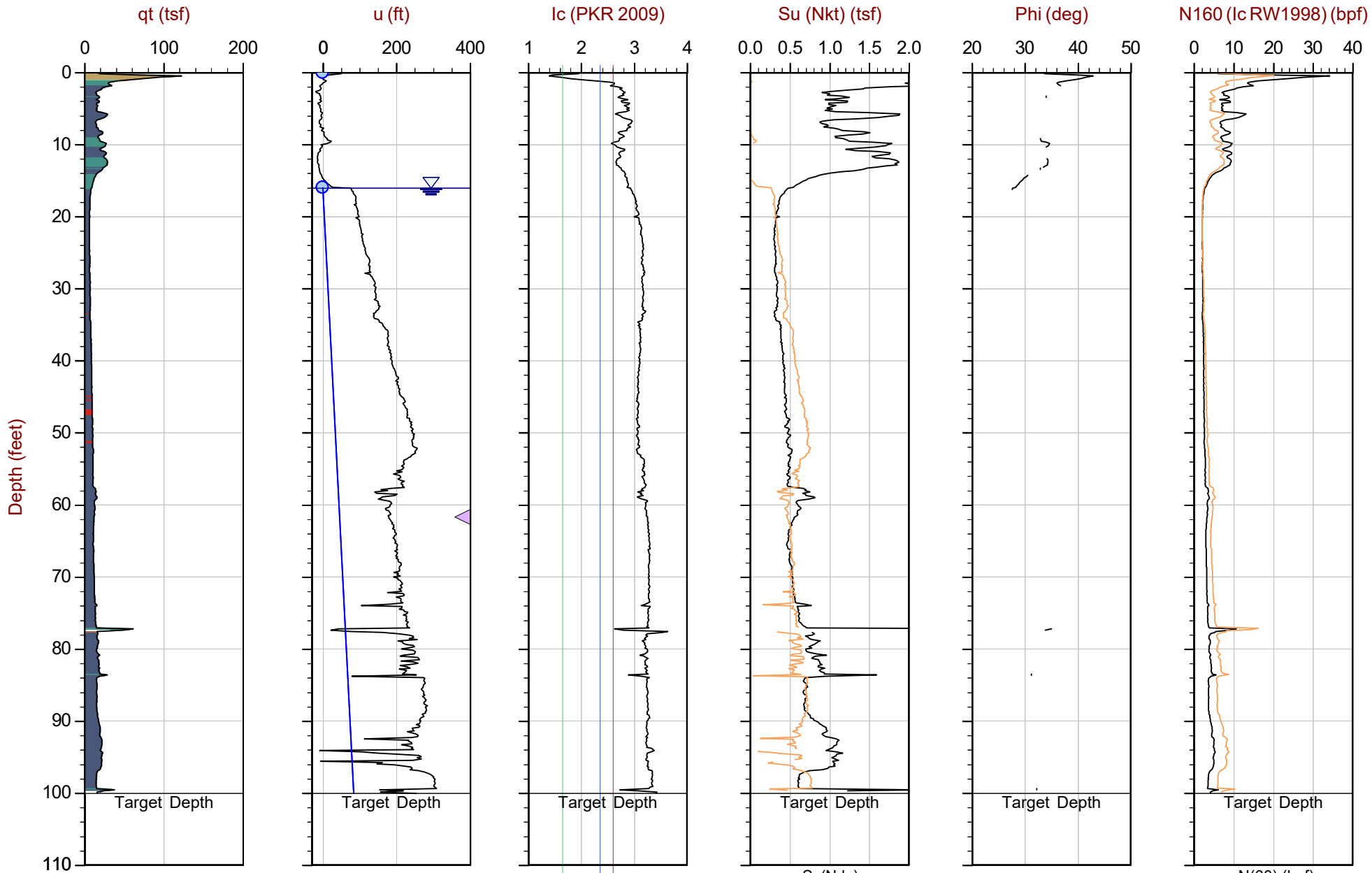
Job No: 20-61-21681

Date: 2020-12-09 11:04

Site: DTE Belle River Power Plant

Sounding: CPT20-07

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP07.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471015ft E: 13625752ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

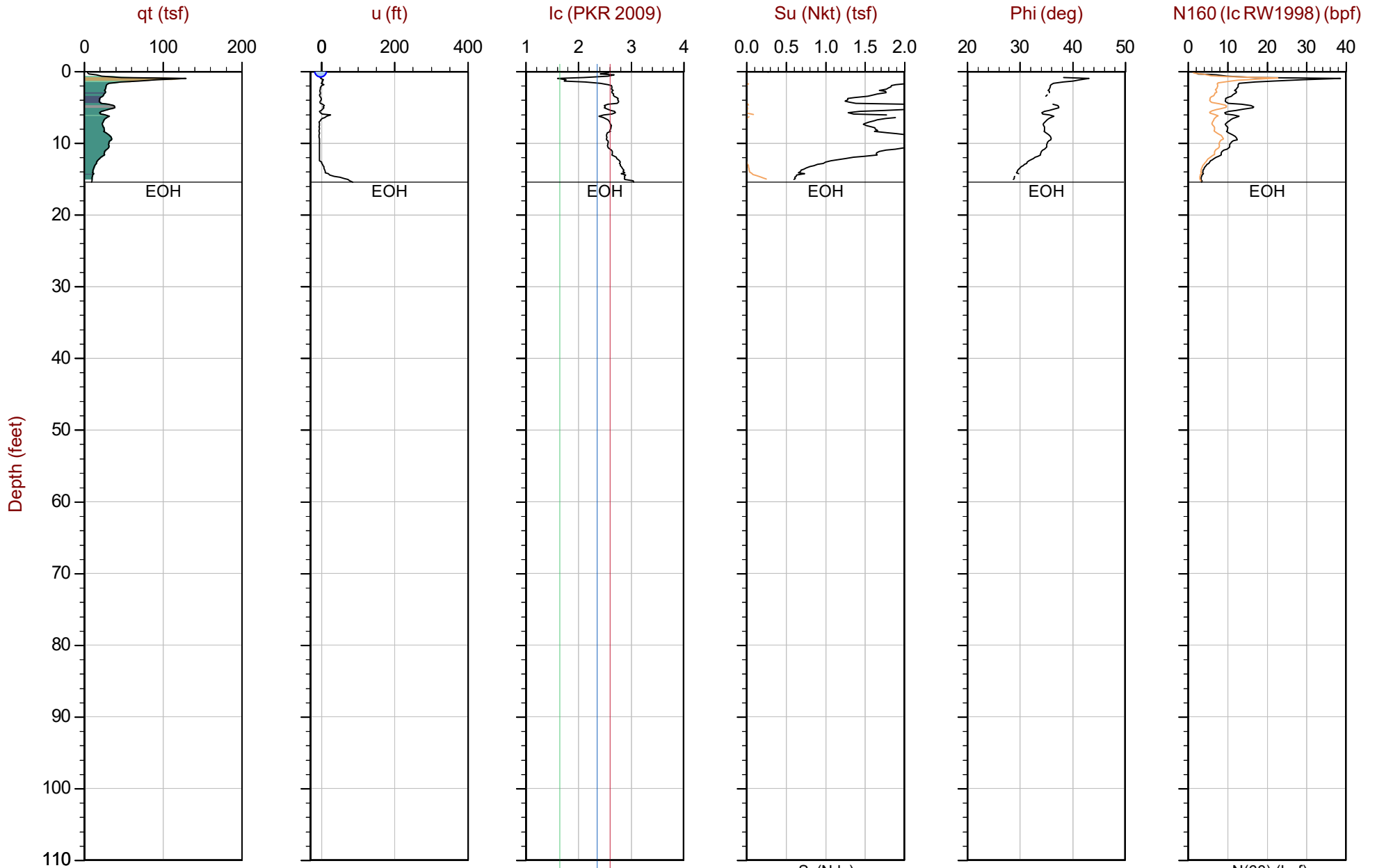
Job No: 20-61-21681

Date: 2020-12-11 12:09

Site: DTE Belle River Power Plant

Sounding: CPT20-08

Cone: 568:T1500F15U500



Max Depth: 4.700 m / 15.42 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470392ft E: 13626398ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

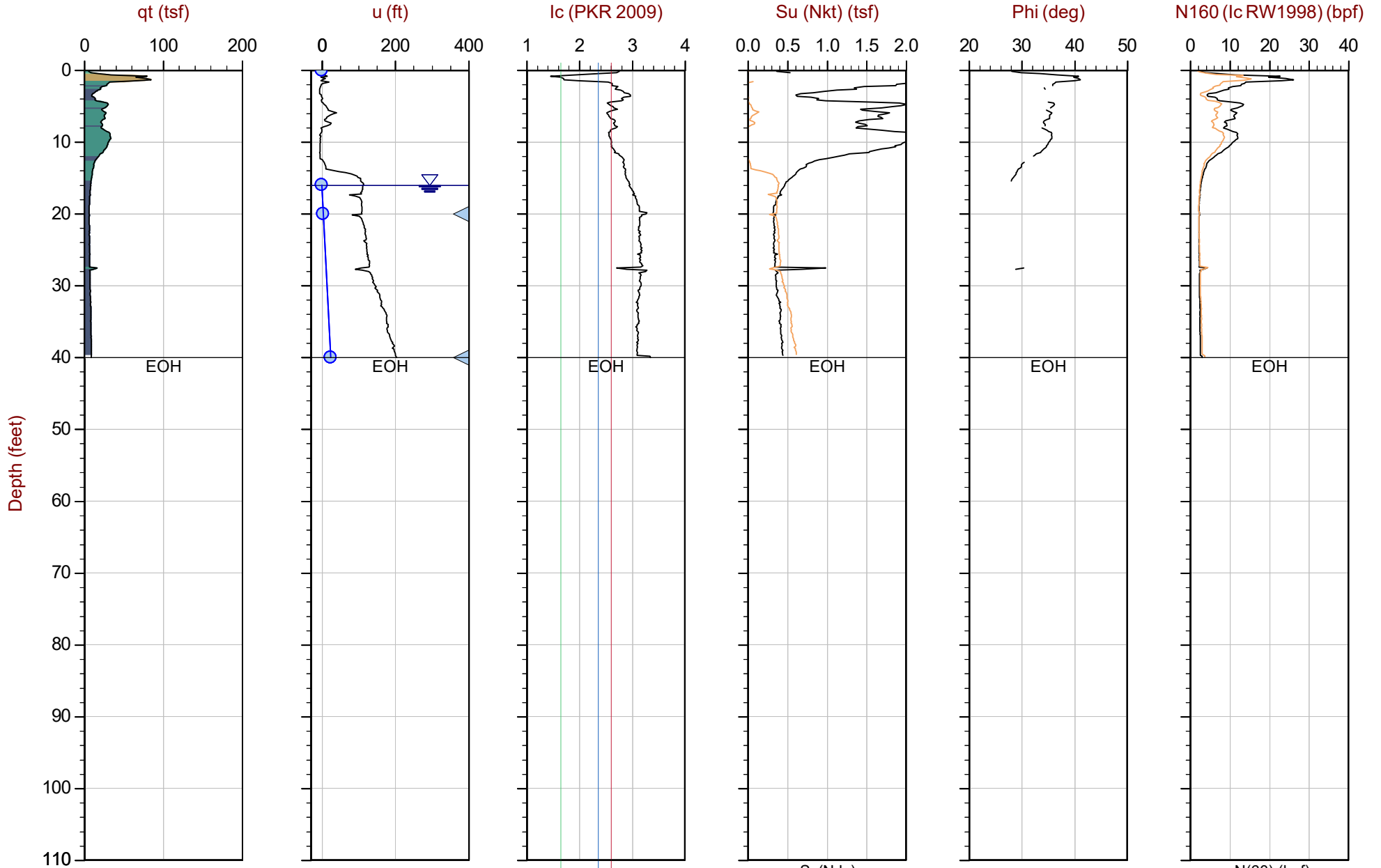
Job No: 20-61-21681

Date: 2020-12-11 12:35

Site: DTE Belle River Power Plant

Sounding: CPT20-08B

Cone: 568:T1500F15U500



Max Depth: 12.200 m / 40.03 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

△ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470382ft E: 13626396ft

Sheet No: 1 of 1

△ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

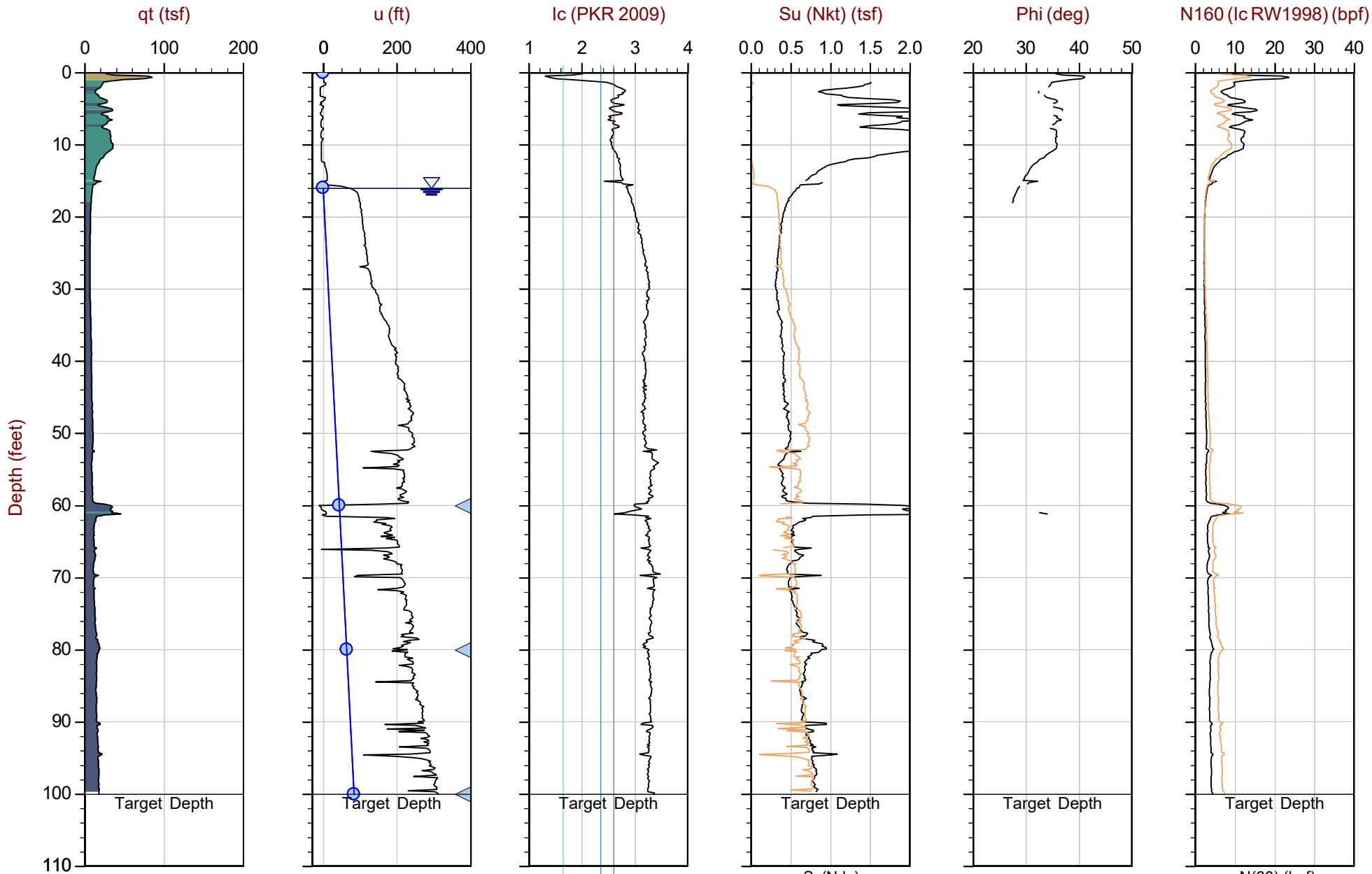
Job No: 20-61-21681

Date: 2020-12-15 08:41

Site: DTE Belle River Power Plant

Sounding: CPT20-08C

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08C.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470384ft E: 13626391ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

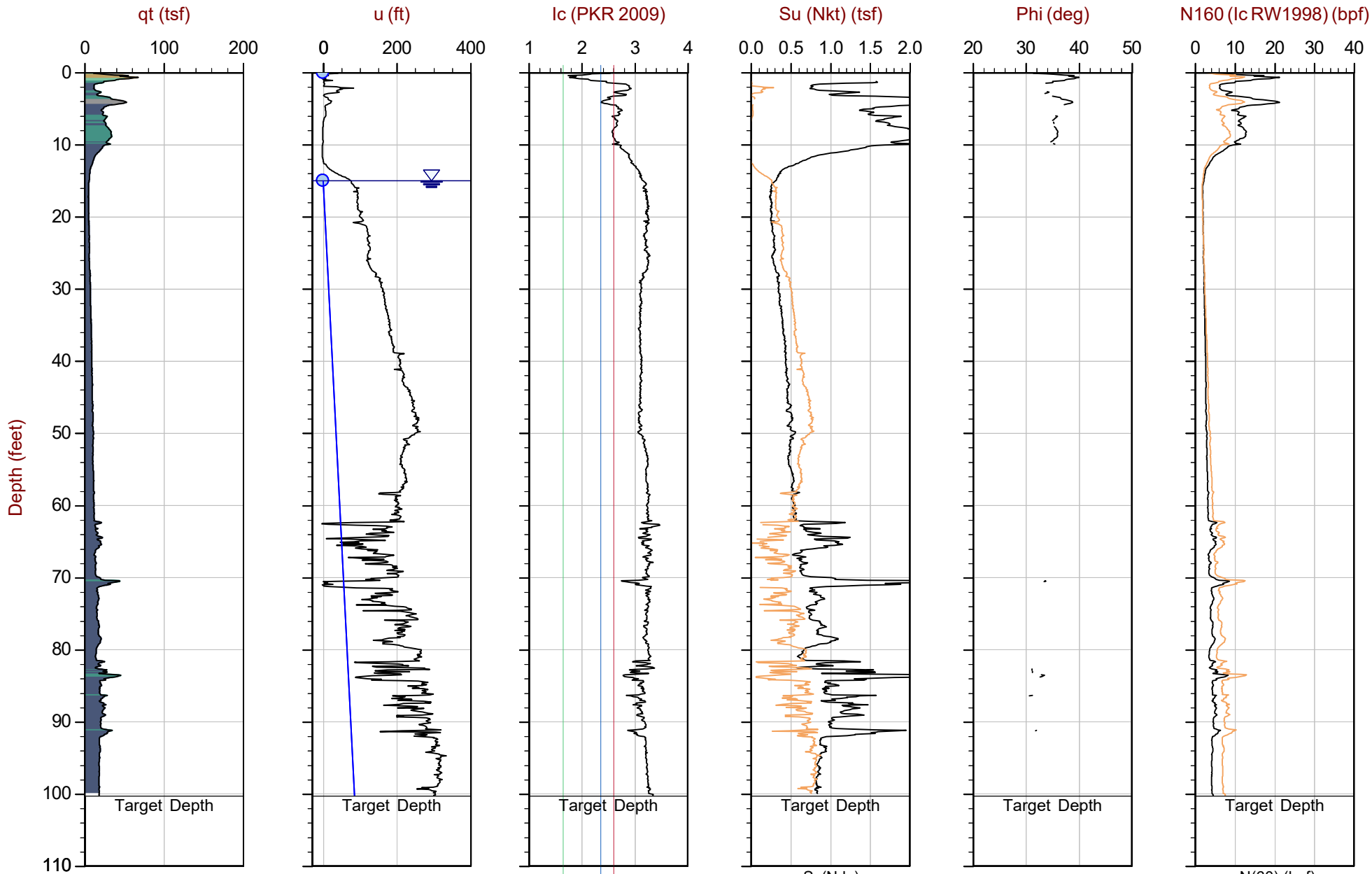
Job No: 20-61-21681

Date: 2020-12-16 11:02

Site: DTE Belle River Power Plant

Sounding: CPT20-10.1

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP10.1.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469861 ft E: 13626732 ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

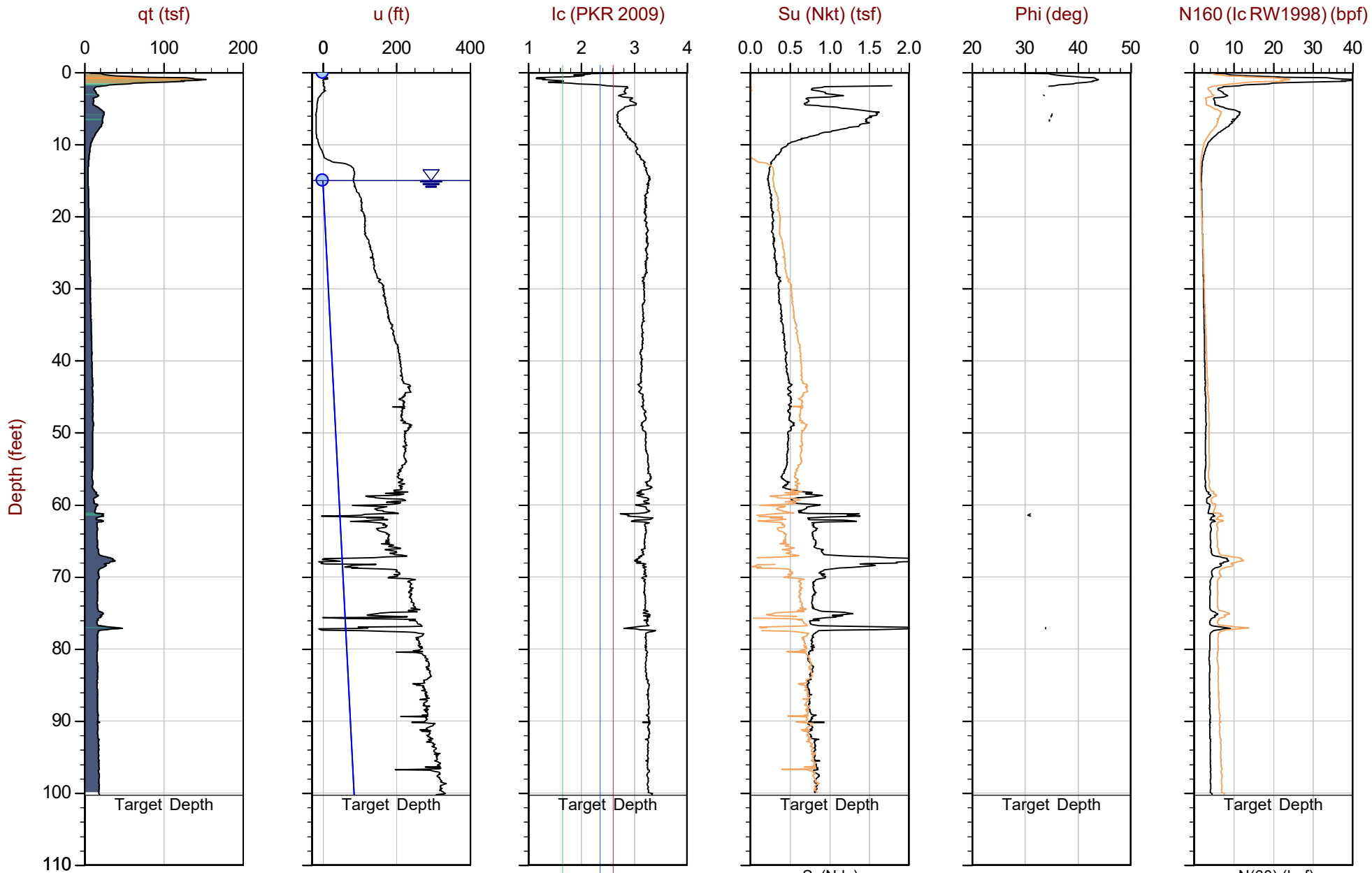
Job No: 20-61-21681

Date: 2020-12-16 11:53

Site: DTE Belle River Power Plant

Sounding: CPT20-10A

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP10A.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469934ft E: 13626592ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

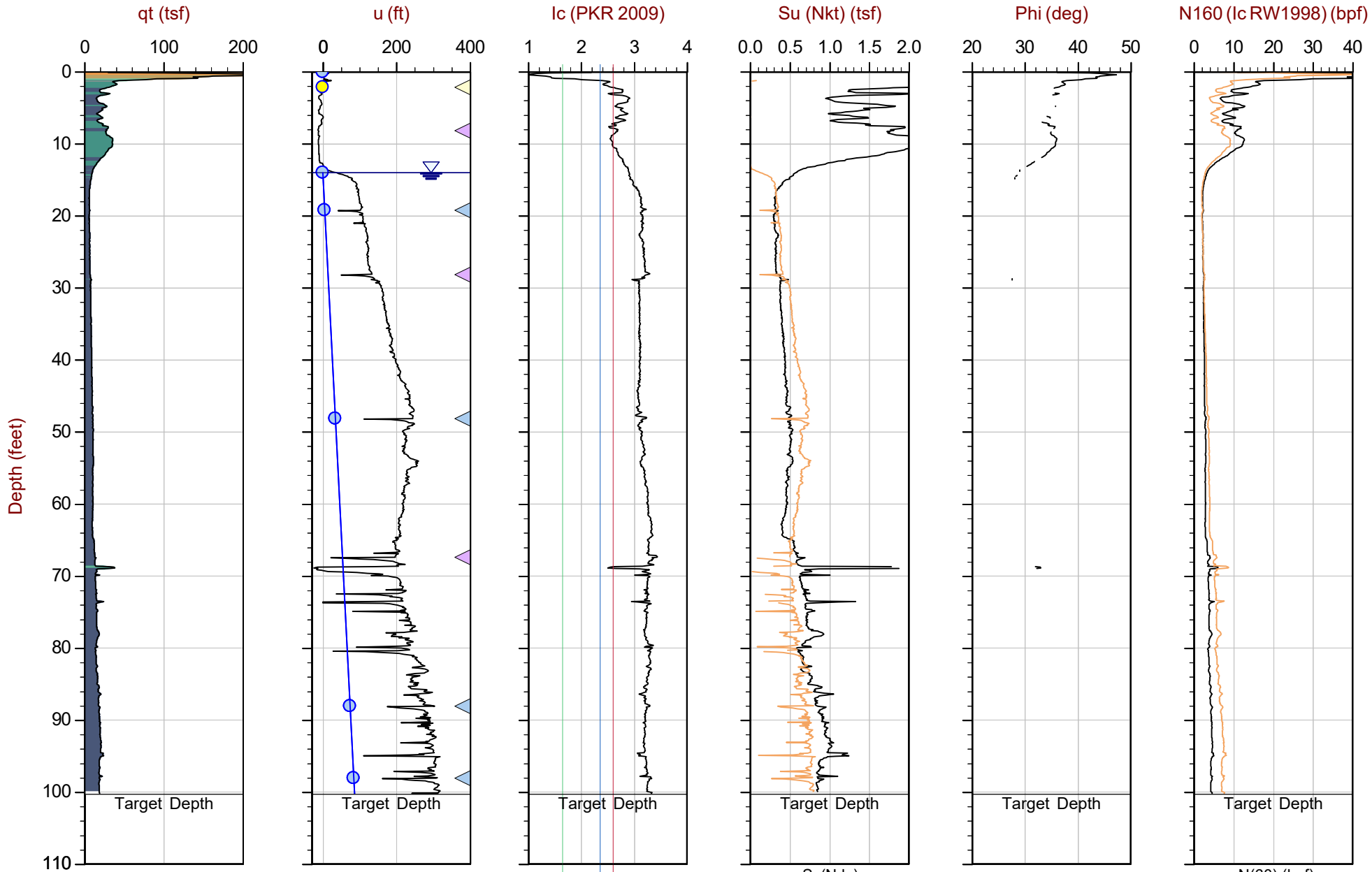
Job No: 20-61-21681

Date: 2020-12-15 11:07

Site: DTE Belle River Power Plant

Sounding: CPT20-11

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP11.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469979ft E: 13626765ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

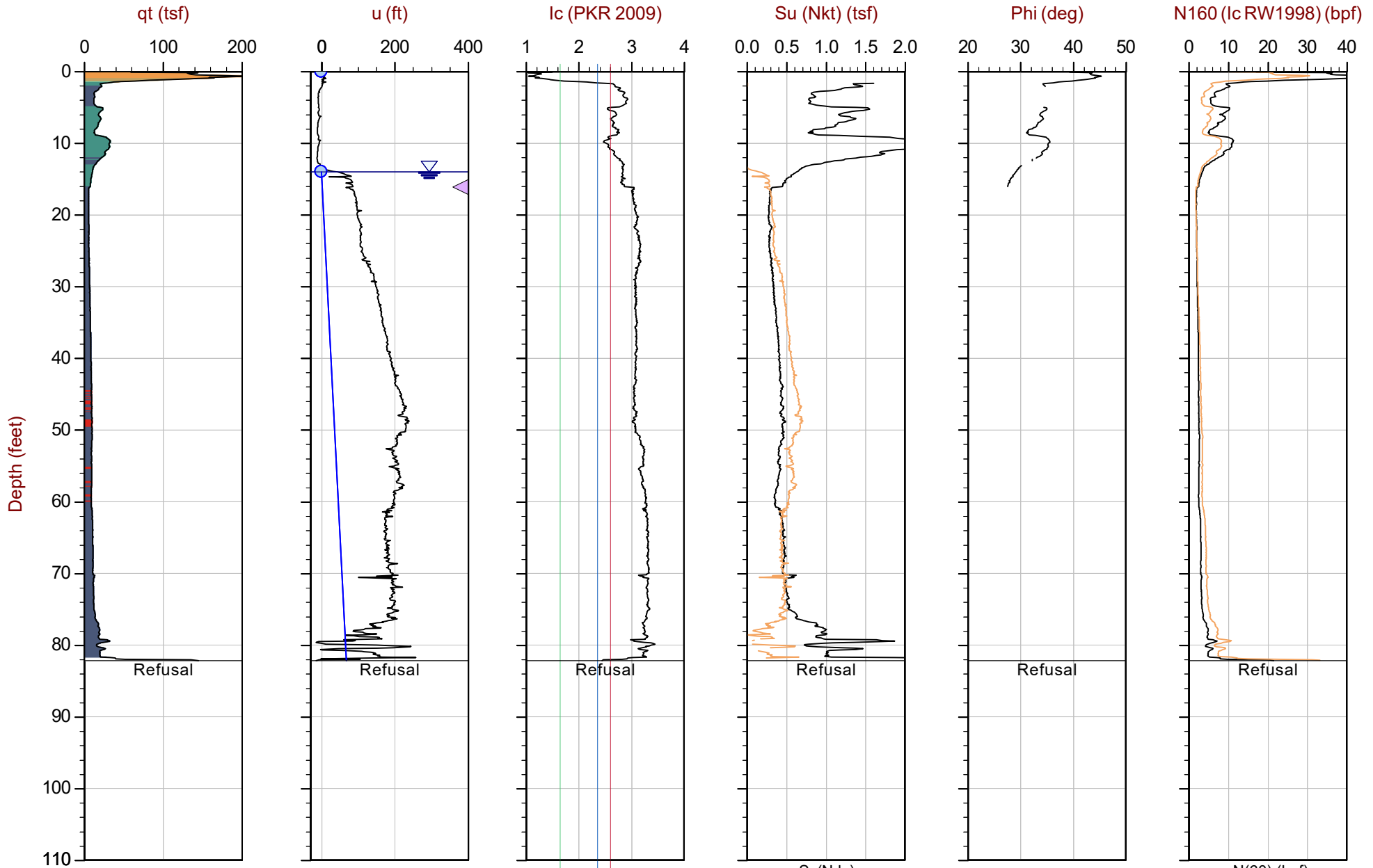
Job No: 20-61-21681

Date: 2020-12-15 08:44

Site: DTE Belle River Power Plant

Sounding: CPT20-12

Cone: 551:T1500F15U500



Max Depth: 25.050 m / 82.18 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP12.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470292ft E: 13626802ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

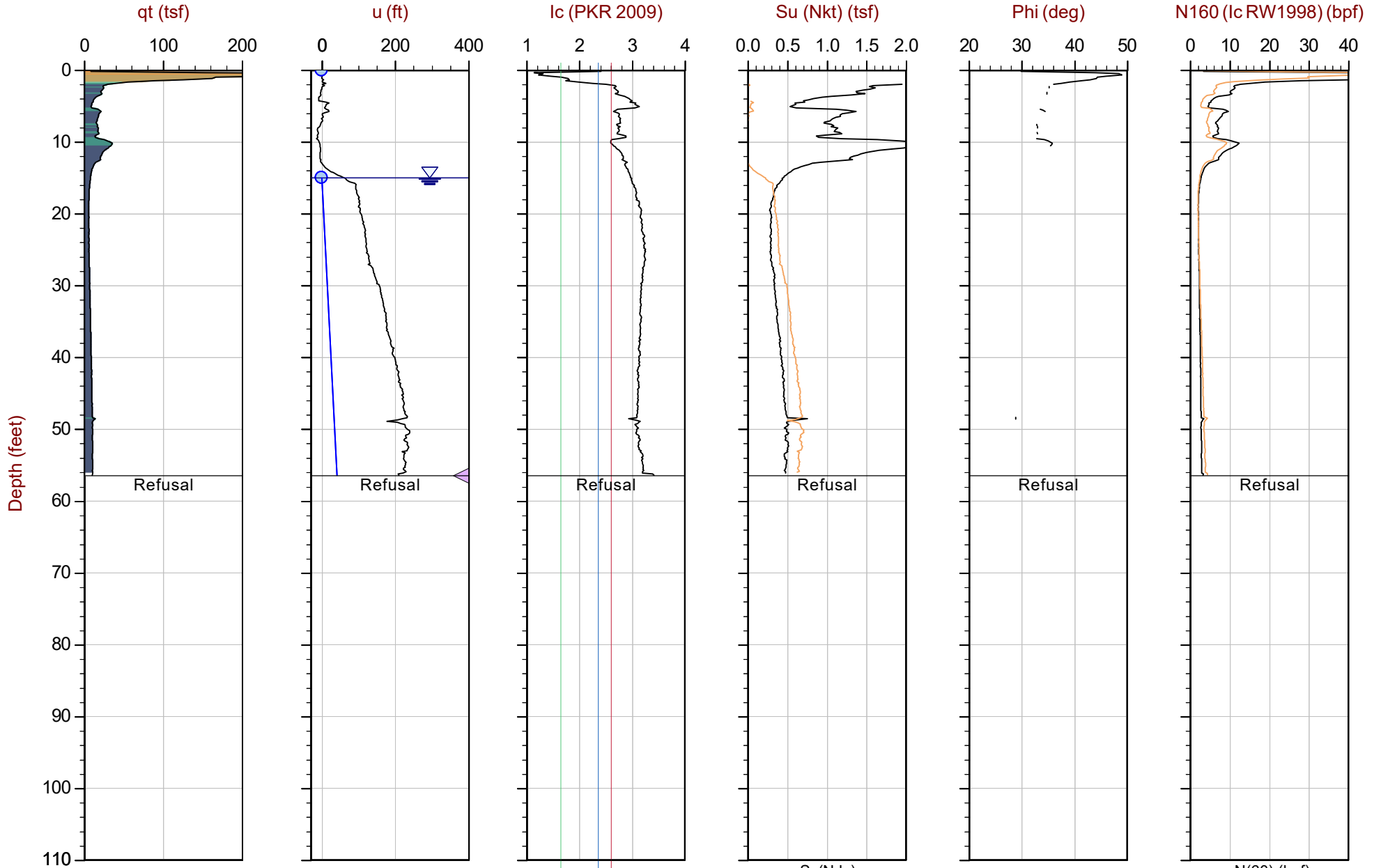
Job No: 20-61-21681

Date: 2020-12-10 15:00

Site: DTE Belle River Power Plant

Sounding: CPT20-13

Cone: 513:T1500F15U500



Max Depth: 17.200 m / 56.43 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

△ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470478ft E: 13626800ft

Sheet No: 1 of 1

△ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

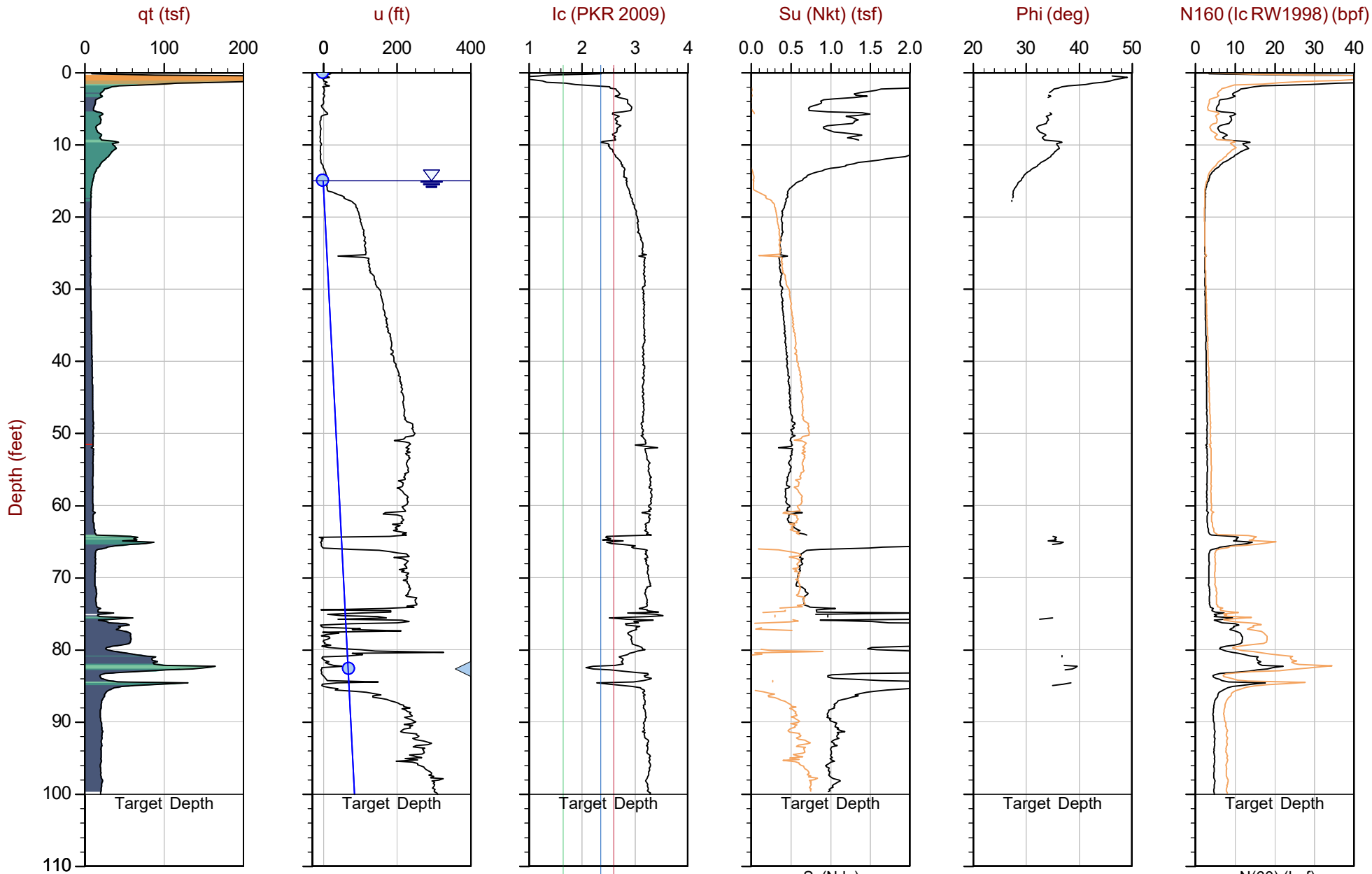
Job No: 20-61-21681

Date: 2020-12-11 09:09

Site: DTE Belle River Power Plant

Sounding: CPT20-13B

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

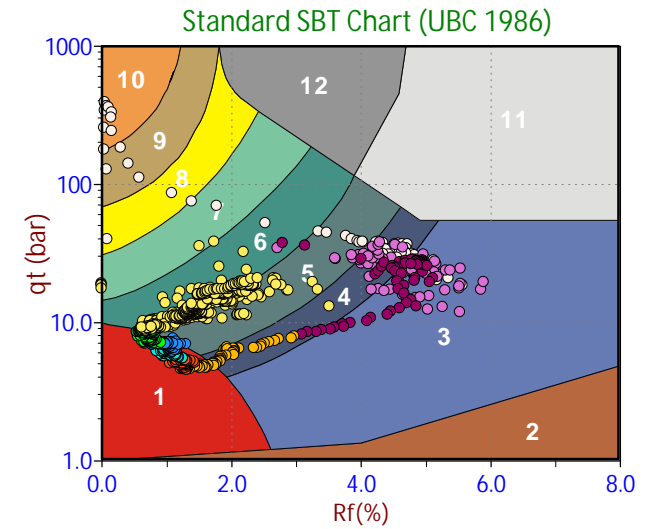
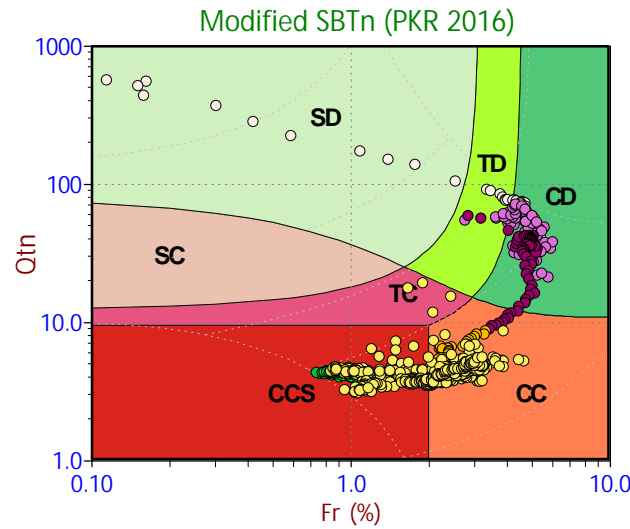
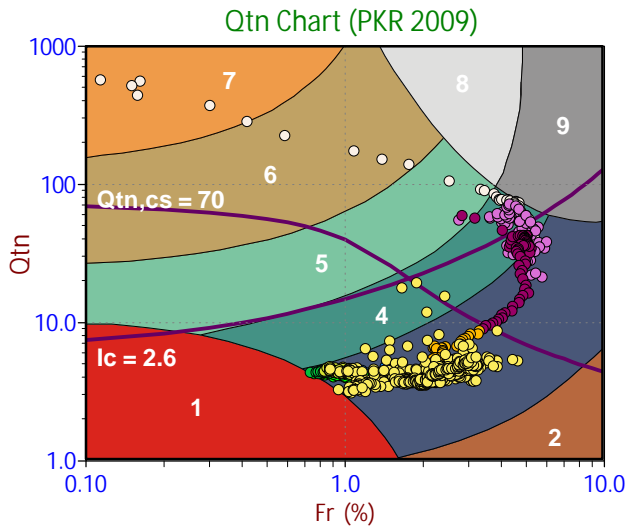
Coords: Michigan State Plane South N: 470491ft E: 13626793ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line

## Soil Behavior Type (SBT) Scatter Plots



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

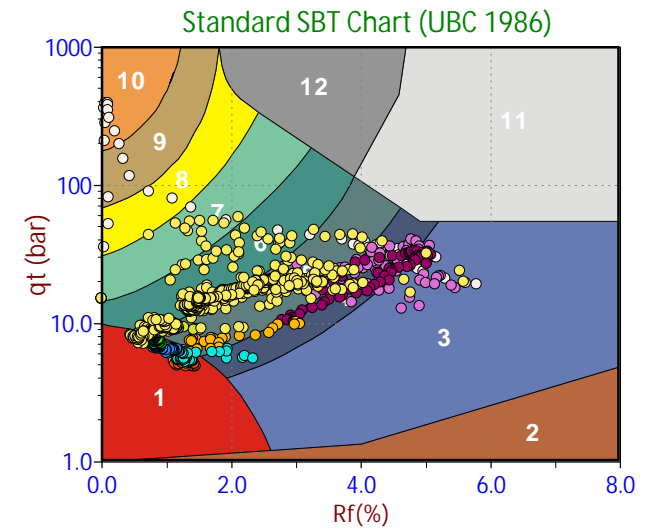
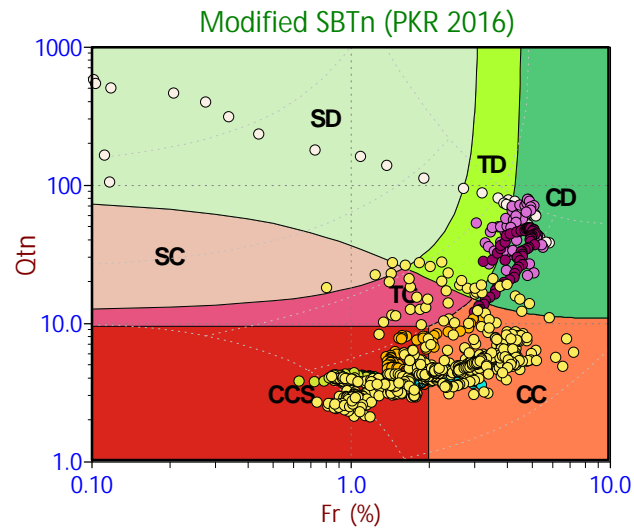
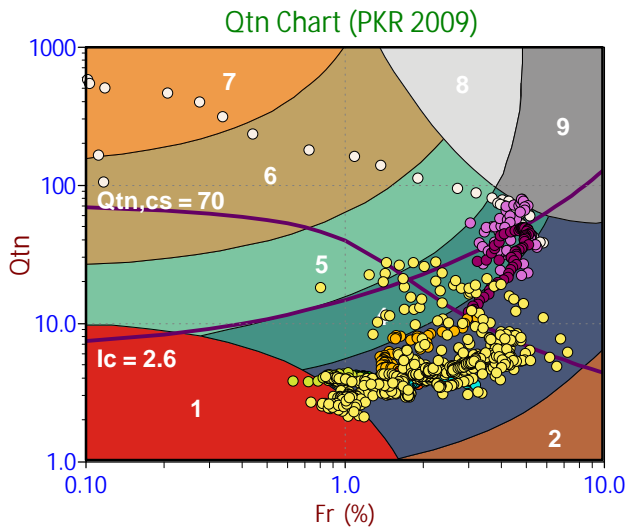
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

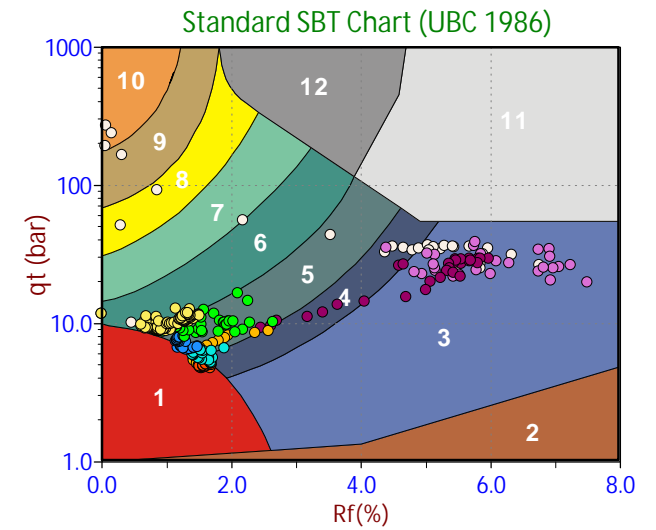
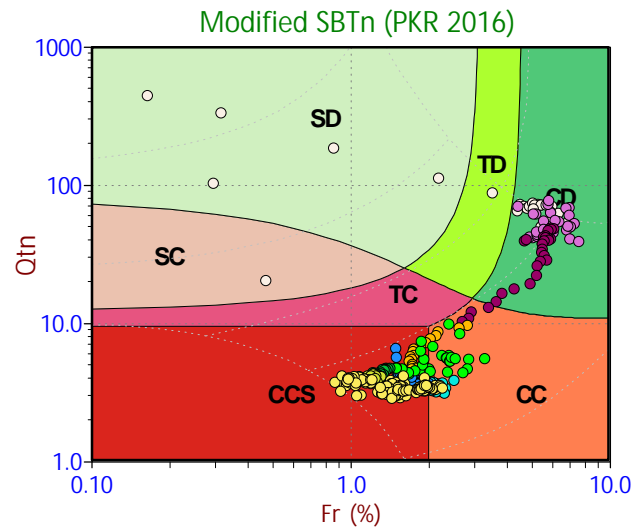
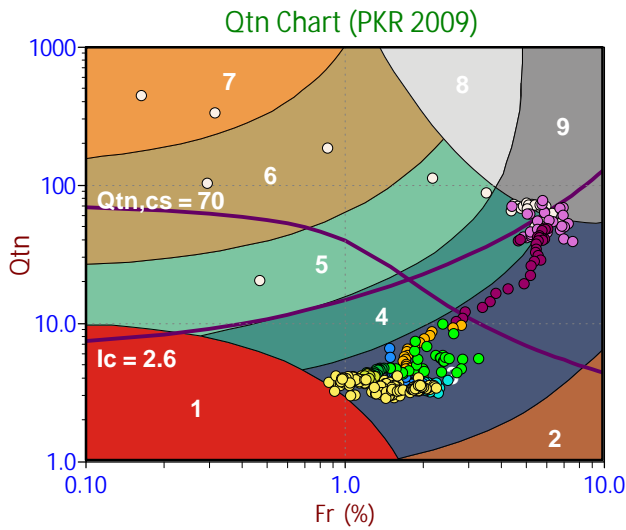
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

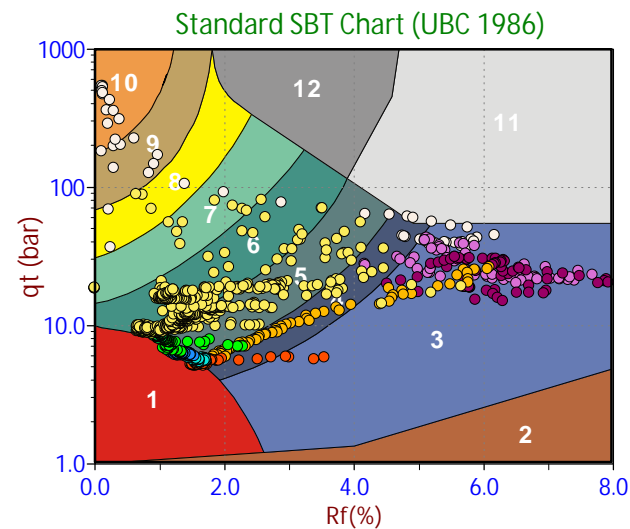
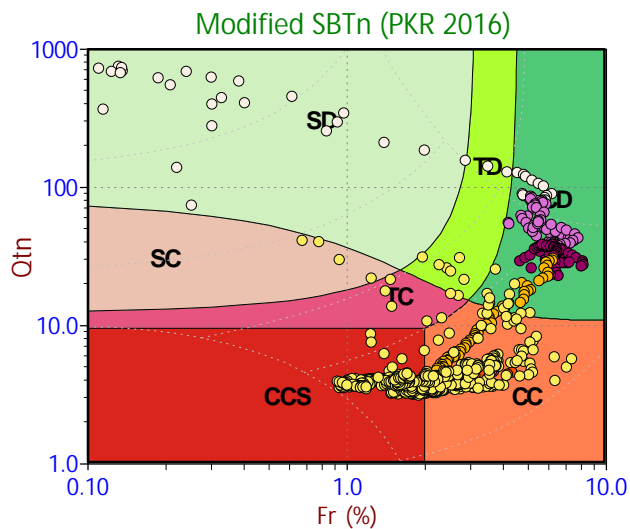
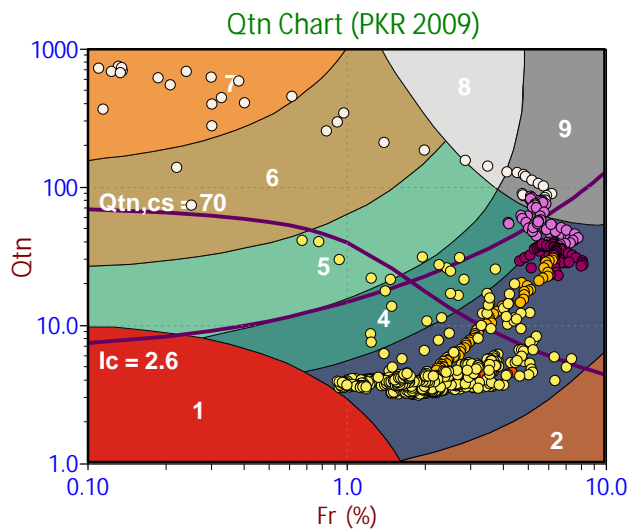
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
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- Sand
- Gravelly Sand
- Stiff Fine Grained
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- >30.0 to 35.0 ft
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- >40.0 to 45.0 ft
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Legend

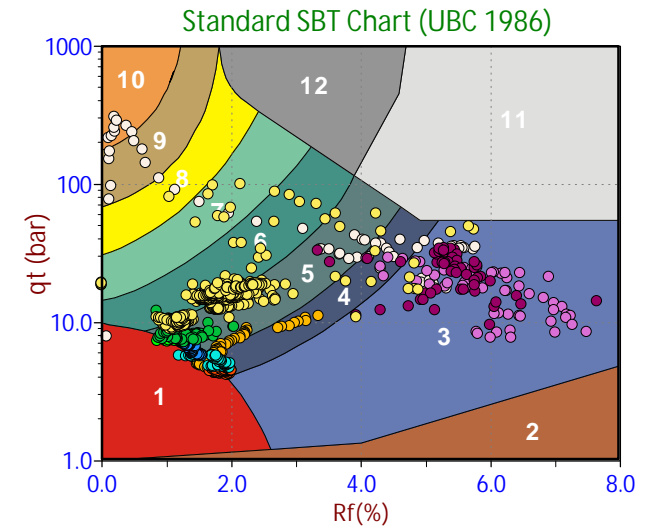
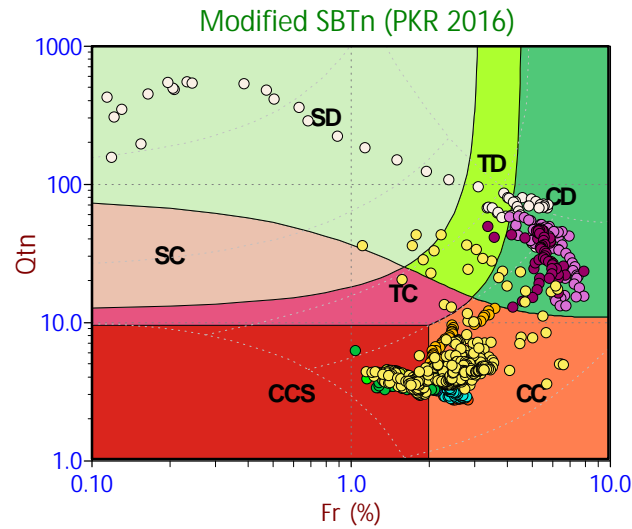
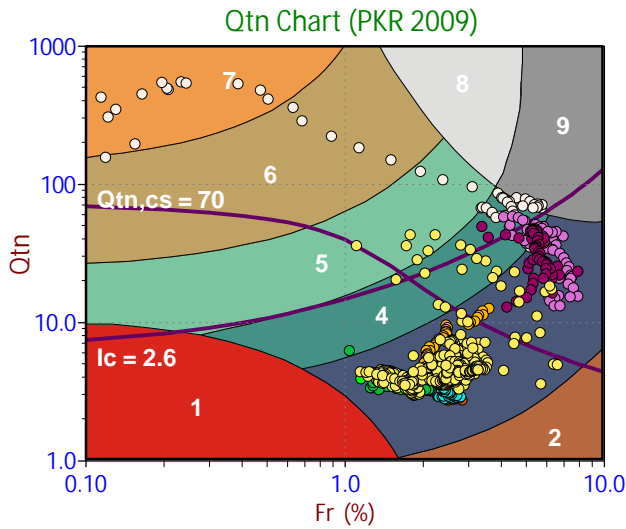
- Sensitive, Fine Grained
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- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
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Legend

- Sensitive Fines
- Organic Soil
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Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
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- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

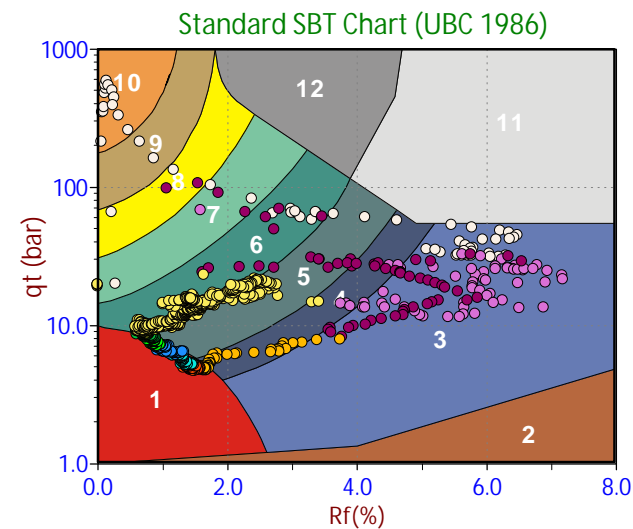
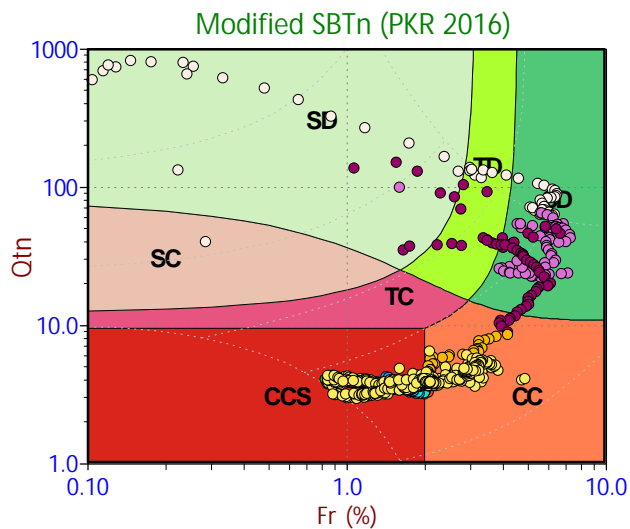
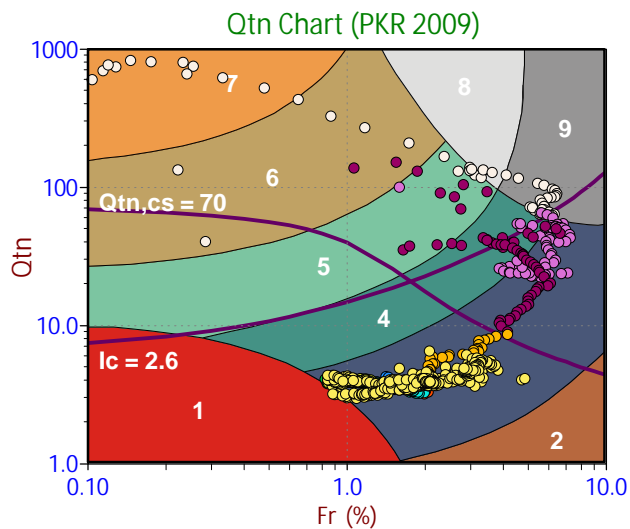
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
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Legend

- Sensitive Fines
- Organic Soil
- Clay
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- >45.0 to 50.0 ft
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Legend

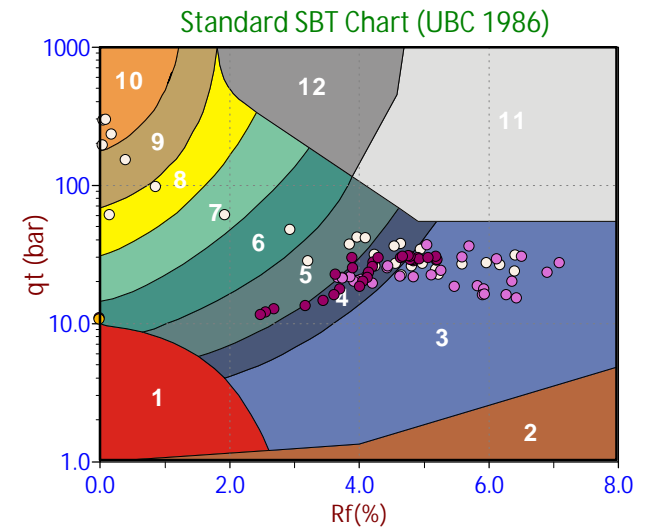
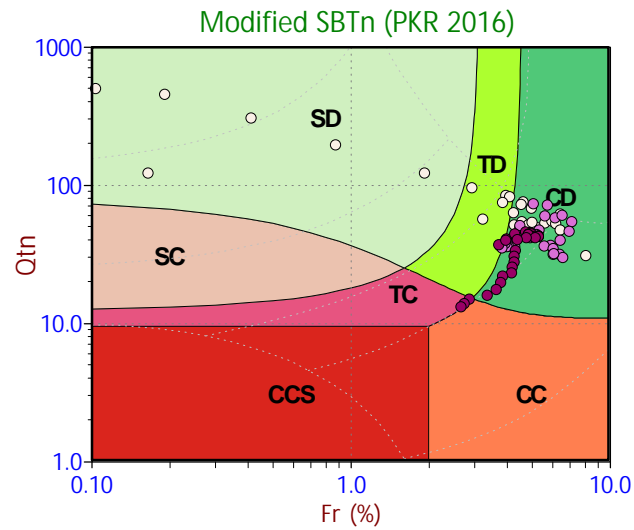
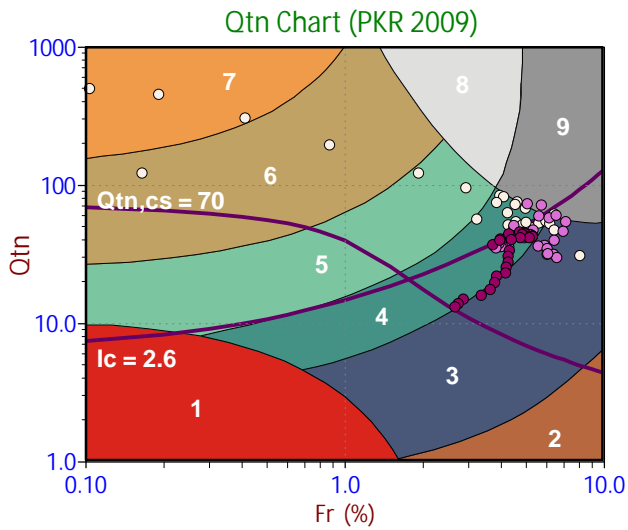
- Sensitive, Fine Grained
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Legend

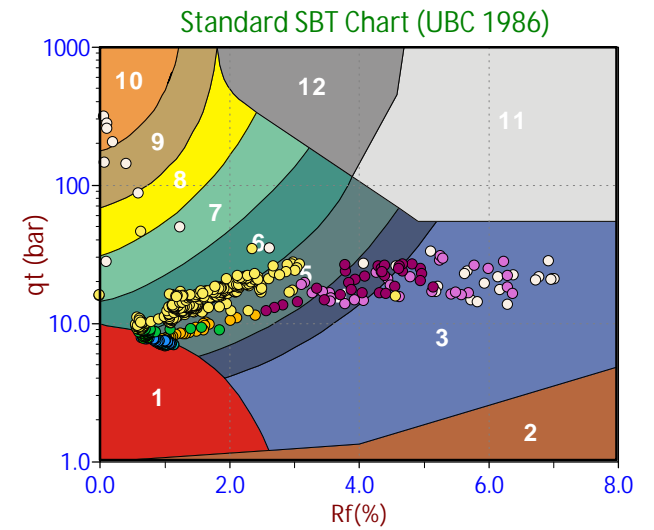
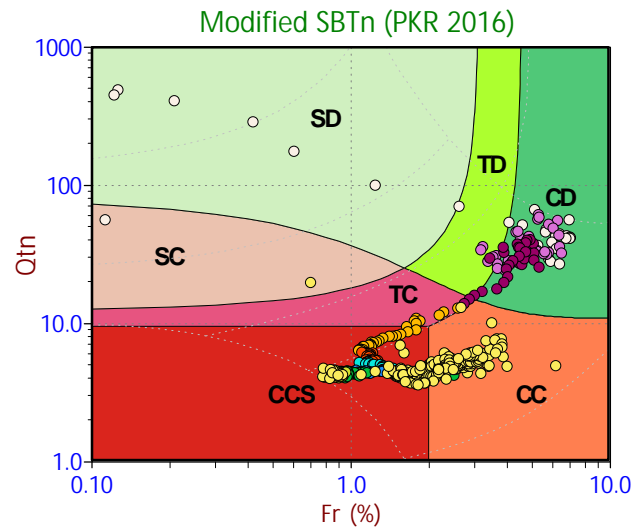
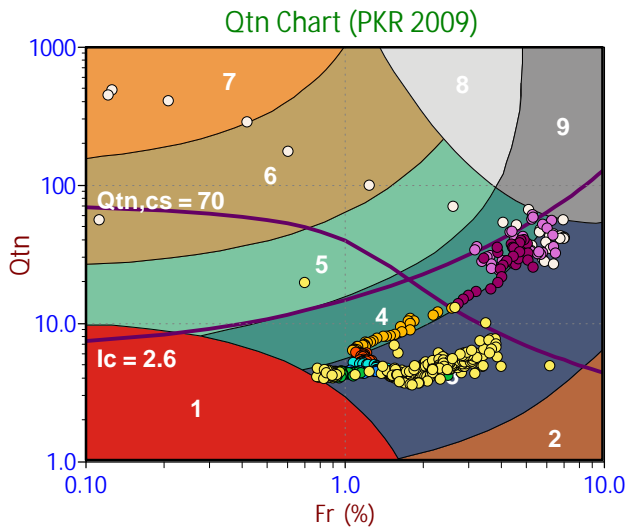
- Sensitive, Fine Grained
- Organic Soils
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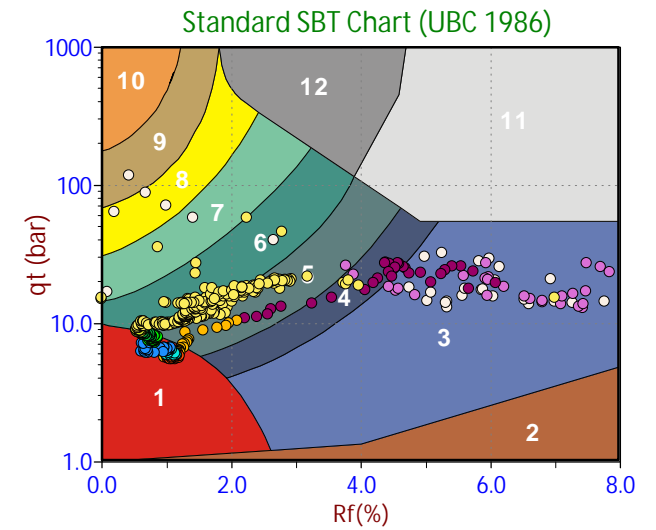
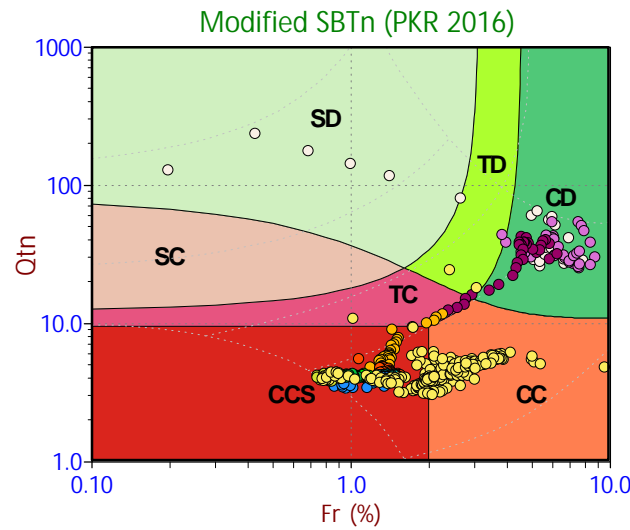
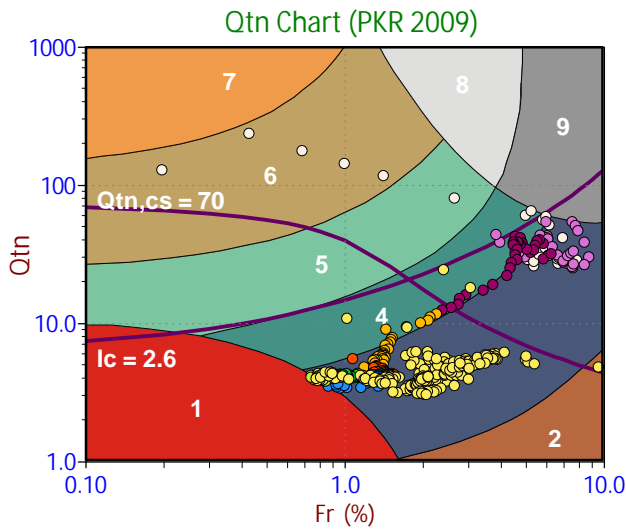
- Sensitive, Fine Grained
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Legend

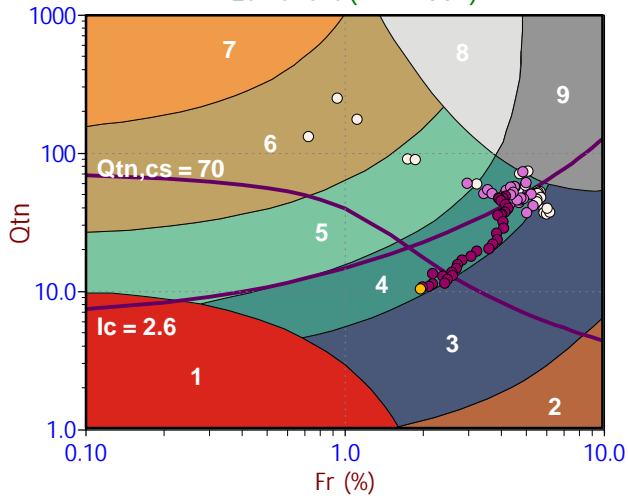
- CCS (Cont. sensitive clay like)
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Legend

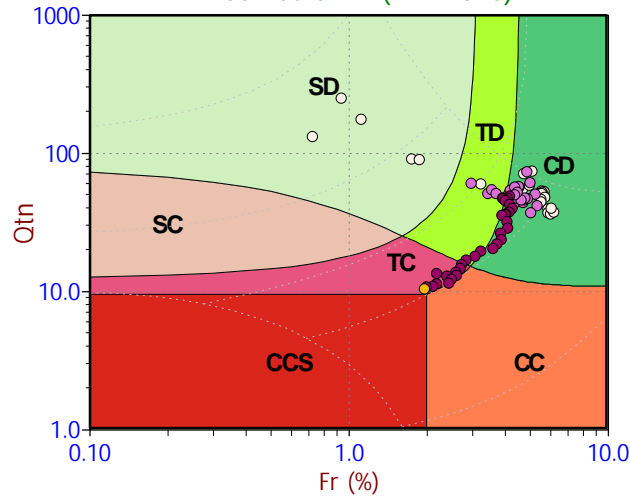
- Sensitive Fines
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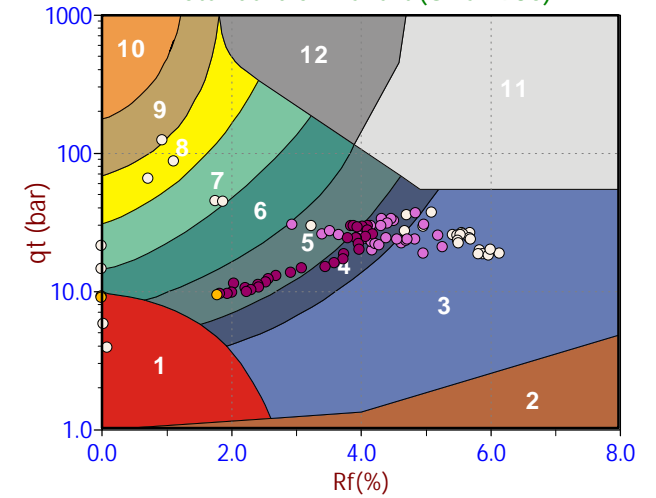
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
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Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
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- Gravelly Sand to Sand
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- Very Stiff Fine Grained

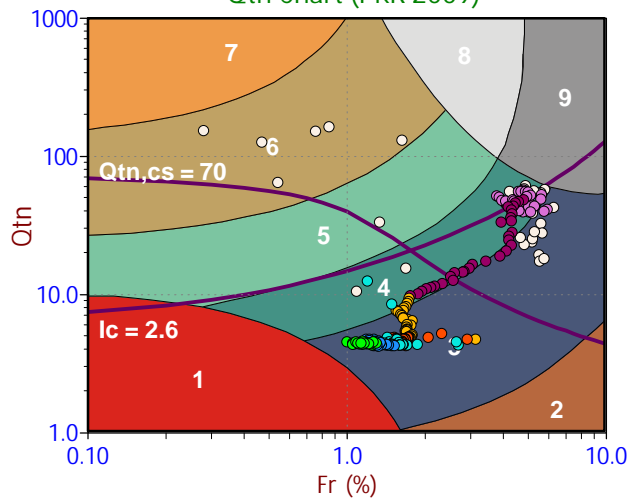
Legend

- CCS (Cont. sensitive clay like)
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- SC (Cont. sand like)
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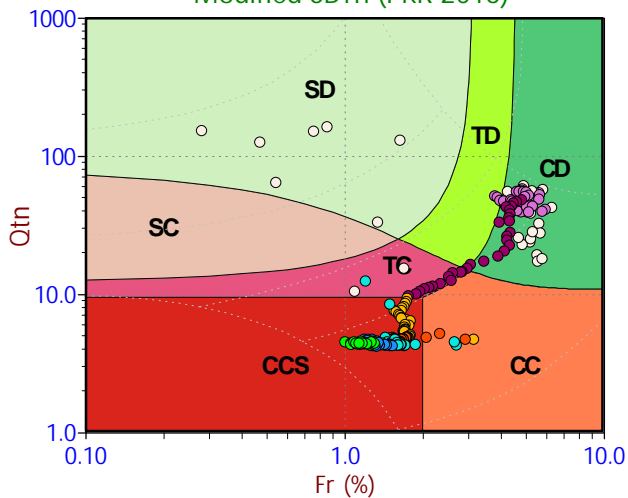
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

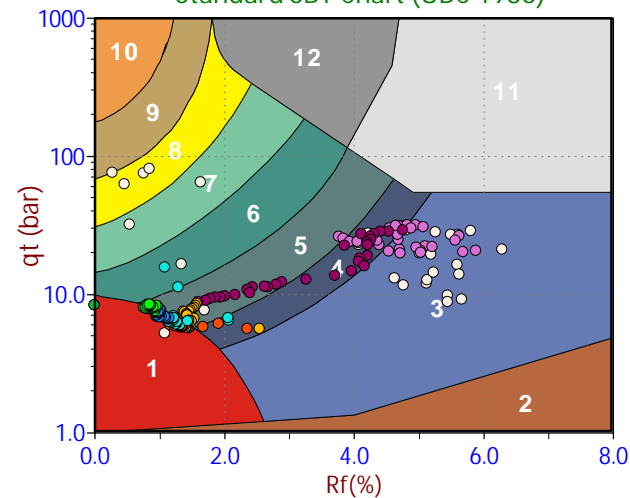
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
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Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
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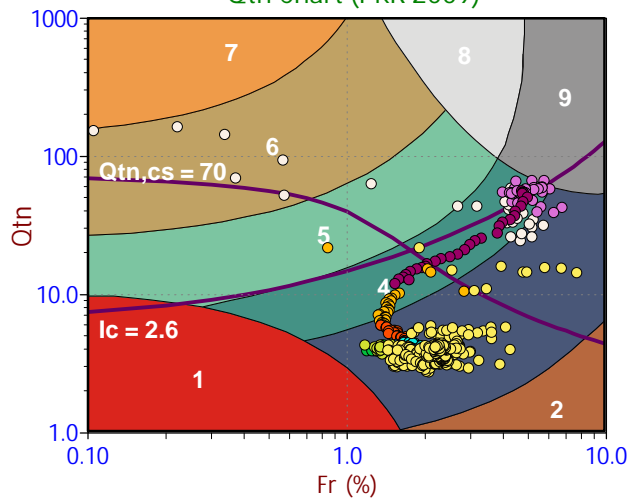
Legend

- CCS (Cont. sensitive clay like)
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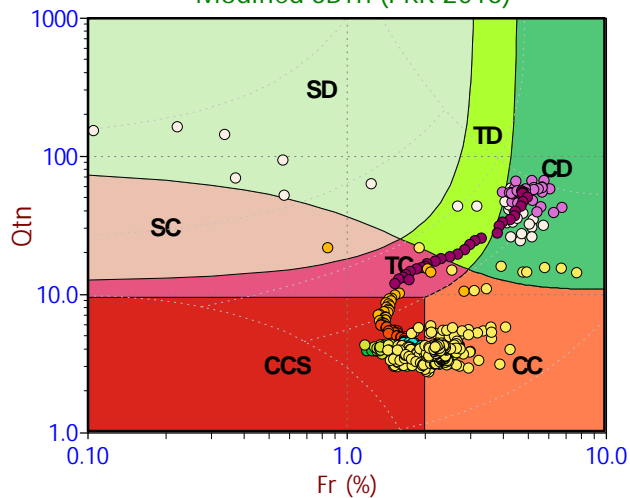
Legend

- Sensitive Fines
- Organic Soil
- Clay
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- Sand
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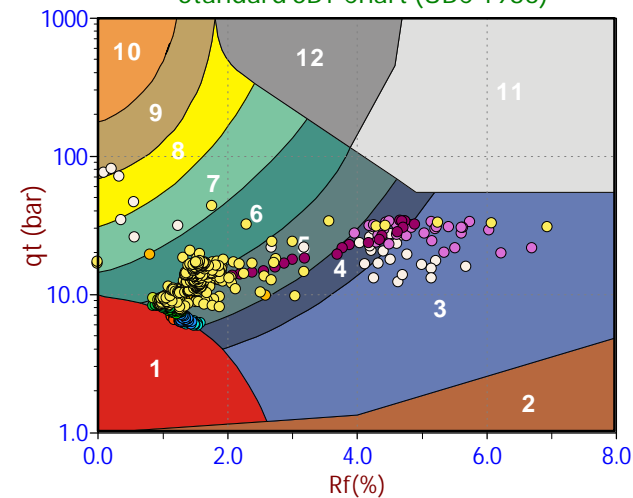
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
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Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

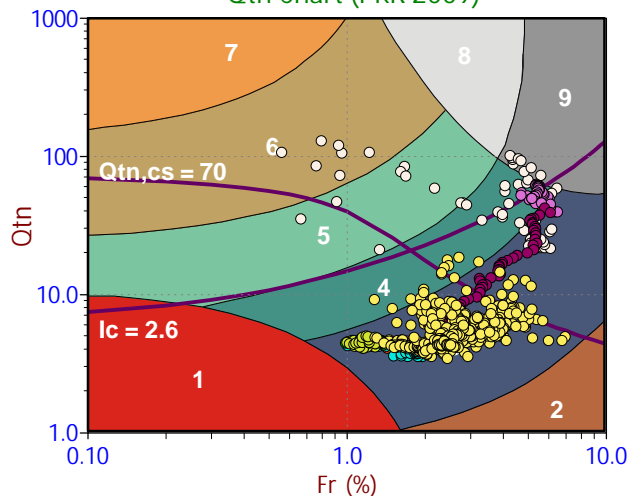
- CCS (Cont. sensitive clay like)
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Legend

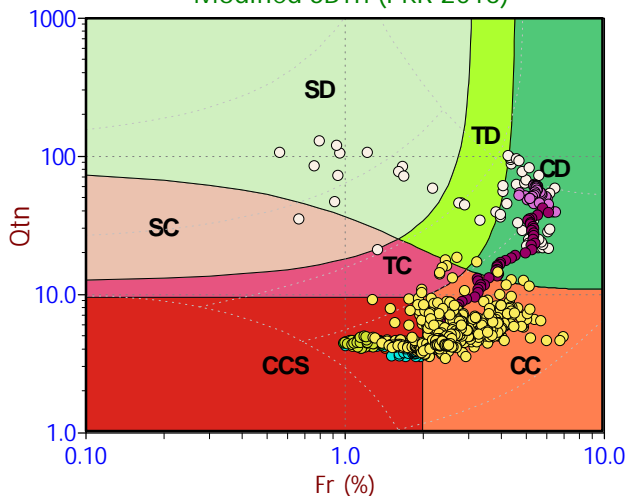
- Sensitive Fines
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- Clay
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- Silty Sand/Sand
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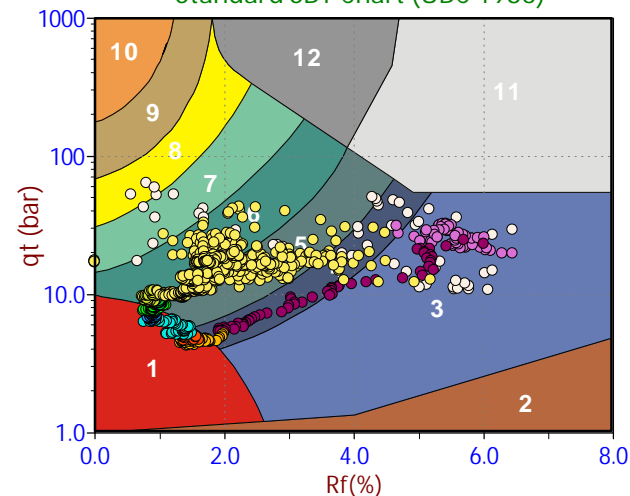
Qtn Chart (PKR 2009)



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Depth Ranges

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Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
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- Sands
- Gravelly Sand to Sand
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Legend

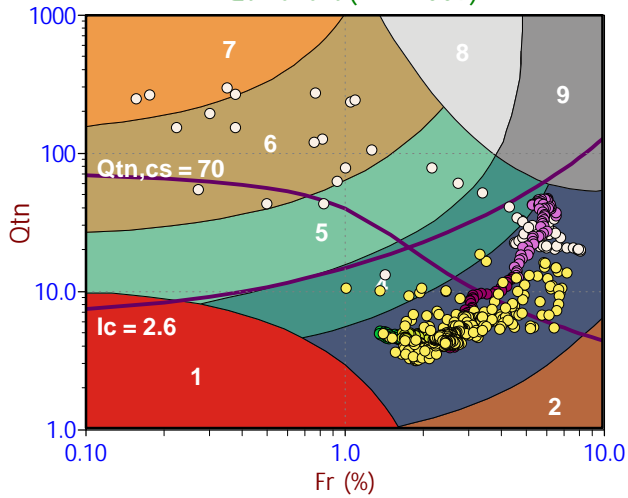
- CCS (Cont. sensitive clay like)
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Legend

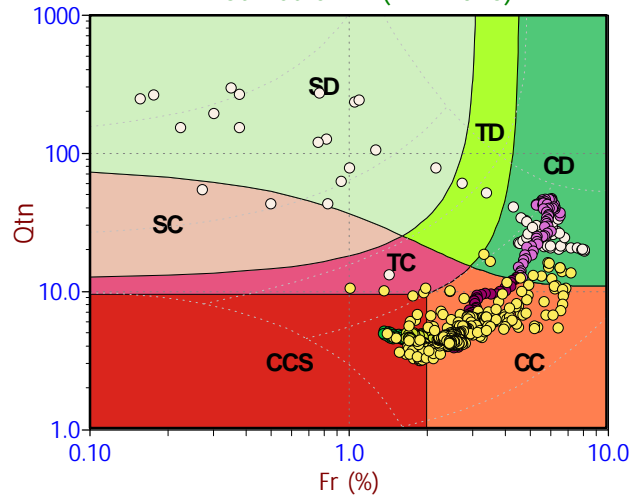
- Sensitive Fines
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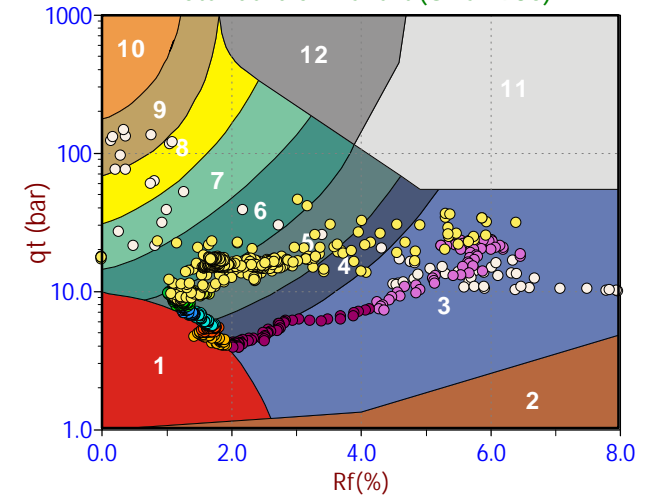
Qtn Chart (PKR 2009)



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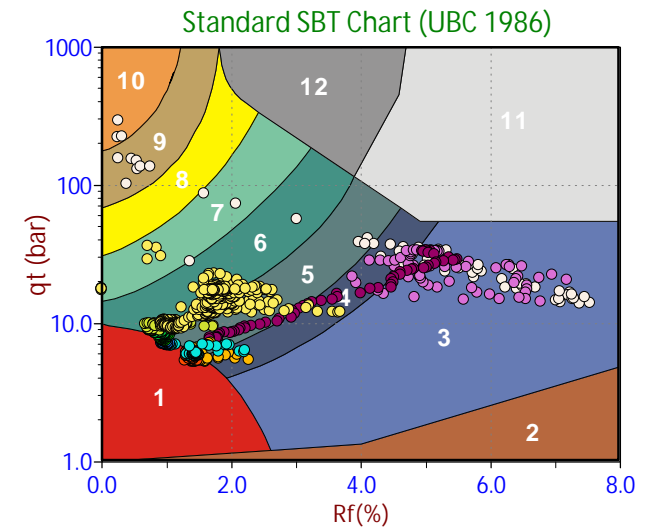
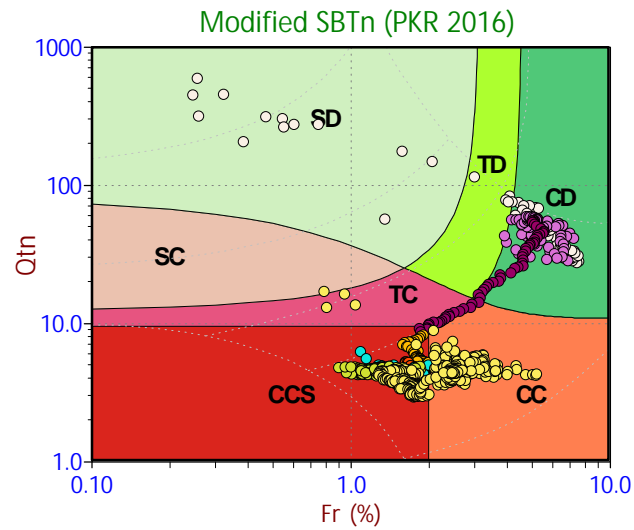
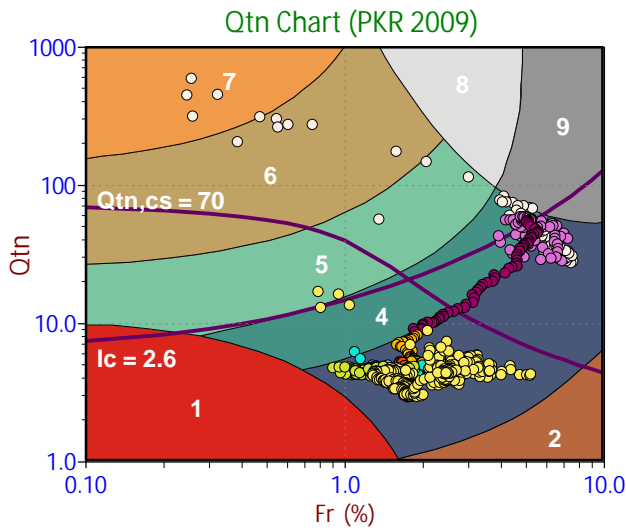
- Sensitive, Fine Grained
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Legend

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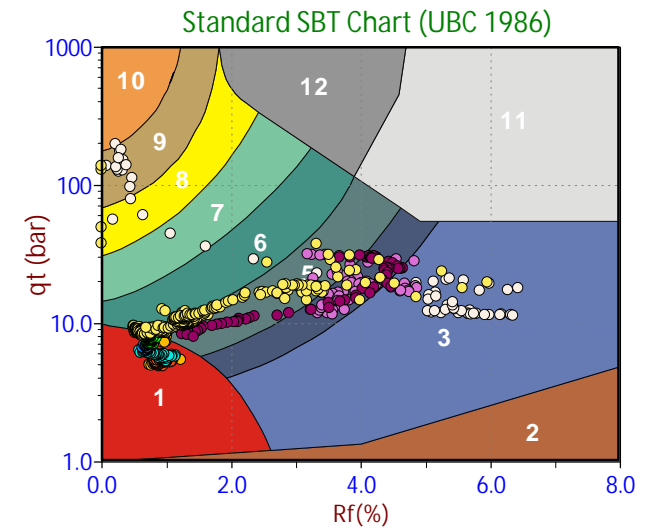
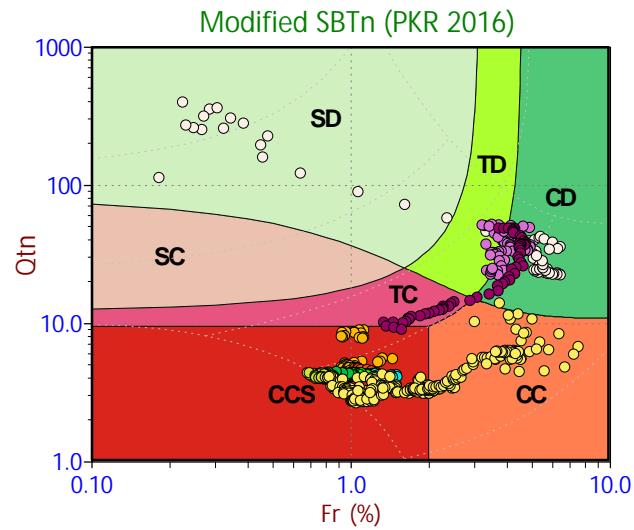
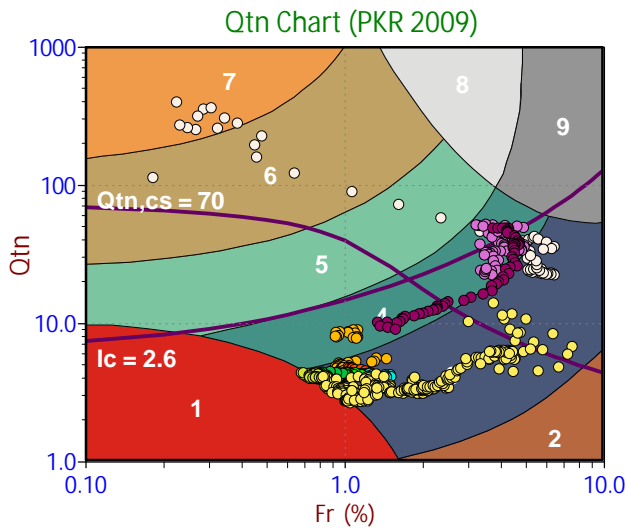
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- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

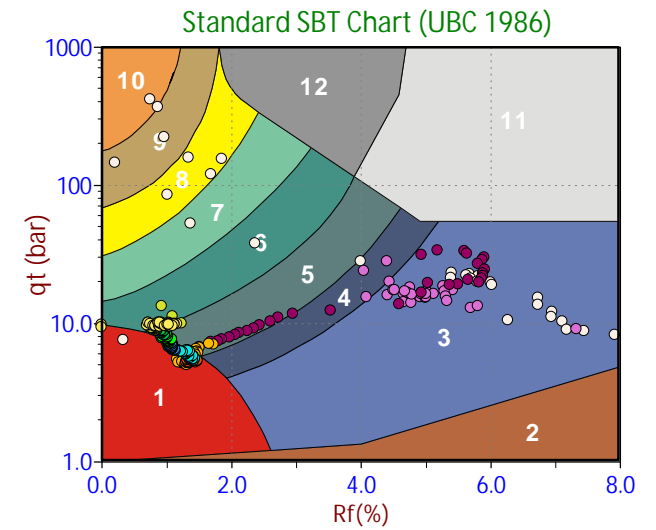
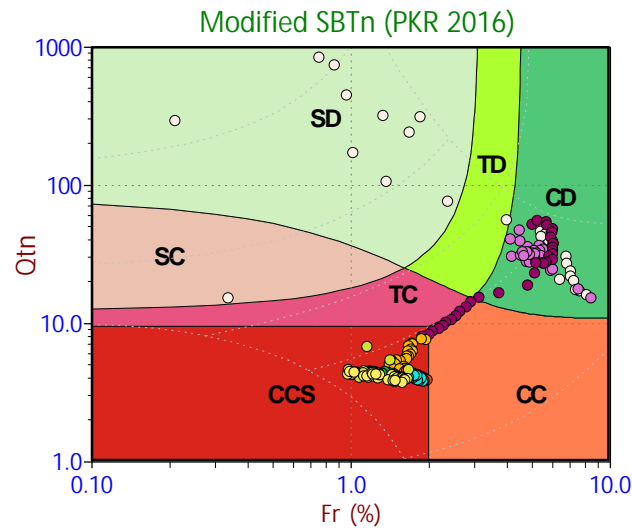
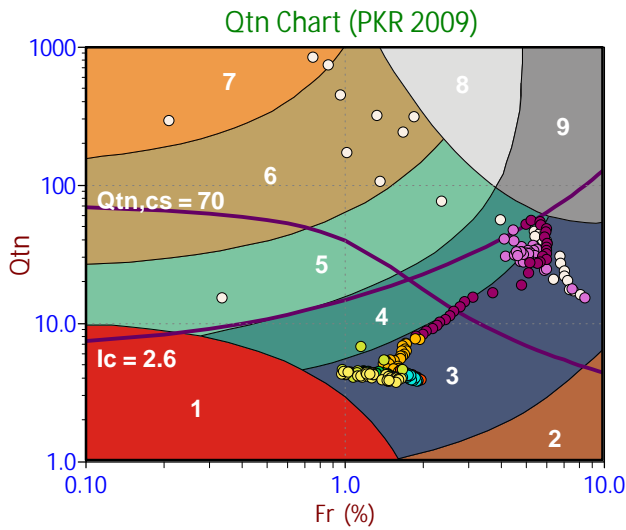
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

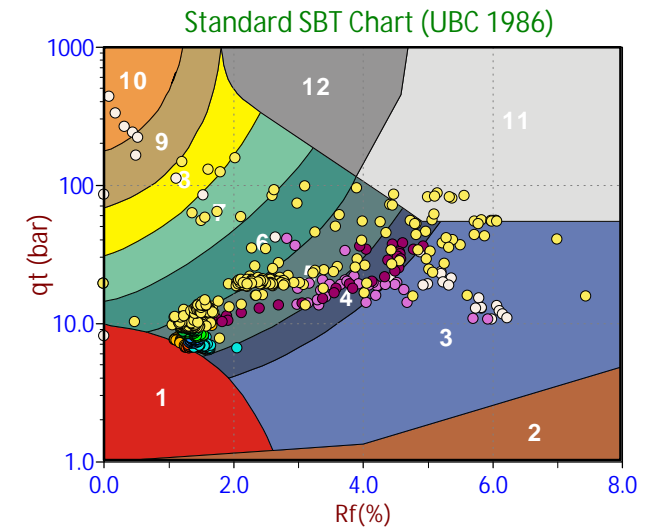
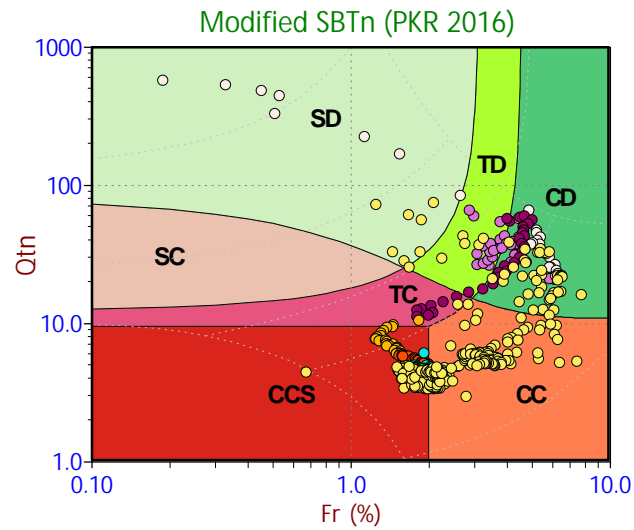
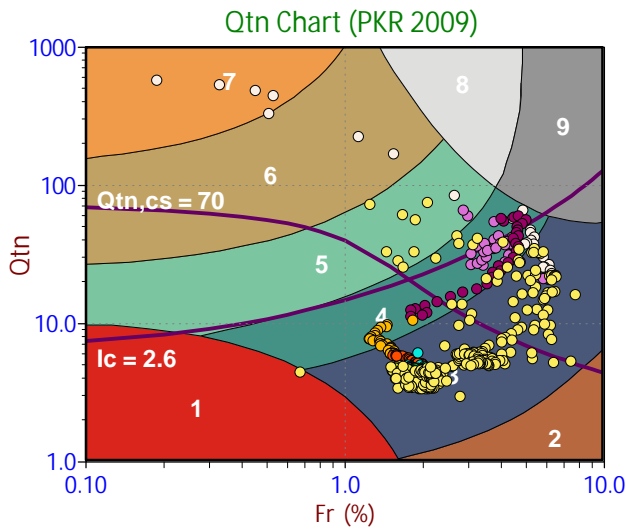
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

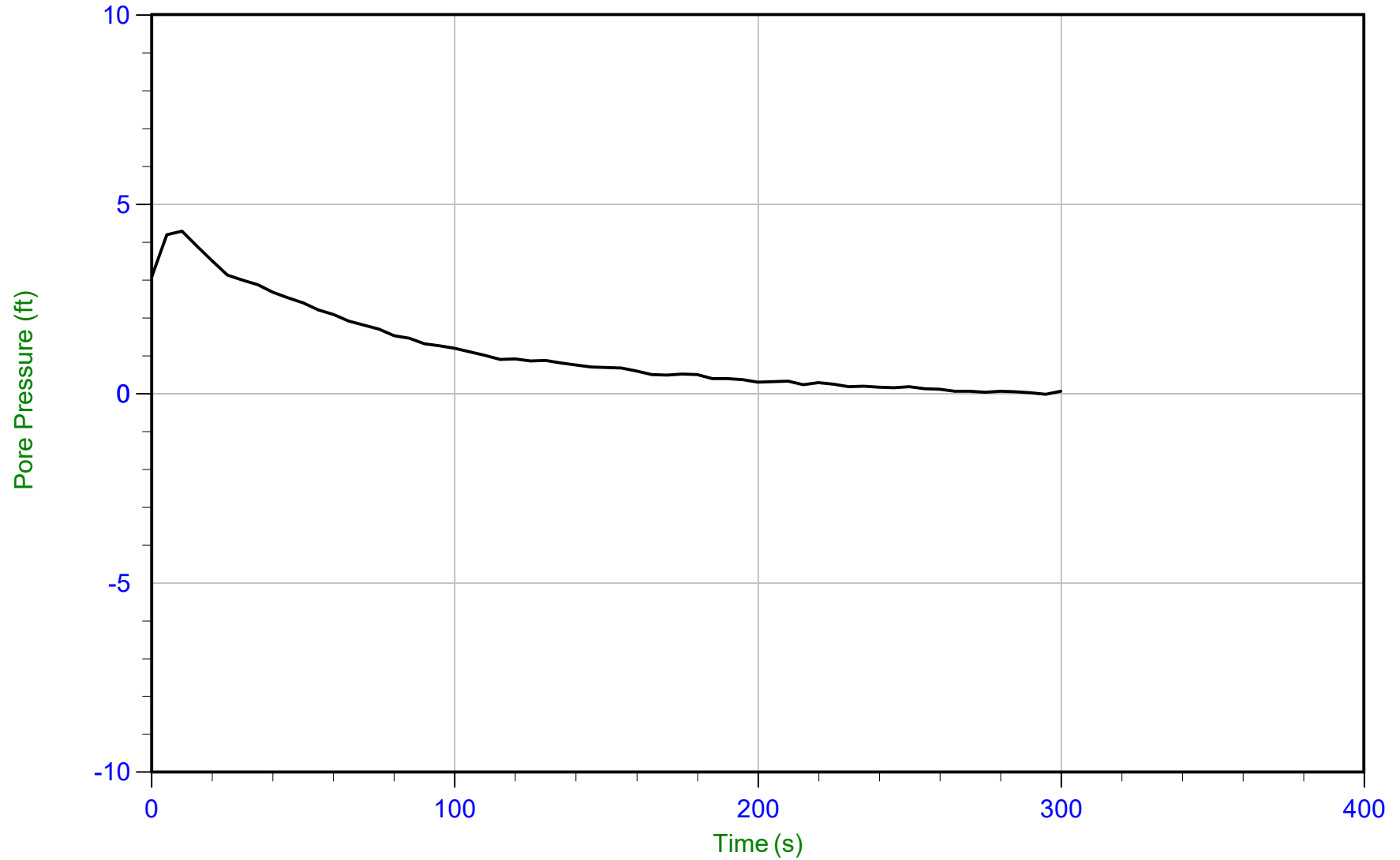
**Appendix I2**  
**PPD Test Results**



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 300.0 s

u Min: -0.0 ft  
u Max: 4.3 ft  
u Final: 0.1 ft

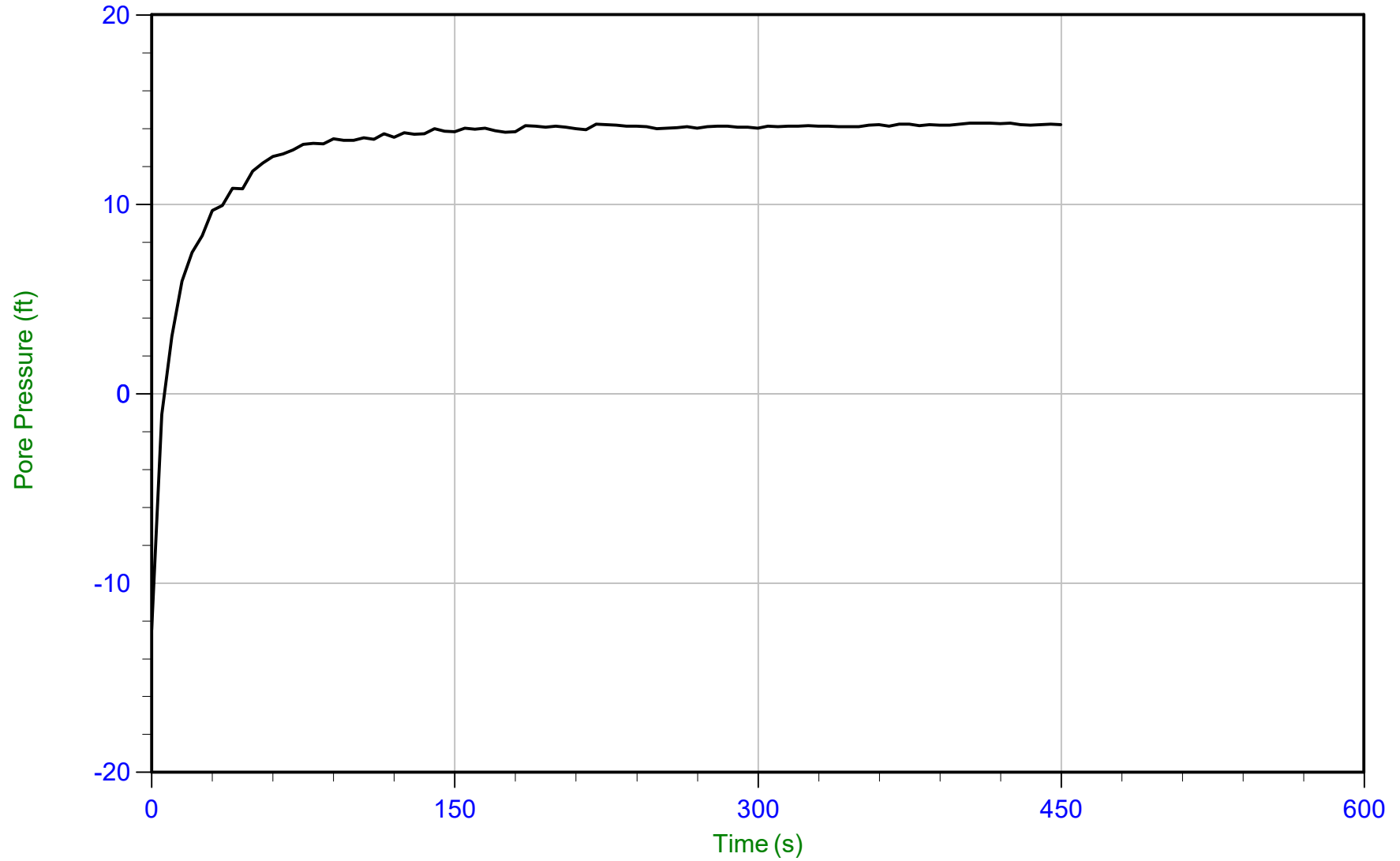
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 2.775 m / 9.104 ft  
Duration: 450.0 s

u Min: -12.5 ft  
u Max: 14.3 ft  
u Final: 14.2 ft

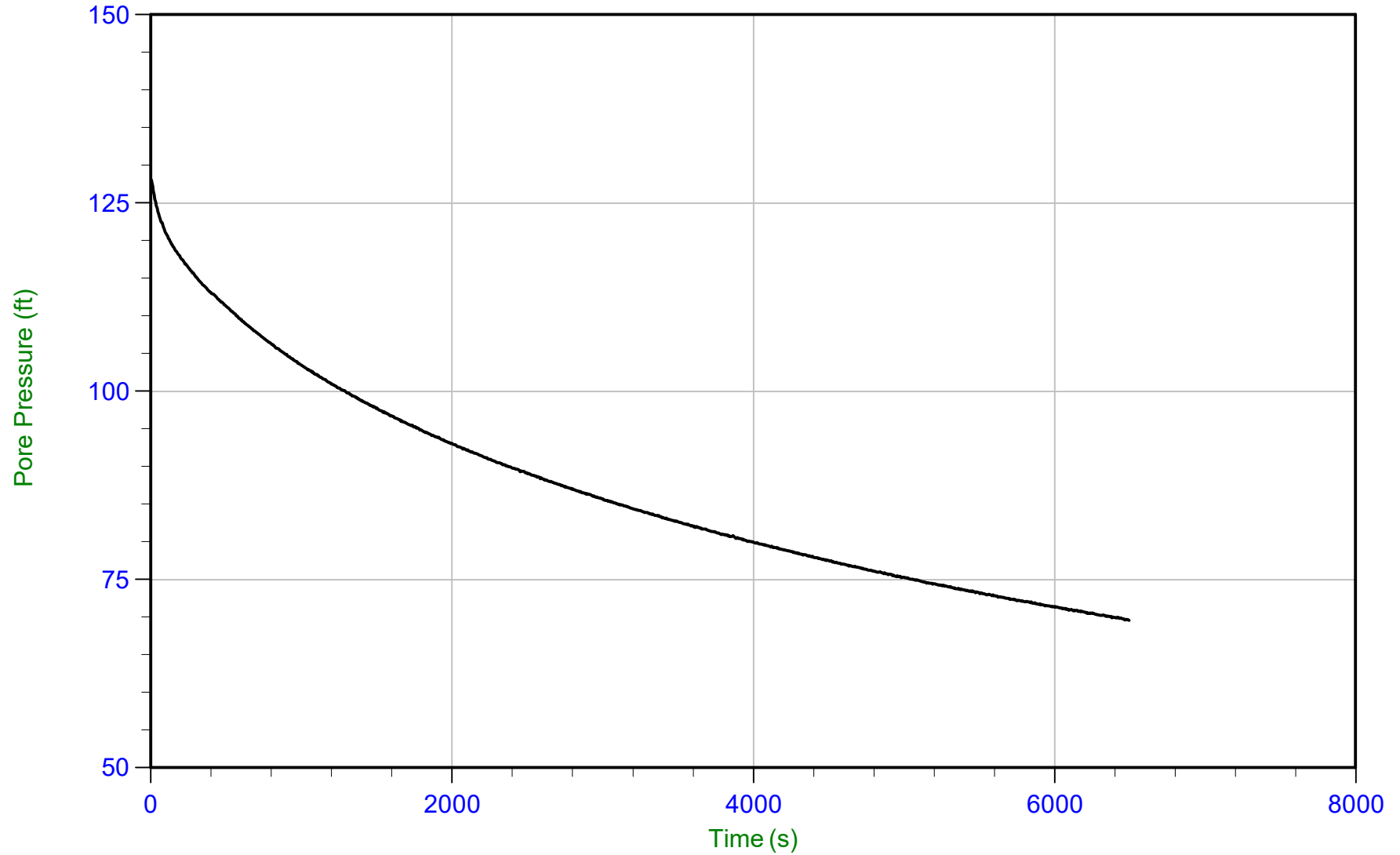




Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 6500.0 s

u Min: 69.6 ft  
u Max: 128.1 ft  
u Final: 69.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 13.1 ft  
U(50): 70.62 ft

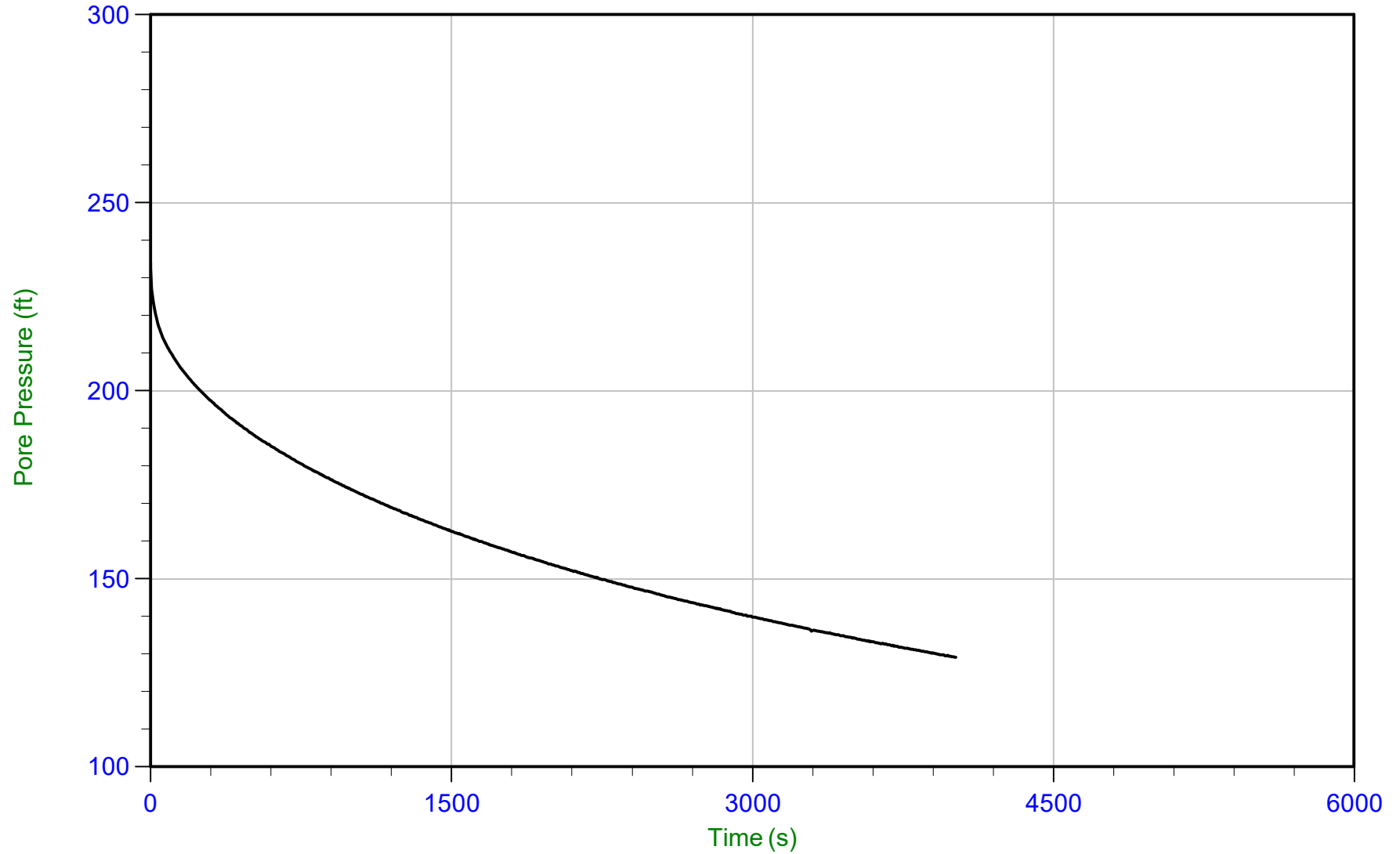
T(50): 6203.4 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 4015.0 s

u Min: 129.2 ft  
u Max: 234.0 ft  
u Final: 129.2 ft

WT: 4.572 m / 15.000 ft  
Ueq: 33.1 ft  
U(50): 133.60 ft

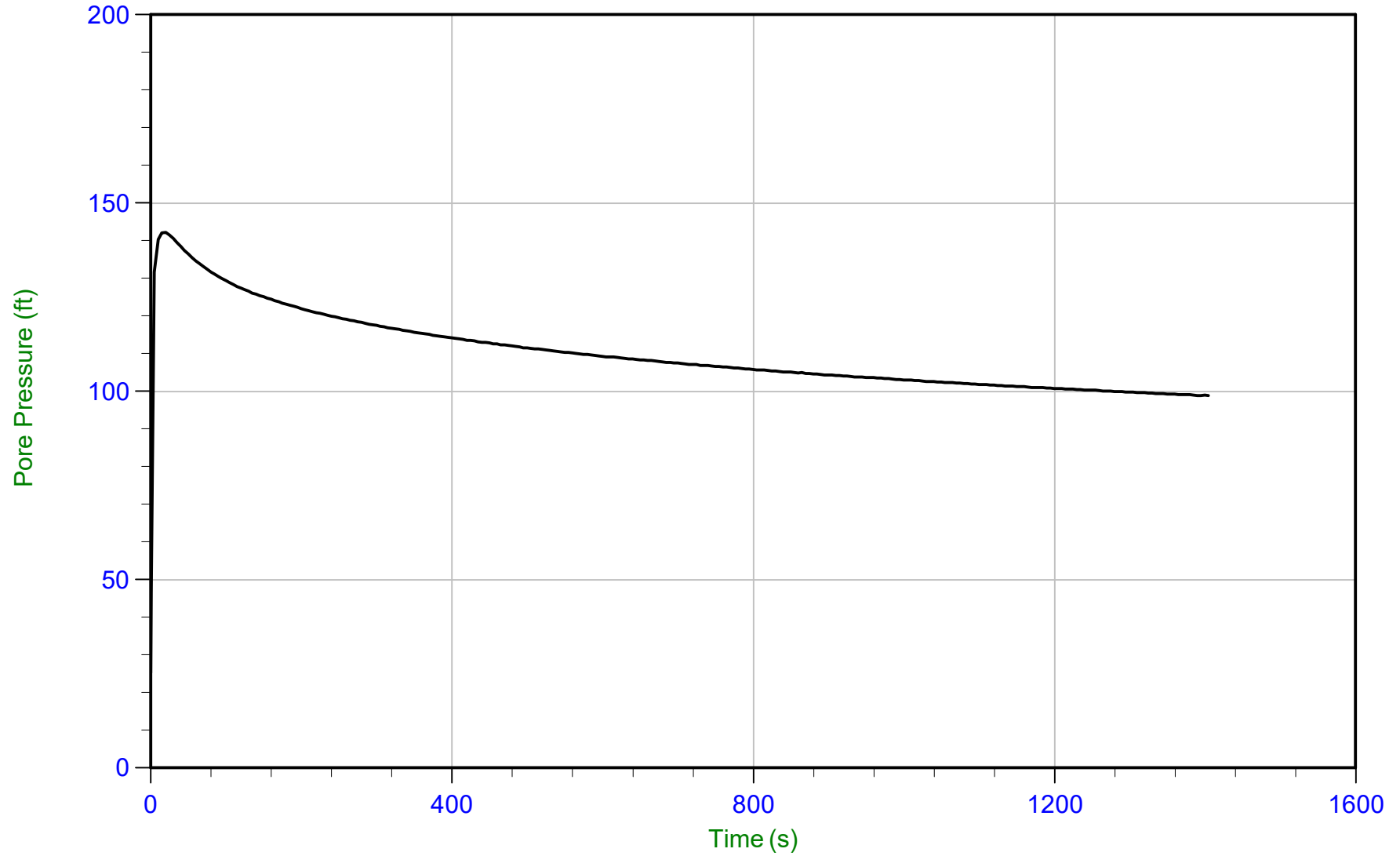
T(50): 3564.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 19.975 m / 65.534 ft  
Duration: 1405.0 s

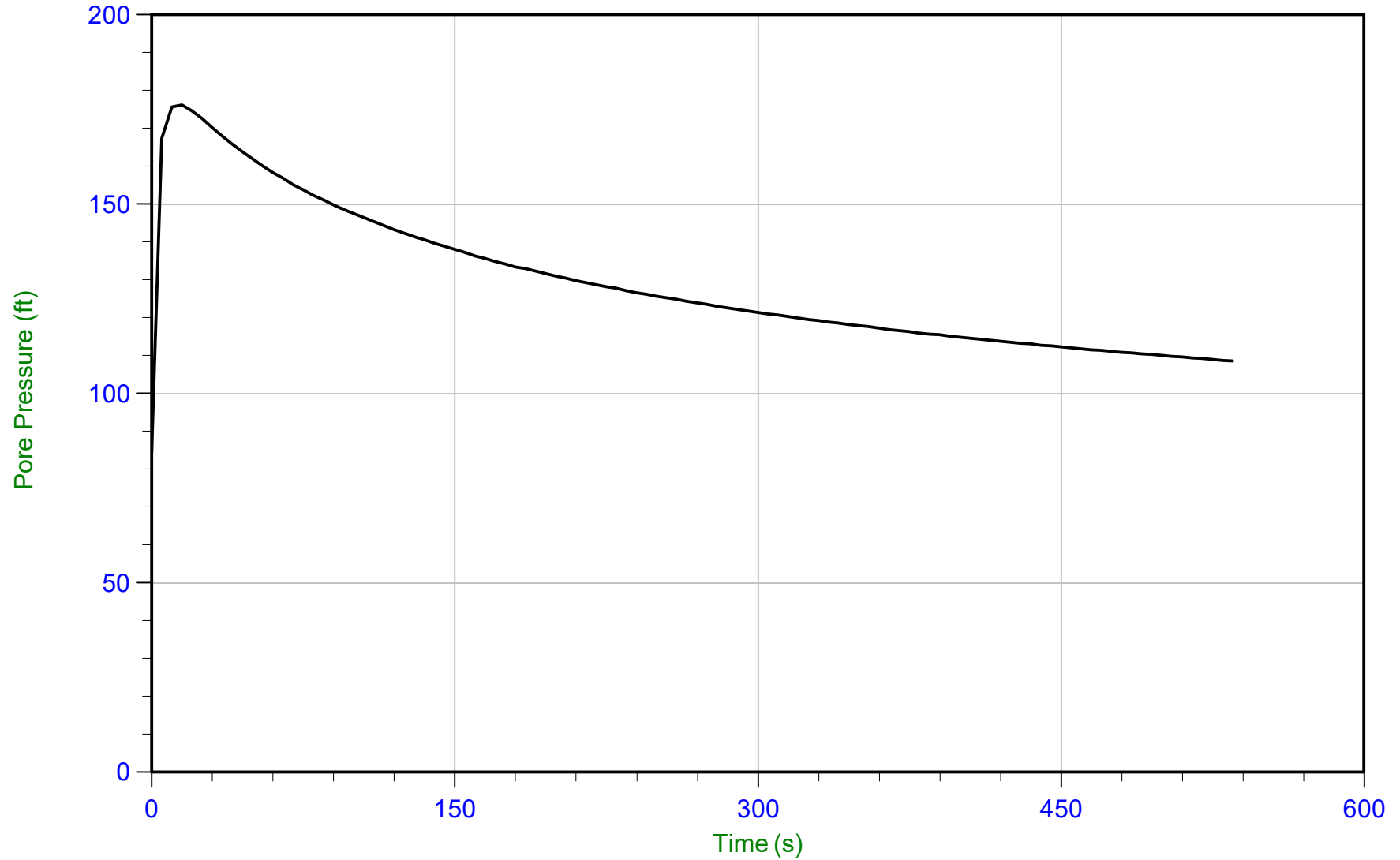
u Min: 25.2 ft  
u Max: 142.2 ft  
u Final: 98.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 20.775 m / 68.159 ft  
Duration: 535.0 s

u Min: 84.4 ft  
u Max: 176.2 ft  
u Final: 108.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 53.2 ft  
U(50): 114.66 ft

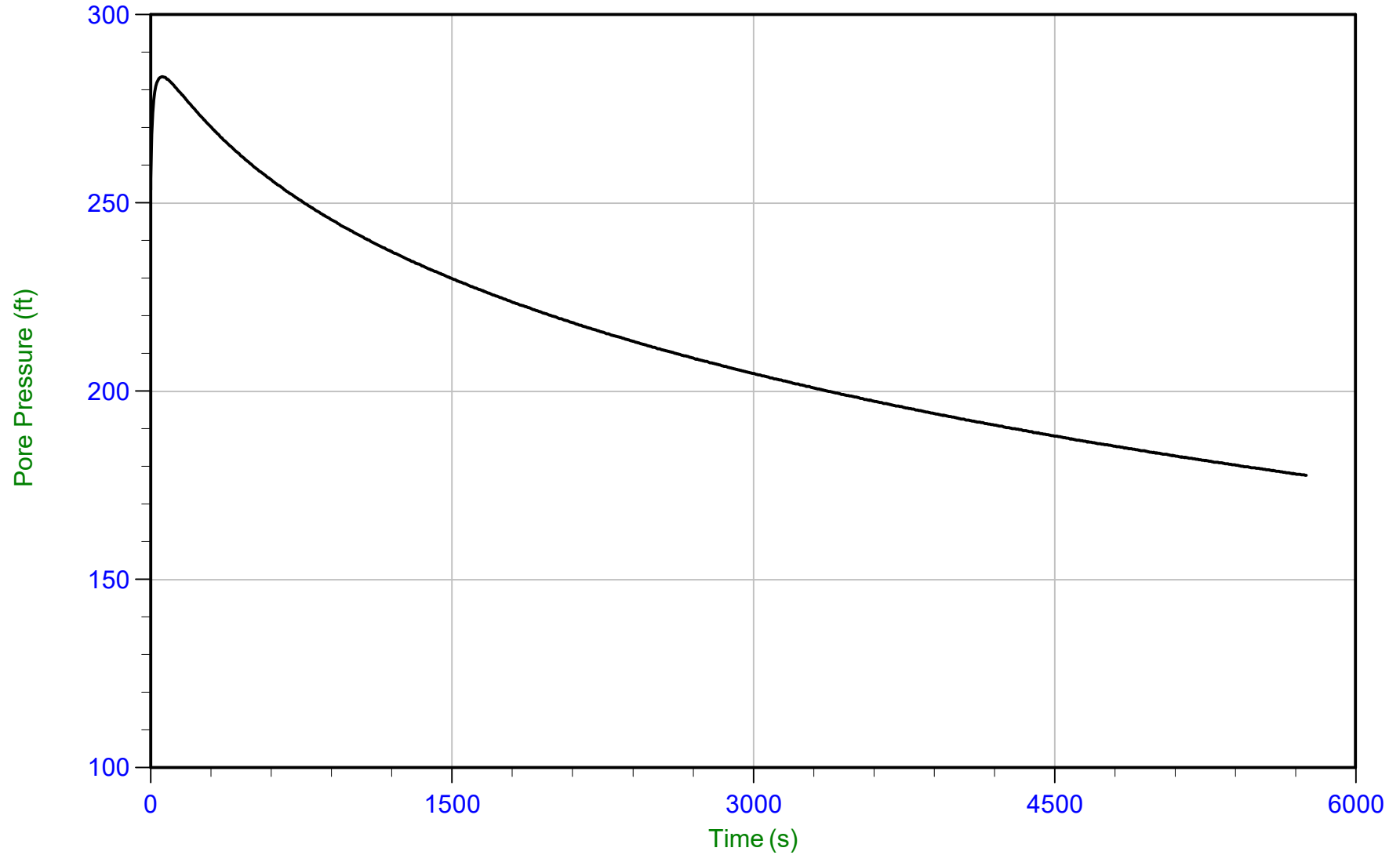
T(50): 389.0 s  
lr: 100  
Ch: 1.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 5755.0 s

u Min: 177.6 ft  
u Max: 283.6 ft  
u Final: 177.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 73.1 ft  
U(50): 178.34 ft

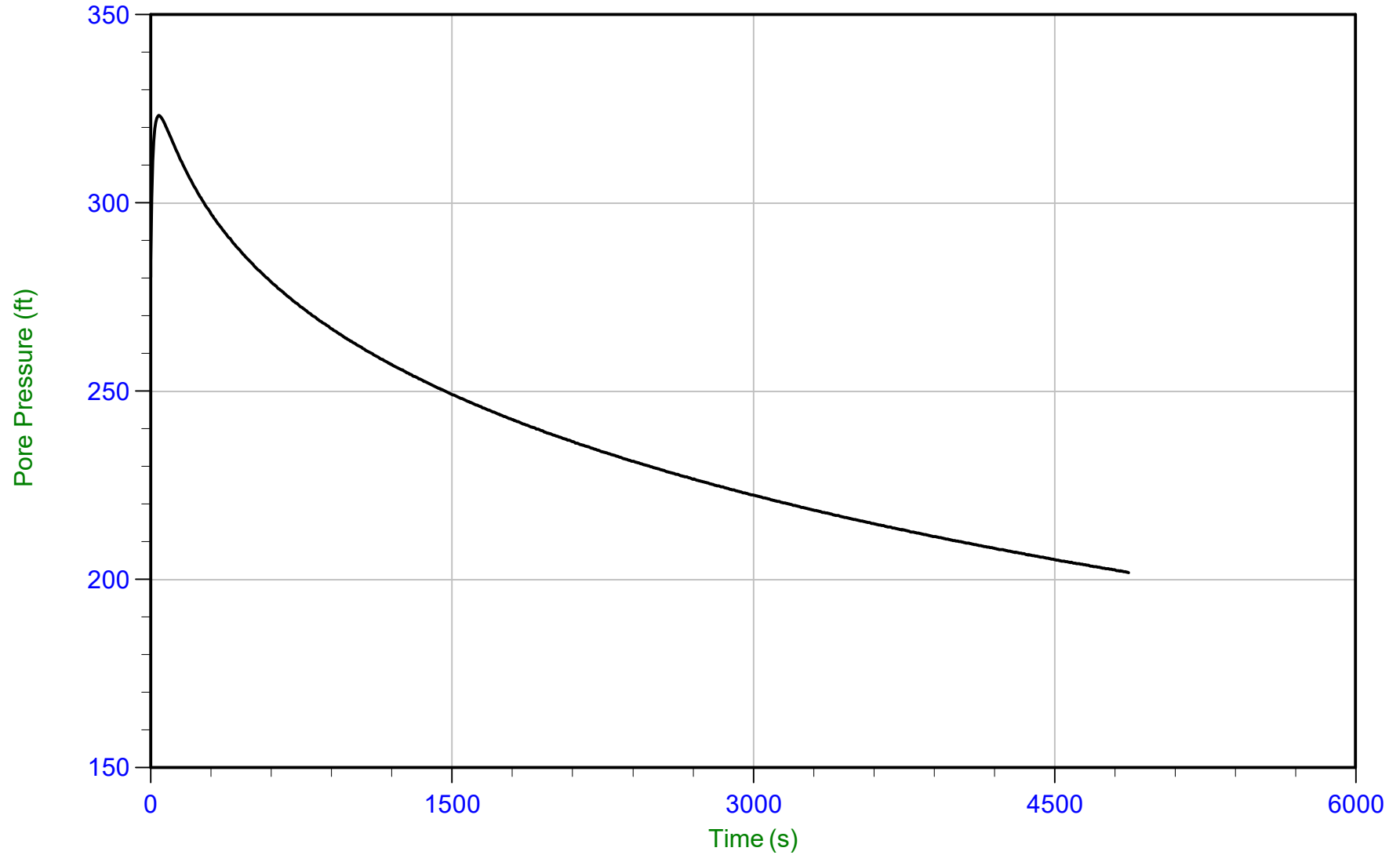
T(50): 5600.8 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4870.0 s

u Min: 201.9 ft  
u Max: 323.3 ft  
u Final: 201.9 ft

WT: 4.572 m / 15.000 ft  
Ueq: 83.1 ft  
U(50): 203.21 ft

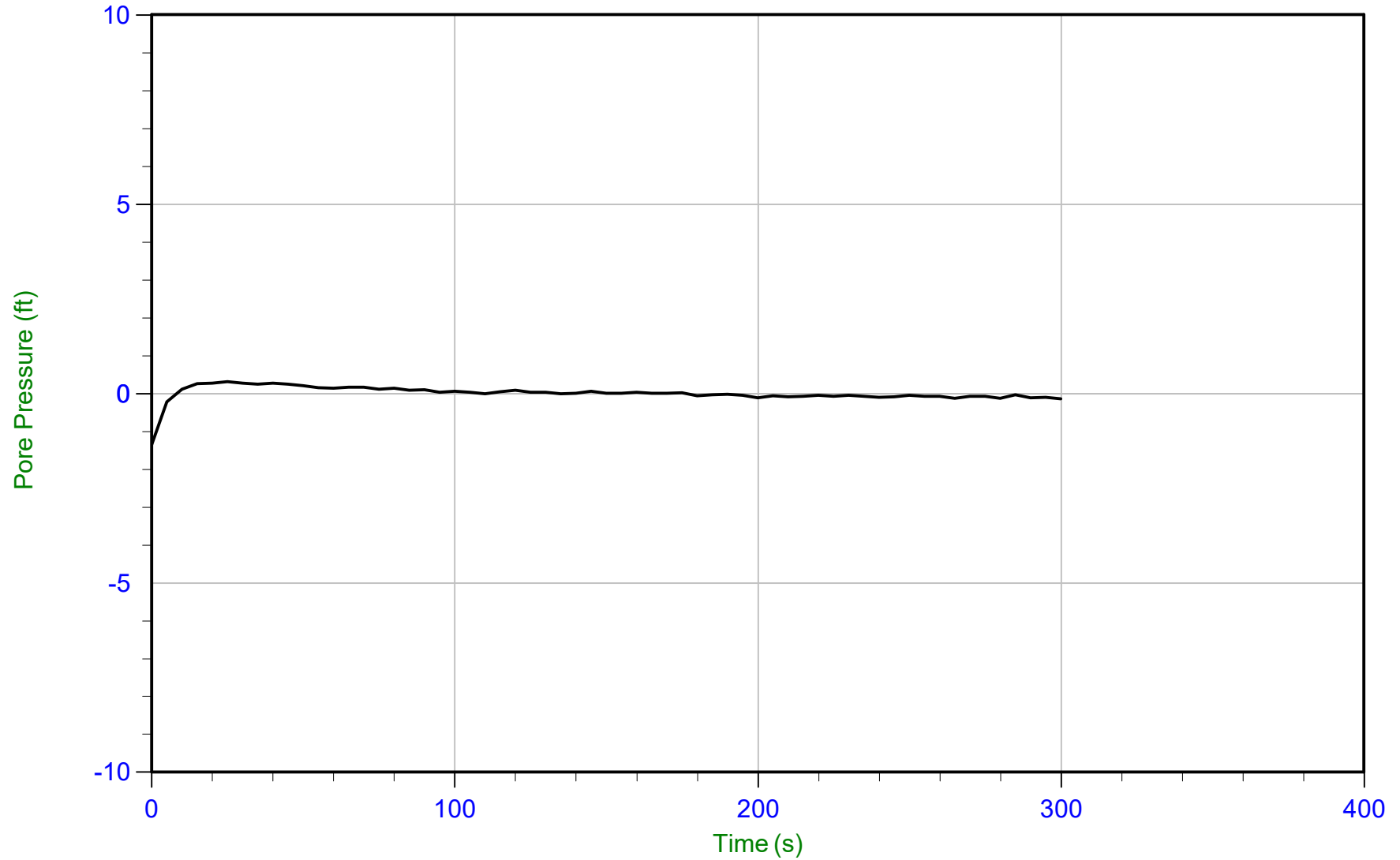
T(50): 4686.3 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 3.100 m / 10.170 ft  
Duration: 300.0 s

u Min: -1.4 ft  
u Max: 0.3 ft  
u Final: -0.1 ft

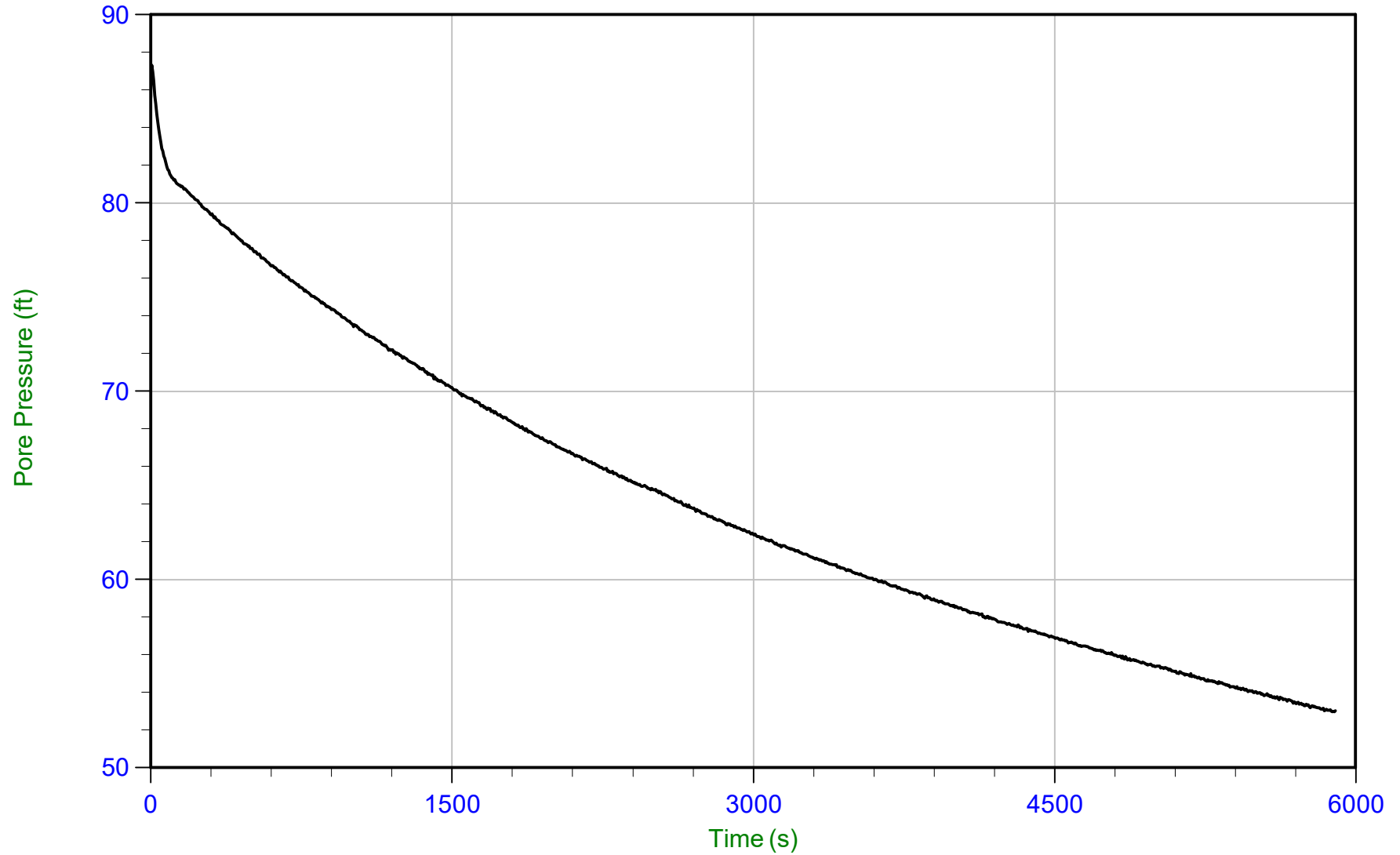
WT: 3.100 m / 10.170 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 6.150 m / 20.177 ft  
Duration: 5900.0 s

u Min: 53.0 ft  
u Max: 87.3 ft  
u Final: 53.0 ft

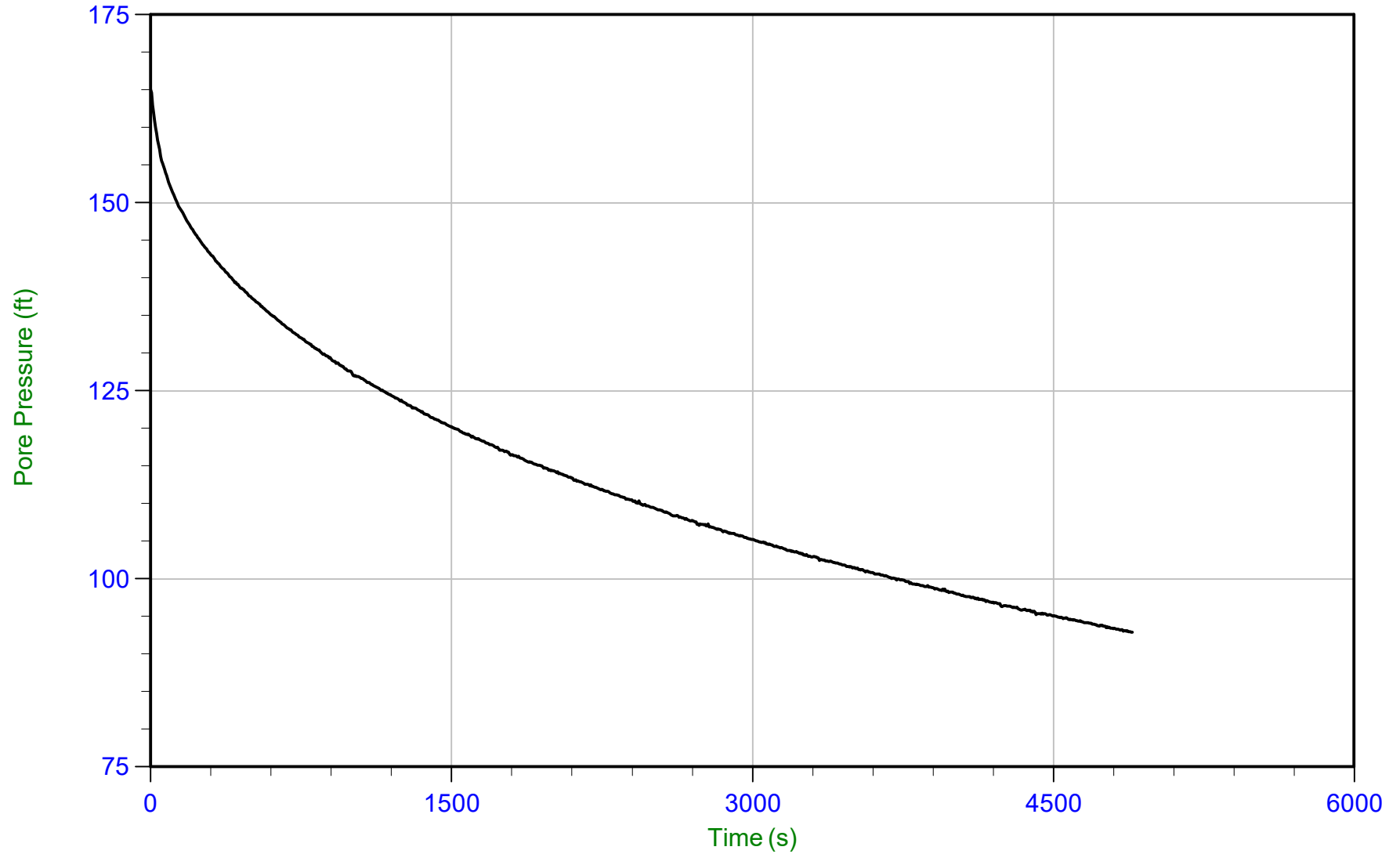




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 11.325 m / 37.155 ft  
Duration: 4895.0 s

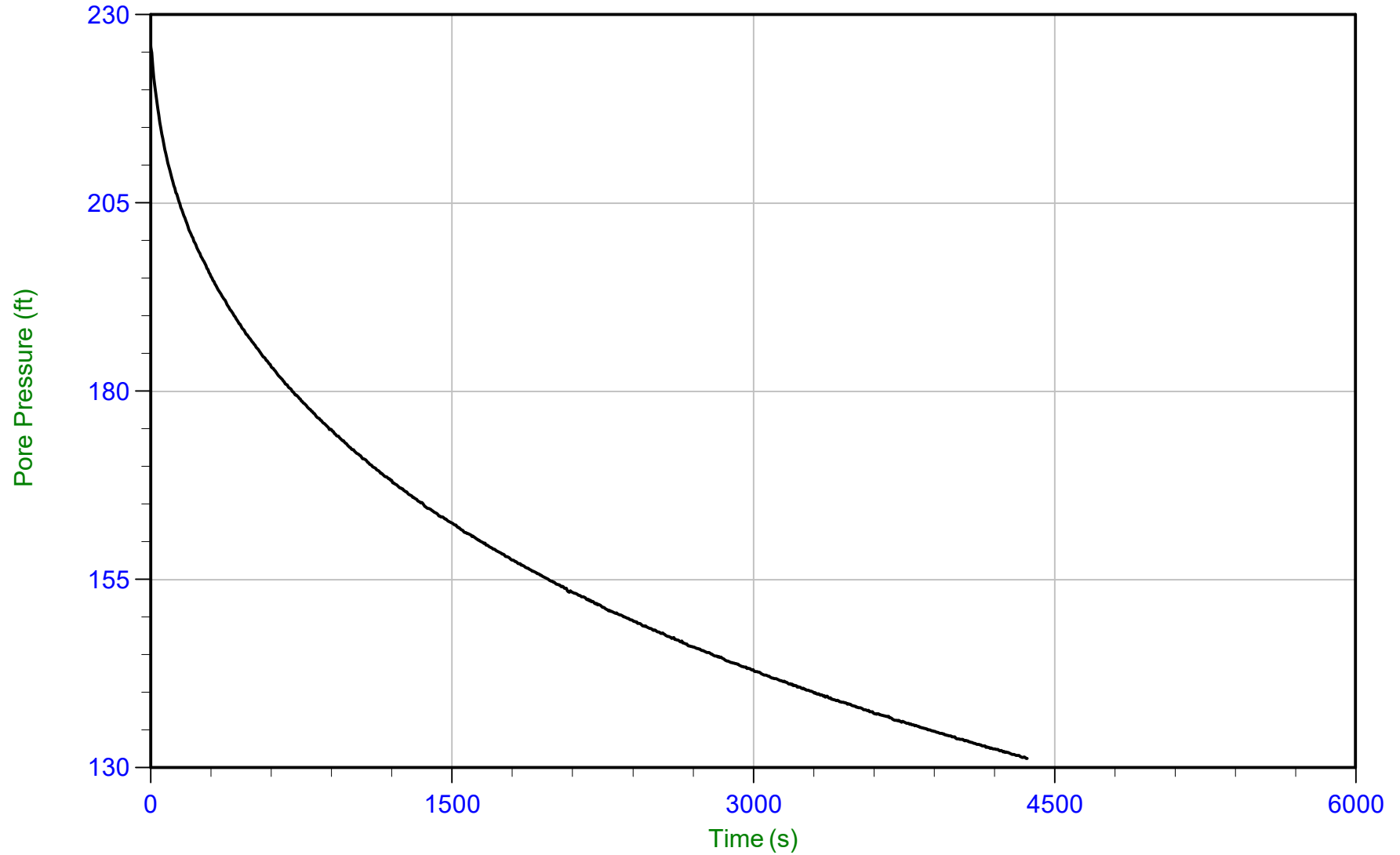
u Min: 92.9 ft  
u Max: 165.1 ft  
u Final: 92.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 17.725 m / 58.152 ft  
Duration: 4365.0 s

u Min: 131.3 ft  
u Max: 225.8 ft  
u Final: 131.3 ft

WT: 5.486 m / 17.998 ft  
Ueq: 40.2 ft  
U(50): 133.00 ft

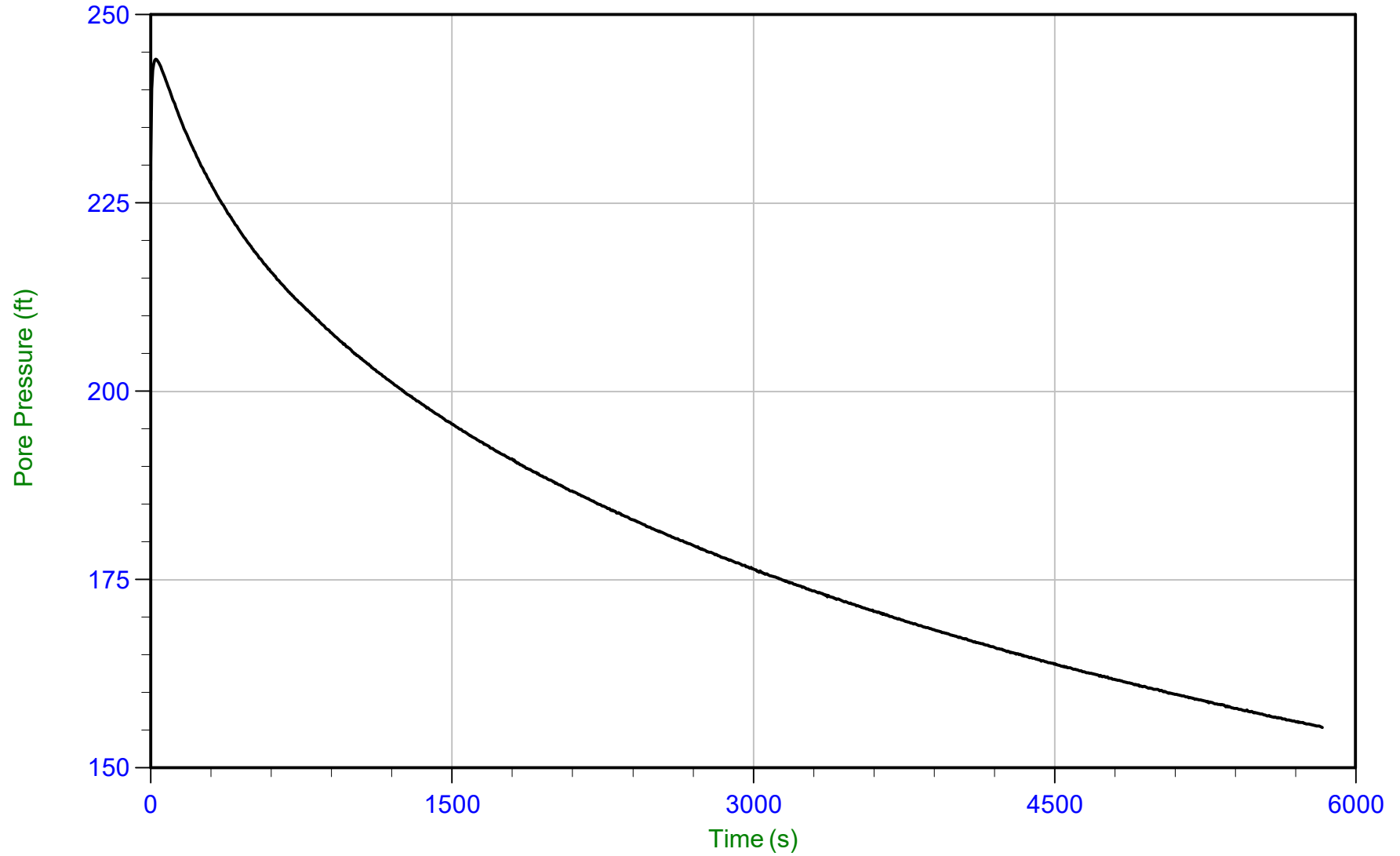
T(50): 4136.3 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 24.425 m / 80.134 ft  
Duration: 5835.0 s

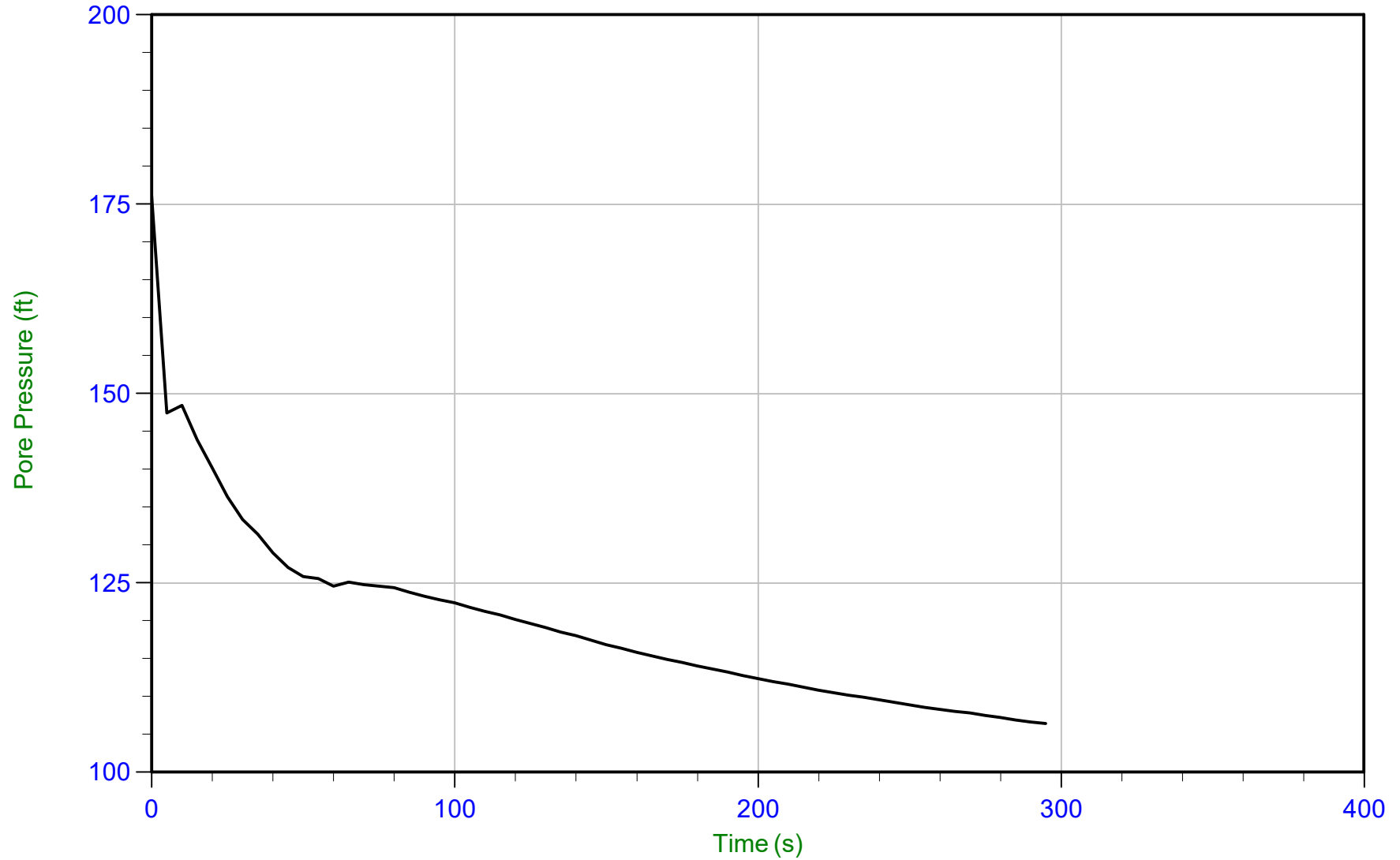
u Min: 155.4 ft  
u Max: 244.1 ft  
u Final: 155.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.050 m / 82.184 ft  
Duration: 295.0 s

u Min: 106.4 ft  
u Max: 176.0 ft  
u Final: 106.4 ft

WT: 5.486 m / 17.998 ft  
Ueq: 64.2 ft  
U(50): 120.10 ft

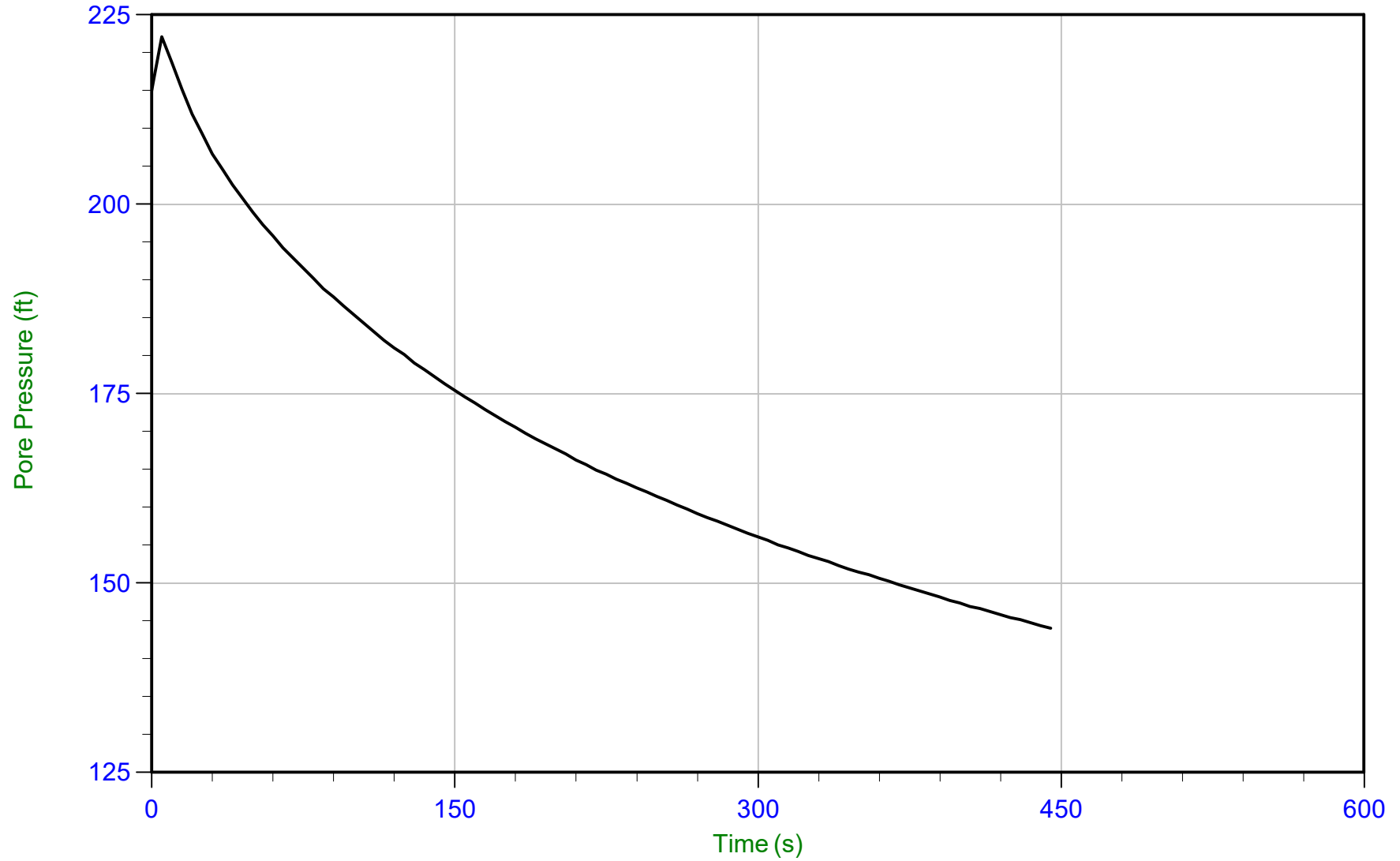
T(50): 120.6 s  
lr: 100  
Ch: 5.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.700 m / 84.317 ft  
Duration: 445.0 s

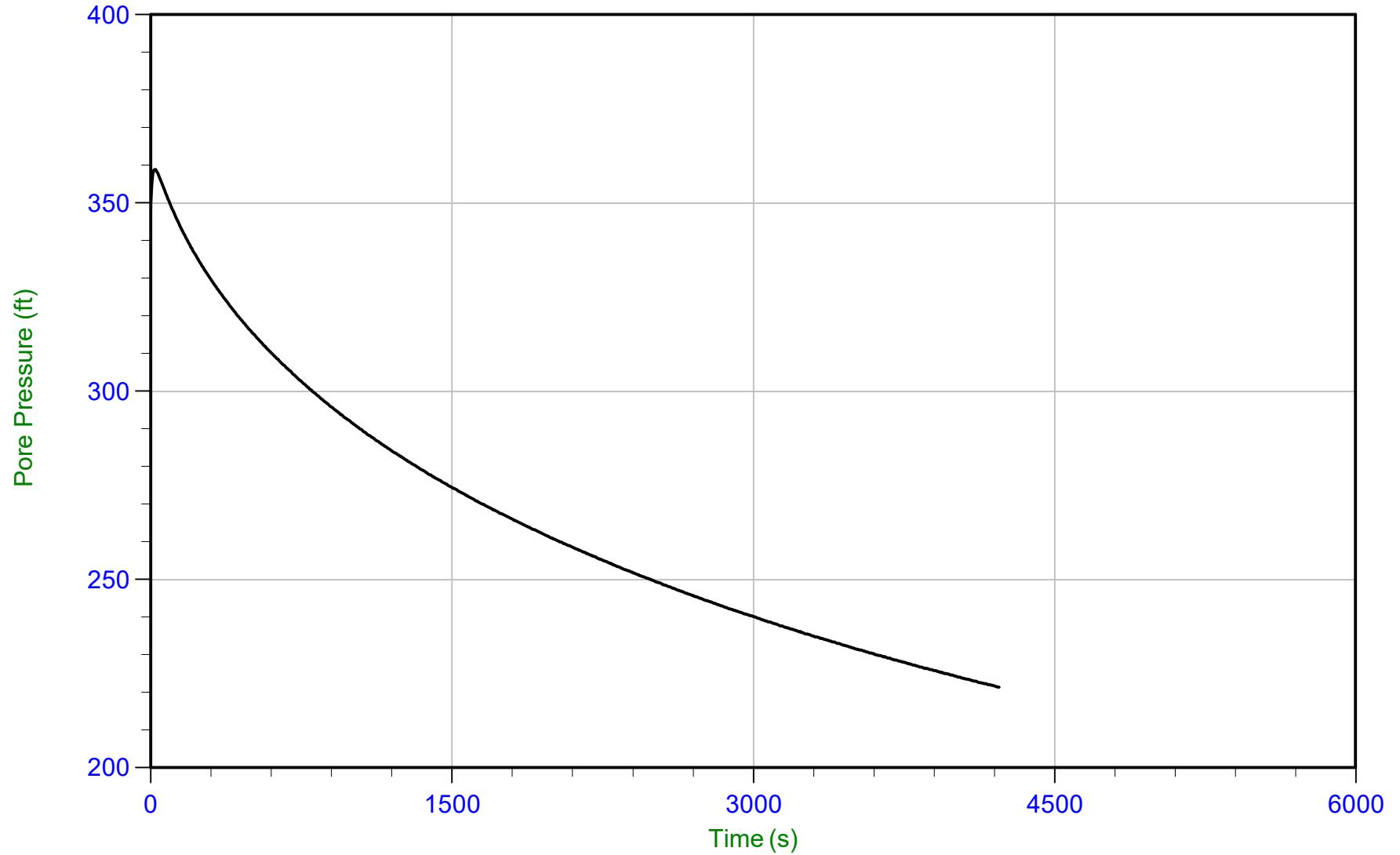
u Min: 144.0 ft  
u Max: 222.1 ft  
u Final: 144.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 30.225 m / 99.162 ft  
Duration: 4225.0 s

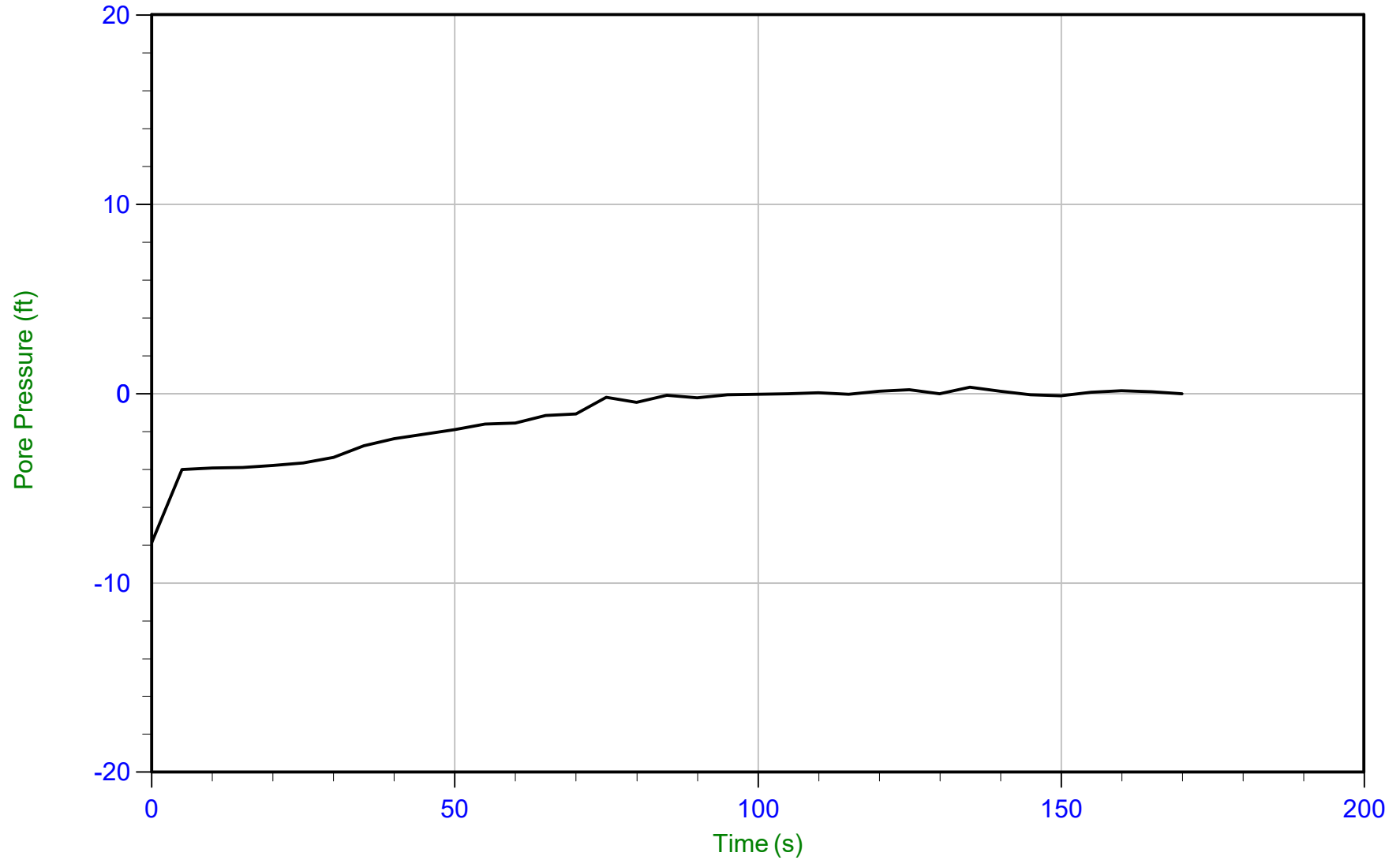
u Min: 221.4 ft  
u Max: 358.9 ft  
u Final: 221.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 170.0 s

u Min: -7.9 ft  
u Max: 0.3 ft  
u Final: -0.0 ft

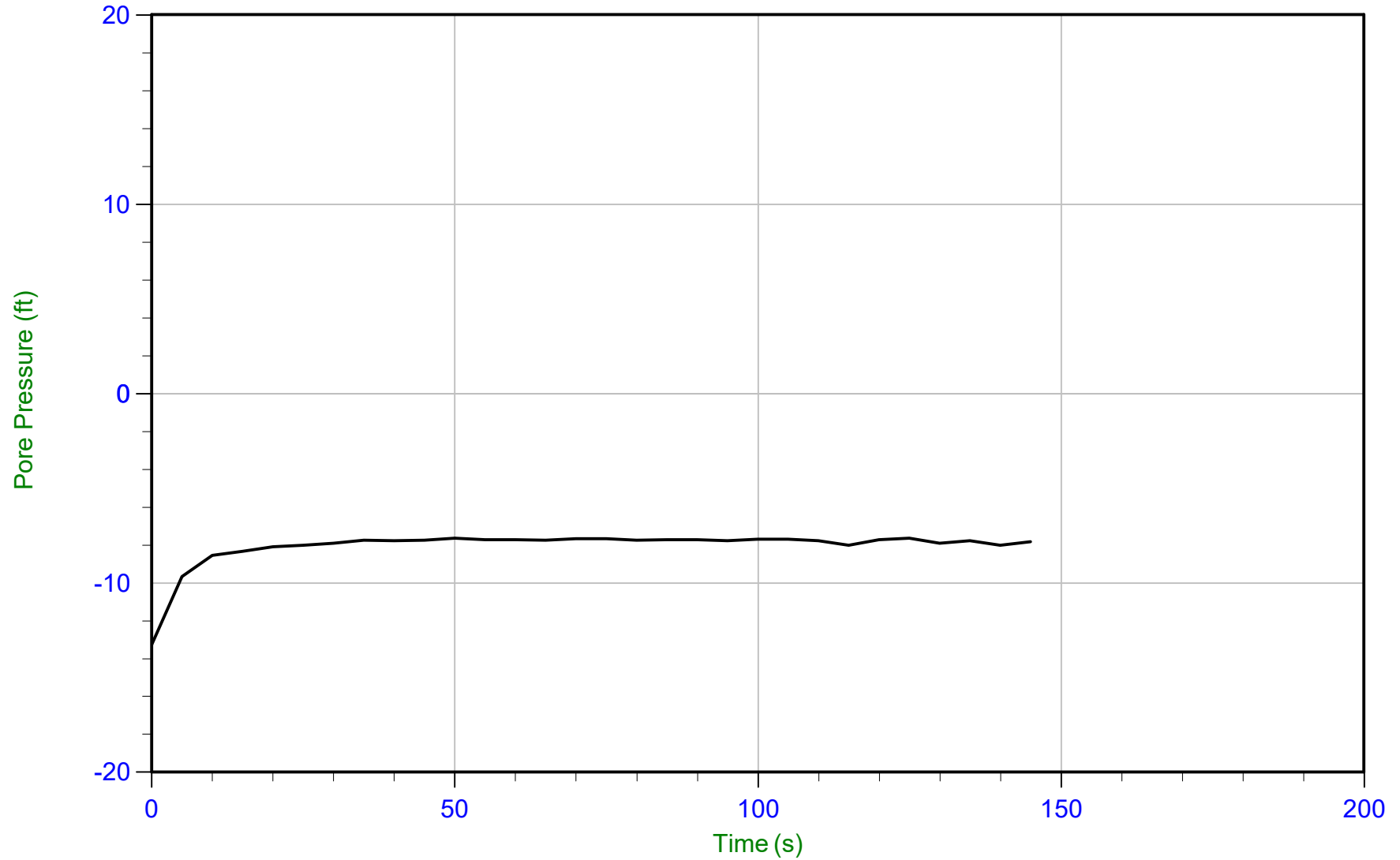
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 2.475 m / 8.120 ft  
Duration: 145.0 s

u Min: -13.3 ft  
u Max: -7.6 ft  
u Final: -7.8 ft

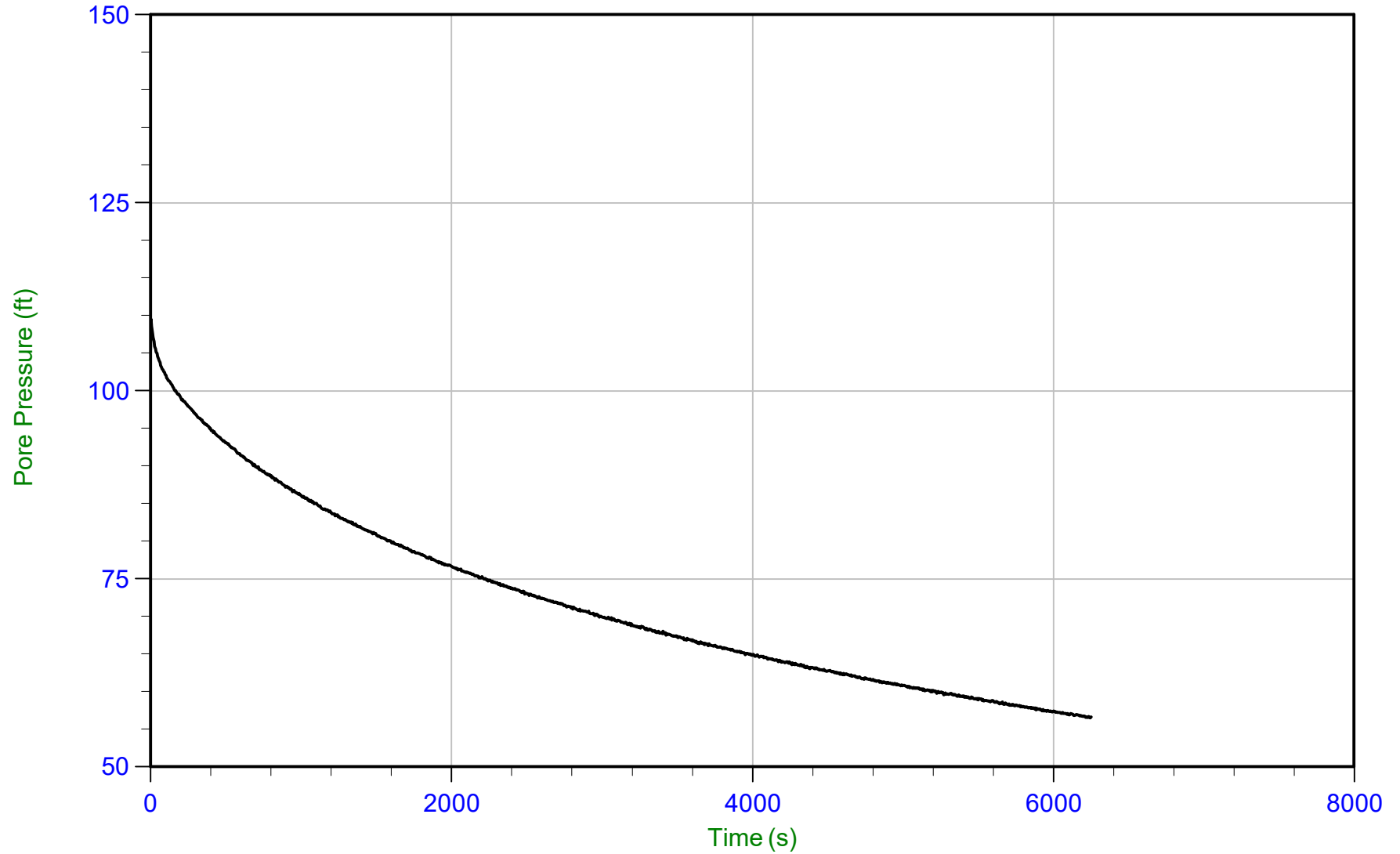




Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 5.850 m / 19.193 ft  
Duration: 6255.0 s

u Min: 56.5 ft  
u Max: 109.5 ft  
u Final: 56.6 ft

WT: 4.267 m / 13.999 ft  
Ueq: 5.2 ft  
U(50): 57.33 ft

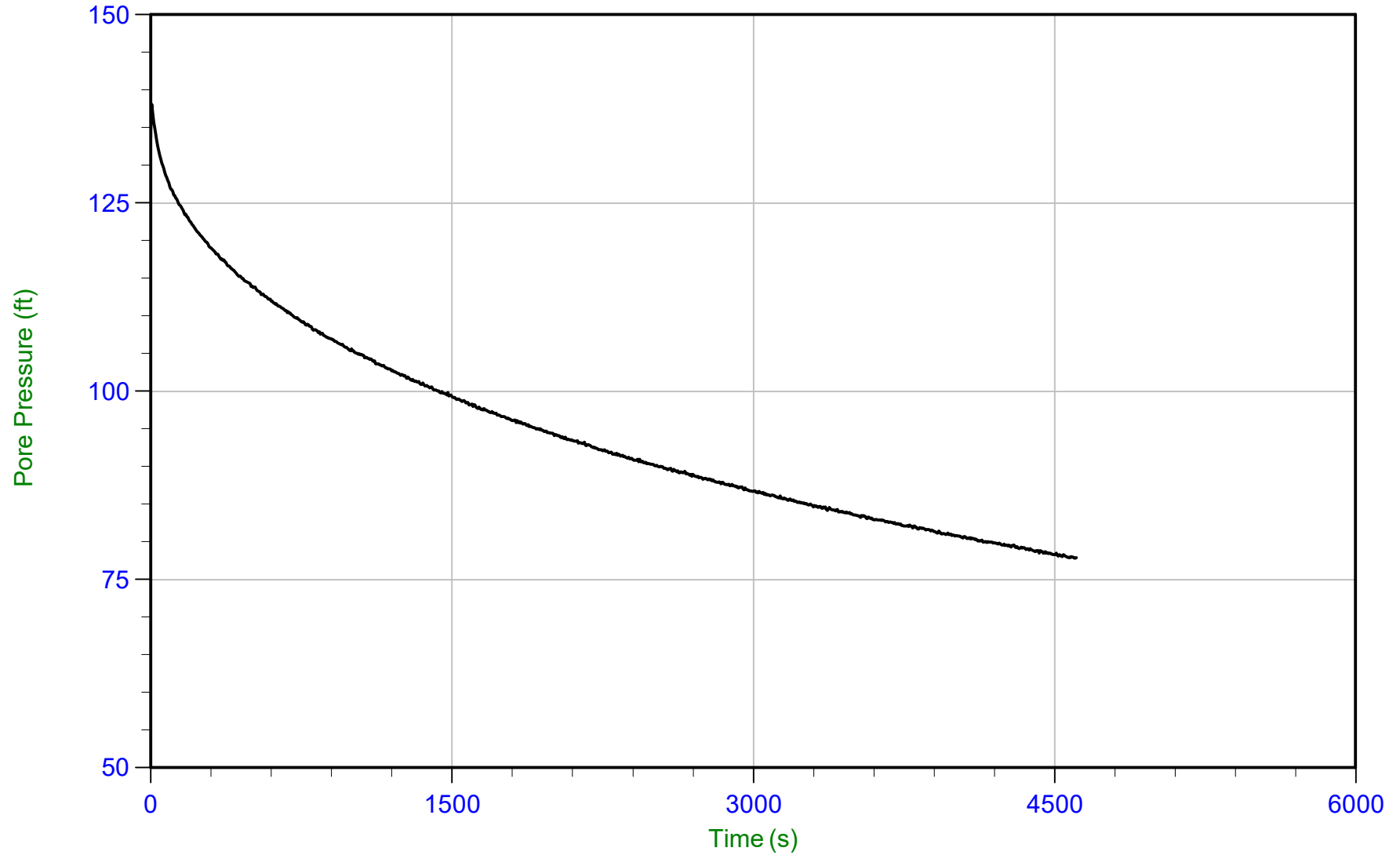
T(50): 5985.9 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 4610.0 s

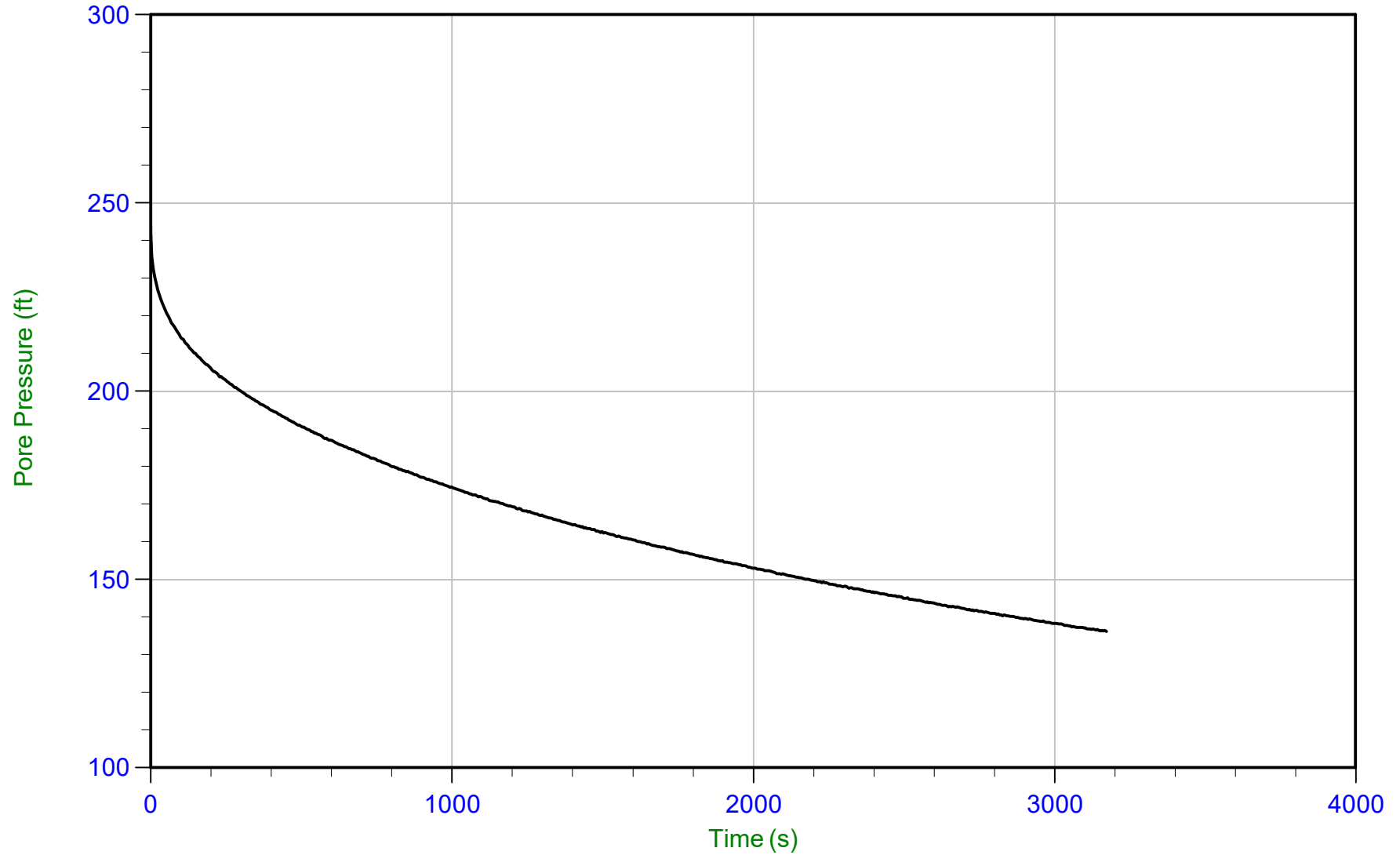
u Min: 77.8 ft  
u Max: 138.1 ft  
u Final: 77.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 3175.0 s

u Min: 136.1 ft  
u Max: 243.7 ft  
u Final: 136.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 34.1 ft  
U(50): 138.91 ft

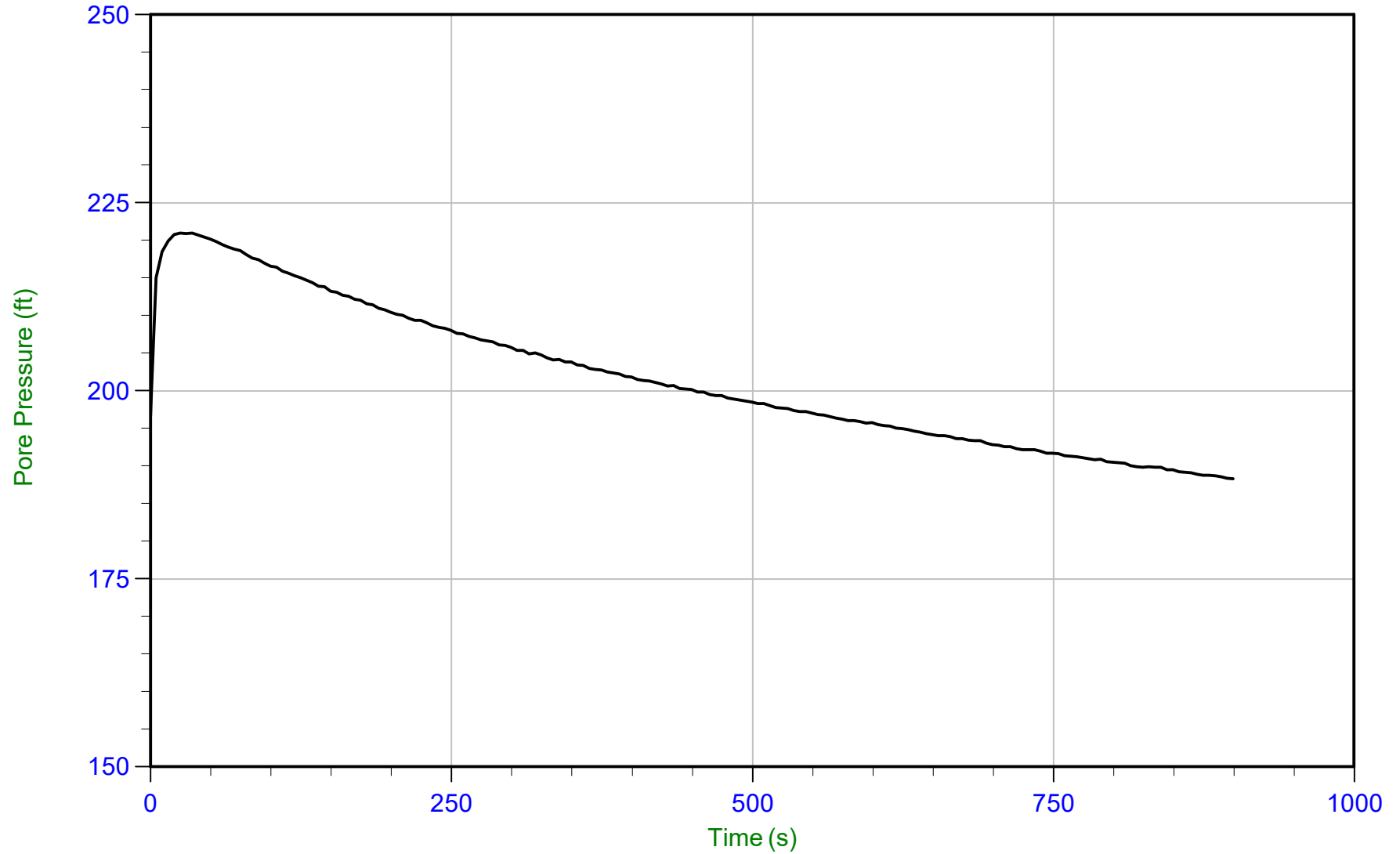
T(50): 2952.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 20.550 m / 67.420 ft  
Duration: 900.0 s

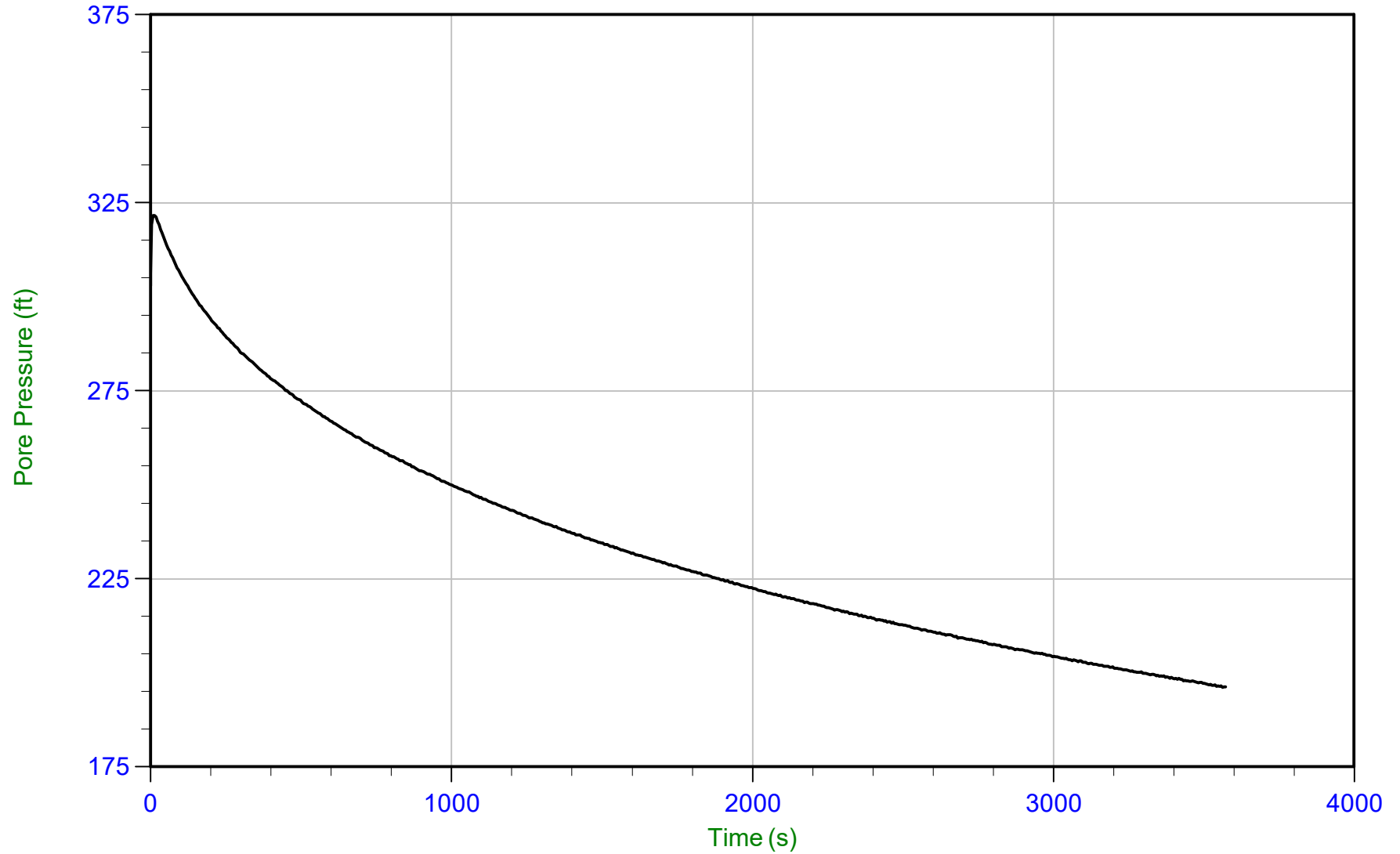
u Min: 188.3 ft  
u Max: 221.0 ft  
u Final: 188.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 3575.0 s

u Min: 196.1 ft  
u Max: 321.7 ft  
u Final: 196.3 ft

WT: 4.267 m / 13.999 ft  
Ueq: 74.1 ft  
U(50): 197.88 ft

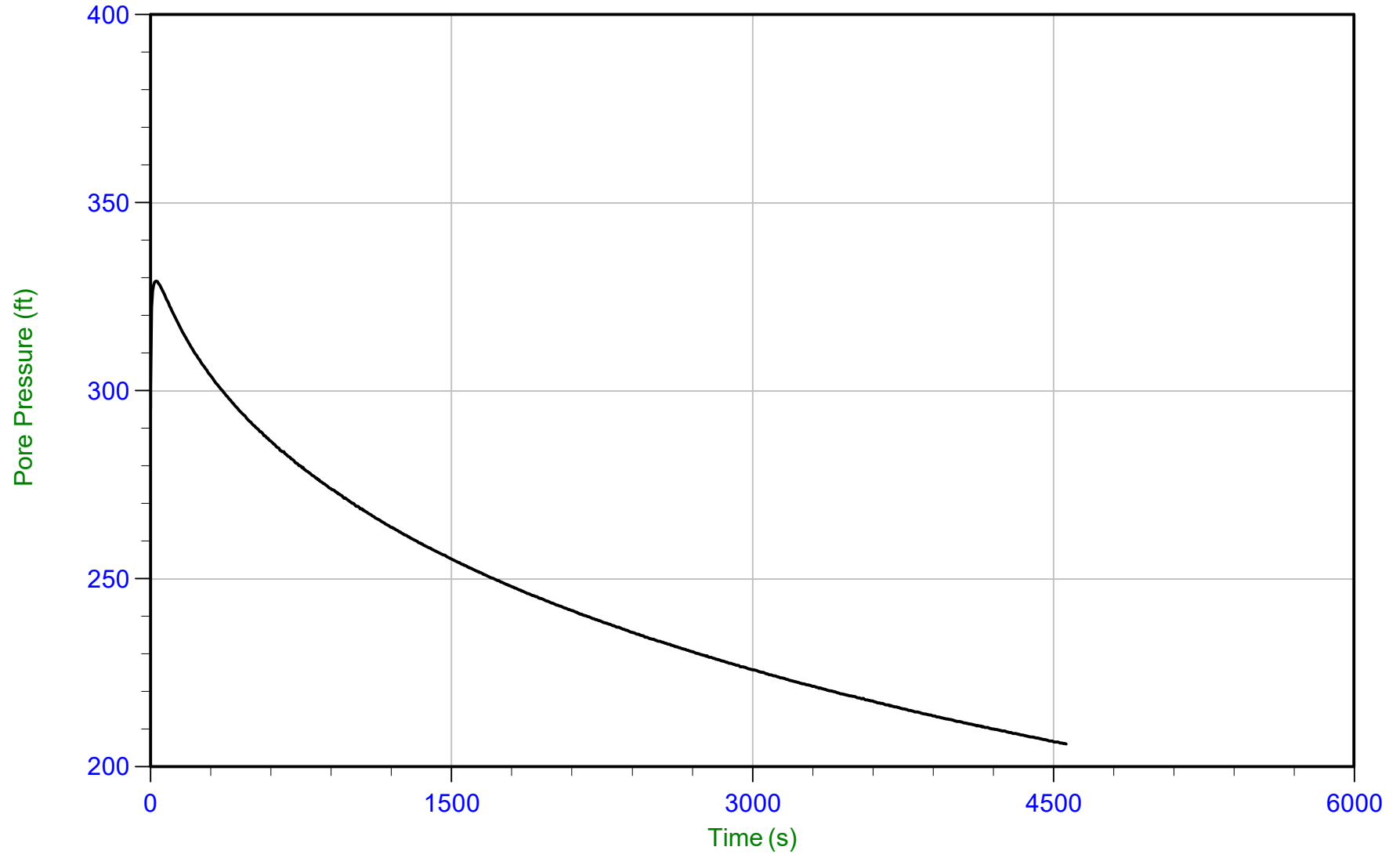
T(50): 3435.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4565.0 s

u Min: 206.1 ft  
u Max: 329.2 ft  
u Final: 206.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 84.1 ft  
U(50): 206.63 ft

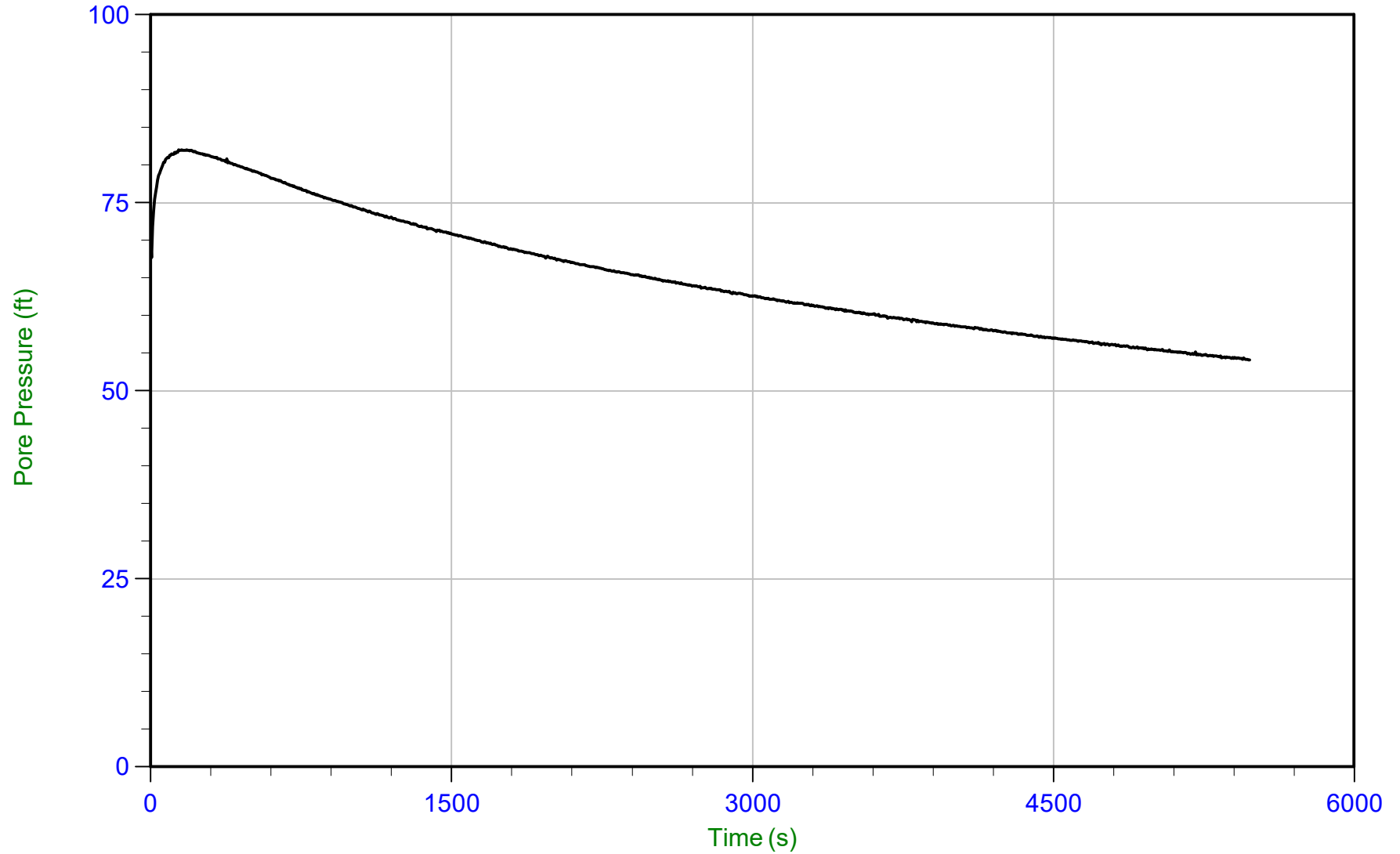
T(50): 4484.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:44  
Site: DTE Belle River Power Plant

Sounding: CPT20-12  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP12.PPF  
Depth: 4.900 m / 16.076 ft  
Duration: 5480.0 s

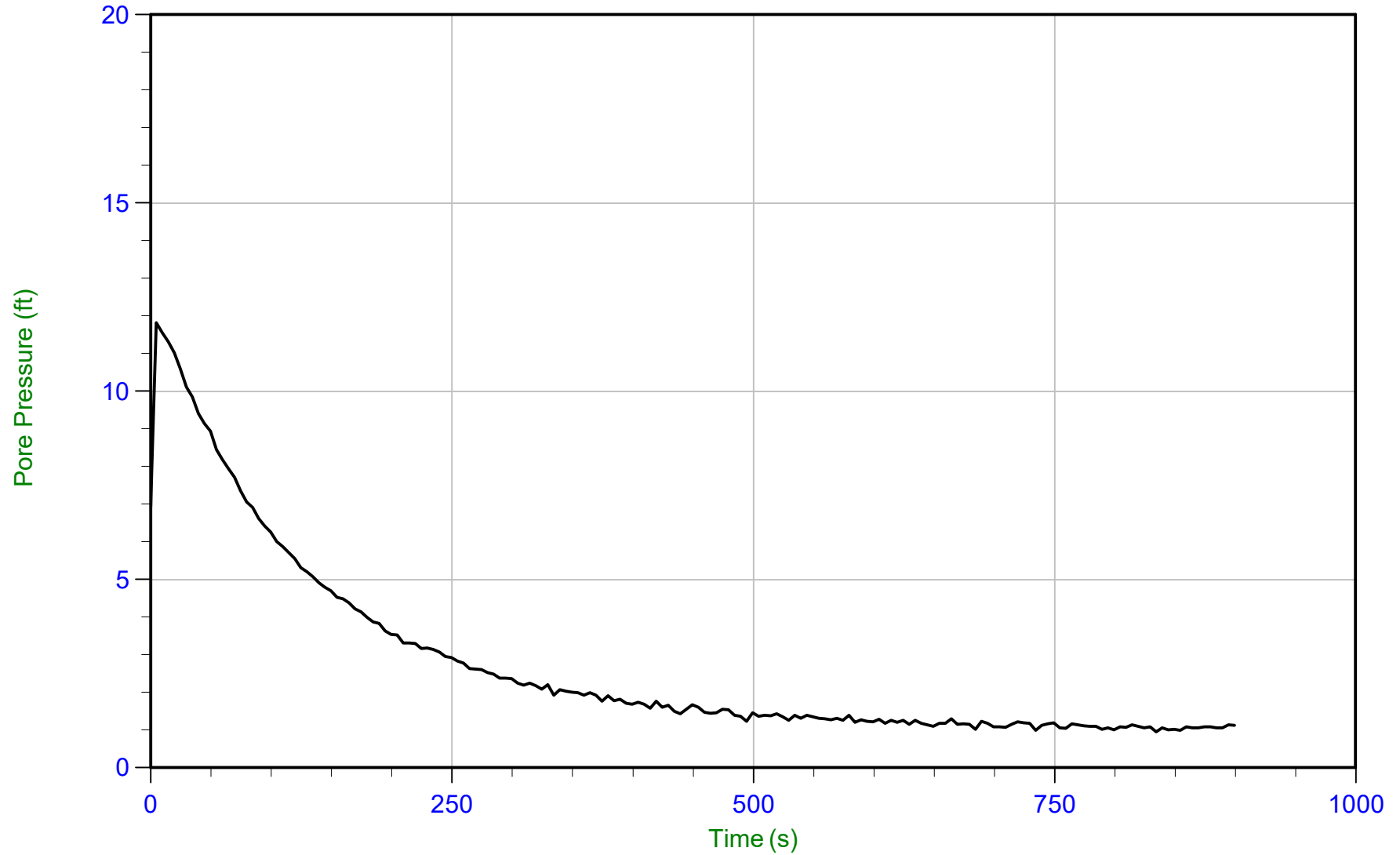
u Min: 54.1 ft  
u Max: 82.0 ft  
u Final: 54.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 1.000 m / 3.281 ft  
Duration: 900.0 s

u Min: 1.0 ft  
u Max: 11.8 ft  
u Final: 1.1 ft

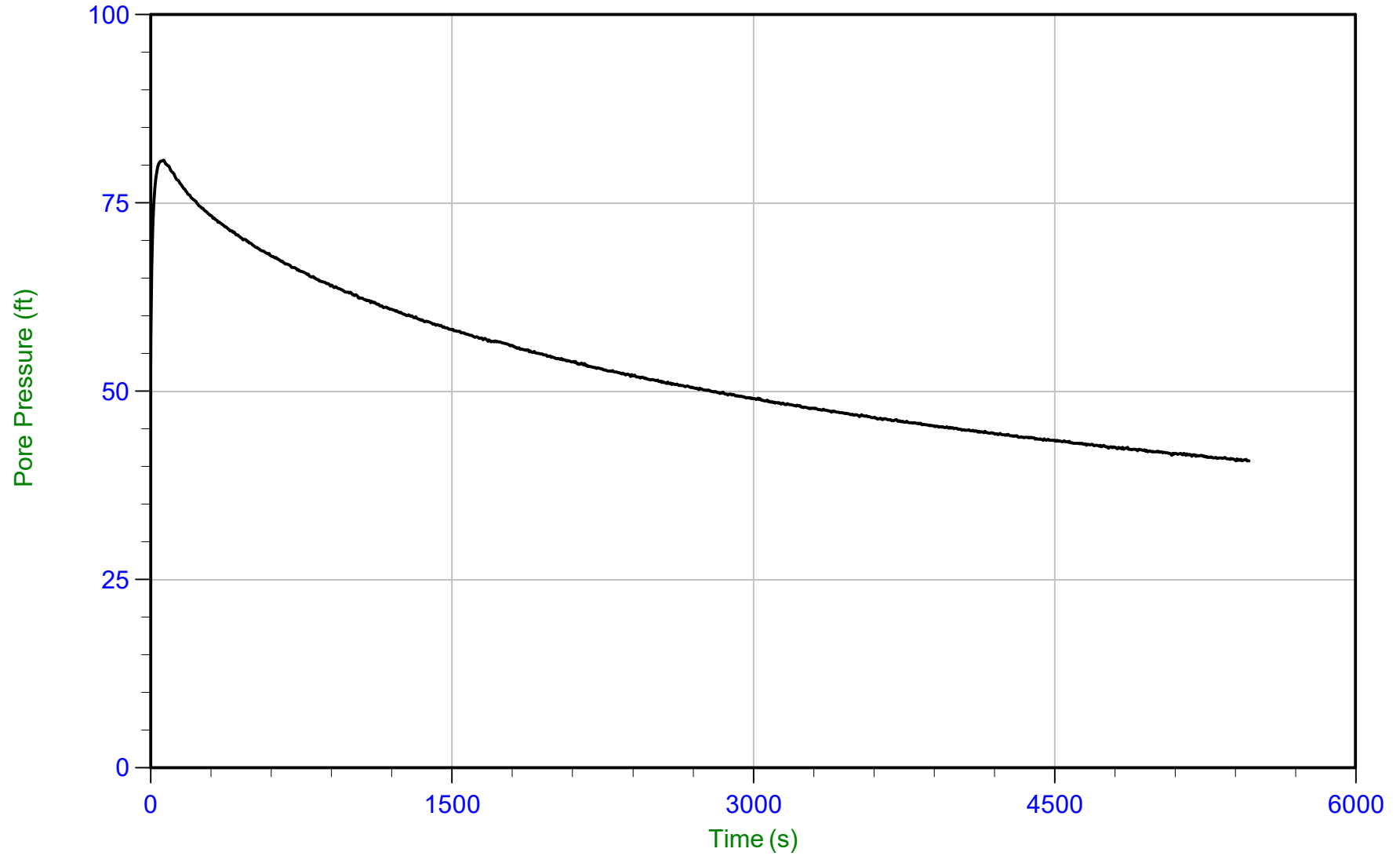




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 4.600 m / 15.092 ft  
Duration: 5470.0 s

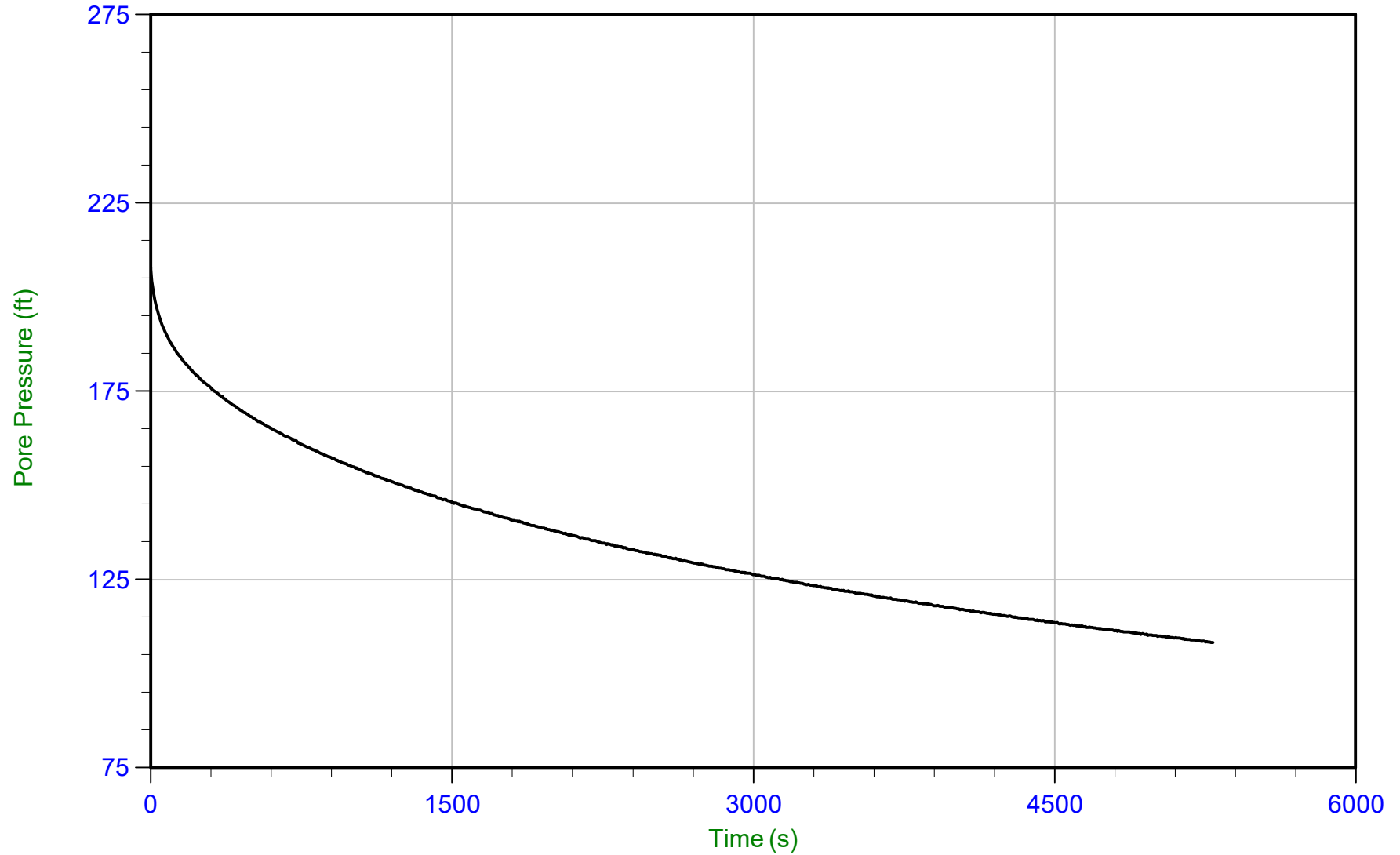
u Min: 40.7 ft  
u Max: 80.7 ft  
u Final: 40.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.450 m / 44.127 ft  
Duration: 5290.0 s

u Min: 108.2 ft  
u Max: 208.0 ft  
u Final: 108.3 ft

WT: 5.182 m / 17.000 ft  
Ueq: 27.1 ft  
U(50): 117.58 ft

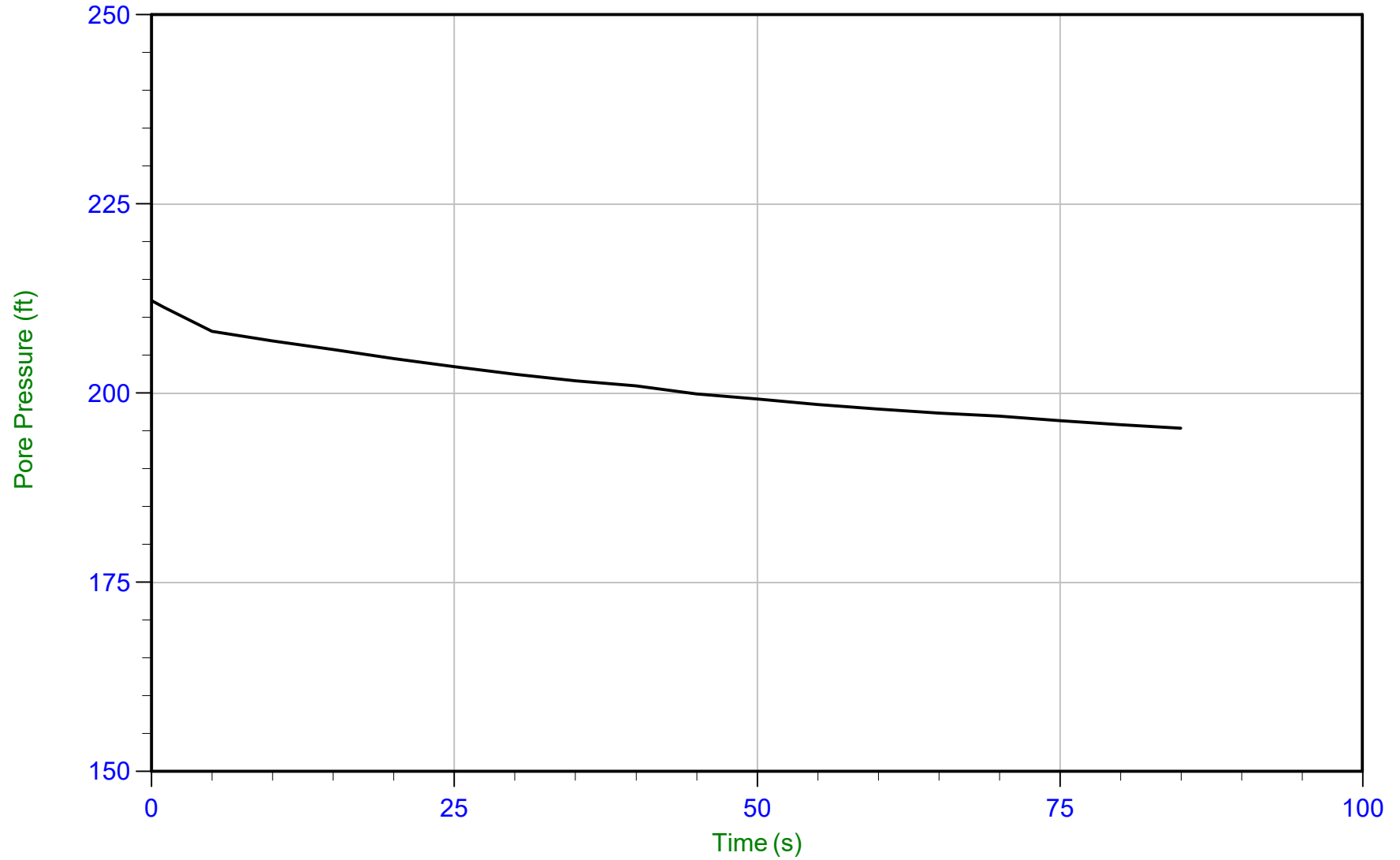
T(50): 3964.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.800 m / 45.275 ft  
Duration: 85.0 s

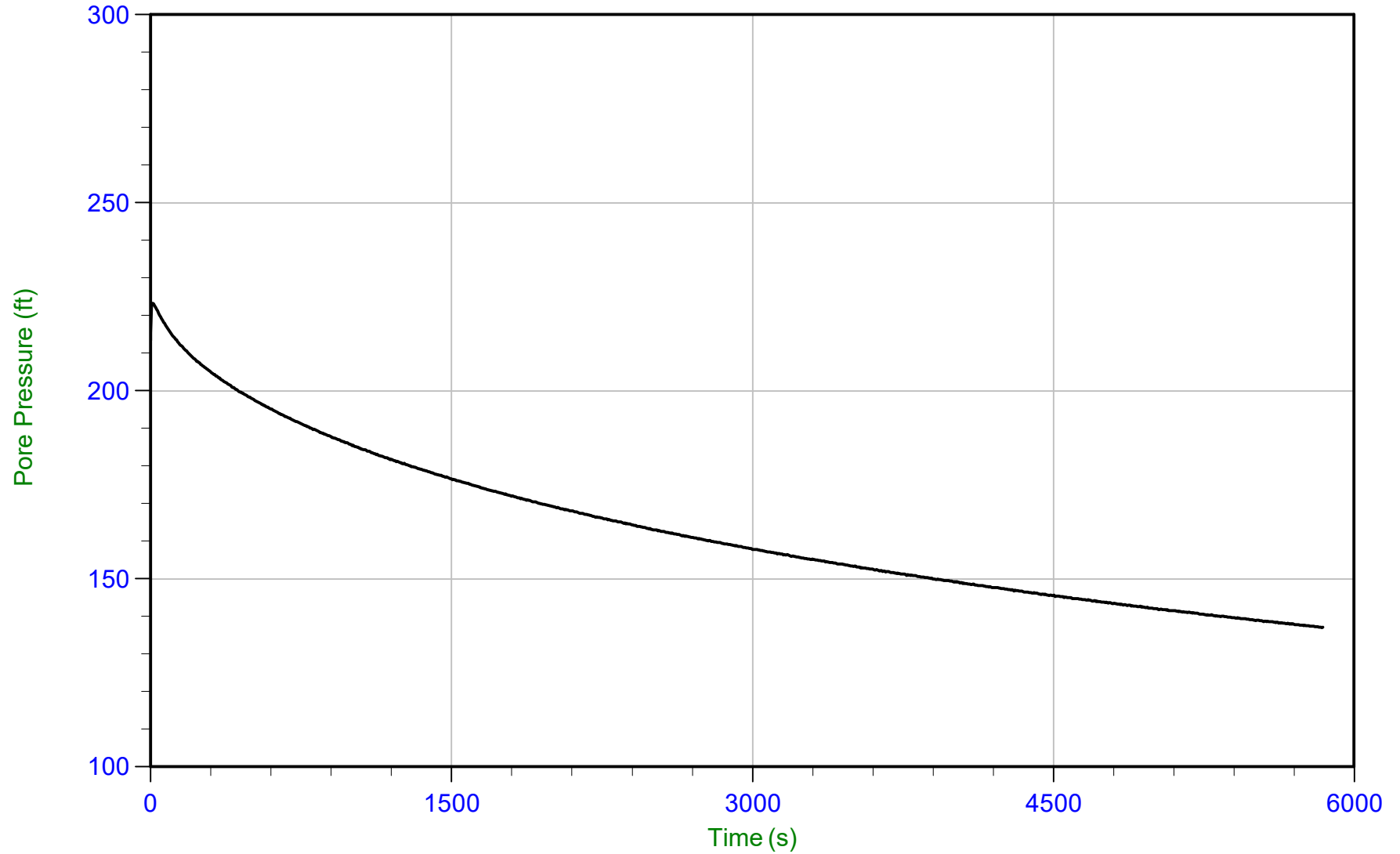
u Min: 195.3 ft  
u Max: 212.2 ft  
u Final: 195.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 19.550 m / 64.140 ft  
Duration: 5845.0 s

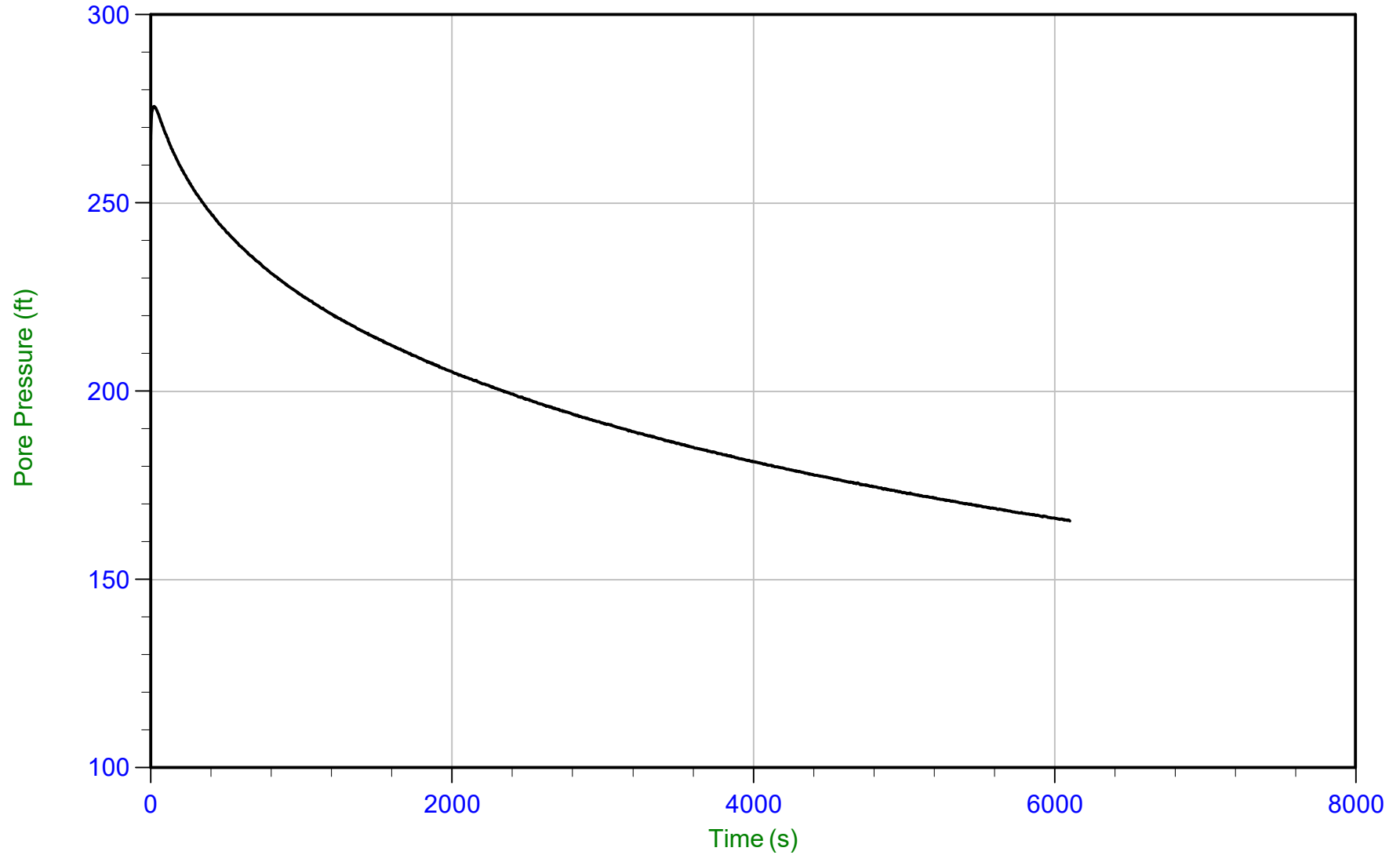
u Min: 137.0 ft  
u Max: 223.2 ft  
u Final: 137.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 25.650 m / 84.153 ft  
Duration: 6105.0 s

u Min: 165.5 ft  
u Max: 275.6 ft  
u Final: 165.5 ft

WT: 5.182 m / 17.000 ft  
Ueq: 67.2 ft  
U(50): 171.39 ft

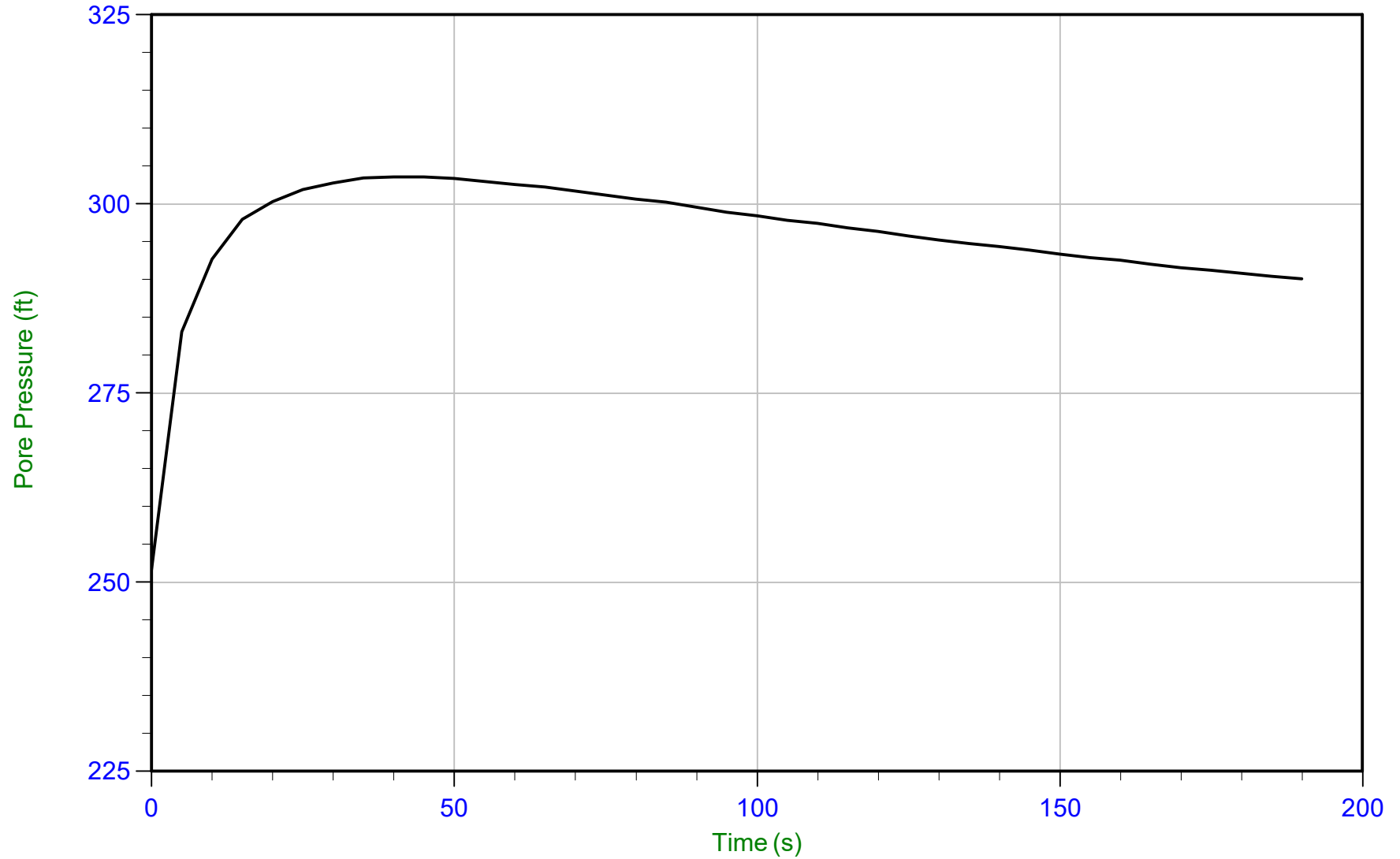
T(50): 5203.0 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 29.550 m / 96.948 ft  
Duration: 190.0 s

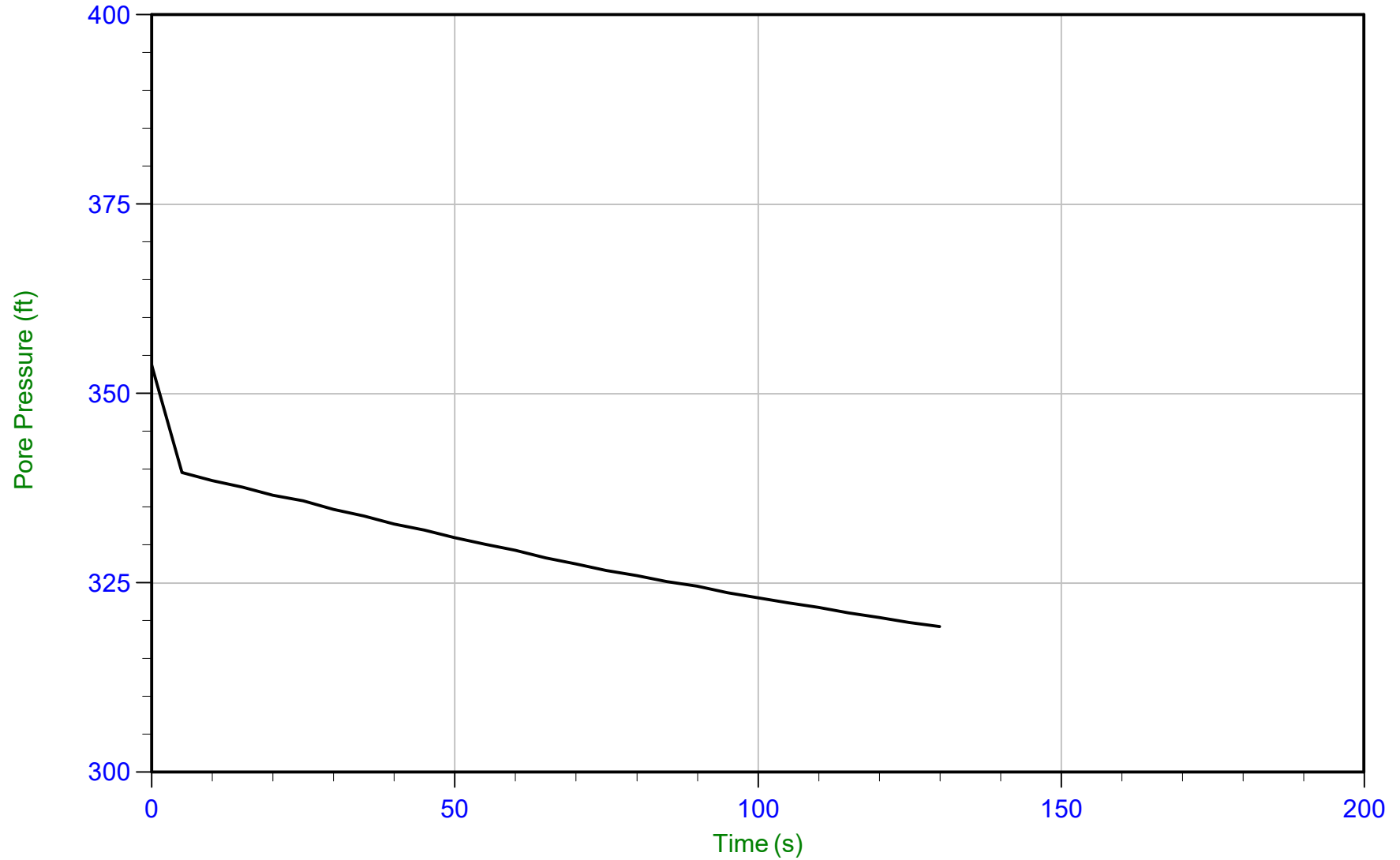
u Min: 251.6 ft  
u Max: 303.6 ft  
u Final: 290.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 130.0 s

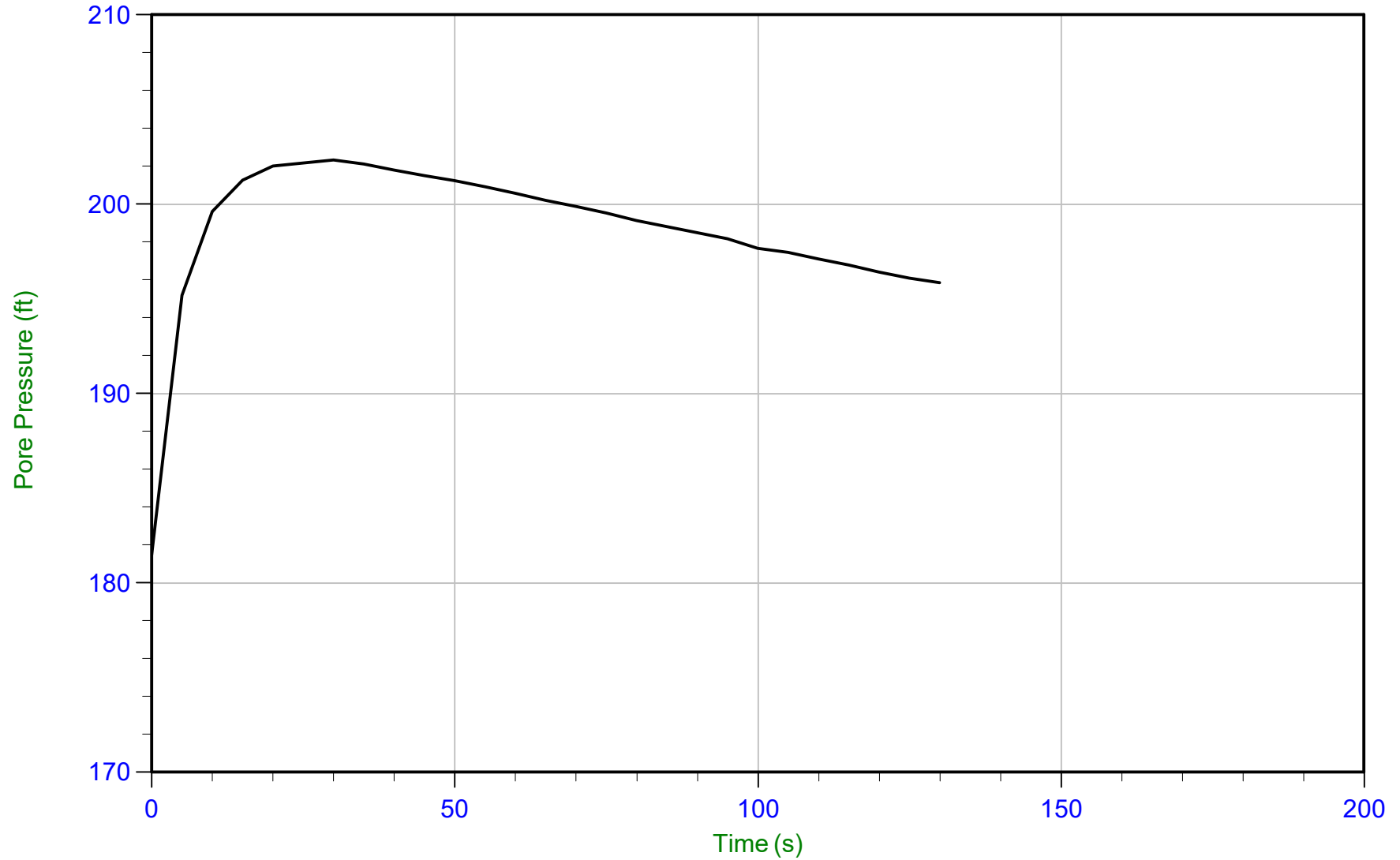
u Min: 319.2 ft  
u Max: 353.7 ft  
u Final: 319.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 11:04  
Site: DTE Belle River Power Plant

Sounding: CPT20-07  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP07.PPF  
Depth: 18.800 m / 61.679 ft  
Duration: 130.0 s

u Min: 181.5 ft  
u Max: 202.3 ft  
u Final: 195.9 ft

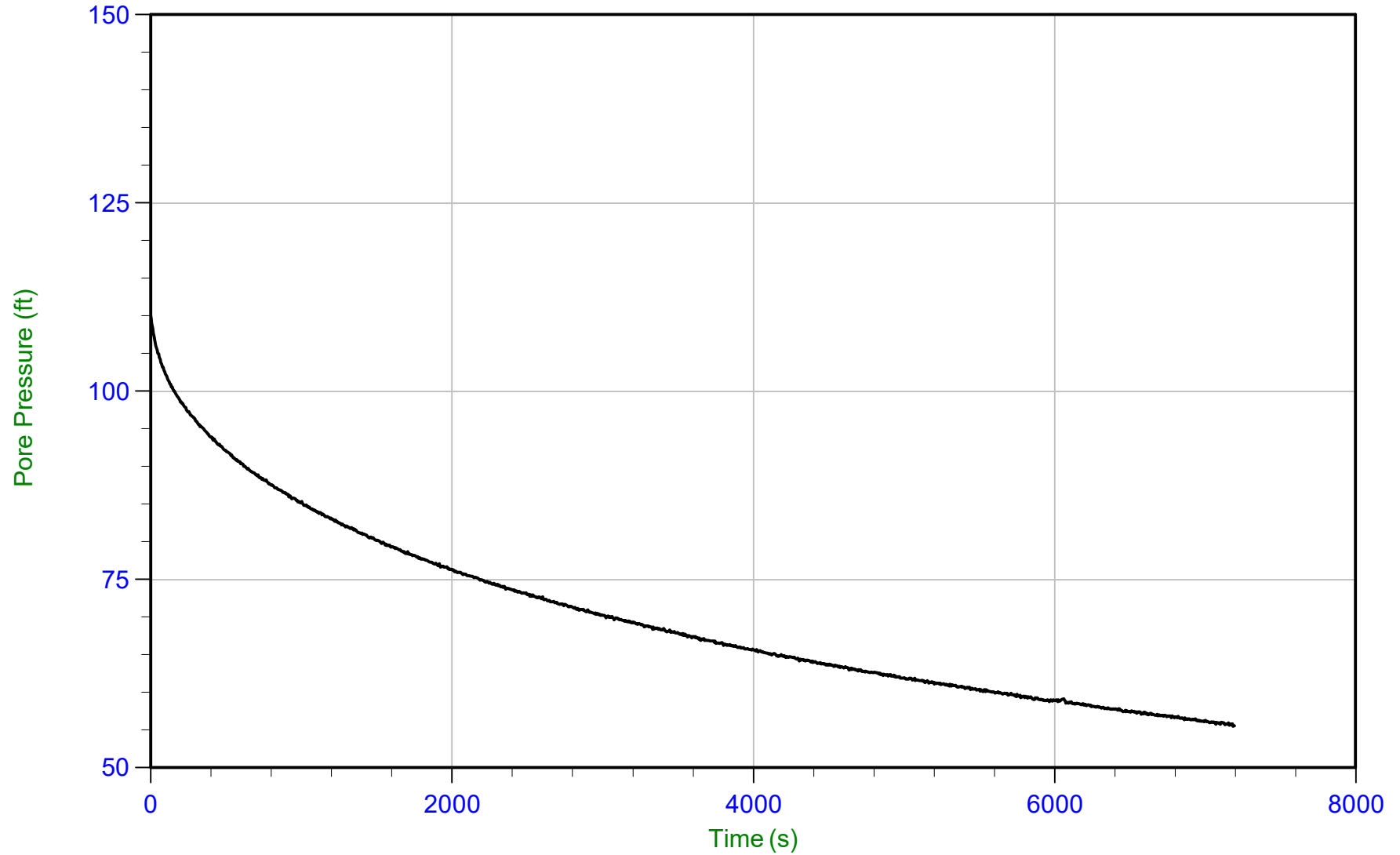




Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 6.100 m / 20.013 ft  
Duration: 7200.0 s

u Min: 55.5 ft  
u Max: 110.1 ft  
u Final: 55.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 4.0 ft  
U(50): 57.04 ft

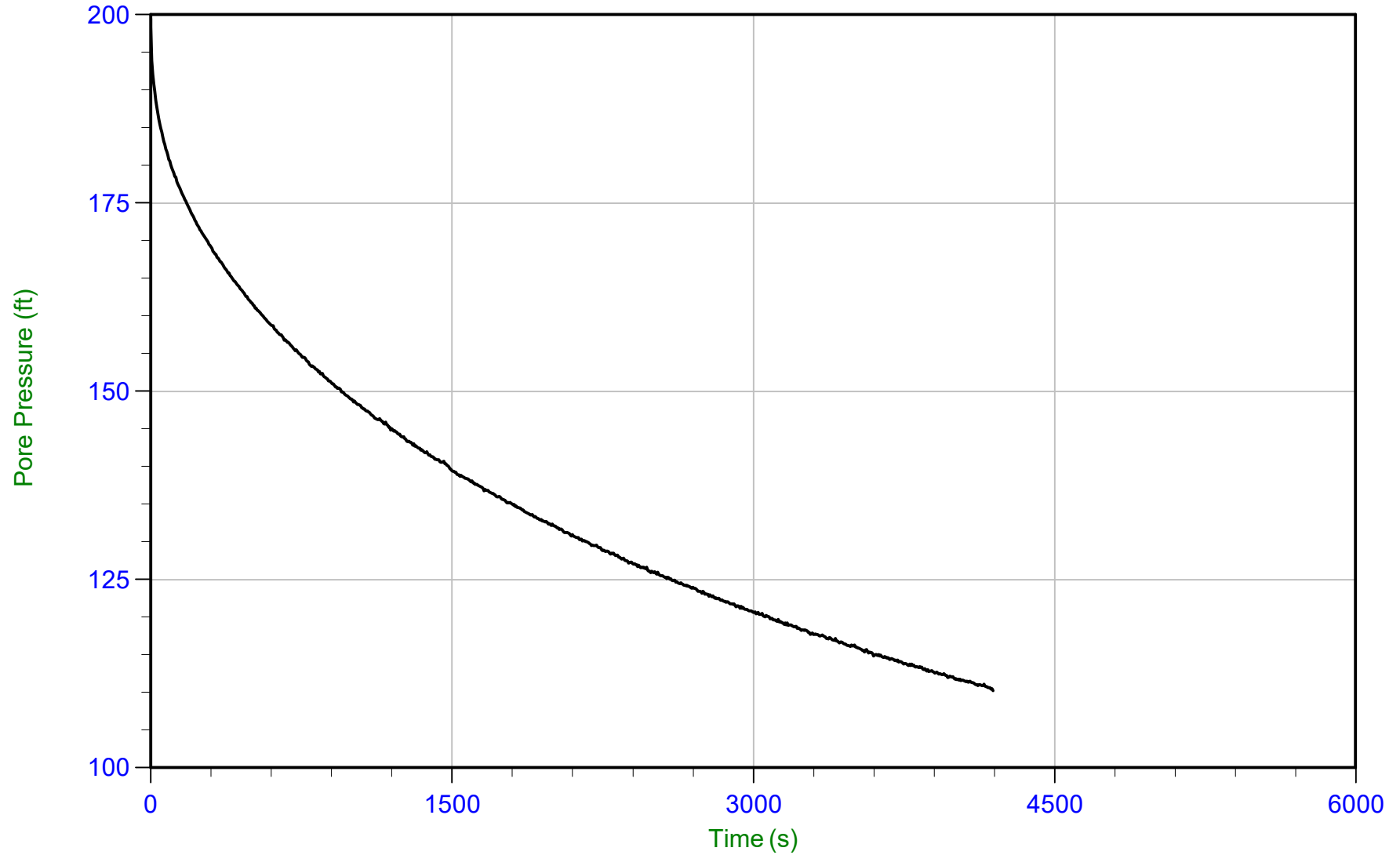
T(50): 6624.7 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 12.200 m / 40.026 ft  
Duration: 4195.0 s

u Min: 110.2 ft  
u Max: 199.5 ft  
u Final: 110.2 ft

WT: 4.877 m / 16.000 ft  
Ueq: 24.0 ft  
U(50): 111.76 ft

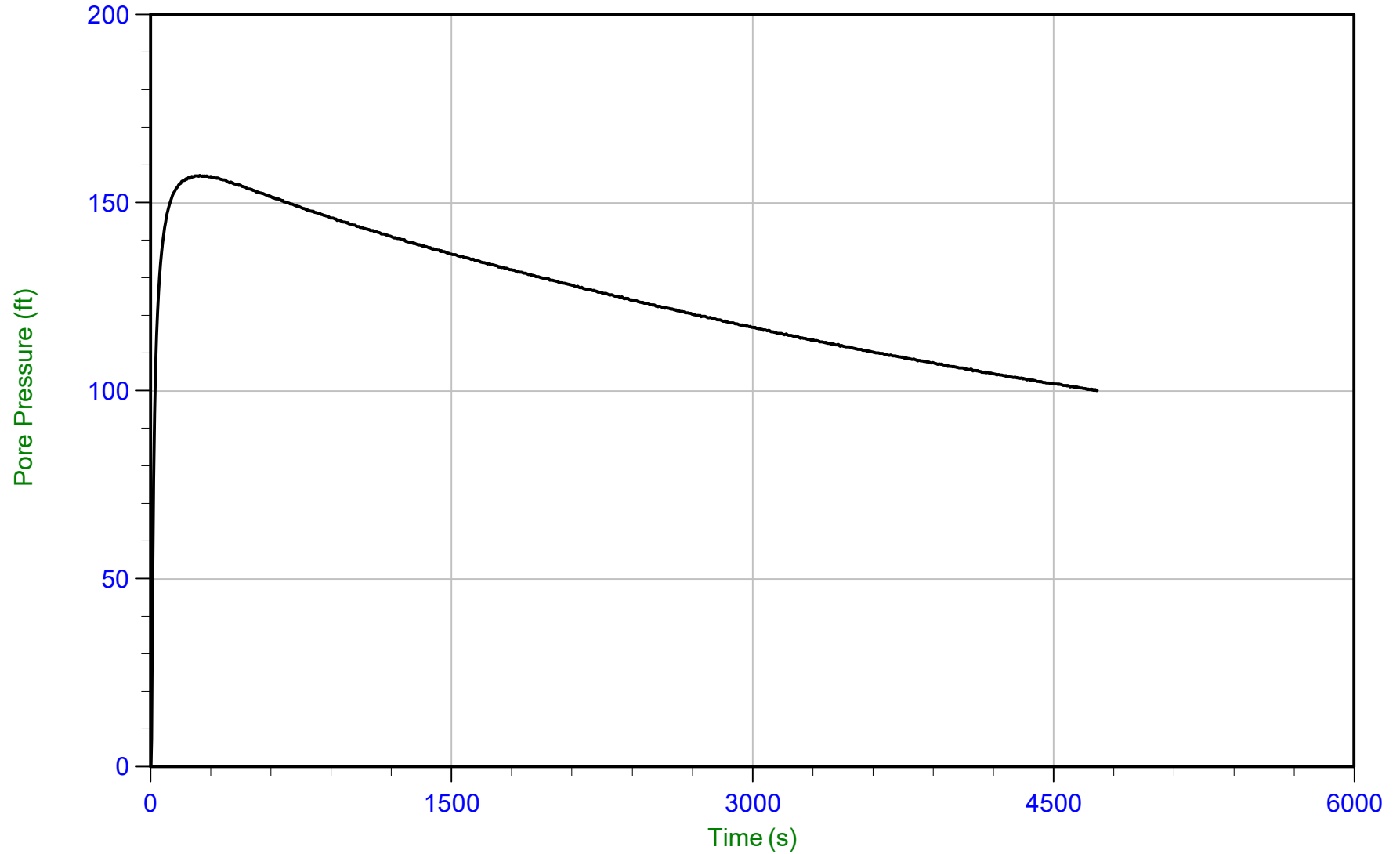
T(50): 4004.2 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 18.300 m / 60.039 ft  
Duration: 4720.0 s

u Min: -7.2 ft  
u Max: 157.2 ft  
u Final: 100.1 ft

WT: 4.877 m / 16.000 ft  
Ueq: 44.0 ft  
U(50): 100.63 ft

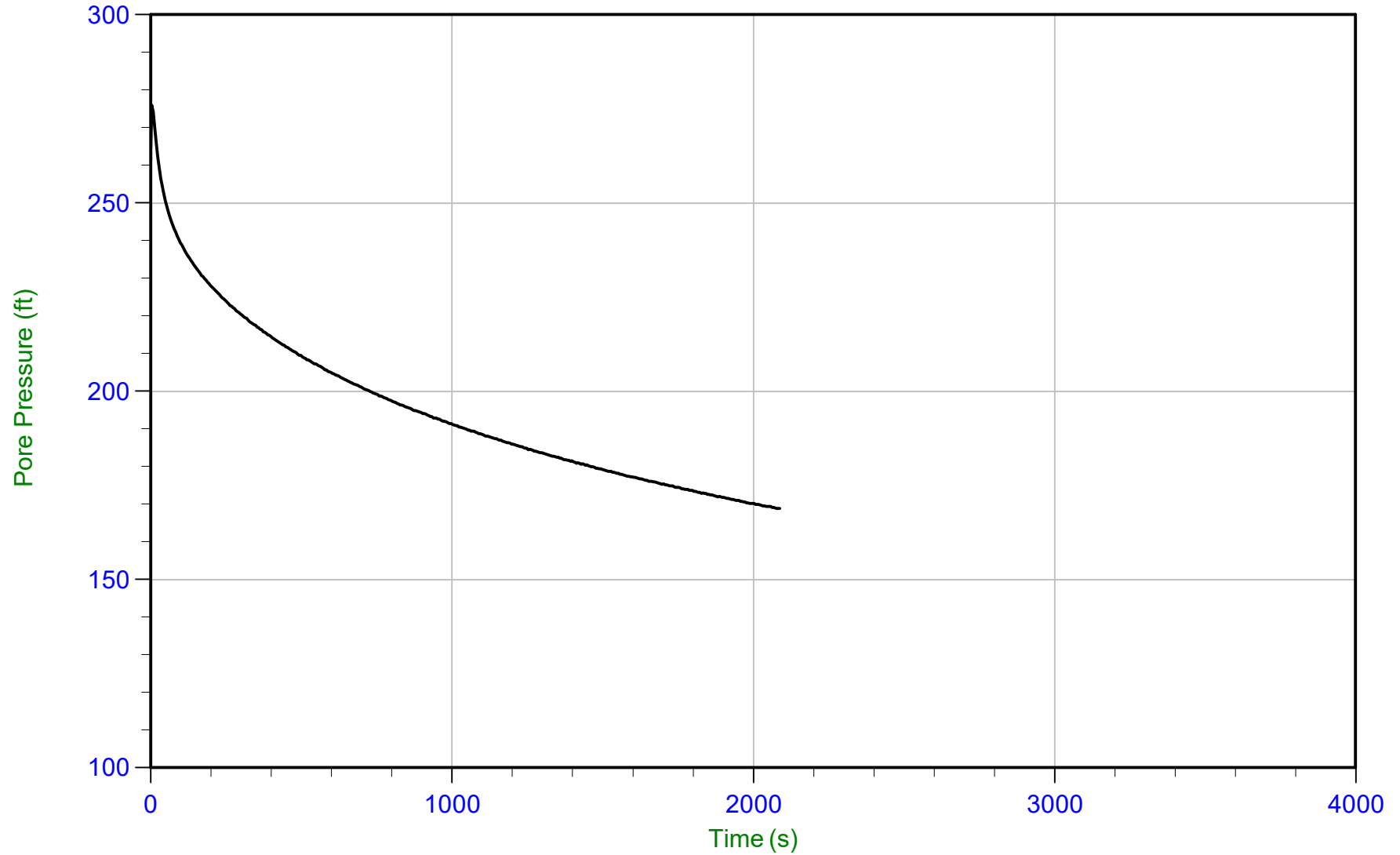
T(50): 4406.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 24.400 m / 80.052 ft  
Duration: 2090.0 s

u Min: 168.8 ft  
u Max: 276.0 ft  
u Final: 168.8 ft

WT: 4.877 m / 16.000 ft  
Ueq: 64.1 ft  
U(50): 170.02 ft

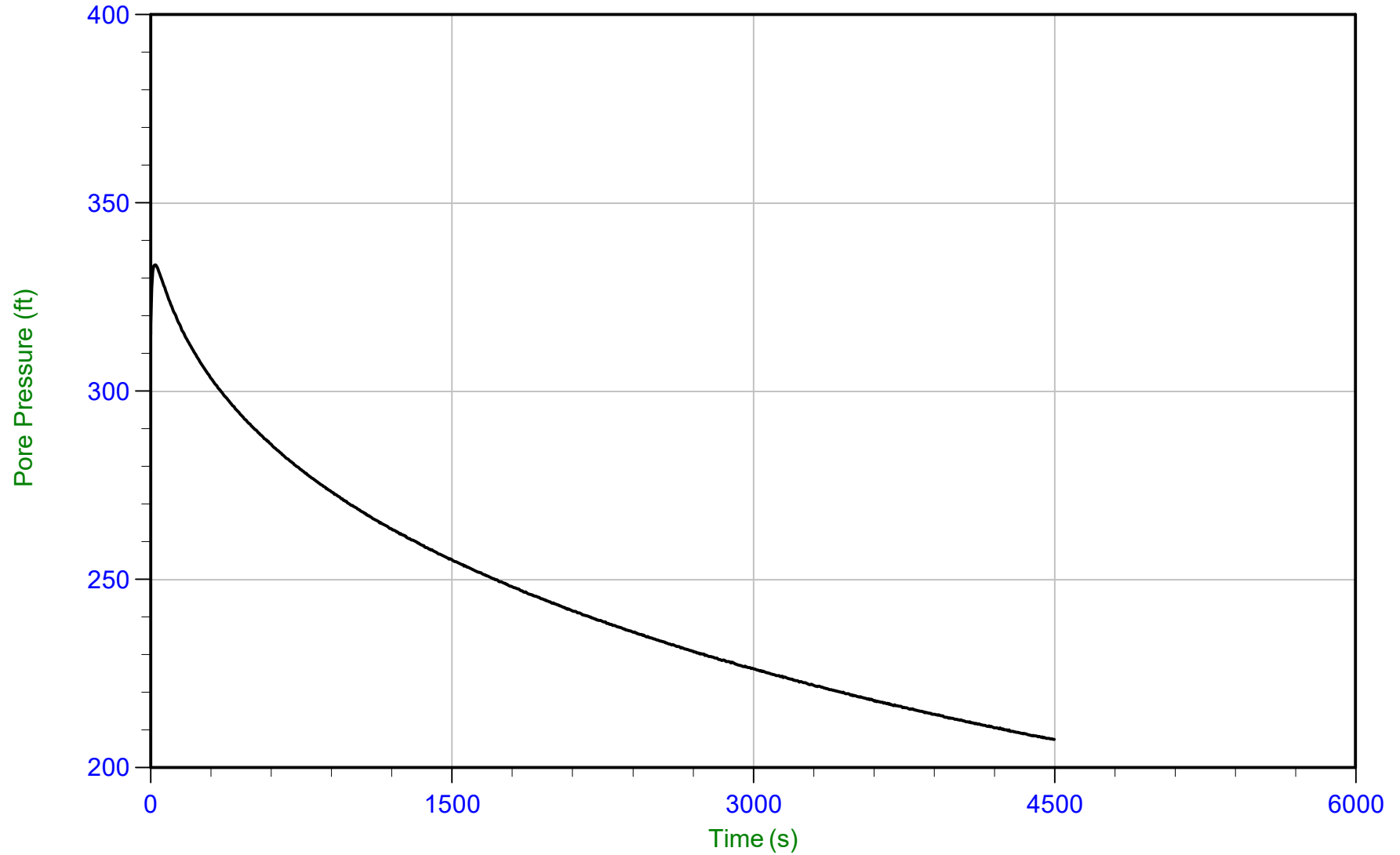
T(50): 2003.9 s  
lr: 100  
Ch: 0.4 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 4500.0 s

u Min: 207.5 ft  
u Max: 333.6 ft  
u Final: 207.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 84.1 ft  
U(50): 208.83 ft

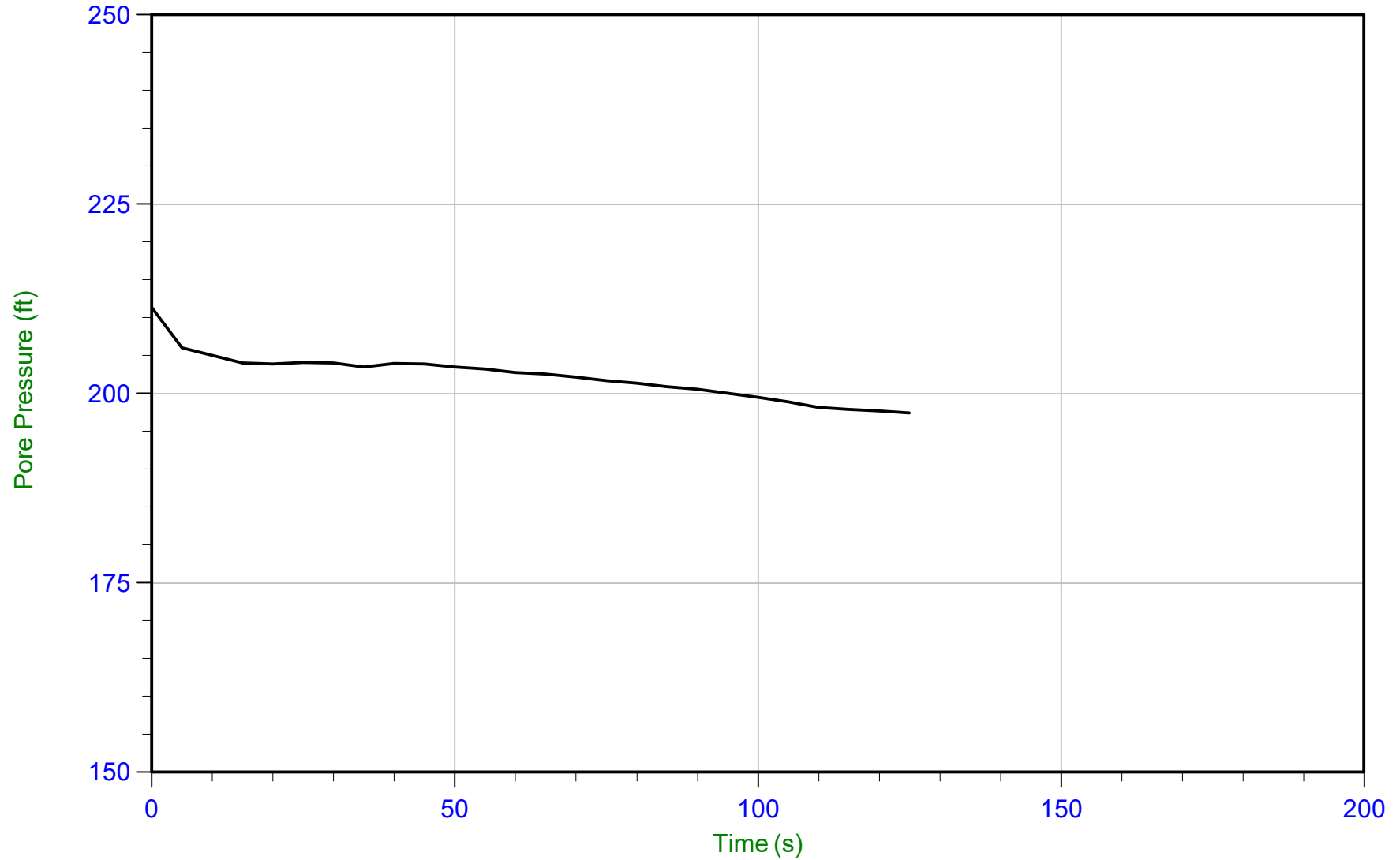
T(50): 4346.6 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 15:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-13  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13.PPF  
Depth: 17.200 m / 56.430 ft  
Duration: 125.0 s

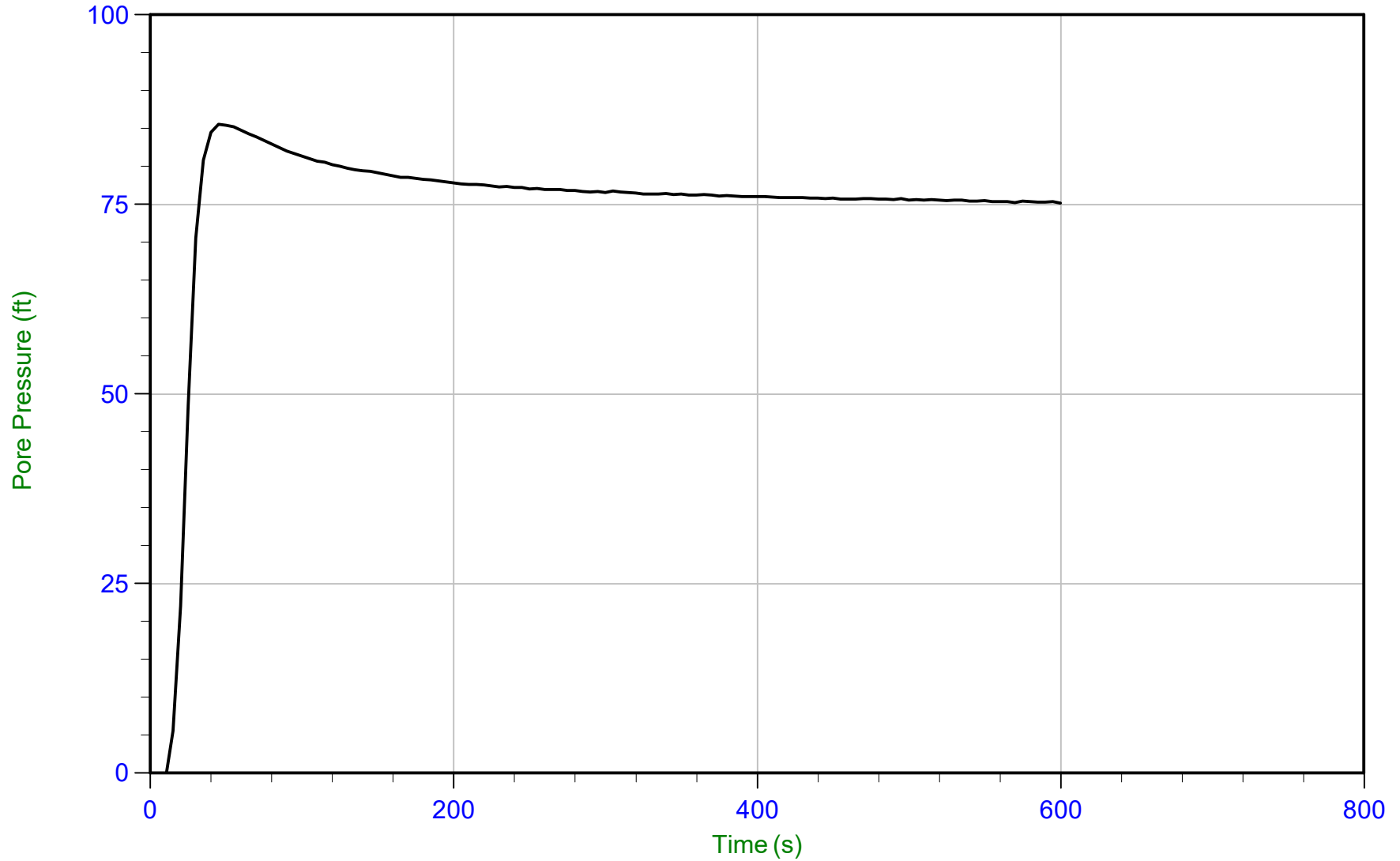
u Min: 197.4 ft  
u Max: 211.4 ft  
u Final: 197.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 09:09  
Site: DTE Belle River Power Plant

Sounding: CPT20-13B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13B.PPF  
Depth: 25.200 m / 82.676 ft  
Duration: 600.0 s

u Min: -3.9 ft  
u Max: 85.6 ft  
u Final: 75.2 ft

WT: 3.962 m / 13.000 ft  
Ueq: 69.7 ft  
U(50): 77.63 ft

T(50): 171.6 s  
lr: 100  
Ch: 4.1 cm<sup>2</sup>/min

**Appendix J**  
**Chemistry Analysis of Site-Specific Water**





05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental ALS

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

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<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

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**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>9.9</b>		<b>1.0</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Fluoride</b>	<b>0.22</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Sulfate</b>	<b>140</b>		<b>8.0</b>	<b>mg/L</b>	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.43</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>330</b>		<b>50</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>43</b>		<b>20</b>	<b>mg/L</b>	20	12/30/2020 06:55 PM
<b>Fluoride</b>	<b>0.44</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:49 PM
<b>Sulfate</b>	<b>1,200</b>		<b>100</b>	<b>mg/L</b>	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.32</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>2,100</b>		<b>300</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A



**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0				
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0				
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0				
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0				
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0				
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0				
Calcium	63.88	0.50	10	53.04	108	75-125	0			O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0				
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0				
Iron	8.964	0.080	10	0.02083	89.4	75-125	0				
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0				
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0				
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0				
Potassium	12.35	0.20	10	2.605	97.4	75-125	0				
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0				
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0				

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0				
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0				
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0				
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0				
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0				
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0				
Calcium	34.88	0.50	10	25.15	97.2	75-125	0				
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0				
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0				
Iron	9.488	0.080	10	0.143	93.5	75-125	0				
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0				
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0				
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0				
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0				
Potassium	12.88	0.20	10	3.03	98.5	75-125	0				
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0				
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO	

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO	

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20		
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20		
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20		
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20		
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20		
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20		
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O	
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20		
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20		
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20		
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20		
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20		
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O	
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20		
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20		
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20		
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O	
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:37 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043032		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20		
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20		
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20		
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20		
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20		
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20		
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20		
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20		
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20		
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20		
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20		
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20		
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20		
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20		
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20		
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20		
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O	
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20		

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:22 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046544		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO	

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:41 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046556		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO	

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 169727 Instrument ID TDS Method: A2540 C-11

MBLK		Sample ID: MBLK-169727-169727				Units: mg/L		Analysis Date: 12/23/2020 02:50 PM			
Client ID:		Run ID: TDS_201223B		SeqNo: 7021476		Prep Date: 12/22/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids ND 30

LCS		Sample ID: LCS-169727-169727				Units: mg/L		Analysis Date: 12/23/2020 02:50 PM			
Client ID:		Run ID: TDS_201223B		SeqNo: 7021475		Prep Date: 12/22/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

DUP		Sample ID: 20121752-03B DUP				Units: mg/L		Analysis Date: 12/23/2020 02:50 PM			
Client ID: DB		Run ID: TDS_201223B		SeqNo: 7021469		Prep Date: 12/22/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Bicarbonate (as CaCO3)	ND	10									
Alkalinity, Carbonate (as CaCO3)	ND	10									
Alkalinity, Hydroxide (as CaCO3)	ND	10									
Alkalinity, Phenolphthalein (as CaCO3)	ND	10									
Alkalinity, Total (as CaCO3)	ND	10									

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0				
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0				

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10		
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10		

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10		

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.



# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information			Project Information				Parameter/Method Request for Analysis											
Purchase Order		Project Name	DTE Belle River		A	Metals												
Work Order		Project Number	GLP 8017		B	pH, Anions, TDS, Alkalinity												
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants		C													
Send Report To	Michael Coram	Invoice Attn.	Michael Coram		D													
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.		E													
	Suite 100		Suite 100		F													
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105		G													
Phone	734-794-1547	Phone	734-794-1547		H													
Fax	734-332-8063	Fax	734-332-8063		I													
e-Mail Address					J													
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold	
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x										
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x										
3	DB	12/16/2020	4:00	GW	2	2	x	x										
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
Sampler(s): Please Print & Sign <i>Mike Coram</i>		Shipment Method: Carrier <i>FedEx</i>		Turnaround Time: (Business Days) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____				Results Due Date:										
Relinquished by: <i>[Signature]</i>	Date: 12/17	Time: 3:00	Received by:		Date:	Time:	Notes: <b>Separate Report</b>											
Relinquished by: <i>Fedex</i>	Date: 12/18/20	Time: 10:00	Received by (Laboratory): <i>[Signature]</i>		Date:	Time:	ALS Cooler ID:	Cooler Temp: 5.8°C	QC Package: (Check Box Below)									
Logged by (Laboratory): <i>MTG</i>	Date: 12/18/20	Time: 13:46	Checked by (Laboratory): <i>[Signature]</i>						<input checked="" type="checkbox"/> Level II: Standard QC	<input type="checkbox"/> Level III: Raw Data								
									<input type="checkbox"/> TRRP LRC	<input type="checkbox"/> TRRP Level IV								
									<input type="checkbox"/> Level IV: SW846 Methods/CLP like									
									<input type="checkbox"/> Other: _____									

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752**

Received by: **MJG**

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 5.8/5.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 12/18/2020 1:47:53 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.



# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

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**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

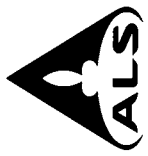
**Client Project Name:** DTE - Belle River

**Client Project Number:** GLP-8017

**Client PO Number:**

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00



Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

Parameter/Method Request for Analysis  
Radium 226 and 228 combined

ALS Project Manager: *Report Separate*

<b>Purchase Order</b>	<b>Project Name</b>	<b>Project Information</b>
<b>Work Order</b>	<i>DTE - Belle River</i>	
<b>Company Name</b>	<b>Project Number</b>	
<b>Send Report To</b>	<i>GRP - 8017</i>	
<b>Address</b>	<b>Bill To Company</b>	
<b>City/State/Zip</b>	<b>Invoice Attn</b>	
<b>Phone</b>	<b>Address</b>	
<b>Fax</b>	<b>City/State/Zip</b>	
<b>e-Mail Address</b>	<b>Phone</b>	
	<b>Fax</b>	
	<b>e-Mail Address</b>	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	<i>BAB - E</i>	<i>12/16</i>	<i>3:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
2	<i>BAB - W</i>	<i>12/16</i>	<i>2:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
3	<i>DB</i>	<i>12/16</i>	<i>4:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

**Sampler(s) Please Print & Sign**  
*Mike Coram - Cor*

**Shipment Method**  
*Fed Ex*

**Required Turnaround Time: (Check Box)**  
 5 WK Days  
 Std. 10 WK Days  
 2 WK Days  
 24 Hour

**Results Due Date:**

**Relinquished by:** *[Signature]* **Date:** *12/17* **Time:** *3:00*

**Relinquished by:** *[Signature]* **Date:** *12/17* **Time:** *3:00*

**Logged by (Laboratory):** *[Signature]* **Date:** *12/17* **Time:** *3:00*

**QC Package: (Check One Box Below)**  
 Level III Std. CC  
 Level III Std. CC/Pres. Data  
 Level IV SW/826-CLP  
 Other

**Preservative Key:** 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20

ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWT: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-355 RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECEIVING**  
**225 COMMERCE DR**

12-1  
3.2

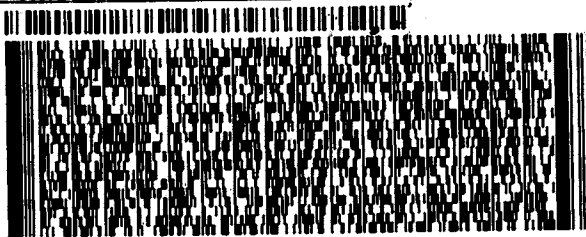
**FORT COLLINS CO 80524**

(616) 582-5201

REF:

THU:

DEPT:



**FedEx**  
Express



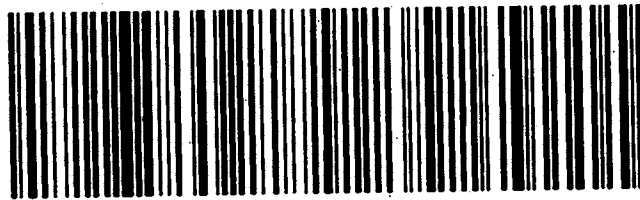
14107-100020207

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	45		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C



ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012397-1	2012397-2	2012397-3
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Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3

**Appendix K**  
**ALD Hydraulic Conductivity Test Results**



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143	26.7	98.1	-	-	3/15/2021	0	1.2E-08	0.0434	-	-	-	-	
						3/22/2021	7	9.3E-09	0.0434	-	-	-	-	
						3/29/2021	14	7.3E-09	0.0710	8.3	8.4	-	-	
						4/05/2021	21	7.0E-09	0.1122	-	-	-	-	
						4/12/2021	28	7.1E-09	0.1402	-	-	-	-	
						4/14/2021	30	6.9E-09	0.1468	8.2	8.5	-	-	
						4/19/2021	35	7.8E-09	0.1798	-	-	-	-	
						4/26/2021	42	6.4E-09	0.2107	-	-	-	-	
						4/27/2021	43	6.9E-09	0.2146	8.2	8.4	656	1614	
						5/3/2021	49	7.6E-09	0.2537	-	-	-	-	
						5/04/2021	50	7.8E-09	0.2592	-	-	-	-	
						5/07/2021	53	7.7E-09	0.2730	-	-	-	-	
						5/10/2021	56	6.8E-09	0.2843	8.3	8.2	-	-	
						5/14/2021	60	8.0E-09	0.3114	-	-	-	-	
						5/21/2021	67	7.2E-09	0.3464	-	-	-	-	
						5/24/2021	70	6.9E-09	0.3568	8.5	8.6	-	-	
						5/28/2021	74	8.1E-09	0.3840	-	-	-	-	
						6/04/2021	81	7.0E-09	0.4176	8.4	8.6	660	1411	
6/11/2021	88	7.6E-09	0.4591	-	-	-	-							
6/17/2021	94	6.4E-09	0.4830	8.3	8.2	-	-							
6/18/2021	95	7.3E-09	0.4929	-	-	-	-							
6/25/2021	102	7.6E-09	0.5356	-	-	-	-							
7/01/2021	108	6.4E-09	0.5602	8.5	8.2	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.4 657 1418

PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com



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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143	26.7	98.1	-	-	7/02/2021	109	7.6E-09	0.5692	-	-	-	-	
						7/09/2021	116	7.0E-09	0.6119	-	-	-	-	
						7/16/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
						7/23/2021	130	7.6E-09	0.6838	-	-	-	-	
						7/30/2021	137	7.0E-09	0.7116	8.6	8.5	-	-	
						8/06/2021	144	6.9E-09	0.7521	-	-	-	-	
						8/13/2021	151	6.7E-09	0.7806	8.5	8.1	-	-	
						8/20/2021	158	8.2E-09	0.8267	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.4 657 1418  
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Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (1-3')	20L149	20.4	105.7	-	-	3/15/2021	0	1.8E-08	0.0911	-	-	-	-		
						3/22/2021	7	1.7E-08	0.0911	8.5	8.1	-	-		
						3/29/2021	14	1.3E-08	0.1666	-	-	-	-		
						3/30/2021	15	1.3E-08	0.1716	8.5	8.3	-	-		
						4/05/2021	21	1.4E-08	0.2192	-	-	-	-		
						4/09/2021	25	1.3E-08	0.2442	8.0	8.1	782	3050		
						4/12/2021	28	1.4E-08	0.2807	-	-	-	-		
						4/16/2021	32	1.3E-08	0.3163	8.2	8.5	-	-		
						4/19/2021	35	1.3E-08	0.3522	-	-	-	-		
						4/26/2021	42	1.1E-08	0.4021	8.0	7.9	-	-		
						5/03/2021	49	1.3E-08	0.4766	8.2	8.5	560	2300		
						5/07/2021	53	1.3E-08	0.5194	-	-	-	-		
						5/12/2021	58	1.2E-08	0.5592	8.1	8.3	-	-		
						5/14/2021	60	1.3E-08	0.5859	-	-	-	-		
						5/21/2021	67	1.2E-08	0.6498	8.3	8.1	-	-		
						5/28/2021	74	1.2E-08	0.7192	8.4	8.2	621	1790		
						6/04/2021	81	1.2E-08	0.7866	-	-	-	-		
						6/11/2021	88	1.2E-08	0.8573	-	-	-	-		
6/14/2021	91	1.1E-08	0.8748	8.3	8.2	-	-								
6/18/2021	95	1.3E-08	0.9204	-	-	-	-								
6/22/2021	99	1.1E-08	0.9495	8.3	8.1	595	1982								
6/25/2021	102	1.3E-08	0.9867	-	-	-	-								
7/01/2021	108	1.1E-08	1.0332	8.5	8.5	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.2 645 2146

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	-	-	7/02/2021	109	1.2E-08	1.0459	-	-	-	-	
						7/09/2021	116	1.1E-08	1.1124	8.8	8.4	-	-	
						7/16/2021	123	1.2E-08	1.1811	8.7	8.1	657	1988	
						7/23/2021	130	1.2E-08	1.2542	8.3	8.4	-	-	
						7/30/2021	137	1.2E-08	1.3223	-	-	-	-	
						8/02/2021	140	1.1E-08	1.3400	8.7	8.1	-	-	
						8/06/2021	144	1.2E-08	1.3836	-	-	-	-	
						8/13/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
						8/20/2021	158	1.2E-08	1.5042	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 645 2146  
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**Test Results Summary**

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Project Name: Belle River ALD Support

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Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49)	20L152	36.6	84.2	-	-	3/15/2021	0	2.4E-08	0.0736	-	-	-	-		
						3/22/2021	7	1.9E-08	0.0736	8.2	8.0	-	-		
						3/29/2021	14	2.0E-08	0.1494	8.2	8.1	-	-		
						4/05/2021	21	1.9E-08	0.2090	8.1	8.2	523	1271		
						4/12/2021	28	2.0E-08	0.2804	-	-	-	-		
						4/13/2021	29	2.0E-08	0.2860	8.3	8.3	-	-		
						4/19/2021	35	2.0E-08	0.3546	8.2	8.1	-	-		
						4/26/2021	42	1.9E-08	0.4262	8.1	8.0	578	1313		
						4/30/2021	46	2.2E-08	0.4799	8.4	8.1	-	-		
						5/05/2021	51	2.1E-08	0.5425	8.4	8.2	-	-		
						5/07/2021	53	2.0E-08	0.5706	-	-	-	-		
						5/10/2021	56	1.9E-08	0.6011	8.3	8.0	607	1081		
						5/14/2021	60	2.1E-08	0.6528	-	-	-	-		
						5/19/2021	65	2.1E-08	0.7152	8.0	8.2	-	-		
						5/21/2021	67	2.1E-08	0.7473	-	-	-	-		
						5/24/2021	70	2.1E-08	0.7774	8.2	8.2	666	1197		
						5/28/2021	74	2.2E-08	0.8301	8.3	8.1	-	-		
						6/02/2021	79	2.1E-08	0.8917	8.2	8.2	-	-		
						6/04/2021	81	2.1E-08	0.9222	-	-	-	-		
						6/07/2021	84	2.1E-08	0.9528	8.6	8.3	598	1074		
6/11/2021	88	2.2E-08	1.0062	8.4	8.1	-	-								
6/16/2021	93	2.1E-08	1.0692	8.4	8.0	-	-								
6/18/2021	95	2.1E-08	1.1005	-	-	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.3 8.2 609 1087

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**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49')	20L152	36.6	84.2	-	-	6/21/2021	98	2.0E-08	1.1309	8.4	8.2	665	944		
						6/25/2021	102	2.2E-08	1.1877	-	-	-	-		
						6/29/2021	106	2.2E-08	1.2408	8.6	8.4	-	-		
						7/02/2021	109	1.9E-08	1.2789	8.6	8.1	618	1000		
						7/07/2021	114	2.0E-08	1.3455	8.1	8.1	-	-		
						7/09/2021	116	2.0E-08	1.3736	-	-	-	-		
						7/13/2021	120	2.1E-08	1.4129	8.3	8.4	-	-		
						7/16/2021	123	2.2E-08	1.4552	-	-	-	-		
						7/19/2021	126	2.0E-08	1.4823	8.2	8.4	612	974		
						7/23/2021	130	2.1E-08	1.5353	8.2	8.1	-	-		
						7/29/2021	136	2.0E-08	1.6059	8.2	8.1	-	-		
						7/30/2021	137	2.1E-08	1.6223	-	-	-	-		
						8/04/2021	142	1.9E-08	1.6722	8.3	8.2	610	933		
						8/06/2021	144	1.8E-08	1.6991	-	-	-	-		
						8/10/2021	148	2.0E-08	1.7386	8.2	8.1	-	-		
						8/13/2021	151	2.1E-08	1.7827	-	-	-	-		
8/16/2021	154	2.2E-08	1.8112	8.3	8.1	-	-								
8/20/2021	158	2.2E-08	1.8678	-	-	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 609 1087

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79)	20L160	20.5	106.6	-	-	3/15/2021	0	2.2E-08	0.1027	-	-	-	-		
						3/22/2021	7	2.1E-08	0.1027	8.5	8.2	-	-		
						3/29/2021	14	1.9E-08	0.1903	8.1	8.2	-	-		
						4/05/2021	21	1.8E-08	0.2806	8.2	8.2	633	1118		
						4/12/2021	28	1.9E-08	0.3709	-	-	-	-		
						4/13/2021	29	1.9E-08	0.3789	8.3	8.1	-	-		
						4/19/2021	35	1.9E-08	0.4651	8.2	8.1	-	-		
						4/26/2021	42	1.8E-08	0.5563	8.4	8.0	648	1027		
						5/03/2021	49	2.0E-08	0.6537	8.5	8.1	-	-		
						5/10/2021	56	1.8E-08	0.7482	8.1	7.8	-	-		
						5/14/2021	60	1.9E-08	0.8117	8.5	8.1	719	980		
						5/20/2021	66	1.9E-08	0.8996	8.6	8.4	-	-		
						5/21/2021	67	1.9E-08	0.9209	-	-	-	-		
						5/25/2021	71	1.9E-08	0.9765	8.1	8.1	-	-		
						5/28/2021	74	2.0E-08	1.0299	8.3	8.2	611	1024		
						6/04/2021	81	1.8E-08	1.1265	8.6	8.0	-	-		
						6/10/2021	87	2.0E-08	1.2169	8.8	8.6	-	-		
						6/11/2021	88	2.0E-08	1.2366	-	-	-	-		
						6/16/2021	93	1.9E-08	1.3037	8.5	8.1	699	927		
						6/18/2021	95	1.9E-08	1.3425	-	-	-	-		
6/22/2021	99	1.8E-08	1.3929	8.2	7.9	-	-								
6/25/2021	102	2.1E-08	1.4542	-	-	-	-								
6/28/2021	105	2.0E-08	1.4939	8.3	8.6	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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Project Name: Belle River ALD Support

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R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79)	20L160	20.5	106.6	-	-	7/02/2021	109	2.0E-08	1.5670	8.2	7.8	-	-		
						7/08/2021	115	1.9E-08	1.6590	8.2	8.2	735	816		
						7/09/2021	116	1.8E-08	1.6784	-	-	-	-		
						7/14/2021	121	1.9E-08	1.7482	8.3	8.1	-	-		
						7/16/2021	123	1.8E-08	1.7795	-	-	-	-		
						7/20/2021	127	1.9E-08	1.8074	8.2	8.2	-	-		
						7/23/2021	130	2.0E-08	1.8619	-	-	-	-		
						7/27/2021	134	1.9E-08	1.9098	8.7	8.2	681	862		
						7/30/2021	137	1.8E-08	1.9593	-	-	-	-		
						8/03/2021	141	1.6E-08	1.9998	8.4	8.3	-	-		
						8/06/2021	144	1.7E-08	2.0456	-	-	-	-		
						8/10/2021	148	1.7E-08	2.0883	8.1	8.1	-	-		
						8/13/2021	151	1.9E-08	2.1392	-	-	-	-		
						8/16/2021	154	2.0E-08	2.1745	8.1	8.1	714	817		
						8/20/2021	158	1.9E-08	2.2383	-	-	-	-		

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49)	20L164	42.1	80.7	-		3/15/2021	0	2.7E-08	0.0636	-	-	-	-		
						3/19/2021	4	3.1E-08	0.0636	8.6	8.4	-	-		
						3/22/2021	7	2.9E-08	0.1133	-	-	-	-		
						3/24/2021	9	3.1E-08	0.1358	8.7	8.2	-	-		
						3/29/2021	14	2.5E-08	0.2018	8.4	8.3	565	910		
						4/02/2021	18	2.3E-08	0.2600	8.5	8.1	-	-		
						4/05/2021	21	2.4E-08	0.3038	-	-	-	-		
						4/07/2021	23	2.4E-08	0.3234	7.9	8.0	-	-		
						4/12/2021	28	2.6E-08	0.3905	-	-	-	-		
						4/13/2021	29	2.6E-08	0.3978	7.7	8.0	661	930		
						4/19/2021	35	2.5E-08	0.4718	8.0	8.0	-	-		
						4/23/2021	39	2.6E-08	0.5303	8.5	8.7	-	-		
						4/26/2021	42	2.5E-08	0.5757	-	-	-	-		
						4/27/2021	43	2.6E-08	0.5880	8.1	8.0	586	823		
						5/03/2021	49	2.7E-08	0.6796	8.4	8.1	-	-		
						5/07/2021	53	2.7E-08	0.7380	8.7	8.1	-	-		
						5/12/2021	58	2.6E-08	0.8059	8.3	8.1	518	788		
						5/14/2021	60	2.6E-08	0.8380	-	-	-	-		
						5/17/2021	63	2.6E-08	0.8719	8.2	8.2	-	-		
						5/21/2021	67	2.6E-08	0.9310	7.7	7.8	-	-		
5/25/2021	71	2.7E-08	0.9895	7.8	7.8	584	746								
5/28/2021	74	2.7E-08	1.0384	7.8	8.0	-	-								
6/01/2021	78	2.7E-08	1.0976	7.9	7.9	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.2 8.1 625 778

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**Test Results Summary**

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Project Name: Belle River ALD Support

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Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49)	20L164	42.1	80.7	-	-	6/04/2021	81	2.7E-08	1.1447	8.0	7.9	586	778		
						6/08/2021	85	2.7E-08	1.2046	8.1	8.2	-	-		
						6/11/2021	88	2.7E-08	1.2536	8.2	8.1	-	-		
						6/15/2021	92	2.7E-08	1.3129	8.2	8.2	730	597		
						6/18/2021	95	2.6E-08	1.3630	8.1	8.2	-	-		
						6/23/2021	100	2.6E-08	1.4333	8.4	8.3	-	-		
						6/25/2021	102	2.8E-08	1.4724	-	-	-	-		
						6/28/2021	105	2.7E-08	1.5088	8.5	8.3	650	774		
						7/02/2021	109	2.7E-08	1.5703	8.2	7.8	-	-		
						7/06/2021	113	2.7E-08	1.6320	8.3	8.4	-	-		
						7/09/2021	116	2.6E-08	1.6795	8.5	8.1	710	830		
						7/14/2021	121	2.6E-08	1.7543	8.3	8.2	-	-		
						7/16/2021	123	2.9E-08	1.7946	-	-	-	-		
						7/19/2021	126	2.8E-08	1.8287	8.3	8.2	-	-		
						7/23/2021	130	2.7E-08	1.8868	8.4	8.2	651	734		
						7/28/2021	135	2.7E-08	1.9561	8.2	8.2	-	-		
						7/30/2021	137	2.6E-08	1.9925	-	-	-	-		
						8/03/2021	141	2.4E-08	2.0346	8.3	8.2	-	-		
8/06/2021	144	2.5E-08	2.0800	-	-	-	-								
8/09/2021	147	2.5E-08	2.1094	8.3	8.2	651	749								
8/13/2021	151	2.7E-08	2.1691	8.1	8.1	-	-								
8/17/2021	155	2.8E-08	2.2325	8.3	8.3	-	-								
8/20/2021	158	2.8E-08	2.2807	8.3	8.2	611	671								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.2 8.1 625 778

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**Test Results Summary**

**Compatibility Test Results**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89)	20L172	21.6	107.5	-	-	3/15/2021	0	1.7E-08	0.0905	-	-	-	-		
						3/22/2021	7	1.6E-08	0.0905	8.4	8.0	-	-		
						3/29/2021	14	1.5E-08	0.1730	-	-	-	-		
						3/30/2021	15	1.5E-08	0.1794	8.4	8.3	-	-		
						4/02/2021	18	1.6E-08	0.2136	8.5	8.4	605	2010		
						4/05/2021	21	1.6E-08	0.2577	-	-	-	-		
						4/09/2021	25	1.5E-08	0.2972	7.9	8.0	-	-		
						4/12/2021	28	1.6E-08	0.3419	-	-	-	-		
						4/16/2021	32	1.6E-08	0.3816	8.6	8.5	-	-		
						4/19/2021	35	1.6E-08	0.4302	-	-	-	-		
						4/23/2021	39	1.4E-08	0.4658	8.5	8.3	676	1372		
						4/26/2021	42	1.1E-08	0.4844	-	-	-	-		
						5/05/2021	51	7.8E-09	0.5510	8.5	8.2	-	-		
						5/07/2021	53	1.2E-08	0.5830	-	-	-	-		
						5/12/2021	58	1.5E-08	0.6371	8.5	8.3	-	-		
						5/14/2021	60	1.6E-08	0.6685	-	-	-	-		
						5/18/2021	64	1.6E-08	0.7166	8.3	8.2	697	1569		
						5/21/2021	67	1.4E-08	0.7643	-	-	-	-		
5/24/2021	70	1.3E-08	0.7968	8.4	8.3	-	-								
5/28/2021	74	1.8E-08	0.8590	8.5	8.1	-	-								
6/04/2021	81	1.5E-08	0.9471	8.3	8.2	760	1192								
6/11/2021	88	1.6E-08	1.0343	8.2	8.5	-	-								
6/18/2021	95	1.5E-08	1.1243	8.1	8.4	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.2 678 1341

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**Test Results Summary**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**21H21**

**Project No.: PN1017**

**R23**

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89)	20L172	21.6	107.5			6/24/2021	101	1.6E-08	1.2048	8.6	8.0	679	1067		
						6/25/2021	102	1.6E-08	1.2226	-	-	-	-		
						6/29/2021	106	1.6E-08	1.2773	8.3	8.0	-	-		
						7/02/2021	109	1.6E-08	1.3251	-	-	-	-		
						7/06/2021	113	1.6E-08	1.3731	8.6	8.1	-	-		
						7/09/2021	116	1.5E-08	1.4176	-	-	-	-		
						7/13/2021	120	1.5E-08	1.4573	8.3	8.3	598	1134		
						7/16/2021	123	1.6E-08	1.5039	-	-	-	-		
						7/21/2021	128	1.5E-08	1.5523	8.2	8.1	-	-		
						7/23/2021	130	1.5E-08	1.5831	-	-	-	-		
						7/28/2021	135	1.5E-08	1.6370	8.1	8.1	-	-		
						7/30/2021	137	1.4E-08	1.6636	-	-	-	-		
						8/06/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040		
						8/13/2021	151	1.4E-08	1.7722	8.1	8.1	-	-		
8/20/2021	158	1.5E-08	1.8667	8.2	8.1	-	-								

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 8.4 8.2 678 1341

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**Test Results Summary**  
**Compatibility Test Results as of August 20, 2021**

Project Name: Belle River ALD Support

21H21

Project No.: PN1017

R23

Site ID	Lab No.	Test Information														Remarks
		Initial Conditions				Specific Gravity	Date Test Started	Date Comp Started (Injection)	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Total Volume	Volume of Pores							In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(cm <sup>3</sup> )	(cm <sup>3</sup> )	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B1-ST-1 (7-9')	20L143	26.7	98.1	145.8	62.5	2.750	1/29/2021	3/15/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
									151	6.7E-09	0.7806	8.5	8.1	-	-	
									158	8.2E-09	0.8267	-	-	-	-	
B2-ST-1 (1-3')	20L149	20.4	105.7	144.9	57.1	2.796	2/12/2021	3/15/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
									158	1.2E-08	1.5042	-	-	-	-	
B2-ST-4 (47-49')	20L152	36.6	84.2	146.8	75.6	2.781	2/12/2021	3/15/2021	142	1.9E-08	1.6722	8.3	8.2	610	933	
									154	2.2E-08	1.8113	8.3	8.1	-	-	
									158	2.2E-08	1.8678	-	-	-	-	
B3-ST-5 (77-79')	20L160	20.5	106.6	149.0	55.1	2.709	2/12/2021	3/15/2021	154	2.0E-08	2.1745	8.1	8.1	714	817	
									158	1.9E-08	2.2383	-	-	-	-	
B4-ST-3 (47-49')	20L164	42.1	80.7	143.2	77.0	2.795	2/12/2021	3/15/2021	158	2.8E-08	2.2807	8.3	8.2	611	671	
B5-ST-5 (87-89')	20L172	21.6	107.5	146.2	54.3	2.740	2/20/2021	3/15/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040	
									158	1.5E-08	1.8667	8.2	8.1	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average: 8.3 663

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**Appendix L**  
**Groundwater Protection Standard**  
**Calculations**

## Technical Memorandum

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**Date:** November 24, 2021

**To:** Chris Scieszka, DTE Electric Company

**From:** Vince Buening, TRC  
Sarah Holmstrom, TRC  
Kristin Lowery, TRC

**Project No.:** 413591.0003.0000 Phase 1 Task 1

**Subject:** Groundwater Protection Standard Calculation – DTE Electric Company, Belle River Power Plant Diversion Basin

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DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Belle River Power Plant (BRPP) Diversion Basin (DB) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule<sup>1</sup> (“Part B”) that allows a facility to prepare demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the BRPP DB remains in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)<sup>2</sup>, the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the BRPP DB CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the BRPP DB from August 2016 through September 2017, as part of initiating the

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<sup>1</sup> On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

<sup>2</sup> As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

## Technical Memorandum

detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to September 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the BRPP DB were evaluated in accordance with the *Groundwater Statistical Evaluation Plan (Stats Plan)* (TRC, October 2017). Per the Stats Plan, the BRPP DB CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL. The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for BRPP DB includes MW-16-05, MW-16-06, MW-16-07, MW-16-08, MW-16-10, and MW-16-11/A<sup>3</sup>. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of non-detects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

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<sup>3</sup> Monitoring well MW-16-11 was decommissioned and replaced by monitoring well MW-16-11A in May 2017 to repair a damaged casing. For the purposes of statistical evaluation, the data sets for the original and replacement well have been combined and referred to as "MW-16-11A"

## Technical Memorandum

### Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

### Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) indicated potential or suspect outliers for arsenic, chromium, cobalt, and lead at MW-16-07 on 8/3/2016, radium 226/228 at MW-16-11A on 8/2/2016, and chromium, cobalt, and lead at MW-16-11A on 9/22/2016. In addition, multiple sampling events were performed within a two to three-week timeframe during the background data collection in order to verify results and/or collect an adequate number of data points within the constraints of the limited CCR Rule implementation timeline. In order to maximize temporal independence within the background data set, several data points were removed from the MW-16-10 and MW-16-11A data sets as noted on Table 1. Data for the additional sampling events conducted in August 2017 for MW-16-10 were similar to the July and September results. Data for the additional sampling event conducted in June 2017 for MW-16-11A were similar to the May and July results. Thus, the June 2017 and August 2017 data were removed to avoid potential biasing of the two data sets for that time-frame.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

### Outlier Testing

Outlier removal from the background data set is summarized in Table 1. Probability plots of data residuals (Attachment A) were used to further evaluate the potential outliers for MW-16-07 that were identified in the T v. C graphs. In general, probability plots of the data residuals for MW-16-07 show that arsenic, chromium, cobalt, and lead data collected on 8/3/2016 were from a different distribution than the remaining data. Prior to outlier removal, many of the parameters exhibited a non-normal distribution. Subsequent to outlier removal, the data sets for the majority of the parameters exhibited a normal distribution. As such, data collected from monitoring well MW-16-07 on 8/3/2016 were removed from the data set.

After the removal of the data collected on 6/6/2017 from the background data set for MW-16-11A, probability plots of the data residuals for MW-16-11A show the radium 226/228 data collected on 8/2/2016, and the chromium, cobalt, and lead data collected on 9/22/2016 were from a different distribution than the remaining data. Prior to outlier removal, many of the parameters exhibited a non-normal distribution. Subsequent to outlier removal, the data sets for the majority of the parameters exhibited a normal distribution. As such, these data points were removed from the data set.

## Technical Memorandum

### Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 2.

### Tolerance Limits

Table 2 presents the calculated UTLs for the background/baseline data sets. As discussed above, the BRPP DB CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For nonnormal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

### Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 3.

### Attachments

Table 1 – Summary of Outlier Evaluation and Data Removal

Table 2 – Summary of Descriptive Statistics and Tolerance Limit Calculations

Table 3 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

# Technical Memorandum

## Tables

**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Antimony	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	2.4	Removed to maintain temporal independence.
Arsenic	ug/L	MW-16-07	08/03/16	28	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 5.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 5.0	Removed to maintain temporal independence.
MW-16-11A	06/06/17	< 5.0	Removed to maintain temporal independence.		
Barium	ug/L	MW-16-10	04/18/17	75	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	65	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	115	Removed to maintain temporal independence.
		MW-16-10	08/30/17	99.5	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	260	Removed to maintain temporal independence.
Beryllium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Cadmium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Chromium	ug/L	MW-16-07	08/03/16	53	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 2.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 2.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	7.35	Removed to maintain temporal independence.
		MW-16-10	08/30/17	8.7	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	39	Anomalously high value, failed Dixon's Test for outliers at 1% significance
MW-16-11A	06/06/17	3	Removed to maintain temporal independence.		

**Notes:**

ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Cobalt	ug/L	MW-16-07	08/03/16	21	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	3.6	Removed to maintain temporal independence.
		MW-16-10	08/30/17	2.95	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	14	Anomalously high value, failed Dixon's Test for outliers at 1% significance
Fluoride	mg/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.1	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Lead	ug/L	MW-16-07	08/03/16	23	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	2.45	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.7	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	26	Anomalously high value, failed Dixon's Test for outliers at 1% significance
Lithium	ug/L	MW-16-10	04/18/17	120	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	130	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	86	Removed to maintain temporal independence.
		MW-16-10	08/30/17	73	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	34	Removed to maintain temporal independence.
Mercury	ug/L	MW-16-10	04/18/17	< 0.20	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 0.20	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 0.20	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 0.20	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 0.20	Removed to maintain temporal independence.

**Notes:**

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter



**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Molybdenum	ug/L	MW-16-10	04/18/17	23	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	21	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	18	Removed to maintain temporal independence.
		MW-16-10	08/30/17	15.5	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	17	Removed to maintain temporal independence.
Radium 226/228	pCi/L	MW-16-10	04/18/17	0.900	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	1.32	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	1.48	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.375	Removed to maintain temporal independence.
		MW-16-11A	08/02/16	6.94	Anomalously high value, failed Dixon's Test for outliers at 1% significance
MW-16-11A	06/06/17	1.45	Removed to maintain temporal independence.		
Selenium	ug/L	MW-16-10	04/18/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 5.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 5.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 5.0	Removed to maintain temporal independence.
Thallium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.

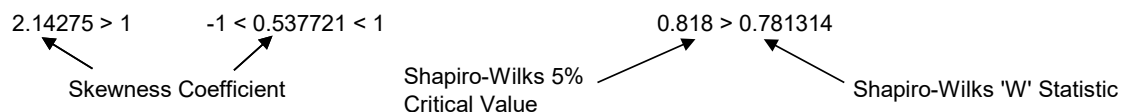
**Notes:**

ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Antimony (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0
MW-16-08	> 50% Non-Detect				N	Non-Parametric	2.1
MW-16-10	> 50% Non-Detect				Y	Non-Parametric	2.1
MW-16-11/A	> 50% Non-Detect				Y	Non-Parametric	3.2
<b>Arsenic (ug/L)</b>							
MW-16-05	> 50% Non-Detect				N	Non-Parametric	14
MW-16-06	> 50% Non-Detect				N	Non-Parametric	7.5
MW-16-07	-1 < 0.373835 < 1	--	--	--	Y	Parametric	19
MW-16-08	-1 < 0.897249 < 1	--	--	--	N	Parametric	30
MW-16-10	> 50% Non-Detect				Y	Non-Parametric	11
MW-16-11/A	-1 < 0.148067 < 1	--	--	--	Y	Parametric	24
<b>Barium (ug/L)</b>							
MW-16-05	1 < 1.01157	-1 < 0.95611 < 1	--	--	N	Parametric	370
MW-16-06	-1 < 0.516938 < 1	--	--	--	N	Parametric	330
MW-16-07	1 < 1.44883	1 < 1.21299	0.829 > 0.8055999	0.829 < 0.847205	N	Parametric	500
MW-16-08	-1 < 0.431717 < 1	--	--	--	N	Parametric	490
MW-16-10	-1 < 0.134164 < 1	--	--	--	Y	Parametric	200
MW-16-11/A	-1 < -0.0523964 < 1	--	--	--	Y	Parametric	620
<b>Beryllium (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	> 50% Non-Detect				N	Non-Parametric	1.7
MW-16-08	> 50% Non-Detect				N	Non-Parametric	1.6
MW-16-10	100% Non-Detect				Y	PQL	1.0
MW-16-11/A	> 50% Non-Detect				Y	Non-Parametric	1.6

**Notes:**

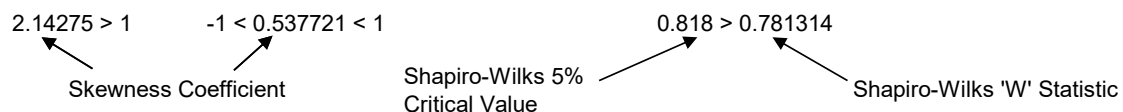


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Cadmium (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	> 50% Non-Detect				N	Non-Parametric	1.3
MW-16-08	> 50% Non-Detect				N	Non-Parametric	1.5
MW-16-10	100% Non-Detect				Y	PQL	1.0
MW-16-11/A	100% Non-Detect				Y	PQL	1.0
<b>Chromium (ug/L)</b>							
MW-16-05	1 < 1.71747	-1 < 0.673789 < 1	--	--	N	Parametric	47
MW-16-06	> 50% Non-Detect				N	Non-Parametric	14
MW-16-07	-1 < 0.320197 < 1	--	--	--	Y	Parametric	27
MW-16-08	-1 < 0.995955 < 1	--	--	--	N	Parametric	55
MW-16-10	-1 < 0.236403 < 1	--	--	--	Y	Parametric	32
MW-16-11/A	-1 < -0.755706 < 1	--	--	--	Y	Parametric	18
<b>Cobalt (ug/L)</b>							
MW-16-05	1 < 1.66974	-1 < 0.486789 < 1	--	--	N	Parametric	21
MW-16-06	> 50% Non-detect				N	Non-Parametric	4.7
MW-16-07	-1 < 0.377399 < 1	--	--	--	Y	Parametric	13
MW-16-08	-1 < 0.710724 < 1	--	--	--	N	Parametric	22
MW-16-10	-1 < 0.989395 < 1	--	--	--	Y	Parametric	17
MW-16-11/A	-1 < 0.168083 < 1	--	--	--	Y	Parametric	7.1
<b>Fluoride (mg/L)</b>							
MW-16-05	-2.36014 < -1	-2.90896 < -1	0.887 > 0.696028	0.887 > 0.582757	N	Non-Parametric	1.3
MW-16-06	-2.19557 < -1	-2.80843 < -1	0.887 > 0.739569	0.887 > 0.617868	N	Non-Parametric	1.3
MW-16-07	-1.77484 < -1	-2.0008 < -1	0.887 > 0.68499	0.887 > 0.609979	N	Non-Parametric	1.2
MW-16-08	-1 < 0.229585 < 1	--	--	--	N	Parametric	1.3
MW-16-10	-1 < 0.281128 < 1	--	--	--	Y	Parametric	2.1
MW-16-11/A	-1 < 0.411854 < 1	--	--	--	Y	Parametric	1.9

**Notes:**

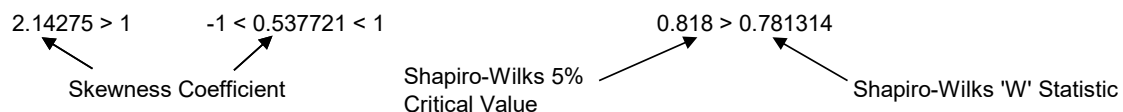


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
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**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Lead (ug/L)</b>							
MW-16-05	1 < 1.81739	-1 < 0.489817 < 1	--	--	N	Parametric	23
MW-16-06	> 50% Non-Detect				N	Non-Parametric	4.4
MW-16-07	-1 < 0.114555 < 1	--	--	--	Y	Parametric	12
MW-16-08	-1 < 0.878446 < 1	--	--	--	N	Parametric	22
MW-16-10	1 < 1.1556	-1 < -0.336561 < 1	--	--	Y	Parametric	35
MW-16-11/A	-1 < 0.741547 < 1	--	--	--	Y	Parametric	7.7
<b>Lithium (ug/L)</b>							
MW-16-05	-1 < 0.20306 < 1	--	--	--	N	Parametric	67
MW-16-06	-1 < 0.493967 < 1	--	--	--	N	Parametric	55
MW-16-07	-1 < 0.351593 < 1	--	--	--	N	Parametric	92
MW-16-08	-1 < 0.949387 < 1	--	--	--	N	Parametric	110
MW-16-10	-1 < -0.119962 < 1	--	--	--	Y	Parametric	120
MW-16-11/A	1 < 1.67414	1 < 1.10921	0.818 > 0.764918	0.818 < 0.87926	Y	Parametric	150
<b>Mercury (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	0.20
MW-16-06	100% Non-Detect				N	PQL	0.20
MW-16-07	100% Non-Detect				N	PQL	0.20
MW-16-08	100% Non-Detect				N	PQL	0.20
MW-16-10	100% Non-Detect				Y	PQL	0.20
MW-16-11/A	100% Non-Detect				Y	PQL	0.20
<b>Molybdenum (ug/L)</b>							
MW-16-05	1 < 2.11944	1 < 1.8128	0.829 > 0.650199	0.829 > 0.746132	N	Non-Parametric	43
MW-16-06	1 < 1.79557	1 < 1.57811	0.829 > 0.688295	0.829 > 0.73398	N	Non-Parametric	30
MW-16-07	1 < 1.90393	1 < 1.32689	0.829 > 0.697642	0.829 < 0.832132	N	Parametric	100
MW-16-08	-1 < 0.851996 < 1	--	--	--	N	Parametric	67
MW-16-10	1 < 1.25926	-1 < 0.873361 < 1	--	--	Y	Parametric	50
MW-16-11/A	1 < 1.04371	-1 < 0.974189 < 1	--	--	Y	Parametric	49

**Notes:**

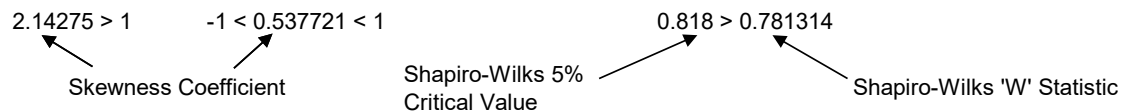


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
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 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Radium 226/228 (pCi/L)</b>							
MW-16-05	1 < 1.7901	1 < 1.07063	0.829 > 0.760667	0.829 < 0.907933	N	Parametric	5.49
MW-16-06	-1 < 0.713621 < 1	--	--	--	N	Parametric	2.60
MW-16-07	-1 < 0.761539 < 1	--	--	--	N	Parametric	5.80
MW-16-08	1 < 1.49391	-1 < -0.879177 < 1	--	--	N	Parametric	7.57
MW-16-10	-1 < -0.170195 < 1	--	--	--	Y	Parametric	3.15
MW-16-11/A	-1 < 0.818505 < 1	--	--	--	Y	Parametric	2.58
<b>Selenium (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	5.0
MW-16-06	100% Non-Detect				N	PQL	5.0
MW-16-07	> 50% Non-detect				N	Non-Parametric	5.3
MW-16-08	100% Non-Detect				N	PQL	5.0
MW-16-10	100% Non-Detect				Y	PQL	5.0
MW-16-11/A	100% Non-Detect				Y	PQL	5.0
<b>Thallium (ug/L)</b>							
MW-16-05	> 50% Non-detect				N	Non-Parametric	1.1
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	> 50% Non-detect				N	Non-Parametric	2.3
MW-16-08	> 50% Non-detect				N	Non-Parametric	1.3
MW-16-10	100% Non-Detect				Y	PQL	1.0
MW-16-11/A	100% Non-Detect				Y	PQL	1.0

**Notes:**



PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 3**  
 Summary of Groundwater Protection Standards  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11/A	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.1	<b>6.0</b>	2.1	<b>6.0</b>	3.2	<b>6.0</b>
Arsenic	ug/L	Background or MCL	10	14	<b>14</b>	7.5	<b>10</b>	19	<b>19</b>	30	<b>30</b>	11	<b>11</b>	24	<b>24</b>
Barium	ug/L	MCL	2000	370	<b>2,000</b>	330	<b>2,000</b>	500	<b>2,000</b>	490	<b>2,000</b>	200	<b>2,000</b>	620	<b>2,000</b>
Beryllium	ug/L	MCL	4	1.0	<b>4.0</b>	1.0	<b>4.0</b>	1.7	<b>4.0</b>	1.6	<b>4.0</b>	1.0	<b>4.0</b>	1.6	<b>4.0</b>
Cadmium	ug/L	MCL	5	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.3	<b>5.0</b>	1.5	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>
Chromium	ug/L	MCL	100	47	<b>100</b>	14	<b>100</b>	27	<b>100</b>	55	<b>100</b>	32	<b>100</b>	18	<b>100</b>
Cobalt	ug/L	Background or RSL	6	21	<b>21</b>	4.7	<b>6.0</b>	13	<b>13</b>	22	<b>22</b>	17	<b>17</b>	7.1	<b>7.1</b>
Fluoride	mg/L	MCL	4	1.3	<b>4.0</b>	1.3	<b>4.0</b>	1.2	<b>4.0</b>	1.3	<b>4.0</b>	2.1	<b>4.0</b>	1.9	<b>4.0</b>
Lead	ug/L	Background or RSL	15	23	<b>23</b>	4.4	<b>15</b>	12	<b>15</b>	22	<b>22</b>	35	<b>35</b>	7.7	<b>15</b>
Lithium	ug/L	Background	40	67	<b>67</b>	55	<b>55</b>	92	<b>92</b>	110	<b>110</b>	120	<b>120</b>	150	<b>150</b>
Mercury	ug/L	MCL	2	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>
Molybdenum	ug/L	RSL	100	43	<b>100</b>	30	<b>100</b>	100	<b>100</b>	67	<b>100</b>	50	<b>100</b>	49	<b>100</b>
Radium-226/228	pCi/L	Background or MCL	5	5.49	<b>5.49</b>	2.60	<b>5.00</b>	5.80	<b>5.80</b>	7.57	<b>7.57</b>	3.15	<b>5.00</b>	2.58	<b>5.00</b>
Selenium	ug/L	MCL	50	5.0	<b>50</b>	5.0	<b>50</b>	5.3	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>
Thallium	ug/L	Background or MCL	2	1.1	<b>2.0</b>	1.0	<b>2.0</b>	2.3	<b>2.3</b>	1.3	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>

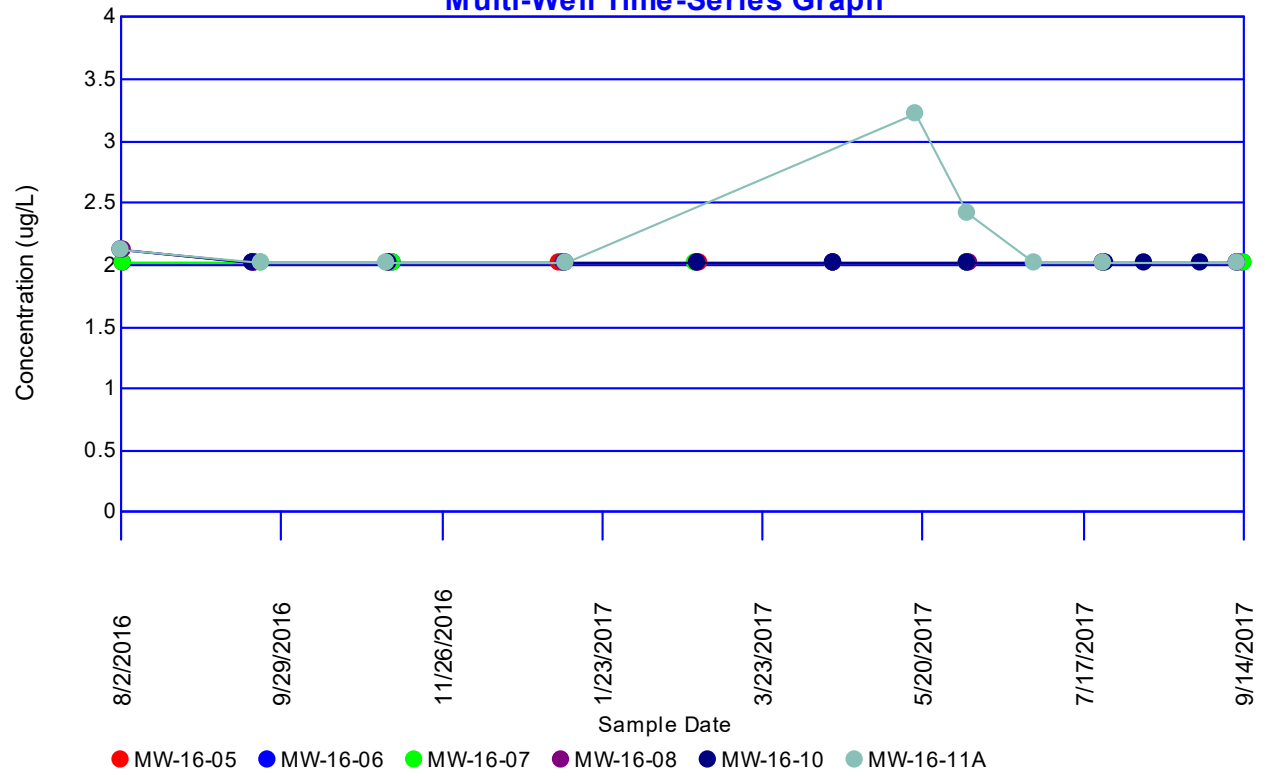
**Notes:**

- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
- ug/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

## Technical Memorandum

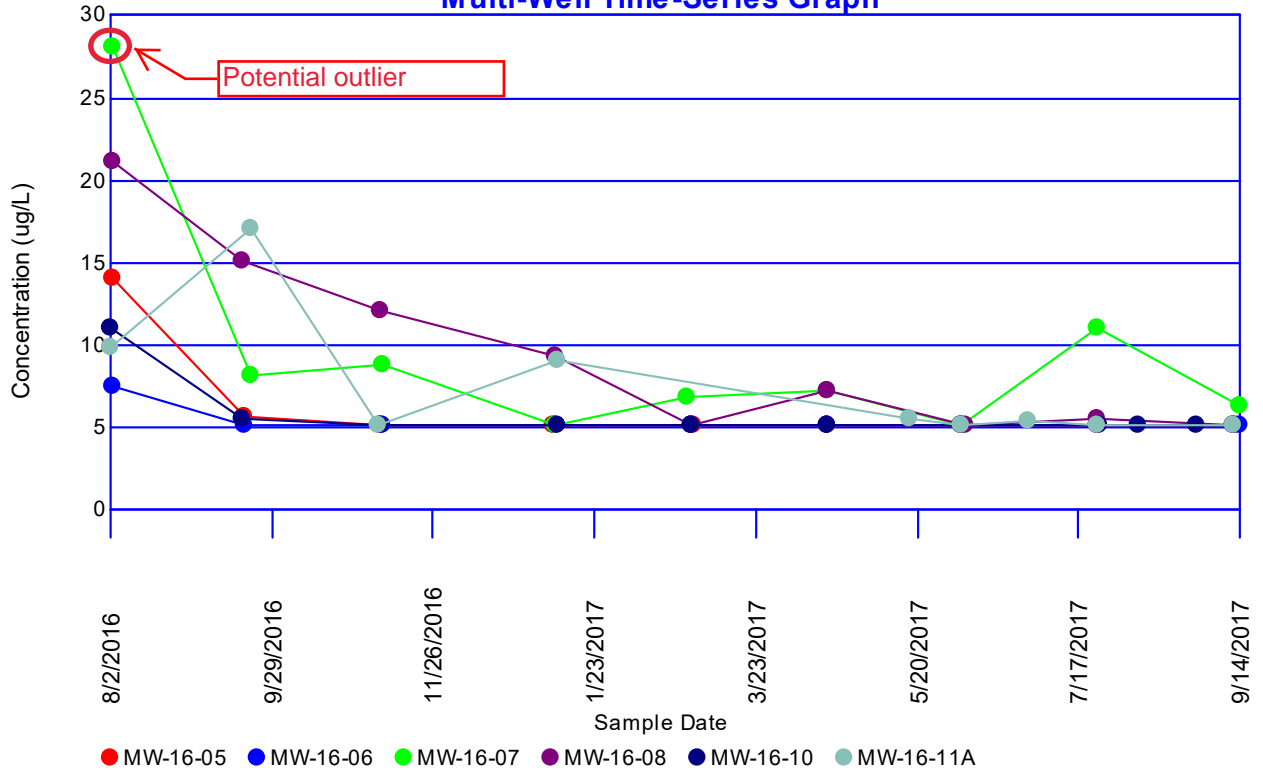
# Attachment A ChemStat™ Outputs

# Antimony Multi-Well Time-Series Graph

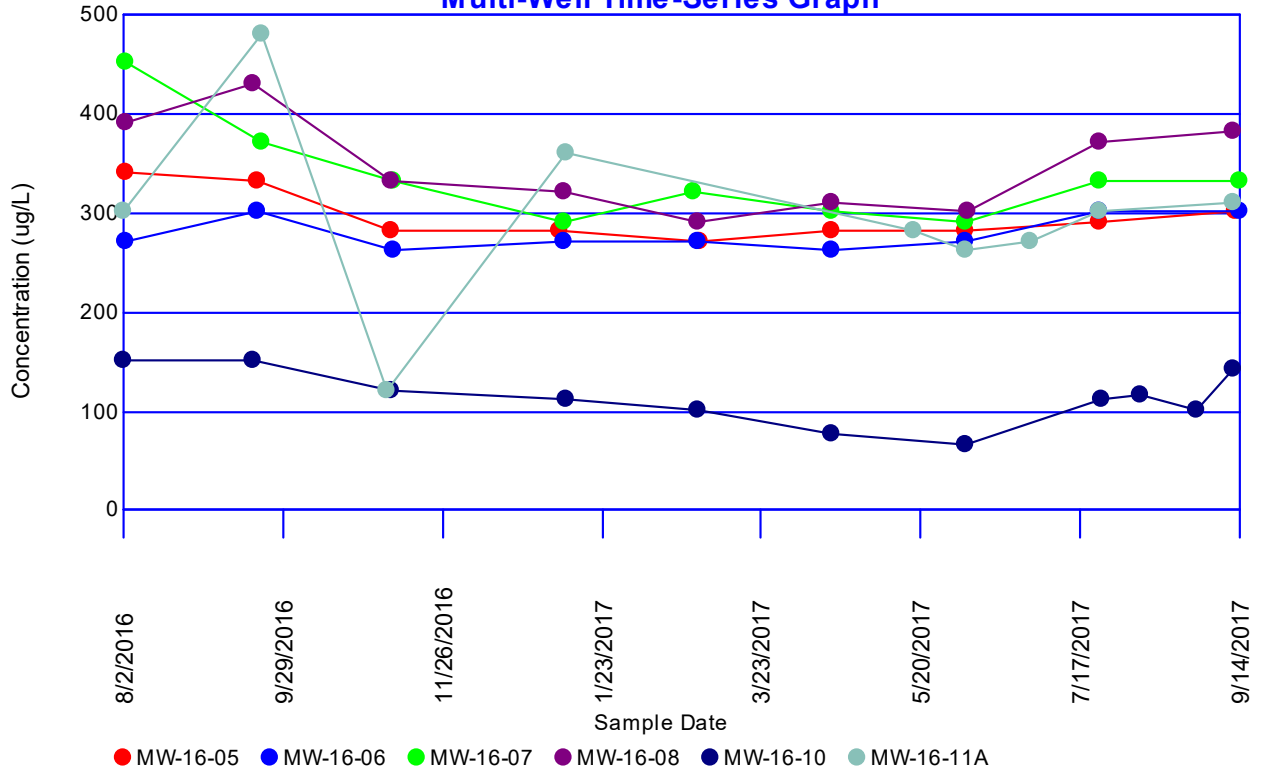




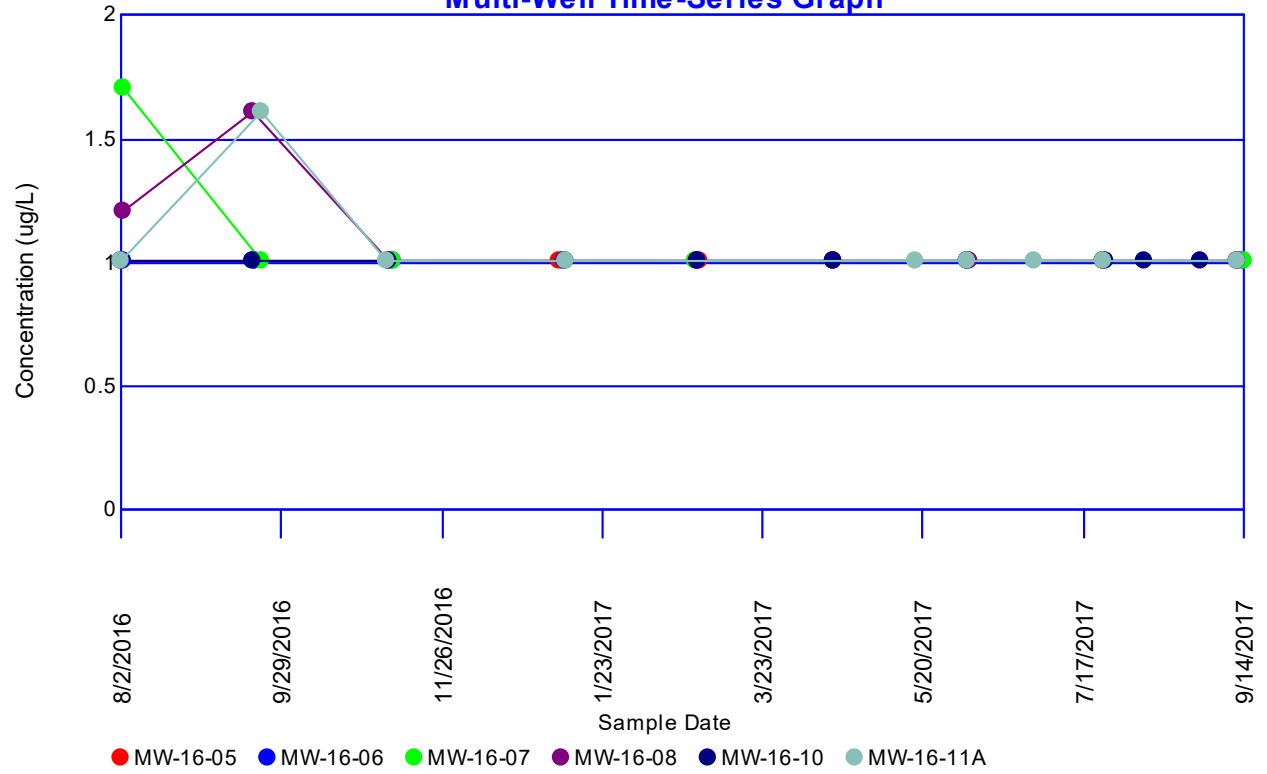
# Arsenic Multi-Well Time-Series Graph



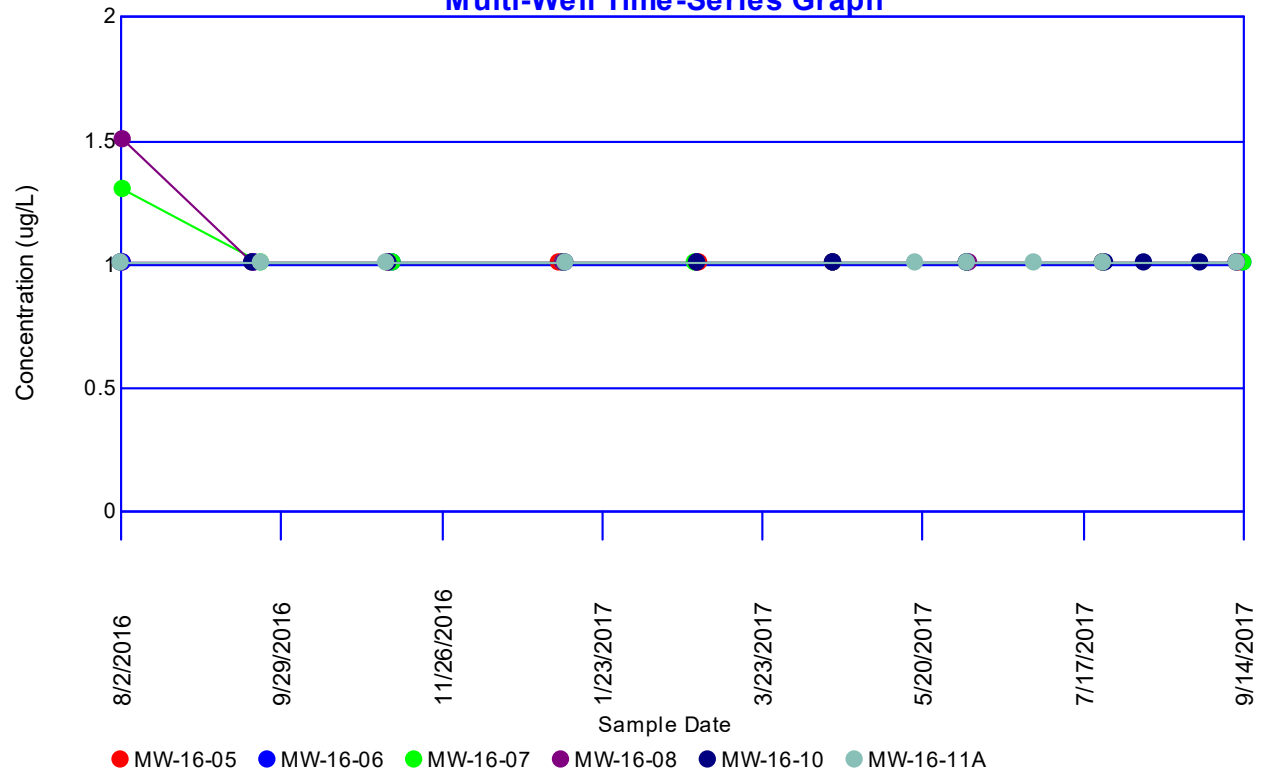
# Barium Multi-Well Time-Series Graph



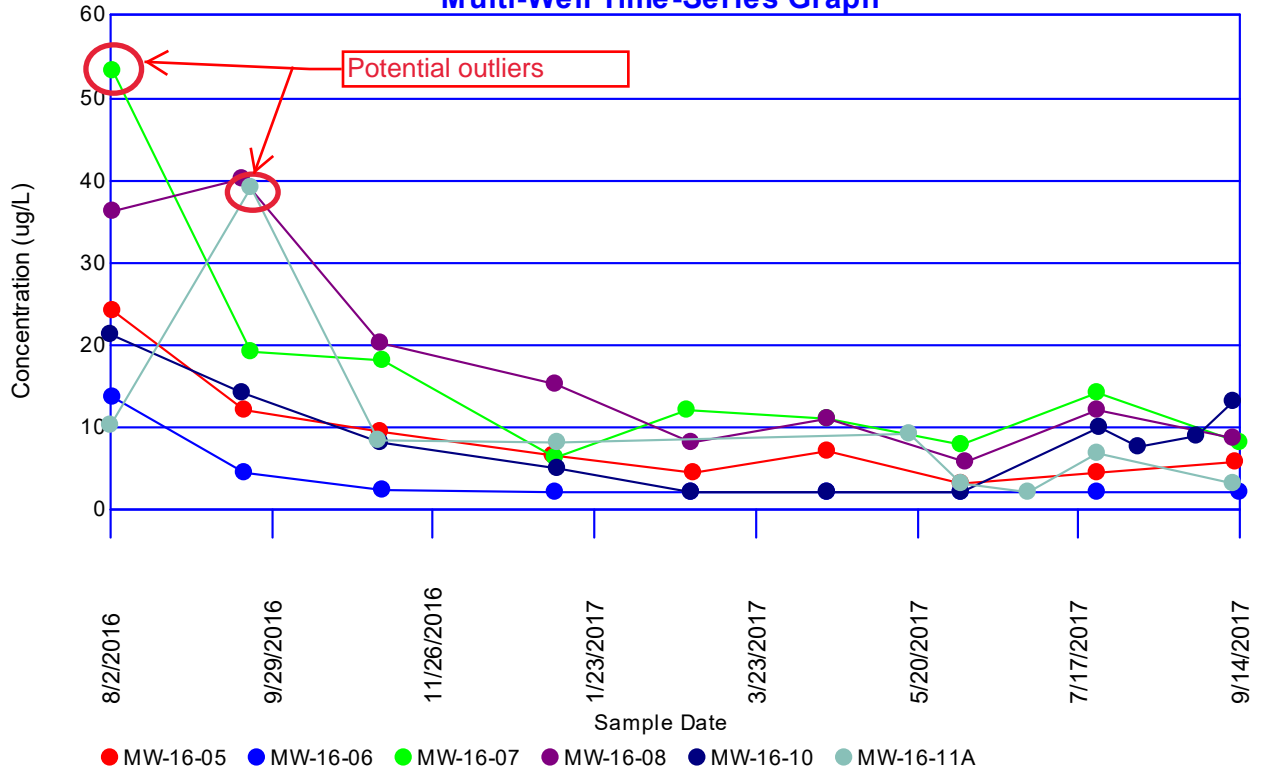
# Beryllium Multi-Well Time-Series Graph



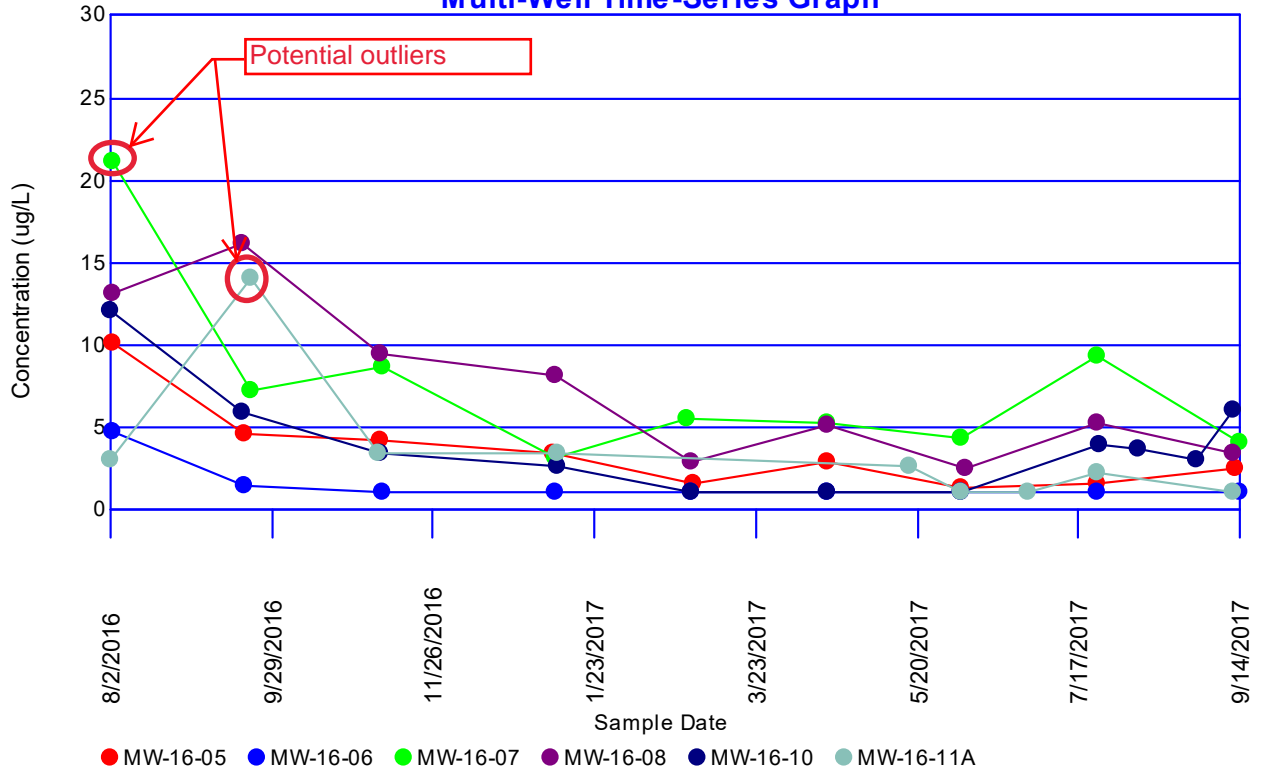
# Cadmium Multi-Well Time-Series Graph



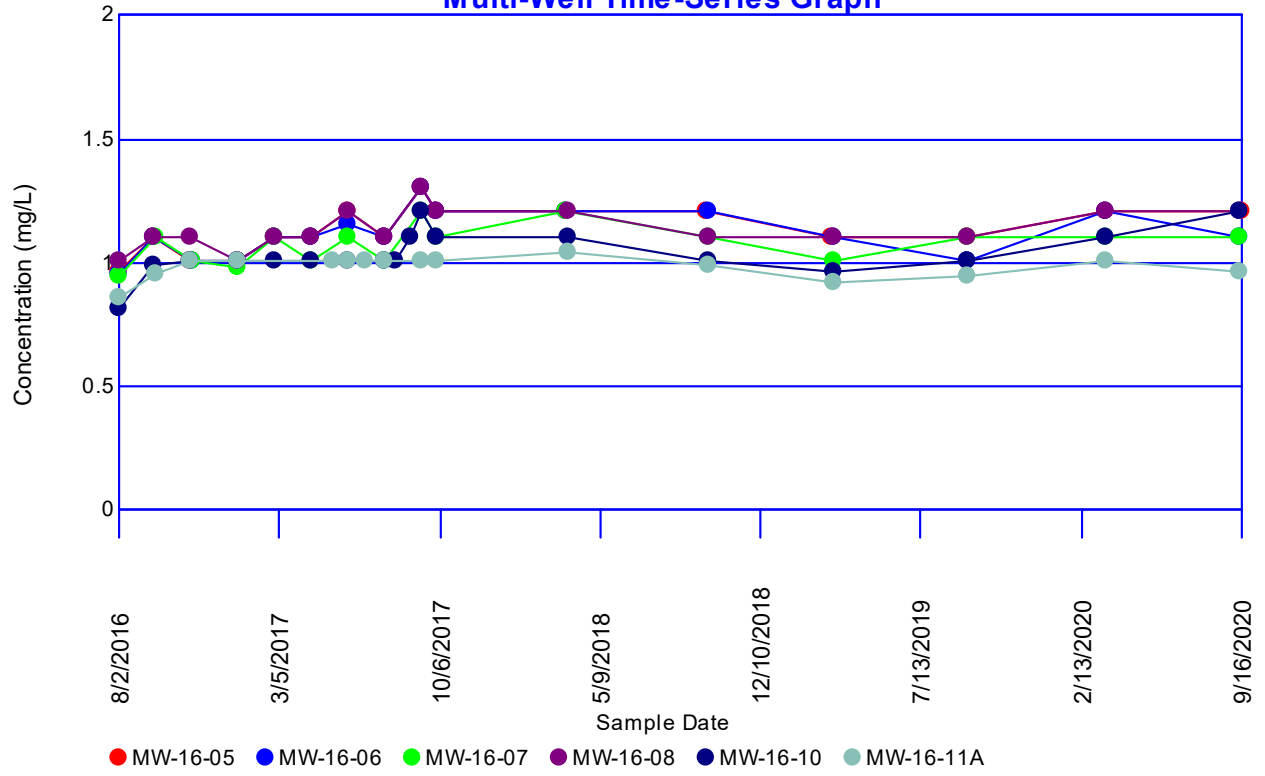
# Chromium Multi-Well Time-Series Graph



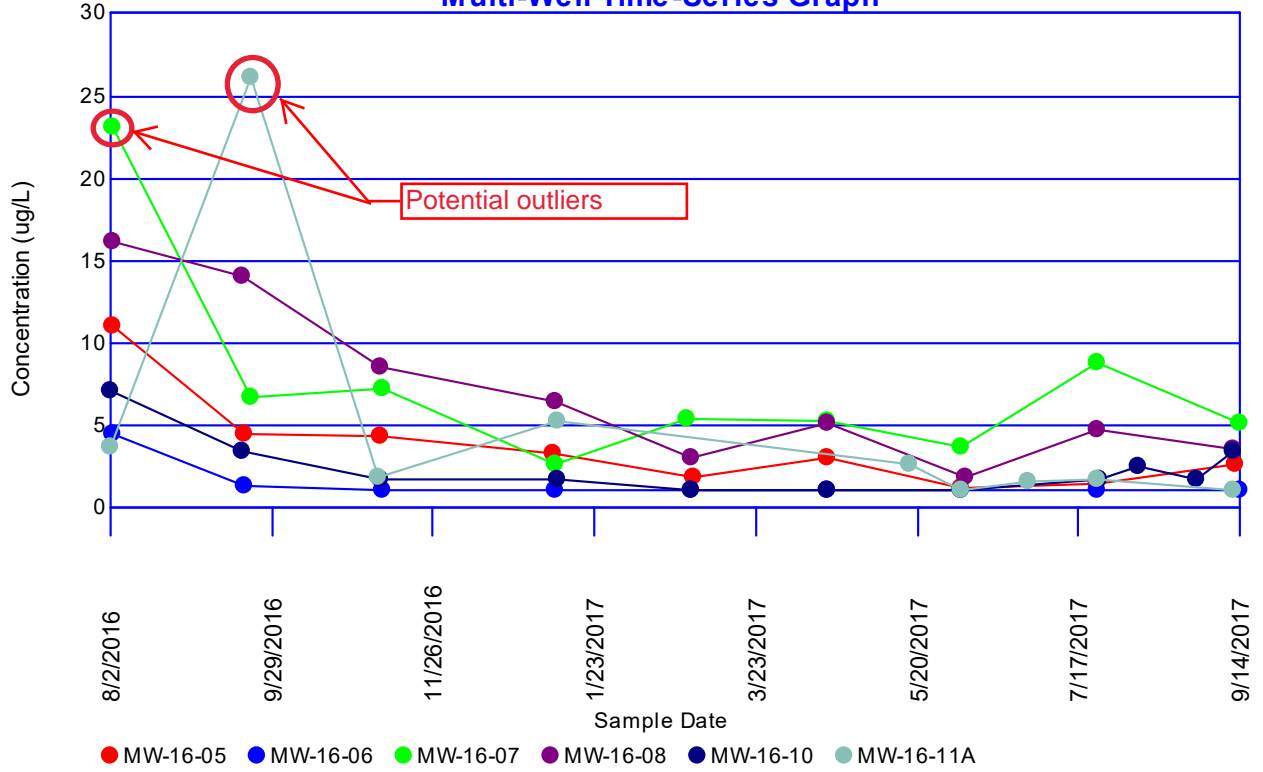
# Cobalt Multi-Well Time-Series Graph



## Fluoride Multi-Well Time-Series Graph

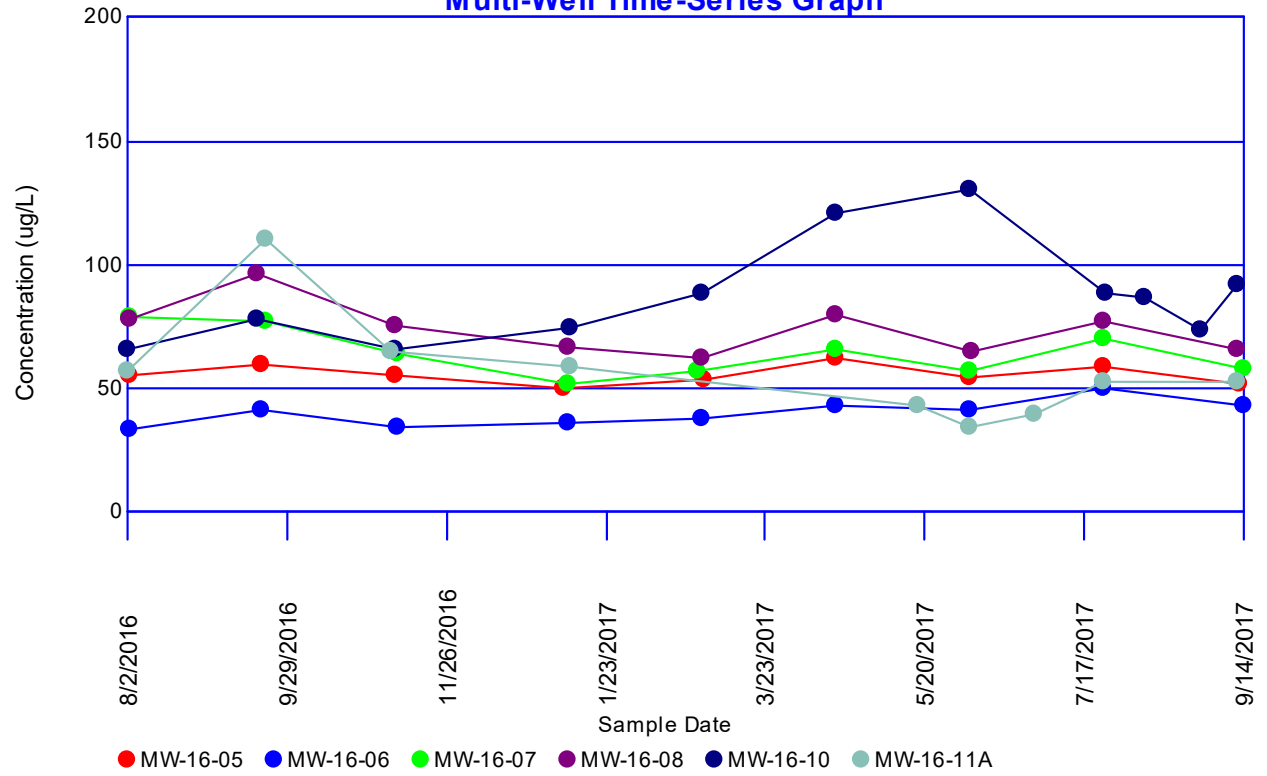


# Lead Multi-Well Time-Series Graph



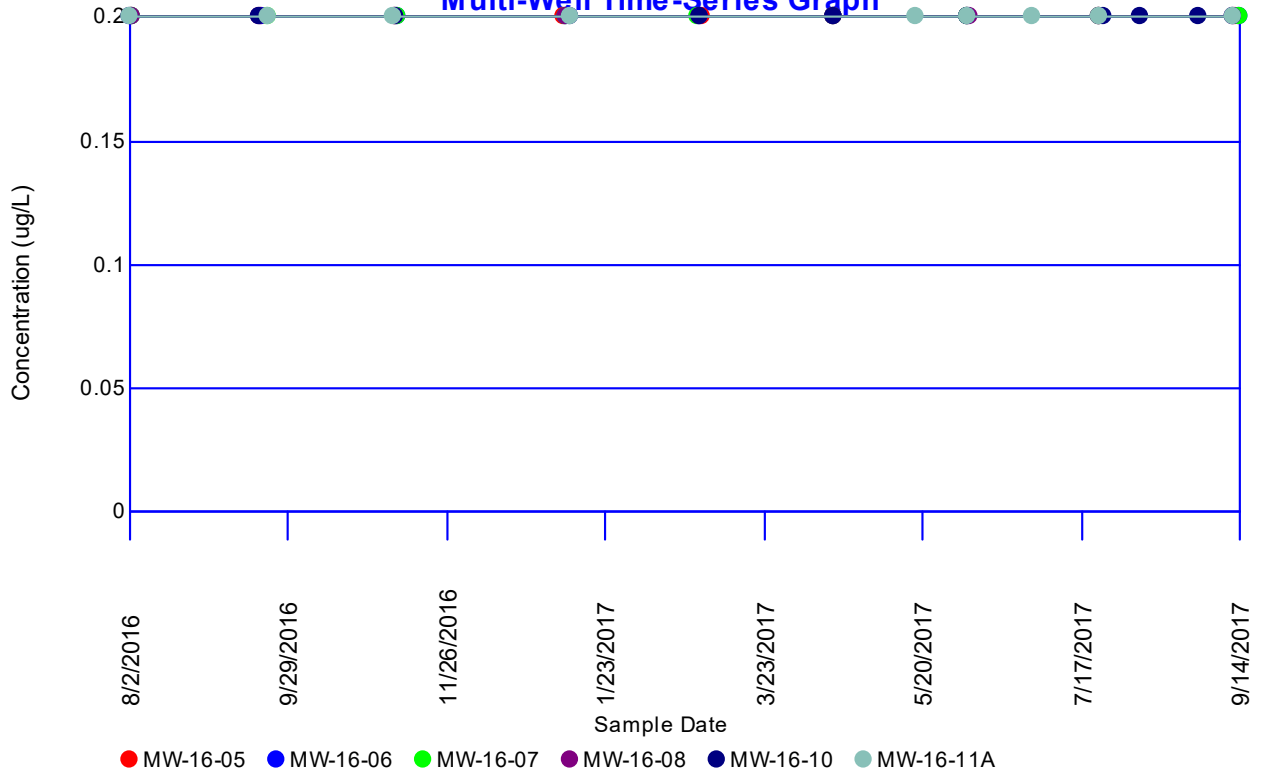


# Lithium Multi-Well Time-Series Graph

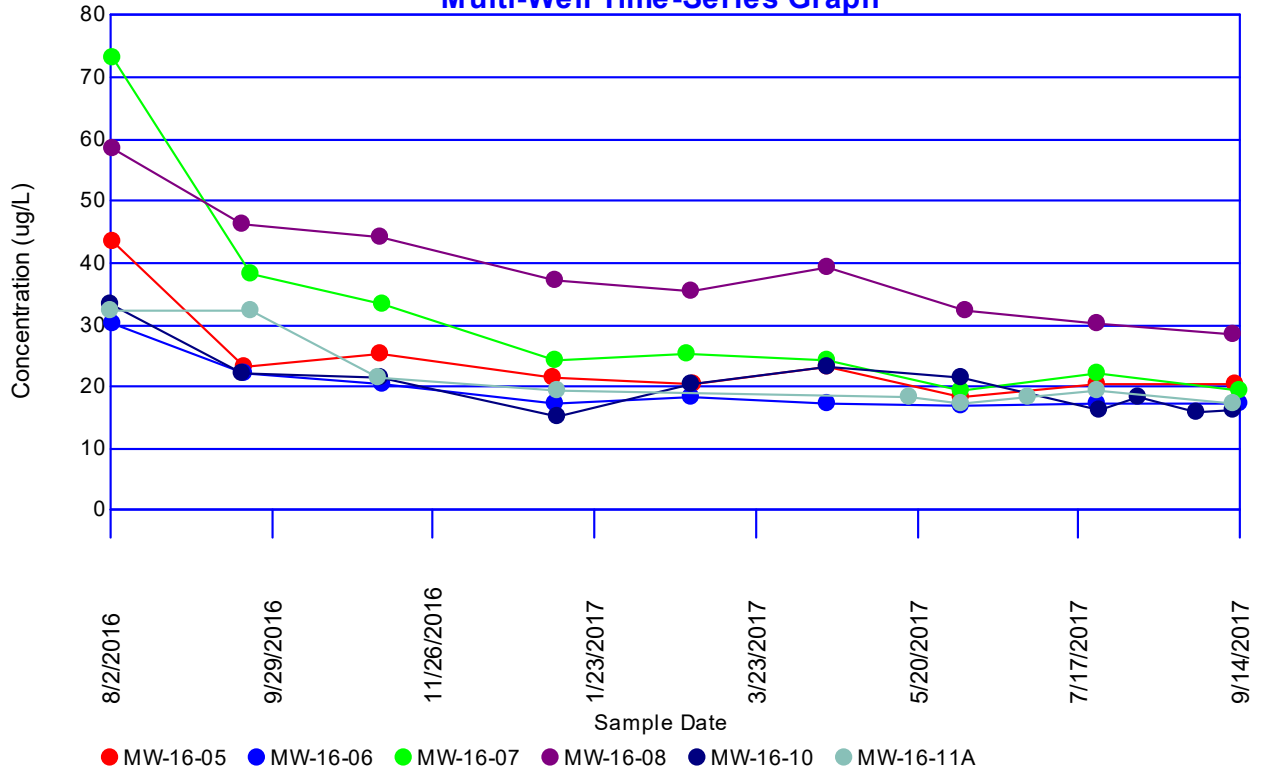


# Mercury

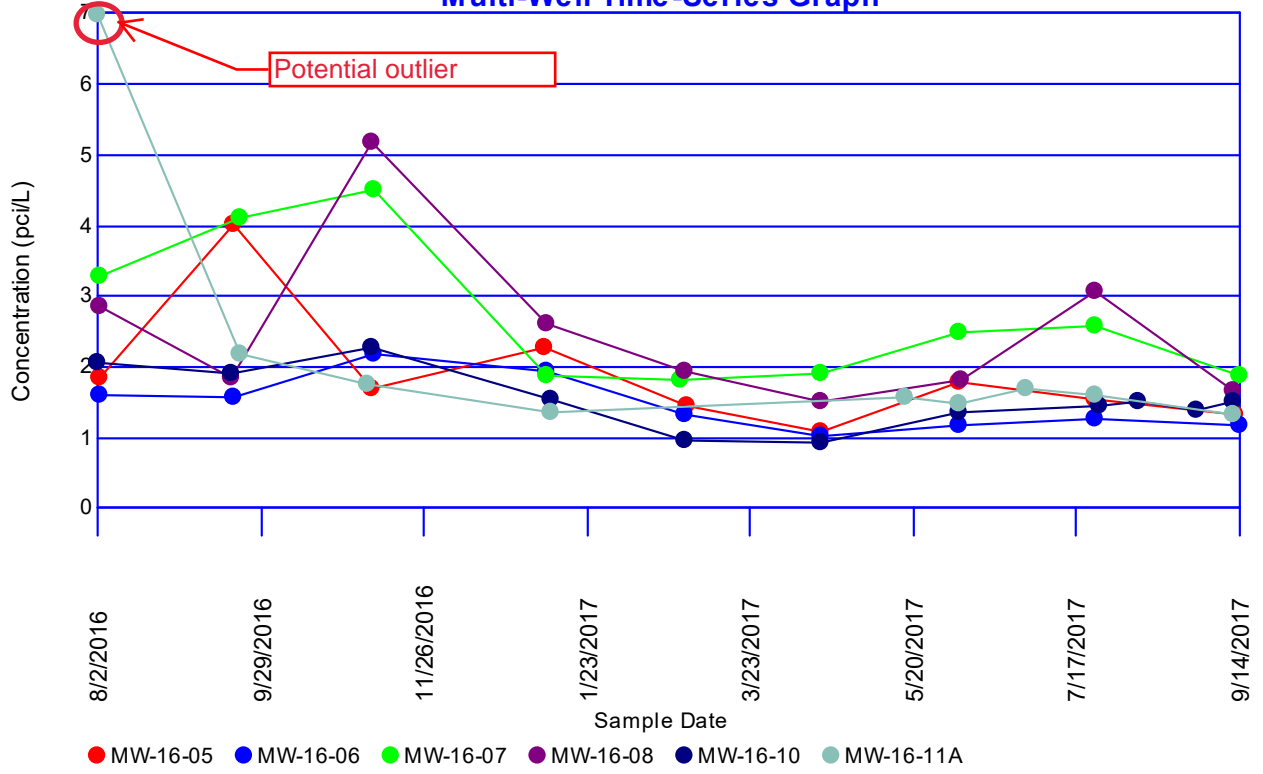
## Multi-Well Time-Series Graph



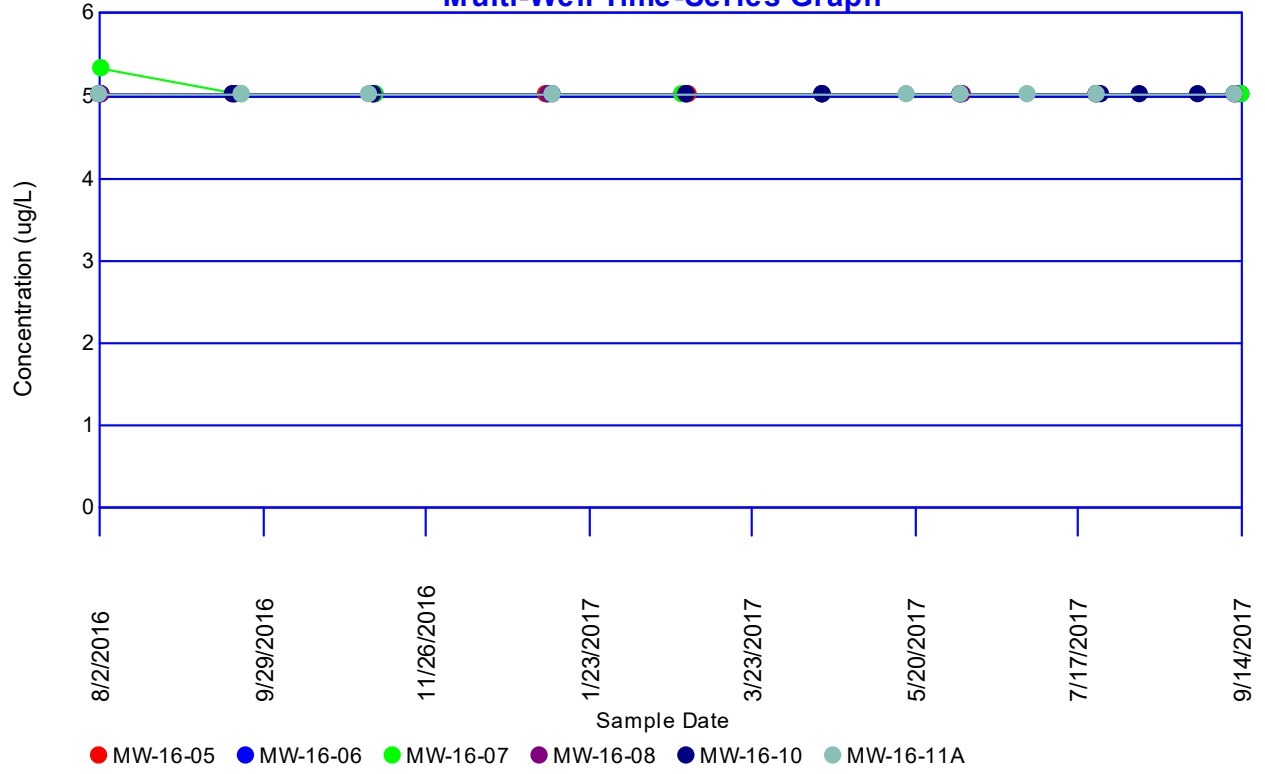
# Molybdenum Multi-Well Time-Series Graph



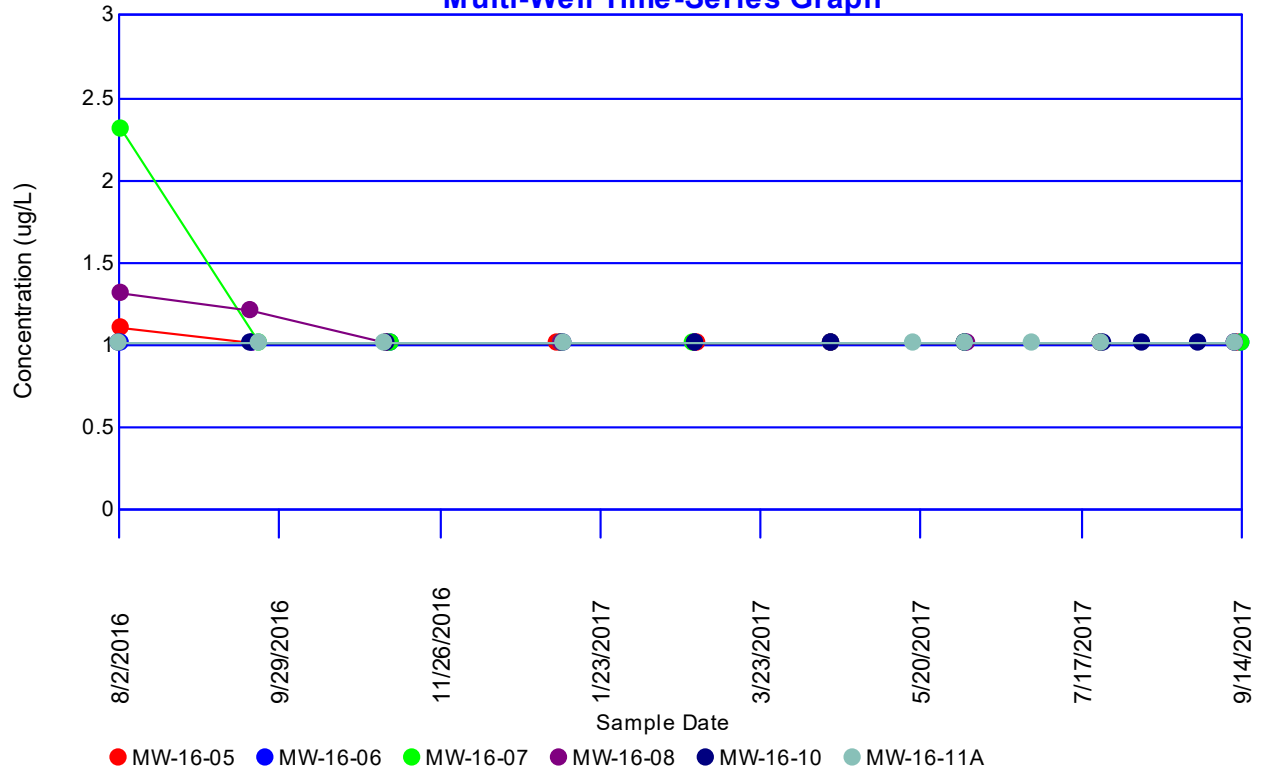
# Radium-226/228 Multi-Well Time-Series Graph



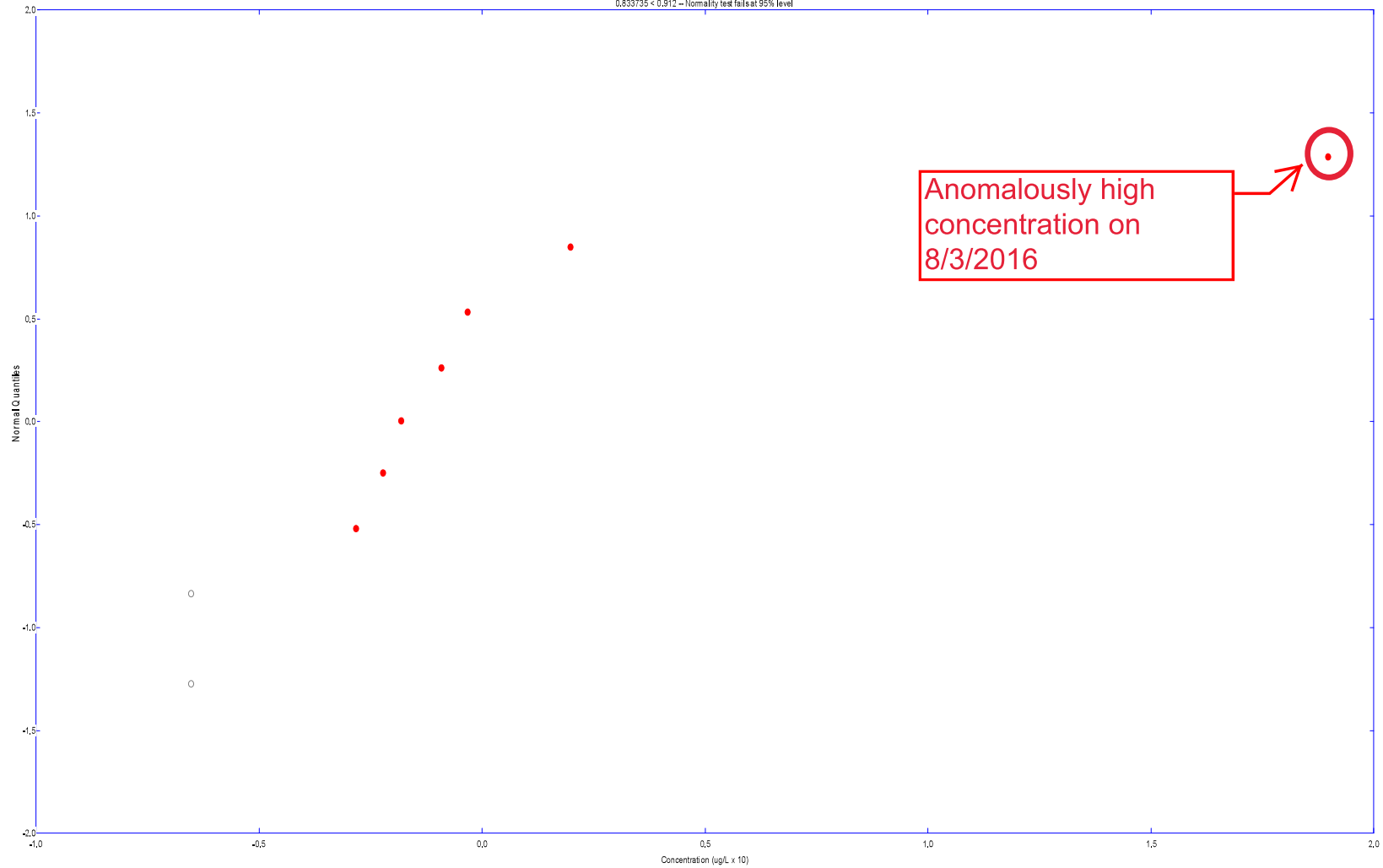
# Selenium Multi-Well Time-Series Graph



# Thallium Multi-Well Time-Series Graph



Arsenic  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0.833735  
0.833735 < 0.912 -- Normality test fails at 95% level



**Arsenic**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0.833735  
0.833735 < 0.912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Arsenic

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.666667	0	0.635	28
2	0.270588	0	0.683	None

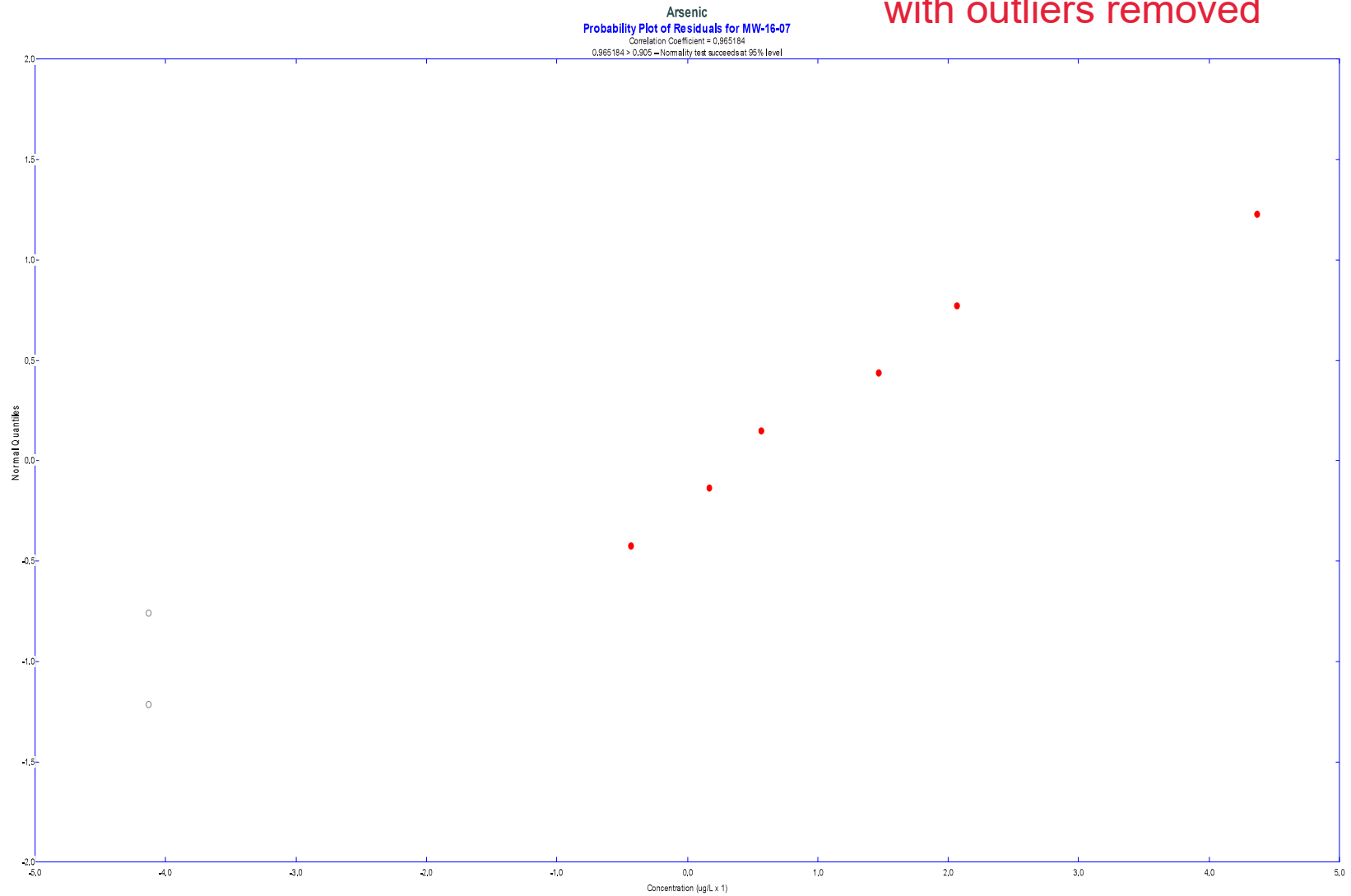
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>28</b>	<b>TRUE</b>
	9/22/2016	8.1	FALSE
	11/9/2016	8.7	FALSE
	1/10/2017	ND<2.5 U	FALSE
	2/27/2017	6.8	FALSE
	4/18/2017	7.2	FALSE
	6/6/2017	ND<2.5 U	FALSE
	7/25/2017	11	FALSE
	9/14/2017	6.2	FALSE

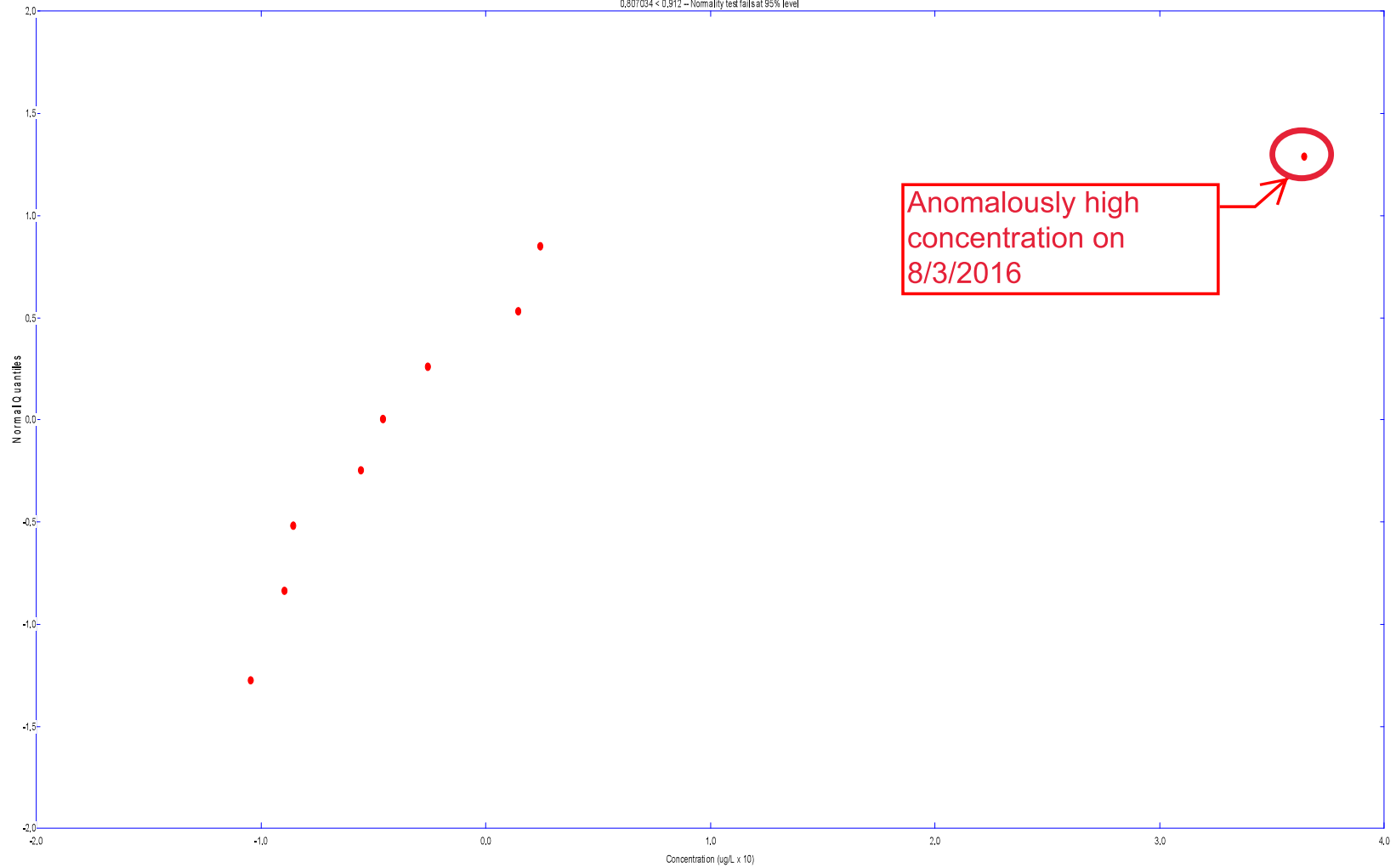


with outliers removed



**Arsenic**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0.965184  
0.965184 > 0.905 – Normality test succeeds at 95% level

Chromium  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,807034  
0,807034 < 0,912 – Normality test fails at 95% level



**Chromium**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0,807034  
0,807034 < 0,912 – Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Chromium

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.748899	0.116279	0.635	53
2	0.0877193	0.12605	0.683	None

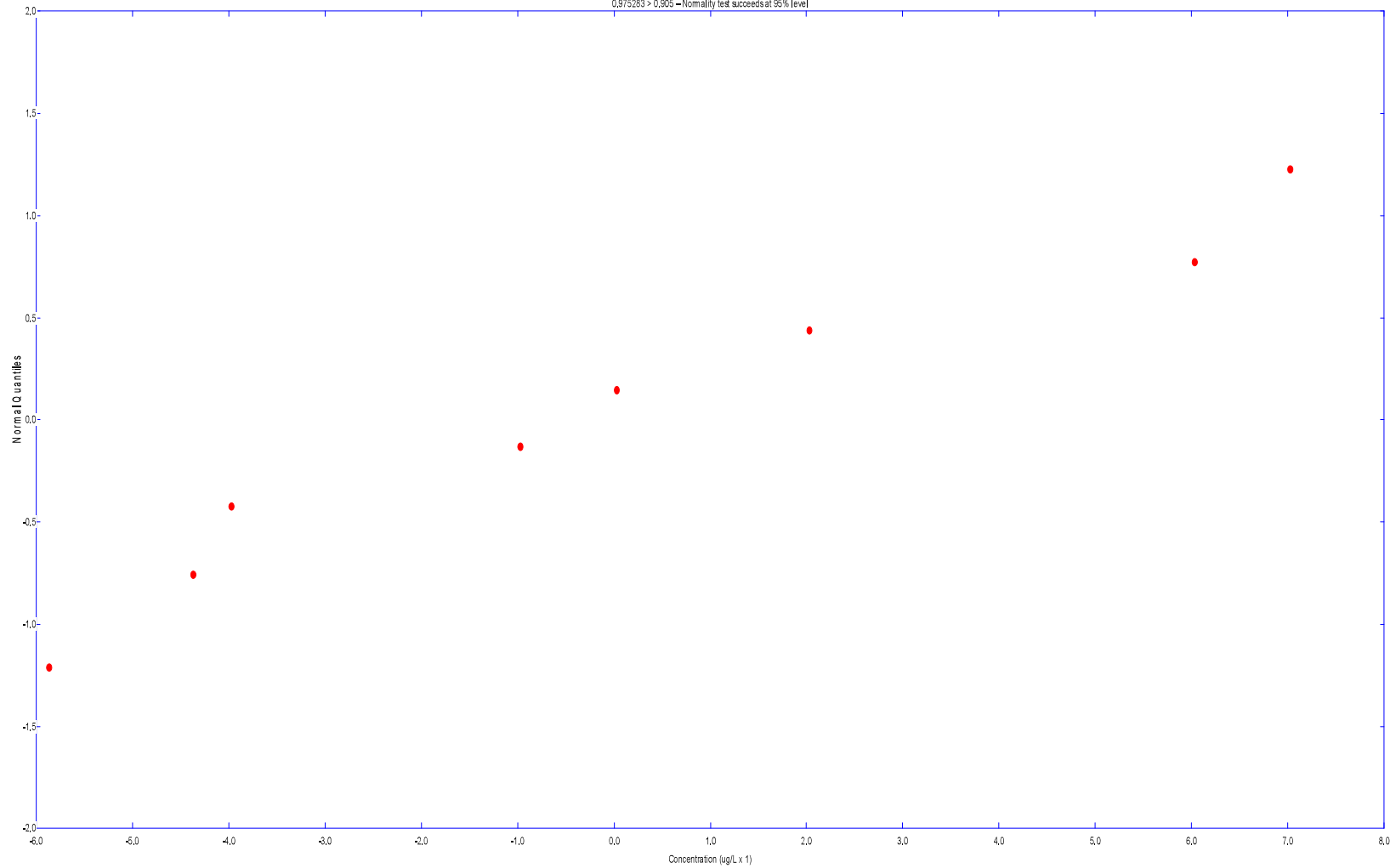
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>53</b>	<b>TRUE</b>
	9/22/2016	19	FALSE
	11/9/2016	18	FALSE
	1/10/2017	6.1	FALSE
	2/27/2017	12	FALSE
	4/18/2017	11	FALSE
	6/6/2017	7.6	FALSE
	7/25/2017	14	FALSE
	9/14/2017	8	FALSE

Chromium  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,975283  
0,975283 > 0,905 – Normality test succeeds at 95% level

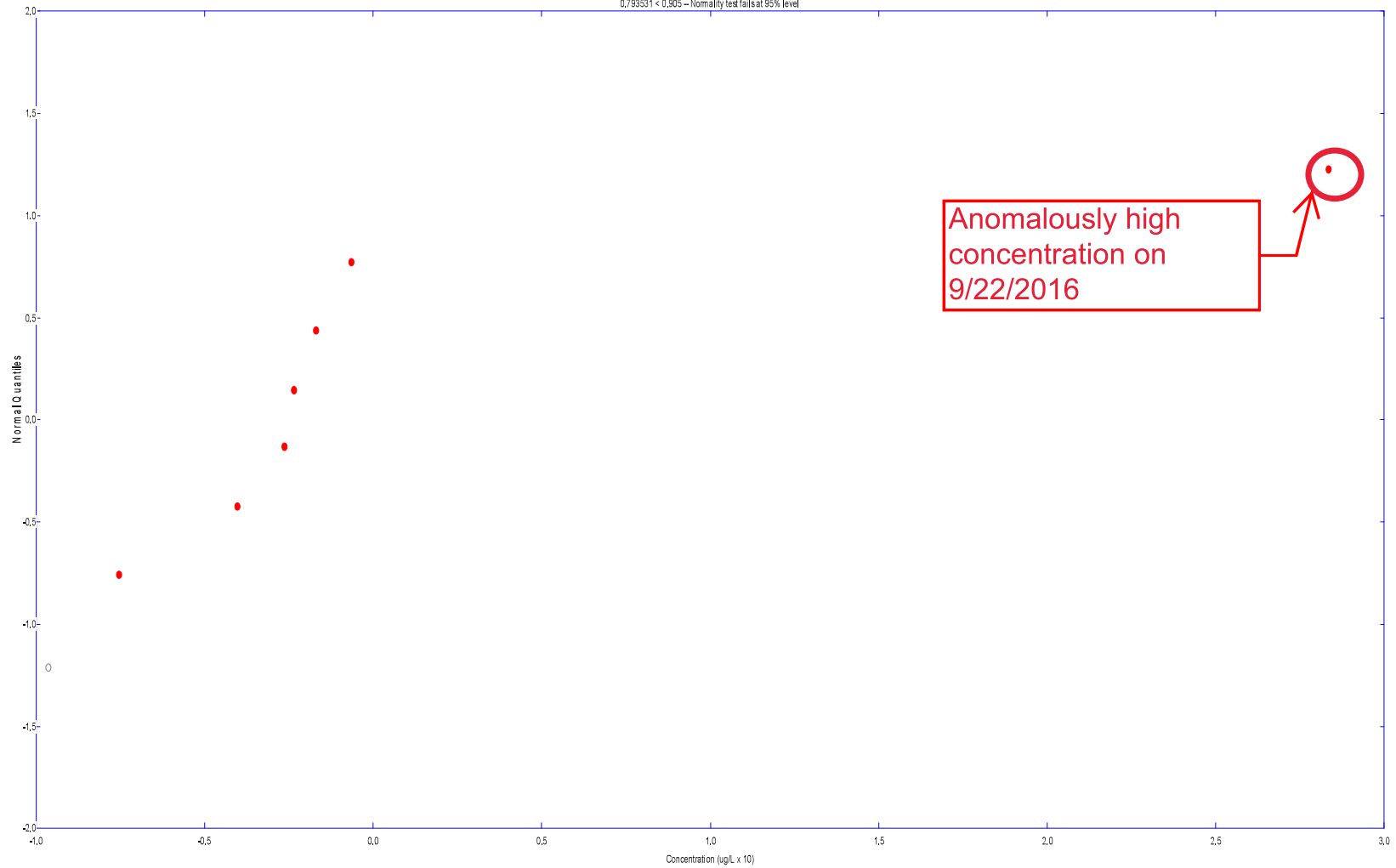
with outliers removed



**Chromium**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0,975283  
0,975283 > 0,905 – Normality test succeeds at 95% level

Chromium  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0.793531  
0.793531 < 0.905 -- Normality test fails at 95% level



Chromium  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0.793531  
0.793531 < 0.905 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Chromium

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.807799	0.233333	0.683	39
2	0.116667	0.233333	0.637	None

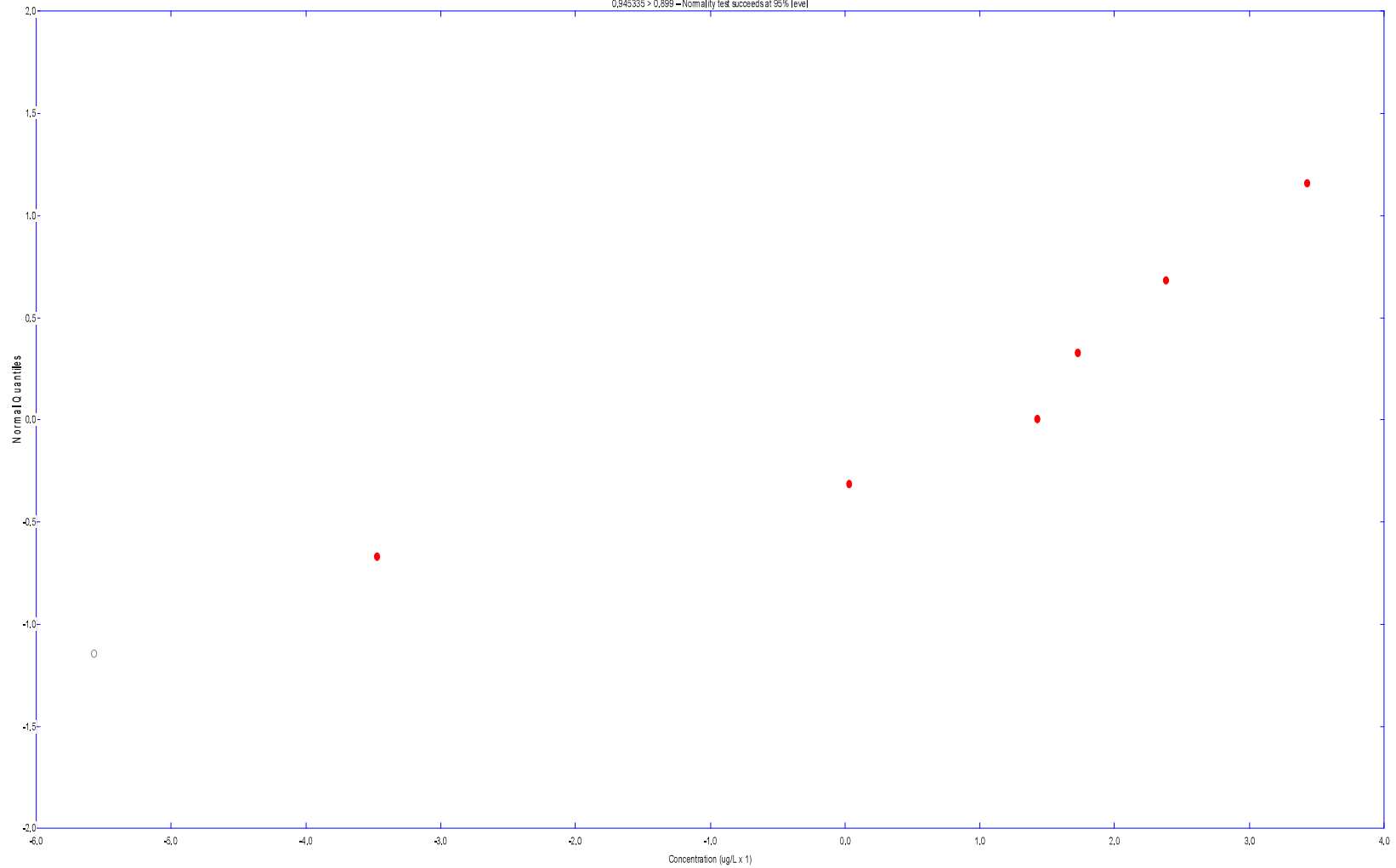
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	10	FALSE
	9/22/2016	39	TRUE
	11/7/2016	8.3	FALSE
	1/11/2017	8	FALSE
	5/18/2017 ~	8.95	FALSE
	6/30/2017 ~	ND<1 U	FALSE
	7/25/2017	6.6	FALSE
	9/12/2017	3.1	FALSE

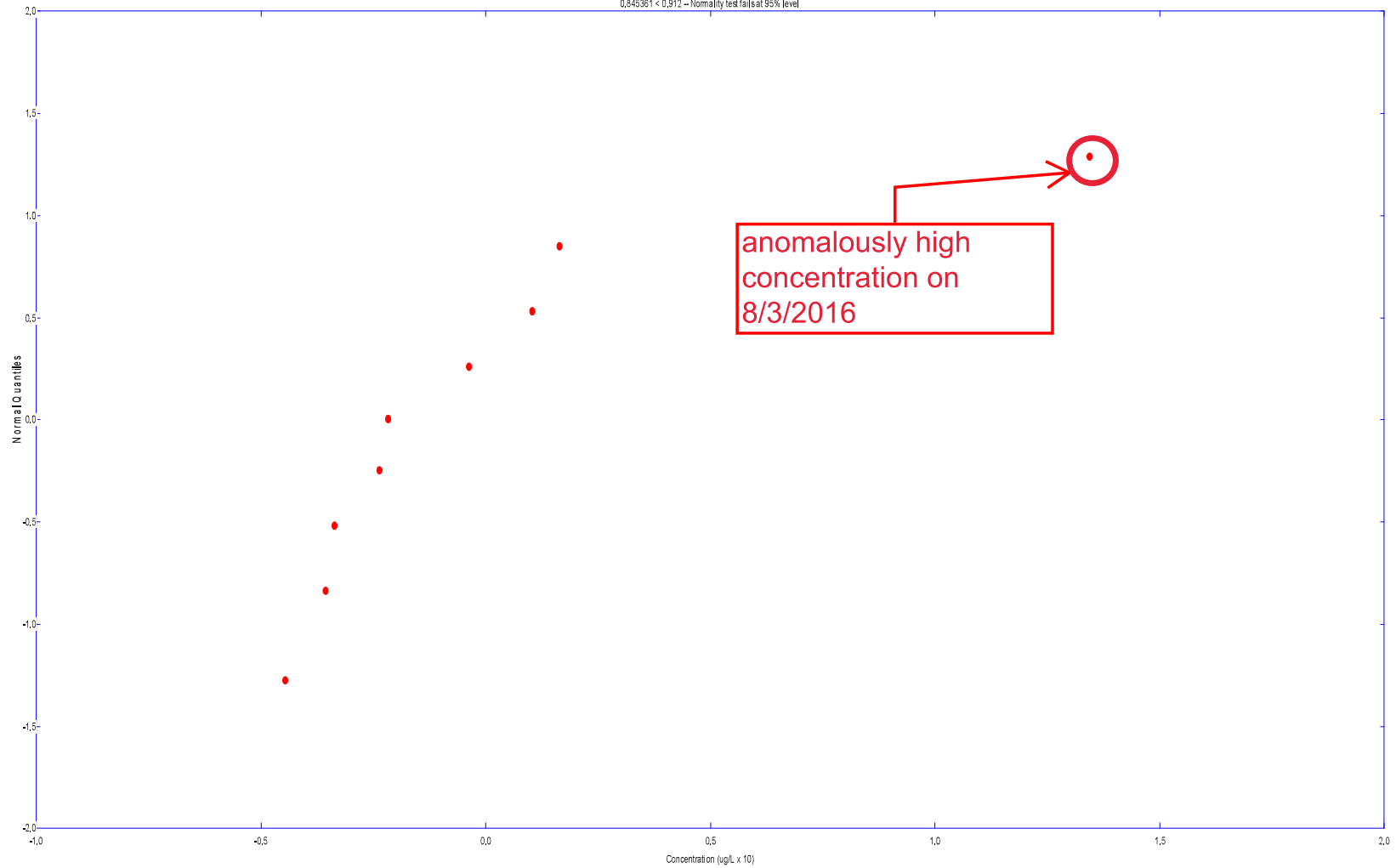
Chromium  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,945335  
0,945335 > 0,899 – Normality test succeeds at 95% level

with outliers removed



**Chromium**  
**Probability Plot of Residuals for MW-16-11A**  
Correlation Coefficient = 0,945335  
0,945335 > 0,899 – Normality test succeeds at 95% level

Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,845361  
0,845361 < 0,912 -- Normality test fails at 95% level



Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,845361  
0,845361 < 0,912 -- Normality test fails at 95% level



## Dixon's Test for Outliers

Parameter: Cobalt

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.694118	0.147541	0.635	21
2	0.115385	0.163636	0.683	None

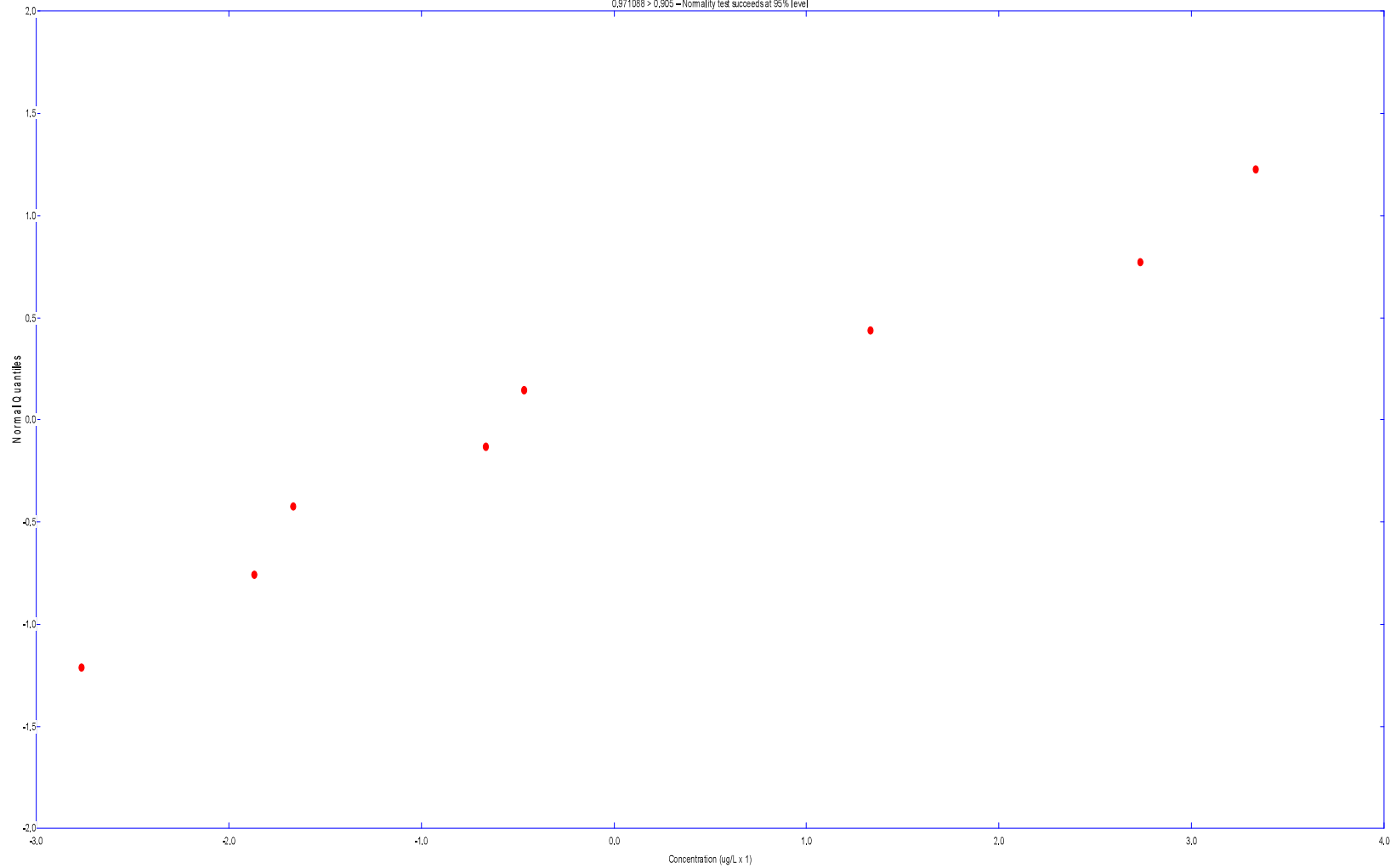
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>21</b>	<b>TRUE</b>
	9/22/2016	7.2	FALSE
	11/9/2016	8.6	FALSE
	1/10/2017	3.1	FALSE
	2/27/2017	5.4	FALSE
	4/18/2017	5.2	FALSE
	6/6/2017	4.2	FALSE
	7/25/2017	9.2	FALSE
	9/14/2017	4	FALSE

Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,971088  
0,971088 > 0,905 – Normality test succeeds at 95% level

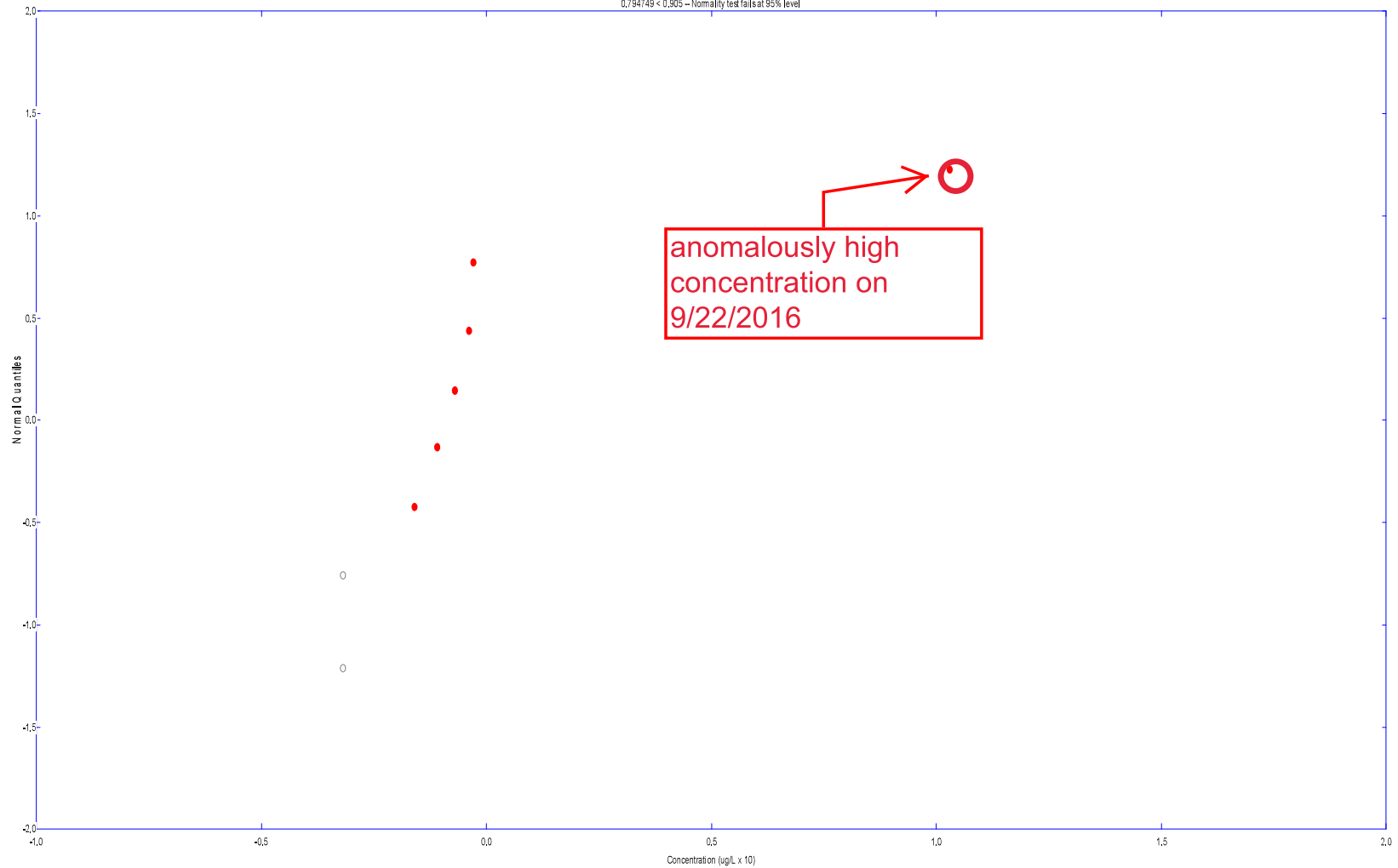
with outliers removed



**Cobalt**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0,971088  
0,971088 > 0,905 – Normality test succeeds at 95% level

Cobalt  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,794749  
0,794749 < 0,905 – Normality test fails at 95% level



Cobalt

Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,794749  
0,794749 < 0,905 – Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Cobalt

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.785185	0	0.683	14
2	0.0344828	0	0.637	None

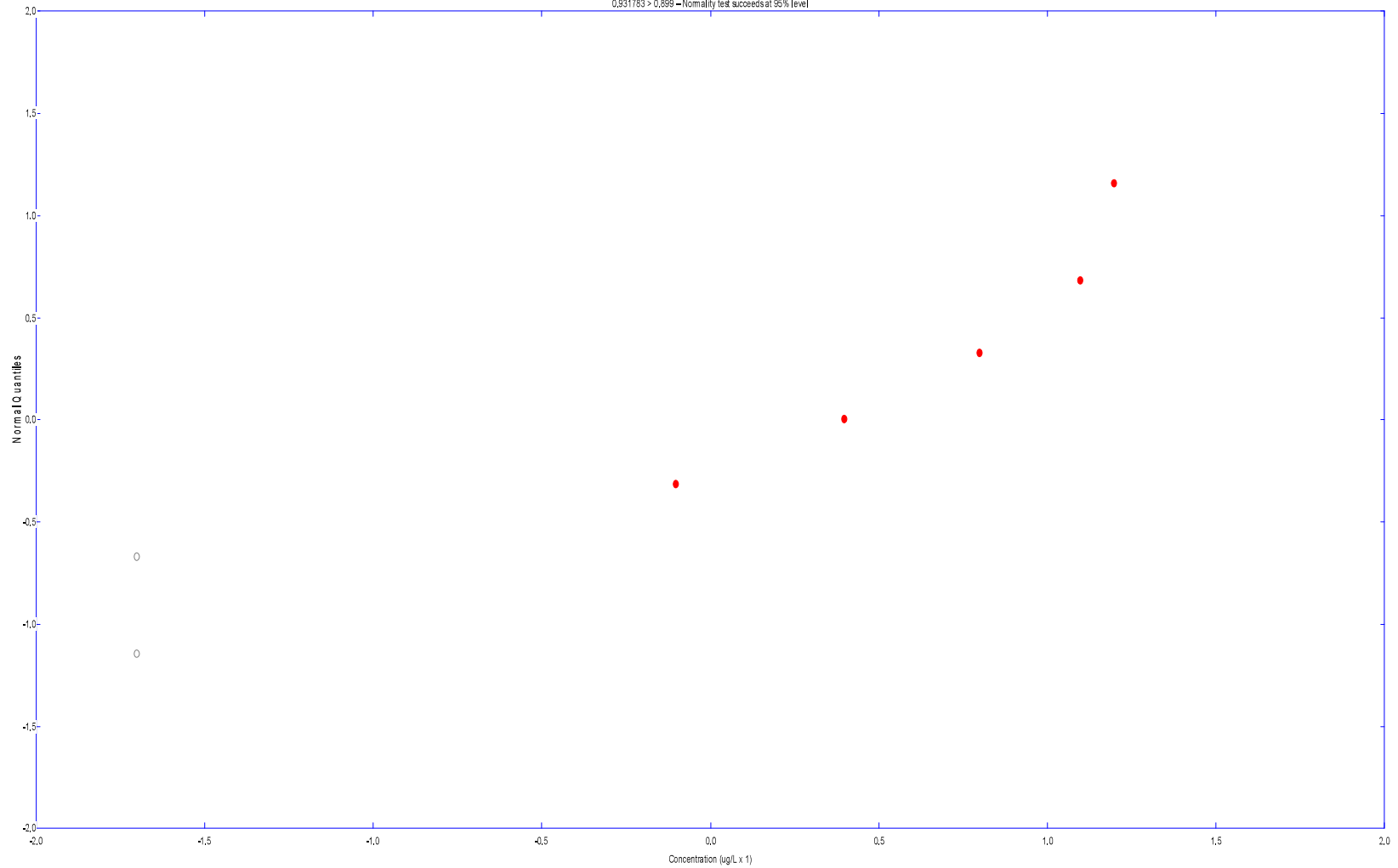
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	3	FALSE
	9/22/2016	14	TRUE
	11/7/2016	3.3	FALSE
	1/11/2017	3.4	FALSE
	5/18/2017 ~	2.6	FALSE
	6/30/2017 ~	ND<0.5 U	FALSE
	7/25/2017	2.1	FALSE
	9/12/2017	ND<0.5 U	FALSE

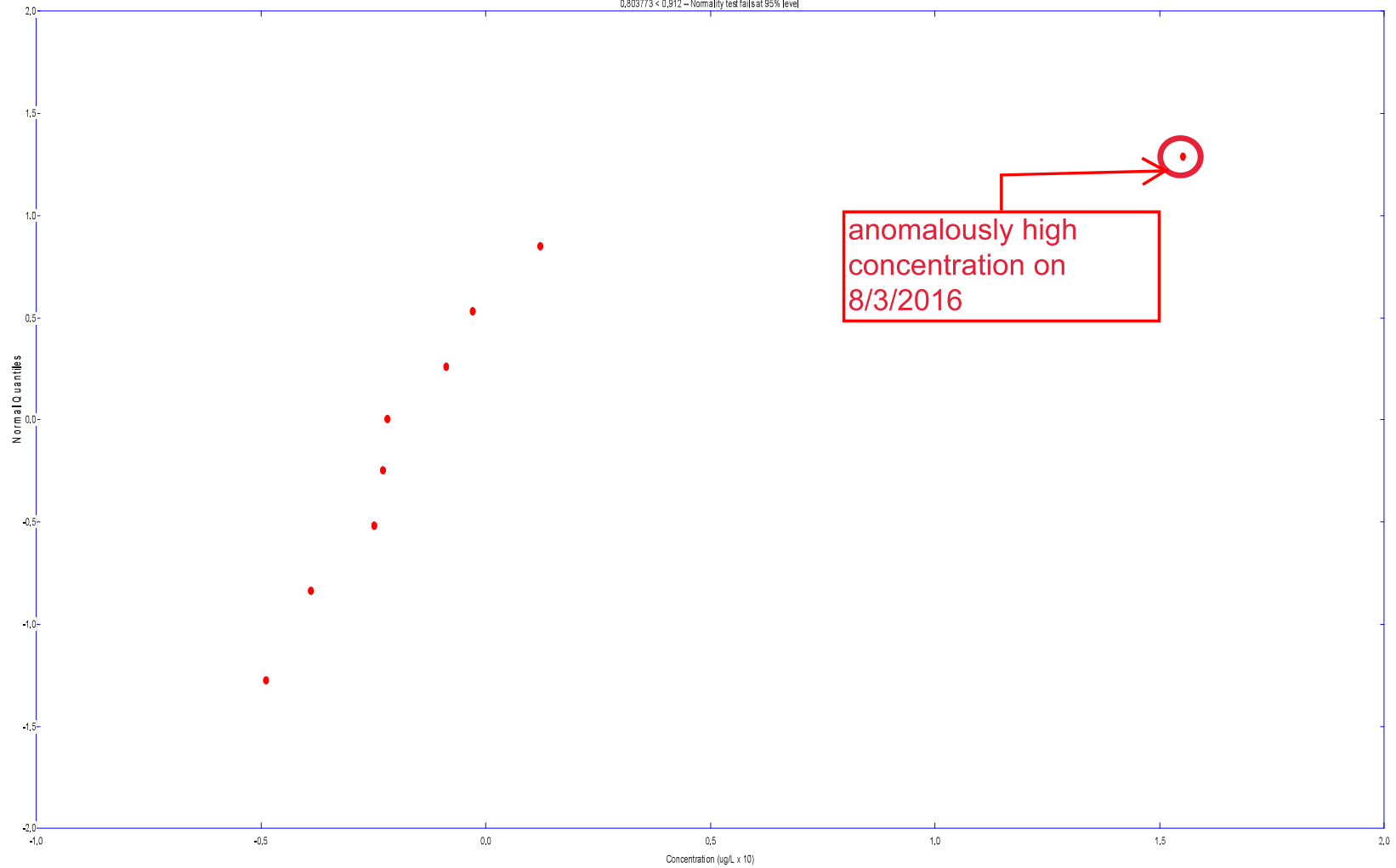
Cobalt  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,931783  
0,931783 > 0,899 – Normality test succeeds at 95% level

with outliers removed



Cobalt  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,931783  
0,931783 > 0,899 – Normality test succeeds at 95% level

Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,803773  
0,803773 < 0,912 -- Normality test fails at 95% level



Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,803773  
0,803773 < 0,912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Lead

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.737113	0.163934	0.635	23
2	0.294118	0.217391	0.683	None

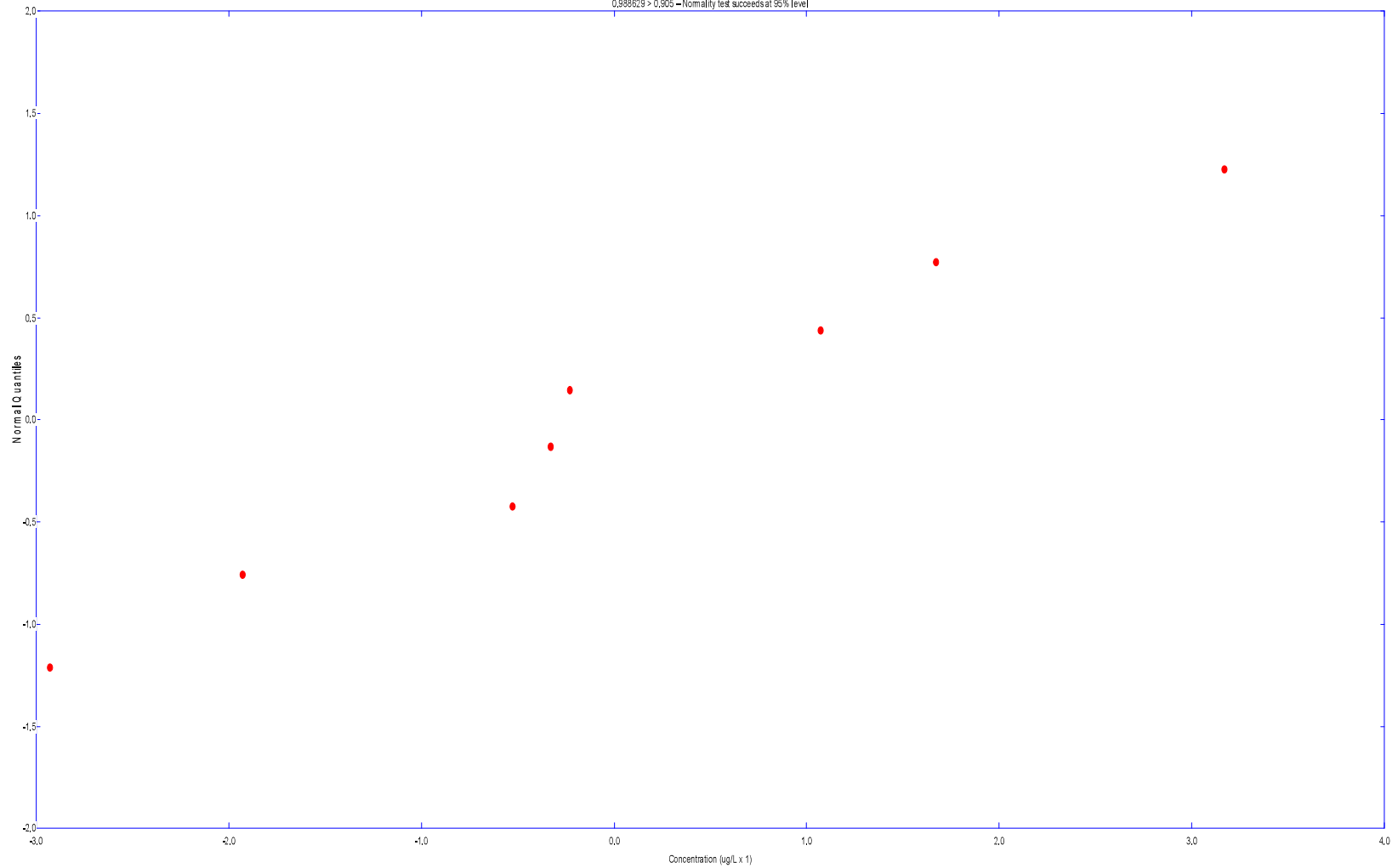
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>23</b>	<b>TRUE</b>
	9/22/2016	6.6	FALSE
	11/9/2016	7.2	FALSE
	1/10/2017	2.6	FALSE
	2/27/2017	5.3	FALSE
	4/18/2017	5.2	FALSE
	6/6/2017	3.6	FALSE
	7/25/2017	8.7	FALSE
	9/14/2017	5	FALSE

Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,988629  
0,988629 > 0,905 – Normality test succeeds at 95% level

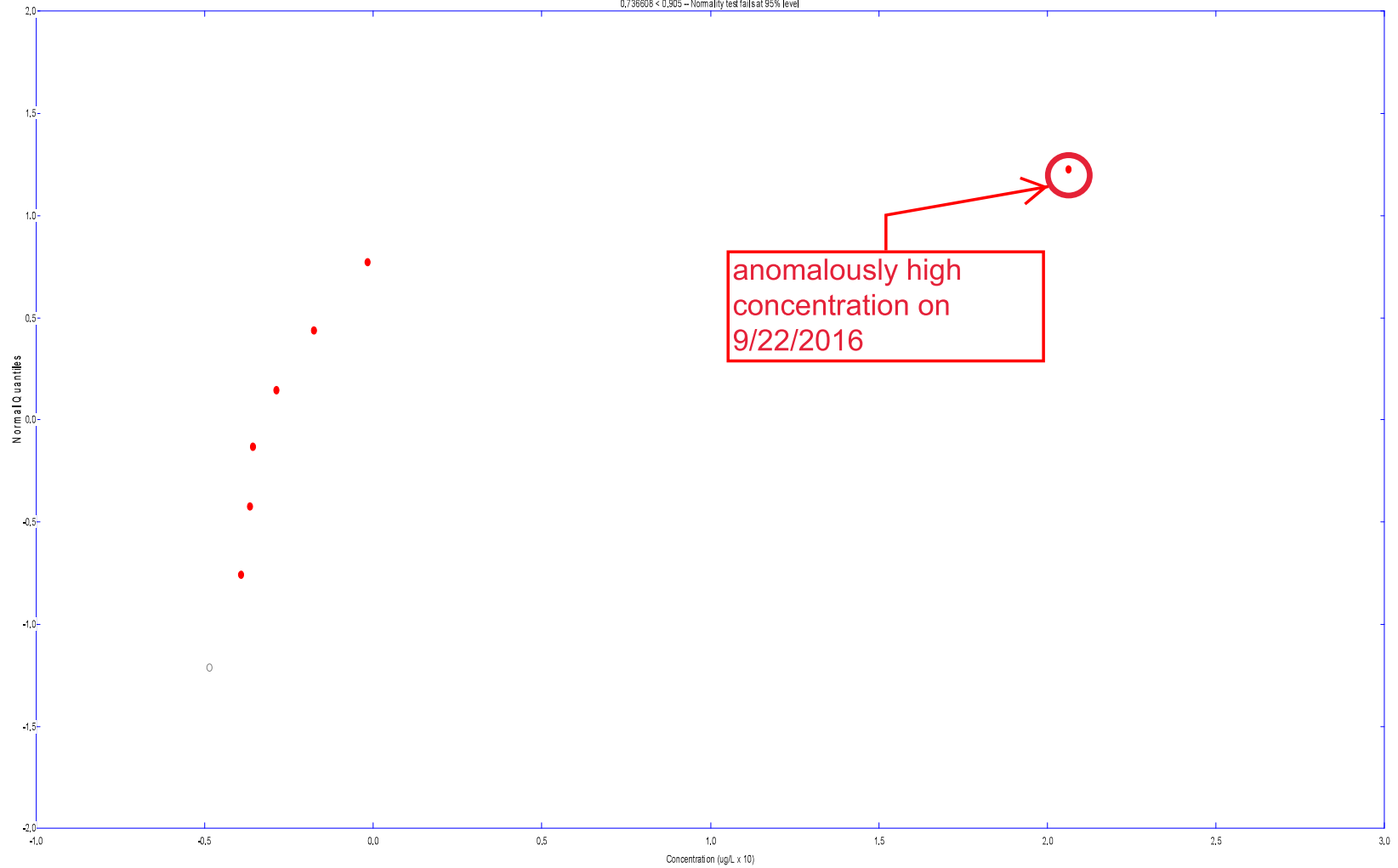
with outliers removed



Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,988629  
0,988629 > 0,905 – Normality test succeeds at 95% level



Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0.736608  
0.736608 < 0.905 -- Normality test fails at 95% level



Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0.736608  
0.736608 < 0.905 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Lead

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.847251	0.202128	0.683	26
2	0.340426	0.202128	0.637	None

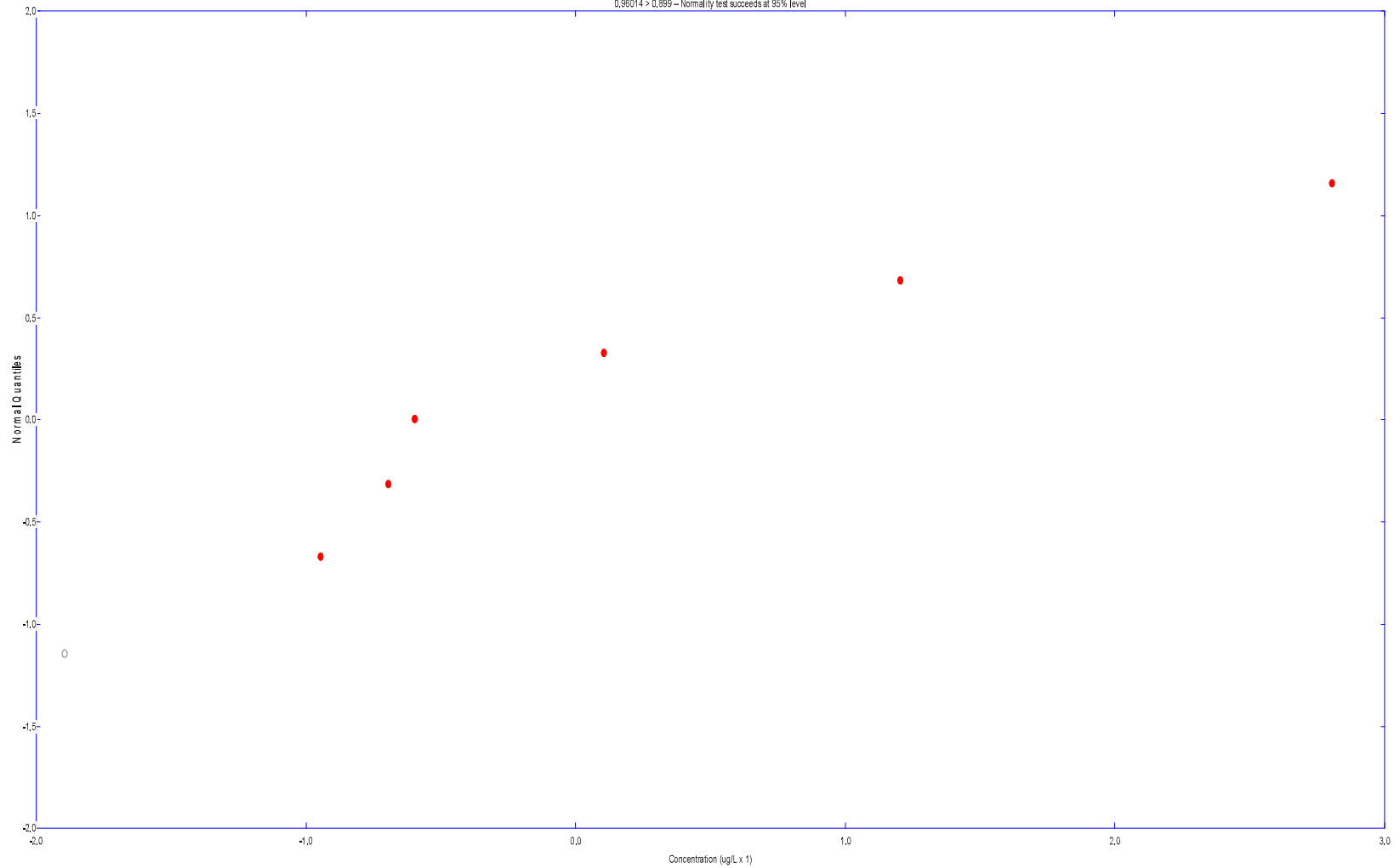
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	3.6	FALSE
	9/22/2016	<b>26</b>	<b>TRUE</b>
	11/7/2016	1.8	FALSE
	1/11/2017	5.2	FALSE
	5/18/2017 ~	2.5	FALSE
	6/30/2017 ~	1.45	FALSE
	7/25/2017	1.7	FALSE
	9/12/2017	ND<0.5 U	FALSE

Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,96014  
0,96014 > 0,899 – Normality test succeeds at 95% level

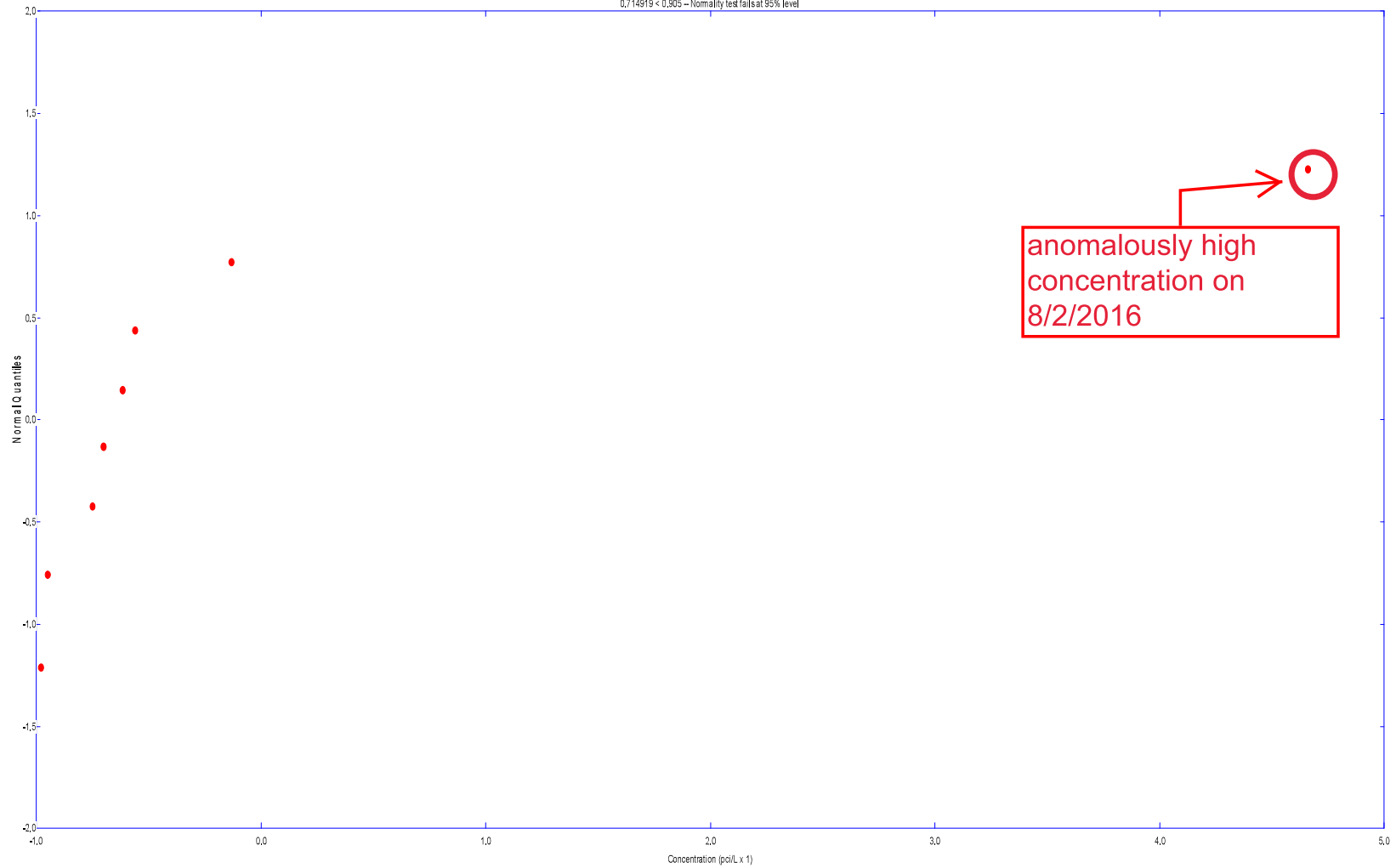
with outliers removed



Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,96014  
0,96014 > 0,899 – Normality test succeeds at 95% level

Radium-226/228  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,714919  
0,714919 < 0,905 – Normality test fails at 95% level



anomalously high  
concentration on  
8/2/2016

Radium-226/228  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,714919  
0,714919 < 0,905 – Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Radium-226/228

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.853832	0.0352941	0.683	6.94
2	0.505882	0.0352941	0.637	None

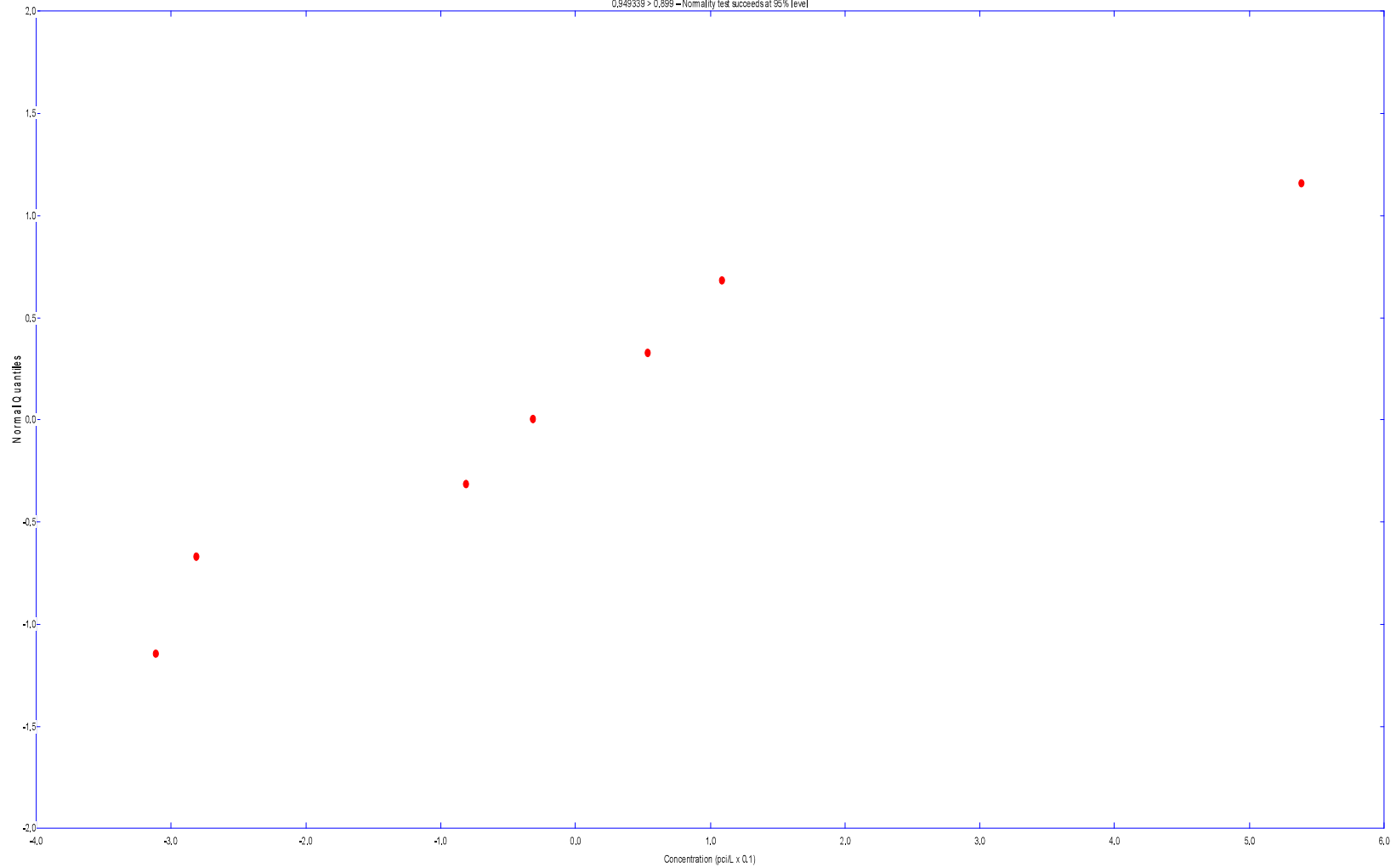
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	<b>6.94</b>	<b>TRUE</b>
	9/22/2016	2.15	FALSE
	11/7/2016	1.72	FALSE
	1/11/2017	1.33	FALSE
	5/18/2017 ~	1.53	FALSE
	6/30/2017 ~	1.665	FALSE
	7/25/2017	1.58	FALSE
	9/12/2017	1.3	FALSE

Radium-226/228  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,949339  
0,949339 > 0,899 – Normality test succeeds at 95% level

with outliers removed



**Radium-226/228**  
**Probability Plot of Residuals for MW-16-11A**  
Correlation Coefficient = 0,949339  
0,949339 > 0,899 – Normality test succeeds at 95% level

## Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 46

Percent Non-Detects: 90.1961%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<1 U	ND<2 U
			9/20/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/9/2017	ND<1 U	ND<2 U
			3/1/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/13/2017	ND<1 U	ND<2 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<1 U	ND<2 U
			9/20/2016	ND<1 U	ND<2 U
			11/9/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017 ~	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017 ~	ND<1 U	ND<2 U

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MW-16-07	9	9 (100%)	8/3/2016	ND<1 U	ND<2 U
			9/22/2016	ND<1 U	ND<2 U
			11/9/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/27/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017	ND<1 U	ND<2 U

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MW-16-08	9	8 (88.8889%)	8/3/2016	2.1	2.1
			9/19/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/7/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U

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MW-16-10	7	6 (85.7143%)	8/2/2016	2.1	2.1
			9/19/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/11/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			7/26/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U
			<b>4/18/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>			

			8/30/2017 ~	ND<1 U	ND<2 U
MW-16-11A	8	5 (62.5%)	8/2/2016	2.1	2.1
			9/22/2016	ND<1 U	ND<2 U
			11/7/2016	ND<1 U	ND<2 U
			1/11/2017	ND<1 U	ND<2 U
			5/18/2017 ~	3.2	3.2
			6/30/2017 ~	2	2
			7/25/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U
			<b>6/6/2017</b>	<b>2.4</b>	<b>2.4</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 50

Total Non-Detect: 27

Percent Non-Detects: 54%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	6 (66.6667%)	8/3/2016	14	14
			9/20/2016	5.6	5.6
			11/8/2016	5.1	5.1
			1/9/2017	ND<2.5 U	ND<5 U
			3/1/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/13/2017	ND<2.5 U	ND<5 U

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MW-16-06	9	8 (88.8889%)	8/3/2016 ~	7.45	7.45
			9/20/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
9/14/2017 ~	ND<2.5 U	ND<5 U			

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MW-16-07	8	2 (25%)	9/22/2016	8.1	8.1
			11/9/2016	8.7	8.7
			1/10/2017	ND<2.5 U	ND<5 U
			2/27/2017	6.8	6.8
			4/18/2017	7.2	7.2
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	11	11
			9/14/2017	6.2	6.2
			<b>8/3/2016</b>	<b>28</b>	<b>28</b>

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MW-16-08	9	3 (33.3333%)	8/3/2016	21	21
			9/19/2016	15	15
			11/8/2016	12	12
			1/10/2017	9.2	9.2
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	7.2	7.2
			6/7/2017	ND<2.5 U	ND<5 U
			7/25/2017	5.4	5.4
			9/12/2017	ND<2.5 U	ND<5 U

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MW-16-10	7	5 (71.4286%)	8/2/2016	11	11
			9/19/2016	5.5	5.5
			11/8/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			7/26/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			<b>4/18/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
			<b>6/6/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>			

			8/30/2017 ~	ND<2.5 U	ND<5 U
MW-16-11A	8	3 (37.5%)	8/2/2016	9.7	9.7
			9/22/2016	17	17
			11/7/2016	ND<2.5 U	ND<5 U
			1/11/2017	9	9
			5/18/2017 ~	5.4	5.4
			6/30/2017 ~	5.25	5.25
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	340	340
			9/20/2016	330	330
			11/8/2016	280	280
			1/9/2017	280	280
			3/1/2017	270	270
			4/18/2017	280	280
			6/6/2017	280	280
			7/25/2017	290	290
			9/13/2017	300	300
MW-16-06	9	0 (0%)	8/3/2016 ~	270	270
			9/20/2016	300	300
			11/9/2016	260	260
			1/10/2017	270	270
			2/28/2017	270	270
			4/18/2017	260	260
			6/6/2017 ~	270	270
			7/25/2017	300	300
			9/14/2017 ~	300	300
MW-16-07	9	0 (0%)	8/3/2016	450	450
			9/22/2016	370	370
			11/9/2016	330	330
			1/10/2017	290	290
			2/27/2017	320	320
			4/18/2017	300	300
			6/6/2017	290	290
			7/25/2017	330	330
			9/14/2017	330	330
MW-16-08	9	0 (0%)	8/3/2016	390	390
			9/19/2016	430	430
			11/8/2016	330	330
			1/10/2017	320	320
			2/28/2017	290	290
			4/18/2017	310	310
			6/7/2017	300	300
			7/25/2017	370	370
			9/12/2017	380	380
MW-16-10	7	0 (0%)	8/2/2016	150	150
			9/19/2016	150	150
			11/8/2016	120	120
			1/11/2017	110	110
			2/28/2017	100	100
			7/26/2017	110	110
			9/12/2017	140	140
			<b>4/18/2017</b>	<b>75</b>	<b>75</b>
			<b>6/6/2017</b>	<b>65</b>	<b>65</b>
<b>8/9/2017 ~</b>	<b>115</b>	<b>115</b>			

			8/30/2017 ~	99.5	99.5
MW-16-11A	8	0 (0%)	8/2/2016	300	300
			9/22/2016	480	480
			11/7/2016	120	120
			1/11/2017	360	360
			5/18/2017 ~	280	280
			6/30/2017 ~	270	270
			7/25/2017	300	300
			9/12/2017	310	310
			<b>6/6/2017</b>	<b>260</b>	<b>260</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 47

Percent Non-Detects: 92.1569%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U^	ND<1 U^
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	1.7	1.7
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	ND<0.5 U	ND<1 U

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MW-16-08	9	7 (77.7778%)	8/3/2016	1.2	1.2
			9/19/2016	1.6	1.6
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
8/9/2017 ~	ND<0.5 U	ND<1 U			

			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	7 (87.5%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	1.6	1.6
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 49

Percent Non-Detects: 96.0784%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U	ND<1 U
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	1.3	1.3
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	ND<0.5 U	ND<1 U

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MW-16-08	9	8 (88.8889%)	8/3/2016	1.5	1.5
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>			

			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	ND<0.5 U	ND<1 U
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 8

Percent Non-Detects: 16.3265%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	24	24
			9/20/2016	12	12
			11/8/2016	9.2	9.2
			1/9/2017	6.3	6.3
			3/1/2017	4.2	4.2
			4/18/2017	6.9	6.9
			6/6/2017	2.9	2.9
			7/25/2017	4.4	4.4
			9/13/2017	5.6	5.6
MW-16-06	9	6 (66.6667%)	8/3/2016 ~	13.5	13.5
			9/20/2016	4.3	4.3
			11/9/2016	2.2	2.2
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017 ~	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017 ~	ND<1 U	ND<2 U
MW-16-07	8	0 (0%)	9/22/2016	19	19
			11/9/2016	18	18
			1/10/2017	6.1	6.1
			2/27/2017	12	12
			4/18/2017	11	11
			6/6/2017	7.6	7.6
			7/25/2017	14	14
			9/14/2017	8	8
			<b>8/3/2016</b>	<b>53</b>	<b>53</b>
MW-16-08	9	0 (0%)	8/3/2016	36	36
			9/19/2016	40	40
			11/8/2016	20	20
			1/10/2017	15	15
			2/28/2017	8	8
			4/18/2017	11	11
			6/7/2017	5.6	5.6
			7/25/2017	12	12
			9/12/2017	8.6	8.6
MW-16-10	7	1 (14.2857%)	8/2/2016	21	21
			9/19/2016	14	14
			11/8/2016	8.1	8.1
			1/11/2017	4.8	4.8
			2/28/2017	ND<1 U	ND<2 U
			7/26/2017	9.7	9.7
			9/12/2017	13	13
			<b>4/18/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
<b>8/9/2017 ~</b>	<b>7.35</b>	<b>7.35</b>			

			8/30/2017 ~	8.7	8.7
MW-16-11A	7	1 (14.2857%)	8/2/2016	10	10
			11/7/2016	8.3	8.3
			1/11/2017	8	8
			5/18/2017 ~	8.95	8.95
			6/30/2017 ~	ND<1 U	ND<2 U
			7/25/2017	6.6	6.6
			9/12/2017	3.1	3.1
			<b>9/22/2016</b>	<b>39</b>	<b>39</b>
			<b>6/6/2017</b>	<b>3</b>	<b>3</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 10

Percent Non-Detects: 20.4082%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	10	10
			9/20/2016	4.5	4.5
			11/8/2016	4.1	4.1
			1/9/2017	3.3	3.3
			3/1/2017	1.5	1.5
			4/18/2017	2.8	2.8
			6/6/2017	1.2	1.2
			7/25/2017	1.5	1.5
			9/13/2017	2.4	2.4
MW-16-06	9	7 (77.7778%)	8/3/2016 ~	4.7	4.7
			9/20/2016	1.4	1.4
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U
MW-16-07	8	0 (0%)	9/22/2016	7.2	7.2
			11/9/2016	8.6	8.6
			1/10/2017	3.1	3.1
			2/27/2017	5.4	5.4
			4/18/2017	5.2	5.2
			6/6/2017	4.2	4.2
			7/25/2017	9.2	9.2
			9/14/2017	4	4
			<b>8/3/2016</b>	<b>21</b>	<b>21</b>
MW-16-08	9	0 (0%)	8/3/2016	13	13
			9/19/2016	16	16
			11/8/2016	9.4	9.4
			1/10/2017	8.1	8.1
			2/28/2017	2.8	2.8
			4/18/2017	5.1	5.1
			6/7/2017	2.4	2.4
			7/25/2017	5.2	5.2
			9/12/2017	3.3	3.3
MW-16-10	7	1 (14.2857%)	8/2/2016	12	12
			9/19/2016	5.8	5.8
			11/8/2016	3.3	3.3
			1/11/2017	2.6	2.6
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	3.8	3.8
			9/12/2017	5.9	5.9
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>3.6</b>	<b>3.6</b>			

			<b>8/30/2017 ~</b>	<b>2.95</b>	<b>2.95</b>
MW-16-11A	7	2 (28.5714%)	8/2/2016	3	3
			11/7/2016	3.3	3.3
			1/11/2017	3.4	3.4
			5/18/2017 ~	2.6	2.6
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	2.1	2.1
			9/12/2017	ND<0.5 U	ND<1 U
			<b>9/22/2016</b>	<b>14</b>	<b>14</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 93

Total Non-Detect: 13

Percent Non-Detects: 13.9785%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	16	1 (6.25%)	8/3/2016	0.96	0.96
			9/20/2016	1.1	1.1
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	1	1
			3/1/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/6/2017	1.2	1.2
			7/25/2017	1.1	1.1
			9/13/2017	1.3	1.3
			10/2/2017	1.2	1.2
			3/27/2018	1.2	1.2
			10/1/2018	1.2	1.2
			3/18/2019	1.1	1.1
			9/17/2019	1.1	1.1
			3/19/2020	1.2	1.2
			9/16/2020	1.2	1.2
MW-16-06	16	1 (6.25%)	8/3/2016 ~	0.95	0.95
			9/20/2016	1.1	1.1
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	1	1
			2/28/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/6/2017 ~	1.15	1.15
			7/25/2017	1.1	1.1
			9/14/2017 ~	1.3	1.3
			10/2/2017	1.2	1.2
			3/27/2018 ~	1.2	1.2
			10/2/2018	1.2	1.2
			3/20/2019	1.1	1.1
			9/17/2019	1	1
			3/19/2020	1.2	1.2
			9/15/2020	1.1	1.1
MW-16-07	16	2 (12.5%)	8/3/2016	0.94	0.94
			9/22/2016	1.1	1.1
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	0.97	0.97
			2/27/2017	1.1	1.1
			4/18/2017	1	1
			6/6/2017	1.1	1.1
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	1.2	1.2
			10/3/2017	1.1	1.1
			3/27/2018	1.2	1.2
			10/2/2018	1.1	1.1
			3/20/2019	1	1
			9/17/2019	1.1	1.1
			3/19/2020	1.1	1.1
			9/15/2020	1.1	1.1

MW-16-08	16	0 (0%)	8/3/2016	1	1
			9/19/2016	1.1	1.1
			11/8/2016	1.1	1.1
			1/10/2017	1	1
			2/28/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/7/2017	1.2	1.2
			7/25/2017	1.1	1.1
			9/12/2017	1.3	1.3
			10/4/2017	1.2	1.2
			3/28/2018	1.2	1.2
			10/4/2018	1.1	1.1
			3/19/2019	1.1	1.1
			9/17/2019	1.1	1.1
			3/18/2020	1.2	1.2
			9/15/2020	1.2	1.2

MW-16-10	14	4 (28.5714%)	8/2/2016	0.81	0.81
			9/19/2016	0.98	0.98
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	1.2	1.2
			10/4/2017	1.1	1.1
			3/28/2018	1.1	1.1
			10/3/2018	1	1
			3/19/2019	0.96	0.96
			9/17/2019	1	1
			3/18/2020	1.1	1.1
			9/15/2020	1.2	1.2
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>8/9/2017 ~</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>8/30/2017 ~</b>	<b>1.1</b>	<b>1.1</b>

MW-16-11A	15	5 (33.3333%)	8/2/2016	0.85	0.85
			9/22/2016	0.95	0.95
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 UF1	ND<1 UF1
			9/12/2017	1	1
			10/4/2017	1	1
			3/28/2018 ~	1.03333	1.03333
			10/4/2018	0.98	0.98
			3/19/2019	0.91	0.91
			9/17/2019	0.94	0.94
			3/18/2020	1	1
			9/15/2020	0.96	0.96
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 9

Percent Non-Detects: 18.3673%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	11	11
			9/20/2016	4.4	4.4
			11/8/2016	4.2	4.2
			1/9/2017	3.2	3.2
			3/1/2017	1.8	1.8
			4/18/2017	2.9	2.9
			6/6/2017	1.1	1.1
			7/25/2017	1.4	1.4
			9/13/2017	2.5	2.5
MW-16-06	9	7 (77.7778%)	8/3/2016 ~	4.4	4.4
			9/20/2016	1.3	1.3
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U
MW-16-07	8	0 (0%)	9/22/2016	6.6	6.6
			11/9/2016	7.2	7.2
			1/10/2017	2.6	2.6
			2/27/2017	5.3	5.3
			4/18/2017	5.2	5.2
			6/6/2017	3.6	3.6
			7/25/2017	8.7	8.7
			9/14/2017	5	5
			<b>8/3/2016</b>	<b>23</b>	<b>23</b>
MW-16-08	9	0 (0%)	8/3/2016	16	16
			9/19/2016	14	14
			11/8/2016	8.5	8.5
			1/10/2017	6.4	6.4
			2/28/2017	2.9	2.9
			4/18/2017	5	5
			6/7/2017	1.8	1.8
			7/25/2017	4.7	4.7
			9/12/2017	3.5	3.5
MW-16-10	7	1 (14.2857%)	8/2/2016	7	7
			9/19/2016	3.3	3.3
			11/8/2016	1.7	1.7
			1/11/2017	1.6	1.6
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	1.7	1.7
			9/12/2017	3.4	3.4
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>2.45</b>	<b>2.45</b>			

			8/30/2017 ~	1.7	1.7
MW-16-11A	7	1 (14.2857%)	8/2/2016	3.6	3.6
			11/7/2016	1.8	1.8
			1/11/2017	5.2	5.2
			5/18/2017 ~	2.5	2.5
			6/30/2017 ~	1.45	1.45
			7/25/2017	1.7	1.7
			9/12/2017	ND<0.5 U	ND<1 U
			<b>9/22/2016</b>	<b>26</b>	<b>26</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	0 (0%)	8/3/2016	55	55
			9/20/2016	59	59
			11/8/2016	55	55
			1/9/2017	49	49
			3/1/2017	53	53
			4/18/2017	62	62
			6/6/2017	54	54
			7/25/2017	58	58
			9/13/2017	51	51

MW-16-06	9	0 (0%)	8/3/2016 ~	33	33
			9/20/2016	41	41
			11/9/2016	34	34
			1/10/2017	35	35
			2/28/2017	37	37
			4/18/2017	42	42
			6/6/2017 ~	40.5	40.5
			7/25/2017	49	49
			9/14/2017 ~	42	42

MW-16-07	9	0 (0%)	8/3/2016	78	78
			9/22/2016	76	76
			11/9/2016	63	63
			1/10/2017	51	51
			2/27/2017	56	56
			4/18/2017	65	65
			6/6/2017	56	56
			7/25/2017	69	69
			9/14/2017	57	57

MW-16-08	9	0 (0%)	8/3/2016	77	77
			9/19/2016	96	96
			11/8/2016	75	75
			1/10/2017	66	66
			2/28/2017	62	62
			4/18/2017	79	79
			6/7/2017	64	64
			7/25/2017	76	76
			9/12/2017	65	65

MW-16-10	7	0 (0%)	8/2/2016	65	65
			9/19/2016	77	77
			11/8/2016	65	65
			1/11/2017	74	74
			2/28/2017	88	88
			7/26/2017	88	88
			9/12/2017	91	91
			4/18/2017	120	120
			6/6/2017	130	130
8/9/2017 ~	86	86			

			8/30/2017 ~	73	73
MW-16-11A	8	0 (0%)	8/2/2016	56	56
			9/22/2016	110	110
			11/7/2016	64	64
			1/11/2017	58	58
			5/18/2017 ~	42.5	42.5
			6/30/2017 ~	39	39
			7/25/2017	52	52
			9/12/2017	52	52
			<b>6/6/2017</b>	<b>34</b>	<b>34</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 51

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/20/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/9/2017	ND<0.1 U	ND<0.2 U
			3/1/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/13/2017	ND<0.1 U	ND<0.2 U
MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.1 U	ND<0.2 U
			9/20/2016	ND<0.1 U	ND<0.2 U
			11/9/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017 ~	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/14/2017 ~	ND<0.1 U	ND<0.2 U
MW-16-07	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/22/2016	ND<0.1 U	ND<0.2 U
			11/9/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/27/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/14/2017	ND<0.1 U	ND<0.2 U
MW-16-08	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/19/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/7/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
MW-16-10	7	7 (100%)	8/2/2016	ND<0.1 U	ND<0.2 U
			9/19/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/11/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			7/26/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
			<b>4/18/2017</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>			

			8/30/2017 ~	ND<0.1 U	ND<0.2 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.1 U	ND<0.2 U
			9/22/2016	ND<0.1 U	ND<0.2 U
			11/7/2016	ND<0.1 U	ND<0.2 U
			1/11/2017	ND<0.1 U	ND<0.2 U
			5/18/2017 ~	ND<0.1 U	ND<0.2 U
			6/30/2017 ~	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	43	43
			9/20/2016	23	23
			11/8/2016	25	25
			1/9/2017	21	21
			3/1/2017	20	20
			4/18/2017	23	23
			6/6/2017	18	18
			7/25/2017	20	20
			9/13/2017	20	20
MW-16-06	9	0 (0%)	8/3/2016 ~	30	30
			9/20/2016	22	22
			11/9/2016	20	20
			1/10/2017	17	17
			2/28/2017	18	18
			4/18/2017	17	17
			6/6/2017 ~	16.5	16.5
			7/25/2017	17	17
			9/14/2017 ~	17	17
MW-16-07	9	0 (0%)	8/3/2016	73	73
			9/22/2016	38	38
			11/9/2016	33	33
			1/10/2017	24	24
			2/27/2017	25	25
			4/18/2017	24	24
			6/6/2017	19	19
			7/25/2017	22	22
			9/14/2017	19	19
MW-16-08	9	0 (0%)	8/3/2016	58	58
			9/19/2016	46	46
			11/8/2016	44	44
			1/10/2017	37	37
			2/28/2017	35	35
			4/18/2017	39	39
			6/7/2017	32	32
			7/25/2017	30	30
			9/12/2017	28	28
MW-16-10	7	0 (0%)	8/2/2016	33	33
			9/19/2016	22	22
			11/8/2016	21	21
			1/11/2017	15	15
			2/28/2017	20	20
			7/26/2017	16	16
			9/12/2017	16	16
			4/18/2017	23	23
			6/6/2017	21	21
8/9/2017 ~	18	18			

			8/30/2017 ~	15.5	15.5
MW-16-11A	8	0 (0%)	8/2/2016	32	32
			9/22/2016	32	32
			11/7/2016	21	21
			1/11/2017	19	19
			5/18/2017 ~	18	18
			6/30/2017 ~	18	18
			7/25/2017	19	19
			9/12/2017	17	17
			6/6/2017	17	17

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 50

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	1.81	1.81
			9/20/2016	3.99	3.99
			11/8/2016	1.67	1.67
			1/9/2017	2.26	2.26
			3/1/2017	1.41	1.41
			4/18/2017	1.06	1.06
			6/6/2017	1.77	1.77
			7/25/2017	1.51	1.51
			9/13/2017	1.3	1.3
MW-16-06	9	0 (0%)	8/3/2016 ~	1.56	1.56
			9/20/2016	1.53	1.53
			11/9/2016	2.15	2.15
			1/10/2017	1.9	1.9
			2/28/2017	1.31	1.31
			4/18/2017	0.99	0.99
			6/6/2017 ~	1.145	1.145
			7/25/2017	1.23	1.23
			9/14/2017 ~	1.14	1.14
MW-16-07	9	0 (0%)	8/3/2016	3.26	3.26
			9/22/2016	4.09	4.09
			11/9/2016	4.48	4.48
			1/10/2017	1.85	1.85
			2/27/2017	1.78	1.78
			4/18/2017	1.88	1.88
			6/6/2017	2.46	2.46
			7/25/2017	2.54	2.54
			9/14/2017	1.86	1.86
MW-16-08	9	0 (0%)	8/3/2016	2.84	2.84
			9/19/2016	1.82	1.82
			11/8/2016	5.14	5.14
			1/10/2017	2.58	2.58
			2/28/2017	1.91	1.91
			4/18/2017	1.47	1.47
			6/7/2017	1.8	1.8
			7/25/2017	3.05	3.05
			9/12/2017	1.65	1.65
MW-16-10	7	0 (0%)	8/2/2016	2.04	2.04
			9/19/2016	1.89	1.89
			11/8/2016	2.24	2.24
			1/11/2017	1.5	1.5
			2/28/2017	0.934	0.934
			7/26/2017	1.41	1.41
			9/12/2017	1.48	1.48
			4/18/2017	0.9	0.9
			6/6/2017	1.32	1.32
8/9/2017 ~	1.48	1.48			

			<b>8/30/2017 ~</b>	<b>1.375</b>	<b>1.375</b>
MW-16-11A	7	0 (0%)	9/22/2016	2.15	2.15
			11/7/2016	1.72	1.72
			1/11/2017	1.33	1.33
			5/18/2017 ~	1.53	1.53
			6/30/2017 ~	1.665	1.665
			7/25/2017	1.58	1.58
			9/12/2017	1.3	1.3
			<b>8/2/2016</b>	<b>6.94</b>	<b>6.94</b>
			<b>6/6/2017</b>	<b>1.45</b>	<b>1.45</b>

There are 0 unused locations

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 50

Percent Non-Detects: 98.0392%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<2.5 U	ND<5 U
			9/20/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/9/2017	ND<2.5 U	ND<5 U
			3/1/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/13/2017	ND<2.5 U	ND<5 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<2.5 U	ND<5 U
			9/20/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/14/2017 ~	ND<2.5 U	ND<5 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	5.3	5.3
			9/22/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/27/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/14/2017	ND<2.5 U	ND<5 U

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MW-16-08	9	9 (100%)	8/3/2016	ND<2.5 U	ND<5 U
			9/19/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/7/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<2.5 U	ND<5 U
			9/19/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			7/26/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
8/9/2017 ~	ND<2.5 U	ND<5 U			

			8/30/2017 ~	ND<2.5 U	ND<5 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<2.5 U	ND<5 U
			9/22/2016	ND<2.5 U	ND<5 U
			11/7/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			5/18/2017 ~	ND<2.5 U	ND<5 U
			6/30/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

## Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 46

Percent Non-Detects: 90.1961%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	8 (88.8889%)	8/3/2016	1.1	1.1
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U	ND<1 U
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U

---

MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
9/14/2017 ~	ND<0.5 U	ND<1 U			

---

MW-16-07	9	7 (77.7778%)	8/3/2016	2.3	2.3
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	1	1
9/14/2017	ND<0.5 U	ND<1 U			

---

MW-16-08	9	7 (77.7778%)	8/3/2016	1.3	1.3
			9/19/2016	1.2	1.2
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
9/12/2017	ND<0.5 U	ND<1 U			

---

MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
8/9/2017 ~	ND<0.5 U^	ND<1 U^			

			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	ND<0.5 U	ND<1 U
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

## Skewness Coefficient

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	2.74444	4.81641	1.81691
MW-16-06	9	0.827778	2.48333	7.54422
MW-16-07	8	6	3.97887	0.373835
MW-16-08	9	7.75556	7.36802	0.897249
MW-16-10	7	2.35714	4.32738	1.70824
MW-16-11A	8	5.79375	6.00324	1.05752

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	4.256	5.43931	1.36665

## Skewness Coefficient

Parameter: Arsenic

Original Data (Not Transformed)

Cohen's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-11A	8	9.27	4.77357	0.148067
MW-16-05	9	8.23333	5.00033	-0.0637032
MW-16-06	9	-0.292	4.35522	<b>2.64762</b>
MW-16-07	8	6.88705	2.51055	0.613695
MW-16-08	9	7.66396	7.68485	0.813109
MW-16-10	7	8.25	3.88909	-0.52529

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	4.03884	6.30378	0.931901

## Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	294.444	24.5515	1.01157
MW-16-06	9	277.778	17.1594	0.519638
MW-16-07	9	334.444	50.0278	1.44883
MW-16-08	9	346.667	47.697	0.431717
MW-16-10	7	125.714	20.702	0.134164
MW-16-11A	8	302.5	99.8213	-0.0523964

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	285.882	84.2894	-0.526493

## Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	5.68214	0.0804871	0.95611
MW-16-06	9	5.62516	0.0609499	0.49528
MW-16-07	9	5.80354	0.13808	1.21299
MW-16-08	9	5.84014	0.135293	0.297747
MW-16-10	7	4.82236	0.164934	0.0455551
MW-16-11A	8	5.65309	0.394627	-1.22778

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	5.59883	0.370072	-1.40006



## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	290	450	160	0.5888	94.208
2	290	370	80	0.3244	25.952
3	300	330	30	0.1976	5.928
4	320	330	10	0.0947	0.947
5	330	330	0		
6	330	320	-10		
7	330	300	-30		
8	370	290	-80		
9	450	290	-160		

---

Sum of b values = 127.035

Sample Standard Deviation = 50.0278

W Statistic = 0.805999

**5% Critical value of 0.829 exceeds 0.805999**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.805999  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.66988	6.10925	0.439367	0.5888	0.258699
2	5.66988	5.9135	0.243622	0.3244	0.079031
3	5.70378	5.79909	0.0953102	0.1976	0.0188333
4	5.76832	5.79909	0.0307717	0.0947	0.00291408
5	5.79909	5.79909	0		
6	5.79909	5.76832	-0.0307717		
7	5.79909	5.70378	-0.0953102		
8	5.9135	5.66988	-0.243622		
9	6.10925	5.66988	-0.439367		

---

Sum of b values = 0.359477

Sample Standard Deviation = 0.13808

W Statistic = 0.847205

5% Critical value of 0.829 is less than 0.847205

Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.847205

Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-11A	7	6.56429	3.30488	-0.755706
MW-16-05	9	8.38889	6.47446	1.71747
MW-16-06	9	2.88889	4.13021	2.17688
MW-16-07	8	11.9625	4.78329	0.320197
MW-16-08	9	17.3556	12.4719	0.995955
MW-16-10	7	10.2286	6.54948	0.236403

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	9.61122	8.25515	1.7573

## Skewness Coefficient

Parameter: Chromium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.92871	0.631947	0.673789
MW-16-06	9	0.538862	0.929372	1.42792
MW-16-07	8	2.40907	0.412611	-0.0660623
MW-16-08	9	2.64588	0.670618	0.392812
MW-16-10	7	2.02588	1.00685	-1.22591
MW-16-11A	7	1.67263	0.83318	-1.3333

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	1.86088	1.01347	-0.631762

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.47778	2.70729	1.66974
MW-16-06	9	1.06667	1.39463	2.2839
MW-16-07	8	5.8625	2.23411	0.377399
MW-16-08	9	7.25556	4.77915	0.710724
MW-16-10	7	4.84286	3.66554	0.989395
MW-16-11A	7	2.2	1.24097	-0.583273

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	4.13061	3.56944	1.35901

## Skewness Coefficient

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.03443	0.665075	0.486789
MW-16-06	9	-0.329777	0.782029	<b>1.82308</b>
MW-16-07	8	1.70411	0.386072	0.0171255
MW-16-08	9	1.783	0.67782	0.0796129
MW-16-10	7	1.25843	0.994225	-0.980572
MW-16-11A	7	0.546781	0.862325	-0.838728

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	0.993026	1.02931	-0.459192

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.47778	2.70729	1.66974
MW-16-06	9	0.677778	1.5778	2.21712
MW-16-07	8	5.8625	2.23411	0.377399
MW-16-08	9	7.25556	4.77915	0.710724
MW-16-10	7	4.77143	3.76772	1.05097
MW-16-11A	7	2.05714	1.4718	0.168083

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	4.02857	3.6795	1.38805

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	1.0975	0.180647	-2.36014
MW-16-06	16	1.08125	0.178769	-2.19557
MW-16-07	16	1.00687	0.210356	-1.77484
MW-16-08	16	1.13125	0.07932	0.229585
MW-16-10	14	0.889286	0.274071	-0.560684
MW-16-11A	15	0.808222	0.229616	-0.604672

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	1.00692	0.225893	-1.39077



## Skewness Coefficient

Parameter: Fluoride

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	0.0746366	0.218445	-2.90896
MW-16-06	16	0.0599271	0.21625	-2.80843
MW-16-07	16	-0.021969	0.270443	-2.0008
MW-16-08	16	0.121028	0.0699272	0.0589912
MW-16-10	14	-0.170983	0.356557	-0.720364
MW-16-11A	15	-0.257598	0.322028	-0.647146

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	-0.0270942	0.283941	-1.6905

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-05

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.3	0.8	0.5056	0.40448
2	0.96	1.2	0.24	0.329	0.07896
3	1	1.2	0.2	0.2521	0.05042
4	1.1	1.2	0.1	0.1939	0.01939
5	1.1	1.2	0.1	0.1447	0.01447
6	1.1	1.2	0.1	0.1005	0.01005
7	1.1	1.2	0.1	0.0593	0.00593
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.2	1.1	-0.1		
11	1.2	1.1	-0.1		
12	1.2	1.1	-0.1		
13	1.2	1.1	-0.1		
14	1.2	1	-0.2		
15	1.2	0.96	-0.24		
16	1.3	0.5	-0.8		

---

Sum of b values = 0.5837

Sample Standard Deviation = 0.180647

W Statistic = 0.696028

**5% Critical value of 0.887 exceeds 0.696028**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.696028**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	-0.693147	0.262364	0.955511	0.5056	0.483107
2	-0.040822	0.182322	0.223144	0.329	0.0734142
3	0	0.182322	0.182322	0.2521	0.0459633
4	0.0953102	0.182322	0.0870114	0.1939	0.0168715
5	0.0953102	0.182322	0.0870114	0.1447	0.0125905
6	0.0953102	0.182322	0.0870114	0.1005	0.00874464
7	0.0953102	0.182322	0.0870114	0.0593	0.00515977
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.182322	0.0953102	-0.0870114		
11	0.182322	0.0953102	-0.0870114		
12	0.182322	0.0953102	-0.0870114		
13	0.182322	0.0953102	-0.0870114		
14	0.182322	0	-0.182322		
15	0.182322	-0.040822	-0.223144		
16	0.262364	-0.693147	-0.955511		

---

Sum of b values = 0.645851

Sample Standard Deviation = 0.218445

W Statistic = 0.582757

**5% Critical value of 0.887 exceeds 0.582757**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.582757**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.3	0.8	0.5056	0.40448
2	0.95	1.2	0.25	0.329	0.08225
3	1	1.2	0.2	0.2521	0.05042
4	1	1.2	0.2	0.1939	0.03878
5	1.1	1.2	0.1	0.1447	0.01447
6	1.1	1.15	0.05	0.1005	0.005025
7	1.1	1.1	0	0.0593	0
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.1	1.1	0		
11	1.15	1.1	-0.05		
12	1.2	1.1	-0.1		
13	1.2	1	-0.2		
14	1.2	1	-0.2		
15	1.2	0.95	-0.25		
16	1.3	0.5	-0.8		

---

Sum of b values = 0.595425

Sample Standard Deviation = 0.178769

W Statistic = 0.739569

**5% Critical value of 0.887 exceeds 0.739569**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.739569**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	-0.693147	0.262364	0.955511	0.5056	0.483107
2	-0.0512933	0.182322	0.233615	0.329	0.0768593
3	0	0.182322	0.182322	0.2521	0.0459633
4	0	0.182322	0.182322	0.1939	0.0353521
5	0.0953102	0.182322	0.0870114	0.1447	0.0125905
6	0.0953102	0.139762	0.0444518	0.1005	0.0044674
7	0.0953102	0.0953102	0	0.0593	0
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.0953102	0.0953102	0		
11	0.139762	0.0953102	-0.0444518		
12	0.182322	0.0953102	-0.0870114		
13	0.182322	0	-0.182322		
14	0.182322	0	-0.182322		
15	0.182322	-0.0512933	-0.233615		
16	0.262364	-0.693147	-0.955511		

---

Sum of b values = 0.658339

Sample Standard Deviation = 0.21625

W Statistic = 0.617868

**5% Critical value of 0.887 exceeds 0.617868**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.617868**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.2	0.7	0.5056	0.35392
2	0.5	1.2	0.7	0.329	0.2303
3	0.94	1.1	0.16	0.2521	0.040336
4	0.97	1.1	0.13	0.1939	0.025207
5	1	1.1	0.1	0.1447	0.01447
6	1	1.1	0.1	0.1005	0.01005
7	1.1	1.1	0	0.0593	0
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.1	1.1	0		
11	1.1	1	-0.1		
12	1.1	1	-0.1		
13	1.1	0.97	-0.13		
14	1.1	0.94	-0.16		
15	1.2	0.5	-0.7		
16	1.2	0.5	-0.7		

---

Sum of b values = 0.674283

Sample Standard Deviation = 0.210356

W Statistic = 0.68499

**5% Critical value of 0.887 exceeds 0.68499**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.68499**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	-0.693147	0.182322	0.875469	0.5056	0.442637
2	-0.693147	0.182322	0.875469	0.329	0.288029
3	-0.0618754	0.0953102	0.157186	0.2521	0.0396265
4	-0.0304592	0.0953102	0.125769	0.1939	0.0243867
5	0	0.0953102	0.0953102	0.1447	0.0137914
6	0	0.0953102	0.0953102	0.1005	0.00957867
7	0.0953102	0.0953102	0	0.0593	0
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.0953102	0.0953102	0		
11	0.0953102	0	-0.0953102		
12	0.0953102	0	-0.0953102		
13	0.0953102	-0.0304592	-0.125769		
14	0.0953102	-0.0618754	-0.157186		
15	0.182322	-0.693147	-0.875469		
16	0.182322	-0.693147	-0.875469		

---

Sum of b values = 0.818049

Sample Standard Deviation = 0.270443

W Statistic = 0.609979

**5% Critical value of 0.887 exceeds 0.609979**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.609979**

**Evidence of non-normality at 99% level of significance**

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	1.06625	0.296802	0.0673564
MW-16-06	16	1.05	0.293825	0.0800714
MW-16-07	16	0.944375	0.375499	0.0835742
MW-16-08	16	1.13125	0.07932	0.229585
MW-16-10	14	0.746429	0.49984	0.281128
MW-16-11A	15	0.641556	0.471515	0.411854

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	0.937025	0.39121	0.116362



## Skewness Coefficient

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.61111	2.99893	1.81739
MW-16-06	9	1.02222	1.294	2.29847
MW-16-07	8	5.525	1.9543	0.114555
MW-16-08	9	6.97778	4.97488	0.878446
MW-16-10	7	2.74286	2.13608	1.1556
MW-16-11A	7	2.39286	1.5627	0.741547

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	3.76837	3.41014	1.69528

## Skewness Coefficient

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.05315	0.690688	0.489817
MW-16-06	9	-0.34534	0.754472	<b>1.86086</b>
MW-16-07	8	1.64834	0.386411	-0.52269
MW-16-08	9	1.71892	0.717566	0.068632
MW-16-10	7	0.743103	0.827518	-0.336561
MW-16-11A	7	0.663245	0.748863	-0.563398

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	0.915748	0.981552	-0.302976

## Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	55.1111	4.04489	0.20306
MW-16-06	9	39.2778	5.05662	0.493967
MW-16-07	9	63.4444	9.4222	0.351593
MW-16-08	9	73.3333	10.6536	0.949387
MW-16-10	7	78.2857	10.9805	-0.119962
MW-16-11A	8	59.1875	22.0583	<b>1.67414</b>

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	60.8235	16.841	0.579078

## Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	4.00697	0.0731896	0.0789647
MW-16-06	9	3.66346	0.126602	0.278714
MW-16-07	9	4.14052	0.146804	0.200143
MW-16-08	9	4.28621	0.138705	0.696363
MW-16-10	7	4.35174	0.14266	-0.203025
MW-16-11A	8	4.03259	0.314509	1.10921

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	4.07054	0.278116	-0.112333

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-11A

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	39	110	71	0.6052	42.9692
2	42.5	64	21.5	0.3164	6.8026
3	52	58	6	0.1743	1.0458
4	52	56	4	0.0561	0.2244
5	56	52	-4		
6	58	52	-6		
7	64	42.5	-21.5		
8	110	39	-71		

---

Sum of b values = 51.042

Sample Standard Deviation = 22.0583

W Statistic = 0.764918

**5% Critical value of 0.818 exceeds 0.764918**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.764918  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-11A

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.66356	4.70048	1.03692	0.6052	0.627543
2	3.7495	4.15888	0.409379	0.3164	0.129528
3	3.95124	4.06044	0.109199	0.1743	0.0190334
4	3.95124	4.02535	0.074108	0.0561	0.00415746
5	4.02535	3.95124	-0.074108		
6	4.06044	3.95124	-0.109199		
7	4.15888	3.7495	-0.409379		
8	4.70048	3.66356	-1.03692		

---

Sum of b values = 0.780262

Sample Standard Deviation = 0.314509

W Statistic = 0.87926

5% Critical value of 0.818 is less than 0.87926  
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.87926  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	23.6667	7.54983	2.11944
MW-16-06	9	19.3889	4.37163	1.79557
MW-16-07	9	30.7778	17.0278	1.90393
MW-16-08	9	38.7778	9.39119	0.851996
MW-16-10	7	20.4286	6.18755	1.25926
MW-16-11A	8	22	6.27922	1.04371

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	26.1275	11.4904	1.96117

## Skewness Coefficient

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.13035	0.256218	1.8128
MW-16-06	9	2.94606	0.195269	1.57811
MW-16-07	9	3.33105	0.42687	1.32689
MW-16-08	9	3.63358	0.230075	0.47356
MW-16-10	7	2.983	0.271862	0.873361
MW-16-11A	8	3.05985	0.257785	0.974189

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	3.19077	0.362574	0.990304



## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	18	43	25	0.5888	14.72
2	20	25	5	0.3244	1.622
3	20	23	3	0.1976	0.5928
4	20	23	3	0.0947	0.2841
5	21	21	0		
6	23	20	-3		
7	23	20	-3		
8	25	20	-5		
9	43	18	-25		

---

Sum of b values = 17.2189

Sample Standard Deviation = 7.54983

W Statistic = 0.650199

**5% Critical value of 0.829 exceeds 0.650199**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.650199**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.89037	3.7612	0.870828	0.5888	0.512744
2	2.99573	3.21888	0.223144	0.3244	0.0723878
3	2.99573	3.13549	0.139762	0.1976	0.027617
4	2.99573	3.13549	0.139762	0.0947	0.0132355
5	3.04452	3.04452	0		
6	3.13549	2.99573	-0.139762		
7	3.13549	2.99573	-0.139762		
8	3.21888	2.99573	-0.223144		
9	3.7612	2.89037	-0.870828		

---

Sum of b values = 0.625984

Sample Standard Deviation = 0.256218

W Statistic = 0.746132

**5% Critical value of 0.829 exceeds 0.746132**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.746132**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-06

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	16.5	30	13.5	0.5888	7.9488
2	17	22	5	0.3244	1.622
3	17	20	3	0.1976	0.5928
4	17	18	1	0.0947	0.0947
5	17	17	0		
6	18	17	-1		
7	20	17	-3		
8	22	17	-5		
9	30	16.5	-13.5		

---

Sum of b values = 10.2583

Sample Standard Deviation = 4.37163

W Statistic = 0.688295

**5% Critical value of 0.829 exceeds 0.688295**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.688295**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.80336	3.4012	0.597837	0.5888	0.352006
2	2.83321	3.09104	0.257829	0.3244	0.0836398
3	2.83321	2.99573	0.162519	0.1976	0.0321137
4	2.83321	2.89037	0.0571584	0.0947	0.0054129
5	2.83321	2.83321	0		
6	2.89037	2.83321	-0.0571584		
7	2.99573	2.83321	-0.162519		
8	3.09104	2.83321	-0.257829		
9	3.4012	2.80336	-0.597837		

---

Sum of b values = 0.473173

Sample Standard Deviation = 0.195269

W Statistic = 0.73398

**5% Critical value of 0.829 exceeds 0.73398**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.73398**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-07

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	19	73	54	0.5888	31.7952
2	19	38	19	0.3244	6.1636
3	22	33	11	0.1976	2.1736
4	24	25	1	0.0947	0.0947
5	24	24	0		
6	25	24	-1		
7	33	22	-11		
8	38	19	-19		
9	73	19	-54		

---

Sum of b values = 40.2271

Sample Standard Deviation = 17.0278

W Statistic = 0.697642

**5% Critical value of 0.829 exceeds 0.697642**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.697642**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.94444	4.29046	1.34602	0.5888	0.792537
2	2.94444	3.63759	0.693147	0.3244	0.224857
3	3.09104	3.49651	0.405465	0.1976	0.0801199
4	3.17805	3.21888	0.040822	0.0947	0.00386584
5	3.17805	3.17805	0		
6	3.21888	3.17805	-0.040822		
7	3.49651	3.09104	-0.405465		
8	3.63759	2.94444	-0.693147		
9	4.29046	2.94444	-1.34602		

---

Sum of b values = 1.10138

Sample Standard Deviation = 0.42687

W Statistic = 0.832132

5% Critical value of 0.829 is less than 0.832132  
Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.832132  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.86444	0.867613	1.7901
MW-16-06	9	1.43944	0.383849	0.713621
MW-16-07	9	2.68889	1.02732	0.761539
MW-16-08	9	2.47333	1.14409	1.49391
MW-16-10	7	1.642	0.443285	-0.170195
MW-16-11A	7	1.61071	0.285342	0.818505

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	1.97928	0.892146	1.80807

## Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	0.550291	0.380046	1.07063
MW-16-06	9	0.334522	0.255133	0.411715
MW-16-07	9	0.929541	0.358243	0.519467
MW-16-08	9	0.829284	0.394328	0.879177
MW-16-10	7	0.46126	0.293093	-0.630276
MW-16-11A	7	0.463979	0.169948	0.513871

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	0.605388	0.378112	0.807454



## Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	1.06	3.99	2.93	0.5888	1.72518
2	1.3	2.26	0.96	0.3244	0.311424
3	1.41	1.81	0.4	0.1976	0.07904
4	1.51	1.77	0.26	0.0947	0.024622
5	1.67	1.67	0		
6	1.77	1.51	-0.26		
7	1.81	1.41	-0.4		
8	2.26	1.3	-0.96		
9	3.99	1.06	-2.93		

---

Sum of b values = 2.14027

Sample Standard Deviation = 0.867613

W Statistic = 0.760667

**5% Critical value of 0.829 exceeds 0.760667**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.760667**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.0582689	1.38379	1.32552	0.5888	0.780468
2	0.262364	0.815365	0.553001	0.3244	0.179393
3	0.34359	0.593327	0.249737	0.1976	0.0493481
4	0.41211	0.57098	0.15887	0.0947	0.015045
5	0.512824	0.512824	0		
6	0.57098	0.41211	-0.15887		
7	0.593327	0.34359	-0.249737		
8	0.815365	0.262364	-0.553001		
9	1.38379	0.0582689	-1.32552		

---

Sum of b values = 1.02425

Sample Standard Deviation = 0.380046

W Statistic = 0.907933

5% Critical value of 0.829 is less than 0.907933

Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.907933

Data is normally distributed at 99% level of significance

# Non-Parametric Tolerance Interval MW-16-05

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 66.6667%

Background measurements (n) = 9

Maximum Background Concentration = 14

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 5.68214

Background standard deviation = 0.0804871

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 5.9261

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Chromium**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.92871

Background standard deviation = 0.631947

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.84414

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Cobalt**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.03443

Background standard deviation = 0.665075

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.05028

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 6.25%

Background measurements (n) = 16

Maximum Background Concentration = 1.3

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.05315

Background standard deviation = 0.690688

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.14662

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 55.1111

Background standard deviation = 4.04489

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 67.3712

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 43

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.550291

Background standard deviation = 0.380046

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 1.70221

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.1

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-06

**Parameter: Arsenic**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 7.45

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-06

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 277.778

Background standard deviation = 17.1594

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 329.788

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-06

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 66.6667%

Background measurements (n) = 9

Maximum Background Concentration = 13.5

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-06

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 4.7

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-06

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 6.25%

Background measurements (n) = 16

Maximum Background Concentration = 1.3

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-06

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 4.4

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-06

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 39.2778

Background standard deviation = 5.05662

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 54.6044

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-06

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 30

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.43944

Background standard deviation = 0.383849

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.60289

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 6

Background standard deviation = 3.97887

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 18.6846

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 5.80354

Background standard deviation = 0.13808

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 6.22207

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-07

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.7

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-07

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.3

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 11.9625

Background standard deviation = 4.78329

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 27.2116

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 5.8625

Background standard deviation = 2.23411

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 12.9848

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-07

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 12.5%

Background measurements (n) = 16

Maximum Background Concentration = 1.2

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 5.525

Background standard deviation = 1.9543

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 11.7553

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 63.4444

Background standard deviation = 9.4222

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 92.0031

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.33105

Background standard deviation = 0.42687

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 4.62489

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.68889

Background standard deviation = 1.02732

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 5.8027

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Location	Date	Value	Significant
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## Non-Parametric Tolerance Interval

MW-16-07

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 5.3

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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## Non-Parametric Tolerance Interval

MW-16-07

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 2.3

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-08

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.1

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 7.75556

Background standard deviation = 7.36802

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 30.088

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 346.667

Background standard deviation = 47.697

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 491.236

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-08

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 1.6

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-08

**Parameter: Cadmium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.5

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 17.3556

Background standard deviation = 12.4719

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 55.1578

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 7.25556

Background standard deviation = 4.77915

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 21.7412

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.13125

Background standard deviation = 0.07932

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.33137

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 6.97778

Background standard deviation = 4.97488

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 22.0566

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 73.3333

Background standard deviation = 10.6536

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 105.625

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Location	Date	Value	Significant
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## Parametric Tolerance Interval Analysis

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

### USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 38.7778

Background standard deviation = 9.39119

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 67.2425

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.829284

Background standard deviation = 0.394328

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.02449

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-08

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 1.3

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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## Non-Parametric Tolerance Interval

MW-16-10

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 85.7143%

Background measurements (n) = 7

Maximum Background Concentration = 2.1

Minimum Coverage = 65.2%

Average Coverage = 87.5%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-10

**Parameter: Arsenic**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 71.4286%

Background measurements (n) = 7

Maximum Background Concentration = 11

Minimum Coverage = 65.2%

Average Coverage = 87.5%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis

# MW-16-10

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 125.714

Background standard deviation = 20.702

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 196.08

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 10.2286

Background standard deviation = 6.54948

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 32.4903

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 4.84286

Background standard deviation = 3.66554

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 17.302

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Fluoride

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 14

Background mean = 0.746429

Background standard deviation = 0.49984

One-sided normal tolerance factor (K) at 95% confidence = 2.614

Upper tolerance limit = 2.05301

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 0.743103

Background standard deviation = 0.827518

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.55584

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 78.2857

Background standard deviation = 10.9805

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 115.608

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.983

Background standard deviation = 0.271862

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.90706

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 1.642

Background standard deviation = 0.443285

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.14872

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-11/MW-16-11A

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 62.5%

Background measurements (n) = 8

Maximum Background Concentration = 3.2

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Arsenic

Original Data (Not Transformed)

Cohen's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 9.27

Background standard deviation = 4.77357

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 24.4882

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 302.5

Background standard deviation = 99.8213

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 620.73

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-11/MW-16-11A

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%

Background measurements (n) = 8

Maximum Background Concentration = 1.6

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 6.56429

Background standard deviation = 3.30488

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 17.7976

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Cobalt

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.05714

Background standard deviation = 1.4718

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 7.05979

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Aitchison's Adjustment**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15

Background mean = 0.641556

Background standard deviation = 0.471515

One-sided normal tolerance factor (K) at 95% confidence = 2.566

Upper tolerance limit = 1.85146

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Lead**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.39286

Background standard deviation = 1.5627

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 7.70447

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Lithium**

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 4.03259

Background standard deviation = 0.314509

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 5.03524

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 3.05985

Background standard deviation = 0.257785

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 3.88167

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 1.61071

Background standard deviation = 0.285342

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 2.58059

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Location	Date	Value	Significant
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**Appendix M**  
**Fate and Transport Model Inputs**


# Calculation Package


**COMPUTATION COVER SHEET**

Client:   DTE   Project:   BRPP ALD   Project/  
Proposal No.:   GLP8017    
Task No.


Title of Computations   Vertical Darcy Velocity and Travel Time Calculations  

Computations by: Signature  11/17/2021  
Printed Name   Nick Williams   Date  
Title   Senior Staff Professional  

Assumptions and Procedures Checked by: Signature  11/17/2021  
Printed Name   Jesse Varsho   Date  
(peer reviewer) Title \_\_\_\_\_

Computations Checked by: Signature  11/17/2021  
Printed Name   Isaiah Vaught   Date  
Title \_\_\_\_\_

Computations backchecked by: Signature  11/17/2021  
(originator) Printed Name   Nick Williams   Date  
Title \_\_\_\_\_

Approved by: Signature  11/24/2021  
(pm or designate) Printed Name   Omer Bozok   Date  
Title \_\_\_\_\_

Approval notes: \_\_\_\_\_

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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2. ASSUMPTIONS.....	3
3. DARCY VELOCITY SOLUTION .....	3
4. TRAVEL TIME SOLUTION.....	4



## 1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Belle River Power Plant Diversion Basin (DB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the DB to the Uppermost Aquifer.

## 2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

## 3. SOLUTION

The Darcy velocity ( $q$ ) through the model lithologies or layers is expressed in m/year =

$$= K(i) = K \left( \frac{H_1 - H_2}{l_1 - l_2} \right)$$

Where,

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$H_1 - H_2$  = difference in hydraulic head between the DB water level and the uppermost aquifer potentiometric surface

$l_1 - l_2$  = distance in direction of flow

Thus:

$K$  = Geomean of Clay with Sand hydraulic conductivity value (data provided in Attachment 1) = Total  $2.15 \times 10^{-8}$  cm/s

$H_1$  = head at the bottom of DB = 579 ft

$H_2$  = Average water level elevation from monitoring wells (data provided in Attachment 2) = 575.16<sup>1</sup> ft

$l_1$  = Bottom of ash pond = 574 ft

$l_2$  = Average elevation of well screen midpoints = 449.88<sup>1</sup> ft

$q$  = **Darcy velocity in m/year (= cm/s \* 315360) =  $2.03 \times 10^{-4}$  m/year**

<sup>1</sup> Value is an average taken from all monitoring wells

#### 4. TRAVEL TIME SOLUTION

Travel time ( $T$ ) through the model lithology is expressed in years =

$$T = t / \left( \frac{K * i}{n} \right)$$

Where:

$t$  = minimum model thickness

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$n$  = effective porosity

Thus:

$t$  = Minimum model thickness per EVS model = 35.36 m

$K$  = Hydraulic conductivity =  $2.15 \times 10^{-8}$  cm/s

$i$  = Calculated using variables in Section 3 = 0.03

$n$  = Average of porosity data from Clay with Sand layer, converted to effective porosity using Sara (1994) = 0.34

$T$  = **Travel time in years (= s / 31536000) = 59,105 years**

**Note:** Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of DB to top of uppermost aquifer.

# Attachment 1

Location ID	Layer	Elevation (ft)	Vertical Hydraulic Conductivity, $k_v$ (cm/s)		Vertical Hydraulic Conductivity, $k_v$ (cm/s)		
			DDW	Site Water	Clay	Clay with Sand	Dike
B1-ST-3 (36-38)	Clay	555.8	2.20E-08		2.20E-08		
	Clay	555.8	2.60E-09		2.60E-09		
B2-ST-2 (7-9)	Dike	584.0	2.10E-08				2.10E-08
	Dike	584.0	1.90E-08				1.90E-08
B2-ST-7 (97-99)	Clay with Sand	494.0	3.30E-08			3.30E-08	
	Clay with Sand	494.0	2.00E-08			2.00E-08	
B3-ST-1 (1-3)	Dike	590.0	9.50E-09				9.50E-09
B4-ST-4 (67-69)	Clay with Sand	518.0	2.80E-08			2.80E-08	
	Clay with Sand	518.0	1.80E-08			1.80E-08	
B5-ST-2 (27-29)	Clay	563.3	3.40E-08		3.40E-08		
	Clay	563.3	2.30E-08		2.30E-08		
B6-ST-4 (47-49)	Clay	541.3	2.50E-08		2.50E-08		
	Clay	541.3	1.80E-08		1.80E-08		
B6-ST-7 (97-99)	Clay with Sand	491.3	2.40E-08			2.40E-08	
	Clay with Sand	491.3	1.20E-08			1.20E-08	
B1-ST-1 (7-9)	Dike	584.8		8.20E-09			8.20E-09
B2-ST-1 (1-3)	Dike	590.0		1.20E-08			1.20E-08
B2-ST-4 (47-49)	Clay	544.0		2.20E-08	2.20E-08		
B3-ST-5 (77-79)	Clay with Sand	514.0		1.90E-08		1.90E-08	
B4-ST-3 (47-49)	Clay	538.0		2.80E-08	2.80E-08		
B5-ST-5 (87-89)	Clay with Sand	503.3		1.50E-08		1.50E-08	
MW-16-01	Clay with Sand	537.2	2.90E-08			2.90E-08	
MW-16-05	Clay with Sand	537.3	2.70E-08			2.70E-08	
MW-16-07	Clay	538.9	2.90E-08		2.90E-08		
MW-16-02	Sand	491.7					
MW-16-03	Sand	453.7					
MW-16-06	Sand	452.5					
MW-16-08	Sand	453.8					
MW-16-09	Sand	449.9					
MW-16-10	Sand	441.8					
MW-16-11A	Sand	450.0					
SB-16-01	Clay	537.7	2.10E-08		2.10E-08		
<b>Statistical Parameter</b>					<b>Clay</b>	<b>Clay with Sand</b>	<b>Dike</b>
<b>Mean</b>					2.25E-08	2.25E-08	1.39E-08
<b>GeoMean</b>					<b>1.94E-08</b>	<b>2.15E-08</b>	<b>1.30E-08</b>
<b>Maximum</b>					3.40E-08	3.30E-08	2.10E-08
<b>Minimum</b>					2.60E-09	1.20E-08	8.20E-09
<b>Count</b>					10	10	5
<b>Standard Deviation</b>					8.37E-09	6.75E-09	5.74E-09

## Attachment 2

Table 1

Summary of Groundwater Elevation Data – March and September 2020  
 Belle River Power Plant Diversion Basin – RCRA CCR Monitoring Program  
 China Township, Michigan

Well ID	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11A	
Date Installed	3/4/2016		3/11/2016		3/9/2016		3/10/2016		6/6/2016		5/12/2017	
TOC Elevation	590.82		593.21		592.58		591.88		592.26		591.66	
Geologic Unit of Screened Interval	Clayey Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Gravelly Silt and Silty Clay		Silt and Silty Clay	
Screened Interval Elevation	449.3 to 444.3		455.0 to 450.0		456.9 to 451.9		456.3 to 451.3		444.3 to 439.3		452.5 to 447.5	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
03/17/2020	16.76	574.06	17.50	575.71	16.62	575.96	15.57	576.31	17.74	574.52	16.81	574.85
09/14/2020	16.85	573.97	17.60	575.61	16.71	575.87	15.60	576.28	17.83	574.43	16.88	574.78

**Notes:**

Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet Below top of casing

Well ID	MW-16-05	MW-16-06	MW-16-07	MW-16-08	MW-16-10	MW-16-11A
Screen Mid Point Elevation, $I_2$ (ft)	446.8	452.5	454.4	453.8	441.8	450
Aquifer Water Level, $H_2$ (ft)	574.0	575.6	575.9	576.3	574.4	574.8
Total Head Difference, $H_1 - H_2$ (ft)	5.03	3.4	3.1	2.7	4.6	4.22
Flow Distance, $I_1 - I_2$ (ft)	127.2	121.5	119.6	120.2	132.2	124
Gradient, $i$	0.04	0.03	0.03	0.02	0.03	0.03

Pond Water Elevation, $H_1$ (ft)	579
Elevation of Pond Outflow, $I_1$ (ft)	574

Average Gradient	0.03
------------------	------

# POLLUTE Model Inputs

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Dist. Coeff.	Dry Density (kg/m3)
DB	Clay	2.03E-04	4.07E-04	11.13	12.13	10.70	20	1.94E-08	0.019	0.02375	0.01425	0.37	0.45	0.28	0	1509.084
	Clay with Sand	2.03E-04	4.07E-04	25.66	26.82	24.66	50	2.15E-08	0.019	0.02375	0.01425	0.34	0.45	0.20	0	1509.084

Notes:

1. Kv = vertical hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table M-1
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. Kv of Clay with Sand selected for the calculation of the Darcy velocity as the higher and thus more conservative value of the two layers; POLLUTE only allows one input for Darcy velocity
4. CoHD = Coefficient of Hydrodynamic Dispersion
5. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994

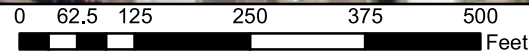
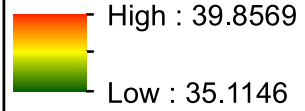


## Model Thickness



**DB Clay Thickness (ft)**

**Value**



**Diversion Basin  
Clay Thickness**

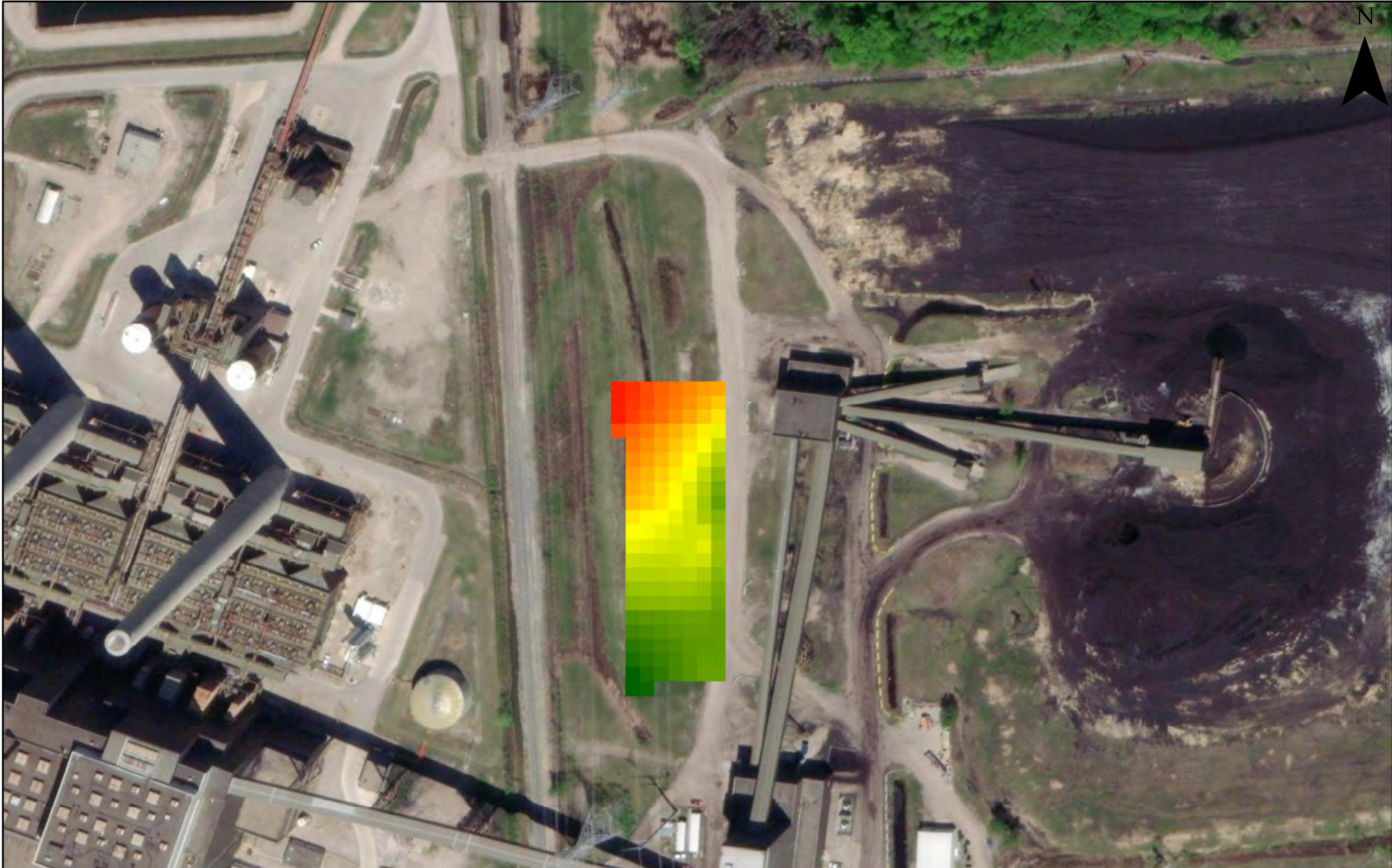


10/13/2021

Chicago, IL

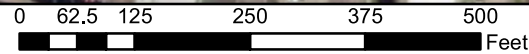
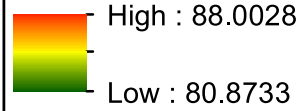
**Figure**

**M-1**



**DB Clay with Sand Thickness (ft)**

**Value**

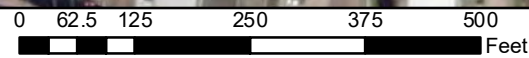
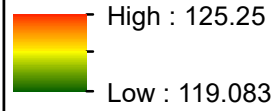


<b>Diversion Basin Clay with Sand Thickness</b>		<b>Figure M-2</b>
10/13/2021	Chicago, IL	



**Model Interval Thickness**

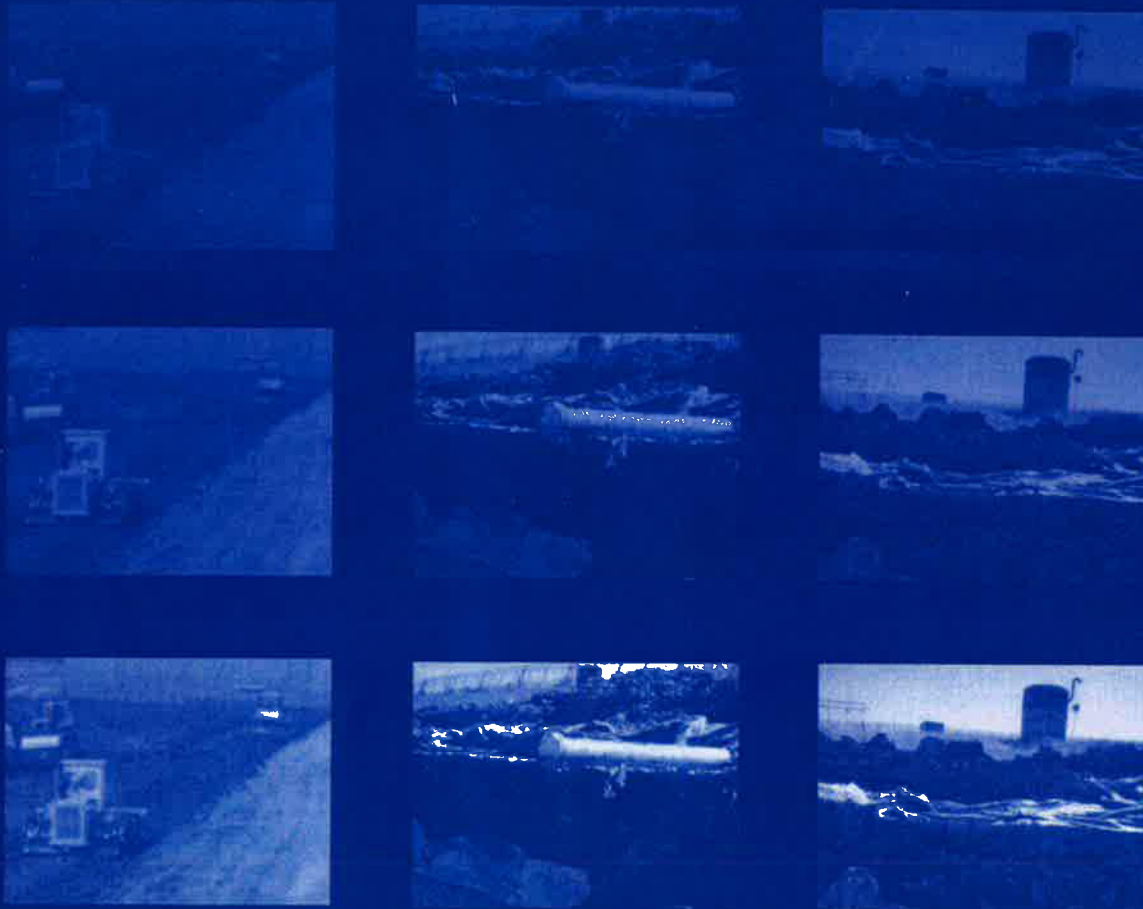
**Value**



<b>Diversion Basin Model Interval Thickness</b>		<b>Figure M-3</b>
		
11/11/2021	Chicago, IL	

## Reference Material

 **CRC Press**  
Taylor & Francis Group  
A CHAPMAN & HALL BOOK



# BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES

2ND EDITION

R. Kerry Rowe, Robert M. Quigley,  
Richard W.I. Brachman & John R. Booker

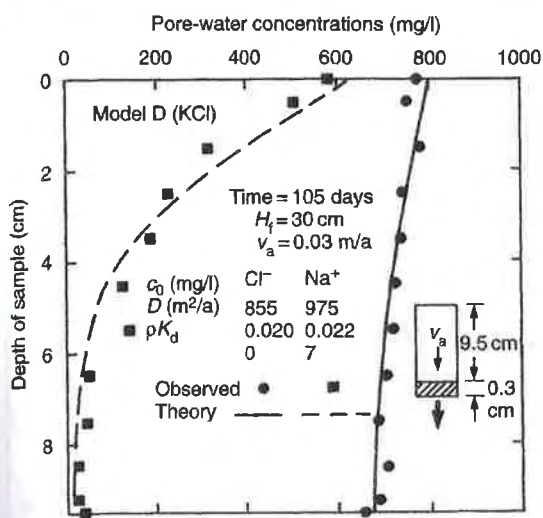


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe et al., 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some con-

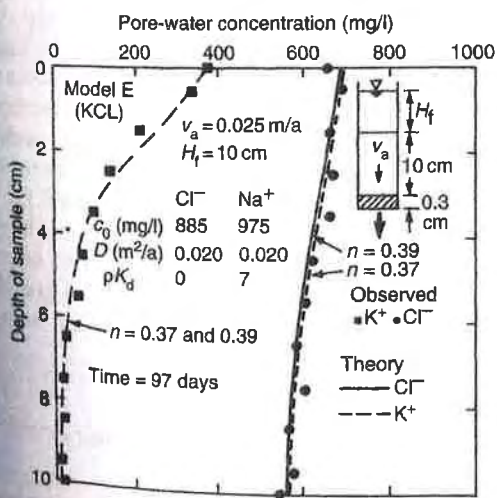


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe et al., 1988).

fidence in the parameters  $D$  and  $\rho K_d$  for the clay and source fluids examined.

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient,  $D$ , for chloride was deduced for each model and ranged between 0.018 and 0.02 m<sup>2</sup>/a with an average value of 0.019 m<sup>2</sup>/a. This small variation in  $D$  does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m<sup>2</sup>/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters  $D$  and  $K_d$ . Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

### 8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection-diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

# SITE ASSESSMENT and REMEDIATION Handbook **Second Edition**

**Martin N. Sara**



 LEWIS PUBLISHERS



**Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils**

Texture Class	Sample Size	Total	Residual	Effective
		Porosity ( $\phi$ ) cm <sup>3</sup> /cm <sup>3</sup>	Saturation ( $\phi_r$ ) cm <sup>3</sup> /cm <sup>3</sup>	Porosity ( $\phi_c$ ) cm <sup>3</sup> /cm <sup>3</sup>
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 (0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 (0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value

Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.

**Appendix N**  
**Fate and Transport Model Outputs**

# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.163E+01	4.115E-42
1.215E+01	2.886E-44
1.266E+01	1.729E-46
1.317E+01	1.611E-48
1.369E+01	3.150E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.163E+01	1.536E-30
	1.215E+01	9.625E-32
	1.266E+01	8.577E-33
	1.317E+01	7.168E-34
	1.369E+01	5.323E-35
	1.420E+01	3.484E-36
	1.471E+01	2.002E-37
	1.523E+01	1.004E-38
	1.574E+01	4.381E-40
	1.625E+01	1.654E-41
	1.677E+01	5.396E-43
	1.728E+01	1.540E-44
	1.779E+01	4.101E-46
	1.830E+01	1.269E-47
	1.882E+01	6.022E-49
	1.933E+01	3.898E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.861E-21 1.862E-22 1.219E-23 6.752E-25 3.146E-26 1.242E-27 4.465E-29 2.066E-30 1.929E-31 2.619E-32 3.607E-33 4.641E-34 5.507E-35



	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.538E-18
	1.112E+01	2.150E-19
	1.163E+01	3.018E-20
	1.215E+01	3.793E-21
	1.266E+01	4.251E-22
	1.317E+01	4.231E-23
	1.369E+01	3.723E-24
	1.420E+01	2.882E-25
	1.471E+01	1.960E-26
	1.523E+01	1.179E-27
	1.574E+01	6.610E-29
	1.625E+01	4.258E-30
	1.677E+01	4.525E-31
	1.728E+01	7.420E-32
	1.779E+01	1.352E-32
	1.830E+01	2.396E-33
	1.882E+01	4.020E-34
	1.933E+01	6.345E-35
	1.984E+01	9.404E-36
	2.036E+01	1.307E-36
	2.087E+01	1.699E-37
	2.138E+01	2.065E-38
	2.190E+01	2.340E-39
	2.241E+01	2.470E-40
	2.292E+01	2.425E-41
	2.344E+01	2.212E-42
	2.395E+01	1.879E-43
	2.446E+01	1.500E-44
	2.498E+01	1.155E-45
	2.549E+01	9.196E-47
	2.600E+01	8.513E-48
	2.652E+01	9.956E-49
	2.703E+01	1.392E-49
	2.754E+01	2.081E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01



1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
3.336E+00  
3.892E+00  
4.448E+00  
5.004E+00  
5.560E+00  
6.116E+00  
6.672E+00  
7.228E+00  
7.784E+00  
8.340E+00  
8.896E+00  
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1.056E+01  
1.112E+01  
1.163E+01  
1.215E+01  
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2.618E-39  
3.526E-40  
4.482E-41  
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6.077E-43  
6.509E-44  
6.675E-45  
6.741E-46  
7.118E-47  
8.587E-48  
1.252E-48  
2.124E-49  
3.859E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.386E-15
	1.056E+01	6.986E-16
	1.112E+01	1.974E-16
	1.163E+01	5.564E-17
	1.215E+01	1.472E-17
	1.266E+01	3.645E-18
	1.317E+01	8.441E-19
	1.369E+01	1.824E-19
	1.420E+01	3.672E-20
	1.471E+01	6.868E-21
	1.523E+01	1.191E-21
	1.574E+01	1.911E-22
	1.625E+01	2.829E-23
	1.677E+01	3.855E-24
	1.728E+01	4.824E-25
	1.779E+01	5.537E-26
	1.830E+01	5.835E-27
	1.882E+01	5.711E-28
	1.933E+01	5.434E-29
	1.984E+01	5.762E-30
	2.036E+01	8.459E-31
	2.087E+01	1.766E-31
	2.138E+01	4.314E-32
	2.190E+01	1.076E-32
	2.241E+01	2.615E-33
	2.292E+01	6.129E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.379E-34 2.978E-35 6.163E-36 1.221E-36 2.316E-37 4.197E-38 7.265E-39 1.200E-39 1.889E-40 2.833E-41 4.046E-42 5.506E-43 7.163E-44 8.983E-45 1.108E-45 1.399E-46 1.933E-47 3.100E-48 5.784E-49 1.187E-49 2.521E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.121E-14 3.931E-15 1.344E-15 4.576E-16 1.478E-16 4.524E-17 1.311E-17 3.590E-18 9.281E-19 2.262E-19 5.186E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.117E-20 2.257E-21 4.268E-22 7.542E-23 1.242E-23 1.905E-24 2.713E-25 3.588E-26 4.414E-27 5.109E-28 5.789E-29 7.168E-30 1.158E-30 2.579E-31 6.848E-32 1.897E-32 5.189E-33 1.379E-33 3.545E-34 8.797E-35 2.107E-35 4.863E-36 1.082E-36 2.316E-37 4.771E-38 9.449E-39 1.798E-39 3.283E-40 5.752E-41 9.665E-42 1.558E-42 2.411E-43 3.598E-44 5.226E-45 7.536E-46 1.120E-46 1.812E-47 3.340E-48 7.017E-49 1.608E-49 3.823E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.628E-14
1.056E+01	1.434E-14
1.112E+01	5.636E-15
1.163E+01	2.204E-15
1.215E+01	8.241E-16
1.266E+01	2.945E-16
1.317E+01	1.005E-16
1.369E+01	3.270E-17
1.420E+01	1.014E-17
1.471E+01	2.992E-18
1.523E+01	8.391E-19
1.574E+01	2.235E-19
1.625E+01	5.643E-20
1.677E+01	1.349E-20
1.728E+01	3.050E-21
1.779E+01	6.511E-22
1.830E+01	1.310E-22
1.882E+01	2.480E-23
1.933E+01	4.413E-24
1.984E+01	7.366E-25
2.036E+01	1.152E-25
2.087E+01	1.689E-26
2.138E+01	2.330E-27
2.190E+01	3.067E-28
2.241E+01	4.023E-29
2.292E+01	5.849E-30
2.344E+01	1.092E-30
2.395E+01	2.694E-31
2.446E+01	7.770E-32
2.498E+01	2.338E-32
2.549E+01	6.985E-33
2.600E+01	2.038E-33
2.652E+01	5.777E-34
2.703E+01	1.589E-34
2.754E+01	4.236E-35
2.806E+01	1.094E-35
2.857E+01	2.737E-36
2.908E+01	6.623E-37
2.960E+01	1.550E-37
3.011E+01	3.507E-38
3.062E+01	7.664E-39
3.113E+01	1.617E-39
3.165E+01	3.291E-40
3.216E+01	6.460E-41
3.267E+01	1.222E-41
3.319E+01	2.230E-42
3.370E+01	3.926E-43
3.421E+01	6.687E-44
3.473E+01	1.108E-44
3.524E+01	1.811E-45
3.575E+01	2.989E-46
3.627E+01	5.181E-47
3.678E+01	9.874E-48

45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.163E+01	7.460E-15
1.215E+01	3.121E-15
1.266E+01	1.255E-15
1.317E+01	4.851E-16
1.369E+01	1.800E-16
1.420E+01	6.405E-17
1.471E+01	2.185E-17
1.523E+01	7.135E-18
1.574E+01	2.230E-18
1.625E+01	6.658E-19
1.677E+01	1.898E-19
1.728E+01	5.161E-20
1.779E+01	1.337E-20
1.830E+01	3.294E-21
1.882E+01	7.712E-22
1.933E+01	1.714E-22
1.984E+01	3.608E-23
2.036E+01	7.190E-24
2.087E+01	1.354E-24
2.138E+01	2.409E-25
2.190E+01	4.043E-26
2.241E+01	6.414E-27
2.292E+01	9.679E-28
2.344E+01	1.418E-28
2.395E+01	2.131E-29
2.446E+01	3.665E-30
2.498E+01	8.075E-31
2.549E+01	2.246E-31
2.600E+01	7.029E-32
2.652E+01	2.268E-32
2.703E+01	7.262E-33
2.754E+01	2.277E-33
2.806E+01	6.959E-34
2.857E+01	2.071E-34
2.908E+01	5.995E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.688E-35 4.617E-36 1.227E-36 3.166E-37 7.928E-38 1.925E-38 4.534E-39 1.034E-39 2.286E-40 4.891E-41 1.013E-41 2.031E-42 3.944E-43 7.439E-44 1.369E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 1.980E-14 9.036E-15 3.989E-15 1.701E-15 6.995E-16 2.774E-16 1.060E-16 3.900E-17 1.381E-17 4.698E-18 1.536E-18 4.819E-19 1.450E-19 4.179E-20 1.153E-20 3.040E-21 7.656E-22 1.839E-22 4.210E-23 9.173E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.900E-24 3.737E-25 6.979E-26 1.238E-26 2.093E-27 3.412E-28 5.533E-29 9.586E-30 1.978E-30 5.170E-31 1.613E-31 5.437E-32 1.861E-32 6.301E-33 2.092E-33 6.787E-34 2.149E-34 6.640E-35 2.000E-35 5.873E-36 1.680E-36 4.681E-37 1.270E-37 3.351E-38 8.601E-39 2.147E-39 5.206E-40 1.227E-40 2.807E-41 6.237E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.492E-14 2.160E-14 1.026E-14 4.735E-15 2.116E-15



1.420E+01	9.159E-16
1.471E+01	3.835E-16
1.523E+01	1.553E-16
1.574E+01	6.075E-17
1.625E+01	2.296E-17
1.677E+01	8.374E-18
1.728E+01	2.946E-18
1.779E+01	9.988E-19
1.830E+01	3.262E-19
1.882E+01	1.025E-19
1.933E+01	3.096E-20
1.984E+01	8.985E-21
2.036E+01	2.503E-21
2.087E+01	6.684E-22
2.138E+01	1.710E-22
2.190E+01	4.187E-23
2.241E+01	9.800E-24
2.292E+01	2.191E-24
2.344E+01	4.674E-25
2.395E+01	9.510E-26
2.446E+01	1.846E-26
2.498E+01	3.427E-27
2.549E+01	6.130E-28
2.600E+01	1.078E-28
2.652E+01	1.957E-29
2.703E+01	3.996E-30
2.754E+01	9.996E-31
2.806E+01	3.055E-31
2.857E+01	1.050E-31
2.908E+01	3.764E-32
2.960E+01	1.352E-32
3.011E+01	4.794E-33
3.062E+01	1.667E-33
3.113E+01	5.676E-34
3.165E+01	1.890E-34
3.216E+01	6.155E-35
3.267E+01	1.958E-35
3.319E+01	6.088E-36
3.370E+01	1.848E-36
3.421E+01	5.478E-37
3.473E+01	1.584E-37
3.524E+01	4.471E-38
3.575E+01	1.230E-38
3.627E+01	3.300E-39
3.678E+01	8.626E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ExtendedRun

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.163E+01	4.115E-42
1.215E+01	2.886E-44
1.266E+01	1.729E-46
1.317E+01	1.611E-48
1.369E+01	3.150E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.560E-01	4.652E-01
	1.112E+00	1.431E-01
	1.668E+00	2.781E-02
	2.224E+00	3.327E-03
	2.780E+00	2.407E-04
	3.336E+00	1.042E-05
	3.892E+00	2.682E-07
	4.448E+00	4.082E-09
	5.004E+00	3.709E-11
	5.560E+00	3.339E-13
	6.116E+00	3.550E-14
	6.672E+00	7.575E-15
	7.228E+00	1.435E-15
	7.784E+00	2.363E-16
	8.340E+00	3.365E-17
	8.896E+00	4.119E-18
	9.452E+00	4.309E-19
	1.001E+01	3.825E-20
	1.056E+01	2.861E-21
	1.112E+01	1.862E-22
	1.163E+01	1.219E-23
	1.215E+01	6.752E-25
	1.266E+01	3.146E-26
	1.317E+01	1.242E-27
	1.369E+01	4.465E-29
	1.420E+01	2.066E-30
	1.471E+01	1.929E-31
	1.523E+01	2.619E-32
	1.574E+01	3.607E-33
	1.625E+01	4.641E-34
	1.677E+01	5.507E-35
	1.728E+01	6.009E-36
	1.779E+01	6.013E-37
	1.830E+01	5.504E-38
	1.882E+01	4.597E-39
	1.933E+01	3.494E-40
	1.984E+01	2.411E-41
	2.036E+01	1.510E-42
	2.087E+01	8.602E-44
	2.138E+01	4.545E-45
	2.190E+01	2.370E-46
	2.241E+01	1.414E-47
	2.292E+01	1.132E-48
	2.344E+01	1.162E-49
	2.395E+01	1.295E-50
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
25	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 5.729E-01 2.580E-01 8.913E-02 2.324E-02 4.519E-03 6.506E-04 6.898E-05 5.363E-06 3.049E-07 1.265E-08 3.831E-10 8.758E-12 2.658E-13 4.643E-14 1.416E-14 4.118E-15 1.103E-15 2.717E-16 6.142E-17 1.319E-17 2.833E-18 5.612E-19 1.023E-19 1.709E-20 2.613E-21 3.643E-22 4.617E-23 5.301E-24 5.499E-25 5.141E-26 4.340E-27

	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.367E-28 2.590E-29 2.459E-30 3.638E-31 7.360E-32 1.607E-32 3.443E-33 7.069E-34 1.383E-34 2.575E-35 4.556E-36 7.651E-37 1.218E-37 1.836E-38 2.618E-39 3.526E-40 4.482E-41 5.372E-42 6.077E-43 6.509E-44 6.675E-45 6.741E-46 7.118E-47 8.587E-48 1.252E-48 2.124E-49 3.859E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14

9.452E+00	3.054E-14
1.001E+01	1.121E-14
1.056E+01	3.931E-15
1.112E+01	1.344E-15
1.163E+01	4.576E-16
1.215E+01	1.478E-16
1.266E+01	4.524E-17
1.317E+01	1.311E-17
1.369E+01	3.590E-18
1.420E+01	9.281E-19
1.471E+01	2.262E-19
1.523E+01	5.186E-20
1.574E+01	1.117E-20
1.625E+01	2.257E-21
1.677E+01	4.268E-22
1.728E+01	7.542E-23
1.779E+01	1.242E-23
1.830E+01	1.905E-24
1.882E+01	2.713E-25
1.933E+01	3.588E-26
1.984E+01	4.414E-27
2.036E+01	5.109E-28
2.087E+01	5.789E-29
2.138E+01	7.168E-30
2.190E+01	1.158E-30
2.241E+01	2.579E-31
2.292E+01	6.848E-32
2.344E+01	1.897E-32
2.395E+01	5.189E-33
2.446E+01	1.379E-33
2.498E+01	3.545E-34
2.549E+01	8.797E-35
2.600E+01	2.107E-35
2.652E+01	4.863E-36
2.703E+01	1.082E-36
2.754E+01	2.316E-37
2.806E+01	4.771E-38
2.857E+01	9.449E-39
2.908E+01	1.798E-39
2.960E+01	3.283E-40
3.011E+01	5.752E-41
3.062E+01	9.665E-42
3.113E+01	1.558E-42
3.165E+01	2.411E-43
3.216E+01	3.598E-44
3.267E+01	5.226E-45
3.319E+01	7.536E-46
3.370E+01	1.120E-46
3.421E+01	1.812E-47
3.473E+01	3.340E-48
3.524E+01	7.017E-49
3.575E+01	1.608E-49
3.627E+01	3.823E-50
3.678E+01	0.000E+00

1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.163E+01	7.460E-15
1.215E+01	3.121E-15
1.266E+01	1.255E-15
1.317E+01	4.851E-16
1.369E+01	1.800E-16
1.420E+01	6.405E-17
1.471E+01	2.185E-17
1.523E+01	7.135E-18
1.574E+01	2.230E-18
1.625E+01	6.658E-19
1.677E+01	1.898E-19
1.728E+01	5.161E-20
1.779E+01	1.337E-20
1.830E+01	3.294E-21
1.882E+01	7.712E-22
1.933E+01	1.714E-22
1.984E+01	3.608E-23
2.036E+01	7.190E-24
2.087E+01	1.354E-24
2.138E+01	2.409E-25
2.190E+01	4.043E-26
2.241E+01	6.414E-27
2.292E+01	9.679E-28
2.344E+01	1.418E-28
2.395E+01	2.131E-29
2.446E+01	3.665E-30
2.498E+01	8.075E-31
2.549E+01	2.246E-31
2.600E+01	7.029E-32
2.652E+01	2.268E-32
2.703E+01	7.262E-33
2.754E+01	2.277E-33
2.806E+01	6.959E-34
2.857E+01	2.071E-34
2.908E+01	5.995E-35
2.960E+01	1.688E-35
3.011E+01	4.617E-36
3.062E+01	1.227E-36



	3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.166E-37 7.928E-38 1.925E-38 4.534E-39 1.034E-39 2.286E-40 4.891E-41 1.013E-41 2.031E-42 3.944E-43 7.439E-44 1.369E-44
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.492E-14 2.160E-14 1.026E-14 4.735E-15 2.116E-15 9.159E-16 3.835E-16 1.553E-16 6.075E-17 2.296E-17 8.374E-18 2.946E-18 9.988E-19 3.262E-19 1.025E-19 3.096E-20 8.985E-21 2.503E-21 6.684E-22 1.710E-22 4.187E-23 9.800E-24 2.191E-24

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	4.674E-25 9.510E-26 1.846E-26 3.427E-27 6.130E-28 1.078E-28 1.957E-29 3.996E-30 9.996E-31 3.055E-31 1.050E-31 3.764E-32 1.352E-32 4.794E-33 1.667E-33 5.676E-34 1.890E-34 6.155E-35 1.958E-35 6.088E-36 1.848E-36 5.478E-37 1.584E-37 4.471E-38 1.230E-38 3.300E-39 8.626E-40
85	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 7.631E-01 5.447E-01 3.619E-01 2.229E-01 1.269E-01 6.654E-02 3.209E-02 1.421E-02 5.765E-03 2.142E-03 7.277E-04 2.260E-04 6.410E-05 1.659E-05 3.919E-06 8.442E-07 1.658E-07 2.967E-08 4.842E-09 7.497E-10 1.193E-10 1.781E-11 2.630E-12 4.669E-13 1.378E-13 6.441E-14 3.518E-14 1.958E-14

1.574E+01	1.075E-14
1.625E+01	5.796E-15
1.677E+01	3.060E-15
1.728E+01	1.583E-15
1.779E+01	8.013E-16
1.830E+01	3.971E-16
1.882E+01	1.926E-16
1.933E+01	9.136E-17
1.984E+01	4.238E-17
2.036E+01	1.922E-17
2.087E+01	8.518E-18
2.138E+01	3.687E-18
2.190E+01	1.559E-18
2.241E+01	6.432E-19
2.292E+01	2.590E-19
2.344E+01	1.017E-19
2.395E+01	3.892E-20
2.446E+01	1.452E-20
2.498E+01	5.274E-21
2.549E+01	1.865E-21
2.600E+01	6.418E-22
2.652E+01	2.148E-22
2.703E+01	6.987E-23
2.754E+01	2.208E-23
2.806E+01	6.775E-24
2.857E+01	2.018E-24
2.908E+01	5.829E-25
2.960E+01	1.633E-25
3.011E+01	4.439E-26
3.062E+01	1.171E-26
3.113E+01	3.002E-27
3.165E+01	7.523E-28
3.216E+01	1.862E-28
3.267E+01	4.649E-29
3.319E+01	1.217E-29
3.370E+01	3.519E-30
3.421E+01	1.168E-30
3.473E+01	4.429E-31
3.524E+01	1.837E-31
3.575E+01	7.970E-32
3.627E+01	3.507E-32
3.678E+01	1.541E-32

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB Darcy

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000407$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7    N = 20    SIG = 0    RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.054E-01
	1.112E+00	1.109E-02
	1.668E+00	1.363E-04
	2.224E+00	3.580E-07

2.780E+00	1.955E-10
3.336E+00	1.055E-13
3.892E+00	6.301E-15
4.448E+00	3.143E-16
5.004E+00	1.016E-17
5.560E+00	2.064E-19
6.116E+00	2.544E-21
6.672E+00	1.826E-23
7.228E+00	7.295E-26
7.784E+00	1.647E-28
8.340E+00	6.015E-31
8.896E+00	1.285E-32
9.452E+00	2.817E-34
1.001E+01	4.648E-36
1.056E+01	5.650E-38
1.112E+01	5.184E-40
1.163E+01	4.873E-42
1.215E+01	3.446E-44
1.266E+01	2.081E-46
1.317E+01	1.954E-48
1.369E+01	3.852E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.730E-01
	1.112E+00	7.357E-02
	1.668E+00	7.149E-03
	2.224E+00	3.293E-04
	2.780E+00	7.033E-06
	3.336E+00	6.875E-08
	3.892E+00	3.058E-10
	4.448E+00	8.042E-13
	5.004E+00	3.626E-14
	5.560E+00	5.410E-15
	6.116E+00	6.675E-16
	6.672E+00	6.649E-17
	7.228E+00	5.295E-18
	7.784E+00	3.333E-19
	8.340E+00	1.637E-20
	8.896E+00	6.191E-22
	9.452E+00	1.773E-23
	1.001E+01	3.788E-25
	1.056E+01	5.977E-27
	1.112E+01	7.757E-29
	1.163E+01	1.818E-30
	1.215E+01	1.149E-31
	1.266E+01	1.032E-32
	1.317E+01	8.694E-34
	1.369E+01	6.508E-35
	1.420E+01	4.295E-36
	1.471E+01	2.487E-37
	1.523E+01	1.258E-38
	1.574E+01	5.534E-40
	1.625E+01	2.106E-41
	1.677E+01	6.927E-43
	1.728E+01	1.992E-44
	1.779E+01	5.350E-46
	1.830E+01	1.669E-47
	1.882E+01	7.981E-49
	1.933E+01	5.208E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.689E-01 1.454E-01 2.849E-02 3.435E-03 2.506E-04 1.094E-05 2.837E-07 4.353E-09 3.987E-11 3.618E-13 3.877E-14 8.340E-15 1.593E-15 2.644E-16 3.795E-17 4.683E-18 4.939E-19 4.420E-20 3.332E-21 2.187E-22 1.443E-23 8.059E-25 3.786E-26 1.506E-27 5.460E-29 2.546E-30 2.396E-31 3.280E-32 4.554E-33 5.906E-34 7.065E-35





	9.452E+00	6.846E-17
	1.001E+01	1.173E-17
	1.056E+01	1.791E-18
	1.112E+01	2.524E-19
	1.163E+01	3.572E-20
	1.215E+01	4.525E-21
	1.266E+01	5.114E-22
	1.317E+01	5.131E-23
	1.369E+01	4.551E-24
	1.420E+01	3.553E-25
	1.471E+01	2.436E-26
	1.523E+01	1.477E-27
	1.574E+01	8.347E-29
	1.625E+01	5.419E-30
	1.677E+01	5.804E-31
	1.728E+01	9.593E-32
	1.779E+01	1.762E-32
	1.830E+01	3.149E-33
	1.882E+01	5.325E-34
	1.933E+01	8.473E-35
	1.984E+01	1.266E-35
	2.036E+01	1.773E-36
	2.087E+01	2.325E-37
	2.138E+01	2.848E-38
	2.190E+01	3.255E-39
	2.241E+01	3.464E-40
	2.292E+01	3.427E-41
	2.344E+01	3.152E-42
	2.395E+01	2.700E-43
	2.446E+01	2.172E-44
	2.498E+01	1.686E-45
	2.549E+01	1.353E-46
	2.600E+01	1.263E-47
	2.652E+01	1.488E-48
	2.703E+01	2.098E-49
	2.754E+01	3.160E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.775E-01

1.112E+00  
1.668E+00  
2.224E+00  
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1.033E-45  
1.099E-46  
1.336E-47  
1.964E-48  
3.358E-49  
6.150E-50

	3.113E+01	1.136E-50
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.122E-01
	1.112E+00	3.073E-01
	1.668E+00	1.240E-01
	2.224E+00	3.972E-02
	2.780E+00	9.991E-03
	3.336E+00	1.961E-03
	3.892E+00	2.989E-04
	4.448E+00	3.525E-05
	5.004E+00	3.208E-06
	5.560E+00	2.248E-07
	6.116E+00	1.212E-08
	6.672E+00	5.022E-10
	7.228E+00	1.636E-11
	7.784E+00	5.732E-13
	8.340E+00	7.890E-14
	8.896E+00	2.597E-14
	9.452E+00	8.734E-15
	1.001E+01	2.756E-15
	1.056E+01	8.132E-16
	1.112E+01	2.316E-16
	1.163E+01	6.583E-17
	1.215E+01	1.755E-17
	1.266E+01	4.382E-18
	1.317E+01	1.023E-18
	1.369E+01	2.229E-19
	1.420E+01	4.523E-20
	1.471E+01	8.529E-21
	1.523E+01	1.491E-21
	1.574E+01	2.412E-22
	1.625E+01	3.600E-23
	1.677E+01	4.945E-24
	1.728E+01	6.239E-25
	1.779E+01	7.219E-26
	1.830E+01	7.670E-27
	1.882E+01	7.568E-28
	1.933E+01	7.259E-29
	1.984E+01	7.756E-30
	2.036E+01	1.148E-30
	2.087E+01	2.414E-31
	2.138E+01	5.945E-32
	2.190E+01	1.494E-32
	2.241E+01	3.663E-33
	2.292E+01	8.654E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.964E-34 4.274E-35 8.917E-36 1.782E-36 3.405E-37 6.222E-38 1.086E-38 1.808E-39 2.869E-40 4.338E-41 6.246E-42 8.570E-43 1.124E-43 1.421E-44 1.766E-45 2.249E-46 3.131E-47 5.061E-48 9.517E-49 1.968E-49 4.215E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.398E-01 3.458E-01 1.554E-01 5.735E-02 1.725E-02 4.205E-03 8.264E-04 1.305E-04 1.653E-05 1.676E-06 1.357E-07 8.775E-09 4.531E-10 1.904E-11 8.171E-13 1.035E-13 3.498E-14 1.294E-14 4.575E-15 1.577E-15 5.412E-16 1.762E-16 5.437E-17 1.588E-17 4.385E-18 1.143E-18 2.808E-19 6.491E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.410E-20 2.871E-21 5.474E-22 9.751E-23 1.620E-23 2.503E-24 3.595E-25 4.792E-26 5.943E-27 6.935E-28 7.922E-29 9.885E-30 1.609E-30 3.612E-31 9.666E-32 2.699E-32 7.443E-33 1.994E-33 5.168E-34 1.293E-34 3.121E-35 7.264E-36 1.629E-36 3.516E-37 7.303E-38 1.458E-38 2.796E-39 5.149E-40 9.095E-41 1.541E-41 2.503E-42 3.906E-43 5.877E-44 8.604E-45 1.251E-45 1.874E-46 3.055E-47 5.675E-48 1.202E-48 2.775E-49 6.651E-50 1.601E-50
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.625E-01 3.790E-01 1.847E-01 7.595E-02 2.615E-02 7.500E-03 1.784E-03 3.510E-04 5.699E-05 7.619E-06 8.378E-07 7.569E-08 5.613E-09

7.784E+00	3.422E-10
8.340E+00	1.748E-11
8.896E+00	9.140E-13
9.452E+00	1.207E-13
1.001E+01	4.187E-14
1.056E+01	1.669E-14
1.112E+01	6.611E-15
1.163E+01	2.606E-15
1.215E+01	9.824E-16
1.266E+01	3.539E-16
1.317E+01	1.217E-16
1.369E+01	3.994E-17
1.420E+01	1.248E-17
1.471E+01	3.713E-18
1.523E+01	1.050E-18
1.574E+01	2.819E-19
1.625E+01	7.177E-20
1.677E+01	1.730E-20
1.728E+01	3.943E-21
1.779E+01	8.485E-22
1.830E+01	1.721E-22
1.882E+01	3.285E-23
1.933E+01	5.892E-24
1.984E+01	9.915E-25
2.036E+01	1.564E-25
2.087E+01	2.311E-26
2.138E+01	3.214E-27
2.190E+01	4.264E-28
2.241E+01	5.639E-29
2.292E+01	8.261E-30
2.344E+01	1.554E-30
2.395E+01	3.864E-31
2.446E+01	1.123E-31
2.498E+01	3.407E-32
2.549E+01	1.026E-32
2.600E+01	3.018E-33
2.652E+01	8.625E-34
2.703E+01	2.392E-34
2.754E+01	6.428E-35
2.806E+01	1.674E-35
2.857E+01	4.221E-36
2.908E+01	1.030E-36
2.960E+01	2.430E-37
3.011E+01	5.542E-38
3.062E+01	1.221E-38
3.113E+01	2.597E-39
3.165E+01	5.329E-40
3.216E+01	1.055E-40
3.267E+01	2.012E-41
3.319E+01	3.700E-42
3.370E+01	6.567E-43
3.421E+01	1.128E-43
3.473E+01	1.884E-44
3.524E+01	3.104E-45
3.575E+01	5.163E-46
3.627E+01	9.019E-47
3.678E+01	1.732E-47

45

0.000E+00	1.000E+00
5.560E-01	6.814E-01
1.112E+00	4.079E-01
1.668E+00	2.120E-01
2.224E+00	9.486E-02
2.780E+00	3.630E-02
3.336E+00	1.182E-02
3.892E+00	3.264E-03
4.448E+00	7.619E-04
5.004E+00	1.500E-04
5.560E+00	2.489E-05
6.116E+00	3.472E-06
6.672E+00	4.070E-07
7.228E+00	4.004E-08
7.784E+00	3.306E-09
8.340E+00	2.295E-10
8.896E+00	1.370E-11
9.452E+00	8.618E-13
1.001E+01	1.278E-13
1.056E+01	4.646E-14
1.112E+01	2.014E-14
1.163E+01	8.819E-15
1.215E+01	3.719E-15
1.266E+01	1.508E-15
1.317E+01	5.875E-16
1.369E+01	2.197E-16
1.420E+01	7.884E-17
1.471E+01	2.711E-17
1.523E+01	8.927E-18
1.574E+01	2.812E-18
1.625E+01	8.466E-19
1.677E+01	2.433E-19
1.728E+01	6.670E-20
1.779E+01	1.741E-20
1.830E+01	4.326E-21
1.882E+01	1.021E-21
1.933E+01	2.287E-22
1.984E+01	4.856E-23
2.036E+01	9.755E-24
2.087E+01	1.853E-24
2.138E+01	3.322E-25
2.190E+01	5.621E-26
2.241E+01	8.989E-27
2.292E+01	1.367E-27
2.344E+01	2.020E-28
2.395E+01	3.058E-29
2.446E+01	5.300E-30
2.498E+01	1.177E-30
2.549E+01	3.298E-31
2.600E+01	1.040E-31
2.652E+01	3.385E-32
2.703E+01	1.092E-32
2.754E+01	3.453E-33
2.806E+01	1.064E-33
2.857E+01	3.192E-34
2.908E+01	9.317E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.644E-35 7.292E-36 1.954E-36 5.082E-37 1.283E-37 3.142E-38 7.458E-39 1.716E-39 3.822E-40 8.244E-41 1.721E-41 3.479E-42 6.812E-43 1.295E-43 2.403E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.977E-01 4.334E-01 2.373E-01 1.137E-01 4.735E-02 1.707E-02 5.312E-03 1.422E-03 3.270E-04 6.446E-05 1.088E-05 1.571E-06 1.938E-07 2.043E-08 1.839E-09 1.418E-10 9.642E-12 7.243E-13 1.265E-13 5.003E-14 2.341E-14 1.077E-14 4.792E-15 2.059E-15 8.539E-16 3.414E-16 1.315E-16 4.878E-17 1.741E-17 5.972E-18 1.968E-18 6.226E-19 1.889E-19 5.487E-20 1.526E-20 4.057E-21 1.030E-21 2.495E-22 5.757E-23 1.265E-23



	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.640E-24 5.236E-25 9.858E-26 1.763E-26 3.004E-27 4.937E-28 8.071E-29 1.409E-29 2.929E-30 7.715E-31 2.426E-31 8.242E-32 2.844E-32 9.708E-33 3.249E-33 1.063E-33 3.393E-34 1.057E-34 3.210E-35 9.501E-36 2.740E-36 7.696E-37 2.104E-37 5.599E-38 1.449E-38 3.646E-39 8.914E-40 2.118E-40 4.885E-41 1.094E-41
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.117E-01 4.561E-01 2.608E-01 1.321E-01 5.901E-02 2.314E-02 7.940E-03 2.379E-03 6.208E-04 1.410E-04 2.781E-05 4.762E-06 7.072E-07 9.103E-08 1.015E-08 9.810E-10 8.256E-11 6.296E-12 5.673E-13 1.224E-13 5.308E-14 2.573E-14 1.232E-14 5.732E-15 2.583E-15

1.420E+01	1.127E-15
1.471E+01	4.756E-16
1.523E+01	1.941E-16
1.574E+01	7.658E-17
1.625E+01	2.918E-17
1.677E+01	1.073E-17
1.728E+01	3.805E-18
1.779E+01	1.301E-18
1.830E+01	4.281E-19
1.882E+01	1.356E-19
1.933E+01	4.131E-20
1.984E+01	1.209E-20
2.036E+01	3.394E-21
2.087E+01	9.138E-22
2.138E+01	2.357E-22
2.190E+01	5.817E-23
2.241E+01	1.373E-23
2.292E+01	3.094E-24
2.344E+01	6.654E-25
2.395E+01	1.365E-25
2.446E+01	2.671E-26
2.498E+01	4.999E-27
2.549E+01	9.014E-28
2.600E+01	1.598E-28
2.652E+01	2.924E-29
2.703E+01	6.015E-30
2.754E+01	1.516E-30
2.806E+01	4.668E-31
2.857E+01	1.617E-31
2.908E+01	5.843E-32
2.960E+01	2.116E-32
3.011E+01	7.564E-33
3.062E+01	2.652E-33
3.113E+01	9.103E-34
3.165E+01	3.056E-34
3.216E+01	1.003E-34
3.267E+01	3.218E-35
3.319E+01	1.009E-35
3.370E+01	3.087E-36
3.421E+01	9.223E-37
3.473E+01	2.690E-37
3.524E+01	7.651E-38
3.575E+01	2.123E-38
3.627E+01	5.740E-39
3.678E+01	1.513E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB CoHD High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.02375 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.02375 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7    N = 20    SIG = 0    RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.556E-01
	1.112E+00	2.279E-02
	1.668E+00	6.322E-04
	2.224E+00	5.160E-06

2.780E+00	1.206E-08
3.336E+00	8.267E-12
3.892E+00	4.341E-14
4.448E+00	3.814E-15
5.004E+00	2.492E-16
5.560E+00	1.150E-17
6.116E+00	3.663E-19
6.672E+00	7.867E-21
7.228E+00	1.106E-22
7.784E+00	9.861E-25
8.340E+00	5.432E-27
8.896E+00	2.108E-29
9.452E+00	2.215E-31
1.001E+01	7.694E-33
1.056E+01	2.479E-34
1.112E+01	6.626E-36
1.163E+01	1.818E-37
1.215E+01	4.015E-39
1.266E+01	7.073E-41
1.317E+01	9.870E-43
1.369E+01	1.106E-44
1.420E+01	1.141E-46
1.471E+01	1.768E-48
1.523E+01	5.105E-50
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	4.225E-01
	1.112E+00	1.080E-01
	1.668E+00	1.581E-02
	2.224E+00	1.284E-03
	2.780E+00	5.671E-05
	3.336E+00	1.347E-06
	3.892E+00	1.707E-08
	4.448E+00	1.155E-10
	5.004E+00	5.749E-13
	5.560E+00	3.720E-14
	6.116E+00	6.815E-15
	6.672E+00	1.083E-15
	7.228E+00	1.453E-16
	7.784E+00	1.634E-17
	8.340E+00	1.530E-18
	8.896E+00	1.182E-19
	9.452E+00	7.465E-21
	1.001E+01	3.813E-22
	1.056E+01	1.558E-23
	1.112E+01	5.248E-25
	1.163E+01	1.781E-26
	1.215E+01	4.986E-28
	1.266E+01	1.338E-29
	1.317E+01	6.167E-31
	1.369E+01	6.029E-32
	1.420E+01	6.949E-33
	1.471E+01	7.524E-34
	1.523E+01	7.411E-35
	1.574E+01	6.603E-36
	1.625E+01	5.304E-37
	1.677E+01	3.829E-38
	1.728E+01	2.475E-39
	1.779E+01	1.428E-40
	1.830E+01	7.331E-42
	1.882E+01	3.351E-43
	1.933E+01	1.379E-44
	1.984E+01	5.375E-46
	2.036E+01	2.308E-47
	2.087E+01	1.368E-48
	2.138E+01	1.110E-49
	2.190E+01	1.001E-50
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 5.134E-01 1.901E-01 4.908E-02 8.638E-03 1.022E-03 8.049E-05 4.195E-06 1.440E-07 3.246E-09 4.841E-11 6.352E-13 5.377E-14 1.347E-14 3.200E-15 6.812E-16 1.294E-16 2.186E-17 3.268E-18 4.308E-19 5.187E-20 6.274E-21 6.724E-22 6.355E-23 5.270E-24 3.817E-25 2.407E-26 1.330E-27 6.776E-29 3.973E-30 3.966E-31 6.194E-32

	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.065E-32 1.770E-33 2.769E-34 4.056E-35 5.556E-36 7.100E-37 8.451E-38 9.351E-39 9.602E-40 9.132E-41 8.035E-42 6.540E-43 4.949E-44 3.542E-45 2.520E-46 1.986E-47 1.965E-48 2.440E-49 3.380E-50 0.000E+00
20	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 5.720E-01 2.572E-01 8.871E-02 2.309E-02 4.483E-03 6.444E-04 6.821E-05 5.294E-06 3.005E-07 1.245E-08 3.764E-10 8.591E-12 2.603E-13 4.540E-14 1.383E-14 4.014E-15

	9.452E+00	1.074E-15
	1.001E+01	2.640E-16
	1.056E+01	5.959E-17
	1.112E+01	1.277E-17
	1.163E+01	2.740E-18
	1.215E+01	5.418E-19
	1.266E+01	9.856E-20
	1.317E+01	1.645E-20
	1.369E+01	2.510E-21
	1.420E+01	3.494E-22
	1.471E+01	4.421E-23
	1.523E+01	5.069E-24
	1.574E+01	5.249E-25
	1.625E+01	4.900E-26
	1.677E+01	4.130E-27
	1.728E+01	3.199E-28
	1.779E+01	2.456E-29
	1.830E+01	2.328E-30
	1.882E+01	3.439E-31
	1.933E+01	6.948E-32
	1.984E+01	1.515E-32
	2.036E+01	3.240E-33
	2.087E+01	6.641E-34
	2.138E+01	1.297E-34
	2.190E+01	2.411E-35
	2.241E+01	4.259E-36
	2.292E+01	7.141E-37
	2.344E+01	1.135E-37
	2.395E+01	1.708E-38
	2.446E+01	2.432E-39
	2.498E+01	3.270E-40
	2.549E+01	4.150E-41
	2.600E+01	4.966E-42
	2.652E+01	5.608E-43
	2.703E+01	5.997E-44
	2.754E+01	6.141E-45
	2.806E+01	6.192E-46
	2.857E+01	6.527E-47
	2.908E+01	7.862E-48
	2.960E+01	1.145E-48
	3.011E+01	1.939E-49
	3.062E+01	3.516E-50
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	6.138E-01



1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
3.336E+00  
3.892E+00  
4.448E+00  
5.004E+00  
5.560E+00  
6.116E+00  
6.672E+00  
7.228E+00  
7.784E+00  
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8.896E+00  
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3.062E+01

3.115E-01  
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8.746E-20  
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2.246E-37  
4.215E-38  
7.566E-39  
1.298E-39  
2.128E-40  
3.330E-41  
4.971E-42  
7.085E-43  
9.662E-44  
1.269E-44

	3.113E+01	1.632E-45
	3.165E+01	2.123E-46
	3.216E+01	2.960E-47
	3.267E+01	4.710E-48
	3.319E+01	8.724E-49
	3.370E+01	1.805E-49
	3.421E+01	3.926E-50
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.455E-01
	1.112E+00	3.561E-01
	1.668E+00	1.655E-01
	2.224E+00	6.407E-02
	2.780E+00	2.051E-02
	3.336E+00	5.400E-03
	3.892E+00	1.164E-03
	4.448E+00	2.047E-04
	5.004E+00	2.931E-05
	5.560E+00	3.410E-06
	6.116E+00	3.220E-07
	6.672E+00	2.464E-08
	7.228E+00	1.528E-09
	7.784E+00	7.716E-11
	8.340E+00	3.384E-12
	8.896E+00	2.245E-13
	9.452E+00	5.382E-14
	1.001E+01	2.027E-14
	1.056E+01	7.604E-15
	1.112E+01	2.798E-15
	1.163E+01	1.024E-15
	1.215E+01	3.572E-16
	1.266E+01	1.186E-16
	1.317E+01	3.745E-17
	1.369E+01	1.123E-17
	1.420E+01	3.197E-18
	1.471E+01	8.619E-19
	1.523E+01	2.199E-19
	1.574E+01	5.301E-20
	1.625E+01	1.206E-20
	1.677E+01	2.582E-21
	1.728E+01	5.202E-22
	1.779E+01	9.838E-23
	1.830E+01	1.743E-23
	1.882E+01	2.890E-24
	1.933E+01	4.475E-25
	1.984E+01	6.464E-26
	2.036E+01	8.719E-27
	2.087E+01	1.105E-27
	2.138E+01	1.346E-28
	2.190E+01	1.689E-29
	2.241E+01	2.522E-30
	2.292E+01	5.106E-31

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.322E-31 3.773E-32 1.089E-32 3.079E-33 8.459E-34 2.251E-34 5.796E-35 1.443E-35 3.472E-36 8.068E-37 1.809E-37 3.912E-38 8.155E-39 1.637E-39 3.164E-40 5.883E-41 1.052E-41 1.809E-42 2.995E-43 4.788E-44 7.447E-45 1.144E-45 1.788E-46 2.978E-47 5.542E-48 1.173E-48 2.742E-49
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.706E-01 3.935E-01 1.996E-01 8.675E-02 3.209E-02 1.005E-02 2.657E-03 5.907E-04 1.102E-04 1.724E-05 2.256E-06 2.467E-07 2.254E-08 1.719E-09 1.098E-10 6.113E-12 4.098E-13 7.905E-14 3.049E-14 1.289E-14 5.460E-15 2.223E-15 8.691E-16 3.260E-16 1.172E-16 4.036E-17 1.330E-17 4.191E-18

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.261E-18 3.619E-19 9.901E-20 2.578E-20 6.382E-21 1.500E-21 3.343E-22 7.053E-23 1.407E-23 2.651E-24 4.710E-25 7.885E-26 1.244E-26 1.859E-27 2.664E-28 3.818E-29 6.006E-30 1.182E-30 3.023E-31 9.068E-32 2.865E-32 9.049E-33 2.803E-33 8.466E-34 2.488E-34 7.108E-35 1.973E-35 5.320E-36 1.392E-36 3.535E-37 8.704E-38 2.077E-38 4.801E-39 1.074E-39 2.327E-40 4.874E-41 9.874E-42 1.935E-42 3.669E-43 6.750E-44 1.211E-44 2.141E-45
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.911E-01 4.252E-01 2.306E-01 1.094E-01 4.514E-02 1.612E-02 4.967E-03 1.317E-03 2.999E-04 5.855E-05 9.788E-06 1.400E-06 1.710E-07

7.784E+00	1.785E-08
8.340E+00	1.591E-09
8.896E+00	1.215E-10
9.452E+00	8.186E-12
1.001E+01	6.093E-13
1.056E+01	1.055E-13
1.112E+01	4.133E-14
1.163E+01	1.915E-14
1.215E+01	8.725E-15
1.266E+01	3.846E-15
1.317E+01	1.637E-15
1.369E+01	6.721E-16
1.420E+01	2.661E-16
1.471E+01	1.015E-16
1.523E+01	3.729E-17
1.574E+01	1.318E-17
1.625E+01	4.478E-18
1.677E+01	1.462E-18
1.728E+01	4.579E-19
1.779E+01	1.375E-19
1.830E+01	3.958E-20
1.882E+01	1.090E-20
1.933E+01	2.870E-21
1.984E+01	7.216E-22
2.036E+01	1.731E-22
2.087E+01	3.955E-23
2.138E+01	8.603E-24
2.190E+01	1.779E-24
2.241E+01	3.494E-25
2.292E+01	6.514E-26
2.344E+01	1.153E-26
2.395E+01	1.947E-27
2.446E+01	3.169E-28
2.498E+01	5.132E-29
2.549E+01	8.876E-30
2.600E+01	1.829E-30
2.652E+01	4.772E-31
2.703E+01	1.487E-31
2.754E+01	5.003E-32
2.806E+01	1.709E-32
2.857E+01	5.780E-33
2.908E+01	1.916E-33
2.960E+01	6.205E-34
3.011E+01	1.962E-34
3.062E+01	6.052E-35
3.113E+01	1.820E-35
3.165E+01	5.335E-36
3.216E+01	1.524E-36
3.267E+01	4.239E-37
3.319E+01	1.148E-37
3.370E+01	3.024E-38
3.421E+01	7.751E-39
3.473E+01	1.931E-39
3.524E+01	4.676E-40
3.575E+01	1.100E-40
3.627E+01	2.513E-41
3.678E+01	5.575E-42

45

0.000E+00	1.000E+00
5.560E-01	7.082E-01
1.112E+00	4.526E-01
1.668E+00	2.588E-01
2.224E+00	1.315E-01
2.780E+00	5.910E-02
3.336E+00	2.338E-02
3.892E+00	8.122E-03
4.448E+00	2.471E-03
5.004E+00	6.569E-04
5.560E+00	1.524E-04
6.116E+00	3.084E-05
6.672E+00	5.432E-06
7.228E+00	8.325E-07
7.784E+00	1.110E-07
8.340E+00	1.285E-08
8.896E+00	1.294E-09
9.452E+00	1.136E-10
1.001E+01	8.929E-12
1.056E+01	7.543E-13
1.112E+01	1.322E-13
1.163E+01	5.276E-14
1.215E+01	2.535E-14
1.266E+01	1.221E-14
1.317E+01	5.720E-15
1.369E+01	2.600E-15
1.420E+01	1.145E-15
1.471E+01	4.884E-16
1.523E+01	2.017E-16
1.574E+01	8.053E-17
1.625E+01	3.109E-17
1.677E+01	1.160E-17
1.728E+01	4.177E-18
1.779E+01	1.451E-18
1.830E+01	4.863E-19
1.882E+01	1.570E-19
1.933E+01	4.877E-20
1.984E+01	1.458E-20
2.036E+01	4.186E-21
2.087E+01	1.154E-21
2.138E+01	3.054E-22
2.190E+01	7.741E-23
2.241E+01	1.879E-23
2.292E+01	4.362E-24
2.344E+01	9.677E-25
2.395E+01	2.050E-25
2.446E+01	4.147E-26
2.498E+01	8.018E-27
2.549E+01	1.487E-27
2.600E+01	2.679E-28
2.652E+01	4.822E-29
2.703E+01	9.237E-30
2.754E+01	2.065E-30
2.806E+01	5.702E-31
2.857E+01	1.864E-31
2.908E+01	6.621E-32

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.406E-32 8.698E-33 3.096E-33 1.081E-33 3.692E-34 1.235E-34 4.037E-35 1.291E-35 4.033E-36 1.231E-36 3.672E-37 1.069E-37 3.038E-38 8.422E-39 2.277E-39
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 7.229E-01 4.766E-01 2.845E-01 1.528E-01 7.356E-02 3.160E-02 1.208E-02 4.104E-03 1.235E-03 3.292E-04 7.758E-05 1.615E-05 2.967E-06 4.810E-07 6.873E-08 8.657E-09 9.612E-10 9.444E-11 8.432E-12 8.379E-13 1.630E-13 6.293E-14 3.097E-14 1.556E-14 7.657E-15 3.667E-15 1.708E-15 7.729E-16 3.398E-16 1.450E-16 6.005E-17 2.412E-17 9.390E-18 3.542E-18 1.293E-18 4.570E-19 1.561E-19 5.155E-20 1.643E-20 5.055E-21

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.499E-21 4.284E-22 1.178E-22 3.118E-23 7.927E-24 1.935E-24 4.535E-25 1.019E-25 2.198E-26 4.553E-27 9.113E-28 1.785E-28 3.533E-29 7.502E-30 1.853E-30 5.538E-31 1.922E-31 7.191E-32 2.752E-32 1.050E-32 3.956E-33 1.465E-33 5.322E-34 1.897E-34 6.626E-35 2.269E-35 7.610E-36 2.500E-36 8.043E-37 2.533E-37
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.355E-01 4.978E-01 3.079E-01 1.732E-01 8.822E-02 4.055E-02 1.678E-02 6.236E-03 2.078E-03 6.204E-04 1.657E-04 3.954E-05 8.427E-06 1.603E-06 2.721E-07 4.118E-08 5.555E-09 6.685E-10 7.210E-11 7.464E-12 9.420E-13 1.869E-13 7.117E-14 3.566E-14 1.854E-14



1.420E+01	9.492E-15
1.471E+01	4.745E-15
1.523E+01	2.313E-15
1.574E+01	1.098E-15
1.625E+01	5.081E-16
1.677E+01	2.289E-16
1.728E+01	1.003E-16
1.779E+01	4.280E-17
1.830E+01	1.775E-17
1.882E+01	7.154E-18
1.933E+01	2.801E-18
1.984E+01	1.065E-18
2.036E+01	3.928E-19
2.087E+01	1.405E-19
2.138E+01	4.873E-20
2.190E+01	1.637E-20
2.241E+01	5.323E-21
2.292E+01	1.674E-21
2.344E+01	5.092E-22
2.395E+01	1.496E-22
2.446E+01	4.242E-23
2.498E+01	1.161E-23
2.549E+01	3.061E-24
2.600E+01	7.777E-25
2.652E+01	1.903E-25
2.703E+01	4.482E-26
2.754E+01	1.017E-26
2.806E+01	2.231E-27
2.857E+01	4.761E-28
2.908E+01	1.005E-28
2.960E+01	2.177E-29
3.011E+01	5.142E-30
3.062E+01	1.417E-30
3.113E+01	4.637E-31
3.165E+01	1.718E-31
3.216E+01	6.759E-32
3.267E+01	2.707E-32
3.319E+01	1.081E-32
3.370E+01	4.263E-33
3.421E+01	1.656E-33
3.473E+01	6.324E-34
3.524E+01	2.373E-34
3.575E+01	8.744E-35
3.627E+01	3.164E-35
3.678E+01	1.124E-35

#### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB CoHD Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.01425 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.01425 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	1.423E-01
	1.112E+00	3.291E-03
	1.668E+00	1.026E-05
	2.224E+00	3.995E-09

2.780E+00	3.251E-13
3.336E+00	7.337E-15
3.892E+00	2.276E-16
4.448E+00	3.947E-18
5.004E+00	3.646E-20
5.560E+00	1.694E-22
6.116E+00	3.702E-25
6.672E+00	3.681E-28
7.228E+00	5.171E-31
7.784E+00	6.216E-33
8.340E+00	6.939E-35
8.896E+00	5.242E-37
9.452E+00	2.607E-39
1.001E+01	8.317E-42
1.056E+01	1.699E-44
1.112E+01	3.109E-47
1.163E+01	2.144E-49
1.215E+01	0.000E+00
1.266E+01	0.000E+00
1.317E+01	0.000E+00
1.369E+01	0.000E+00
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.008E-01
	1.112E+00	3.806E-02
	1.668E+00	1.839E-03
	2.224E+00	3.236E-05
	2.780E+00	2.020E-07
	3.336E+00	4.417E-10
	3.892E+00	4.936E-13
	4.448E+00	2.190E-14
	5.004E+00	2.274E-15
	5.560E+00	1.796E-16
	6.116E+00	1.058E-17
	6.672E+00	4.580E-19
	7.228E+00	1.428E-20
	7.784E+00	3.138E-22
	8.340E+00	4.747E-24
	8.896E+00	4.828E-26
	9.452E+00	3.340E-28
	1.001E+01	2.500E-30
	1.056E+01	7.400E-32
	1.112E+01	3.721E-33
	1.163E+01	2.004E-34
	1.215E+01	9.161E-36
	1.266E+01	3.525E-37
	1.317E+01	1.134E-38
	1.369E+01	3.027E-40
	1.420E+01	6.661E-42
	1.471E+01	1.209E-43
	1.523E+01	1.884E-45
	1.574E+01	3.104E-47
	1.625E+01	8.368E-49
	1.677E+01	3.520E-50
	1.728E+01	0.000E+00
	1.779E+01	0.000E+00
	1.830E+01	0.000E+00
	1.882E+01	0.000E+00
	1.933E+01	0.000E+00
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 3.994E-01 9.091E-02 1.109E-02 6.995E-04 2.237E-05 3.580E-07 2.846E-09 1.155E-11 1.055E-13 1.563E-14 2.429E-15 3.142E-16 3.351E-17 2.922E-18 2.063E-19 1.167E-20 5.220E-22 1.825E-23 4.915E-25 1.054E-26 2.367E-28 5.631E-30 2.940E-31 2.864E-32 2.896E-33 2.667E-34 2.202E-35 1.623E-36 1.064E-37 6.178E-39 3.165E-40



	9.452E+00	4.509E-19
	1.001E+01	4.013E-20
	1.056E+01	3.009E-21
	1.112E+01	1.964E-22
	1.163E+01	1.290E-23
	1.215E+01	7.160E-25
	1.266E+01	3.346E-26
	1.317E+01	1.324E-27
	1.369E+01	4.773E-29
	1.420E+01	2.214E-30
	1.471E+01	2.073E-31
	1.523E+01	2.823E-32
	1.574E+01	3.897E-33
	1.625E+01	5.027E-34
	1.677E+01	5.982E-35
	1.728E+01	6.545E-36
	1.779E+01	6.567E-37
	1.830E+01	6.027E-38
	1.882E+01	5.048E-39
	1.933E+01	3.847E-40
	1.984E+01	2.662E-41
	2.036E+01	1.671E-42
	2.087E+01	9.547E-44
	2.138E+01	5.058E-45
	2.190E+01	2.644E-46
	2.241E+01	1.582E-47
	2.292E+01	1.270E-48
	2.344E+01	1.307E-49
	2.395E+01	1.460E-50
	2.446E+01	0.000E+00
	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.156E-01

1.112E+00	1.918E-01
1.668E+00	4.971E-02
2.224E+00	8.787E-03
2.780E+00	1.044E-03
3.336E+00	8.258E-05
3.892E+00	4.322E-06
4.448E+00	1.490E-07
5.004E+00	3.373E-09
5.560E+00	5.053E-11
6.116E+00	6.657E-13
6.672E+00	5.659E-14
7.228E+00	1.424E-14
7.784E+00	3.396E-15
8.340E+00	7.261E-16
8.896E+00	1.385E-16
9.452E+00	2.350E-17
1.001E+01	3.529E-18
1.056E+01	4.672E-19
1.112E+01	5.649E-20
1.163E+01	6.862E-21
1.215E+01	7.386E-22
1.266E+01	7.011E-23
1.317E+01	5.839E-24
1.369E+01	4.247E-25
1.420E+01	2.690E-26
1.471E+01	1.493E-27
1.523E+01	7.638E-29
1.574E+01	4.497E-30
1.625E+01	4.508E-31
1.677E+01	7.070E-32
1.728E+01	1.221E-32
1.779E+01	2.038E-33
1.830E+01	3.201E-34
1.882E+01	4.711E-35
1.933E+01	6.480E-36
1.984E+01	8.316E-37
2.036E+01	9.941E-38
2.087E+01	1.105E-38
2.138E+01	1.139E-39
2.190E+01	1.088E-40
2.241E+01	9.616E-42
2.292E+01	7.861E-43
2.344E+01	5.974E-44
2.395E+01	4.293E-45
2.446E+01	3.068E-46
2.498E+01	2.428E-47
2.549E+01	2.412E-48
2.600E+01	3.008E-49
2.652E+01	4.185E-50
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00



	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	5.535E-01
	1.112E+00	2.341E-01
	1.668E+00	7.356E-02
	2.224E+00	1.687E-02
	2.780E+00	2.788E-03
	3.336E+00	3.292E-04
	3.892E+00	2.763E-05
	4.448E+00	1.641E-06
	5.004E+00	6.873E-08
	5.560E+00	2.028E-09
	6.116E+00	4.252E-11
	6.672E+00	8.040E-13
	7.228E+00	7.030E-14
	7.784E+00	1.950E-14
	8.340E+00	5.408E-15
	8.896E+00	1.372E-15
	9.452E+00	3.169E-16
	1.001E+01	6.646E-17
	1.056E+01	1.263E-17
	1.112E+01	2.254E-18
	1.163E+01	4.028E-19
	1.215E+01	6.558E-20
	1.266E+01	9.692E-21
	1.317E+01	1.296E-21
	1.369E+01	1.562E-22
	1.420E+01	1.690E-23
	1.471E+01	1.636E-24
	1.523E+01	1.413E-25
	1.574E+01	1.087E-26
	1.625E+01	7.540E-28
	1.677E+01	5.001E-29
	1.728E+01	3.904E-30
	1.779E+01	4.853E-31
	1.830E+01	8.844E-32
	1.882E+01	1.781E-32
	1.933E+01	3.516E-33
	1.984E+01	6.621E-34
	2.036E+01	1.181E-34
	2.087E+01	1.994E-35
	2.138E+01	3.180E-36
	2.190E+01	4.785E-37
	2.241E+01	6.782E-38
	2.292E+01	9.042E-39

	2.344E+01	1.133E-39
	2.395E+01	1.331E-40
	2.446E+01	1.466E-41
	2.498E+01	1.512E-42
	2.549E+01	1.466E-43
	2.600E+01	1.347E-44
	2.652E+01	1.205E-45
	2.703E+01	1.113E-46
	2.754E+01	1.174E-47
	2.806E+01	1.524E-48
	2.857E+01	2.349E-49
	2.908E+01	3.904E-50
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
35	0.000E+00	1.000E+00
	5.560E-01	5.839E-01
	1.112E+00	2.713E-01
	1.668E+00	9.799E-02
	2.224E+00	2.709E-02
	2.780E+00	5.673E-03
	3.336E+00	8.926E-04
	3.892E+00	1.050E-04
	4.448E+00	9.199E-06
	5.004E+00	5.984E-07
	5.560E+00	2.885E-08
	6.116E+00	1.030E-09
	6.672E+00	2.759E-11
	7.228E+00	7.151E-13
	7.784E+00	7.527E-14
	8.340E+00	2.270E-14
	8.896E+00	7.005E-15
	9.452E+00	2.007E-15
	1.001E+01	5.309E-16
	1.056E+01	1.296E-16
	1.112E+01	3.022E-17
	1.163E+01	7.041E-18
	1.215E+01	1.521E-18
	1.266E+01	3.037E-19
	1.317E+01	5.595E-20
	1.369E+01	9.485E-21
	1.420E+01	1.476E-21
	1.471E+01	2.101E-22
	1.523E+01	2.728E-23

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.222E-24 3.452E-25 3.350E-26 2.954E-27 2.420E-28 2.011E-29 2.125E-30 3.451E-31 7.374E-32 1.676E-32 3.733E-33 7.982E-34 1.631E-34 3.176E-35 5.895E-36 1.041E-36 1.748E-37 2.787E-38 4.213E-39 6.035E-40 8.181E-41 1.049E-41 1.272E-42 1.463E-43 1.607E-44 1.721E-45 1.877E-46 2.251E-47 3.199E-48 5.384E-49 1.001E-49 1.919E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.090E-01 3.041E-01 1.221E-01 3.888E-02 9.727E-03 1.899E-03 2.879E-04 3.377E-05 3.057E-06 2.131E-07 1.142E-08 4.709E-10 1.526E-11

7.784E+00	5.318E-13
8.340E+00	7.284E-14
8.896E+00	2.384E-14
9.452E+00	7.977E-15
1.001E+01	2.503E-15
1.056E+01	7.348E-16
1.112E+01	2.082E-16
1.163E+01	5.884E-17
1.215E+01	1.560E-17
1.266E+01	3.875E-18
1.317E+01	8.998E-19
1.369E+01	1.950E-19
1.420E+01	3.935E-20
1.471E+01	7.380E-21
1.523E+01	1.283E-21
1.574E+01	2.064E-22
1.625E+01	3.064E-23
1.677E+01	4.187E-24
1.728E+01	5.254E-25
1.779E+01	6.047E-26
1.830E+01	6.389E-27
1.882E+01	6.271E-28
1.933E+01	5.983E-29
1.984E+01	6.360E-30
2.036E+01	9.361E-31
2.087E+01	1.959E-31
2.138E+01	4.799E-32
2.190E+01	1.200E-32
2.241E+01	2.925E-33
2.292E+01	6.873E-34
2.344E+01	1.551E-34
2.395E+01	3.358E-35
2.446E+01	6.968E-36
2.498E+01	1.385E-36
2.549E+01	2.632E-37
2.600E+01	4.784E-38
2.652E+01	8.302E-39
2.703E+01	1.375E-39
2.754E+01	2.170E-40
2.806E+01	3.263E-41
2.857E+01	4.673E-42
2.908E+01	6.378E-43
2.960E+01	8.319E-44
3.011E+01	1.046E-44
3.062E+01	1.293E-45
3.113E+01	1.638E-46
3.165E+01	2.269E-47
3.216E+01	3.649E-48
3.267E+01	6.825E-49
3.319E+01	1.404E-49
3.370E+01	2.991E-50
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

45

0.000E+00	1.000E+00
5.560E-01	6.301E-01
1.112E+00	3.332E-01
1.668E+00	1.454E-01
2.224E+00	5.171E-02
2.780E+00	1.487E-02
3.336E+00	3.435E-03
3.892E+00	6.345E-04
4.448E+00	9.342E-05
5.004E+00	1.093E-05
5.560E+00	1.016E-06
6.116E+00	7.472E-08
6.672E+00	4.352E-09
7.228E+00	2.010E-10
7.784E+00	7.638E-12
8.340E+00	3.617E-13
8.896E+00	6.614E-14
9.452E+00	2.339E-14
1.001E+01	8.339E-15
1.056E+01	2.818E-15
1.112E+01	9.263E-16
1.163E+01	3.033E-16
1.215E+01	9.400E-17
1.266E+01	2.754E-17
1.317E+01	7.617E-18
1.369E+01	1.986E-18
1.420E+01	4.873E-19
1.471E+01	1.124E-19
1.523E+01	2.431E-20
1.574E+01	4.924E-21
1.625E+01	9.322E-22
1.677E+01	1.646E-22
1.728E+01	2.705E-23
1.779E+01	4.129E-24
1.830E+01	5.844E-25
1.882E+01	7.657E-26
1.933E+01	9.297E-27
1.984E+01	1.054E-27
2.036E+01	1.149E-28
2.087E+01	1.319E-29
2.138E+01	1.907E-30
2.190E+01	3.878E-31
2.241E+01	9.842E-32
2.292E+01	2.664E-32
2.344E+01	7.161E-33
2.395E+01	1.872E-33
2.446E+01	4.726E-34
2.498E+01	1.151E-34
2.549E+01	2.702E-35
2.600E+01	6.105E-36
2.652E+01	1.327E-36
2.703E+01	2.774E-37
2.754E+01	5.572E-38
2.806E+01	1.074E-38
2.857E+01	1.986E-39
2.908E+01	3.520E-40

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	5.977E-41 9.716E-42 1.513E-42 2.259E-43 3.251E-44 4.557E-45 6.370E-46 9.268E-47 1.488E-47 2.748E-48 5.768E-49 1.307E-49 3.046E-50 0.000E+00 0.000E+00
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.482E-01 3.591E-01 1.676E-01 6.517E-02 2.096E-02 5.540E-03 1.199E-03 2.118E-04 3.045E-05 3.559E-06 3.375E-07 2.594E-08 1.615E-09 8.191E-11 3.608E-12 2.403E-13 5.785E-14 2.188E-14 8.243E-15 3.046E-15 1.120E-15 3.922E-16 1.308E-16 4.148E-17 1.250E-17 3.571E-18 9.670E-19 2.478E-19 5.998E-20 1.370E-20 2.948E-21 5.964E-22 1.133E-22 2.016E-23 3.356E-24 5.219E-25 7.571E-26 1.026E-26 1.305E-27 1.597E-28

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.013E-29 3.017E-30 6.134E-31 1.595E-31 4.571E-32 1.325E-32 3.763E-33 1.038E-33 2.775E-34 7.175E-35 1.794E-35 4.335E-36 1.012E-36 2.278E-37 4.948E-38 1.036E-38 2.089E-39 4.054E-40 7.570E-41 1.359E-41 2.348E-42 3.904E-43 6.268E-44 9.790E-45 1.510E-45 2.371E-46 3.965E-47 7.410E-48 1.574E-48 3.697E-49
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 6.640E-01 3.825E-01 1.887E-01 7.897E-02 2.783E-02 8.219E-03 2.025E-03 4.152E-04 7.068E-05 9.968E-06 1.163E-06 1.122E-07 8.940E-09 5.886E-10 3.237E-11 1.668E-12 1.634E-13 4.951E-14 1.986E-14 8.052E-15 3.250E-15 1.257E-15 4.651E-16 1.647E-16 5.570E-17

1.420E+01	1.798E-17
1.471E+01	5.537E-18
1.523E+01	1.624E-18
1.574E+01	4.532E-19
1.625E+01	1.202E-19
1.677E+01	3.024E-20
1.728E+01	7.214E-21
1.779E+01	1.629E-21
1.830E+01	3.475E-22
1.882E+01	6.997E-23
1.933E+01	1.327E-23
1.984E+01	2.369E-24
2.036E+01	3.972E-25
2.087E+01	6.253E-26
2.138E+01	9.251E-27
2.190E+01	1.294E-27
2.241E+01	1.747E-28
2.292E+01	2.413E-29
2.344E+01	3.855E-30
2.395E+01	8.077E-31
2.446E+01	2.163E-31
2.498E+01	6.499E-32
2.549E+01	1.999E-32
2.600E+01	6.073E-33
2.652E+01	1.800E-33
2.703E+01	5.185E-34
2.754E+01	1.450E-34
2.806E+01	3.936E-35
2.857E+01	1.036E-35
2.908E+01	2.641E-36
2.960E+01	6.522E-37
3.011E+01	1.559E-37
3.062E+01	3.607E-38
3.113E+01	8.068E-39
3.165E+01	1.744E-39
3.216E+01	3.641E-40
3.267E+01	7.337E-41
3.319E+01	1.427E-41
3.370E+01	2.679E-42
3.421E+01	4.859E-43
3.473E+01	8.532E-44
3.524E+01	1.459E-44
3.575E+01	2.458E-45
3.627E+01	4.174E-46
3.678E+01	7.407E-47

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB ClayPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.035E-01
	1.112E+00	1.088E-02
	1.668E+00	1.325E-04
	2.224E+00	3.447E-07

2.780E+00	1.865E-10
3.336E+00	9.968E-14
3.892E+00	5.897E-15
4.448E+00	2.914E-16
5.004E+00	9.329E-18
5.560E+00	1.877E-19
6.116E+00	2.292E-21
6.672E+00	1.629E-23
7.228E+00	6.449E-26
7.784E+00	1.442E-28
8.340E+00	5.218E-31
8.896E+00	1.104E-32
9.452E+00	2.398E-34
1.001E+01	3.920E-36
1.056E+01	4.720E-38
1.112E+01	4.689E-40
1.163E+01	4.372E-42
1.215E+01	3.066E-44
1.266E+01	1.837E-46
1.317E+01	1.711E-48
1.369E+01	3.347E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.695E-01
	1.112E+00	7.219E-02
	1.668E+00	6.949E-03
	2.224E+00	3.171E-04
	2.780E+00	6.708E-06
	3.336E+00	6.495E-08
	3.892E+00	2.862E-10
	4.448E+00	7.456E-13
	5.004E+00	3.331E-14
	5.560E+00	4.922E-15
	6.116E+00	6.016E-16
	6.672E+00	5.936E-17
	7.228E+00	4.682E-18
	7.784E+00	2.919E-19
	8.340E+00	1.421E-20
	8.896E+00	5.321E-22
	9.452E+00	1.510E-23
	1.001E+01	3.194E-25
	1.056E+01	4.993E-27
	1.112E+01	7.016E-29
	1.163E+01	1.632E-30
	1.215E+01	1.023E-31
	1.266E+01	9.112E-33
	1.317E+01	7.616E-34
	1.369E+01	5.655E-35
	1.420E+01	3.702E-36
	1.471E+01	2.127E-37
	1.523E+01	1.067E-38
	1.574E+01	4.655E-40
	1.625E+01	1.757E-41
	1.677E+01	5.733E-43
	1.728E+01	1.636E-44
	1.779E+01	4.357E-46
	1.830E+01	1.348E-47
	1.882E+01	6.397E-49
	1.933E+01	4.141E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.560E-01	4.645E-01
	1.112E+00	1.427E-01
	1.668E+00	2.769E-02
	2.224E+00	3.308E-03
	2.780E+00	2.390E-04
	3.336E+00	1.033E-05
	3.892E+00	2.655E-07
	4.448E+00	4.035E-09
	5.004E+00	3.661E-11
	5.560E+00	3.292E-13
	6.116E+00	3.495E-14
	6.672E+00	7.447E-15
	7.228E+00	1.409E-15
	7.784E+00	2.316E-16
	8.340E+00	3.294E-17
	8.896E+00	4.026E-18
	9.452E+00	4.206E-19
	1.001E+01	3.729E-20
	1.056E+01	2.785E-21
	1.112E+01	1.978E-22
	1.163E+01	1.295E-23
	1.215E+01	7.173E-25
	1.266E+01	3.343E-26
	1.317E+01	1.319E-27
	1.369E+01	4.743E-29
	1.420E+01	2.195E-30
	1.471E+01	2.049E-31
	1.523E+01	2.783E-32
	1.574E+01	3.832E-33
	1.625E+01	4.930E-34
	1.677E+01	5.851E-35

	1.728E+01	6.384E-36
	1.779E+01	6.388E-37
	1.830E+01	5.847E-38
	1.882E+01	4.884E-39
	1.933E+01	3.712E-40
	1.984E+01	2.562E-41
	2.036E+01	1.604E-42
	2.087E+01	9.138E-44
	2.138E+01	4.828E-45
	2.190E+01	2.517E-46
	2.241E+01	1.502E-47
	2.292E+01	1.202E-48
	2.344E+01	1.234E-49
	2.395E+01	1.375E-50
	2.446E+01	0.000E+00
	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.560E-01	5.271E-01
	1.112E+00	2.048E-01
	1.668E+00	5.682E-02
	2.224E+00	1.103E-02
	2.780E+00	1.476E-03
	3.336E+00	1.351E-04
	3.892E+00	8.407E-06
	4.448E+00	3.539E-07
	5.004E+00	1.005E-08
	5.560E+00	1.927E-10
	6.116E+00	2.724E-12
	6.672E+00	1.037E-13
	7.228E+00	2.384E-14
	7.784E+00	6.175E-15
	8.340E+00	1.452E-15
	8.896E+00	3.072E-16

9.452E+00	5.832E-17
1.001E+01	9.898E-18
1.056E+01	1.499E-18
1.112E+01	2.284E-19
1.163E+01	3.206E-20
1.215E+01	4.029E-21
1.266E+01	4.517E-22
1.317E+01	4.495E-23
1.369E+01	3.955E-24
1.420E+01	3.062E-25
1.471E+01	2.082E-26
1.523E+01	1.253E-27
1.574E+01	7.022E-29
1.625E+01	4.523E-30
1.677E+01	4.807E-31
1.728E+01	7.883E-32
1.779E+01	1.436E-32
1.830E+01	2.546E-33
1.882E+01	4.271E-34
1.933E+01	6.741E-35
1.984E+01	9.990E-36
2.036E+01	1.388E-36
2.087E+01	1.805E-37
2.138E+01	2.194E-38
2.190E+01	2.486E-39
2.241E+01	2.624E-40
2.292E+01	2.576E-41
2.344E+01	2.350E-42
2.395E+01	1.996E-43
2.446E+01	1.593E-44
2.498E+01	1.227E-45
2.549E+01	9.770E-47
2.600E+01	9.045E-48
2.652E+01	1.058E-48
2.703E+01	1.479E-49
2.754E+01	2.210E-50
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

1.112E+00	2.573E-01
1.668E+00	8.876E-02
2.224E+00	2.310E-02
2.780E+00	4.487E-03
3.336E+00	6.451E-04
3.892E+00	6.829E-05
4.448E+00	5.302E-06
5.004E+00	3.010E-07
5.560E+00	1.247E-08
6.116E+00	3.771E-10
6.672E+00	8.610E-12
7.228E+00	2.609E-13
7.784E+00	4.552E-14
8.340E+00	1.387E-14
8.896E+00	4.025E-15
9.452E+00	1.077E-15
1.001E+01	2.649E-16
1.056E+01	6.001E-17
1.112E+01	1.401E-17
1.163E+01	3.010E-18
1.215E+01	5.962E-19
1.266E+01	1.086E-19
1.317E+01	1.816E-20
1.369E+01	2.776E-21
1.420E+01	3.870E-22
1.471E+01	4.905E-23
1.523E+01	5.632E-24
1.574E+01	5.842E-25
1.625E+01	5.462E-26
1.677E+01	4.611E-27
1.728E+01	3.577E-28
1.779E+01	2.751E-29
1.830E+01	2.612E-30
1.882E+01	3.865E-31
1.933E+01	7.820E-32
1.984E+01	1.708E-32
2.036E+01	3.658E-33
2.087E+01	7.510E-34
2.138E+01	1.470E-34
2.190E+01	2.736E-35
2.241E+01	4.840E-36
2.292E+01	8.128E-37
2.344E+01	1.294E-37
2.395E+01	1.951E-38
2.446E+01	2.782E-39
2.498E+01	3.746E-40
2.549E+01	4.762E-41
2.600E+01	5.708E-42
2.652E+01	6.456E-43
2.703E+01	6.915E-44
2.754E+01	7.092E-45
2.806E+01	7.162E-46
2.857E+01	7.562E-47
2.908E+01	9.123E-48
2.960E+01	1.330E-48
3.011E+01	2.257E-49
3.062E+01	4.100E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.065E-01
	1.112E+00	3.016E-01
	1.668E+00	1.206E-01
	2.224E+00	3.825E-02
	2.780E+00	9.531E-03
	3.336E+00	1.853E-03
	3.892E+00	2.798E-04
	4.448E+00	3.269E-05
	5.004E+00	2.947E-06
	5.560E+00	2.045E-07
	6.116E+00	1.092E-08
	6.672E+00	4.483E-10
	7.228E+00	1.447E-11
	7.784E+00	5.023E-13
	8.340E+00	6.852E-14
	8.896E+00	2.234E-14
	9.452E+00	7.443E-15
	1.001E+01	2.327E-15
	1.056E+01	6.845E-16
	1.112E+01	2.097E-16
	1.163E+01	5.912E-17
	1.215E+01	1.563E-17
	1.266E+01	3.873E-18
	1.317E+01	8.968E-19
	1.369E+01	1.938E-19
	1.420E+01	3.901E-20
	1.471E+01	7.296E-21
	1.523E+01	1.265E-21
	1.574E+01	2.030E-22
	1.625E+01	3.005E-23
	1.677E+01	4.095E-24
	1.728E+01	5.125E-25
	1.779E+01	5.882E-26
	1.830E+01	6.199E-27
	1.882E+01	6.067E-28
	1.933E+01	5.773E-29
	1.984E+01	6.121E-30
	2.036E+01	8.987E-31
	2.087E+01	1.876E-31
	2.138E+01	4.583E-32
	2.190E+01	1.143E-32
	2.241E+01	2.779E-33
	2.292E+01	6.511E-34



	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.465E-34 3.164E-35 6.548E-36 1.298E-36 2.460E-37 4.459E-38 7.718E-39 1.275E-39 2.007E-40 3.009E-41 4.298E-42 5.850E-43 7.610E-44 9.543E-45 1.177E-45 1.486E-46 2.053E-47 3.294E-48 6.145E-49 1.261E-49 2.678E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.339E-01 3.394E-01 1.510E-01 5.523E-02 1.646E-02 3.974E-03 7.736E-04 1.210E-04 1.519E-05 1.525E-06 1.223E-07 7.833E-09 4.007E-10 1.668E-11 7.092E-13 8.908E-14 2.982E-14 1.094E-14 3.864E-15 1.428E-15 4.862E-16 1.570E-16 4.806E-17 1.393E-17 3.814E-18 9.860E-19 2.403E-19 5.510E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.187E-20 2.398E-21 4.535E-22 8.012E-23 1.320E-23 2.024E-24 2.883E-25 3.812E-26 4.689E-27 5.428E-28 6.151E-29 7.616E-30 1.231E-30 2.740E-31 7.276E-32 2.015E-32 5.513E-33 1.465E-33 3.766E-34 9.347E-35 2.238E-35 5.167E-36 1.149E-36 2.461E-37 5.069E-38 1.004E-38 1.910E-39 3.488E-40 6.111E-41 1.027E-41 1.655E-42 2.561E-43 3.823E-44 5.552E-45 8.006E-46 1.190E-46 1.925E-47 3.549E-48 7.455E-49 1.708E-49 4.062E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.563E-01 3.719E-01 1.796E-01 7.315E-02 2.495E-02 7.088E-03 1.670E-03 3.255E-04 5.234E-05 6.932E-06 7.551E-07 6.757E-08 4.964E-09

7.784E+00	2.997E-10
8.340E+00	1.516E-11
8.896E+00	7.859E-13
9.452E+00	1.029E-13
1.001E+01	3.542E-14
1.056E+01	1.414E-14
1.112E+01	5.988E-15
1.163E+01	2.341E-15
1.215E+01	8.756E-16
1.266E+01	3.129E-16
1.317E+01	1.068E-16
1.369E+01	3.474E-17
1.420E+01	1.077E-17
1.471E+01	3.178E-18
1.523E+01	8.915E-19
1.574E+01	2.374E-19
1.625E+01	5.995E-20
1.677E+01	1.433E-20
1.728E+01	3.241E-21
1.779E+01	6.917E-22
1.830E+01	1.392E-22
1.882E+01	2.635E-23
1.933E+01	4.688E-24
1.984E+01	7.825E-25
2.036E+01	1.224E-25
2.087E+01	1.795E-26
2.138E+01	2.475E-27
2.190E+01	3.258E-28
2.241E+01	4.274E-29
2.292E+01	6.214E-30
2.344E+01	1.160E-30
2.395E+01	2.863E-31
2.446E+01	8.255E-32
2.498E+01	2.484E-32
2.549E+01	7.421E-33
2.600E+01	2.165E-33
2.652E+01	6.138E-34
2.703E+01	1.688E-34
2.754E+01	4.501E-35
2.806E+01	1.163E-35
2.857E+01	2.907E-36
2.908E+01	7.037E-37
2.960E+01	1.647E-37
3.011E+01	3.726E-38
3.062E+01	8.143E-39
3.113E+01	1.718E-39
3.165E+01	3.497E-40
3.216E+01	6.863E-41
3.267E+01	1.299E-41
3.319E+01	2.369E-42
3.370E+01	4.171E-43
3.421E+01	7.104E-44
3.473E+01	1.178E-44
3.524E+01	1.924E-45
3.575E+01	3.175E-46
3.627E+01	5.504E-47
3.678E+01	1.049E-47

45

0.000E+00	1.000E+00
5.560E-01	6.751E-01
1.112E+00	4.003E-01
1.668E+00	2.061E-01
2.224E+00	9.137E-02
2.780E+00	3.463E-02
3.336E+00	1.117E-02
3.892E+00	3.055E-03
4.448E+00	7.065E-04
5.004E+00	1.378E-04
5.560E+00	2.265E-05
6.116E+00	3.130E-06
6.672E+00	3.634E-07
7.228E+00	3.541E-08
7.784E+00	2.896E-09
8.340E+00	1.992E-10
8.896E+00	1.178E-11
9.452E+00	7.341E-13
1.001E+01	1.082E-13
1.056E+01	3.950E-14
1.112E+01	1.825E-14
1.163E+01	7.926E-15
1.215E+01	3.316E-15
1.266E+01	1.334E-15
1.317E+01	5.154E-16
1.369E+01	1.912E-16
1.420E+01	6.805E-17
1.471E+01	2.321E-17
1.523E+01	7.581E-18
1.574E+01	2.369E-18
1.625E+01	7.074E-19
1.677E+01	2.017E-19
1.728E+01	5.483E-20
1.779E+01	1.420E-20
1.830E+01	3.499E-21
1.882E+01	8.193E-22
1.933E+01	1.820E-22
1.984E+01	3.833E-23
2.036E+01	7.639E-24
2.087E+01	1.439E-24
2.138E+01	2.559E-25
2.190E+01	4.295E-26
2.241E+01	6.814E-27
2.292E+01	1.028E-27
2.344E+01	1.507E-28
2.395E+01	2.264E-29
2.446E+01	3.893E-30
2.498E+01	8.580E-31
2.549E+01	2.386E-31
2.600E+01	7.468E-32
2.652E+01	2.410E-32
2.703E+01	7.715E-33
2.754E+01	2.419E-33
2.806E+01	7.394E-34
2.857E+01	2.200E-34
2.908E+01	6.370E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.793E-35 4.905E-36 1.304E-36 3.364E-37 8.423E-38 2.046E-38 4.817E-39 1.099E-39 2.429E-40 5.196E-41 1.076E-41 2.157E-42 4.190E-43 7.904E-44 1.455E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.912E-01 4.254E-01 2.307E-01 1.095E-01 4.518E-02 1.614E-02 4.973E-03 1.319E-03 3.004E-04 5.866E-05 9.807E-06 1.403E-06 1.714E-07 1.790E-08 1.596E-09 1.219E-10 8.211E-12 6.119E-13 1.075E-13 4.534E-14 2.104E-14 9.601E-15 4.239E-15 1.807E-15 7.432E-16 2.947E-16 1.126E-16 4.144E-17 1.467E-17 4.992E-18 1.632E-18 5.120E-19 1.541E-19 4.440E-20 1.225E-20 3.230E-21 8.134E-22 1.954E-22 4.473E-23 9.745E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.018E-24 3.971E-25 7.414E-26 1.315E-26 2.223E-27 3.624E-28 5.878E-29 1.018E-29 2.101E-30 5.493E-31 1.714E-31 5.776E-32 1.977E-32 6.695E-33 2.223E-33 7.211E-34 2.284E-34 7.055E-35 2.125E-35 6.240E-36 1.785E-36 4.974E-37 1.349E-37 3.560E-38 9.139E-39 2.281E-39 5.531E-40 1.303E-40 2.982E-41 6.627E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.052E-01 4.476E-01 2.535E-01 1.273E-01 5.631E-02 2.187E-02 7.434E-03 2.206E-03 5.703E-04 1.283E-04 2.507E-05 4.252E-06 6.255E-07 7.976E-08 8.810E-09 8.434E-10 7.031E-11 5.313E-12 4.781E-13 1.109E-13 4.773E-14 2.295E-14 1.090E-14 5.031E-15 2.249E-15

1.420E+01	9.731E-16
1.471E+01	4.074E-16
1.523E+01	1.650E-16
1.574E+01	6.455E-17
1.625E+01	2.439E-17
1.677E+01	8.897E-18
1.728E+01	3.130E-18
1.779E+01	1.061E-18
1.830E+01	3.465E-19
1.882E+01	1.089E-19
1.933E+01	3.289E-20
1.984E+01	9.546E-21
2.036E+01	2.659E-21
2.087E+01	7.102E-22
2.138E+01	1.817E-22
2.190E+01	4.448E-23
2.241E+01	1.041E-23
2.292E+01	2.328E-24
2.344E+01	4.966E-25
2.395E+01	1.010E-25
2.446E+01	1.961E-26
2.498E+01	3.641E-27
2.549E+01	6.513E-28
2.600E+01	1.146E-28
2.652E+01	2.079E-29
2.703E+01	4.245E-30
2.754E+01	1.062E-30
2.806E+01	3.246E-31
2.857E+01	1.116E-31
2.908E+01	3.999E-32
2.960E+01	1.437E-32
3.011E+01	5.093E-33
3.062E+01	1.771E-33
3.113E+01	6.031E-34
3.165E+01	2.008E-34
3.216E+01	6.539E-35
3.267E+01	2.081E-35
3.319E+01	6.468E-36
3.370E+01	1.964E-36
3.421E+01	5.820E-37
3.473E+01	1.683E-37
3.524E+01	4.750E-38
3.575E+01	1.307E-38
3.627E+01	3.506E-39
3.678E+01	9.164E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB ClayPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.28	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.560E-01	2.043E-01	
	1.112E+00	1.097E-02	
	1.668E+00	1.341E-04	
	2.224E+00	3.503E-07	



2.780E+00	1.902E-10
3.336E+00	1.021E-13
3.892E+00	6.065E-15
4.448E+00	3.009E-16
5.004E+00	9.671E-18
5.560E+00	1.954E-19
6.116E+00	2.395E-21
6.672E+00	1.709E-23
7.228E+00	6.794E-26
7.784E+00	1.525E-28
8.340E+00	5.541E-31
8.896E+00	1.177E-32
9.452E+00	2.567E-34
1.001E+01	4.212E-36
1.056E+01	5.092E-38
1.112E+01	4.027E-40
1.163E+01	3.755E-42
1.215E+01	2.634E-44
1.266E+01	1.578E-46
1.317E+01	1.469E-48
1.369E+01	2.874E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.710E-01
	1.112E+00	7.277E-02
	1.668E+00	7.033E-03
	2.224E+00	3.222E-04
	2.780E+00	6.843E-06
	3.336E+00	6.653E-08
	3.892E+00	2.943E-10
	4.448E+00	7.698E-13
	5.004E+00	3.453E-14
	5.560E+00	5.123E-15
	6.116E+00	6.286E-16
	6.672E+00	6.228E-17
	7.228E+00	4.932E-18
	7.784E+00	3.087E-19
	8.340E+00	1.509E-20
	8.896E+00	5.672E-22
	9.452E+00	1.616E-23
	1.001E+01	3.433E-25
	1.056E+01	5.387E-27
	1.112E+01	6.026E-29
	1.163E+01	1.401E-30
	1.215E+01	8.782E-32
	1.266E+01	7.825E-33
	1.317E+01	6.540E-34
	1.369E+01	4.856E-35
	1.420E+01	3.179E-36
	1.471E+01	1.826E-37
	1.523E+01	9.165E-39
	1.574E+01	3.998E-40
	1.625E+01	1.509E-41
	1.677E+01	4.924E-43
	1.728E+01	1.405E-44
	1.779E+01	3.742E-46
	1.830E+01	1.158E-47
	1.882E+01	5.494E-49
	1.933E+01	3.556E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.664E-01 1.438E-01 2.803E-02 3.361E-03 2.438E-04 1.058E-05 2.730E-07 4.167E-09 3.796E-11 3.426E-13 3.652E-14 7.812E-15 1.484E-15 2.450E-16 3.497E-17 4.292E-18 4.501E-19 4.006E-20 3.003E-21 1.699E-22 1.112E-23 6.160E-25 2.871E-26 1.133E-27 4.074E-29 1.885E-30 1.760E-31 2.390E-32 3.291E-33 4.234E-34 5.024E-35



	9.452E+00	6.241E-17
	1.001E+01	1.063E-17
	1.056E+01	1.611E-18
	1.112E+01	1.962E-19
	1.163E+01	2.753E-20
	1.215E+01	3.460E-21
	1.266E+01	3.879E-22
	1.317E+01	3.860E-23
	1.369E+01	3.396E-24
	1.420E+01	2.630E-25
	1.471E+01	1.788E-26
	1.523E+01	1.076E-27
	1.574E+01	6.031E-29
	1.625E+01	3.884E-30
	1.677E+01	4.128E-31
	1.728E+01	6.769E-32
	1.779E+01	1.233E-32
	1.830E+01	2.186E-33
	1.882E+01	3.667E-34
	1.933E+01	5.788E-35
	1.984E+01	8.579E-36
	2.036E+01	1.192E-36
	2.087E+01	1.550E-37
	2.138E+01	1.884E-38
	2.190E+01	2.135E-39
	2.241E+01	2.254E-40
	2.292E+01	2.212E-41
	2.344E+01	2.018E-42
	2.395E+01	1.714E-43
	2.446E+01	1.368E-44
	2.498E+01	1.054E-45
	2.549E+01	8.390E-47
	2.600E+01	7.767E-48
	2.652E+01	9.083E-49
	2.703E+01	1.270E-49
	2.754E+01	1.898E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.744E-01

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1.668E+00  
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2.780E+00  
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5.560E+00  
6.116E+00  
6.672E+00  
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7.784E+00  
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4.156E-36  
6.980E-37  
1.111E-37  
1.675E-38  
2.389E-39  
3.217E-40  
4.089E-41  
4.901E-42  
5.544E-43  
5.938E-44  
6.090E-45  
6.150E-46  
6.494E-47  
7.834E-48  
1.142E-48  
1.938E-49  
3.520E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.089E-01
	1.112E+00	3.040E-01
	1.668E+00	1.220E-01
	2.224E+00	3.886E-02
	2.780E+00	9.723E-03
	3.336E+00	1.898E-03
	3.892E+00	2.877E-04
	4.448E+00	3.375E-05
	5.004E+00	3.054E-06
	5.560E+00	2.129E-07
	6.116E+00	1.141E-08
	6.672E+00	4.703E-10
	7.228E+00	1.524E-11
	7.784E+00	5.311E-13
	8.340E+00	7.273E-14
	8.896E+00	2.381E-14
	9.452E+00	7.964E-15
	1.001E+01	2.497E-15
	1.056E+01	7.266E-16
	1.112E+01	1.801E-16
	1.163E+01	5.076E-17
	1.215E+01	1.342E-17
	1.266E+01	3.325E-18
	1.317E+01	7.700E-19
	1.369E+01	1.664E-19
	1.420E+01	3.350E-20
	1.471E+01	6.265E-21
	1.523E+01	1.087E-21
	1.574E+01	1.743E-22
	1.625E+01	2.581E-23
	1.677E+01	3.517E-24
	1.728E+01	4.401E-25
	1.779E+01	5.051E-26
	1.830E+01	5.323E-27
	1.882E+01	5.210E-28
	1.933E+01	4.958E-29
	1.984E+01	5.256E-30
	2.036E+01	7.717E-31
	2.087E+01	1.611E-31
	2.138E+01	3.935E-32
	2.190E+01	9.812E-33
	2.241E+01	2.386E-33
	2.292E+01	5.591E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.258E-34 2.717E-35 5.622E-36 1.114E-36 2.113E-37 3.829E-38 6.628E-39 1.095E-39 1.723E-40 2.584E-41 3.691E-42 5.023E-43 6.535E-44 8.195E-45 1.010E-45 1.276E-46 1.763E-47 2.828E-48 5.277E-49 1.083E-49 2.300E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.364E-01 3.421E-01 1.528E-01 5.612E-02 1.679E-02 4.070E-03 7.955E-04 1.250E-04 1.574E-05 1.587E-06 1.278E-07 8.218E-09 4.221E-10 1.764E-11 7.530E-13 9.493E-14 3.190E-14 1.172E-14 4.070E-15 1.226E-15 4.174E-16 1.348E-16 4.126E-17 1.196E-17 3.275E-18 8.466E-19 2.063E-19 4.731E-20



	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.019E-20 2.059E-21 3.894E-22 6.880E-23 1.133E-23 1.738E-24 2.475E-25 3.273E-26 4.027E-27 4.661E-28 5.282E-29 6.539E-30 1.057E-30 2.353E-31 6.247E-32 1.730E-32 4.733E-33 1.258E-33 3.233E-34 8.025E-35 1.922E-35 4.436E-36 9.867E-37 2.113E-37 4.352E-38 8.620E-39 1.640E-39 2.995E-40 5.248E-41 8.817E-42 1.421E-42 2.200E-43 3.283E-44 4.768E-45 6.875E-46 1.022E-46 1.653E-47 3.047E-48 6.401E-49 1.467E-49 3.487E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.589E-01 3.749E-01 1.817E-01 7.432E-02 2.545E-02 7.259E-03 1.717E-03 3.361E-04 5.426E-05 7.215E-06 7.890E-07 7.089E-08 5.228E-09

7.784E+00	3.170E-10
8.340E+00	1.610E-11
8.896E+00	8.377E-13
9.452E+00	1.101E-13
1.001E+01	3.789E-14
1.056E+01	1.477E-14
1.112E+01	5.141E-15
1.163E+01	2.010E-15
1.215E+01	7.517E-16
1.266E+01	2.686E-16
1.317E+01	9.166E-17
1.369E+01	2.983E-17
1.420E+01	9.248E-18
1.471E+01	2.729E-18
1.523E+01	7.655E-19
1.574E+01	2.039E-19
1.625E+01	5.148E-20
1.677E+01	1.231E-20
1.728E+01	2.783E-21
1.779E+01	5.940E-22
1.830E+01	1.195E-22
1.882E+01	2.263E-23
1.933E+01	4.026E-24
1.984E+01	6.720E-25
2.036E+01	1.051E-25
2.087E+01	1.541E-26
2.138E+01	2.126E-27
2.190E+01	2.798E-28
2.241E+01	3.670E-29
2.292E+01	5.336E-30
2.344E+01	9.959E-31
2.395E+01	2.458E-31
2.446E+01	7.088E-32
2.498E+01	2.133E-32
2.549E+01	6.371E-33
2.600E+01	1.859E-33
2.652E+01	5.270E-34
2.703E+01	1.449E-34
2.754E+01	3.864E-35
2.806E+01	9.982E-36
2.857E+01	2.496E-36
2.908E+01	6.042E-37
2.960E+01	1.414E-37
3.011E+01	3.199E-38
3.062E+01	6.992E-39
3.113E+01	1.475E-39
3.165E+01	3.002E-40
3.216E+01	5.893E-41
3.267E+01	1.115E-41
3.319E+01	2.035E-42
3.370E+01	3.582E-43
3.421E+01	6.100E-44
3.473E+01	1.011E-44
3.524E+01	1.652E-45
3.575E+01	2.727E-46
3.627E+01	4.726E-47
3.678E+01	9.008E-48

45

0.000E+00	1.000E+00
5.560E-01	6.778E-01
1.112E+00	4.035E-01
1.668E+00	2.086E-01
2.224E+00	9.283E-02
2.780E+00	3.533E-02
3.336E+00	1.144E-02
3.892E+00	3.142E-03
4.448E+00	7.294E-04
5.004E+00	1.429E-04
5.560E+00	2.357E-05
6.116E+00	3.270E-06
6.672E+00	3.812E-07
7.228E+00	3.730E-08
7.784E+00	3.063E-09
8.340E+00	2.115E-10
8.896E+00	1.256E-11
9.452E+00	7.854E-13
1.001E+01	1.156E-13
1.056E+01	4.097E-14
1.112E+01	1.567E-14
1.163E+01	6.804E-15
1.215E+01	2.846E-15
1.266E+01	1.145E-15
1.317E+01	4.425E-16
1.369E+01	1.642E-16
1.420E+01	5.842E-17
1.471E+01	1.993E-17
1.523E+01	6.509E-18
1.574E+01	2.034E-18
1.625E+01	6.073E-19
1.677E+01	1.732E-19
1.728E+01	4.708E-20
1.779E+01	1.219E-20
1.830E+01	3.005E-21
1.882E+01	7.035E-22
1.933E+01	1.563E-22
1.984E+01	3.292E-23
2.036E+01	6.560E-24
2.087E+01	1.236E-24
2.138E+01	2.197E-25
2.190E+01	3.689E-26
2.241E+01	5.851E-27
2.292E+01	8.830E-28
2.344E+01	1.294E-28
2.395E+01	1.944E-29
2.446E+01	3.343E-30
2.498E+01	7.366E-31
2.549E+01	2.048E-31
2.600E+01	6.411E-32
2.652E+01	2.069E-32
2.703E+01	6.624E-33
2.754E+01	2.077E-33
2.806E+01	6.348E-34
2.857E+01	1.889E-34
2.908E+01	5.469E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.539E-35 4.212E-36 1.119E-36 2.888E-37 7.232E-38 1.756E-38 4.136E-39 9.437E-40 2.085E-40 4.462E-41 9.240E-42 1.852E-42 3.598E-43 6.787E-44 1.249E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.939E-01 4.288E-01 2.335E-01 1.112E-01 4.608E-02 1.653E-02 5.114E-03 1.362E-03 3.114E-04 6.104E-05 1.025E-05 1.471E-06 1.806E-07 1.893E-08 1.694E-09 1.299E-10 8.787E-12 6.556E-13 1.115E-13 3.891E-14 1.806E-14 8.241E-15 3.639E-15 1.551E-15 6.380E-16 2.530E-16 9.668E-17 3.557E-17 1.259E-17 4.286E-18 1.401E-18 4.396E-19 1.323E-19 3.812E-20 1.052E-20 2.773E-21 6.984E-22 1.678E-22 3.841E-23 8.368E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.733E-24 3.409E-25 6.367E-26 1.129E-26 1.909E-27 3.112E-28 5.048E-29 8.745E-30 1.804E-30 4.716E-31 1.471E-31 4.959E-32 1.697E-32 5.748E-33 1.908E-33 6.191E-34 1.961E-34 6.057E-35 1.825E-35 5.358E-36 1.533E-36 4.270E-37 1.158E-37 3.057E-38 7.846E-39 1.958E-39 4.749E-40 1.119E-40 2.561E-41 5.690E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.079E-01 4.512E-01 2.566E-01 1.293E-01 5.744E-02 2.240E-02 7.644E-03 2.277E-03 5.911E-04 1.335E-04 2.619E-05 4.460E-06 6.588E-07 8.434E-08 9.354E-09 8.990E-10 7.524E-11 5.704E-12 5.058E-13 9.520E-14 4.096E-14 1.970E-14 9.359E-15 4.318E-15 1.930E-15

	1.420E+01	8.353E-16
	1.471E+01	3.498E-16
	1.523E+01	1.416E-16
	1.574E+01	5.541E-17
	1.625E+01	2.094E-17
	1.677E+01	7.638E-18
	1.728E+01	2.687E-18
	1.779E+01	9.111E-19
	1.830E+01	2.975E-19
	1.882E+01	9.348E-20
	1.933E+01	2.824E-20
	1.984E+01	8.196E-21
	2.036E+01	2.283E-21
	2.087E+01	6.098E-22
	2.138E+01	1.560E-22
	2.190E+01	3.819E-23
	2.241E+01	8.940E-24
	2.292E+01	1.999E-24
	2.344E+01	4.264E-25
	2.395E+01	8.675E-26
	2.446E+01	1.684E-26
	2.498E+01	3.126E-27
	2.549E+01	5.592E-28
	2.600E+01	9.837E-29
	2.652E+01	1.785E-29
	2.703E+01	3.645E-30
	2.754E+01	9.118E-31
	2.806E+01	2.786E-31
	2.857E+01	9.579E-32
	2.908E+01	3.433E-32
	2.960E+01	1.233E-32
	3.011E+01	4.372E-33
	3.062E+01	1.521E-33
	3.113E+01	5.177E-34
	3.165E+01	1.724E-34
	3.216E+01	5.614E-35
	3.267E+01	1.786E-35
	3.319E+01	5.553E-36
	3.370E+01	1.686E-36
	3.421E+01	4.997E-37
	3.473E+01	1.445E-37
	3.524E+01	4.078E-38
	3.575E+01	1.122E-38
	3.627E+01	3.010E-39
	3.678E+01	7.868E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	3.821E-40
1.163E+01	3.556E-42
1.215E+01	2.489E-44
1.266E+01	1.489E-46
1.317E+01	1.384E-48
1.369E+01	2.701E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00



	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	5.718E-29
	1.163E+01	1.327E-30
	1.215E+01	8.302E-32
	1.266E+01	7.383E-33
	1.317E+01	6.158E-34
	1.369E+01	4.564E-35
	1.420E+01	2.982E-36
	1.471E+01	1.710E-37
	1.523E+01	8.562E-39
	1.574E+01	3.727E-40
	1.625E+01	1.404E-41
	1.677E+01	4.572E-43
	1.728E+01	1.302E-44
	1.779E+01	3.461E-46
	1.830E+01	1.069E-47
	1.882E+01	5.062E-49
	1.933E+01	3.270E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.859E-21 1.612E-22 1.054E-23 5.823E-25 2.708E-26 1.067E-27 3.828E-29 1.768E-30 1.647E-31 2.233E-32 3.069E-33 3.940E-34 4.666E-35



	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.535E-18
	1.112E+01	1.862E-19
	1.163E+01	2.608E-20
	1.215E+01	3.271E-21
	1.266E+01	3.659E-22
	1.317E+01	3.635E-23
	1.369E+01	3.192E-24
	1.420E+01	2.467E-25
	1.471E+01	1.674E-26
	1.523E+01	1.005E-27
	1.574E+01	5.623E-29
	1.625E+01	3.615E-30
	1.677E+01	3.834E-31
	1.728E+01	6.275E-32
	1.779E+01	1.141E-32
	1.830E+01	2.019E-33
	1.882E+01	3.380E-34
	1.933E+01	5.324E-35
	1.984E+01	7.875E-36
	2.036E+01	1.092E-36
	2.087E+01	1.417E-37
	2.138E+01	1.719E-38
	2.190E+01	1.945E-39
	2.241E+01	2.048E-40
	2.292E+01	2.007E-41
	2.344E+01	1.827E-42
	2.395E+01	1.549E-43
	2.446E+01	1.234E-44
	2.498E+01	9.484E-46
	2.549E+01	7.536E-47
	2.600E+01	6.963E-48
	2.652E+01	8.127E-49
	2.703E+01	1.134E-49
	2.754E+01	1.692E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01

1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
3.336E+00  
3.892E+00  
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5.471E-46  
5.765E-47  
6.942E-48  
1.010E-48  
1.710E-49  
3.101E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.385E-15
	1.056E+01	6.920E-16
	1.112E+01	1.709E-16
	1.163E+01	4.809E-17
	1.215E+01	1.269E-17
	1.266E+01	3.138E-18
	1.317E+01	7.252E-19
	1.369E+01	1.564E-19
	1.420E+01	3.142E-20
	1.471E+01	5.865E-21
	1.523E+01	1.015E-21
	1.574E+01	1.626E-22
	1.625E+01	2.402E-23
	1.677E+01	3.266E-24
	1.728E+01	4.080E-25
	1.779E+01	4.673E-26
	1.830E+01	4.915E-27
	1.882E+01	4.801E-28
	1.933E+01	4.560E-29
	1.984E+01	4.825E-30
	2.036E+01	7.070E-31
	2.087E+01	1.473E-31
	2.138E+01	3.591E-32
	2.190E+01	8.938E-33
	2.241E+01	2.169E-33
	2.292E+01	5.072E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.139E-34 2.455E-35 5.071E-36 1.003E-36 1.898E-37 3.433E-38 5.931E-39 9.775E-40 1.536E-40 2.299E-41 3.277E-42 4.451E-43 5.779E-44 7.233E-45 8.900E-46 1.122E-46 1.547E-47 2.477E-48 4.612E-49 9.443E-50 2.002E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.120E-14 3.876E-15 1.164E-15 3.954E-16 1.275E-16 3.894E-17 1.126E-17 3.078E-18 7.942E-19 1.931E-19 4.420E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	9.504E-21 1.916E-21 3.617E-22 6.378E-23 1.049E-23 1.605E-24 2.281E-25 3.011E-26 3.696E-27 4.270E-28 4.829E-29 5.968E-30 9.624E-31 2.139E-31 5.668E-32 1.567E-32 4.278E-33 1.135E-33 2.911E-34 7.210E-35 1.723E-35 3.970E-36 8.812E-37 1.883E-37 3.872E-38 7.653E-39 1.453E-39 2.649E-40 4.632E-41 7.767E-42 1.249E-42 1.930E-43 2.874E-44 4.167E-45 5.997E-46 8.896E-47 1.436E-47 2.643E-48 5.541E-49 1.267E-49 3.007E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09



7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.619E-14
1.056E+01	1.407E-14
1.112E+01	4.880E-15
1.163E+01	1.904E-15
1.215E+01	7.108E-16
1.266E+01	2.535E-16
1.317E+01	8.633E-17
1.369E+01	2.804E-17
1.420E+01	8.676E-18
1.471E+01	2.555E-18
1.523E+01	7.153E-19
1.574E+01	1.901E-19
1.625E+01	4.791E-20
1.677E+01	1.143E-20
1.728E+01	2.580E-21
1.779E+01	5.495E-22
1.830E+01	1.103E-22
1.882E+01	2.085E-23
1.933E+01	3.703E-24
1.984E+01	6.168E-25
2.036E+01	9.630E-26
2.087E+01	1.409E-26
2.138E+01	1.940E-27
2.190E+01	2.548E-28
2.241E+01	3.336E-29
2.292E+01	4.841E-30
2.344E+01	9.018E-31
2.395E+01	2.221E-31
2.446E+01	6.394E-32
2.498E+01	1.920E-32
2.549E+01	5.725E-33
2.600E+01	1.667E-33
2.652E+01	4.716E-34
2.703E+01	1.295E-34
2.754E+01	3.445E-35
2.806E+01	8.881E-36
2.857E+01	2.217E-36
2.908E+01	5.354E-37
2.960E+01	1.251E-37
3.011E+01	2.824E-38
3.062E+01	6.159E-39
3.113E+01	1.297E-39
3.165E+01	2.634E-40
3.216E+01	5.161E-41
3.267E+01	9.747E-42
3.319E+01	1.775E-42
3.370E+01	3.118E-43
3.421E+01	5.300E-44
3.473E+01	8.769E-45
3.524E+01	1.430E-45
3.575E+01	2.355E-46
3.627E+01	4.075E-47
3.678E+01	7.751E-48

45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.519E-13
1.001E+01	1.104E-13
1.056E+01	3.903E-14
1.112E+01	1.487E-14
1.163E+01	6.447E-15
1.215E+01	2.691E-15
1.266E+01	1.080E-15
1.317E+01	4.167E-16
1.369E+01	1.543E-16
1.420E+01	5.481E-17
1.471E+01	1.866E-17
1.523E+01	6.082E-18
1.574E+01	1.897E-18
1.625E+01	5.653E-19
1.677E+01	1.609E-19
1.728E+01	4.365E-20
1.779E+01	1.128E-20
1.830E+01	2.775E-21
1.882E+01	6.484E-22
1.933E+01	1.438E-22
1.984E+01	3.022E-23
2.036E+01	6.010E-24
2.087E+01	1.130E-24
2.138E+01	2.005E-25
2.190E+01	3.359E-26
2.241E+01	5.319E-27
2.292E+01	8.011E-28
2.344E+01	1.171E-28
2.395E+01	1.757E-29
2.446E+01	3.015E-30
2.498E+01	6.632E-31
2.549E+01	1.841E-31
2.600E+01	5.750E-32
2.652E+01	1.852E-32
2.703E+01	5.917E-33
2.754E+01	1.851E-33
2.806E+01	5.648E-34
2.857E+01	1.678E-34
2.908E+01	4.847E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.362E-35 3.718E-36 9.861E-37 2.539E-37 6.346E-38 1.538E-38 3.615E-39 8.232E-40 1.816E-40 3.877E-41 8.013E-42 1.603E-42 3.108E-43 5.851E-44 1.075E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.260E-13 1.062E-13 3.694E-14 1.711E-14 7.793E-15 3.434E-15 1.461E-15 5.998E-16 2.374E-16 9.053E-17 3.324E-17 1.174E-17 3.989E-18 1.302E-18 4.076E-19 1.224E-19 3.521E-20 9.692E-21 2.551E-21 6.412E-22 1.537E-22 3.512E-23 7.637E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.579E-24 3.099E-25 5.776E-26 1.022E-26 1.725E-27 2.807E-28 4.544E-29 7.856E-30 1.618E-30 4.221E-31 1.314E-31 4.422E-32 1.510E-32 5.104E-33 1.691E-33 5.476E-34 1.731E-34 5.337E-35 1.605E-35 4.702E-36 1.342E-36 3.733E-37 1.010E-37 2.661E-38 6.819E-39 1.698E-39 4.111E-40 9.667E-41 2.208E-41 4.896E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.446E-12 4.817E-13 9.038E-14 3.882E-14 1.863E-14 8.834E-15 4.068E-15 1.815E-15

1.420E+01	7.837E-16
1.471E+01	3.275E-16
1.523E+01	1.323E-16
1.574E+01	5.168E-17
1.625E+01	1.949E-17
1.677E+01	7.096E-18
1.728E+01	2.492E-18
1.779E+01	8.431E-19
1.830E+01	2.748E-19
1.882E+01	8.616E-20
1.933E+01	2.598E-20
1.984E+01	7.525E-21
2.036E+01	2.092E-21
2.087E+01	5.576E-22
2.138E+01	1.424E-22
2.190E+01	3.479E-23
2.241E+01	8.127E-24
2.292E+01	1.813E-24
2.344E+01	3.861E-25
2.395E+01	7.840E-26
2.446E+01	1.519E-26
2.498E+01	2.814E-27
2.549E+01	5.024E-28
2.600E+01	8.820E-29
2.652E+01	1.598E-29
2.703E+01	3.256E-30
2.754E+01	8.129E-31
2.806E+01	2.480E-31
2.857E+01	8.507E-32
2.908E+01	3.043E-32
2.960E+01	1.091E-32
3.011E+01	3.861E-33
3.062E+01	1.340E-33
3.113E+01	4.553E-34
3.165E+01	1.513E-34
3.216E+01	4.918E-35
3.267E+01	1.562E-35
3.319E+01	4.845E-36
3.370E+01	1.468E-36
3.421E+01	4.343E-37
3.473E+01	1.254E-37
3.524E+01	3.530E-38
3.575E+01	9.695E-39
3.627E+01	2.596E-39
3.678E+01	6.771E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.2	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	5.498E-40
1.163E+01	5.155E-42
1.215E+01	3.636E-44
1.266E+01	2.191E-46
1.317E+01	2.052E-48
1.369E+01	4.036E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	8.226E-29
	1.163E+01	1.924E-30
	1.215E+01	1.213E-31
	1.266E+01	1.087E-32
	1.317E+01	9.132E-34
	1.369E+01	6.819E-35
	1.420E+01	4.489E-36
	1.471E+01	2.594E-37
	1.523E+01	1.309E-38
	1.574E+01	5.741E-40
	1.625E+01	2.180E-41
	1.677E+01	7.151E-43
	1.728E+01	2.052E-44
	1.779E+01	5.496E-46
	1.830E+01	1.710E-47
	1.882E+01	8.161E-49
	1.933E+01	5.312E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00



	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.863E-21 2.320E-22 1.527E-23 8.506E-25 3.986E-26 1.582E-27 5.720E-29 2.661E-30 2.499E-31 3.413E-32 4.726E-33 6.114E-34 7.297E-35

	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	8.006E-36 8.057E-37 7.417E-38 6.230E-39 4.762E-40 3.305E-41 2.081E-42 1.192E-43 6.335E-45 3.321E-46 1.993E-47 1.604E-48 1.656E-49 1.856E-50 0.000E+00
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20	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 5.278E-01 2.054E-01 5.706E-02 1.109E-02 1.487E-03 1.363E-04 8.492E-06 3.580E-07 1.018E-08 1.955E-10 2.767E-12 1.055E-13 2.428E-14 6.299E-15 1.483E-15 3.142E-16
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9.452E+00	5.974E-17
1.001E+01	1.016E-17
1.056E+01	1.544E-18
1.112E+01	2.678E-19
1.163E+01	3.780E-20
1.215E+01	4.778E-21
1.266E+01	5.386E-22
1.317E+01	5.390E-23
1.369E+01	4.769E-24
1.420E+01	3.714E-25
1.471E+01	2.540E-26
1.523E+01	1.537E-27
1.574E+01	8.661E-29
1.625E+01	5.610E-30
1.677E+01	5.995E-31
1.728E+01	9.885E-32
1.779E+01	1.811E-32
1.830E+01	3.229E-33
1.882E+01	5.447E-34
1.933E+01	8.646E-35
1.984E+01	1.289E-35
2.036E+01	1.801E-36
2.087E+01	2.355E-37
2.138E+01	2.878E-38
2.190E+01	3.280E-39
2.241E+01	3.482E-40
2.292E+01	3.437E-41
2.344E+01	3.153E-42
2.395E+01	2.694E-43
2.446E+01	2.162E-44
2.498E+01	1.675E-45
2.549E+01	1.341E-46
2.600E+01	1.248E-47
2.652E+01	1.468E-48
2.703E+01	2.064E-49
2.754E+01	3.101E-50
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
3.336E+00  
3.892E+00  
4.448E+00  
5.004E+00  
5.560E+00  
6.116E+00  
6.672E+00  
7.228E+00  
7.784E+00  
8.340E+00  
8.896E+00  
9.452E+00  
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1.163E+01  
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3.011E+01  
3.062E+01

2.580E-01  
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4.519E-03  
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3.831E-10  
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1.416E-14  
4.118E-15  
1.103E-15  
2.718E-16  
6.202E-17  
1.643E-17  
3.549E-18  
7.069E-19  
1.295E-19  
2.177E-20  
3.347E-21  
4.693E-22  
5.981E-23  
6.907E-24  
7.205E-25  
6.774E-26  
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4.487E-28  
3.470E-29  
3.313E-30  
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1.003E-31  
2.202E-32  
4.744E-33  
9.795E-34  
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3.609E-35  
6.420E-36  
1.084E-36  
1.736E-37  
2.632E-38  
3.774E-39  
5.112E-40  
6.533E-41  
7.876E-42  
8.958E-43  
9.650E-44  
9.952E-45  
1.011E-45  
1.073E-46  
1.302E-47  
1.909E-48  
3.256E-49  
5.948E-50

	3.113E+01	1.096E-50
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.389E-15
	1.056E+01	7.107E-16
	1.112E+01	2.459E-16
	1.163E+01	6.970E-17
	1.215E+01	1.854E-17
	1.266E+01	4.617E-18
	1.317E+01	1.075E-18
	1.369E+01	2.337E-19
	1.420E+01	4.730E-20
	1.471E+01	8.897E-21
	1.523E+01	1.552E-21
	1.574E+01	2.503E-22
	1.625E+01	3.727E-23
	1.677E+01	5.107E-24
	1.728E+01	6.428E-25
	1.779E+01	7.419E-26
	1.830E+01	7.863E-27
	1.882E+01	7.739E-28
	1.933E+01	7.406E-29
	1.984E+01	7.895E-30
	2.036E+01	1.166E-30
	2.087E+01	2.447E-31
	2.138E+01	6.010E-32
	2.190E+01	1.507E-32
	2.241E+01	3.685E-33
	2.292E+01	8.684E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.965E-34 4.268E-35 8.882E-36 1.770E-36 3.375E-37 6.152E-38 1.071E-38 1.778E-39 2.816E-40 4.246E-41 6.099E-42 8.348E-43 1.092E-43 1.377E-44 1.708E-45 2.169E-46 3.013E-47 4.860E-48 9.117E-49 1.881E-49 4.019E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.055E-14 1.124E-14 4.032E-15 1.674E-15 5.731E-16 1.862E-16 5.730E-17 1.670E-17 4.598E-18 1.196E-18 2.930E-19 6.756E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.464E-20 2.974E-21 5.655E-22 1.005E-22 1.665E-23 2.567E-24 3.677E-25 4.889E-26 6.049E-27 7.041E-28 8.023E-29 9.989E-30 1.623E-30 3.634E-31 9.702E-32 2.702E-32 7.434E-33 1.987E-33 5.136E-34 1.282E-34 3.087E-35 7.166E-36 1.603E-36 3.452E-37 7.151E-38 1.424E-38 2.725E-39 5.004E-40 8.818E-41 1.490E-41 2.415E-42 3.759E-43 5.642E-44 8.240E-45 1.195E-45 1.786E-46 2.905E-47 5.385E-48 1.137E-48 2.620E-49 6.266E-50 1.504E-50
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.055E-13
1.001E+01	3.644E-14
1.056E+01	1.483E-14
1.112E+01	7.020E-15
1.163E+01	2.760E-15
1.215E+01	1.038E-15
1.266E+01	3.730E-16
1.317E+01	1.280E-16
1.369E+01	4.189E-17
1.420E+01	1.306E-17
1.471E+01	3.875E-18
1.523E+01	1.093E-18
1.574E+01	2.927E-19
1.625E+01	7.434E-20
1.677E+01	1.787E-20
1.728E+01	4.064E-21
1.779E+01	8.723E-22
1.830E+01	1.765E-22
1.882E+01	3.361E-23
1.933E+01	6.013E-24
1.984E+01	1.009E-24
2.036E+01	1.588E-25
2.087E+01	2.341E-26
2.138E+01	3.247E-27
2.190E+01	4.298E-28
2.241E+01	5.670E-29
2.292E+01	8.289E-30
2.344E+01	1.555E-30
2.395E+01	3.860E-31
2.446E+01	1.119E-31
2.498E+01	3.387E-32
2.549E+01	1.018E-32
2.600E+01	2.985E-33
2.652E+01	8.512E-34
2.703E+01	2.354E-34
2.754E+01	6.312E-35
2.806E+01	1.640E-35
2.857E+01	4.124E-36
2.908E+01	1.004E-36
2.960E+01	2.363E-37
3.011E+01	5.375E-38
3.062E+01	1.181E-38
3.113E+01	2.506E-39
3.165E+01	5.130E-40
3.216E+01	1.013E-40
3.267E+01	1.927E-41
3.319E+01	3.536E-42
3.370E+01	6.260E-43
3.421E+01	1.072E-43
3.473E+01	1.787E-44
3.524E+01	2.937E-45
3.575E+01	4.873E-46
3.627E+01	8.494E-47
3.678E+01	1.628E-47



45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.522E-13
1.001E+01	1.114E-13
1.056E+01	4.162E-14
1.112E+01	2.139E-14
1.163E+01	9.344E-15
1.215E+01	3.931E-15
1.266E+01	1.590E-15
1.317E+01	6.179E-16
1.369E+01	2.305E-16
1.420E+01	8.250E-17
1.471E+01	2.830E-17
1.523E+01	9.294E-18
1.574E+01	2.921E-18
1.625E+01	8.771E-19
1.677E+01	2.515E-19
1.728E+01	6.876E-20
1.779E+01	1.791E-20
1.830E+01	4.437E-21
1.882E+01	1.045E-21
1.933E+01	2.335E-22
1.984E+01	4.944E-23
2.036E+01	9.908E-24
2.087E+01	1.877E-24
2.138E+01	3.357E-25
2.190E+01	5.666E-26
2.241E+01	9.039E-27
2.292E+01	1.372E-27
2.344E+01	2.021E-28
2.395E+01	3.054E-29
2.446E+01	5.280E-30
2.498E+01	1.170E-30
2.549E+01	3.271E-31
2.600E+01	1.030E-31
2.652E+01	3.341E-32
2.703E+01	1.076E-32
2.754E+01	3.392E-33
2.806E+01	1.043E-33
2.857E+01	3.120E-34
2.908E+01	9.084E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.571E-35 7.075E-36 1.891E-36 4.906E-37 1.235E-37 3.018E-38 7.146E-39 1.640E-39 3.644E-40 7.840E-41 1.633E-41 3.292E-42 6.431E-43 1.220E-43 2.258E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.413E-12 6.289E-13 1.132E-13 5.315E-14 2.480E-14 1.138E-14 5.053E-15 2.166E-15 8.959E-16 3.573E-16 1.373E-16 5.080E-17 1.808E-17 6.189E-18 2.035E-18 6.420E-19 1.942E-19 5.630E-20 1.562E-20 4.142E-21 1.049E-21 2.534E-22 5.834E-23 1.278E-23

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.662E-24 5.267E-25 9.890E-26 1.764E-26 2.999E-27 4.917E-28 8.019E-29 1.397E-29 2.898E-30 7.615E-31 2.389E-31 8.098E-32 2.787E-32 9.491E-33 3.169E-33 1.034E-33 3.293E-34 1.023E-34 3.099E-35 9.151E-36 2.633E-36 7.376E-37 2.012E-37 5.340E-38 1.378E-38 3.460E-39 8.439E-40 1.999E-40 4.601E-41 1.028E-41
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.453E-12 4.975E-13 1.300E-13 5.626E-14 2.721E-14 1.300E-14 6.031E-15 2.711E-15

1.420E+01	1.180E-15
1.471E+01	4.967E-16
1.523E+01	2.022E-16
1.574E+01	7.957E-17
1.625E+01	3.024E-17
1.677E+01	1.109E-17
1.728E+01	3.924E-18
1.779E+01	1.338E-18
1.830E+01	4.393E-19
1.882E+01	1.388E-19
1.933E+01	4.218E-20
1.984E+01	1.231E-20
2.036E+01	3.448E-21
2.087E+01	9.261E-22
2.138E+01	2.383E-22
2.190E+01	5.866E-23
2.241E+01	1.381E-23
2.292E+01	3.104E-24
2.344E+01	6.660E-25
2.395E+01	1.363E-25
2.446E+01	2.660E-26
2.498E+01	4.967E-27
2.549E+01	8.934E-28
2.600E+01	1.580E-28
2.652E+01	2.884E-29
2.703E+01	5.921E-30
2.754E+01	1.489E-30
2.806E+01	4.575E-31
2.857E+01	1.582E-31
2.908E+01	5.700E-32
2.960E+01	2.059E-32
3.011E+01	7.342E-33
3.062E+01	2.568E-33
3.113E+01	8.792E-34
3.165E+01	2.945E-34
3.216E+01	9.641E-35
3.267E+01	3.085E-35
3.319E+01	9.645E-36
3.370E+01	2.945E-36
3.421E+01	8.777E-37
3.473E+01	2.553E-37
3.524E+01	7.245E-38
3.575E+01	2.005E-38
3.627E+01	5.408E-39
3.678E+01	1.422E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12.13 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.065E-01	1.655E-01
	1.213E+00	5.484E-03
	1.820E+00	3.070E-05
	2.426E+00	2.705E-08

3.033E+00	3.911E-12
3.639E+00	2.047E-14
4.245E+00	9.250E-16
4.852E+00	2.531E-17
5.459E+00	4.027E-19
6.065E+00	3.565E-21
6.672E+00	1.665E-23
7.278E+00	3.878E-26
7.885E+00	4.754E-29
8.491E+00	1.723E-31
9.098E+00	2.907E-33
9.704E+00	3.953E-35
1.031E+01	3.779E-37
1.092E+01	2.484E-39
1.152E+01	1.099E-41
1.213E+01	3.391E-44
1.264E+01	2.030E-46
1.316E+01	1.841E-48
1.367E+01	3.552E-50
1.418E+01	0.000E+00
1.470E+01	0.000E+00
1.521E+01	0.000E+00
1.572E+01	0.000E+00
1.624E+01	0.000E+00
1.675E+01	0.000E+00
1.726E+01	0.000E+00
1.778E+01	0.000E+00
1.829E+01	0.000E+00
1.880E+01	0.000E+00
1.931E+01	0.000E+00
1.983E+01	0.000E+00
2.034E+01	0.000E+00
2.085E+01	0.000E+00
2.137E+01	0.000E+00
2.188E+01	0.000E+00
2.239E+01	0.000E+00
2.291E+01	0.000E+00
2.342E+01	0.000E+00
2.393E+01	0.000E+00
2.445E+01	0.000E+00
2.496E+01	0.000E+00
2.547E+01	0.000E+00
2.599E+01	0.000E+00
2.650E+01	0.000E+00
2.701E+01	0.000E+00
2.753E+01	0.000E+00
2.804E+01	0.000E+00
2.855E+01	0.000E+00
2.907E+01	0.000E+00
2.958E+01	0.000E+00
3.009E+01	0.000E+00
3.061E+01	0.000E+00
3.112E+01	0.000E+00
3.163E+01	0.000E+00
3.214E+01	0.000E+00
3.266E+01	0.000E+00
3.317E+01	0.000E+00

	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
10	0.000E+00	1.000E+00
	6.065E-01	3.280E-01
	1.213E+00	4.996E-02
	1.820E+00	3.245E-03
	2.426E+00	8.598E-05
	3.033E+00	9.071E-07
	3.639E+00	3.758E-09
	4.245E+00	6.375E-12
	4.852E+00	5.766E-14
	5.459E+00	7.165E-15
	6.065E+00	7.474E-16
	6.672E+00	6.052E-17
	7.278E+00	3.754E-18
	7.885E+00	1.758E-19
	8.491E+00	6.110E-21
	9.098E+00	1.548E-22
	9.704E+00	2.799E-24
	1.031E+01	3.543E-26
	1.092E+01	3.189E-28
	1.152E+01	3.044E-30
	1.213E+01	1.040E-31
	1.264E+01	9.257E-33
	1.316E+01	7.764E-34
	1.367E+01	5.788E-35
	1.418E+01	3.804E-36
	1.470E+01	2.195E-37
	1.521E+01	1.106E-38
	1.572E+01	4.847E-40
	1.624E+01	1.838E-41
	1.675E+01	6.026E-43
	1.726E+01	1.726E-44
	1.778E+01	4.596E-46
	1.829E+01	1.408E-47
	1.880E+01	6.586E-49
	1.931E+01	4.242E-50
	1.983E+01	0.000E+00
	2.034E+01	0.000E+00
	2.085E+01	0.000E+00
	2.137E+01	0.000E+00
	2.188E+01	0.000E+00
	2.239E+01	0.000E+00
	2.291E+01	0.000E+00
	2.342E+01	0.000E+00
	2.393E+01	0.000E+00
	2.445E+01	0.000E+00
	2.496E+01	0.000E+00
	2.547E+01	0.000E+00

	2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	0.000E+00 0.000E+00
15	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01 1.521E+01 1.572E+01 1.624E+01 1.675E+01 1.726E+01 1.778E+01	1.000E+00 4.255E-01 1.100E-01 1.638E-02 1.359E-03 6.167E-05 1.513E-06 1.992E-08 1.406E-10 7.023E-13 4.093E-14 7.586E-15 1.227E-15 1.680E-16 1.931E-17 1.851E-18 1.468E-19 9.536E-21 5.024E-22 2.123E-23 7.416E-25 3.475E-26 1.378E-27 4.955E-29 2.253E-30 2.060E-31 2.785E-32 3.842E-33 4.954E-34 5.895E-35 6.450E-36 6.472E-37



1.829E+01	5.942E-38
1.880E+01	4.977E-39
1.931E+01	3.795E-40
1.983E+01	2.627E-41
2.034E+01	1.650E-42
2.085E+01	9.427E-44
2.137E+01	4.990E-45
2.188E+01	2.598E-46
2.239E+01	1.539E-47
2.291E+01	1.220E-48
2.342E+01	1.245E-49
2.393E+01	1.387E-50
2.445E+01	0.000E+00
2.496E+01	0.000E+00
2.547E+01	0.000E+00
2.599E+01	0.000E+00
2.650E+01	0.000E+00
2.701E+01	0.000E+00
2.753E+01	0.000E+00
2.804E+01	0.000E+00
2.855E+01	0.000E+00
2.907E+01	0.000E+00
2.958E+01	0.000E+00
3.009E+01	0.000E+00
3.061E+01	0.000E+00
3.112E+01	0.000E+00
3.163E+01	0.000E+00
3.214E+01	0.000E+00
3.266E+01	0.000E+00
3.317E+01	0.000E+00
3.368E+01	0.000E+00
3.420E+01	0.000E+00
3.471E+01	0.000E+00
3.522E+01	0.000E+00
3.574E+01	0.000E+00
3.625E+01	0.000E+00
3.676E+01	0.000E+00
3.728E+01	0.000E+00
3.779E+01	0.000E+00

20

0.000E+00	1.000E+00
6.065E-01	4.909E-01
1.213E+00	1.670E-01
1.820E+00	3.786E-02
2.426E+00	5.581E-03
3.033E+00	5.267E-04
3.639E+00	3.151E-05
4.245E+00	1.187E-06
4.852E+00	2.802E-08
5.459E+00	4.139E-10
6.065E+00	4.085E-12
6.672E+00	1.057E-13
7.278E+00	2.157E-14
7.885E+00	4.887E-15
8.491E+00	9.832E-16
9.098E+00	1.744E-16
9.704E+00	2.714E-17

	1.031E+01	3.689E-18
	1.092E+01	4.356E-19
	1.152E+01	4.445E-20
	1.213E+01	4.054E-21
	1.264E+01	4.562E-22
	1.316E+01	4.558E-23
	1.367E+01	4.026E-24
	1.418E+01	3.130E-25
	1.470E+01	2.138E-26
	1.521E+01	1.291E-27
	1.572E+01	7.236E-29
	1.624E+01	4.613E-30
	1.675E+01	4.813E-31
	1.726E+01	7.828E-32
	1.778E+01	1.426E-32
	1.829E+01	2.531E-33
	1.880E+01	4.254E-34
	1.931E+01	6.728E-35
	1.983E+01	9.992E-36
	2.034E+01	1.391E-36
	2.085E+01	1.813E-37
	2.137E+01	2.208E-38
	2.188E+01	2.509E-39
	2.239E+01	2.654E-40
	2.291E+01	2.611E-41
	2.342E+01	2.388E-42
	2.393E+01	2.033E-43
	2.445E+01	1.625E-44
	2.496E+01	1.252E-45
	2.547E+01	9.942E-47
	2.599E+01	9.142E-48
	2.650E+01	1.061E-48
	2.701E+01	1.478E-49
	2.753E+01	2.208E-50
	2.804E+01	0.000E+00
	2.855E+01	0.000E+00
	2.907E+01	0.000E+00
	2.958E+01	0.000E+00
	3.009E+01	0.000E+00
	3.061E+01	0.000E+00
	3.112E+01	0.000E+00
	3.163E+01	0.000E+00
	3.214E+01	0.000E+00
	3.266E+01	0.000E+00
	3.317E+01	0.000E+00
	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
25	0.000E+00	1.000E+00
	6.065E-01	5.384E-01

1.213E+00	2.171E-01
1.820E+00	6.358E-02
2.426E+00	1.327E-02
3.033E+00	1.946E-03
3.639E+00	1.990E-04
4.245E+00	1.410E-05
4.852E+00	6.888E-07
5.459E+00	2.315E-08
6.065E+00	5.348E-10
6.672E+00	8.789E-12
7.278E+00	2.109E-13
7.885E+00	3.731E-14
8.491E+00	1.020E-14
9.098E+00	2.580E-15
9.704E+00	5.909E-16
1.031E+01	1.222E-16
1.092E+01	2.275E-17
1.152E+01	3.803E-18
1.213E+01	5.910E-19
1.264E+01	1.080E-19
1.316E+01	1.810E-20
1.367E+01	2.775E-21
1.418E+01	3.880E-22
1.470E+01	4.933E-23
1.521E+01	5.683E-24
1.572E+01	5.914E-25
1.624E+01	5.547E-26
1.675E+01	4.698E-27
1.726E+01	3.652E-28
1.778E+01	2.803E-29
1.829E+01	2.630E-30
1.880E+01	3.837E-31
1.931E+01	7.720E-32
1.983E+01	1.685E-32
2.034E+01	3.615E-33
2.085E+01	7.432E-34
2.137E+01	1.457E-34
2.188E+01	2.716E-35
2.239E+01	4.813E-36
2.291E+01	8.096E-37
2.342E+01	1.291E-37
2.393E+01	1.950E-38
2.445E+01	2.785E-39
2.496E+01	3.758E-40
2.547E+01	4.786E-41
2.599E+01	5.747E-42
2.650E+01	6.512E-43
2.701E+01	6.987E-44
2.753E+01	7.173E-45
2.804E+01	7.243E-46
2.855E+01	7.626E-47
2.907E+01	9.150E-48
2.958E+01	1.326E-48
3.009E+01	2.242E-49
3.061E+01	4.068E-50
3.112E+01	0.000E+00
3.163E+01	0.000E+00

	3.214E+01	0.000E+00
	3.266E+01	0.000E+00
	3.317E+01	0.000E+00
	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
30	0.000E+00	1.000E+00
	6.065E-01	5.750E-01
	1.213E+00	2.604E-01
	1.820E+00	9.070E-02
	2.426E+00	2.390E-02
	3.033E+00	4.710E-03
	3.639E+00	6.890E-04
	4.245E+00	7.442E-05
	4.852E+00	5.911E-06
	5.459E+00	3.442E-07
	6.065E+00	1.467E-08
	6.672E+00	4.574E-10
	7.278E+00	1.074E-11
	7.885E+00	3.121E-13
	8.491E+00	5.049E-14
	9.098E+00	1.545E-14
	9.704E+00	4.542E-15
	1.031E+01	1.232E-15
	1.092E+01	3.073E-16
	1.152E+01	7.044E-17
	1.213E+01	1.535E-17
	1.264E+01	3.810E-18
	1.316E+01	8.843E-19
	1.367E+01	1.915E-19
	1.418E+01	3.864E-20
	1.470E+01	7.245E-21
	1.521E+01	1.260E-21
	1.572E+01	2.026E-22
	1.624E+01	3.007E-23
	1.675E+01	4.108E-24
	1.726E+01	5.156E-25
	1.778E+01	5.934E-26
	1.829E+01	6.270E-27
	1.880E+01	6.149E-28
	1.931E+01	5.848E-29
	1.983E+01	6.158E-30
	2.034E+01	8.927E-31
	2.085E+01	1.848E-31
	2.137E+01	4.503E-32
	2.188E+01	1.123E-32
	2.239E+01	2.734E-33
	2.291E+01	6.415E-34
	2.342E+01	1.446E-34
	2.393E+01	3.126E-35

	2.445E+01	6.477E-36
	2.496E+01	1.285E-36
	2.547E+01	2.441E-37
	2.599E+01	4.430E-38
	2.650E+01	7.680E-39
	2.701E+01	1.270E-39
	2.753E+01	2.003E-40
	2.804E+01	3.008E-41
	2.855E+01	4.303E-42
	2.907E+01	5.865E-43
	2.958E+01	7.641E-44
	3.009E+01	9.591E-45
	3.061E+01	1.183E-45
	3.112E+01	1.491E-46
	3.163E+01	2.052E-47
	3.214E+01	3.275E-48
	3.266E+01	6.084E-49
	3.317E+01	1.246E-49
	3.368E+01	2.645E-50
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
35	0.000E+00	1.000E+00
	6.065E-01	6.042E-01
	1.213E+00	2.980E-01
	1.820E+00	1.177E-01
	2.426E+00	3.667E-02
	3.033E+00	8.932E-03
	3.639E+00	1.689E-03
	4.245E+00	2.467E-04
	4.852E+00	2.773E-05
	5.459E+00	2.392E-06
	6.065E+00	1.581E-07
	6.672E+00	7.989E-09
	7.278E+00	3.091E-10
	7.885E+00	9.447E-12
	8.491E+00	3.514E-13
	9.098E+00	5.884E-14
	9.704E+00	1.947E-14
	1.031E+01	6.369E-15
	1.092E+01	1.948E-15
	1.152E+01	5.564E-16
	1.213E+01	1.531E-16
	1.264E+01	4.696E-17
	1.316E+01	1.363E-17
	1.367E+01	3.740E-18
	1.418E+01	9.687E-19
	1.470E+01	2.365E-19
	1.521E+01	5.434E-20
	1.572E+01	1.173E-20
	1.624E+01	2.375E-21

	1.675E+01 1.726E+01 1.778E+01 1.829E+01 1.880E+01 1.931E+01 1.983E+01 2.034E+01 2.085E+01 2.137E+01 2.188E+01 2.239E+01 2.291E+01 2.342E+01 2.393E+01 2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	4.501E-22 7.969E-23 1.316E-23 2.022E-24 2.887E-25 3.827E-26 4.718E-27 5.470E-28 6.195E-29 7.629E-30 1.220E-30 2.693E-31 7.127E-32 1.974E-32 5.403E-33 1.438E-33 3.699E-34 9.191E-35 2.203E-35 5.093E-36 1.134E-36 2.431E-37 5.015E-38 9.944E-39 1.894E-39 3.464E-40 6.077E-41 1.023E-41 1.650E-42 2.557E-43 3.821E-44 5.553E-45 8.005E-46 1.188E-46 1.915E-47 3.514E-48 7.354E-49 1.682E-49 3.997E-50 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00	1.000E+00 6.282E-01 3.309E-01 1.437E-01 5.084E-02 1.453E-02 3.331E-03 6.103E-04 8.904E-05 1.032E-05 9.476E-07 6.889E-08 3.960E-09 1.804E-10

8.491E+00	6.777E-12
9.098E+00	3.263E-13
9.704E+00	6.182E-14
1.031E+01	2.186E-14
1.092E+01	7.751E-15
1.152E+01	2.603E-15
1.213E+01	8.499E-16
1.264E+01	3.042E-16
1.316E+01	1.039E-16
1.367E+01	3.388E-17
1.418E+01	1.052E-17
1.470E+01	3.109E-18
1.521E+01	8.735E-19
1.572E+01	2.330E-19
1.624E+01	5.894E-20
1.675E+01	1.412E-20
1.726E+01	3.198E-21
1.778E+01	6.838E-22
1.829E+01	1.378E-22
1.880E+01	2.615E-23
1.931E+01	4.662E-24
1.983E+01	7.797E-25
2.034E+01	1.222E-25
2.085E+01	1.796E-26
2.137E+01	2.481E-27
2.188E+01	3.269E-28
2.239E+01	4.284E-29
2.291E+01	6.193E-30
2.342E+01	1.145E-30
2.393E+01	2.805E-31
2.445E+01	8.066E-32
2.496E+01	2.426E-32
2.547E+01	7.253E-33
2.599E+01	2.118E-33
2.650E+01	6.010E-34
2.701E+01	1.655E-34
2.753E+01	4.416E-35
2.804E+01	1.142E-35
2.855E+01	2.858E-36
2.907E+01	6.925E-37
2.958E+01	1.623E-37
3.009E+01	3.675E-38
3.061E+01	8.040E-39
3.112E+01	1.698E-39
3.163E+01	3.460E-40
3.214E+01	6.800E-41
3.266E+01	1.288E-41
3.317E+01	2.353E-42
3.368E+01	4.147E-43
3.420E+01	7.070E-44
3.471E+01	1.173E-44
3.522E+01	1.917E-45
3.574E+01	3.160E-46
3.625E+01	5.466E-47
3.676E+01	1.038E-47
3.728E+01	2.223E-48
3.779E+01	5.297E-49

45

0.000E+00	1.000E+00
6.065E-01	6.484E-01
1.213E+00	3.598E-01
1.820E+00	1.685E-01
2.426E+00	6.582E-02
3.033E+00	2.130E-02
3.639E+00	5.679E-03
4.245E+00	1.241E-03
4.852E+00	2.219E-04
5.459E+00	3.235E-05
6.065E+00	3.839E-06
6.672E+00	3.704E-07
7.278E+00	2.901E-08
7.885E+00	1.845E-09
8.491E+00	9.561E-11
9.098E+00	4.268E-12
9.704E+00	2.689E-13
1.031E+01	6.041E-14
1.092E+01	2.274E-14
1.152E+01	8.619E-15
1.213E+01	3.207E-15
1.264E+01	1.291E-15
1.316E+01	4.997E-16
1.367E+01	1.856E-16
1.418E+01	6.616E-17
1.470E+01	2.260E-17
1.521E+01	7.391E-18
1.572E+01	2.313E-18
1.624E+01	6.916E-19
1.675E+01	1.975E-19
1.726E+01	5.378E-20
1.778E+01	1.395E-20
1.829E+01	3.443E-21
1.880E+01	8.074E-22
1.931E+01	1.797E-22
1.983E+01	3.791E-23
2.034E+01	7.568E-24
2.085E+01	1.428E-24
2.137E+01	2.544E-25
2.188E+01	4.279E-26
2.239E+01	6.800E-27
2.291E+01	1.028E-27
2.342E+01	1.506E-28
2.393E+01	2.258E-29
2.445E+01	3.858E-30
2.496E+01	8.430E-31
2.547E+01	2.331E-31
2.599E+01	7.280E-32
2.650E+01	2.349E-32
2.701E+01	7.523E-33
2.753E+01	2.361E-33
2.804E+01	7.222E-34
2.855E+01	2.151E-34
2.907E+01	6.232E-35
2.958E+01	1.756E-35
3.009E+01	4.808E-36



	3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	1.279E-36 3.303E-37 8.280E-38 2.013E-38 4.745E-39 1.084E-39 2.397E-40 5.134E-41 1.064E-41 2.136E-42 4.153E-43 7.840E-44 1.444E-44 2.620E-45 4.773E-46
50	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01 1.521E+01 1.572E+01 1.624E+01 1.675E+01 1.726E+01 1.778E+01 1.829E+01 1.880E+01 1.931E+01 1.983E+01 2.034E+01 2.085E+01 2.137E+01 2.188E+01 2.239E+01	1.000E+00 6.657E-01 3.855E-01 1.918E-01 8.119E-02 2.905E-02 8.736E-03 2.200E-03 4.628E-04 8.108E-05 1.181E-05 1.429E-06 1.435E-07 1.194E-08 8.232E-10 4.743E-11 2.478E-12 2.084E-13 5.626E-14 2.252E-14 9.258E-15 4.092E-15 1.746E-15 7.191E-16 2.855E-16 1.092E-16 4.024E-17 1.426E-17 4.860E-18 1.591E-18 4.998E-19 1.506E-19 4.346E-20 1.201E-20 3.170E-21 7.997E-22 1.924E-22 4.411E-23 9.626E-24 1.997E-24 3.935E-25

	2.291E+01 2.342E+01 2.393E+01 2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	7.360E-26 1.307E-26 2.214E-27 3.612E-28 5.854E-29 1.010E-29 2.070E-30 5.372E-31 1.669E-31 5.619E-32 1.923E-32 6.516E-33 2.165E-33 7.029E-34 2.228E-34 6.888E-35 2.077E-35 6.103E-36 1.747E-36 4.872E-37 1.323E-37 3.494E-38 8.976E-39 2.242E-39 5.443E-40 1.284E-40 2.940E-41 6.539E-42 1.413E-42 2.967E-43
55	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01	1.000E+00 6.807E-01 4.085E-01 2.137E-01 9.664E-02 3.754E-02 1.247E-02 3.527E-03 8.474E-04 1.726E-04 2.975E-05 4.332E-06 5.326E-07 5.523E-08 4.829E-09 3.562E-10 2.249E-11 1.378E-12 1.585E-13 5.100E-14 2.208E-14 1.050E-14 4.850E-15 2.170E-15 9.400E-16 3.940E-16

1.521E+01	1.597E-16
1.572E+01	6.255E-17
1.624E+01	2.367E-17
1.675E+01	8.642E-18
1.726E+01	3.044E-18
1.778E+01	1.033E-18
1.829E+01	3.378E-19
1.880E+01	1.063E-19
1.931E+01	3.215E-20
1.983E+01	9.342E-21
2.034E+01	2.605E-21
2.085E+01	6.968E-22
2.137E+01	1.785E-22
2.188E+01	4.377E-23
2.239E+01	1.026E-23
2.291E+01	2.297E-24
2.342E+01	4.908E-25
2.393E+01	1.000E-25
2.445E+01	1.944E-26
2.496E+01	3.614E-27
2.547E+01	6.471E-28
2.599E+01	1.138E-28
2.650E+01	2.062E-29
2.701E+01	4.187E-30
2.753E+01	1.040E-30
2.804E+01	3.161E-31
2.855E+01	1.084E-31
2.907E+01	3.884E-32
2.958E+01	1.396E-32
3.009E+01	4.950E-33
3.061E+01	1.723E-33
3.112E+01	5.869E-34
3.163E+01	1.956E-34
3.214E+01	6.373E-35
3.266E+01	2.029E-35
3.317E+01	6.314E-36
3.368E+01	1.918E-36
3.420E+01	5.690E-37
3.471E+01	1.647E-37
3.522E+01	4.651E-38
3.574E+01	1.281E-38
3.625E+01	3.439E-39
3.676E+01	8.996E-40
3.728E+01	2.292E-40
3.779E+01	5.689E-41

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	10.69 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.345E-01	2.218E-01	
	1.069E+00	1.441E-02	
	1.603E+00	2.399E-04	
	2.138E+00	9.640E-07	

2.672E+00	9.079E-10
3.207E+00	3.346E-13
3.741E+00	1.252E-14
4.276E+00	7.814E-16
4.810E+00	3.292E-17
5.345E+00	9.126E-19
5.879E+00	1.615E-20
6.414E+00	1.764E-22
6.948E+00	1.142E-24
7.483E+00	4.249E-27
8.017E+00	1.106E-29
8.552E+00	1.127E-31
9.086E+00	3.133E-33
9.621E+00	7.263E-35
1.016E+01	1.284E-36
1.069E+01	1.777E-38
1.120E+01	2.111E-40
1.172E+01	1.877E-42
1.223E+01	1.263E-44
1.274E+01	7.682E-47
1.326E+01	8.223E-49
1.377E+01	1.703E-50
1.428E+01	0.000E+00
1.480E+01	0.000E+00
1.531E+01	0.000E+00
1.582E+01	0.000E+00
1.634E+01	0.000E+00
1.685E+01	0.000E+00
1.736E+01	0.000E+00
1.787E+01	0.000E+00
1.839E+01	0.000E+00
1.890E+01	0.000E+00
1.941E+01	0.000E+00
1.993E+01	0.000E+00
2.044E+01	0.000E+00
2.095E+01	0.000E+00
2.147E+01	0.000E+00
2.198E+01	0.000E+00
2.249E+01	0.000E+00
2.301E+01	0.000E+00
2.352E+01	0.000E+00
2.403E+01	0.000E+00
2.455E+01	0.000E+00
2.506E+01	0.000E+00
2.557E+01	0.000E+00
2.609E+01	0.000E+00
2.660E+01	0.000E+00
2.711E+01	0.000E+00
2.763E+01	0.000E+00
2.814E+01	0.000E+00
2.865E+01	0.000E+00
2.917E+01	0.000E+00
2.968E+01	0.000E+00
3.019E+01	0.000E+00
3.070E+01	0.000E+00
3.122E+01	0.000E+00
3.173E+01	0.000E+00

	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.345E-01	3.889E-01
	1.069E+00	8.418E-02
	1.603E+00	9.507E-03
	2.138E+00	5.402E-04
	2.672E+00	1.512E-05
	3.207E+00	2.060E-07
	3.741E+00	1.355E-09
	4.276E+00	4.568E-12
	4.810E+00	6.778E-14
	5.345E+00	1.065E-14
	5.879E+00	1.532E-15
	6.414E+00	1.816E-16
	6.948E+00	1.758E-17
	7.483E+00	1.377E-18
	8.017E+00	8.637E-20
	8.552E+00	4.284E-21
	9.086E+00	1.659E-22
	9.621E+00	4.948E-24
	1.016E+01	1.120E-25
	1.069E+01	2.003E-27
	1.120E+01	3.431E-29
	1.172E+01	9.202E-31
	1.223E+01	6.482E-32
	1.274E+01	5.780E-33
	1.326E+01	4.745E-34
	1.377E+01	3.453E-35
	1.428E+01	2.214E-36
	1.480E+01	1.245E-37
	1.531E+01	6.107E-39
	1.582E+01	2.603E-40
	1.634E+01	9.596E-42
	1.685E+01	3.059E-43
	1.736E+01	8.570E-45
	1.787E+01	2.292E-46
	1.839E+01	7.502E-48
	1.890E+01	3.817E-49
	1.941E+01	2.524E-50
	1.993E+01	0.000E+00
	2.044E+01	0.000E+00
	2.095E+01	0.000E+00
	2.147E+01	0.000E+00
	2.198E+01	0.000E+00
	2.249E+01	0.000E+00
	2.301E+01	0.000E+00
	2.352E+01	0.000E+00
	2.403E+01	0.000E+00

	2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	0.000E+00 0.000E+00
15	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01 1.531E+01 1.582E+01 1.634E+01	1.000E+00 4.827E-01 1.592E-01 3.447E-02 4.773E-03 4.161E-04 2.261E-05 7.605E-07 1.576E-08 2.012E-10 1.795E-12 7.167E-14 1.567E-14 3.369E-15 6.387E-16 1.061E-16 1.538E-17 1.935E-18 2.101E-19 1.956E-20 1.616E-21 1.211E-22 7.720E-24 4.158E-25 1.884E-26 7.262E-28 2.627E-29 1.340E-30 1.381E-31 1.906E-32 2.602E-33 3.305E-34





	9.086E+00	1.801E-16
	9.621E+00	3.528E-17
	1.016E+01	6.230E-18
	1.069E+01	1.027E-18
	1.120E+01	1.576E-19
	1.172E+01	2.174E-20
	1.223E+01	2.682E-21
	1.274E+01	2.950E-22
	1.326E+01	2.879E-23
	1.377E+01	2.482E-24
	1.428E+01	1.882E-25
	1.480E+01	1.253E-26
	1.531E+01	7.412E-28
	1.582E+01	4.161E-29
	1.634E+01	2.844E-30
	1.685E+01	3.312E-31
	1.736E+01	5.625E-32
	1.787E+01	1.025E-32
	1.839E+01	1.802E-33
	1.890E+01	2.994E-34
	1.941E+01	4.679E-35
	1.993E+01	6.863E-36
	2.044E+01	9.435E-37
	2.095E+01	1.214E-37
	2.147E+01	1.458E-38
	2.198E+01	1.634E-39
	2.249E+01	1.705E-40
	2.301E+01	1.654E-41
	2.352E+01	1.491E-42
	2.403E+01	1.253E-43
	2.455E+01	9.914E-45
	2.506E+01	7.631E-46
	2.557E+01	6.171E-47
	2.609E+01	5.919E-48
	2.660E+01	7.176E-49
	2.711E+01	1.021E-49
	2.763E+01	1.531E-50
	2.814E+01	0.000E+00
	2.865E+01	0.000E+00
	2.917E+01	0.000E+00
	2.968E+01	0.000E+00
	3.019E+01	0.000E+00
	3.070E+01	0.000E+00
	3.122E+01	0.000E+00
	3.173E+01	0.000E+00
	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.345E-01	5.879E-01

1.069E+00  
1.603E+00  
2.138E+00  
2.672E+00  
3.207E+00  
3.741E+00  
4.276E+00  
4.810E+00  
5.345E+00  
5.879E+00  
6.414E+00  
6.948E+00  
7.483E+00  
8.017E+00  
8.552E+00  
9.086E+00  
9.621E+00  
1.016E+01  
1.069E+01  
1.120E+01  
1.172E+01  
1.223E+01  
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1.685E+01  
1.736E+01  
1.787E+01  
1.839E+01  
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1.941E+01  
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2.763E+01  
2.814E+01  
2.865E+01  
2.917E+01  
2.968E+01  
3.019E+01

2.770E-01  
1.023E-01  
2.915E-02  
6.348E-03  
1.048E-03  
1.305E-04  
1.222E-05  
8.570E-07  
4.495E-08  
1.761E-09  
5.194E-11  
1.337E-12  
9.919E-14  
2.812E-14  
8.925E-15  
2.647E-15  
7.273E-16  
1.850E-16  
4.505E-17  
1.034E-17  
2.192E-18  
4.285E-19  
7.701E-20  
1.269E-20  
1.912E-21  
2.625E-22  
3.274E-23  
3.699E-24  
3.773E-25  
3.469E-26  
2.883E-27  
2.216E-28  
1.730E-29  
1.748E-30  
2.771E-31  
5.748E-32  
1.256E-32  
2.674E-33  
5.447E-34  
1.057E-34  
1.953E-35  
3.426E-36  
5.704E-37  
9.001E-38  
1.345E-38  
1.900E-39  
2.535E-40  
3.192E-41  
3.790E-42  
4.248E-43  
4.513E-44  
4.605E-45  
4.661E-46  
4.997E-47  
6.207E-48  
9.320E-49  
1.608E-49

	3.070E+01	2.934E-50
	3.122E+01	0.000E+00
	3.173E+01	0.000E+00
	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.345E-01	6.214E-01
	1.069E+00	3.216E-01
	1.603E+00	1.363E-01
	2.138E+00	4.665E-02
	2.672E+00	1.280E-02
	3.207E+00	2.794E-03
	3.741E+00	4.833E-04
	4.276E+00	6.600E-05
	4.810E+00	7.099E-06
	5.345E+00	6.001E-07
	5.879E+00	3.981E-08
	6.414E+00	2.071E-09
	6.948E+00	8.489E-11
	7.483E+00	2.957E-12
	8.017E+00	1.789E-13
	8.552E+00	4.462E-14
	9.086E+00	1.579E-14
	9.621E+00	5.397E-15
	1.016E+01	1.739E-15
	1.069E+01	5.439E-16
	1.120E+01	1.615E-16
	1.172E+01	4.507E-17
	1.223E+01	1.180E-17
	1.274E+01	2.890E-18
	1.326E+01	6.620E-19
	1.377E+01	1.414E-19
	1.428E+01	2.814E-20
	1.480E+01	5.199E-21
	1.531E+01	8.905E-22
	1.582E+01	1.410E-22
	1.634E+01	2.061E-23
	1.685E+01	2.770E-24
	1.736E+01	3.418E-25
	1.787E+01	3.868E-26
	1.839E+01	4.023E-27
	1.890E+01	3.902E-28
	1.941E+01	3.731E-29
	1.993E+01	4.111E-30
	2.044E+01	6.437E-31
	2.095E+01	1.398E-31
	2.147E+01	3.448E-32
	2.198E+01	8.576E-33
	2.249E+01	2.074E-33

	2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.828E-34 1.079E-34 2.315E-35 4.757E-36 9.361E-37 1.762E-37 3.170E-38 5.446E-39 8.925E-40 1.394E-40 2.074E-41 2.939E-42 3.970E-43 5.130E-44 6.404E-45 7.899E-46 1.007E-46 1.421E-47 2.341E-48 4.456E-49 9.226E-50 1.963E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01	1.000E+00 6.480E-01 3.594E-01 1.682E-01 6.575E-02 2.129E-02 5.678E-03 1.243E-03 2.224E-04 3.247E-05 3.861E-06 3.733E-07 2.932E-08 1.869E-09 9.717E-11 4.345E-12 2.712E-13 6.015E-14 2.260E-14 8.569E-15 3.189E-15 1.133E-15 3.825E-16 1.225E-16 3.717E-17 1.067E-17 2.896E-18 7.416E-19 1.790E-19

	1.531E+01 1.582E+01 1.634E+01 1.685E+01 1.736E+01 1.787E+01 1.839E+01 1.890E+01 1.941E+01 1.993E+01 2.044E+01 2.095E+01 2.147E+01 2.198E+01 2.249E+01 2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.063E-20 8.663E-21 1.732E-21 3.240E-22 5.660E-23 9.218E-24 1.397E-24 1.966E-25 2.568E-26 3.125E-27 3.590E-28 4.086E-29 5.219E-30 8.910E-31 2.066E-31 5.561E-32 1.540E-32 4.197E-33 1.110E-33 2.836E-34 6.999E-35 1.666E-35 3.823E-36 8.451E-37 1.798E-37 3.681E-38 7.244E-39 1.369E-39 2.484E-40 4.322E-41 7.214E-42 1.155E-42 1.776E-43 2.637E-44 3.819E-45 5.517E-46 8.282E-47 1.365E-47 2.574E-48 5.504E-49 1.273E-49 3.033E-50
40	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00	1.000E+00 6.697E-01 3.919E-01 1.979E-01 8.548E-02 3.137E-02 9.728E-03 2.541E-03 5.571E-04 1.023E-04 1.572E-05 2.016E-06 2.157E-07 1.924E-08

7.483E+00	1.430E-09
8.017E+00	8.900E-11
8.552E+00	4.858E-12
9.086E+00	3.412E-13
9.621E+00	7.269E-14
1.016E+01	2.851E-14
1.069E+01	1.198E-14
1.120E+01	4.857E-15
1.172E+01	1.886E-15
1.223E+01	7.000E-16
1.274E+01	2.483E-16
1.326E+01	8.408E-17
1.377E+01	2.715E-17
1.428E+01	8.351E-18
1.480E+01	2.444E-18
1.531E+01	6.799E-19
1.582E+01	1.795E-19
1.634E+01	4.494E-20
1.685E+01	1.065E-20
1.736E+01	2.385E-21
1.787E+01	5.044E-22
1.839E+01	1.005E-22
1.890E+01	1.884E-23
1.941E+01	3.317E-24
1.993E+01	5.480E-25
2.044E+01	8.482E-26
2.095E+01	1.231E-26
2.147E+01	1.682E-27
2.198E+01	2.204E-28
2.249E+01	2.913E-29
2.301E+01	4.369E-30
2.352E+01	8.561E-31
2.403E+01	2.189E-31
2.455E+01	6.393E-32
2.506E+01	1.925E-32
2.557E+01	5.734E-33
2.609E+01	1.665E-33
2.660E+01	4.699E-34
2.711E+01	1.286E-34
2.763E+01	3.411E-35
2.814E+01	8.764E-36
2.865E+01	2.180E-36
2.917E+01	5.249E-37
2.968E+01	1.222E-37
3.019E+01	2.749E-38
3.070E+01	5.973E-39
3.122E+01	1.253E-39
3.173E+01	2.535E-40
3.224E+01	4.947E-41
3.276E+01	9.306E-42
3.327E+01	1.688E-42
3.378E+01	2.955E-43
3.430E+01	5.008E-44
3.481E+01	8.272E-45
3.532E+01	1.351E-45
3.584E+01	2.241E-46
3.635E+01	3.932E-47

45

0.000E+00	1.000E+00
5.345E-01	6.880E-01
1.069E+00	4.201E-01
1.603E+00	2.252E-01
2.138E+00	1.052E-01
2.672E+00	4.259E-02
3.207E+00	1.486E-02
3.741E+00	4.454E-03
4.276E+00	1.144E-03
4.810E+00	2.513E-04
5.345E+00	4.711E-05
5.879E+00	7.531E-06
6.414E+00	1.025E-06
6.948E+00	1.188E-07
7.483E+00	1.170E-08
8.017E+00	9.806E-10
8.552E+00	7.026E-11
9.086E+00	4.515E-12
9.621E+00	3.672E-13
1.016E+01	8.112E-14
1.069E+01	3.385E-14
1.120E+01	1.505E-14
1.172E+01	6.497E-15
1.223E+01	2.701E-15
1.274E+01	1.079E-15
1.326E+01	4.144E-16
1.377E+01	1.527E-16
1.428E+01	5.398E-17
1.480E+01	1.829E-17
1.531E+01	5.930E-18
1.582E+01	1.840E-18
1.634E+01	5.453E-19
1.685E+01	1.543E-19
1.736E+01	4.162E-20
1.787E+01	1.069E-20
1.839E+01	2.614E-21
1.890E+01	6.068E-22
1.941E+01	1.337E-22
1.993E+01	2.790E-23
2.044E+01	5.510E-24
2.095E+01	1.028E-24
2.147E+01	1.812E-25
2.198E+01	3.013E-26
2.249E+01	4.738E-27
2.301E+01	7.101E-28
2.352E+01	1.039E-28
2.403E+01	1.582E-29
2.455E+01	2.817E-30
2.506E+01	6.480E-31
2.557E+01	1.852E-31
2.609E+01	5.851E-32
2.660E+01	1.889E-32
2.711E+01	6.030E-33
2.763E+01	1.883E-33
2.814E+01	5.731E-34
2.865E+01	1.698E-34

	2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.894E-35 1.371E-35 3.734E-36 9.876E-37 2.536E-37 6.319E-38 1.527E-38 3.578E-39 8.121E-40 1.785E-40 3.800E-41 7.827E-42 1.561E-42 3.017E-43 5.666E-44
50	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01 1.531E+01 1.582E+01 1.634E+01 1.685E+01 1.736E+01 1.787E+01 1.839E+01 1.890E+01 1.941E+01 1.993E+01 2.044E+01 2.095E+01	1.000E+00 7.036E-01 4.448E-01 2.504E-01 1.247E-01 5.458E-02 2.093E-02 7.008E-03 2.043E-03 5.179E-04 1.139E-04 2.171E-05 3.585E-06 5.120E-07 6.322E-08 6.747E-09 6.226E-10 5.002E-11 3.692E-12 3.524E-13 8.702E-14 3.765E-14 1.748E-14 7.937E-15 3.485E-15 1.477E-15 6.039E-16 2.381E-16 9.042E-17 3.306E-17 1.163E-17 3.932E-18 1.277E-18 3.980E-19 1.189E-19 3.404E-20 9.321E-21 2.440E-21 6.099E-22 1.454E-22 3.302E-23



	2.147E+01 2.198E+01 2.249E+01 2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	7.135E-24 1.466E-24 2.859E-25 5.294E-26 9.313E-27 1.563E-27 2.539E-28 4.137E-29 7.317E-30 1.567E-30 4.243E-31 1.349E-31 4.572E-32 1.564E-32 5.280E-33 1.747E-33 5.645E-34 1.781E-34 5.479E-35 1.644E-35 4.806E-36 1.369E-36 3.798E-37 1.026E-37 2.694E-38 6.885E-39 1.710E-39 4.129E-40 9.683E-41 2.205E-41
55	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01	1.000E+00 7.171E-01 4.667E-01 2.736E-01 1.435E-01 6.704E-02 2.779E-02 1.019E-02 3.295E-03 9.392E-04 2.354E-04 5.185E-05 1.002E-05 1.699E-06 2.524E-07 3.284E-08 3.743E-09 3.740E-10 3.306E-11 2.763E-12 3.225E-13 8.911E-14 3.985E-14 1.919E-14 9.077E-15 4.167E-15

1.377E+01	1.853E-15
1.428E+01	7.975E-16
1.480E+01	3.321E-16
1.531E+01	1.337E-16
1.582E+01	5.204E-17
1.634E+01	1.955E-17
1.685E+01	7.091E-18
1.736E+01	2.480E-18
1.787E+01	8.357E-19
1.839E+01	2.712E-19
1.890E+01	8.468E-20
1.941E+01	2.542E-20
1.993E+01	7.328E-21
2.044E+01	2.027E-21
2.095E+01	5.378E-22
2.147E+01	1.366E-22
2.198E+01	3.321E-23
2.249E+01	7.715E-24
2.301E+01	1.712E-24
2.352E+01	3.624E-25
2.403E+01	7.318E-26
2.455E+01	1.410E-26
2.506E+01	2.600E-27
2.557E+01	4.629E-28
2.609E+01	8.149E-29
2.660E+01	1.497E-29
2.711E+01	3.146E-30
2.763E+01	8.155E-31
2.814E+01	2.556E-31
2.865E+01	8.884E-32
2.917E+01	3.191E-32
2.968E+01	1.145E-32
3.019E+01	4.047E-33
3.070E+01	1.403E-33
3.122E+01	4.759E-34
3.173E+01	1.579E-34
3.224E+01	5.123E-35
3.276E+01	1.624E-35
3.327E+01	5.029E-36
3.378E+01	1.521E-36
3.430E+01	4.490E-37
3.481E+01	1.294E-37
3.532E+01	3.635E-38
3.584E+01	9.962E-39
3.635E+01	2.661E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB SandThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	26.82 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.166E+01	3.308E-42
1.219E+01	1.821E-44
1.273E+01	8.759E-47
1.327E+01	7.615E-49
1.380E+01	1.335E-50
1.434E+01	0.000E+00
1.487E+01	0.000E+00
1.541E+01	0.000E+00
1.595E+01	0.000E+00
1.648E+01	0.000E+00
1.702E+01	0.000E+00
1.756E+01	0.000E+00
1.809E+01	0.000E+00
1.863E+01	0.000E+00
1.917E+01	0.000E+00
1.970E+01	0.000E+00
2.024E+01	0.000E+00
2.078E+01	0.000E+00
2.131E+01	0.000E+00
2.185E+01	0.000E+00
2.238E+01	0.000E+00
2.292E+01	0.000E+00
2.346E+01	0.000E+00
2.399E+01	0.000E+00
2.453E+01	0.000E+00
2.507E+01	0.000E+00
2.560E+01	0.000E+00
2.614E+01	0.000E+00
2.668E+01	0.000E+00
2.721E+01	0.000E+00
2.775E+01	0.000E+00
2.828E+01	0.000E+00
2.882E+01	0.000E+00
2.936E+01	0.000E+00
2.989E+01	0.000E+00
3.043E+01	0.000E+00
3.097E+01	0.000E+00
3.150E+01	0.000E+00
3.204E+01	0.000E+00
3.258E+01	0.000E+00
3.311E+01	0.000E+00

	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.166E+01	1.327E-30
	1.219E+01	7.713E-32
	1.273E+01	6.164E-33
	1.327E+01	4.520E-34
	1.380E+01	2.907E-35
	1.434E+01	1.627E-36
	1.487E+01	7.882E-38
	1.541E+01	3.289E-39
	1.595E+01	1.176E-40
	1.648E+01	3.584E-42
	1.702E+01	9.341E-44
	1.756E+01	2.153E-45
	1.809E+01	5.109E-47
	1.863E+01	1.750E-48
	1.917E+01	9.274E-50
	1.970E+01	0.000E+00
	2.024E+01	0.000E+00
	2.078E+01	0.000E+00
	2.131E+01	0.000E+00
	2.185E+01	0.000E+00
	2.238E+01	0.000E+00
	2.292E+01	0.000E+00
	2.346E+01	0.000E+00
	2.399E+01	0.000E+00
	2.453E+01	0.000E+00
	2.507E+01	0.000E+00

	2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01 1.595E+01 1.648E+01 1.702E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.861E-21 1.862E-22 1.074E-23 5.154E-25 2.049E-26 6.821E-28 2.135E-29 1.012E-30 1.010E-31 1.286E-32 1.581E-33 1.789E-34 1.850E-35



	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.538E-18
	1.112E+01	2.150E-19
	1.166E+01	2.754E-20
	1.219E+01	3.127E-21
	1.273E+01	3.131E-22
	1.327E+01	2.752E-23
	1.380E+01	2.112E-24
	1.434E+01	1.408E-25
	1.487E+01	8.154E-27
	1.541E+01	4.170E-28
	1.595E+01	2.085E-29
	1.648E+01	1.435E-30
	1.702E+01	1.787E-31
	1.756E+01	2.944E-32
	1.809E+01	4.920E-33
	1.863E+01	7.796E-34
	1.917E+01	1.157E-34
	1.970E+01	1.605E-35
	2.024E+01	2.075E-36
	2.078E+01	2.497E-37
	2.131E+01	2.791E-38
	2.185E+01	2.892E-39
	2.238E+01	2.773E-40
	2.292E+01	2.456E-41
	2.346E+01	2.008E-42
	2.399E+01	1.519E-43
	2.453E+01	1.075E-44
	2.507E+01	7.373E-46
	2.560E+01	5.346E-47
	2.614E+01	4.703E-48
	2.668E+01	5.326E-49
	2.721E+01	7.054E-50
	2.775E+01	0.000E+00
	2.828E+01	0.000E+00
	2.882E+01	0.000E+00
	2.936E+01	0.000E+00
	2.989E+01	0.000E+00
	3.043E+01	0.000E+00
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	3.258E+01	0.000E+00
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	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01



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2.983E-48  
4.399E-49  
7.260E-50  
1.234E-50  
0.000E+00

	3.204E+01	0.000E+00
	3.258E+01	0.000E+00
	3.311E+01	0.000E+00
	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.386E-15
	1.056E+01	6.986E-16
	1.112E+01	1.974E-16
	1.166E+01	5.247E-17
	1.219E+01	1.301E-17
	1.273E+01	3.001E-18
	1.327E+01	6.432E-19
	1.380E+01	1.278E-19
	1.434E+01	2.347E-20
	1.487E+01	3.978E-21
	1.541E+01	6.201E-22
	1.595E+01	8.871E-23
	1.648E+01	1.161E-23
	1.702E+01	1.386E-24
	1.756E+01	1.507E-25
	1.809E+01	1.490E-26
	1.863E+01	1.350E-27
	1.917E+01	1.156E-28
	1.970E+01	1.047E-29
	2.024E+01	1.272E-30
	2.078E+01	2.322E-31
	2.131E+01	5.246E-32
	2.185E+01	1.230E-32
	2.238E+01	2.812E-33
	2.292E+01	6.178E-34
	2.346E+01	1.299E-34

	2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	2.609E-35 5.005E-36 9.154E-37 1.595E-37 2.645E-38 4.171E-39 6.245E-40 8.871E-41 1.195E-41 1.526E-42 1.851E-43 2.146E-44 2.416E-45 2.737E-46 3.334E-47 4.713E-48 7.906E-49 1.492E-49 2.948E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.121E-14 3.931E-15 1.344E-15 4.353E-16 1.331E-16 3.837E-17 1.041E-17 2.658E-18 6.366E-19 1.429E-19 2.998E-20

	1.595E+01 1.648E+01 1.702E+01 1.756E+01 1.809E+01 1.863E+01 1.917E+01 1.970E+01 2.024E+01 2.078E+01 2.131E+01 2.185E+01 2.238E+01 2.292E+01 2.346E+01 2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	5.874E-21 1.072E-21 1.818E-22 2.860E-23 4.164E-24 5.597E-25 6.937E-26 7.936E-27 8.451E-28 8.667E-29 9.510E-30 1.359E-30 2.767E-31 6.897E-32 1.802E-32 4.642E-33 1.158E-33 2.783E-34 6.438E-35 1.432E-35 3.059E-36 6.274E-37 1.234E-37 2.326E-38 4.199E-39 7.251E-40 1.197E-40 1.888E-41 2.844E-42 4.098E-43 5.664E-44 7.576E-45 1.000E-45 1.355E-46 2.001E-47 3.400E-48 6.664E-49 1.433E-49 3.198E-50 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

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3.633E+01  
3.687E+01  
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3.794E+01

3.058E-10  
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1.054E-13  
3.628E-14  
1.434E-14  
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4.188E-47  
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1.548E-48  
3.538E-49

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0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.166E+01	7.178E-15
1.219E+01	2.879E-15
1.273E+01	1.106E-15
1.327E+01	4.067E-16
1.380E+01	1.430E-16
1.434E+01	4.804E-17
1.487E+01	1.540E-17
1.541E+01	4.709E-18
1.595E+01	1.371E-18
1.648E+01	3.797E-19
1.702E+01	9.993E-20
1.756E+01	2.495E-20
1.809E+01	5.904E-21
1.863E+01	1.322E-21
1.917E+01	2.797E-22
1.970E+01	5.583E-23
2.024E+01	1.050E-23
2.078E+01	1.856E-24
2.131E+01	3.084E-25
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2.238E+01	7.050E-27
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2.346E+01	1.314E-28
2.399E+01	1.822E-29
2.453E+01	2.964E-30
2.507E+01	6.362E-31
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2.614E+01	5.200E-32
2.668E+01	1.594E-32
2.721E+01	4.817E-33
2.775E+01	1.419E-33
2.828E+01	4.064E-34
2.882E+01	1.130E-34
2.936E+01	3.046E-35
2.989E+01	7.963E-36

	3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	2.017E-36 4.949E-37 1.175E-37 2.700E-38 5.997E-39 1.287E-39 2.668E-40 5.338E-41 1.031E-41 1.921E-42 3.458E-43 6.031E-44 1.025E-44 1.720E-45 2.919E-46
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01 1.595E+01 1.648E+01 1.702E+01 1.756E+01 1.809E+01 1.863E+01 1.917E+01 1.970E+01 2.024E+01 2.078E+01 2.131E+01 2.185E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 1.913E-14 8.404E-15 3.561E-15 1.452E-15 5.694E-16 2.145E-16 7.757E-17 2.691E-17 8.947E-18 2.849E-18 8.676E-19 2.525E-19 7.017E-20 1.859E-20 4.692E-21 1.127E-21 2.570E-22 5.562E-23 1.141E-23 2.214E-24

	2.238E+01 2.292E+01 2.346E+01 2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	4.063E-25 7.044E-26 1.154E-26 1.796E-27 2.690E-28 4.038E-29 6.641E-30 1.354E-30 3.549E-31 1.090E-31 3.536E-32 1.150E-32 3.674E-33 1.146E-33 3.485E-34 1.032E-34 2.971E-35 8.321E-36 2.266E-36 5.993E-37 1.540E-37 3.840E-38 9.290E-39 2.180E-39 4.957E-40 1.092E-40 2.331E-41 4.817E-42 9.645E-43 1.874E-43
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.343E-14 2.021E-14 9.257E-15 4.103E-15 1.756E-15



1.434E+01	7.256E-16
1.487E+01	2.891E-16
1.541E+01	1.110E-16
1.595E+01	4.106E-17
1.648E+01	1.462E-17
1.702E+01	5.004E-18
1.756E+01	1.646E-18
1.809E+01	5.198E-19
1.863E+01	1.575E-19
1.917E+01	4.571E-20
1.970E+01	1.270E-20
2.024E+01	3.377E-21
2.078E+01	8.576E-22
2.131E+01	2.078E-22
2.185E+01	4.801E-23
2.238E+01	1.056E-23
2.292E+01	2.209E-24
2.346E+01	4.391E-25
2.399E+01	8.289E-26
2.453E+01	1.486E-26
2.507E+01	2.540E-27
2.560E+01	4.179E-28
2.614E+01	6.811E-29
2.668E+01	1.173E-29
2.721E+01	2.377E-30
2.775E+01	6.087E-31
2.828E+01	1.879E-31
2.882E+01	6.327E-32
2.936E+01	2.174E-32
2.989E+01	7.409E-33
3.043E+01	2.477E-33
3.097E+01	8.096E-34
3.150E+01	2.584E-34
3.204E+01	8.046E-35
3.258E+01	2.444E-35
3.311E+01	7.235E-36
3.365E+01	2.088E-36
3.419E+01	5.869E-37
3.472E+01	1.606E-37
3.526E+01	4.279E-38
3.579E+01	1.109E-38
3.633E+01	2.796E-39
3.687E+01	6.849E-40
3.740E+01	1.631E-40
3.794E+01	3.772E-41

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	24.65 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7    N = 20    SIG = 0    RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.560E-01	2.037E-01	
	1.112E+00	1.091E-02	
	1.668E+00	1.331E-04	
	2.224E+00	3.467E-07	

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.161E+01	4.974E-42
1.211E+01	4.304E-44
1.260E+01	3.147E-46
1.309E+01	3.164E-48
1.358E+01	6.662E-50
1.408E+01	0.000E+00
1.457E+01	0.000E+00
1.506E+01	0.000E+00
1.556E+01	0.000E+00
1.605E+01	0.000E+00
1.654E+01	0.000E+00
1.704E+01	0.000E+00
1.753E+01	0.000E+00
1.802E+01	0.000E+00
1.851E+01	0.000E+00
1.901E+01	0.000E+00
1.950E+01	0.000E+00
1.999E+01	0.000E+00
2.049E+01	0.000E+00
2.098E+01	0.000E+00
2.147E+01	0.000E+00
2.197E+01	0.000E+00
2.246E+01	0.000E+00
2.295E+01	0.000E+00
2.344E+01	0.000E+00
2.394E+01	0.000E+00
2.443E+01	0.000E+00
2.492E+01	0.000E+00
2.542E+01	0.000E+00
2.591E+01	0.000E+00
2.640E+01	0.000E+00
2.690E+01	0.000E+00
2.739E+01	0.000E+00
2.788E+01	0.000E+00
2.837E+01	0.000E+00
2.887E+01	0.000E+00
2.936E+01	0.000E+00
2.985E+01	0.000E+00
3.035E+01	0.000E+00
3.084E+01	0.000E+00
3.133E+01	0.000E+00

	3.183E+01	0.000E+00
	3.232E+01	0.000E+00
	3.281E+01	0.000E+00
	3.330E+01	0.000E+00
	3.380E+01	0.000E+00
	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.161E+01	1.748E-30
	1.211E+01	1.169E-31
	1.260E+01	1.142E-32
	1.309E+01	1.068E-33
	1.358E+01	8.967E-35
	1.408E+01	6.711E-36
	1.457E+01	4.457E-37
	1.506E+01	2.616E-38
	1.556E+01	1.351E-39
	1.605E+01	6.113E-41
	1.654E+01	2.418E-42
	1.704E+01	8.383E-44
	1.753E+01	2.621E-45
	1.802E+01	8.286E-47
	1.851E+01	3.443E-48
	1.901E+01	2.144E-49
	1.950E+01	1.604E-50
	1.999E+01	0.000E+00
	2.049E+01	0.000E+00
	2.098E+01	0.000E+00
	2.147E+01	0.000E+00
	2.197E+01	0.000E+00
	2.246E+01	0.000E+00
	2.295E+01	0.000E+00
	2.344E+01	0.000E+00
	2.394E+01	0.000E+00





	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.538E-18
	1.112E+01	2.150E-19
	1.161E+01	3.267E-20
	1.211E+01	4.484E-21
	1.260E+01	5.539E-22
	1.309E+01	6.134E-23
	1.358E+01	6.066E-24
	1.408E+01	5.336E-25
	1.457E+01	4.164E-26
	1.506E+01	2.891E-27
	1.556E+01	1.835E-28
	1.605E+01	1.203E-29
	1.654E+01	1.111E-30
	1.704E+01	1.692E-31
	1.753E+01	3.228E-32
	1.802E+01	6.255E-33
	1.851E+01	1.162E-33
	1.901E+01	2.044E-34
	1.950E+01	3.397E-35
	1.999E+01	5.325E-36
	2.049E+01	7.861E-37
	2.098E+01	1.091E-37
	2.147E+01	1.423E-38
	2.197E+01	1.739E-39
	2.246E+01	1.989E-40
	2.295E+01	2.128E-41
	2.344E+01	2.128E-42
	2.394E+01	1.992E-43
	2.443E+01	1.760E-44
	2.492E+01	1.501E-45
	2.542E+01	1.307E-46
	2.591E+01	1.288E-47
	2.640E+01	1.567E-48
	2.690E+01	2.295E-49
	2.739E+01	3.666E-50
	2.788E+01	0.000E+00
	2.837E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.985E+01	0.000E+00
	3.035E+01	0.000E+00
	3.084E+01	0.000E+00
	3.133E+01	0.000E+00
	3.183E+01	0.000E+00
	3.232E+01	0.000E+00
	3.281E+01	0.000E+00
	3.330E+01	0.000E+00
	3.380E+01	0.000E+00
	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01

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5.049E-49



	3.035E+01	9.573E-50
	3.084E+01	1.877E-50
	3.133E+01	0.000E+00
	3.183E+01	0.000E+00
	3.232E+01	0.000E+00
	3.281E+01	0.000E+00
	3.330E+01	0.000E+00
	3.380E+01	0.000E+00
	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.386E-15
	1.056E+01	6.986E-16
	1.112E+01	1.974E-16
	1.161E+01	5.856E-17
	1.211E+01	1.638E-17
	1.260E+01	4.313E-18
	1.309E+01	1.068E-18
	1.358E+01	2.480E-19
	1.408E+01	5.397E-20
	1.457E+01	1.098E-20
	1.506E+01	2.085E-21
	1.556E+01	3.687E-22
	1.605E+01	6.059E-23
	1.654E+01	9.231E-24
	1.704E+01	1.301E-24
	1.753E+01	1.695E-25
	1.802E+01	2.037E-26
	1.851E+01	2.269E-27
	1.901E+01	2.388E-28
	1.950E+01	2.529E-29
	1.999E+01	3.160E-30
	2.049E+01	5.549E-31
	2.098E+01	1.300E-31
	2.147E+01	3.392E-32
	2.197E+01	8.916E-33
	2.246E+01	2.283E-33

	2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	5.649E-34 1.346E-34 3.088E-35 6.812E-36 1.444E-36 2.938E-37 5.735E-38 1.073E-38 1.923E-39 3.299E-40 5.411E-41 8.485E-42 1.272E-42 1.826E-43 2.524E-44 3.395E-45 4.563E-46 6.419E-47 1.006E-47 1.824E-48 3.758E-49 8.315E-50 1.881E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01 1.408E+01 1.457E+01 1.506E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.121E-14 3.931E-15 1.344E-15 4.779E-16 1.618E-16 5.217E-17 1.599E-17 4.653E-18 1.284E-18 3.357E-19 8.301E-20

	1.556E+01 1.605E+01 1.654E+01 1.704E+01 1.753E+01 1.802E+01 1.851E+01 1.901E+01 1.950E+01 1.999E+01 2.049E+01 2.098E+01 2.147E+01 2.197E+01 2.246E+01 2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	1.938E-20 4.269E-21 8.851E-22 1.725E-22 3.154E-23 5.402E-24 8.652E-25 1.294E-25 1.808E-26 2.367E-27 2.948E-28 3.664E-29 5.103E-30 9.314E-31 2.264E-31 6.377E-32 1.858E-32 5.350E-33 1.500E-33 4.079E-34 1.074E-34 2.735E-35 6.737E-36 1.604E-36 3.686E-37 8.177E-38 1.750E-38 3.609E-39 7.169E-40 1.371E-40 2.523E-41 4.467E-42 7.613E-43 1.251E-43 1.993E-44 3.108E-45 4.851E-46 7.868E-47 1.394E-47 2.794E-48 6.303E-49 1.535E-49
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

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8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.628E-14
1.056E+01	1.434E-14
1.112E+01	5.636E-15
1.161E+01	2.289E-15
1.211E+01	8.919E-16
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1.309E+01	1.194E-16
1.358E+01	4.094E-17
1.408E+01	1.343E-17
1.457E+01	4.208E-18
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2.985E+01	7.358E-38
3.035E+01	1.737E-38
3.084E+01	3.970E-39
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3.232E+01	3.887E-41
3.281E+01	7.775E-42
3.330E+01	1.504E-42
3.380E+01	2.815E-43
3.429E+01	5.114E-44
3.478E+01	9.074E-45
3.528E+01	1.592E-45
3.577E+01	2.823E-46

45

0.000E+00	1.000E+00
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2.147E+01	1.775E-25
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2.591E+01	8.637E-32
2.640E+01	2.909E-32
2.690E+01	9.776E-33
2.739E+01	3.228E-33
2.788E+01	1.042E-33
2.837E+01	3.284E-34

	2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	1.009E-34 3.020E-35 8.810E-36 2.502E-36 6.919E-37 1.861E-37 4.869E-38 1.238E-38 3.060E-39 7.345E-40 1.711E-40 3.870E-41 8.492E-42 1.809E-42 3.741E-43
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01 1.408E+01 1.457E+01 1.506E+01 1.556E+01 1.605E+01 1.654E+01 1.704E+01 1.753E+01 1.802E+01 1.851E+01 1.901E+01 1.950E+01 1.999E+01 2.049E+01 2.098E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 2.041E-14 9.623E-15 4.402E-15 1.950E-15 8.355E-16 3.463E-16 1.387E-16 5.365E-17 2.003E-17 7.215E-18 2.505E-18 8.375E-19 2.695E-19 8.339E-20 2.479E-20 7.075E-21 1.936E-21 5.077E-22 1.274E-22 3.057E-23

	2.147E+01 2.197E+01 2.246E+01 2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	7.007E-24 1.532E-24 3.195E-25 6.350E-26 1.204E-26 2.183E-27 3.825E-28 6.653E-29 1.219E-29 2.586E-30 6.817E-31 2.158E-31 7.499E-32 2.675E-32 9.504E-33 3.322E-33 1.138E-33 3.812E-34 1.249E-34 3.997E-35 1.250E-35 3.816E-36 1.137E-36 3.308E-37 9.384E-38 2.596E-38 6.997E-39 1.838E-39 4.701E-40 1.171E-40
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.626E-14 2.288E-14 1.122E-14 5.359E-15 2.486E-15

	1.408E+01	1.119E-15
	1.457E+01	4.890E-16
	1.506E+01	2.072E-16
	1.556E+01	8.504E-17
	1.605E+01	3.381E-17
	1.654E+01	1.302E-17
	1.704E+01	4.847E-18
	1.753E+01	1.745E-18
	1.802E+01	6.072E-19
	1.851E+01	2.040E-19
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	1.950E+01	2.065E-20
	1.999E+01	6.217E-21
	2.049E+01	1.801E-21
	2.098E+01	5.020E-22
	2.147E+01	1.344E-22
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	2.295E+01	2.014E-24
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	2.394E+01	9.876E-26
	2.443E+01	2.049E-26
	2.492E+01	4.078E-27
	2.542E+01	7.833E-28
	2.591E+01	1.476E-28
	2.640E+01	2.831E-29
	2.690E+01	5.934E-30
	2.739E+01	1.478E-30
	2.788E+01	4.481E-31
	2.837E+01	1.559E-31
	2.887E+01	5.763E-32
	2.936E+01	2.160E-32
	2.985E+01	8.033E-33
	3.035E+01	2.941E-33
	3.084E+01	1.057E-33
	3.133E+01	3.722E-34
	3.183E+01	1.284E-34
	3.232E+01	4.339E-35
	3.281E+01	1.435E-35
	3.330E+01	4.645E-36
	3.380E+01	1.471E-36
	3.429E+01	4.555E-37
	3.478E+01	1.379E-37
	3.528E+01	4.081E-38
	3.577E+01	1.180E-38

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**Attachment B**  
**Final Alternative Liner Demonstrations**



*Prepared for*

**DTE Electric Company**  
One Energy Plaza  
Detroit, Michigan 48226

# **ALTERNATE LINER DEMONSTRATION DIVERSION BASIN**

**BELLE RIVER POWER PLANT**  
**East China Township, Michigan**

*Prepared by*

**Geosyntec**   
consultants

Geosyntec Consultants of Michigan

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Detroit, Michigan 48202

GLP8017

April 2023

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## 1. INTRODUCTION

This report has been prepared to provide the Alternate Liner Demonstration (ALD) of Belle River Power Plant Diversion Basin (DB), one of two coal combustion residuals (CCR) units at the site, in accordance with 40 CFR Part 257 as amended on November 12, 2020 (CCR Part B Rule). **Figure 1-1** provides the site location.

This report concludes that there is no reasonable probability that water from the DB will cause a release to the groundwater that will exceed the groundwater protection standards (GWPS) at the waste boundary over the projected active life of the CCR unit.

### 1.1 Background

DTE Electric Company (DTE) submitted the Alternate Liner Demonstration Application for the DB to the United States Environmental Protection Agency (USEPA) on November 30, 2020 [1] in accordance with the CCR Rule. Soon after, DTE started the field and laboratory investigation studies to meet the requirements of the CCR Rule.

One of the requirements of the CCR Rule is to conduct hydraulic conductivity testing using site-specific permeant liquid. The CCR Rule acknowledges that these tests may last a long time such that the operator of the CCR unit may need to submit an extension request for the laboratory testing program, and submit a preliminary ALD.

DTE submitted extension requests due to “analytical limitation” under separate covers, dated September 1, 2021 [2] and September 1, 2022 [3]. The extension requests detailed the compatibility testing program results through August 12, 2022. The USEPA has not yet responded to the extension requests.

The Part B Rule does not require the submittal of a preliminary ALD (PALD) by November 30, 2021 if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A). However, DTE provided a PALD [4] out of an abundance of caution and with confidence in the performance of the liner system as a “place holder” to comply with the requirement to submit an ALD by November 30, 2021.

The PALD detailed the site investigation, conceptual site model, laboratory study, and fate and transport model concluding that there is no reasonable probability that water from the DB will cause a release to the groundwater that will exceed the GWPS at the waste boundary over the projected active life of the CCR unit. This ALD includes additional data analyzed subsequent to the submittal of the PALD, and confirms the appropriateness of the hydraulic conductivities used in the PALD fate and transport model.

## 1.2 Purpose

The purpose of this report is to provide the final ALD including the approach, analysis details, and results in accordance with the CCR Rule.

## 1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific porewater, and discussion of results.
- Section 4 – provides analysis approach, details, GWPS, and evaluation of results as to whether the DB meets the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification.
- Section 7 – provides references.

## 1.4 Terms of Reference

This report was prepared by Mike Coram C.P.G., Clinton Carlson Ph.D., P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec Consultants of Michigan, Inc.(Geosyntec).

## 2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

*§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*

*(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*

*(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*

*(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*

*(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*

*(i) Samples are advanced to a depth less than the top of the groundwater table or 20 ft beneath the bottom of the nearest water body, whichever is greater, and/or*

*(ii) Samples are spaced further apart than 200 ft around the impoundment perimeter;*

*(5) A narrative description of site geological history; and*

*(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*

*(i) The relative location of the impoundment with depth of ponded water noted;*

*(ii) Monitoring wells with screening depth noted;*

*(iii) Depiction of the location of other samples used in the development of the model;*

*(iv) The upper and lower limits of the uppermost aquifer across the site;*

*(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and*

*(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.*

## **2.1 Introduction**

This section provides information on site geology and hydrogeology, data used in site characterization, a summary of ALD-specific field and laboratory study, and a conceptual site model built using the Environmental Visualization System (EVS).

## **2.2 Site Geology**

The surficial topography of St. Clair County is characterized by a low-relief floodplain, stream terrace, and lakeshore deposits. The subsurface geology of the area is defined by glacial deposits, which range in thickness from 100- to 400-feet (ft) thick. These glacial sediments, including lacustrine, till, and sand and gravel outwash deposits, were deposited on the underlying bedrock. Throughout St. Clair County the underlying bedrock varies but is primarily fine-grained siliclastic rock, mostly shale with some sandstone [1].

The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Shallow regional groundwater flow would be expected to be to the east towards the St. Clair River. The DB is located approximately one mile west of the St. Clair River.

### **2.2.1 Diversion Basin Site-Specific Geology**

The geology of St. Clair County consists of approximately 100 to 400 ft of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces. The glacial material underlying the DB appears to be glaciolacustrine clays with local sand lenses. The uppermost aquifer unit appears to be associated with ice contact directly above the bedrock surface (Bedford Shale).

The DB is underlain by 115 to 130 ft of unconsolidated sediments, with the uppermost aquifer unit directly above the Bedford Shale. The uppermost aquifer unit is laterally consistent throughout the DB. During Geosyntec's ALD investigation in December 2020, cone penetration tests (CPT) and pore pressure dissipation (PPD) tests were performed to determine hydraulic conductivity of the underlying clay-rich deposits. The results of the PPD tests are summarized in Section 2.5.1.

The CPT data confirm that the underlying deposits are consistently low hydraulic conductivity units.

The uppermost aquifer unit within the DB is a confined, silty aquifer that directly overlies the Bedford Shale. It is approximately three to five feet in thickness and is encountered at approximately 115 to 130 ft below ground surface (bgs) directly below the bottom of the DB. To the northwest, the silty aquifer transitions into a sandy aquifer and increases in thickness; specifically, in the vicinity of the Bottom Ash Basins (BABs) located to the northwest. For the purposes of this report, the silty aquifer unit within the DB is considered the “uppermost aquifer unit” and is further discussed in Section 2.3.

### **2.3 Uppermost Aquifer Field Testing and Hydrogeology**

TRC calculated the hydraulic conductivities within the CCR monitoring wells set within the upper portion of the uppermost aquifer using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 by TRC [1]. Test results are provided in **Appendix A** and are included in the conceptual site model. The monitoring well logs and construction details are presented in **Appendix B**. As calculated by TRC, the hydraulic conductivity of the uppermost aquifer using wells at the DB (MW-16-05 and MW-16-07) is approximately 0.2 ft/day (7.0E-5 centimeters per second [cm/s]). This relatively low hydraulic conductivity indicates that the uppermost aquifer has low groundwater yield potential across the site. As discussed in the TRC Initial Application for Alternative Liner Demonstration, the potential horizontal groundwater flow is to the west-northwest. The uppermost aquifer is further discussed in Section 2.6.

### **2.4 Summary of Data Used for Site Characterization**

Data from three separate investigations were used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, which are included in the initial ALD Application [1]. Data from Geosyntec’s 2020 ALD Investigation were used to supplement the previous data sets. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. **Figure 2-1** provides investigation locations.

Boring logs from the 1970s, 2016, and 2020 field investigations are provided in **Appendices C** through **E**, respectively. These investigations extend across the site and include the DB and BABs, which is approximately 400 ft northwest of DB. Considering the proximity of both CCR units, field investigation data are used for both the DB and BABs.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and PPD tests at CPT locations. Lab testing included

grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices F** through **H** for the 1970s, 2016, and 2020 laboratory studies, respectively.

It is Geosyntec's opinion that the combined data used in building the site model are sufficient to capture the variability that may exist in soil conditions.

## **2.5 ALD-Specific Site Investigation Details**

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to supplement the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted generally at 200-ft intervals but adjusted in the field as necessary to avoid underground utility lines, overhead power lines, and access issues, as needed. Investigations extended down to 100 ft bgs to an elevation of approximately 490 ft, which is lower than the groundwater elevation, and 20 ft below the nearest water body that is St. Clair River with a bottom elevation of approximately 525 ft.

The following sections provide a summary of the fieldwork completed during the SI.

### **2.5.1 Cone Penetration Tests**

Eight CPTs were completed around the DB in approximate 200 ft intervals along the east and south sides. Similarly, eight CPTs were completed around the BABs. Due to access issues to the area directly north and west of the DB, additional CPT locations were added to the south and southwest and CPT-08B/C was moved to the first accessible location west/northwest of the DB. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or to approximately 100 ft bgs. PPD tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted near the sonic borings and at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 12 PPD tests were completed at CPTs advanced around the DB, and 16 PPD tests were completed at CPTs advanced around the BABs. Hydraulic conductivity values were estimated to range between  $7.97\text{E-}9$  cm/s and  $1.63\text{E-}6$  cm/s around the DB, and range between  $9.76\text{E-}9$  cm/s and  $2.81\text{E-}6$  cm/s around the BABs. Hydraulic conductivity values are similar between soils underlying the DB and BABs. Results are summarized in **Table 2-2**. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

CPT logs are provided in **Appendix I1**, and PPD tests are provided in **Appendix I2**.

## 2.5.2 Sonic Drilling

In December 2020, six soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples for characterization of native soils and the embankment. Soil samples were collected continuously in 2- to 10-ft sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS).

Shelby tubes were collected from the DB embankment soils, and native soils at approximately 20 ft intervals from each of the sonic borings in accordance with ASTM D1587 [5]. The soil borings were advanced to depths of approximately 100 ft-bgs to within the uppermost aquifer and/or into the top of the underlying shale bedrock. Sonic drilling locations are provided in **Figure 2-1**. Boring logs are provided in **Appendix E**. Soil stratigraphy is discussed in Section 2.6.

## 2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. Fourteen soil samples were collected from six borings from depths between 5 ft-bgs and 90 ft-bgs for hydraulic conductivity testing to capture soft to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 24 Moisture Content tests (ASTM D2216)
- 4 Specific Gravity tests (ASTM D854)
- 22 Grain Size Mechanical Sieve tests (ASTM D6913)
- 21 Atterberg Limits tests (ASTM D4318)

Note that these tests are included in **Table 2-1**. Test results are provided in **Appendix H**.

## 2.6 Conceptual Site Model

An EVS model was developed for the site based on data collected during the field investigations from the 1970s, 2016, and 2020. The EVS model centralized all the data to develop a comprehensive conceptual site model. Based on the EVS model, the overall conceptual site model of the DB lithology is relatively consistent with low hydraulic conductivity clay-rich deposits with non-interconnected sand seams at greater depths. Within the DB footprint, the uppermost aquifer

unit sits directly above the bedrock and is relatively consistent at approximately 10 ft thick across the DB.

Specific to the DB, cross-sections (**Figures 2-2 through 2-5**) were created from the EVS model and analyzed to determine the various changes in lithology within the clay confining unit directly underlying the DB and the characteristics of the uppermost aquifer unit which sits directly on the bedrock. Upon review of the transects, the lithology beneath the DB consists of (from the ground surface downward) (1) clay, (2) clay with sand, (3) uppermost aquifer unit, and (4) shale bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]. There were some discrepancies, in that the second clay unit was described as silty instead of sandy. Based on CPT and geotechnical index testing during Geosyntec's 2020 ALD investigation, the lower clay was re-interpreted as "clay with sand" mainly due to the increased sand seams that were encountered. The clay within the "clay with sand" unit is relatively constant stiff gray clay. Therefore, the lithology directly underlying the DB consists of the following:

- (1) Clay – 35 to 40 ft thick directly beneath the DB. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered an aquifer unit.
- (2) Clay with sand – This unit was encountered at approximately 35 to 40 ft bgs with a thickness of approximately 80 to 90 ft. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 2 ft in thickness and have hydraulic conductivity values greater than  $1.0E-7$  cm/s except for one location which is discussed in more detail below. The data supports that none of the sand seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.
- (3) Uppermost Aquifer Unit – This unit was encountered at approximately 115 to 130 ft bgs. The thickness of the unit is relatively consistent at 3- to 5-ft thick and directly sits atop the bedrock. This silty unit is saturated and considered the uppermost aquifer unit within the DB. There is a transition from the silty aquifer beneath the DB to a thicker sandy aquifer beneath the BABs located to the north/northwest of the DB. Both are considered the "uppermost aquifer unit" on the cross sections and within the EVS model.
- (4) Shale bedrock – This unit was encountered at approximately 100-130 ft bgs.

During Geosyntec's 2020 investigation, CPT tests were conducted and PPD tests were completed at CPT-08B, CPT-08C, CPT-11, CPT-12 and CPT-13B to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around DB for long-term breakthrough potential and is further discussed in



Section 3. Based on the review of the PPD test data, values ranged between  $7.97\text{E-}9$  cm/s and  $1.63\text{E-}6$  cm/s around the DB. The CPT-derived highest hydraulic conductivity value of  $1.63\text{E-}6$  cm/s was calculated at CPT-13B from a sand seam at 490 ft above mean sea level (AMSL) (approximately 100 ft bgs) within the (2) clay with sand unit. PPD tests at CPT-13 and CPT-12 located next to CPT-13B indicated hydraulic conductivities less than  $1.0\text{E-}7$  cm/s. Therefore, the (1) clay and (2) clay with sand lithologies beneath the DB have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

Below the clay with sand is the uppermost aquifer unit that mainly consists of silt. This unit directly overlies the Bedford shale. Beyond the DB, the EVS model predicts this unit extending to the BABs with increasing sands. The hydraulic head in the (3) uppermost aquifer unit associated with the DB is approximately 575 ft AMSL [1] with a gradient to the west-northwest.

The bottom of the DB is at an elevation of approximately 576 ft and the bottom of the clay underlying the DB is at an elevation of approximately 450 ft AMSL, thus more than 120 ft of low hydraulic conductivity clay-rich deposits ((1) clay and (2) clay with sand) separate the bottom of the DB from the underlying (3) uppermost aquifer unit.

### 3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

*§257.71(d)(ii)(B) Potential for infiltration. A characterization of the potential for infiltration through any soil-based liner components and/or naturally occurring soil that control release and transport of leachate. All samples collected in the field for measurement of saturated hydraulic conductivity must be sent to a certified laboratory for analysis under controlled conditions and analyzed using recognized and generally accepted methodology. Facilities must document how the selected method is designed to simulate on-site conditions. The owner or operator must also provide documentation of the following as part of this line of evidence:*

- (1) The location, number, depth, and spacing of samples relied upon is supported by the data collected in paragraph (d)(1)(ii)(A) of this section and is sufficient to capture the variability of saturated hydraulic conductivity for the soil-based liner components and/or naturally occurring soil;*
- (2) The liquid used to pre-hydrate the samples and measure long-term hydraulic conductivity reflects the pH and major ion composition of the CCR surface impoundment porewater;*
- (3) That samples intended to represent the hydraulic conductivity of naturally occurring soils (i.e., not mechanically compacted) are handled in a manner that will ensure the macrostructure of the soil is not disturbed during collection, transport, or analysis; and*
- (4) Any test for hydraulic conductivity relied upon includes, in addition to other relevant termination criteria specified by the method, criteria that equilibrium has been achieved between the inflow and outflow, within acceptable tolerance limits, for both electrical conductivity and pH.*

#### 3.1 Site-Specific Soil and Porewater Details

##### 3.1.1 Soil Samples for Hydraulic Conductivity Testing

Fourteen site-specific soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs with PPDs and earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in the natural soils present at the DB.

### 3.1.2 Site-Specific Porewater Testing and Results

Site-specific CCR porewater samples were collected from both the DB and the BABs for geochemical analyses to assess the representative composition of an “aggressive” solution for use in the hydraulic conductivity compatibility testing. Due to the high turbidity of basin waters, samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific porewater samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All porewater samples were found to be slightly basic, with pH concentrations ranging from 7.87 to 9.01 SU. Total dissolved solids (TDS) concentrations of all three samples are similar, ranging from 200 to 300 milligrams per liter (mg/L). All three samples have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as “freshwater”. The DB and BAB samples have similar major ion compositions, as illustrated on the Piper diagram in **Figure 3-1**. The anion composition is very similar for all three samples and consists of predominantly sulfate with some alkalinity and very little chloride. The cation composition is predominantly calcium and monovalent cations (potassium/sodium), with a smaller proportion of magnesium. The DB sample has a slightly higher relative percentage of calcium and lower monovalent cations compared to the BAB samples.

The analytical results are provided in **Appendix J** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist’s Workbench (GWB) v12.0.4. The GWB thermodynamic dataset ‘thermo.com.V8.R6\_.tdat’ was used for the calculations in order to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of mg/L and the ionic strength of each sample was calculated in units of molality (m).

Both BAB samples contained similar ionic strength values (0.0088 and 0.0080 m) compared to the slightly higher ionic strength of the DB sample (0.0106 m). Thus, the DB sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

### 3.2 Hydraulic Conductivity Testing Procedure

Eight soil samples were tested for hydraulic conductivity,  $k$ , using deionized water in accordance with ASTM D5084 [6] to establish a baseline hydraulic conductivity. The other six samples were selected for compatibility testing in accordance with ASTM D7100 [7] using site-specific porewater. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25.
- The hydraulic conductivity is steady, defined as four or more consecutive hydraulic conductivity measurements falling within  $\pm 25\%$  of the mean value for hydraulic conductivity if the mean hydraulic conductivity is greater than or equal to  $1.0\text{E-}8$  cm/s or within  $\pm 50\%$  if the mean hydraulic conductivity is less than  $1.0\text{E-}8$  cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;
- At least 2 pore volumes (PV) of flow has passed through the sample; and
- pH and electrical conductivity of effluent are within 10% of that for the influent with no significant increasing or decreasing trends.

### 3.3 Hydraulic Conductivity Test Results and Assessment

The final measured hydraulic conductivities based on ASTM D5084 for the samples range from  $2.7\text{E-}9$  to  $2.2\text{E-}8$  cm/s. **Table 3-2** presents a summary of the measured hydraulic conductivities for the samples and more details are provided in **Appendix H**.

Results for the hydraulic conductivity compatibility tests are provided in **Appendix K** with measurements through December 23, 2022 and summarized in **Table 3-3**. The table provides sample ID, the start date for testing, amount of PV passed through the sample, and hydraulic conductivity measurements.

A set of figures are included to present:

- PV passed with time;
- hydraulic conductivity with time;
- hydraulic conductivity versus PV passed;
- pH of inflow and outflow with time; and
- electrical conductivity (EC) of inflow and outflow with time.

These plots are provided in **Figures 3-2** through **3-31**.

The final measured hydraulic conductivities of samples range between  $4.4\text{E-}9$  and  $2.1\text{E-}8$  cm/s. The amount of PV that passed through the samples range from 2.8 to 10.5. All samples have passed

more than 2 PV to satisfy the termination criterion. The hydraulic conductivities generally remained steady with time and PV passed.

pH measurements are provided in **Table 3-4**. The average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.2 to 8.4. The average pH of outflow are within 10 percent of the average pH of inflow.

EC measurements are provided in **Table 3-5**. The average EC of inflow ranges from 1,030 to 1,098, and the average EC of outflow ranges from 874 to 1,381. The EC measurements of outflow are within 10% of the EC measurements of inflow for sample B1-ST-1. The EC measurements of outflow were within 10% of the EC measurements of inflow for the other samples for at least one measurement; however, the outflow and inflow EC measurements are not within 10% as of December 2022.

**Table 3-6** summarizes if the samples have reached the termination criteria for PV, hydraulic conductivity, pH, and EC in December 2022. As summarized in the table, all samples have reached the termination criteria for PV passed, hydraulic conductivity, and pH. One sample (B1-ST-1) has reached the termination criterion for EC, though the other samples satisfied this criterion at some point during testing. Overall, the average hydraulic conductivity measurements for the samples ( $6.9\text{E-}9$  to  $2.6\text{E-}8$  cm/s) have remained steady or slightly decreased from the average measurements ( $8.2\text{E-}9$  to  $2.2\text{E-}8$  cm/s) presented in the PALD [4]. Only the average hydraulic conductivity measured for sample B4-ST-3 ( $1.8\text{E-}8$  to  $2.6\text{E-}8$  cm/s) increased from the PALD [4].

The results do not present inflow versus outflow data. The project team decided to keep the inflow constant to provide a more stable hydraulic gradient across the sample, more accurate estimation of hydraulic conductivity, , faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion was satisfied during the two years of testing because of the consistently low hydraulic conductivity results and constant hydraulic conductivity measurements (not significantly increasing or decreasing)..

#### 4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

*§257.71(d)(ii) (C) Mathematical model to estimate the potential for releases. Owners or operators must incorporate the data collected for paragraphs (d)(1)(ii)(A) and (d)(1)(ii)(B) of this section into a mathematical model to calculate the potential groundwater concentrations that may result in downgradient wells as a result of the impoundment. Facilities must also, where available, incorporate the national-scale data on constituent concentrations and behavior provided by the existing risk record. Application of the model must account for the full range of site current and potential future conditions at and around the site to ensure that high-end groundwater concentrations have been effectively characterized. All the data and assumptions incorporated into the model must be documented and justified.*

*(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*

*(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*

*(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

##### 4.1 Introduction

A fate and transport model analysis was performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the DB exceeds the GWPS at the waste boundary throughout its active life.

The model considers flow of CCR porewater Constituents of Concern (COCs) migrating through the bottom of the DB down to the uppermost aquifer. The model does not consider additional migration of COCs horizontally to the waste boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COCs, thus, the model presents a conservative assessment.

According to §257.71(2)(ii)(C)(3), the owner must submit “...a final demonstration that updates only the finalized hydraulic conductivity data to confirm that the model results in the preliminary demonstration are accurate.” The hydraulic conductivity used in the calculation of the Darcy

velocity for the baseline fate and transport model corresponds to the geometric mean of all available data. For the PALD [4], a hydraulic conductivity of  $2.15\text{E-}8$  cm/s was used for the baseline model. The recalculated geometric mean hydraulic conductivity based on the updated laboratory test results presented in Section 3.3 is approximately  $2.14\text{E-}8$  cm/s, or a decrease of less than 1%. Furthermore, a sensitivity analysis was performed as part of the fate and transport analyses in the PALD [4] that captured this change in hydraulic conductivity data within the range of hydraulic conductivities evaluated. Therefore, the model results for the fate and transport analysis presented in the PALD [4] are considered accurate and not updated for this ALD. The following sections summarize the fate and transport analyses from the PALD for convenience.

As discussed in Section 4.6.1, the results of the model predict COC concentrations that are very low such that there is no reasonable probability that water from the DB will cause releases to the groundwater that will exceed the GWPS at the waste boundary over the projected active life of the DB.

#### **4.2 Groundwater Protection Standards**

Groundwater samples from TRC's 2016 and 2017 sampling events were tested for Appendix IV COCs and represent eight rounds of background groundwater data. The data were used to calculate site-specific background levels (background) for Appendix IV COCs. **Appendix L** provides the memorandum describing the statistical calculations.

To develop GWPS for the ALD, the federal Maximum Contaminant Level (MCL), Regional Screening Levels, and site-specific background were evaluated and the highest value was selected as the GWPS in accordance with the CCR Rule. Where MCL are not available Regional Screening Levels were used. GWPS are provided in **Table 4-1**.

#### **4.3 Consideration of Background Groundwater Concentrations**

The site-specific background has been considered and is a factor when determining if GWPS have been exceeded. At the DB, naturally occurring background concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and the peak background concentrations are further discussed in Section 4.6.1.

#### **4.4 CCR Porewater Quality Results**

CCR porewater quality samples from the DB and the BABs were collected in December of 2020 and January of 2021. Samples were analyzed for Appendix III and IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest CCR porewater concentration was used as the established concentration of the constituent ( $C_o$ ) when calculating the predicted groundwater concentrations (PGC<sub>i</sub>), as discussed further below. The CCR porewater quality data is summarized in **Table 4-2**.

In addition to the site-specific CCR porewater concentrations, 90<sup>th</sup> percentile concentrations from the 2014 EPA study [8] were considered in the analysis. This data is summarized in **Table 4-2**.

## 4.5 Fate and Transport Model

### 4.5.1 Analysis Model

A one-dimensional fate and transport model was designed to further understand the potential for contaminant transport from the DB to the uppermost aquifer. The model was developed with a contaminant transport process through the clay and clay with sand layers under the DB. Contaminant transport processes are discussed in Section 4.5.2.

The modeling program POLLUTE [9] was selected for the one-dimensional fate and transport evaluation. POLLUTE uses the input parameters to perform calculations for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

Model setup and inputs are discussed in detail in the following sections and are summarized by layer in **Figure 4-1**.

### 4.5.2 Proposed Mathematical and Associated Computer Model

#### 4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the DB for the various modeled layers include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [10]:

$$\textbf{Equation No. 1:} \quad n \frac{\delta c}{\delta t} = nD \frac{\delta^2 c}{\delta z^2} - V_{\alpha} \frac{\delta c}{\delta z} - \rho K_d \frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

K<sub>d</sub> = distribution coefficient

V<sub>α</sub> = Darcy velocity in the vertical direction



$\rho$  = dry density of soil

$\lambda$  = decay constant of the contaminant species

t = time

POLLUTE utilizes the transport phenomena as governed by Equation No. 1.

#### 4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the CCR porewater. The results from the model can thus be used as a prediction factor for estimating the future concentration of any constituent of concern in groundwater. Multiplying the output prediction factor by the initial CCR porewater concentration provides the predicted groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

$$\text{Equation No. 2: } \text{PGC}_t = \text{PF}_t * C_o$$

Where:

$\text{PGC}_t$  = predicted groundwater concentration after t years.

$\text{PF}_t$  = prediction factored after t years, which is the output of the model.

$C_o$  = established CCR porewater concentration of the constituent of concern.

### 4.5.3 Fate and Transport Model Inputs

#### 4.5.3.1 *Initial CCR Porewater or Source Concentration*

The initial CCR porewater concentration input value used was unity (1). This value is unitless because it represents unit CCR porewater concentration of any given constituent. Therefore, the model results represent a fraction of the initial CCR porewater concentration for any constituent.

#### 4.5.3.2 *Number of Layers and Layer Thickness*

Two layers were modeled at the site: the clay layer and the clay with sand layer. At the DB, the clay layer has an average thickness of 36 ft; the clay with sand layer has an average thickness of 84 ft. The average thickness of each layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer and averaging the difference over the footprint of the DB. Model documentation for the average thickness of each layer can be found in **Appendix M**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The clay layer was divided into 20 sublayers at the DB. The clay with sand layer was divided into 50 sublayers at the DB.

#### 4.5.3.3 *Modeling Period*

The model was run for the operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when operations started at the DB, to 2034, which is the end of the projected active life of the DB.

#### 4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters, or they can be selected by the user. The default Talbot parameters were used in this demonstration [11].

#### 4.5.3.5 *Boundary Conditions*

POLLUTE allows the user to select between multiple upper and lower boundary conditions. The top boundary condition typically represents the bottom of the CCR unit as a potential source. The top boundary can be specified as either zero flux, constant concentration, or finite mass. A constant concentration was assumed as it provides conservative model results because it assumes that the leachate quality will remain constant at the maximum measured values over time.

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used. Therefore, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the clay with sand layer and the underlying uppermost aquifer.

#### 4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model as a whole. The Darcy velocity was calculated for the DB using a vertical gradient and the vertical hydraulic conductivity of the clay with sand layer. For the DB, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the elevation of the typical operation water level within the DB. These parameters were chosen to produce a conservative value for the Darcy velocity. A Darcy velocity value of  $2.03\text{E-}4$  m/year was calculated for the DB as provided in **Appendix M**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing for the vertical hydraulic conductivity data.

#### 4.5.3.7 *Hydrodynamic Dispersion Coefficient*

The vertical coefficient of hydrodynamic dispersion is a required input for each layer within the POLLUTE model. The hydrodynamic dispersion coefficient is calculated using Equation No. 3:

$$\text{Equation No. 3: } D = D^* + av$$

Where:

D = the hydrodynamic dispersion coefficient (m<sup>2</sup>/year);

D\* = the effective diffusion coefficient (m<sup>2</sup>/year).

a = the dispersivity (m);

v = the groundwater seepage velocity (m/year).

For this demonstration, a coefficient of hydrodynamic dispersion value (D) of 0.19 m<sup>2</sup>/year was input into the model. This value was based on the effective diffusion coefficient (D\*) for chloride 0.19 m<sup>2</sup>/year, as calculated by Rowe et al. [12]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest. Therefore, it is a conservative constituent to model among the COCs.

The second part of Equation 3, the product of dispersivity and groundwater seepage velocity, is related to dispersion. Rowe et al. [12] discusses when the seepage velocity (2.03E-4 m/year) is low (i.e., clay soils), diffusion will control the hydrodynamic dispersion (D) and dispersion is negligible.

#### 4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. The model shows good agreement between porosity values and geologic layers, with the overlying clay unit having lower porosities than the underlying clay with sand unit. An average of 51 percent porosity was used for the clay layer, while an average of 63 percent porosity was used for the clay with sand layer.

Based on empirical data provided by Sara [13], the laboratory porosity data was converted to effective porosities. Effective porosity values of 0.41 and 0.51 were used for the clay and clay with sand layers, respectively.

Density values from laboratory testing were also used to determine a suitable model input. The average density of 1,500 kg/m<sup>3</sup> (94.2 pcf) was estimated from the available data. This value was used in the POLLUTE model.

#### 4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of contaminants in the modeled layers, while degradation simulates the breakdown of contaminants over time. In this model, adsorption and degradation are assumed to be zero, which provides a more conservative model result.

### 4.6 Fate and Transport Analysis Results and Evaluation

#### 4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. At the DB, the baseline model calculated a  $PF_t$  of 6.35E-40. With both the  $C_o$  and  $PF_t$  established, the  $PGC_t$  (i.e., predicted concentration) was calculated and compared to the established GWPS for the DB. As provided in **Table 4-3**, the predicted groundwater quality results are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in the 2016-2017 groundwater sampling events and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Table 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of the active life of the DB.

The driving mechanism for the transport is chemical diffusion, because the advective flow would take more than a thousand years for a water molecule to travel from the bottom of the DB to the uppermost aquifer. **Appendix M** provides calculations for the time of travel.

The baseline model outputs for the DB are included in **Appendix N**.

#### 4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or  $PF_t$ , given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**.

The resulting  $PF_t$  from each sensitivity analysis was compared to a threshold prediction value,  $PF_{\text{threshold}}$ . The  $PF_{\text{threshold}}$  value represents the  $PF_t$  at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the DB.  $PF_{\text{threshold}}$  is calculated using Equation 4:

$$\text{Equation No. 4: } PF_{\text{threshold}} = \min \left\{ \frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \dots, \frac{GWPS_i}{C_i}, \dots, \frac{GWPS_n}{C_n} \right\}$$

Where:

$PF_{\text{threshold}}$  = threshold prediction factor

$GWPS_i$  = groundwater protection standard for constituent ‘i’

$C_i$  = maximum porewater concentration of the COC ‘i’

#### 4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity. A Darcy velocity of 4.07E-4 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

#### 4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing [12], and thus a 25% increase and decrease is considered a satisfactory variation for the purposes of a sensitivity analysis.

#### 4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results.

#### 4.6.2.4 *Layer Thickness*

The isopach maps (**Appendix M**) were used to calculate the maximum and minimum thickness for the clay and clay with sand layers. Using those values as inputs, four additional models were run for the DB to evaluate model sensitivities to layer thickness. In each model only one variable was changed.

#### 4.6.2.5 *Modeling Period*

The modeling period used was 55 years (the “baseline”). To further evaluate the impact of modeling runtime on the resultant  $PF_t$ , one model was run with a modeling period of 85 years, to capture the post-closure care period.

#### 4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5**, using more conservative model input parameters resulted in  $PF_t$  values ranging from 5.19E-47 to 1.14E-32. This demonstrates that the DB will not impact groundwater quality assuming conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix N**.

#### 4.6.3 Reliability of Computer Model

The computer-based fate and transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications ([10], [14], [11], [15], [16]) demonstrate the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

#### 4.6.4 Degree of Conservativeness in Model Results

Input parameters for the baseline models were based on site-specific data whenever possible. When not possible, input values were derived from an understanding of the site and relevant peer-reviewed literature. If a high degree of uncertainty was present, conservative input values were selected. A summary of the various conservative assumptions are listed below:

- The maximum measured CCR porewater concentration for each constituent was used for the fate and transport model prediction table;
- Constant CCR porewater concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decreased CCR porewater concentrations over time, but to be conservative the model considered constant CCR porewater concentration over time;
- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays which would retard or slow down the migration. To be conservative, the model assumes no adsorption would occur over time;
- Degradation of concentrations (input values) through either the biologic or chemical process was assumed not to occur during the modeling period. By assuming no degradation, the model overestimates the predicted groundwater quality over time; and

- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of the DB to the top of the uppermost aquifer; the analysis does not consider a horizontal flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

## 5. SUMMARY

This ALD has been prepared to assess if the DB meets the ALD requirements per the CCR Rule. The data included comprehensive field and laboratory investigation data collected from the 1970s to 2020. The 2020 field and laboratory investigation studies were conducted specifically to fill data gaps and to address the CCR Rule requirements. The data were incorporated into an EVS model to create a comprehensive conceptual site model to understand the lithology beneath the DB and as a basis for the fate and transport analysis. The EVS model was relatively consistent with historical representations of the geology associated with the DB.

Site-specific water was collected from the DB and BABs and tested to assess which one of the CCR units had the more aggressive water. Water from DB was deemed to be more aggressive and used for compatibility testing to estimate the impacts on hydraulic conductivity of site-specific soil samples. The results of the testing program are presented in this ALD. .

A comprehensive subsurface stratigraphy model was created using the available data set incorporated into the conceptual site model. Fate and transport analyses were conducted to assess whether there is a reasonable probability that water from the DB may result in a release to the groundwater during its active life that would exceed the GWPS at the waste boundary. The baseline fate and transport analysis was conducted using the available site-specific data and an operating period of 55 years, which captures the period from the 1980s, when operations started at the DB, to 2034, which is the end of the projected active life of the DB.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than a thousand years for a water molecule to travel from the bottom of the DB to the uppermost aquifer. Therefore, the analysis results indicate that, due to the low hydraulic conductivity of the in-situ soils, chemical diffusion is the dominant transport mechanism compared to advection or seepage velocity. Consequently, the hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow.

A sensitivity analysis was performed as part of additional fate and transport analyses to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The sensitivity analyses results show that there is no reasonable probability that water from the DB will result in a release to the groundwater that would exceed the GWPS at the waste boundary over the projected active life of the DB.



**6. CERTIFICATION**

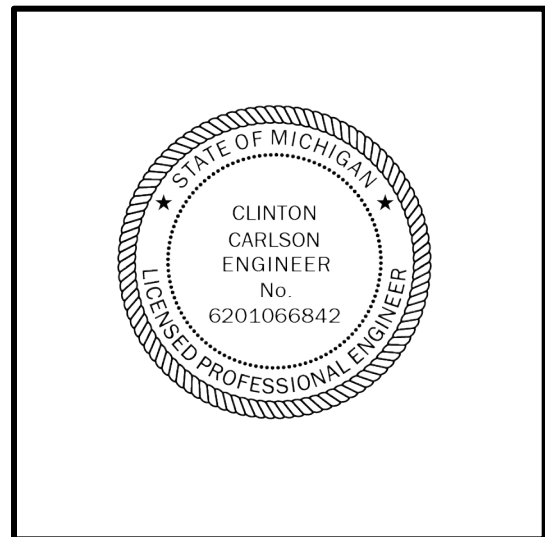
**CCR Unit:** DTE Electric Company; Belle River Power Plant, Diversion Basin (DB)

I, Clinton P. Carlson, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify in accordance with the CCR Rule, to the best of my knowledge, information, and belief, that the information contained in this plan has been prepared in accordance with the accepted practice of engineering and that the DB meets the requirements of the Alternative Liner Demonstration per the CCR Rule.

Clinton P. Carlson, Ph.D.  
 Printed Name

*Clinton Carlson* April 10, 2023  
 Signature Date

6201066842 Michigan February 16, 2025  
 Registration Number State Expiration Date



*Affix Seal*

## 7. REFERENCES

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# **TABLES**

**Table 2-1 – Field and Laboratory Testing Summary**

<b>Test</b>	<b>Current ASTM</b>	<b>Number Used in Characterization</b>
Pocket Penetrometer	WK27337	194
Slug Test	D4044	4
Grain Size Distribution	D6913	43
Atterberg Limits	D4318	72
Water Content	D2216	96
Unit Weight	D7263	64
Specific Gravity	D854	10
Hydraulic Conductivity	D5084/D7100	19/6
Cone Penetration Test	D3441	16

**Table 2-2 – Pore Pressure Dissipation Tests Results**

<b>CPT ID</b>	<b>Lithology Unit</b>	<b>Hydraulic Conductivity (cm/s)</b>
CPT-01B	Clay	1.80E-8
CPT-01B	Clay	3.61E-8
CPT-01B	Seam 2	8.54E-8
CPT-01B	Seam2	5.78E-7
CPT-01B	Seam 3	2.05E-8
CPT-01B	Seam 4	2.57E-8
CPT-03	Clay	9.76E-9
CPT-03	Clay	2.48E-8
CPT-03	Clay with Sand	3.14E-8
CPT-03	Clay with Sand	1.97E-8
CPT-03	Seam 3	2.81E-6
CPT-03	Seam 3	5.19E-7
CPT-03	Clay with Sand	2.96E-8
CPT-06B	Clay	3.33E-8
CPT-06B	Clay with Sand	1.96E-8
CPT-06B	Clay with Sand	2.34E-8
CPT-08B	Clay	1.91E-8
CPT-08B	Clay 2	3.35E-8
CPT-08C	Seam 2	2.97E-8
CPT-08C	Clay with Sand 2	8.03E-8
CPT-08C	Clay with Sand 2	2.97E-8
CPT-11	Clay	1.97E-8
CPT-11	Clay	2.64E-8
CPT-11	Clay with Sand 2	4.68E-8
CPT-11	Clay with Sand 4	3.86E-8
CPT-11	Clay with Sand 4	2.76E-8
CPT-12	Clay	7.97E-9
CPT-13B	Seam 3	1.63E-6

**Table 3-1 – Chemistry Results of Site-Specific Filtered CCR Porewater**

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	88	60	100
Antimony	mg/L	0.01 U	0.01 U	0.01 U
Arsenic	mg/L	0.0085	0.007	0.0093
Barium	mg/L	0.94	0.58	0.59
Beryllium	mg/L	0.004	0.00216	0.004
Boron	mg/L	0.38	0.83	1.29
Cadmium	mg/L	0.004 U	0.004 U	0.004 U
Calcium	mg/L	83	54	80
Chloride	mg/L	9.0	9.6	14
Chromium	mg/L	0.0087	0.0049	0.01
Cobalt	mg/L	0.01	0.00554	0.0052
Fluoride	mg/L	0.26	0.52	0.31
Iron	mg/L	0.16	1.05	0.34

Sample ID	Unit	Bottom Ash Basin - North	Bottom Ash Basin - South	Diversion Basin
Lead	mg/L	0.006	0.0061	0.01
Lithium	mg/L	0.034	0.0174	0.031
Magnesium	mg/L	15.9	13.8	17.5
Manganese	mg/L	0.01	0.0145	0.0137
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	0.035	0.046	0.058
pH	SU	7.87	8.71	9.01
Potassium	mg/L	5.9	7.5	7.6
Selenium	mg/L	0.00582	0.0057	0.0061
Sodium	mg/L	55	86	115
Sulfate	mg/L	100	110	130
Thallium	mg/L	0.01	0.00117	0.00516
Total Dissolved Solids	mg/L	200	220	300
<b>Ionic Strength</b>	<b>molal (m)</b>	<b>0.0088</b>	<b>0.0080</b>	<b>0.0106</b>

Notes:U – Analyzed but not detected above the method detection limit. The method detection limit is shown.



**Table 3-2 – Summary of Hydraulic Conductivity Tests Results [6]**

ID	Date	Hydraulic Conductivity (cm/s)
B1-ST-3 (36-38')	January 26, 2021	2.7E-9
B2-ST-2 (7-9')	January 26, 2021	2.0E-8
B2-ST-7 (97-99')	February 15, 2021	2.2E-8
B3-ST-1 (1-3')	February 8, 2021	9.6E-9
B4-ST-4 (67-69')	February 15, 2021	1.8E-8
B5-ST-2 (27-29')	February 15, 2021	2.1E-8
B6-ST-4 (47-49')	February 17, 2021	1.8E-8
B6-ST-7 (97-99')	February 17, 2021	1.2E-8

**Table 3-3 – Summary of Compatibility Tests [7] - Hydraulic Conductivity and Pore Volumes Passed Results**

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection
B1-ST-1 (7-9')	March 15, 2021	0	1.2E-8	0
	December 23, 2022	648	4.4E-9	2.84
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-8	0
	December 23, 2022	648	8.8E-9	5.21
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-8	0
	December 23, 2022	648	1.8E-8	7.94
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-8	0
	December 23, 2022	648	1.5E-8	10.55
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-8	0
	December 23, 2022	648	2.1E-8	9.89
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-8	0
	December 23, 2022	648	1.0E-8	8.36

**Table 3-4 – Summary of Compatibility Tests [7] - pH Results**

Sample ID	Parameter	pH Inflow	pH Outflow
B1-ST-1 (7-9')	Min	7.8	8.1
	Max	9.1	9.1
	Average	8.4	8.4
B2-ST-1 (1-3')	Min	7.8	7.9
	Max	8.9	9.1
	Average	8.3	8.3
B2-ST-4 (47-49')	Min	7.7	7.8
	Max	9.4	9.0
	Average	8.3	8.3
B3-ST-5 (77-79')	Min	7.5	7.6
	Max	9.1	8.9
	Average	8.3	8.2
B4-ST-3 (47-49')	Min	7.7	7.8
	Max	9.0	8.8
	Average	8.2	8.2
B5-ST-5 (87-89')	Min	7.6	7.7
	Max	8.9	9.2
	Average	8.3	8.2

**Table 3-5 – Summary of Compatibility Tests [7] - Electrical Conductivity Results**

Sample ID	Parameter	EC Inflow ( $\mu\text{s}/\text{cm}$ )	EC Outflow ( $\mu\text{s}/\text{cm}$ )
B1-ST-1 (7-9')	Min	622	1141
	Max	1315	1614
	Average	1094	1280
B2-ST-1 (1-3')	Min	560	856
	Max	1345	3050
	Average	1081	1381
B2-ST-4 (47-49')	Min	523	720
	Max	1312	2090
	Average	1070	1035
B3-ST-5 (77-79')	Min	579	672
	Max	1397	1133
	Average	1098	879
B4-ST-3 (47-49')	Min	518	632
	Max	1283	1637
	Average	1033	874
B5-ST-5 (87-89')	Min	555	655
	Max	1291	2010
	Average	1070	931

**Table 3-6 – Summary of Compatibility Tests [7] - Termination Criteria**

Sample ID	Termination Criterion Reached (as of December 23, 2022)			
	Pore Volumes Passed	Steady Hydraulic Conductivity	pH	Electrical Conductivity
B1-ST-1 (7-9')	Yes	Yes	Yes	Yes
B2-ST-1 (1-3')	Yes	Yes	Yes	No
B2-ST-4 (47-49')	Yes	Yes	Yes	No
B3-ST-5 (77-79')	Yes	Yes	Yes	No
B4-ST-3 (47-49')	Yes	Yes	Yes	No
B5-ST-5 (87-89')	Yes	Yes	Yes	No

**Table 4-1 – Groundwater Protection Standards**

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11/A	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	3.2E-03	<b>6.0E-03</b>
Arsenic	mg/L	Background or MCL	1.0E-02	1.4E-02	<b>1.4E-02</b>	7.5E-03	<b>1.0E-02</b>	1.9E-02	<b>1.9E-02</b>	3.0E-02	<b>3.0E-02</b>	1.1E-02	<b>1.1E-02</b>	2.4E-02	<b>2.4E-02</b>
Barium	mg/L	MCL	2.0E+00	3.7E-01	<b>2.0E+00</b>	3.3E-01	<b>2.0E+00</b>	5.0E-01	<b>2.0E+00</b>	4.9E-01	<b>2.0E+00</b>	2.0E-01	<b>2.0E+00</b>	6.2E-01	<b>2.0E+00</b>
Beryllium	mg/L	MCL	4.0E-03	1.0E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.7E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.3E-03	<b>5.0E-03</b>	1.5E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>
Chromium	mg/L	MCL	1.0E-01	4.7E-02	<b>1.0E-01</b>	1.4E-02	<b>1.0E-01</b>	2.7E-02	<b>1.0E-01</b>	5.5E-02	<b>1.0E-01</b>	3.2E-02	<b>1.0E-01</b>	1.8E-02	<b>1.0E-01</b>
Cobalt	mg/L	Background or RSL	6.0E-03	2.1E-02	<b>2.1E-02</b>	4.7E-03	<b>6.0E-03</b>	1.3E-02	<b>1.3E-02</b>	2.2E-02	<b>2.2E-02</b>	1.7E-02	<b>1.7E-02</b>	7.1E-03	<b>7.1E-03</b>
Fluoride	mg/L	MCL	4.0E+00	1.3E+00	<b>4.0E+00</b>	1.3E+00	<b>4.0E+00</b>	1.2E+00	<b>4.0E+00</b>	1.3E+00	<b>4.0E+00</b>	2.1E+00	<b>4.0E+00</b>	1.9E+00	<b>4.0E+00</b>
Lead	mg/L	Background or RSL	1.5E-02	2.3E-02	<b>2.3E-02</b>	4.4E-03	<b>1.5E-02</b>	1.2E-02	<b>1.5E-02</b>	2.2E-02	<b>2.2E-02</b>	3.5E-02	<b>3.5E-02</b>	7.7E-03	<b>1.5E-02</b>
Lithium	mg/L	Background	4.0E-02	6.7E-02	<b>6.7E-02</b>	5.5E-02	<b>5.5E-02</b>	9.2E-02	<b>9.2E-02</b>	1.1E-01	<b>1.1E-01</b>	1.2E-01	<b>1.2E-01</b>	1.5E-01	<b>1.5E-01</b>
Mercury	mg/L	MCL	2.0E-03	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>
Molybdenum	mg/L	RSL	1.0E-01	4.3E-02	<b>1.0E-01</b>	3.0E-02	<b>1.0E-01</b>	1.0E-01	<b>1.0E-01</b>	6.7E-02	<b>1.0E-01</b>	5.0E-02	<b>1.0E-01</b>	4.9E-02	<b>1.0E-01</b>
Radium-226/228	pCi/L	Background or MCL	5.0E+00	5.5E+00	<b>5.5E+00</b>	2.6E+00	<b>5.0E+00</b>	5.8E+00	<b>5.8E+00</b>	7.6E+00	<b>7.6E+00</b>	3.2E+00	<b>5.0E+00</b>	2.6E+00	<b>5.0E+00</b>
Selenium	mg/L	MCL	5.0E-02	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.3E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>
Thallium	mg/L	Background or MCL	2.0E-03	1.1E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	2.3E-03	<b>2.3E-03</b>	1.3E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-2 – Baseline Fate and Transport Results**

	Constituent	Units	Maximum Observed Concentration	90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality		Most Conservative GWPS	Outcome - Site (Pass/Fail)	Outcome - 90th Percentile
						DB	90th Percentile			
<b>Appendix IV</b>	Antimony	mg/L	1.0E-02	4.0E-02	6.69E-40	6.69E-42	2.68E-41	6.0E-03	PASS	PASS
	Arsenic	mg/L	9.3E-03	7.8E-01	6.69E-40	6.22E-42	5.22E-40	1.0E-02	PASS	PASS
	Barium	mg/L	5.9E-01	2.1E-01	6.69E-40	3.95E-40	1.40E-40	2.0E+00	PASS	PASS
	Beryllium	mg/L	4.0E-03	1.0E-03	6.69E-40	2.68E-42	6.69E-43	4.0E-03	PASS	PASS
	Cadmium	mg/L	4.0E-03	6.0E-02	6.69E-40	2.68E-42	4.01E-41	5.0E-03	PASS	PASS
	Chromium	mg/L	1.0E-02	2.0E-01	6.69E-40	6.69E-42	1.34E-40	1.0E-01	PASS	PASS
	Cobalt	mg/L	5.2E-03	5.0E-02	6.69E-40	3.48E-42	3.35E-41	6.0E-03	PASS	PASS
	Fluoride	mg/L	4.4E-01	2.1E+01	6.69E-40	2.94E-40	1.42E-38	4.0E+00	PASS	PASS
	Lead	mg/L	1.0E-02	1.0E-01	6.69E-40	6.69E-42	6.69E-41	1.5E-02	PASS	PASS
	Lithium	mg/L	6.1E-02	4.5E-01	6.69E-40	4.08E-41	3.01E-40	4.0E-02	PASS	PASS
	Mercury	mg/L	4.0E-04	7.0E-06	6.69E-40	2.68E-43	4.68E-45	2.0E-03	PASS	PASS
	Molybdenum	mg/L	3.0E-01	7.1E+00	6.69E-40	2.01E-40	4.75E-39	1.0E-01	PASS	PASS
	Combined Radium	pCi/L	1.8E+00	-	6.69E-40	1.20E-39	-	5.0E+00	PASS	NA
	Selenium	mg/L	8.7E-03	3.2E-01	6.69E-40	5.82E-42	2.14E-40	5.0E-02	PASS	PASS
Thallium	mg/L	5.2E-03	3.0E-03	6.69E-40	3.45E-42	2.01E-42	2.0E-03	PASS	PASS	

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Maximum Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-05				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.4E-02	6.2E-42	1.4E-02	1.4E-02	Pass
Barium	mg/L	MCL	3.4E-01	3.9E-40	3.4E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.4E-02	6.7E-42	2.4E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.0E-02	3.5E-42	1.0E-02	2.1E-02	Pass
Fluoride	mg/L	MCL	1.3	2.9E-40	1.3	4.0	Pass
Lead	mg/L	Background	1.1E-02	6.7E-42	1.1E-02	2.3E-02	Pass
Lithium	mg/L	Background	6.2E-02	4.1E-41	6.2E-02	6.7E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	4.3E-02	2.0E-40	4.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	4.0E-03	1.2E-39	4.0E-03	5.E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter



**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-06				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.9E-03	6.2E-42	7.9E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.4E-02	6.7E-42	1.4E-02	1.0E-01	Pass
Cobalt	mg/L	RSL	4.9E-03	3.5E-42	4.9E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.30	2.9E-40	1.30	4.0	Pass
Lead	mg/L	RSL	4.8E-03	6.7E-42	4.8E-03	1.5E-02	Pass
Lithium	mg/L	Background	4.9E-02	4.1E-41	4.9E-02	5.5E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.0E-02	2.0E-40	3.0E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.2E-03	1.2E-39	2.2E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-07				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic*	mg/L	Background	1.1E-02	6.2E-42	1.1E-02	1.0E-02	Pass
Barium	mg/L	MCL	4.5E-01	3.9E-40	4.5E-01	2.0	Pass
Beryllium	mg/L	MCL	1.7E-03	2.7E-42	1.7E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.3E-03	2.7E-42	1.3E-03	5.0E-03	Pass
Chromium	mg/L	MCL	5.3E-02	6.7E-42	5.3E-02	1.0E-01	Pass
Cobalt*	mg/L	Background	9.2E-03	3.5E-42	9.2E-03	1.3E-02	Pass
Fluoride	mg/L	MCL	1.2	2.9E-40	1.2	4.0	Pass
Lead*	mg/L	RSL	8.7E-03	6.7E-42	8.7E-03	1.5E-02	Pass
Lithium	mg/L	Background	7.8E-02	4.1E-41	7.8E-02	9.2E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	7.3E-02	2.0E-40	7.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	4.5E-03	1.2E-39	4.5E-03	5.8E-03	Pass
Selenium	mg/L	MCL	5.3E-03	5.8E-42	5.3E-03	5.0E-02	Pass
Thallium	mg/L	Background	2.3E-03	3.5E-42	2.3E-03	2.E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-08				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.1E-03	6.7E-42	2.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	2.1E-02	6.2E-42	2.1E-02	3.0E-02	Pass
Barium	mg/L	MCL	4.3E-01	3.9E-40	4.3E-01	2.0	Pass
Beryllium	mg/L	MCL	1.6E-03	2.7E-42	1.6E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.5E-03	2.7E-42	1.5E-03	5.0E-03	Pass
Chromium	mg/L	MCL	4.0E-02	6.7E-42	4.0E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.6E-02	3.5E-42	1.6E-02	2.2E-02	Pass
Fluoride	mg/L	MCL	1.3	2.9E-40	1.3	4.0	Pass
Lead	mg/L	Background	1.6E-02	6.7E-42	1.6E-02	2.2E-02	Pass
Lithium	mg/L	Background	9.6E-02	4.1E-41	9.6E-02	1.1E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	5.8E-02	2.0E-40	5.8E-02	1.0E-01	Pass
Radium-226/228	pCi/L	Background	5.1E-03	1.2E-39	5.1E-03	7.6E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.3E-03	3.5E-42	1.3E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-10				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.1E-03	6.7E-42	2.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.1E-02	6.7E-42	1.1E-02	1.0E-02	Pass
Barium	mg/L	MCL	1.5E-01	3.9E-40	1.5E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.1E-02	6.7E-42	2.1E-02	1.0E-01	Pass
Cobalt	mg/L	Background	1.2E-02	3.5E-42	1.2E-02	1.7E-02	Pass
Fluoride	mg/L	MCL	1.2	2.9E-40	1.2	4.0	Pass
Lead	mg/L	Background	7.0E-03	6.7E-42	7.0E-03	3.5E-02	Pass
Lithium*	mg/L	Background	9.1E-02	4.1E-41	9.1E-02	1.2E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.3E-02	2.0E-40	3.3E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.0E-03	1.2E-39	2.0E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

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GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-11/11A				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	3.1E-03	6.7E-42	3.1E-03	6.0E-03	Pass
Arsenic	mg/L	Background	1.7E-02	6.2E-42	1.7E-02	2.4E-02	Pass
Barium	mg/L	MCL	4.8E-01	3.9E-40	4.8E-01	2.0	Pass
Beryllium	mg/L	MCL	1.6E-03	2.7E-42	1.6E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	3.9E-02	6.7E-42	3.9E-02	1.0E-01	Pass
Cobalt	mg/L	Background	3.4E-03	3.5E-42	3.4E-03	7.1E-03	Pass
Fluoride	mg/L	MCL	1.0	2.9E-40	9.5E-01	4.0	Pass
Lead	mg/L	RSL	5.2E-03	6.7E-42	5.2E-03	1.5E-02	Pass
Lithium	mg/L	Background	1.1E-01	4.1E-41	1.1E-01	1.5E-01	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	3.2E-02	2.0E-40	3.2E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.2E-03	1.2E-39	2.2E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

\* - Anomalously high value removed, failed Dixon's Test for outliers at 1% significance



**Table 4-4 – Sensitivity Analysis Model Inputs**

	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis
	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr)	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)
<i>Layer Properties</i>																
Clay	11.12	12.13	10.70	2.03E-04	4.07E-04	0.019	0.024	0.014	0.515	0.65	0.46	0.42	0.53	0.37	55	85
Clay with Sand	25.66	26.82	24.66	2.03E-04	4.07E-04	0.019	0.024	0.014	0.635	0.67	0.46	0.51	0.54	0.37	55	85

Dv = Vertical Darcy Velocity

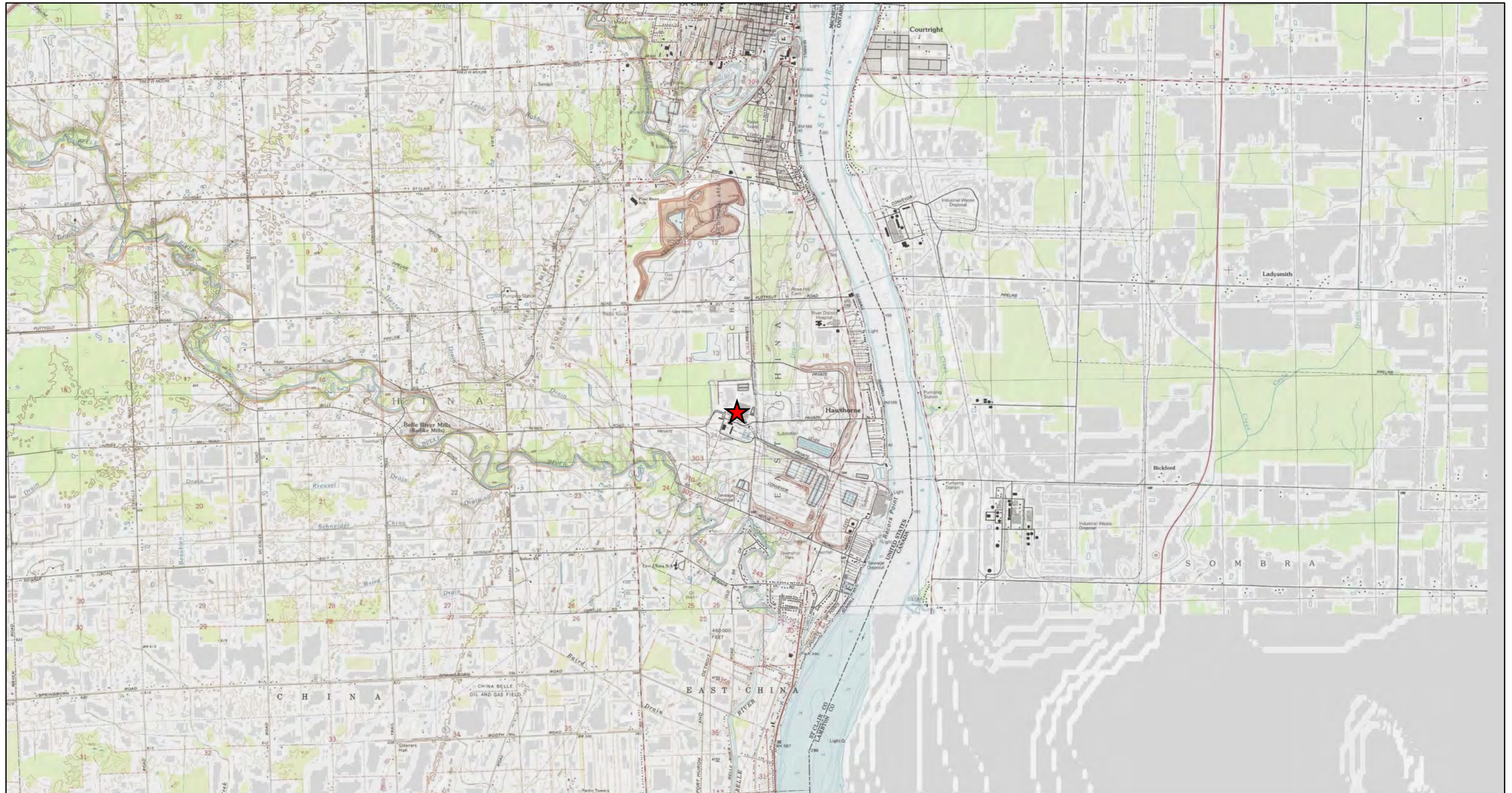
CoHD = Coefficient of Hydrodynamic Dispersion

**Table 4-5 – Sensitivity Analysis Model Results**

<b>Diversion Basin Sensitivity Analysis</b>			
<b>Model Name</b>	<b>Description</b>	<b>Prediction Factor</b>	<b>Pass?*</b>
DB_Baseline	Baseline model for the Bottom Ash Basins.	6.35E-40	YES
DB_ExtendedRun	Model runtime was extended from 55 years to 85 years.	1.14E-32	YES
DB_Darcy	Darcy velocity was doubled.	9.60E-40	YES
DB_CoHD_High	Coefficient of Hydrodynamic Dispersion was increased by 25%.	8.53E-36	YES
DB_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	5.19E-47	YES
DB_ClayPoro_High	Used the highest effective porosity in clay interval; derived from laboratory data in project database.	6.98E-40	YES
DB_ClayPoro_Low	Used the lowest effective porosity in clay interval; derived from laboratory data in project database.	6.08E-40	YES
DB_SandPoro_High	Used the highest effective porosity in clay with sand interval; derived from laboratory data in project database.	6.06E-40	YES
DB_SandPoro_Low	Used the lowest effective porosity in clay with sand interval; derived from laboratory data in project database.	8.29E-40	YES
DB_ClayThick	Used thickest clay interval seen in boring/well; derived from project database.	4.18E-41	YES
DB_ClayThin	Used thinnest clay interval seen in boring/well; derived from project database.	1.96E-39	YES
DB_SandThick	Used thickest clay with sand interval seen in boring/well; derived from project database.	2.76E-41	YES
DB_SandThin	Used thinnest clay sand interval seen in boring/well; derived from project database.	8.74E-39	YES
* Indicates value less than $PF_{\text{threshold}}$ as discussed in Section 4.6.2.			



# FIGURES



Legend  
 Site Location



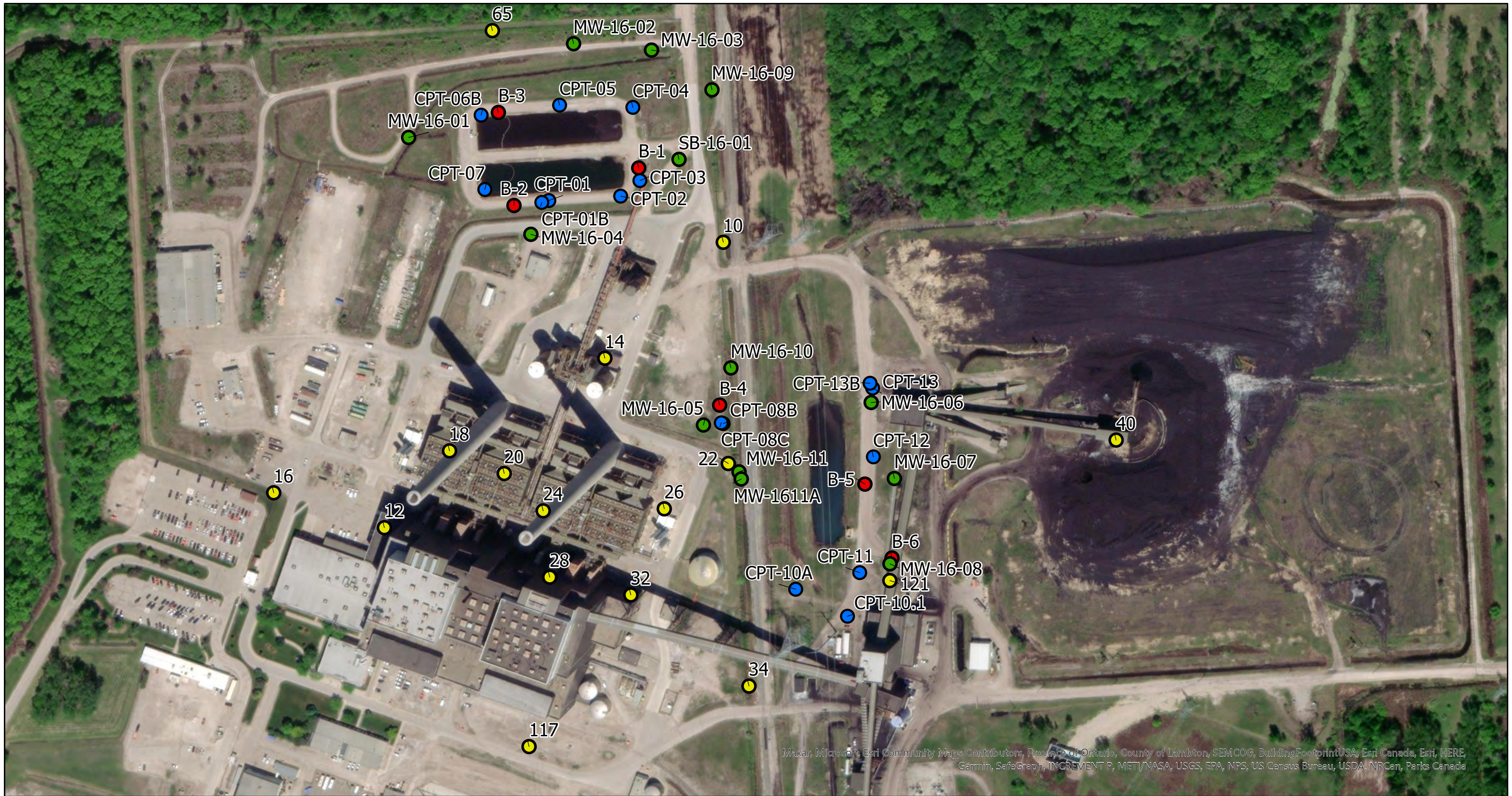
Site Location  
 DTE Energy  
 Belle River Power Plant  
 4505 King Road  
 China Township, Michigan

**Geosyntec**  
 consultants  
Geosyntec Consultants of Michigan

Figure  
**1-1**

Detroit, Michigan

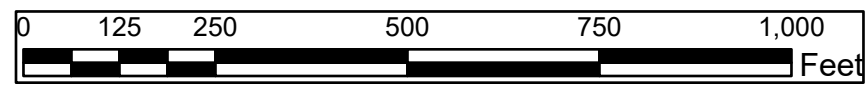
April 2023



Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



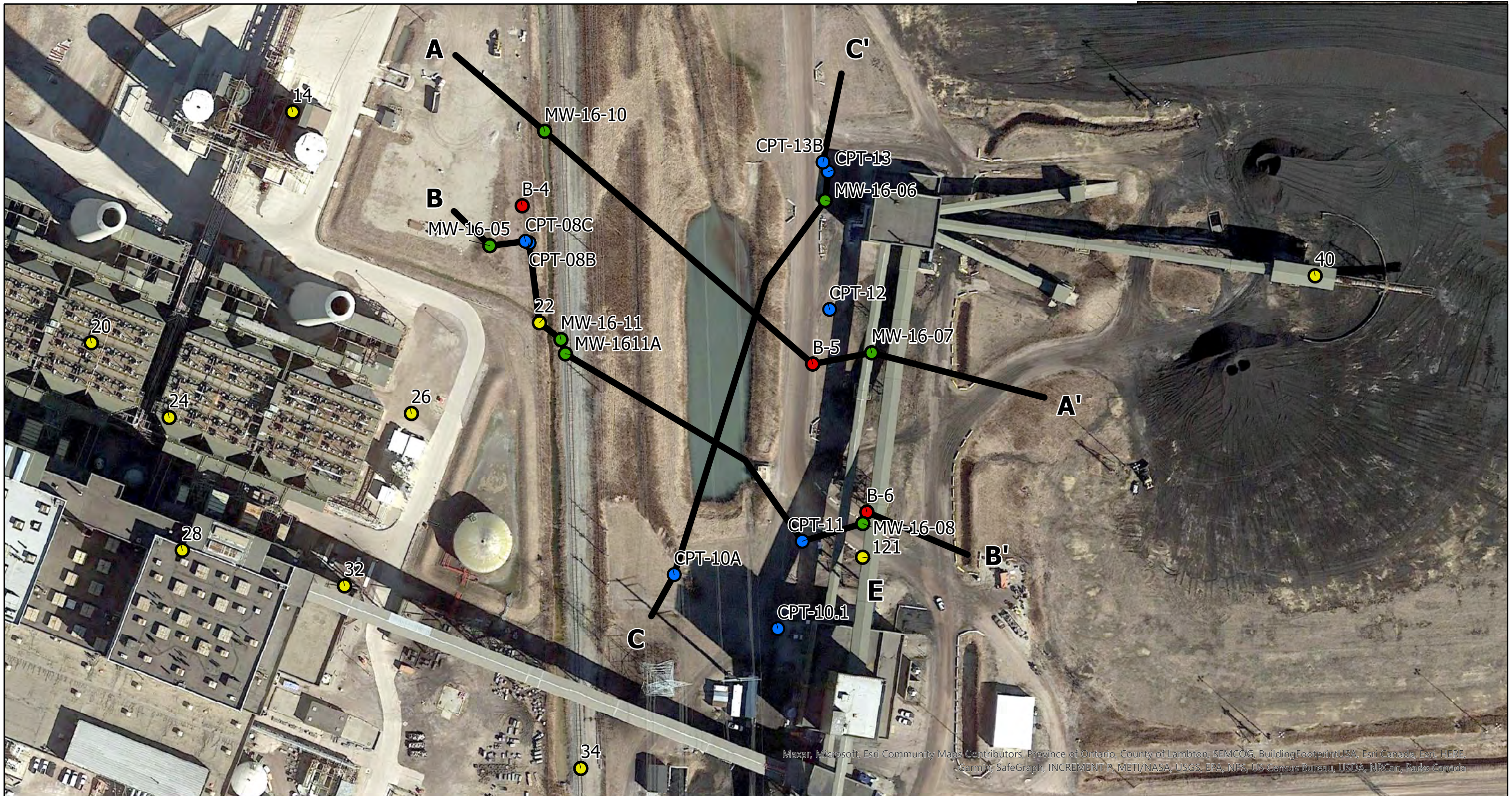
**Field Investigation Locations  
Bell River Power Plant  
China Township, MI**

**Geosyntec**  
consultants  
Geosyntec Consultants of Michigan

**Figure  
2-1**

GLP8017

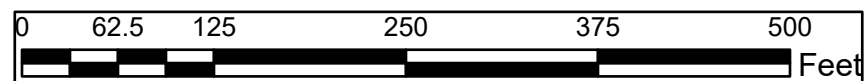
April 2023



Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



**Cross Section Locations**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**

**Geosyntec**  
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**Figure**  
**2-2**

GLP8017

April 2023

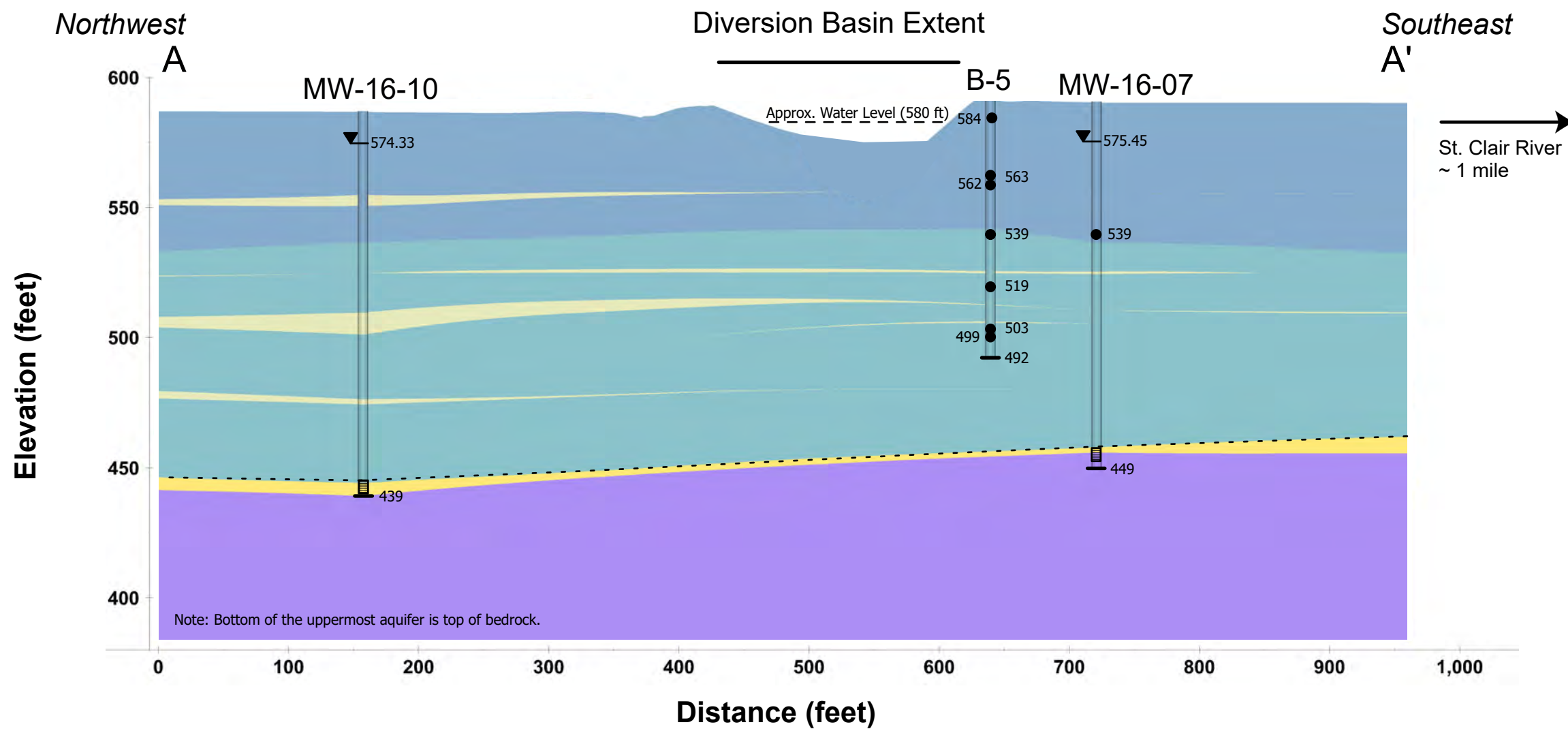


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▤ Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

### Cross-Section A-A' Belle River Power Plant - Diversion Basin China Township, MI

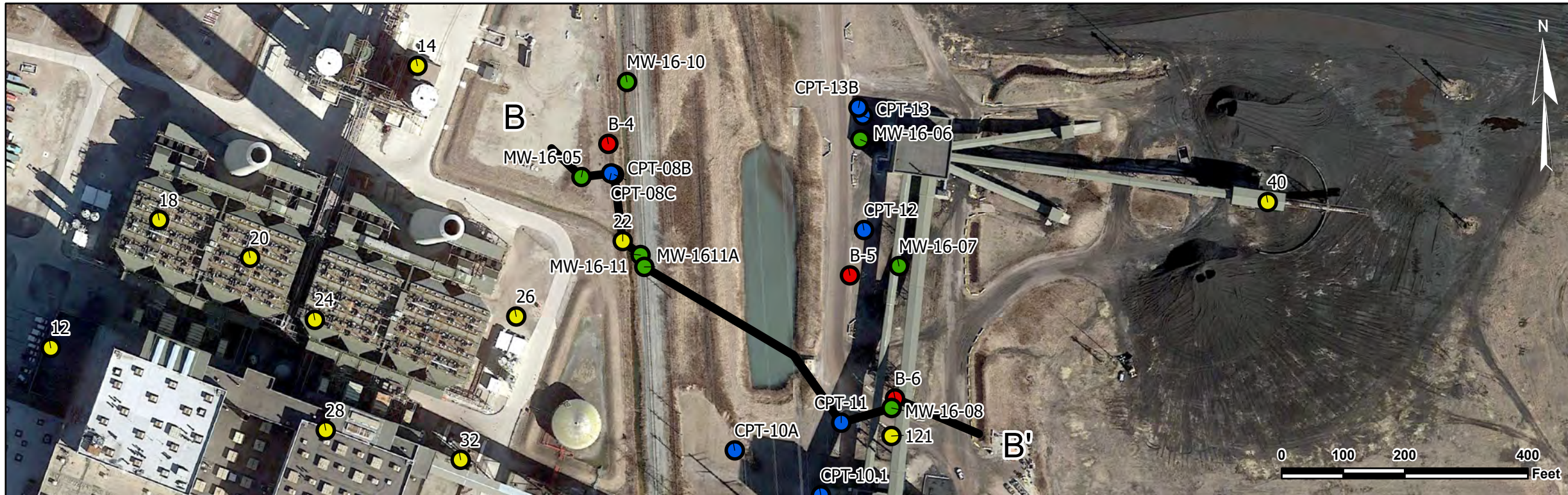
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Figure

2-3

GLP8017

April 2023

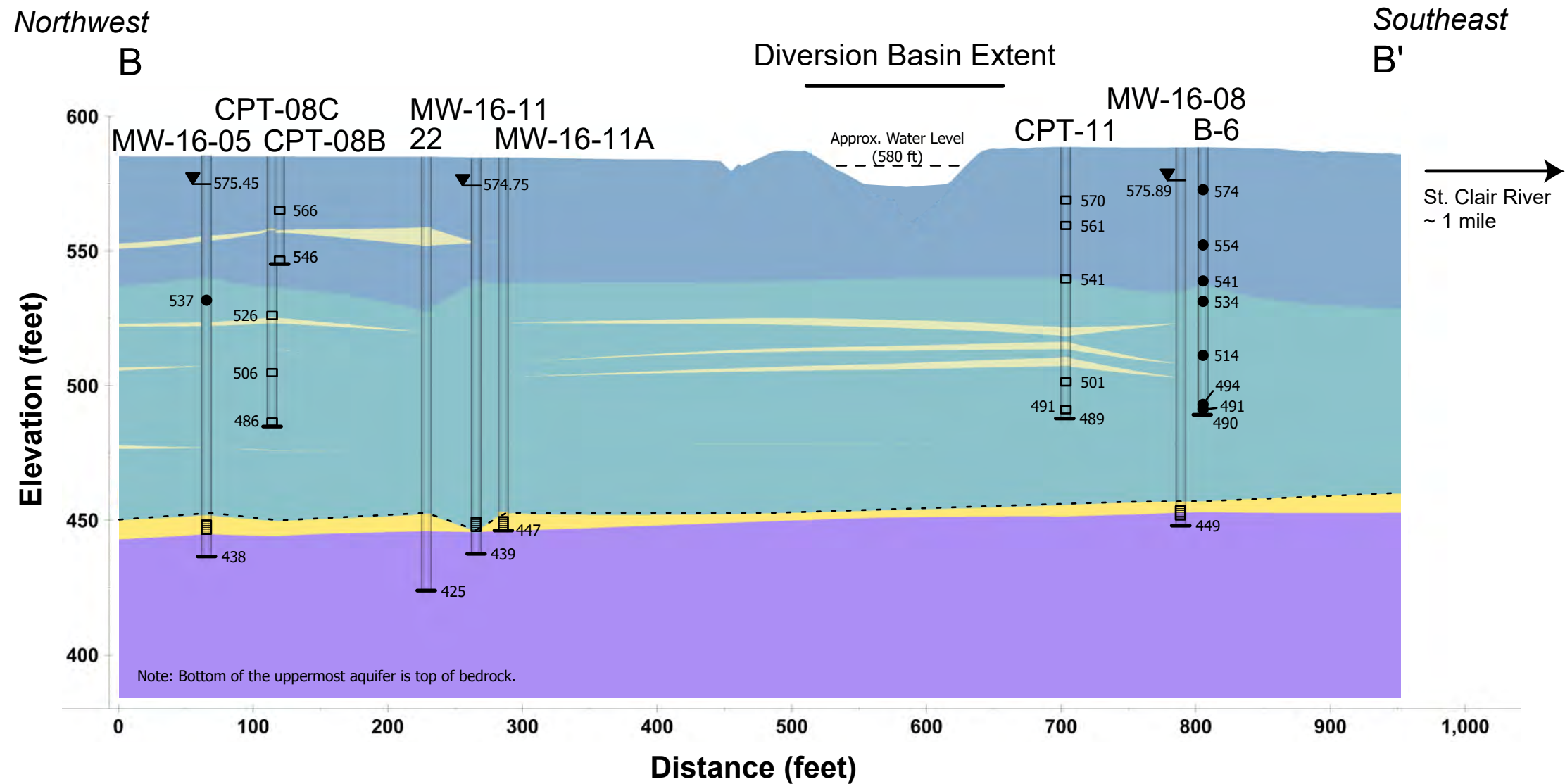


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



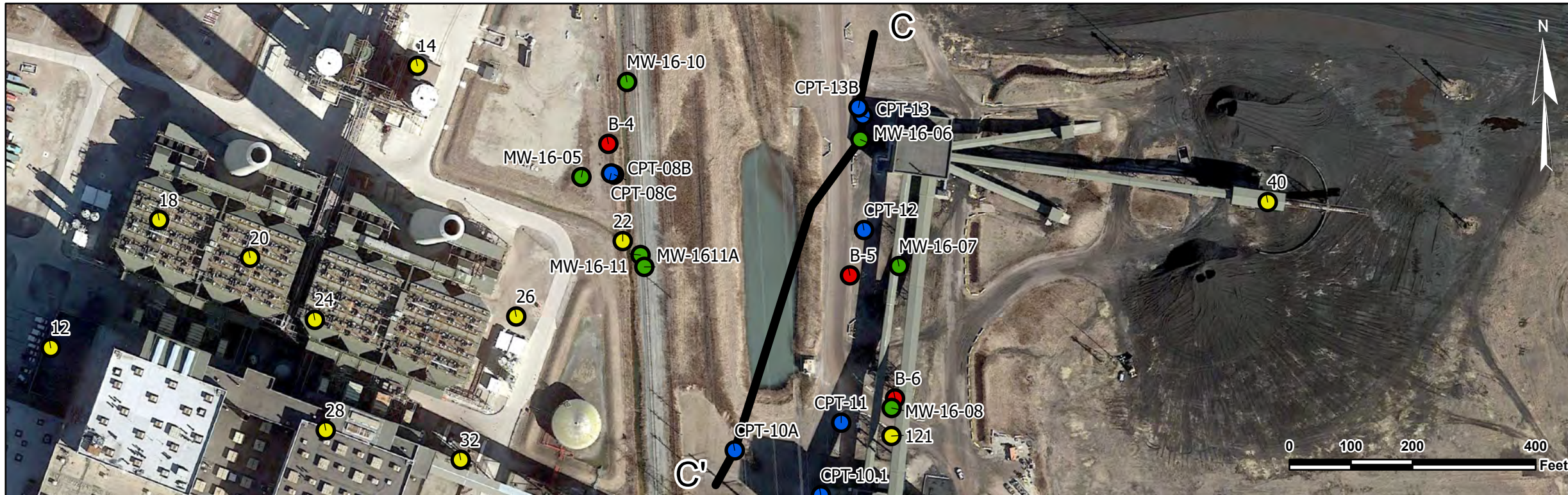
#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross-Section B-B'**  
**Belle River Power Plant - Diversion Basin**  
**China Township, MI**

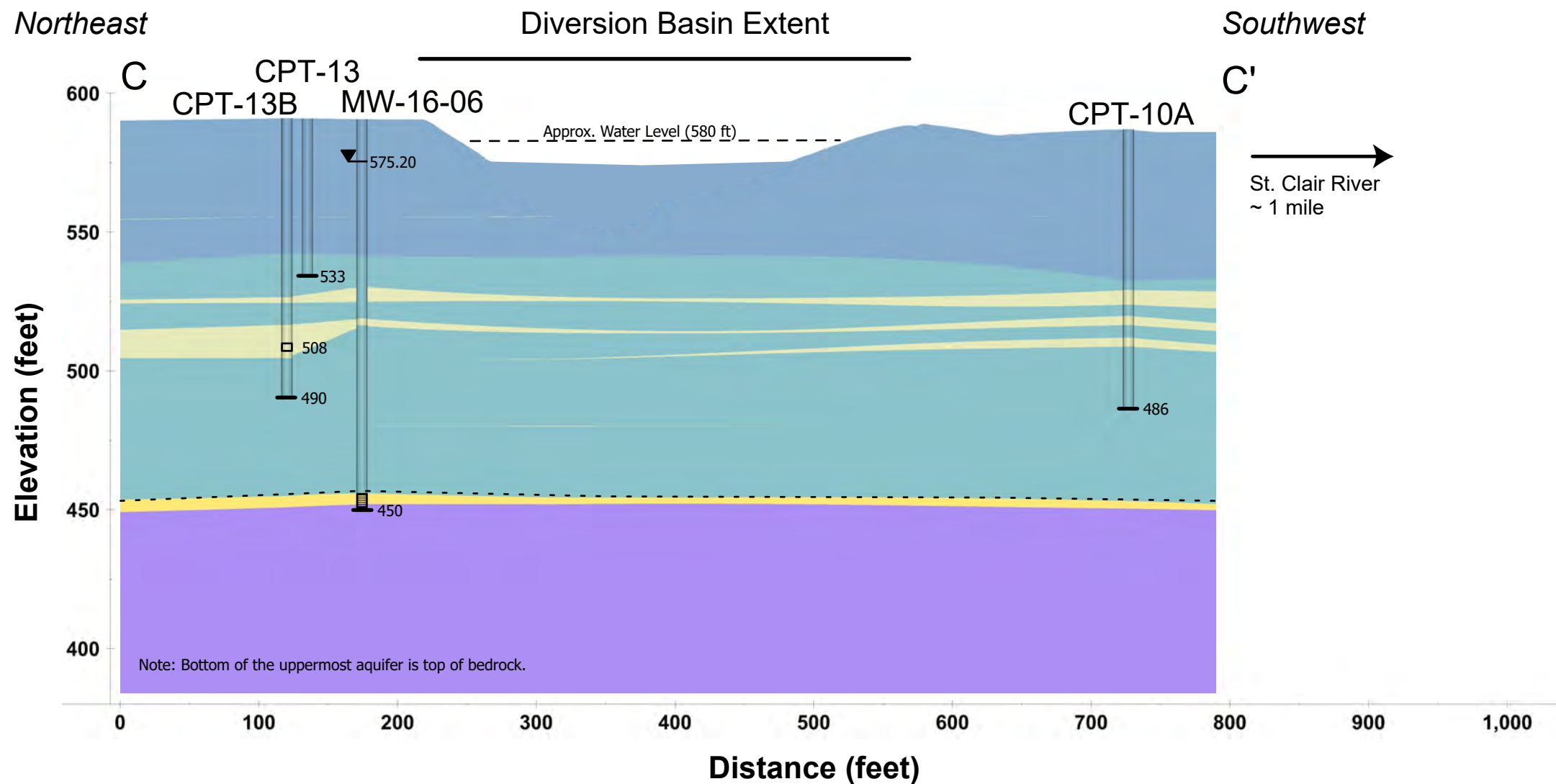


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- ▣ Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

### Cross-Section C-C' Belle River Power Plant - Diversion Basin China Township, MI

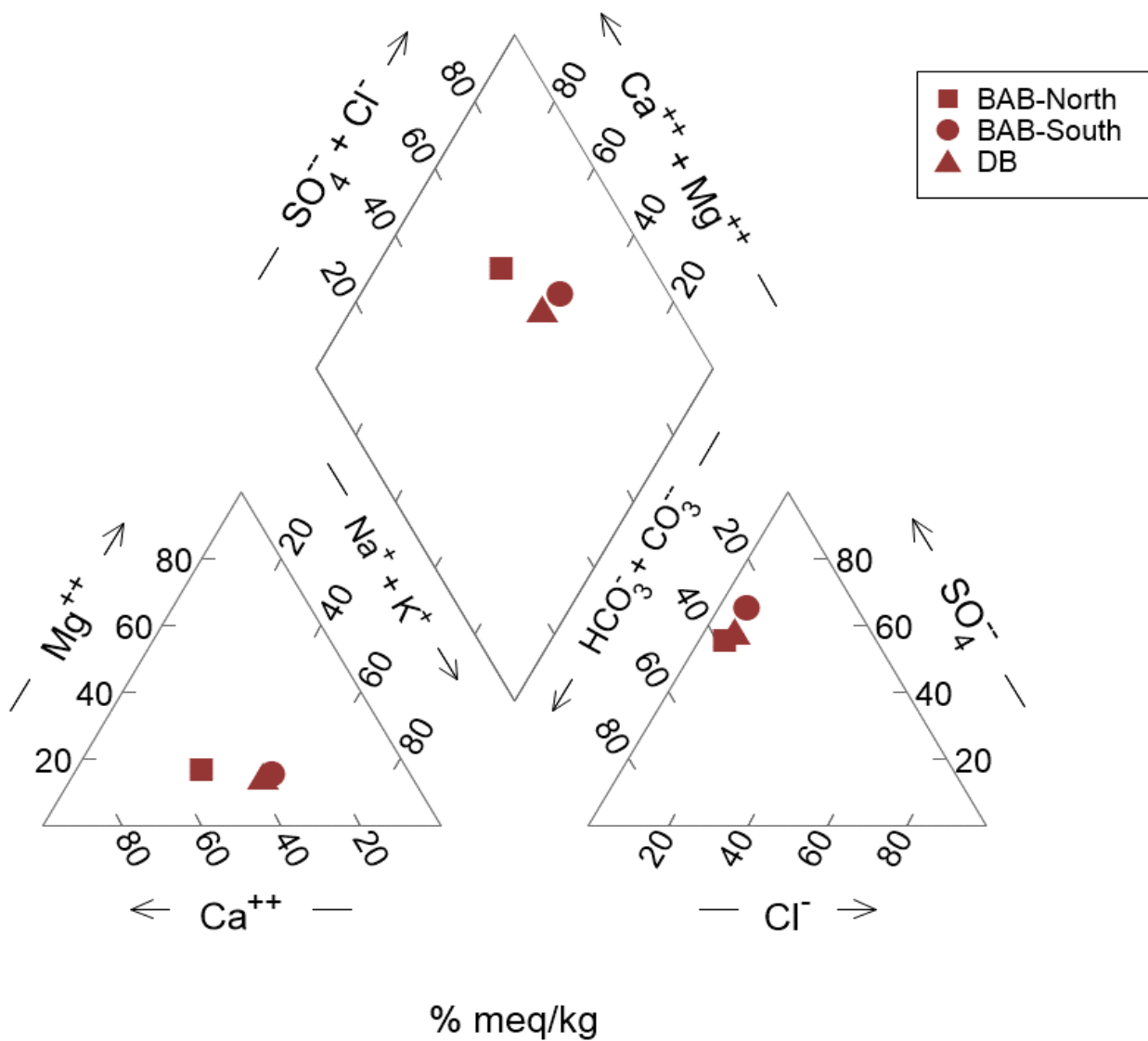
Geosyntec  
consultants

Figure


2-5

GLP8017

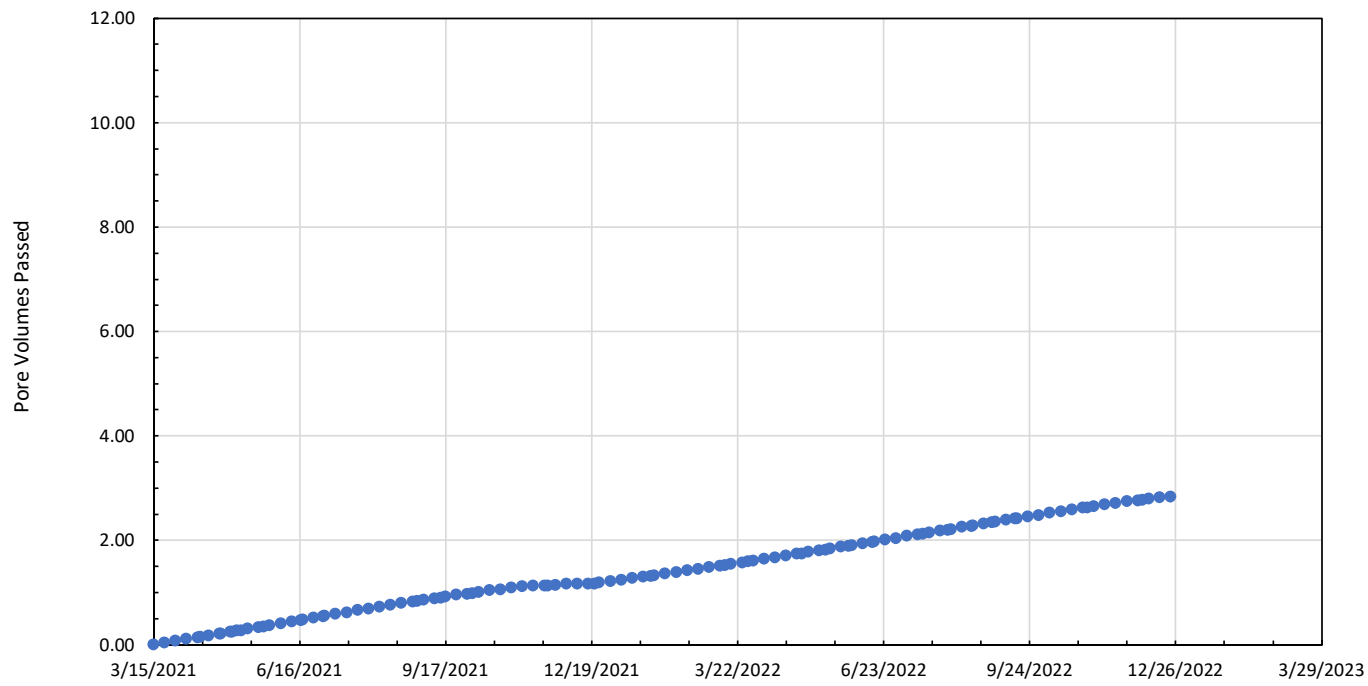
April 2023



**Note:**  
Results are shown in the relative percentage of milliequivalents per kilogram (meq/kg).

<b>Filtered BAB and DB Porewater Sample</b> <b>Piper Diagram</b> Belle River Power Plant St. Clair County, MI	
 Geosyntec consultants <small>Geosyntec Consultants of Michigan</small>	
GLP8017	April 2023
<b>Figure 3-1</b>	





**B1-ST-1 (7-9') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

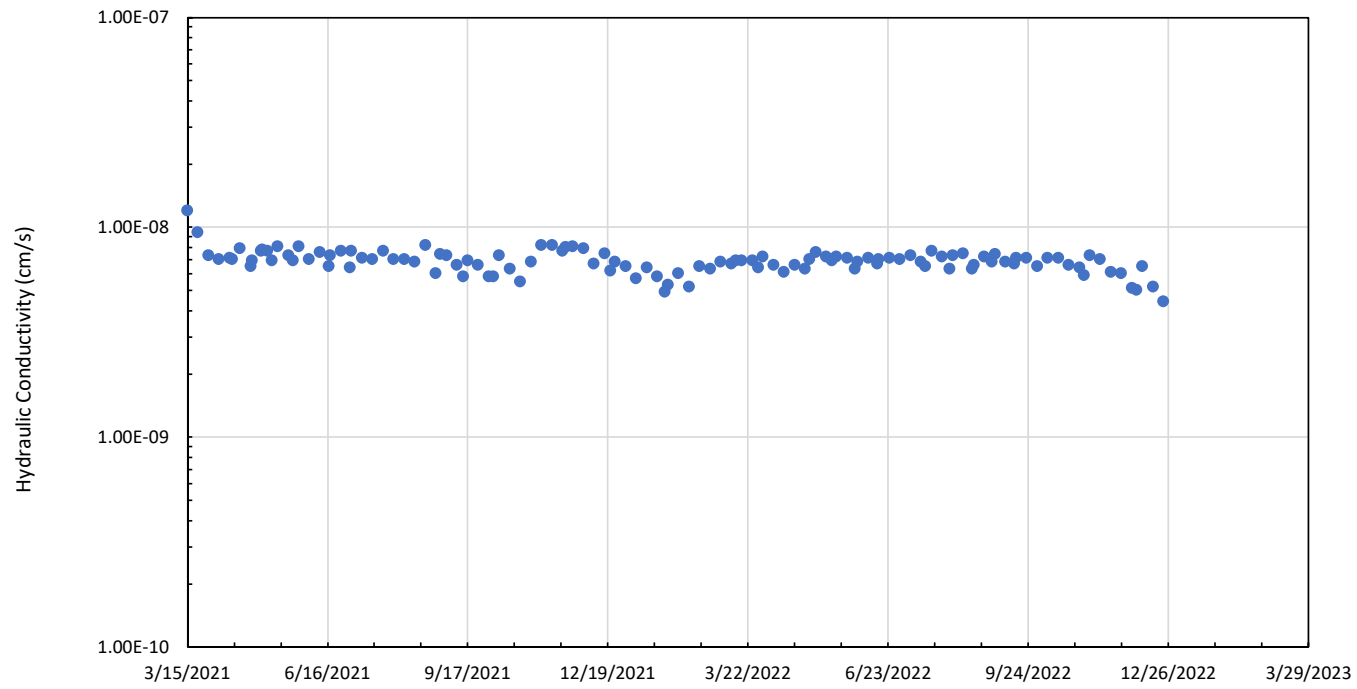



**Figure**

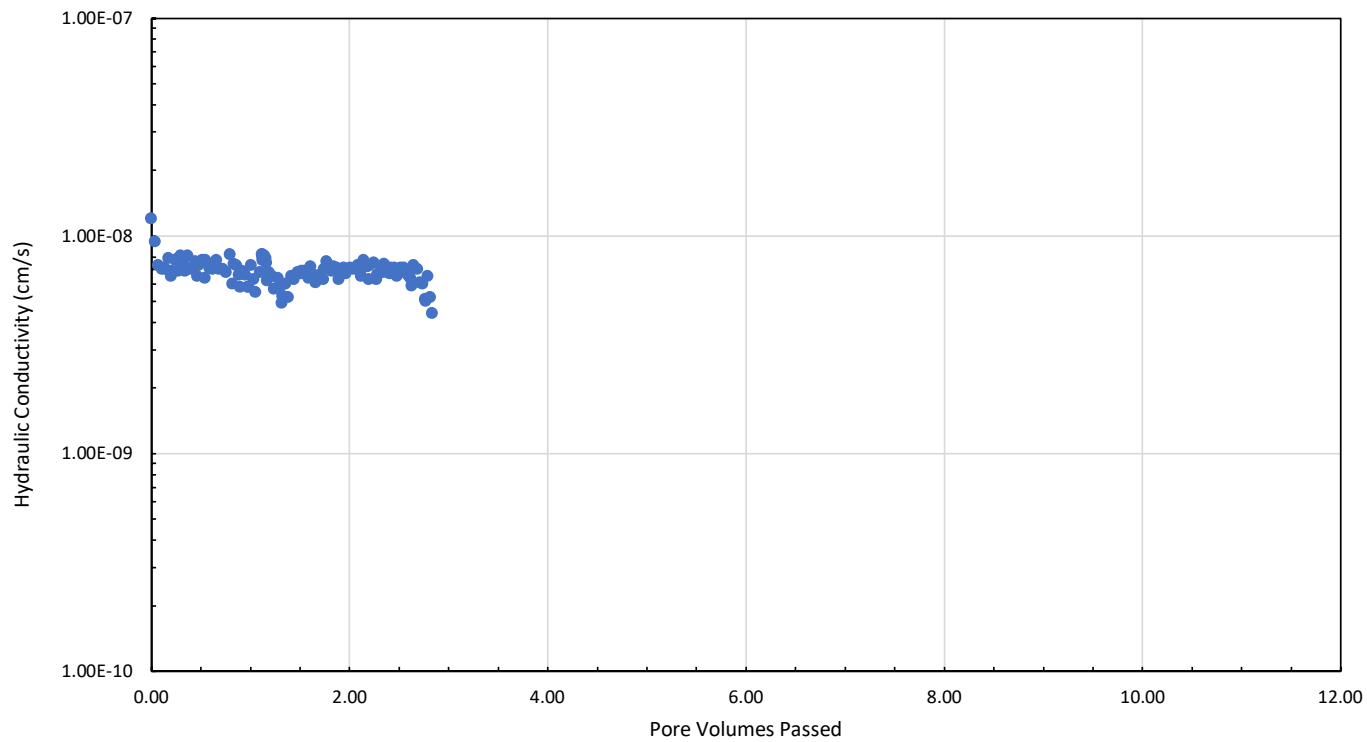
**3-2**

Detroit, MI

April 2023



<b>B1-ST-1 (7-9') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-3</b>	



**B1-ST-1 (7-9') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

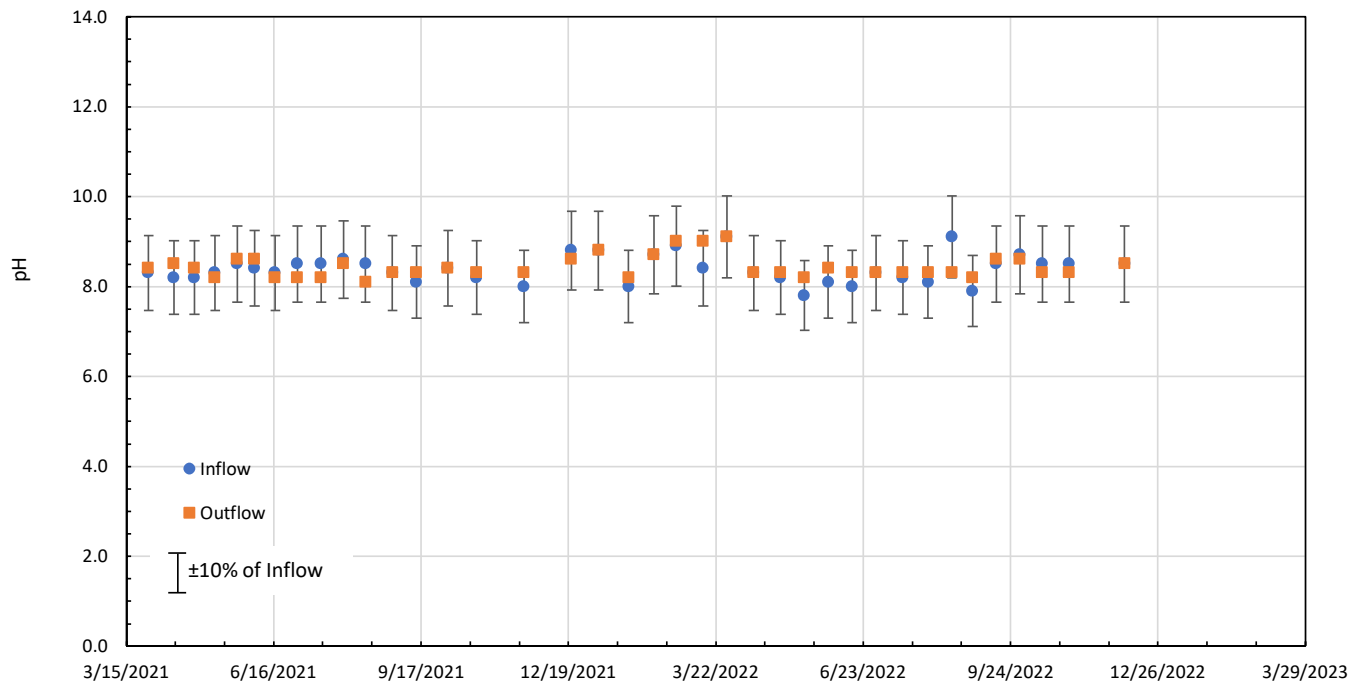



**Figure**

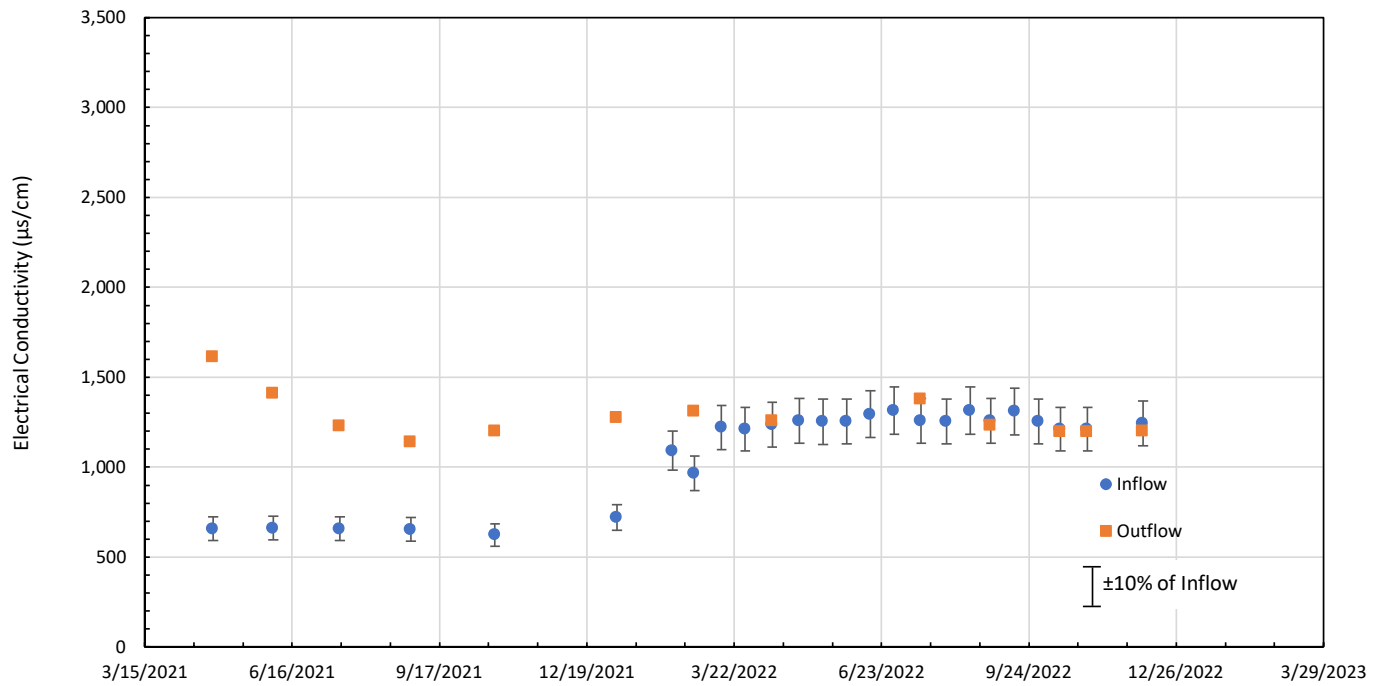
**3-4**

Detroit, MI

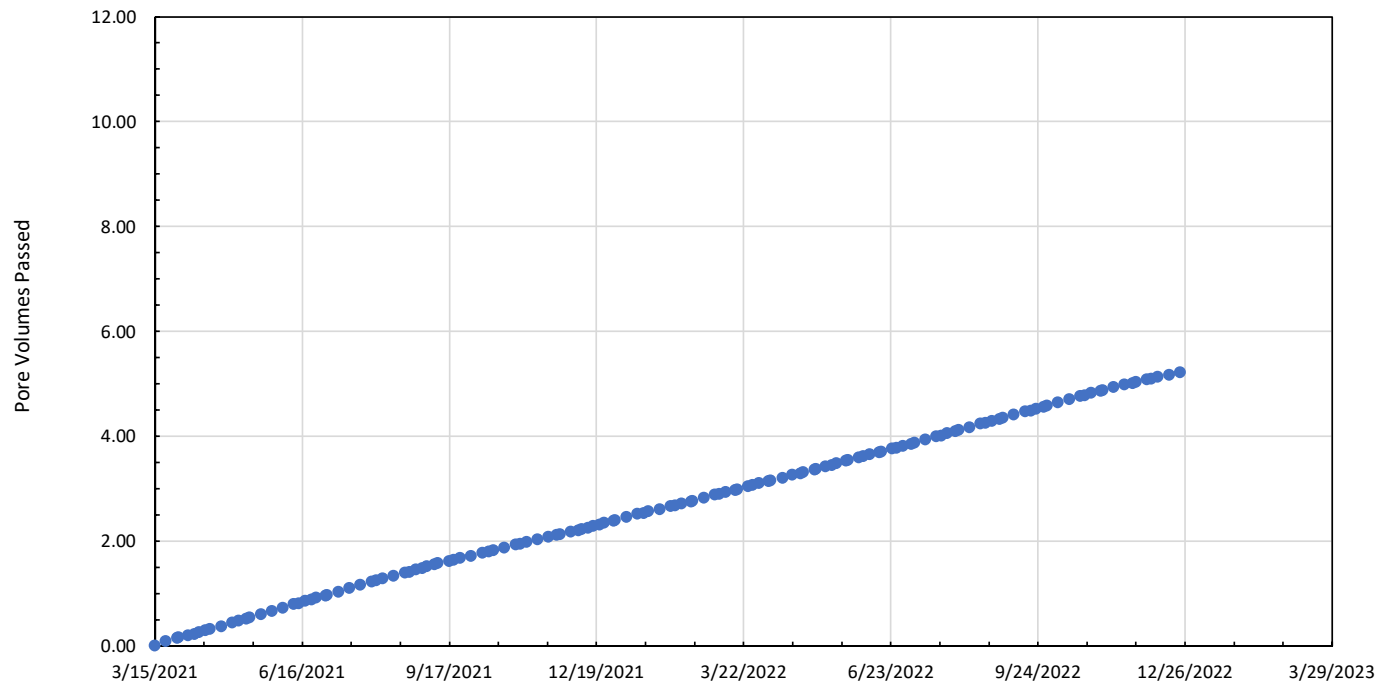
April 2023



<b>B1-ST-1 (7-9') pH of Inflow and Outflow with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	April 2023
<b>Figure 3-5</b>	



<b>B1-ST-1 (7-9') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	Figure <b>3-6</b>
April 2023	



**B2-ST-1 (1-3') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

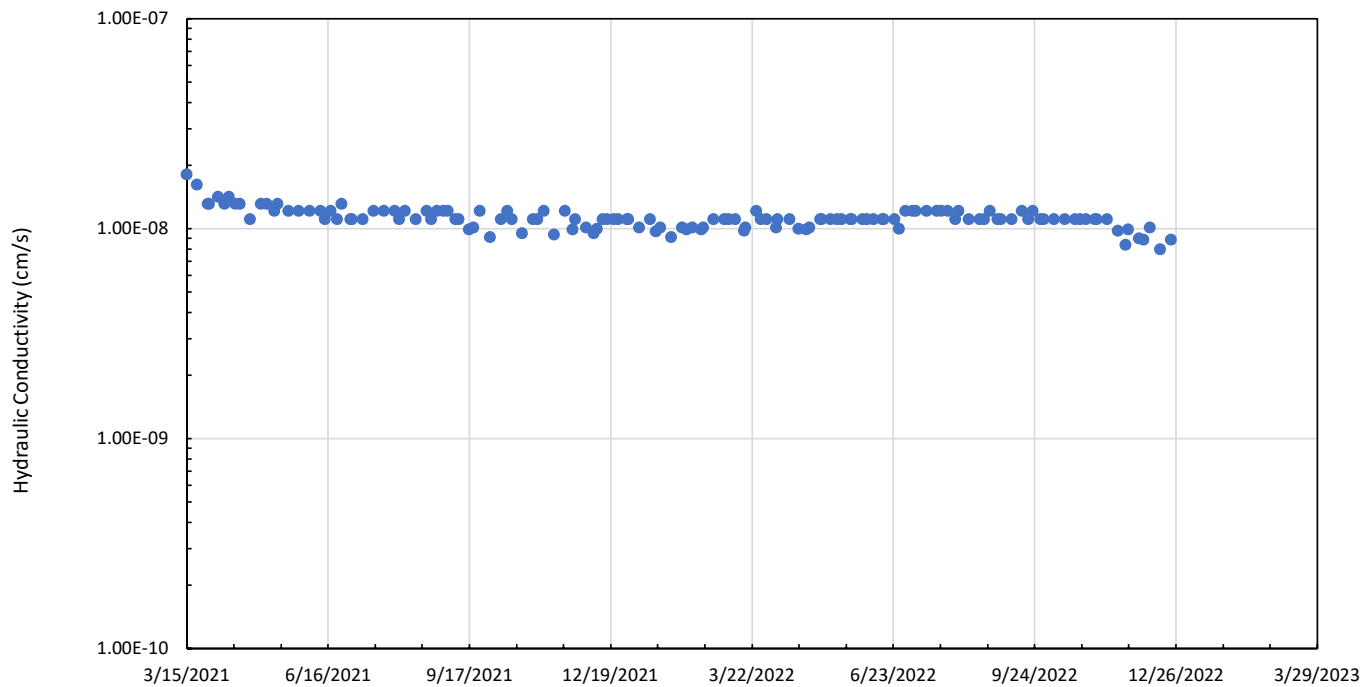



**Figure**

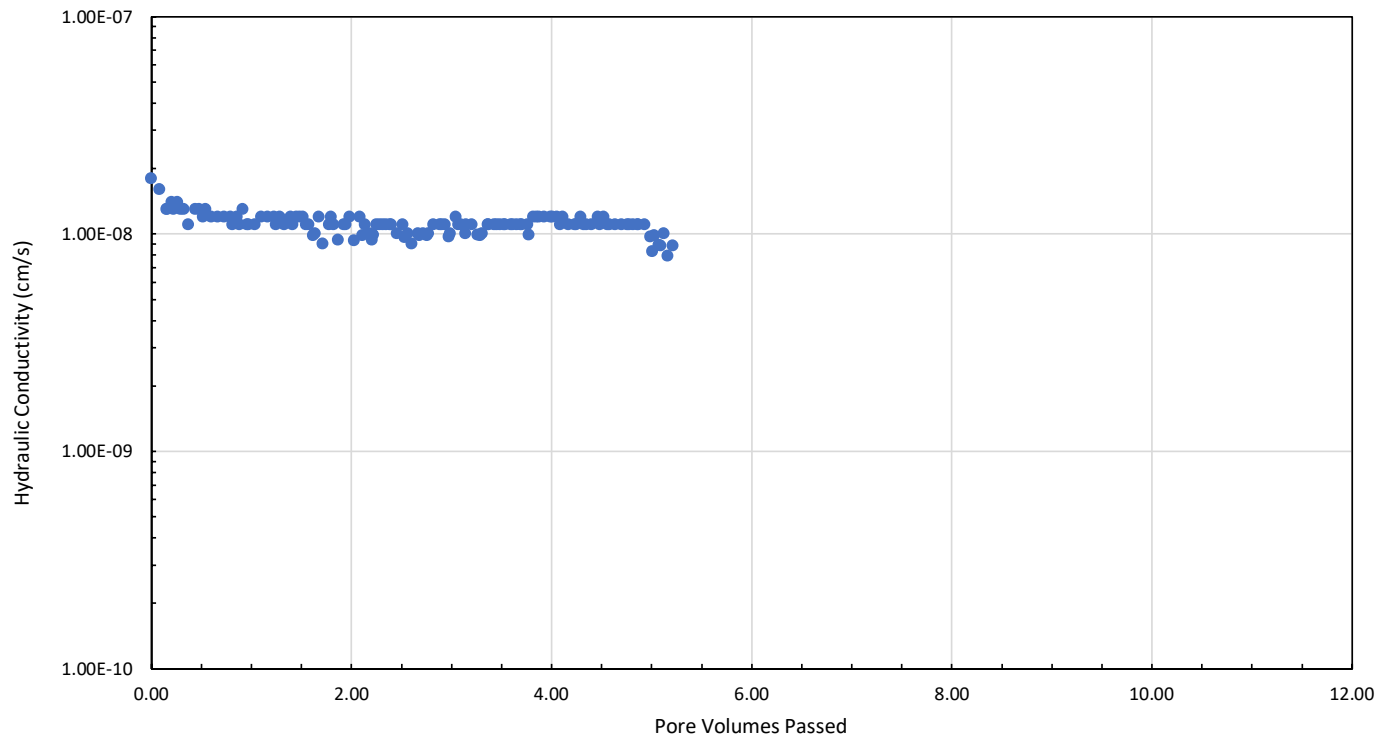
**3-7**

Detroit, MI

April 2023



<b>B2-ST-1 (1-3') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-8</b>	



**B2-ST-1 (1-3') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



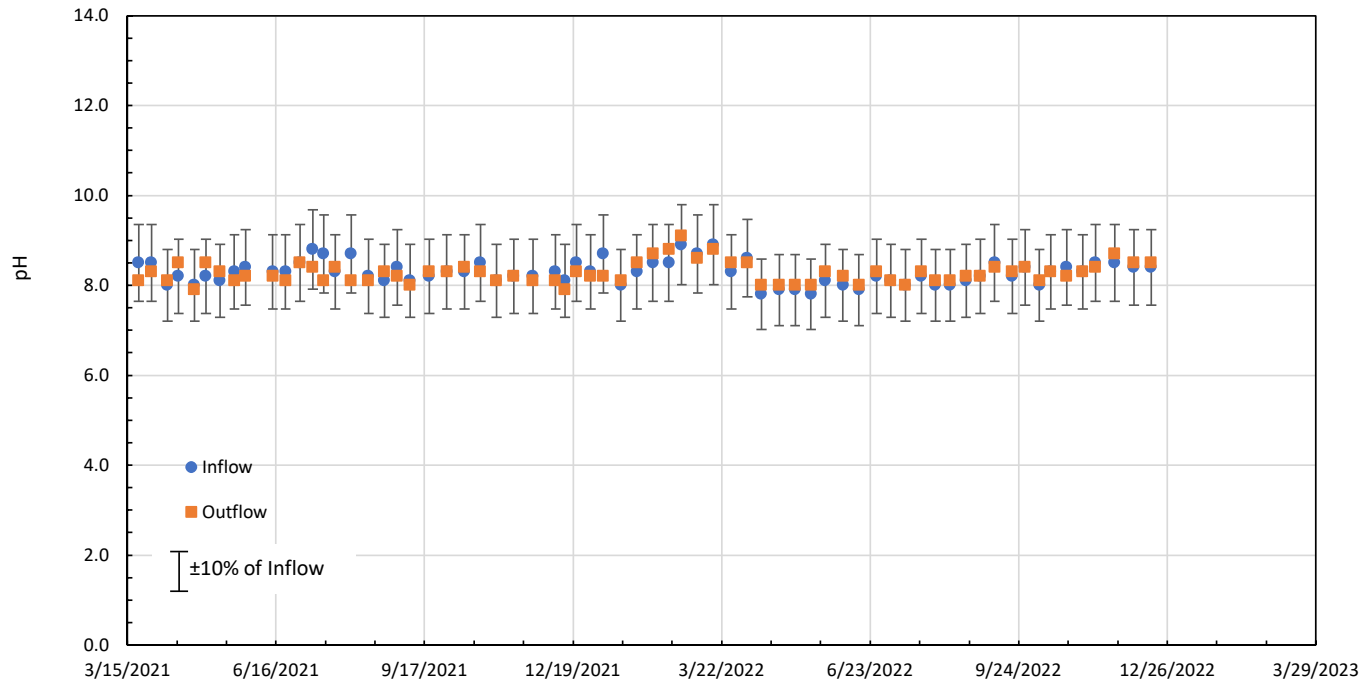
**Figure**

**3-9**

Detroit, MI

April 2023





**B2-ST-1 (1-3') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

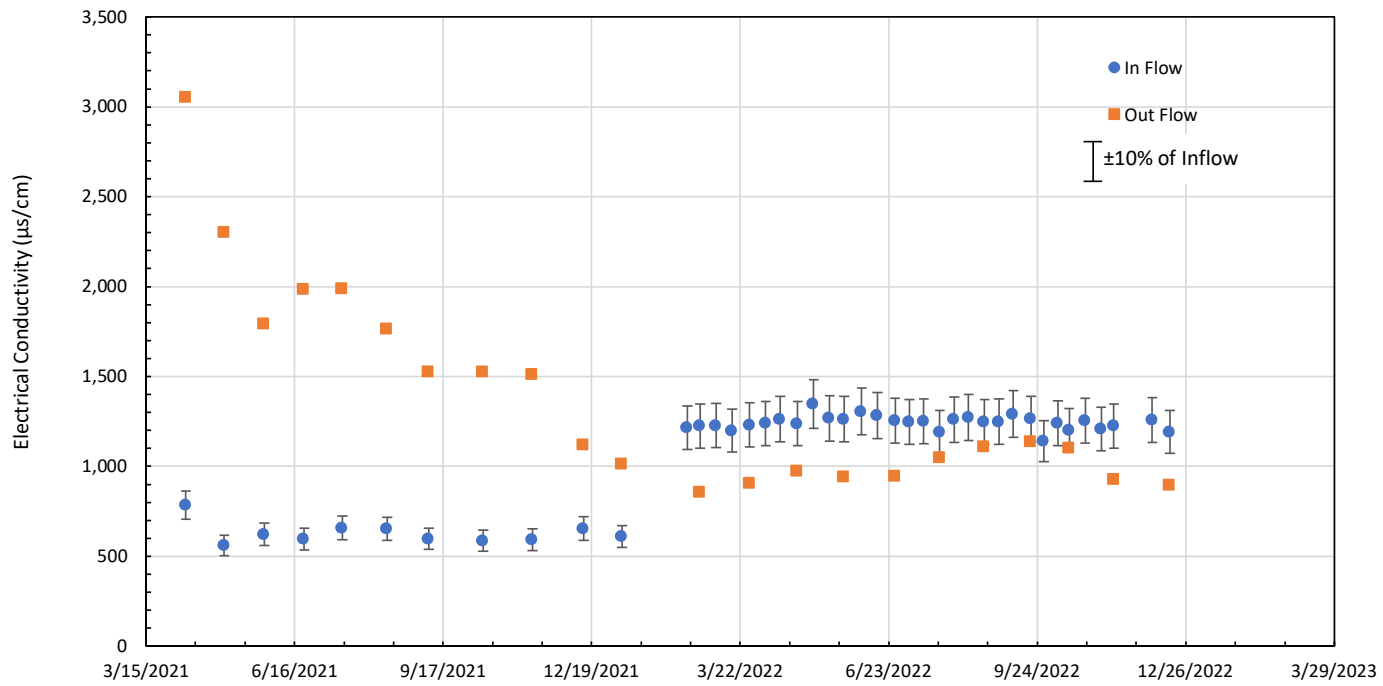
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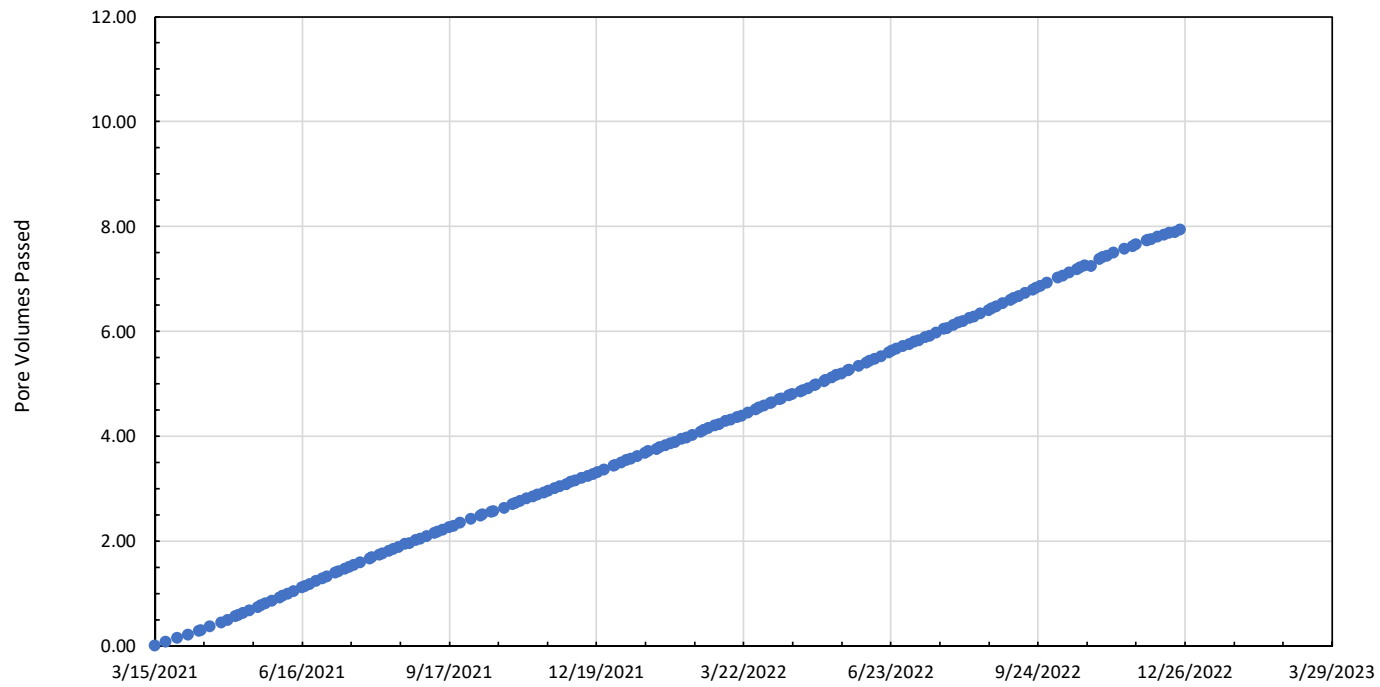
April 2023

**Figure**

**3-10**



<b>B2-ST-1 (1-3') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	April 2023
<b>Figure 3-11</b>	



**B2-ST-4 (47-49') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

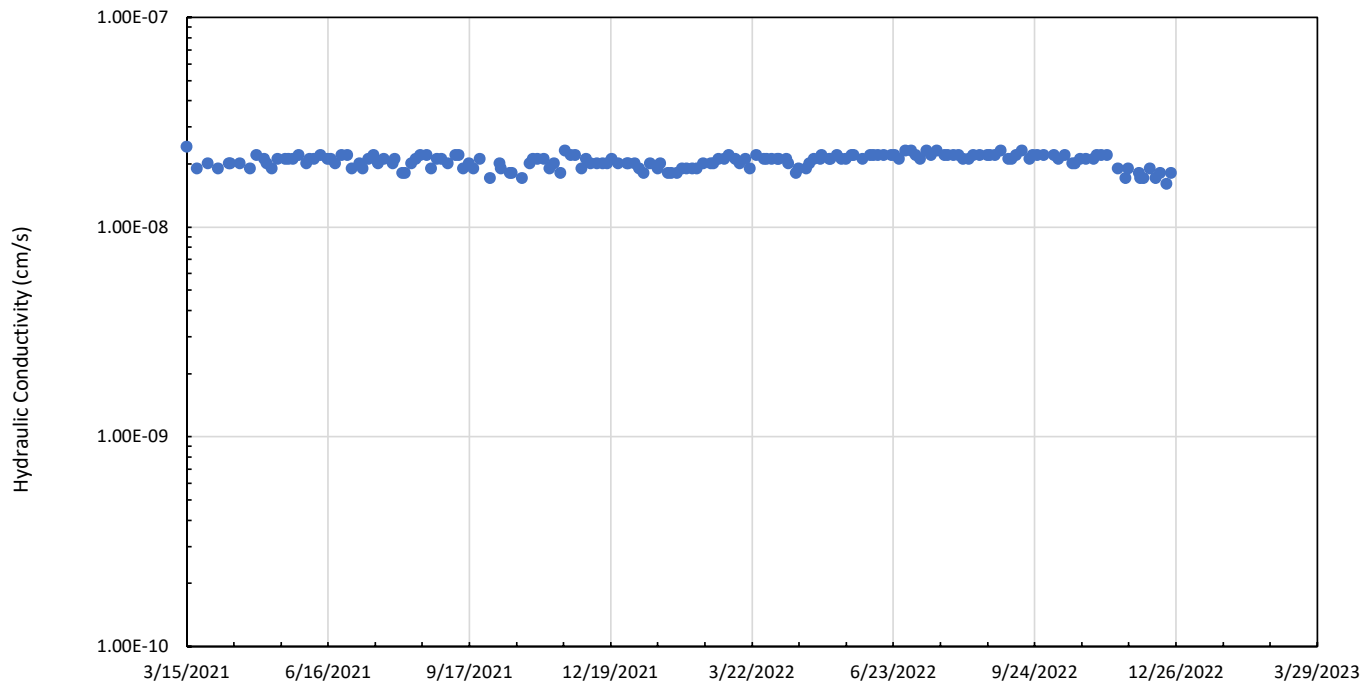



**Figure**

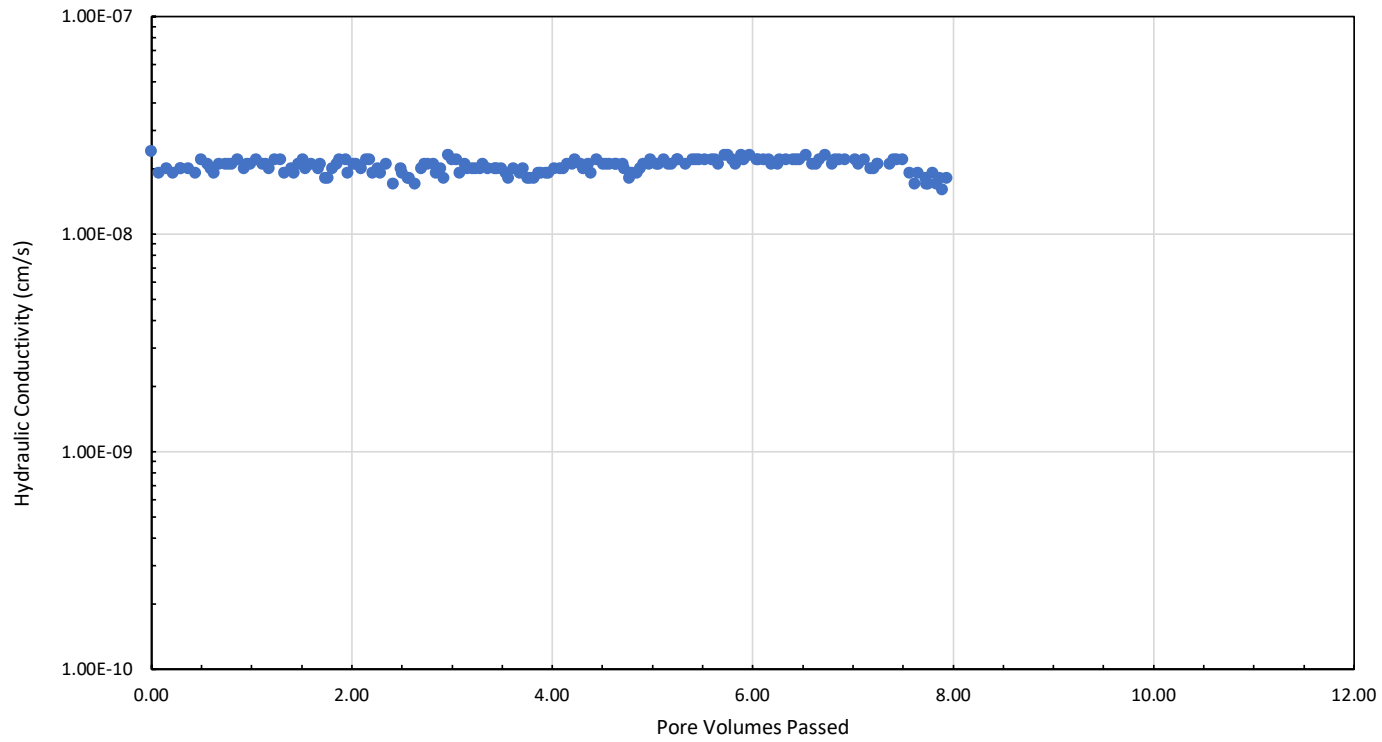
**3-12**


Detroit, MI

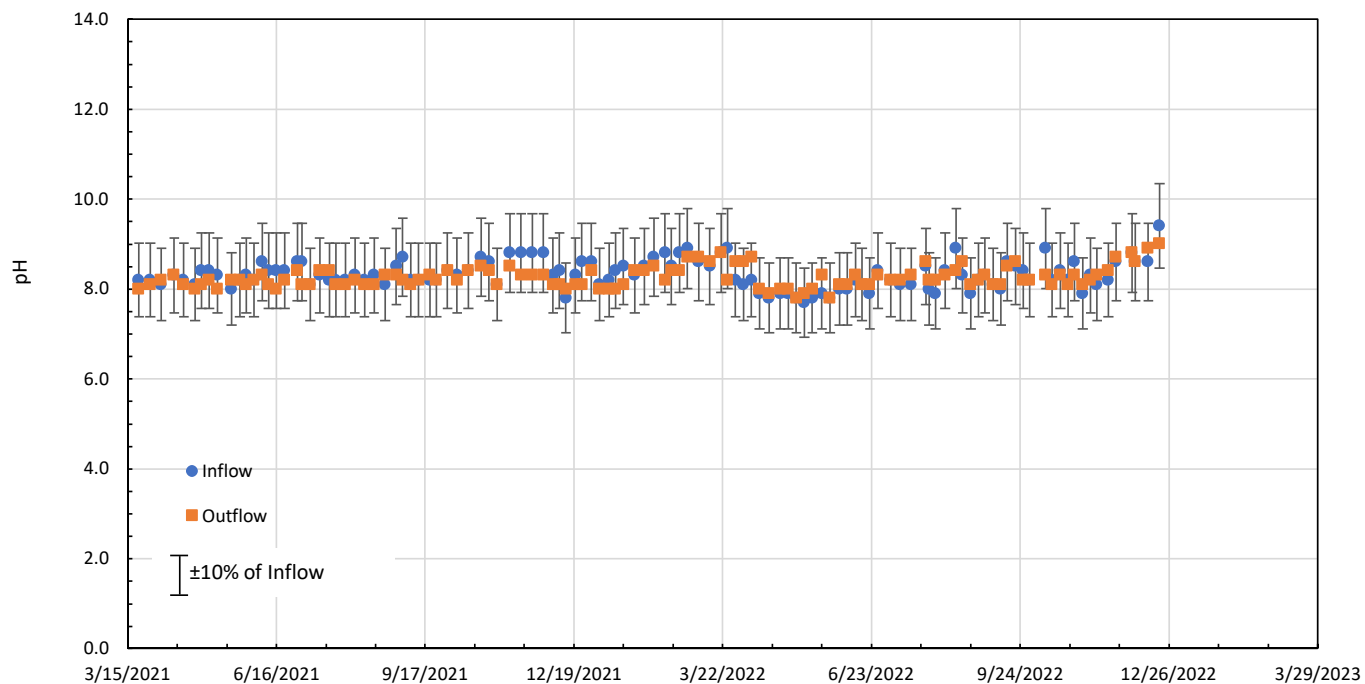
April 2023



<b>B2-ST-4 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-13</b>	



<b>B2-ST-4 (47-49') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	<b>Figure</b>
Detroit, MI	April 2023
<b>3-14</b>	



**B2-ST-4 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

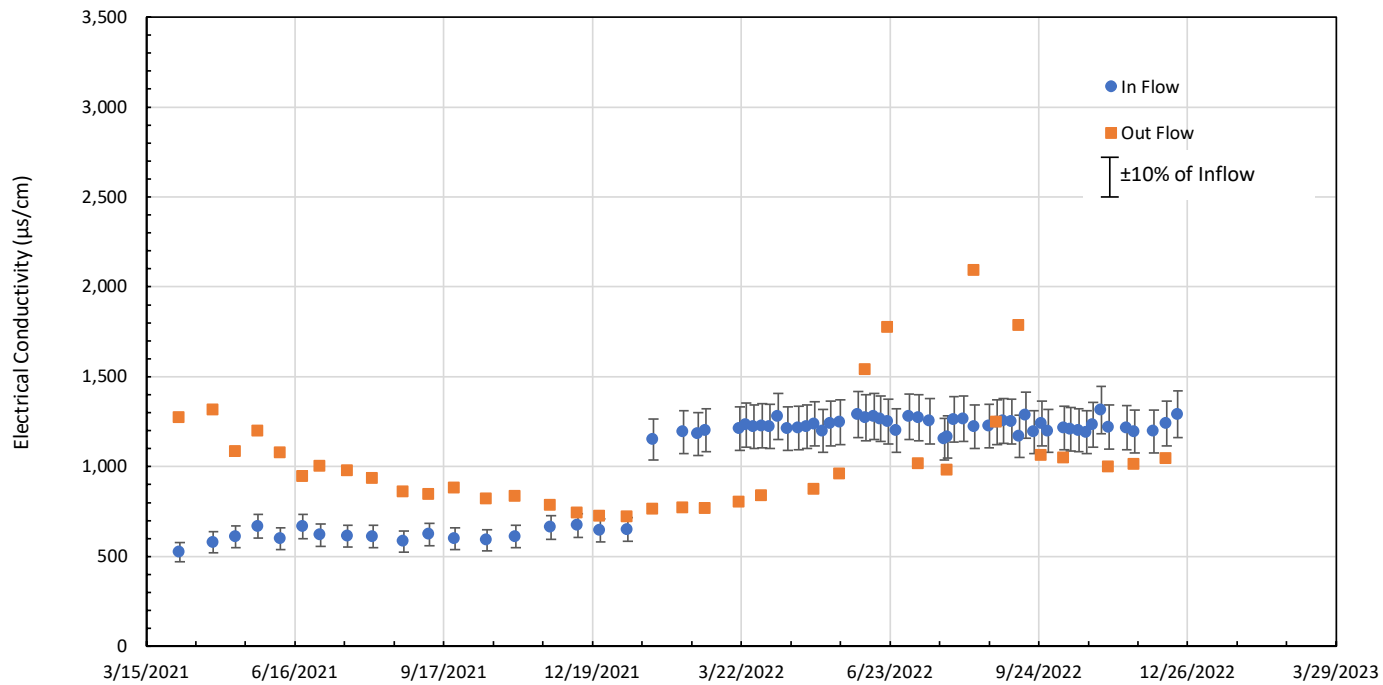



**Figure**

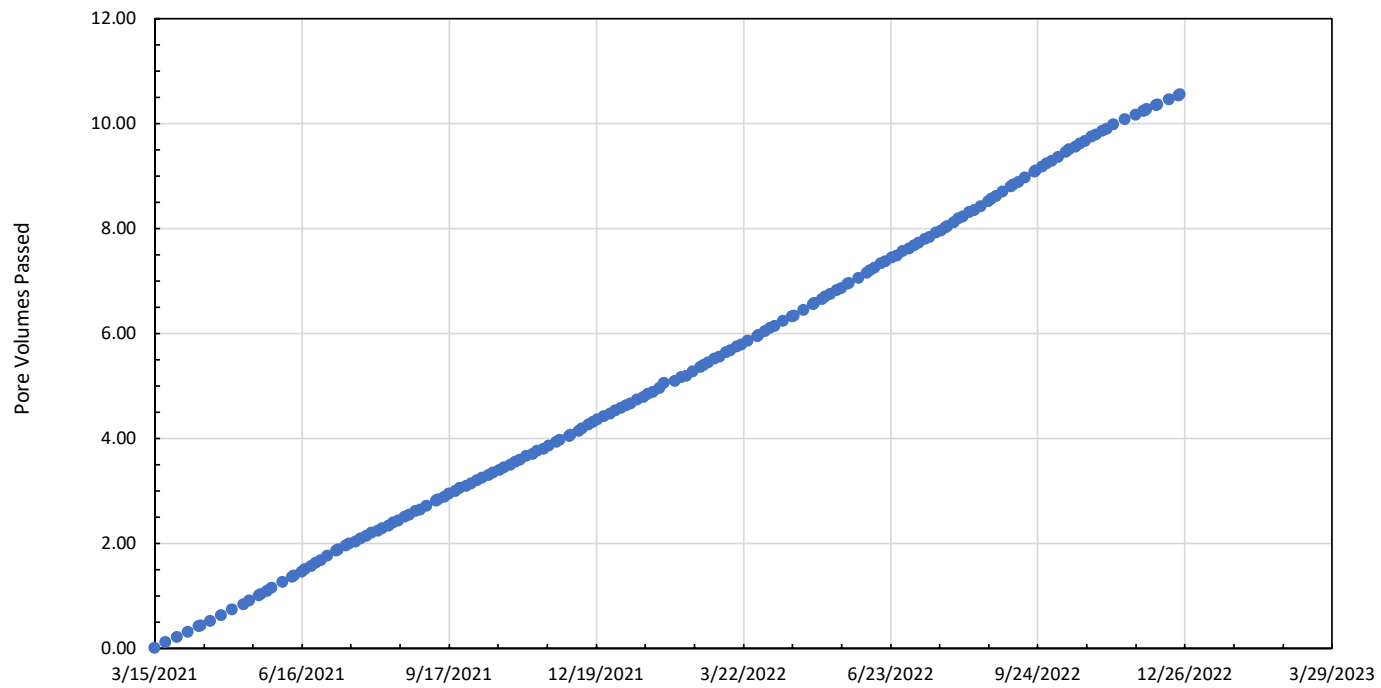
**3-15**

Detroit, MI

April 2023



<b>B2-ST-4 (47-49') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	Figure <b>3-16</b>
April 2023	



**B3-ST-5 (77-79') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



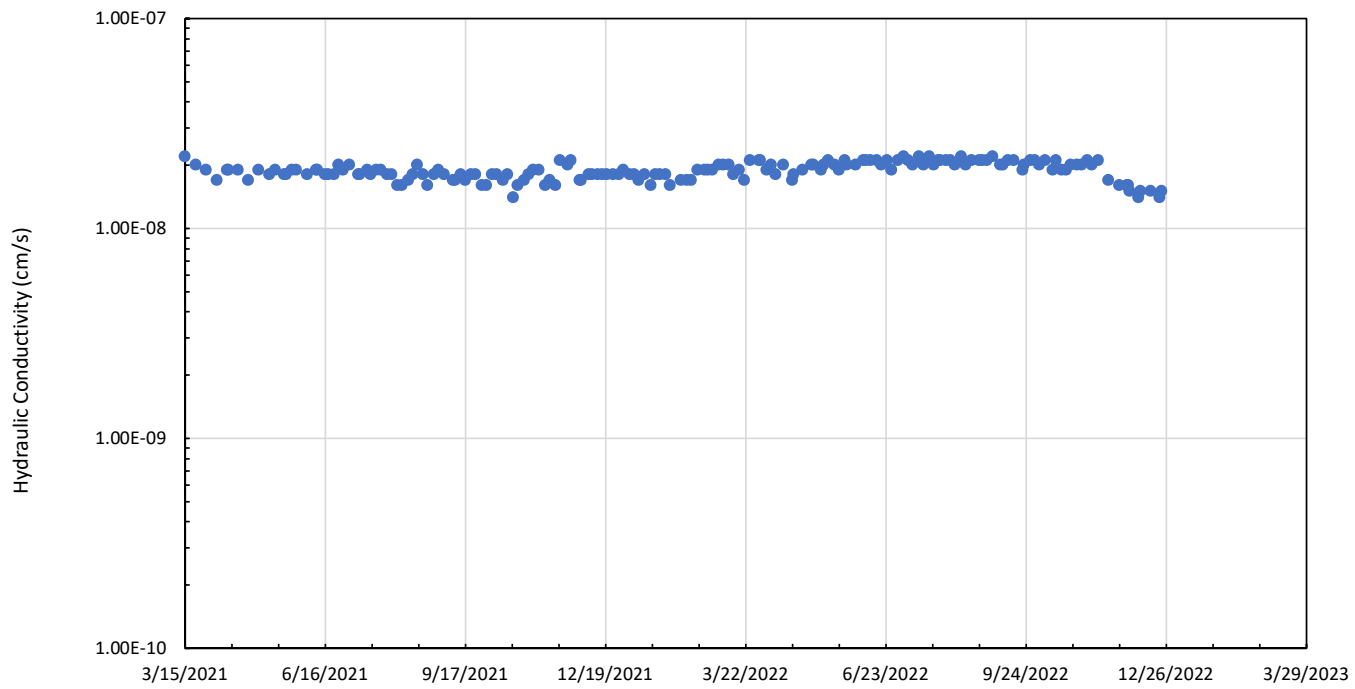
**Figure**


**3-17**

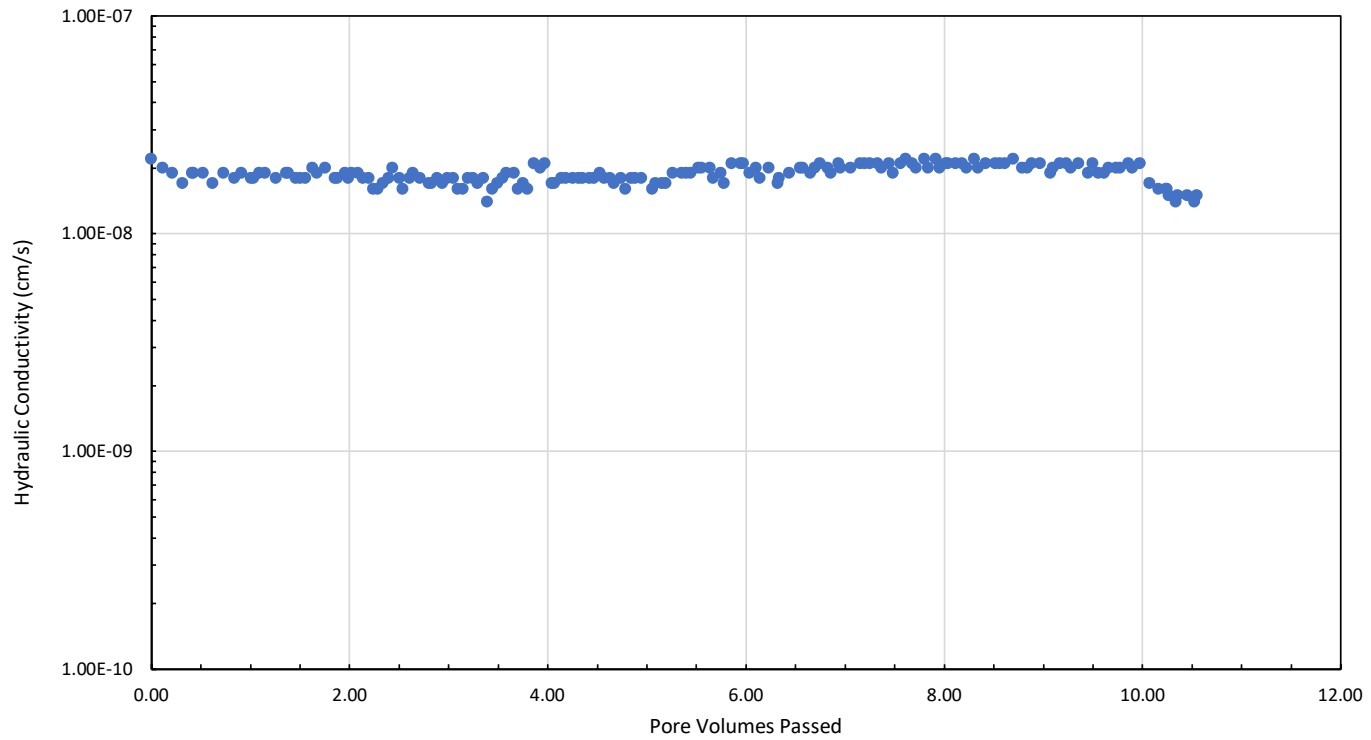
Detroit, MI


April 2023

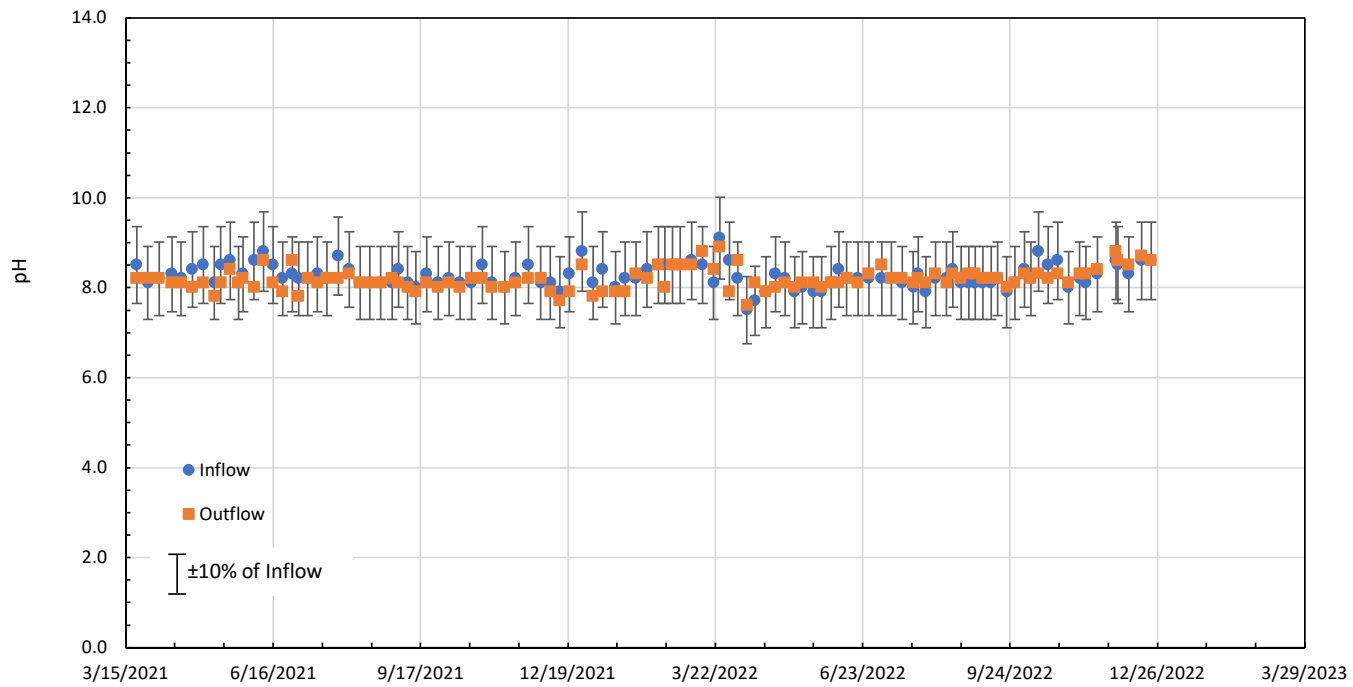




<b>B3-ST-5 (77-79') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-18</b>	



<b>B3-ST-5 (77-79') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-19</b>	



**B3-ST-5 (77-79) pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

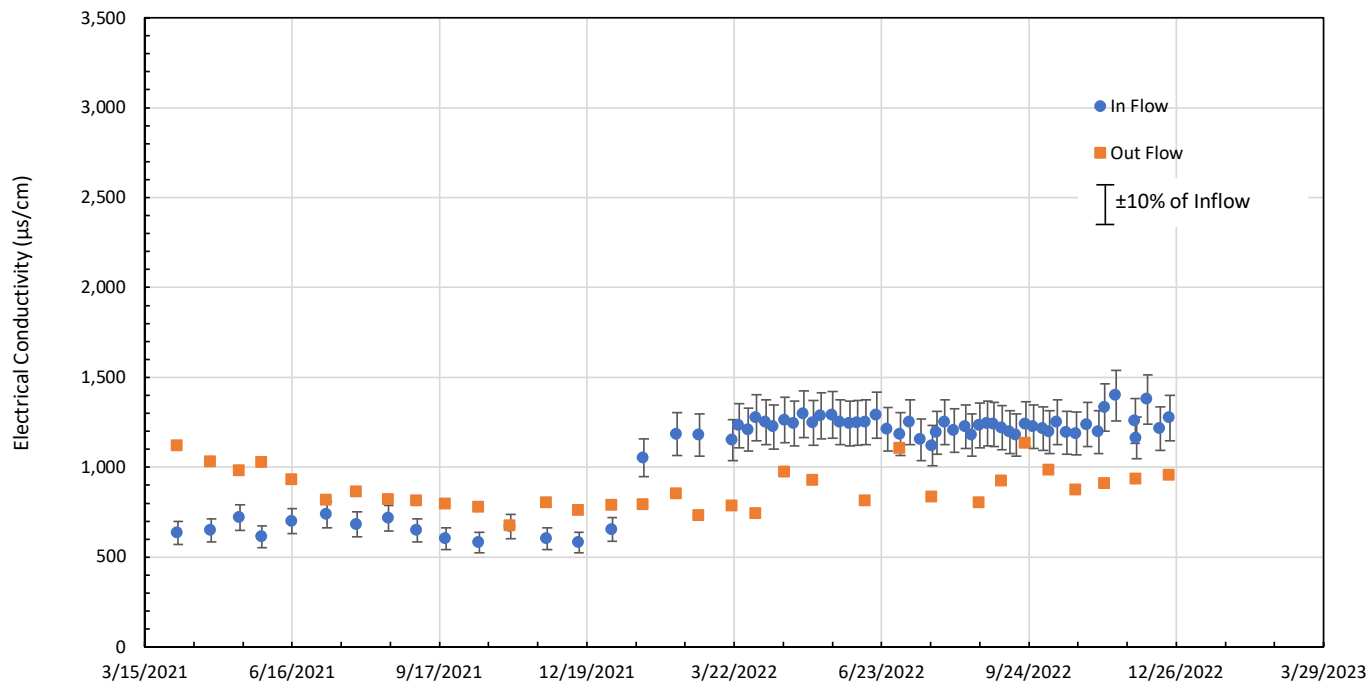
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Geosyntec Consultants of Michigan


Detroit, MI

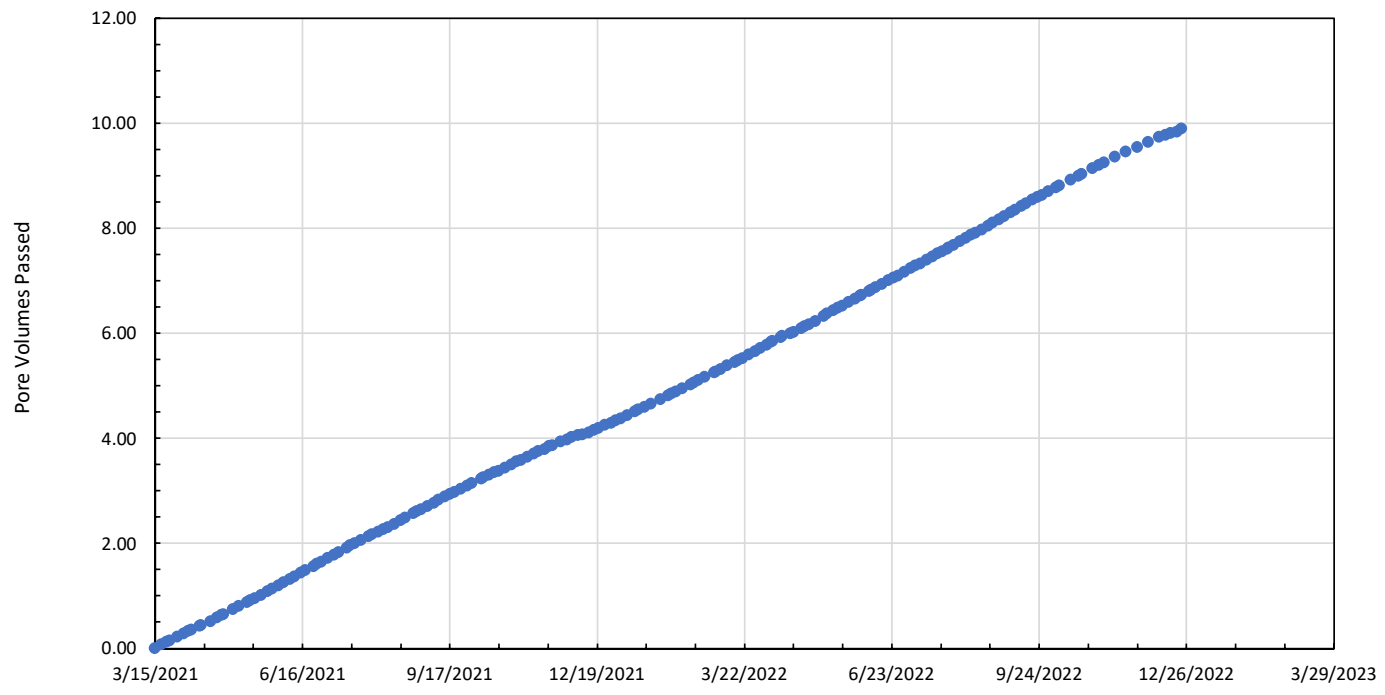
April 2023

**Figure**

**3-20**



<b>B3-ST-5 (77-79') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-21</b>	



**B4-ST-3 (47-49') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

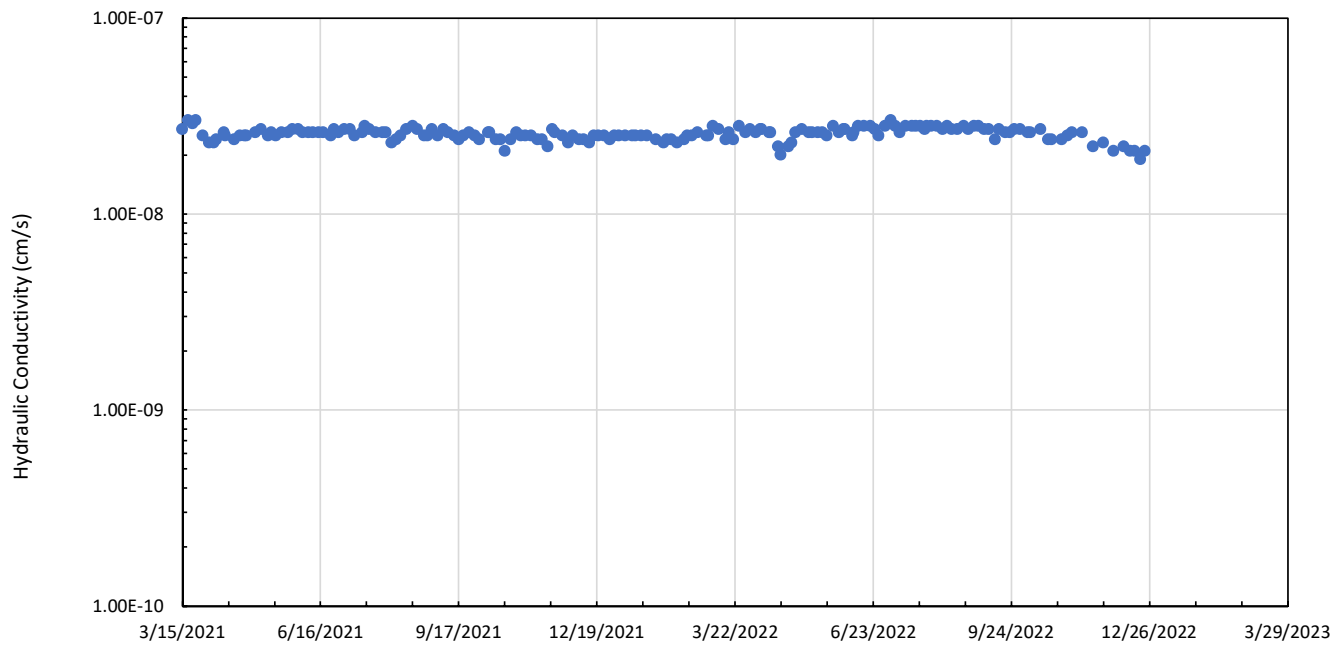



**Figure**

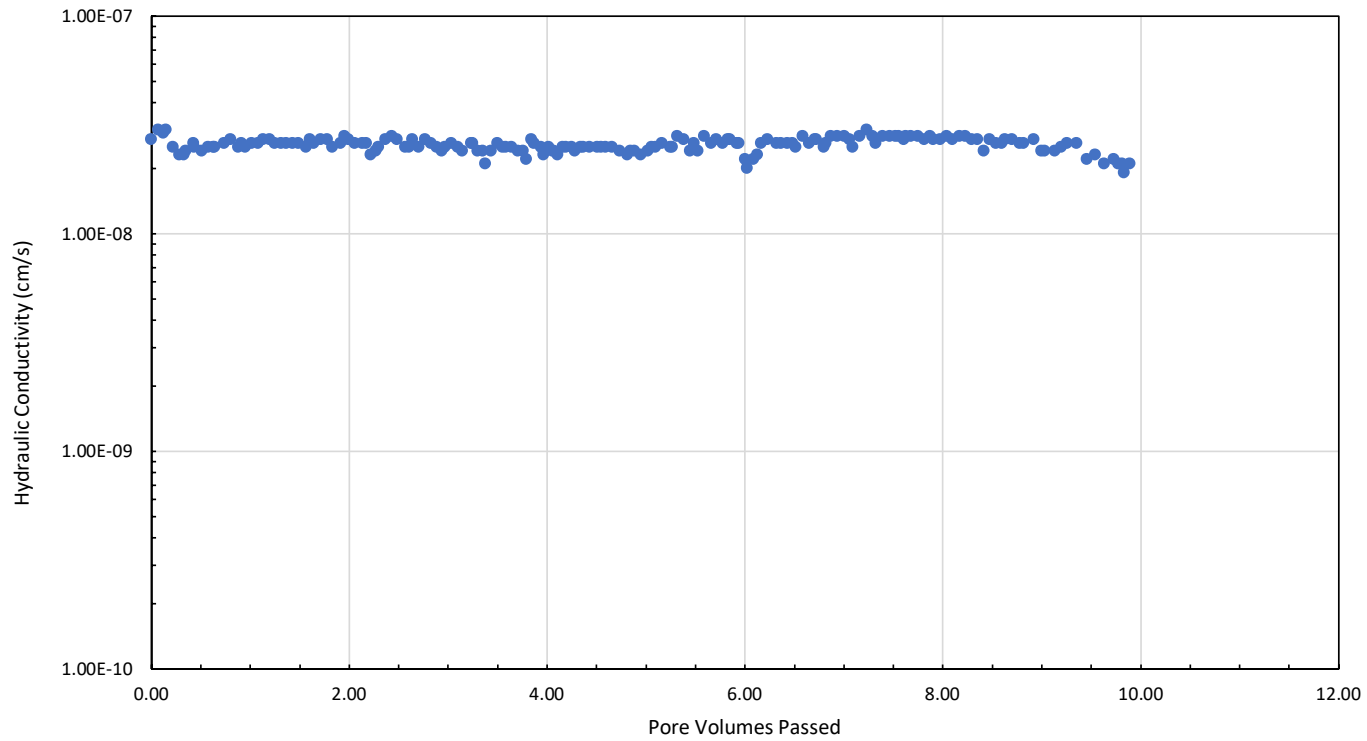
**3-22**


Detroit, MI

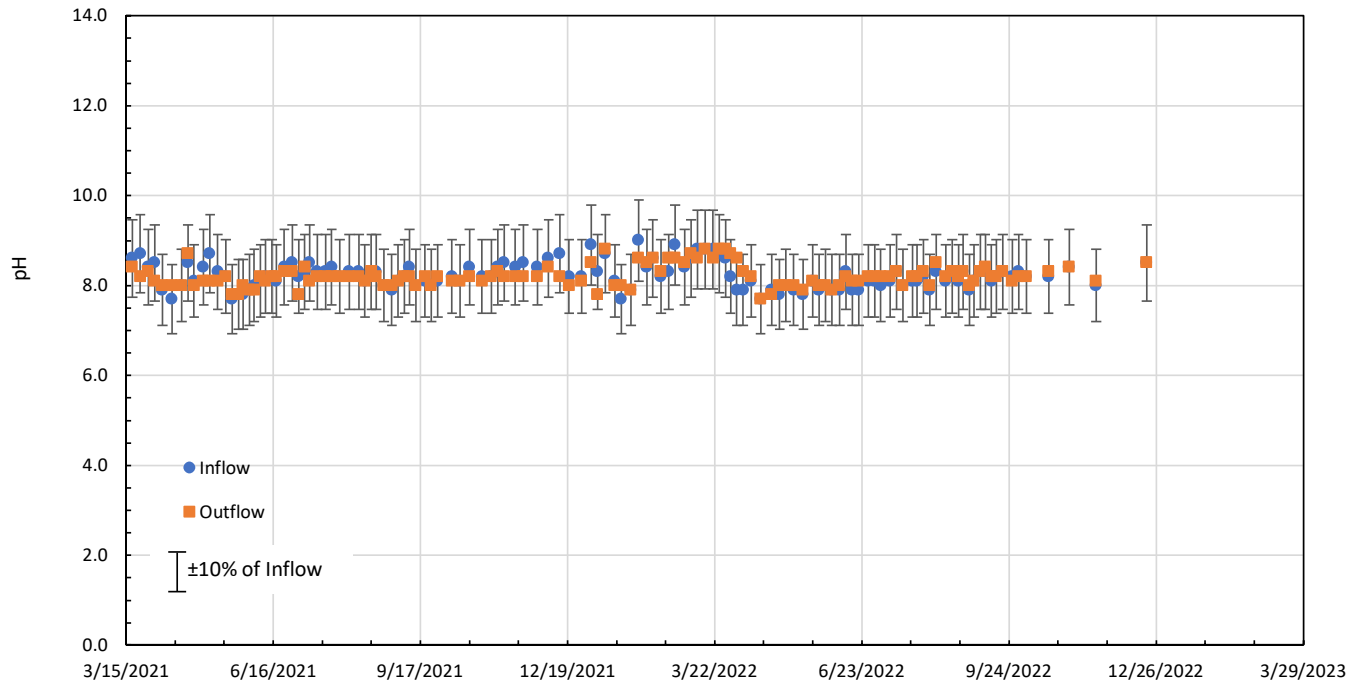
April 2023



<b>B4-ST-3 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-23</b>	



<b>B4-ST-3 (47-49') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	<b>Figure</b>
	<b>3-24</b>
Detroit, MI	April 2023



**B4-ST-3 (47-49') pH of Inflow and Outflow with Time**

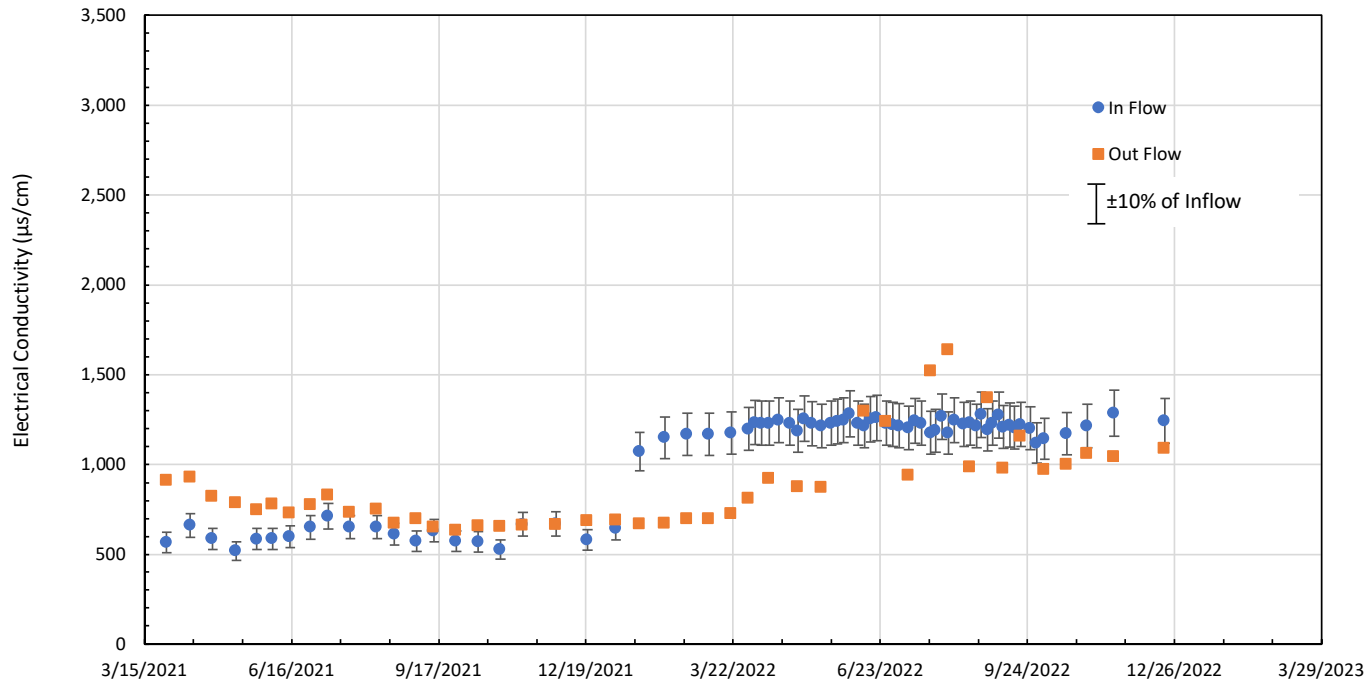
BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

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consultants  
Geosyntec Consultants of Michigan

Detroit, MI      April 2023

**Figure**  
**3-25**





**B4-ST-3 (47-49') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

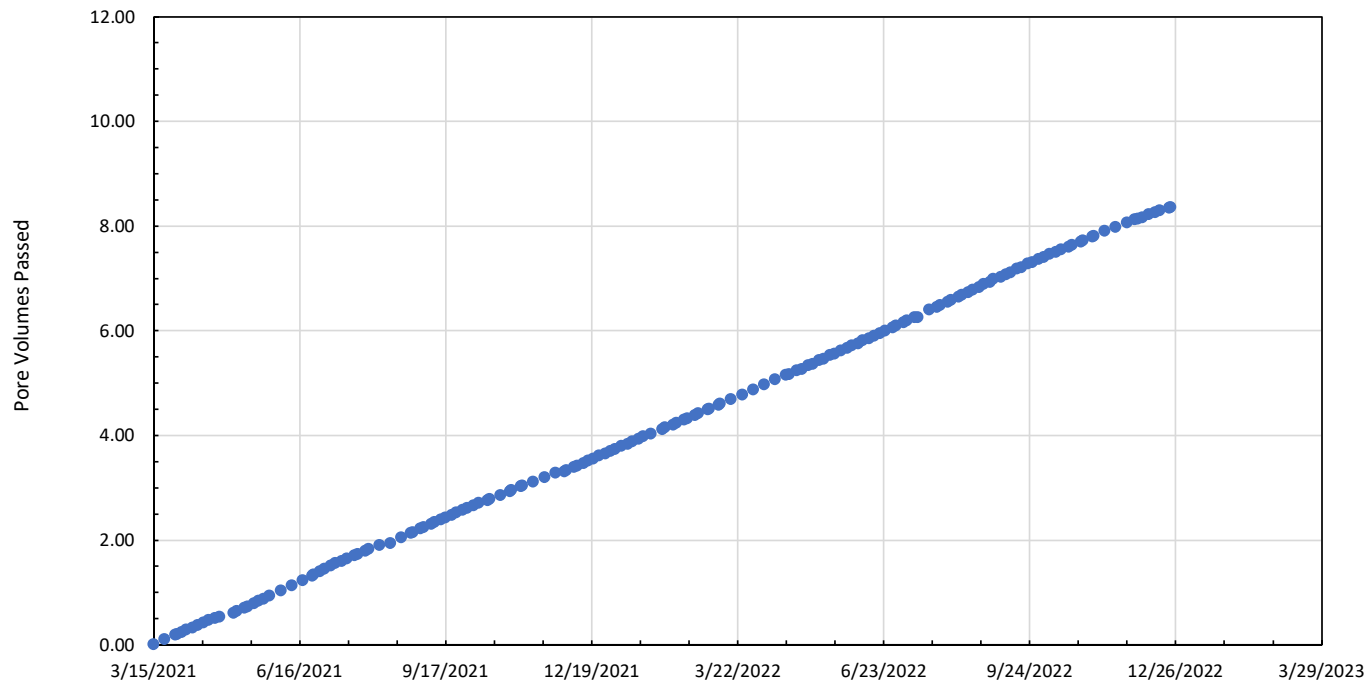


**Figure**

**3-26**

Detroit, MI

April 2023



**B5-ST-5 (87-89') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

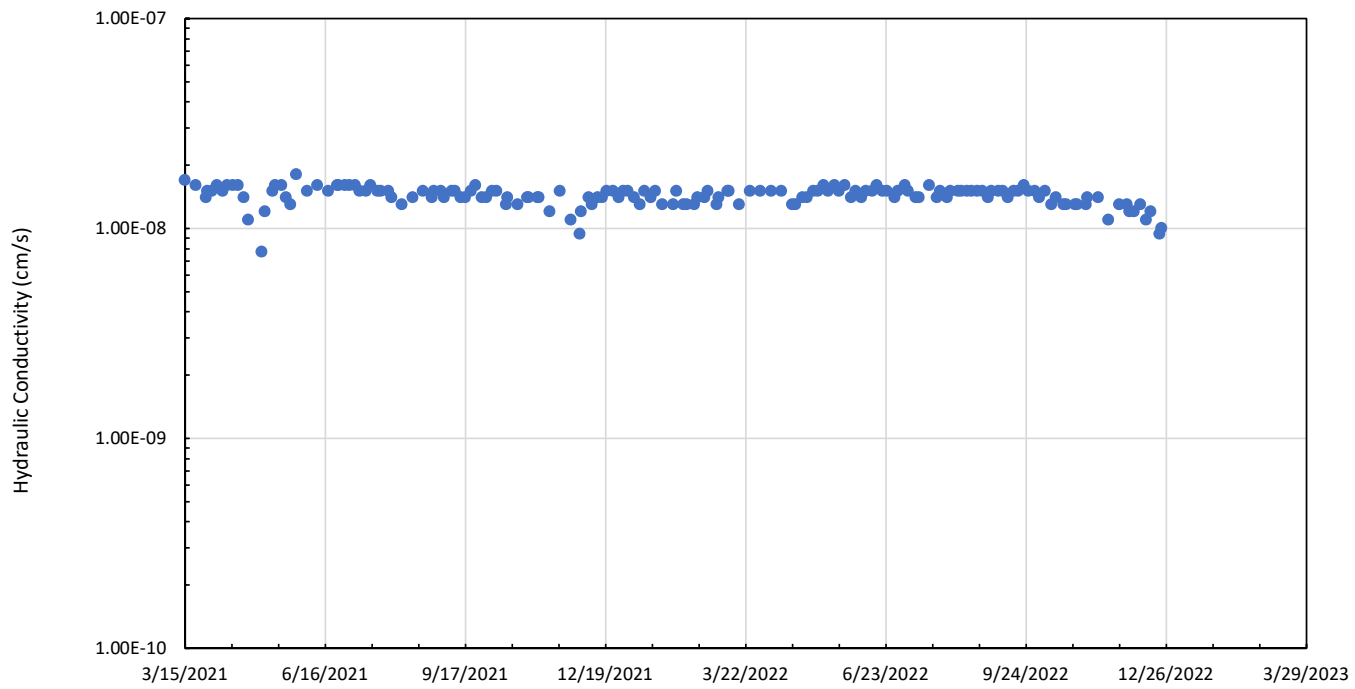



**Figure**

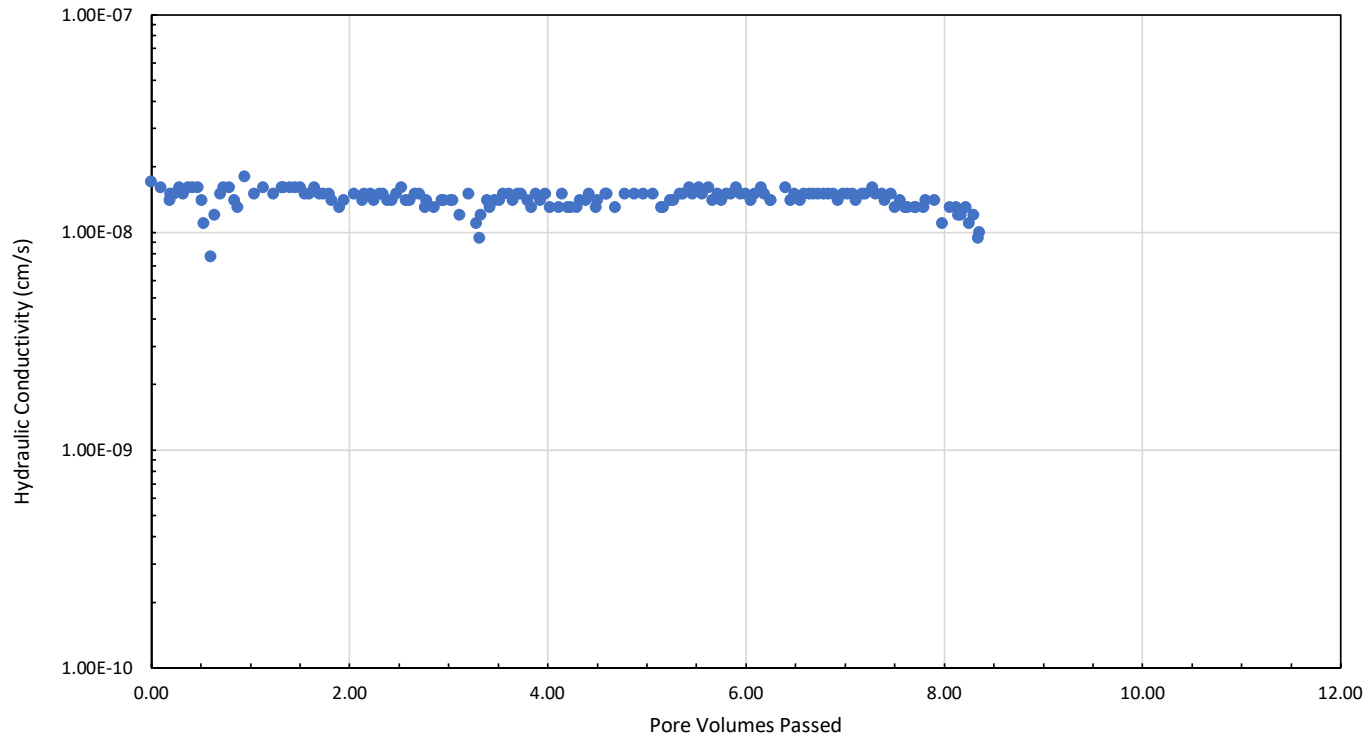
**3-27**

Detroit, MI

April 2023



<b>B5-ST-5 (87-89') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-28</b>	



**B5-ST-5 (87-89') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

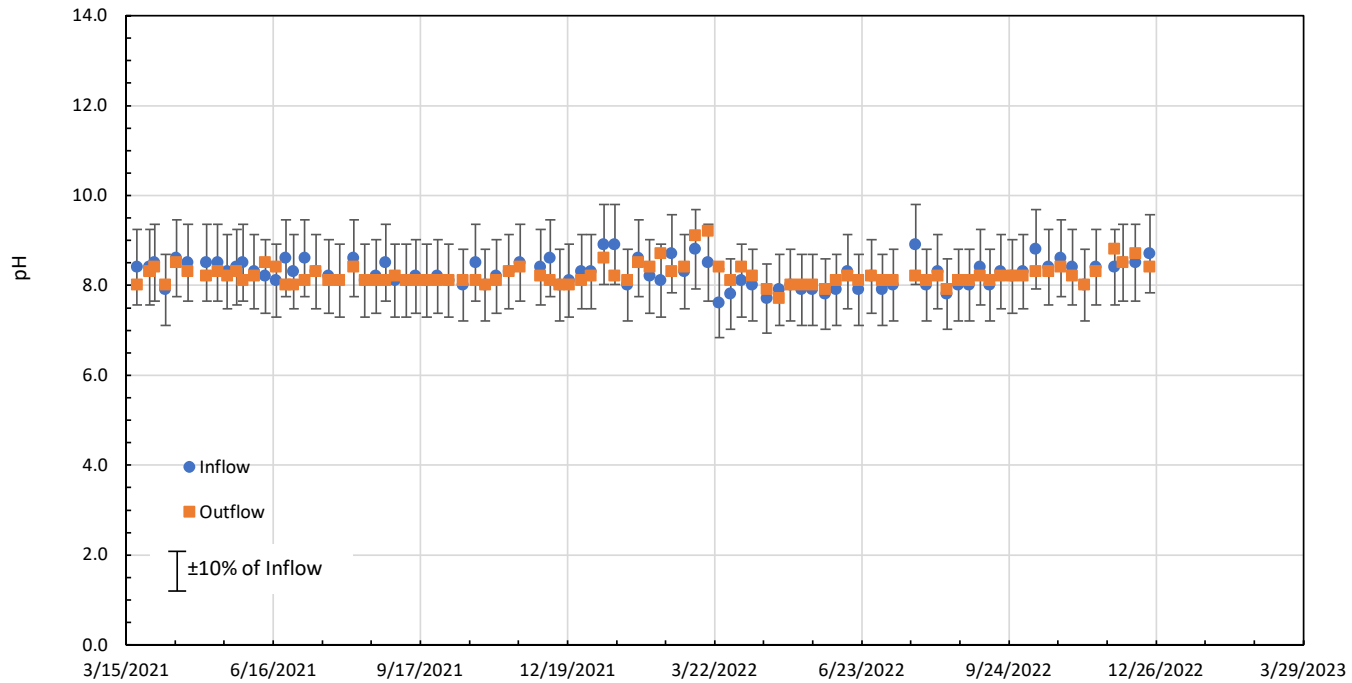


**Figure**

**3-29**

Detroit, MI

April 2023



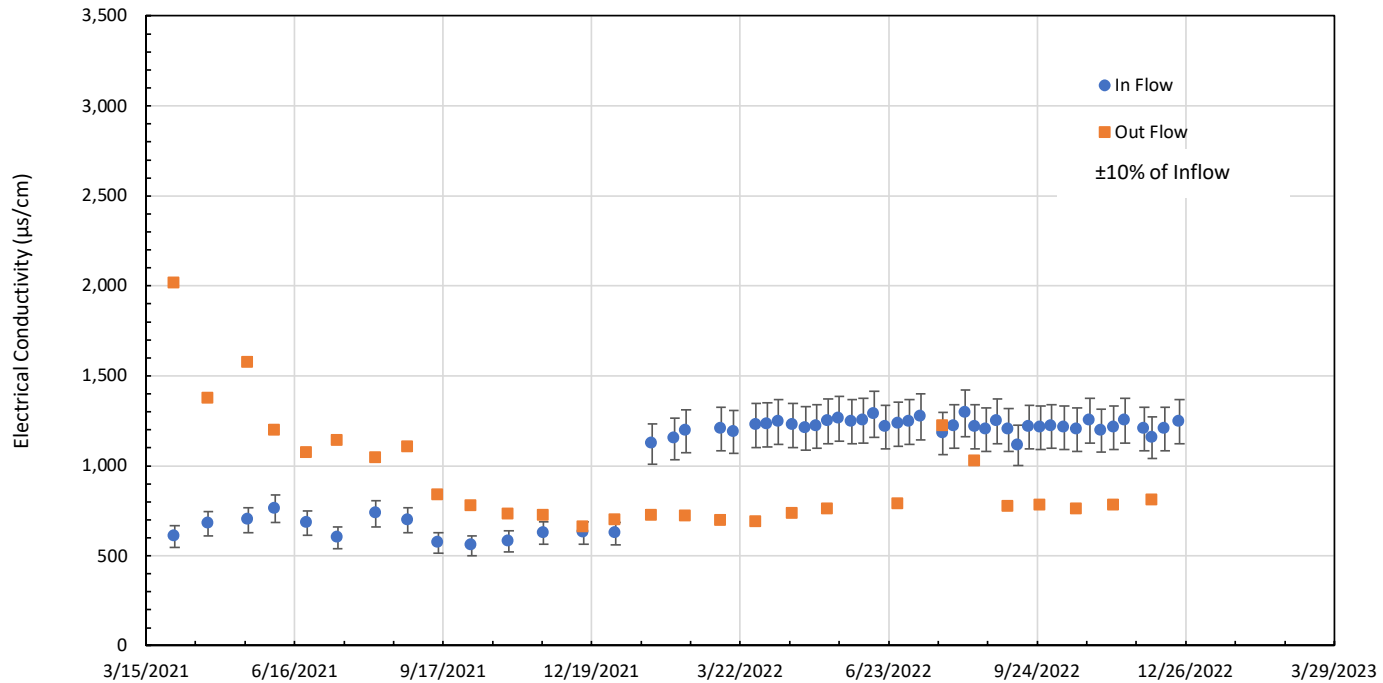
**B5-ST-5 (87-89') pH of Inflow and Outflow with Time**


BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



**Figure**

**3-30**

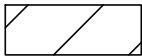
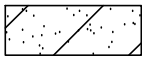



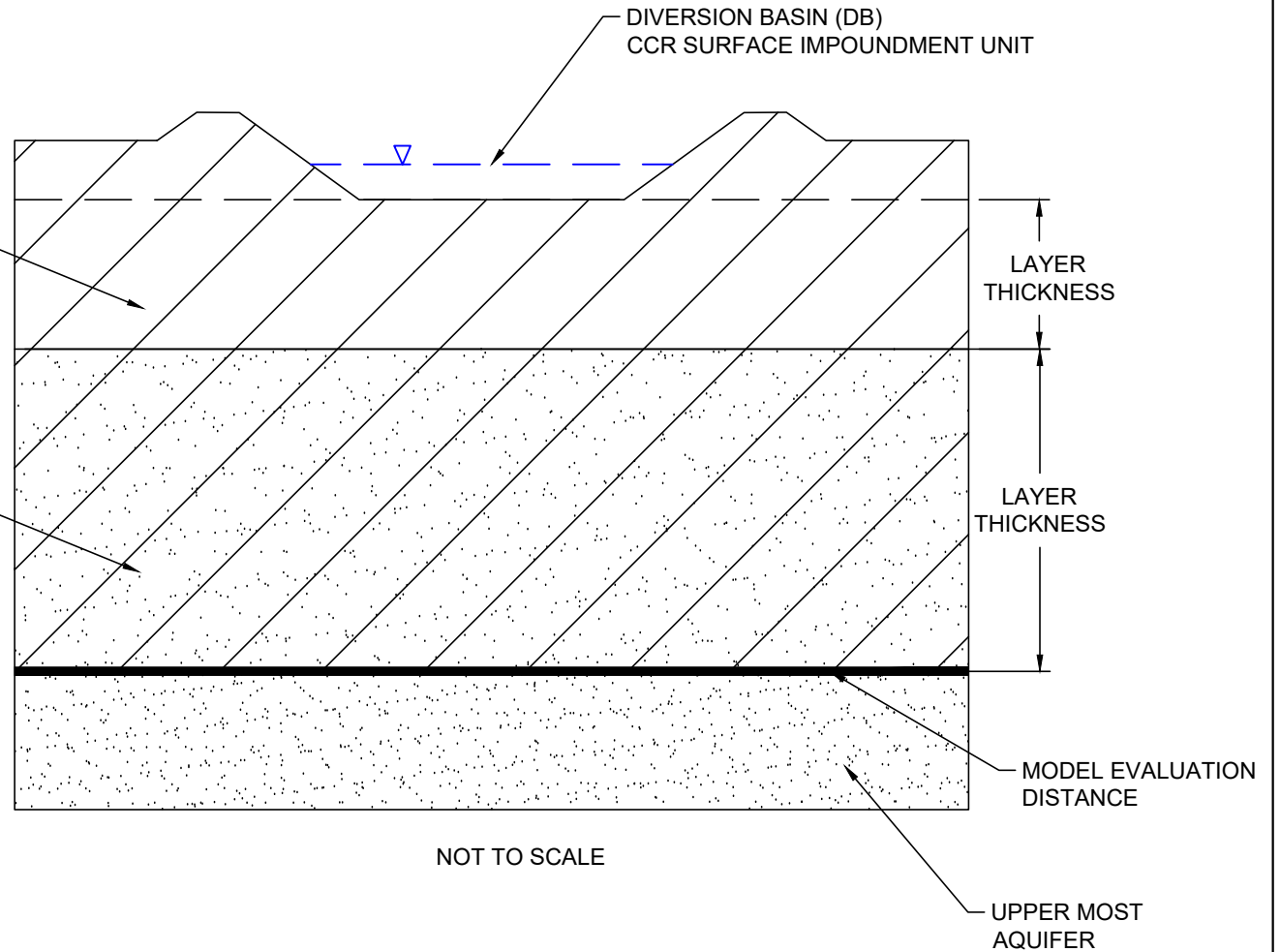
<b>B5-ST-5 (87-89') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	Figure <b>3-31</b>
April 2023	

CLAY LAYER - LAYER 1		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	11.13
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.42
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>3</sup> /KG	0
DEGRADATION		0

CLAY WITH SAND LAYER - LAYER 2		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	25.66
COEFFICIENT OF HYDODYNAMIC DISPERSION	M <sup>2</sup> /a	0.019
EFFECTIVE POROSITY		0.51
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M <sup>3</sup> /KG	0
DEGRADATION		0

**LEGEND**

-  CLAY UNIT
-  CLAY WITH SAND UNIT
-  UPPER MOST AQUIFER



FATE AND TRANSPORT  
CONCEPTUAL MODEL  
BELLE RIVER ALD - DB

Geosyntec  
consultants  
Geosyntec Consultants of Michigan

FIGURE  
4-1

PROJECT NO:

April 2023

**APPENDIX A – MONITORING WELL SLUG TEST  
RESULTS**



## **2016 Slug Test Results**

**Hydraulic Conductivity Results**  
DTE Electric Company Belle River Power Plant  
ChinaTownship, Michigan

Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01b	3/1/2016	Falling Head	3.58E-04	1.015
		Rising Head	2.72E-04	0.770
		<b>Average</b>	<b>3.15E-04</b>	<b>0.892</b>
MW-16-04	3/1/2016	Falling Head	7.93E-05	0.225
		Rising Head	4.11E-05	0.116
		<b>Average</b>	<b>6.02E-05</b>	<b>0.171</b>
MW-16-05	3/1/2016	Falling Head	4.26E-05	0.121
		Rising Head	2.13E-05	0.060
		<b>Average</b>	<b>3.19E-05</b>	<b>0.090</b>
MW-16-07	3/1/2016	Falling Head	1.24E-04	0.350
		Rising Head	7.21E-05	0.204
		<b>Average</b>	<b>9.79E-05</b>	<b>0.277</b>
<b>Minimum</b>			<b>3.19E-05</b>	<b>9.05E-02</b>
<b>Maximum</b>			<b>3.15E-04</b>	<b>8.92E-01</b>
<b>Geometric Mean</b>			<b>8.77E-05</b>	<b>0.249</b>

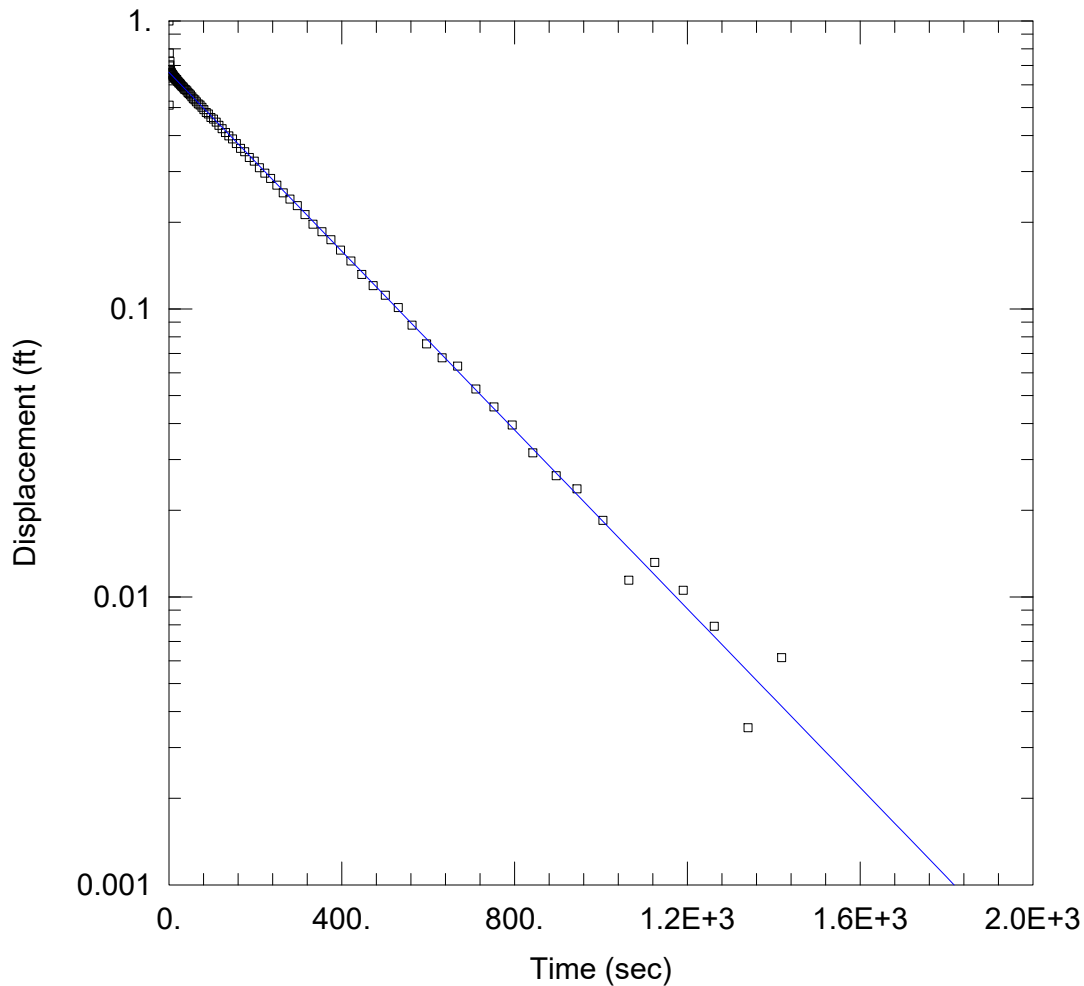
**Conversion:**

$$\frac{1 \text{ cm}}{1 \text{ sec}} \times \frac{86,400 \text{ sec}}{1 \text{ day}} \times \frac{1 \text{ ft}}{30.48 \text{ cm}} = 2.83\text{E}+03 \frac{\text{ft}}{\text{day}}$$

**Notes:**

Slug test results calculated using the Bower-Rice (1976) Solution.





MW-16-01 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_OUT.aqt  
 Date: 05/22/17

Time: 13:40:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-01  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

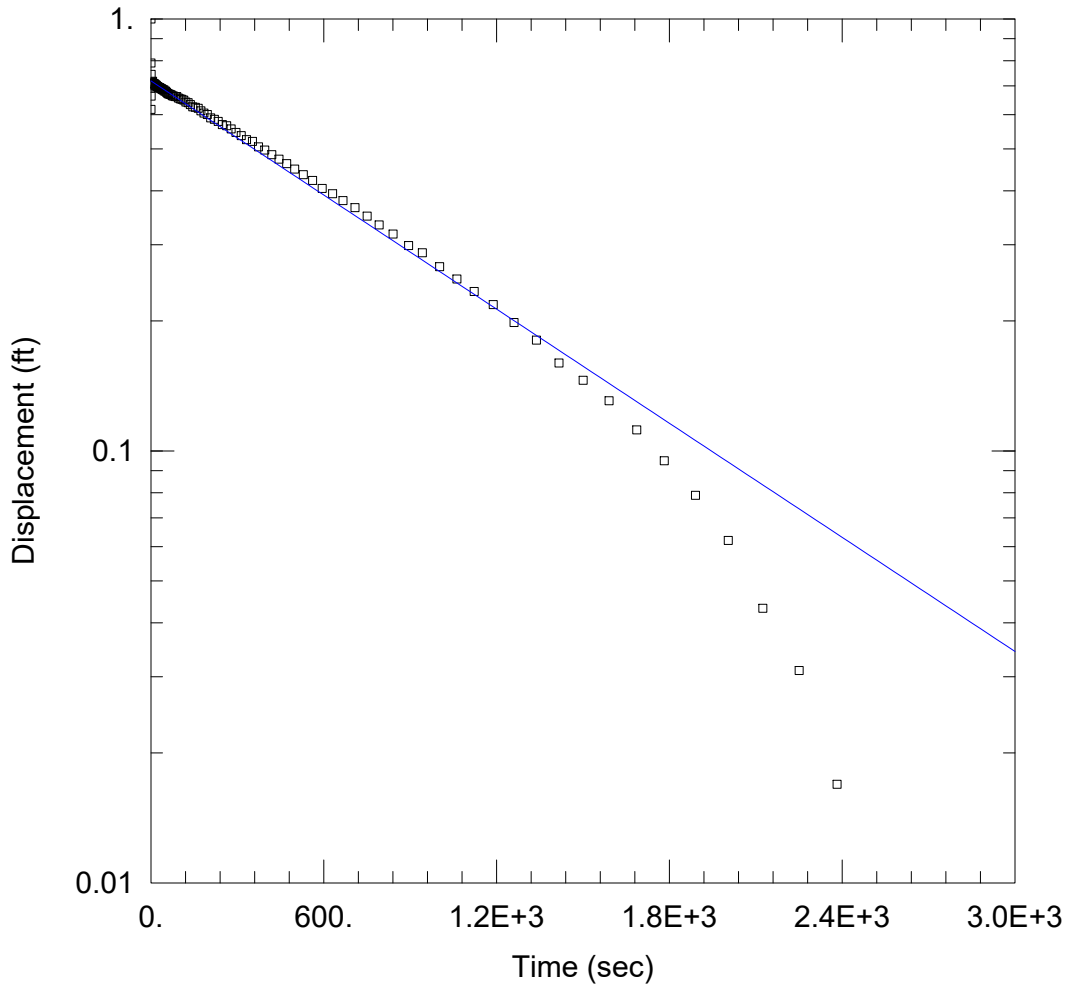
Initial Displacement: 1.138 ft  
 Total Well Penetration Depth: 84.07 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 84.07 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 0.0002716 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7541 ft



MW-16-04 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_IN.aqt  
 Date: 05/22/17

Time: 13:41:00

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

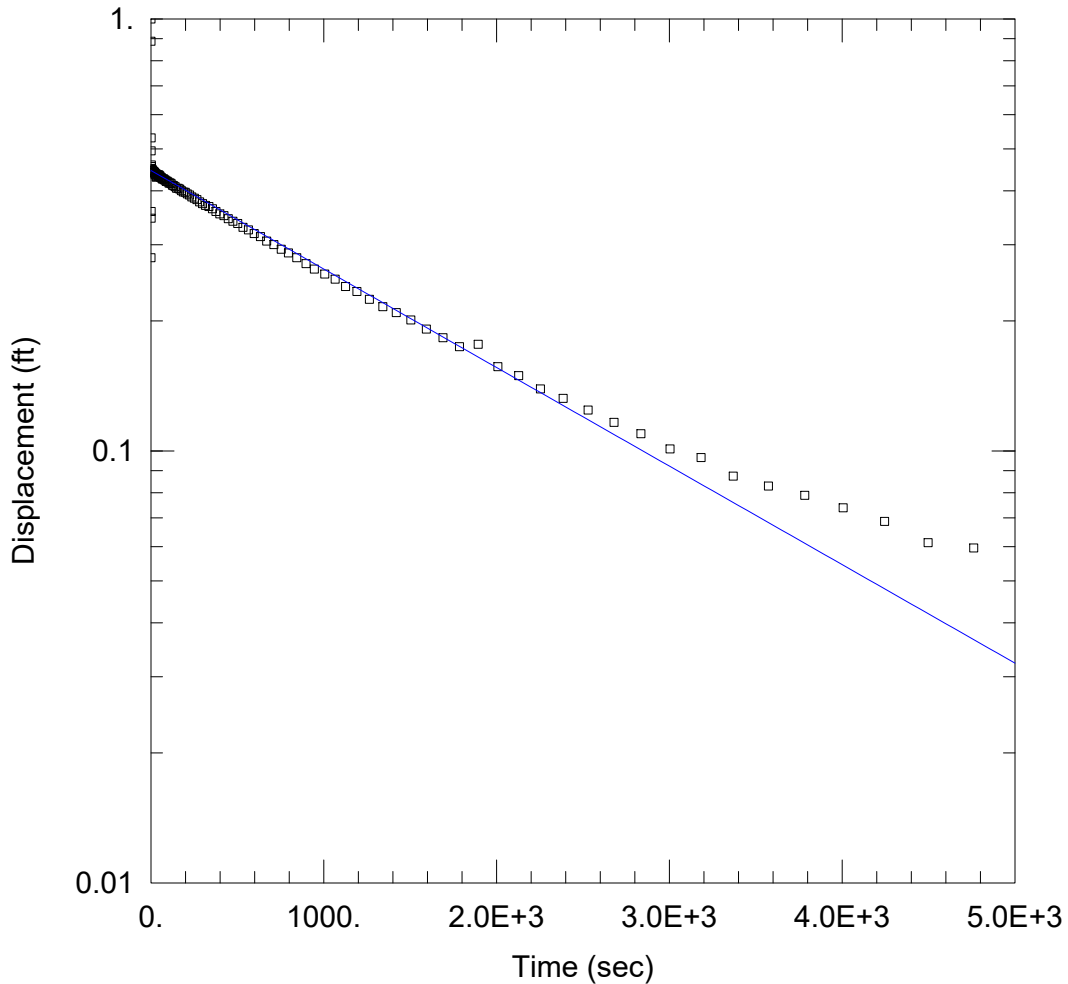
Initial Displacement: 1.064 ft  
 Total Well Penetration Depth: 109.9 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.9 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.93E-5 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.7646 ft



MW-16-04 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_OUT.aqt  
 Date: 05/22/17

Time: 13:42:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

Initial Displacement: 1.761 ft  
 Total Well Penetration Depth: 109.7 ft  
 Casing Radius: 0.08333 ft

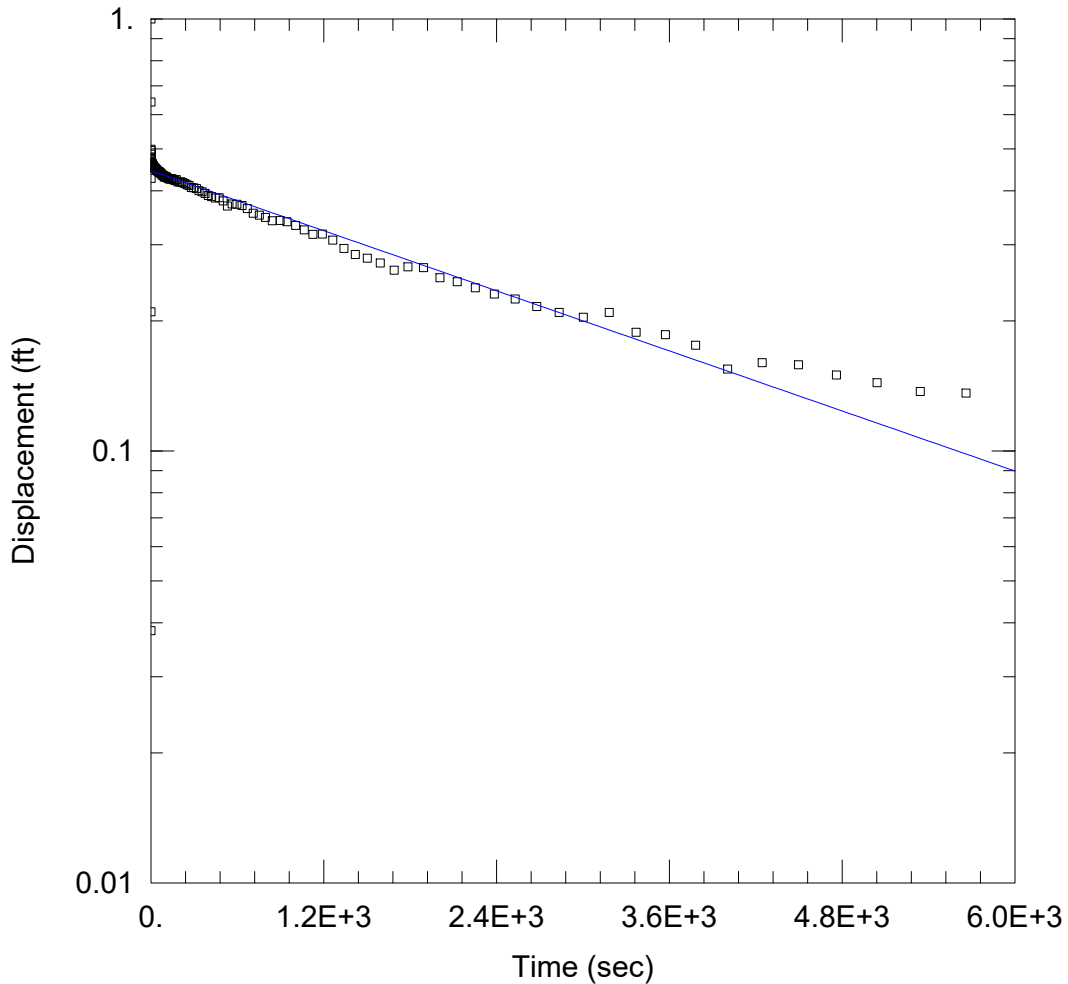
Static Water Column Height: 109.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 4.108E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7851 ft





MW-16-05 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-05\_OUT.aqt  
 Date: 05/22/17

Time: 13:43:26

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-05  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

Initial Displacement: 1.668 ft  
 Total Well Penetration Depth: 130.7 ft  
 Casing Radius: 0.08333 ft

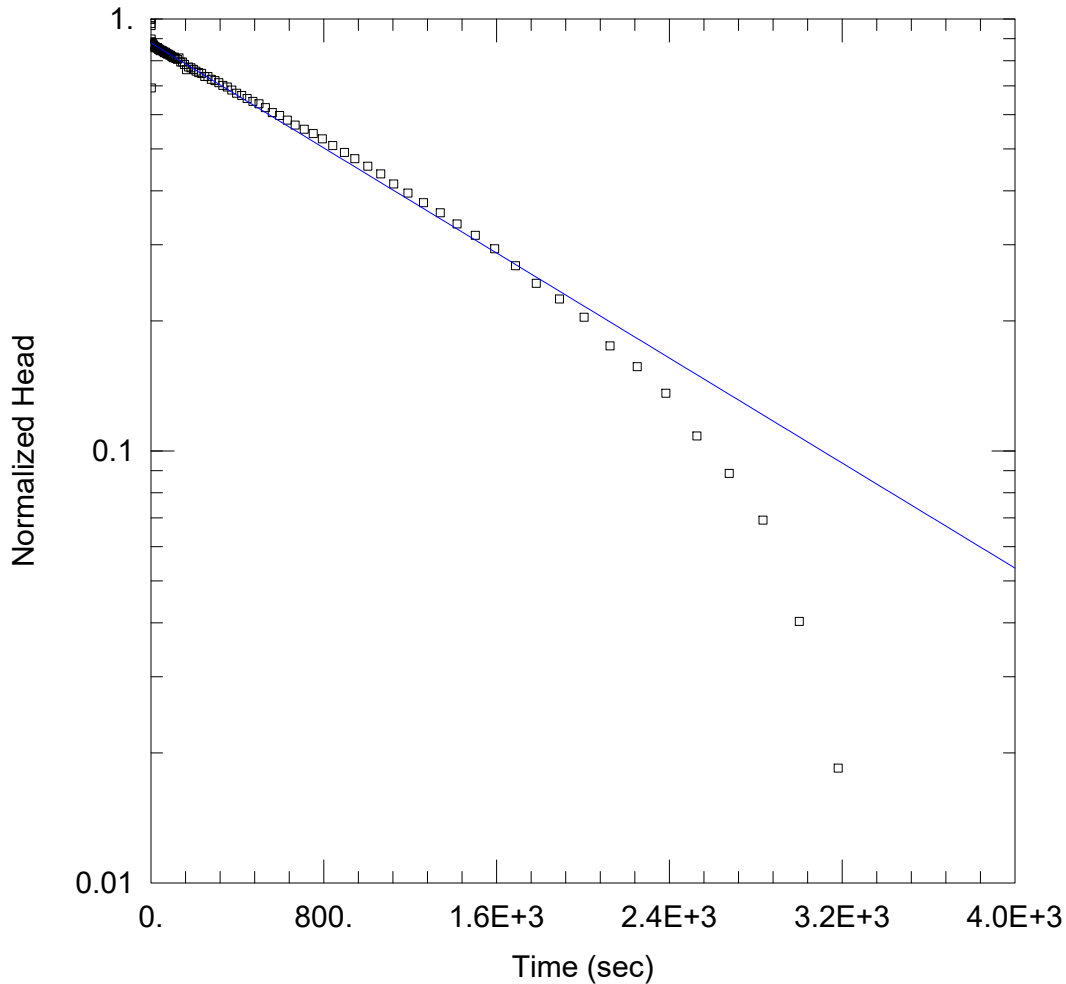
Static Water Column Height: 130.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 2.125E-5 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.743 ft





### MW-16-07 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_IN.aqt  
 Date: 05/22/17

Time: 13:44:03

### PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003  
 Location: China Township, MI  
 Test Well: MW-16-07  
 Test Date: 4/13/16

### AQUIFER DATA

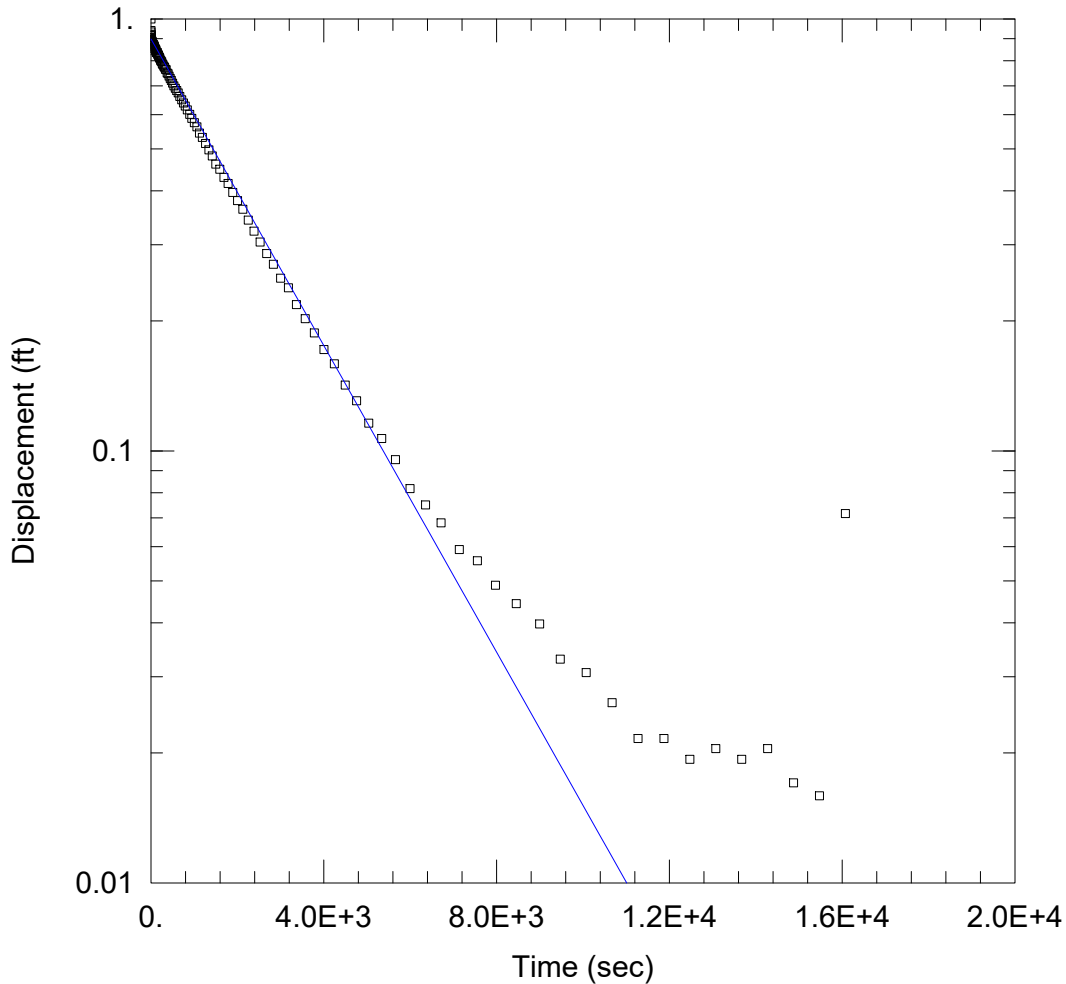
Saturated Thickness: 2. ft                      Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-16-07)

Initial Displacement: 0.868 ft                      Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 124.9 ft                      Screen Length: 5. ft  
 Casing Radius: 0.08333 ft                      Well Radius: 0.08333 ft

### SOLUTION

Aquifer Model: Confined                      Solution Method: Bower-Rice  
 K = 0.0001236 cm/sec                      y0 = 0.7638 ft



MW-16-07 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_OUT.aqt  
Date: 05/22/17

Time: 13:44:45

PROJECT INFORMATION

Company: TRC Environmental Corporation  
Client: DTE EC BRPP CCR  
Project: 231828.0003.0000  
Location: China Township, MI  
Test Well: MW-16-07  
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.88 ft  
Total Well Penetration Depth: 124.4 ft  
Casing Radius: 0.08333 ft

Static Water Column Height: 124.4 ft  
Screen Length: 5. ft  
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
K = 7.212E-5 cm/sec

Solution Method: Bowyer-Rice  
y0 = 0.7909 ft

## **2021 Slug Test Results**

**2021 Hydraulic Conductivity Results Summary**  
**DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin**  
**4505 King Road, China Township, Michigan**

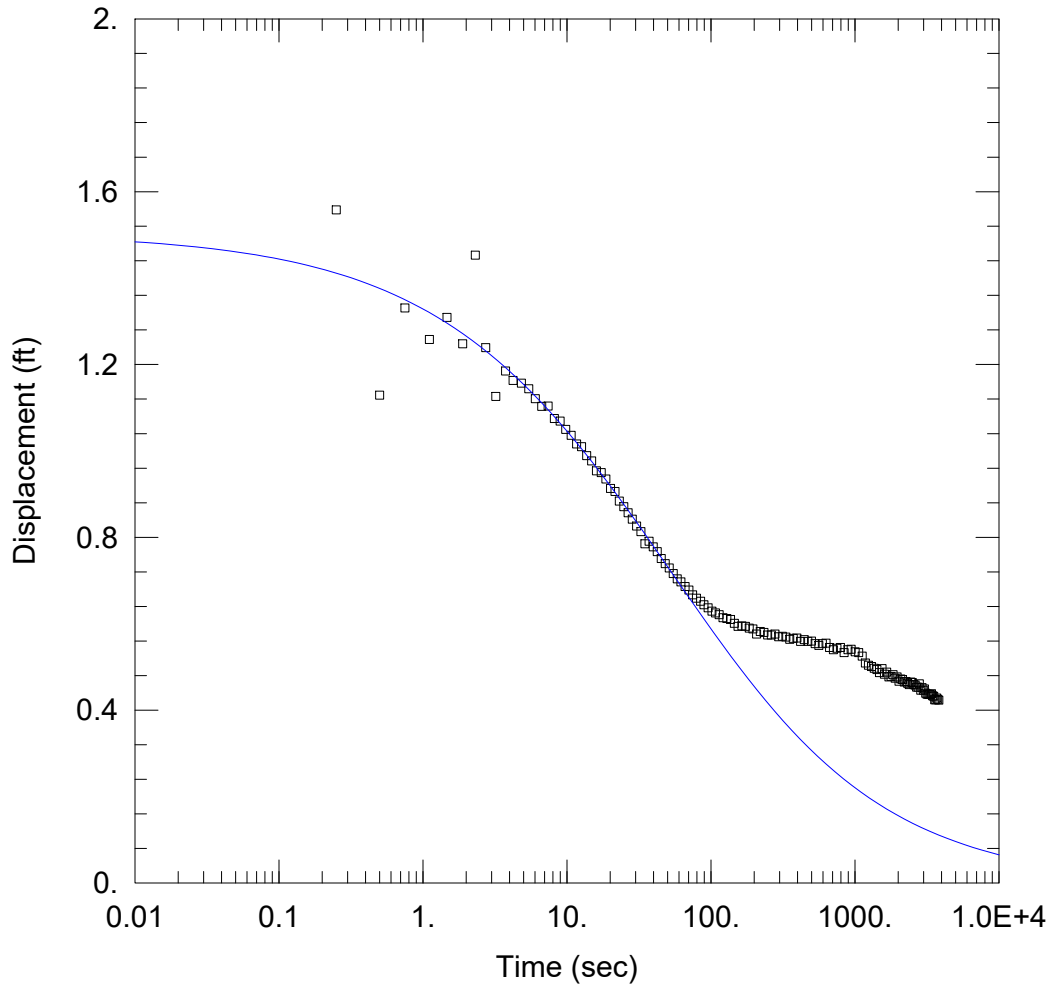
Test	WC (ft)	K (cm/s)	K (ft/day)	Comment/K Geometric mean (cm/s)	K Geometric mean (ft/day)
MW-16-02 Slug In	85.8	NA	NA	Not a good match, use slug out test	NA
MW-16-02 Slug Out	85.8	4.2E-04	1.2	4.2E-04	1.2
MW-16-03 Slug In	123.1	9.8E-03	27.8	9.6E-03	27.4
MW-16-03 Slug Out	123.1	9.5E-03	26.9		
MW-16-06 Slug In	125.6	1.0E-04	0.28	1.0E-04	0.30
MW-16-06 Slug Out	125.6	1.1E-04	0.31		
MW-16-08 Slug In	124.9	1.2E-05	0.03	1.1E-05	0.03
MW-16-08 Slug Out	124.9	1.1E-05	0.03		
MW-16-09 Slug In	126.9	1.5E-04	0.43	1.5E-04	0.43
MW-16-09 Slug Out	126.9	1.5E-04	0.43		
MW-16-10 Slug In	135.3	3.6E-05	0.10	3.6E-05	0.10
MW-16-10 Slug Out	135.3	3.7E-05	0.10		
MW-16-11A Slug In	127.3	6.1E-05	0.17	6.3E-05	0.18
MW-16-11A Slug Out	127.3	6.5E-05	0.18		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A 5' long by 1" diameter slug was utilized to complete slug tests in these wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 In.aqt  
 Date: 10/29/21 Time: 11:44:26

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

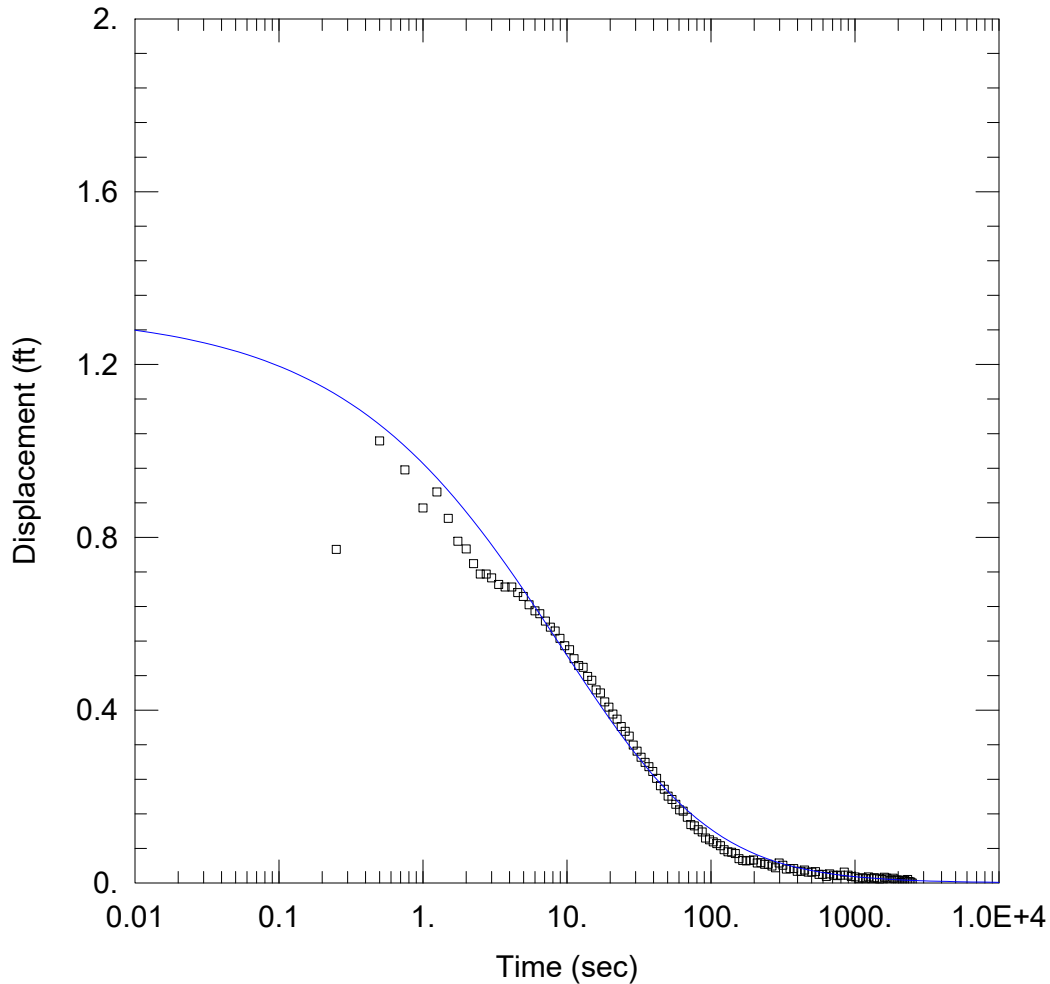
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.503 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.0006905 cm<sup>2</sup>/sec S = 3.692



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 Out.aqt  
 Date: 10/29/21 Time: 11:46:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

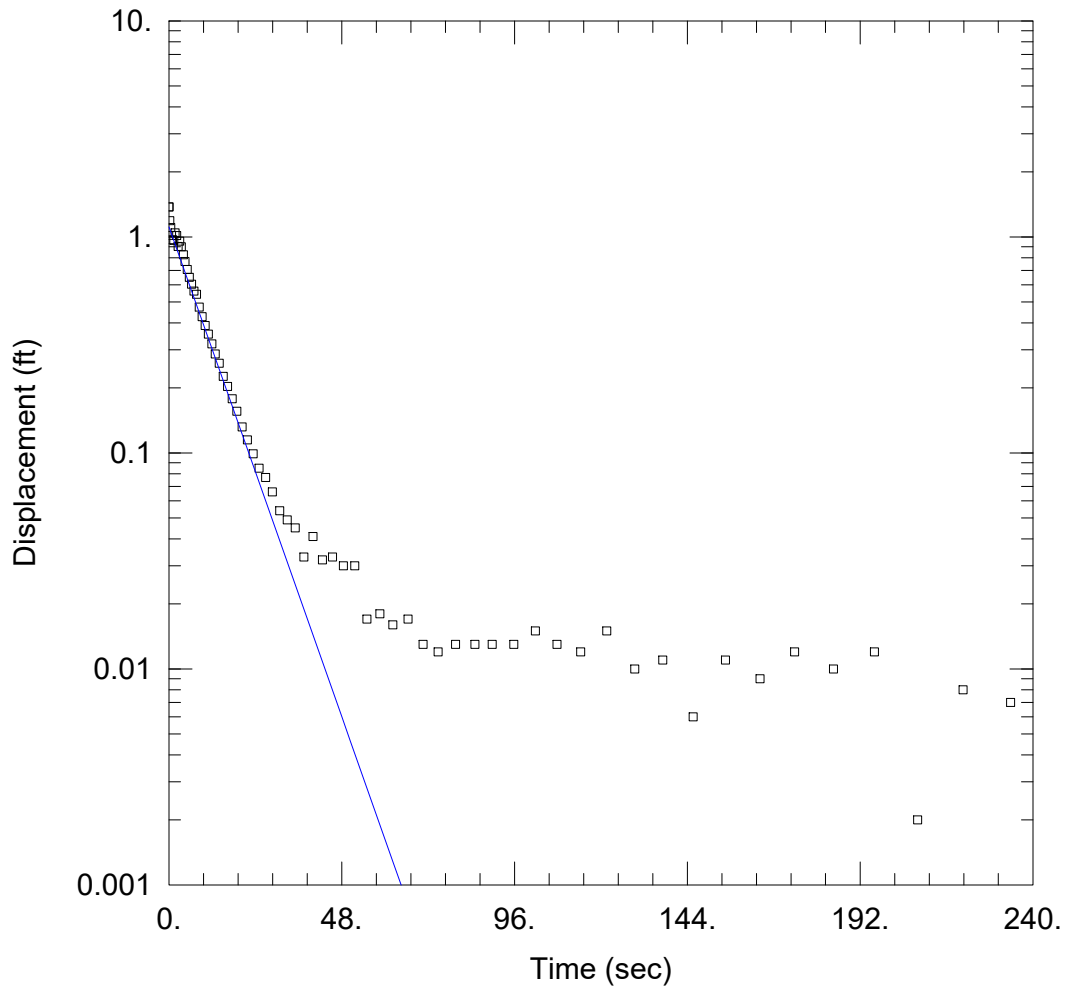
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.32 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.1533 cm<sup>2</sup>/sec S = 0.1



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 In.aqt  
 Date: 10/29/21 Time: 11:52:09

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

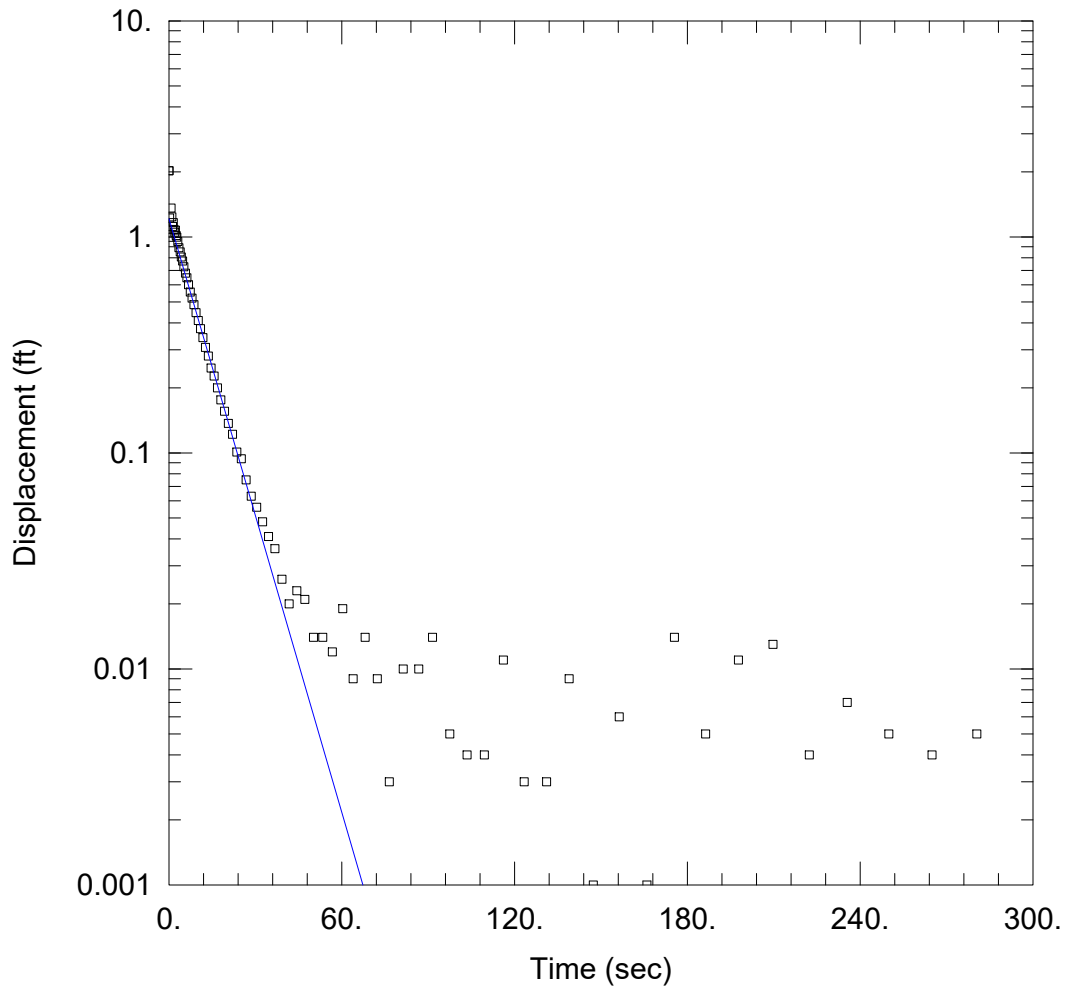
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 1.376 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.009782$  cm/sec  $y_0 = 1.113$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 Out.aqt  
 Date: 10/29/21 Time: 11:53:59

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

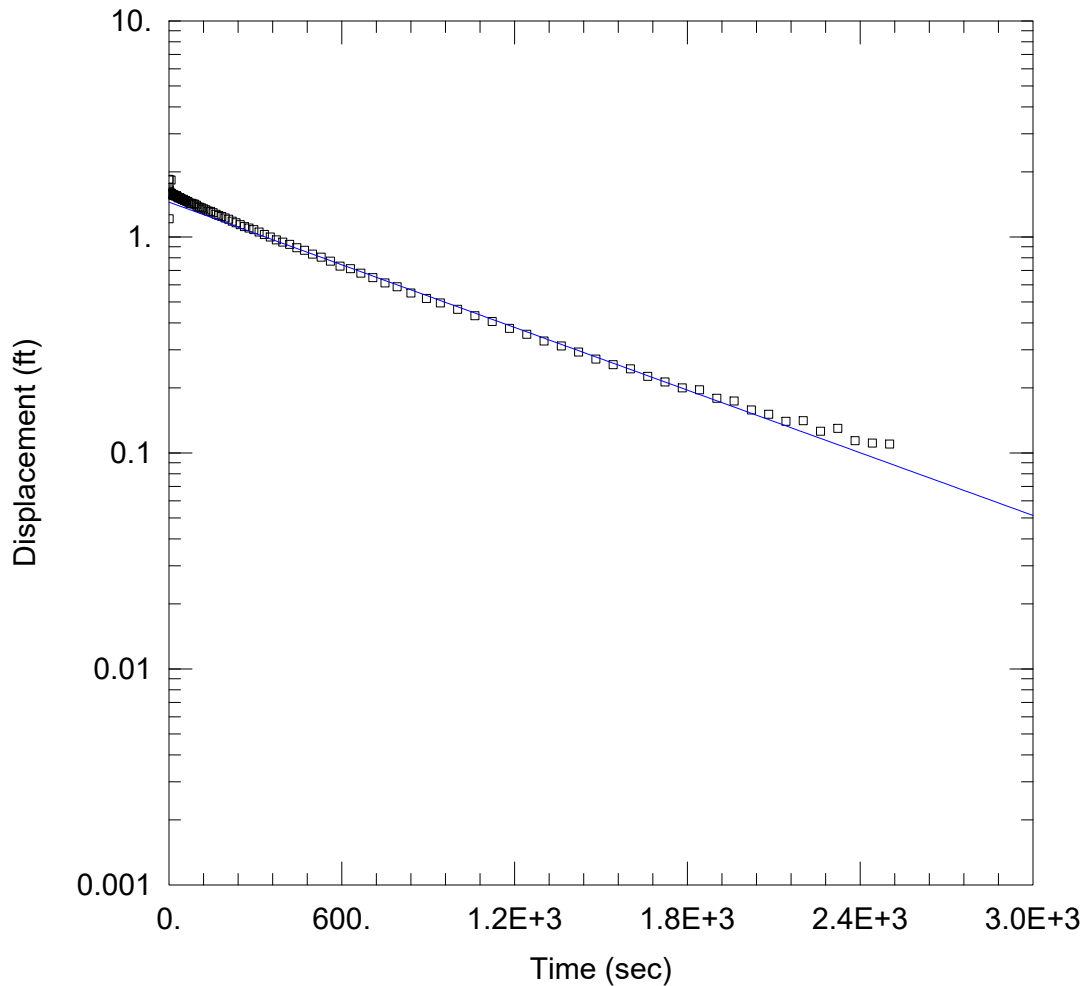
WELL DATA (MW-16-03)

Initial Displacement: 2.023 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.009488 cm/sec y0 = 1.215 ft





WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 In.aqt  
 Date: 10/29/21 Time: 11:57:18

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

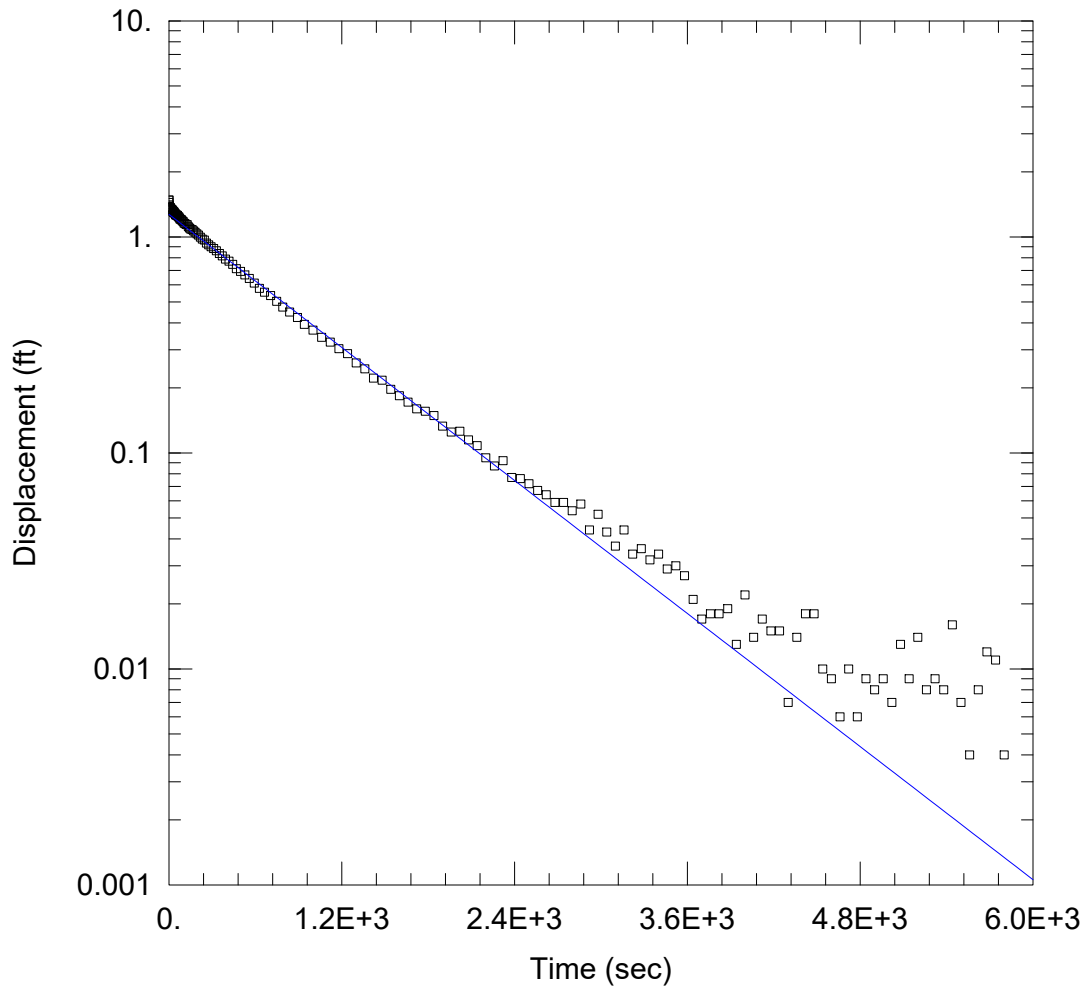
Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.847 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001002$  cm/sec  $y_0 = 1.449$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 Out.aqt  
 Date: 10/29/21 Time: 11:58:41

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

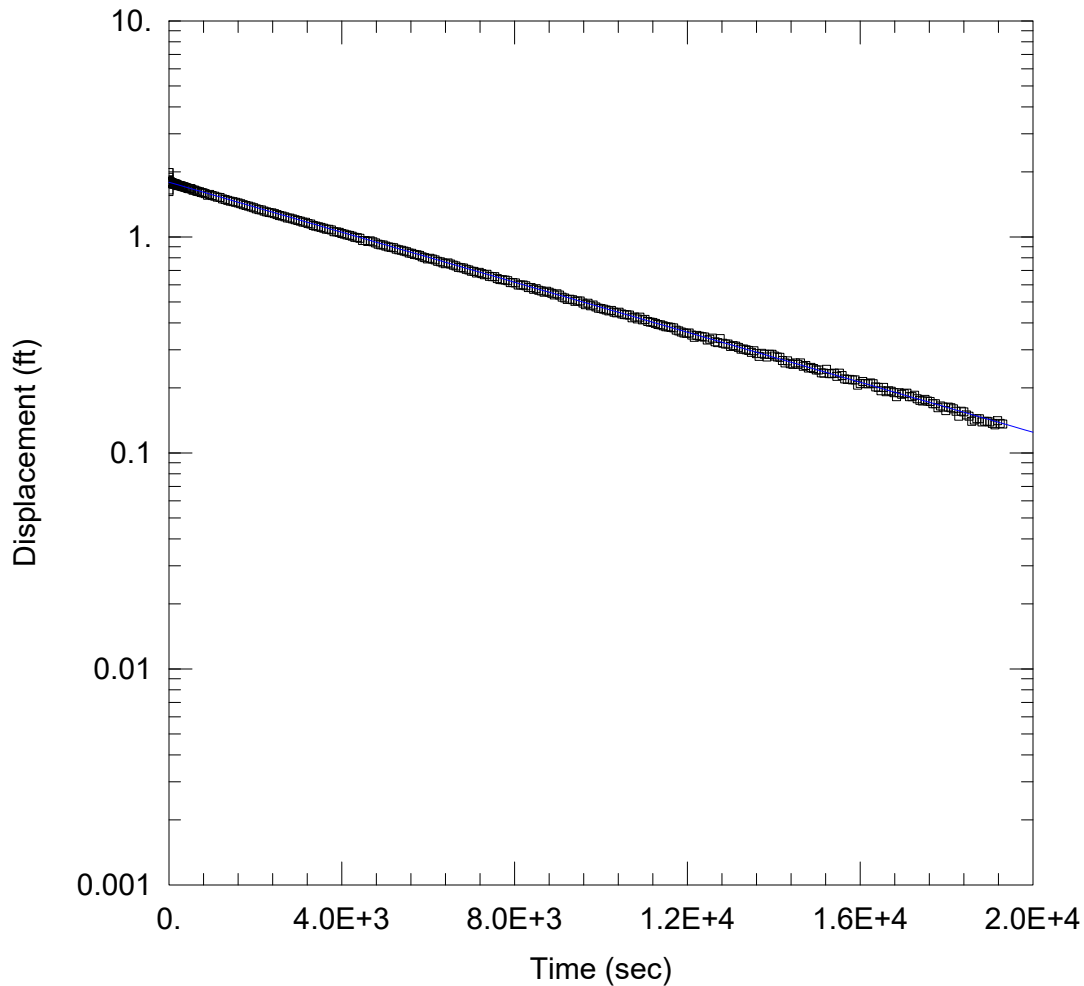
Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.481 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001063$  cm/sec  $y_0 = 1.271$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 In.aqt  
 Date: 10/29/21 Time: 12:36:01

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

AQUIFER DATA

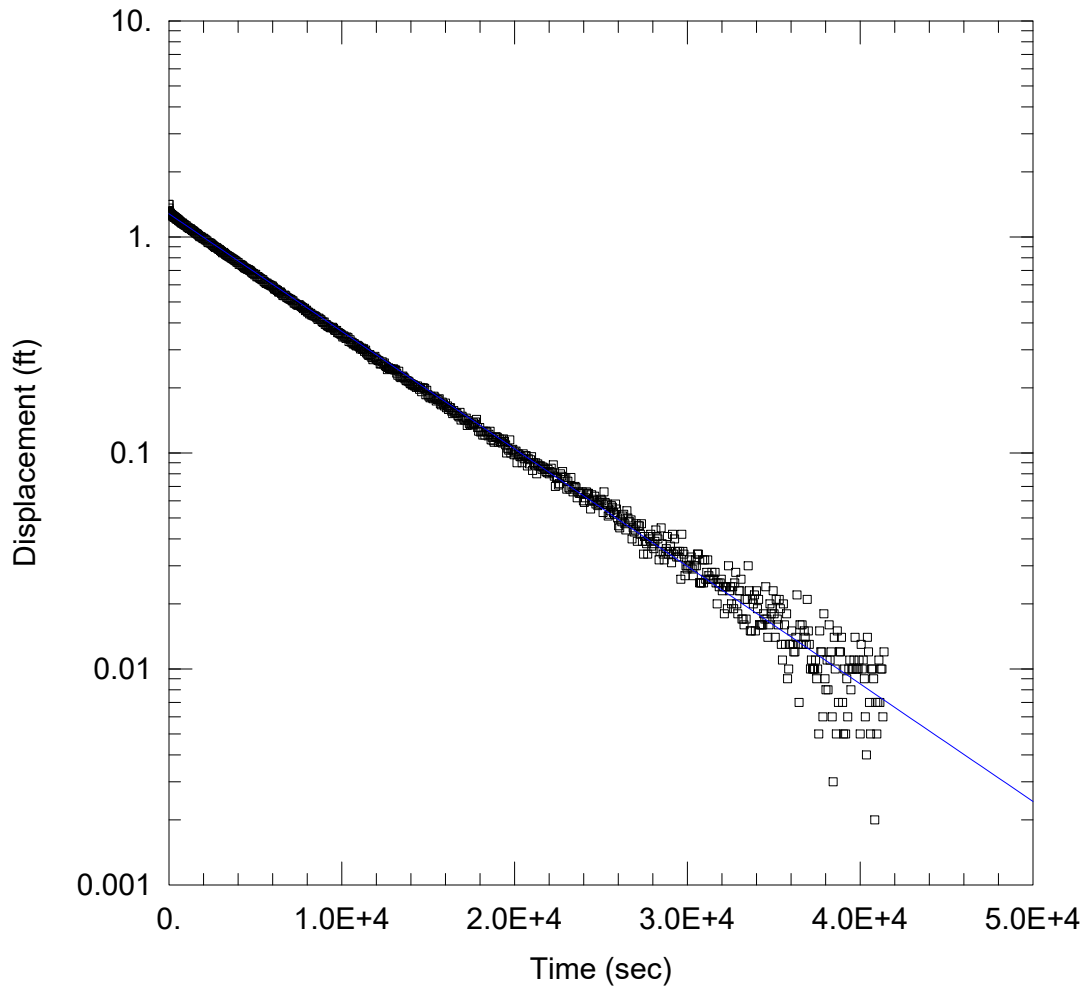
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-08)

Initial Displacement: 1.987 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 1.199E-5 cm/sec y0 = 1.791 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 Out.aqt  
 Date: 10/29/21 Time: 12:38:13

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

### AQUIFER DATA

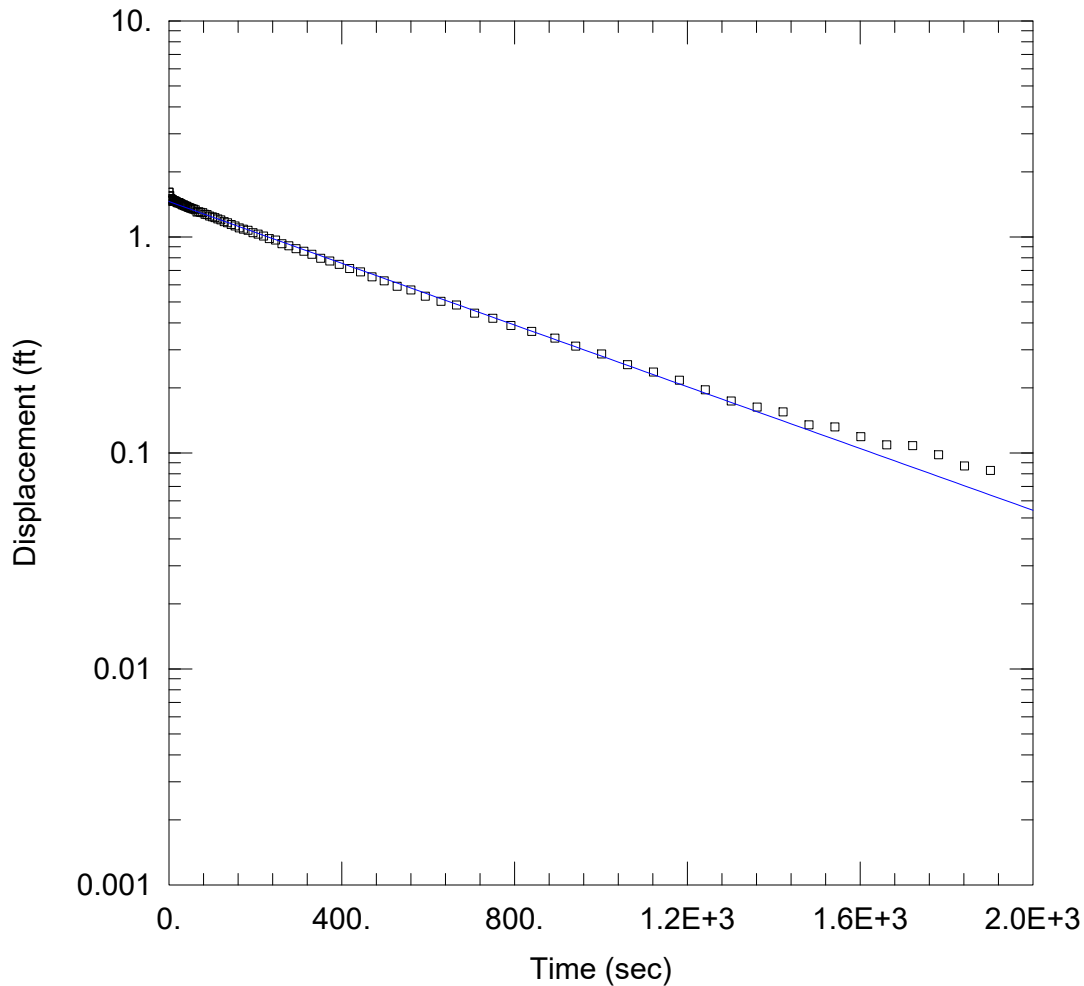
Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-08)

Initial Displacement: 1.415 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 1.127E-5$  cm/sec  $y_0 = 1.279$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 In.aqt  
 Date: 10/29/21 Time: 12:41:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

AQUIFER DATA

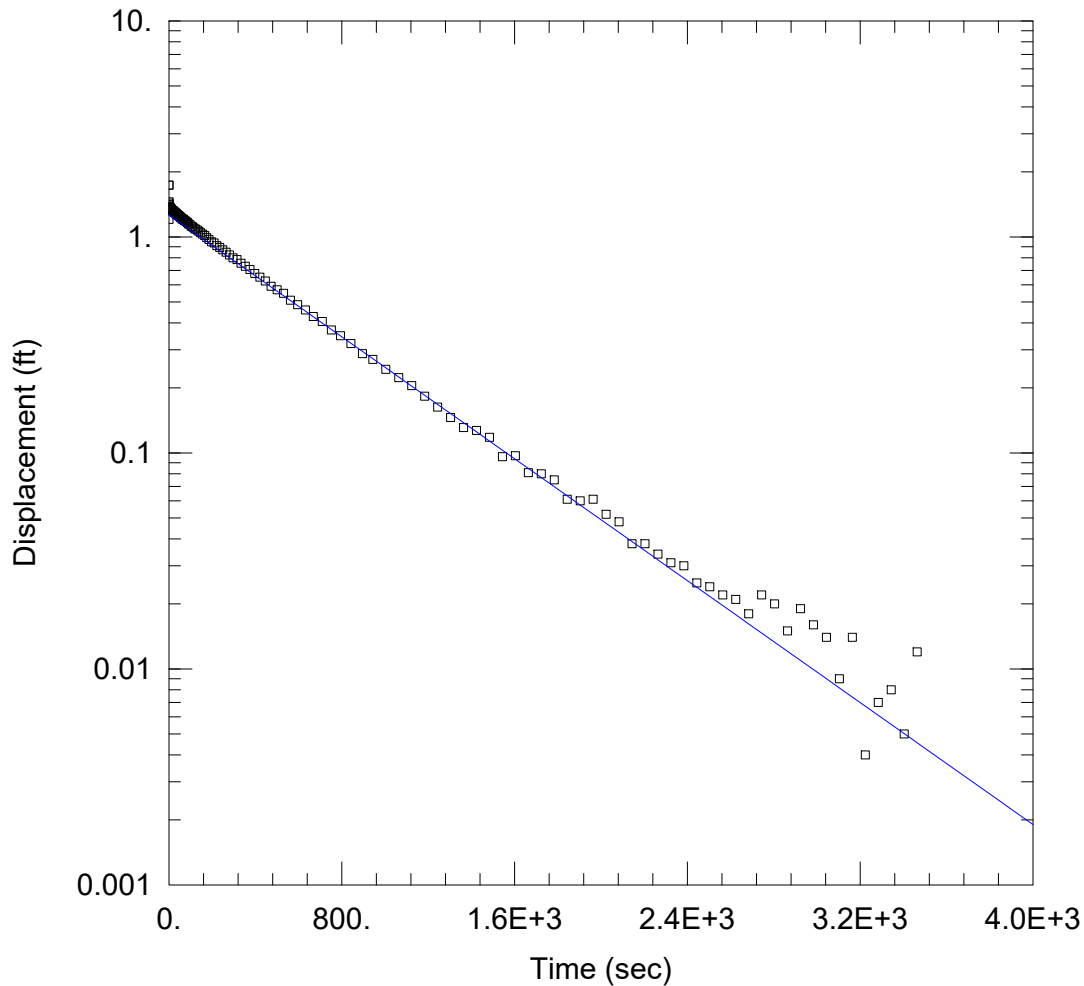
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.611 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.000148 cm/sec y0 = 1.458 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 Out.aqt  
 Date: 10/29/21 Time: 12:43:28

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

### AQUIFER DATA

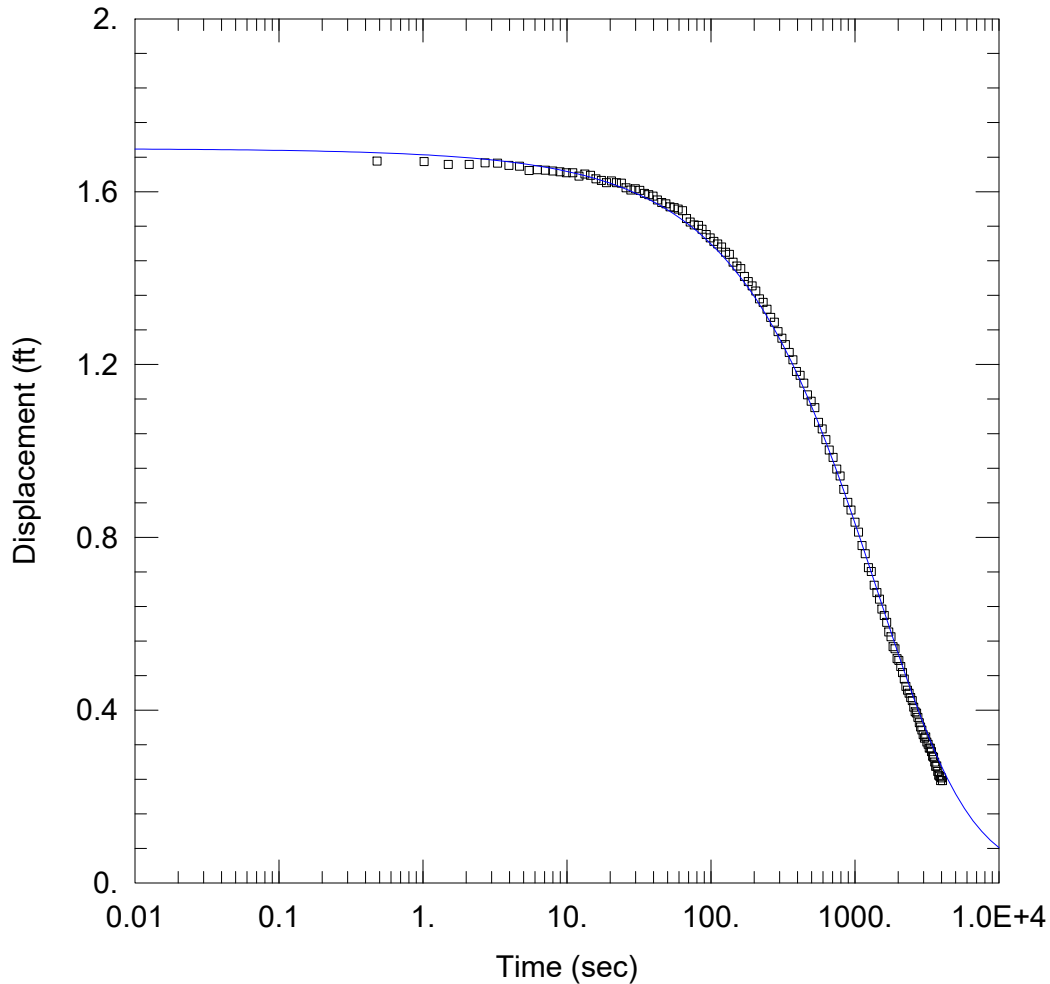
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-09)

Initial Displacement: 1.736 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001461$  cm/sec  $y_0 = 1.265$  ft



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 In.aqt  
 Date: 10/29/21 Time: 12:52:23

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

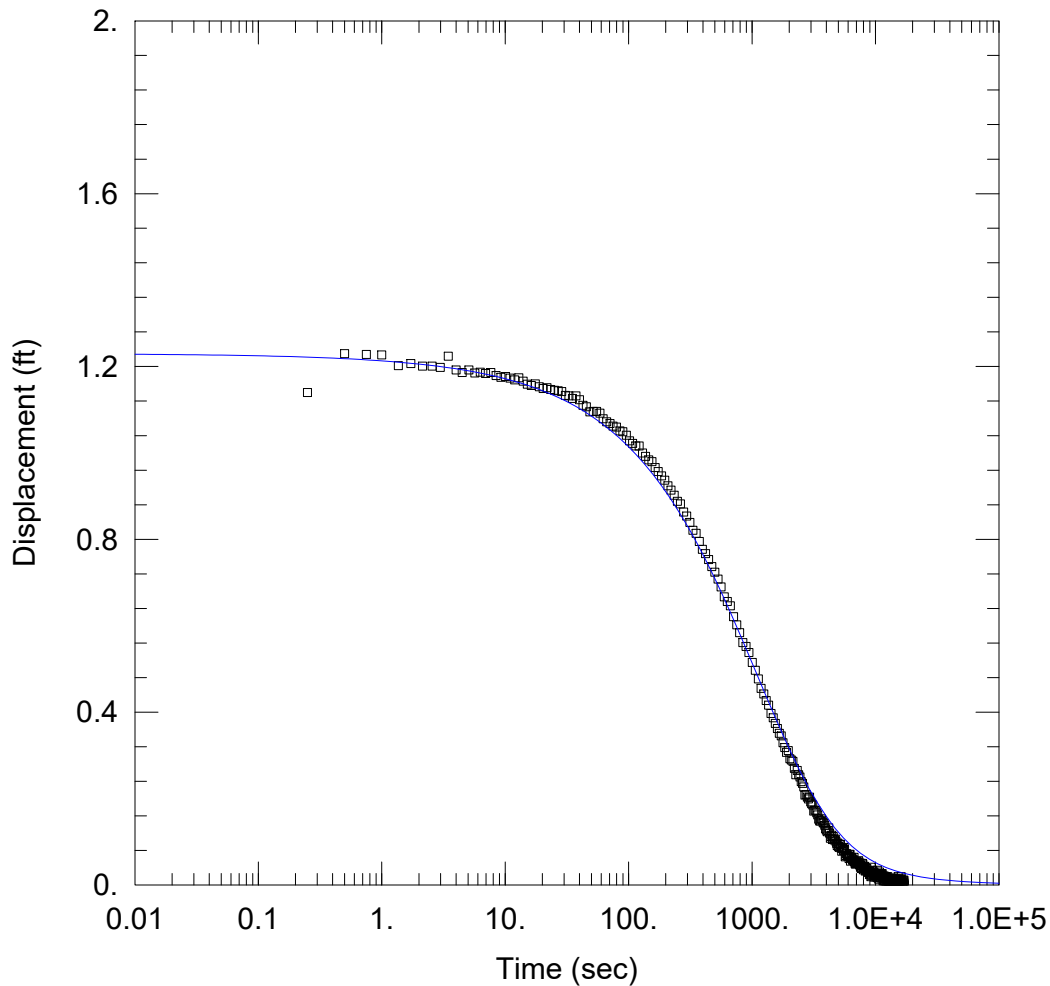
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.7 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005538 cm<sup>2</sup>/sec S = 0.001701



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 Out.aqt  
 Date: 10/29/21 Time: 12:54:58

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

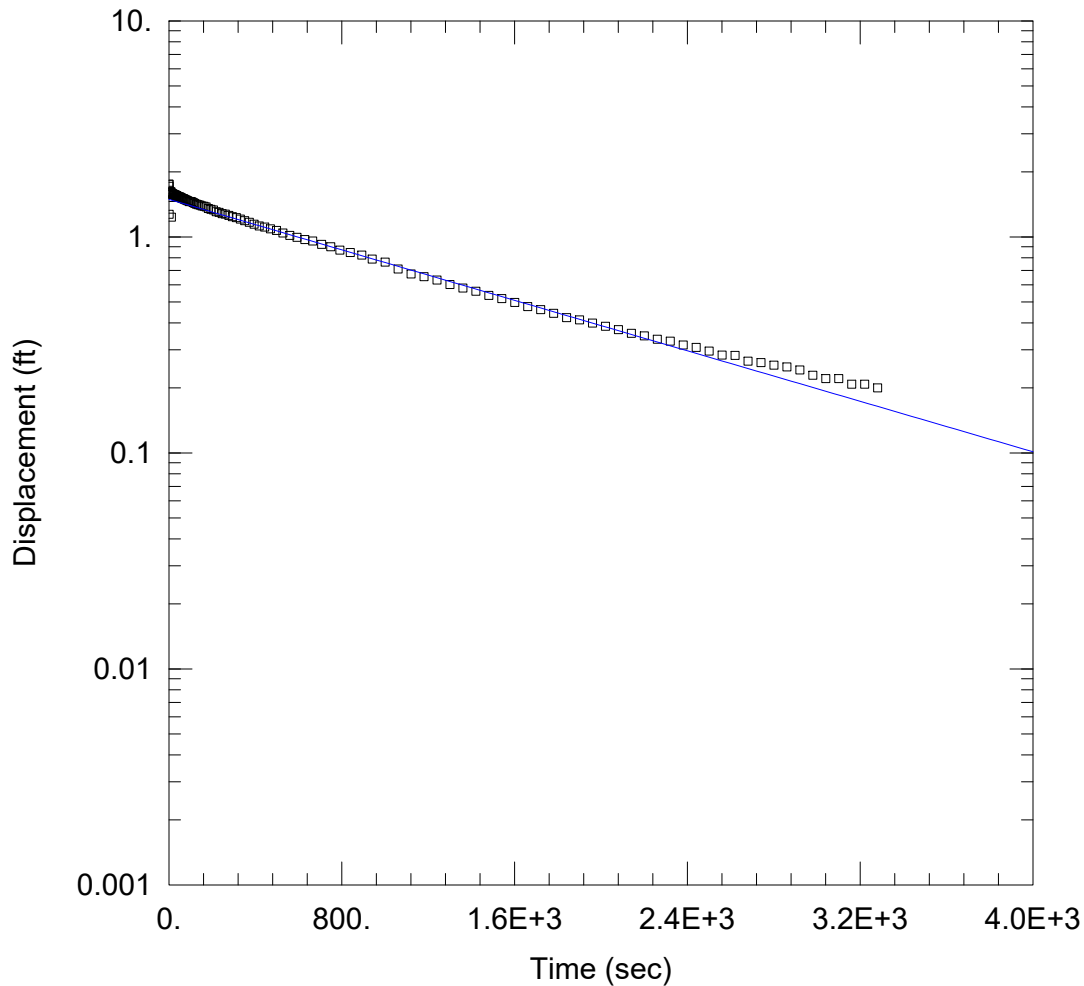
WELL DATA (MW-16-10)

Initial Displacement: 1.23 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005626 cm<sup>2</sup>/sec S = 0.004752





WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A In.aqt  
 Date: 10/29/21 Time: 12:59:49

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

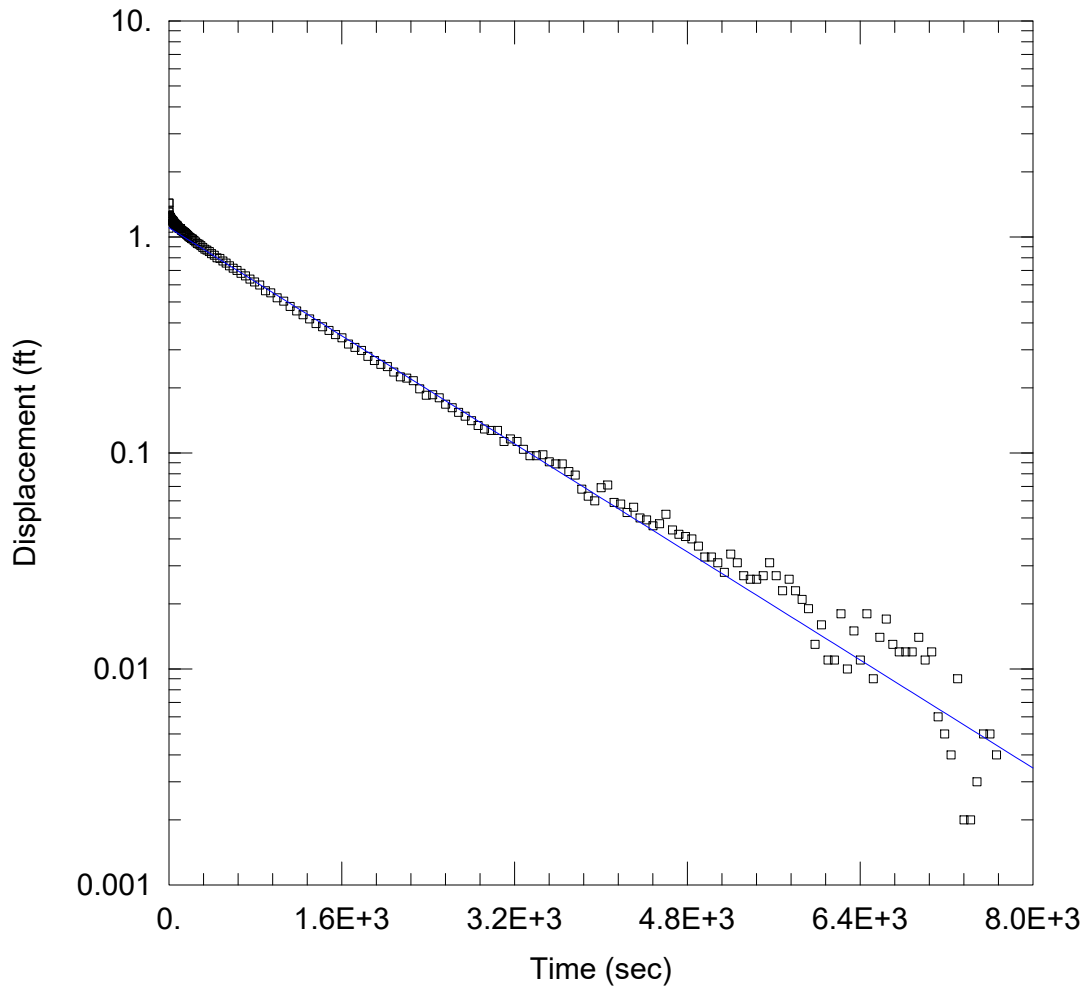
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.753 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 6.051E-5 cm/sec y0 = 1.492 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A Out.aqt  
 Date: 10/29/21 Time: 13:00:15

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.434 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 6.477E-5$  cm/sec  $y_0 = 1.103$  ft

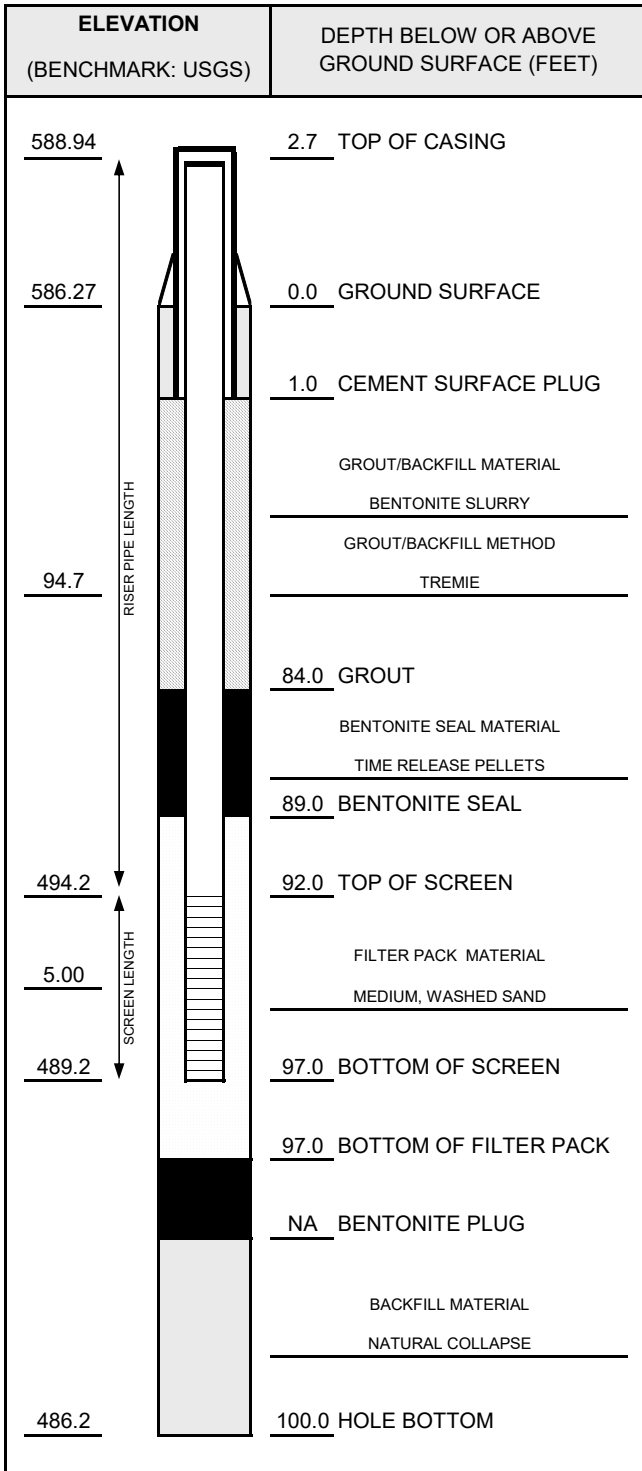
## **APPENDIX B – MONITORING WELL LOGS**





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-02</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>460</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
OTHER SWL:		T/PVC		

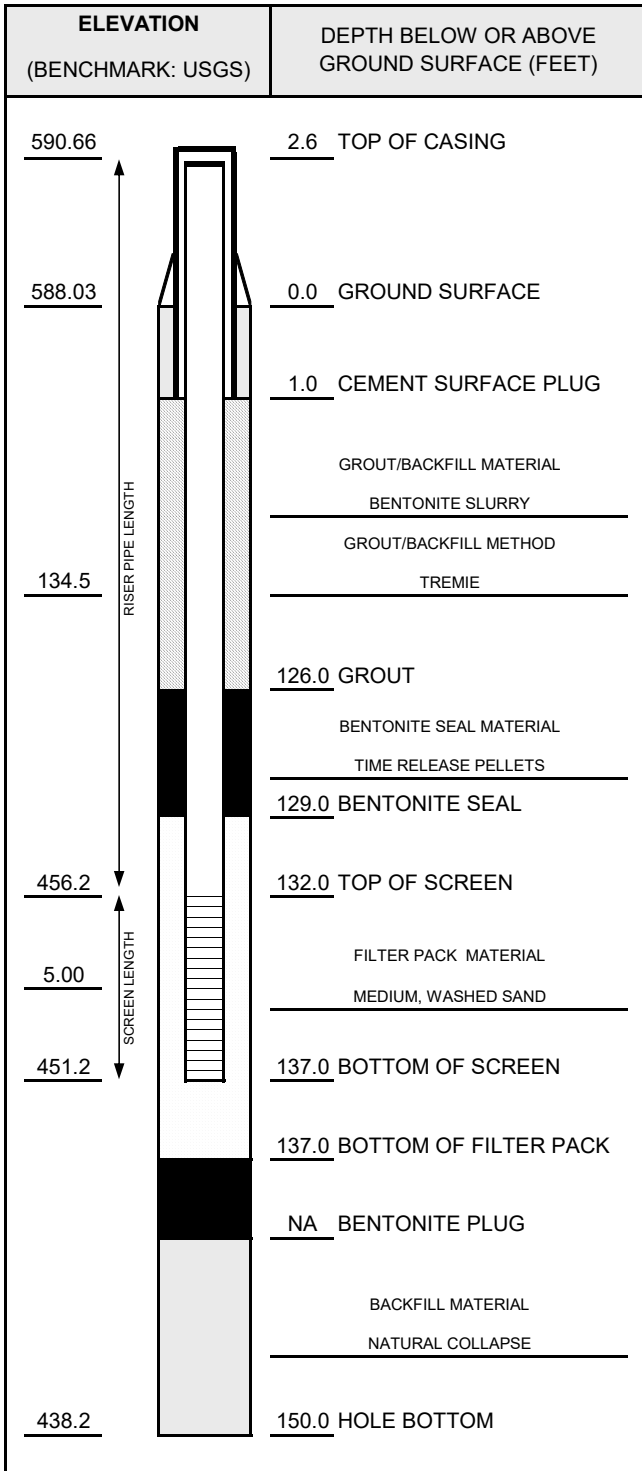
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-03</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>4</u> IN. FROM <u>140</u> TO <u>150</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>60</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>LIGHT GRAY</u>
CLARITY AFTER:	<u>SLIGHTLY TURBID</u>
COLOR AFTER:	<u>VERY LIGHT GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
OTHER SWL:		T/PVC		

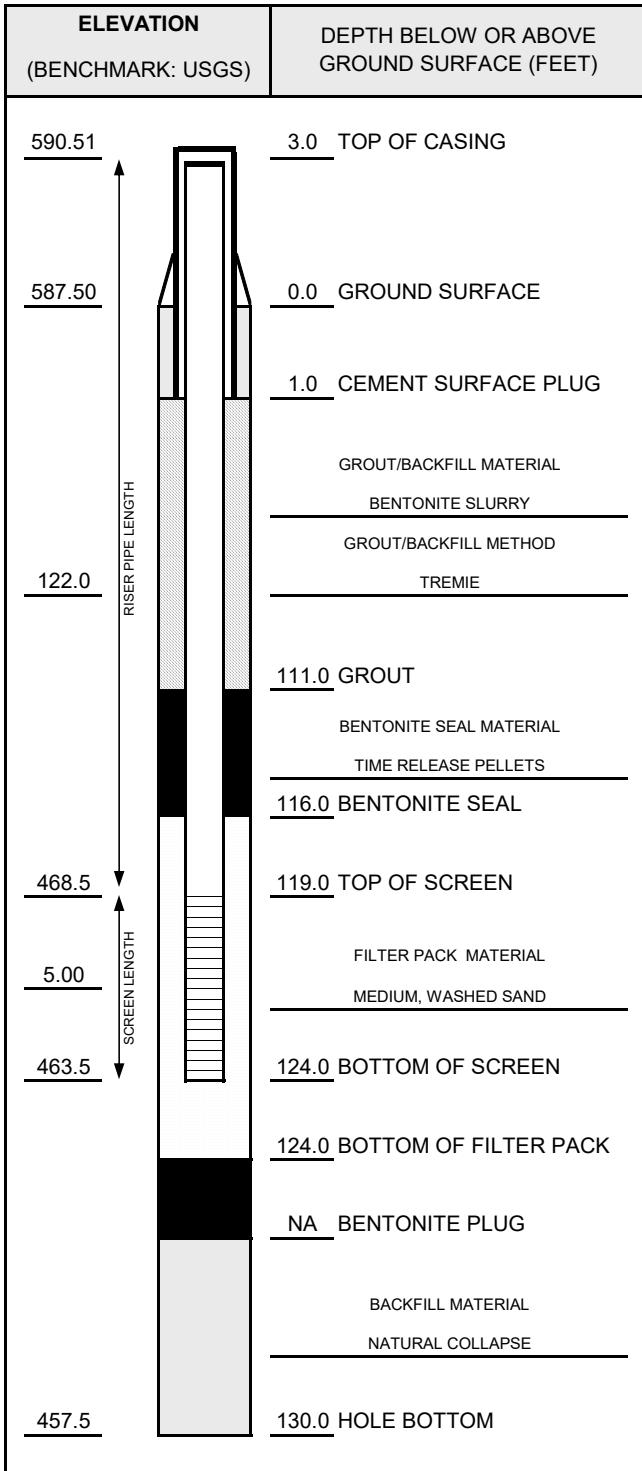
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-04</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER: <u>2-INCH PVC</u>	PIPE SCHEDULE: <u>40</u>
PIPE JOINTS: <u>THREADED O-RINGS</u>	SCREEN TYPE: <u>2-INCH PVC</u>
SCR. SLOT SIZE: <u>0.01-INCH</u>	BOREHOLE DIAMETER: <u>6</u> IN. FROM <u>0</u> TO <u>124</u> FT. <u>4</u> IN. FROM <u>124</u> TO <u>130</u> FT.
SURF. CASING DIAMETER: _____ IN. FROM _____ TO _____ FT. _____ IN. FROM _____ TO _____ FT.	

WELL DEVELOPMENT	
DEVELOPMENT METHOD: <u>AIR LIFT</u>	TIME DEVELOPING: <u>4</u> HOURS
WATER REMOVED: <u>288</u> GALLONS	WATER ADDED: <u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE: <u>VERY TURBID</u>	COLOR BEFORE: <u>BROWN /GREY</u>
CLARITY AFTER: <u>CLEAR</u>	COLOR AFTER: <u>NONE</u>
ODOR (IF PRESENT): <u>NONE</u>	

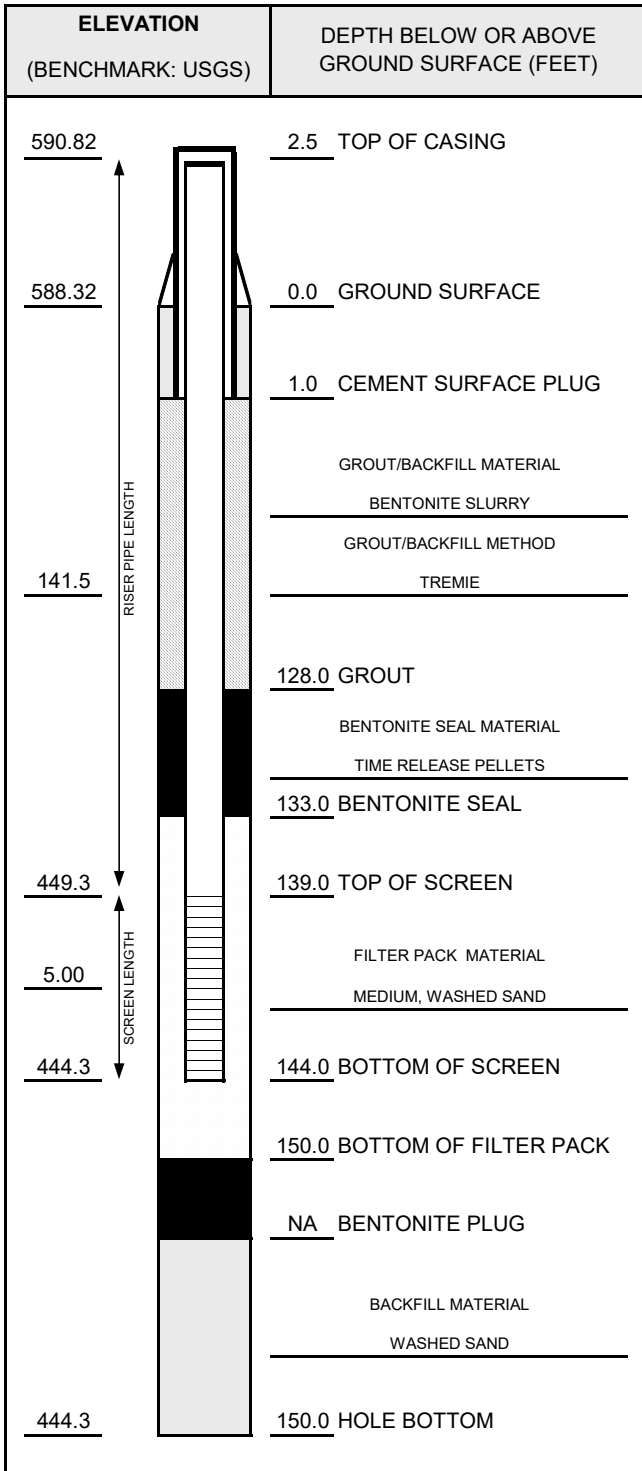
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER: <u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-05</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>300</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
OTHER SWL:		T/PVC		

NOTES:

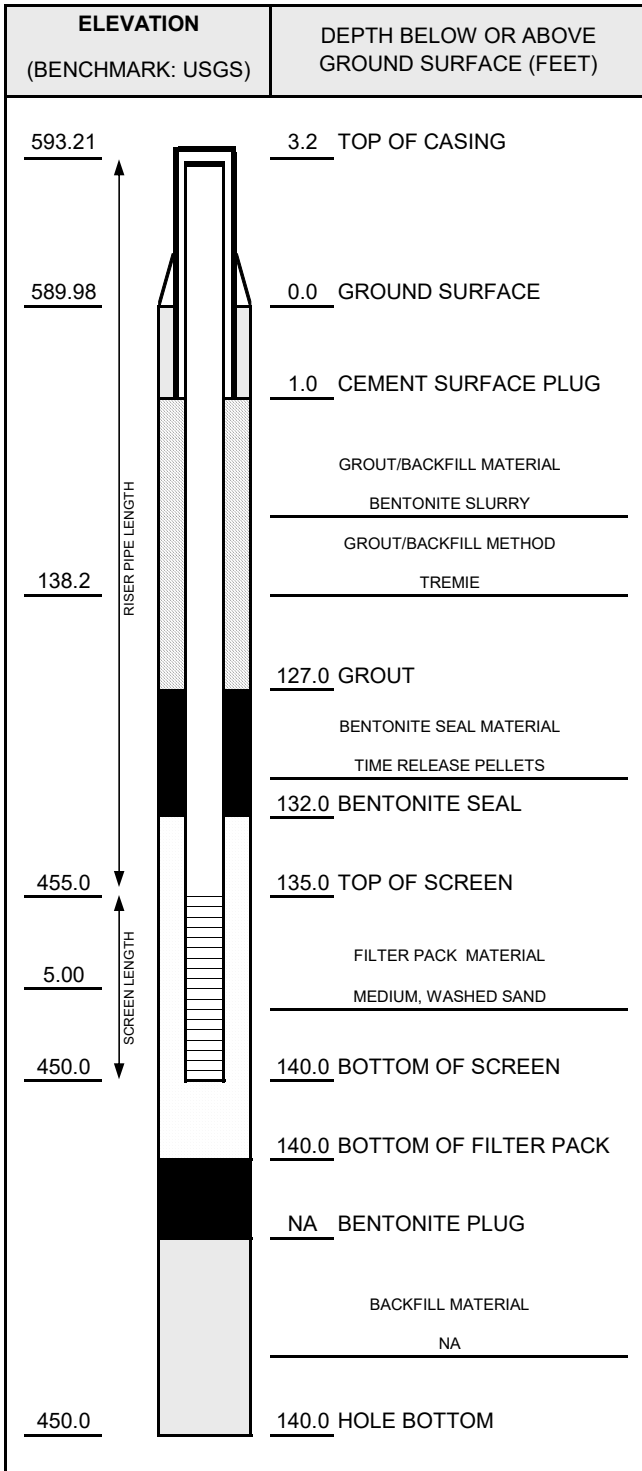
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-06</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>50</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NOT MEASURED</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
OTHER SWL:		T/PVC		

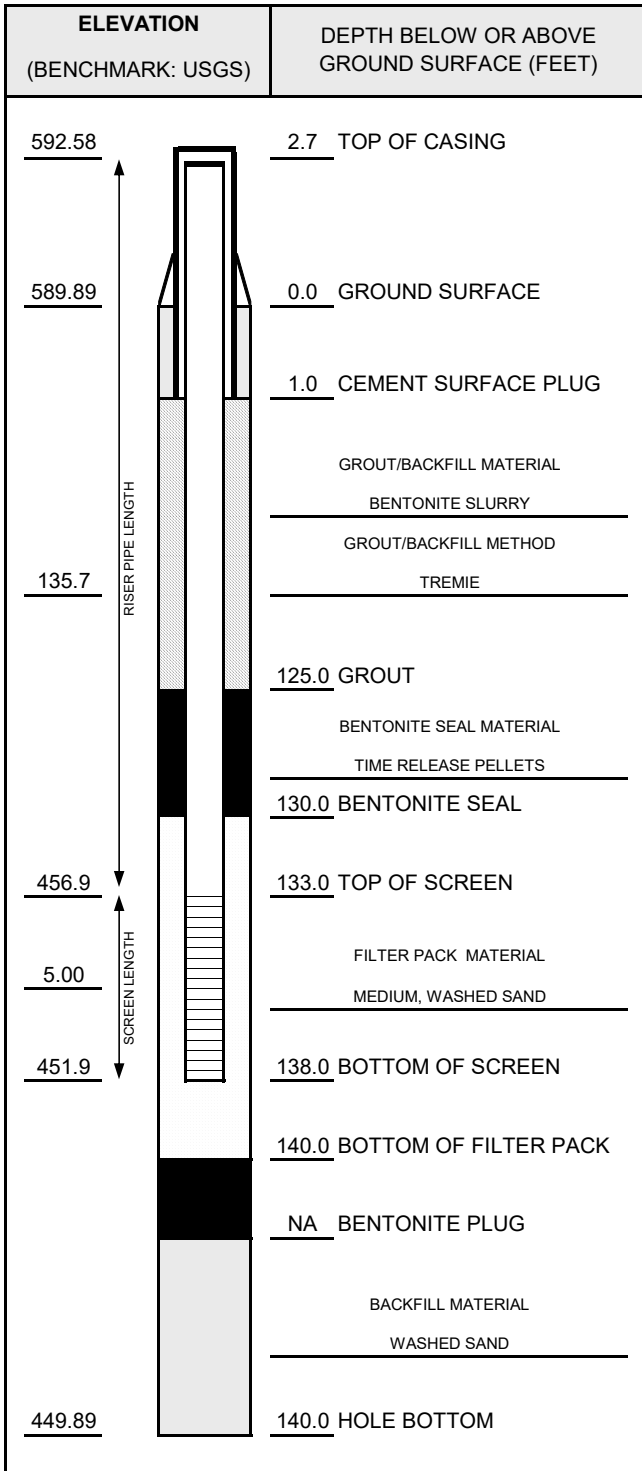
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-07</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
OTHER SWL:		T/PVC		

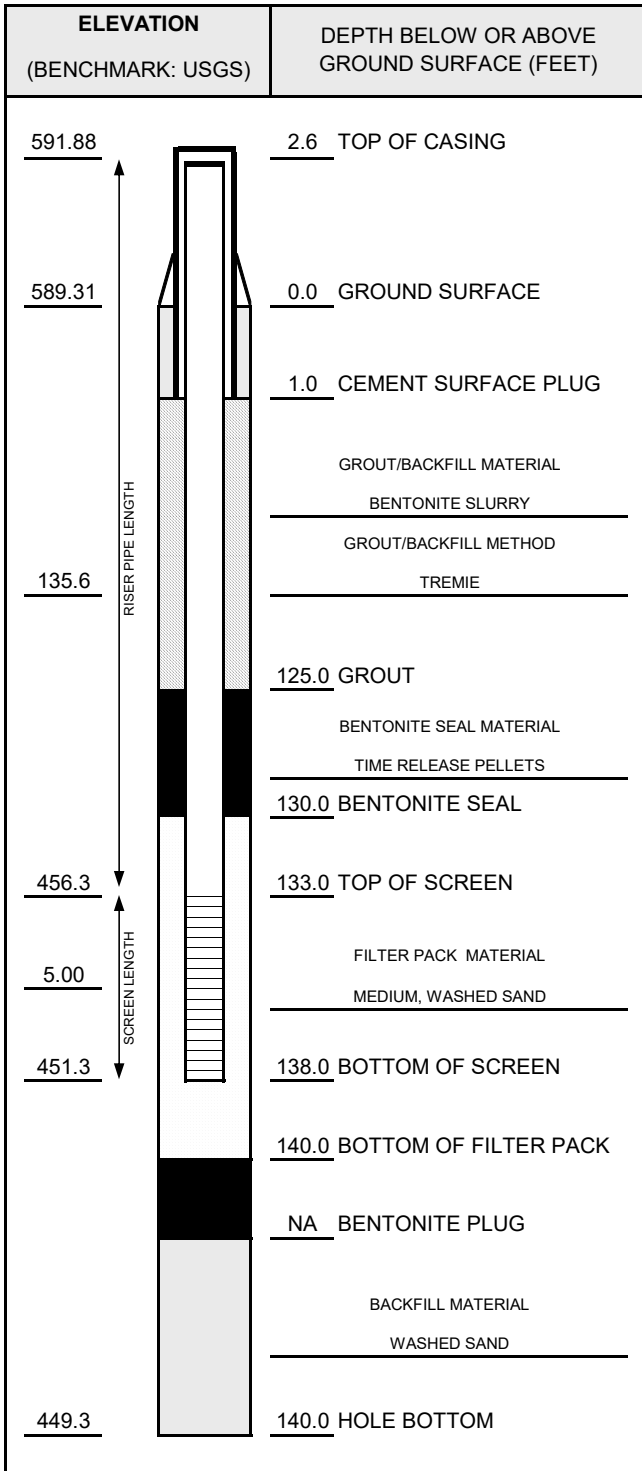
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-08</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016 INSTALLED BY: A. Knutson
CHECKED BY: C. Scieszka	



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>125</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
OTHER SWL:		T/PVC		

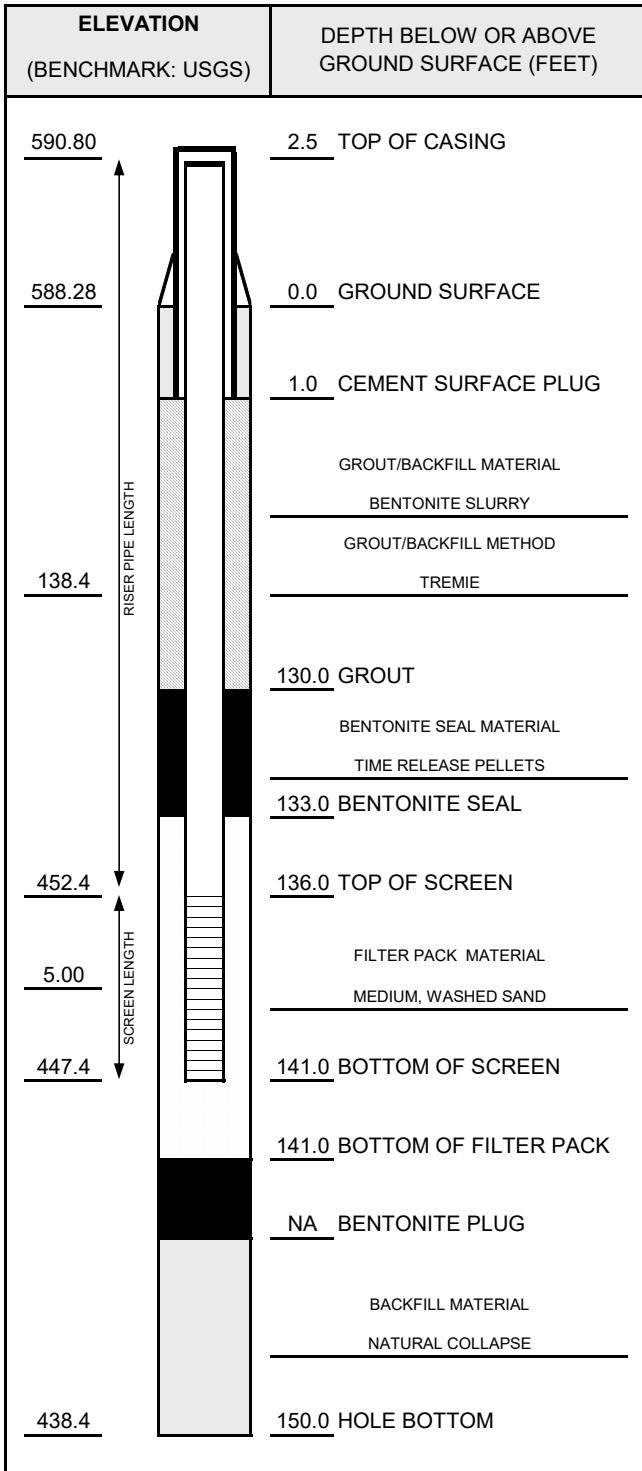
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-09</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>7</u> HOURS
WATER REMOVED:	<u>30</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/7/2016	12:00
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	10:25
SWL BEFORE DEVELOPING:	7.00	T/PVC	6/7/2016	12:00
SWL AFTER DEVELOPING:	117.42	T/PVC	6/8/2016	10:25
OTHER SWL:	16.76	T/PVC	6/9/2016	15:13
OTHER DTB:	144.30	T/PVC	6/9/2016	15:13

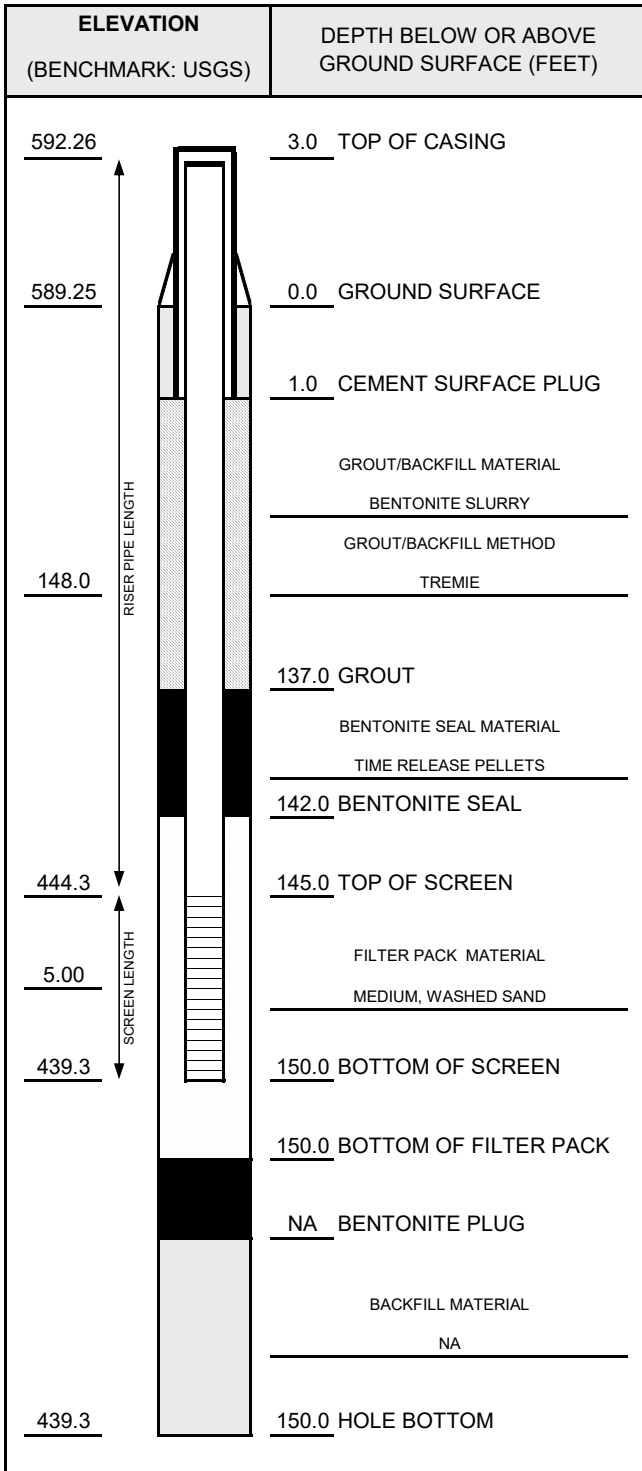
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-10</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/6/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4.5</u> HOURS
WATER REMOVED:	<u>85</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>DARK GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

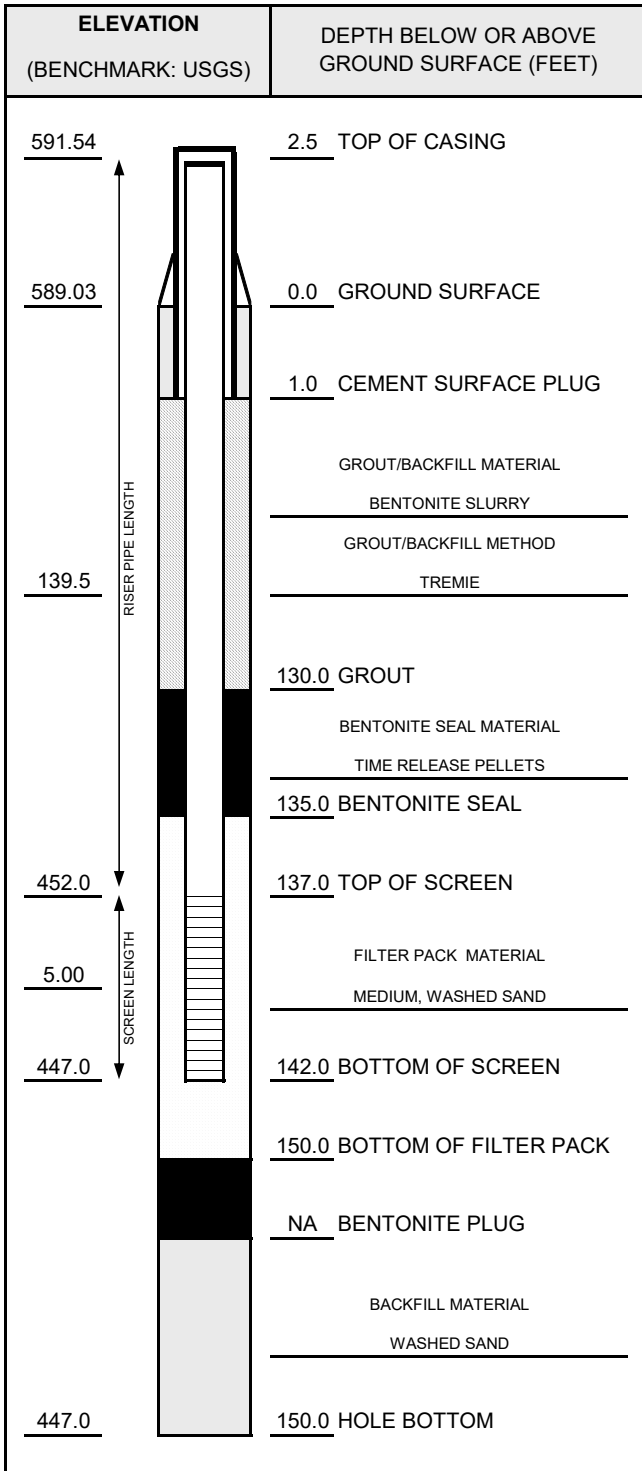
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016
INSTALLED BY: J. Reed	CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>3</u> HOURS
WATER REMOVED:	<u>84</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.36	T/PVC	6/9/2016	12:35
DTB AFTER DEVELOPING:	142.00	T/PVC	6/9/2016	15:45
SWL BEFORE DEVELOPING:	9.65	T/PVC	6/9/2016	12:35
SWL AFTER DEVELOPING:	116.00	T/PVC	6/9/2016	15:45
OTHER SWL:	16.67	T/PVC	6/21/2016	7:45
OTHER SWL:		T/PVC		

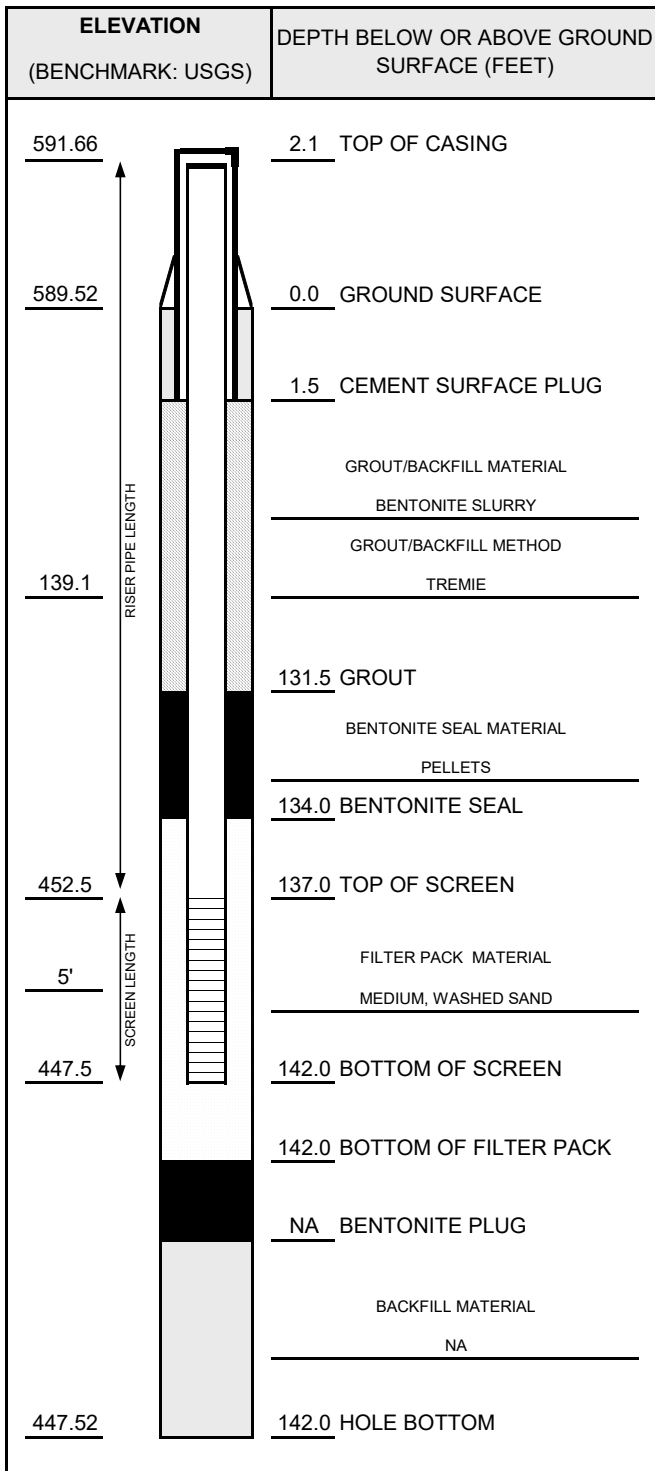
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



## WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: MW-16-11A
PROJ. NO: 265996.0003	DATE INSTALLED: 5/12/2017 INSTALLED BY: Jake Krenz
CHECKED BY: C. Scieszka	



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	6 IN. FROM 0 TO 142 FT. NA IN. FROM NA TO NA FT.
SURF. CASING DIAMETER:	NA IN. FROM NA TO NA FT. NA IN. FROM NA TO NA FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	AIR LIFT
TIME DEVELOPING:	3 HOURS
WATER REMOVED:	110 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Dark Gray
CLARITY AFTER:	Very Turbid
COLOR AFTER:	Light Gray
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	141.98	T/PVC	5/15/2017	0838
DTB AFTER DEVELOPING:	145.45	T/PVC	5/15/2017	1612
SWE BEFORE DEVELOPING:	17.79	T/PVC	5/15/2017	0838
SWE AFTER DEVELOPING:	90.12	T/PVC	5/15/2017	1612
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	3120

## **APPENDIX C - 1970s BORING LOGS**

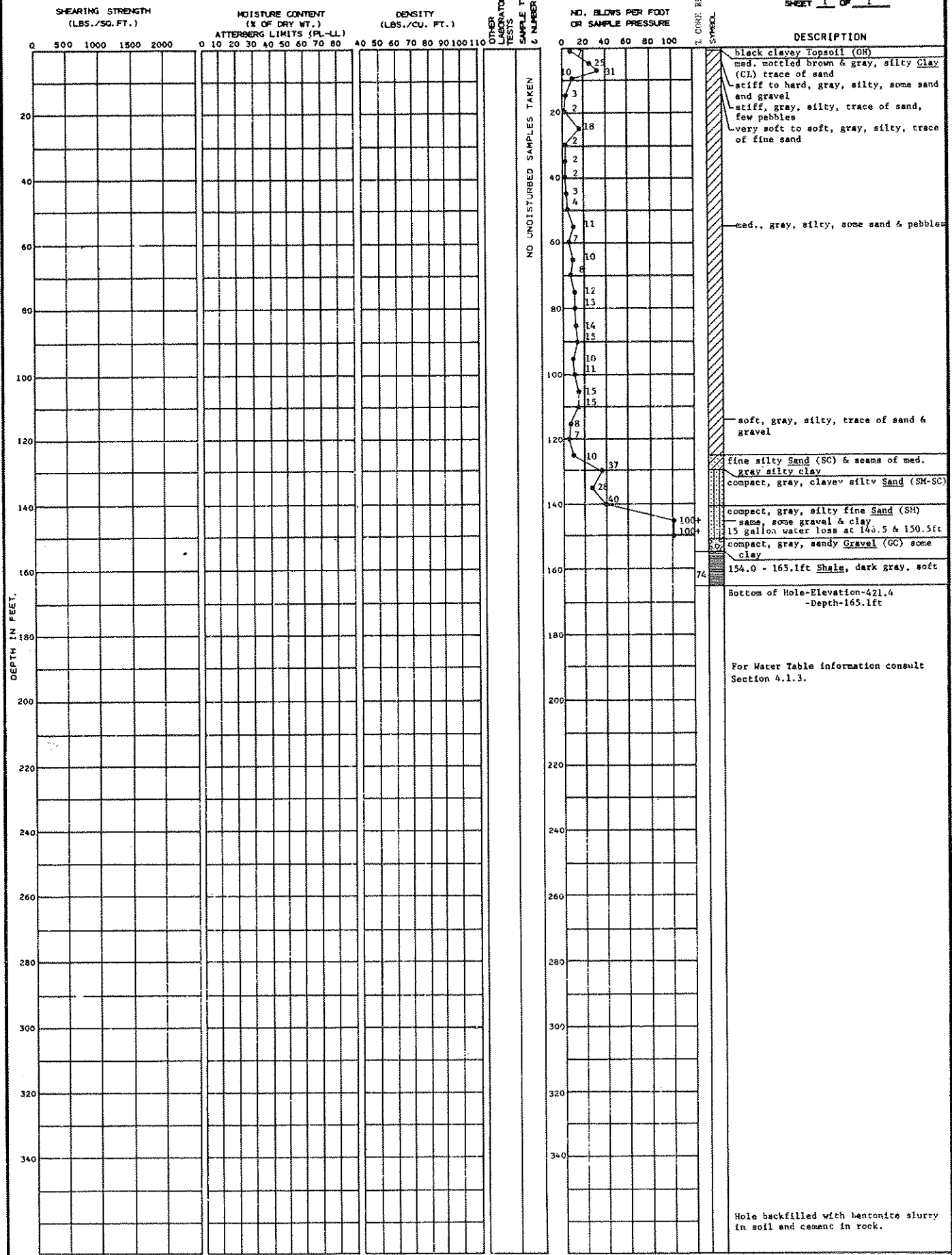


LOCATION: N 7,495  
E 8,304

GROUND ELEVATION: 586.5

DATE DRILLED: 11-26-73  
12-3-73

SHEET 1 OF 1



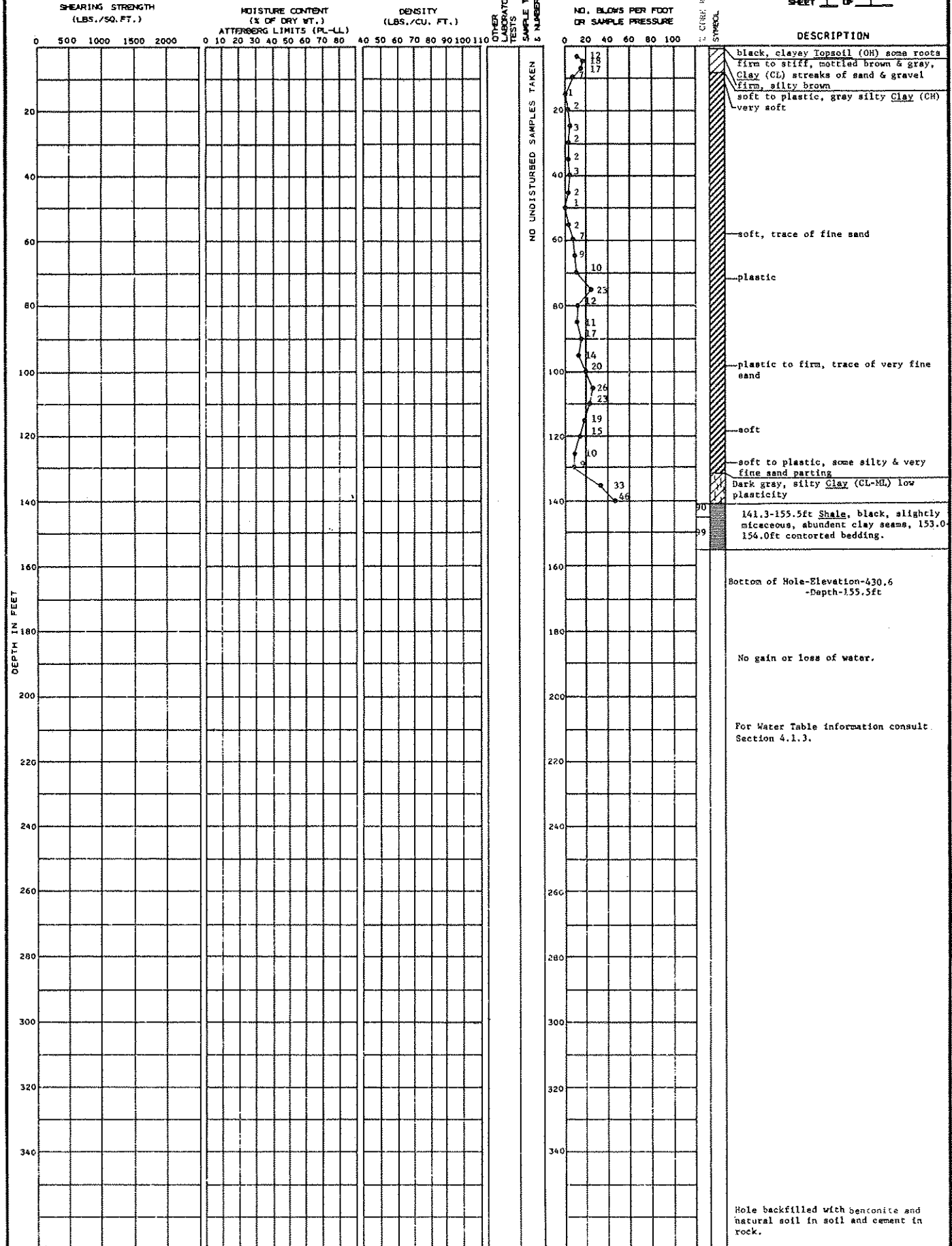
LOCATION: N 8,600  
E 9,965

GROUND ELEVATION

SC9.1

DATE DRILLED: 11-9-73

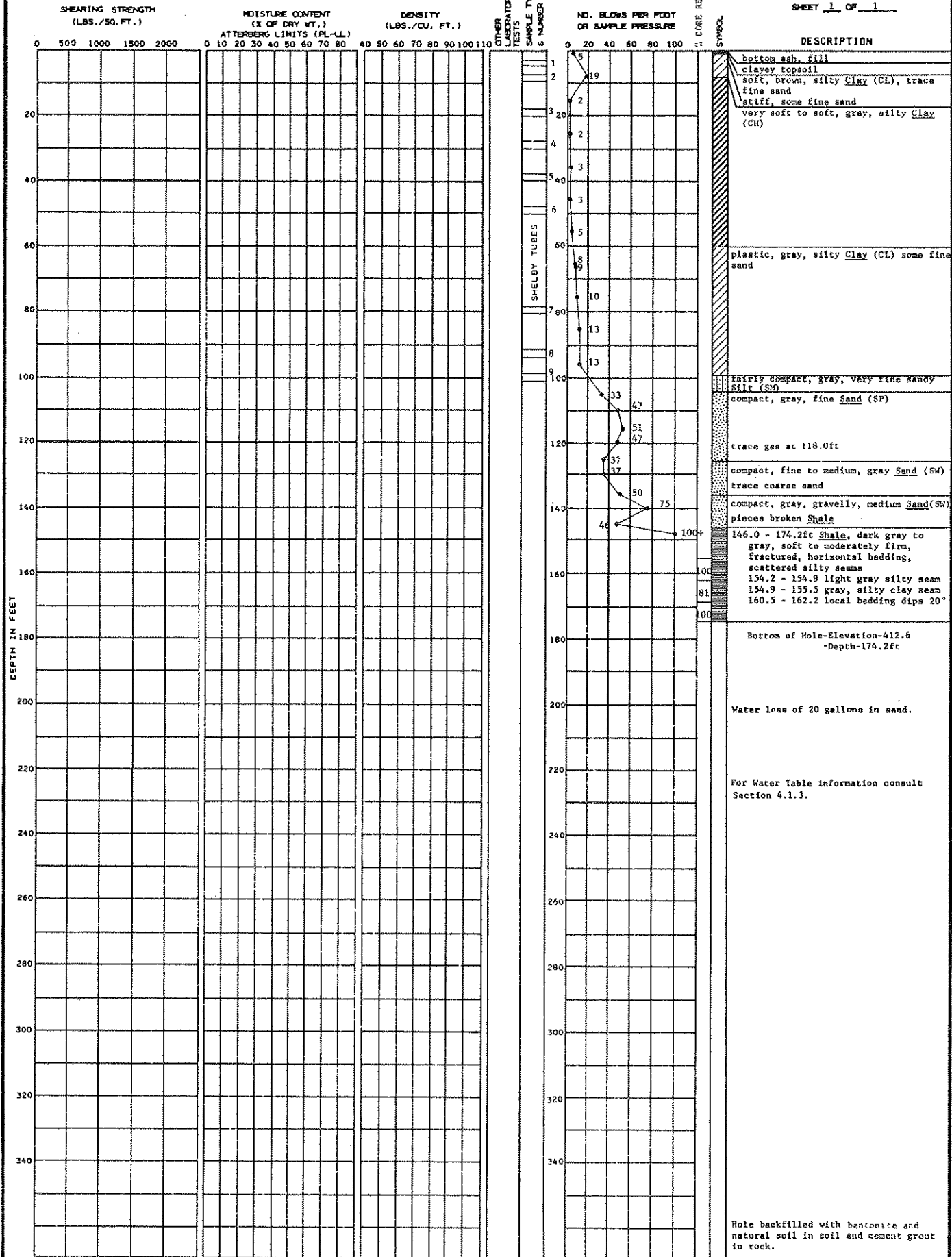
SHEET 1 OF 1



LOCATION: N 7,884 E 9,005 GROUND ELEVATION 586.8

DATE DRILLED: 2-11-74  
2-18-74

SHEET 1 OF 1

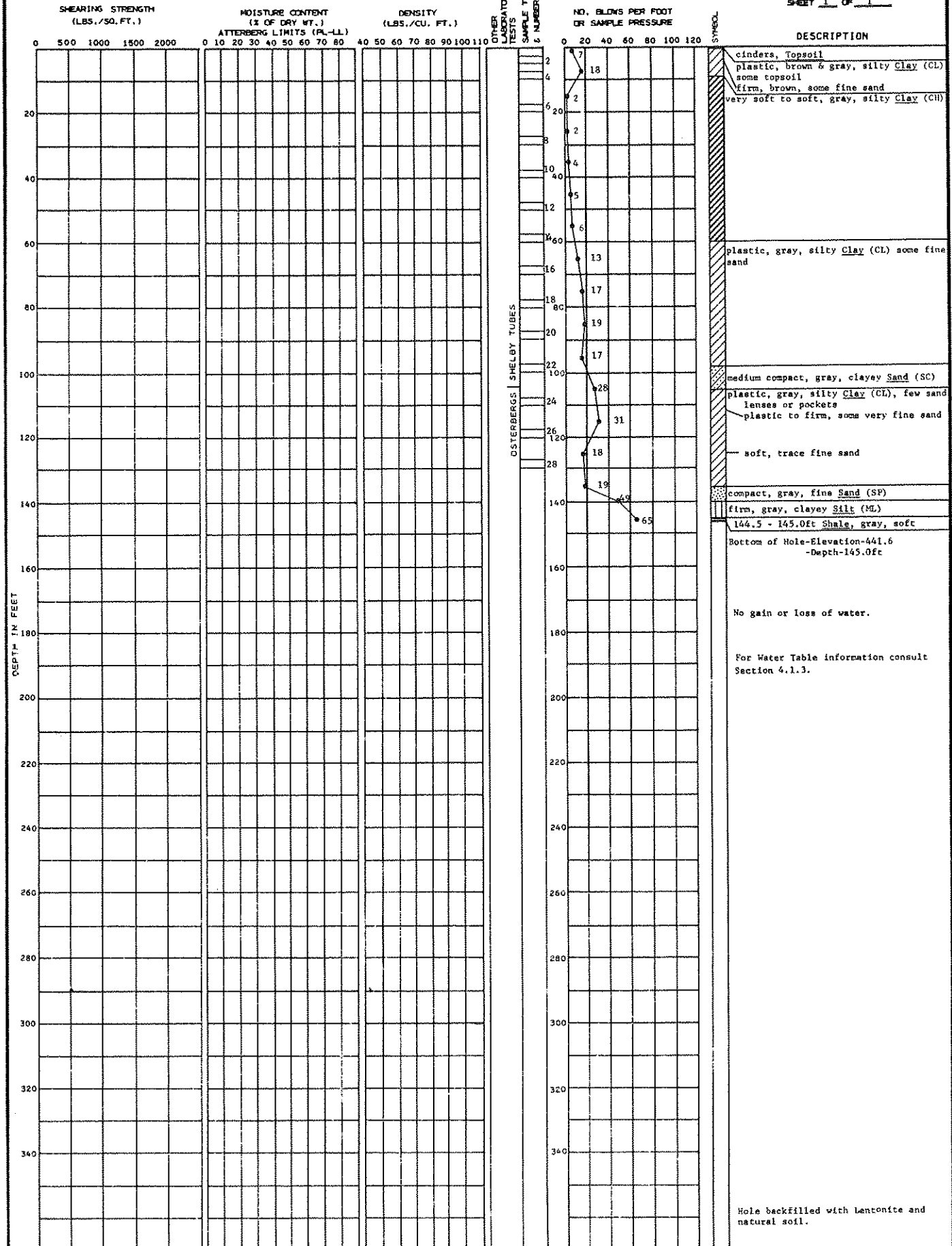


LOCATION: N 8,306  
E 9,627

GROUND ELEVATION 586.6

DATE DRILLED: 1-28-74  
1-31-76

SHEET 1 OF 1



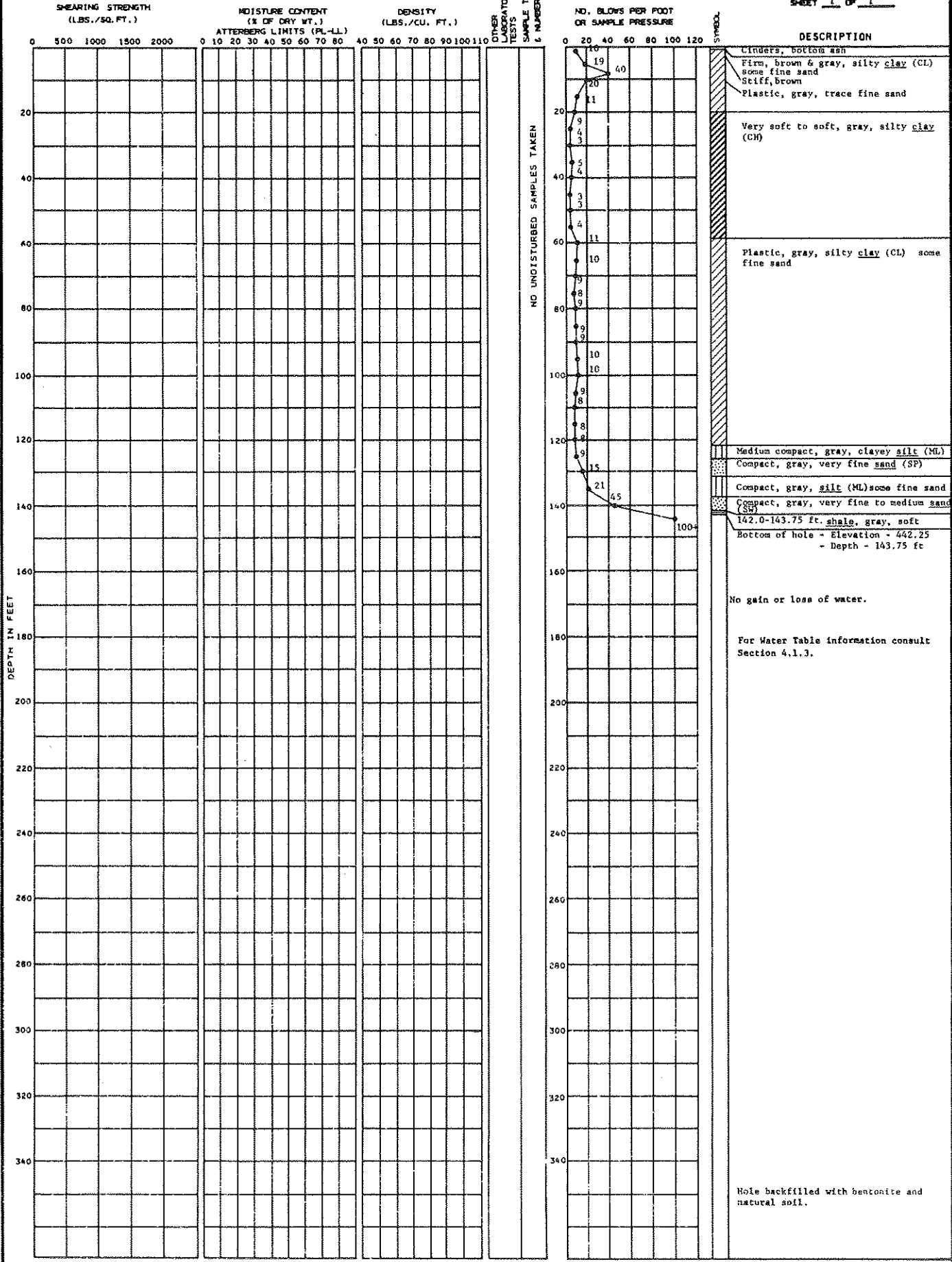
SOIL BORING NO. 14

BECHTEL Belle River

LOCATION: N 7,996 E 8,712 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-16-74

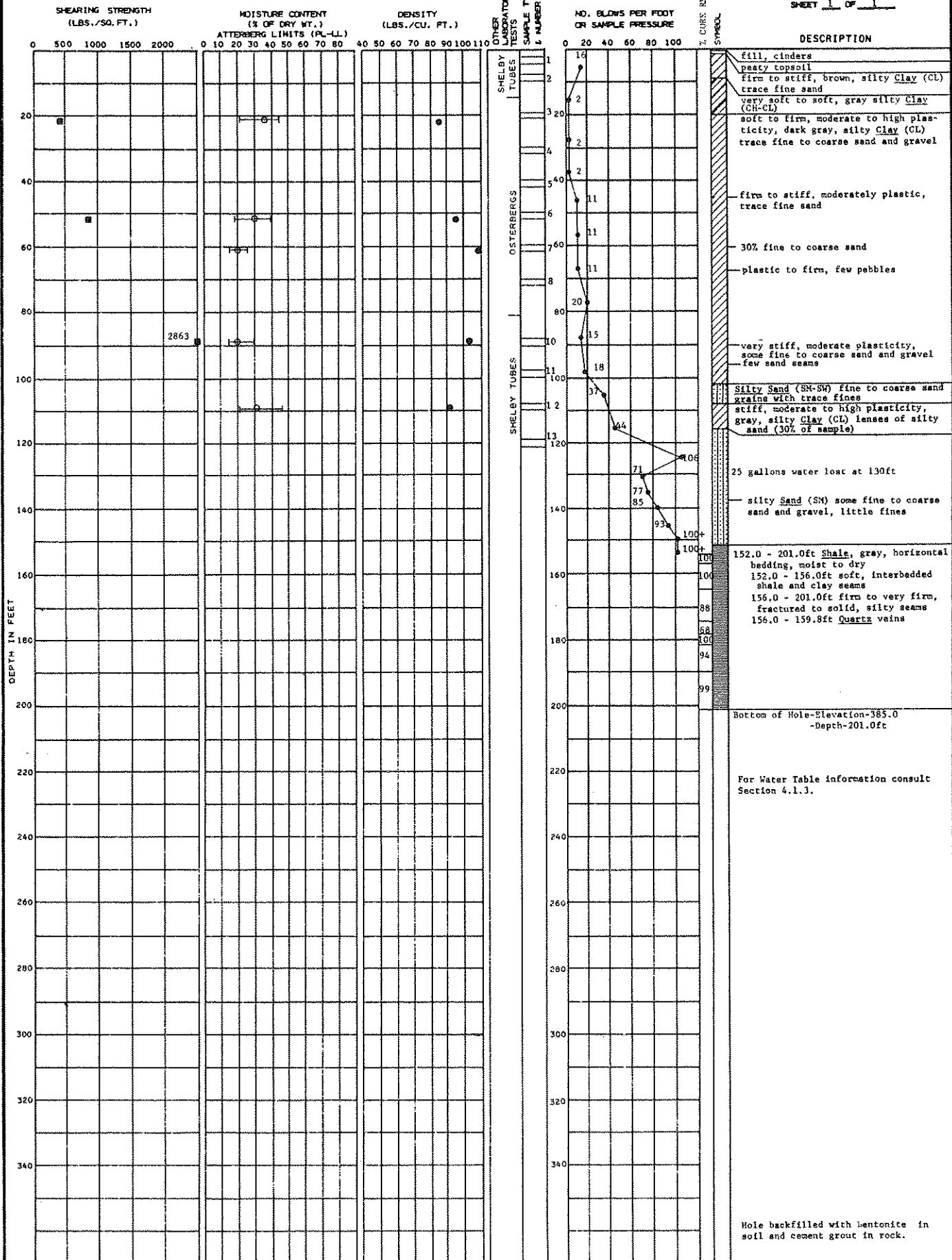
SHEET 1 OF 1



LOCATION: N 8,081 E 9,193 GROUND ELEVATION 586.0

DATE DRILLED: 1-16-74 1-29-74

SHEET 1 OF 1

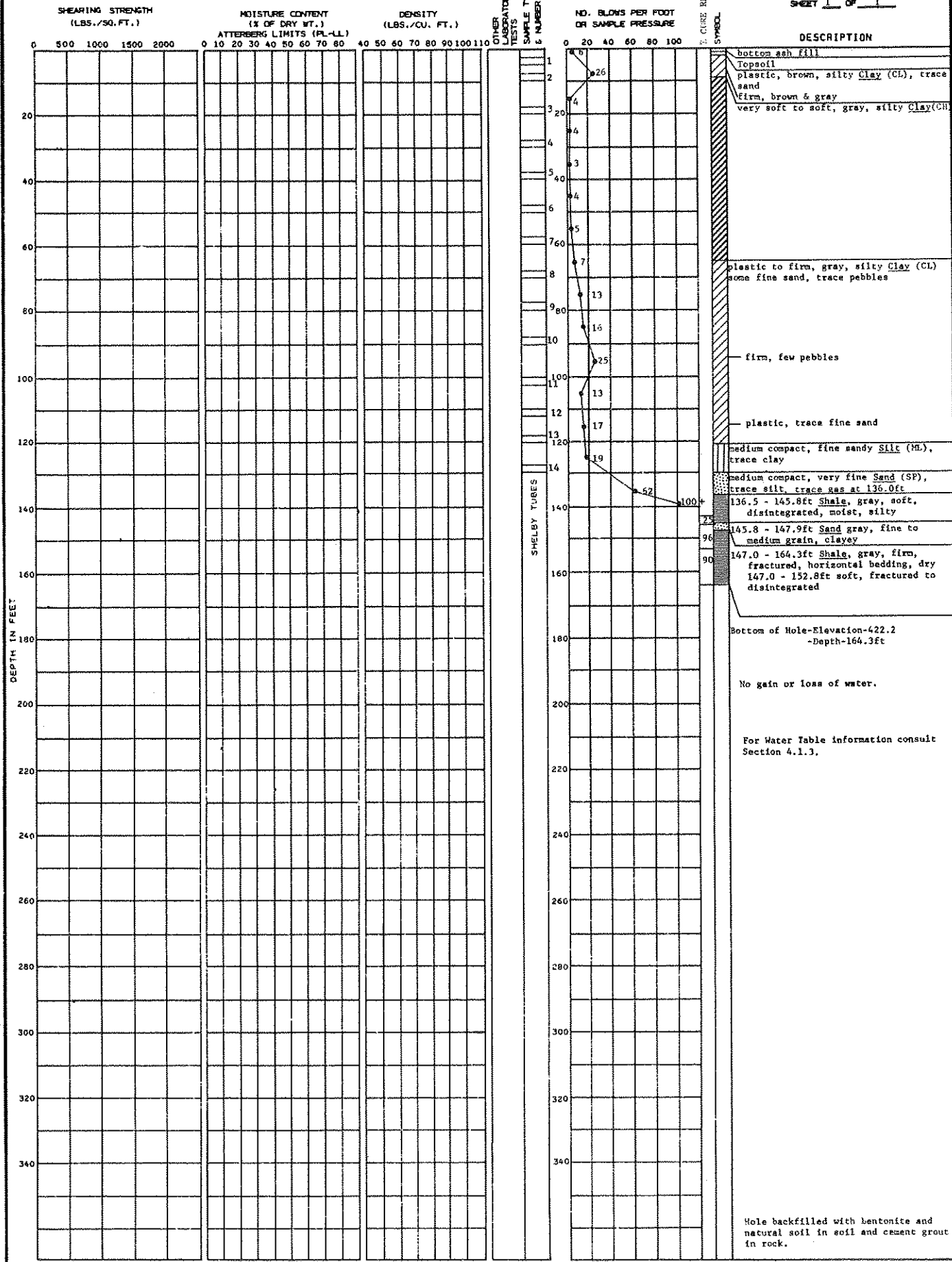


■ Unconsolidated Undrained    — Atterberg Limits  
○ Moisture Content

SOIL BORING NO. 18  
BECHTEL Belle River

LOCATION: N 9,011 E 9,337 GROUND ELEVATION 586.5

DATE DRILLED: 1-17-74  
1-23-74  
SHEET 1 OF 1



LOCATION: N.8,002  
E.9,943

GROUND ELEVATION: 585.9

DATE DRILLED: 11-20-73

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
	(LBS./SQ. FT.)	ATTERBERG LIMITS (PL-LL)	(LBS./CU. FT.)				
0							black clayey Topsoil (OH)
0-2					20		Firm to stiff, mottled brown, silty Clay (CL) trace of sand.
2-4					24		Plastic, gray, silty, some fine sand
4-6					2		very soft gray silty Clay (CH)
6-8					2		
8-10					8		
10-12					2		
12-14					2		
14-16					2		
16-18					2		
18-20					2		
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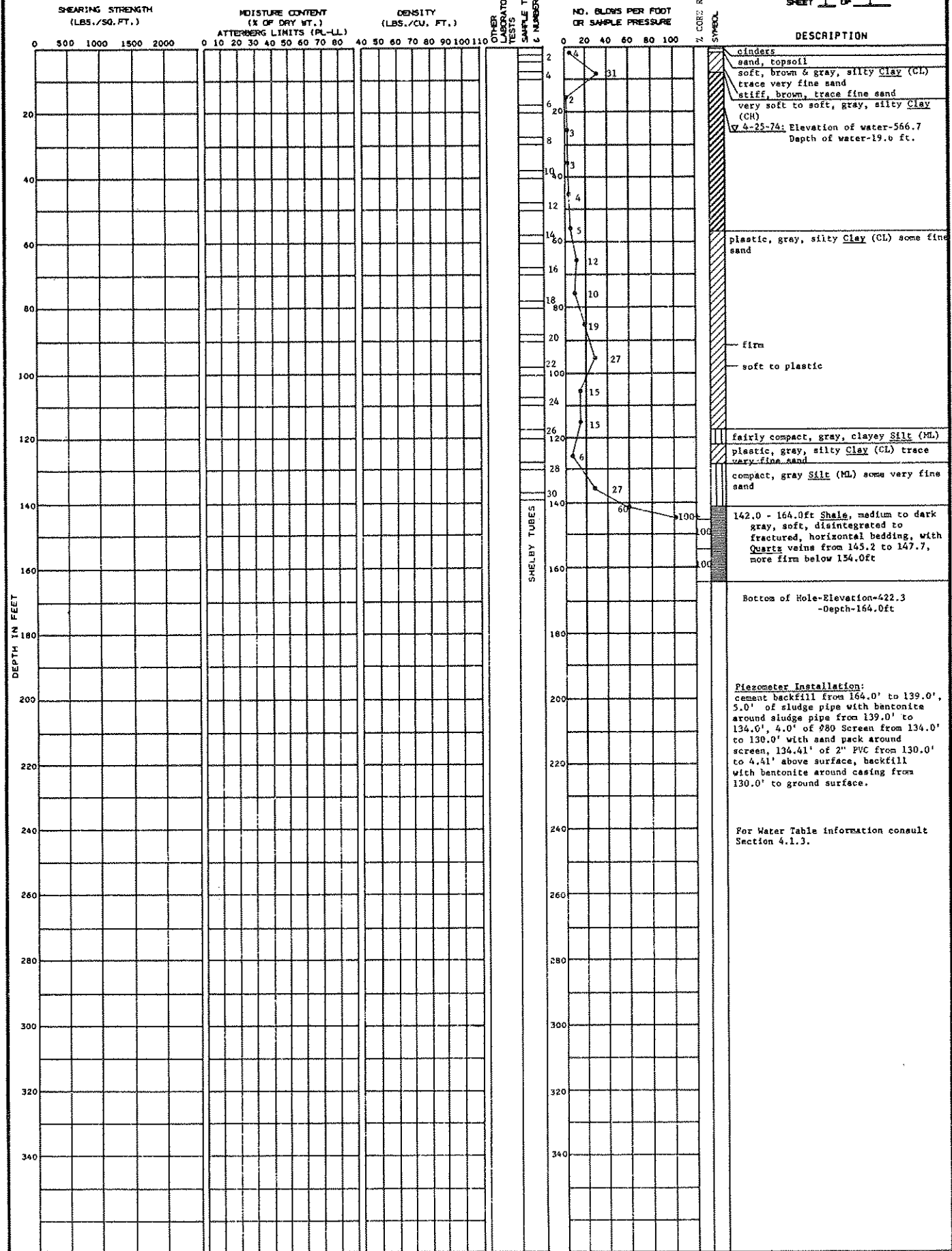


LOCATION: N 7,904  
E 9,436

GROUND ELEVATION 586.3

DATE DRILLED: 1-30-74  
2-5-74

SHEET 1 OF 1



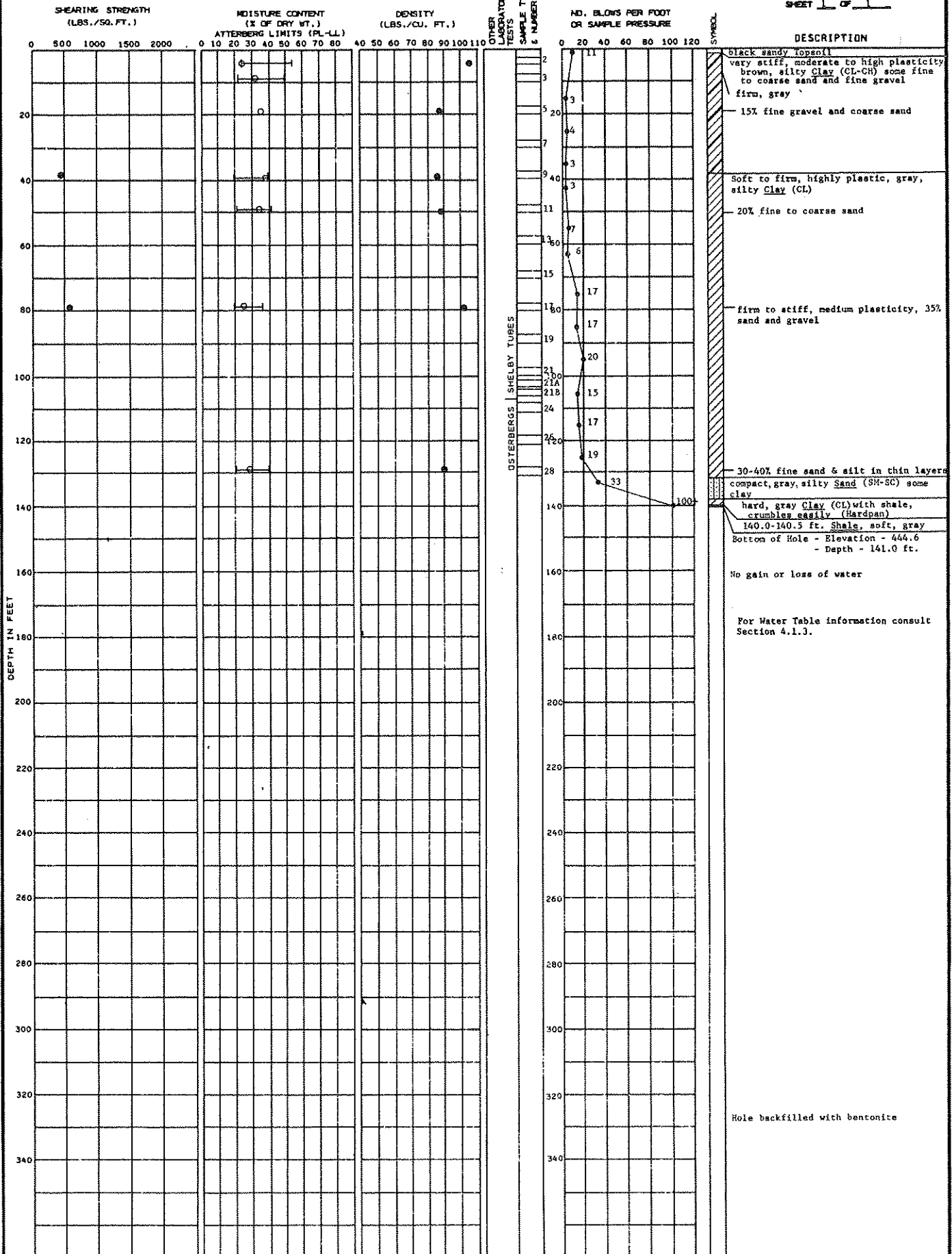
SOIL BORING NO. 24

BECHTEL Belle River

LOCATION: N 7,890 E 9,763 GROUND ELEVATION 585.6

DATE DRILLED: 12-12-73  
12-19-73

SHEET 1 OF 1



● Unconfined Compression  
○ Atterberg Limits  
○ Moisture Content

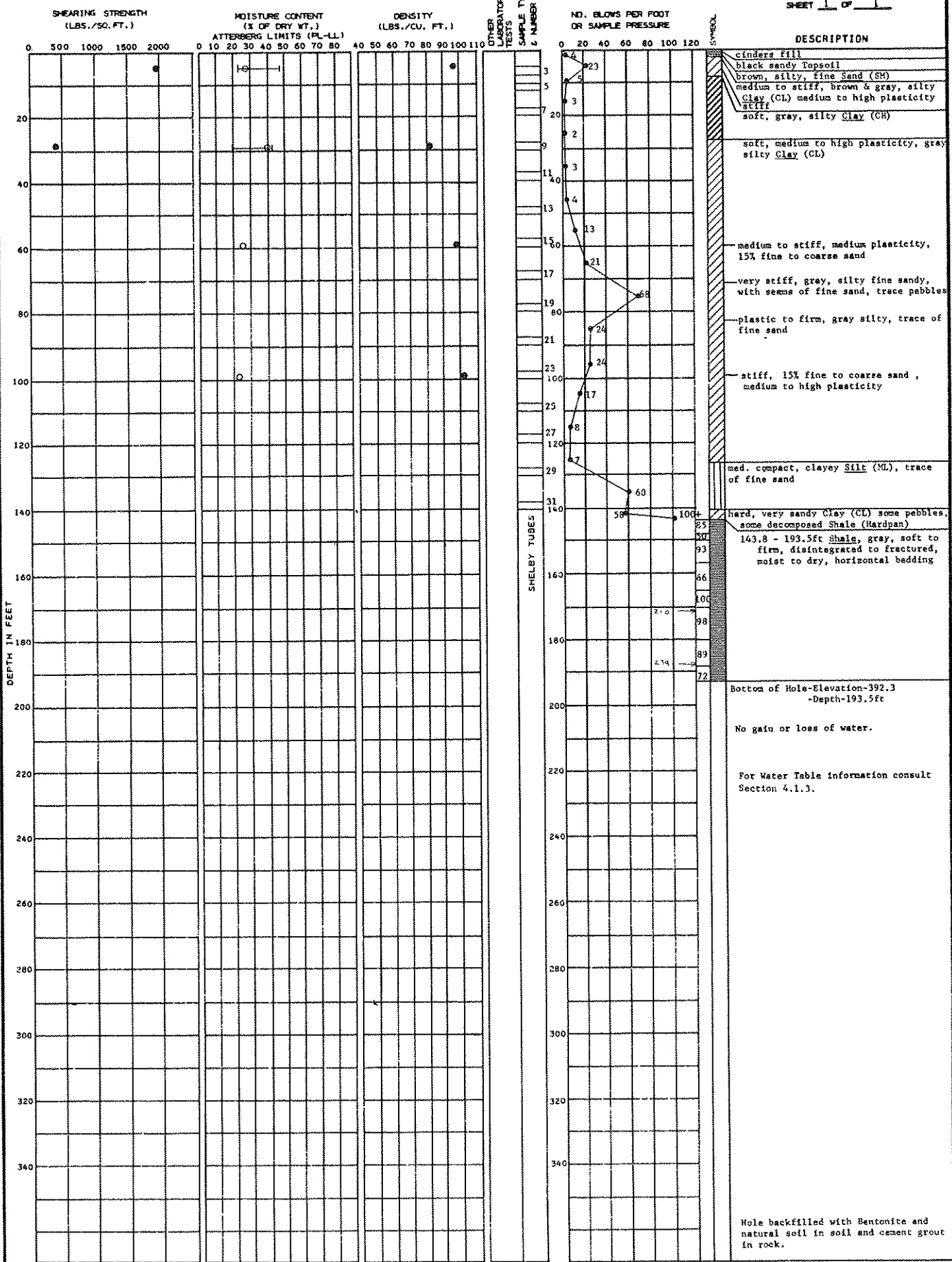
SOIL BORING NO. 26

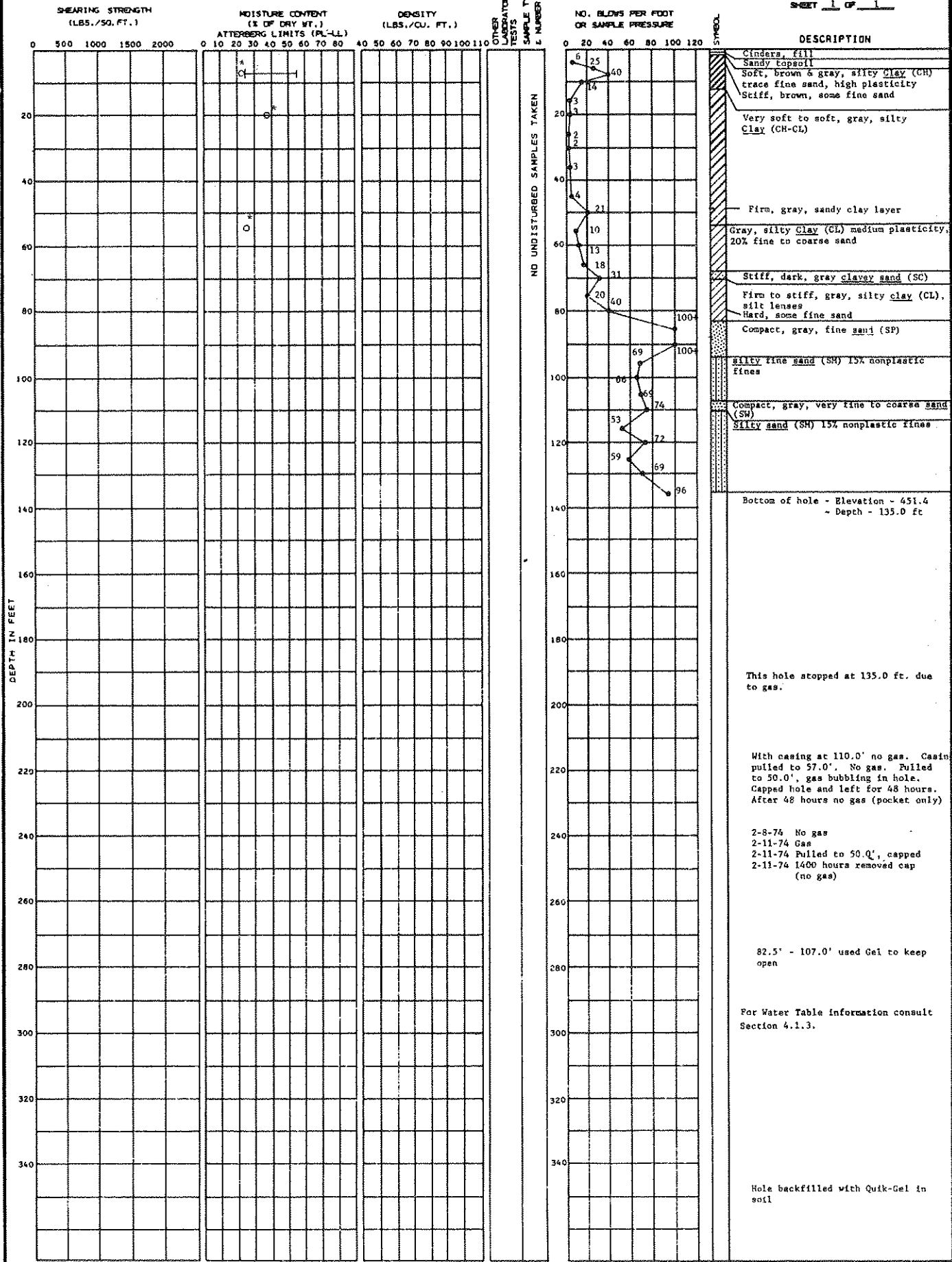
LOCATION: N 7,724  
E 9,443

GROUND ELEVATION 585.8

DATE DRILLED: 1-15-74  
1-22-74

SHEET 1 OF 1





**DESCRIPTION**

Cinders, fill  
Sandy topsoil  
Soft, brown & gray, silty Clay (CH)  
trace fine sand, high plasticity  
Stiff, brown, some fine sand

Very soft to soft, gray, silty Clay (CH-CL)

Firm, gray, sandy clay layer

Gray, silty Clay (CL) medium plasticity, 20% fine to coarse sand

Stiff, dark, gray clayey sand (SC)

Firm to stiff, gray, silty clay (CL), silt lenses  
Hard, some fine sand

Compact, gray, fine sand (SP)

silty fine sand (SM) 15% nonplastic fines

Compact, gray, very fine to coarse sand (SW)

Silty sand (SM) 15% nonplastic fines

Bottom of hole - Elevation - 451.4  
- Depth - 135.0 ft

This hole stopped at 135.0 ft. due to gas.

With casing at 110.0' no gas. Casing pulled to 57.0'. No gas. Pulled to 50.0', gas bubbling in hole. Capped hole and left for 48 hours. After 48 hours no gas (pocket only)

2-8-74 No gas  
2-11-74 Gas  
2-11-74 Pulled to 50.0', capped  
2-11-74 1400 hours removed cap (no gas)

82.5' - 107.0' used Gel to keep open

For Water Table information consult Section 4.1.3.

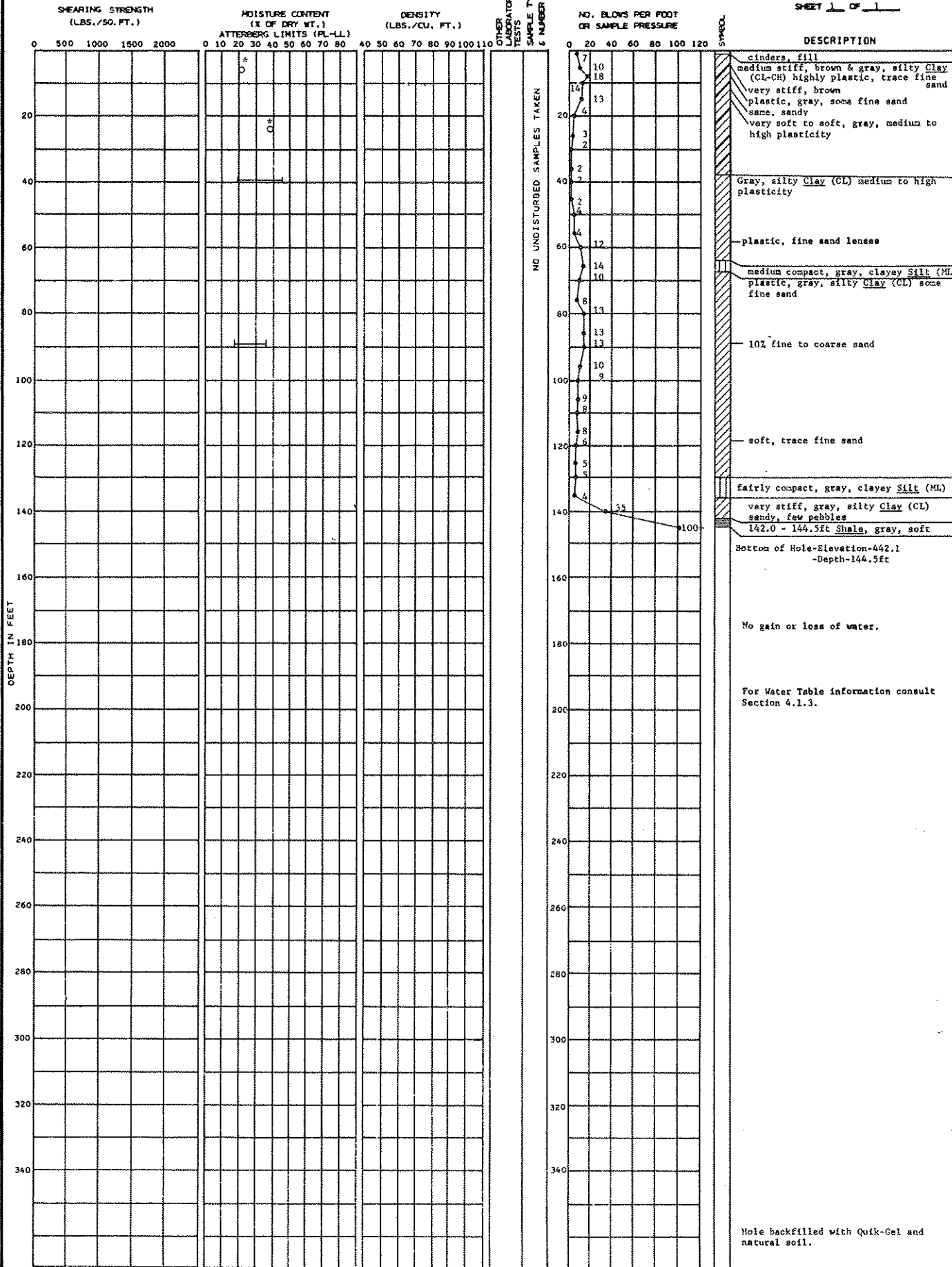
Hole backfilled with Quik-Gel in soil

Atterberg Limits  
○ Moisture Content  
\* Sample Jar Unsealed

LOCATION: N 7,663 E 2,659 GROUND ELEVATION 586.6

DATE DRILLED: 2-6-74  
2-12-74

SHEET 1 OF 1

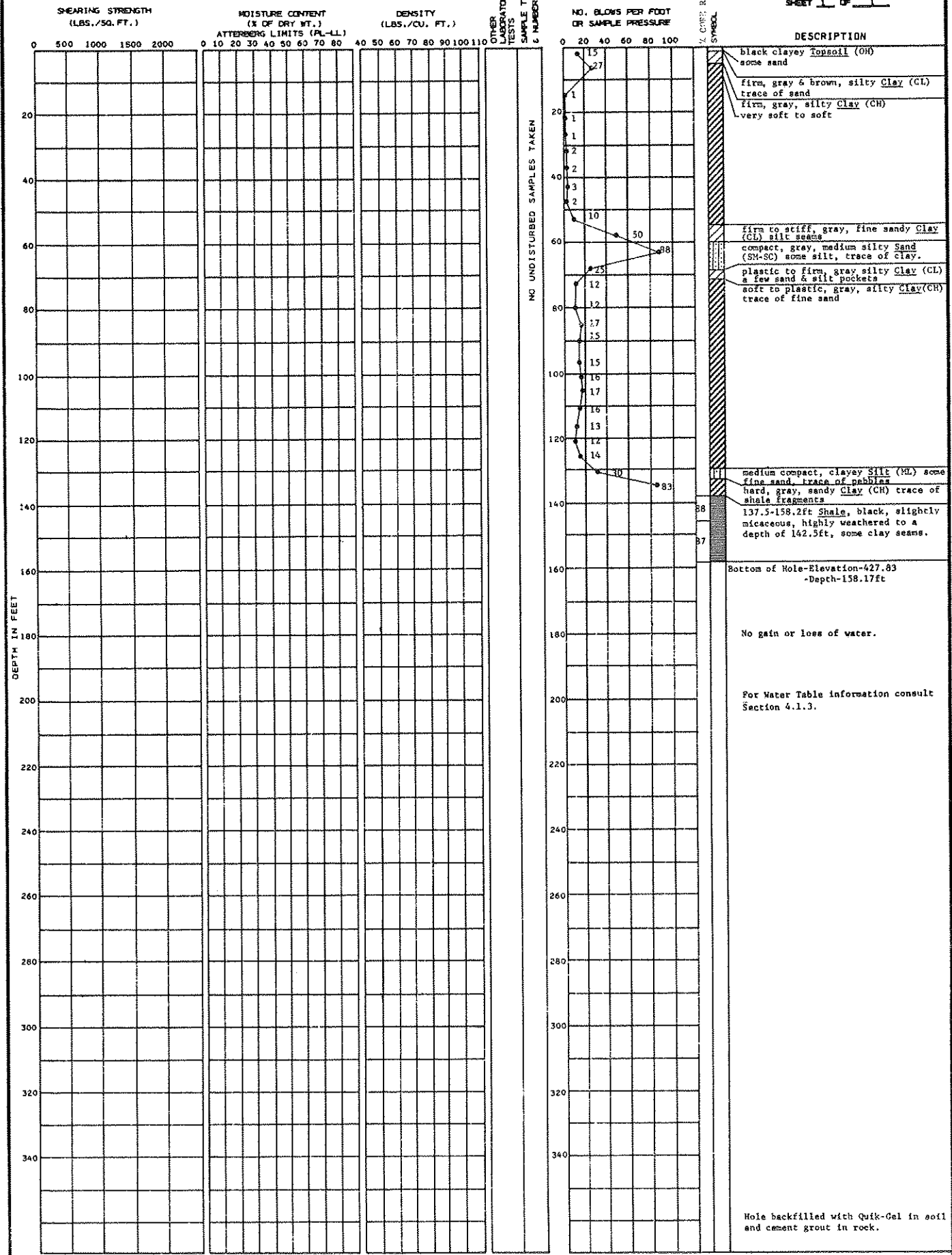


Atterberg Limits  
 ○ Moisture Content  
 \* Sample Jar Unsealed

SOIL BORING NO. 32  
 BECHTEL Belle River

LOCATION: N 7,398  
E 9,963 GROUND ELEVATION 586.0

DATE DRILLED: 11-8-73  
SHEET 1 OF 1

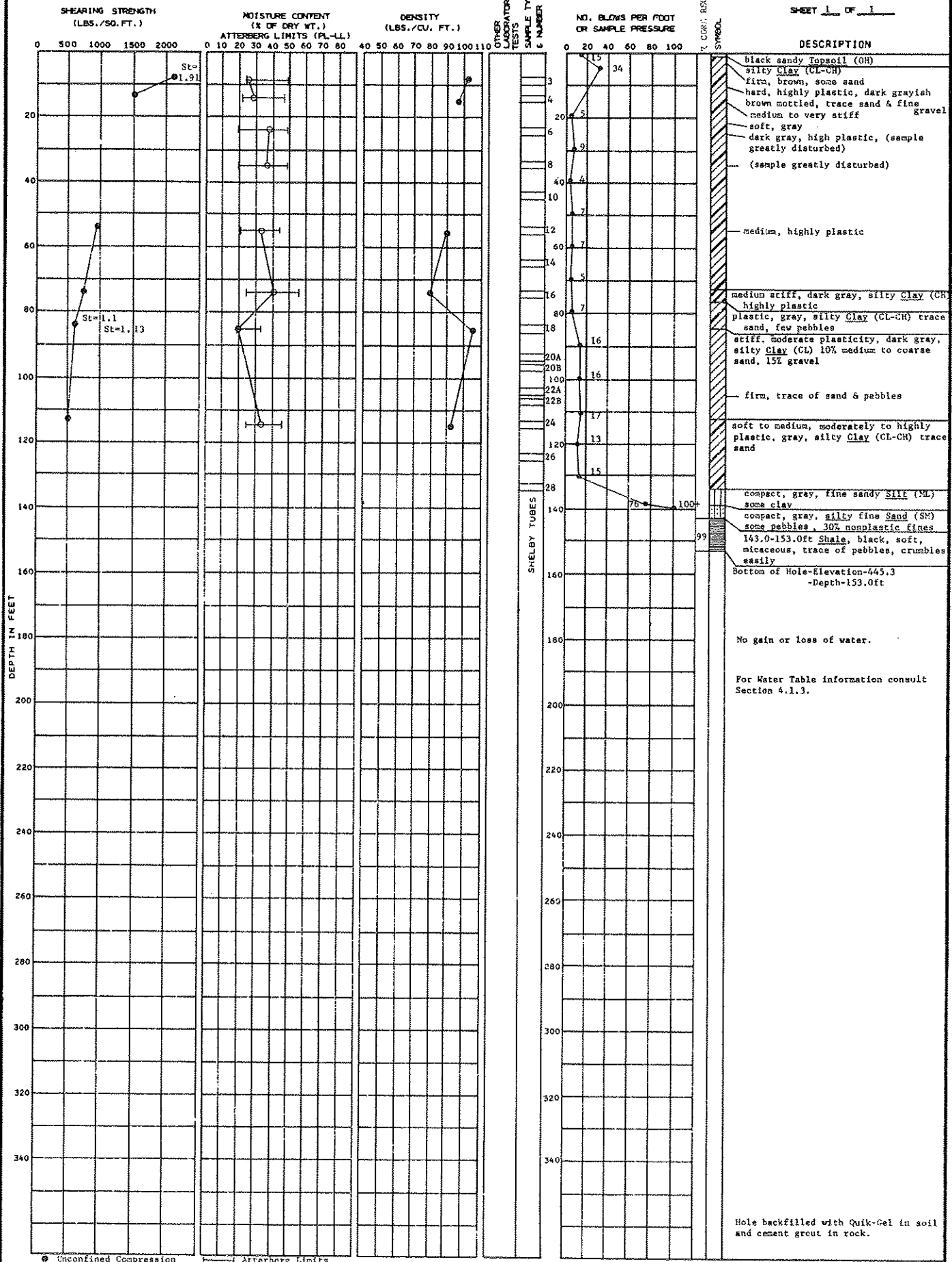


LOCATION: N 9,007  
E 13,035

GROUND ELEVATION: 598.3

DATE DRILLED: 12-6-73  
12-12-73

SHEET 1 OF 1



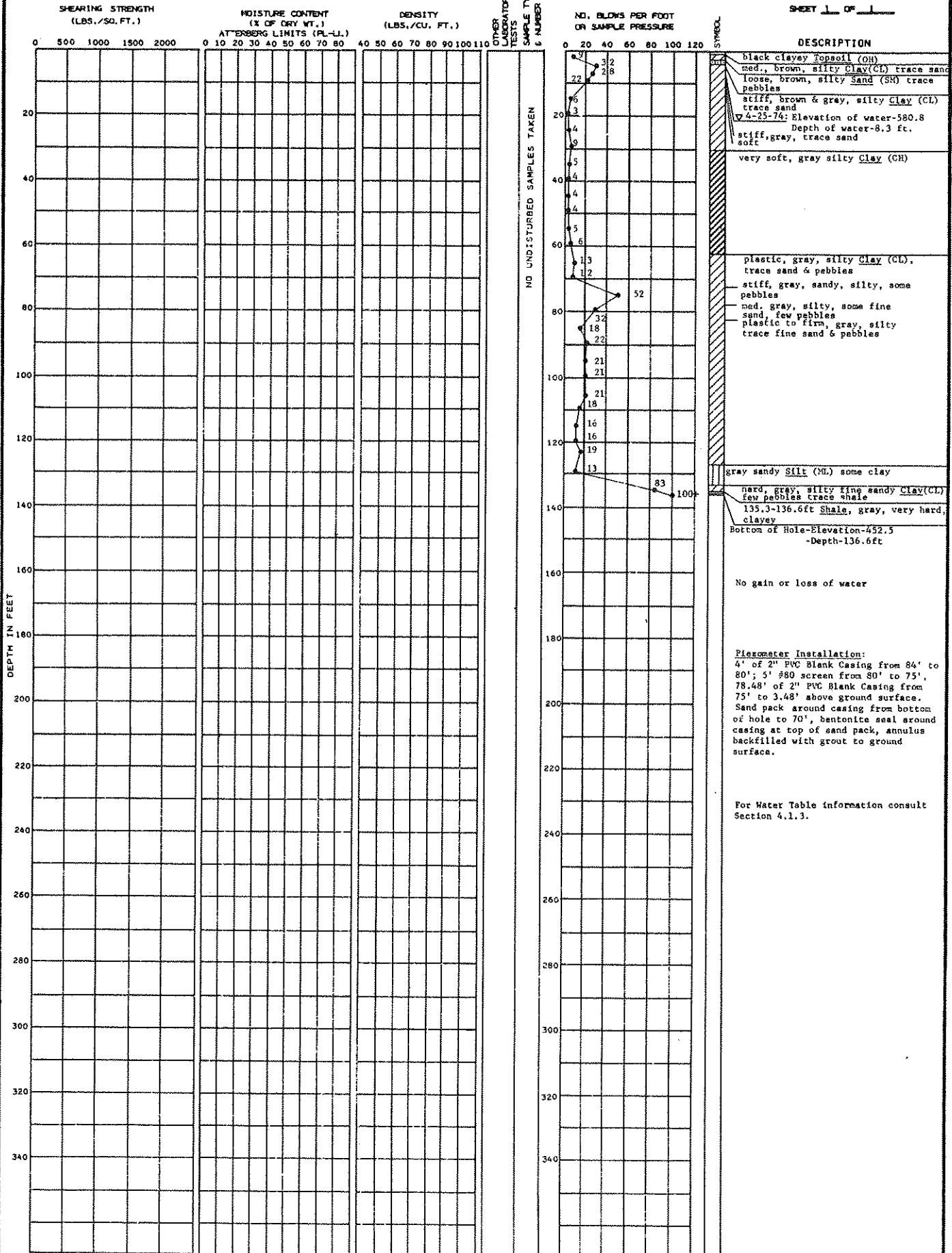
● Unconfined Compression  
St = Sensitivity

○ Atterberg Limits  
Moisture Content

LOCATION: N 8,003 E10,993 GROUND ELEVATION: 589.1

DATE DRILLED: 12-14-73 12-18-73

SHEET 1 OF 1



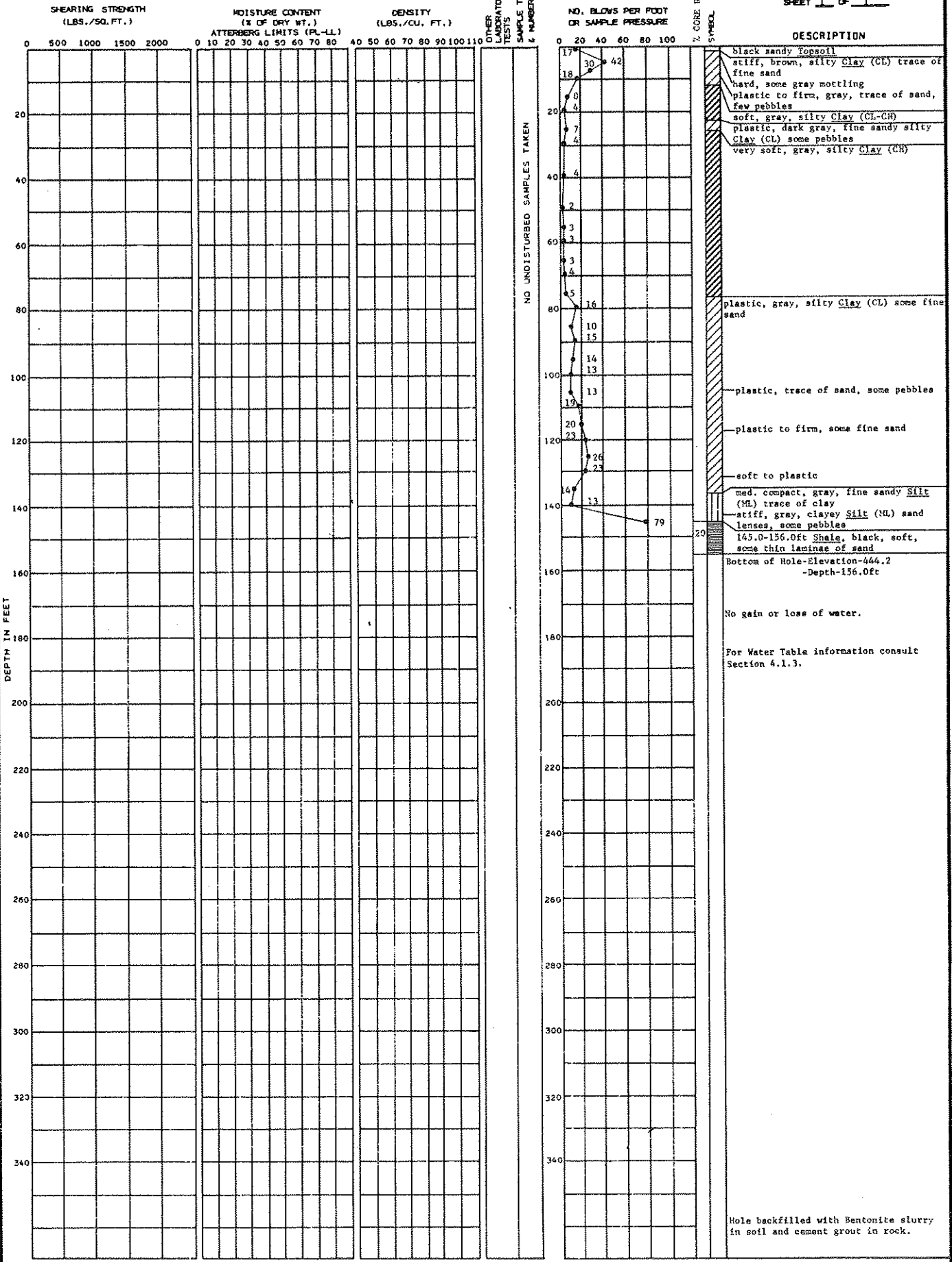


LOCATION: N 8,016  
E 12,991

GROUND ELEVATION 500.2

DATE DRILLED: 11-19-73  
11-21-73

SHEET 1 OF 1

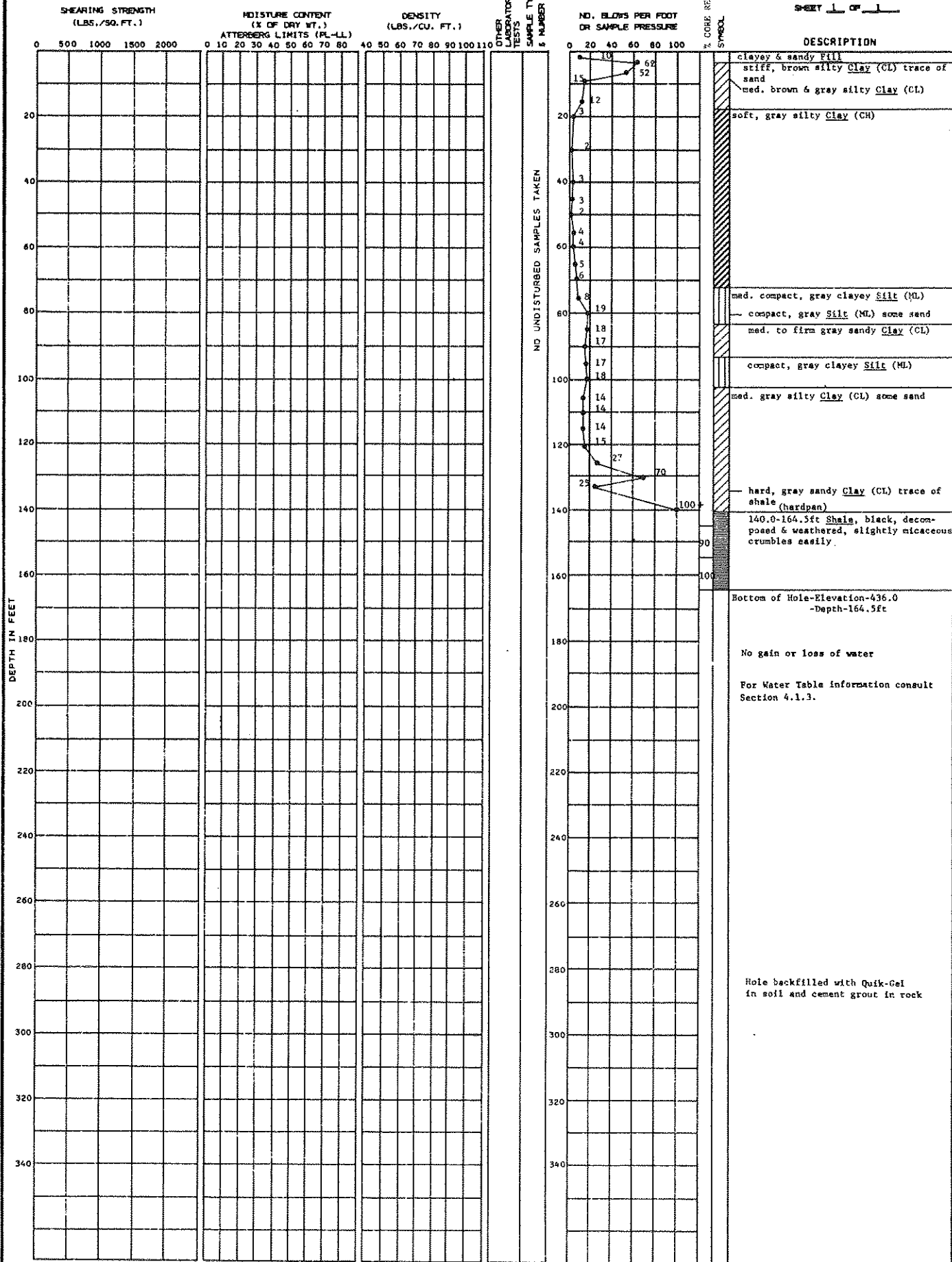


SOIL BORING NO. 42  
BECHTEL Belle River

LOCATION: N 7,004  
E13,000 GROUND ELEVATION 600.5

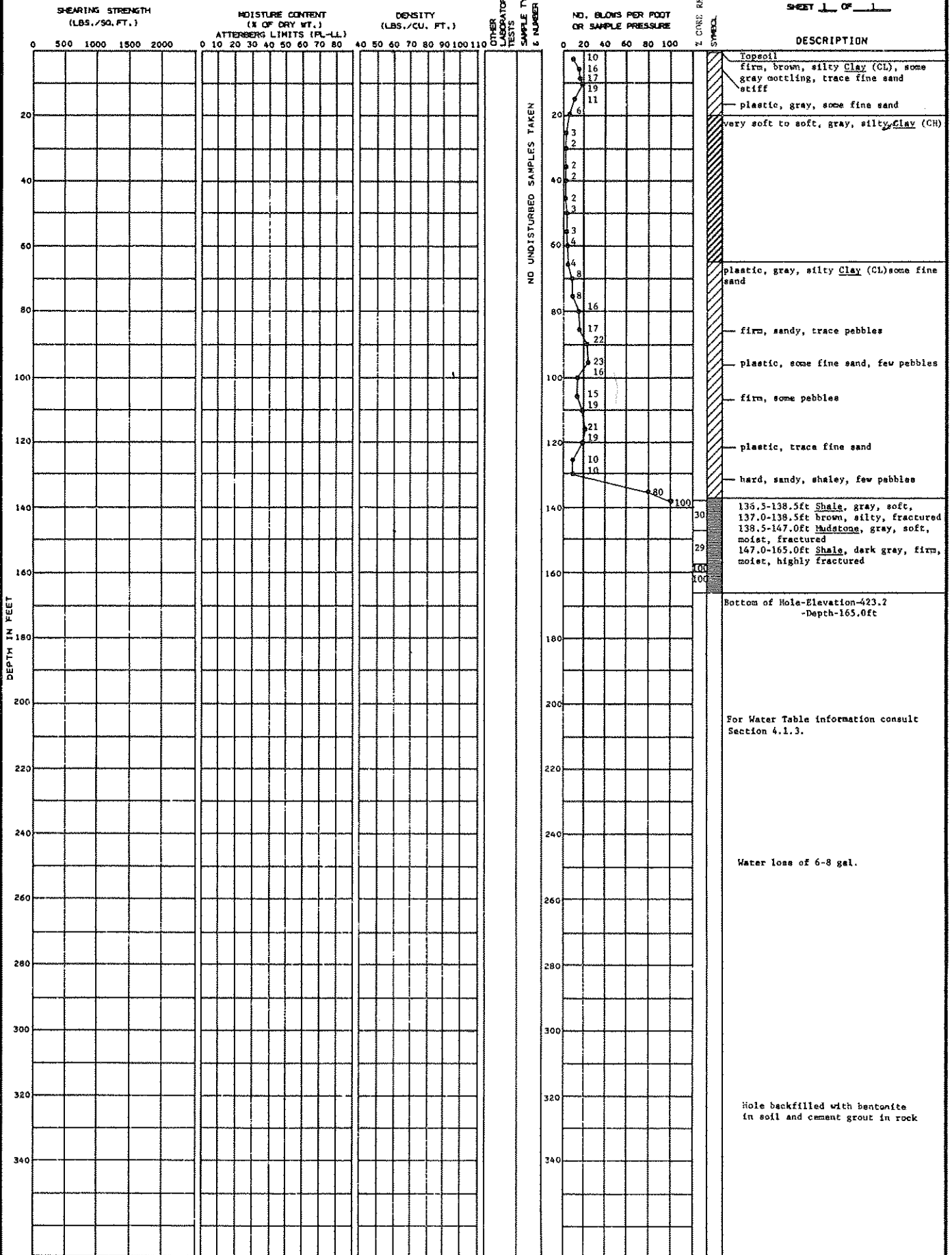
DATE DRILLED: 11-20-73

SHEET 1 OF 1



LOCATION: N 5,344  
E 12,319 GROUND ELEVATION 588.2

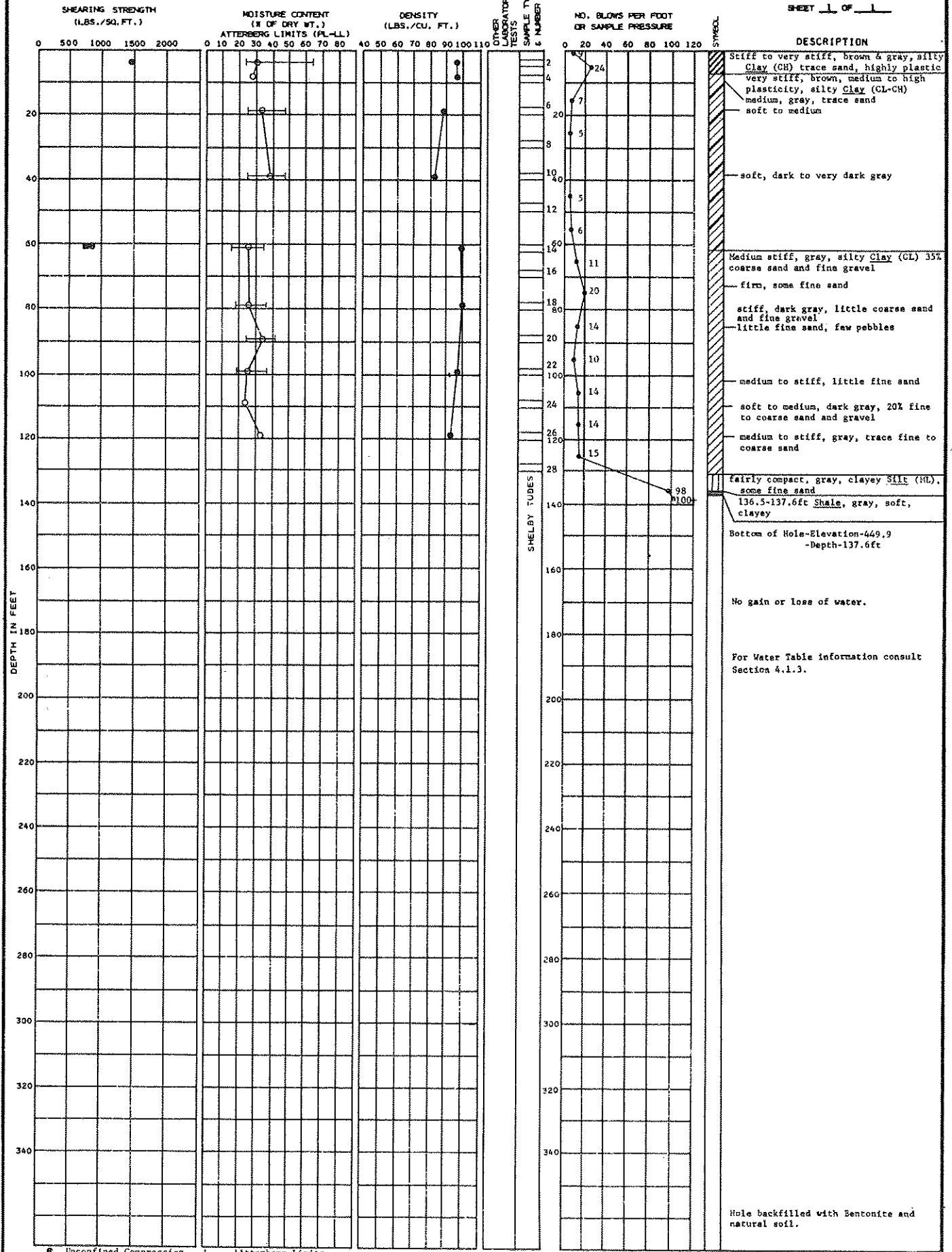
DATE DRILLED: 1-22-74  
1-28-74  
SHEET 1 OF 1



LOCATION: N 3,950 E 12,584 GROUND ELEVATION 587.5

DATE DRILLED: 1-14-74  
1-23-74

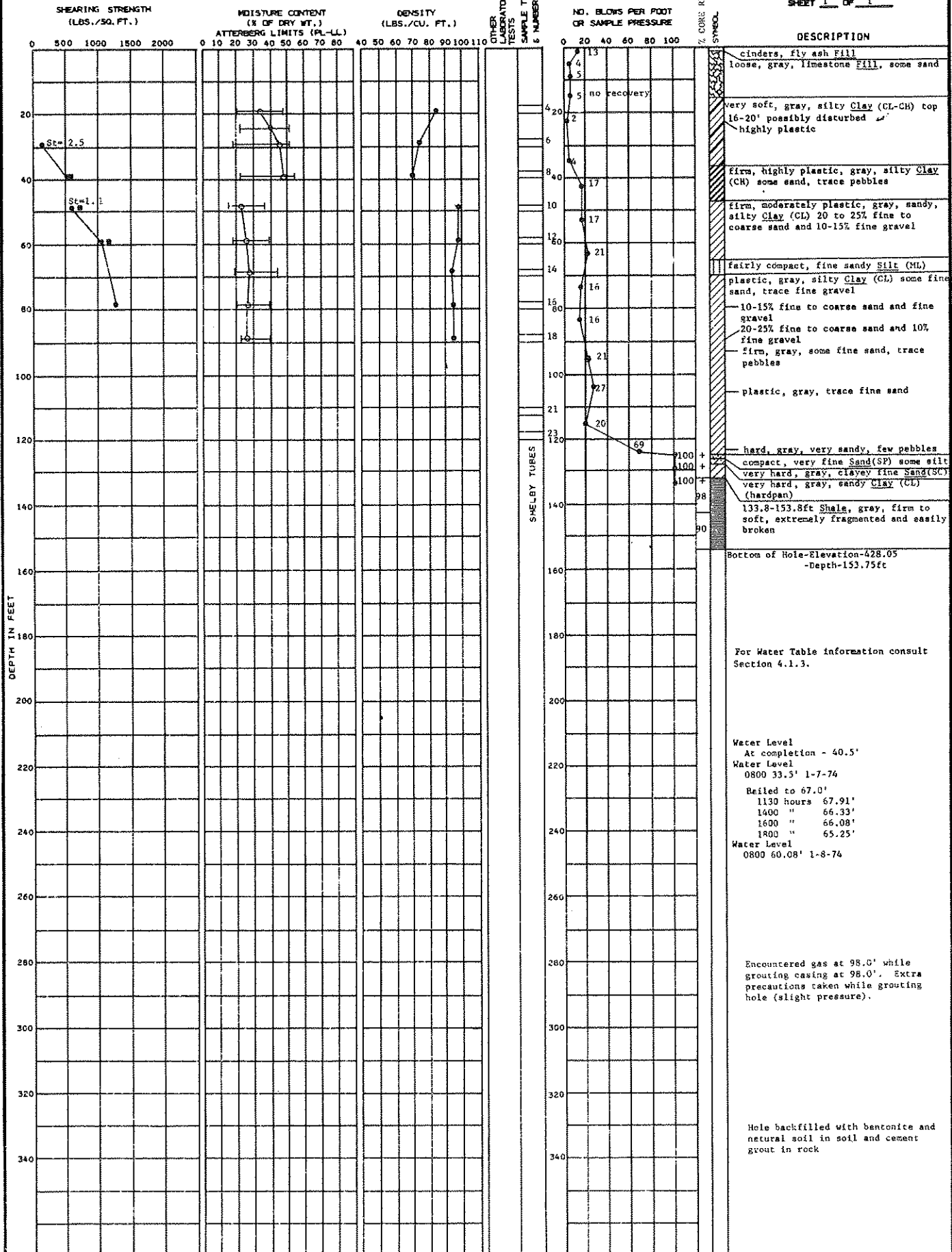
SHEET 1 OF 1



● Unconfined Compression    ○ Atterberg Limits  
 ■ Unconsolidated Undrained    ○ Moisture Content

SOIL BORING NO. 48

BECHTEL Belle River



● Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity  
 ○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 50

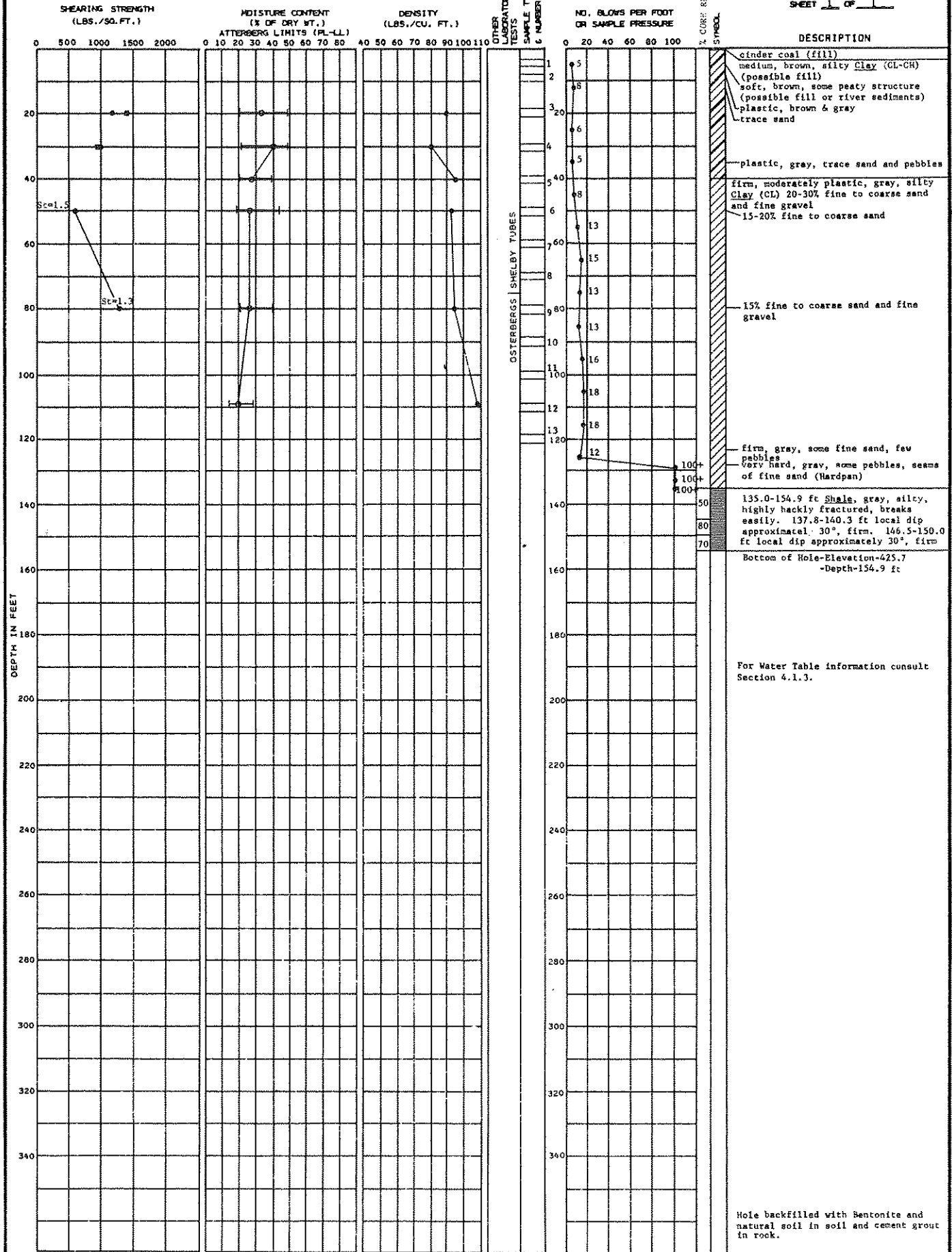
BECHTEL Belle River

LOCATION: N 2,052  
E15,176

GROUND ELEVATION: 580.6

DATE DRILLED: 12-21-73  
1-7-76

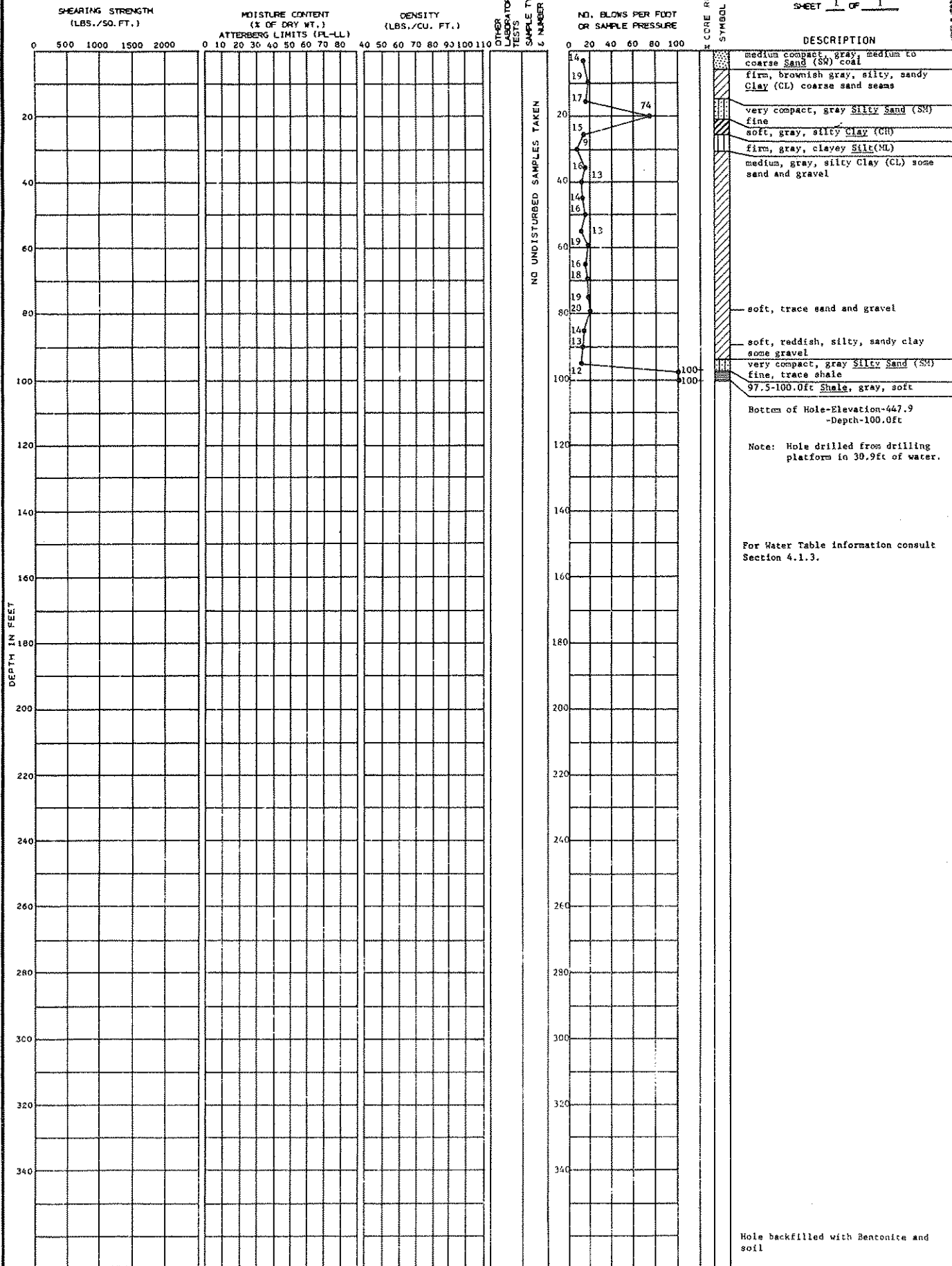
SHEET 1 OF 1



LOCATION: N 2,645 E 15,306 GROUND ELEVATION 547.9

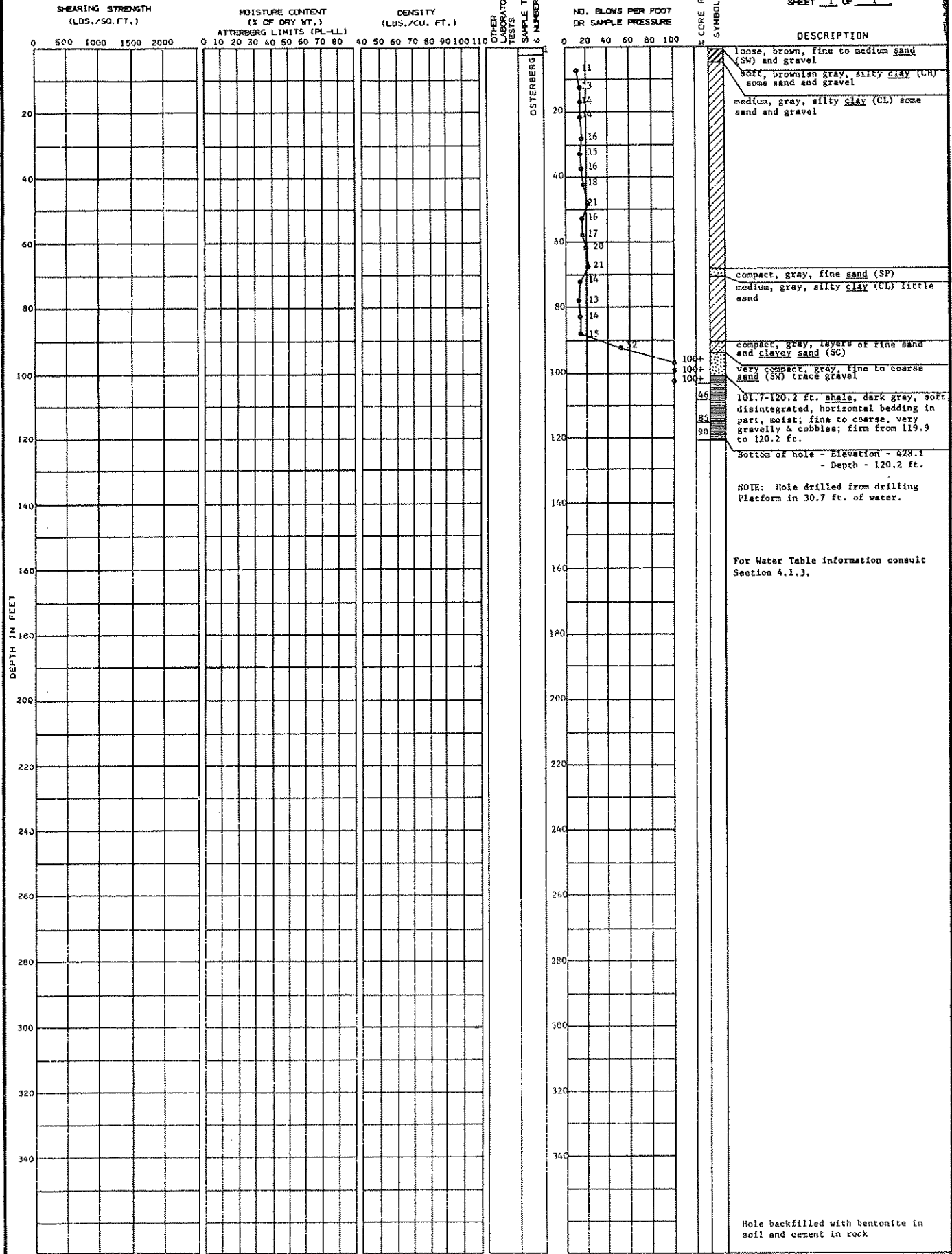
DATE DRILLED: 3-29-74

SHEET 1 OF 1



LOCATION: N 1,907 GROUND ELEVATION 543.3  
 E 15,269

DATE DRILLED: 3-20-74  
 3-25-74  
 SHEET 1 OF 1



Hole backfilled with bentonite in soil and cement in rock

SOIL BORING NO. 57

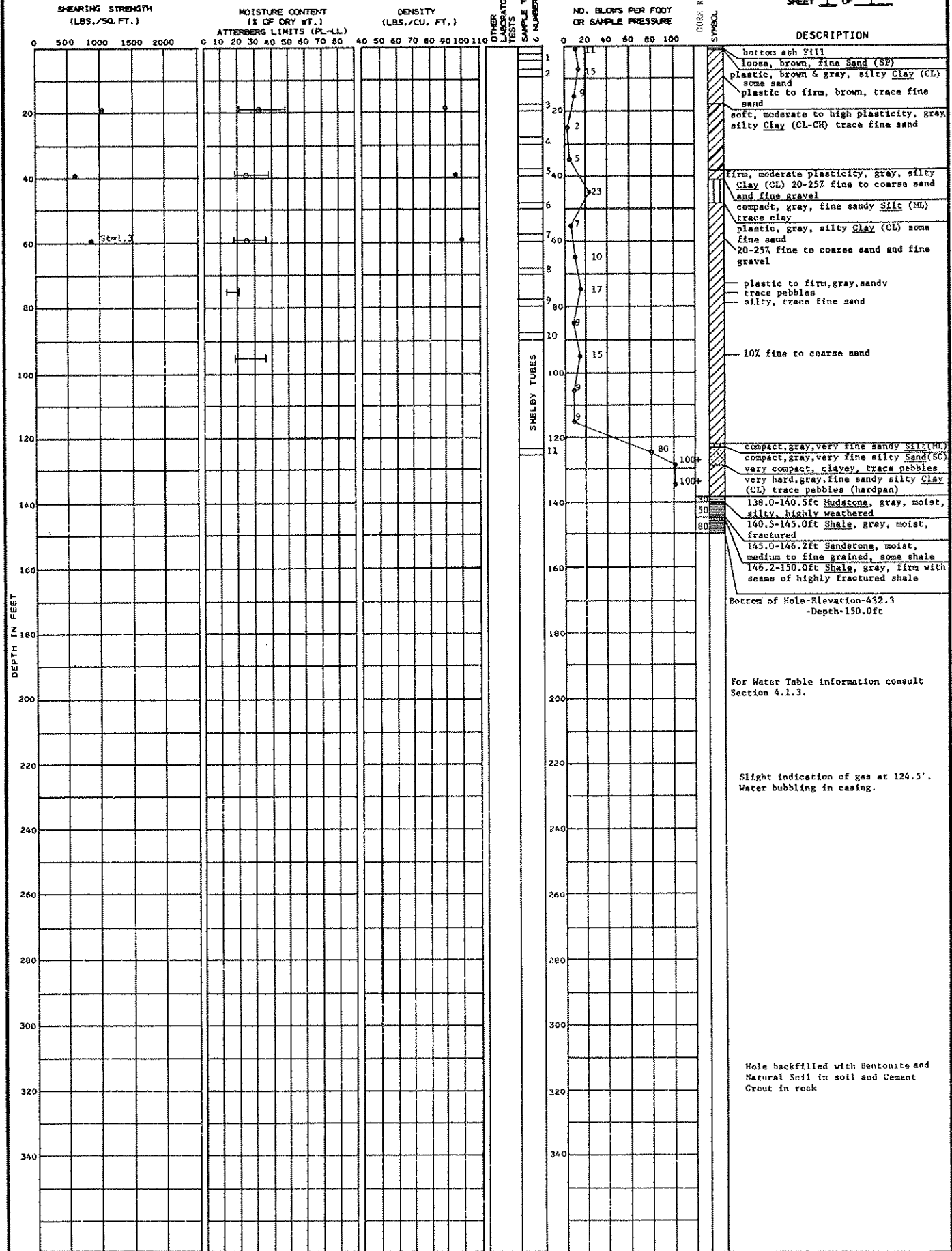
BECHTEL Belle River



LOCATION: N 2393 E15140 GROUND ELEVATION: 582.3

DATE DRILLED: 1-10-74  
1-16-74

SHEET 1 OF 1



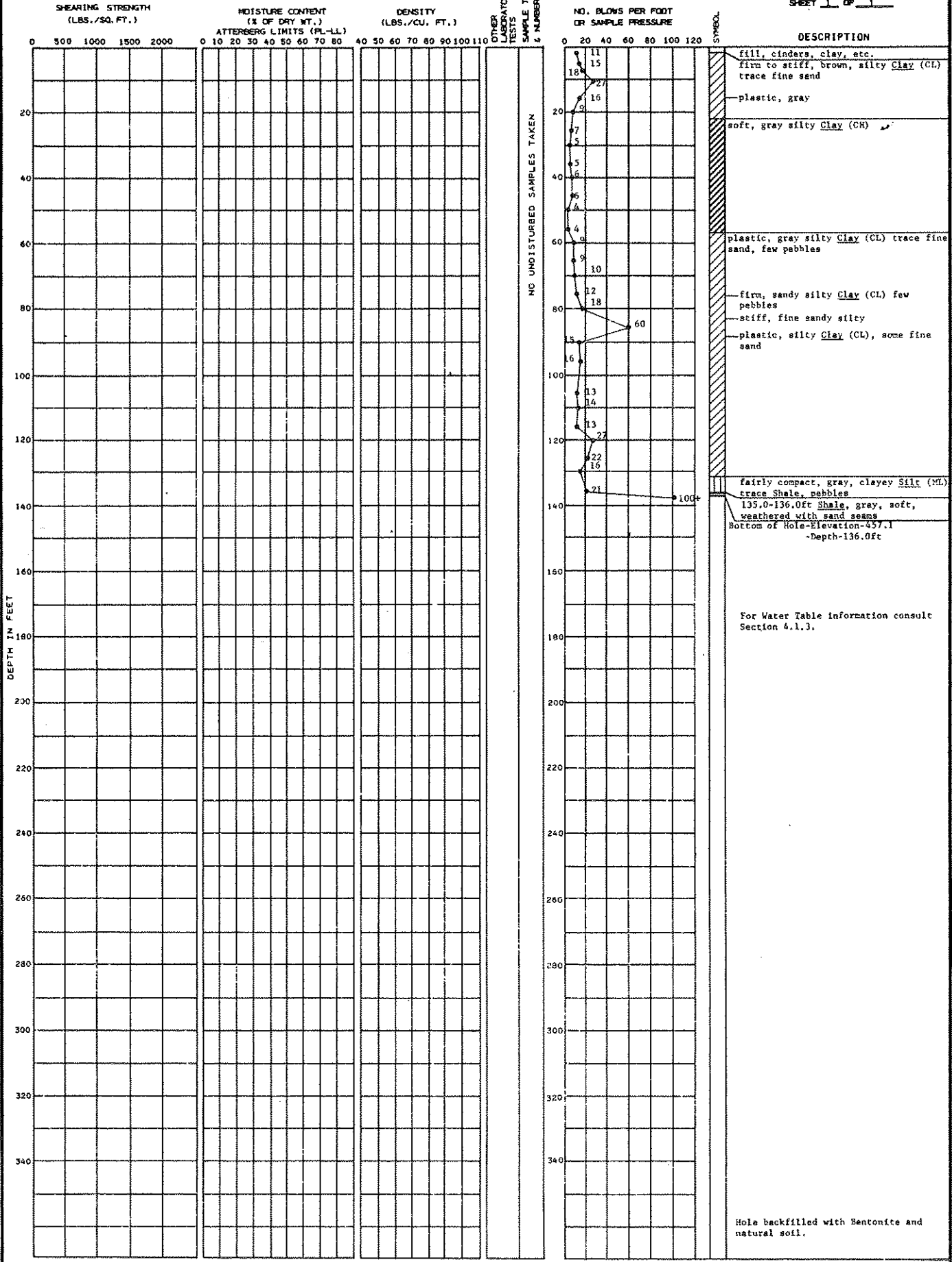
Unconfined  
Moisture Content  
Atterberg Limits

LOCATION: N 5,283  
E 14,042

GROUND ELEVATION 593.1

DATE DRILLED: 1-23-74  
1-29-74

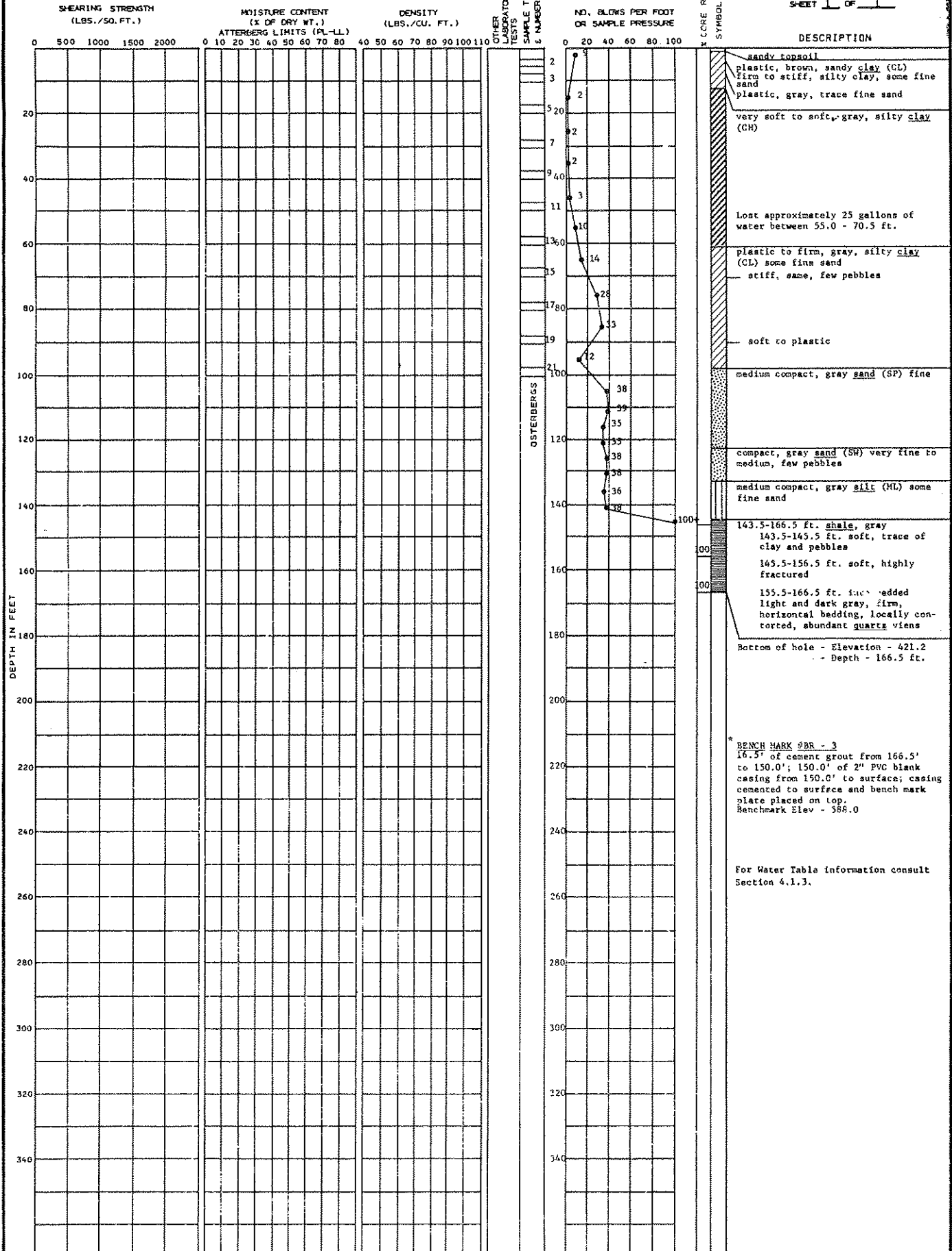
SHEET 1 OF 1



LOCATION: N 9,208.32 GROUND ELEVATION 587.6  
 E 9,376.12

DATE DRILLED: 2-28-74  
 3-7-74

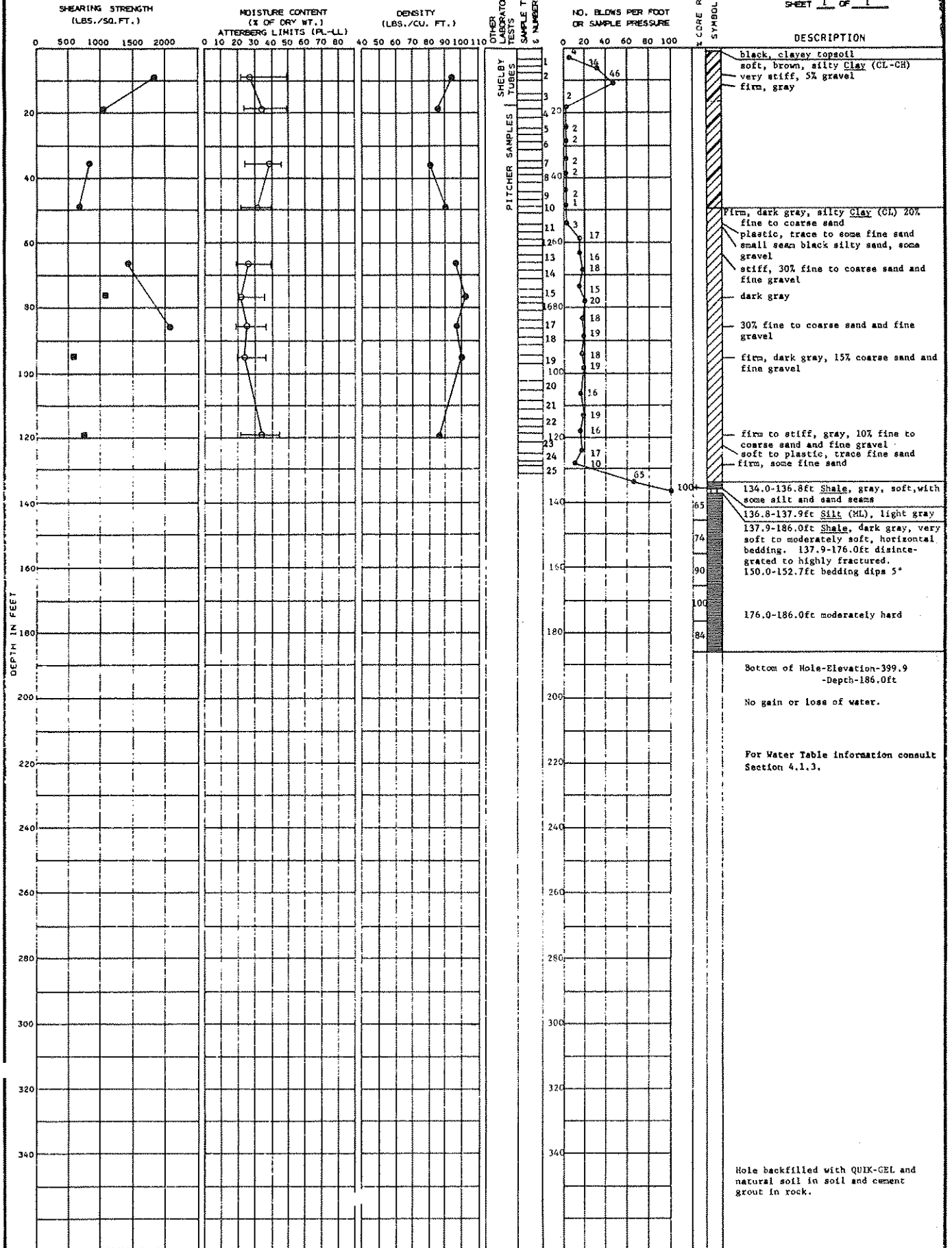
SHEET 1 OF 1



LOCATION: N 3,800 E 12,060 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-26-74

SHEET 1 OF 1



● Unconfined Compression  
■ Unconsolidated Undrained  
— Atterberg Limits  
○ Moisture Content

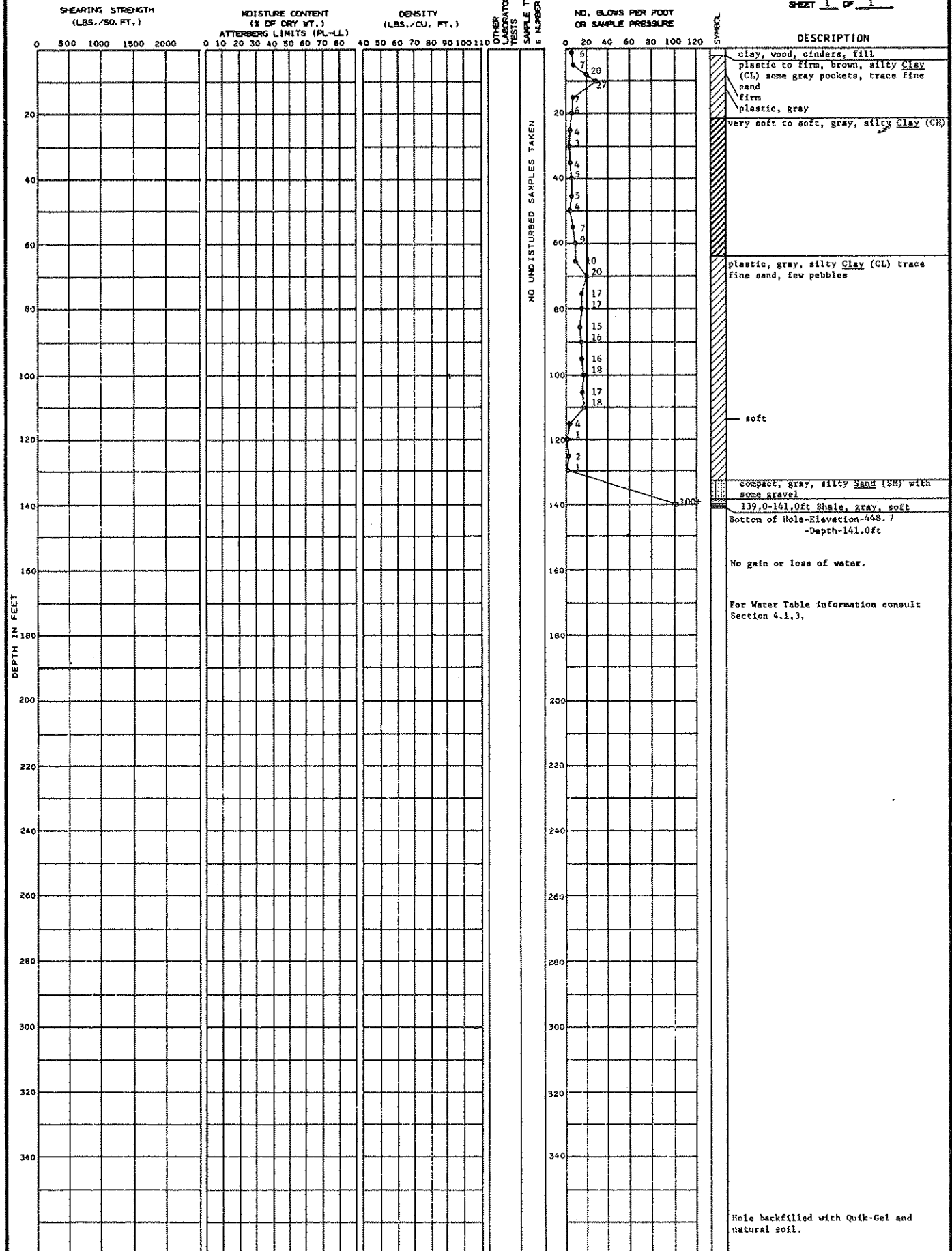
SOIL BORING NO. 101  
BECHTEL Belle River

LOCATION: N 4,435  
E 12,350

GROUND ELEVATION 589.7

DATE DRILLED: 2-5-74  
2-7-74

SHEET 1 OF 1

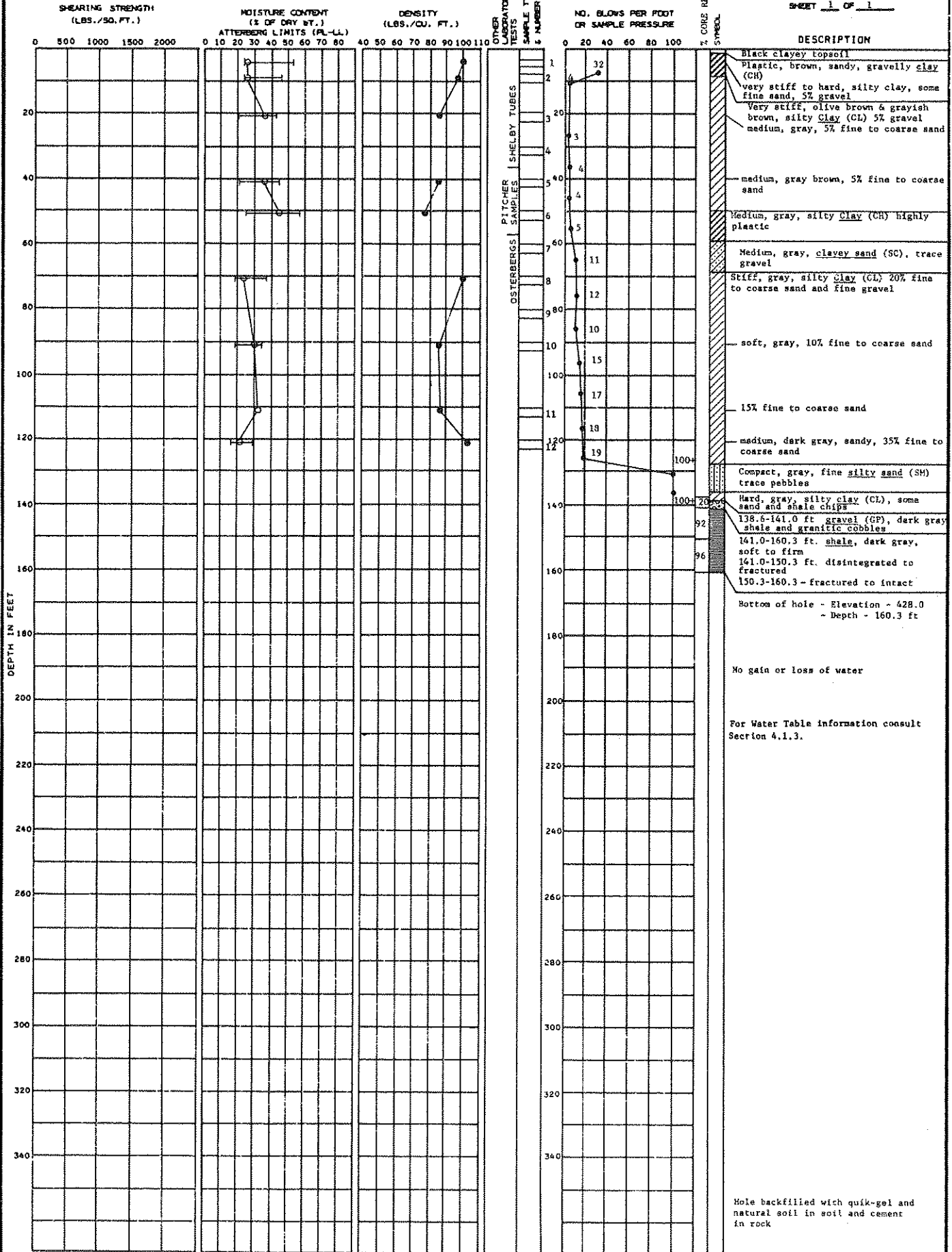


Hole backfilled with Quik-Gel and natural soil.

LOCATION: N 5,000 E 11,000 GROUND ELEVATION 588.3

DATE DRILLED: 2-26-74 3-5-74

SHEET 1 OF 1

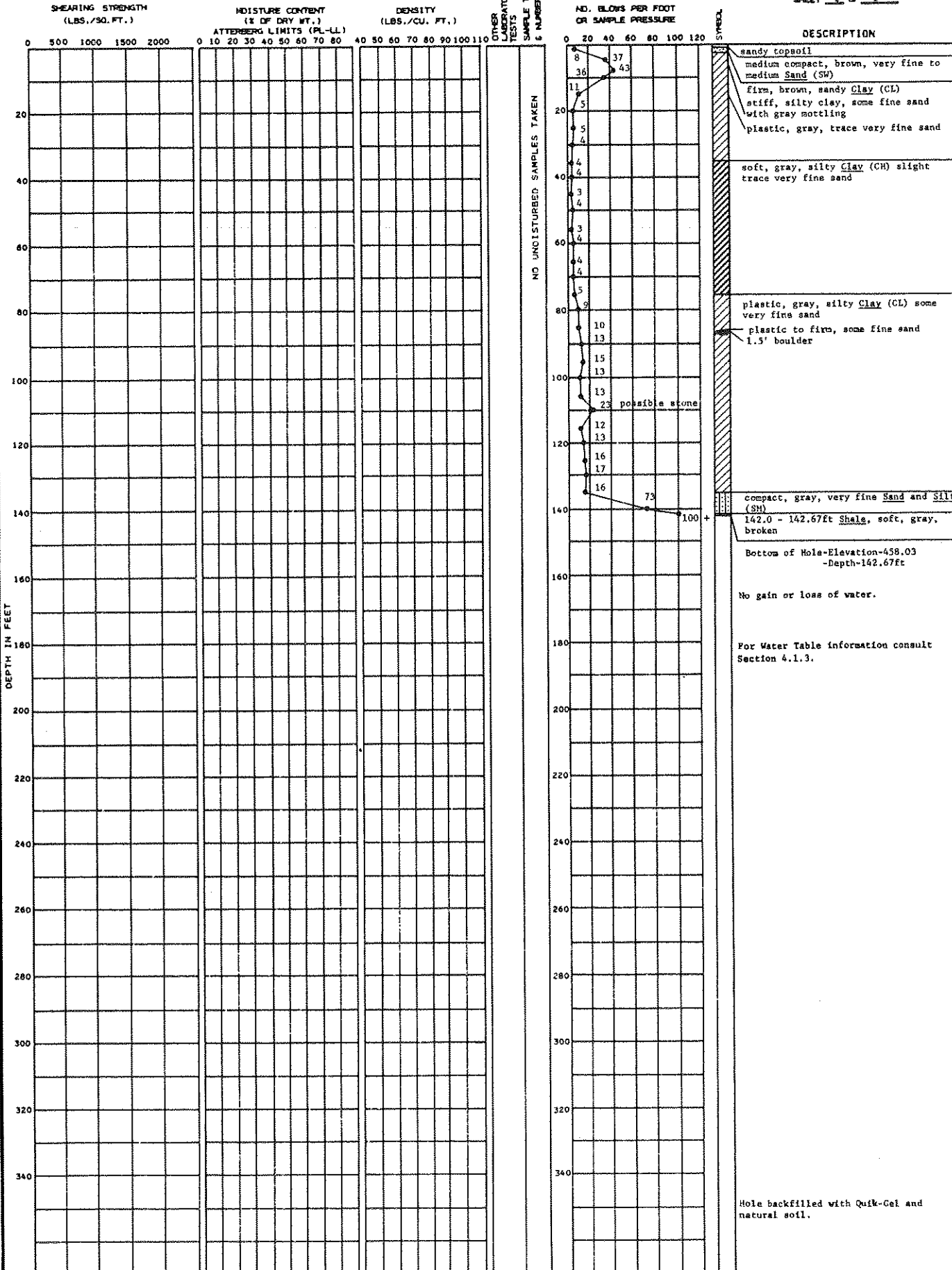


Atterberg Limits  
○ Moisture Content

LOCATION: S 6,450 E 13,140 GROUND ELEVATION 600.7

DATE DRILLED: 2-26-74 3-6-74

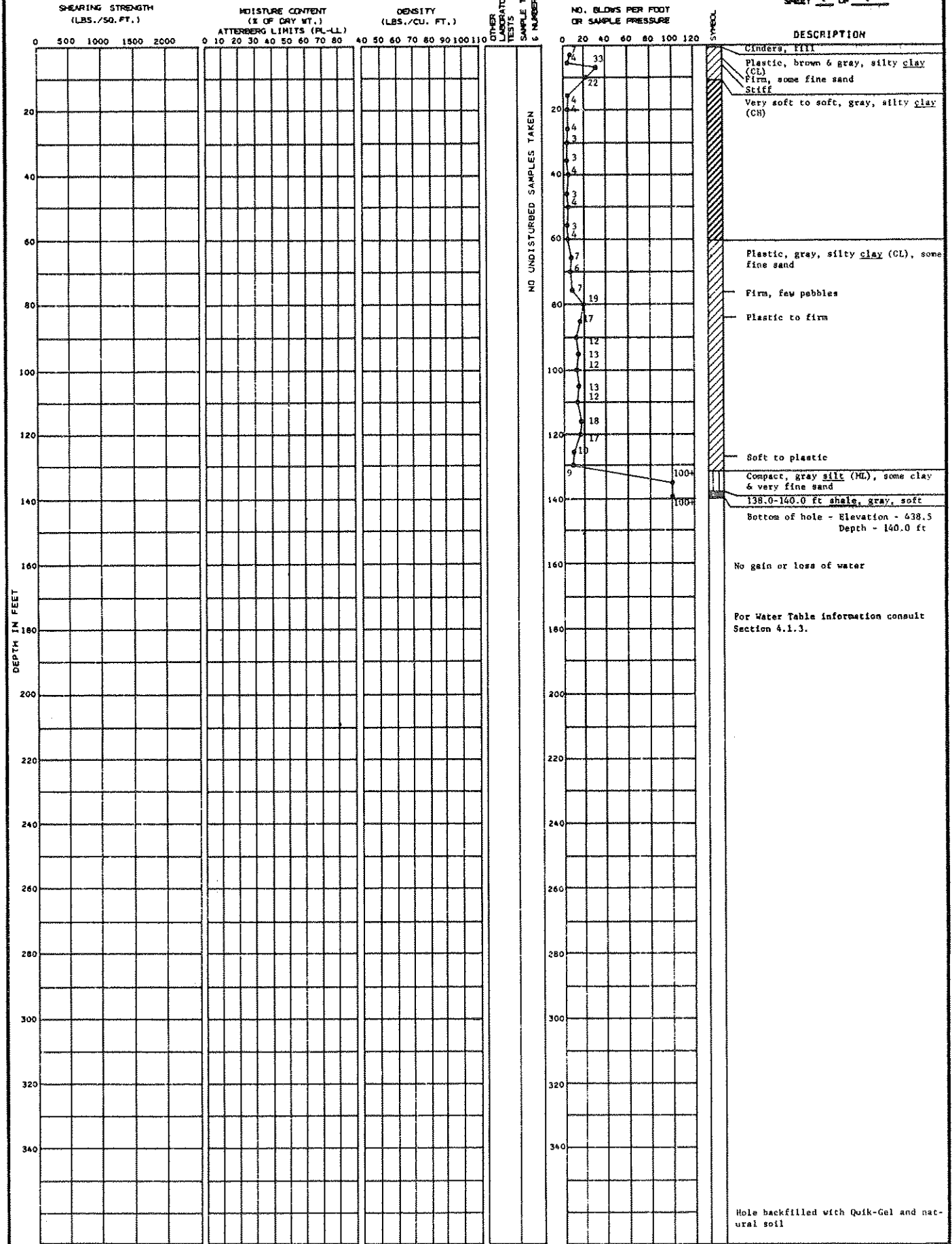
SHEET 1 OF 1



LOCATION: N 6,600 E 11,000 GROUND ELEVATION 588.5

DATE DRILLED: 2-21-74  
2-26-74

SHEET 1 OF 1

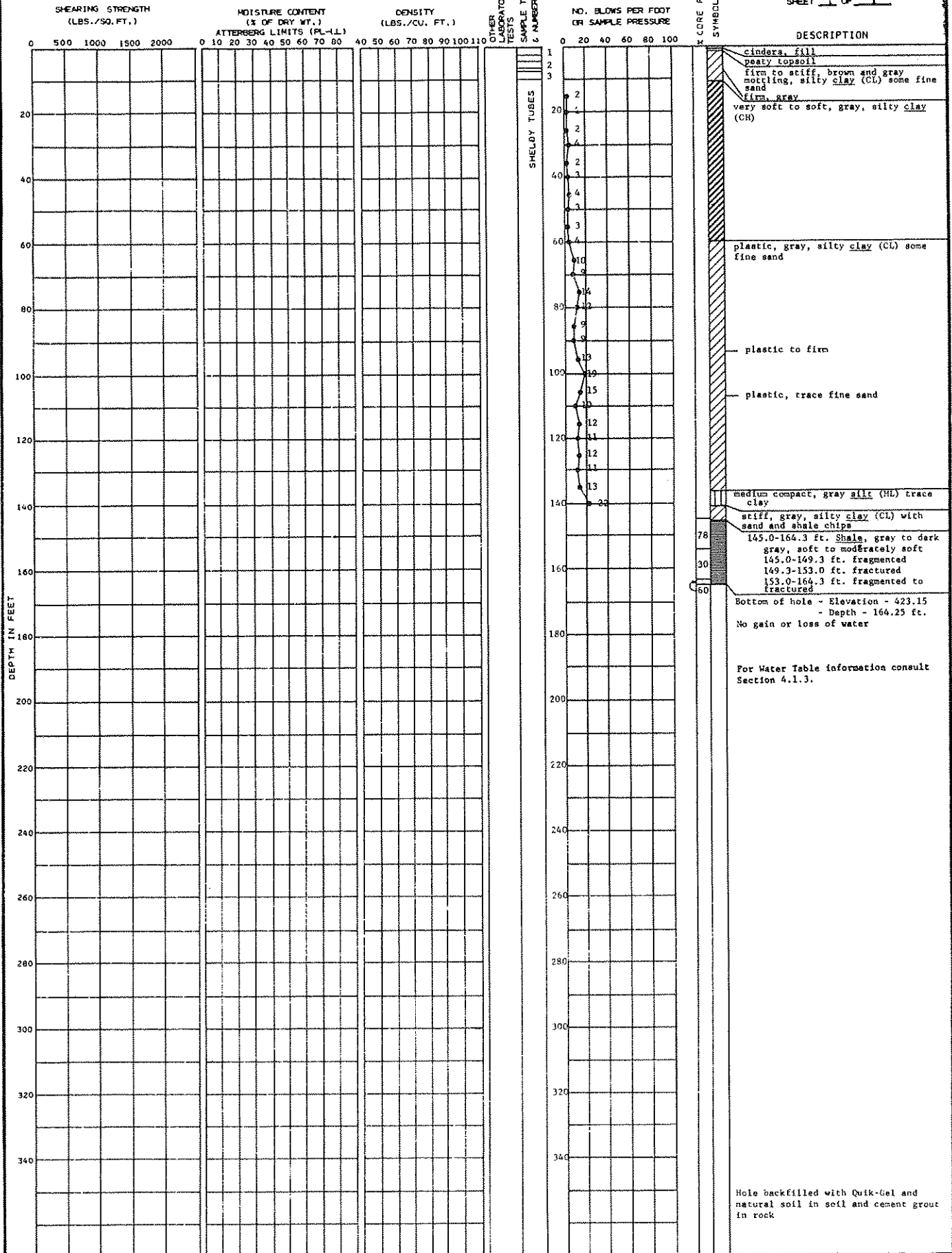




LOCATION: N 6,800 E 9,350 GROUND ELEVATION 587.4

DATE DRILLED: 2-27-74  
3-5-74

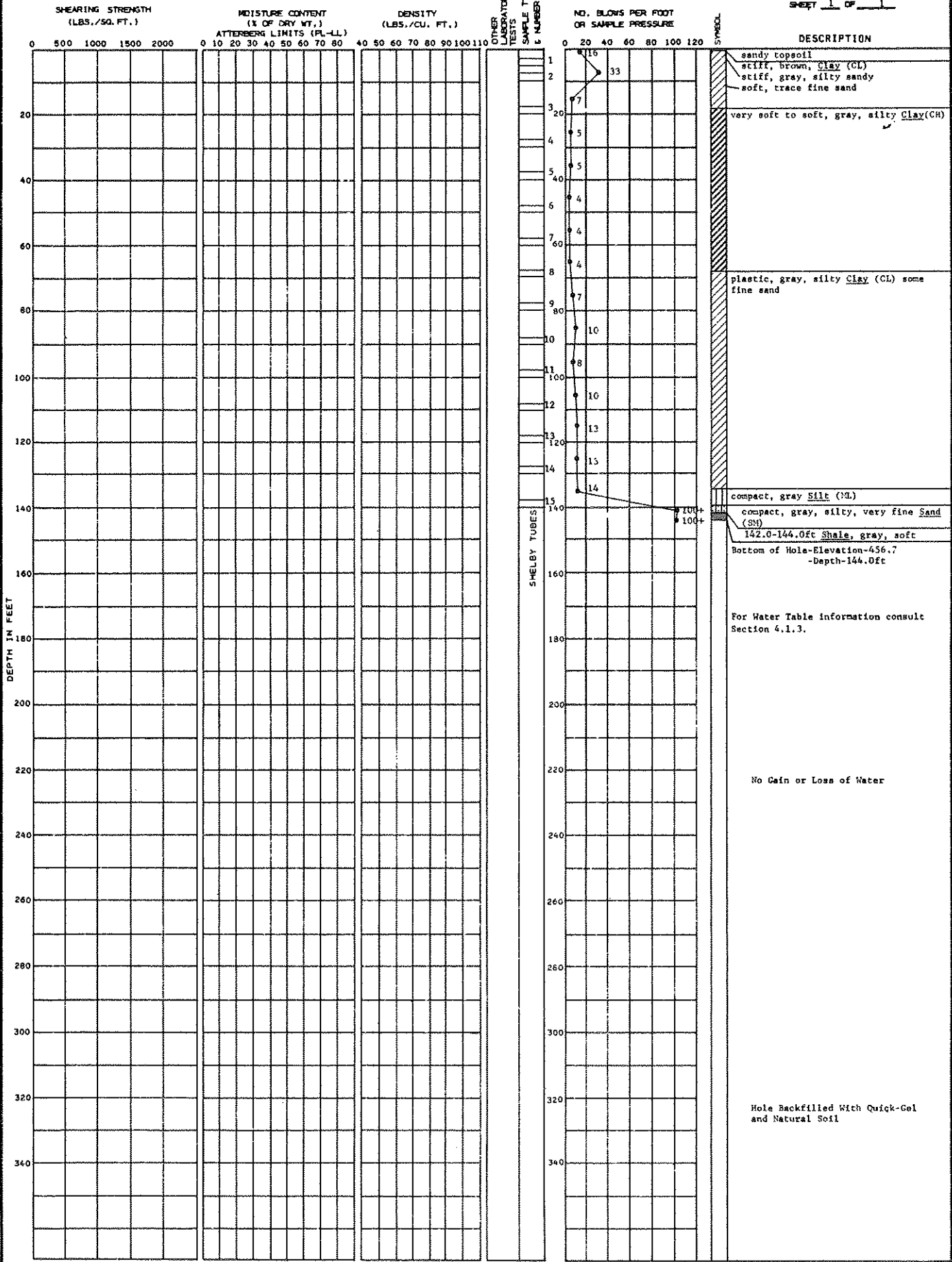
SHEET 1 OF 1



LOCATION: N 7,100 E13,260 GROUND ELEVATION 600.7

DATE DRILLED: 1-30-74 2-6-74

SHEET 1 OF 1



For Water Table information consult Section 4.1.3.

No Gain or Loss of Water

Hole Backfilled With Quick-Gel and Natural Soil

SOIL BORING NO. 115

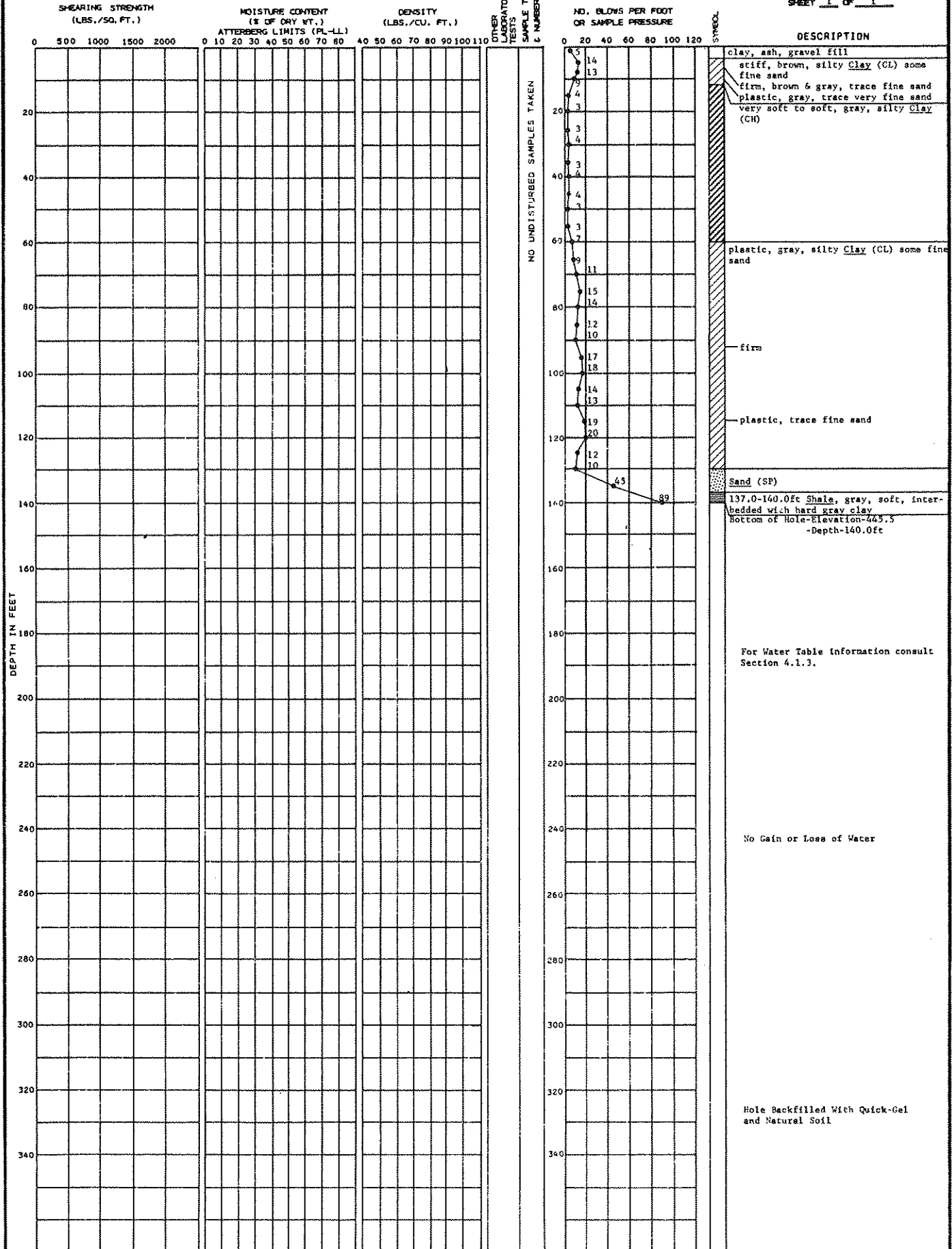
BECHTEL Belle River

LOCATION: N 7,270  
E 9,360

GROUND ELEVATION 585.5

DATE DRILLED: 2-5-74  
2-12-74

SHEET 1 OF 1

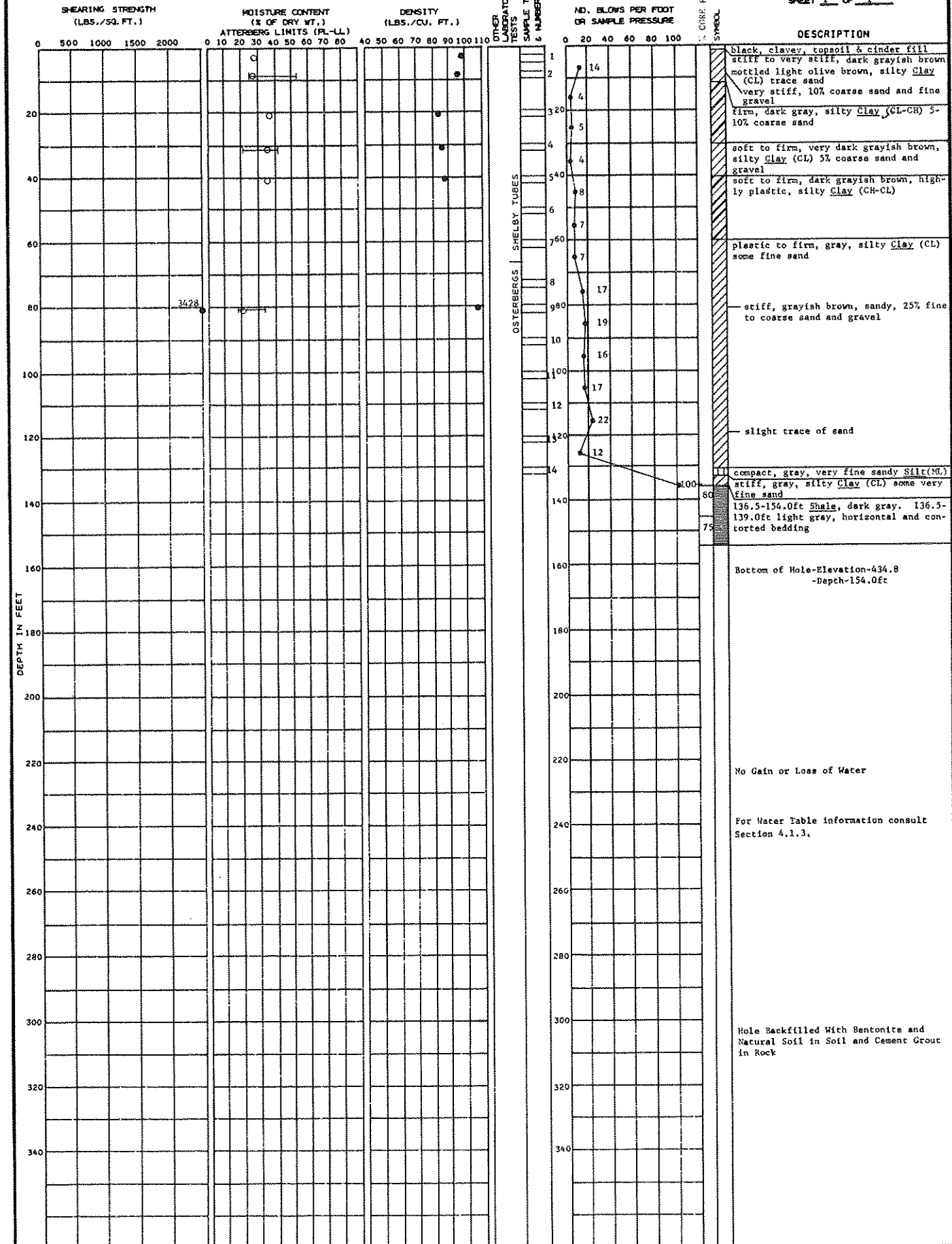


LOCATION: N 7,510  
E11,380

GROUND ELEVATION: 588.8

DATE DRILLED: 1-29-74  
2-5-74

SHEET 1 OF 1



● Unconfined Compression

— Atterberg Limits  
○ Moisture Content

SOIL BORING NO. 119

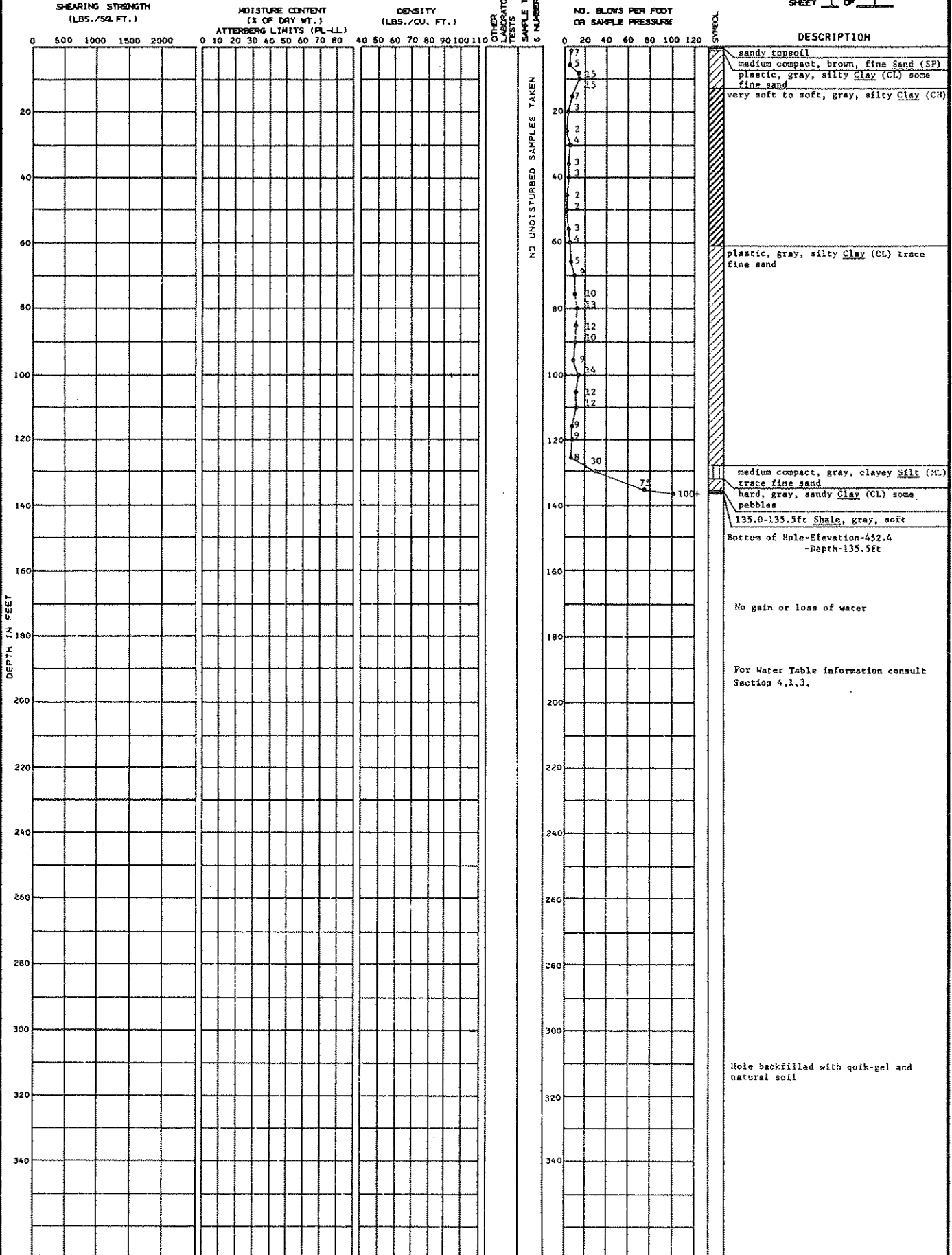
BECHTEL Belle River

B-85

LOCATION: N 7,680 E 10,630 GROUND ELEVATION 587.9

DATE DRILLED: 2-14-74 2-19-74

SHEET 1 OF 1



LOCATION: N 8,017  
E 4,999

GROUND ELEVATION 588.9

DATE DRILLED: 3-25-74

SHEET 1 OF 1

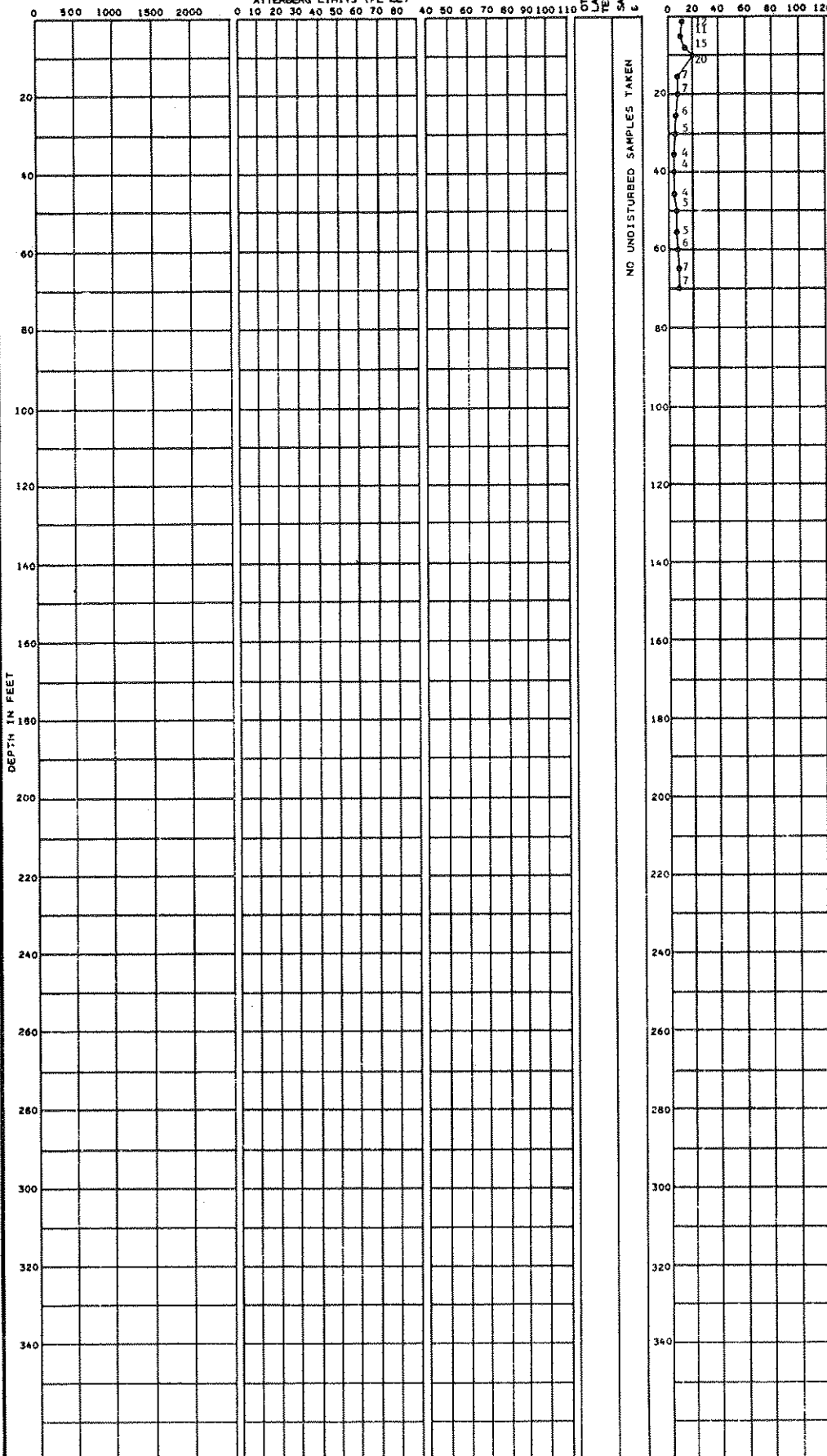
SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

DENSITY  
(LBS./CU. FT.)

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

DESCRIPTION



Gray, silty topsoil  
 Medium, mottled brown & gray, silty sandy clay (CL), trace of pebbles  
 Soft, gray, silty clay (CH), trace of sand

Bottom of hole - Elevation - 518.9  
 - Depth - 70.0 ft

No gain or loss of water

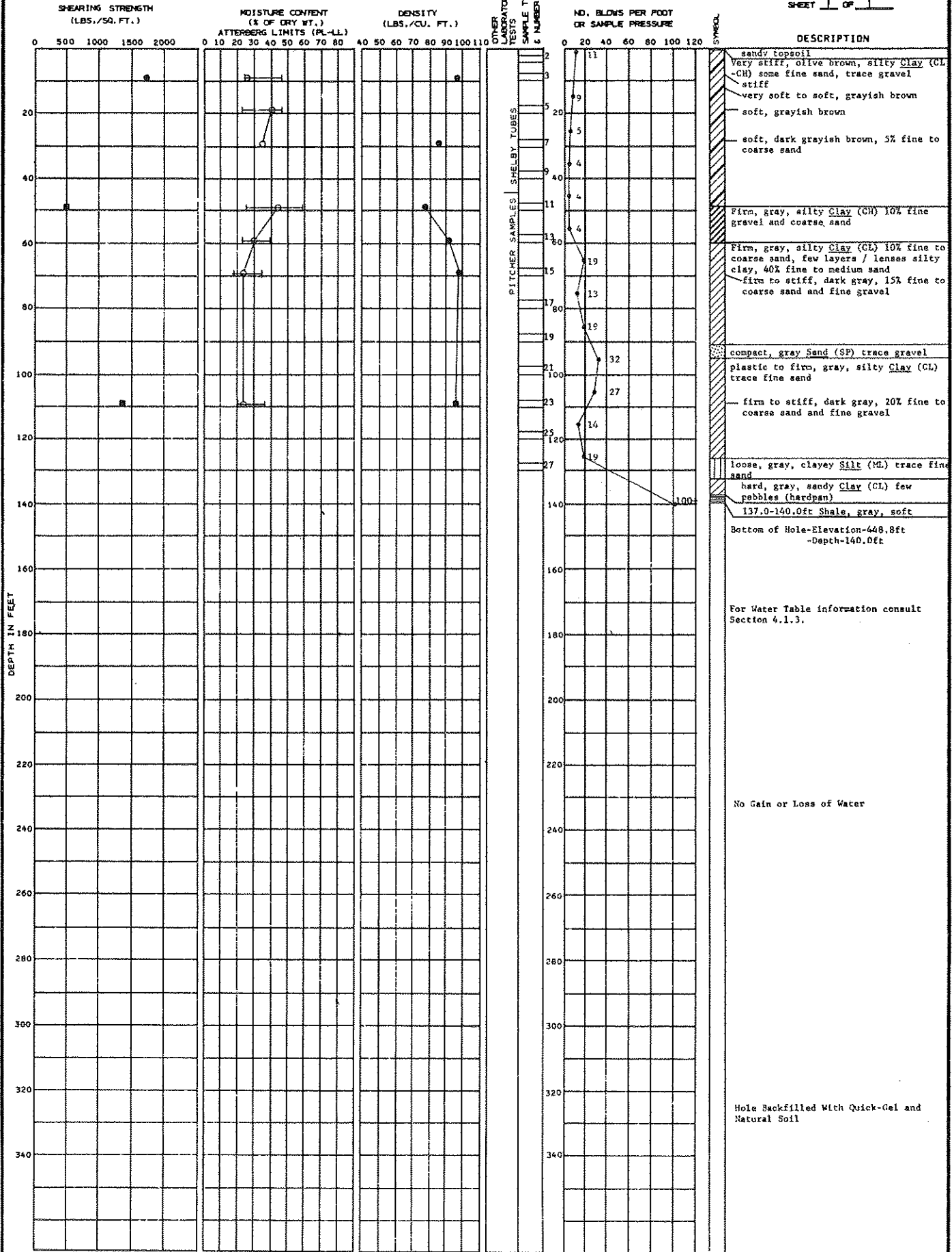
For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

LOCATION: R 7,950 GROUND ELEVATION 588.8  
E 11,140

DATE DRILLED: 2-1-74  
2-6-74

SHEET 1 OF 1



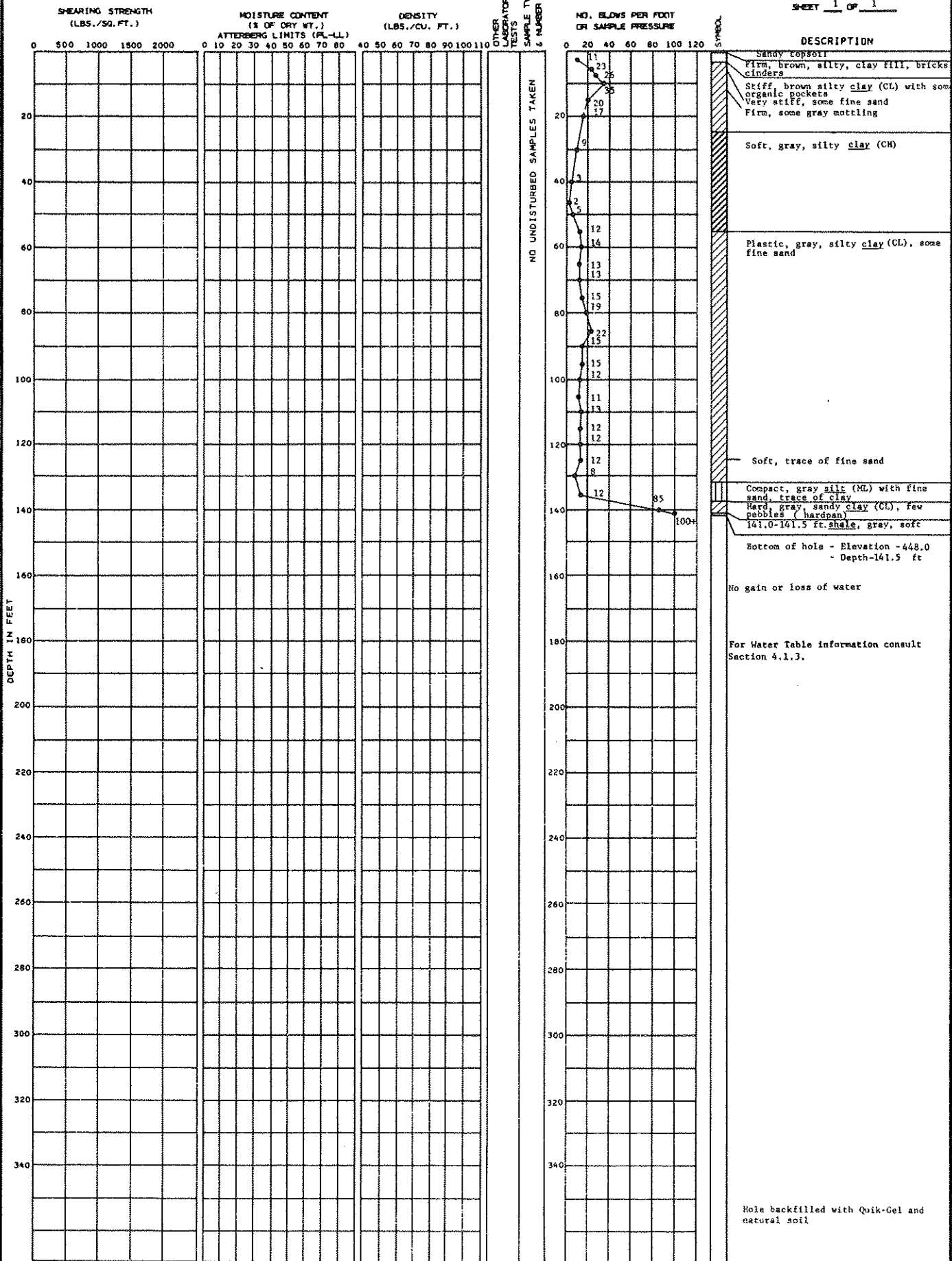
● Unconfined Compression  
■ Unconsolidated Undrained  
○ Moisture Content  
— Atterberg Limits

LOCATION: N 3,000  
E 11,000

GROUND ELEVATION 589.5

DATE DRILLED: 2-7-74  
2-13-74

SHEET 1 OF 1



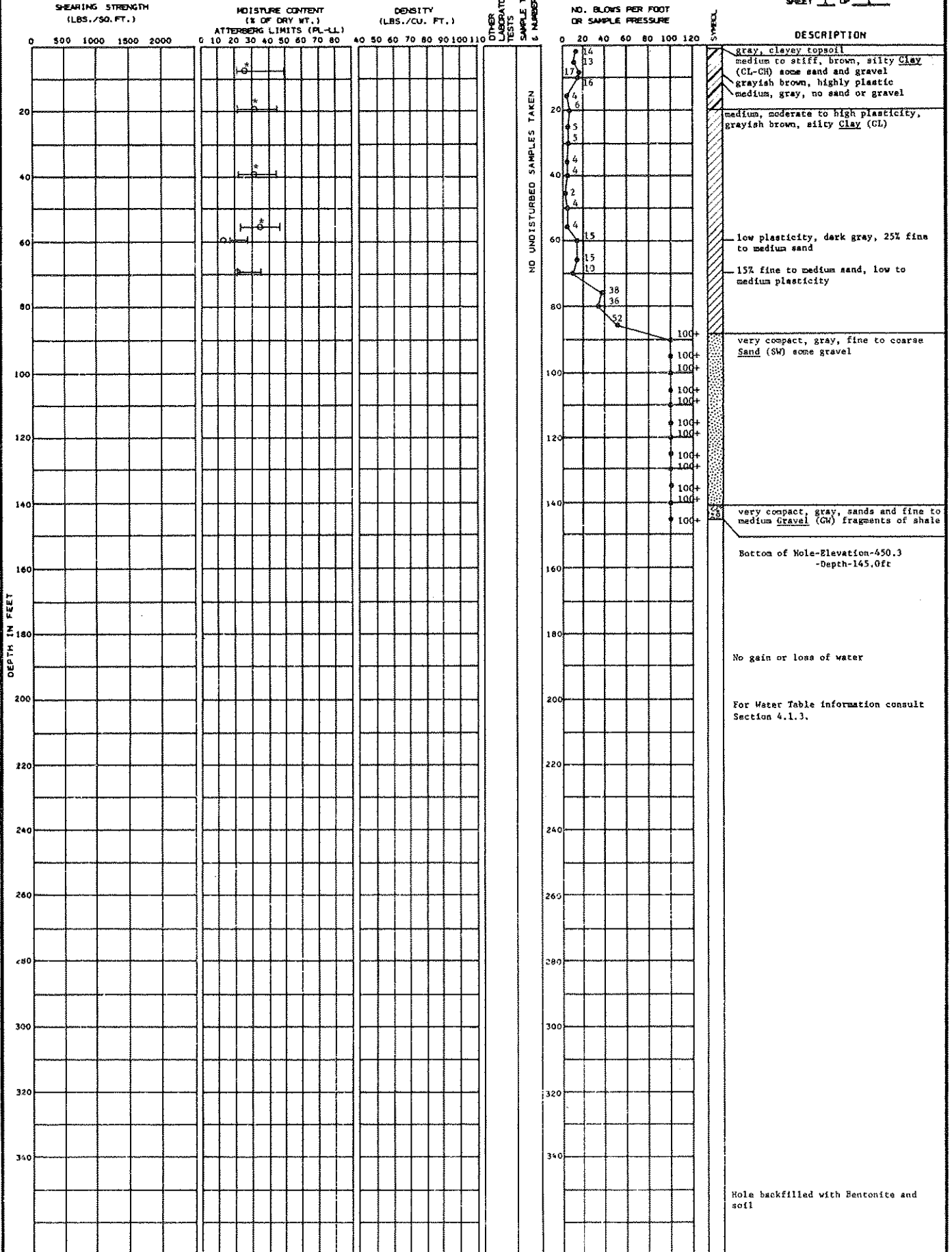


LOCATION: N 9,014 E 4,993 GROUND ELEVATION 595.3

DATE DRILLED: 3-26-74

3-28-74

SHEET 1 OF 1



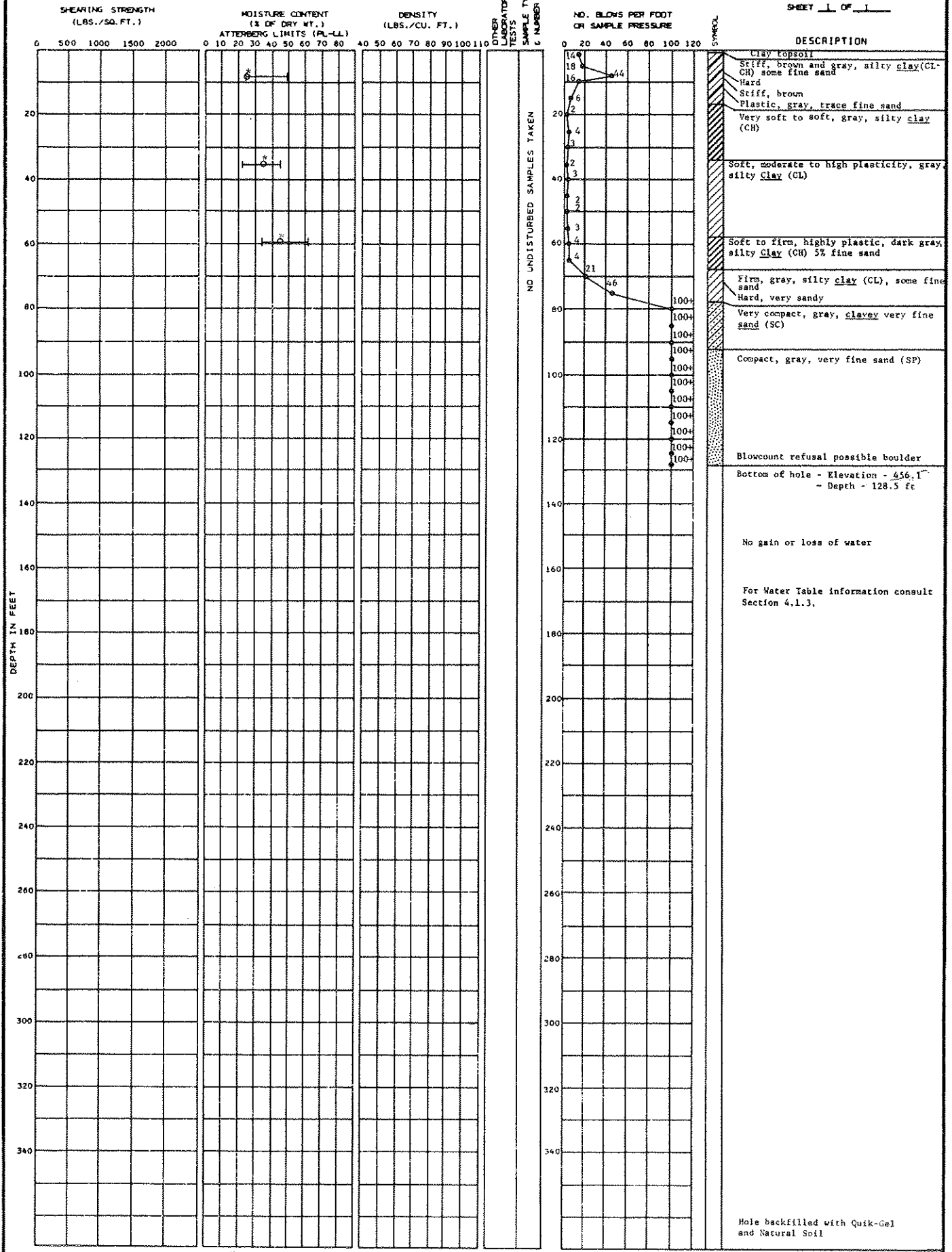
○ Water Content  
 — Atterburg Limiter  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 130

BECHTEL Bella River

LOCATION: N 10,050 E 4,995 GROUND ELEVATION 594.6

DATE DRILLED: 3-5-74 3-7-74 SHEET 1 OF 1

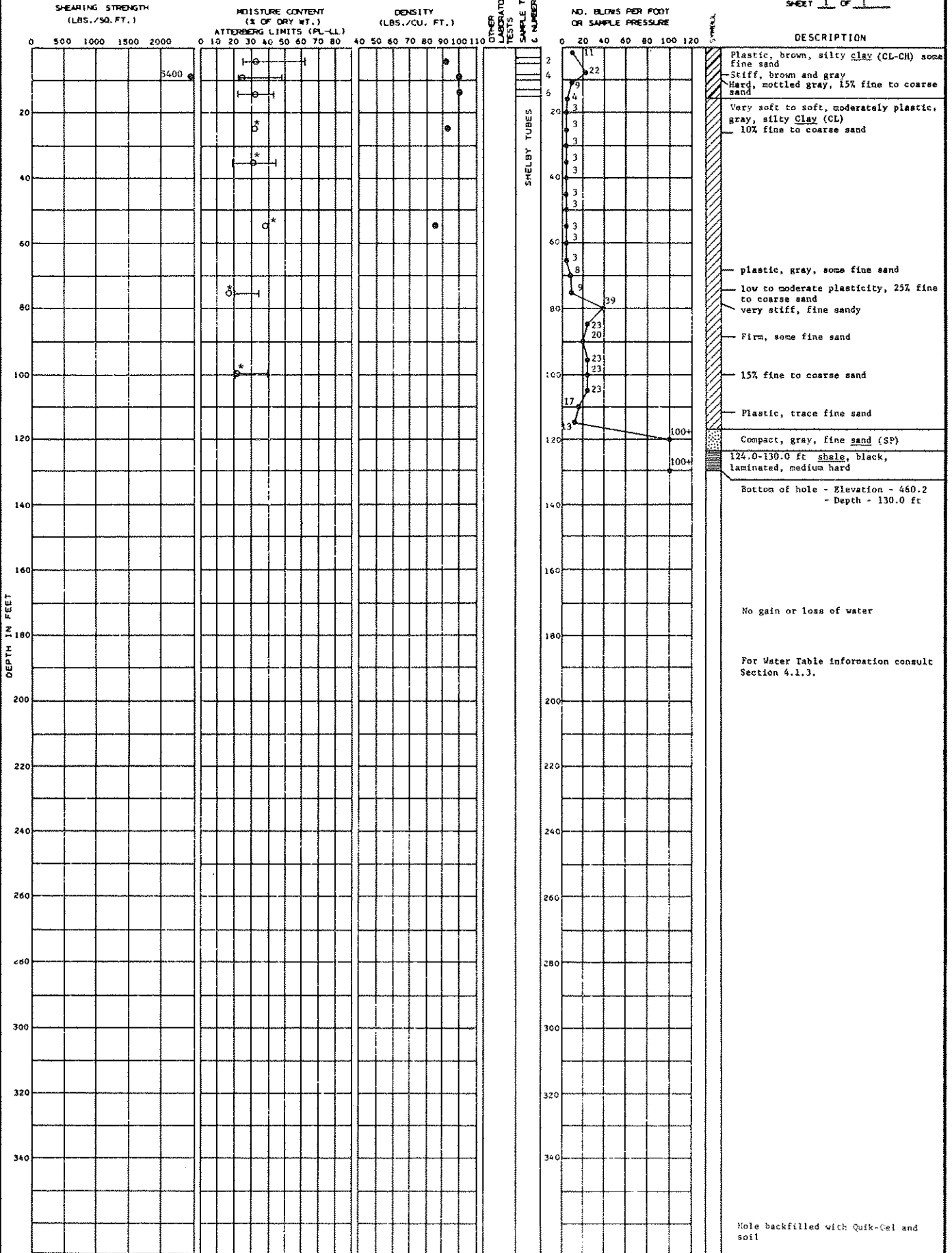


○ Water Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 10,050 E 7,000 GROUND ELEVATION 590.2

DATE DRILLED: 3-8-74  
3-13-74

SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterburg Limits  
\* Water content taken from unsealed jar sample.

SOIL BORING NO. 136

BECHTEL Belle River

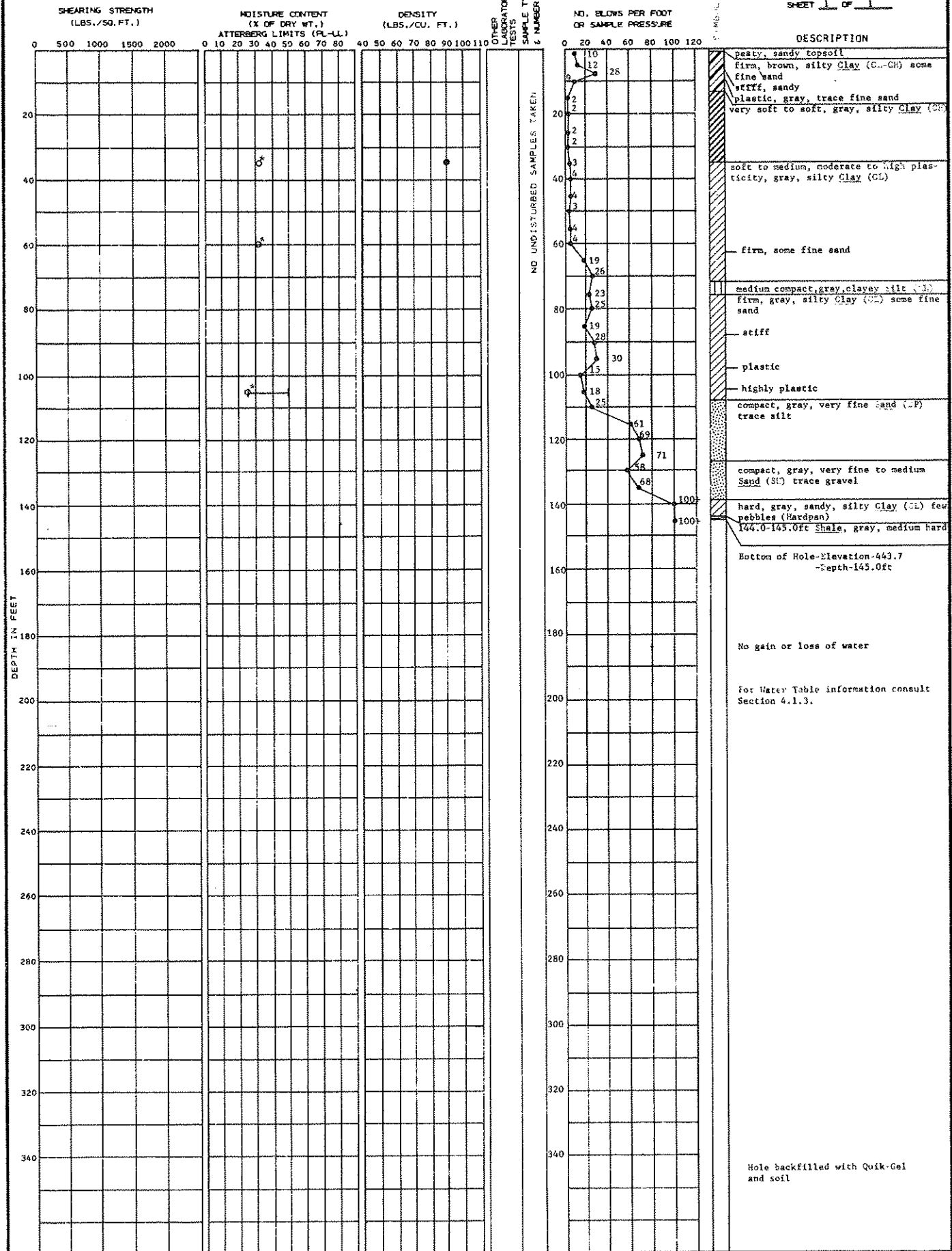
LOCATION: 10,030  
S.977

GROUND ELEVATION

582.7

DATE DRILLED: 3-11-74  
3-14-74

SHEET 1 OF 1



○ Water Content  
Atterburg Limits  
Water content taken from  
unsealed jar sample.

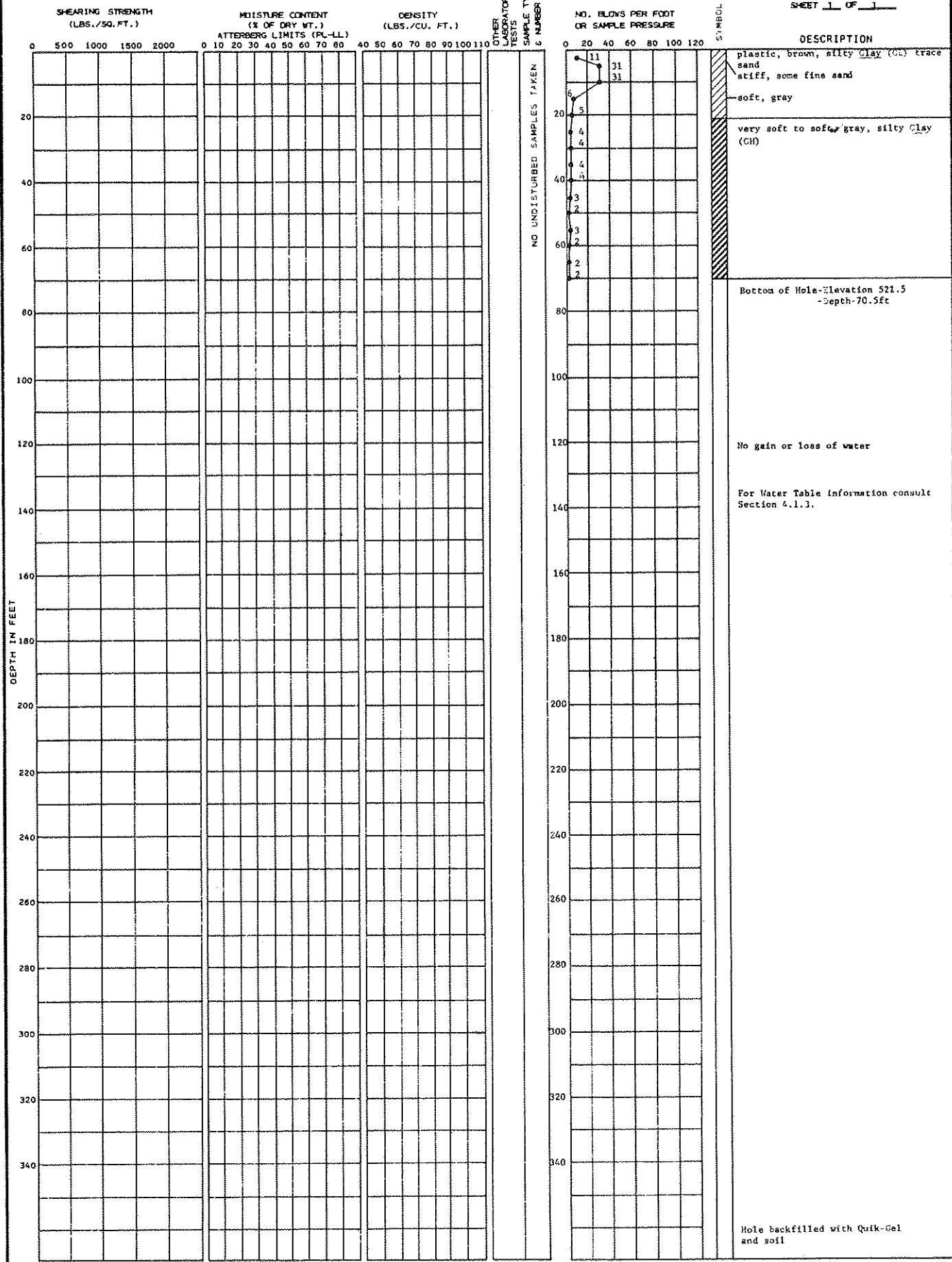
SOIL BORING NO. 138

BECHTEL Belle River

LOCATION: 10,850 GROUND ELEVATION: 592.0

DATE DRILLED: 3-19-74  
3-20-74

SHEET 1 OF 1



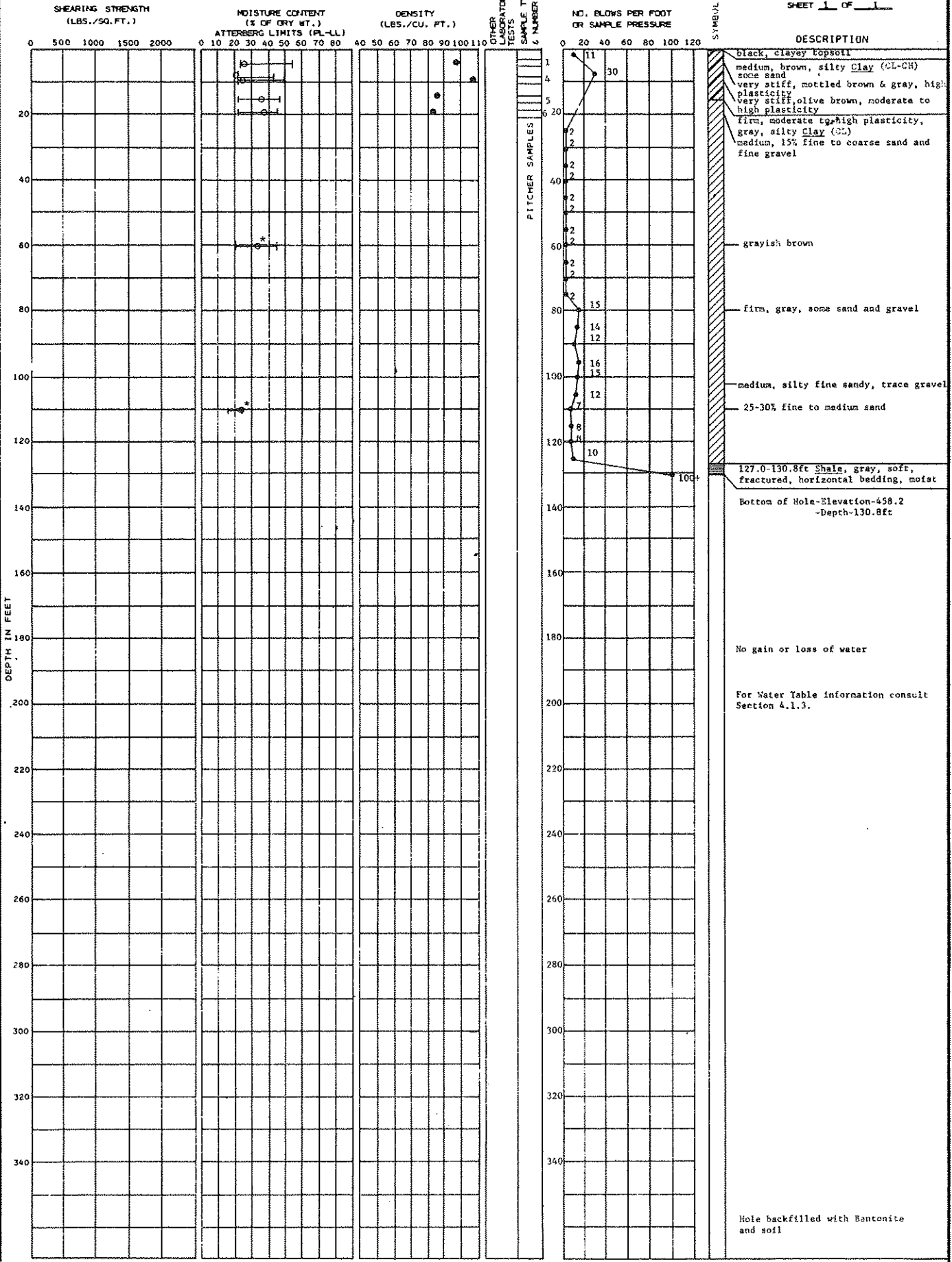
SOIL BORING NO. 140

BECHTEL Belle River

LOCATION: 11,146 GROUND ELEVATION 589.0  
 7,995

DATE DRILLED: 3-25-74  
 3-27-74

SHEET 1 OF 1



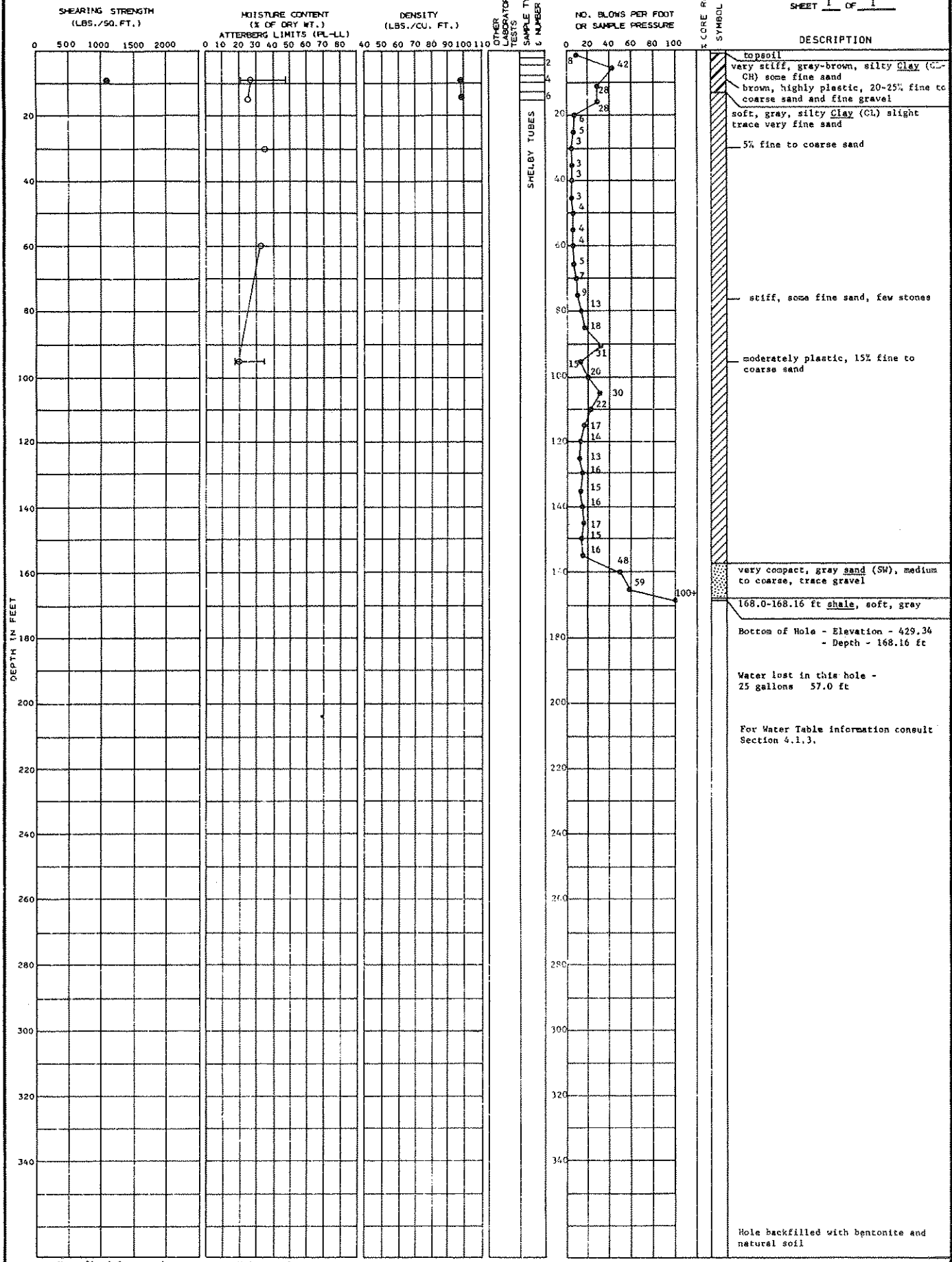
○ Moisture Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 142

BECHTEL Keller

LOCATION: N 12,000 E 5,000 GROUND ELEVATION: 597.5

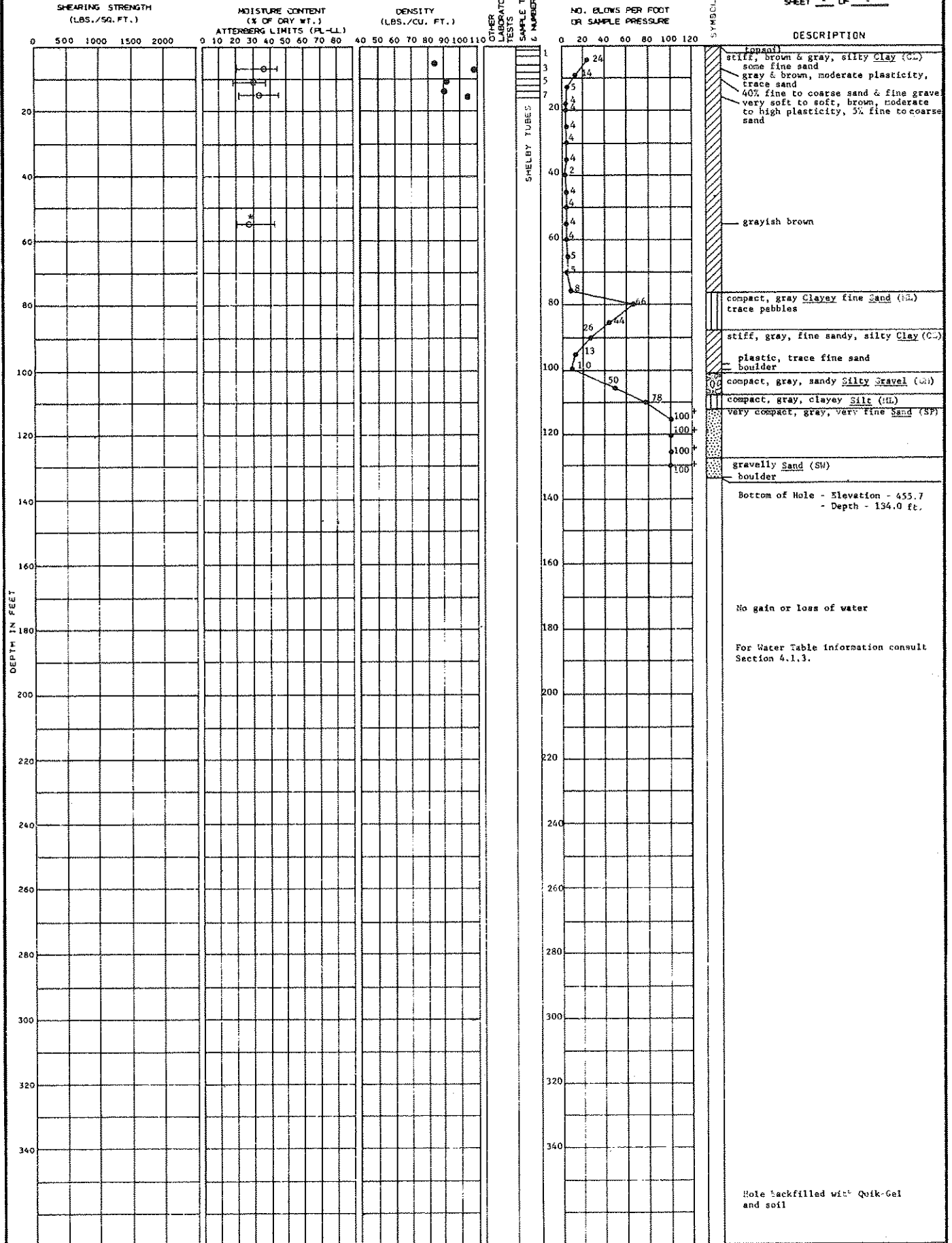
DATE DRILLED: 3-13-74  
3-15-74  
SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterburg Limits

LOCATION: N 12,000  
E 7,000 GROUND ELEVATION 589.7

3-18-74  
DATE DRILLED: 3-19-74  
SHEET 1 OF 1



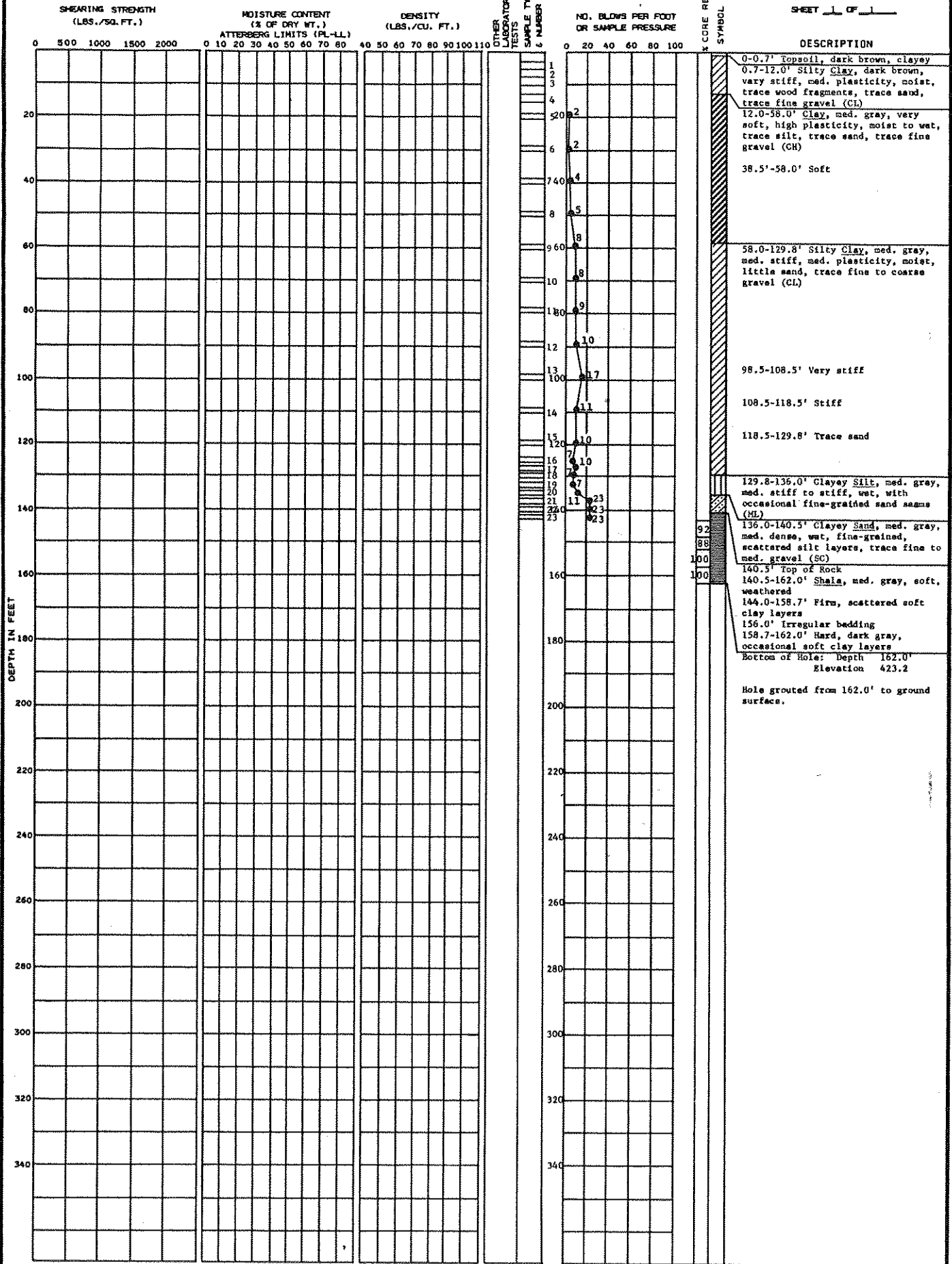
Moisture Content  
Atterburg Limits  
\* Water content taken from unsealed jar sample.





LOCATION: N 7455 E 9535 GROUND ELEVATION 585.2

DATE DRILLED: 9/28/77 9/30/77 SHEET 1 OF 1

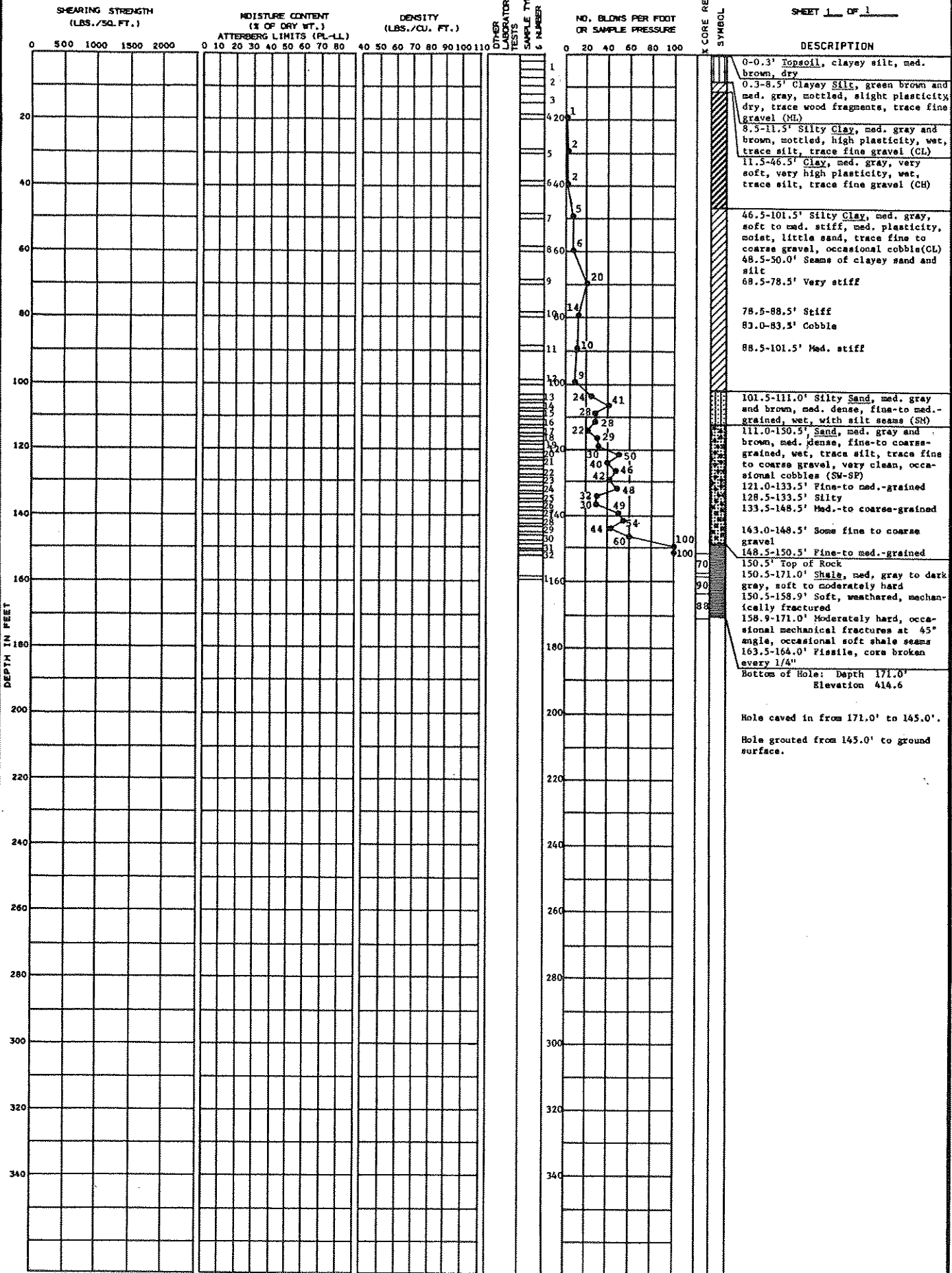


SOIL BORING NO. B-8 BECHTEL Belle River

LOCATION: N 7675 E 9100 GROUND ELEVATION 585.6

DATE DRILLED: 8/8/77 8/11/77

SHEET 1 OF 1



SOIL BORING NO. B-9

BECHTEL Belle River

LOCATION: N 7500 E 9388.7 GROUND ELEVATION 585.3

DATE DRILLED: 7/21/77  
7/23/77  
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0						0-1.0' Clayey Silt, topsoil, light gray to dark brown, med. dense, dry, with wood fragments (ML)
1				16		1.0-6.0' Silty Clay, med. brown and light gray, mottled, very stiff, med. plasticity, moist, trace sand (CL)
2				23		6.0-11.0' Clay, med. brown, very stiff, med. plasticity, moist, trace silt, trace sand (CL-CH)
3				6		7.5-11.0' Light gray, med. stiff, high plasticity
4				2		11.0-54.0' Clay, light gray, very soft, very high plasticity, wet (CH)
5				13		
6				17		54.0-131.0' Silty Clay, med. gray, stiff, high plasticity, moist, trace sand, trace cobble (CL)
7				8		63.5-73.5' Very stiff
8				11		73.5-83.5' Med. stiff
9				13		83.5-93.5' Stiff, trace fine to coarse gravel
10				17		93.5-113.5' Very stiff
11				21		100.5-123.5' Med. plasticity, little sand
12				12		113.5-126.0' Stiff
13				12		
14				6		123.5-124.0' Fine-grained clayey sand seam
15				19		126.0-131.0' Very stiff
16				23		126.5-127.0' Fine-grained silty sand seam
17				27		131.0-138.0' Silty Sand, med. gray, dense, wet, fine-grained (SM)
18				47		Cobble on top of rock
19				37		138.0' Top of Rock
20				87		138.0-160.0' Shale, dark gray, soft to firm, fissile mechanically fractured in areas
21						138.0-141.4' Soft, weathered
22						141.4-160.0' Hard, fissile
23						Bottom of Hole: Depth 160.0' Elevation 425.3
24						Hole grouted from 160.0' to ground surface.

LOCATION: N 13,000 E 7,000 GROUND ELEVATION 590.6

DATE DRILLED: 3-27-74  
3-28-74

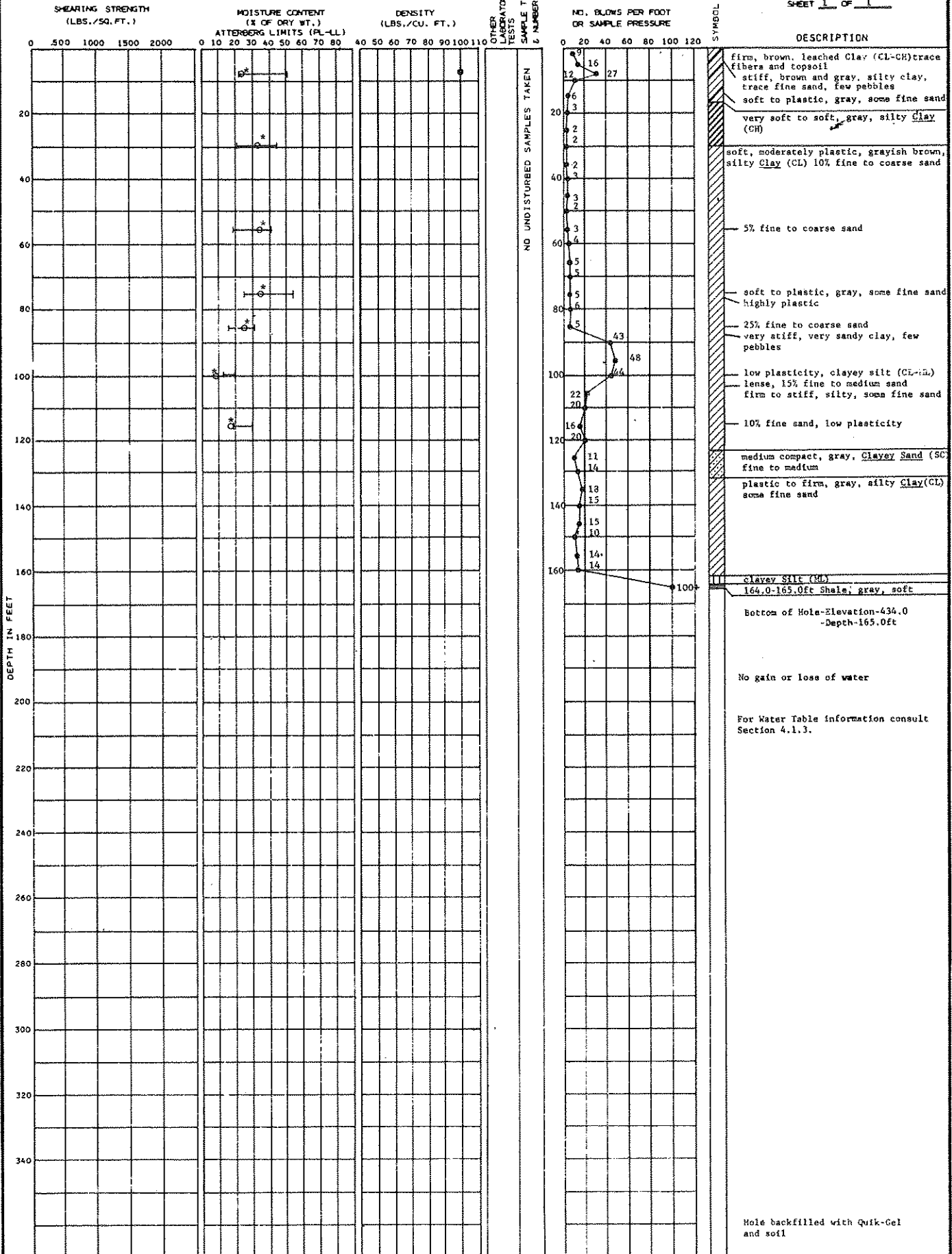
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0					9		black, clayey topsoil
2					20		medium, brown, silty Clay (CL) trace of sand and gravel
4					20		
6					13		gray, silty
8					9		
10					7		soft, gray, sandy, silty Clay (CH)
12					5		
14					2		no sand
16					2		
18					2		
20					2		
22					2		
24					2		
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LOCATION: N 13,785 E 5,006 GROUND ELEVATION 599.0

DATE DRILLED: 3-7-74 3-14-74

SHEET 1 OF 1



○ Moisture Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,000 E 8,000 GROUND ELEVATION 591.5

DATE DRILLED: 4-5-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (X OF DRY WT.) ATTENBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0						Consol firm to stiff, brown, silty clay (CL) very stiff, trace gravel plastic to firm, gray
20				14 30 22		soft, gray, silty clay (CH)
40				2		
60				2		
80				2		
100				2		
120				2		
140				2		
160				2		
180				2		
200				2		
220				2		
240				2		
260				2		
280				2		
300				2		
320				2		
340				2		
						Bottom of Hole - Elevation - 521.5 - Depth - 70.0 ft.
						No gain or loss of water
						For Water Table information consult Section 4.1.3.
						Hole backfilled with Quik-Gel and soil

SOIL BORING NO. 157

BECHTEL Belle River

LOCATION: N 14,000 E 9,950 GROUND ELEVATION 591.3

DATE DRILLED: 4-3-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. OF LABORATORY TESTS	SAMPLE TYPE	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0								GRAY SILT (ML)
0						17		loose to medium compact, brown to gray, silty sand (SM) fine to medium
0						15		firm, gray, silty clay (CL)
0						4		soft, gray, silty clay (CH)
20						2		
40						2		
60						3		
80						4		
100						5		
120								
140								No gain or loss of water
160								For Water Table information consult Section 4.1.3.
180								
200								
220								
240								
260								
280								
300								
320								
340								Hole backfilled with Quik-Gel in soil

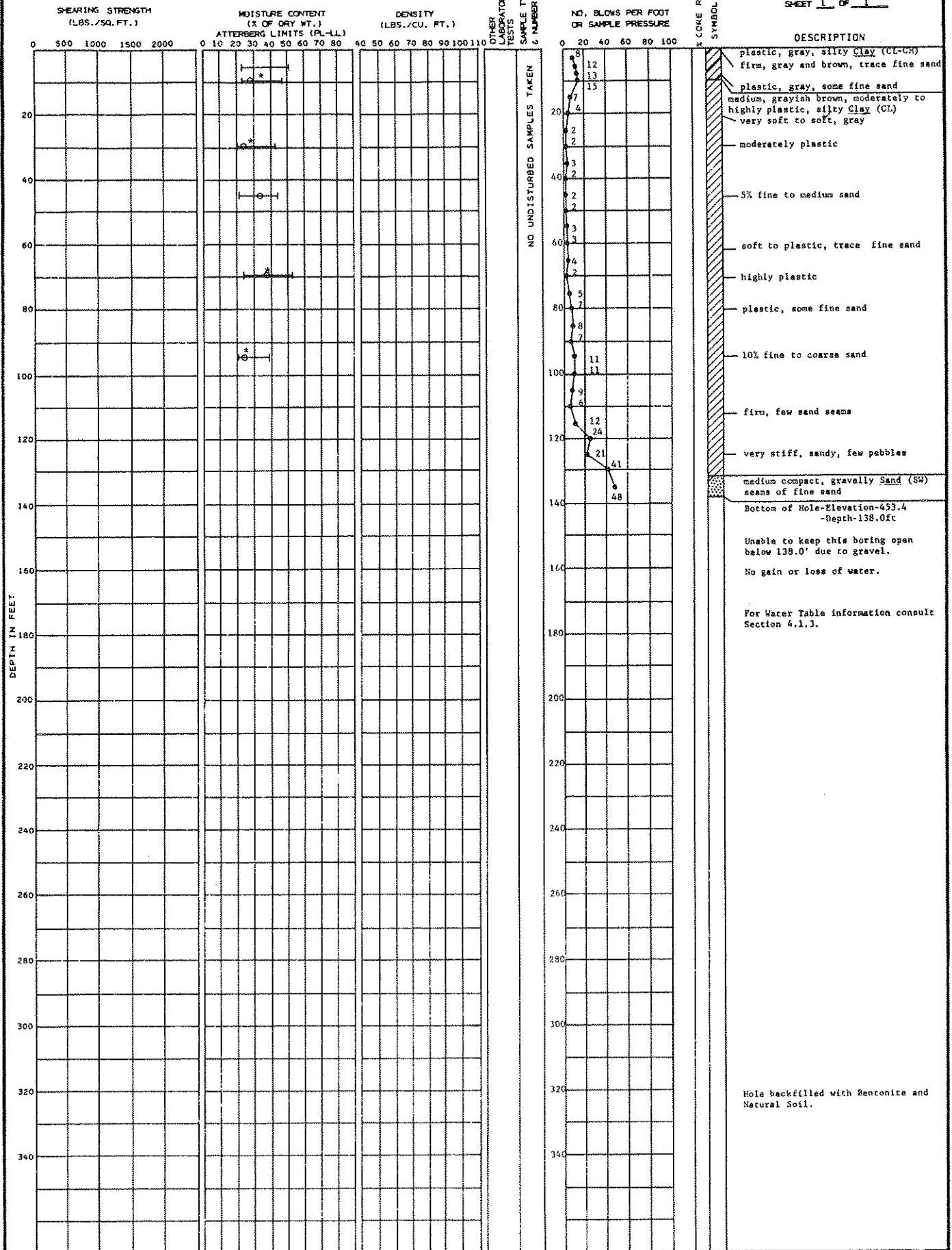


LOCATION: N 15,000  
E 8,000

GROUND ELEVATION: 591.4

DATE DRILLED: 4-8-76

SHEET 1 OF 1

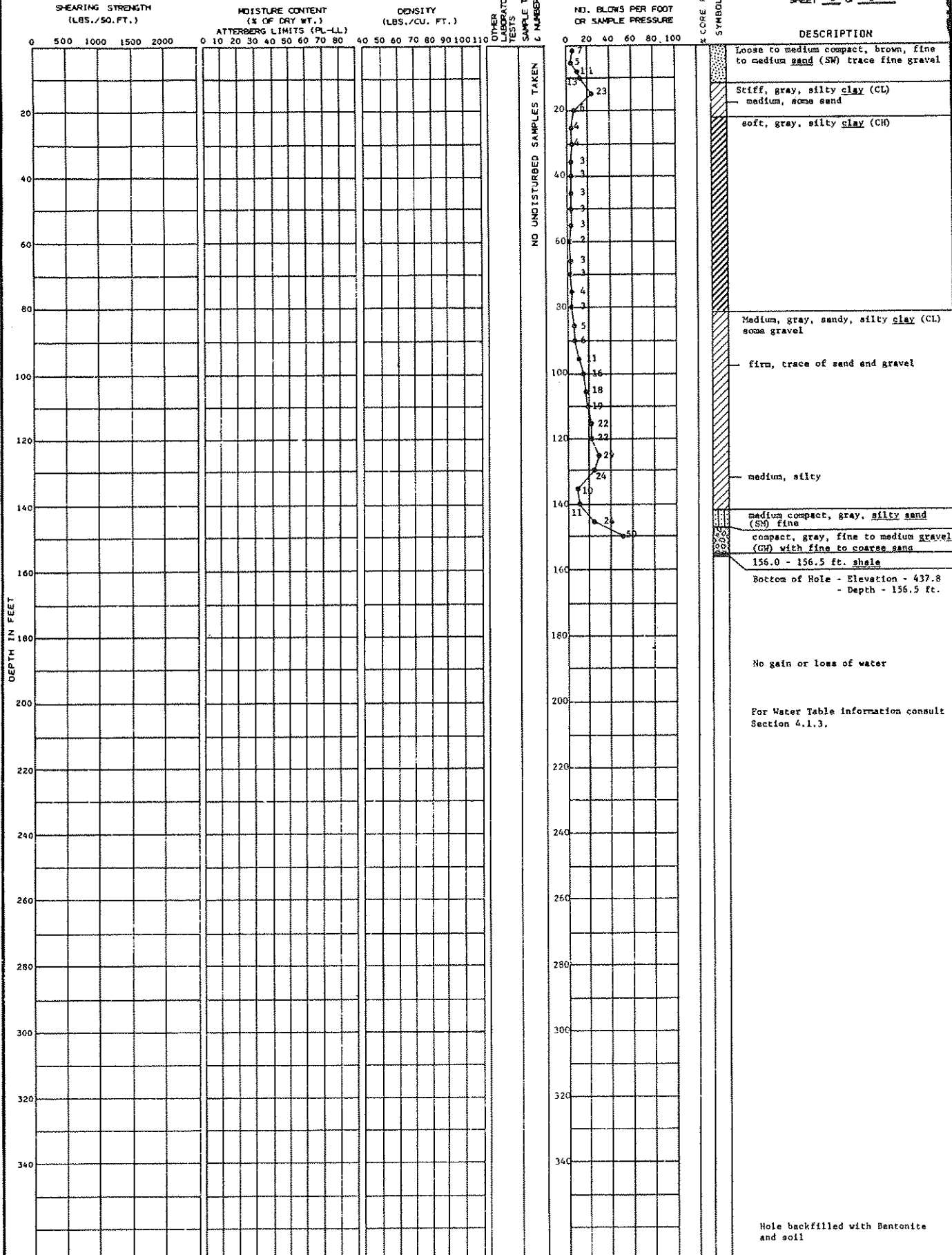


○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,830 E 9,938 GROUND ELEVATION 594.3

DATE DRILLED: 3-26-74  
3-27-74

SHEET 1 OF 1

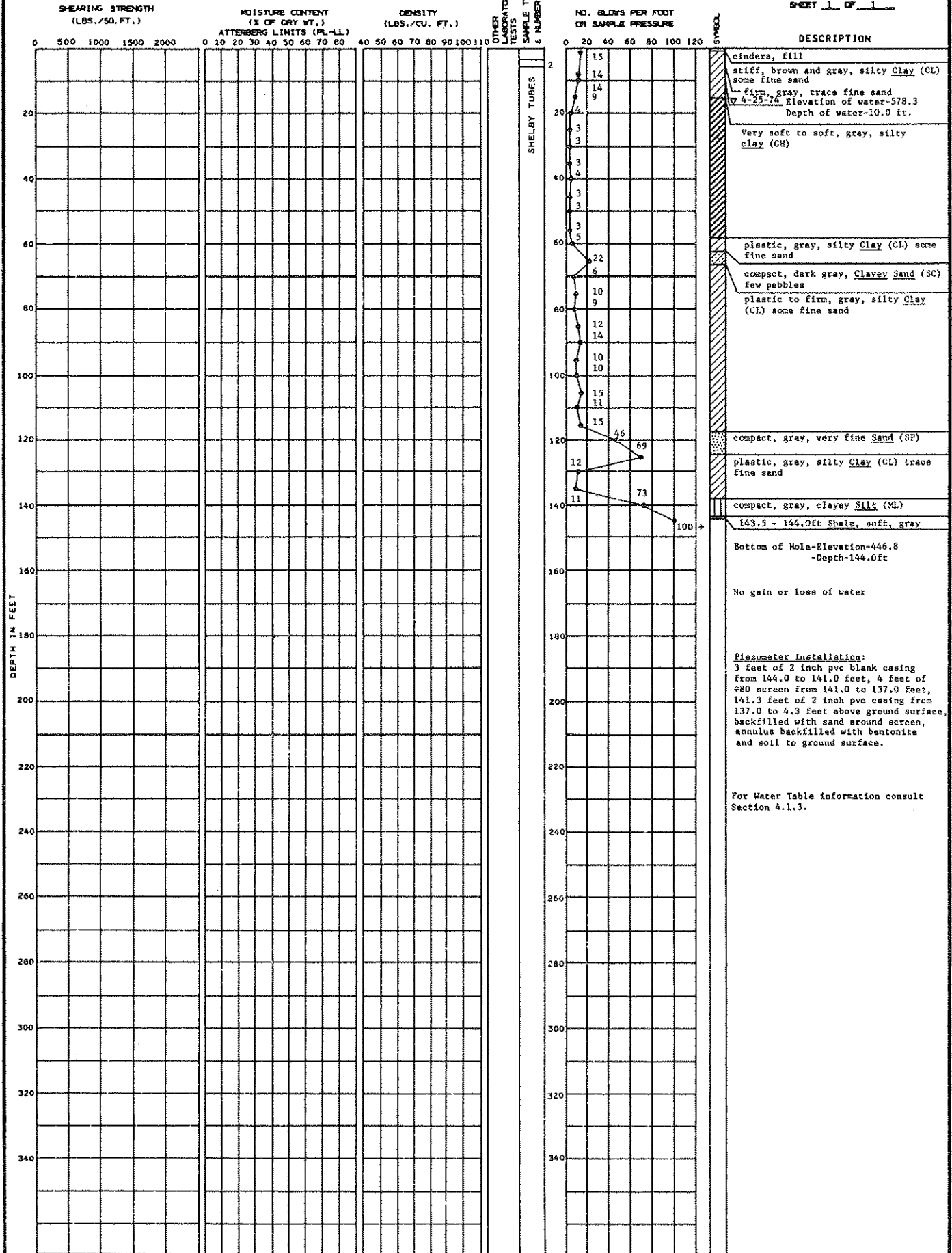


LOCATION: N 3,525  
E 12,533

GROUND ELEVATION 590.8

DATE DRILLED: 3-5-74  
3-7-74

SHEET 1 OF 1



SOIL BORING NO. 181

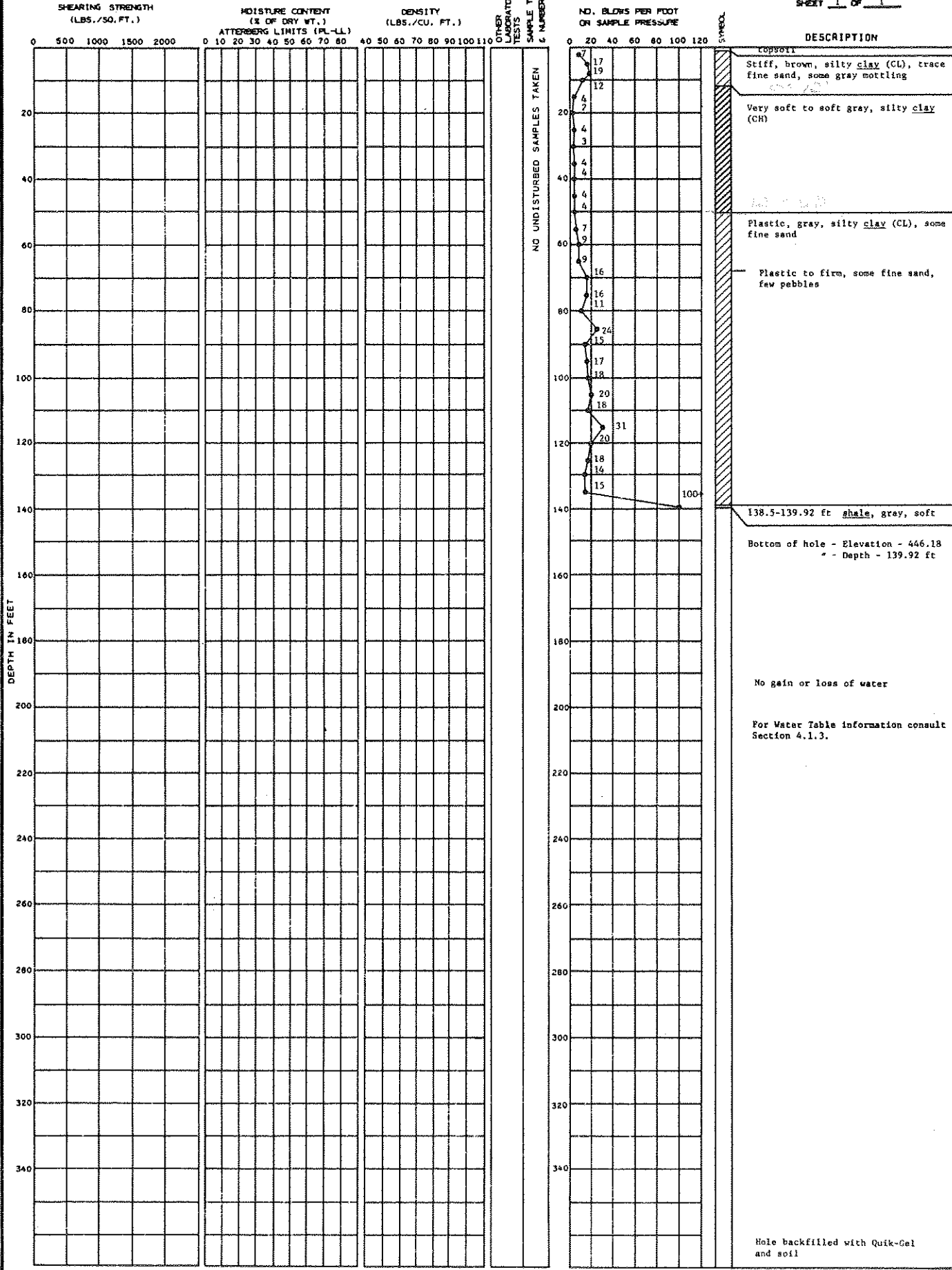
BECHTEL Belle River

B-125

LOCATION: N 3,556 E 9,564 GROUND ELEVATION 586.1

DATE DRILLED: 3-15-74 3-19-74

SHEET 1 OF 1



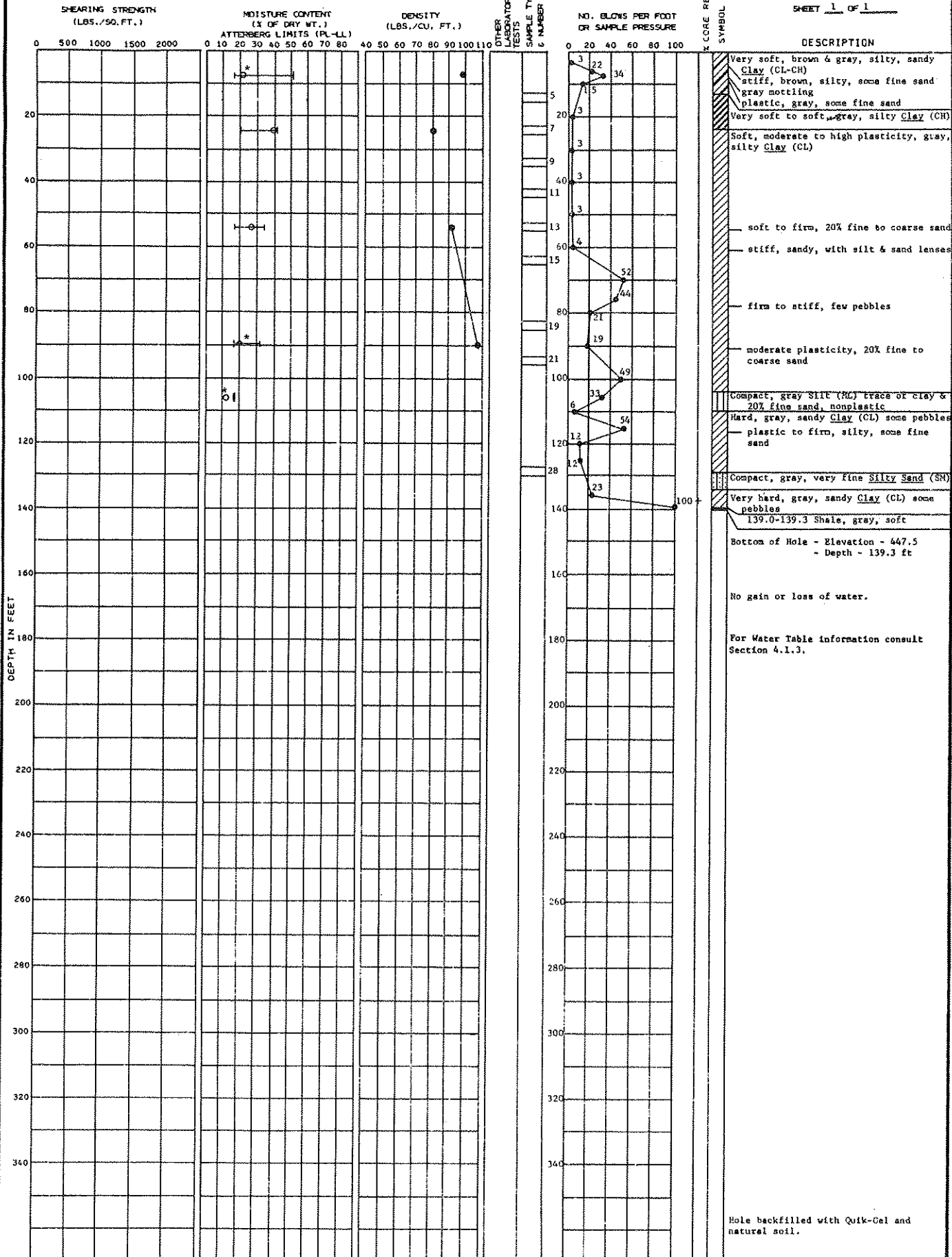
SOIL BORING NO. 184

BECHTEL Belle River

LOCATION: N 5,500 E 9,797 GROUND ELEVATION: 586.8

DATE DRILLED: 2-26-74 2-27-74

SHEET 1 OF 1



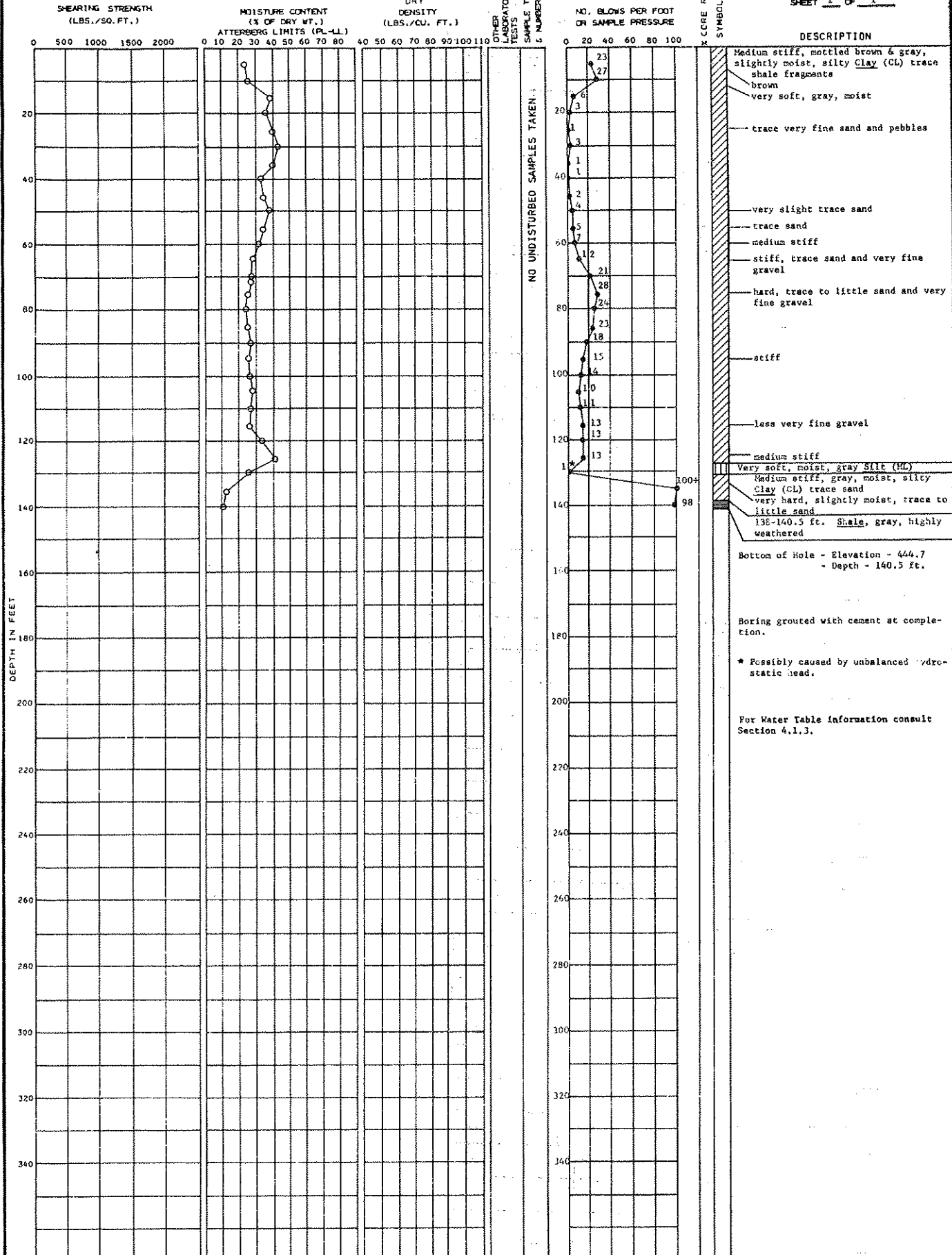
○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 186  
 BECHTEL Belle River

LOCATION: N 3500 E 11741 GROUND ELEVATION: 585.2

DATE DRILLED: 8/6/75 8/8/75

SHEET 1 OF 1

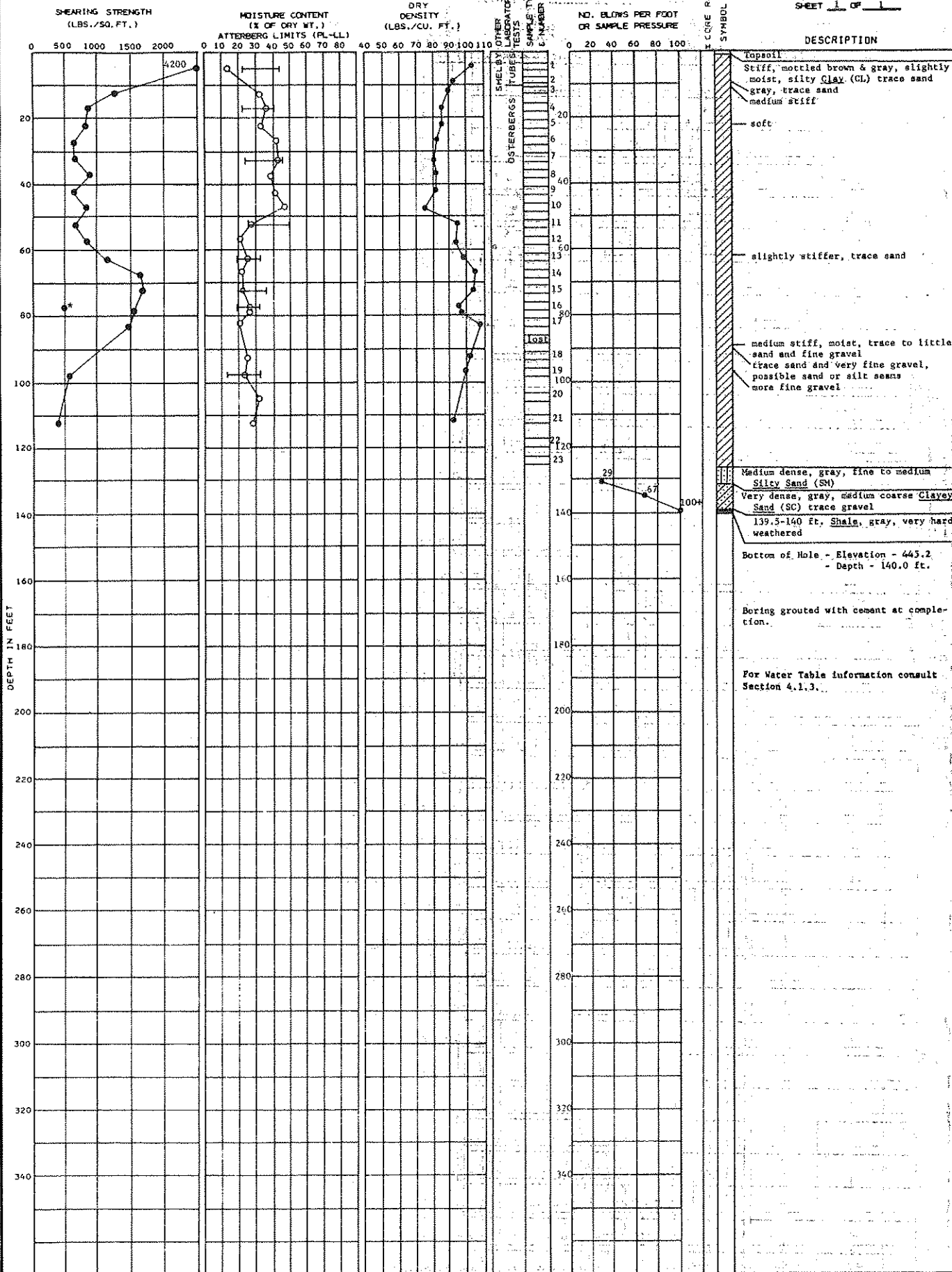


SOIL BORING NO. 191  
BECHTEL BELLE RIVER

H 3558 GROUND ELEVATION 385.2  
 LOCATION: E 11701

DATE DRILLED: 8/11/75  
 8/14/75

SHEET 1 OF 1



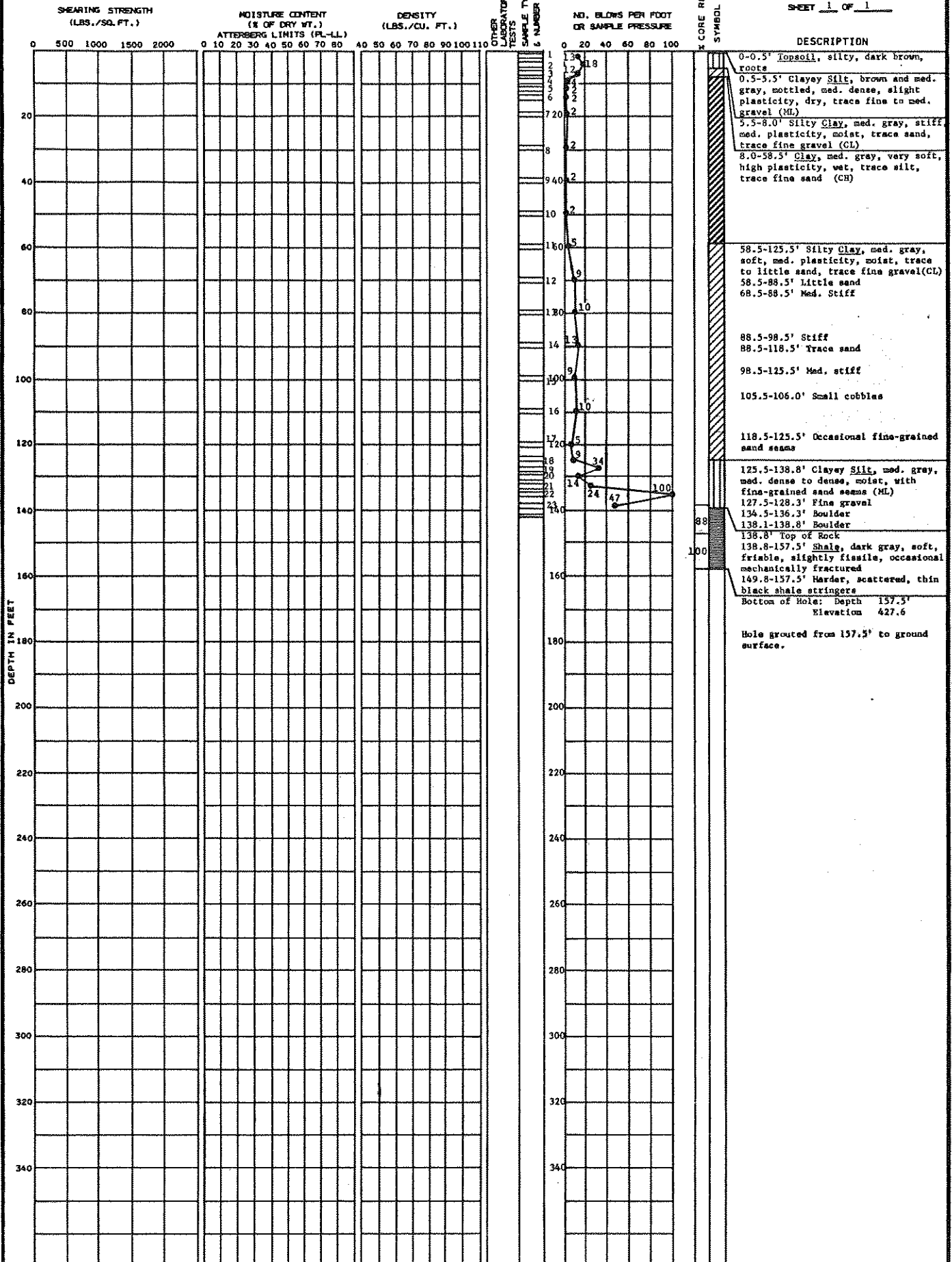
● Unconfined Compression  
 \* Sample contained sand seams.  
 ○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 193  
 BECHTEL BELLE RIVER

LOCATION: N 7800 E 9400 GROUND ELEVATION 585.1

DATE DRILLED: 8/17/77 8/22/77

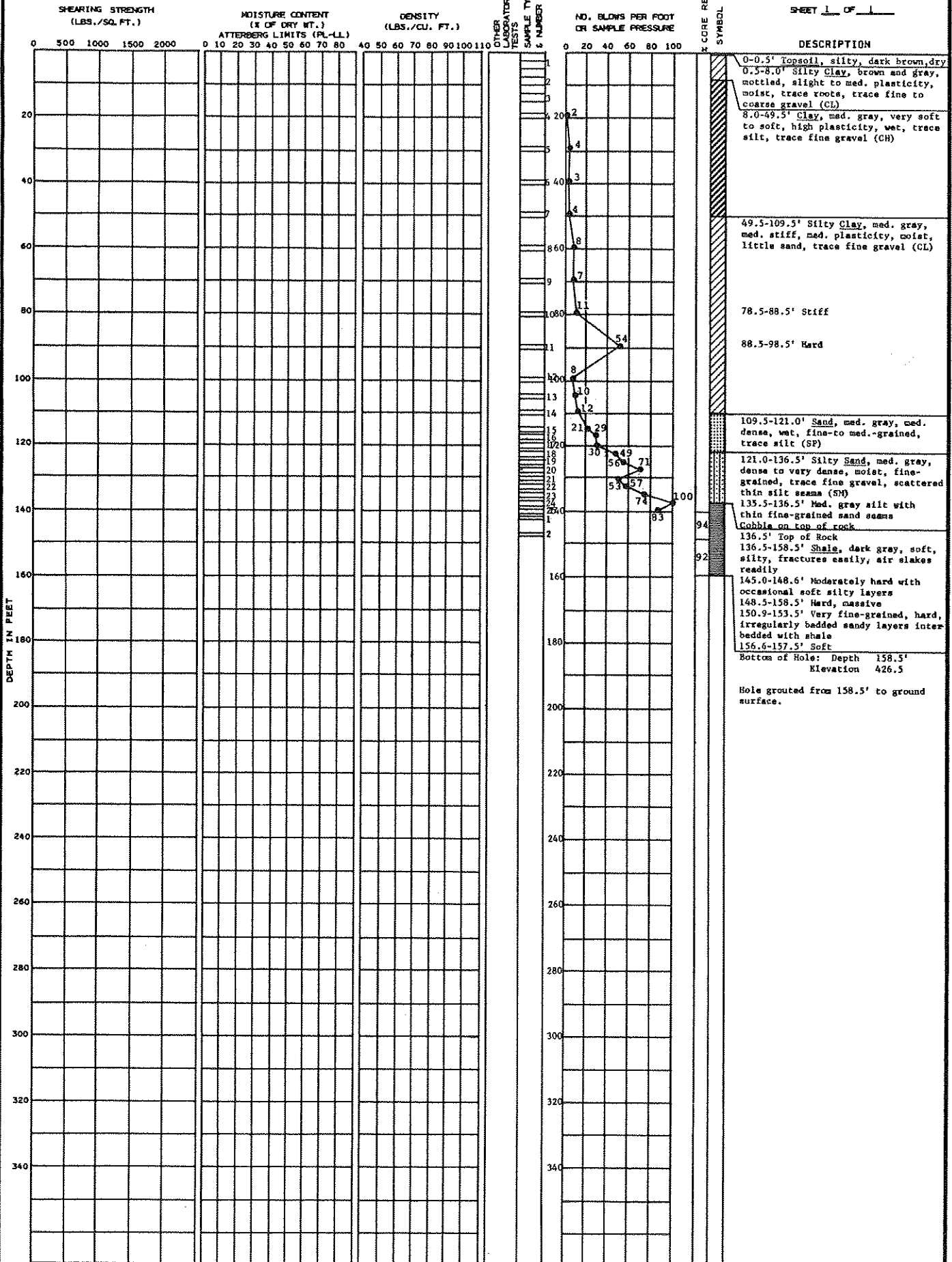
SHEET 1 OF 1





LOCATION: N 7500 E 9200 GROUND ELEVATION 585.0

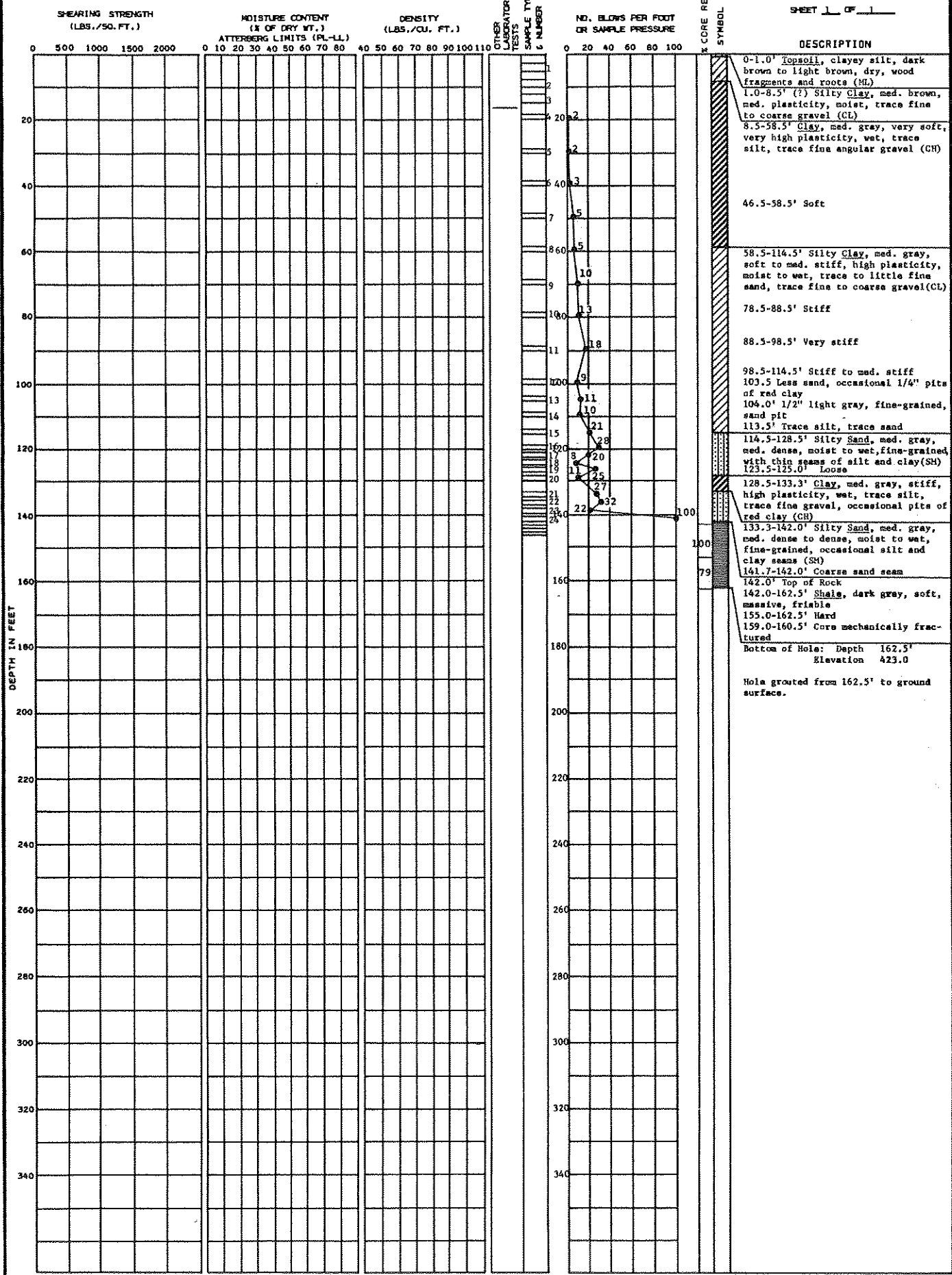
DATE DRILLED: 8/23/77 8/25/77



LOCATION: N 7850 E 9200 GROUND ELEVATION 585.5

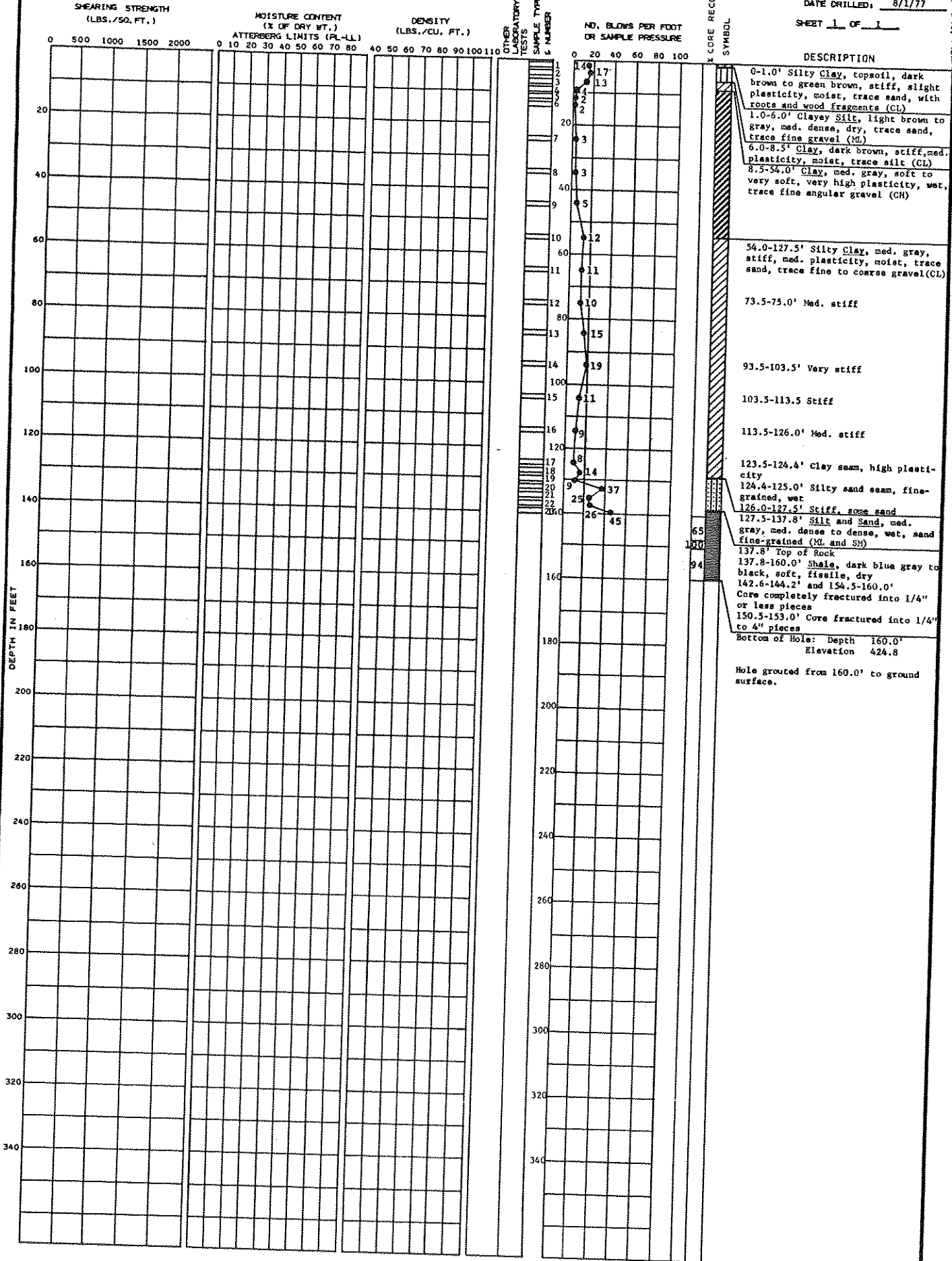
DATE DRILLED: 8/2/77  
8/4/77

SHEET 1 OF 1



LOCATION: N 7600 E 9400 GROUND ELEVATION 584.8

DATE DRILLED: 7/26/77 8/1/77 SHEET 1 OF 1



SOIL BORING NO. B-5 BECHTEL Belle River

LOCATION: N 7650  
E 9550

GROUND ELEVATION 585.7

DATE DRILLED: 8/25/77  
8/31/77

SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTENBERG LIMITS (PL-LL)

DENSITY  
(LBS./CU. FT.)

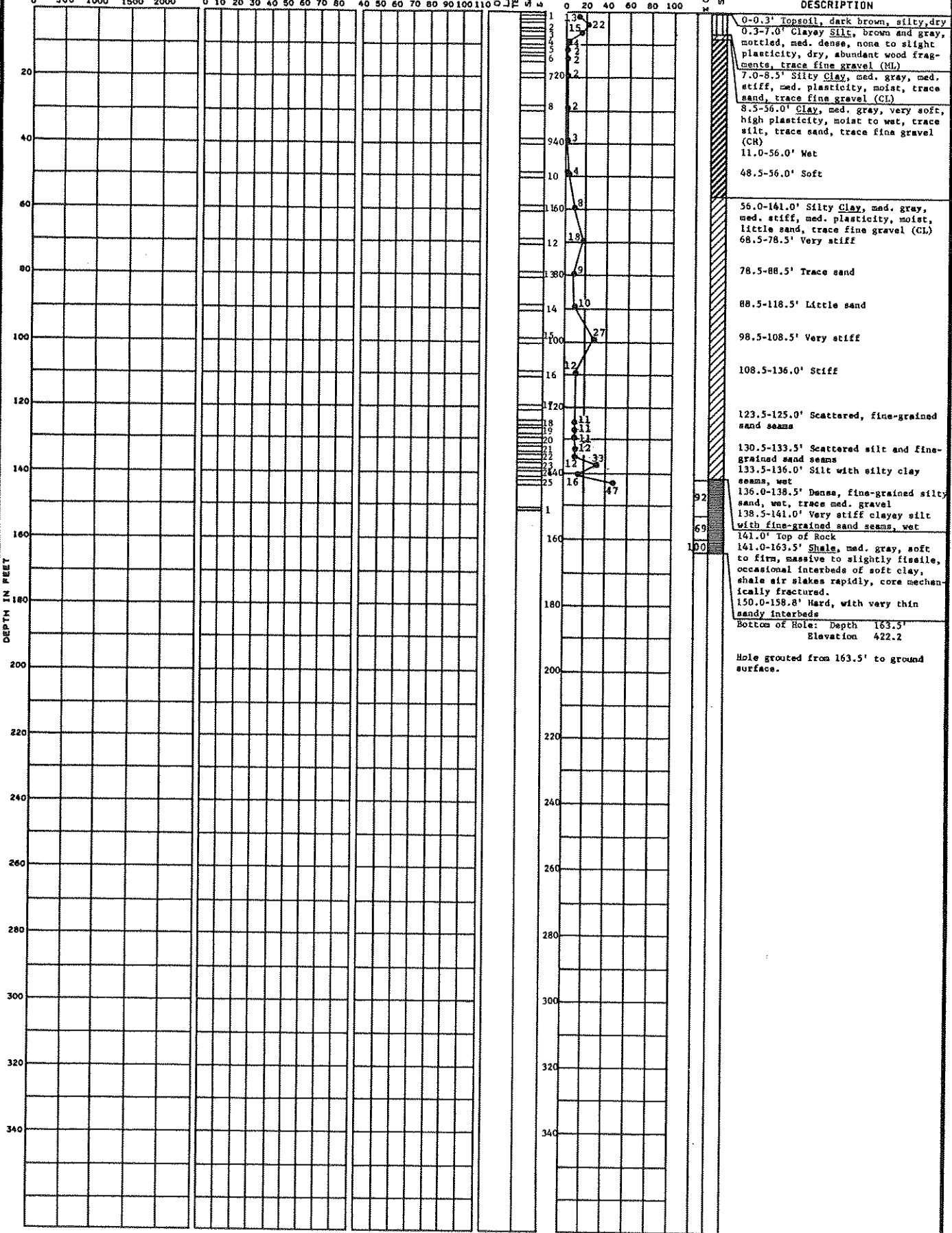
LABORATORY TESTS  
SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

NO. CORE RECOVERY SYMBOL

SHEET 1 OF 1

DESCRIPTION



SOIL BORING NO. 8-6  
BECHTEL Belle River

LOCATION: N 8180 E 9550 GROUND ELEVATION 585.3

DATE DRILLED: 8/12/77 8/17/77

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

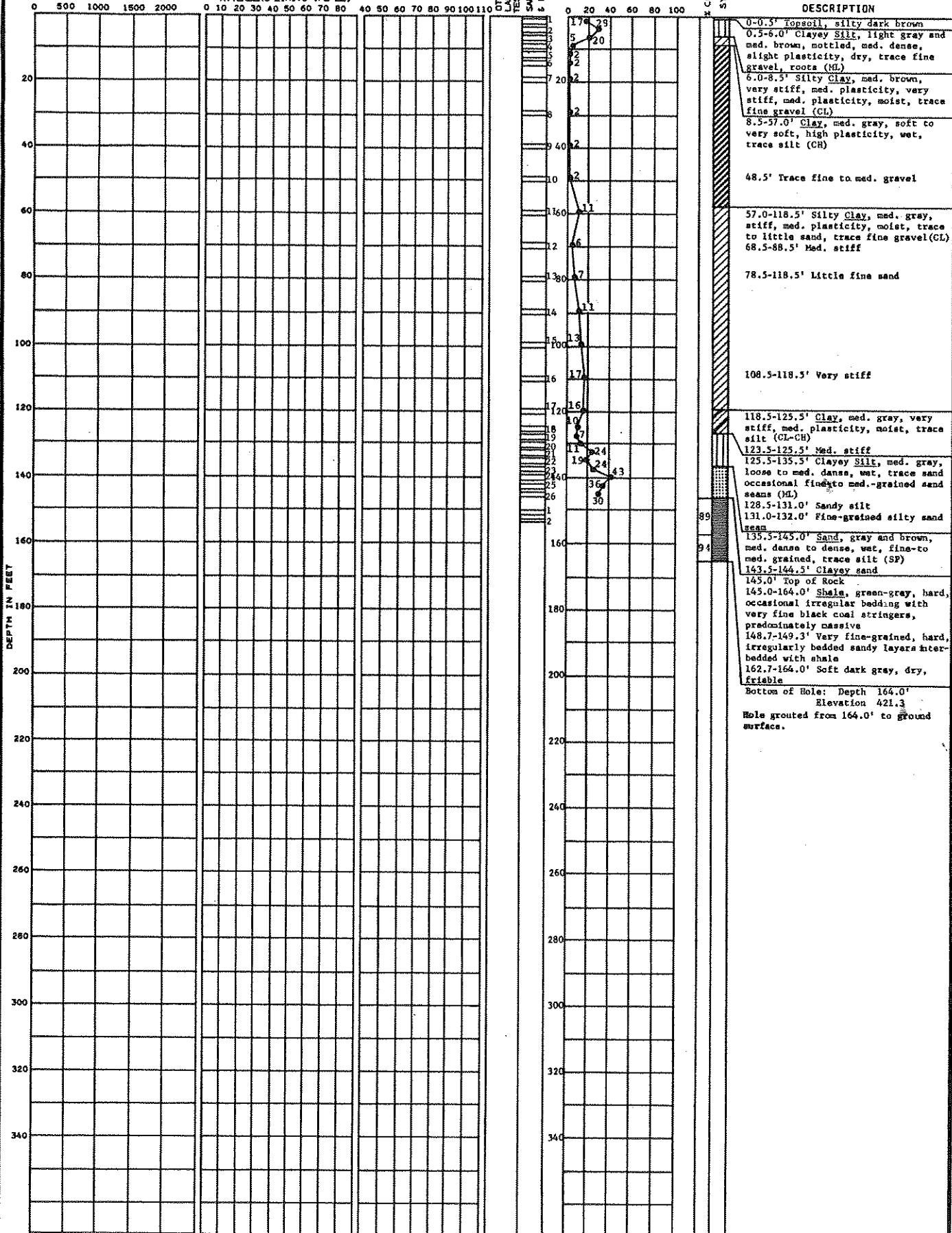
LABORATORY TESTS SAMPLE TYPE NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

CORE RECOVERY SYMBOL

SHEET 1 OF 1

DESCRIPTION

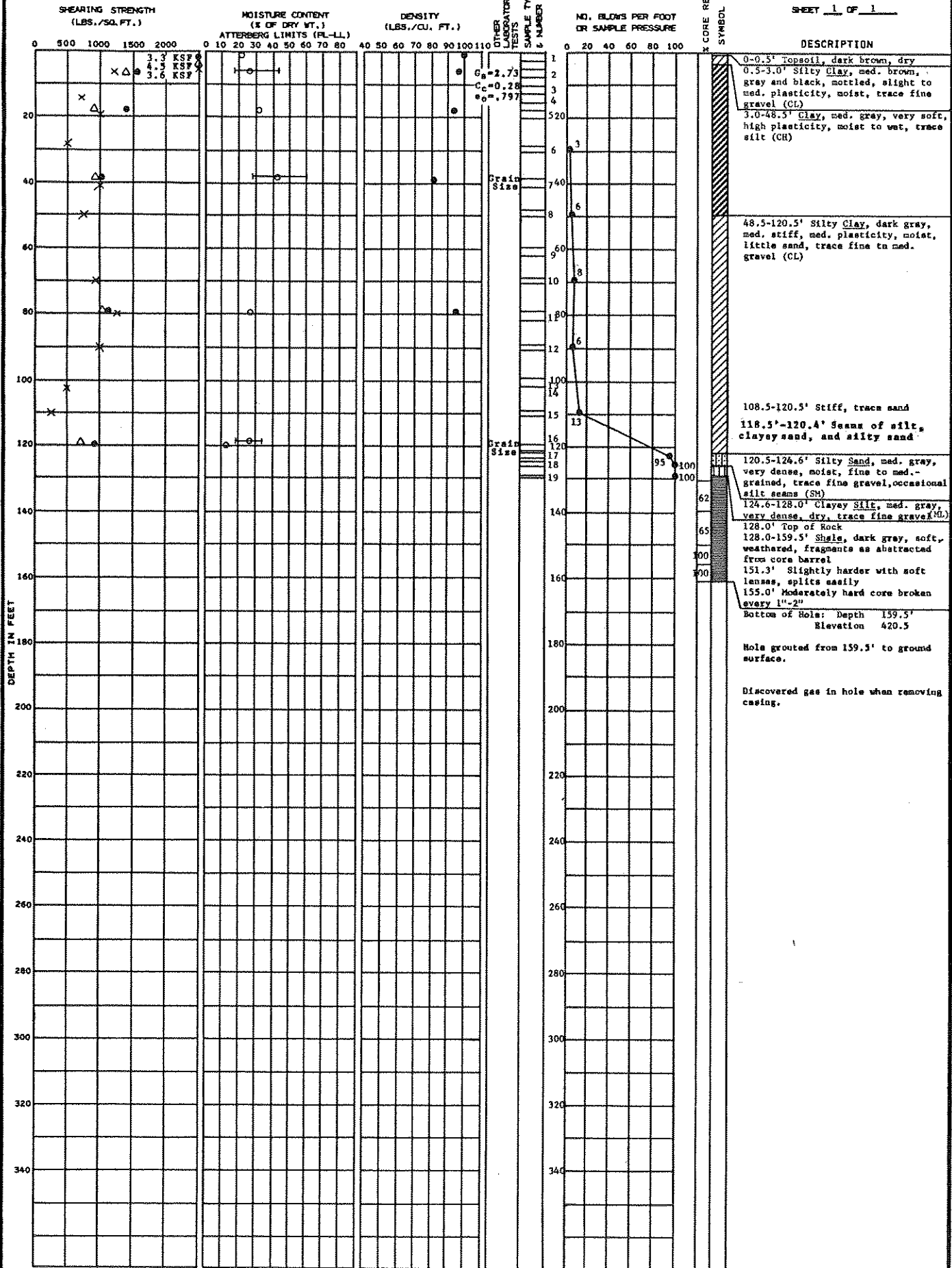


LOCATION: N 5270  
E 15660

GROUND ELEVATION 580.0

DATE DRILLED: 9/7/77  
9/14/77

SHEET 1 OF 1



Δ Torvane  
 ○ Unconsolidated Undrained  
 ⊙ Unconfined Compression  
 — Atterberg Limits  
 G<sub>s</sub> Specific Gravity  
 C<sub>c</sub> Compression Index  
 e<sub>0</sub> Initial Void Ratio  
 × Pocket Penetrometer

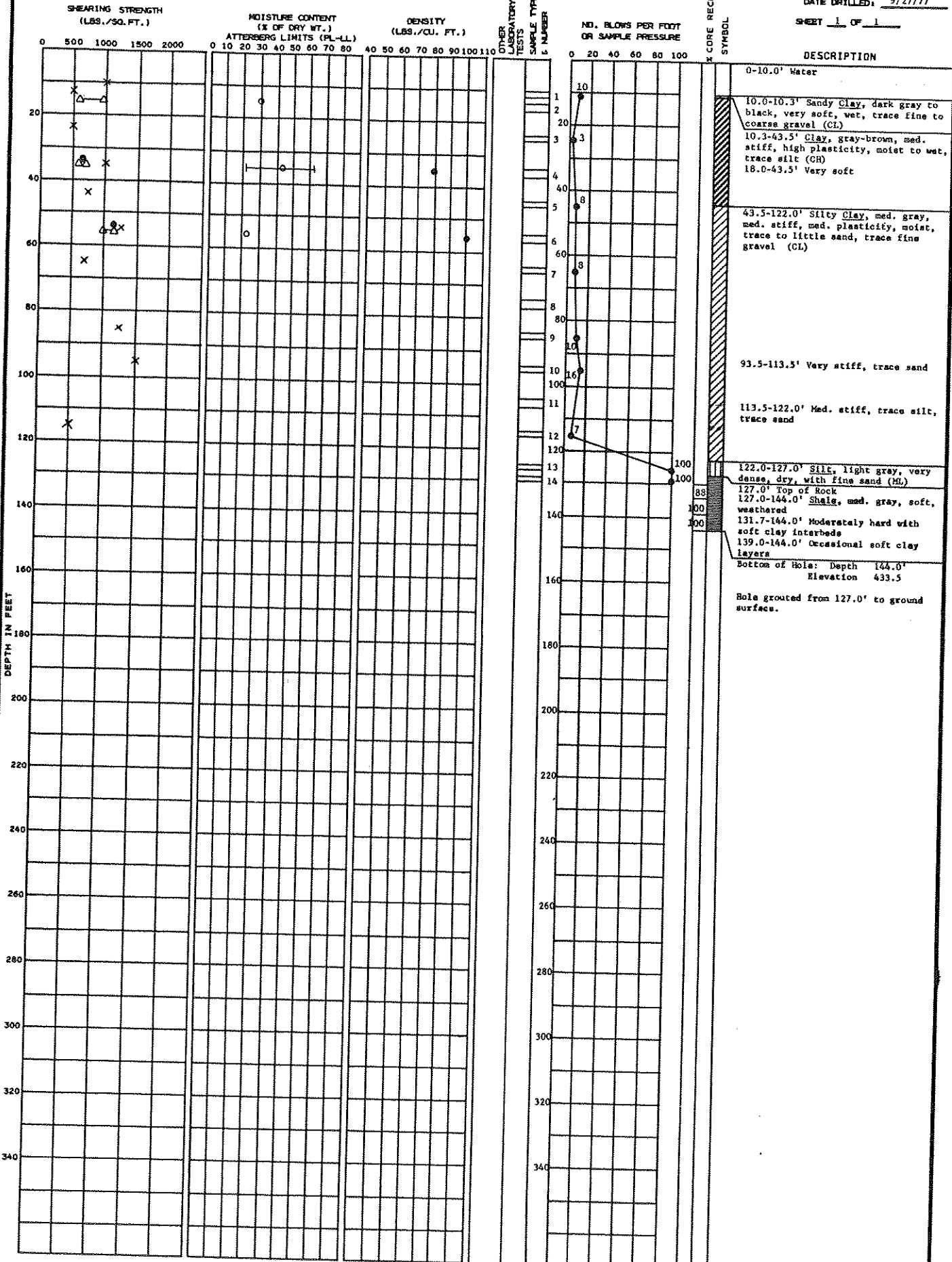
SOIL BORING NO. 8-17  
BECHTEL Bells River

LOCATION: N 5163  
E 15744

GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/21/77  
9/27/77

SHEET 1 OF 1



Δ Torvane  
 I Atterberg Limits  
 ● Unconfined Compression  
 ○ Unconsolidated Undrained  
 X Pocket Penetrometer

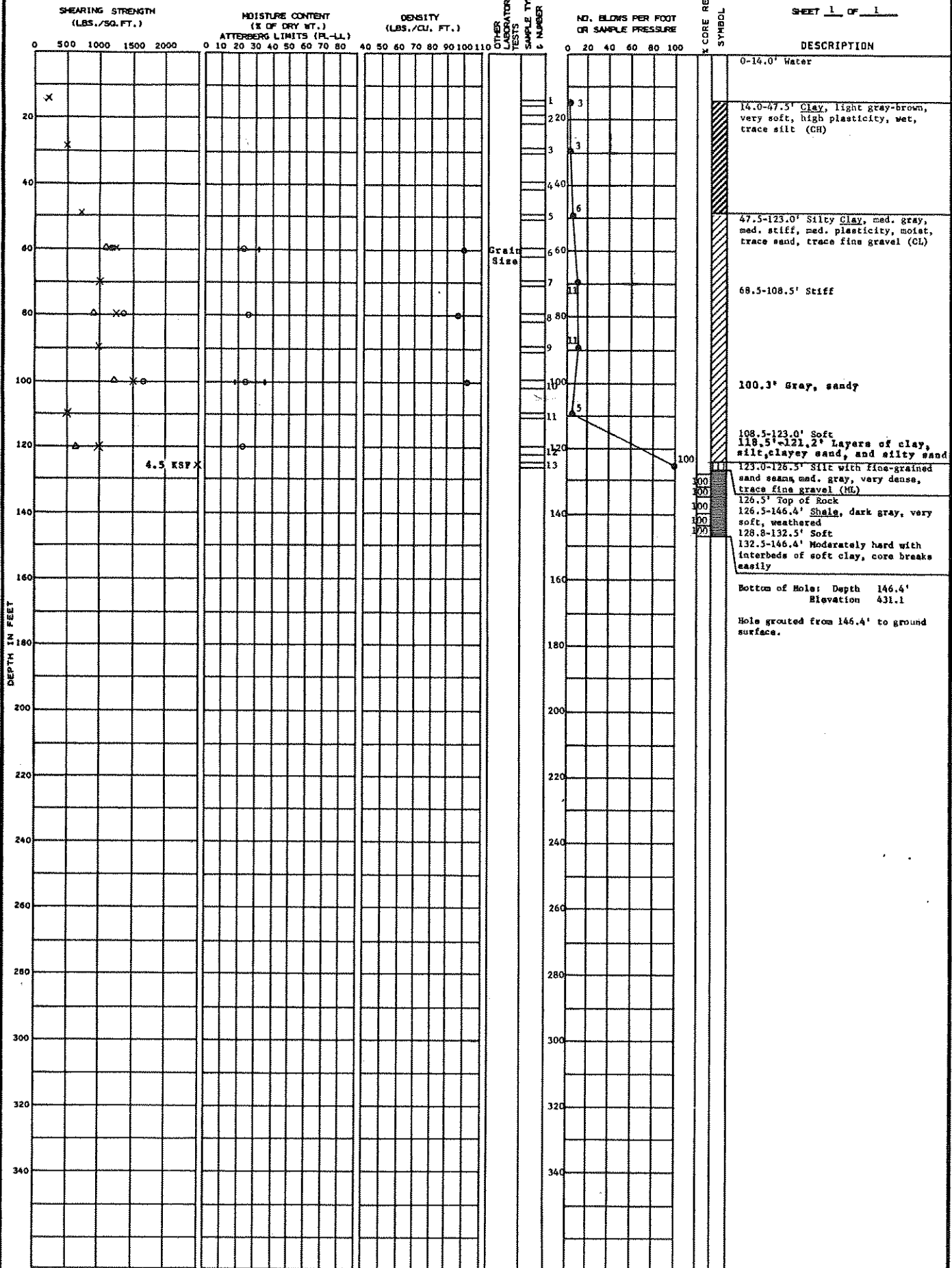
SOIL BORING NO. B-22  
BECHTEL Belle River

LOCATION: N 5364  
E 15750

GROUND ELEVATION 577.5 (Top of Water)

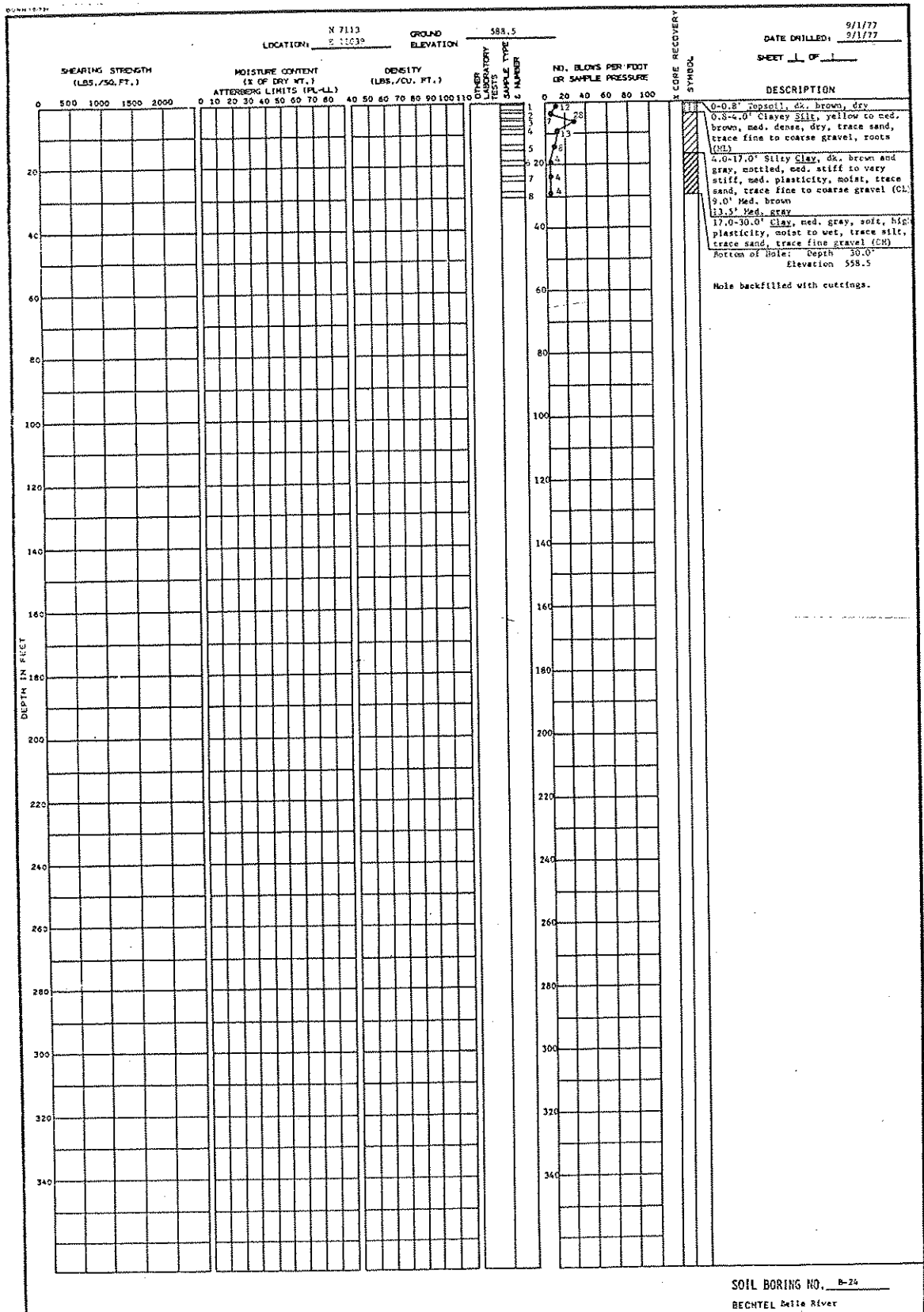
DATE DRILLED: 9/15/77  
9/21/77

SHEET 1 OF 1



△ Teryans  
 ○ Unconsolidated Undrained  
 □ Unconfined Compression  
 — Atterberg Limits  
 × Pocket Faunometer





LOCATION: H 6921 GROUND ELEVATION 587.5  
Z 11501

DATE DRILLED: 9/1/77  
9/1/77  
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)		DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY	DESCRIPTION
		ATTERBERG LIMITS (PL-LL)						
0	0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80	40 50 60 70 80 90 100 110			0 20 40 60 80 100		0-0.7' Topsoil, dk. brown, dry
1						12		0.7-4.5' Silty Sand, tan and yellow, mottled, loose, damp, fine-grained (SM)
2						15		
3						20		4.5-9.0' Silty Clay, brown and gray, mottled, stiff to very stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CI)
4						22		
5						23		9.0-30.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace sand, trace fine gravel, trace silt (CH)
6								
7								
8								
20								
40								
60								
80								
100								
120								
140								
160								
180								
200								
220								
240								
260								
280								
300								
320								
340								

LOCATION: N 6730 E 11963 GROUND ELEVATION 588.1

DATE DRILLED, 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.7' Topsoil, dr. brown, dry
0.7					11		0.7-4.0' Silty Sand, tan and gold, mottled, med. dense, dry, fine-grained, roots (SM)
4.0					21		4.0-13.5' Silty Clay, gray and brown, mottled, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5					3		6.0' Green brown
19.5					3		13.5-30.0' Clay, med. gray, soft, high plasticity, moist to wet, trace silt, trace fine gravel (CH)
30.0					3		Bottom of Hole: Depth 30.0' Elevation 558.1
340							Hole backfilled with cuttings.

LOCATION: N 6539 E 12425 GROUND ELEVATION 588.2

DATE DRILLED: 9/2/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY	SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, fine to med. gravel, dry (GO)
1				16			1.0-5.0' Clayey Silt, dk. brown, med. dense to dense, dry, trace sand, trace fine gravel (ML)
2				37			
3				21			
4							
5				14			5.0-30.0' Silty Clay, dk. brown, hard to very stiff, dry, med. plasticity, trace sand, trace fine to med. gravel (CL)
6				22			
7				12			
8				7			13.5' Moist, dipping parting in sample med. brown with med. gray filling, with roots
19.0-28.3'							19.0-28.3' Med. gray, stiff
23.5'							23.5' green-brown and gray, mottled
28.5-30.0'							28.5-30.0' Med. gray, med. stiff
							Bottom of Hole: Depth 30.0' Elevation 558.2
							Hole backfilled with cuttings.

LOCATION: N 6348 E 12890 GROUND ELEVATION 600.0

DATE DRILLED: 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, dry, sandy fill with coarse gravel
1							
2							
3							
4					17, 23, 28, 24		1.0-6.0' Clayey Silt, green brown, med. dense, dry, trace sand (ML)
5							
6					10		6.0-30.0' Silty Clay, green brown, very stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)
7					9		13.5' Med. gray, stiff to med. stiff, med. plasticity
8					7		28.5-30.0' Med. to high plasticity
40							Bottom of Hole: Depth 30.0' Elevation 570.0
60							Hole backfilled with cuttings.
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

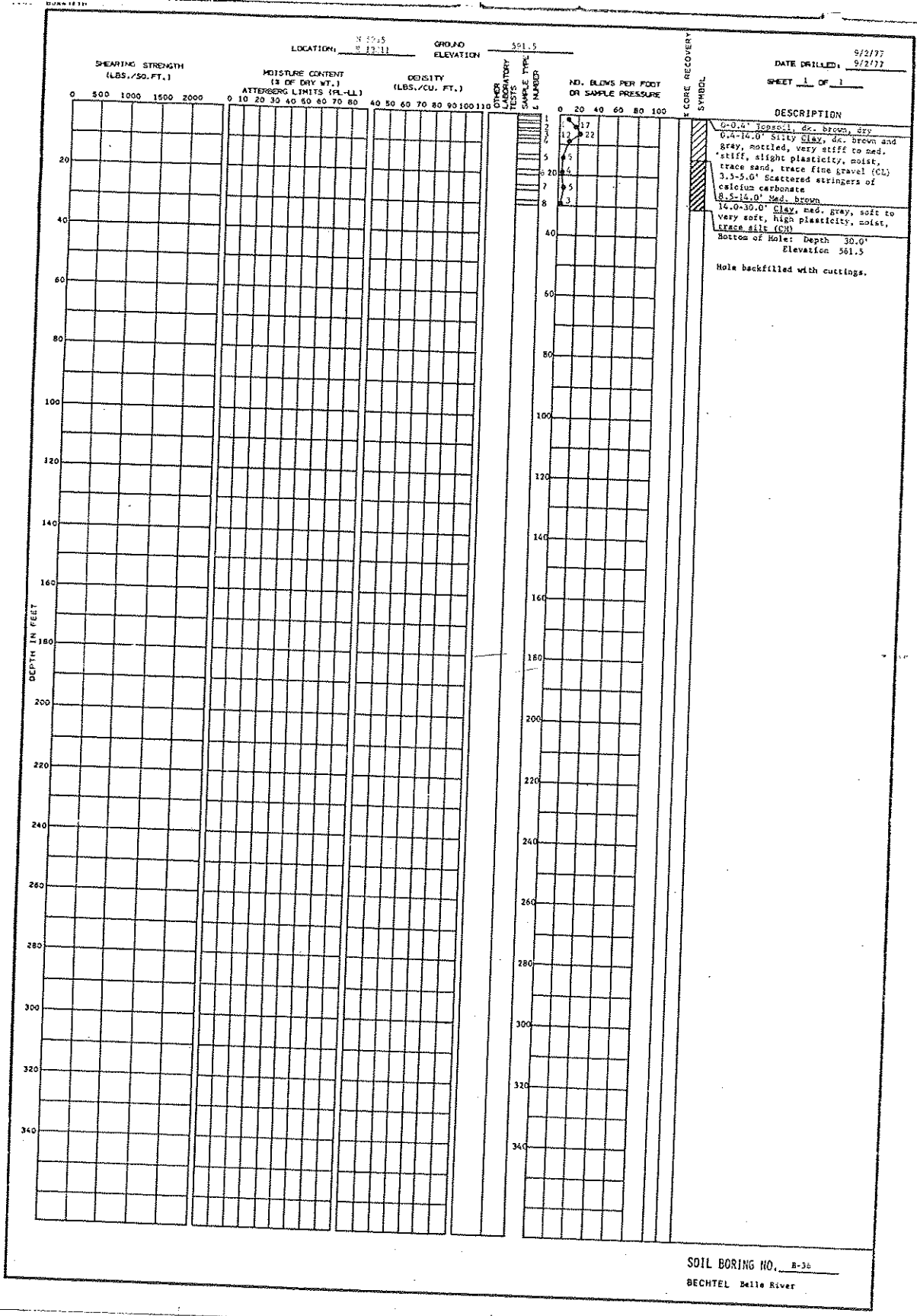
BURN 12-34

LOCATION: N 6156  
E 13309 GROUND ELEVATION 528.8

DATE DRILLED: 9/2/77  
9/2/77

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTENDING LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLINDS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, dry
1							0.3-3.5' Clayey Silt, light brown and gray, mottled, med. dense, none to slight plasticity, dry, trace sand, trace fine to coarse gravel (G)
2							3.5-23.5' Silty Clay, med. brown and gray, lightly mottled, very stiff to hard, med. plasticity, moist, trace sand, trace fine gravel (CL)
3							23.5-30.0' Med. Gray, med. stiff to very soft, high plasticity, moist, trace silt (CH)
30.0'							Bottom of Hole: Depth 30.0' Elevation 568.8
30.0'							Note backfilled with cuttings.
40							
60							
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. B-34  
BECTEL Belle River



SOIL BORING NO. B-30  
BECHTEL Belle River

DAW-11-13

LOCATION: J 5774 E 14272 GROUND ELEVATION: 591.2

DATE DRILLED: 9/6/77 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)				MOISTURE CONTENT (% OF DRY WT.)				DENSITY (LBS./CU. FT.)				LABORATORY TESTS & NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION									
	0	500	1000	1500	2000	0	10	20	30	40	50	60					70	80	40	80	60	70	80	90	100
0																									0-0.3' Topsoil, dk. brown, moist
1																									0.3-13.5' Silty clay, med. brown and gray, mottled, med. stiff, med. plasticity, trace sand, trace fine gravel (GL)
2																									6.0-8.5' Med. brown, very stiff
3																									8.5-13.5' Med. brown, stiff
4																									13.5-30.0' Clay, med. gray, med. stiff, high plasticity, moist, trace silt (CH)
5																									23.5-28.5' Very soft, moist to wet
6																									18.5-30.0' Soft
7																									Bottom of Hole: Depth 30.0'
8																									Elevation 561.2
20																									
40																									
60																									
80																									
100																									
120																									
140																									
160																									
180																									
200																									
220																									
240																									
260																									
280																									
300																									
320																									
340																									

SOIL BORING NO. B-39 BECHTEL Belle River



QUMA 1872A

LOCATION: N 5532 E 14735 GROUND ELEVATION 590.2

DATE DRILLED: 9/6/77 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.)	ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT ON SAMPLE PRESSURE	LABORATORY TESTS SAMPLE TYPE & NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0								0-0.4' Topsoil, dk. brown, dry
0.4					21			0.4-13.5' Silty Clay, med. brown, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5					3			13.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist to wet, trace silt (CH)
30.0					4			Bottom of Hole: Depth 30.0' Elevation 560.2
30.0								Hole backfilled with cuttings.
40								
60								
80								
100								
120								
140								
160								
180								
200								
220								
240								
260								
280								
300								
320								
340								

SOIL BORING NO. E-50  
BECHTEL Belle River

LOCATION: N 5355      GROUND ELEVATION: 559.9  
 S 15258

DATE DRILLED: 9/6/77  
 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
	0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80	40 50 60 70 80 90 100 110	0 20 40 60 80 100		
0						0-0.3' Topsoil, dk. brown, dry
0.3-4.0'						Clayey silt, light brown, med. dense, dry, trace sand, trace fine to coarse gravel (G)
4.0-18.5'						Silty clay, med. brown and gray, mottled, very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
18.5-30.0'						Med. stiff clay, med. gray, very soft, high plasticity, moist to wet, trace silt (CH)
30.0-30.0'						Soft
30.0'						Bottom of Hole: Depth 30.0' Elevation 559.9
						Hole backfilled with cuttings.

OTHER LABORATORY TESTS  
 SAMPLE NUMBER

17  
 20  
 23  
 27  
 33  
 44

SOIL BORING NO. 2-42  
 BECHTEL, Balls River

## **APPENDIX D – 2016 BORING LOGS**



WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 1 of 2

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>2/29/16</b>	Date Drilling Completed: <b>2/29/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.17</b>	TOC Elevation (ft) <b>591.30</b>	Total Depth (ft bgs) <b>120.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins. N: 471155.70 E: 13625546.02		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 08:45</b>		Depth (ft bgs) <b>14.52</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	<p><b>SILTY CLAY WITH GRAVEL</b> mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.</p> <p><b>CLAY</b> mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.</p> <p>Change to dark gray (10YR 4/1), very stiff at 5.0 feet.</p> <p>Change to soft at 8.0 feet.</p>	CL-ML			<p>Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.</p> <p>Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.</p>
2 CS	50		10	<p>Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.</p>				
3 CS	100		20	<p>Change to dark gray (10YR 4/1) at 20.0 feet.</p>	CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS						
NUMBER AND TYPE	RECOVERY (%)													
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.	CL									
6 ST	100		50											
7 CS	100		55											
8 CS	80		65											
9 CS	100		75											
10 CS	100		85											
11 CS	100		95						<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP				
			100											
			100						End of boring at 100.0 feet below ground surface.					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG


WELL NO. MW-16-02

Page 1 of 2

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/14/16	Date Drilling Completed: 3/15/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 586.27	TOC Elevation (ft) 588.94	Total Depth (ft bgs) 100.0	Borehole Dia. (in) 6/4
Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins. N: 471409.06 E: 13625991.78		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:24		Depth (ft bgs) 16.07

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	CLAY mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			7.0	Change to no gravel at 7.0 feet.				
2 CS	80		10	Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.				
			15					
			25					
3 CS	100		25					
			30					
			35					
4 CS	90		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 2 of 2

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	SILTY CLAY mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.				
7 CS	50		55					
8 CS	100		60					
9 CS	100		65		CL-ML			
10 CS	100		70					
			75					
			80					
			85					
			90	CLAYEY SILT mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	SAND mostly fine to coarse sand, dark gray (10YR 4/1), saturated.				
			96.0	Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>5/25/16</b>	Date Drilling Completed: <b>5/31/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.03</b>	TOC Elevation (ft) <b>590.66</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins. N: 471391.78 E: 13626202.49		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time _____ Depth (ft bgs) _____ After Drilling: Date/Time <b>6/8/16 14:30</b> Depth (ft bgs) <b>12.82</b>	

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
	1	100		5	<b>TOPSOIL</b> <b>SILTY CLAY</b> mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
	2	100		10.5	Change to gray (10YR 5/1) at 10.5 feet. <b>CLAY</b> mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
	3	100		25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
	4	100		41.5	Change to trace fine to coarse sand at 41.5 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers





WELL CONSTRUCTION LOG

WELL NO. MW-16-03

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
6 CS	90		50					
			55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	<b>SANDY CLAY</b> mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			70	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.	CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	<b>SANDY SILT</b> mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
			85	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
9 CS	100		90	Change to medium soft at 90.0 feet.	CL			
10 CS	100		95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	CLAY mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12 CS	100		115		CL			
			120					
13 CS	100		125					
			130	<b>SANDY CLAY</b> mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff. <b>SILTY SAND</b> mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	CL SM			
14 CS	90		135	<b>SAND</b> mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
			140	<b>SILTY SAND</b> mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			145	<b>SAND</b> mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
15 CS	100		150	<b>SILT</b> mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense. <b>SHALE</b> weathered shale bedrock, dark gray. End of boring at 150 feet below ground surface.	ML			
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-04**

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Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/7/16</b>	Date Drilling Completed: <b>3/8/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>587.50</b>	TOC Elevation (ft) <b>590.51</b>	Total Depth (ft bgs) <b>130.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 200 feet from W corner of road, S of bottom ash basins. N: 470893.74 E: 13625876.34		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 09:31</b>		Depth (ft bgs) Depth (ft bgs) <b>13.91</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.  Change to stiff at 10.5 feet. Change to dark gray (10YR 4/1), very soft at 12.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.				
6 CS	100		55					
			60	Change to few coarse gravel at 60.0 feet.				
7 CS	100		65					
			70					
			75	SILTY CLAY mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
8 CS	100		75	SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	SAND mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
			80	SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
			85	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
9 CS	100		85	CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.				
			95					
10 CS	100		95		CL-ML			
			100	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828 0003 0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
12 CS	100		115	<b>SILT</b> mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
13 CS	100		125	<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/3/16	Date Drilling Completed: 3/4/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.32	TOC Elevation (ft) 590.82	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W of diversion basin. N: 470378.15 E: 13626342.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55		
			Depth (ft bgs)	Depth (ft bgs) 14.37	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard.</p> <p>Change to no gravel, very stiff at 4.0 feet.</p>	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15					
			20					
			25	Change to medium stiff at 26.0 feet.				
			30	Change to very soft at 28.0 feet.				
3 CS	100		25					
			35					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: 	Firm: TRC Environmental Corporation 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
	5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
					SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
	6 ST	100		50	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
	7 CS	100		55					
				60	Change to few fine to coarse gravel at 60.0 feet.	CL			
	8 CS	100		65	Change to medium stiff at 65.0 feet.				
				67.5	Change to stiff at 67.5 feet.				
	9 CS	100		70	SILTY CLAY mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
				75	Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.				
				80		CL-ML			
	10 CS	60		85	Change to few to little fine sand at 85.5 feet.				
				90	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
				93.5	Change to medium stiff at 93.5 feet.				
	11 CS	100		95	Change to soft at 97.5 feet.	CL			
				100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110-115					
14 CS	100		120-125					
15 CS	100		130-135	CLAYEY SILT mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
16 CS	90		140-145	SHALE dark gray (10YR 4/1), dry.				
			150	End of boring at 150.0 feet below ground surface.				
			155					





**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-06**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/10/16</b>	Date Drilling Completed: <b>3/11/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.98</b>	TOC Elevation (ft) <b>593.21</b>	Total Depth (ft bgs) <b>140.0</b>
Boring Location: 123 feet S of road connecting to haul road, E of diversion basin. N: 470439.03 E: 13626796.04		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 10:01</b> Depth (ft bgs) <b>14.45</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	GRAVEL WITH SAND mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense. CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to few coarse gravel at 10.0 feet.				
2 CS	100		15	Change to dark gray (10YR 4/1), stiff at 12.0 feet. Change to very soft at 13.0 feet.				
			20					
3 CS	100		25					
			30					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *[Handwritten Signature]* Firm: TRC Environmental Corporation 734.971.7080  
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 Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
6 CS	100		55		CL			
7 CS	100		65					
			70	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				<b>SAND</b> mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.				
			80		CL-ML			
9 CS	80		85					
			90	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
10 CS	70		95		CL			
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
12 CS	100		110-115		CL			
13 CS	100		125	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
14 CS	100		135	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			140	<b>SHALE</b> dark gray (10YR 4/1), hard, brittle.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



**WELL CONSTRUCTION LOG**

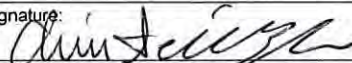
**WELL NO. MW-16-07**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/8/16</b>	Date Drilling Completed: <b>3/9/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.89</b>	TOC Elevation (ft) <b>592.58</b>	Total Depth (ft bgs) <b>140.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: 326 feet S of road connecting to haul road, E of diversion basin. N: 470233.47 E: 13626858.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 11:56</b>		Depth (ft bgs) <b>14.13</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	CLAY mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
			10	Change to dark gray (10YR 4/1) at 11.0 feet.				
			13	▼ Change to moist, very soft at 13.0 feet.				
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		65	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			66	<b>SAND</b> mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
			67	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			70	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.				
9 CS	100		75					
10 CS	100		85		CL-ML			
11 CS	100		95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231825.0003.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		125					
15 CS	100		135					
				<b>SILT</b> mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
				<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/9/16	Date Drilling Completed: 3/10/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.31	TOC Elevation (ft) 591.88	Total Depth (ft bgs) 140.0	Borehole Dia. (in) 6
Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin. N: 470002.90 E: 13626846.85		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 12:00		
			Depth (ft bgs)	Depth (ft bgs) 13.19	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	CLAY WITH GRAVEL mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15	CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
3 CS	100		25		CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		55					
7 CS	80		65					
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
9 CS	100		85					
10 CS	60		95					
			100					





WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.  Change to few fine sand at 105.5 feet.	CL-ML			
12 CS	100		110	Change to no sand at 110.0 feet.				
13 CS	100		115					
14 CS	100		125	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			130	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			135	End of boring at 140.0 feet below ground surface.				
			140					
			145					
			150					
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/1/16</b>	Date Drilling Completed: <b>6/1/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.28</b>	TOC Elevation (ft) <b>590.80</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: _____ Date/Time _____ After Drilling: _____ Date/Time <b>6/9/16 15:13</b>		Depth (ft bgs) <b>14.36</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	75		5	<p><b>TOPSOIL</b></p> <p><b>SILTY CLAY</b> mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.</p>	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	85		15	<p><b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.</p>				
3 CS	100		25		CL			
4 CS	100		35	Change to trace to few fine gravel at 30.0 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: M. Powers



# WELL CONSTRUCTION LOG

WELL NO. MW-16-09

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5	CS	100	45	CLAY mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
			50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6	CS	100	70	Change to soft at 70.0 feet.				
			75		CL			
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
			90					
			95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
8 CS	75		105	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.				
9 CS	80		110					
			115					
			120		CL			
			125					
10 CS	100		130					
			135					
			140	<b>SAND</b> mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
11 CS	80		145	<b>SAND WITH GRAVEL</b> mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
			150	<b>SHALE</b> weathered, gray (10YR 5/1), brittle.				
			155	End of boring at 150.0 feet below ground surface.				



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 6/2/16	Date Drilling Completed: 6/3/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.25	TOC Elevation (ft) 592.26	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W/NW of diversion basin. N: 470532.54 E: 13626417.00		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 6/9/16 07:45		Depth (ft bgs) Depth (ft bgs) 15.30

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	TOPSOIL CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	90		15	Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
3 CS	95		25	Change to soft at 25.0 feet.				
4 CS	100		35	Change to few fine to coarse sand, medium stiff at 30.0 feet. Change to dark gray (10YR 4/1) at 32.0 feet. Change to soft at 35.0 feet.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *M. Powers* Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
6 CS	100		55		CL			
7 CS	100		65					
8 CS	100		75	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.  Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
9 CS	100		85	<b>CLAYEY SAND</b> mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.  <b>SAND</b> mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SC SP			
10 CS	100		95	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			100	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100		115	<b>SAND</b> mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			120	<b>CLAY</b> mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		125					
			130		CL			
14 CS	95		135					
			140					
15 CS	50		145	<b>GRAVELLY SILT</b> mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
			150	<b>SILTY CLAY</b> hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	<b>SHALE</b> dark gray. End of boring at 150.0 feet below ground surface.				
			155					
			160					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-11**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/3/16</b>	Date Drilling Completed: <b>6/6/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.03</b>	TOC Elevation (ft) <b>591.54</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: S of haul road, W of diversion basin. N: 470251.34 E: 13626438.92		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>6/21/16 07:45</b>		Depth (ft bgs) Depth (ft bgs) <b>14.47</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	<b>TOPSOIL</b> CLAY mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to trace gravel at 8.0 feet.				
2 CS	70		15	Change to gray (10YR 5/1) at 12.0 feet. Change to no gravel at 13.0 feet.				
			20	Change to medium stiff at 21.0 feet.	CL			
3 CS	90		25					
			30					
4 CS	90		35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers





WELL CONSTRUCTION LOG

WELL NO. MW-16-11

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	90		45	CLAY mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			50	Change to medium stiff at 49.0 feet.				
6 CS	100		55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.				
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	85		105	<p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.</p> <p>Change to medium stiff at 110.0 feet.</p>	CL			
12 CS	80		115					
13 CS	85		125					
14 CS	90		135					
15 CS	90		145					
			140	<p><b>SANDY CLAY</b> mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.</p> <p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.</p> <p><b>SHALE</b> dark gray.</p>	CL			
			150	End of boring 150.0 feet below ground surface.				
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

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Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 5/11/17	Date Drilling Completed: 5/12/17	Project Number: 231828.0003
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.5	TOC Elevation (ft) 591.66	Total Depth (ft bgs) 142.0
Boring Location: North of fuel oil tank number 2, between berm and fence.		Personnel Logged By - J. Krenz Driller - A. Goldsmith		Drilling Equipment: TSi 150cc
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 5/15/17 08:38	
			Depth (ft bgs)	17.79

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90			CLAY mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60		10					
			19.0	▼ Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.				
3 CS	70		20					
4 CS	70		30		CL			
5 CS	100		40					
6 CS	100		50					
7			60					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 8/21/17

Signature: *Paul Krenz* Firm: TRC Environmental Fax

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 8/21/17

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS		
NUMBER AND TYPE	RECOVERY (%)									
CS	100			CLAY mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.	CL					
			70	Change to few fine to coarse gravel at 70.0 feet.						
8 CS	100									
			80	Change to trace fine sand at 80.0 feet.						
9 CS	90									
			90							
10 CS	70									
			100							
11 CS	100									
			110							
12 CS	100									
			120							
13 CS	100			Change to trace medium to coarse gravel at 126.0 feet.						
			130							
14 CS	60			SILT mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.				ML		
			140	SILTY CLAY mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML					
15 CS	100			BEDROCK shale, weathered, gray (10YR 4/1). End of boring at 142.0 feet below ground surface.						
			150							



SOIL BORING LOG

BORING NO. SB-16-01

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/1/16</b>	Date Drilling Completed: <b>3/1/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.69</b>	TOC Elevation (ft) <b>---</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: <b>Corner of E connecting road off haul road, E of bottom ash basins.</b>		Personnel Logged By - <b>A. Knutson</b> Driller - <b>A. Goldsmith</b>		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>		County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time
				Depth (ft bgs) Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p>	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
			10	Change to stiff at 10.0 feet.			
2 CS	100		15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
3 CS	100		25		CL		
4 CS	100		35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP\_GDT 7/14/16

Signature: 	Firm: <b>TRC Environmental Corporation</b> 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
Checked By: <b>M. Powers</b>		



SOIL BORING LOG

BORING NO. SB-16-01

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
			60	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
				<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		65	<b>SANDY SILT</b> mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
			70	<b>CLAY</b> mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
				Change to no gravel, soft at 72.5 feet.			
9 CS	100		75				
			80				
				Change to few coarse gravel at 80.0 feet.			
10 CS	100		85		CL		
			90				
11 CS	100		95				
			100				



SOIL BORING LOG

BORING NO. SB-16-01

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
12 CS	100		105	CLAY mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		120				
15 CS	100		125	SILT mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
16 CS	100		130				
			135	SHALE dark gray (10YR 4/1), dry.			
			140				
			145	End of boring at 150.0 feet below ground surface.			
			150				
			155				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

## **APPENDIX E – 2020 BORING LOGS**



**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.8			Lean CLAY - brown, hard, dry	4.5	Gravel road at surface
		6/7'	B-1-1 (3')			
5	587.8		B-1-2 (6')	Gravelly SAND - brown, poorly graded, fine gravel, coarse sand, silt, dry		
		100%	B-1-ST-1	Lean CLAY - brown, hard, dry		
10	582.8	3/3'	B-1-3 (10')	Same as above	4.5	
		6/7'	B-1-4 (15')	Very stiff from 14 to 16 ft.	2.5	
				Lean CLAY - Gray, soft - medium stiff, moist	0.5	
20	572.8	100%	B-1-ST-2			
		6/6'	B-1-5 (22')	Same as above	0.5	
25	567.8		B-1-6 (25')			

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.8	4/9'	B-1-7 (34')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
35	557.8	75%	B-1-ST-3		< 0.5	
40	552.8	4/8'	B-1-8 (40')	Same as above		
45	547.8	2/4'	B-1-9 (48')	Same as above	< 0.5	

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	542.8	4'7'	B-1-10 (52')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
55	537.8		B-1-ST-4			
60	532.8	50%	B-1-11 (59')	Same as above	0.5	
		6'6'	B-1-12 (63')	Same as above	0.5	
65	527.8					
70	522.8	2'10'	B-1-13 (74')	Consistency increases to stiff	1.0	
75	517.8					
		1'5'	B-1-14 (80')	Lean CLAYwith Sand - Gray, medium stiff - stiff, moist	0.5	
					1.5	

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.8	25%	B-1-ST-5	Lean CLAY with Sand - Gray, medium stiff - stiff, moist		
			B-1-15 (82')	Becomes very stiff, trace coarse-fine gravel	2.0	
85	507.8	3/6'	B-1-16 (85')			
			B-1-17 (87')	Becomes stiff, no gravel	1.5	
90	502.8	2/8'			1	
			B-1-18 (94')		1	
95	497.8	0%				Shelby tube sample attempted, near zero recovery
		100%	B-1-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
100	492.8			Boring Terminated @ 100'		

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-2-1 (1')	Fat CLAY - brown, hard, some fine gravel and coarse sand, dry	4.5+	Gravel road at surface
		100%	B-2-ST-1			
				Becomes lean	4.5	
5	587.0	4/4'	B-2-2 (5')		4.5	
		100%	B-2-ST-2			
				Same as above		
10	582.0	3/3'	B-2-3 (10')			
			B-2-4 (12')	Lean CLAY - gray, very stiff, dry	2.0	
15	577.0	8/8'				
			B-2-5 (18')			
20	572.0			Becomes soft - medium stiff, moist	0.5	
		7/7'	B-2-6 (24')		0.5	
25	567.0				0.5	
		100%	B-2-ST-3			

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.0	8'8"	B-2-7 (32')	Lean CLAY - gray, soft, wet	< 0.5	
35	557.0				< 0.5	
40	552.0	10'10"	B-2-8 (40')	Becomes moist	< 0.5	
45	547.0				< 0.5	
			B-2-9 (46')	Becomes soft-stiff	1.0	
		100%	B-2-ST-4		< 0.5	
50	542.0	4'4"	B-2-10 (50')		1.0	
					0.5	

Boring B-2				
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0	
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
55	537.0	8'8"	B-2-11 (54')	Sandy Lean CLAY - gray, stiff, moist	1.0	
60	532.0		B-2-12 (60')	Same as above	1.0	
65	527.0	6'6"	B-2-13 (64')		1.0	
		100%	B-2-ST-5		1.5	
70	522.0	6'6"	B-2-14 (70')	Some coarse gravel (69' - 74')	1.0 1.5	
75	517.0		B-2-15 (75')	Lean CLAY with Sand - gray, stiff, moist	1.0	
80	512.0	8'8"	B-2-16 (80')		1.0	

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	507.0	4'4'	B-2-17 (86')	Lean CLAY with Sand - gray, stiff, moist	1.0	
		100%	B-2-ST-6		1.0	
90	502.0	5'5'	B-2-18 (91')	Becomes very stiff	2	
					2	
95	497.0	3'3'	B-2-19 (96')	Same as above	2.5	
					2.5	
99	493.0	100%	B-2-ST-7	Boring Terminated @ 99'		



Boring B-3			
Drilling Start Date:	12/10/2020	Boring Depth (ft):	99
Drilling End Date:	12/11/2020	Boring Diameter (in.):	4.25
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	592.0
Logged By:	Brian Ares	Northing, Easting (MI State Plane)	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-3-1 (1')	GRAVELY SAND - tan, well graded, mostly coarse to fine gravel and coarse sand		Gravel road at surface
		100%	B-3-ST-1			
5	587.0	4/4'	B-3-2 (5')	Lean CLAY - brown, trace fine gravel, hard, dry	4.5	
		100%	B-3-ST-2			
10	582.0	7/7'	B-3-3 (10')	Becomes very stiff	2.5	
			Becomes medium stiff	2.5		
			0.5			
15	577.0		B-3-4 (15')		0.5	
				Transition to moist	0.5	
20	572.0	6/6'	B-3-5 (20')		0.5	
					0.5	
25	567.0	5/5'	B-3-6 (25')		0.5	
					0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-3-ST-3	Lean CLAY - gray, medium stiff, moist		
30	562.0	4 1/4'	B-3-7 (30')		0.5	
				Same as above	0.5	
35	557.0	8 7/8'	B-3-8 (35')		0.5	
				Same as above	0.5	
40	552.0		B-3-9 (40')		0.5	
				Same as above	0.5	
45	547.0	6 1/6'	B-3-10 (45')		0.5	
				Same as above	0.5	
		100%	B-3-ST-4			
50	542.0	7 1/7'	B-3-11 (50')		0.5	
				Same as above	0.5	
55	537.0		B-3-12 (55')		0.5	
				Same as above	0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	532.0	8/8'	B-3-13 (60')	CLAY - gray, medium stiff, moist	0.5	
					0.5	
					0.5	
65	527.0	4/4'	B-3-14 (67')	Sandy Lean CLAY - gray, very fine - fine sand and silt, some fine gravel, moderate grading, moist		
		0%				Shelby tube sample attempted - no recovery
70	522.0	3/3'	B-3-15 (70')	Lean CLAY with Sand - gray, stiff - very stiff, moist	2.0	
					1.5	
75	517.0	4/4'	B-3-16 (75')	Same as above	1.5	
		100%	B-3-ST-5			

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.0	9'9"	B-3-17 (80')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
85	507.0	5'5"	B-3-18 (85')	Same as above	1.5	
					2.0	
90	502.0	4'4"	B-3-19 (90')	Same as above	2.0	
					2.0	
95	497.0	100%	B-3-20 (95')	Boring Terminated @ 99'	2.0	
					1.5	
99	493.0		B-3-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	586.0	0/1'		Lean CLAY - brown, very stiff, dry		
		0%				Shelby tube sample attempted from 1-3', no recovery
				Same as above	2.5	Very little recovery. This assessment comes from verbal description from drilling crew
5	581.0	0.5/4'				
		100%	B-4-ST-1			
				Becomes hard	4.5	
10	576.0		B-4-1 (10)	Lean CLAY - gray, stiff, dry	1	
		6/6'	B-4-2 (12)		1	
				Becomes medium stiff, moist	0.5	
15	571.0		B-4-3 (15)		0.5	
		6/6'			0.5	
					0.5	
20	566.0		B-4-4 (20)			
				Same as above	0.5	
		6/6'			0.5	
25	561.0		B-4-5 (25)		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-4-ST-2	Lean CLAY - gray, medium stiff, moist		
30	556.0		B-4-6 (30)	Same as above	0.5	
		6'6"	B-4-7 (34)		0.5	
					0.5	
35	551.0		B-4-8 (36)	SILTY SAND - gray, mostly very fine - fine sand and silt, some fine gravel, well graded, moist		
		6'6"	B-4-9 (40)	Lean CLAY - gray, medium stiff, moist	0.5	
40	546.0			Same as above	0.5	
		6'6"	B-4-10 (45')		0.5	
45	541.0			Same as above		
		100%	B-4-ST-3			
50	536.0		B-4-11 (50')	Same as above	0.5	
		7'7"			0.5	
55	531.0		B-4-12 (55')		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	526.0	6'6"	B-4-13 (60')	Lean CLAY - gray, medium stiff, moist	0.5	
65	521.0	5'5"	B-4-14 (65')	Same as above	0.5	
		100%	B-4-ST-4			
70	516.0	8'8"	B-4-15 (70')	Same as above		
75	511.0		B-4-16 (75')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
80	506.0	5'5"	B-4-17 (80')		2.0	
					2.0	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	501.0	5'5'	B-4-18 (85')	Lean CLAY with Sand - gray, stiff - very stiff, dry	1.5	
					2.0	
		100%	B-4-ST-5		1.0	
90	496.0	5'5'	B-4-19 (90')	Same as above	1.0	
					1.5	
95	491.0	3'3'	B-4-20 (95')	Same as above		
					1.5	
99	487.0	100%	B-4-ST-6	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite



Boring B-5					
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99		
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3		
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	591.3	0.75/1'		Lean CLAY - light brown, little gravel, little sand, hard, moist	4.0	
		50%	B-5-ST-1	Lean CLAY - gray, very stiff - hard, moist	2.0	
					3.5	
5	586.3	4/4'			> 4.5	
			B-5-1 (7')		2.5	
				Fat CLAY - gray to brown, some fine gravel, medium stiff - very stiff	0.5	
10	581.3	7/7'			0.5	
					1.0	
			B-5-2 (14')		0.5	
15	576.3	7/7'		Lean CLAY - gray, medium stiff, moist	0.5	
					0.5	
20	571.3				0.5	
			B-5-3 (21')	Same as above	0.5	
					0.5	
25	566.3	5/6'			0.5	
					0.5	
		100%	B-5-ST-2		0.5	

Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	561.3		B-5-4 (29')	Lean CLAY - gray, medium stiff - stiff, moist	1.0	
		7/7'	B-5-5 (32')		1.0	
35	556.3			Same as above	1.0	
		5/5'	B-5-6 (37')		0.5	
40	551.3			Same as above	1.0	
		6/6'	B-5-7 (42')		1.0	
45	546.3		B-5-8 (46')		1.0	
		100%	B-5-ST-3		1.0	
50	541.3			color transition to darker gray	0.5	
		4/4'				1 cm sand seam observed
			B-5-9 (52')	Becomes stiff	1.5	

Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
55	536.3	8'8'	B-5-10 (57')	Lean CLAY - dark gray, medium stiff - stiff, moist	1.0	Some fine black gravel observed
				0.5		
60	531.3	6'6'	B-5-11 (62')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, medium stiff - stiff, moist	1.0	
				0.5		
				1.0		
65	526.3	100%	B-5-12 (66')		1.5	
				1.5		
			B-5-ST-4		1.0	
70	521.3	9'9'	B-5-13 (72')	Same as above	1.5	
				1.0		
75	516.3		B-5-14 (77')		1.0	
					1.5	

Boring B-5				
<b>Drilling Start Date:</b>	12/14/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	591.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane)</b>	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	511.3	9/9'	B-5-15 (82')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, stiff - very stiff, moist	1.0	
					2.0	
85	506.3	100%	B-5-16 (86')		1.0	
					1.5	
90	501.3	8/8'	B-5-17 (92')		2.5	
					2.5	
95	496.3			2.0		
		100%	B-5-18 (96')	2.0		
99	492.3			B-5-ST-6 B-5-19 (99')		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
				Boring Terminated @ 99'		

Boring B-6				
Drilling Start Date:	12/15/2020	Boring Depth (ft):	99	
Drilling End Date:	12/15/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	589.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane):	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	589.3	1/1'		GRAVEL - light gray to gray, mostly coarse and fine gravel and sand		
		50%	B-6-ST-1	Lean CLAY - gray to brown, trace gravel, very stiff - hard, moist		
5	584.3	3.5/4'	B-6-1 (5')		3.0 4.5 3.5 3.0	
		100%	B-6-ST-2	Lean CLAY - gray, very stiff, moist	3.0	
10	579.3	7/7'	B-6-2 (10')	Becomes medium stiff - stiff	3.0 1.0 0.5	
15	574.3		B-6-3 (15')	Same as above	0.5	
		4/4'			0.5	
20	569.3		B-6-4 (20')	Same as above	0.5	
		7/7'			1.0	
25	564.3		B-6-5 (25')		0.5	
					1.0	

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-6-ST-3	Lean CLAY - gray, medium stiff - stiff, moist		
30	559.3		B-6-6 (30')	Same as above	0.5	
		9/9'			0.5	
35	554.3		B-6-7 (35')		1.0	
					0.5	
40	549.3		B-6-8 (40')	Same as above	0.5	
		9/9'			0.5	
45	544.3		B-6-9 (45')		0.5	
					1.0	
		100%	B-6-ST-4			

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.):</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	539.3	9/9'	B-6-10 (50')	Lean CLAY - gray, medium stiff - stiff, moist Color transition to darker gray	1.0	
55	534.3	9/9'	B-6-11 (55')		1.0	
					Lean CLAY with Sand - gray, stiff, moist	
60	529.3	9/9'	B-6-12 (60')		1.0	
					Same as above	
65	524.3	100%	B-6-13 (65')		1.5	
			B-6-ST-5			
70	519.3	9/9'	B-6-14 (70')		1.0	
					Same as above	
75	514.3	9/9'	B-6-15 (75')		1.5	

Boring B-6				
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	509.3	9'9"	B-6-16 (80')	Lean CLAY with Sand - gray, stiff, moist	1.5	
85	504.3		B-6-17 (85')	Becomes very stiff	2.0	
		100%	B-6-ST-6			
90	499.3	8'8"	B-6-18 (90')	Becomes stiff	1.5	
95	494.3		B-6-19 (95')	Some gravel observed	1.5	
99	490.3	100%	B-6-ST-7 B-6-20 (99')	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite



**APPENDIX F – 1970s LABORATORY TEST  
RESULTS**

4-9-5-2

# **SUBSURFACE INVESTIGATION AND FOUNDATION REPORT**

THE DETROIT



EDISON COMPANY

## **BELLE RIVER UNITS 1 & 2 JOB 10539 VOLUME 2 OF 2**

**GEOLOGY AND SOIL PROPERTIES**

P. H. COOK

AUG 31 1978

**AUGUST 1976**

**BECHTEL  
ANN ARBOR, MICHIGAN**



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## Appendix C

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B7/28	Jar Sample Clayey SILT; dark gray, low plasticity (CL-ML)	129.5 to 131.0	64								
			H64.1								See plot
B7/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	138.88 to 140.33	65								
			S/H								
			65.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974

IDENTIFICATION SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B10/30	Jar Sample	141.3	66								
	Silty CLAY; sandy, dark gray, low plasticity (CL-ML)		SH 66.1								See plot

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
15/2	1.6' Recovery; say 3.0' to 4.6' depth	3.0-5.0	119								
		3.3-3.6	Saved								
	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL)	3.6-3.7	W119.1	25.5		97					
		3.7	TV								TV=1.00tsf
		3.7-4.1	W119.01	25.4		101		UU	8.0	2386	σ <sub>c</sub> =475 psf
		3.7-4.1	L119.1	23.6	45	21					
		4.1-4.2	W119.2	25.3		97					
		4.2	TV								TV=1.20tsf
		4.2-4.5	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255			
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS			
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>				
15/4	1.3' Recovery: say 8.0' to 9.3' depth	8.0-10.0	120												
		8.1-8.4	saved												
	Silty CLAY, dark gray, stiff consistency, moderate to highly plastic (CL)	8.4	TV									TV=0.70 tsf			
		8.4-8.6	W120.1			90									
		8.6-8.9	U120.1			93	U	6.0	1257						
		8.6-8.9	L120.1			44	19								
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)	8.9	TV									TV=0.61 tsf			
		9.0-9.4	saved												



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
15/6	1.2' Recovery; say 18.0' to 19.2' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to highly plastic (CL)	18.0-20.0	—									
		18.1-18.4	L12L.1	35.0	42	20						
		18.1-18.4	J12L.1	34.1			87	U	15.0	508		@20% strain s= 546 psf
		18.4-18.5	W12L.1	36.1			83					
		18.5	TV									TV=0.28tsf
		18.8-18.9	W12L.2	36.3			83					
		18.9	TV									TV=0.22tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
15/14	2.5' Recovery; say 58.0' to 60.5' depth	58.0-60.5	125								
	Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)	58.3-58.7	Saved								
		58.7-58.9	W125.1	23.4							
		58.9	TV								TV = 0.46tsf
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)	58.9-59.2	Saved								
		59.2-59.6	U125.1	22.5		104	U	15.2	1067		@ 20% strain s = 1260 psf
		59.2-59.6	L125.1	22.6	34	18					
	Note: Void occurs along outside edge of upper 1.3' of sample	59.6-59.7	W125.2	22.4		103					TV = 0.61tsf
		59.7	TV								
		60.0-60.4	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/3	2.4' Recovery; say 20.0' to 22.4' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to high plasticity (CL)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	20.0 - 22.5	—									
		20.1 - 20.4	176									
		20.4 - 20.6	WI76.1	39.1	82							
		20.6	TV									TV=0.26tsf
		20.6 - 20.9	WI76.1	39.9	83							σ <sub>c</sub> -2448psf
		20.6 - 20.9	L176.1	38.3	44	21						
		20.9 - 21.2	Saved									
		21.2 - 21.4	WI76.2	32.1	88							
		21.4	TV									TV=0.26tsf
		21.7 - 22.0	Saved									
		22.0 - 22.4	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: April 1974  
 SHEET: OF

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>	
18/6	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)	—									
	50.0 to 52.5	345									
	50.3 to 50.5	W345.1	35.8								
	50.5	TV									TV=0.38tsf
	50.5 to 50.8	save 345.1									
	51.2 to 51.4	W345.1	24.6		98						
	51.4	TV									
	51.4 to 51.7	L345.0.1	31.0		92						TV=0.50tsf
	51.4 to 51.7	L345.1	29.6	39	18	UU	3.0	827			

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974  
SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/7	2.4' Recovery; say 60.0' to 62.4' depth  Silty CLAY, Sandy, dark gray, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 30% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	60.0										
		62.5	346									
		60.6	TV									TV=0.46 tsf
		60.6-61.0	saved									
		61.0	L346.1	20.2	26	16						
		61.3										
		61.4-61.6	W346.2	19.9		109						
		61.6	TV									TV=0.65 tsf
		61.6-62.0	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
18/10	1.3' Recovery; say 88.0' to 89.3' depth		88.0-90.0	179									
	Silty CLAY, sandy, gray, very stiff consistency, moderate plasticity (CL)		88.4	TV								TV=1.3 tsf	
	Sample includes about 25% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)		88.4	W179.1	22.9	99							
			88.7	W179.2	21.9	98							
			88.8	TV									TV=1.1 tsf
			88.8-90.1	L179.1	17.3	29	15						
		88.8-90.1	U179.01	17.3		110		UU	15.0	2863		σ <sub>c</sub> =6336 psf	

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
DATE July 1974  
SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub> c <sub>c</sub>		
18/11	Jar Sample	103.5 - 105.0	—									
	Silty SAND, subrounded to subangular fine to coarse Sand grains with about 10% non-plastic fines (SM-SW)		430									
				S430.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET	OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
18/12	1.7' Recovery; say 108.0' to 109.7' depth	108.0-110.0	181										
		108.2-108.5	1181.1	34.2	46 22								
	Silty CLAY, grey, stiff consistency, moderate to highly plastic (CL)	108.2-108.5	1181.1.1	34.5		87	CU	5.9	1952			σ <sub>c</sub> =3744psf	
		108.5-108.6	1181.1	32.3		90						TV=0.71tsf	
		108.6	TV										
	Sample includes lenses/layers below 108.9' depth consisting of Silty Sand, subrounded to subangular fine to medium Sand grains with about 40% non-plastic fines (SM)	108.6-108.9	1181.1.2	31.0		92	CU	6.2	2601			σ <sub>c</sub> =7488psf	
		108.6-108.9	1181.1.3	30.7		92	CU	6.8	4088			σ <sub>c</sub> =15120psf	
		108.9-	Saved										
		109.3-109.4	1181.2	26.8		94							
	Layers/lenses comprise ±30% of total sample below 108.9' depth	109.4	TV									TV=0.51tsf	



PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε	e <sub>o</sub>		
18/16	Jar Sample	139.5-141.0									
	Silty SAND, gravelly; about 25% hard subrounded to subangular gravel size particles (3/4" max. size), subrounded to subangular fine to coarse Sand grains, about 15% non-plastic fines (SM)	431									
		S431.1								See plot	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
19/1	Silty CLAY, dark greyish brown, very stiff consistency moderate to high plasticity (CL-CH)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	3.0-5.0	290									
		3.4-3.6	W290.1	25.7	95							
		3.6	TV									TV=1.15tsf
		3.6-3.9	Saved									
		3.9-4.2	Saved									
		4.2-4.3	W290.2	31.4	87							
		4.3	TV									TV=1.13tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
19/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0-20.0	292										
		18.1-18.5	L292.1	40.2	49	24							
	Silty CLAY, gray, soft to firm consistency moderate to high plasticity (CL-OH)	18.5-18.6	W292.1	39.1			85						
		18.6	TV									TV=0.27 tsf	
		18.6-19.0	saved										
		19.1-19.3	W292.2		35.3			83					
		19.3	St									TV=0.23 tsi	
		19.4-19.7	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		c <sub>c</sub>
19/8	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	—	68.0-70.0								
		297	68.4-68.5	23.1		1.03					
		TV	68.5							TV=0.80tsf	
		Saved	68.5-68.8								
		W297.1	69.2-69.3	22.2		1.03					
		TV	69.3							TV=0.73tsf	
		Saved	69.3-69.7								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
19/9	1.9' Recovery; say 78.0' to 79.9' depth	78.0-80.0	298								
	-----	78.2-78.6	saved								
	Silty CLAY, gray, stiff consistency, moderate plasticity (CL)	78.6-78.7	W298.1	21.4	106						TV=0.63 tsf
		78.7	TV								
		78.7-79.0	L298.1	24.4	33	17					
		79.0-79.5	saved								
	Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	79.6-79.7	W298.2	24.9	101						TV=0.67 tsf
		79.7	TV								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET      OF     

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	
19/11	1.8' Recovery; say 100.0' to 101.8' depth	300								
		TV								TV-0.43tsf
	Silty CLAY, grey, firm consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	100.5								
		100.6	W300.1	22.7		100				
		100.9	Saved							
		101.3	W300.2	27.3		94				
		101.4								TV=0.42 tsf
		101.4								
		101.4								
		101.7								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
19/12	1.9' Recovery; say 118.0' to 119.9' depth	—								
		118.0-120.0								
		118.4								
		118.5 W30L1	35.1		86					
		118.5 TV								TV=0.55tsf
		118.5								
		118.9 Saved								
		119.2								
		119.3 W30L2	41.4		80					
		119.3 TV								TV=0.68tsf
		119.3								
		119.6 Saved								

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>    </u> SUMMARY OF LABORATORY TEST RESULTS      DATE <u>Jan. 1974</u> SHEET <u>    </u> OF <u>    </u>										
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		
B22/29	Jar Sample	133.8 to 135.5								
	Clayey SILT; dark gray, slight to low plasticity (CL-ML)	S/H 67.1								See plot



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
25/1	Silly CLAY, grayish brown, very stiff consistency, highly plastic (CH)  Sample includes about 5% hard subrounded gravel size particles  Note: upper 1.0' of sample disturbed (Wash?)	3.0 to 5.0	266								
		4.0	TV								TV=0.4tsf
		4.0 to 4.3	save 266.1								
		4.3 to 4.5	W266.1			100					
		4.5 to 4.8	U266.1			108		5.0	3456		
		4.5 to 4.8	I266.1			59	23				
		4.8	TV								TV=1.8tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SHEET 1 OF 1

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
25/3	1.9' Recovery; say 18.0' to 19.9' depth, upper 0.8' disturbed (WASH??) Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)	18.0-20.0								
		268								
		18.8-19.2	Saved							
		19.2-								
		19.3	W268.1	39.1			80			
		19.3	TV							TV=0.30tsf
		19.3-19.6	Saved							
		19.6-19.7	W268.2	38.1			81			
		19.7	TV							TV=0.27tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
25/4	Silty CLAY, Sandy, dark grey, soft to firm consistency, moderately plastic (CL)  Sample includes about 30% fine to coarse SAND and fine Gravel size particles (sub-rounded to subangular in shape)  few thin lenses/layers of Silty CLAY (CL-CH) throughout comprising ±10% of total  Note: Entire sample slightly disturbed	28.0-30.0	—								
		28.1-28.5	269								
		28.5-28.7	W269.1		18.1		111				
		28.7	TV								TV=0.27tsf
		28.7-29.1	Saved								
		29.1-29.3	W269.2		22.6		102				
		29.3	TV								TV=0.25 tsf
		29.3-29.7	W269.1		31.0	25	16				

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)		$e_0$
25/6	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	48.0-50.0	271								
		48.3-48.7	saved								
		48.7-48.8	W271.1	80							
		48.8	TV								TV=0.37 tsf
		48.8-49.2	saved								
		49.2-49.4	W271.2	82							
		49.4	TV								TV=0.30 tsf
		49.4-49.8	L271.1		38.0	39	19				

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SHEET 1 OF 1

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>		
25/7	<p>Silty CLAY, grey, firm to stiff consistency, moderate plasticity (CL)</p> <p>Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)</p>	58.0-									
		60.0	27.2								
		58.4-									
		58.5	W272.1	24.1	98						
		58.5	TV								TV=0.45 tsf
		58.5-									
		58.8	Saved								
		59.2-									
		59.3	W272.1	24.4	99						
		59.3	TV								TV=0.58tsf
		59.3-									
	59.6	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
25/10	1.8' Recovery; Say 88.0' to 89.8' depth	88.0 to 90.0	275								
		88.1 to 88.4	save 275.1								
		88.4 to 88.6	WZ75.1	19.7		106					
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	88.6	TV								TV=0.74tsf
		88.6 to 88.9	save 275.2								
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	88.9 to 89.2	TZ75.0	22.5		104	UU	11.0	2213		
		88.9 to 89.2	IZ75.1	21.4	36	19					
		89.2 to 89.4	WZ75.2	22.3		103					
		89.4	TV								TV=0.80tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
25/12	2.4' Recovery; say 118.0' to 120.4' depth  Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	118.0-120.5	277									
		118.6-118.7	W277.1	42.8	77							
		118.7	TV									TV=0.70tsf
		118.7-119.0	Saved									
		119.0-119.4	Saved									
		119.4-119.5	W277.2	36.4	82							
		119.8	TV									TV=0.68tsf

FILE NO. 1255  
DATE Jan. 1974  
SHEET      OF     

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B26/2	Recovery 1.6', say 3.5' to 5.1' depth		3.5 to 3.5	1								
			3.7	TV	25.4							TV=0.88 tsf
	Silty CLAY, grayish brown, moderate to high plasticity, very stiff consistency (CL-CH)		3.7	W1.1	25.4							
	Includes about 15% subangular to subrounded fine gravel and coarse sand particles		3.7 to 4.0	save 1.1								
			4.0	TV	23.9							TV=1.4 tsf
			4.0	W1.2	23.9							
			4.0 to 4.3	T1.1.1	23.0		104	CU	15.0	1100		
			4.0 to 4.3	L1.1.	23.0	53	24					
			4.3	TV								TV=1.13 tsf
			4.3 to 4.7	T1.1.2	23.9		103	CU	15.0	1725		
			4.7	TV	21.9							TV= 1.3 tsf
			4.7	W1.3	21.9							
			4.7 to 5.0	T1.1.3	22.3		108	CU	15.0	2400		



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
B26/3	1.5' Recovery; say 8.0' to 9.5' depth	8.0 to 10.0	2								
		8.2	TV	31.5						TV=0.9 tsf	
	Silty CLAY; dark gray, moderately to highly plastic, firm consistency (CL-CH).  Includes about 10% subangular to subrounded fine gravel size particles and $\pm 5\%$ fine to coarse sand size particles.	8.2	W2.1	31.5							
		8.3 to 8.7	save 2.1								
		8.7	TV	33.0							TV=0.6 tsf
		8.7	W2.2	33.0							
		8.8 to 8.9	L2.1	32.0	50	22					
		8.9 to 9.2	save 2.2								
		9.2	TV	32.7							TV=0.4 tsf
		9.2	W2.3	32.7							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
B26/5	1.2' Recovery; say 18.0' to 19.2' depth	18.0 to 20.0	3								
		18.0 to 18.3	T3.13	35.7		86	CU	15.2	2175		
	Silty CLAY, gray, soft consistency, highly plastic (CL-CH)	18.3	TV	35.9							TV=0.17 tsf
		18.3	W3.1	35.9							
		18.3 to 18.7	T3.12	35.3		86	CU	10.7	839		
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	18.7 to 19.0	T3.11	35.4		89	CU	15.1	676		
		19.0	TV	35.6							TV=0.24 tsf
		19.0	W3.2	35.6							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
B26/9	1.9' Recovery; say 38.0' to 39.9' depth	38.0 to 40.0	5									
		38.4	TV	40.6								TV=0.20 tsf
	Silty CLAY; gray, soft to firm consistency, highly plastic (CL)	38.4 to 38.5	W5.1	40.6								
		38.5 to 38.8	save 5.1									
		38.8	TV	39.5								TV=0.23 tsf
		38.8 to 38.9	W5.2	39.5								
		38.9 to 39.3	save 5.2									
		39.3	TV	36.0								TV=0.34 tsf
		39.3 to 39.4	W5.3	36.0								
		39.4 to 39.8	U5.1	36.6	86		U	1.6	443			
		39.4 to 39.8	L.5.1	36.6	38	20						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
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 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_o$	$c_c$
B26/11	Silty CLAY: dark gray, firm consistency, highly plastic (CL)  Sample includes about 20% coarse to fine sand grains (subangular to subrounded in shape)	48.0 to 50.0										
		48.0 to 48.3	save 6.1									
		48.3	TV	31.0								TV=0.28 tsf
		48.3 to 48.4	W6.1	31.0								
		48.4 to 48.7	save 6.2									
		48.7	TV									TV=0.32 tsf
		48.7 to 49.0	T6.1.3	30.0		93	CU	4.6	2206			
		49.0	TV	36.3								TV=0.29 tsf
		49.0 to 49.1	W6.2	36.3								
		49.1 to 49.4	T6.1.2	36.5		86	CU	3.9	1222			
		49.4	TV	34.5								TV=0.33 tsf
		49.4 to 49.5	W6.3	34.5								
	49.5 to 49.8	T6.1.1	36.1		88	CU	3.8	896				
	49.5 to 49.8	L6.1	36.1	41	21							

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>				
B26/17	1.0' Recovery; say 78.0' to 79.0' depth  Silty CLAY, dark gray, firm to stiff consistency, highly plastic (CL)  Includes about 35% subangular to subrounded fine Gravel and coarse Sand particles	78.0 to 80.0	9										
		78.2	TV		25.1						TV=0.46		
		78.2	W9.1		25.1								
		78.2 to 78.5	U9.1	101	24.8			U	12.0	580			
		78.2 to 78.5	L9.1		24.8	36	20						
		78.5	TV		25.8						TV=0.52 tsf		
		78.5 to 78.6	W9.2		25.8								
		78.6 to 78.9	save 9.1										
		78.9	TV		25.0						TV=0.38 tsf		
		78.9 to 79.0	W9.3		25.0								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
26/28	Recovery 2.4'; say 128.0' to 130.4' depth  Silty CLAY, dark grey firm to stiff consistency, moderate to highly plastic (CL)  Bottom third of sample includes 30 to 40% fine Sand and non-plastic Silt particles occurring in thin layers (1/16" to 1/4" thick)	—									
		128.0-									
		131.0	13								
		128.0-									
		128.3	TI3.1.3	34.0		90	CU	3.4	4652		$\bar{\sigma}_c=16,704$ psf
		128.4-									
		128.8	TI3.1.2	35.6		86	CU	4.5	2442		$\bar{\sigma}_c=8352$ psf
		128.4-									
		128.8	LI3.1	35.4	39	21					
		128.8-									
		128.9	WI3.2	32.1							
		128.8-									
		128.9	TV	32.1							TV=0.60tsf
	129.7	TV	27.5							TV=0.50tsf	
	129.7-										
	129.8	WI3.3	27.5								
	129.8-										
	130.2	TI3.1.1	22.9		96	CU	15.0	4500		$\bar{\sigma}_c=4176$ psf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
27/2	1. 4' Recovery; say 3.5' to 4.9' depth  Silty CLAY; greyish brown, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% coarse sand and fine gravel sized particles (subrounded to subangular in shape)	3.5-5.5										
		3.6-4.0										
		4.0-4.2	W302.1	24.2		99						
		4.2	TV									TV=0.87 tsf
		4.2-4.5										
		4.5-4.8	T302.2	24.9		103	UU	8.0	2099			
		4.5-4.8	L302.1	23.1	48	24						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
27/4	1.7' Recovery; Say 8.0' to 9.7' depth	8.0 to 10.0	303									
		8.1 to 8.4	save 303.1									
		8.4 to 8.6	W303.1	31.5		88						
	Silty CLAY, grayish brown, firm to stiff consistency, highly plastic (CL-CH)	8.6	TV									TV=0.66tsf
		8.6 to 8.9	U303.1	30.6		94	U	20.0	1772			@15.0% strain s=1722psf
	Sample includes about 10% coarse sand and fine gravel size particles (subrounded to subangular in shape)	8.9	L303.1	30.4	51	23						
		8.9 to 9.2	save 303.2									
		9.2 to 9.4	W303.2	33.5		87						
		9.4	TV									TV=0.47tsf



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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
27/10	2.4' Recovery; Say 33.0' to 35.4' depth	33.0 to 35.5	306								
	_____	33.1 to 33.4	save 306.1								
	_____	33.4 to 33.6	W306.1	37.9	84						
	Silty CLAY, gray, firm consistency, moderately plastic (CL)	33.6	st								TV=0.3ltsf TVR=0.09tsf
		34.0 to 34.3	C306.1	38.6					1.016	.44	
		34.0 to 34.3	L306.1	37.4	41	22					
		34.0 to 34.3	SC306.1								
		34.3 to 34.6	save 306.2								specific gravity=2.73
		34.6 to 34.8	W306.2	36.3	86						
		34.8 to 35.2	save 306.3								

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
27/14	1.9' Recovery; say 53.0' to 54.9' depth  Silty CLAY, Sandy, very dark gray, stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)  At 53.9' change to Silty CLAY, gray, firm consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	53.0-55.5	308									
		53.1-53.5	saved									
		53.6-53.7	W308.1	120								
		53.7	TV									TV=0.78 tsf
		54.0-54.4	saved									
		54.4-54.5	W308.2	98								
		54.5-54.7	I308.1		24.2	32	17					
		54.7	TV									TV=0.34 tsf

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SHEET 1 OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
27/17	Soil Description	DEPTH (FEET)	—									
	Jar Sample	68.5-70.0	432									
	Clayey SILT, Sandy, dark gray, low plasticity (CL-ML)  Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)		S/H 432.1									See plot

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SUMMARY OF LABORATORY TEST RESULTS

SHEET

OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
27/24	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.0 to 105.5 313								
		103.2 to save 103.5 313.1								
		103.5 TV								TV=0.61tsf
	Sample includes about 25% coarse to fine sand grains and fine gravel sized particles (subrounded to subangular in shape)	103.5 to 103.7 W313.1	27.4		98					
		103.7 to save 104.1 313.2								
		104.2 to 104.5 C313.1	33.9						0.90	.30
		104.2 to 104.5 L313.1	31.1	43 25						
		104.2 to 104.5 SC313.1								

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	$c_c$	
27/26	1.5' Recovery; say 113.0' to 114.5' depth		113.0- 115.0	314								
	Silty CLAY, gray, soft consistency, moderate plasticity (CL)		113.1	TV								
	Sample includes few thin lenses/layers of Silty SAND ( $\pm$ 1/8" thick) comprising $\pm$ 10% of total		113.1- 113.5	W314.1		34.6	89					
	At 113.6' change to - Silty fine SAND, uniform fine Sand grains with about 10% non-plastic fines (SM-SP)		113.6- 114.4	S314.1		21.4						
												TV=0.16 tsf
												See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
27/30	2.4' Recovery; say 129.0' to 131.4' depth; upper 0.8' possibly disturbed	129.0- 131.5	315								
		129.1- 129.4	Saved								
	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)	129.5- 129.6	W315.1	34.0		84					Clay portion
		129.9- 130.1	L315.1	34.3	40	21					
	Sample includes Silty fine Sand	130.2	TV								TV=0.75tsf
	lenses/layers throughout	130.2-									
	comprising about 10% of total sample	130.6	Saved								
		130.6-									
		131.1	Saved								
		131.1-									
		131.3	W315.2	24.1		99					Silty Sand and Clay portion

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TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS ωL    ωP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
28/3	1.2' Recovery; say 5.0' to 6.2' depth	183								
	5.0-7.0									
	5.0-5.3	saved								
	5.3-5.5									
	5.5	WI83.1	33.3		95					
	5.5	TV								TV=1.30 tsf
	5.5-5.8	saved								
	5.8-6.1									
	6.1	UI83.1	25.3		100	U	4.0	1981		
	5.8-6.1									
		LI83.1	25.5	47	23					

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
28/9	Silty CLAY, dark gray, soft consistency, moderate to highly plastic (CL)	28.0-30.0										
		28.1-28.4	186									
		28.4-28.5	saved									
		28.5	WI86.1	40.0		80						
		28.5	TV									TV=0.20 tsf
		28.5-28.8	saved									
		28.8-29.1	UI86.1	38.0		84						
		28.8-29.1	LI86.1	39.2	42 20		U	7.0	425			
		29.1-29.3	WI86.2	41.4		78						
		29.3	TV									TV=0.20 tsf
		29.3-29.6	saved									



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BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	c <sub>c</sub>		
28/15	2.1' Recovery: say 58.0' to 60.1' depth Silty CLAY, dark gray, firm consistency, moderate plasticity (CL) Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	—									
		58.0-60.0	189								
		58.2-58.5	saved								
		58.5-58.6	W189.1	25.5	98						TV=0.38 tsf
		58.6	TV								
		59.0-59.3	saved								
		59.3-59.4	W189.2	25.1	99						
		59.4-59.7	saved								
		59.7	TV								TV=0.43 tsf

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SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
28/23	2.1' Recovery, say 98.0' to 100.1' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL)  Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	98.0-100.0	193									
		98.1-98.4	saved									
		98.4-98.5	W193.1		23.0		104					
		98.5	TV									TV=0.71 tsf
		98.5-98.9	saved									
		99.2-99.3	W193.2		23.8		98					
		99.3	TV									TV=0.93 tsf
		99.3-99.6	saved									

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
30/3	Jar Sample		6.0-7.5	433										
	Silty CLAY, dark grayish brown, high plasticity (CH)			L433.1	22.4*	55	25							
	*Note: Water content taken from unsealed jar sample													

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
30/6	Jar Sample	18.5- 20.0	—								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)		434	*							
			W434.1	37.7							

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
30/12	Jar Sample	53.5 - 55.0	435									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subangular to subrounded in shape)  *Note: Water content taken from unsealed jar sample		W435.1	*								

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc			
				w <sub>L</sub>	w <sub>p</sub>		ε						
30/15	Jar Sample	68.5-70.0	436										
	Silty CLAY, Sandy, gray moderate plasticity (CL)		S/H 436.1								See plot		
	Sample includes about 25% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)												

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET 1 OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	
30/21	Jar Sample	98.5 - 100.0	437							
	Silty fine SAND, uniform fine Sand grains with about 15% non plastic fines (SM)		S437.1							See plot

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
30/25	Jar Sample	118.5-120.0										
	Silty SAND, subrounded to subangular fine to medium Sand grains, about 15% non-plastic fines (SM)		438								See plot	
				S438.1								

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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. % WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
32/3	Jar Sample	6.0- 7.5	439								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)		W439.1	20.3							

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
32/7	Jar Sample	23.5- 25.0	440								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-GH)		W440.1	*							

\*Note: Water content taken from unsealed jar sample

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
32/10	Jar Sample	38.5-40.0	441								
	Silty CLAY, gray, moderate to high plasticity (CL)		L41.1	44	19						

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BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
32/20	Jar Sample	—							
	Silty CLAY, gray, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	88.5 - 90.0							
		L4421	36	17					

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IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
BORING SAMPLE 33/3*	<p>1.4' Recovery; say 8.0' to 9.4' depth</p> <p>Silty CLAY, dark grey, firm to stiff consistency, moderate to high plasticity (CL-CH)</p> <p>Sample includes about 5% fine to medium Sand grains (sub-rounded to subangular in shape)</p> <p>*Note: This sample labeled B33/2, 8'-10'6"</p>		8.0-10.5									
			8.1-8.4									
			8.4-8.5	W280.1	30.6		92					
			8.5	TV								TV = 0.78tsf
			8.5-8.8	Saved								
			8.8	TV								TV = 0.68tsf
			8.8-9.2	L280.1	31.6	48	25					
			9.2-9.3	W280.2	33.3		89					

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
33/5	<p>Silly CLAY, gray, firm consistency, moderate to high plasticity (CL)</p> <p>Sample includes about 5% fine to coarse Sand grains (sub-rounded to subangular in shape)</p> <p>Note: This sample and 33/9 labeled B33/5, 38-40'6"</p>	18.0-18.5	—									
		18.2-18.5	282									
		18.5-18.6	Saved									
			W282.1	86								
			18.6	TV								TV=0.29 tsf
			18.6-19.0	L282.1	37.6	43	23					
			19.7-19.8	W282.1	36.2		84					
			19.8	TV								TV=0.32 tsf
			19.8-20.3	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
33/7*	2.1' Recovery, say 28.0' to 30.1' depth	281								
		save								
	Silty CLAY, gray, soft to firm consistency, moderate to high plasticity (CL)  Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)  * Note: This sample labeled B33/4, 28'-30'6"	W281.1	40.3		81					
		TV								TV=0.20 tsf
		T281.1	39.0		82	CU	13.4	739		$\bar{\sigma}_c=1440$ psf
		I281.1	39.7		82	CU	4.6	966		$\bar{\sigma}_c=2880$ psf
		W281.1	37.7		83					
		TV								TV=0.26 tsf
		T281.1	38.3		84	CU	6.3	1521		$\bar{\sigma}_c=5760$ psf
		I281.1	38.7	46	22					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
33/9*	2.1' Recovery; say 38.0' to 40.1' depth	38.0-40.5	283								
		38.3-38.6	Saved								
	Silty CLAY, grey, soft to firm consistency, moderate to high plasticity (CL)	38.6-38.7	W283.1	36.8		85					
		38.7	TV								TV = 0.27tsf
		38.7-									
		39.1	T283.1.1	37.4		83	CU	6.9	798		$\bar{\sigma}_c = 1728 \text{psf}$
		38.7-									
		39.1	T283.1.2	37.1		85	CU	5.5	1081		$\bar{\sigma}_c = 3456 \text{psf}$
		39.1-									
	* Note: This sample labeled B33/5, 38'-40'6"	39.5	T283.1.3	36.2		86	CU	5.2	1662		$\bar{\sigma}_c = 6912 \text{psf}$
		39.1-									
		39.5	L283.1	37.2	43	23					
		39.5-									
		39.6	W283.2	37.3		85					
		39.6	TV								TV = 0.28tsf
		39.6-									
		39.9	Saved								
		39.9	St								TV = 0.35tsf TV <sub>r</sub> = 0.09tsf



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
33/11*	1.9' Recovery; say 48.0' to 49.9' depth	48.0-50.5	284								
		48.1-48.4	saved								
	Silty CLAY, dark gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W284.1	45.1		76					
		48.5	TV								TV = 0.30 tsf
		48.5-48.8	saved								
	Sample contains about 10% fine to coarse SAND grains (subrounded to subangular in shape)	48.8-49.0	L284.1	41.8	48	25					
		49.0-49.3	saved								
		49.3-49.4	W284.2	34.5		81					
	* Note: This sample labeled B33/6 48'-50'6"										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B38/3	Silty CLAY; dark grayish brown mottled with blue gray, highly plastic; hard consistency with a blocky structure.  Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape) (CL-GH)	8.0 to 10.0										
		17										
		W17.1	8.5	25.3								
		TV	8.5	25.3							TV=2.4 tsf	
		L17.1	8.6 to 8.9	24.9	49	24						
		U17.1	8.6 to 8.9	24.3		102	U	3.0	212.3			
		UR17.1	8.6 to 8.9	24.2		103	UR	7.0	761			
		H17.1	8.6 to 8.9									see plot
		W17.2	9.0	26.3								
		ST	9.0	26.3								TV=2.1 tsf TV <sub>p</sub> =1.1
	save	9.1 to 9.5										
	17.1											
	W17.3	9.6	27.3									
	TV	9.9	27.3								TV-2.1 tsf	

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255			
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>			
B38/4	1.8' Recovery; say 13.5' to 15.3' depth; upper 0.2' disturbed	13.5 to 15.5	18												
		13.8 to 14.2	save 18.1												
		14.2	W18.1	28.6											
	Silty CLAY; dark grayish brown, highly plastic, stiff to very stiff consistency.	14.2	TV	28.6							TV=1.1 tsf				
		14.3 to 14.6	UI8.1	28.5		96	U	4.0	1506						
	Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	14.3 to 14.6	L18.1	28.5	46	22									
	(CL-CH)	14.6	H18.1								see plot				
		14.6	C18.1	29.0						.770	specific gravity=2.71				
		14.6	SG18.1												
		14.7	W18.2	28.8											
		14.7	TV	28.8							TV=0.9 t sf				
		14.8 to 15.2	save 18.2												

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 DATE Jan. 1974  
 SHEET \_\_\_ OF \_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	ε %	e <sub>o</sub>	
B38/6	Recovery 0.7'; say 23.5' to 24.2' depth	23.5 to 25.5 23.7 to 24.1	— 19 19.1	37.6	48	19					
	Silty CLAY, dark gray, highly plastic (CL-CH)	24.1	W19.1	37.6							
	Note: Entire sample greatly disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B38/8	0.8' Recovery; say 33.5' to 34.3' depth	33.5 to 35.5	20								
		34.1	W20.1	35.7							
		34.1 to 34.3	L20.1	36.3	48	20					
	Silty CLAY, dark gray, highly plastic (CL-CH)  Note: Entire sample greatly disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	
B38/12	1.8' Recovery; say 53.5' to 55.3'	22								
		W22.1	33.7							
		TV	33.7							IV=0.36 tsf
		save								
		22.1								
		W22.2	33.1							
		TV	33.1							IV=0.41 tsf
		54.1 to 54.4								
		U22.1	33.4		90	U	5.0	985		
		54.1 to 54.4								
		54.4	32.9	44	21					
		54.1 to 54.4								See plot
		H22.1								
		54.5	33.5							
		W22.3	33.5							
		TV	33.5							
		save								
		22.2								IV=0.44 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255											
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974											
IDENTIFICATION		SHEET 1 OF 1											
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
B38/16	0.6' Recovery; say 73.5' to 74.1' depth  Silty CLAY, dark gray, highly plastic, soft to firm consistency (CH)	73.5 to 75.5	24										
		73.6	TV		43.5								TV=0.27 tsf
		73.6	W24.1		43.5								
		73.7 to 74.0	U24.1	79	41.3			4.8	704				
		73.7 to 74.0	L24.1		41.3	55	24						
		73.7 to 74.0	H24.1										See plot
		74.0 to 74.1	C24.1		36.0					.935	.33		specific gravity=2.72
		74.0 to 74.1	SC24.1										
		74.0 to 74.1	W24.2		40.7								

FILE NO. 1255

DATE Jan. 1974

SHEET OF

PROJECT: BELLE RIVER PLANT UNITS I & II

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION

TEST NO.

PROPERTIES

STRENGTH

CONSOLIDATION

OTHER TESTS AND REMARKS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	NAT. WATER CONTENT (%)		ATTERBERG LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	OTHER TESTS AND REMARKS	
				w <sub>L</sub>	w <sub>P</sub>	w <sub>L</sub>	w <sub>P</sub>							
B38/18	1.5' Recovery; say 83.5' to 85.0' depth  Silty CLAY; gravelly dark gray, moderate plasticity, stiff consistency (CL)  Includes ±10 % medium to coarse Sand and ±15% sub-angular to subrounded Gravel size particles (1/4" to 1" size)	83.5 to 85.5	25											
		83.7	TV			14.4							TV=0.78 tsf	
		83.7	W25.1			14.4								
		83.7 to 84.1	save											
		84.1	25.1											
		84.1	TV			17.8								TV=0.82 tsf
		84.1	W25.2			17.8								
		84.2 to 84.6	save											
		84.6	25.2											
		84.6	St			22.8								
		84.6	W25.3			22.8								
		84.6 to 85.0	U25.1			22.2			104	U	14.0	603		
	84.6 to 85.0	U25.1			22.2			105	Ur	17.4	548			
	84.6 to 85.0	L25.1			22.2	33	19							
	84.6 to 85.0	H25.1											See plot	



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FILE NO. 1255

DATE Jan. 1974

TABLE        SUMMARY OF LABORATORY TEST RESULTS

SHEET        OF       

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B38/24	1.9' Recovery; say 113.0' to 114.9' depth	113.0 to 115.0	26								
	Silty CLAY; gray, moderately to highly plastic, soft to firm consistency (CL-CH) Includes about 5% fine Sand size particles	113.3	TV	34.5							TV=0.32 tsf
		113.3	W26.1	34.5							
		113.3 to 113.7	save 26.1								
		113.7	TV	32.2							TV=0.48 tsf
		113.7	W26.2	32.2							
		113.7 to 114.1	save 26.2								
		114.1	TV	33.1							TV=0.44 tsf
		114.1	W26.3	33.1							
		114.1 to 114.6	U26.1	31.9		92	U	6.0	500		
		114.1 to 114.6	L26.1	31.9	45	25					
		114.1 to 114.6	H26.1								See plot
		114.6	TV								TV=0.52 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTE RBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
B38/30	Jar Sample Silty SAND; subrounded to subangular fine to coarse Sand grains, about 30% non- plastic fines (SM)	138.5 to 140.0	69 S/H 69.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/2	1.1' Recovery; say 4.0' to 5.1' depth	4.0 to 6.0	28								
		4.1	W28.1	33.6							
	Silty CLAY; olive gray mottled with yellowish brown, highly plastic, very stiff consistency throughout	4.1	TV	33.6							TV=1.0 tsf
		4.1 to 4.4	save 28.1								
		4.4	W28.2	31.1							
	Soil includes 2 to 5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	4.4	TV	31.1							TV=1.1 tsf
		4.5 to 4.8	U28.1	29.4		94	U	5.0	1024		
		4.5 to 4.8	Up28.1	29.4		95	Up	9.0	974		
	(CH)	4.5 to 4.8	L28.1	29.4	63	28					
		4.5 to 4.8	H28.1								See plot
		4.8	W28.3	39.5							
		4.8	ST	39.5							TV=1.4 tsf TV <sub>R</sub> =1.0 tsf
		4.9 to 5.1	save 28.2								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
B41/5	1.2' Recovery: say 10.0' to 11.2' depth	29									
		TV	29.0								TV=1.25 tsf
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	W29.1	29.0								
		save 29.1									
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	TV	27.5								TV=1.43 tsf
		W29.2	27.5								
		C29.1	29.5						.799	.23	
		I29.1	29.5	46	23						
		11.1 to 11.2	28.9								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B 41/7	Silty CLAY, dark gray, highly plastic; soft to firm consistency throughout (CL-CH)	20.0 to 22.0	30									
		20.5	W30.1	39.7								
		20.5	TV	39.7								TV=0.28 tsf
		20.6 to 20.9	U30.1	39.2			83	3.0	338			
		20.6 to 20.9	L30.1	39.2	47	24						
		20.6 to 20.9	H30.1									See plot
		21.0 to 21.1	C30.1	38.1						1.055	.34	Specific gravity=2.70
		21.0 to 21.1	SG30.1									
		21.1	W30.2	39.4								TV=0.30 tsf
		21.1	TV	39.4								
		21.1 to 21.5	save 30.1									
		21.5	W30.3	38.2								
		21.5	TV	38.2								TV=0.30 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
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 SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/9	1.7' Recovery; say 30.0' to 31.7' depth		30.0 to 32.0	31								TV=0.30 tsf
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)		30.4 to 30.5	TV	36.6							
	Includes about 5% subangular to subrounded coarse Sand particles		30.4 to 30.5	W31.1	36.6							
	Note: Upper 0.4' of sample disturbed		30.5 to save	31.1								
			30.8	TV	35.6							TV=0.28 tsf
			30.8 to 30.9	W31.2	35.6							
			30.9 to 31.2	U31.1	36.9	86	U	15.0	696			
			30.9 to 31.2	L31.1	36.9	45	21					
			31.2	TV	36.1							TV=0.32 tsf
			31.2 to 31.3	W31.3	36.1							
			31.3 to save	31.2								
			31.6									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>		
B41/11	1.1' Recovery; say 40.0' to 41.1' depth  Silty CLAY, sandy, very dark gray, about 35% fine to coarse Sand, ±10% sub-angular to subrounded fine Gravel size particles, fines of low plasticity  (CL-SC)	40.0 to 42.0	32									
		40.2	TV		16.8							TV=0.30 tsf
		40.2	W32.1		16.8							
		40.2 to 40.6	save 32.1									
		40.6	ST		16.5							TV=0.34 tsf TV=0.28 tsf
		40.6	W32.2		16.5							
		40.6 to 41.0	U32.1		16.0		118	U	20.0	884		@15.0% strain s = 648 psf
		40.6 to 41.0	L32.1		16.0	20	12					
		40.6 to 41.0	S/H 32.1									See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET 1 OF 1	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$	
B41/13	1.5' Recovery; say 52.0' to 53.5' depth; upper 0.3' disturbed	52.0 to 54.0	33										
		52.3	TV	47.5							TV=0.21 tsf		
		52.3 to 52.4	W33.1	47.5									
	Silty CLAY, gray, soft to firm consistency, highly plastic (CL-CH)	52.4 to 52.7	save 33.1			76							
		52.7	TV	45.5							TV=0.23 tsf		
		52.7 to 52.8	W33.2	45.5									
		53.0 to 53.2	C33.1	46.5					1.235	.35			
		53.0 to 53.2	L33.1	46.5	52	25					TV=0.27 tsf TVR=0.16 tsf		
		53.2	ST	44.1									
		53.2 to 53.3	W33.3	44.1									



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 10, 1974  
SHEET 10 OF 10

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc	
B41/17	1.0' Recovery; say 72.5' to 73.5' depth; upper 0.1' is 'wash' disturbed sample (?)		72.5 to 74.5	35								
	Silty CLAY, sandy, dark gray, soft to firm consistency; sand occurs primarily as pockets of Silty fine Sand (±30% of sample) (CL-SC)		72.8	TV								TV=0.15 tsf
			72.9 to 73.2	T35.0	19.6		105	UU	14.0	454		
			72.9 to 73.2	L35.1	19.6	25	15					
			72.9 to 73.2	S/H 35.1								See plot
	Also 5% to 10% Gravel size particles throughout		73.3	C35.1	26.7					697	.21	Specific Gravity=2.68
			73.3	SG35.1								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B41/23	Silty CLAY, dark gray, moderate plasticity, firm consistency (CL); includes 10% to 15% fine to coarse Sand and fine Gravel size particles	101.0 to 103.0										
		101.3	TV	23.2								TV=0.46 tsf
		101.3	W37.1	23.2								
		101.3 to 101.8	save 37.1									
		101.8	TV	25.4								TV=0.62 tsf
		101.8	W37.2	25.4								
		101.9 to 102.3	U37.1	26.4		99	U	10.0	534			
		101.9 to 102.3	L37.1	26.4	34	20						
		101.9 to 102.3	HB7.1									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B41/25	1.7 Recovery; say 112.0' to 113.7' depth	112.0 to 114.0	38								
		112.3	TV	20.9							TV=0.65 tsf
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	112.3 to 112.4	W38.1	20.9							
		112.4 to 112.7	save 38.1								
		112.7	TV	24.0							TV=0.60 tsf
	Includes about 35% subrounded to subangular fine Gravel and coarse Sand particles	112.7 to 112.8	W38.2	24.0							
		113.0 to 113.2	C38.1	24.2					.642	.18	
		113.0 to 113.2	L38.1	24.2	29	19	104				
		113.2	TV	19.4							TV=1.0 tsf
		113.2 to 113.3	W38.3	19.4							
		113.3 to 113.7	save 38.2								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B41/29	1.1' Recovery; say 130.0' to 131.1' depth	130.0 to 132.0	40									
	Clayey SAND, gravelly, dark gray; about 35% fine to coarse Sand particles and ±10% sub-rounded Gravel size particles; fines of low plasticity (GC-SC)	130.2	TV	14.7							TV=0.50 tsf	
		130.2 to 130.6	W40.1	save	14.7							
		130.6	W40.2	40.1								
		130.6 to 130.9	U40.1	40.1	10.9							
		130.9	U40.1	40.1	13.8		124	U	8.0	1749		
		130.6 to 130.9	L40.1	40.1	13.8	25	17					
		130.6 to 130.9	S/H	40.1								See plot
		130.9 to 131.1	C40.1	40.1	11.3					.370	.09	Specific Gravity = 2.69
		130.9 to 131.1	SC40.1	40.1								

PROJECT: BELLE RIVER PLANT UNITS I & II														FILE NO. 1255
TABLE SUMMARY OF LABORATORY TEST RESULTS														DATE Jan. 1974
IDENTIFICATION														SHEET 1 OF 2
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_0$					
B48/2	0.9' Recovery; say 3.0' to 3.9' depth	3.0 to 5.0	198											
		3.1	TV	32.4									TV=0.68 tsf	
	Silty CLAY, dark grayish brown mottled light gray, stiff to very stiff consistency, highly plastic (CH)	3.1 to 3.2	W198.1	32.4										
		3.2 to 3.5	L198.1	27.3	63	24								
		3.2 to 3.5	U198.1	27.3			97	U	3.2	1466				TV=1.18 tsf
			3.5	TV										
	Sample includes 5-10% medium to coarse Sand grains (subrounded to sub-angular in shape)	3.5 to 3.9	save 198.1											

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$C_c$
B48/4	Silty CLAY; dark grayish brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	8.0 to 10.0										
		8.5 to 8.7	H199.1									See plot
		8.7	TV	27.5								TV=1.23 tsf
		8.7 to 8.8	W199.1	27.5								
		8.8 to 9.1	save 199.1			97						
		9.1	TV	28.9								TV=1.23 tsf
		9.1 to 9.2	W199.2	28.9								
		9.2 to 9.5	save 199.2									
		9.5	TV									TV=1.43 tsf
		9.5 to 9.9	save 199.3									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
B48/6	Recovery 2.3'; say 18.0' to 20.3' depth; upper 0.4' disturbed	18.0 to 20.0	200								
		18.3	TV	34.4							TV=0.26 tsf
	Silty CLAY; dark gray, firm consistency, highly plastic (CL-GH)	18.3 to 18.4	W200.1	34.4							
		18.4 to 18.7	save 200.1								
		18.7	TV								TV=0.49 tsf
	Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	18.7 to 19.1	T200.1.1	32.8		90	CU	6.5	928		
		18.7 to 19.1	L200.1	34.3	47	25					
		19.1	TV	32.7							
		19.1 to 19.2	W200.2	32.7							
		19.2 to 19.5	T200.1.2	34.2		89	CU	4.5	1304		
		19.5	TV	34.1							TV=0.38 tsf
		19.5 to 19.6	W200.3	34.1							
		19.6 to 19.9	T200.1.3	35.6		88	CU	10.6	1579		

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B48/10	1.5' Recovery; say 38.0' to 39.5' depth; Upper 1.0' disturbed	202									
		TV	40.4								TV = 0.10 tsf
		W202.1	40.4								
	Silty CLAY, dark gray to very dark gray, soft consistency, highly plastic (CL-CH)	TV									TV = 0.15 tsf
		save									
		202.1									
		C202.1	38.8						1.027	.33	
		L202.1	38.8	47	24						
		SC202.1									
		Y202.1	38.8			82					
		TV	40.0								TV = 0.25 tsf
		W202.2	40.0								



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B48/14	2.0' Recovery; say 60.0' to 62.6' depth. Upper 0.4' depth disturbed	204								
		TV	26.0							TV = 0.34 tsf
		W204.1	26.0							
		L204.1	26.3	34	16					
		UU								
		204.1	26.3		99	UU	15.0	746		TV = 0.42 tsf
		TV	25.8							
		W204.2	25.8							
		U204.1	25.2		100	U	15.0	745		TV = 0.38 tsf
		TV	25.3							
		W204.3	25.3							
		204.2								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1971									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B48/18	1.5' Recovery: say 78.0' to 79.5' depth	78.0 to 80.0	206								
		78.1	TV	25.6							TV=0.56 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)  Sample includes about 15% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	78.1 to 78.2	W206.1	25.6							
		78.2 to 78.5	save 206.1								
		78.5 to 78.6	L206.1		25.6	36	18				
		78.6	TV		25.6						TV=0.70 tsf
		78.6 to 78.7	W206.2		25.6						
		78.7 to 79.0	save 206.2				100				
		79.0	TV		26.0						TV=0.73 tsf
		79.0 to 79.1	W206.3		26.0						
		79.1 to 79.4	save 206.3								
		79.4	TV								TV=0.63 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/20	1. 3' Recovery; say 88.0' to 89.3' depth	88.0 to 90.0	207								
		88.2 to 88.3	W207.1	44.51							
	Silty CLAY, dark gray, very soft consistency, highly plastic (CL-CH)	88.9 to 89.0	W207.2	30.2							
		89.0 to 89.2	L207.1	28.2	41	25					
	Sample includes ±10% coarse Sand or fine Gravel size particles (subrounded to subangular)										
	Note: Entire sample much disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>	
B48/22	2.0' Recovery; say 98.0' to 100.0' depth, upper 0.4' disturbed	98.0 to 100.0	208								
		98.4	TV	27.5							TV=0.45 tsf
		98.4 to 98.5	W208.1	27.5							
	Silty CLAY; dark gray, firm to stiff consistency, moderately to highly plastic (CL)	98.5 to 98.9	T208.1	27.6		97	CU	11.4	4410		TV=0.54 tsf
		98.9	TV								
		98.9 to 99.2	T208.1	26.8		99	CU	11.5	2017		
	Sample includes 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	98.9 to 99.2	L208.1	26.8	36	19					
		99.2	TV	26.1							
		99.2 to 99.3	W208.2	26.1							
		99.3 to 99.6	T208.1	26.0		96	CU	11.8	2880		TV=0.52 tsf
		99.6	TV	24.0							
		99.6 to 99.7	W208.3	24.0							
		99.7 to 100.0	save 208.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
48/24	Silty CLAY; dark gray, soft to medium consistency, moderately plastic (CL)  Sample contains ±20% coarse to fine Sand and fine Gravel particles (subrounded to sub-angular in shape)  Note: Entire sample thoroughly disturbed	108.0 to 110.0	209								
		108.6	TV		25.6						TV=0.26 tsf
		108.6 to 108.7	W209.1		25.6						
		108.7 to 109.1	save 209.1								
		109.1	TV		23.0						TV=0.31 tsf
		109.1 to 109.2	W209.2		23.0						
		109.6 to 110.0	save 209.2								

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B48/26	2.1' Recovery; say 118.0' to 120.1' depth		118.0 to 120.5	210								
			118.1	TV	33.2							TV = 0.43 tsf
	Silty CLAY, gray, medium to stiff consistency, moderate to highly plastic (CL)		118.1 to 118.2	W210.1	33.2							
			118.2 to 118.5	save 210.1								
	Sample includes about 5% fine to coarse Sand sized particles (subrounded to subangular in shape)		118.5 to 118.9	save 210.2								
			118.9	TV	32.8							TV = 0.51 tsf
			118.9 to 119.0	W210.2	32.8							
			119.0 to 119.4	W210.1	32.9		91					
			119.0 to 119.4	S/H 210.1								See Plot
			119.4	TV	33.0							TV = 0.60 tsf
			119.4 to 119.5	W210.3	33.0							
			119.5 to 119.9	save 210.3								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE

SUMMARY OF LABORATORY TEST RESULTS

DATE March 1974

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc
B49/2	2.1' Recovery; say 6.0' to 8.1' depth	132										
		TV	29.3									TV=1.6 tsf
		W132.1	29.3									
		TV	28.8									TV=1.4 tsf
		W132.2	28.8									
		Y132.1	28.0		95							
		TV										TV=1.85 tsf
		L132.1	26.2	50	17							
		M132.1	28.1									γ <sub>dry</sub> Max=116 W <sub>opt</sub> =16.5

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B49/3	Silty CLAY; dark grayish brown, firm to stiff consistency, highly plastic (CL-CH)	13.0 to 15.0	133									
		13.2	IV		29.0							TV=0.73tsf
		13.2 to 13.3	MB3.1		29.0							
		13.3 to 13.7	save 133.1				92					
		13.7	IV									TV=0.53tsf
		13.7 to 14.0	CB3.1		33.3					0.823	0.26	
		13.7 to 14.0	MB3.1		31.8	47 23						
		13.7 to 14.0	save 133.1									
		14.0	IV		31.3							TV=0.42tsf
		14.0 to 14.1	MB3.2		31.3							
		14.1 to 14.4	save 133.2									
		14.4	IV		30.4							TV=0.45tsf
		14.4 to 14.5	MB3.3		30.4							
		14.5 to 14.9	save 133.3									



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B49/4	1.9' Recovery; say 23.0 to 24.9' depth	23.0 to 25.0	134								
		23.1	TV	32.2							TV=0.34 tsf
		23.1 to 23.2	W134.1	32.2							
	Silty CLAY; grayish brown, firm consistency, moderately to highly plastic (CL)	23.2 to 23.5	save 134.1								
		23.5	TV								TV=0.37 tsf
		23.5 to 23.9	save 134.2								
		23.9	TV	34.0							TV=0.41 tsf
		23.9 to 24.0	W134.2	34.0							
		24.0 to 24.3	U134.1	34.0	90		U	6.0	1028		
		24.0 to 24.3	L134.1	32.8	42	22					
		24.4	TV								TV=0.42 tsf
		24.4 to 24.8	save 134.3								
		24.8	TV	34.0							TV=0.37 tsf
		24.8 to 24.9	W134.3	34.0							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	
49/6	1.9' Recovery; say 43.0' to 44.9' depth	43.0-45.0	136							
	Silty CLAY; dark greyish brown, firm consistency, highly plastic (CH-CL)	43.1-43.2	WI36.1	39.9						
		43.5	TV							TV=0.42tsf
		43.8-43.9	WI36.2	35.2						
	Sample includes ±5% coarse Sand grains (subrounded to subangular in shape)	43.9-44.2	TI36.12	46.3		75	CU	2.9	1356	$\bar{\sigma}_c=3744psf$
		43.9-44.2	LI36.1	45.5	53	22				
	Lower portions of sample appear to be "sensitive", i.e. became soft and sticky on remolding	44.2-44.3	TV	45.7						TV=0.37tsf
		44.2-44.3	WI36.3	45.7						
		44.3-44.7	TI36.11	43.5		78	CU	5.8	921	$\bar{\sigma}_c=1872psf$
		44.3-44.7	TI36.13	44.9		77	CU	4.7	1928	$\bar{\sigma}_c=7488psf$

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B49/7	1.9' Recovery; say 53.0' to 54.6' depth  Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand particles (subrounded to subangular in shape)	53.0 to 55.0	—									
		53.2	TV	25.9								TV = 0.34 tsf
		53.2 to 53.3	W	25.7								
		53.3 to 53.7	save 137.1									
		53.7 to 54.1	γ									
		54.1 to 54.4	S/H 137.1	97								See Plot
		54.4	TV	25.9								TV = 0.65 tsf
		54.4 to 54.6	W	25.9								
		54.6 to 54.9	save 137.1									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/9	1.5' Recovery; say 73.0' to 74.5' depth	73.0 to 75.0	139								
		73.1	TV	25.7							TV=0.68 tsf
	Silty CLAY, sandy; dark gray, stiff consistency, moderately plastic (CL)	73.1 to 73.2	W139.1	25.7							
		73.2 to 73.5	save 139.1			99					
		73.5	TV	24.1							TV=0.75 tsf
	Sample includes ±30% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	73.5 to 73.6	W139.2	24.1							
		73.6 to 73.9	save 139.2								
		73.9	TV								TV=0.80 tsf
		73.9 to 74.3	U139.1	25.6		100		U	20.0	2513	@ 15% strain s=2254 psf
		73.9 to 74.3	L139.1	18.2	33	22					
		74.3	TV	22.8							TV=0.76 tsf
		74.3 to 74.4	W139.3	22.8							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE _____		DATE _____									
SUMMARY OF LABORATORY TEST RESULTS		SHEET _____ OF _____									
BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B49/111	1.5' Recovery; say 93.0' to 94.5' depth	93.0 to 95.0	141								
		93.1	TV	26.6							TV = 0.62 tsf
	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	93.1 to 93.2	W141.1	26.6							
		93.2 to 93.5	save 141.1			98					
	Sample includes ±20% coarse Sand and fine Gravel size particles (subangular to subrounded in shape)	93.5	TV	26.2							TV = 0.70 tsf
		93.5 to 93.6	W141.2	26.2							
		93.8 to 94.0	C141.1	28.6					0.701	0.20	
		93.8 to 94.0	L141.1	24.3	37	22					
		93.8 to 94.0	SG141.1								Specific Gravity=2.68
		94.0	TV	27.0							TV = 0.68 tsf
		94.0 to 94.1	W141.3	27.0							
		94.1 to 94.5	save 141.2								

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B49/13	1.6' Recovery; say 113.0' to 114.6' depth  Silty CLAY: sandy, dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 25% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	113.0 to 115.0	—								
		113.1	TV								TV=0.55 tsf
		113.1 to 113.2	W143.1								
		113.2 to 113.5	W143.1.3		93	CU	11.1	4132			
		113.5	TV								TV=0.62 tsf
		113.5 to 113.8	W143.1.2		95	CU	11.8	2426			
		113.8	TV								TV=0.64 tsf
		113.8 to 113.9	W143.2								
		113.9 to 114.2	W143.1.1		100	CU	12.7	1787			
		113.9 to 114.2	L143.1								
		114.2	TV								TV=0.64 tsf
		114.2 to 114.3	W143.3								
		114.3 to 114.6	save 143.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255																			
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE																			
IDENTIFICATION		SHEET																			
TEST NO.		CONSOLIDATION																			
DEPTH (FEET)		e <sub>0</sub>																			
SOIL DESCRIPTION		c <sub>c</sub>																			
BORING SAMPLE		OTHER TESTS AND REMARKS																			
TEST NO.		STRENGTH																			
NAT. WATER CONTENT (%)		MAX. SHEAR STRESS (PSF)																			
ATTERBERG LIMITS		TEST TYPE																			
w <sub>L</sub> w <sub>P</sub>		%																			
DRY UNIT WEIGHT (PCF)																					
50/4	1.5' Recovery; say 18.0' to 19.5' depth - disturbed	18.0 to 20.0	84																		
		18.7 to 19.0	saved																		
	Silty CLAY, gray, moderate to high plasticity (CL)	19.0 to 19.1	W84.1	34.6	84																
	Note: Entire sample disturbed	19.1	TV																		TV = 0.13tsf
		19.1 to 19.4	L84.1	34.6	20																

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET _____ OF _____	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL	PL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
50/5	Jar Sample	23.5-25.0	453										
	Silty CLAY, gray, high plasticity (CH-CL)		L453.1	39.8*	52	22							

\*Note: Water content taken from unsealed jar sample



PROJECT: GREENWOOD ENERGY CENTER UNITS 2 & 3

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/6	1.9' Recovery; say 28.0' to 29.9' depth		28.0 to 30.0	85								
			28.1 to 28.3	V85.1	35.2			VS	443			St = 2.1
	Silty CLAY, gray, firm consistency, moderate plasticity (CL)		28.3 to 28.5	k85.1	37.2		84			1.002		hydrometer - see plot
			28.5 to 28.6	W85.1	35.2							
			28.6 to 28.9	T85.1	33.0		88	CU	13.1	842		σ <sub>c</sub> = 1440 psf
			28.6 to 28.9	T85.12	33.1		90	CU	14.5	1050		σ <sub>c</sub> = 2880 psf
			29.0	W85.2	34.3							TV = 0.28 tsf
			29.1 to 29.4	L85.2	34.3	39	18					
	Note: Below 29.4' depth sample becomes softer, more sensitive on remolding		29.1 to 29.4	T85.13	34.3		86	CU	14.0	1718		σ <sub>c</sub> = 5760 psf
			29.4 to 29.7	U85.1	45.8		75	U	2.4	197		
			29.4 to 29.7	L85.1	45.7	51	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE SHEET OF										
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BDRING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$		
50/8	2.0' Recovery	38.0 to 40.0										
	Silty CLAY, gray, firm consistency, highly plastic (CH)	38.1 to 38.4	46.2		74	UU	4.0	643			$\sigma_c = 3456$ psf	
		38.4 to 38.5	47.6		71							
		38.5										
		38.5 to 38.9		51.6						1.383	0.55	TV = 0.39 tsf
		38.9 to 39.2		51.3		70	U	2.0	550			Specific Gravity = 2.75
		38.9 to 39.2		51.2	55 23							
		39.2 to 39.3		48.6		71						
		39.3 to 39.6										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
50/10	1.8' Recovery; say 48.0' to 49.8' depth	48.0 to 50.0 48.1 to 48.4	87									
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)  Sample includes 20 to 25% fine to coarse Sand particles and 10 to 15% subrounded to subangular Gravel size particles to 1/2 inch maximum	48.5	W87.1	25.9	96						St = 1.1	
		48.6 to 48.8	k87.1	26.9	97				.730		sieve/hydrometer see plot	
		48.9	W87.2	24.2	97							
		48.9	TV	24.2							TV = 0.41 tsf	
		49.0 to 49.3	U87.1	23.6	99	U	15.0	527				
		49.0 to 49.3	L87.1	23.4	36	16						
		49.3 to 49.6	T87.0.1	23.2	100	UU	15.0	721			σ <sub>c</sub> = 4320	

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/12	1.9' Recovery; say 58.0' to 59.9' depth	58.0 to 60.0	88								
		58.1 to 58.5	saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.5	W88.1	23.8		99					
		58.5	TV	23.8							TV = 0.53 tsf
		58.6 to 58.9	U88.1	25.8		99	U	9.0	1008		
	Sample includes about 20% fine to coarse Sand particles and about 10% subrounded to subangular Gravel particles to 1/2 inch maximum size	58.6 to 58.9	L88.1	24.2	39	18					
		59.0	W88.2	24.8		97					
		59.0	TV	24.8							TV = 0.54 tsf
		59.1 to 59.4	T88.0.1	24.3		101	UU	10.0	1132		σ <sub>c</sub> = 4608 psf
		59.4 to 59.8	saved								

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/14	1.9' Recovery; say 68.0' to 69.9' depth	89									
		saved									
	Silty CLAY, sandy; gray, firm to stiff consistency, moderately plastic (CL)	W89.1	27.3		93						
		TV	27.3								IV = 0.48 tsf
		saved									
	Sample includes 20 to 25% fine to coarse Sand particles and subrounded to subangular Gravel size particles	L89.1	27.9	43	18						
		W89.2	29.5		94						
		TV	29.5								IV = 0.54 tsf
		saved									

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
50/16	1.9' Recovery; say 78.0' to 79.9' depth	78.0 to 80.0 78.2 to 78.5 saved	— 90								
	Silty CLAY, gray, firm to stiff consistency, moderate plasticity (CL)	78.5	W90.1	27.7		95					
		78.5	IV	27.7							TV = 0.56 tsf
	Sample includes 10 to 15% fine to coarse Sand particles and subrounded to subangular Gravel particles to 1/2 inch maximum size	78.6 to 78.9	U90.1	27.9		95	U	10.0	1271		
		78.6 to 78.9	L90.1	27.9	39	20					
		79.0	W90.2	27.8		92					
		79.0	IV	27.8							TV = 0.63 tsf
		79.1 to 79.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
50/18	1.9' Recovery, say 88.0' to 89.9' depth; upper 0.3' disturbed	88.0 to 90.0	91								
		88.3 to 88.6	T9L1.1	28.0	97	CU	14.6	1923			σ <sub>c</sub> = 3456 psf
		88.6	W9L1.1	27.6	95						
		88.6	TV	27.6							TV = 0.59 tsf
	Silty CLAY, sandy, gray, firm to stiff consistency, moderate plasticity (CL)	88.7 to 89.0	T9L1.2	27.6	97	CU	11.7	2590			σ <sub>c</sub> = 6912 psf
		88.7 to 89.0	L9L1.1	29.5	39	23					
	Sample includes 20 to 25% fine to coarse Sand size particles and about 10% subrounded to subangular Gravel size particles	89.0	W9L1.2	27.0	95						
		89.0	TV	27.0							TV = 0.69 tsf
		89.1 to 89.4	T9L1.3	27.6	96	CU	11.8	3989			σ <sub>c</sub> = 13,824 psf
		89.5 to 89.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE _____	
SUMMARY OF LABORATORY TEST RESULTS												SHEET _____ OF _____	
IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
52/3	2.3' Recovery; say 20.0' to 22.3' depth	108											
		saved											
	Silty CLAY; gray, very stiff consistency, moderate to high plasticity (CL - CH)	W108.1	31.1		92								
		TV										TV = 1.2 tsf	
		U108.1	30.3		92	U	4.0	2737					
		U108.1	30.9	49	20								
	NOTE: Consistency of soil decreases within lower half of sample with no visible signs of disturbance	W108.2	30.4		92								
		T											
		U108.0.1	31.1		92	UU	8.0	1591				σ <sub>c</sub> = 2016 psf	
		W108.3	31.4		91								
		TV										TV = 0.7 tsf	
		saved											



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (pcf)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/4	2.5' Recovery; say 28.0' to 30.5' depth	28.0 to 30.5	I09								
		28.2 to 28.5	saved								
	Silty CLAY, gray, firm consistency, of moderate plasticity (CL)	28.5	W109.1	32.5		89					
		28.6 to 28.9	U109.1	31.8		94	U	9.0	489		
	Sample includes lenses or layers of non-plastic sandy Silt (about 15% of total sample)	28.6 to 28.9	L109.1	29.4	35	18					
		28.9 to 29.2	V109.1	30.5			VS		568		St = 2.1
	Note change in physical properties of soil below 29.5' depth - is Silty CLAY (CL-CH)	29.2 to 29.3	W109.2	30.5		89					
		29.4 to 29.7	saved								
		29.8	W109.3	41.3		79					
		29.9 to 30.2	C109.1	40.5						1.013	0.45
		29.9 to 30.2	SG109.1								Specific Gravity = 2.70
		29.9 to 30.2	L109.2	40.5	49	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
52/6	2.4' Recovery; say 48.0' to 50.4' depth	48.0 to 50.5 48.1 to 48.4	III THI.11			101	CU	10.2	15159		$\bar{\sigma}_c = 2160$ psf
	SILT, dark gray, firm consistency, non-plastic to slightly plastic (ML)	48.4	WIII.1	22.9		99					TV = 0.27 tsf
		48.4	TV	22.9							
		48.5 to 48.8	THI.12	22.7		99	CU	15.0	17508		$\bar{\sigma}_c = 4320$ psf
		48.8 to 49.1	THI.13	22.1		104	CU	13.3	27777		$\bar{\sigma}_c = 8640$ psf
	Becomes more plastic with depth,	49.1	WIII.2	21.5		103					
		49.1	TV	21.5							TV = 0.35 tsf
	At ±49.5' depth-change to Silty CLAY, sandy; dark gray, stiff consistency; moderately plastic (CL)	49.2 to 49.5	UIII.1	25.2		100	U	2.5	317		
		49.2 to 49.5	LIII.1	25.2	22	18					
	Includes 15 to 20% fine to coarse Sand size particles with less than 5% fine Gravel size pieces to 1/4 inch maximum size	49.5	WIII.3	23.6		101					
		49.5	TV	23.6							TV = 0.73 tsf
		49.6 to 49.8	VIII.1	23.6			VS		2160		
							FVS		1950		St = 1.1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
52/7	2.4' Recovery; say 58.0' to 60.4' depth	—								
		112								
		saved								
	Silty CLAY; sandy, very dark gray, very stiff consistency, moderate plasticity (CL)	W1121	16.0		112					
		TV								TV = 1.10 tsf
		U1121	15.1					0.411		sieve/hydro-meter see plot
		U1121	13.0		116					
		L1121	12.9	23	14	U	6.0	1799		
		saved								
		W1122	14.6		115					
		TV								TV = 1.20 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BDRING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
52/8	1.5' Recovery; say 68.0' to 69.5' depth	68.0 to 69.5'	113								
		68.2	W113.1	14.5		111					
		68.2	TV								TV = 1.0 tsf
		68.2 to 68.5	U113.1	14.2		115	U	13.0	1677		
		68.2 to 68.5	L113.1	13.8	24	14					
		68.6	W113.2	14.3							
		68.6	TV								TV = 1.2 tsf
		69.0 to 69.4	T								
		69.4	U13.0.1	16.2		111	UU	15.0	1891		$\sigma_c = 5184$ psf
		69.4	W113.3	19.4							
		69.4	TV								TV = 0.8 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/9	2.5' Recovery; say 78.0' to 80.5' depth		78.0 to 80.5'	114								
	Silty CLAY; gray, stiff consistency, moderately plastic (CL)		78.2 to 78.5'	saved								
			78.5 to 78.6'	W114.1	23.3		105					
			78.6 to 78.6'	TV								TV = 0.5 tsf
			78.6 to 78.9'	T								
	Sample includes about 20% fine to coarse Sand and fine Gravel particles (subangular to subrounded)		78.9 to 79.0'	W14.0.1	21.8		105	UU	14.0	1157		σ <sub>c</sub> = 5760 psf
			78.9 to 79.0'	L114.1	23.5	35	18					
			79.0 to 79.0'	W114.2	22.1		106					
			79.0 to 79.0'	TV								TV = 0.8 tsf
			79.0 to 79.3'	saved								
			79.3 to 79.7'	saved								
			79.7 to 79.8'	W114.3	21.9		103					
			79.8 to 79.8'	TV								TV = 0.95 tsf

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/10	2.5' Recovery; say 88.0' to 90.5' depth		88.0 to 90.5	115								
			88.2 to 88.5	saved								
	Silty CLAY; sandy, gray, stiff consistency, moderate plasticity (CL)		88.5	W115.1	26.7		97					
			88.6 to 88.9	U115.1	27.2		97	U	8.0	2435		
			88.6 to 88.9	L115.1	26.4	39	18					
	Sample includes 25 to 30% fine to coarse Sand size particles and subrounded to subangular Gravel particles		89.0	W115.2	26.4		96					
			89.1 to 89.4	V115.1	26.4			VS		1662		
			89.5 to 89.8	saved				rVS		1529		St = 1.1
			89.8	W115.3	27.0		95					
			89.9 to 90.3	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/12	2.5' Recovery; say 108.0' to 110.5' depth	108.0 - 110.5	117								
		108.1 - 108.5	saved								
	Silty CLAY; gray, medium to stiff consistency, moderate to high plasticity (CL)	108.5	W117.1	29.7		83					TV = 0.55 tsf
		108.5	TV								
		108.5 - 108.8	saved								
	Sample includes about 10% fine to coarse subrounded to rounded Sand grains	108.8 - 109.1	saved								
		109.1	W117.2	35.1							
		109.1	TV								TV = 0.35 tsf
		109.3 - 109.6'	T 117.0.1	35.8		87		UU	3.0	1596	$\sigma_c = 7632$ psf
		109.3 - 109.6	L117.1	36.2	46	22					
		109.6 - 109.9	saved								
		110.0	W117.3	35.5		87					
		110.0	TV								TV = 0.51 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
52/12	Jar Sample	115.5	567									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)		L567.1	34	18							



IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
53/3	1.7' Recovery; say 19.0' to 20.7' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL-CH)	—										
		19.0 to 21.0	96									
		19.2 to 19.5	saved									
		19.5	W96.1	32.0		87						
		19.5	TV									
		19.6 to 19.9	U96.1	31.8		88	U	5.0	1156			
		19.6 to 19.9	L96.1	31.7	49	20						
		20.0	W96.2	32.1		87						
		20.0	TV									
		20.1 to 20.4	T96.0.1	32.2		91	UU	8.9	1425			

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**SUMMARY OF LABORATORY TEST RESULTS**

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
53/4	1.8' Recovery; say 29.0' to 30.8' depth  Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	29.0 to 31.0	—								
		29.1 to 29.4	97								
		29.5	saved								
		29.5	W97.1			77					
		29.6 to 29.9	TV								
		29.6 to 29.9	U97.1			80	U	5.0	1006		
		30.0	L97.1		49	22					TV = 0.53 tsf
		30.0	W97.2								
		30.1 to 30.4	TV								TV = 0.47 tsf
		30.4 to 30.7	I97.0.1			88	UU	2.4	973		σ <sub>c</sub> = 3024 psf
			saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
53/5	1.7' Recovery; say 39.0' to 40.7' depth	39.0 to 41.0	98								
		39.1 to 39.4	saved								
		39.4 to 39.5	W98.1	26.3	97						
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	39.5	TV	26.3						TV = 0.49 tsf	
		39.5 to 39.8	C98.1	30.9							
	Sample includes 20 to 30% coarse to fine Sand and fine Gravel size particles	39.5 to 39.8	CG98.1						0.872	0.35	Specific Gravity = 2.72
	(subrounded to subangular in shape)	39.5 to 39.8	L98.1	30.5	39	20					
		39.5 to 39.8	k98.1	30.2					0.732		Sieve Hydro-meter seepbt
		39.8 to 40.1	saved								
		40.1 to 40.2	W98.2	29.6		92					
		40.2	TV	29.6							TV = 0.34 tsf
		40.2 to 40.6	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
53/6	1.5' Recovery; say 49.0' to 50.5' depth	49.0-51.0	99									
	Silty CLAY, grey, soft to firm consistency, moderately plastic (CL)  Sample includes 15 to 20% fine to coarse Sand size particles and subrounded to subangular gravel size pieces  Sample slightly disturbed throughout	49.1	W99.1	36.2		89						
		49.2	U99.1	27.9			94	14.9	561			
		49.2	L99.1	27.8	43	18						
		49.6	W99.2	27.3			94					
		49.7	V99.1	27.3				VS		540		
		50.0	V99.1	27.3				FVS		340		
		50.0-50.3	50.3	Saved								

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
53/9	2.5' Recovery; say 79.0' to 81.5' depth	79.0 to 81.5	101									
	Silty CLAY; mottled gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel size particles	79.4	W10L1	27.6		97						
		79.5 to 79.8	V10L1	27.9		95	VS	1371				
		80.1 to 80.4	U01.1	27.9		95	rVS	1025			St = 1.3	
		80.1 to 80.4	L10L1	28.0	39	21	U	6.0	1275			
		80.5 to 80.8	saved									
		80.9 to 81.2	saved									

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
53/12	2.5' Recovery; say 109.0' to 111.5' depth  Silty CLAY; dark gray, stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	109.0 - 111.5'	104									
		109.2 - 109.5	saved									
		109.5 - 109.7	W1041	108	20.0							TV = 0.68 tsf
		109.7	TV									
		109.7 - 110.0	11041	15	20.5	29	15					
		110.0 - 110.4	saved									
		110.4 - 110.5	W1042	107	20.1							TV = 0.85 tsf
		110.5	TV									
		110.5' - 110.8	saved									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)		$e_0$
53/12	Jar Sample	116.0	568								
	Silty CLAY, grey, moderate plasticity (CL)		L568.1	36	19						
	Sample includes about 15% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)										

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SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
54/4	1.8' Recovery, say 53.0' to 54.8' depth	397								
		T397.1.1	23.6		102	CU	10.7	488		$\bar{\sigma}_c = 2160$ psf
	Clayey SILT, dark gray, firm consistency, slightly plastic to non-plastic (CL - ML)	T397.0.1	24.4		99	UU	15.0	533		$\bar{\sigma}_c = 4320$ psf
		L397.1	22.8	21	17					
		W397.1	25.7							
	@± 53.5' depth, change to Silty CLAY sandy very dark gray, firm to stiff consistency, moderately plastic (CL)	TV								TV=0.36 tsf
		T397.1.4	22.6		101	CU	14.9	1430		$\bar{\sigma}_e = 2160$ psf
	Sample includes few lenses/ layers of clayey SILT; also about 15% fine to coarse sand size particles and subrounded to subangular gravel size pieces	T397.1.2	23.2		102	CU	14.8	2022		$\bar{\sigma}_c = 4320$ psf
		T397.1.3	23.2		102	CU	13.8	3867		$\bar{\sigma}_c = 8640$ psf
		W397.2	23.3							
		T397.1.5	24.0		100	CU	10.6	2805		$\bar{\sigma}_c = 6480$ psf
		L397.2	24.0	31	18					
		TV								TV = 0.47 tsf



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
54/5	2.0' Recovery	—									
		58.5 to 60.5									
		58.6 to 58.9									
		58.9	25.2		93						
		58.9	25.2								TV = 0.44 tsf
		59.0 to 59.3	25.4								
		59.3 to 59.6	25.8		99	UU	15.0	768			σ <sub>c</sub> = 4464 psf
		59.3 to 59.6	26.2	38	17	U	11.0	557			
		59.6	27.5		92						
		59.6	27.5								
		59.7 to 60.0	27.5			VS		1100			TV = 0.55 tsf
		60.0 to 60.3			92						

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/6	2.0' Recovery	63.0 to 65.0	399									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 25% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	63.1 to 63.4	I399.0.1	26.1		98	UU	13.0	796		$\bar{\sigma}_c = 5040$ psf	
		63.4 to 63.5	W399.1	24.3		92						
		63.5	TV	24.3							TV = 0.46 tsf	
		63.5 to 63.8	C399.1	26.0						0.696	0.24	
		63.5 to 63.8	SG399.1									Specific Gravity = 2.71 Sieve/hydrometer See plot
		63.5 to 63.8	k399.1	27.2		98				.724		
		63.5 to 63.8	L399.1	26.0	36	18						
		63.8 to 64.1	T399.1.1	26.4		98	CU	12.0	1362			$\bar{\sigma}_c = 2448$ psf
		64.1 to 64.2	W399.2	25.0		98						TV = 0.52 tsf
		64.2	TV	25.0								$\bar{\sigma}_c = 4896$ psf
		64.2 to 64.5	T399.1.2	25.2		98	CU	12.1	2008			$\bar{\sigma}_c = 2792$ psf
		64.5 to 64.8	T399.1.3	25.8		98	CU	11.6	2929			TV = 0.48 tsf
	64.8	TV										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$
54/7	2.0' Recovery	400									
	Silty CLAY, sandy, gray, stiff consistency, moderately plastic (CL)  Sample includes 30 to 40% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	68.0 to 70.0									
		68.1 to 68.4	V400.1	26.3			VS		1300		
		68.4 to 68.5	W400.1	26.3		96	VS		840		St = 1.5
		68.5 to 68.5	TV	26.3							TV = 0.58 tsf
		68.5 to 68.8	U400.1	25.9		98	U	8.9	788		
		68.8 to 68.8	L400.1	26.2	37	18					
		68.8 to 69.1	P400.0.1	25.9		98	UU	12.0	1148		$\sigma_c = 5112$ psf
		69.1 to 69.2	W400.2	22.5		102					
		69.2 to 69.2	TV	22.5							TV = 0.54 tsf
		69.2 to 69.8	saved								
	69.8	TV								TV = 0.56 tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/8	2.0' Recovery	73.0 to 75.0	401								
	Silty CLAY, gray, stiff consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains and silty fine Sand lenses	73.0 to 73.3	saved								
		73.3 to 73.4	W40L.1	81							
		73.4	TV								TV = 0.54 tsf
		73.4 to 73.7	saved								
		73.7 to 74.0	C40L.1						0.982	0.41	
		73.7 to 74.0	SC40L.1								Specific Gravity=2.73
		73.7 to 74.0	L40L.1		31.6	45	21				
		73.7 to 74.0	K40L.1		31.6					0.851	see hydrometer see plot
		74.0 to 74.1	W40L.2		30.0						
		74.1	TV		30.0						TV = 0.50 tsf
	74.1 to 74.7	saved									

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TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)		e <sub>0</sub>
58/2	Jar Sample Silty CLAY, dark greyish brown, moderate to high plasticity (CL)	— 562 L562.1	6.0'		42      19						

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 TABLE SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
58/6	Jar Sample		25.0'	563								
	Silty CLAY, grey, moderate to high plasticity (CL-CH)			L563.1	48	20						

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TABLE <u>SUMMARY OF LABORATORY TEST RESULTS</u>		DATE <u>July 1974</u>									
IDENTIFICATION		SHEET <u>    </u> OF <u>    </u>									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
58/10	Jar Sample	45.0'	564								
	Silty CLAY, Sandy, low to moderate plasticity (CL)		1564.1	27	19						
	Sample includes about 35% fine Sand grains										

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SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	
58/13	Jar Sample Silty CLAY, Sandy, gray, moderately plastic (CL) Sample includes about 45% fine to coarse Sand grains (Subrounded to subangular in shape)	565							
		L565.1	34	17					



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
58/17	Jar Sample Silty CLAY, dark gray, moderate to high plasticity (CL)	80.0'	566								
			L566.1		43 20						

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B59/3	1.8' Recovery; say 18.0' to 19.8' depth	76									
		saved									
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	18.4 to 18.5	32.1		83						
		18.5	32.1								TV = 0.58 tsf
		18.5 to 18.8	V76.1	32.8			VS		1260		
		18.8 to 19.1	U76.1	32.8		90	U	6.9	1056		
		18.8 to 19.1	L76.1	32.7	48	20					
		19.1 to 19.3	W76.1	31.6		90					
		19.3	TV	31.6							TV = 0.56 tsf
		19.3 to 19.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
59/5	1.9' Recovery; say 38.0' to 39.9' depth; upper 0.5' disturbed	38.0 to 40.0	78									
		38.6 to 38.7	W78.1	26.7		94						
		38.7	TV	26.7							TV = 0.46 tsf	
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)  Sample includes 20 to 25% fine to coarse Sand and fine Gravel size particles, subrounded to subangular in shape	38.7 to 39.0	U78.1	26.2		99	U	14.9	626			
		38.7 to 39.0	L78.1	26.2	38	18						
		39.0 to 39.3	saved									
		39.3 to 39.4	W78.2	25.6			96					
		39.4	TV	25.6								TV = 0.47 tsf
		39.4 to 39.7	V78.1	25.6			VS		637			

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
59/7	1.5' Recovery; say 58.0' to 59.5' depth	58.0 to 60.0	80								
		58.1 to 58.4	saved								
		58.4 to 58.6	W80.1	25.0		100					
	Silty CLAY, sandy, dark gray, firm to stiff consistency, moderately plastic (CL)	58.6	TV	25.0							TV = 0.49 tsf
		58.6 to 58.9	U80.1	26.3		98		U 8.0	835		
	Sample includes 20 to 25% coarse to fine Sand and fine Gravel size particles	58.6 to 58.9	L80.1	24.5	36	18					
	(subrounded to subangular in shape)	58.9 to 59.0	W80.2	24.1		102					
		59.0	TV	24.1							TV = 0.51 tsf
		59.0 to 59.3	V80.1	24.1				VS	734		
								rVS	(969)		

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
59/9	Jar Sample	75.0	569								
	Clayey SAND, subrounded to subangular fine to coarse Sand and fine Gravel size particles with 35 to 40% low to moderately plastic fines (SC)		L569.1	22	14						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
59/11	Jar Sample	95.0	570								
	Silly CLAY, grey, moderate plasticity (CL)		L570.1	37	19						
	Sample includes about 10% fine to coarse Sand size particles (subrounded to sub-angular in shape)										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
B60/1	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	5.0 to 6.5	70							
			L70.1	27.3	50 20					
			H70.1							See plot
B60/2	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	10.0 to 12.5	71							
			L71.1	28.0	44 19					
			H71.1							See plot
B60/3	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	19.0 to 20.5	72							
			L72.1	30.3	43 19					
			H72.1							See plot
B60/5	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	27.0 to 28.5	73							
			L73.1	34.3	48 20					
			H73.1							See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE Jan. 1974  
SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/2	Silty CLAY; grayish brown, stiff to very stiff consistency, highly plastic (CL-CH)		8.0 to 10.0	42								
			8.0 to 8.3	save 42.1								
			8.3	TV	28.3							TV=1.1tsf
			8.3 to 8.4	W42.1	28.3							
			8.4 to 8.7	save 42.2								
			8.7 to 9.0	T42.1.3	28.9		96	CU	5.3	1336		
			8.7 to 9.0	T42.1.3	28.9		98	CU <sub>p</sub>	11.6	1751		Remolded sample
			9.0	TV	29.0							TV=0.88tsf
			9.0 to 9.1	W42.2	29.0							
			9.1 to 9.4	T42.1.2	29.3		95	CU	5.2	882		Remolded sample
			9.1 to 9.4	T42.1.2	29.3		99	CU <sub>p</sub>	10.8	1244		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		94	CU	3.6	530		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		96	CU <sub>p</sub>	15.0	875		Remolded sample
			9.7	TV	29.7							TV=1.1tsf
			9.7 to 9.8	W42.3	29.7							
			9.8 to 10.0	C42.1	30.0							Specific Gravity=2.71
			9.8 to 10.0	L42.1	29.7	53	26					



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/3	2.0 Recovery; say 17.0' to 19.0' depth. Upper 0.5' disturbed		17.0 to 19.0	43								
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)		17.5 to 17.6	TV	29.9							TV=0.27 tsf
			17.6 to 18.0	W43.1	29.9							
			17.6 to 18.0	U43.1	24.3		105	U	20.0	1143		@15.0% strain s=1029 psf
			17.6 to 18.0	Ur43.1	24.3		103	Ur	20.0	1053		@15.0% strain s=879 psf
	Sample includes about 10% fine to coarse Sand grains (sub-rounded to subangular in shape)		17.6 to 18.0	L43.1	24.3	39	21					
			18.0	TV	19.2							TV=0.87 tsf
			18.0 to 18.1	W43.2	19.2							
			18.1 to 18.3	L43.1	26.1							
			18.1 to 18.3	H43.1								See plot
			18.6	TV	19.5							TV=0.46 tsf
			18.6 to 18.7	W43.3	19.5							
			18.7 to 19.0	save 43.1								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974  
SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
B60/4	1.8' Recovery; say 21.0' to 22.8' depth  Silty CLAY, grayish brown, stiff consistency, highly plastic (CL-CH)  Includes about 5% coarse Sand and fine Gravel particles	21.0 to 23.0	44										
		21.1	TV	31.8									TV=0.52 tsf
		21.1 to 21.2	W44.1		31.8								
		21.2 to 21.5	T44.1.3		31.0		94	CU	3.8	2658			
		21.8	TV		30.9								TV=0.71 tsf
		21.8 to 21.9	W44.2		30.9								
		21.9 to 22.3	T44.1.1		30.4		94	CU	6.7	1389			
		21.9 to 22.3	I44.1		30.4	43	17						
		22.3	TV		29.9								TV=0.68 tsf
		22.3 to 22.4	W44.3		29.9								
		22.4 to 22.8	T44.1.4		30.6		95	CU	7.6	1588			

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$C_c$
B60/5	1.9' Recovery; say 25.0' to 26.9' depth  Silty CLAY; gray, moderate to high plasticity, firm to stiff consistency (CH-CL)	25.0 to 27.0	45									
		25.1	TV		34.8							TV=0.53 tsf
		25.1	W45.1		34.8							
		25.2 to 25.6	save 45.1									
		25.6	TV		35.5							TV=0.55 tsf
		25.6	W45.2		35.5							
		25.7 to 26.1	U45.1		36.8	86	U	4.0	1002			
		25.7 to 26.1	save 45.1		36.8	51	22					
		26.2	TV		36.3							
		26.2	W45.3		36.3							
		26.2 to 26.5	save 45.2									
		26.5	TV									TV=0.50 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
60/6	Silty CLAY, gray, firm to stiff consistency, high plasticity (CL-CH)	30.0-	—										
		32.0	46										
		30.1-	Saved										
		30.4	W46.1	40.4	81								
		30.4	TV										TV=0.47tsf
		30.5-	U46.1	35.0	88		U	3.7	1577				
		30.5-	L46.1	34.7	48	25							
		31.0	V46.1	34.0			VS		1000				
		31.3	TV				rVS		550				TV=0.40tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_o$	
B60/8	1.7' Recovery; say 40.0' to 41.7' depth	48								
	40.1	TV	23.6							TV=0.46 tsf
	40.1 to 40.2	W48.1	23.6							
	40.2 to save									
	40.6	48.1								
	40.6	TV	33.7							TV=0.40 tsf
	40.6	W48.2	33.7							
	40.7 to 41.1	U48.1	39.7		83	U	3.0	338		
	40.7 to 41.1	L48.1	39.7	47	25					
	41.1	TV	41.4							TV=0.40 tsf
	41.1	W48.3	41.4							
	41.1 to save									
	41.5	48.2								
	41.5	TV								TV=0.33 tsf

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/9	1.9' Recovery; say 45.0' to 46.9' depth		45.0 to 47.0	49								
			45.1	TV	25.9							TV=0.45tsf
	Silty CLAY, sandy, dark gray, firm to stiff consistency, highly plastic (CL)		45.1 to 45.2	W49.1	25.9							
	Includes about 30% subangular to subrounded fine Gravel to coarse Sand size particles		45.2 to 45.5	T49.1.3	26.0	102	CU	8.5	2510			
			45.5 to 45.8	T49.1.2	27.0	98	CU	8.2	1499			TV=0.50tsf
			45.8	TV	25.4							
			45.8 to 45.9	W49.2	25.4							
			45.9 to 46.3	T49.1.1	26.6	99	CU	12.9	1267			
			45.9 to 46.3	L49.1	24.8	38	16					
			46.3	TV	25.3							TV=0.52tsf
			46.3 to 46.4	W49.3	25.3							
			46.4 to 46.7	save 49.1								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
60/10	1.7' Recovery; say 50.0' to 51.7' depth; upper 0.5' disturbed  Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)  Sample includes about 10% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)  Few thin (± 1/16" thick) lenses/layers of SILT, grey, non-plastic (ML) appear throughout comprising 5% of total sample	50.0-52.0										
		50.3-50.4	W50.1	29.3								
		50.5-50.9	saved									
		50.9	TV									TV=0.36 tsf
		50.9-51.2	U50.1	25.5		100	U	15.2	1255			@20% strain s=1367 psf
		50.9-51.2	L50.1	25.7	34	16						
		51.2-51.3	W50.2	25.9		97						
		51.3	TV									TV=0.42 tsf
		51.3-51.6	V50.1				VS		1950			
							rVS		1050			

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE March 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/11	1.8' Recovery; say 55.0' to 56.8' depth	55.0 to 57.0	51								
		55.1	TV	25.9							TV=0.33 tsf
	Silty CLAY, dark gray, moderate plasticity, firm to stiff consistency (CL)	55.1 to 55.2	W51.1	25.9							
		55.2 to 55.5	save 51.1								
		55.5	TV	24.8							TV=0.63 tsf
	Includes about 20% medium to coarse SAND and #10% sub-angular to subrounded gravel size particles (1/4" to 1" size)	55.5 to 55.9	U51.1	24.8		103	U	24.0	1407		@15.0% strain s=1299 psf
		55.5 to 55.9	J <sub>r</sub> 51.1	24.8		103	U <sub>r</sub>	20.0	1002		@15.0% strain s=817 psf
		55.9	L51.1	24.8	33	18					
		56.0	TV	25.9							TV=0.50 tsf
		56.0	W51.2	25.9							
		56.1 to 56.4	K51.1	25.5							
		56.1 to 56.4	S/H 51.1								See plot
		56.4	TV	25.9							TV=0.46 tsf
		56.4	W51.3	25.9							
		56.4 to 56.7	save 51.3								



BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		cc <sub>0</sub>
B60/12	0.5' Recovery; say 60.0' to 60.5' depth  Silty CLAY, dark gray, moderate plasticity (CL) Entire sample disturbed		—									
			60.0 to 62.0	52								
			60.0 to 60.2	W52.2	28.9							
			60.2	W52.1	27.9							
			60.2 to 60.4	L52.1	27.9	36	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B60/13	1.9' Recovery; say 67.0' to 68.9' depth	67.0 to 69.0	53								
		67.1	TV	24.7							TV=0.63 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	67.1 to 67.2	W53.1	24.7							
	Sample includes zones of Silty CLAY, gravelly, stiff to very stiff consistency, moderately plastic (CL) and Clayey GRAVEL, sandy, slightly plastic (GC)	67.2 to 67.5	T53.1.4	15.5		114	CU	12.9	4613		
		67.2 to 67.5	T53.1.5	21.0		104	CU	11.9	3178		TV=0.95 tsf
		67.5	TV	16.4							
		67.5 to 67.6	W53.2	16.4							
		67.6 to 67.9	T53.1.3	19.7		104	CU	15.0	4060		
		67.9	TV								TV=0.48tsf
		67.9 to 68.3	L53.1	29.4	40	19					
		68.3 to 68.6	T53.1.1	23.6		104	CU	15.0	1945		
		68.3 to 68.6	T53.1.2	31.9		91	CU	6.2	1723		
		68.6	TV								TV=0.50 tsf
		68.6 to 68.7	W53.3	33.2							

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET	OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$	
B60/14	2.2' Recovery; say 74.0' to 76.2' depth	74.0 to 76.5	54										
		74.4	TV	25.9								TV=0.54tsf	
	Silty CLAY, dark gray, moderately to highly plastic, medium consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	74.4	W54.1	25.9									
		74.5 to 75.0	save 54.1										
		75.0	TV	26.8									TV=0.70tsf
		75.0	W54.2	26.8									
		75.1 to 75.6	U54.1	26.9	97			U	5.0	652			
		75.1 to 75.6	L54.1	26.9	40	20							
		75.6	TV	26.0									TV=0.70tsf
		75.6	W54.3	26.0									
		75.6 to 76.0	save 54.2										
		76.0	TV										TV=0.63tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE March 1974  
SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/16	2.4' Recovery; say 84.0' to 86.4' depth	84.0 to 86.5	56.0								
		84.2	TV	27.4							TV=0.62 tsf
	Silty CLAY, dark gray, moderate to high plasticity, firm consistency (CL)	84.2	W56.1	27.4							
		84.2 to 84.6	save 56.1								
		84.6	TV	26.7							TV=0.73 tsf
		84.6	W56.2	26.7							
	Includes about 20% fine to coarse sand particles and ±15% subangular to subrounded Gravel particles	84.7 to 85.1	save 56.2								
		85.2 to 85.4	C56.1	27.9					.744	.27	
		85.2 to 85.4	L56.1	26.9	40	19					
		85.2 to 85.4	SC56.1								Specific Gravity=2.73
		85.6	TV	26.1							TV=0.65 tsf
		85.6	W56.3	26.1							
		85.6 to 86.1	k56.1	29.1							
		85.6 to 86.1	S/H 56.1								See plot
		86.1	TV								TV=0.65 tsf

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B60/19	2.5' Recovery; say 99.0' to 101.5' depth	99.0 to 101.5	59									
		99.5	TV	27.6							TV=0.61 tsf	
	Silty CLAY; dark gray, highly plastic, firm to stiff consistency (CL)	99.5	W59.1	27.6								
	Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	99.5 to 99.9	save 59.1									
		99.9	TV	26.9								TV=0.80 tsf
		99.9	W59.2	26.9								
		100.0 to 100.4	U59.1	27.1			101	7.0	1132			
		100.0 to 100.4	L59.1	27.1	38	20						
		100.4	TV	26.8								TV=0.80 tsf
		100.4	W59.3	26.8								
		100.5 to 100.9	save 59.2									
		100.9	TV									TV=0.66 tsf
		100.9 to save 101.4	59.3									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET      OF     

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/23	Recovery; say 119.0' to 121.3' depth		119.0 to 121.5	63								
	Silty CLAY, gray mottled reddish brown, low plasticity, soft consistency; includes about 40% fine to coarse Sand grains (subrounded to subangular) (CL-ML)		119.6 to 120.0	TV	32.9							TV=0.35 tsf
	At 120.0' change to Clayey SAND about 10% hard, subrounded to subangular Gravel particles, about 15% plastic and non-plastic fines (SC)		119.6 to 120.0	W63.1	32.9							
			120.0	U63.1	15.4		115	U	6.0	335		
			120.0	L63.1	15.4	17	11					TV=0.10 test performed on sand lens
			120.0	TV	12.9							
			120.0 to 120.5	W63.2	12.9							
			120.5 to save									
			120.5	63.1								
			120.5	TV	17.2							TV=0.21 tsf
			120.5	W63.3	17.2							
			120.5 to save									
			121.0	63.2								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET 0F										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
101/2	Silty CLAY, olive brown very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard, subrounded to rounded gravel size particles	8.0 to 10.0	349									
		8.1 to 8.7	save 349.1									
		8.7 to 8.9	W349.1	27.7	94							sample used for T466.1, 2, 3
		8.9 to 9.2	U349.1	27.8	96			U	2.4	1828		
		8.9 to 9.2	L349.1	27.8	50	22						
		9.2	TV									TV=1.8tsf
		9.2 to 10.0	save 349.2									sample used for T466.1, 2, 3

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE April 1974

TABLE        SUMMARY OF LABORATORY TEST RESULTS SHEET    OF   

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
101/4	2.3' Recovery; Say 19.0' to 21.3' depth  Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	19.0 to 21.5	—									
		19.0 to 19.3	save 351.1									
		19.3 to 19.5	W35L1		89							
		19.5	TV									TV=0.48tsf
		19.5 to 19.9	save 351.2									
		19.9 to 20.2	U35L1		86		U	6.0	1014			
		19.9 to 20.2	L35L1		49	24						
		20.2 to 20.4	W35L2		88							
		20.4	TV									TV=0.38tsf
		20.4 to 20.8	save 351.3									



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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
101/7	2.1' Recovery; Say 34.0' to 36.1' depth  Silty CLAY, gray, firm consistency, moderately to highly plastic (CL-CH)	34.0 to 36.5	—								
		34.1 to save	354								
		34.4	354.1								
		34.4 to 34.6	W354.1		39.9	81					
		34.6	TV								TV=0.27tsf
		34.6 to 34.9	save 354.2								
		34.9 to 35.2	U354.1		40.0	81		U	2.4	796	
		34.9 to 35.2	L354.1		37.8	46	24				
		35.2 to 35.4	W354.2		38.6	83					
		35.4	TV								TV=0.34tsf
		35.4 to 35.7	save 354.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/10	2.4' Recovery; Say 49.0' to 51.4' depth	49.0 to 51.6	357								
		49.1 to 49.4	save 357.1								
		49.4 to 49.6	W357.1	33.0		88					
	Silty CLAY; dark gray, firm consistency, moderately plastic (CL)	49.6	TV								TV=0.32tsf
		46.6 to 49.9	save 357.2								
	Sample includes about 20% coarse to fine sand grains (subrounded to subangular in shape)	50.1 to 50.4	U357.1	32.8		90			5.0	722	
		50.1 to 50.4	U357.1	31.0	40	22					
		50.4	TV								TV=0.44tsf
		50.6 to 50.8	W357.2	28.8		93					
		50.8	TV								TV=0.30tsf
		50.8 to 51.2	save 357.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/13	2.4' Recovery; say 64.0' to 66.4' depth	64.0 to 66.5	360								
		64.6 to save									
		64.9	360.1								
	Silty CLAY; sandy, gray, stiff consistency, moderately plastic (CL)	64.9	TV								TV=0.49tsf
		64.9 to 65.1	W360.1			26.3	97				
		65.2 to 65.6	U360.1			26.6	97				@15.0%strain s=1337 psf
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	65.2 to 65.6	360.1			26.6	39	19			
		65.6 to 65.8	W360.2			26.2	96				
		65.8	TV								TV=0.52tsf
		65.8 to 66.1	360.2								

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
101/15	1.0' Recovery; Say 74.0' to 75.0' depth  Silty CLAY; sandy, dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 30% coarse sand and fine gravel size particles (subrounded to subangular in shape)	74.0 to 76.5	362									
		74.1 to 74.4	save 362.1									
		74.4 to 74.6	W362.1	99								
		74.6	TV									TV=0.69tsf
		74.6 to 74.9	T362.01	105			UU	17.0	1098			@15.0% strain s=1054 psf
		74.6 to 74.9	L362.1		22.8	36	21					

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/17	2.3' Recovery; Say 84.0' to 86.3' depth	84.0 to 86.5	364								
		84.1 to save									
		84.4 to 364.1									
		84.4 to W364.1									
		84.6	W364.1	23.9		98					
	Silty CLAY; sandy, dark gray, stiff consistency. moderately plastic (CL)	84.6	TV								TV=0.60tsf
		84.6 to save									
		84.9	364.2								
	Sample includes about 30% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	85.2 to 85.5	UB364.1	25.2		97	U	20.0	207		@15.0% strain s=1923 psf
		85.2 to U364.1									
		85.5 to W364.2									
		85.5 to 85.7	W364.2	26.2		99					
		85.7	TV								TV=0.57tsf
		85.7 to save									
		86.1	364.3								

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
101/19	1.3' Recovery; say 94.0' to 95.3' depth; upper 0.9' disturbed (Wash?)	94.0 to 96.5	366								
		94.9	TV								TV=0.36tsf @15.0%strain s=548 psf
		94.9 to 95.3	366.0.1	24.5	100	UU	20.0	572			
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	94.9 to 95.3	1366.1	24.5	36	20					
	Sample includes about 15% coarse sand and fine gravel size particles (subrounded to subangular in shape)										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
101/23	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 10% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	119.0 to 121.5	370									
		119.1 to 119.4	370.1									
		119.4 to 119.5	W370.1	91								
		119.5 to 119.8	TV									TV=0.42 tsf
		119.8 to 120.2	370.2									
		120.2 to 119.8 to 120.2	U370.0.1	85					UU	8.0	721	
		120.2 to 120.4	L370.1		44	22						
		120.4 to 120.4	W370.2	88								
		120.4 to 120.7	TV									TV=0.55tsf
		120.7 to 121.1	370.3									
		121.1 to 121.1	370.4									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	C <sub>c</sub>
105/1	Silty CLAY; olive brown and grayish brown, very stiff to hard consistency, highly plastic (CH)  Sample includes about 5% hard, rounded gravel sized particles	4.0 to 6.0									
		373									
		4.2 to 4.5	save 373.1								
		4.5 to 4.7	W373.1	23.4	100						
		4.7 to 5.0	save 373.2								
		5.0	TV								TV=2.00tsf
		5.1 to 5.4	C373.1	23.6					.642	.10	
		5.1 to 5.4	L373.1	23.6	53 24						
		5.1 to 5.4	SC373.1								specific gravity=2.72
		5.4 to 5.6	W373.2	24.2	101						
		5.6 to 5.9	save 373.3								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/2	<p>Silty CLAY, olive brown and greyish brown, very stiff consistency, moderate to highly plastic (CL)</p> <p>Sample includes about 5% hard subrounded gravel particles to 3/4" max. size</p> <p>Note: Saved material used as part of MC466.1 and T466.1.1, 2, 3 test series</p>	9.0-11.0	—									
		9.1-9.4	T374.14	27.7		98	CU	5.8	1189			$\bar{\sigma}_c = 864 \text{psf}$
		9.4-9.7	L374.1	27.6	46	24						
		9.7-9.9	W374.1	26.1		100						
		9.9-10.2	T374.1.1	26.3		97	CU	3.0	1273			$\bar{\sigma}_c = 576 \text{psf}$
		10.2	TV									TV-1.1tsf
		10.2-10.6	T374.1.2	26.4		99	CU	4.4	1227			$\bar{\sigma}_c = 1152 \text{psf}$
		10.6-10.9	T374.1.3	26.9		96	CU	10.5	2191			$\bar{\sigma}_c = 2304 \text{psf}$

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc
105/3	Silty CLAY, grey, medium consistency, moderately plastic (CL)  Sample includes about 5% fine to coarse Sand grain (subrounded to subangular in shape)	20.0-22.0										
		20.1-20.4	375									
		20.4-20.6	Saved									
		20.6	W375.1	36.0		85						
		20.6	TV									TV-0.39tsf
		20.6-20.9	Saved									
		20.9-21.2	L375.1	33.4	42	20						
		21.2-21.4	W375.2	33.3		86						
		21.4	TV									TV=0.41tsf
		21.4-21.7	Saved									

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 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/4	SOIL DESCRIPTION		30.0-32.0	376								
	1.1' Recovery; say 30.0' to 31.1' depth		30.7-31.0	Saved								
	Silty CLAY, grey, moderately plastic (CL)											
	Note: Entire Sample much disturbed.											

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/5	2.2' Recovery; say 40.0' to 42.2' depth	40.0-42.5	377								
		40.1-40.4	T377.1A	39.2		84	CU	7.6	1902		$\bar{\sigma}_c = 7200$ psf
		40.4	TV								TV=0.35 tsf
		40.4-									
		40.6	W377.1	35.7							
		40.6-41.0	T377.1I	35.9		84	CU	5.9	1068		$\bar{\sigma}_c = 1800$ psf
		40.6-									
		41.0	L377.1	35.9	44	21					
		41.0-41.3	T377.1J	35.9		85	CU	3.1	1376		$\bar{\sigma}_c = 3600$ psf
		41.3-									
		41.5	W377.2	34.9		86					
		41.5	TV								TV=0.37 tsf
		41.5-41.8	T377.1K	35.1		85	CU	3.8	1830		$\bar{\sigma}_c = 7200$ psf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
105/6	1.7' Recovery; say 50.0' to 51.7' depth	378								
	Silty CLAY, grey, medium consistency, highly plastic (CH)	50.0-52.5								
		50.0-50.3	Saved							
		50.3-50.5	W378.1	42.8	76					
		50.5	TV							TV=0.35tsf
		50.5-50.8	Saved							
		50.8-51.1	L378.2	46.2	57	25				
		51.1-51.3	W378.2	41.2	78					
		51.3	TV							TV=0.33tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
IDENTIFICATION										SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
105/8	2.3' Recovery; say 70.0' to 72.3' depth	70.0-72.5	380								
		70.1-70.4	Saved								
	Silty CLAY, dark grey, stiff consistency, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	70.4-70.6	W380.1	23.9		100					
		70.6	TV								TV=0.65tsf
		70.6-70.9	Saved								
		70.9-71.2	C380.1	23.7					0.625	.21	
		70.9-71.2	L380.1	23.8	37	19					
		70.9-71.2	SG 380.1								Specific Gravity-2.70
		71.3-71.5	W380.2	23.5			100				
		71.5	TV								TV=0.70tsf
		71.5-71.8	Saved								
		71.8-72.2	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_o$	$c_c$		
105/10	1.6' Recovery; say 90.0' to 91.6' depth  Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	90.0-92.0	382									
		90.5-90.6	W382.1	31.0	84							
		90.6	TV									TV=0.17tsf
		90.6-90.9	L382.1	29.4	34	19						
		90.9-91.2	Saved									
		91.2-91.3	W382.2	30.3	88							
		91.3	TV									TV=0.18tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
105/11	1.7' Recovery; say 110.0' to 111.7' depth; upper 0.7' disturbed, WASH? ?	110.0- 111.5	383								
		110.7- 110.9	W383.1	31.7		86					
	Silly CLAY, grey, soft consistency, moderately plastic (CL)	110.9	TV								TV-0.25tsf
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire Sample disturbed.	110.9-									
		111.3	Saved								



BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
105/12	0.7' Recovery; say 120.0' to 120.7' depth	120.0-122.5 120.2-120.3	384 W384.1	22.1	102						
	Silty CLAY, Sandy, dark gray, medium consistency, moderate plasticity (CL)	120.3-120.6 120.6-120.7	saved I-384.1								
	Sample includes about 35% fine to coarse SAND grains (subrounded to subangular in shape)										
	Note: Entire sample slightly disturbed										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
118/1	2.1' Recovery; say 3.0' to 5.1' depth; upper 1.0' disturbed (WASH??)		3.0-5.0	252								
	Silty CLAY, greyish brown, hard consistency, moderate to highly plastic (CL-CH)		4.0-4.3	L252.1	21.4	49 26						
			4.4-4.5	W252.1	22.3		101					
			4.5	TV								TV > 2.5tsf
			4.6-5.0	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
118/2	1.5' Recovery; say 8.0' to 9.5' depth	8.0 - 10.0'	253							
		8.1'	W253,1	23.8						
	Silty CLAY, dark grayish brown, very stiff to hard consistency, highly plastic (CL - CH)  Sample includes ±5% coarse Sand and fine Gravel size particles	8.2 -								
		8.5'	T253,2	23.0	107	CD	4.3	754		$\bar{\sigma}_c = 576$ psf
		8.2 -								
		8.5'	L253,1	23.3	49					
		8.5'	W253,2	21.5						
		8.6 -								
		8.9'	T253,2	23.3	105	CD	3.6	1248		$\bar{\sigma}_c = 1152$ psf
		8.9 -								
		9.2'	T253,3	24.2	103	CD	2.2	2156		$\bar{\sigma}_c = 2304$ psf
		9.2 -								
		9.5'	Saved							

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL / WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
118/3	2.1' Recovery; say 18.0' to 20.1' depth; upper 0.5' disturbed  Silly CLAY, grey, firm consistency, moderate to high plasticity (CL)	18.0 - 20.0	254									
		18.7 - 18.9	W254.1	35.5	84							
		18.9	TV									TV=0.37tsf
		18.9 - 19.3	Saved									
		19.3 - 19.5	W254.2		31.6	89						
		19.5	TV									TV=0.40tsf
		19.5 - 19.9	L254.1		35.3	45	23					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
118/4	21.4' Recovery; say 28.0' to 30.1' depth	28.0-30.0	255								
		28.5-28.6	W255.1	25.3		94					
	Silty CLAY, gray, mottled very dark gray, firm to stiff consistency, moderate plasticity (CL)	28.6	TV								TV= 0.28 tsf
		28.6-28.9	saved								
		28.9-29.3	saved								
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	29.3-29.4	W255.2	20.6		103					
		29.4	TV								TV=0.64 tsf
	Note: Upper 1.3' of sample slightly disturbed	29.4-29.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
118/5	Silty CLAY, greyish brown, firm consistency, moderately plastic (CL)		38.0-	—									
			40.0	256									
			38.1-	Saved									
			38.4	TV									TV=0.34tsf
			38.4-										
			38.6	W256.1			36.9		85				
			38.6-										
			38.9	Saved									
			38.9-										
			39.3	C256.1			36.9					0.969	0.39
			38.9-										
			39.3	I256.1			36.9	41	22				
			38.9-	SG									Specific Gravity-2.70
			39.3	256.1									TV-0.35tsf
	39.3	TV											
	39.3-												
	39.5	W256.2			36.6		86						
	39.5-												
	39.8	Saved											

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FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
118/6	2.1' Recovery; say 48.0' to 50.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes few thin lenses/layers of SILT, Sandy (ML) comprising ±5% of total	48.0-50.0	—									
		48.4-48.5	W257.1	42.6	76							
		48.5	TV									TV=0.30tsf
		48.5-48.8	Saved									
		48.8-49.2	Saved									
		49.2-49.3	W257.2	43.9	76							
		49.3	TV									TV=0.43tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
118/9	1.9' Recovery; say 78.0' to 79.9' depth; upper 0.3' disturbed	78.0-80.0	260								
		78.1-78.4	Saved								
	Silty CLAY; dark grey, stiff consistency, moderately plastic (CL)	78.4-78.7	W260.1	22.1		103					TV=0.68tsf
		78.7	TV								
		78.7-	C260.1	27.8					0.741	.24	
	Sample includes about 20% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	79.0	L260.1	25.3	42	23					Specific Gravity -2.70
		79.0	SG								
		79.0-	260.1								
	Note: Proportions of Sand and fine Gravel increase with depth approaching 40% near bottom of sample.	79.4	Saved								
		79.4-	W260.2	13.1		123					
		79.7									



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
B119/1	0.8' Recovery; say 3.0' to 3.8' depth	331								
		TV	32.4							TV=1.0 tsf
	Silty CLAY; dark grayish brown mottled light olive brown, stiff to very stiff consistency, moderately to highly plastic (CL)	W33L1	32.4							
		save								
		33L1								
		TV	25.4							TV=1.34 tsf
		Y33L1	25.4		98					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B119/2	Recovery 2.2'; say 8.0' to 10.2' depth	8.0 to 10.0	332								
	Silty CLAY, dark, grayish brown, very stiff consistency, moderately to highly plastic (CL)	8.2	TV								TV=1.25 tsf
	Sample includes about 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	8.2 to 8.3	W332.1	28.4							
		8.3 to 8.6	T332.1.3	27.9	98	CU	2.2	2012			
		8.6	TV								TV=1.43 tsf
		8.6 to 9.0	T332.1.4	29.2	94	CU	1.5	1240			
		9.0	TV								TV=1.43 tsf
		9.0 to 9.1	W332.2	27.5							
		9.1 to 9.4	T332.1.1	28.3	95	CU	2.2	887			
		9.4	TV								TV=1.50 tsf
		9.4 to 9.5	W332.3	29.2							
		9.5 to 9.7	L332.1	30.8	53	26					
	9.7 to 10.1	save 332.1									

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FILE NO. 1255

DATE Jan. 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B119/3	1.9' Recovery; say 20.0' to 21.9' depth; upper 0.3' disturbed	333									
		St	37.3							TV=0.31 tsf IV <sub>R</sub> =0.17 tsf	
	Silty CLAY: dark gray, firm consistency, highly plastic (CL-CH)	W333.1 333.1	37.3								
	Sample includes about 5 to 10% coarse Sand grains (subrounded to subangular in shape)	20.7 TV								TV=0.32 tsf	
		20.7 to 21.1 save	333.2								
		21.1 TV		37.2							TV=0.31 tsf
		21.1 to 21.2	W333.2	37.2							
		21.2 to 21.5	save 333.3								
		21.5 TV									
		21.5 to 21.9	W333.1	36.3	83						TV=0.29 tsf

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DATE Jan. 1974  
SHEET OF

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B119/4	Silty CLAY: very dark grayish brown, soft to firm consistency, highly plastic (CL)  Sample includes ±5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	30.0 to 32.0										
		30.1	35.4									TV=0.24 tsf
		30.1 to 30.2	35.4									
		30.2 to 30.5										
		30.5										TV=0.26 tsf
		30.5 to 30.8	35.3			87	CU	5.6	1655			TV=0.29 tsf TV=0.11 tsf
		30.8	37.8									
		30.8 to 30.9	37.8									
		30.9 to 31.2	38.5			85	CU	1.5	1229			
		31.2										TV=0.30 tsf
		31.2 to 31.6	36.9			86	CU	1.5	985			
		31.2 to 31.6	36.4	41	22							
		31.6 to 31.9										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B119/5	Silty CLAY: dark grayish brown, soft to firm consistency, highly plastic (CL-CH)		40.0 to 42.5	335								
			40.2 to 40.5	TV			88					TV=0.26 tsf
			40.5 to 40.6	TV								TV=0.27 tsf
			40.6 to 40.9	W335.1 save 335.1								
			40.9 to 41.3	TV								TV=0.29 tsf
			41.3 to 41.4	save 335.2								TV=0.27 tsf
			41.4 to 41.7	St 335.2 save 335.3								TV <sub>R</sub> =0.14 tsf
			41.7 to 42.1	TV								TV=0.31 tsf
			42.1 to 42.1	TV								TV=0.30 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L      w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
B119/9	2.1' Recovery; say 80.0' to 82.1' depth	80.0 to 82.5	339								
		80.1	TV	22.4							TV = 0.90 tsf
		80.1 to 80.2	W339.1	22.4							
		80.2 to 80.5	save 339.1								
		80.5 to 80.8	W339.1	21.6		107					
		80.5 to 80.8	save 339.2								
		80.8	TV	21.0							TV = 1.0 tsf
		80.8 to 80.9	W339.2	21.0							
		80.9 to 81.2	save 339.3								
		81.2 to 81.5	save 339.4								
		81.5	TV	22.1							TV = 0.73 tsf
		81.5 to 81.6	W339.1	22.1							
		81.6 to 81.9	U339.1	20.7		107					@15% Strain s = 3072 psf
		81.6 to 81.9	L339.1	20.7	33	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc
126/3	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard subrounded to subangular gravel particles	8.0 to 10.0										
		8.2 to 8.6	U2A.1	26.2		99	U	2.4	1735			
		8.2 to 8.6	L2A.1	26.6	47	24						
		8.6 to 8.8	W2A.1	27.1		97						
		9.1	TV									
		9.4 to 9.6	W2A.2	27.0		96						
		9.6 to 9.9	save 241.2									

TV=1.12tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
126/5	1.9' Recovery: Say 18.0' to 19.9' depth	18.0 to 20.0	242								
		18.4 to 18.5	W242.1	49.3							
		19.2 to 19.3	W242.2	34.7							
		19.6 to 19.8	L242.1	35.6	47	23					

Silty CLAY, grayish brown soft consistency, moderately to highly plastic (CL-CH)

Note: Entire sample disturbed



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DATE April 1974

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/7	Silty CLAY, dark grayish brown, soft consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse to fine sand grains (subrounded to subangular in shape)  Note: Entire sample disturbed	28.0 to 30.0									
		28.5									
		28.5 to 28.7	35.4		86						TV=0.18tsf
		29.0 to 29.3									
		29.3 to 29.5	34.9		86						
		29.5									TV=0.19tsf
		29.5 to 29.9									

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE: <u>SUMMARY OF LABORATORY TEST RESULTS</u> DATE <u>April 1974</u> SHEET <u>    </u> OF <u>    </u>											
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
126/11	2.3' Recovery; Say 48.0' to 50.3' depth	—	48.0 to 50.5								
			48.2 to 48.5								
			48.5 to 48.7	46.3		76					
	Silty CLAY, gray, firm consistency, highly plastic (CH)	TV	48.7								TV=0.35tsf
			48.7 to 49.1								
			49.1 to 49.4	41.1		81	UU	4.0	498		
	Sample includes about 10% fine gravel and coarse sand size particles (subrounded to subangular in shape)		49.1 to 49.4	41.2	59	25					
			49.4 to 49.6	41.4		80					
		TV	49.6								TV=0.40tsf
			49.6 to 49.9								

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FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/13	Silty CLAY, dark grey, firm consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  few layers/lenses ±1" thick of Silty CLAY, Sandy, very stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to medium Sand grains (subrounded to subangular in shape)	58.0-60.5										
		58.2-58.5	246									
		58.5-58.7	W246.1	38.8		79						Silty Clay Portion
		58.7	TV									TV=0.32tsf
		59.0-59.3	L246.1	32.9	40	23						
		59.9-60.0	W246.2	22.1		104						Silty clay, Sandy layer
		60.0	TV									TV=0.46tsf
		60.0-60.3	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/15	2.4' Recovery; say 68.0' to 70.4' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel sized particles (sub-rounded to subangular in shape)	68.0-70.5										
		68.3-68.7										
		68.7-68.8	W247.1	24.1		99						
		68.8	TV									TV=0.50tsf
		68.8-69.3	L247.1	23.2	34	18						
		69.6-69.9	Saved									
		70.1-70.2	W247.2	24.0		100						
		70.2	TV									TV=0.47tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/23	Silty CLAY; dark gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	108.0 to 110.0	251									
		108.1 to 108.4	save 251.1									
		108.4 to 108.6	W251.1		25.1		97					
		108.6	TV									TV=0.48tsf
		108.6 to 108.9	I251.0.1		25.3		96					@15.0%strain
		108.6 to 108.9	I251.1		23.6	36 20						s=1339 psf
		109.2 to 109.4	W251.2		24.2		97					
		109.4	TV									TV=0.48 tsf
		109.4 to 109.8	save 251.3									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE April 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/2	1.4' Recovery; Say 3.5' to 4.9' depth	3.5 to 5.5	302								
		3.6 to 4.0	save 302.1								
	Silty CLAY; grayish brown, stiff consistency, moderately to highly plastic (CL-CH)	4.0 to 4.2	W302.1	24.2	99						TV=0.87tsf
		4.2	TV								
		4.2 to 4.5	save 302.2								
		4.5 to 4.8	I302.0.1	24.9	103						
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	4.5 to 4.8	I302.1	23.1	48 24		UU	8.0	2099		

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
127/3	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL-CH) @ 5.2' change to - Clayey SAND, dark grey, fine to coarse Sand grains with about 40% moderately plastic fines (SC) roots and fibers evident @5.6' change to - Silty CLAY, olive grey, firm to stiff consistency, moderate to high plasticity (CL-CH) Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)	5.0-7.0										
		5.1	TV									TV=1.20tsf
		5.4-5.5	W416.1	29.3		77						
		5.0-5.2	MC									See plot
		5.6-7.0	416.1									TV=0.68tsf
		5.9	TV									
		6.2-6.3	W416.2	27.0		94						
		6.6	TV									TV=1.1tsf
		6.6-7.0	L416.1	25.8	49	22						
		6.6-7.0	416.1	13.5		113	rU	3.2	9403			Test at 95% of MC 416.1

PROJECT: BELLE RIVER PLANT UNITS I & II											FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS											DATE April 1974	
IDENTIFICATION											SHEET	OF
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
127/4	1.6' Recovery; Say 8.0' to 9.6' depth	8.0 to 10.0	417									
		8.1 to 8.7	save 417.1									sample used for T466.1, 2, 3
		8.7 to 8.9	W417.1	21.9		107						sample used for T466.1, 2, 3
	Silty CLAY, olive brown mottled grayish brown, very stiff to hard consistency, moderately to highly plastic (CL-CH)	8.9 to 9.6	save 417.2									TV=2.0 tsf
	Sample includes about 20% coarse to fine sand and fine gravel size particles (sub-rounded to subangular in shape)	9.1	TV									



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
127/8	2.1' Recovery; say 16.0' to 18.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes lenses/layers which contain about 20% fine to coarse Sand grains (sub-rounded to subangular in shape)	16.0-18.0	—									
		16.2-16.5	421									
		16.6-16.7	W421.1	28.0		91						
		16.7	TV									TV=0.77tsf
		16.7-17.0	Saved									
		17.0-17.3	Saved									
		17.3-17.4	W421.2	30.7		93						
		17.4	TV									TV=0.40tsf
		17.4-17.7	Saved									

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
127/11	Jar Sample	28.5 - 30.0	456									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  *Note: Water content taken from unsealed jar sample		W456.1	22.8								

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u>		FILE NO. <u>1255</u>									
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS		DATE <u>July 1974</u>									
IDENTIFICATION		SHEET <u>      </u> OF <u>      </u>									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/13	Jar Sample	38.0-40.0	457								
	Silty CLAY, grey, moderate plasticity (CL)		W457.1	21.4							
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
127/14	Jar Sample	43.5- 45.0	— 458							
	Silty CLAY, dark grey, moderate plasticity (CL)		L458.1	32	18					
	Sample includes < 5% fine to coarse Sand grains (subrounded to subangular in shape)									

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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/15	Jar Sample	48.5-50.0	459								
	Silty CLAY, dark grey, moderate plasticity (CL)		W459.1	20.6							
	Sample includes 10 to 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
BORING SAMPLE	SOIL DESCRIPTION									
127/18	Jar Sample	—	63.5-							
			65.0	*						
		W460.1		20.3						
	Silty CLAY, grey, moderate plasticity (CL)									
	Sample includes about 10 to 15% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)									
	*Note: Water content taken from unsealed jar sample									

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 DATE July 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
127/19	Jar Sample	—									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	68.5-									
		70.0	461								
			L461.1		33	16					

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
127/24	Jar Sample	93.5 - 95.0	462								
	SILT, grey, non-plastic (ML)		W462.1	24.9*							
	Sample includes about 25% fine Sand grains										

\*Note: Water content taken from unsealed jar sample



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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	C <sub>c</sub>
127/29	Jar Sample	—										
	Silty CLAY, dark gray, moderate plasticity (CL)		113.5									
			115.0									
	Sample includes 5 to 10% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	L463.1		41	21							

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
127/32	Jar Sample		128.5- 130.0								
	Silty CLAY, dark gray, moderate plasticity (CL)	W464.1		30.9*							

\*Note: Water content taken from unsealed jar sample.

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SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
129/3	1.1' Recovery; Say 8.0' to 9.1' depth; upper 0.3' disturbed (Wash?)	386									
		save 386.1									
		TV									TV = 1.5tsf
	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)	8.6 to 8.7	22.9		108						
		8.7 to 9.0	22.3		108	UU	6.0	3381			
		8.7 to 9.0	22.9	48	23						

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE: July 1974									
IDENTIFICATION		SHEET: _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
129/5	2.1' Recovery; say 18.0' to 20.1' depth	18.0-21.0	387								
		18.1-	Saved								
		18.4-									
	Silty CLAY, greyish brown, stiff consistency, moderate to highly plastic (CL-CH)	18.4-	I387.1.1	33.5		90	CU	6.8	11.02	$\bar{\sigma}_c = 1152 \text{ psf}$	
		18.7	I387.1.1	30.8	48	21					
		18.7-	I387.1.1	31.7							
		18.8	W387.1								
		18.8	TV							TV=0.63tsf	
		18.8-	I387.1.4	33.1			90	CU	9.7	1276	$\bar{\sigma}_c = 2304 \text{ psf}$
		19.1-	I387.1.3	31.9			90	CU	3.6	2087	$\bar{\sigma}_c = 4608 \text{ psf}$
		19.4-	W387.2	33.1			89				
		19.6	TV							TV=0.53tsf	
		19.6-	Saved								
		20.0									

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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SHEET     OF    

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/7	SOIL DESCRIPTION  2.0' Recovery; Say 28.0' to 30.0' depth  Silty CLAY, gray, moderately to highly plastic (CL-CH) Note: Entire sample highly disturbed	DEPTH (FEET)									
		28.0 to 30.5	388								
		28.3 to 28.4	W388.1	35.8	88						
		28.4 to 28.6	L388.1	35.6	45	20					

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/9	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL)	38.0 to 40.5	389								
		38.1 to 38.4	save 389.1								
		38.4 to 38.6	W389.1	87							
		38.6	TV								TV=0.29tsf
		38.6 to 38.9	save 389.2								
		39.1 to 39.3	L389.1		41	22					
		39.1 to 39.3	C389.1						1.083	.39	
		39.1 to 39.3	SC389.1								specific gravity=2.73
		39.3 to 39.6	save 389.3								
		39.6	TV								TV=0.31tsf
		39.6 to 39.8	W389.2	88							
		39.8 to 40.0	save 389.4								

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OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
129/11	1.8' Recovery; say 48.0' to 49.81' depth	48.0-50.5	390									
	Silty CLAY, grey, soft consistency, moderate to highly plastic (CL)	48.2-48.5	Saved									
		48.5	TV									
	Note: Sample much disturbed below 48.8' depth	48.5-48.6	W390.1	45.2		77					TV=0.28tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
129/13	0.6' Recovery; say 58.5' to 59.1' depth	58.5-60.5	391								
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire sample slightly disturbed	58.6-58.7	W391.1	25.7		97					
		58.7-58.9	L391.1	31.7	35	18					
		58.9-59.1	Saved								



BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
129/15	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse sand and fine gravel sized particles (subrounded to subangular in shape)  Note: Upper 0.8' of sample disturbed (Wash?)	DEPTH (FEET) 73.0 to 75.5 73.8 to 74.0 74.0 to 74.3 74.0 to 74.3 74.0 to 74.3 74.3 to 74.7 74.7 to 74.9 74.9 74.9 to 75.2	—									
			392									
			W392.1	24.6	99							
			L392.1	22.8	36	21						
			T392.01	24.8		101	UU	7.0	954			
			save 392.1									
			W392.2	23.2		102						TV=0.68tsf
			TV									
			save 392.2									

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
129/19	1.8' Recovery; say 93.0' to 94.8' depth		93.0-95.5	394								
			93.1-93.4	T394.1.1	23.7		99	CU	15.0	1518		$\bar{\sigma}_c = 3240$ psf
			93.1-93.4	L394.1	23.7	41	21					
	Silty CLAY, grey, firm to stiff consistency, moderate to high plasticity (CL)		93.4	TV								TV=0.50tsf
			93.4-93.5	W394.1	25.8							
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)		93.5-93.8	T394.1.2	25.9		99	CU	15.0	3047		$\bar{\sigma}_c = 6480$ psf
			93.8-94.1	I394.1.3	27.0		99	CU	13.2	4450		$\bar{\sigma}_c = 12960$ psf
			94.1-94.3	W394.2	26.8		98					TV=0.44tsf
			94.3	TV								
			94.3-94.6	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/21	2.2' Recovery; Say 103.0' to 105.2' depth	103.0 to 105.5	395								
		103.2 to save									
		103.5 to 395.1									
		103.5 to									
		103.7 W395.1		27.3		97					
	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.7 TV									TV=0.68tsf
		103.7 to									
		104.0 C395.1		28.0					.703	.23	
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	103.7 to 104.0 SC395.1									specific gravity=2.71
		103.7 to 104.0 L395.1		26.1	39	21					
		104.1 to save 395.2									
		104.4 to									
		104.4 to									
		104.6 W395.2		25.1		102					
		104.6 TV									TV=0.51tsf
		104.6 to save									
		104.9 395.3									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
				$w_L$	$w_p$						
129/22	Jar Sample	108.5 110.0	— 465								
	Silty CLAY, grey, moderate plasticity (CL)		W465.1	26.6	*						
	Sample includes about 10% fine to coarse Sand grains (sub-angular to subrounded in shape)		L465.1	39	19						
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE April 1974  
SHEET 1 OF 1

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
129/24	1.8' Recovery; Say 123.0' to 124.8' depth; upper 0.5' disturbed (Wash?)	123.0 to 125.5	396								
		123.5	TV								IV=0.36tsf
		123.5 to 123.9	save 396.1								
	Silty CLAY, gray, stiff consistency, moderately to highly plastic (CL-CH)	123.9 to 124.1	396.1	32.4		90					
		124.1 to 124.4	T396.01	30.6		95		UU	8.0	679	
		124.1 to 124.4	396.1	30.2	46 22						
	Sample includes about 10% hard subrounded gravel size particles	124.4	TV								IV=0.34tsf

FILE NO. 1255

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
130/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)		7.5'	571								
				L571.1	24.9*	49	21					
130/SS6	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		20.0'	572								
				L572.1	30.1*	44	22					
130/SS10	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		40.0'	573								
				L573.1	30.7*	44	23					
130/SS13	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		55.0'	574								
				L574.1	34.3*	46	23					

\*Not: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE 12/74

SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
130/SS14	Jar Sample Silty CLAY, dark gray, low plasticity (CL)	60	575	13.5	26	17					
	Sample includes ±25% fine to medium Sand size particles										
130/SS16	Jar Sample Silty CLAY, dark gray, low to moderate plasticity (CL)	70	576	20.8	34	21					
	Sample includes about 15% fine to medium Sand size particles										

\*Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
134/SS4	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	—								
		578	8.5-10.0'							
		L578.1		24.2*	49	24				
134/SS9	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	—								
		579	33.5-35.0'							
		L579.1		34.5*	45	22				
134/SS14	Jar Sample Silty CLAY, dark gray, highly plastic (CH) Sample includes ±5% fine Sand	—								
		580	58.5-60.0'							
		L580.1		44.1*	52	33				

\*Note: Water content taken from unsealed jar sample



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Nov., 1974

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
B136/2	1.9' Recovery; say 3.0' to 4.9' depth  Silty CLAY, mottled gray-brown and yellow-brown, very stiff consistency, high plasticity (CH)  Includes about $\pm 5\%$ fine to coarse subangular to subrounded Sand grains	3.0-5.0'										
		3.1-3.4'	525									
		3.4-3.5'	MC									
		3.5-4.2'	W525.1	36.2								Used for processor. See plot
		4.2-4.3'	TV			92						TV = 1.28 tsf
		4.3-4.9'	MC									Used for processor. See plot
		3.0-4.9'	W525.2	29.8								TV = 1.62 tsf
			TV									Used for processor. See plot
			MC									
			I525.1		62	25						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Nov. 1974  
 SHEET \_\_\_ OF \_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B136/4	1.8' Recovery; say 8.0' to 9.8' depth		8.0'-10.0'	526								
	Silty CLAY, mottled gray, gray-brown and yellow brown, hard consistency, moderate to high plasticity (CL-CH)		8.5'-8.8'	saved								
			8.8'-9.2'	U526.1	24.3		102	U	3.0	5446		
			8.8'-9.2'	L526.1	25.1	48	22					
			9.2'-9.3'	W526.2	25.7		98					
	Upper 0.5' of sample includes about ±15% fine to coarse Sand size particles (subrounded to subangular in shape)		9.3'	TV								TV > 2.5 tsf
			9.3'-9.6'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
136/6	1.6' Recovery; say 13.0' to 14.6' depth  Silty CLAY, grayish-brown, stiff consistency, moderately plastic (CL)  Sample includes 10-20% fine to coarse Sand particles	13.0-15.0'	—									
		13.1-13.5'	527 rC / rU									
		13.5'	W527.1	31.5	90							used for compacted C/U
		13.5'	TV									TV = 0.62 tsf used for compacted C/U
		13.6-14.1'	rC / rU									TV = 0.67 tsf used for compacted C/U
		14.1'	TV									TV = 0.67 tsf used for compacted C/U
		14.1-14.6'	rC / rU									
		13.0-14.6'	L527.1	43	22							
		13.0-14.6'	C527.1	17.3	101				0.675	.15		
		13.0-14.6'	U1527.1	17.5	100	rU	2.0	2763				
		13.0-14.6'	SC527.1									Specific Gravity=2.74

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
136/SS9	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±10% fine to coarse Sand size particles (CL)	23.5 - 25.0'	581								
			W5811	31.1*		93*					
136/SS11	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	33.5 - 35.0'	582								
			L5821	31.9* 43	19						
136/SS15	Jar Sample Silty CLAY, gray-brown, moderate plasticity (CL)	53.5 - 55.0'	583								
			W5831	38.5*		85*					
136/SS19	Jar Sample Silty CLAY dark gray, of low to moderate plasticity. Sample includes about 25% fine to coarse Sand size particles (CL)	73.5 - 75.0'	584								
			L5841	17.0* 34	21						

\* Water content taken from unsealed jar samples

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
136/SS24	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)  Sample includes ±15% fine to coarse Sand size particles	98.5- 100.0'	585	21.0% 40 21							

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE \_\_\_\_\_ OF \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
137/SS1	Jar Sample Silty CLAY, yellow-brown, moderately to highly plastic (CL-CH)	1.5 to 3.0	586								
			S/H								
			586.1								See plot
	Sample includes ±15% fine to coarse Sand size particles										
137/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH)	9.5 to 11.0	587								
			1587.1	24.8*	53	24					

Note: Water content taken from unsealed jar sample

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
138/SS4	Jar Sample Silty CLAY, dark gray, moderate to high plasticity. Sample includes about 10% fine to coarse Sand size particles occurring as pockets (CL-CH)	588	8.5 - 10.0'								
138/SS9	Jar Sample Silty CLAY, light gray-brown, moderate to high plasticity (CL)	W589.1	33.5 - 35.0'	32.0*	90						
138/SS14	Jar Sample Silty CLAY, dark gray-brown, high plasticity (CL-CH)	W590.1	58.5 - 60.0'	31.9*							
138/SS23	Jar Sample Silty CLAY, dark gray, high plasticity (CL-CH)	W591.1	103.5 - 105.0'	26.7* 49	25						

\* Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255		
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE _____ OF _____		
IDENTIFICATION			TEST NO.		PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>
139/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CH-CL) Sample includes ±5% fine to medium Sand size particles		6.5- 8.0'	593								
				L593.1	23.5*	50    24						
139/SS8	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)		29.5- 31.0'	594								
				L594.1	25.2*	42    22						
139/SS12	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)		49.5- 51.0'	595								
				L595.1	31.4*	43    20						
139/SS22	Jar Sample GRAVEL, subangular to sub-rounded Gravel particles, 1/2" to 1-1/2" in size with about 15% fine to coarse Sand, less than 10% non-plastic fines (GP)		99.5- 101.0'	596								
				S596.1								See plot

\*Note: Water content taken from unsealed jar sample



TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
B141/1	1.9' Recovery; say 3.0' to 4.9' depth  Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH)  Includes ±5% Gravel size pieces (subrounded to sub-angular in shape)  Breaks vertical and laterally in a blocky manner	3.0-5.0'									
		3.1-3.4'									
		3.4-3.5'	W5281	28.9		90					
		3.5'	TV								Used for processor. See plot
		3.5-4.1'	MC								
		4.1-4.2'	W5282	25.7		88					TV=1.50 tsf Used for processor. See plot
		4.2-4.5'	MC								
		4.5'	TV								Used for processor. See plot
		4.5-4.9'	MC								TV -1.00 tsf Used for processor. See plot
		3.0-4.9'	W5281		56    23						

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
141/2	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH-CL)  Sample includes ±20% fine to coarse Sand size particles		8.0-10.0'	—										
			8.1-8.7'	rU										
			8.7'	W529.1	26.3	95								Used for compacted U
			8.7'	TV										TV = 1.77 tsf
			8.8-9.2'	rU										Used for compacted U
			9.2'	W529.2	25.0	95								
			9.2'	TV										
			9.3-10.0'	rU										
			8.0-10.0'	U529.1			49	23						
			8.0-10.0'	U529.1	17.5	103			rU	2.0	5558			

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	$c_c$	
B141/4	1.9' Recovery, say 18.0 to 19.9' depth  Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)  Sample includes $\pm 5\%$ fine to coarse Sand grains and fine subangular to subrounded Gravel pieces (1/4" max. size)		18.1-20.1	531								
			18.0-18.3	Saved								
			18.3-18.4	W531.1		35.3	86					
			18.4	TV								TV=0.37 tsf.
			18.4-									
			18.7	T531.1		35.5	87		CU	3.2	1393	$\bar{\sigma}_c = 2304$ psf
			18.4-									
			18.7	L531.1		35.2	45	21				
			18.7-									
			19.1	T531.1		36.3	86		CU	3.0	1040	$\bar{\sigma}_c = 1152$ psf
			19.1-19.2	W531.2		36.6	85					
			19.2	TV								TV=0.32 tsf
		19.2-										
		19.5	T531.1	b	37.3	84		CU	9.6	1626	$\bar{\sigma}_c = 46.37$ psf	
		19.5-		a								
		19.9	T531.1		35.1	85		CU	4.2	1625	$\bar{\sigma}_c = 46.08$ psf	

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
141/SS4	Jar Sample Silty CLAY, brown, moderate to high plasticity (CL)	29.5- 31.0'	597								
			L597.1	33.8*	47 21						
141/SS10	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	59.5- 61.0'	598								
			L598.1	30.2*	41 19						
141/SS21	Jar Sample Sandy GRAVEL, hard sub-angular to subrounded Gravel size particles to 3/4" maximum about 30% fine to coarse Sand and 20% non-plastic fines (GM)	114.5- 116.0'	599								
			S599.1								See plot
141/SS27	Jar Sample Sandy CLAY, gray, low plasticity; about 45% fine to coarse Sand and fine Gravel size particles to 1/4" max. size (SM-SC)	144.5- 146.0'	600								
			S600.1								See plot

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B142/1	0.9' Recovery; say 3.0' to 3.9' depth	3.0-5.5'	532								
		3.0-3.4'	MC								
	Silty CLAY, mottled brown and gray, very stiff consistency high plasticity (CH)	3.4-3.5'	W532.1	28.9		98					
		3.5'	TV								Used for processor. See plot
		3.5-3.7'	MC								
	Includes $\pm 10\%$ subrounded to subangular fine to coarse Sand grains	3.7-3.8'	W532.2	25.1		97					TV=1.53 tsf Used for processor. See plot
		3.8'	TV								
		3.8-3.9'	MC								TV=1.58 tsf Used for processor. See plot
		3.0-3.9'	L532.1		54	23					

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE: <u>SUMMARY OF LABORATORY TEST RESULTS</u> DATE <u>Nov. 1974</u> SHEET <u>      </u> OF <u>      </u>													
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc	
B142/4	0.7' Recovery; say 8.0' to 8.6' depth	533	22.8		106								
		L533.2	21.4	42	22								
		W533.1	24.8										
	Silty CLAY, olive brown to dark brown with layers of Sandy CLAY; very stiff consistency, moderate to high plasticity (CL)	TV											
	at 8.3'	L533.1	24.5	49	22								
	<u>CHANGE TO:</u>												
	Olive-gray/brown Silty CLAY, very stiff consistency, highly plastic (CL-CH)												
	Sample includes ±10% fine to coarse Sand and Gravel size particles (subrounded to sub-angular in shape; 1/2 inch maximum size)												

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: \_\_\_\_\_  
 SHEET: \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
142/5	2.1' Recovery: say 14.0' to 16.1' depth	534										
	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)	I CU									Used for compacted CU	
		14.4'	W534.1	36.5		82						TV = 0.35 tsf
		14.4'	TV									Used for compacted CU
		14.5' - 15.1'	I CU									TV = 0.40 tsf
		15.1'	W534.2	34.0		86						Used for compacted CU
		15.1'	TV									TV = 0.40 tsf
		15.2' - 15.6'	I CU									Used for compacted CU
		15.6'	W534.3	35.1		88						TV = 0.41 tsf
		15.6'	TV									Used for compacted CU
		15.7' - 16.1'	I CU									TV = 0.41 tsf
		14.0' - 16.1'	L534.1		47 22							Used for compacted CU
		14.0' - 16.1'	T534.1.2	15.3		105	CU	15.0	1475			$\bar{\sigma}_c = 1872$ psf
		14.0' - 16.1'	T534.1.3	15.1		105	CU	15.0	2625			$\bar{\sigma}_c = 3600$ psf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B142/6	2.3' Recovery; say 19.0' to 21.4' depth	19.0'- 21.5'	535								
		19.2'	TV								TV = 0.30 tsf
		19.2'- 19.5'	saved								
	Silty CLAY, gray-brown, medium consistency, moderate to high plasticity (CL)	19.5'- 19.6'	W535.1	38.5							
		19.6	TV								TV = 0.32 tsf
	Sample includes ±15% fine to coarse Sand and fine Gravel size pieces (1/2 inch maximum size)	19.6'- 19.9'	saved								
		20.1'- 20.5	C535.1	38.2					1.019	.41	Specific gravity = 2.69
		20.1'- 20.5'	SC535.1								
		20.1'- 20.5'	L535.1	37.9	45	22					
		20.5'- 20.6'	W535.2	37.7			83				
		20.6'	TV								TV = 0.36 tsf
		20.6'- 20.9'	saved								



PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
142/SS14	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	61.0'	601								
			1601.1	34.3*	44 20						
142/SS24	Jar Sample Silty CLAY, sandy, gray, of low plasticity (CL-ML)	111.0'	602								
			1602.1	22.0*	23 16						
	Sample includes 25-30% fine to medium Sand size particles										

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
143/SS2	Jar Sample Silty CLAY, yellow-brown, of moderate to high plasticity (CL)	6.0'	603	23.1*	45 20						
143/SS4	Jar Sample Silty CLAY, gray, moderately plastic (CL)	16.0'	604	26.7*	43 22						
143/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	36.0'	605	36.1*	46 23						
143/SS11	Jar Sample Silty CLAY, grayish-brown, of moderate plasticity (CL)	51.0'	606	31.6	43 22						

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT.* WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
143/SS15	Jar Sample Silty CLAY, grayish-brown, highly plastic (CL-CH)		71.0'	607								
				L607.1	29.9*	48	21					
143/SS20	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes 20-25% fine to coarse Sand size particles		96.0'	608								
				L608.1	19.3*	38	20					
143/SS27	Jar Sample Sandy CLAY, gray, of low plasticity (SC) Sample includes ±35% fine to coarse Sand and ±5% fine Gravel size particles to 1/4" maximum		131.0'	609								
				L609.1	14.7*	27	17					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE Nov. 1974

TABLE        SUMMARY OF LABORATORY TEST RESULTS

SHEET        OF       

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	AT- TERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B144/4	2' Recovery; say 8.0' to 10.0'	8.0- 10.0'	— 537								
		8.2'	TV								TV = 1.80 tsf
		8.2- 8.5'	saved								
	Silty CLAY, brown, hard consistency, highly plastic (CL-CH)	8.5- 8.8'	U537.1	26.3		97	U	1.7	861		
		8.5- 8.8'	U537.1	24.1		99	U	15.0	1482		
	Includes about 20 - 25% fine to coarse Sand and fine	8.5- 8.8'	L537.1	27.3	48 21						
	Gravel size pieces (sub- rounded to subangular in shape; 1/2 inch max. size)	8.8- 8.9'	W537.1	28.1							
		8.9'	TV								TV = 1.70 tsf
	Entire sample slightly disturbed?	8.9- 9.2'	U537.2	24.1		100	U	3.0	1002		
		9.2- 9.3'	W537.2	27.1							

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B144/6	1.7' Recovery; say 13.0' to 14.7' depth  Silty CLAY, brown and gray- ish brown, very stiff consistency, moderate to high plasticity (CL)  Sample includes 15 to 20% fine to coarse Sand size particles	13.0-	—								
		15.0'	538	25.7	99						
		13.3-	saved								
		13.7'									
		13.7-									
		13.8'	W538.1	25.7							
		13.8'	TV								TV = 1.53 tsf
		13.8-									sieve/hydro-
		14.1'	S/H538.1								meter. See plot
		14.1-									
		14.2'	W538.2	25.7							
		14.2'	TV								TV = 1.88 tsf
		14.2-									
		14.5'	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)		ε
144/SS10	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±5% fine to coarse sand size particles (CL)	28.5 to 30	35.5							
144/SS16	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity (CL)	58.5 to 60								
144/SS23	Jar Sample Silty CLAY, gray, moderate plasticity (CL) Sample includes 15% fine to coarse sand size particles	93.5 to 95	19.8	35	18					

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SUMMARY OF LABORATORY TEST RESULTS		SHEET _____ OF _____							
BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
B146/3	1.8' Recovery: say 6.0' to 7.8' depth	540							
		r CU							Used for compacted CU
	Silty CLAY, brown & gray mottled, very stiff to hard consistency, moderate plasticity (CL)	W540.1	36.2		84				
		TV							TV = 2.03 tsf
		r CU							Used for compacted CU
	Sample includes ±5% fine to medium Sand size particles (subangular to subrounded in shape)	W540.2	37.8		83				
		TV							TV = 2.03 tsf
		r CU							Used for compacted CU
		L540.1	37.2	44	21				
		r CU							Used for compacted CU
		T540.1.2	14.4		108	CU	15.0	2163	$\bar{\sigma}_c = 1872$ psf
		T540.1.3	14.2		108	CU	10.9	3173	$\bar{\sigma}_c = 3888$ psf

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B146/5	1.6' Recovery; say 10.0' to 11.6' depth	10.0-12.0'	541								
		10.1-10.4'	MC								Used for proc-tor. See plot
	Silty CLAY, mottled brown and gray, firm consistency, moderate plasticity (CL) includes $\pm 10\%$ fine to coarse Sand size particles	10.4'	W541.1	33.9		90					
		10.4'	TV								TV = 0.67 tsf
		10.5-11.0'	MC								Used for proc-tor. See plot
		11.0'	W541.1	27.5		92					
	@ $\pm 11.1'$ depth changes to Silty CLAY, Sandy, firm consistency, moderately plastic (CL) Includes $\pm 40\%$ fine to coarse Sand and Gravel size pieces	11.0'	TV								TV = 0.73 tsf
		11.1-11.6'	MC								Used for proc-tor. See plot
		10.0-11.6'	L541.1		38 19						



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TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION				WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> / w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
146/7	2.1' Recovery; say 14.0' to 16.1' depth  Silty CLAY, brown, firm to stiff consistency, moderate to high plasticity (CL)  Sample includes ±5% fine to coarse Sand size particles		14.0-16.0'	—									
				14.1'-14.5'	542 rC / rU								
				14.5'	W542.1	32.2		88					used for compacted C/U
				14.5'	TV								
				14.6'-15.1'	rC / rU								TV = 0.48 tsf used for compacted C/U
				15.1'	W542.2	33.3		90					
				15.1'	TV								
				15.2'-15.6'	rC / rU								TV = 0.50 tsf used for compacted C/U
				15.6'	W542.3	34.0		85					
				15.6'	TV								
				15.7'-16.1'	rC / rU								TV = 0.49 tsf used for compacted C/U
				14.0'-16.1'	L542.1	46	22						
				14.0'-16.1'	C542.1	15.9		103			(.679)	.15	
				14.0'-16.1'	U542.1	16.6		104	rU	2.0	3282		
				14.0'-16.1'	S0542.1								Specific Gravity = 2.75

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
146/SS16	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	53.5-55.0'	614	43 20							

\*Note: Water content taken from unsealed jar sample

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT* WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
147/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH) Sample includes ±10% fine to coarse Sand size particles	624		58    24						
147/SS7	Jar Sample Silty CLAY, gray, of moderate to high plasticity (CL) Sample includes ±5% fine to coarse Sand size particles	616								
		L66.1	31.9*	46    23						

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

DATE Nov. 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B151A/2	1.2' Recovery; say 7.5' to 8.7' depth	7.5'- 10.0'	— 544								See plot
		7.7'- 8.0'	S/H 544								
	Silty CLAY, mottled yellow-brown and gray, very stiff consistency, moderate to high plasticity	8.0'	W544.1	25.0		94					TV = 1.40 tsf
		8.0'	TV								
	Sample includes 5-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape- to 1/2 inch maximum size)	8.1'- 8.4'	saved								TV = 1.40 tsf
		8.5'	W544.2	24.8		98					
		8.5'	TV								

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
B151A/3	1.2' Recovery; say 12.5' to 13.7' depth	12.5'-15.0'										
		12.6'-12.9'										
		12.9'	W345.1	27.5	94							
	Silty CLAY, gray, very stiff consistency, highly plastic (CL-CH)  Sample includes 10-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/4 inch maximum size)	12.9'										
		13.0'-T									TV = 1.13 tsf	
		13.3'-13.0'	W45.0.1	28.3		95	UU	10.0	2325			σ <sub>c</sub> = 1555 psf
		13.3'-13.3'	L545.1	27.7	48	20						
		13.3'-13.6'	saved									
		13.7'	W345.2	31.5		93						TV = 0.55 tsf
		13.7'										

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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
154/SS3	Jar Sample Silty CLAY, yellow brown, highly plastic (CH-CL) Sample includes ±10% fine to coarse Sand size particles	6.0'- 7.5'	617								
			L617.1	23.2*	51	23					
			W617.1				100				
154/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±10% fine to coarse Sand size particles	28.5'- 30.0'	618								
			L618.1	33.3*	44	21					
154/SS13	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to coarse Sand size particles	53.5'- 55.0'	619								
			L619.1	33.4*	40	19					
154/SS17	Jar Sample Silty CLAY, gray, highly plastic (CH)	73.5'- 75.0'	620								
			L620.1	33.1*	54	25					

Note: Water content taken from unsealed jar sample

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %		MAX. SHEAR STRESS (PSF)	e <sub>o</sub>
154/SS19	Jar Sample Silty CLAY, Sandy, dark gray, of low to moderate plasticity (CL)	83.5-85.0'	25.7*	31 16							
	Sample includes ±25% fine to coarse Sand size particles										
154/SS22	Jar Sample Clayey SILT, gray, of low plasticity (CL-ML)	98.5-100.0'	9.6*	20 13							
	Sample includes ±15% fine to medium Sand size particles										
154/SS25	Jar Sample Silty CLAY, gray, of low plasticity, (CL)	113.5-115.0'	18.4*	30 19							
	Sample includes ±10% fine Sand size particles										

Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
158/2	2.2' Recovery; say 7.5' to 9.7' depth; upper 1.5' disturbed  Silty CLAY, mottled gray-brown and grayish brown, stiff to very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes fine to medium Sand size particles; 30% or more near top of sample, ±10% near bottom	7.5-10.0'	548								
		7.6-8.1'	rU								used for compacted U
		8.1'	W548.1		29.0		94				
		8.2-8.5'	rU								used for compacted U
		8.5'	W548.2		28.2		95				
		8.6-8.9'	rU								used for compacted U
		9.0'	W548.3		24.3						
		9.0'	TV								
		9.1-9.4'	rU								used for compacted U
		9.4'	W548.4		21.6		101				
	9.4'	TV									
	9.5-9.7'	rU								used for compacted U	
	7.5-9.7'	L548.1		50	21						
	7.5-9.7'	Ur548.1		16.8		104	rU	2.0	347		



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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub> c <sub>c</sub>
B158/4	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)  Sample includes 5-10% fine to coarse Sand size particles	17.5-20.0'									
		17.5-17.8'	saved								
		17.9'	W550.1	36.2		84					
		17.9'	TV								TV = 0.34 tsf
		18.0-18.5'	saved								
		18.5'	W550.2	37.8		83					
		18.5'	TV								TV = 0.37 tsf
		18.6-18.9'	U550.1.1	37.5		83	CU	3.2	885		σ <sub>c</sub> = 1080 psf
		18.6-18.9'	U550.1		46 19						
		19.0-19.3'	U550.1.2	33.5		87	CU	5.1	971		σ <sub>c</sub> = 2160 psf
		19.3-19.6'	U550.1.3	37.1		83	CU	5.7	1297		σ <sub>c</sub> = 4320 psf
		19.8	W550.3	37.2							

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE		SHEET		OF	
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS							
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	cc								
			w <sub>L</sub>	w <sub>P</sub>		ε											
						%											
163/SS2	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH-CL) Sample includes ±5% fine to coarse Sand size particles	3.5-5.0'		51 24													
163/SS4	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	8.5-10.0'	28.4*	47 23													
163/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	28.5-30.0'	23.9*	42 20													
163/SS11	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to medium Sand size particles	43.5-45.0'	33.5	45 21													

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT.* WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
163/SS16	Jar Sample Silty CLAY, grayish-brown, highly plastic (CH)		68.5-70.0'	628								
				L628.1	36.9*	52    24						
163/SS21	Jar Sample Silty CLAY, gray, moderately plastic (CL)		93.5-95.0'	629								
	Sample includes ±10% fine to coarse Sand size particles			L629.1	22.3*	39    20						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Nov. 1974	
IDENTIFICATION												SHEET 1 OF 1	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	Cc			
B185/3	2.7' Recovery; say 6.0' to 8.7' depth	6.0' 9.0'	552										
		6.5'- 6.8'	saved										
	Silty CLAY, mottled gray-brown and brown, very stiff to hard consistency, highly plastic (CL-CH)	6.8'	W552.1	25.2		99							
		6.9'- 7.2'	saved										
		7.5'- 7.8'	U552.1	23.9		104	U	4.0	2948				
		7.5'- 7.8'	I552.1	24.7	50	23							
	Sample includes <5% fine to coarse Sand and Gravel particles (subrounded to subangular in shape- to 1" maximum size)	7.8'	W552.2	26.9		99							
		7.8'	TV								TV = 1.75 tsf		
		7.9'- 8.1'	C552.1	29.1						.757	0.18		
		7.9'- 8.1'	SG552.1								Specific Gravity = 2.72		
		8.2'- 8.5'	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B185/7	2.7' Recovery; say 18.0' to 20.7' depth		18.0-21.0'	554								
			18.2-18.5'	saved								
	Silty CLAY, gray, medium consistency, highly plastic (CL-CH)		18.5-18.8'	U554.1	39.3		81	U	2.4	416		
			18.5-18.8'	L554.1	39.0	49 22						
	Sample includes less than 5% fine Sand size particles		18.8-18.9'	W554.1	38.8		81					TV = 0.35 tsf
			18.9'	TV								
			19.2-19.8'	saved								
			19.9'	W554.2	35.4		82					TV = 0.32 tsf
			19.9'	TV								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      PL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B185/13	2.8' Recovery; say 48.0' to 50.8' depth  Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)  Sample includes varying amounts of fine to medium Sand, ±10% at top of sample to ±40% near bottom; less than 5% subangular to subrounded Gravel particles to 1/4" size occur throughout	48.0-51.0'	556									
		48.2-48.5'	saved									
		48.5'	W556.1	85	34.7							TV = 0.44 tsf
		48.5'	TV									
		48.6-48.9'	L556.1		37.1	47	22					
		49.4'	W556.2	87	31.5							
		49.5-49.9'	L556.2		25.9	28	17					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
186/3	Jar Sample Silty CLAY, dark greyish brown, high plasticity (CH-CL)	6.0 7.5	443								
			L443.1	52	18						
			W443.1	21.5*		99					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
IDENTIFICATION										SHEET	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
186/7	0.8' Recovery; say 23.0' to 23.8' depth  Silty CLAY, grey, soft consistency, moderate to high plasticity (CL)  Note: Entire sample much disturbed	23.0 - 25.0	423								
		23.0 - 23.3	I423.1	40.5	42	21					
		23.3 - 23.5	W423.1	39.0		80					
		23.5 - 23.8	Saved								



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
186/13	SOIL DESCRIPTION 1.5' Recovery; say 53.0' to 54.5' depth  Silty CLAY, grey, soft to firm consistency, moderate plasticity (CL)  below 53.8' depth, sample includes about 20% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	—	53.0-55.0									
		426	53.2-53.5									
		Saved	53.5-53.6	40.7	80							
		TV	53.6								TV = 0.28tsf	
		Saved	53.6-54.0									
		L426.1	54.0-54.3	27.0	33	17						
		W426.2	54.3-54.4	28.6		92						
		TV	54.4								TV = 0.21tsf	

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
186/20	Jar Sample	88.5-90.0	444								
	Silty CLAY, grey, moderate plasticity (CL)		W444.1	20.2*		107					
			L444.1		32	17					
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974  
SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
186/23	Jar Sample		103.5 105.0	— 445								
	SILT, grey, non-plastic (ML)			W445.1	12.0*							
	Sample includes about 20% fine Sand grains			L445.1		18	18					

\*Note: Water content taken from unsealed jar sample

FILE NO. 1255  
 DATE July 1974  
 SHEET \_\_\_ OF \_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
187/6	Jar Sample	18.5-20.0	446								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)		W446.1	35.9*							
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974  
SHEET 1 OF 1

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
187/7	Jar Sample	23.5 - 25.0	447								
	Silty CLAY, gray, moderate to high plasticity (CL-CH)		1447.1	37.9*	47 20						
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
					NAT* WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
187/13	Jar Sample		53.5 - 55.0	448								
	Silty CLAY, grey, moderate to high plasticity (CL)			W448.1	39.5*							
	*Note: Water content taken from unsealed jar sample											

FILE NO. 1255

DATE July 1974

SHEET    OF   

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE: SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)								
187/14	Jar Sample	58.5-								
	Clayey SILT, Sandy, gray, low to moderate plasticity (CL-ML)	60.0								
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II			FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS			DATE July 1974								
IDENTIFICATION			SHEET 1 OF 1								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
187/17	Jar Sample	73.5- 75.0	450								
	Silty CLAY, dark grey, moderate plasticity (CL)		W450.1	25.6*							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

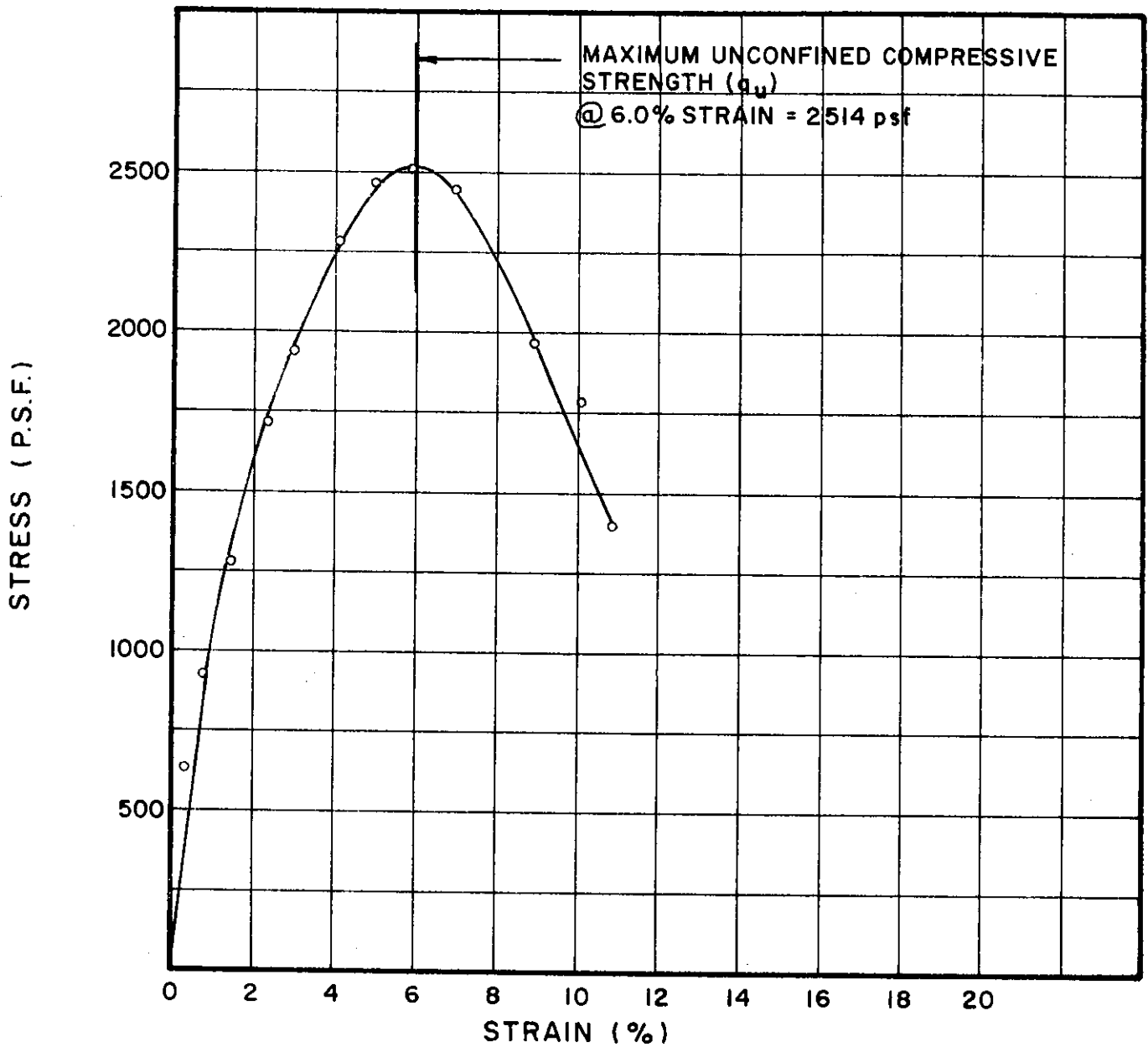
FILE NO. 1255  
 DATE July 1974

SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	
			w <sub>L</sub>	w <sub>p</sub>						
187/22	Jar Sample	98.5-100.0								
	Silty CLAY, dark grey, moderate plasticity (CL)		24.1							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)									
	*Note: Water content taken from unsealed jar sample									

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u>											
DATE <u>July 1974</u>											
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS SHEET <u>      </u> OF <u>      </u>											
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		
187/23	Jar Sample	452	103.5 105.0								
	Silty CLAY, gray, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	1452.1		28.8*34	19						

\*Note: Water content taken from unsealed jar sample

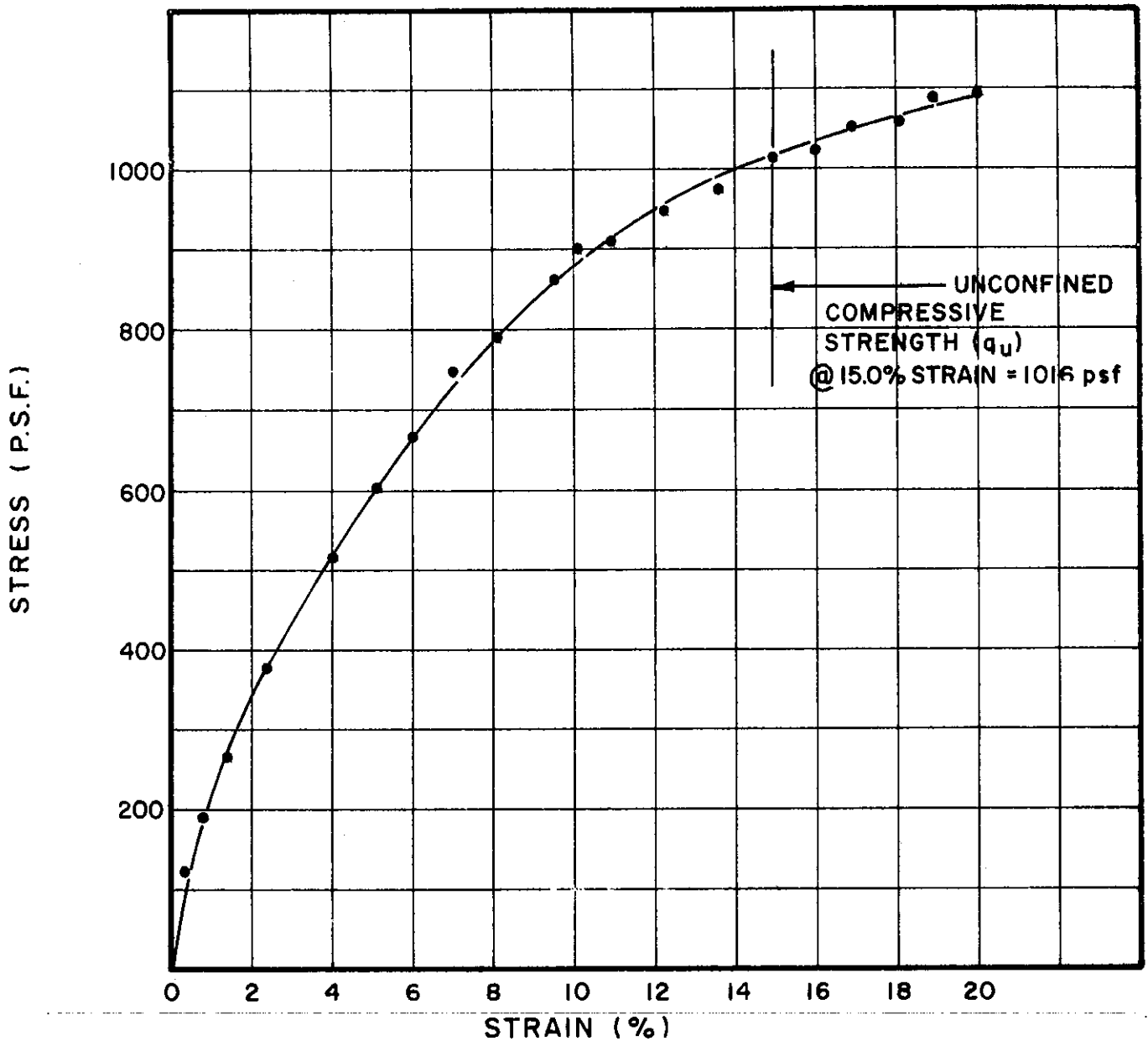


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI20.2	1.40	3.50	0.26	31.6	93	44	19	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



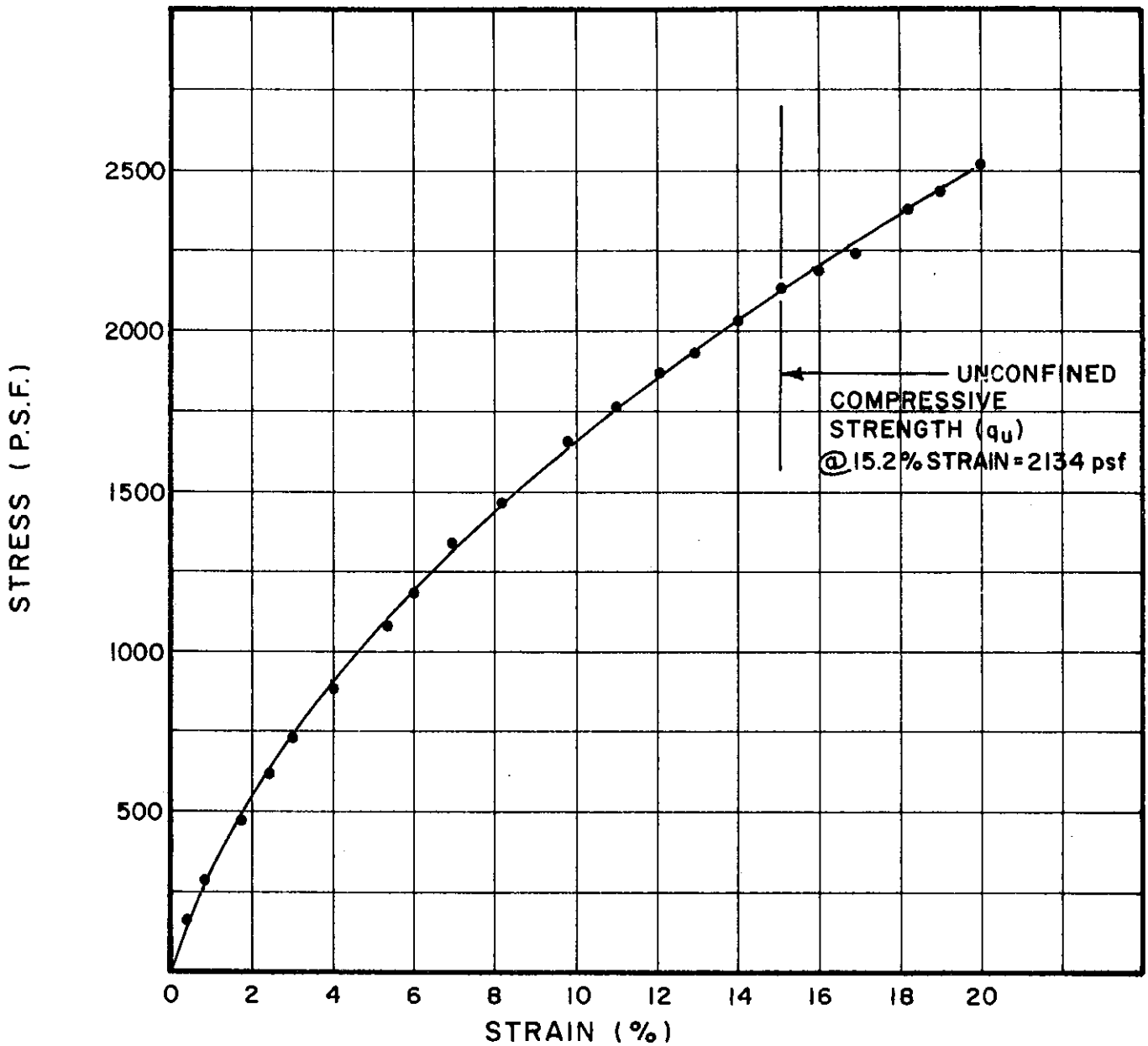
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
UI21.1	1.40	3.50	0.26	34.1	87	42	20	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 6  
 DEPTH 18.1' TO 18.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

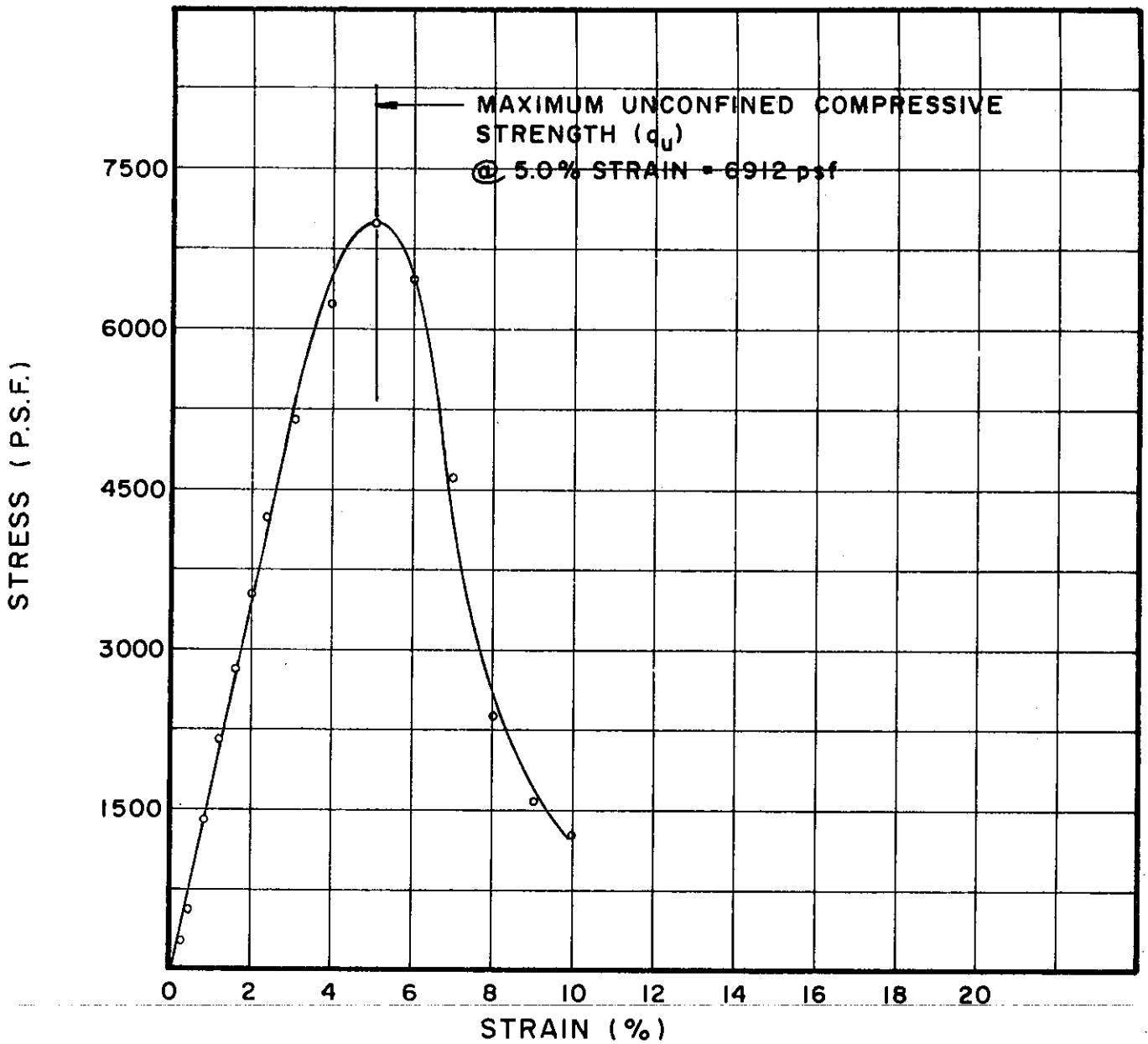


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI25.1	1.40	3.50	0.26	22.5	104	34	18	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 14  
 DEPTH 59.2' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U266.1	1.44	3.46	.260	22.4	108	59	23	SILTY CLAY (CH)

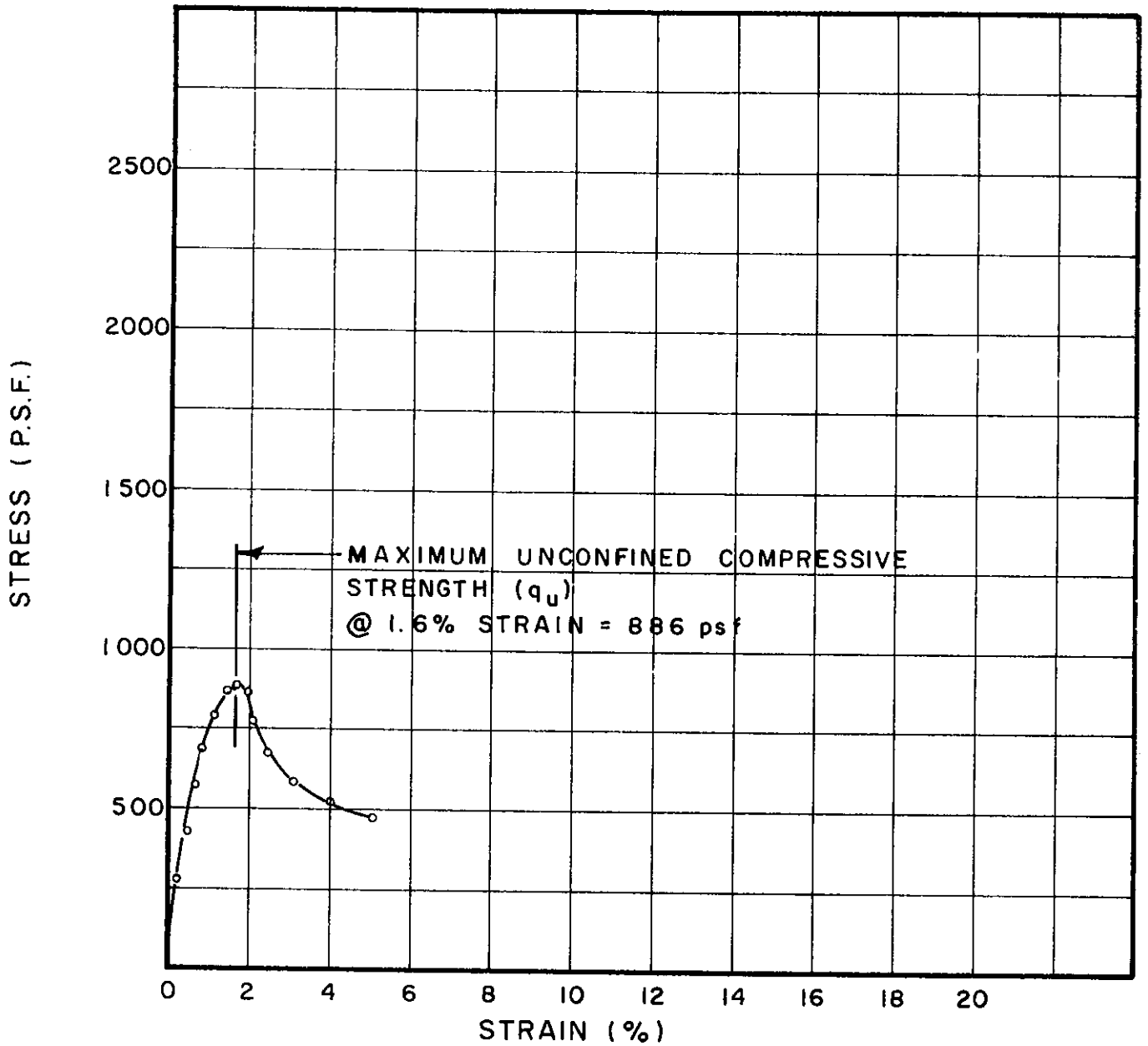
BORING NO. 25

SAMPLE NO. 1

DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

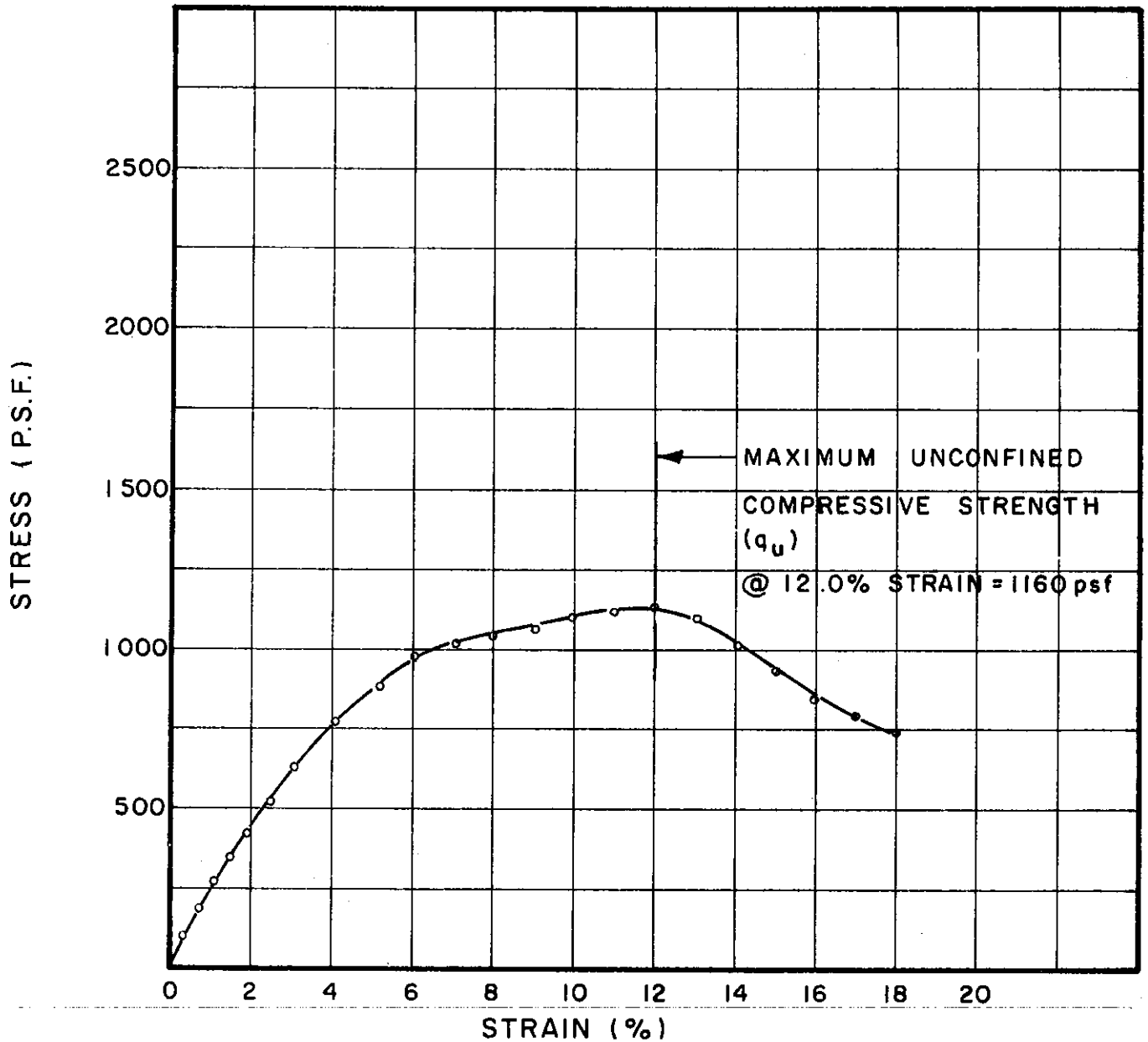


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U5.1	1.41	3.50	.257	36.6	86	38	20	SILTY CLAY (CL)

BORING NO. 26  
 SAMPLE NO. 9  
 DEPTH 39.4' TO 39.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U9.1	1.41	3.45	.261	24.8	101	36	20	SILTY CLAY, SANDY (CL)

BORING NO. 26

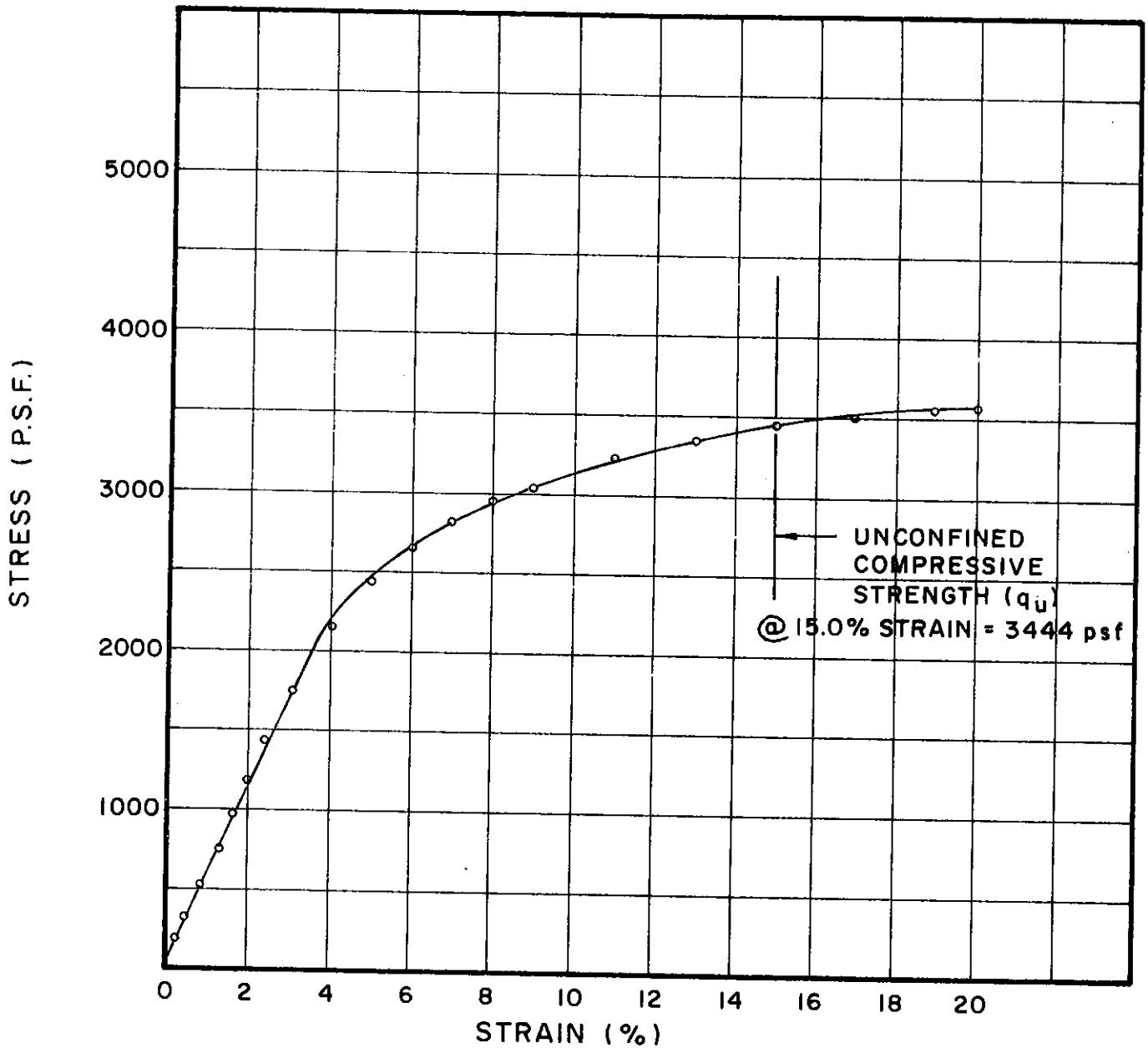
SAMPLE NO. 17

DEPTH 78.2' TO 78.5'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



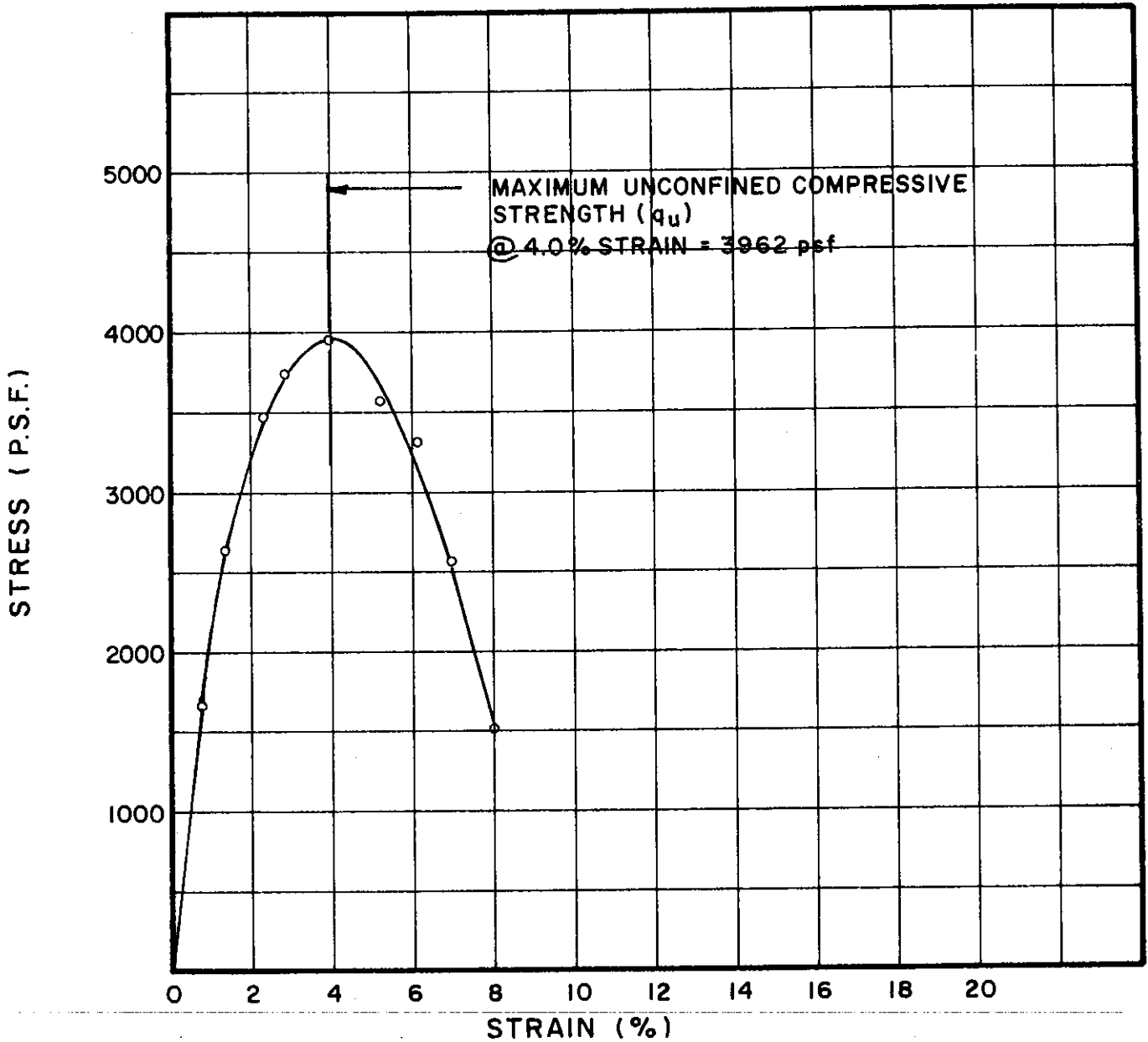


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U303.1	1.41	3.45	.261	30.6	94	51	23	SILTY CLAY (CL-CH)

BORING NO. 27  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U183.1	1.39	3.49	0.26	25.3	100	47	23	SILTY CLAY (CL)

BORING NO. 28

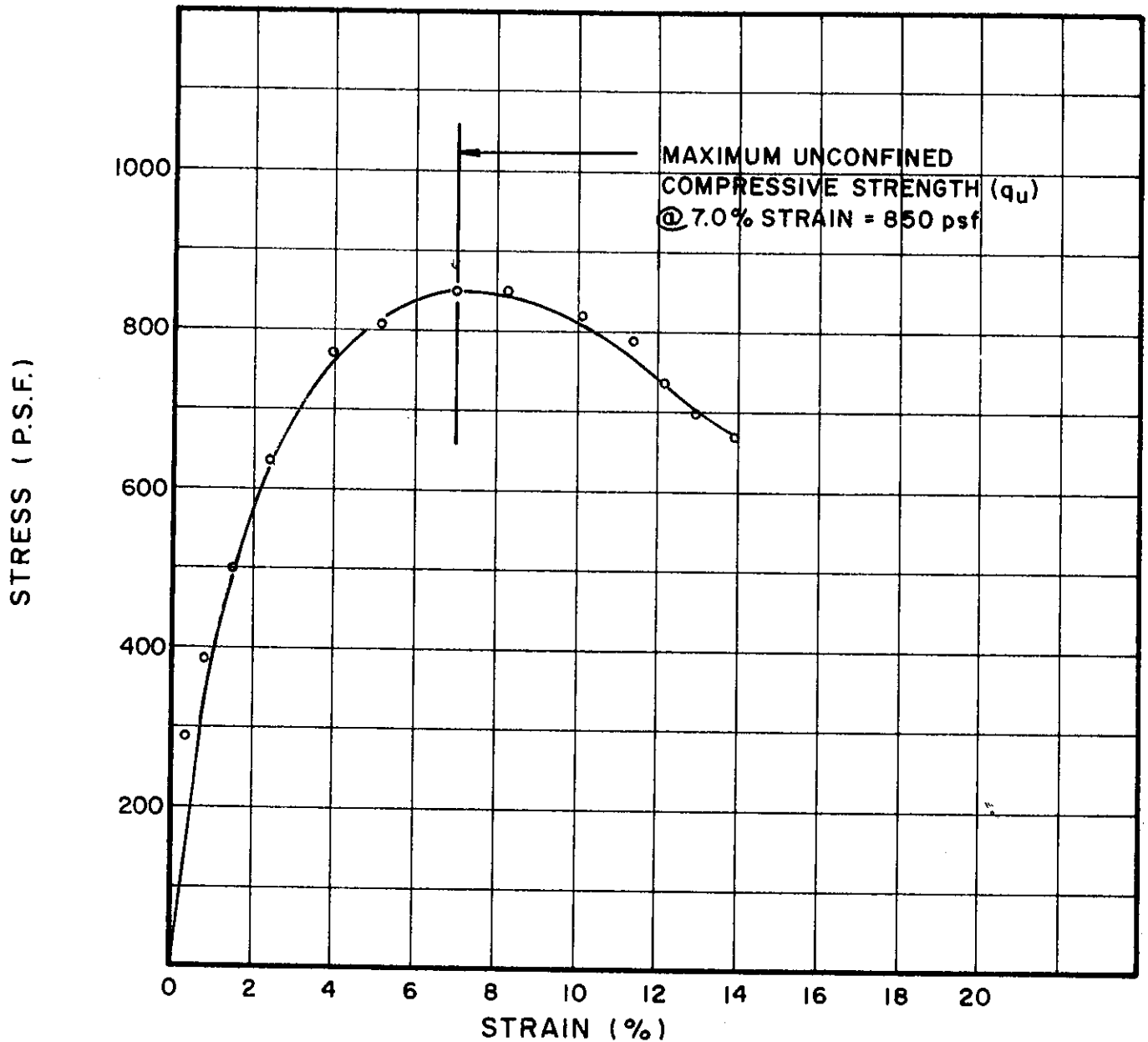
SAMPLE NO. 3

DEPTH 5.8' TO 6.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
UI86.2	1.40	3.50	0.26	38.0	84	42	20	SILTY CLAY (CL)

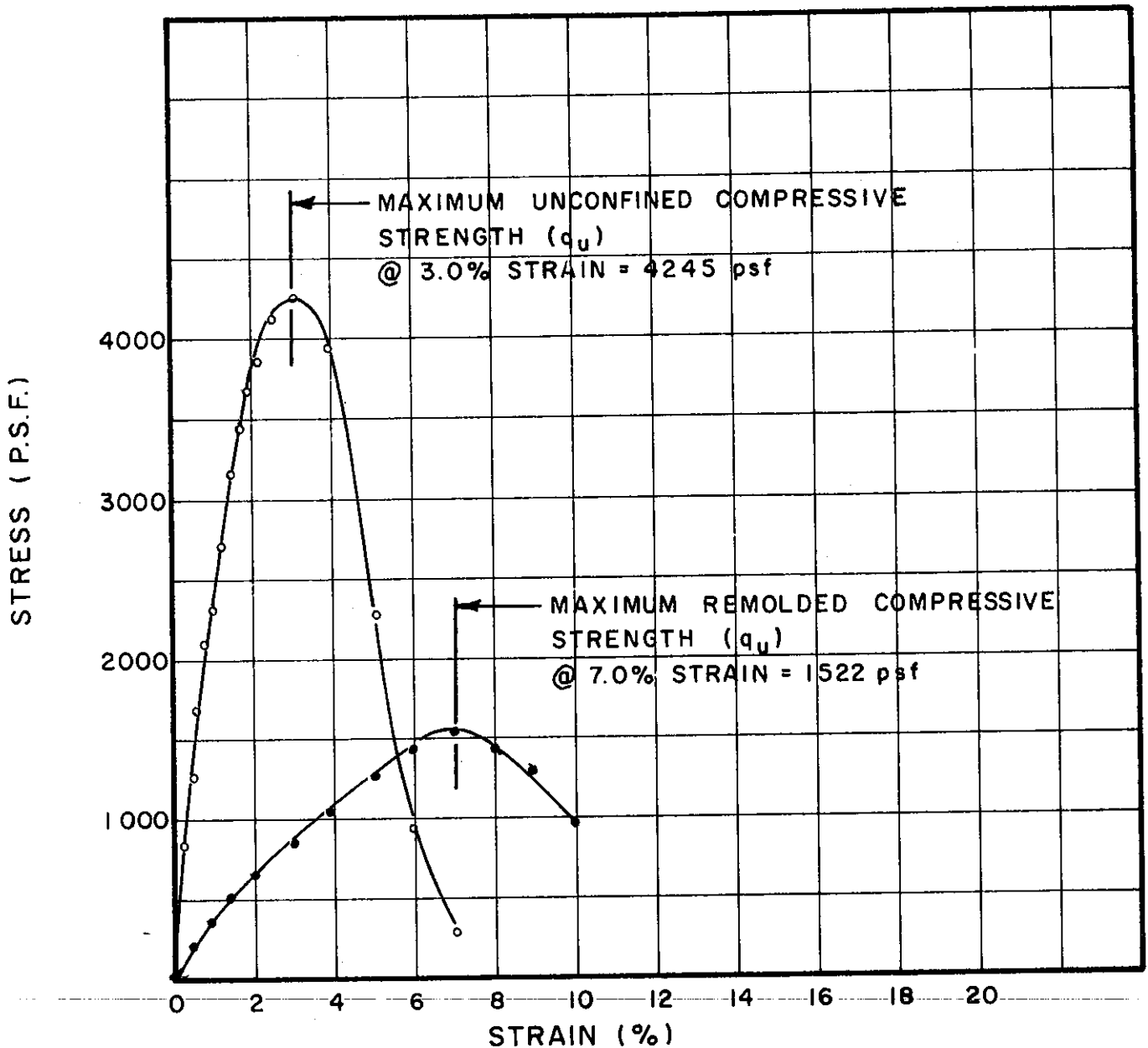
BORING NO. 28

SAMPLE NO. 9

DEPTH 28.8' TO 29.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



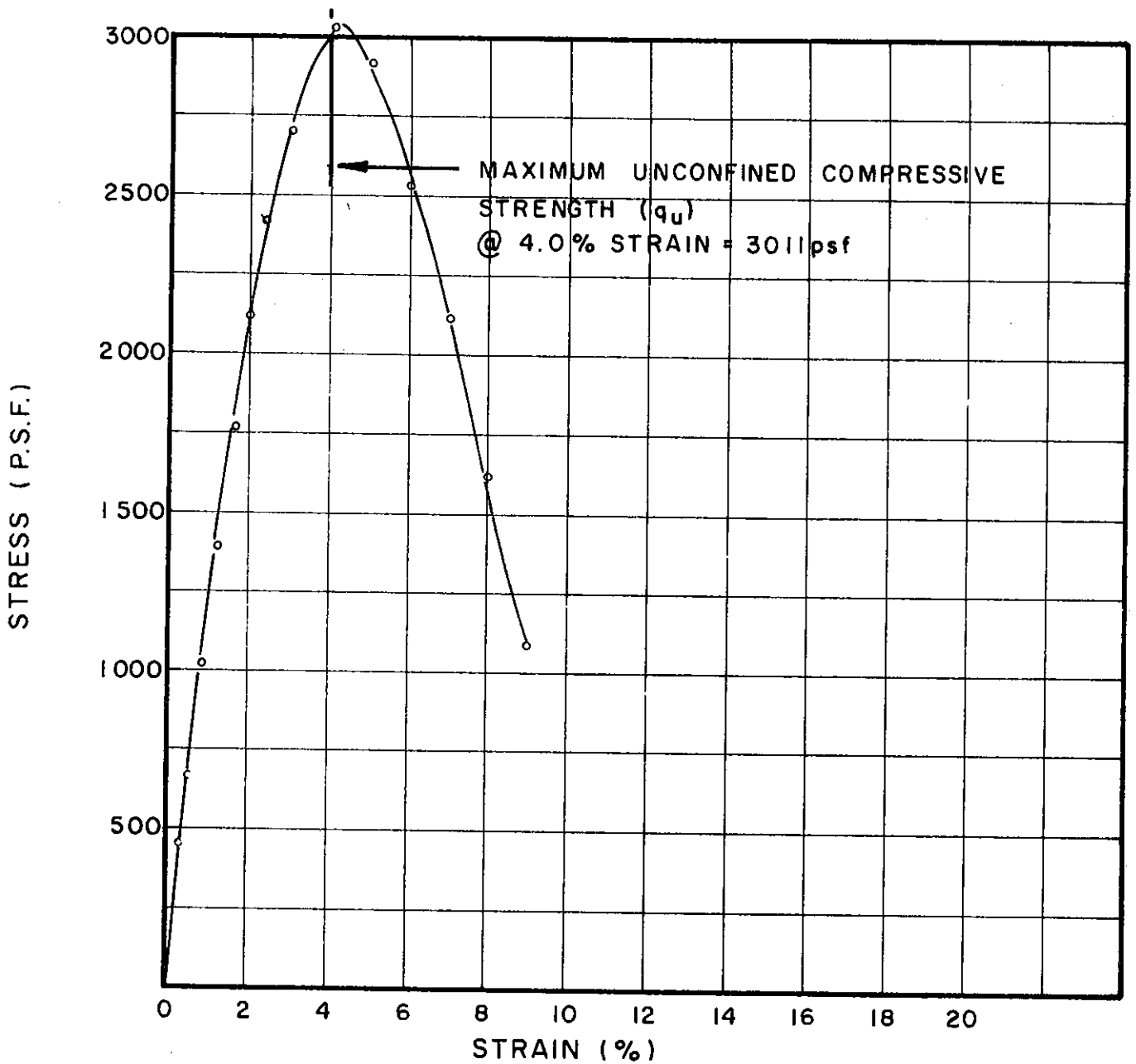
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI7.1	1.44	3.54	.254	24.3	102	49	24	SILTY CLAY (CL-CH)
UI7.1	1.40	3.50	.257	24.3	103	49	24	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 3  
 DEPTH 8.7' TO 9.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

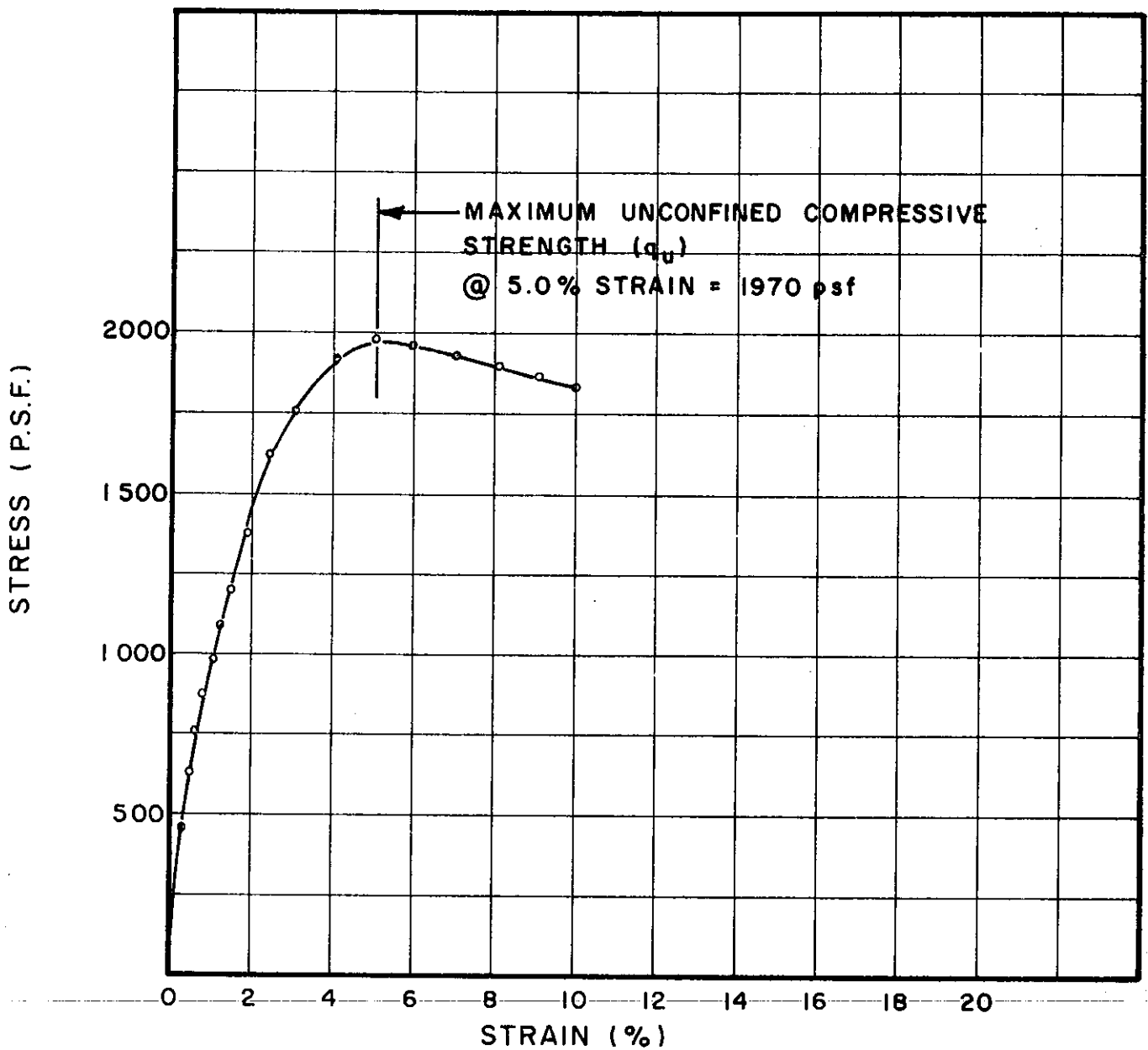


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI8.1	1.42	3.50	.257	28.5	96	46	22	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.3' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U22.1	1.41	3.50	.257	33.4	90	44	21	SILTY CLAY (CL-CH)

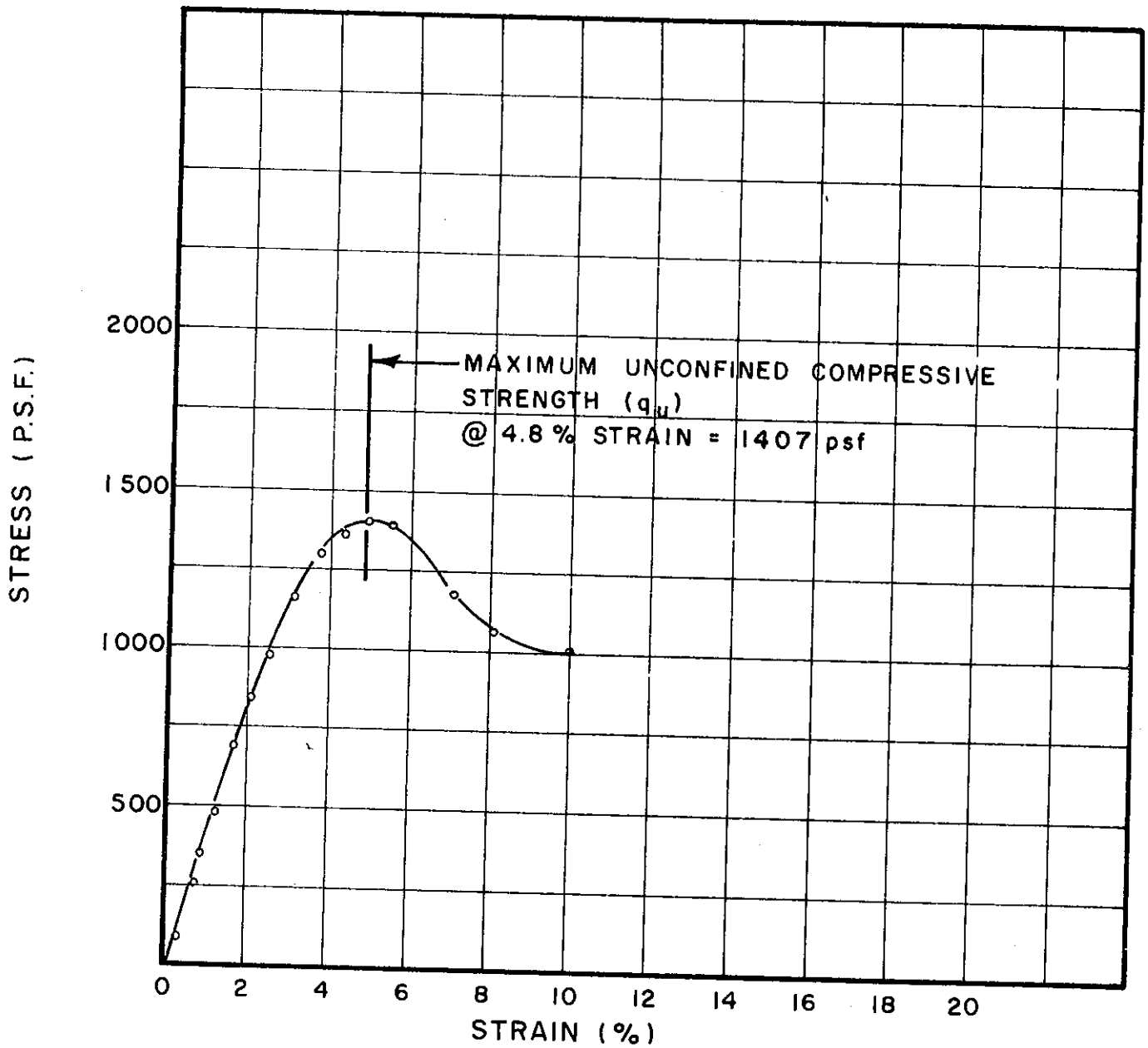
BORING NO. 38

SAMPLE NO. 12

DEPTH 54.2' TO 54.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U24.1	1.40	3.50	.257	41.3	79	55	24	SILTY CLAY (CL-CH)

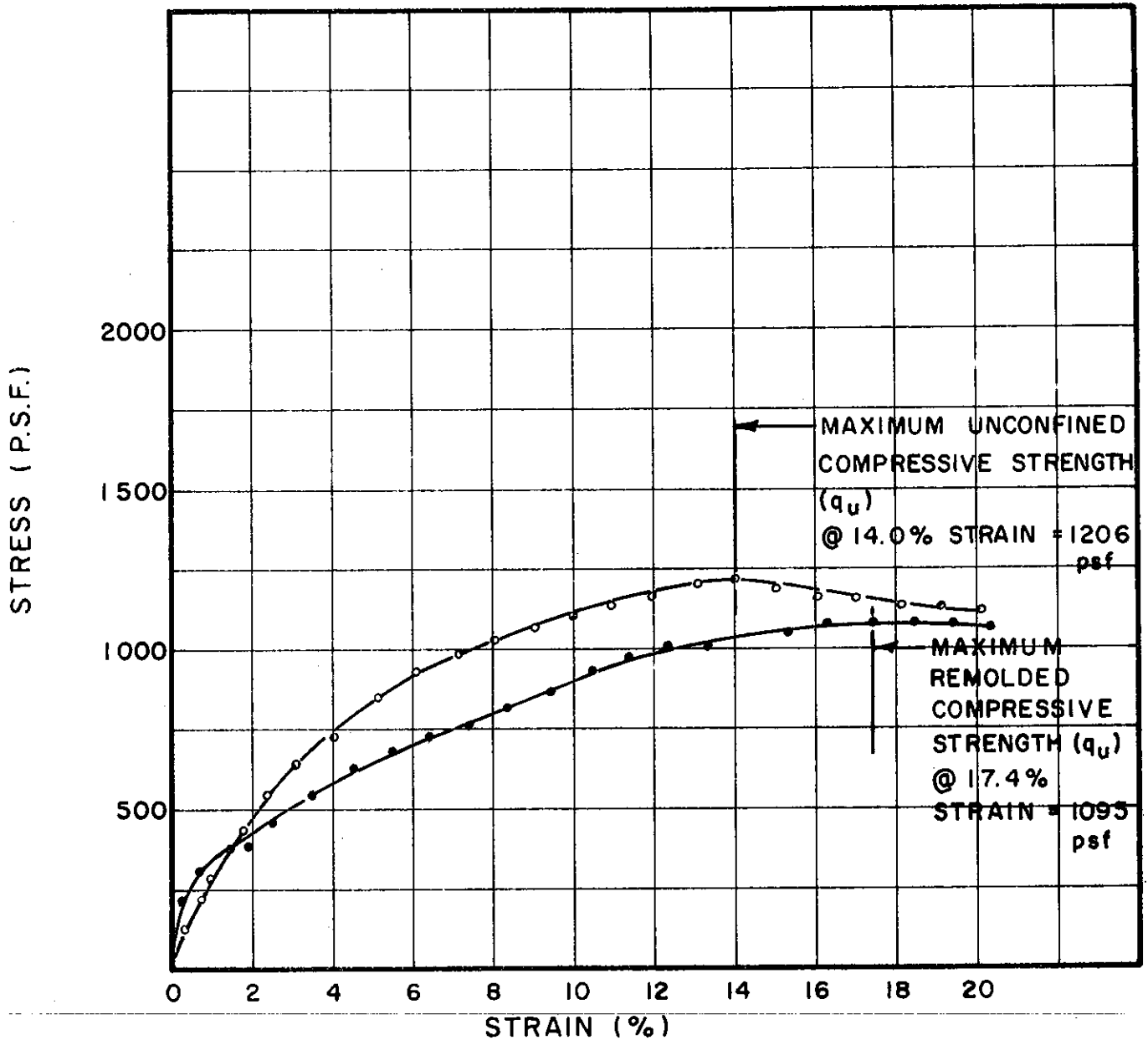
BORING NO. 38

SAMPLE NO. 16

DEPTH 73.7' TO 74.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U25.1	1.41	3.50	.257	22.2	104	33	19	SILTY CLAY GRAVELLY (CL)
U <sub>r</sub> 25.1	1.40	3.52	.256	22.2	105	33	19	SILTY CLAY GRAVELLY (CL)

BORING NO. 38

SAMPLE NO. 18

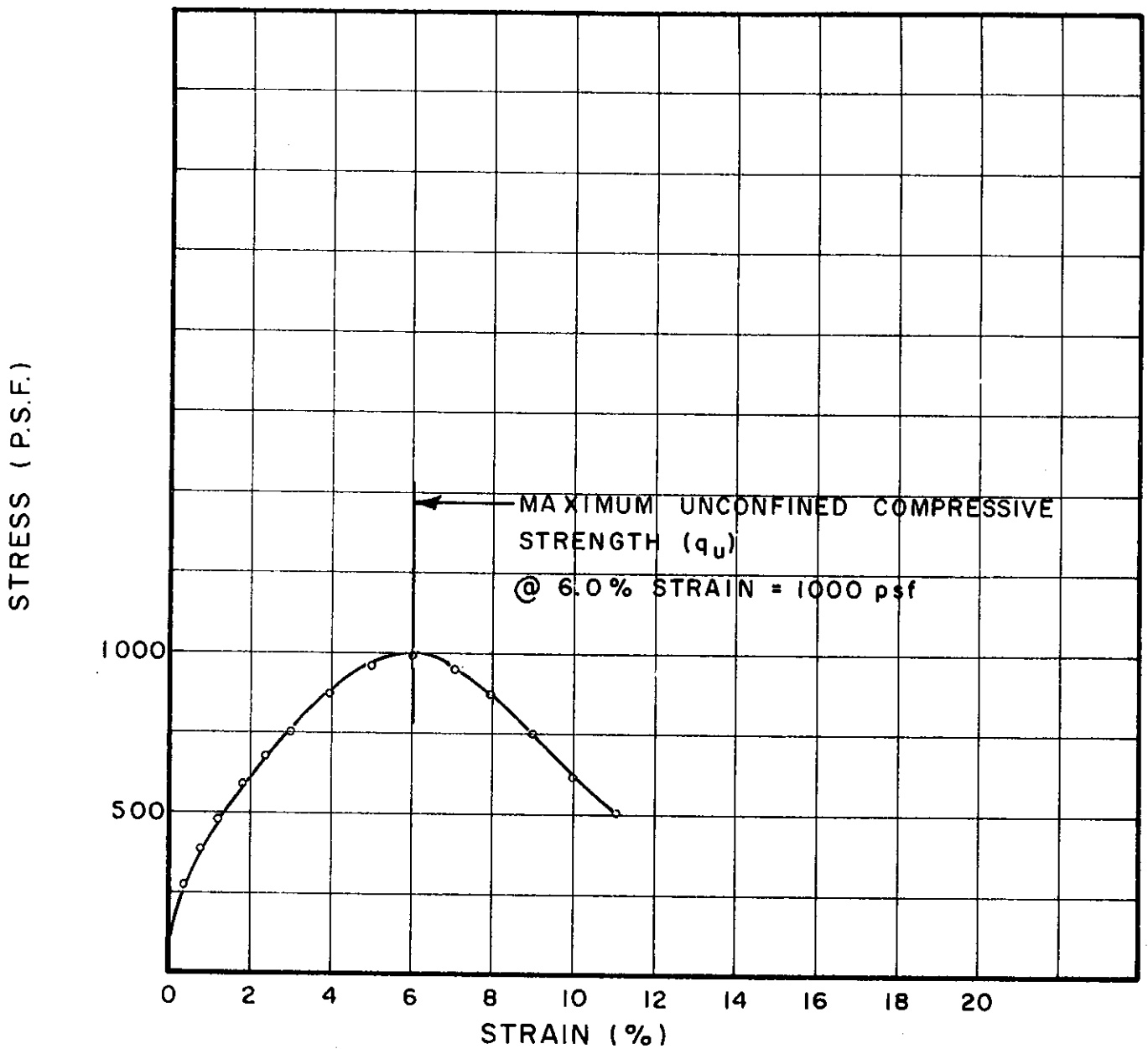
DEPTH 84.6' TO 84.9'

## UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



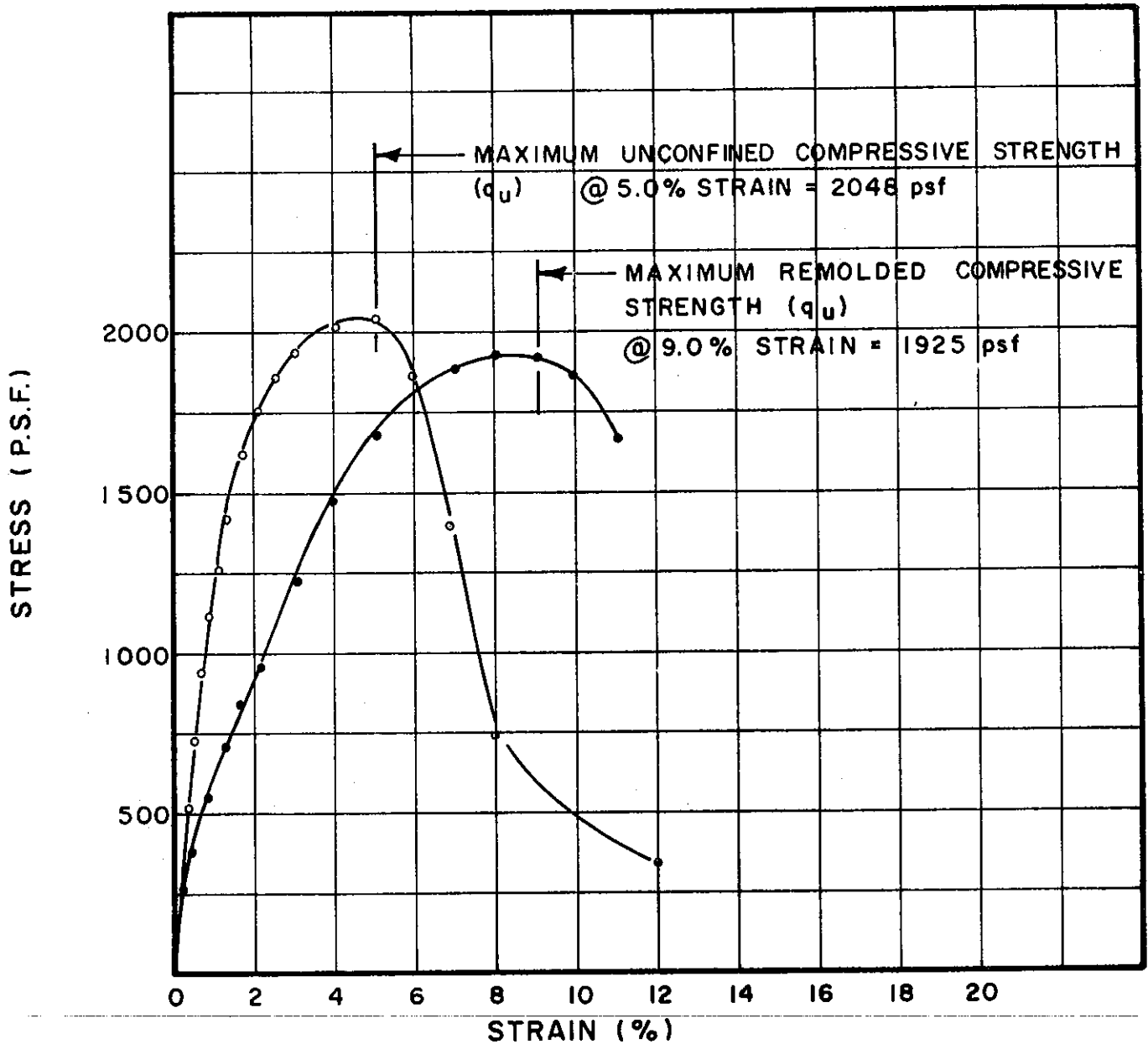


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U26.1	1.42	3.50	.257	31.9	92	45	25	SILTY CLAY (CL)

BORING NO. 38  
 SAMPLE NO. 24  
 DEPTH 114.2' TO 114.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



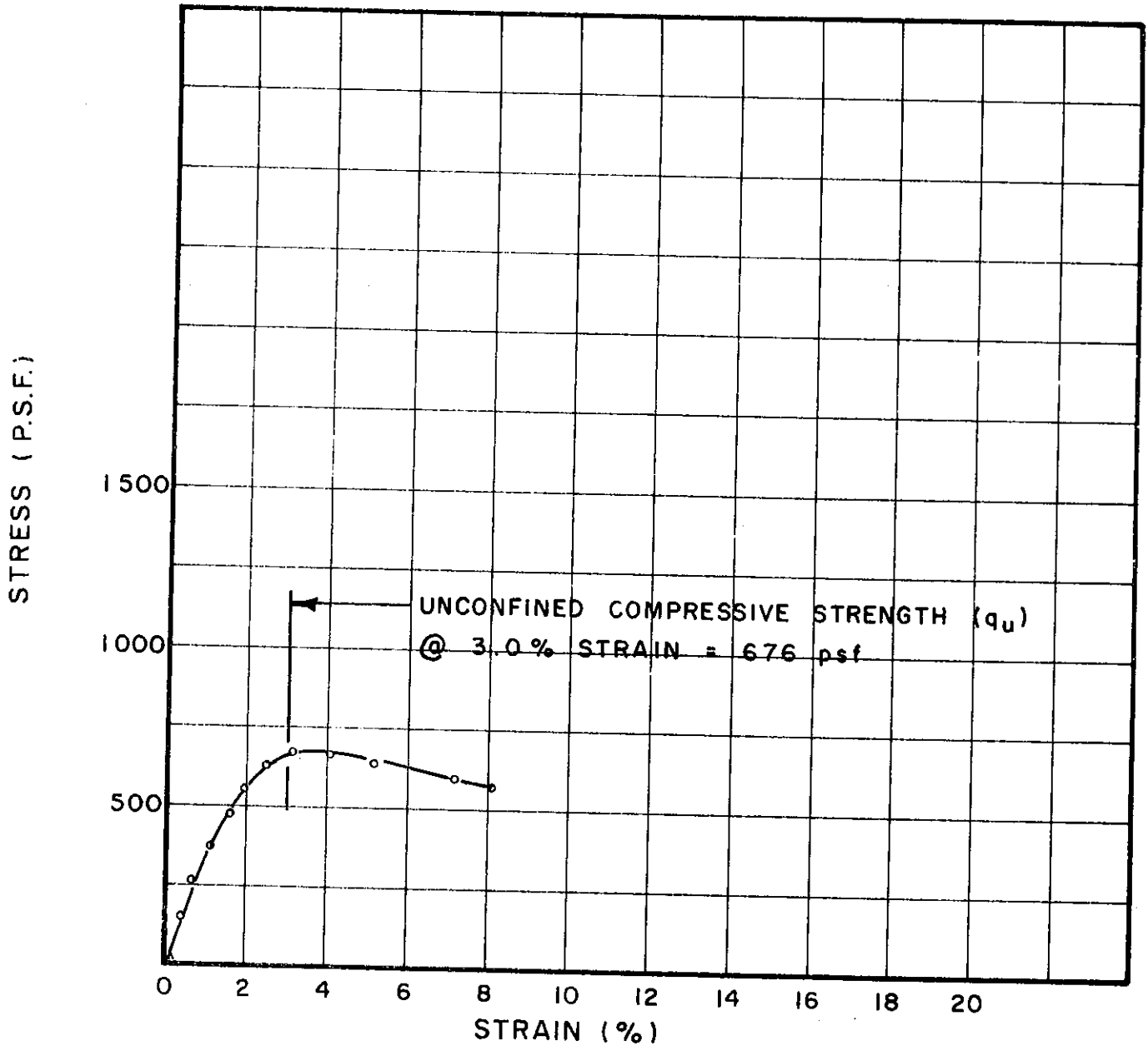
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U28.1	1.43	3.50	.257	29.4	94	63	28	SILTY CLAY (CH)
U <sub>r</sub> 28.1	1.40	3.38	.266	29.4	95	63	28	SILTY CLAY (CH)

BORING NO. 41  
 SAMPLE NO. 2  
 DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

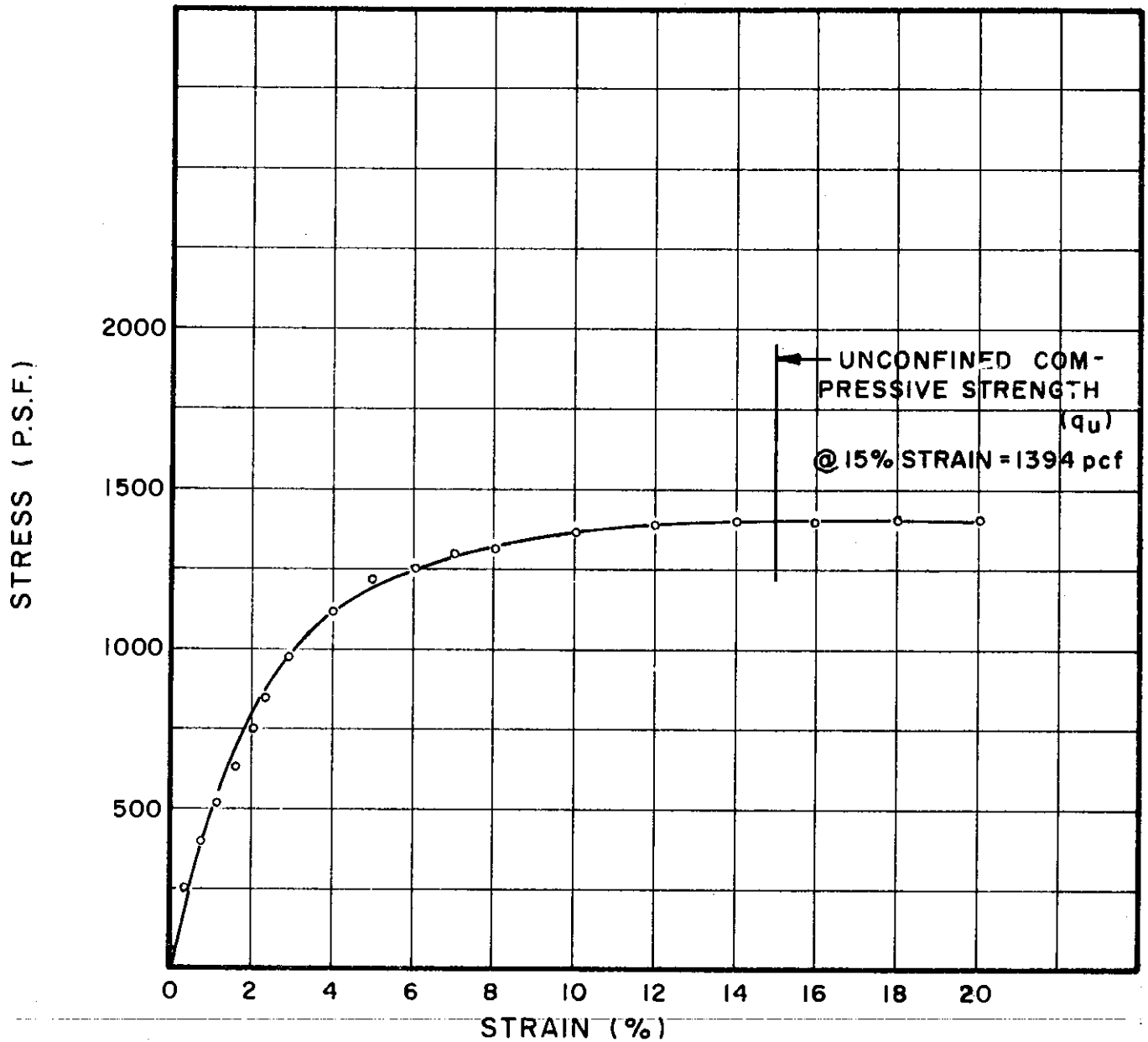


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U30.1	1.42	3.50	.257	39.2	83	47	24	SILTY CLAY (CL-CH)

BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 20.6' TO 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



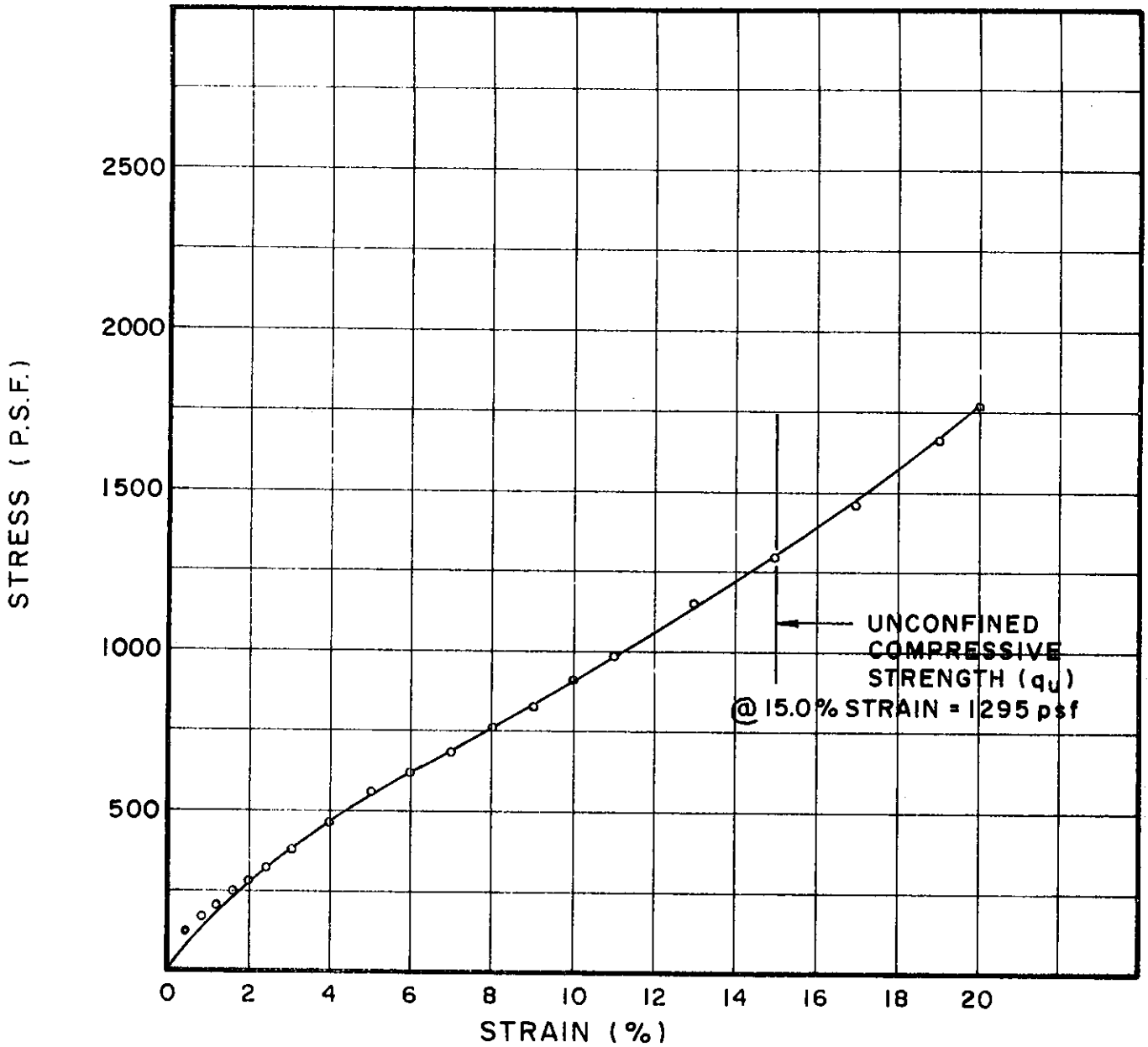
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U31.1	1.40	3.50	.257	36.9	86	45	21	SILTY CLAY, (CL-CH)

BORING NO. 41  
 SAMPLE NO. 9  
 DEPTH 30.9' TO 31.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

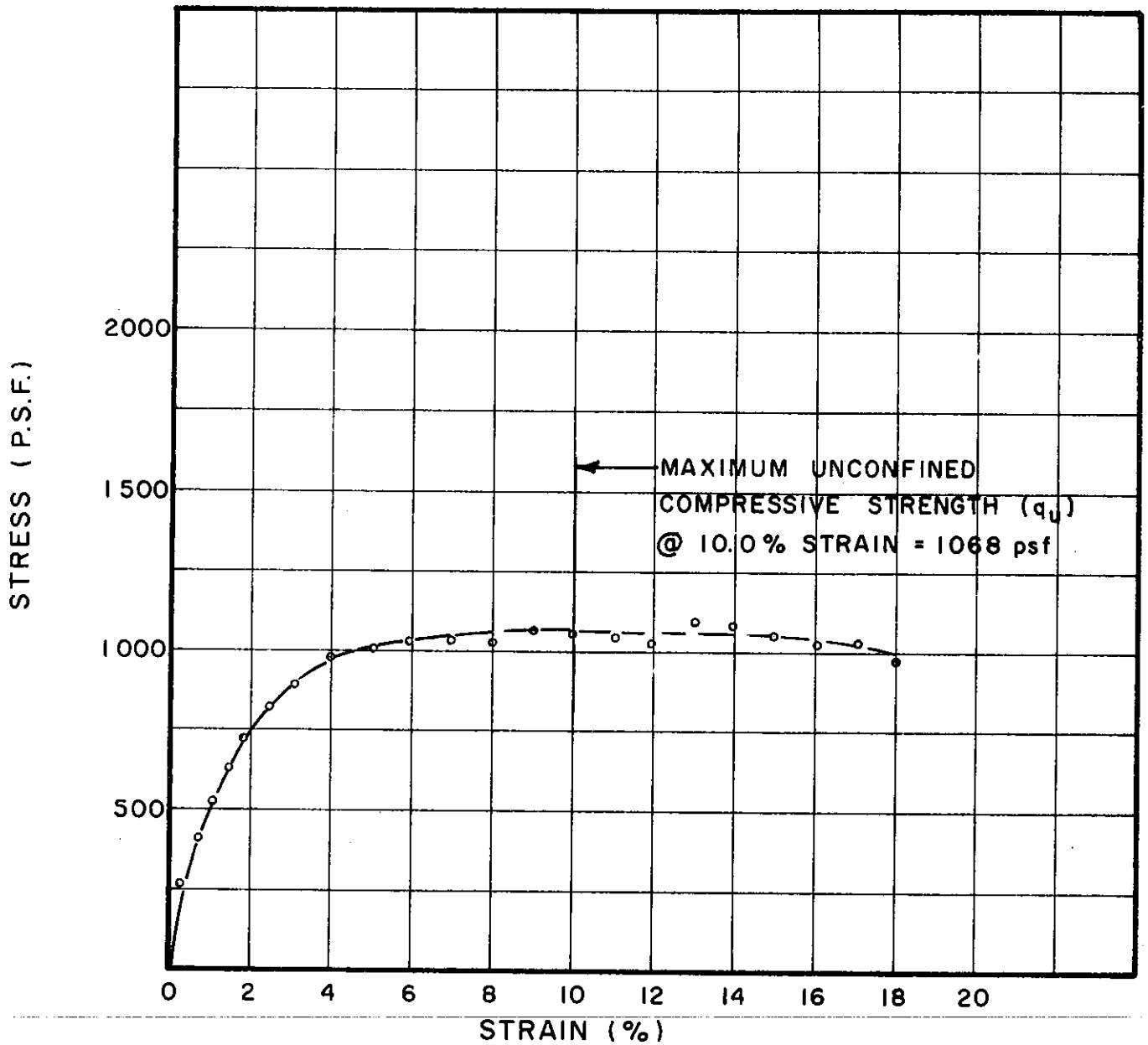


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U32.1	1.37	3.45	.260	16.0	118	20	12	SILTY CLAY, SANDY (CL-SC)
								(SAMPLE SLIGHTLY DISTURBED)

BORING NO. 41  
 SAMPLE NO. 11  
 DEPTH 40.6' TO 41.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

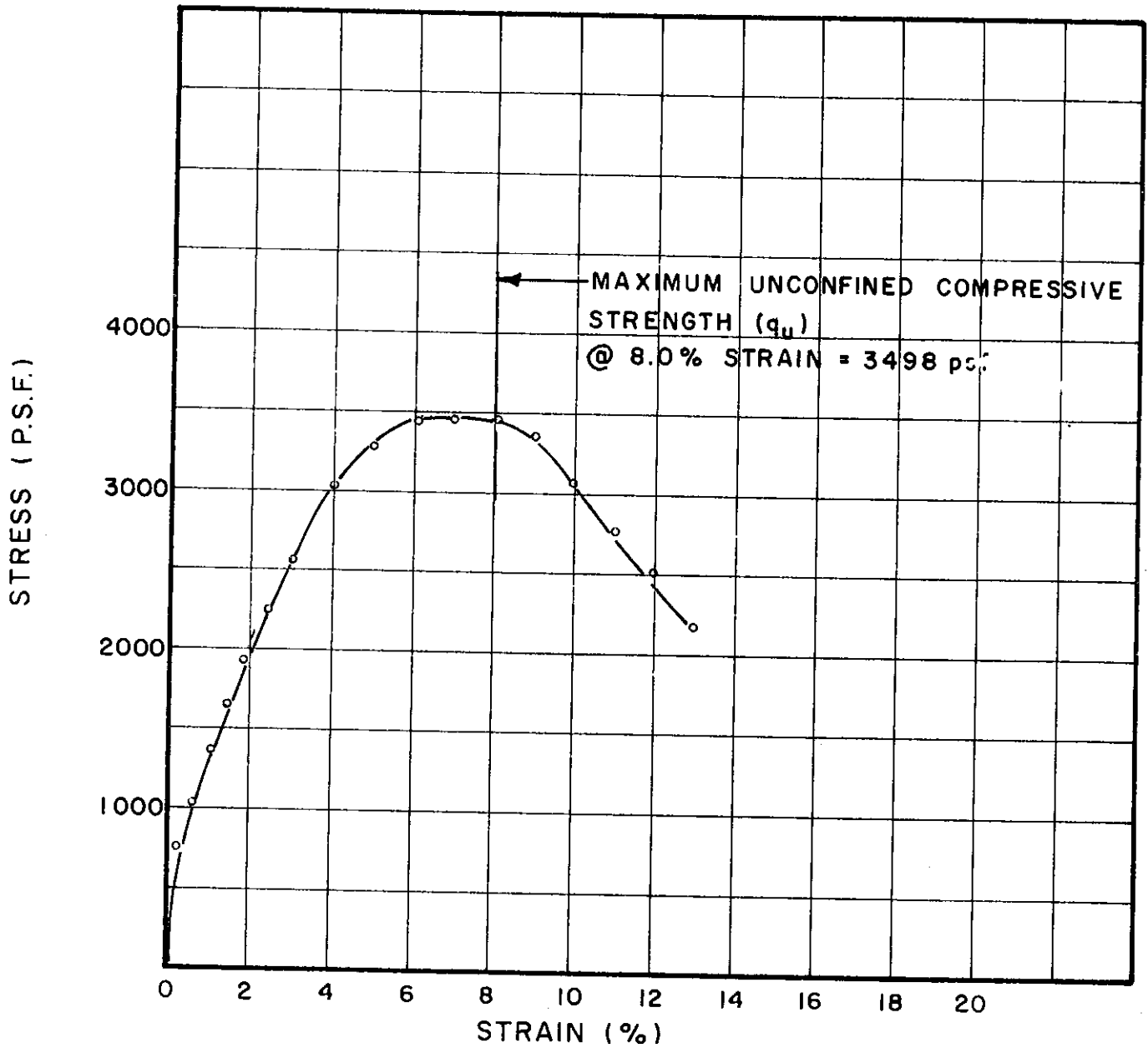


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	PL (%)	SOIL DESCRIPTION
U37.1	1.41	3.47	.259	26.4	99	34	20	SILTY CLAY, SANDY (CL)

BORING NO. 41  
 SAMPLE NO. 23  
 DEPTH 101.8' TO 102.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

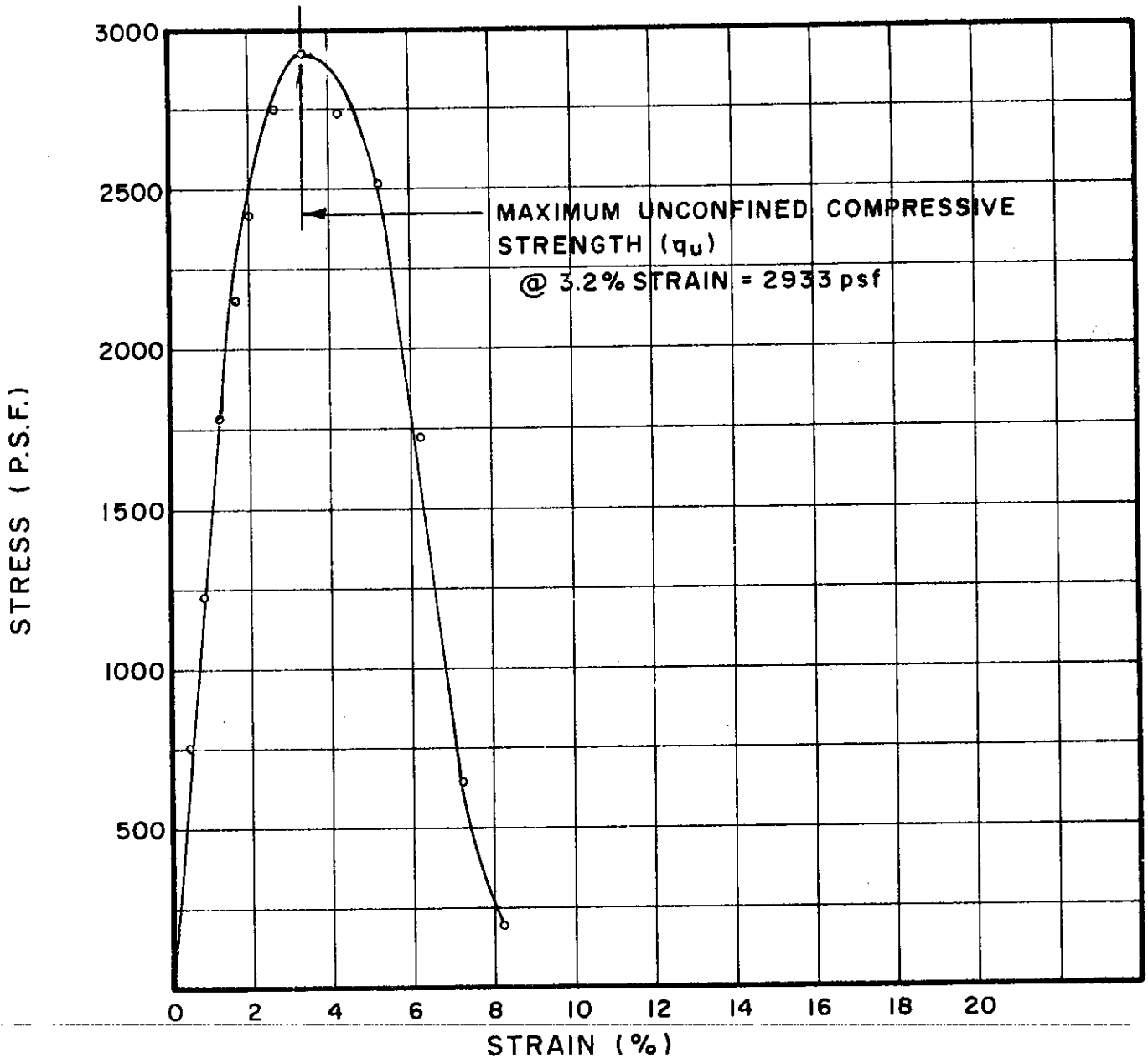


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U40.1	1.44	3.13	.29	13.8	124	25	17	CLAYEY SAND (GC-SC)

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.7' TO 131.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI98.1	1.43	3.50	.257	27.3	97	63	24	SILTY CLAY (CH)

BORING NO. 48

SAMPLE NO. 2

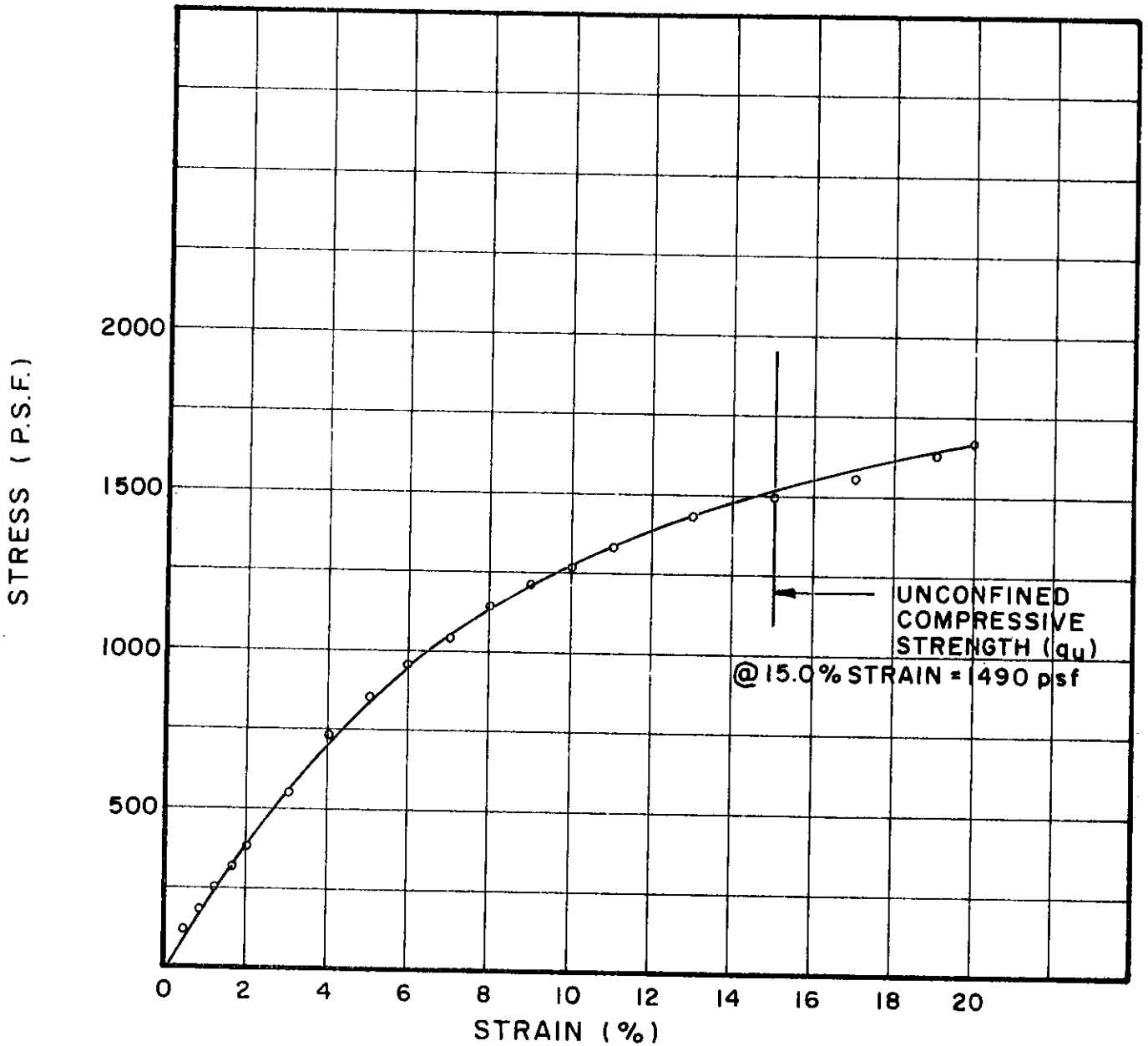
DEPTH 3.2' TO 3.5'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



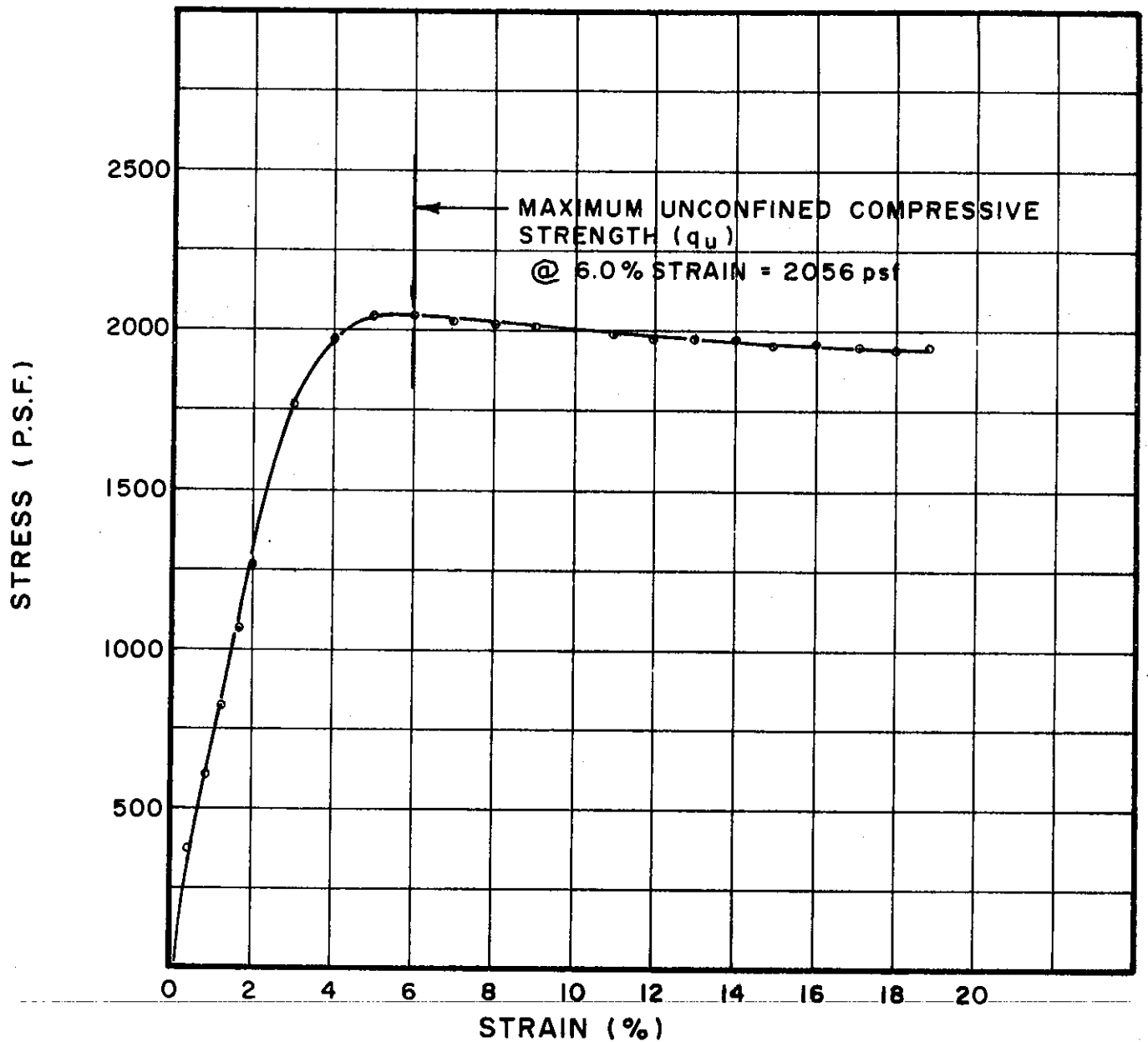


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U204.1	1.41	3.41	.264	25.2	100	34	16	SILTY CLAY, SANDY (CL)

BORING NO. 48  
 SAMPLE NO. 14  
 DEPTH 61.2' TO 61.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U134.1	1.41	3.51	.256	34.0	90	42	22	SILTY CLAY (CL)

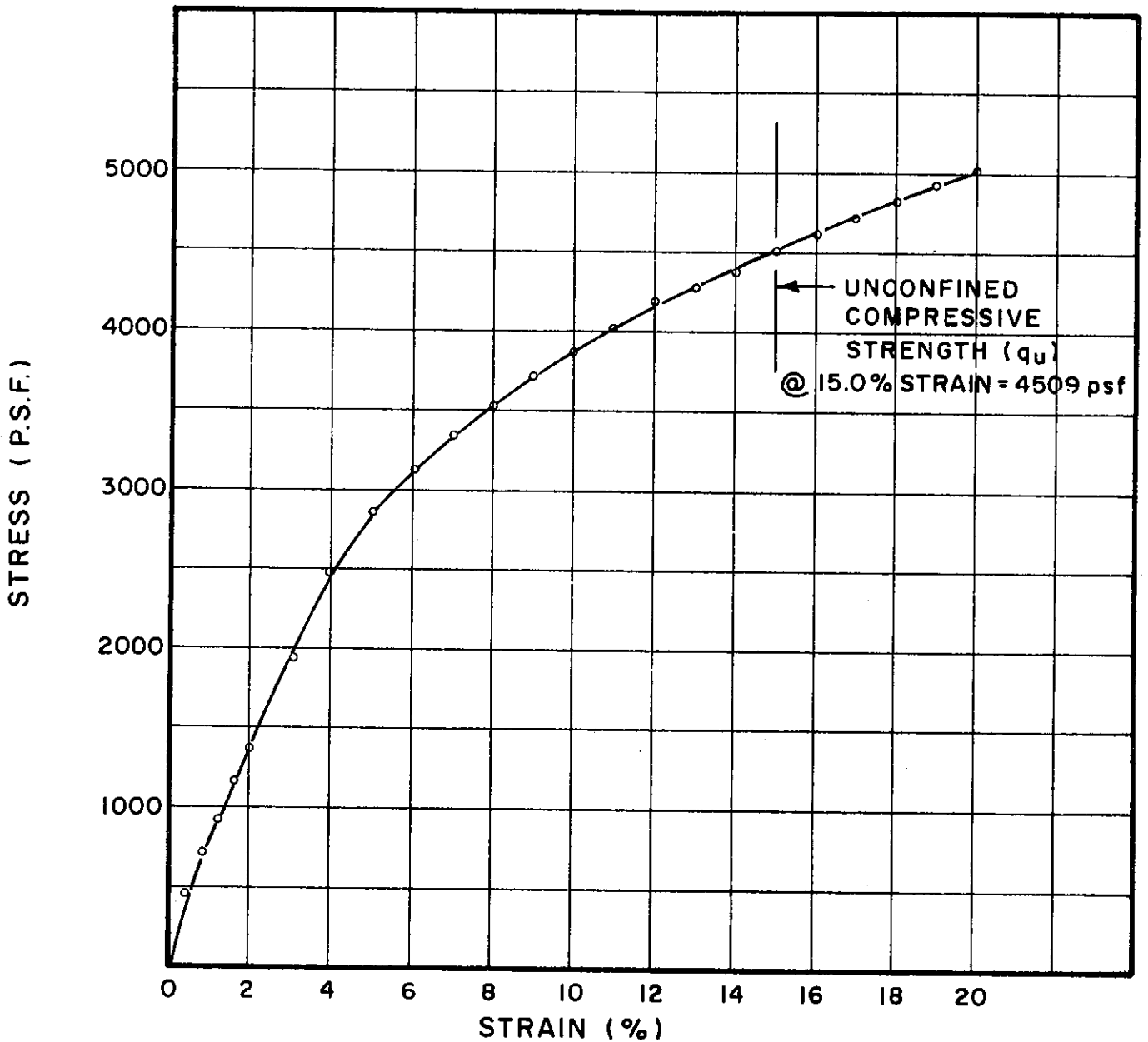
BORING NO. 49

SAMPLE NO. 4

DEPTH 24.0' TO 24.3'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI39.1	1.41	3.36	.268	25.6	100	33	22	SILTY CLAY; SANDY
								(CL)

BORING NO. 49

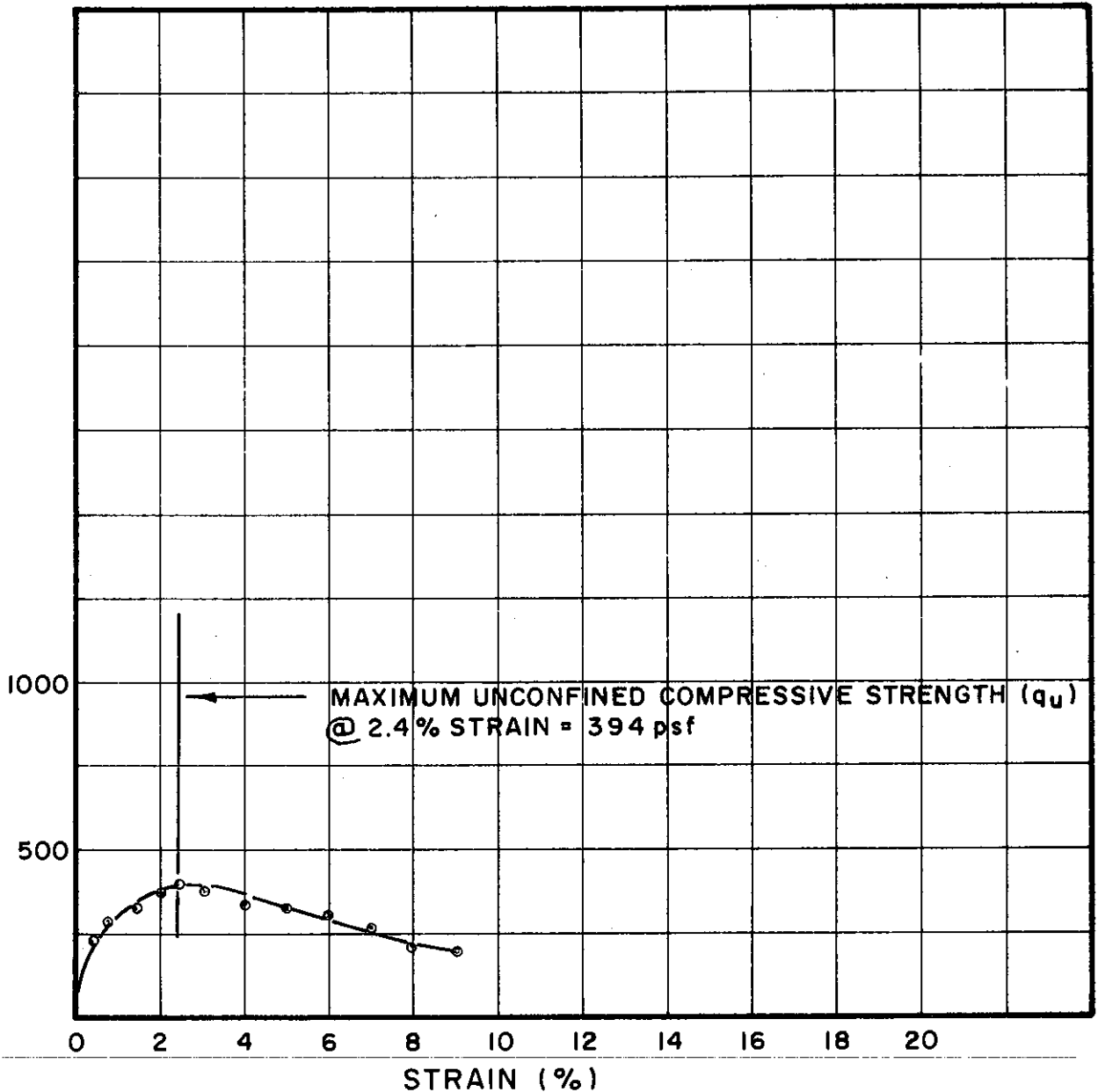
SAMPLE NO. 9

DEPTH 73.9' TO 74.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

STRESS (PSF)



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U85.1	1.39	3.21	.25	45.8	75	51	18	SILTY CLAY (CH-CL)

BORING NO. 50

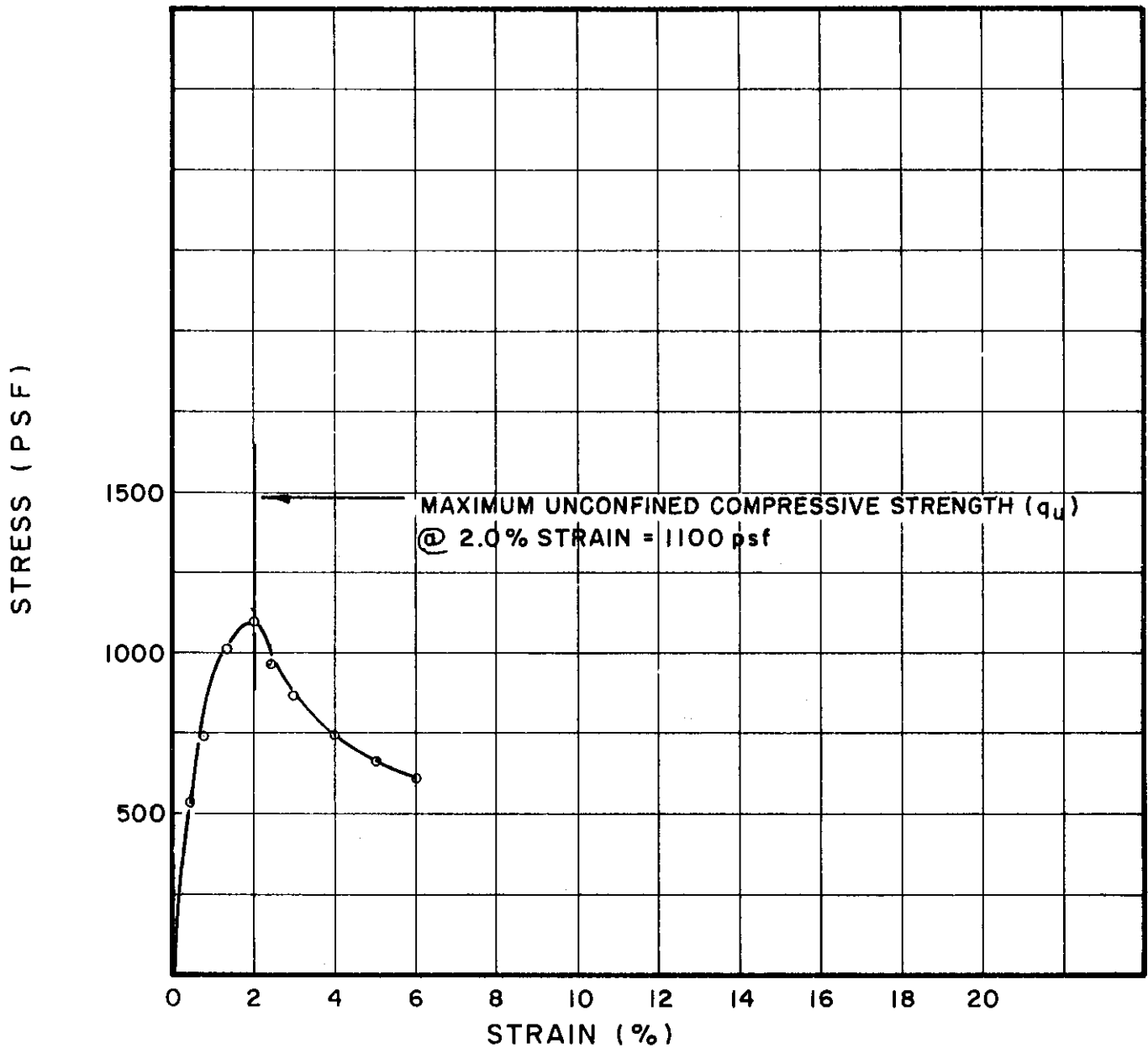
SAMPLE NO. 6

DEPTH 29.3' TO 29.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

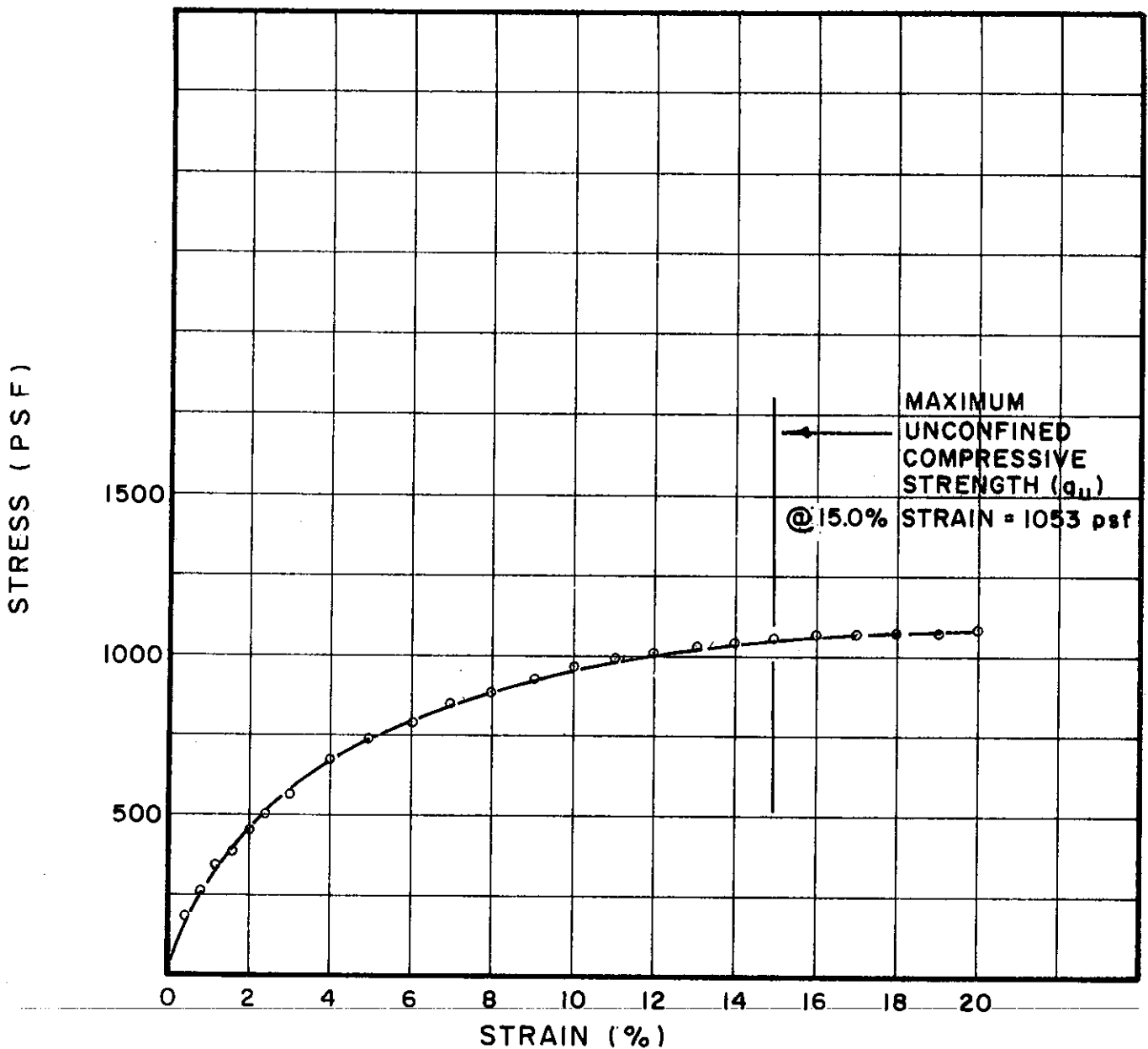


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U86.1	1.40	3.27	0.25	51.3	70	55	23	SILTY CLAY (CH)

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.9' TO 39.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U87.1	1.40	3.25	.25	23.6	99	36	16	SILTY CLAY, SANDY (CL)

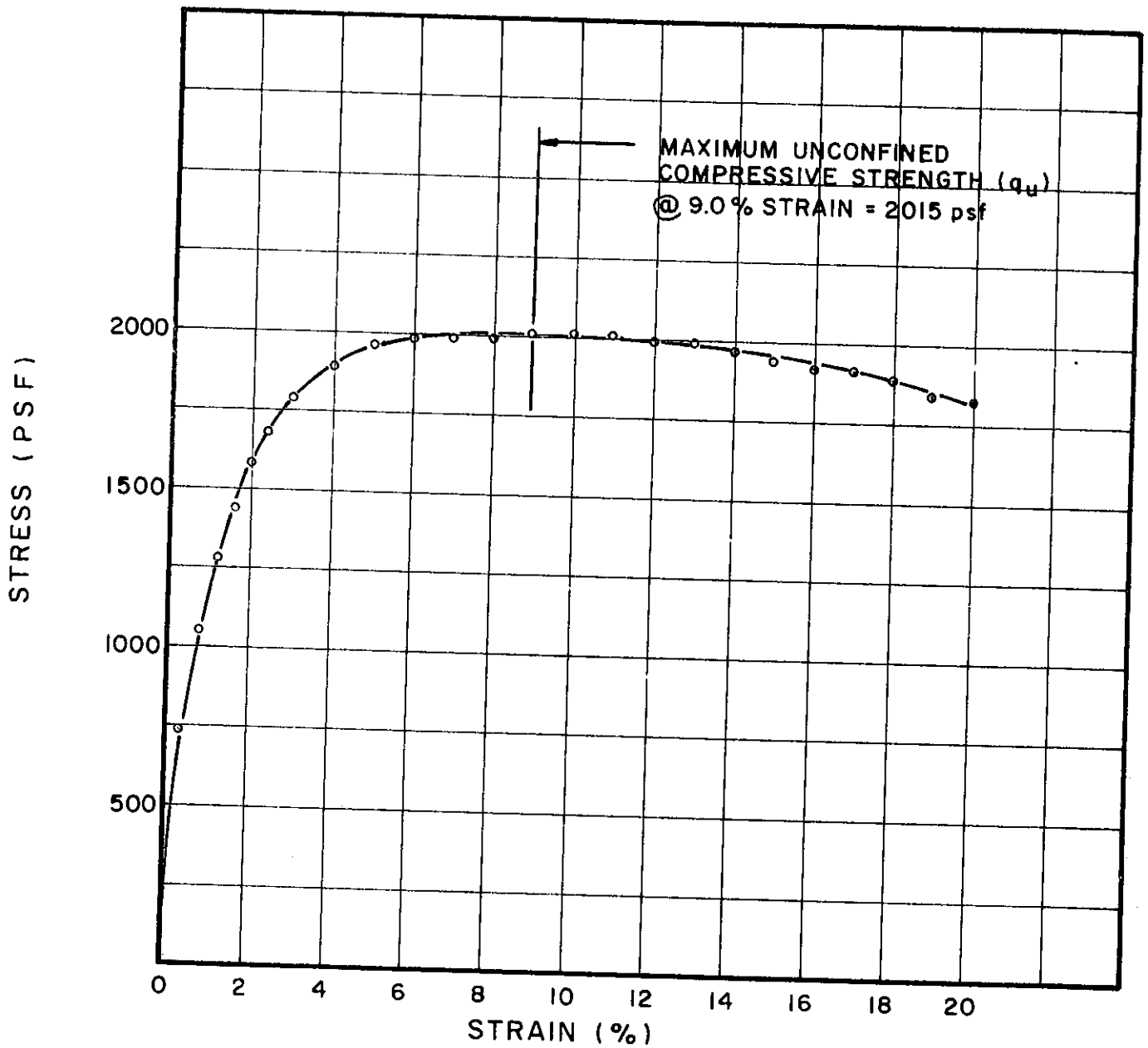
BORING NO. 50

SAMPLE NO. 10

DEPTH 49.0' TO 49.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U88.1	1.38	3.20	.25	25.8	99	39	18	SILTY CLAY (CL)

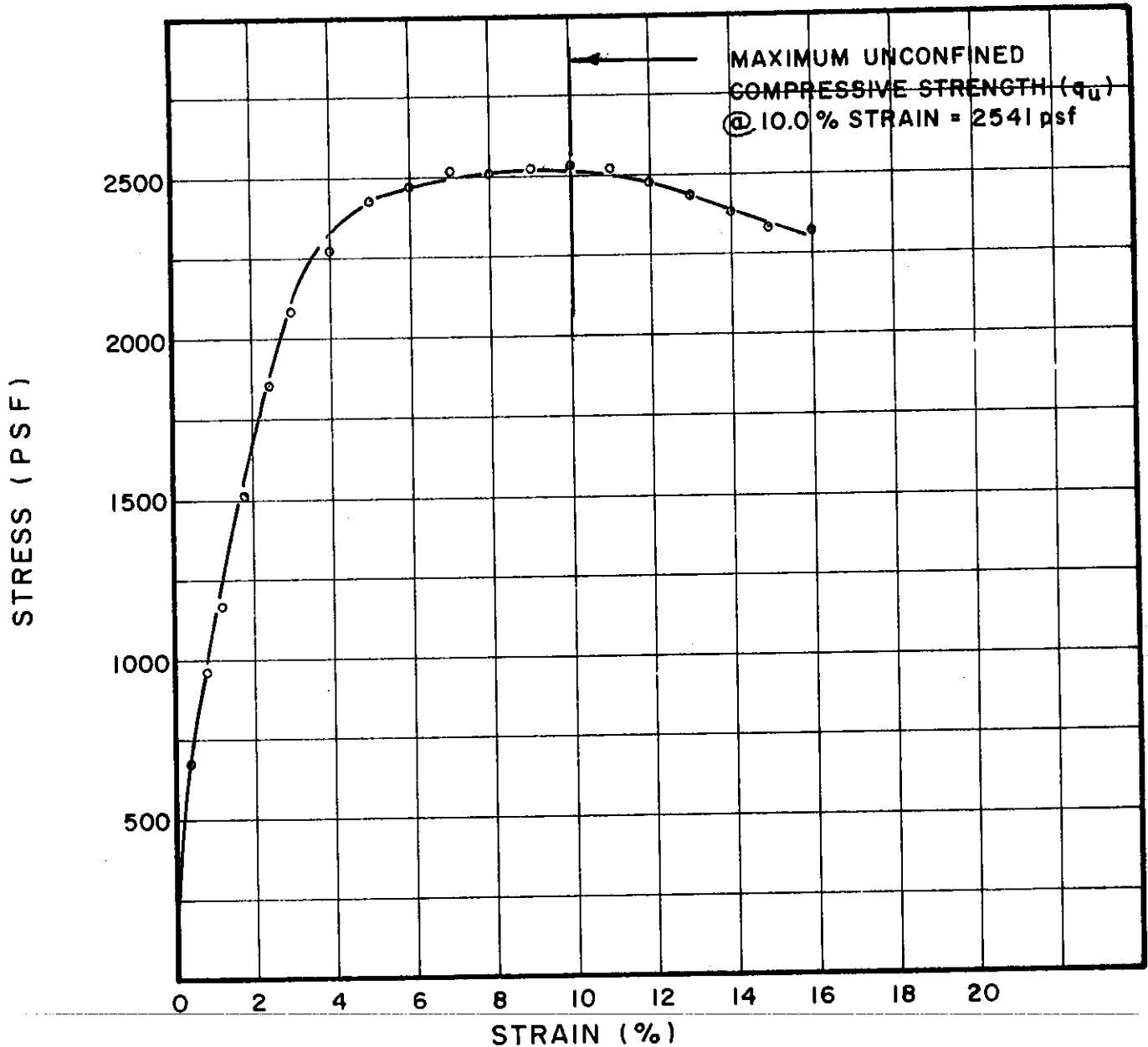
BORING NO. 50

SAMPLE NO. 12

DEPTH 58.6' - 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U90.1	1.39	3.20	.25	27.9	95	39	20	SILTY CLAY (CL)

BORING NO. 50

SAMPLE NO. 16

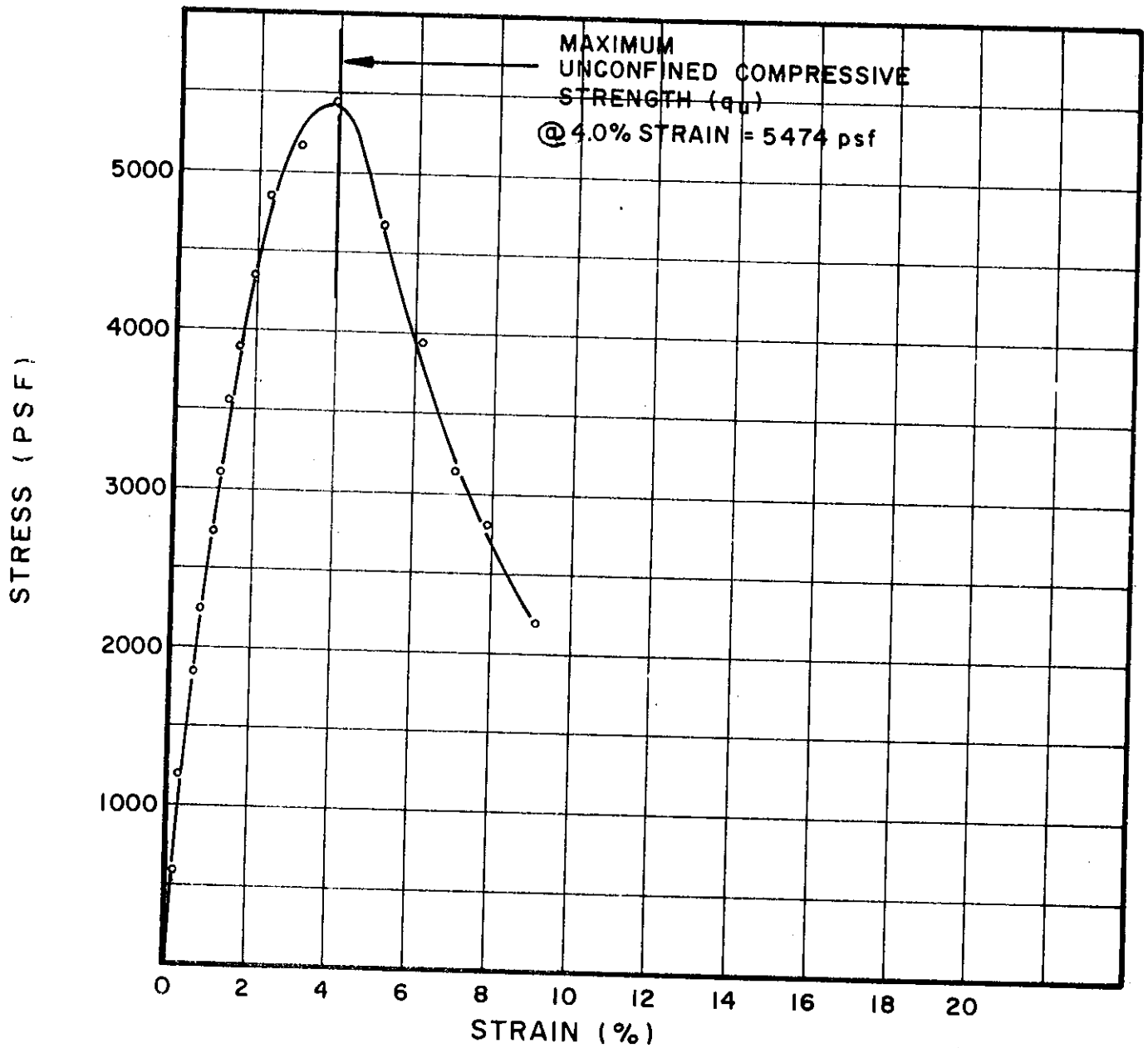
DEPTH 78.6' - 78.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI08.1	1.37	3.48	.25	30.3	92	49	20	SILTY CLAY (CL-CH)

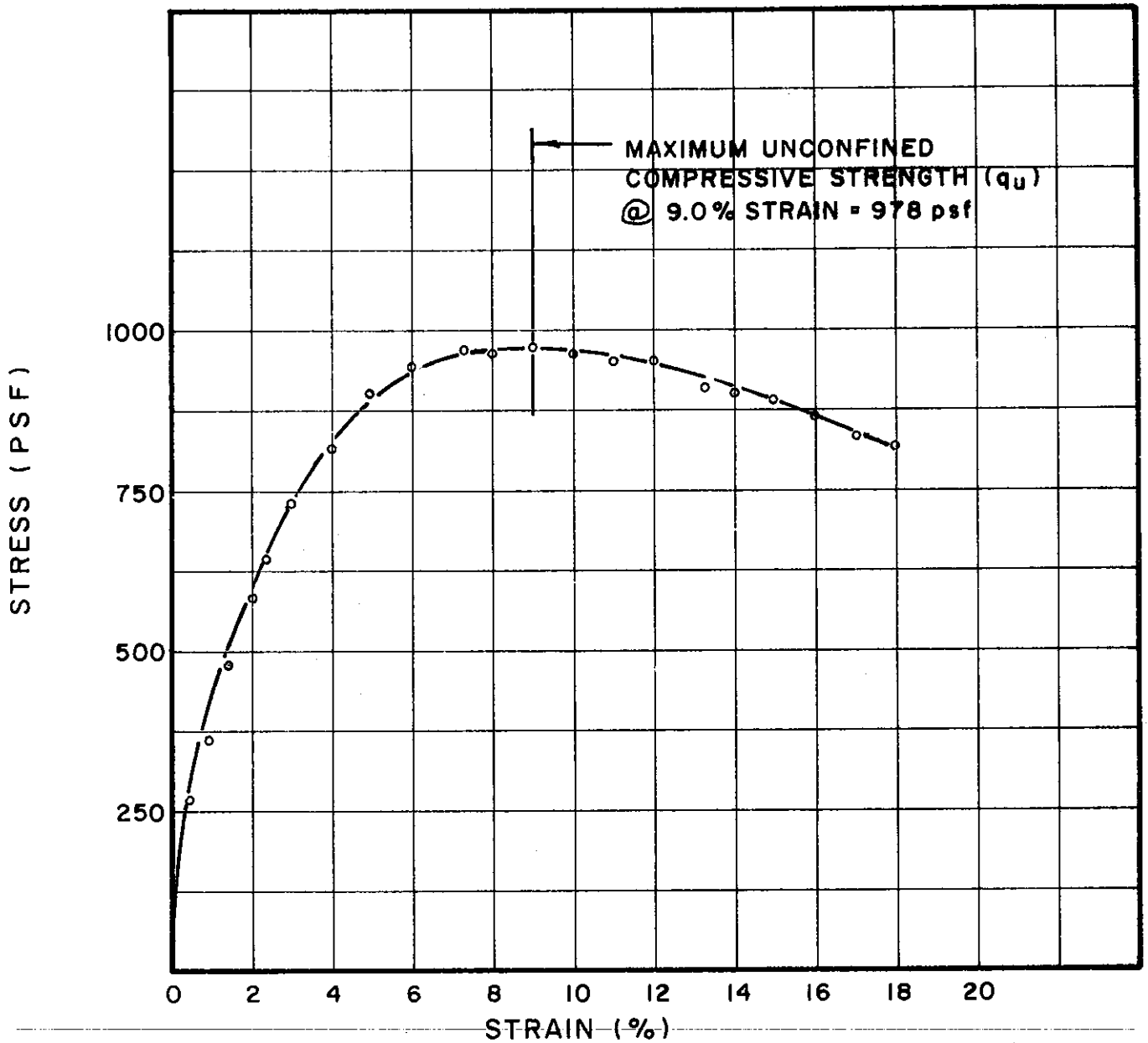
BORING NO. 52

SAMPLE NO. 3

DEPTH 20.5' - 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
UI09.1	1.37	3.25	.25	31.8	94	35	18	SILTY CLAY (CL)

BORING NO. 52

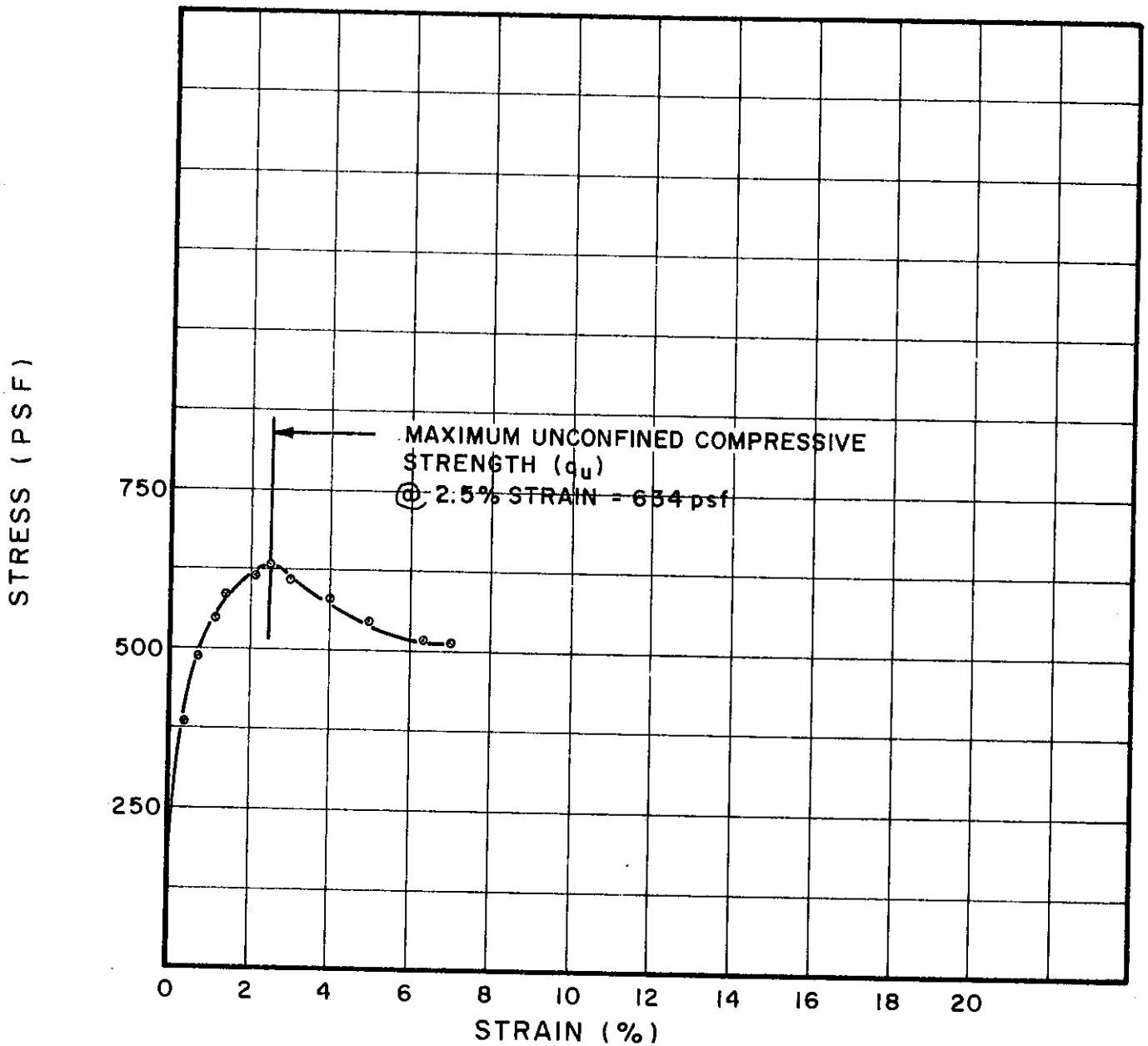
SAMPLE NO. 4

DEPTH 28.6' TO 28.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U111.1	1.38	3.02	.29	25.2	100	22	18	SILTY CLAY (CL-ML)

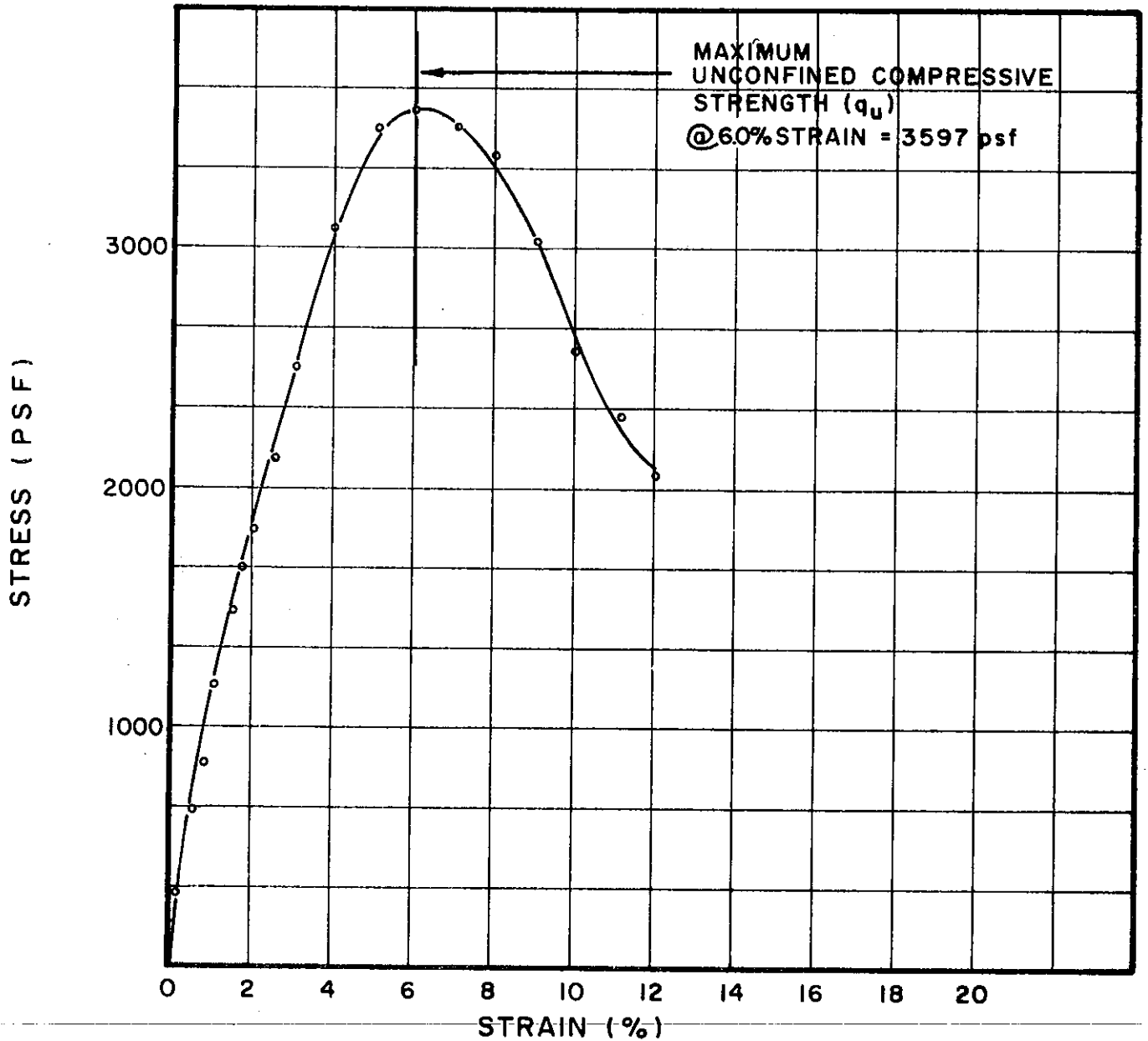
BORING NO. 52

SAMPLE NO. 6

DEPTH 49.2' - 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U112.1	1.36	3.37	.25	13.0	116	23	14	SILTY CLAY, SANDY
								(CL)

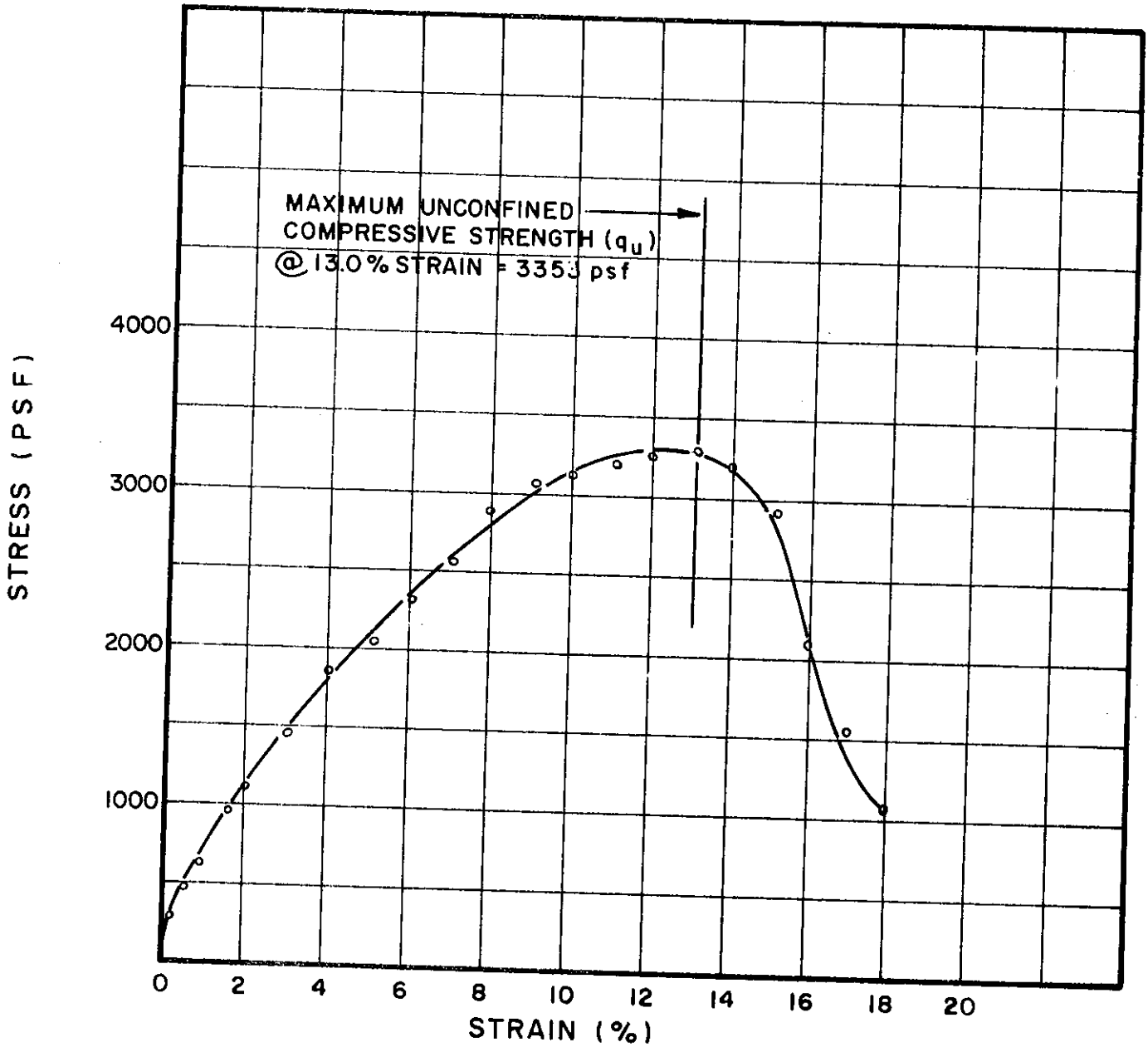
BORING NO. 52

SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U113.1	1.34	3.50	.25	14.2	115	24	14	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 8  
 DEPTH 68.2' TO 68.5'

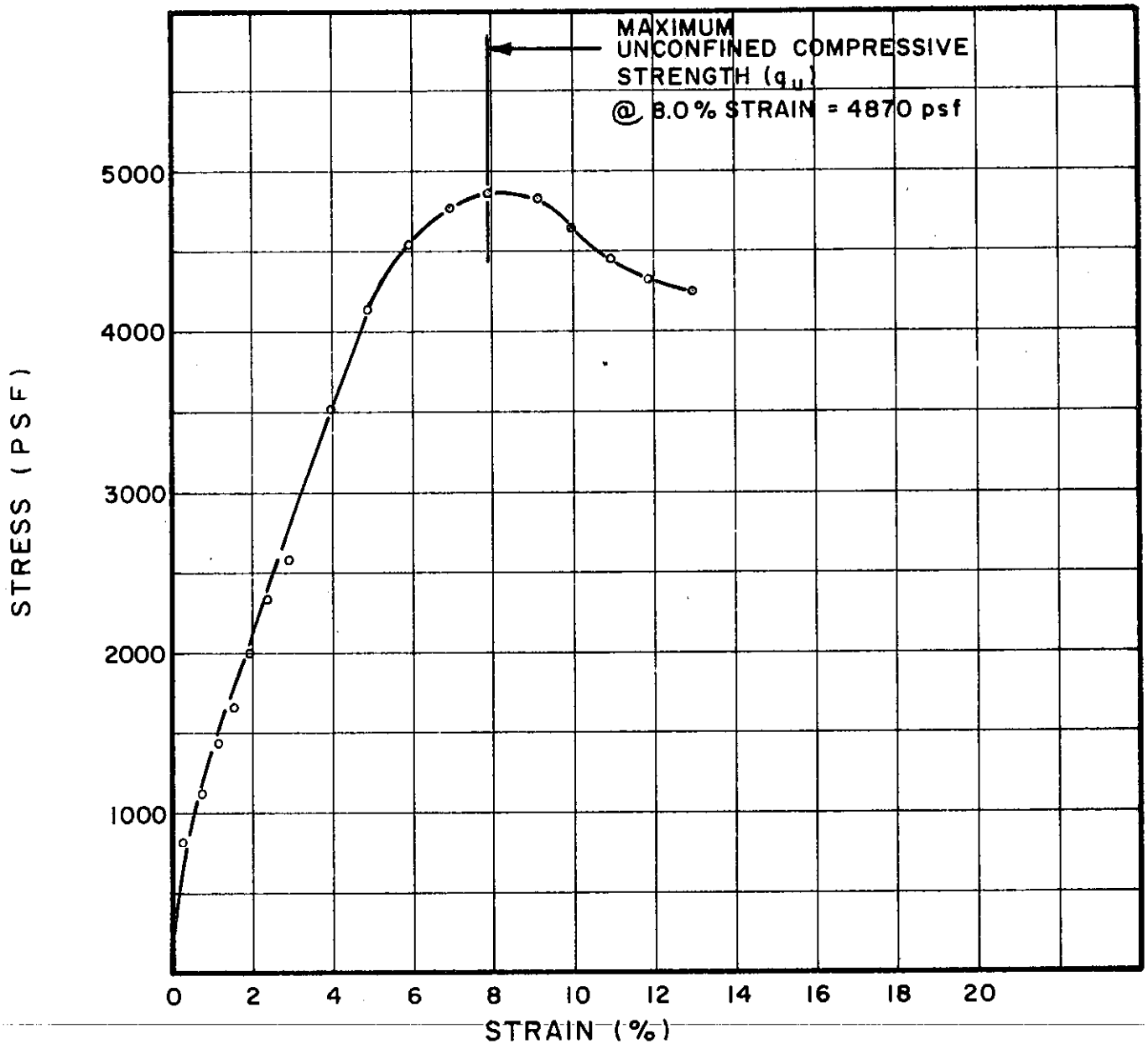
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-305



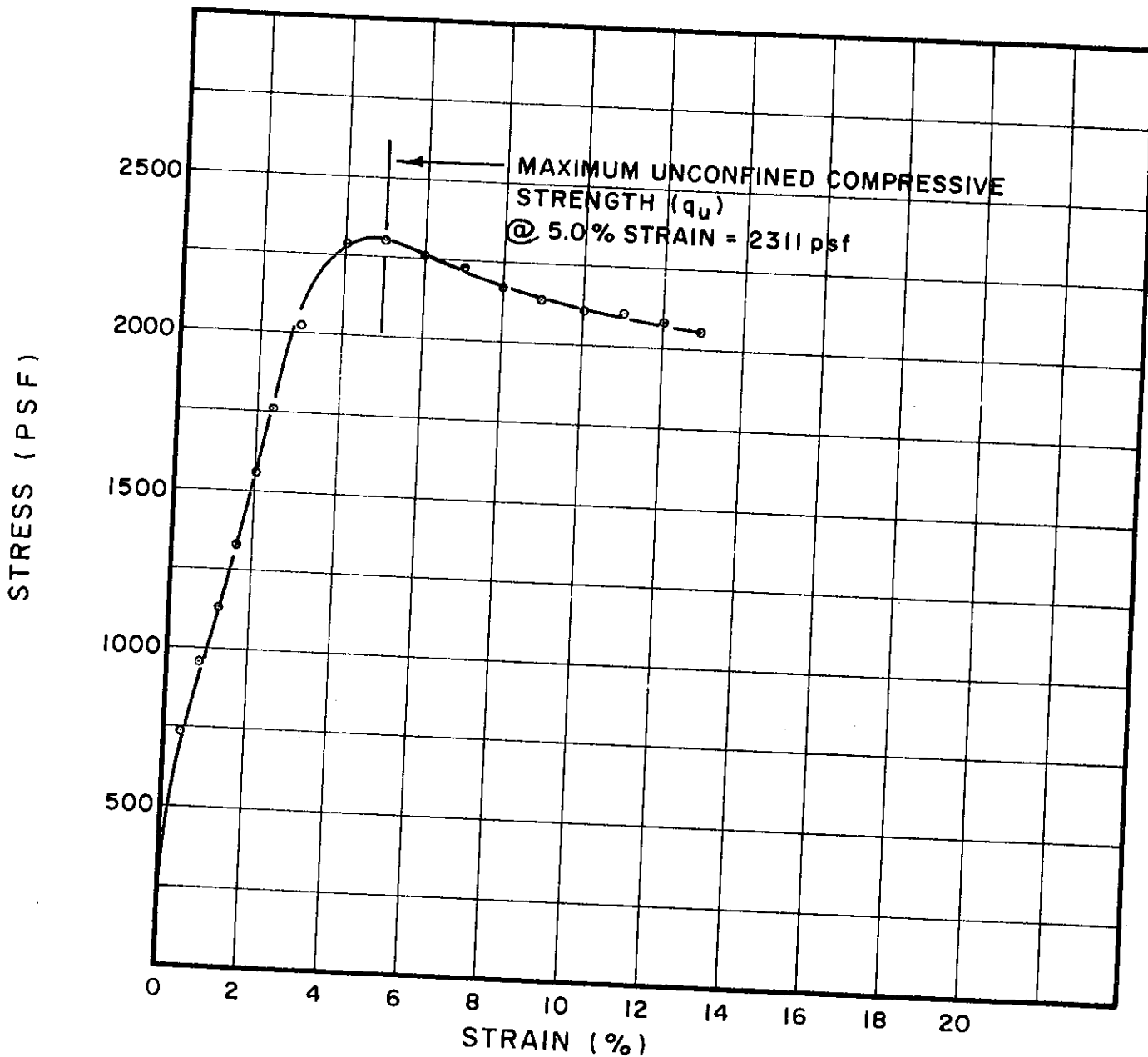
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U115.1	1.39	3.27	.28	27.2	97	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 88.6' - 88.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U96.1	1.40	3.20	.25	31.8	88	49	20	SILTY CLAY (CL-CH)

BORING NO. 53  
 SAMPLE NO. 3  
 DEPTH 19.6' TO 19.9'

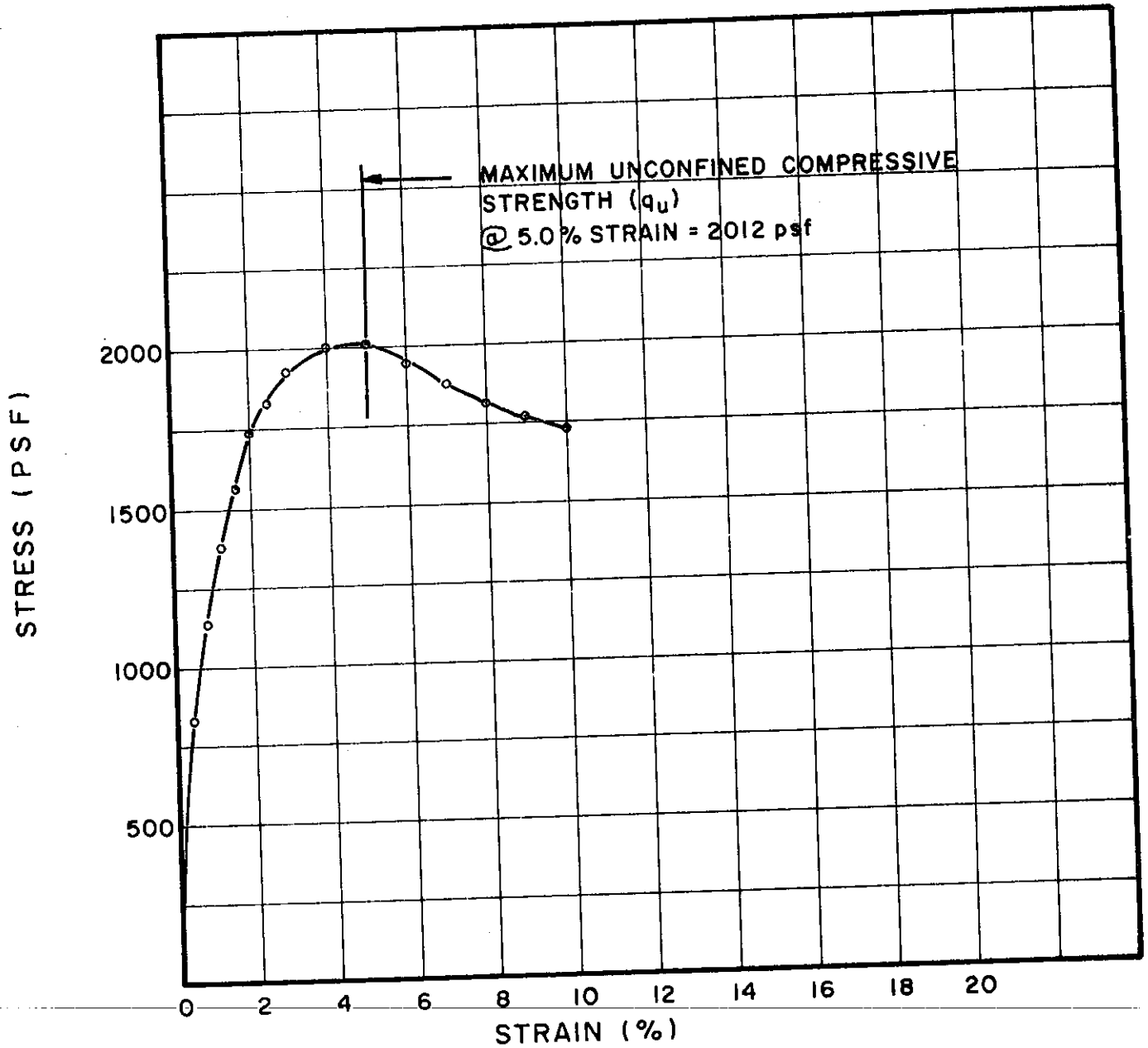
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-307



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U97.1	1.38	3.24	.25	40.7	80	49	22	SILTY CLAY (CL-CH)

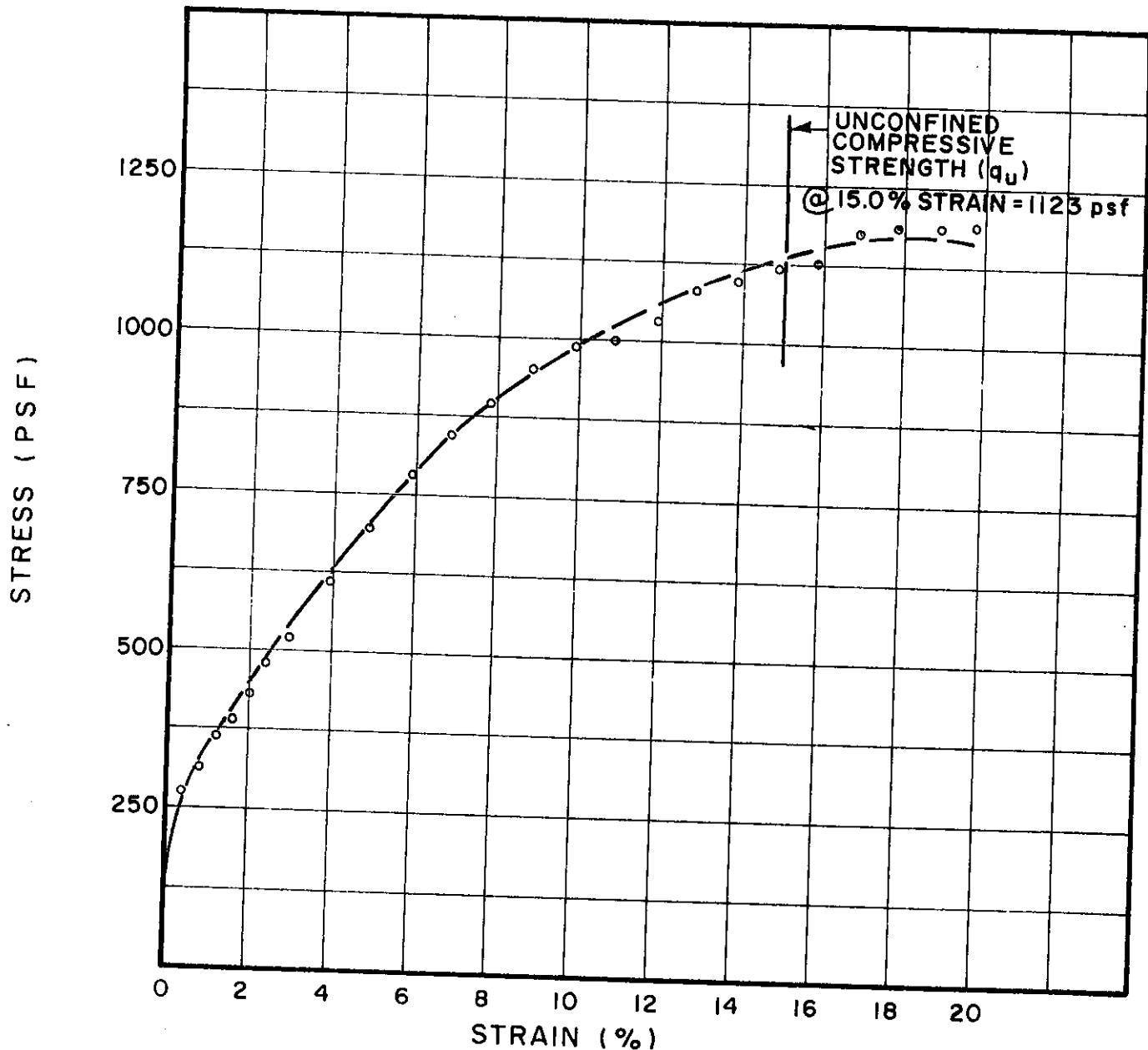
BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 29.6' - 29.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



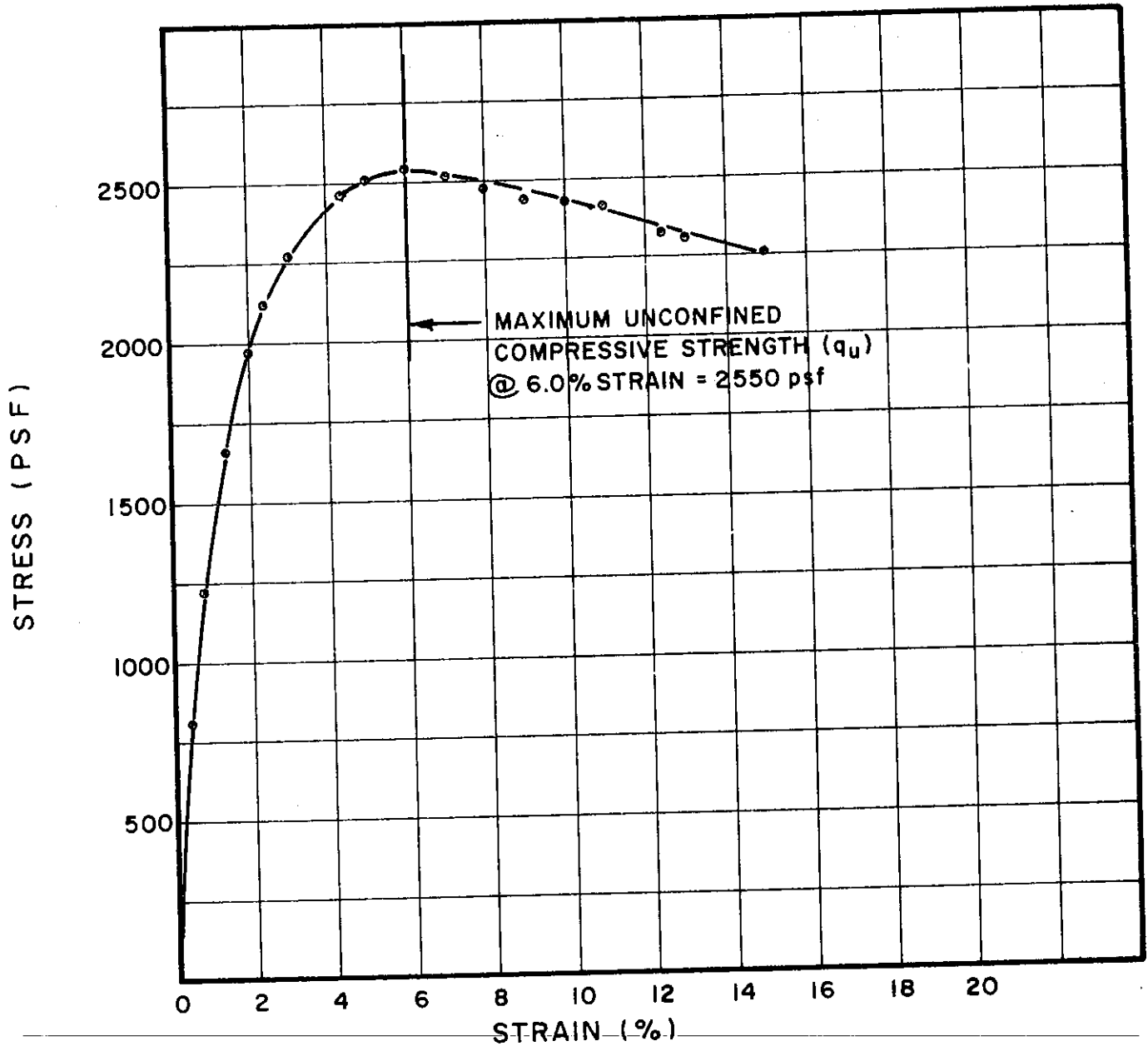


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U99.1	1.37	3.17	.25	27.9	94	43	18	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 6  
 DEPTH 49.2' TO 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



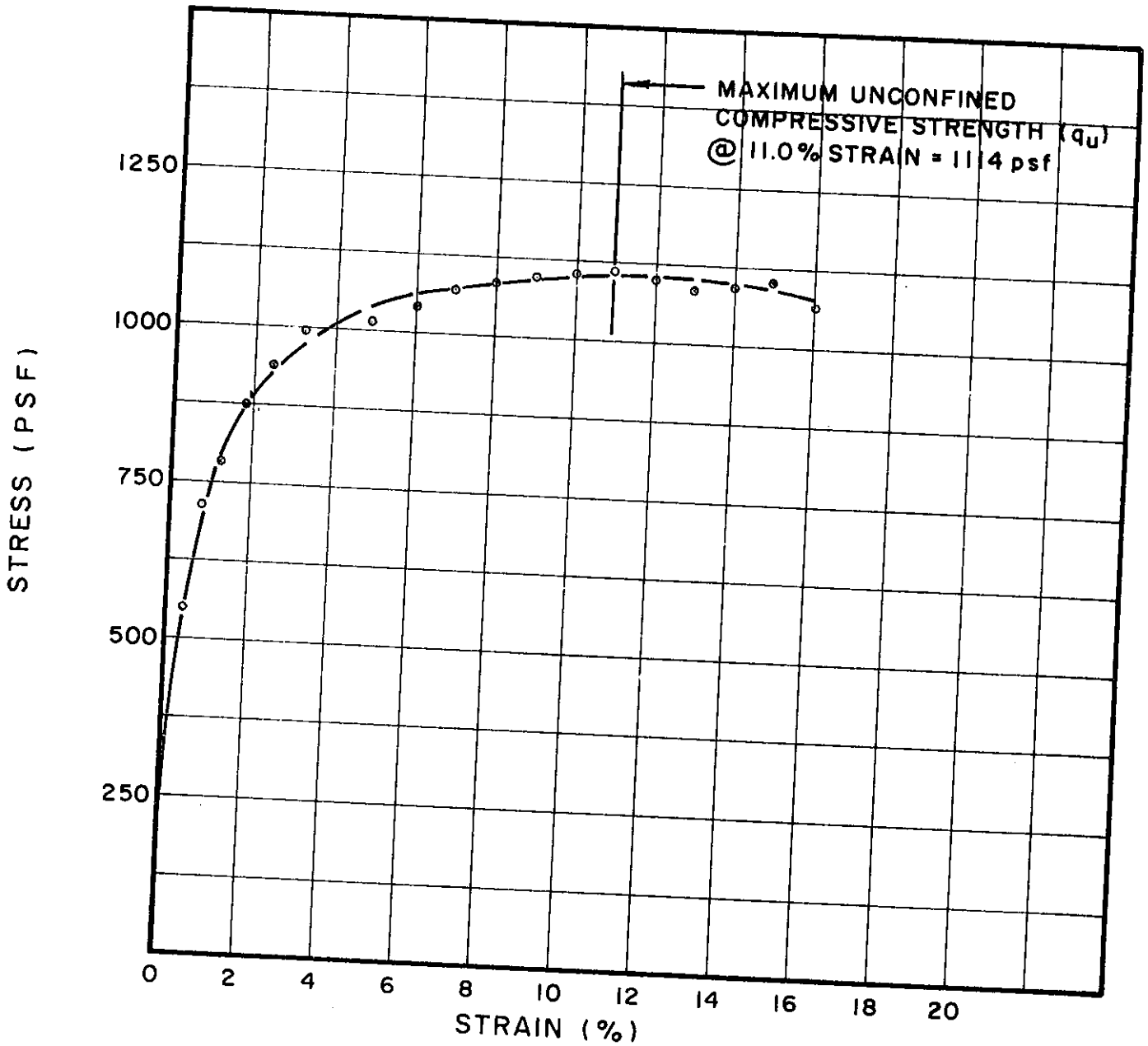
TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U101.1	1.40	3.20	.25	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 80.1' - 80.4'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

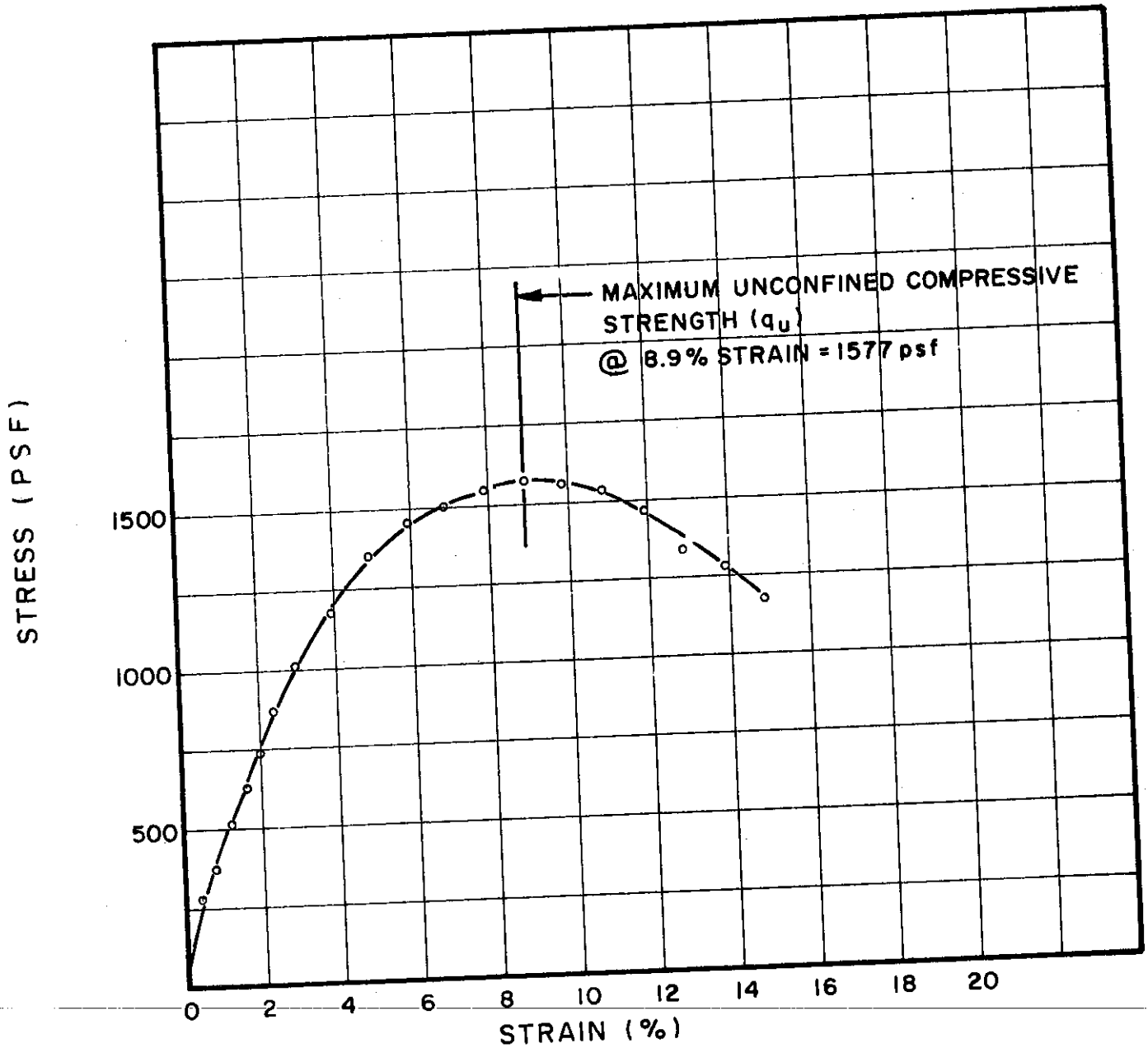


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U398.1	1.38	3.25	.25	25.8	99	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 5  
 DEPTH 59.3' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



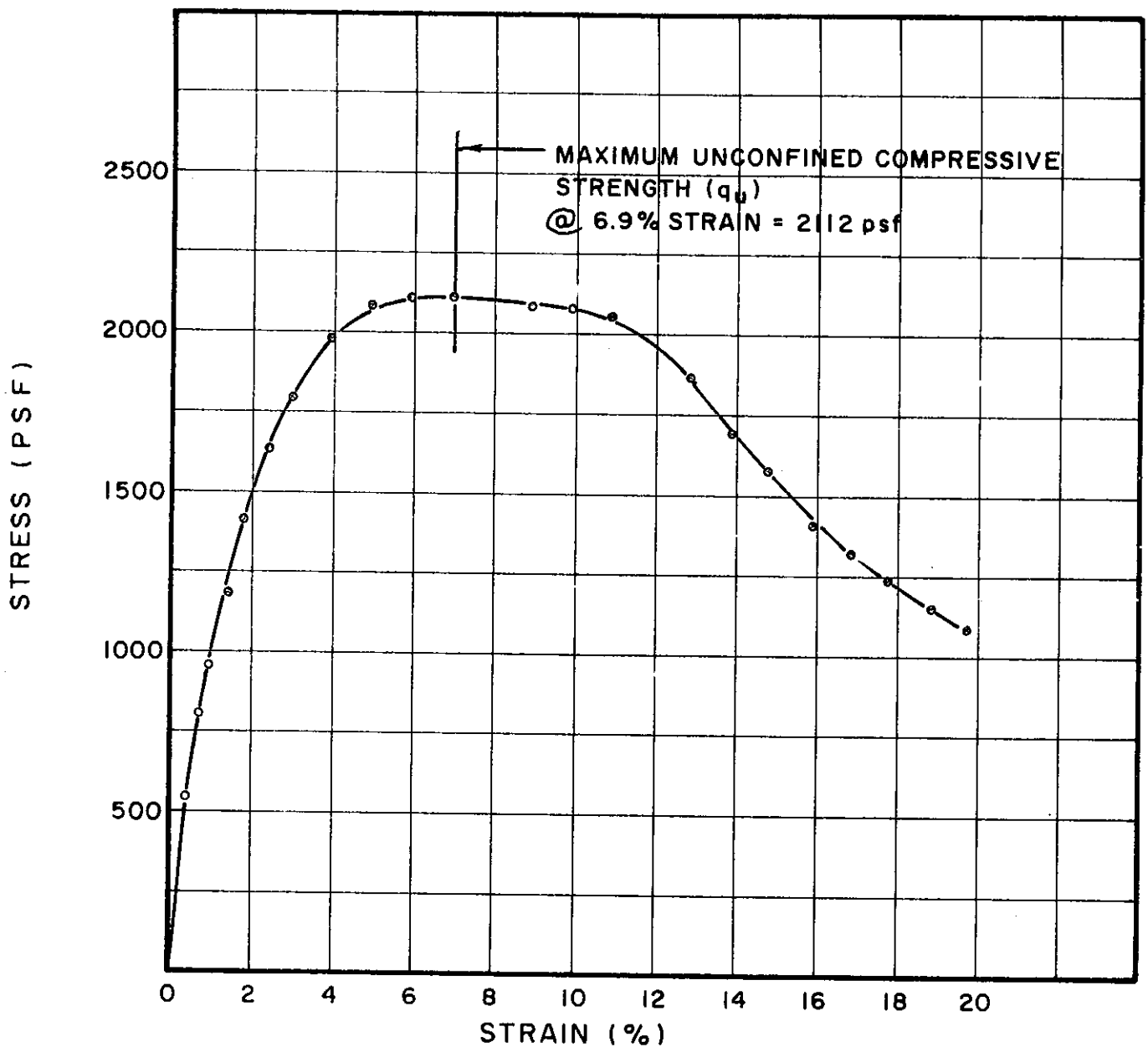
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U400.1	1.39	3.17	.25	25.9	98	37	18	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 7  
 DEPTH 68.5' TO 68.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

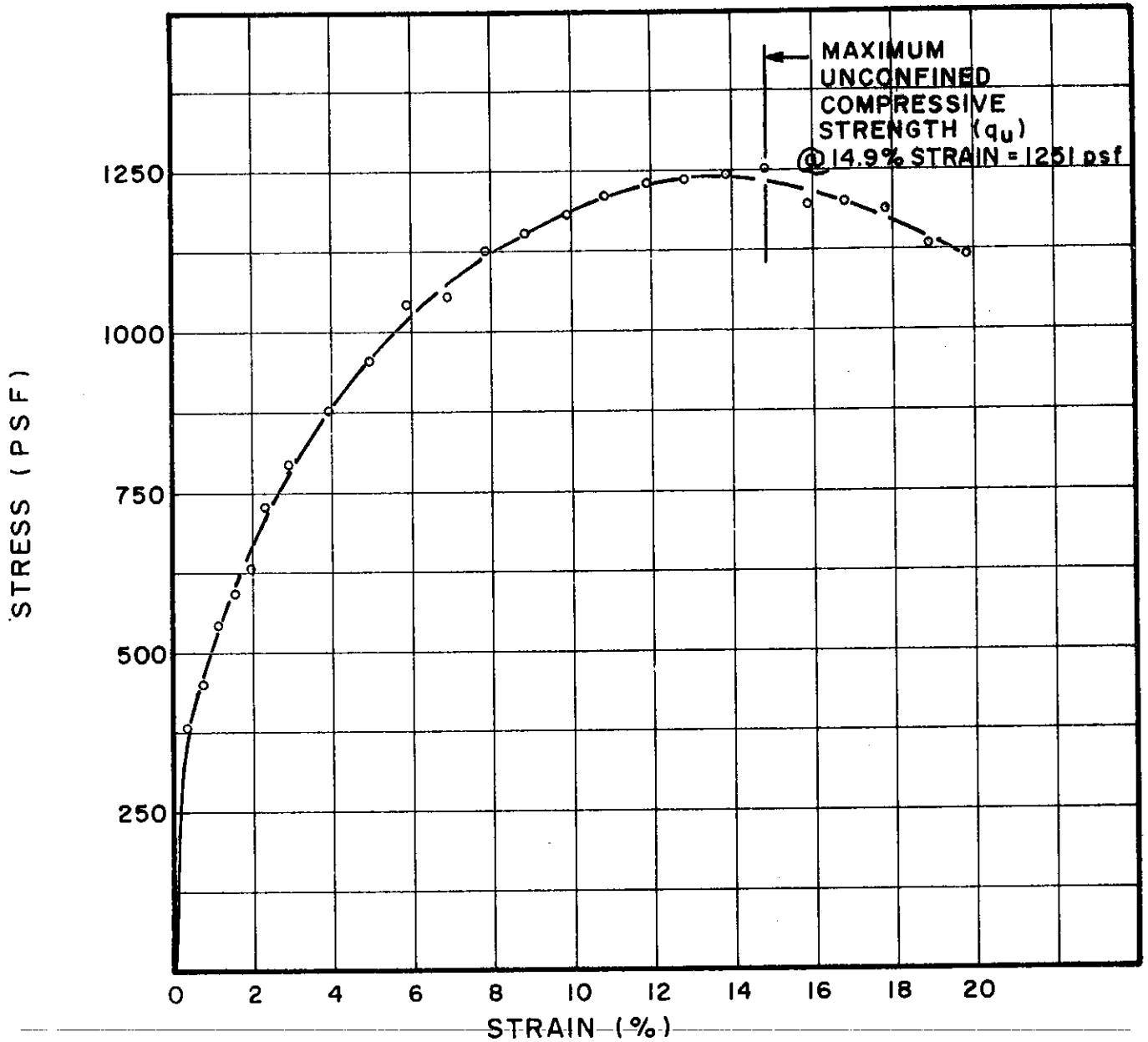


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U76.1	1.38	3.22	.25	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.8' TO 19.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U78.1	1.38	3.27	.25	26.2	99	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

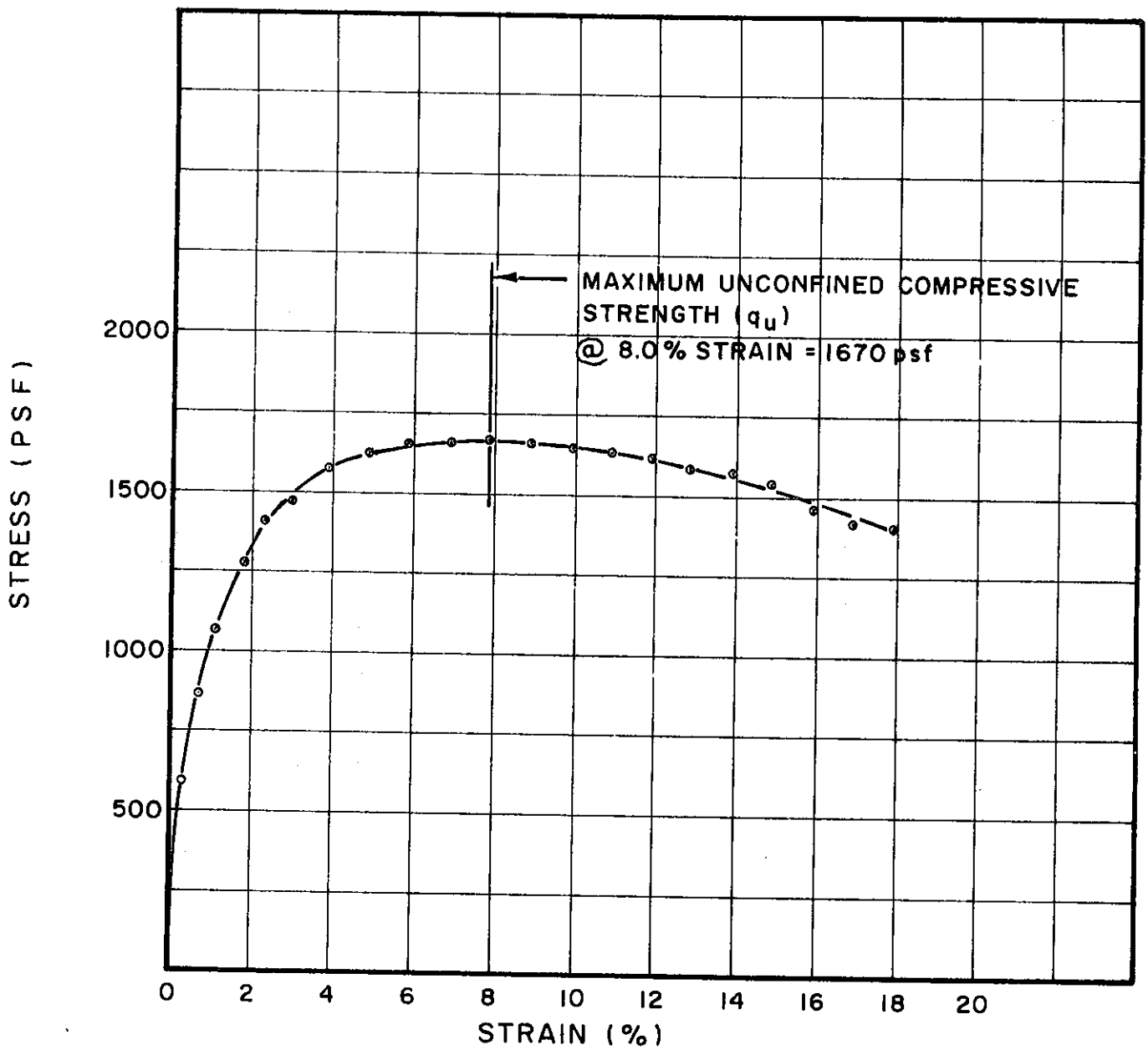
SAMPLE NO. 5

DEPTH 38.7' TO 39.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U80.1	1.38	3.26	.25	26.3	98	36	18	SILTY CLAY, SANDY (CL)

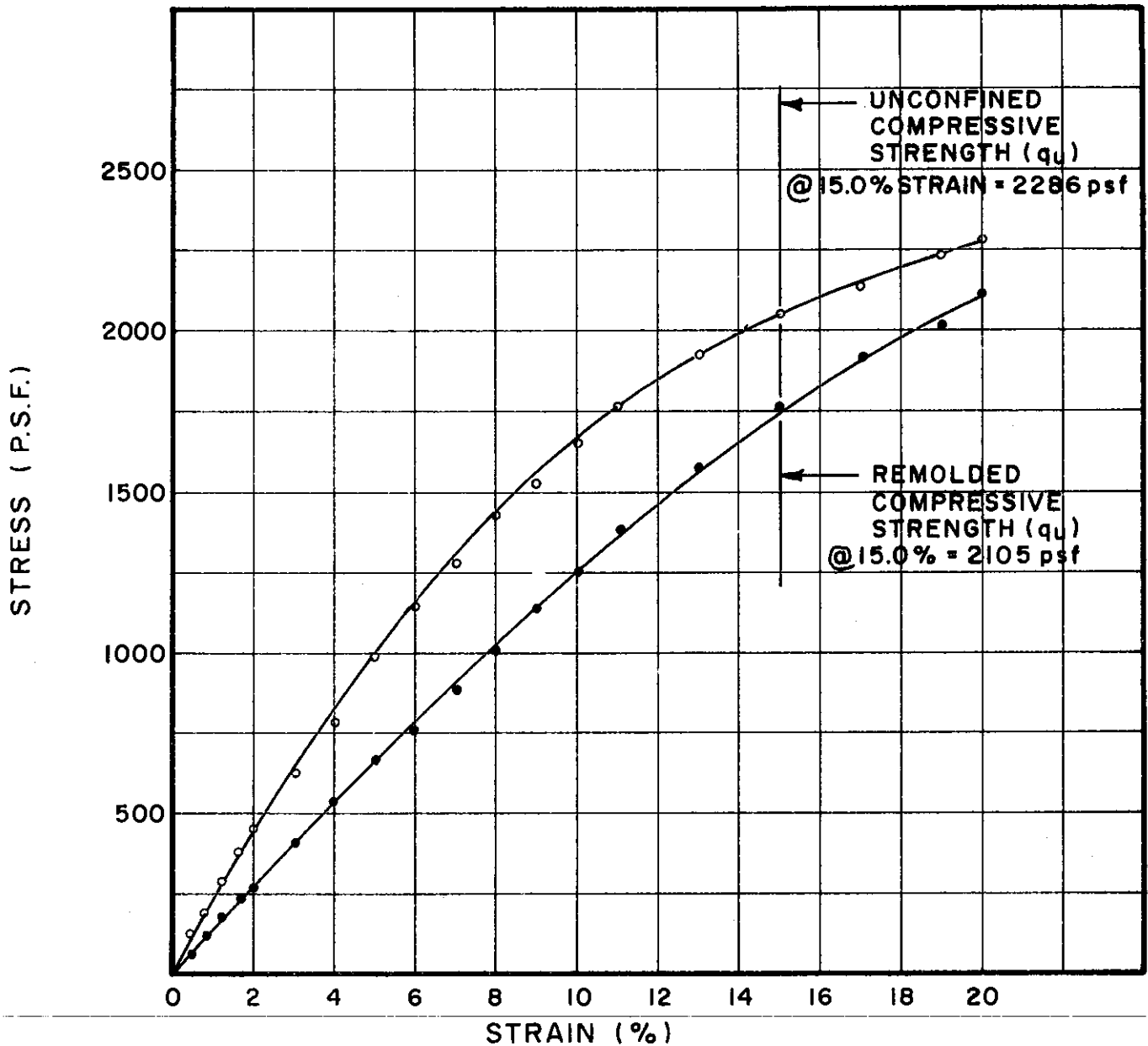
BORING NO. 59

SAMPLE NO. 7

DEPTH 58.6' TO 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U43.1	1.40	2.85	.316	24.3	105	39	21	SILTY CLAY (CL)
U <sub>R</sub> 43.1	1.44	2.70	.333	24.3	103	39	21	SILTY CLAY (CL)

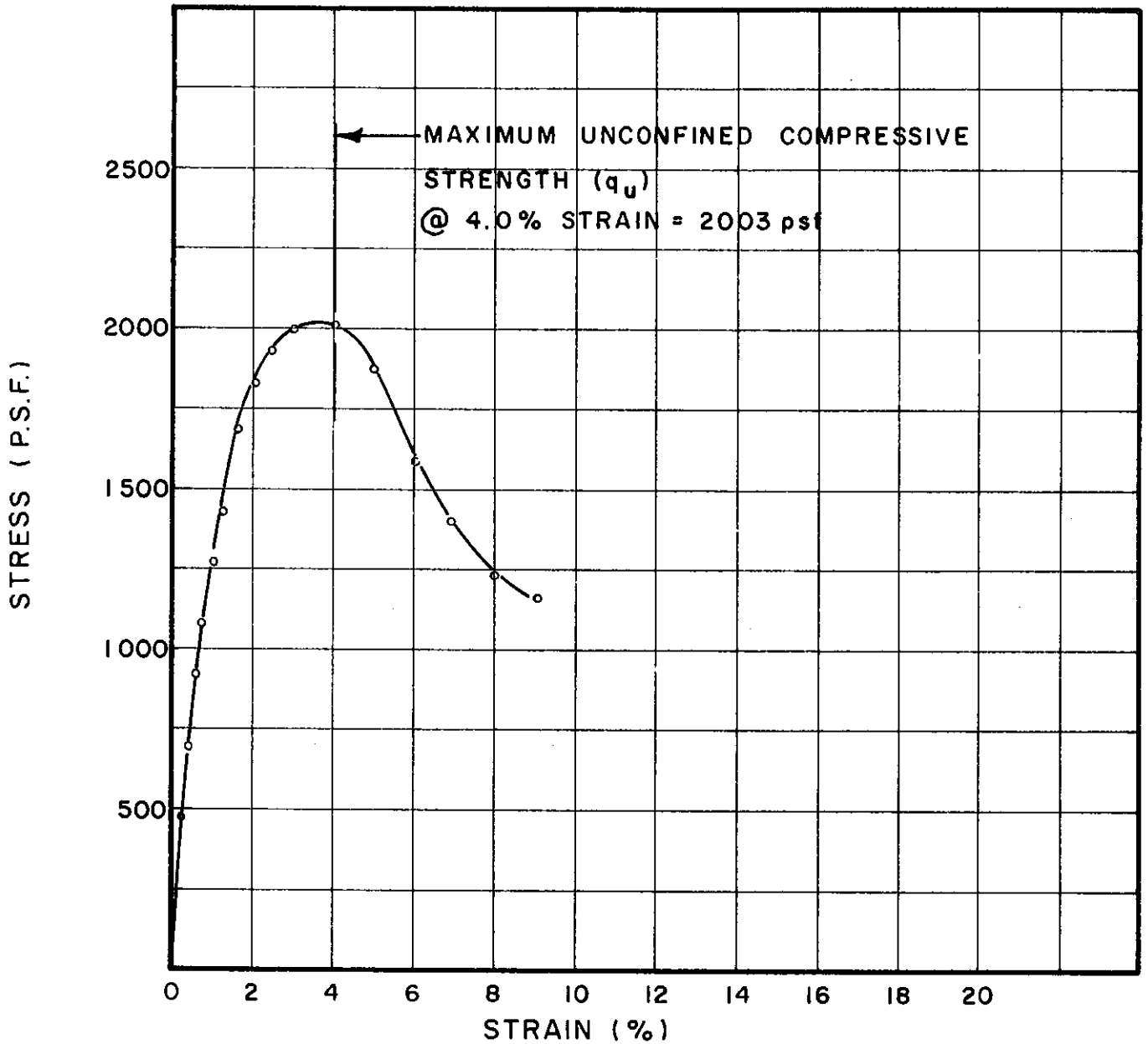
BORING NO. 60  
 SAMPLE NO. 3  
 DEPTH 17.6' TO 18.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U45.1	1.43	3.50	.257	36.8	86	51	22	SILTY CLAY (CH)

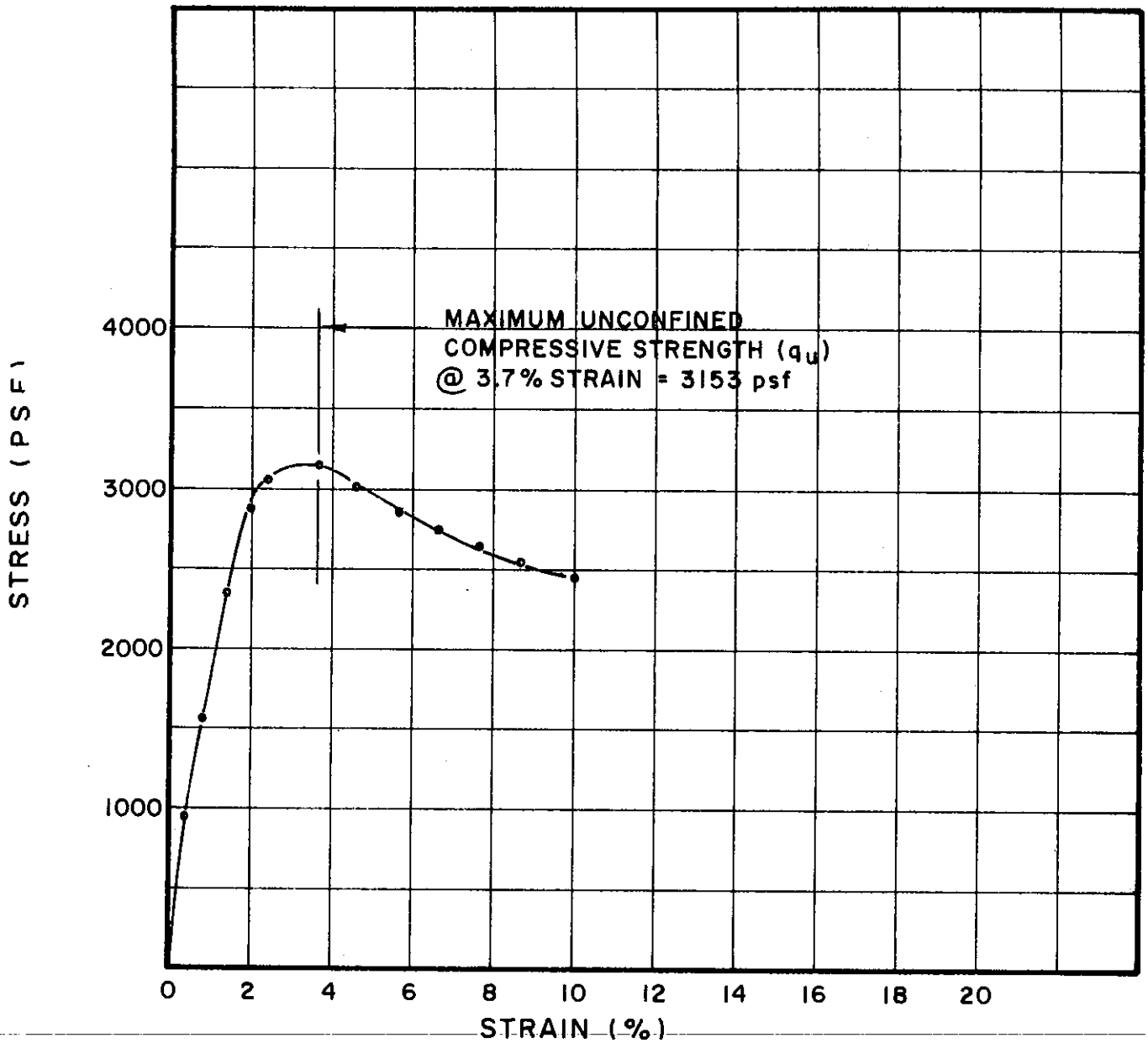
BORING NO. 60

SAMPLE NO. 5

DEPTH 25.6' TO 25.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



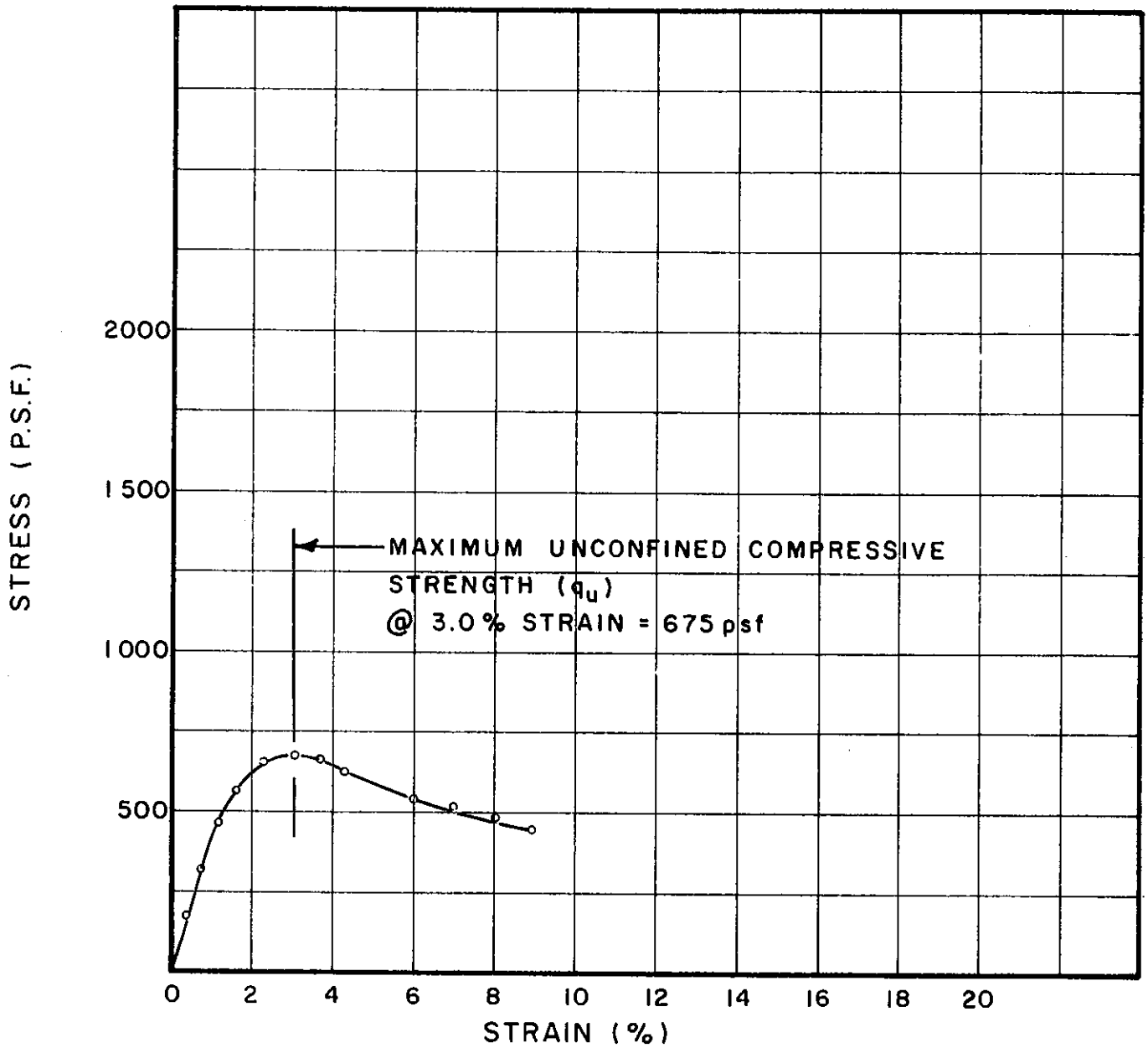
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U46.1	1.41	3.06	.26	35.0	88	48	25	SILTY CLAY (CL-CH)

BORING NO. 60  
 SAMPLE NO. 6  
 DEPTH 30.5' TO 30.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

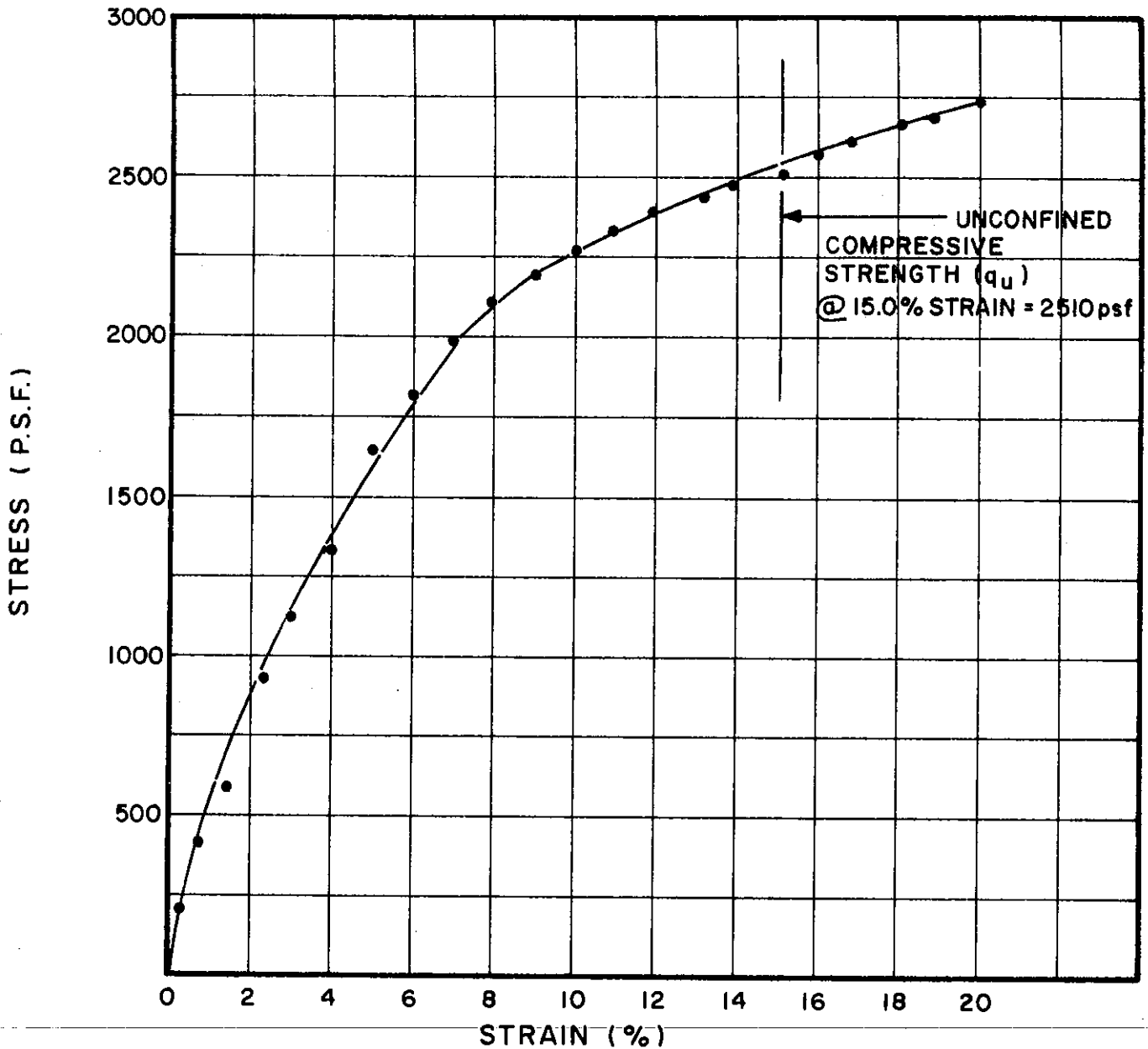


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U48.1	1.41	3.50	.257	39.7	83	47	25	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 8  
 DEPTH 40.6' TO 41.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

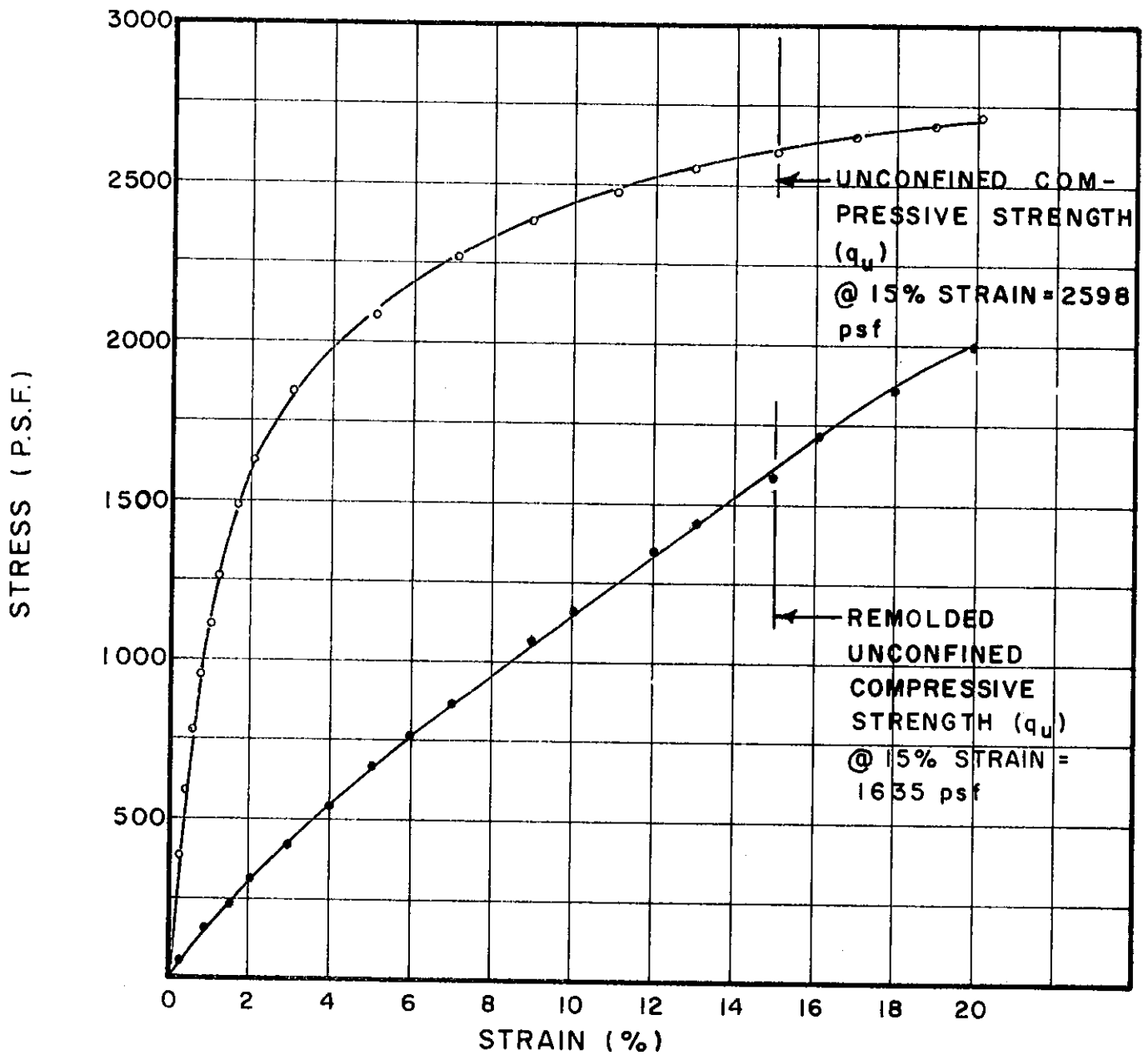


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U50.1	1.40	3.50	0.26	25.5	100	34	16	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 10  
 DEPTH 50.9' TO 51.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U51.1	1.41	3.49	.258	24.8	103	33	18	SILTY CLAY, SANDY (CL)
U51.1	1.41	3.30	.273	24.8	103	33	18	SILTY CLAY, SANDY (CL)

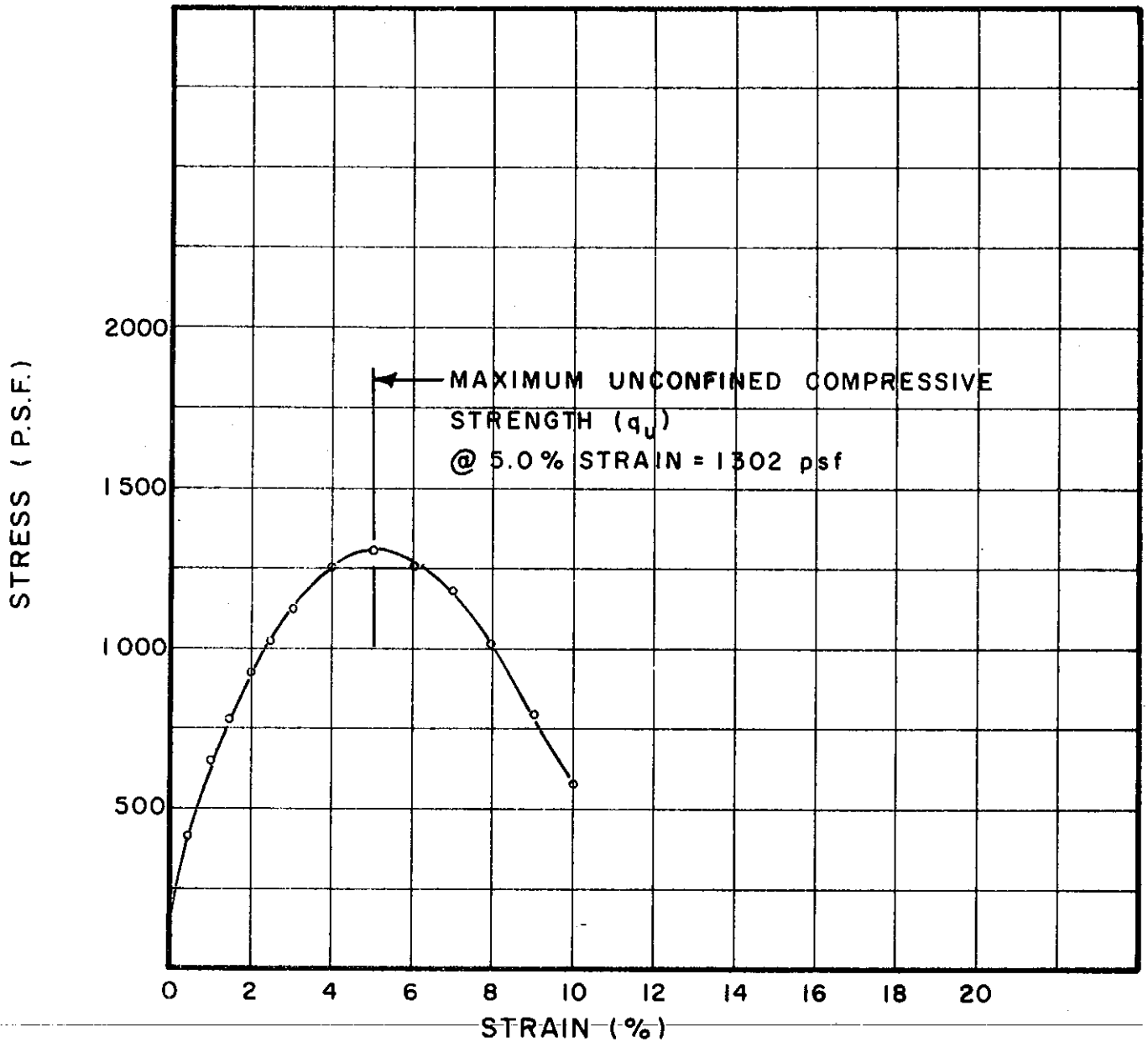
BORING NO. 60

SAMPLE NO. 11

DEPTH 55.6' TO 56.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U54.1	1.42	3.50	.257	26.9	97	40	20	SILTY CLAY (CL)

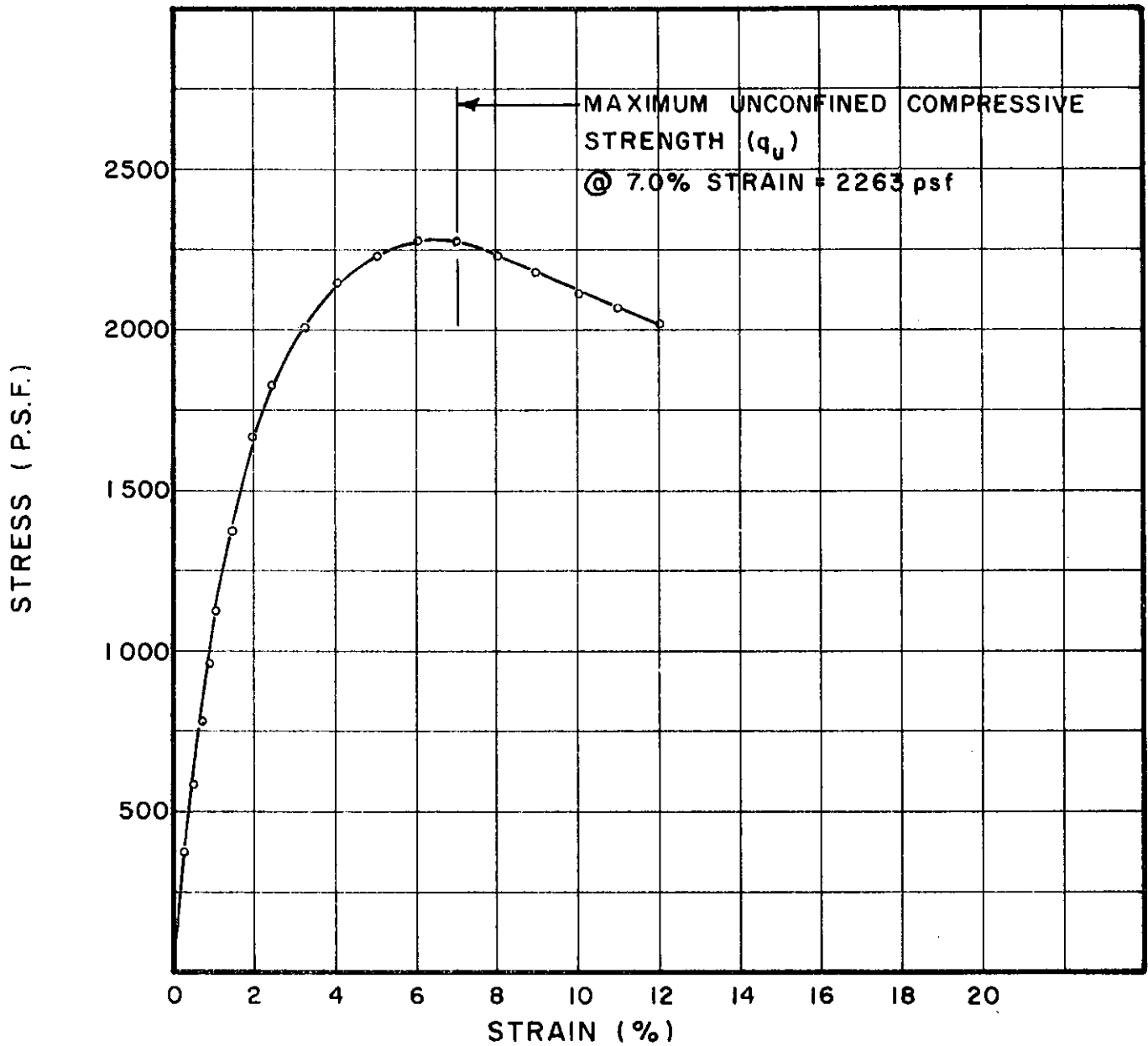
BORING NO. 60

SAMPLE NO. 14

DEPTH 75.1' TO 75.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

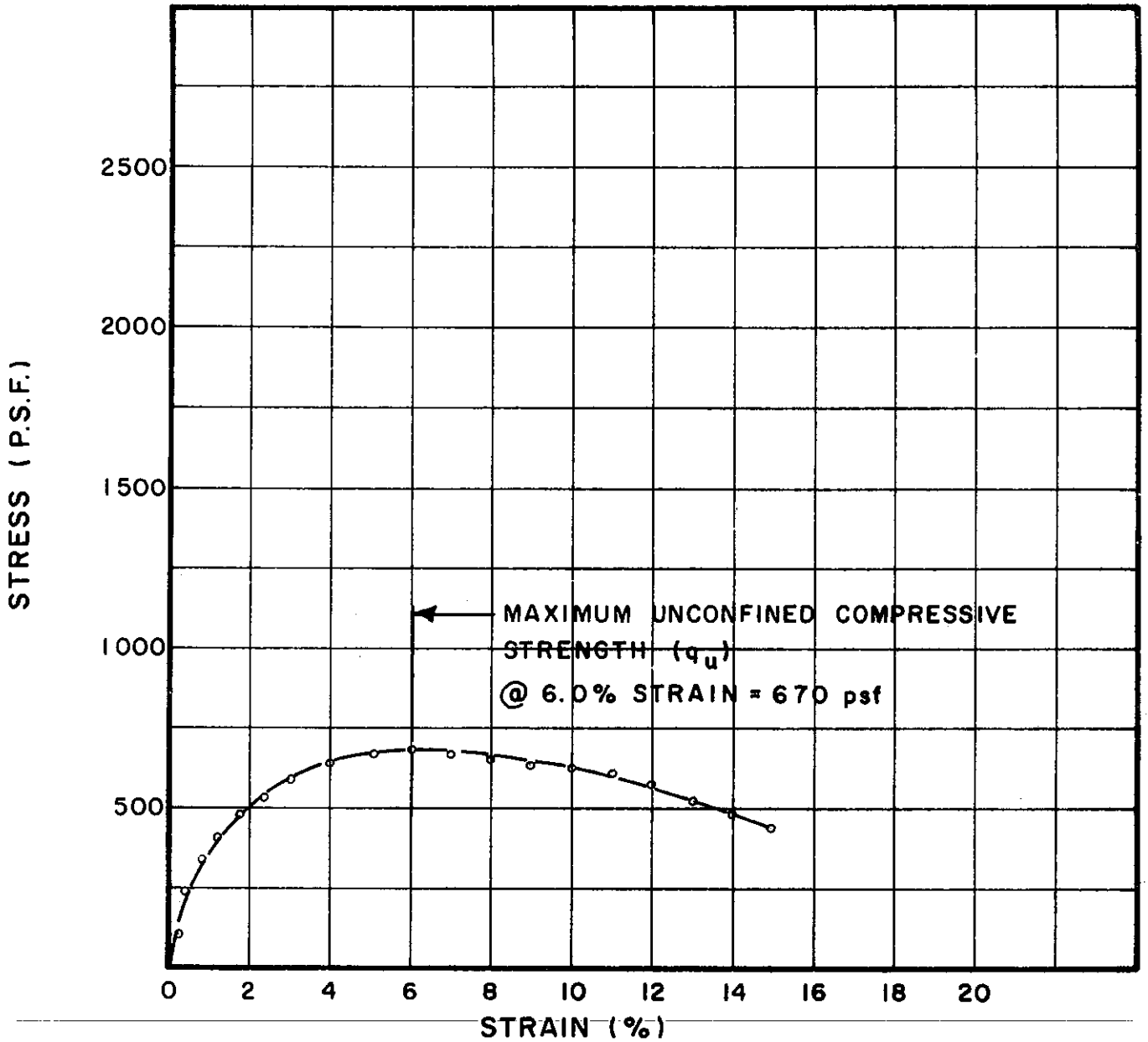


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U59.1	1.41	3.50	.257	27.1	101	38	20	SILTY CLAY SANDY (CL)

BORING NO. 60  
 SAMPLE NO. 19  
 DEPTH 100.1' TO 100.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U63.1	1.44	3.50	.257	15.4	115	17	11	SILTY CLAY, SANDY (CL - ML)

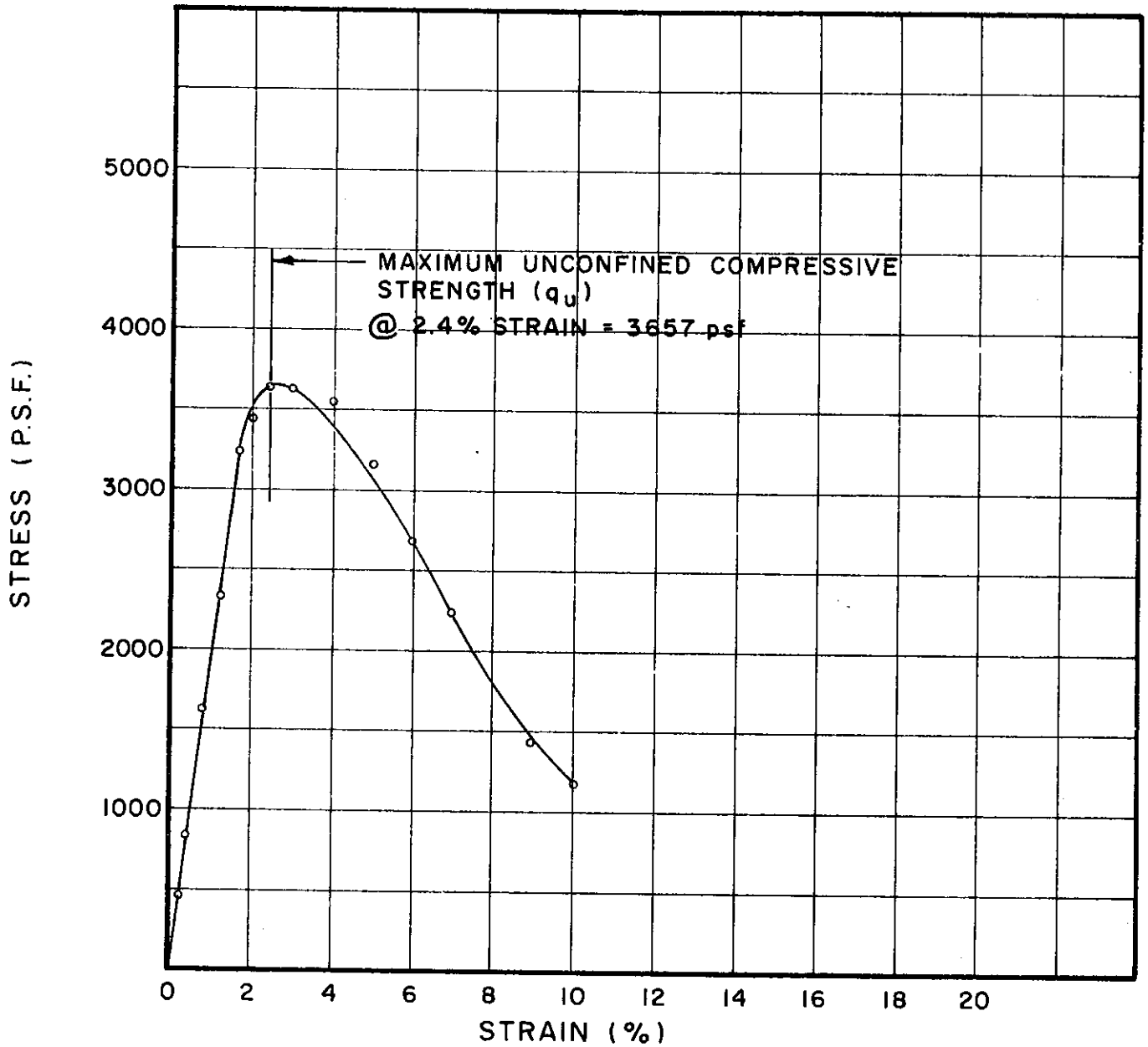
BORING NO. 60  
 SAMPLE NO. 23  
 DEPTH 119.6' TO 120.0

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



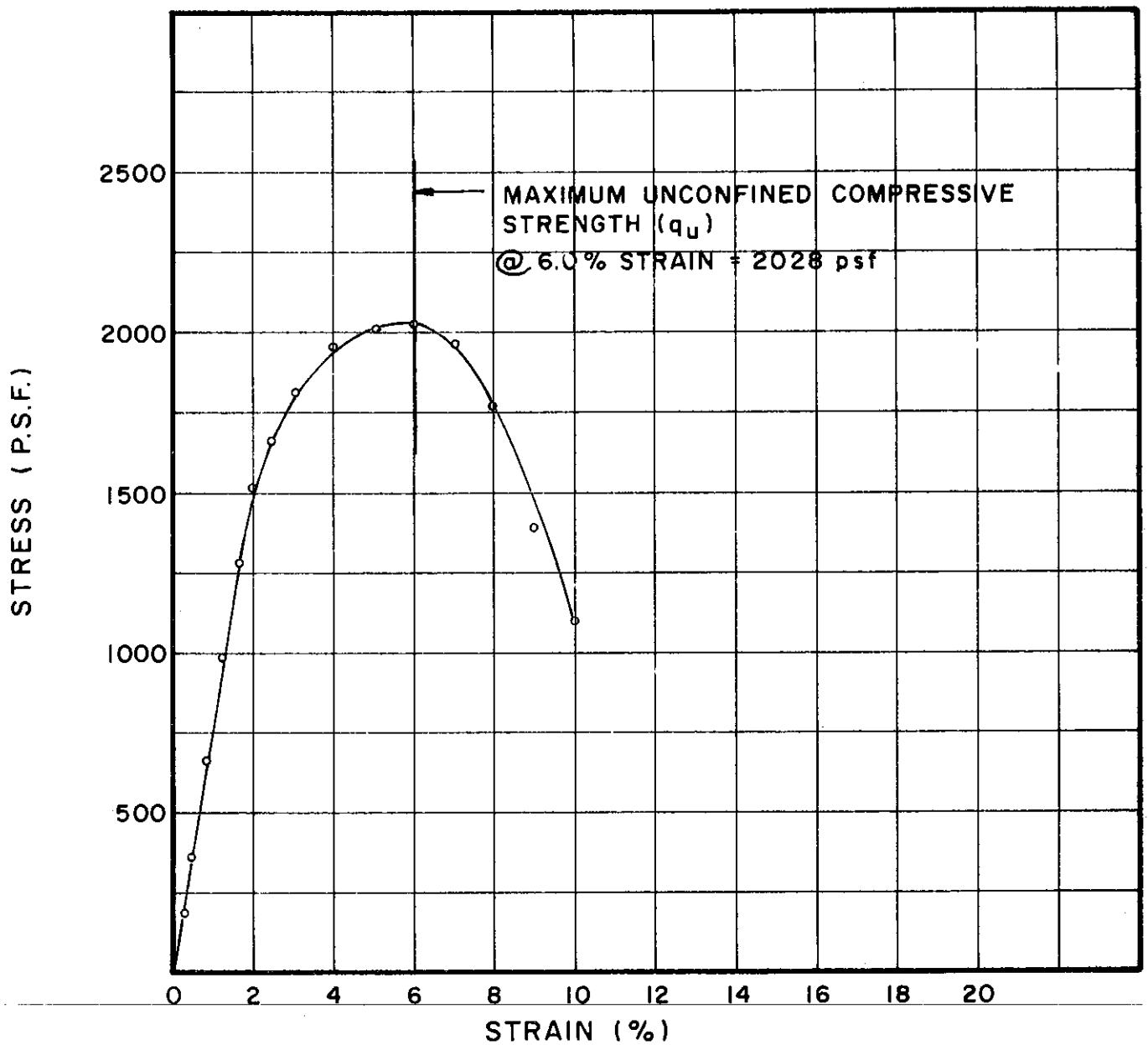


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U349.1	1.44	3.15	.286	27.8	96	50	22	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 2  
 DEPTH 8.9' TO 9.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



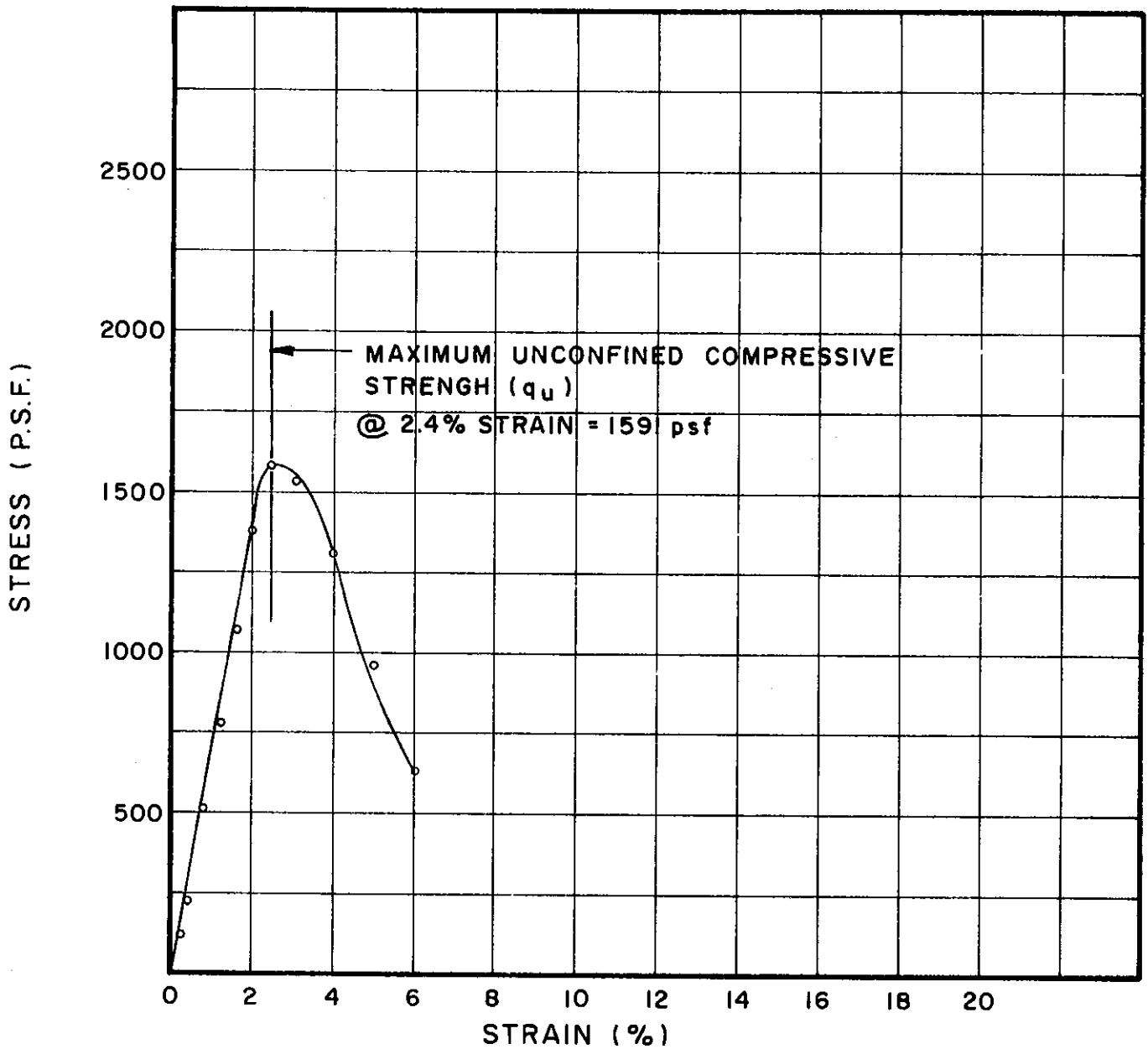
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U351.1	1.41	3.29	.274	35.8	86	49	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 4  
 DEPTH 19.9' TO 20.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

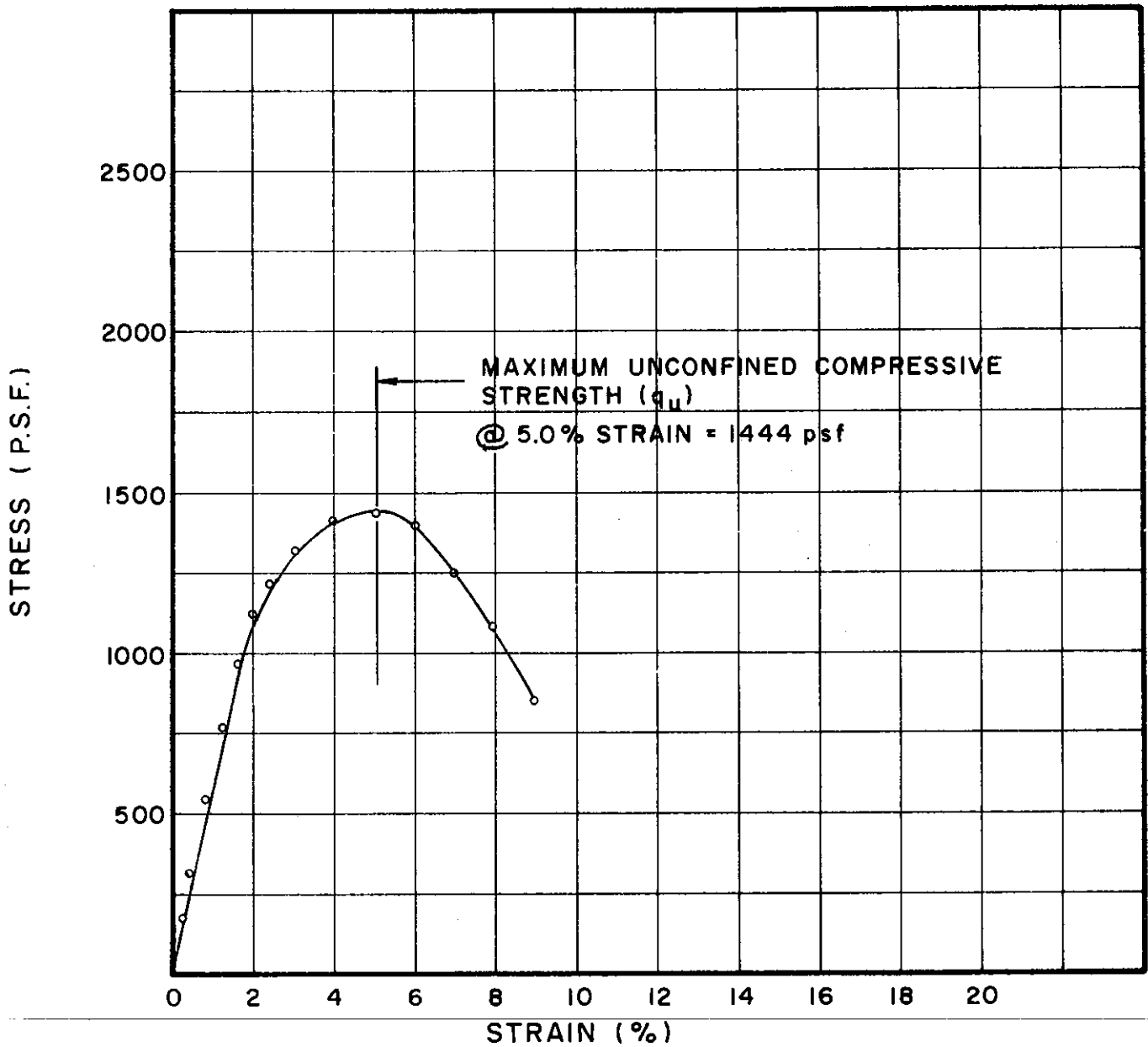


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U354.1	1.41	3.37	.267	40.0	81	46	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 7  
 DEPTH 34.9' TO 35.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U357.1	1.40	3.30	.273	32.8	90	40	22	SILTY CLAY (CL-CH)

BORING NO. 101

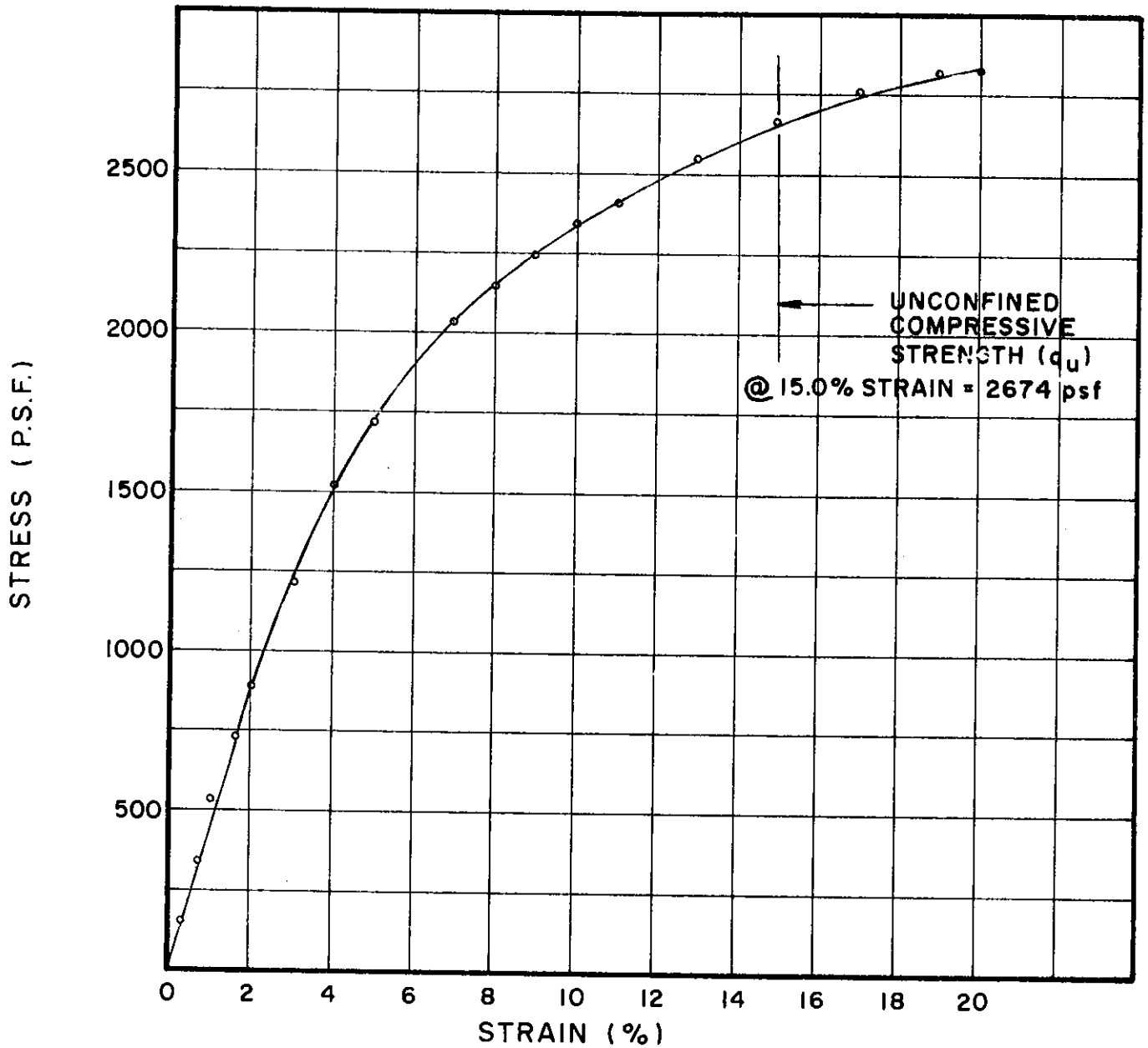
SAMPLE NO. 10

DEPTH 50.1' TO 50.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

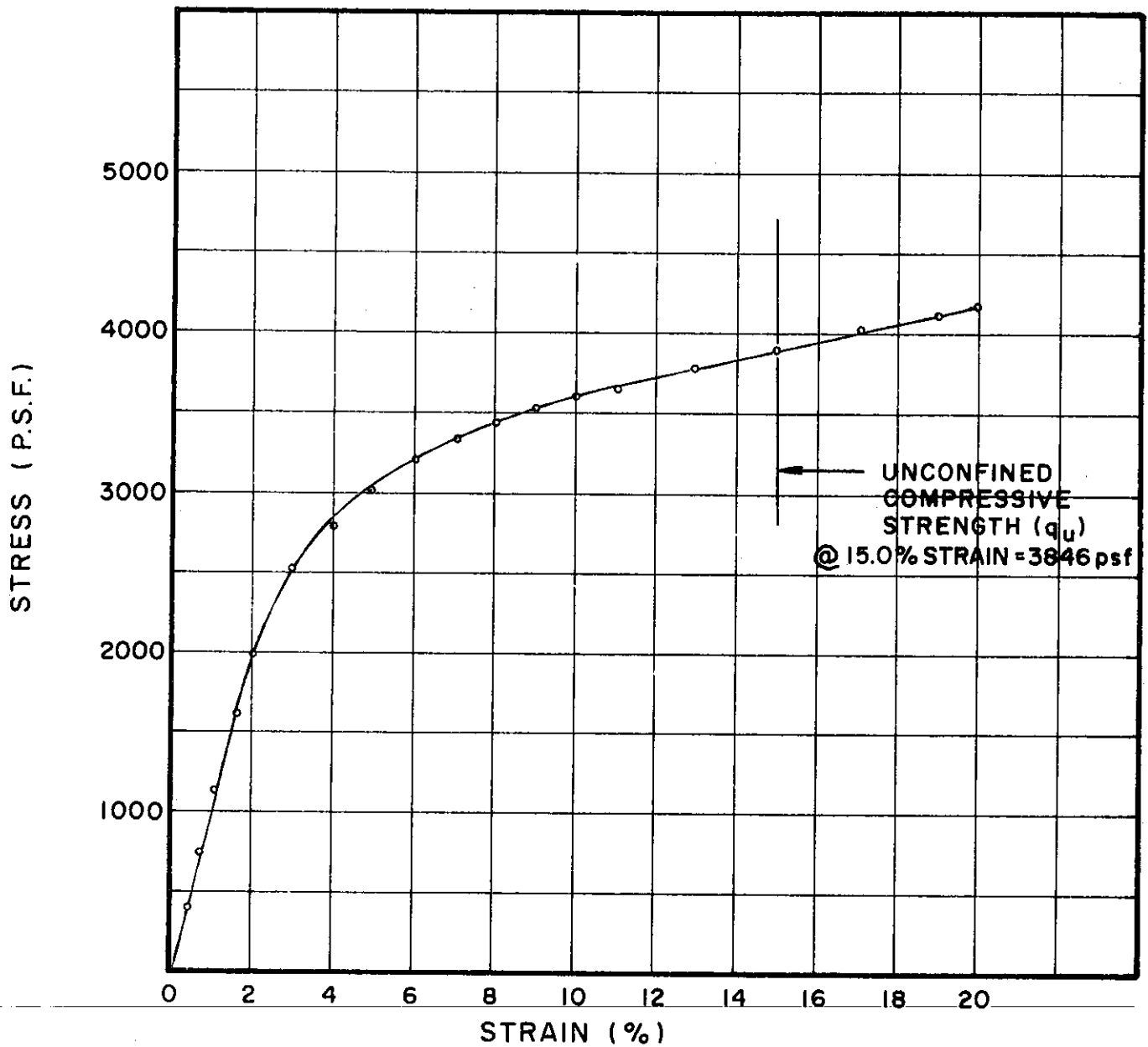


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U360.1	1.39	3.28	.274	26.6	97	36	19	SILTY CLAY, SANDY (CL)

BORING NO. 101  
 SAMPLE NO. 13  
 DEPTH 65.2' TO 65.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U364.1	1.41	3.35	.269	25.2	97	37	19	SILTY CLAY, SANDY (CL)

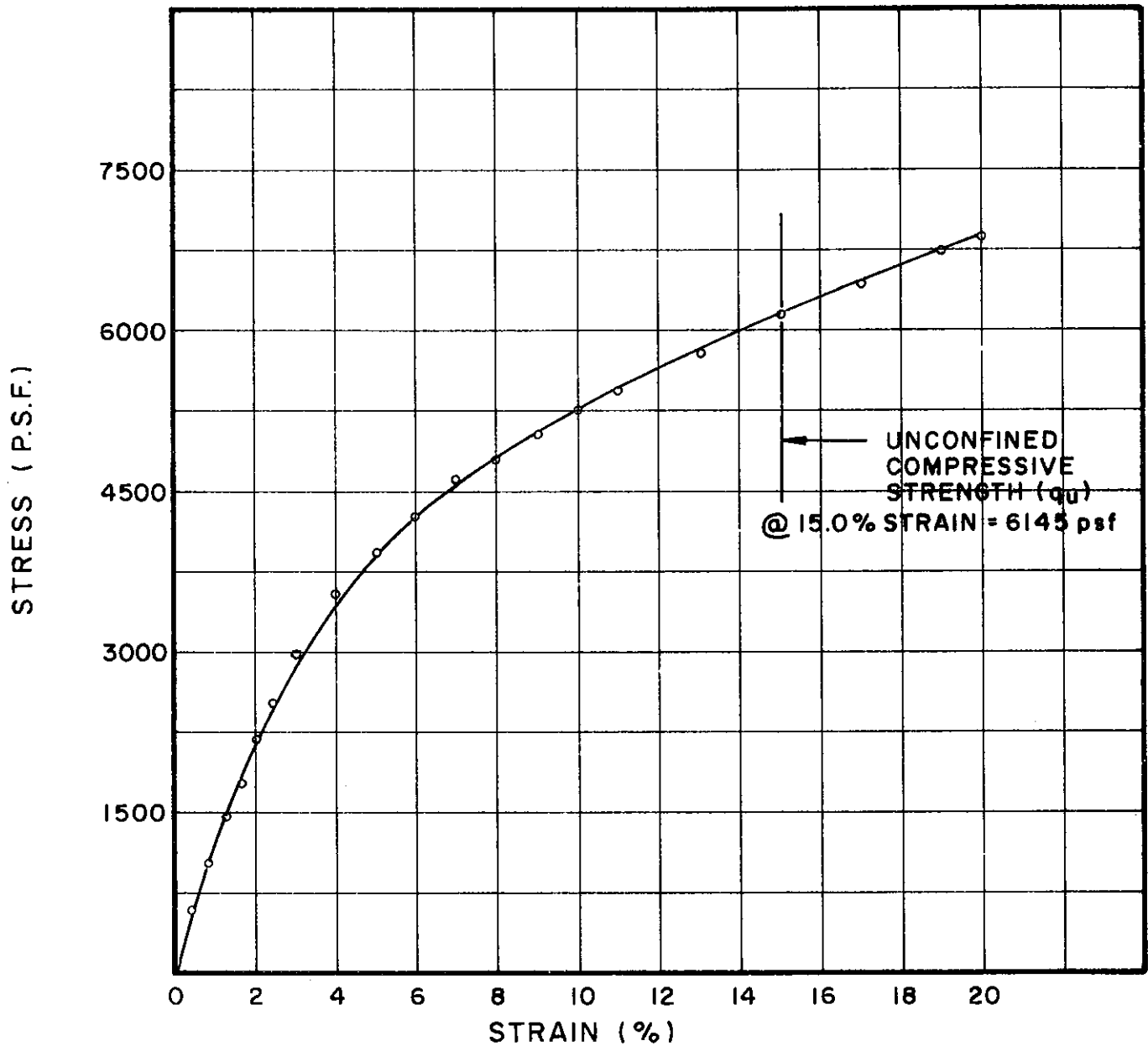
BORING NO. 101

SAMPLE NO. 17

DEPTH 85.2' TO 85.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U339.1	1.41	3.35	.268	20.7	107	33	20	SILTY CLAY, SANDY (CL)

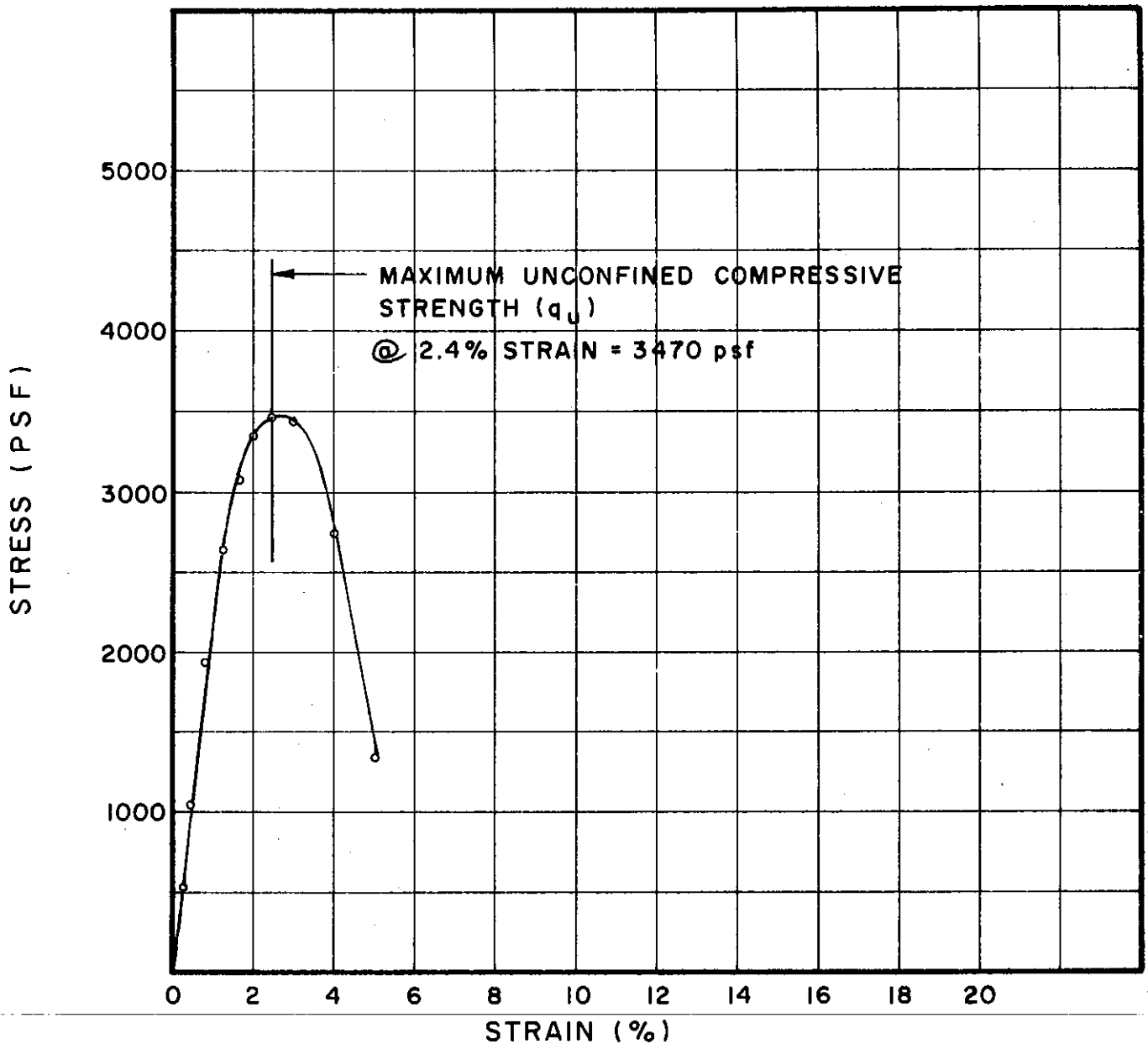
BORING NO. 119

SAMPLE NO. 9

DEPTH 81.6' TO 81.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



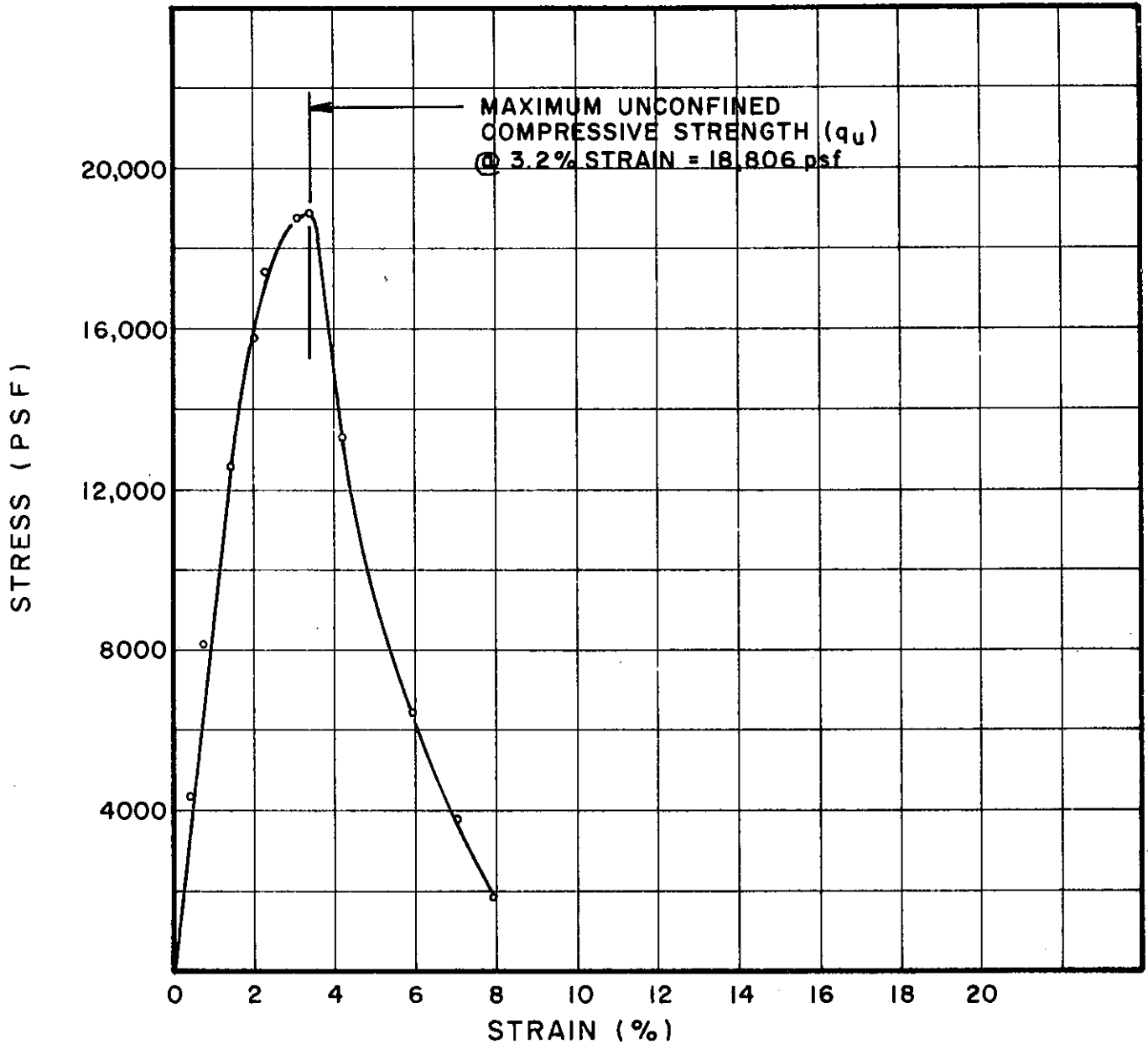
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U241.1	1.46	3.50	.257	26.2	99	47	24	SILTY CLAY (CL-CH)

BORING NO. 126  
 SAMPLE NO. 3  
 DEPTH 8.2' TO 8.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



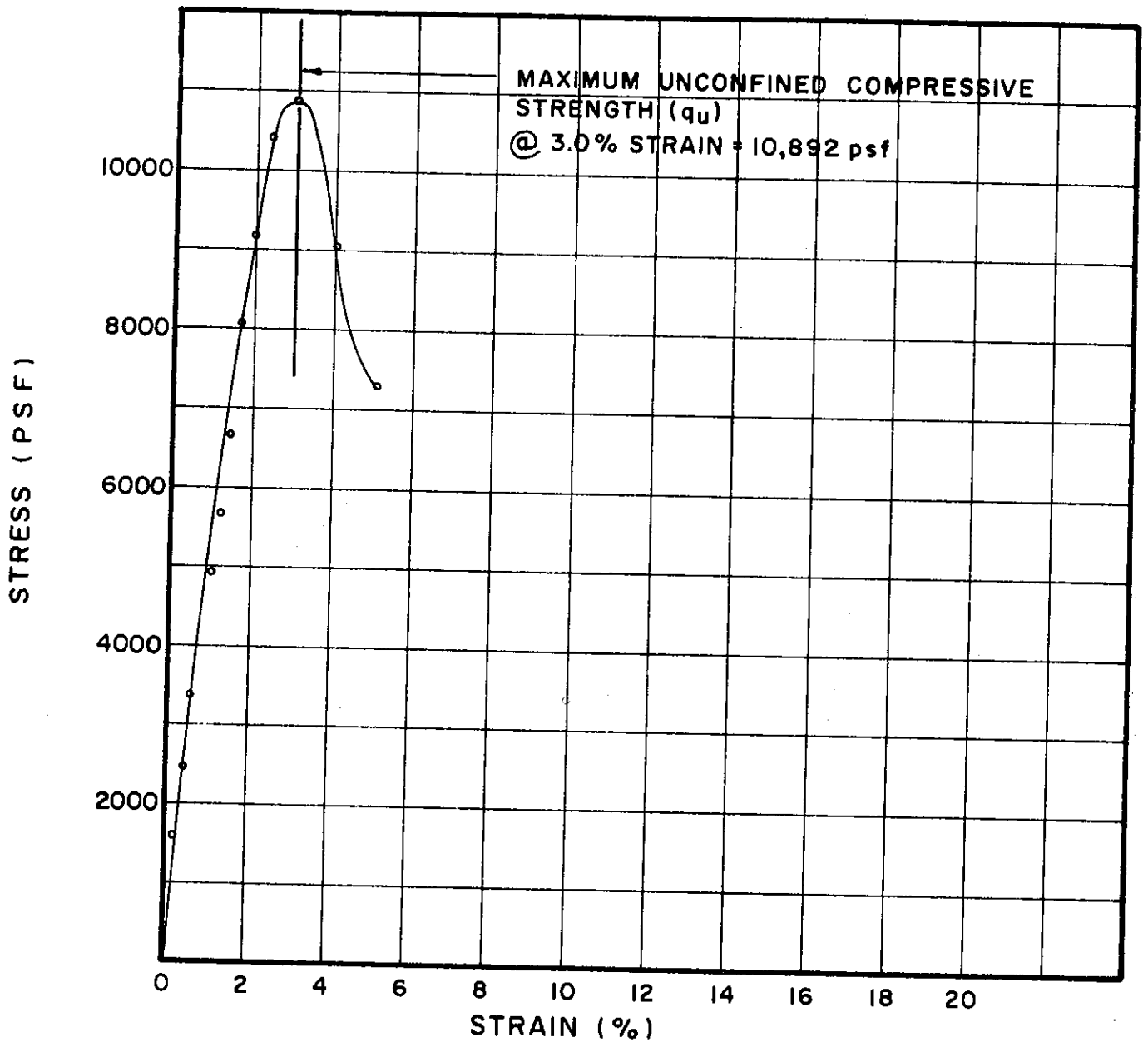


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U416.2	1.42	3.55	0.26	13.5	113	49	22	SILTY CLAY (CL-CH)
								"COMPACTED SAMPLE"

BORING NO. 127  
 SAMPLE NO. 3  
 DEPTH 5.6' TO 7.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U526.1	1.42	3.46	0.25	24.3	102	48	22	SILTY CLAY (CL-CH)

BORING NO. 136

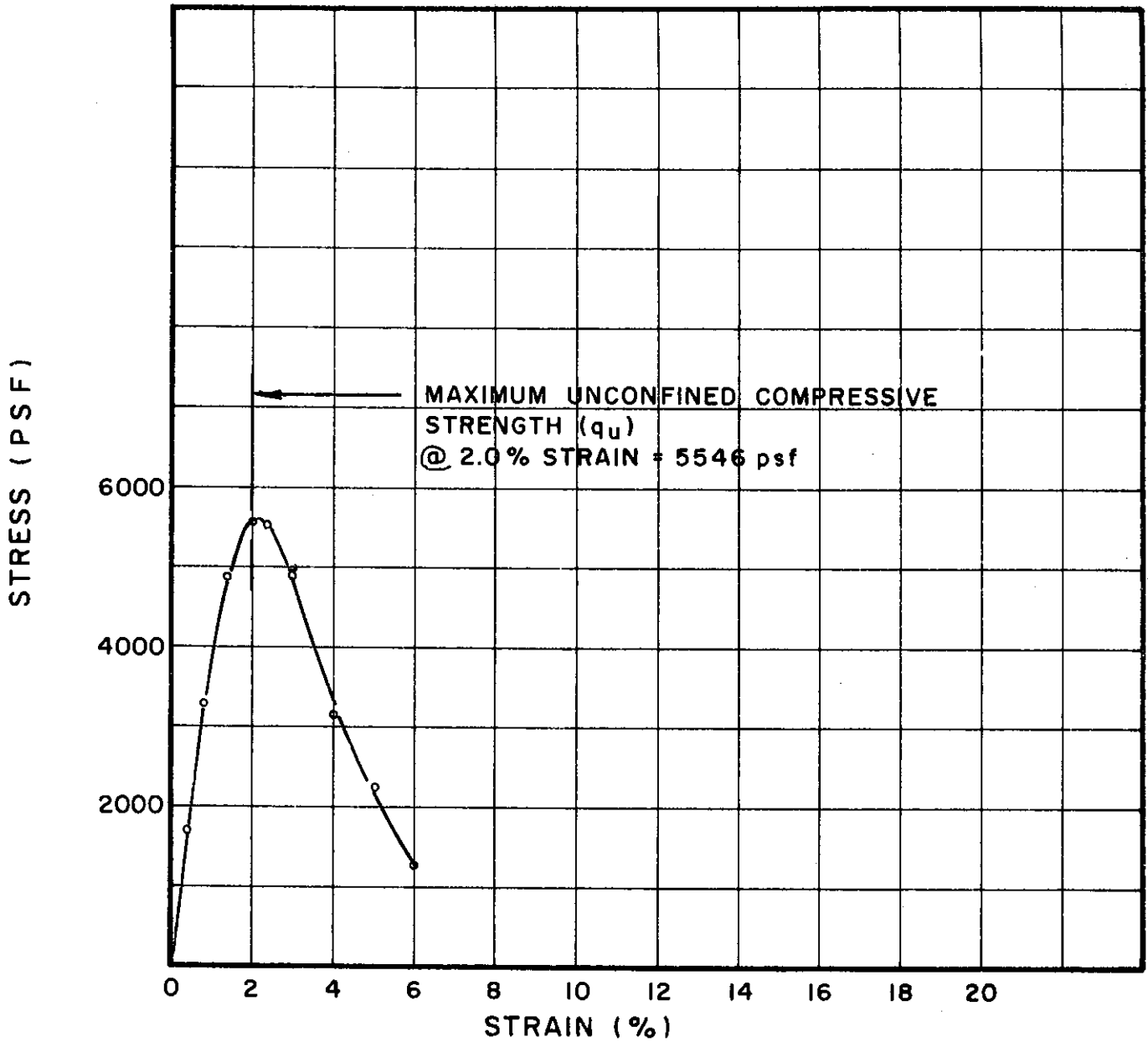
SAMPLE NO. 4

DEPTH 8.8' TO 9.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

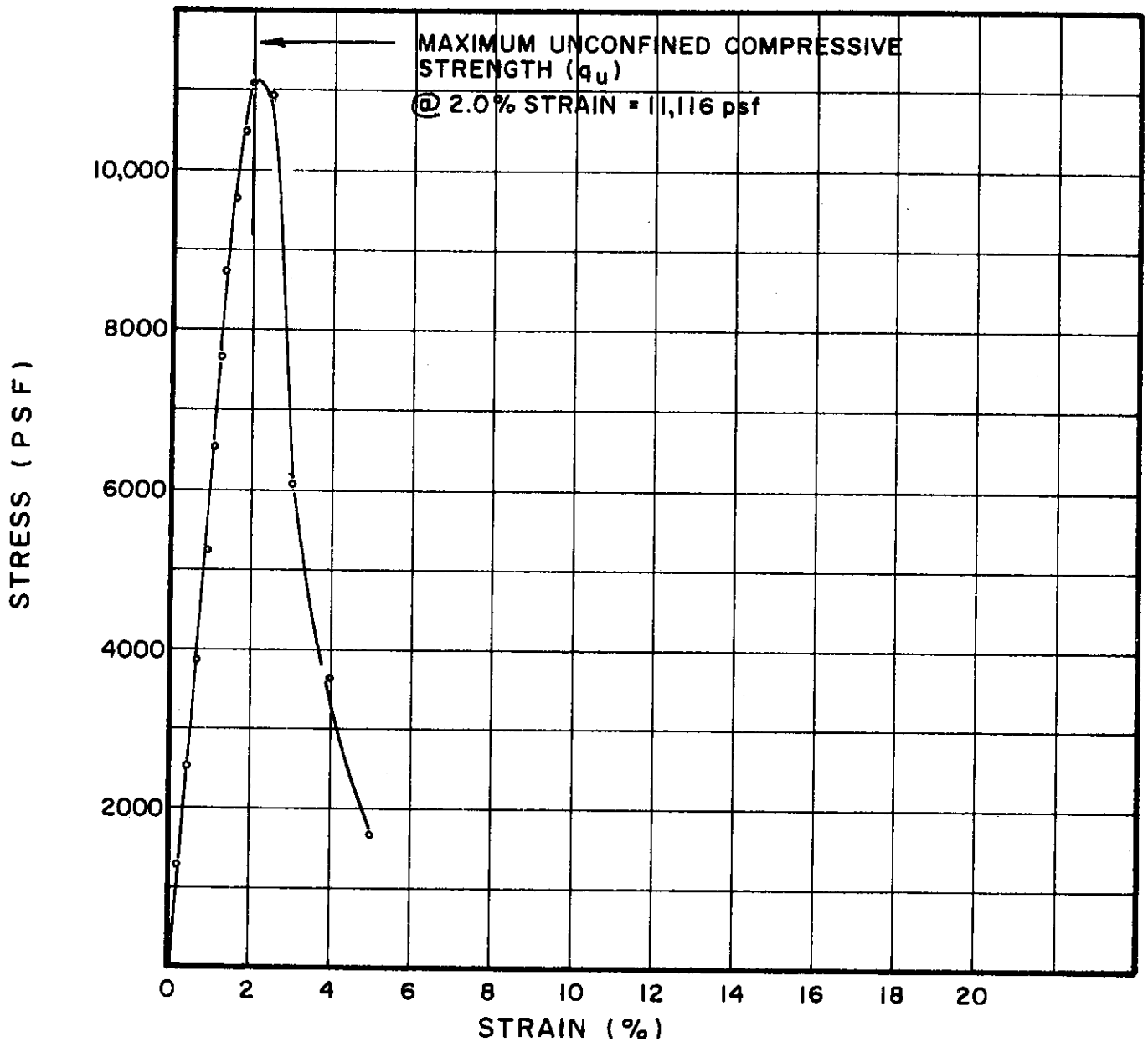


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>p</sub> 527.1	1.40	3.28	.274	17.5	100	43	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U529.1	1.41	3.05	.28	17.5	103	49	23	SILTY CLAY (CL-CH)

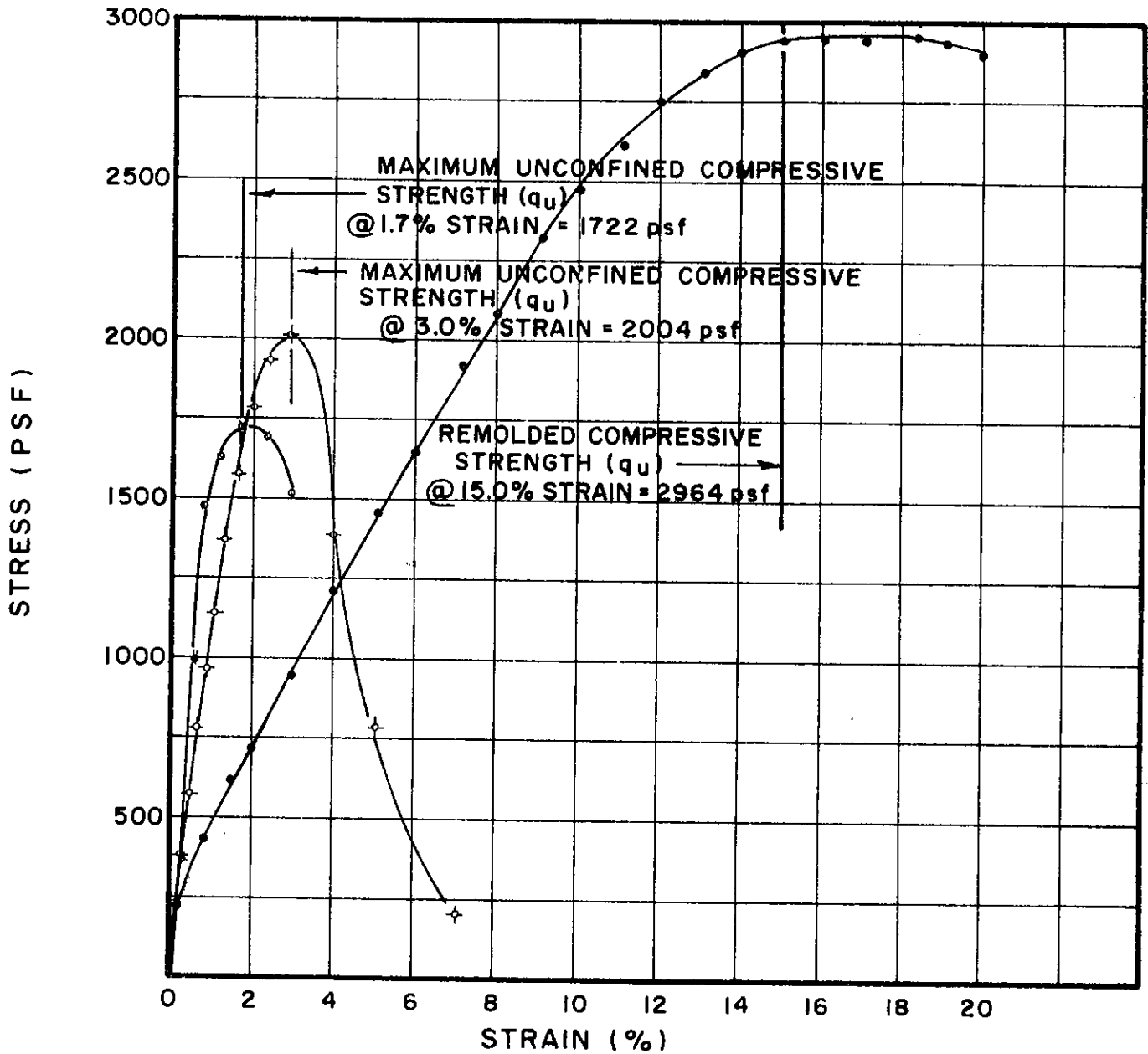
BORING NO. 141

SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

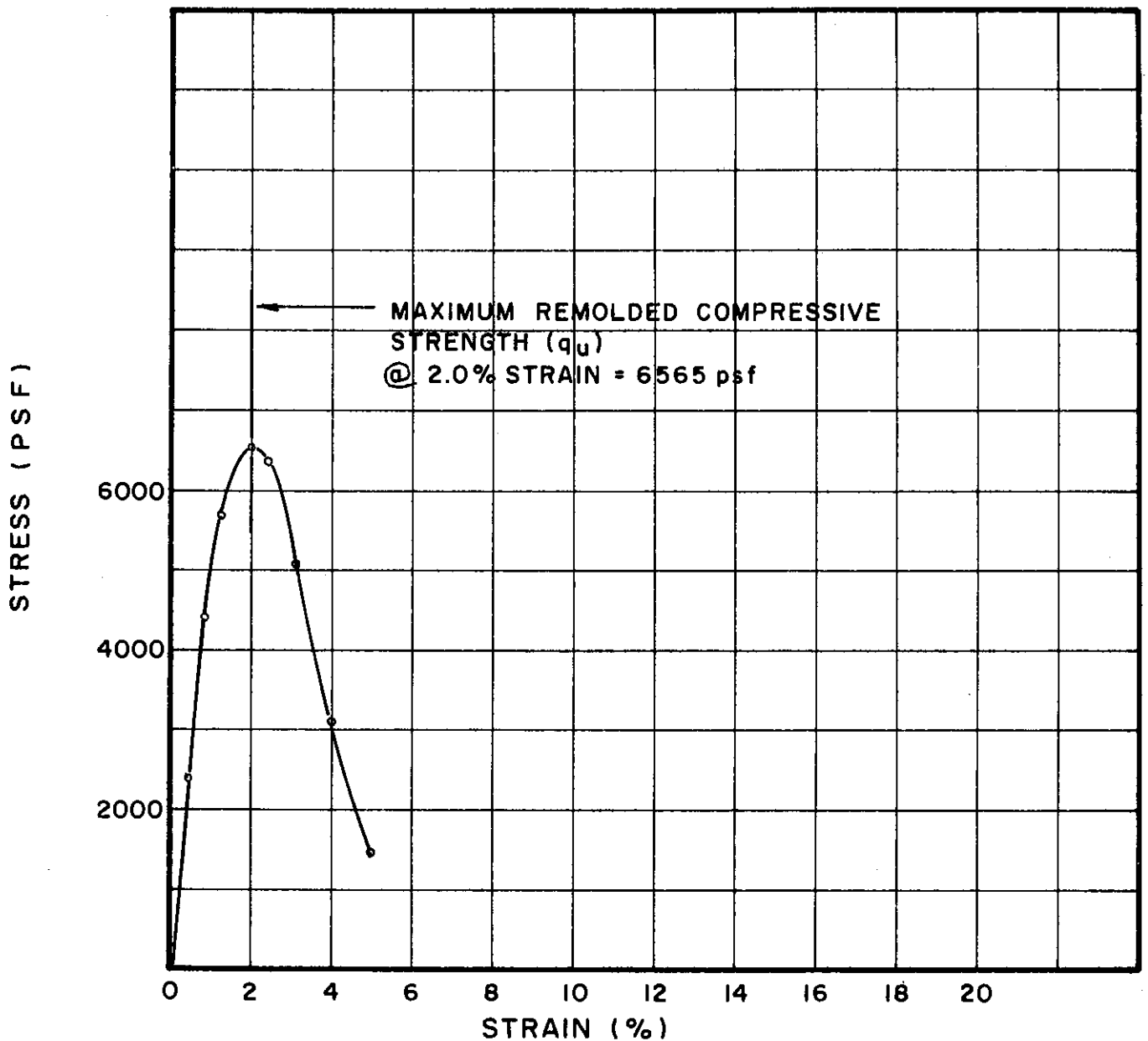


TEST NO.	TEST DATA			SOIL PROPERTIES		SOIL DESCRIPTION	
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)		ATTERBERG LIMITS LL(%) PL(%)
U537.1	1.41	3.24	.28	26.3	97	48 21	SILTY CLAY (CL-CH)
U537.2	1.39	3.23	.28	24.1	99		
rU537.1	1.42	3.15	.28	24.1	100		

BORING NO. 144  
 SAMPLE NO. 4  
 DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U <sub>r</sub> 542.1	1.40	3.18	.283	16.6	104	46	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 146

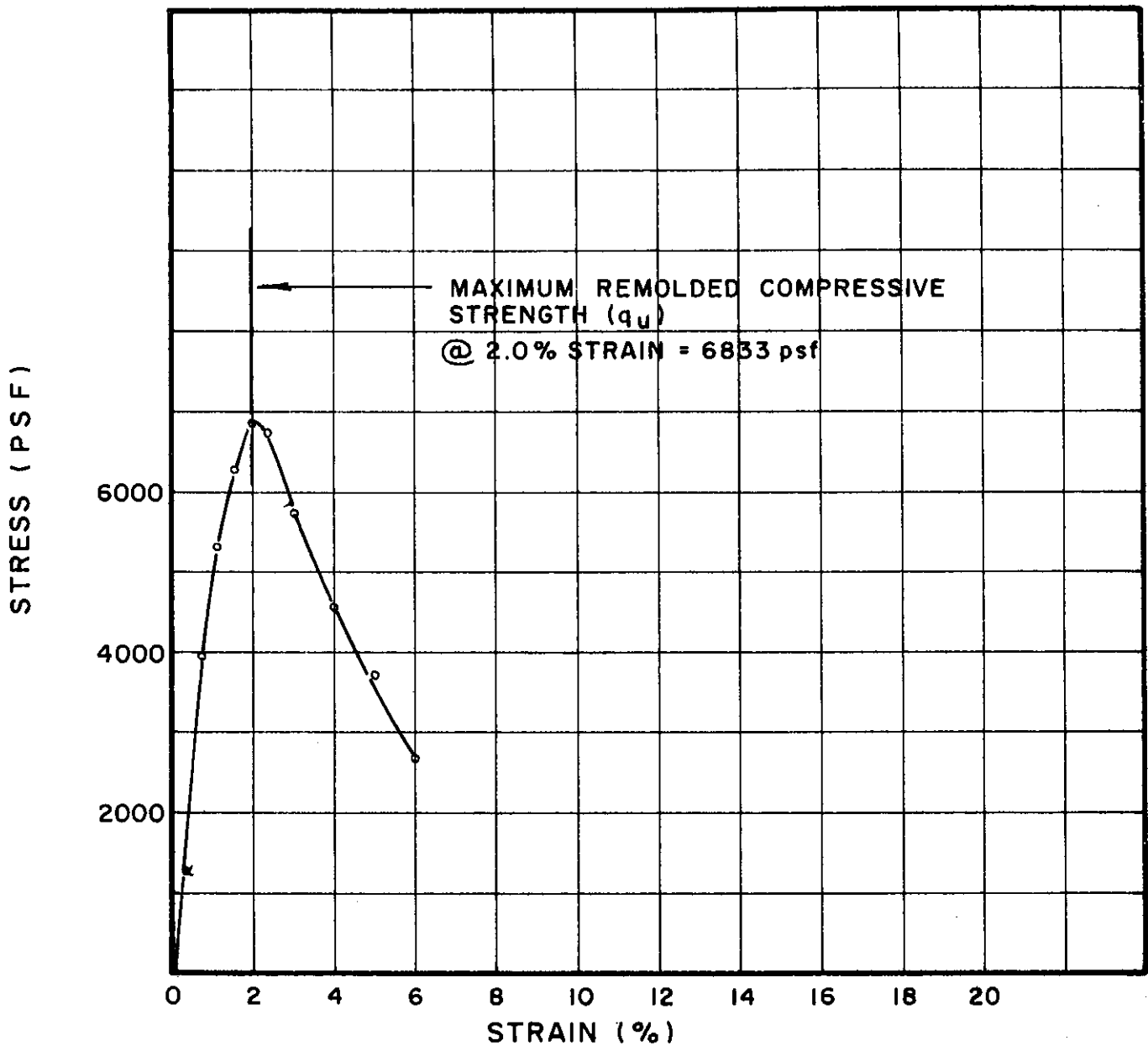
SAMPLE NO. ST 7

DEPTH 14.0' TO 16.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

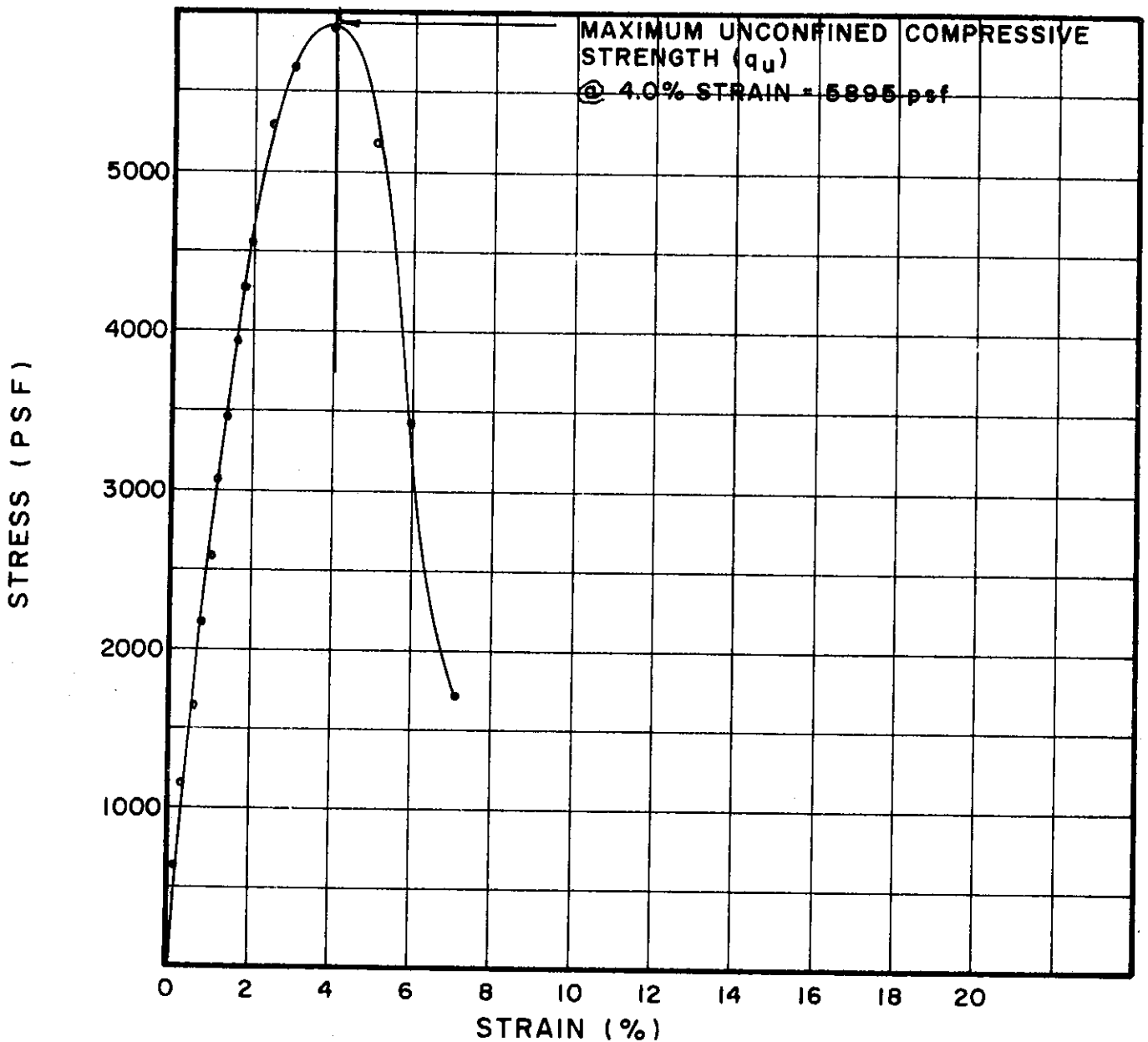


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>r</sub> 548.1	1.37	3.20	.281	16.8	104	50	21	SILTY CLAY (CL-CH)
								COMPACTED SAMPLE

BORING NO. 158  
 SAMPLE NO. ST 2  
 DEPTH 7.5' TO 9.7'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U552.1	1.40	3.43	0.25	23.9	104	50	23	SILTY CLAY (CL-CH)

BORING NO. 185

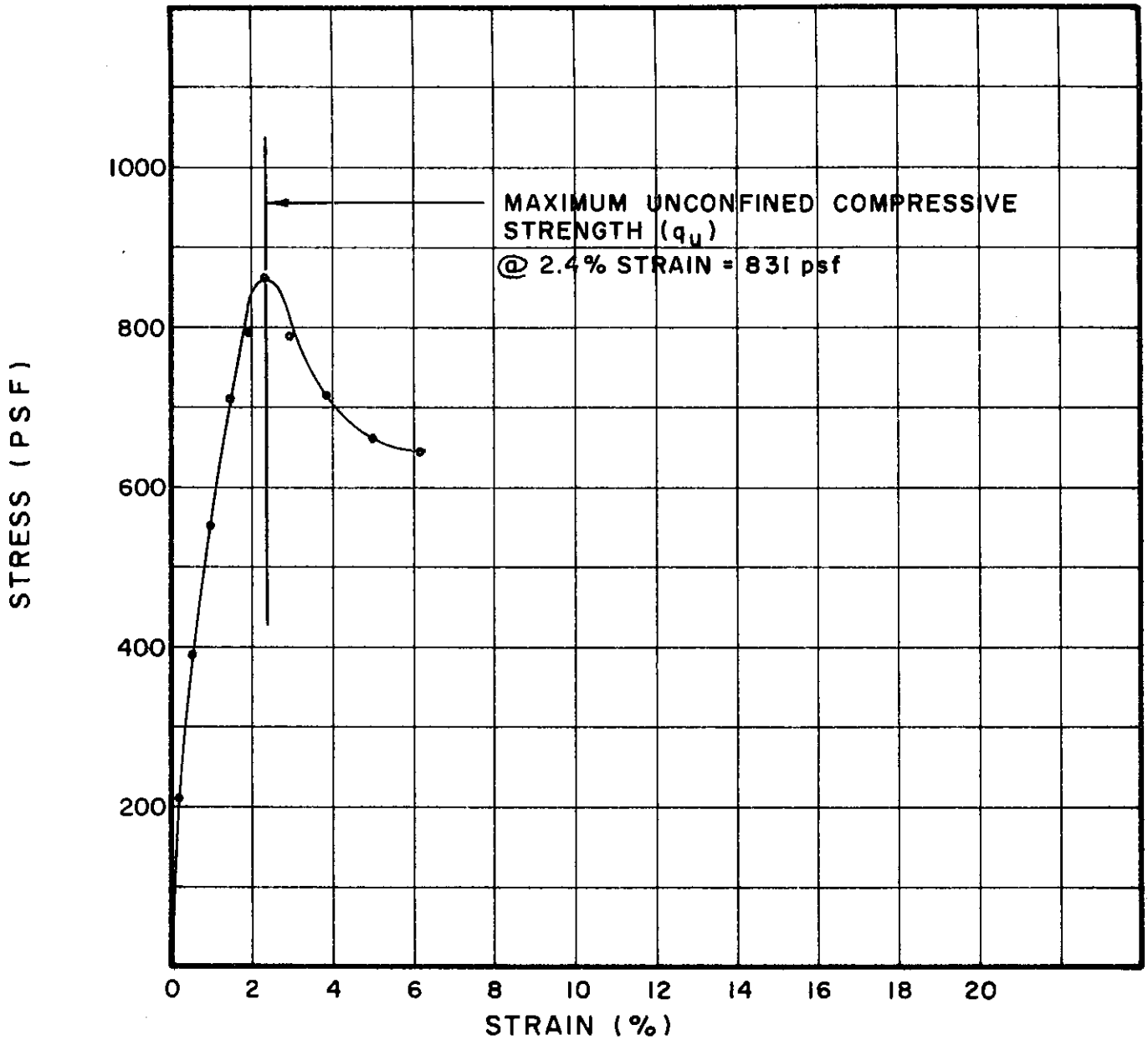
SAMPLE NO. 3

DEPTH 7.5' TO 7.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





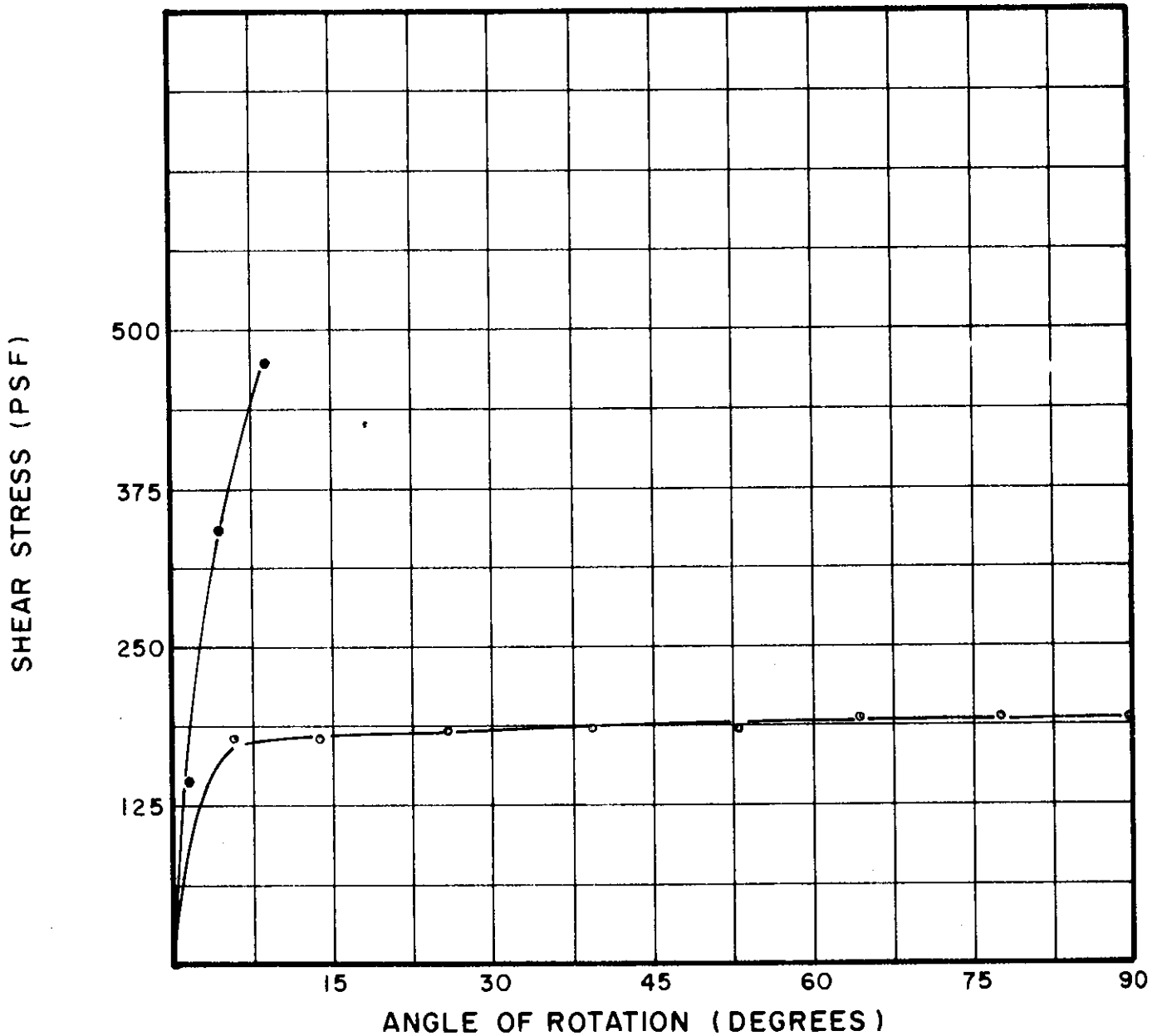
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U554.1	1.41	3.33	0.25	39.3	81	49	22	SILTY CLAY (CL-CH)

BORING NO. 185  
 SAMPLE NO. 7  
 DEPTH 18.5' TO 18.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)

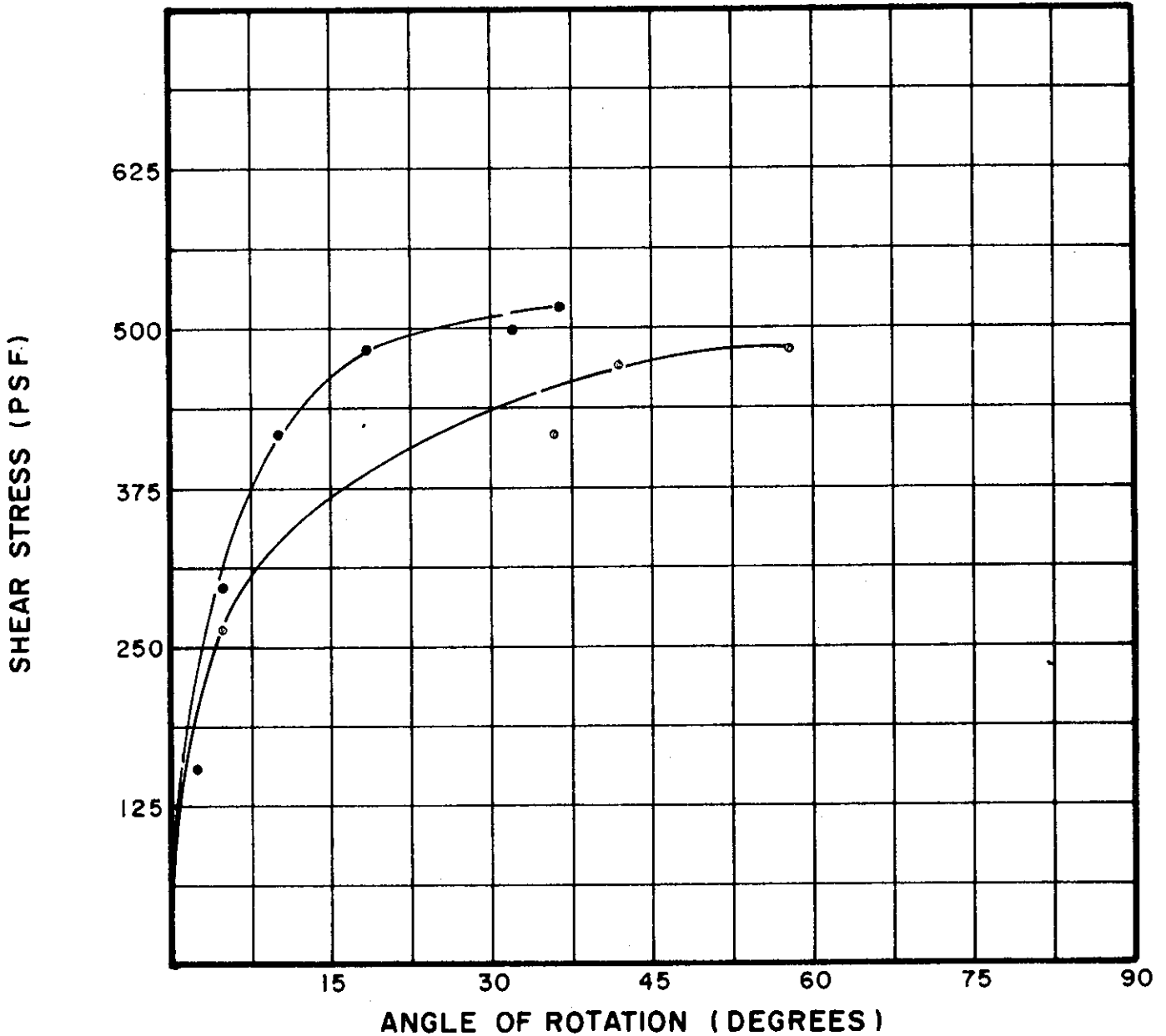
BORING NO. 50

SAMPLE NO. 6

DEPTH 28.1' - 28.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

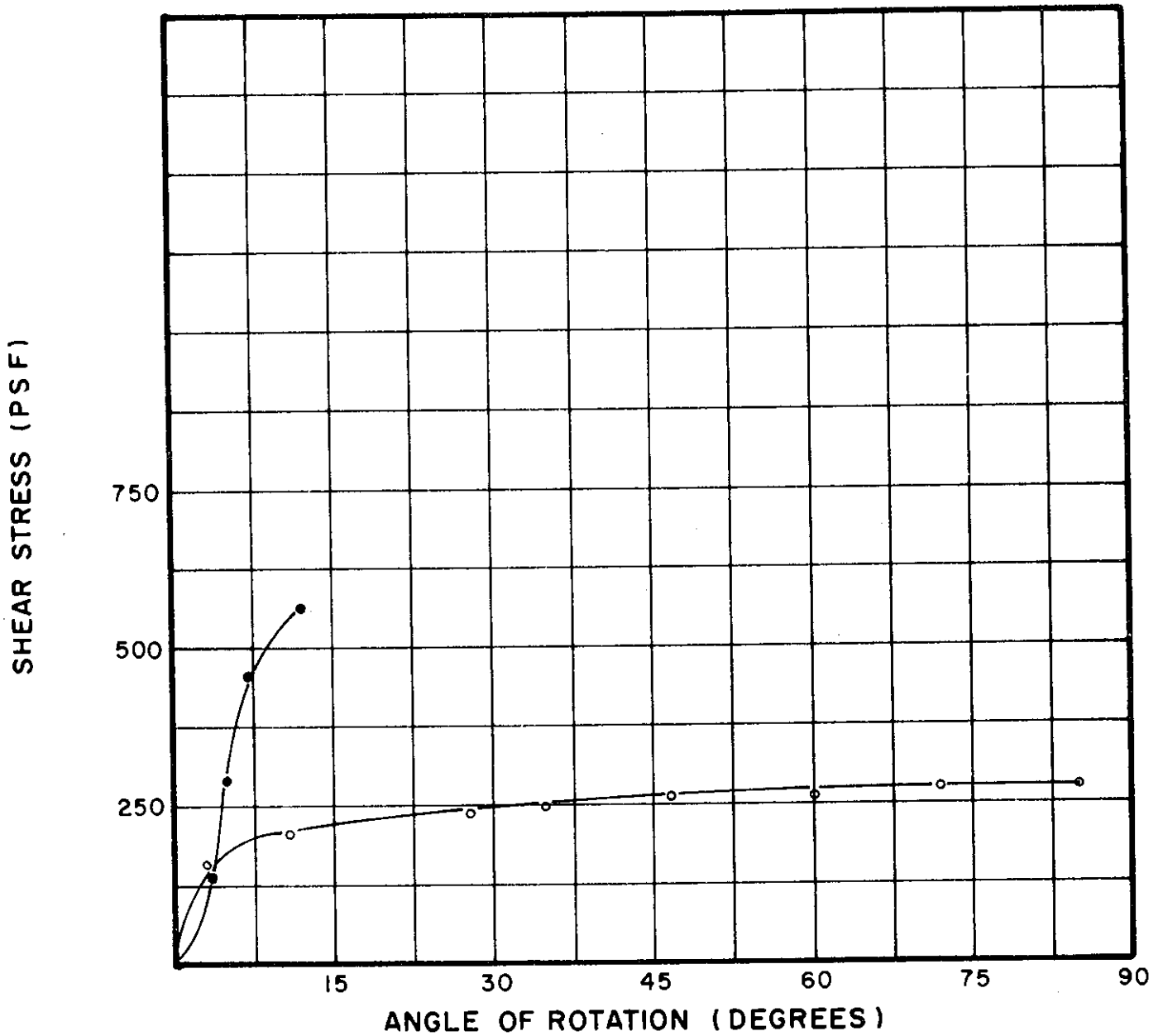


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.1' - 48.4'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

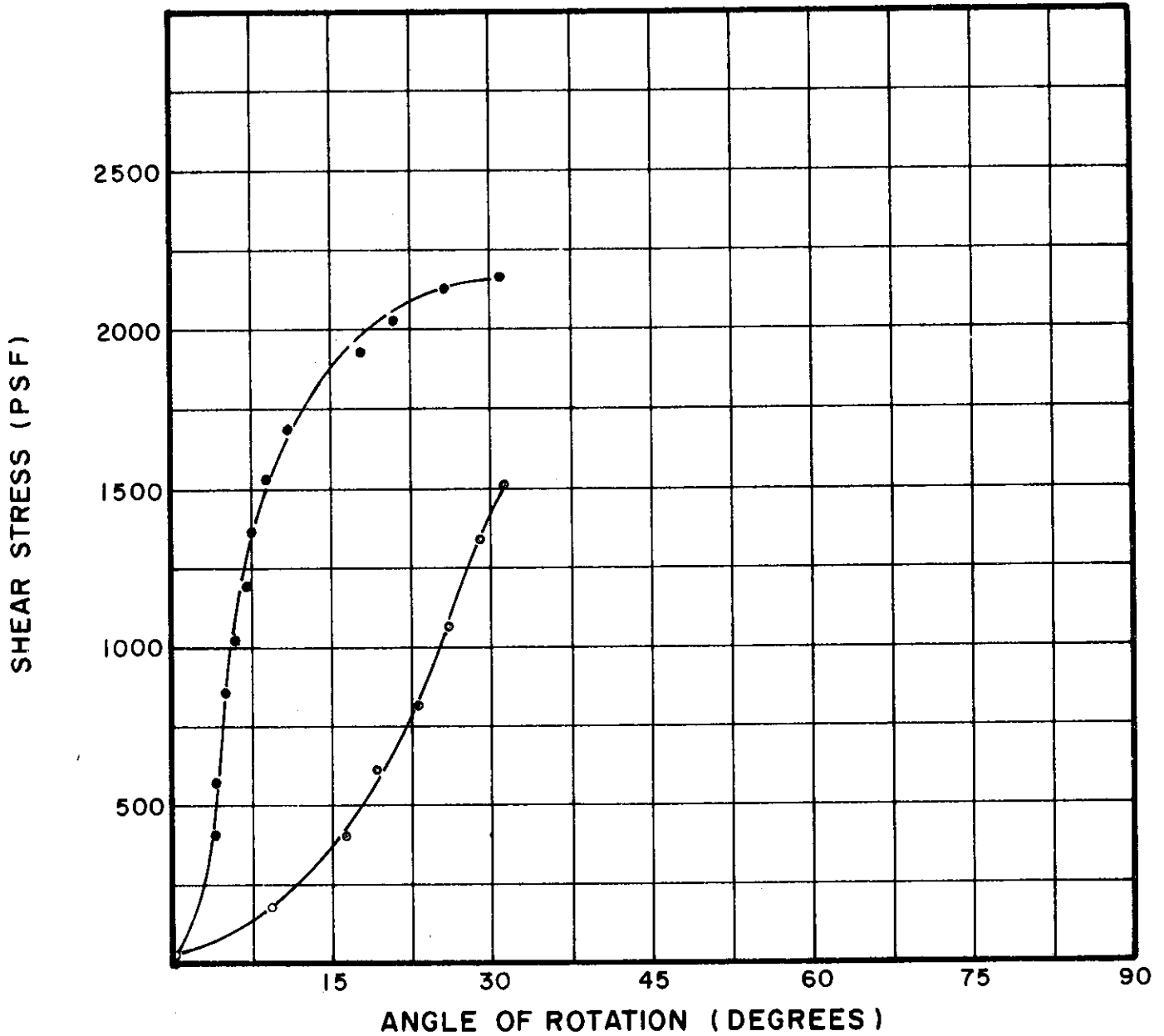


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VSI09.1 ●	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)
rVSI09.1 ○	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 28.9' - 29.2'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

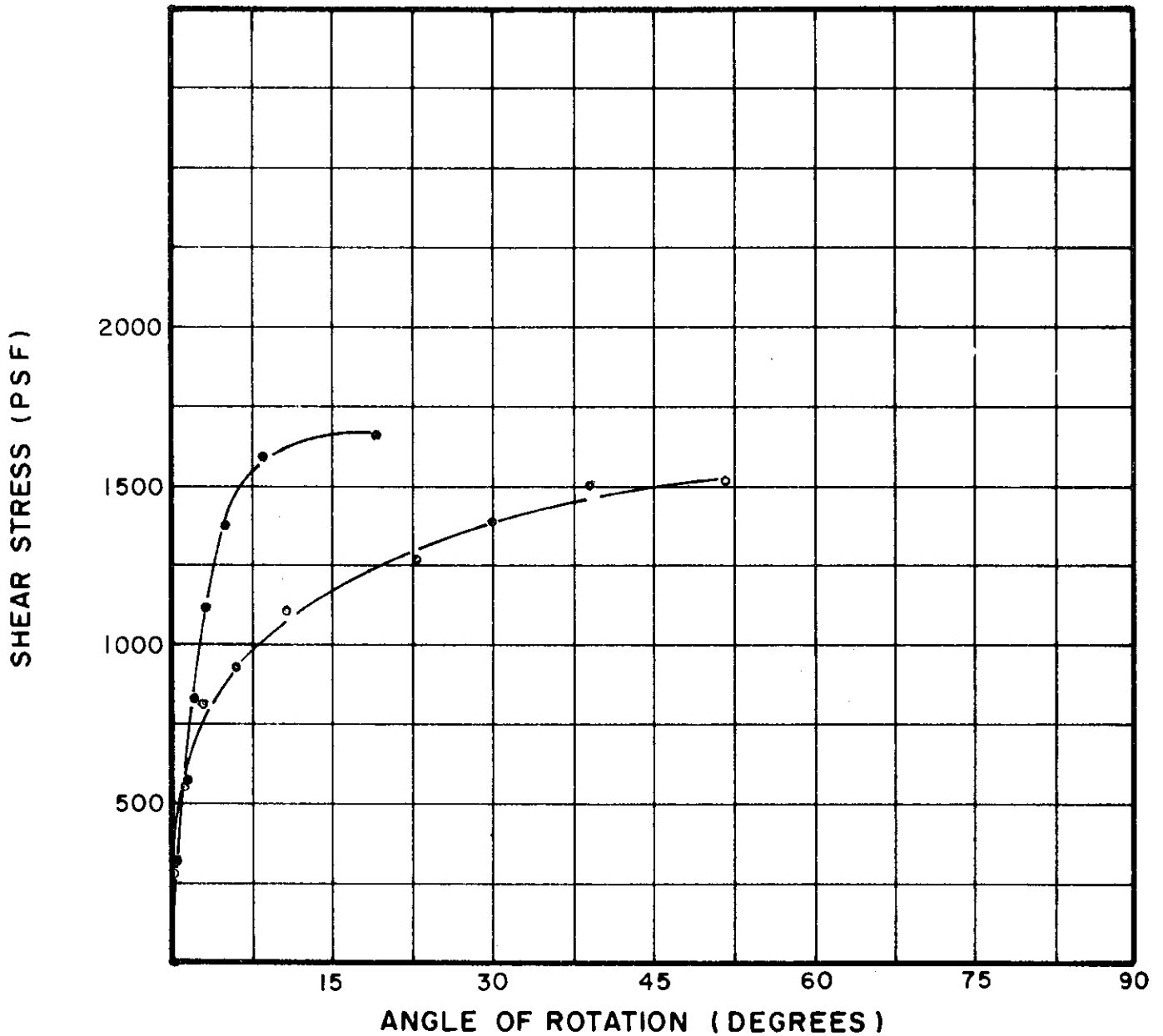


TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%) PL (%)	
VS111.1 ●	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)
VS111.1 ○	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 49.6' - 49.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

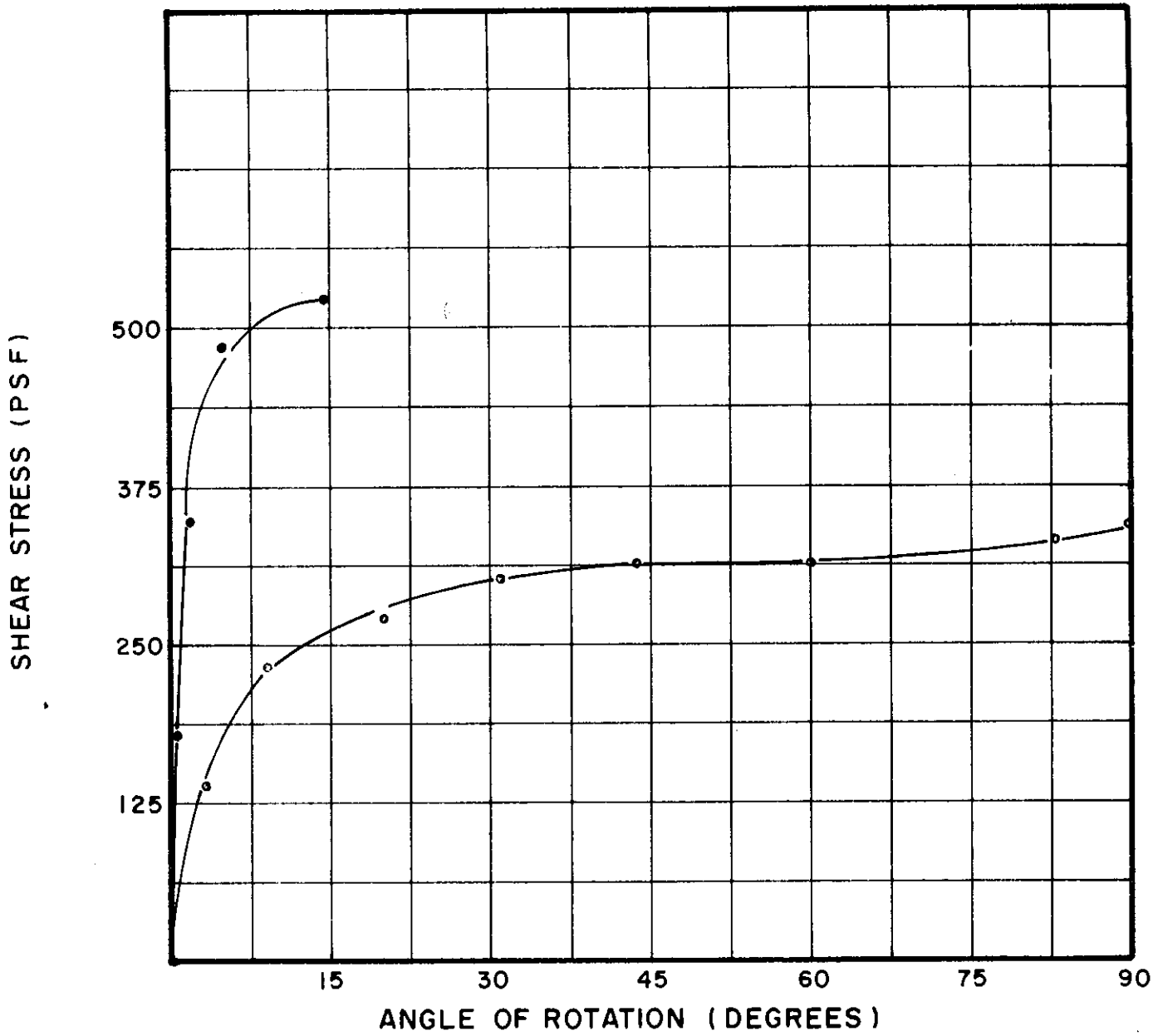


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 89.1' - 89.4'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

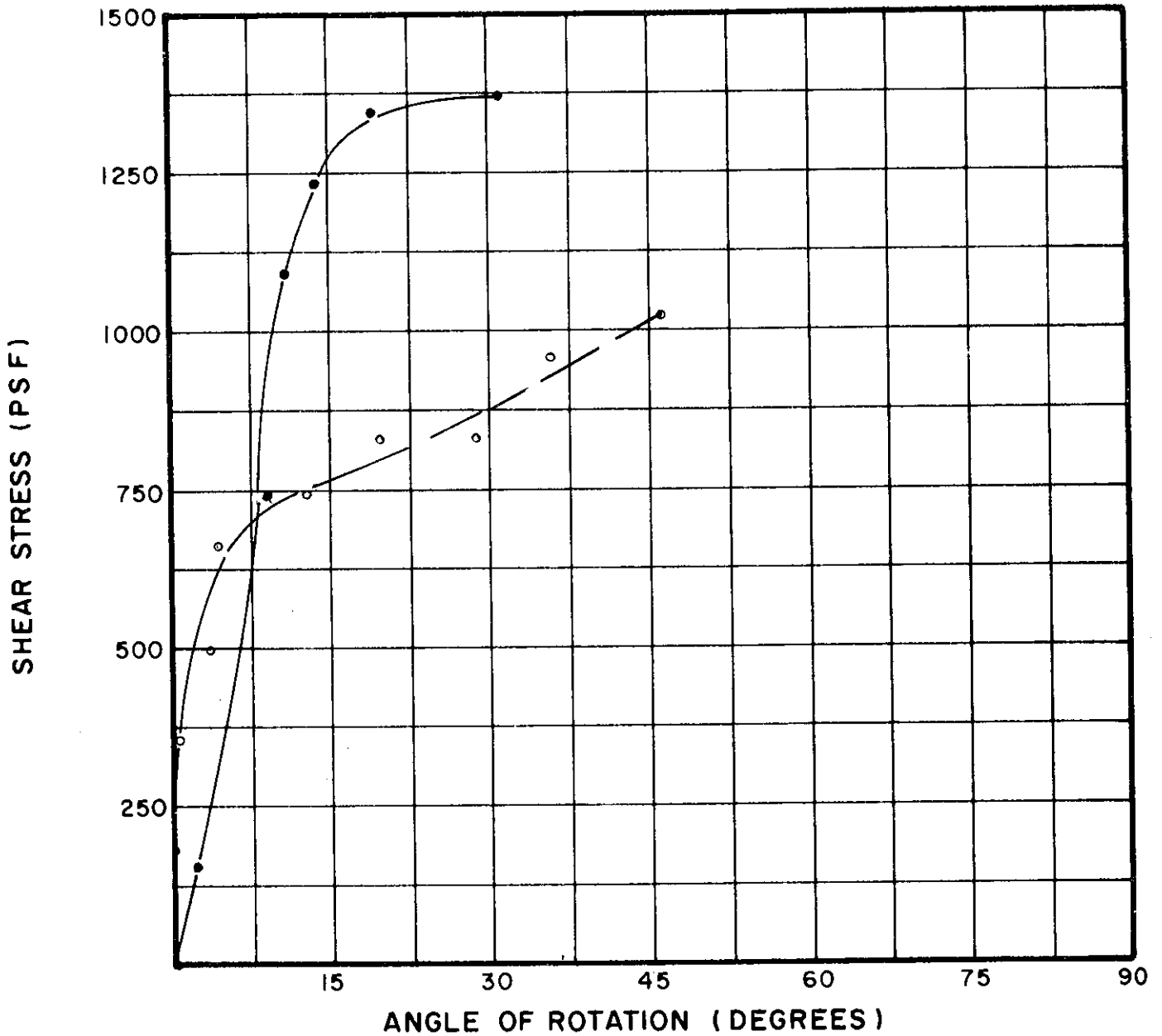


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS99.2 ●	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)
rVS99.2 ○	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 6  
 DEPTH 49.7' - 50.0'

LABORATORY VANE SHEAR TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



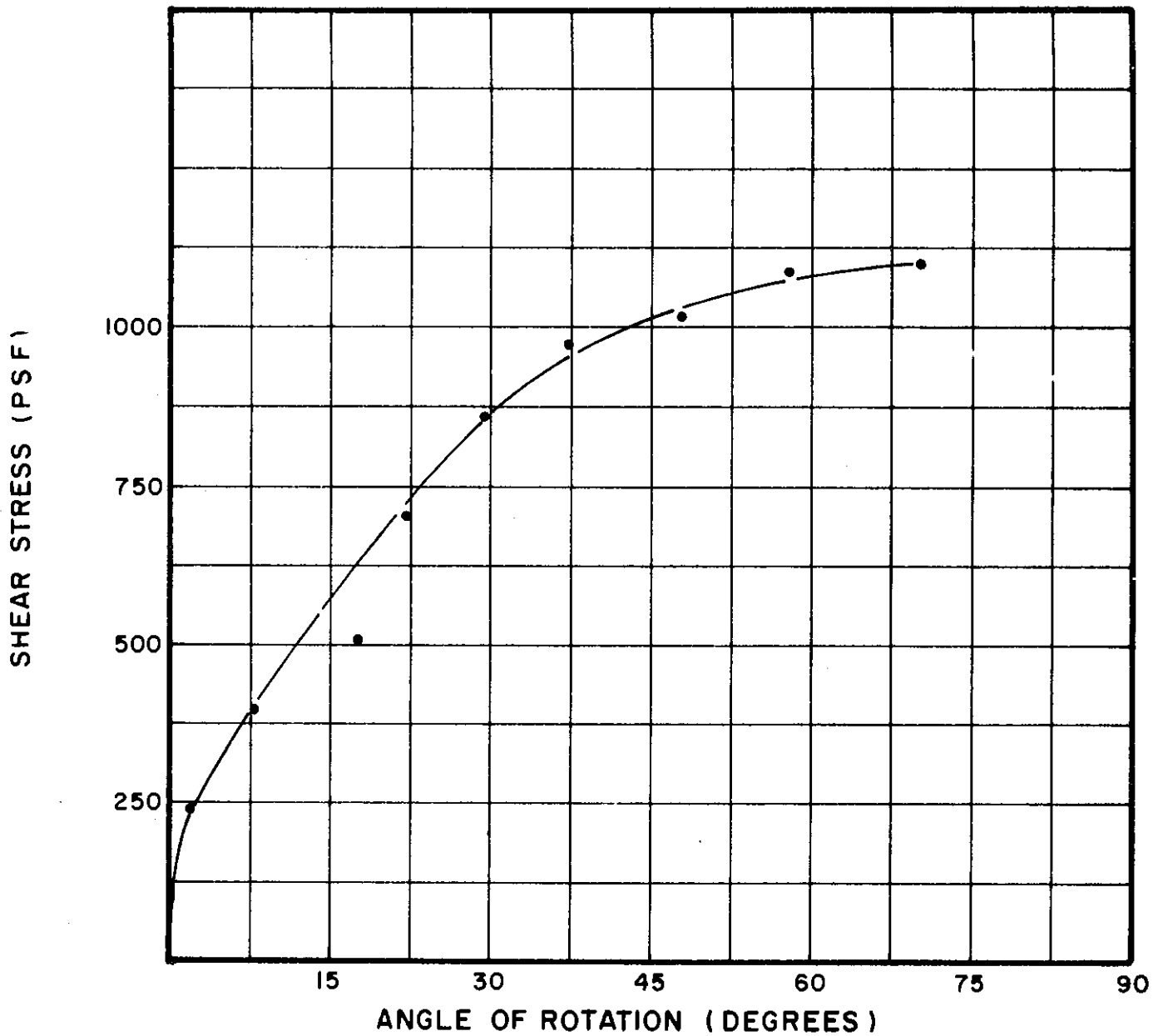


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)
rVS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 79.5' - 79.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS398.1	.50	.25	6.0	27.5	92	38	17	SILTY CLAY, SANDY (CL)

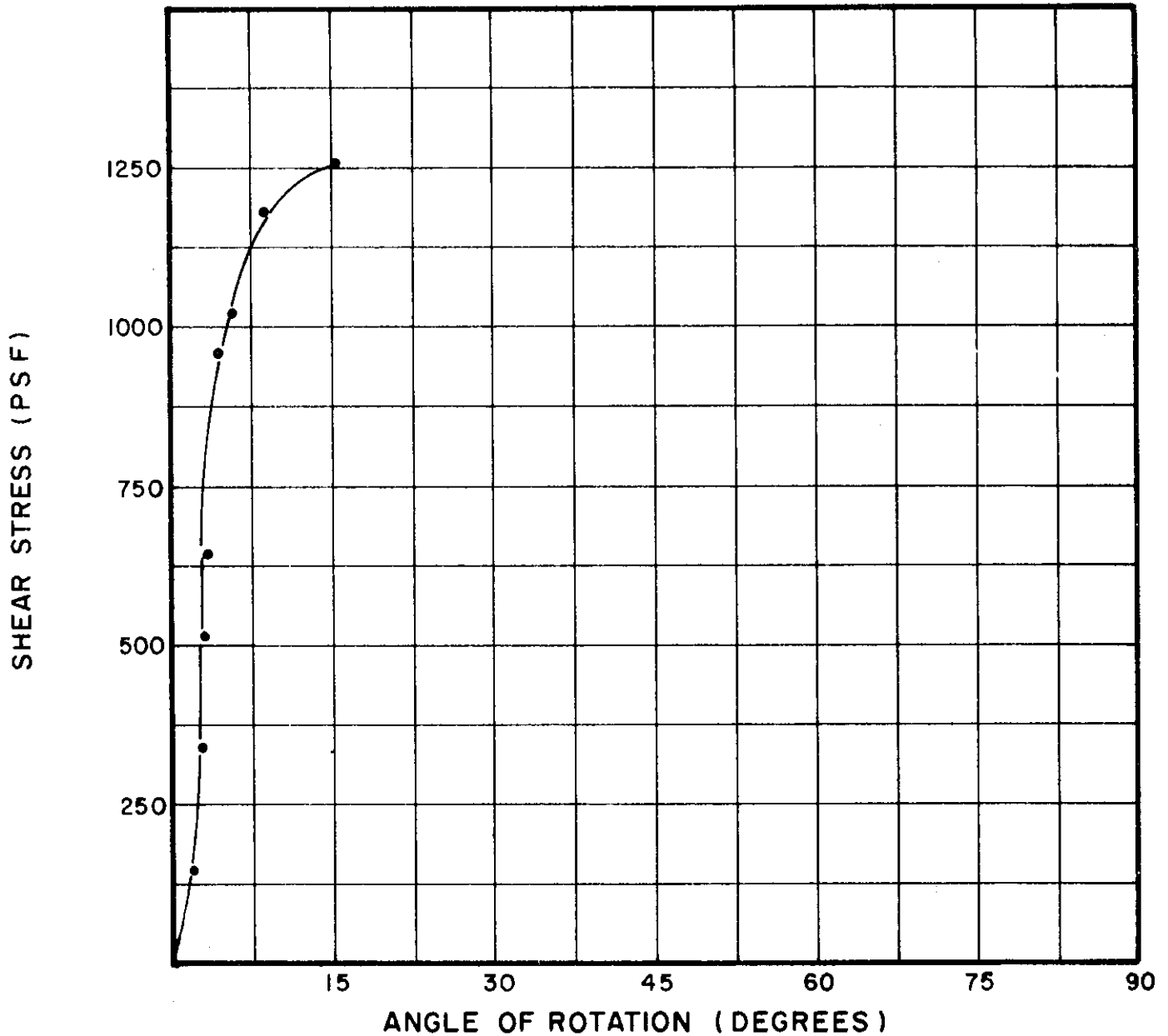
BORING NO. 54

SAMPLE NO. 5

DEPTH 59.7' - 60.0'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

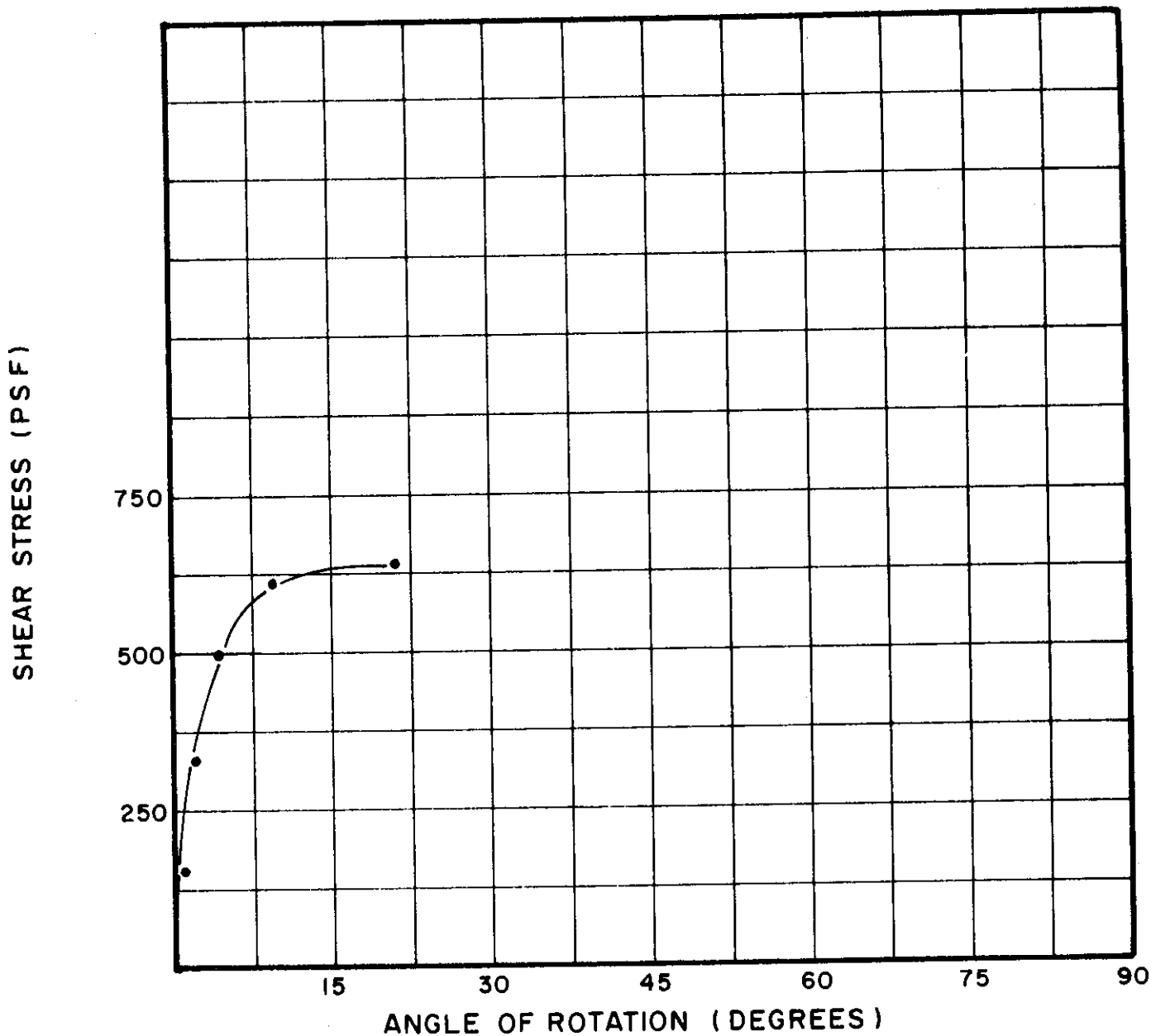


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS76.1	.50	.25	6.0	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.5' - 18.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

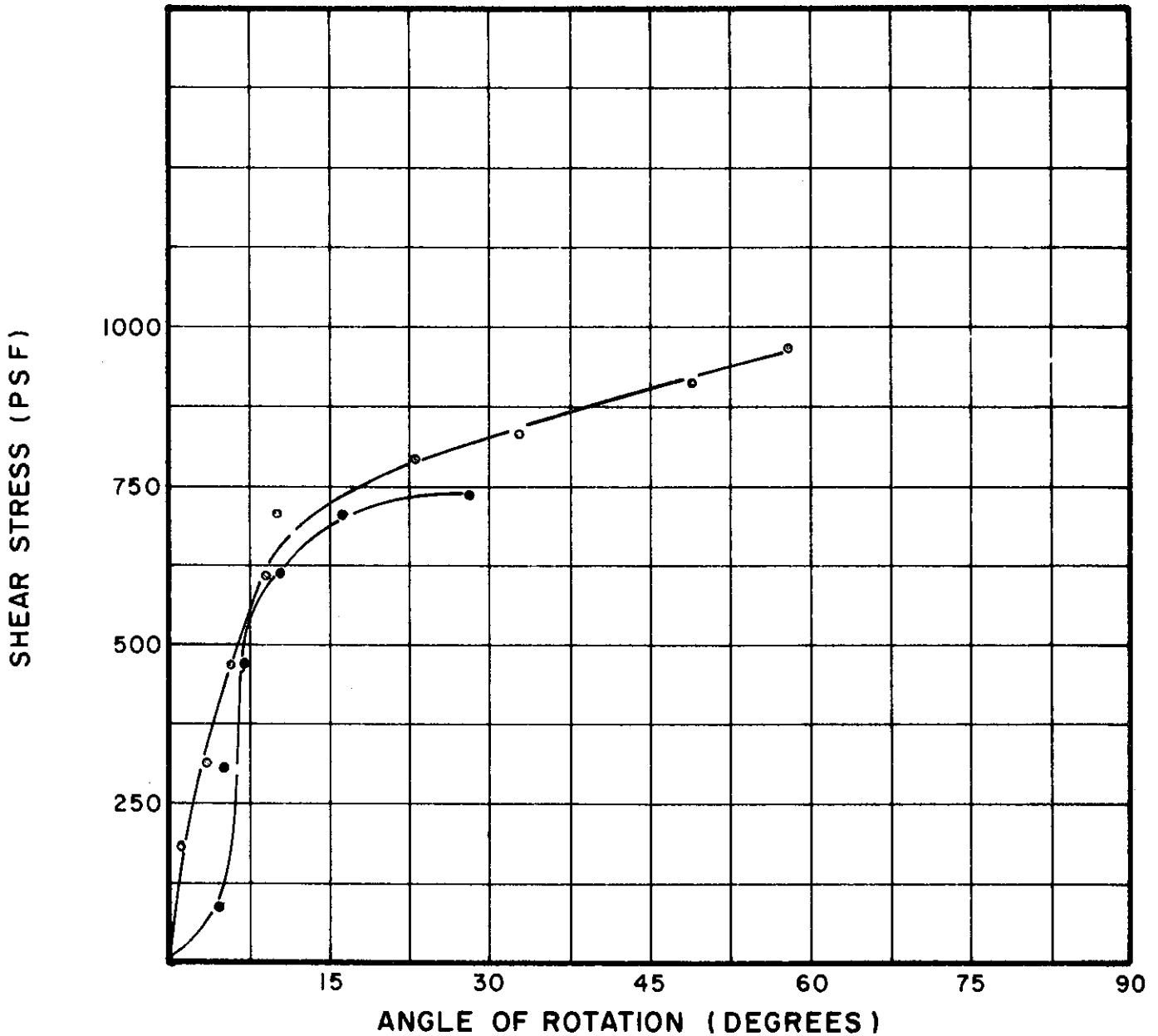


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS78.1	.50	.25	6.0	25.6	96	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59  
 SAMPLE NO. 5  
 DEPTH 39.4' - 39.7'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



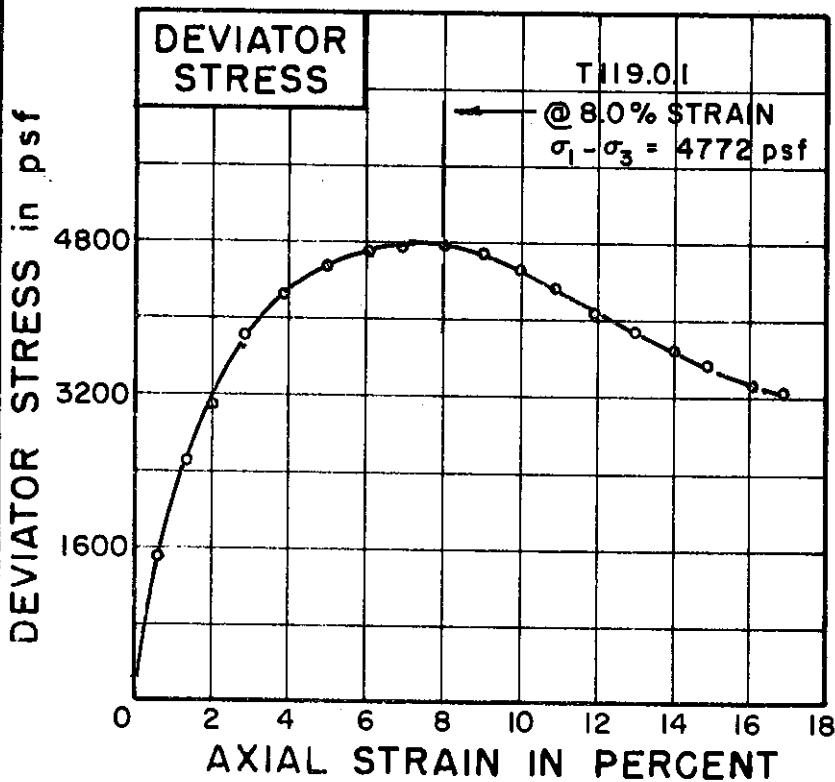
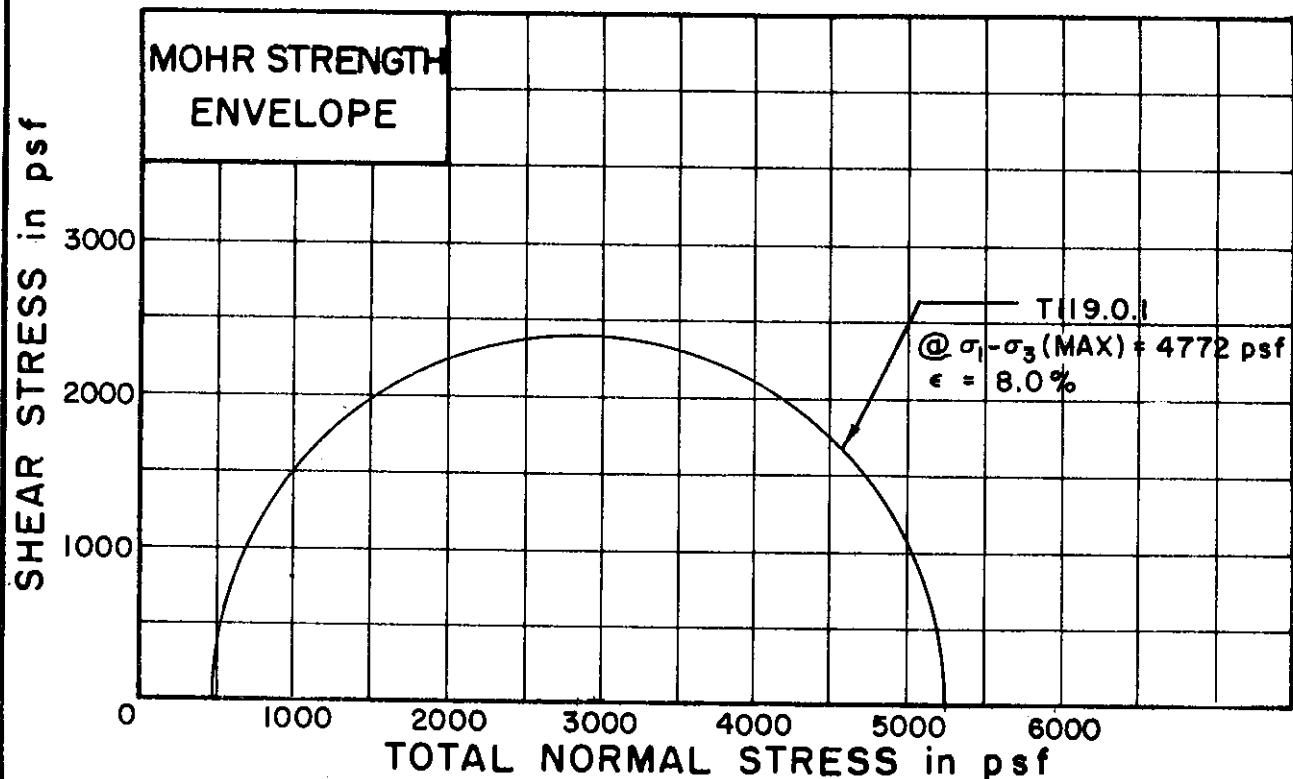
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)
rVS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)

BORING NO. 59  
 SAMPLE NO. 7  
 DEPTH 59.0' - 59.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T119.01		
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INITIAL WATER CONTENT	$w_o$	25.4%		
DRY DENSITY pcf	$\gamma_d$	101		
SAMPLE DIAMETER in.	$D_o$	1.40		
SAMPLE HEIGHT in.	$H_o$	3.41		

CONFINING PRESSURE psf	$\sigma_3$	475		
RATE OF STRAIN PERCENT/MINUTE		0.26		

FINAL WATER CONTENT	$w_f$	25.1%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 15

SAMPLE NO. 2

DEPTH 3.7' TO 4.1'

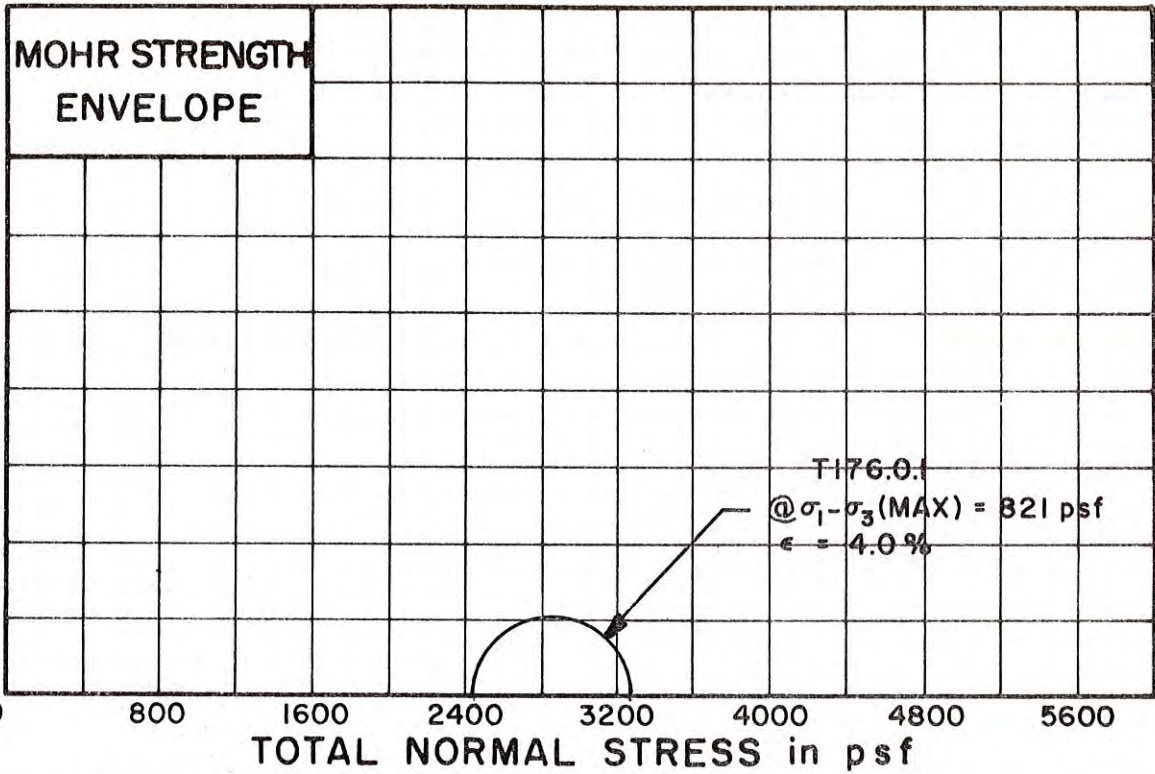
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

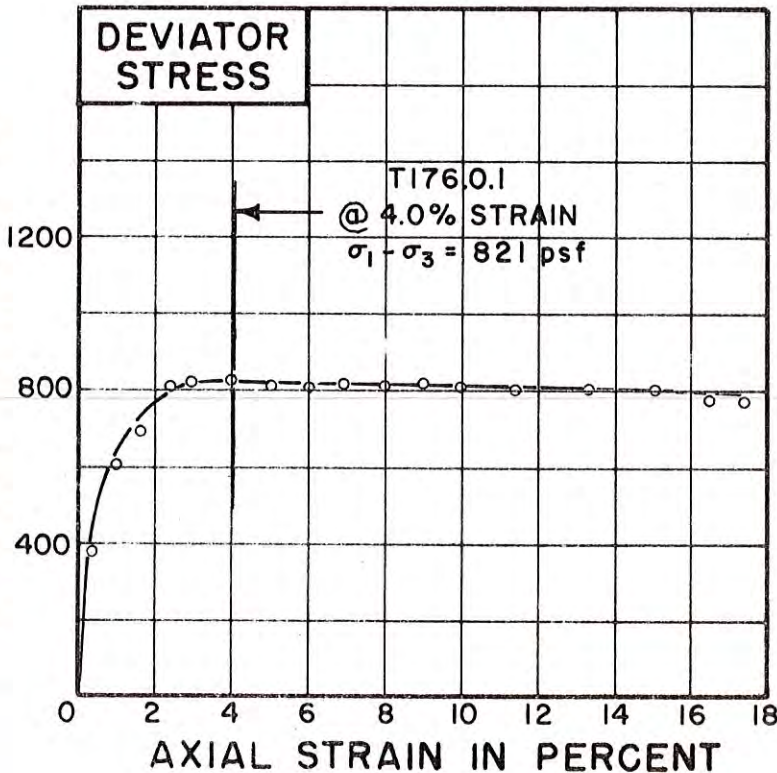
**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL T176.0.1

INITIAL WATER CONTENT  $w_o$  39.9%

DRY DENSITY  $\rho_{cf}$   $\gamma_d$  83

SAMPLE DIAMETER, in.  $D_o$  1.37

SAMPLE HEIGHT in.  $H_o$  3.29

CONFINING PRESSURE  $\sigma_3$  2448 psf

RATE OF STRAIN PERCENT/MINUTE 0.26

FINAL WATER CONTENT  $w_f$  39.8%

SKETCH OF SAMPLE AT END OF TEST

BORING NO. 18

SAMPLE NO. 3

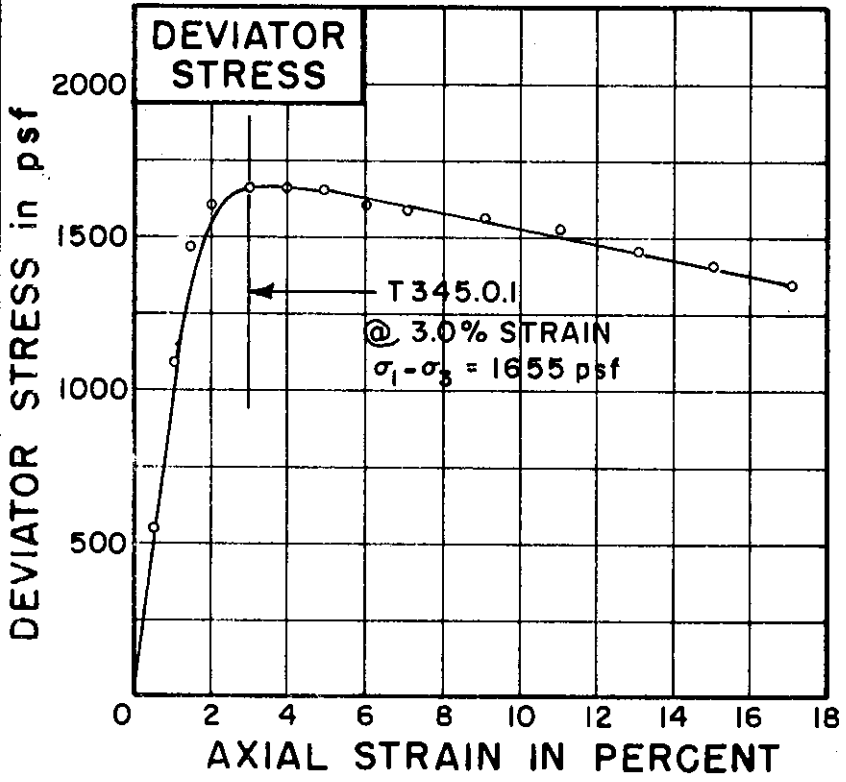
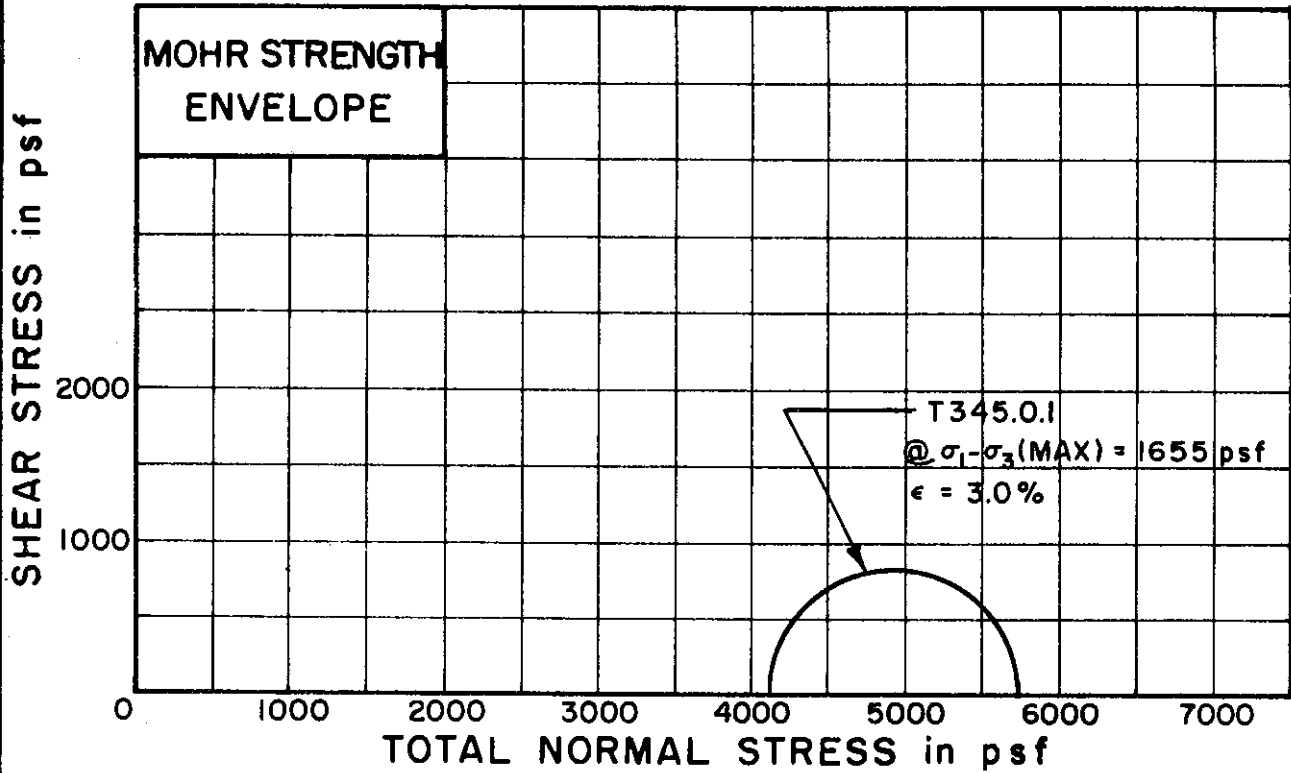
DEPTH 20.6' TO 20.9'

SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T345.0.1		
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INITIAL WATER CONTENT	$w_0$	31.0%		
DRY DENSITY pcf	$\gamma_d$	92		
SAMPLE DIAMETER in.	$D_0$	1.41		
SAMPLE HEIGHT in.	$H_0$	3.34		

CONFINING PRESSURE psf	$\sigma_3$	4104		
RATE OF STRAIN PERCENT/MINUTE		0.27		

FINAL WATER CONTENT	$w_f$	30.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 6

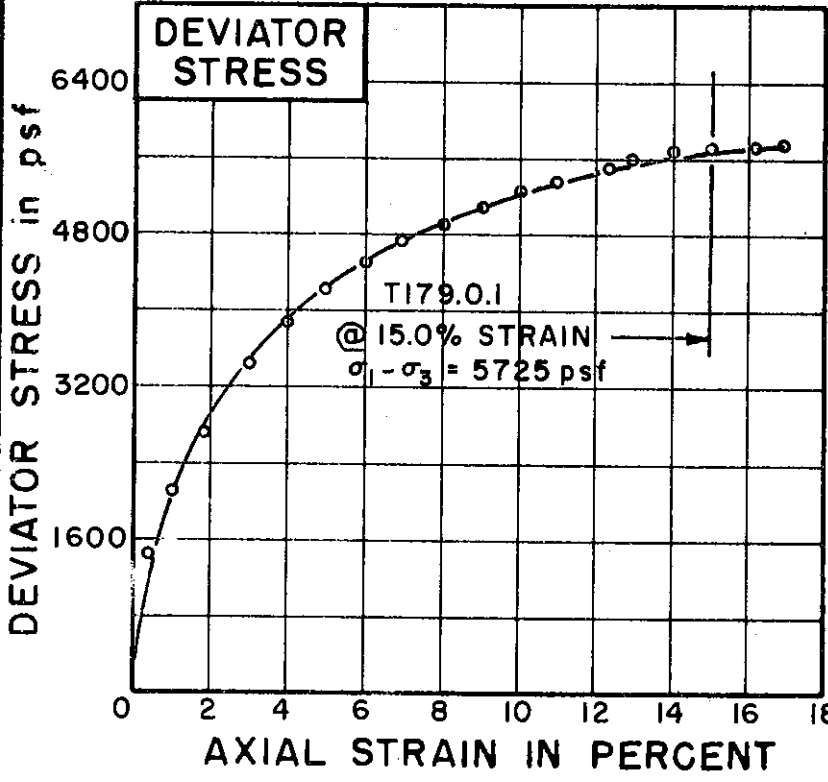
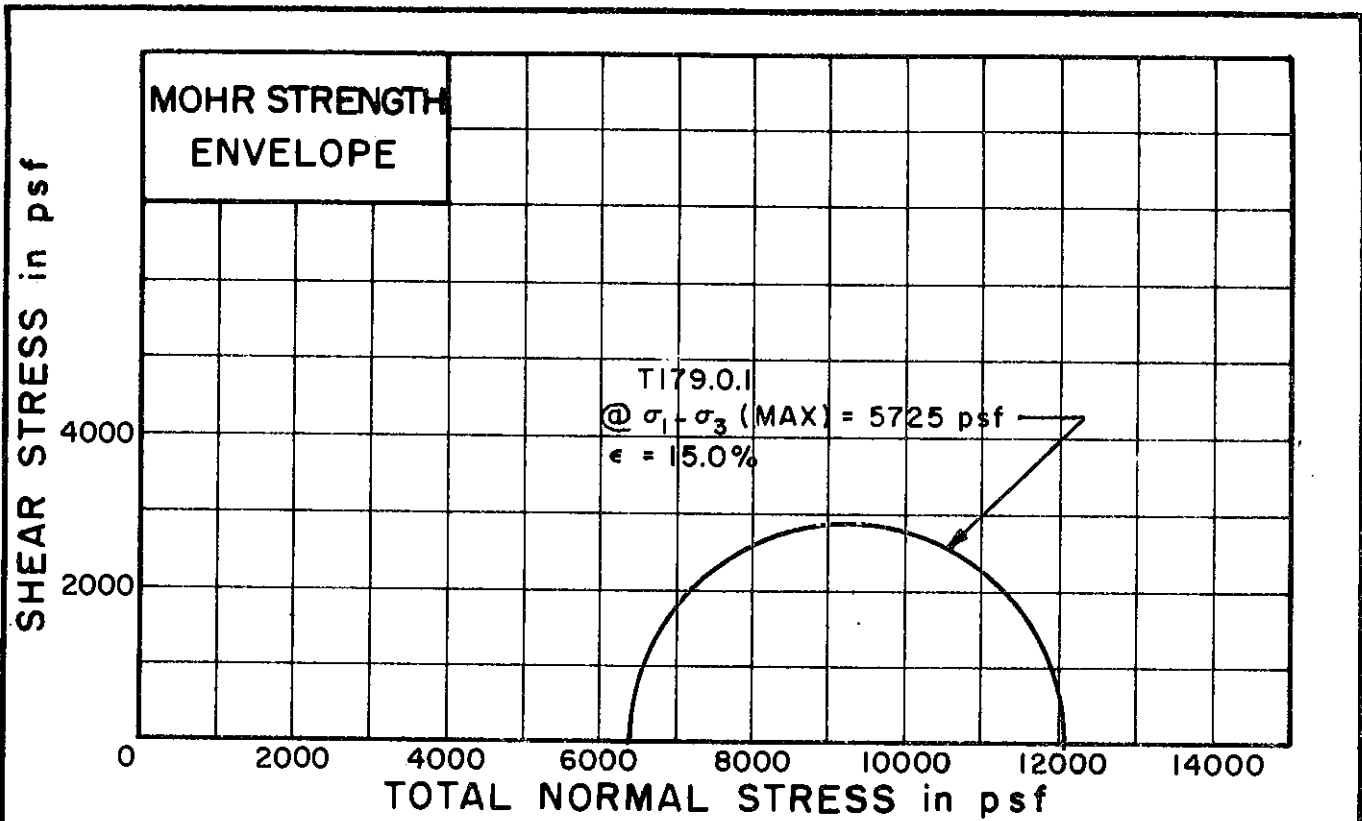
DEPTH 51.4' TO 51.7'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T179.0.1		
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INITIAL WATER CONTENT	$w_0$	17.3%	
DRY DENSITY	$\rho_d$	111	
SAMPLE DIAMETER	$D_0$	1.36	
SAMPLE HEIGHT	$H_0$	3.22	

CONFINING PRESSURE	$\sigma_3$	6336	
RATE OF STRAIN		0.26	

FINAL WATER CONTENT	$w_f$	17.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 18

SAMPLE NO. 10

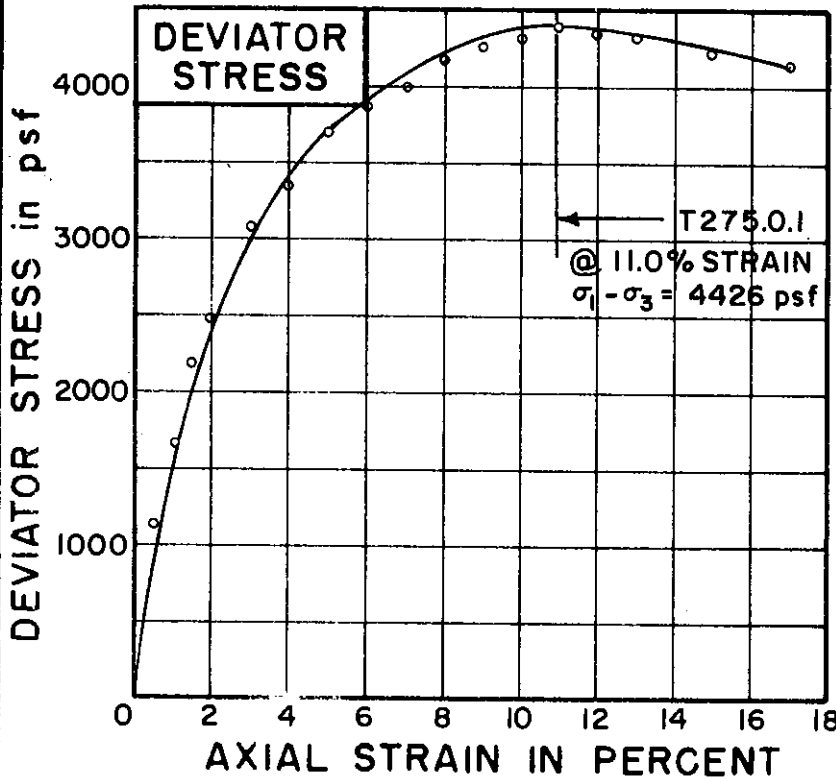
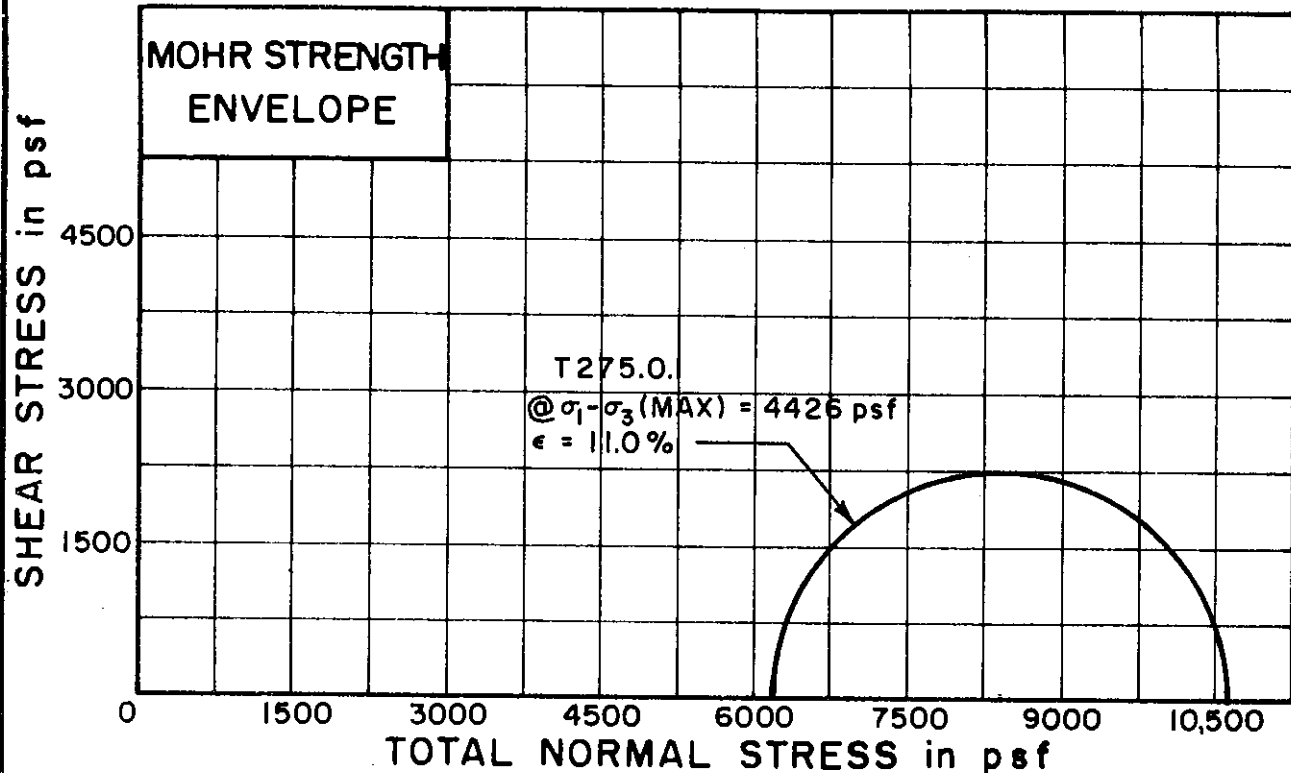
DEPTH 88.8' TO 90.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 29 PLASTIC LIMIT 15

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T275.0		
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INITIAL WATER CONTENT	$w_o$	22.5%	
DRY DENSITY pcf	$\gamma_d$	104	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.35	

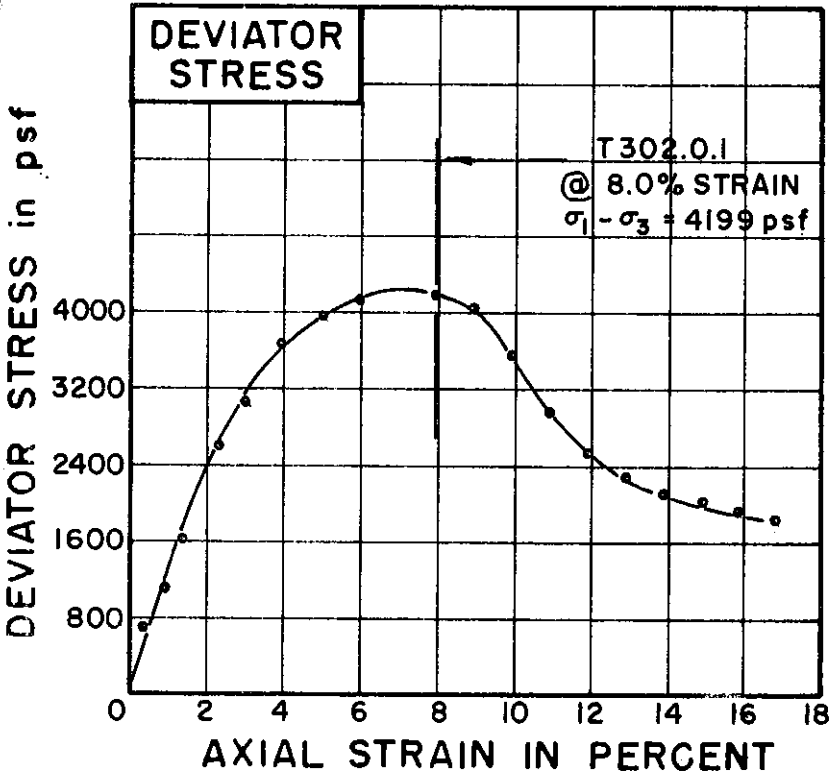
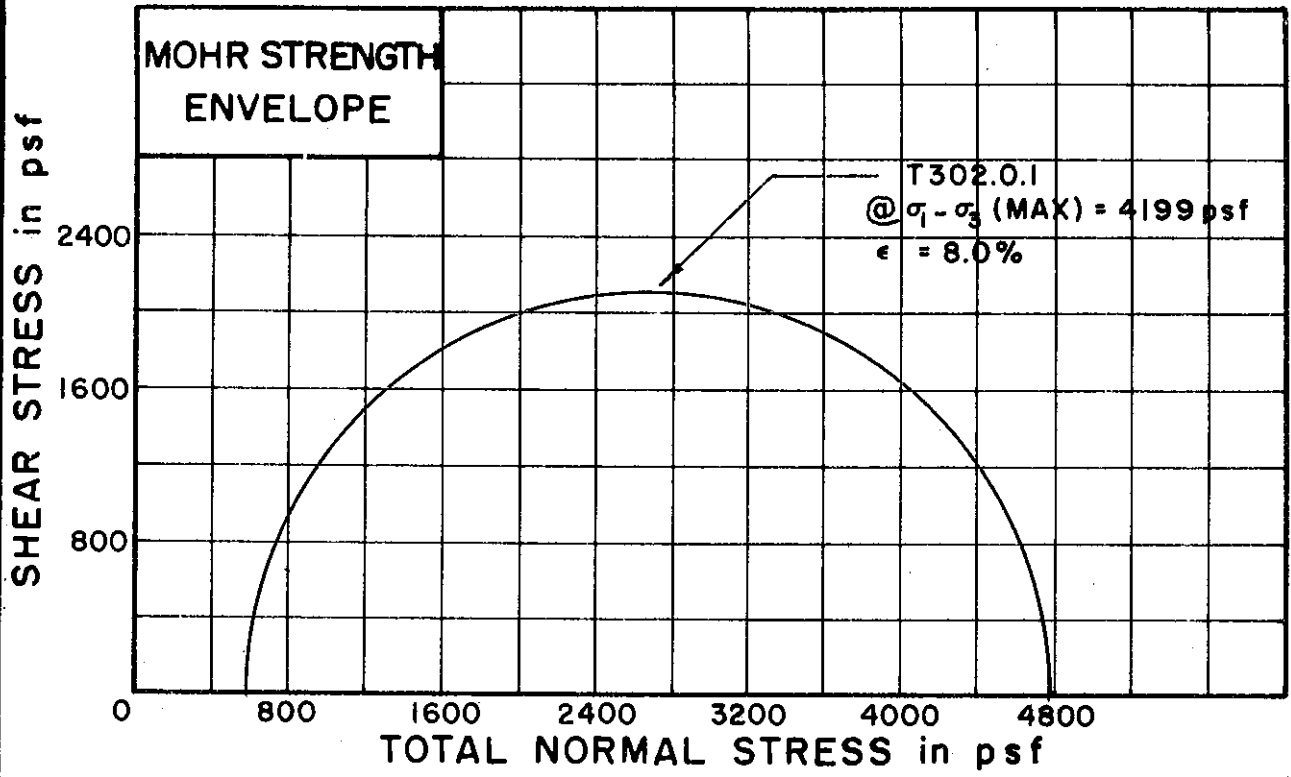
CONFINING PRESSURE psf	$\sigma_3$	6192	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	22.4%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 25  
 SAMPLE NO. 10  
 DEPTH 88.9' TO 89.2'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T302.0.		
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INITIAL WATER CONTENT	$w_o$	24.9%		
DRY DENSITY	$\gamma_d$ pcf	103		
SAMPLE DIAMETER	$D_o$ in.	1.40		
SAMPLE HEIGHT	$H_o$ in.	3.33		

CONFINING PRESSURE	$\sigma_3$ psf	576		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	24.7%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 27

SAMPLE NO. 2

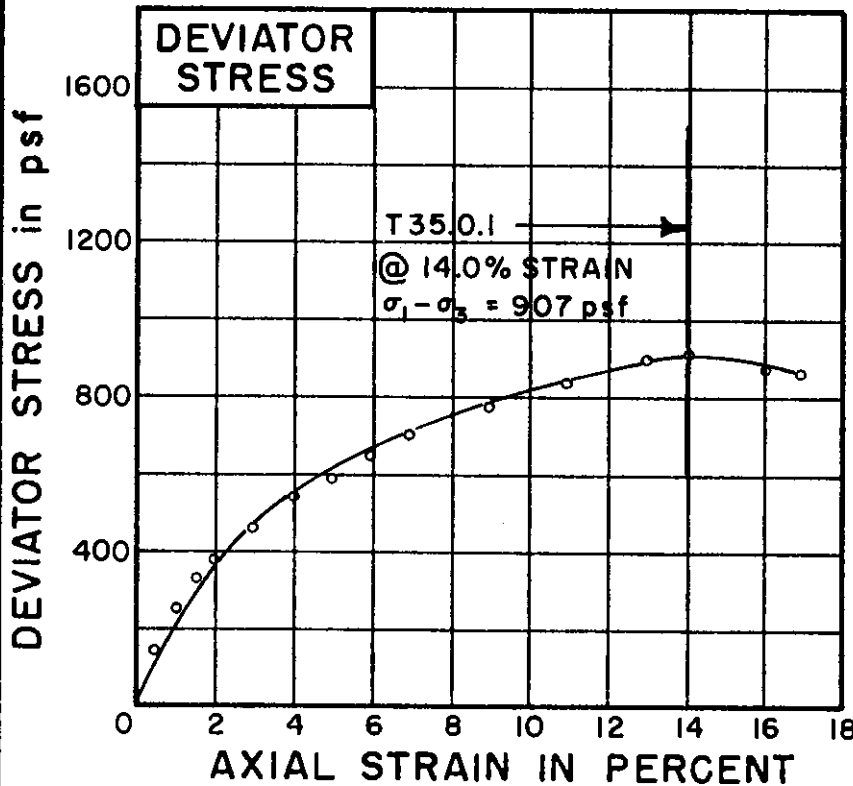
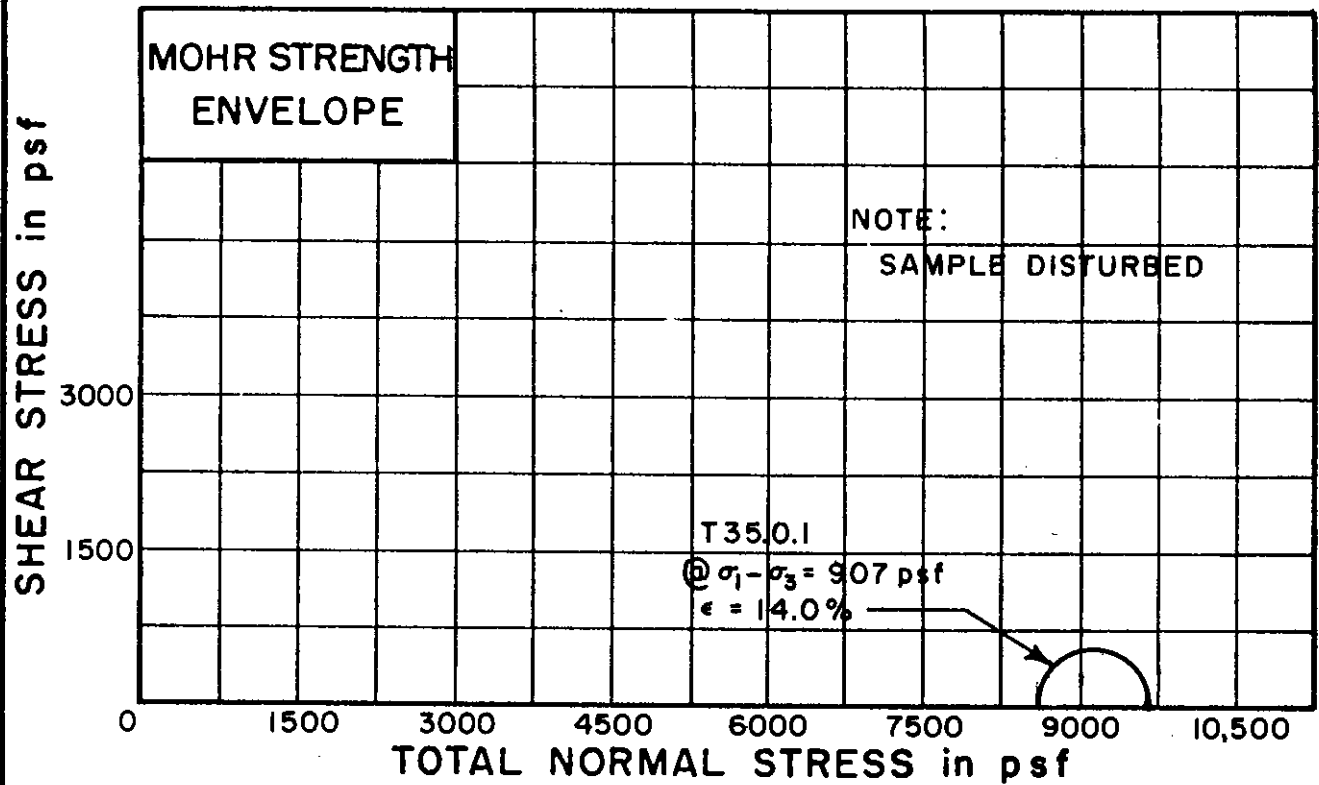
DEPTH 4.5' TO 4.8'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 24

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T35.0.1		
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INITIAL WATER CONTENT	$w_o$	19.6%	
DRY DENSITY pcf	$\gamma_d$	105	
SAMPLE DIAMETER, in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	8654	
RATE OF STRAIN PERCENT/MINUTE		0.26	

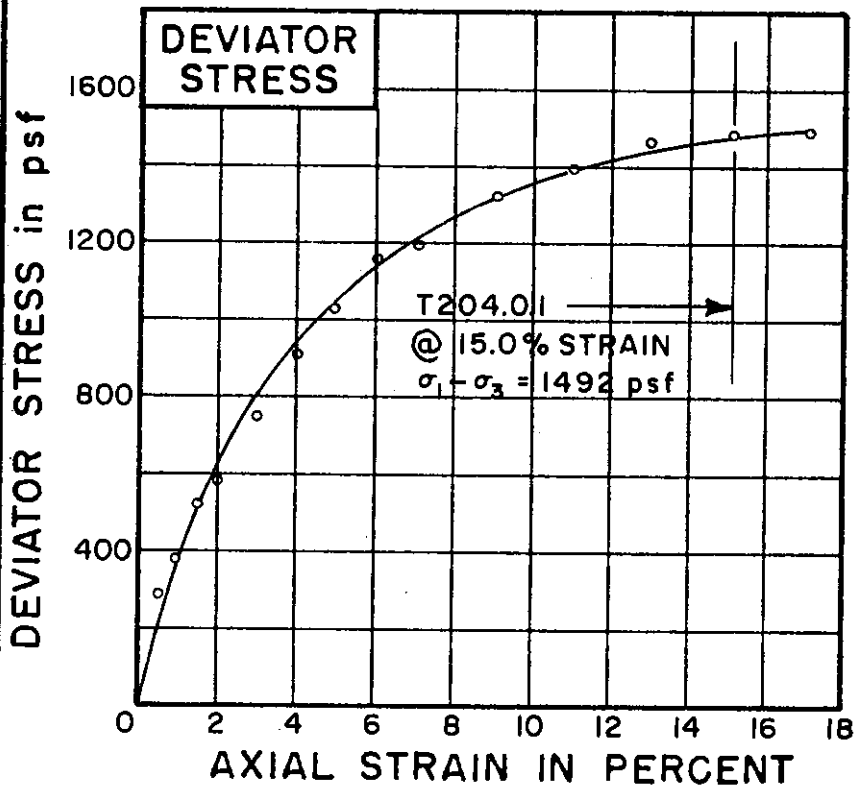
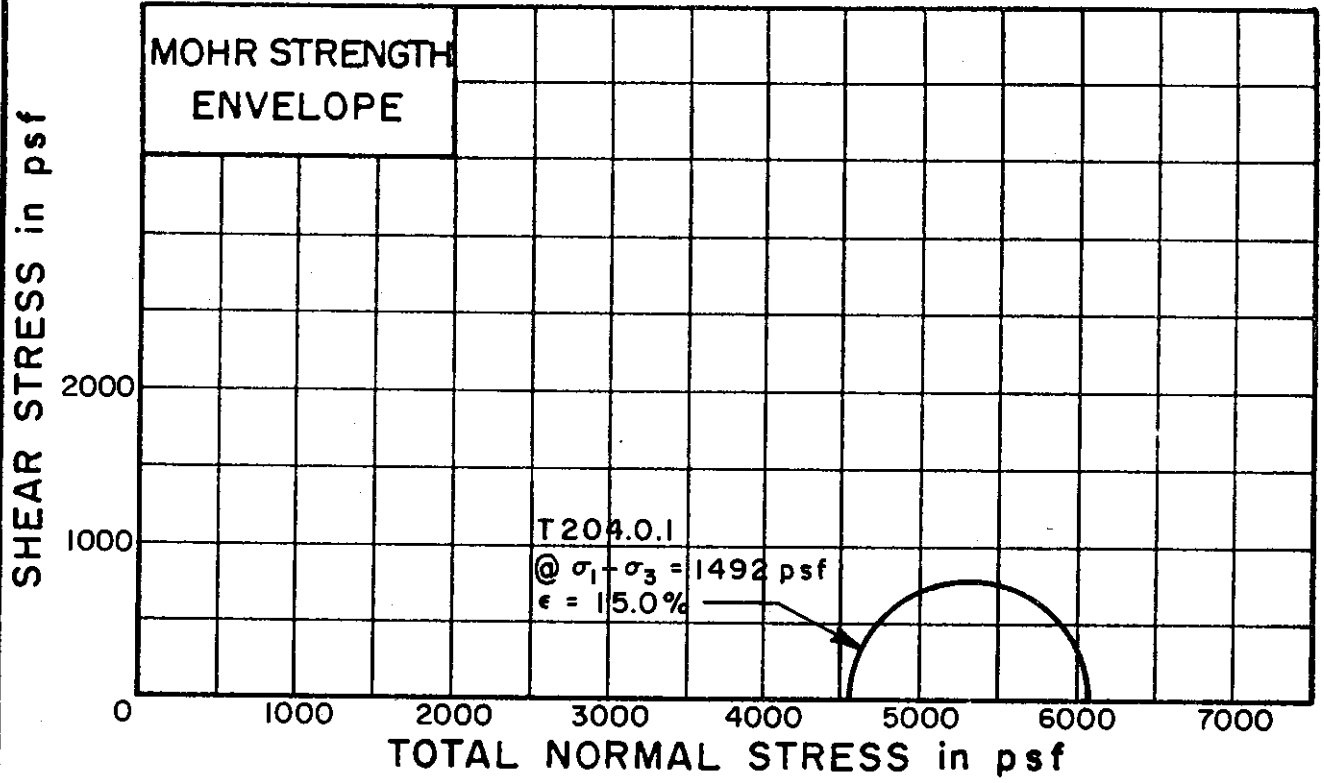
FINAL WATER CONTENT	$w_f$	19.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 72.9' TO 73.2'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T204.0.1	
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INITIAL WATER CONTENT	$w_0$	26.3%	
DRY DENSITY	$\gamma_d$	99	
SAMPLE DIAMETER	$D_0$	1.40	
SAMPLE HEIGHT	$H_0$	3.43	

CONFINING PRESSURE	$\sigma_3$	4608	
RATE OF STRAIN		0.26	
PERCENT/MINUTE			

FINAL WATER CONTENT	$w_f$	25.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 48

SAMPLE NO. 14

DEPTH 60.8' TO 61.1'

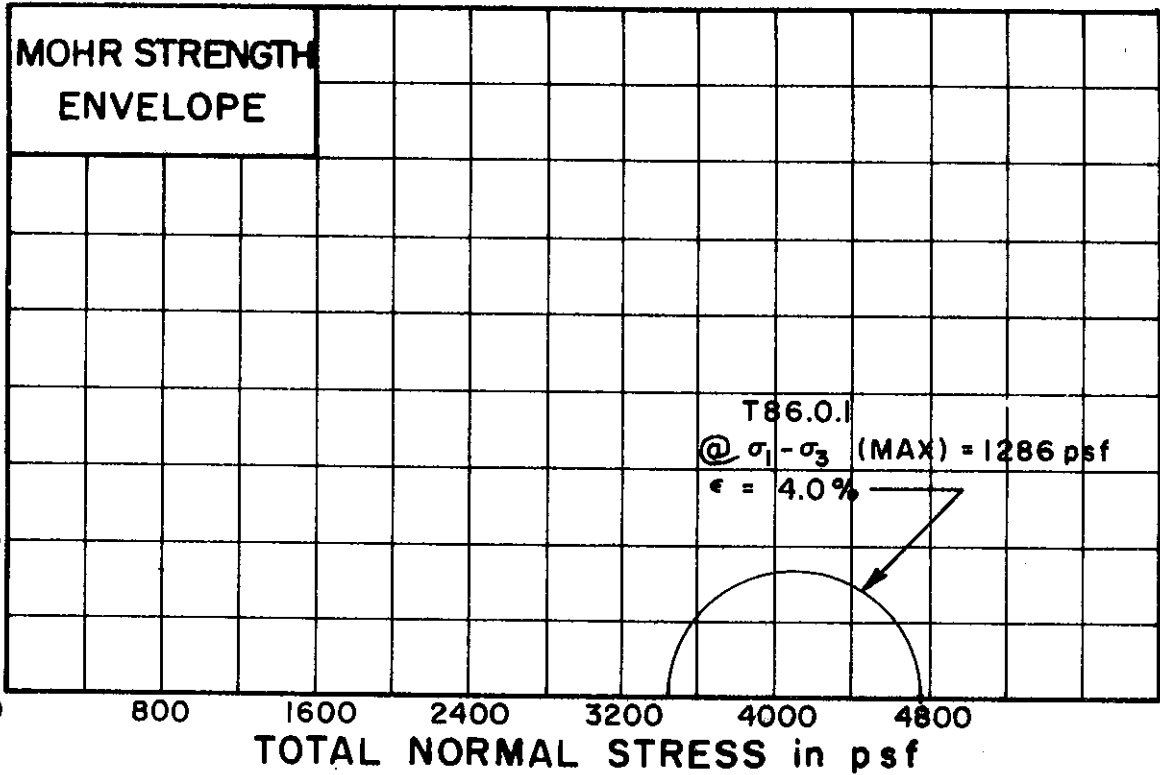
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 34% PLASTIC LIMIT 16%

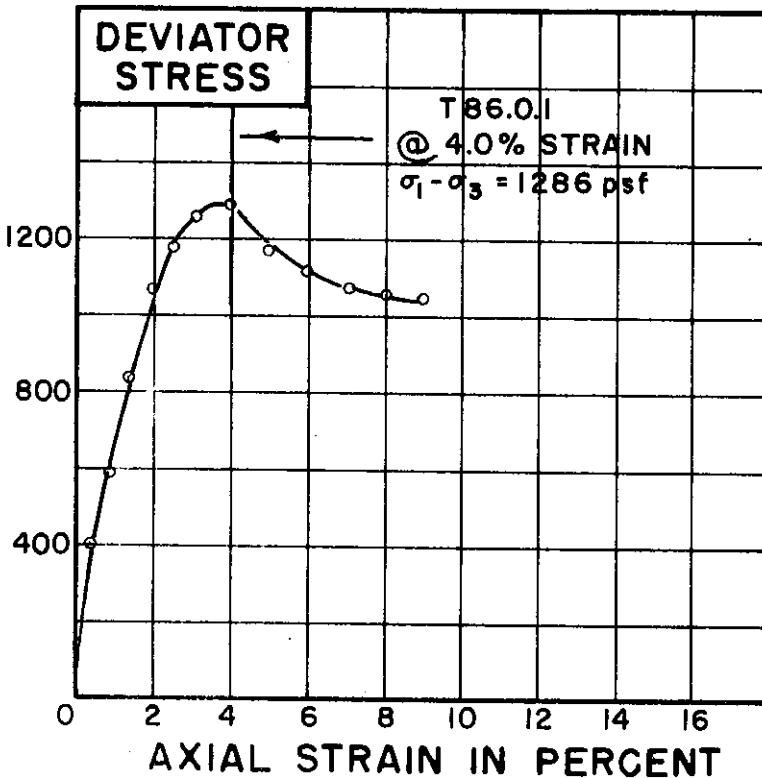
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T86.0.1	
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INITIAL WATER CONTENT	w <sub>o</sub>	46.2%
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DRY DENSITY pcf	γ <sub>d</sub>	74
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SAMPLE DIAMETER in.	D <sub>o</sub>	1.40
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SAMPLE HEIGHT in.	H <sub>o</sub>	3.27
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CONFINING PRESSURE psf	σ <sub>3</sub>	3456
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RATE OF STRAIN PERCENT/MINUTE		.25
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FINAL WATER CONTENT	w <sub>f</sub>	46.3%
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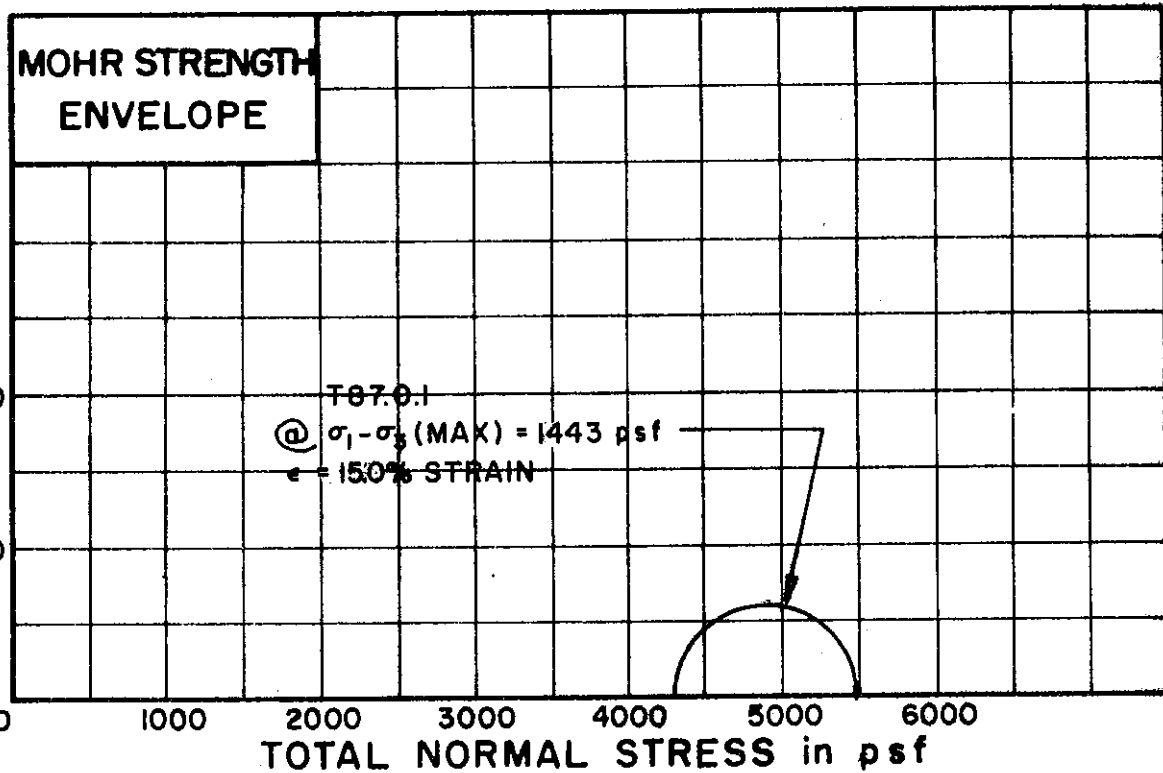
SKETCH OF SAMPLE AT END OF TEST		
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BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.1' TO 38.4'  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 LIQUID LIMIT 55 PLASTIC LIMIT 23

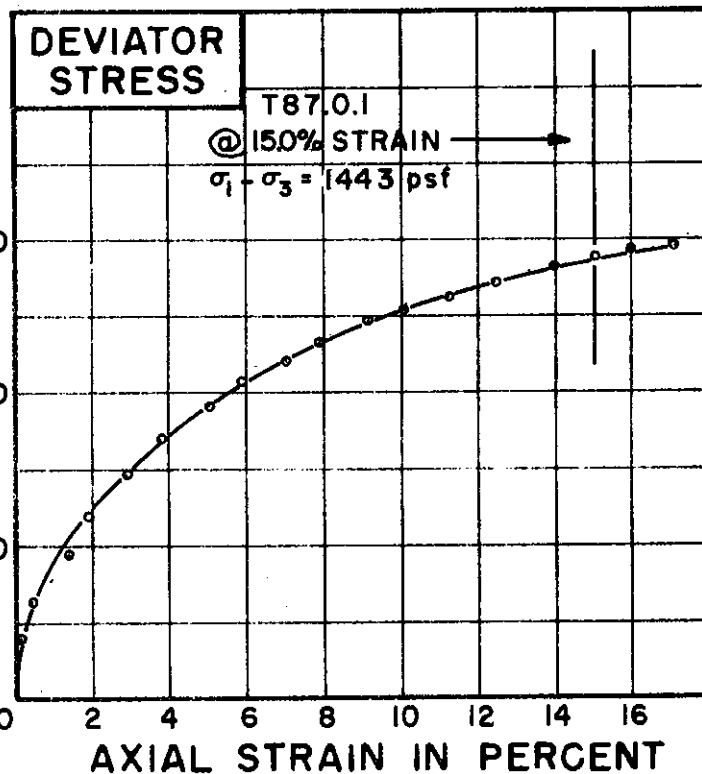
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T87.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	23.2	
DRY DENSITY	γ <sub>d</sub>	100	
SAMPLE DIAMETER	D <sub>o</sub>	1.40	
SAMPLE HEIGHT	H <sub>o</sub>	3.12	

CONFINING PRESSURE	σ <sub>3</sub>	4320	
RATE OF STRAIN	PERCENT/MINUTE	.25	

FINAL WATER CONTENT	w <sub>f</sub>	23.0	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 10

DEPTH 49.3' TO 49.6'

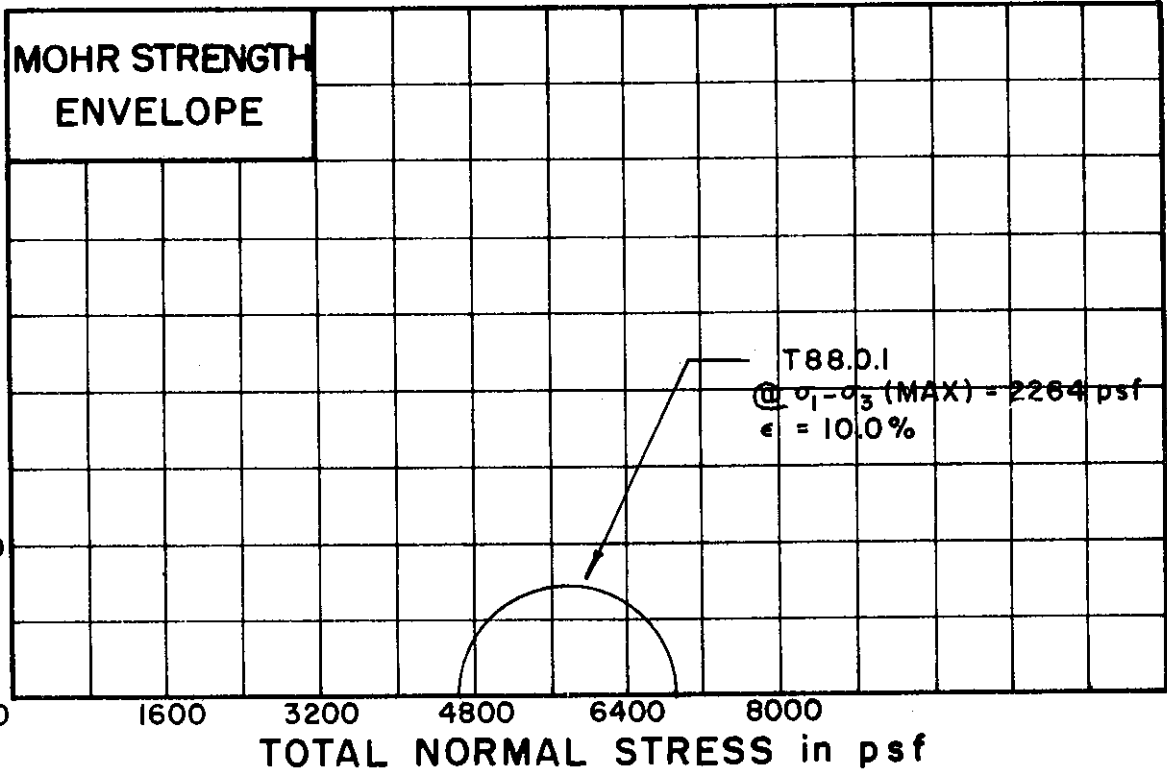
SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 16 (CL)

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

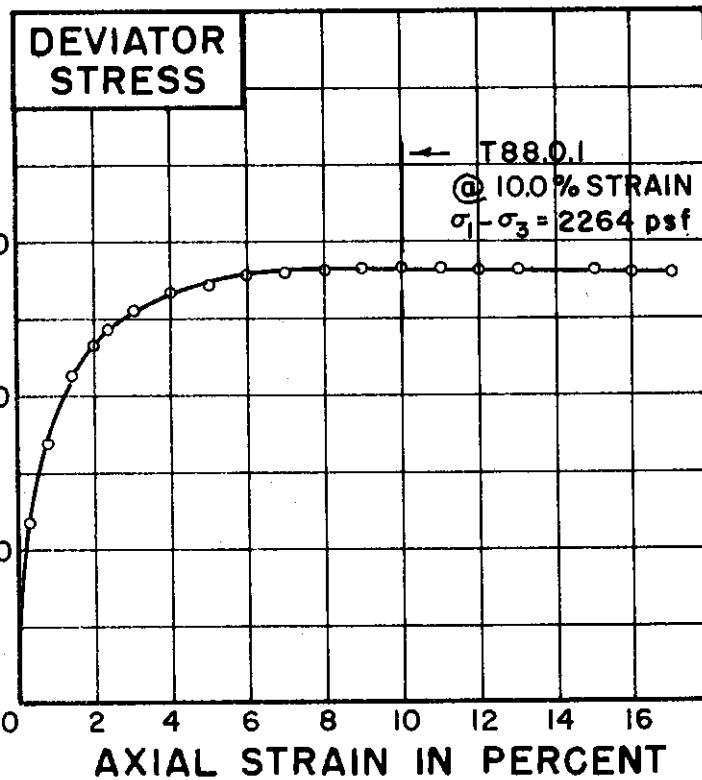
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T88.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	24.3	
DRY DENSITY pcf	γ <sub>d</sub>	101	
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38	
SAMPLE HEIGHT in.	H <sub>o</sub>	3.11	

CONFINING PRESSURE psf	σ <sub>3</sub>	4608	
RATE OF STRAIN PERCENT/MINUTE		.26	

FINAL WATER CONTENT	w <sub>f</sub>	23.5	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 12

DEPTH 59.1' TO 59.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

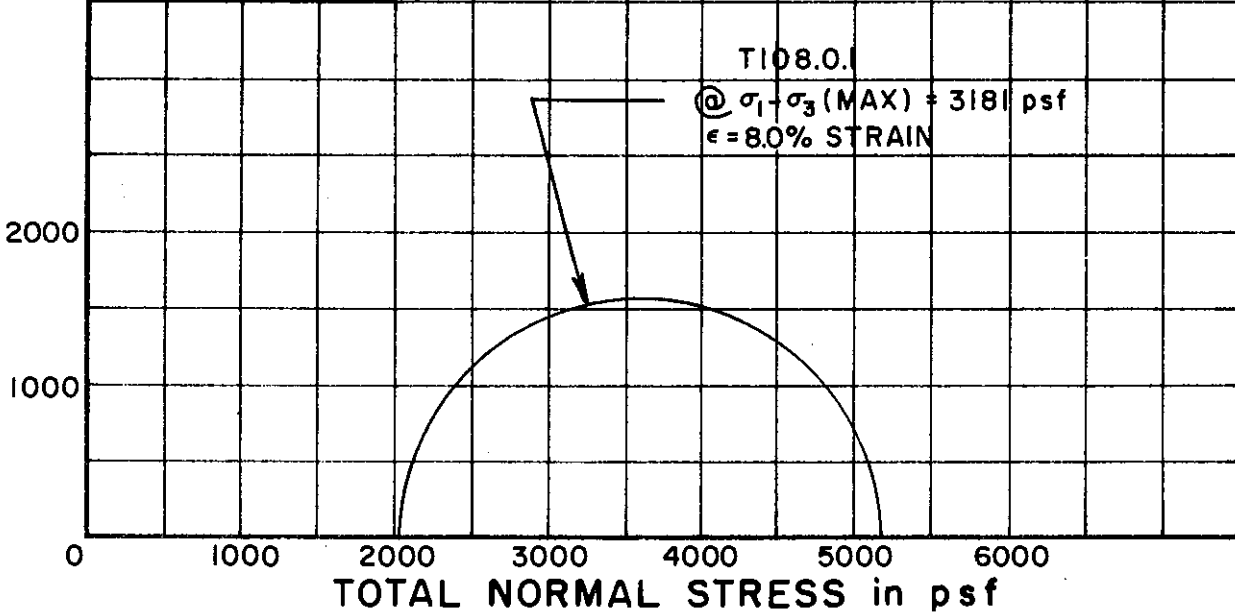
LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

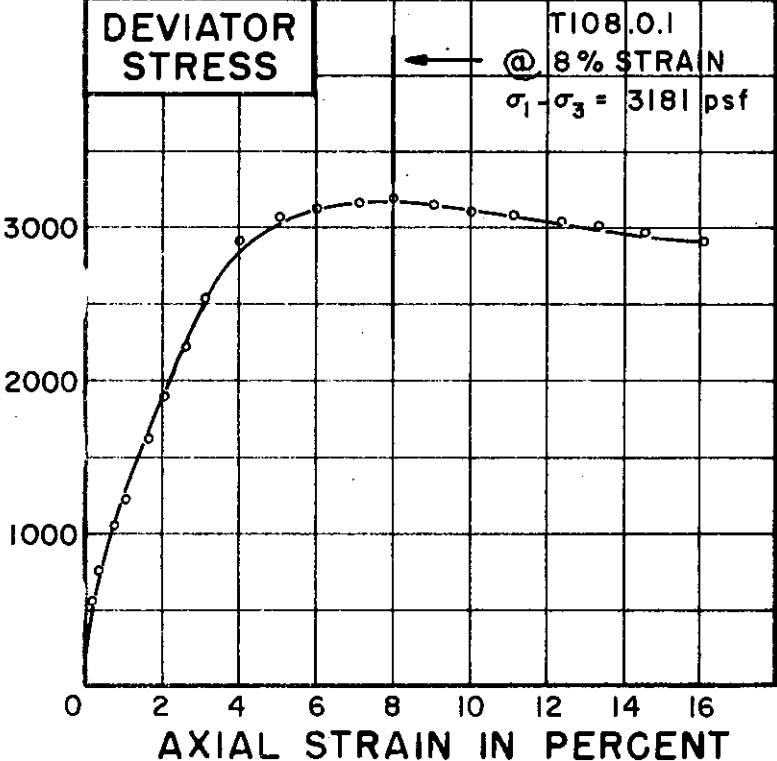
SHEAR STRESS in psf

**MOHR STRENGTH ENVELOPE**



DEVIATOR STRESS in psf

**DEVIATOR STRESS**



TEST NO./SYMBOL	T108.0.1		
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INITIAL WATER CONTENT	$w_o$	31.1		
DRY DENSITY $\rho_{cf}$	$\gamma_d$	92		
SAMPLE DIAMETER, in.	$D_o$	1.41		
SAMPLE HEIGHT, in.	$H_o$	3.25		

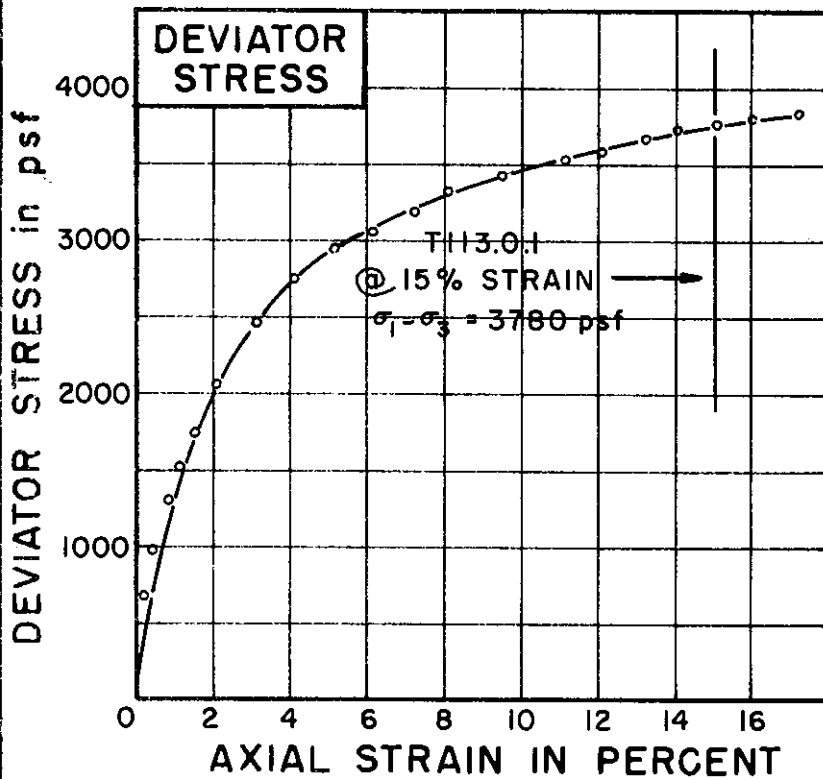
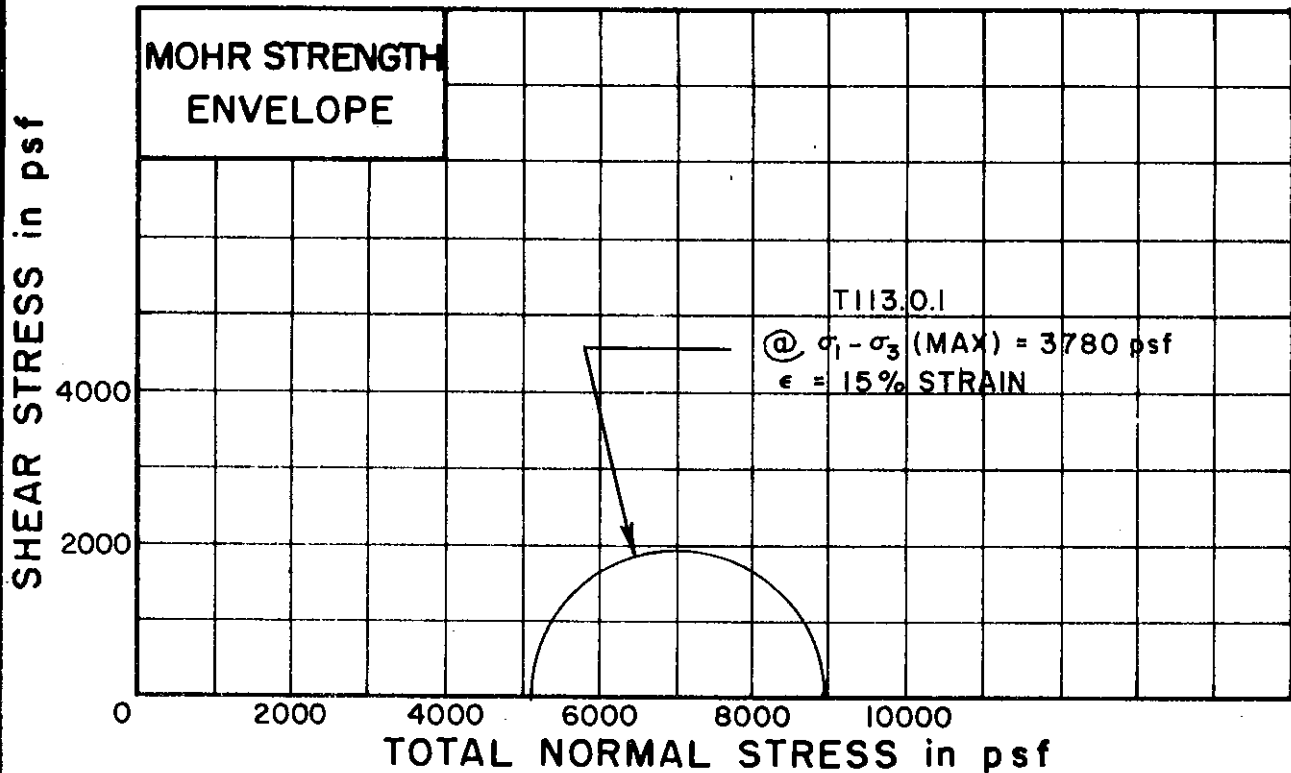
CONFINING PRESSURE $\rho_{sf}$	$\sigma_3$	2016		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	30.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 3  
 DEPTH 21.2' TO 21.5'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T113.0.1		
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INITIAL WATER CONTENT	$w_0$	16.2		
DRY DENSITY pcf	$\gamma_d$	111		
SAMPLE DIAMETER, in.	$D_0$	1.38		
SAMPLE HEIGHT in.	$H_0$	3.18		

CONFINING PRESSURE psf	$\sigma_3$	5184		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	16.1		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

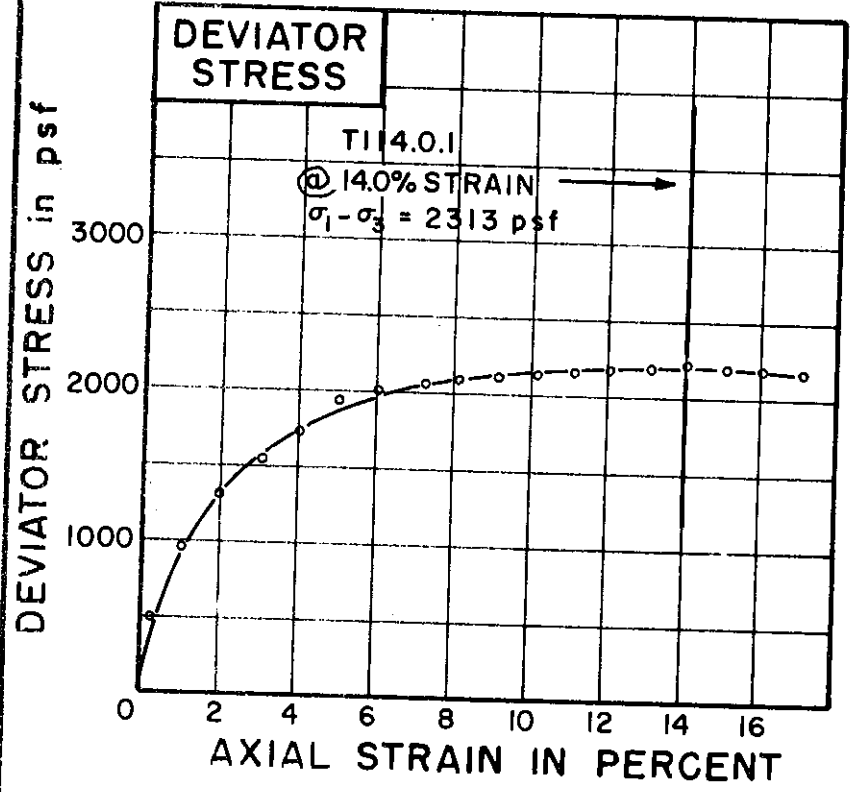
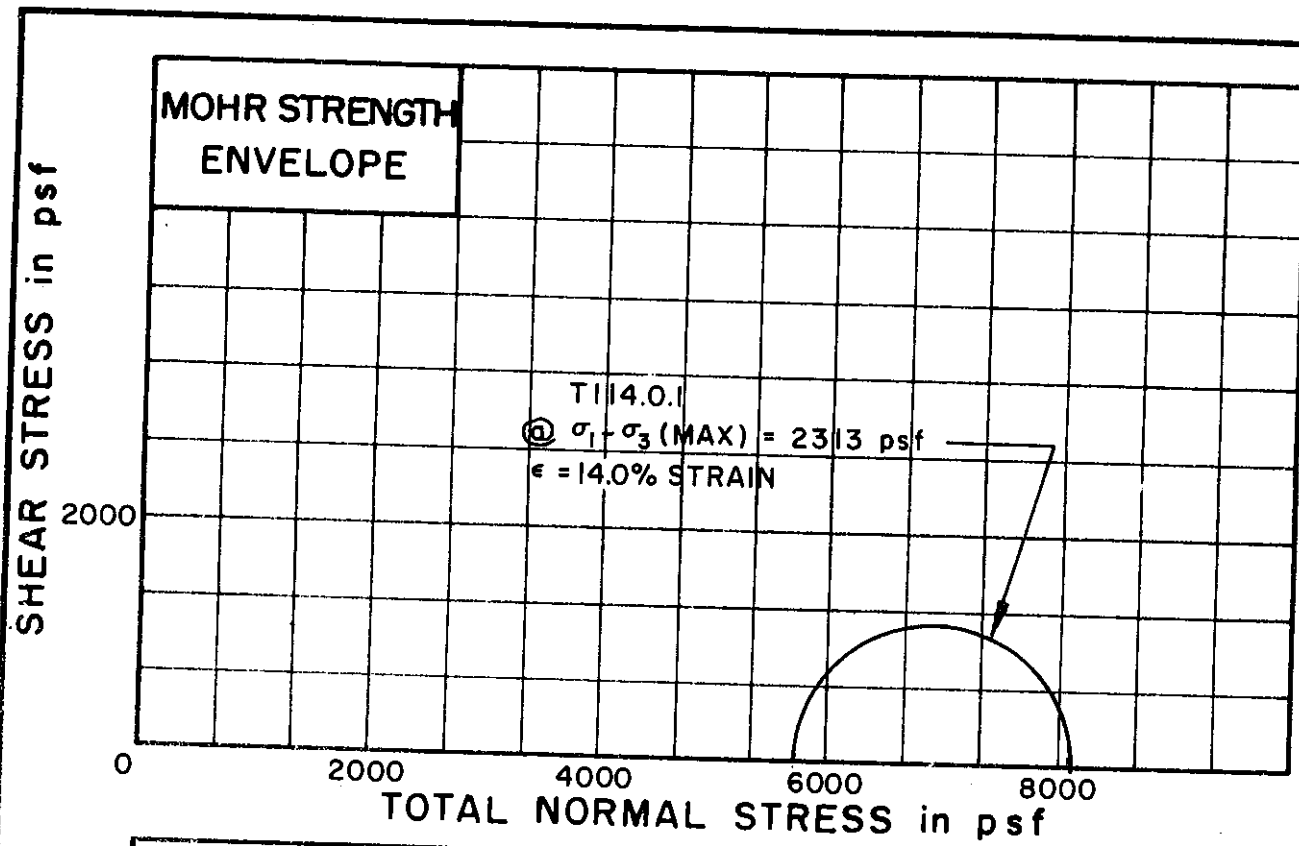
SAMPLE NO. 8

DEPTH 69.0 TO 69.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 24 PLASTIC LIMIT 14 (CL)

**UNCONSOLIDATED UNDRAINED  
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 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T114.0.1		
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INITIAL WATER CONTENT	$w_o$	21.8		
DRY DENSITY	$\gamma_d$ pcf	105		
SAMPLE DIAMETER	$D_o$ in.	1.38		
SAMPLE HEIGHT	$H_o$ in.	3.31		

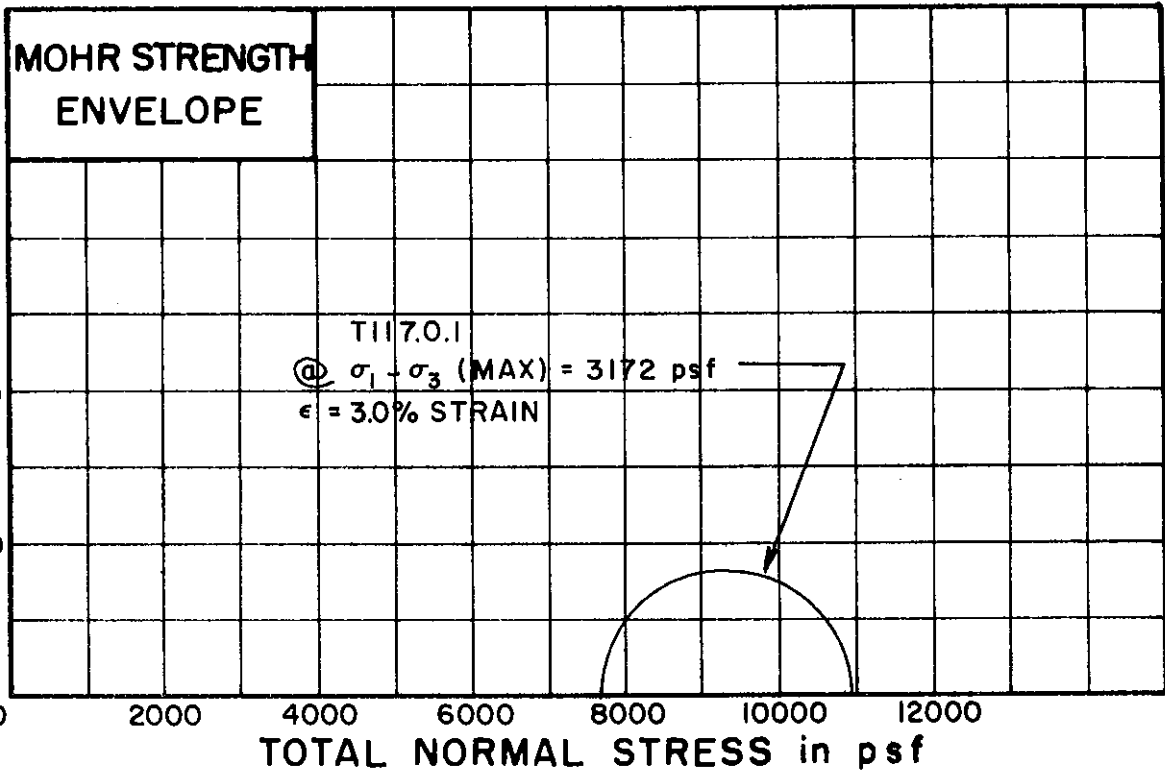
CONFINING PRESSURE	$\sigma_3$ psf	5760		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	21.7		
SKETCH OF SAMPLE AT END OF TEST				

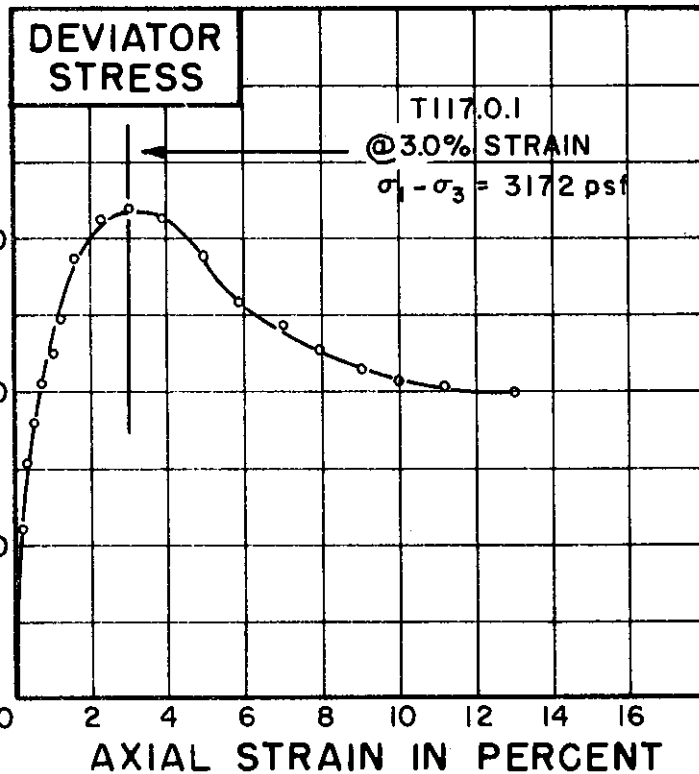
BORING NO. 52  
 SAMPLE NO. 9  
 DEPTH 78.6' TO 78.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 35 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED  
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 TESTS  
 THE DETROIT EDISON COMPANY  
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SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T117.0.1		
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INITIAL WATER CONTENT	$w_o$	35.8		
DRY DENSITY pcf	$\gamma_d$	87		
SAMPLE DIAMETER in.	$D_o$	1.38		
SAMPLE HEIGHT in.	$H_o$	3.45		

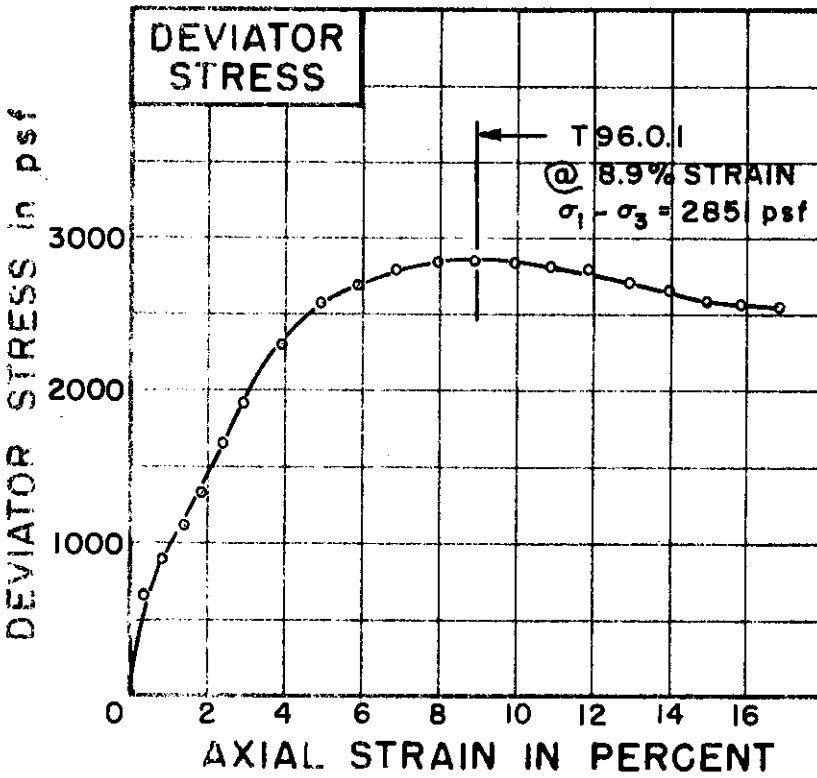
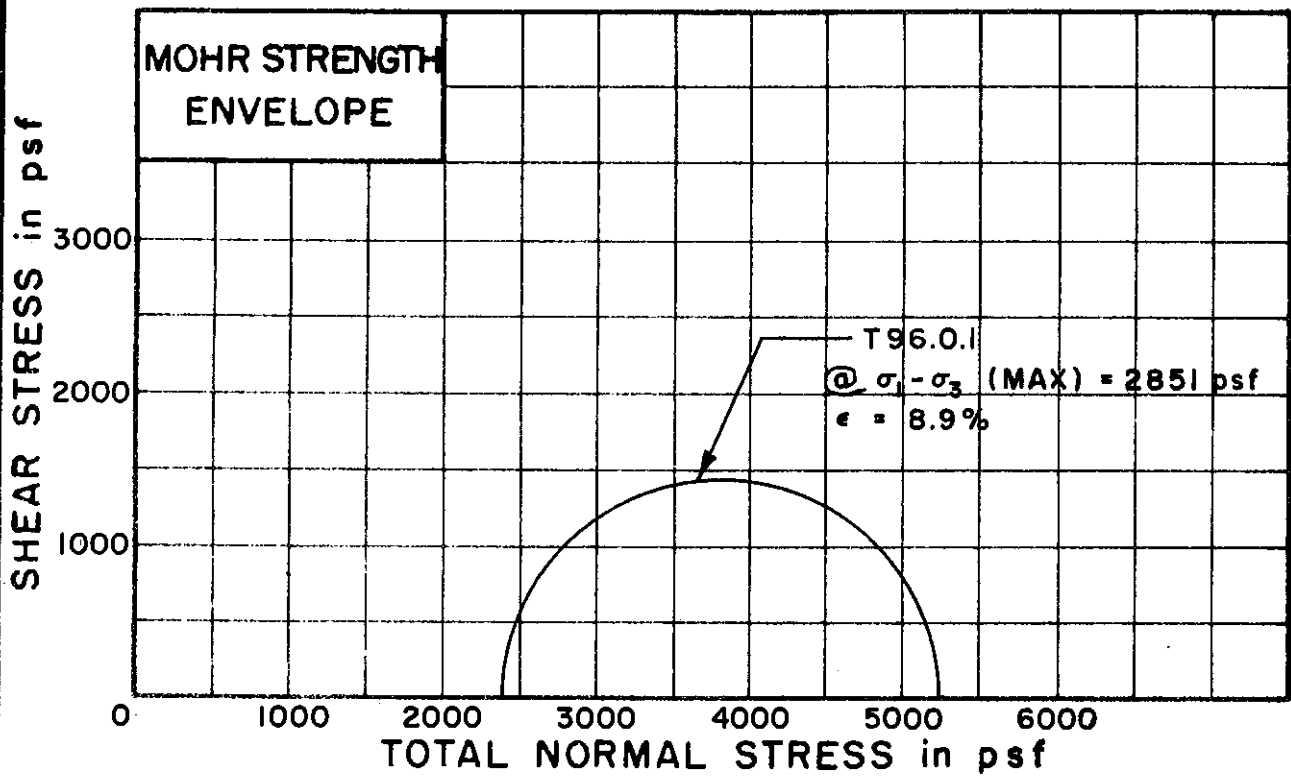
CONFINING PRESSURE psf	$\sigma_3$	7632		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	35.7		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 12  
 DEPTH 109.3' TO 109.6'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

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TEST NO./SYMBOL	T96.0.1		
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INITIAL WATER CONTENT	$w_0$	32.2%		
DRY DENSITY pcf	$\gamma_d$	91		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.26		

CONFINING PRESSURE psf	$\sigma_3$	2405		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	31.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 53

SAMPLE NO. 3

DEPTH 20.1' TO 20.4'

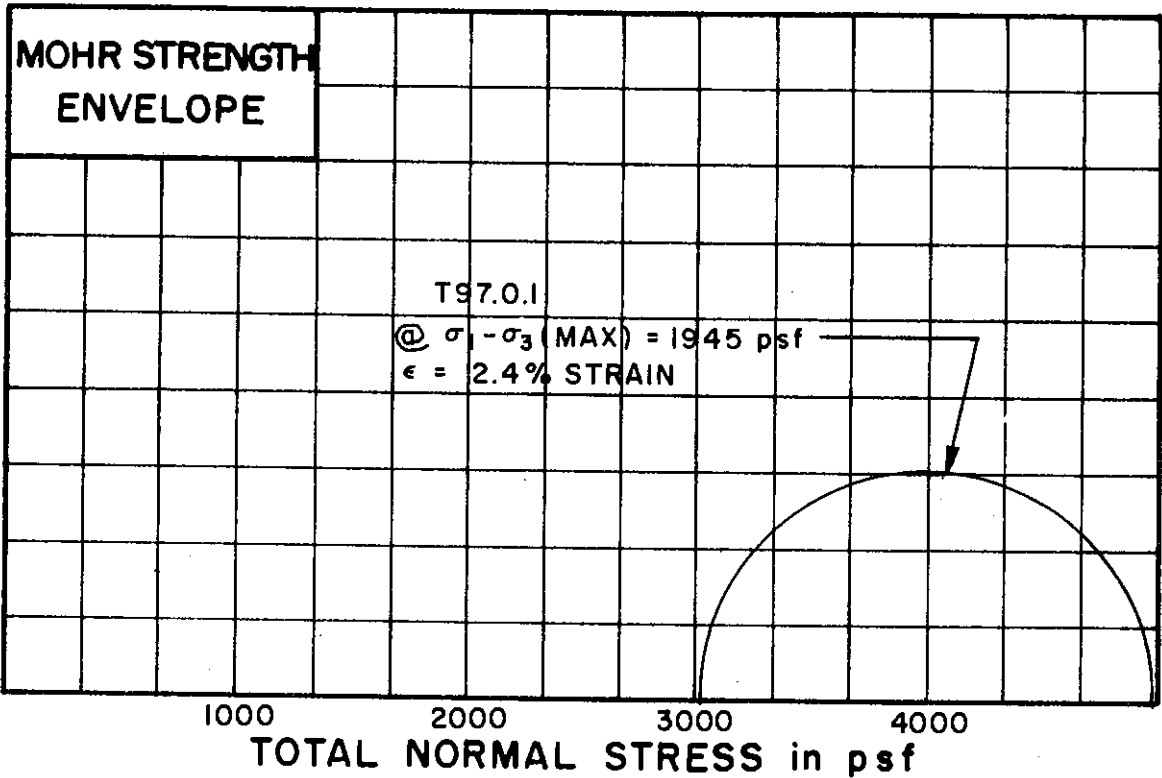
SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 20

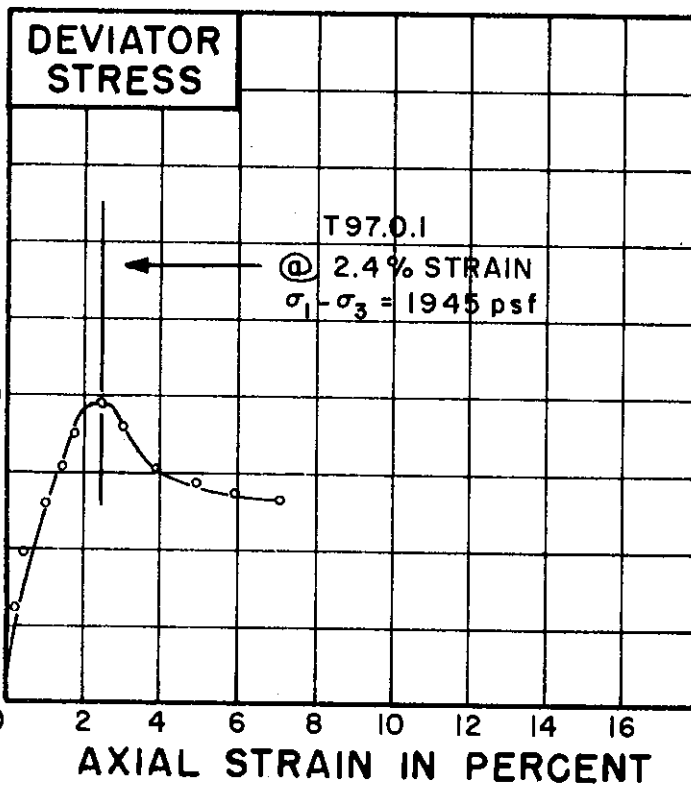
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T97.0.1		
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INITIAL WATER CONTENT	w <sub>0</sub>	34.0		
DRY DENSITY pcf	γ <sub>d</sub>	88		
SAMPLE DIAMETER, in.	D <sub>0</sub>	1.39		
SAMPLE HEIGHT in.	H <sub>0</sub>	3.21		

CONFINING PRESSURE psf	σ <sub>3</sub>	3024		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	3.42		
SKETCH OF SAMPLE AT END OF TEST				

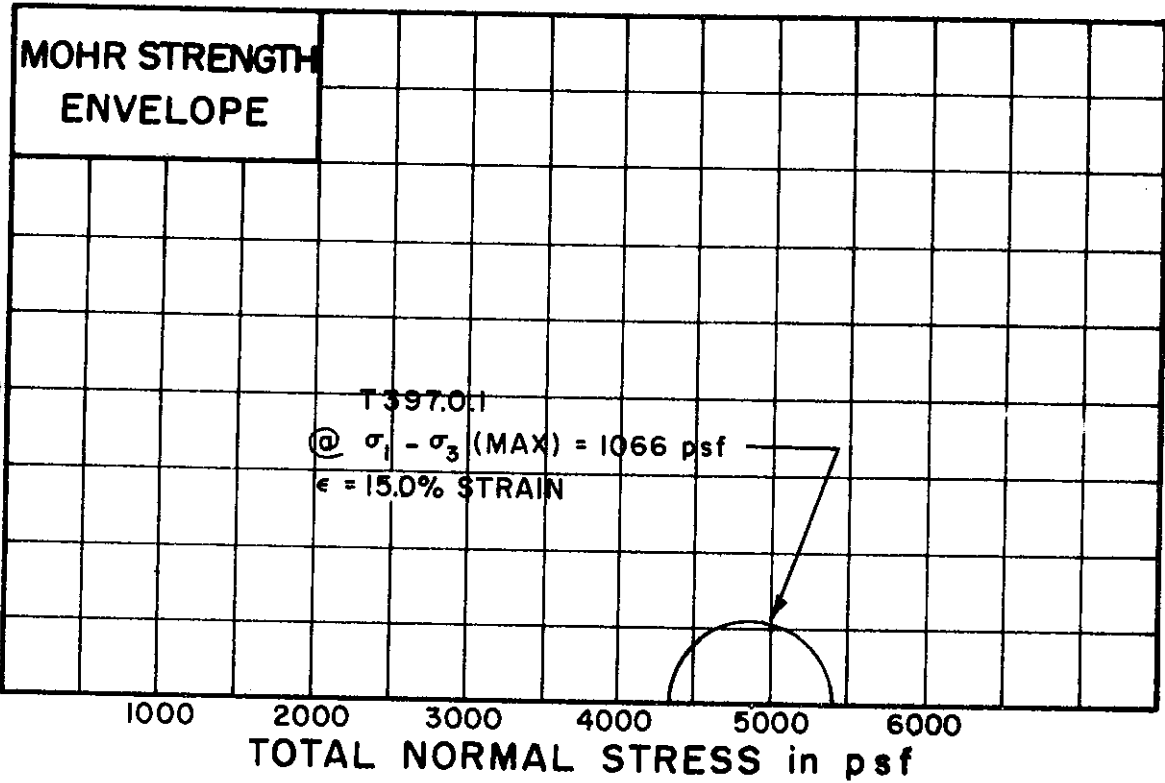
BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 30.1' TO 30.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 22

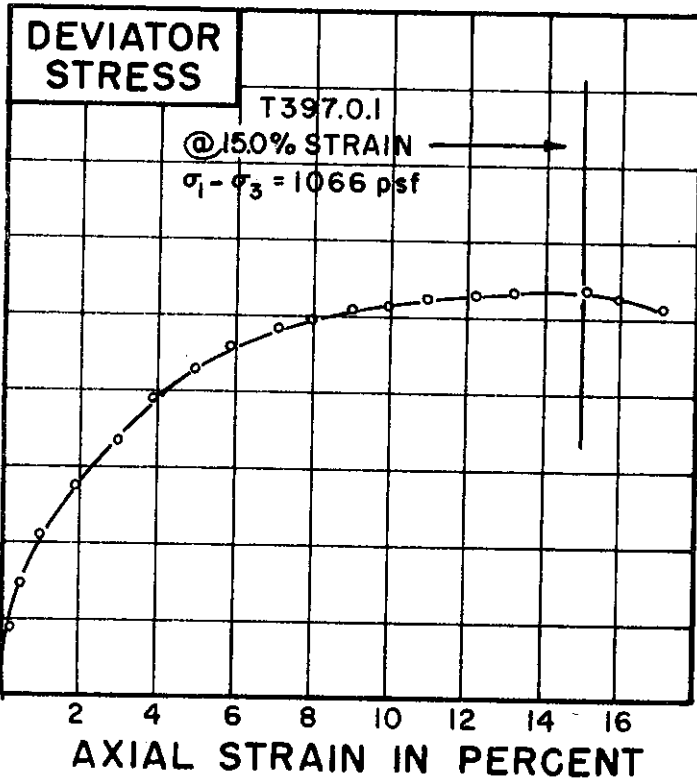
**UNCONSOLIDATED UNDRAINED  
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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T397.0.1		
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INITIAL WATER CONTENT	$w_0$	24.4	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_0$	1.39	
SAMPLE HEIGHT in.	$H_0$	3.24	

CONFINING PRESSURE psf	$\sigma_3$	4320	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	23.9	
SKETCH OF SAMPLE AT END OF TEST			

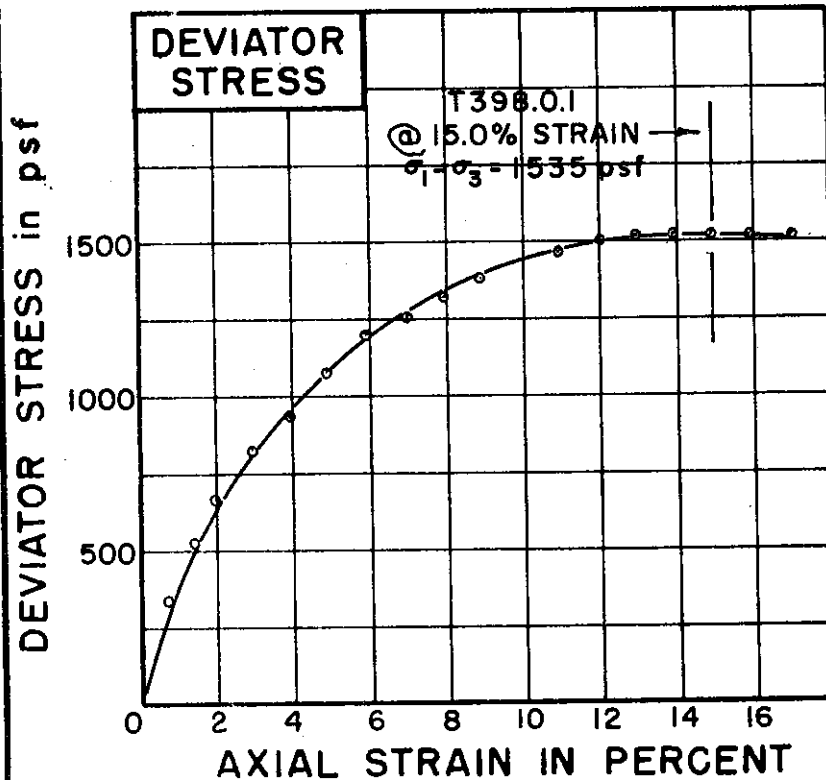
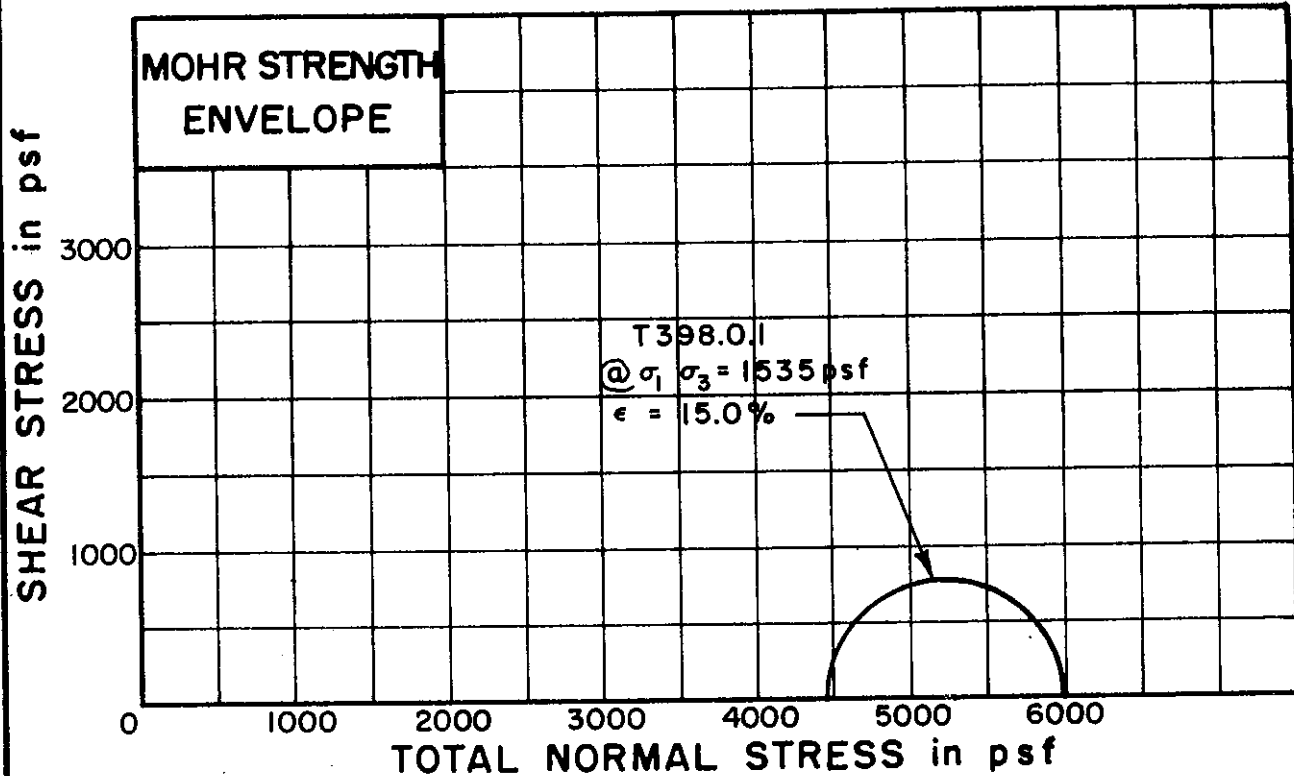
BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.2' TO 53.5'  
 SOIL DESCRIPTION: CLAYEY SILT (ML-CL)  
 LIQUID LIMIT 21 PLASTIC LIMIT 17

**UNCONSOLIDATED UNDRAINED  
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TEST NO./SYMBOL	T398.0.1	
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.38	
SAMPLE HEIGHT in.	$H_o$	3.26	

CONFINING PRESSURE psf	$\sigma_3$	4464	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 5

DEPTH 59.0' TO 59.3'

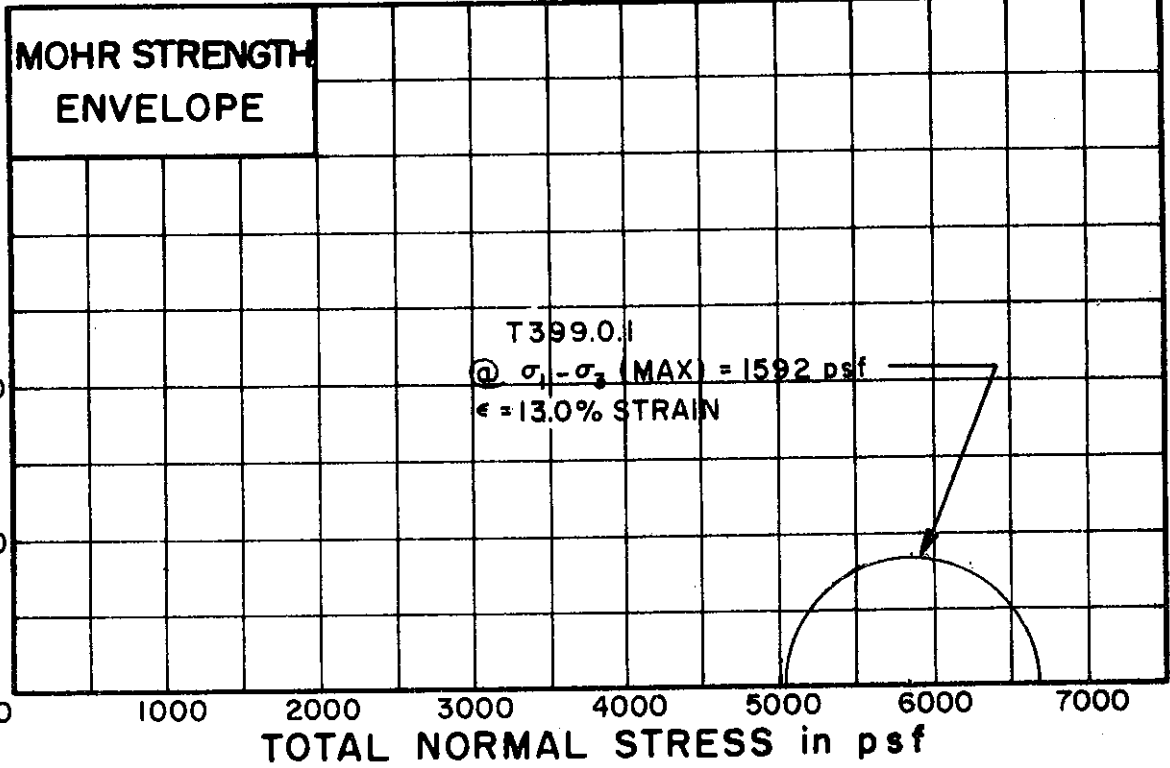
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 17

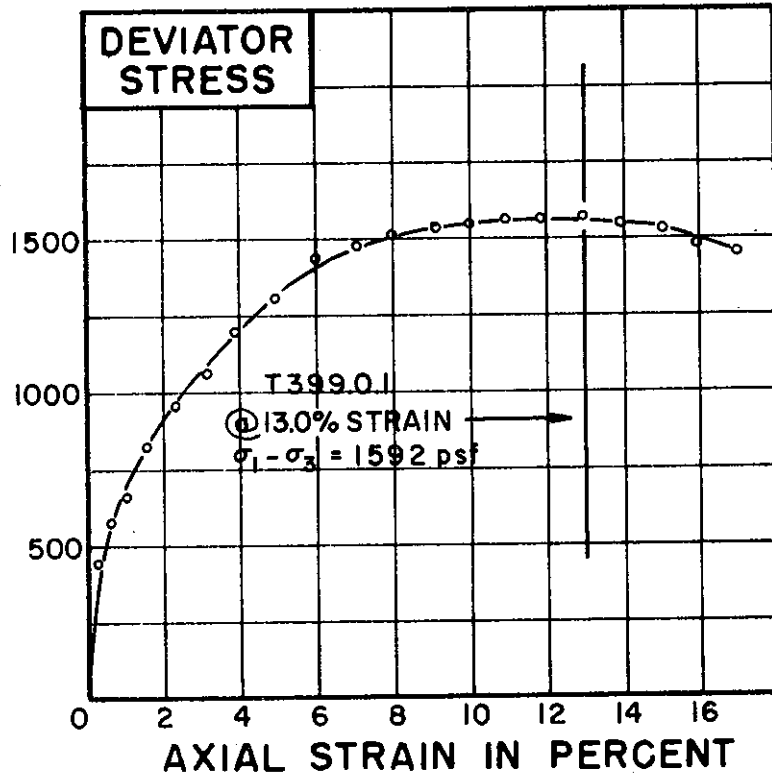
**UNCONSOLIDATED UNDRAINED  
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SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T399.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	26.1		
DRY DENSITY pcf	γ <sub>d</sub>	98		
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38		
SAMPLE HEIGHT in.	H <sub>o</sub>	3.33		

CONFINING PRESSURE psf	σ <sub>3</sub>	5040		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	25.8		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

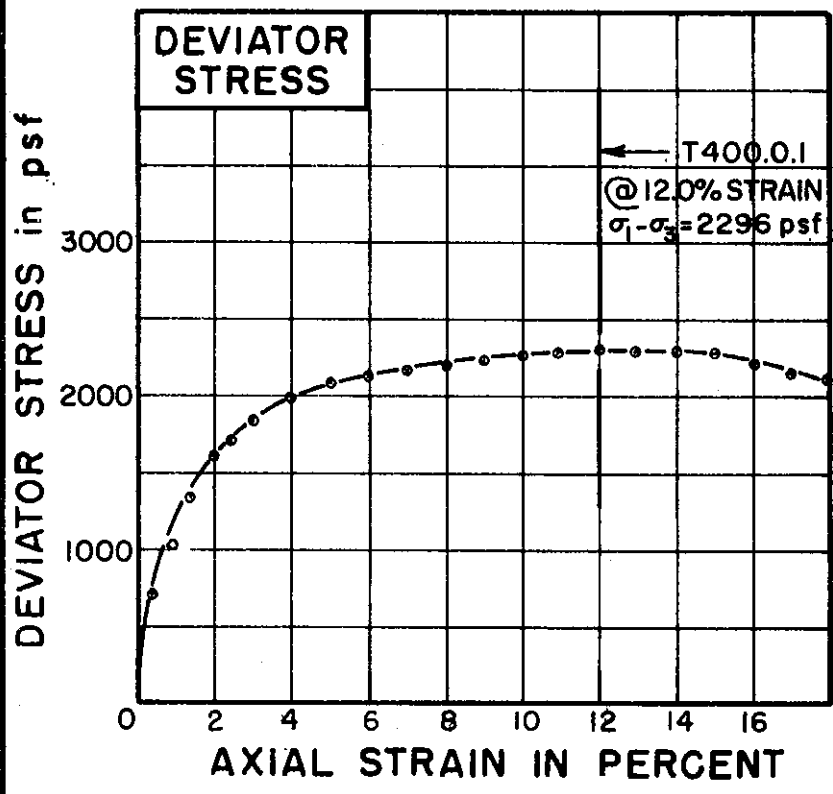
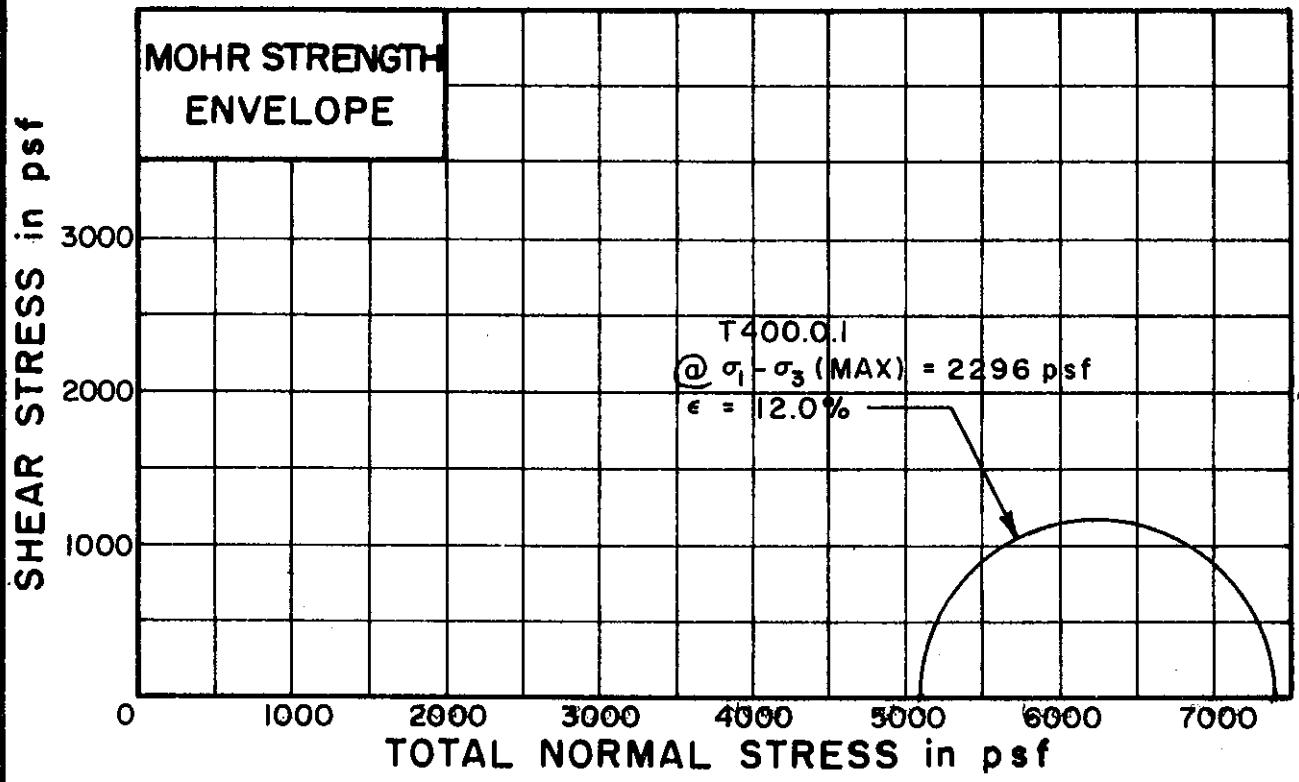
SAMPLE NO. 6

DEPTH 63.1' TO 63.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 18 (CL)

UNCONSOLIDATED UNDRAINED  
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TEST NO./SYMBOL	T400.0.		
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INITIAL WATER CONTENT	$w_0$	25.9%		
DRY DENSITY pcf	$\gamma_d$	98		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.25		

CONFINING PRESSURE psf	$\sigma_3$	5112		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	25.5%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

SAMPLE NO. 7

DEPTH 68.8' TO 69.1'

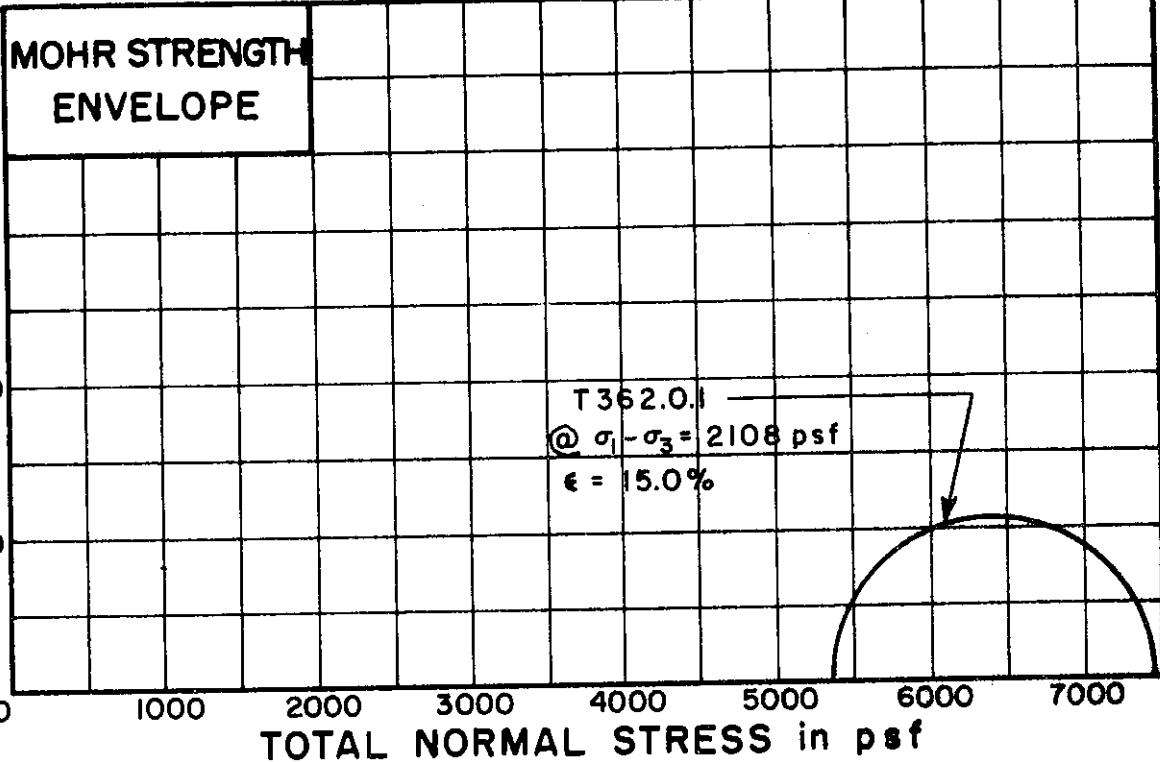
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 37 PLASTIC LIMIT 18

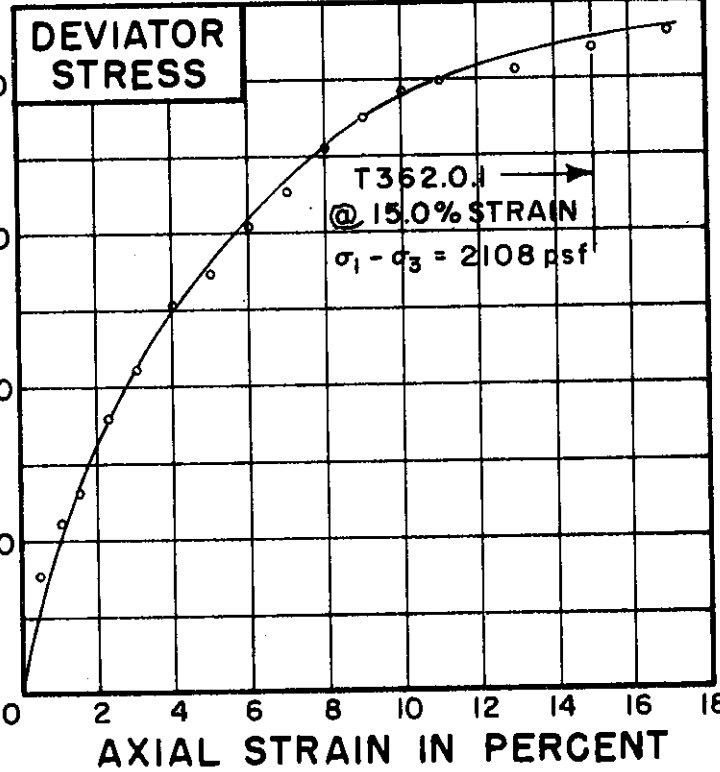
**UNCONSOLIDATED UNDRAINED  
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BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T362.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	22.6%		
DRY DENSITY	pcf	γ <sub>d</sub>	105	
SAMPLE DIAMETER	in.	D <sub>o</sub>	1.40	
SAMPLE HEIGHT	in.	H <sub>o</sub>	3.31	

CONFINING PRESSURE	psf	σ <sub>3</sub>	5328	
RATE OF STRAIN	PERCENT/MINUTE		0.27	

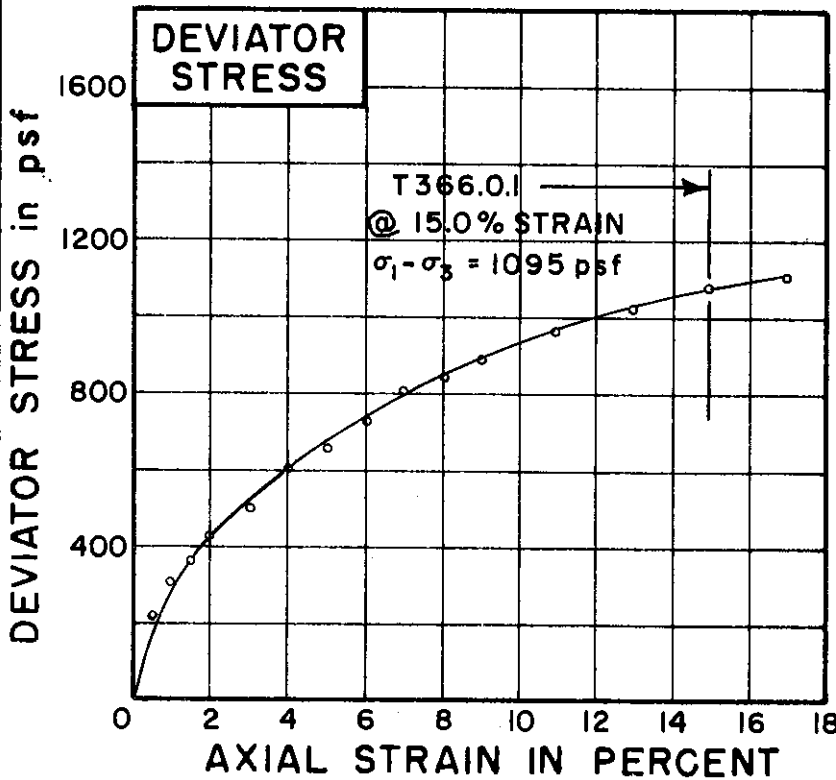
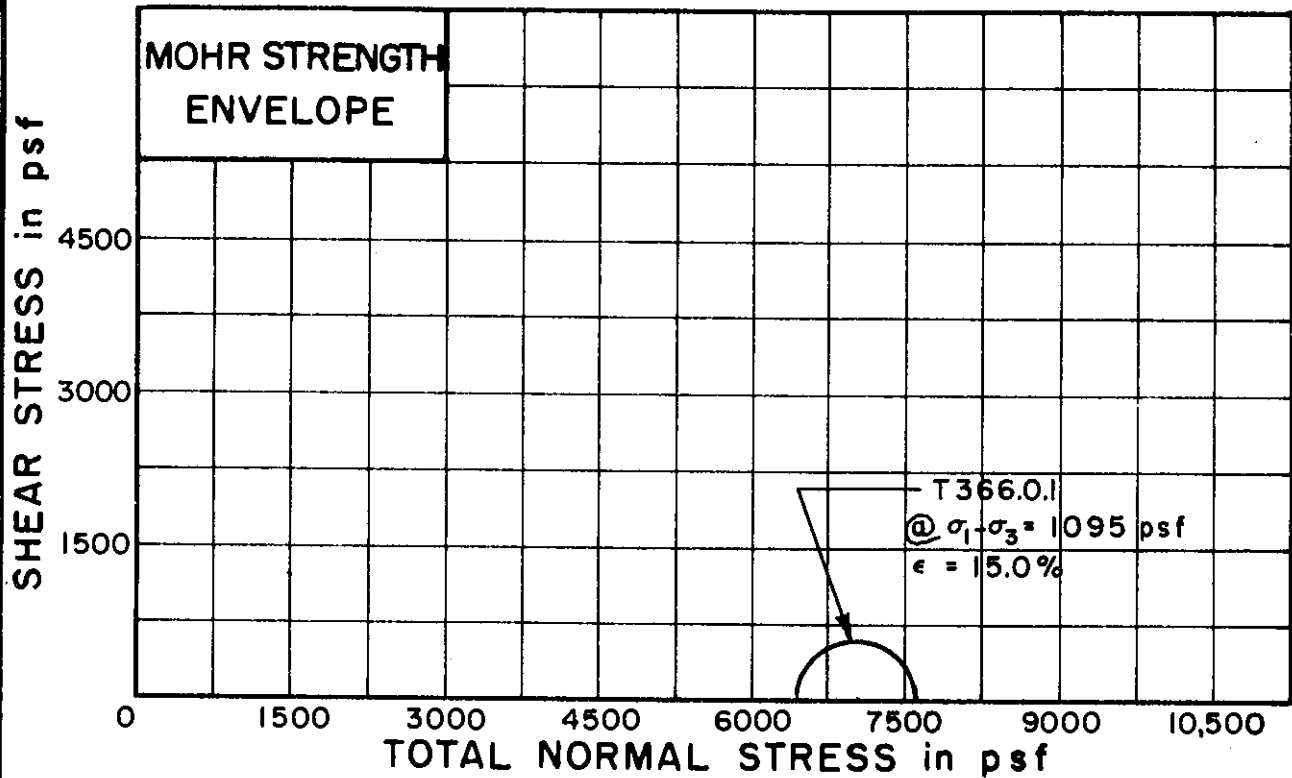
FINAL WATER CONTENT	w <sub>f</sub>	22.6%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 101  
 SAMPLE NO. 15  
 DEPTH 74.6' TO 74.9'  
 SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 21

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TEST NO./SYMBOL	T366.0.1		
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INITIAL WATER CONTENT	$w_0$	24.5%	
DRY DENSITY pcf	$\gamma_d$	100	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.27	

CONFINING PRESSURE psf	$\sigma_3$	6480	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_1$	24.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 19

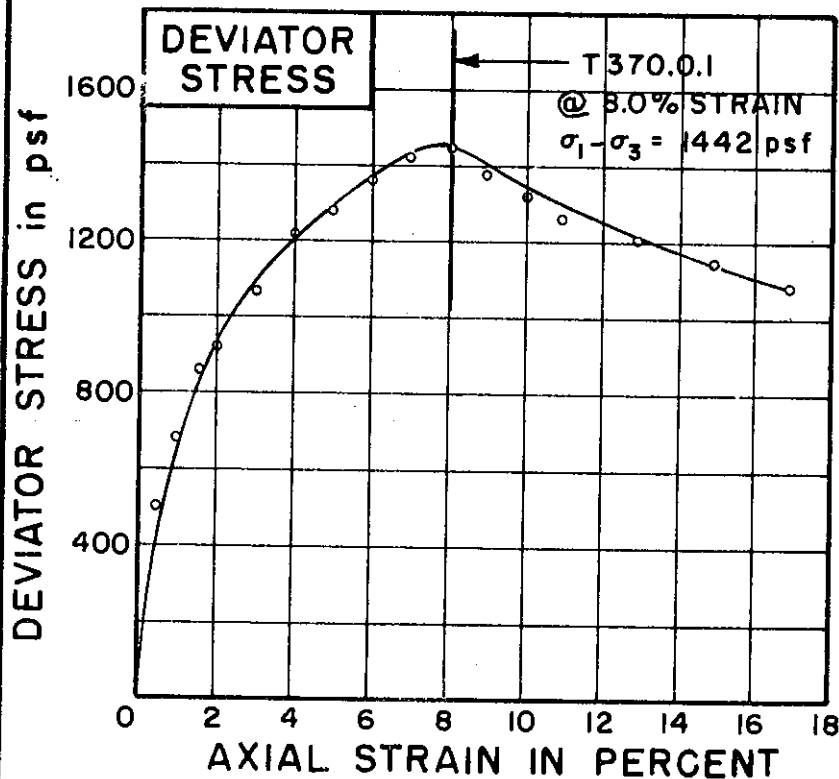
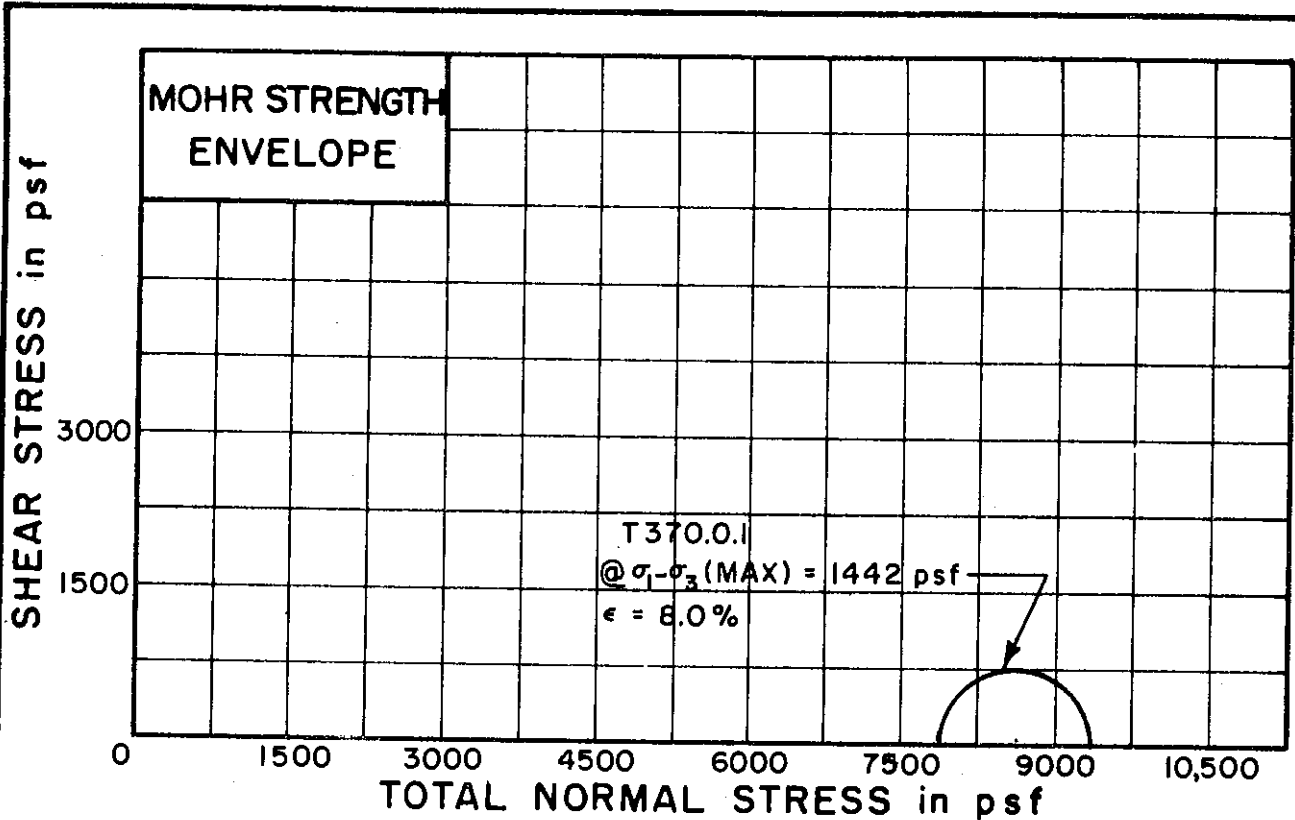
DEPTH 94.9' TO 95.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED  
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TEST NO./SYMBOL	T370.0.1		
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INITIAL WATER CONTENT	$w_0$	37.2%	
DRY DENSITY $\rho_{cf}$	$\gamma_d$	85	
SAMPLE DIAMETER, in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.23	

CONFINING PRESSURE $\rho_{cf}$	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	36.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 23

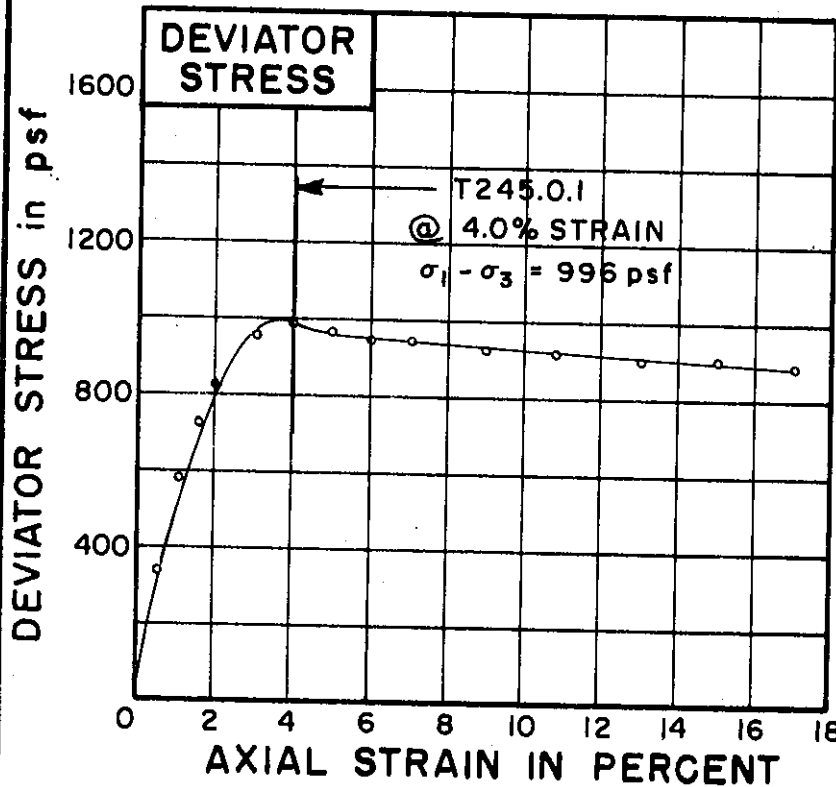
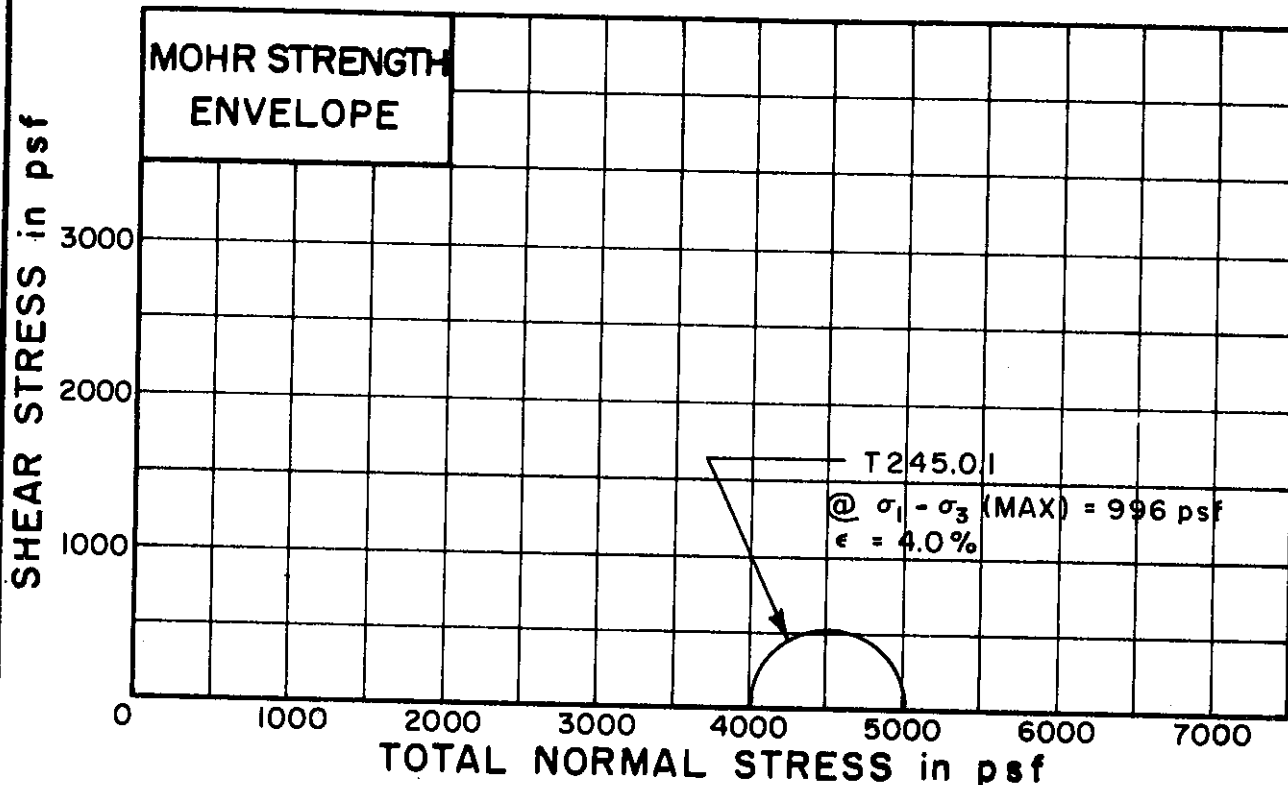
DEPTH 119.8' TO 120.2'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 44 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED  
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TEST NO./SYMBOL	T245.0.1		
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INITIAL WATER CONTENT	$w_0$	41.1%	
DRY DENSITY psf	$\gamma_d$	81	
SAMPLE DIAMETER in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.25	

CONFINING PRESSURE psf	$\sigma_3$	4032	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	40.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126

SAMPLE NO. 11

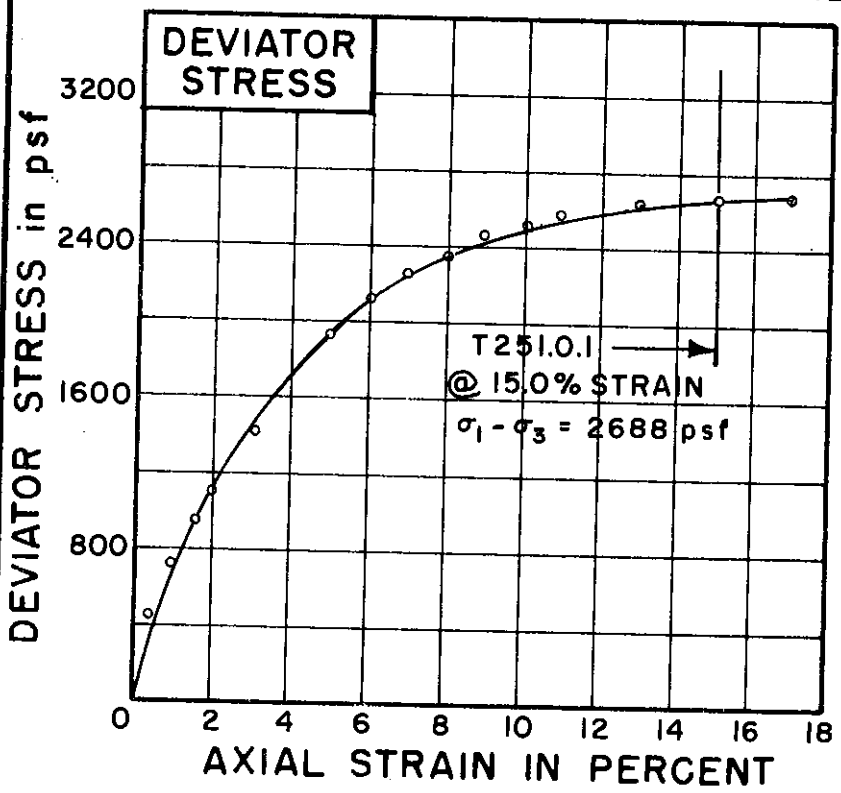
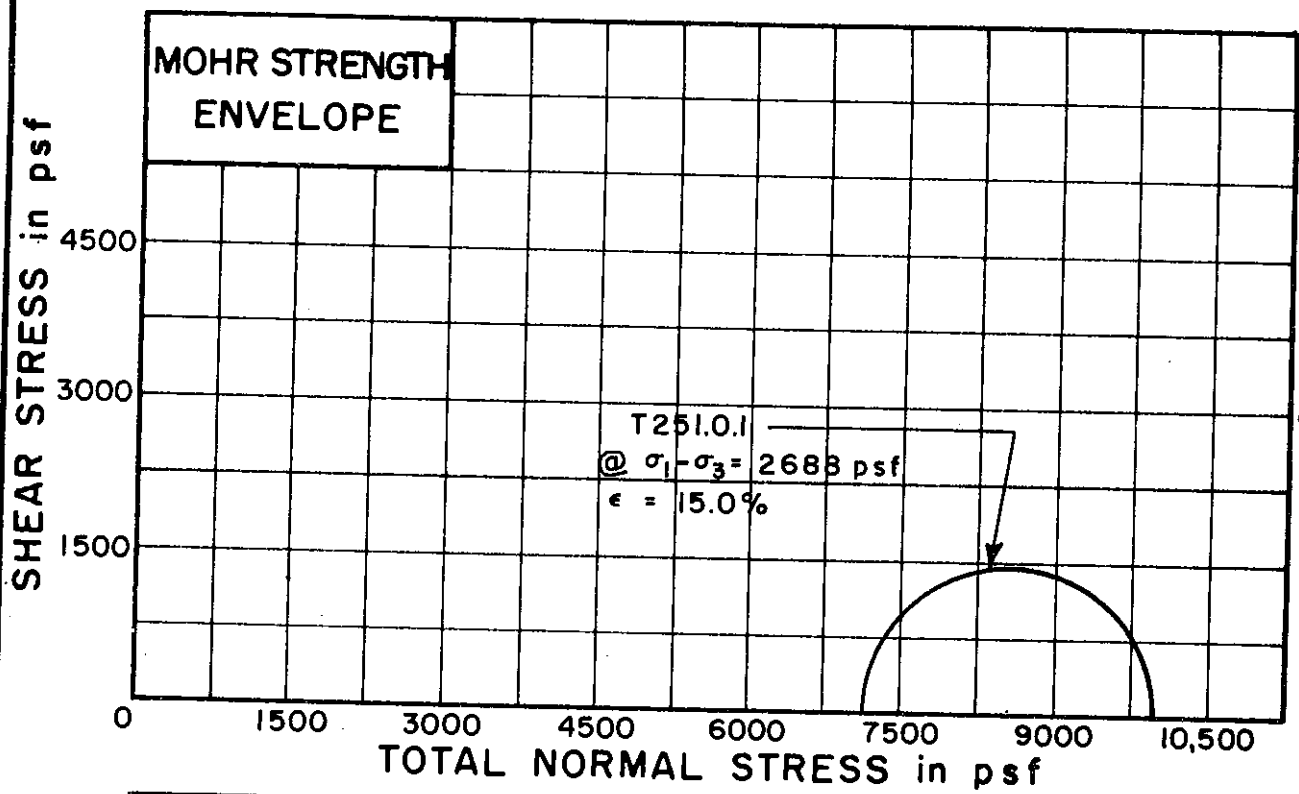
DEPTH 49.1' TO 49.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 59 PLASTIC LIMIT 25

UNCONSOLIDATED UNDRAINED  
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TEST NO./SYMBOL	T251.0.1		
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INITIAL WATER CONTENT	$w_0$	25.3%	
DRY DENSITY pcf	$\gamma_d$	96	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.33	

CONFINING PRESSURE psf	$\sigma_3$	7200	
RATE OF STRAIN PERCENT/MINUTE		0.27	

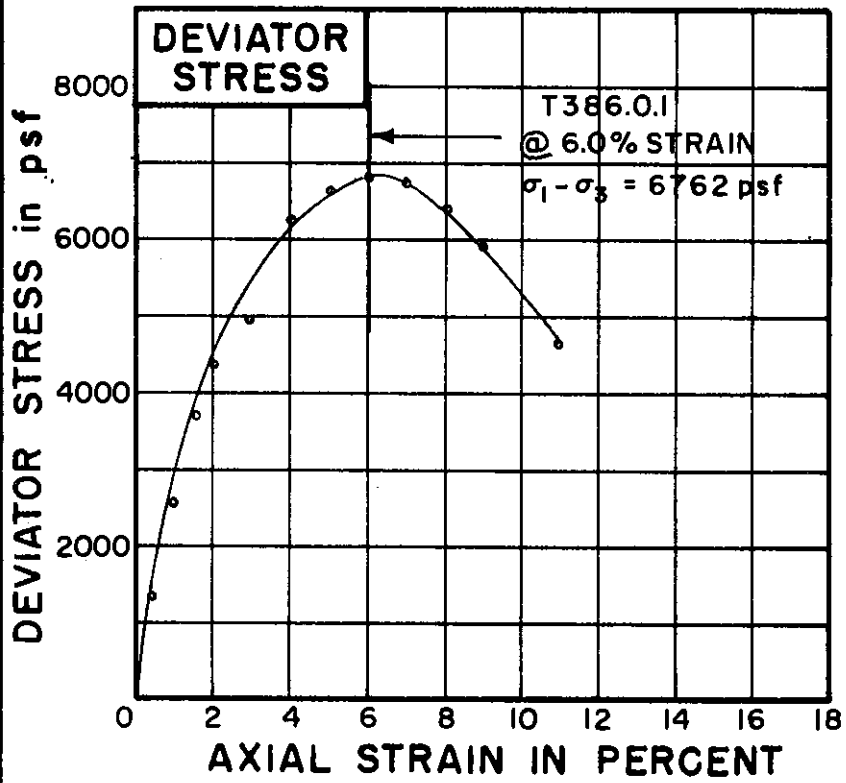
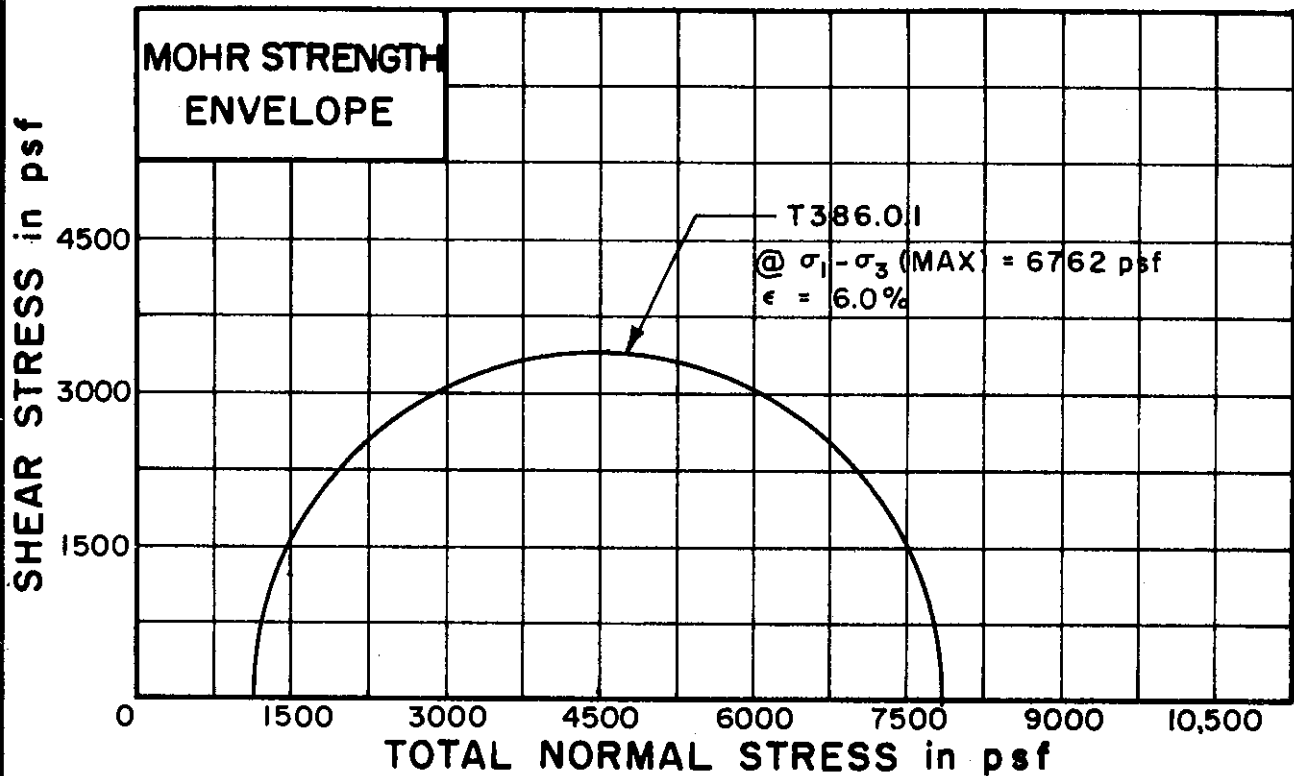
FINAL WATER CONTENT	$w_f$	25.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126  
 SAMPLE NO. 23  
 DEPTH 108.6' TO 108.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
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 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T386.0.1		
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INITIAL WATER CONTENT	$w_0$	22.3%	
DRY DENSITY pcf	$\gamma_d$	108	
SAMPLE DIAMETER in.	$D_0$	1.45	
SAMPLE HEIGHT in.	$H_0$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	1080	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	22.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 3

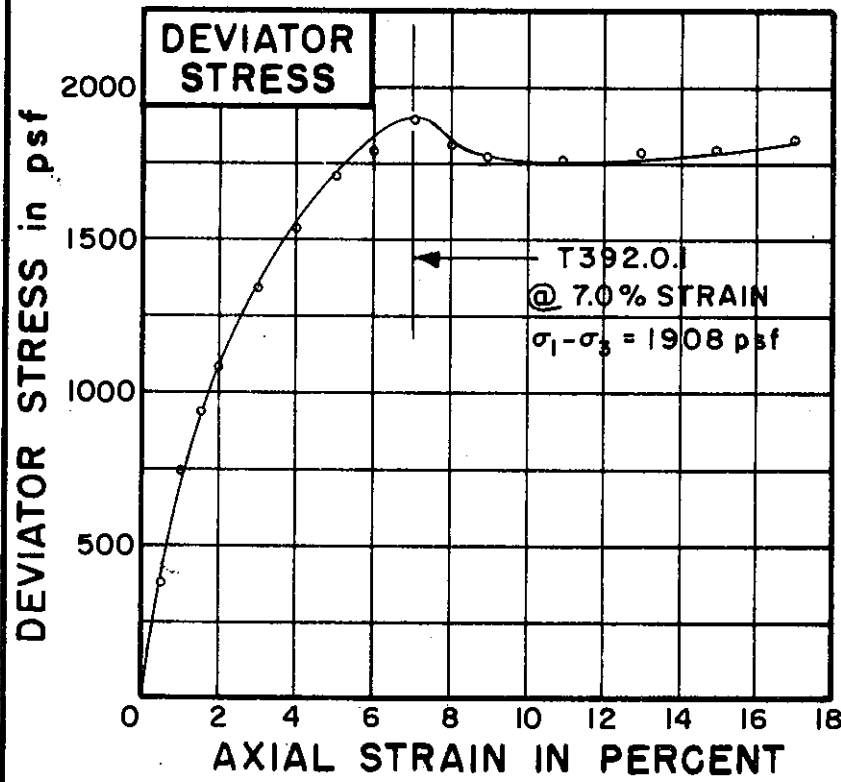
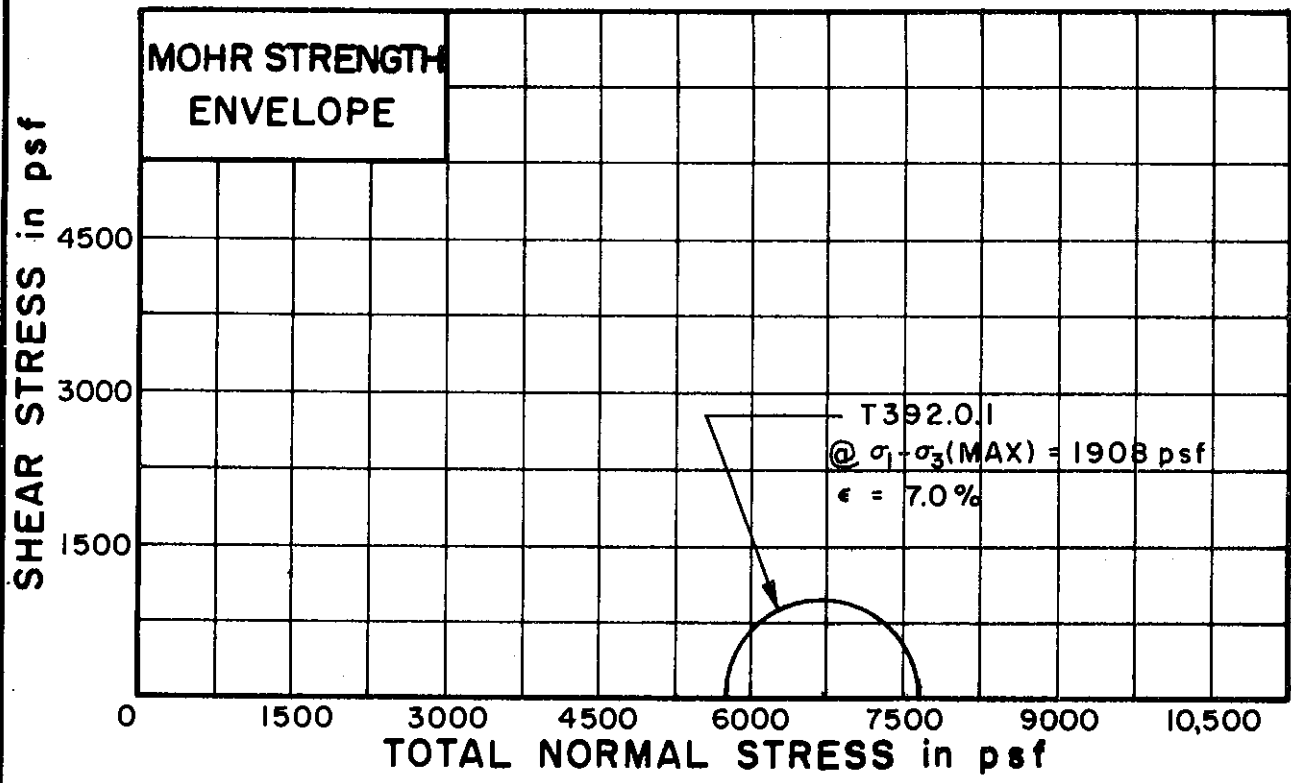
DEPTH 8.7' TO 9.0'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 23

**UNCONSOLIDATED UNDRAINED  
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BELLE RIVER PLANT UNITS I & II

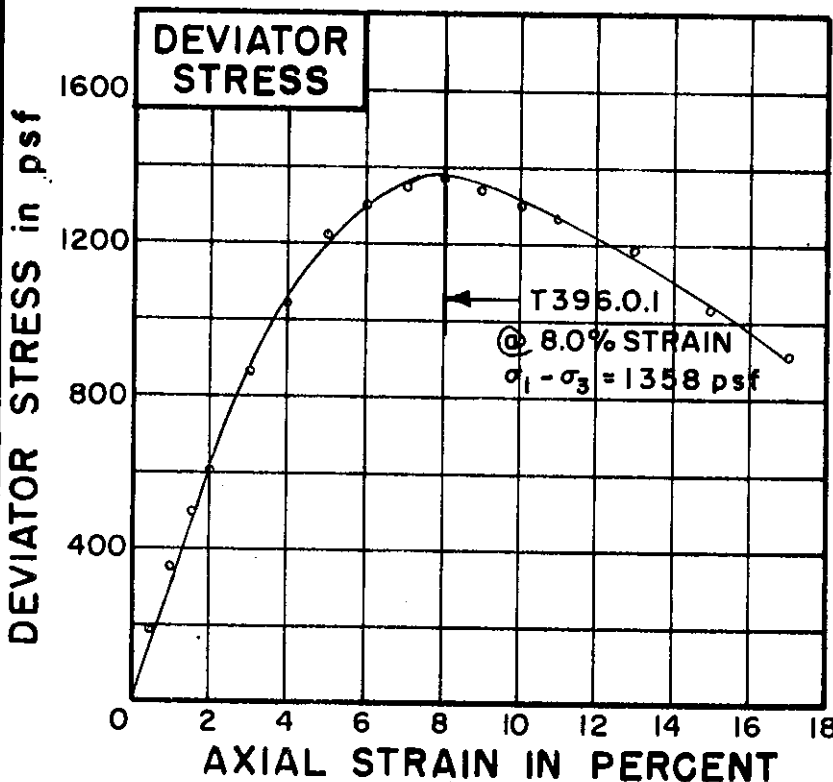
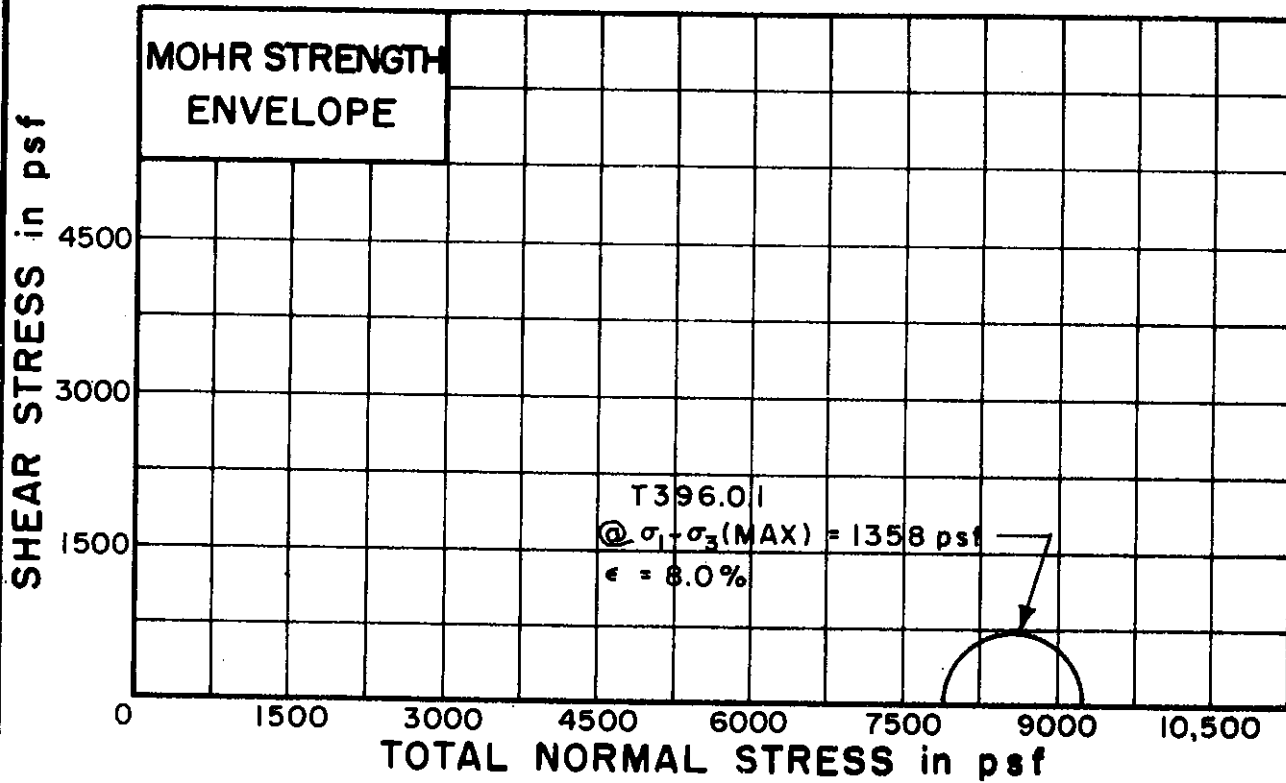


TEST NO./SYMBOL	T392.0.1		
INITIAL WATER CONTENT	w <sub>o</sub> 24.8%		
DRY DENSITY pcf	γ <sub>d</sub> 101		
SAMPLE DIAMETER, in.	D <sub>o</sub> 1.41		
SAMPLE HEIGHT in.	H <sub>o</sub> 3.35		
CONFINING PRESSURE psf	σ <sub>3</sub> 5760		
RATE OF STRAIN PERCENT/MINUTE	0.27		
FINAL WATER CONTENT	w <sub>f</sub> 24.6%		
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129  
 SAMPLE NO. 15  
 DEPTH 74.0' TO 74.3'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
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 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T396.0.1		
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INITIAL WATER CONTENT	$w_0$	30.6%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER, in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.20	

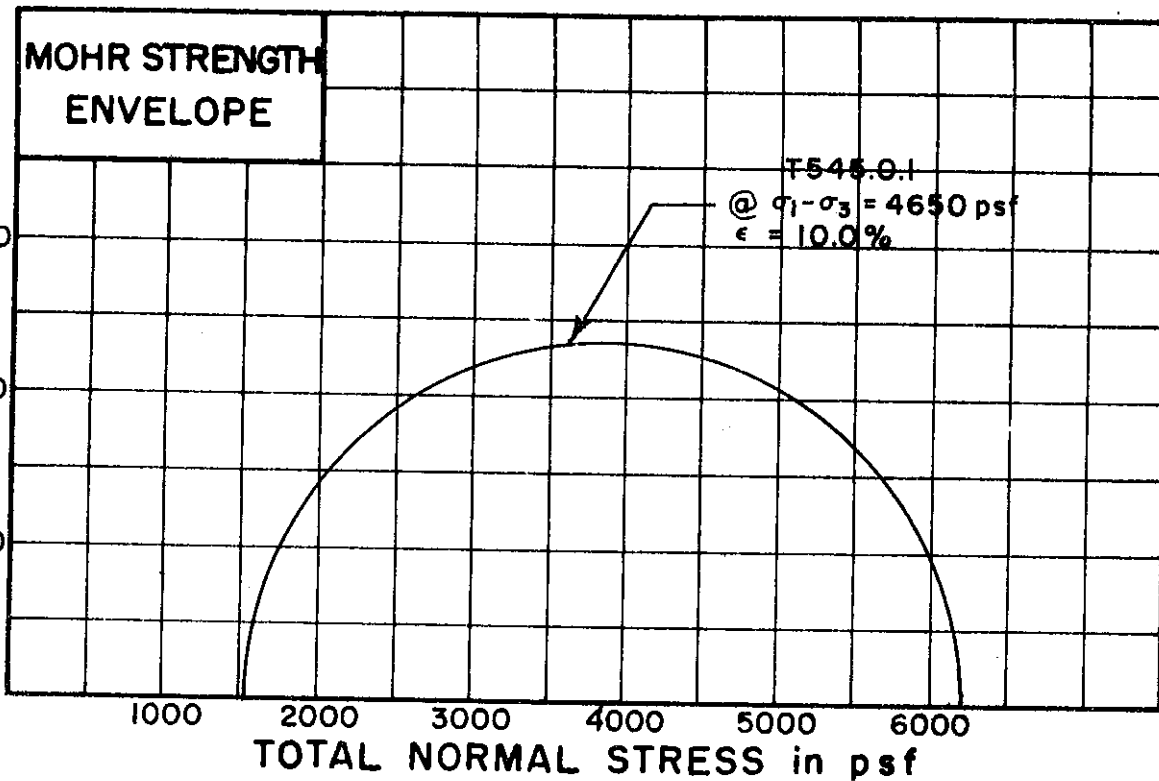
CONFINING PRESSURE psf	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.28	

FINAL WATER CONTENT	$w_f$	30.3%	
SKETCH OF SAMPLE AT END OF TEST			

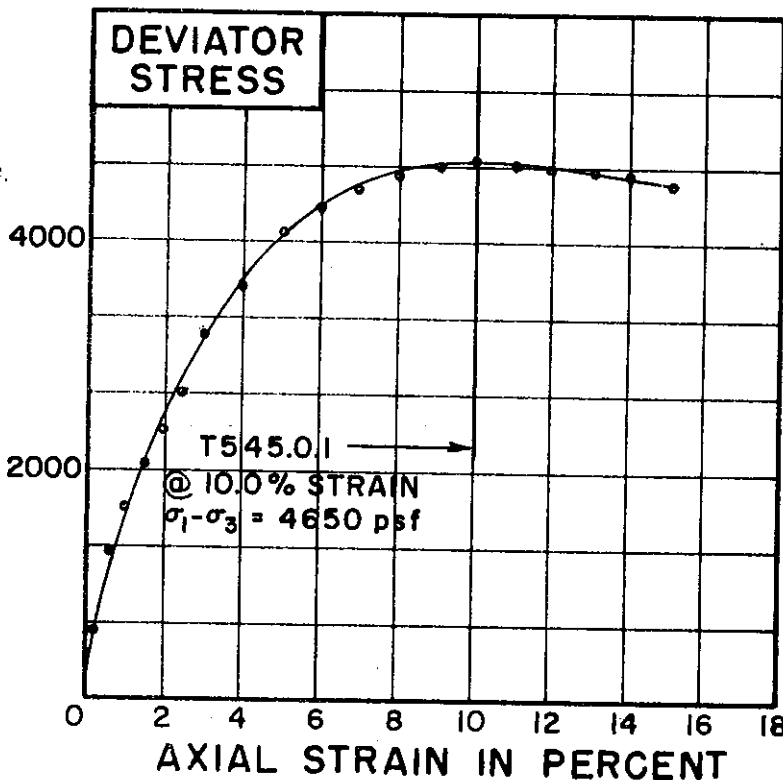
BORING NO. 129  
 SAMPLE NO. 24  
 DEPTH 124.1' TO 124.4'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T545.0.1		
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INITIAL WATER CONTENT	$w_o$	28.3%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.32	

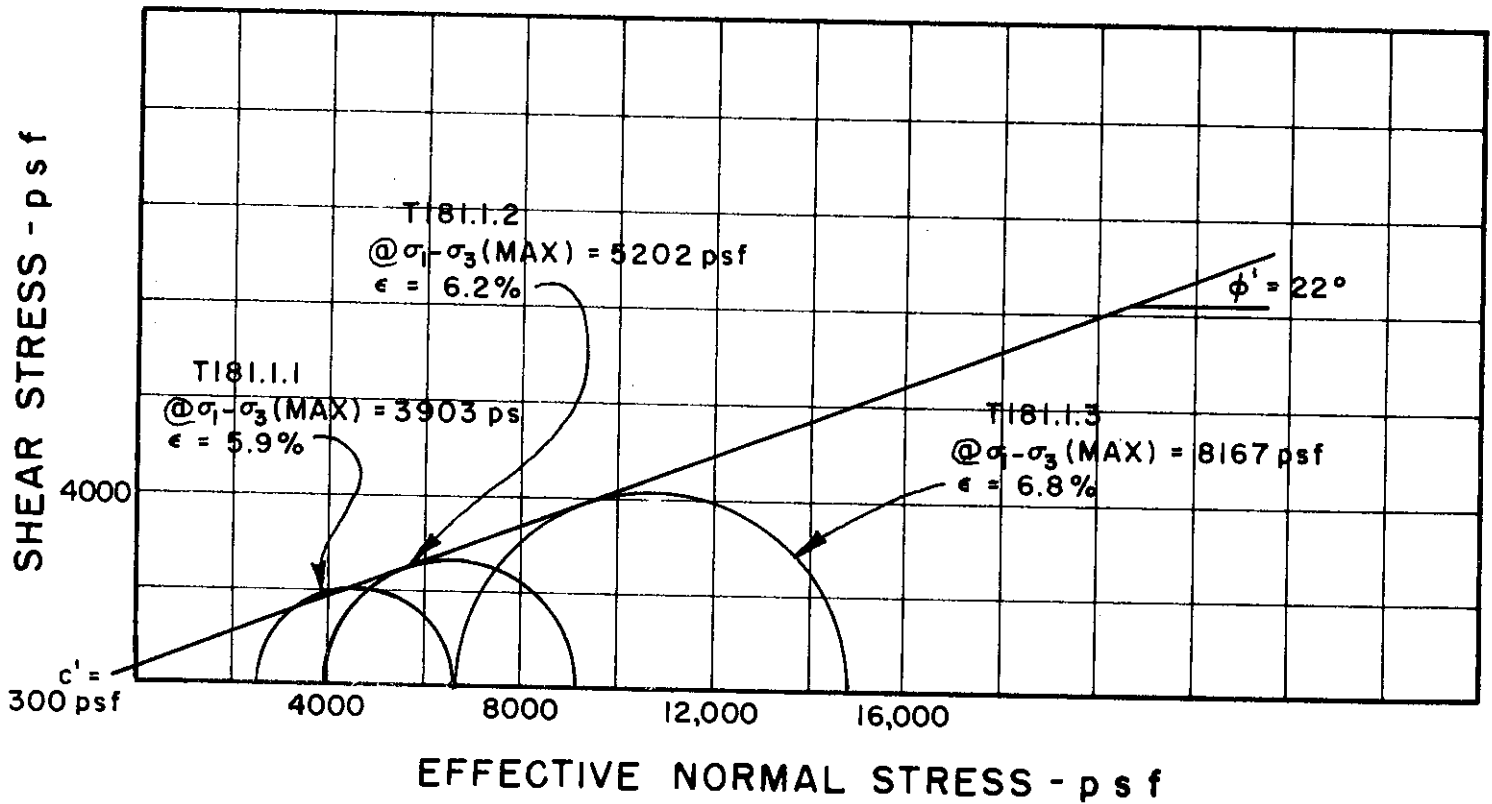
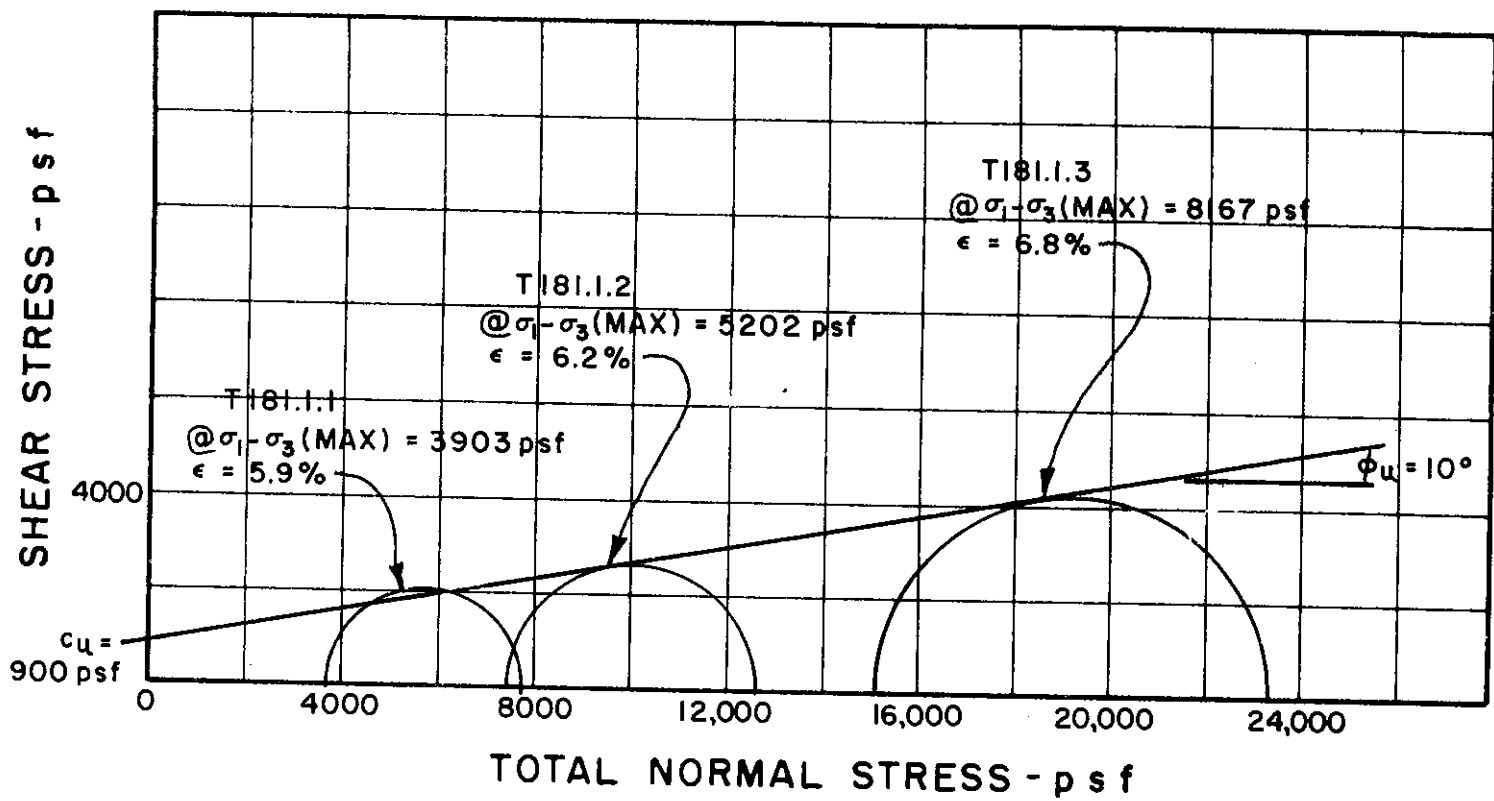
CONFINING PRESSURE psf	$\sigma_3$	1555	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	28.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 151A  
 SAMPLE NO. 3  
 DEPTH 13.0' TO 13.3'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 48 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 18

SAMPLE NO. 12

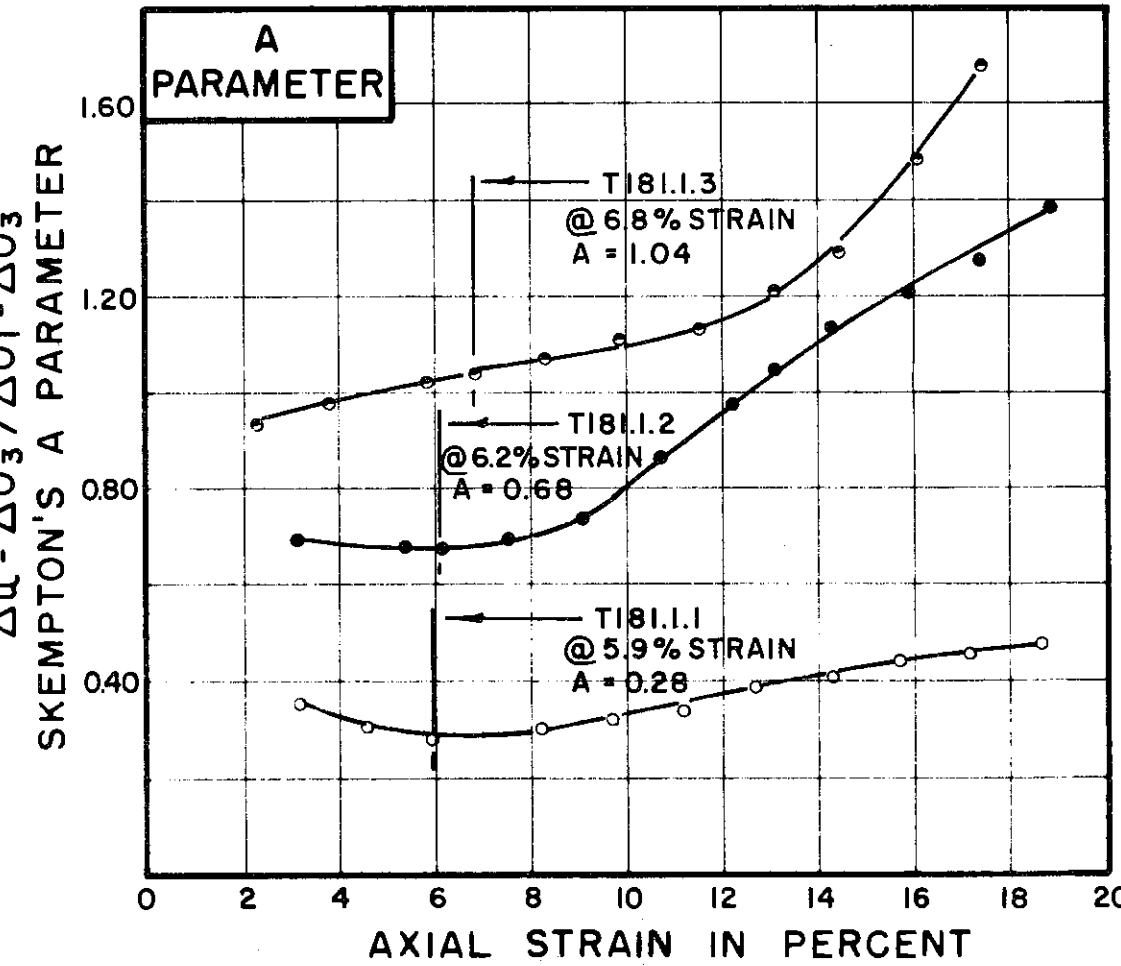
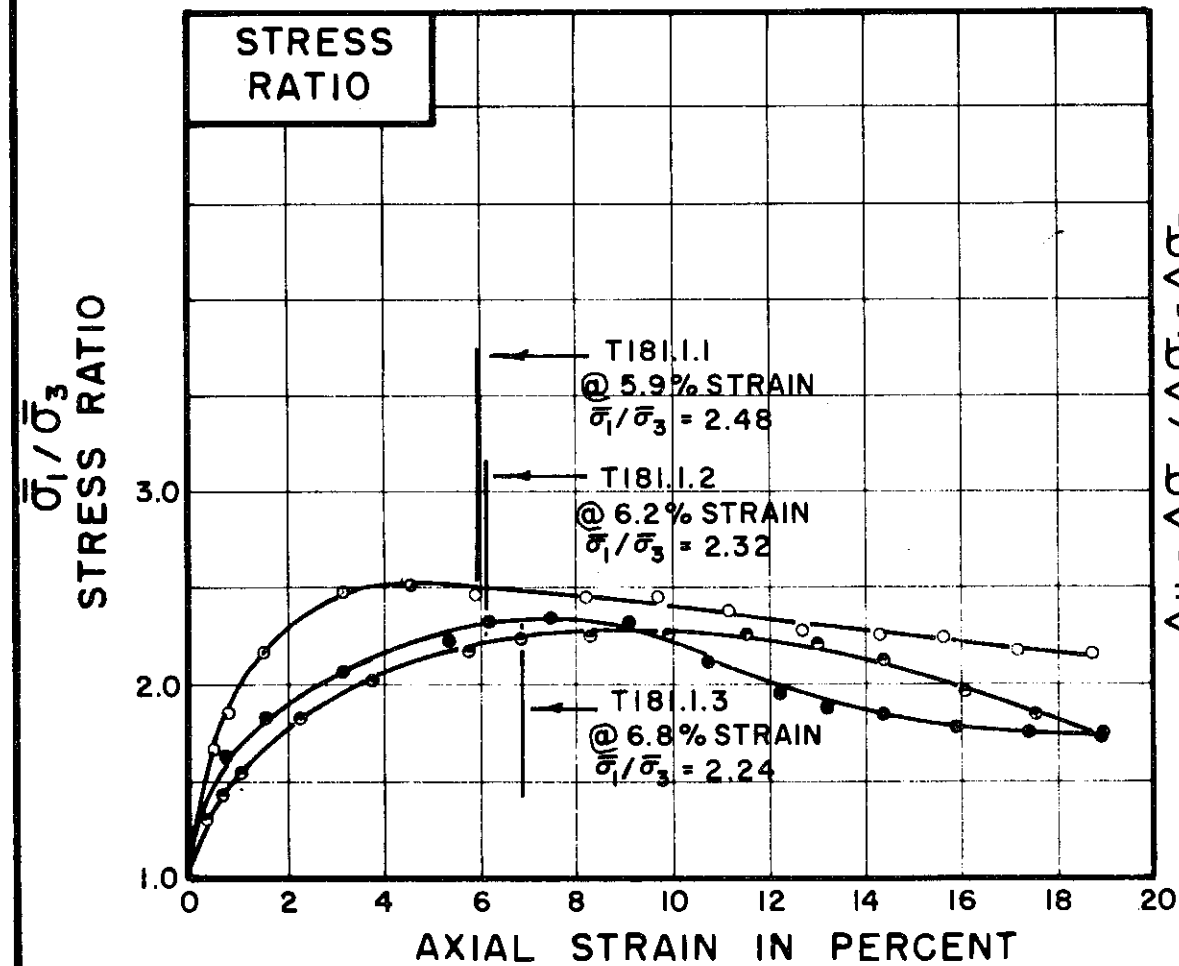
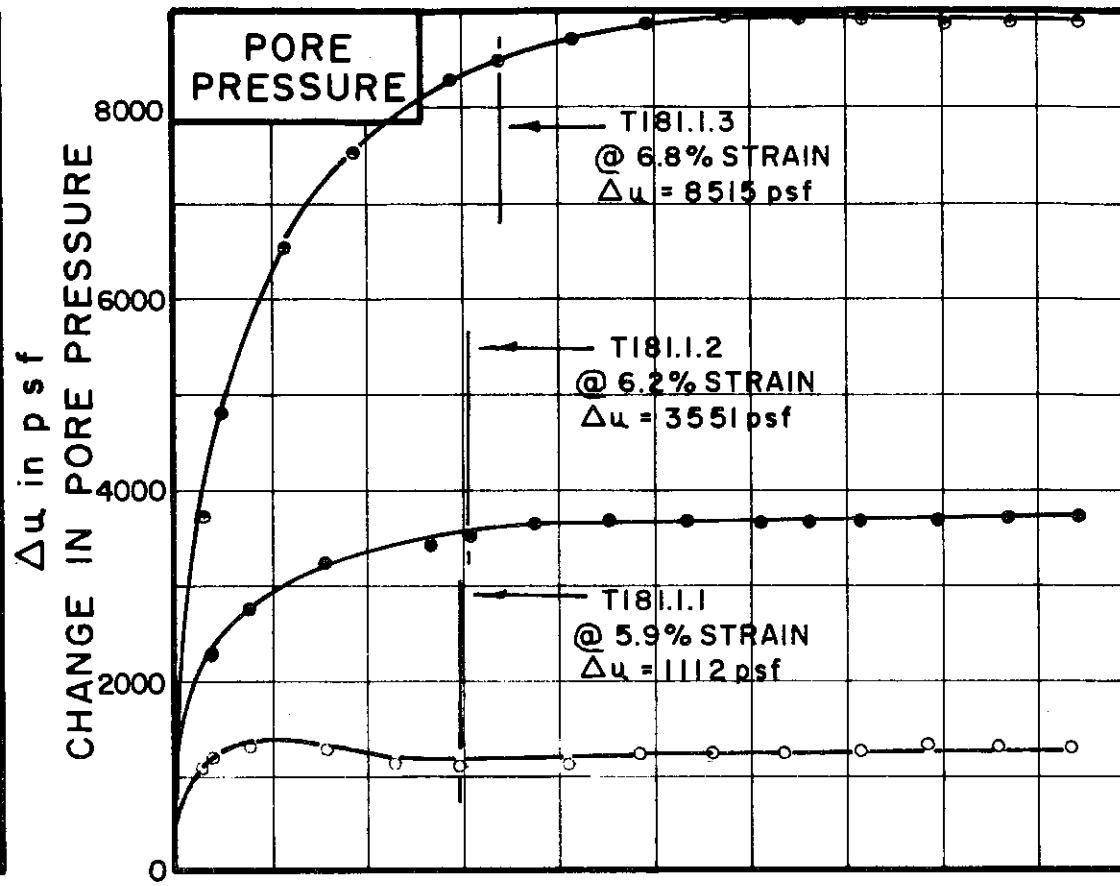
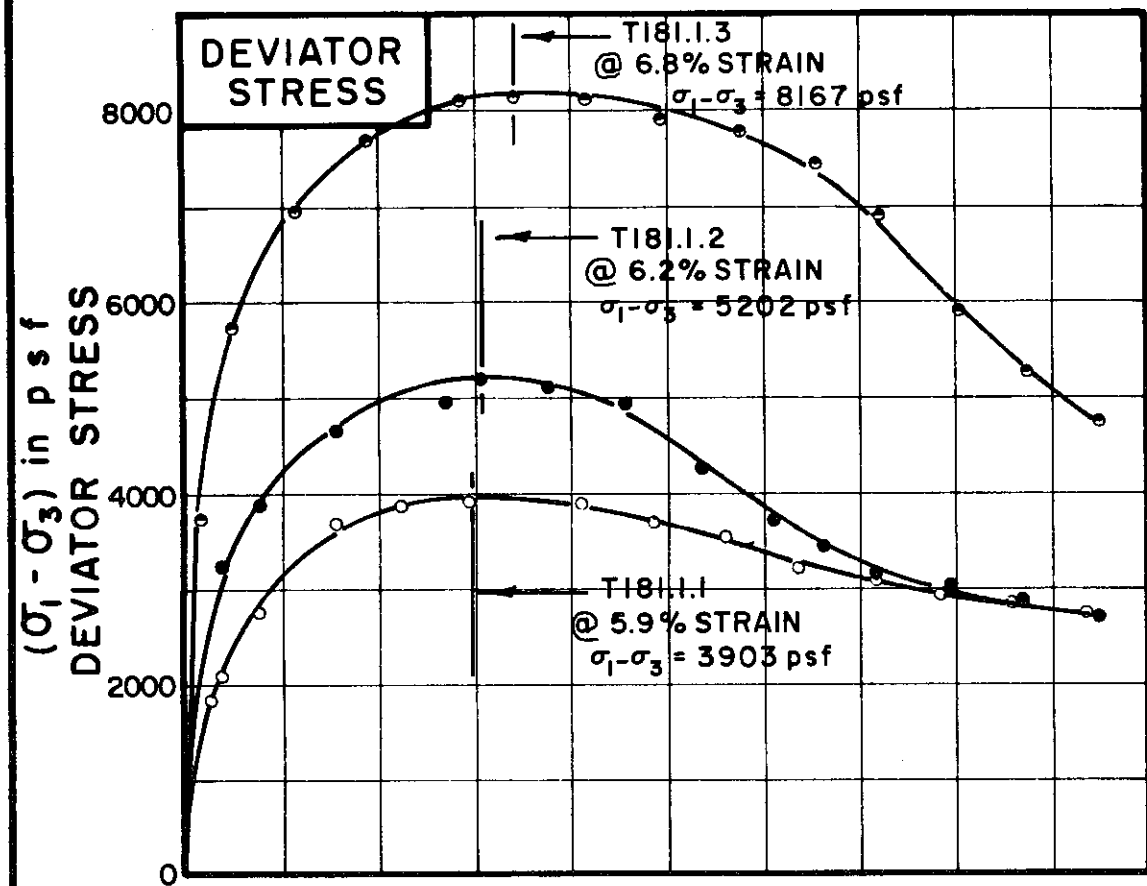
DEPTH 108.0' TO 110.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



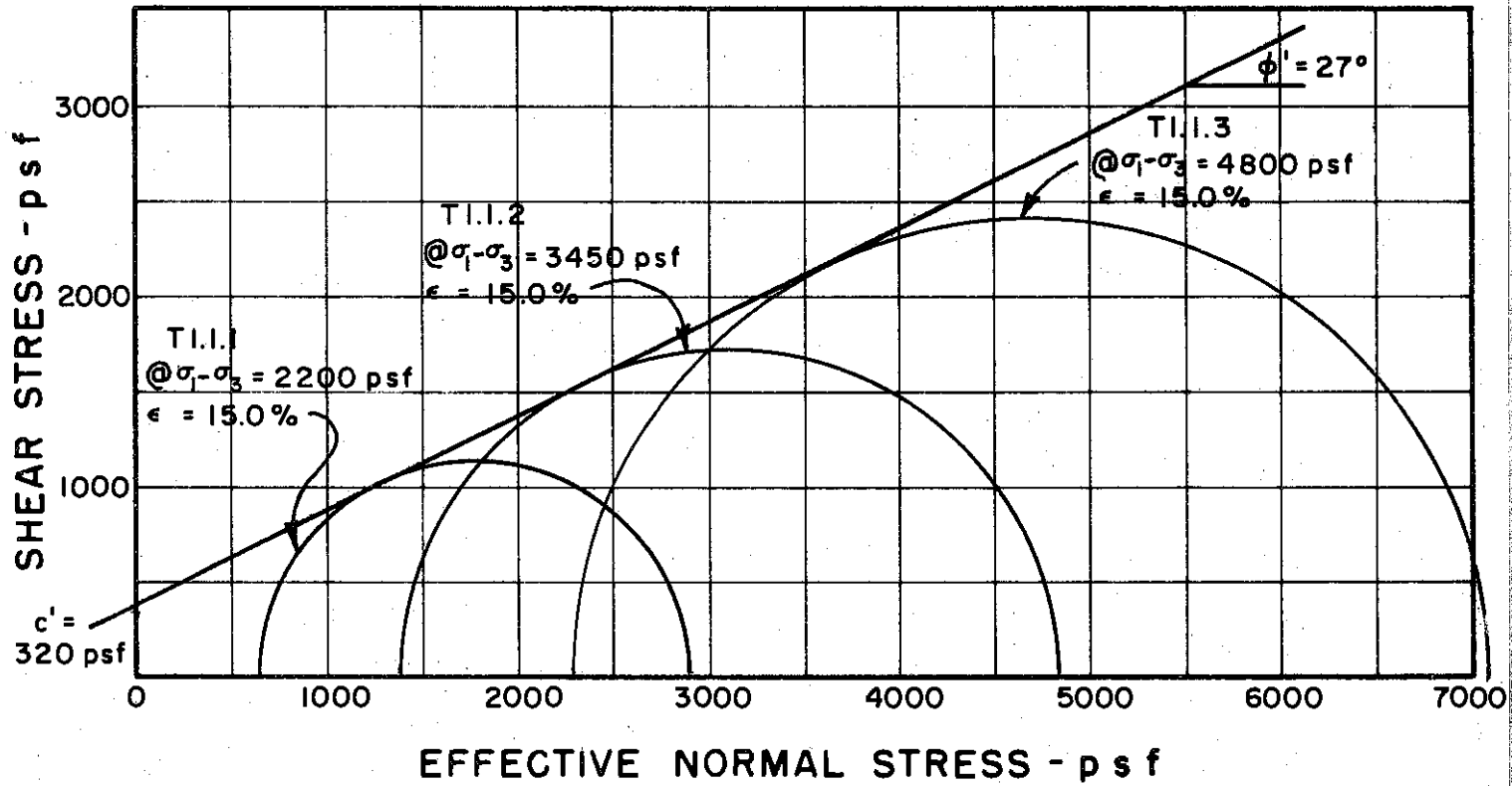
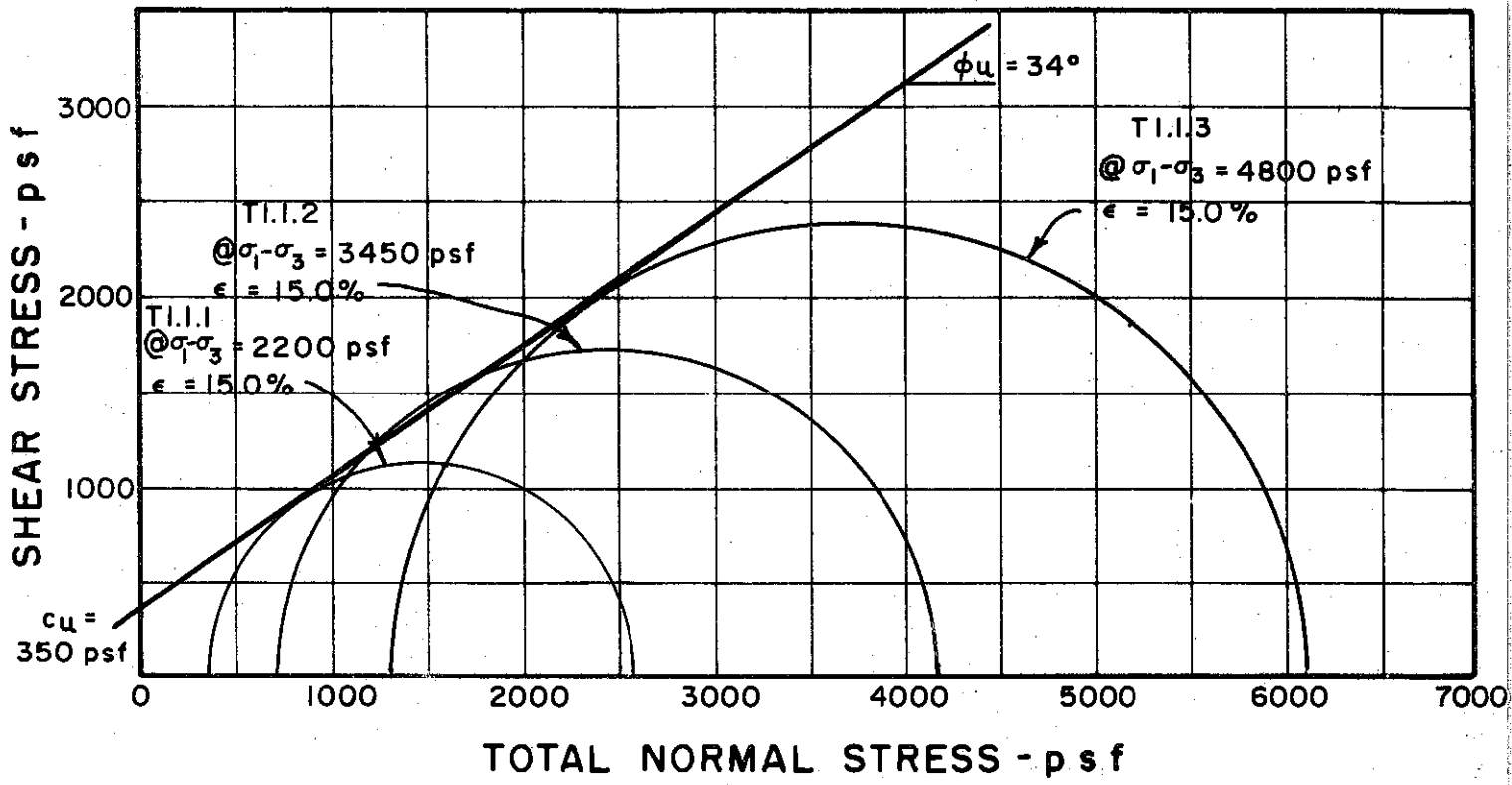
TEST NO. / SYMBOL	T181.1.1	T181.1.2	T181.1.3
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	34.5%	31.0%	30.7%
	DRY DENSITY	$\gamma_d$	87	92	92
	lb/cu ft				
CONDITIONS BEFORE SHEAR	SAMPLE DIAMETER	$D_0$	1.40	1.39	1.37
	in.				
	SAMPLE HEIGHT	$H_0$	3.37	3.35	3.37
FINAL CONDITIONS	FINAL BACK PRESSURE	$u_0$	10080	7200	6480
	psf				
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	3744	7488	15120
CONDITIONS BEFORE SHEAR	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.32%	4.19%	6.61%
	PORE PRESSURE RESPONSE		95%	97%	93%
	WATER CONTENT	$w_f$	33.7%	29.3%	27.7%
FINAL CONDITIONS	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 18  
 SAMPLE NO. 12  
 DEPTH 108.0' TO 110.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



BORING NO. 26

SAMPLE NO. 2

DEPTH 3.5 TO 5.5

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

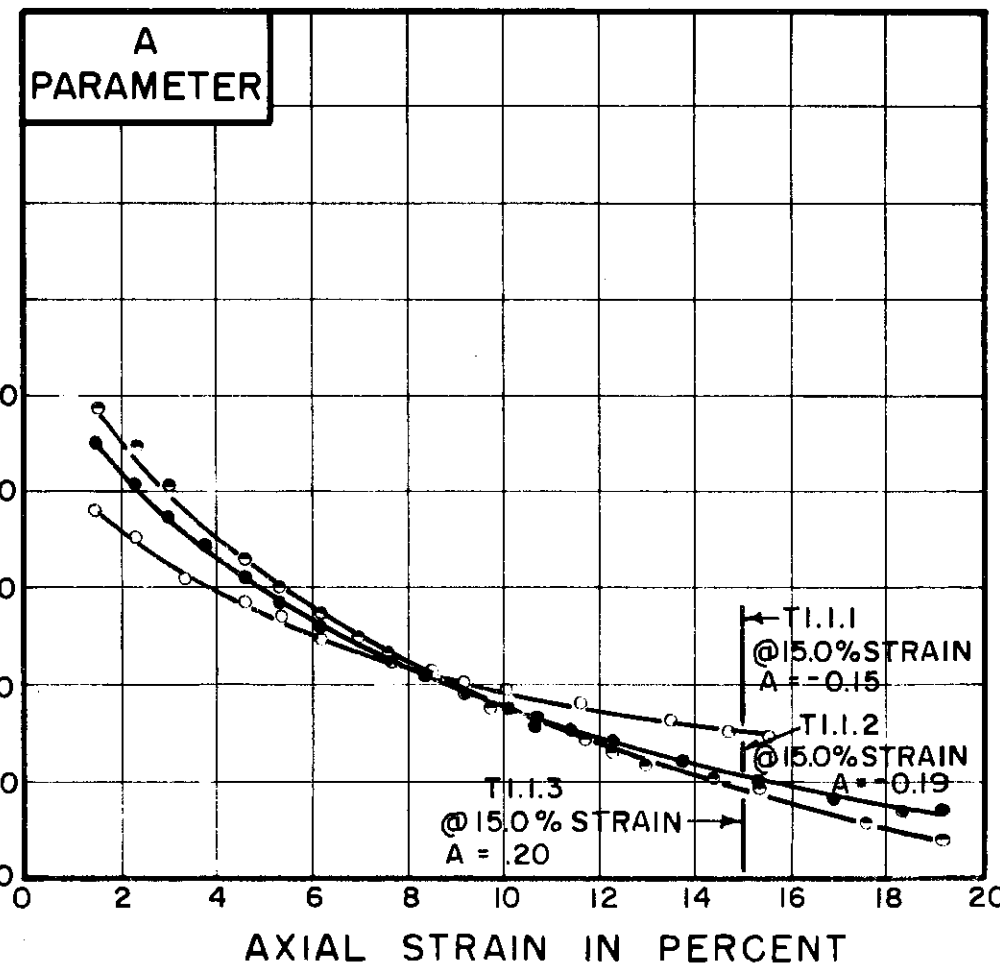
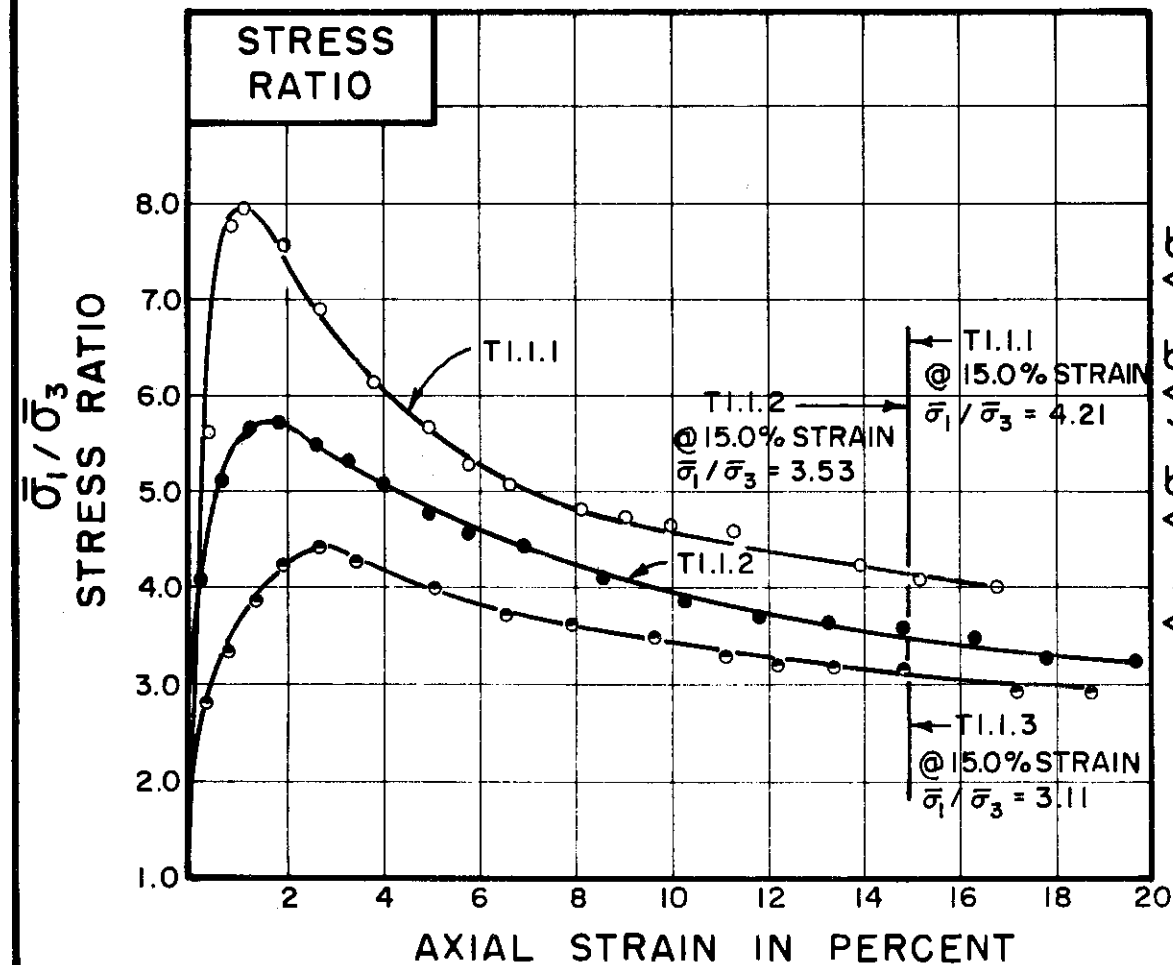
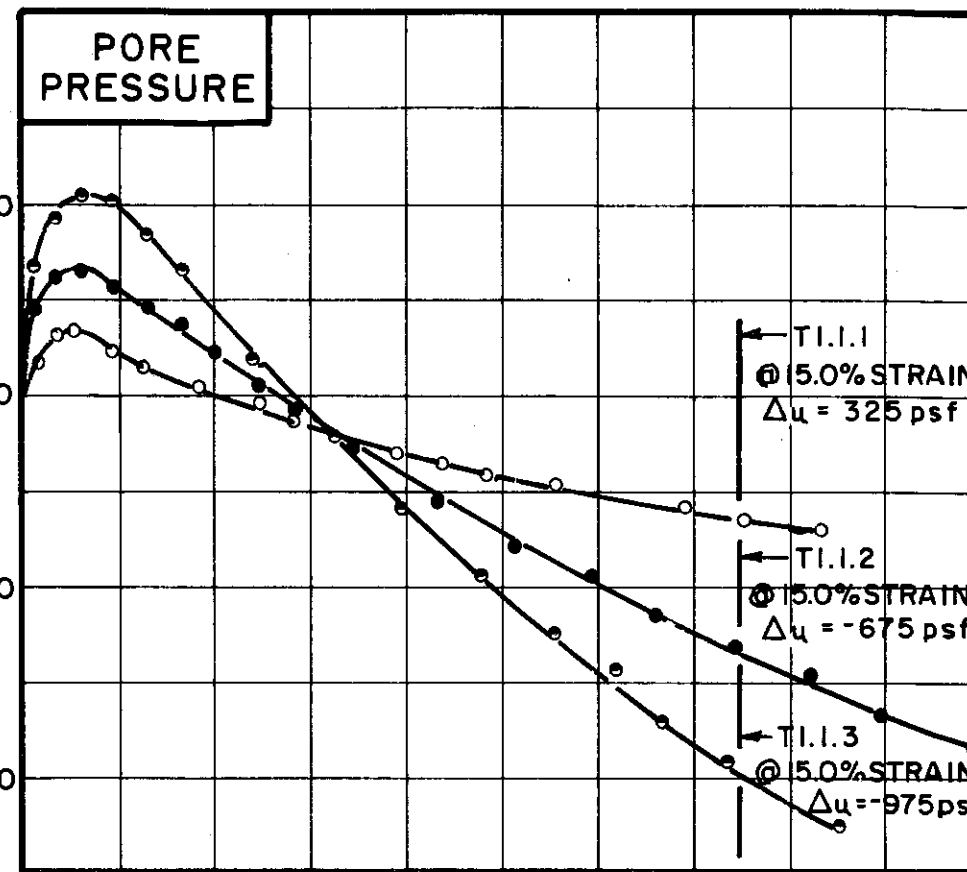
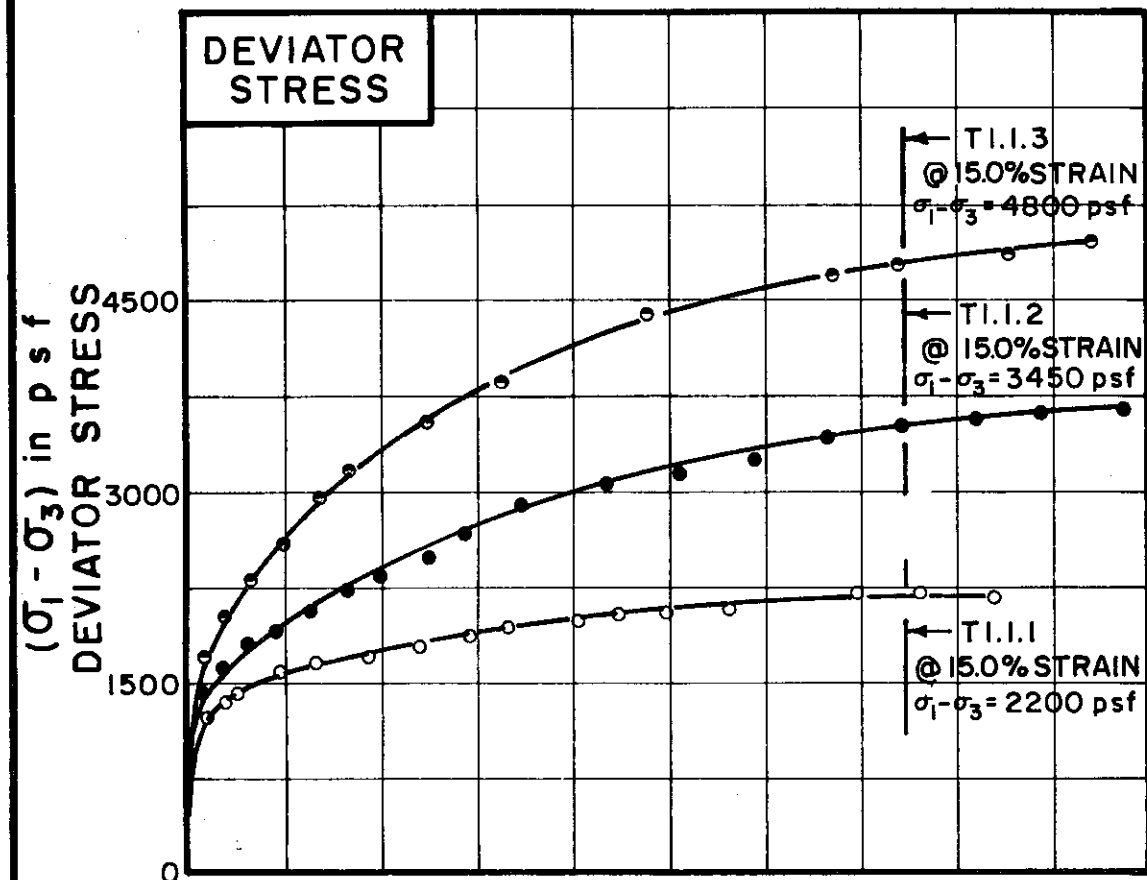
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-387



TEST NO. / SYMBOL	T1.1.1	T1.1.2	T1.1.3
	○	●	○

INITIAL CONDITIONS		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_0$	23.0%	23.9%	22.3%
DRY DENSITY	$\gamma_d$ pcf	104	103	108
SAMPLE DIAMETER	$D_0$ in.	1.39	1.39	1.47
SAMPLE HEIGHT	$H_0$ in.	3.22	3.25	3.26
FINAL CONDITIONS BEFORE SHEAR		T1.1.1	T1.1.2	T1.1.3
FINAL BACK PRESSURE	$u_0$ psf	8740	8352	8410
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$ psf	360	691	1296
VOLUMETRIC STRAIN	$\epsilon_{vol}$	.4%	1.0%	1.4%
PORE PRESSURE RESPONSE		100%	98%	94%
FINAL CONDITIONS AFTER SHEAR		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_f$	26.7%	26.7%	25.3%
SKETCH OF SAMPLE AT END OF TEST				

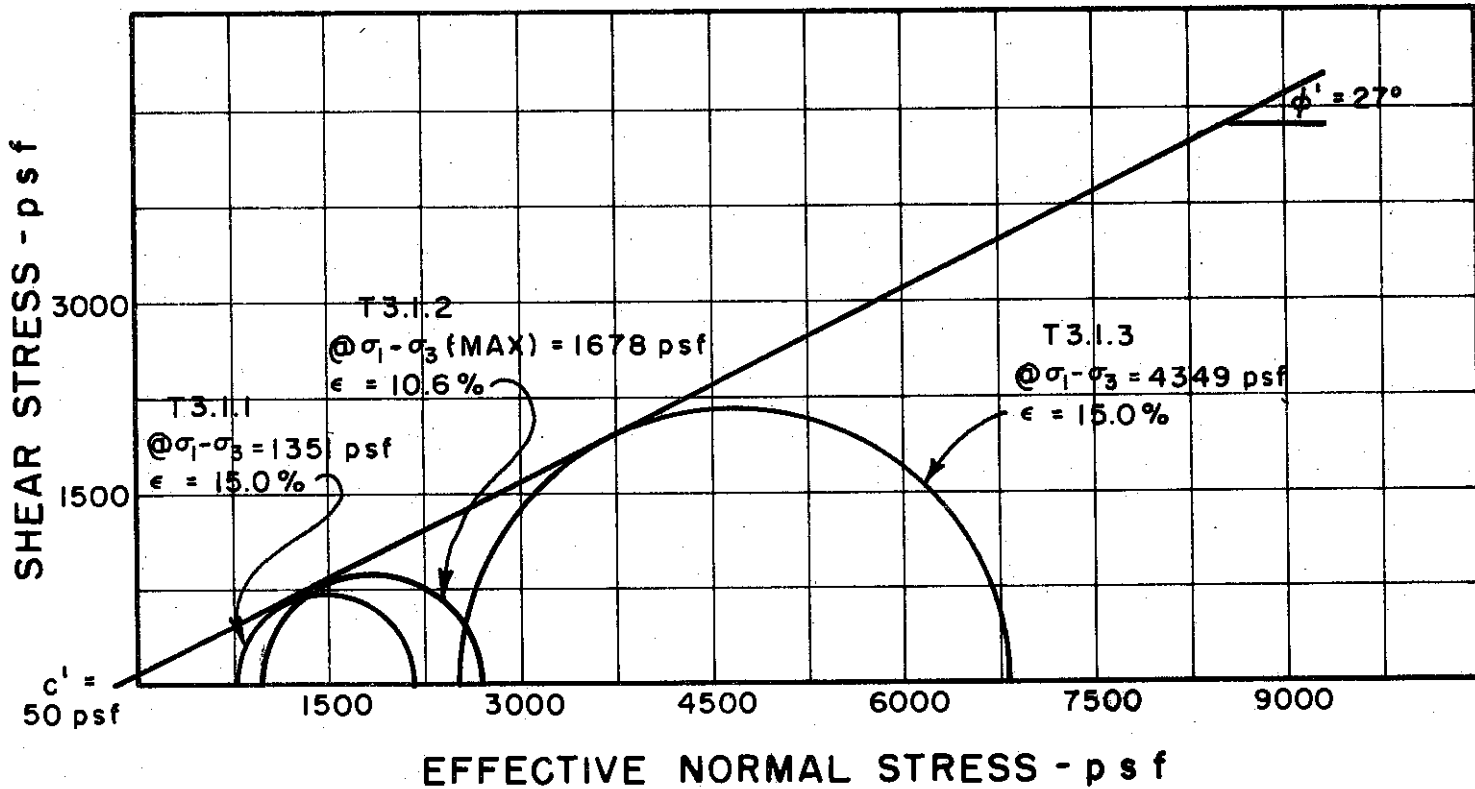
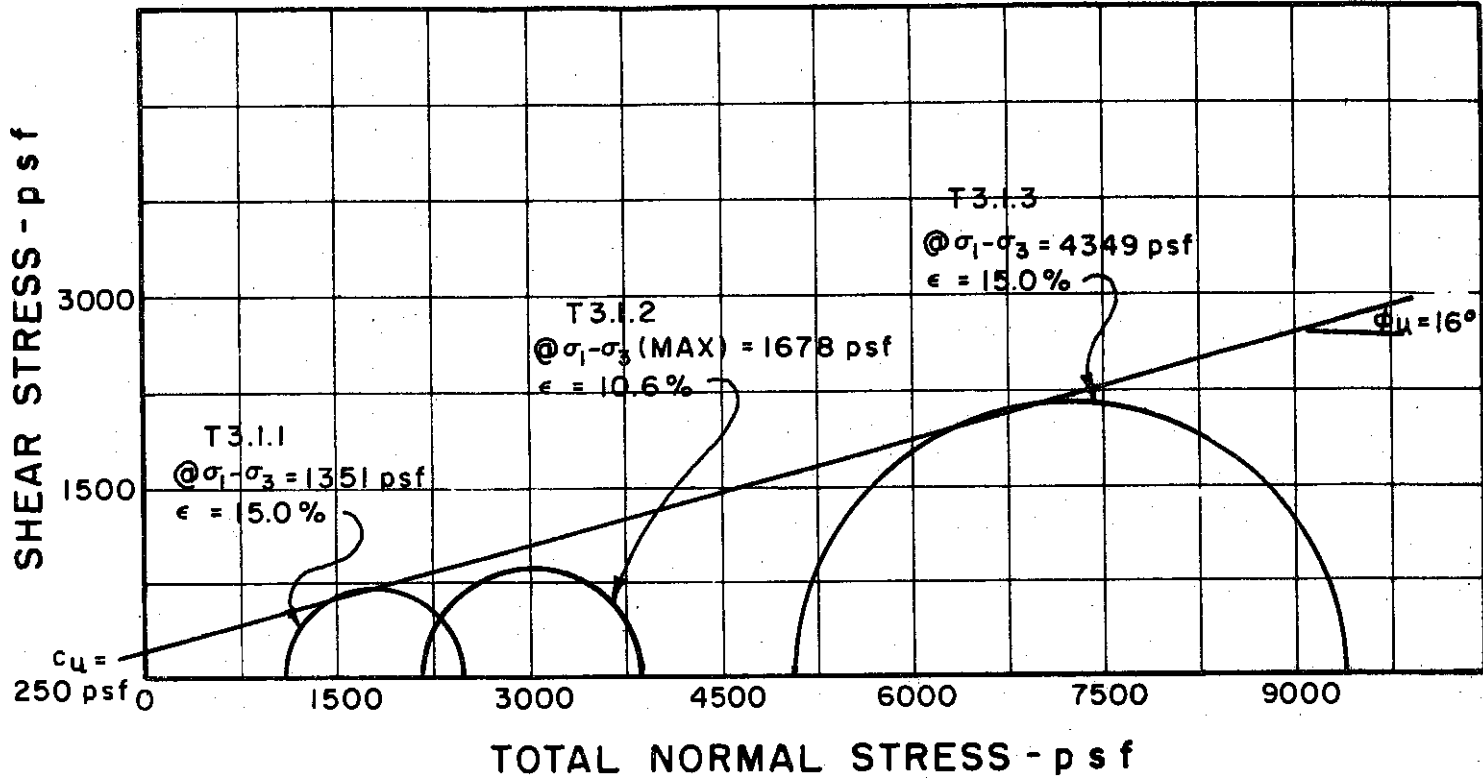
RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

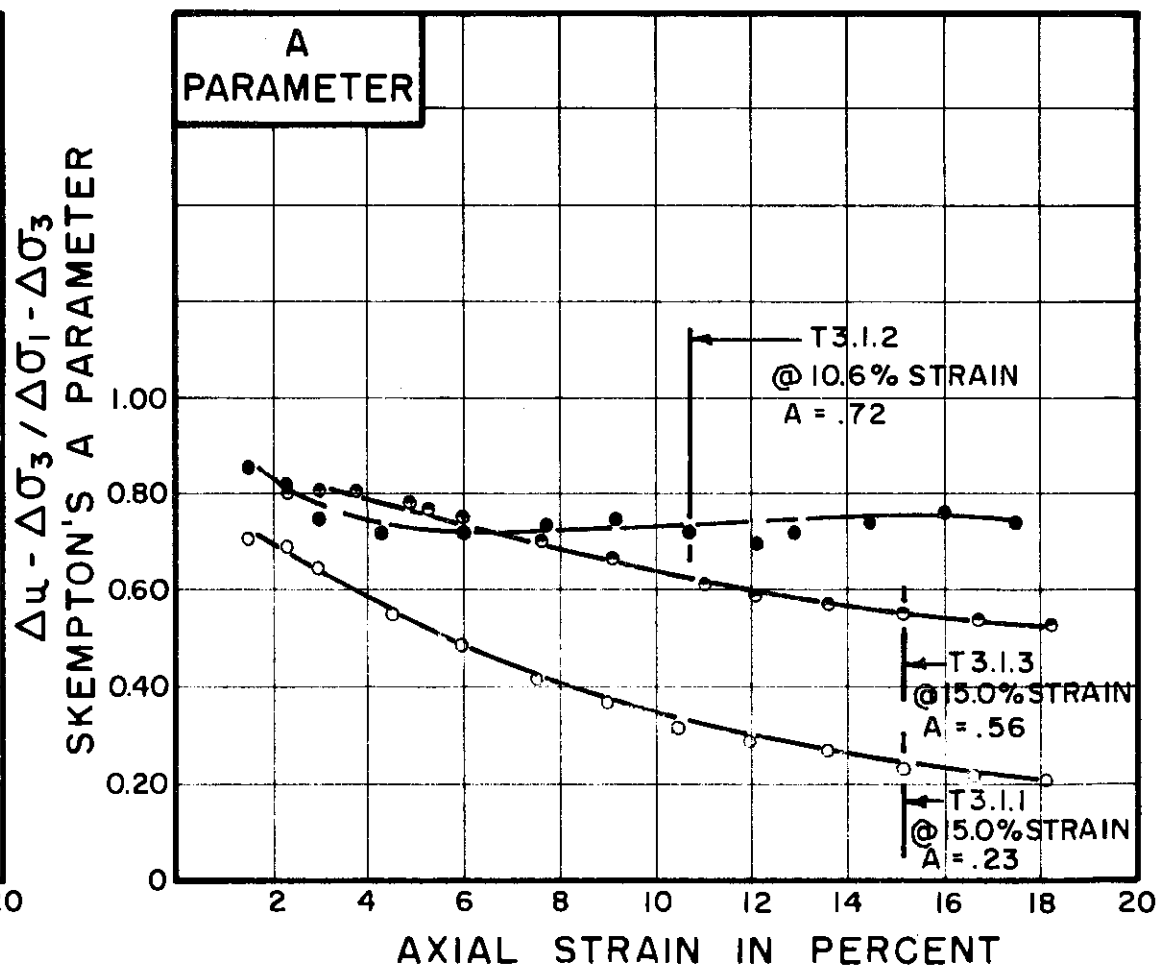
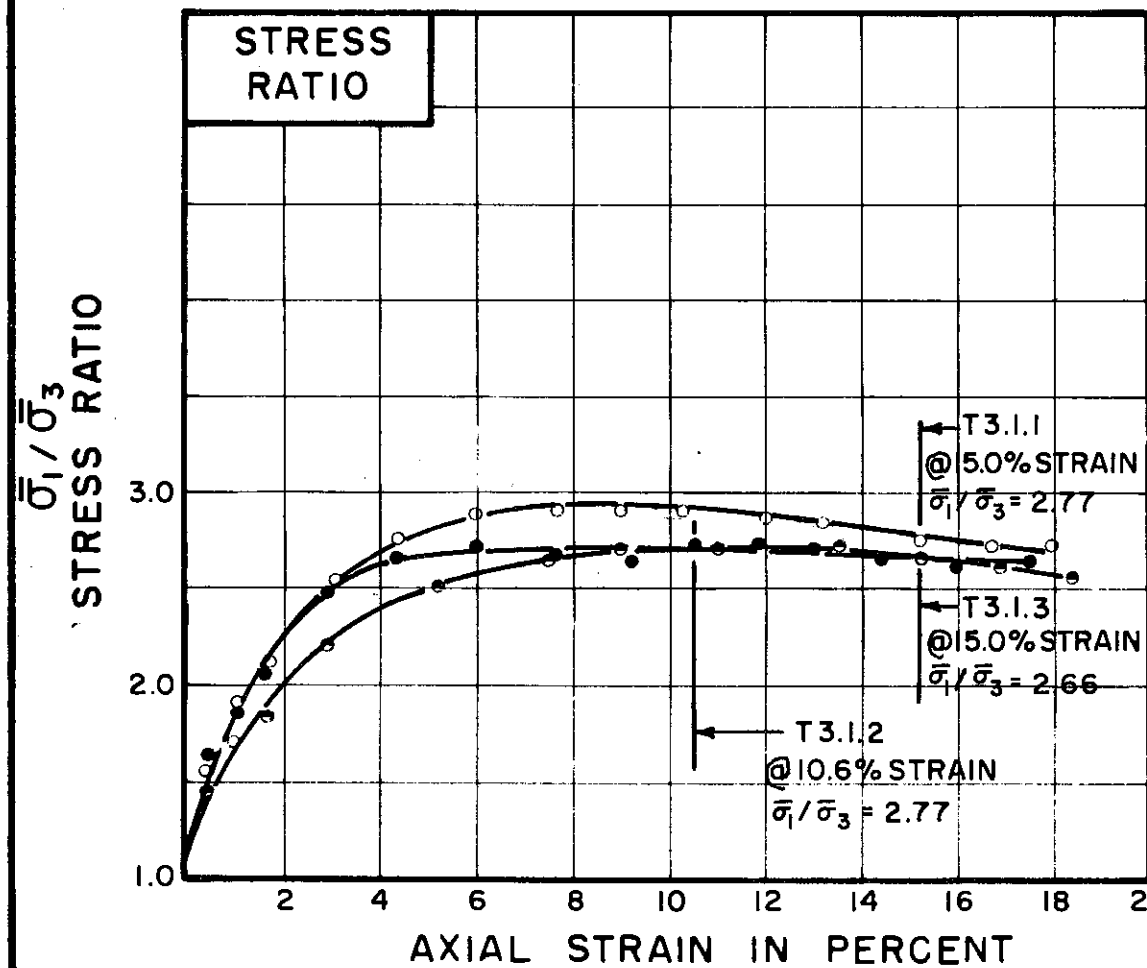
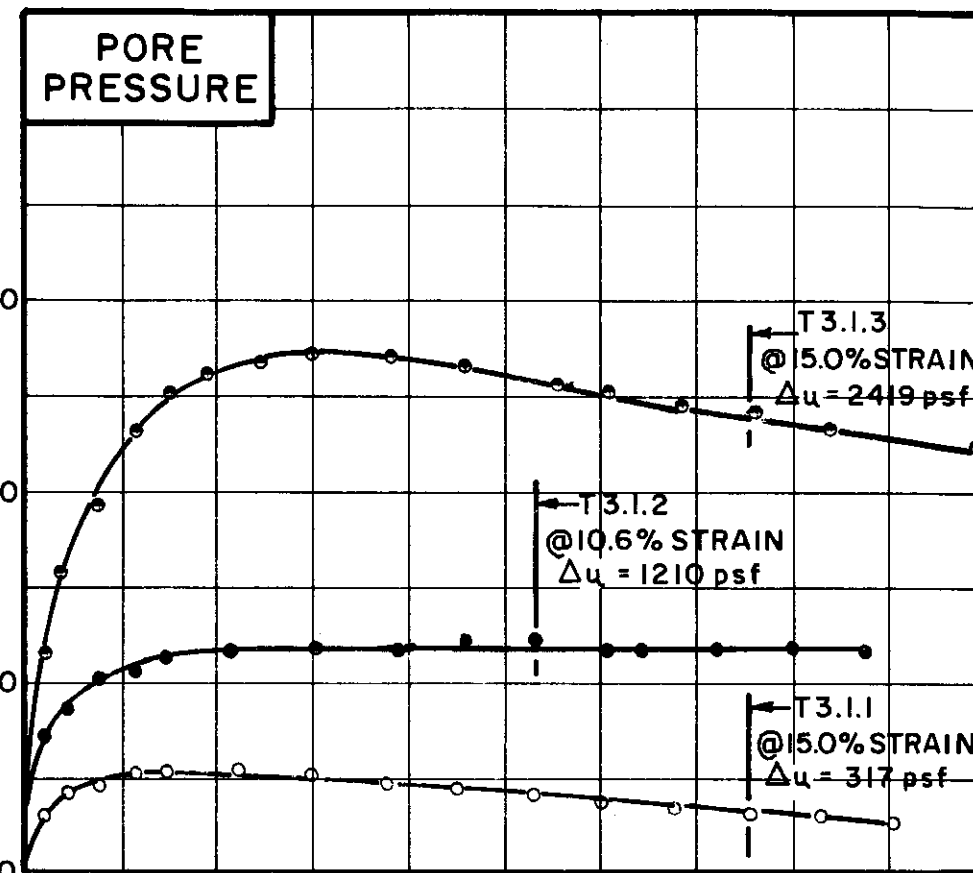
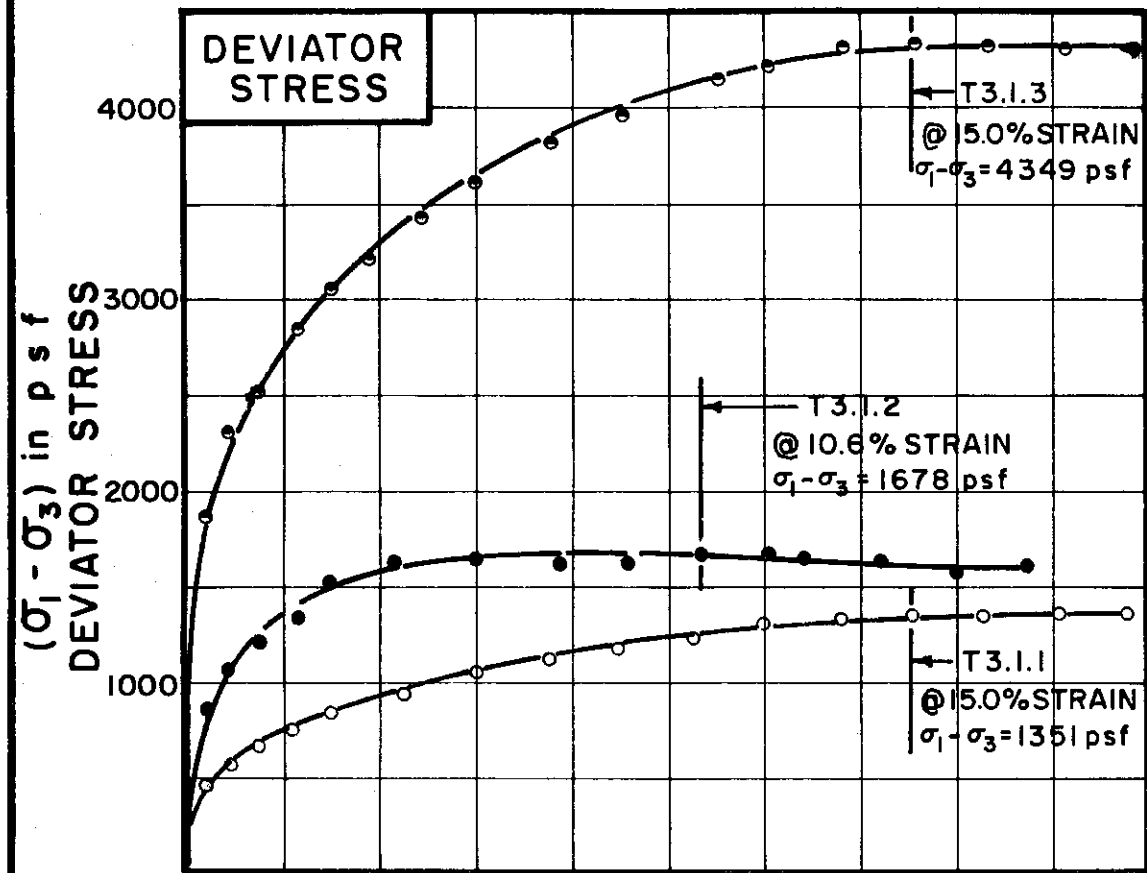
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T3.1.1 ○	T3.1.2 ●	T3.1.3 ◉
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INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	35.4%	35.3%	35.7%	
DRY DENSITY		pcf	$\gamma_d$	89	86	86	
SAMPLE DIAMETER		in.	D <sub>0</sub>	1.40	1.40	1.41	
SAMPLE HEIGHT		in.	H <sub>0</sub>	3.36	3.35	3.35	
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	psf	u <sub>0</sub>	7200	7200	10800
INITIAL EFFECTIVE STRESS		psf	$\sigma_{1/3}$	1080	2160	5040	
VOLUMETRIC STRAIN			$\epsilon_{vol}$	5.3%	6.2%	8.7%	
PORE PRESSURE RESPONSE				100%	98%	95%	
FINAL CONDITIONS		WATER CONTENT	w <sub>f</sub>	31.1%	30.8%	28.4%	
SKETCH OF SAMPLE AT END OF TEST							

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

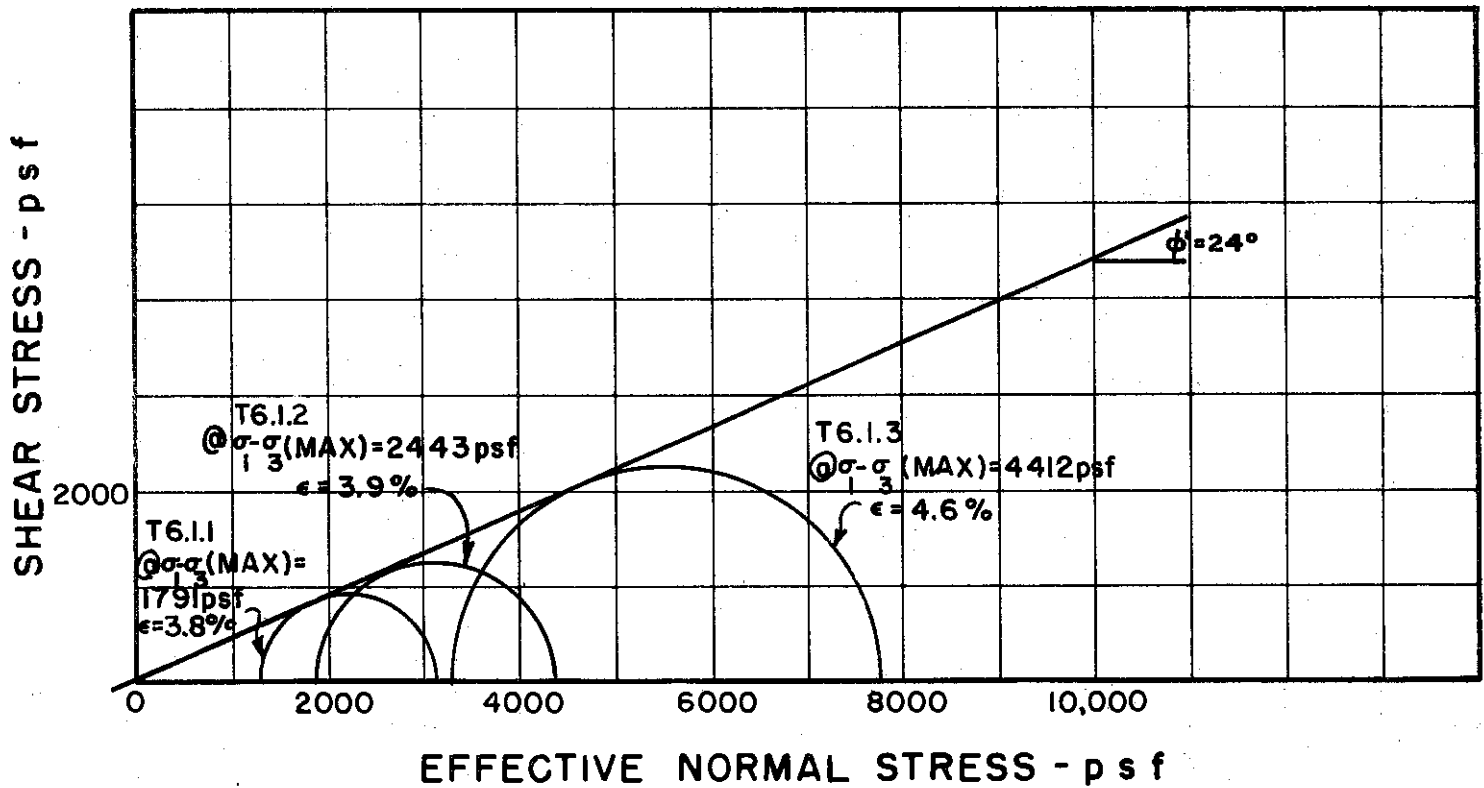
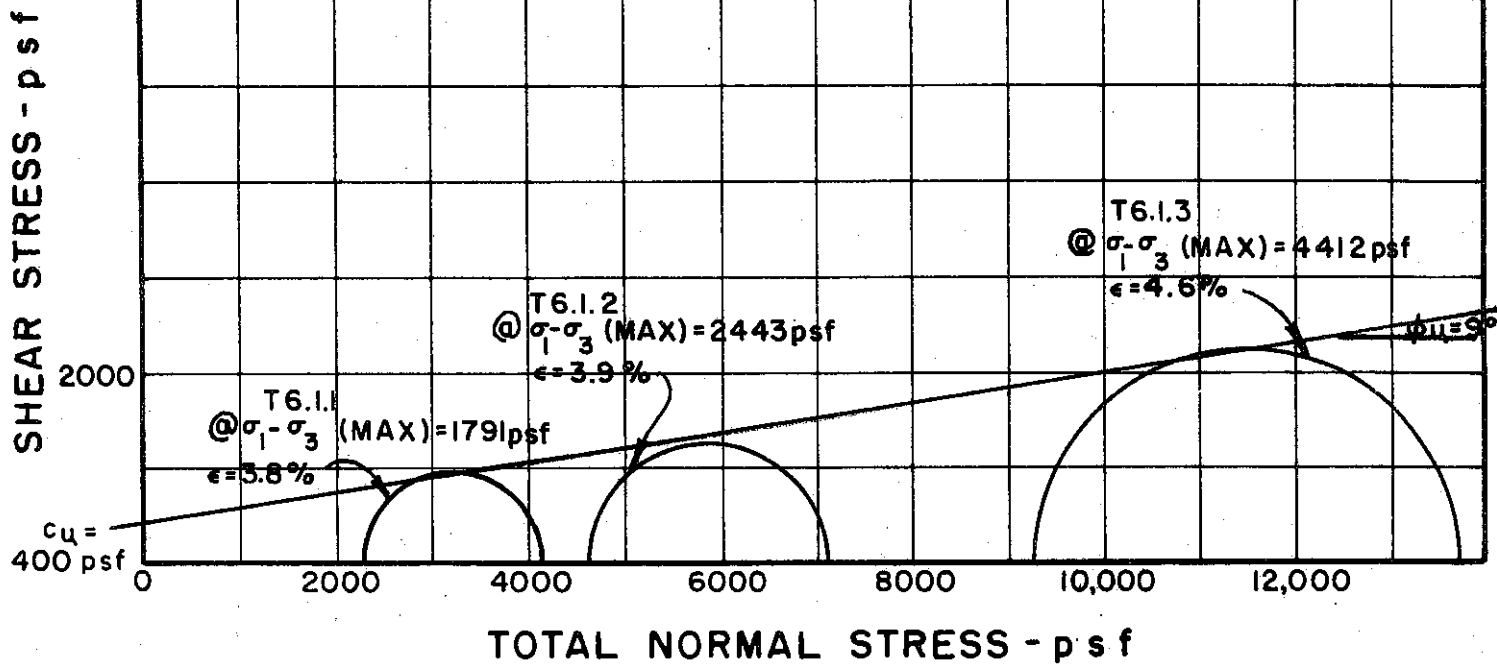
SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 26

SAMPLE NO. 11

DEPTH 48.0 TO 50.0

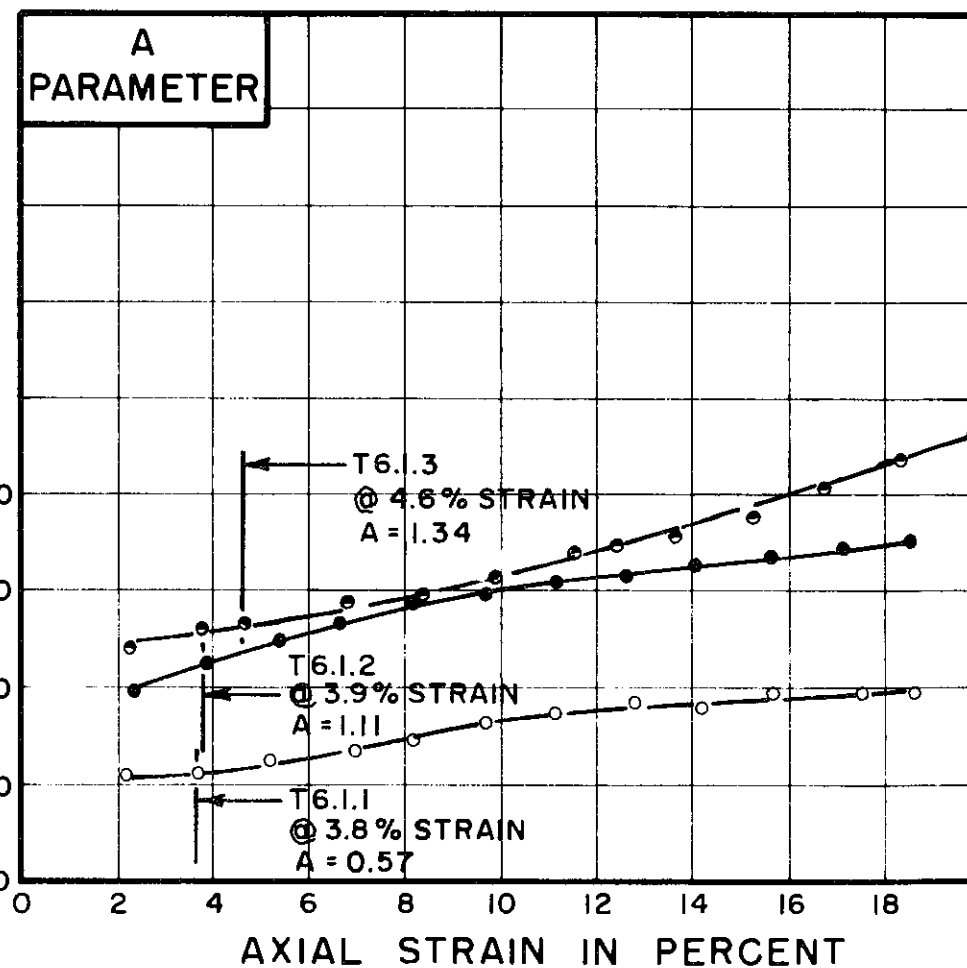
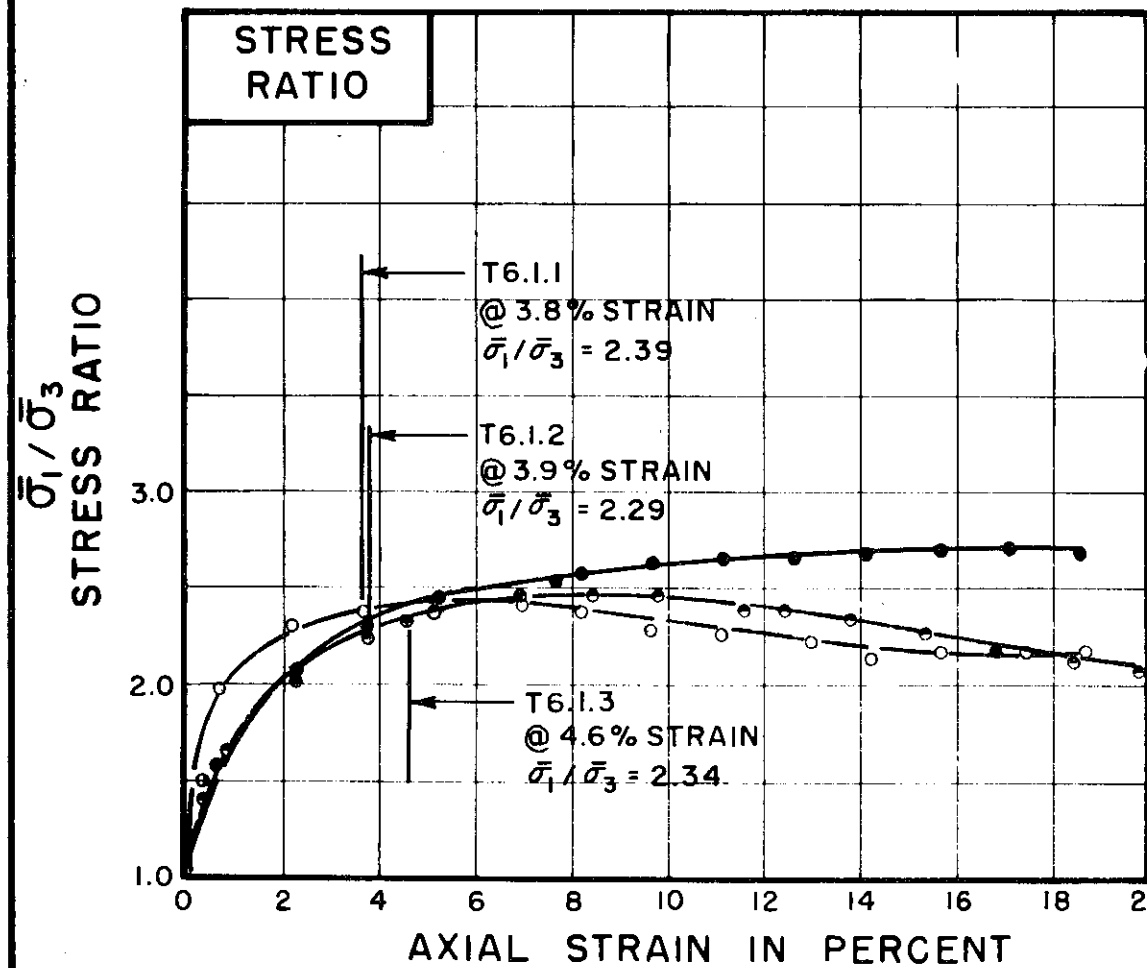
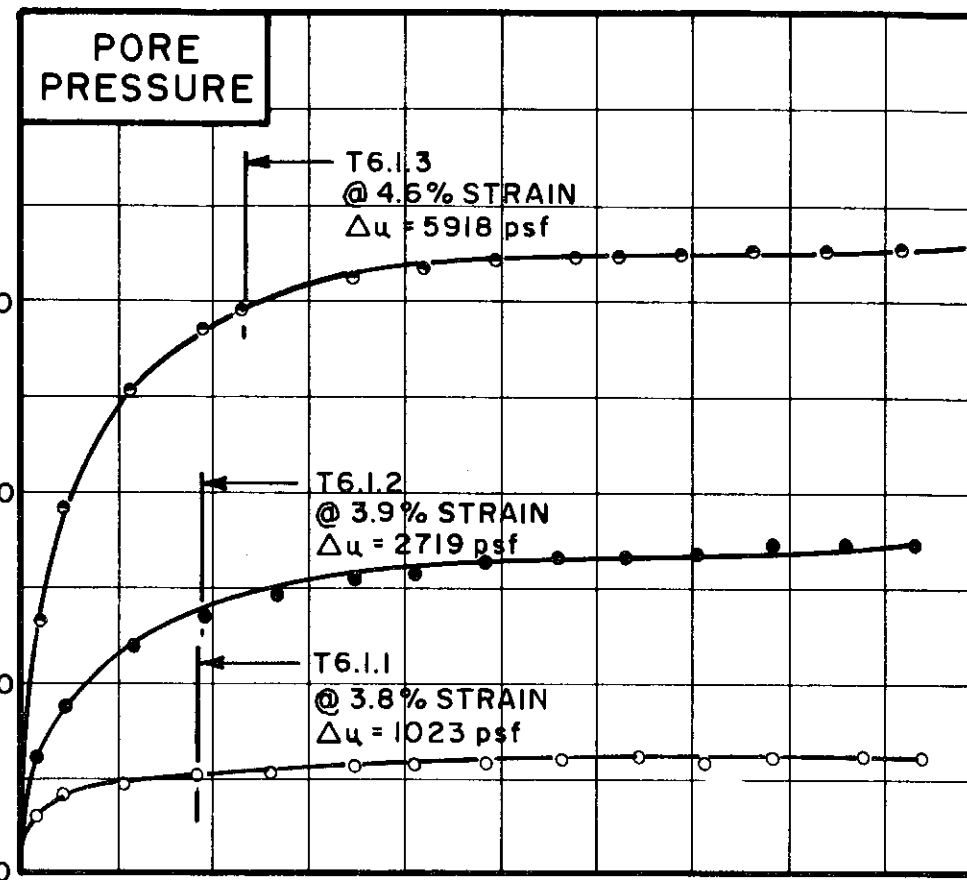
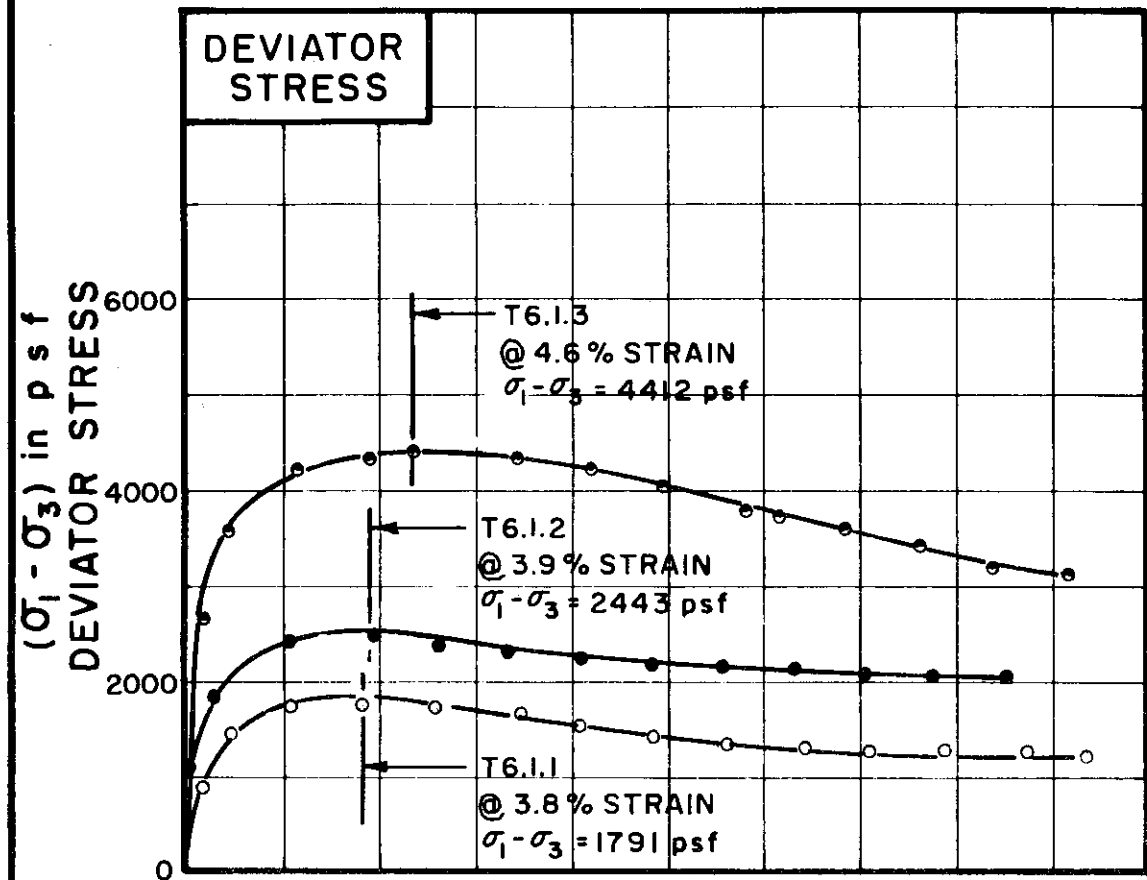
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS

AVAILABLE

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MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255



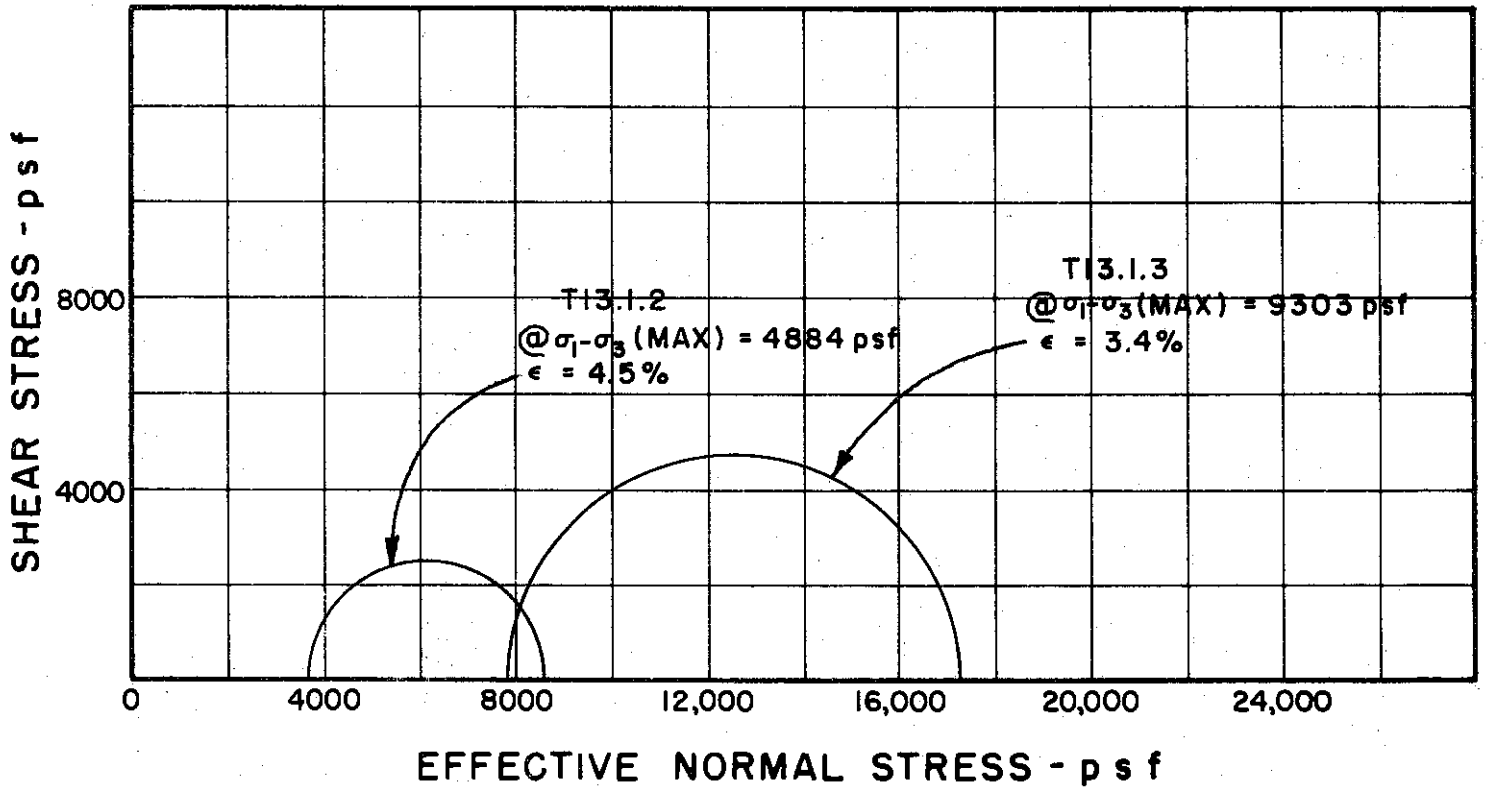
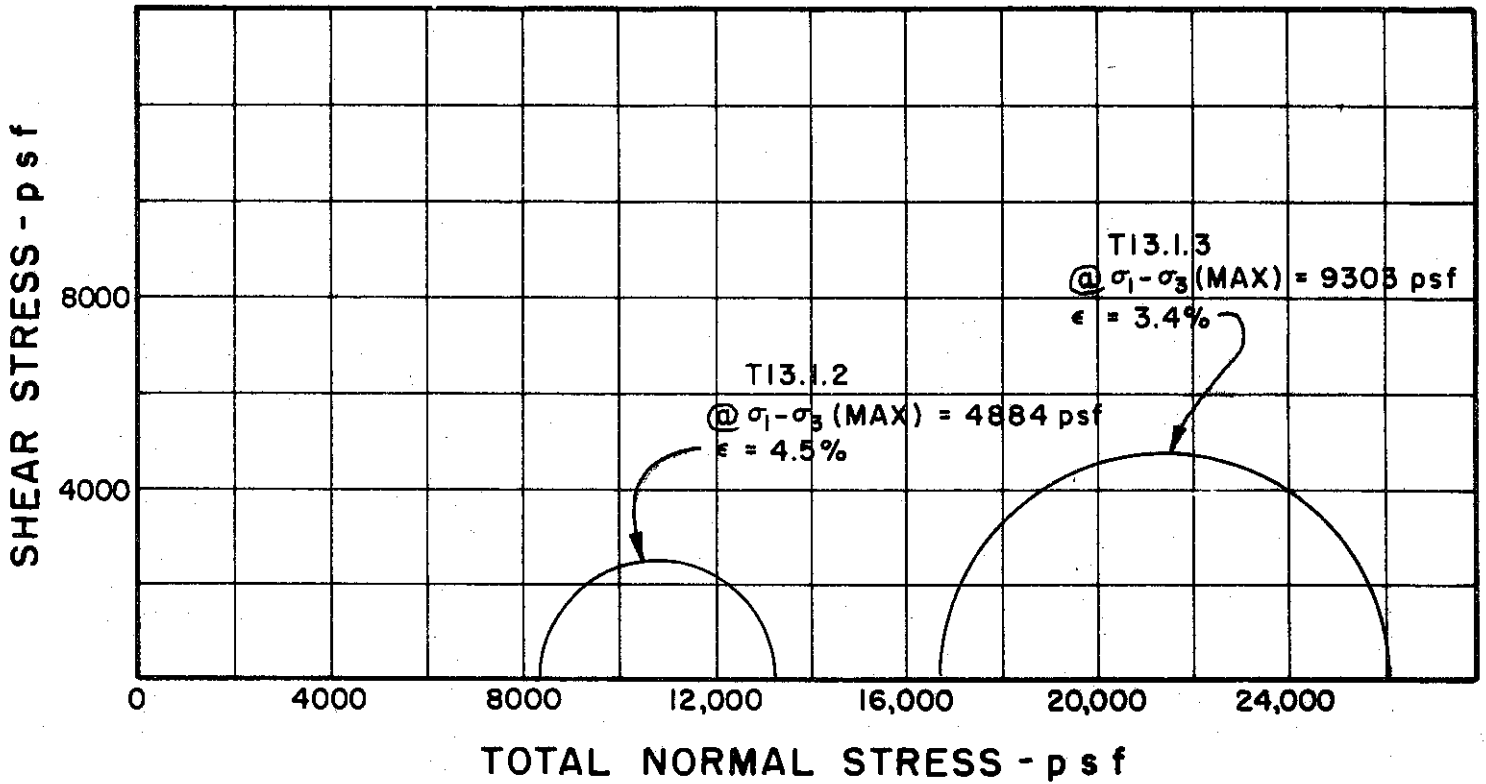
TEST NO. / SYMBOL	T6.1.1	T6.1.2	T6.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	W <sub>0</sub>	36.1%	36.5%	30.0%
	DRY DENSITY	γ <sub>d</sub>	88	86	93
	SAMPLE DIAMETER	D <sub>0</sub>	1.40	1.40	1.40
	SAMPLE HEIGHT	H <sub>0</sub>	3.35	3.40	3.36
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	u <sub>0</sub>	5760	7200	7200
	INITIAL EFFECTIVE STRESS	σ̄ <sub>1/3</sub>	2304	4608	9216
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	2.0%	4.8%	8.5%
PORE PRESSURE RESPONSE			99%	95%	100%
FINAL CONDITIONS	WATER CONTENT	W <sub>f</sub>	34.3%	32.9%	23.8%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025
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BORING NO. 26  
 SAMPLE NO. 11  
 DEPTH 48.0 TO 50.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

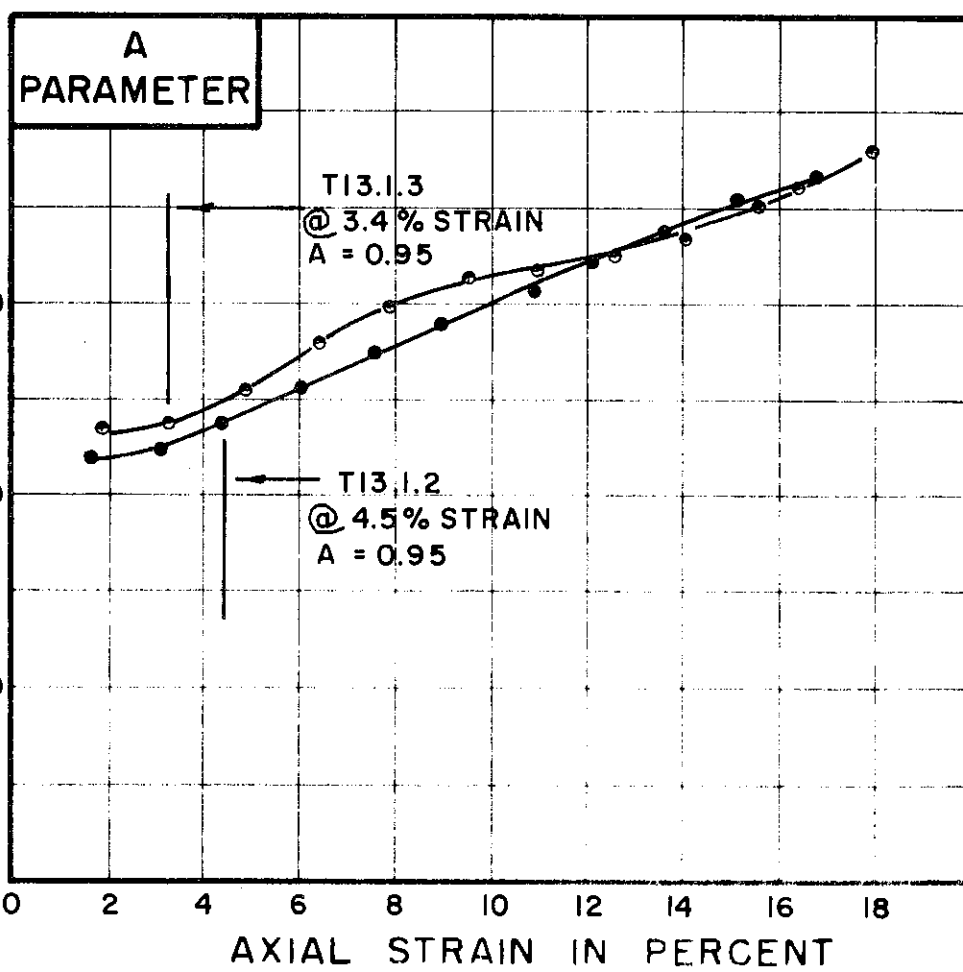
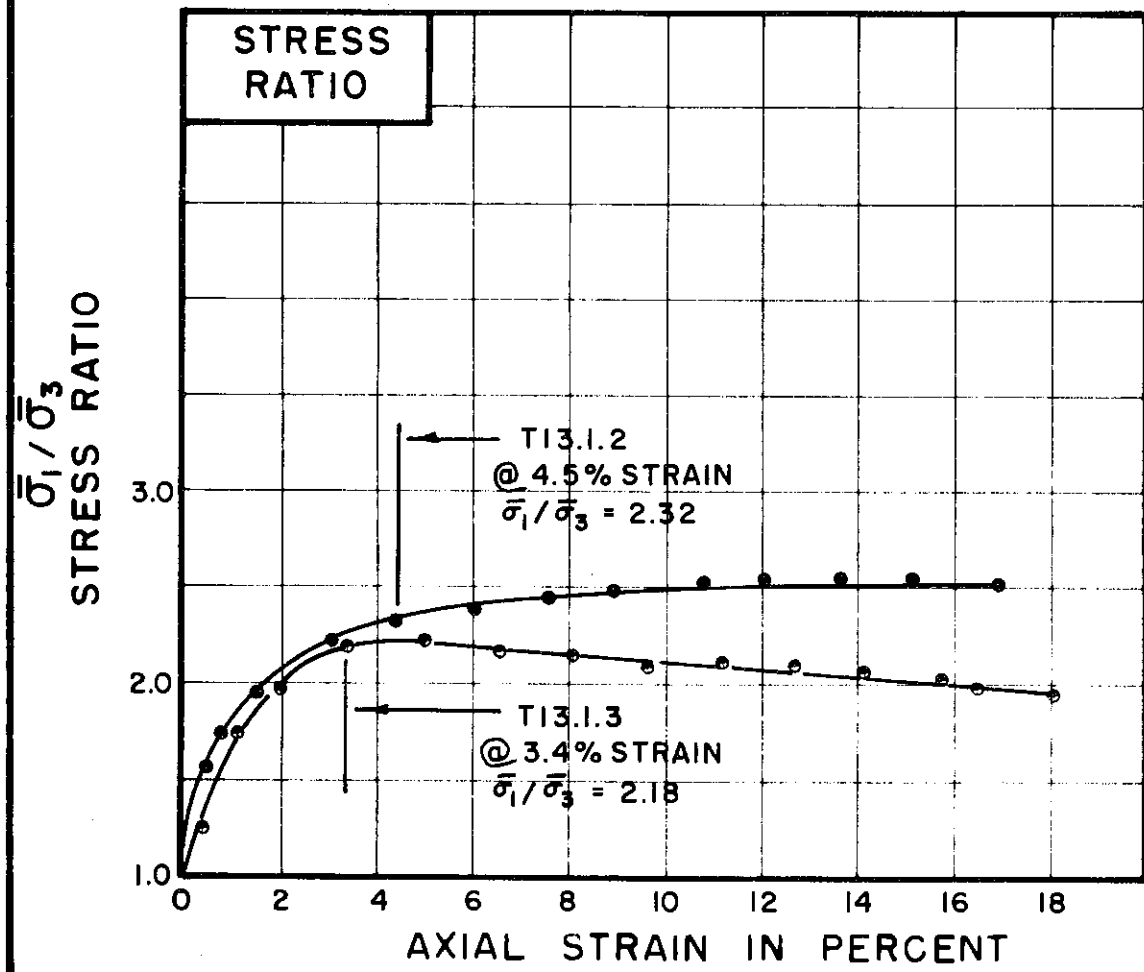
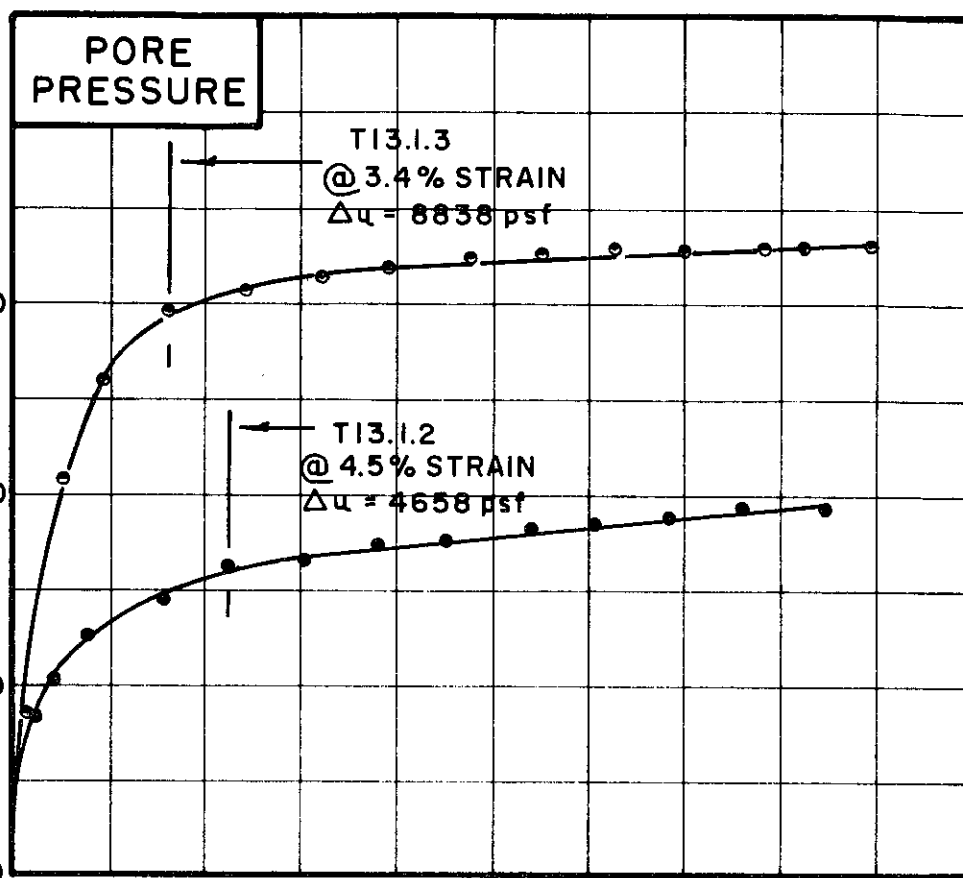
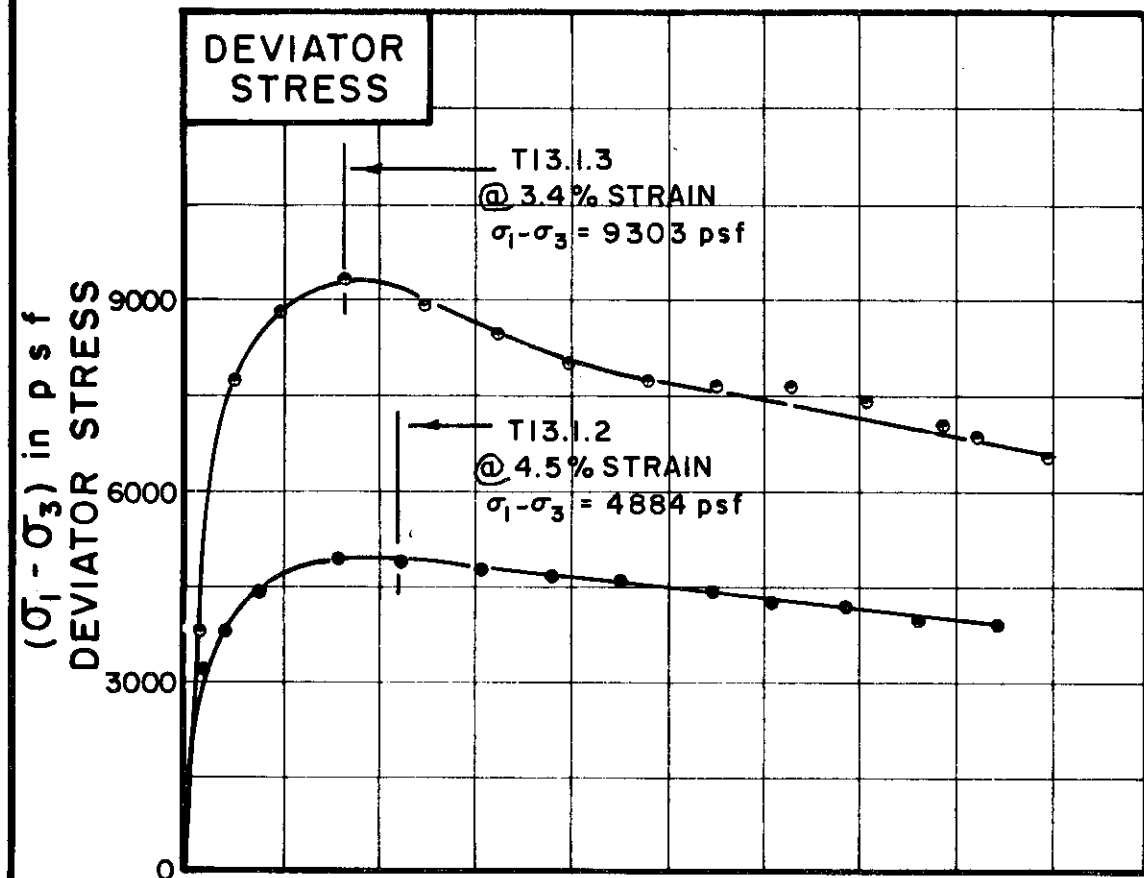
REMARKS SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T13.1.2	T13.1.3
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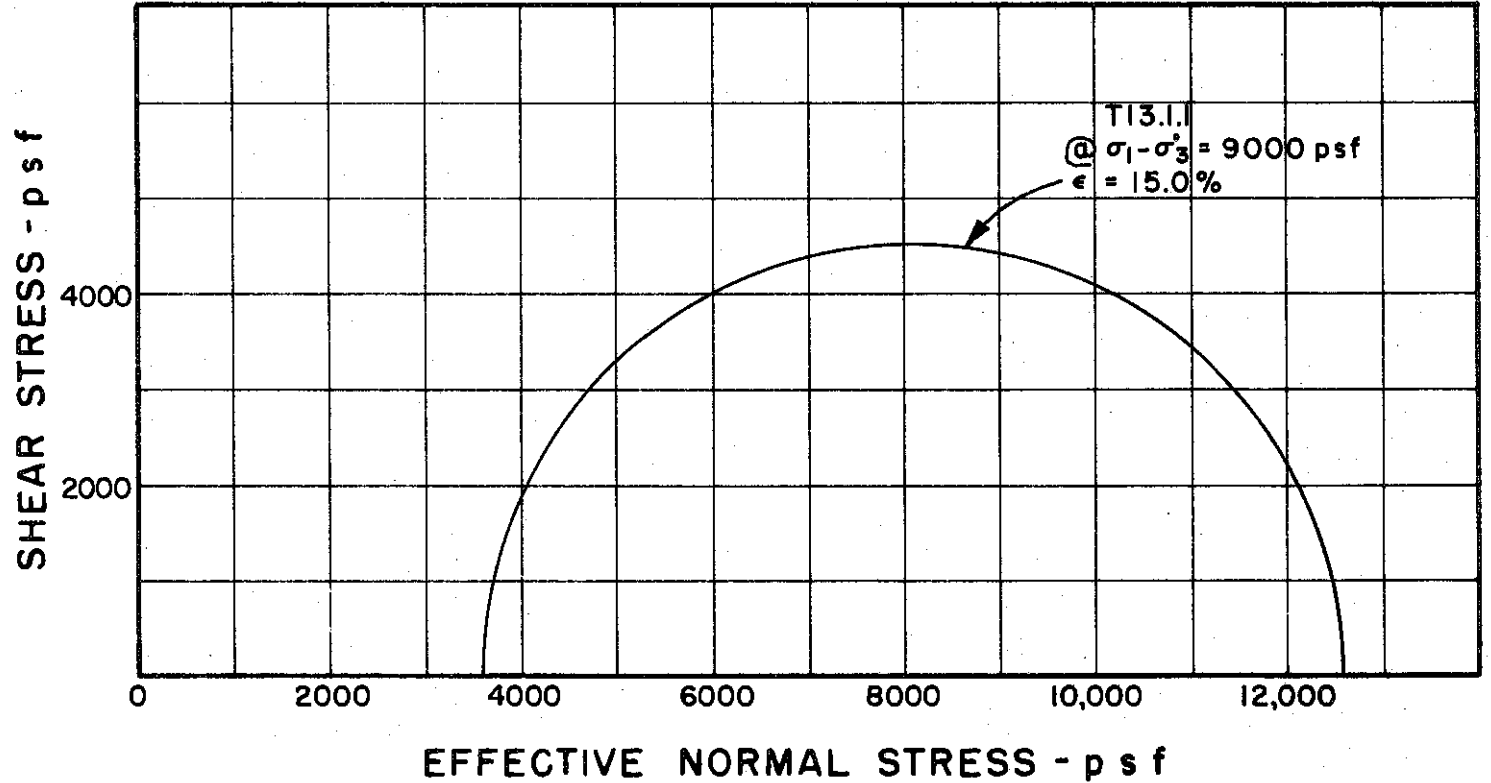
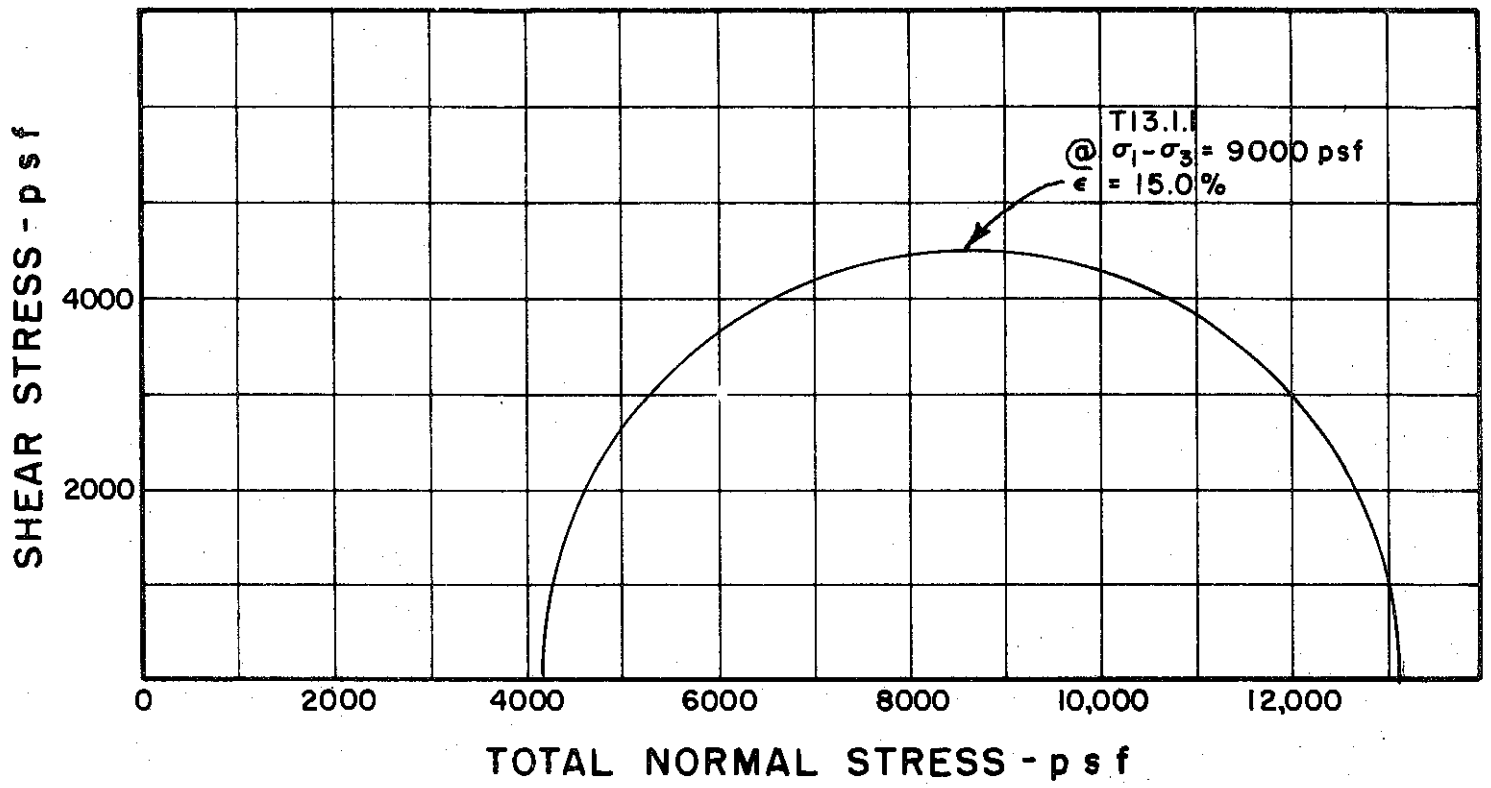
INITIAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_0$		35.6%	34.0%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	86	90	
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	
SAMPLE HEIGHT	$H_0$	in.	3.35	3.38	
FINAL CONDITIONS BEFORE SHEAR			T13.1.2	T13.1.3	
FINAL BACK PRESSURE	$u_0$	psf	6480	8640	
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1$ $\bar{\sigma}_3$	psf	8352	16704	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		60.9%	10.9%	%
PORE PRESSURE RESPONSE			98%	98%	
FINAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_f$		31.4%	27.6%	%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025
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BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 21  
 NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

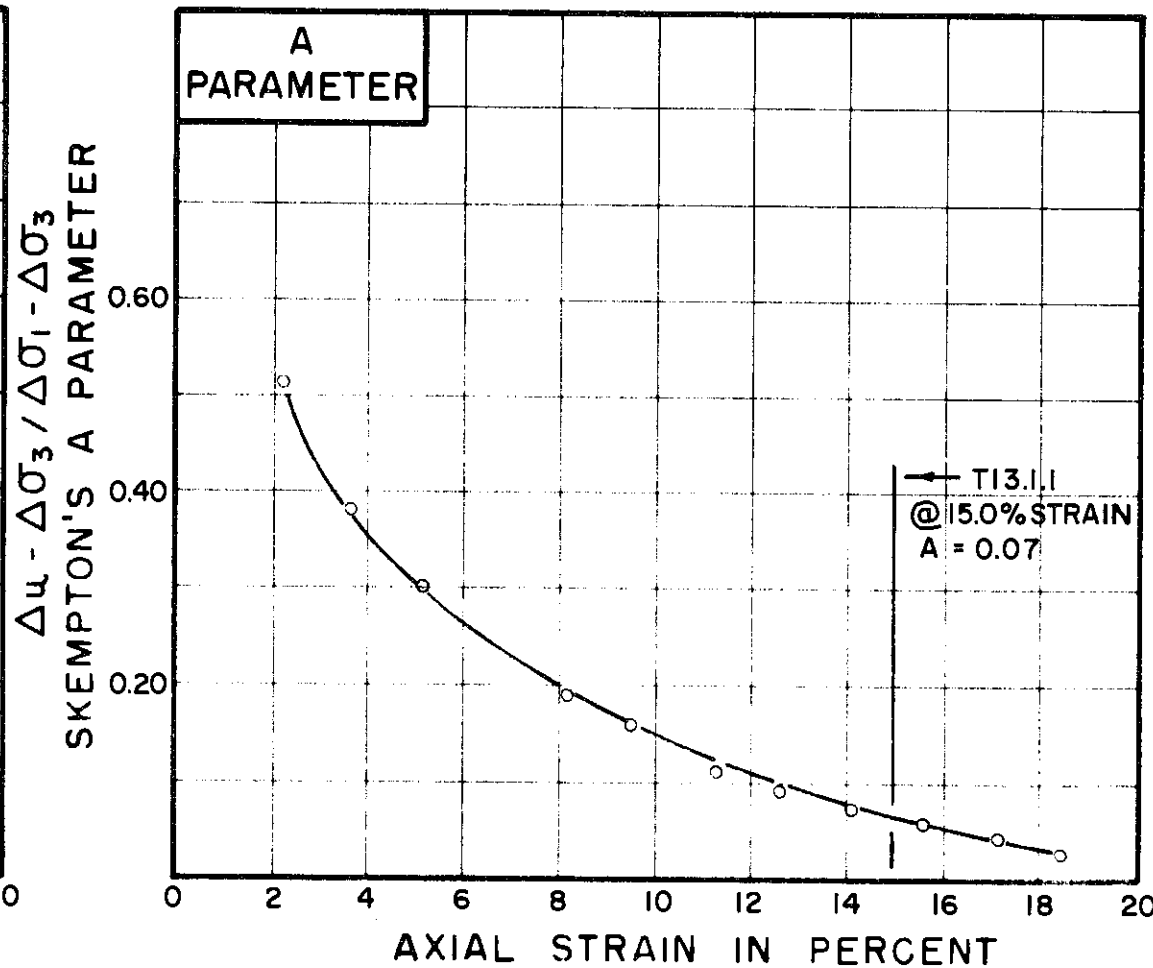
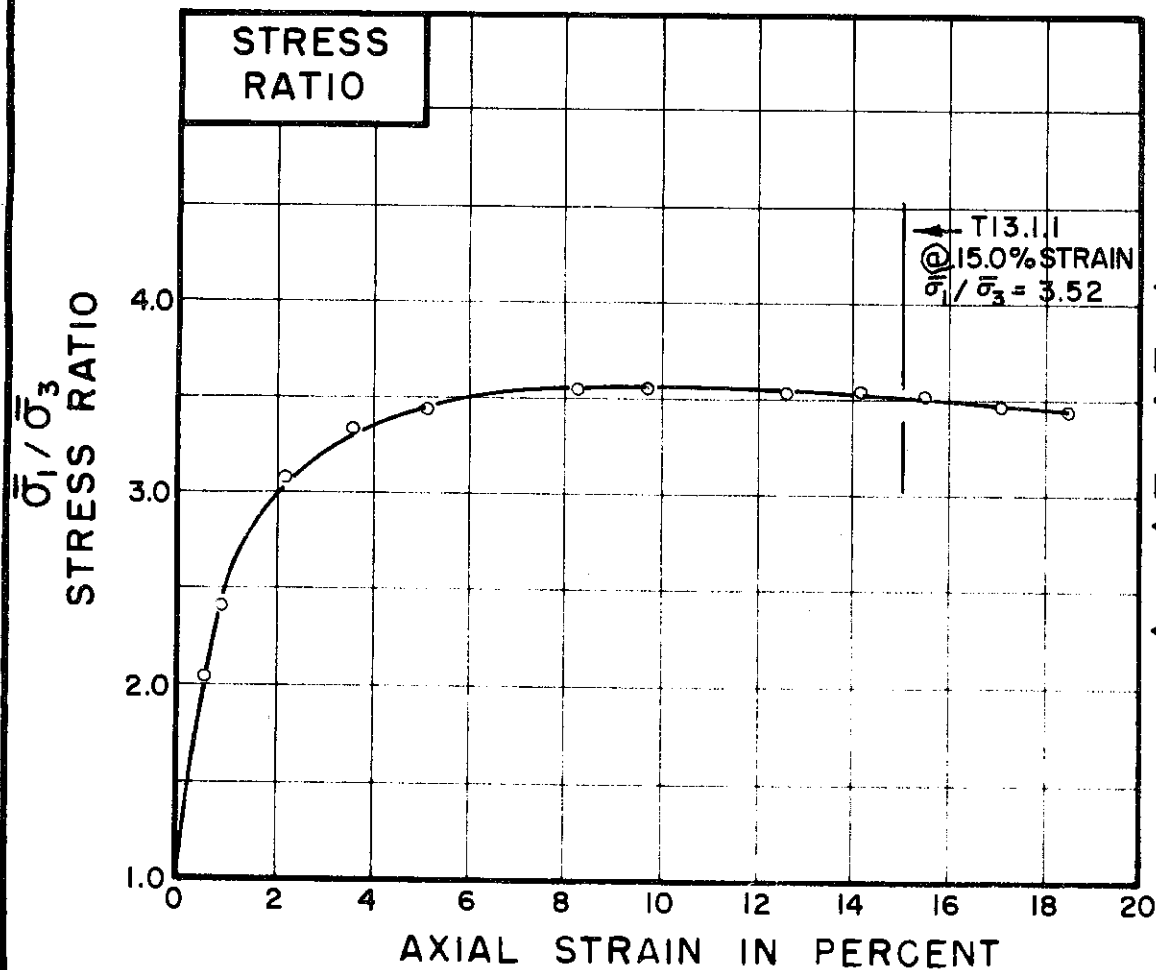
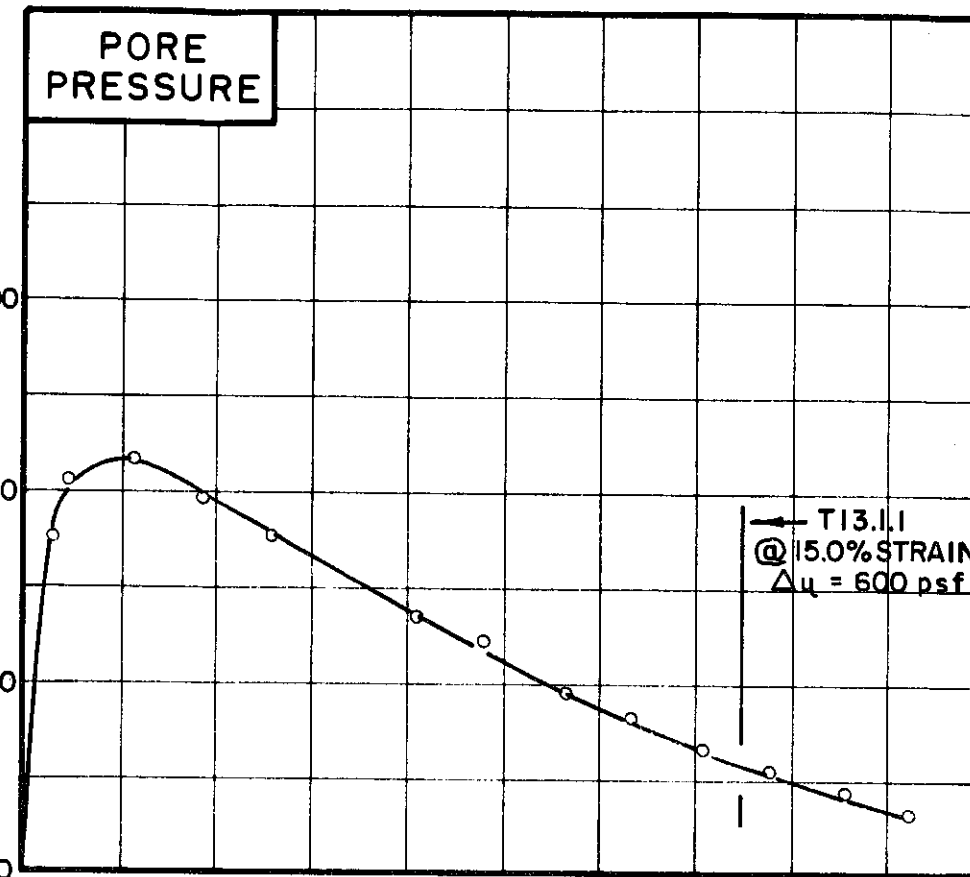
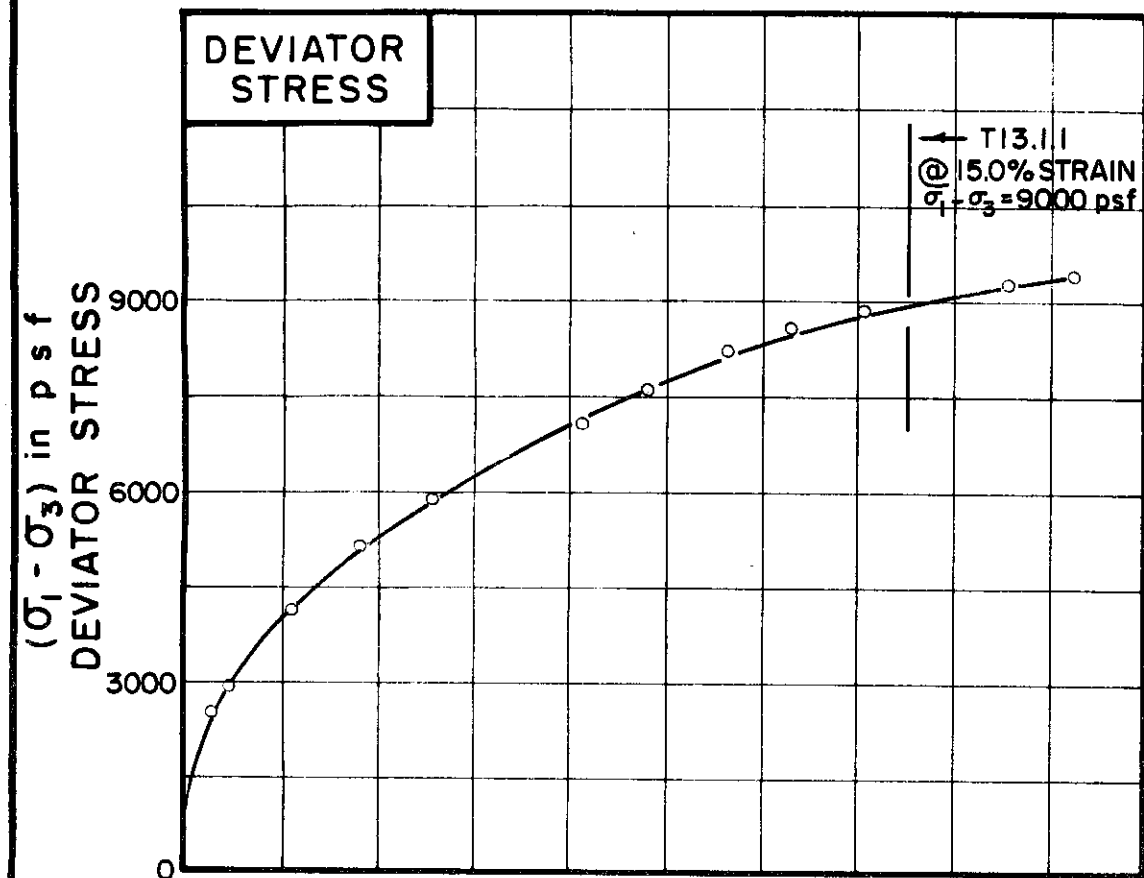
REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.2 & T13.1.3

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-395



TEST NO. / SYMBOL T13.1.1

INITIAL CONDITIONS	WATER CONTENT	w <sub>o</sub>	22.9%	%	%
	DRY DENSITY	γ <sub>d</sub>	96		
	SAMPLE DIAMETER	D <sub>o</sub>	1.40		
	SAMPLE HEIGHT	H <sub>o</sub>	3.38		
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	u <sub>o</sub>	6480		
	INITIAL EFFECTIVE STRESS	σ <sub>1</sub> / σ <sub>3</sub>	4176		
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	1.77%	%	%
	PORE PRESSURE RESPONSE		96%		
FINAL CONDITIONS	WATER CONTENT	w <sub>f</sub>	22.9%	%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE .024

BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'

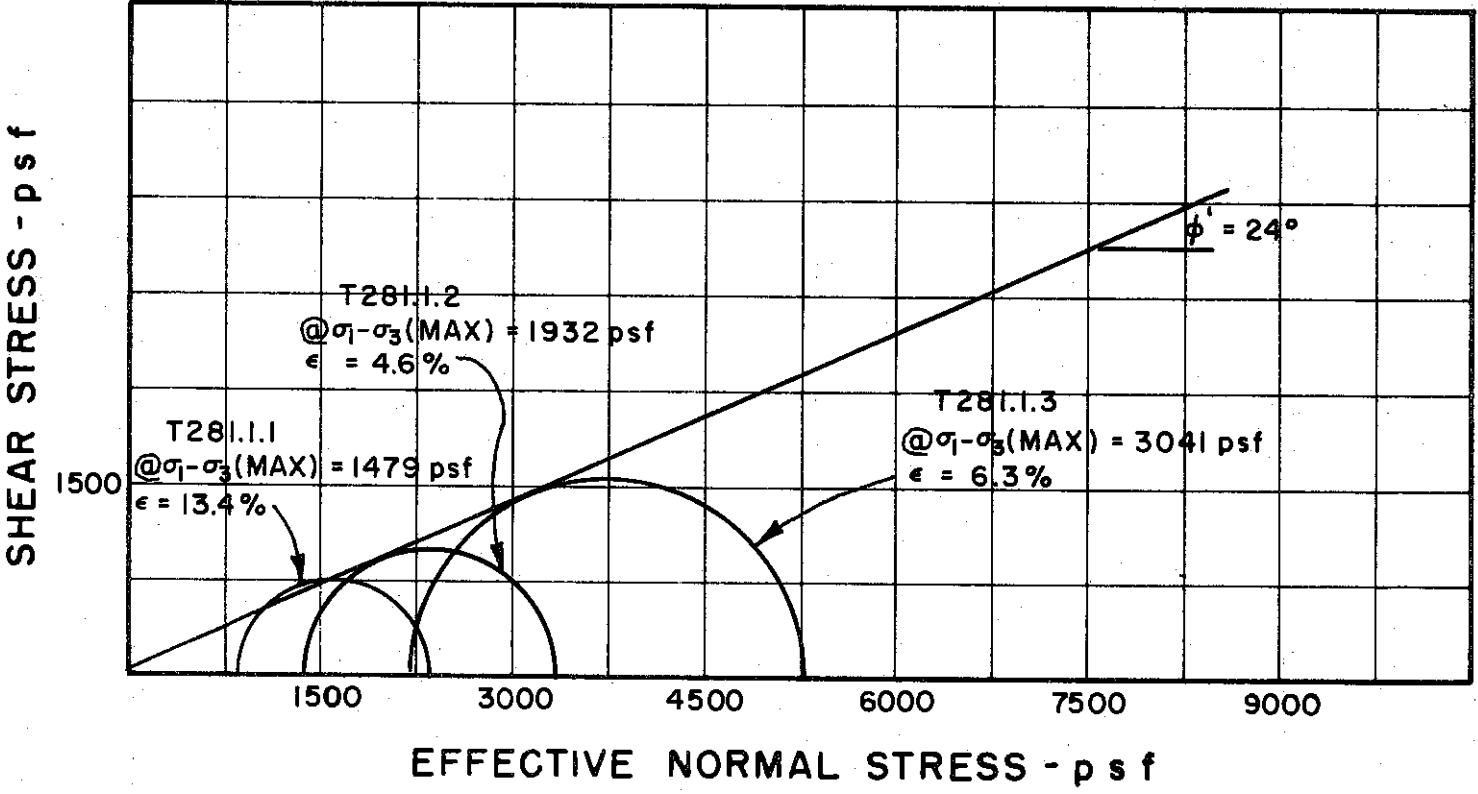
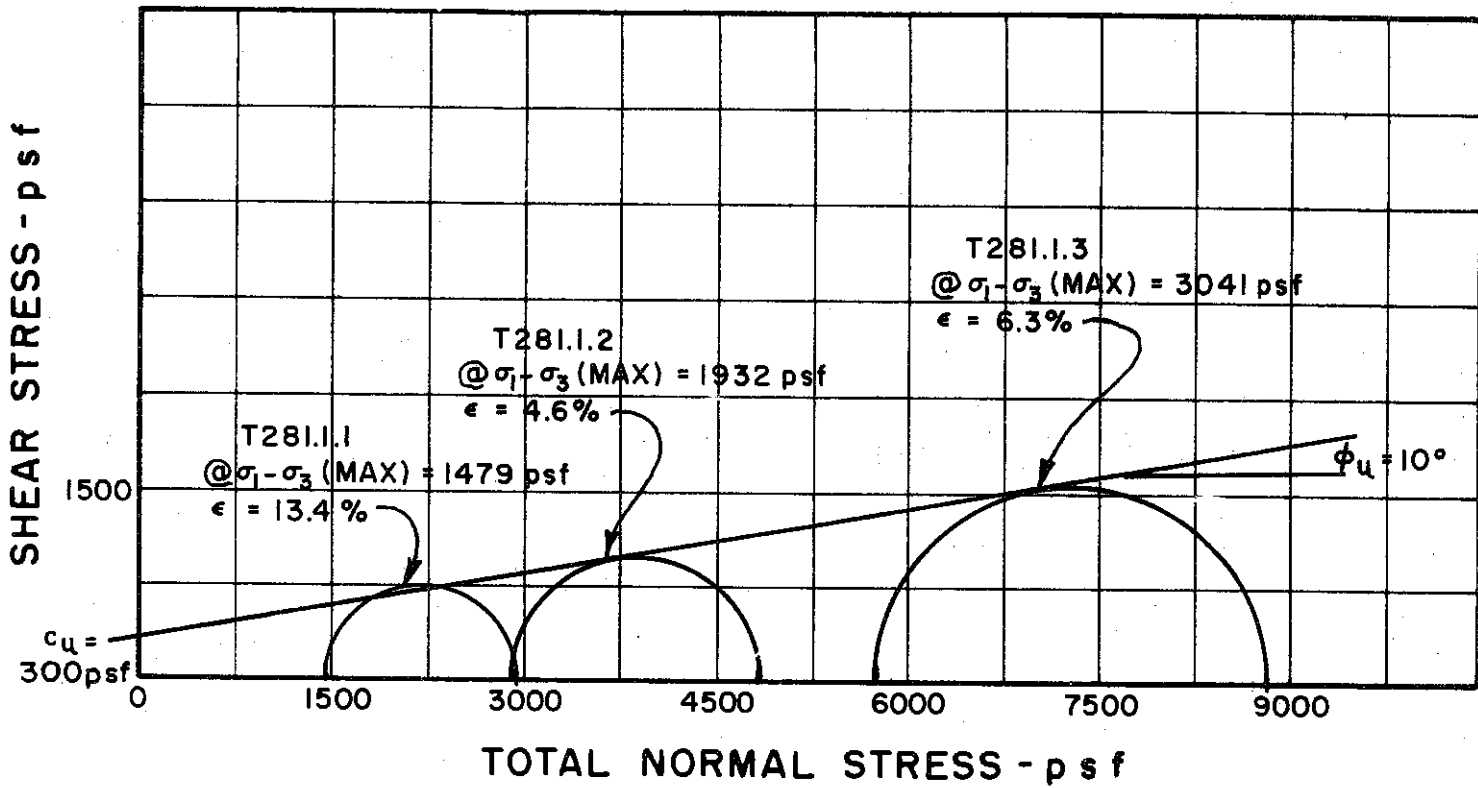
SOIL DESCRIPTION SILTY CLAY WITH LAYERS OF FINE SAND & SILT

LIQUID LIMIT — PLASTIC LIMIT —

NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 33

SAMPLE NO. 7

DEPTH 28.0' TO 30.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

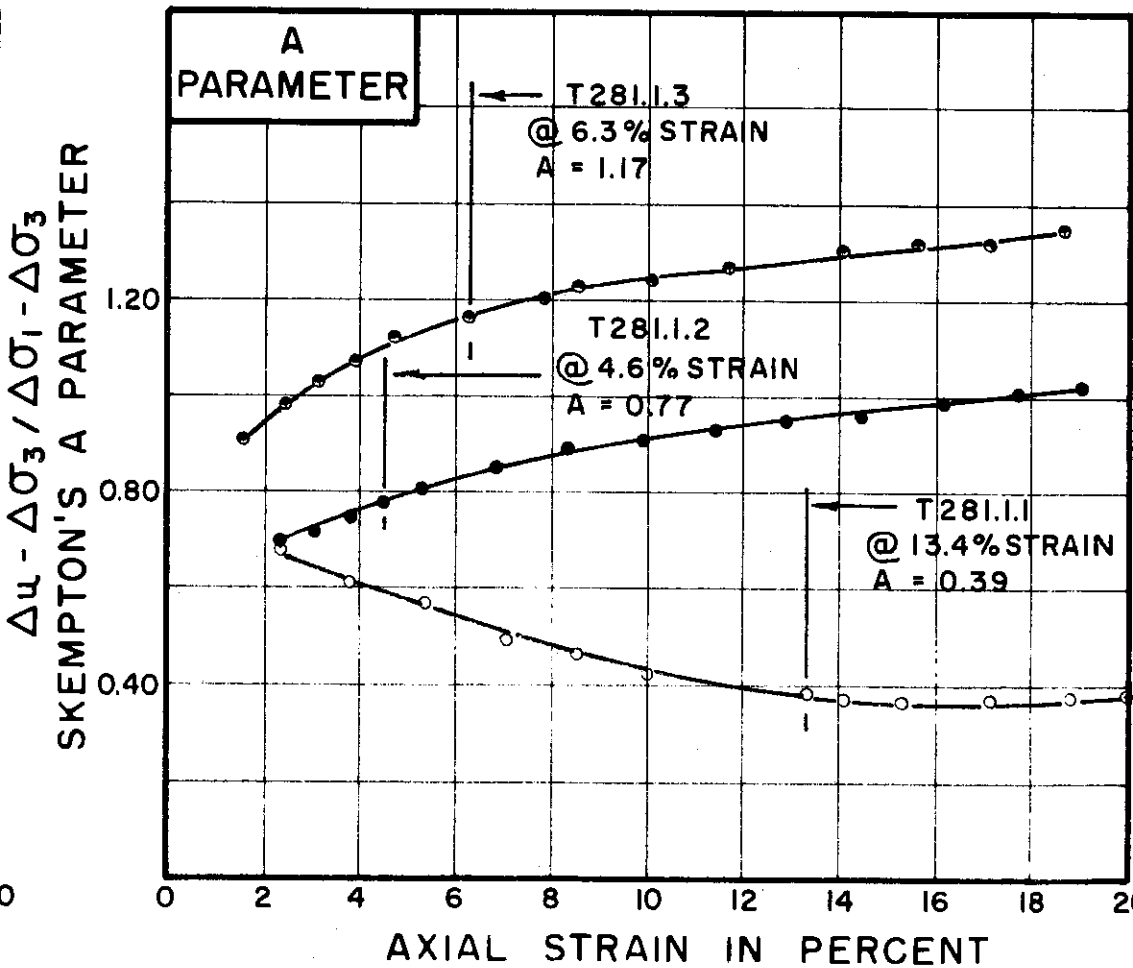
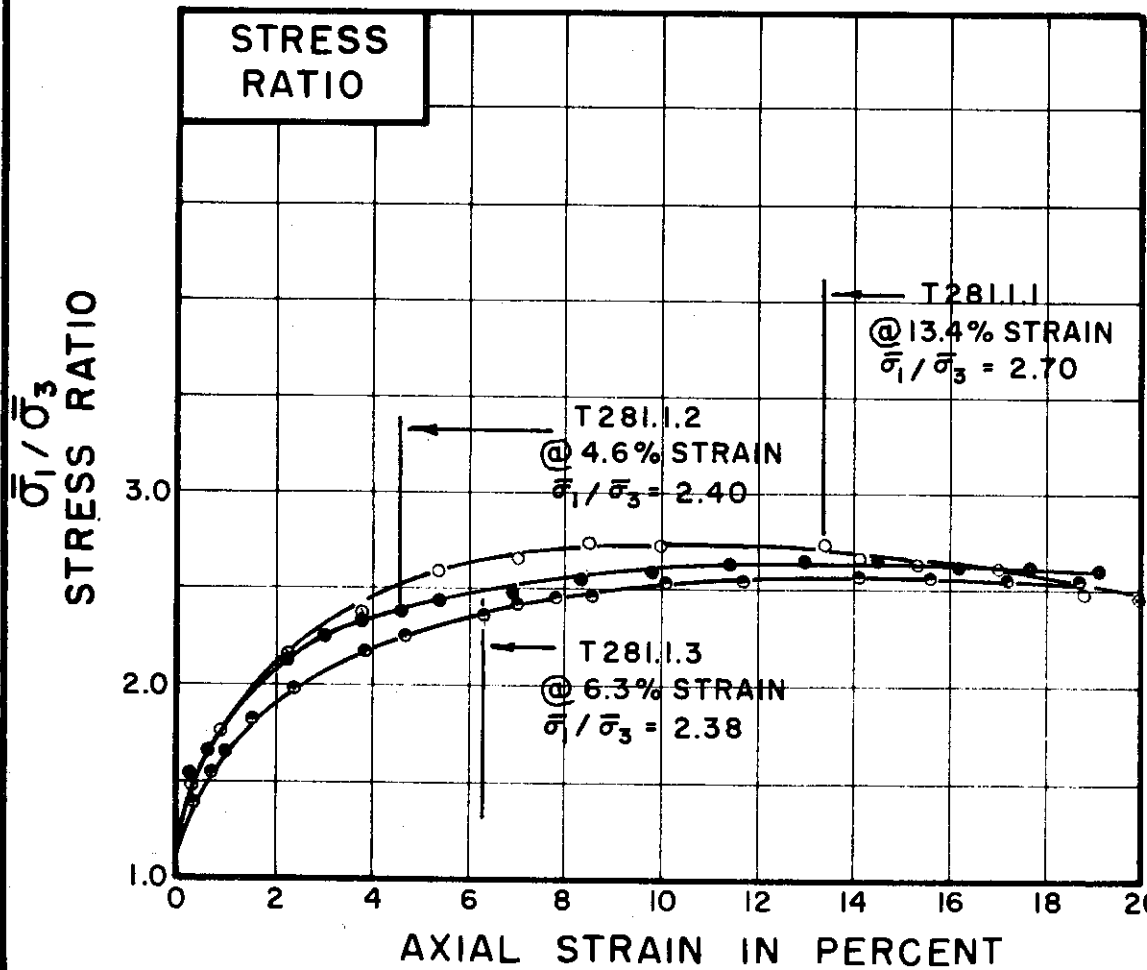
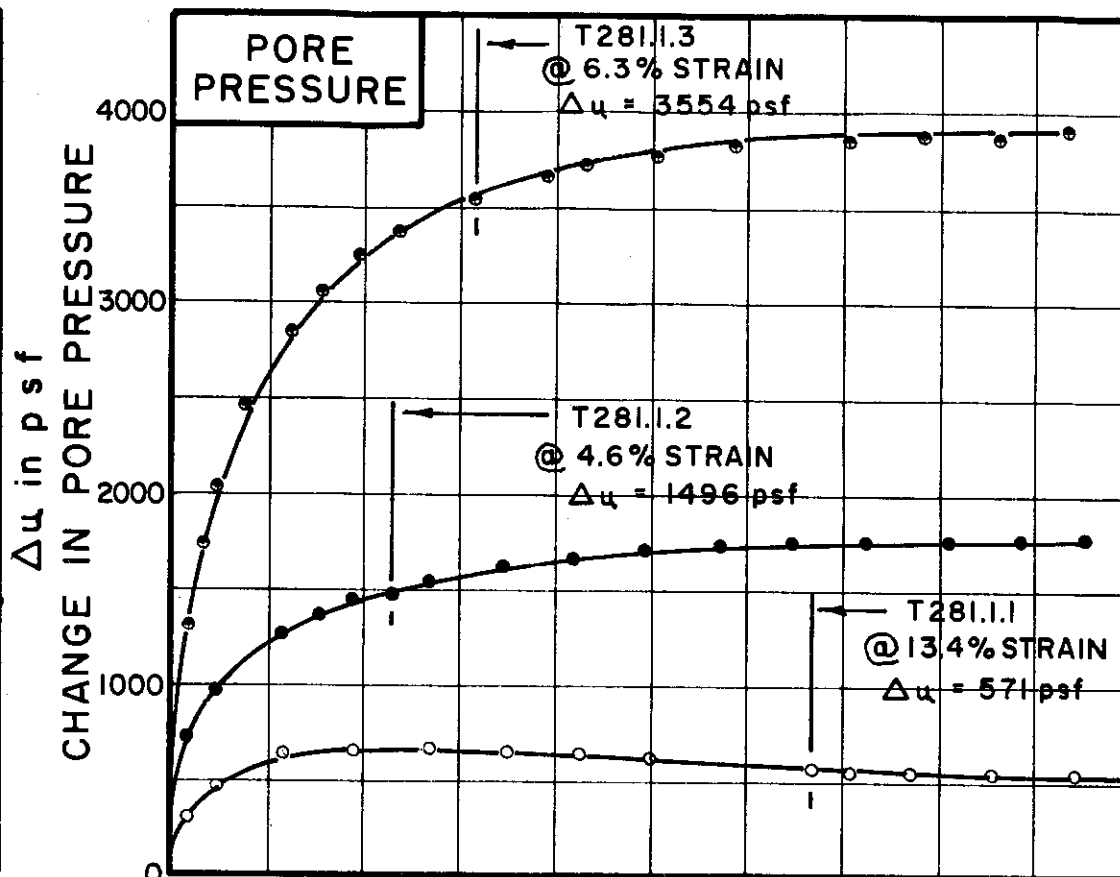
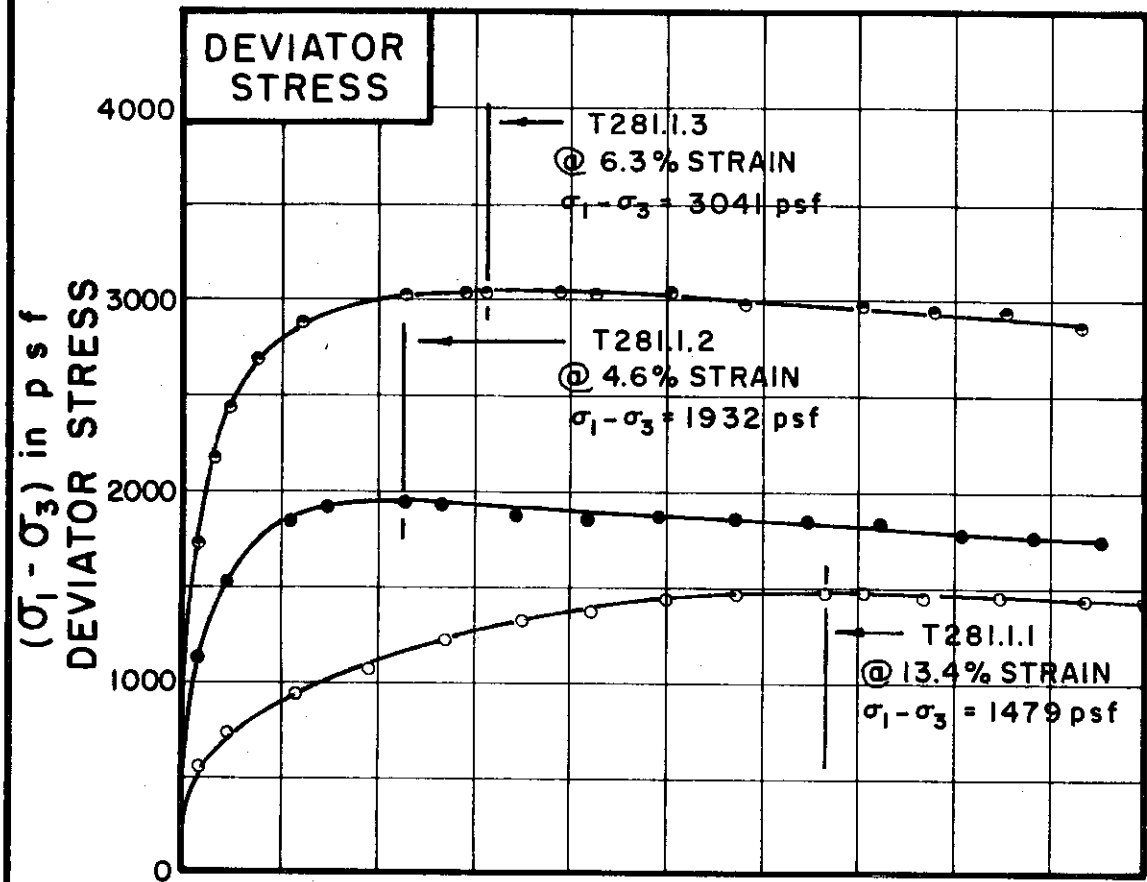
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-397



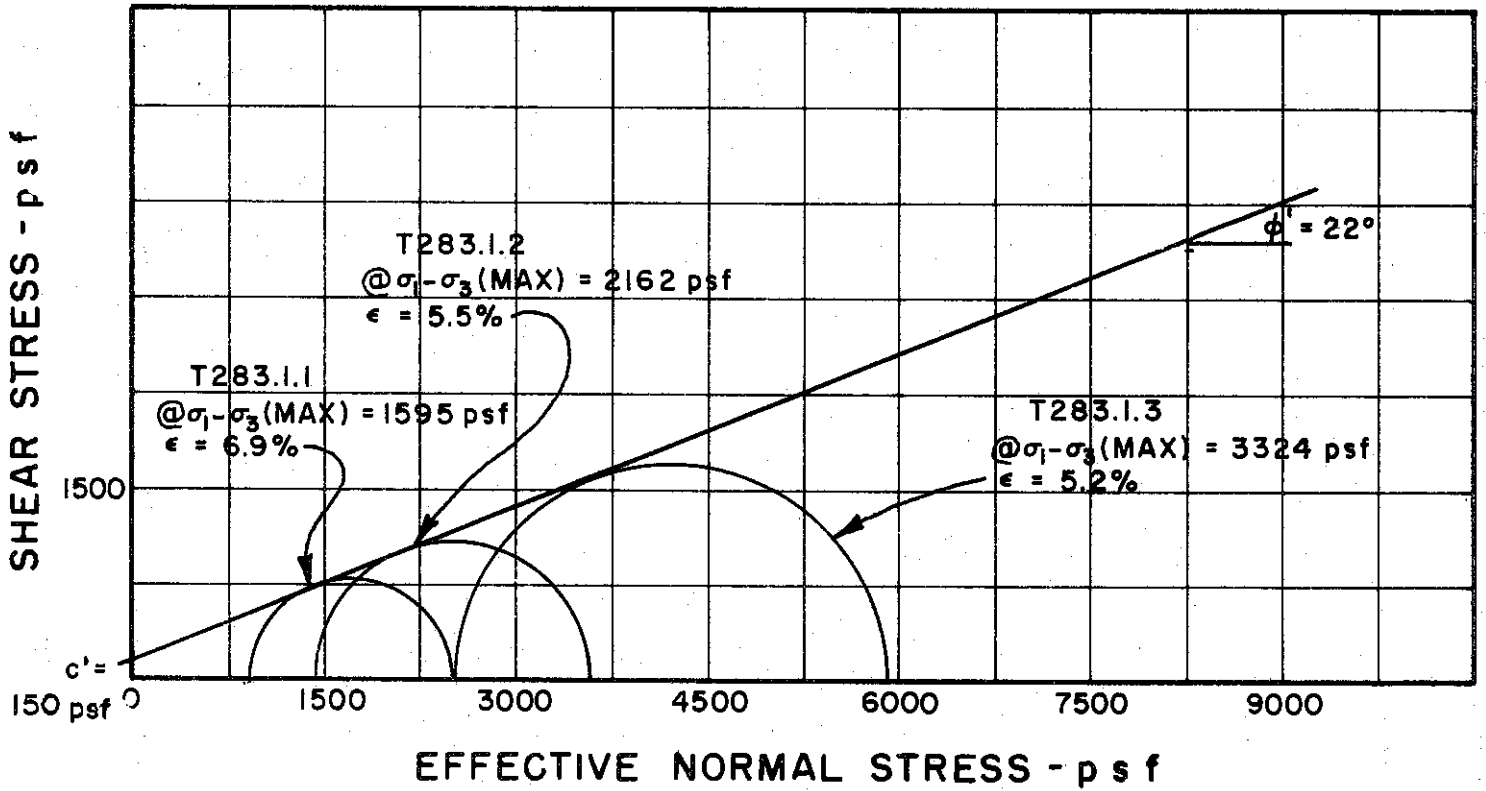
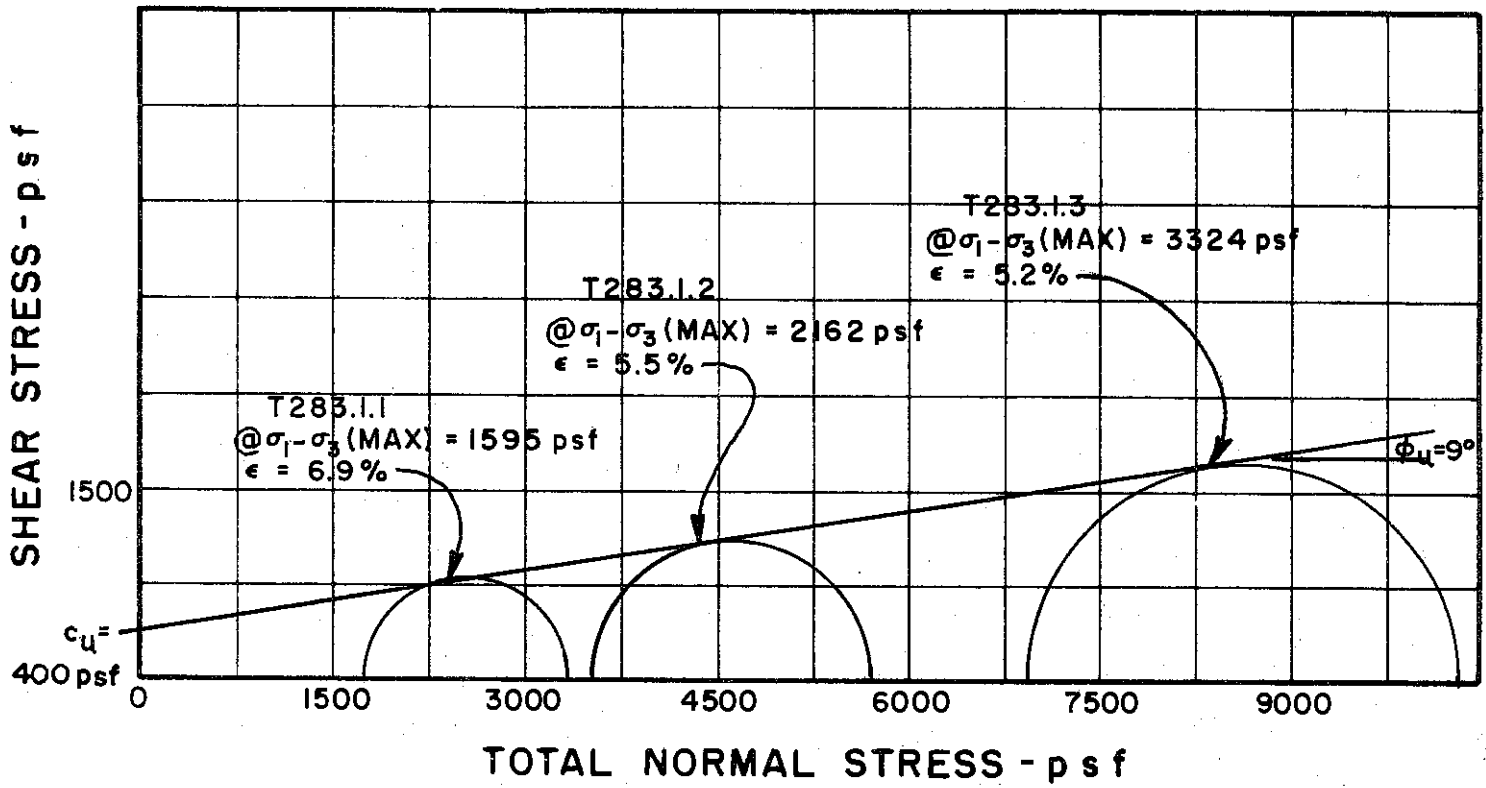
TEST NO. / SYMBOL	T281.1.1	T281.1.2	T281.1.3
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INITIAL CONDITIONS			T281.1.1	T281.1.2	T281.1.3
WATER CONTENT	$w_0$		39.0%	39.7%	38.3%
DRY DENSITY	$\gamma_d$	lb/cu ft	82	82	84
SAMPLE DIAMETER	$D_0$	in.	1.38	1.38	1.38
SAMPLE HEIGHT	$H_0$	in.	3.28	3.27	3.28
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1$ $\bar{\sigma}_3$	psf	1440	2880	5760
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.96%	4.10%	7.21%
PORE PRESSURE RESPONSE			98%	98%	96%
FINAL CONDITIONS					
WATER CONTENT	$w_f$		37.3%	36.6%	31.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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BORING NO. 33  
 SAMPLE NO. 7  
 DEPTH 28.0' TO 30.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 9

DEPTH 38.0' TO 40.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

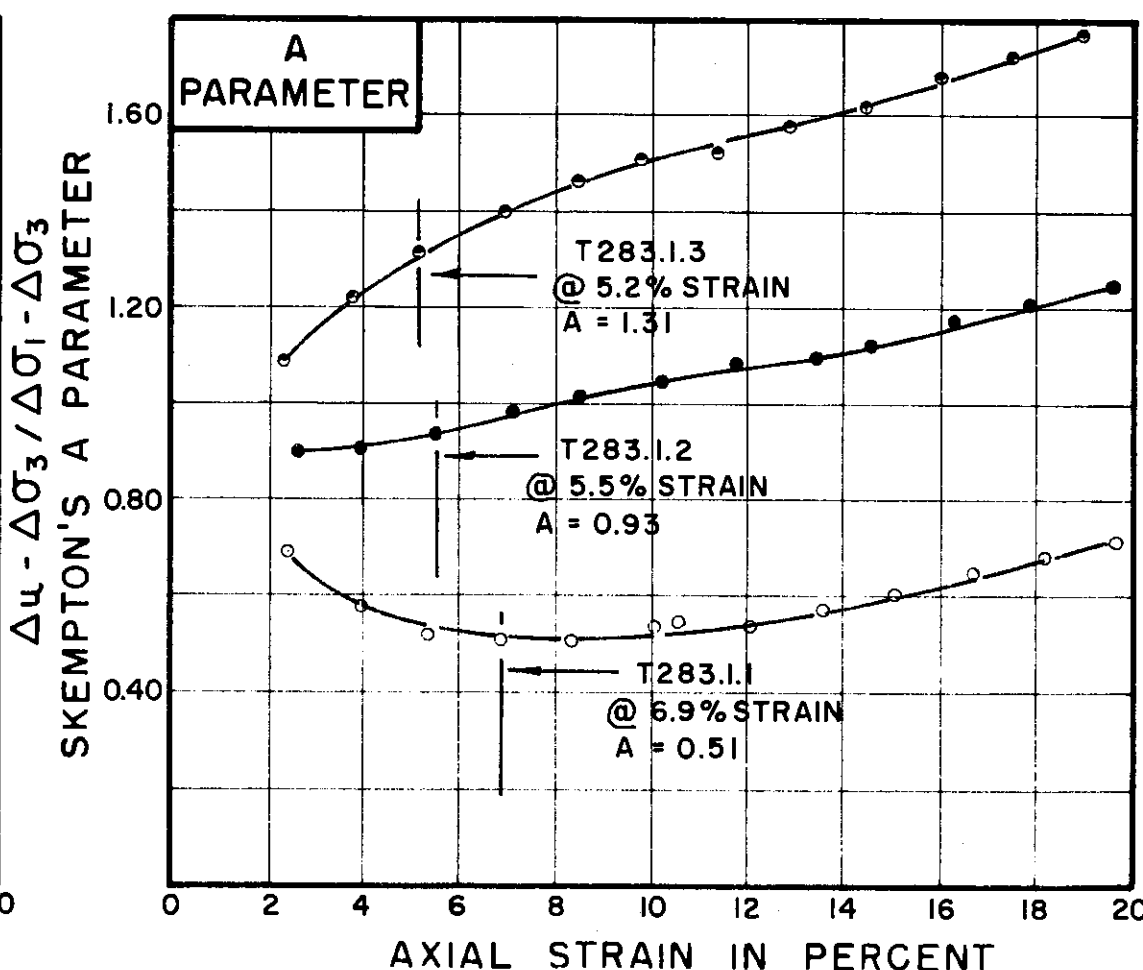
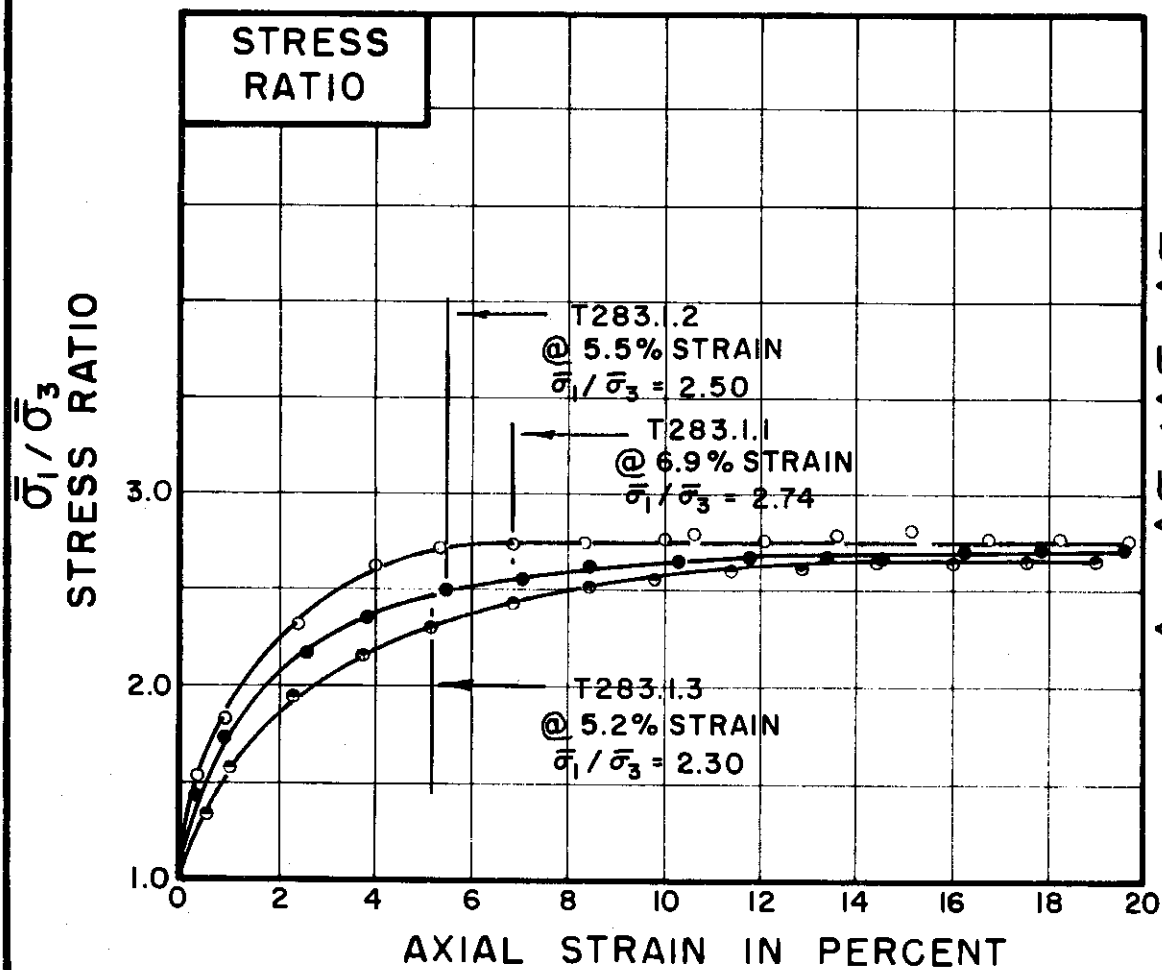
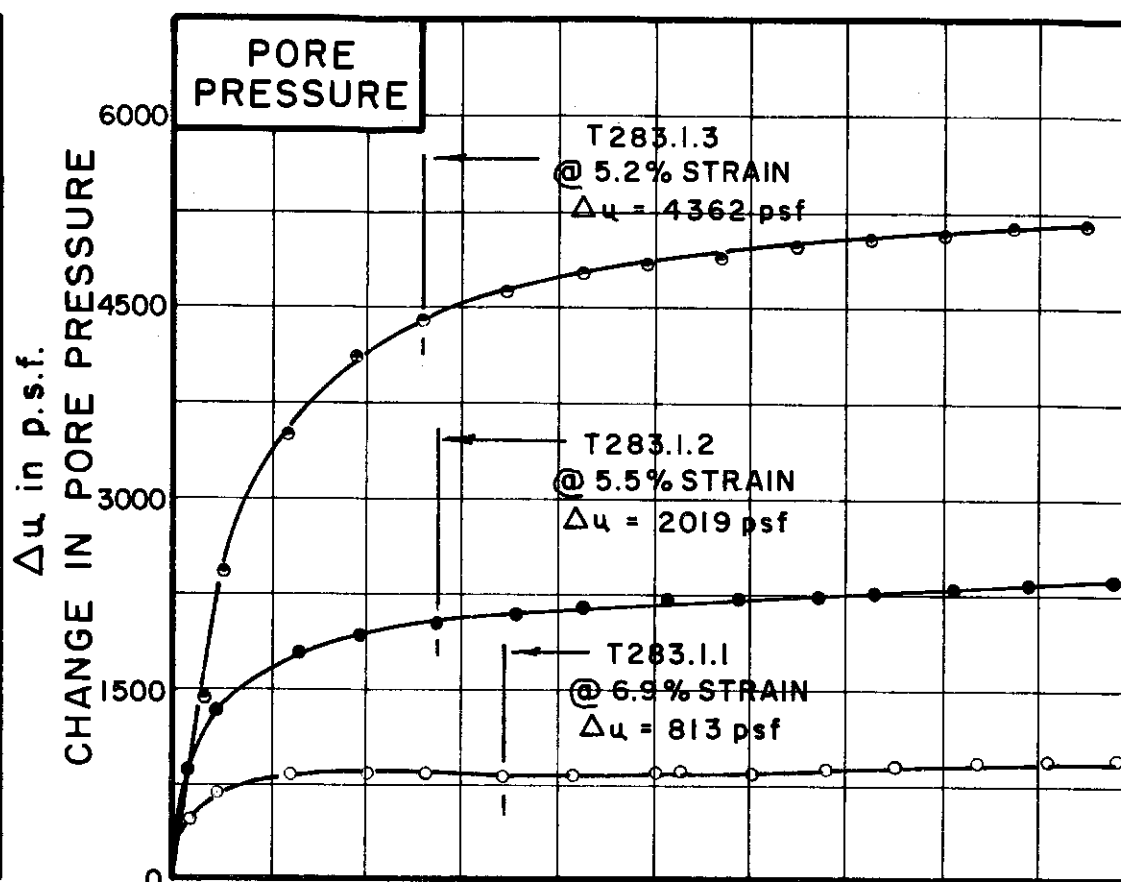
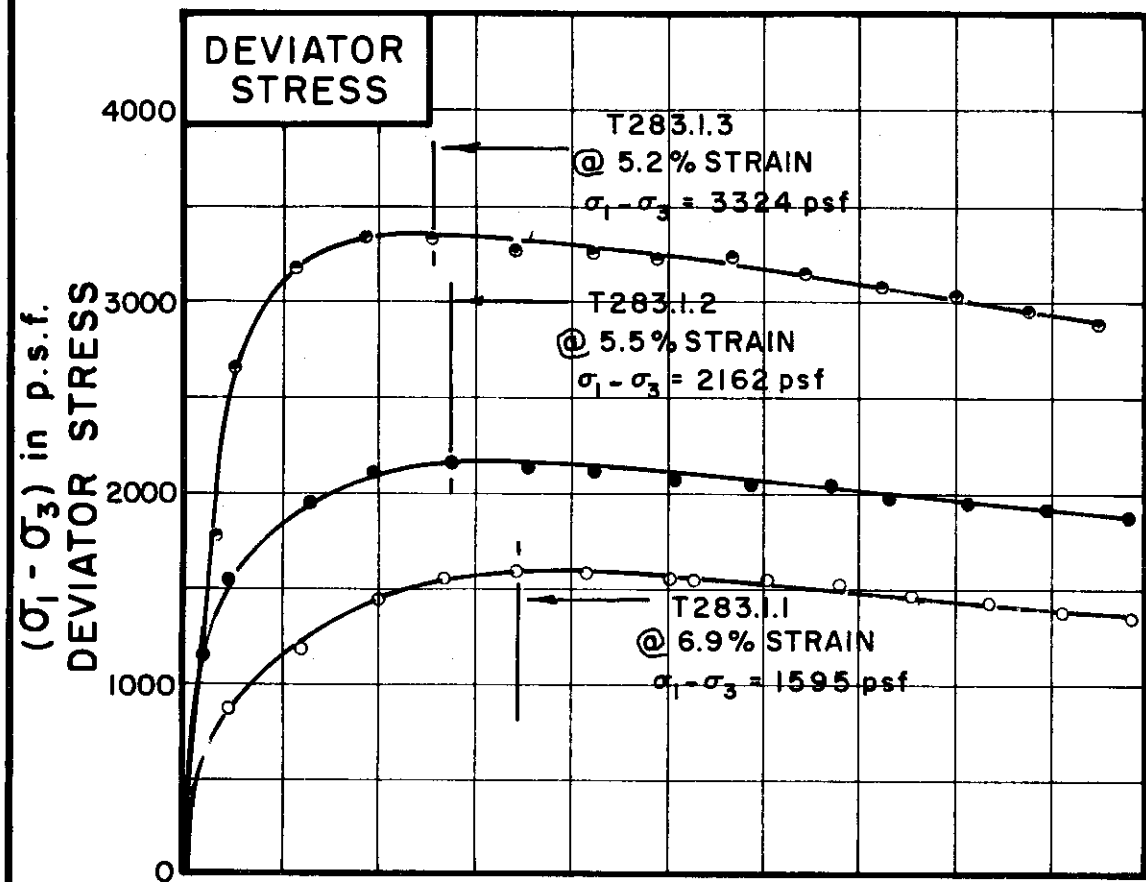
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-399



TEST NO. / SYMBOL	T283.1.1	T283.1.2	T283.1.3
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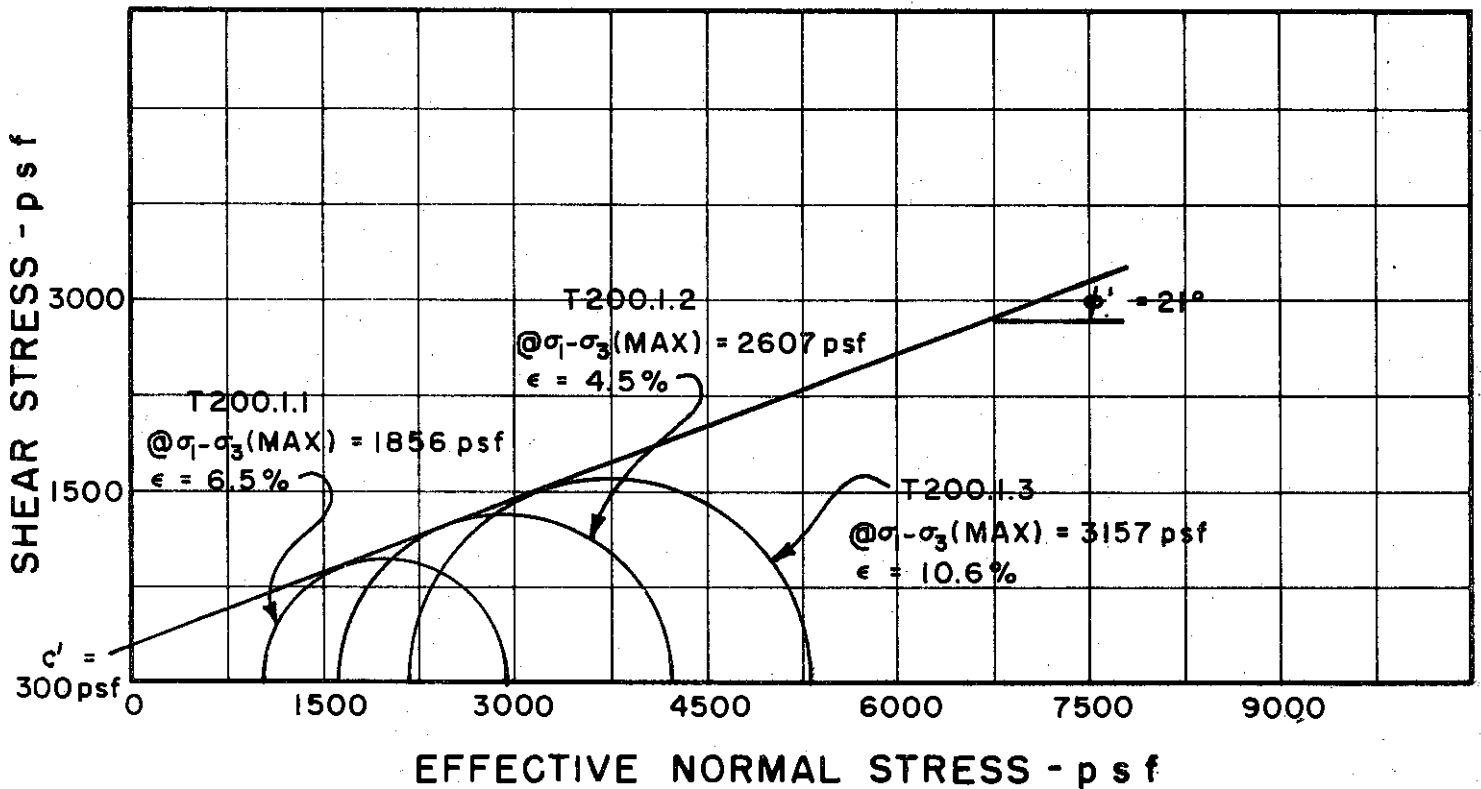
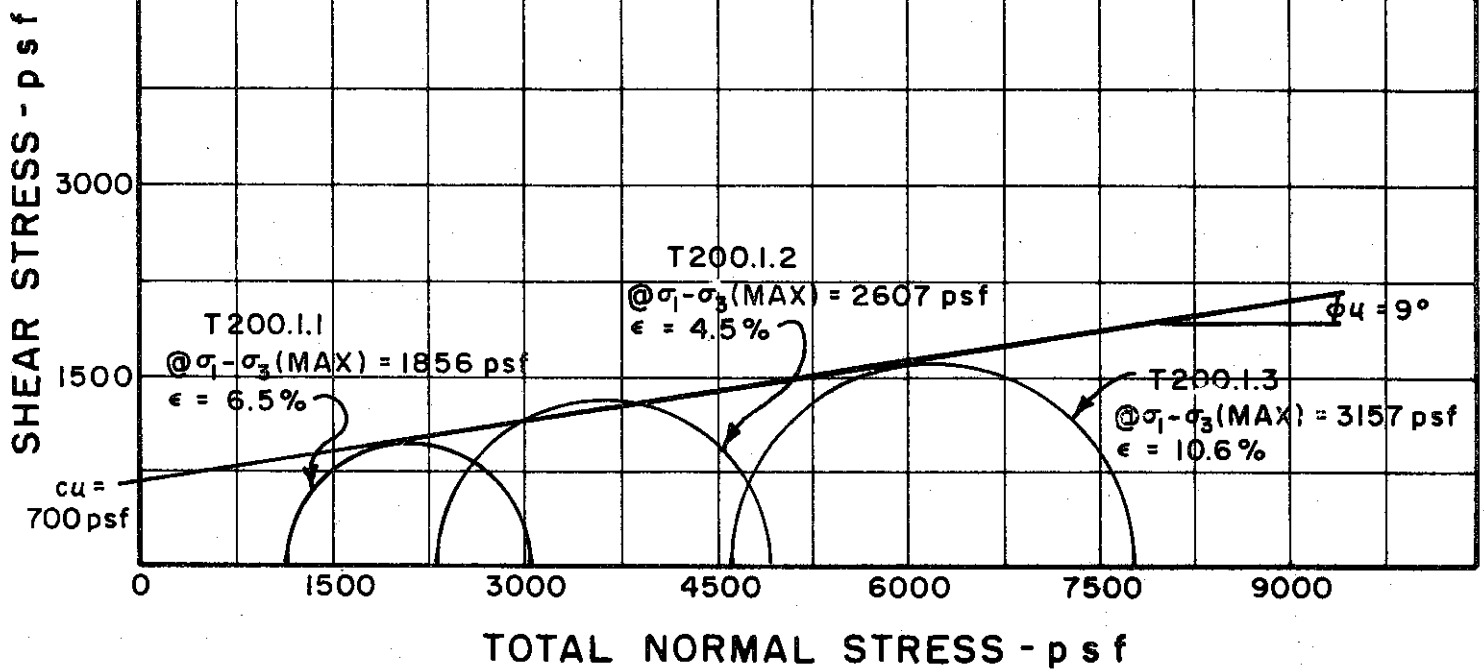
INITIAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_0$		37.4%	37.1%	36.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	85	86
SAMPLE DIAMETER	$D_0$	in.	1.40	1.39	1.39
SAMPLE HEIGHT	$H_0$	in.	3.31	3.25	3.32
CONDITIONS BEFORE SHEAR			T283.1.1	T283.1.2	T283.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	12960
INITIAL EFFECTIVE STRESS	$\frac{\bar{\sigma}_1}{\bar{\sigma}_3}$	p.s.f.	1728	3456	6912
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.35%	5.16%
PORE PRESSURE RESPONSE			96%	98%	95%
FINAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_f$		35.5%	33.6%	30.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025	.024
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BORING NO. 33  
 SAMPLE NO. 9  
 DEPTH 38.0' TO 40.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 43 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0

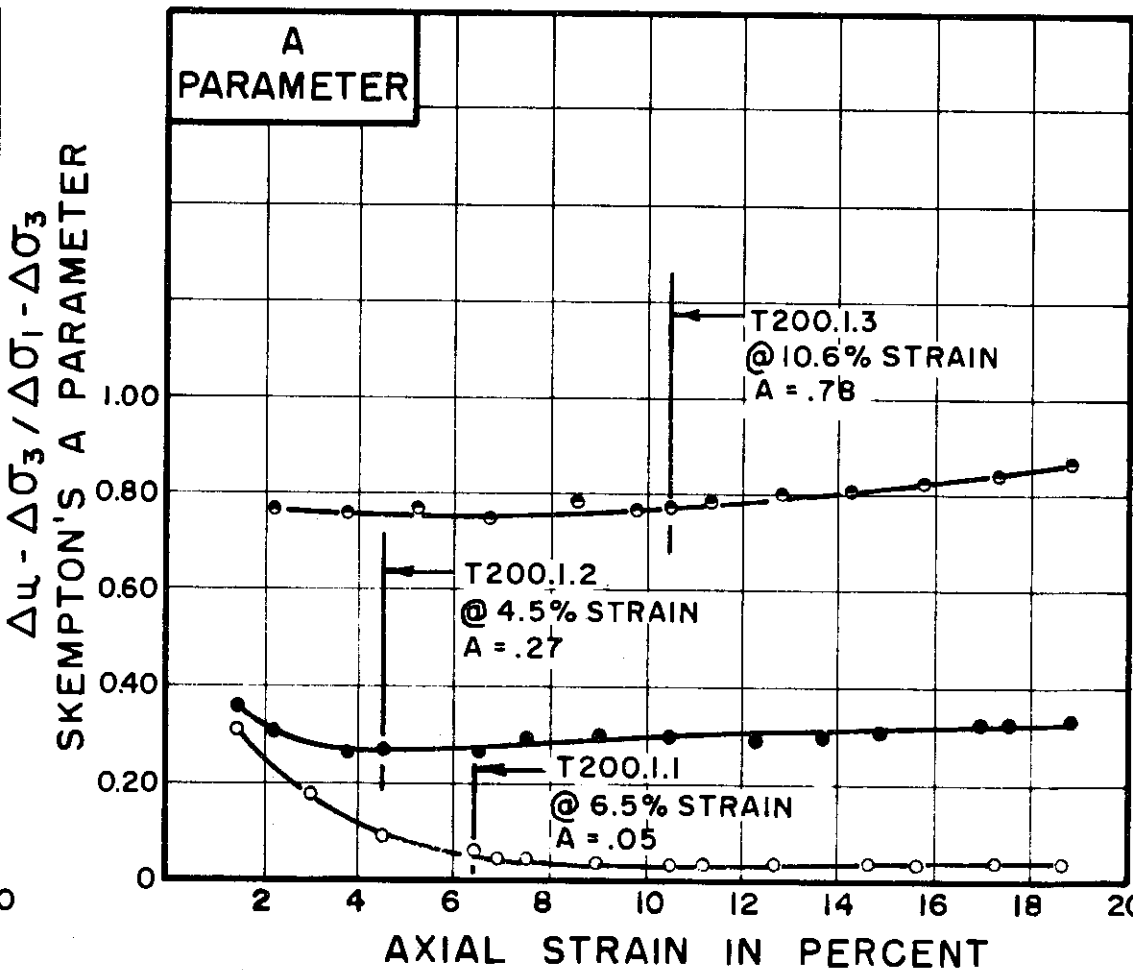
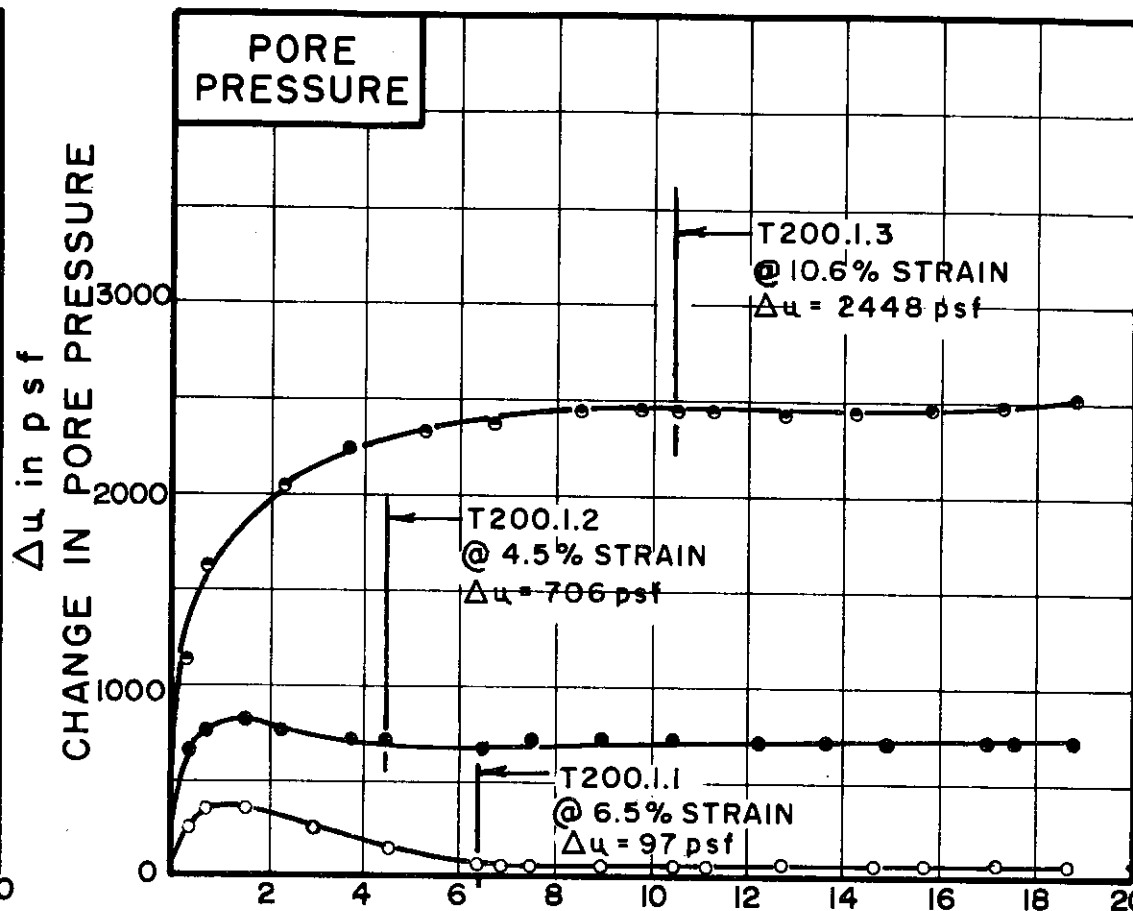
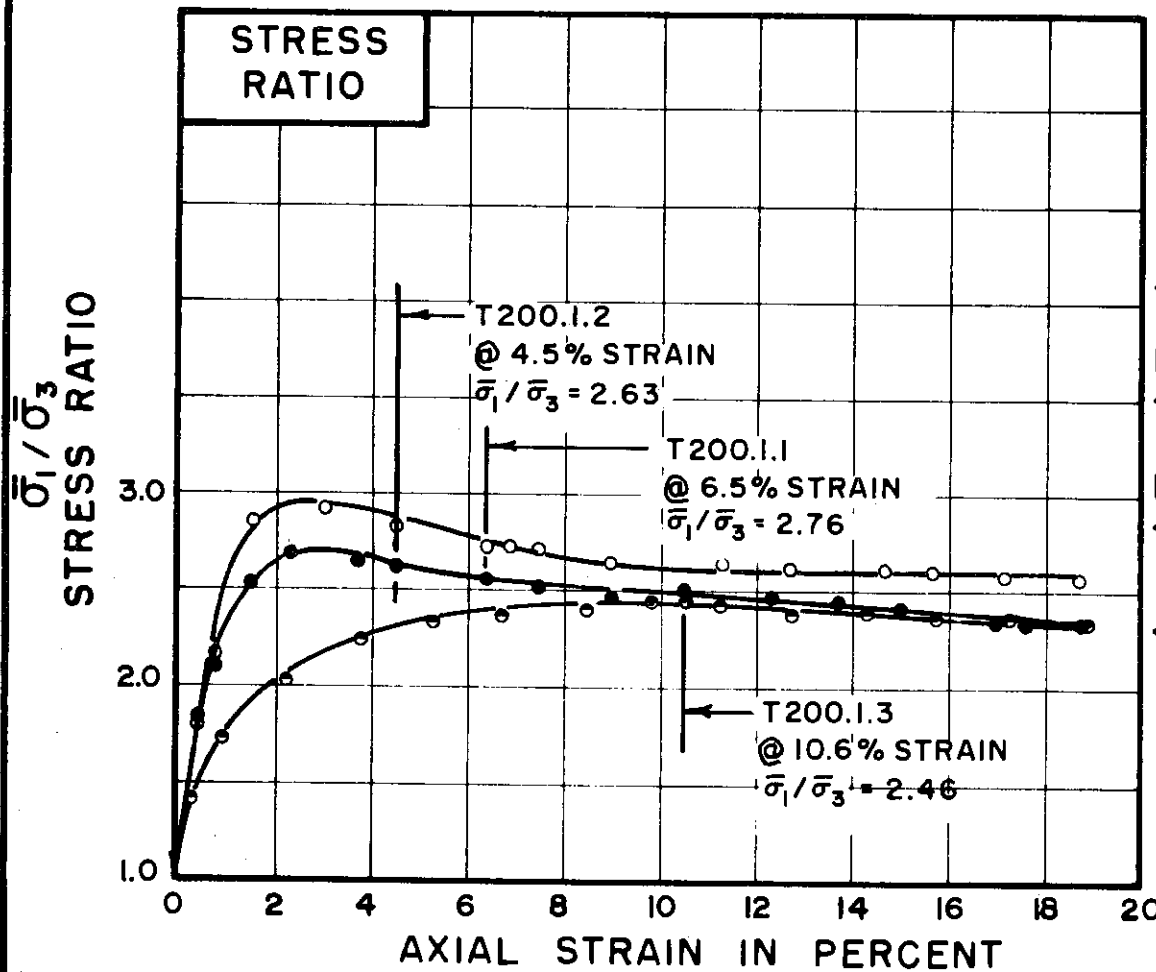
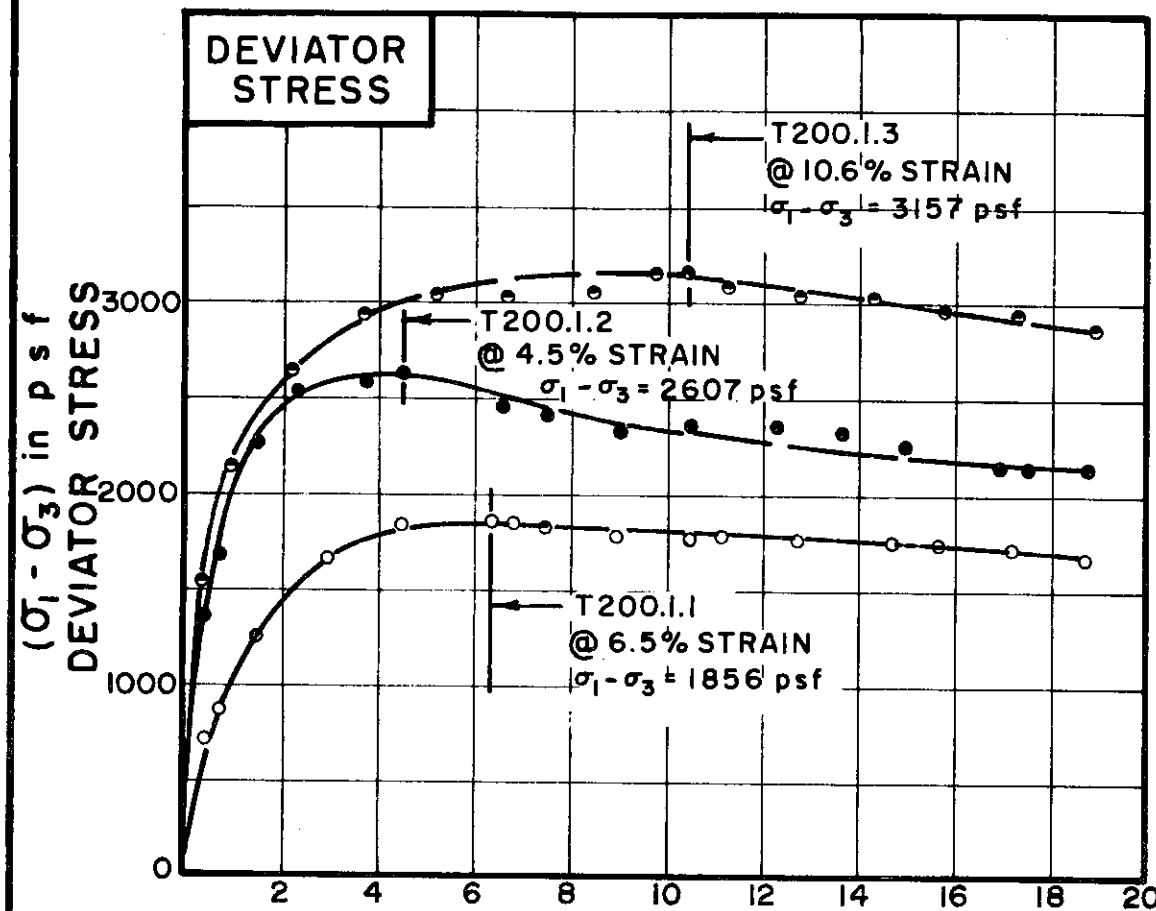
**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255



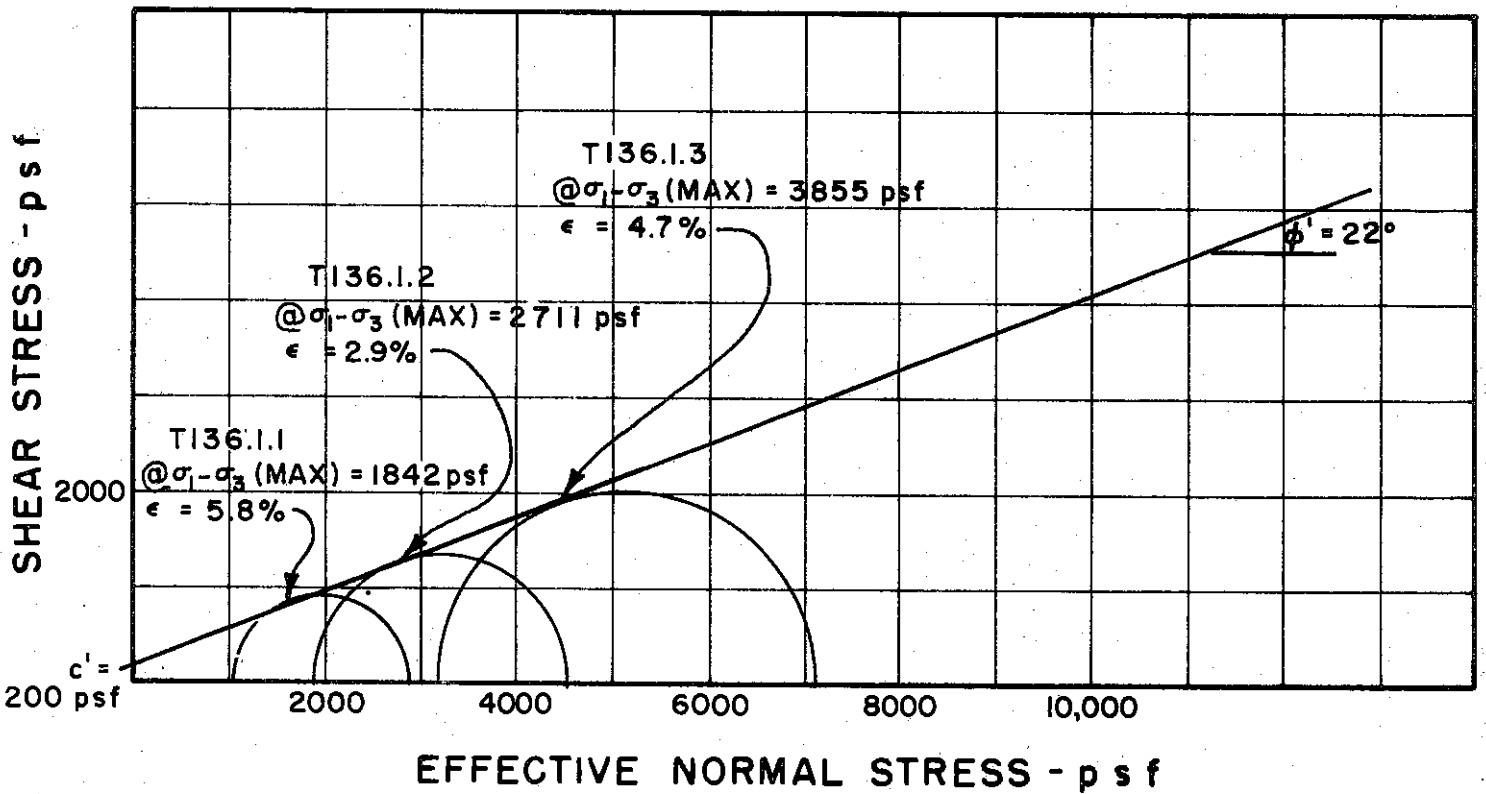
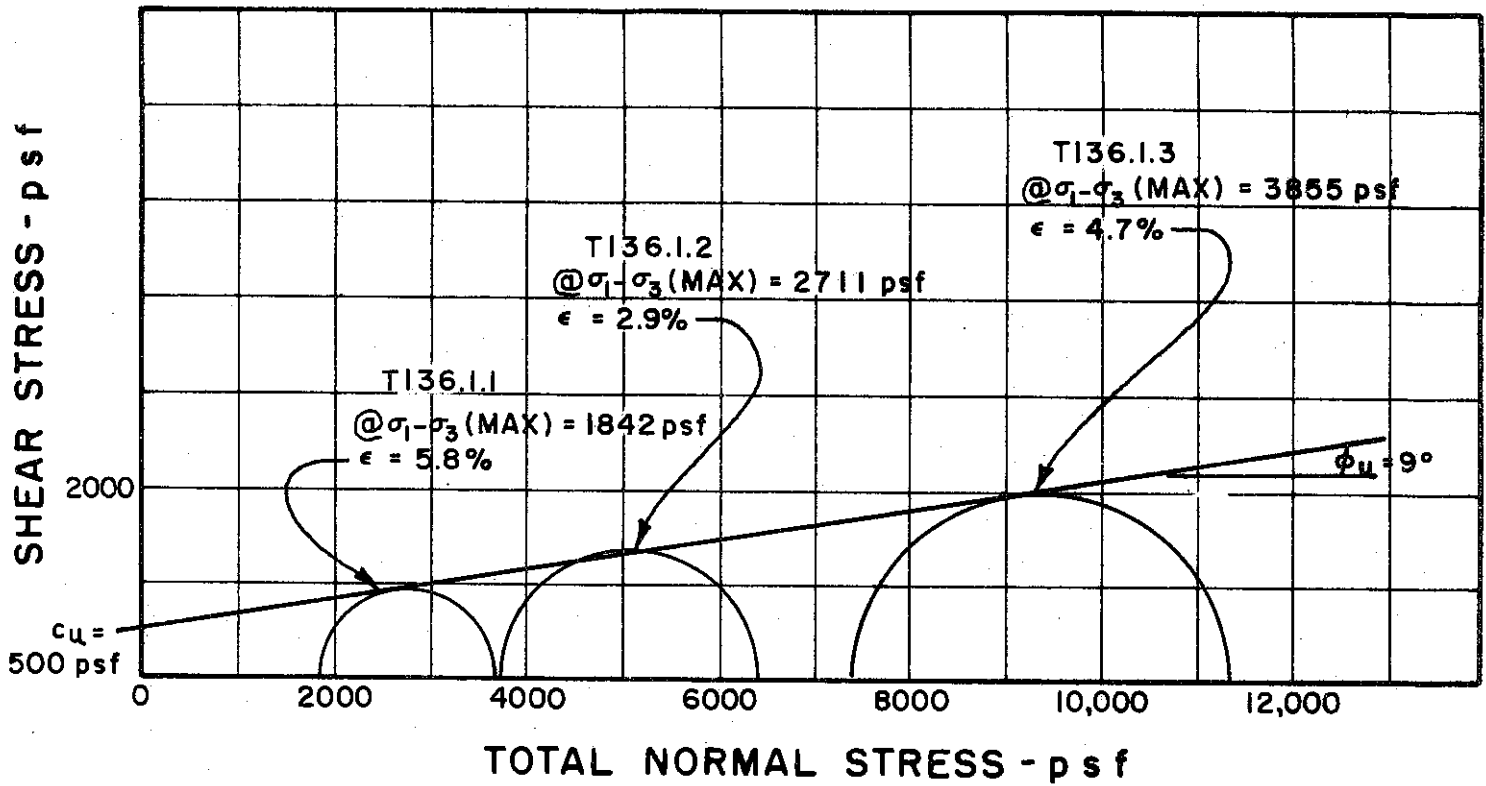
TEST NO. / SYMBOL	T200.1.1	T200.1.2	T200.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	$w_0$	32.8%	34.2%	35.6%
	DRY DENSITY	$\gamma_d$	90	89	88
	SAMPLE DIAMETER	$D_0$	1.41	1.41	1.41
	SAMPLE HEIGHT	$H_0$	3.35	3.35	3.38
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	8640	8640	8640
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	1152	2304	4608
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.6%	2.7%	5.9%
	PORE PRESSURE RESPONSE		96%	99%	100%
FINAL CONDITIONS	WATER CONTENT	$w_f$	32.1%	33.4%	31.0%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0  
 SOIL DESCRIPTION SILTY CLAY, (CL-CH)  
 LIQUID LIMIT 47 PLASTIC LIMIT 25

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 49

SAMPLE NO. 6

DEPTH 43.0' TO 45.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

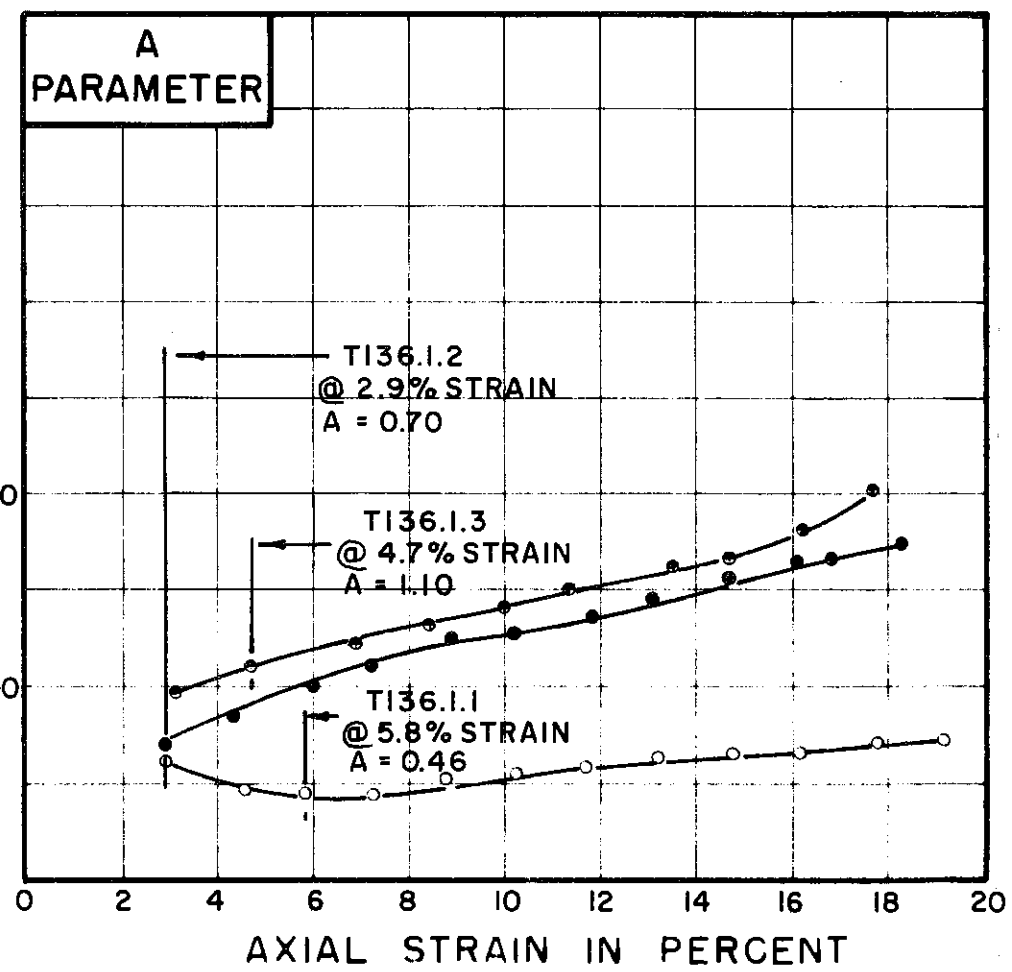
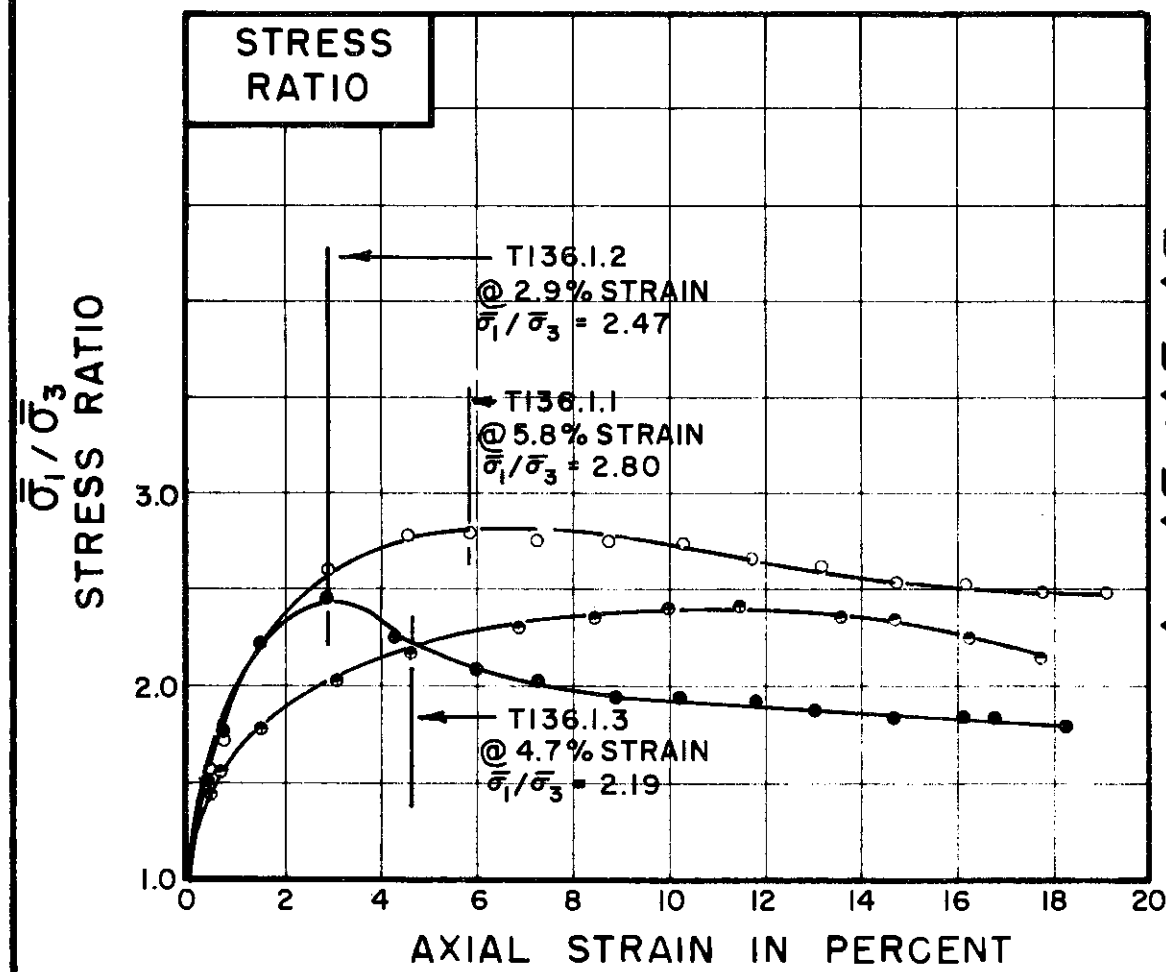
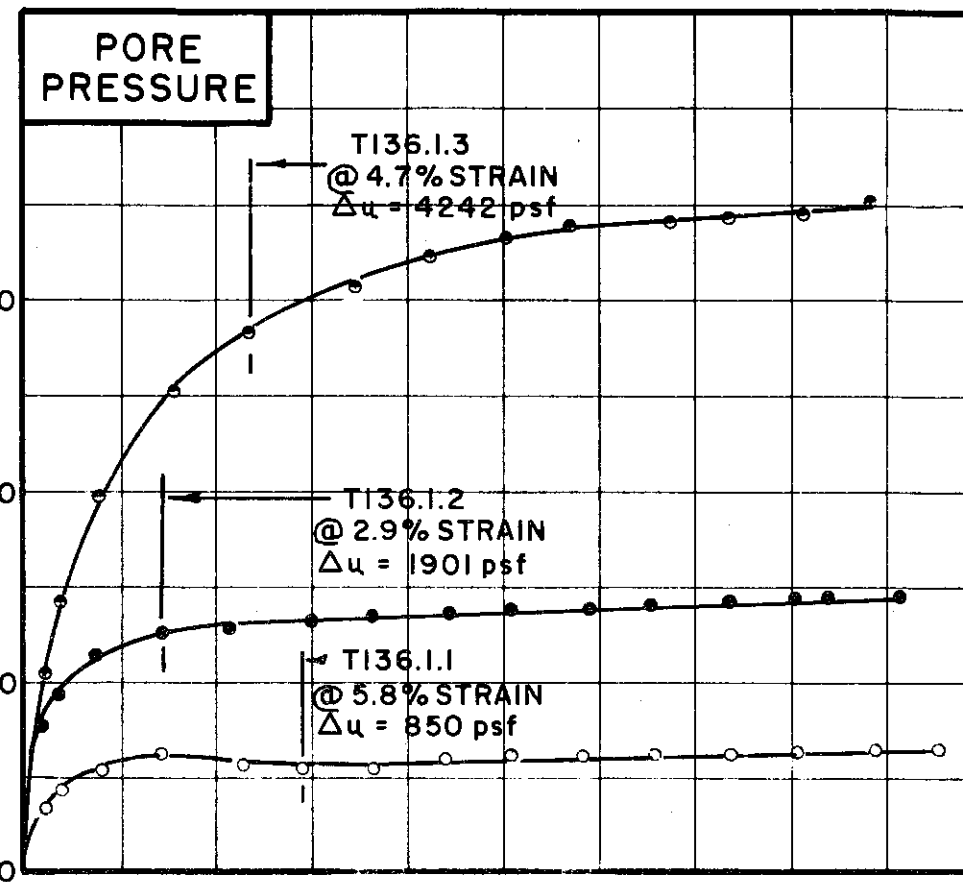
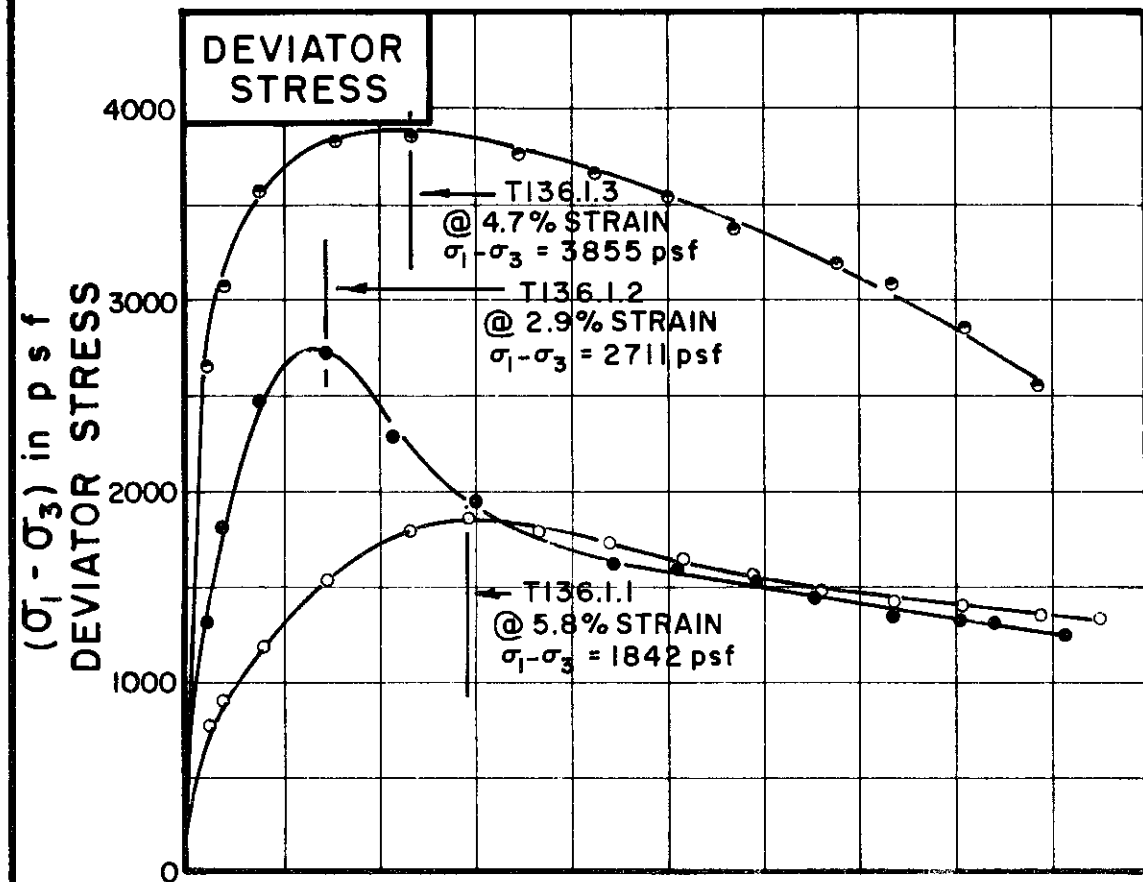
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-403



TEST NO. / SYMBOL	T136.1.1	T136.1.2	T136.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	$w_0$	43.5%	46.3%	44.9%
		DRY DENSITY lb/cu ft	$\gamma_d$	78	75
	SAMPLE DIAMETER in.	$D_0$	1.40	1.40	1.41
	SAMPLE HEIGHT in.	$H_0$	3.43	3.45	3.34
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	11520	8640	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1872	3744	7488
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.55%	2.88%	8.59%
	PORE PRESSURE RESPONSE		98%	100%	96%
FINAL CONDITIONS	WATER CONTENT	$w_f$	41.5%	44.7%	38.5%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.025
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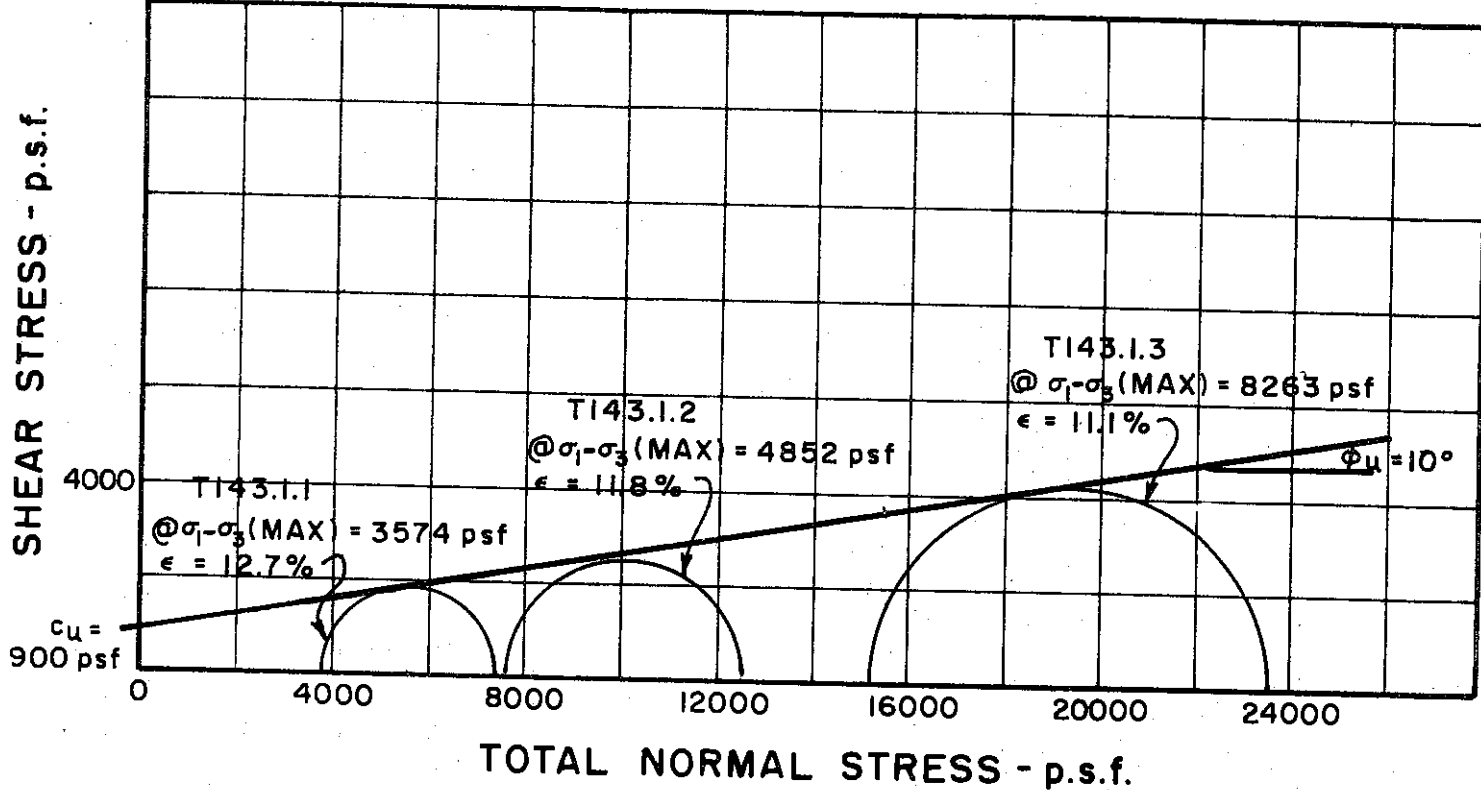
BORING NO. 49  
 SAMPLE NO. 6  
 DEPTH 43.0' TO 45.0'  
 SOIL DESCRIPTION SILTY CLAY (CH-CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

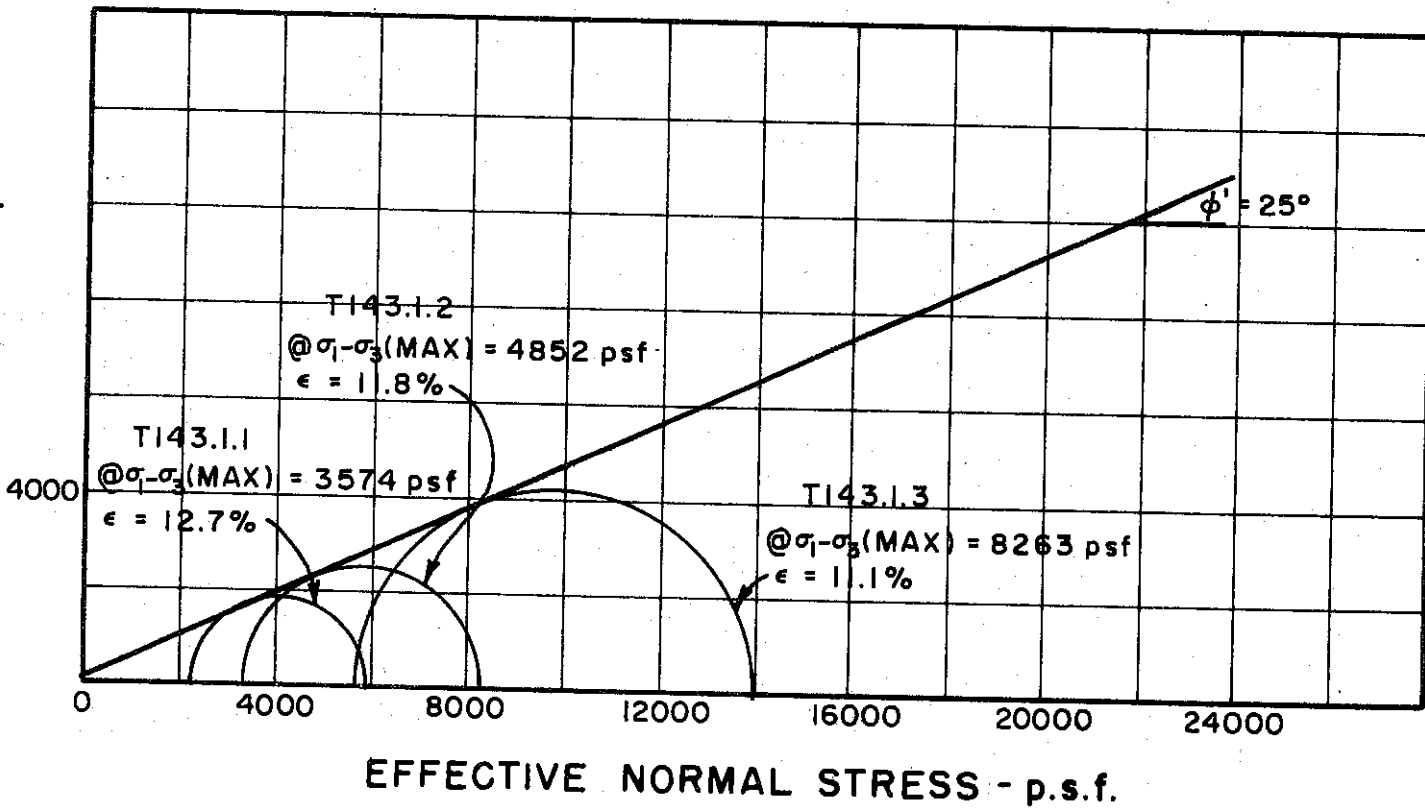
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SHEAR STRESS - p.s.f.



SHEAR STRESS - p.s.f.



BORING NO. 49

SAMPLE NO. 13

DEPTH 113.0' TO 115.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

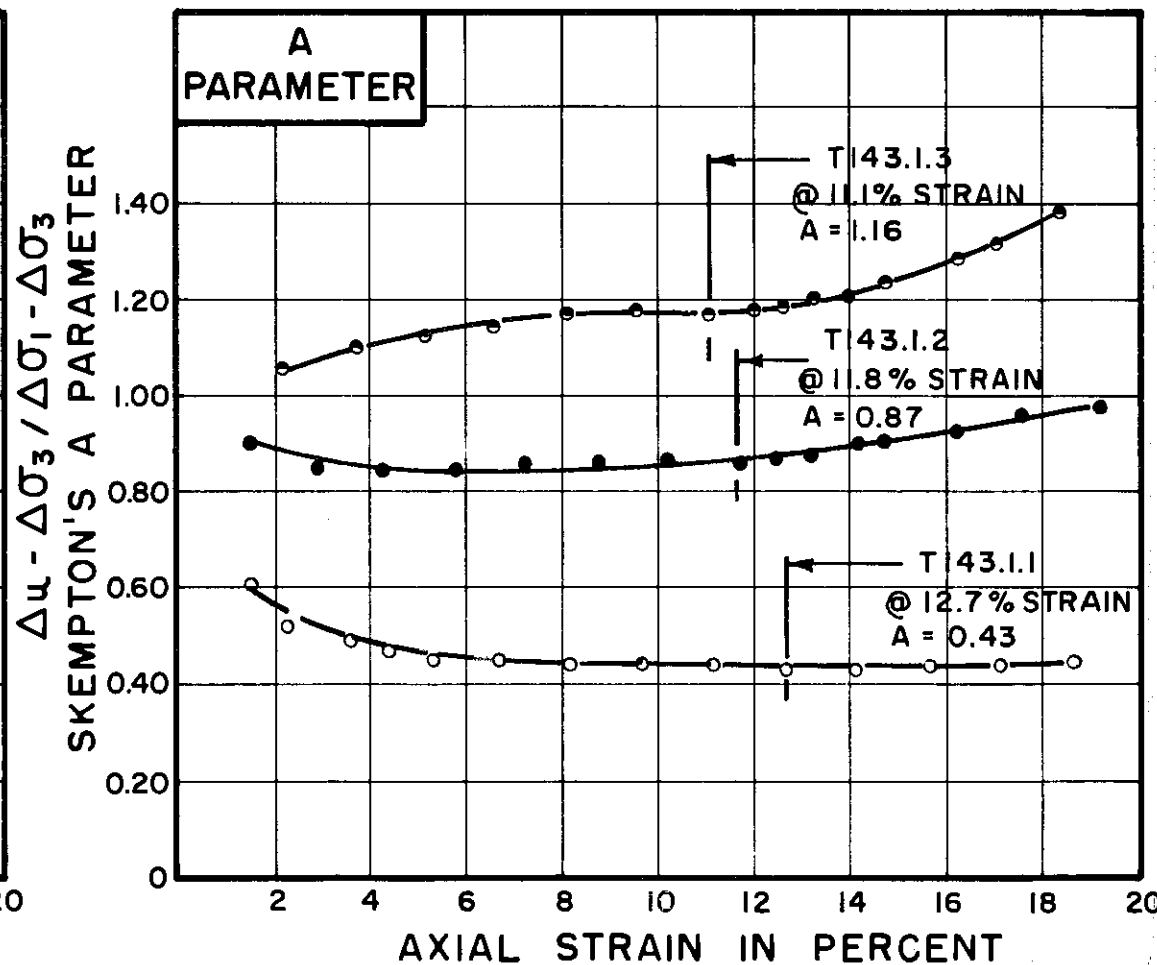
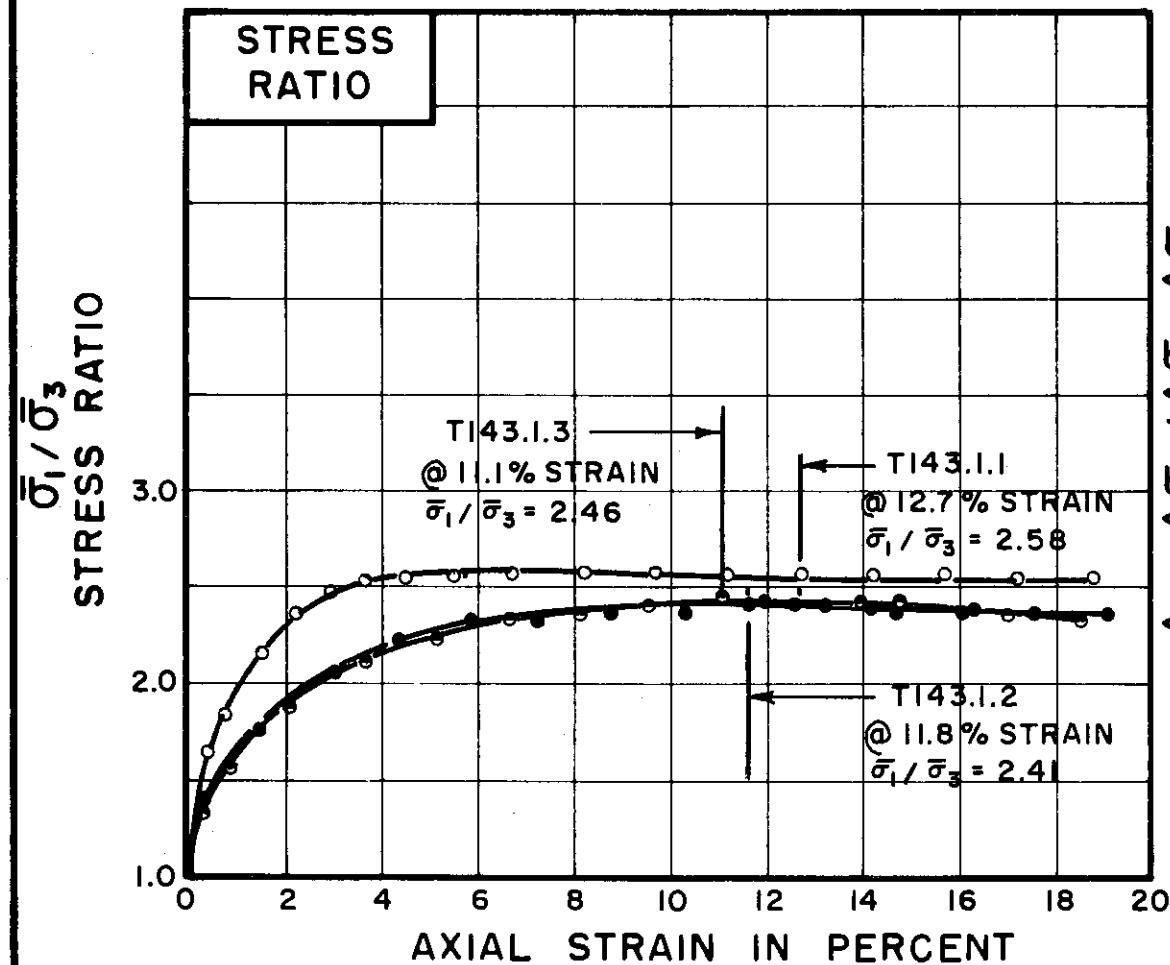
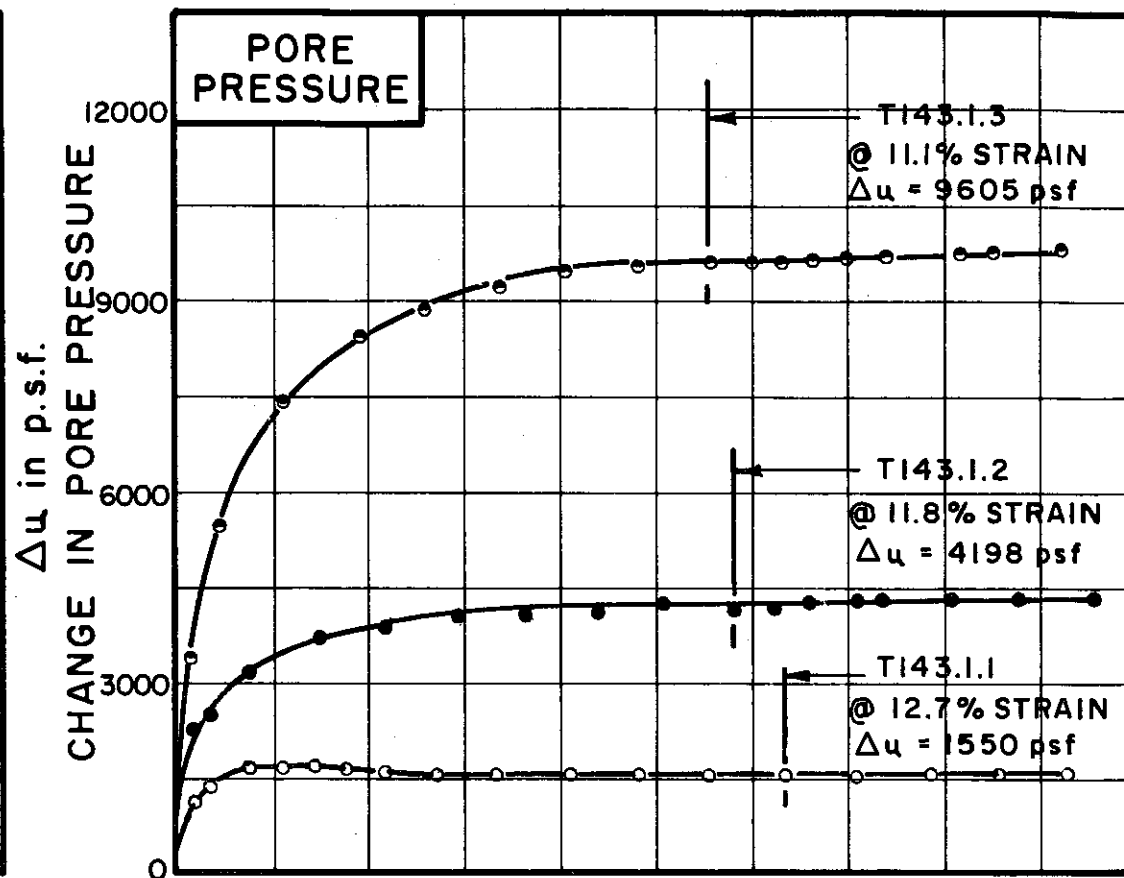
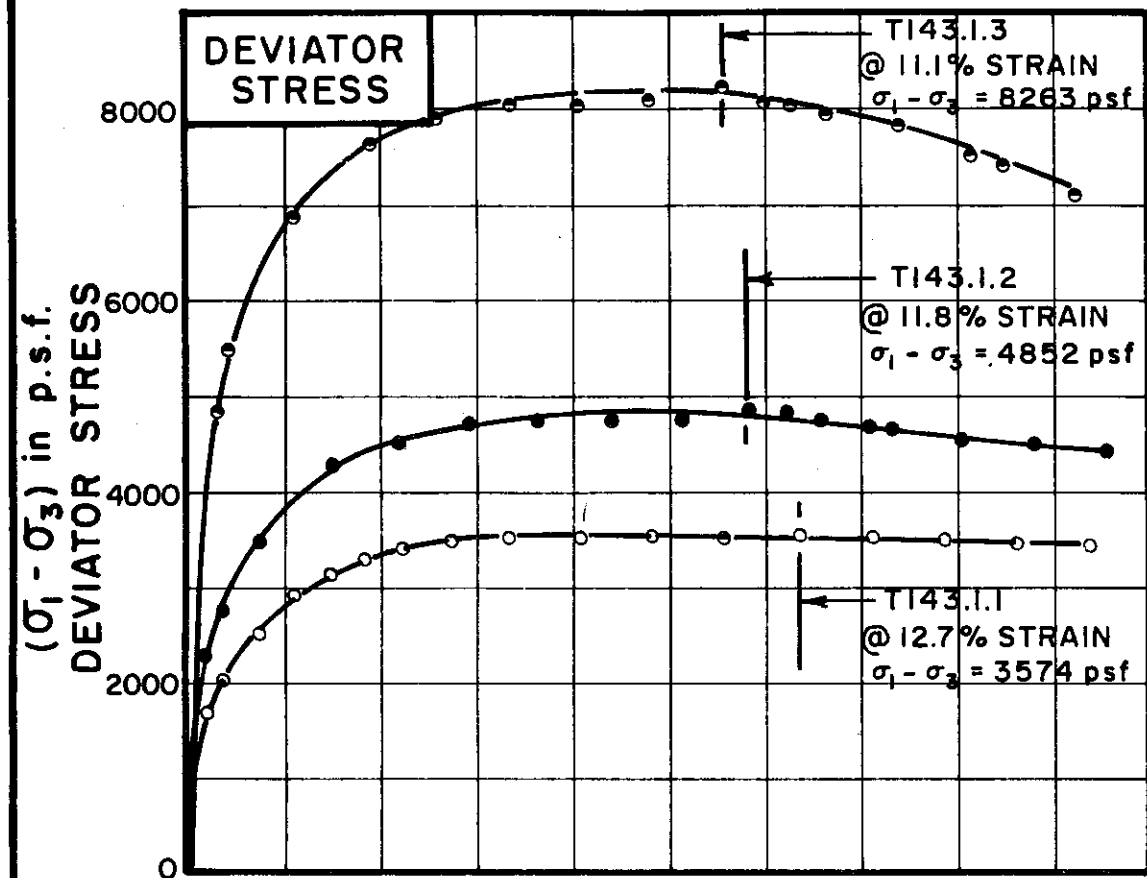
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-405



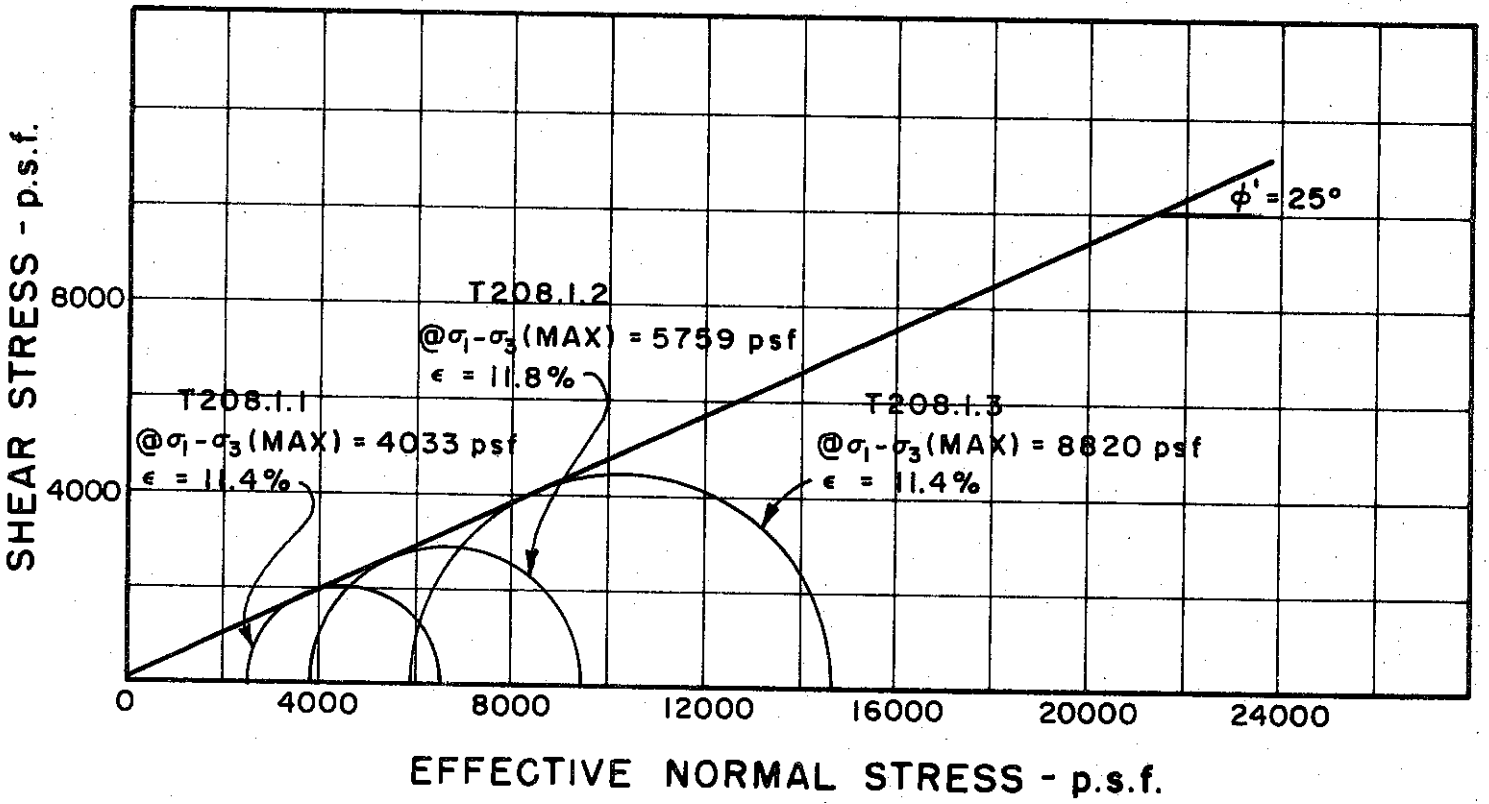
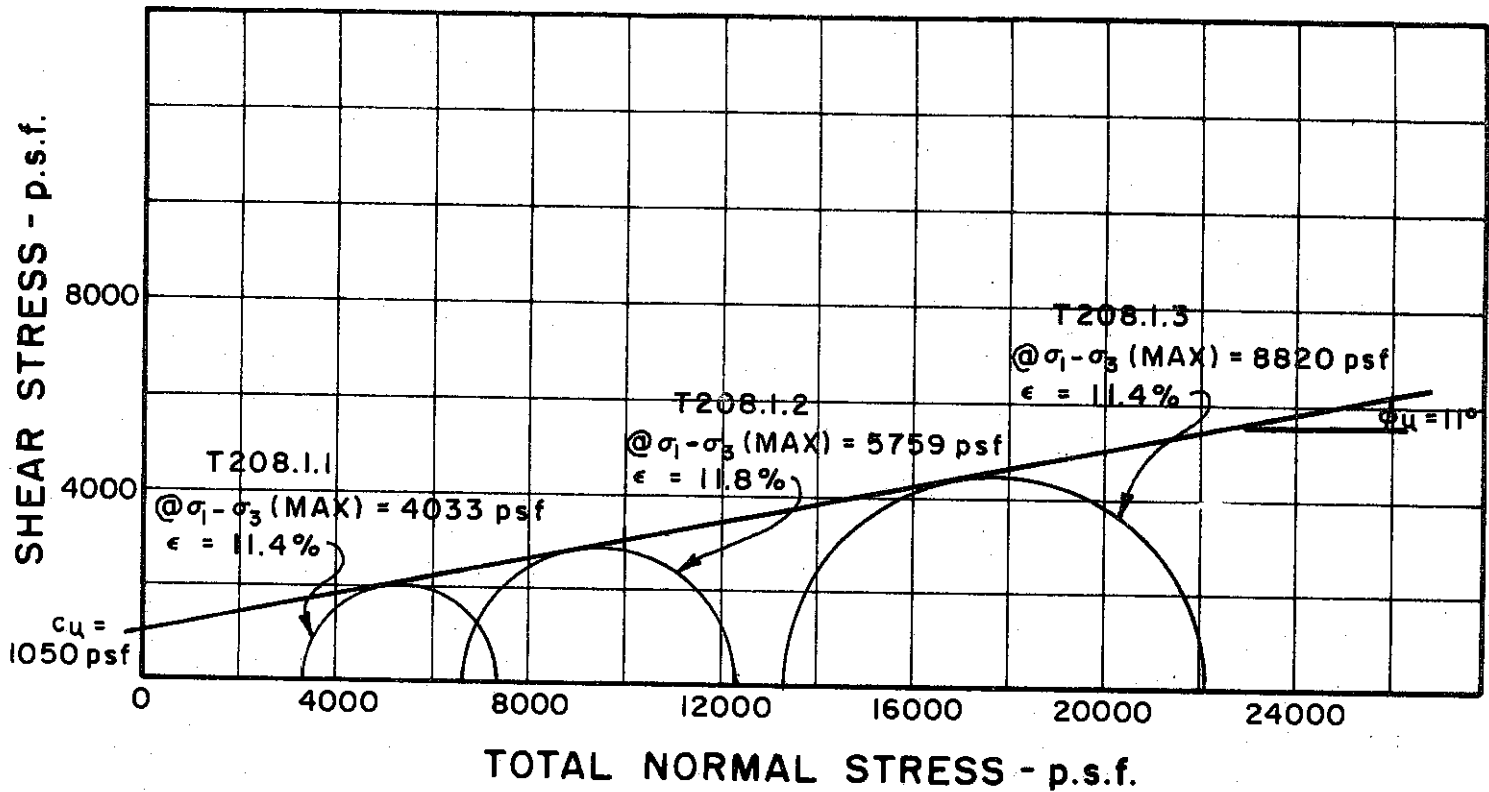
TEST NO. / SYMBOL	T143.1.1	T143.1.2	T143.1.3
	○	●	○

INITIAL CONDITIONS		T143.1.1	T143.1.2	T143.1.3
WATER CONTENT	$w_0$	24.0%	28.7%	29.2%
DRY DENSITY	$\gamma_d$	100	95	93
SAMPLE DIAMETER	$D_0$	1.40	1.40	1.41
SAMPLE HEIGHT	$H_0$	3.37	3.46	3.44
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	11520	7200	7200
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	3816	7632	15264
VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.6%	5.1%	6.3%
PORE PRESSURE RESPONSE		95	100	100
FINAL CONDITIONS AFTER SHEAR				
WATER CONTENT	$w_f$	23.1%	26.5%	24.4%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 49  
 SAMPLE NO. 13  
 DEPTH 113.0' TO 115.0'  
 SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 33 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

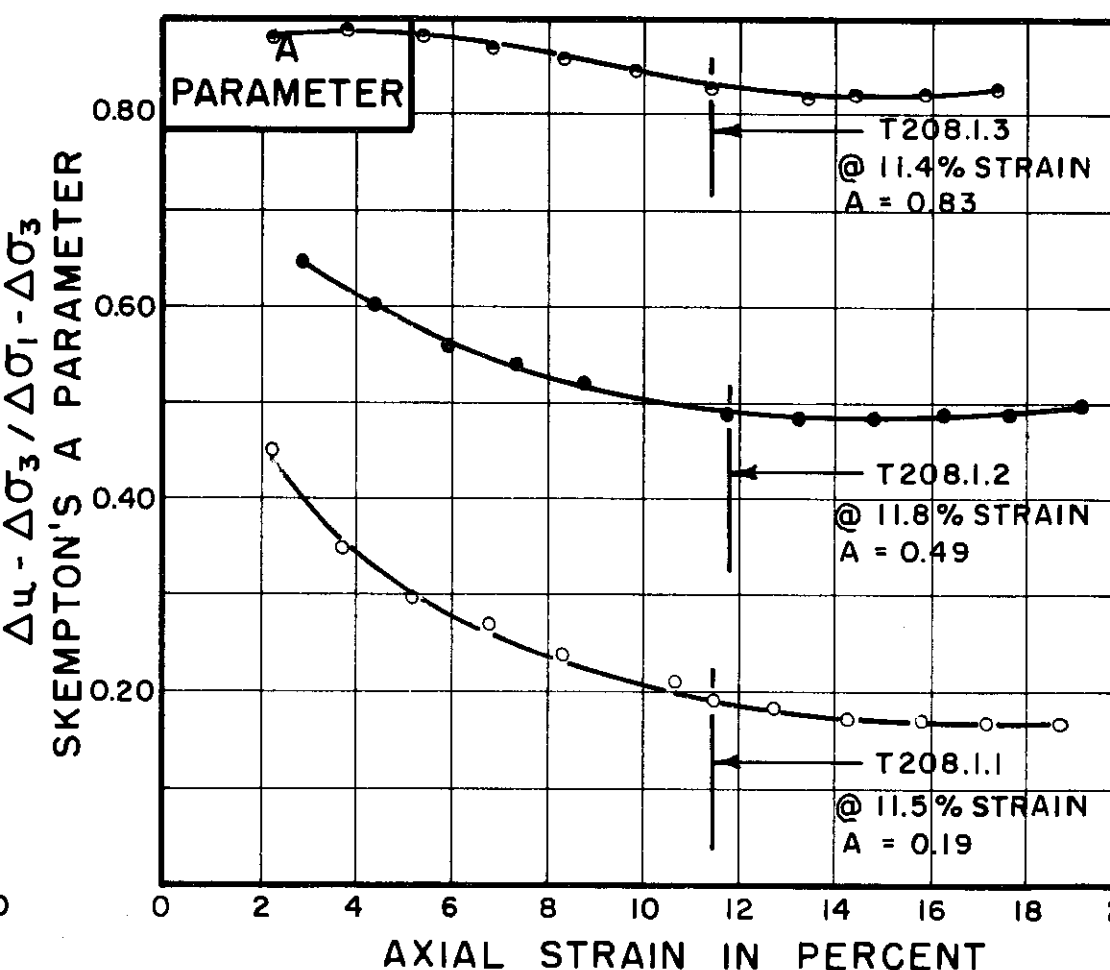
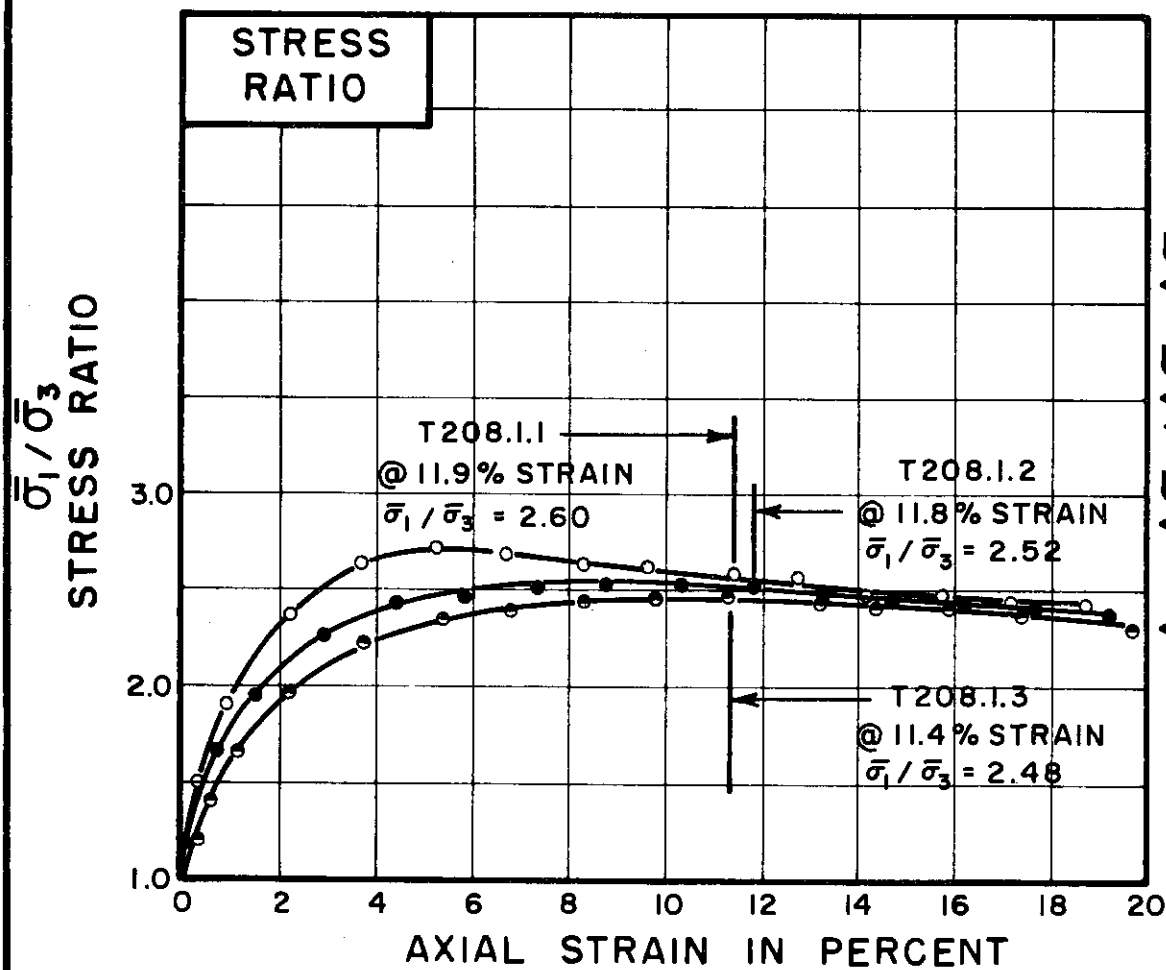
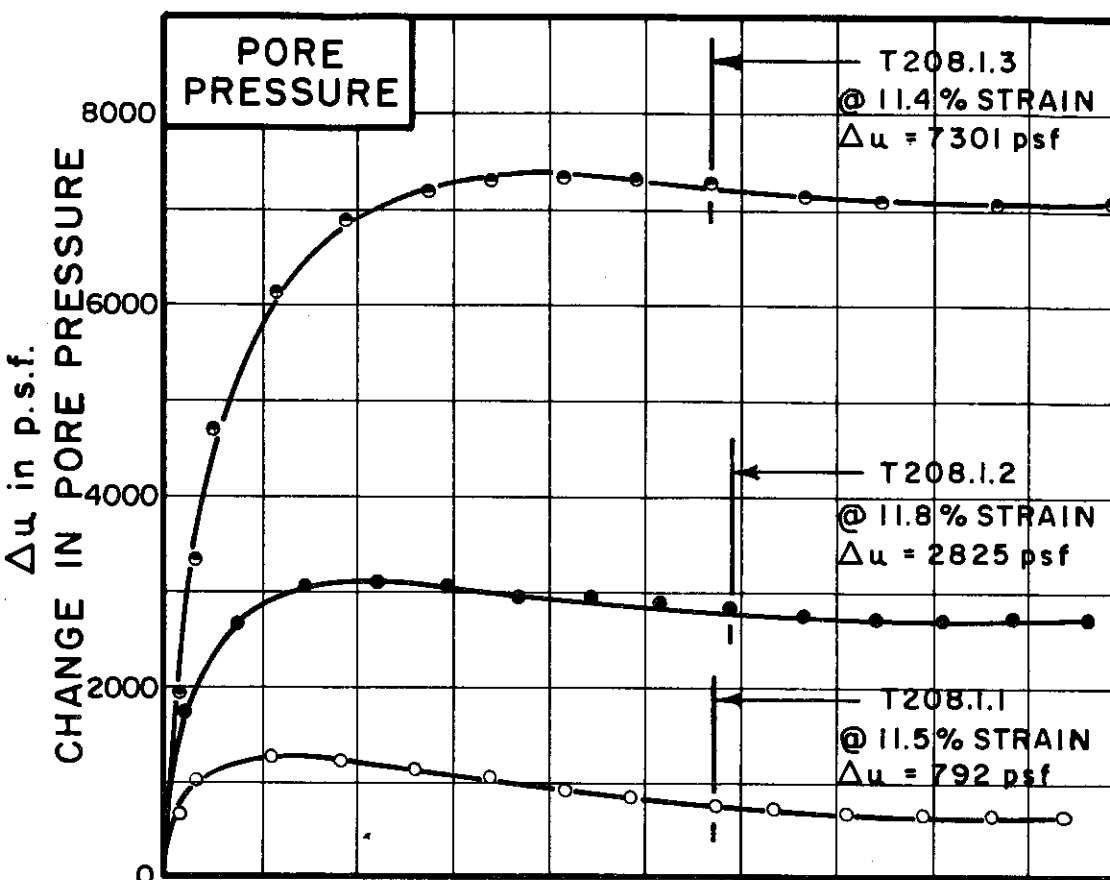
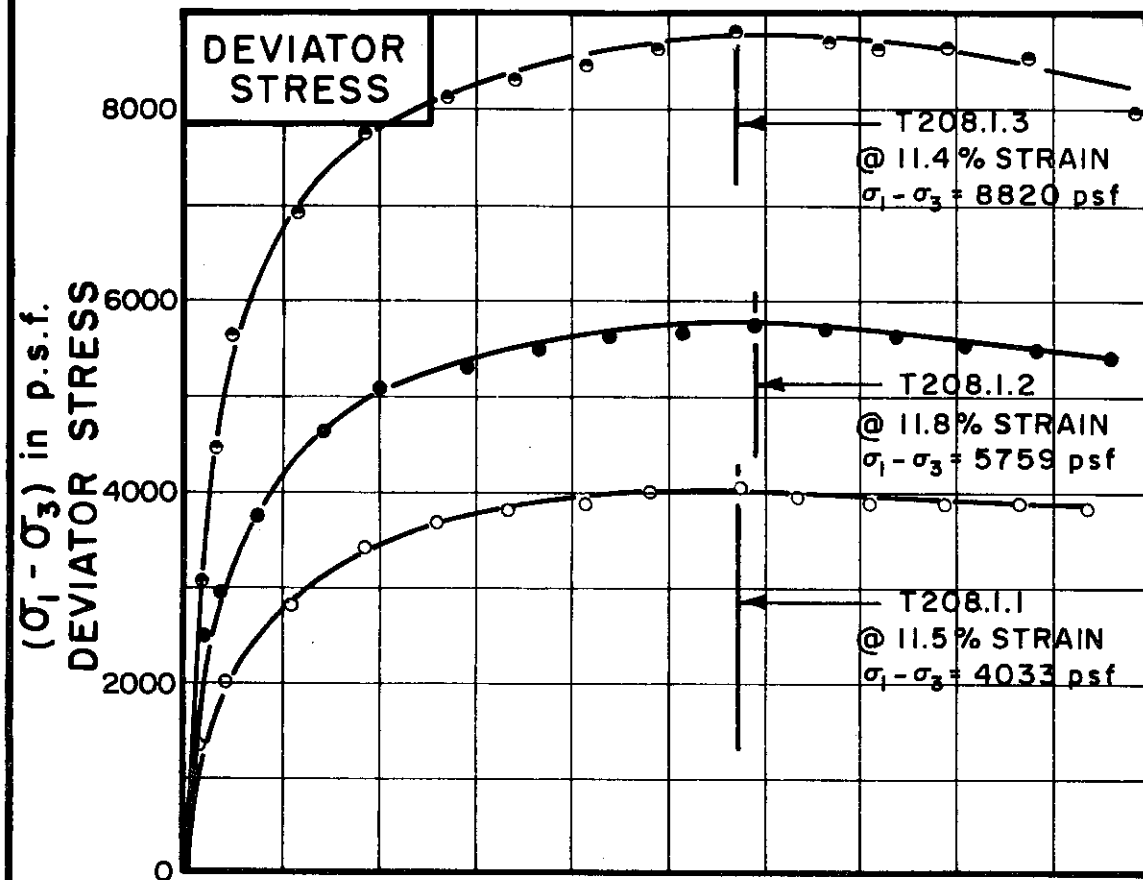


BORING NO. 48  
 SAMPLE NO. 22  
 DEPTH 98.0' TO 100.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 \_\_\_\_\_  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

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 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-407



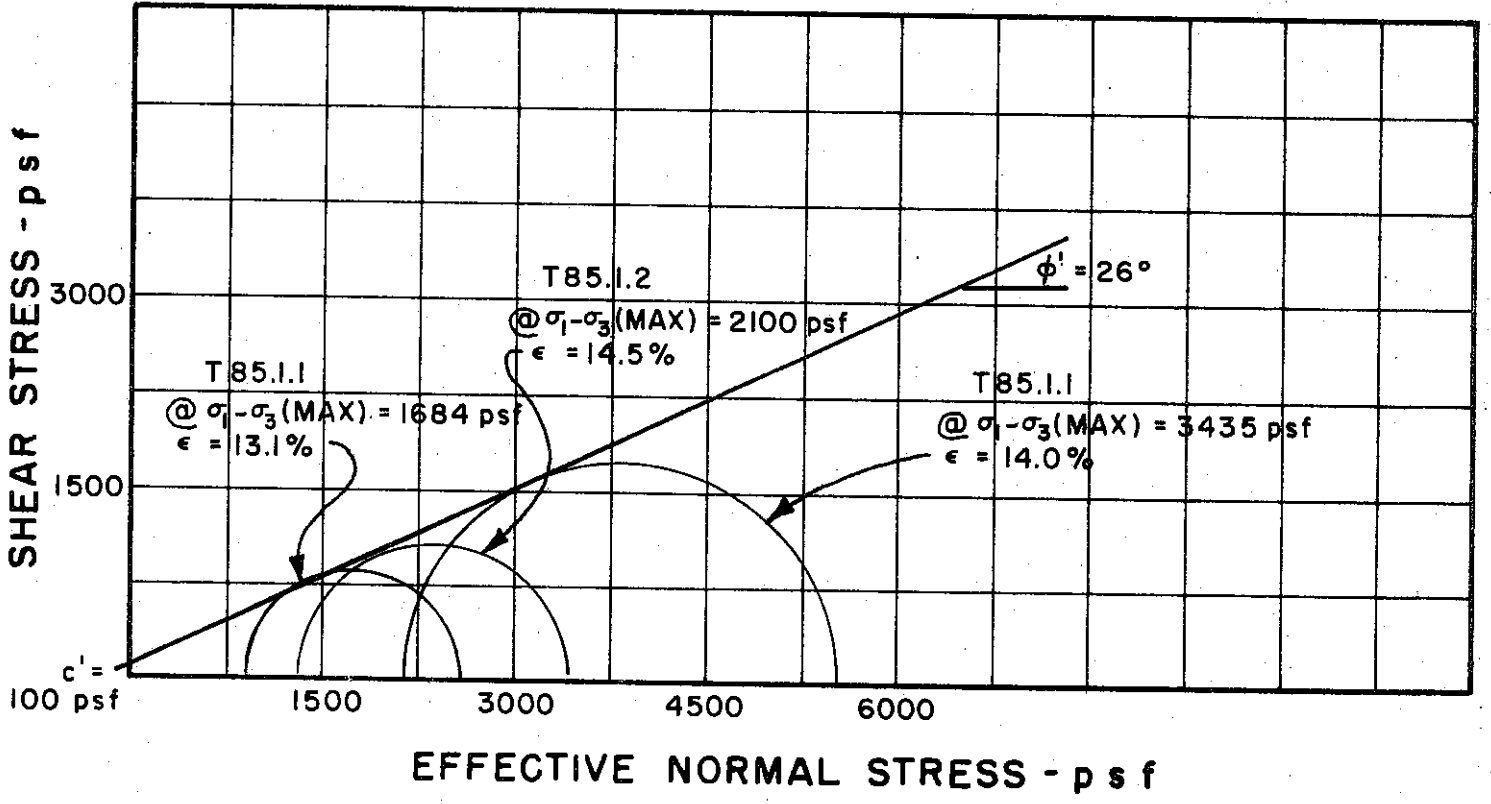
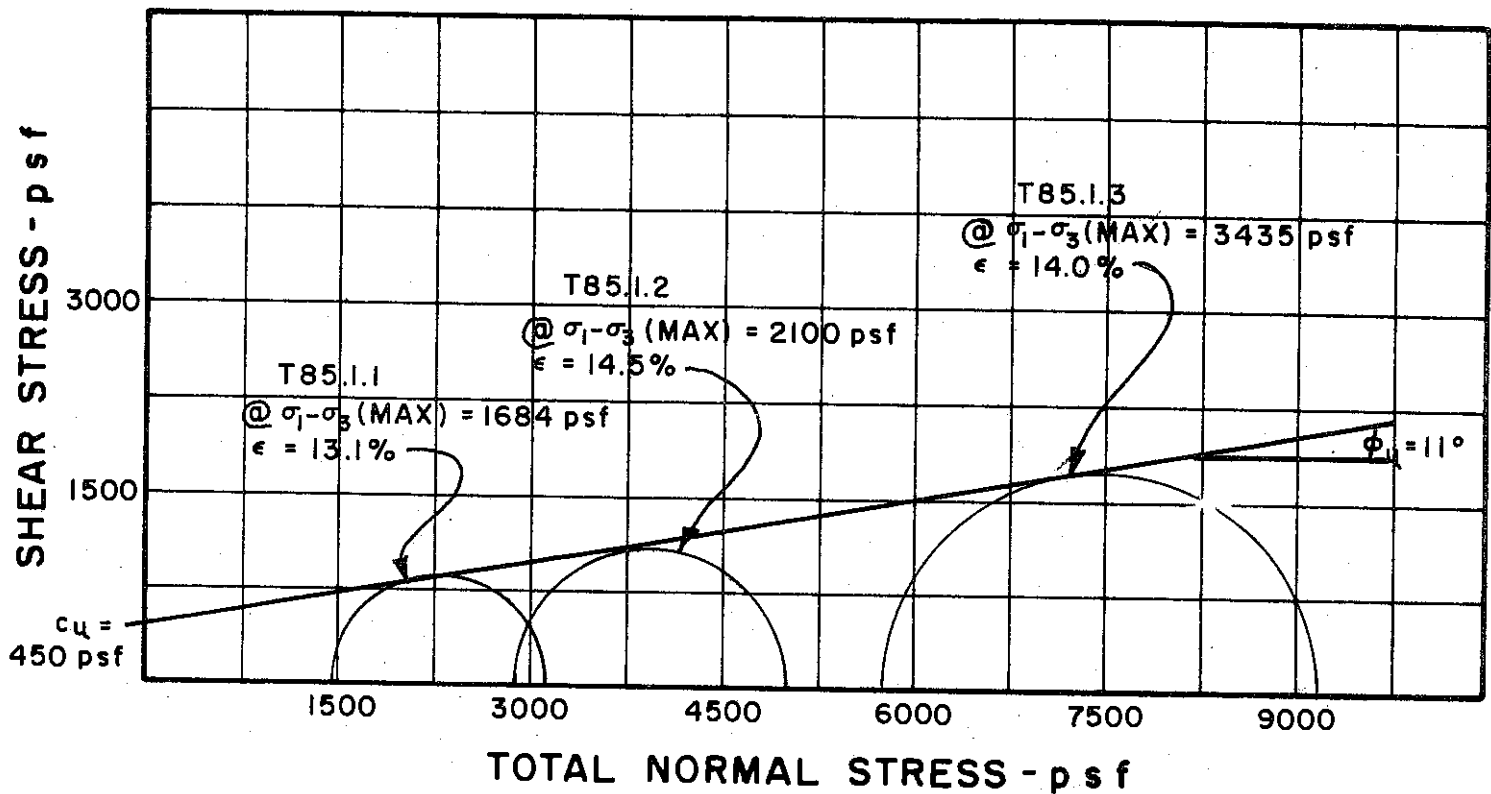
TEST NO. / SYMBOL	T208.1.1	T208.1.2	T208.1.3
	○	●	○

INITIAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>0</sub>		26.8%	26.0%	27.6%
DRY DENSITY	γ <sub>d</sub>	pcf	99	96	97
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.36	3.44	3.32
FINAL CONDITIONS BEFORE SHEAR			T208.1.1	T208.1.2	T208.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	8640	11520	7200
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	p.s.f.	3312	6624	13248
VOLUMETRIC STRAIN	ε <sub>vol</sub>		3.0%	5.2%	7.8%
PORE PRESSURE RESPONSE			95%	94%	98%
FINAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>f</sub>		25.3%	23.7%	22.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 48  
 SAMPLE NO. 22  
 DEPTH 98.0' TO 100.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

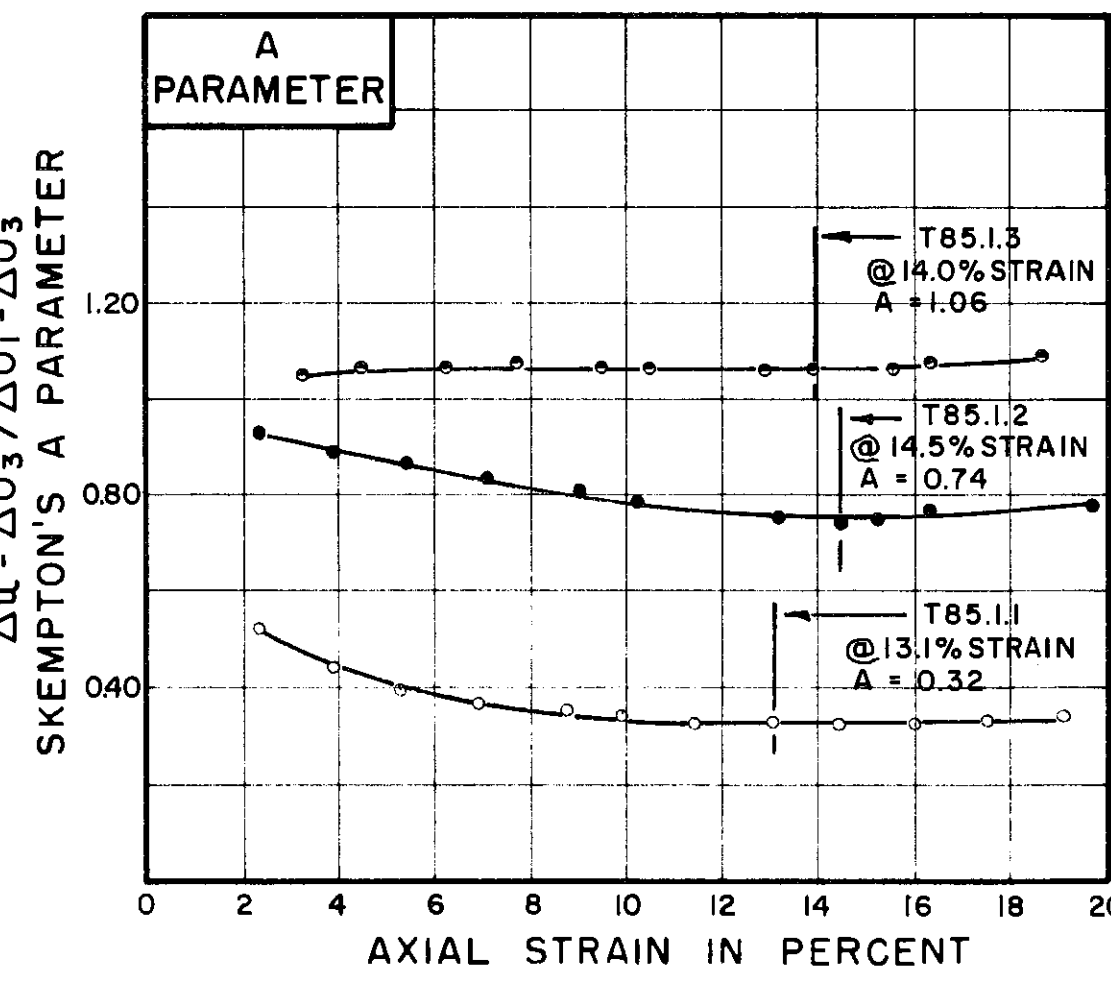
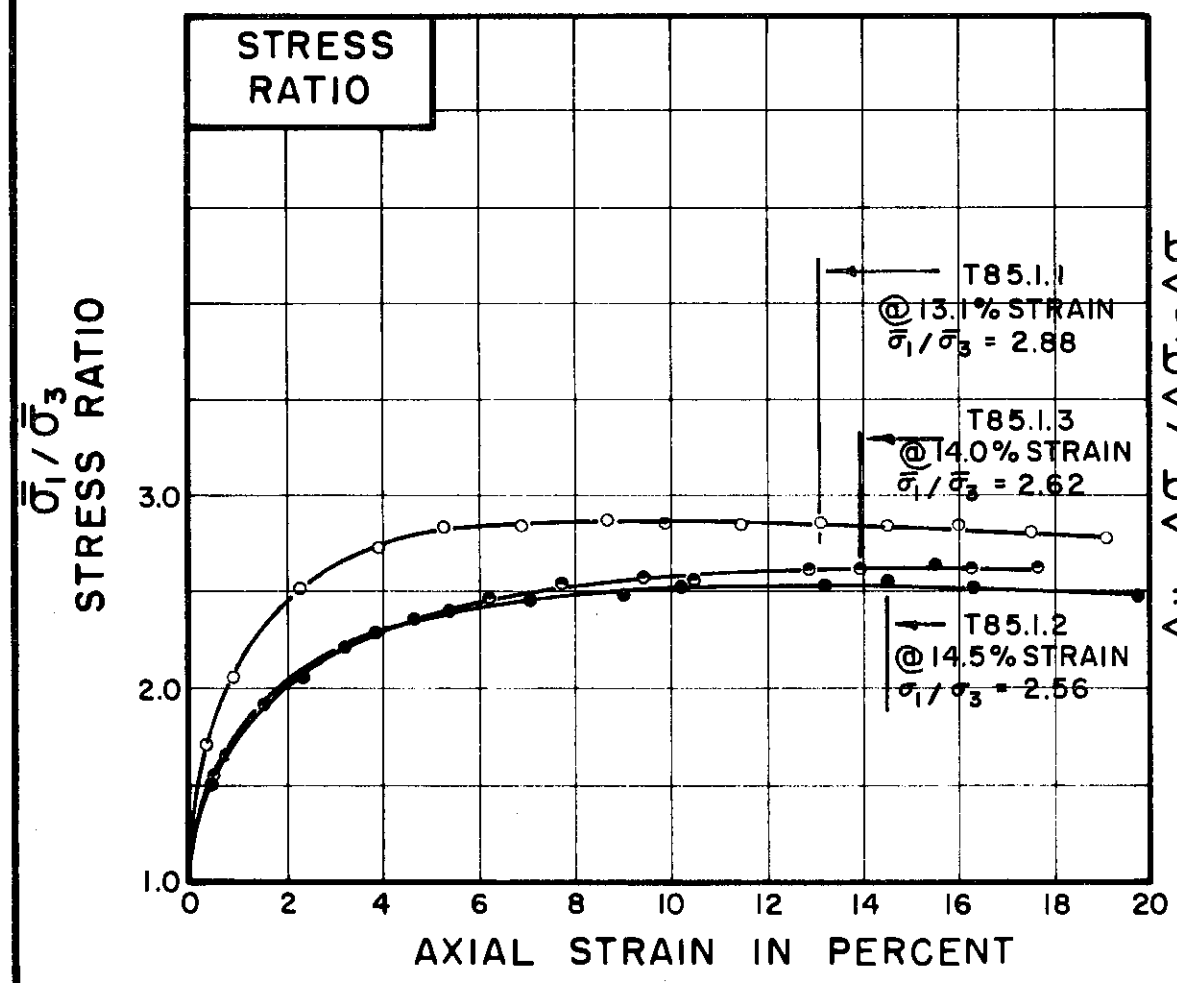
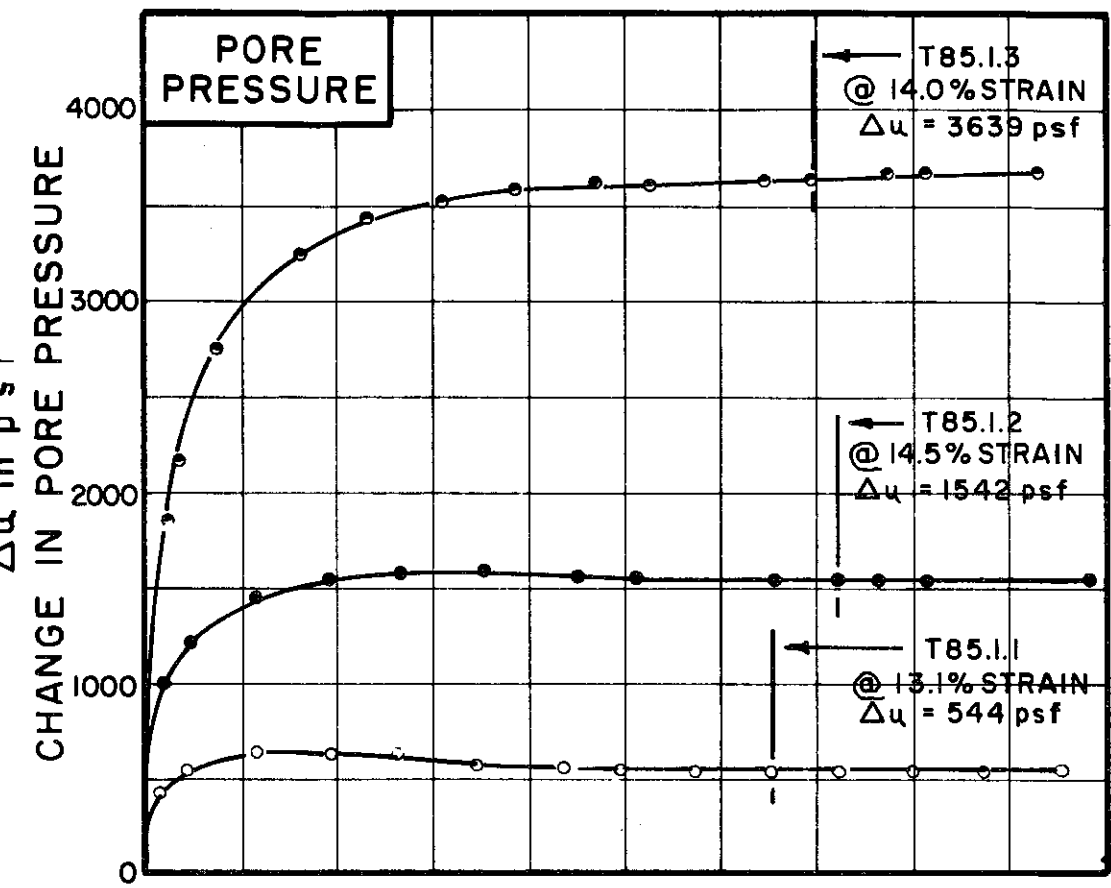
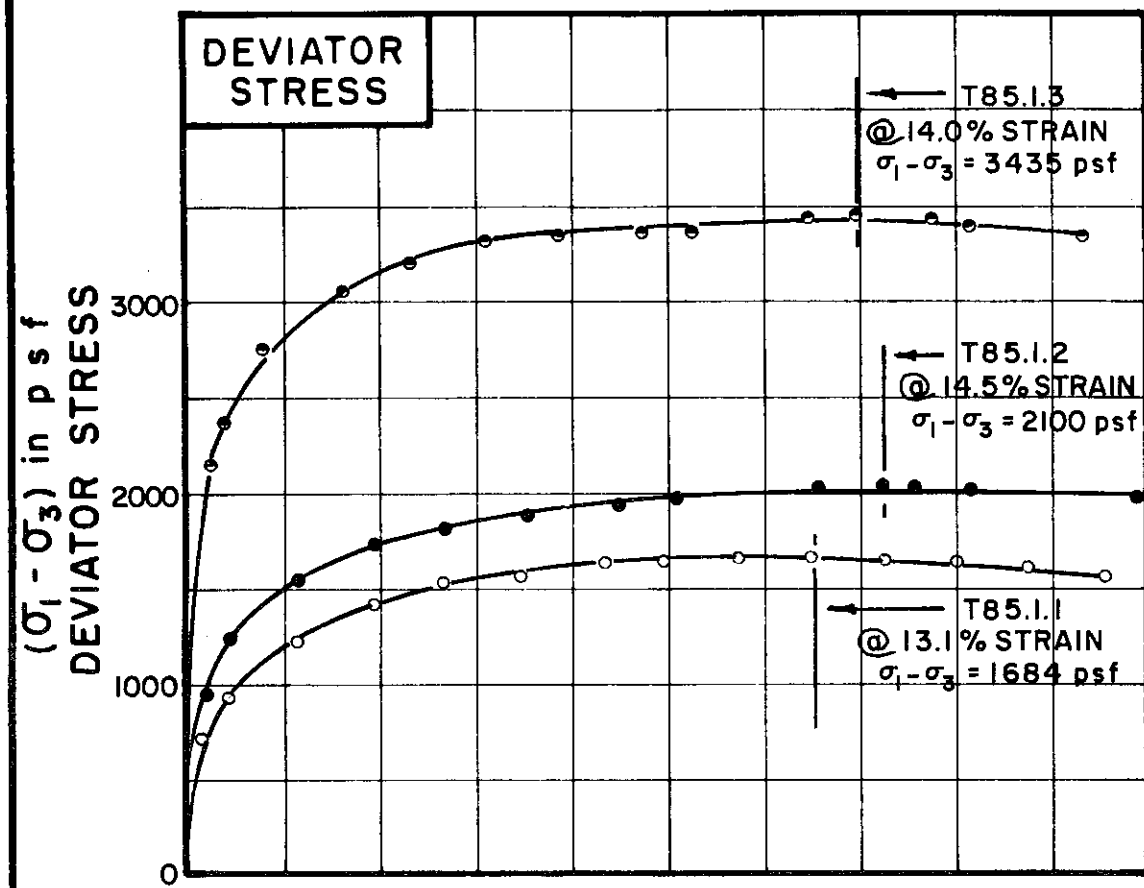


BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 \_\_\_\_\_  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-409



TEST NO. / SYMBOL	T85.1.1	T85.1.2	T85.1.3
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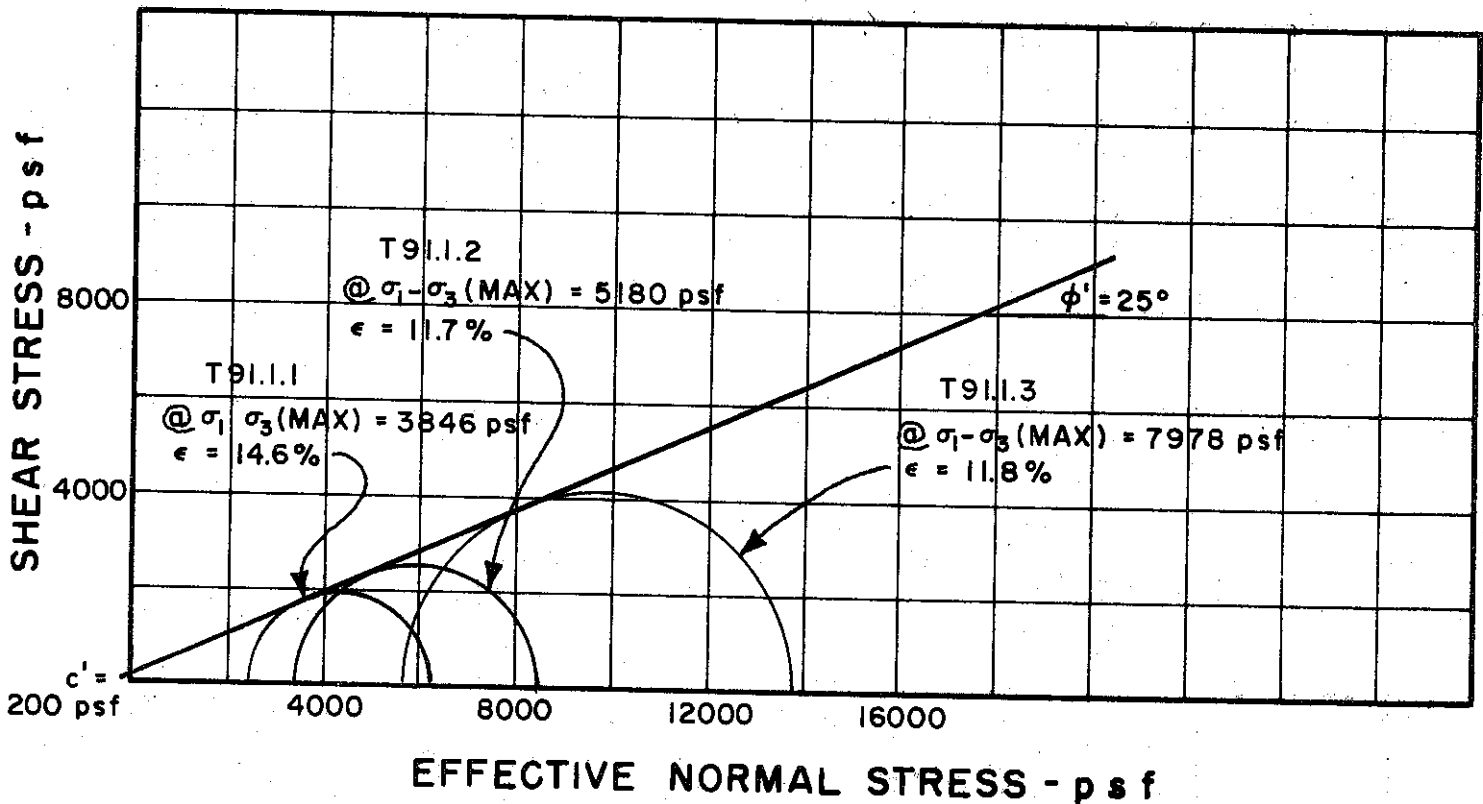
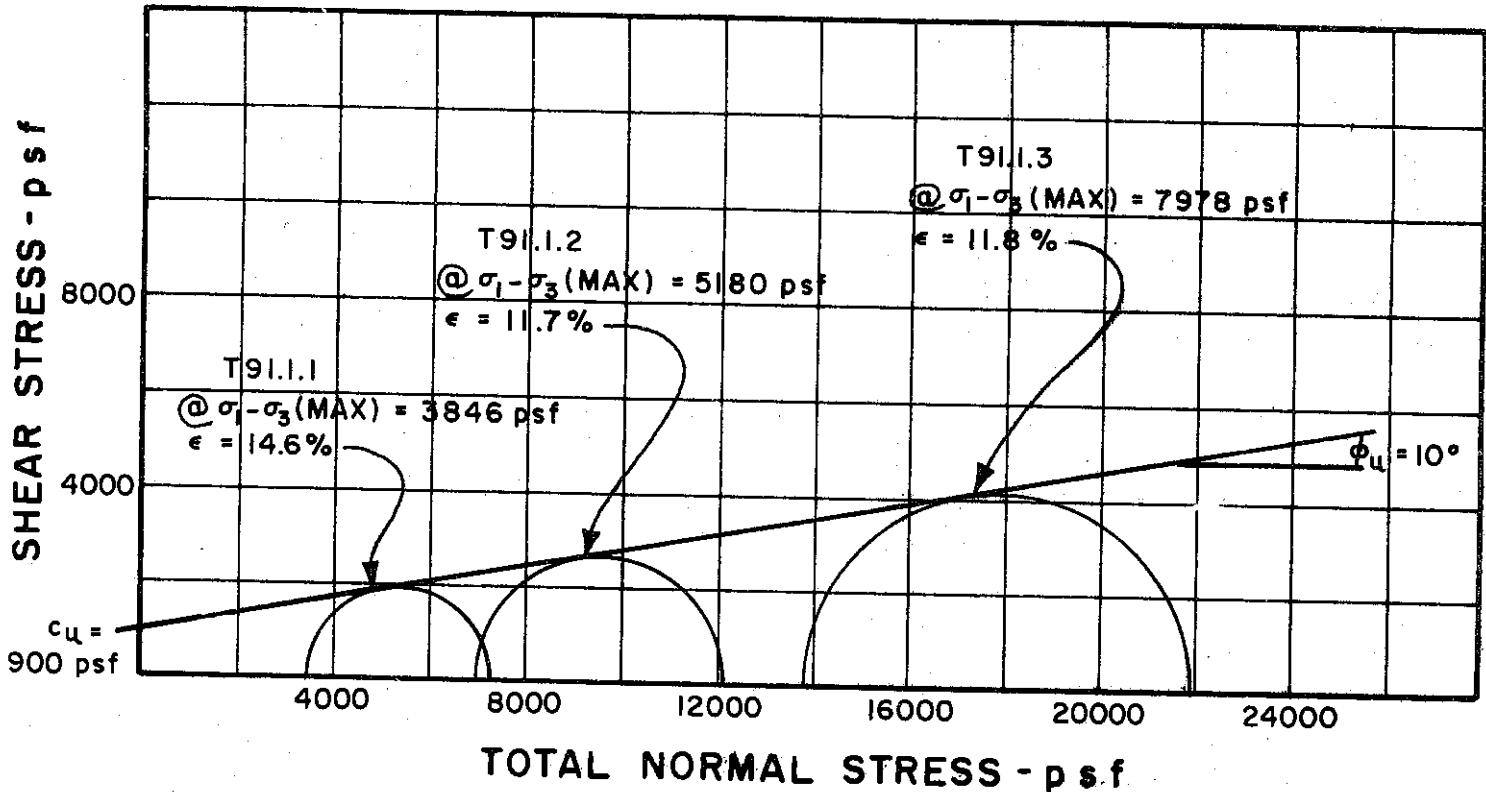
INITIAL CONDITIONS	WATER CONTENT	$w_0$	33.0%	33.1%	34.3%
	DRY DENSITY lb/cu ft	$\gamma_d$	88	90	86
SAMPLE DIAMETER in.	$D_0$	1.38	1.39	1.39	
SAMPLE HEIGHT in.	$H_0$	3.30	3.25	3.27	
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1, \bar{\sigma}_3$	1440	2880	5760
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.58%	3.18%	4.86%
	PORE PRESSURE RESPONSE		96%	95%	100%
FINAL CONDITIONS	WATER CONTENT	$w_f$	31.5%	27.3%	28.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.024
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BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.0' TO 30.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 39 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 50

SAMPLE NO. 18

DEPTH 88.0' TO 90.0'

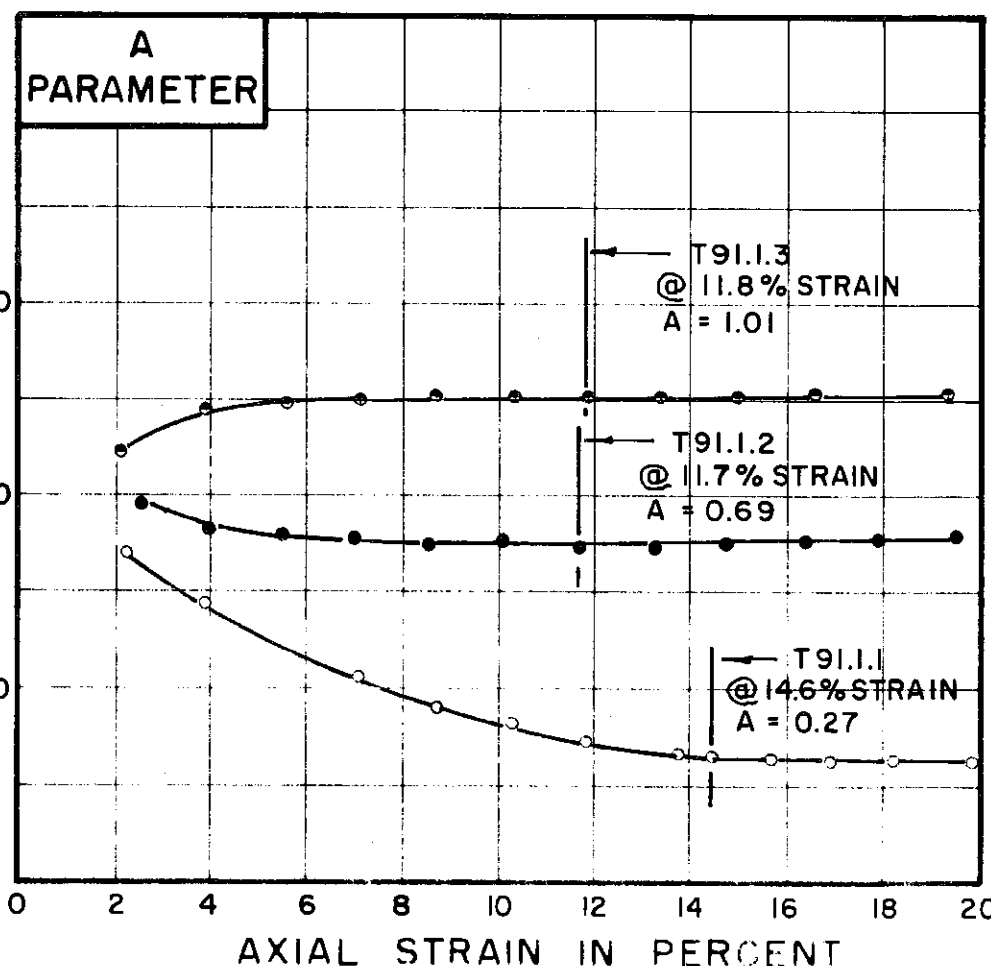
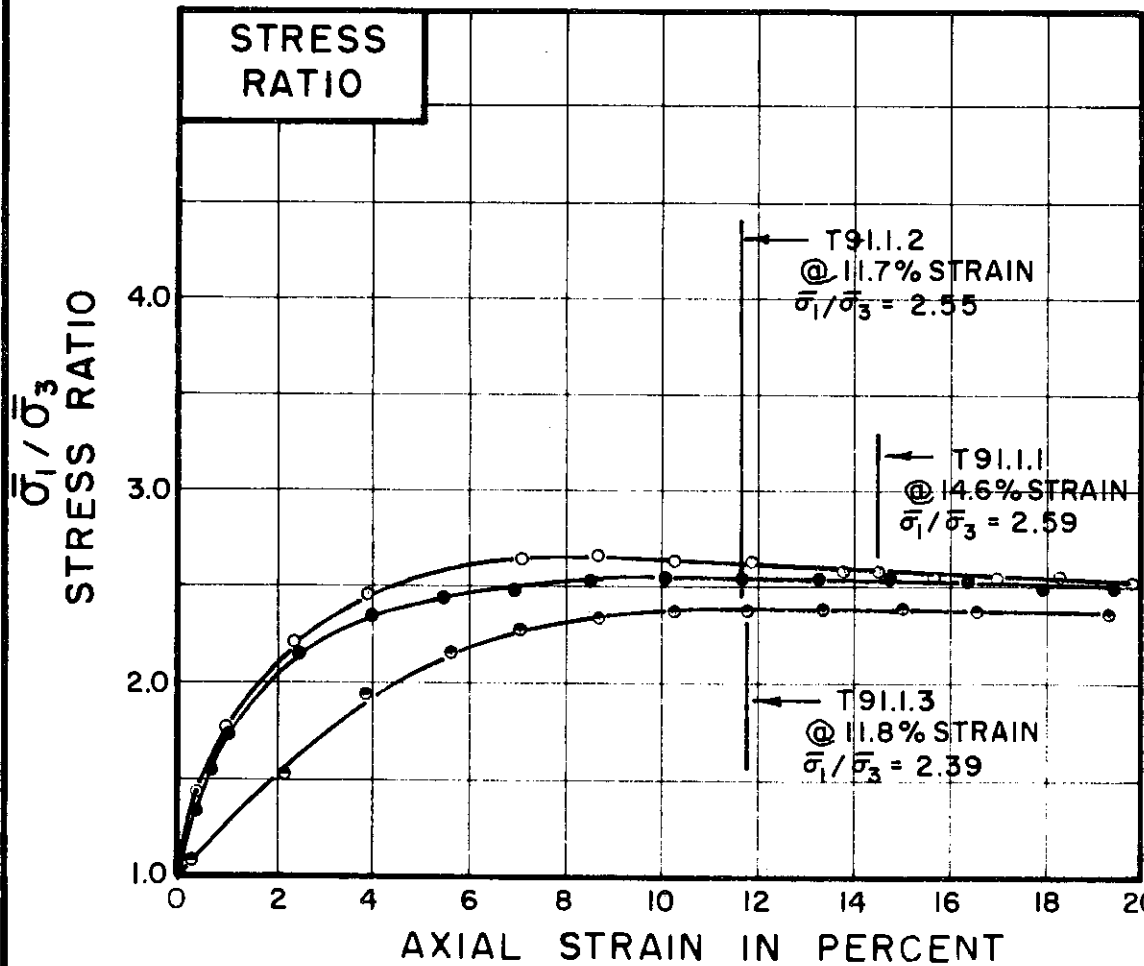
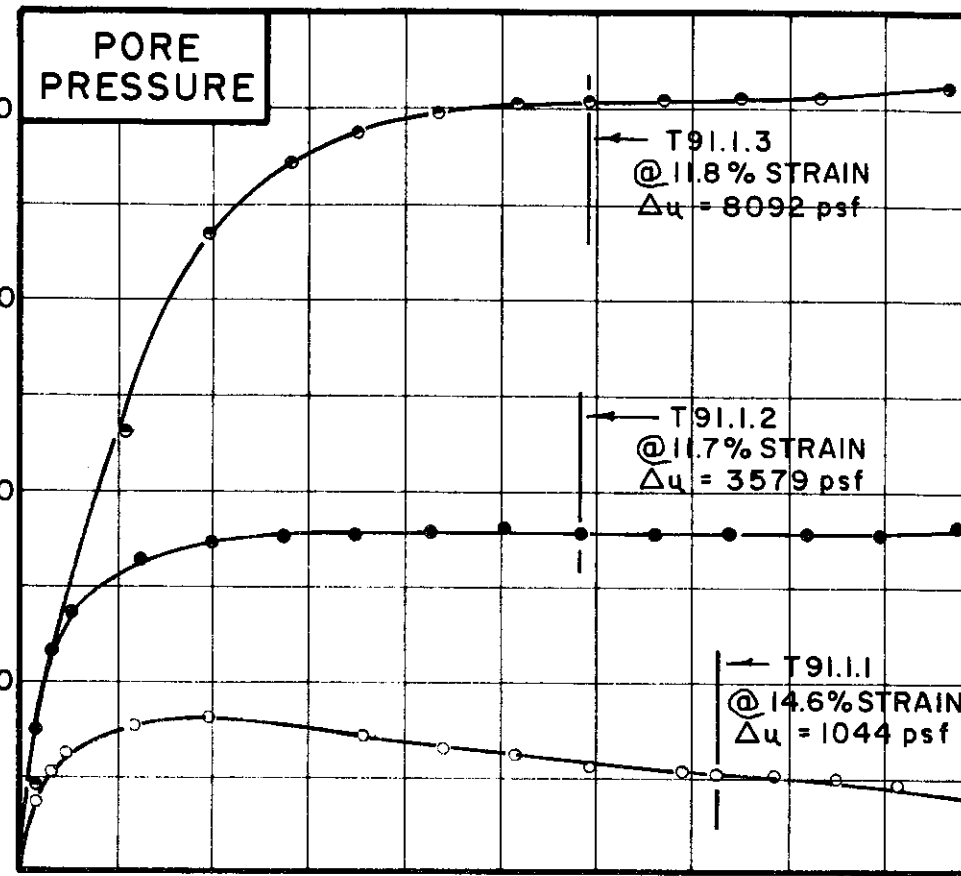
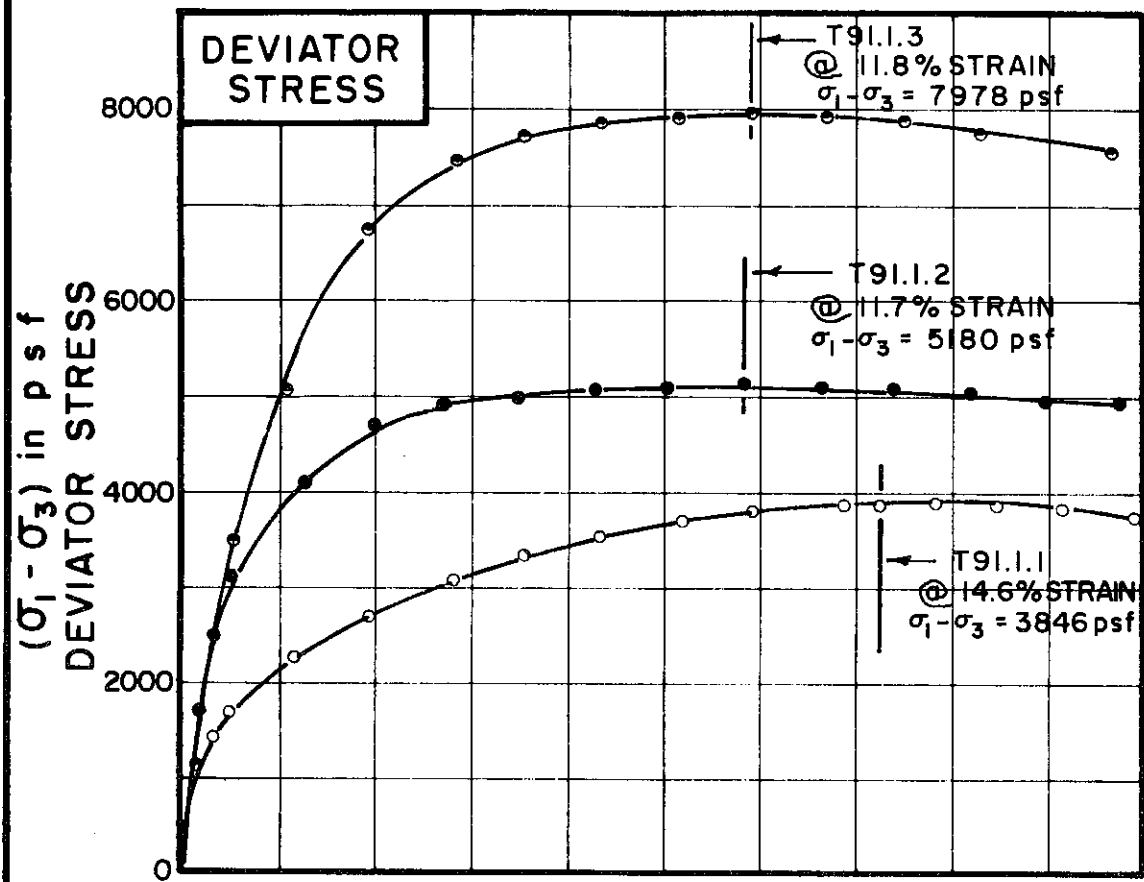
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-411



TEST NO. / SYMBOL	T91.1.1	T91.1.2	T91.1.3
	○	●	○

INITIAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_0$		28.0%	27.6%	27.6%
DRY DENSITY	$\gamma_d$	lb/cu ft	97	97	96
SAMPLE DIAMETER	$D_0$	in.	1.37	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.18	3.25	3.25
FINAL CONDITIONS BEFORE SHEAR			T91.1.1	T91.1.2	T91.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	8640	12960
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	3456	6912	13824
VOLUMETRIC STRAIN	$\epsilon_{vol}$		3.54%	4.24%	6.87%
PORE PRESSURE RESPONSE			96%	95%	96%
FINAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_f$		25.5%	26.0%	22.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

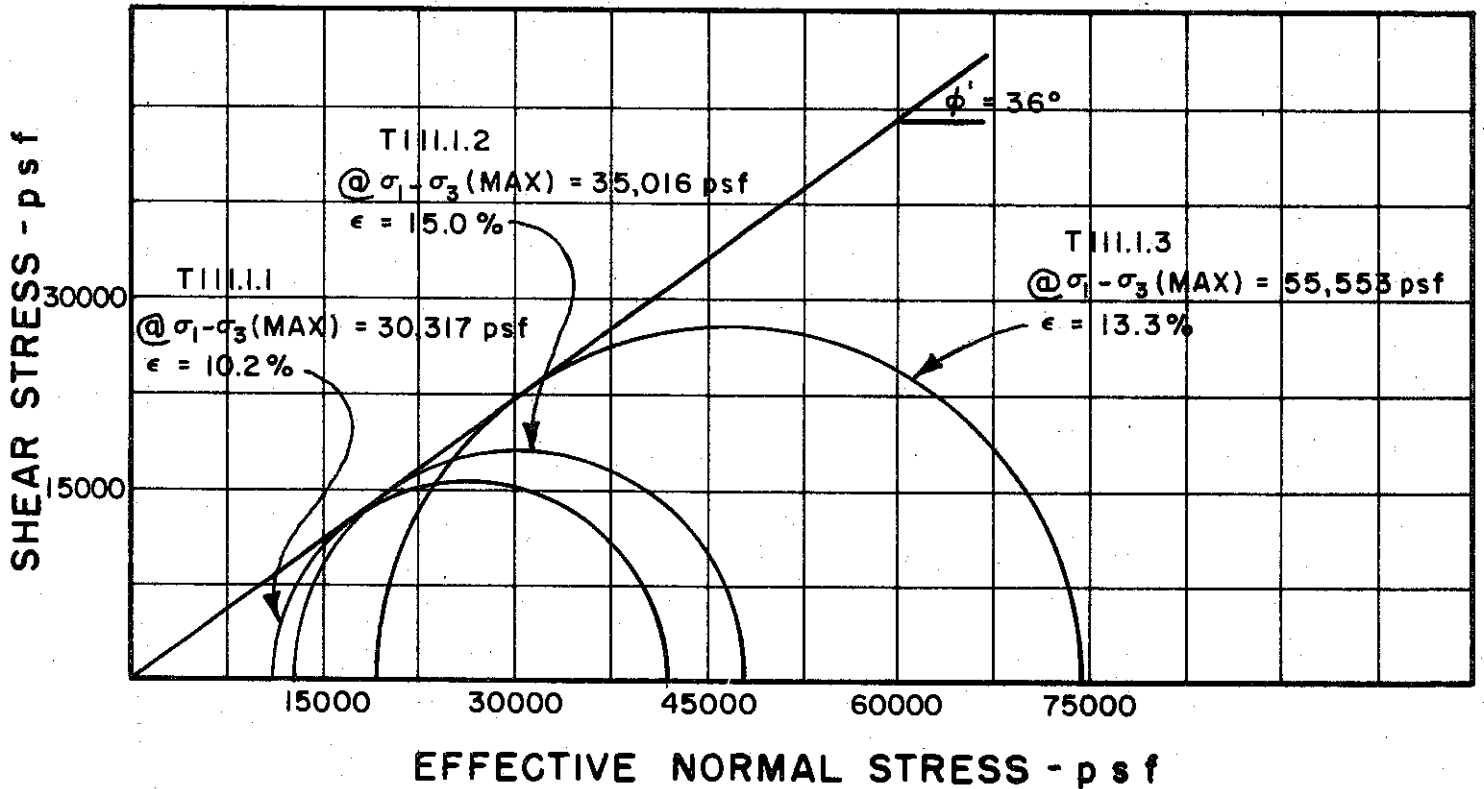
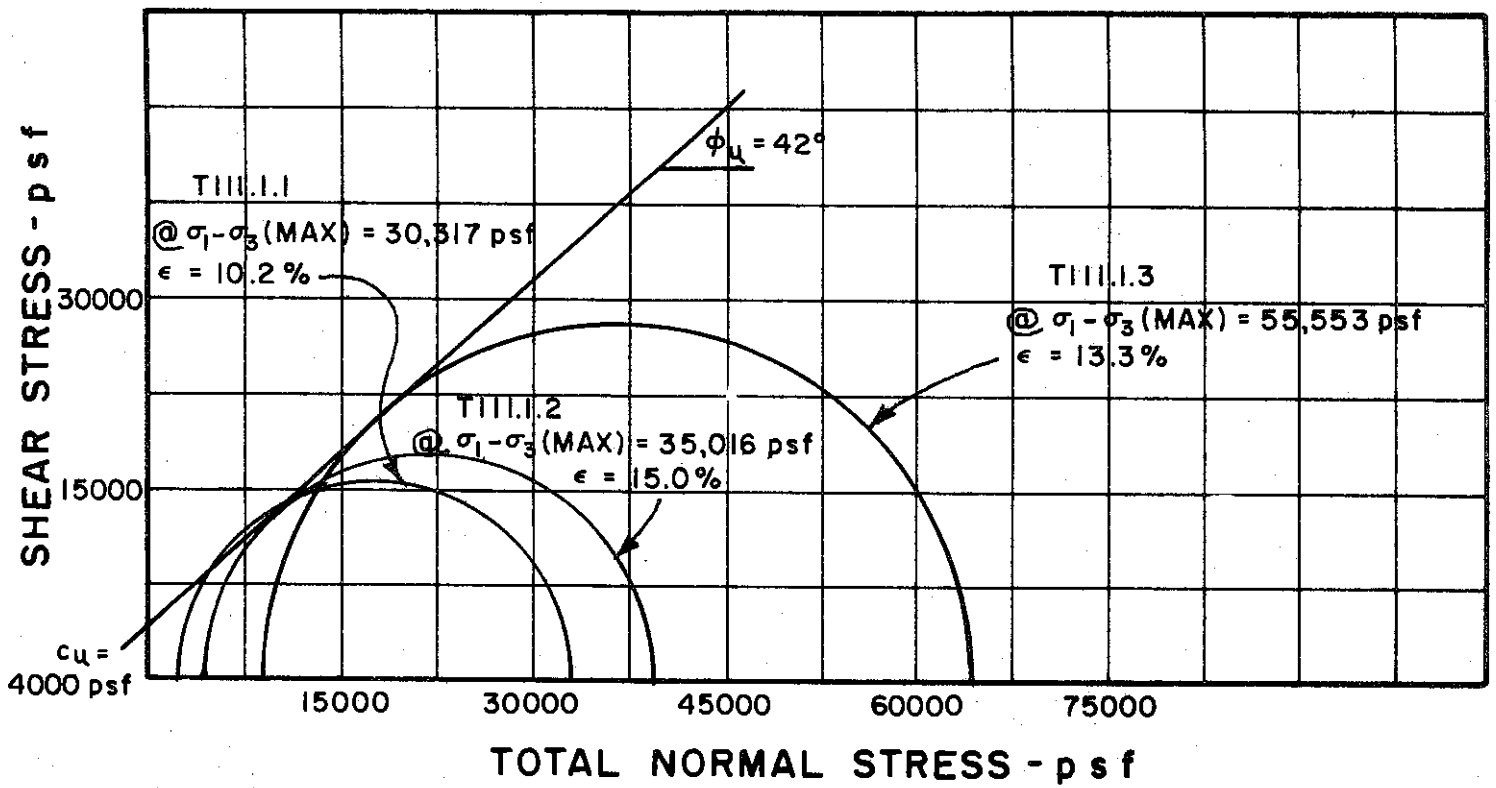
SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 23

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 52

SAMPLE NO. 6

DEPTH 48.0' TO 50.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

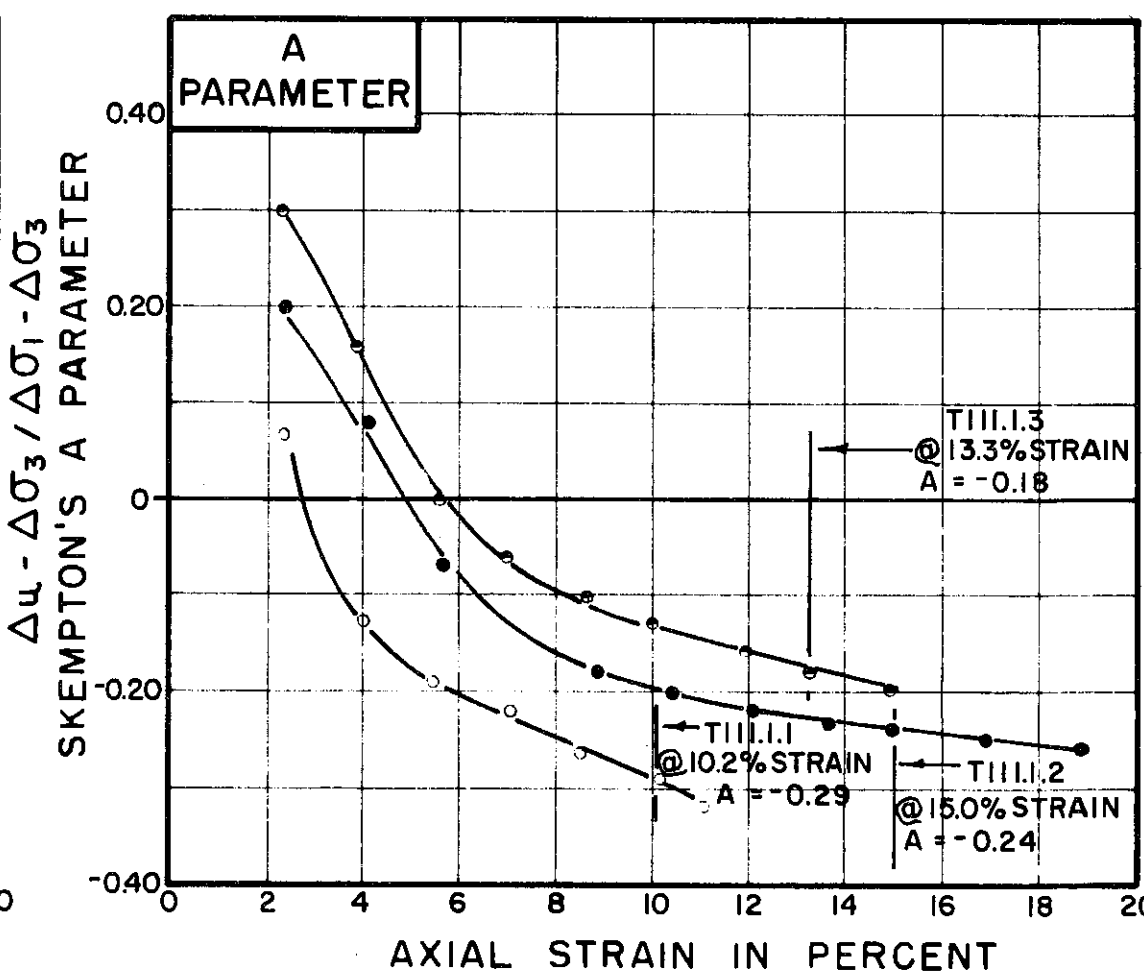
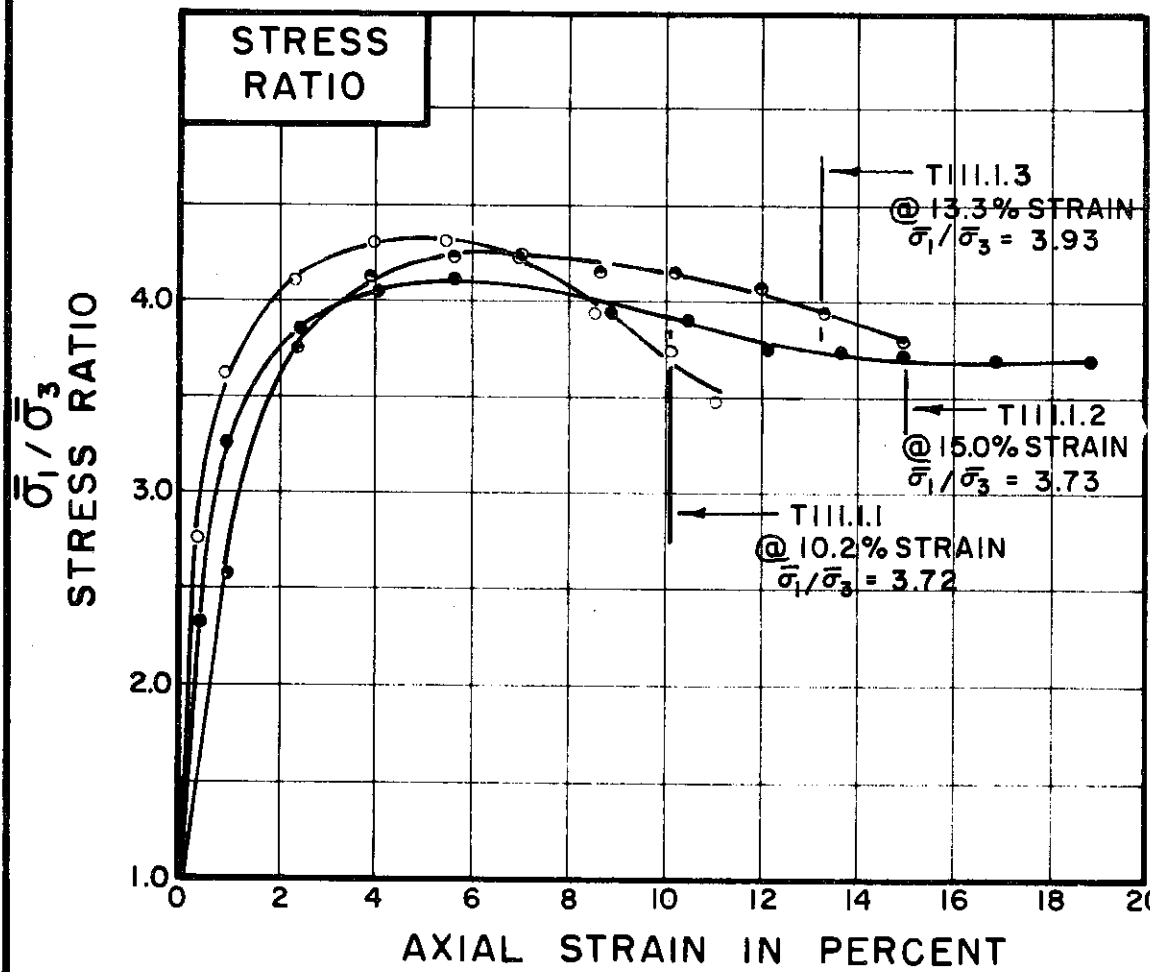
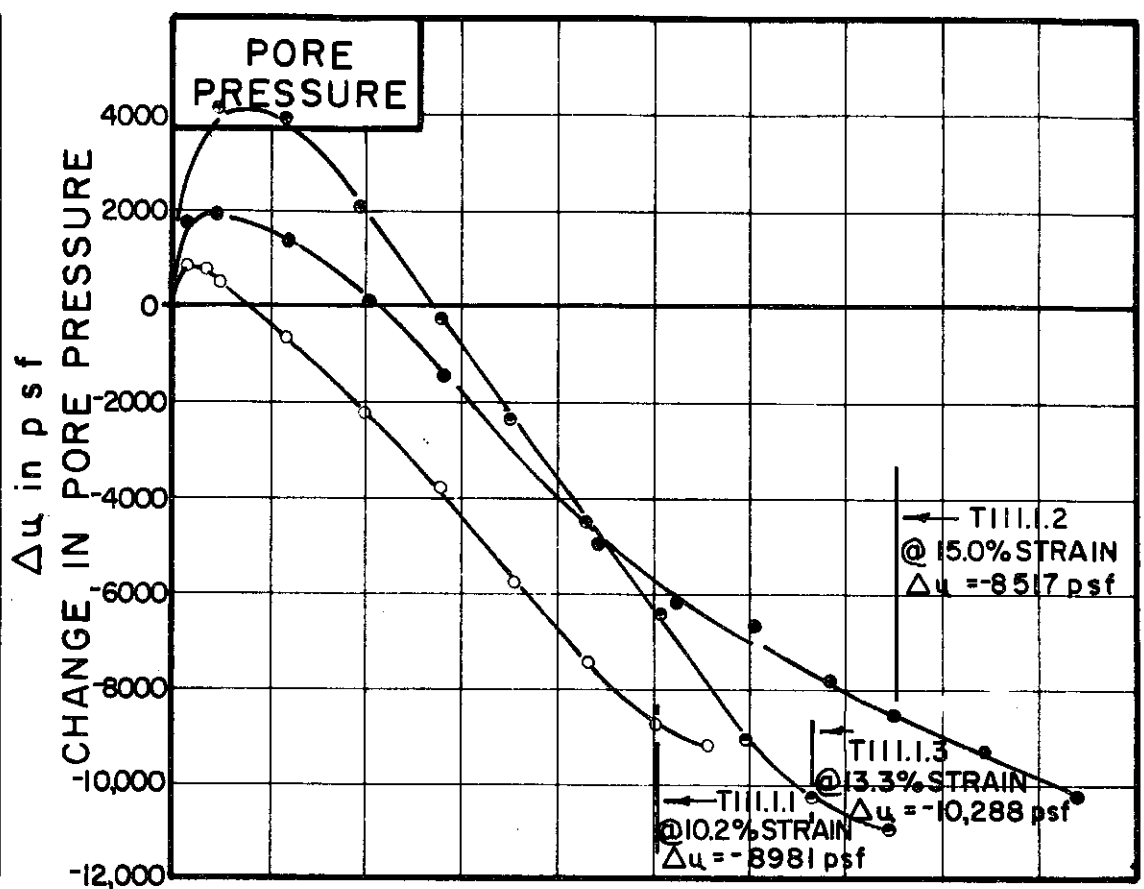
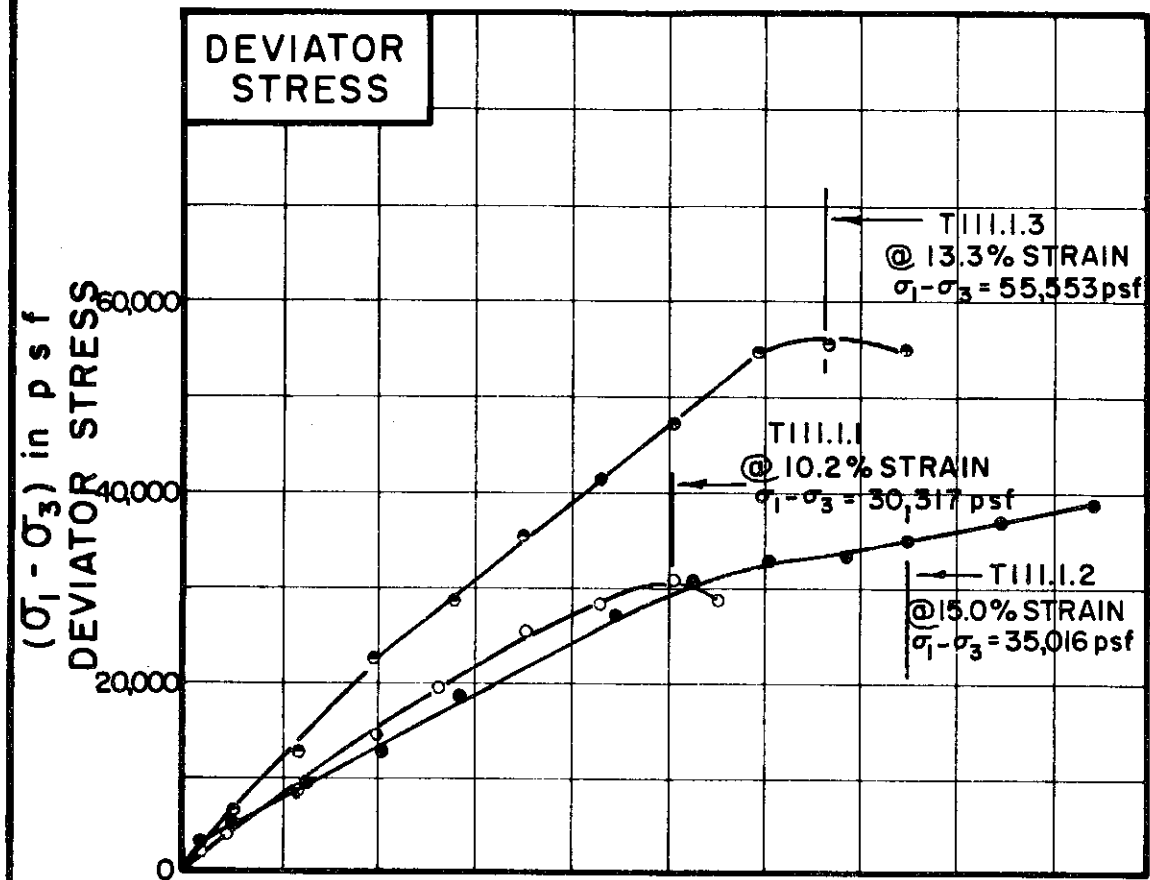
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-413



TEST NO. / SYMBOL	TIII.1.1	TIII.1.2	TIII.1.3
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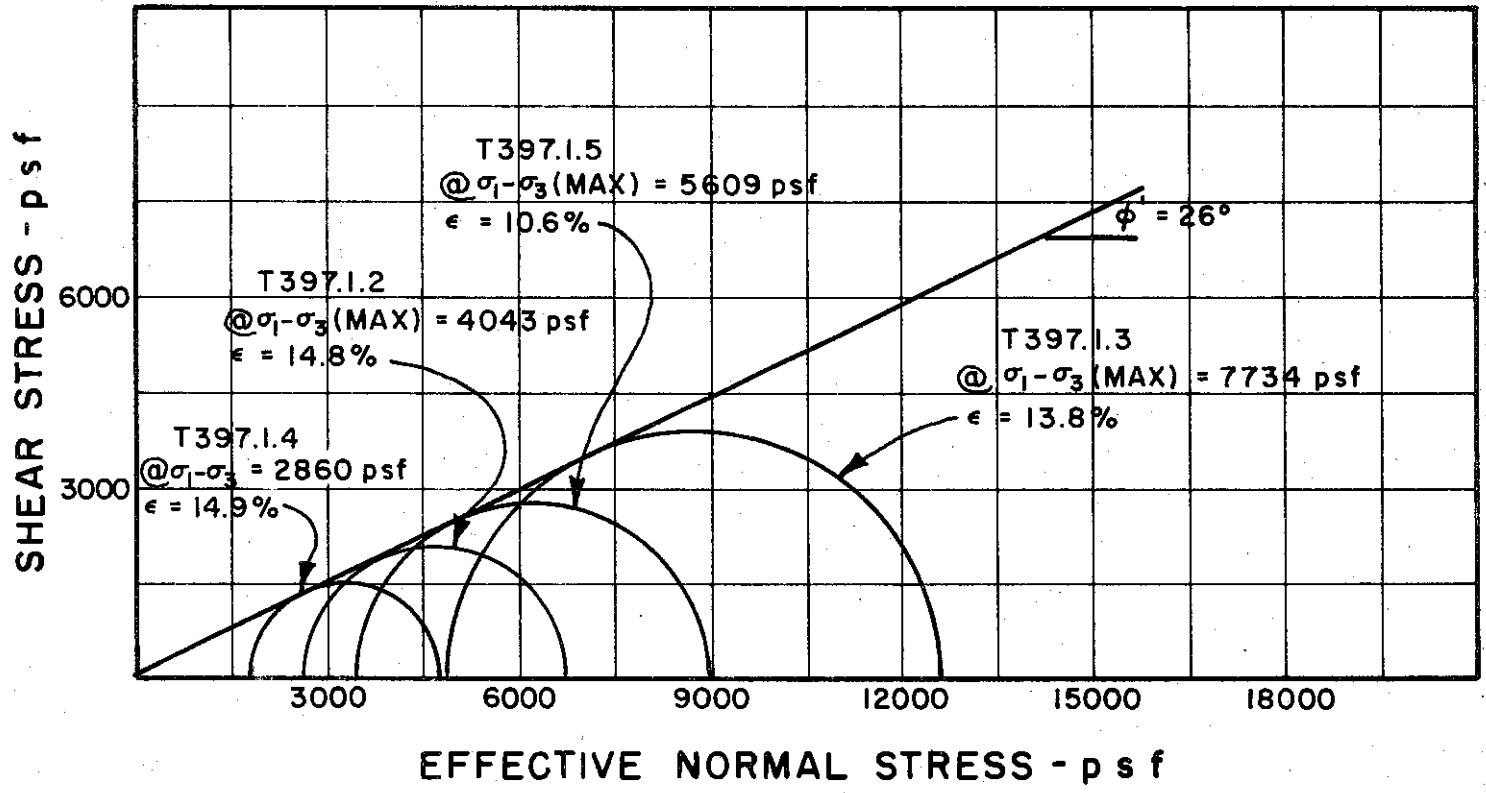
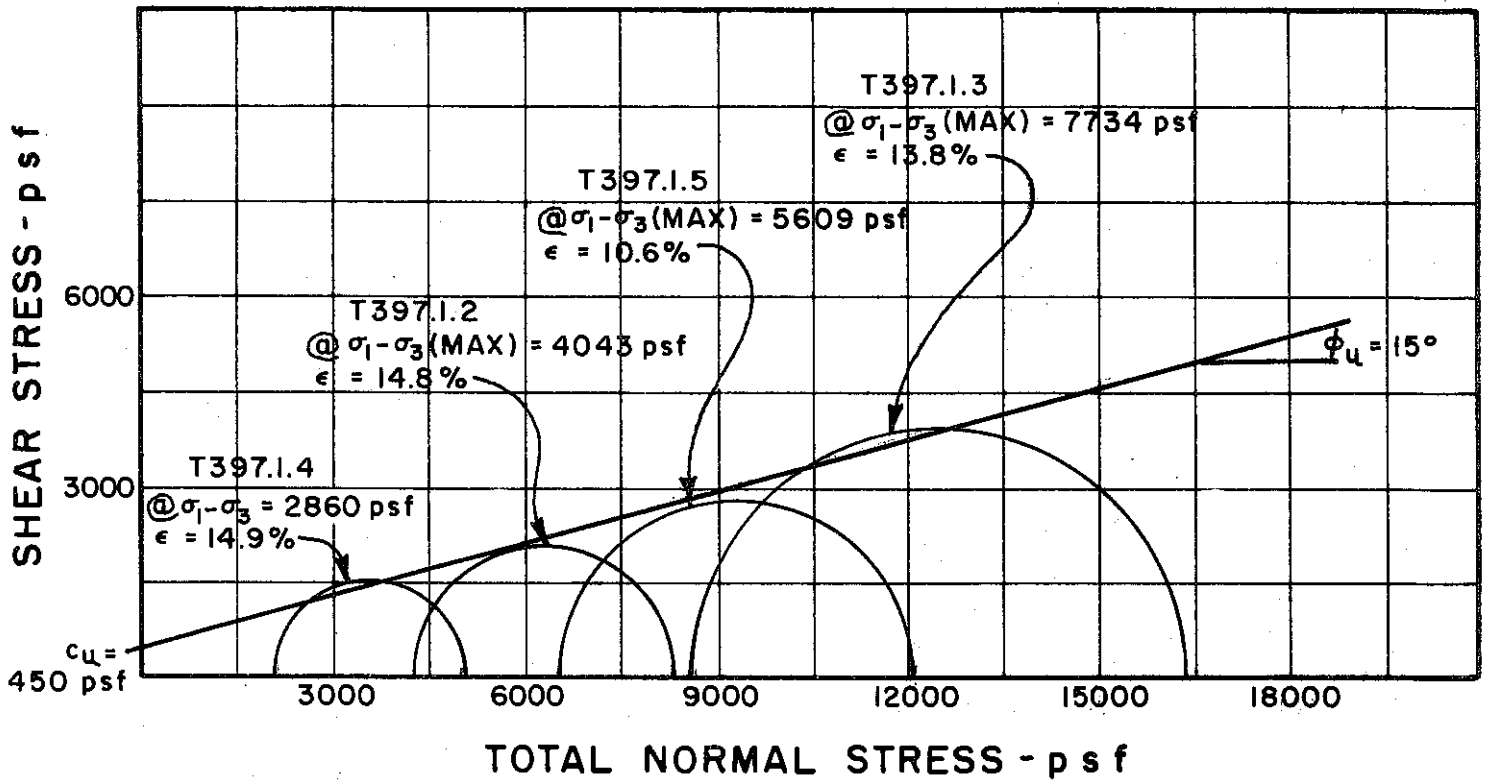
INITIAL CONDITIONS		TIII.1.1	TIII.1.2	TIII.1.3
WATER CONTENT	$w_0$	22.1%	22.7%	22.1%
DRY DENSITY	$\gamma_d$ lb/cu ft	101	99	104
SAMPLE DIAMETER	$D_0$ in.	1.39	1.38	1.38
SAMPLE HEIGHT	$H_0$ in.	3.20	3.10	3.21
FINAL CONDITIONS BEFORE SHEAR		TIII.1.1	TIII.1.2	TIII.1.3
FINAL BACK PRESSURE	$u_0$ psf	9360	11,520	11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$ psf	2160	4320	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.62%	1.22%	1.78%
PORE PRESSURE RESPONSE		99%	97%	97%
FINAL CONDITIONS		TIII.1.1	TIII.1.2	TIII.1.3
WATER CONTENT	$w_f$	21.8%	21.8%	21.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.026	.025
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BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 48.0' TO 50.5'  
 SOIL DESCRIPTION SILT (ML)  
 LIQUID LIMIT NON-PLASTIC  
 PLASTIC LIMIT PLASTIC LIMIT

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

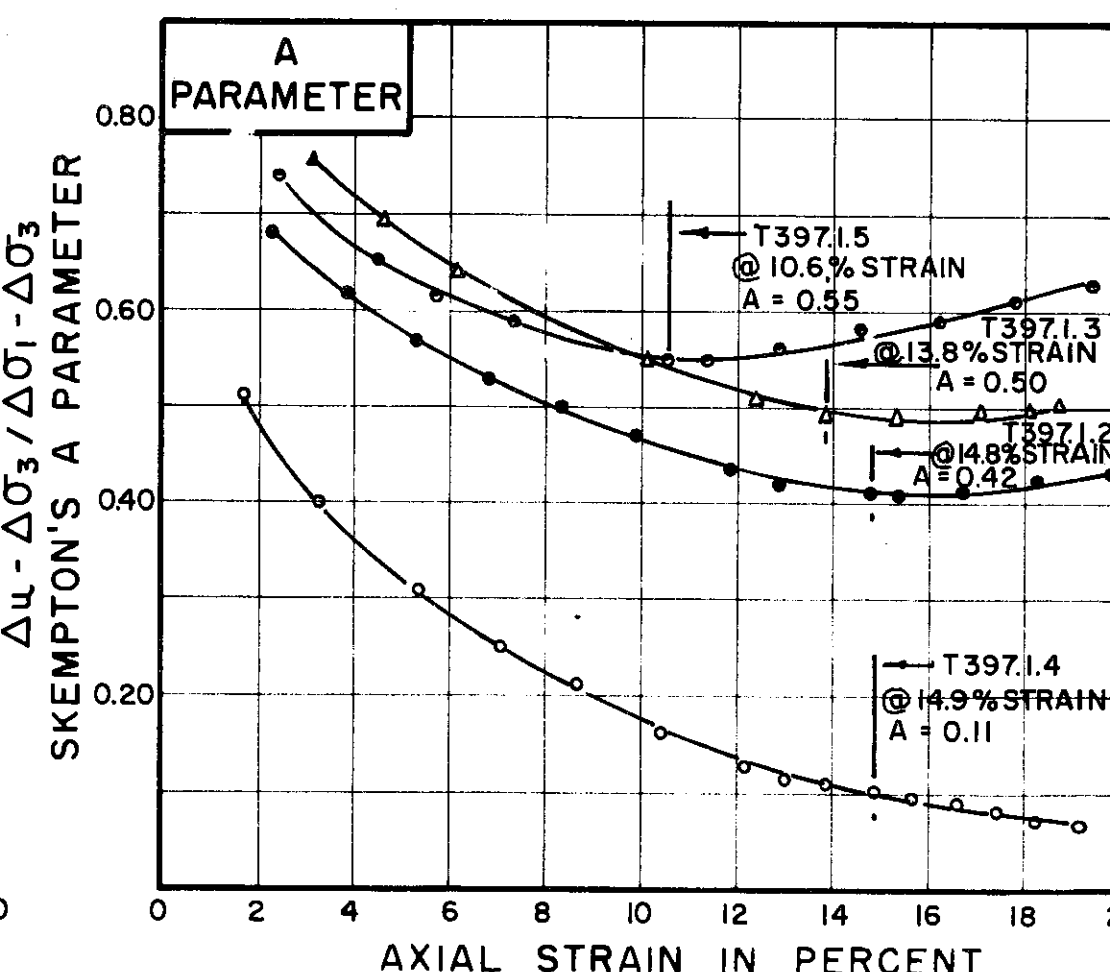
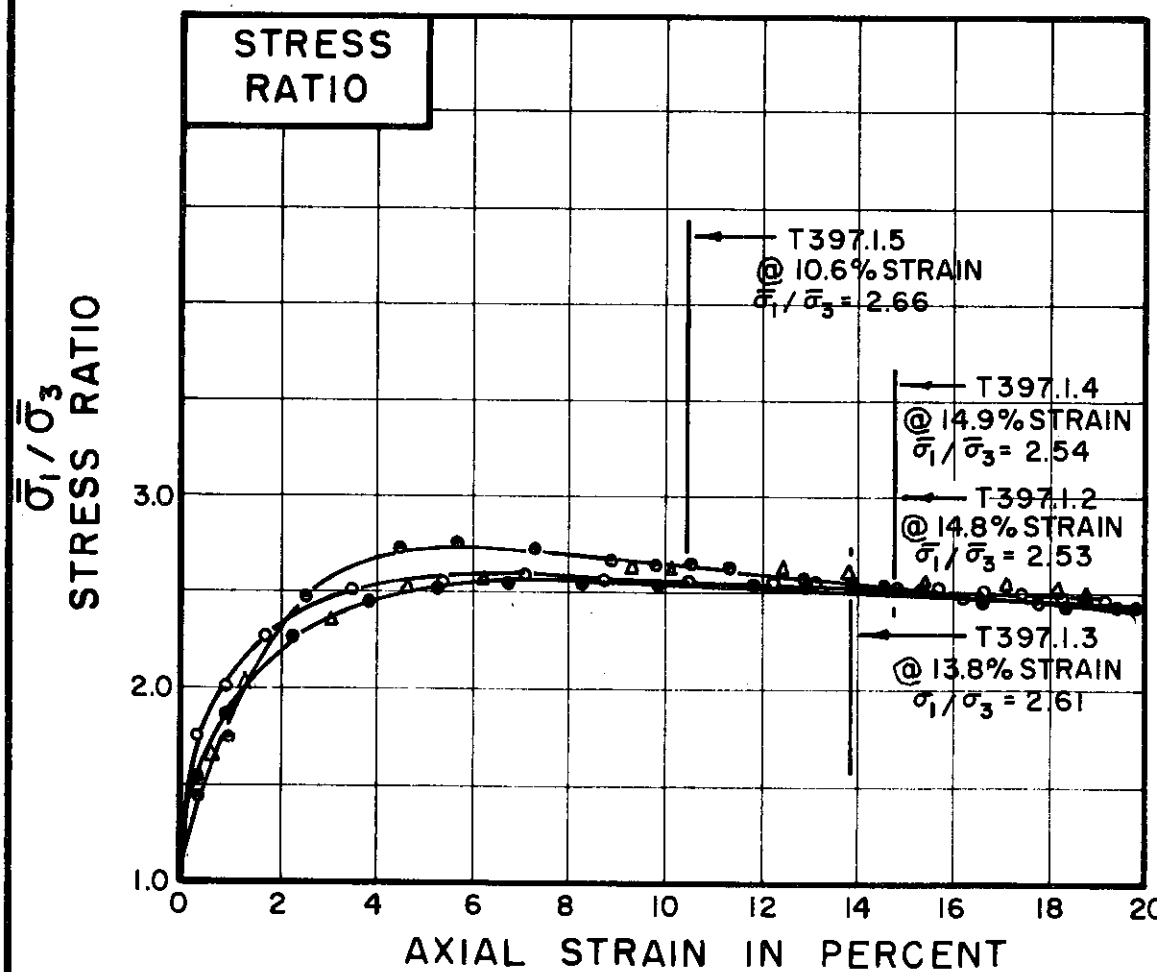
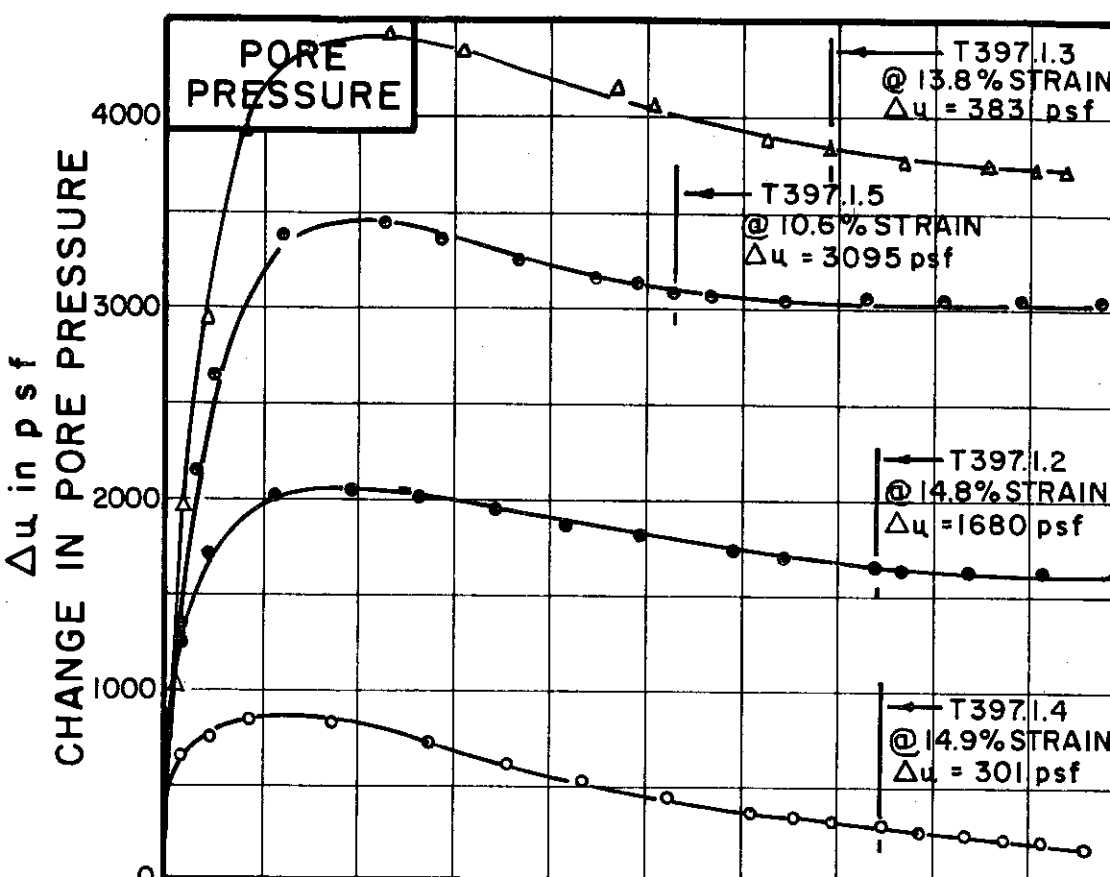
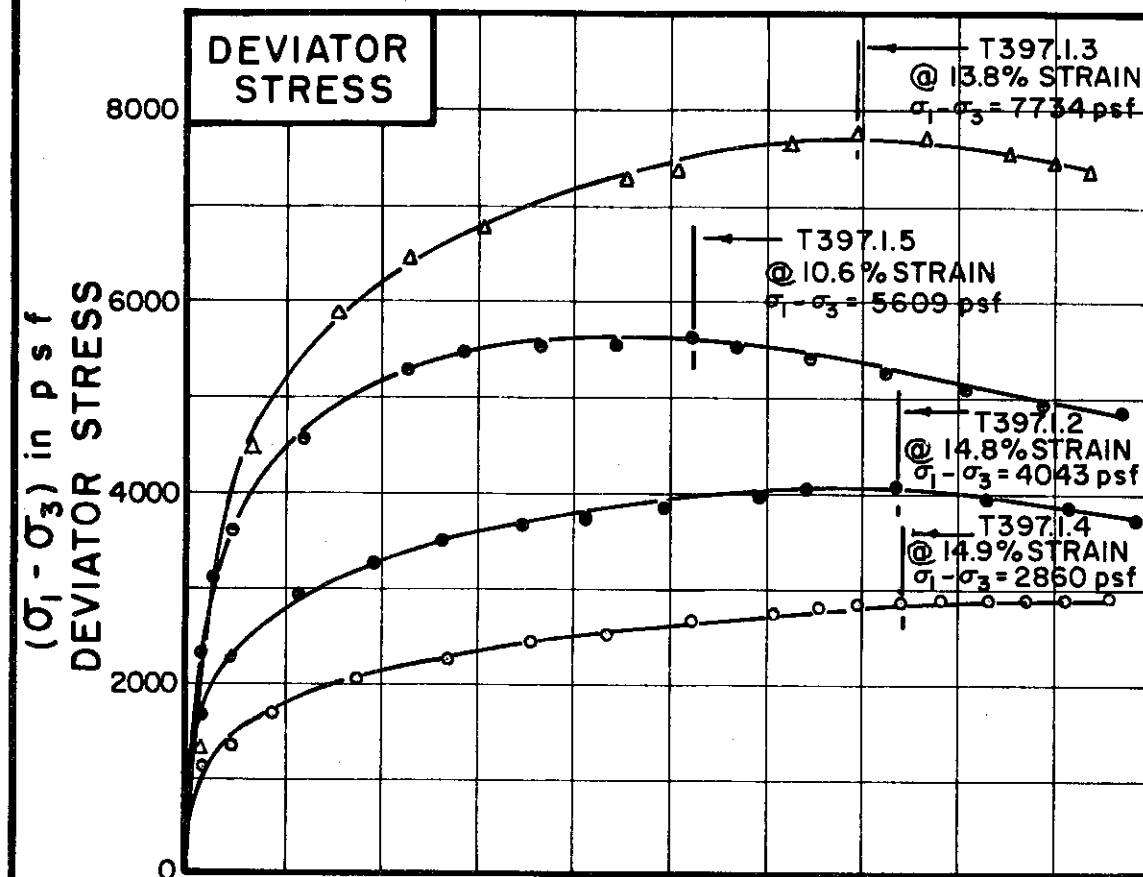


BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-415



TEST NO. / SYMBOL	T397.1.4	T397.1.2	T397.1.5	T397.1.3
	○	●	●	△

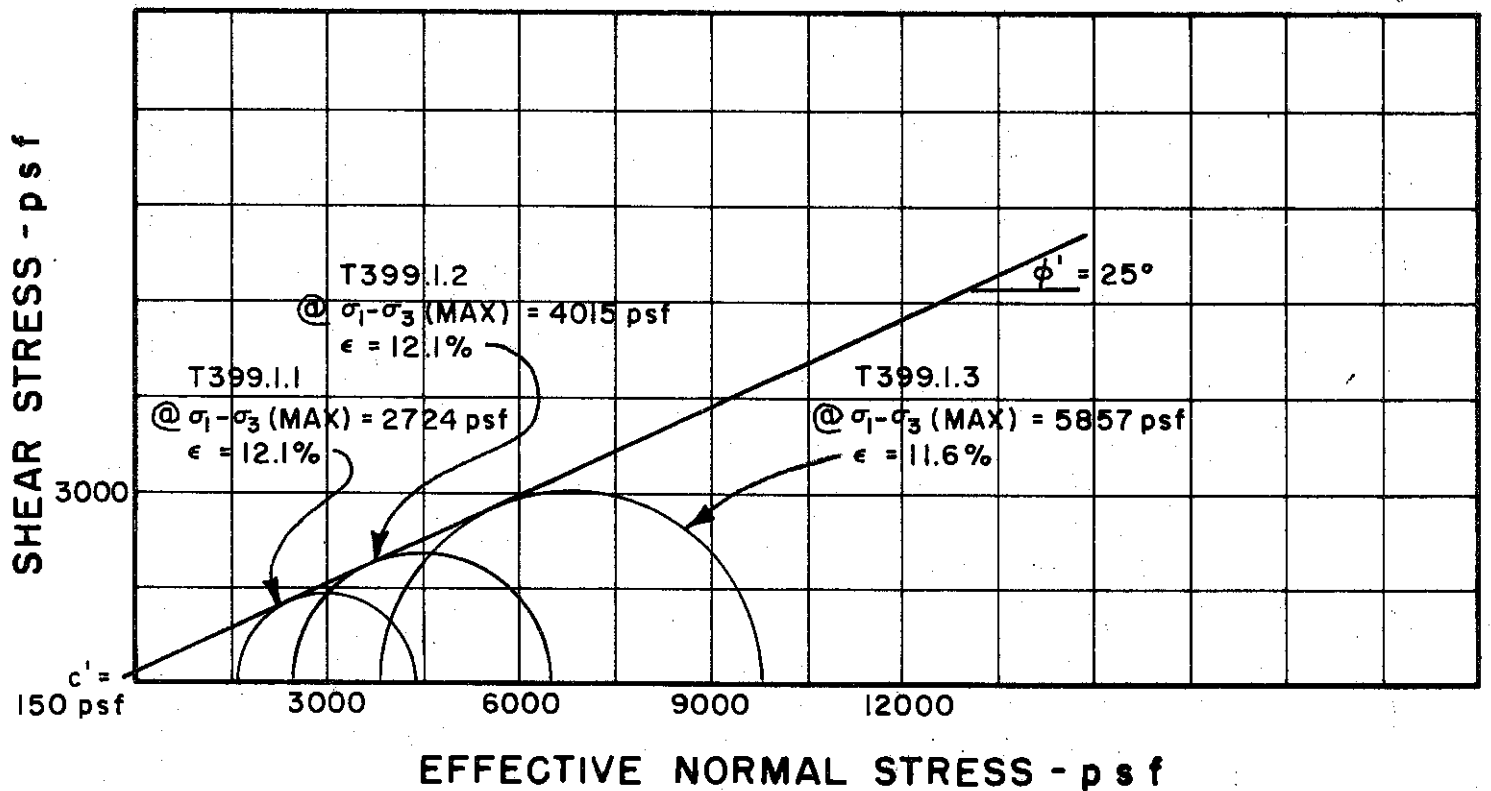
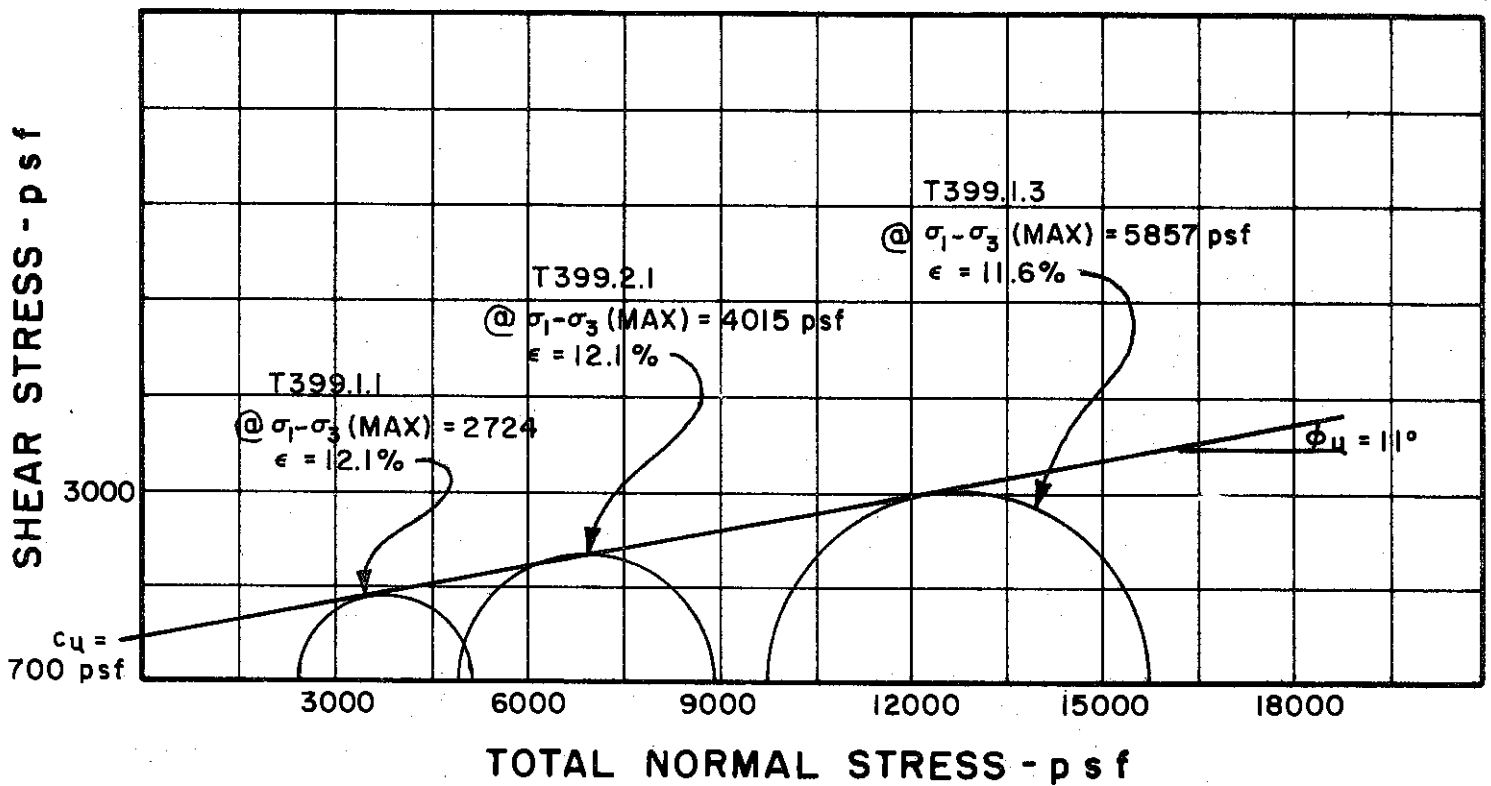
INITIAL CONDITIONS	WATER CONTENT	$w_0$	22.6%	23.2%	24.0%	23.2%
	DRY DENSITY	$\gamma_d$	101	102	100	102
	SAMPLE DIAMETER	$D_0$	1.37	1.37	1.37	1.38
	SAMPLE HEIGHT	$H_0$	2.88	3.30	3.12	3.30
	FINAL BACK PRESSURE	$u_0$	7200	10080	8640	7200
	INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	2160	4320	6480	8640
CONDITIONS BEFORE SHEAR	VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.68%	1.94%	3.33%	4.95%
	PORE PRESSURE RESPONSE		95%	96%	98%	95%
	WATER CONTENT	$w_f$	21.5%	21.3%	19.9%	19.8%
FINAL CONDITIONS	SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.028	.024	.026	.025
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BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 31 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

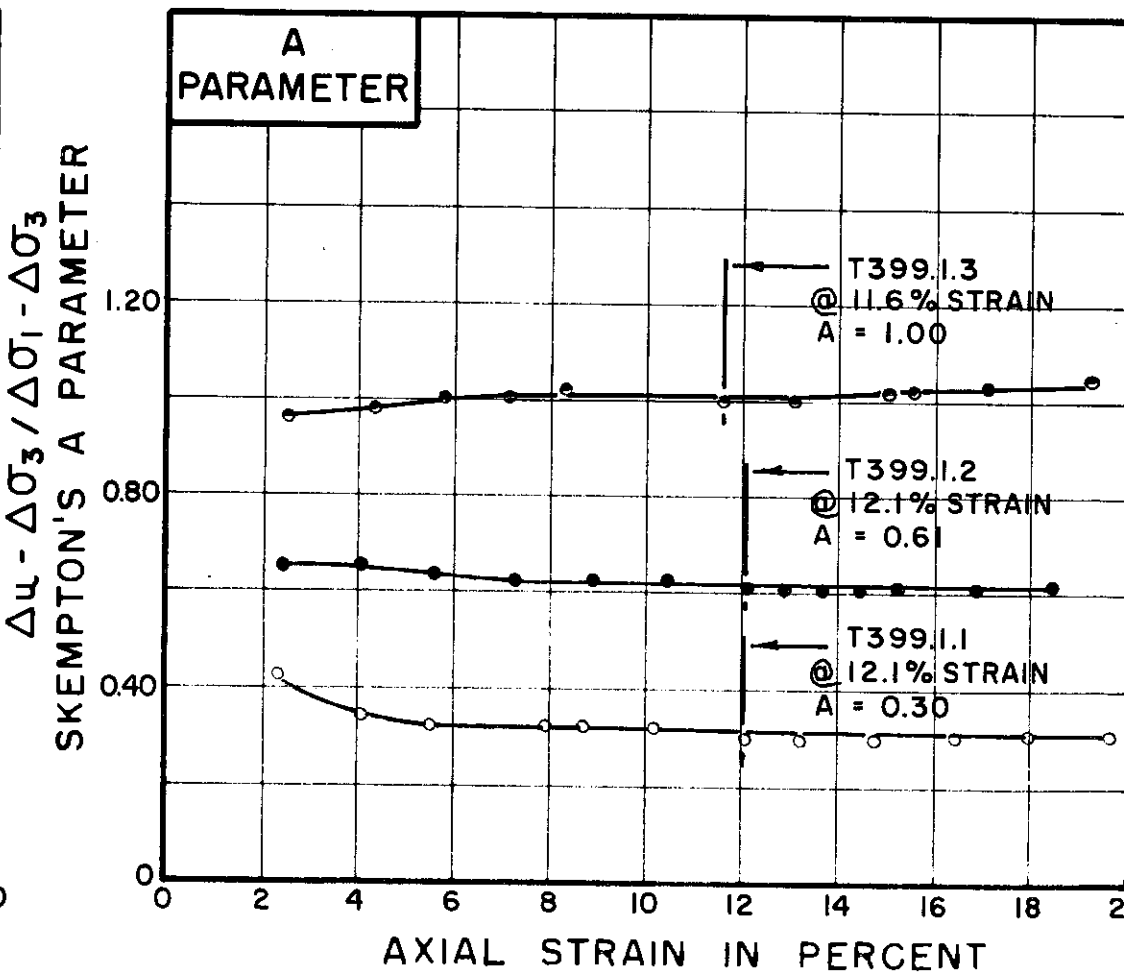
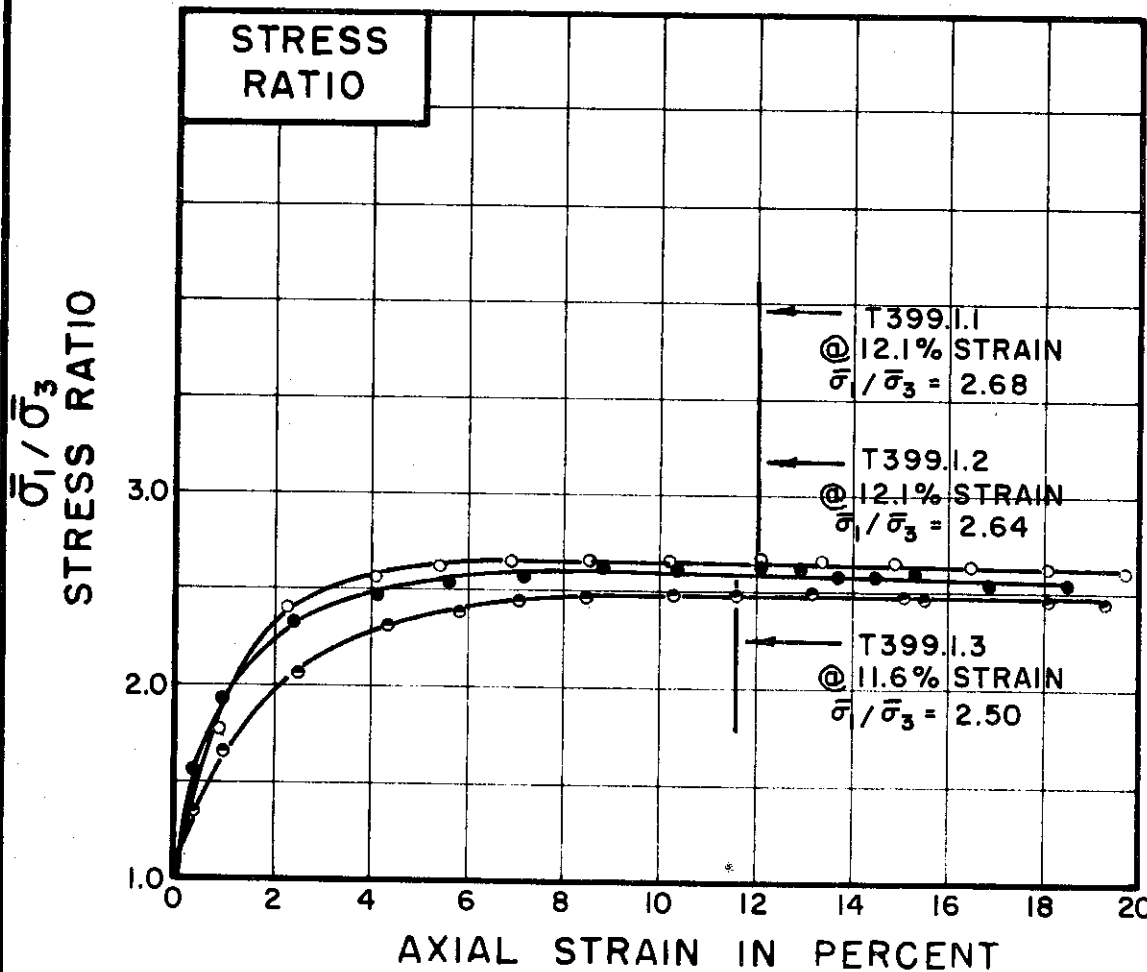
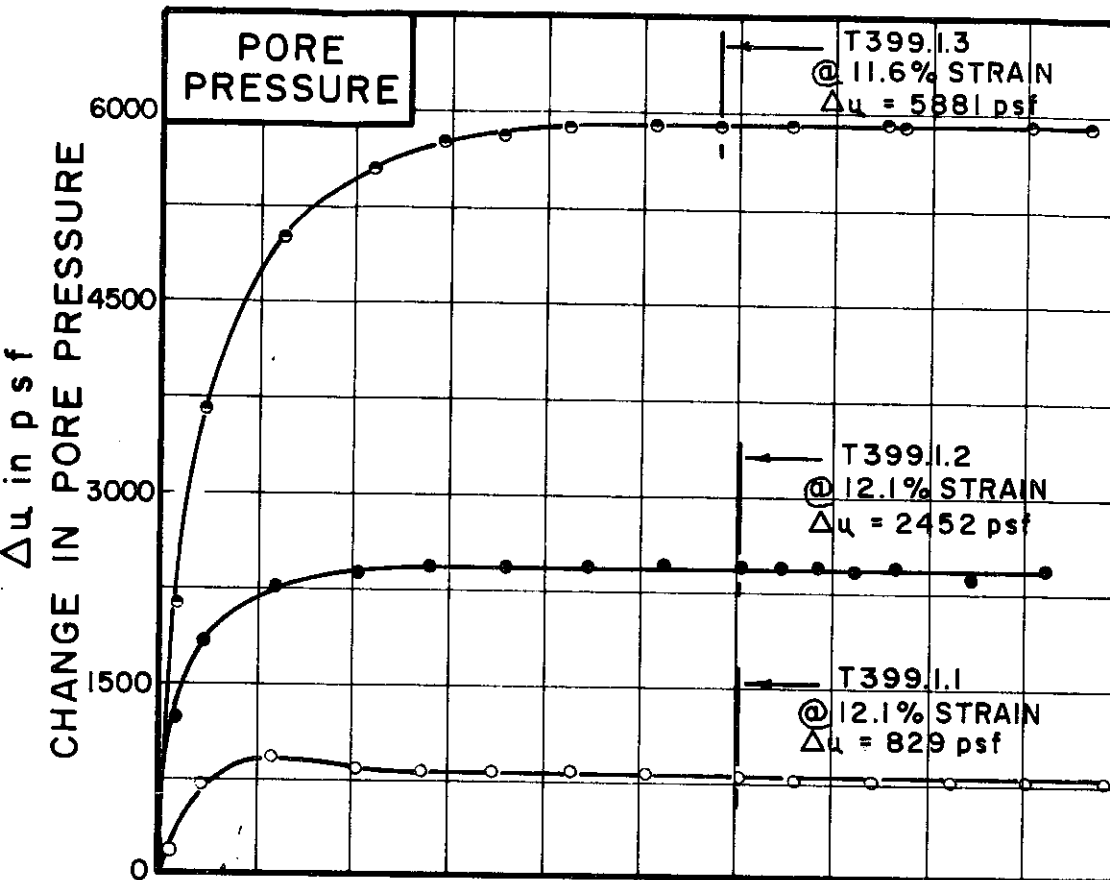
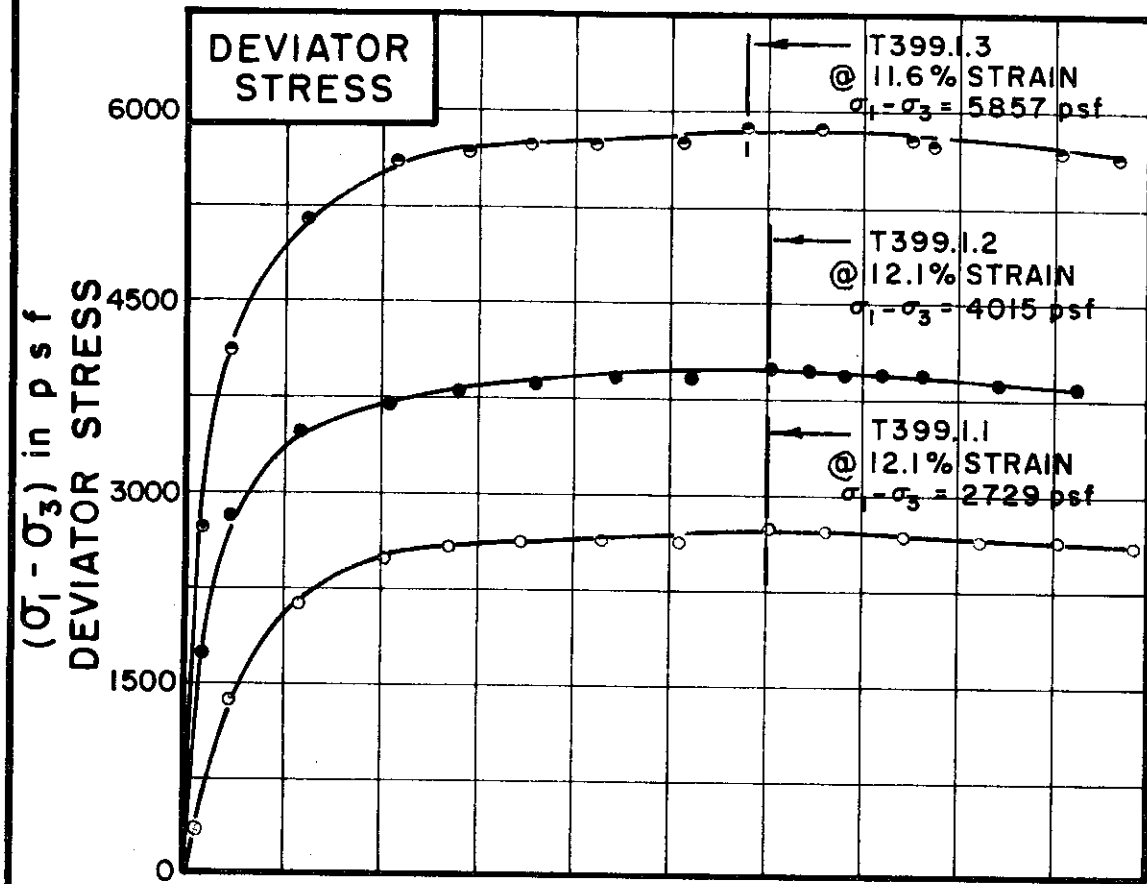
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-417



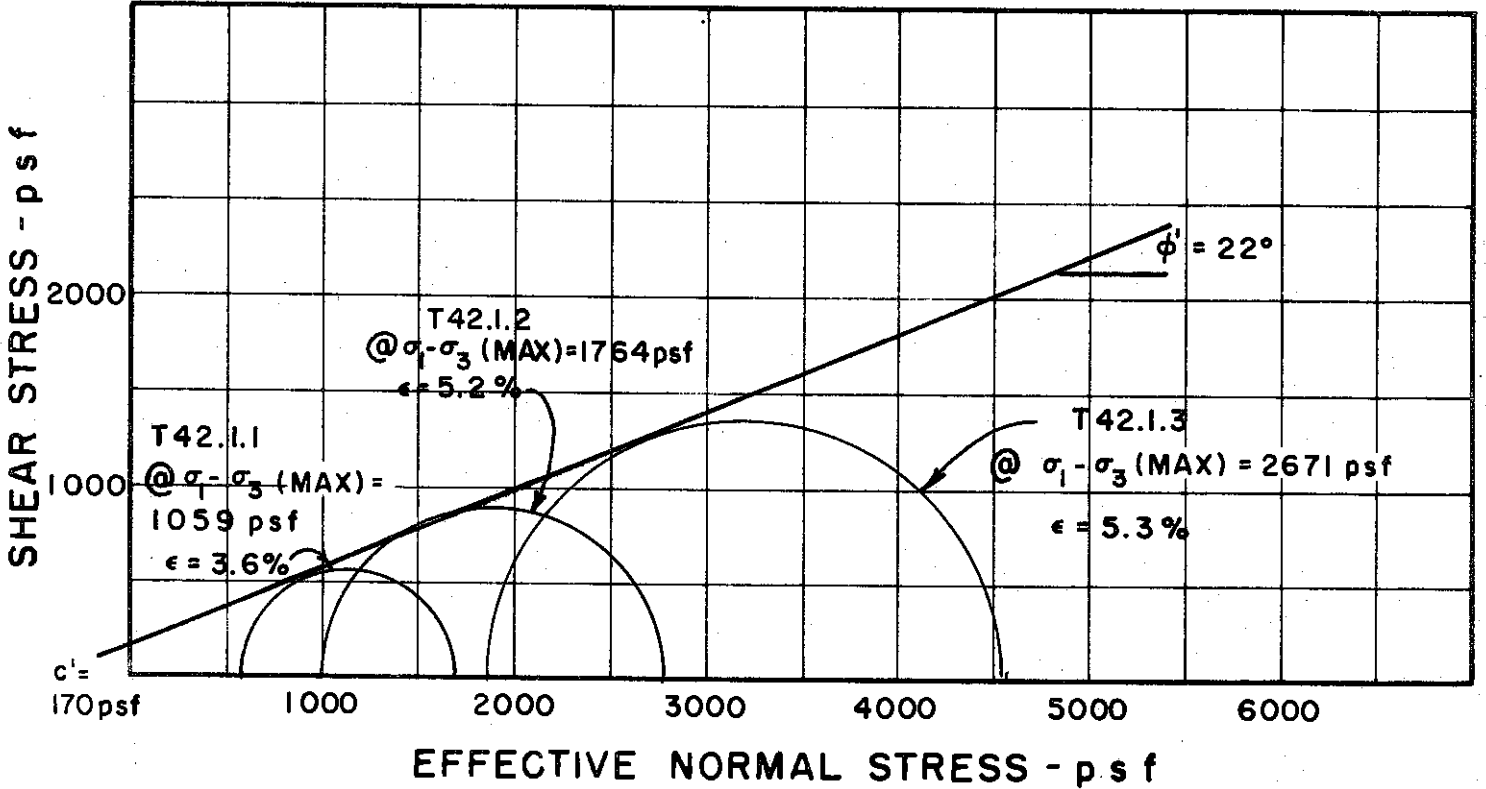
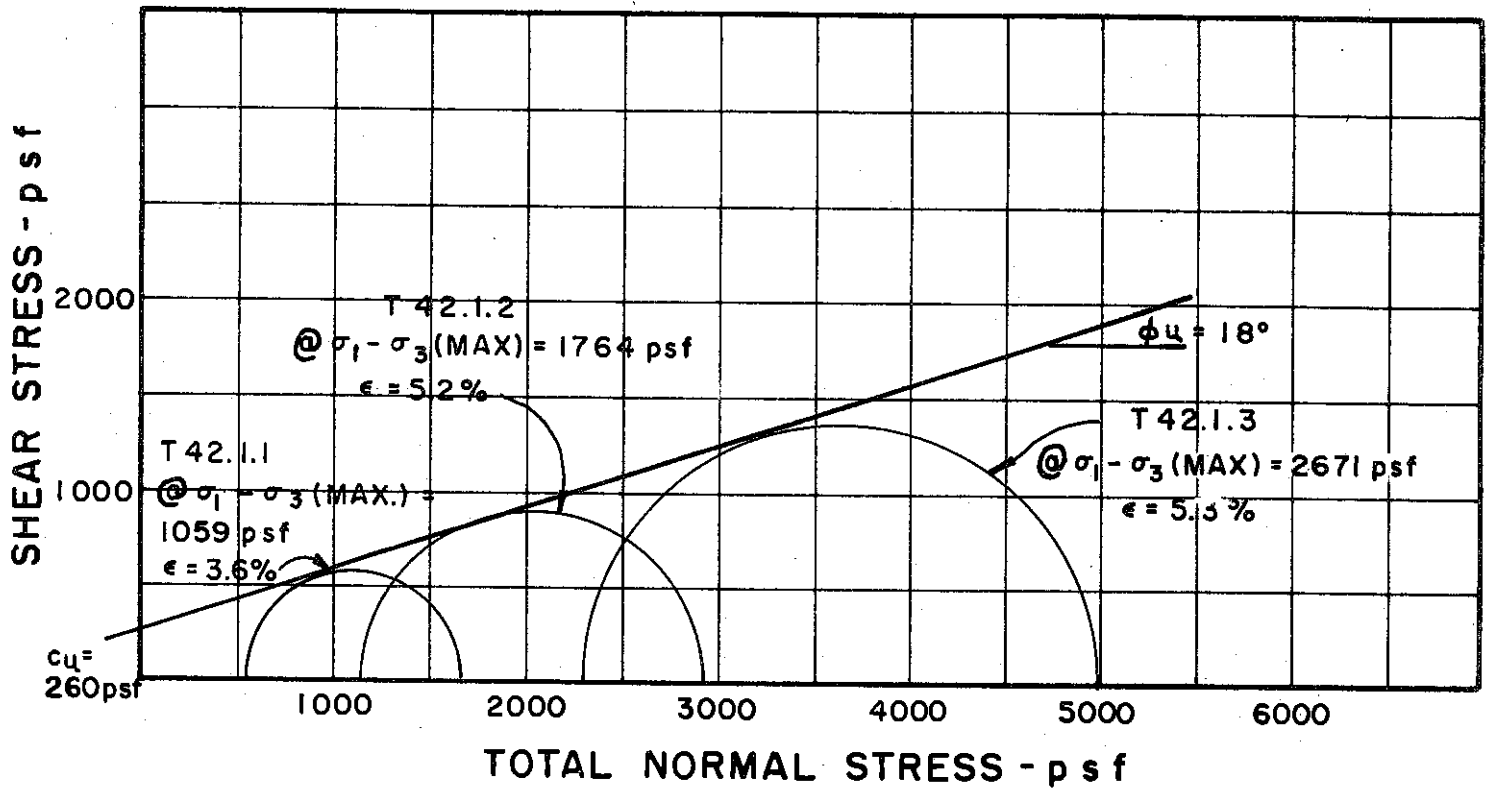
TEST NO. / SYMBOL	T399.1.1	T399.1.2	T399.1.3
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INITIAL CONDITIONS			T399.1.1	T399.1.2	T399.1.3
WATER CONTENT	$w_0$		26.4%	25.2%	25.8%
DRY DENSITY	$\gamma_d$	lb/cu ft	98	98	98
SAMPLE DIAMETER	$D_0$	in.	1.39	1.38	1.39
SAMPLE HEIGHT	$H_0$	in.	3.20	3.14	3.29
FINAL CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	10,080	10,080	10,080
INITIAL EFFECTIVE STRESS	$\frac{\sigma'_1}{\sigma'_3}$	psf	2448	4896	9792
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.48%	5.79%
PORE PRESSURE RESPONSE			96%	95%	98%
FINAL CONDITIONS AT END OF TEST					
WATER CONTENT	$w_f$		25.5%	22.8%	22.2%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.026	.025
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BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.0' TO 65.0'  
 SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

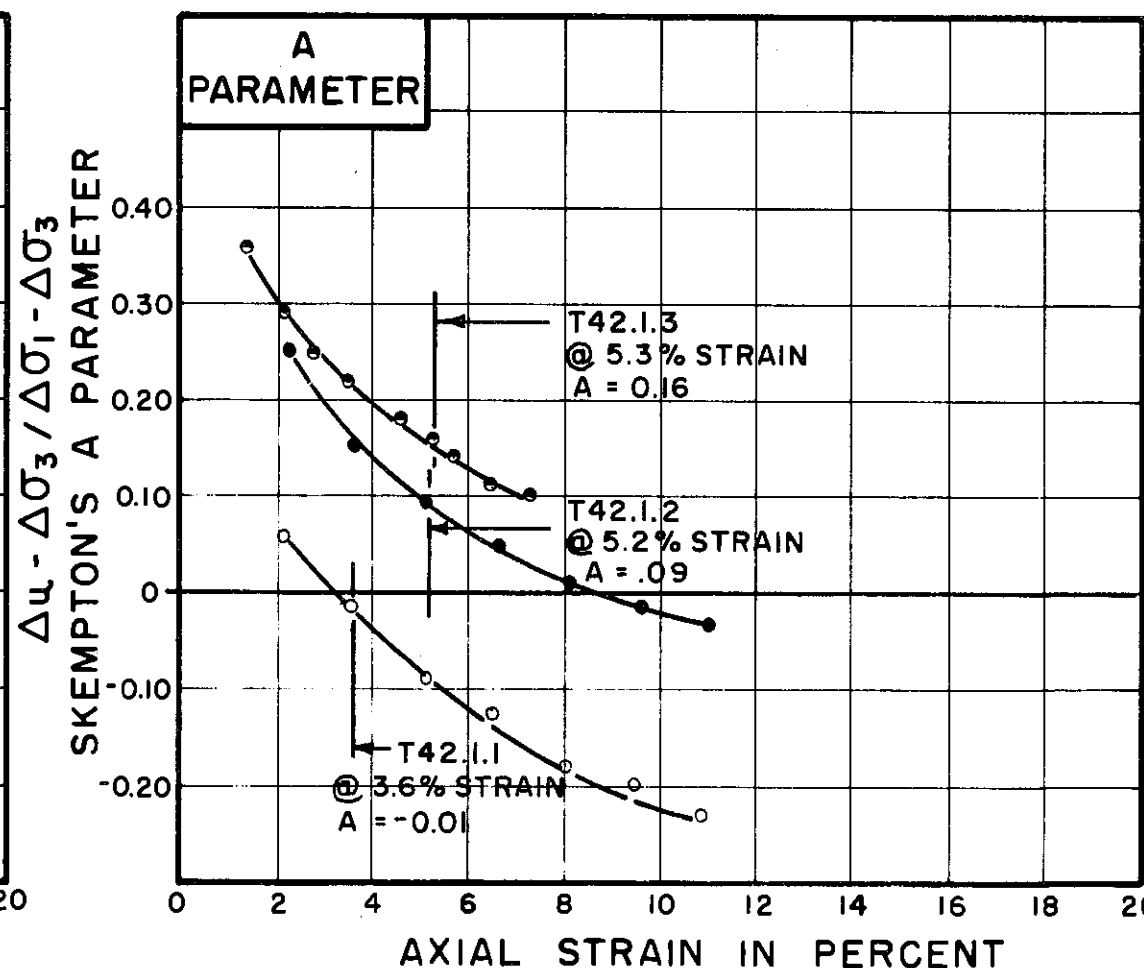
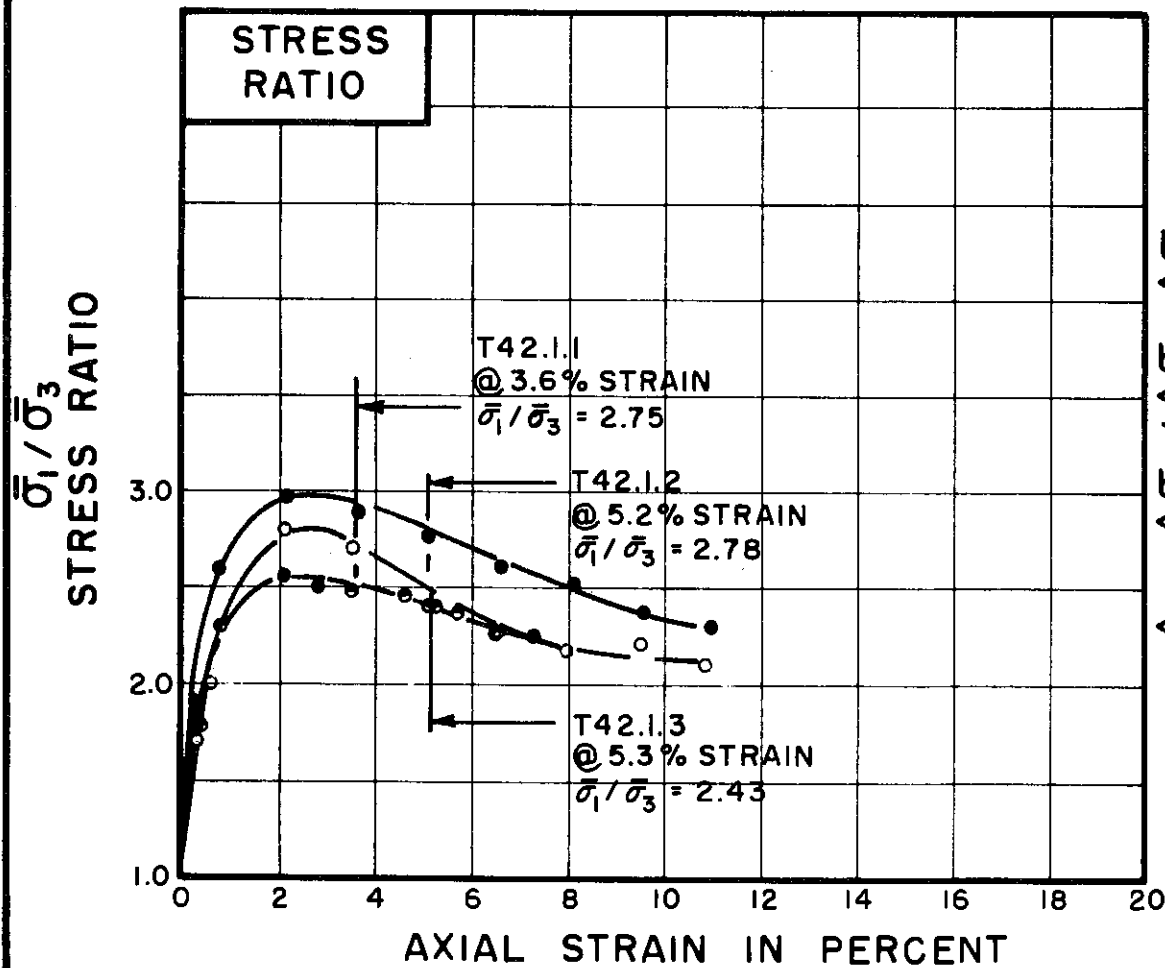
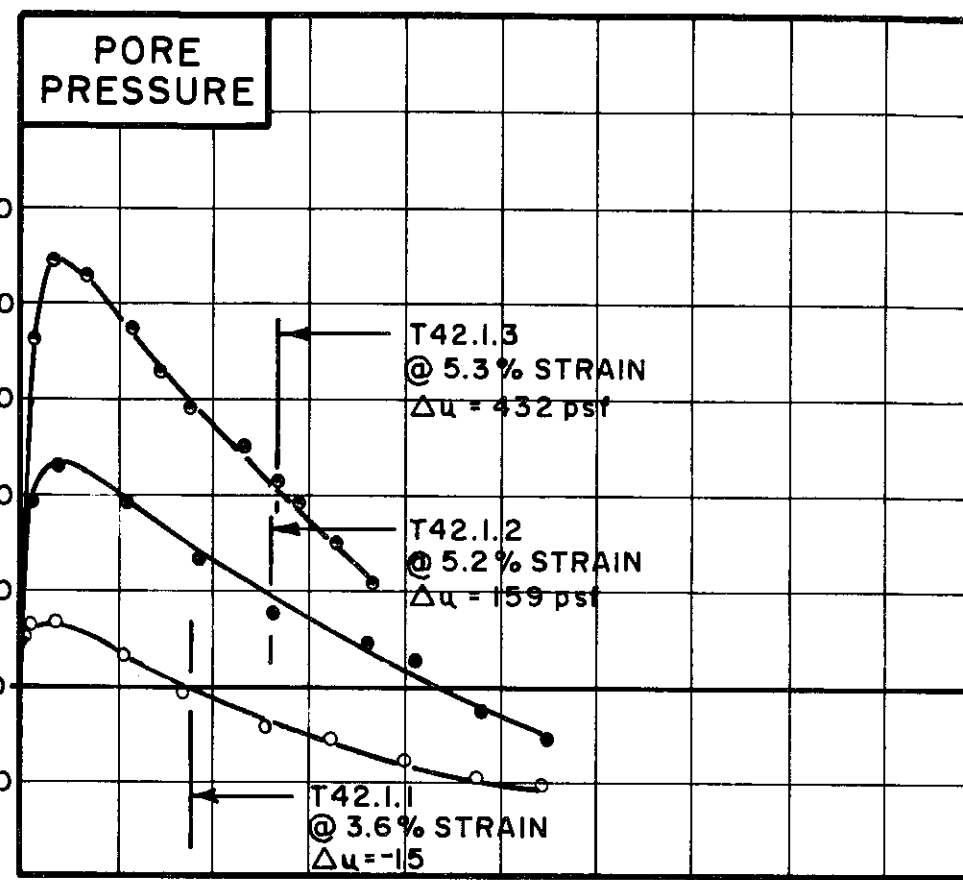
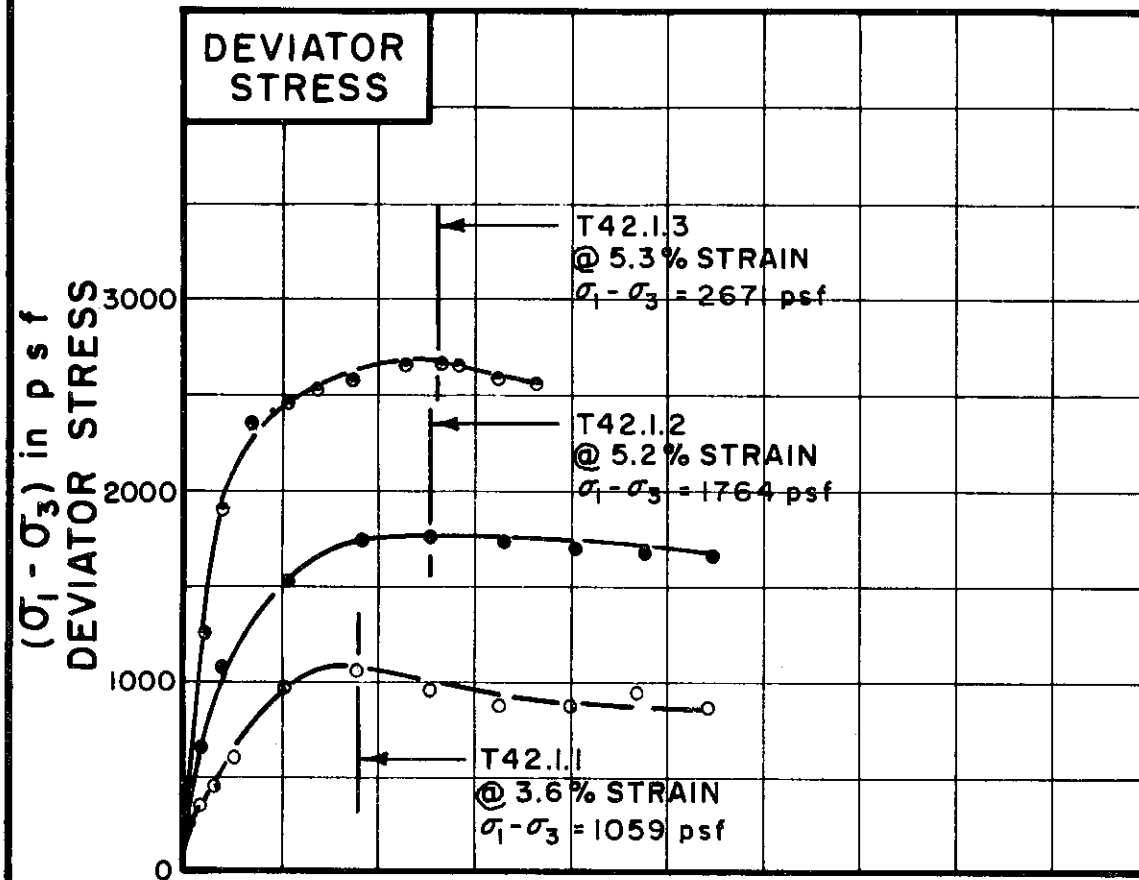
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T42.1.1	T42.1.2	T42.1.3
	○	●	○

INITIAL CONDITIONS		W <sub>0</sub>	29.8%	29.3%	28.9%
WATER CONTENT					
DRY DENSITY	γ <sub>d</sub>	94	95	96	
pcf					
SAMPLE DIAMETER	D <sub>0</sub>	1.40	1.40	1.40	
in.					
SAMPLE HEIGHT	H <sub>0</sub>	3.43	3.40	3.42	
in.					
FINAL CONDITIONS BEFORE SHEAR		u <sub>0</sub>	7200	7200	8784
FINAL BACK PRESSURE					
psf					
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	590	1152	2304	
psf					
VOLUMETRIC STRAIN	ε <sub>vol</sub>	0.2%	1.6%	1.4%	
PORE PRESSURE RESPONSE		98%	99%	98%	
FINAL CONDITIONS		w <sub>f</sub>	32.3%	30.9%	29.6%
WATER CONTENT					
SKETCH OF SAMPLE AT END OF TEST					

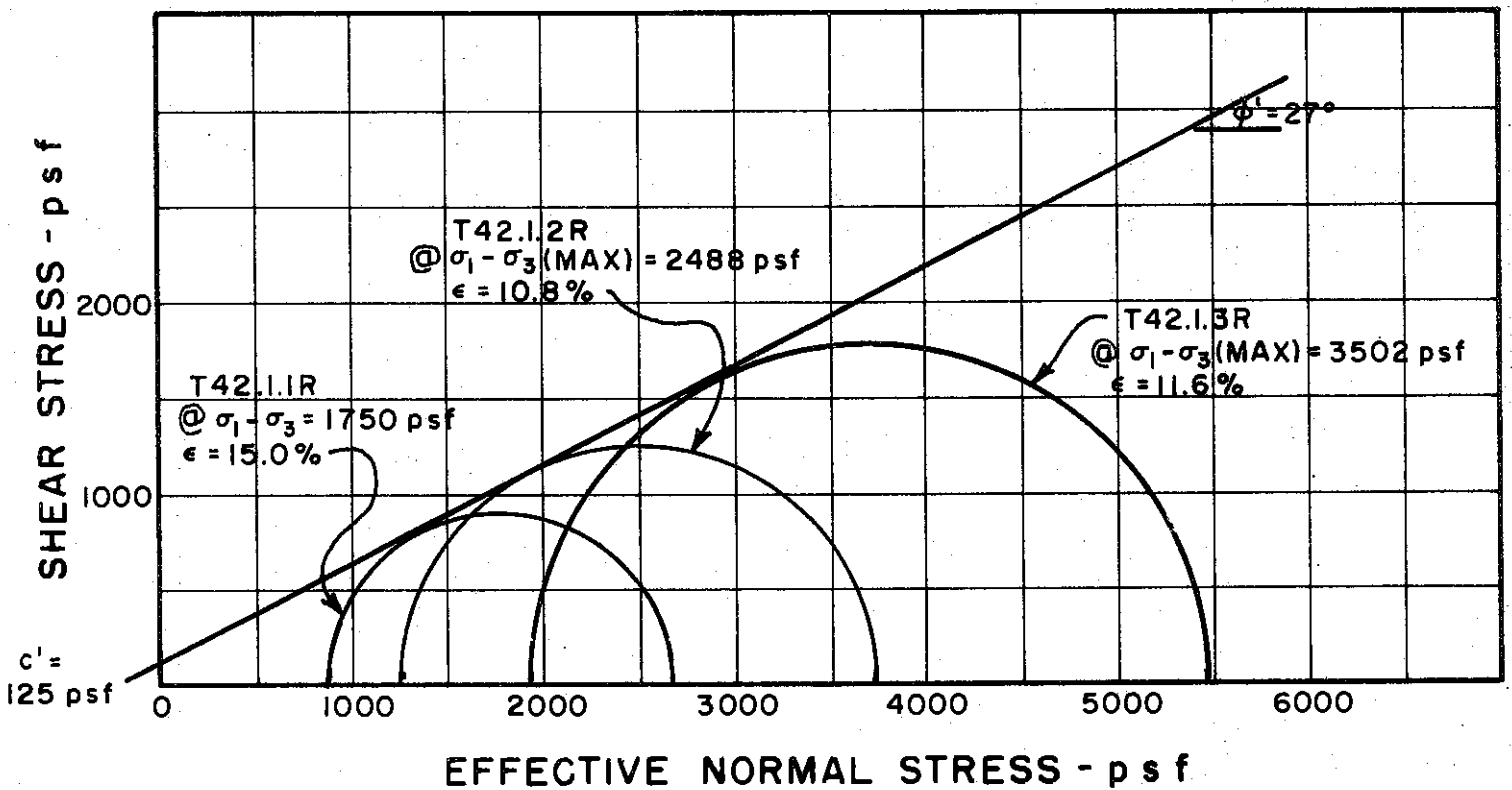
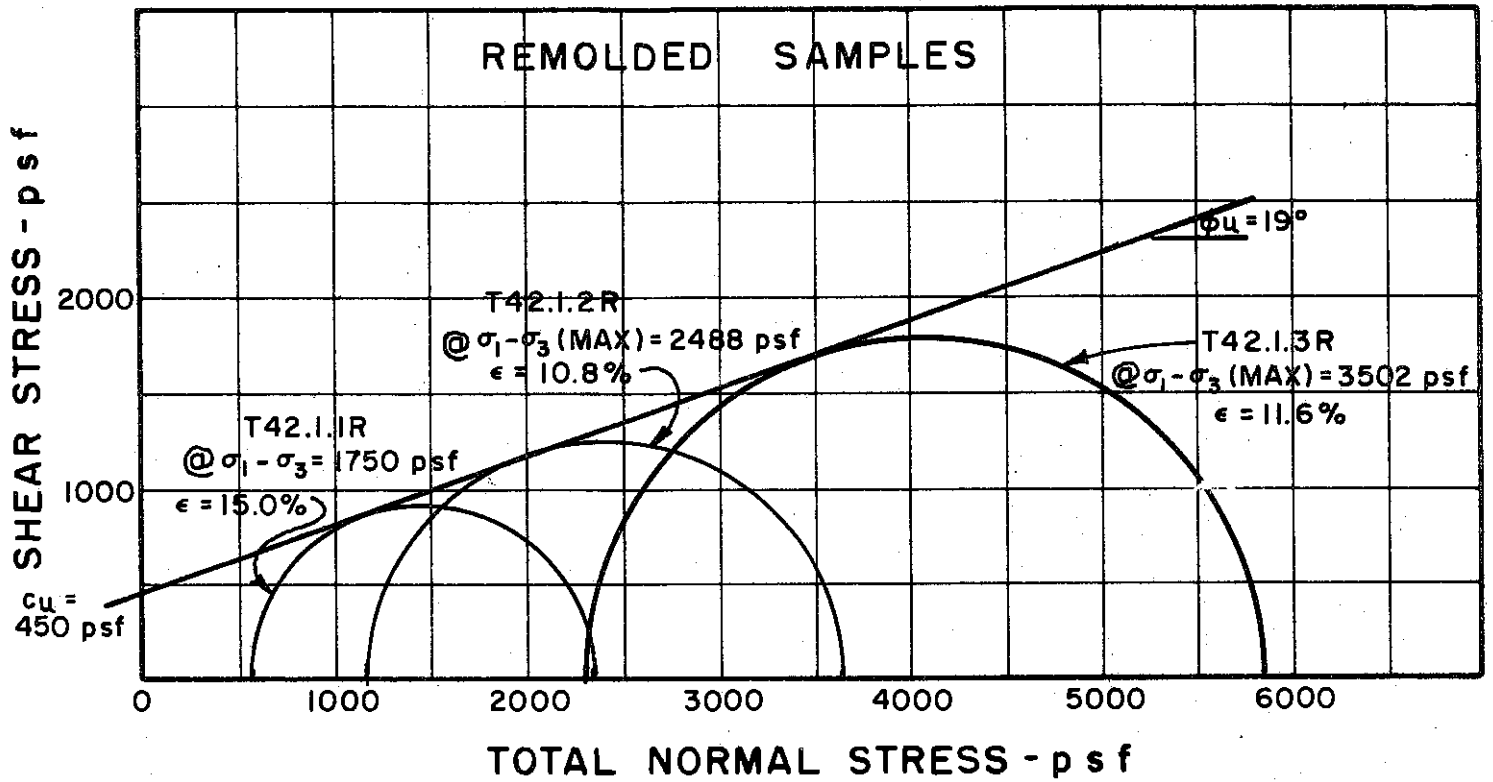
RATE OF STRAIN PERCENT/MINUTE	.023	.024	.023
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BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 8.0 TO 10.0  
 SOIL DESCRIPTION SILTY CLAY (CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

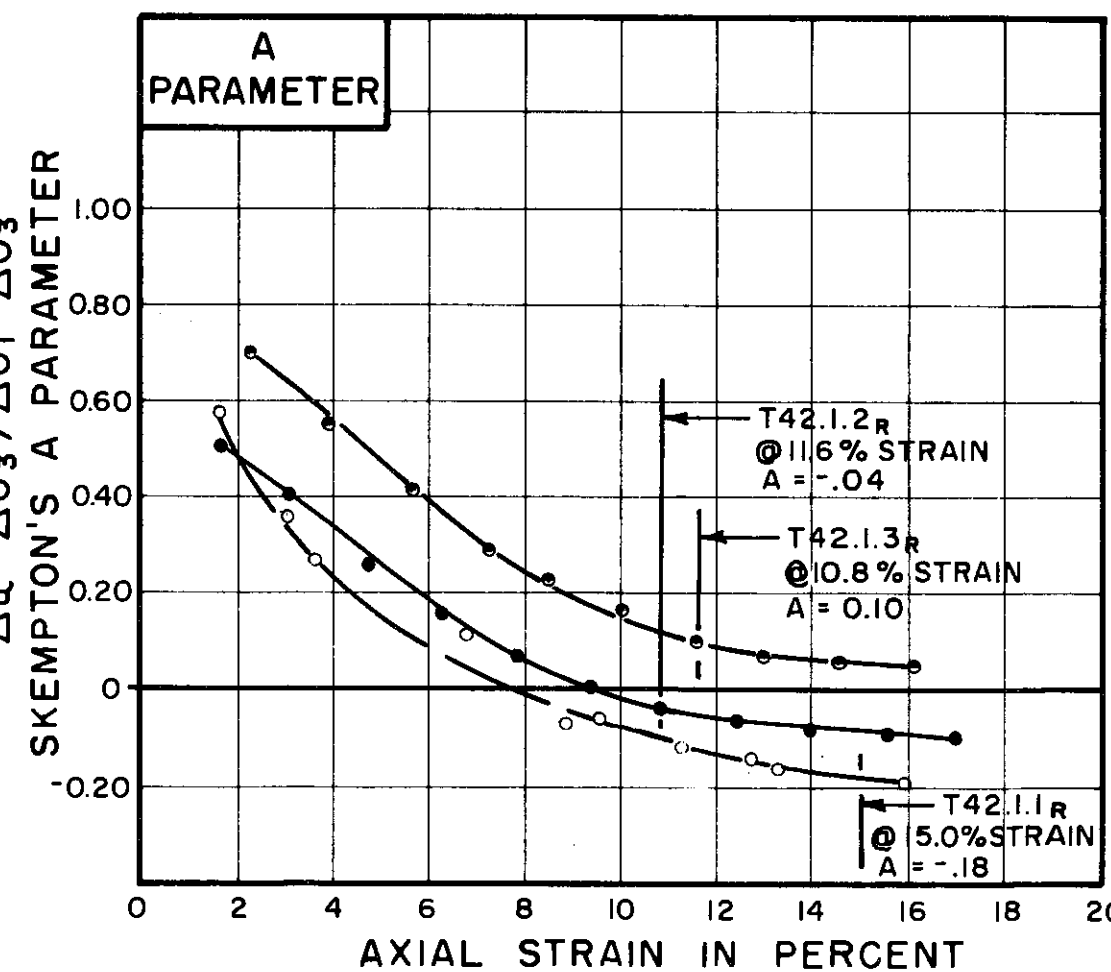
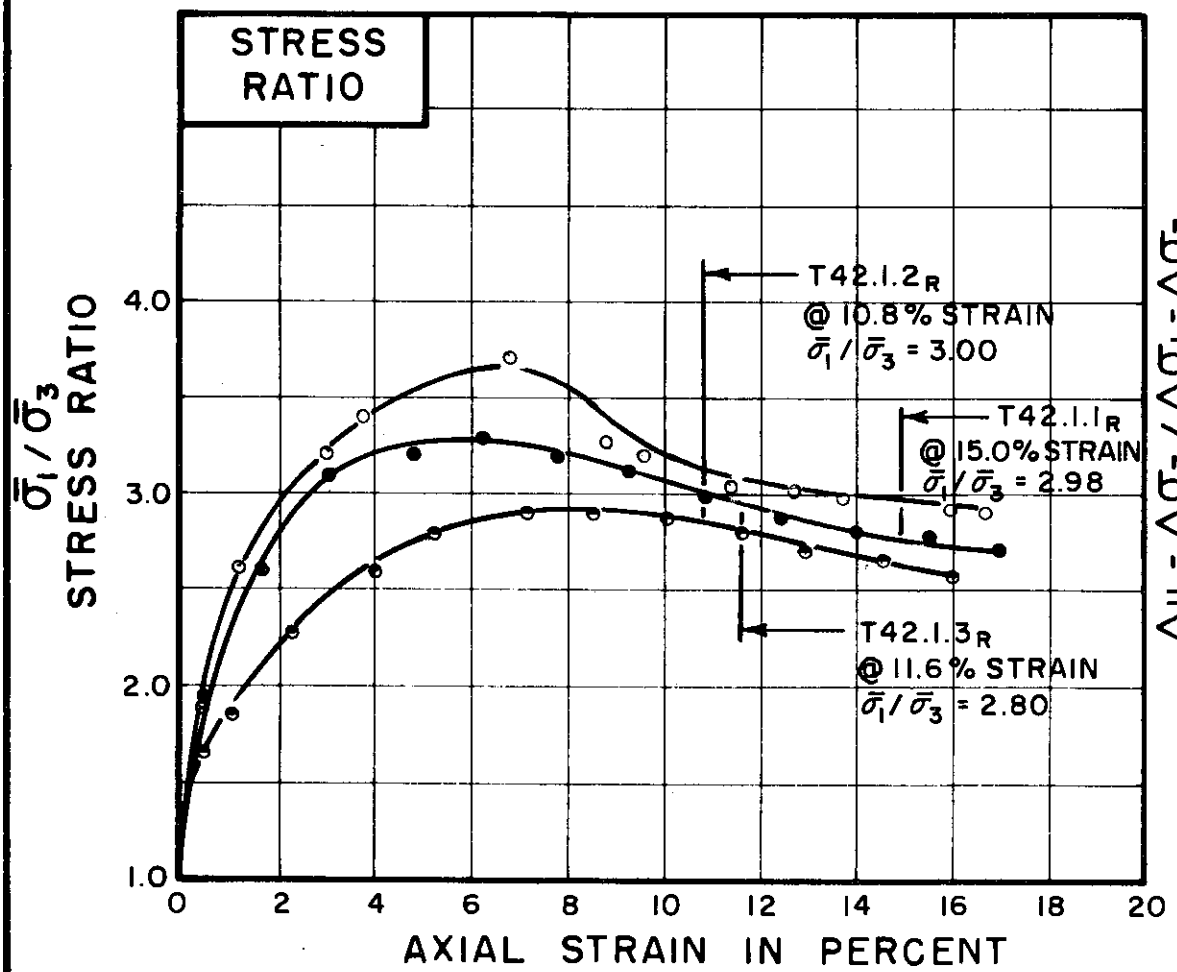
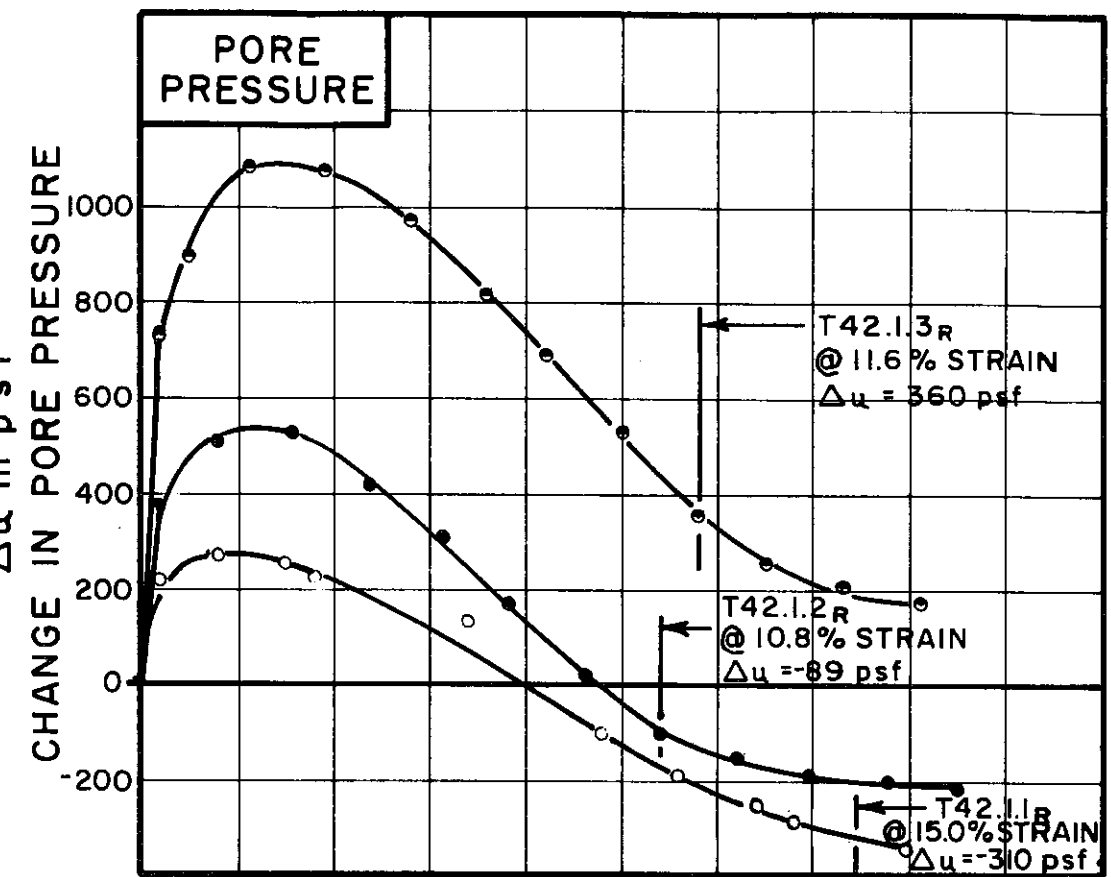
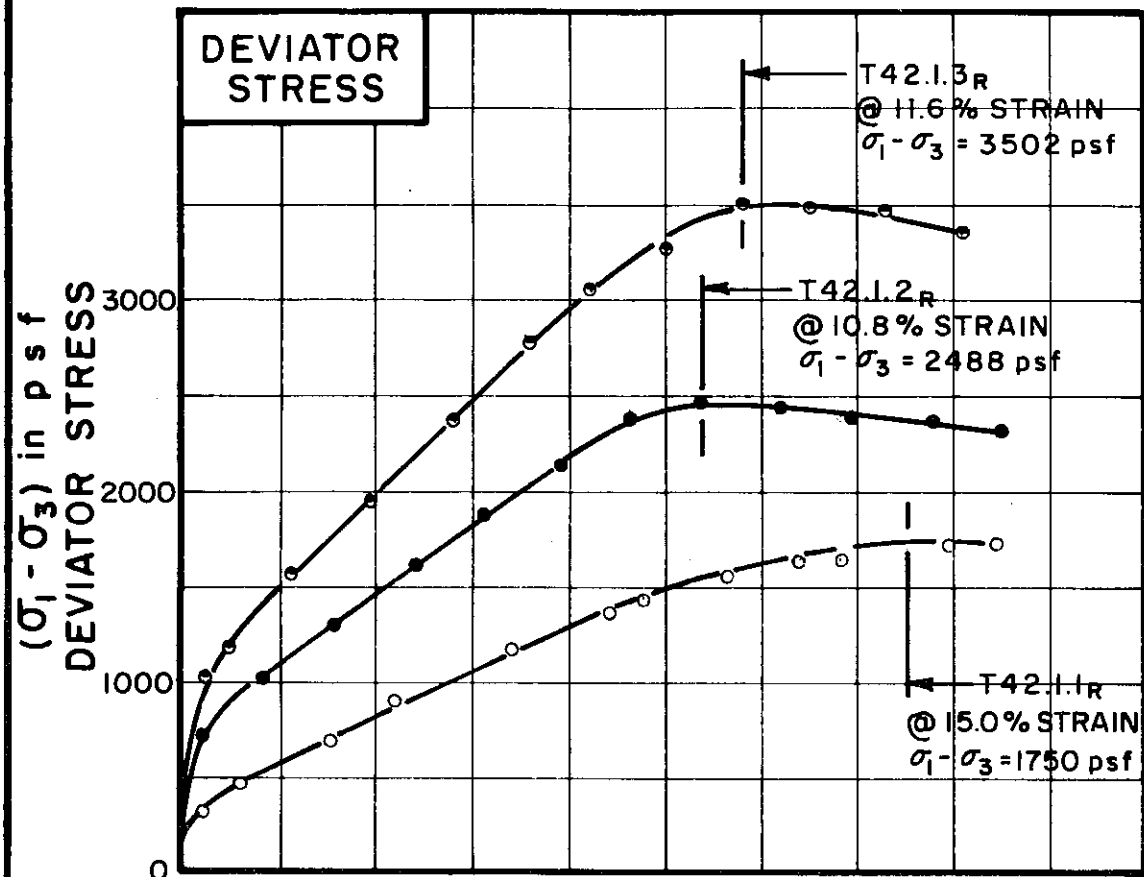
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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**MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-421



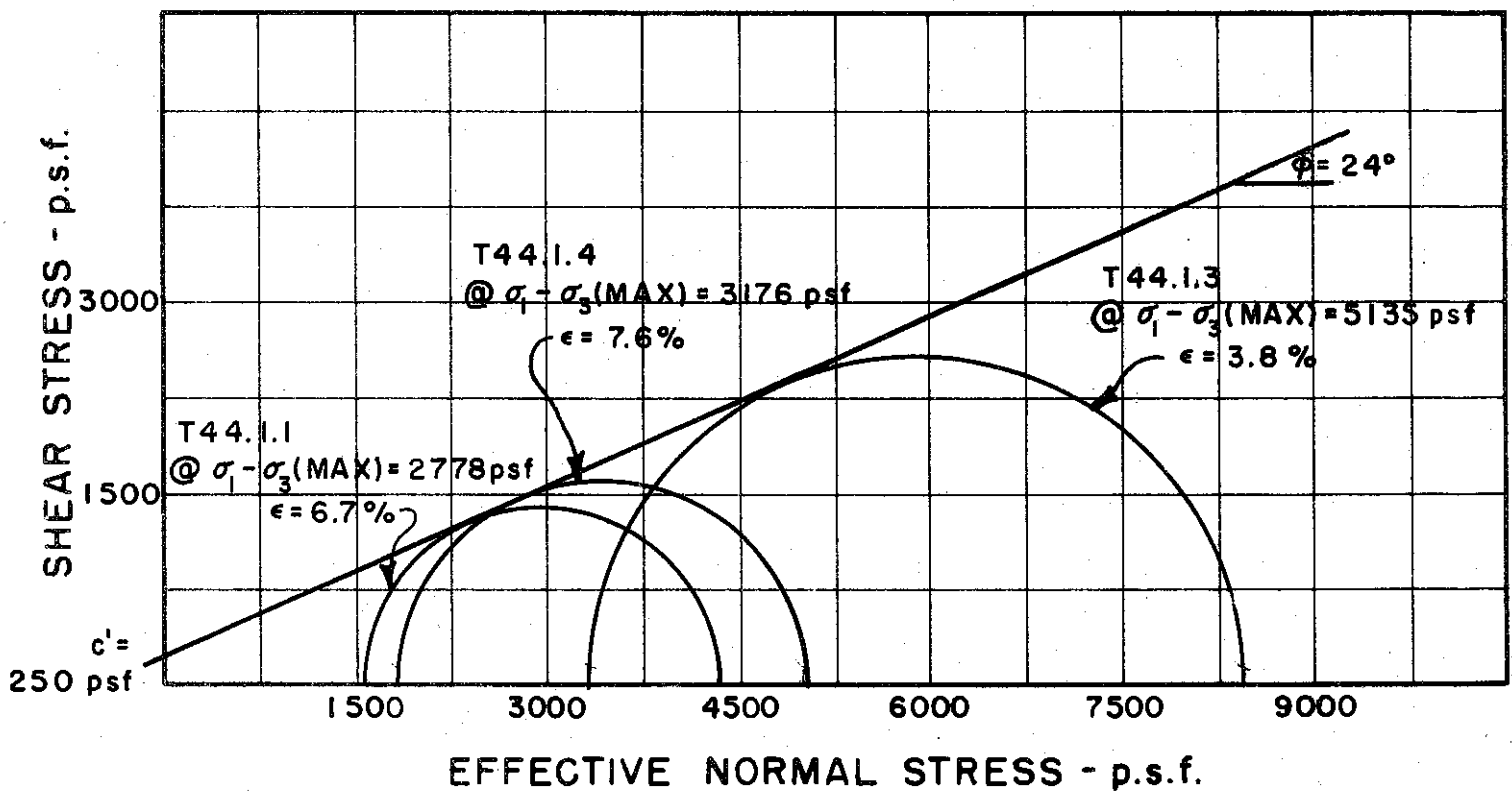
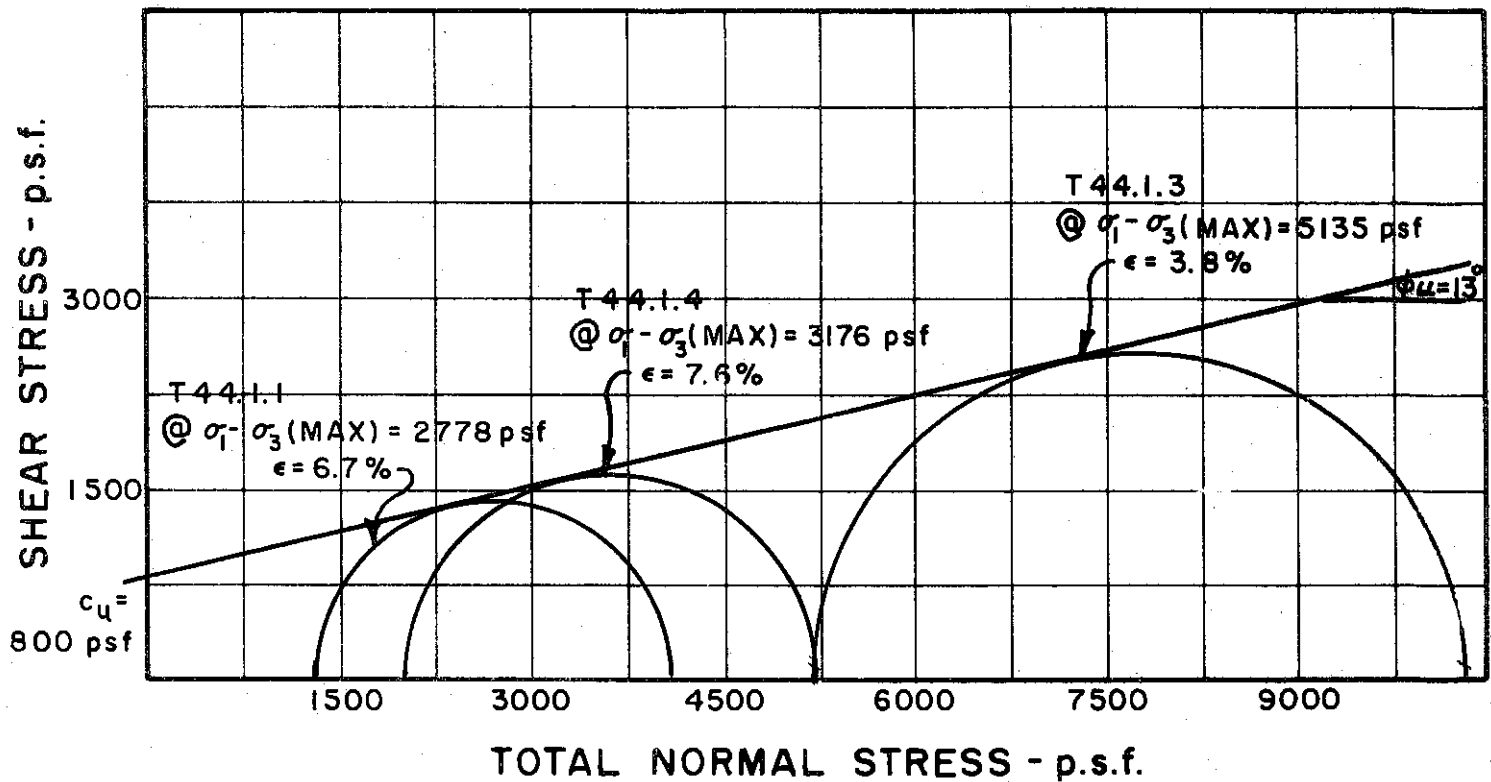
TEST NO. / SYMBOL	T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
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INITIAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_0$	29.3%	29.3%	29.3%
DRY DENSITY	$\gamma_d$ pcf	96	99	98
SAMPLE DIAMETER	$D_0$ in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$ in.	3.30	3.25	3.29
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$ psf	8640	8640	8640
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$ psf	576	1152	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.7%	2.4%	3.3%
PORE PRESSURE RESPONSE		97%	97%	97%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	29.0%	26.1%	25.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.025	.025
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BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 8.0 TO 10.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26  
**REMOLDED SAMPLES**

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



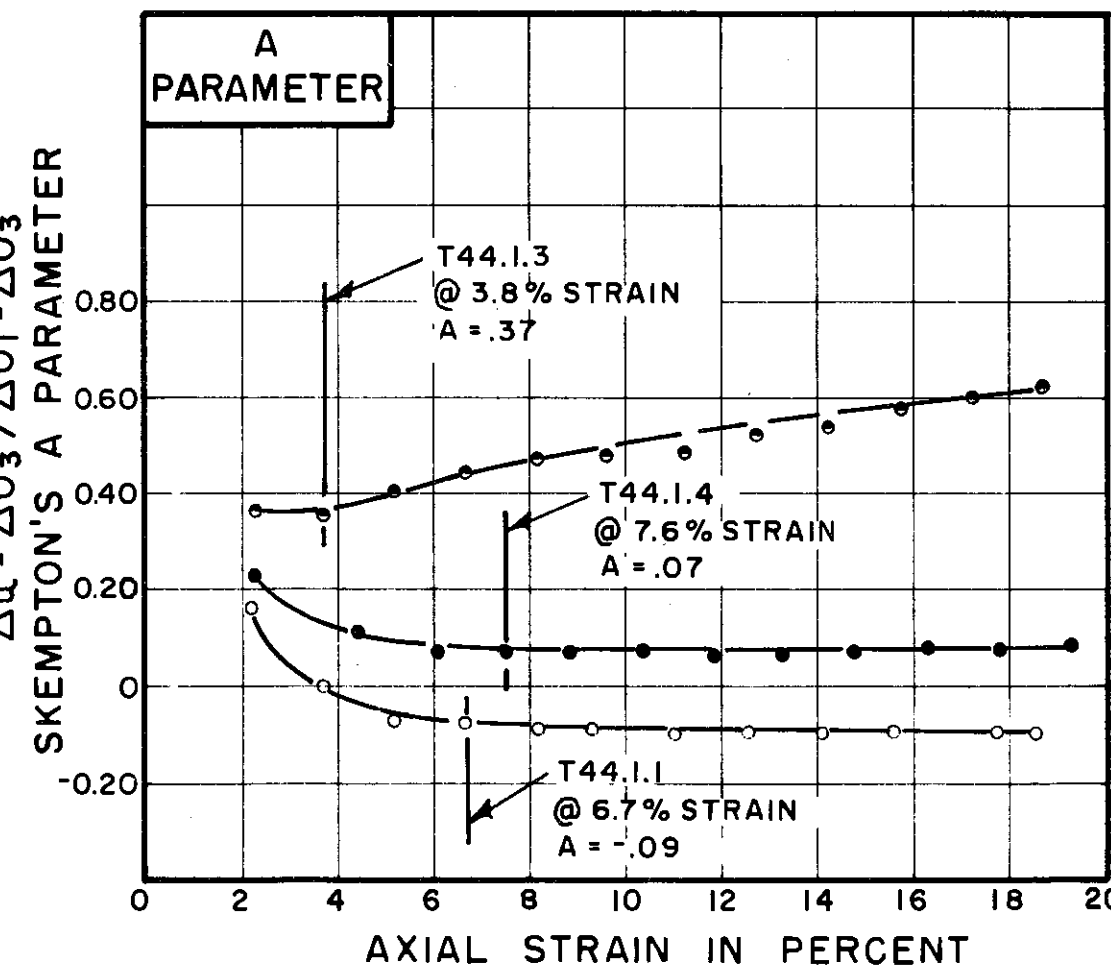
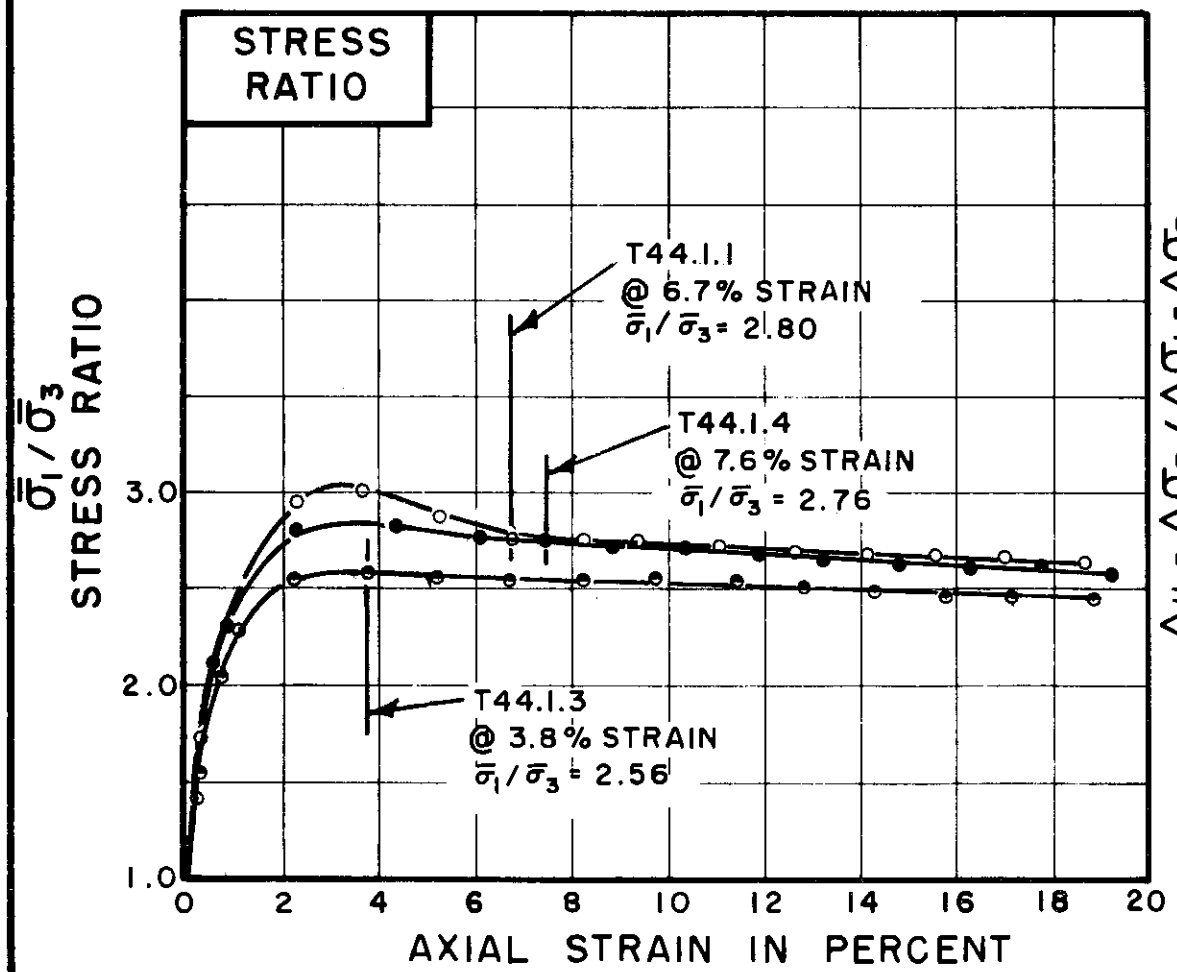
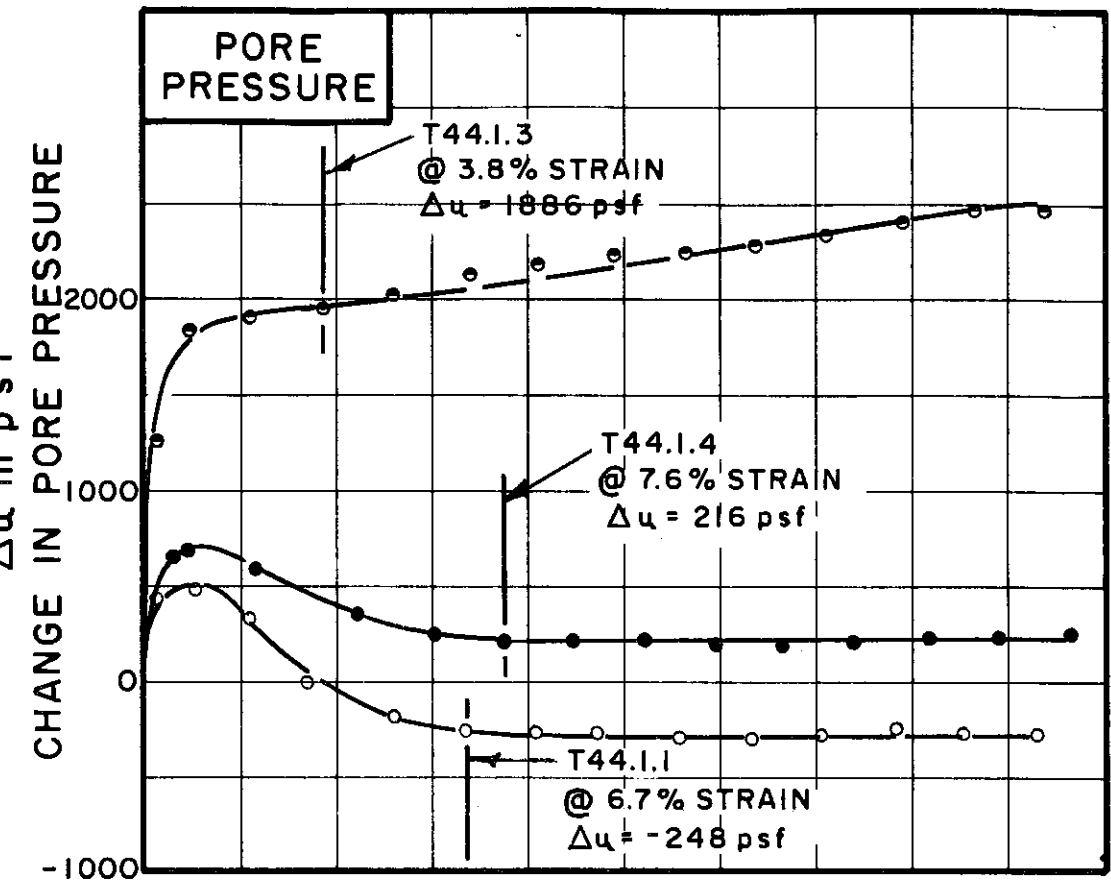
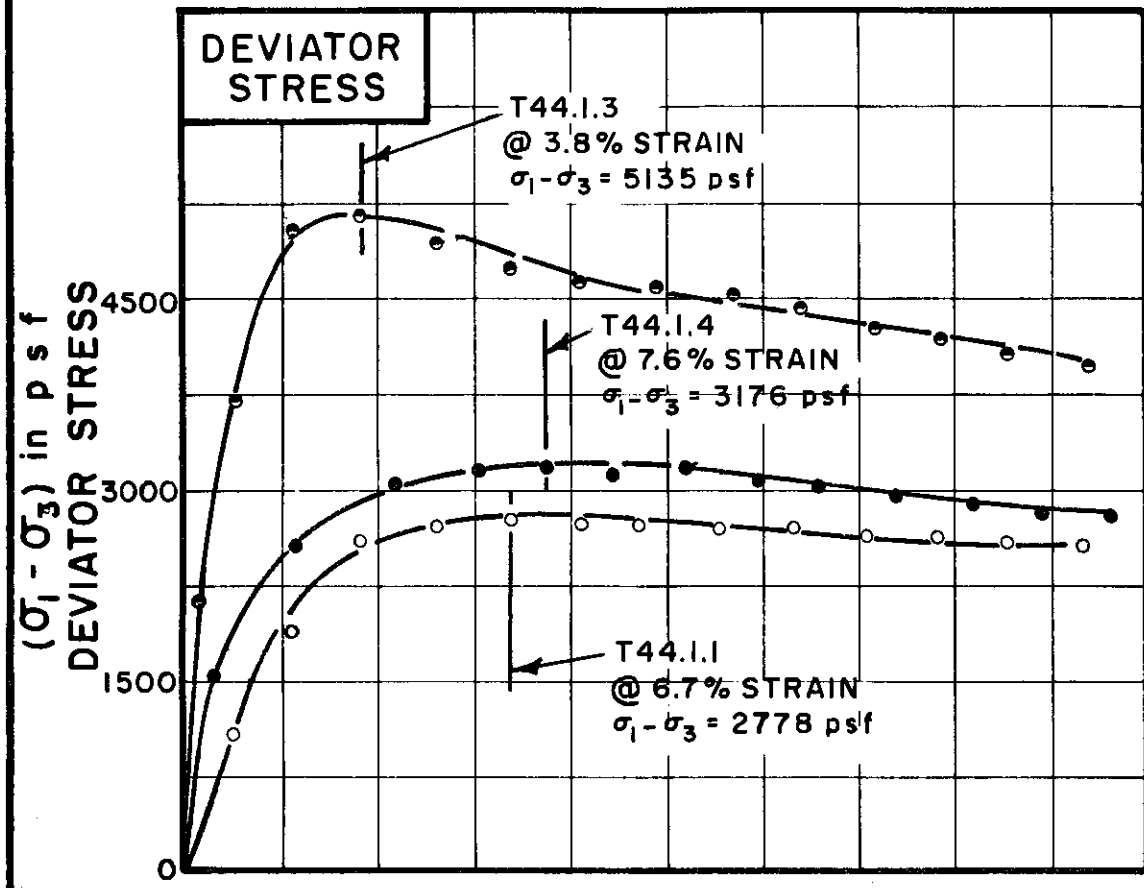
BORING NO. 60  
 SAMPLE NO. 4  
 DEPTH 21.0 TO 23.0

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T44.1.1	T44.1.4	T44.1.3
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INITIAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_0$		30.4%	30.6%	31.0%
DRY DENSITY	$\gamma_d$	pcf	94	95	94
SAMPLE DIAMETER	$D_0$	in.	1.43	1.42	1.43
SAMPLE HEIGHT	$H_0$	in.	3.37	3.40	3.36
CONDITIONS BEFORE SHEAR			T44.1.1	T44.1.4	T44.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	8640	10080
INITIAL EFFECTIVE STRESS	$\sigma'_{1,0}$ $\sigma'_{3,0}$	psf	1296 5184	2016 5184	5184 5184
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.5%	3.6%	3.8%
PORE PRESSURE RESPONSE			98%	97%	96%
FINAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_f$		31.2%	30.1%	29.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024
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BORING NO. 60

SAMPLE NO. 4

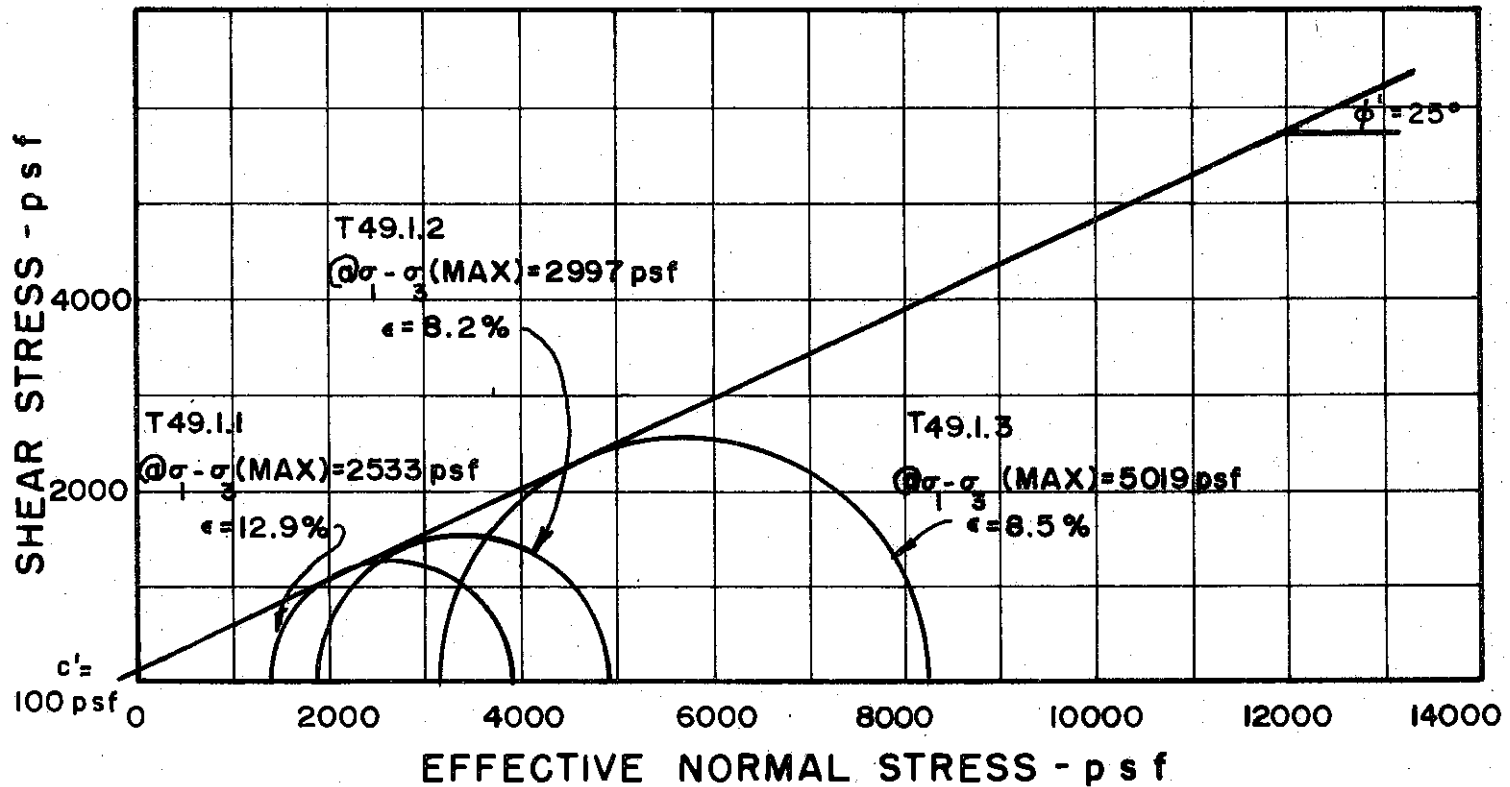
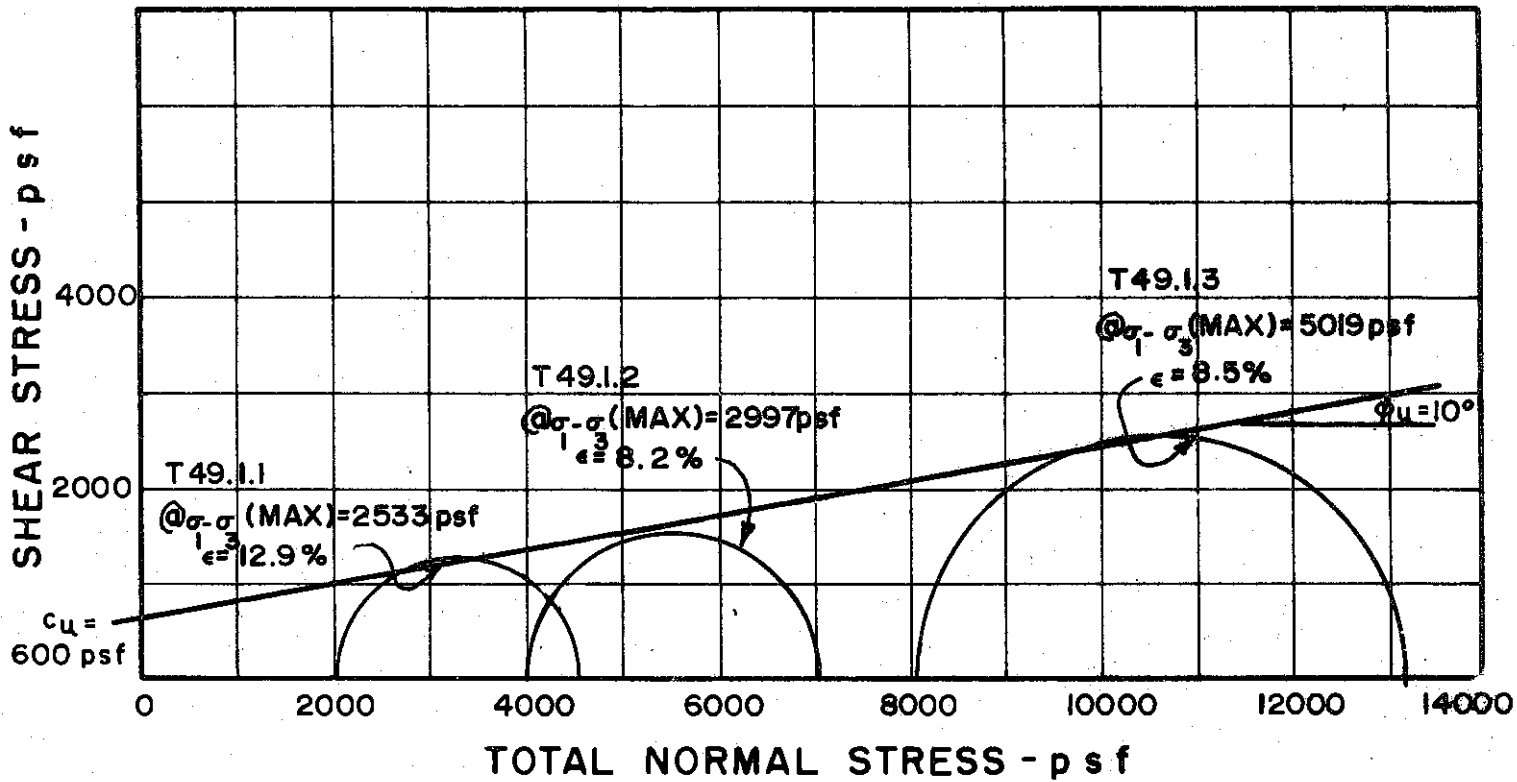
DEPTH 21.0 TO 23.0

SOIL DESCRIPTION SILTY CLAY, (CL)

LIQUID LIMIT 43 PLASTIC LIMIT 17

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

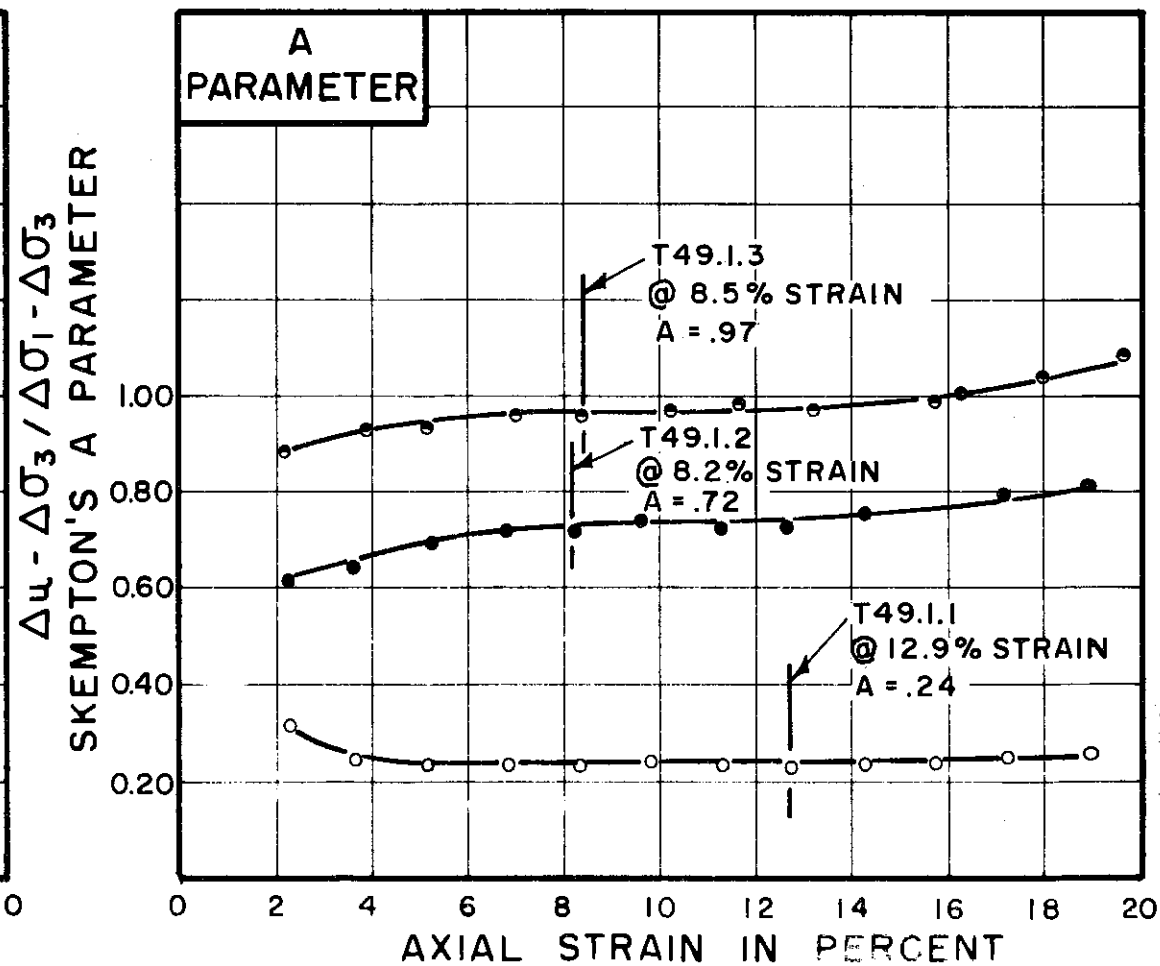
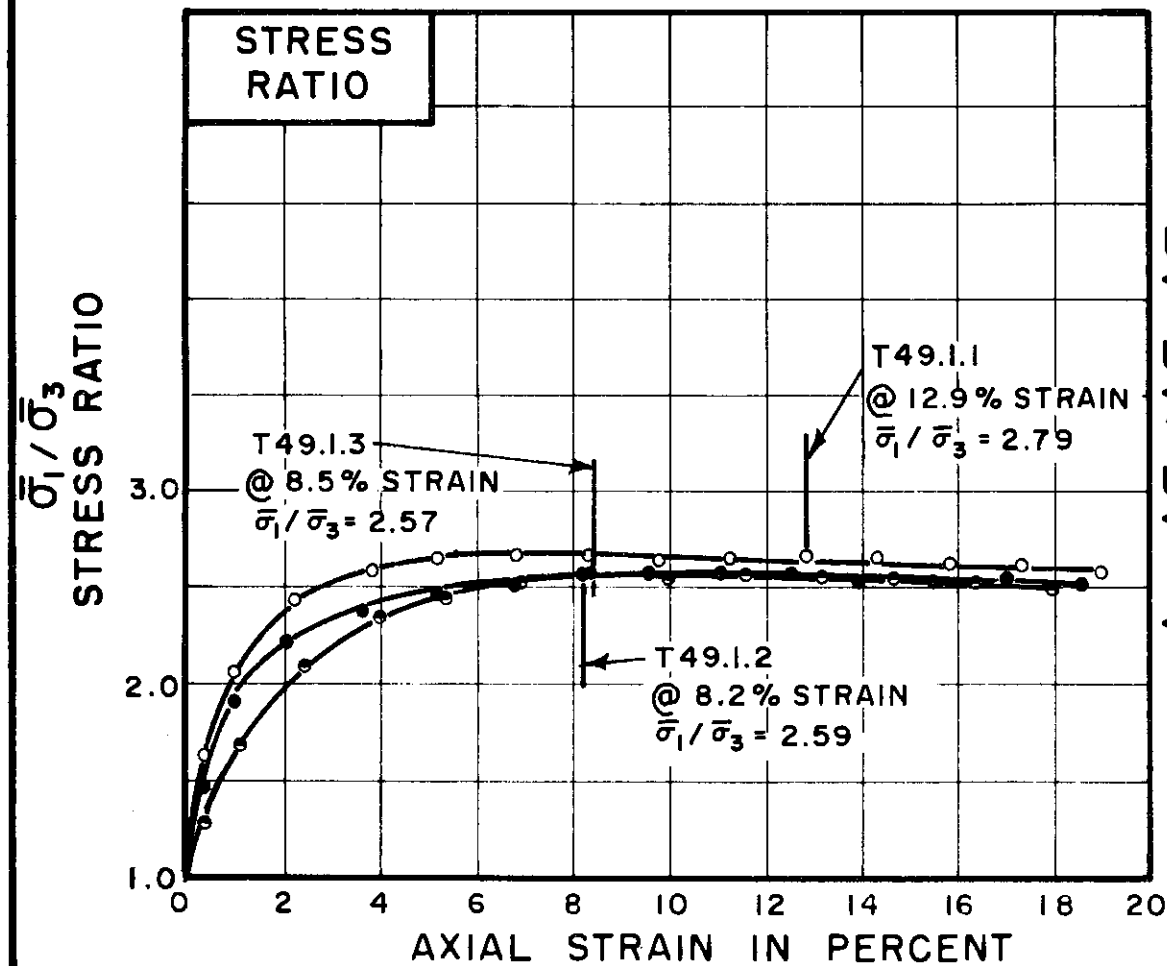
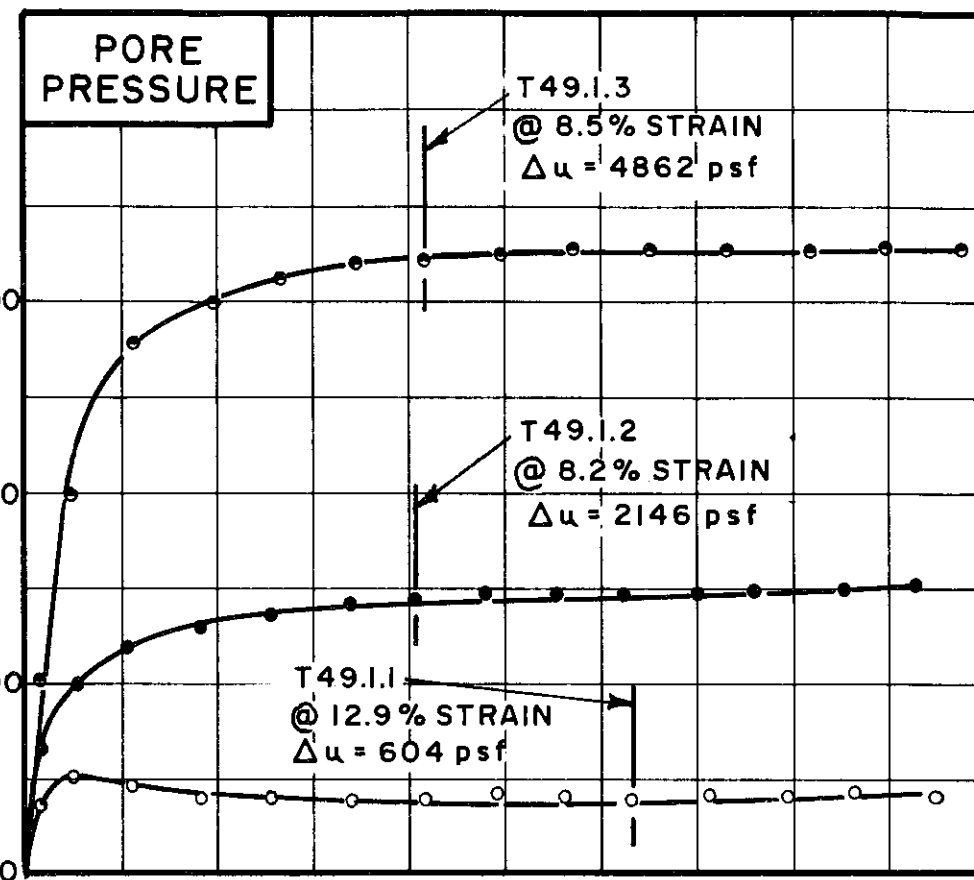
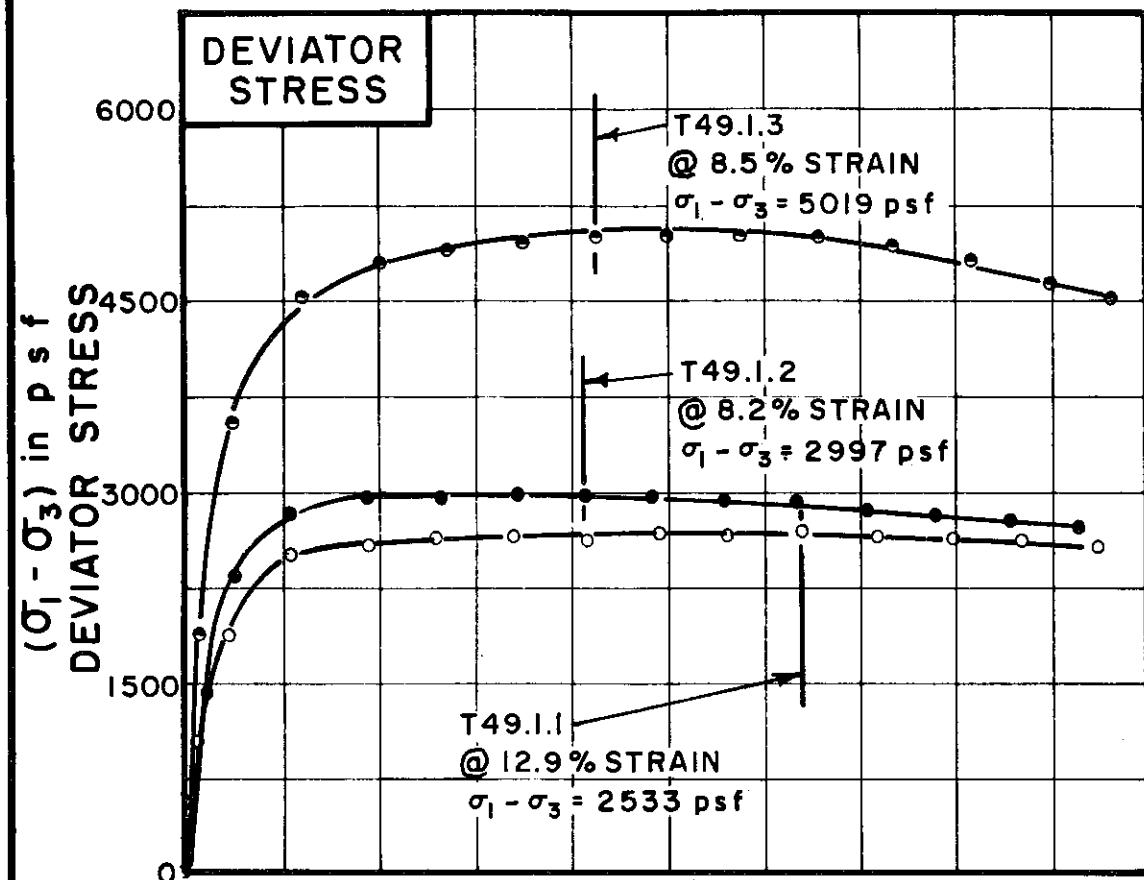
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255  
 C-425



TEST NO. / SYMBOL	T49.1.1	T49.1.2	T49.1.3
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INITIAL CONDITIONS			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_0$		26.6%	27.0%	26.0%
DRY DENSITY	$\gamma_d$	pcf	99	98	102
SAMPLE DIAMETER	$D_0$	in.	1.42	1.40	1.39
SAMPLE HEIGHT	$H_0$	in.	3.32	3.40	3.26
FINAL CONDITIONS BEFORE SHEAR			T49.1.1	T49.1.2	T49.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	10080	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1^*$ $\bar{\sigma}_3^*$	psf	2016	4032	8064
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.9%	3.5%	5.7%
PORE PRESSURE RESPONSE			97%	96%	91%
FINAL CONDITIONS AT END OF TEST			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_f$		26.0%	25.5%	22.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.025
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BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

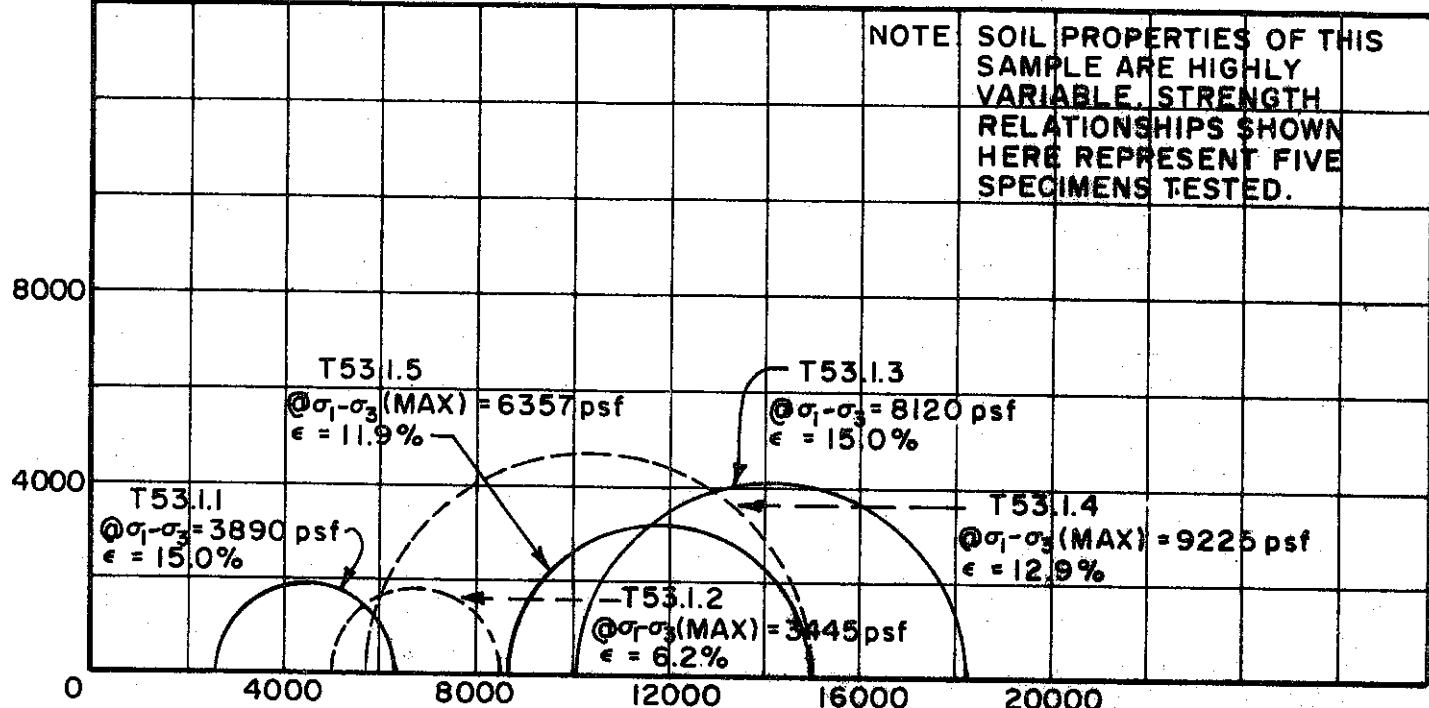
LIQUID LIMIT 38 PLASTIC LIMIT 16

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

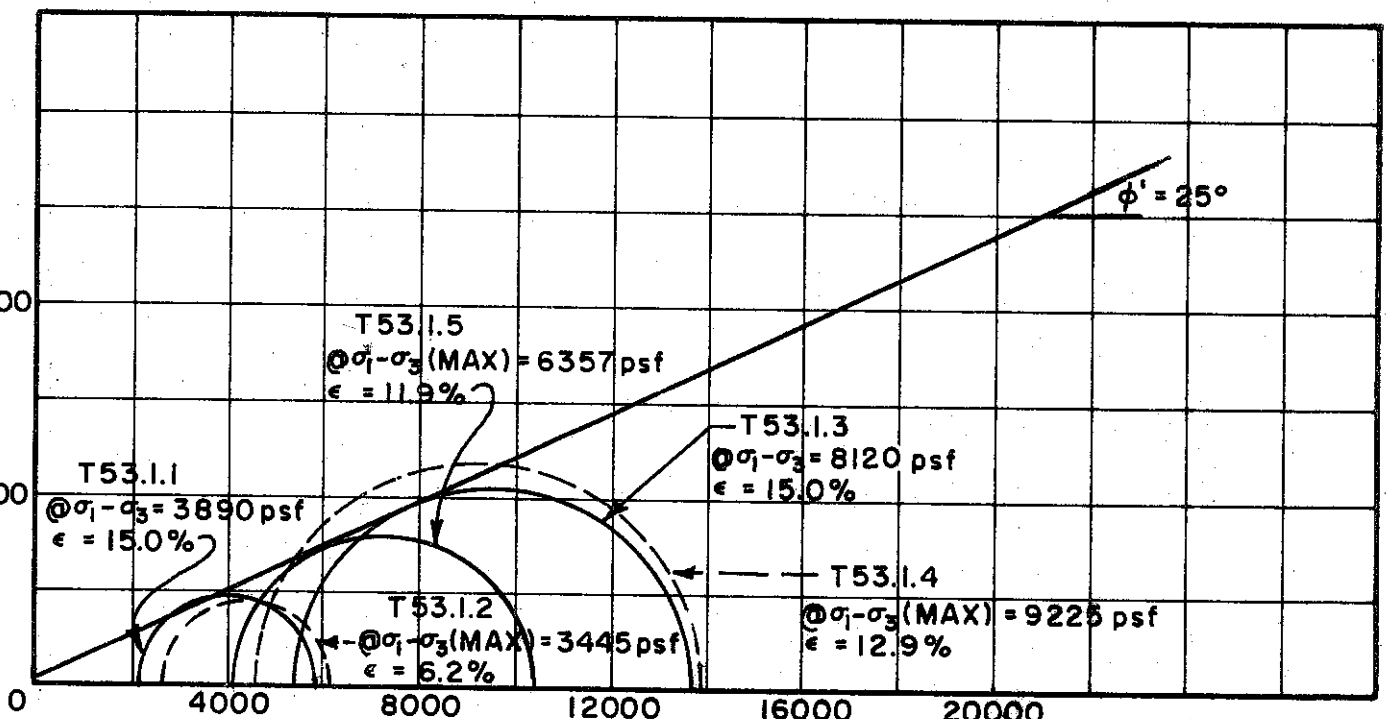
NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE. STRENGTH RELATIONSHIPS SHOWN HERE REPRESENT FIVE SPECIMENS TESTED.

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f

SHEAR STRESS - p s f



EFFECTIVE NORMAL STRESS - p s f

BORING NO. 60

SAMPLE NO. 13

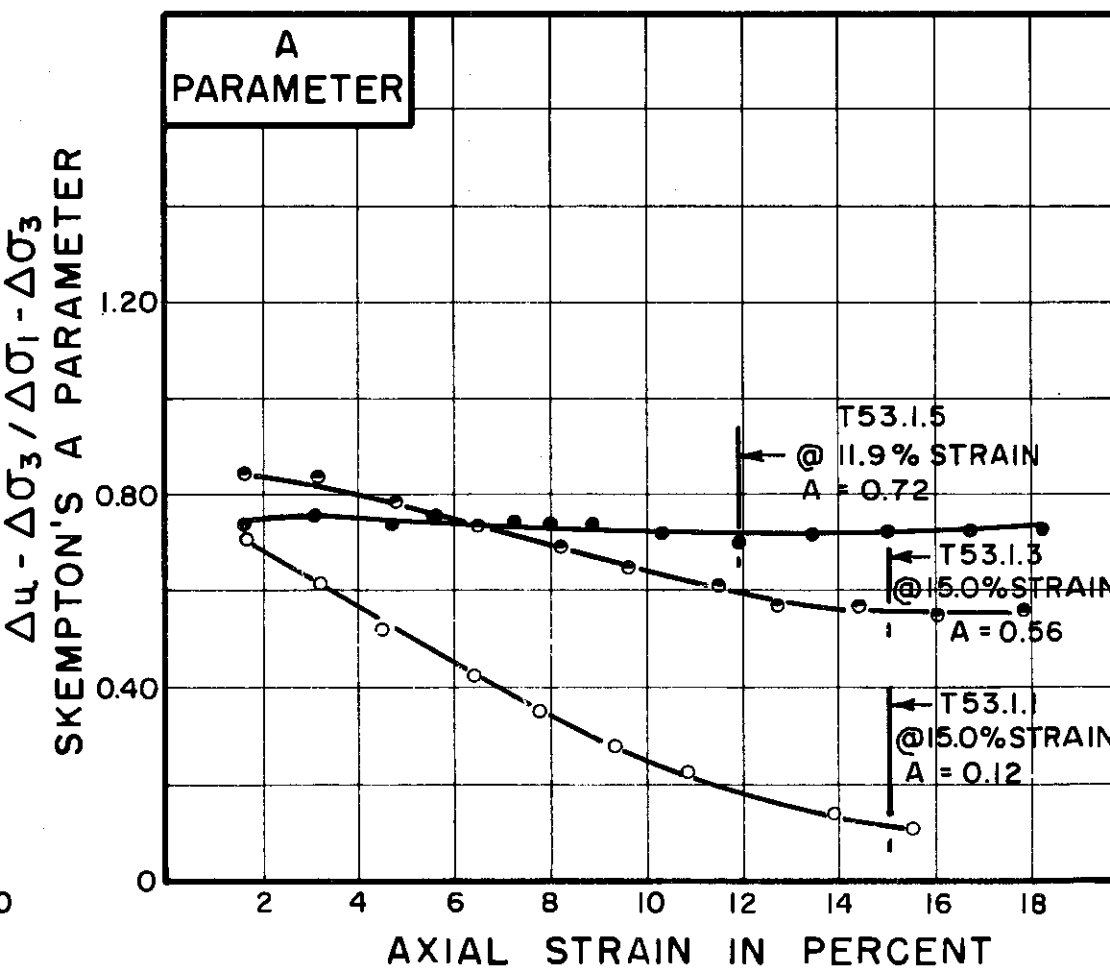
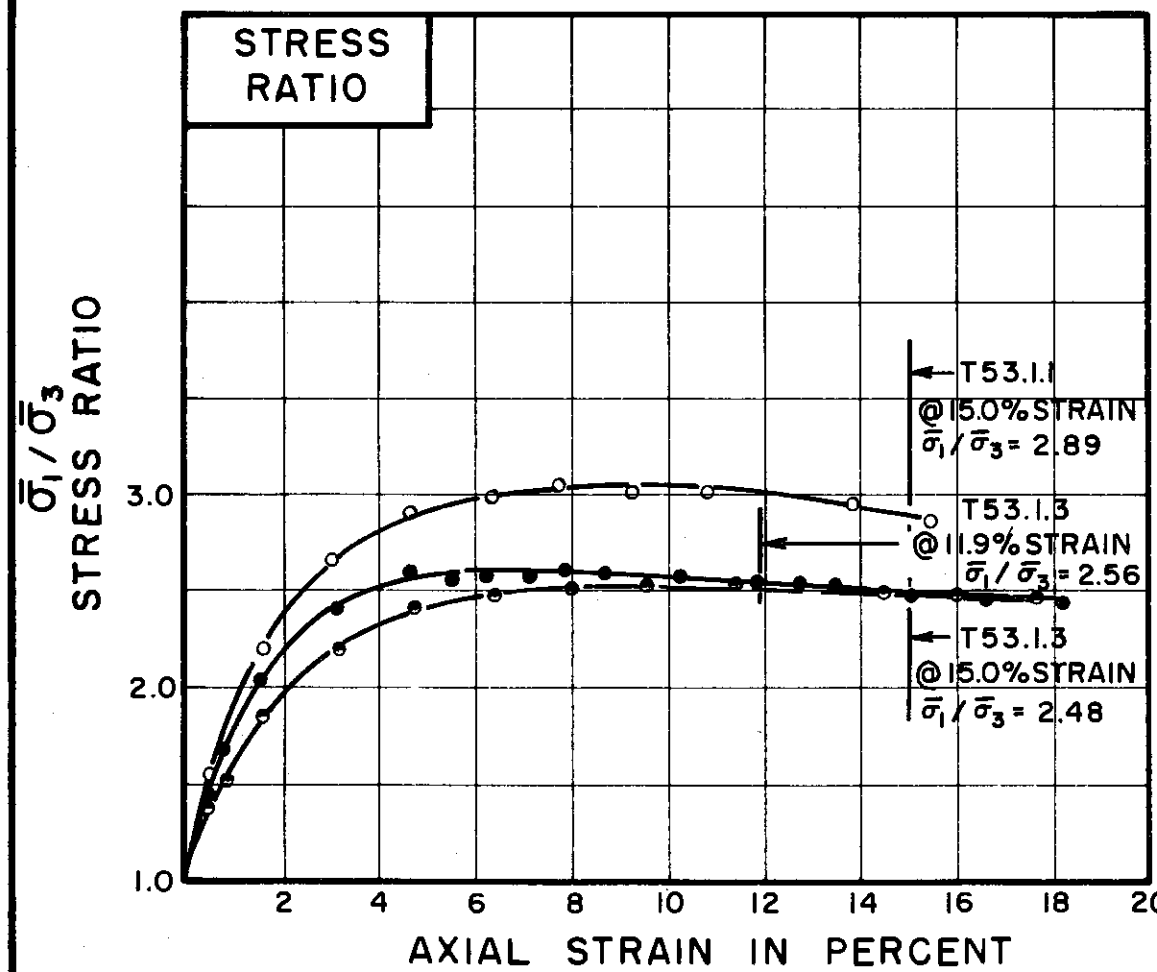
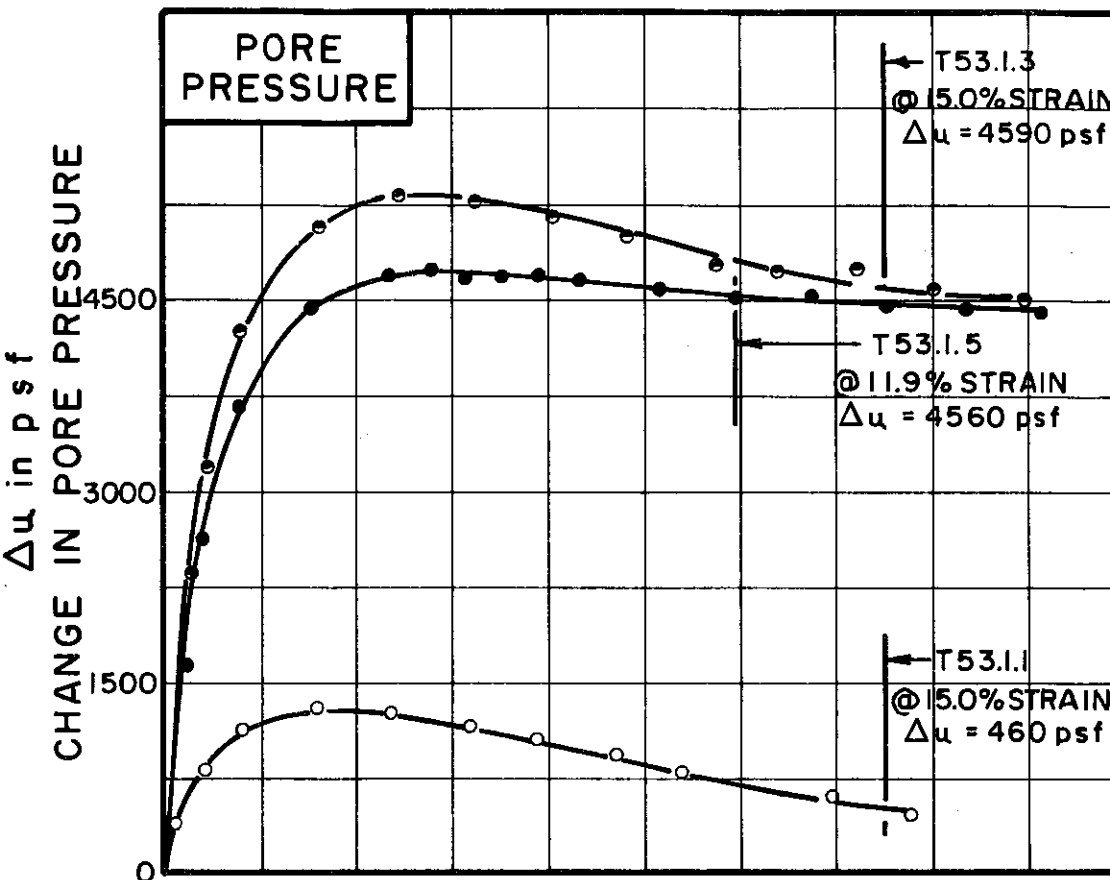
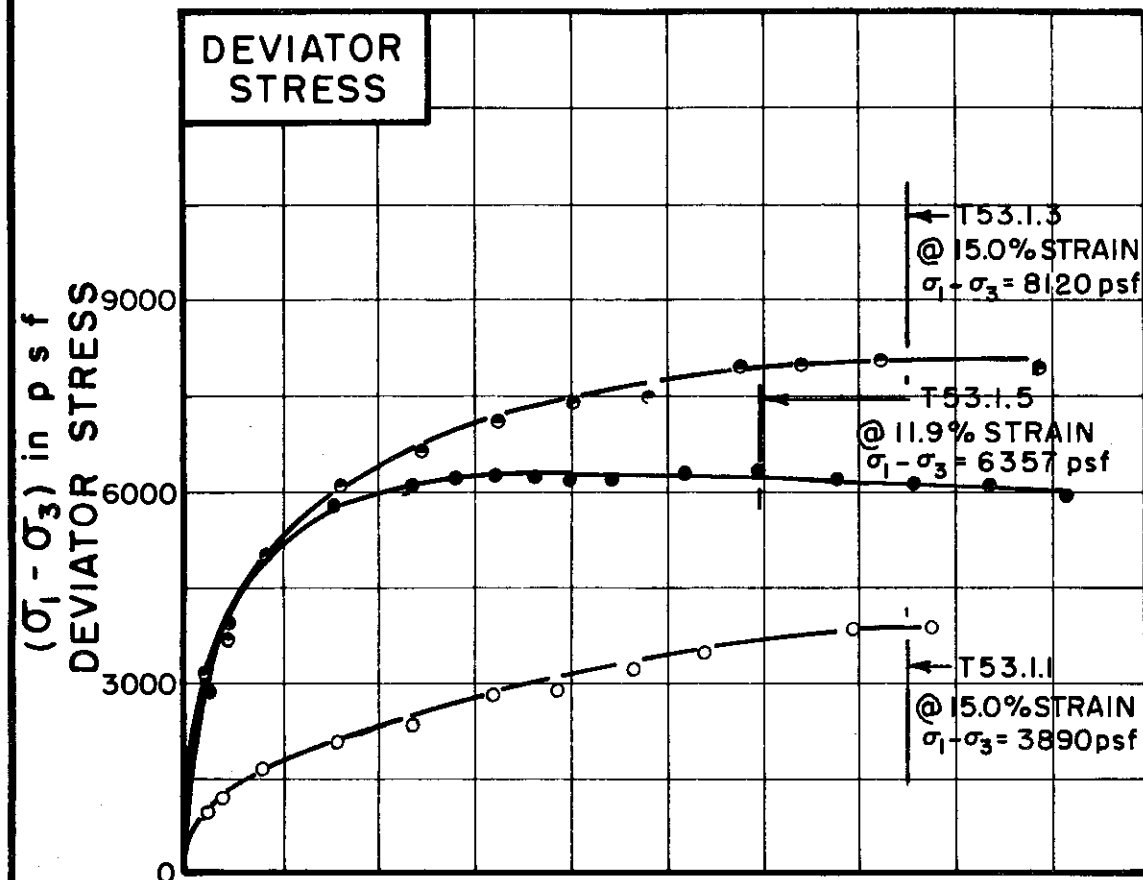
DEPTH 67.0' TO 69.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



TEST NO.*/SYMBOL	T53.1.1	T53.1.5	T53.1.3
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INITIAL CONDITIONS		T53.1.1	T53.1.5	T53.1.3
WATER CONTENT	$w_0$	23.6%	21.0%	19.7%
DRY DENSITY	$\gamma_d$ pcf	103	104	104
SAMPLE DIAMETER	$D_0$ in.	1.42	1.42	1.41
SAMPLE HEIGHT	$H_0$ in.	3.25	3.19	3.20
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$ p.s.f.	7200	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$ p.s.f.	2520	8640	10080
VOLUMETRIC STRAIN	$\epsilon_{vol}$	3.0%	5.0%	6.1%
PORE PRESSURE RESPONSE		97%	100%	100%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	21.7%	18.9%	17.6%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

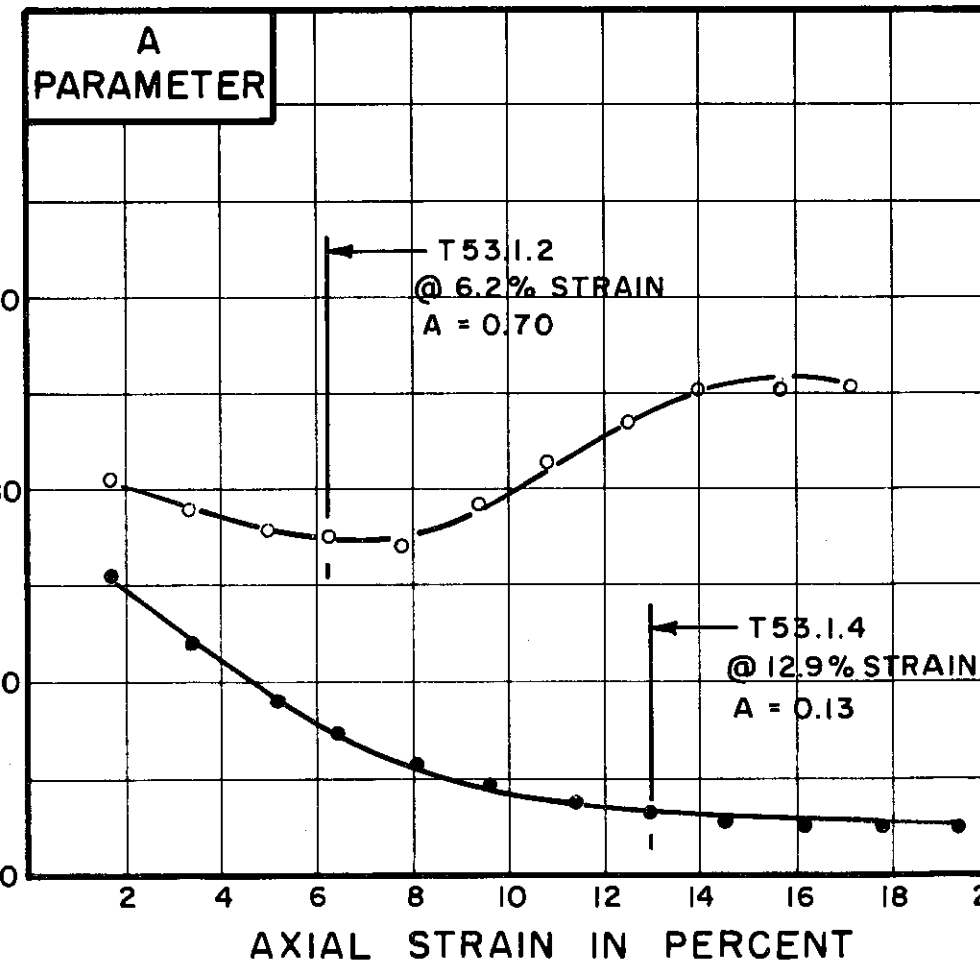
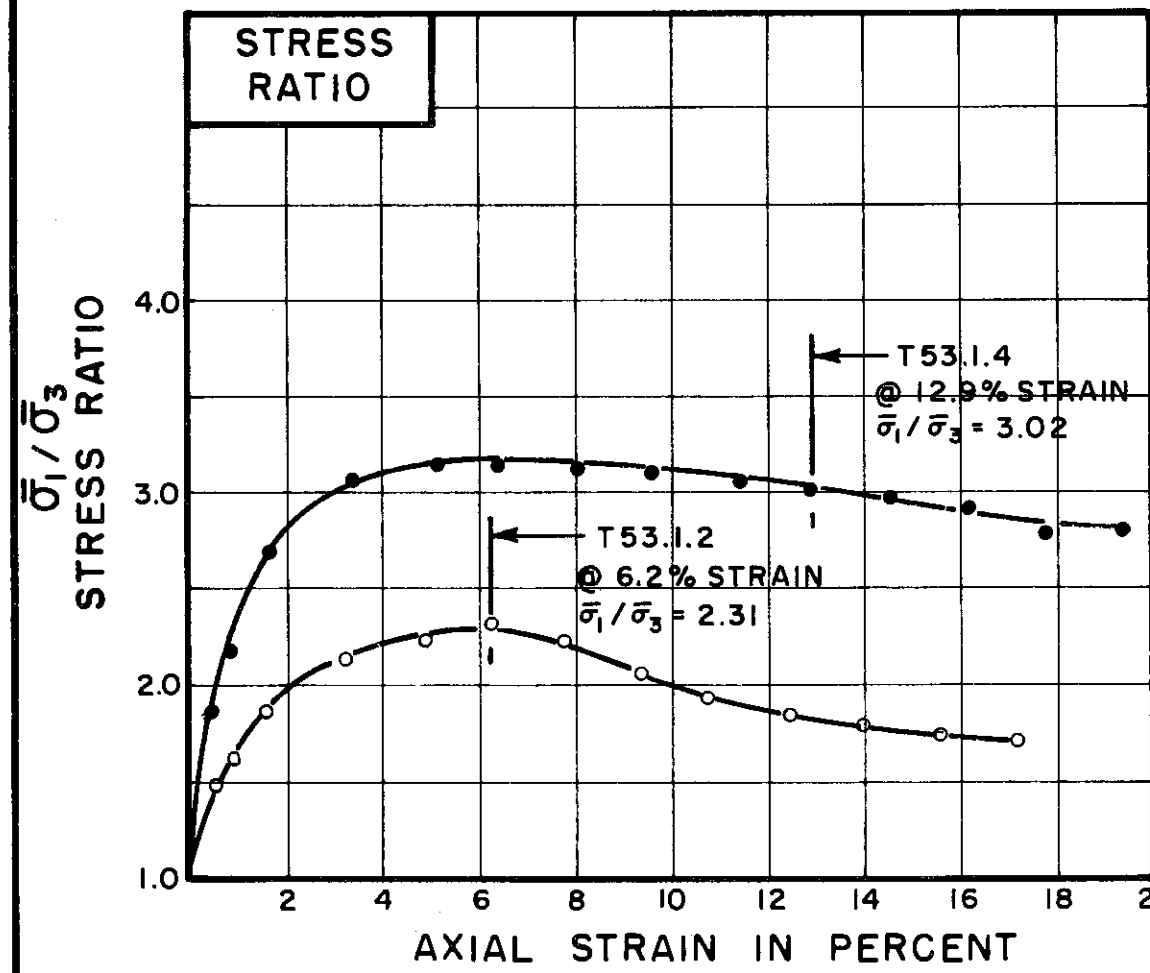
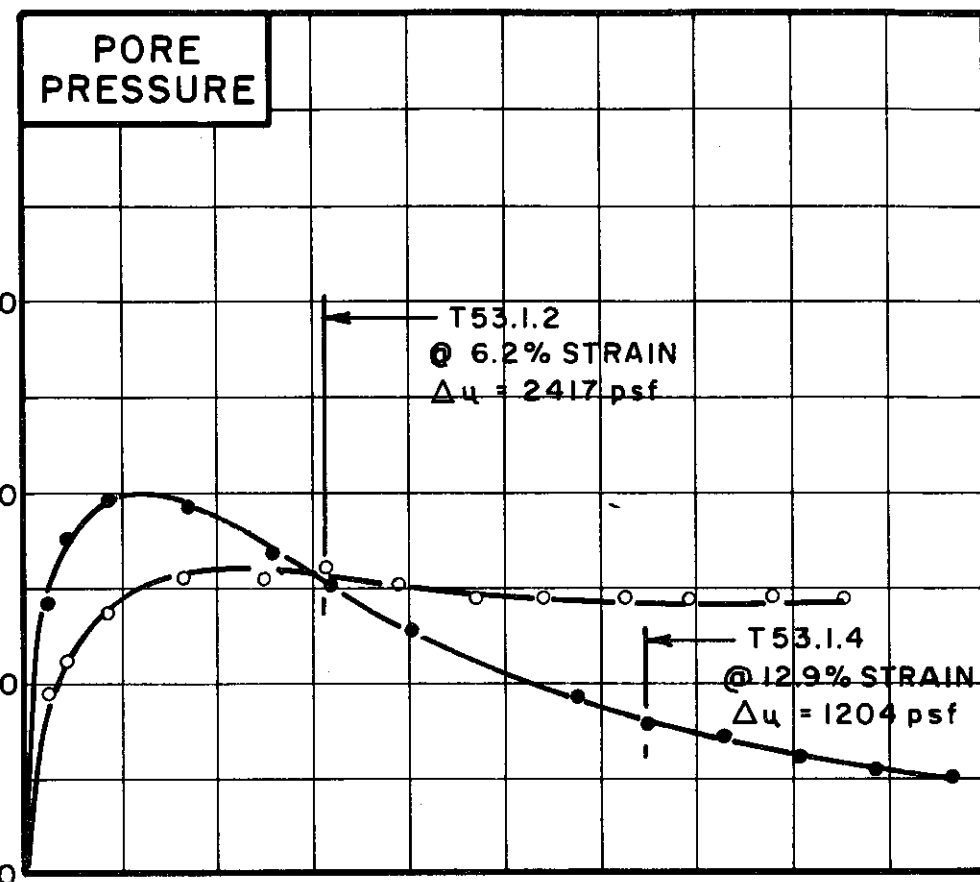
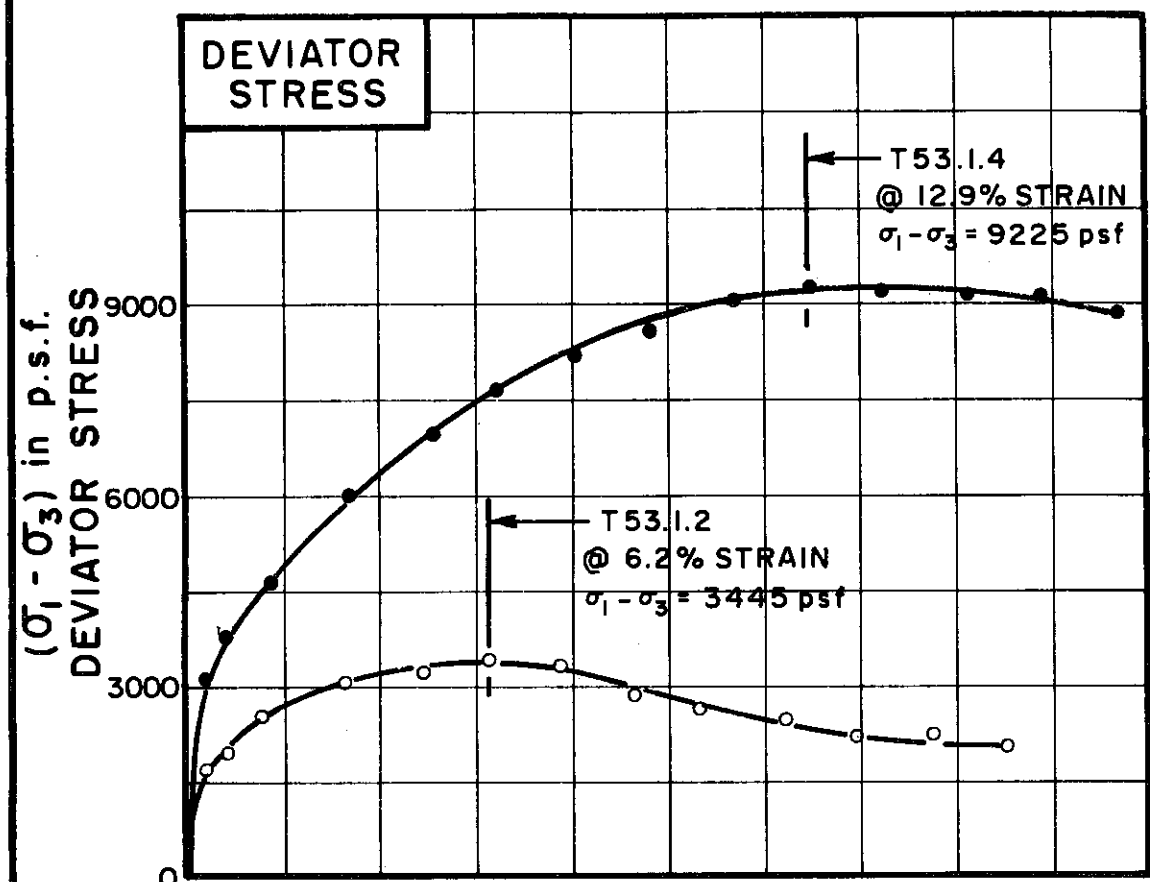
SOIL DESCRIPTION SILTY CLAY, GRAVELLY (CL-ML)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE-SEE DATA FOR TESTS T53.1.2 AND T53.1.4

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO. <sup>*</sup> 7 SYMBOL	T53.1.2	T53.1.4
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INITIAL CONDITIONS		T53.1.2		T53.1.4	
WATER CONTENT	$w_0$	31.9%	%	15.5%	
DRY DENSITY	$\gamma_d$	91		114	
SAMPLE DIAMETER	$D_0$	1.41		1.40	
SAMPLE HEIGHT	$H_0$	3.28		3.15	
FINAL CONDITIONS BEFORE SHEAR		T53.1.2		T53.1.4	
FINAL BACK PRESSURE	$u_0$	8640		11,520	
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	5040		5760	
VOLUMETRIC STRAIN	$\epsilon_{vol}$	5.3%	%	2.4%	
PORE PRESSURE RESPONSE		97%		93%	
FINAL CONDITIONS		T53.1.2		T53.1.4	
WATER CONTENT	$w_f$	28.4%	%	14.9%	
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.026
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BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

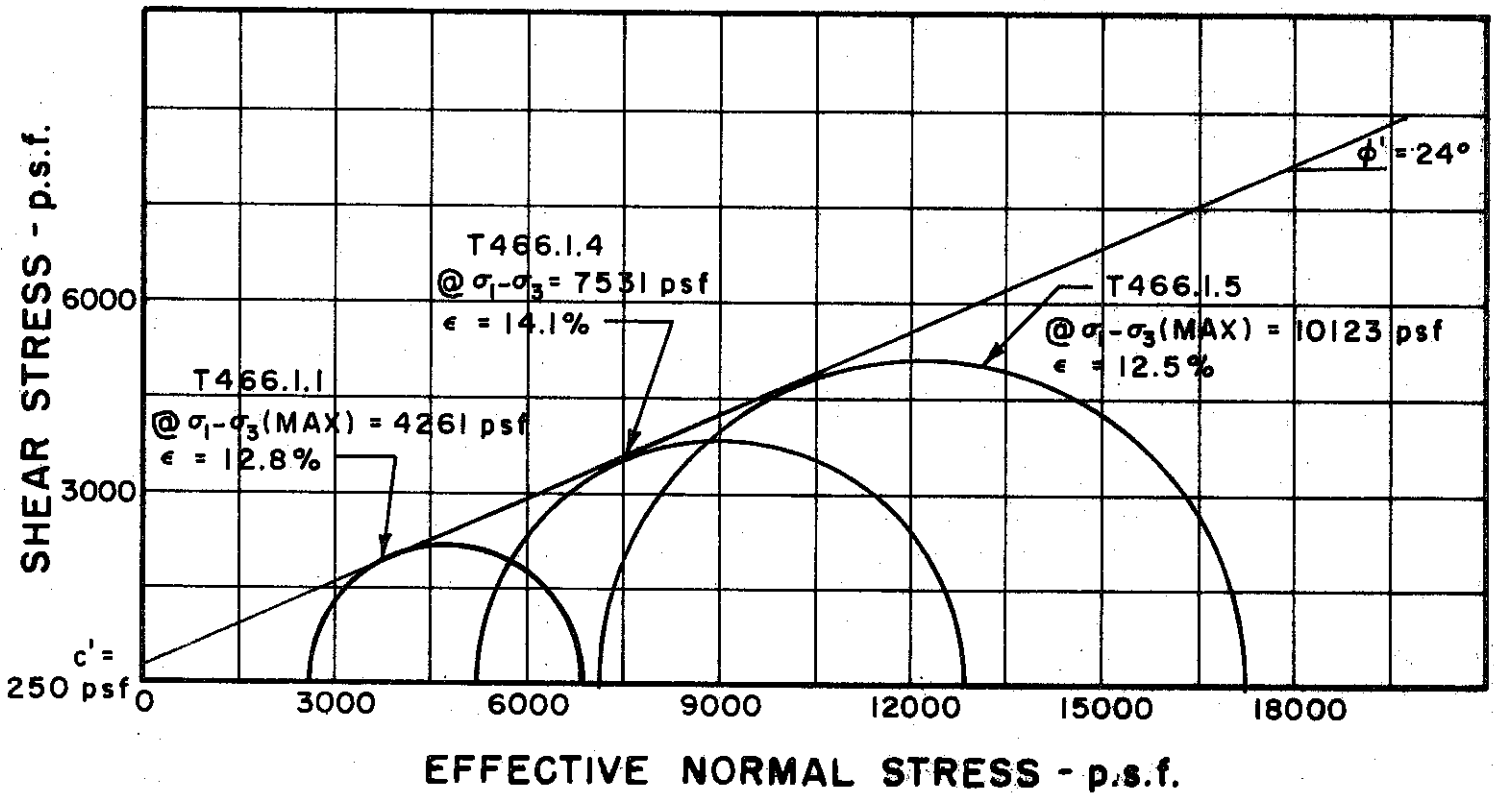
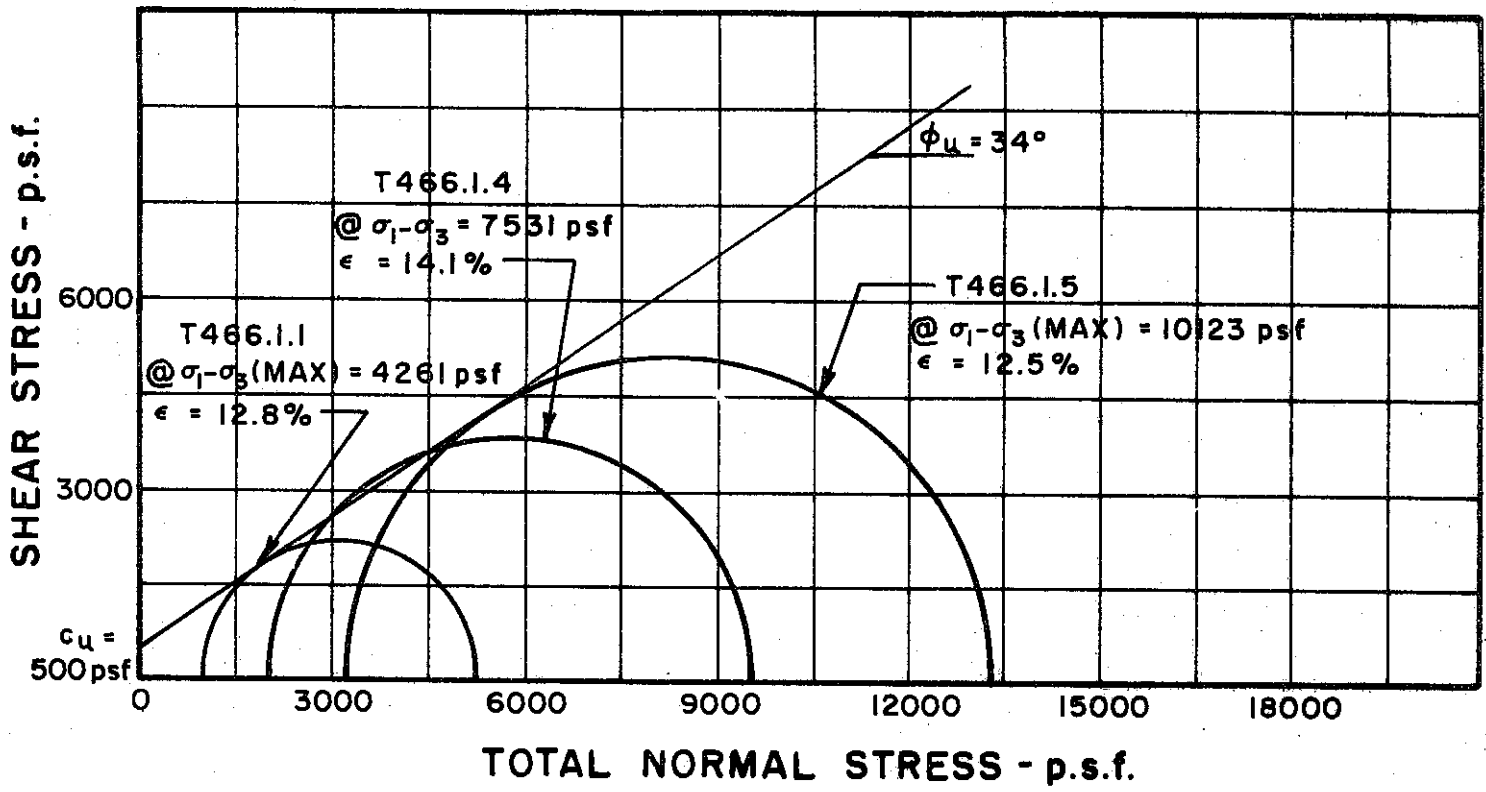
SOIL DESCRIPTION T53.1.2-CLAYEY GRAVEL(GC)  
T53.1.4-SILTY CLAY(CL)

LIQUID LIMIT (40) PLASTIC LIMIT (19)

\* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR T53.1.1, T53.1.3 AND T53.1.5

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

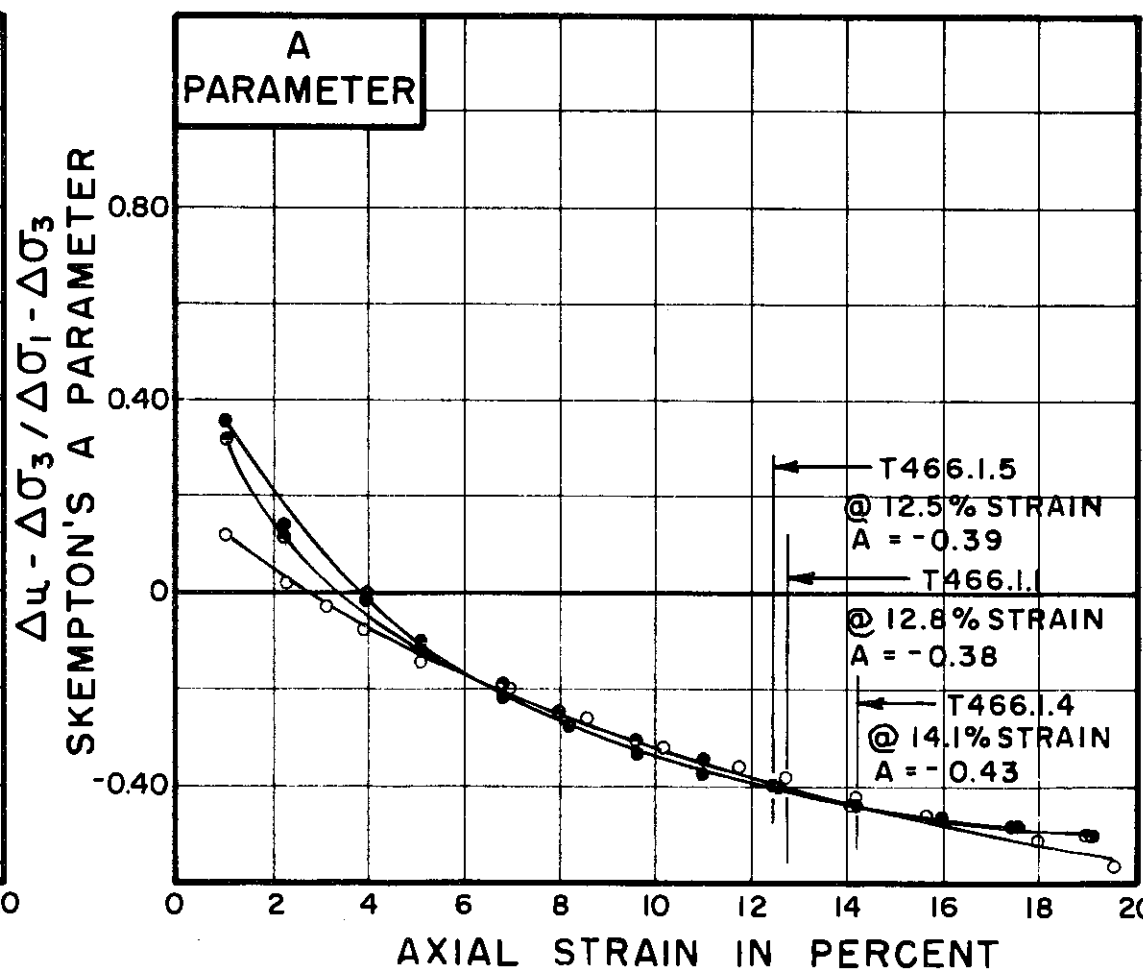
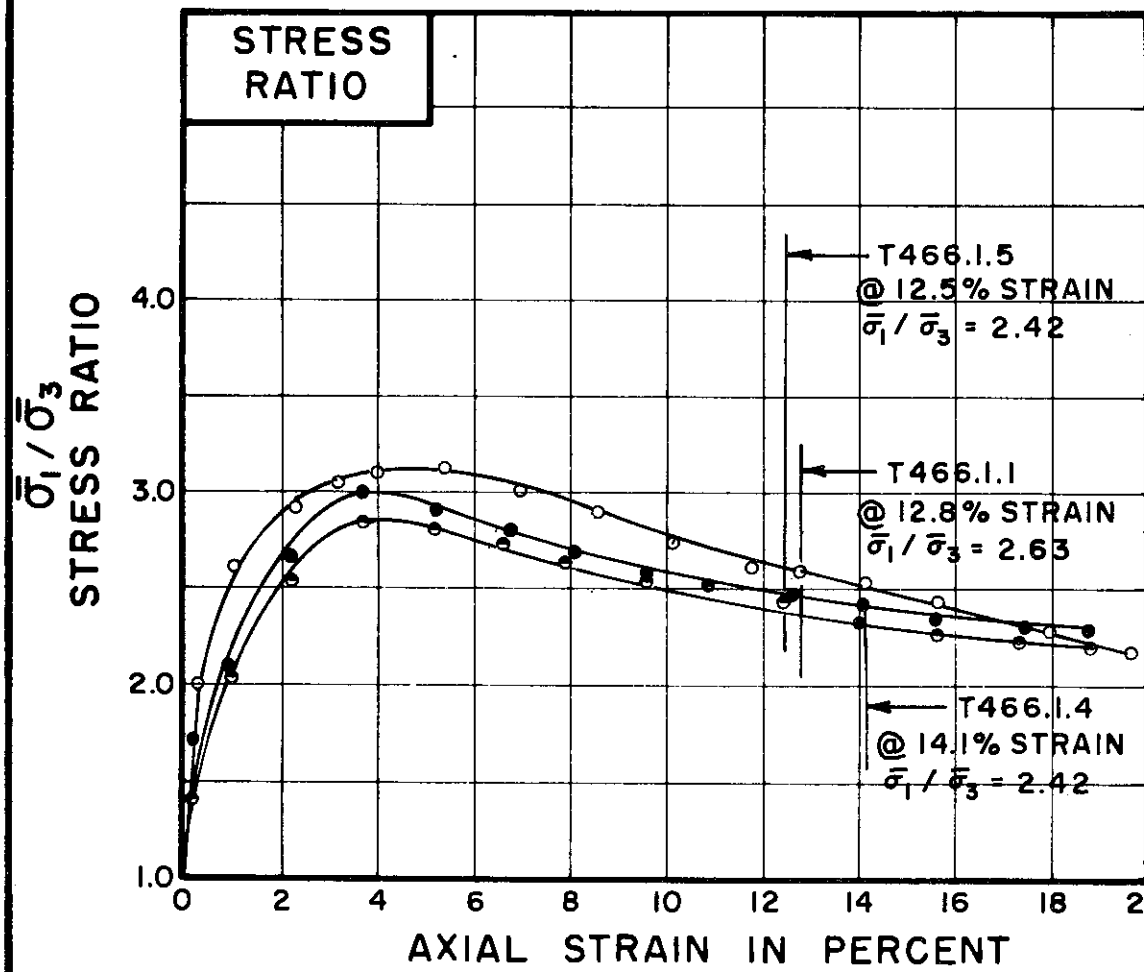
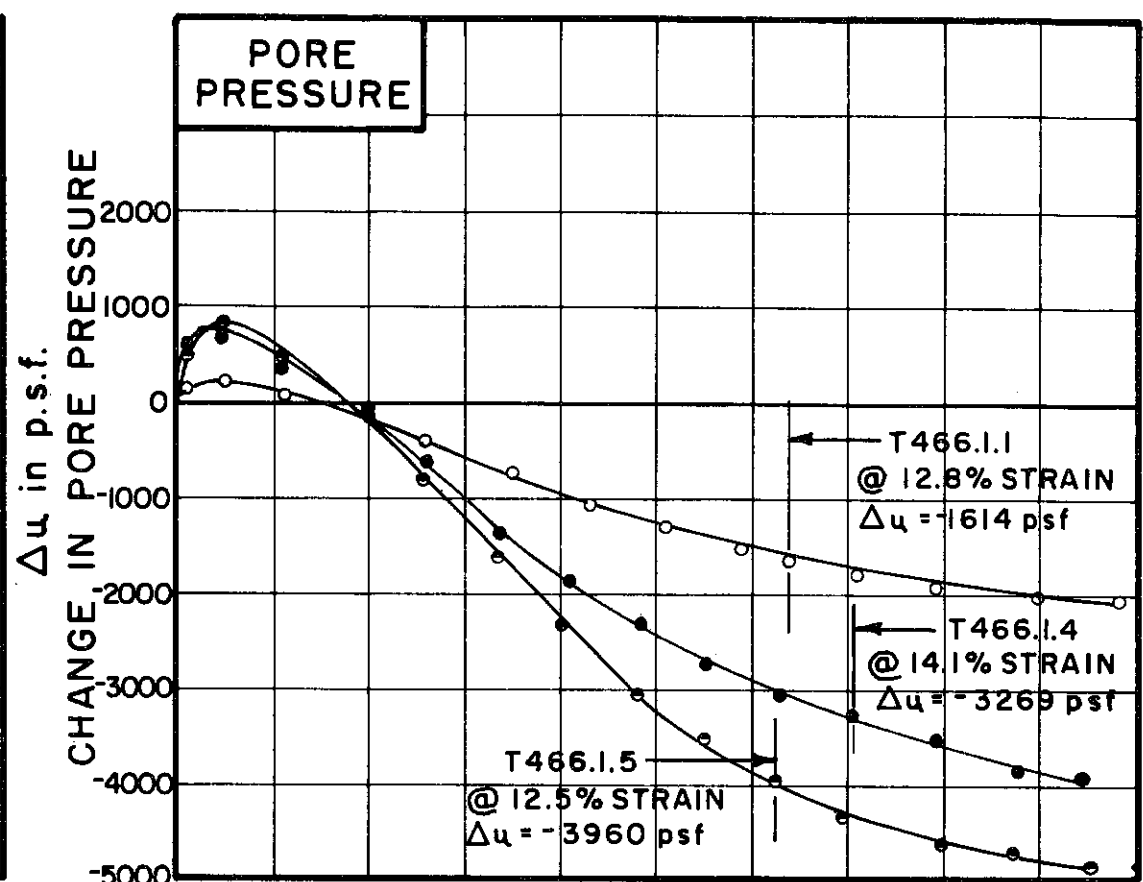
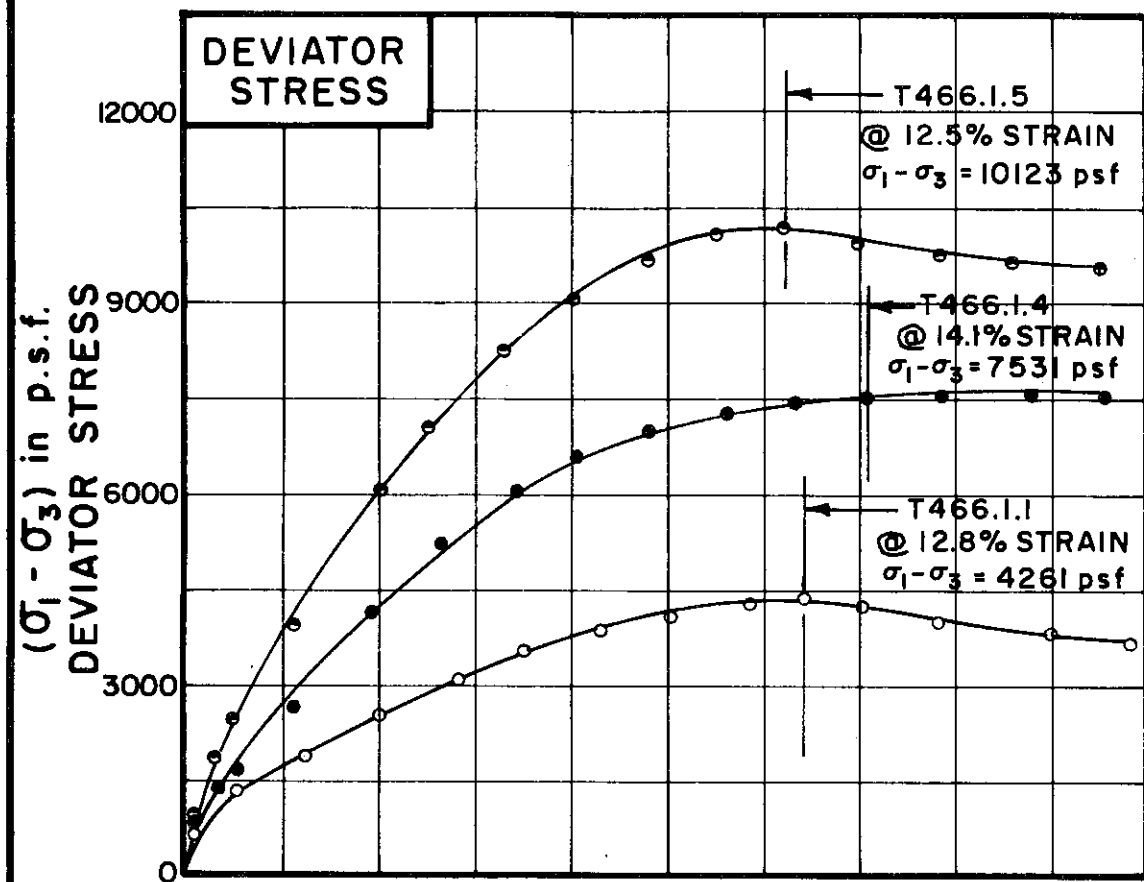


BORING NO. 101,105,127,128,180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-430



TEST NO. / SYMBOL	T466.1.1	T466.1.4	T466.1.5
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INITIAL CONDITIONS		T466.1.1	T466.1.4	T466.1.5
WATER CONTENT	$w_0$	15.3%	15.5%	15.9%
DRY DENSITY	$\gamma_d$ pcf	113	114	114
SAMPLE DIAMETER	$D_0$ in.	1.38	1.39	1.40
SAMPLE HEIGHT	$H_0$ in.	3.19	3.36	3.44
FINAL CONDITIONS BEFORE SHEAR		T466.1.1	T466.1.4	T466.1.5
FINAL BACK PRESSURE	$u_0$ p.s.f.	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$ p.s.f.	1008	2016	3168
VOLUMETRIC STRAIN	$\epsilon_{vol}$	— %	.14 %	.14 %
PORE PRESSURE RESPONSE		98%	99%	98%
FINAL CONDITIONS		T466.1.1	T466.1.4	T466.1.5
WATER CONTENT	$w_f$	21.3%	19.1%	18.4%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.024	.023
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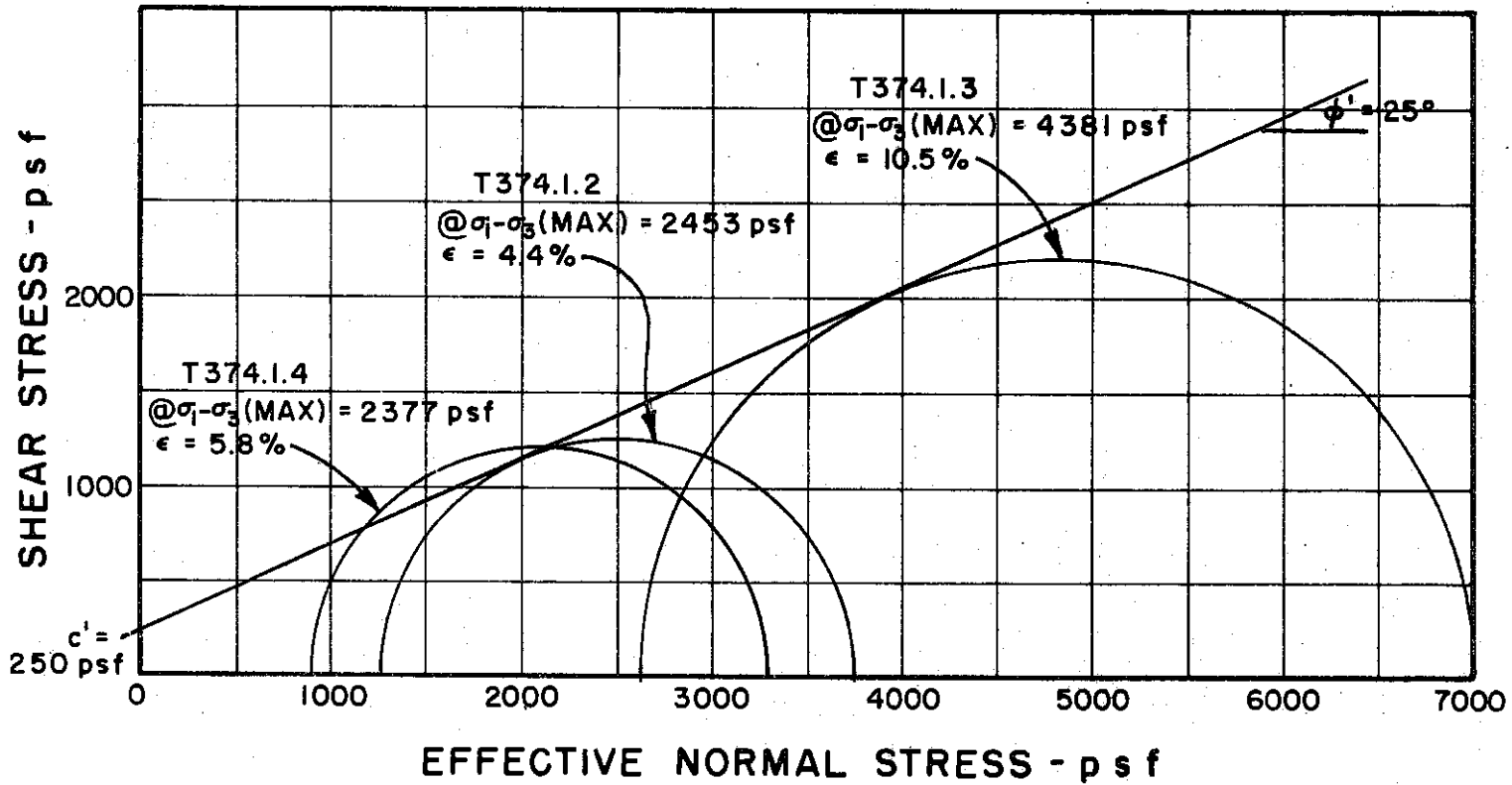
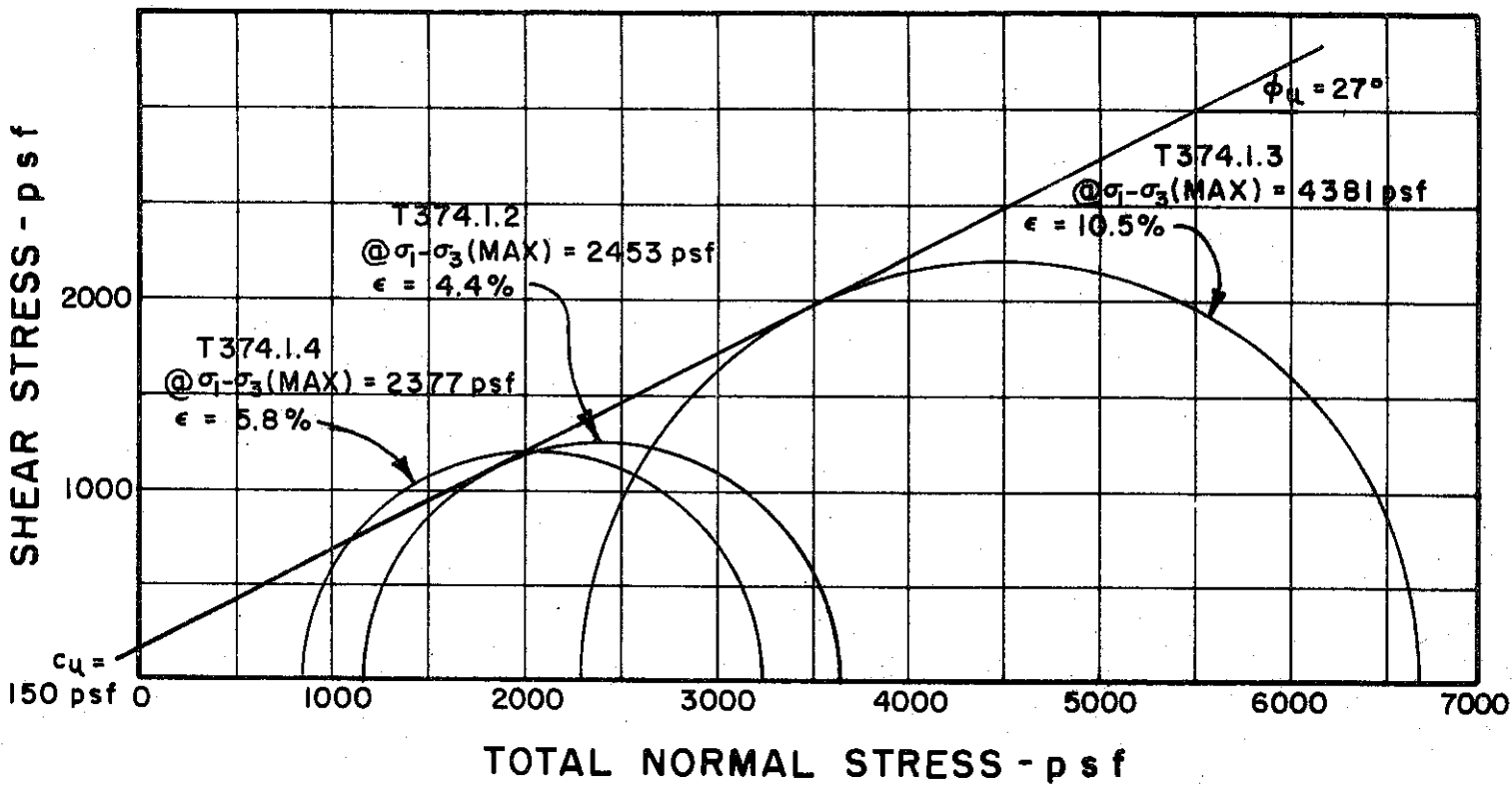
BORING NO. 101, 105, 127, 128, 180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 SEE DATA FOR INDIVIDUAL SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 2

DEPTH 9.0' TO 11.0'

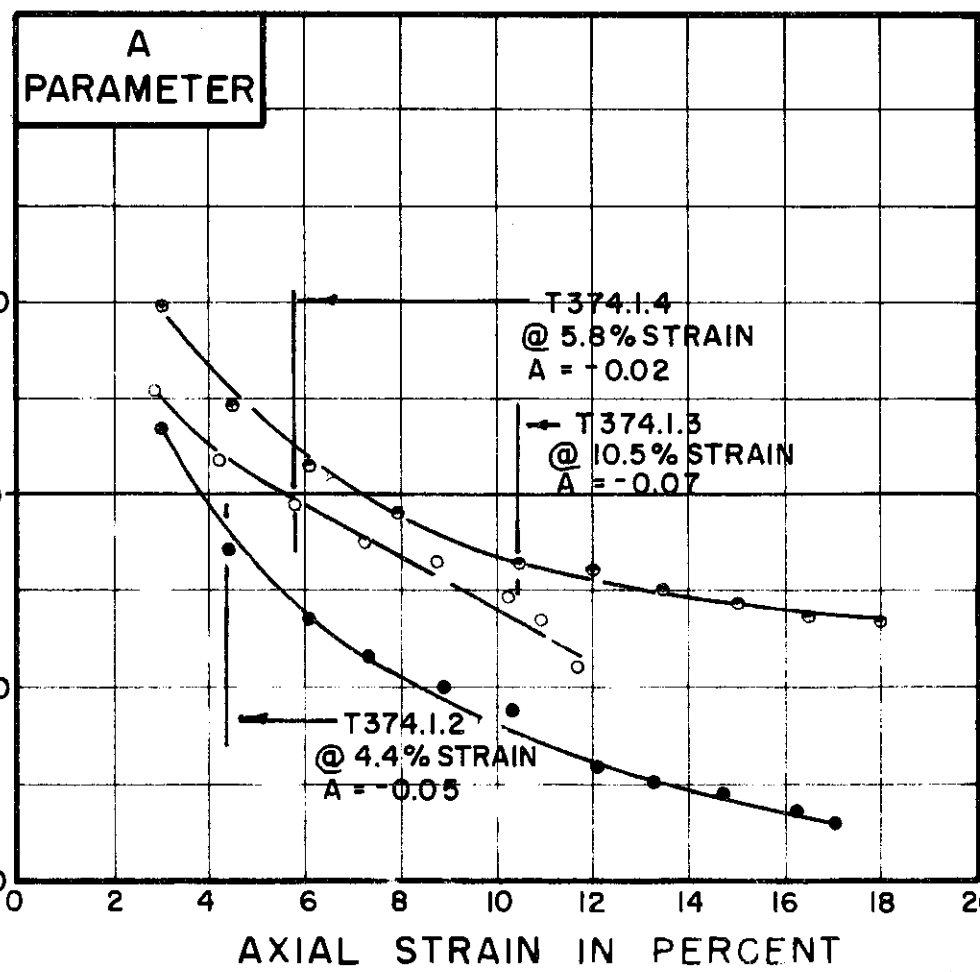
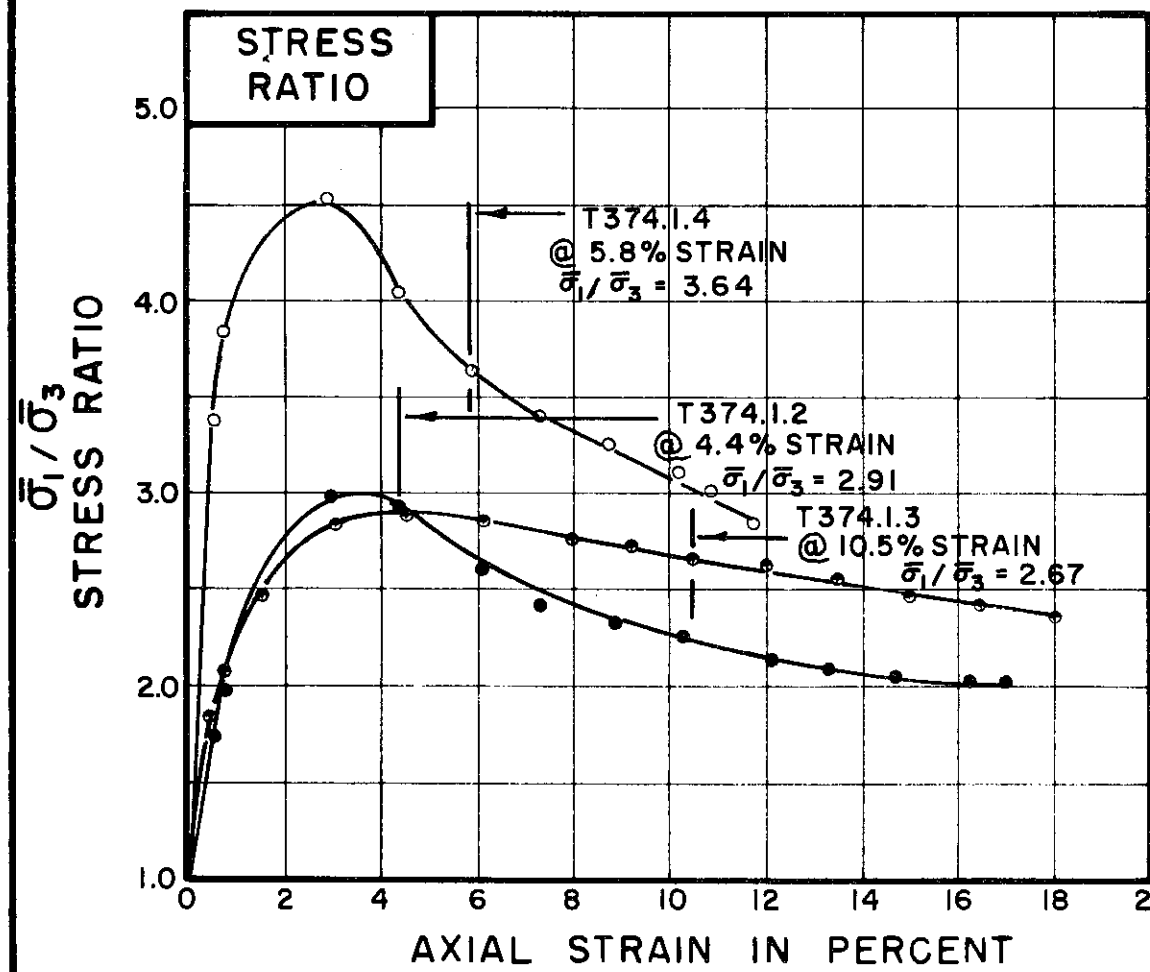
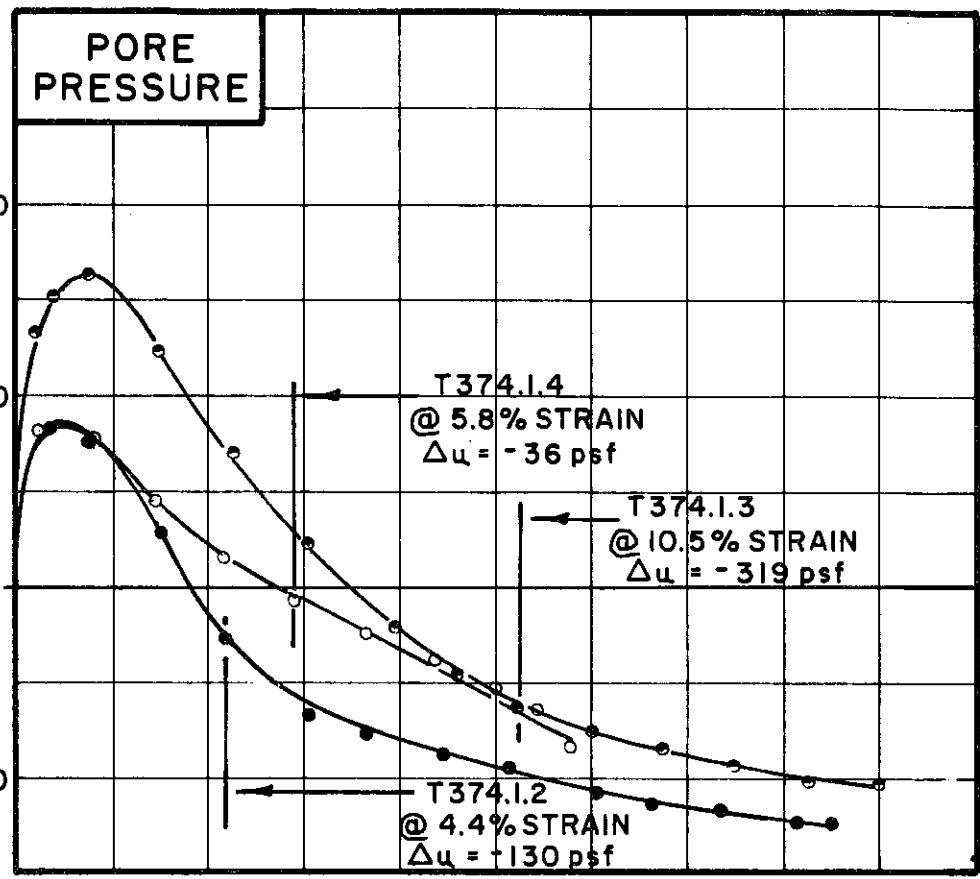
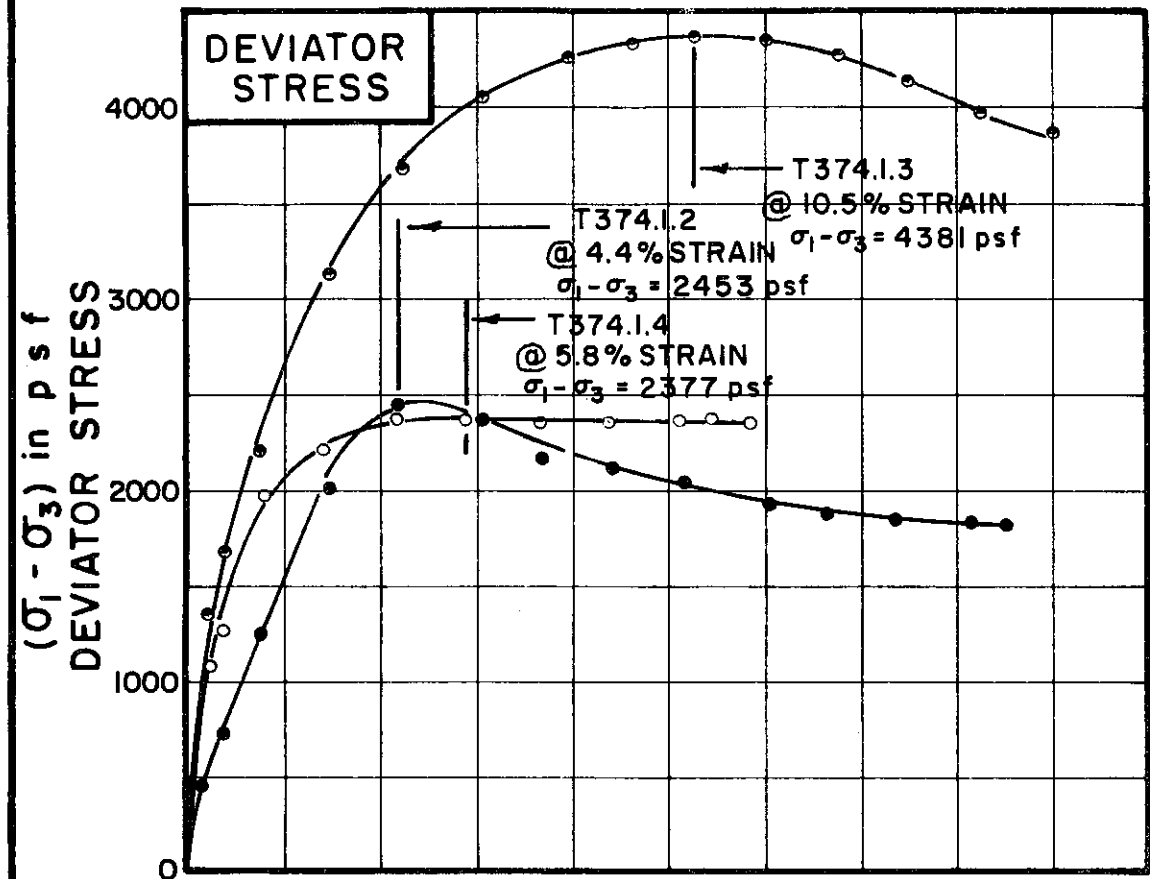
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T374.1.4	T374.1.2	T374.1.3
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INITIAL CONDITIONS		W <sub>0</sub>	27.7%	26.4%	26.9%
WATER CONTENT	W <sub>0</sub>	27.7%	26.4%	26.9%	
DRY DENSITY	γ <sub>d</sub>	98	99	96	
lb/cu ft					
SAMPLE DIAMETER	D <sub>0</sub>	1.42	1.40	1.38	
in.					
SAMPLE HEIGHT	H <sub>0</sub>	3.44	3.39	3.35	
in.					
FINAL BACK PRESSURE	u <sub>0</sub>	5760	6480	7200	
psf					
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 - \bar{\sigma}_3$	864	1152	2304	
psf					
VOLUMETRIC STRAIN	ε <sub>vol</sub>	0.60%	0.50%	1.35%	
PORE PRESSURE RESPONSE		98%	95%	95%	
FINAL CONDITIONS BEFORE SHEAR					
WATER CONTENT	W <sub>f</sub>	28.5%	27.7%	27.6%	
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.024
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BORING NO. 105

SAMPLE NO. 2

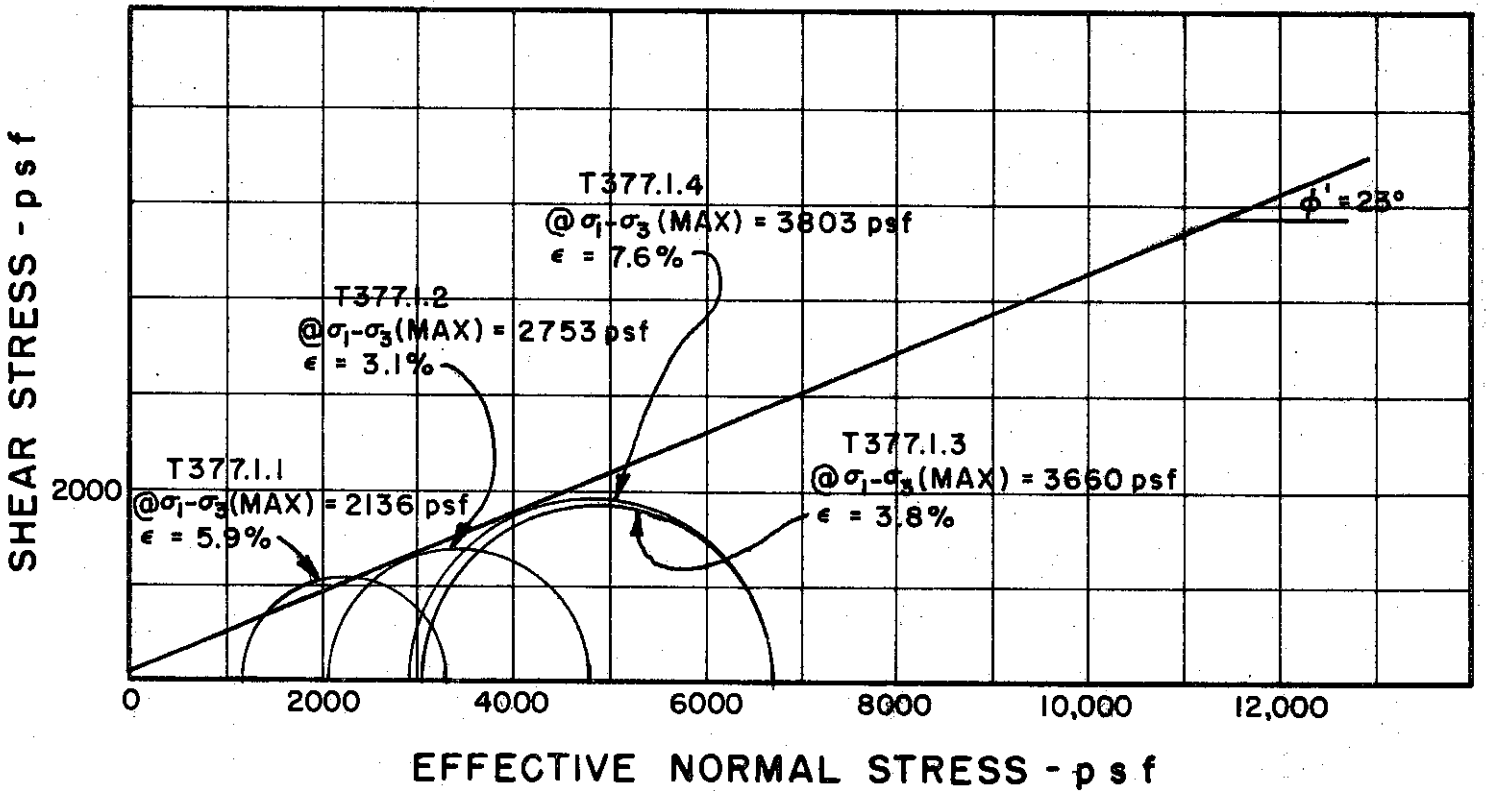
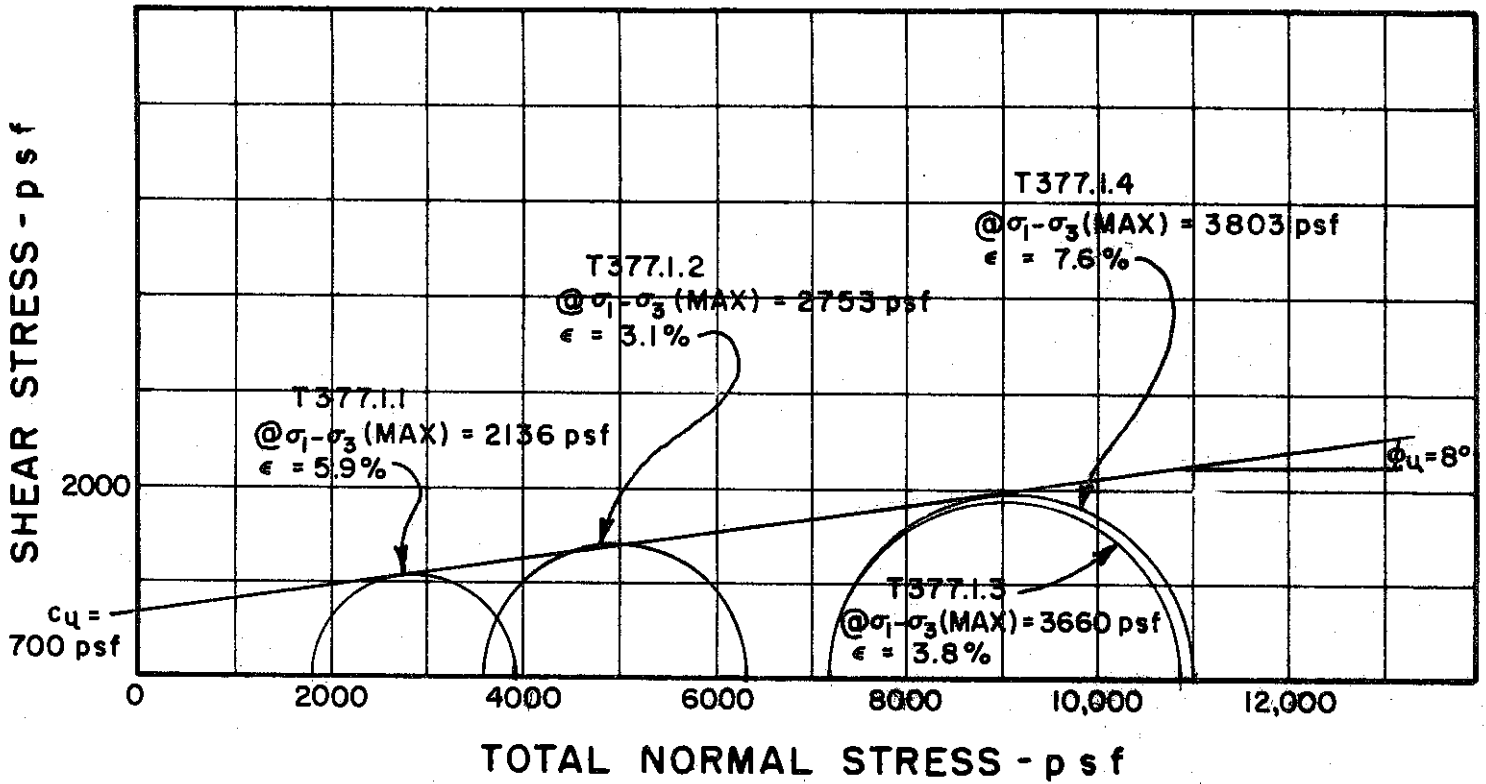
DEPTH 9.0' TO 11.0'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 46 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 5

DEPTH 40.0' TO 42.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

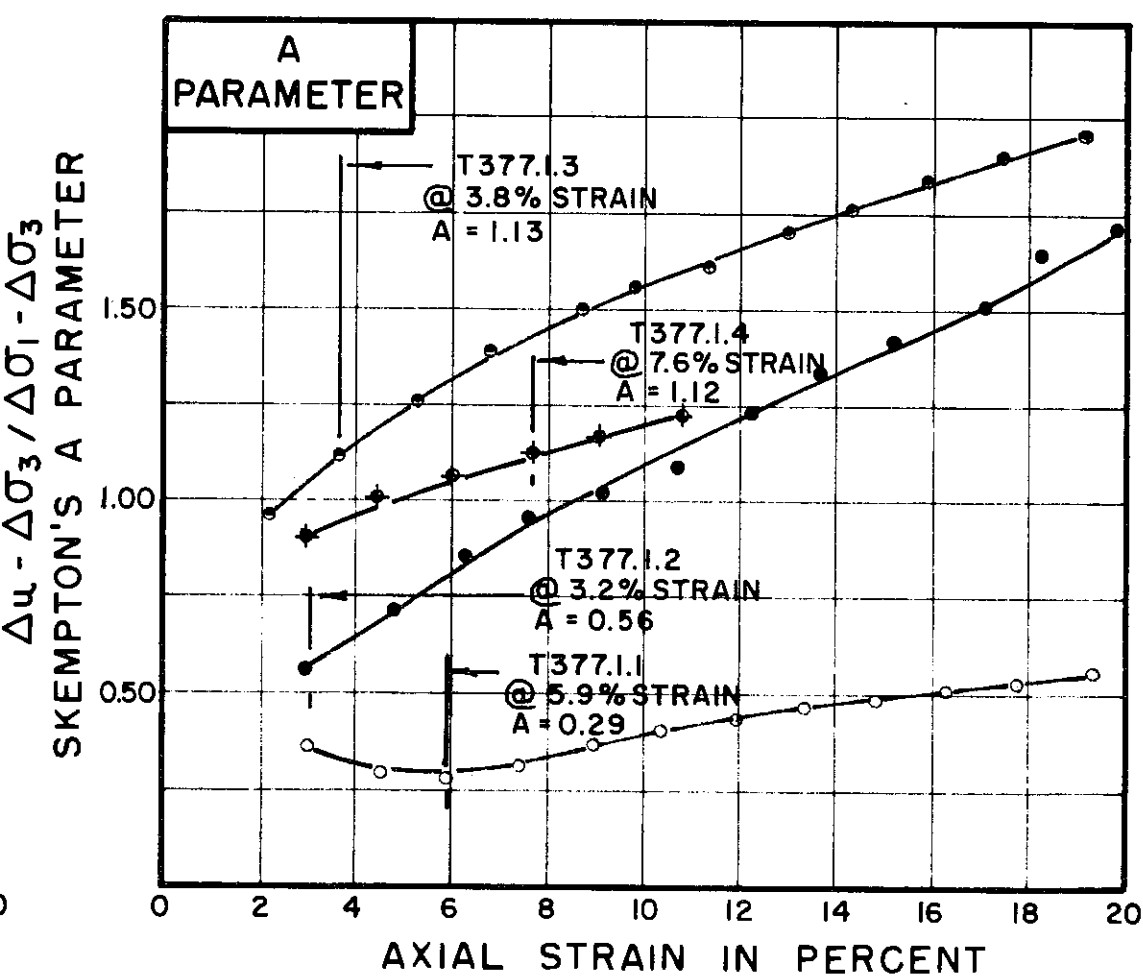
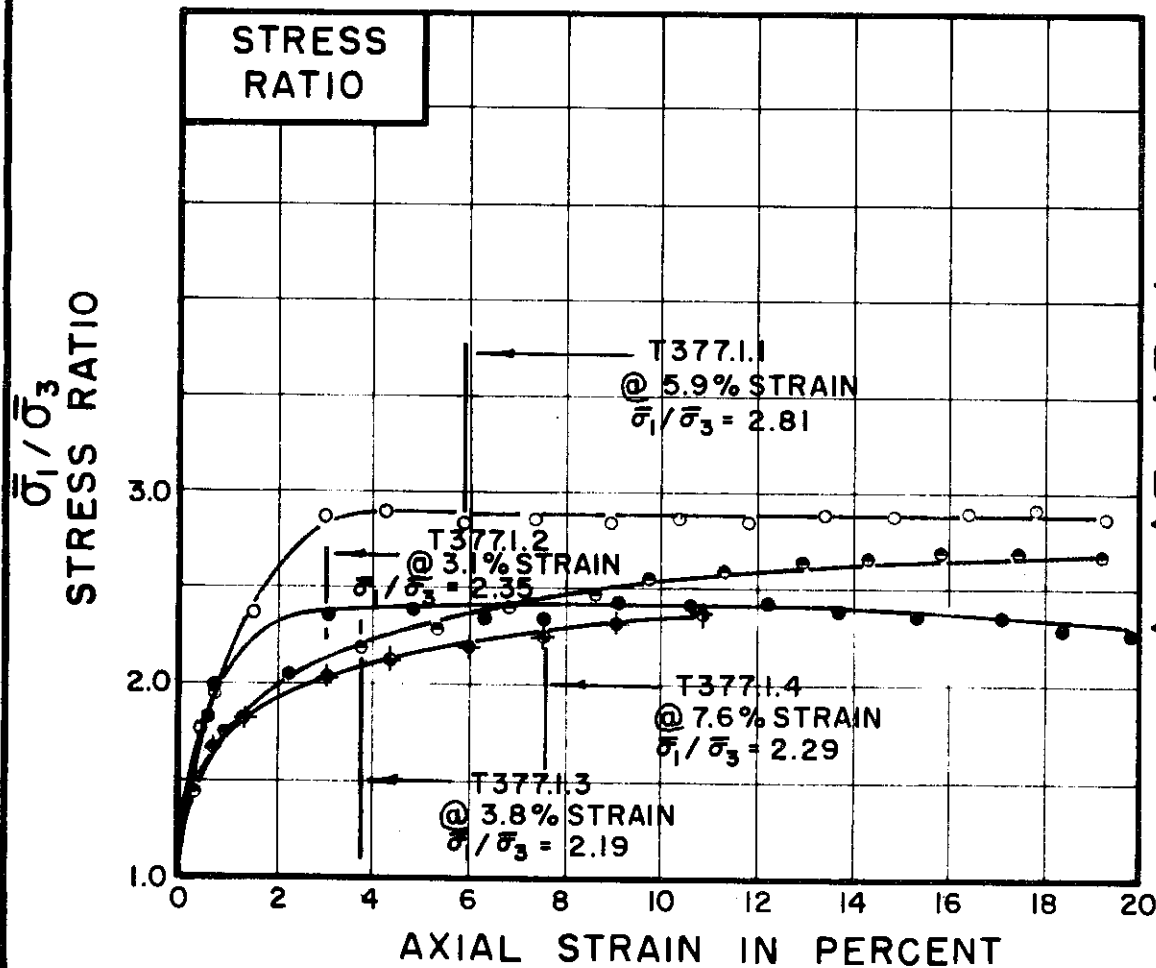
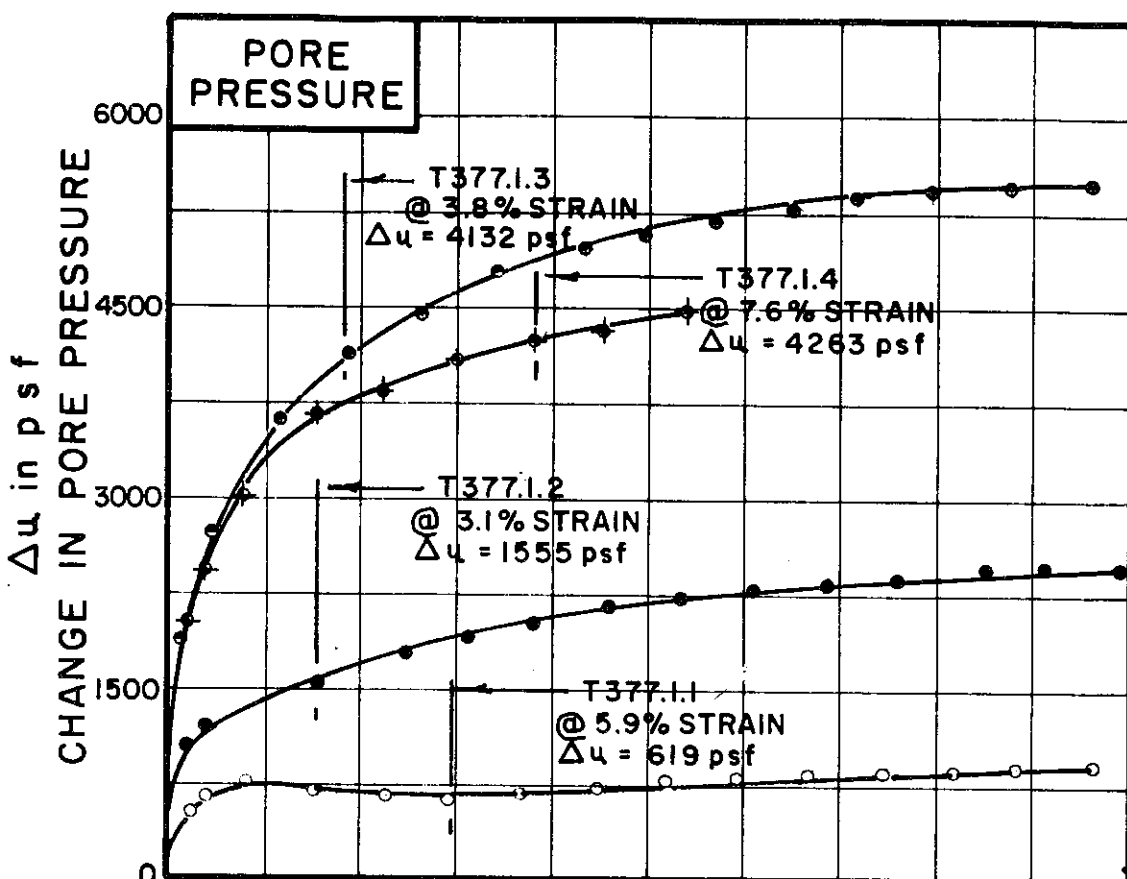
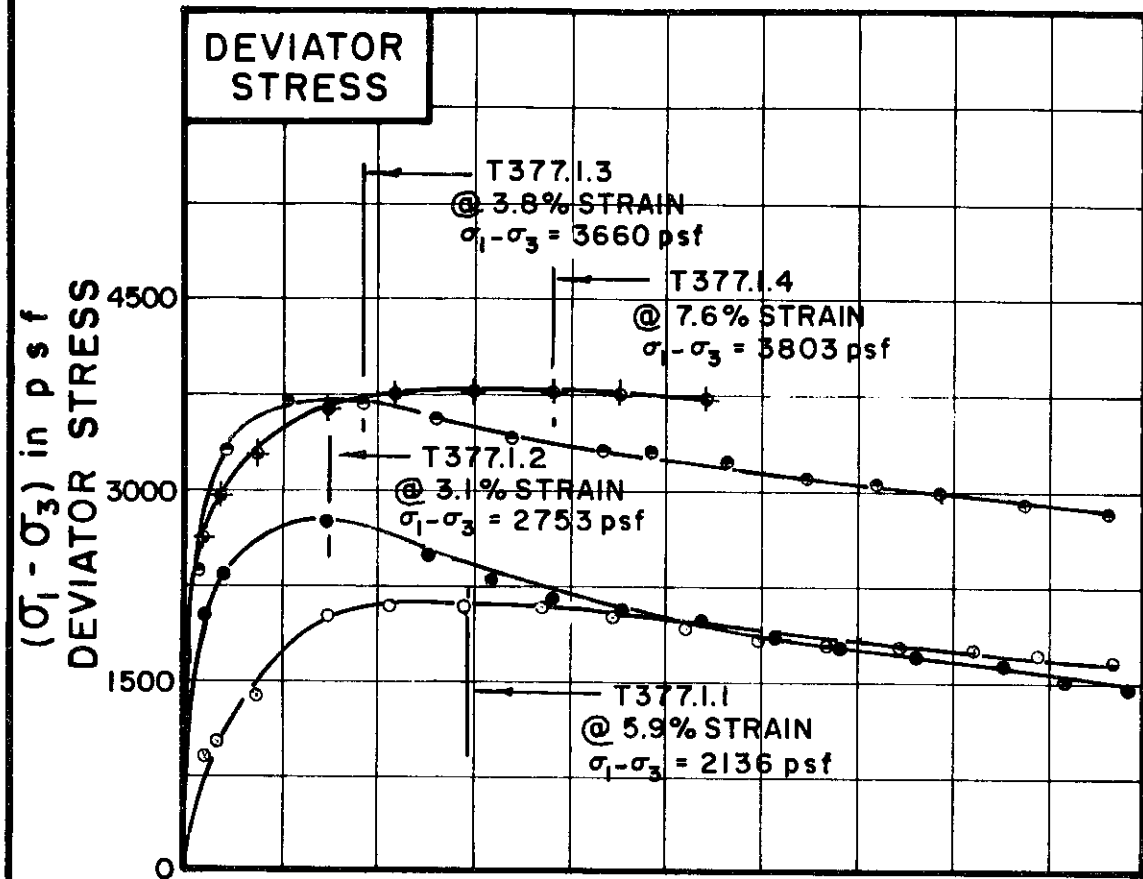
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-434



TEST NO. / SYMBOL	T377.1.1	T377.1.2	T377.1.3	T377.1.4
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INITIAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_0$		35.9%	35.9%	35.1%	39.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	84	85	85	84
SAMPLE DIAMETER	$D_0$	in.	1.39	1.42	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.38	3.30	3.34	3.37
CONDITIONS BEFORE SHEAR			T377.1.1	T377.1.2	T377.1.3	T377.1.4
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\sigma_1 / \sigma_3$	psf	1800	3600	7200	7200
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.49%	2.38%	4.36%	7.47%
PORE PRESSURE RESPONSE			97%	96%	96%	96%
FINAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_f$		35.3%	34.1%	30.9%	33.4%
SKETCH OF SAMPLE AT END OF TEST						

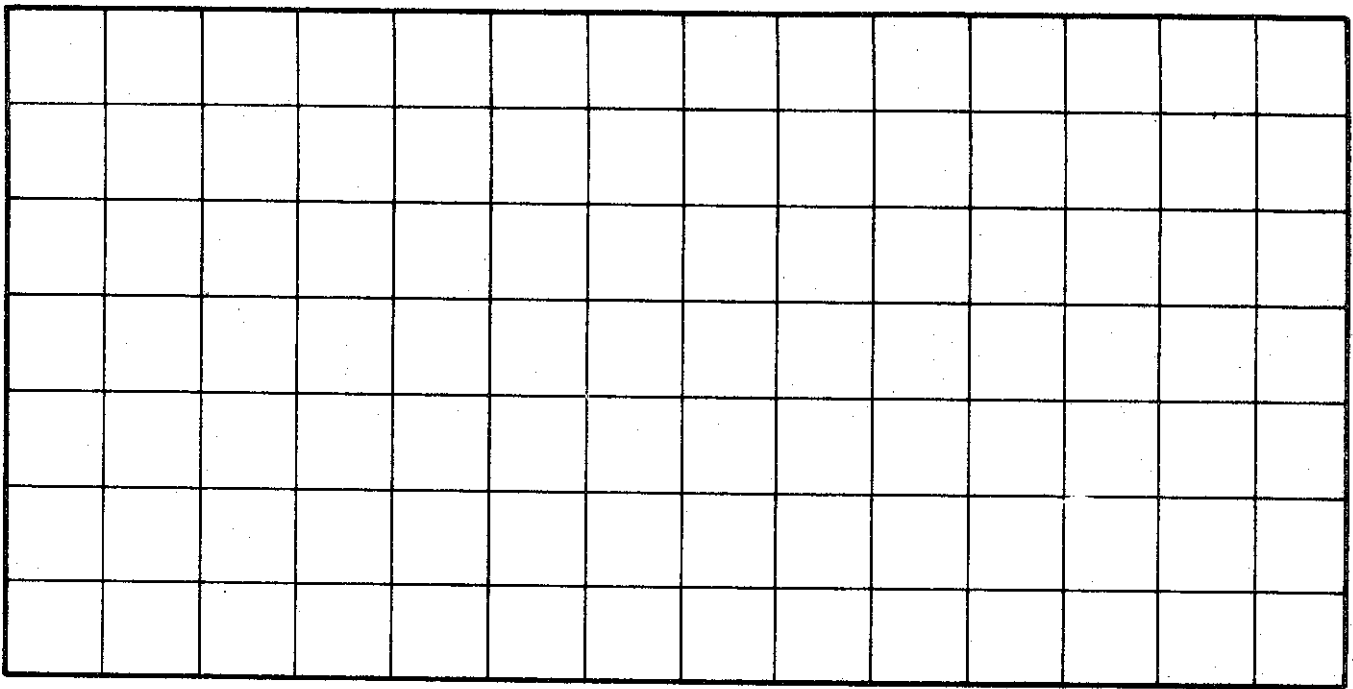
RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024	.024
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BORING NO. 105  
 SAMPLE NO. 5  
 DEPTH 40.0' TO 42.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

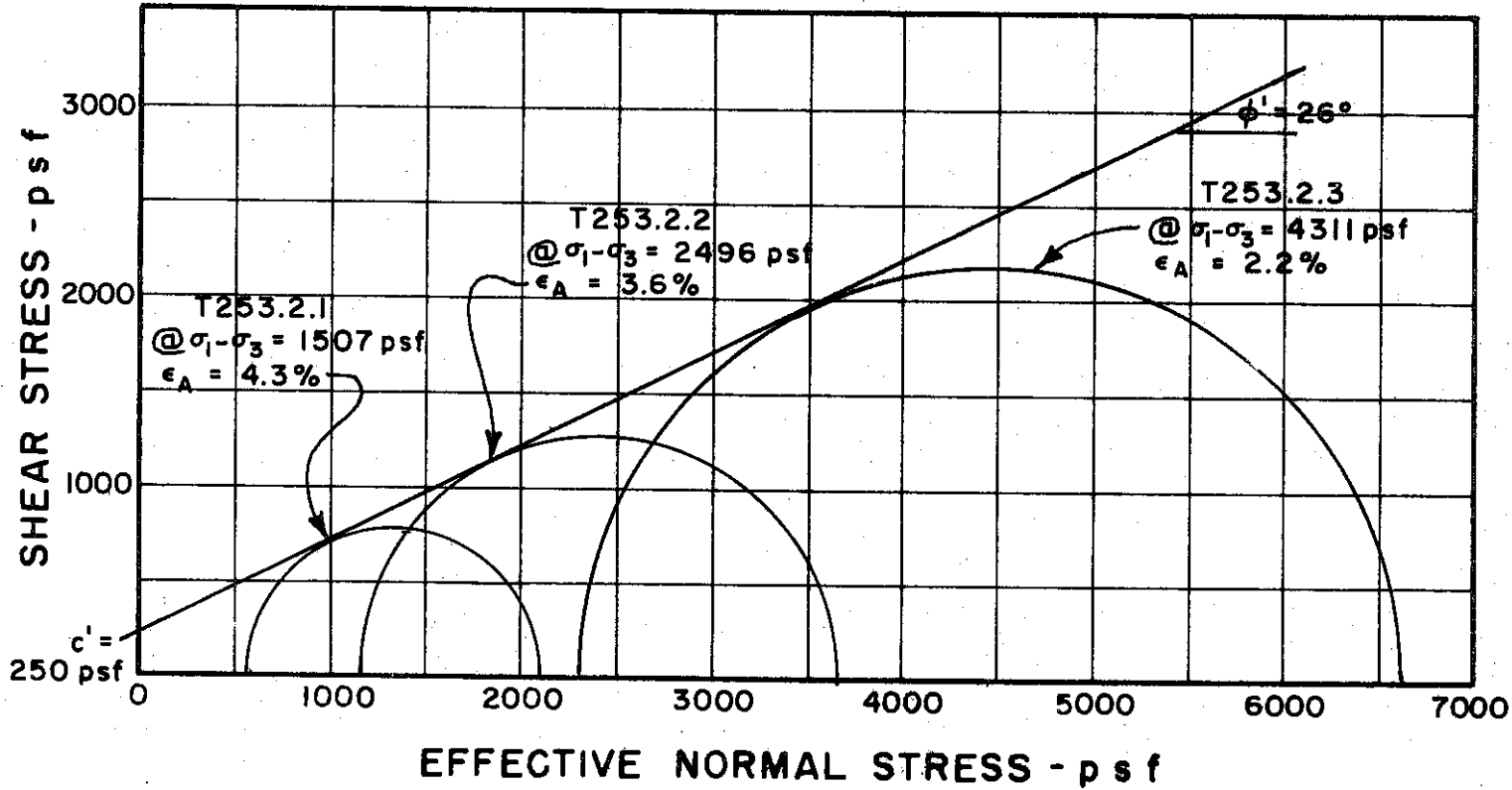
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f



BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

REMARKS \_\_\_\_\_

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

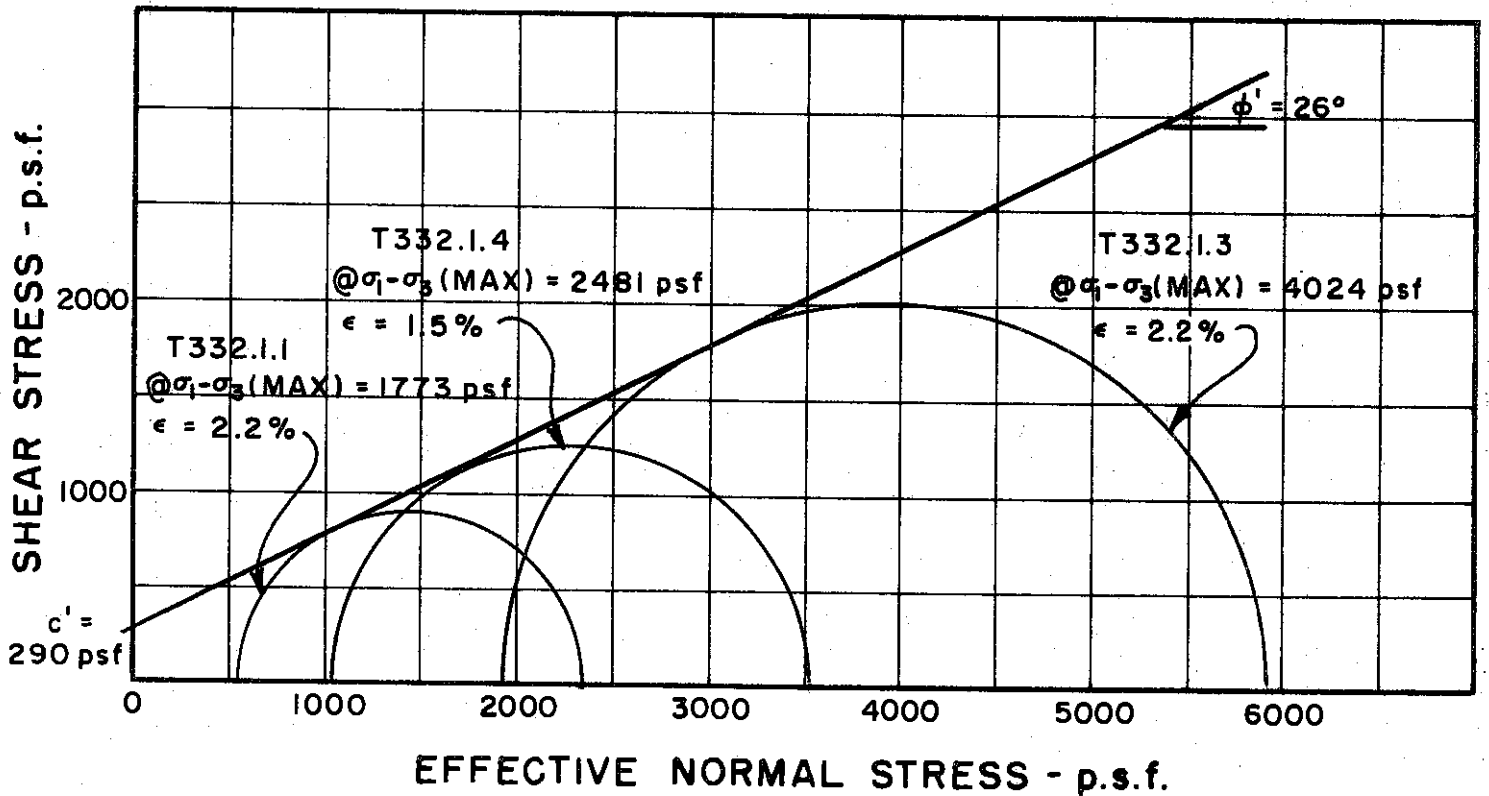
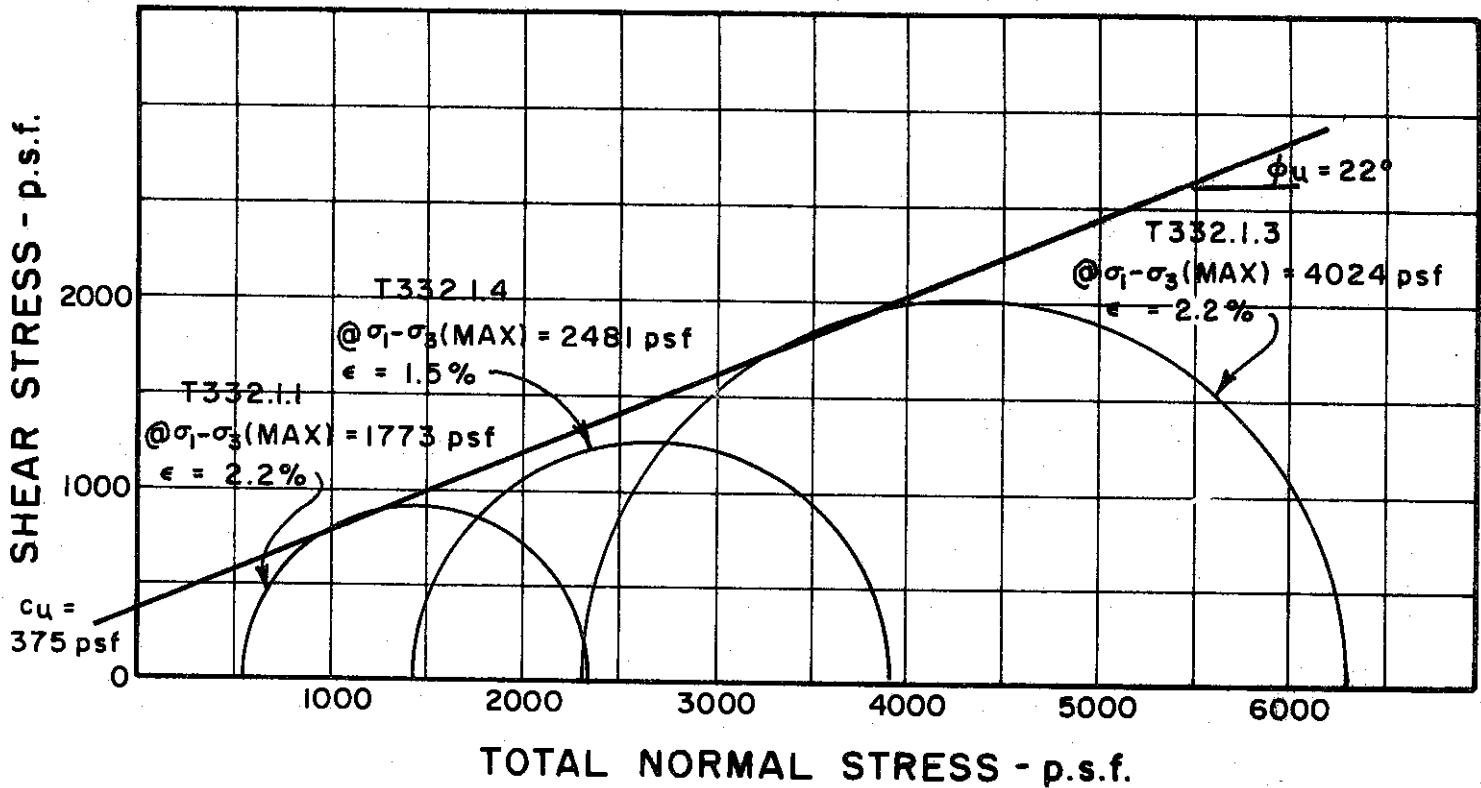
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-436





BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

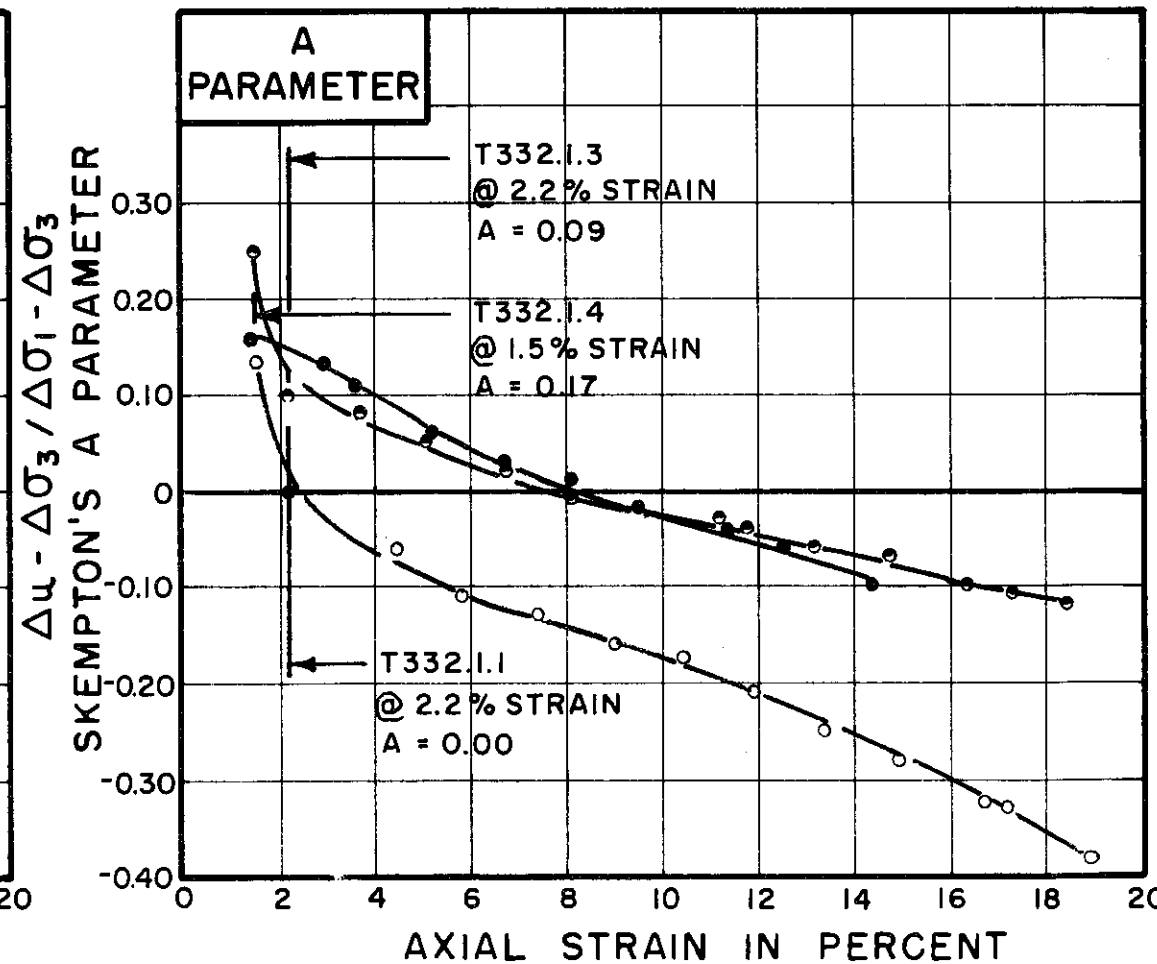
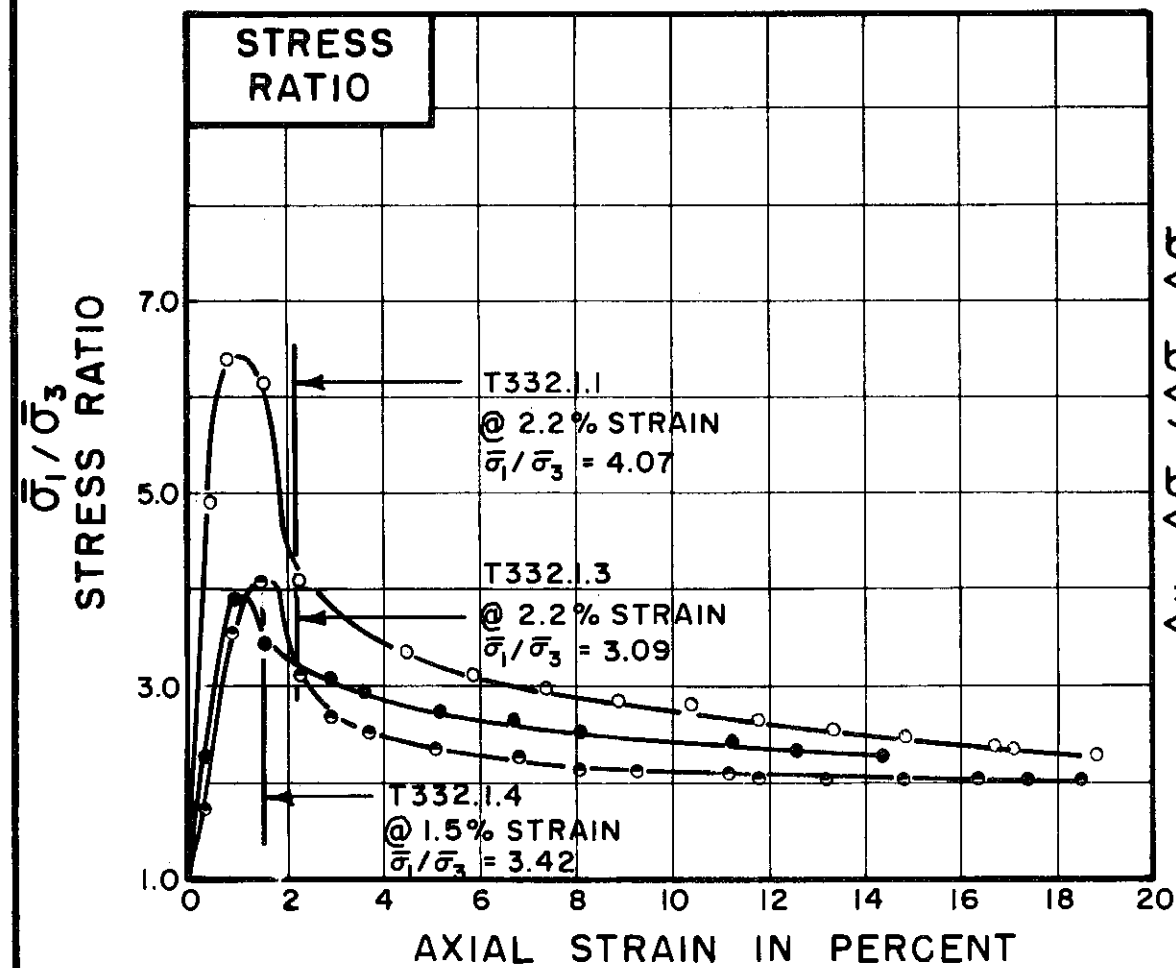
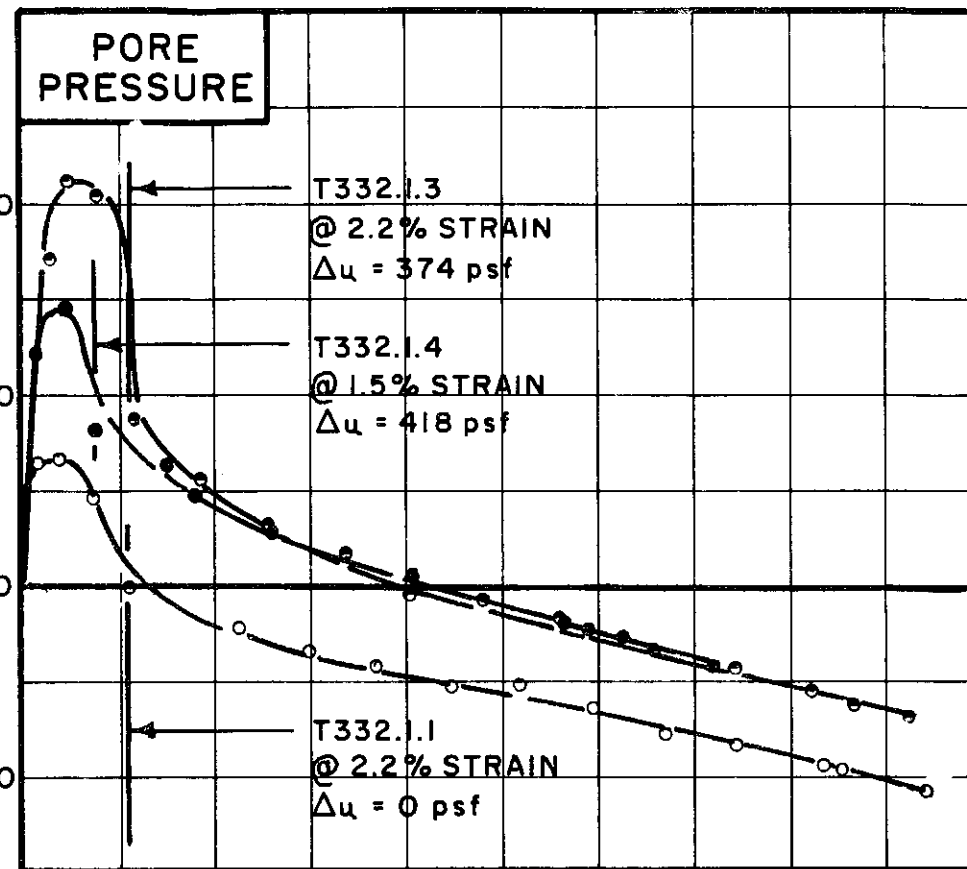
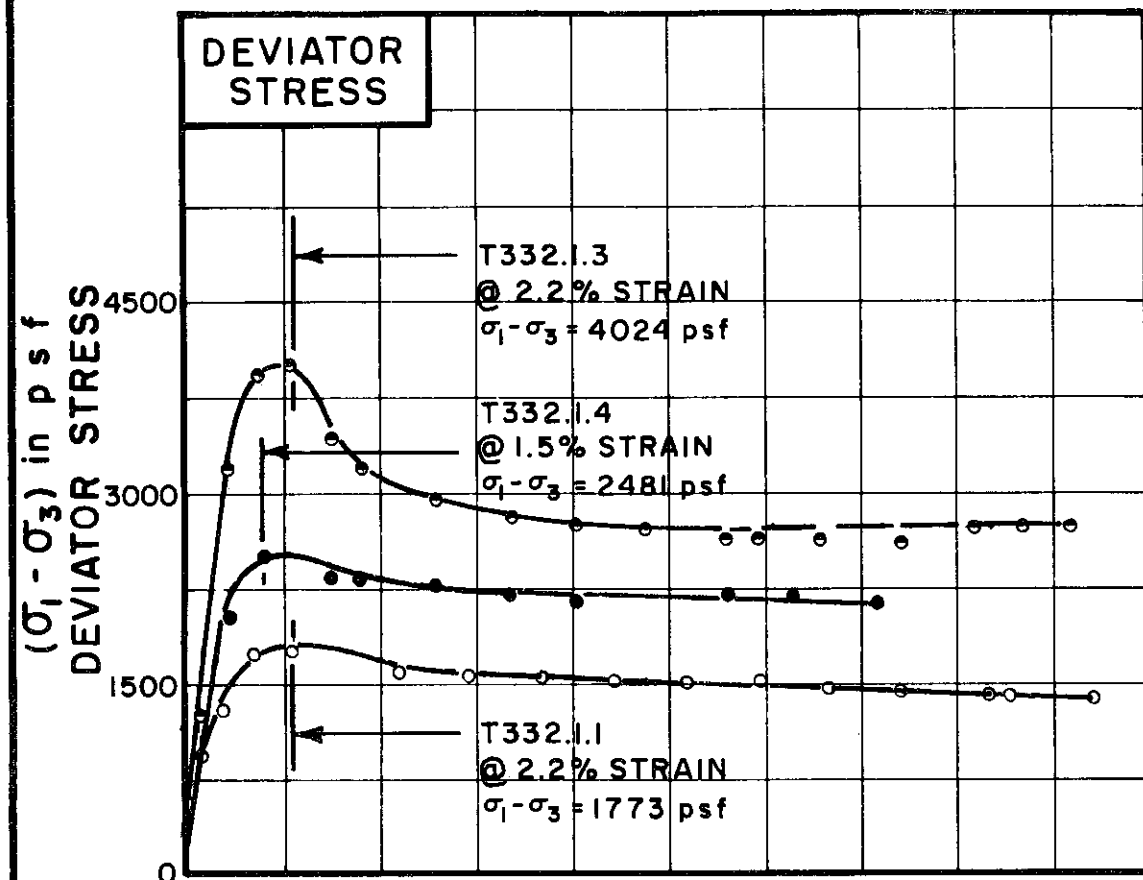
REMARKS ENVELOPE IS INTERPRETIVE  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-437



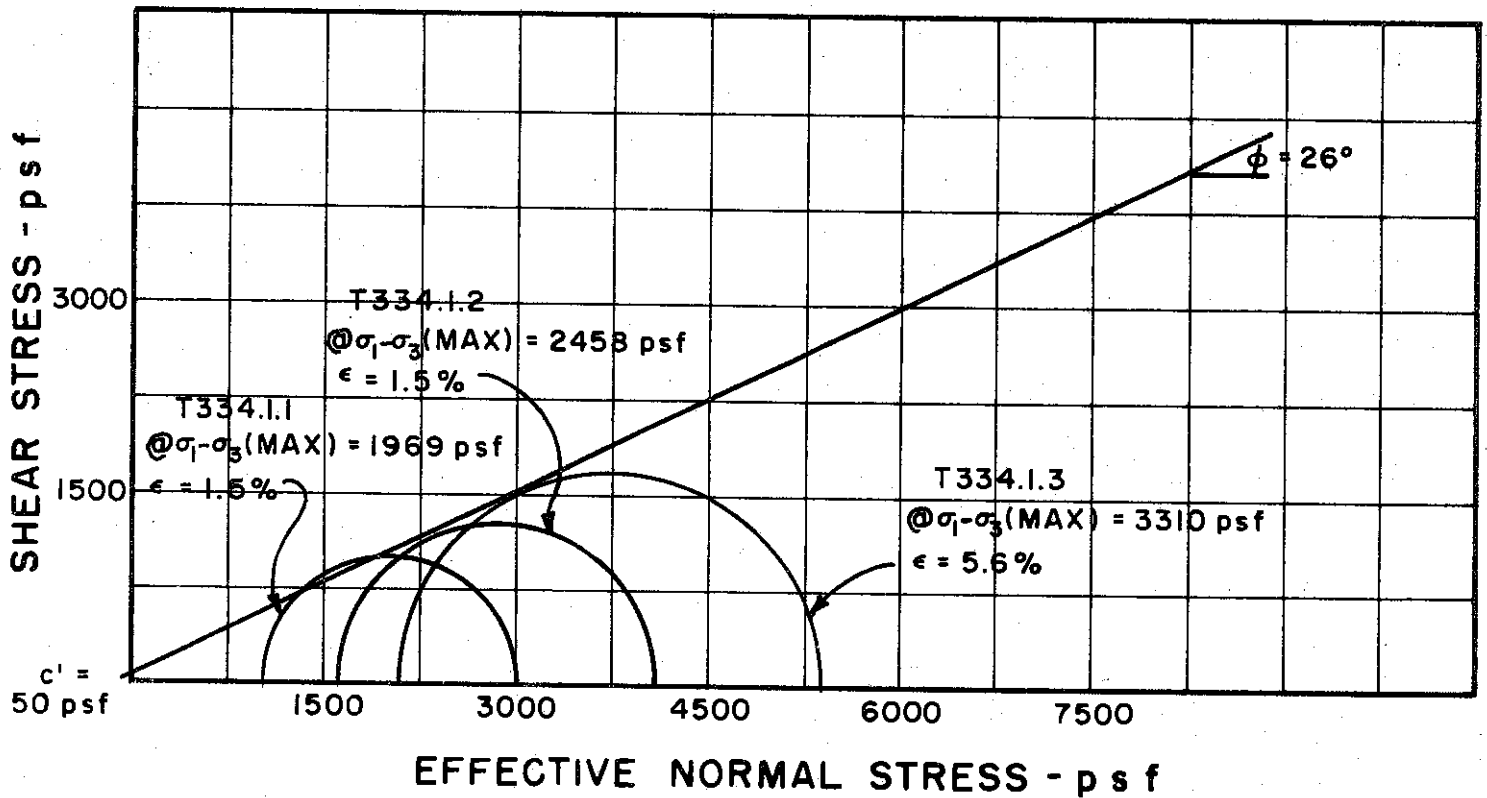
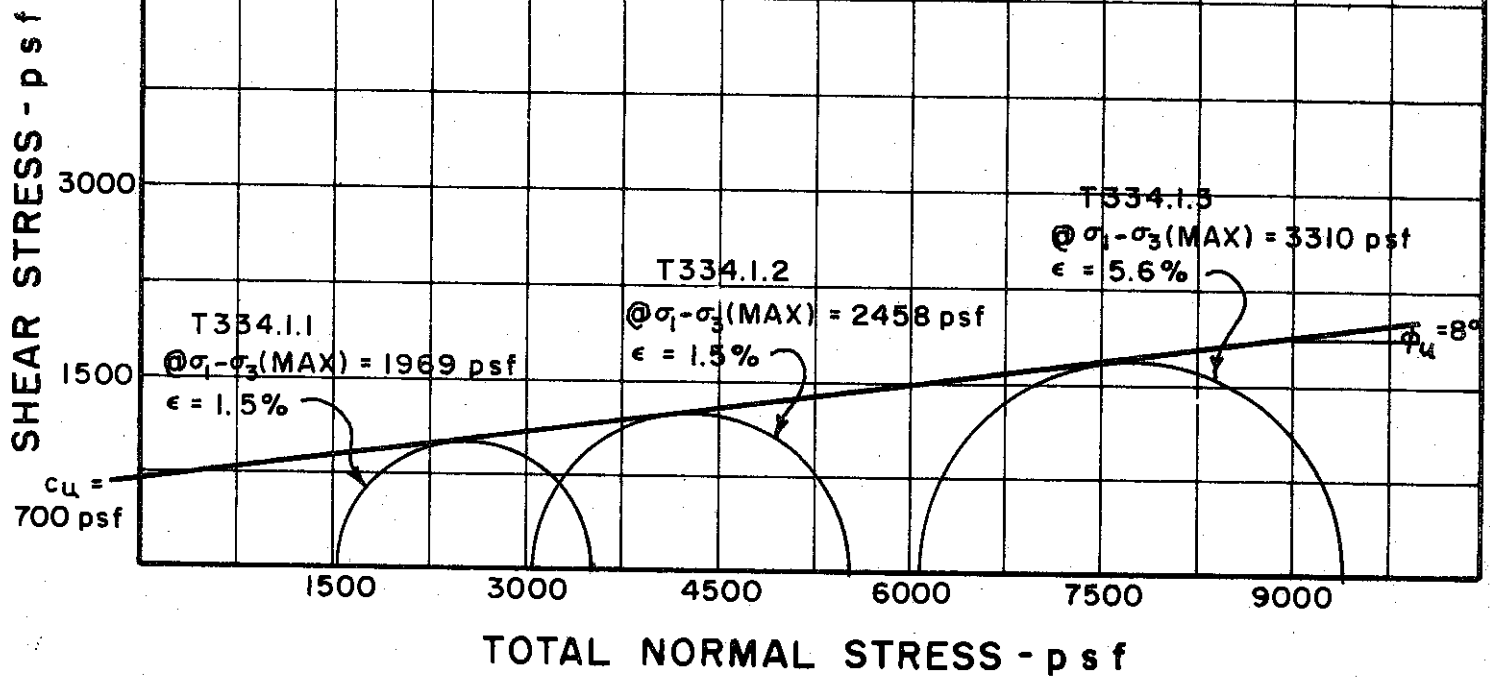
TEST NO. / SYMBOL	T332.1.1	T332.1.4	T332.1.3
	○	●	●

INITIAL CONDITIONS	WATER CONTENT	$w_0$	28.3%	29.2%	27.9%
	DRY DENSITY	$\gamma_d$	95	94	99
	pcf				
SAMPLE DIMENSIONS	SAMPLE DIAMETER	$D_0$	1.42	1.41	1.41
	in.				
	SAMPLE HEIGHT	$H_0$	3.36	3.38	3.40
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	8640	7200	8640
	psf				
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	576	1440	2304
psf					
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.4%	1.7%	1.9%
PORE PRESSURE RESPONSE			98%	98%	99%
FINAL CONDITIONS AFTER SHEAR	WATER CONTENT	$w_f$	29.4%	29.5%	27.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-438



BORING NO. 119

SAMPLE NO. 4

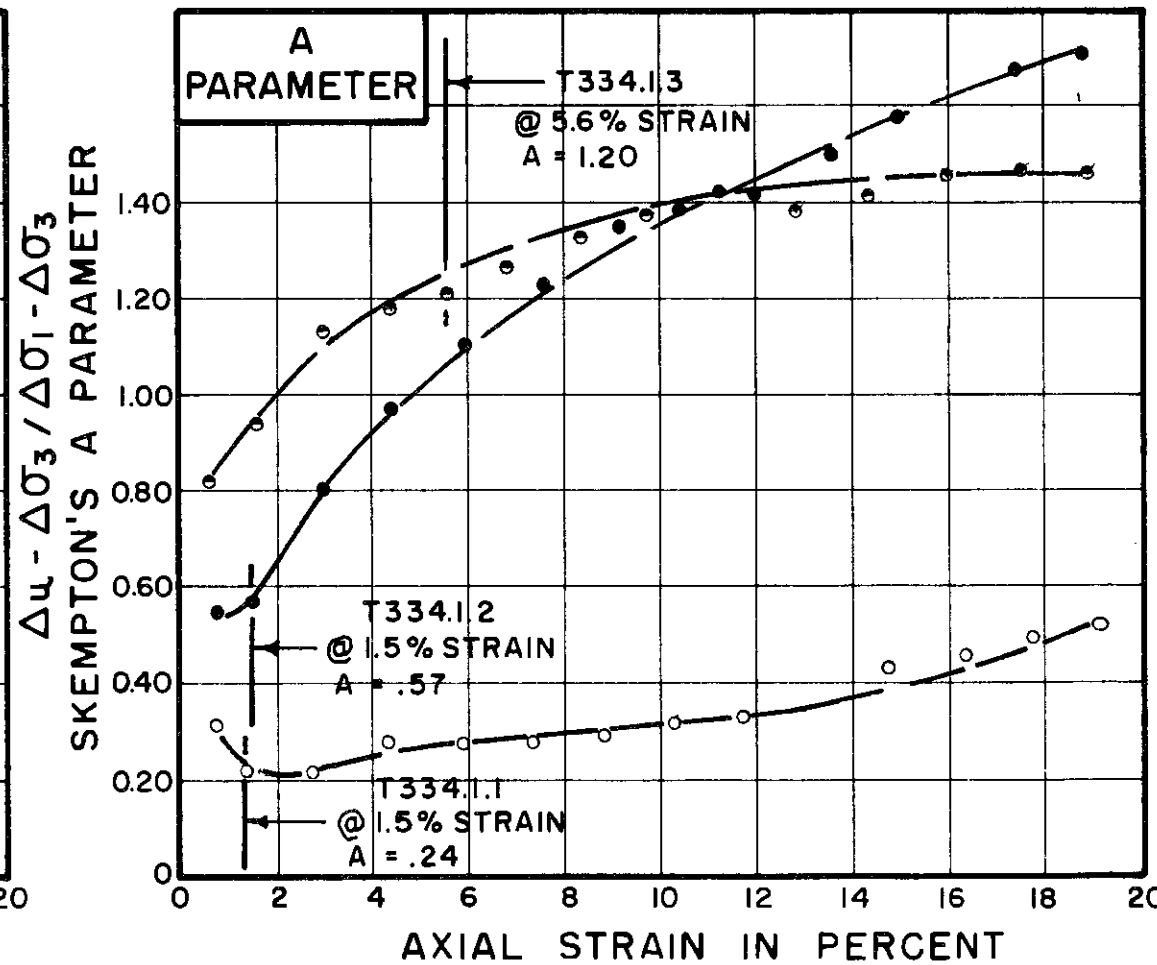
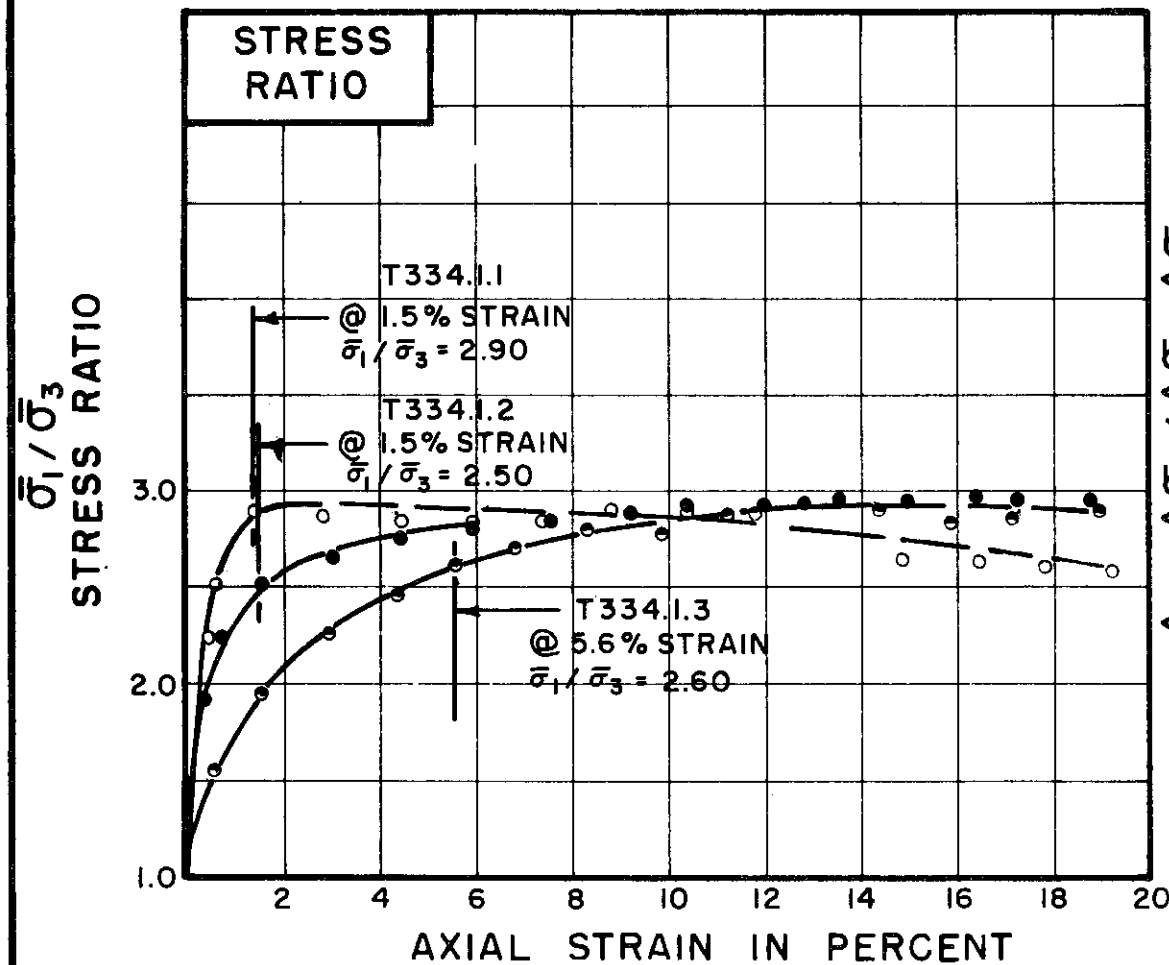
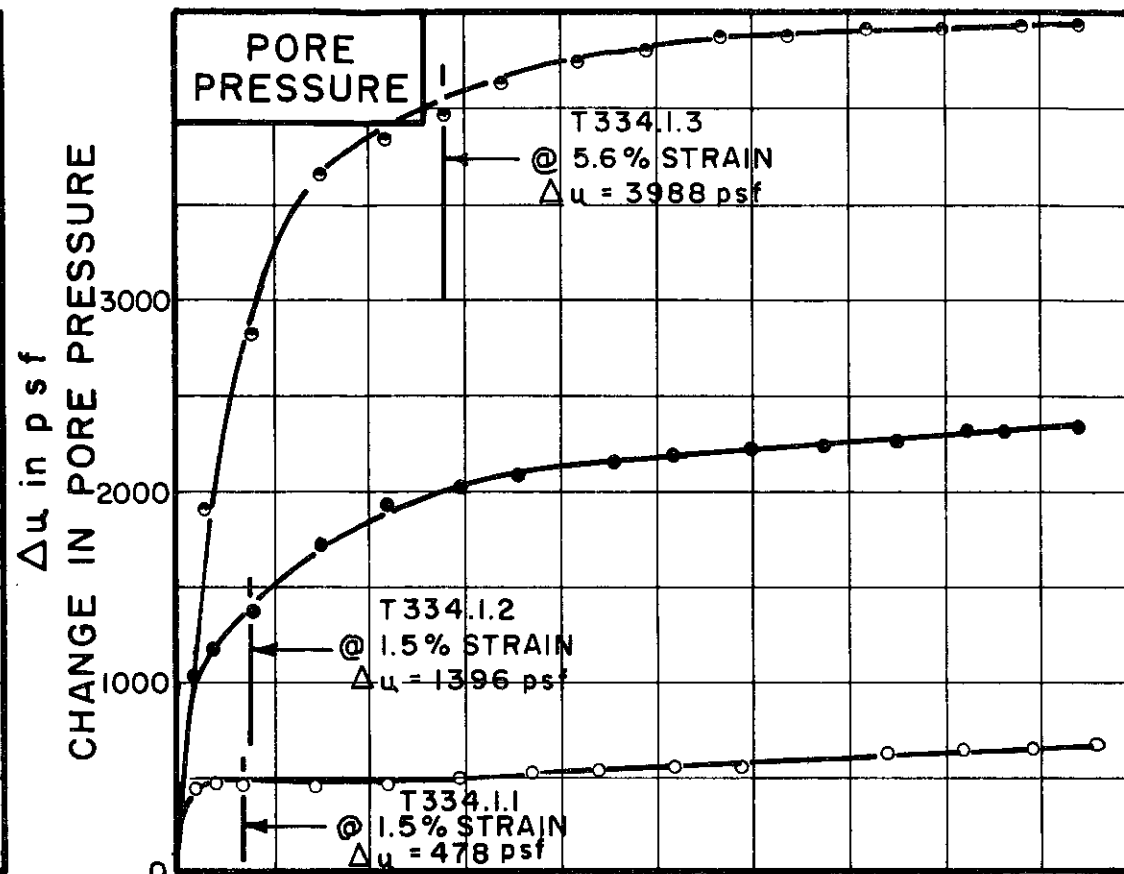
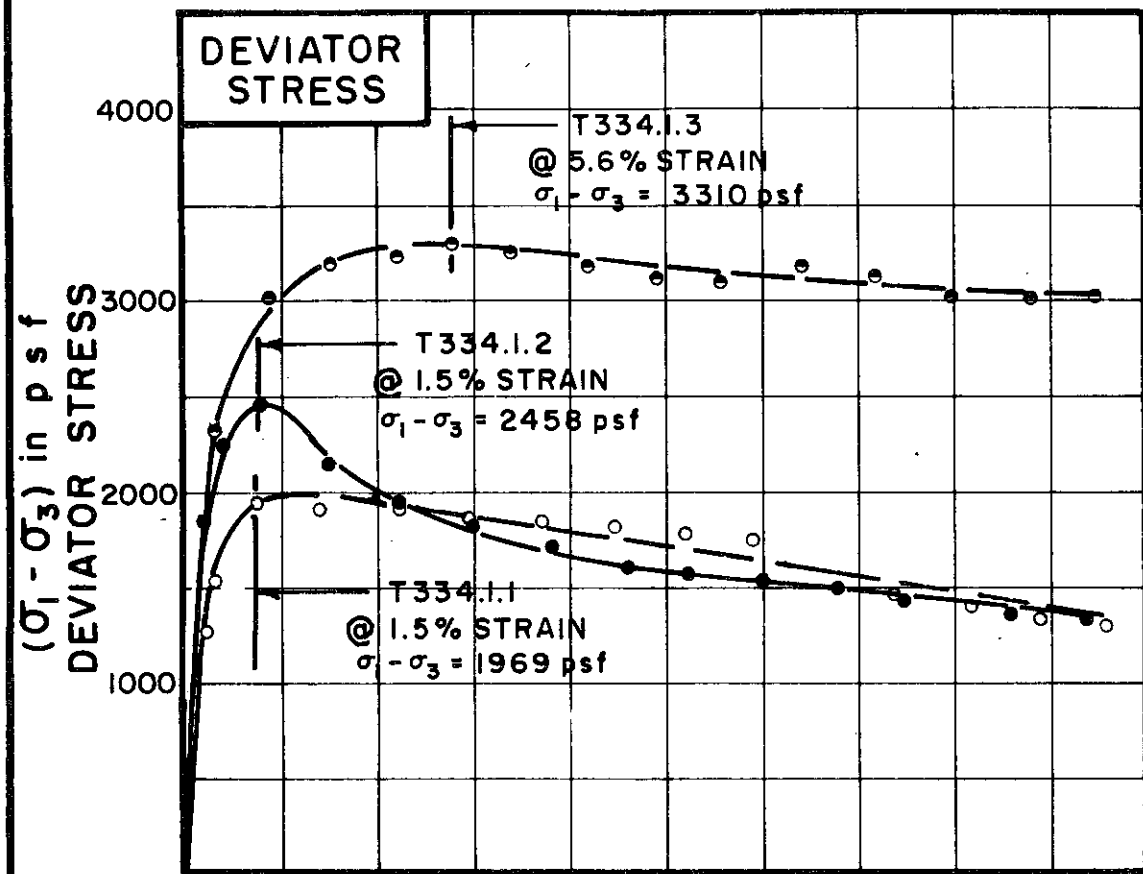
DEPTH 30.0 TO 32.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-439



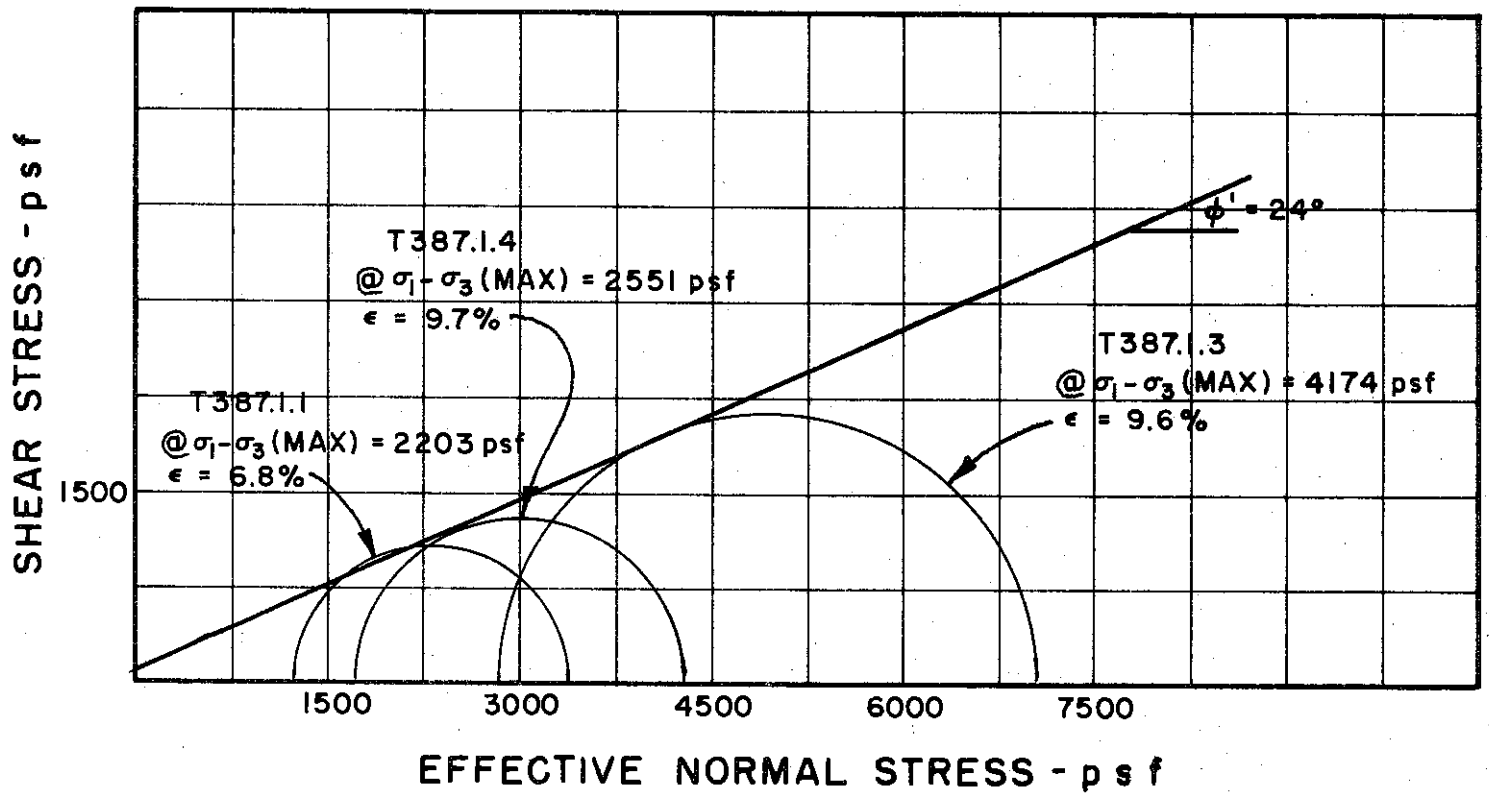
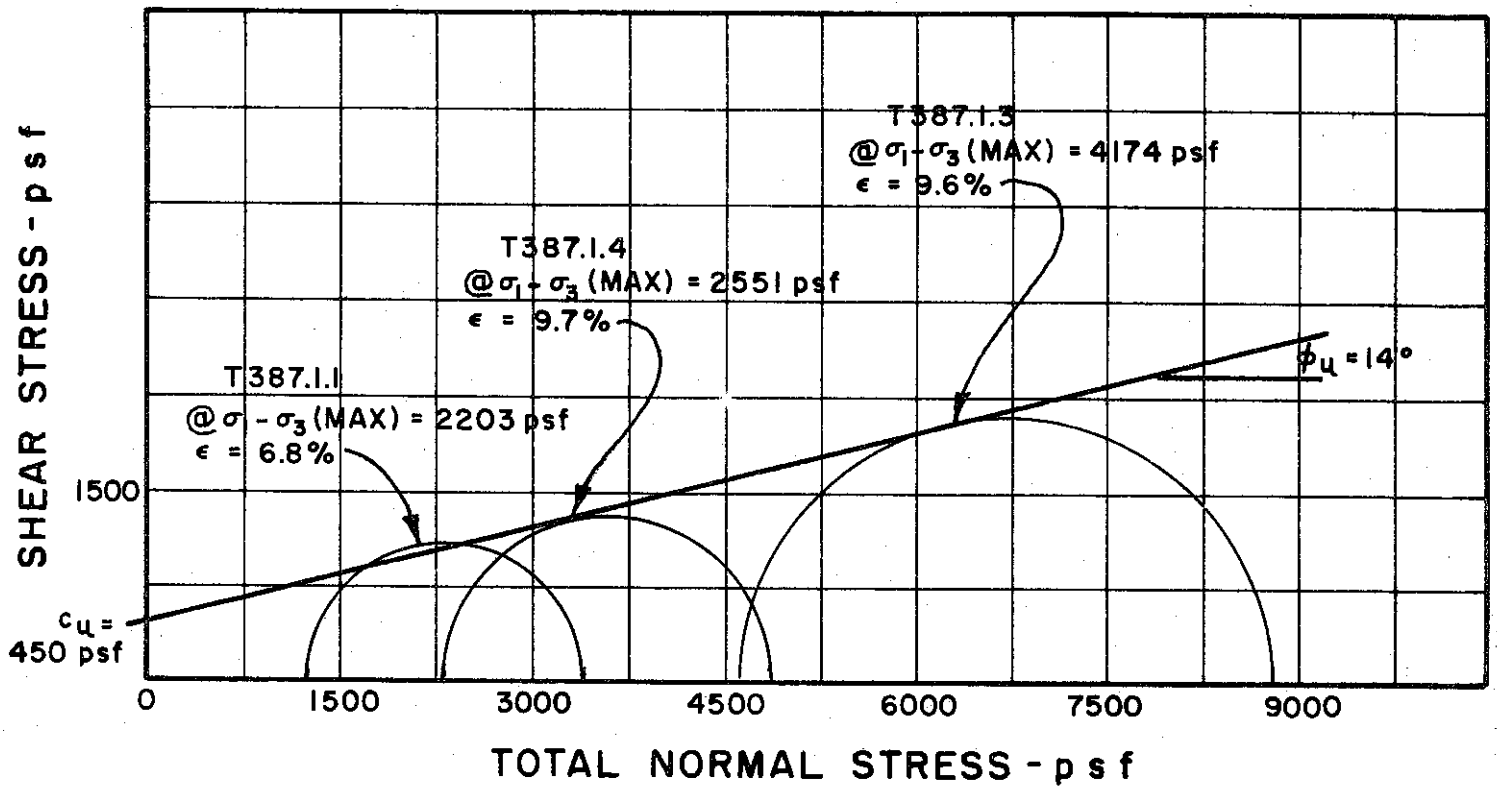
TEST NO. / SYMBOL	T334.1.1	T334.1.2	T334.1.3
	○	●	○

INITIAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_0$		36.9%	38.5%	35.3%
DRY DENSITY	$\gamma_d$	pcf	86	85	87
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.35	3.36
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	11520	7200	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	1512	3024	6048
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.7%	6.4%
PORE PRESSURE RESPONSE			95%	99%	100%
FINAL CONDITIONS					
WATER CONTENT	$w_f$		35.2%	36.1%	29.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 4  
 DEPTH 30.0 TO 32.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

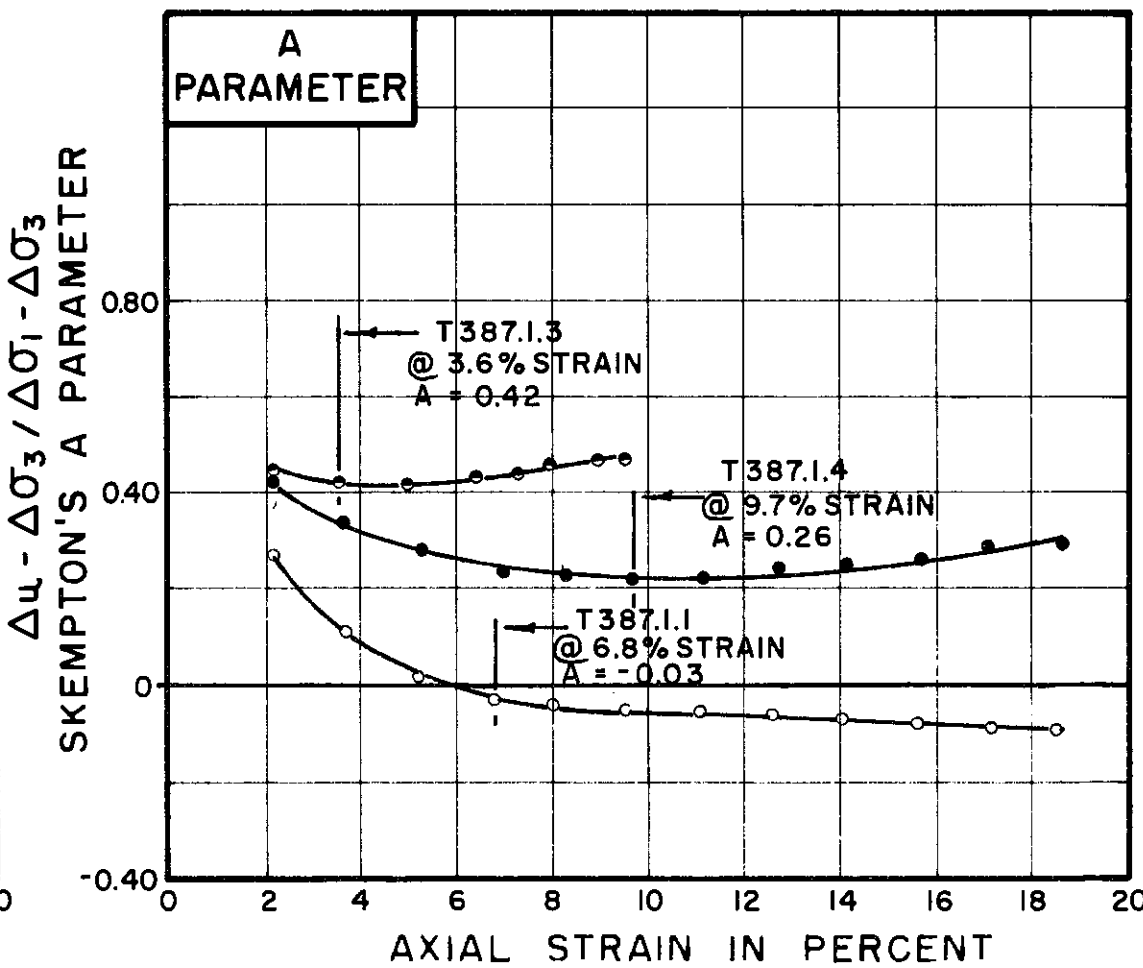
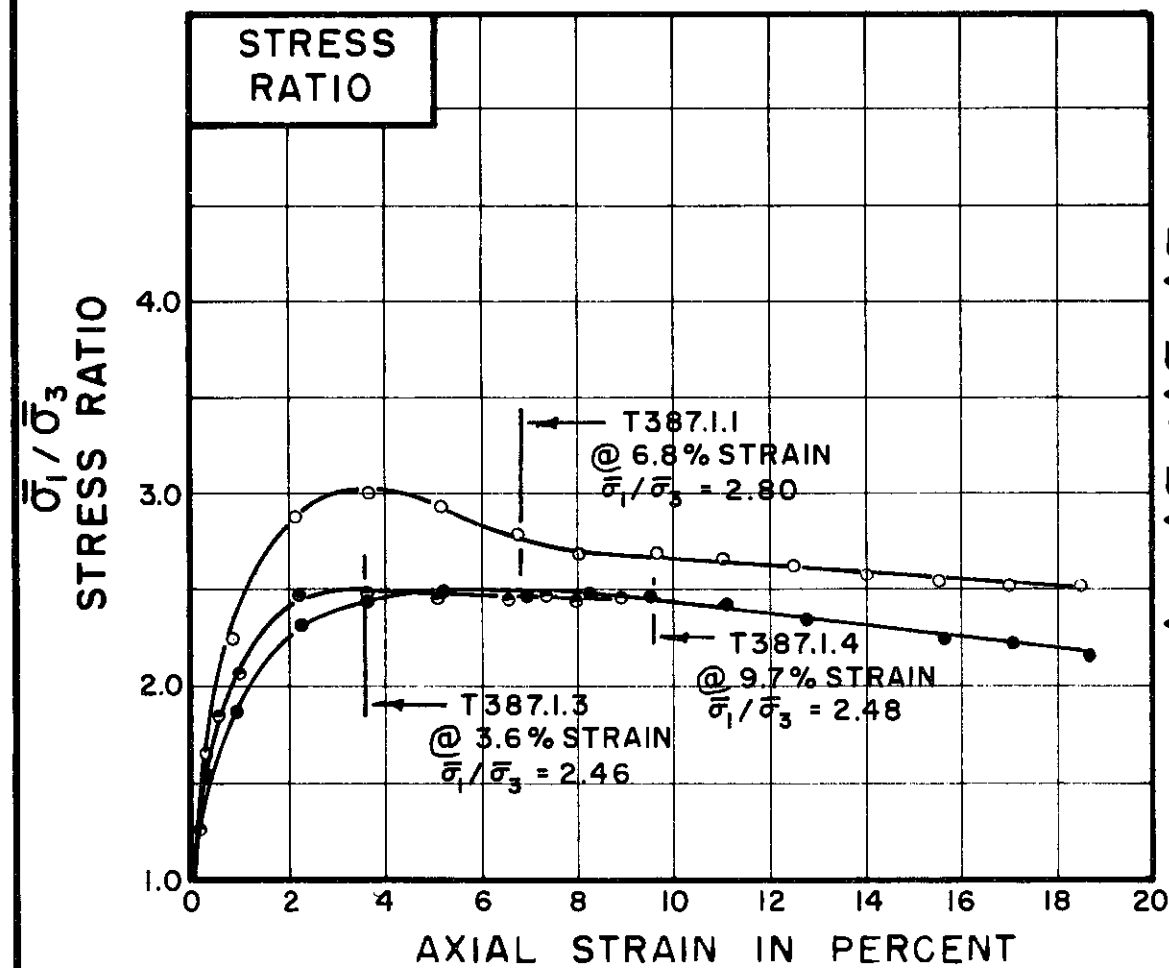
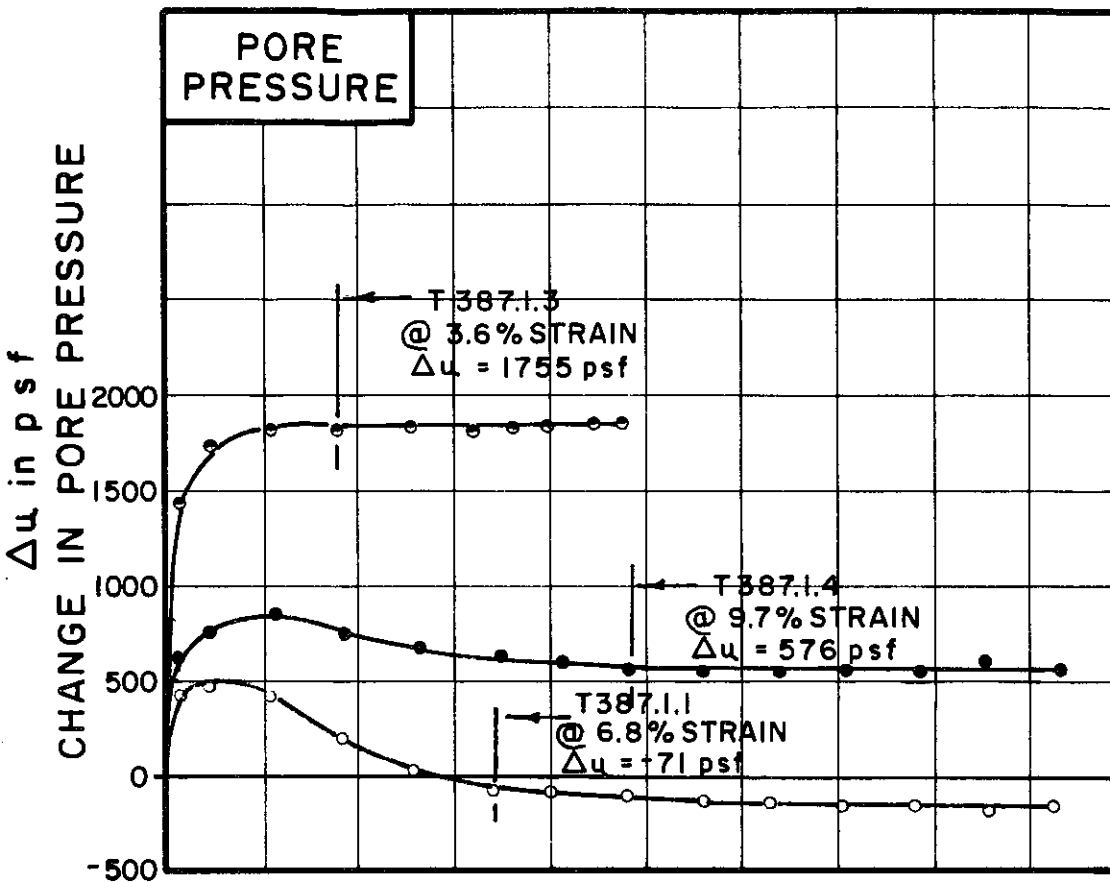
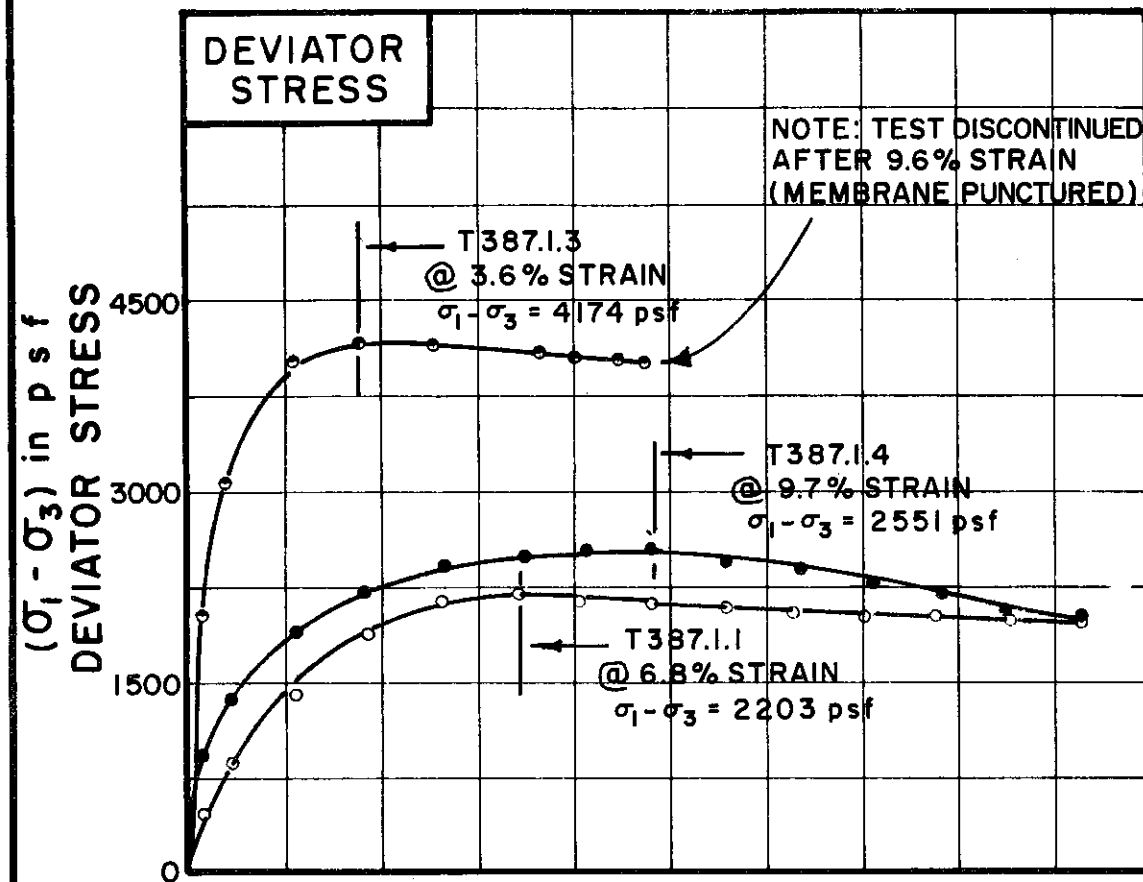
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-441



TEST NO. / SYMBOL	T387.1.1	T387.1.4	T387.1.3
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INITIAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_0$		33.5%	33.1%	31.9%
DRY DENSITY	$\gamma_d$	lb/cu ft	90	90	90
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.38	3.45
FINAL CONDITIONS BEFORE SHEAR			T387.1.1	T387.1.4	T387.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	6480	5760	6480
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	p.s.f.	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.31%	2.94%	3.20%
PORE PRESSURE RESPONSE			98%	99%	97%
FINAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_f$		33.4%	31.9%	—%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.023
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BORING NO. 129

SAMPLE NO. 5

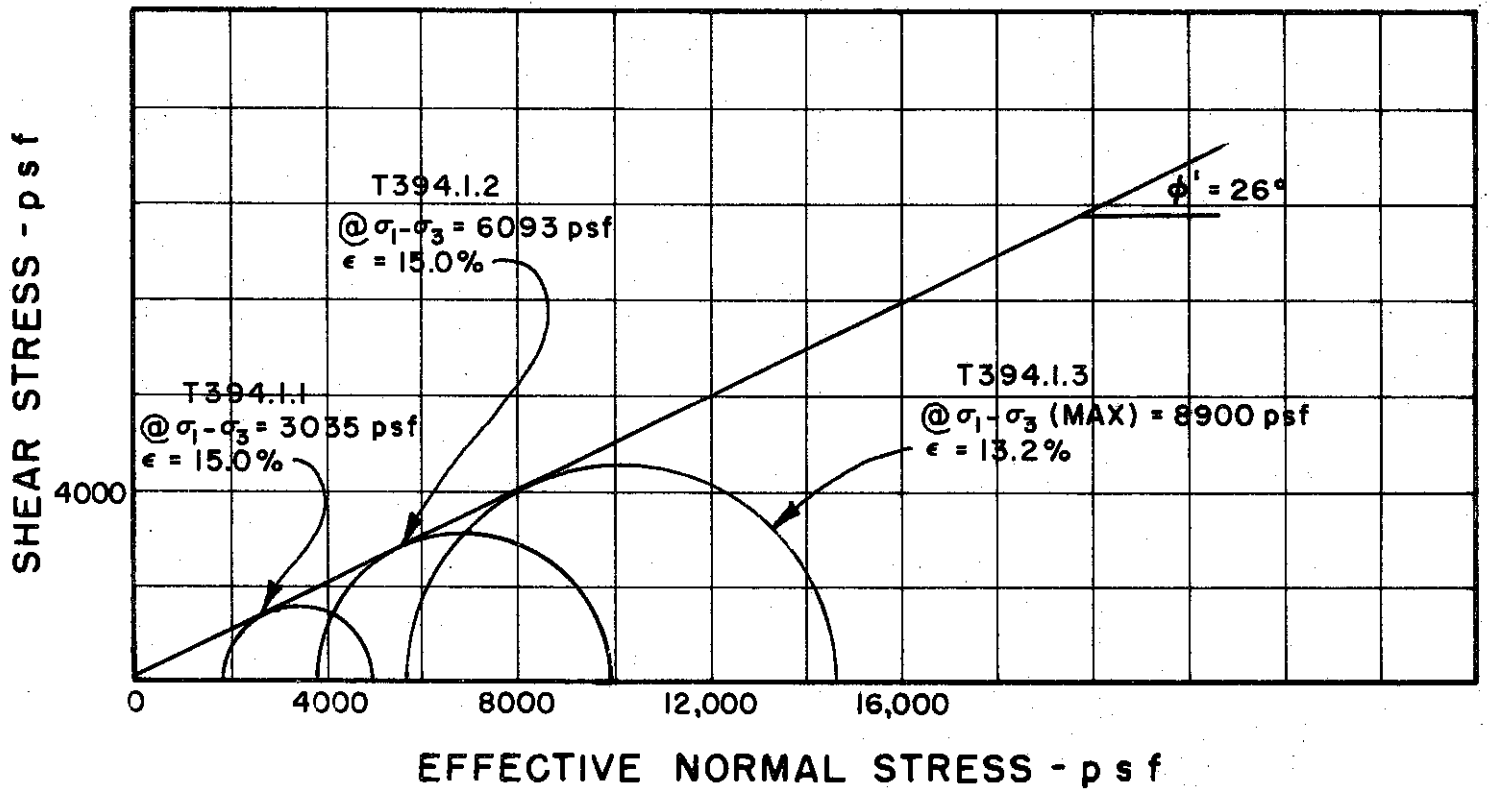
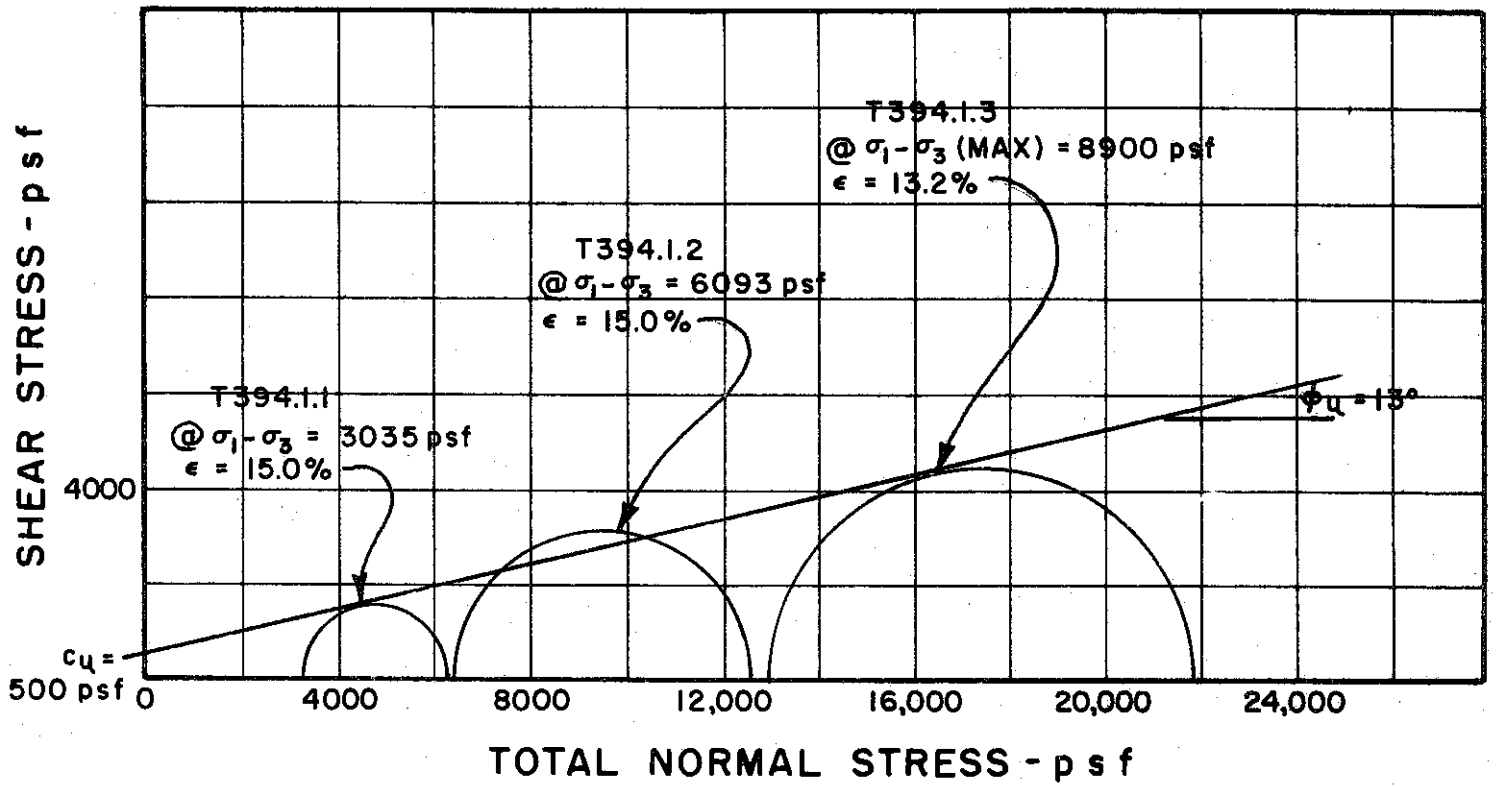
DEPTH 18.0' TO 21.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 19

DEPTH 93.0' TO 95.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

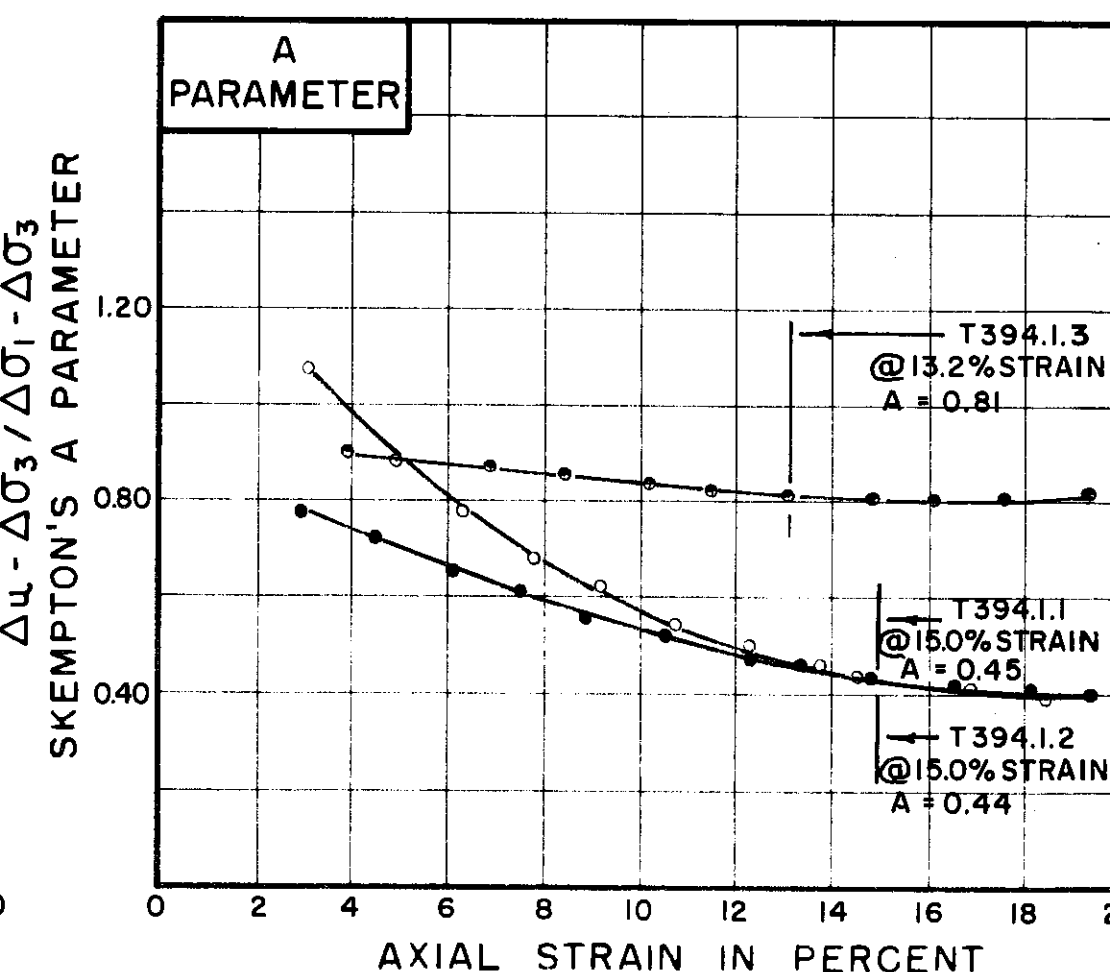
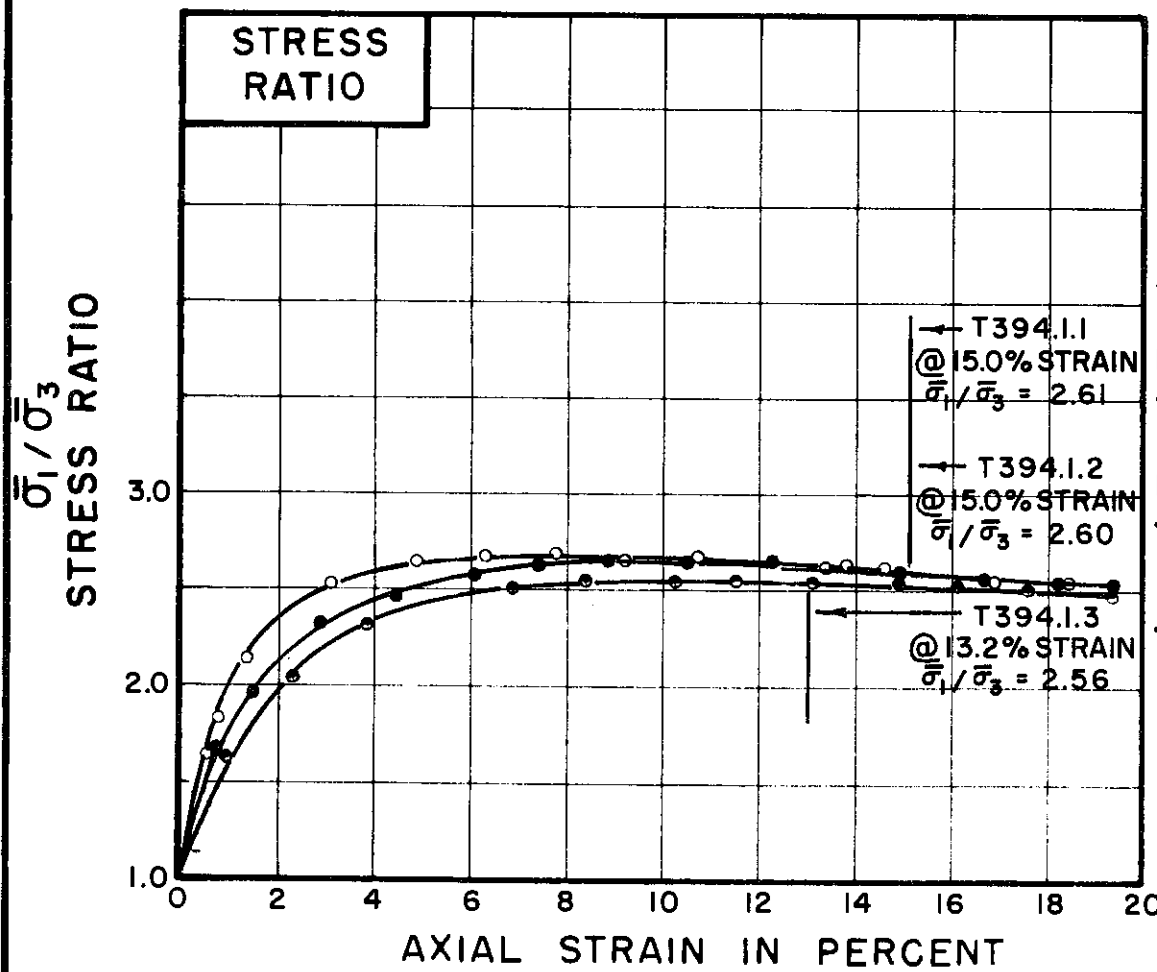
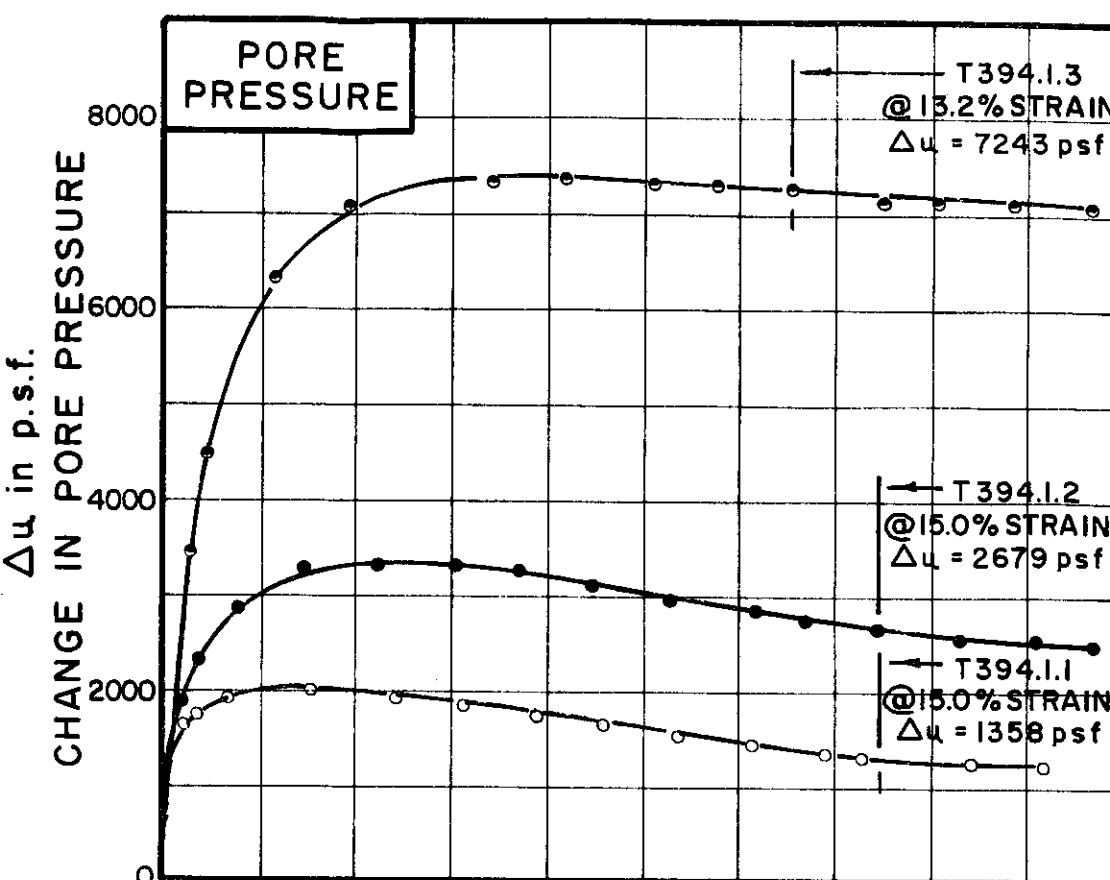
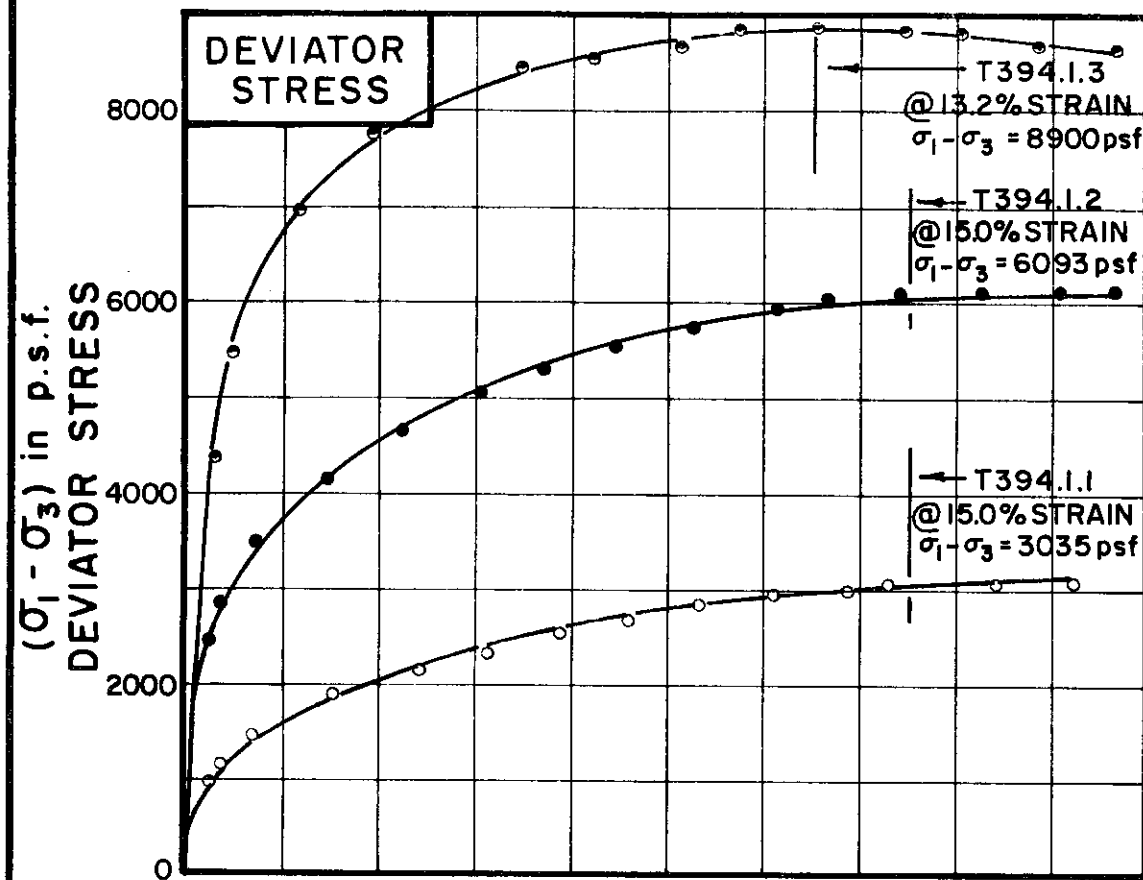
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-443



TEST NO. / SYMBOL	T394.1.1	T394.1.2	T394.1.3
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INITIAL CONDITIONS		T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_0$	23.7%	25.9%	27.0%
DRY DENSITY	$\gamma_d$	99	99	99
SAMPLE DIAMETER	$D_0$	1.39	1.40	1.40
SAMPLE HEIGHT	$H_0$	3.27	3.38	3.32
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	3240	6480	12960
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.73%	2.61%	5.03%
PORE PRESSURE RESPONSE		99%	98%	98%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	22.2%	22.7%	21.5%
SKETCH OF SAMPLE AT END OF TEST				

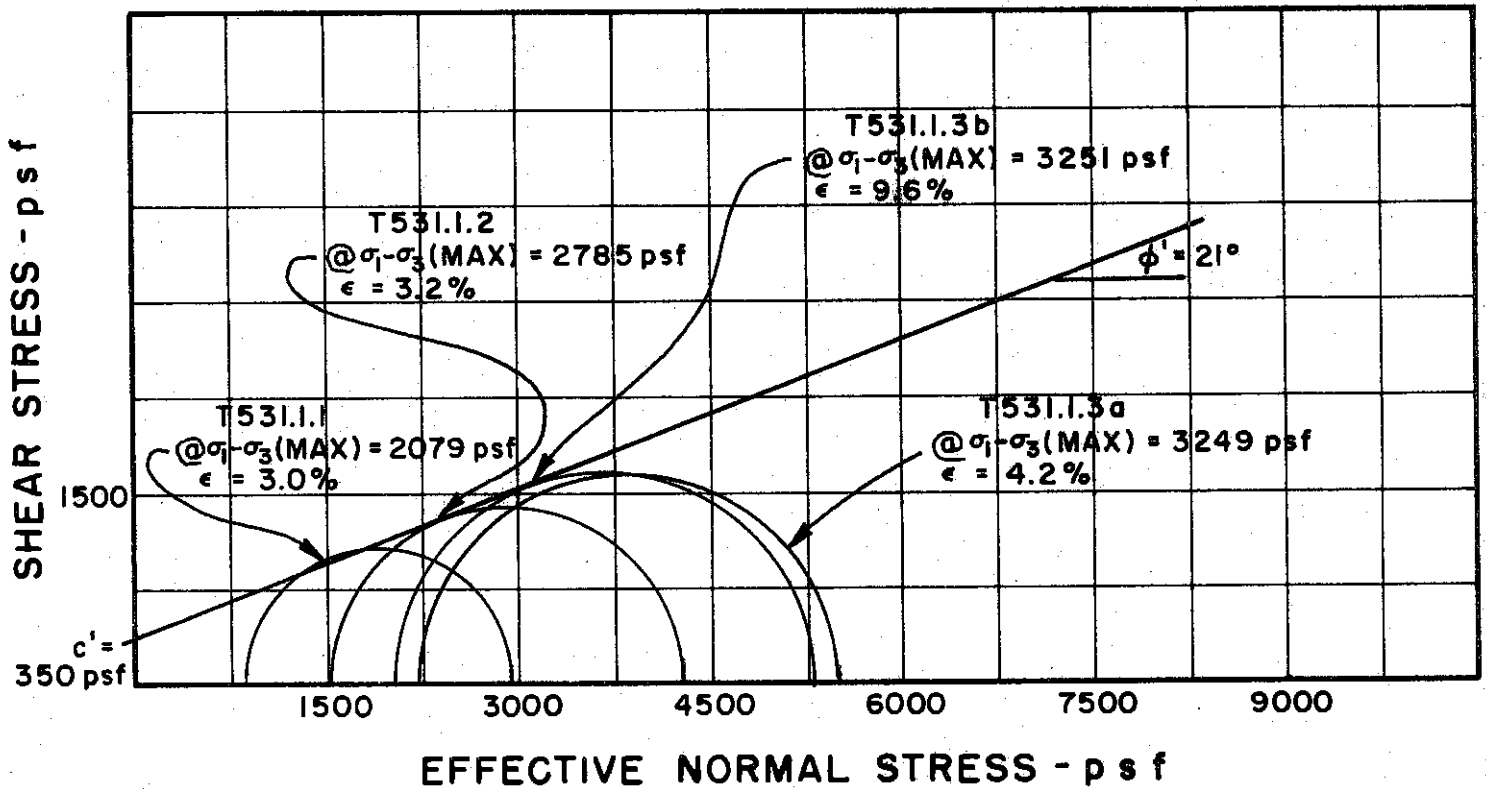
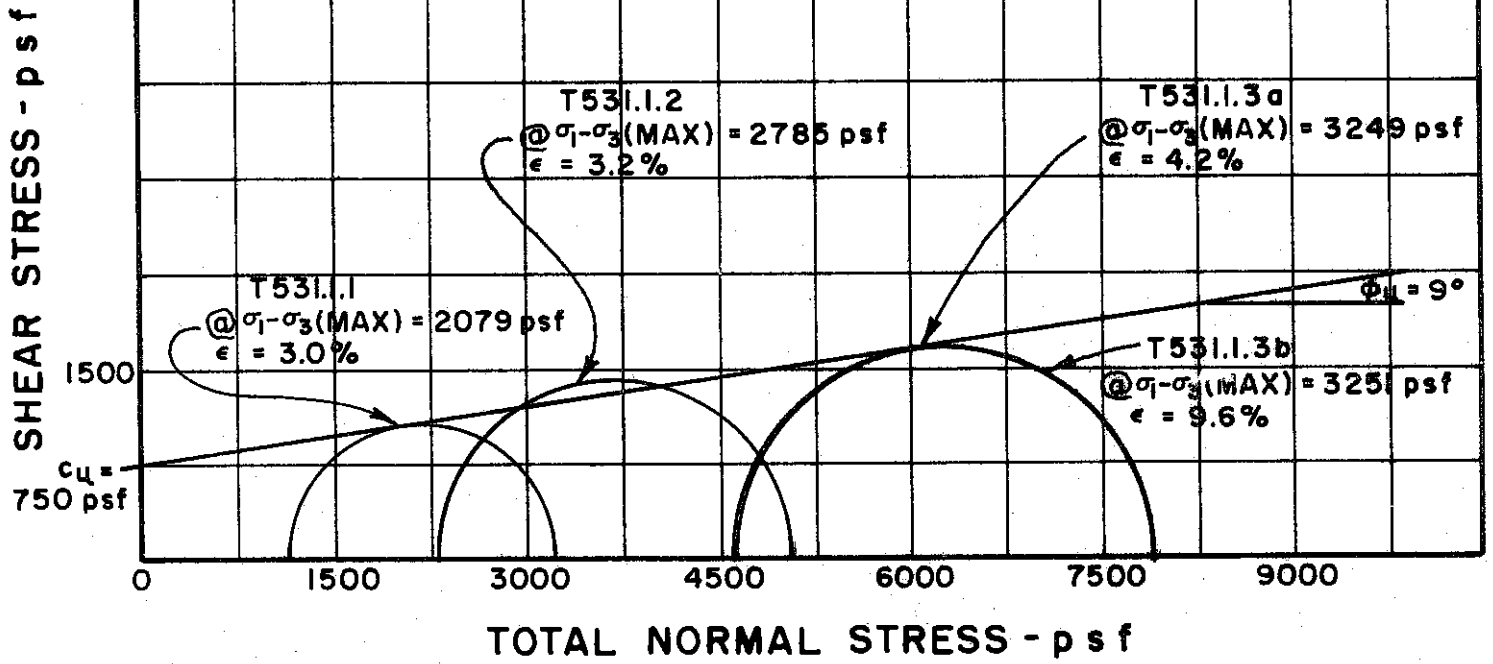
RATE OF STRAIN PERCENT / MINUTE	.025	.024	.025
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BORING NO. 129  
 SAMPLE NO. 19  
 DEPTH 93.0' TO 95.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 141  
 SAMPLE NO. 4  
 DEPTH 18.0' TO 20.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

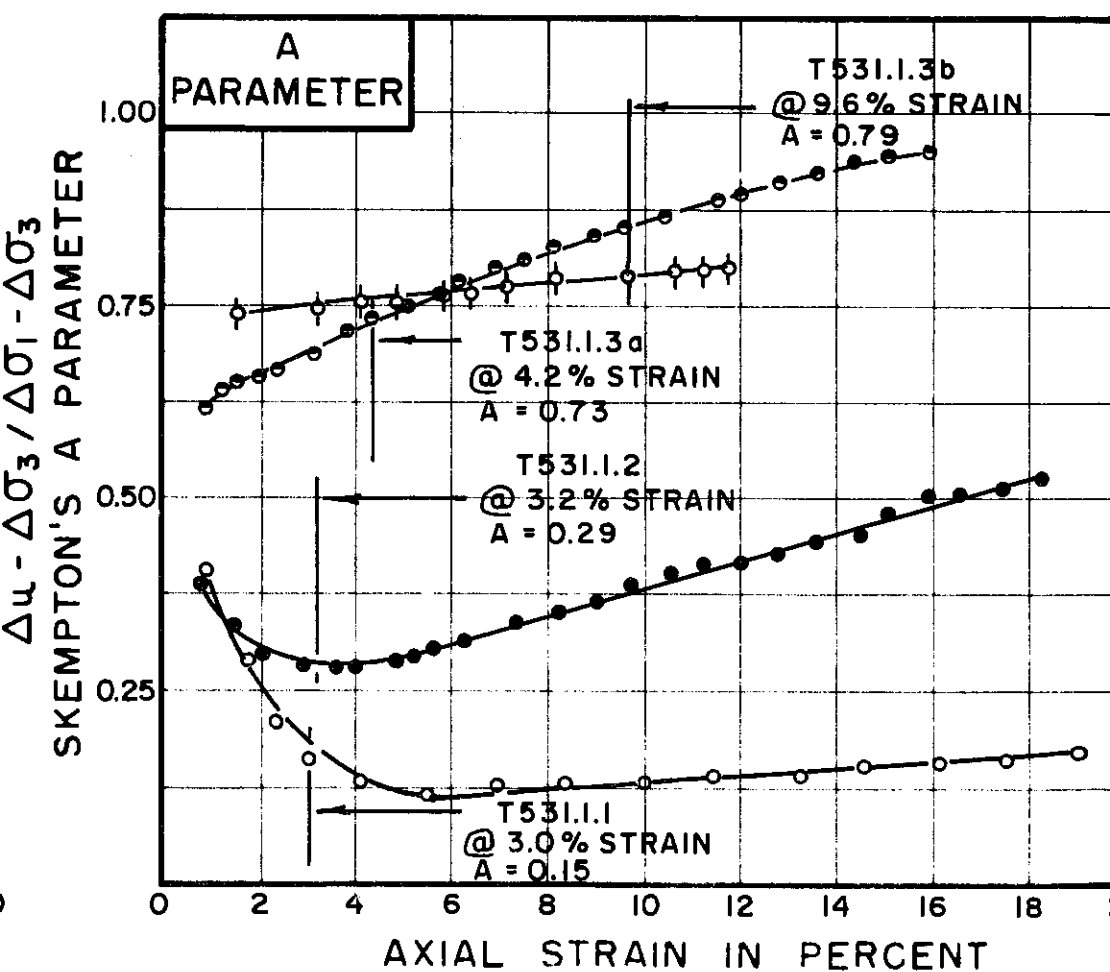
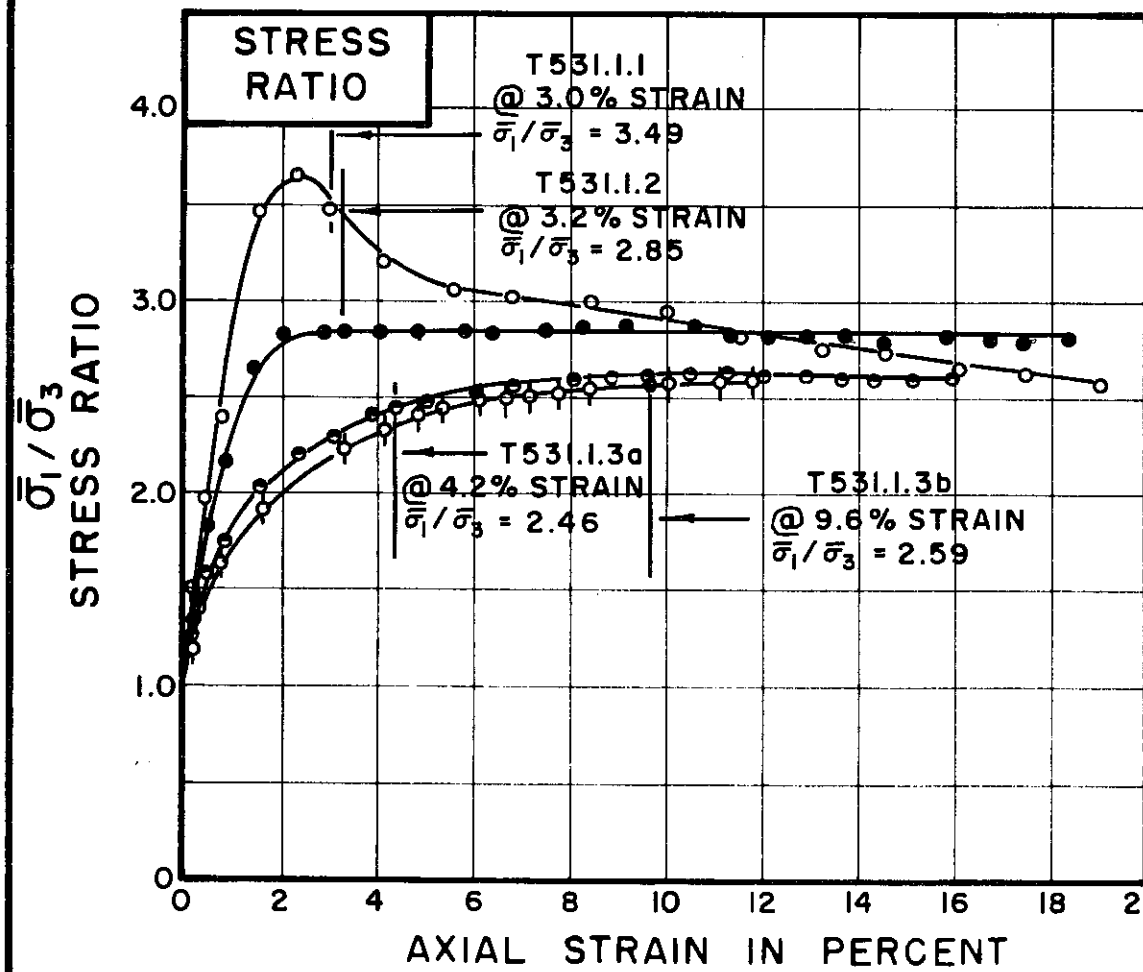
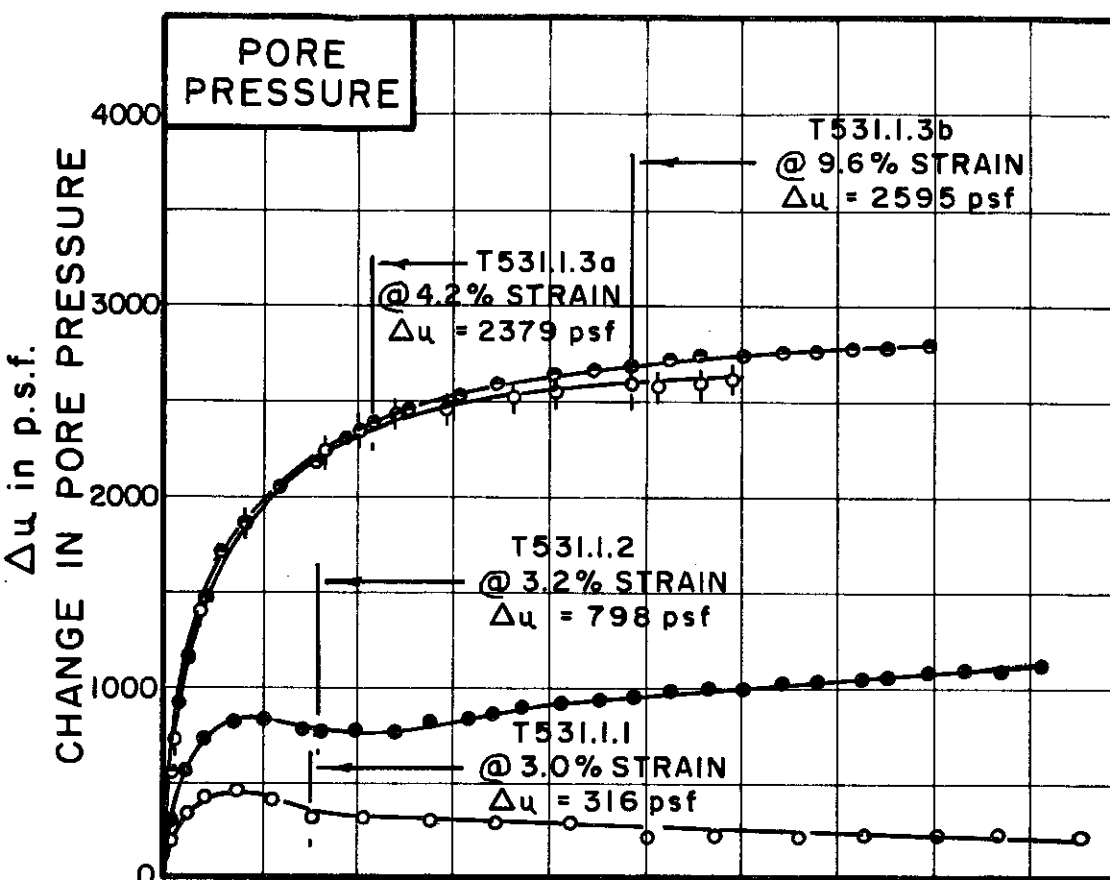
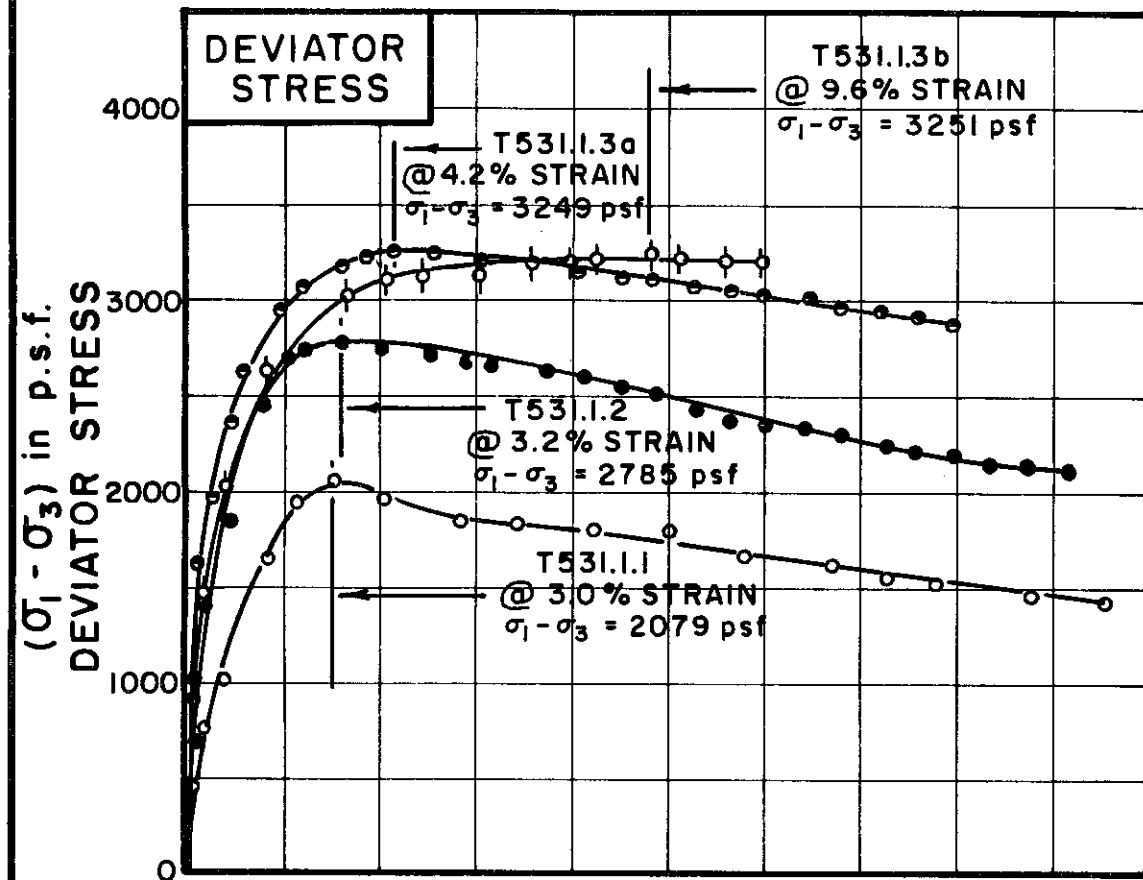
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-445



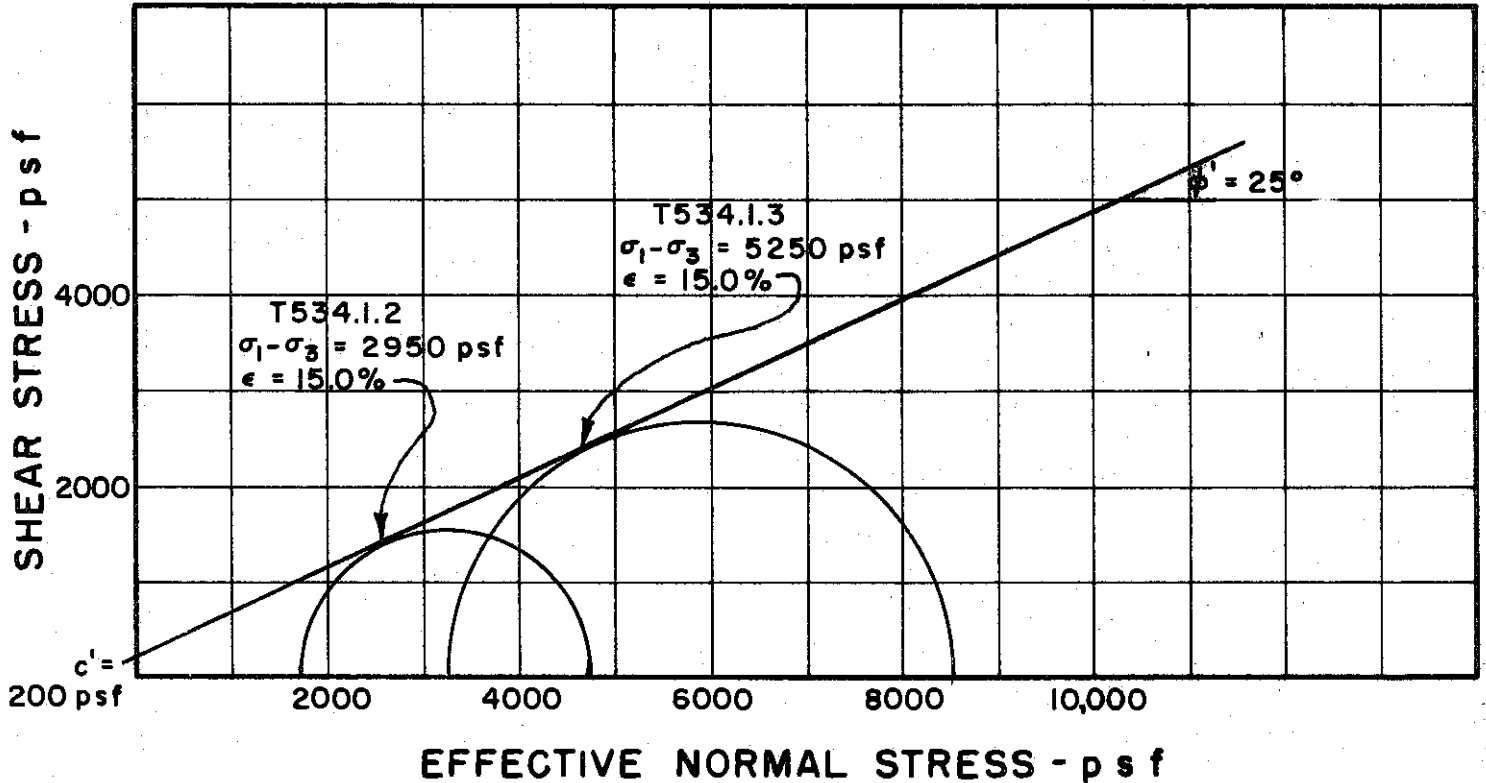
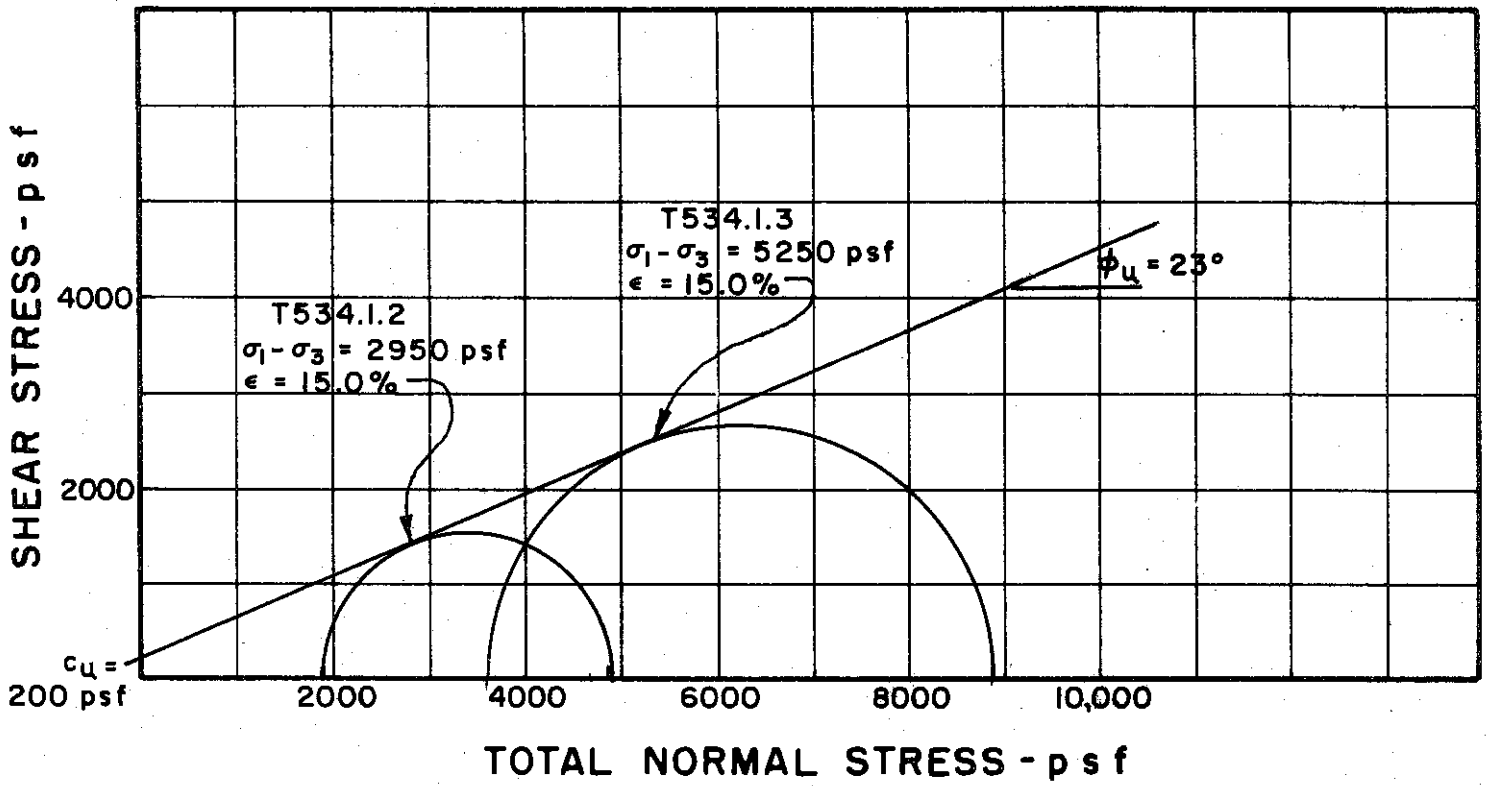
TEST NO. / SYMBOL	T531.1.1	T531.1.2	T531.1.3a	T531.1.3b
	○	●	◊	◐

INITIAL CONDITIONS			T531.1.1	T531.1.2	T531.1.3a	T531.1.3b
WATER CONTENT	w <sub>0</sub>		36.3%	35.5%	35.1%	37.3%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	86	87	85	84
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.39	1.40	1.41	1.39
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.30	3.20	3.33	3.28
FINAL CONDITIONS BEFORE SHEAR			T531.1.1	T531.1.2	T531.1.3a	T531.1.3b
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	10080	8640	11520	14400
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	p.s.f.	1152	2304	4608	4637
VOLUMETRIC STRAIN	ε <sub>vol</sub>		0.9%	1.2%	4.3%	5.1%
PORE PRESSURE RESPONSE			96%	95%	96%	91%
FINAL CONDITIONS			T531.1.1	T531.1.2	T531.1.3a	T531.1.3b
WATER CONTENT	w <sub>f</sub>		35.5%	34.5%	30.9%	34.4%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT / MINUTE	0.24	.010	.010 / .007
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BORING NO. 141  
 SAMPLE NO. 4  
 DEPTH 18.0' TO 20.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 45 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



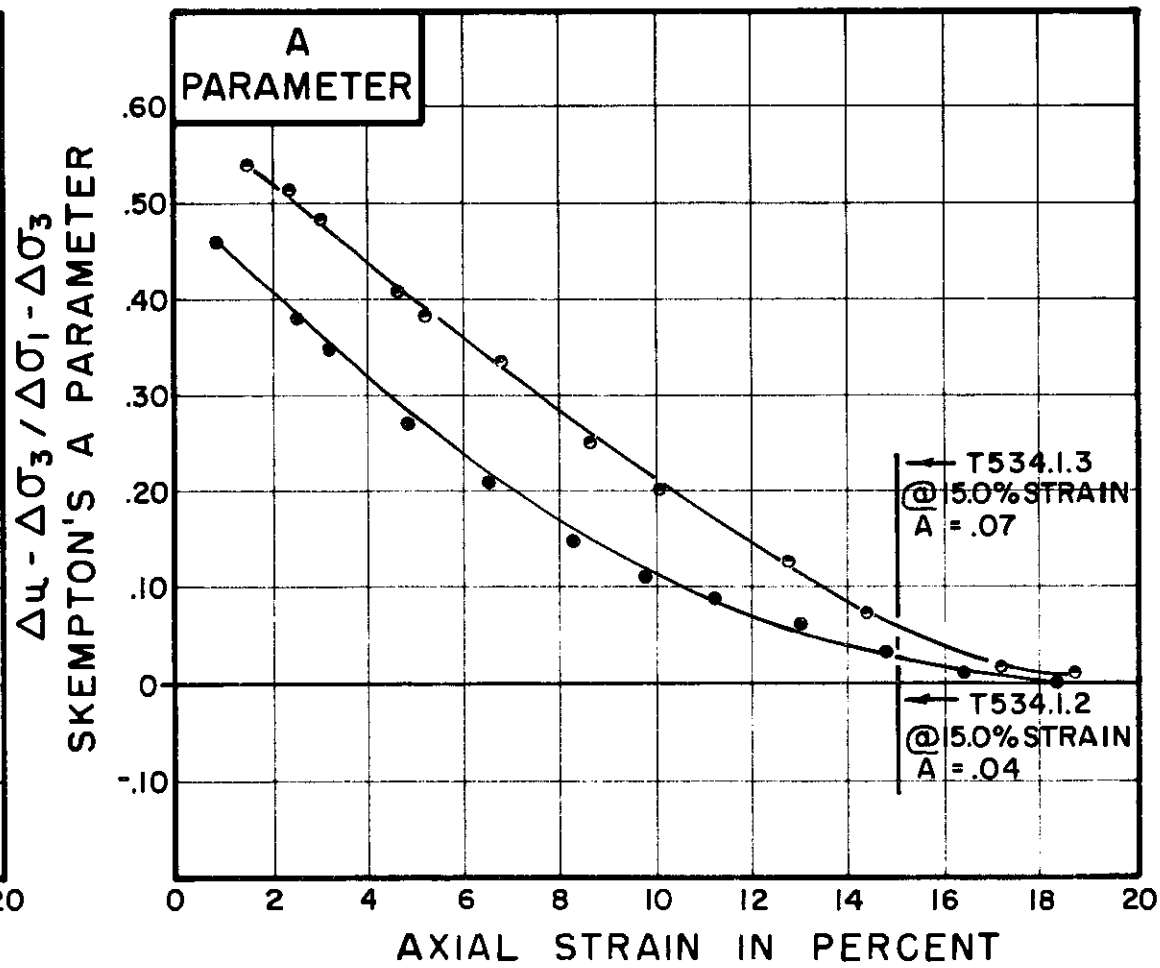
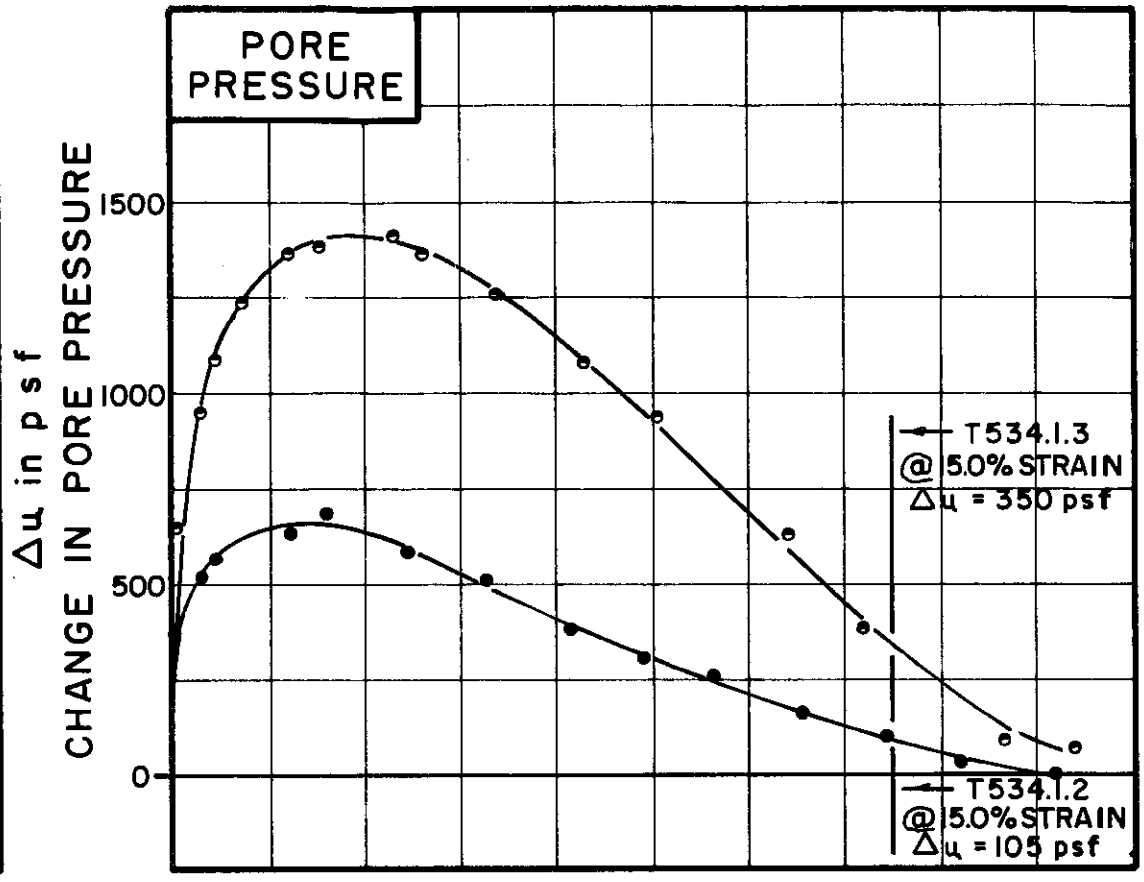
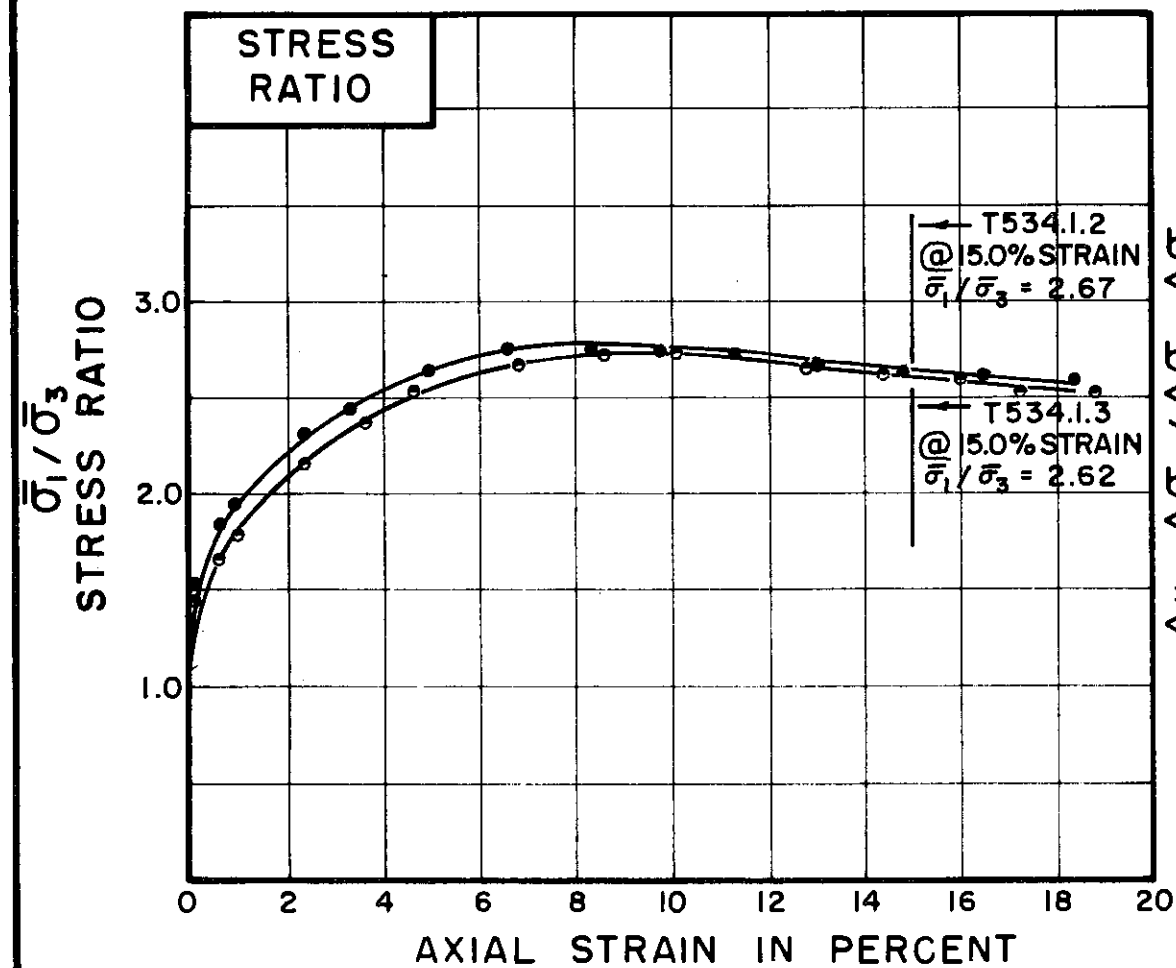
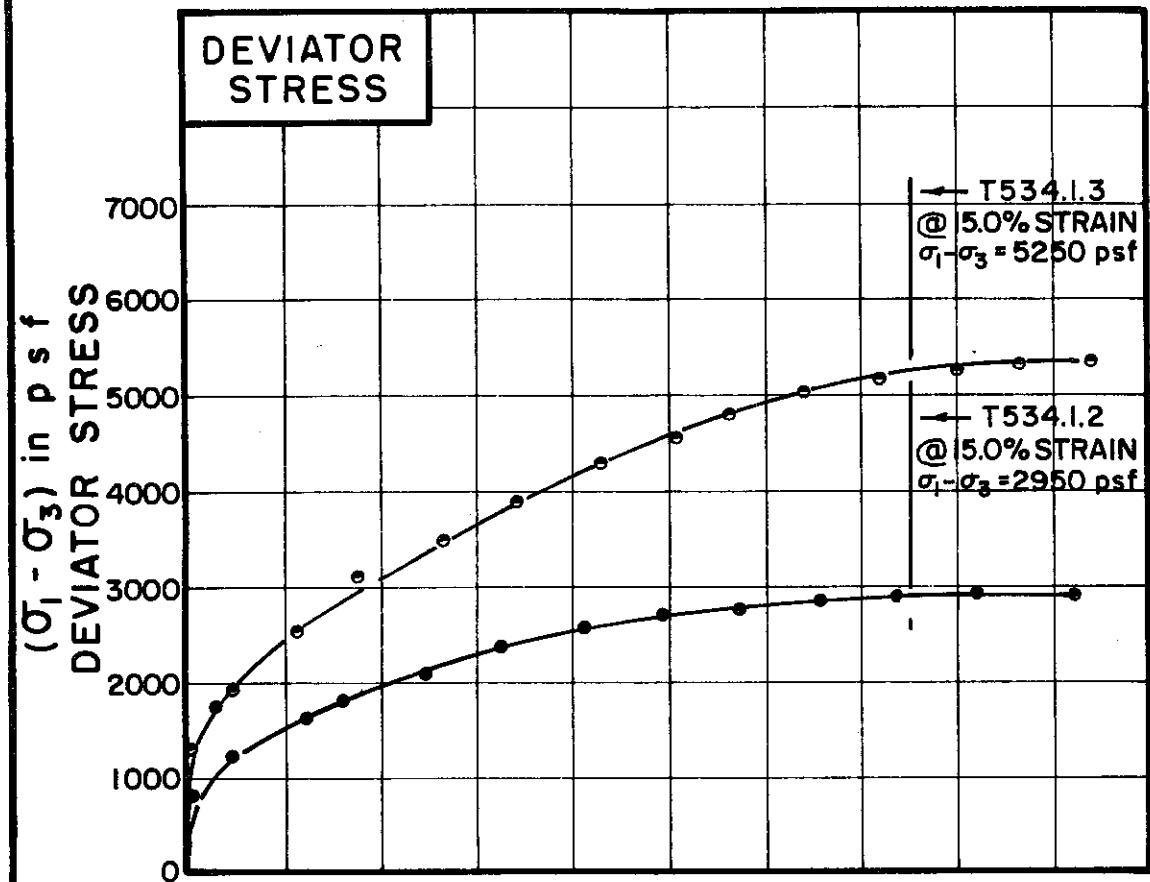
BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING



TEST NO. / SYMBOL	T534.1.2	T534.1.3
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INITIAL CONDITIONS		T534.1.2	T534.1.3	UNIT
WATER CONTENT	$w_0$	15.3%	15.1%	%
DRY DENSITY	$\gamma_d$	105	105	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.385	1.37	in.
SAMPLE HEIGHT	$H_0$	3.05	3.31	in.
CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	20160	23155	psf
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	1872	3600	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.13%	0.13%	%
PORE PRESSURE RESPONSE		97%	94%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	29.0%	24.1%	%
SKETCH OF SAMPLE AT END OF TEST				

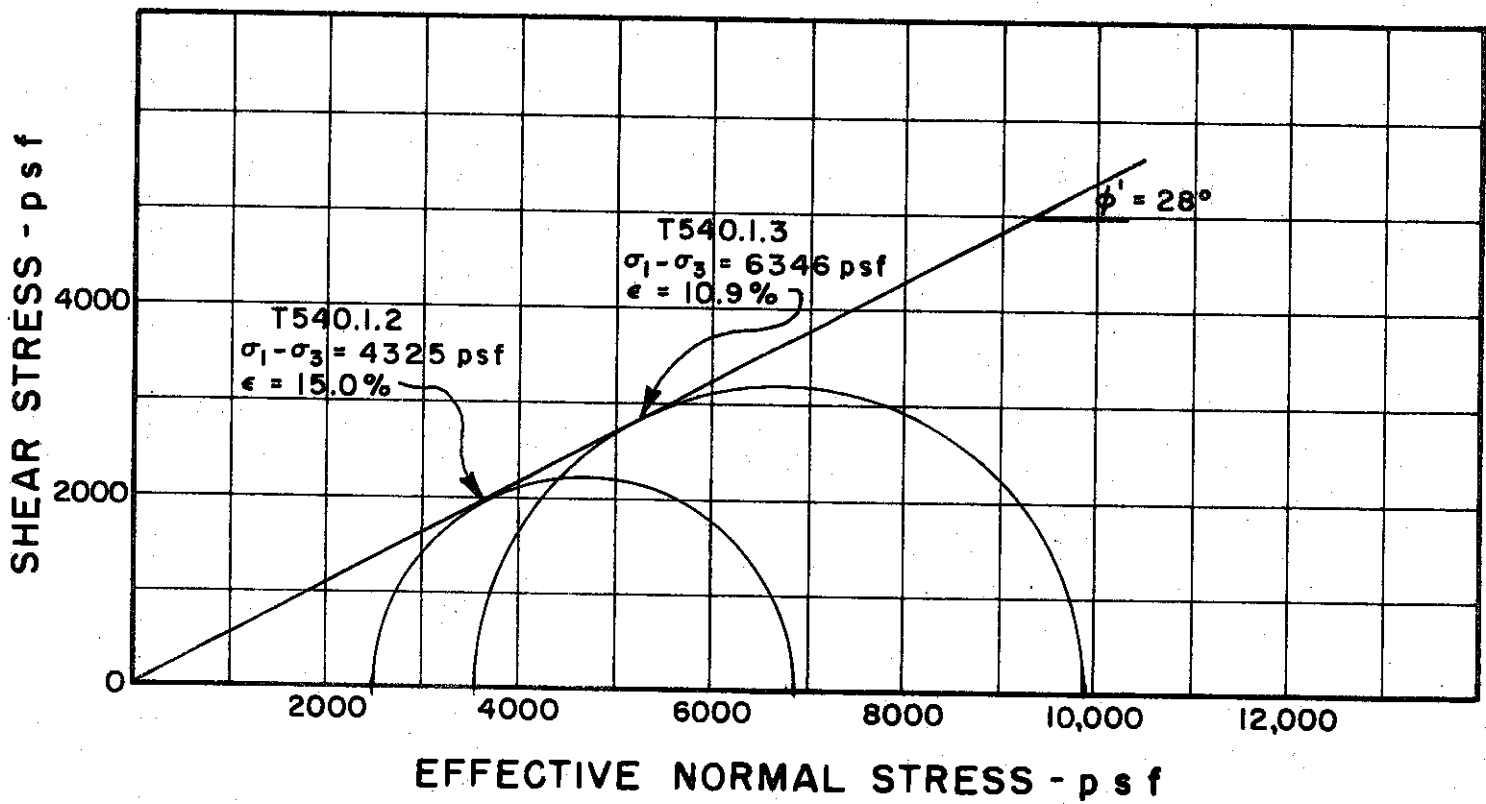
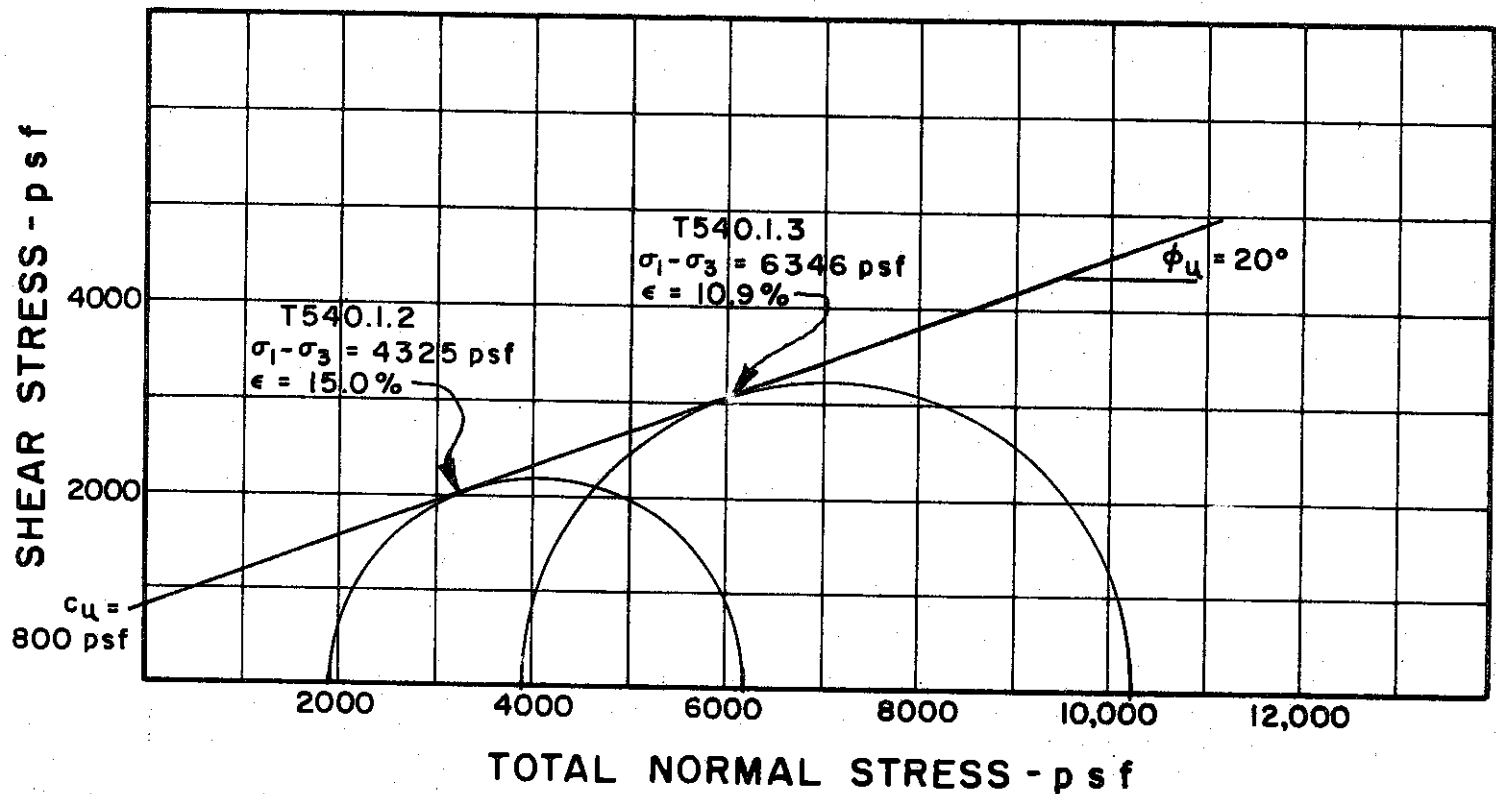
RATE OF STRAIN PERCENT / MINUTE	.0078	.0072
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BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 47 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 146

SAMPLE NO. ST 3

DEPTH 6.0' TO 7.8'

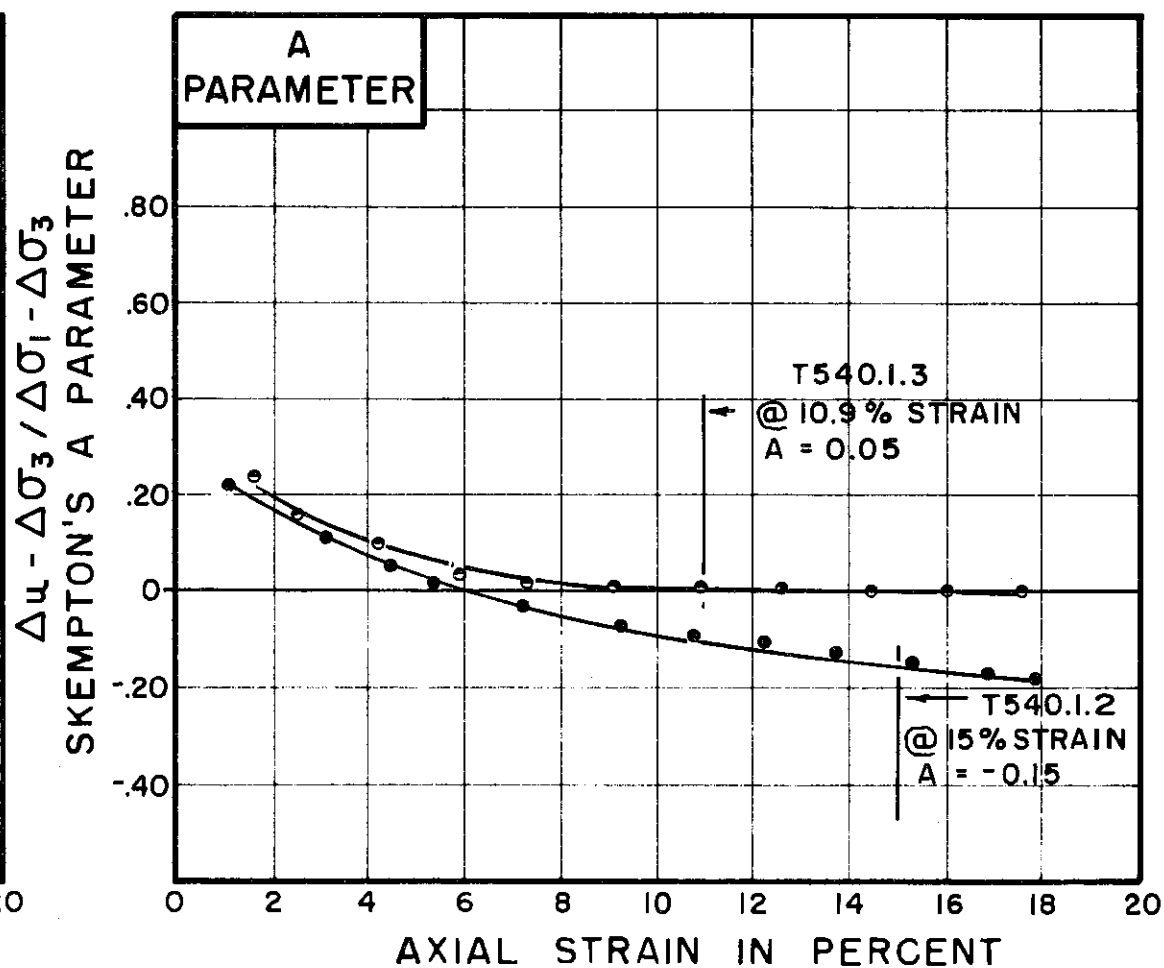
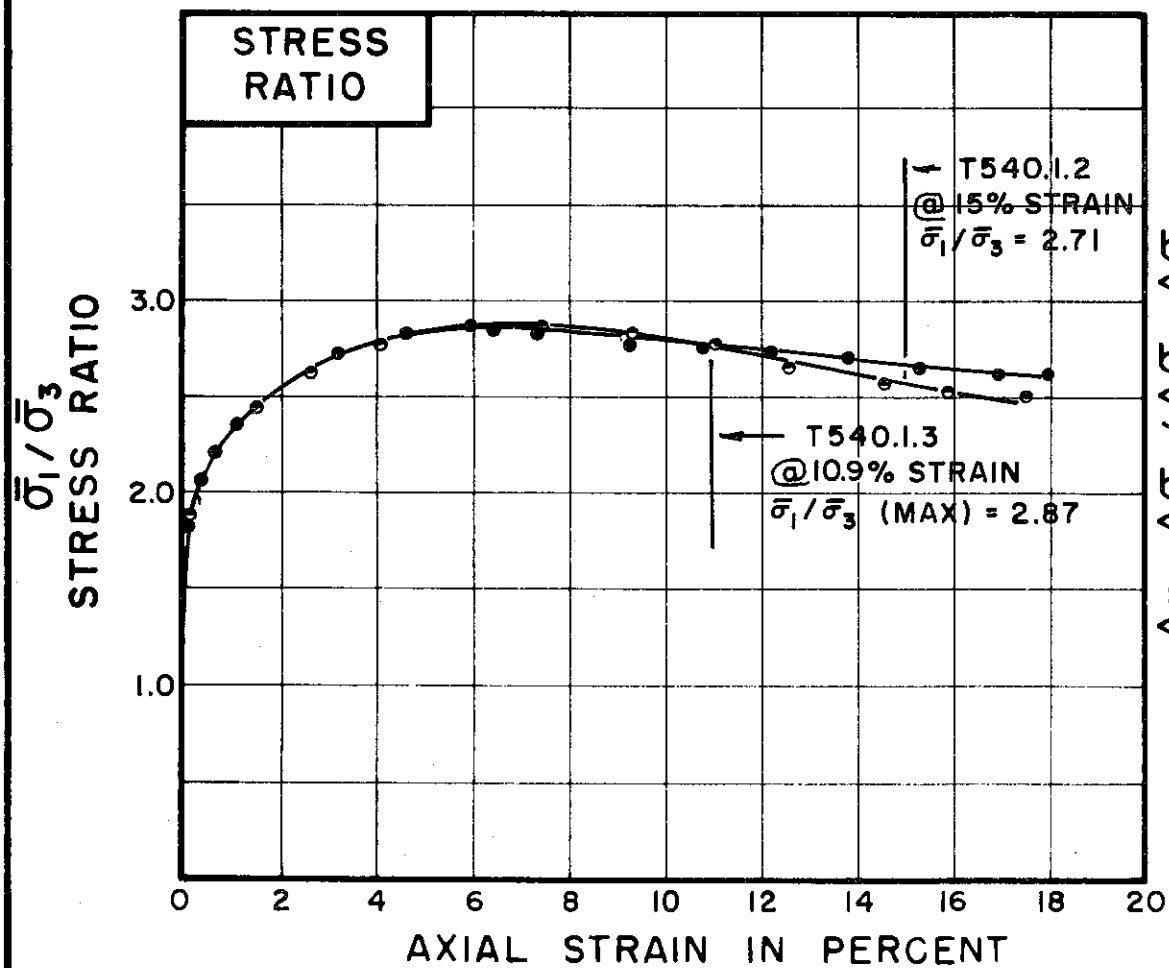
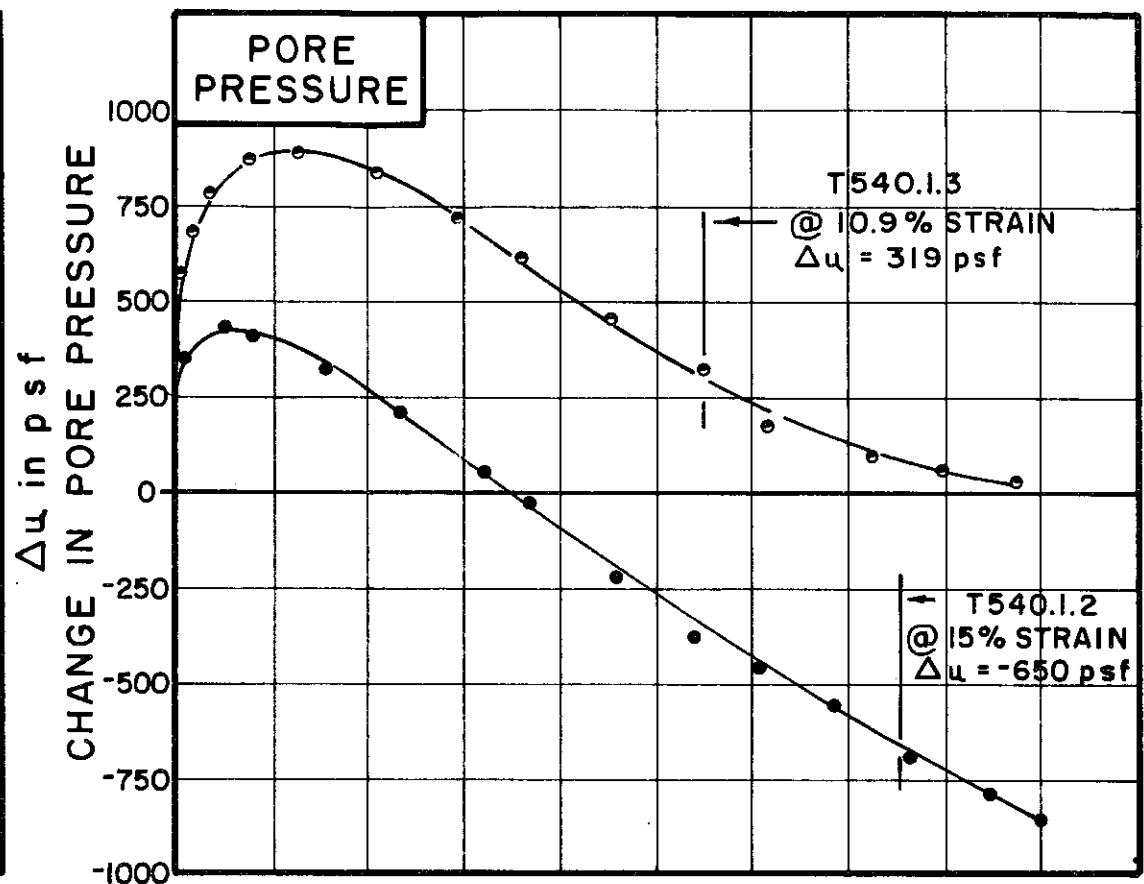
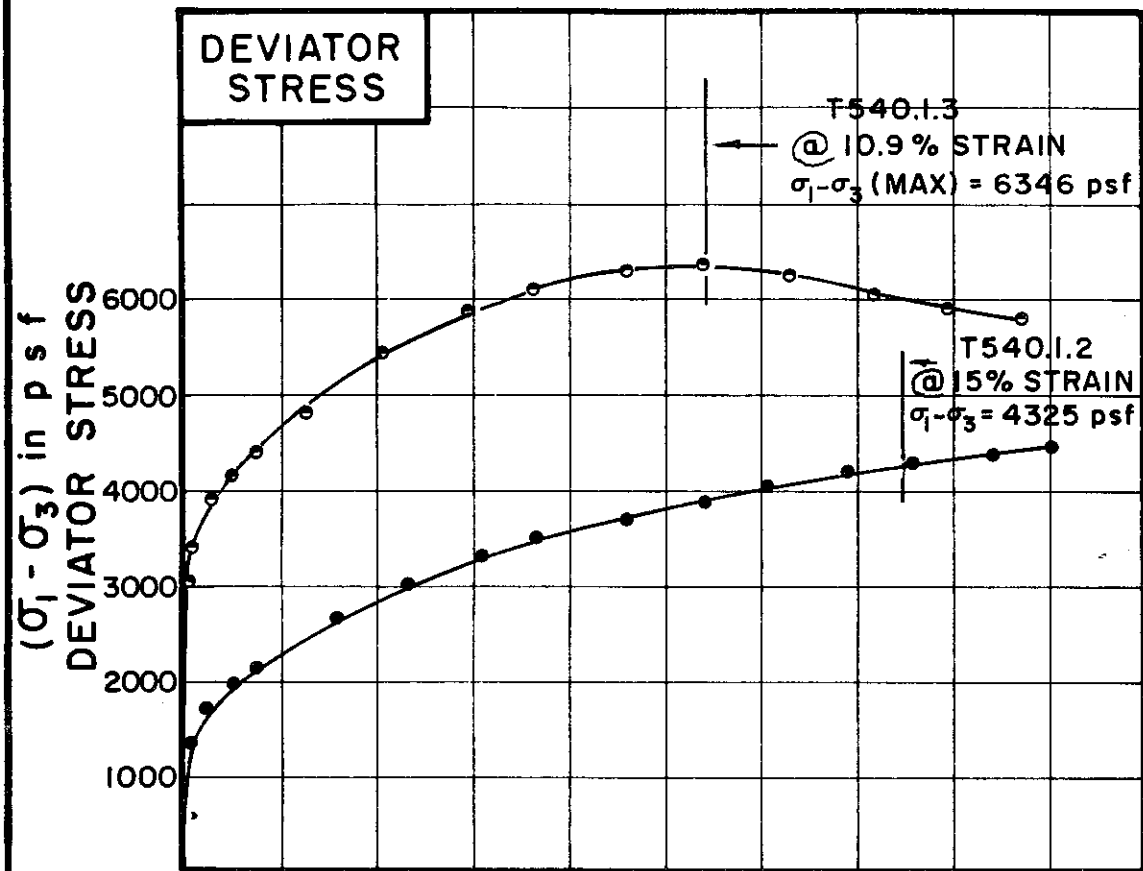
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T540.1.2	T540.1.3
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INITIAL CONDITIONS		T540.1.2	T540.1.3	UNIT
WATER CONTENT	$w_0$	14.4%	14.2%	%
DRY DENSITY	$\gamma_d$	108	108	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.35	1.37	in.
SAMPLE HEIGHT	$H_0$	3.27	3.02	in.
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	25344	25344	psf
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	1872	3888	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.82%	4.12%	%
PORE PRESSURE RESPONSE		97%	96%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	24.4%	23.2%	%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.0073	.0079
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BORING NO. 146

SAMPLE NO. ST 3

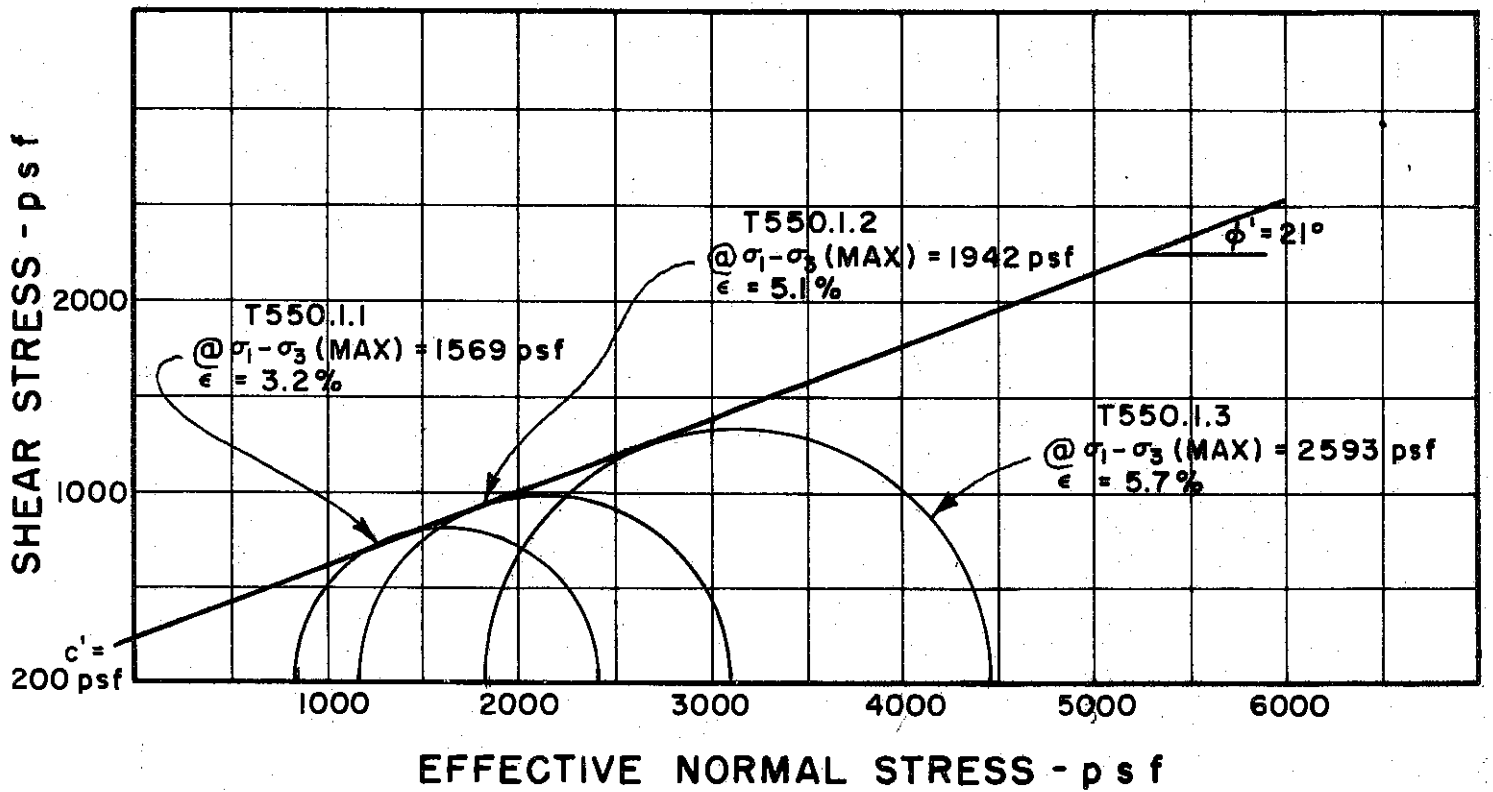
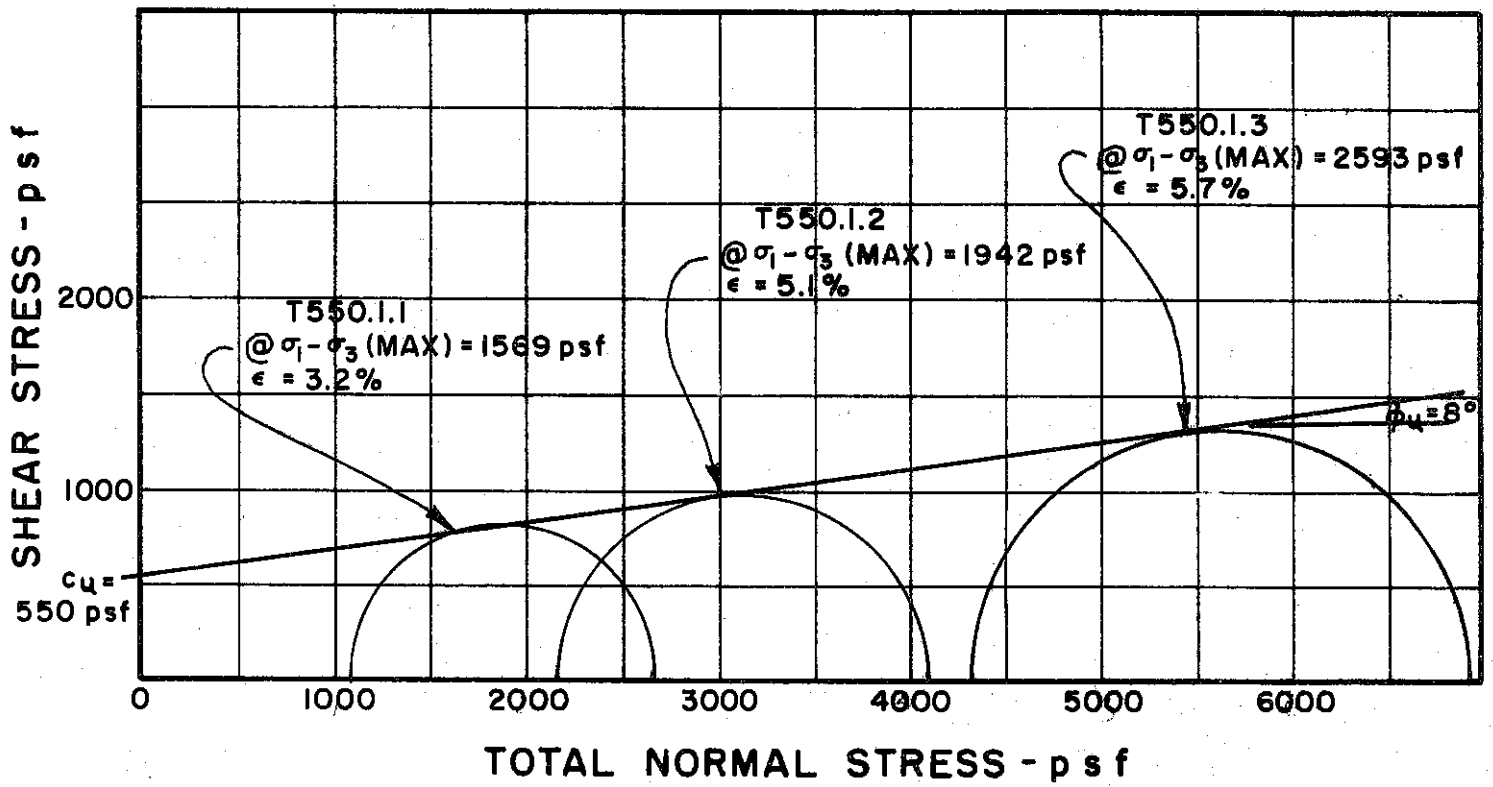
DEPTH 6.0' TO 7.8'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 44 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

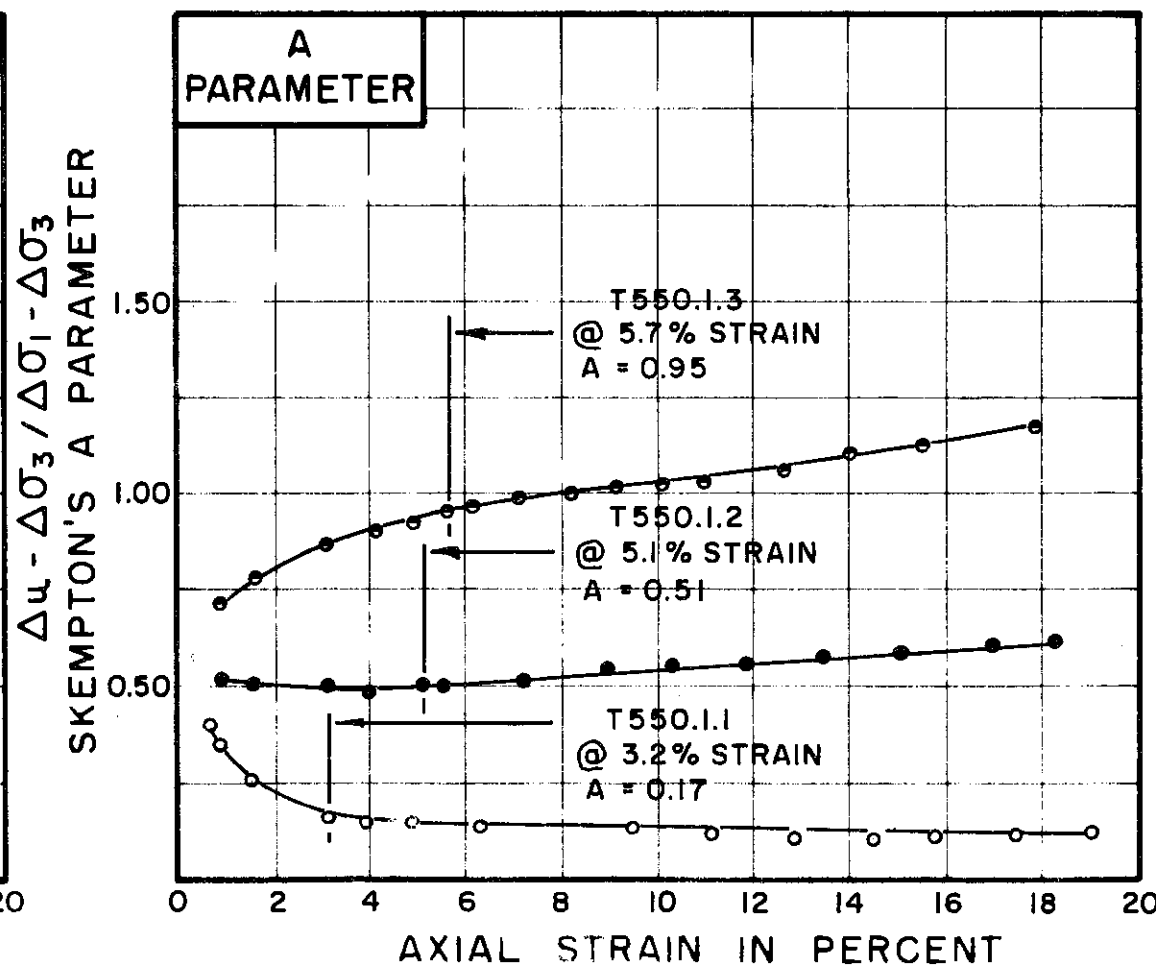
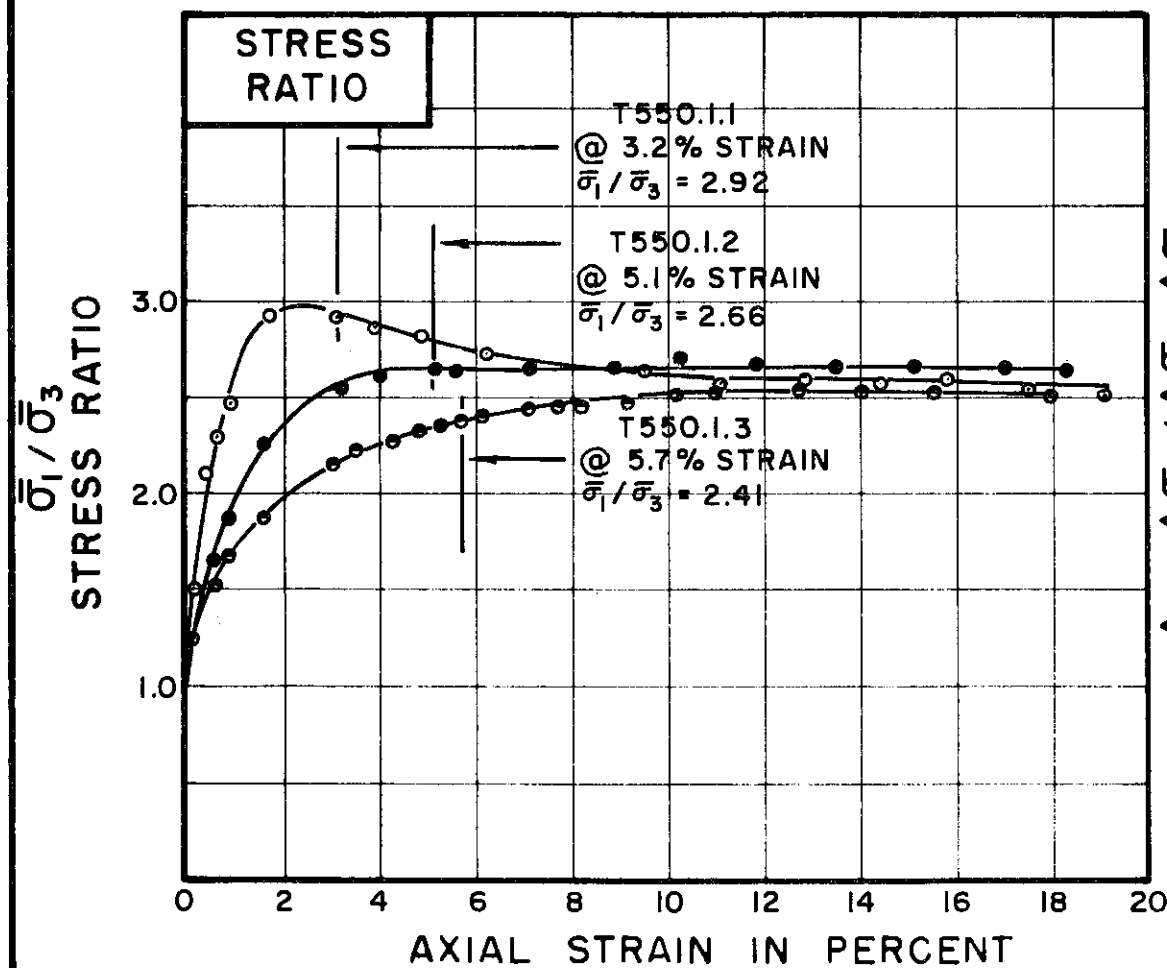
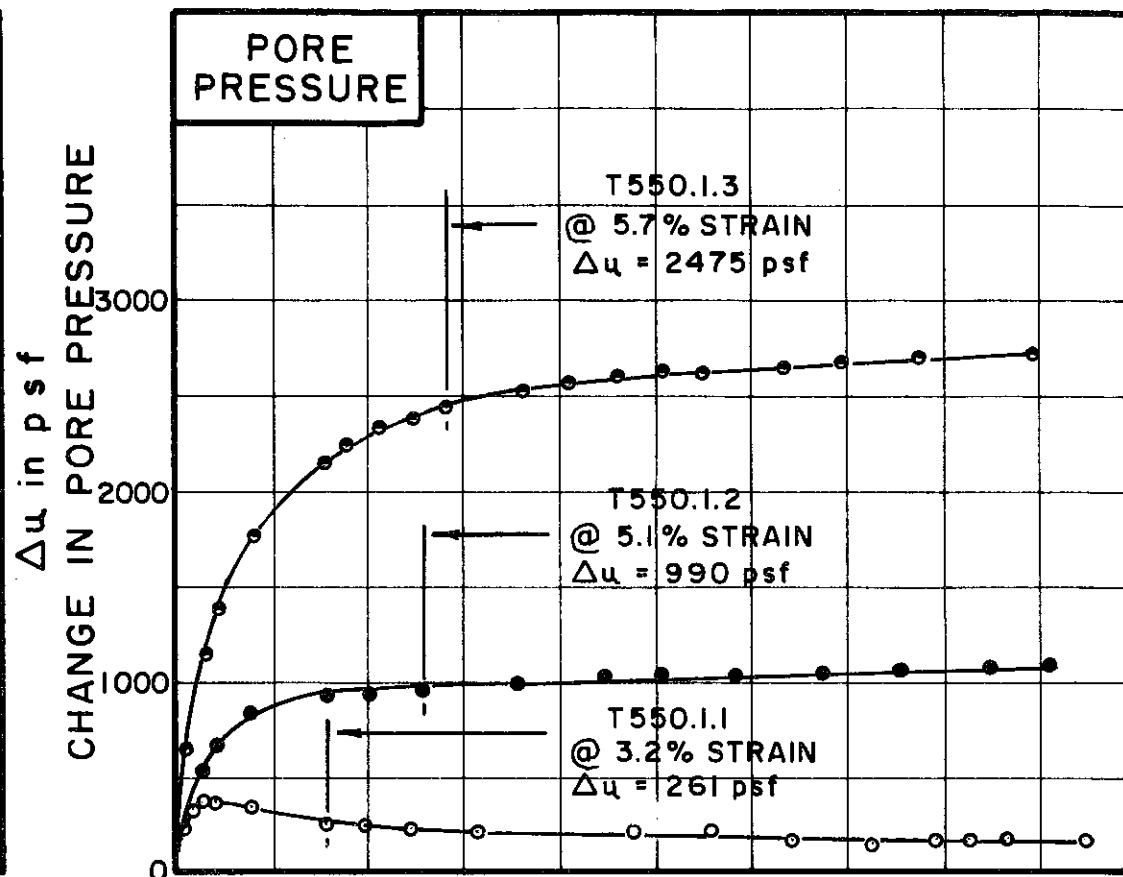
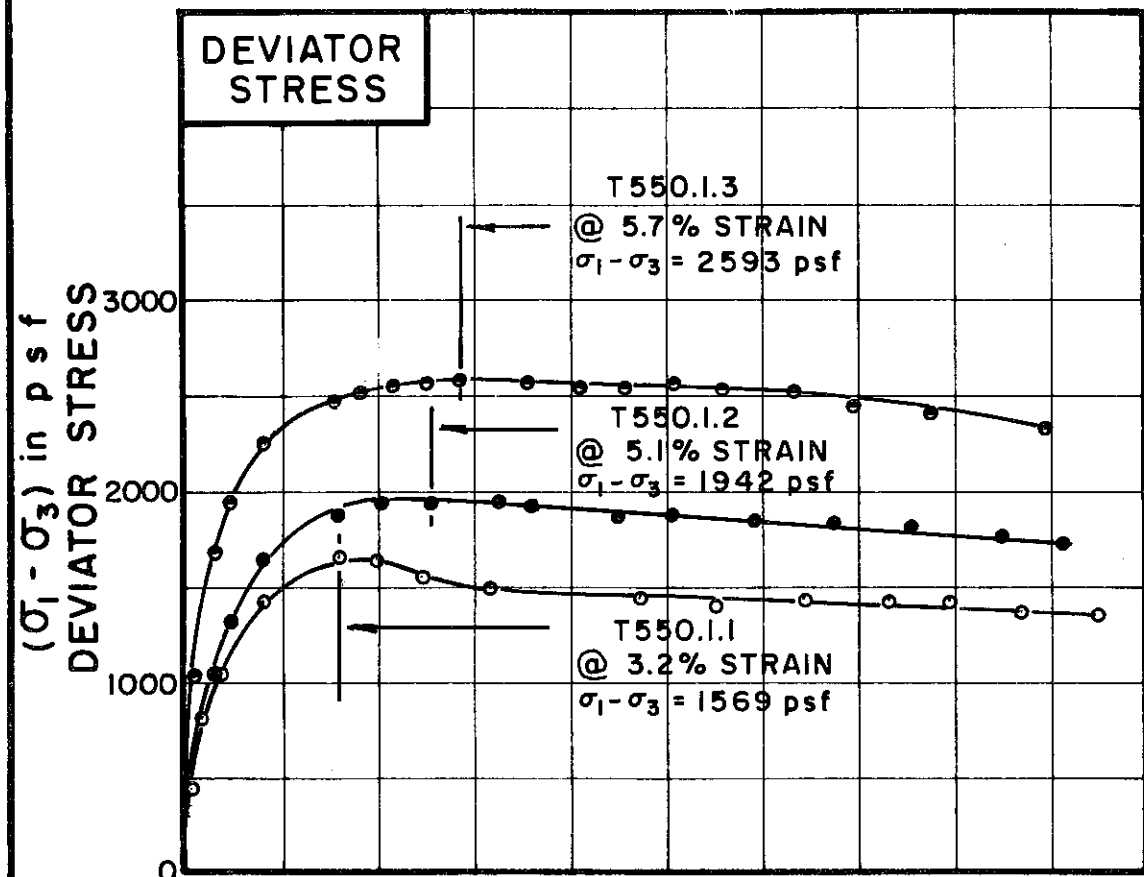
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T550.1.1	T550.1.2	T550.1.3
	○	●	●

INITIAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	w <sub>0</sub>		37.5%	33.5%	37.1%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	83	87	83
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.16	3.18	3.19
FINAL CONDITIONS BEFORE SHEAR			T550.1.1	T550.1.2	T550.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	psf	8640	10080	15840
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	psf	1080	2160	4320
VOLUMETRIC STRAIN	ε <sub>vol</sub>		1.4%	2.4%	4.2%
PORE PRESSURE RESPONSE			95%	95%	96%
FINAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	w <sub>f</sub>		37.4%	32.2%	33.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.008
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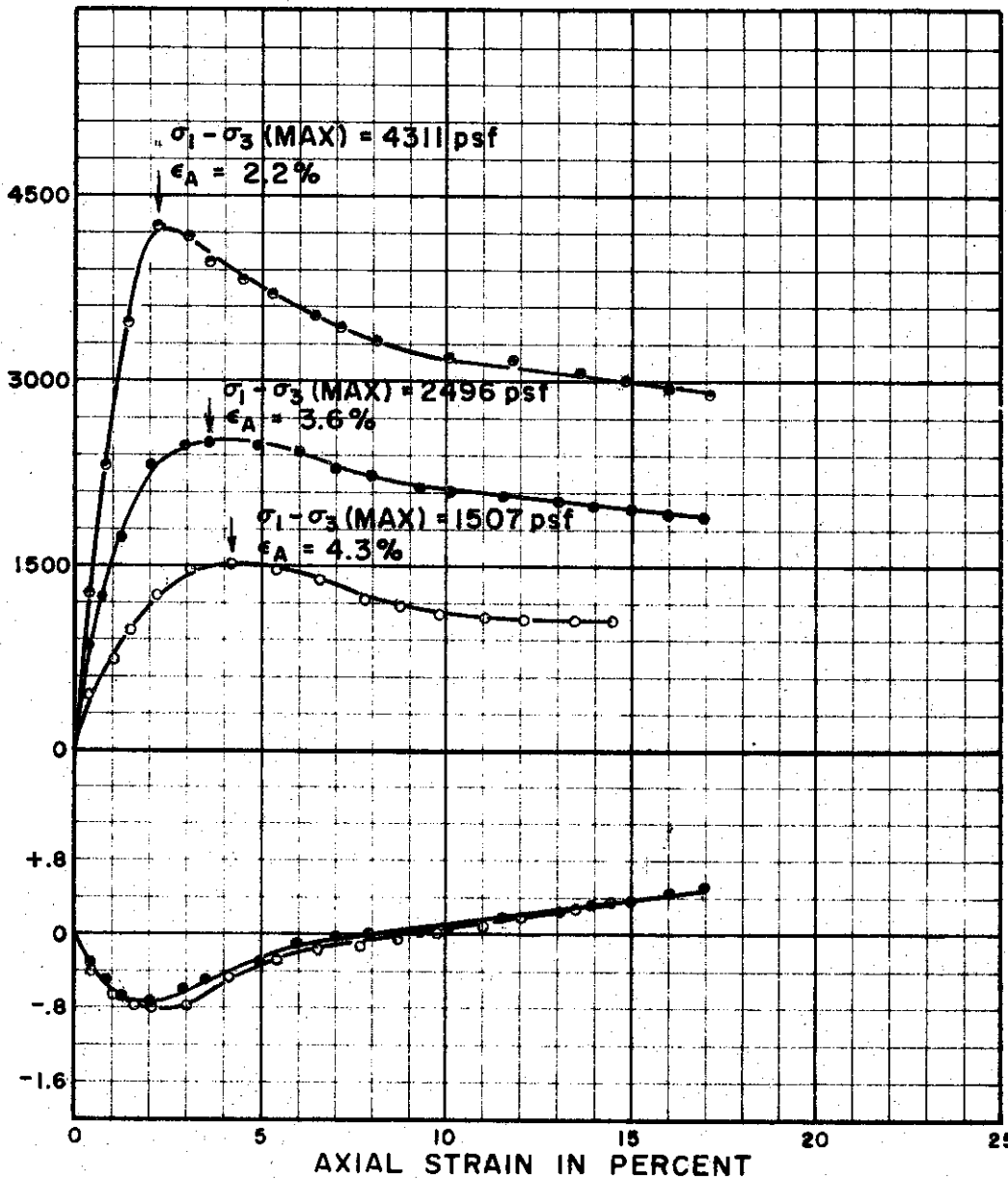
BORING NO. 158  
 SAMPLE NO. 4  
 DEPTH 17.5' TO 20.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



DEVIATOR STRESS,  $\sigma_1 - \sigma_3$  IN psf

VOLUMETRIC STRAIN,  $\Delta V/V_0$  IN PERCENT



SKETCHES AT FAILURE



TEST NO. 253.23



TEST NO. 253.22



TEST NO. 253.21

TEST NO./SYMBOL		253.21	253.22	253.23
INITIAL CONDITIONS	INITIAL WATER CONTENT %	$w_0$ 23.0	23.3	24.2
	INITIAL UNIT WEIGHT pcf	$\gamma_d$ 107	105	103
	SAMPLE HEIGHT & DIAMETER in	$D_0$ 1.39	1.39	1.41
		$H_0$ 3.51	3.46	3.43
CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS psf	$\sigma_1 = \sigma_3$ 576	1152	2304
	FINAL BACK PRESSURE psf	$u_0$ 7776	8352	7776
	VOLUMETRIC STRAIN %	$\epsilon_{vol}$ .94	1.28	2.74
	PORE PRESSURE RESPONSE %	99	97	96
	FINAL CONDITIONS	FINAL WATER CONTENT %	$w_f$ 26.8	26.1
	FINAL UNIT WEIGHT pcf	$\gamma_d$ 107	106	—
RATE OF STRAIN PERCENT PER MINUTE		.002	.002	.002

BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)

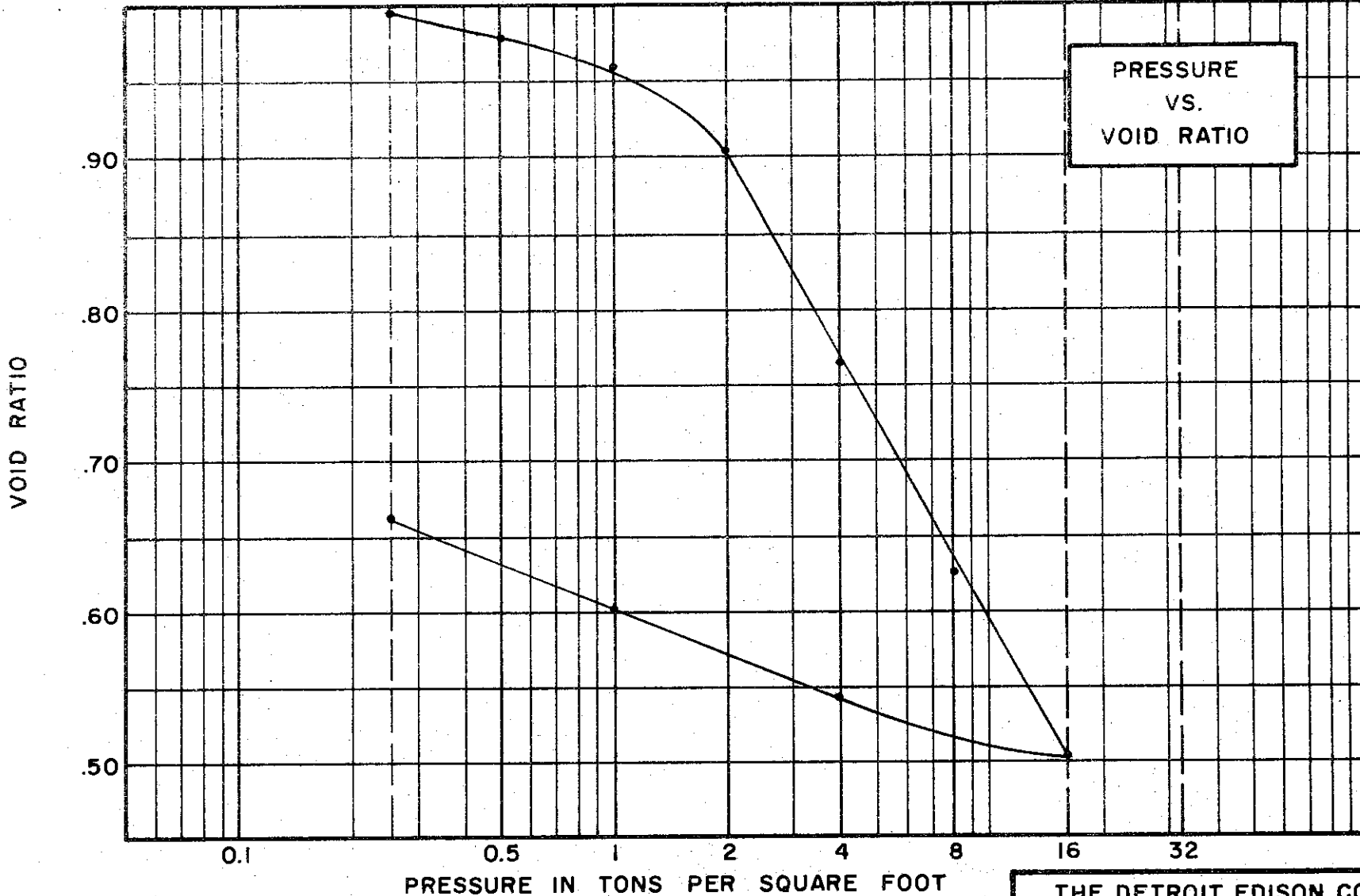
LIQUID LIMIT 49 PLASTIC LIMIT 23

**CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.6% FINAL 27.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

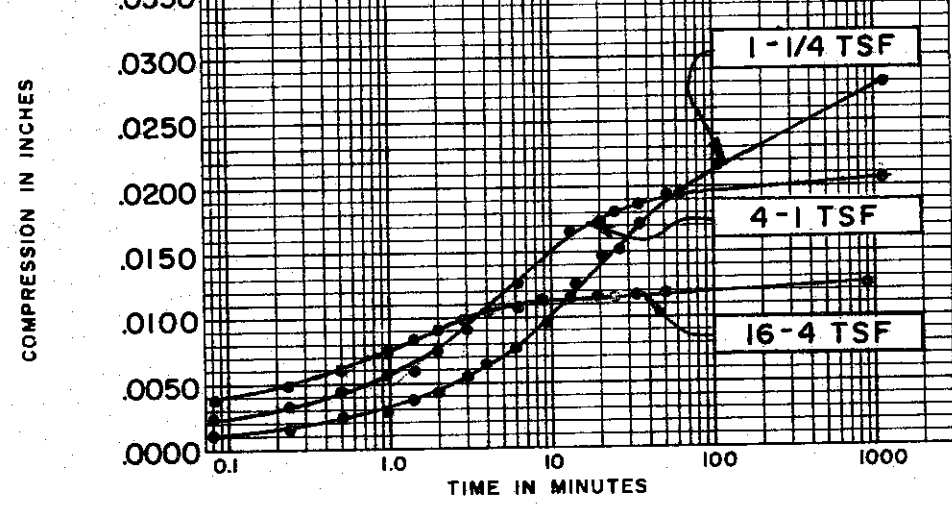
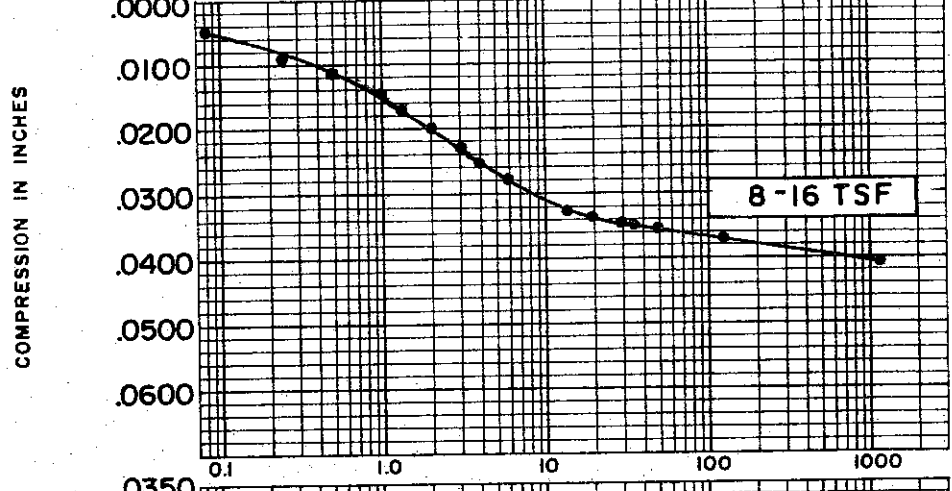
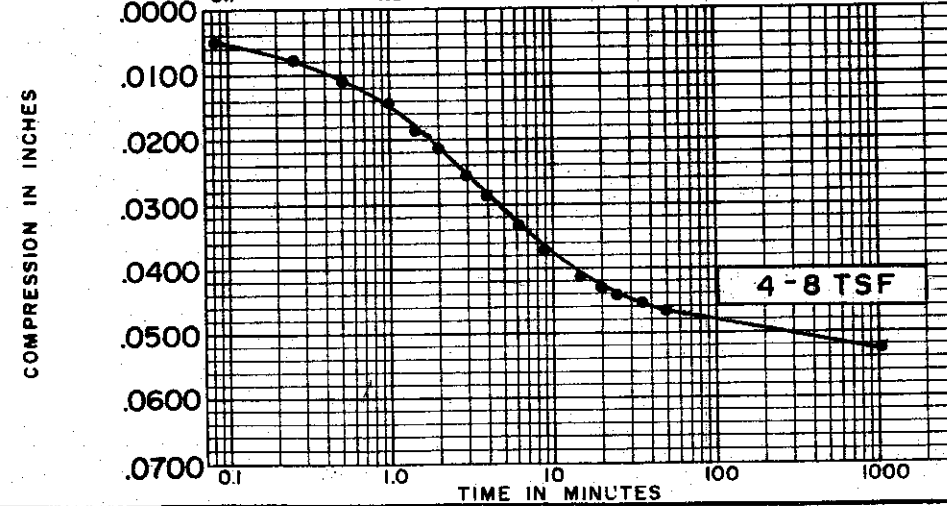
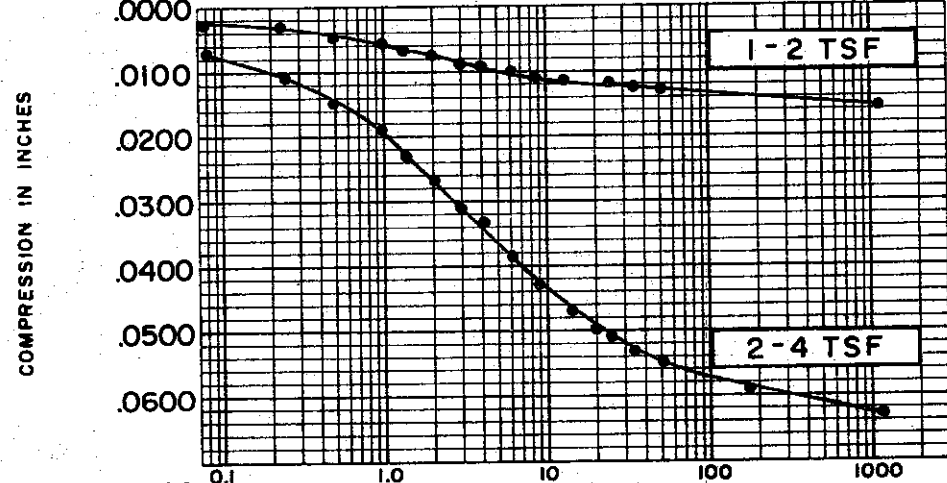
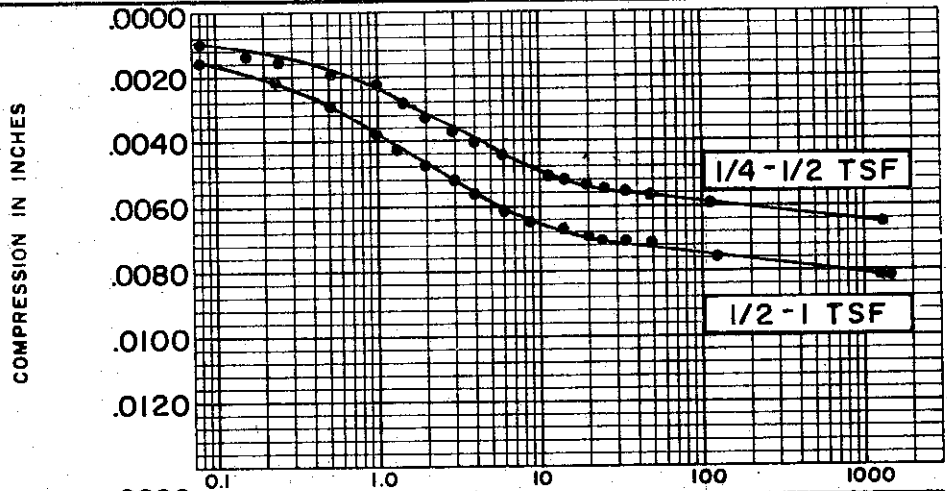
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C306.1  
 SAMPLE NO. 10 DATE APRIL 74  
 DEPTH 34.0' TO 34.3'

C-455



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.6%  
 FINAL WATER CONTENT 27.9%

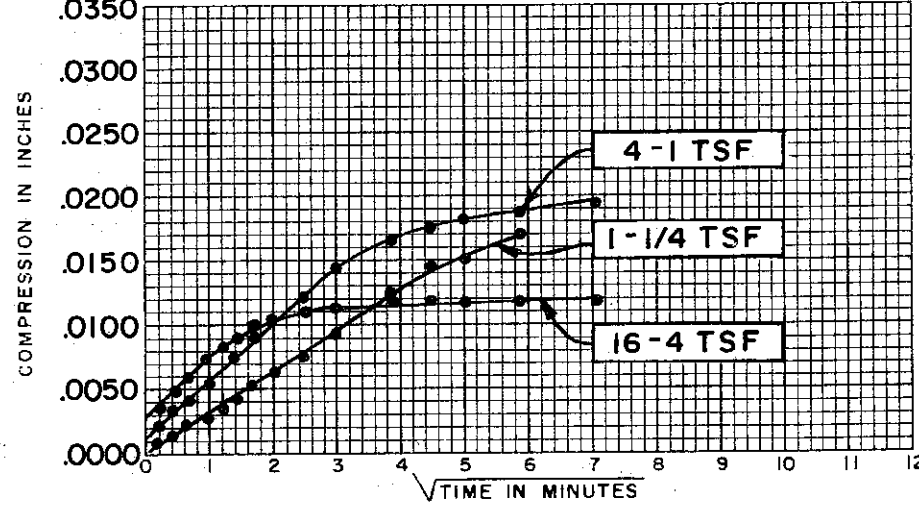
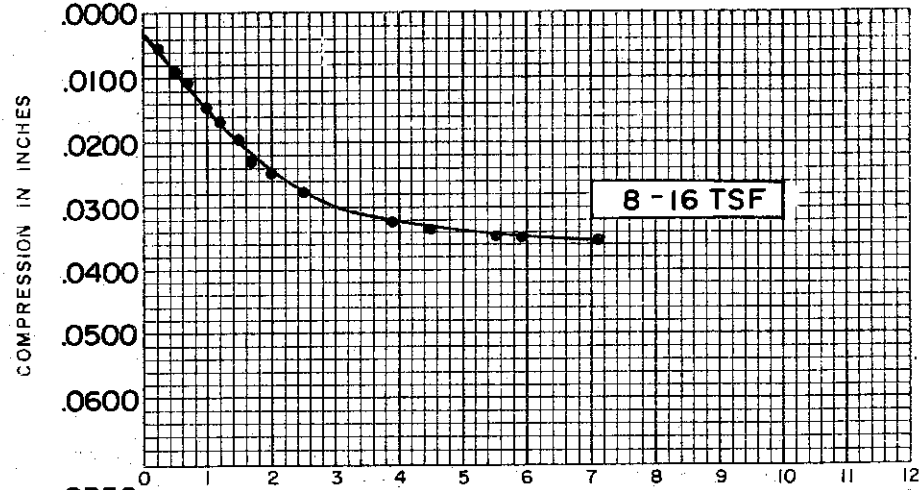
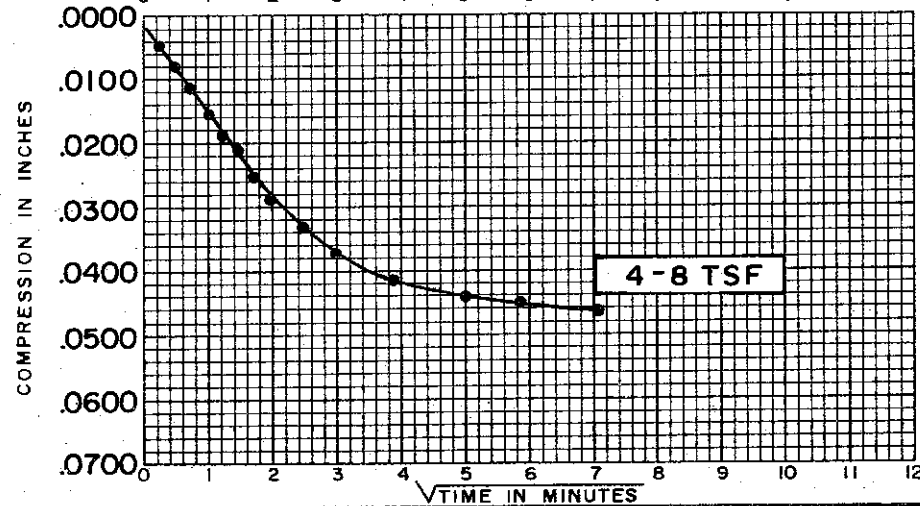
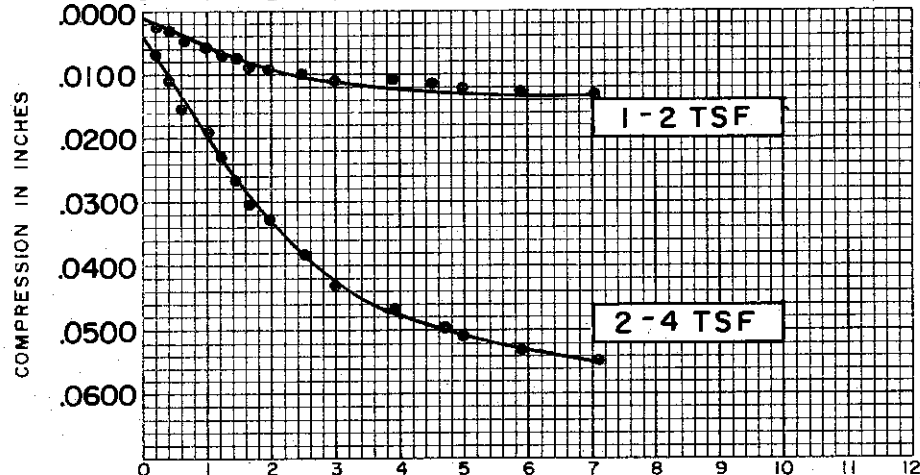
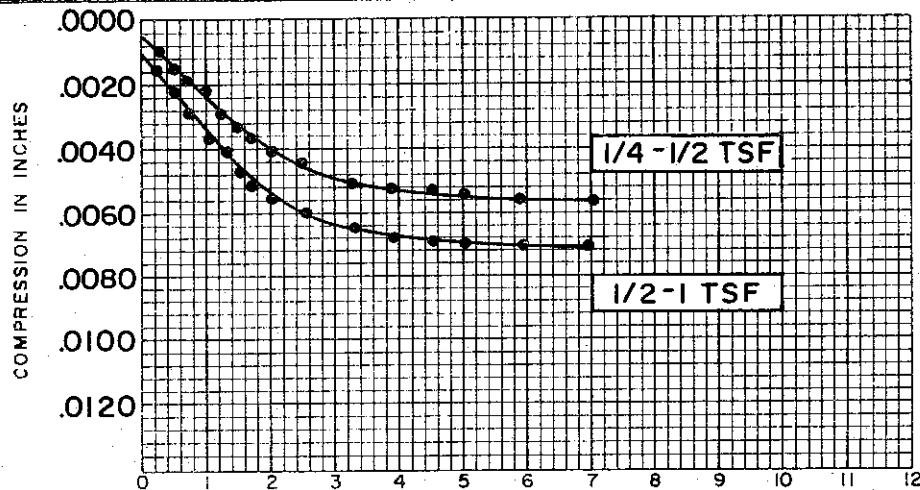
BORING NO. 27  
 SAMPLE NO. 10  
 DEPTH 34.0' TO 34.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

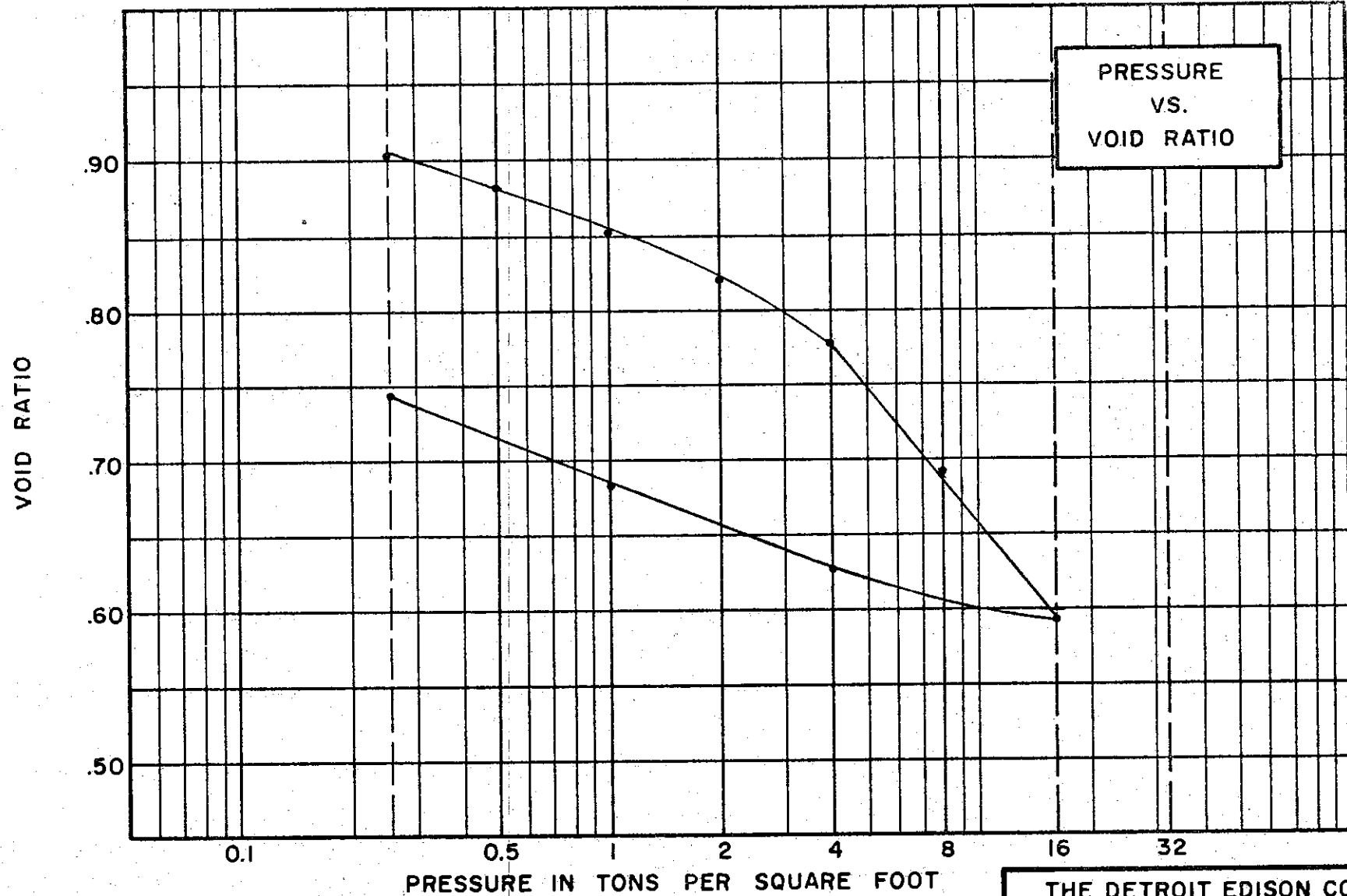


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.6%
FINAL WATER CONTENT	27.9%
BORING NO.	27
SAMPLE NO.	10
DEPTH	34.0' TO 34.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.016

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-457



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 33% FINAL 30%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 25 %

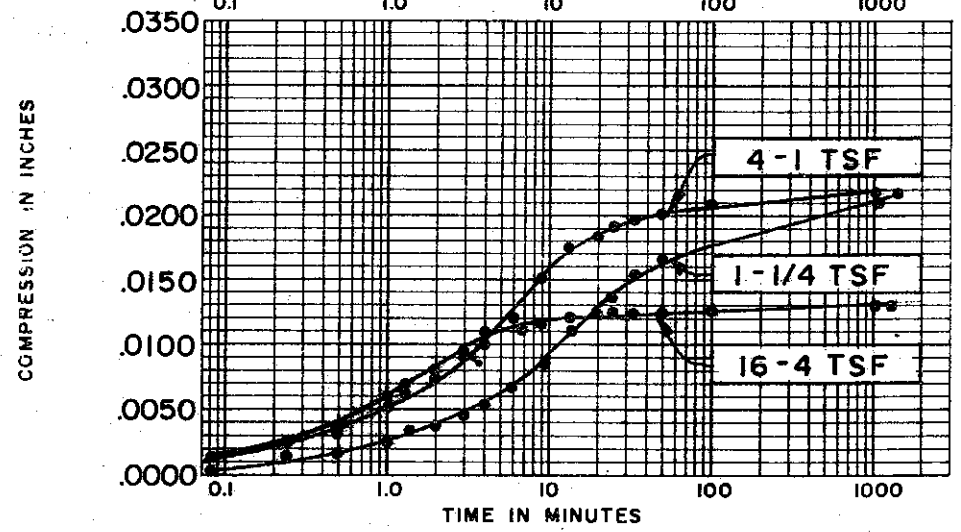
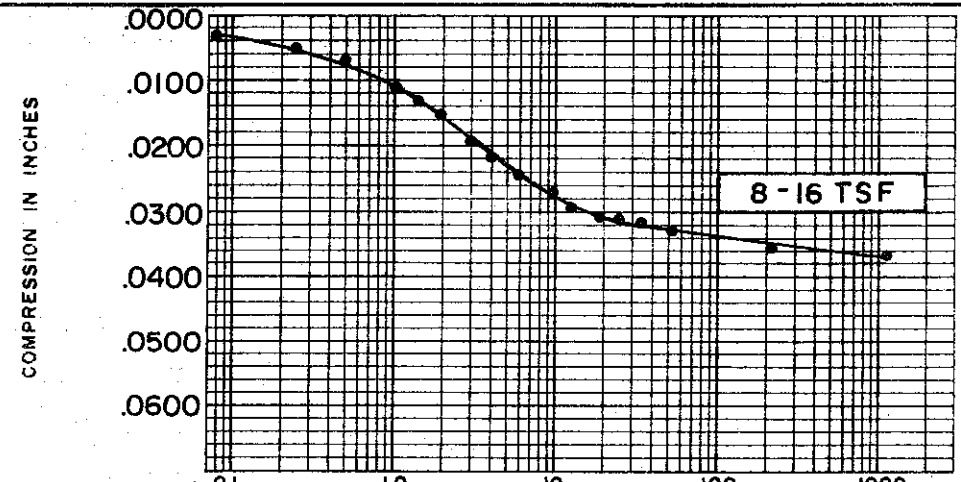
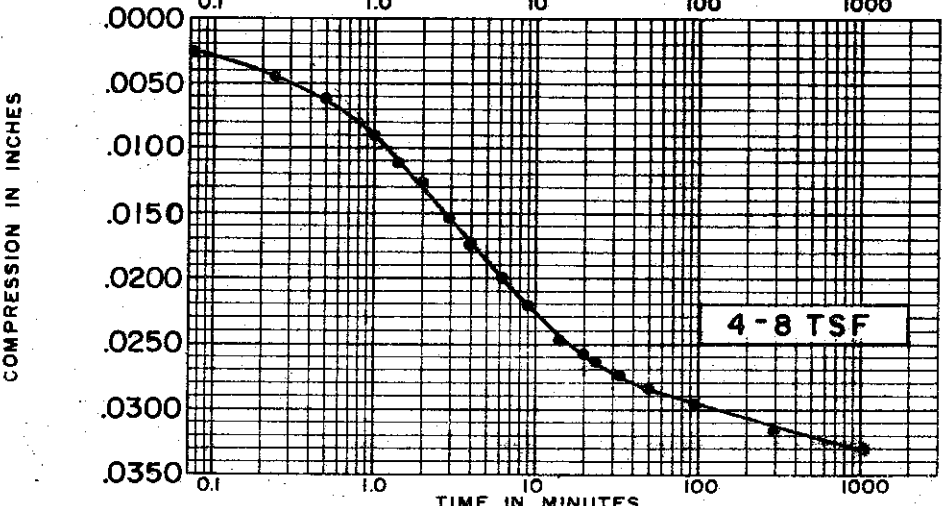
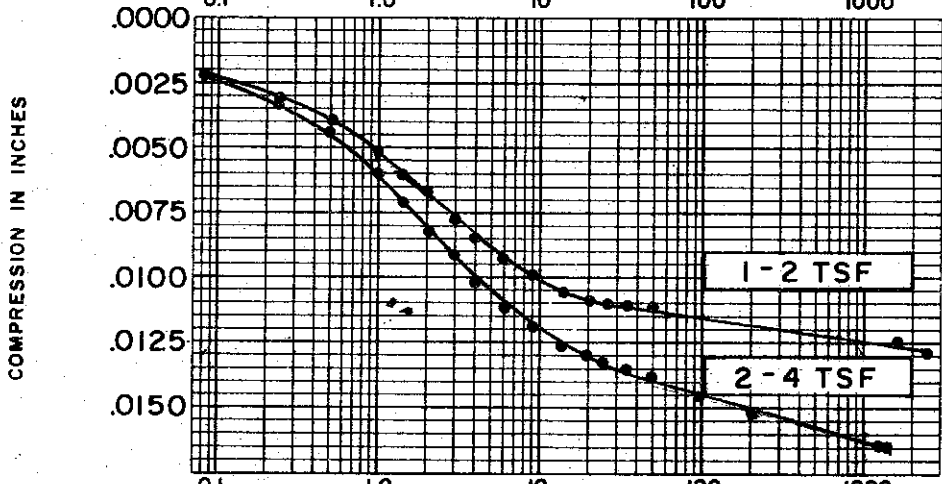
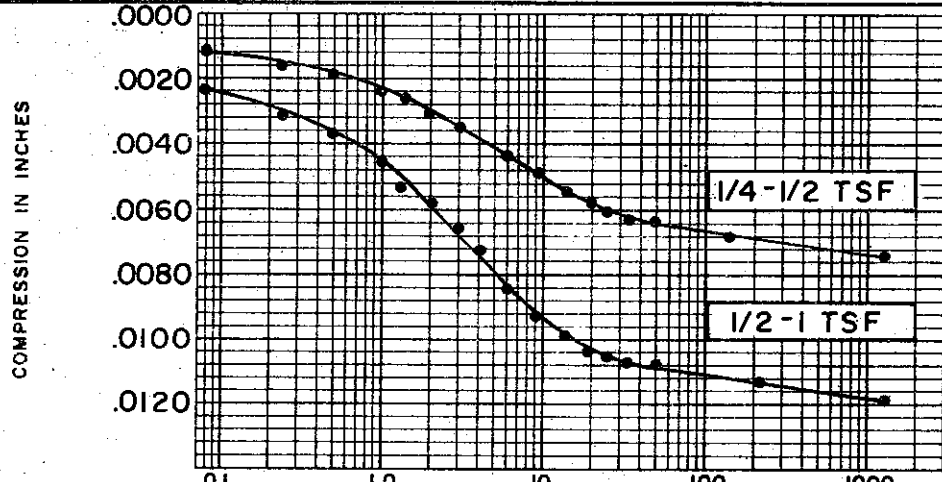
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C313.1  
 SAMPLE NO. 24 DATE APRIL 74  
 DEPTH 104.2' TO 104.5'



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT 33.9%  
 FINAL WATER CONTENT 30.0%

BORING NO. 27  
 SAMPLE NO. 24  
 DEPTH 104.2' TO 104.5'

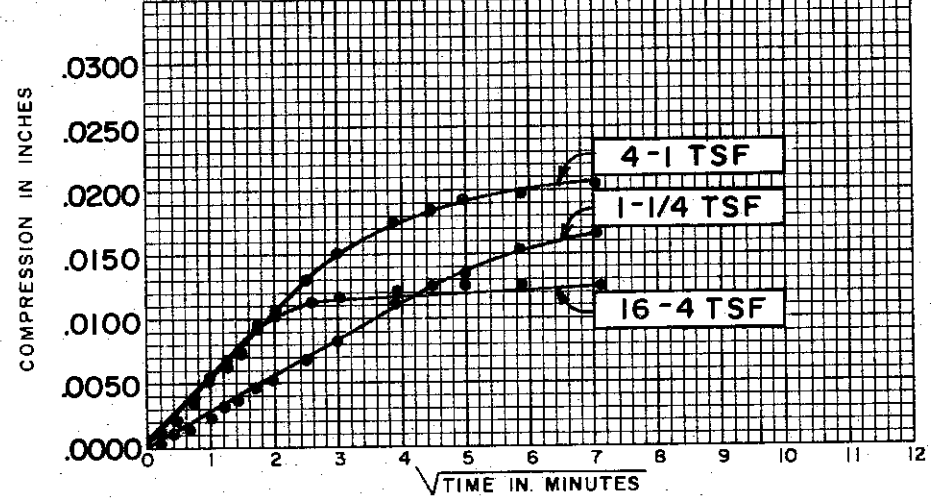
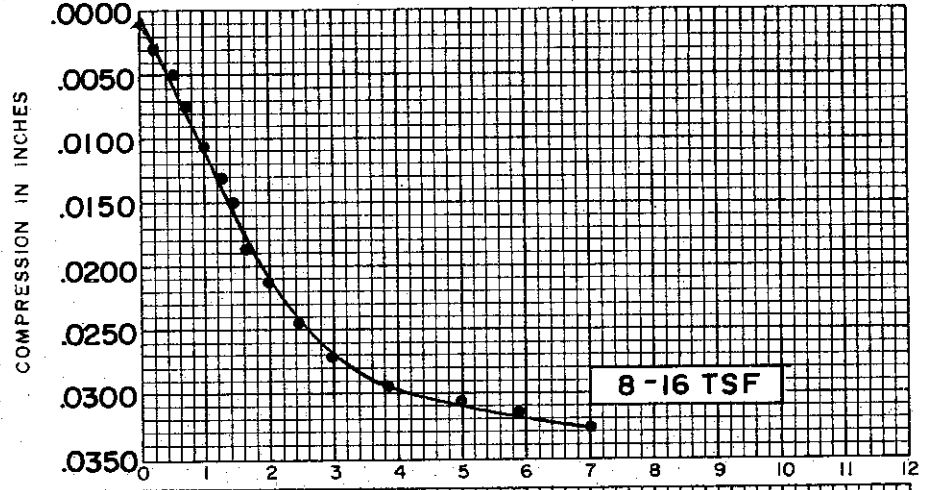
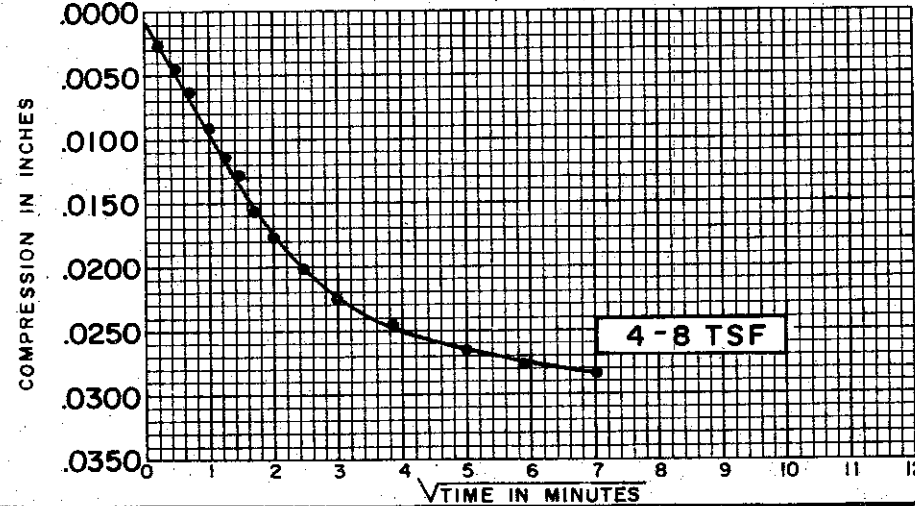
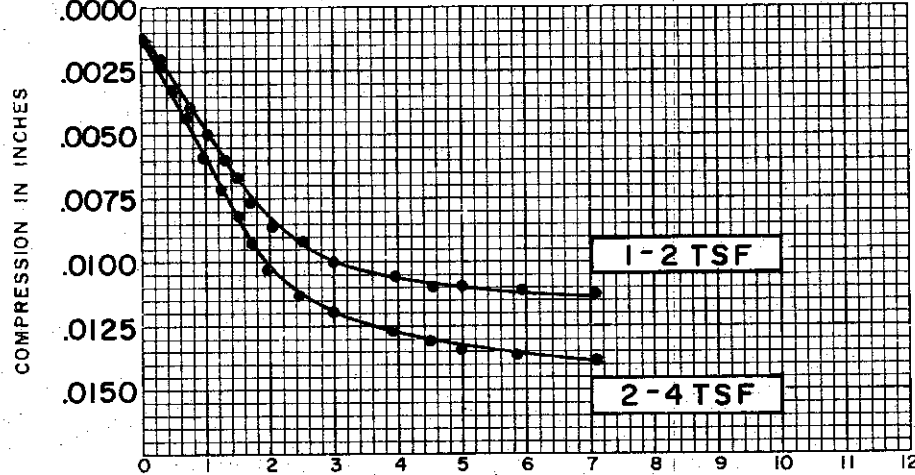
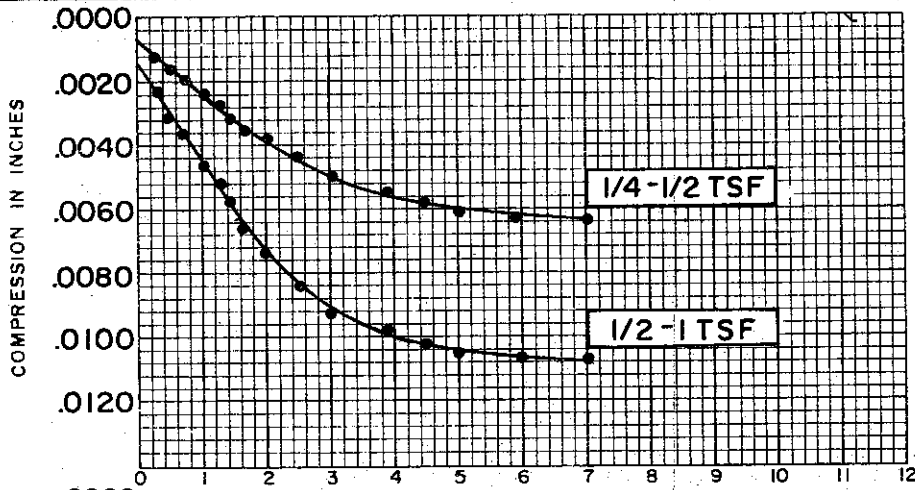
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE:**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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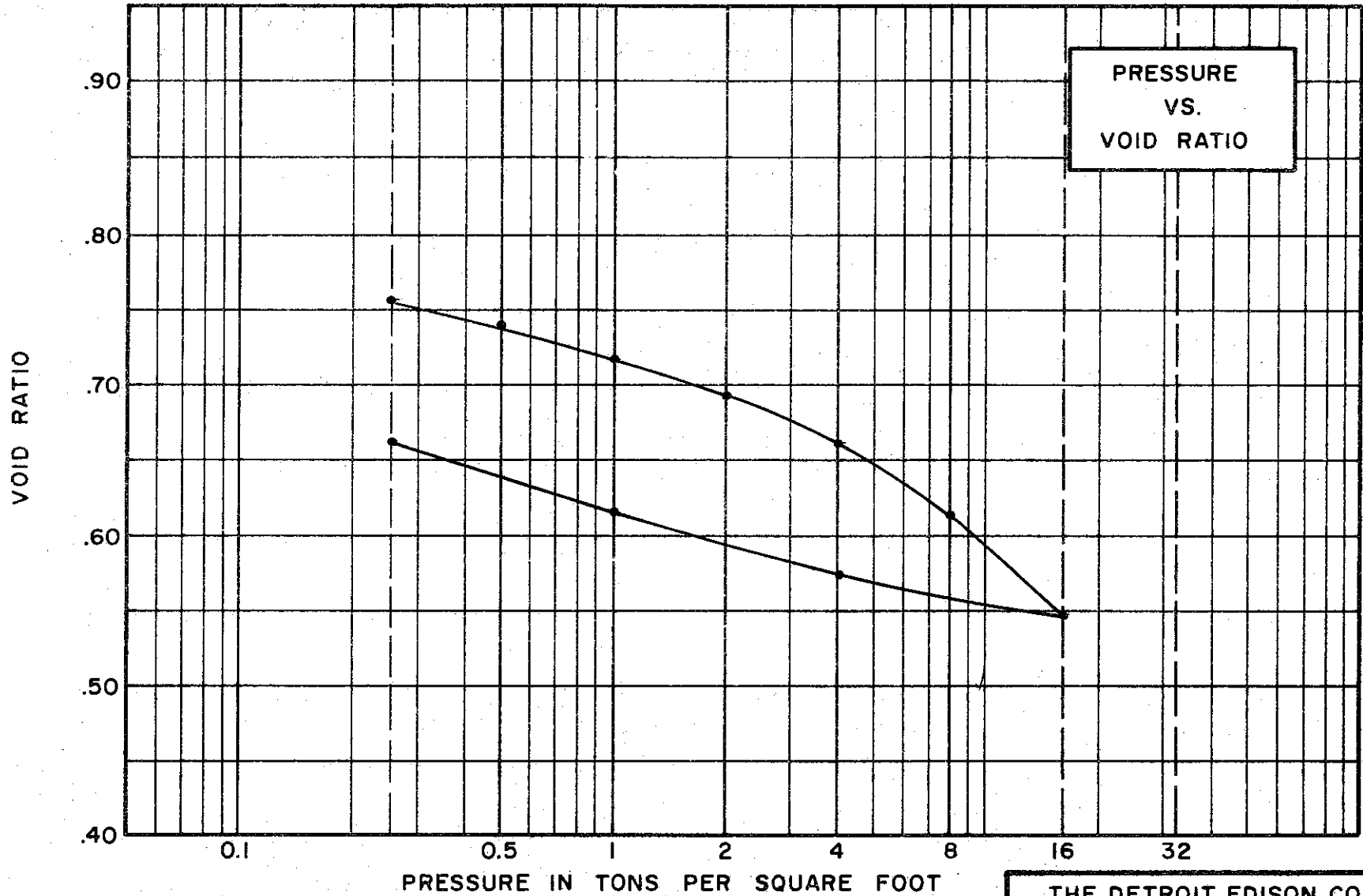


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY	2.74
INITIAL WATER CONTENT	33.9%
FINAL WATER CONTENT	30.0%
BORING NO.	27
SAMPLE NO.	24
DEPTH	104.2' TO 104.5'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.910

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 29.0% FINAL 28.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

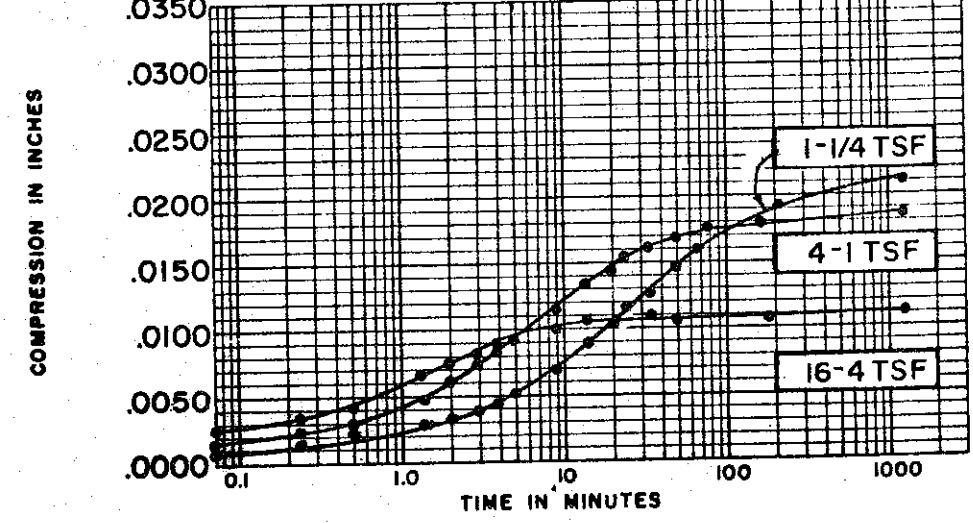
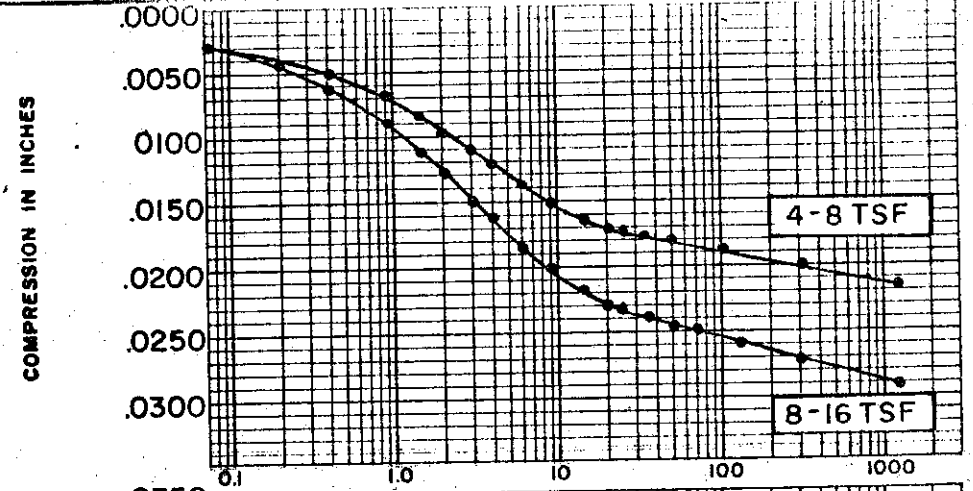
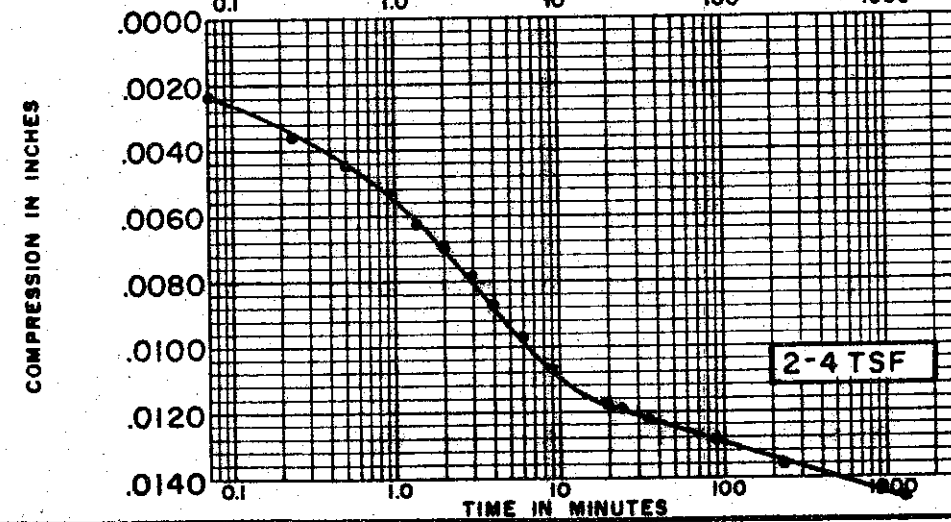
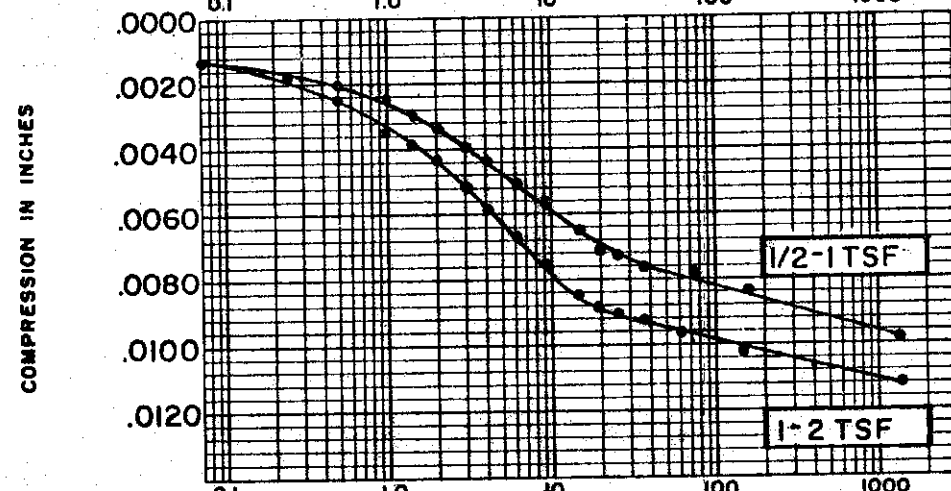
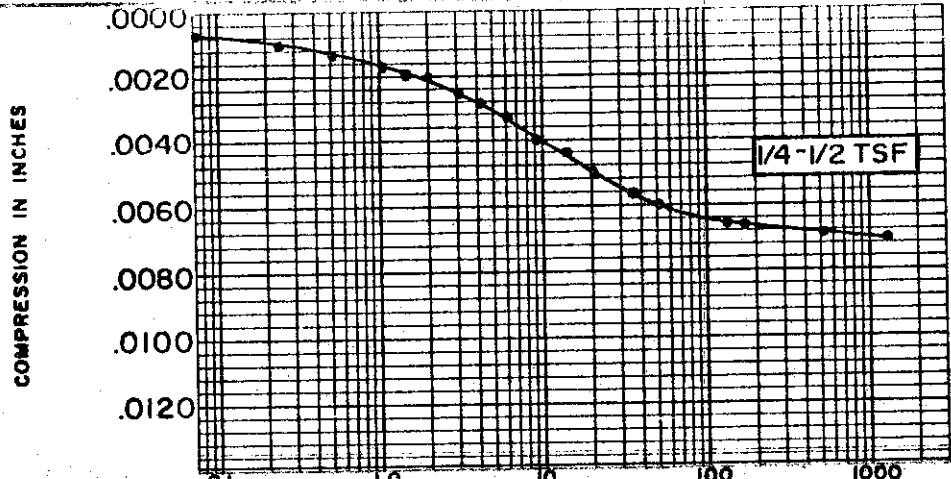
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C18.1  
 SAMPLE NO. 4 DATE JAN. 1974  
 DEPTH 14.6' TO 14.7'

T94-C-461



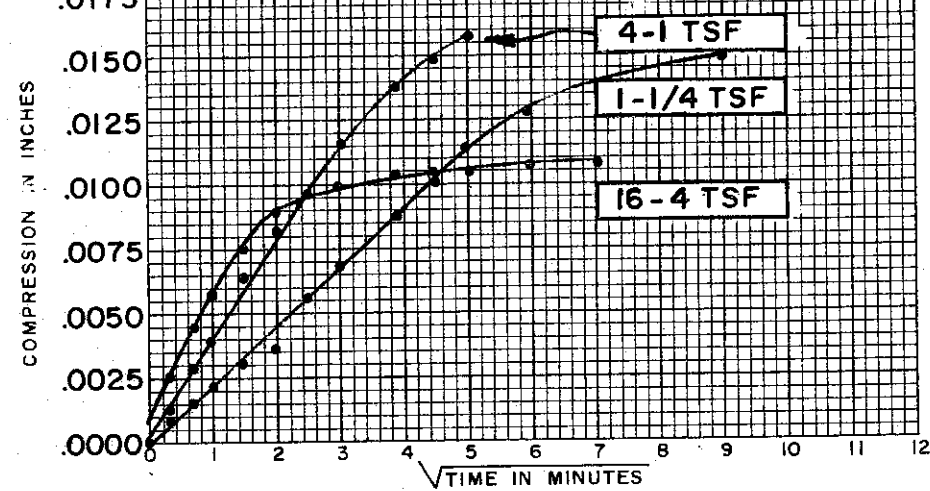
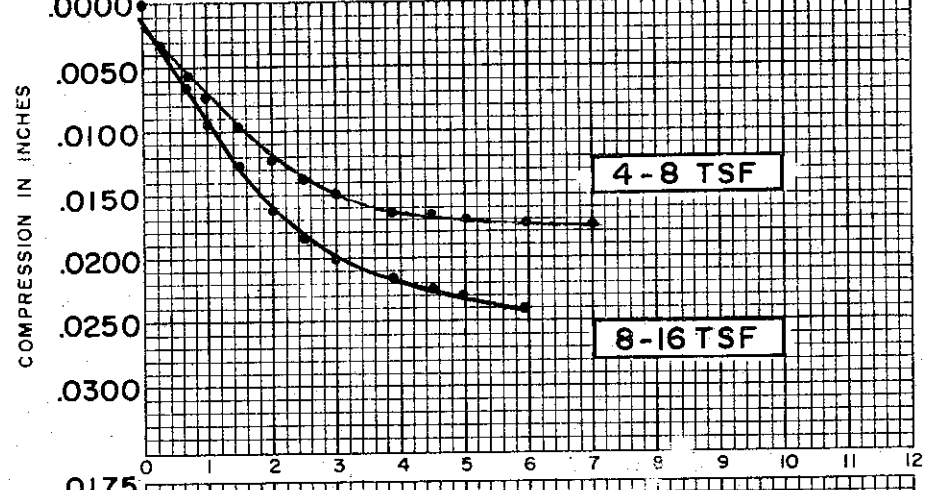
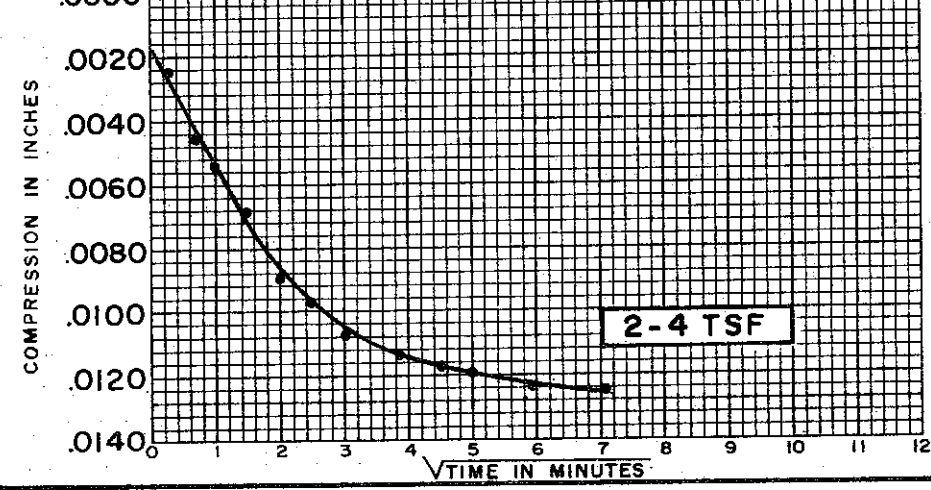
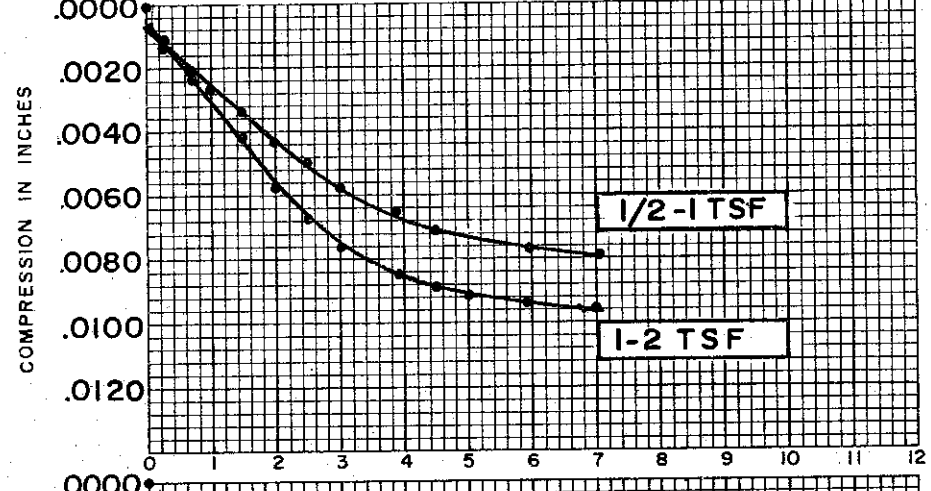
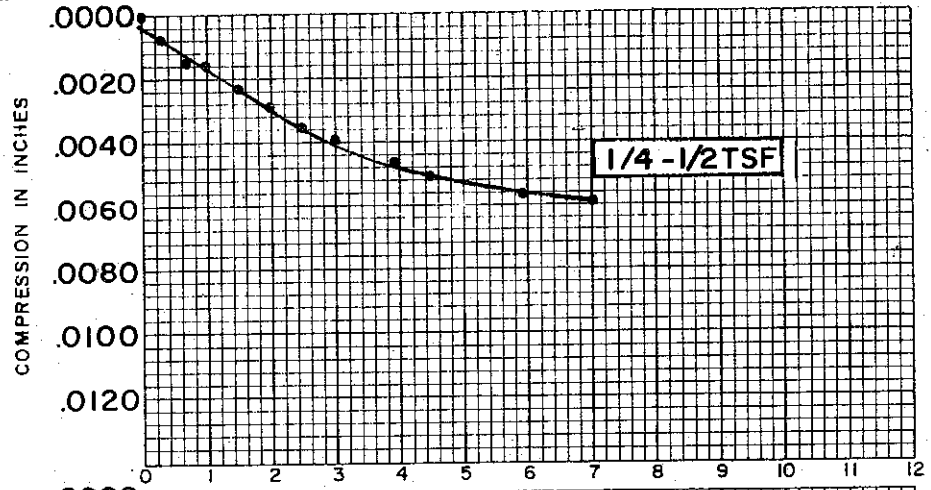
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 29.0%  
 FINAL WATER CONTENT 28.0%

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' TO 14.7'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.800"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVE**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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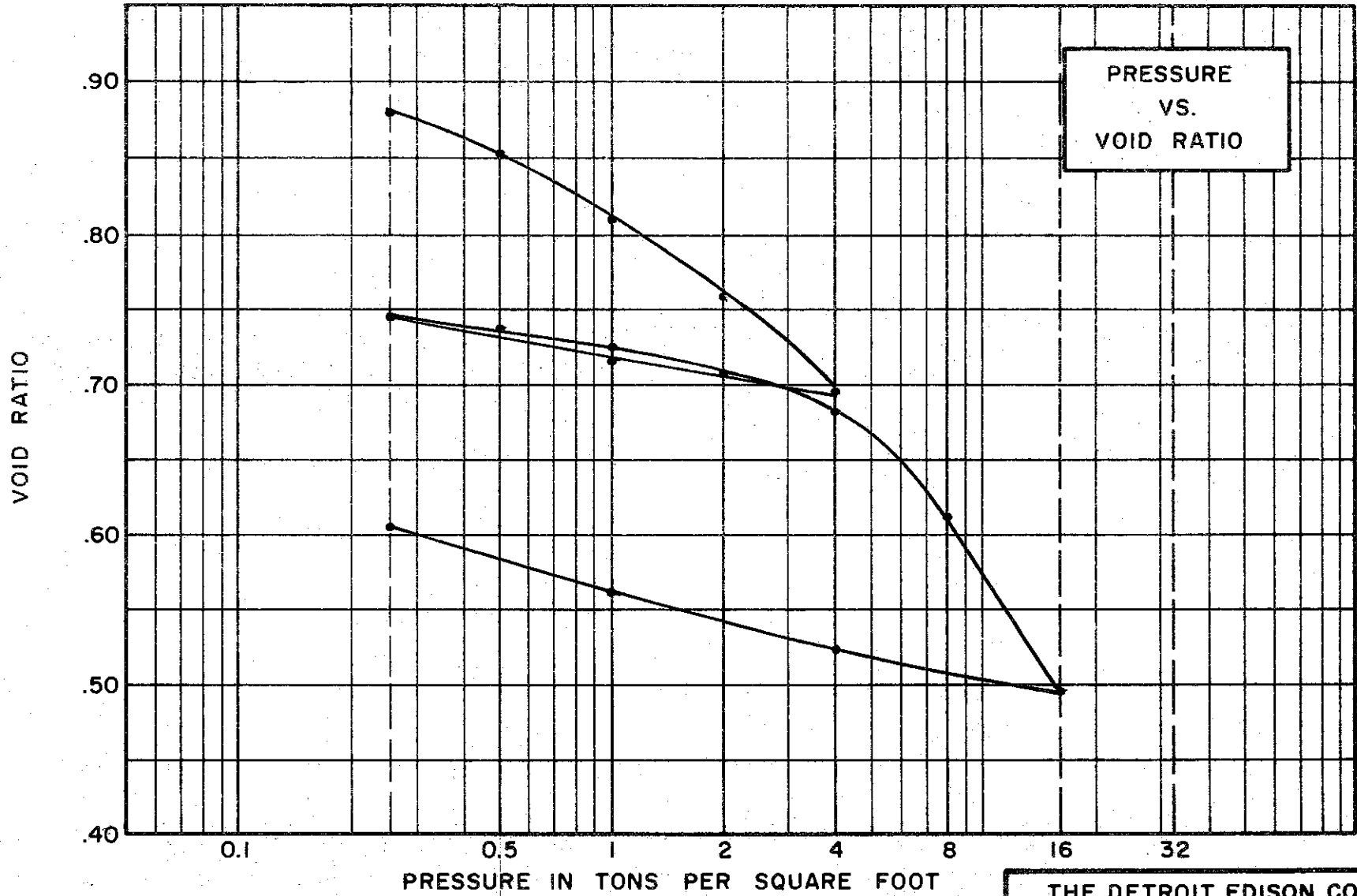


SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>4</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>14.6' TO 14.7'</u>
INITIAL WATER CONTENT	<u>29.0 %</u>	
FINAL WATER CONTENT	<u>28.0 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.770</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 36.0% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55% PLASTIC LIMIT 24%

**TEST DATA**

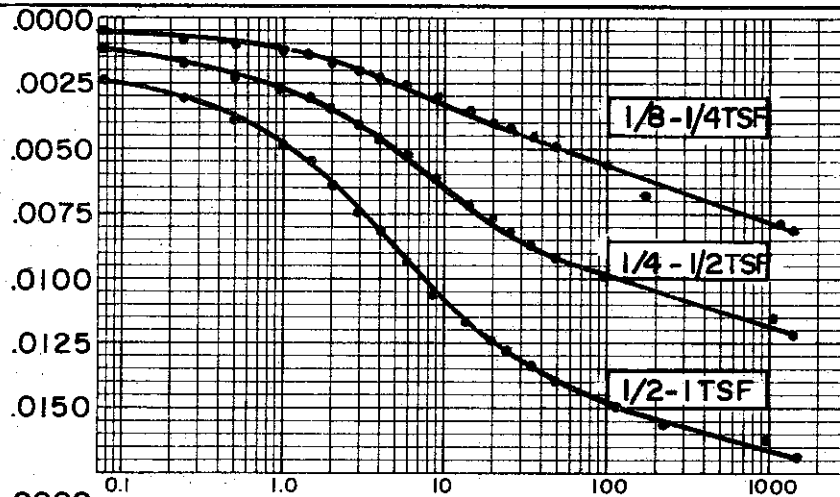
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

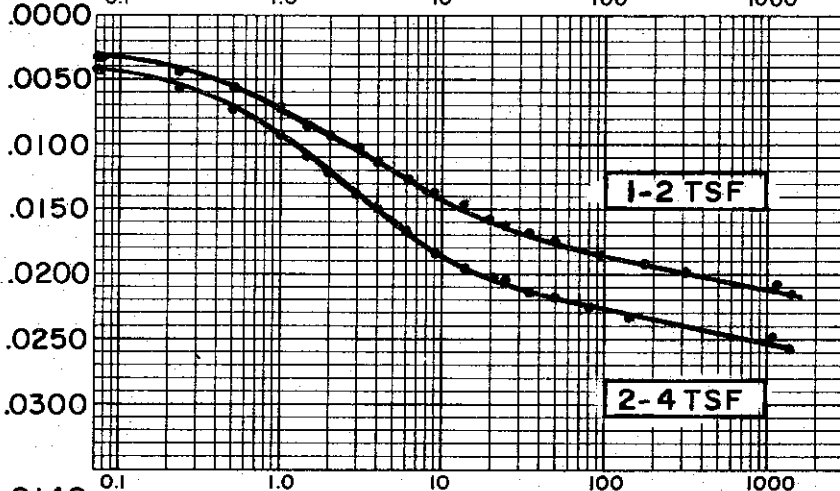
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C24.1  
 SAMPLE NO. 16 DATE JAN. 1974  
 DEPTH 74.0' TO 74.1'

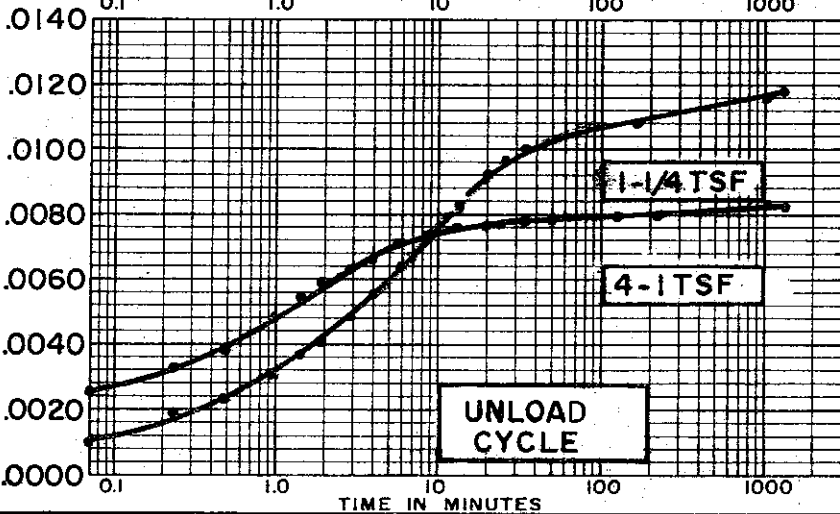
COMPRESSION IN INCHES



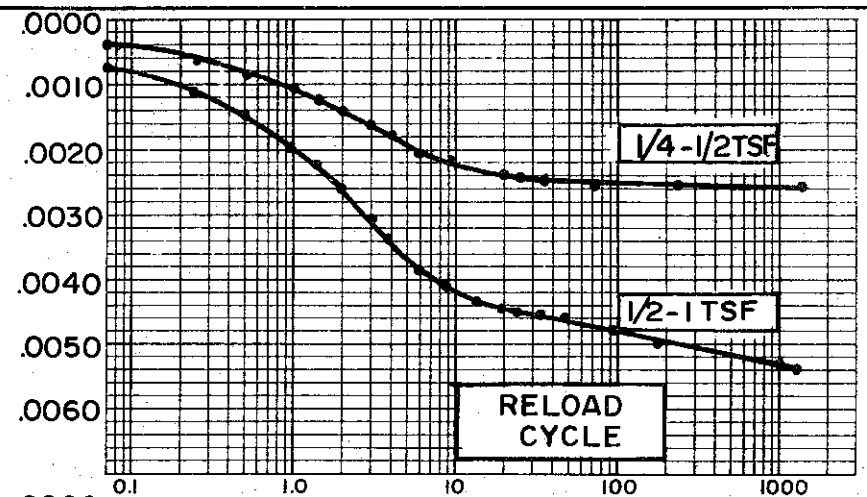
COMPRESSION IN INCHES



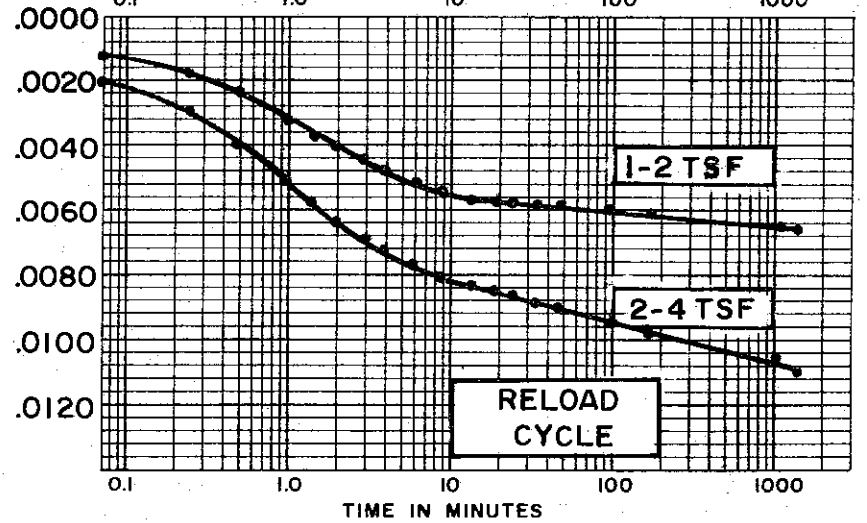
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 36.0%  
 FINAL WATER CONTENT 27.0%

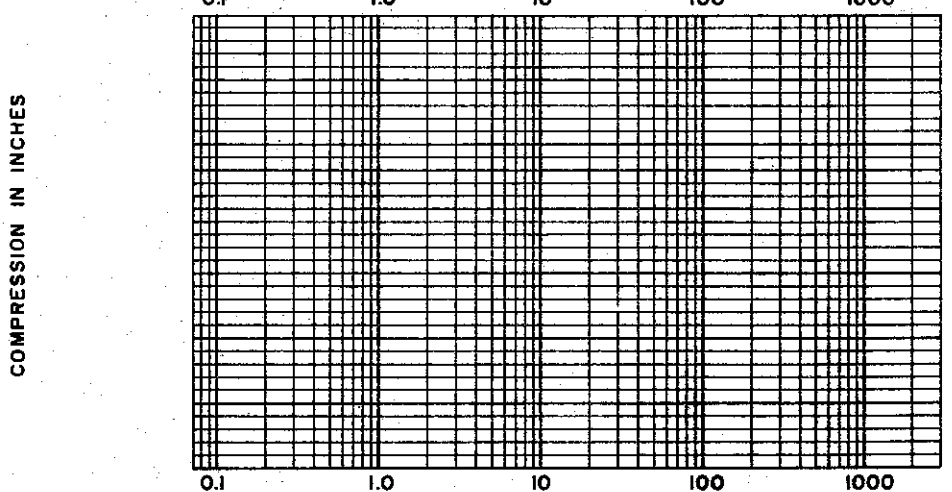
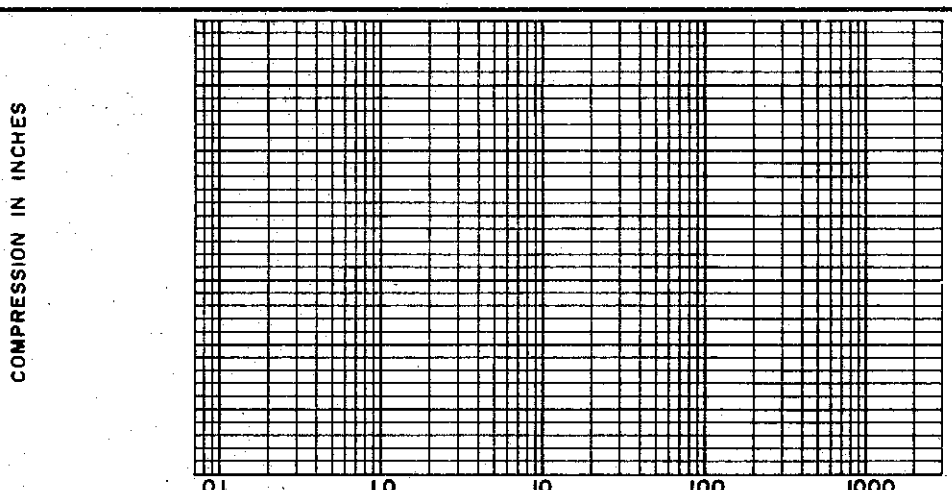
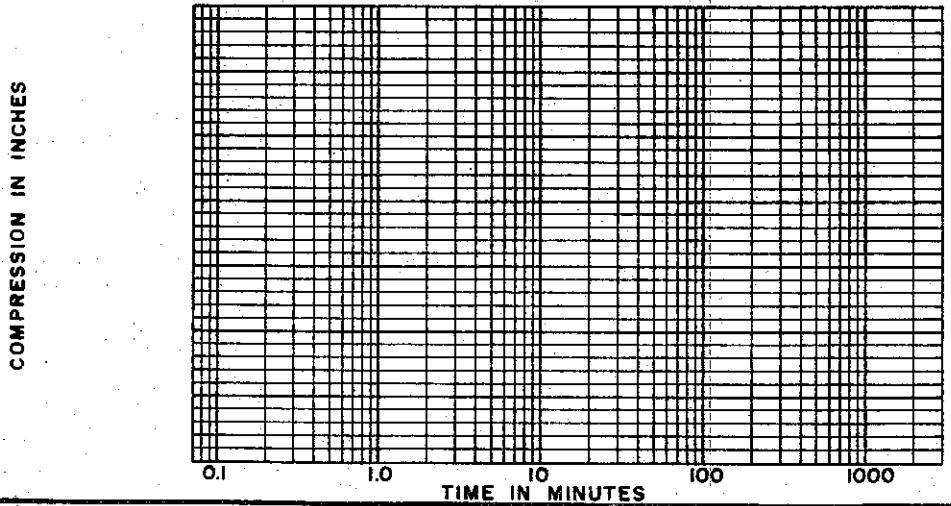
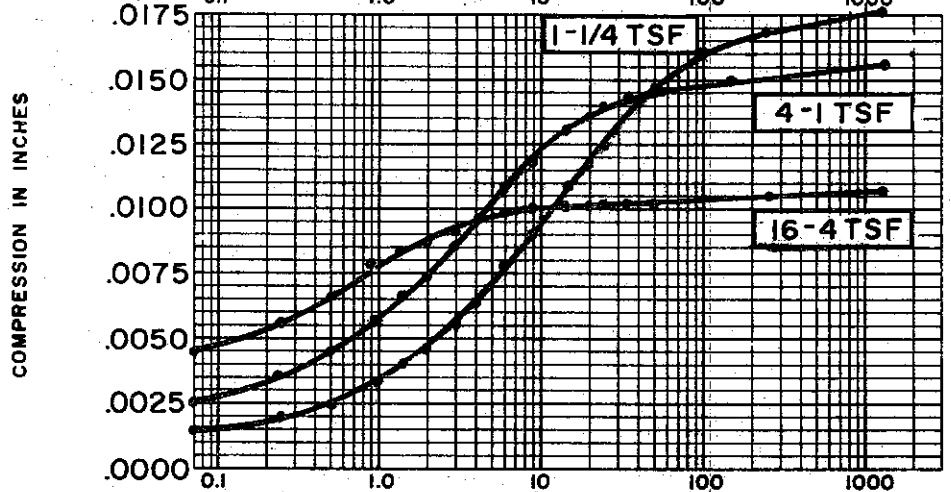
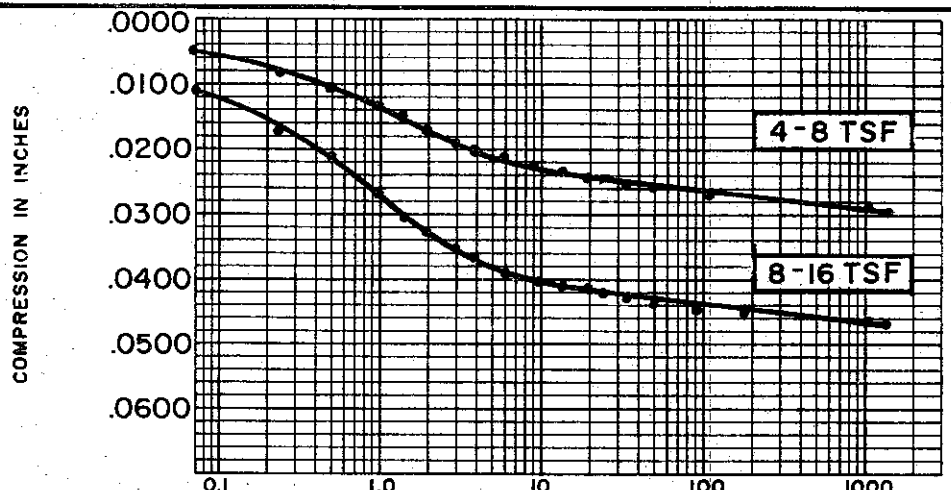
BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' TO 74.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

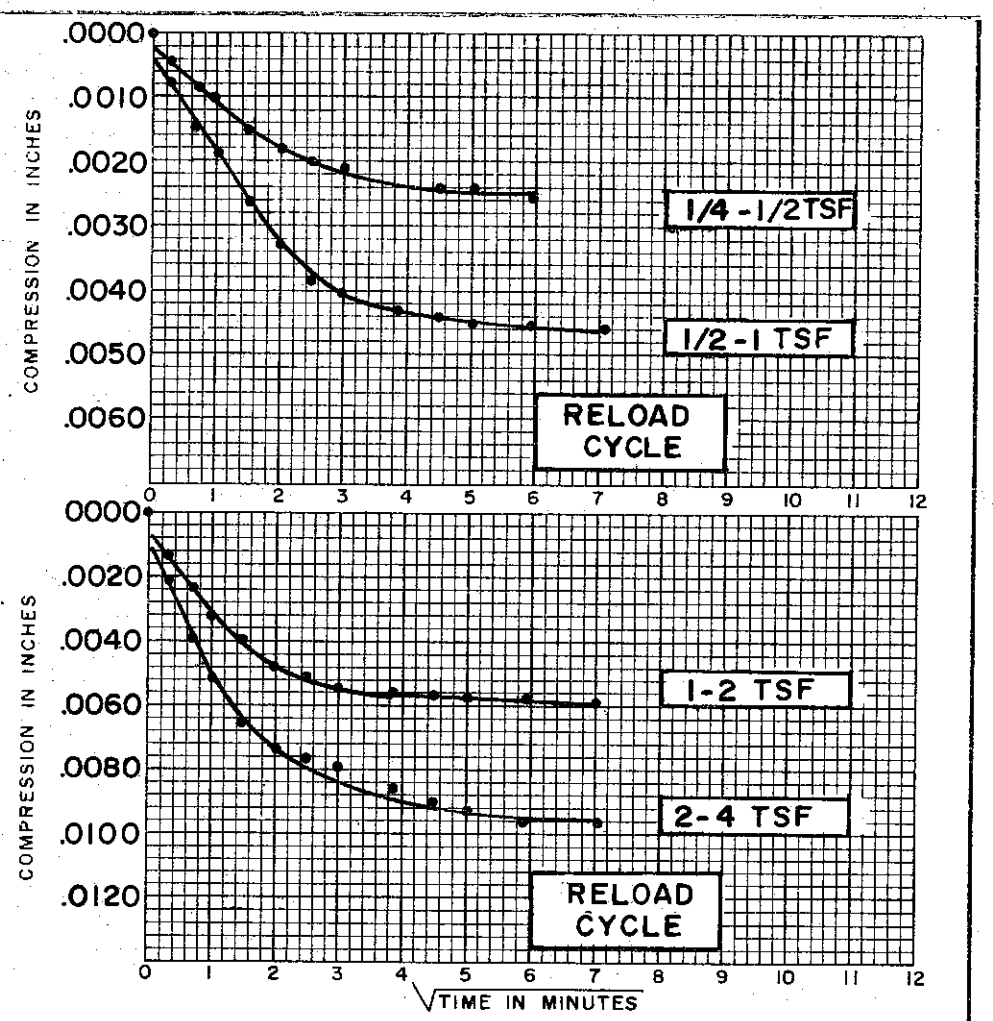
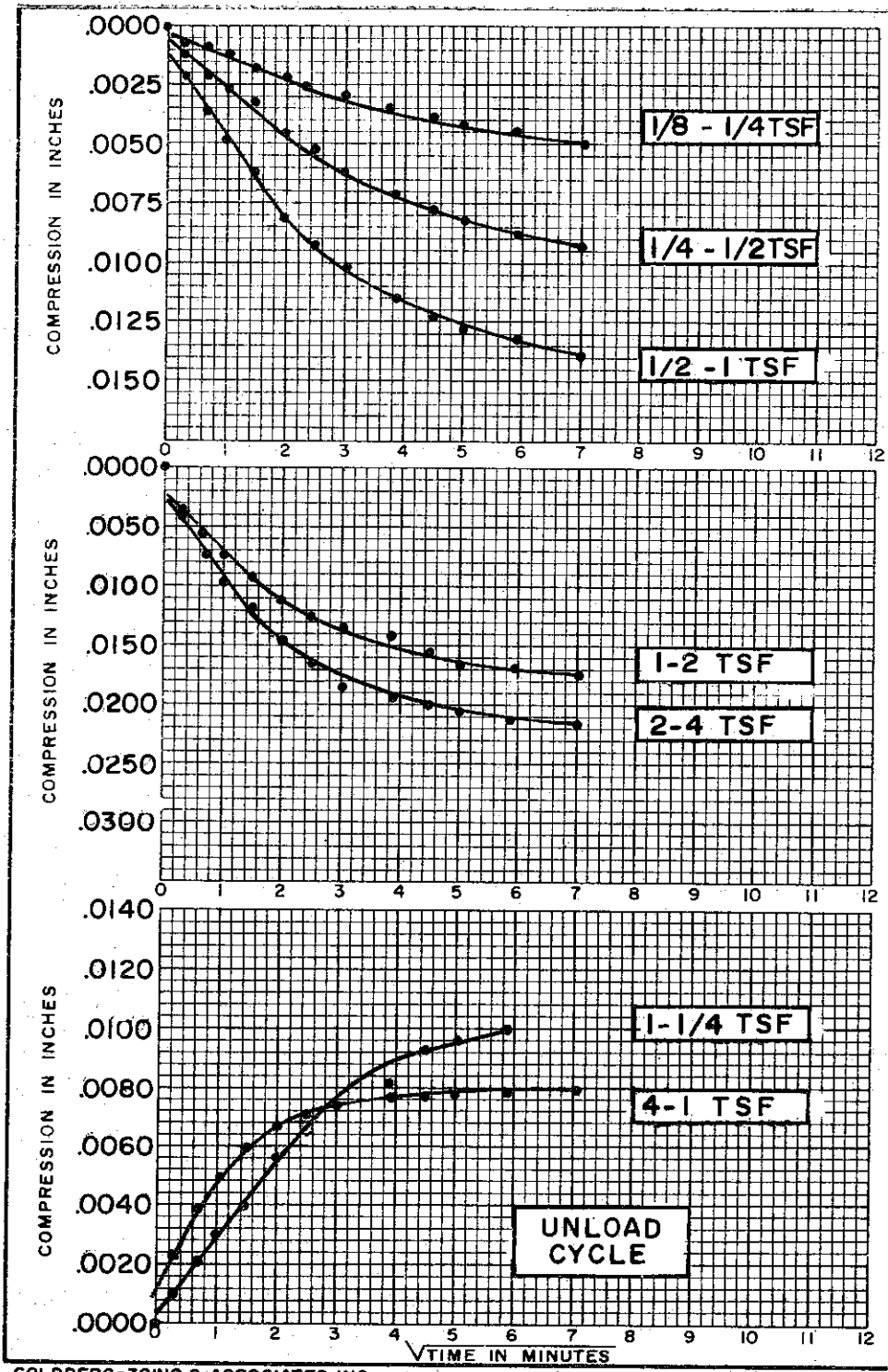


TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	36.0%
FINAL WATER CONTENT	27.7%
BORING NO.	38
SAMPLE NO.	16
DEPTH	74.0 TO 74.1

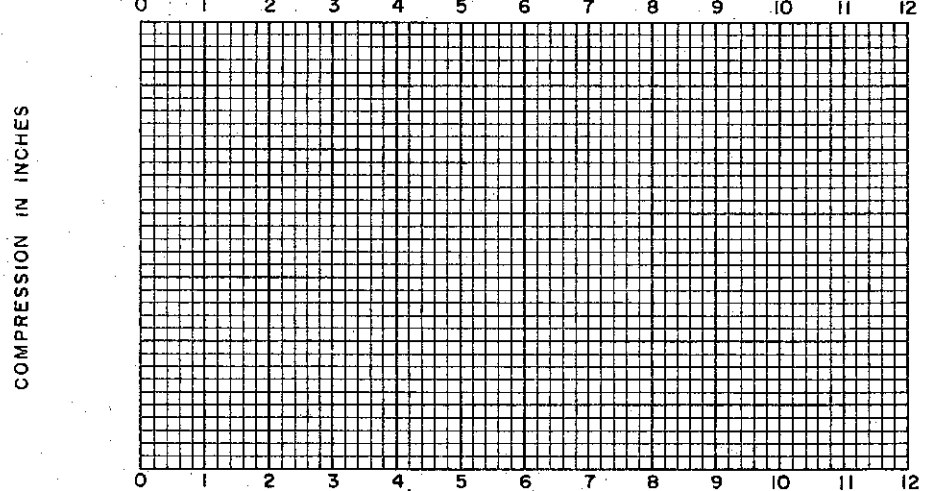
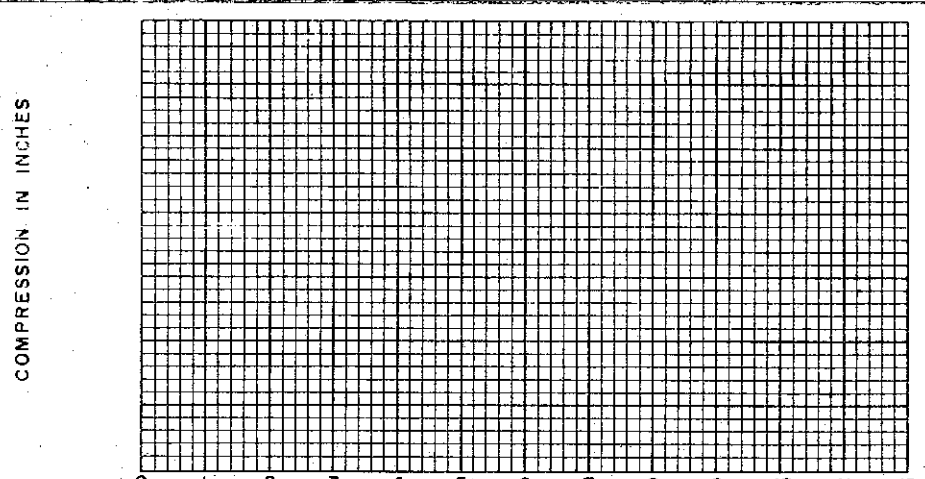
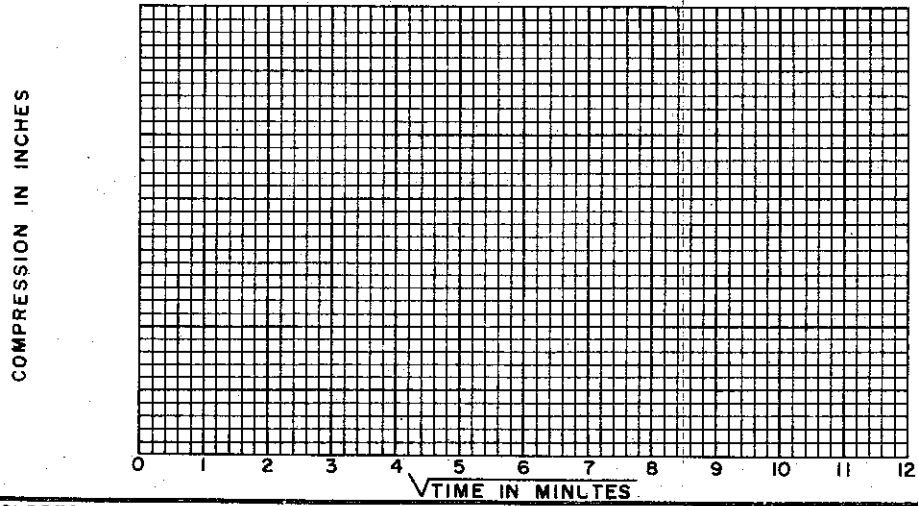
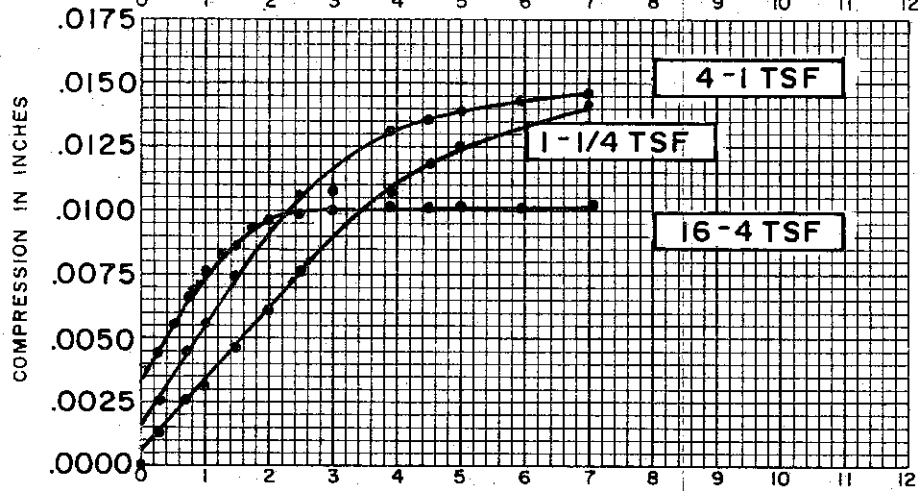
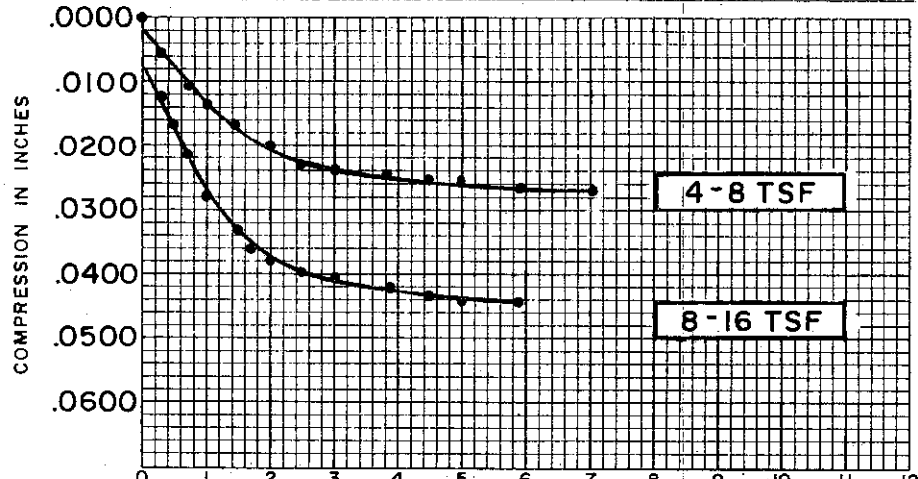
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.935

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	SILTY CLAY (CH)	SAMPLE NO. <u>16</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>74.0' TO 74.1'</u>
INITIAL WATER CONTENT	<u>36.0%</u>	
FINAL WATER CONTENT	<u>27.7%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.935</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		

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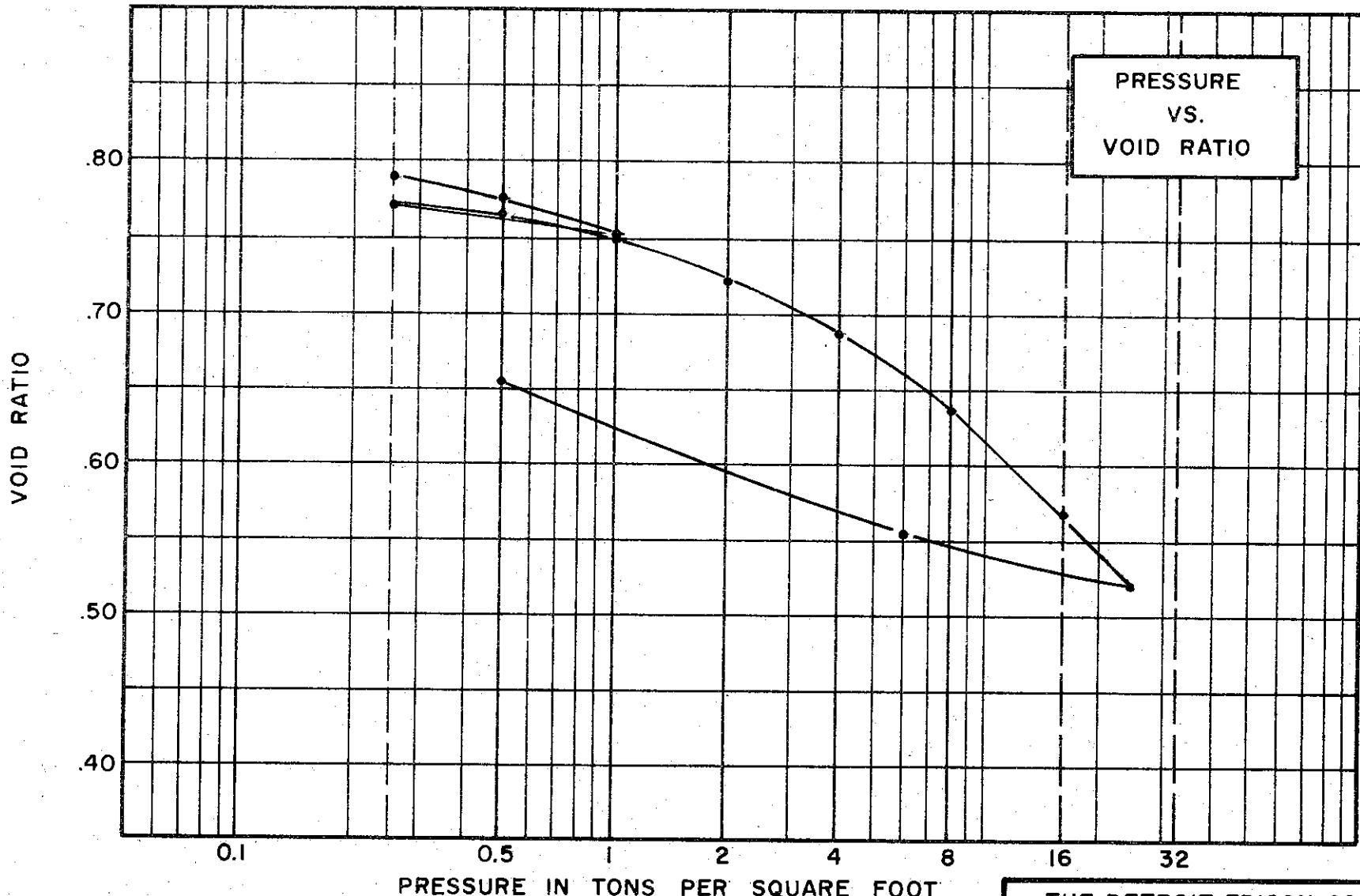
√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION: <u>SILTY CLAY (CH)</u>	BORING NO. <u>38</u>
SPECIFIC GRAVITY <u>2.72</u>	SAMPLE NO. <u>16</u>
INITIAL WATER CONTENT <u>36.0 %</u>	DEPTH <u>74.0 TO 74.1</u>
FINAL WATER CONTENT <u>27.7 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.935</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.5% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 23%

**TEST DATA**

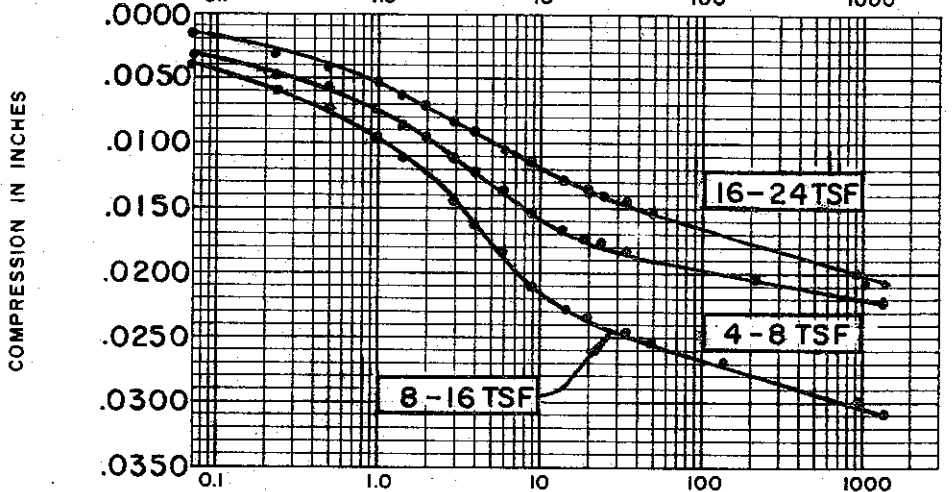
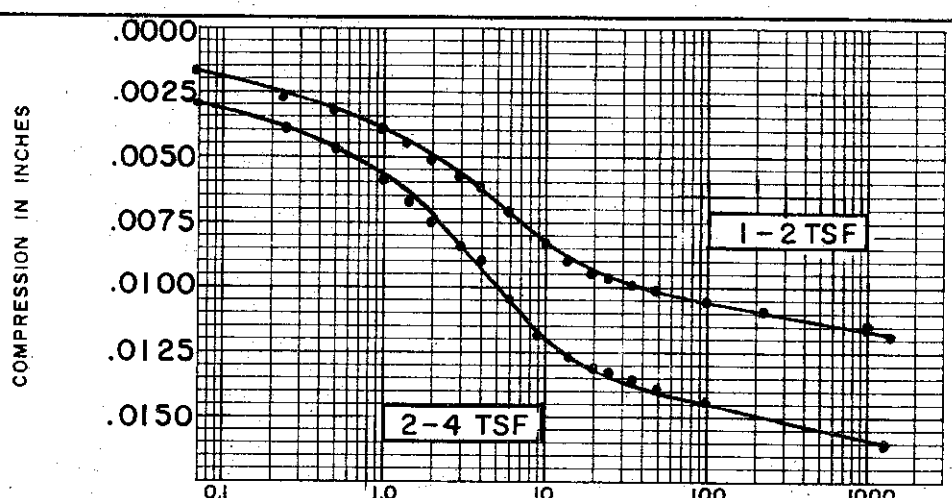
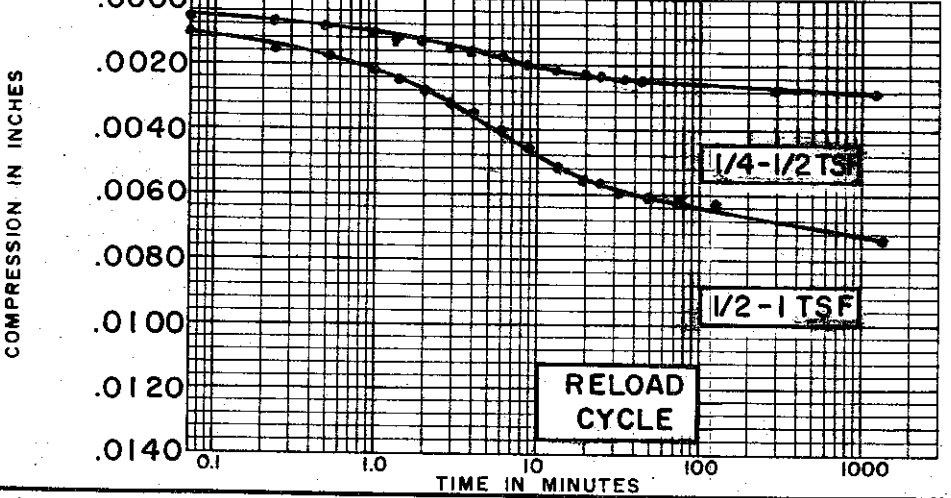
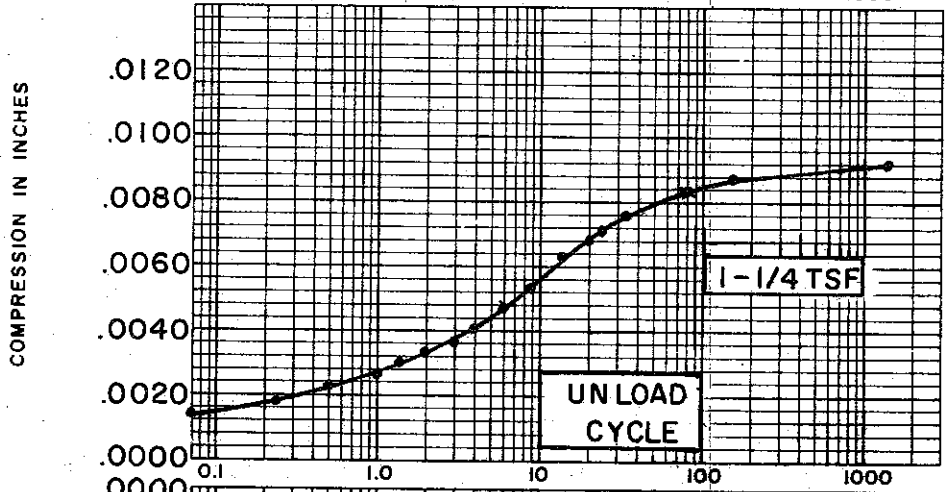
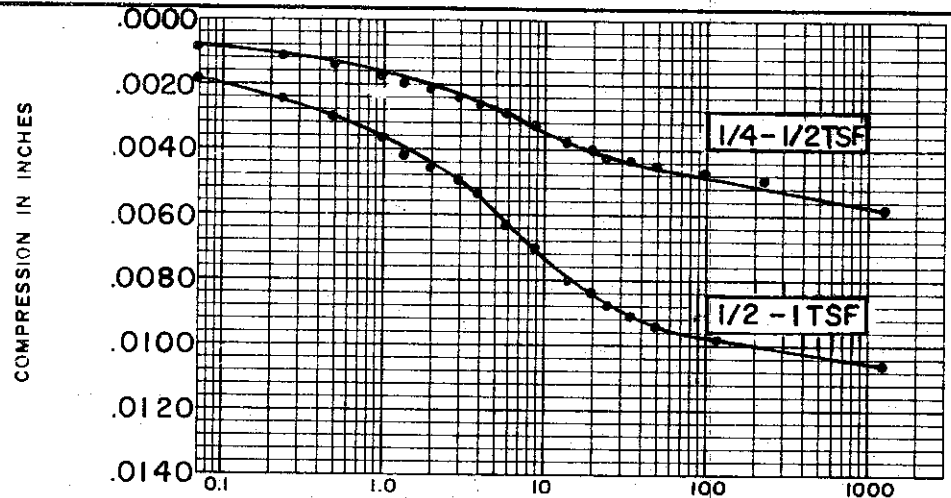
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C29.1  
 SAMPLE NO. 5 DATE JAN 74  
 DEPTH 10.8'

694-C-469

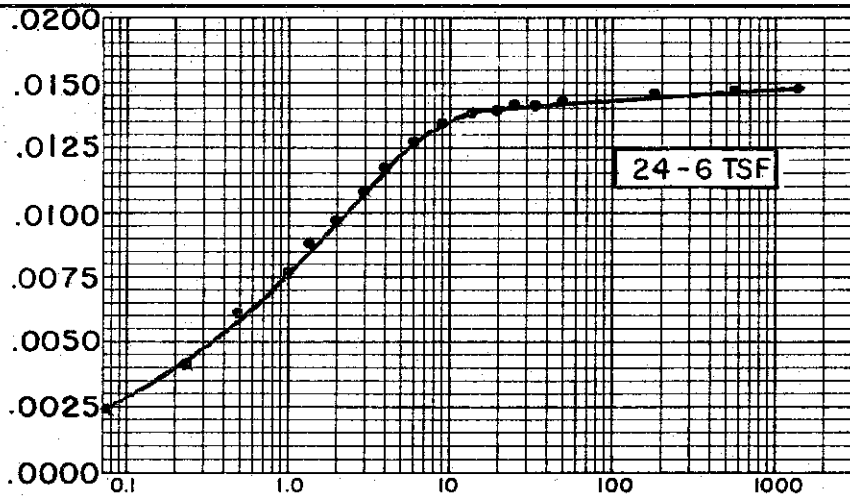


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	21.5 %
FINAL WATER CONTENT	27.7 %
BORING NO.	41
SAMPLE NO.	5
DEPTH	10.8'

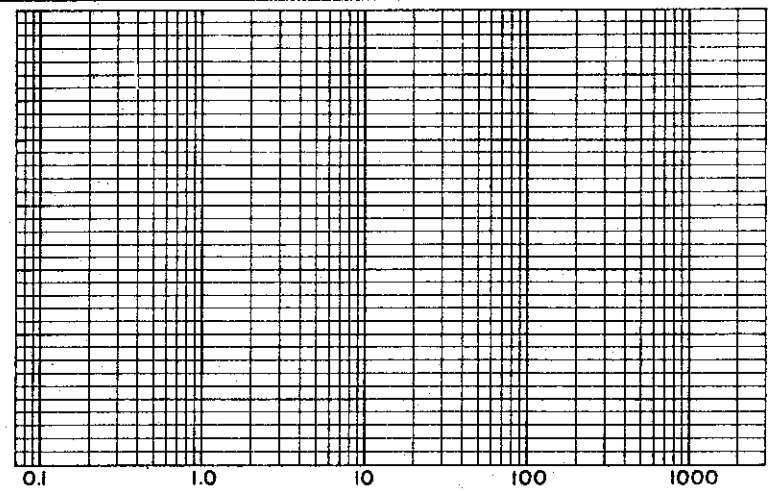
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.799

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

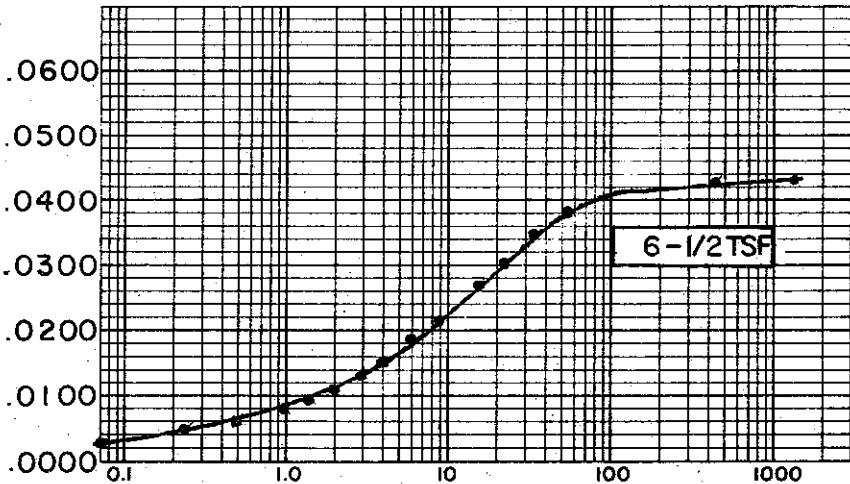
COMPRESSION IN INCHES



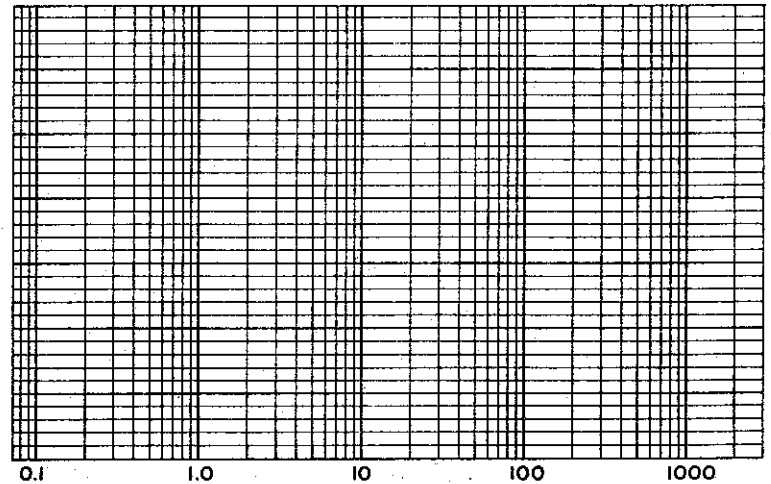
COMPRESSION IN INCHES



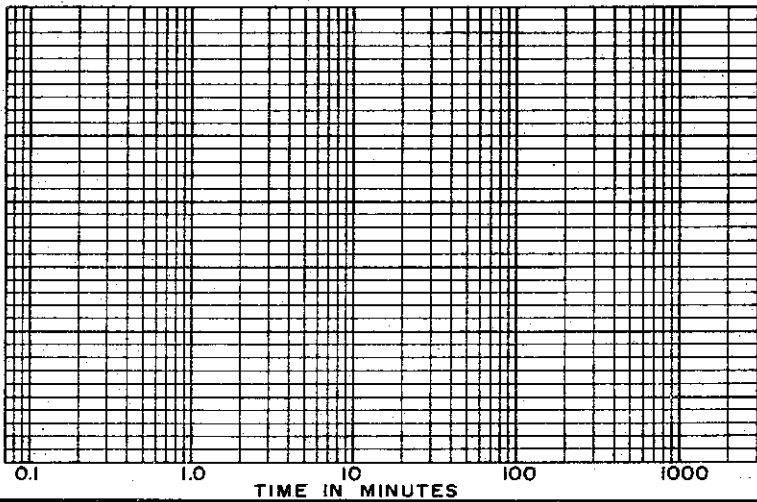
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5 %  
 FINAL WATER CONTENT 27.7 %

BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.6'

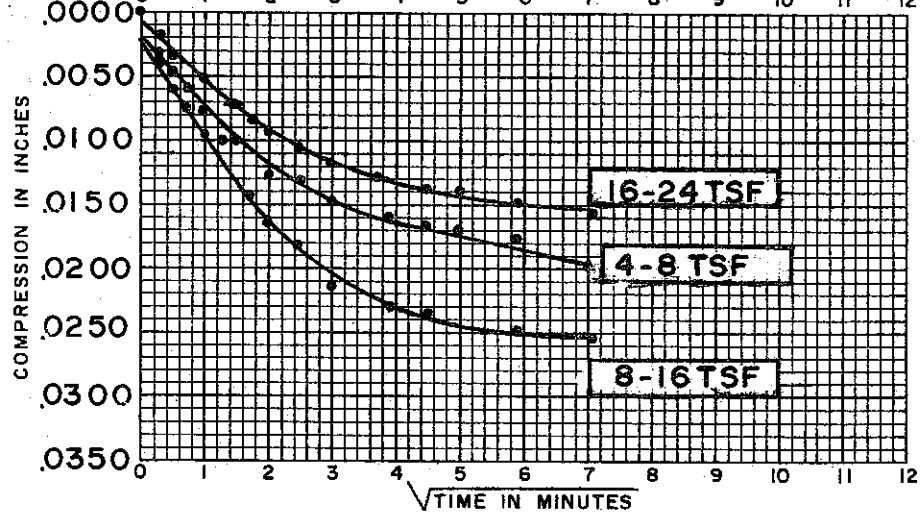
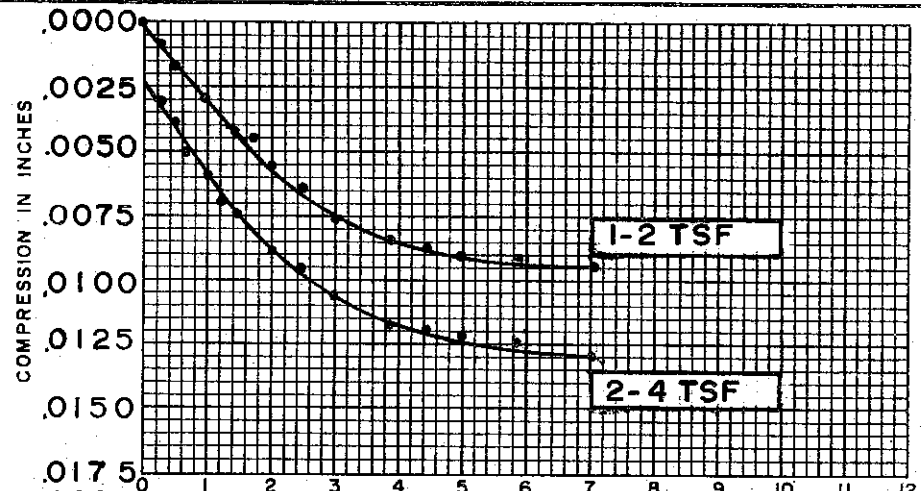
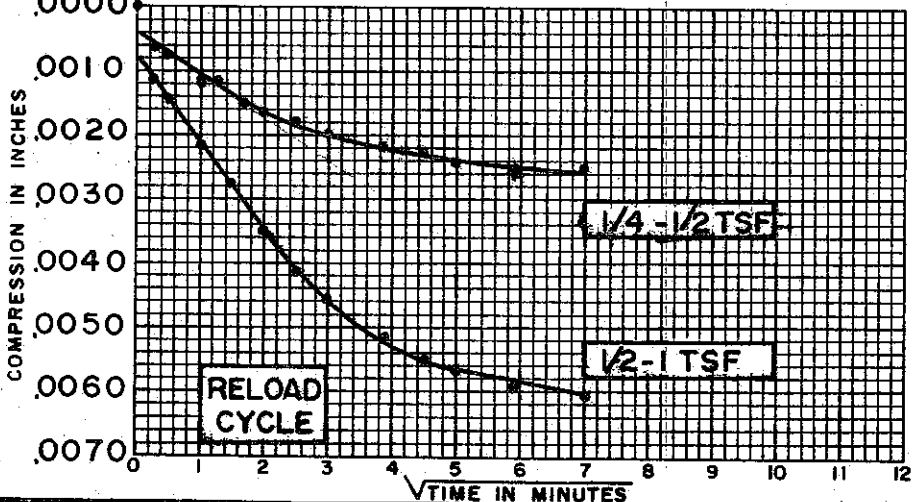
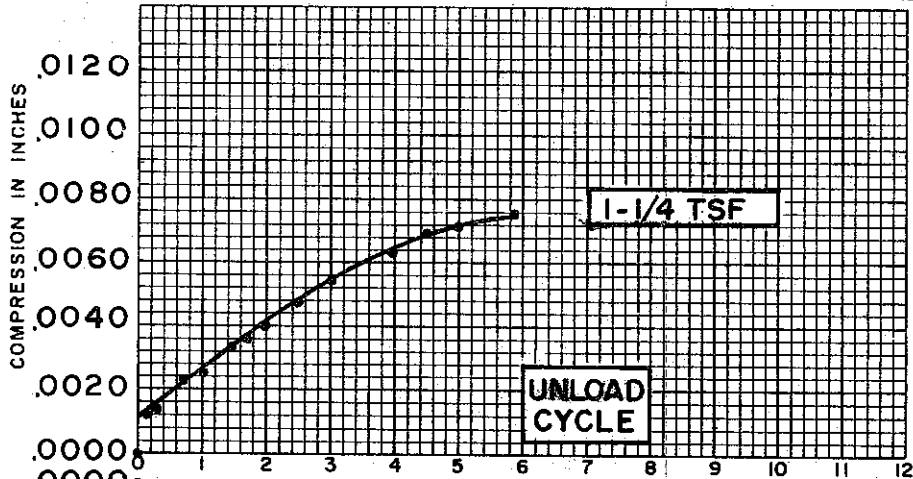
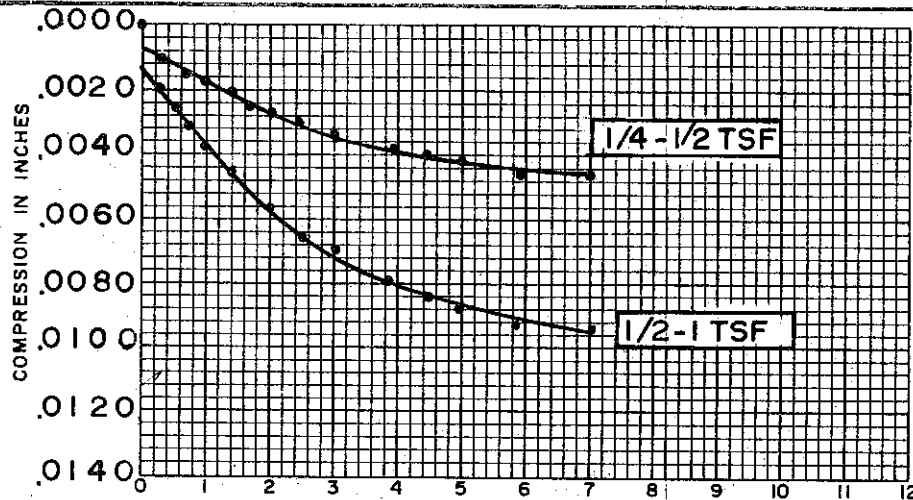
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.72  
INITIAL WATER CONTENT 29.5%  
FINAL WATER CONTENT 27.7%

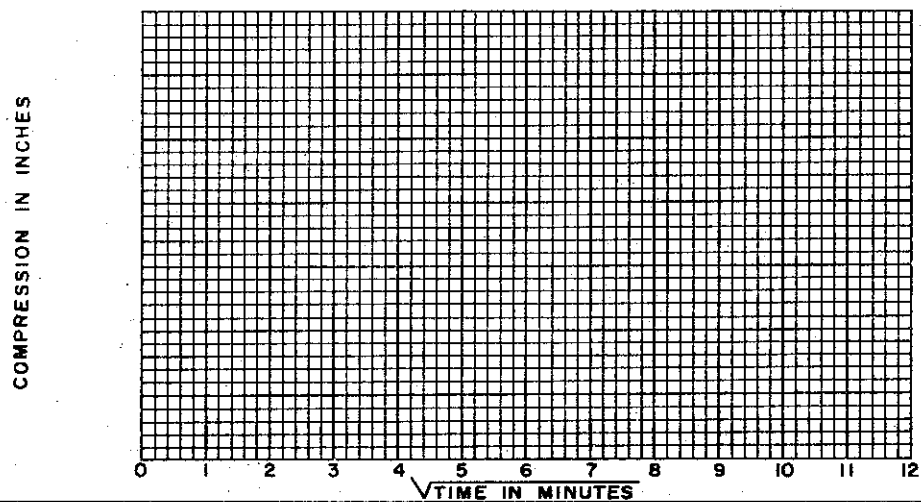
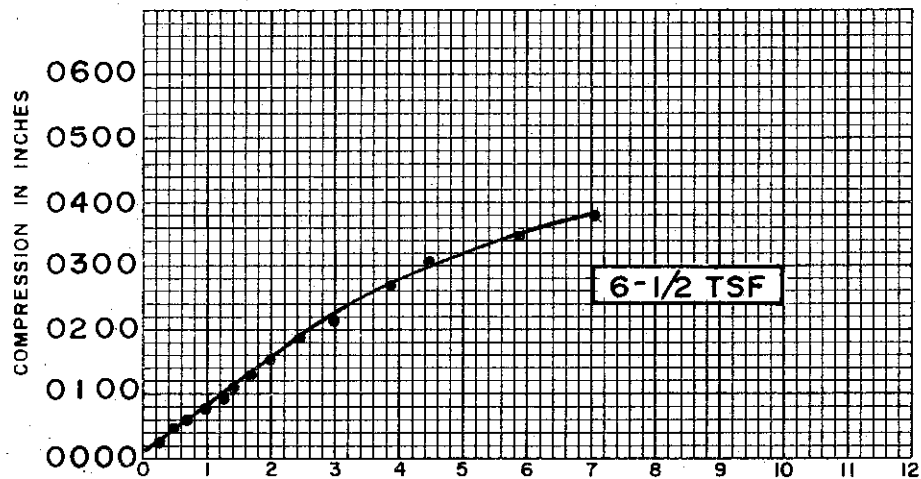
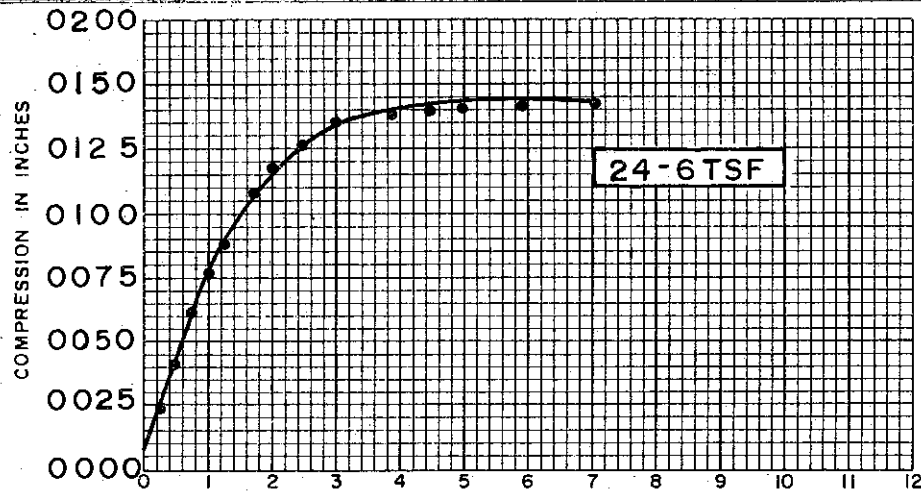
BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.789

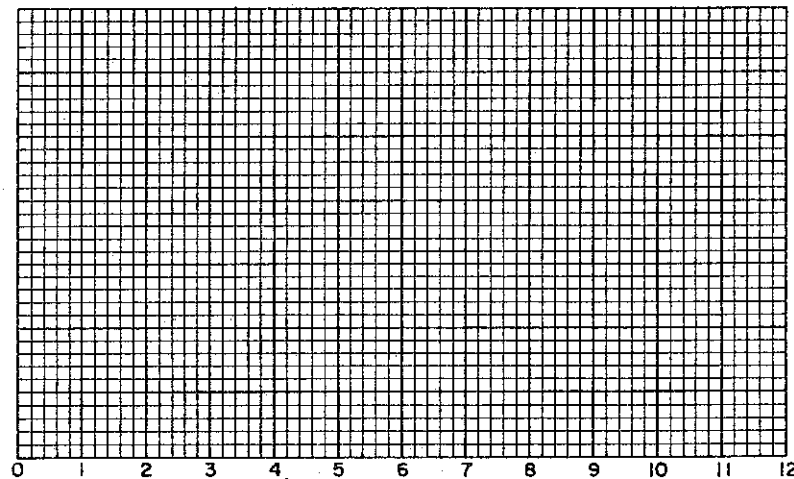
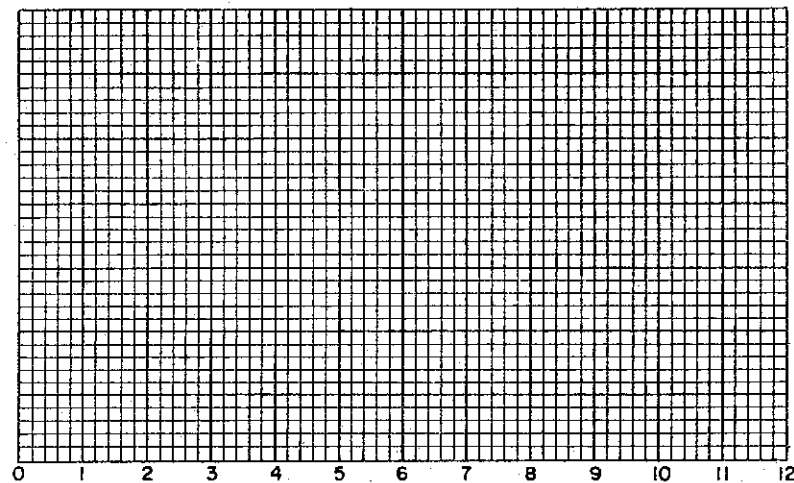
**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

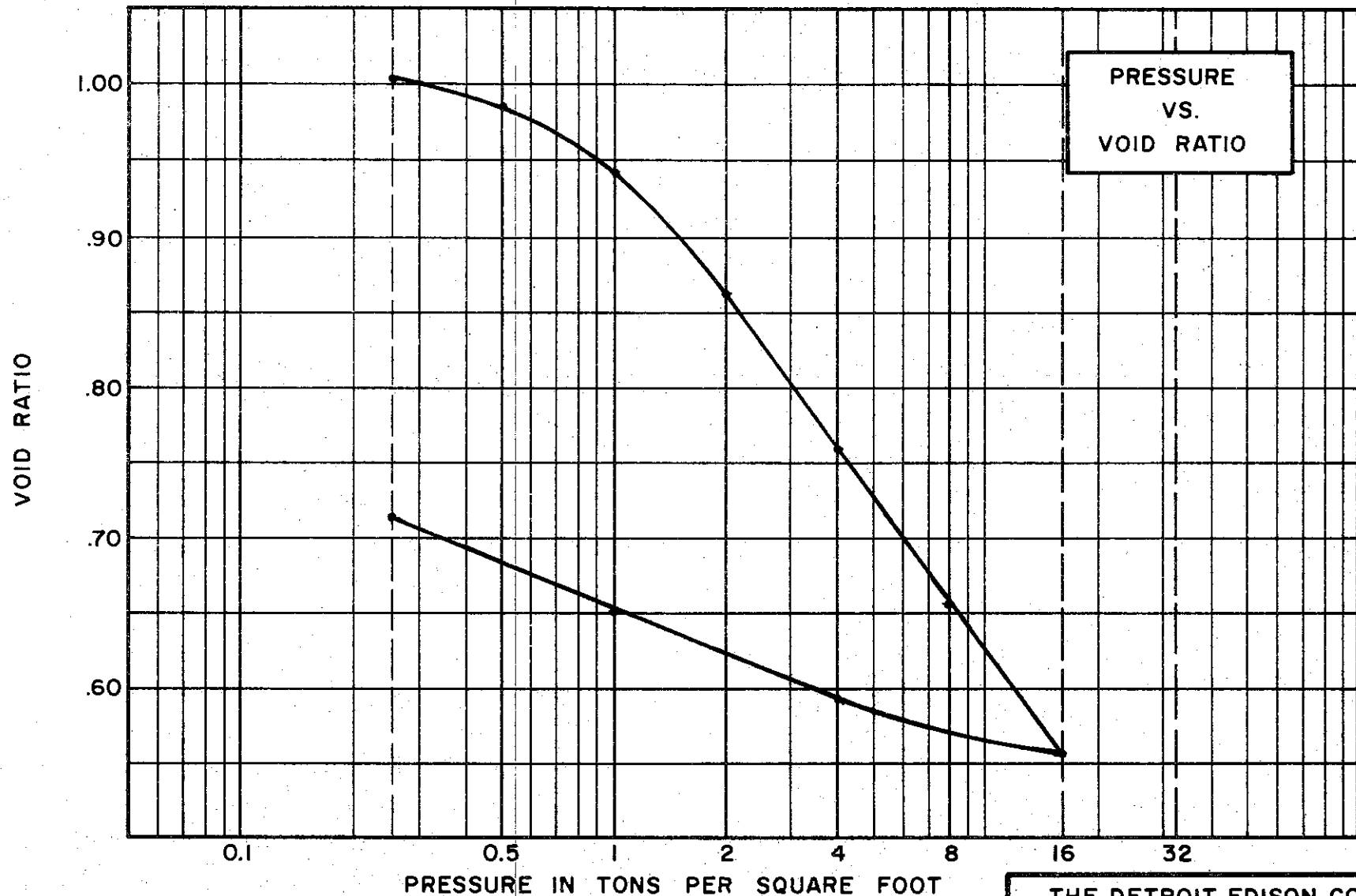
SOIL PROPERTIES		BORING NO.	41
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	5
SPECIFIC GRAVITY	2.72	DEPTH	10.8'
INITIAL WATER CONTENT	29.5 %		
FINAL WATER CONTENT	27.7 %		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.799

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 38.1% FINAL 30.1%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

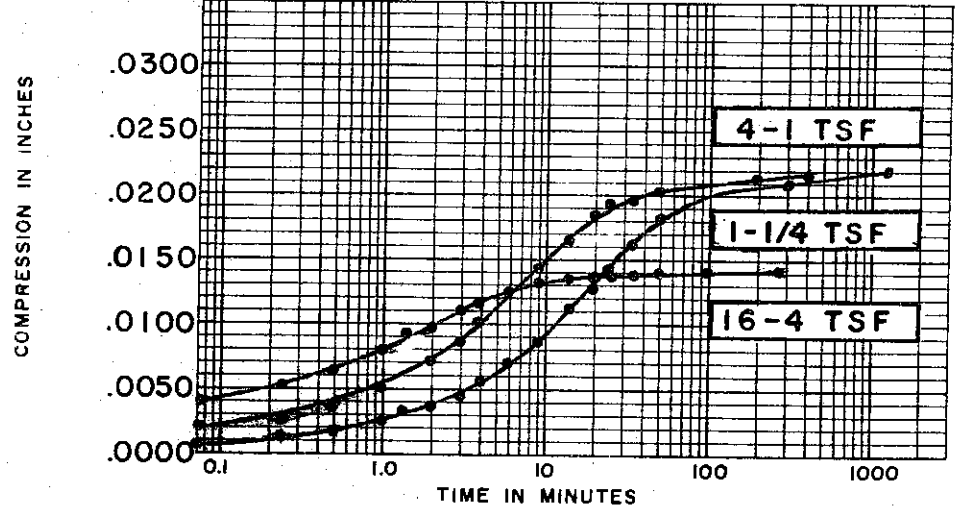
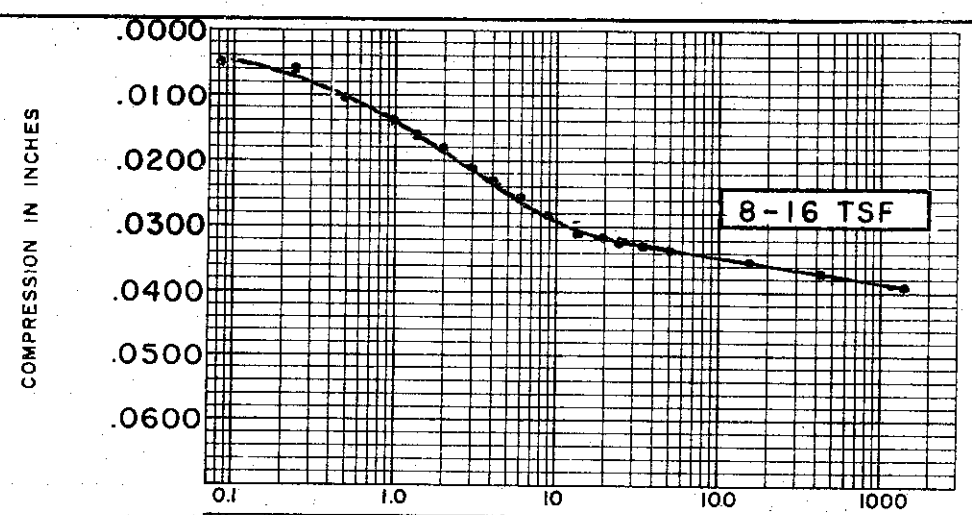
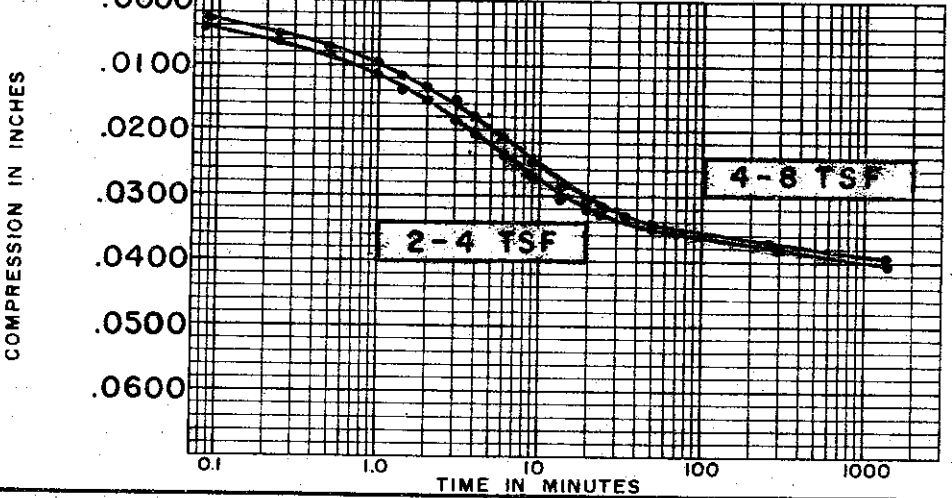
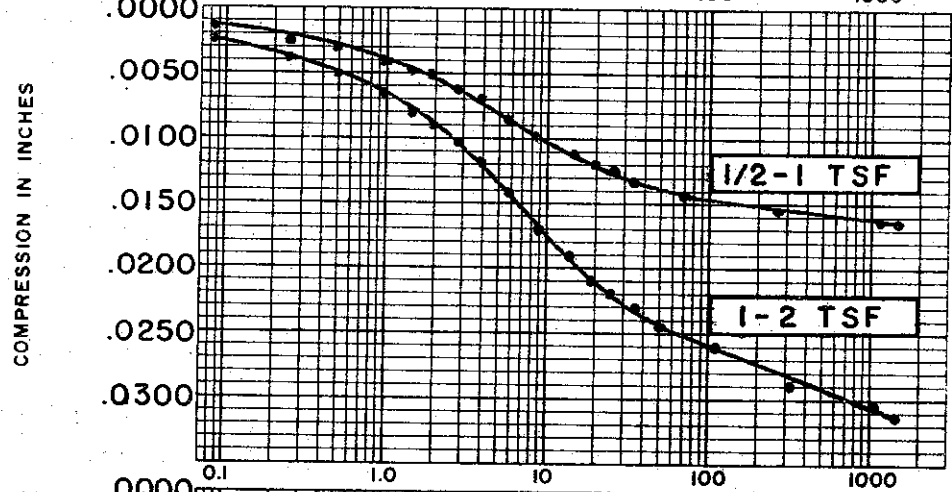
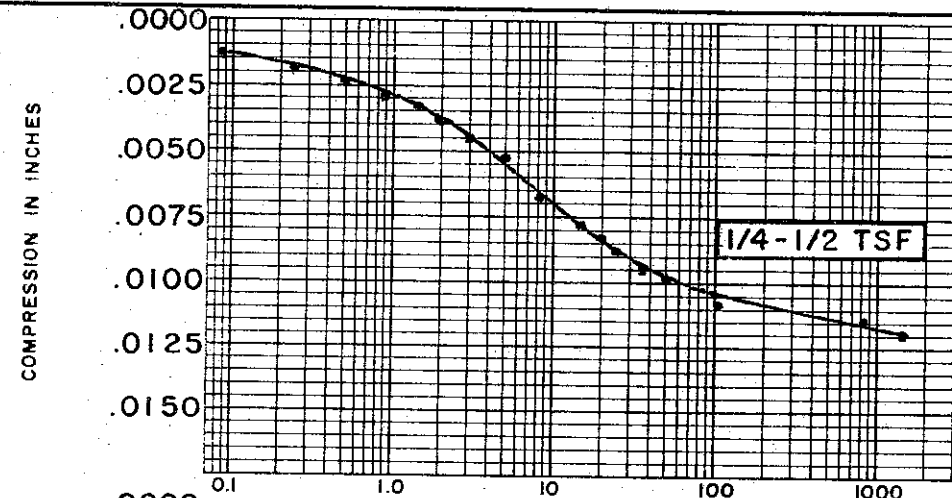
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C 30.1  
 SAMPLE NO. 7 DATE FEB 74  
 DEPTH 21.0' TO 21.1'

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 38.1 %  
FINAL WATER CONTENT 30.1 %

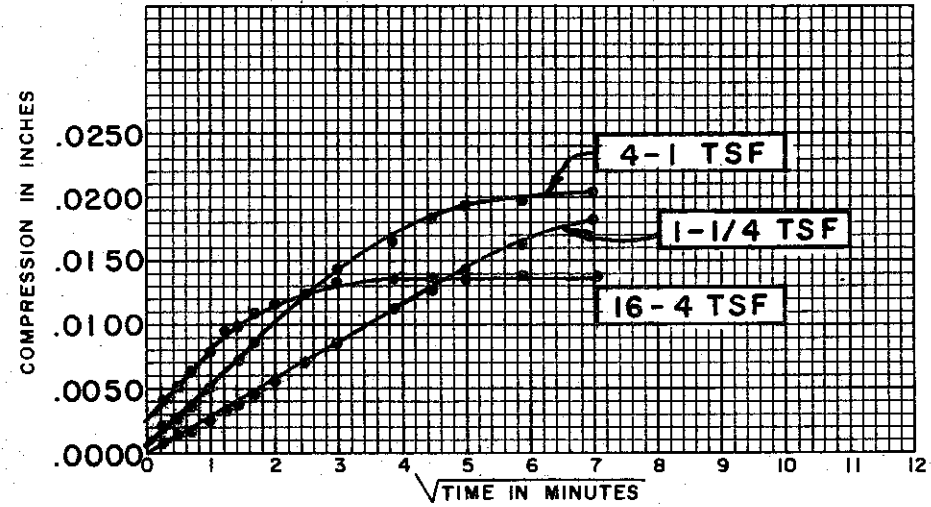
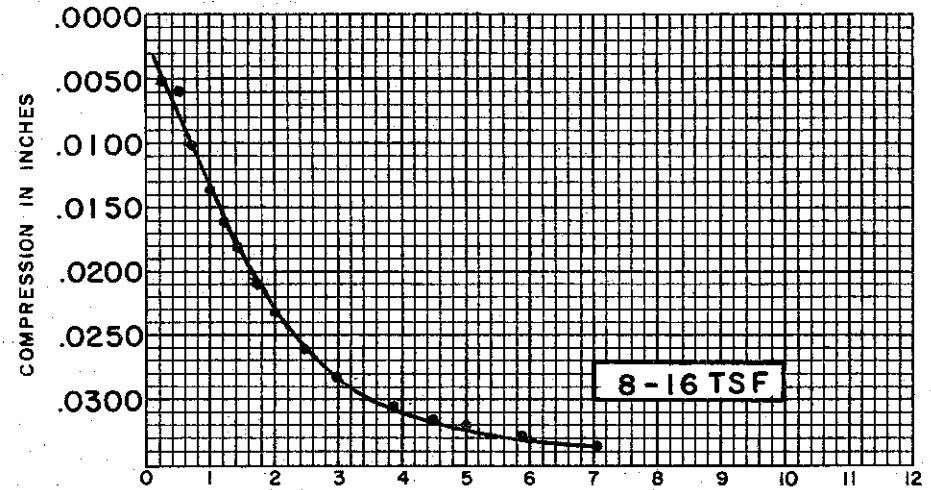
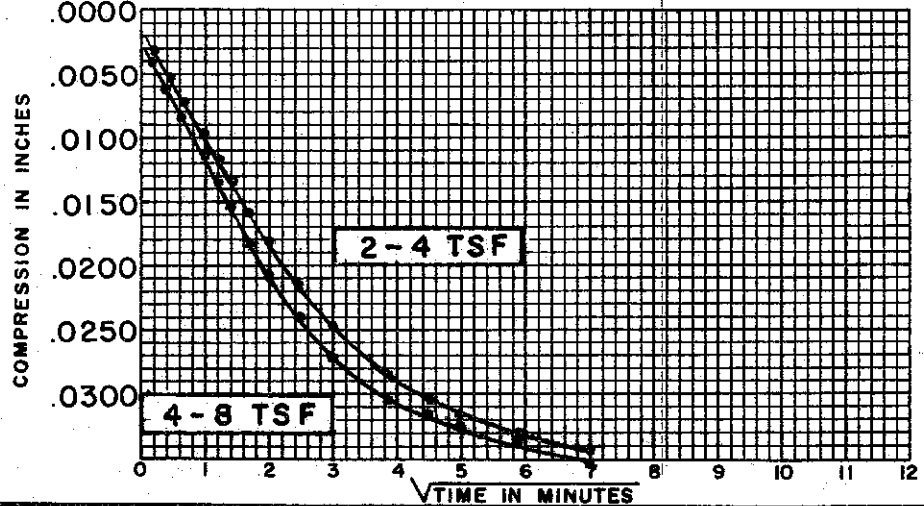
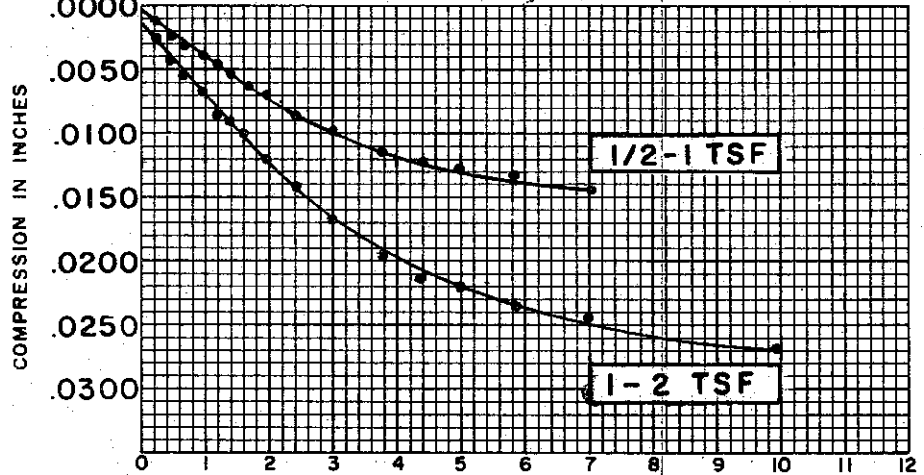
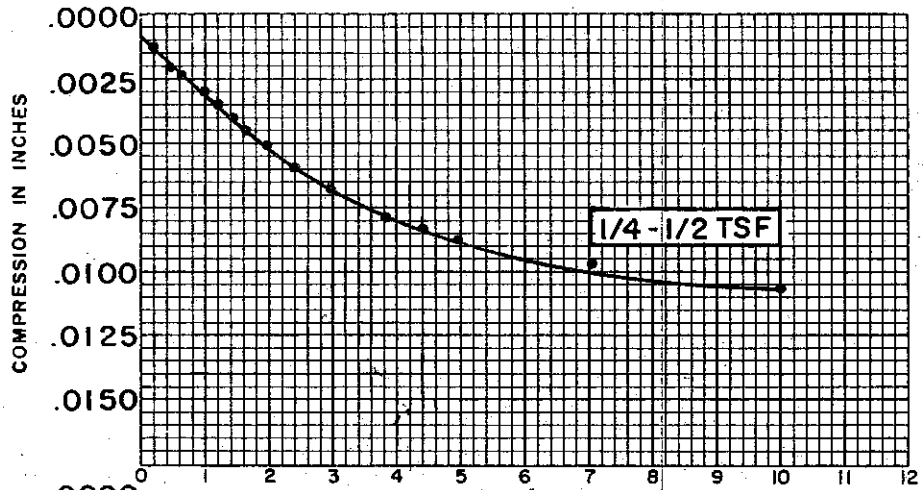
BORING NO. 41  
SAMPLE NO. 7  
DEPTH 21.1

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.0

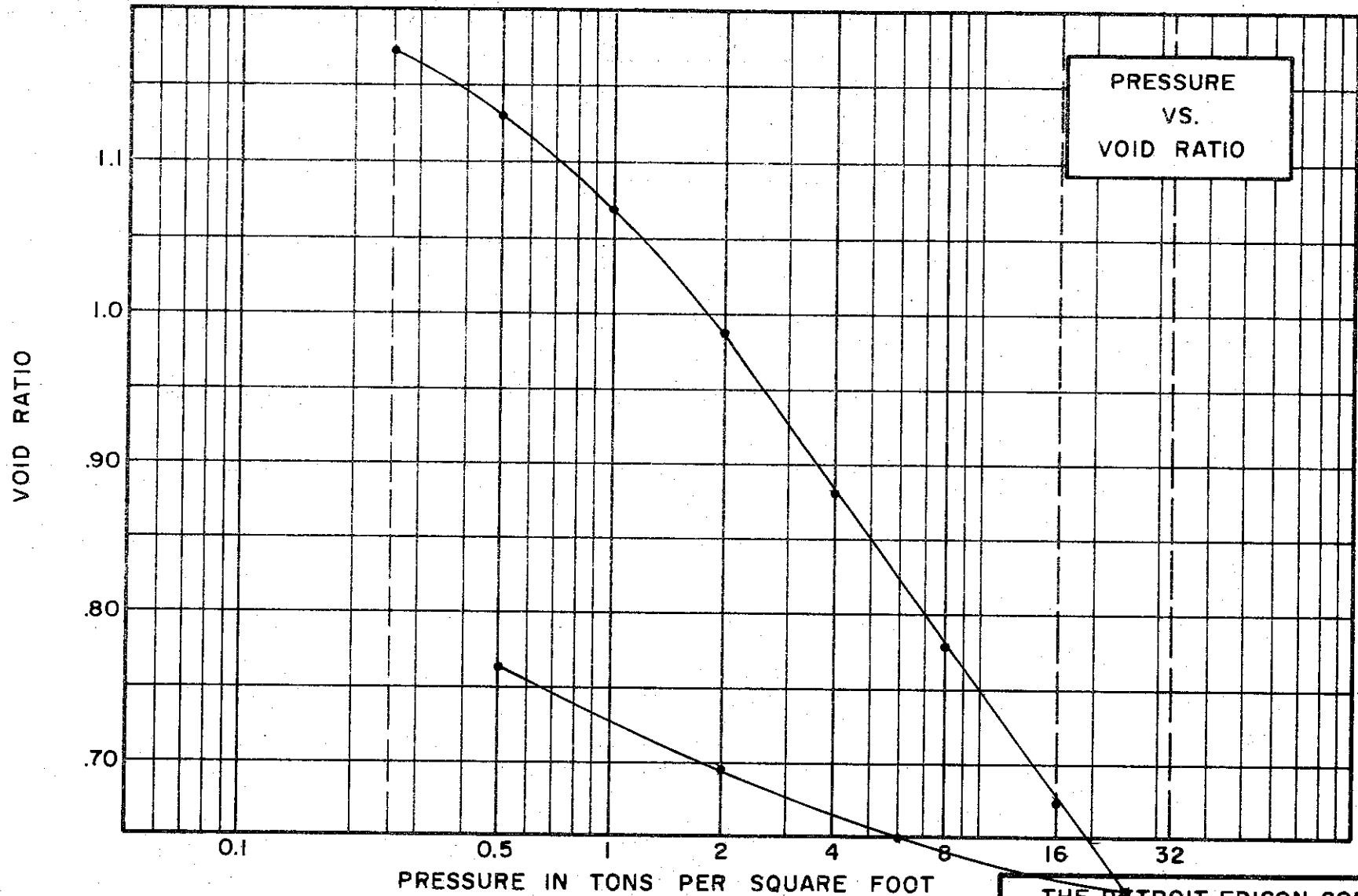
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 46.5% FINAL 31.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 52% PLASTIC LIMIT 25%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

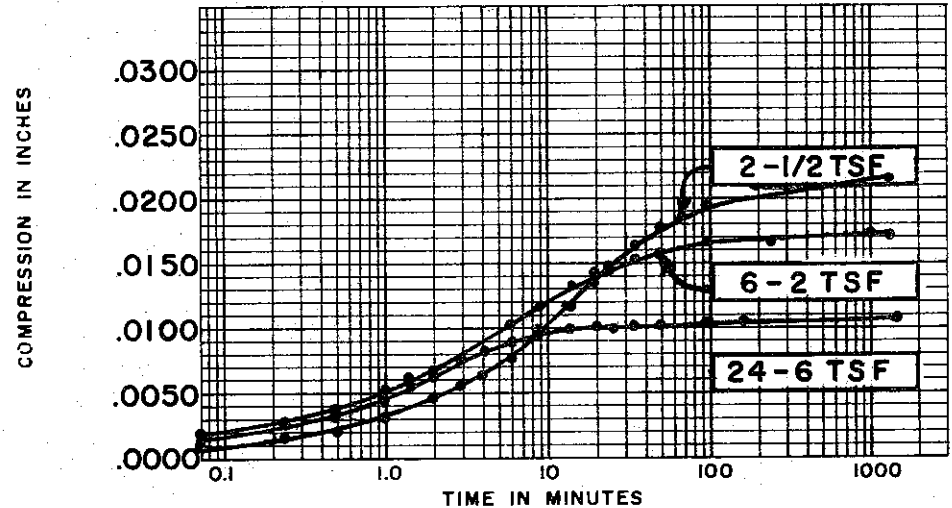
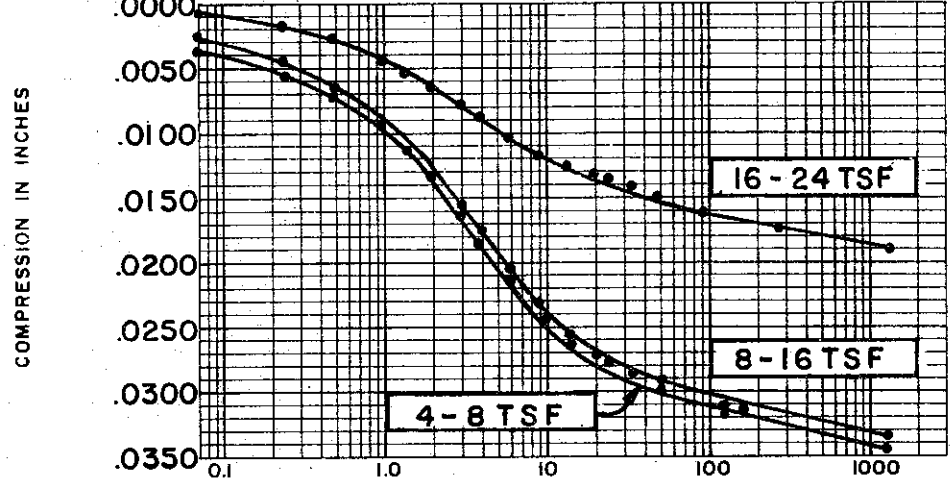
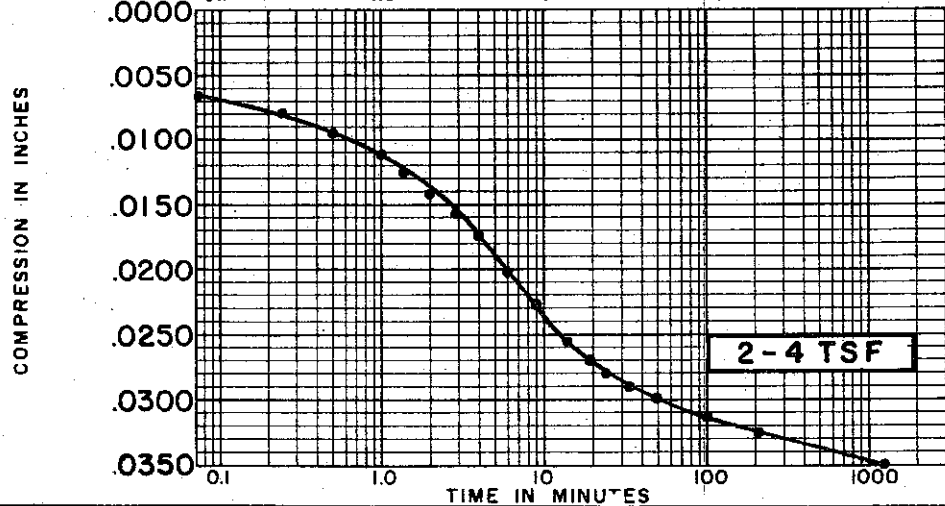
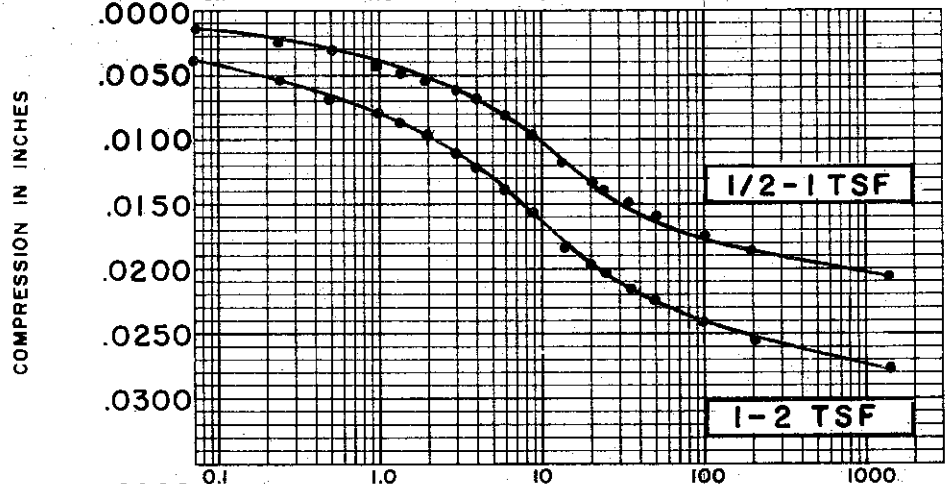
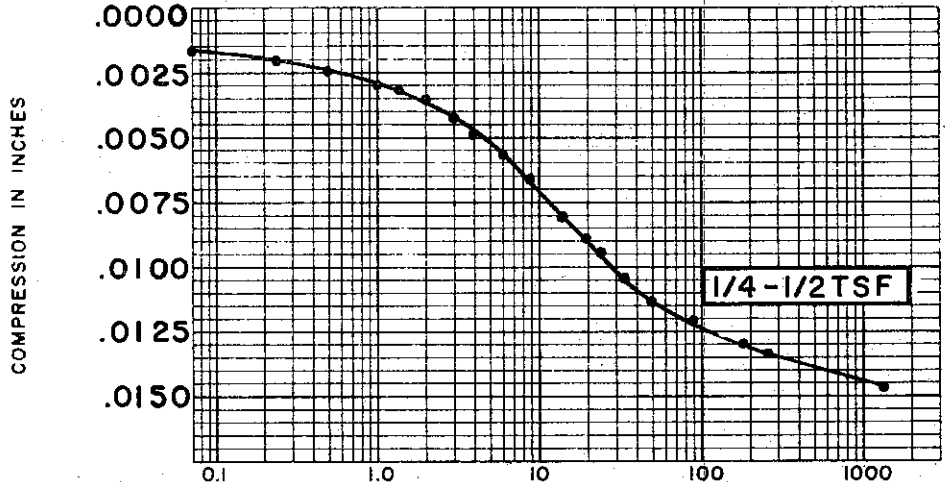
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C33.1  
 SAMPLE NO. 13 DATE JAN. 1974  
 DEPTH 53'

C-477

0-7-0



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 43.5%  
 FINAL WATER CONTENT 31.9%

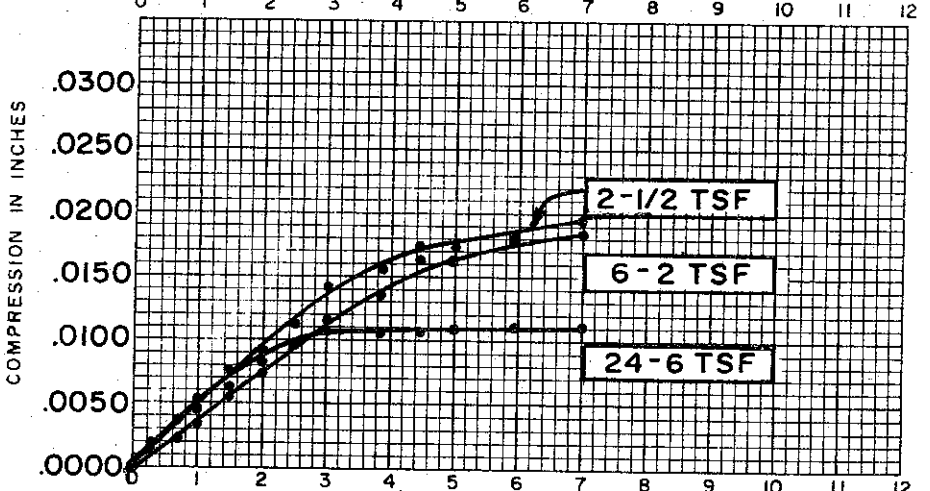
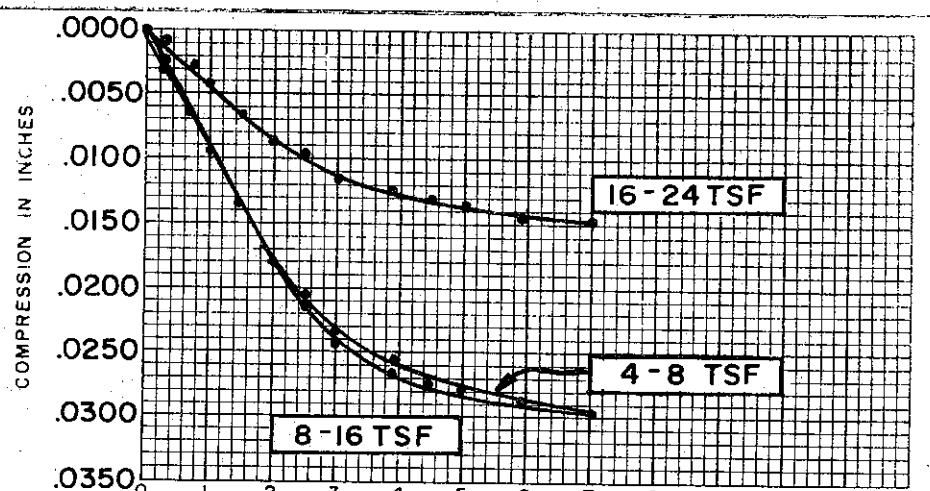
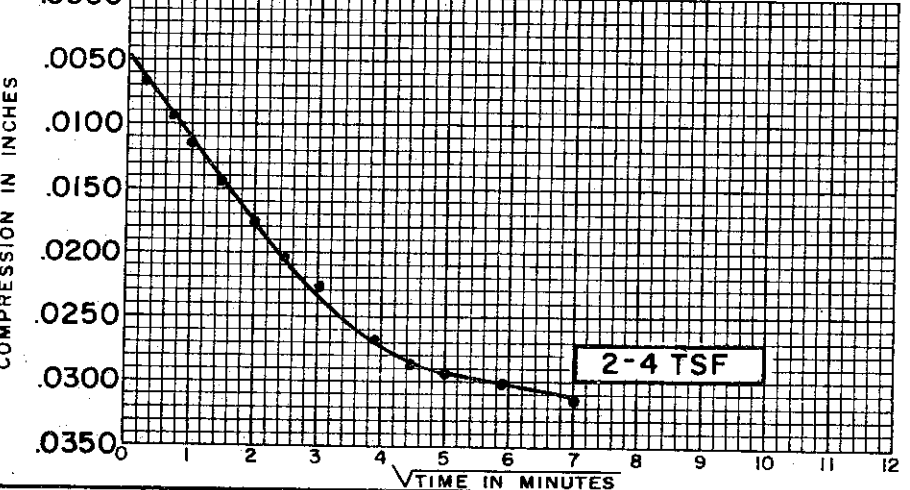
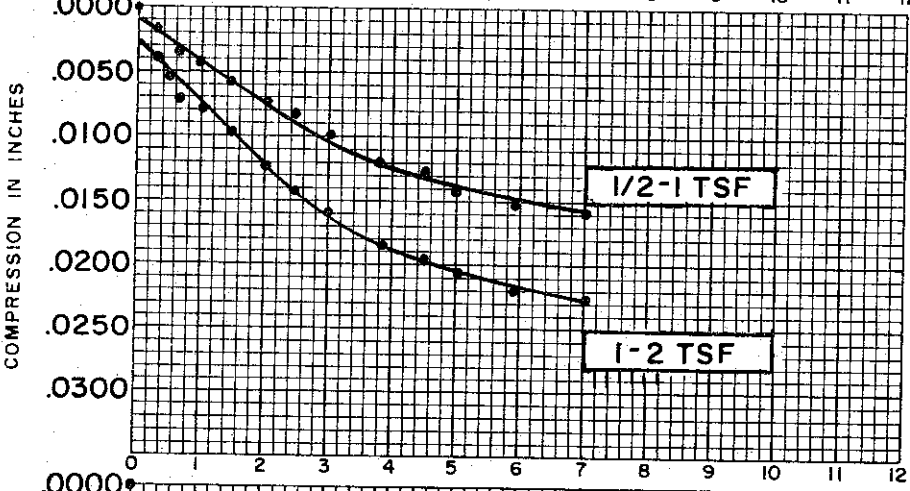
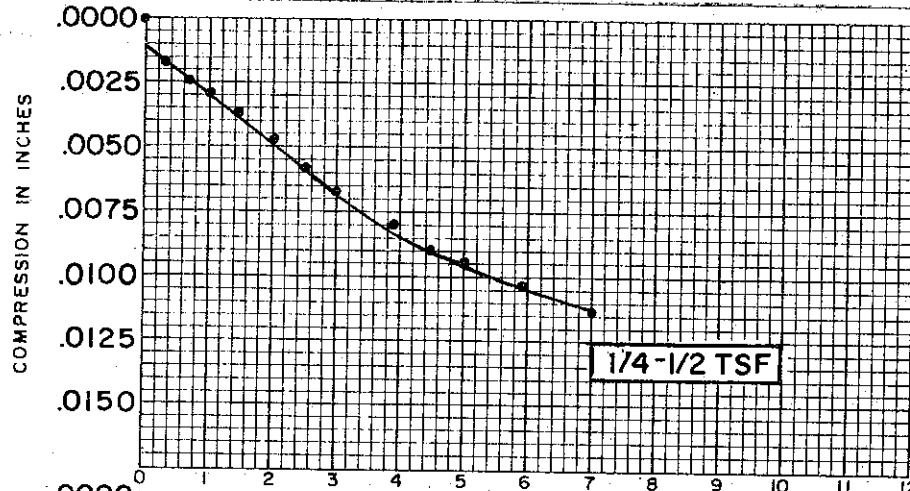
BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



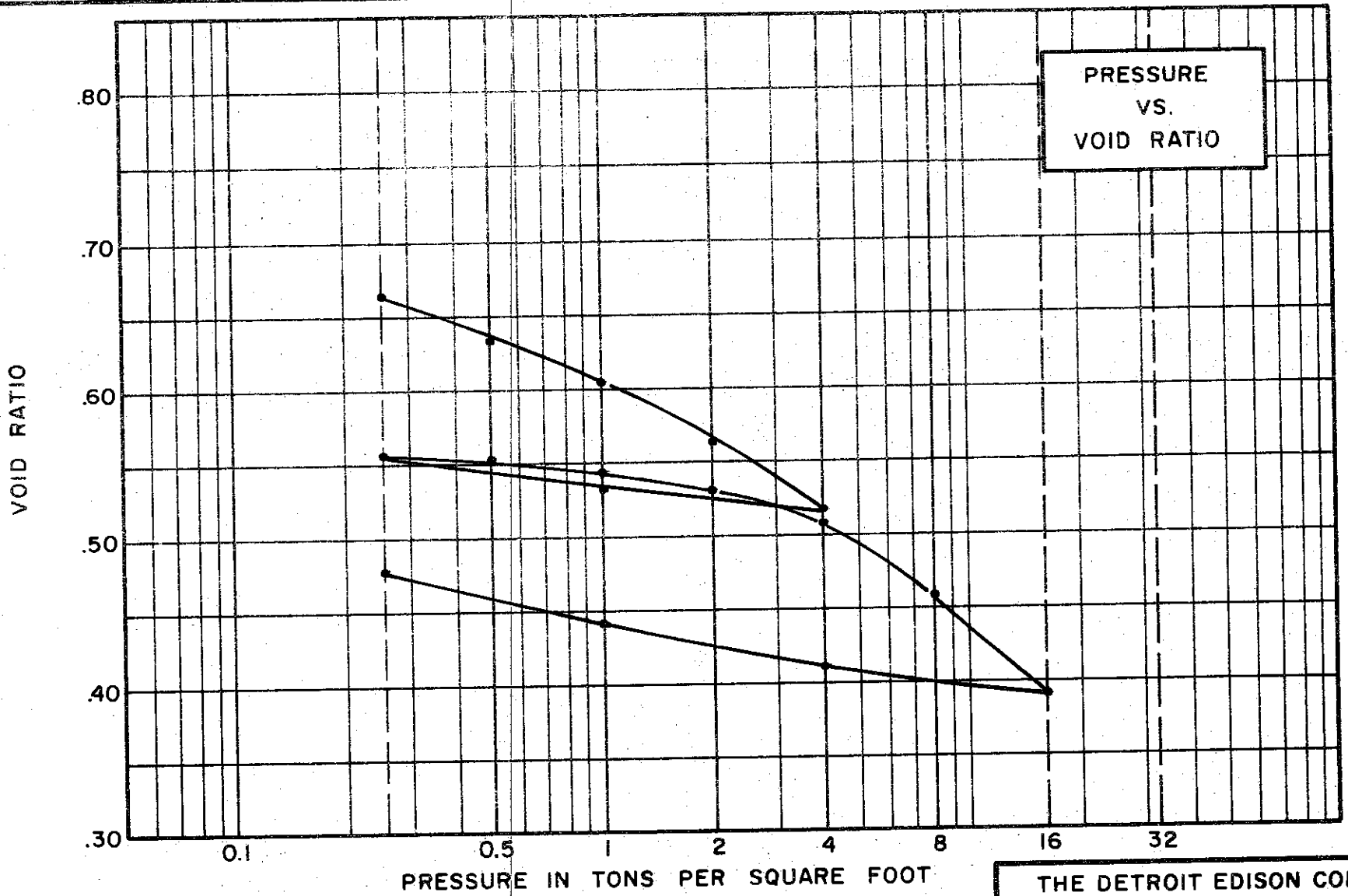
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.75
INITIAL WATER CONTENT	46.5%
FINAL WATER CONTENT	31.9%
BORING NO.	41
SAMPLE NO.	13
DEPTH	53.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.235

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS



THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C35.1  
 SAMPLE NO. 17 DATE JAN. 1974  
 DEPTH 73.5'

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY;  
SANDY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 26.7% FINAL 19.7%

ATTERBERG LIMITS:  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

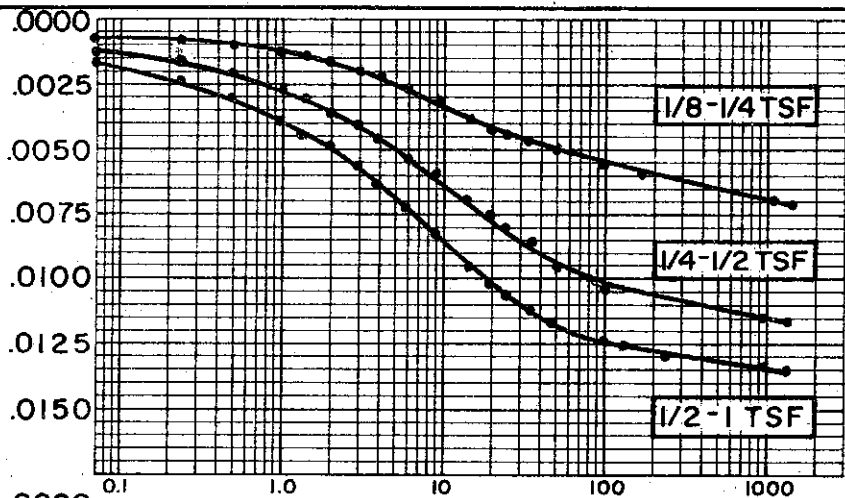
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

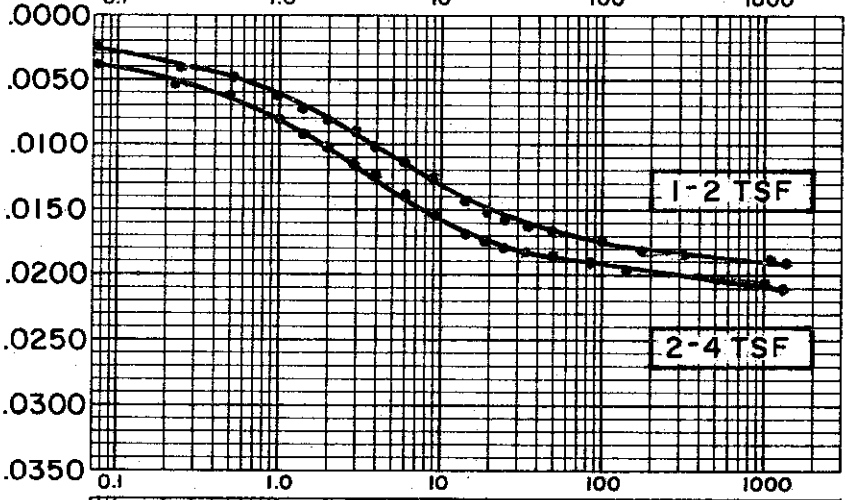
INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.697

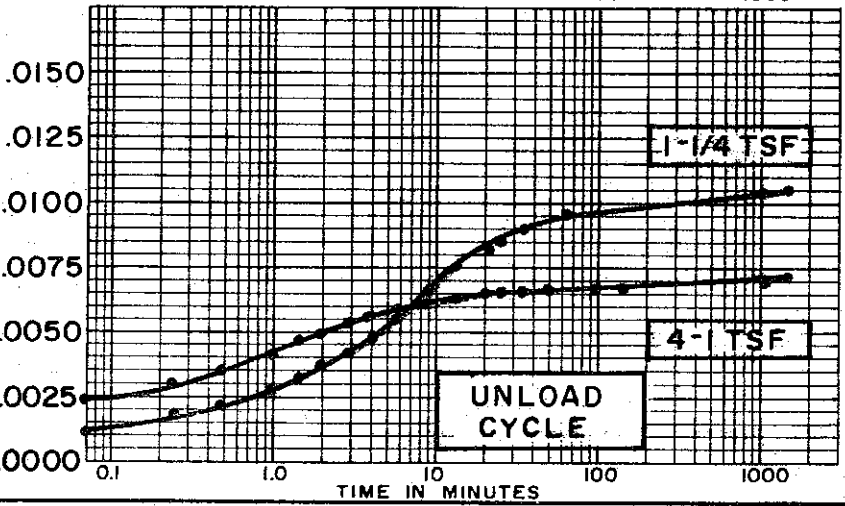
COMPRESSION IN INCHES



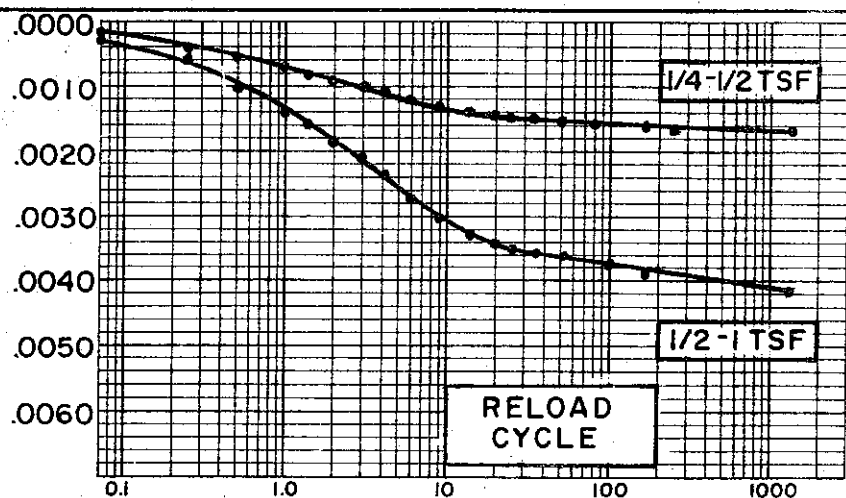
COMPRESSION IN INCHES



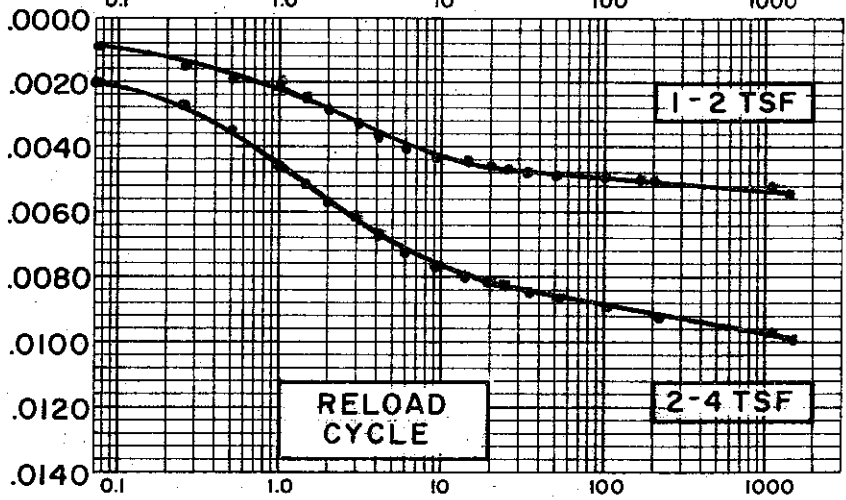
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7%  
 FINAL WATER CONTENT 19.7%

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5'

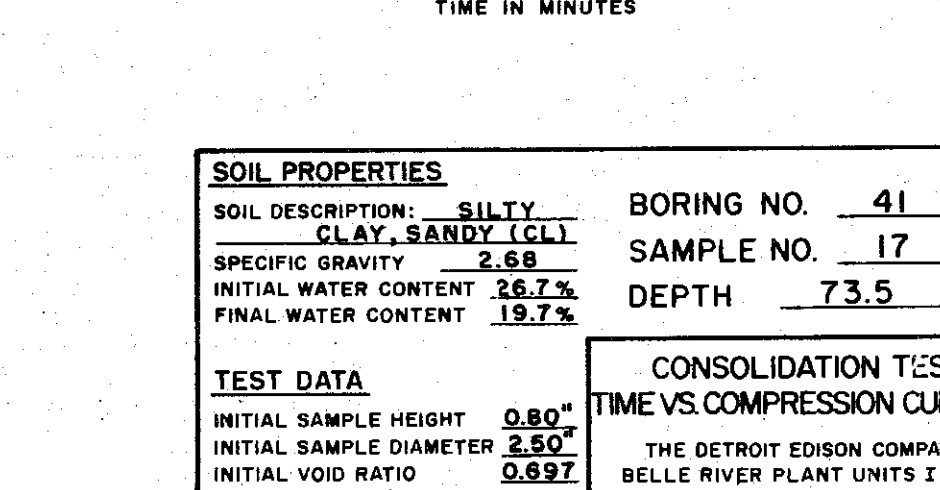
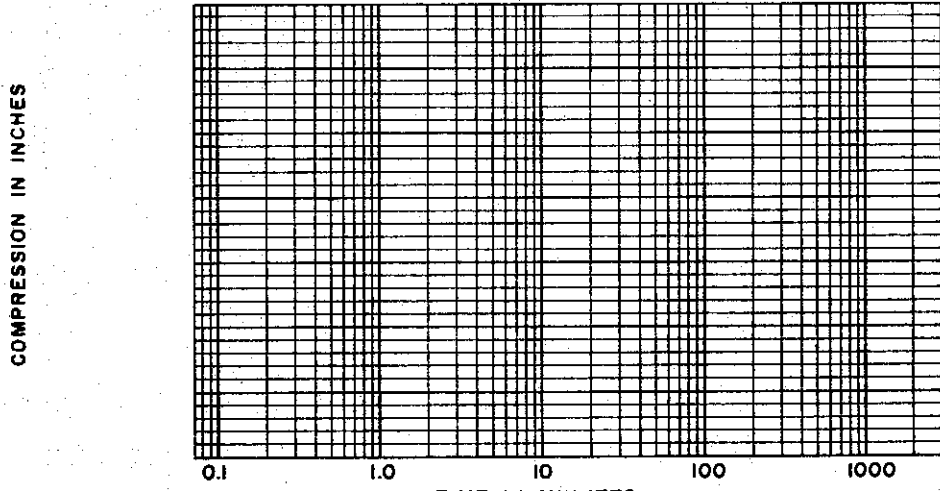
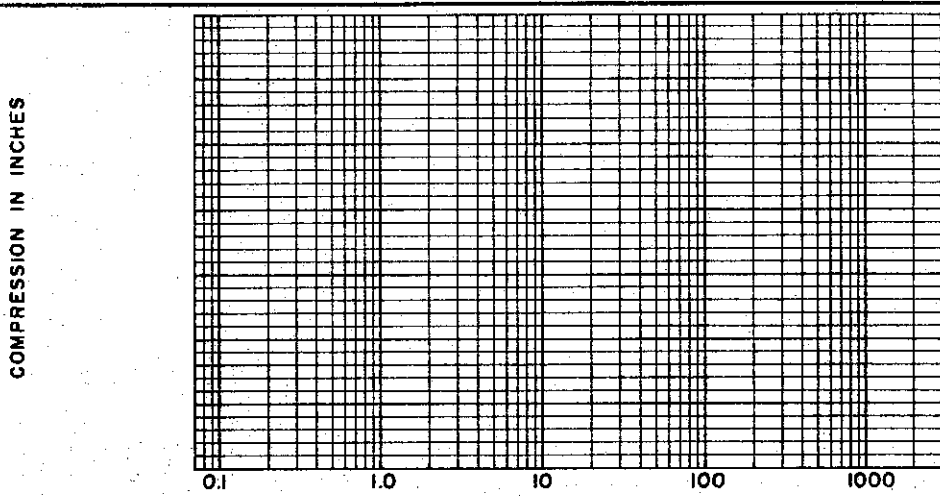
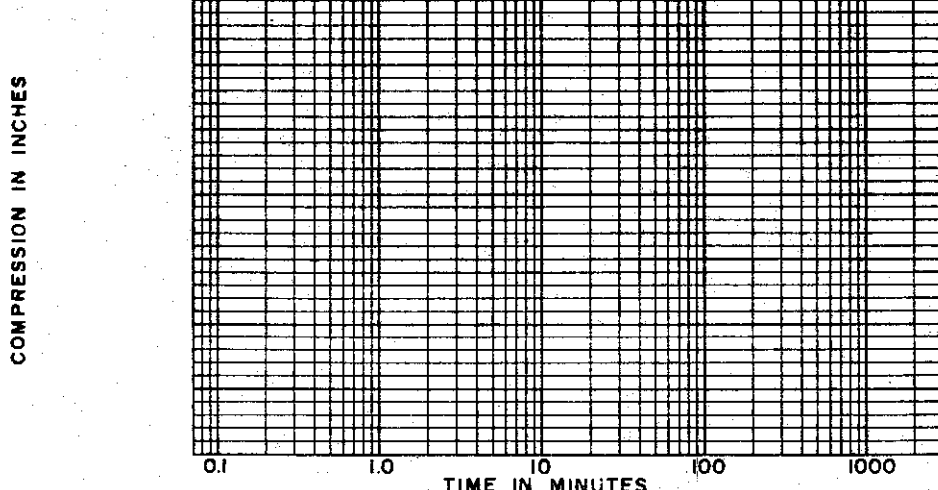
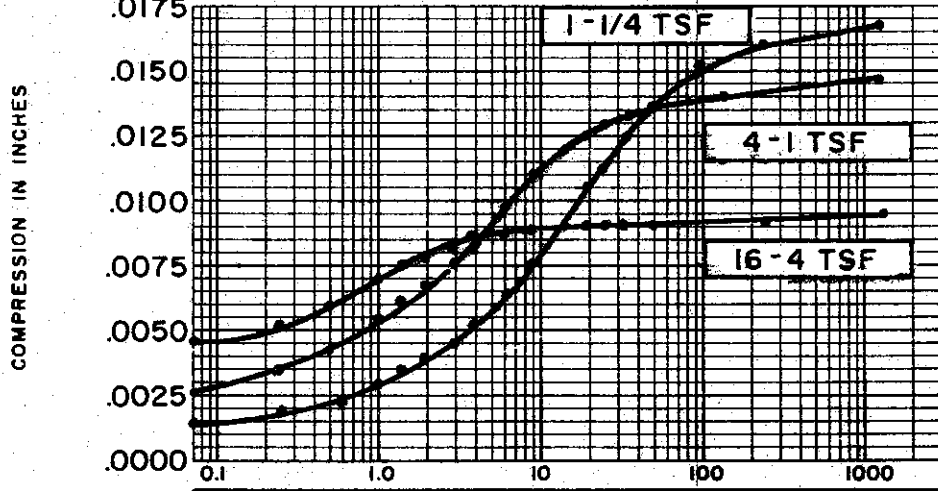
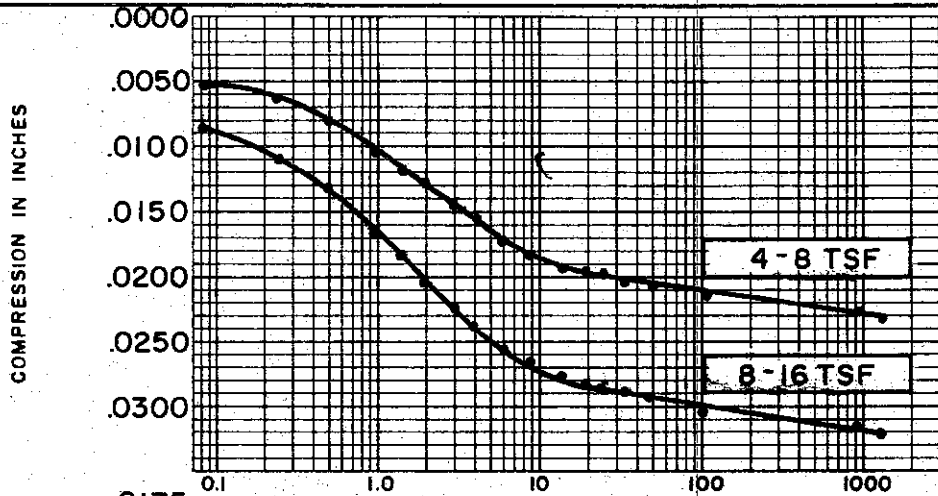
TEST DATA

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DI. METER 2.50"  
 INITIAL VOID RATIO 0.697

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

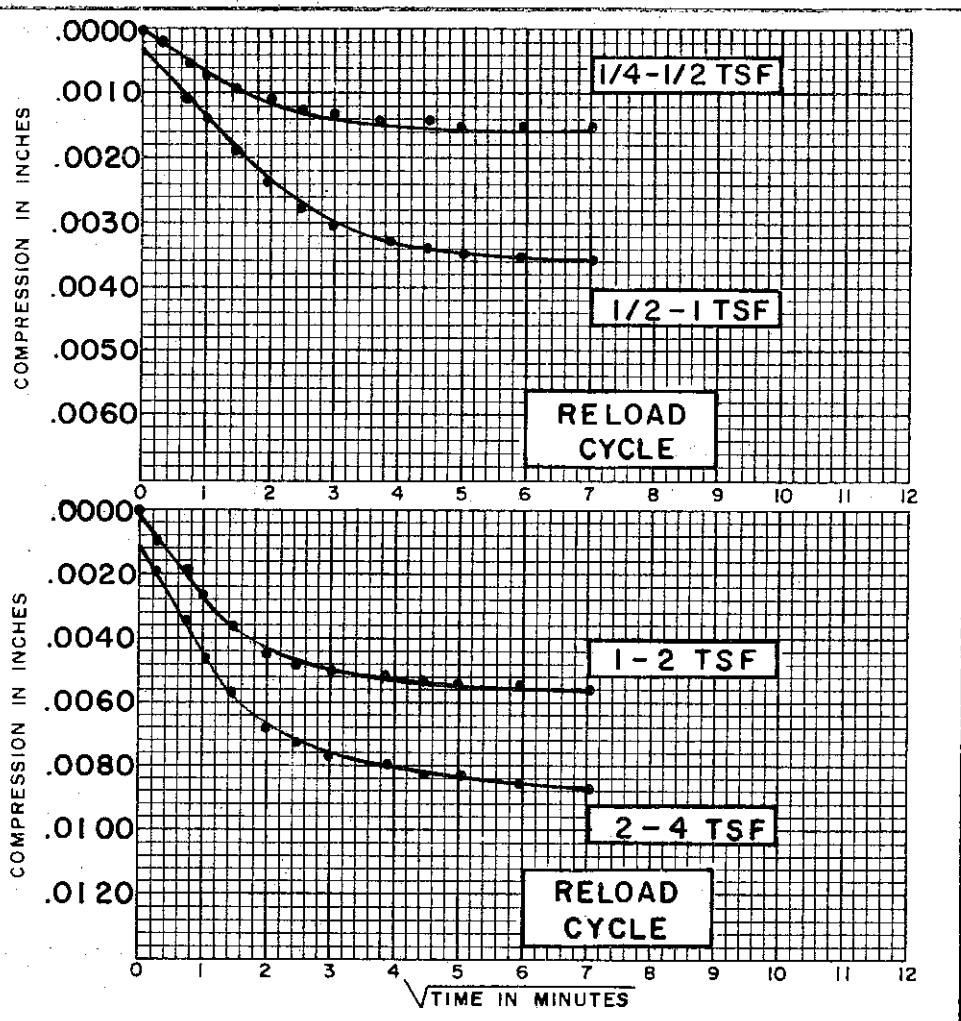
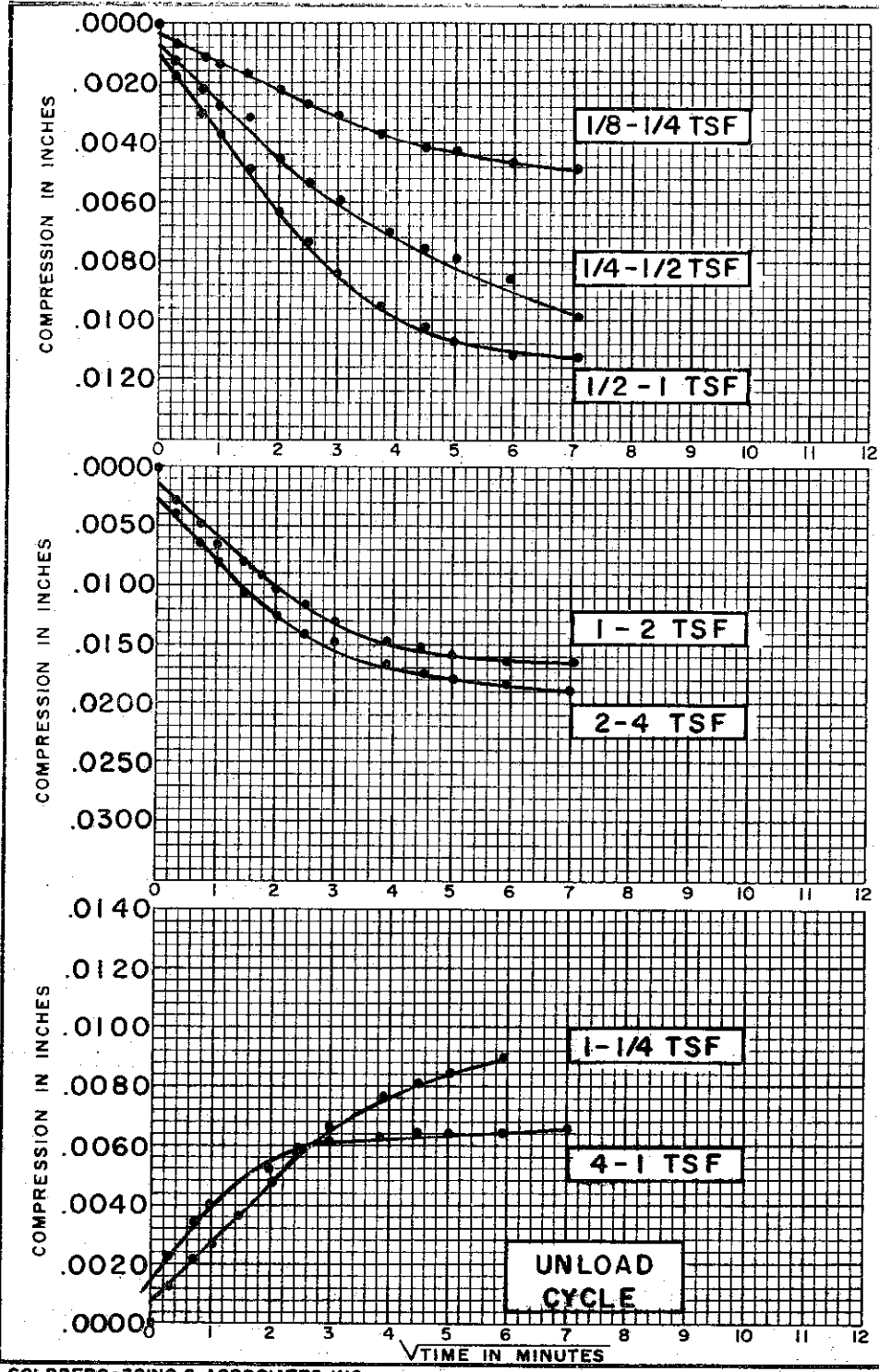
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SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

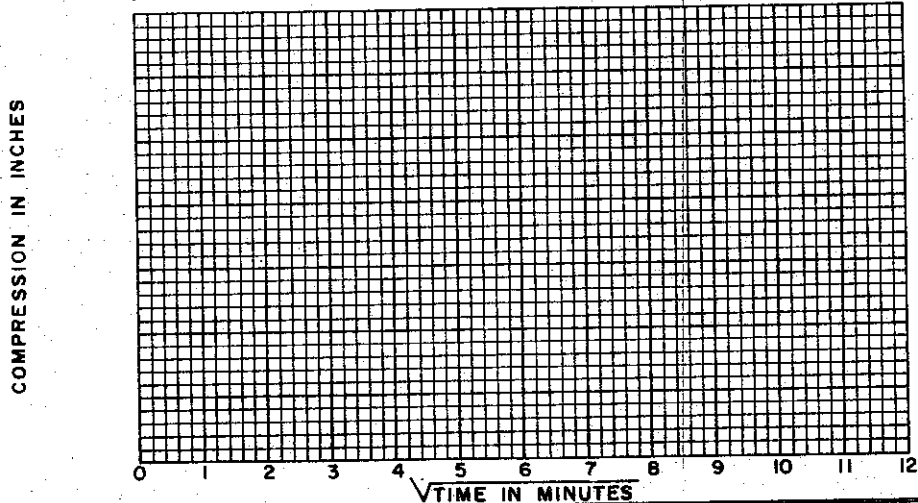
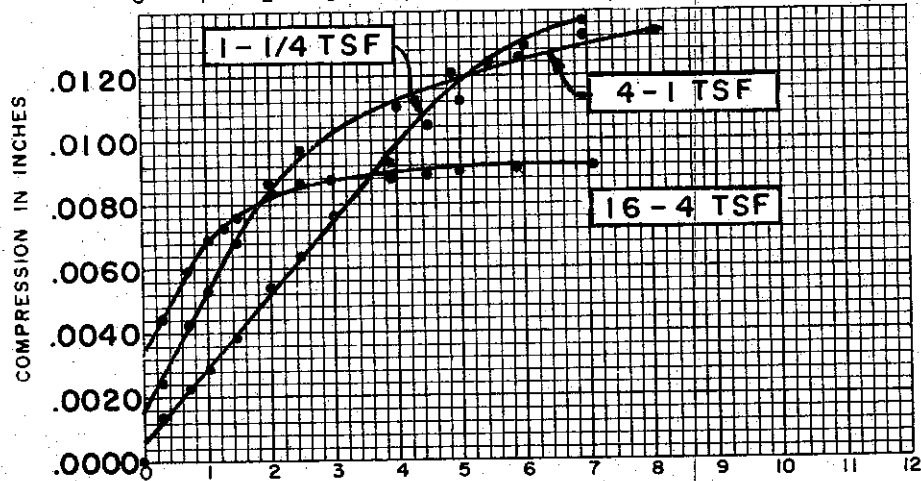
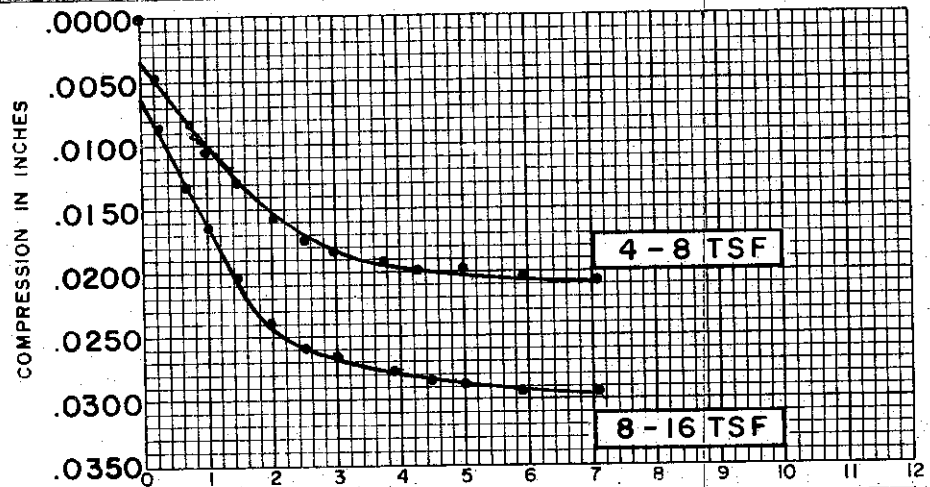
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

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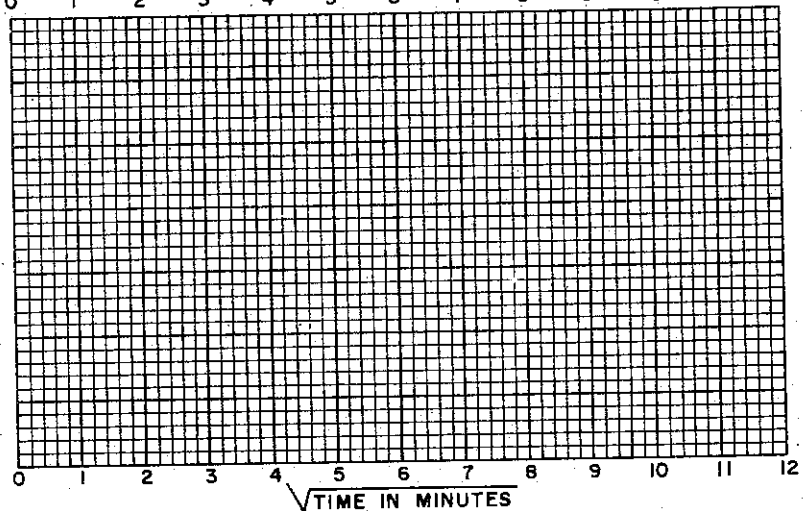
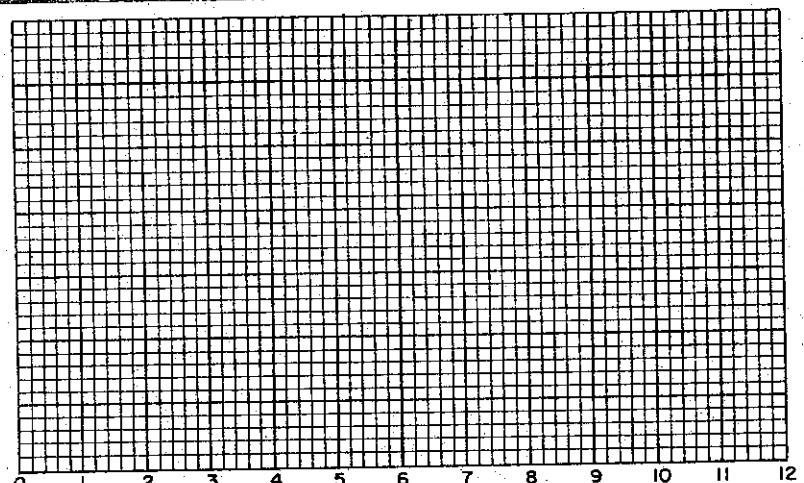
787-484



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7 %  
 FINAL WATER CONTENT 19.7 %

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5

**TEST DATA**

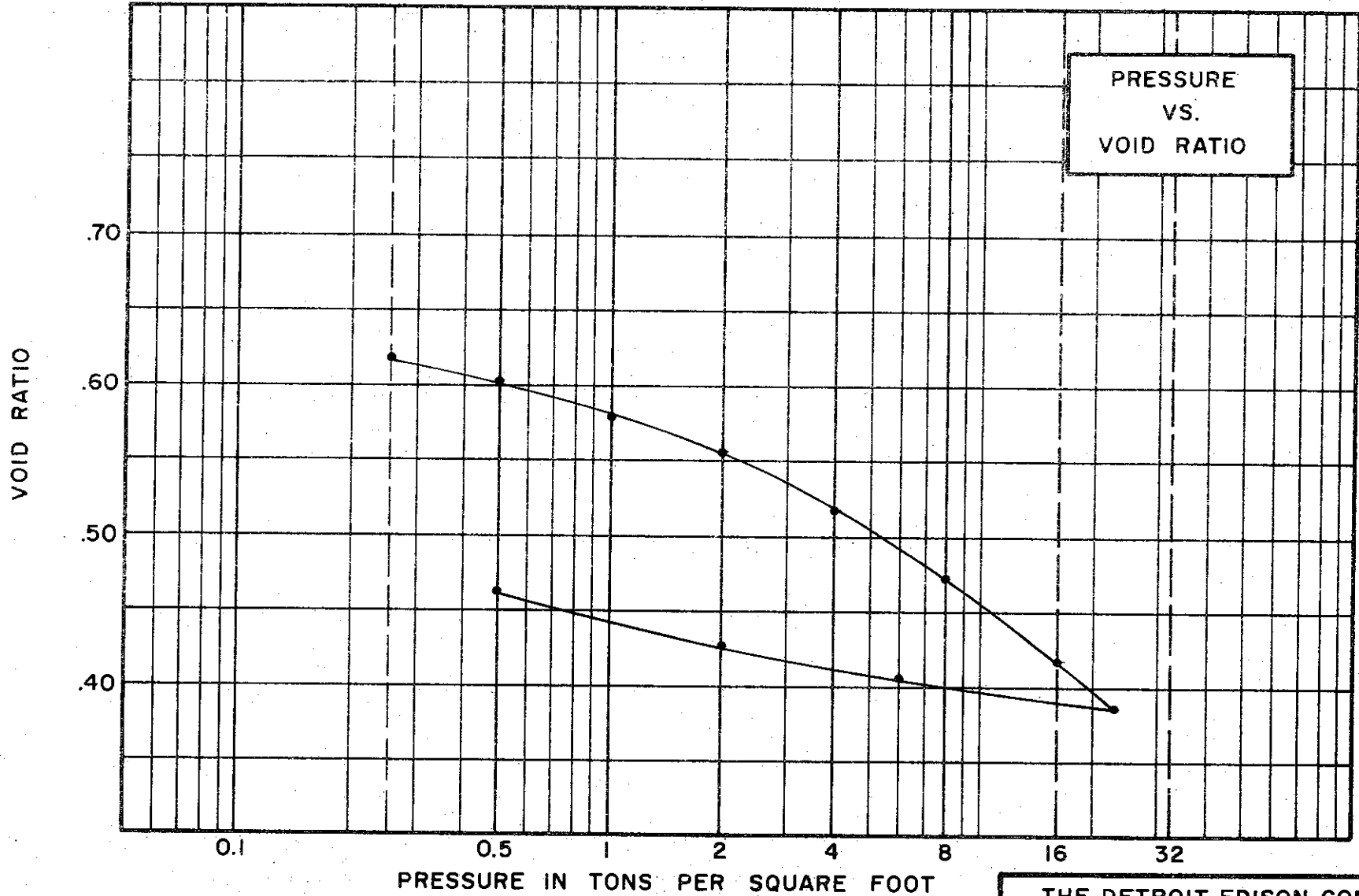
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 24.2% FINAL 19.4%  
ATTERBERG LIMITS:  
LIQUID LIMIT 29% PLASTIC LIMIT 19%

**TEST DATA**

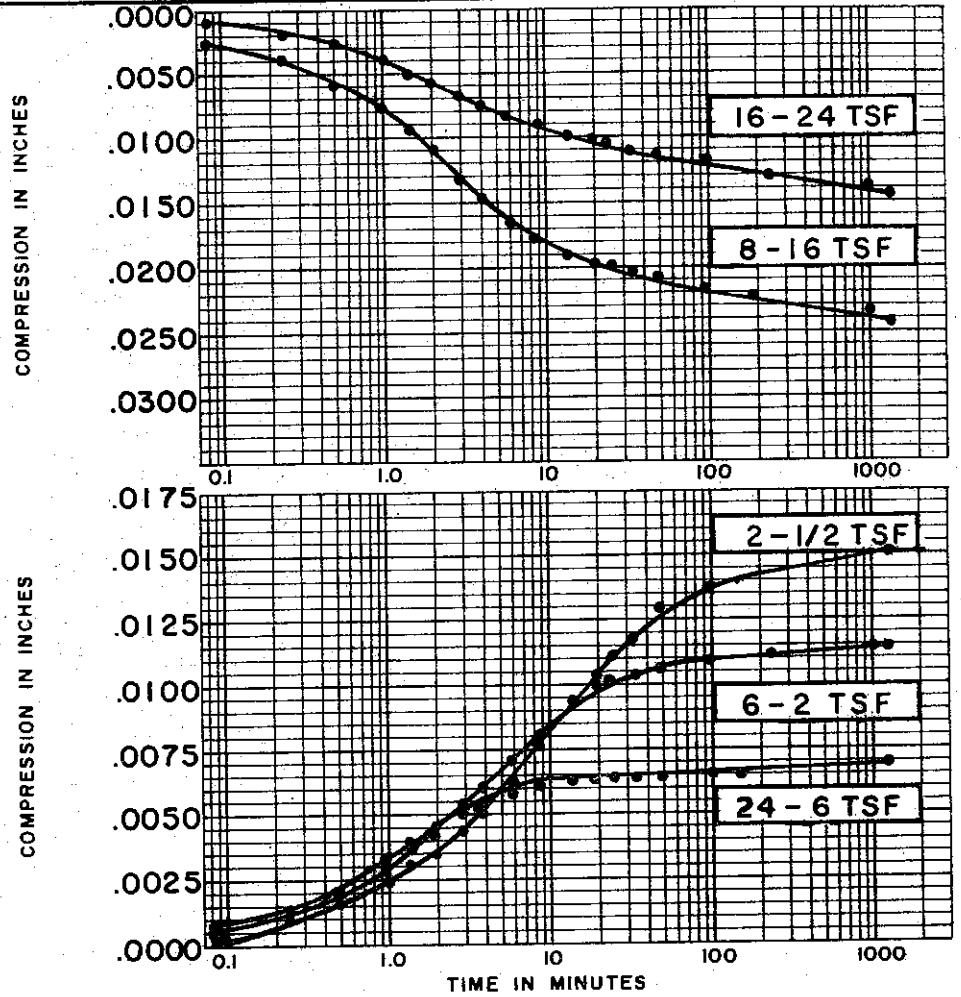
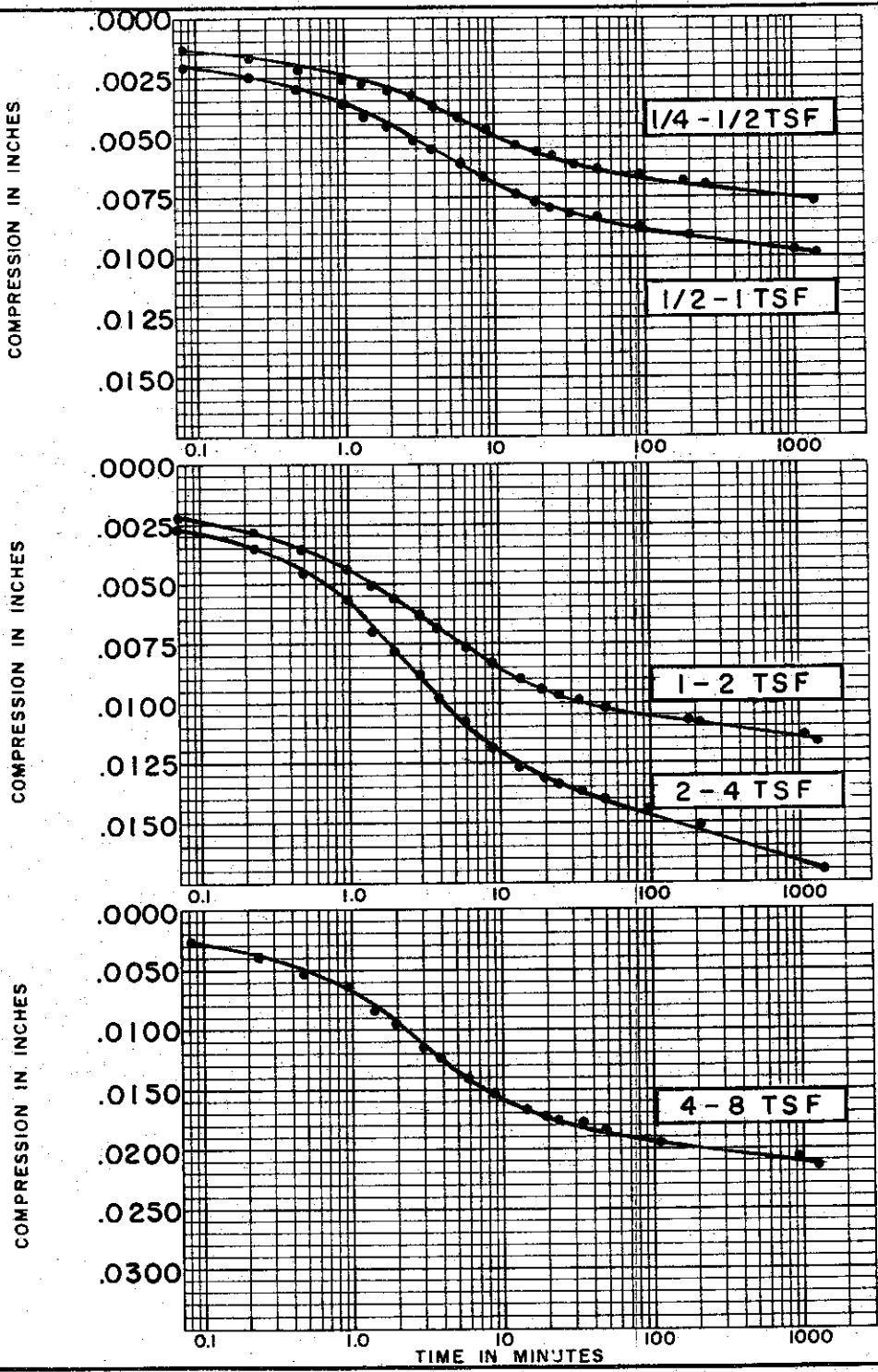
INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C38.1  
SAMPLE NO. 25 DATE JAN. 1974  
DEPTH 113'

C-485



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

INITIAL WATER CONTENT 24.2 %

FINAL WATER CONTENT 19.4 %

BORING NO. 41

SAMPLE NO. 25

DEPTH 113'

**TEST DATA**

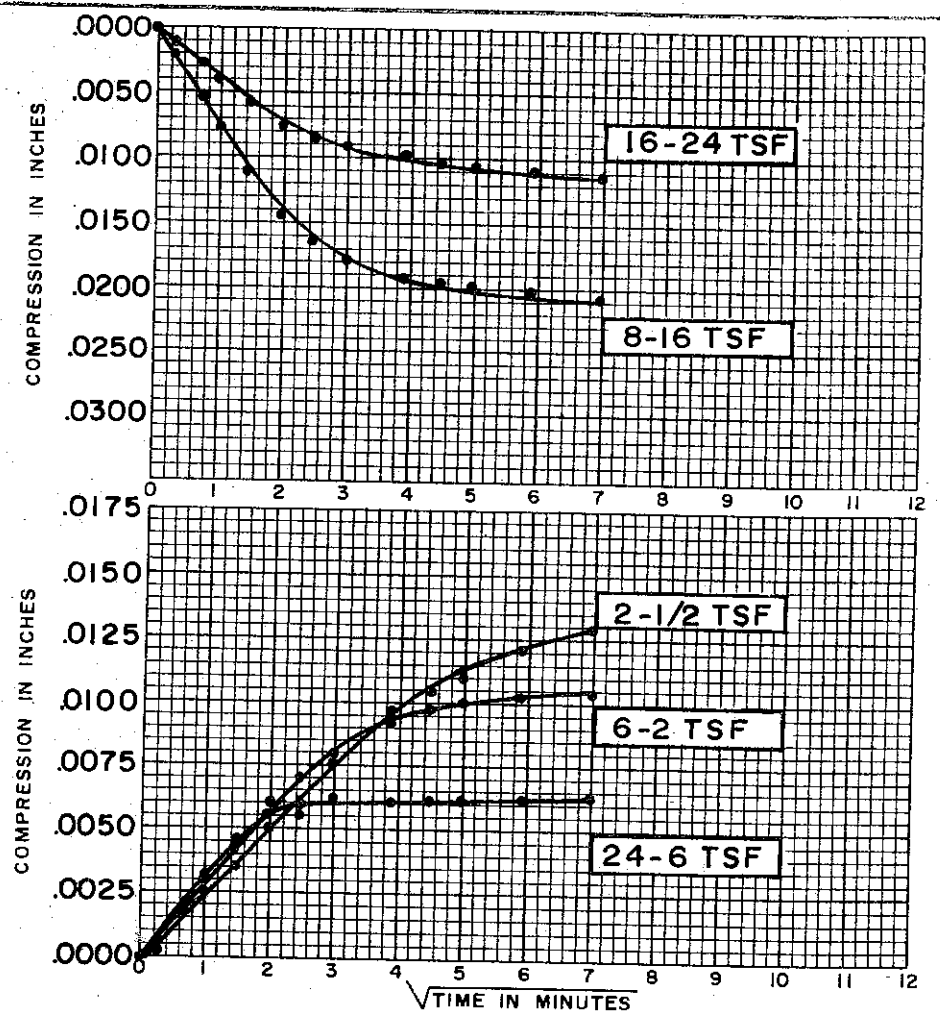
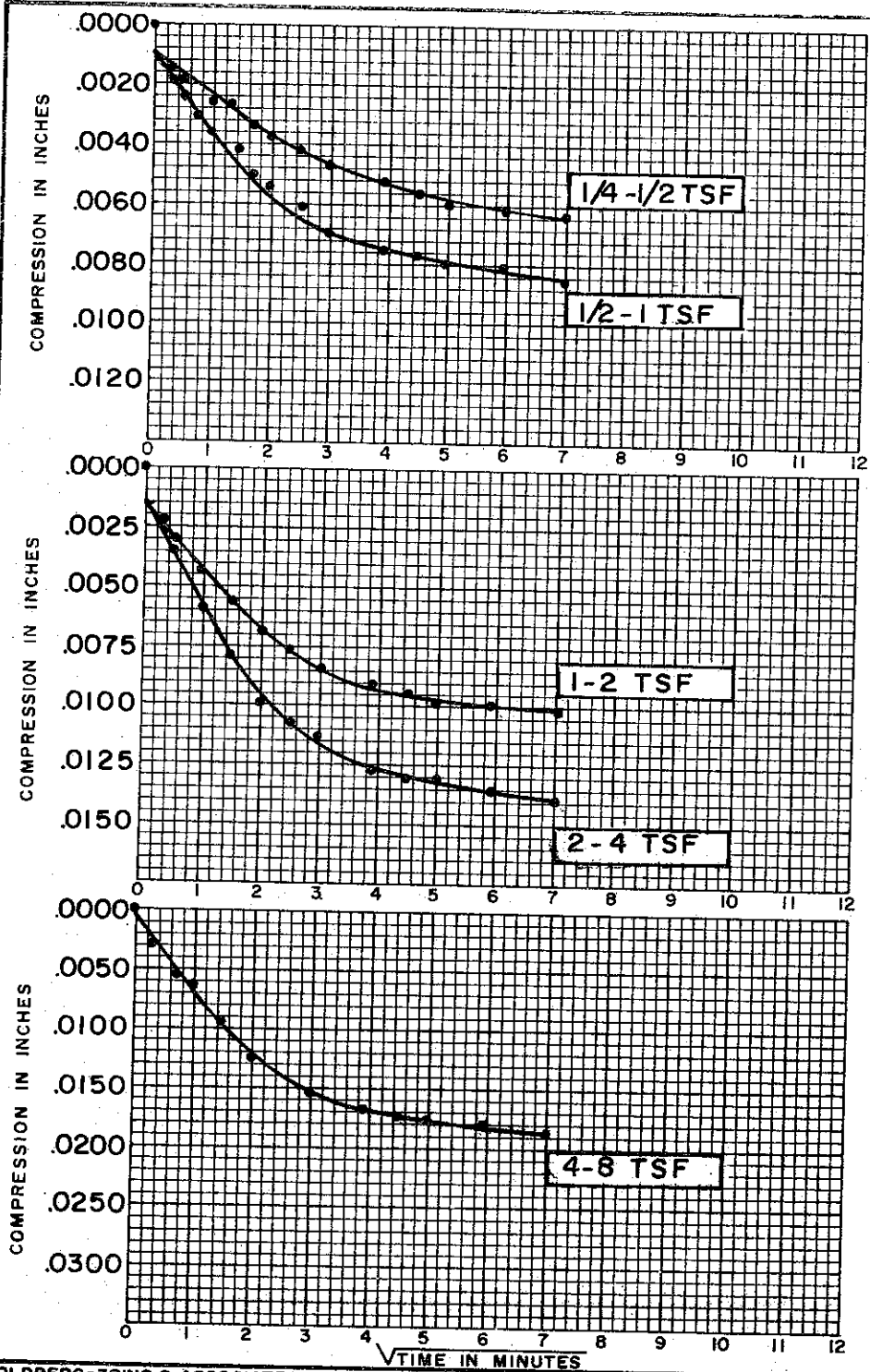
INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 24.2%  
 FINAL WATER CONTENT 19.4%

BORING NO. 41  
 SAMPLE NO. 25  
 DEPTH 113'

**TEST DATA**

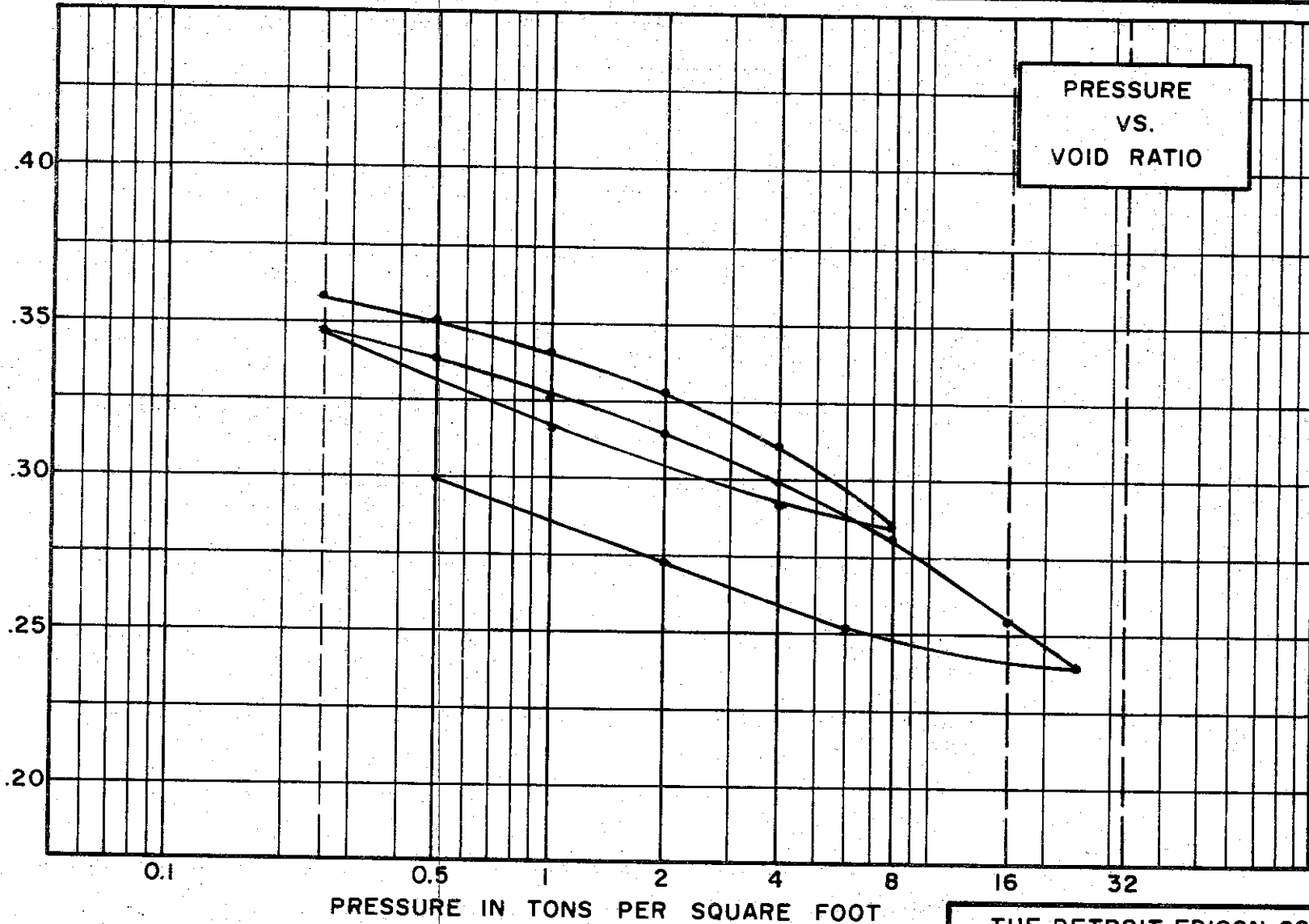
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

G-487

VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 WATER CONTENT, INITIAL 11.3% FINAL 12.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

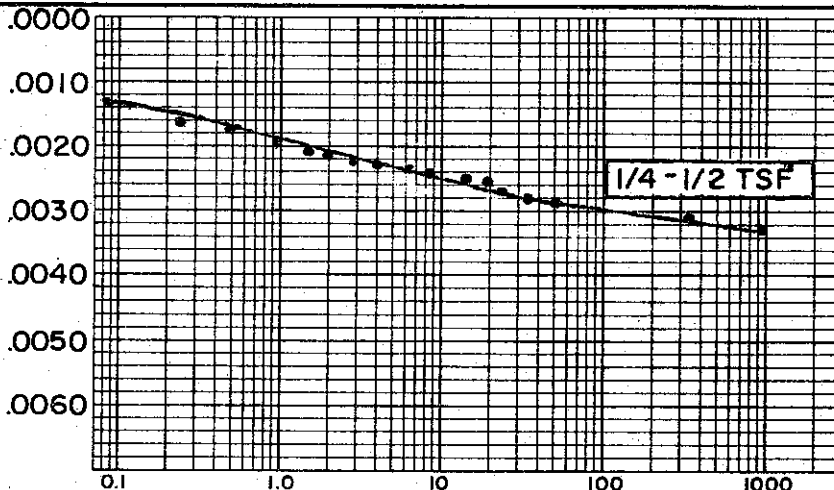
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.370

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

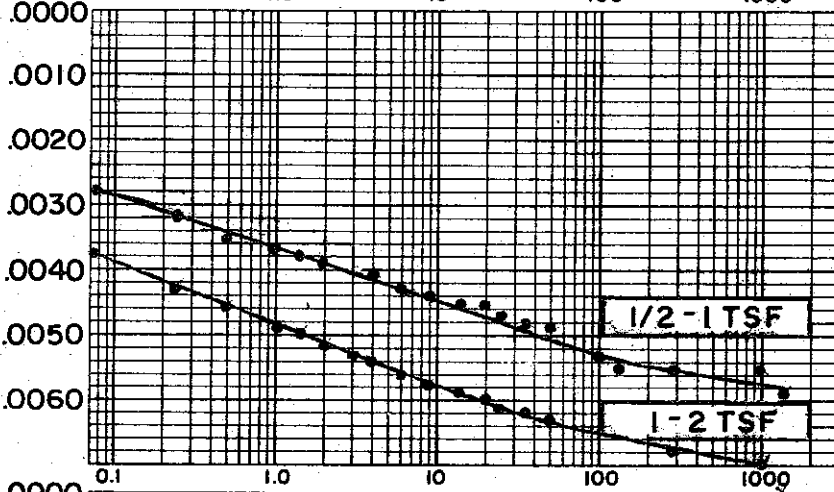
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C4C.1  
 SAMPLE NO. 29 DATE FEB. 1974  
 DEPTH 130.8'

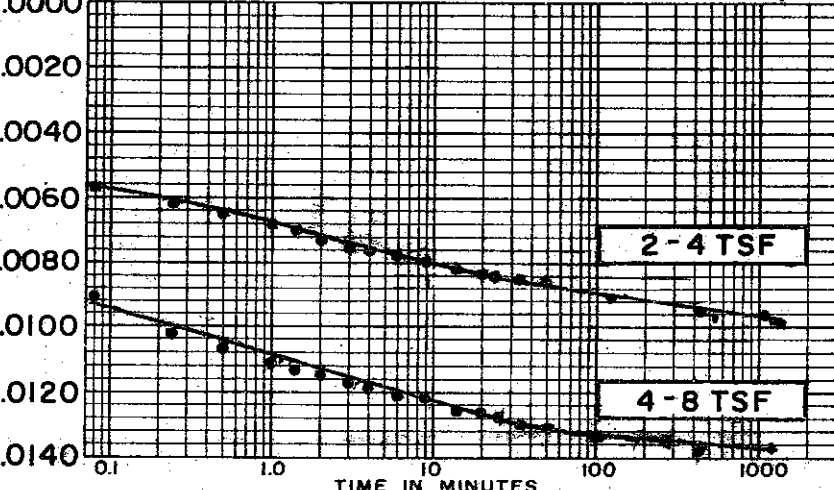
COMPRESSION IN INCHES



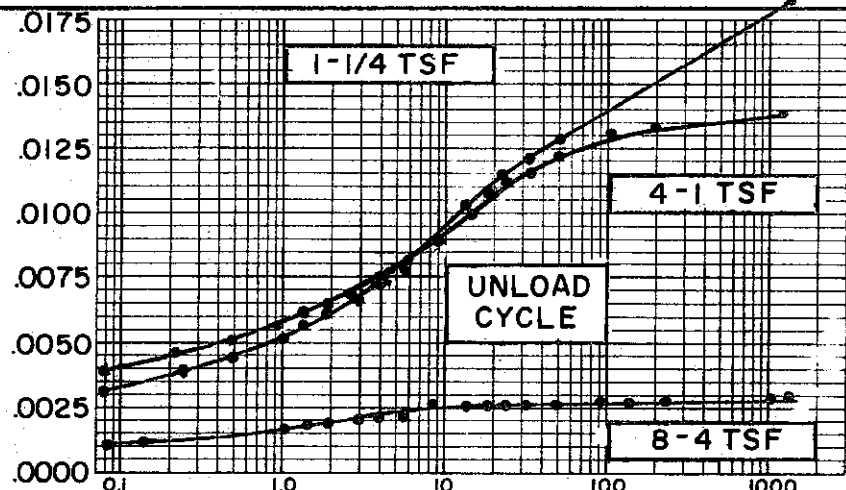
COMPRESSION IN INCHES



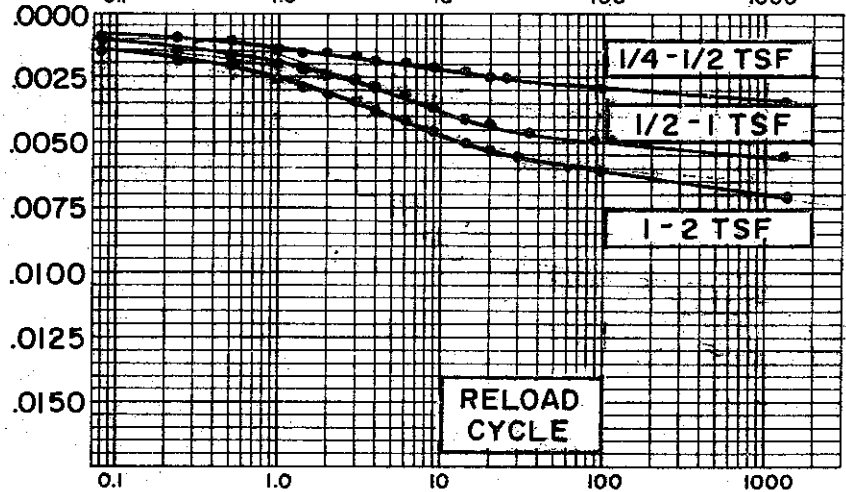
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



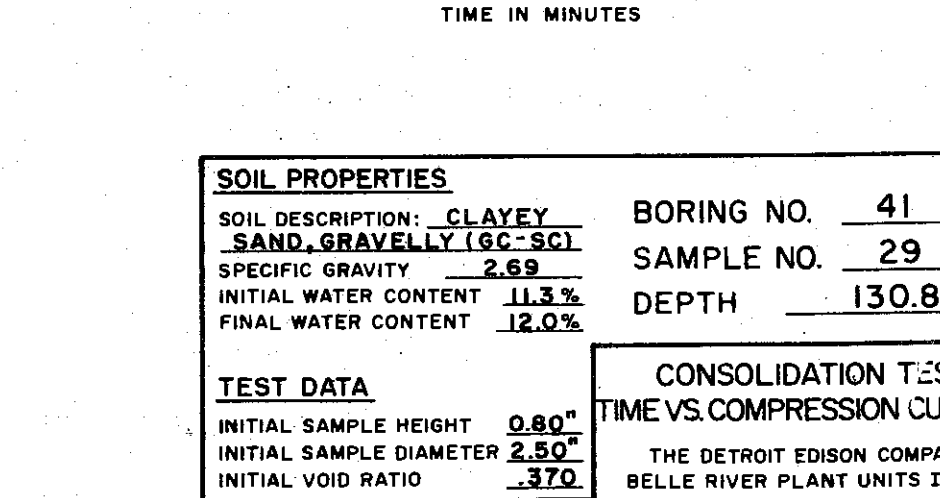
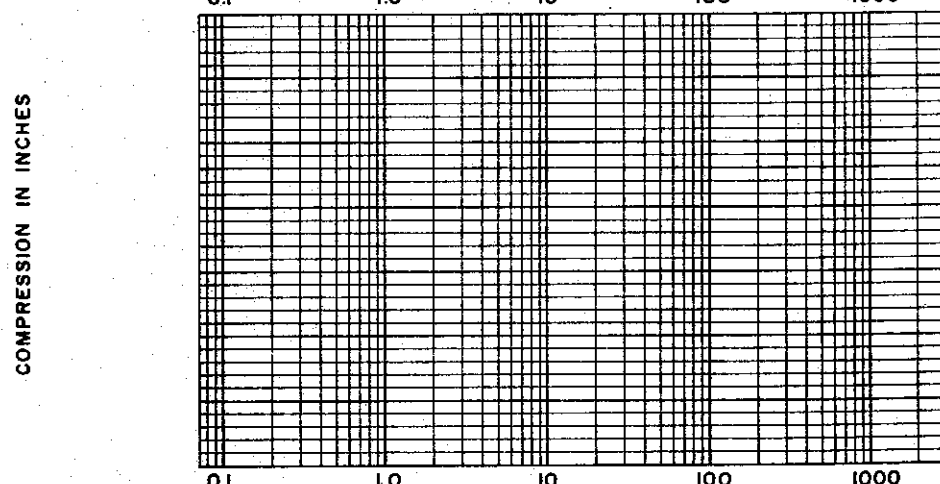
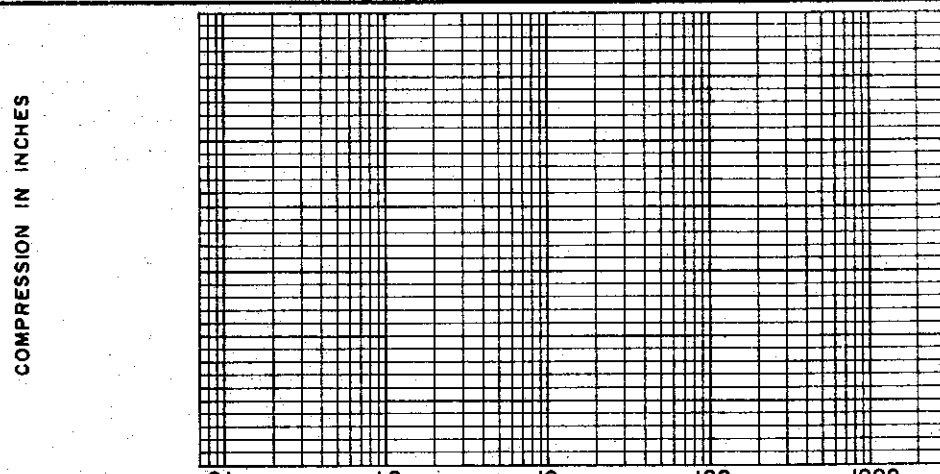
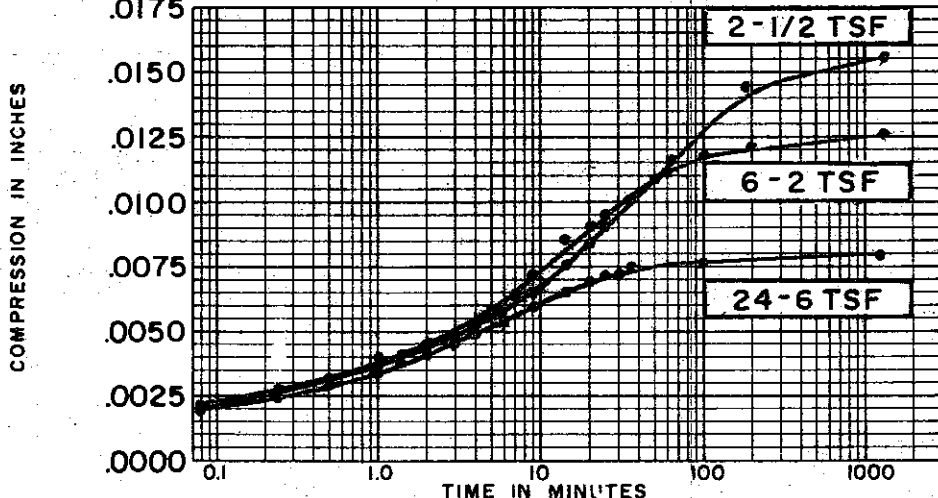
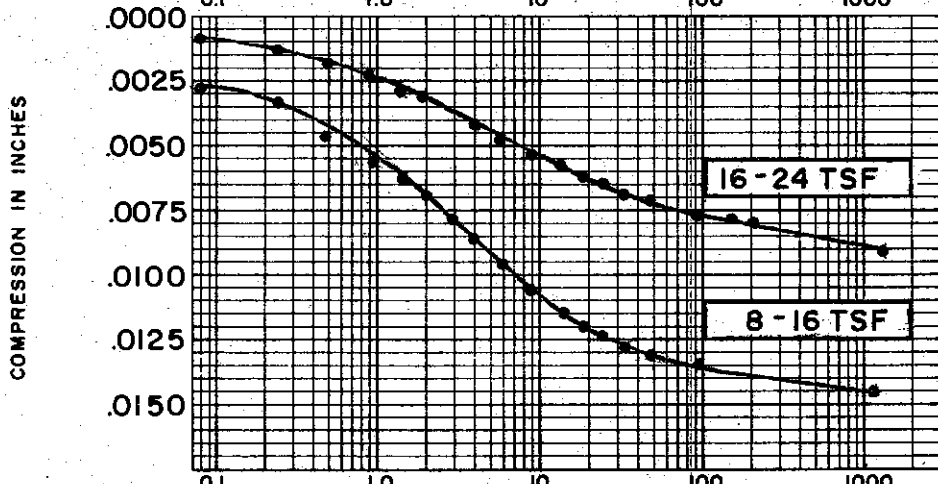
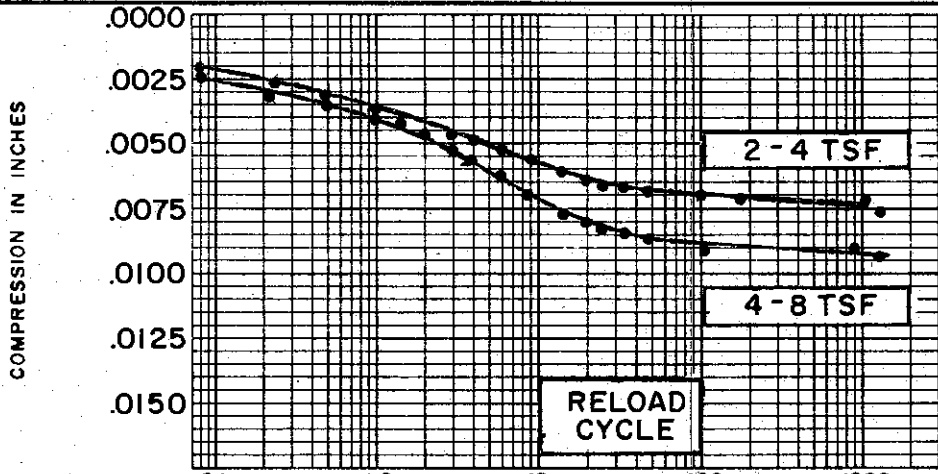
TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

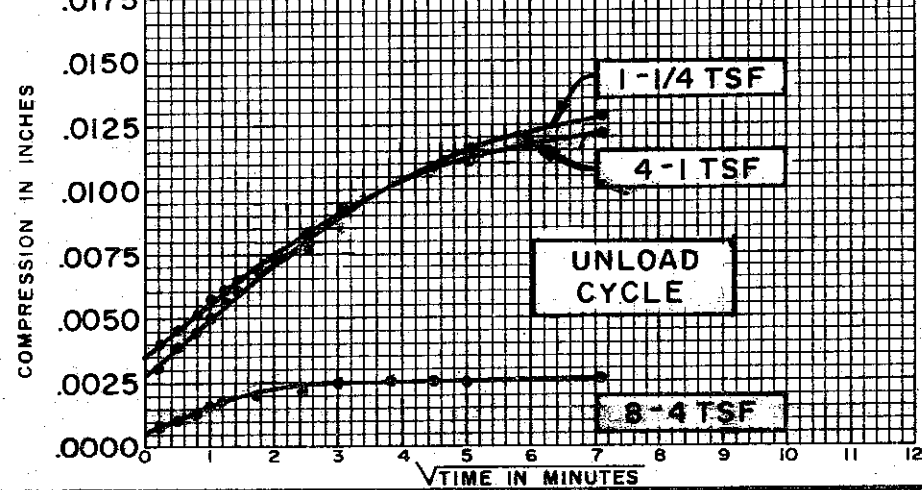
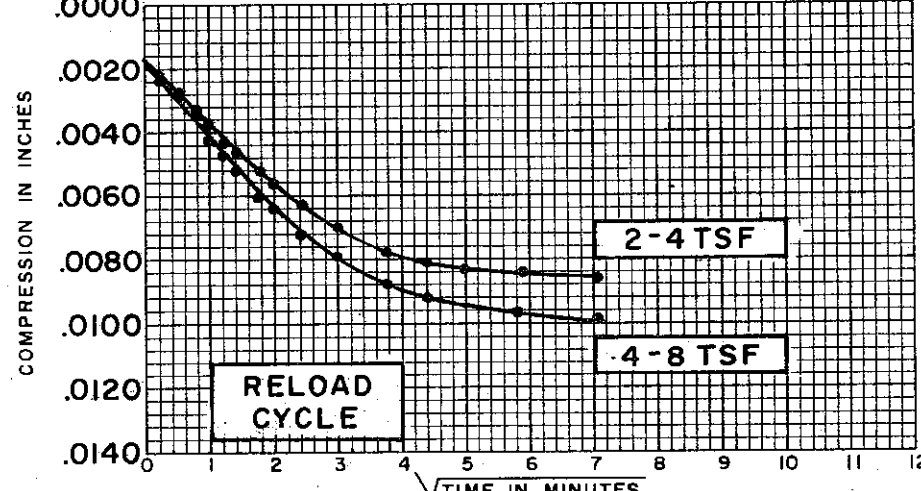
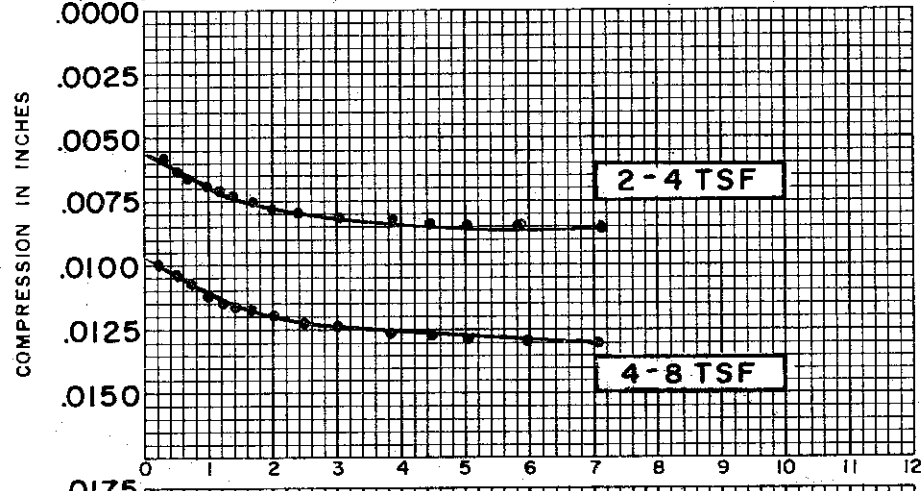
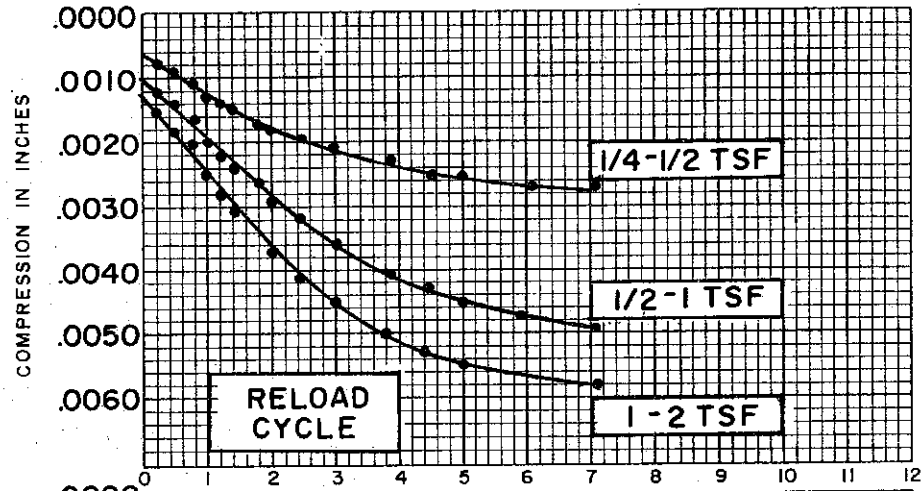
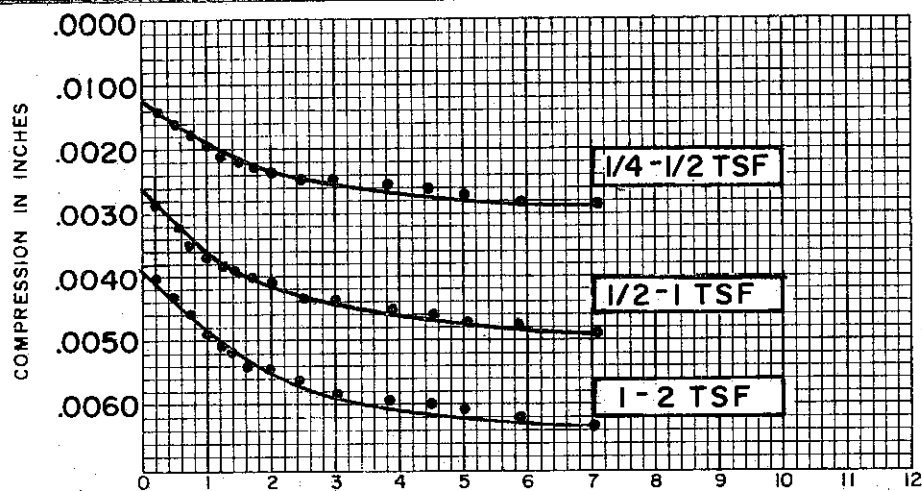
C-489



SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

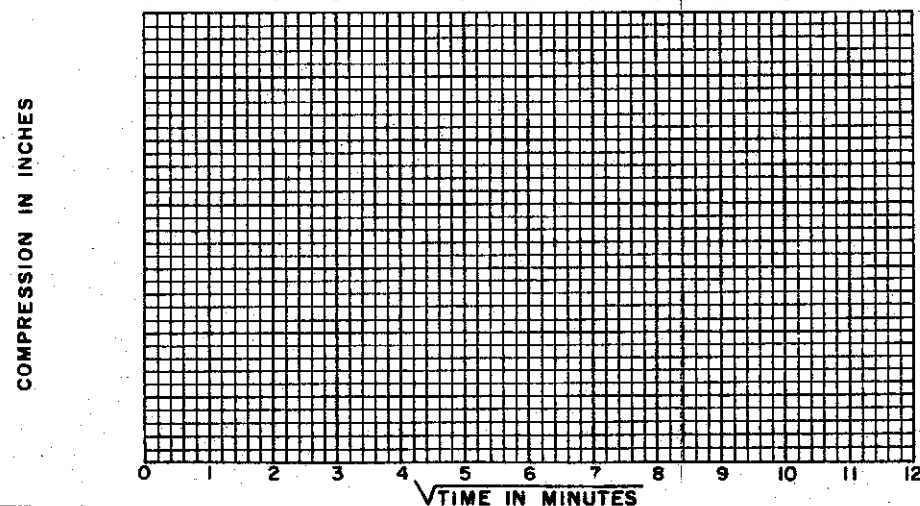
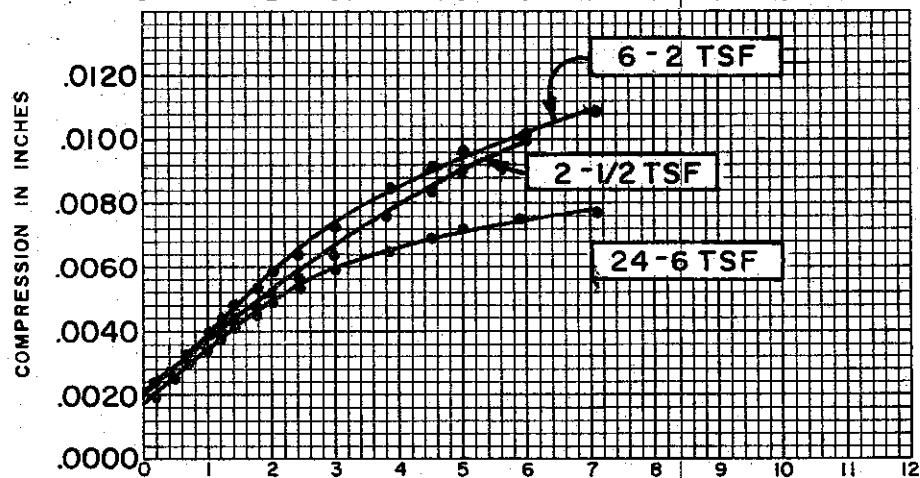
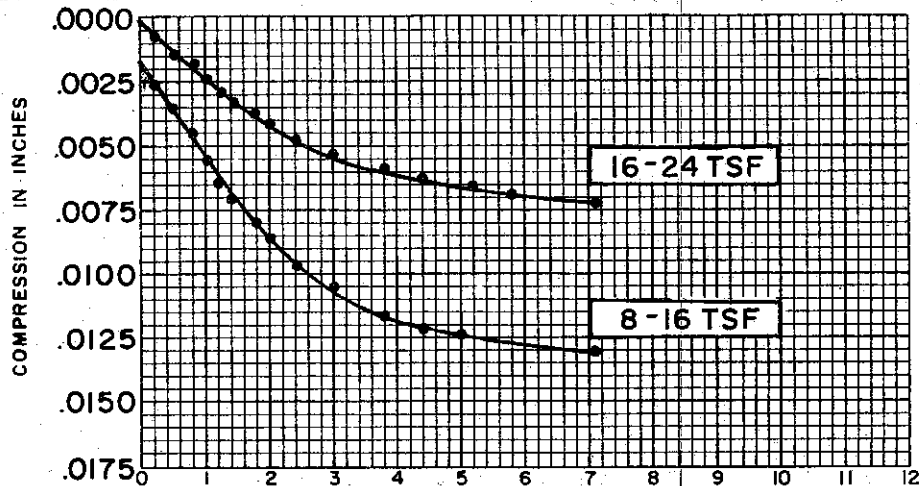
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



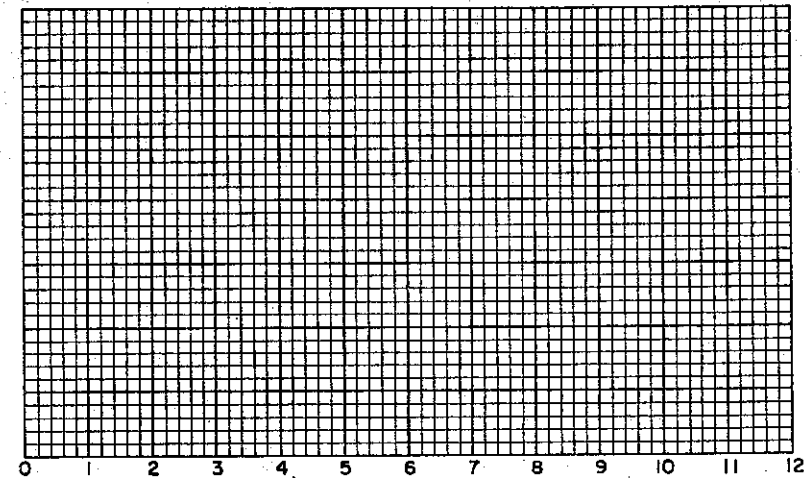
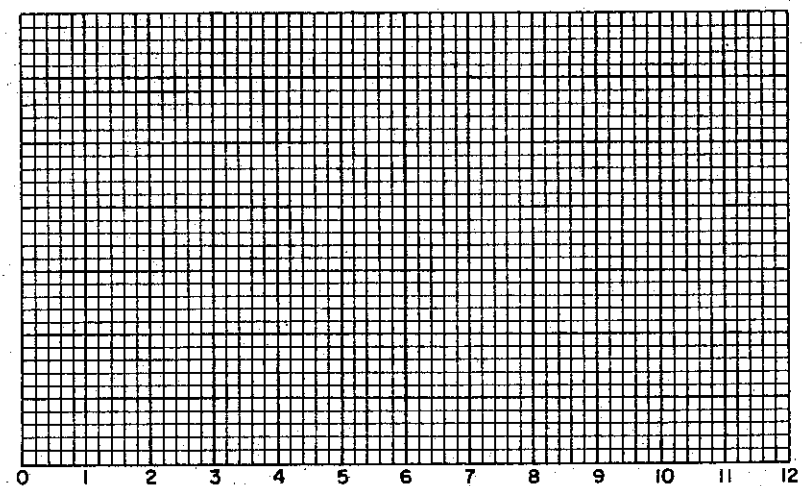
SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

C-491



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 INITIAL WATER CONTENT 11.5%  
 FINAL WATER CONTENT 12.0%

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.8'

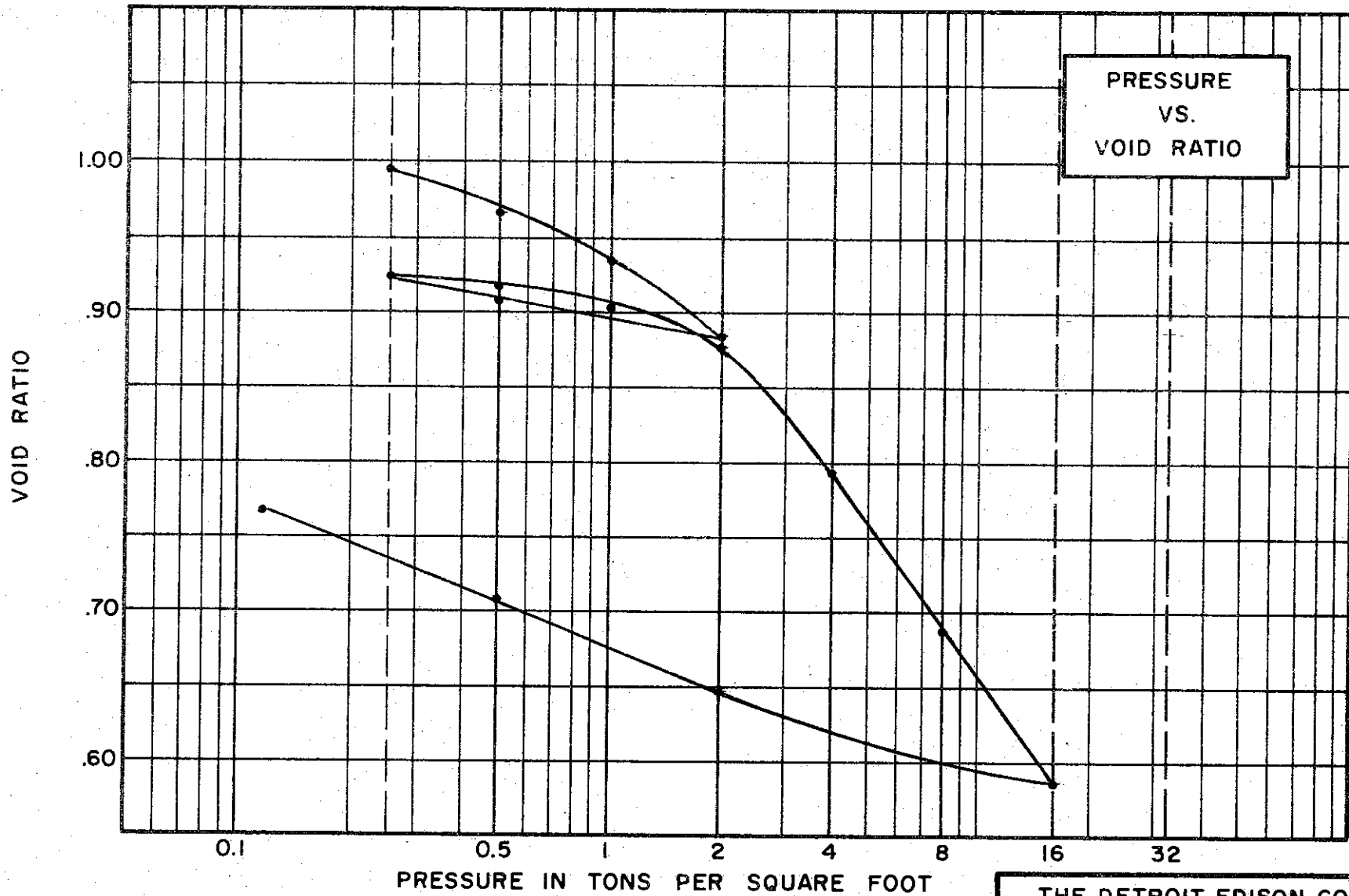
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .370

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.8% FINAL 31.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

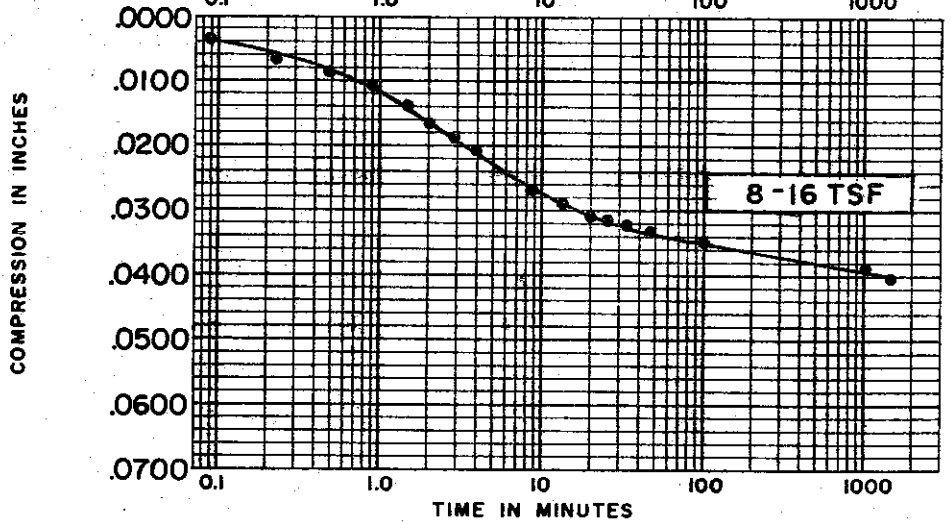
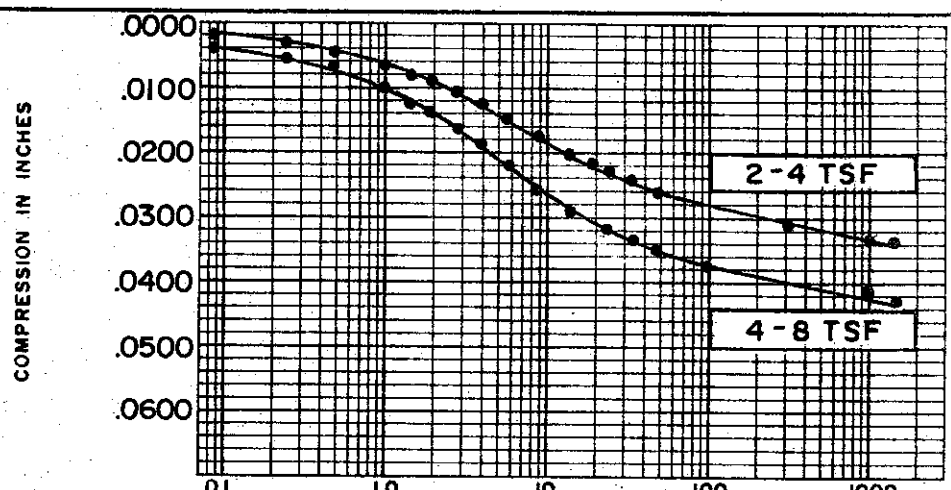
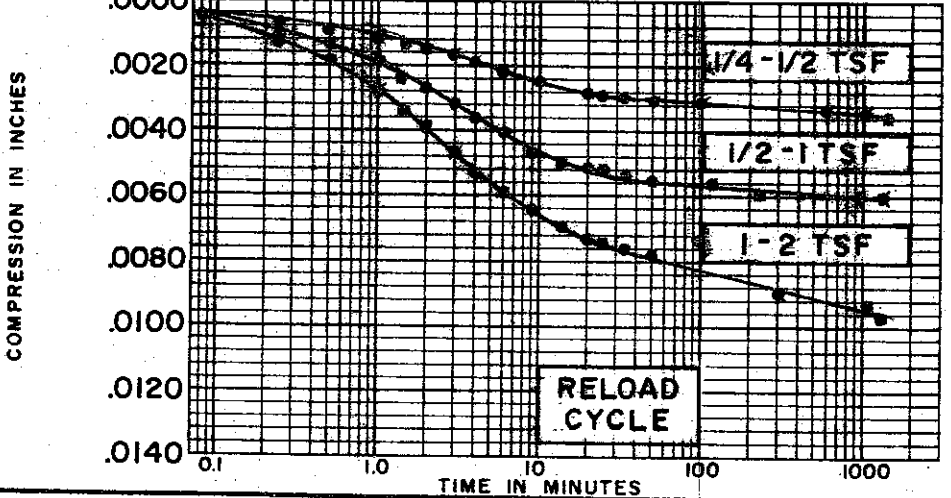
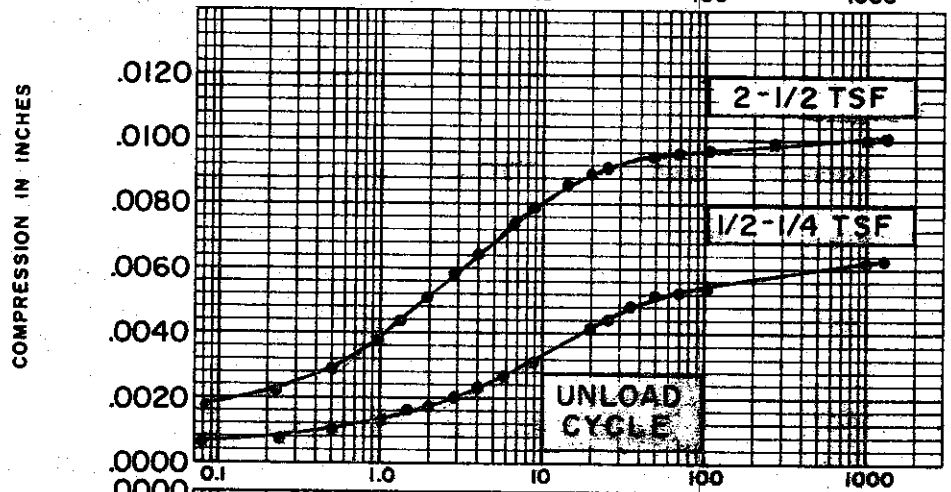
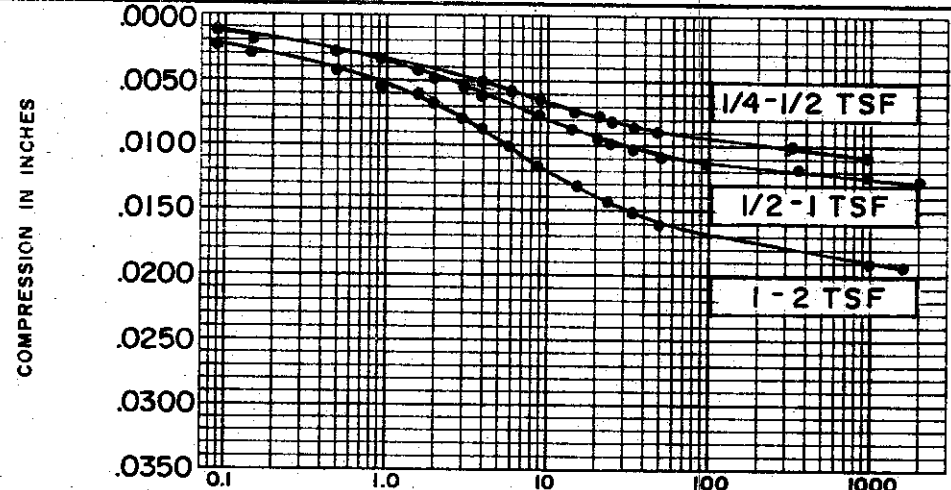
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 48 TEST NO. C202.1  
 SAMPLE NO. 10 DATE MARCH 74  
 DEPTH 39.2' TO 39.4'

C-493



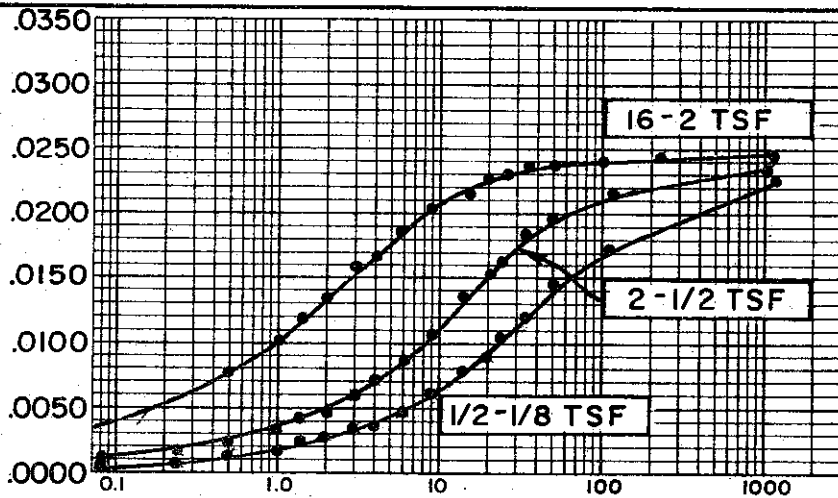
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	29.8%
FINAL WATER CONTENT	31.5%
BORING NO.	48
SAMPLE NO.	10
DEPTH	39.2' TO 39.4'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.027

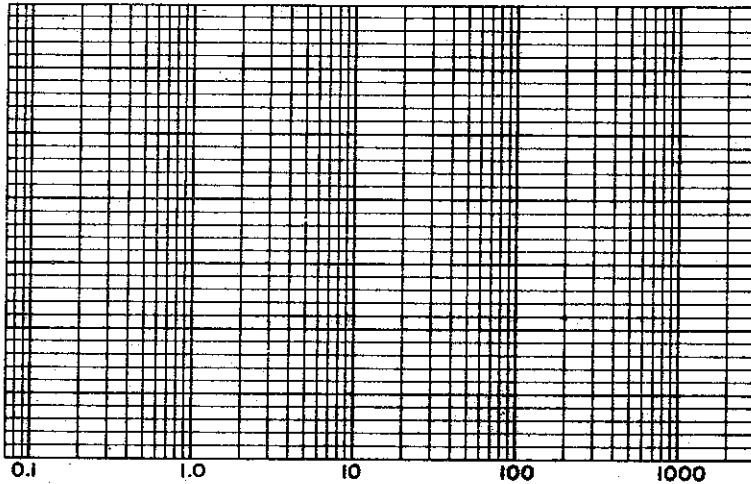
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-495

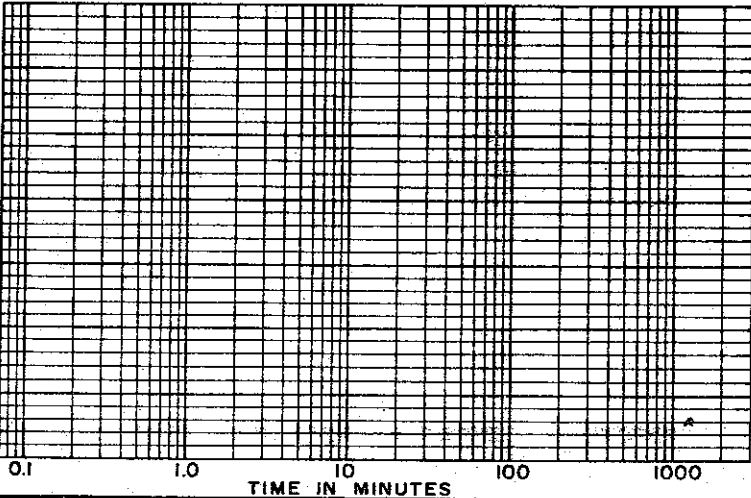
COMPRESSION IN INCHES



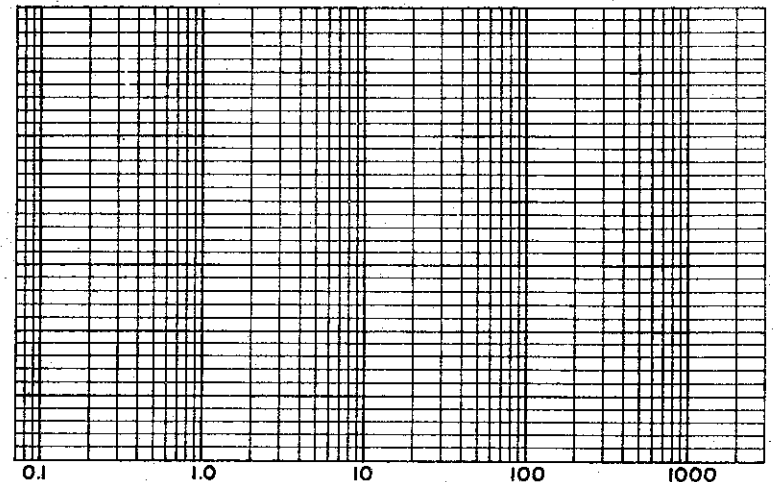
COMPRESSION IN INCHES



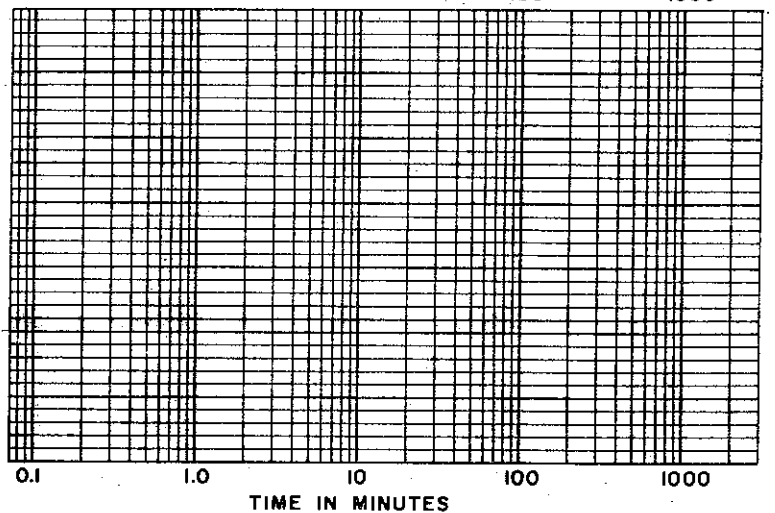
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.7'

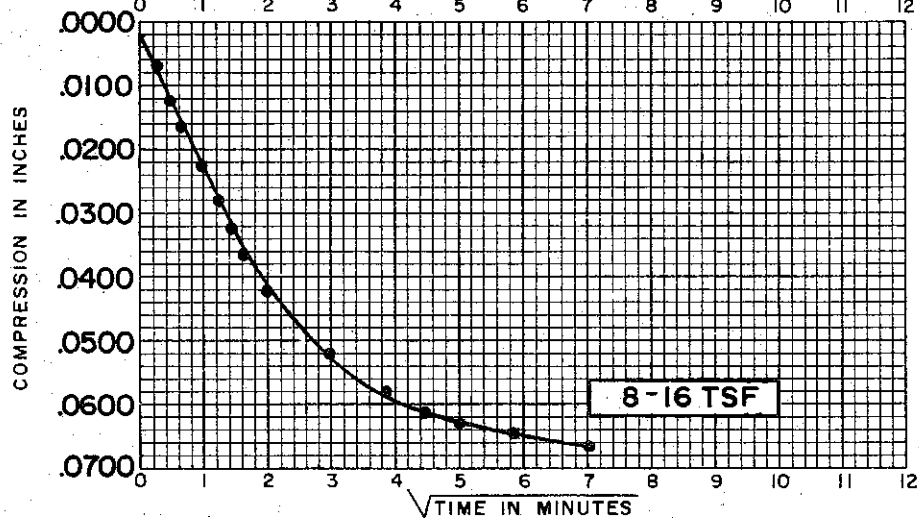
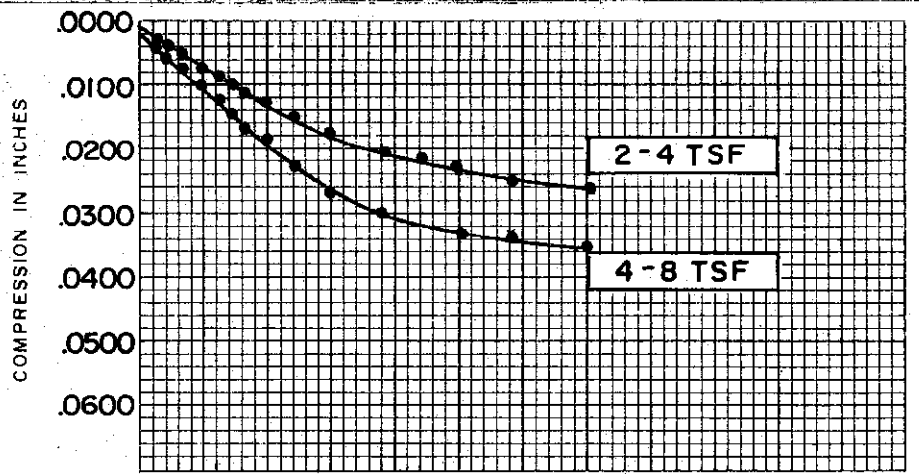
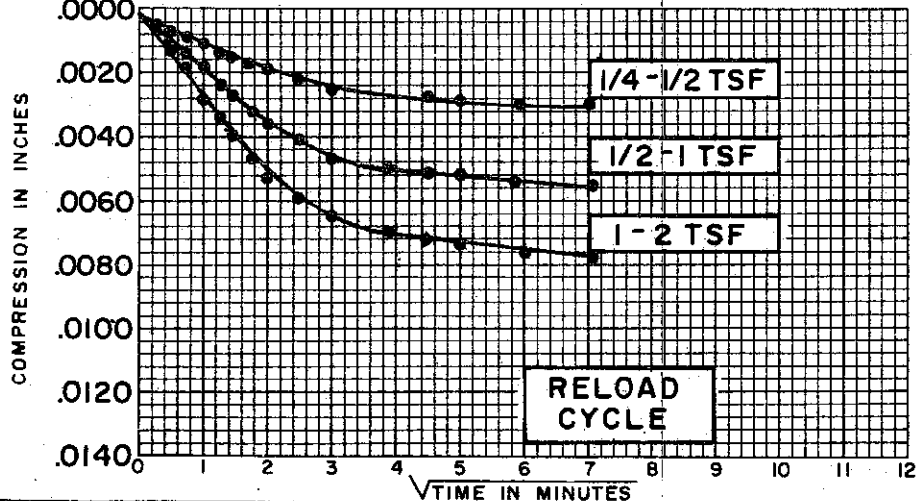
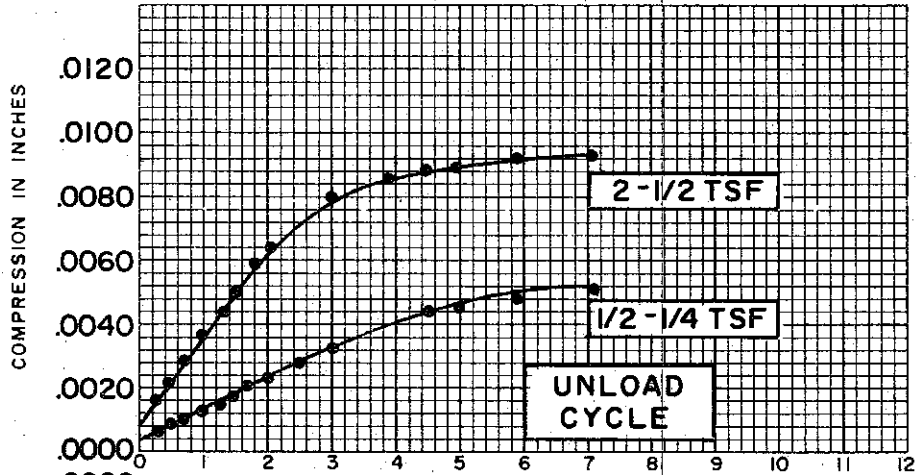
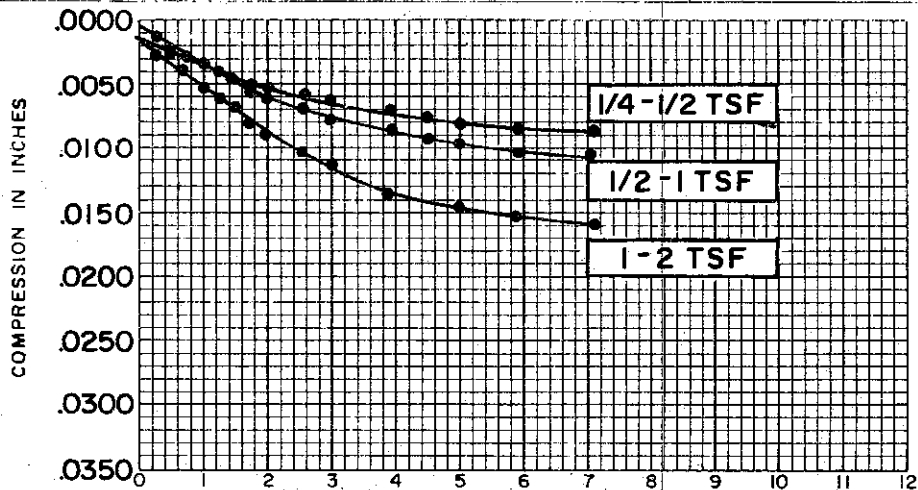
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

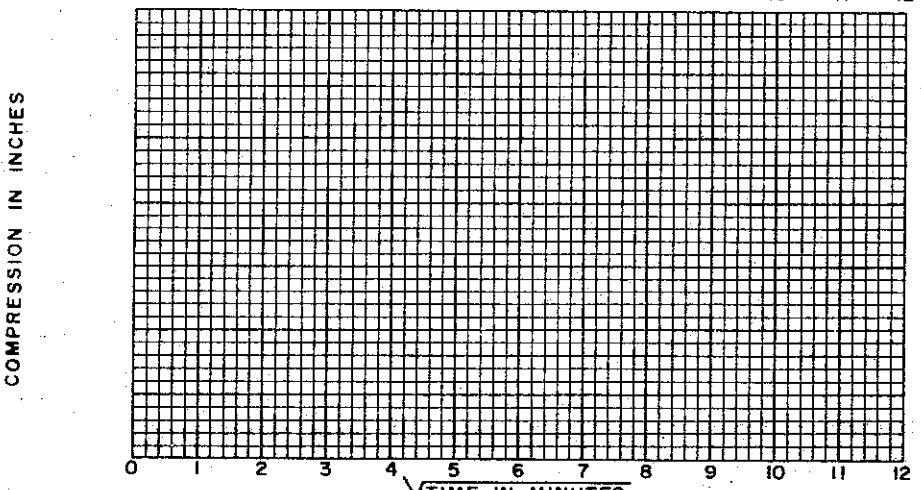
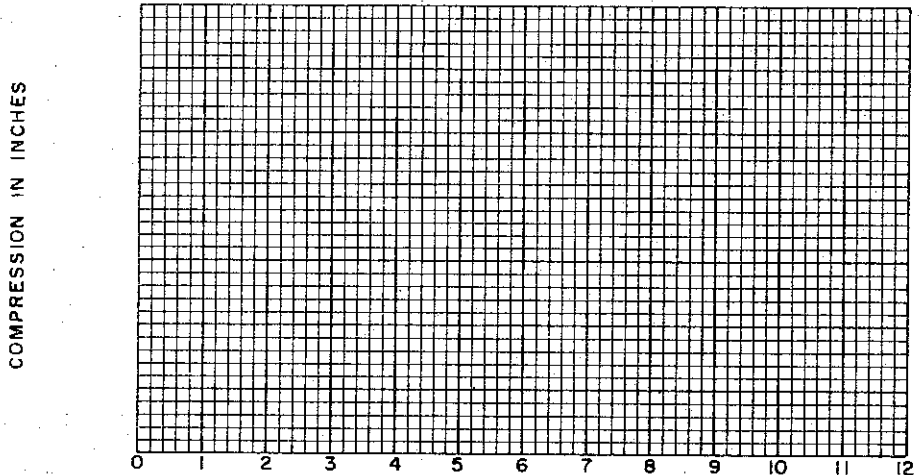
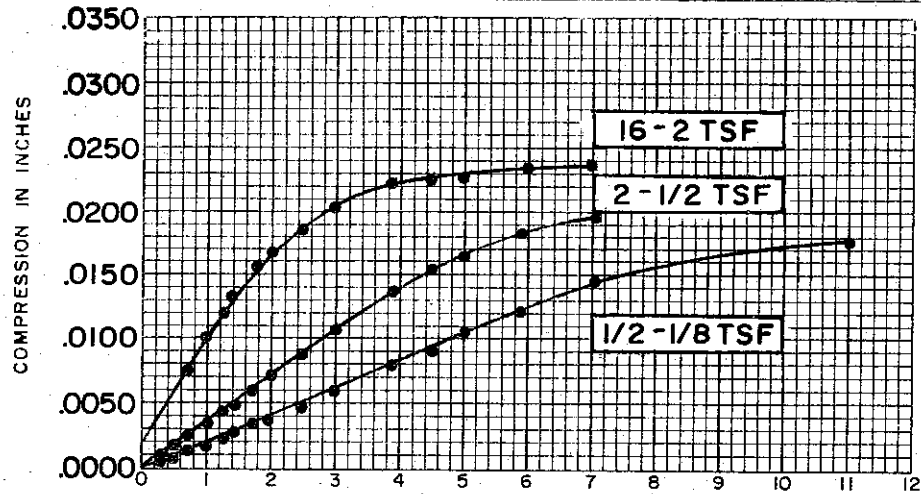
BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

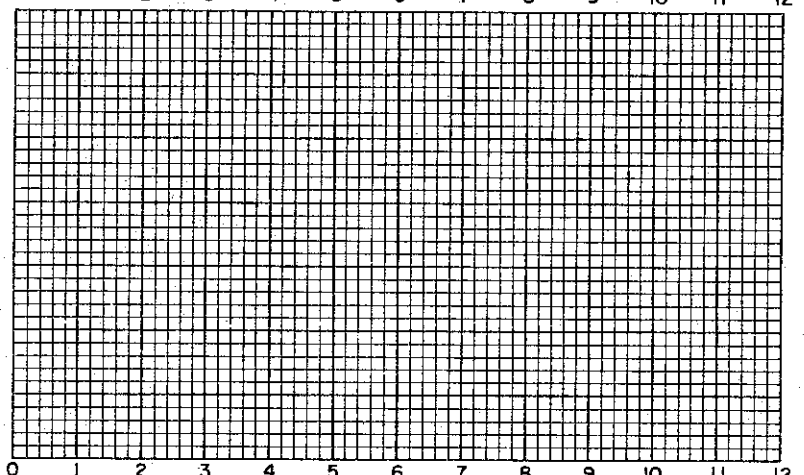
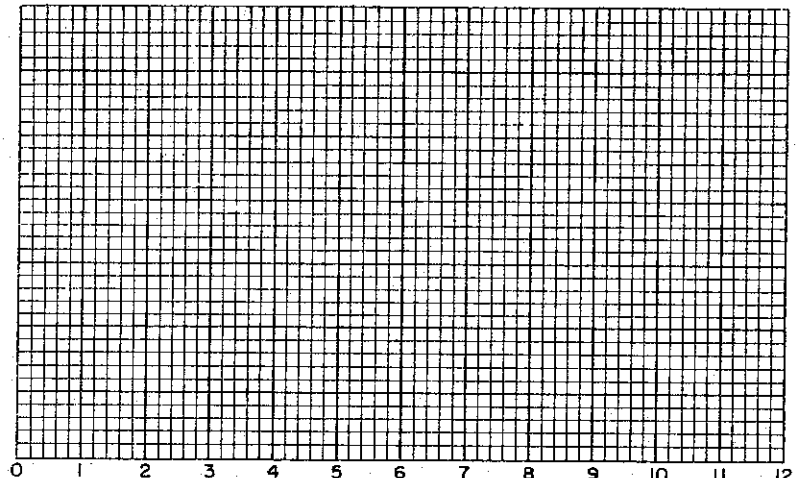
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

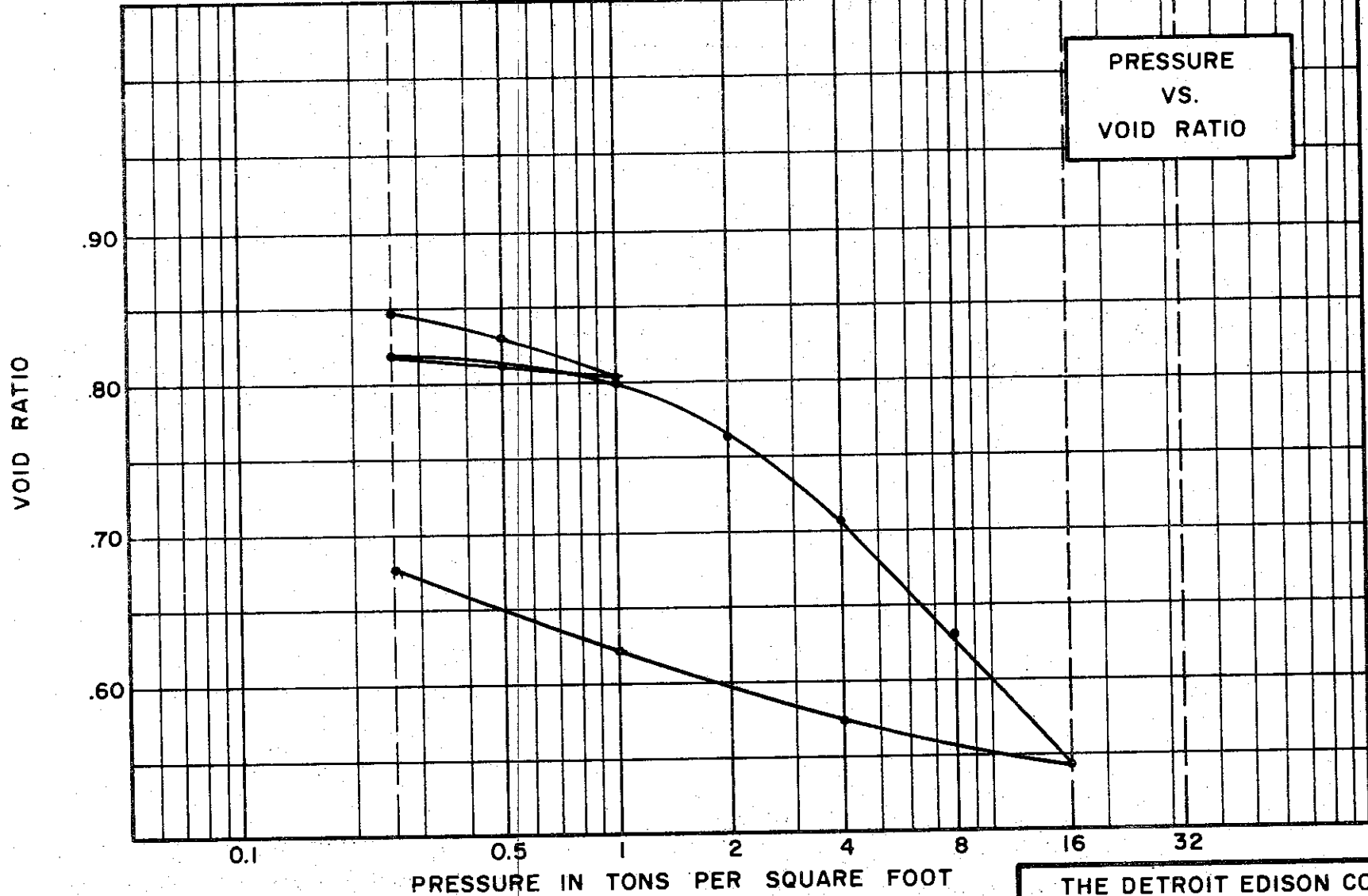
SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>
SPECIFIC GRAVITY	<u>2.73</u>
INITIAL WATER CONTENT	<u>38.8%</u>
FINAL WATER CONTENT	<u>31.5%</u>
BORING NO.	<u>48</u>
SAMPLE NO.	<u>10</u>
DEPTH	<u>39.2' TO 39.4'</u>

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>1.027</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-497

**PRESSURE  
VS.  
VOID RATIO**



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 33.3% FINAL 28.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 47% PLASTIC LIMIT 23%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.863

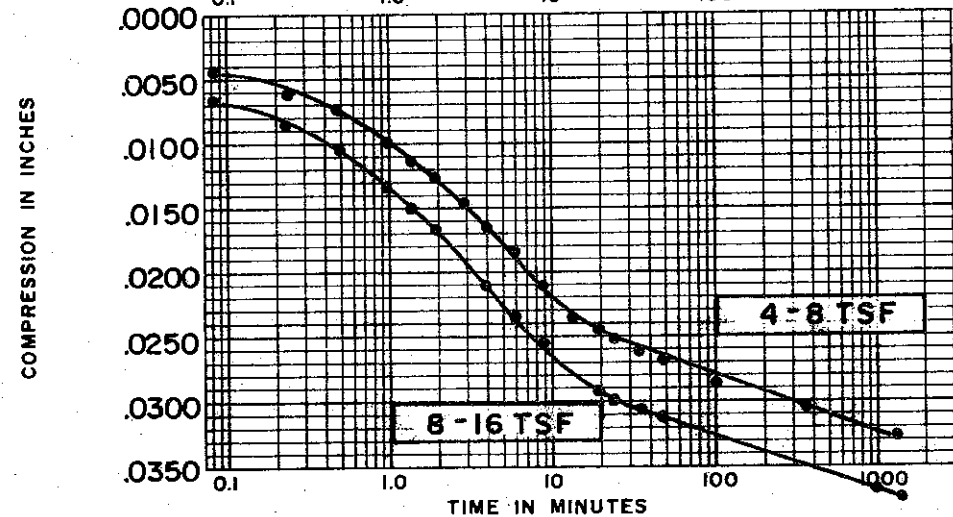
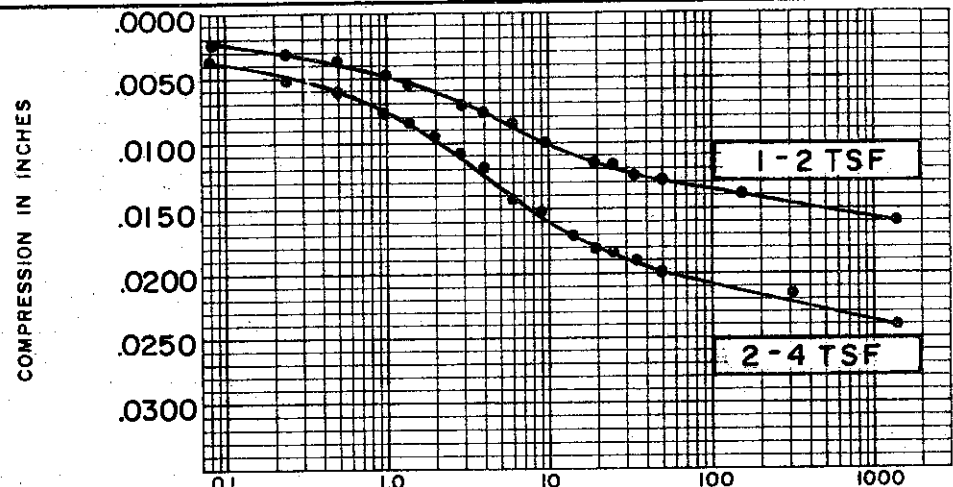
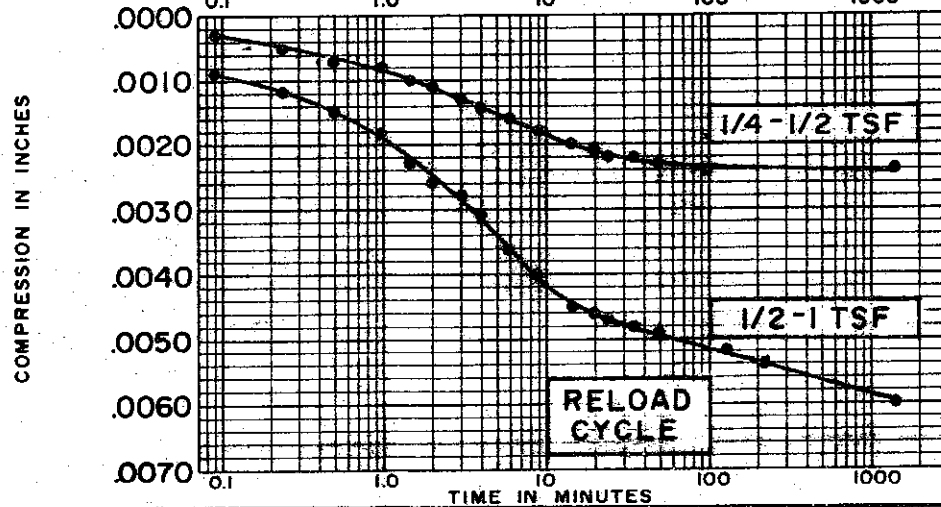
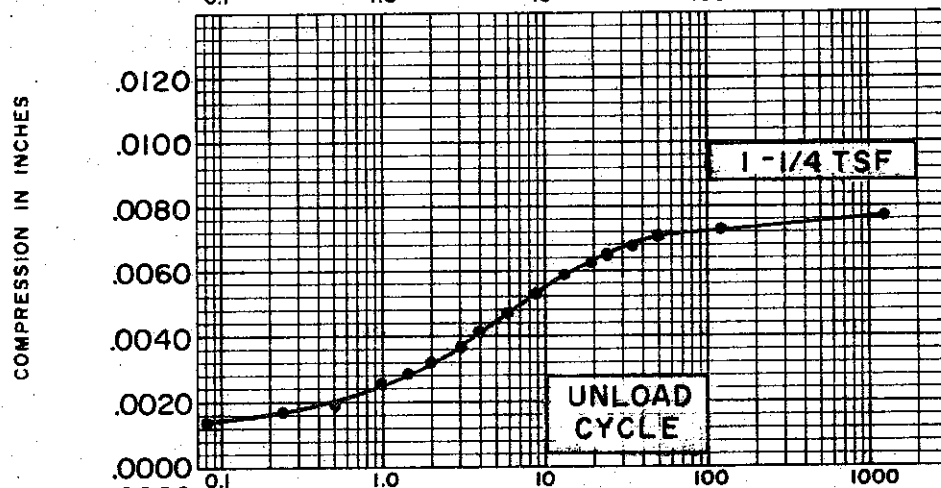
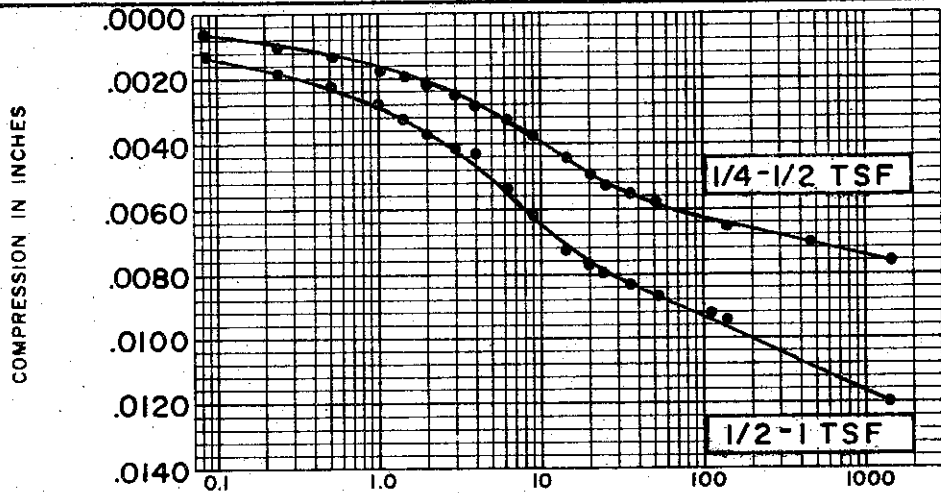
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 49 TEST NO. C133.1

SAMPLE NO. 3 DATE FEB. 1974

DEPTH 13.7' TO 14.0'



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

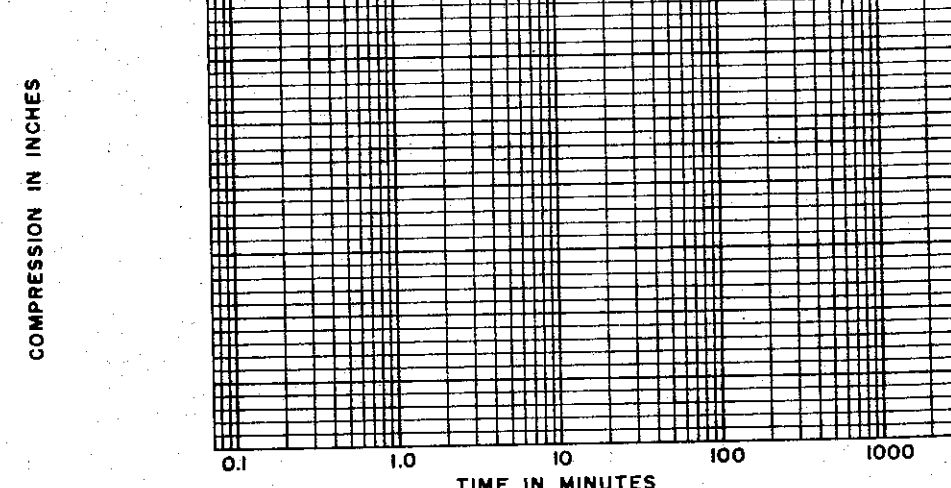
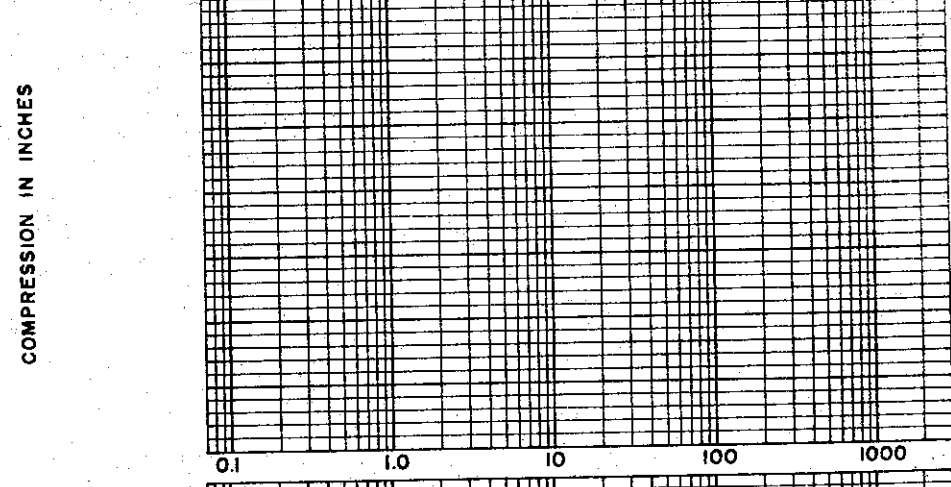
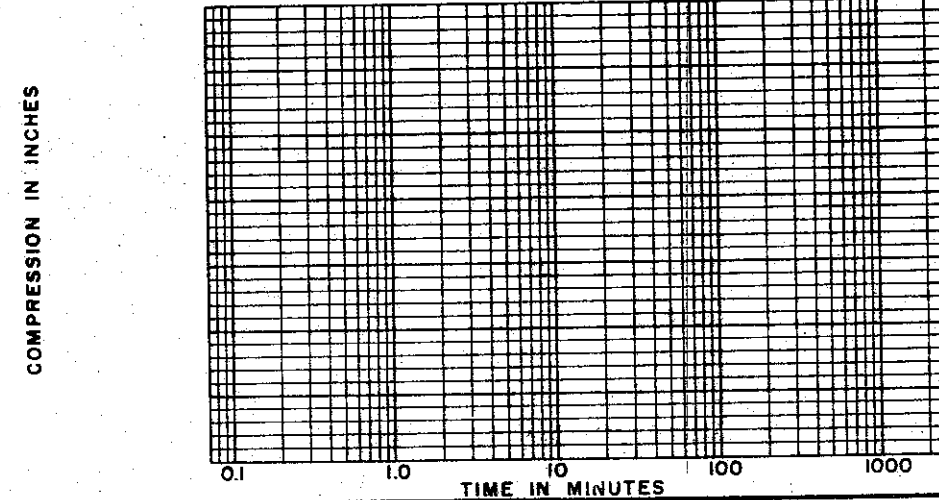
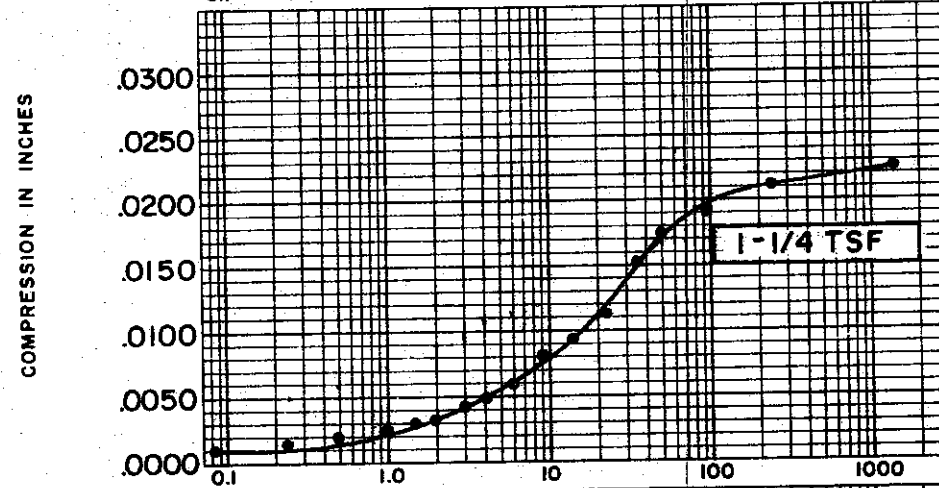
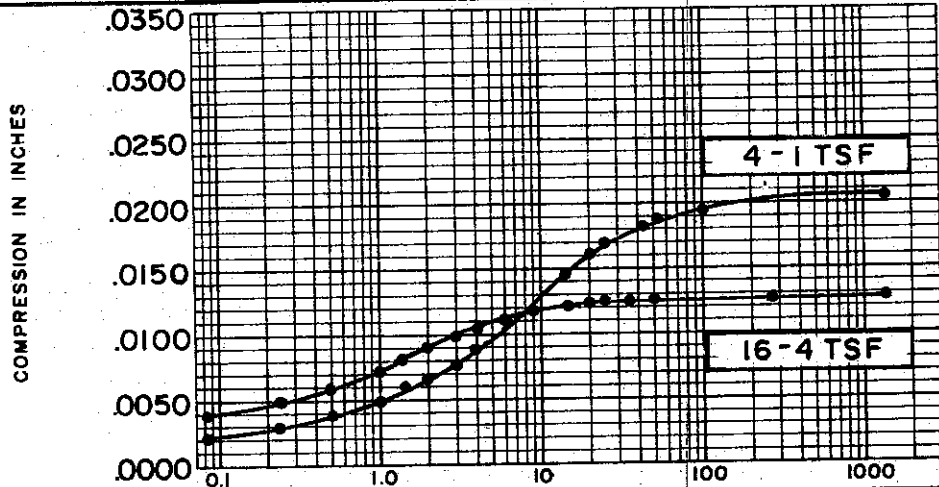
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-499

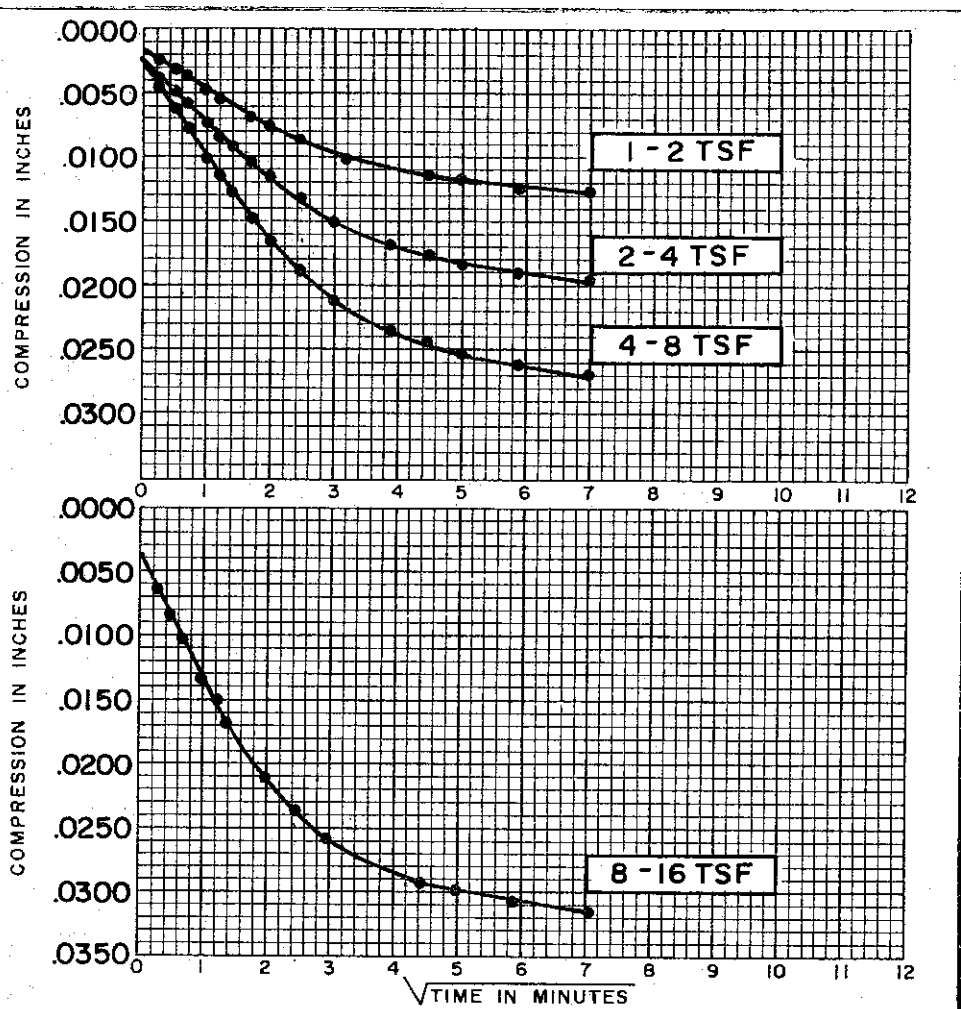
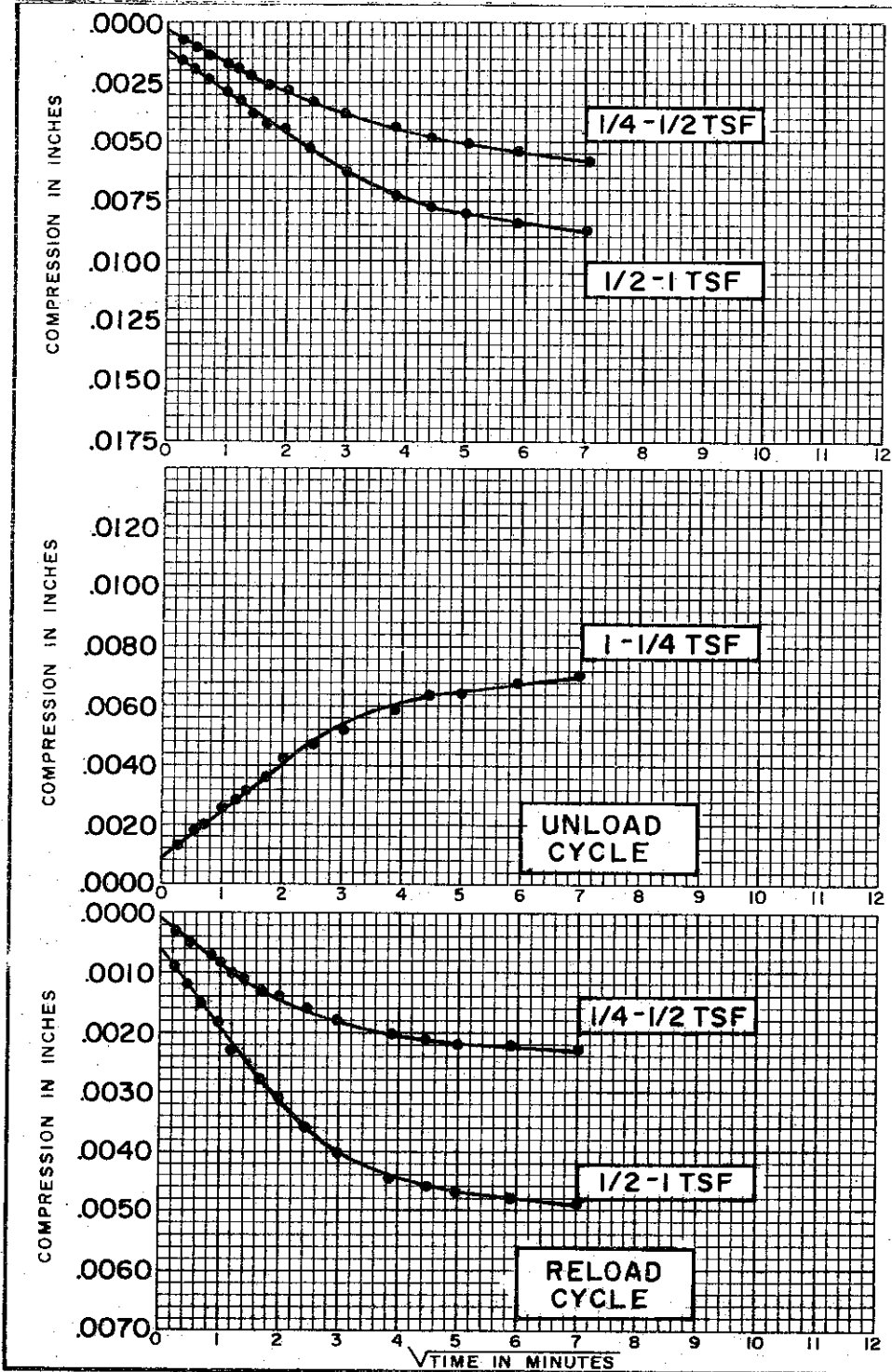


SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>3</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>13.7' TO 14.0'</u>
INITIAL WATER CONTENT	<u>33.3%</u>	
FINAL WATER CONTENT	<u>28.5%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	CONSOLIDATION TEST TIME VS. COMPRESSION CURVE
INITIAL SAMPLE DIAMETER	<u>2.80"</u>	
INITIAL VOID RATIO	<u>0.863</u>	

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



C-501

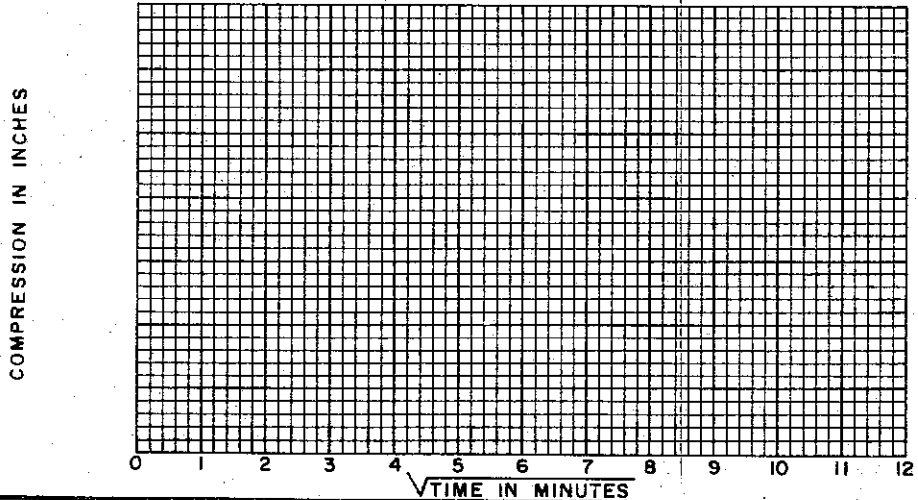
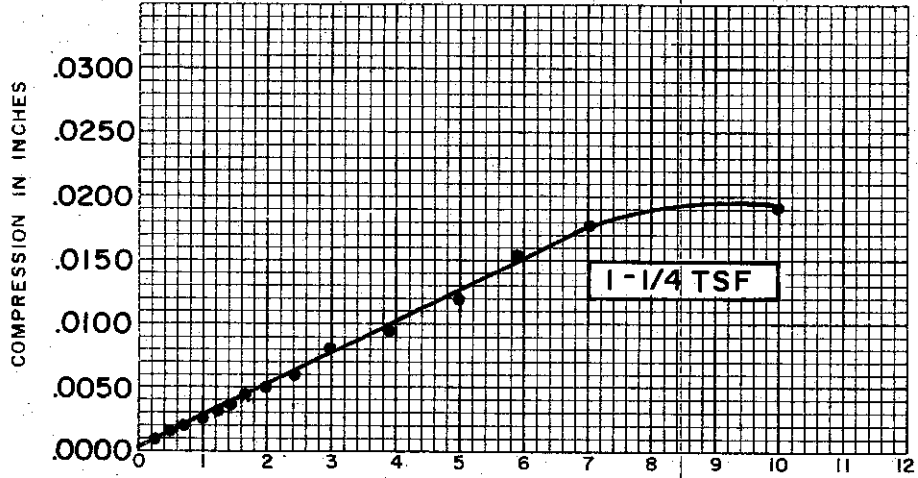
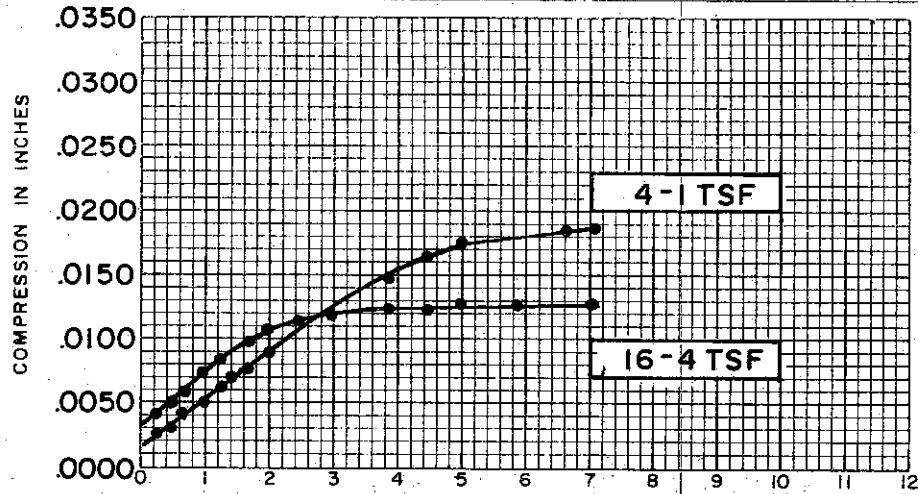


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	33.3%
FINAL WATER CONTENT	28.5%
BORING NO.	49
SAMPLE NO.	3
DEPTH	13.7' TO 14.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.60"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.863

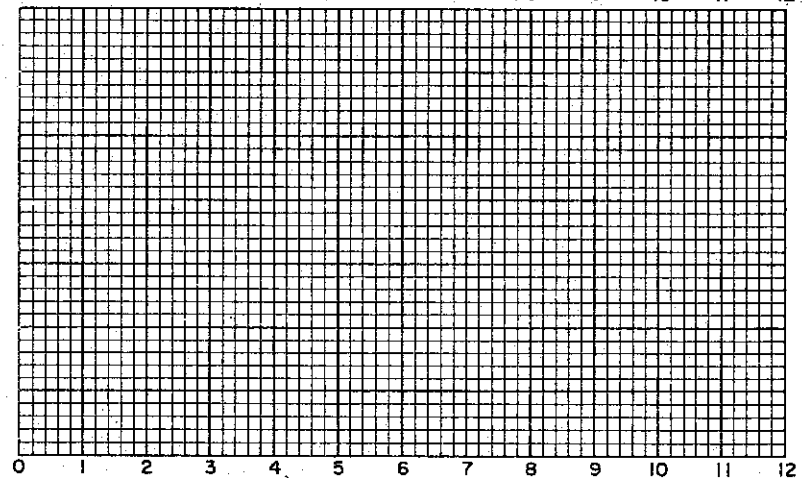
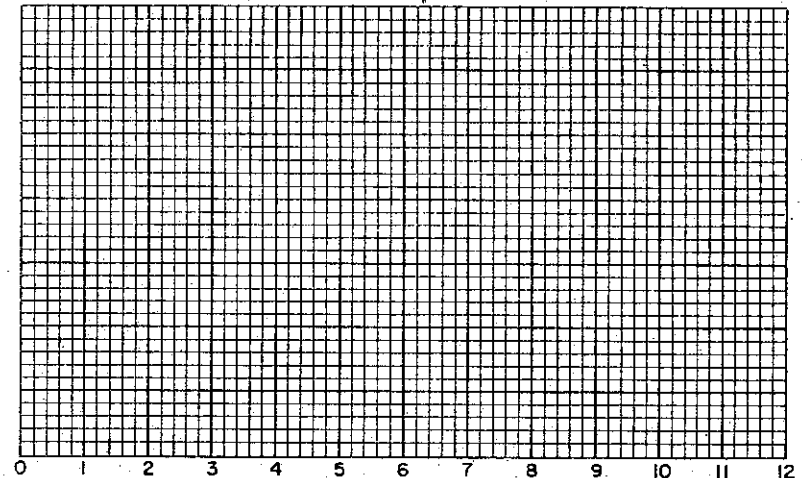
CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

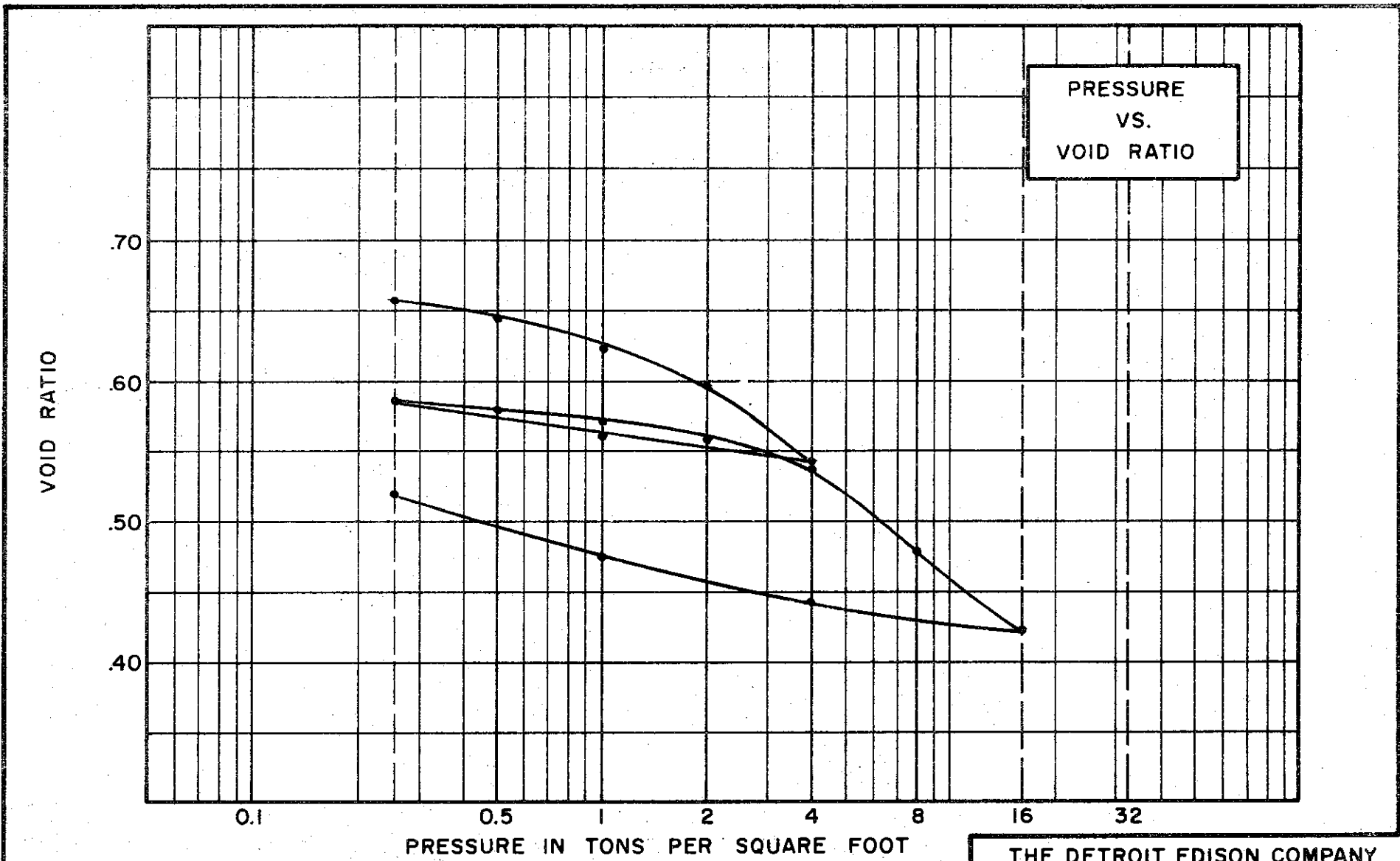
BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 28.6% FINAL 24.4%

ATTERBERG LIMITS:  
 LIQUID LIMIT 37% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.701

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

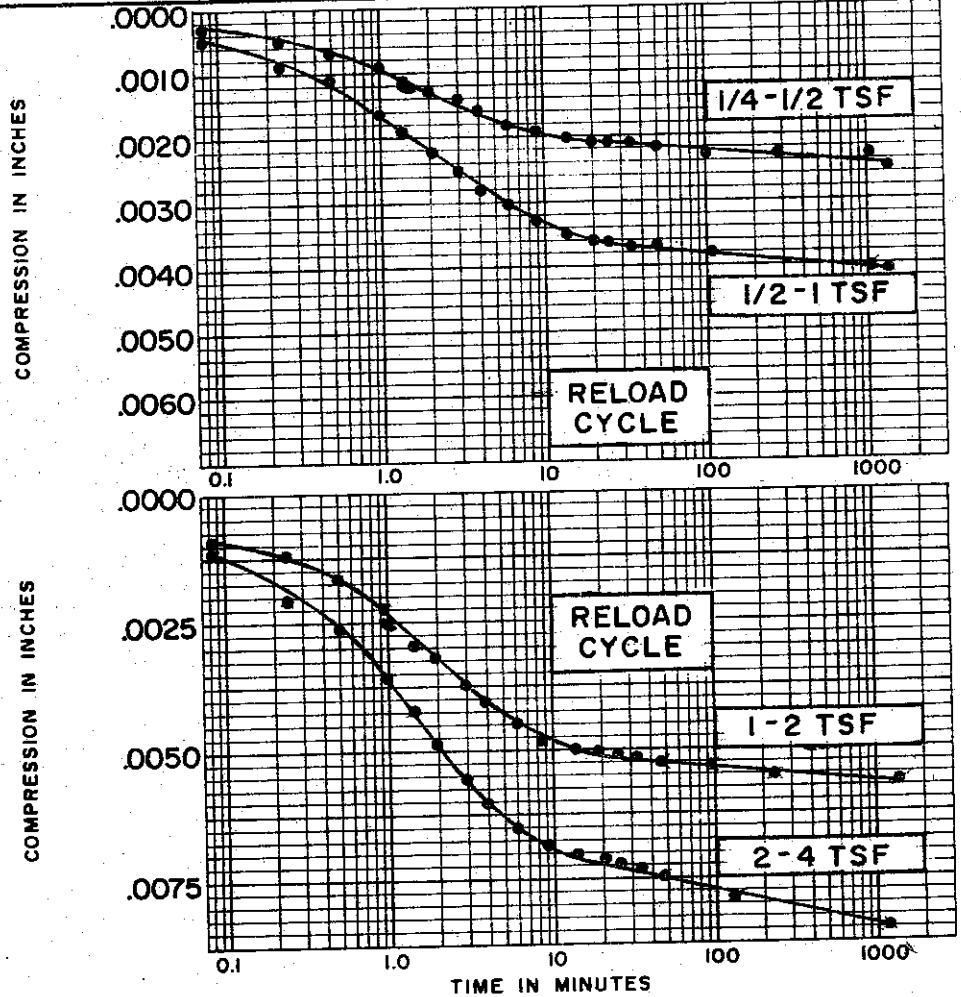
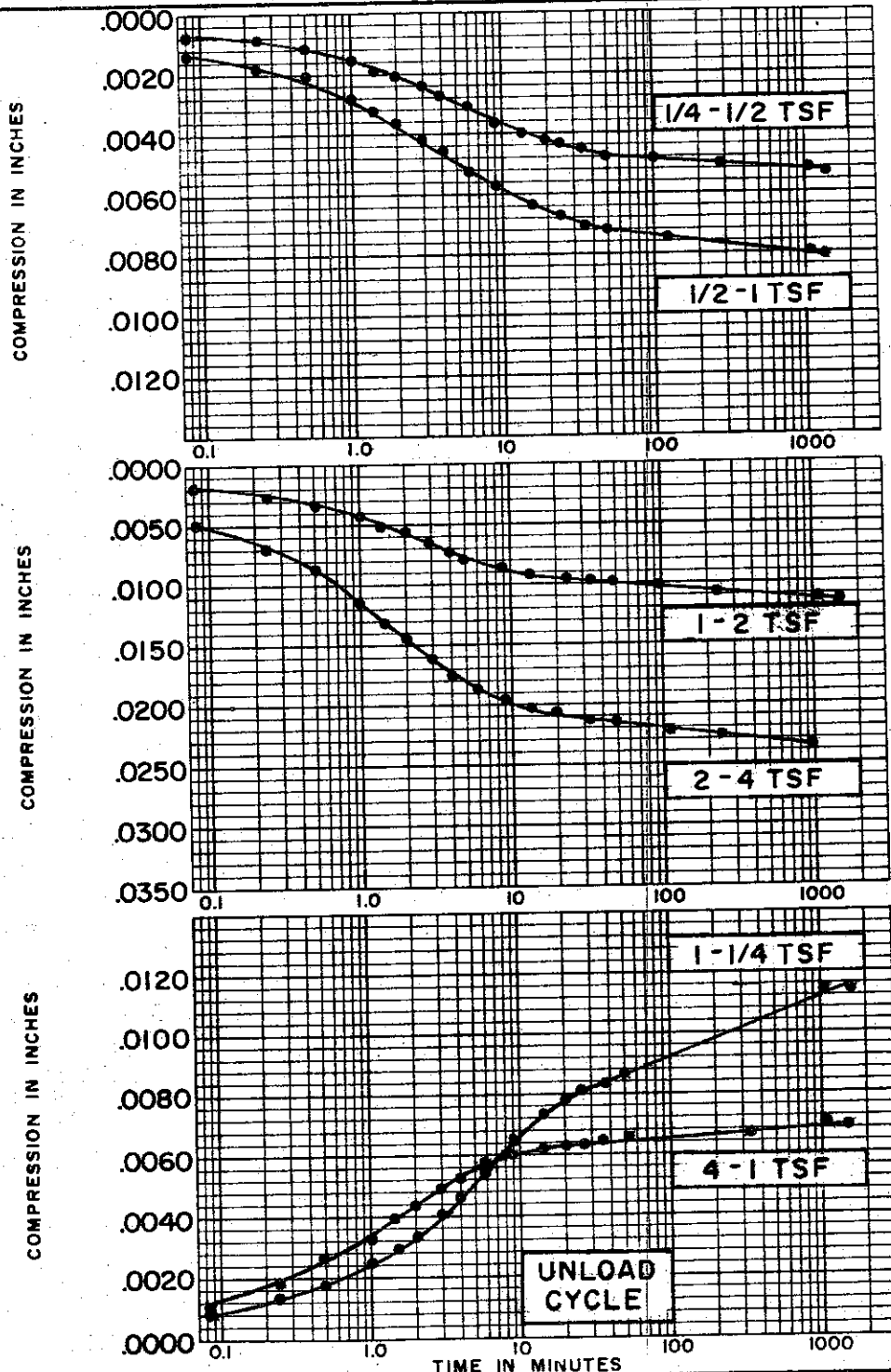
BORING NO. 49 TEST NO. C141.1

SAMPLE NO. 11 DATE MARCH 74

DEPTH 93.8' TO 94.0'

C-503

C-504

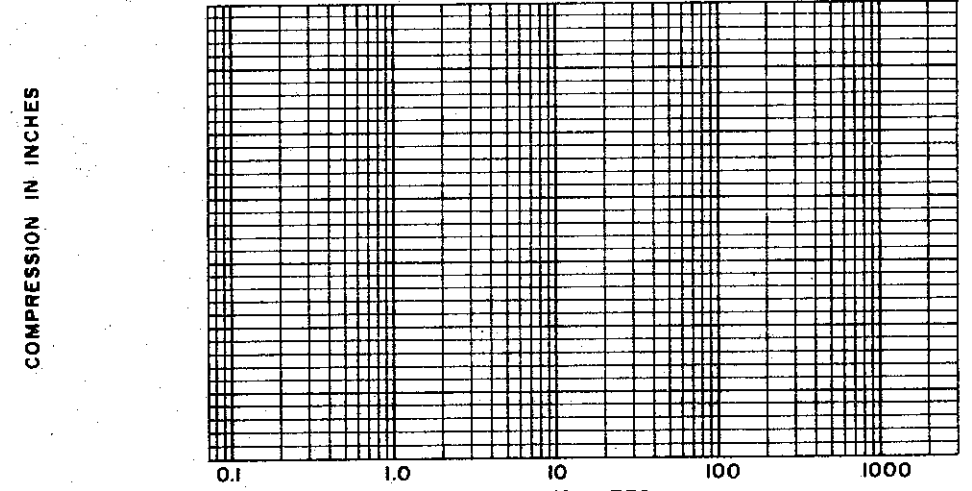
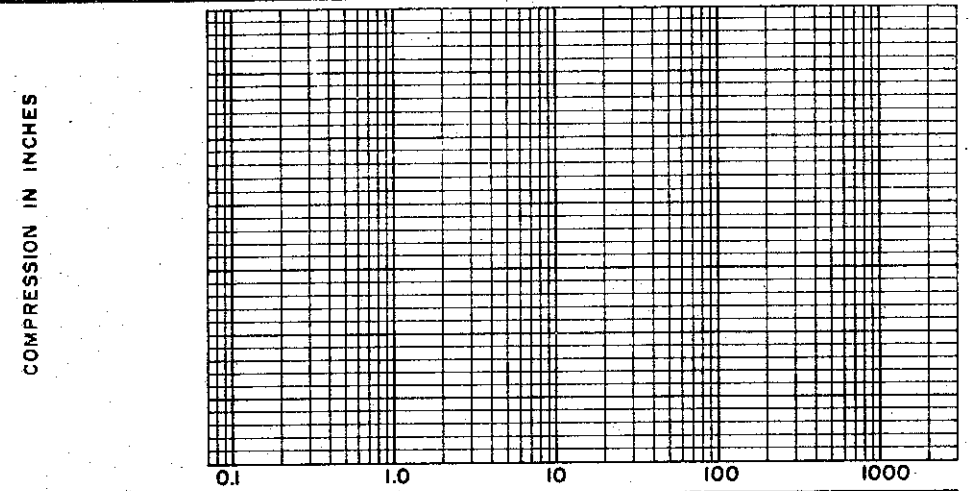
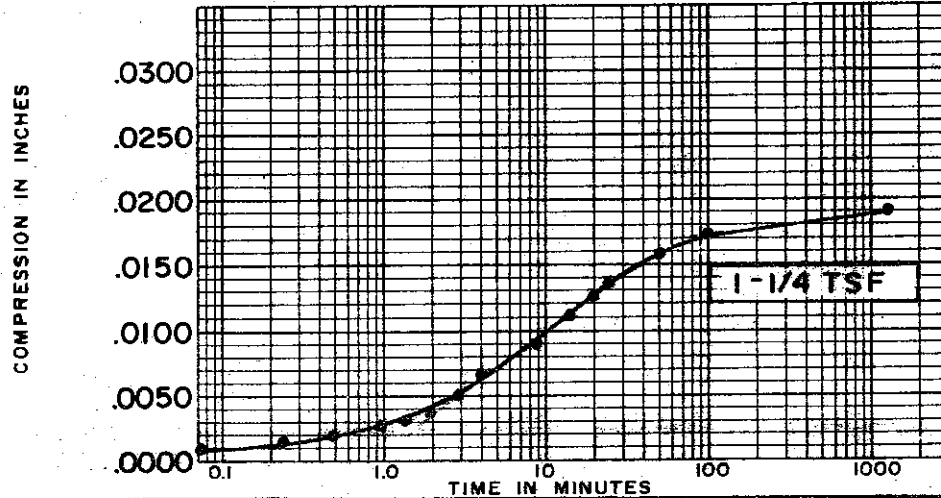
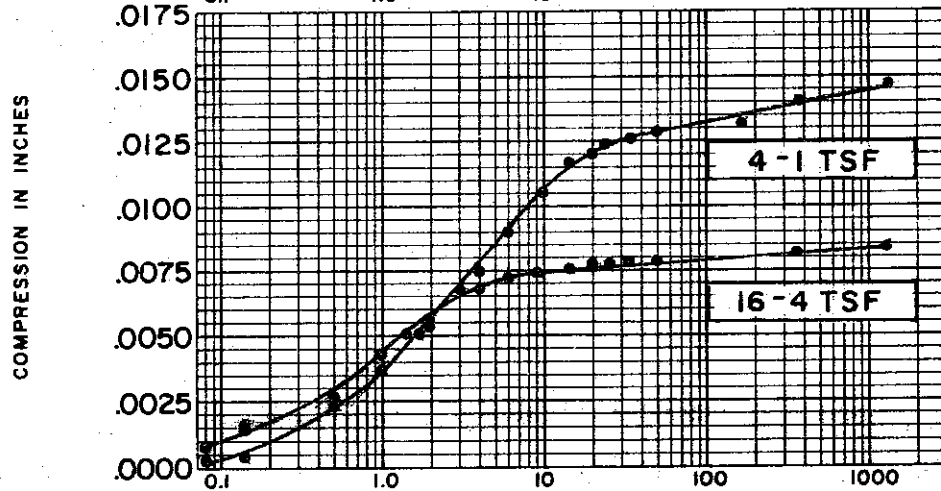
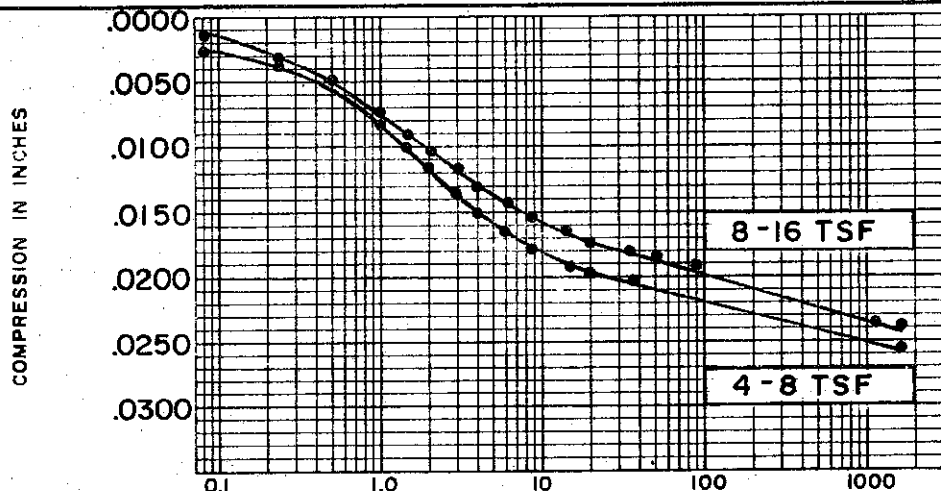


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	28.6%
FINAL WATER CONTENT	24.4%
TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.701

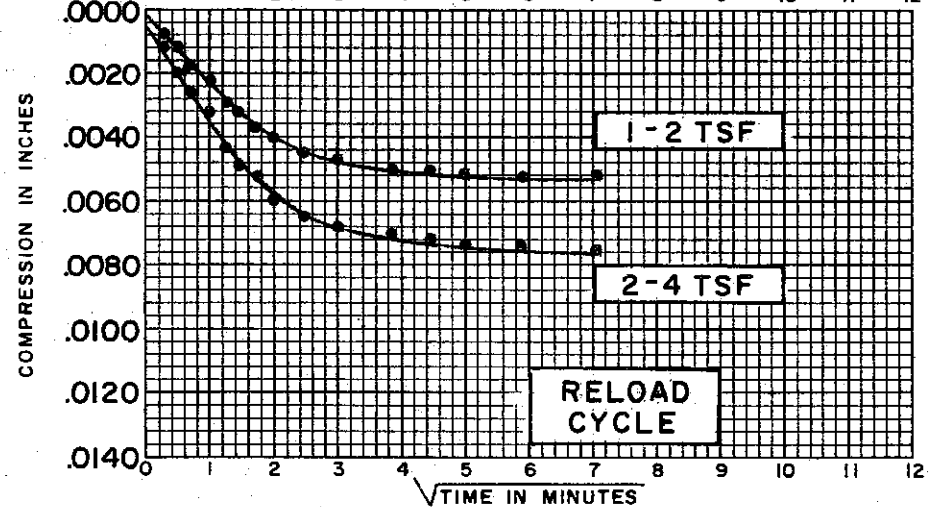
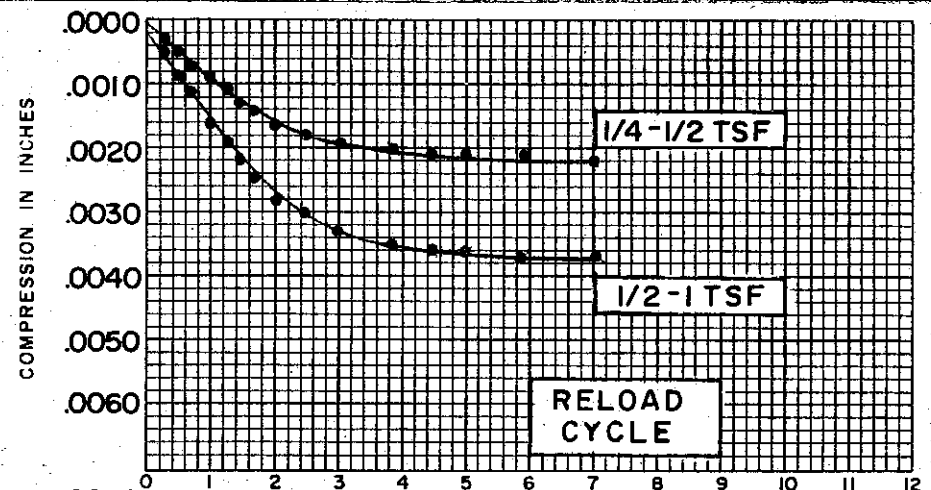
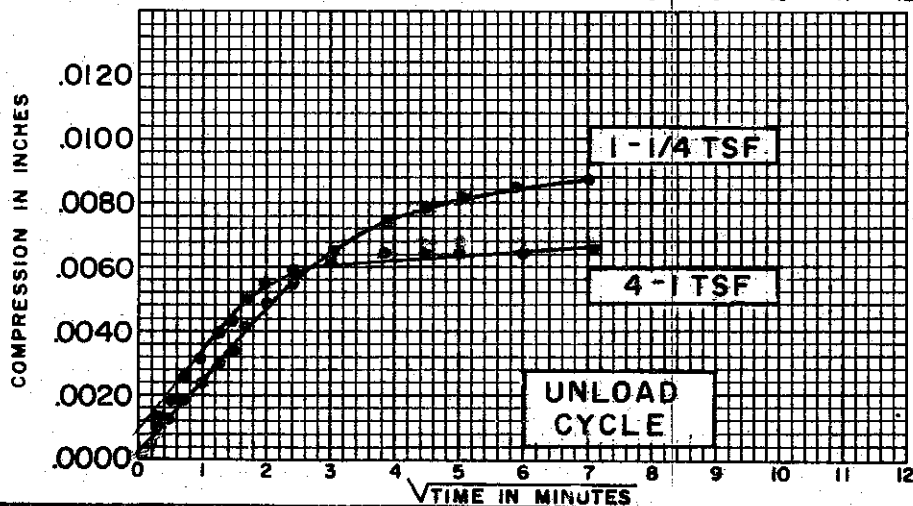
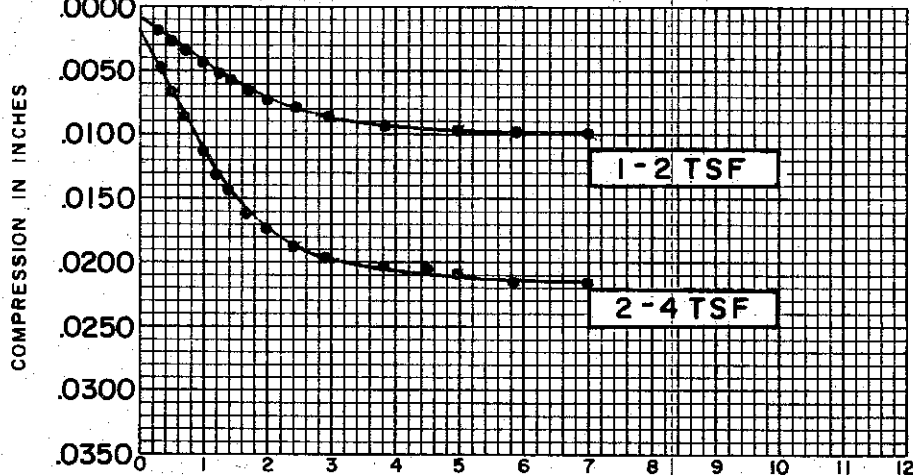
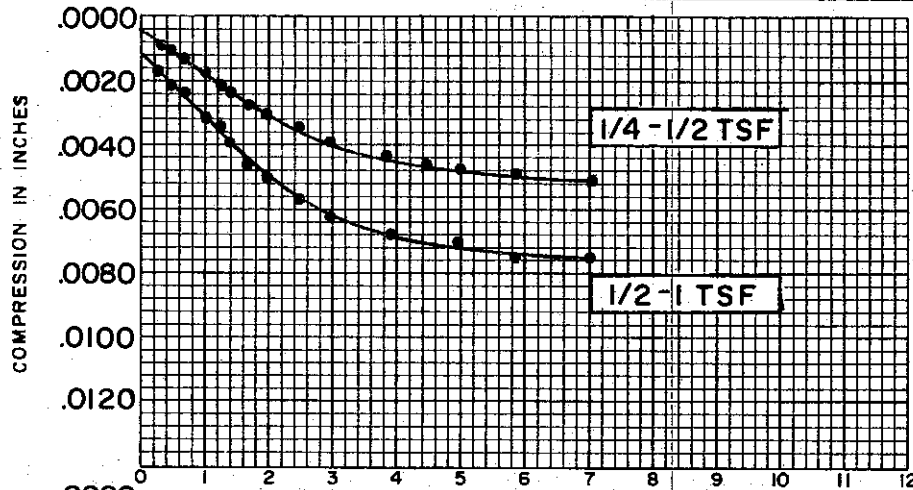
BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-505



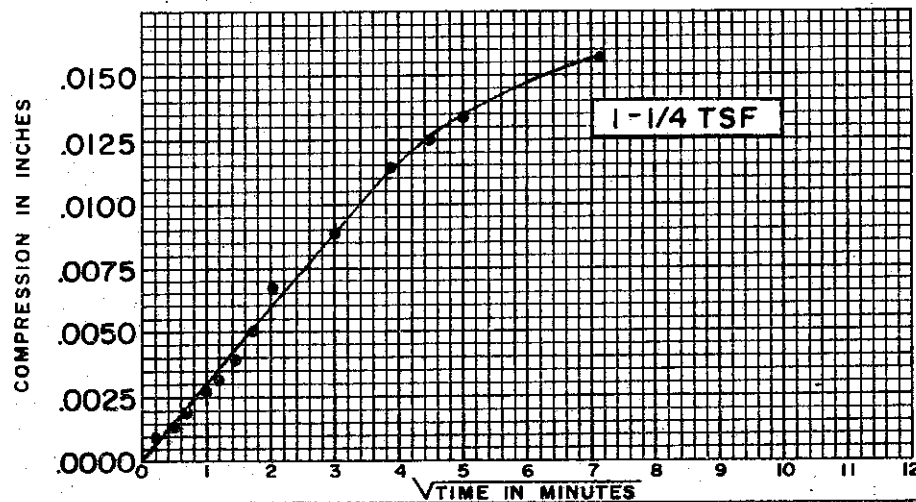
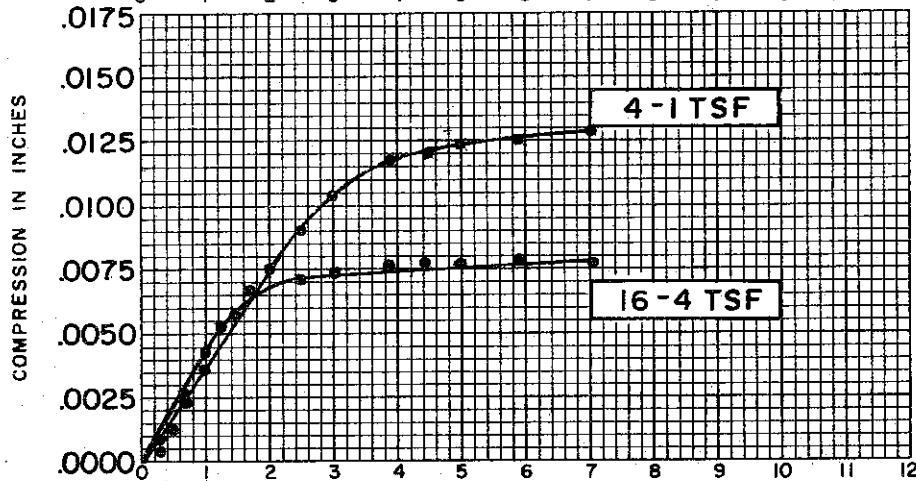
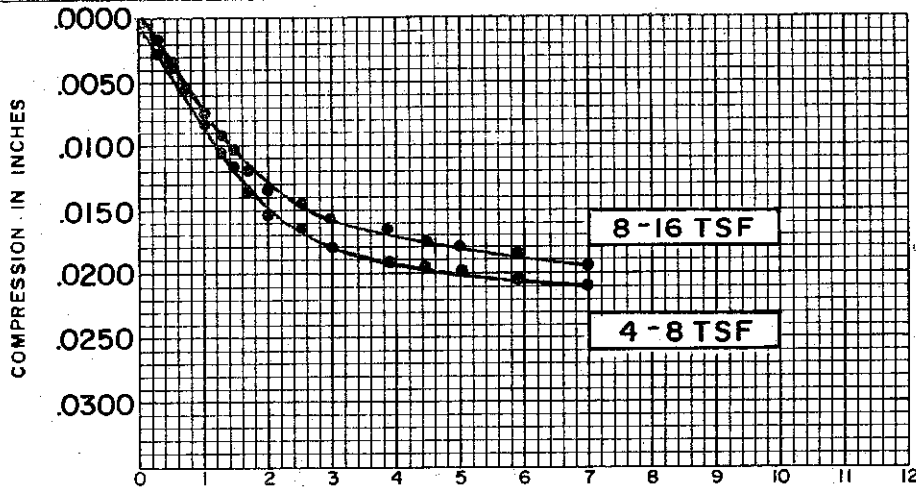
SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.75"</u>	<b>CONSOLIDATION TEST</b> <b>TIME VS. COMPRESSION CURVE</b> THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.701</u>	



SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	

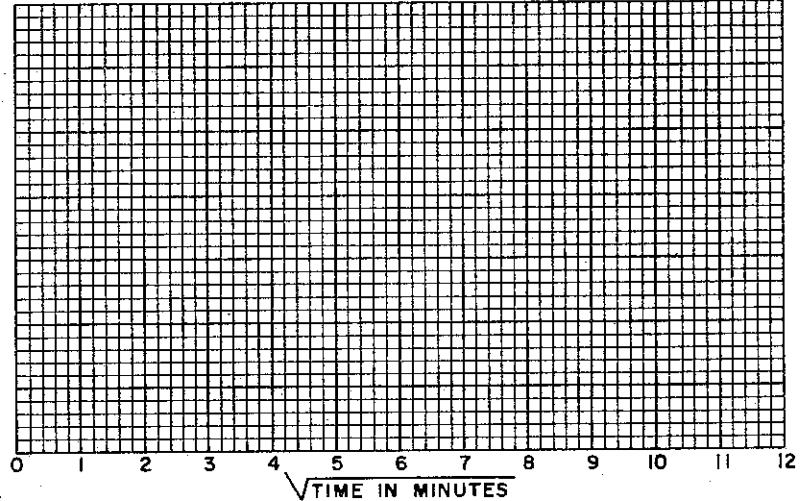
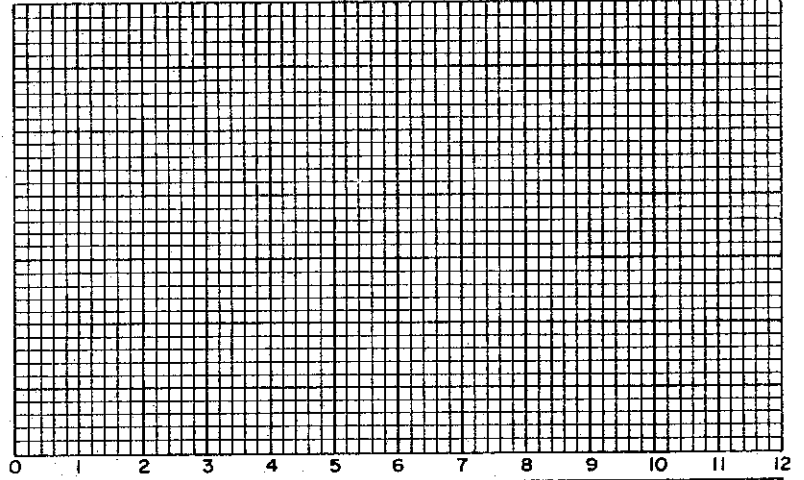
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.701</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 28.6%  
 FINAL WATER CONTENT 24.4%

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

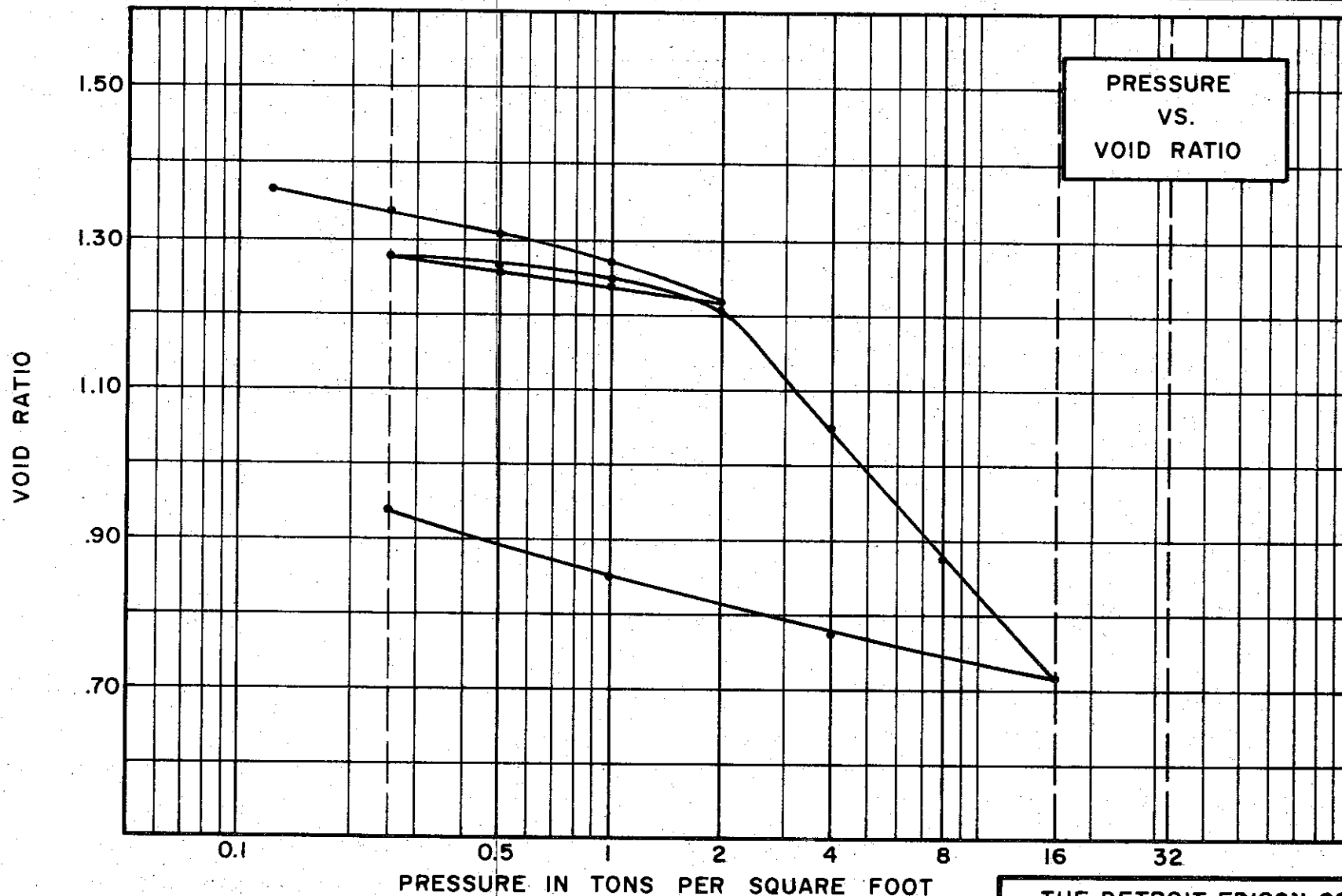
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.701

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-507



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 51.6% FINAL 39.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

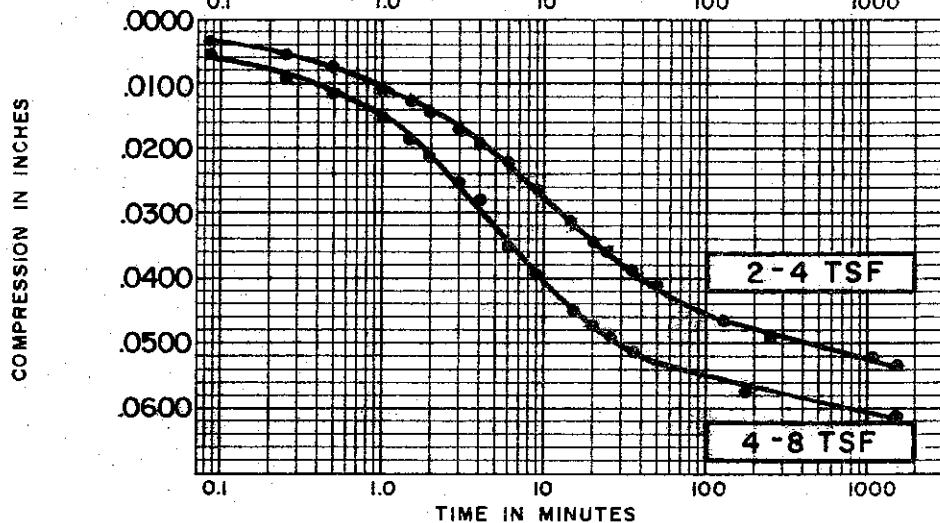
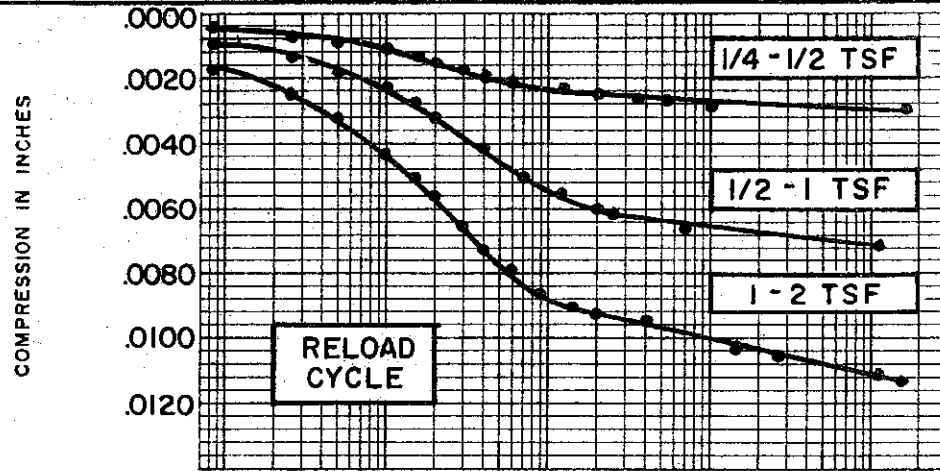
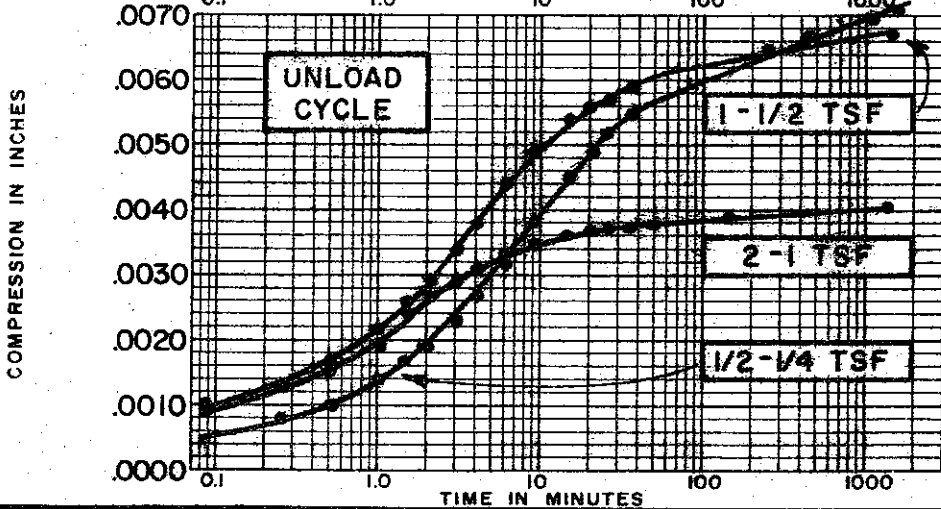
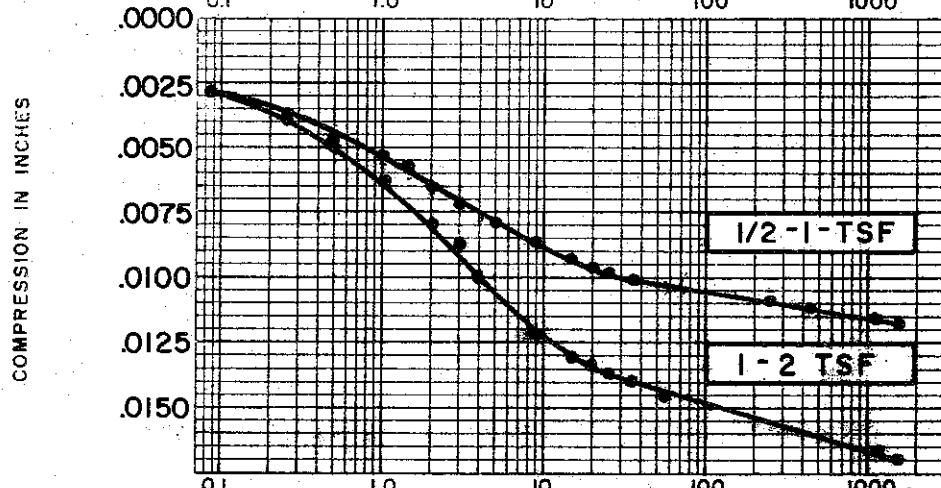
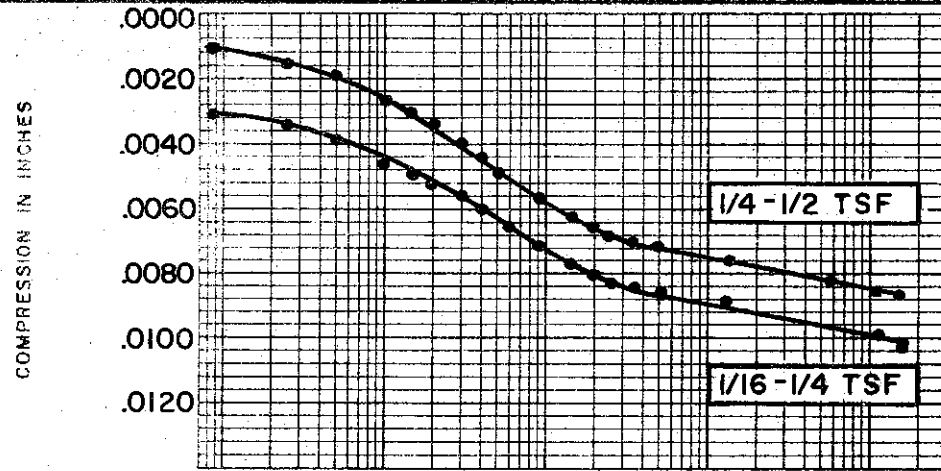
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 50 TEST NO. C86.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 38.5' TO 38.9'



C-509



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

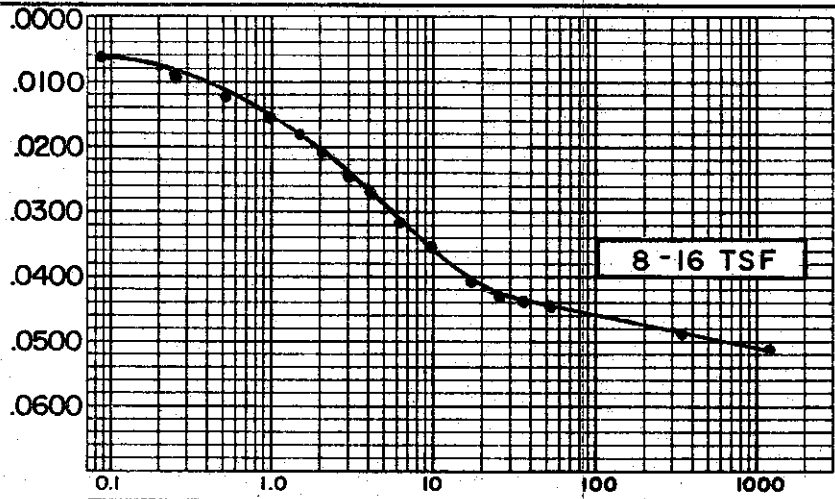
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE D. AMETER 2.50"  
 INITIAL VOID RATIO 1.383

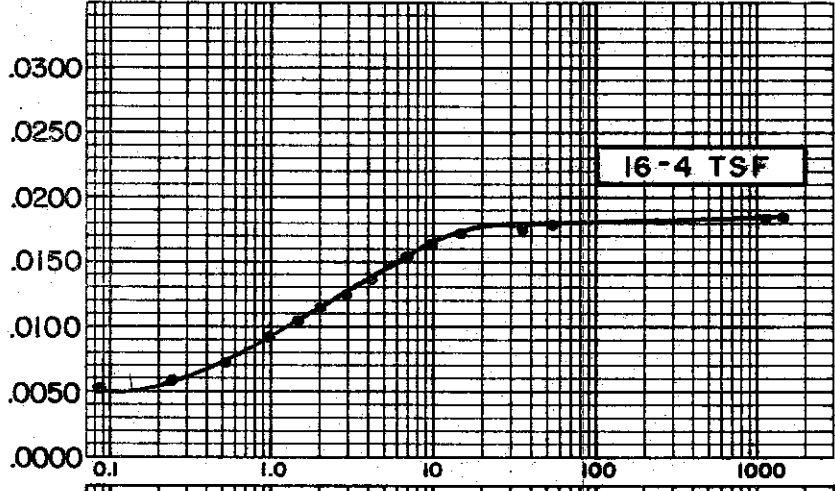
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

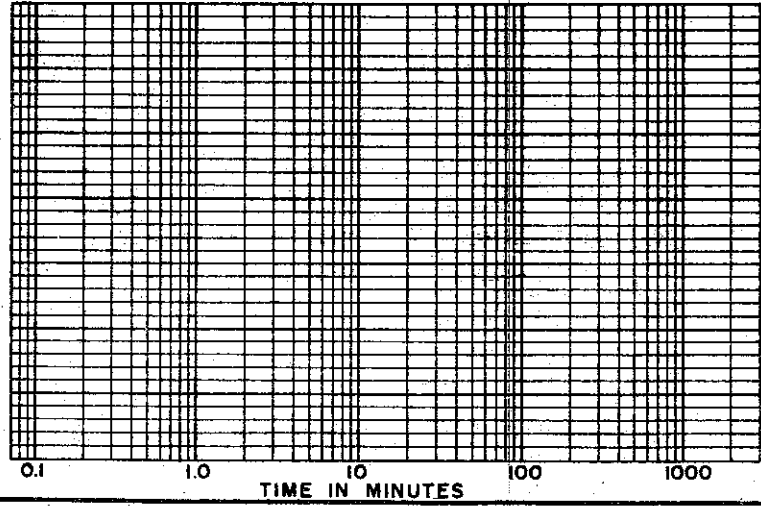
COMPRESSION IN INCHES



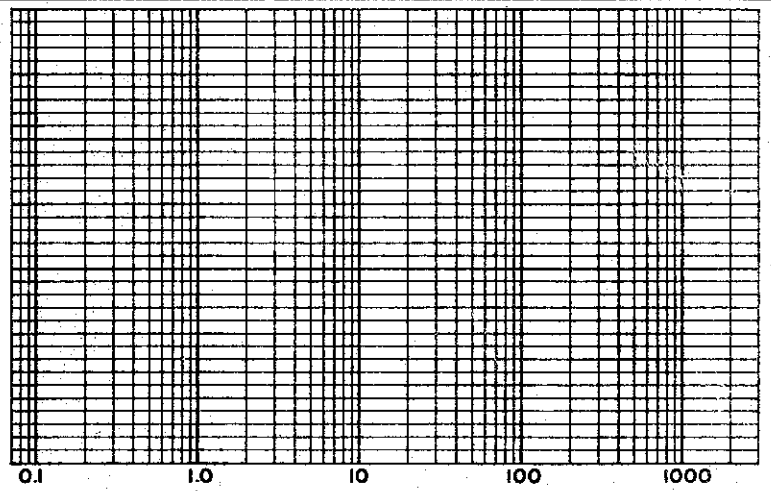
COMPRESSION IN INCHES



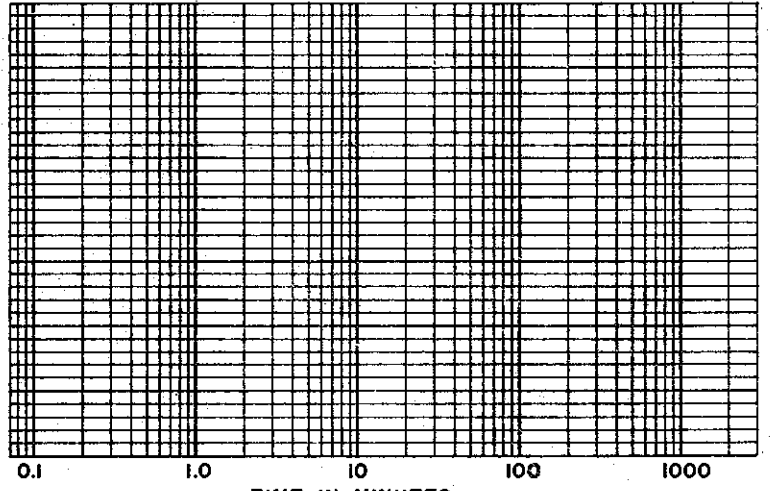
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

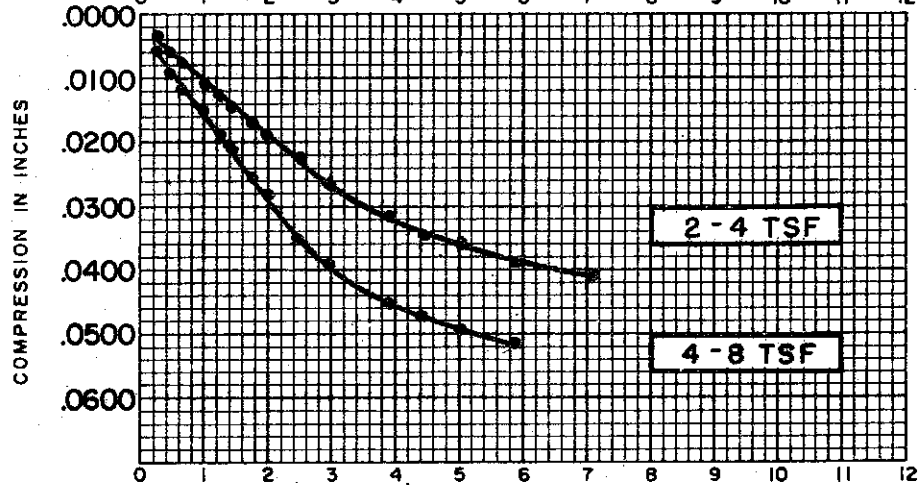
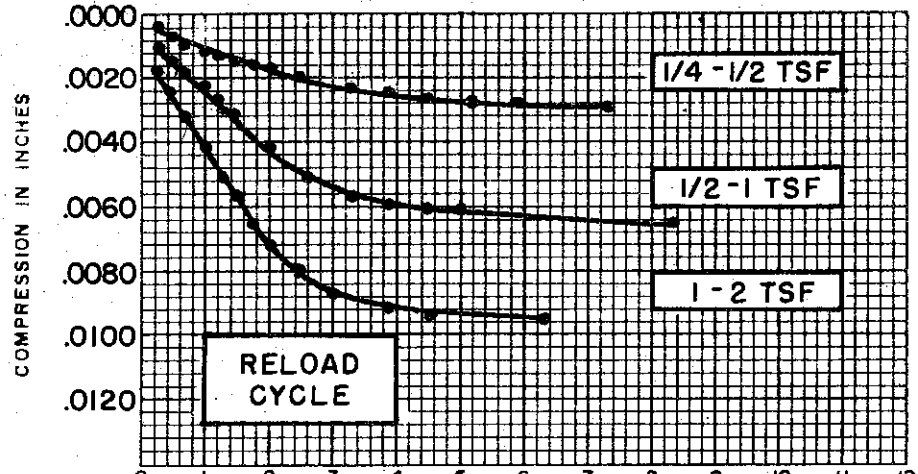
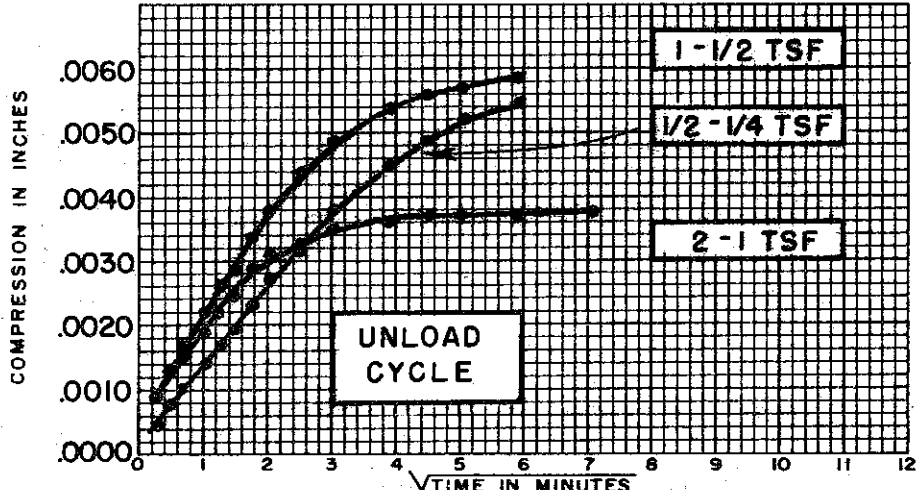
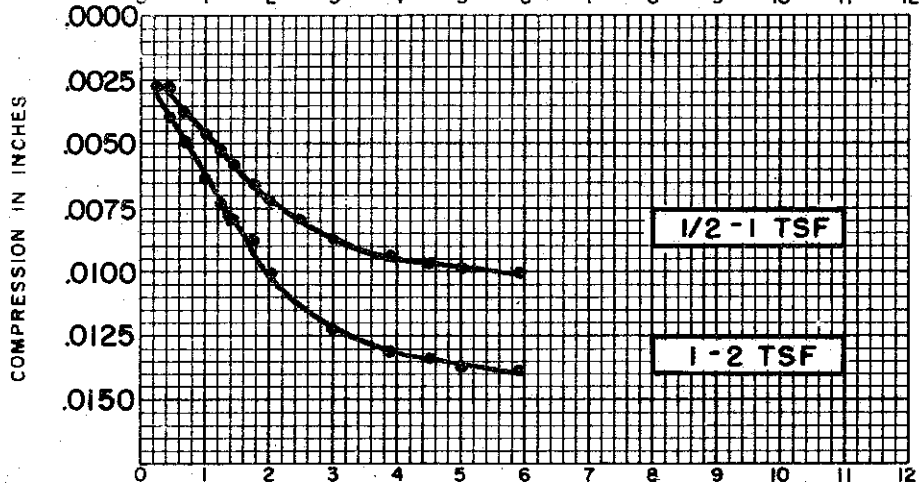
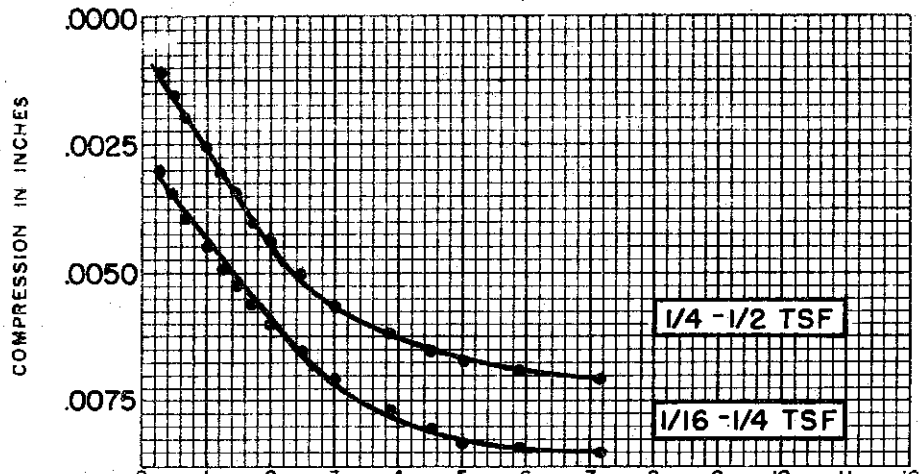
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-511



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

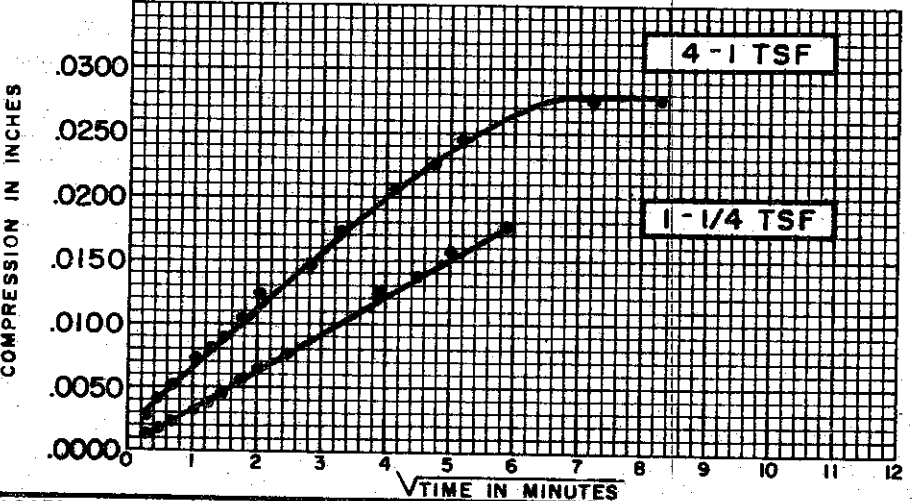
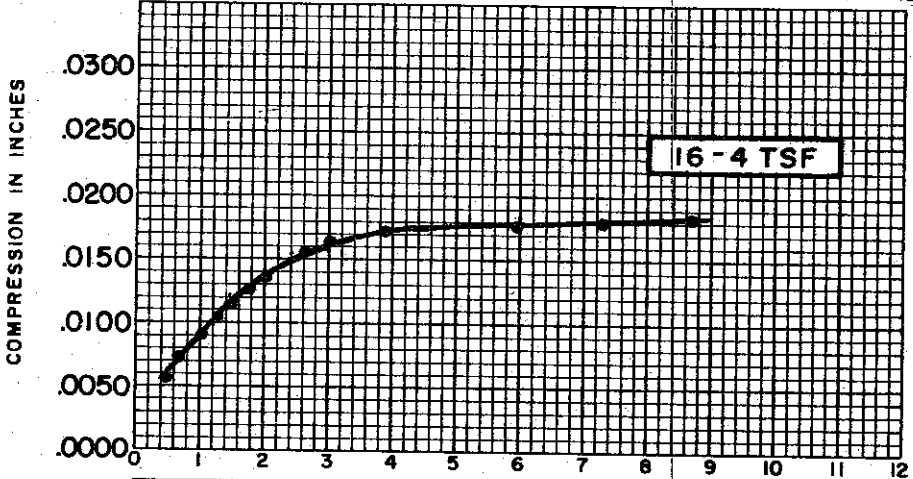
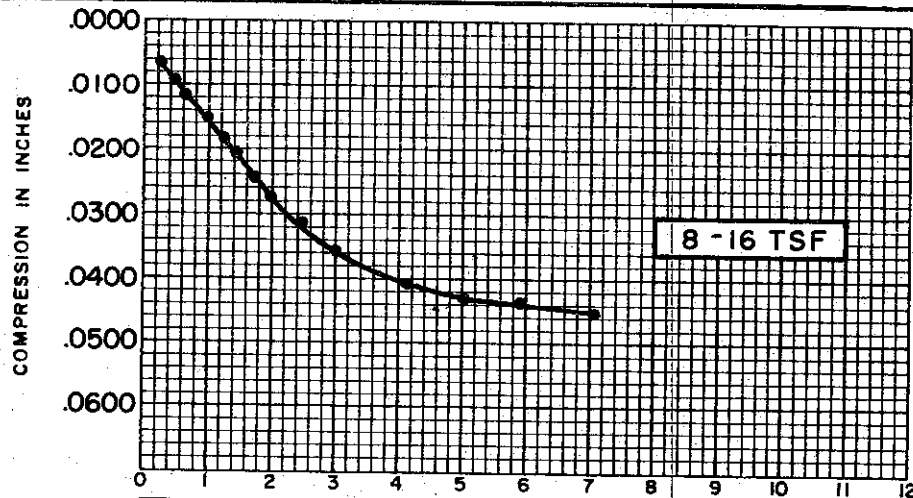
BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

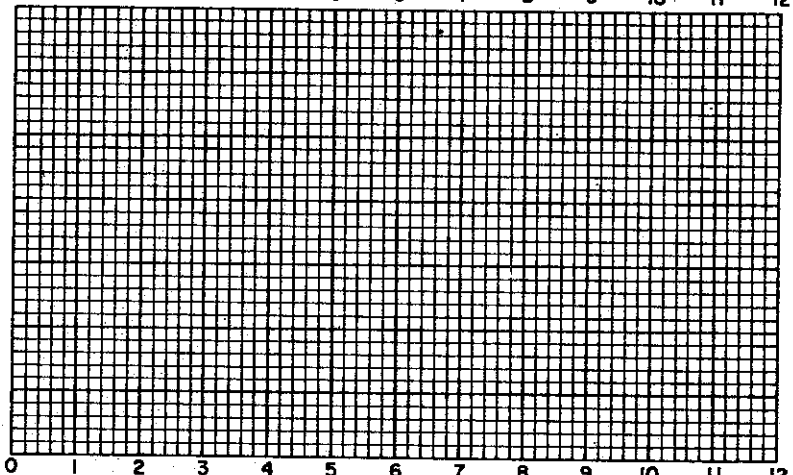
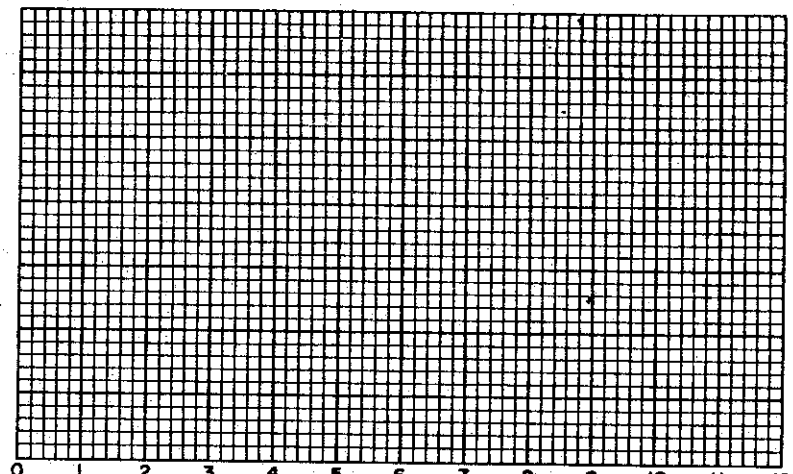
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

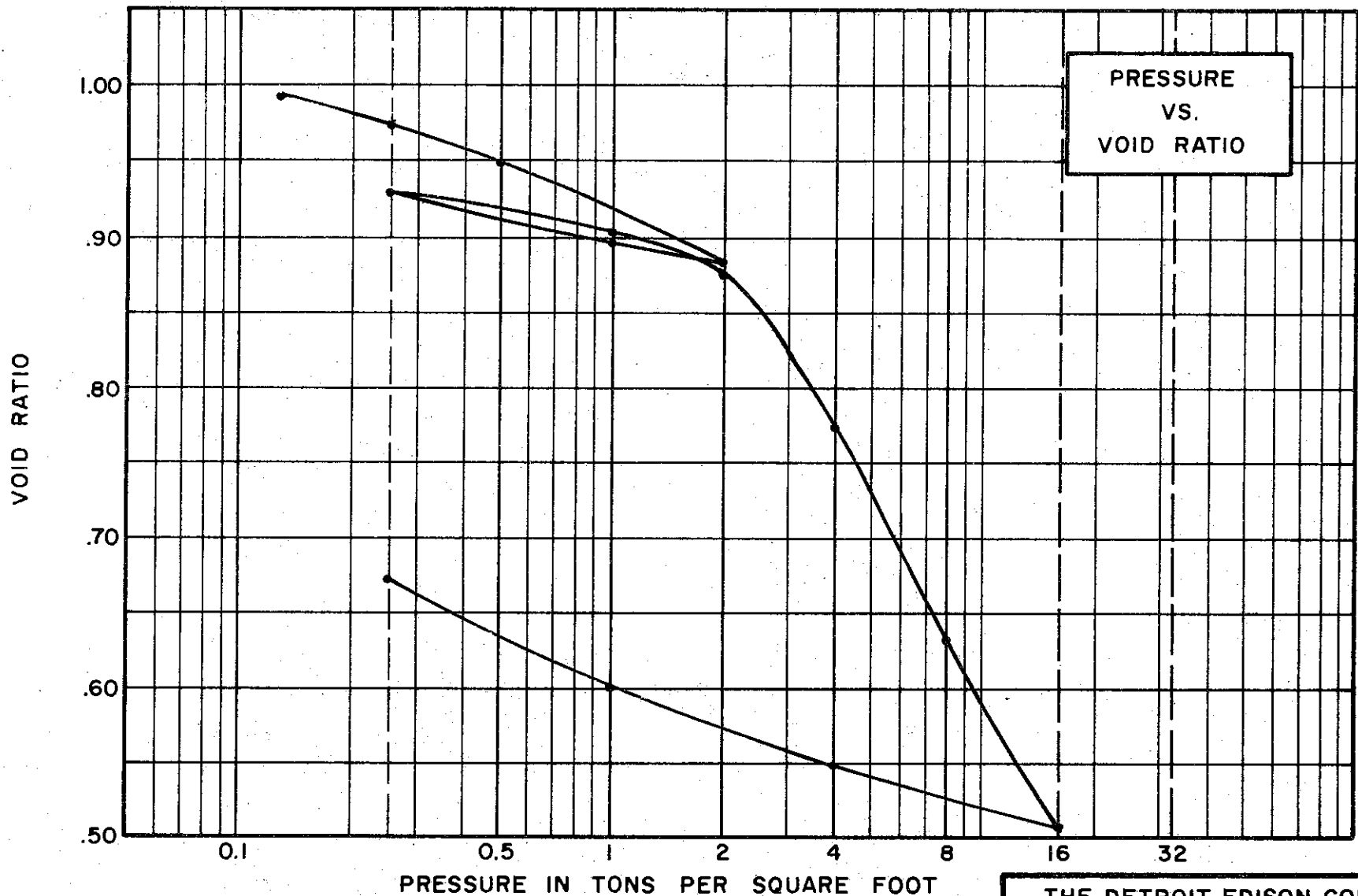
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.75
INITIAL WATER CONTENT	51.6 %
FINAL WATER CONTENT	39.9 %
BORING NO.	50
SAMPLE NO.	8
DEPTH	38.5'-38.9'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.383

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 40.5% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

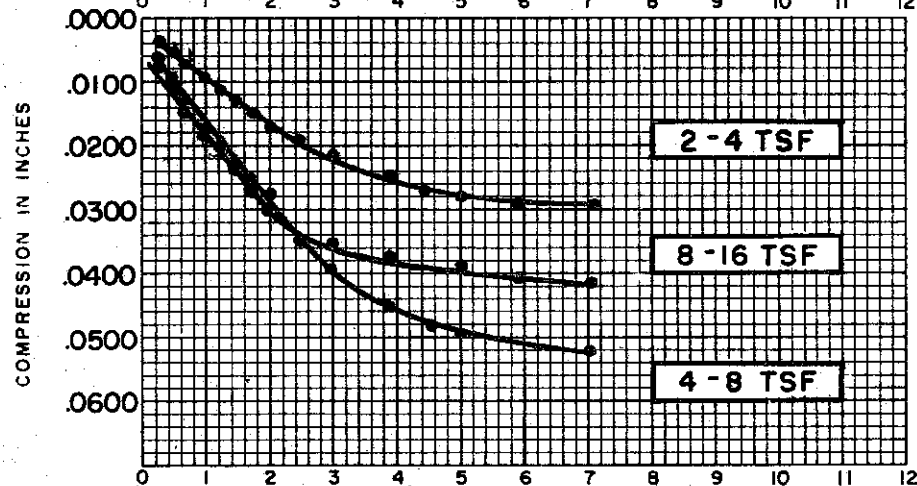
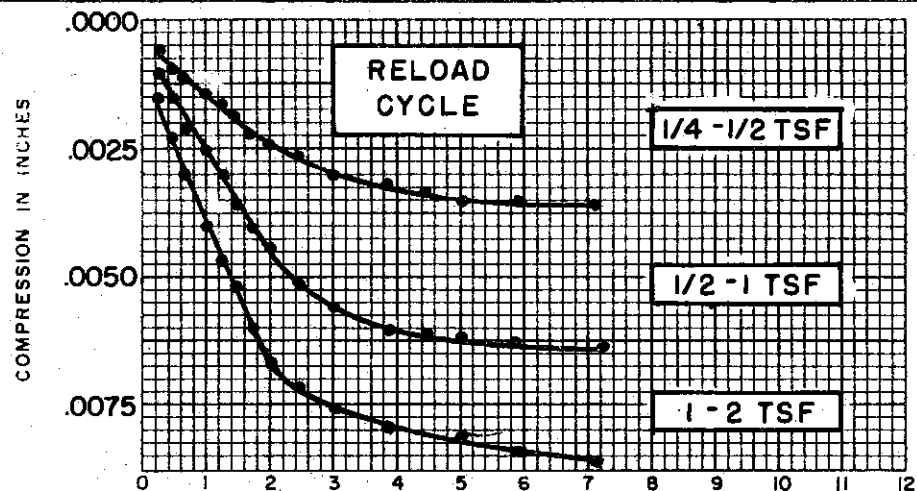
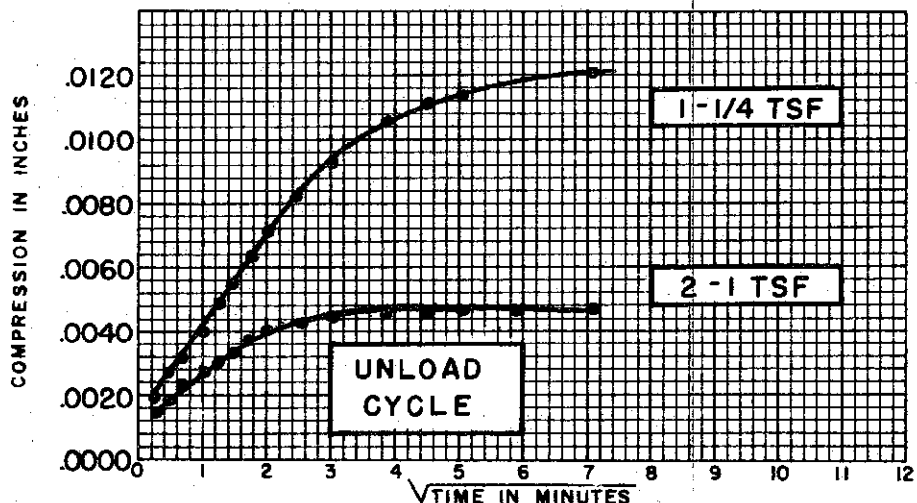
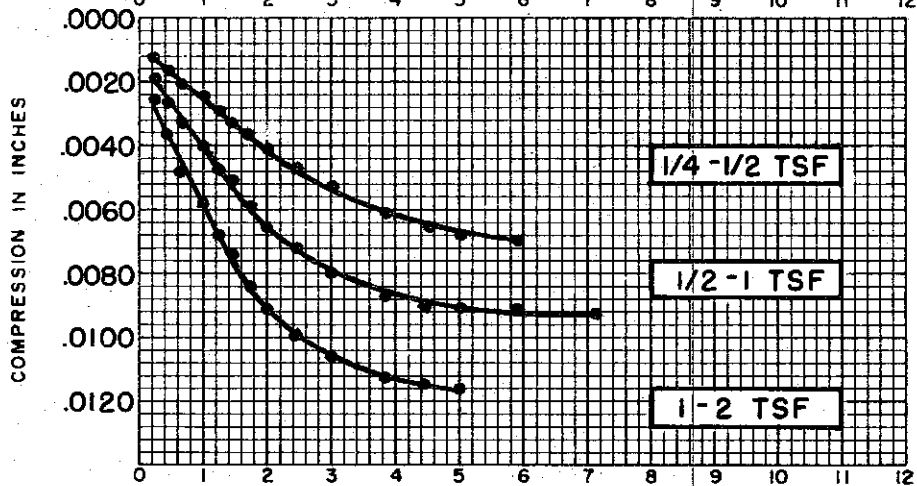
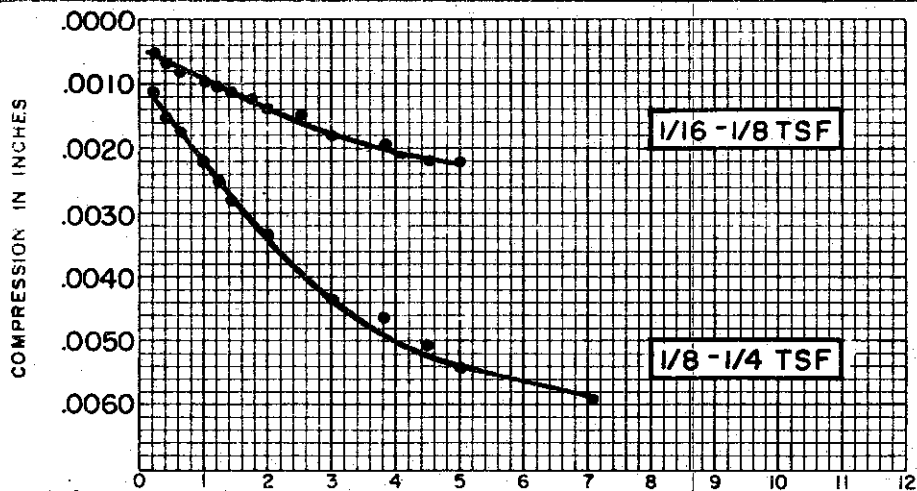
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 52 TEST NO. C109.1  
 SAMPLE NO. 4 DATE JULY 1974  
 DEPTH 29.9' TO 30.2'

C-513

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

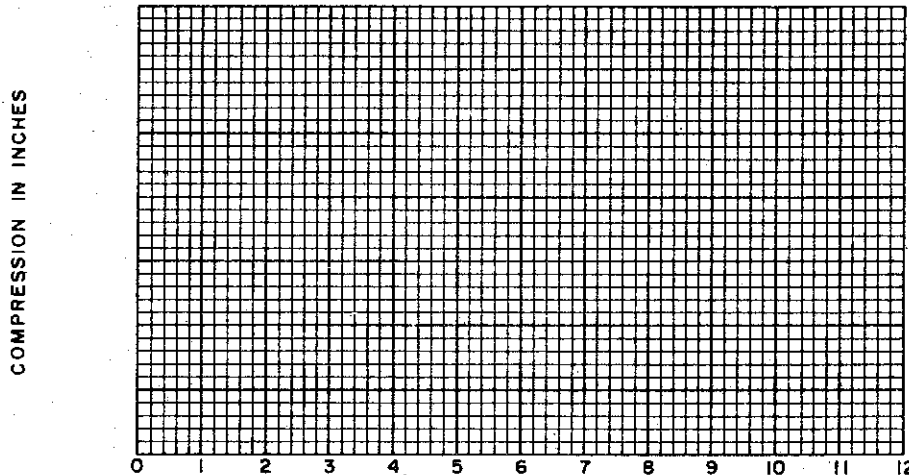
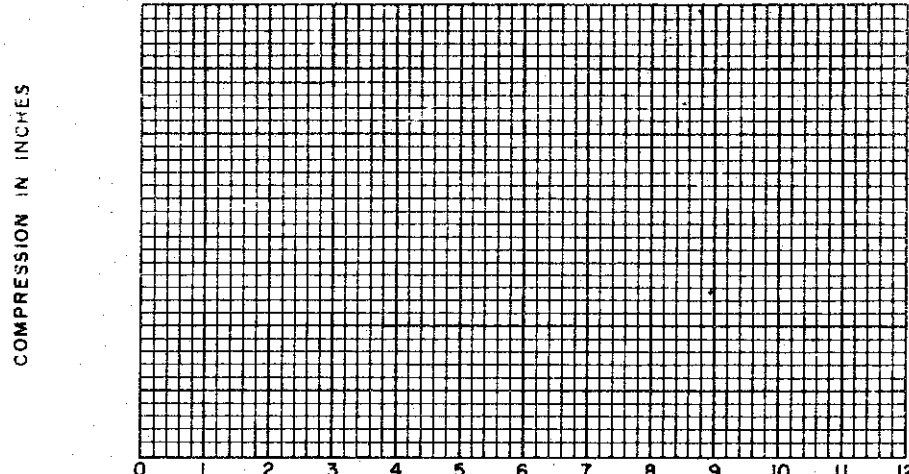
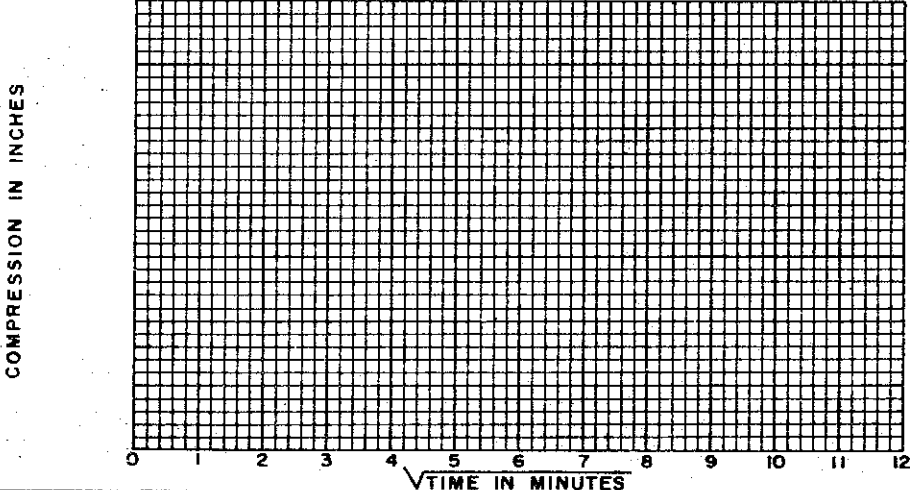
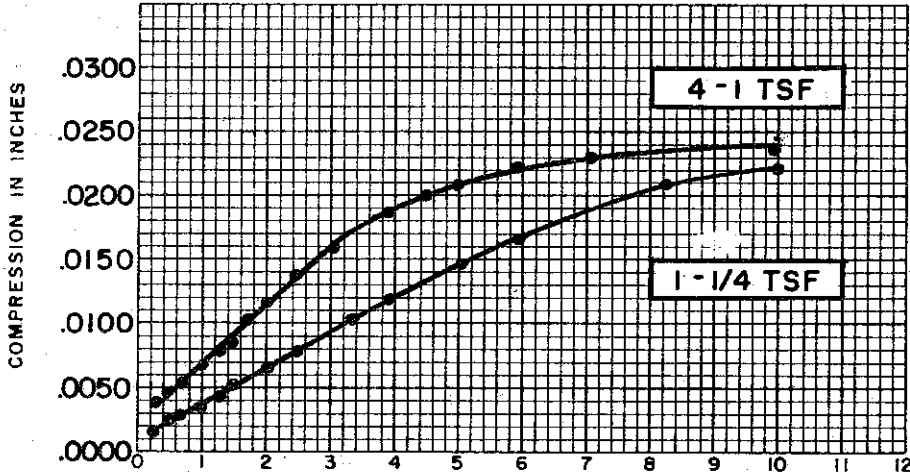
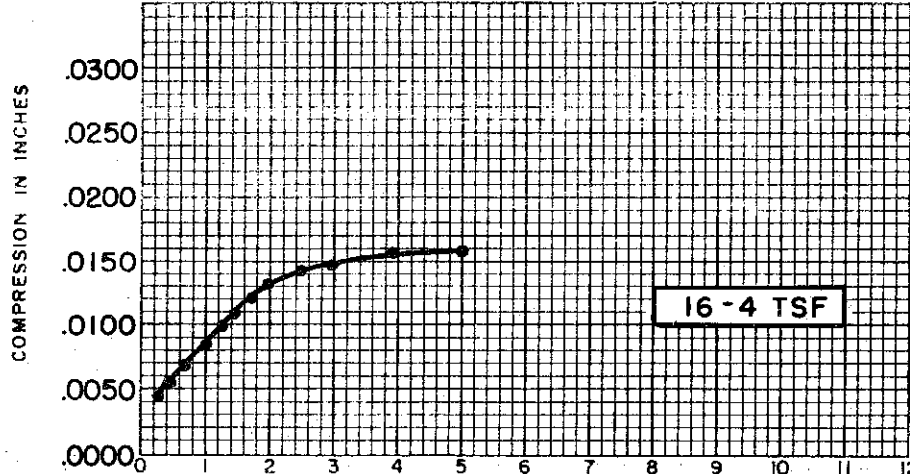


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	40.5 %
FINAL WATER CONTENT	28.9 %
BORING NO.	52
SAMPLE NO.	4
DEPTH	29.9' - 30.2'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.013

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-515

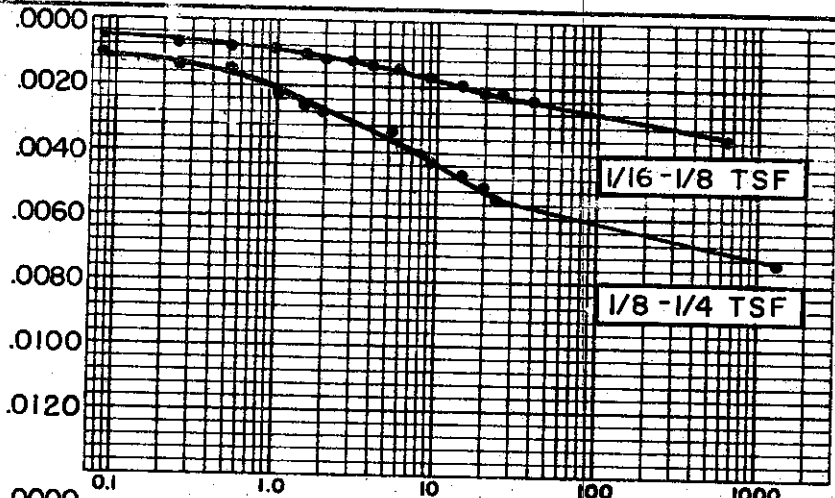


SOIL PROPERTIES		BORING NO.	52
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	4
SPECIFIC GRAVITY	2.70	DEPTH	29.9'-30.2'
INITIAL WATER CONTENT	40.5 %		
FINAL WATER CONTENT	28.9 %		

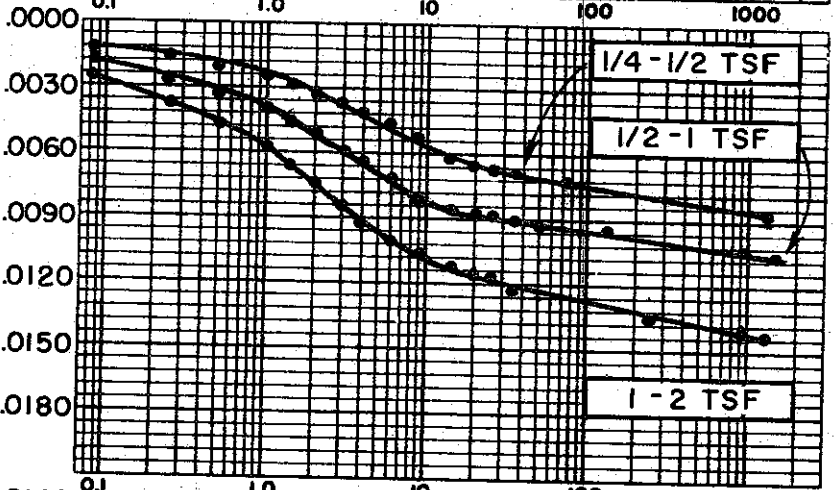
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.013

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

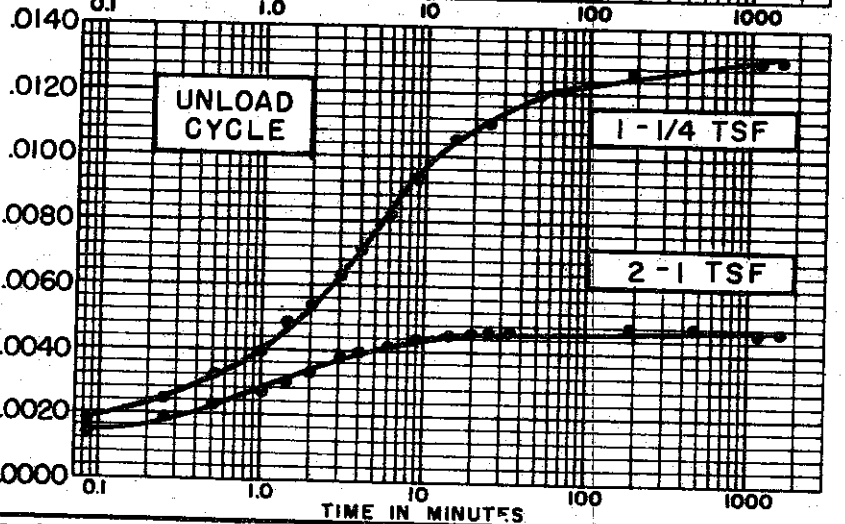
COMPRESSION IN INCHES



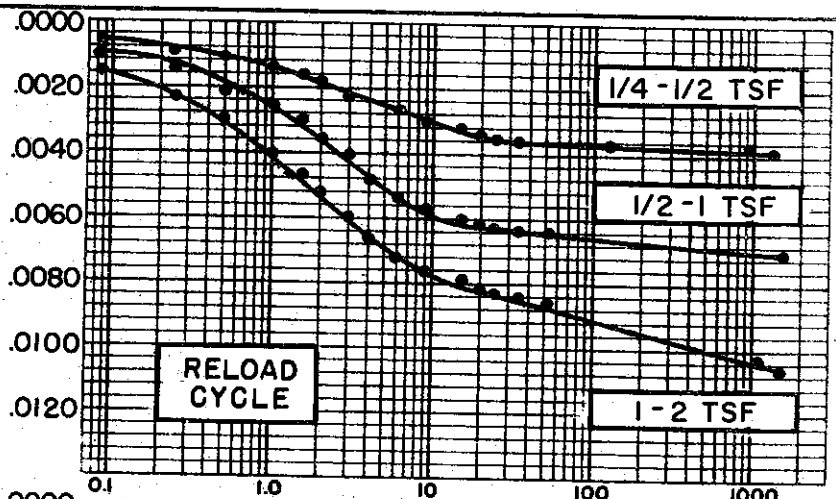
COMPRESSION IN INCHES



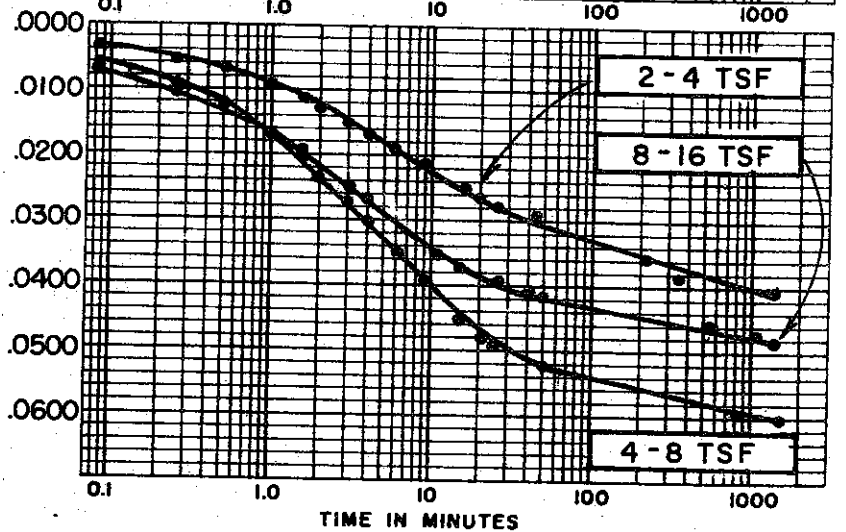
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 40.5 %  
FINAL WATER CONTENT 28.9 %

BORING NO. 52  
SAMPLE NO. 4  
DEPTH 29.9'-30.2'

**TEST DATA**

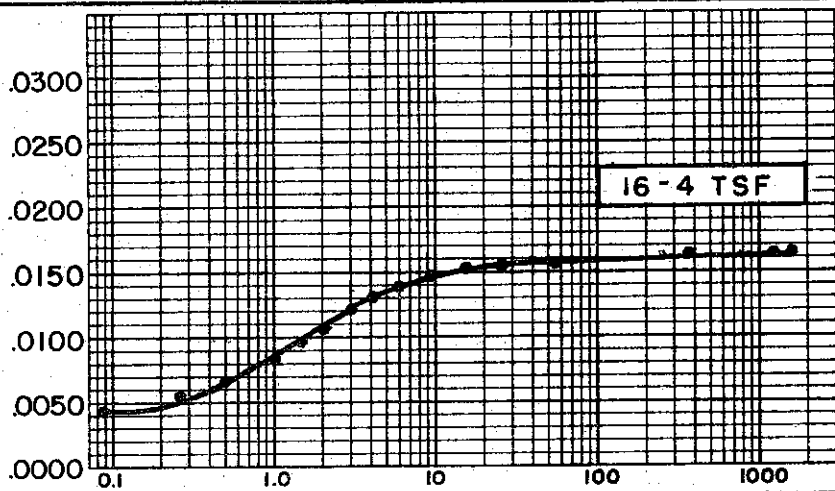
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

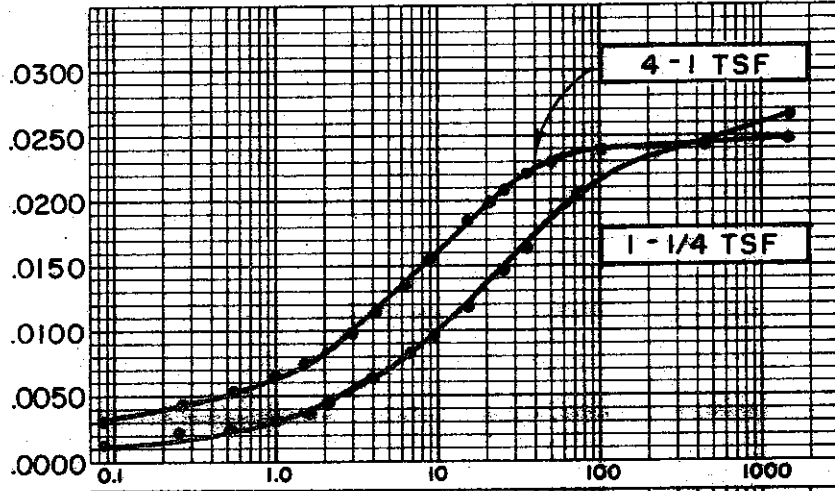
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



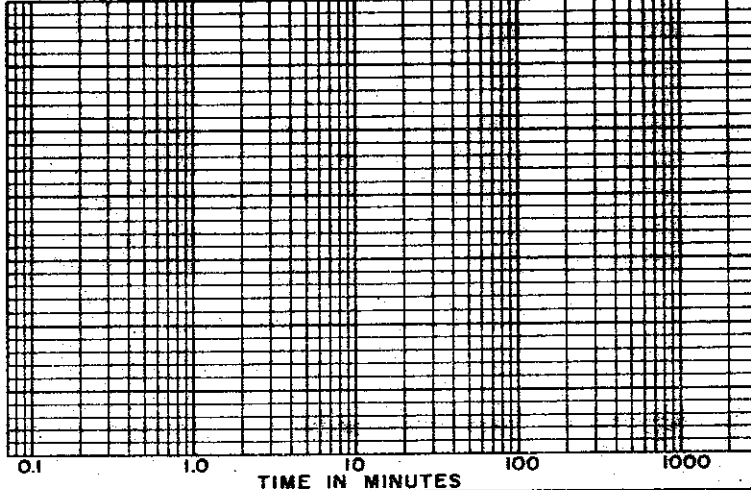
COMPRESSION IN INCHES



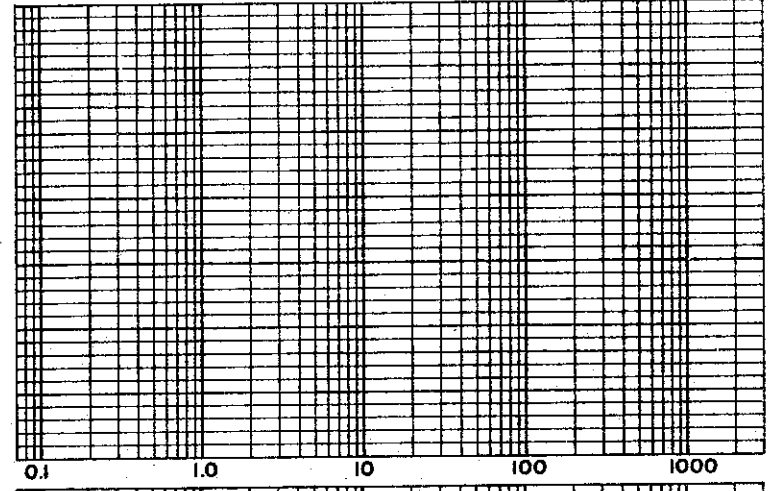
COMPRESSION IN INCHES



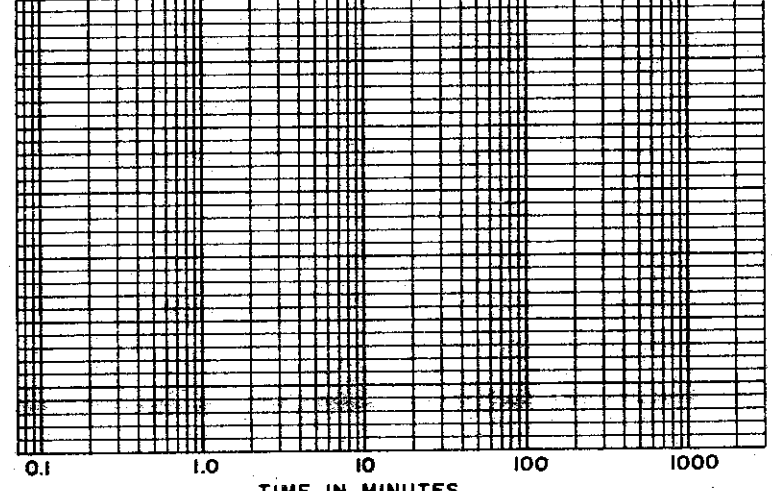
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

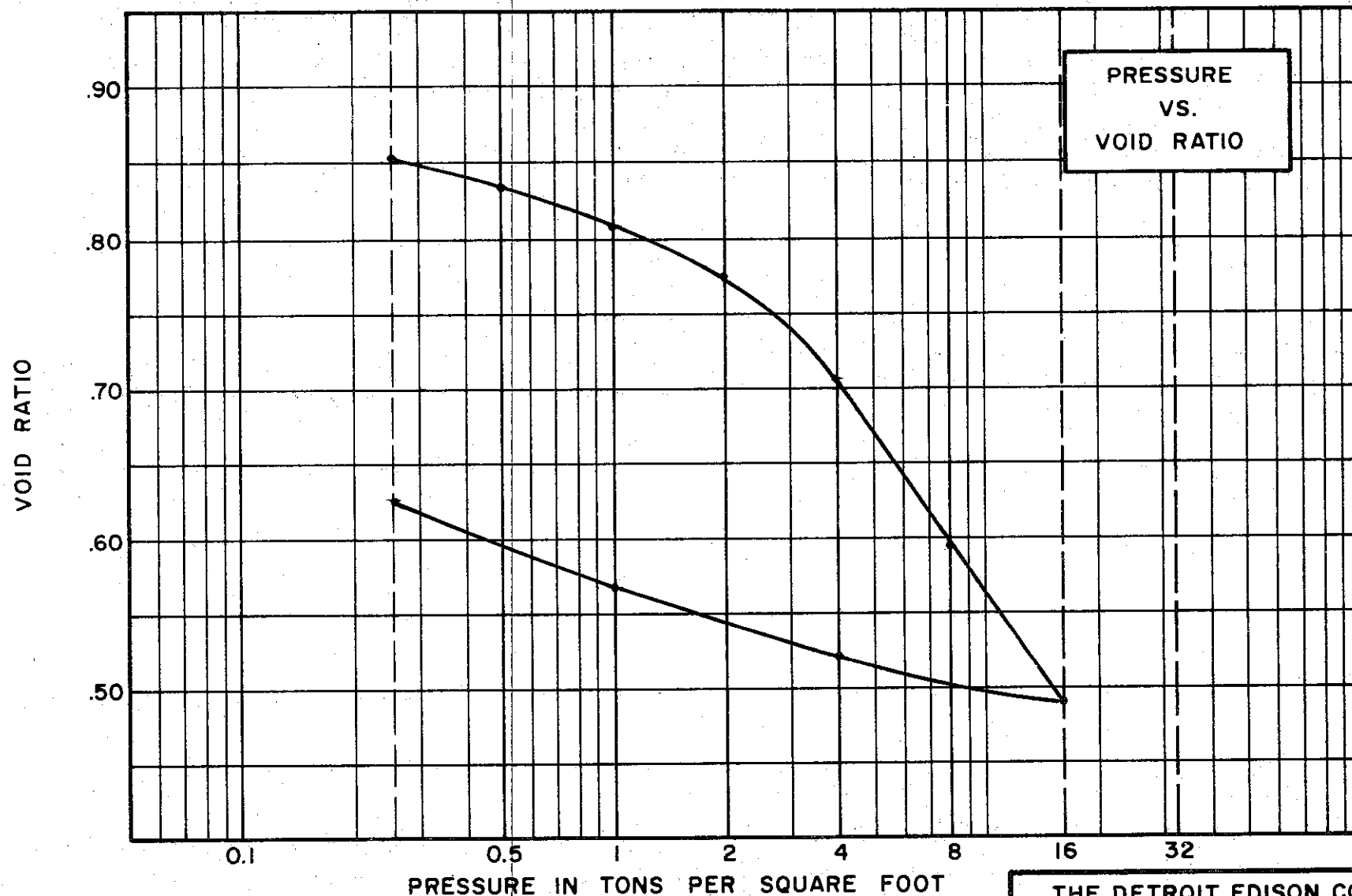
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 0.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY,  
SANDY (CL)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 30.9% FINAL 22.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

**TEST DATA**

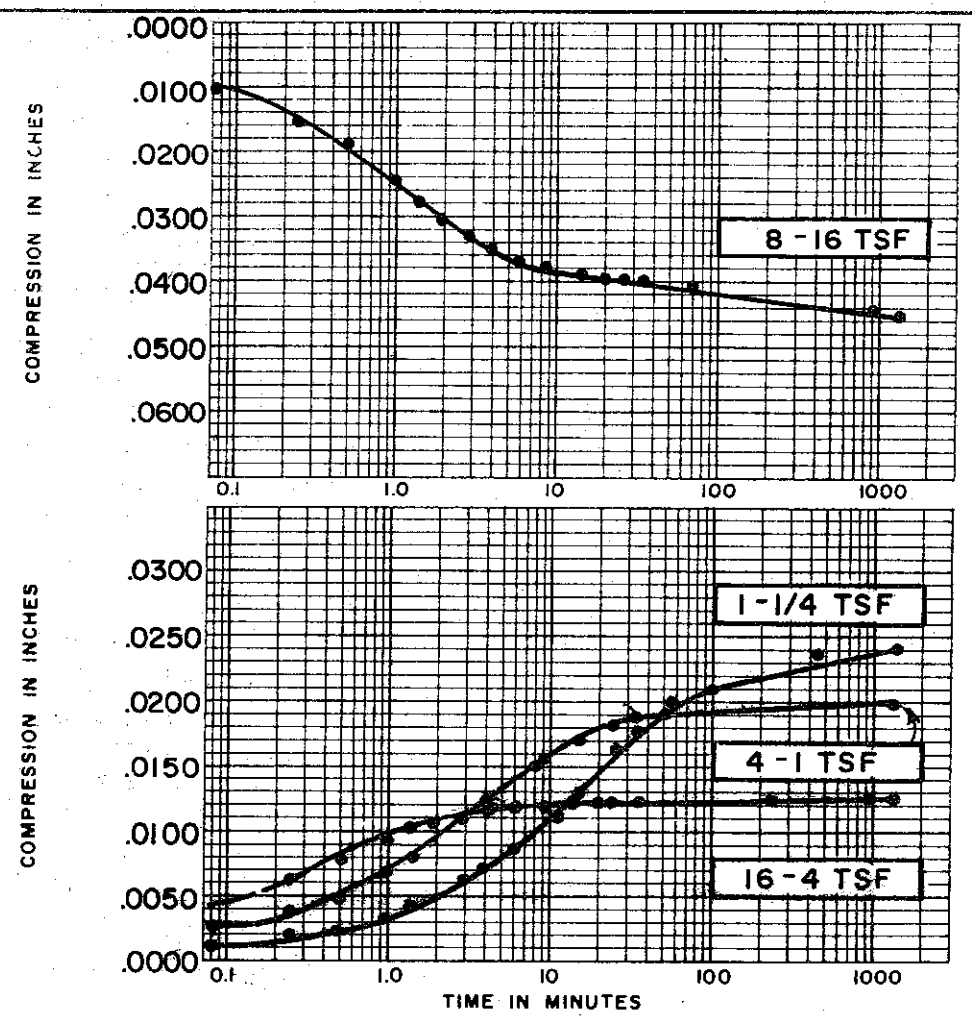
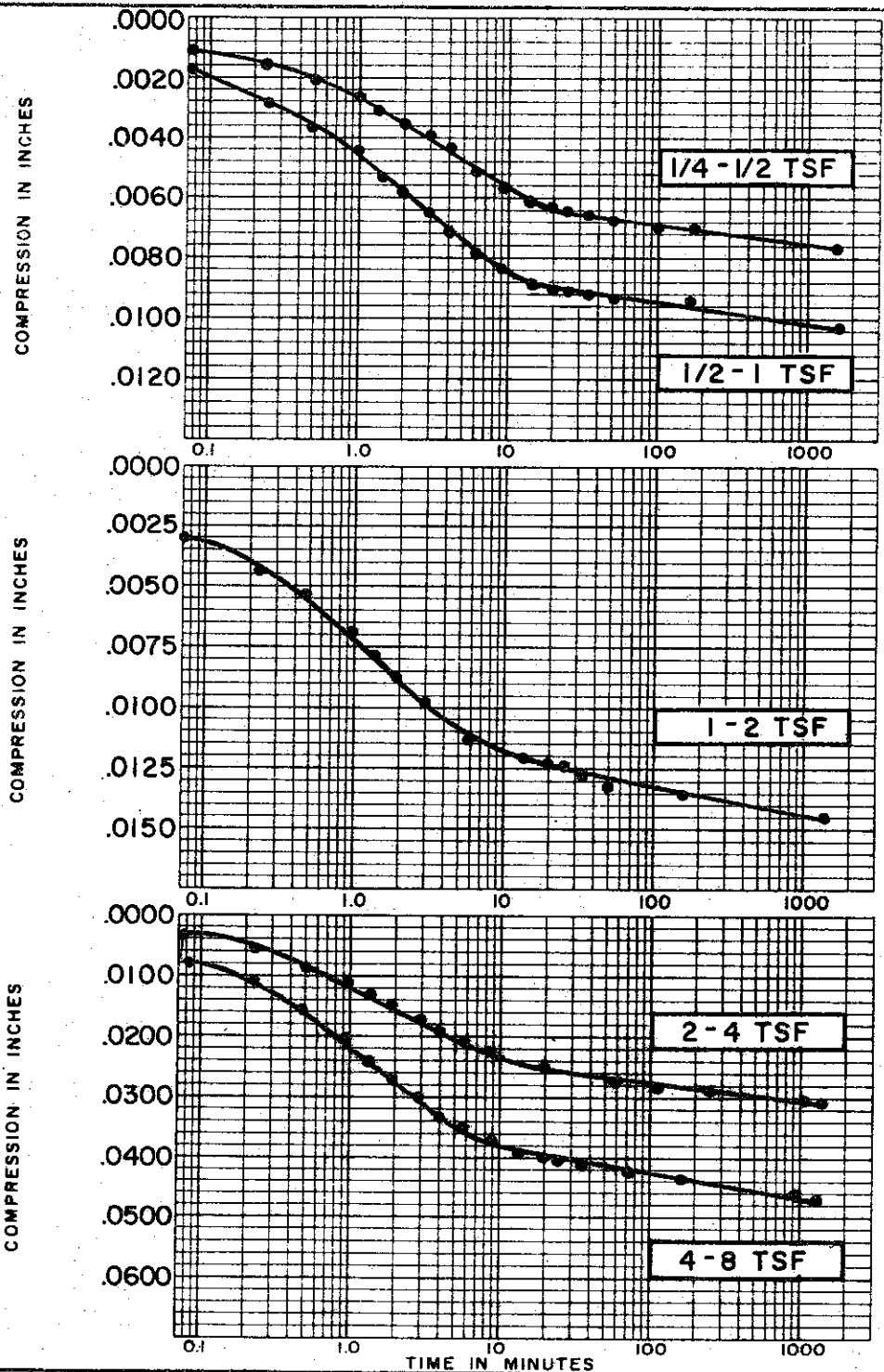
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.872

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 53 TEST NO. C98.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 39.5' TO 39.8'

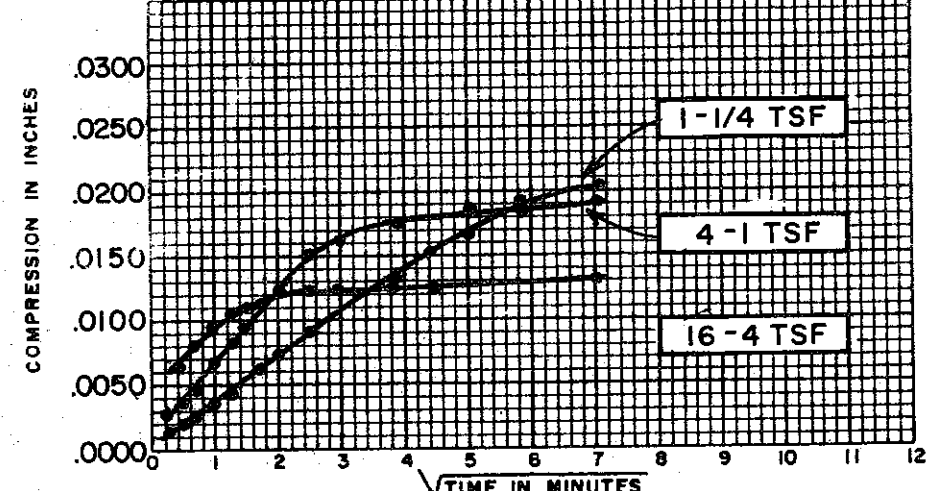
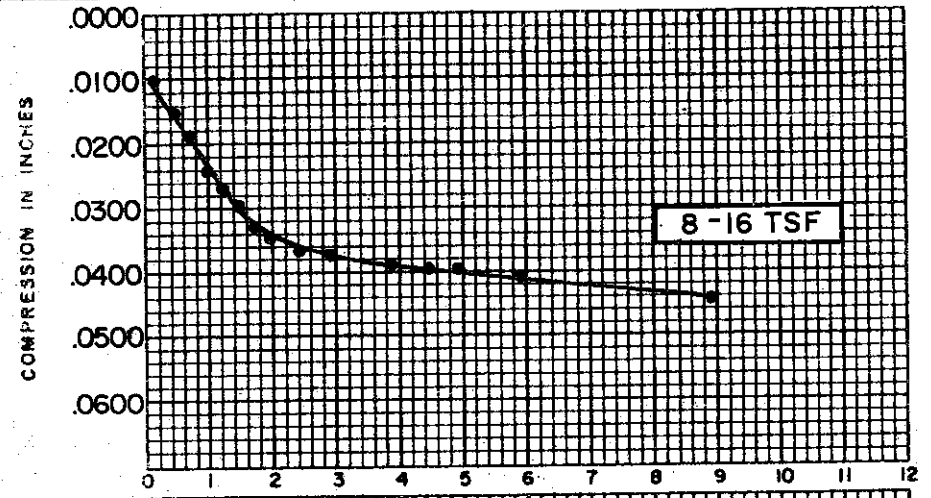
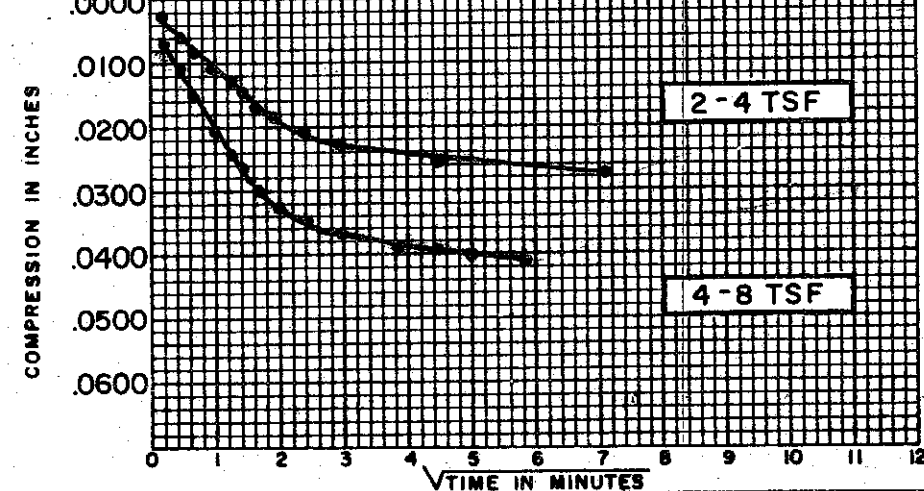
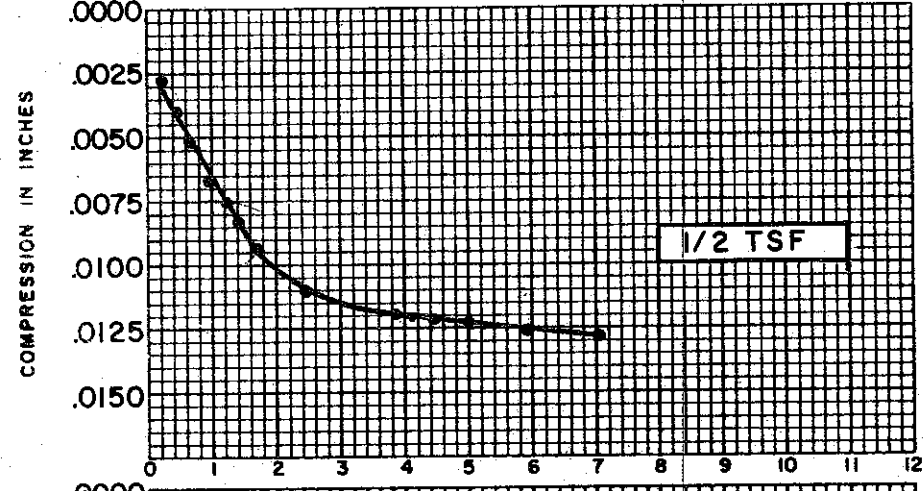
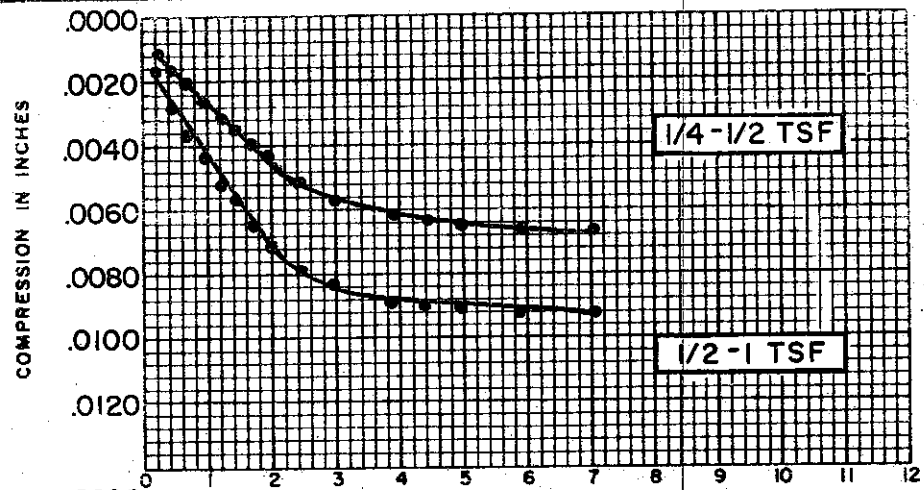
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SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY, SANDY (CL)</u>
SPECIFIC GRAVITY	<u>2.72</u>
INITIAL WATER CONTENT	<u>30.9 %</u>
FINAL WATER CONTENT	<u>22.7 %</u>
BORING NO.	<u>53</u>
SAMPLE NO.	<u>5</u>
DEPTH	<u>39.5' - 39.8'</u>
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.872</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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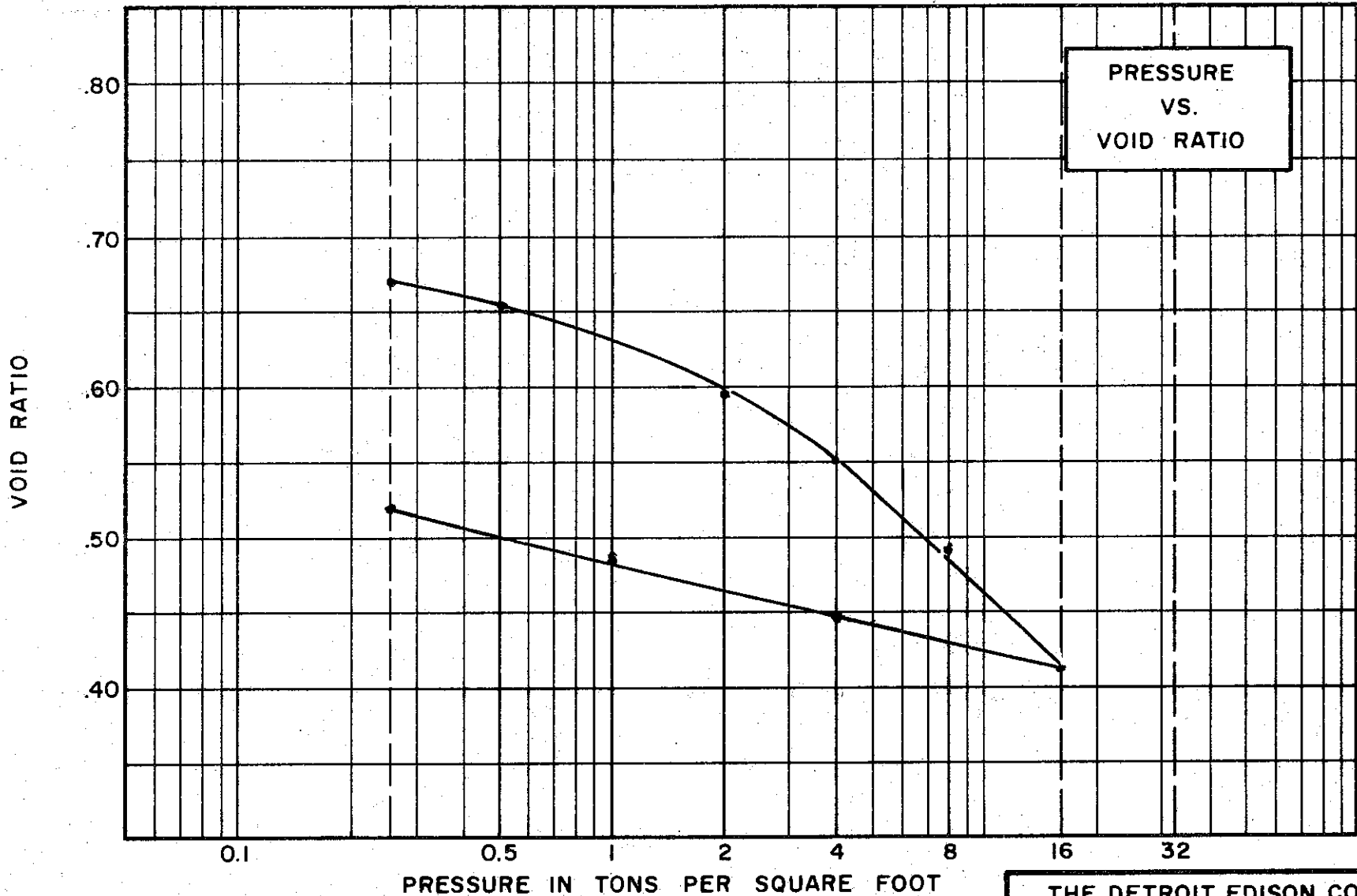


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	30.9%
FINAL WATER CONTENT	22.7%
BORING NO.	53
SAMPLE NO.	5
DEPTH	39.5'-39.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.872

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY  
(CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 26.0% FINAL 22.0%  
ATTERBERG LIMITS:  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

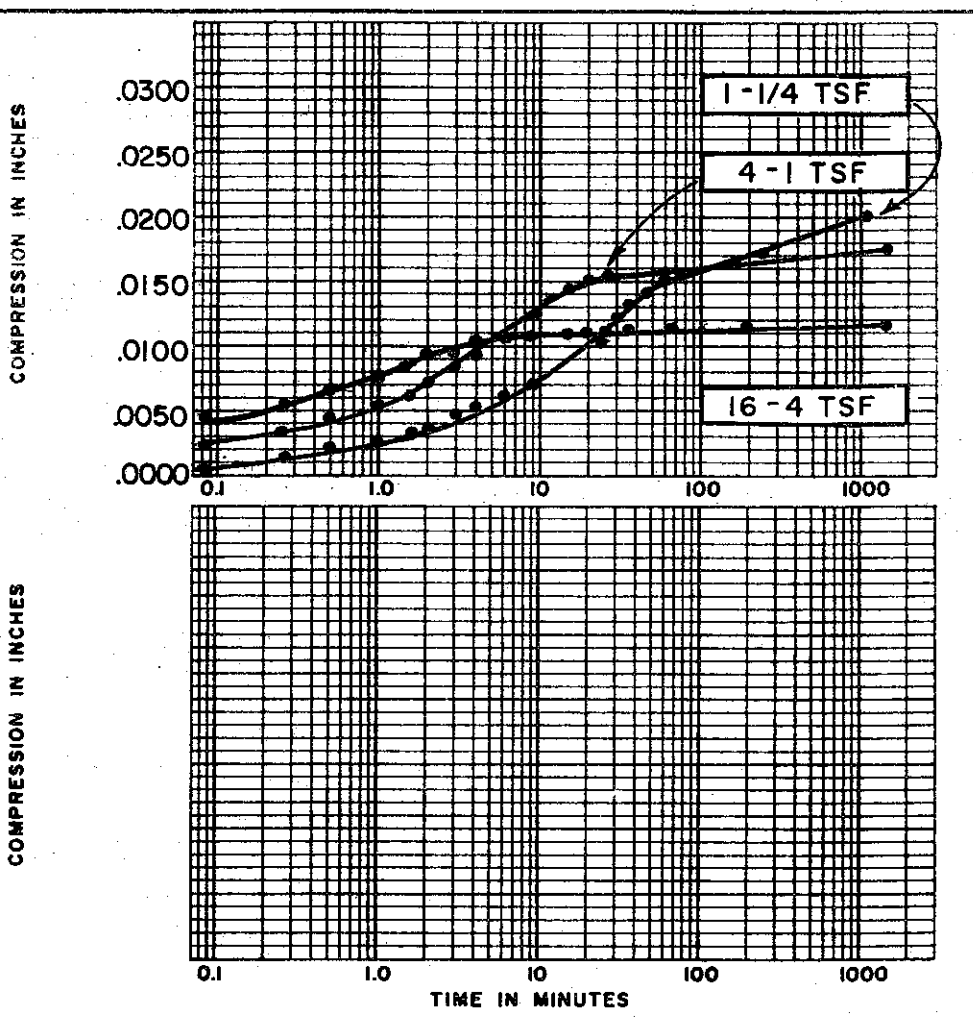
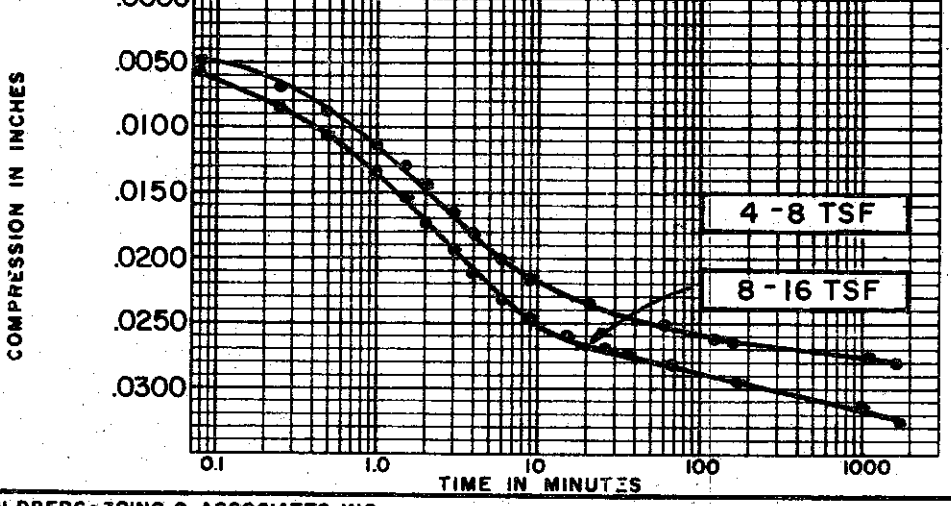
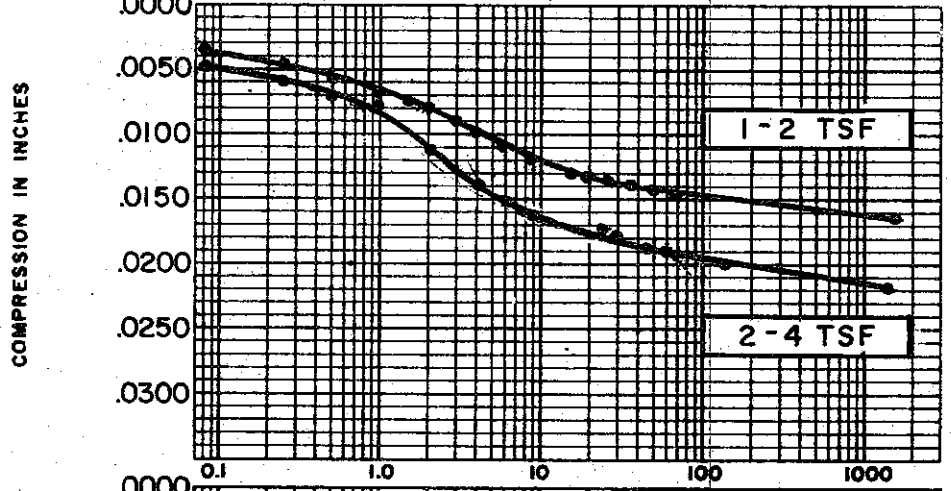
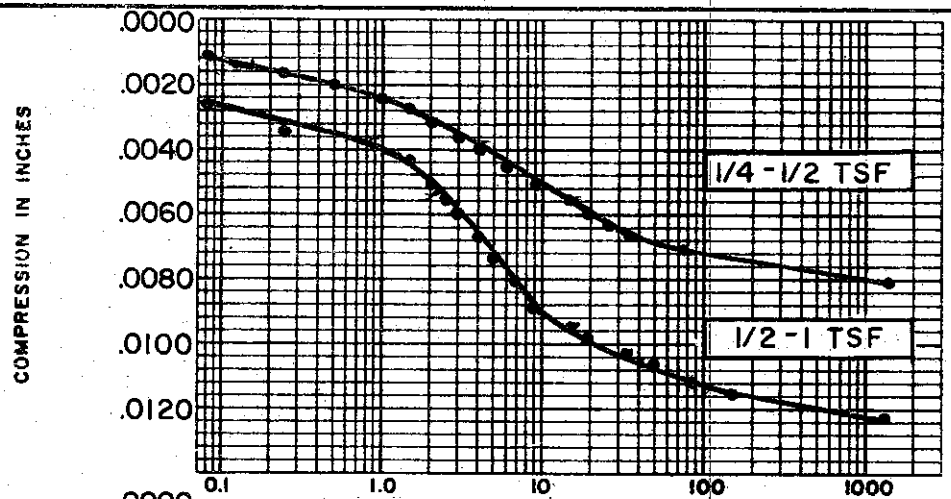
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.696

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 54 TEST NO. C399.1  
SAMPLE NO. 6 DATE JULY 1974  
DEPTH 63.5' TO 63.8'

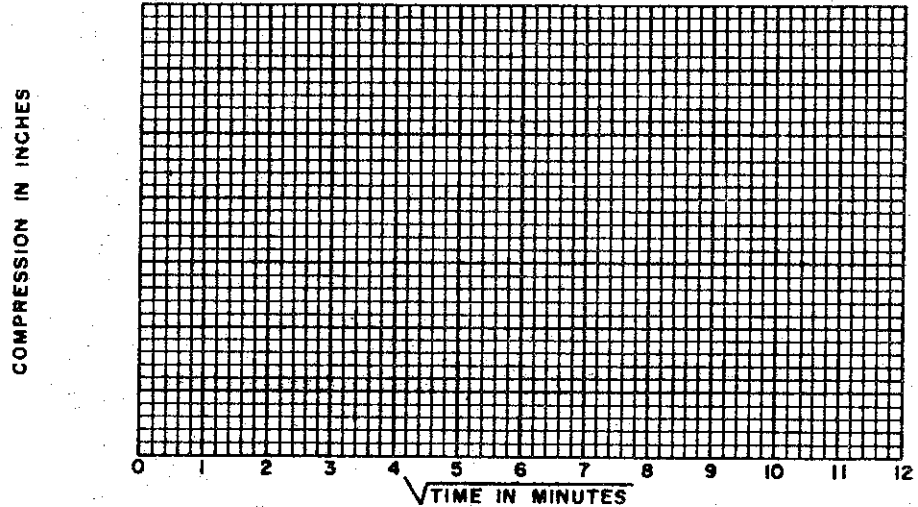
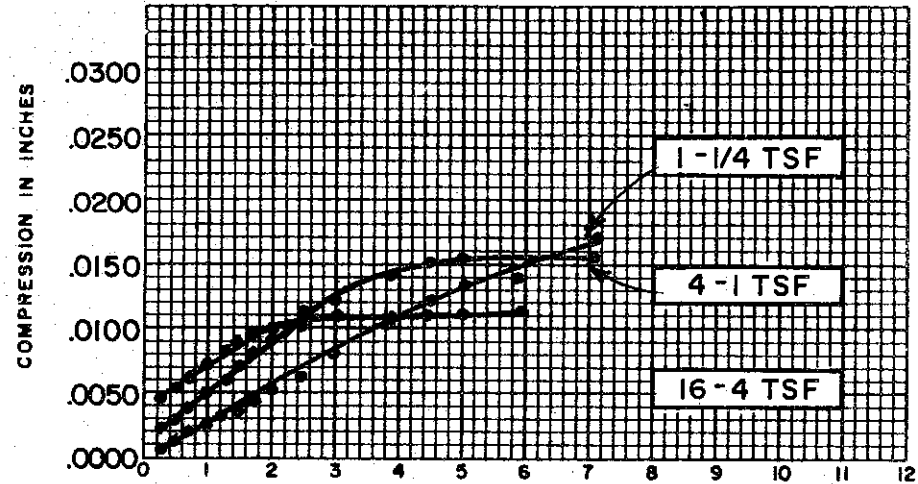
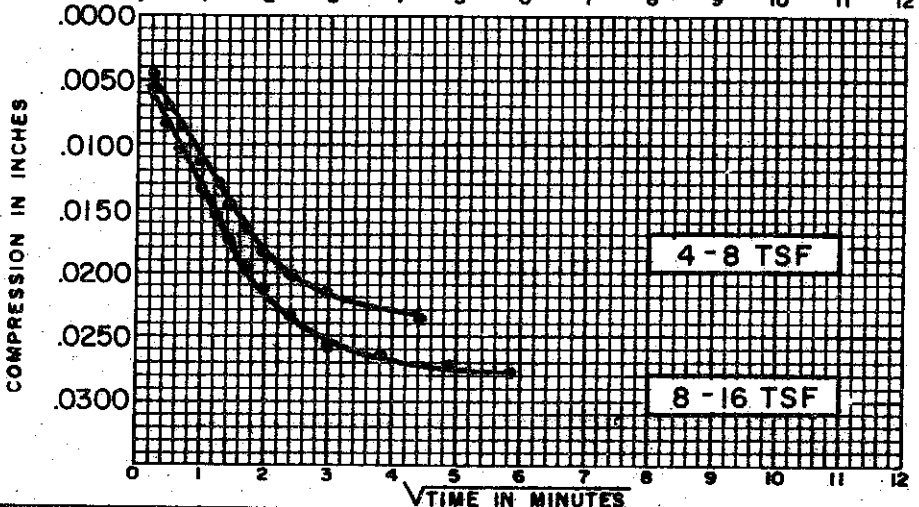
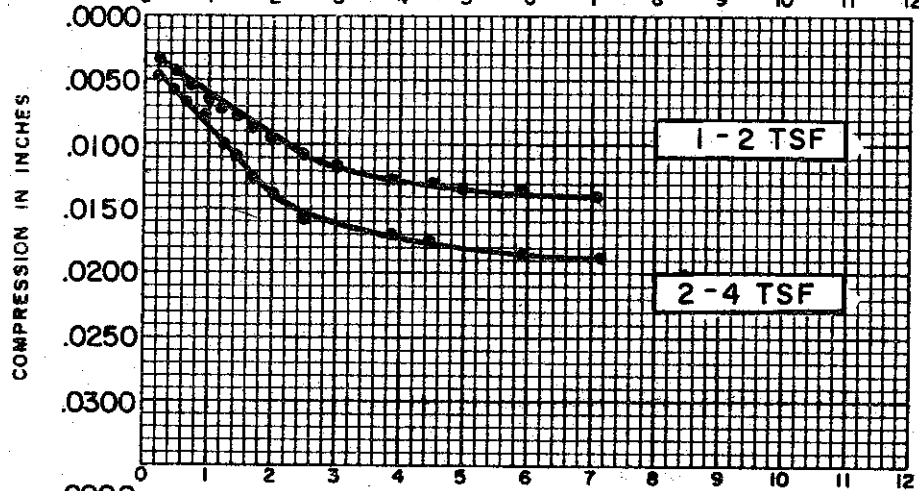
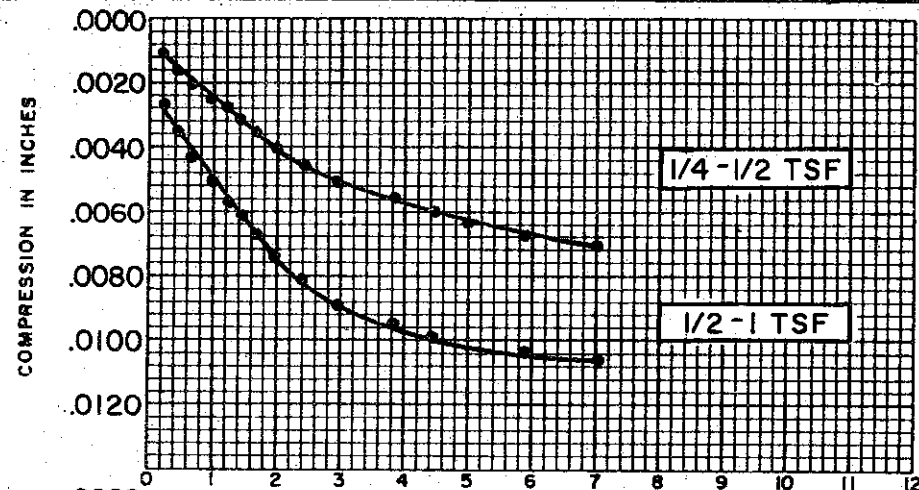
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SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	20.0 %
FINAL WATER CONTENT	22.0 %
BORING NO.	54
SAMPLE NO.	6
DEPTH	63.5' - 63.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.696

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 26.0%  
 FINAL WATER CONTENT 22.0%

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5'-63.8'

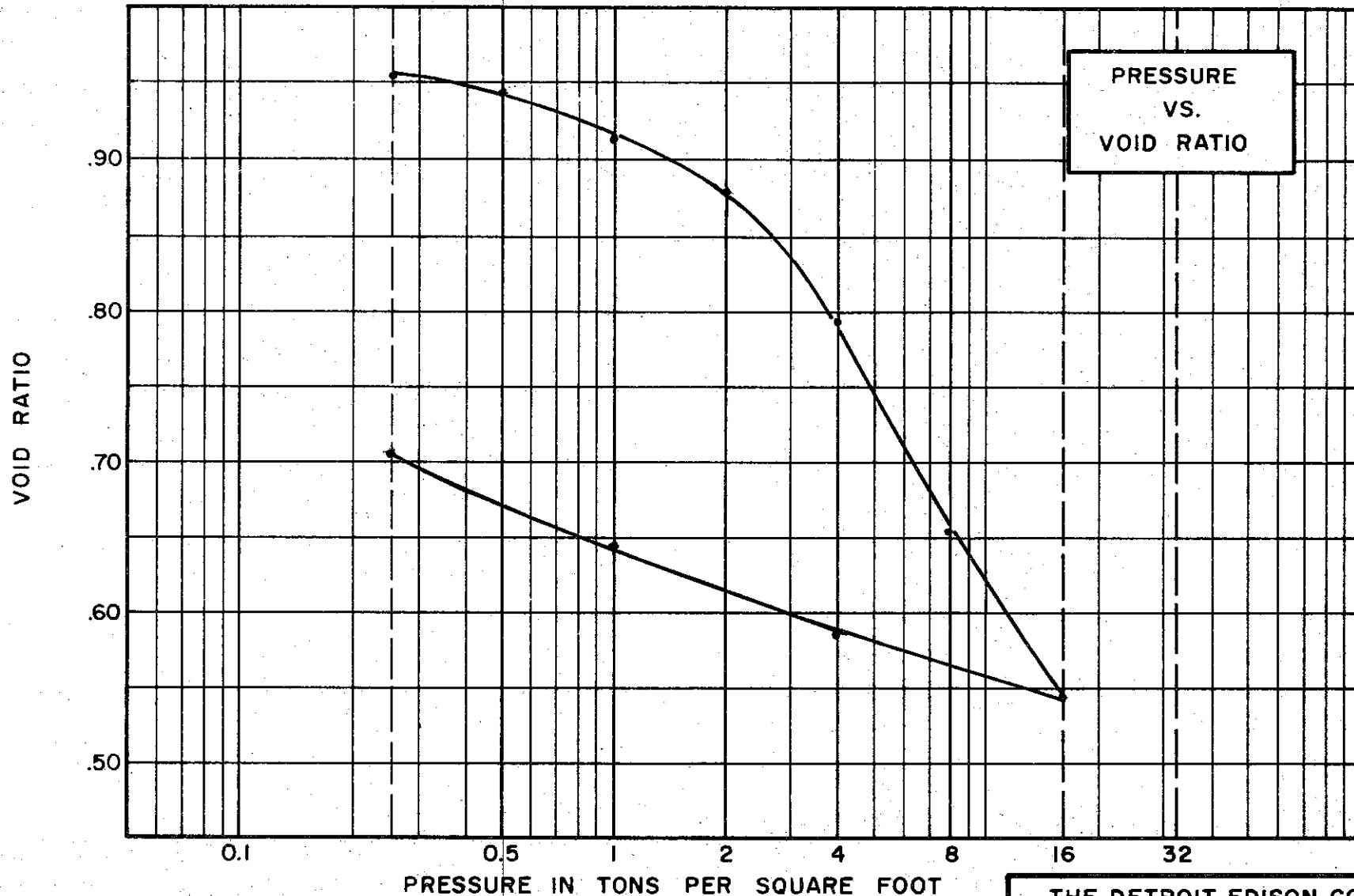
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.696

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.3% FINAL 30.6%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

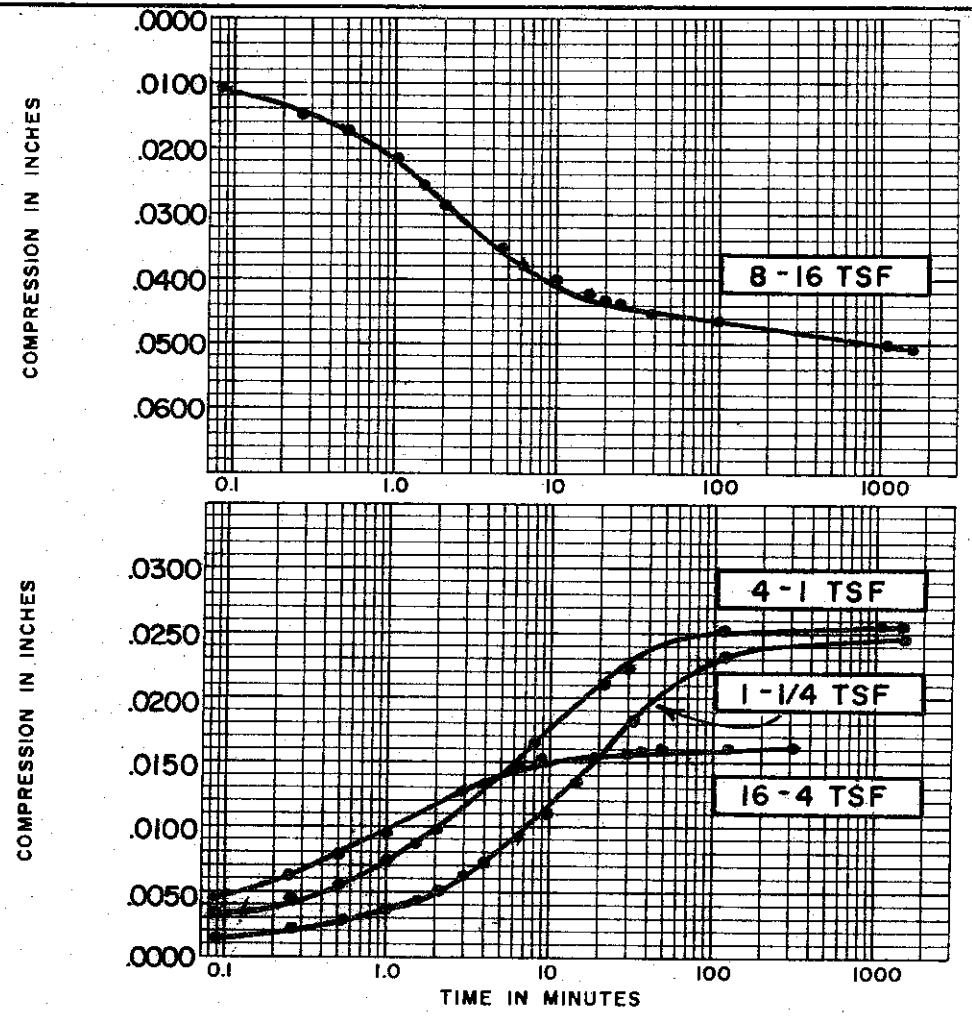
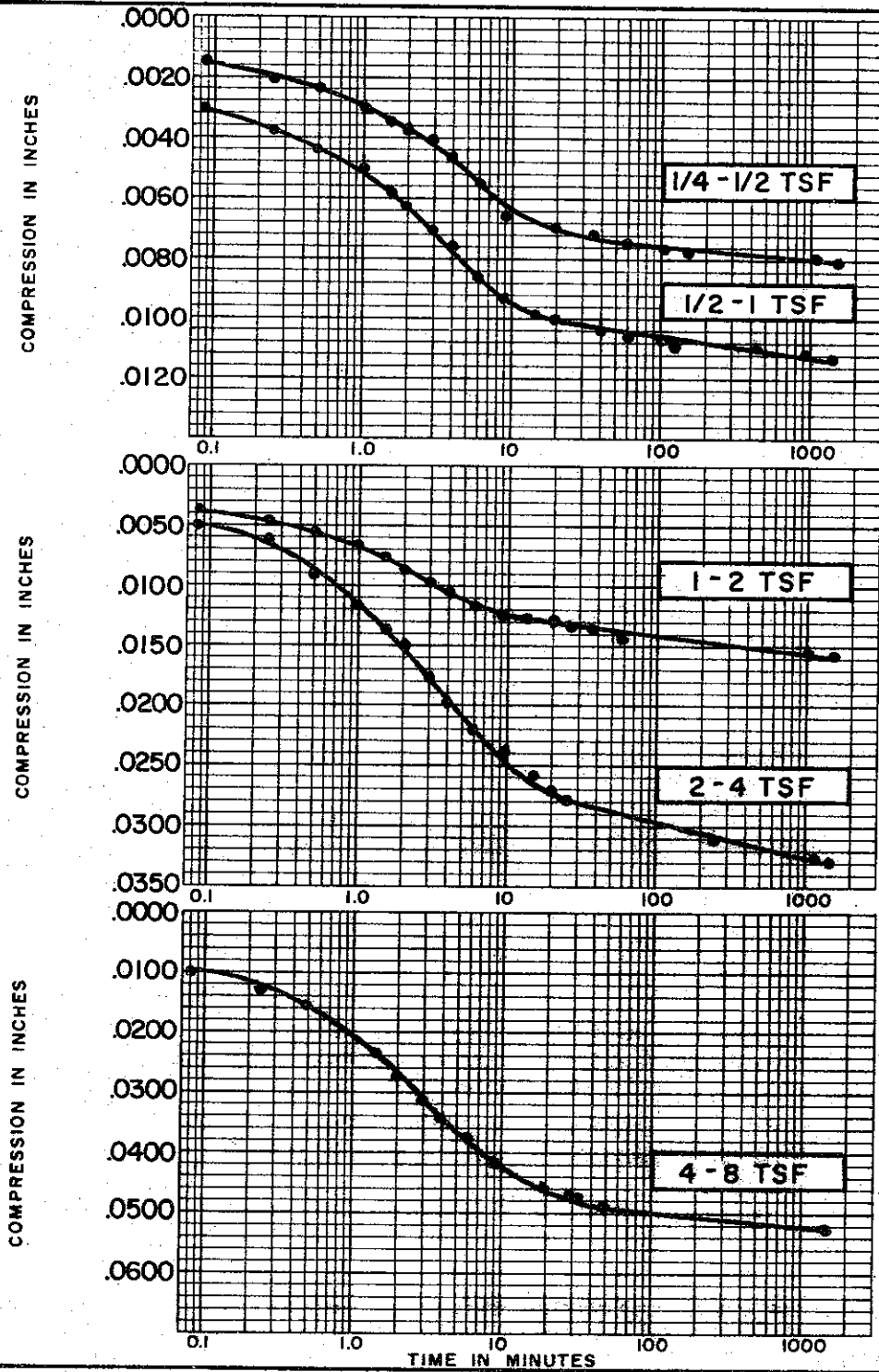
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 54 TEST NO. C401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7' TO 74.0'



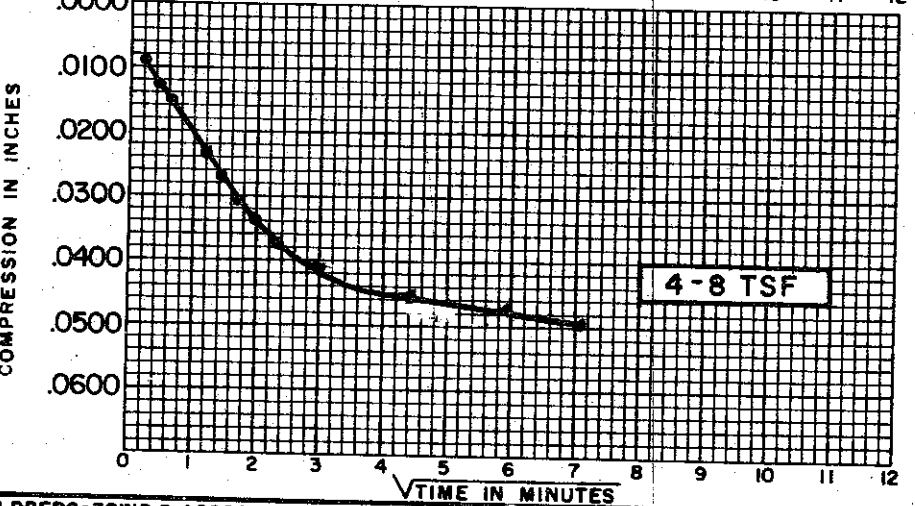
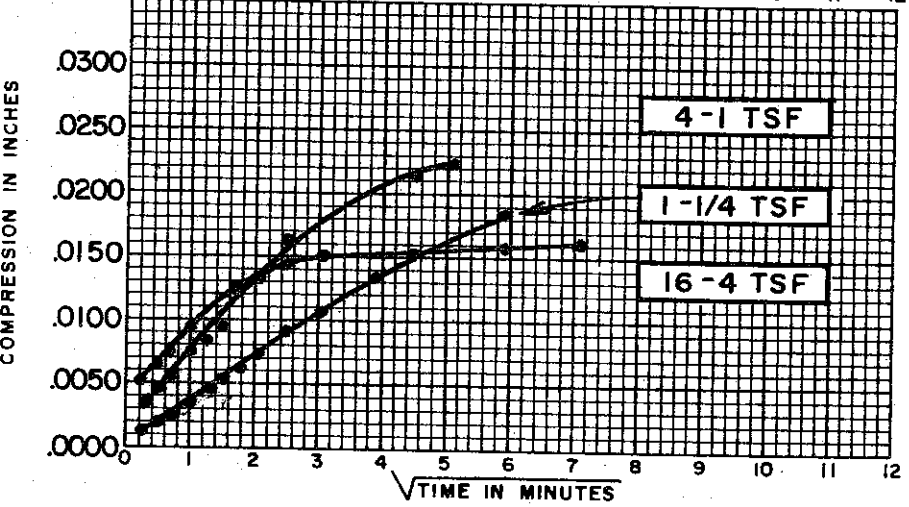
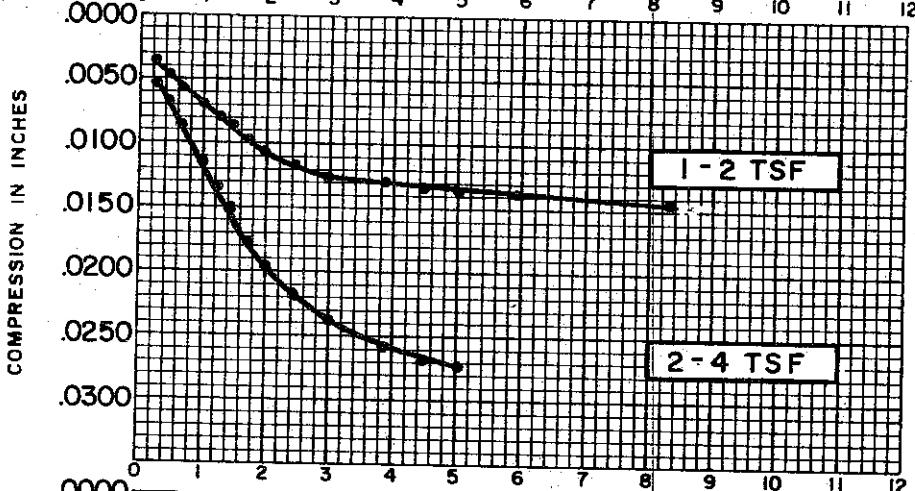
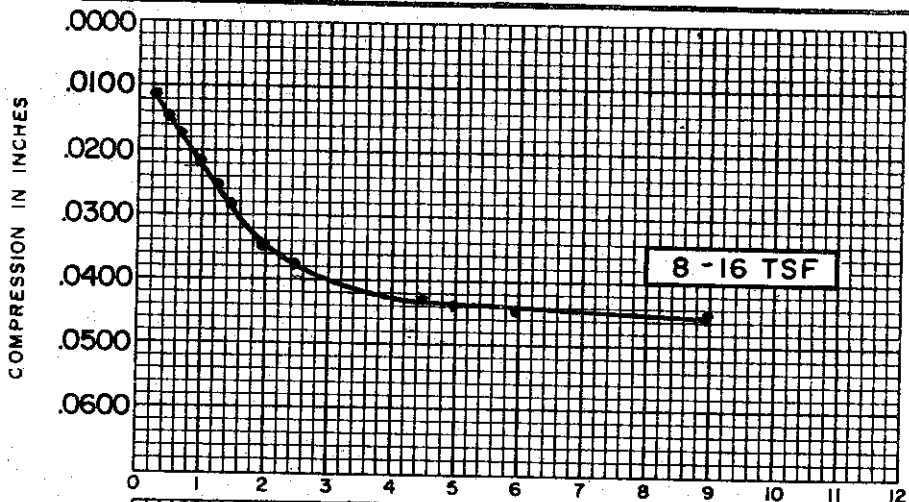
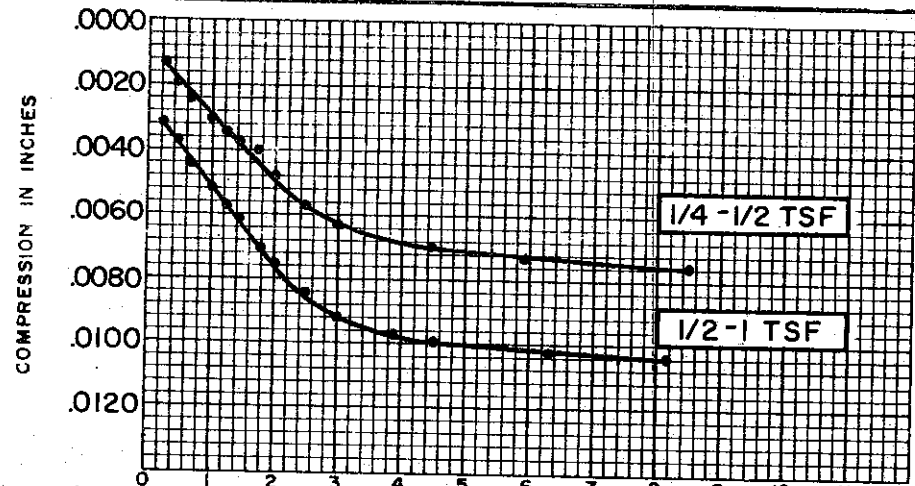
C-525



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.3 %
FINAL WATER CONTENT	30.6 %
BORING NO.	54
SAMPLE NO.	8
DEPTH	73.7'-74.0'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.962

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

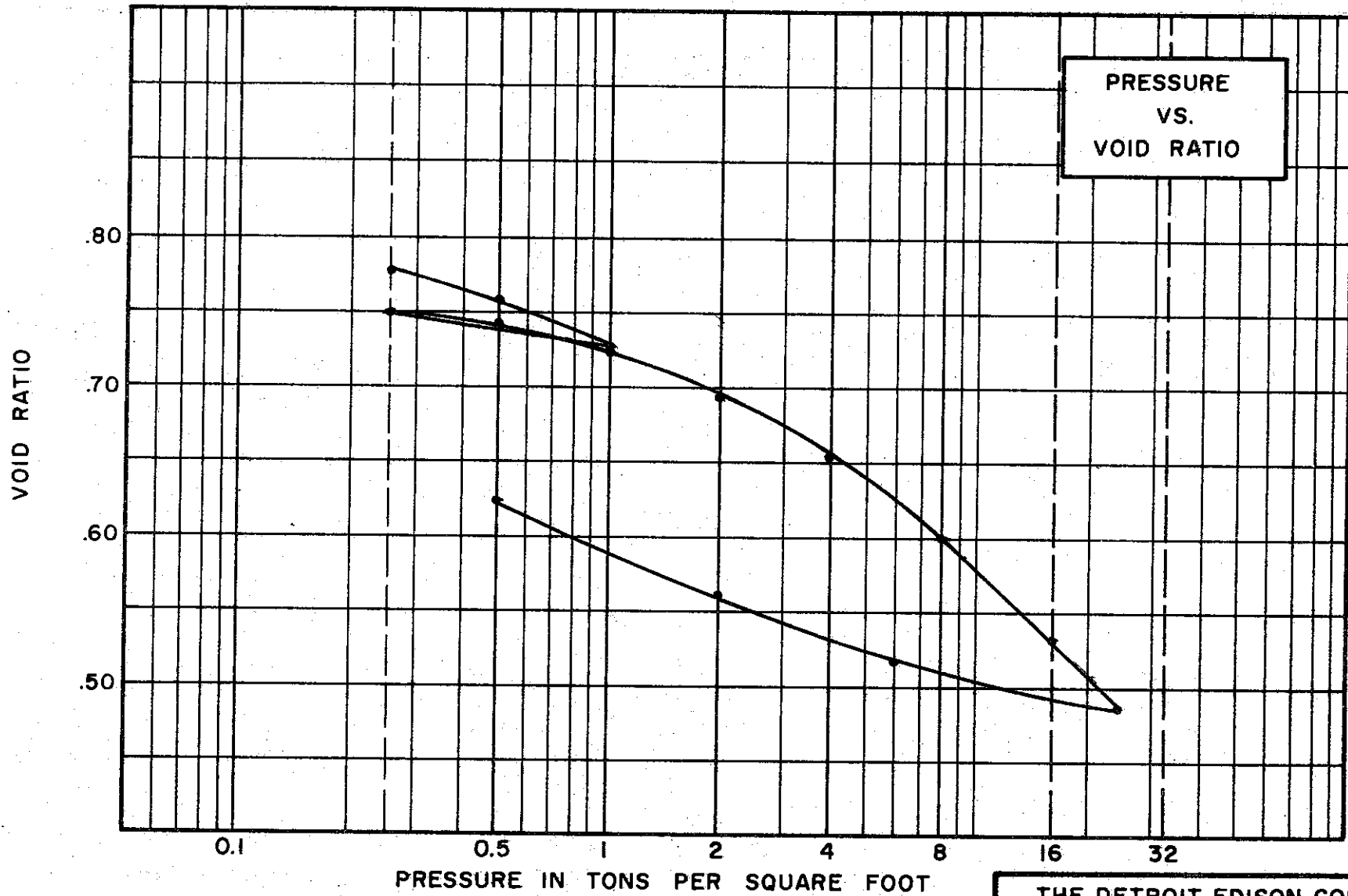
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL) BORING NO. 54  
 SPECIFIC GRAVITY 2.73 SAMPLE NO. 8  
 INITIAL WATER CONTENT 38.3% DEPTH 73.7'-74.0'  
 FINAL WATER CONTENT 30.6%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

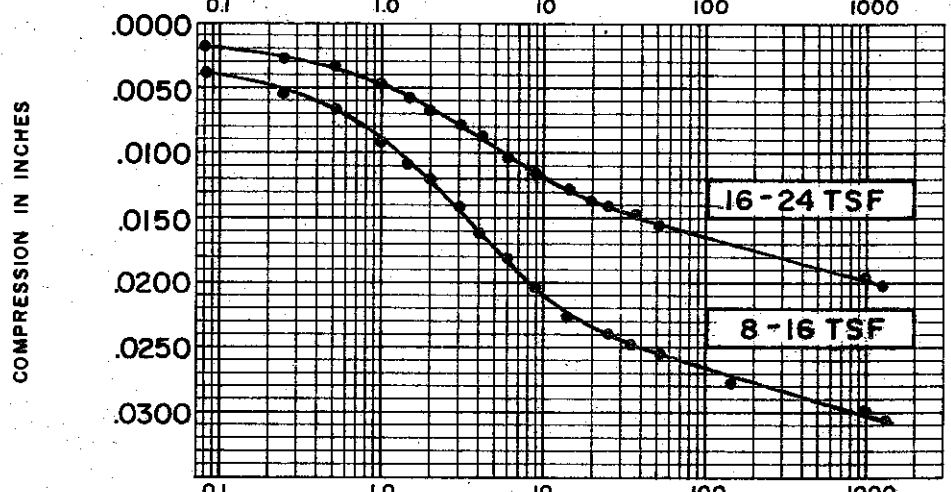
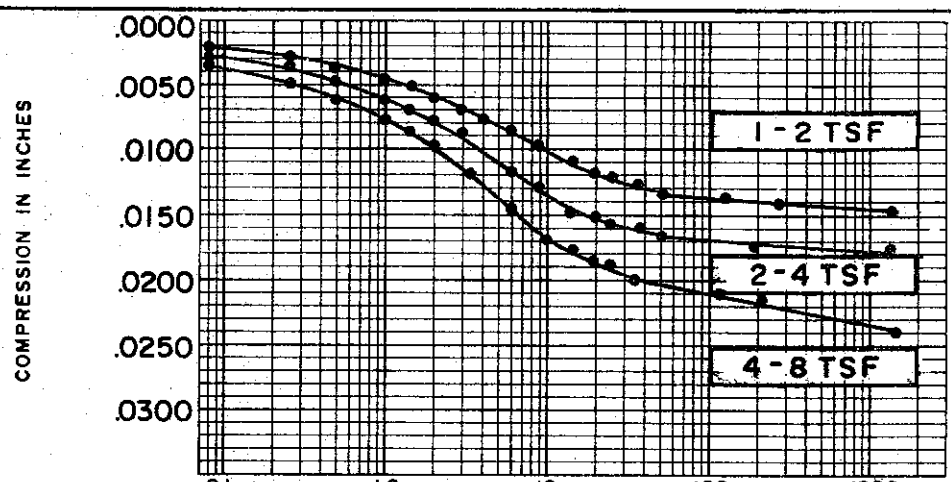
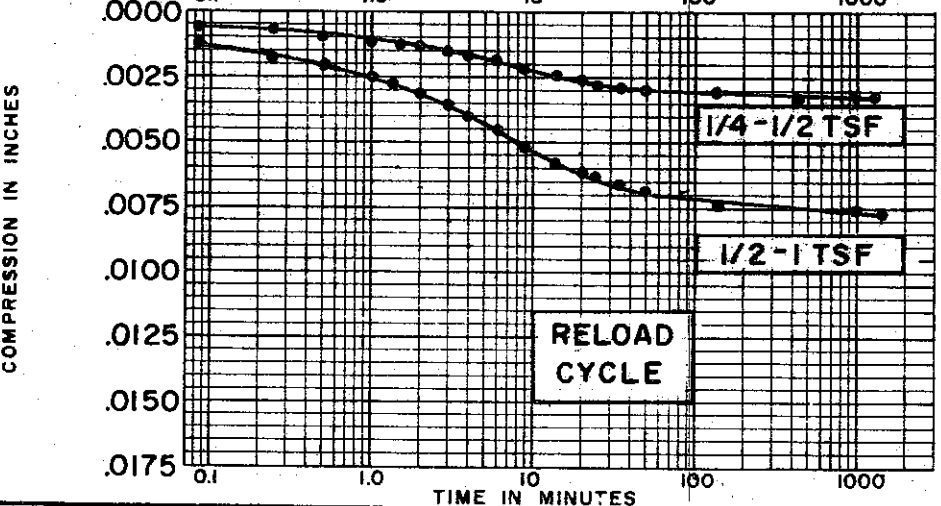
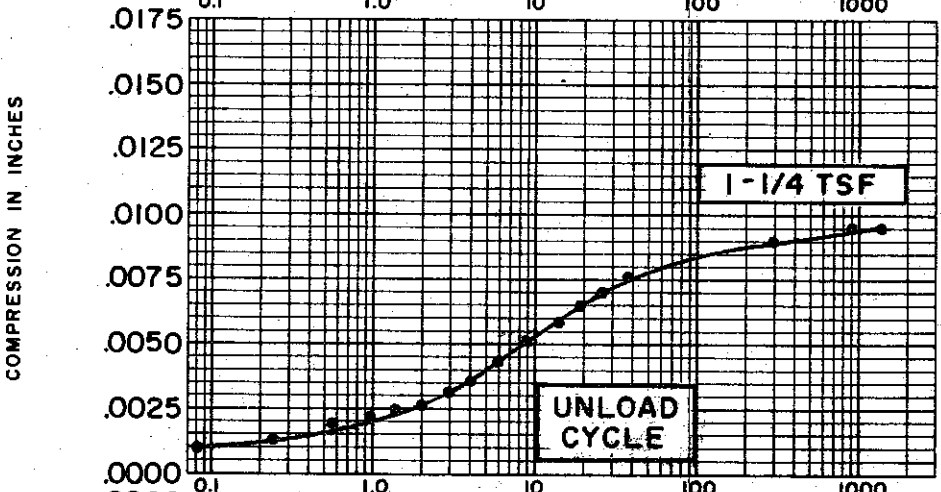
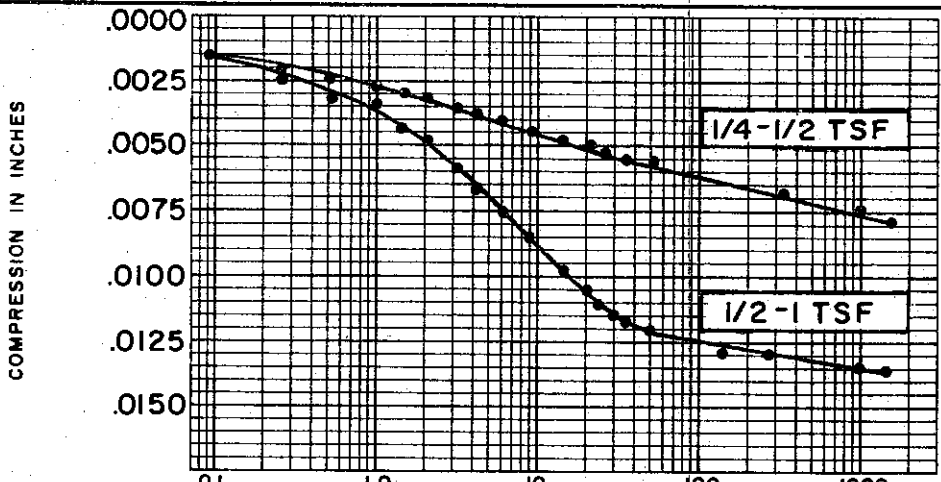
SOIL DESCRIPTION SILTY  
CLAY (CL-CH)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 30.0% FINAL 28.8%  
ATTERBERG LIMITS:  
LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.787

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**  
BORING NO. 60 TEST NO. C42.1  
SAMPLE NO. 2 DATE FEB. 1974  
DEPTH 9.8' TO 10.0'

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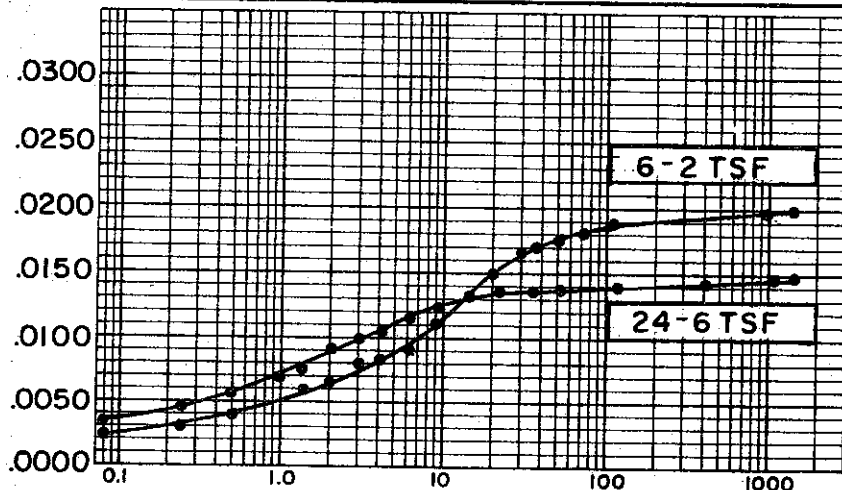
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	10.0%
FINAL WATER CONTENT	28.8%
BORING NO.	60
SAMPLE NO.	2
DEPTH	9.8' TO 10.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

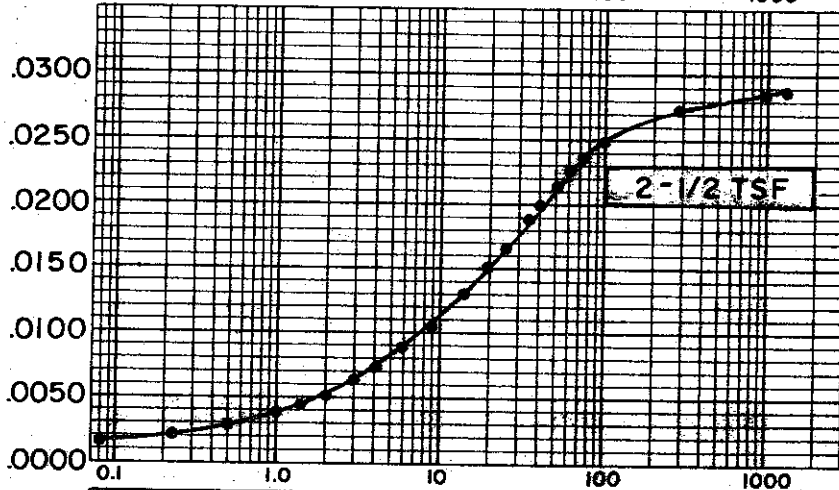
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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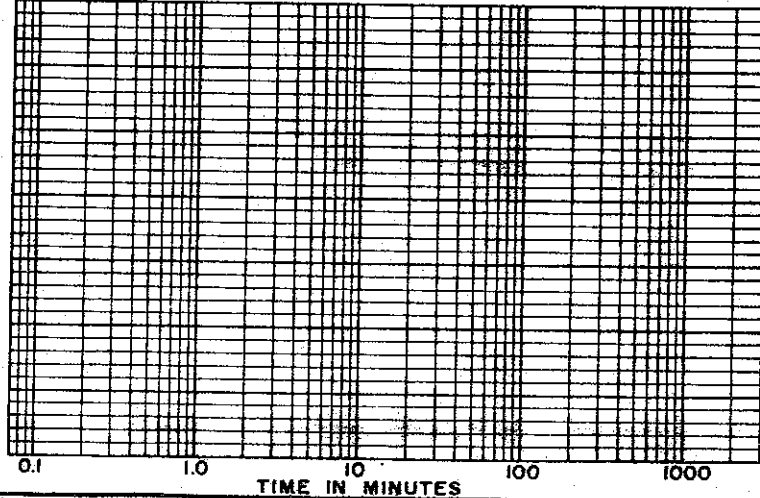
COMPRESSION IN INCHES



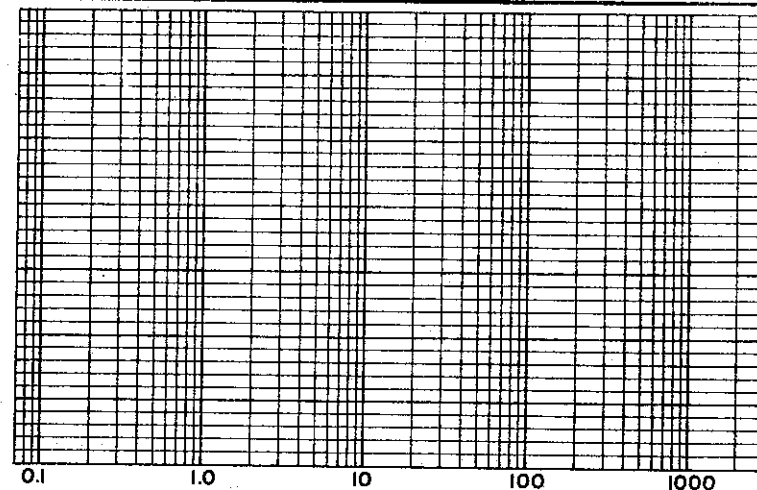
COMPRESSION IN INCHES



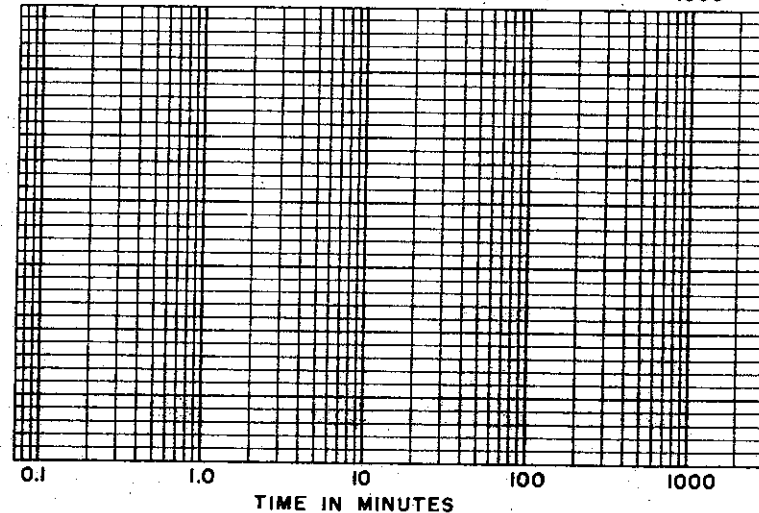
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

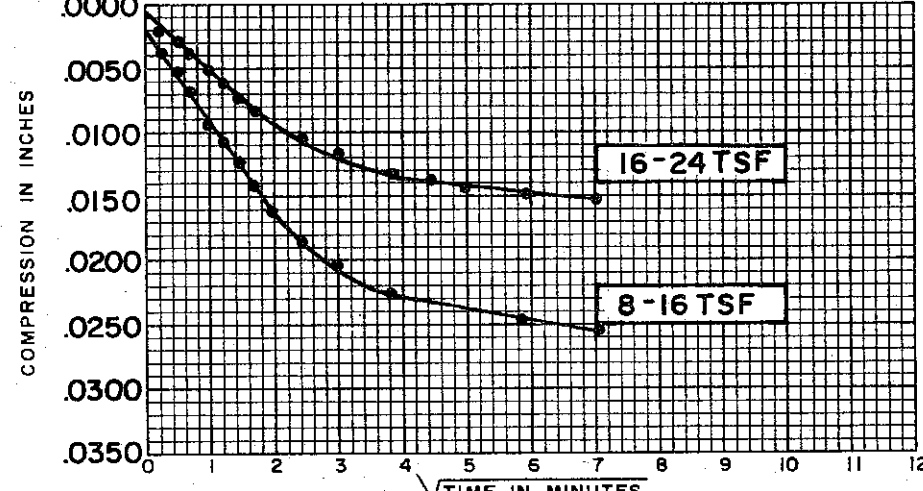
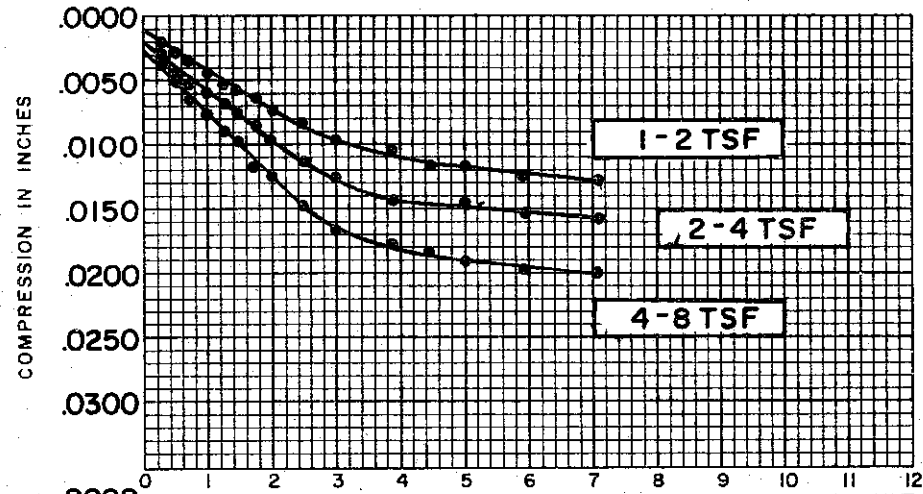
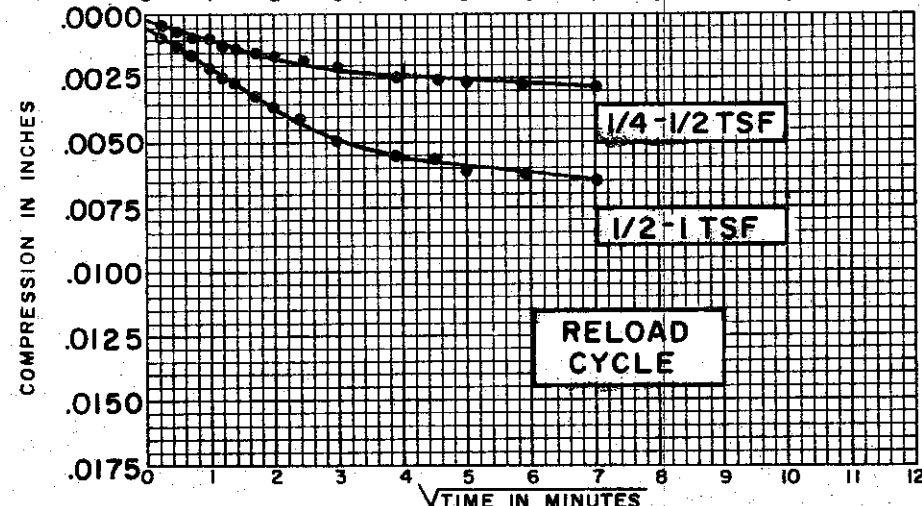
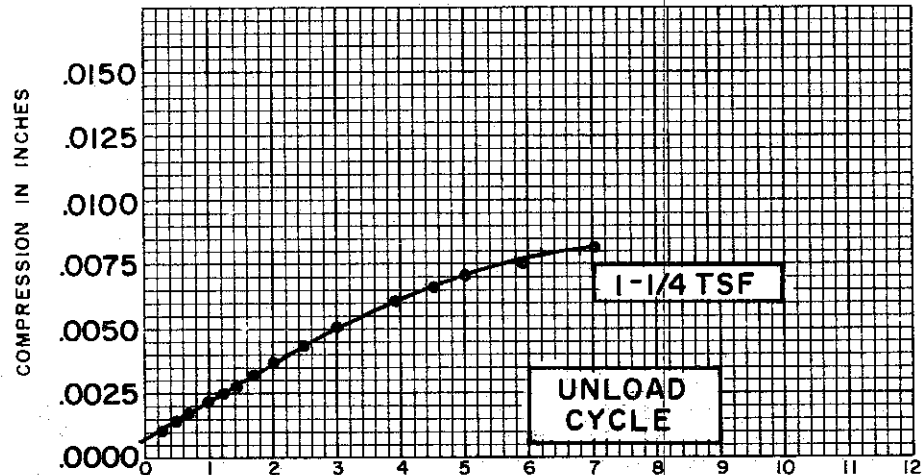
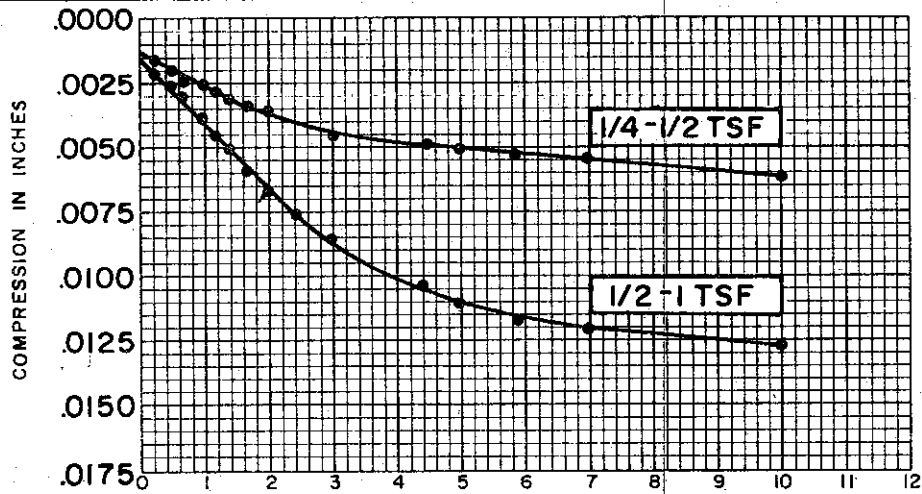
BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.60"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

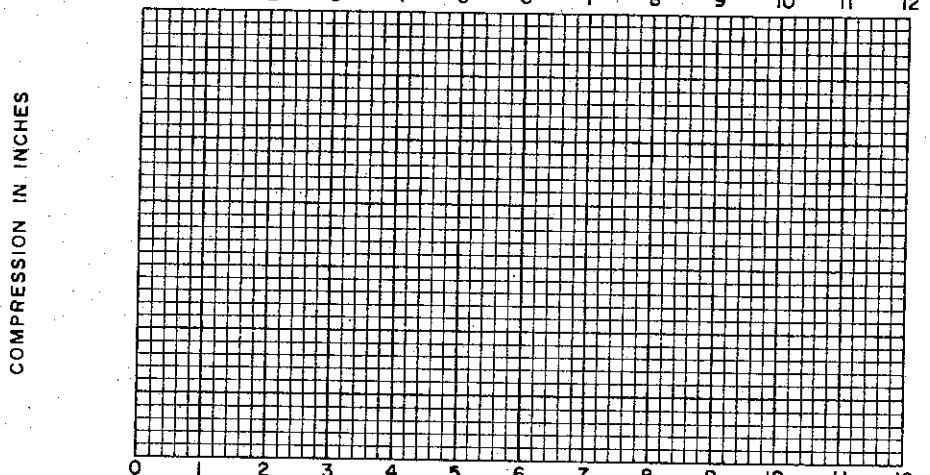
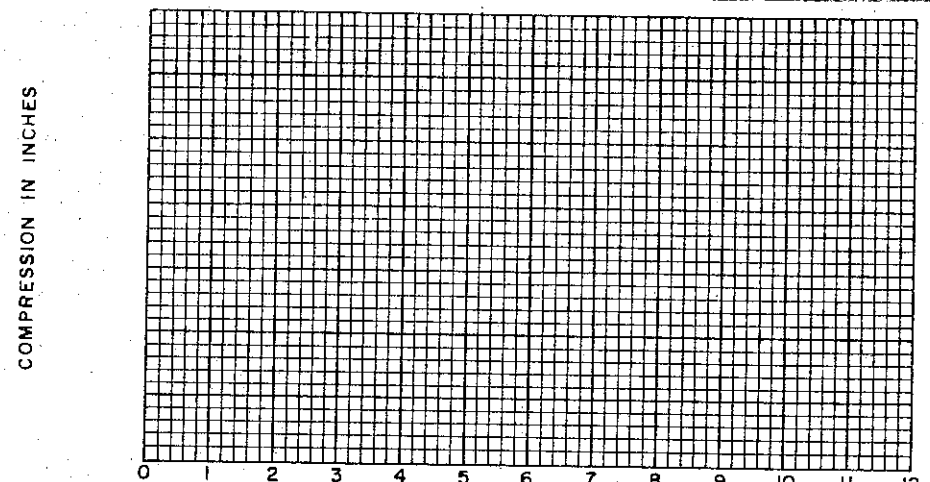
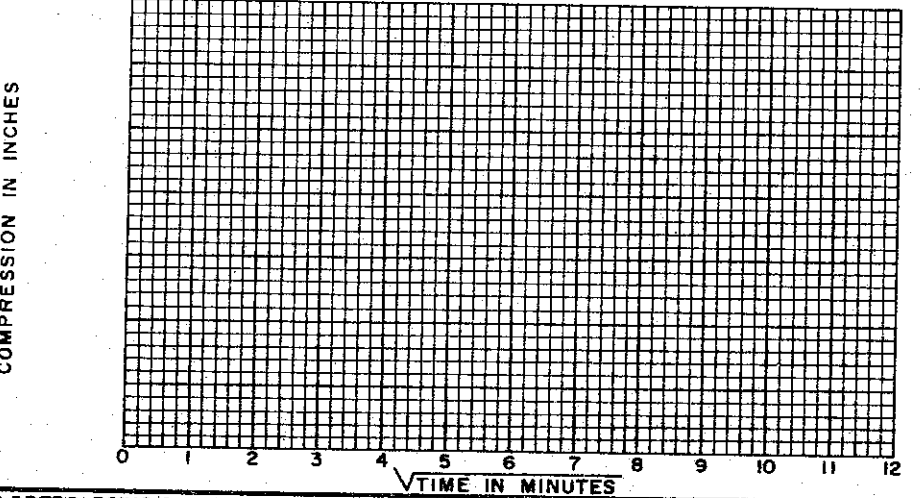
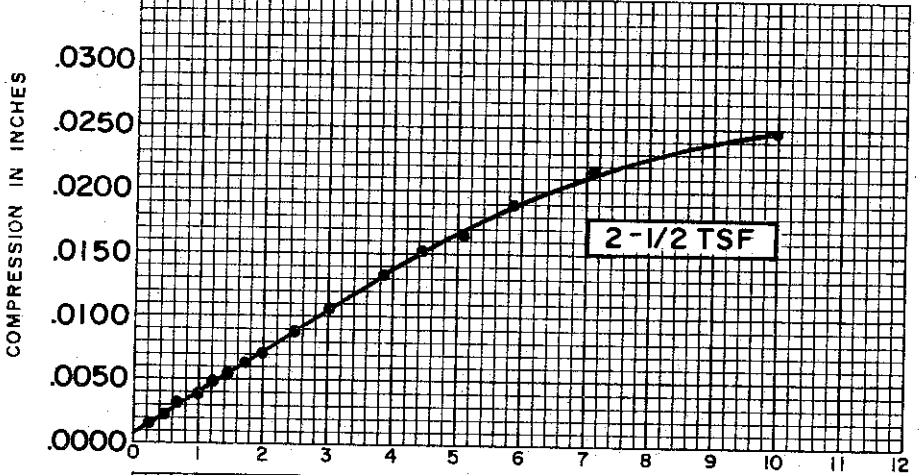
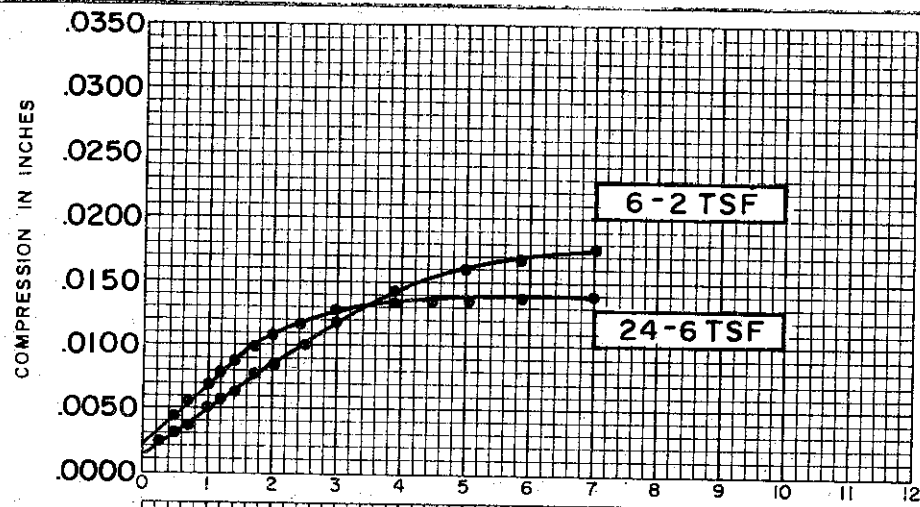
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO.	60
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	2
SPECIFIC GRAVITY	2.71	DEPTH	9.8' TO 10.0'
INITIAL WATER CONTENT	30.0%		
FINAL WATER CONTENT	28.8%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



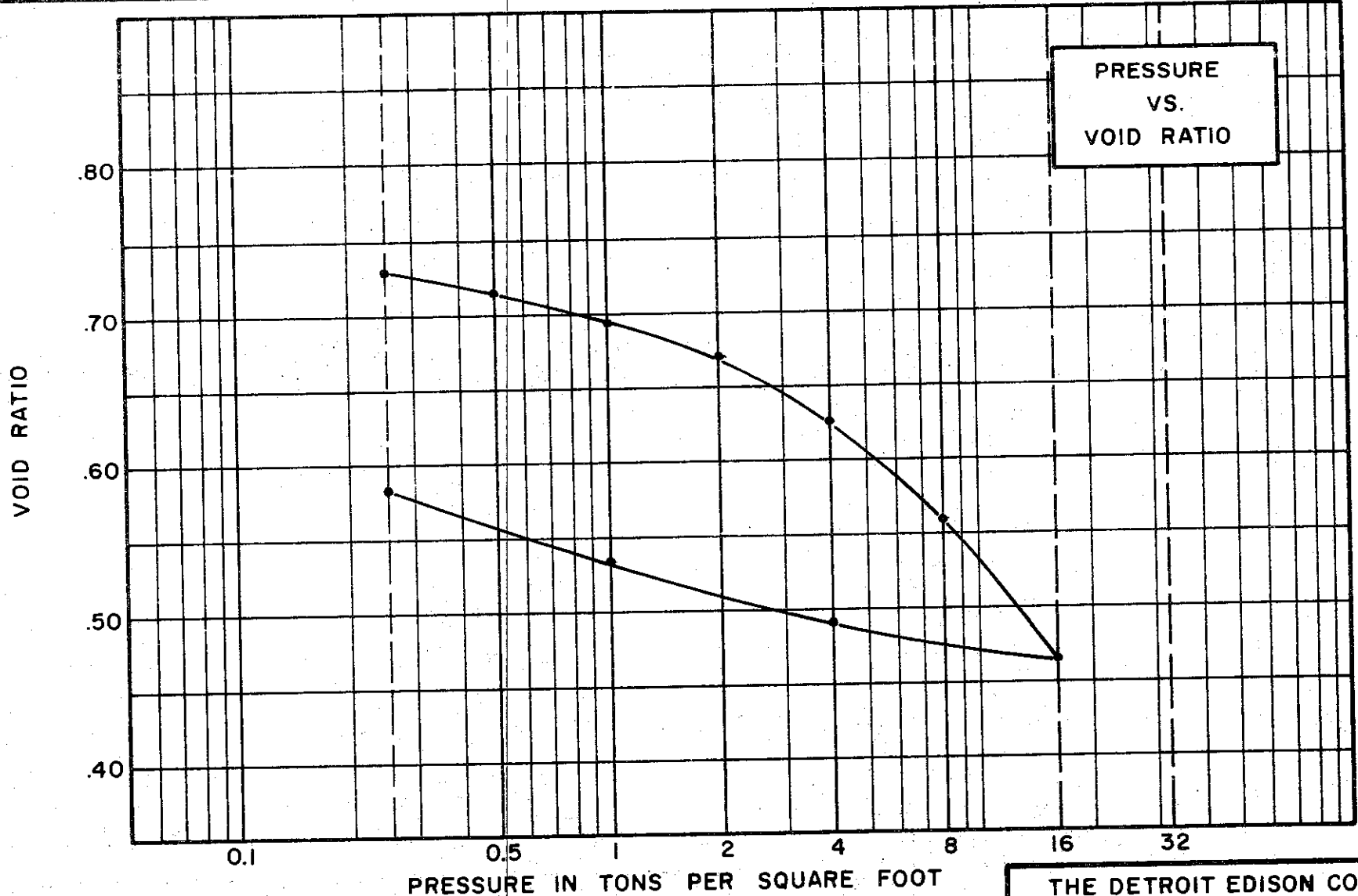
TIME IN MINUTES

SOIL PROPERTIES		BORING NO. <u>60</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>2</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>9.8' TO 10.0'</u>
INITIAL WATER CONTENT	<u>30.0%</u>	
FINAL WATER CONTENT	<u>28.8%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.787</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-531



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL)  
SPECIFIC GRAVITY 2.73  
WATER CONTENT, INITIAL 27.9% FINAL 25.5%  
ATTERBERG LIMITS:  
LIQUID LIMIT 40% PLASTIC LIMIT 19%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.744

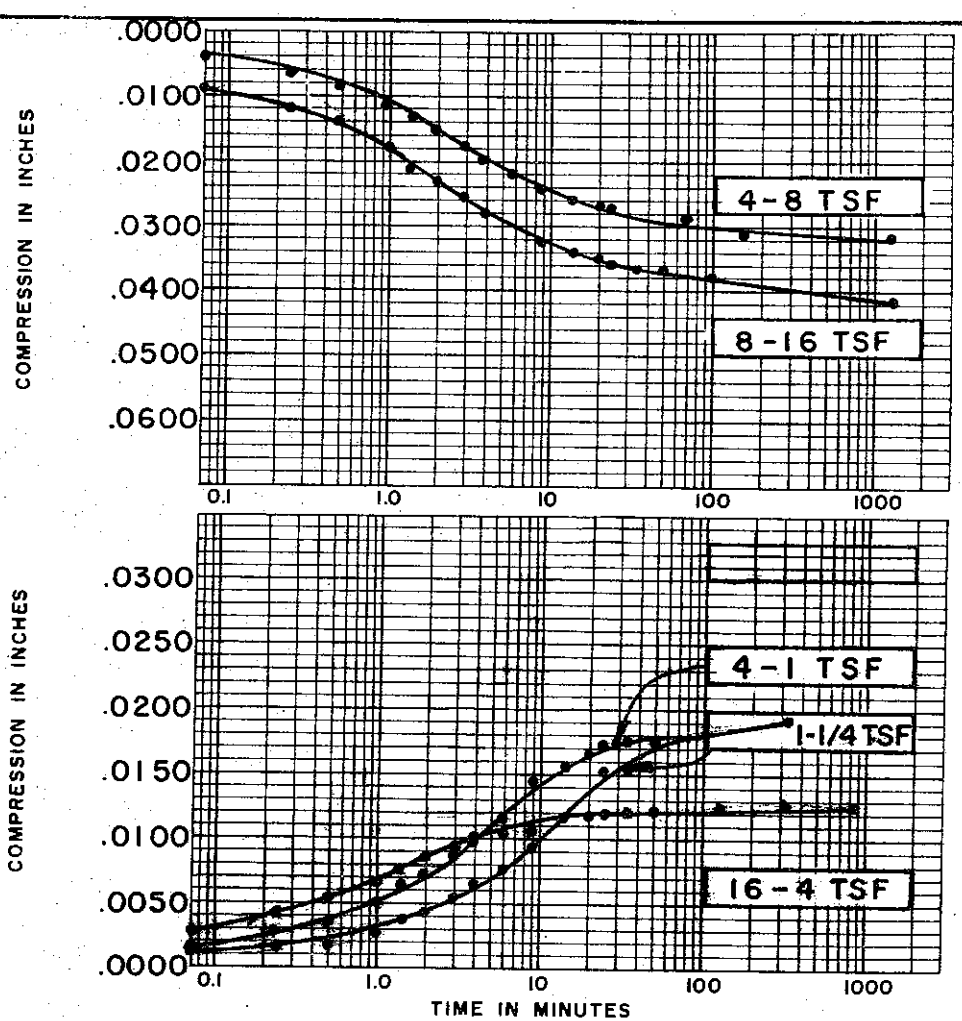
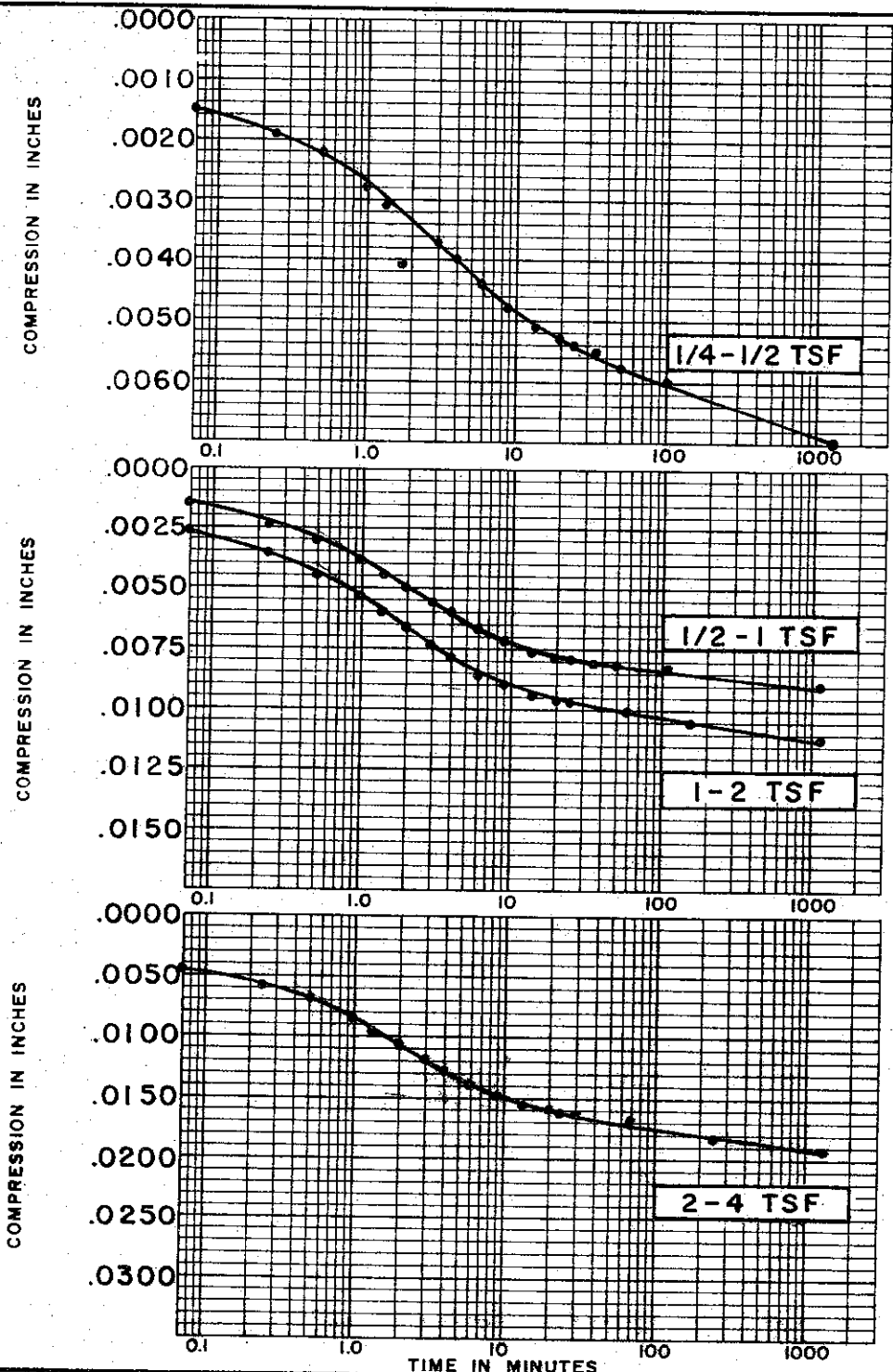
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 60 TEST NO. C56.1  
SAMPLE NO. 16 DATE JAN. 1974  
DEPTH 85.5'



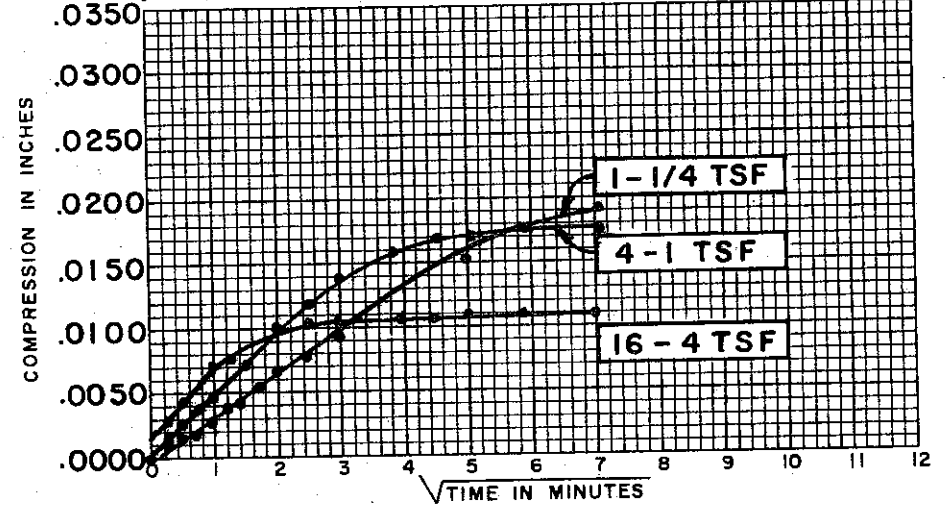
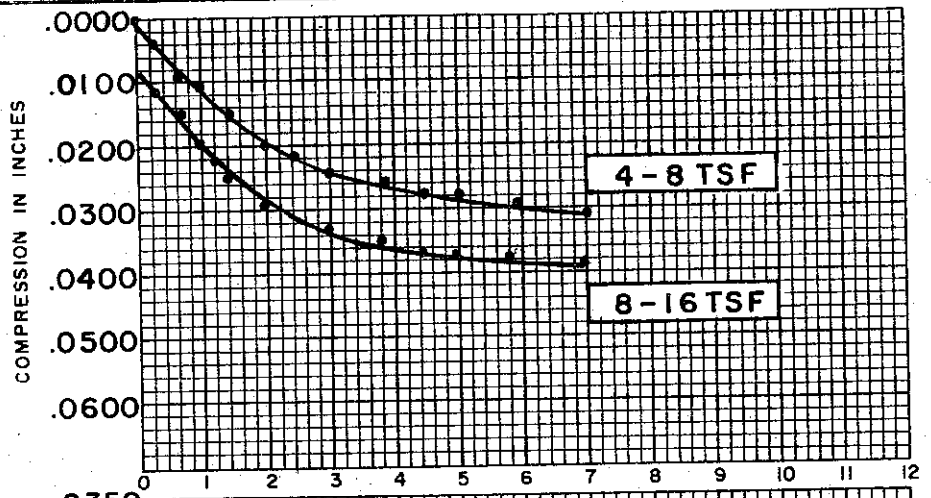
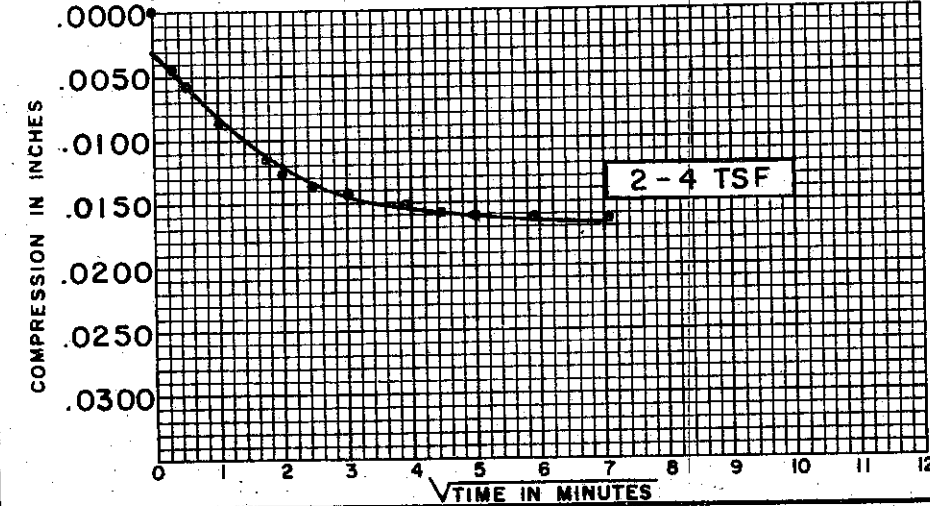
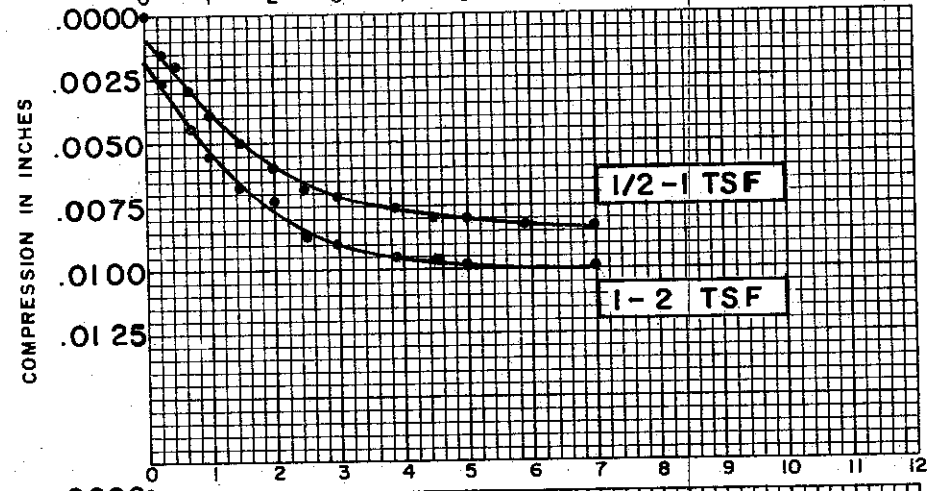
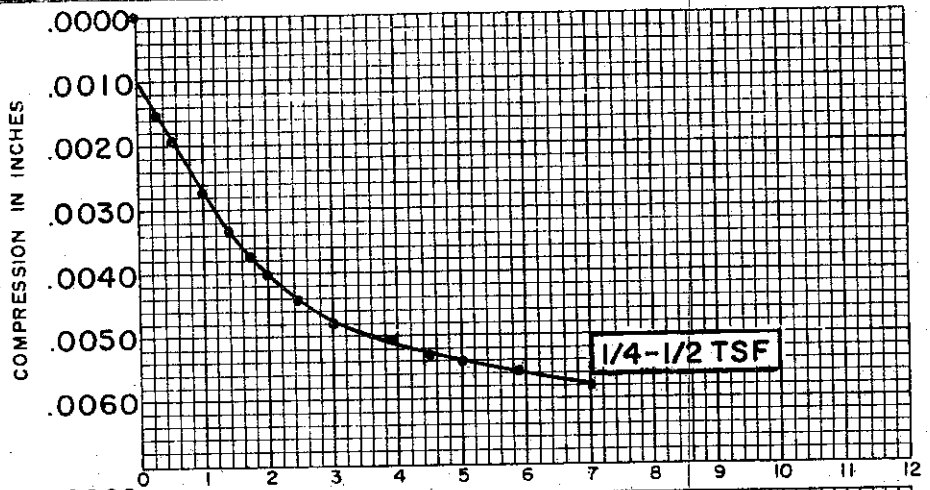
C-533



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	27.9 %
FINAL WATER CONTENT	25.5 %
BORING NO.	60
SAMPLE NO.	16
DEPTH	85.5'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

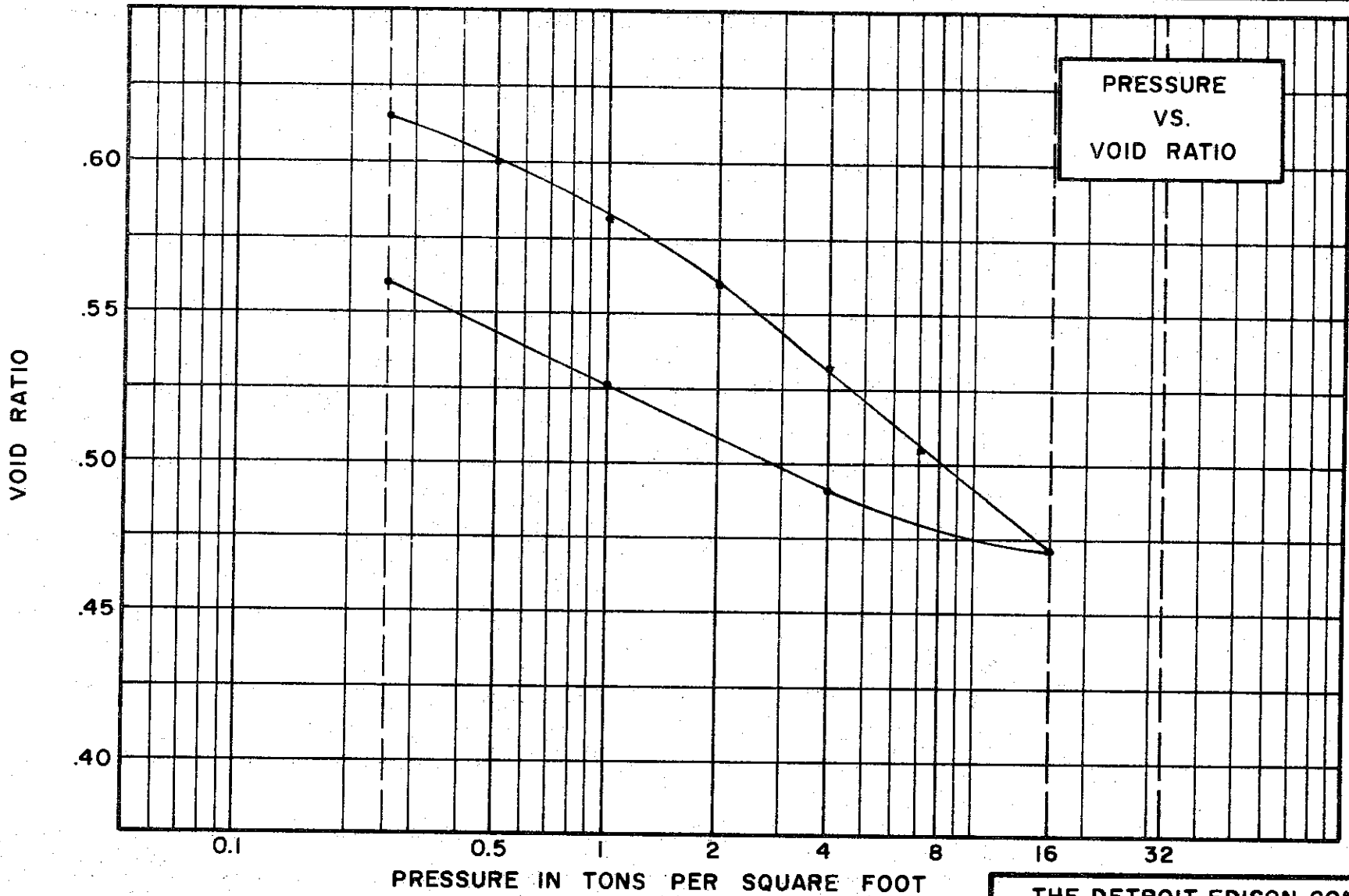
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	27.9 %
FINAL WATER CONTENT	25.5 %
BORING NO.	60
SAMPLE NO.	16
DEPTH	85.5'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 23.6% FINAL 23.4%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 53% PLASTIC LIMIT 24%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

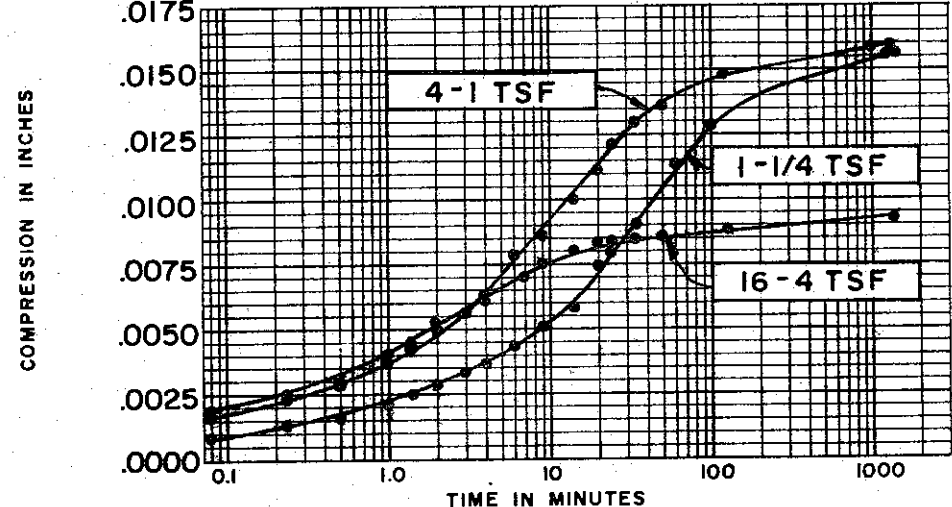
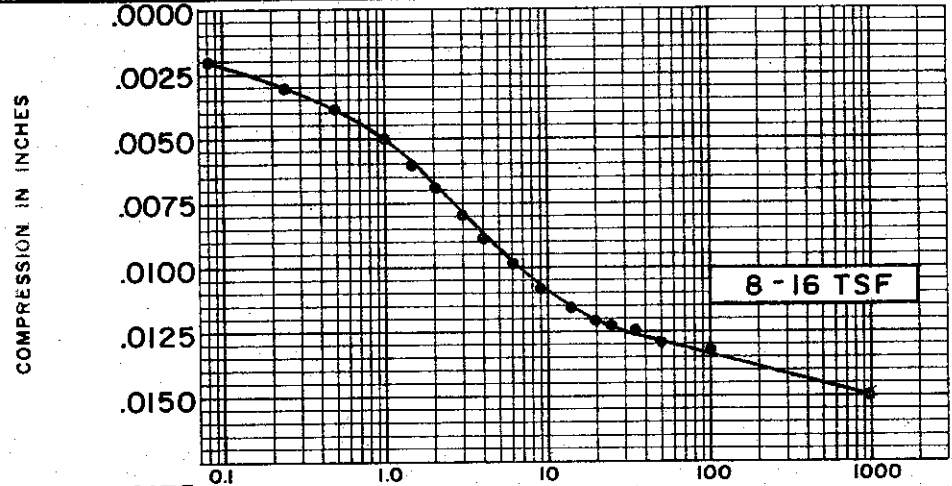
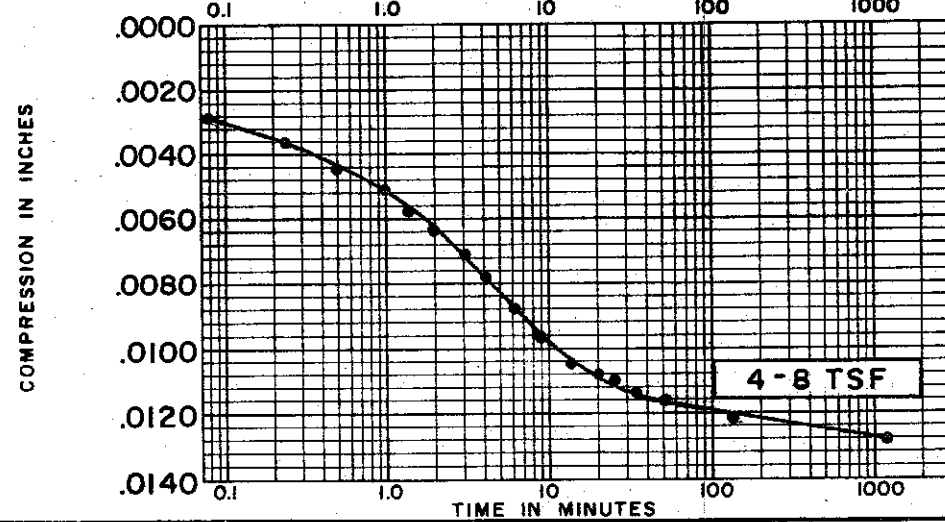
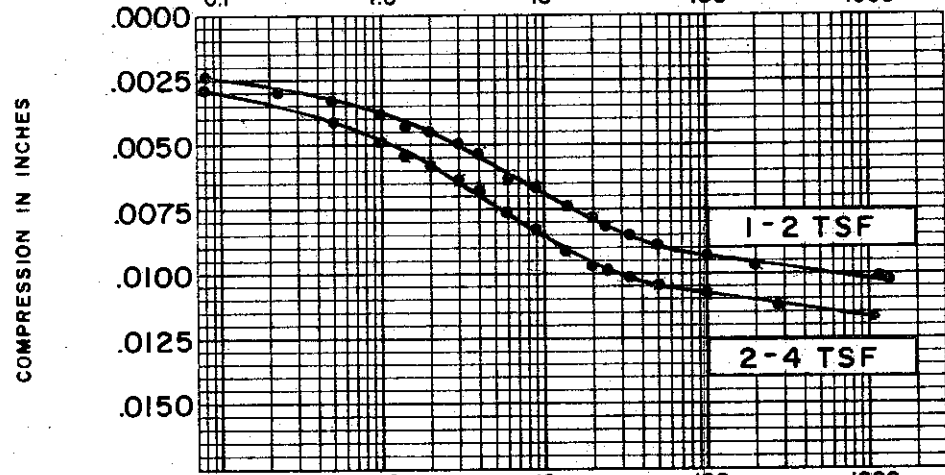
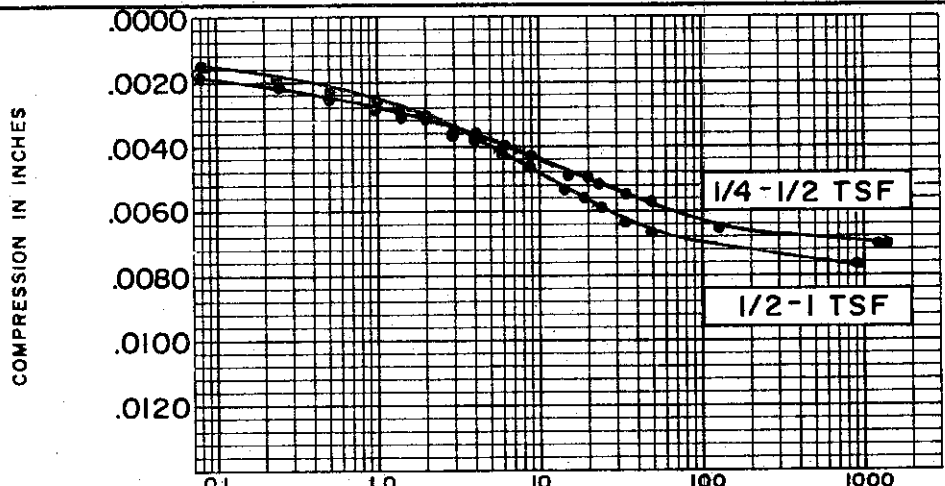
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 105 TEST NO. C373.1  
 SAMPLE NO. 1 DATE APRIL 74  
 DEPTH 5.1' TO 5.4'

C-535

C-536



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

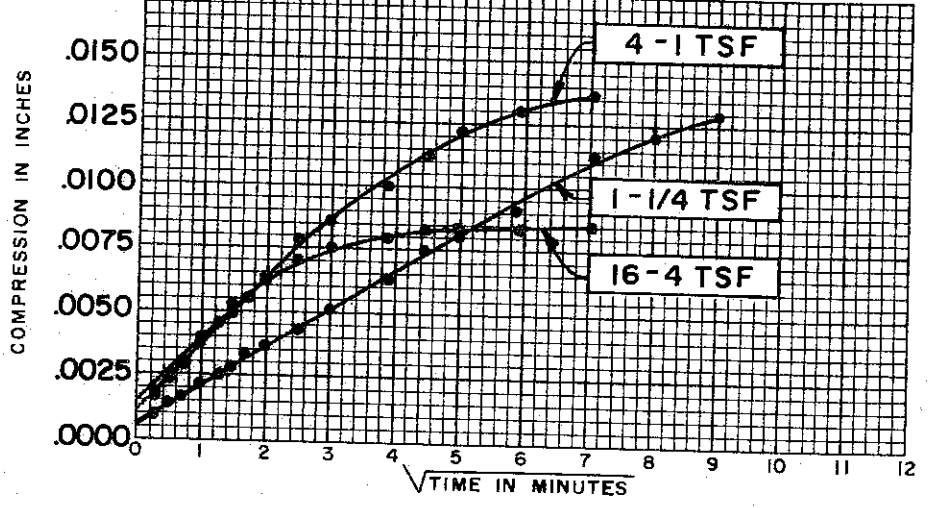
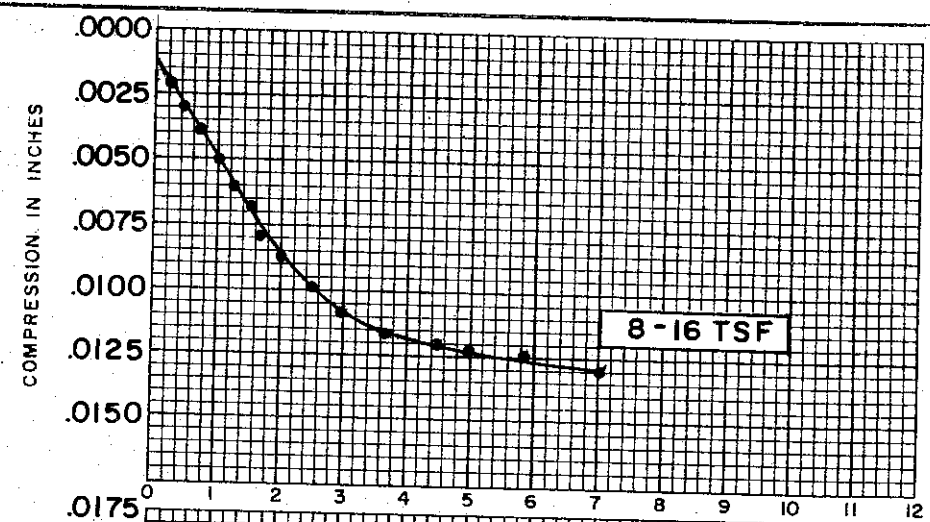
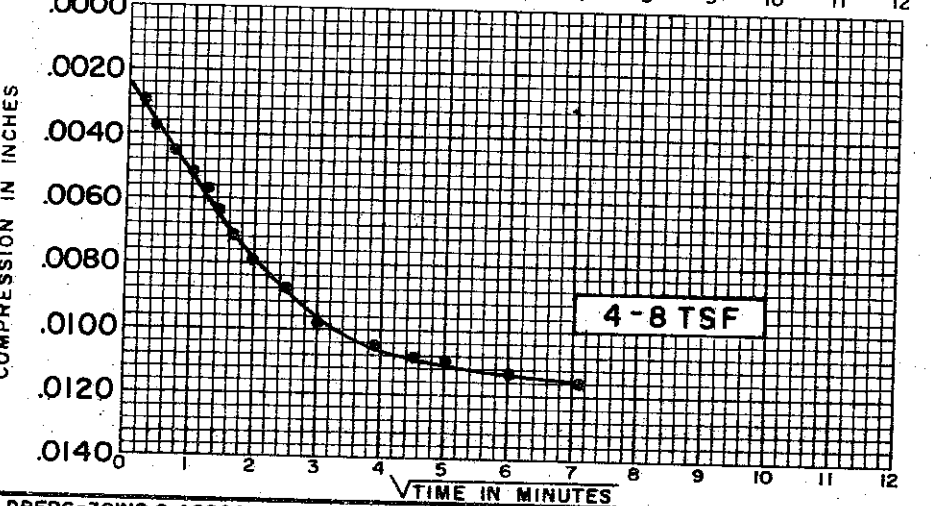
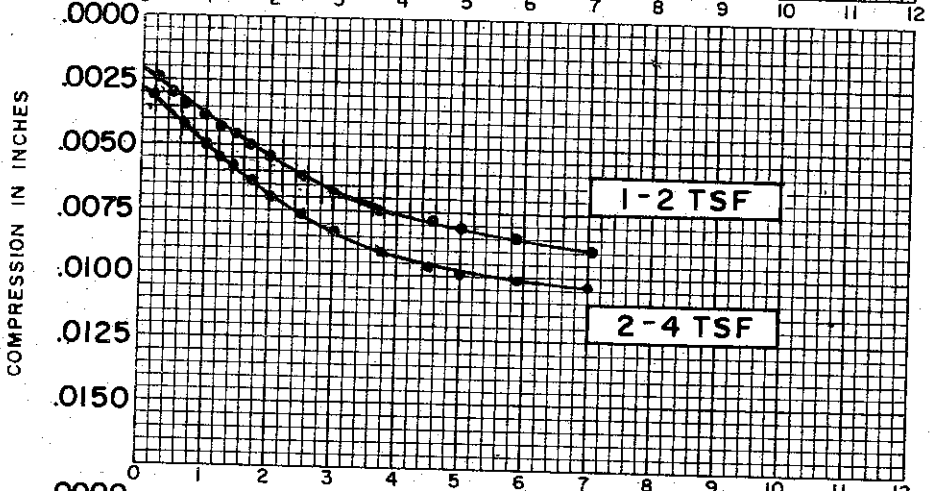
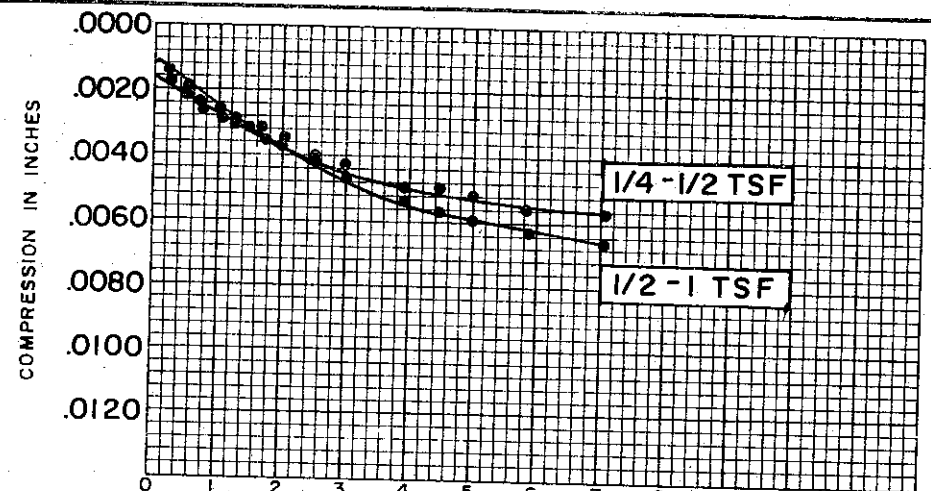
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-537



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

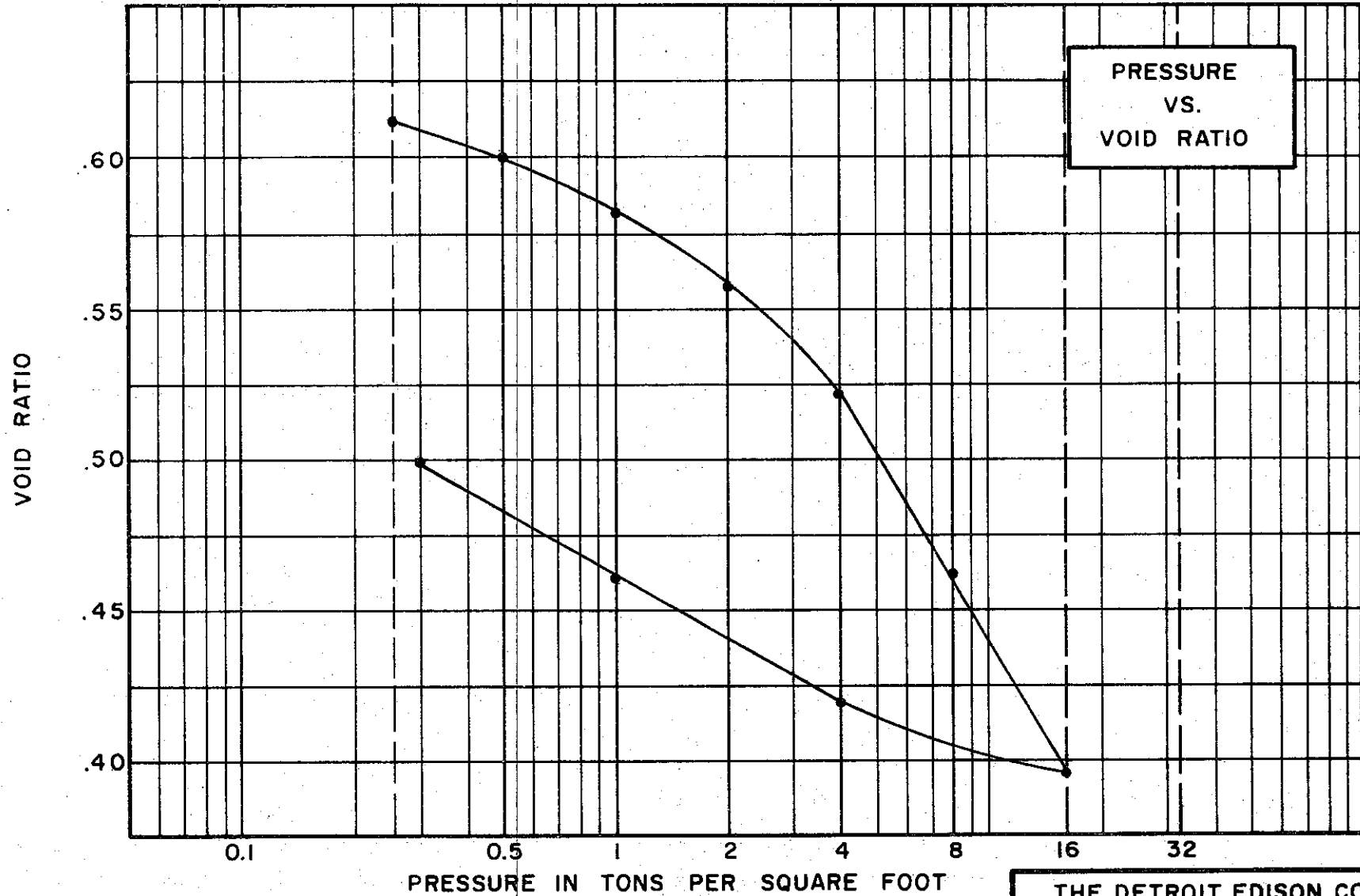
BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 23.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

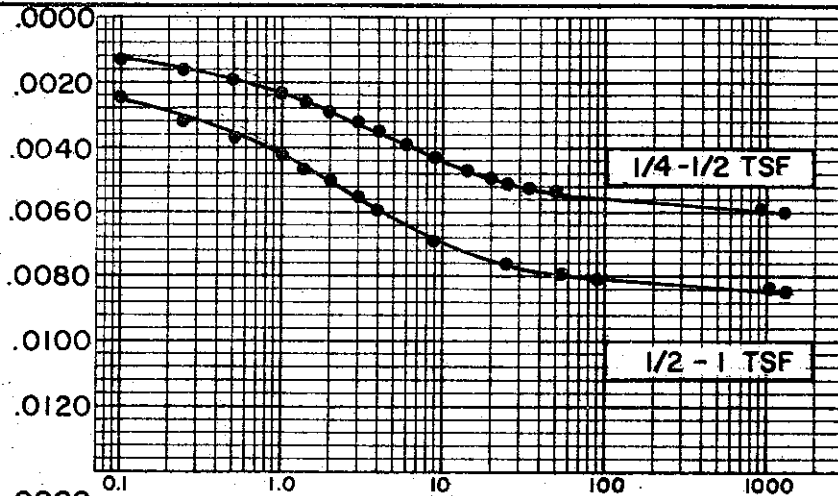
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

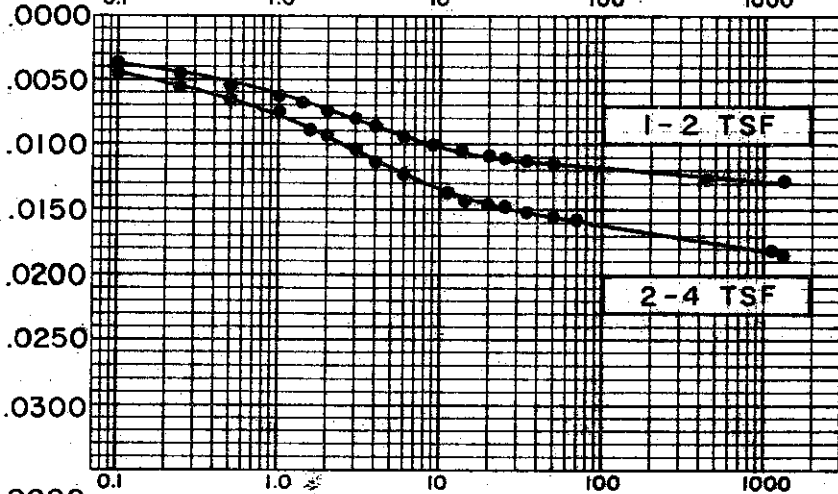
BORING NO. 105 TEST NO. C380.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 70.9' TO 71.2'

C-539

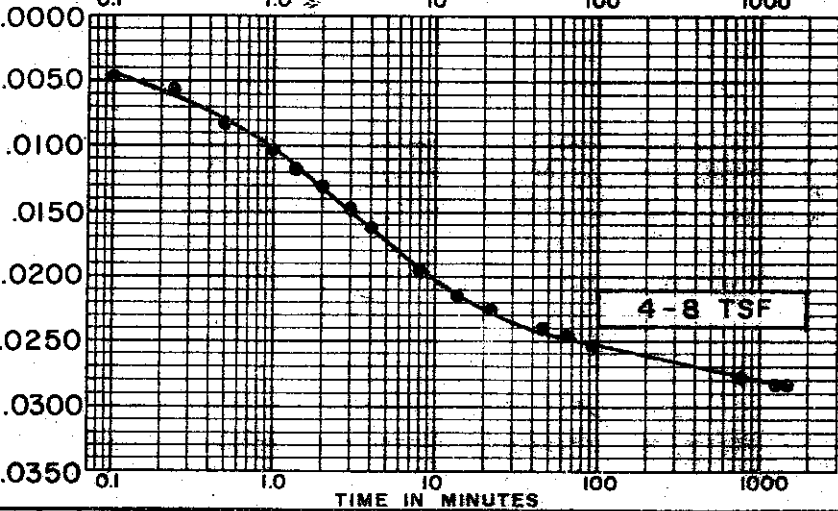
COMPRESSION IN INCHES



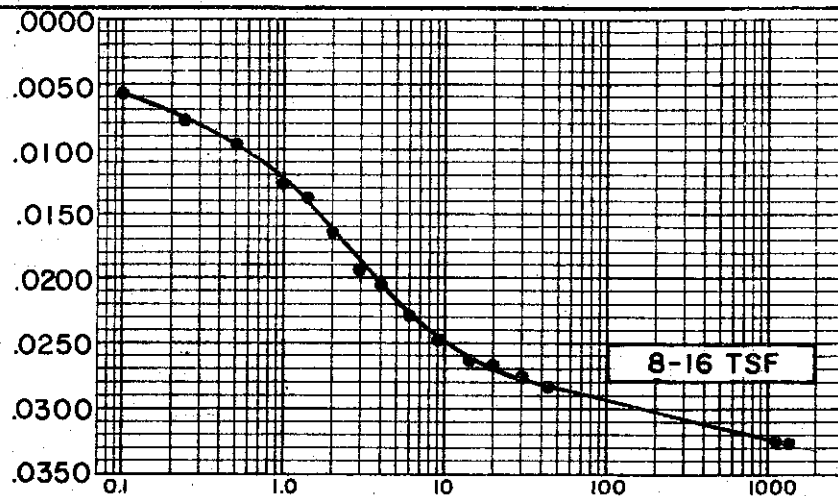
COMPRESSION IN INCHES



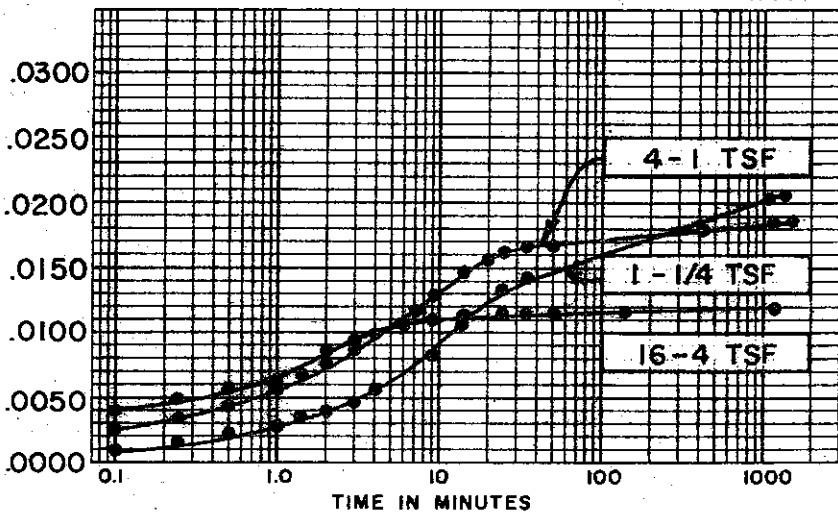
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 23.7 %  
 FINAL WATER CONTENT 22.5 %

BORING NO. 105  
 SAMPLE NO. 8  
 DEPTH 70.9' TO 71.2'

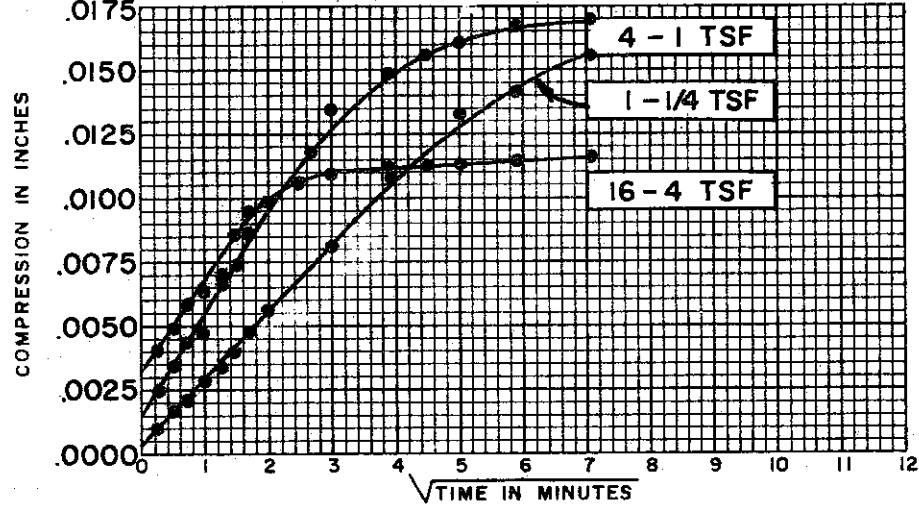
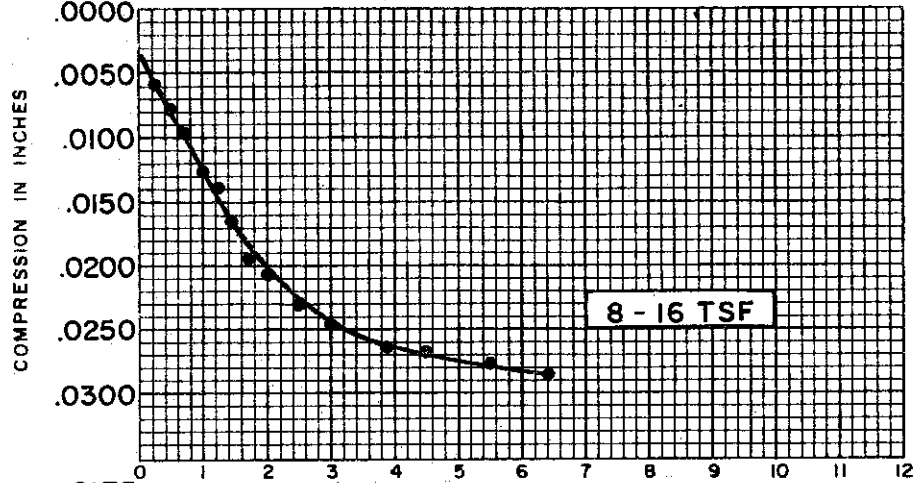
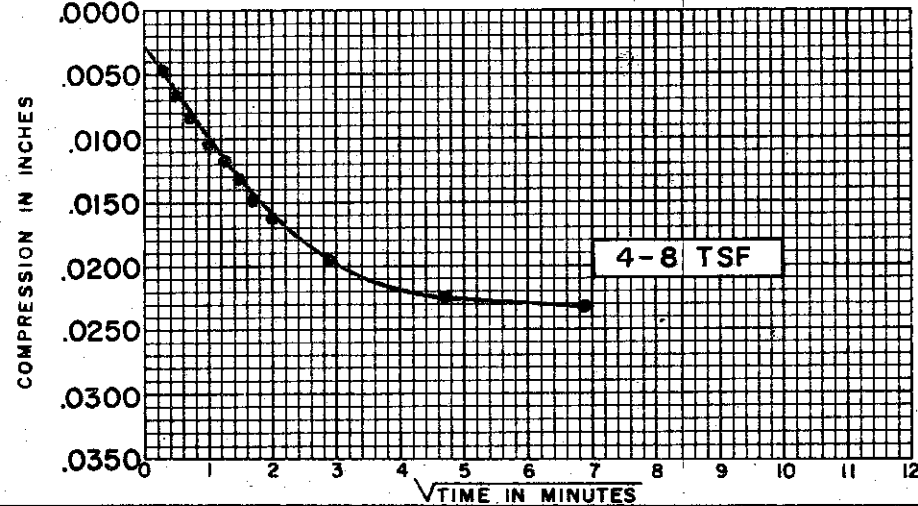
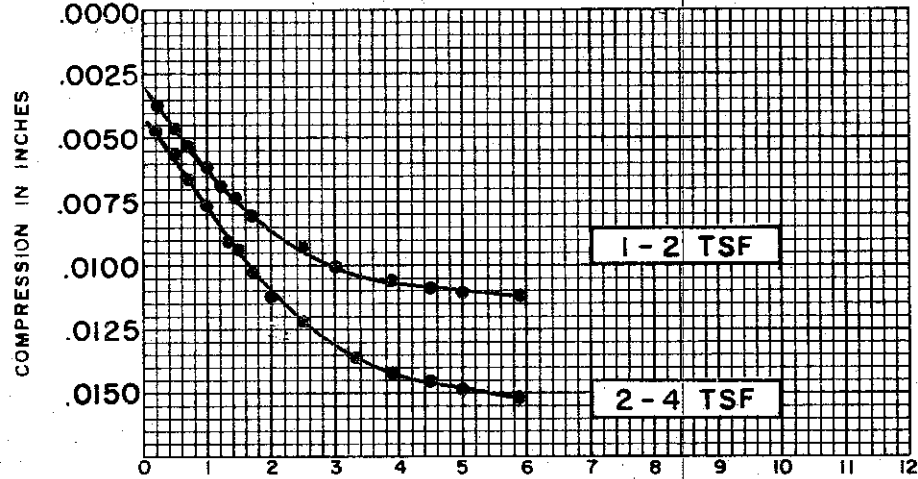
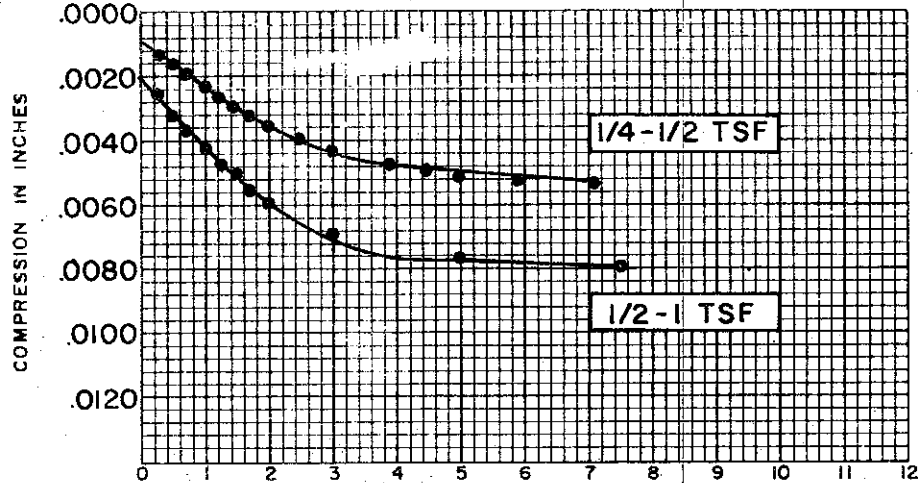
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-540



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 23.7 %  
 FINAL WATER CONTENT 22.5 %

BORING NO. 105  
 SAMPLE NO. 8  
 DEPTH 70.9' TO 71.2'

**TEST DATA**

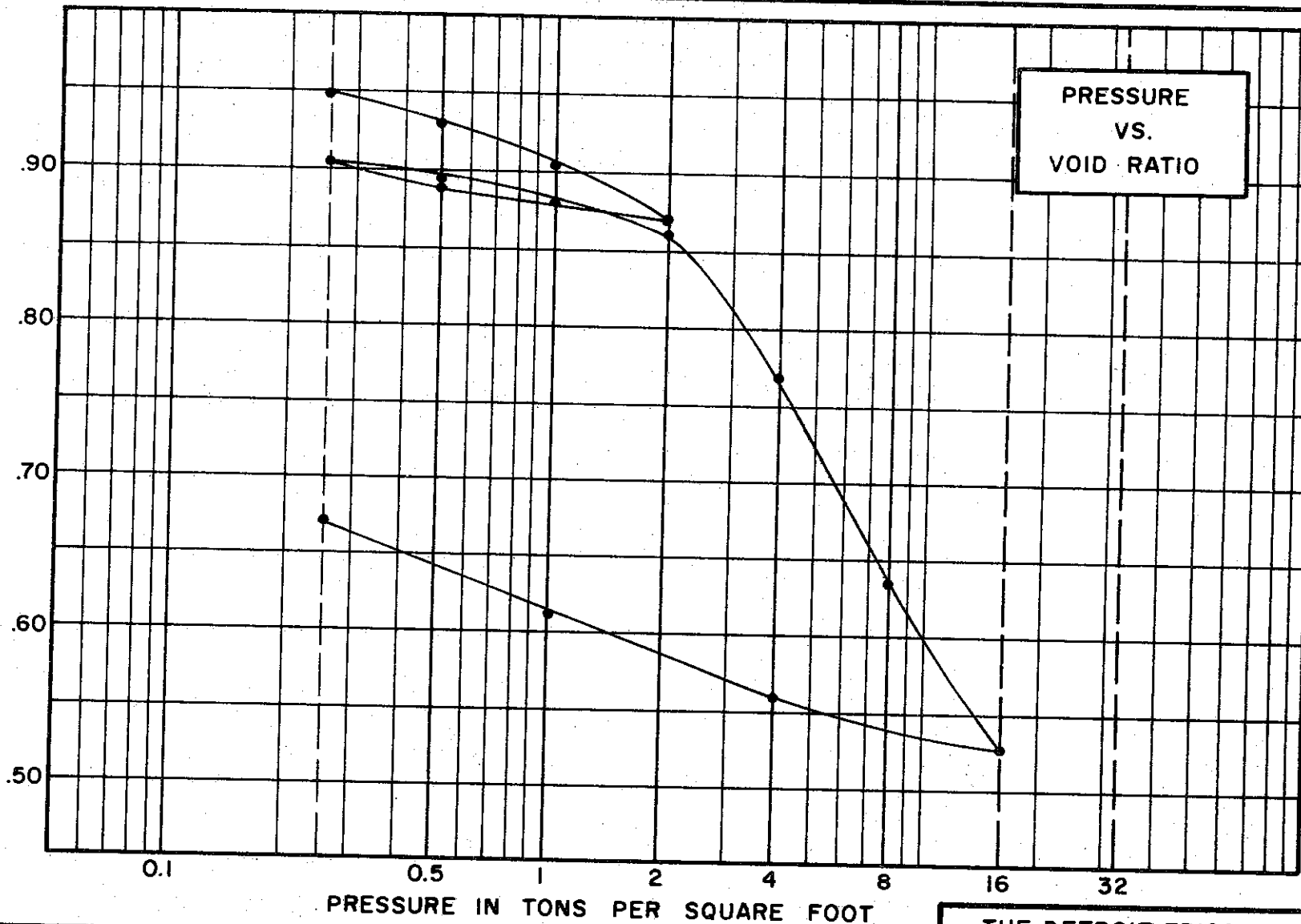
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 36.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

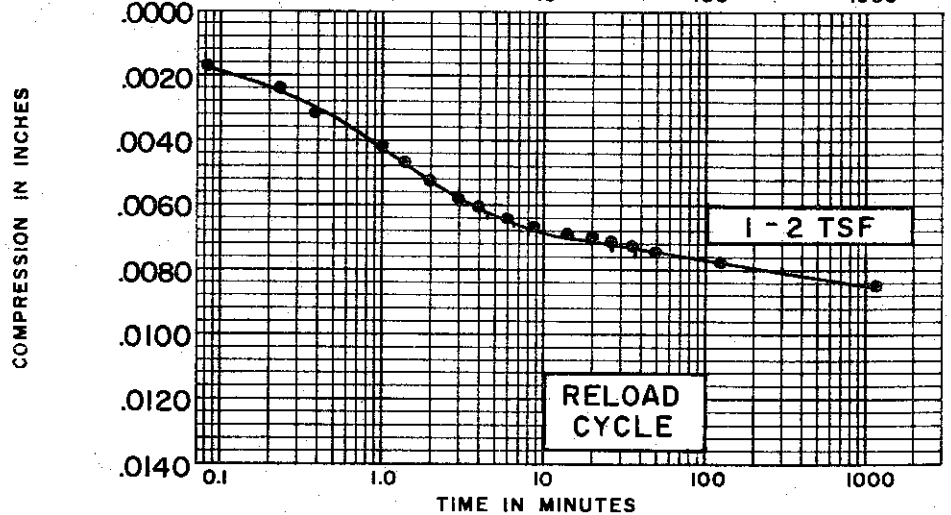
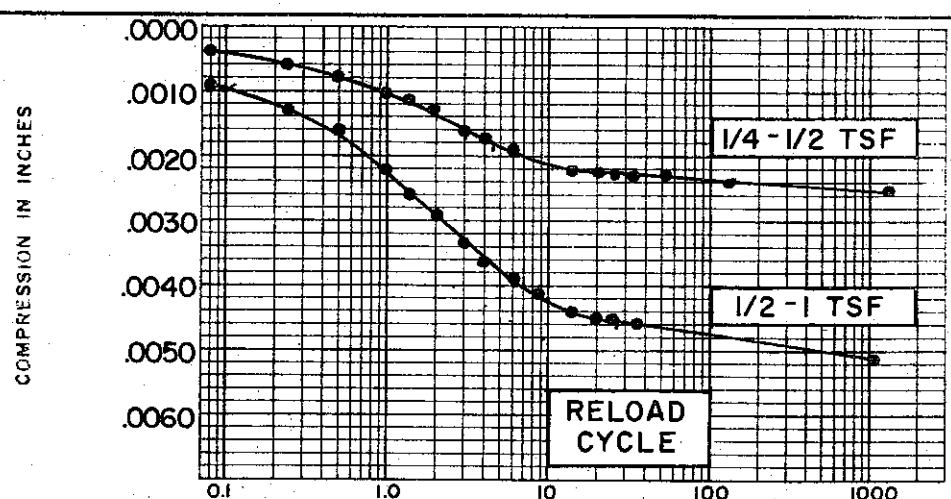
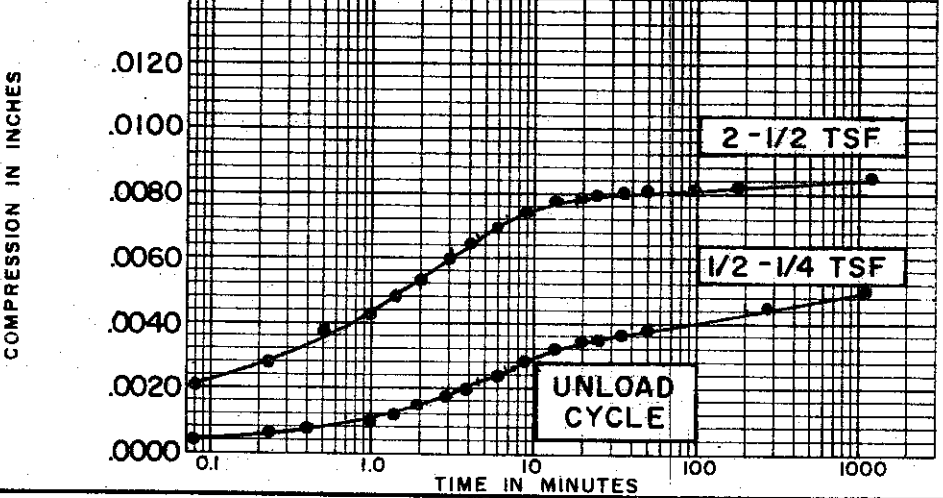
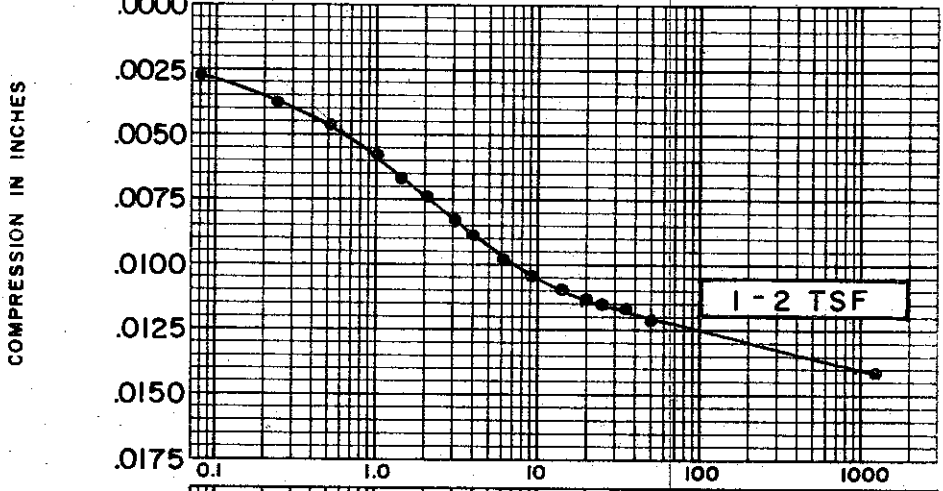
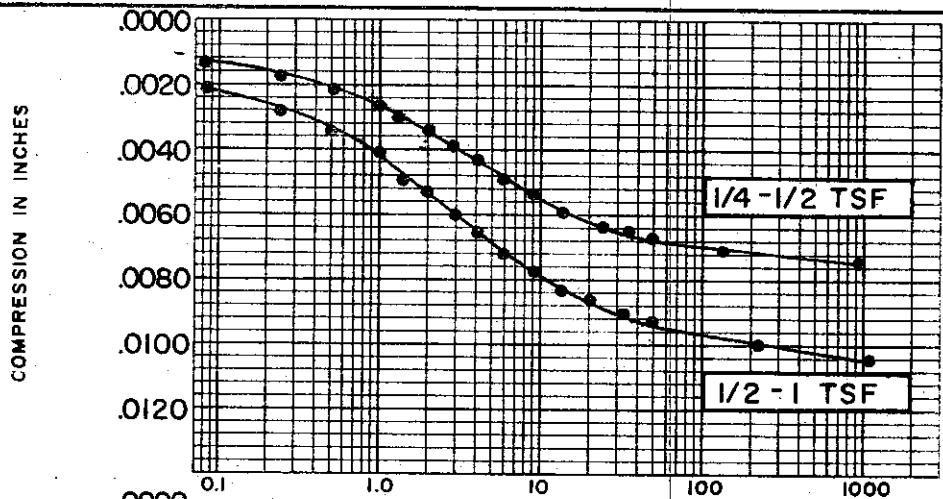
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C256.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 38.6' TO 38.9'

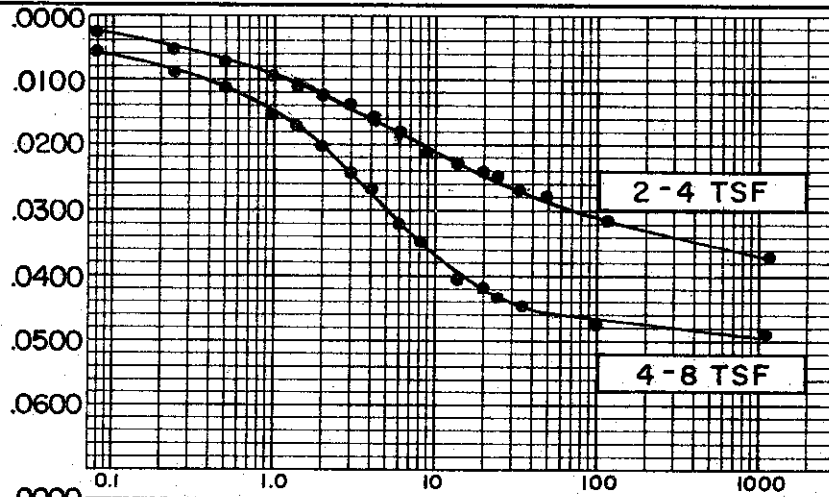
GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

C-541

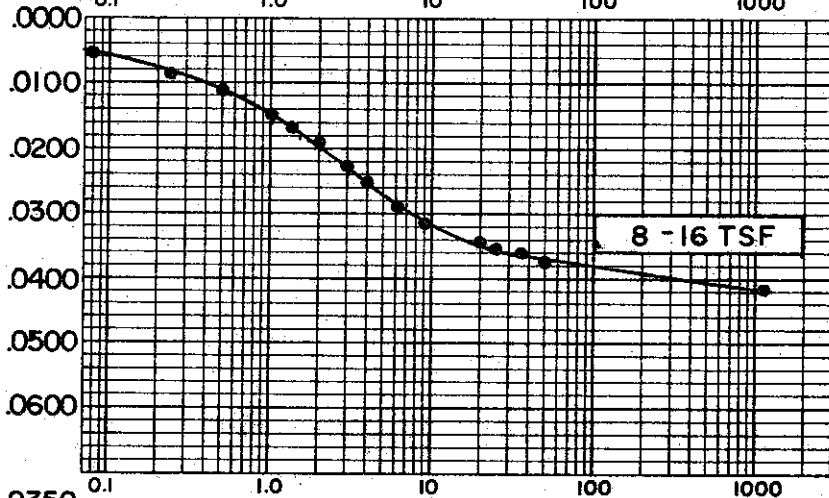


SOIL PROPERTIES		BORING NO.	118
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO.	5
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH	<u>38.6' TO 38.9'</u>
INITIAL WATER CONTENT	<u>36.9 %</u>		
FINAL WATER CONTENT	<u>    %    </u>		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	TIME VS. COMPRESSION CURVE	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	<u>0.969</u>	BELLE RIVER PLANT UNITS I & II	
		FILE 1255	

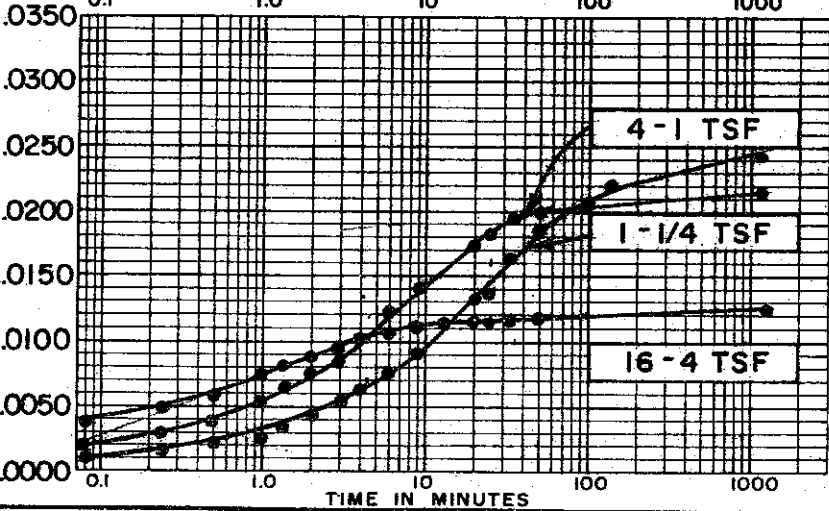
COMPRESSION IN INCHES



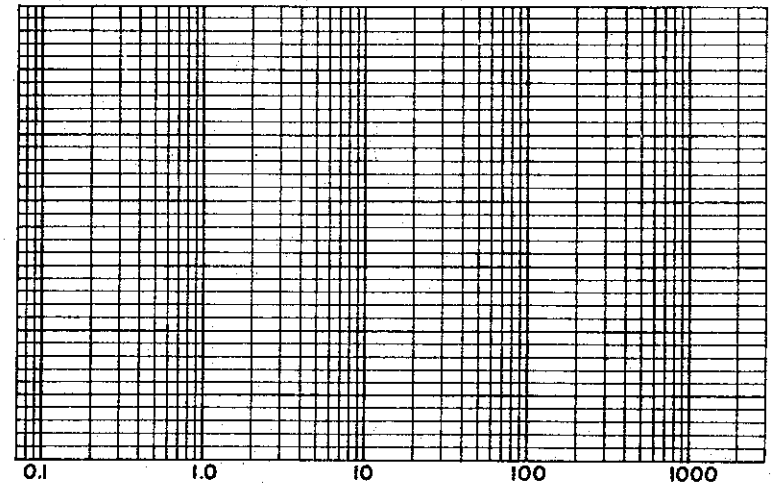
COMPRESSION IN INCHES



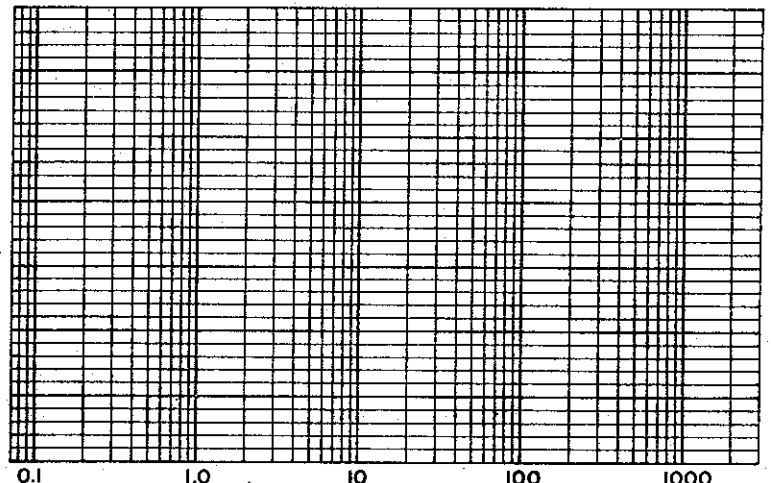
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT     %

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

**TEST DATA**

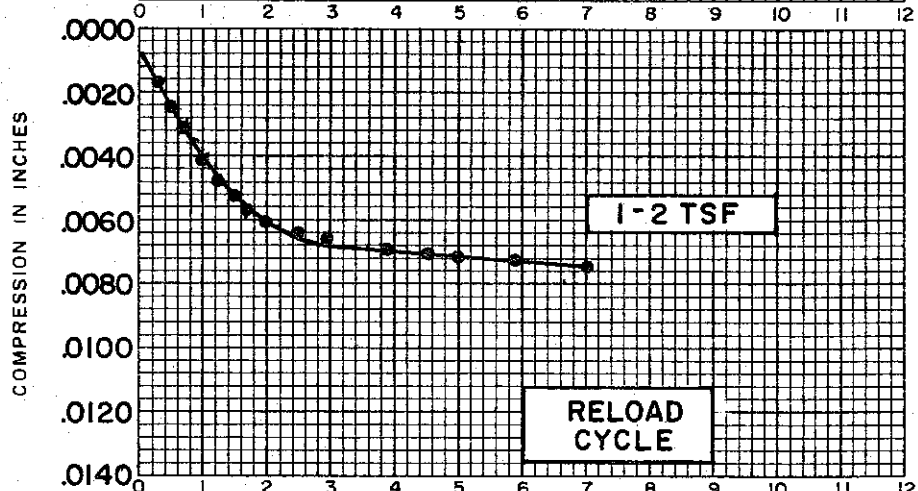
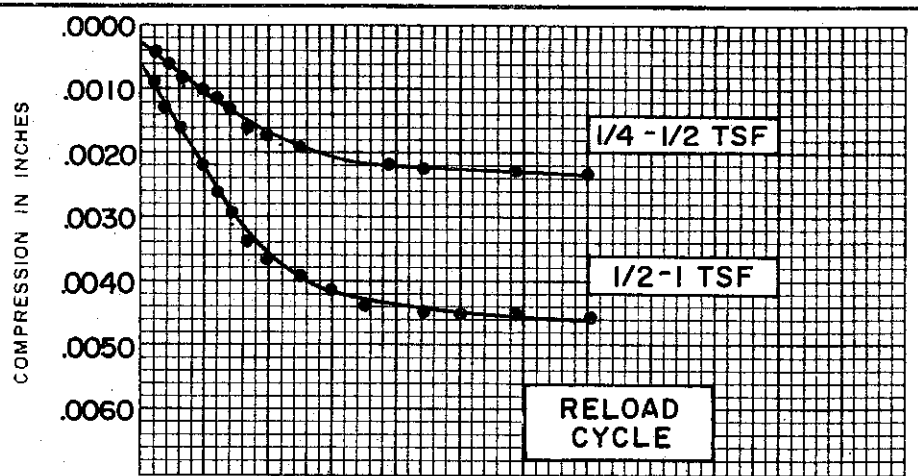
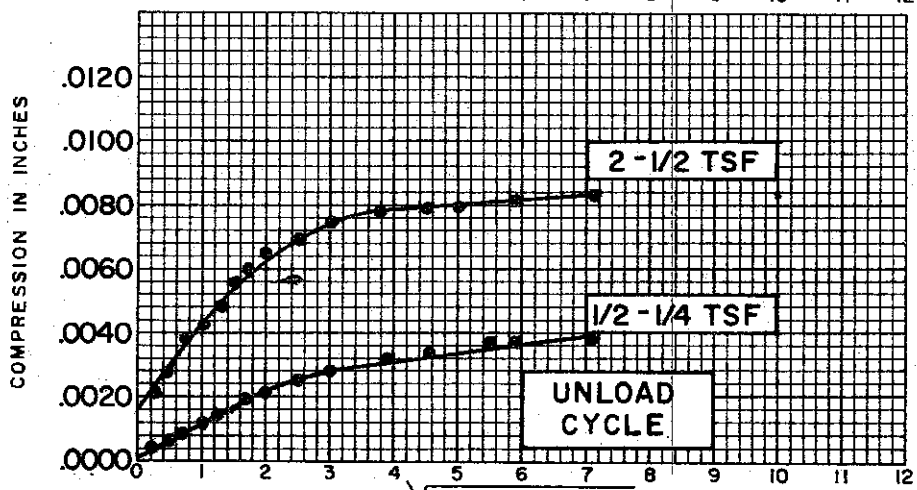
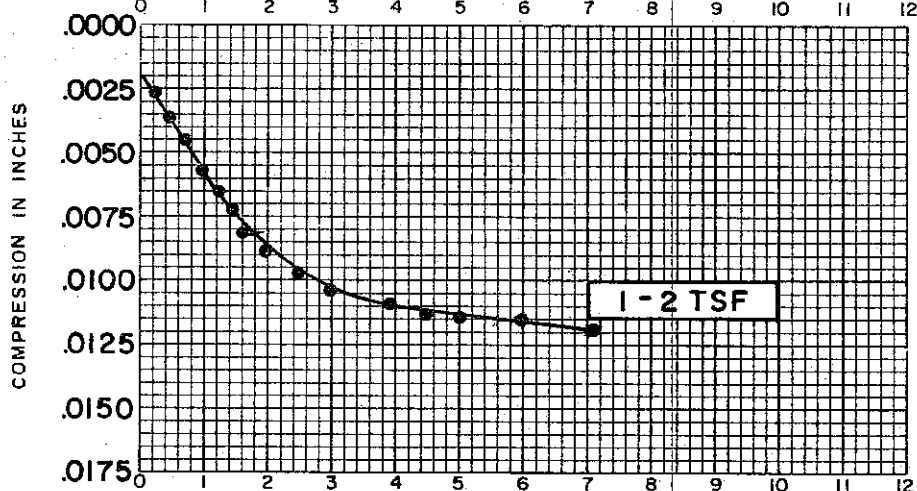
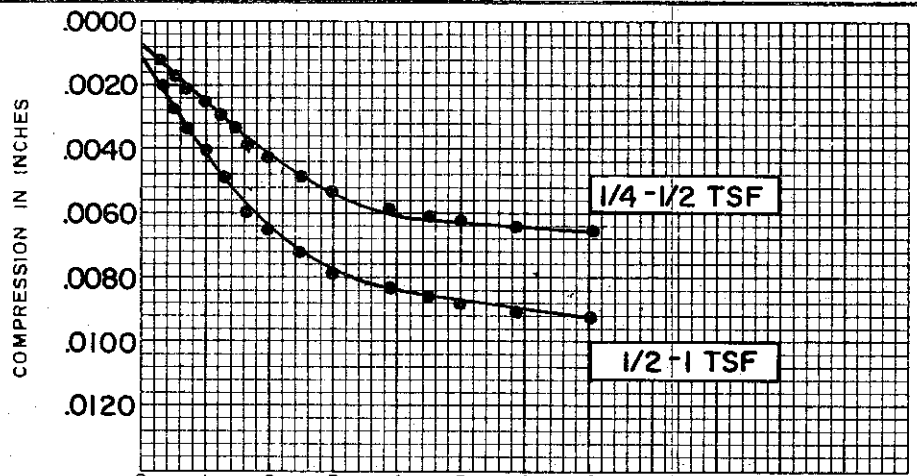
INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

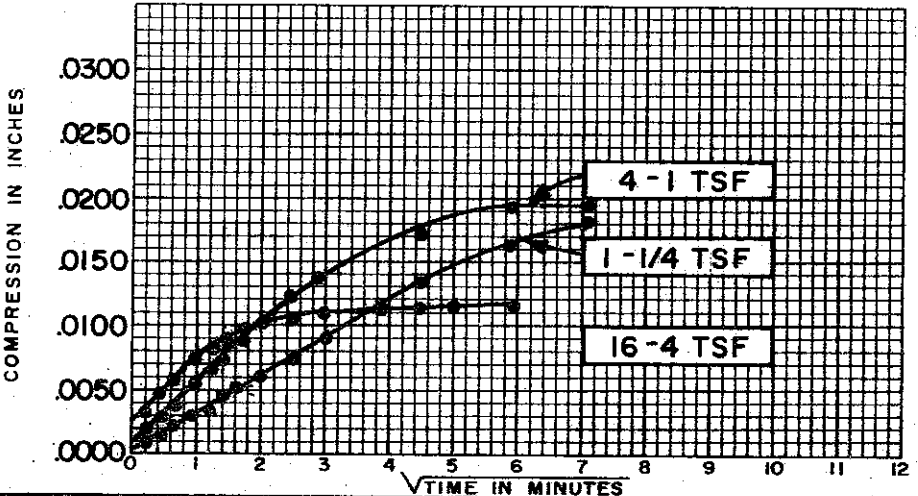
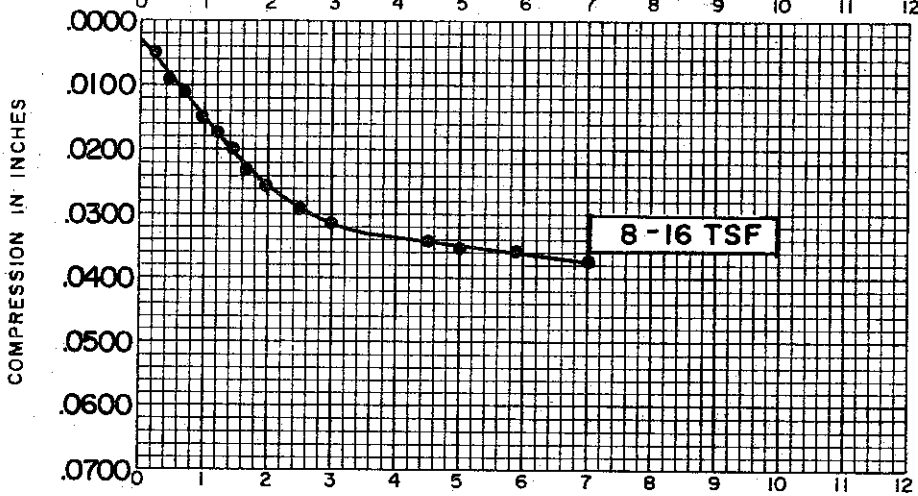
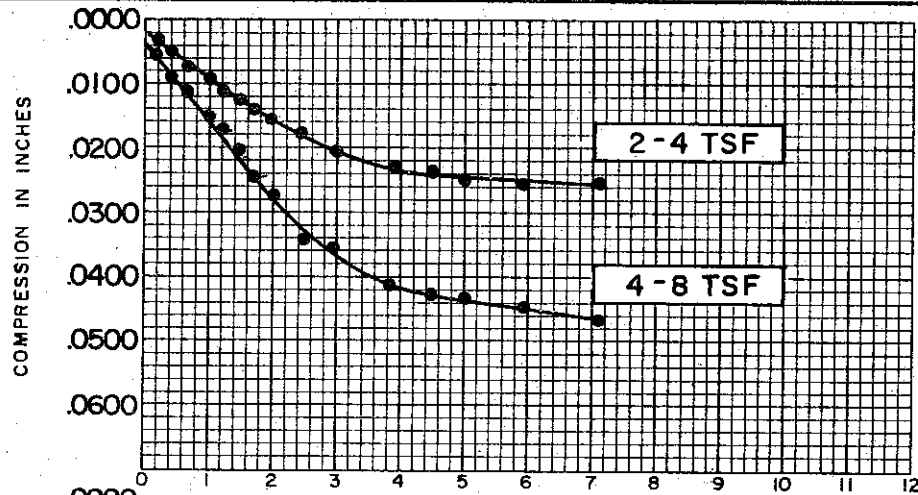
C-543



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	36.9 %
FINAL WATER CONTENT	%
BORING NO.	118
SAMPLE NO.	5
DEPTH	38.6' TO 38.9'

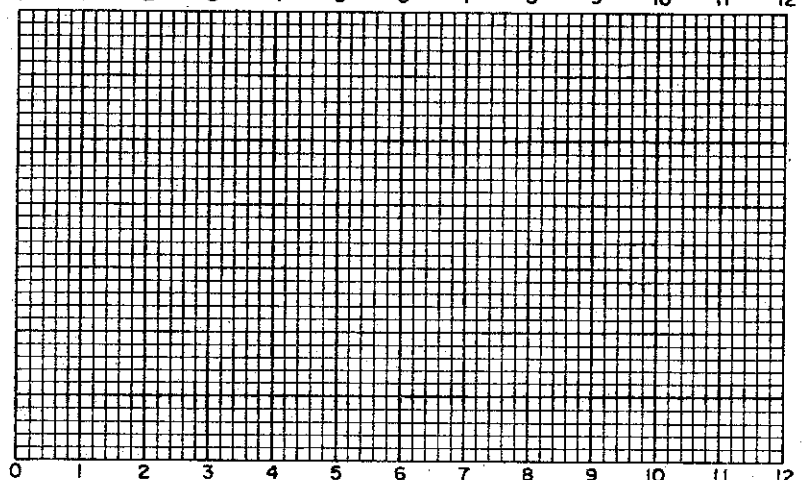
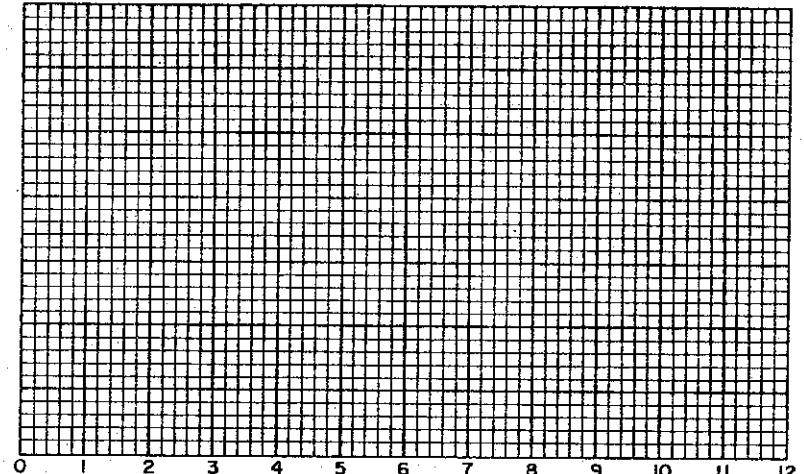
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.969

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 36.9 %  
FINAL WATER CONTENT       %      

BORING NO. 118  
SAMPLE NO. 5  
DEPTH 38.6' TO 38.9'

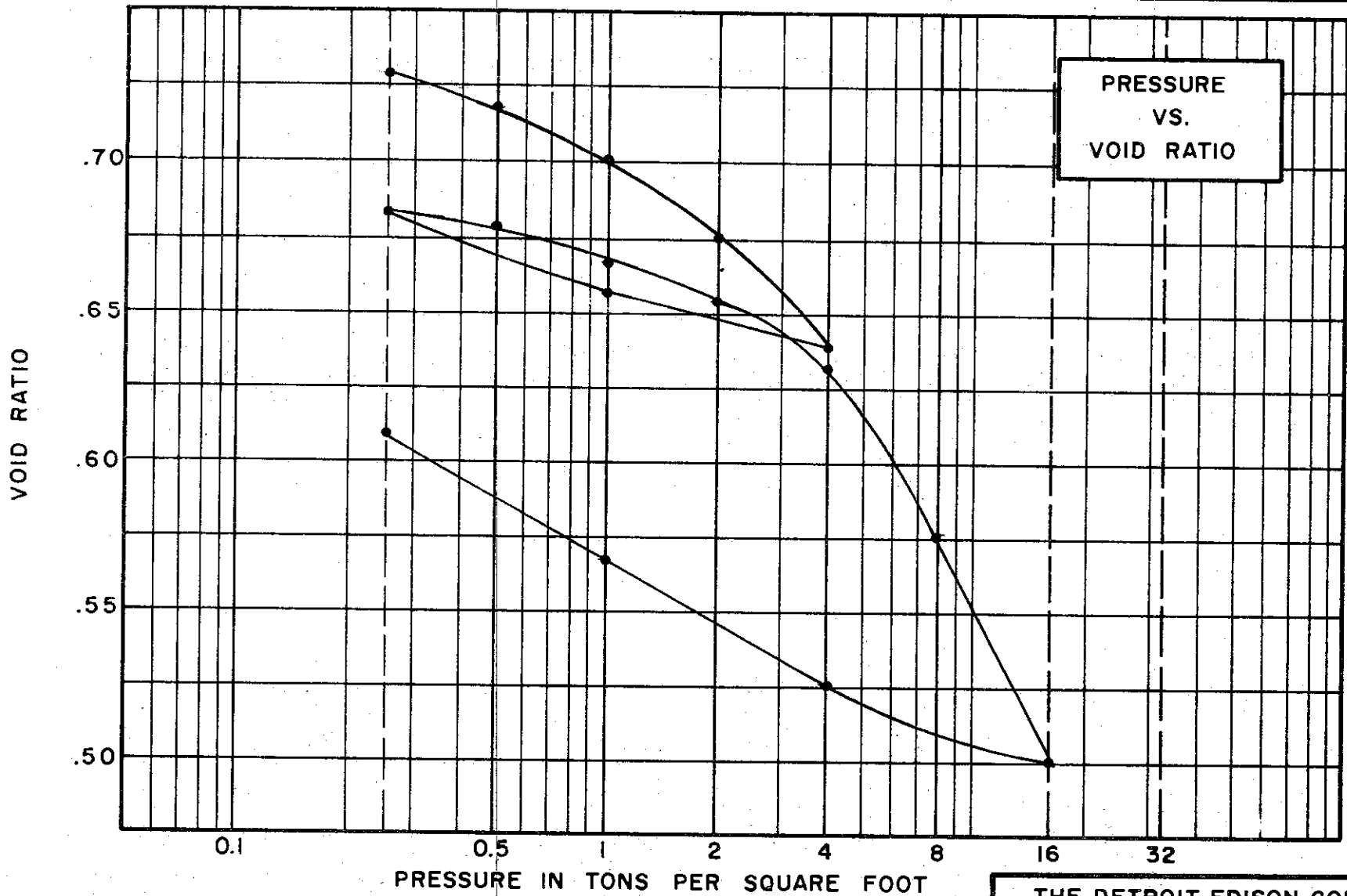
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-545



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 27.8%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

**TEST DATA**

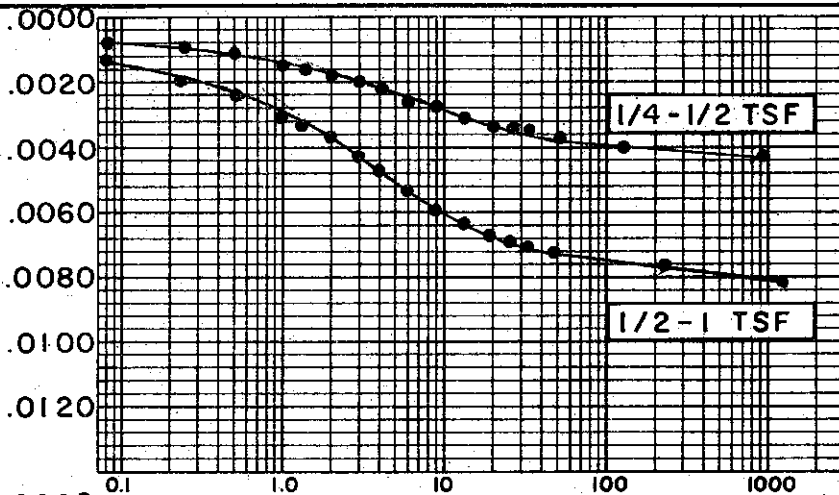
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

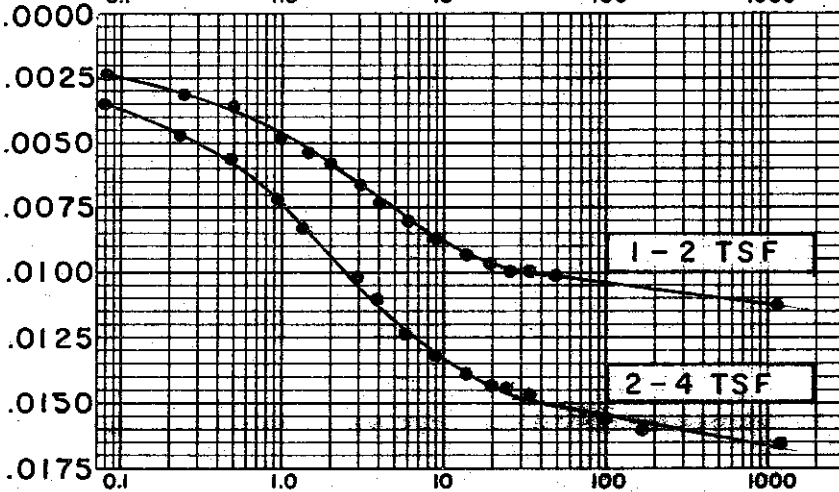
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C260.1  
 SAMPLE NO. 9 DATE JULY 1974  
 DEPTH 78.7' TO 79.0'

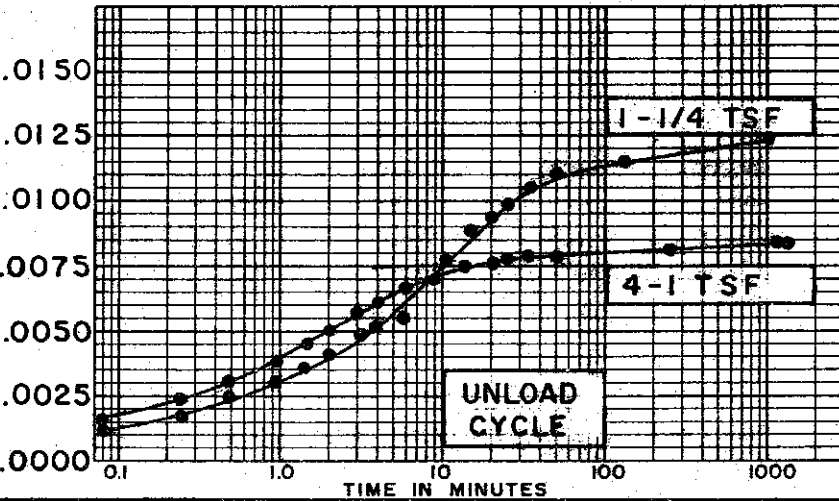
COMPRESSION IN INCHES



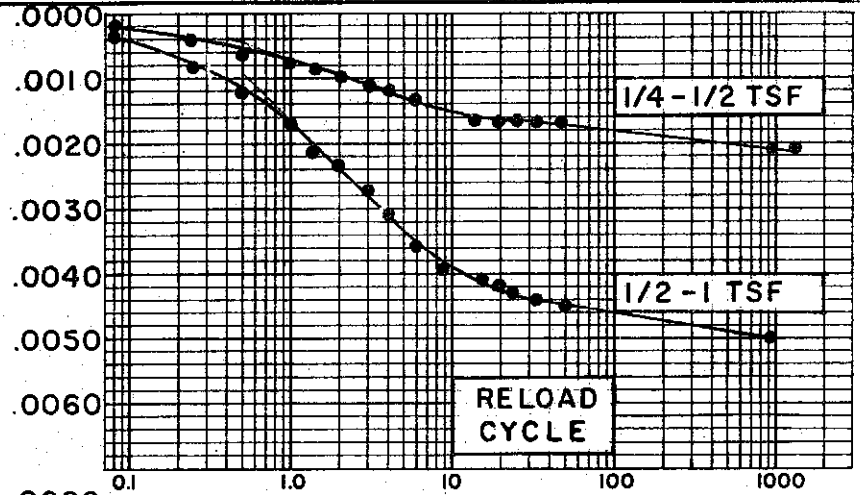
COMPRESSION IN INCHES



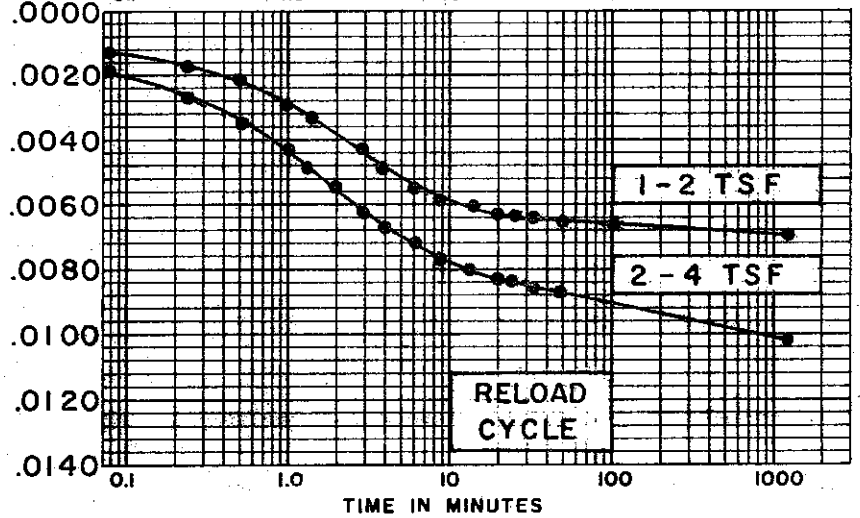
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

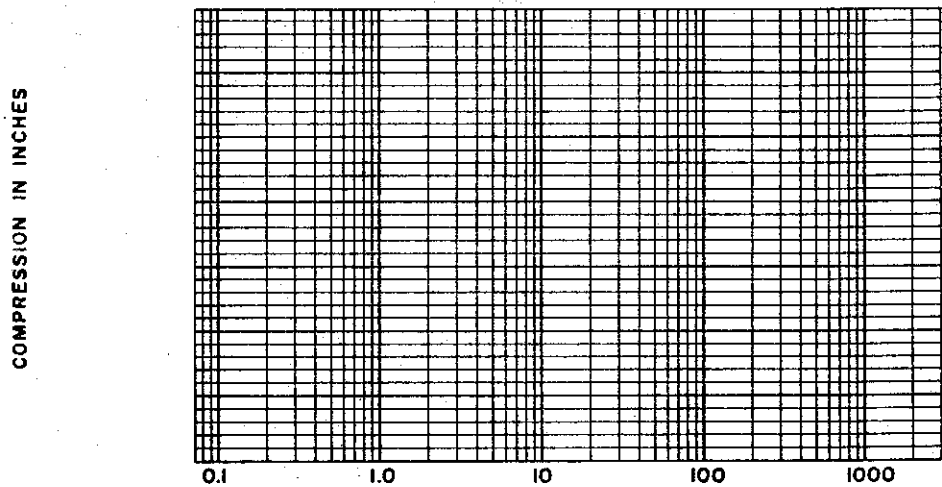
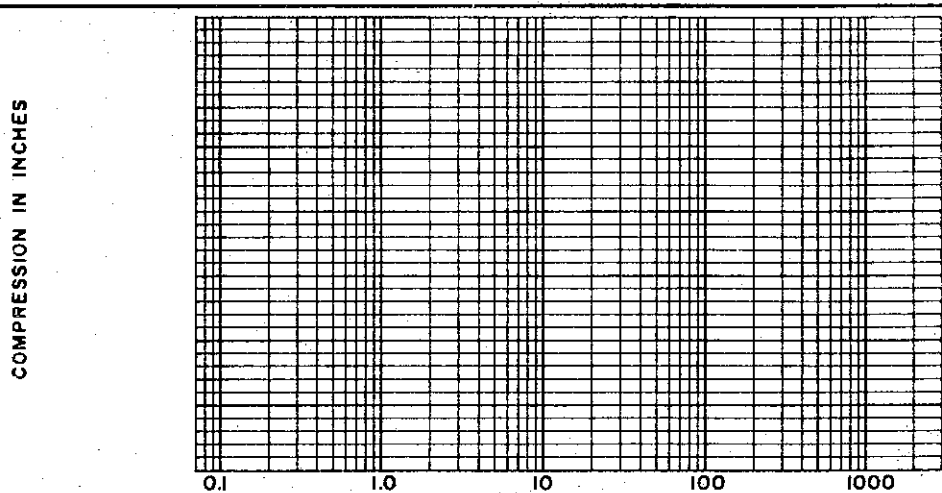
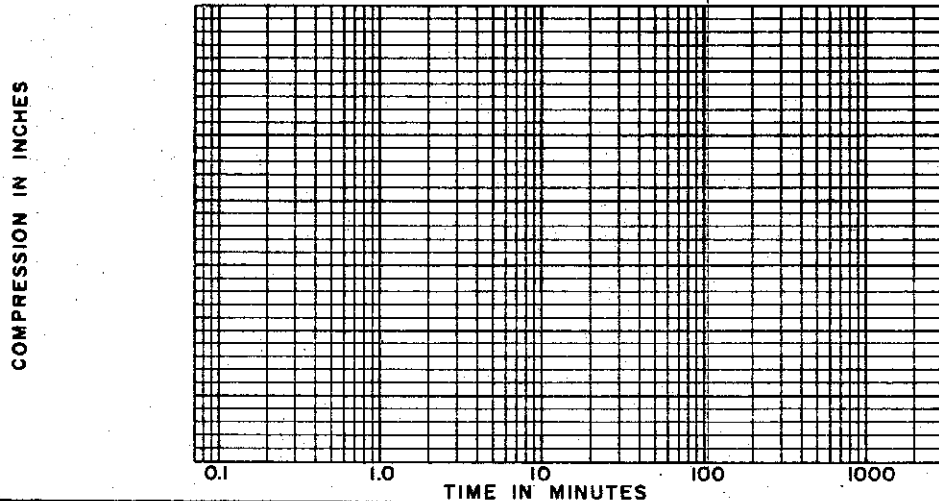
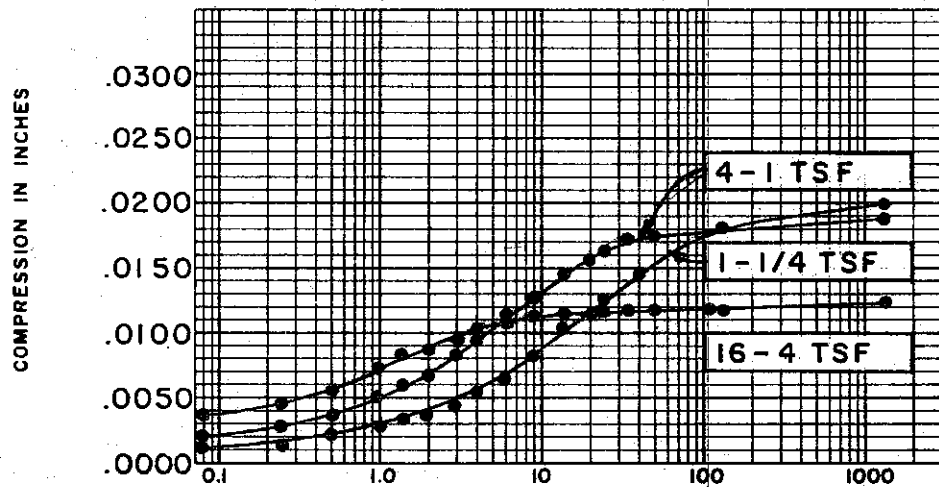
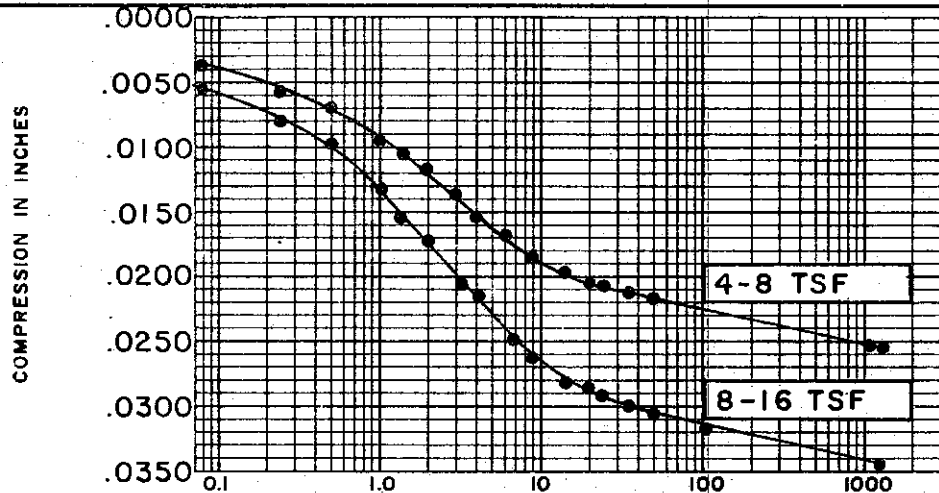
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

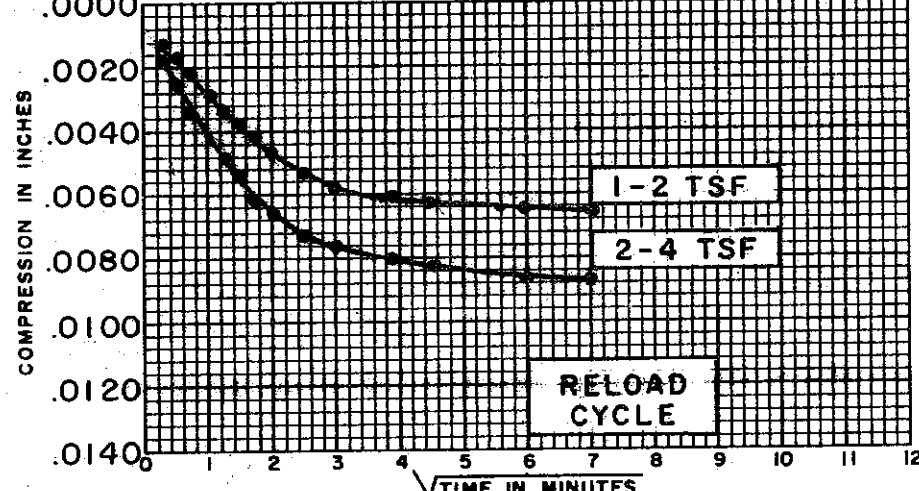
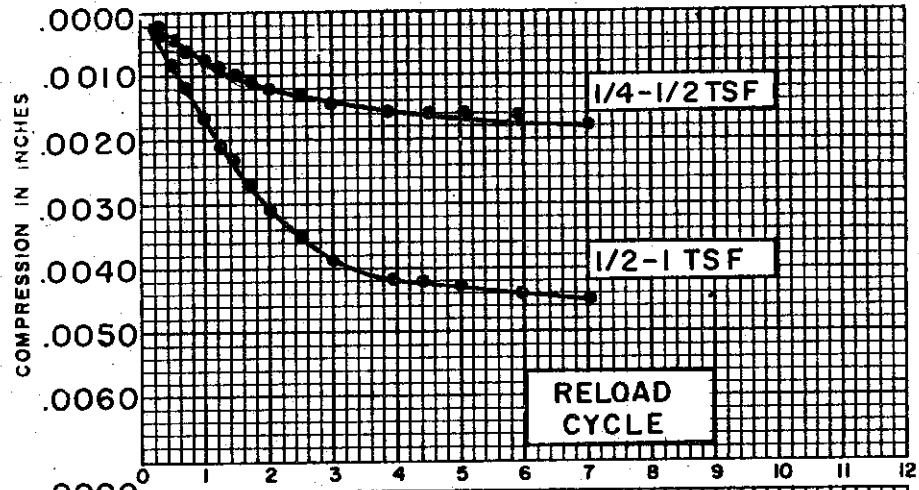
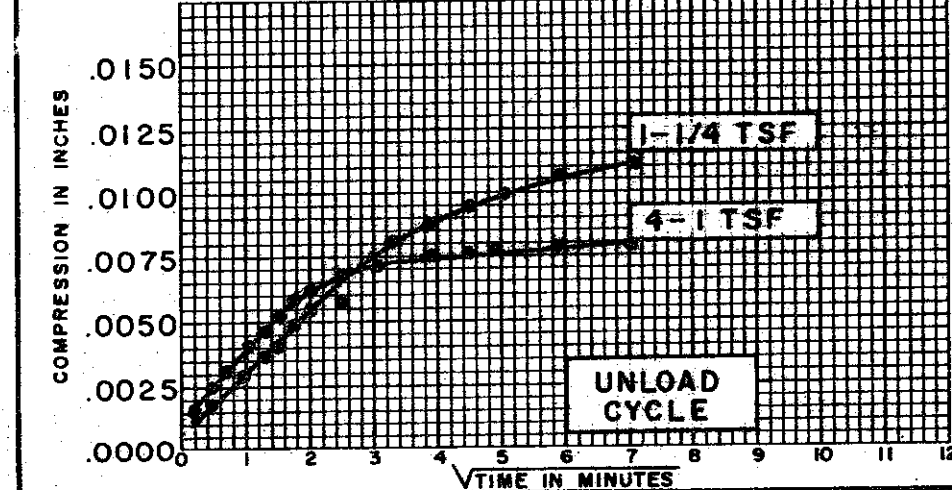
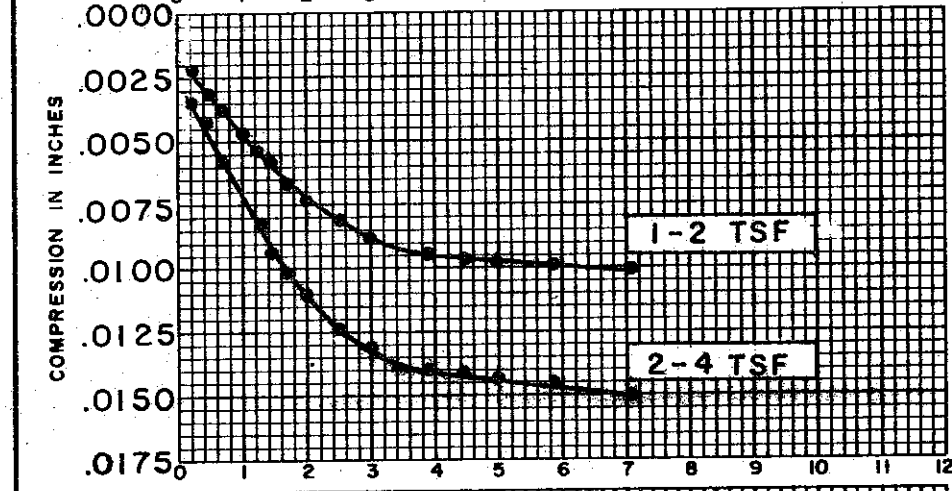
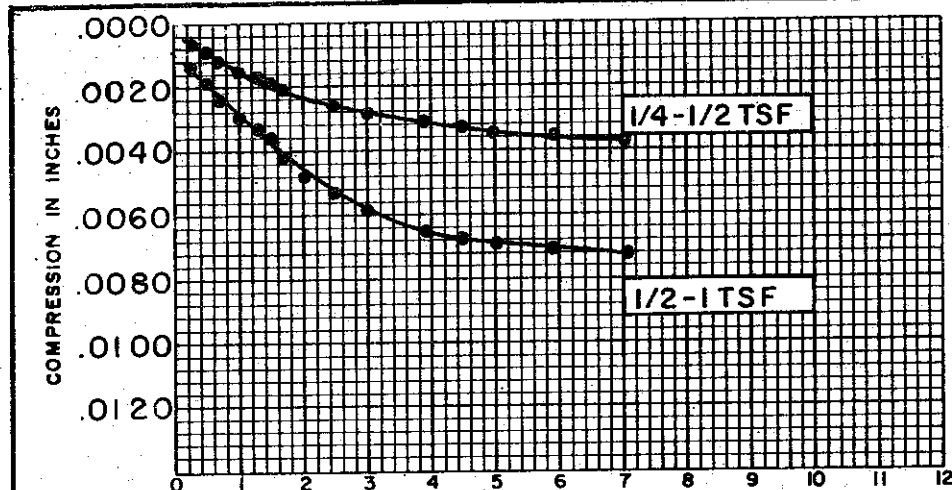
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



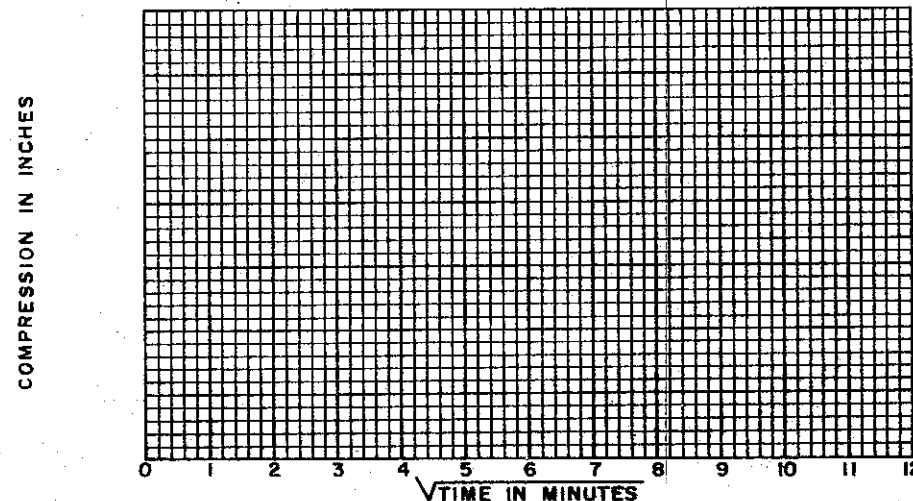
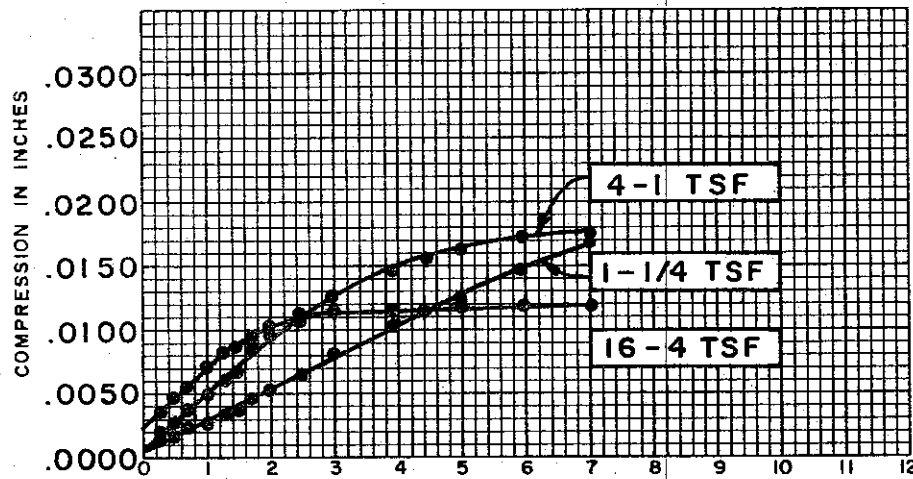
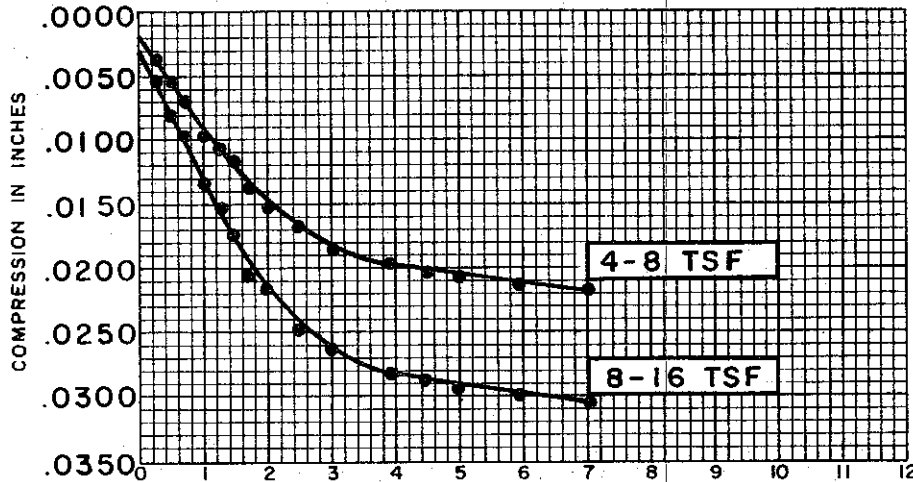
SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, (CE)</u>	SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.30"</u>	
INITIAL VOID RATIO	<u>0.741</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		





SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	27.8 %
FINAL WATER CONTENT	25.6 %
BORING NO. 118	
SAMPLE NO. 9	
DEPTH 78.7' TO 79.0'	
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.741
CONSOLIDATION TEST	
TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY	
BELLE RIVER PLANT UNITS I & II	

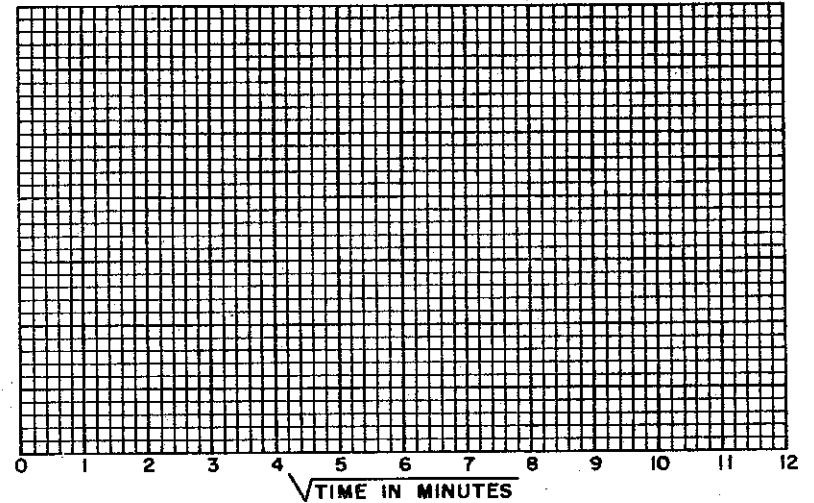
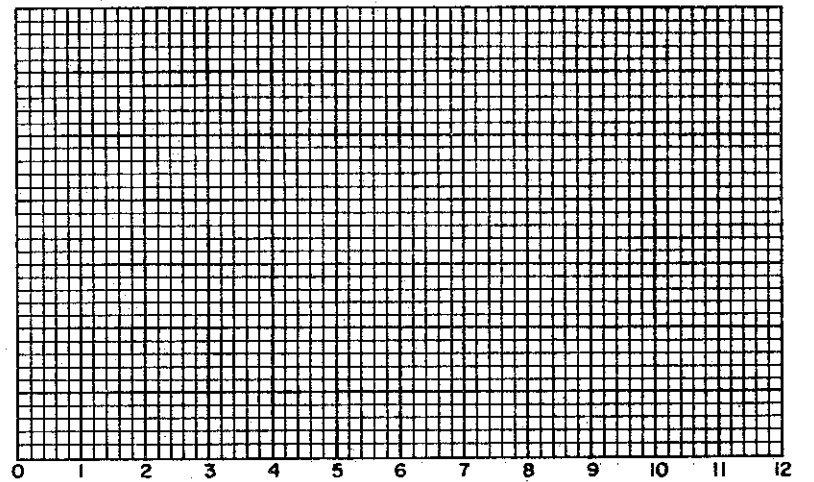
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COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

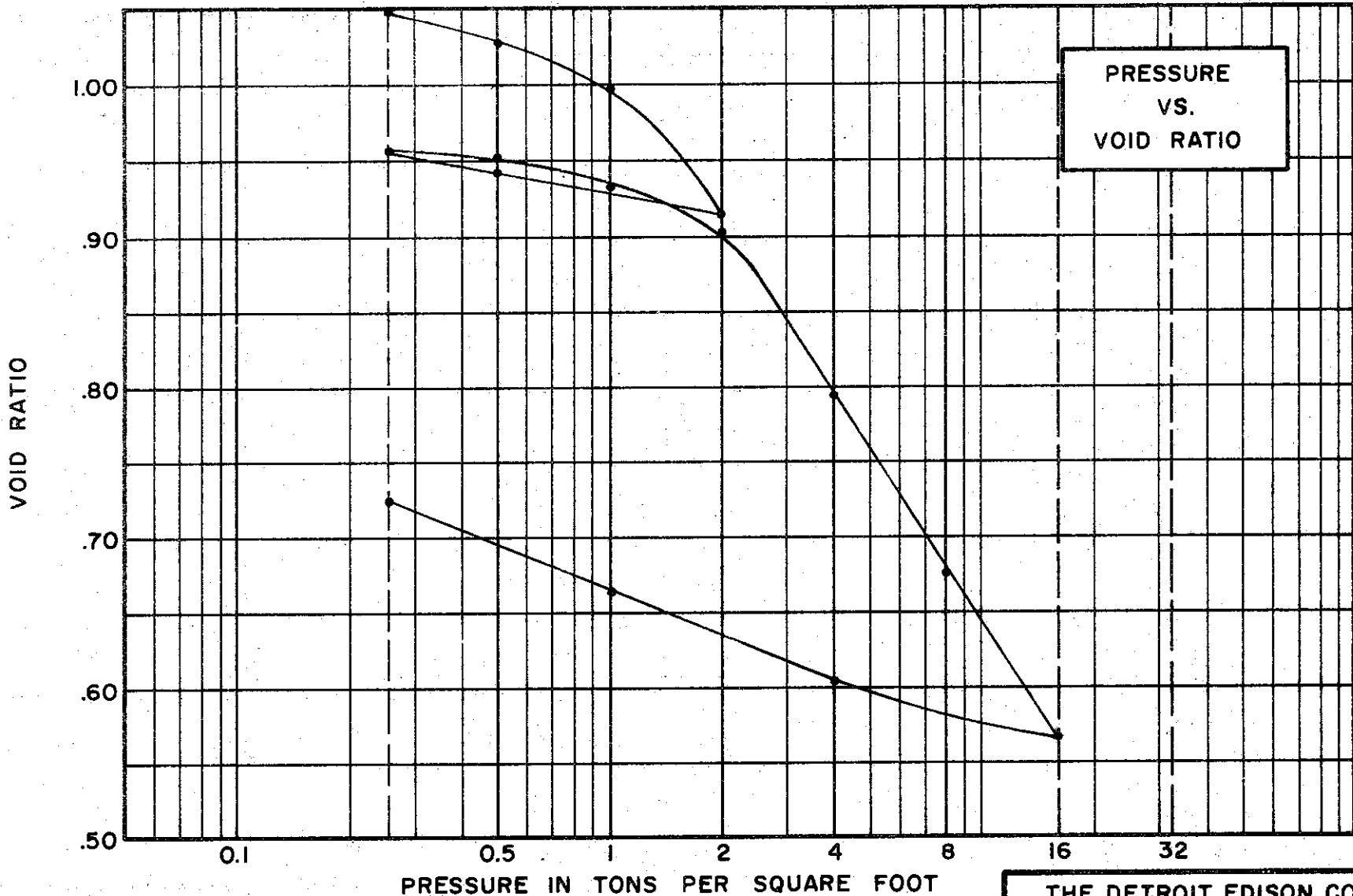
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 40.2% FINAL 30.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

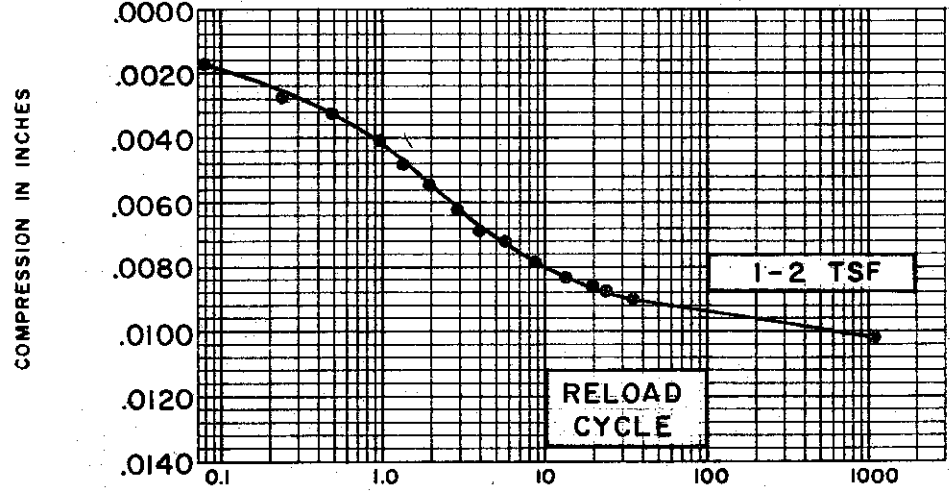
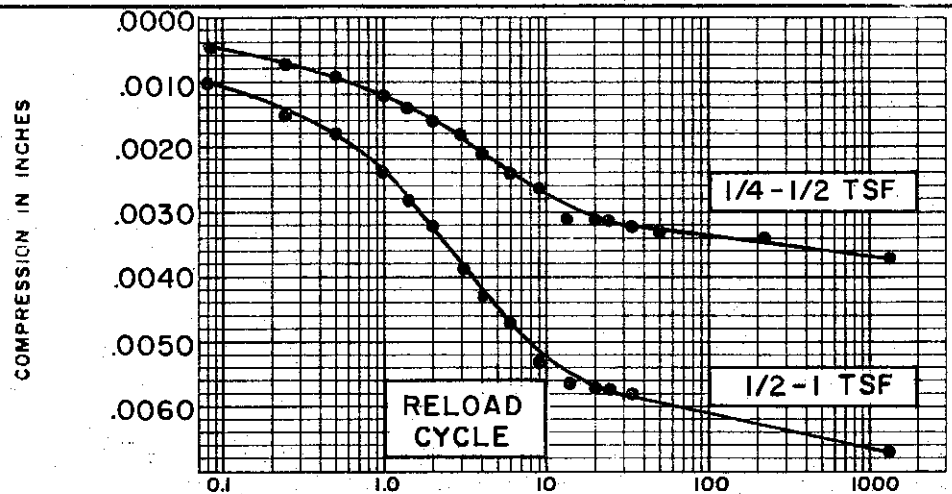
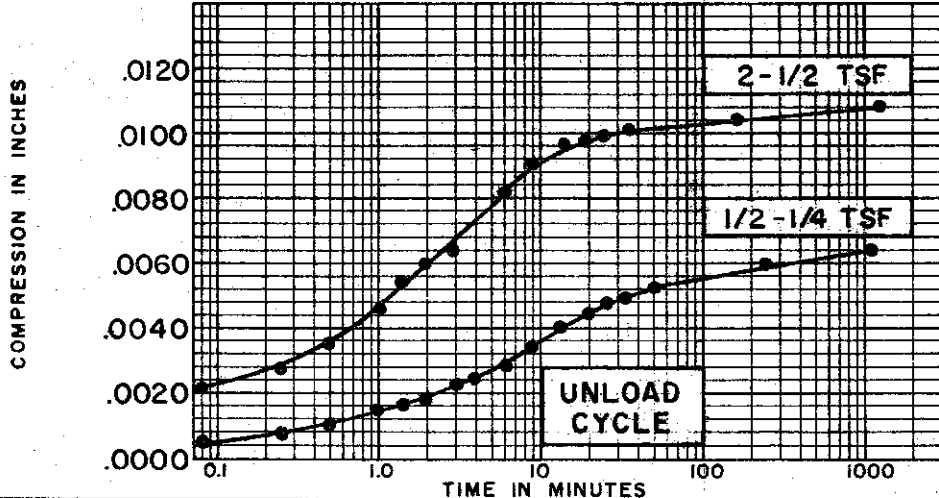
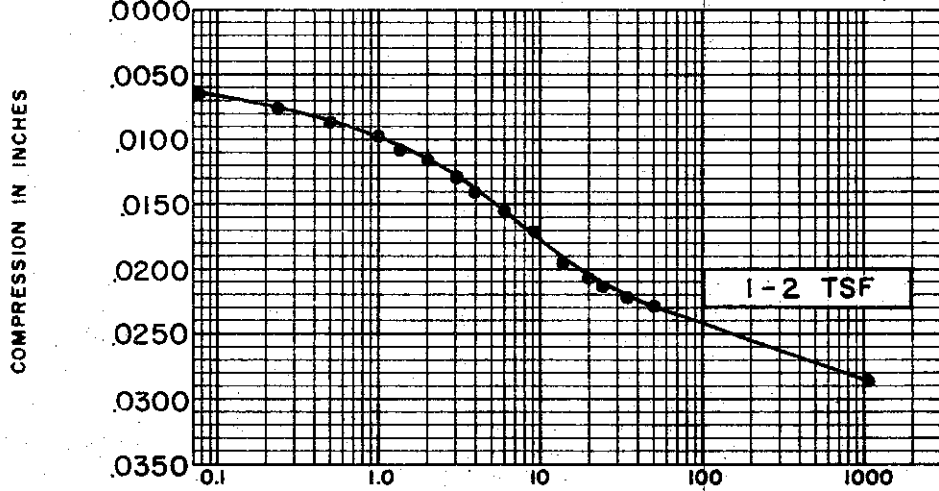
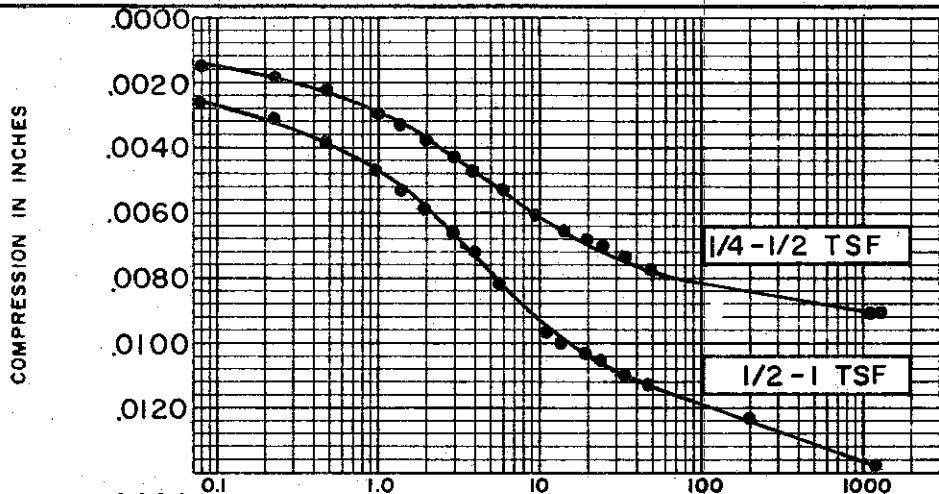
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C389.1  
 SAMPLE NO. 9 DATE APRIL 74  
 DEPTH 39.1' TO 39.3'

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GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

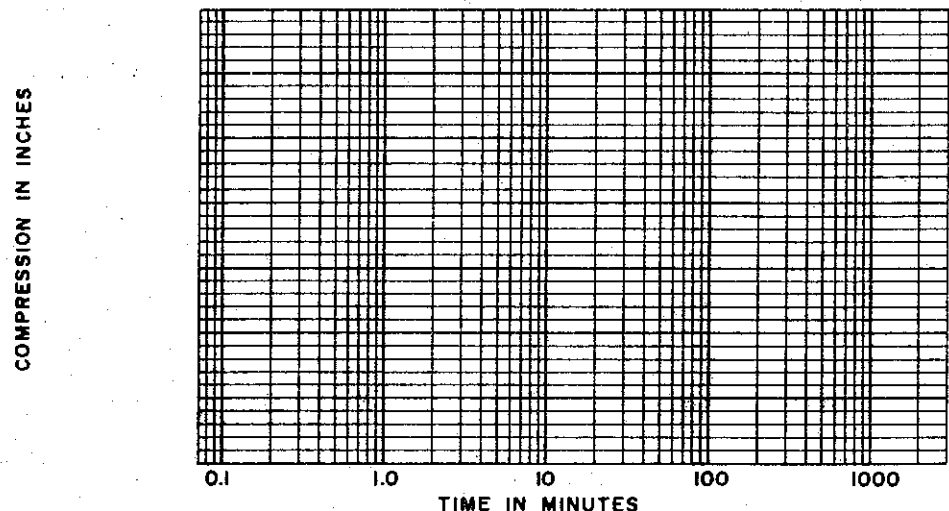
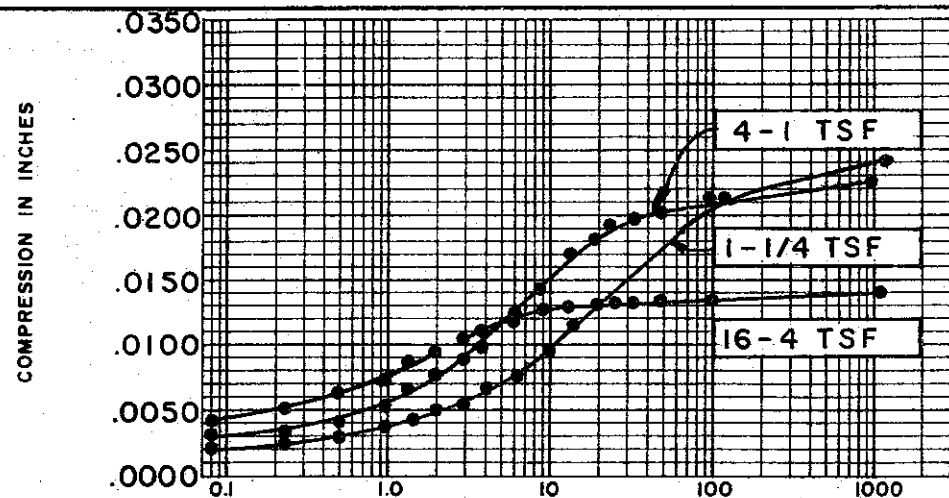
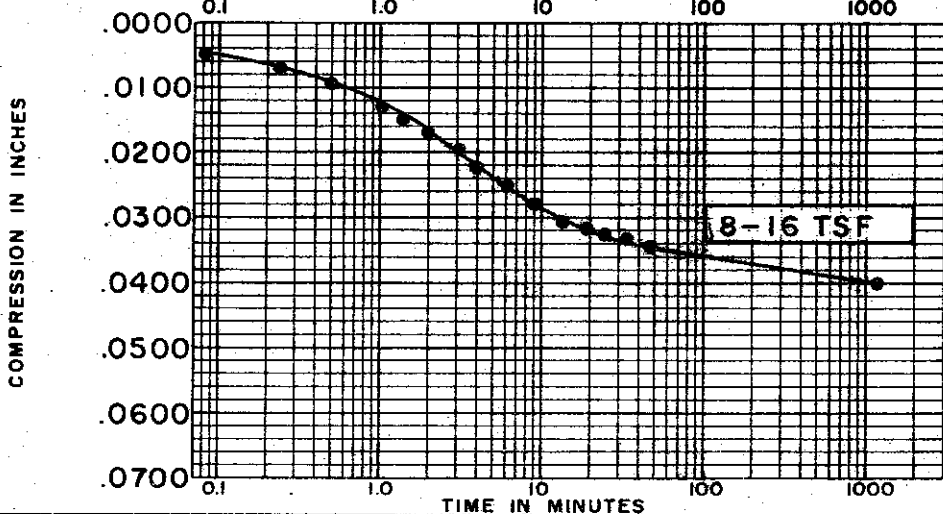
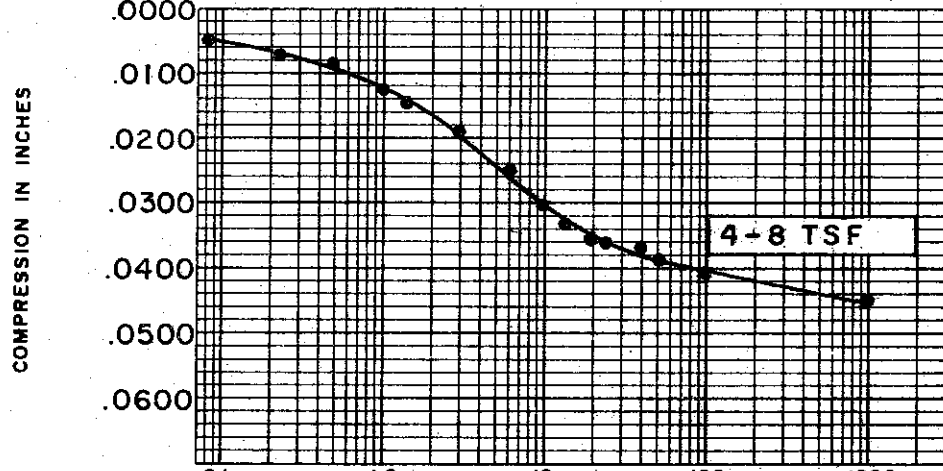
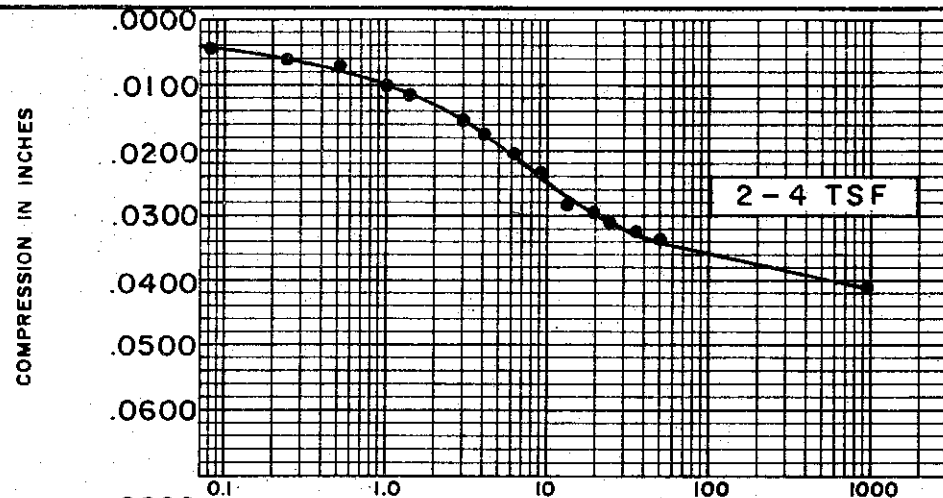


SOIL PROPERTIES		BORING NO.	129
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	9
SPECIFIC GRAVITY	2.73	DEPTH	39.1' TO 39.3'
INITIAL WATER CONTENT	40.2 %		
FINAL WATER CONTENT	30.0 %		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 40.2 %  
 FINAL WATER CONTENT 30.0 %

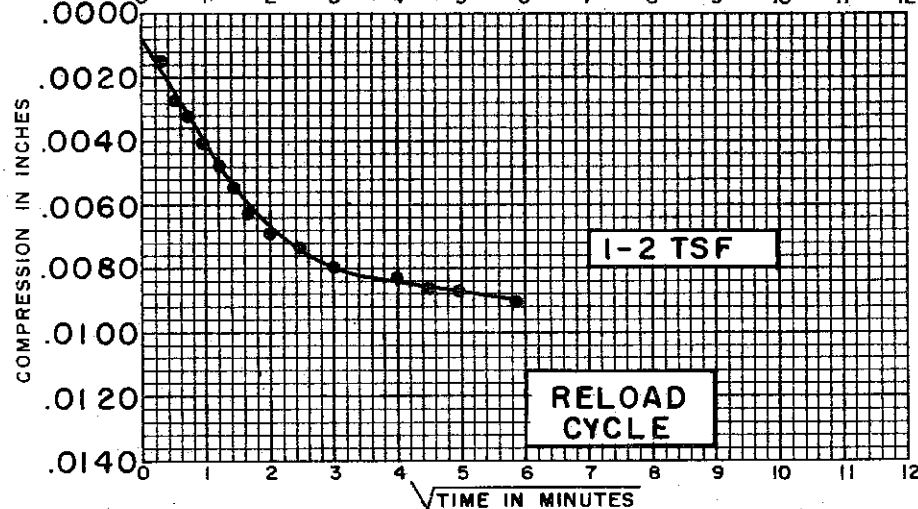
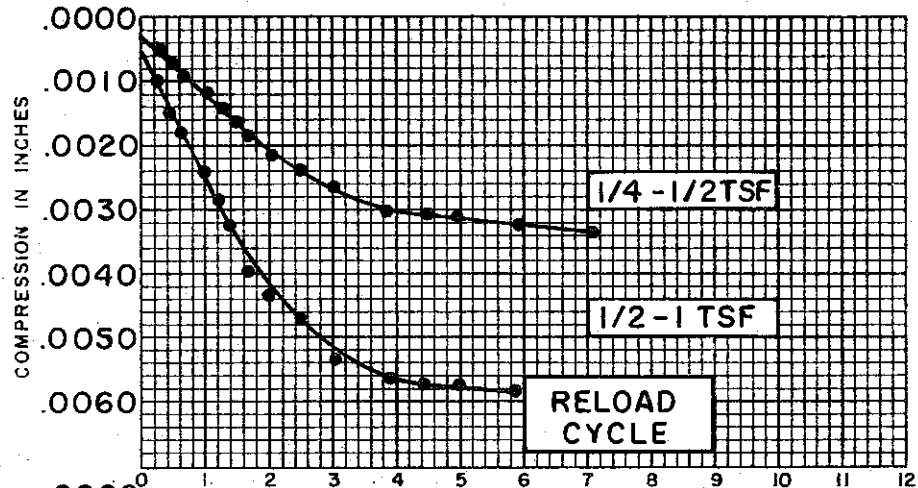
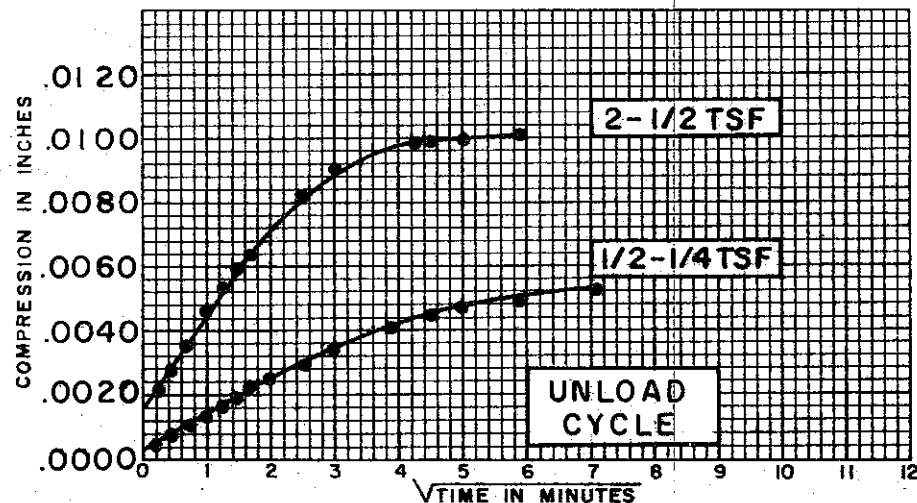
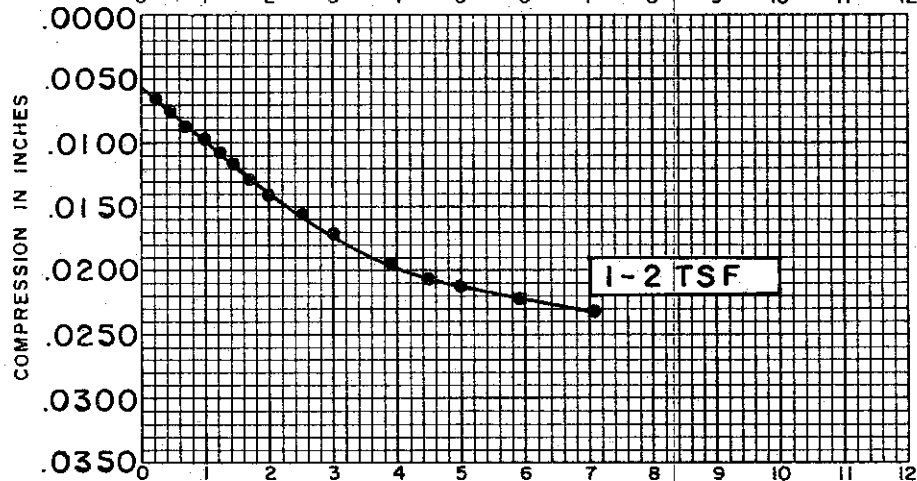
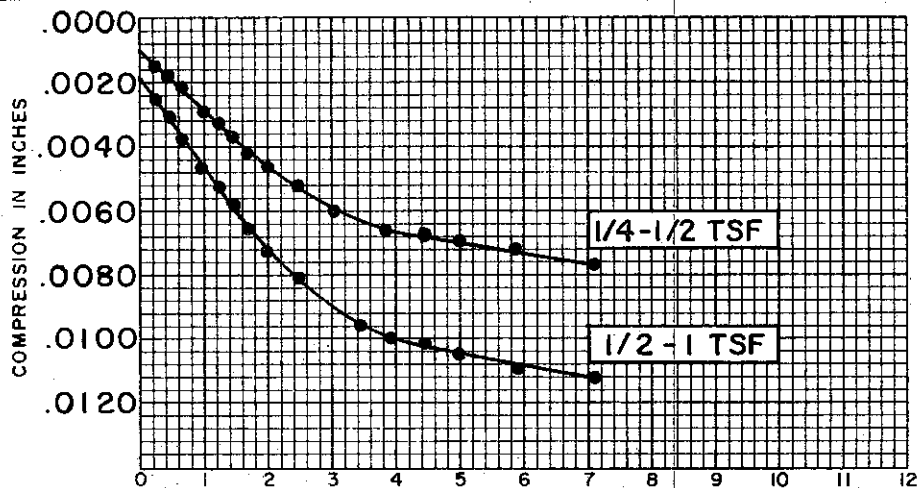
BORING NO. 129  
 SAMPLE NO. 9  
 DEPTH 39.1 TO 39.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 40.2 %  
 FINAL WATER CONTENT 30.0 %

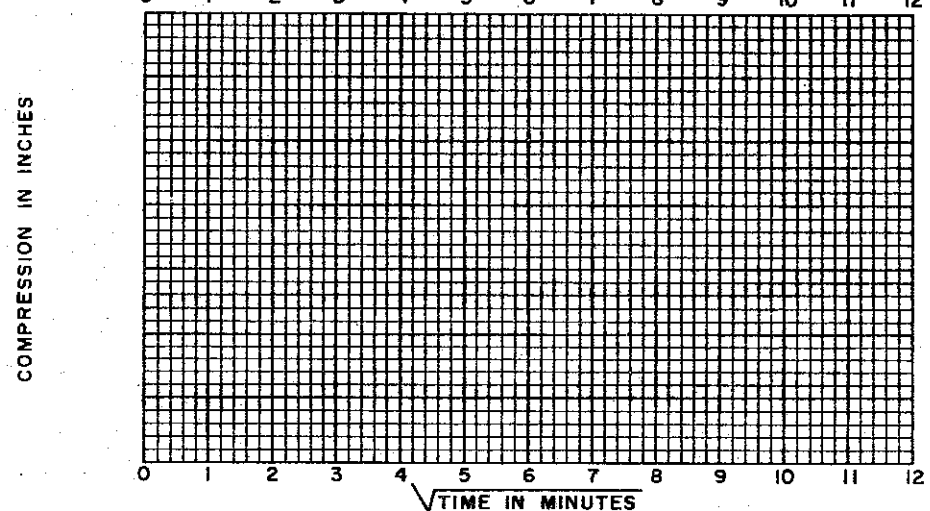
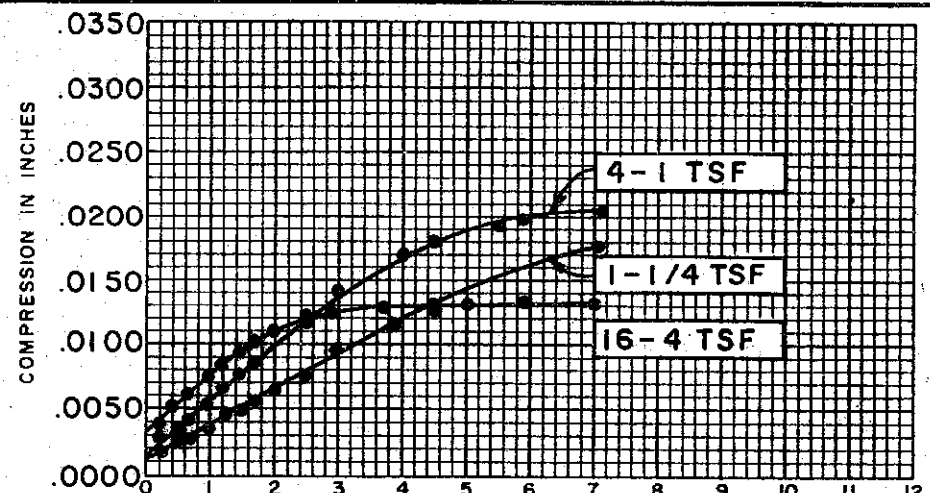
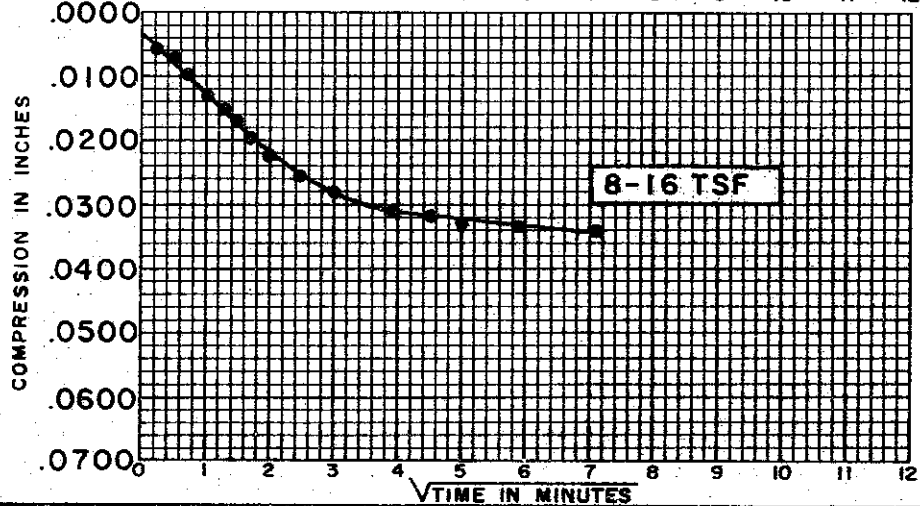
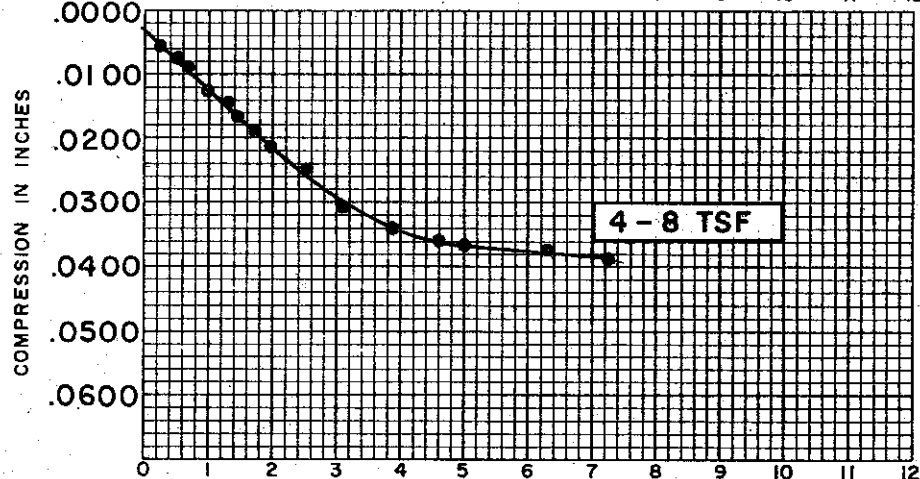
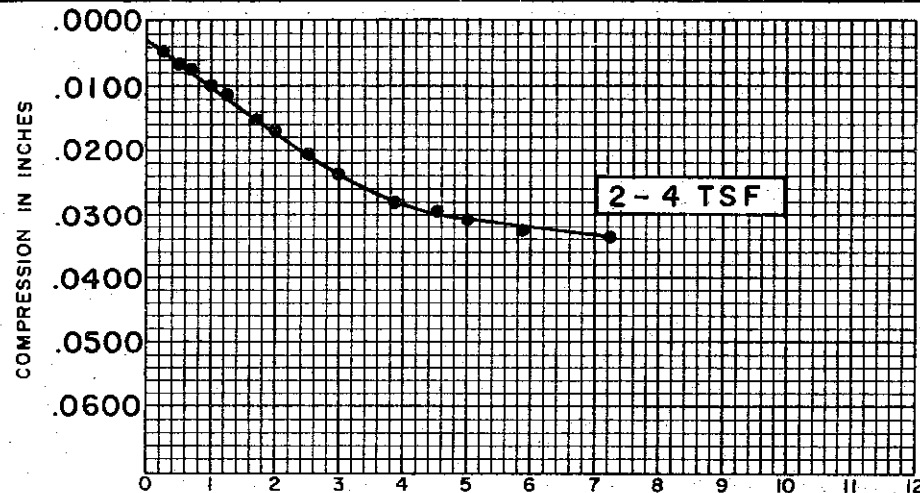
BORING NO. 129  
 SAMPLE NO. 9  
 DEPTH 39.1' TO 39.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

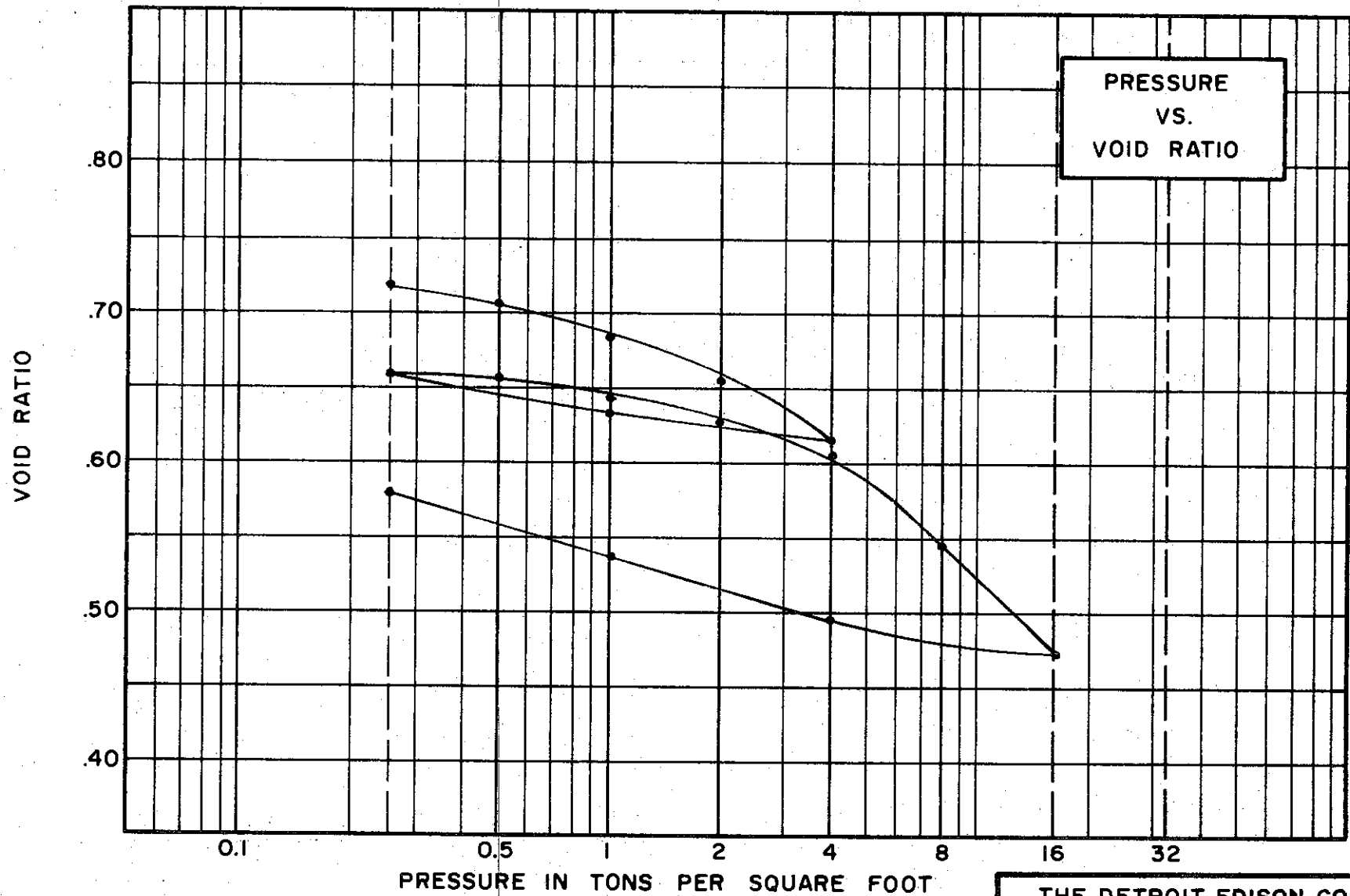


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	40.2 %
FINAL WATER CONTENT	30.0 %
BORING NO.	129
SAMPLE NO.	9
DEPTH	39.1' TO 39.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 28.0% FINAL 24.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.703

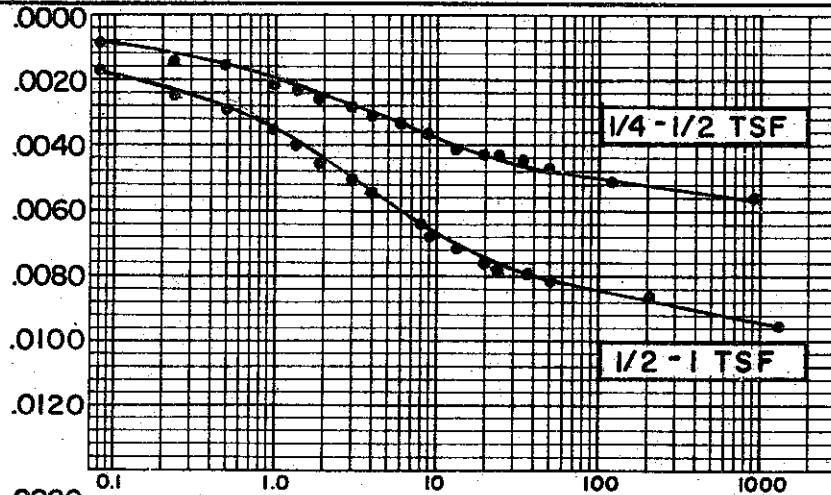
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

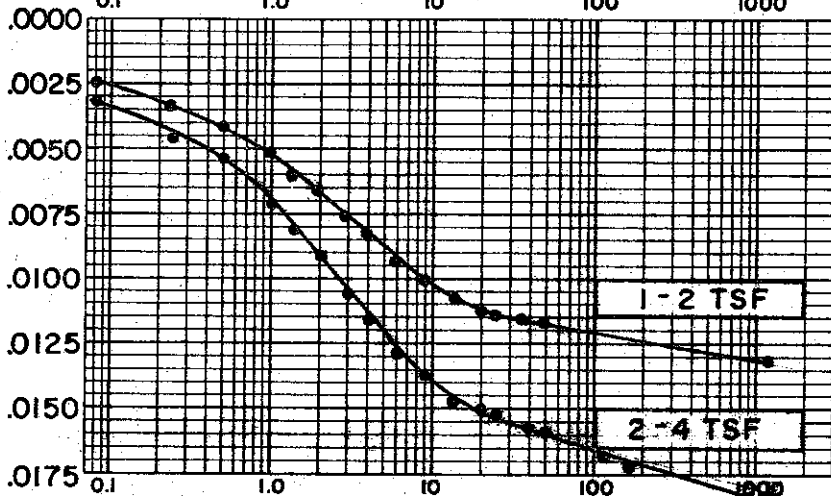
BORING NO. 129 TEST NO. C395.1  
 SAMPLE NO. 21 DATE APRIL 74  
 DEPTH 103.7' TO 104.0'



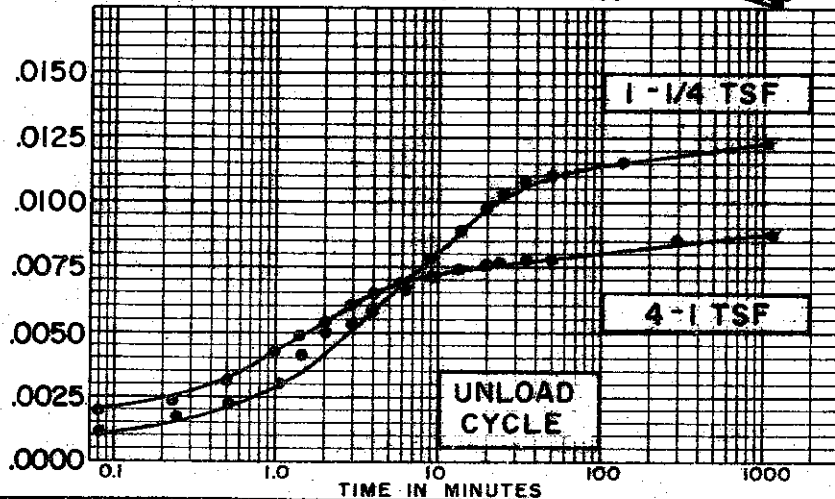
COMPRESSION IN INCHES



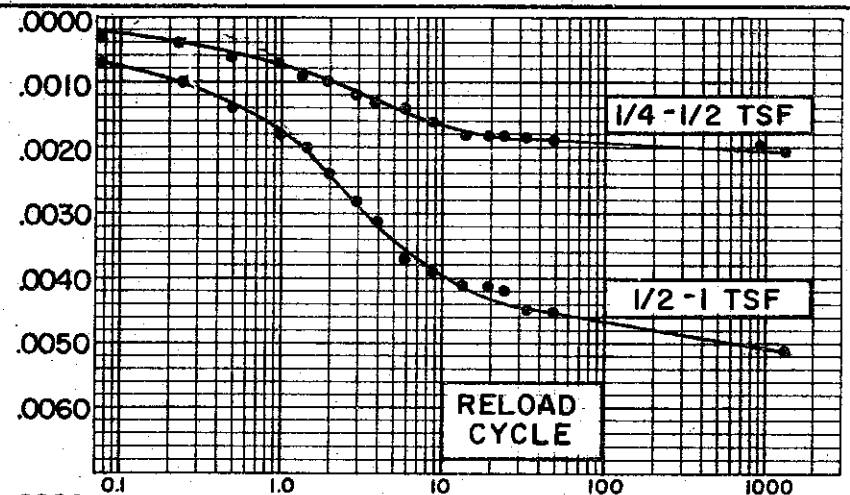
COMPRESSION IN INCHES



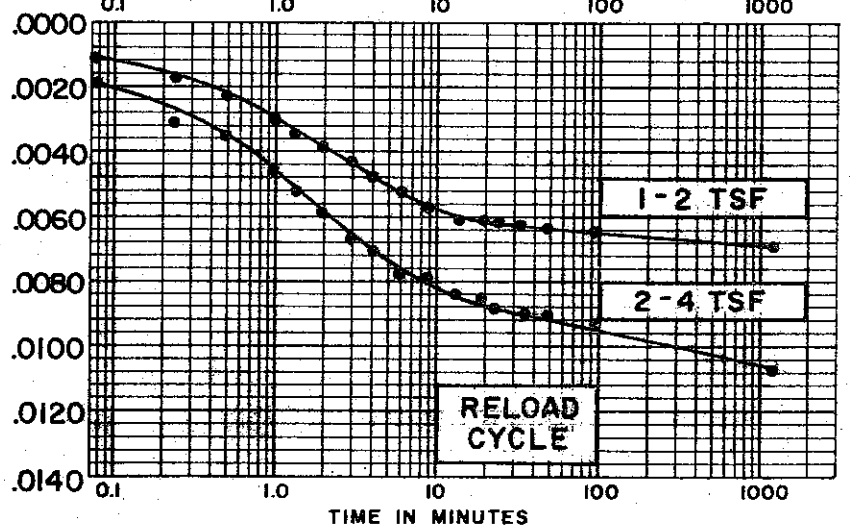
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

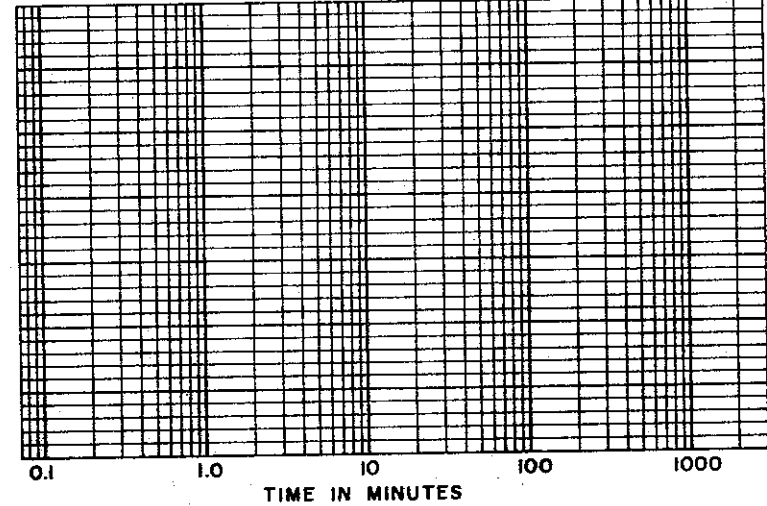
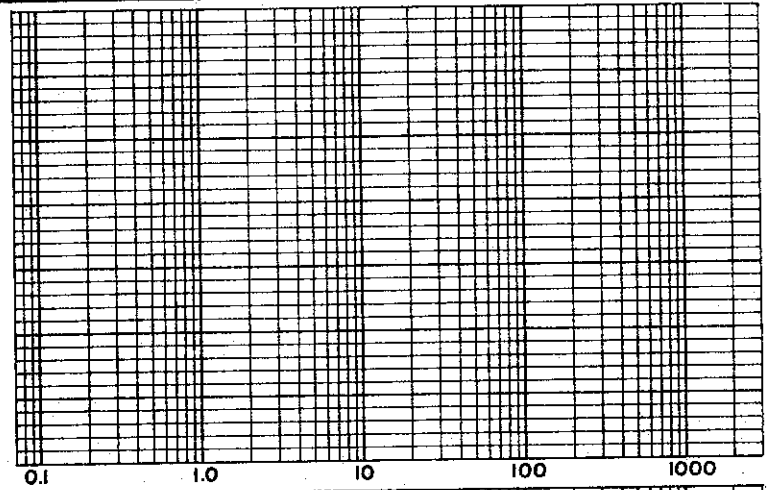
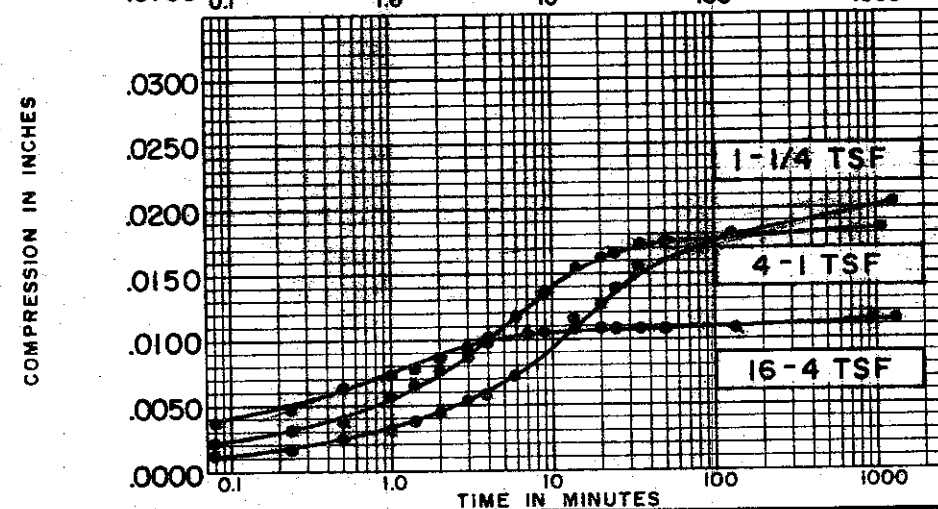
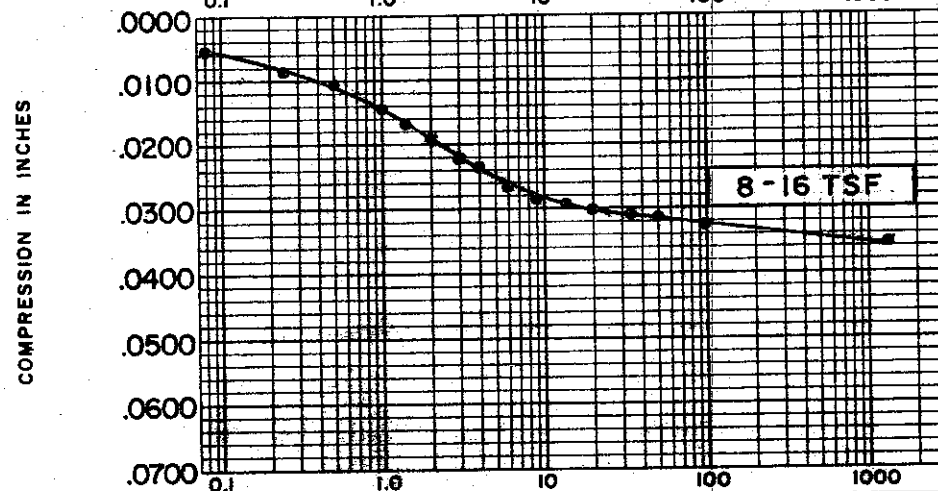
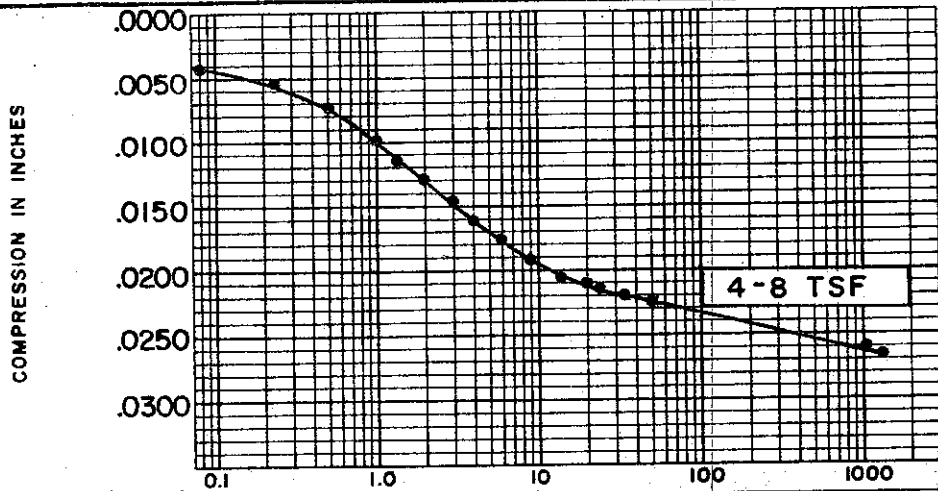
BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE.**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
INITIAL WATER CONTENT 28.0 %  
FINAL WATER CONTENT 24.5 %

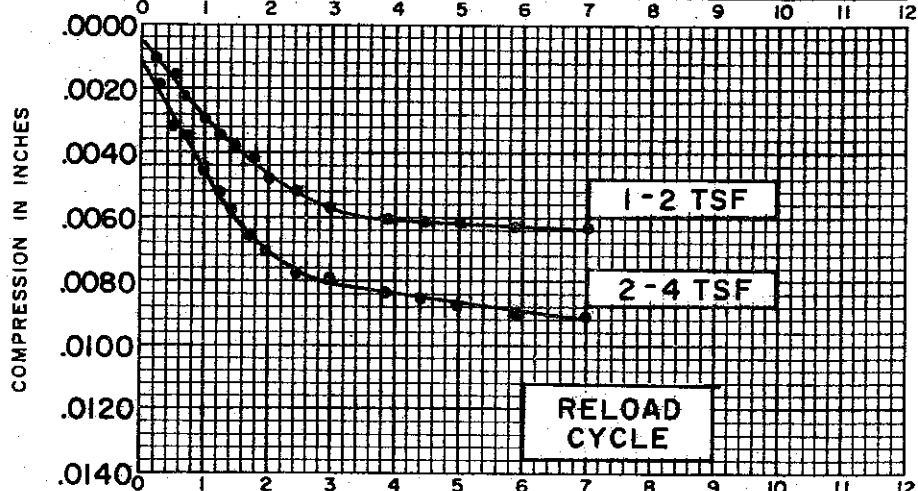
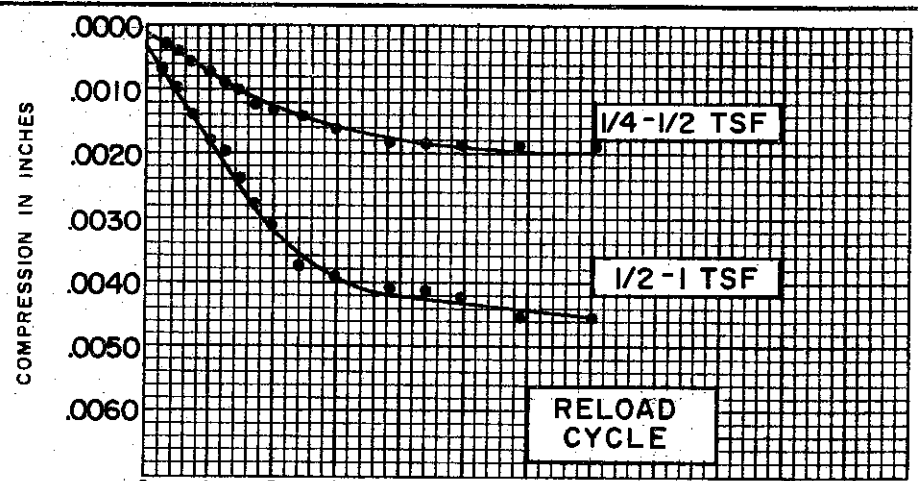
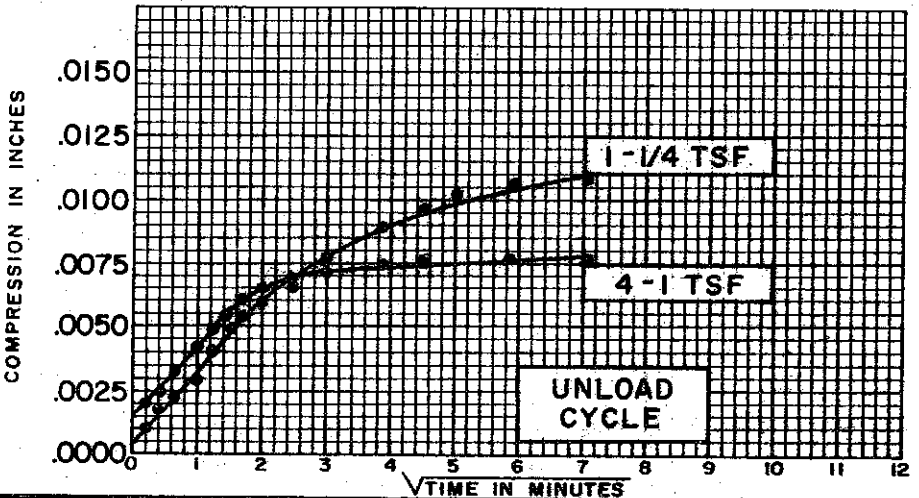
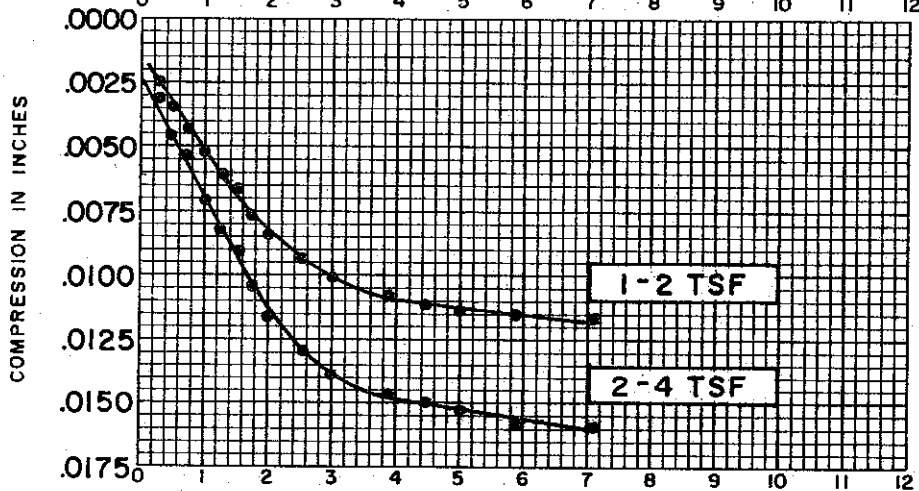
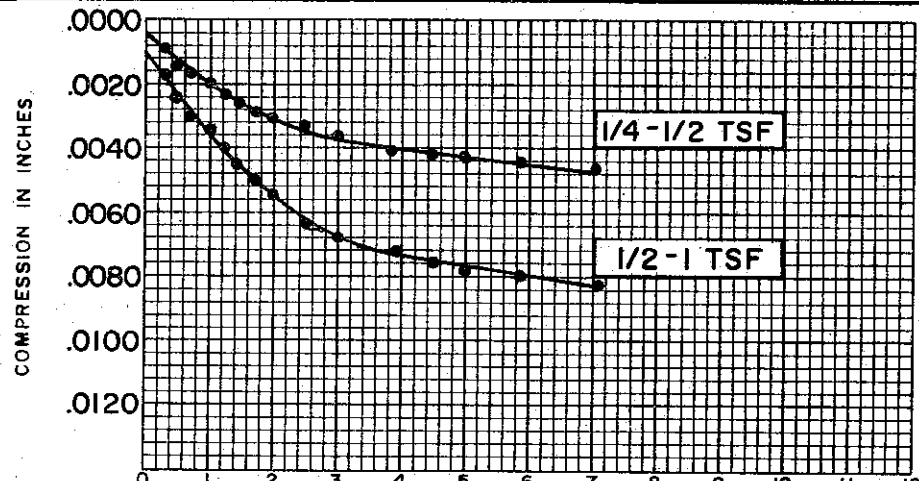
BORING NO. 129  
SAMPLE NO. 21  
DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



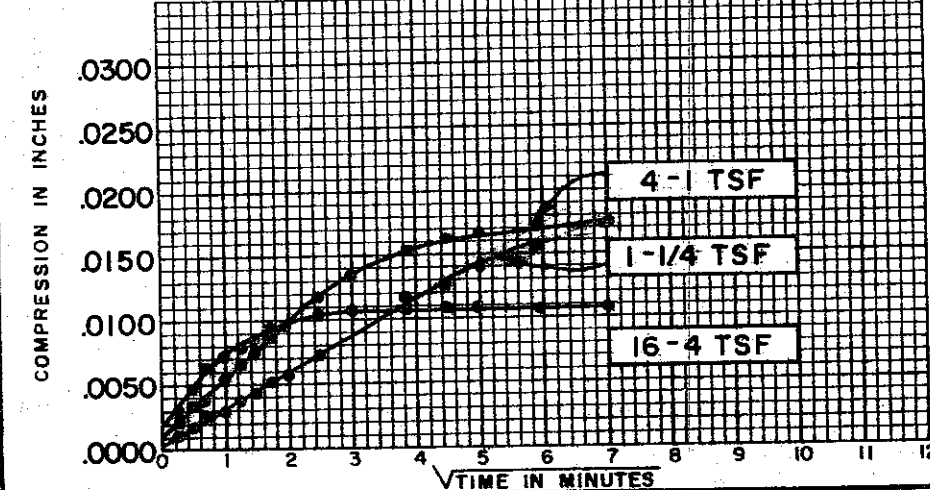
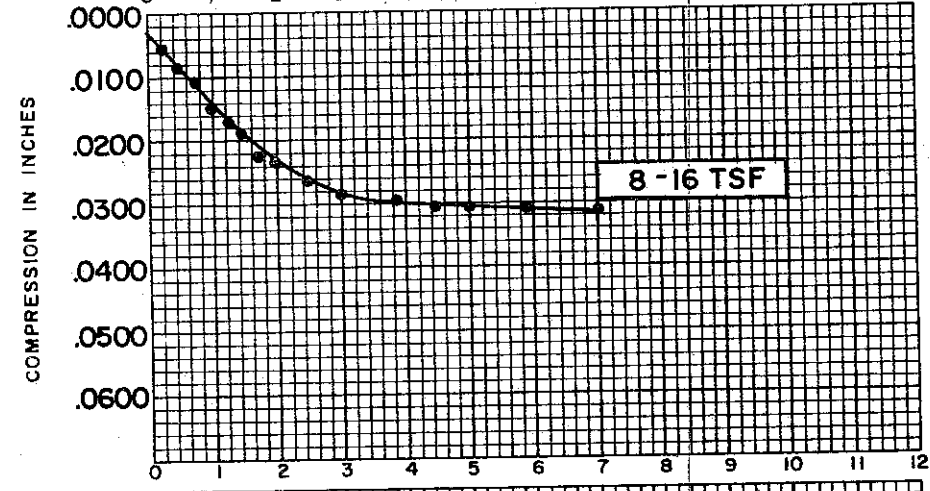
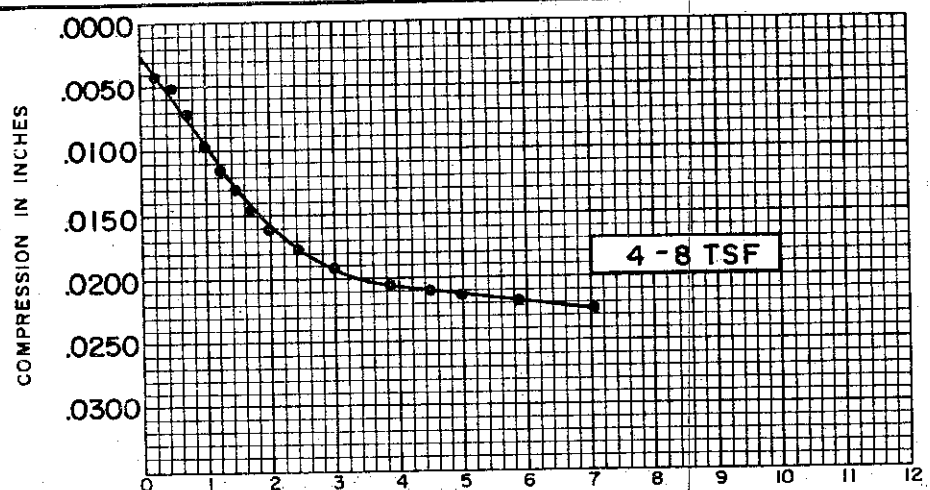
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	28.0 %
FINAL WATER CONTENT	24.5 %
BORING NO.	129
SAMPLE NO.	21
DEPTH	103.7' TO 104.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.730

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

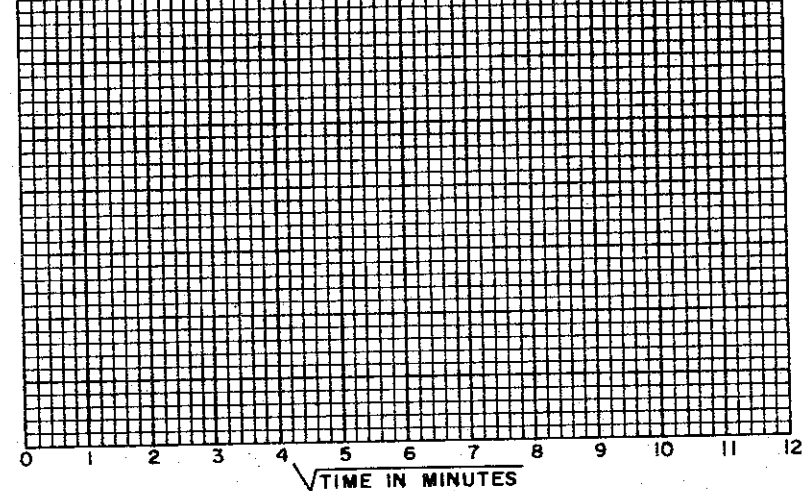
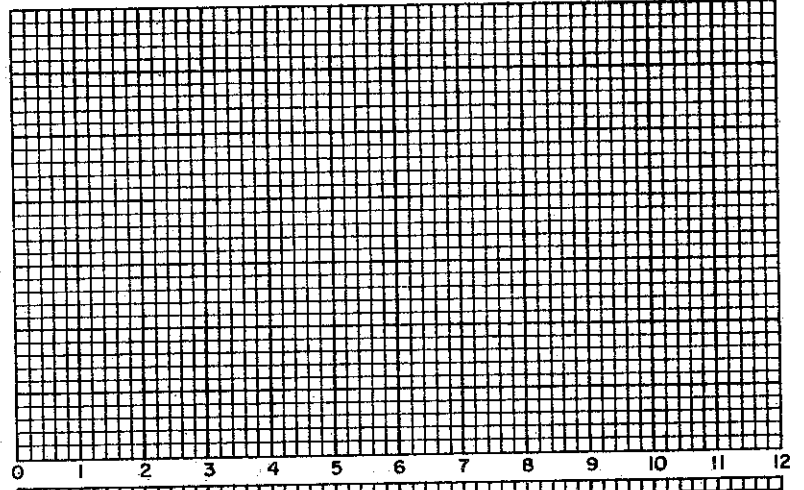
C-559

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



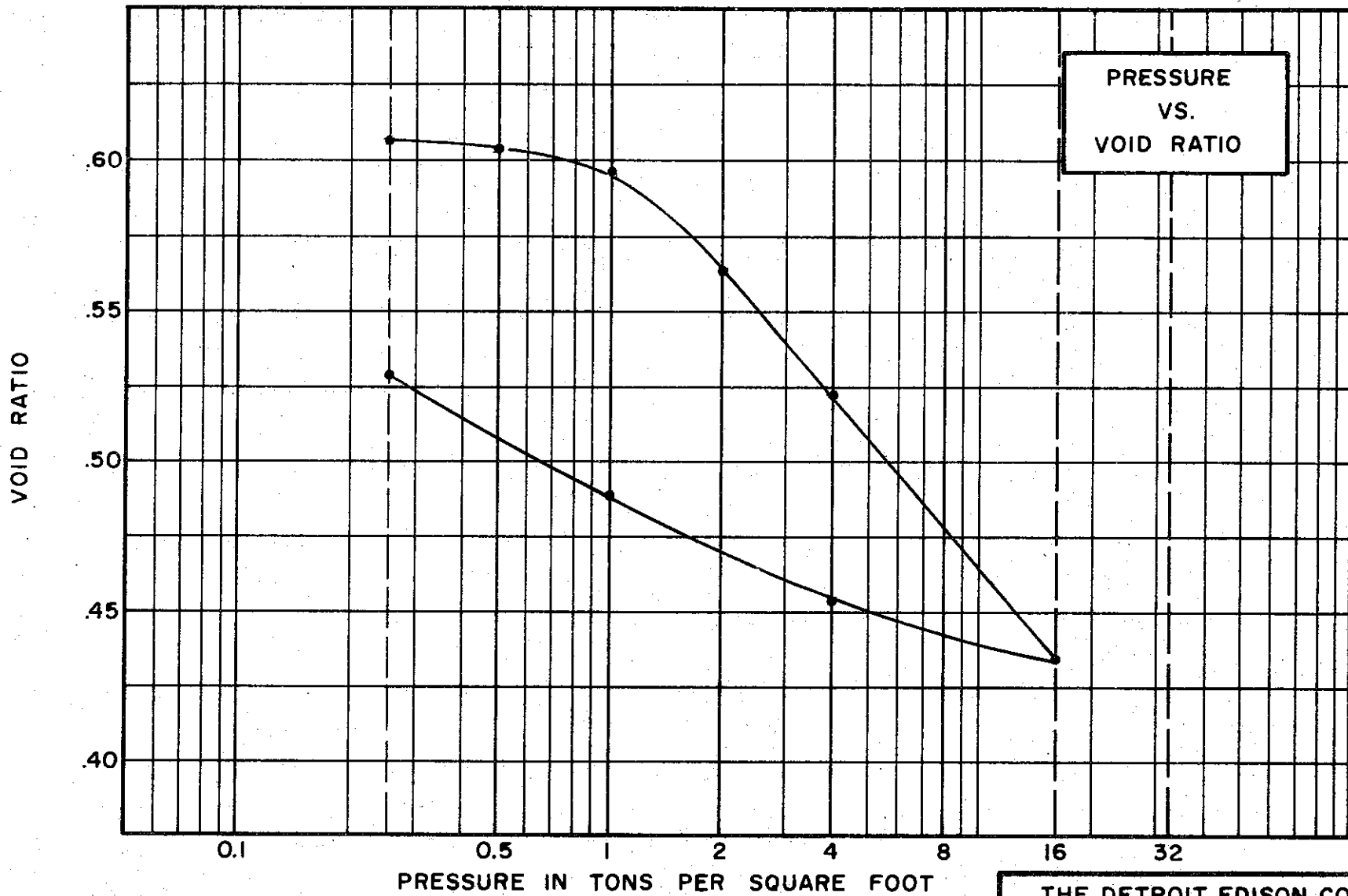
SOIL PROPERTIES		BORING NO. <u>129</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, SANDY (CL)</u>	SAMPLE NO. <u>21</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>103.7' TO 104.0'</u>
INITIAL WATER CONTENT	<u>28.0 %</u>	
FINAL WATER CONTENT	<u>24.5 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.730</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 17.3% FINAL 21.3%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**

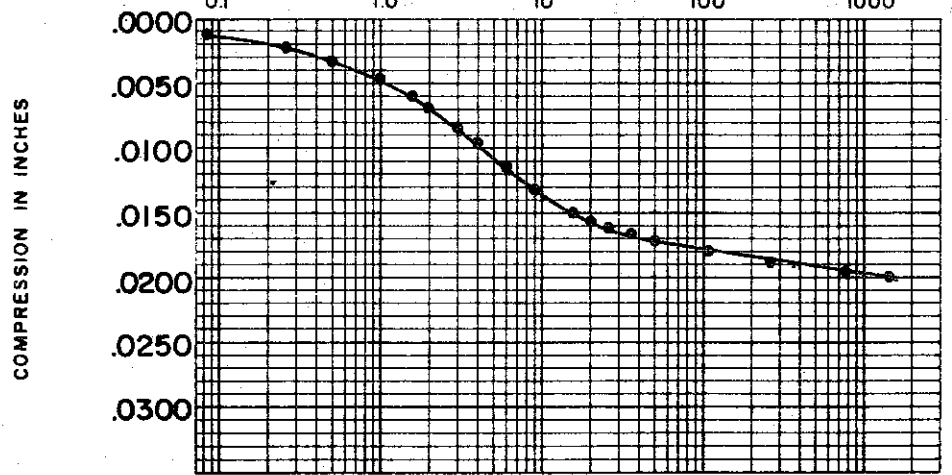
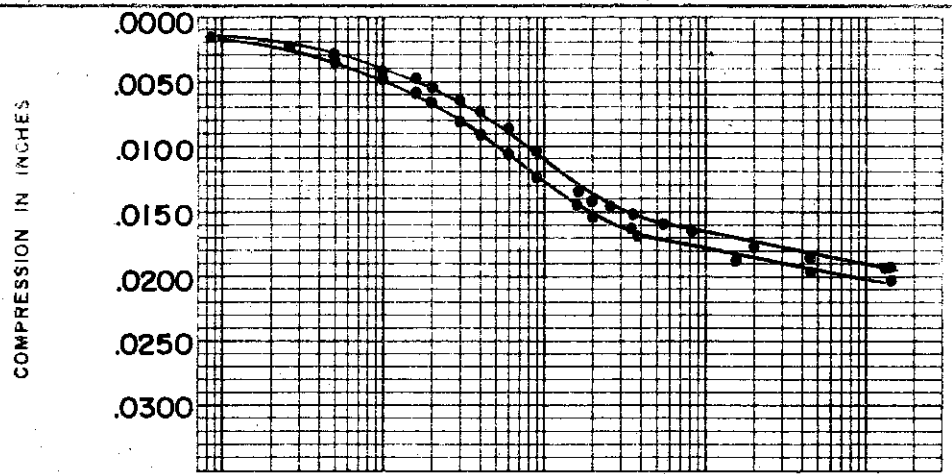
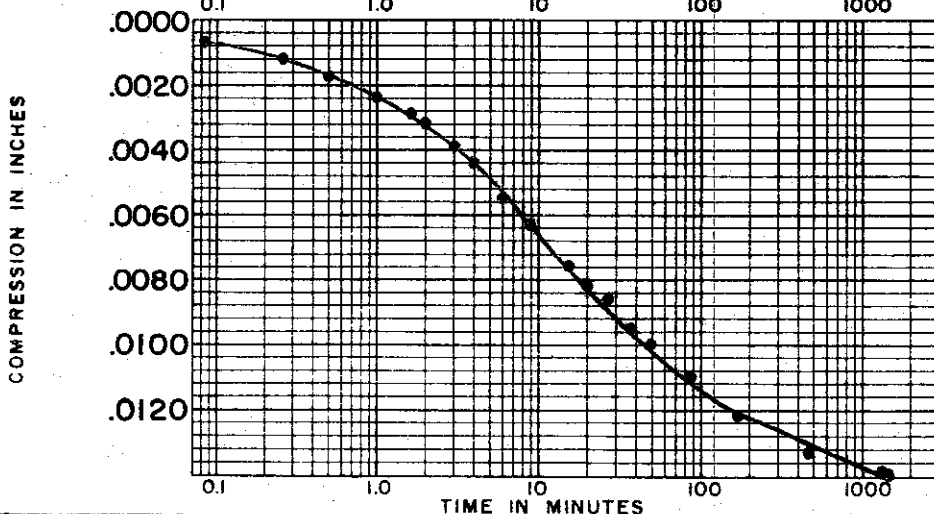
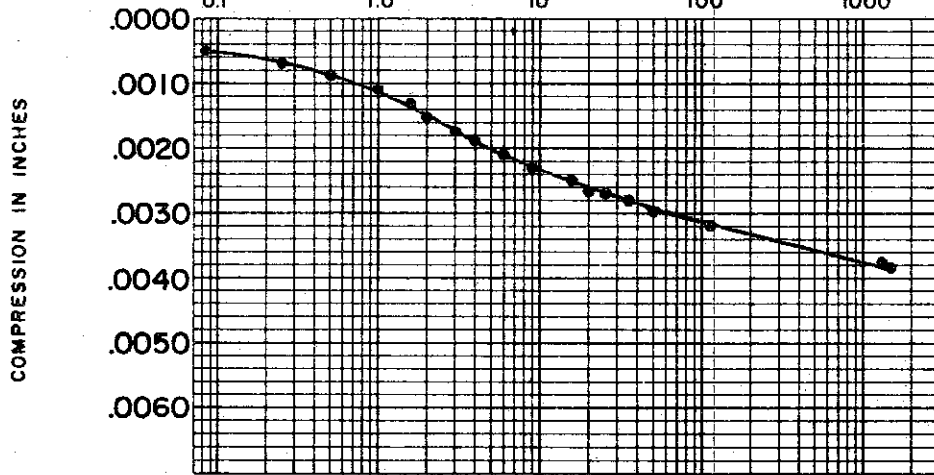
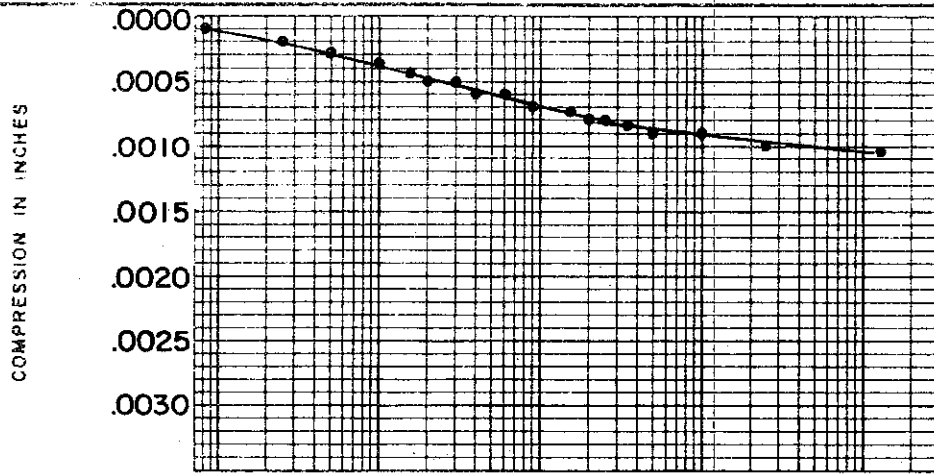
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.448"  
 INITIAL VOID RATIO (0.675)<sup>AS</sup> COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 136 TEST NO. C527.1  
 SAMPLE NO. ST6 DATE DEC. 1974  
 DEPTH 13.0' TO 14.6'

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SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.74
INITIAL WATER CONTENT	17.3 %
FINAL WATER CONTENT	21.3 %

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

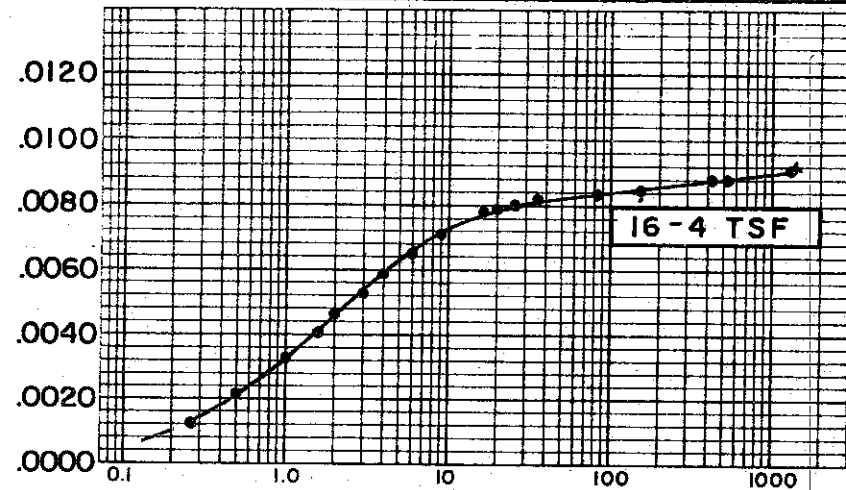
TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	(0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

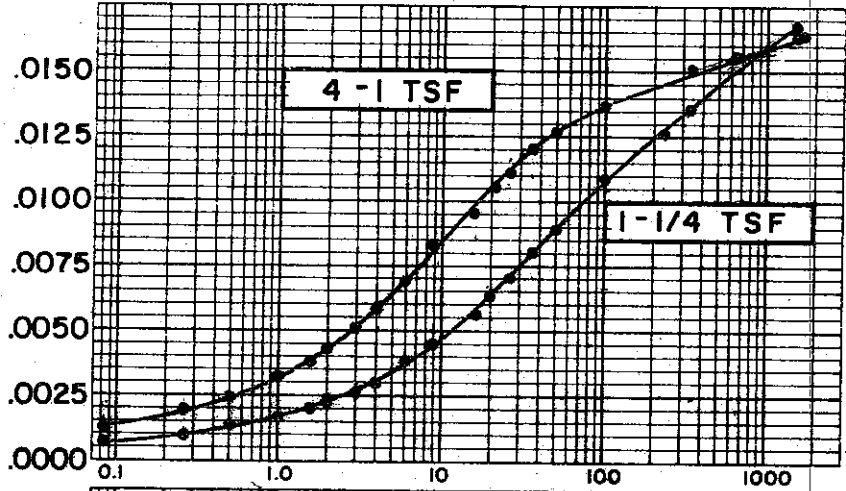
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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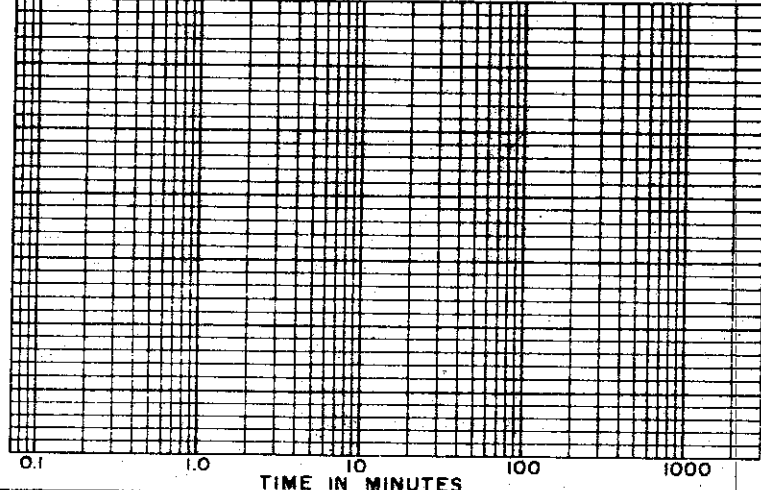
COMPRESSION IN INCHES



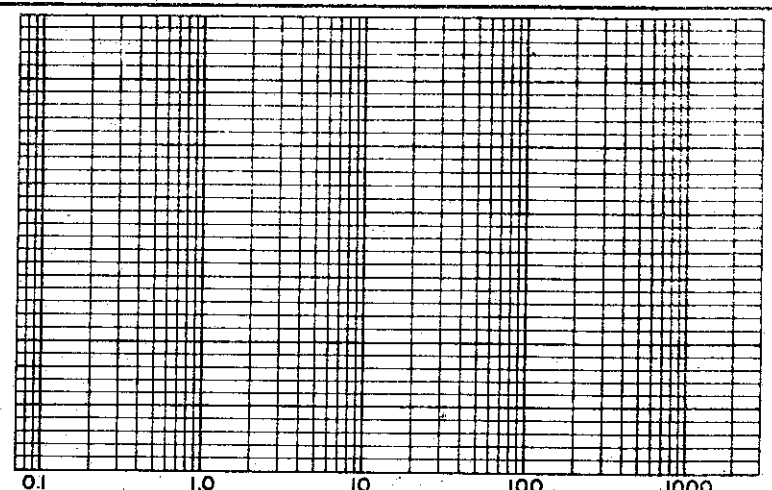
COMPRESSION IN INCHES



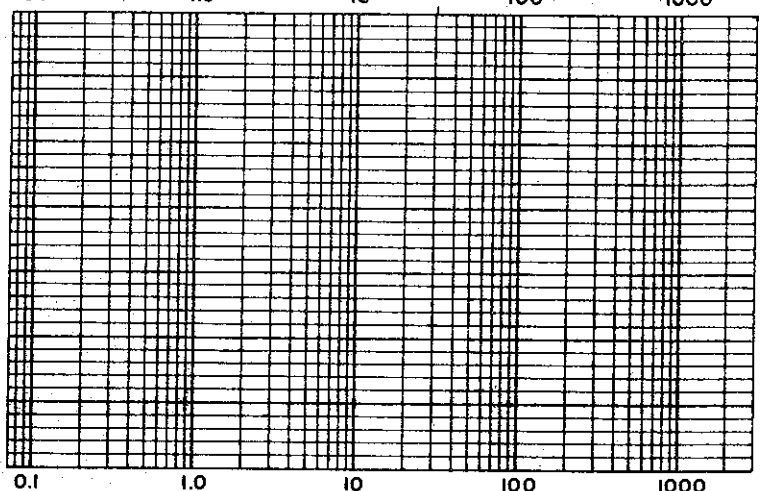
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

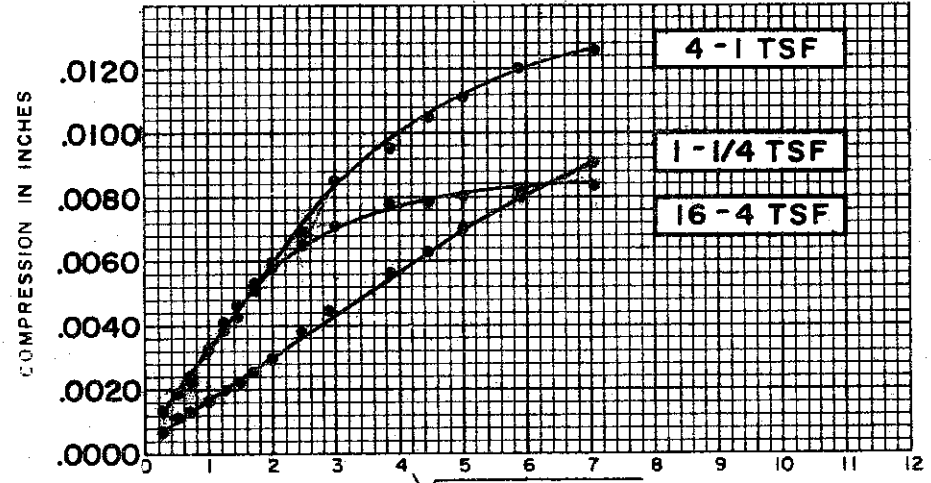
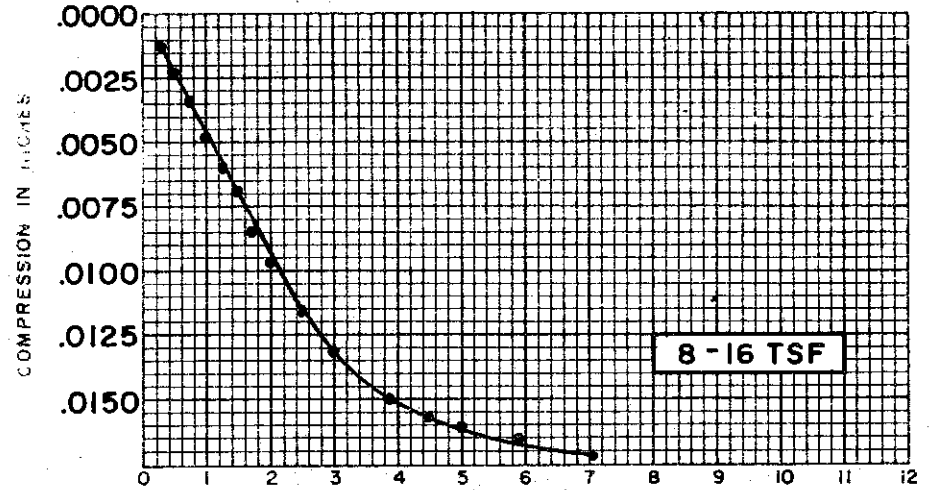
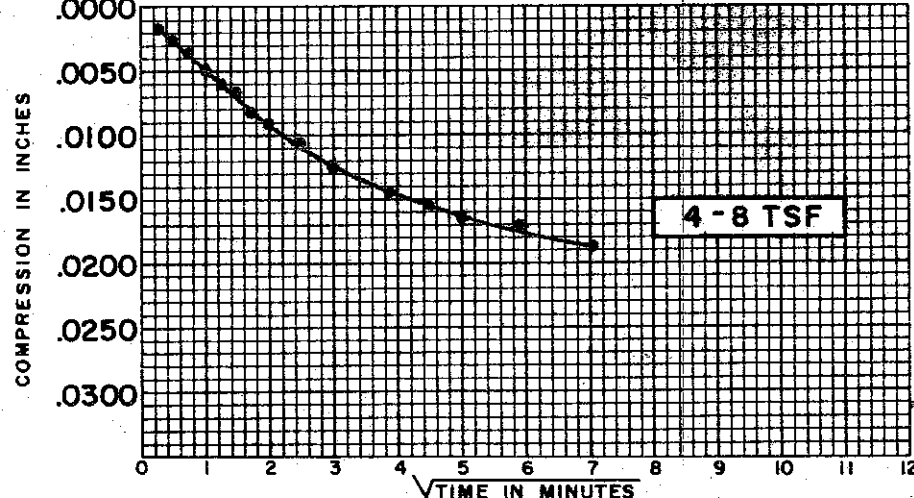
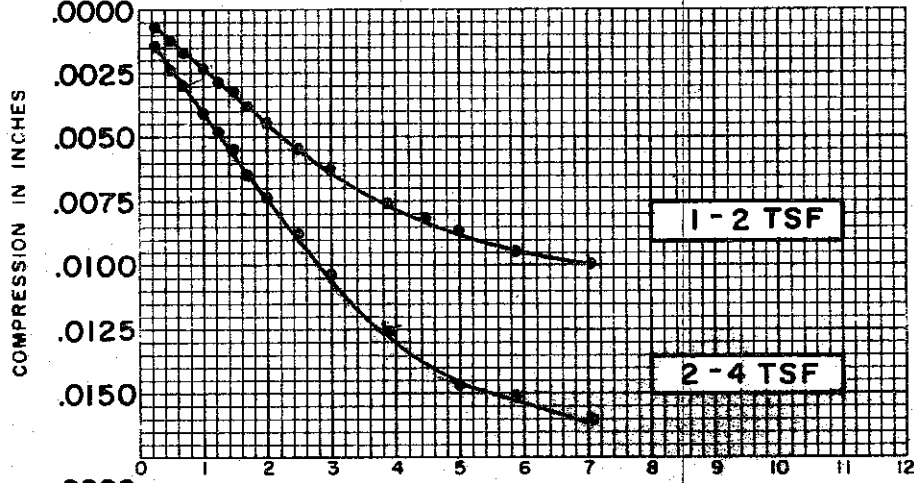
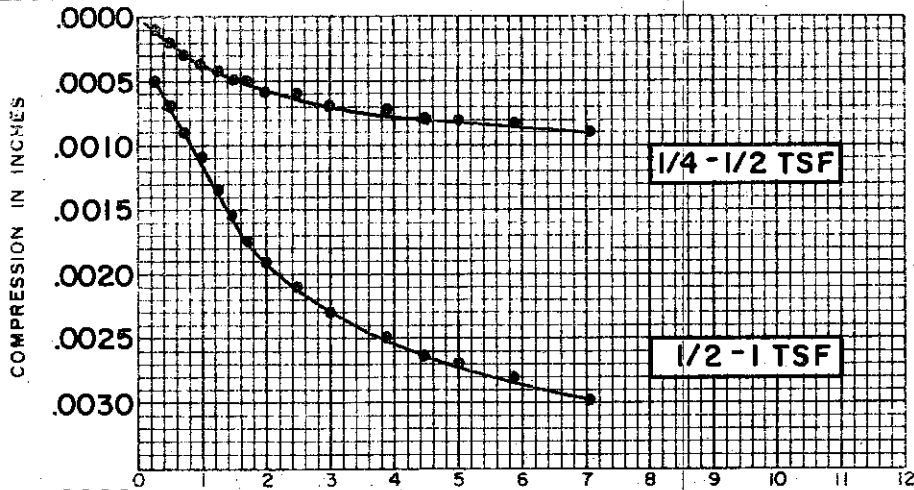
BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

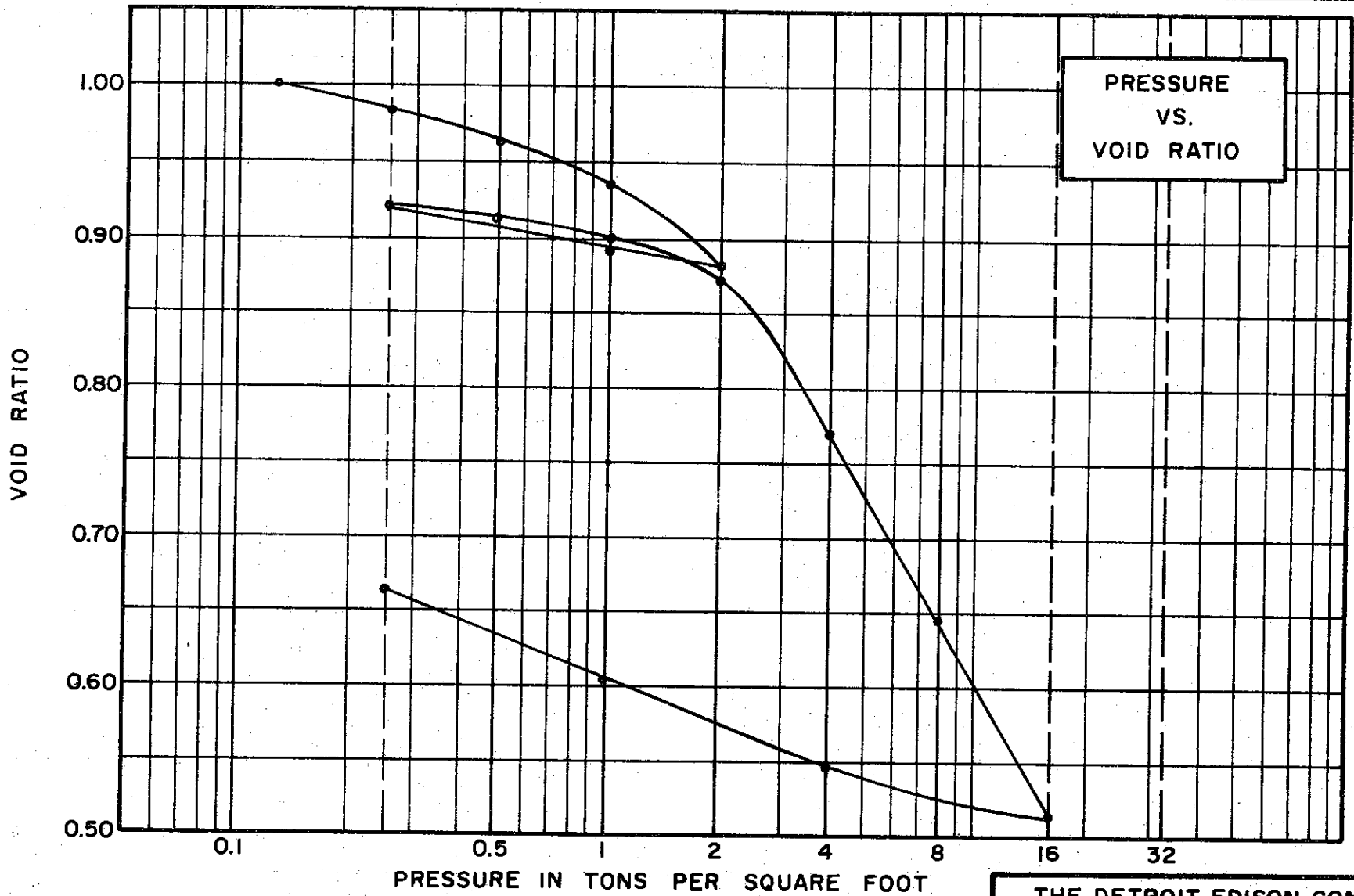


**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 BORING NO. 136  
 SAMPLE NO. ST 6  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 DEPTH 13.0' TO 14.6'  
 FINAL WATER CONTENT 21.3 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.2% FINAL 30.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.019

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

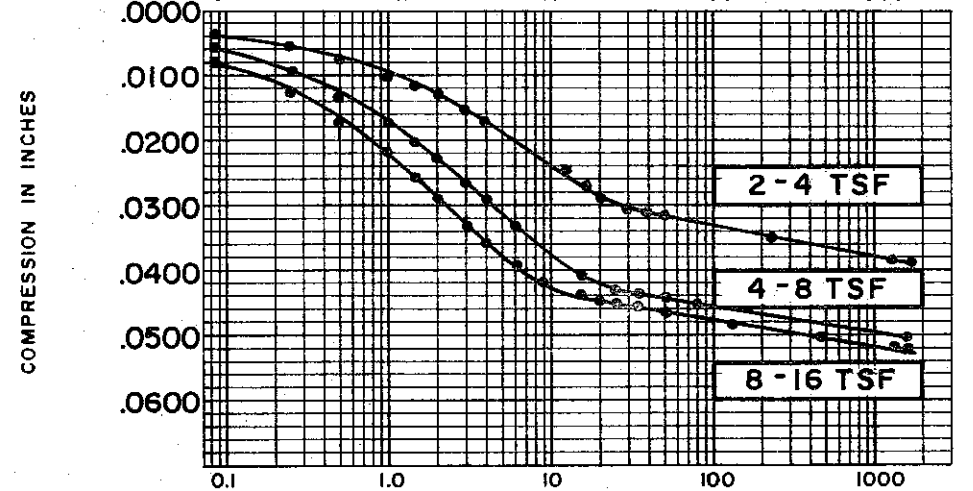
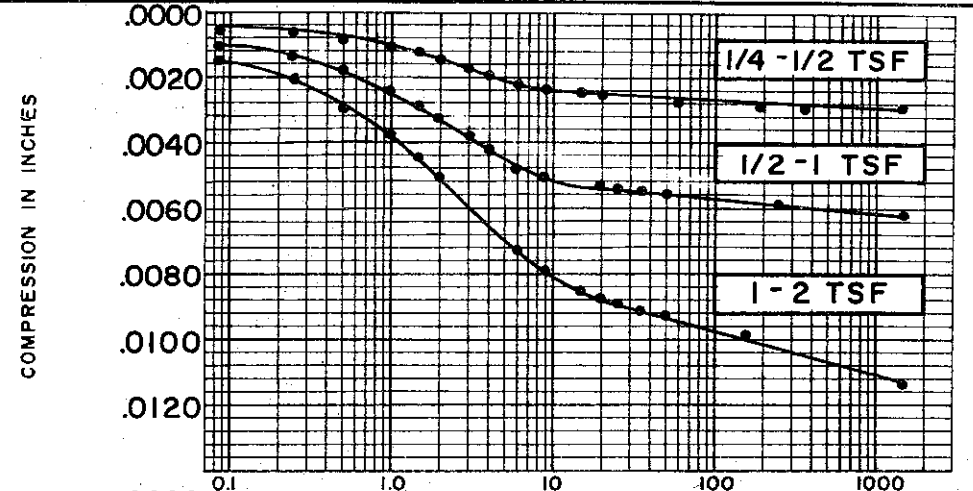
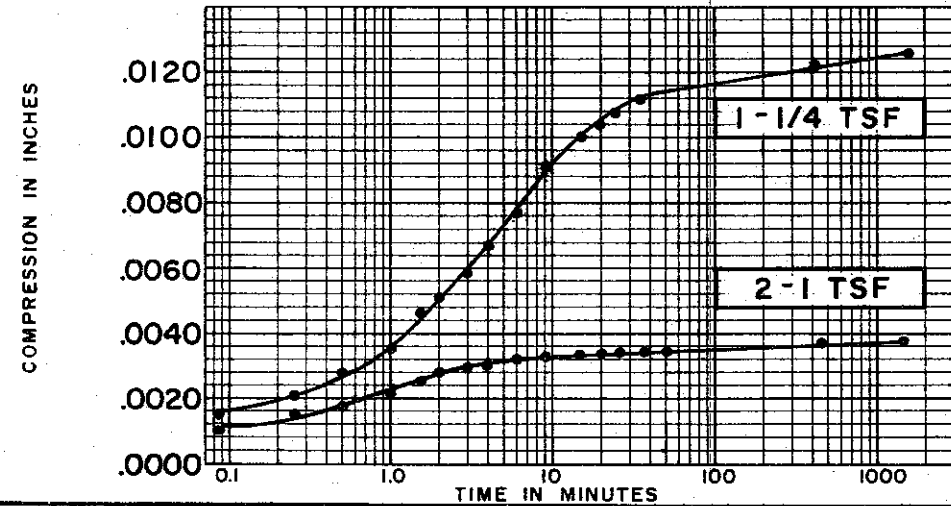
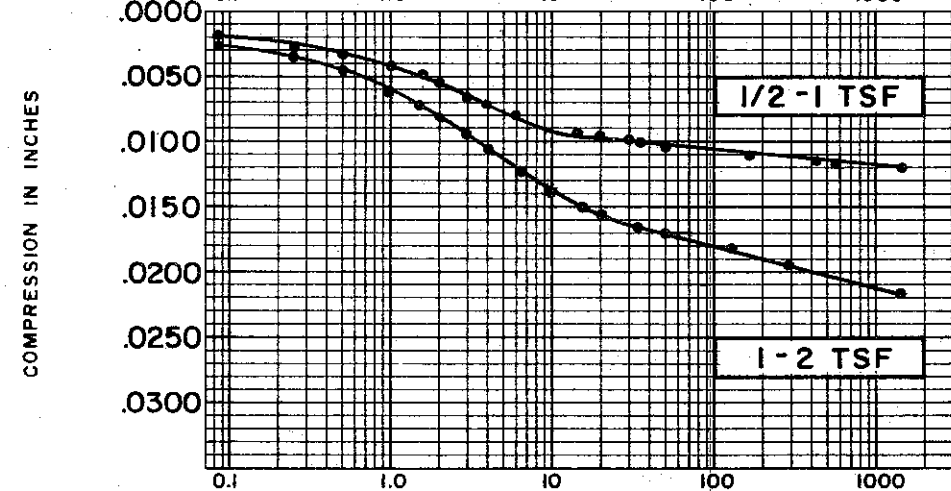
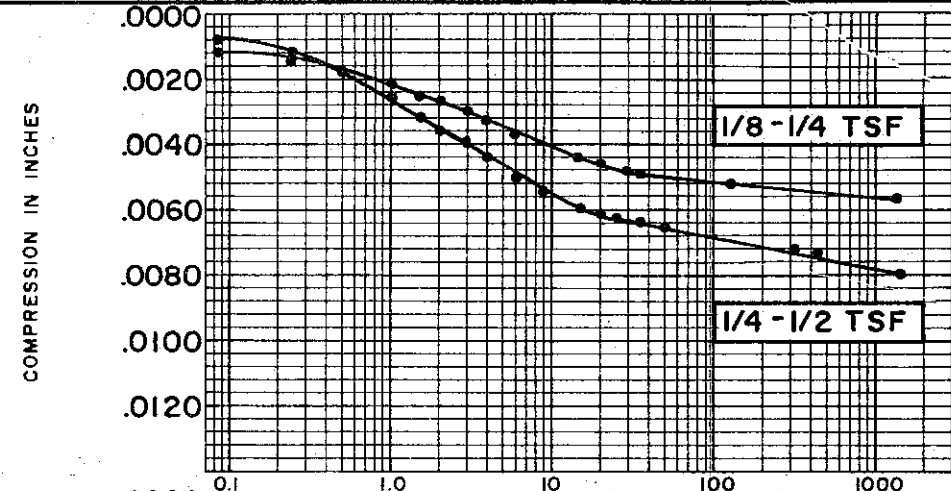
**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 142 TEST NO. C535.1

SAMPLE NO. 6 DATE NOV. 1974

DEPTH 20.1' TO 20.5'

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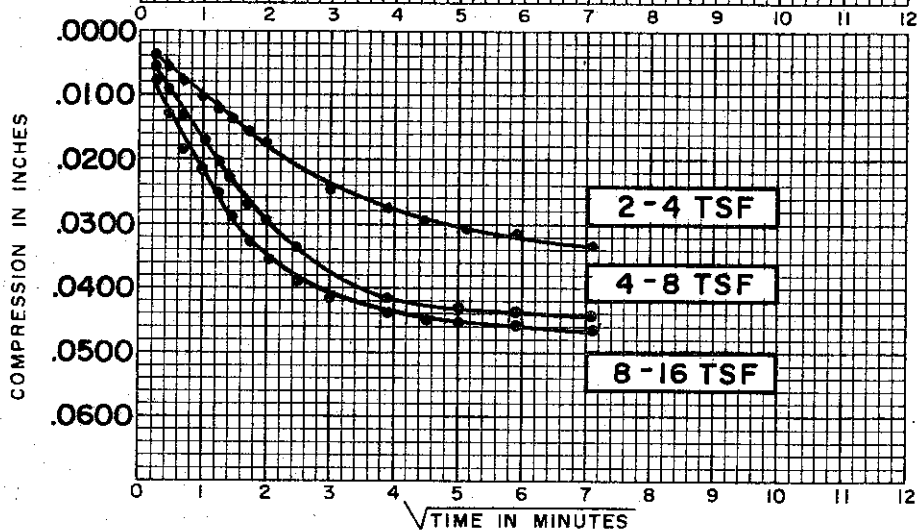
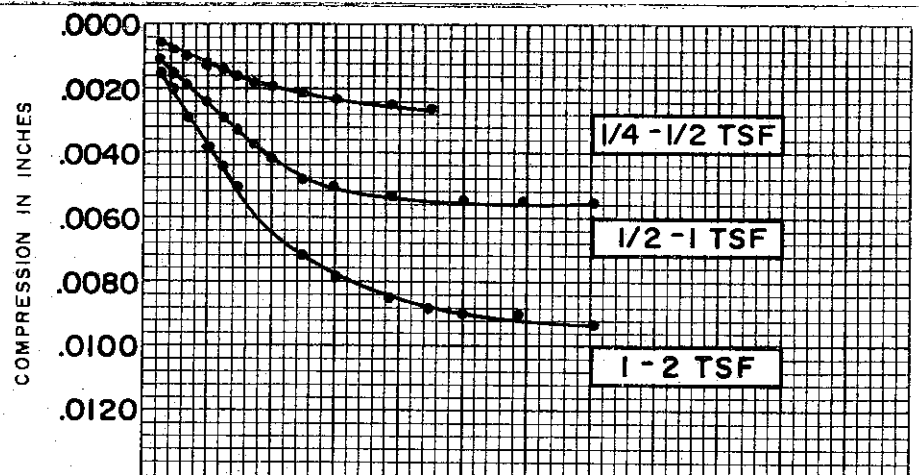
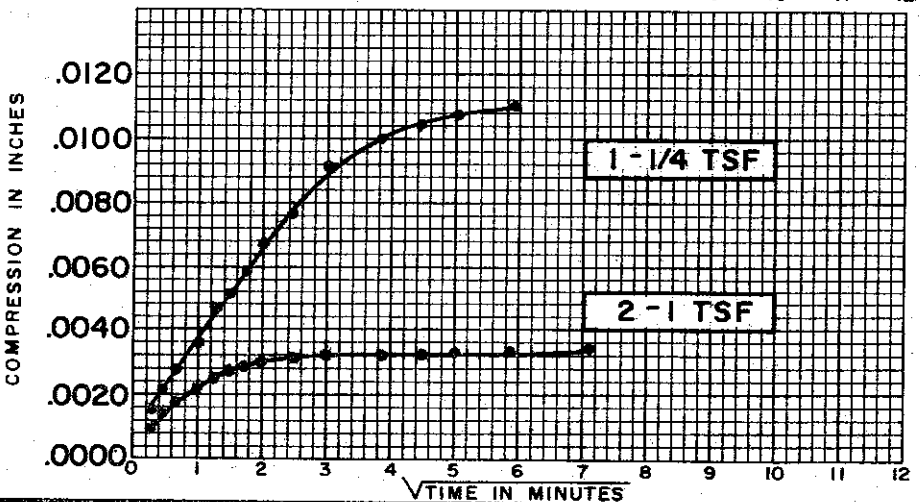
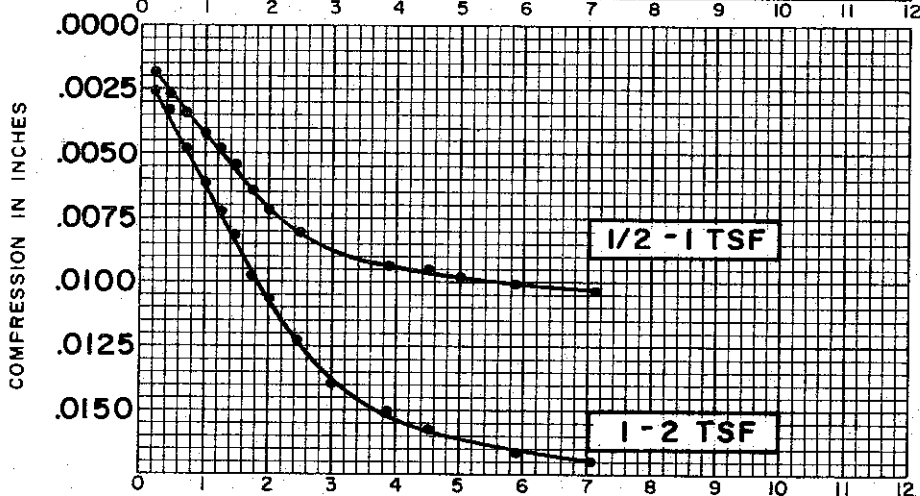
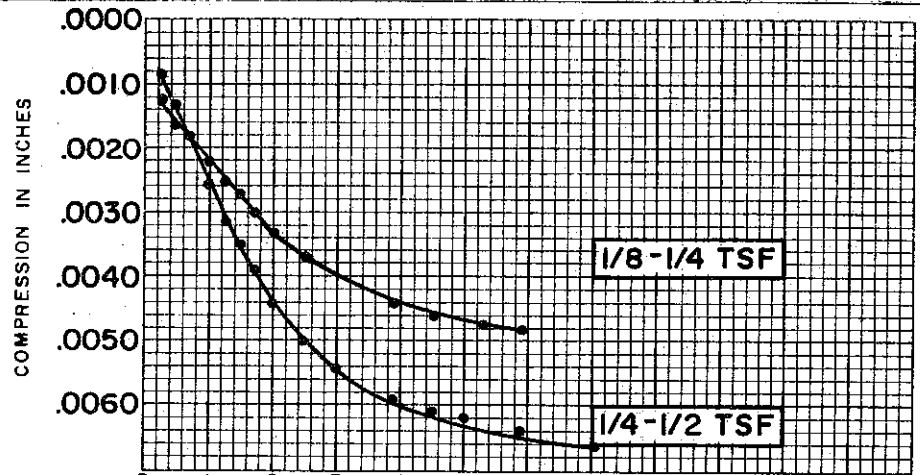


**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2%  
 FINAL WATER CONTENT 30.5%

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2 %  
 FINAL WATER CONTENT 30.5 %

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

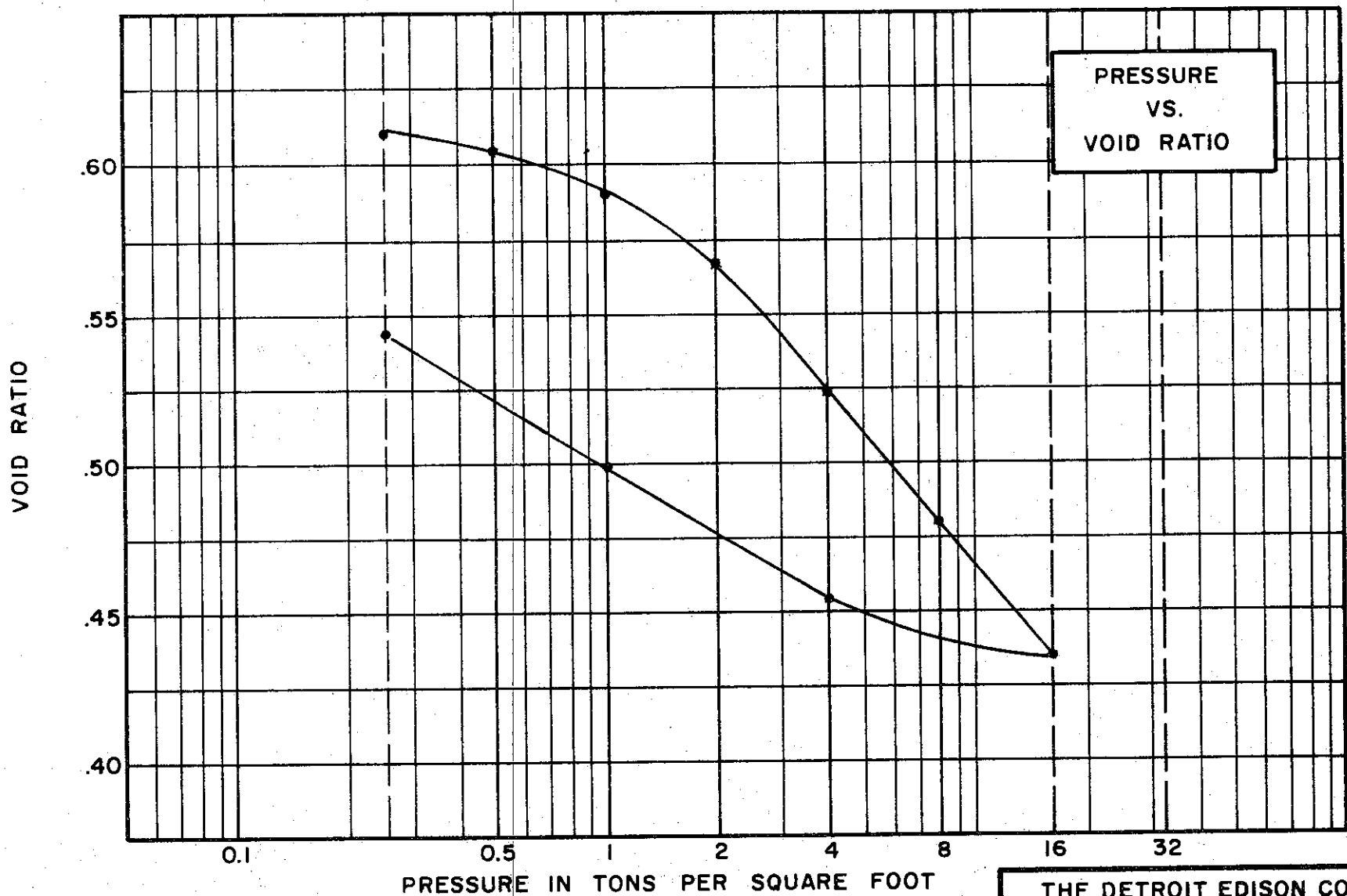
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 5.9% FINAL 22.2%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

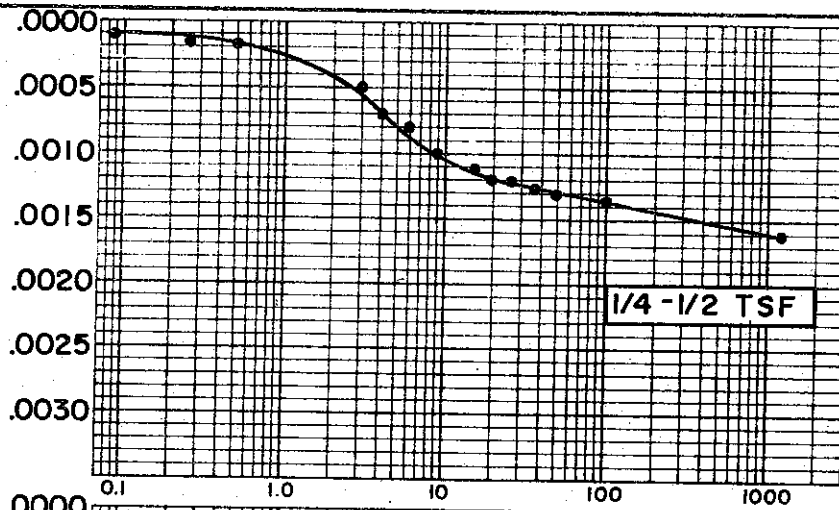
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.447"  
 INITIAL VOID RATIO (0.679) <sup>AS</sup> COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

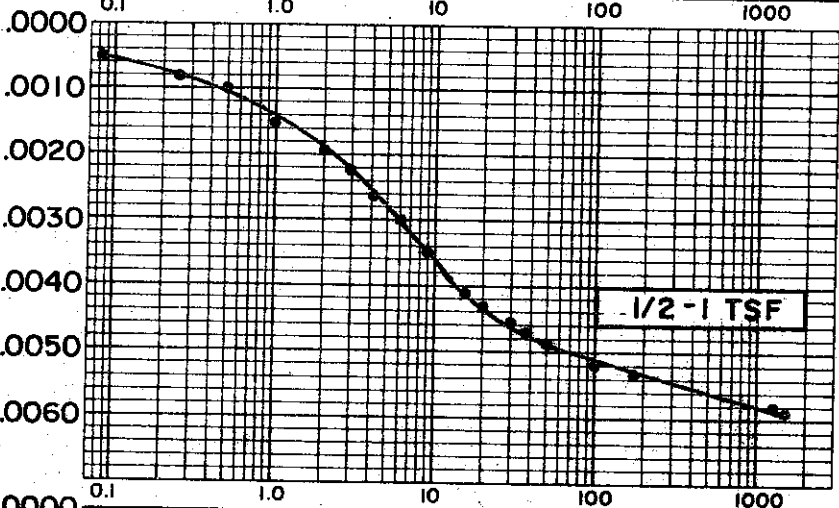
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 146 TEST NO. C542.1  
 SAMPLE NO. 7 DATE DEC. 1974  
 DEPTH 14.0' TO 16.1'

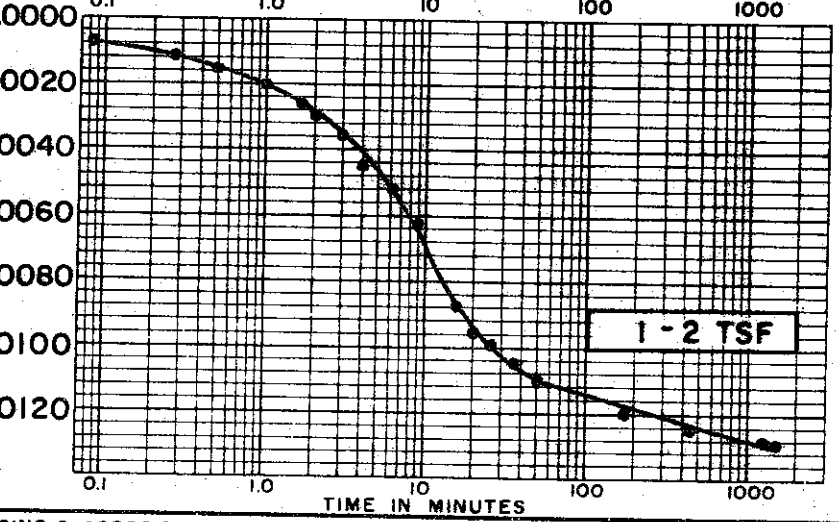
COMPRESSION IN INCHES



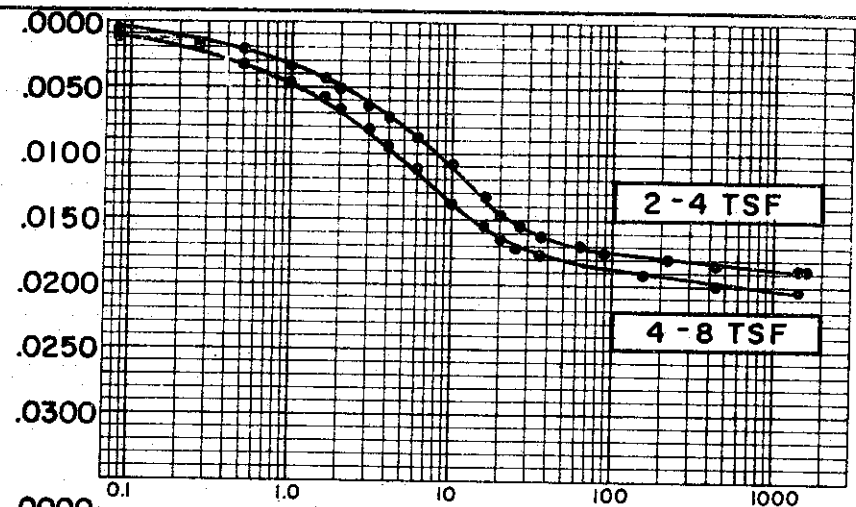
COMPRESSION IN INCHES



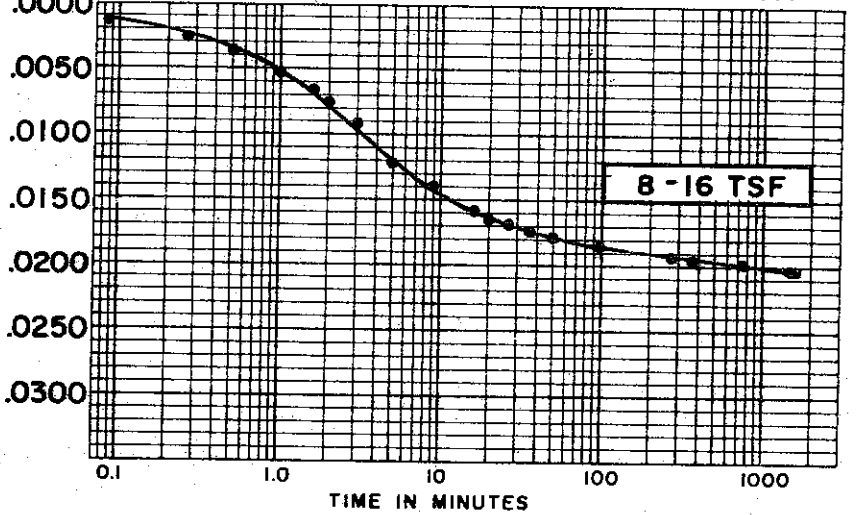
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9)%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

TEST DATA

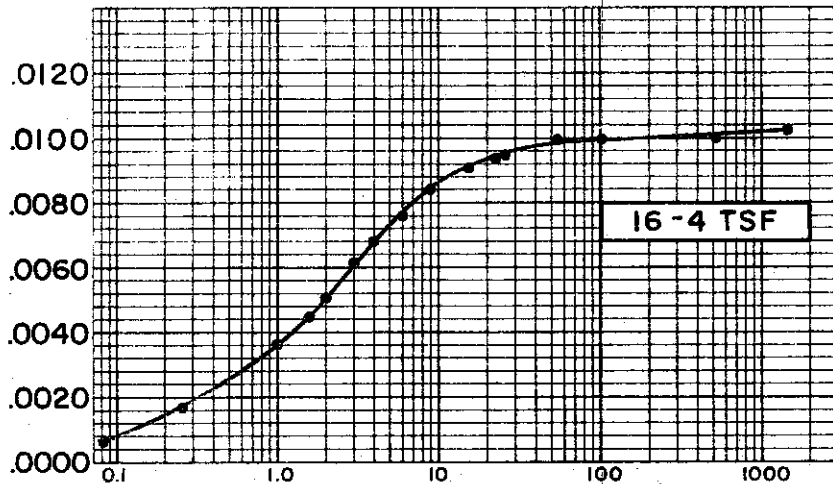
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

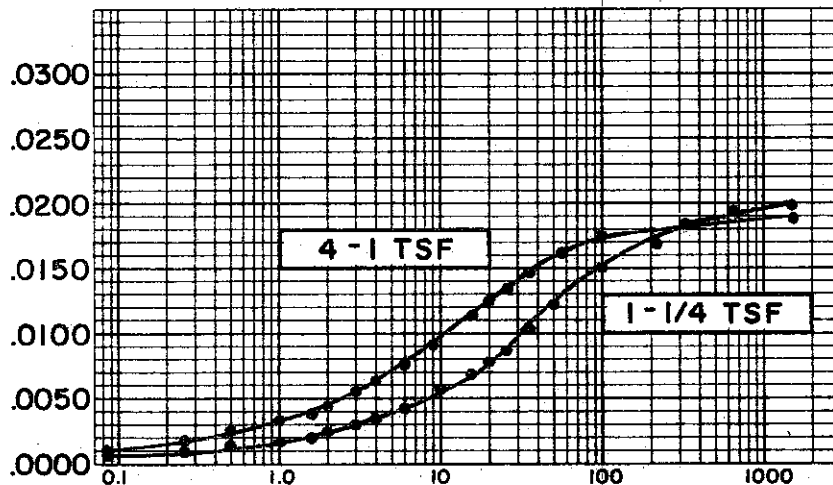
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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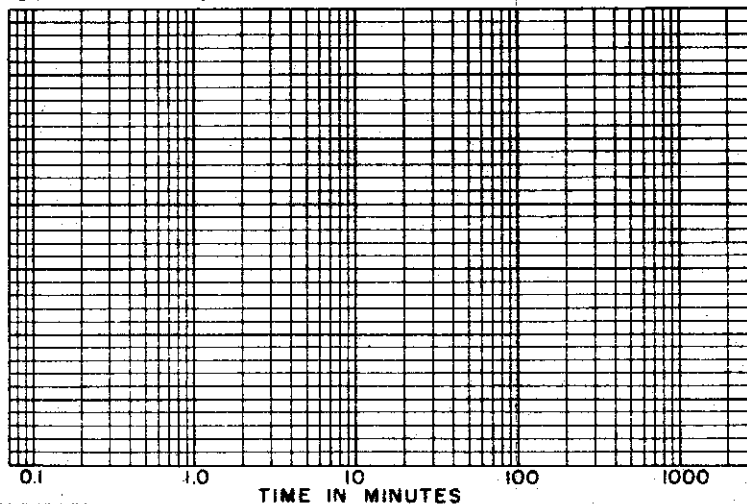
COMPRESSION IN INCHES



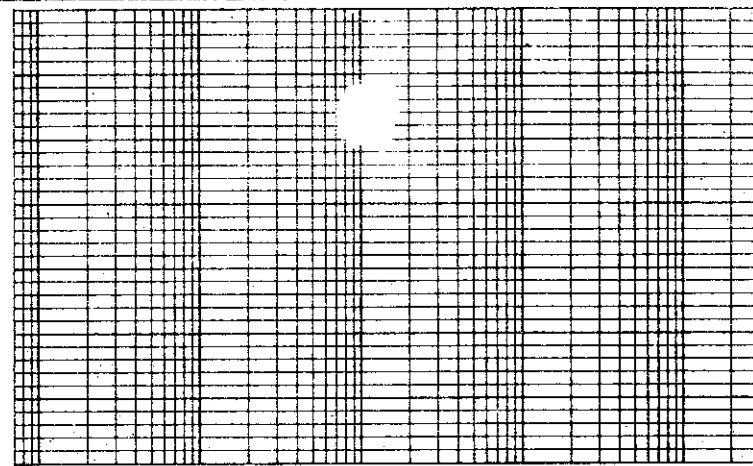
COMPRESSION IN INCHES



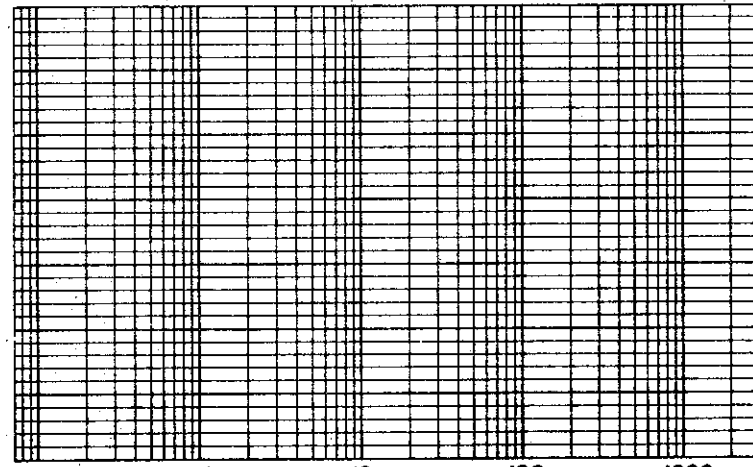
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.75  
INITIAL WATER CONTENT (15.9)%  
FINAL WATER CONTENT 22.2%

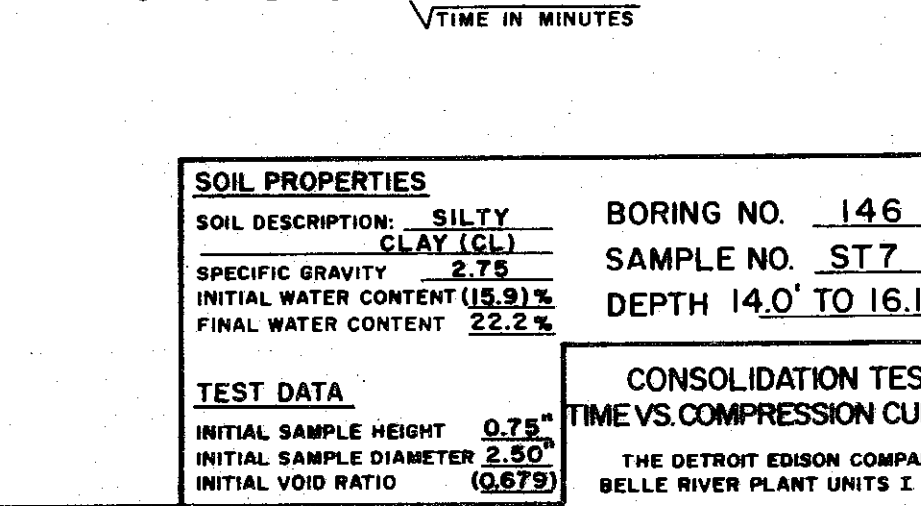
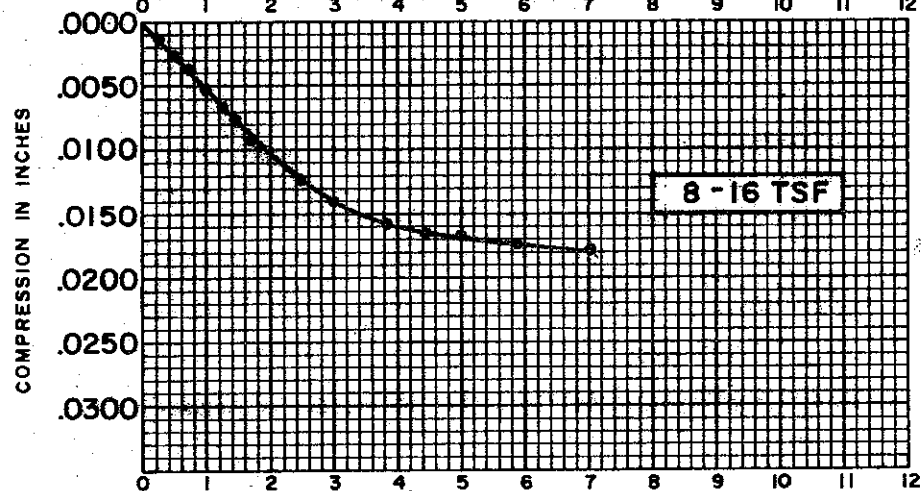
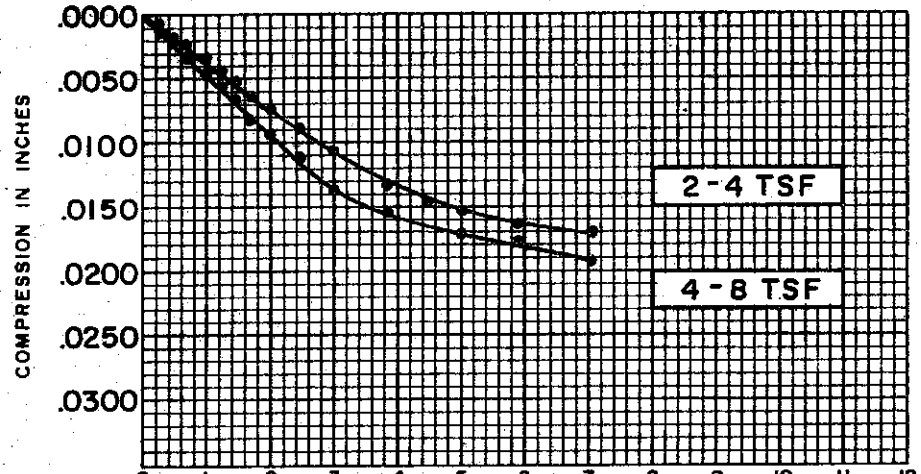
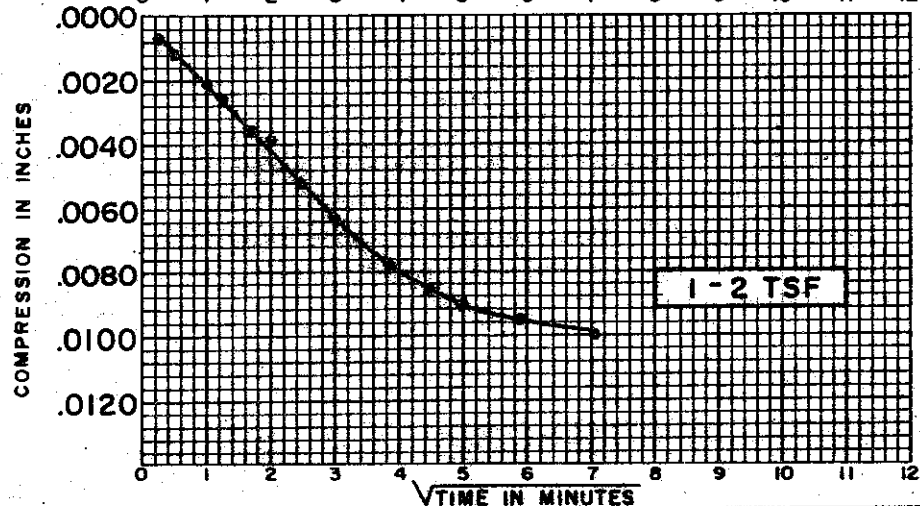
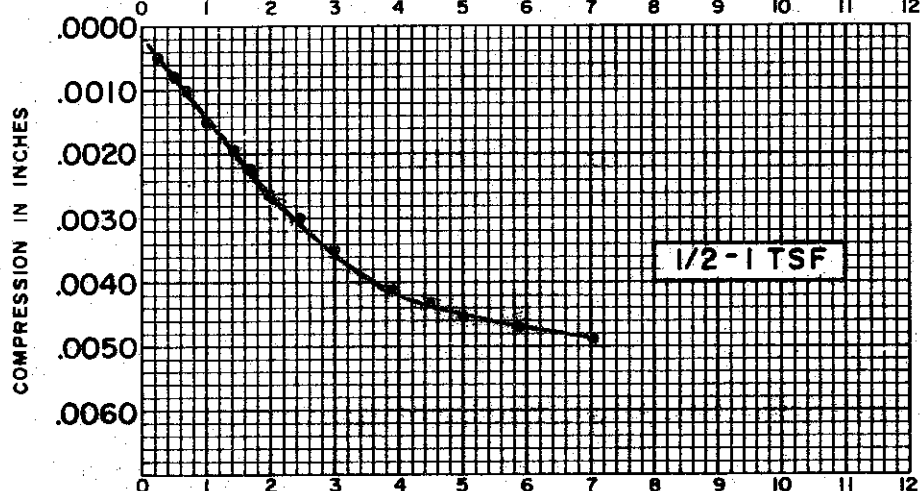
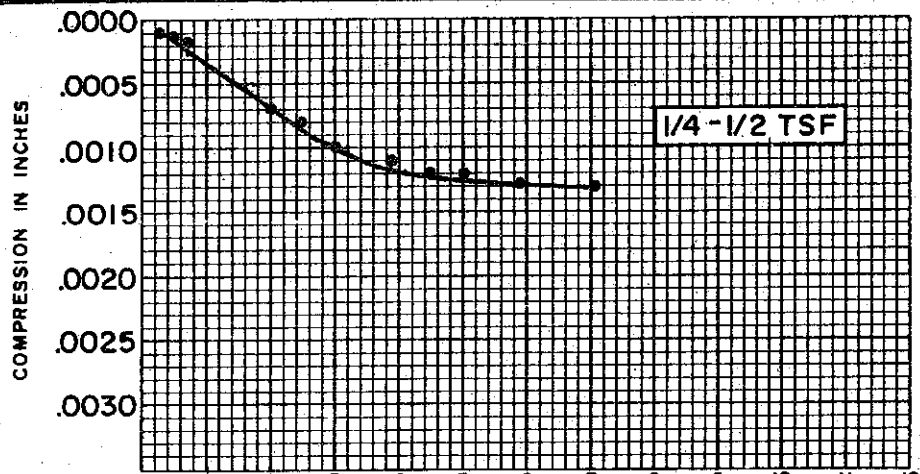
BORING NO. 146  
SAMPLE NO. ST 7  
DEPTH 14.0' TO 16.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9) %  
 FINAL WATER CONTENT 22.2 %

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

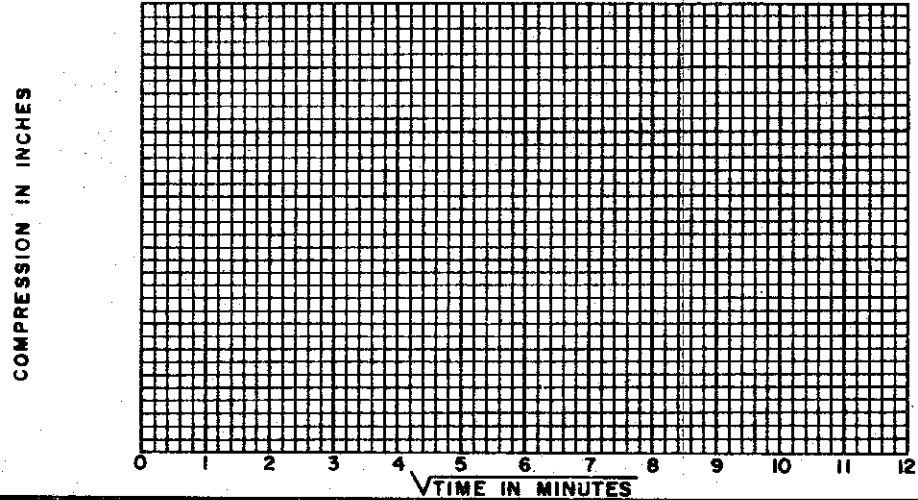
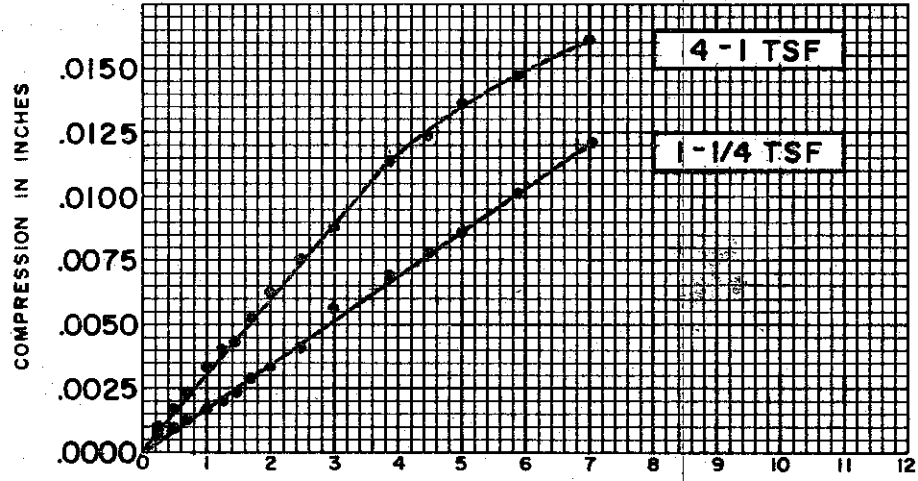
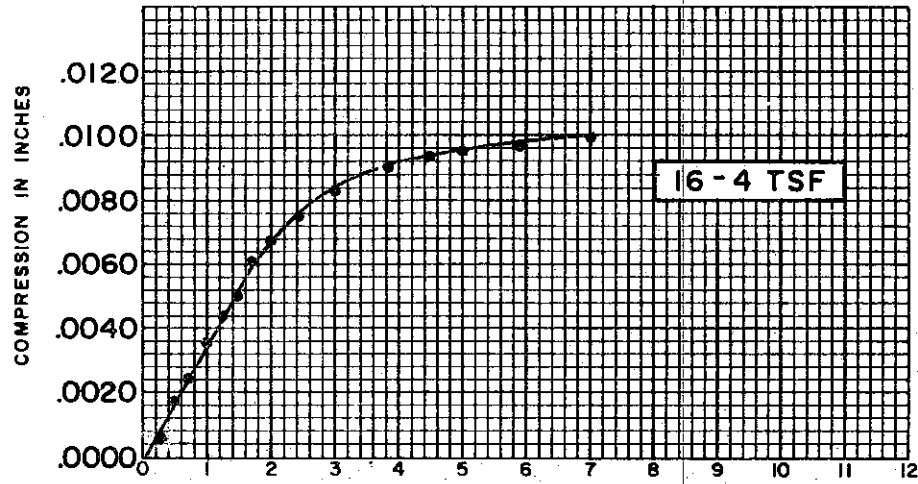
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

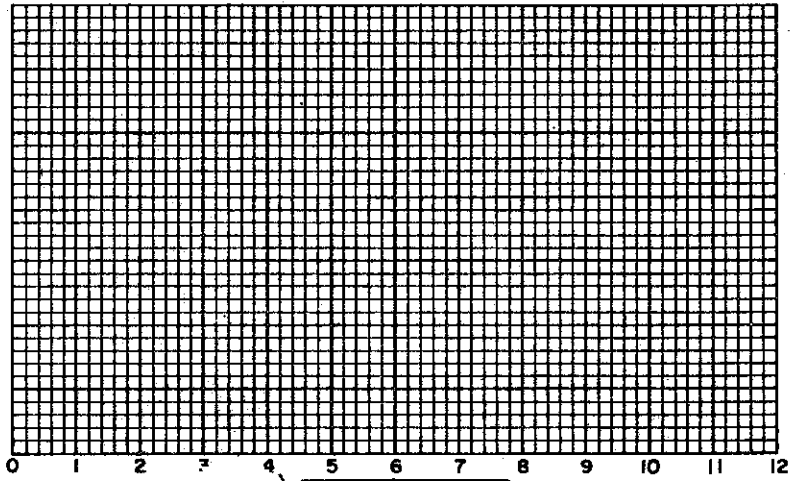
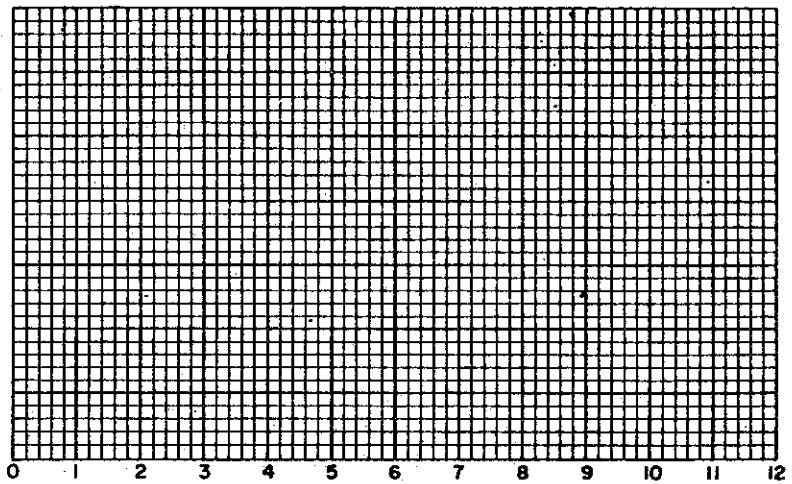
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 15.9%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

**TEST DATA**

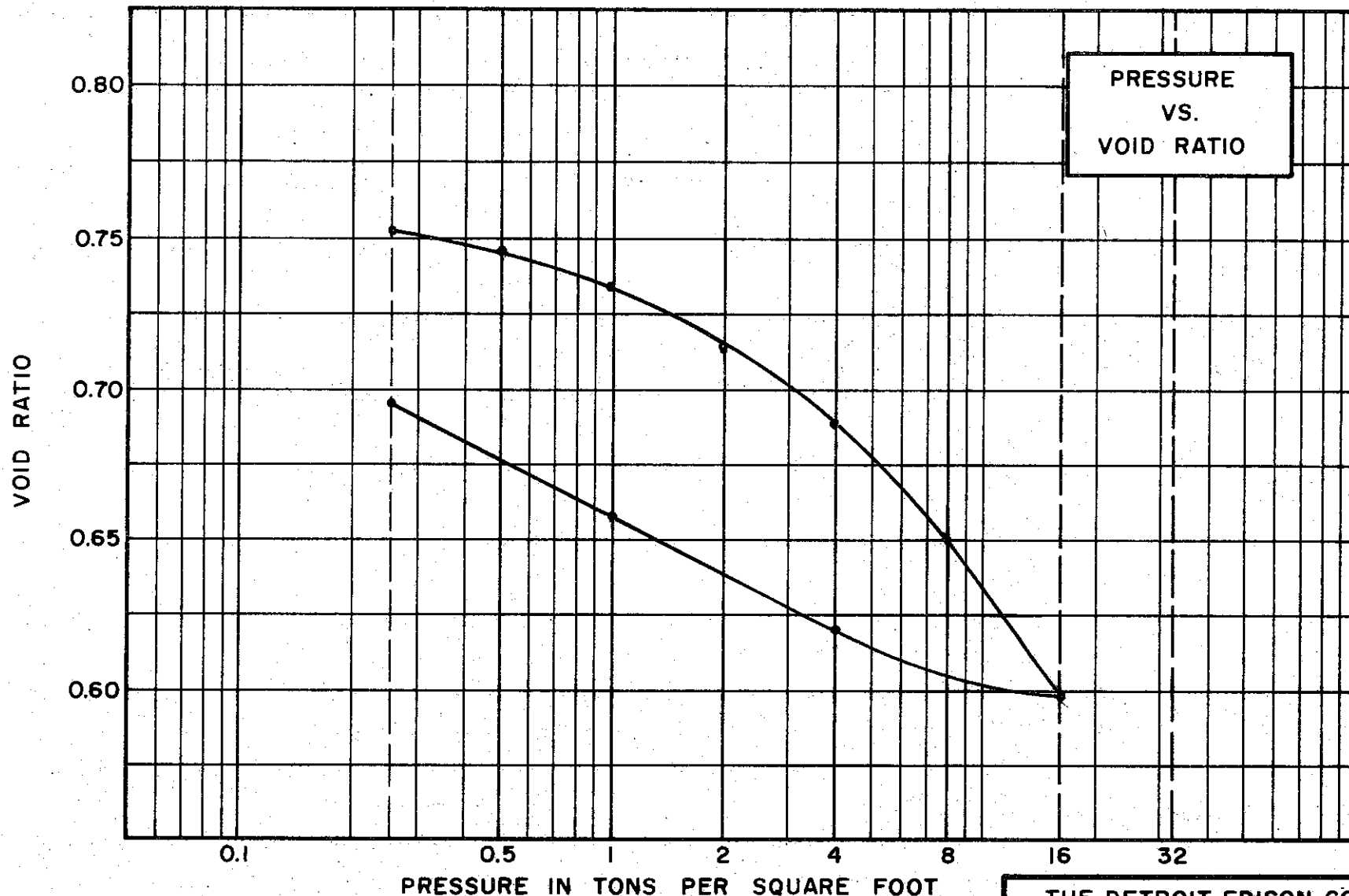
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.1% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

**TEST DATA**

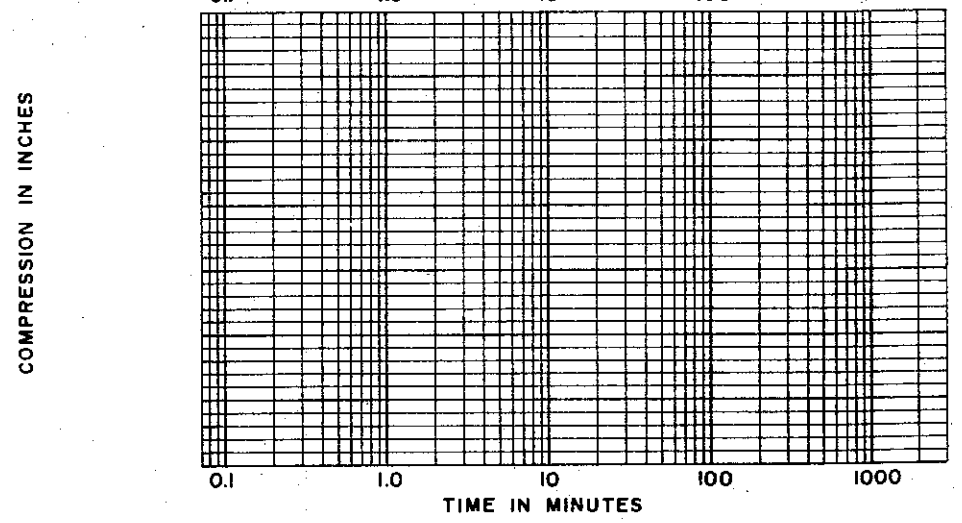
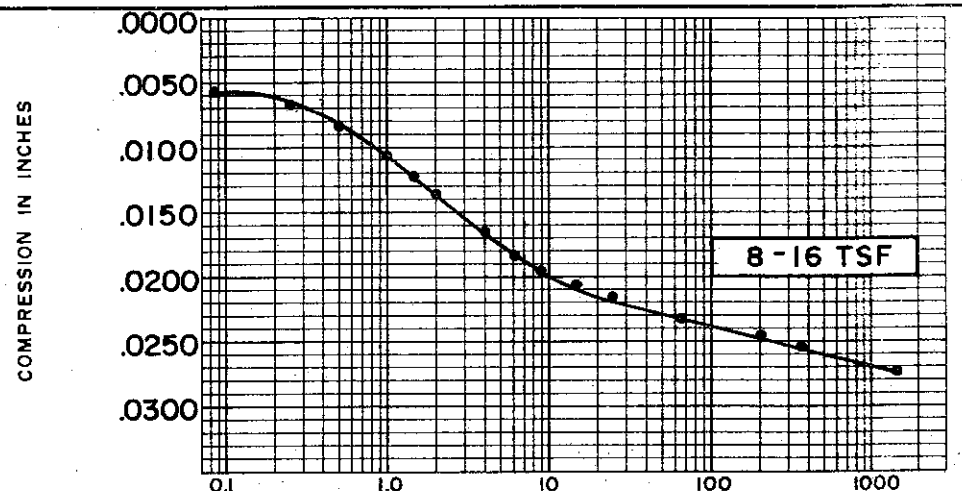
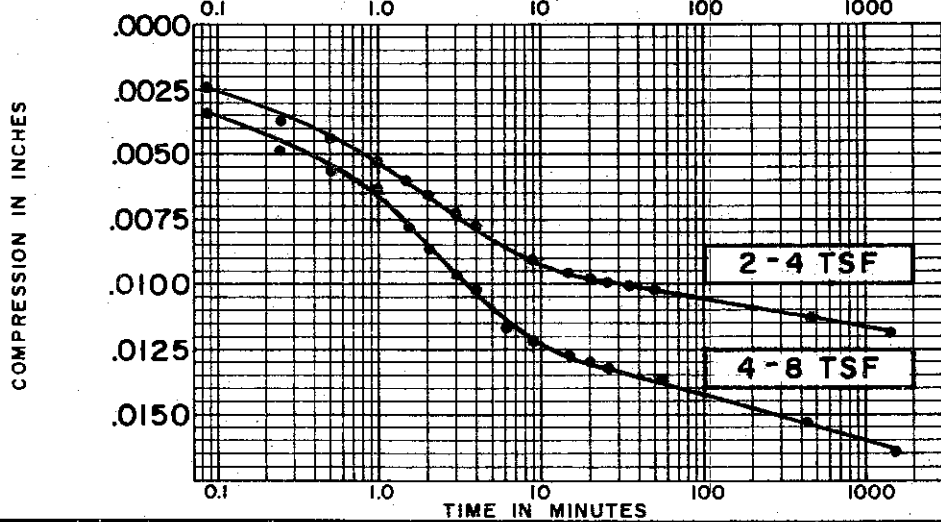
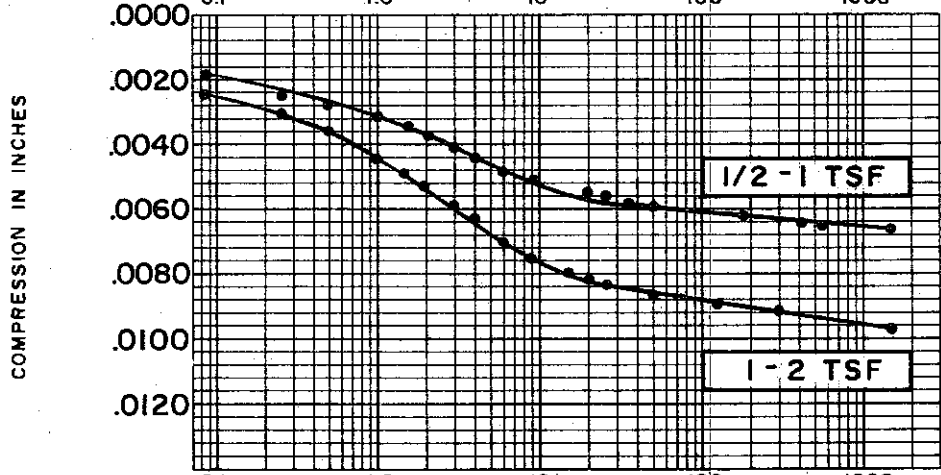
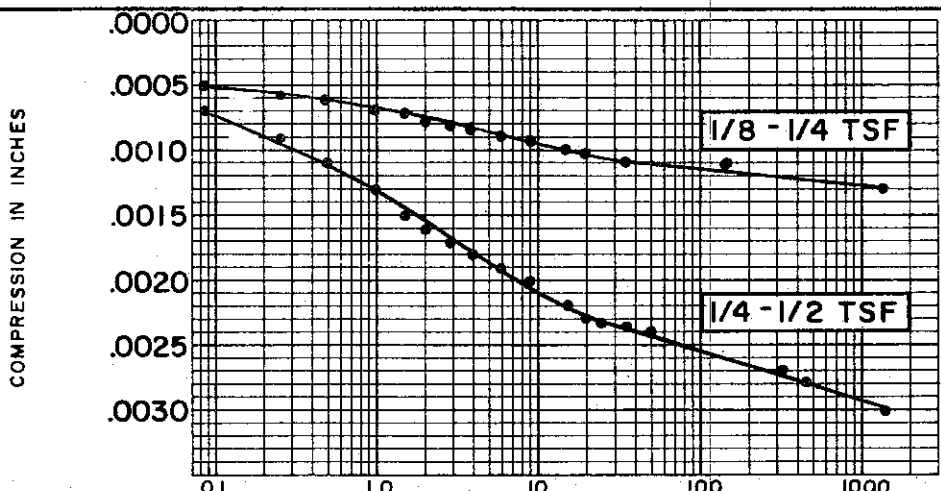
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.757

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 185 TEST NO. C552.1  
 SAMPLE NO. 3 DATE NOV. 1974  
 DEPTH 7.9' TO 8.1'

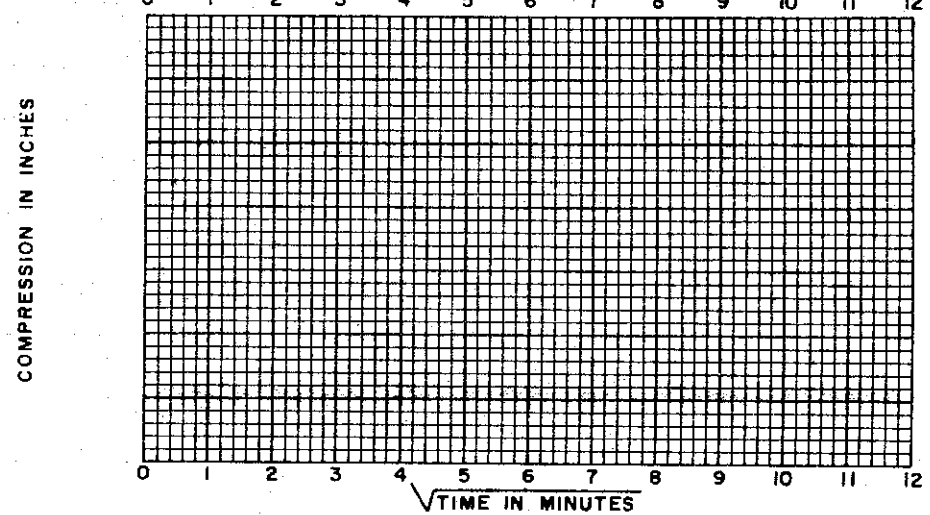
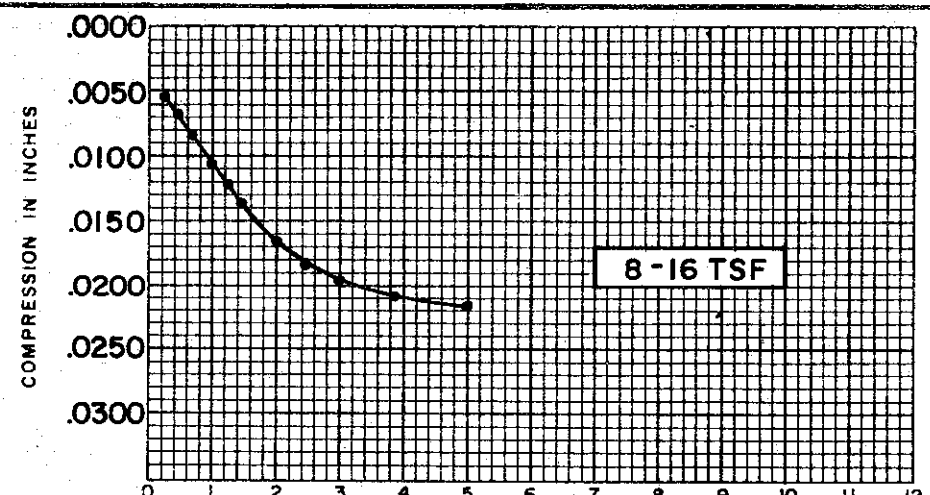
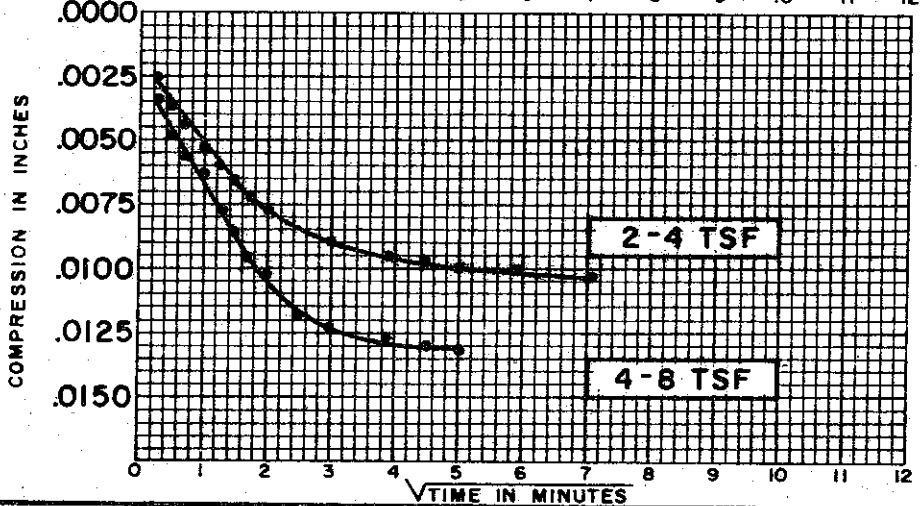
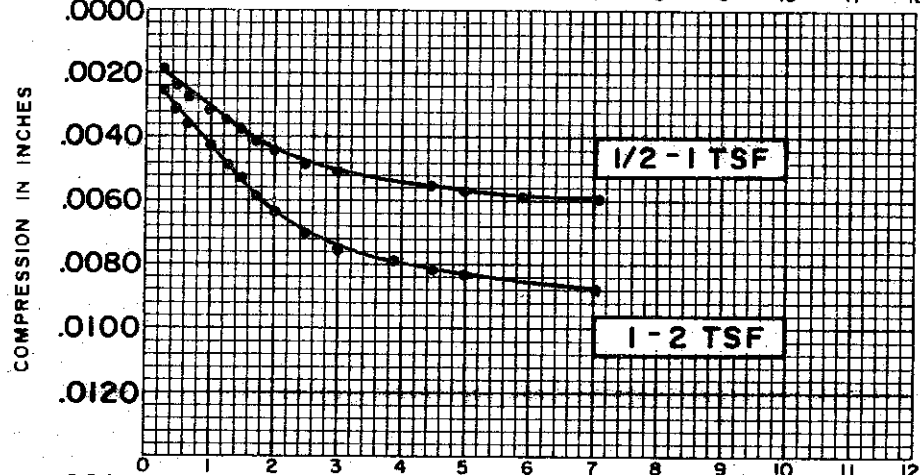
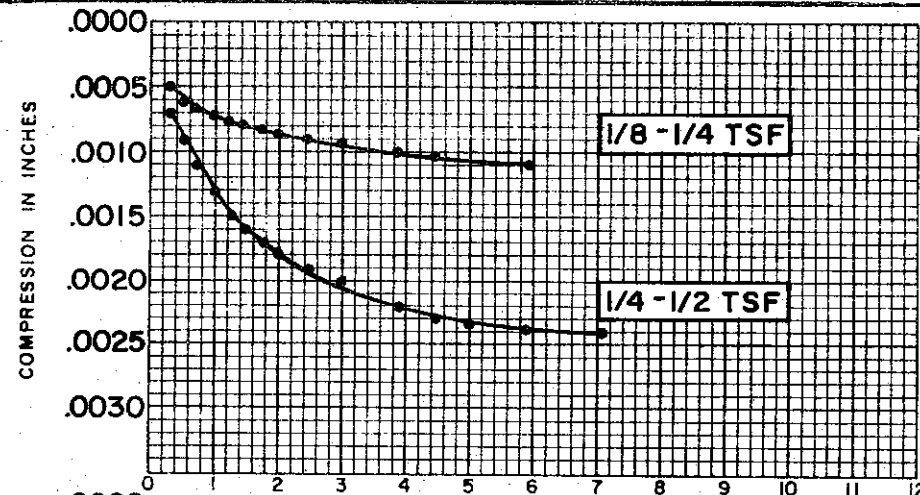
C-573



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	29.1 %
FINAL WATER CONTENT	28.9 %
BORING NO.	185
SAMPLE NO.	3
DEPTH	7.9' TO 8.1'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.757

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO. <u>185</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>3</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>7.9' TO 8.1'</u>
INITIAL WATER CONTENT	<u>29.1%</u>	
FINAL WATER CONTENT	<u>28.9%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.757</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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9-576

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	738	.11	.0012	300	.07	.0007
1/2 - 1	612	.13	.0014	180	.10	.0011
1 - 2	540	.14	.0015	138	.13	.0014
2 - 4	378	.19	.0020	78	.21	.0023
4 - 8	468	.15	.0016	108	.15	.0016
8 - 16	378	.17	.0018	108	.19	.0015
16 - 4	174	.36	.0039	60	.24	.0026
4 - 1	1164	.06	.0006	240	.07	.0007
1 - 1/4	3024	.02	.0002	900	.02	.0002

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' to 14.7'  
 TEST NO. C18.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .770 C<sub>c</sub> .19

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/8 - 1/4	960	.08	.0009	---	---	----
1/4 - 1/2	612	.12	.0013	180	.10	.0011
1/2 - 1	468	.16	.0017	156	.11	.0012
1 - 2	378	.19	.0020	120	.13	.0014
2 - 4	288	.22	.0024	90	.17	.0018
4 - 1	135	.46	.0050	54	.27	.0029
1 - 1/4	912	.07	.0008	216	.07	.0007
1/4 - 1/2	264	.25	.0027	102	.15	.0016
1/2 - 1	438	.15	.0016	84	.18	.0019
1 - 2	173	.37	.0040	48	.31	.0033
2 - 4	135	.46	.0050	36	.40	.0043
4 - 8	216	.27	.0029	48	.28	.0030
8 - 16	192	.27	.0029	42	.29	.0031
16 - 4	138	.36	.0039	33	.34	.0037
4 - 1	576	.09	.0010	150	.08	.0009
1 - 1/4	1380	.04	.0004	450	.03	.0003

BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' to 74.1'  
 TEST NO. C24.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CH)  
 INITIAL WATER CONTENT 36.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .935 C<sub>c</sub> .33

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	168	.11	.0012
1/2 - 1	408	.20	.0021	180	.10	.0011
1 - 1/4	1164	.07	.0007	312	.06	.0006
1/4 - 1/2	438	.18	.0019	120	.15	.0016
1/2 - 1	822	.09	.0010	180	.10	.0011
1 - 2	378	.20	.0022	132	.13	.0014
2 - 4	408	.18	.0019	120	.14	.0015
4 - 8	408	.17	.0018	102	.16	.0017
8 - 16	540	.11	.0012	120	.13	.0014
24 - 6	138	.42	.0046	45	.31	.0033
6 - 1/2	1218	.06	.0006	450	.04	.0004

BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8' to 11.0'  
TEST NO. C29.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 29.5 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 23 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.799 C<sub>c</sub> 0.23

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	614	.12	.0013	240	.07	.0008
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	614	.11	.0012	225	.07	.0008
2 - 4	778	.08	.0009	210	.07	.0007
4 - 8	614	.09	.0010	162	.08	.0009
8 - 16	406	.12	.0013	96	.12	.0013
16 - 4	194	.24	.0026	54	.20	.0022
4 - 1	1110	.05	.0005	240	.05	.0005
1 - 1/4	3024	.02	.0002	720	.02	.0002

BORING NO. 41  
SAMPLE NO. 7  
DEPTH 21.0' to 21.1'  
TEST NO. C30.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 38.1 %  
ATTERBERG LIMITS  
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 1.055 C<sub>c</sub> 0.34

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	1500	.05	.0005	420	.04	.0004	DEPTH <u>53.0' to 53.2'</u>
1/2 - 1	1056	.06	.0006	300	.05	.0005	TEST NO. <u>C33.1</u>
1 - 2	738	.08	.0009	240	.06	.0006	<b>SOIL PROPERTIES</b>
2 - 4	696	.07	.0008	228	.06	.0006	SOIL DESCRIPTION: _____
4 - 8	540	.09	.0010	150	.07	.0008	<u>Silty CLAY (CL-CH)</u>
8 - 16	504	.08	.0009	108	.09	.0010	INITIAL WATER CONTENT <u>46.5 %</u>
24 - 6	378	.10	.0011	90	.10	.0011	ATTERBERG LIMITS
6 - 2	912	.05	.0005	192	.05	.0005	LIQUID LIMIT <u>52 %</u> PLASTIC LIMIT <u>25 %</u>
2 - 1/2	1500	.03	.0003	480	.02	.0002	<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.75 IN 1.905 CM.</u>
							INITIAL VOID RATIO <u>1.235</u> C <sub>c</sub> <u>0.35</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/8 - 1/4	1500	.06	.0006	360	.05	.0005	DEPTH <u>73.3'</u>
1/4 - 1/2	696	.11	.0012	240	.07	.0008	TEST NO. <u>C35.1</u>
1/2 - 1	696	.10	.0011	180	.09	.0010	<b>SOIL PROPERTIES</b>
1 - 2	468	.15	.0016	168	.10	.0011	SOIL DESCRIPTION: <u>Silty</u>
2 - 4	318	.21	.0023	120	.13	.0014	<u>CLAY, sandy (CL)</u>
4 - 1	240	.27	.0029	45	.33	.0036	INITIAL WATER CONTENT <u>26.7 %</u>
1 - 1/4	1008	.07	.0007	228	.07	.0007	ATTERBERG LIMITS
1/4 - 1/2	264	.26	.0028	60	.26	.0028	LIQUID LIMIT <u>25 %</u> PLASTIC LIMIT <u>15 %</u>
1/2 - 1	504	.13	.0014	102	.15	.0016	<b>TEST DATA</b>
1 - 2	174	.38	.0041	78	.20	.0021	INITIAL SAMPLE HEIGHT <u>0.80 IN 2.03 CM.</u>
2 - 4	216	.30	.0032	54	.28	.0030	INITIAL VOID RATIO <u>.697</u> C <sub>c</sub> <u>0.21</u>
4 - 8	348	.18	.0019	96	.15	.0016	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
8 - 16	348	.17	.0018	72	.19	.0020	
16 - 4	138	.40	.0043	36	.35	.0038	
4 - 1	438	.13	.0014	54	.24	.0026	
1 - 1/4	2382	.03	.0003	660	.02	.0002	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.13	.0014	210	.07	.0008
1/2 - 1	408	.17	.0018	132	.12	.0013
1 - 2	378	.18	.0019	114	.13	.0014
2 - 4	408	.16	.0017	108	.13	.0014
4 - 8	408	.15	.0016	114	.12	.0013
8 - 16	408	.14	.0015	96	.13	.0014
24 - 6	216	.24	.0026	54	.22	.0024
6 - 2	822	.07	.0007	168	.07	.0008
2 - 1/2	1686	.04	.0004	348	.04	.0004

BORING NO. 41  
SAMPLE NO. 25  
DEPTH 113'  
TEST NO. C38.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 24.2 %  
ATTERBERG LIMITS  
LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.642 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	240	.33	.0036	108	.17	.0018
1/2 - 1	216	.36	.0039	120	.15	.0016
1 - 2	318	.24	.0026	90	.20	.0021
2 - 4	240	.32	.0034	108	.16	.0017
4 - 8	240	.31	.0033	108	.16	.0017
8 - 4	174	.41	.0044	54	.31	.0033
4 - 1	780	.09	.0010	276	.07	.0007
1 - 1/4	1380	.06	.0006	276	.07	.0007
1/4 - 1/2	348	.22	.0024	150	.12	.0013
1/2 - 1	540	.14	.0015	174	.10	.0011
1 - 2	780	.09	.0010	150	.11	.0012
2 - 4	654	.11	.0012	108	.16	.0017
4 - 8	468	.15	.0016	150	.16	.0012
8 - 16	378	.19	.0020	120	.13	.0014
24 - 6	540	.12	.0013	150	.10	.0011
6 - 2	960	.07	.0008	540	.03	.0003
2 - 1/2	1272	.06	.0006	960	.02	.0002

BORING NO. 41  
SAMPLE NO. 29  
DEPTH 130.9' to 131.1'  
TEST NO. C40.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Clayey SAND, gravelly (GC-SC)  
INITIAL WATER CONTENT 11.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.370 C<sub>c</sub> 0.09

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>48</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	438	.18	.0019	180	.10	.0011	DEPTH <u>39.2' to 39.4'</u>
1/2 - 1	540	.14	.0015	210	.08	.0009	TEST NO. <u>C202.1</u>
1 - 2	654	.11	.0012	156	.10	.0011	<b>SOIL PROPERTIES</b>
2 - 1/2	504	.13	.0014	114	.14	.0015	
1/2 - 1/4	1500	.05	.0005	390	.05	.0005	<u>Silty CLAY (CL-CH)</u>
1/4 - 1/2	576	.13	.0014	138	.12	.0013	INITIAL WATER CONTENT <u>38.8 %</u>
1/2 - 1	468	.15	.0016	138	.12	.0013	ATTERBERG LIMITS
1 - 2	504	.14	.0015	108	.15	.0016	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>24 %</u>
2 - 4	696	.09	.0010	300	.05	.0005	<b>TEST DATA</b>
4 - 8	654	.09	.0010	174	.08	.0009	
8 - 16	504	.10	.0011	144	.08	.0009	INITIAL VOID RATIO <u>1.027</u> C <sub>c</sub> <u>0.33</u>
16 - 2	438	.12	.0013	108	.11	.0012	
2 - 1/2	2232	.03	.0003	540	.11	.0002	
1/2 - 1/8	4440	.01	.0001	1020	.01	.0001	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>49</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	470	.17	.0018	240	.07	.0008	DEPTH <u>13.7' to 14.0'</u>
1/2 - 1	540	.14	.0015	162	.11	.0012	TEST NO. <u>C133.1</u>
1 - 1/4	738	.10	.0011	210	.08	.0009	<b>SOIL PROPERTIES</b>
1/4 - 1/2	264	.29	.0031	126	.14	.0015	
1/2 - 1	540	.14	.0015	120	.15	.0016	<u>Silty CLAY (CL-CH)</u>
1 - 2	540	.14	.0015	156	.11	.0012	INITIAL WATER CONTENT <u>33.3 %</u>
2 - 4	540	.13	.0014	156	.10	.0011	ATTERBERG LIMITS
4 - 8	504	.13	.0014	126	.12	.0013	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>23 %</u>
8 - 16	318	.19	.0020	108	.13	.0014	<b>TEST DATA</b>
16 - 4	318	.18	.0019	66	.20	.0021	
4 - 1	1320	.05	.0005	330	.05	.0005	INITIAL VOID RATIO <u>0.863</u> C <sub>c</sub> <u>0.26</u>
1 - 1/4	4620	.01	.0001	1140	.01	.0001	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							SOIL PROPERTIES SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							TEST DATA INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 49 SAMPLE NO. _____ 11 DEPTH _____ 93.8' to 94.0' TEST NO. _____ C141.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	504	.13	.0014	174	.09	.0010	SOIL PROPERTIES SOIL DESCRIPTION: _____ Silty CLAY (CL)
1/2 - 1	504	.13	.0014	132	.11	.0012	INITIAL WATER CONTENT <u>28.6</u> %
1 - 2	348	.19	.0020	96	.16	.0017	ATTERBERG LIMITS
2 - 4	192	.32	.0034	57	.25	.0027	LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>22</u> %
4 - 1	264	.22	.0024	48	.29	.0031	TEST DATA
1 - 1/4	780	.07	.0008	168	.08	.0009	INITIAL SAMPLE HEIGHT <u>0.75</u> IN <u>1.905</u> CM.
1/4 - 1/2	288	.22	.0023	66	.22	.0023	INITIAL VOID RATIO <u>0.701</u> C <sub>c</sub> <u>0.20</u>
1/2 - 1	318	.20	.0021	84	.17	.0018	
1 - 2	264	.23	.0025	84	.17	.0018	
2 - 4	240	.25	.0027	60	.23	.0025	
4 - 8	264	.22	.0023	72	.19	.0020	
8 - 16	264	.20	.0021	60	.21	.0022	
16 - 4	156	.33	.0035	39	.30	.0032	
4 - 1	738	.07	.0008	120	.10	.0011	
1 - 1/4	2016	.03	.0003	420	.03	.0003	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/16 - 1/4	438	.18	.0019	174	.10	.0011
1/4 - 1/2	540	.14	.0015	138	.13	.0014
1/2 - 1	438	.18	.0019	84	.20	.0022
1 - 2	438	.17	.0018	84	.20	.0022
2 - 1	264	.27	.0029	60	.28	.0030
1 - 1/2	576	.13	.0014	156	.11	.0012
1/2 - 1/4	1272	.06	.0006	240	.07	.0008
1/4 - 1/2	240	.31	.0033	60	.29	.0031
1/2 - 1	468	.16	.0017	120	.14	.0015
1 - 2	408	.18	.0019	60	.28	.0030
2 - 4	960	.07	.0007	360	.05	.0005
4 - 8	698	.08	.0009	240	.06	.0006
8 - 16	612	.07	.0008	156	.07	.0007
16 - 4	288	.15	.0016	90	.11	.0012
4 - 1	2538	.02	.0002			
1 - 1/4	4338	.01	.0001			

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5 - 38.9  
 TEST NO. C86.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CH)

INITIAL WATER CONTENT 51.6 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 1.383 C<sub>c</sub> 0.55

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<b>SOIL PROPERTIES</b>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTEBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.		SAMPLE NO. _____
1/16 - 1/8	378	.21	.0023	150	.12	.0013	DEPTH _____	
1/8 - 1/4	690	.11	.0012	210	.08	.0009	TEST NO. _____	
1/4 - 1/2	576	.13	.0014	168	.10	.0011	<b>SOIL PROPERTIES</b>	
1/2 - 1	378	.20	.0021	90	.20	.0021	SOIL DESCRIPTION: _____	
1 - 2	288	.25	.0027	72	.24	.0026	Silty CLAY (CL-CH)	
2 - 1	288	.25	.0027	51	.33	.0035	INITIAL WATER CONTENT <u>40.5</u> %	
1 - 1/4	780	.09	.0010	144	.12	.0013	ATTEBERG LIMITS	
1/4 - 1/2	348	.21	.0023	114	.15	.0016	LIQUID LIMIT <u>49</u> % PLASTIC LIMIT <u>20</u> %	
1/2 - 1	504	.15	.0016	108	.16	.0017	<b>TEST DATA</b>	
1 - 2	378	.19	.0020	60	.28	.0030	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.	
2 - 4	648	.10	.0011	156	.10	.0011	INITIAL VOID RATIO <u>1.013</u> C <sub>c</sub> <u>0.45</u>	
4 - 8	540	.11	.0012	156	.08	.0009	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>	
8 - 16	624	.07	.0008	120	.09	.0010		THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
16 - 4	318	.15	.0016	84	.13	.0014		
4 - 1	1164	.05	.0005	312	.04	.0004		
1 - 1/4	3744	.02	.0002	840	.02	.0002		

C-583

C-584

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	504	.16	.0017	72	.25	.0027
1/2 - 1	438	.18	.0019	114	.16	.0017
1 - 2	288	.26	.0028	43	.40	.0043
2 - 4	240	.29	.0031	60	.27	.0029
4 - 8	264	.24	.0026	45	.33	.0035
8 - 16	240	.23	.0025	36	.35	.0038
16 - 4	138	.38	.0041	18	.68	.0073
4 - 1	654	.08	.0009	144	.09	.0010
1 - 1/4	2616	.02	.0002	600	.02	.0002

BORING NO. 53

SAMPLE NO. 5

DEPTH 39.5'-39.8'

TEST NO. C98.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, Sandy (CL)

INITIAL WATER CONTENT 30.9%

ATTERBERG LIMITS

LIQUID LIMIT 39% PLASTIC LIMIT 20%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO .872 C<sub>c</sub> 0.35

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_

SAMPLE NO. \_\_\_\_\_

DEPTH \_\_\_\_\_

TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**

SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_%

ATTERBERG LIMITS

LIQUID LIMIT \_\_\_\_\_% PLASTIC LIMIT \_\_\_\_\_%

**TEST DATA**

INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.

INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	216	.08	.0009
1/2 - 1	438	.18	.0019	216	.08	.0009
1 - 2	540	.14	.0015	132	.13	.0014
2 - 4	438	.16	.0017	114	.14	.0015
4 - 8	408	.16	.0017	84	.18	.0019
8 - 16	348	.18	.0019	84	.17	.0018
16 - 4	348	.17	.0018	27		
4 - 1	1008	.06	.0006	144	.10	.0011
1 - 1/4	2304	.03	.0003	540	.03	.0003

BORING NO. 54  
SAMPLE NO. 6  
DEPTH 63.5' - 63.8'  
TEST NO. C399.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 26.0 %  
ATTERBERG LIMITS  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.696 C<sub>c</sub> 0.24

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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C-586

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	156	.12	.0013
1/2 - 1	540	.14	.0015	102	.18	.0019
1 - 2	408	.19	.0020	96	.18	.0019
2 - 4	348	.20	.0022	108	.15	.0016
4 - 8	438	.14	.0015	120	.12	.0013
8 - 16	318	.17	.0018	96	.13	.0014
16 - 4	216	.23	.0025	45	.26	.0028
4 - 1	576	.09	.0010	240	.06	.0006
1 - 1/4	2160	.03	.0003	570	.03	.0003

BORING NO. 54  
 SAMPLE NO. 8  
 DEPTH 73.7' - 74.0'  
 TEST NO. C401.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 INITIAL WATER CONTENT 38.3 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.982 C<sub>c</sub> 0.41

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>	
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.		SAMPLE NO. <u>2</u>
1/4 - 1/2	348	.23	.0025	114	.16	.0017	DEPTH <u>9.8' to 10.0'</u>	
1/2 - 1	654	.12	.0013	216	.08	.0009	TEST NO. <u>C42.1</u>	
1 - 1/4	1560	.05	.0005	330	.06	.0006	<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL-CH)</u> INITIAL WATER CONTENT <u>30.0%</u> ATTERBERG LIMITS LIQUID LIMIT <u>53%</u> PLASTIC LIMIT <u>26%</u>	
1/4 - 1/2	318	.24	.0026	180	.10	.0011		
1/2 - 1	774	.10	.0011	270	.07	.0007		
1 - 2	468	.16	.0017	180	.09	.0010		
2 - 4	576	.12	.0013	168	.10	.0011		
4 - 8	540	.12	.0013	156	.10	.0011		
8 - 16	318	.20	.0021	132	.11	.0012		
24 - 6	318	.18	.0019	72	.19	.0020		
6 - 2	1218	.05	.0005	420	.04	.0004		
2 - 1/2	3378	.02	.0002	960	.02	.0002		
								TEST DATA
								INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
								INITIAL VOID RATIO <u>0.787</u> C <sub>c</sub> <u>0.23</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>	
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.		SAMPLE NO. <u>16</u>
1/4 - 1/2	240	.33	.0035	90	.20	.0022	DEPTH <u>85.2' to 85.4'</u>	
1/2 - 1	240	.33	.0035	78	.23	.0025	TEST NO. <u>C56.1</u>	
1 - 2	192	.39	.0042	54	.33	.0035	<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL)</u> INITIAL WATER CONTENT <u>27.9%</u> ATTERBERG LIMITS LIQUID LIMIT <u>40%</u> PLASTIC LIMIT <u>19%</u>	
2 - 4	264	.28	.0030	72	.23	.0025		
4 - 8	264	.26	.0028	84	.19	.0020		
8 - 16	348	.18	.0019	84	.17	.0018		
16 - 4	156	.37	.0040	51	.26	.0028		
4 - 1	864	.07	.0008	210	.07	.0007		
1 - 1/4	2400	.03	.0003	450	.04	.0004		
								TEST DATA
								INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
								INITIAL VOID RATIO <u>0.744</u> C <sub>c</sub> <u>0.27</u>

**CONSOLIDATION TEST**  
**SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 105 SAMPLE NO. _____ 8 DEPTH _____ 70.9 - 71.2 TEST NO. _____ C380.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	408	.20	.0021	138	.14	.0014	<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ Silty CLAY (CL)  INITIAL WATER CONTENT <u>23.7</u> % ATTERBERG LIMITS LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>19</u> %  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>0.625</u> C <sub>c</sub> <u>0.21</u>
1/2 - 1	318	.24	.0026	96	.19	.0020	
1 - 2	318	.24	.0026	102	.17	.0018	
2 - 4	408	.18	.0019	90	.19	.0020	
4 - 8	438	.16	.0017	114	.14	.0015	
8 - 16	318	.20	.0021	96	.15	.0016	
16 - 4	318	.20	.0021	72	.20	.0021	
4 - 1	774	.08	.0008	180	.09	.0009	
1 - 1/4	2454	.03	.0003	480	.03	.0003	

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118 SAMPLE NO. _____ 5 DEPTH _____ 38.9' - 39.3' TEST NO. _____ C256.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	156	.13	.0013	<u>SOIL PROPERTIES</u> SOIL DESCRIPTION: _____ Silty CLAY (CL) INITIAL WATER CONTENT <u>36.9</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <u>TEST DATA</u> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>0.969</u> C <sub>c</sub> <u>0.39</u>
1/2 - 1	378	.21	.0022	108	.17	.0018	
1 - 2	264	.28	.0030	84	.21	.0022	
2 - 1/2	264	.28	.0030	72	.24	.0026	
1/2 - 1/4	468	.16	.0017	132	.13	.0014	
1/4 - 1/2	240	.31	.0034	78	.22	.0024	
1/2 - 1	318	.24	.0025	72	.24	.0026	
1 - 2	174	.42	.0045	45	.38	.0041	
2 - 4	576	.12	.0013	192	.09	.0009	
4 - 8	654	.10	.0010	138	.11	.0011	
8 - 16	378	.14	.0014	102	.12	.0013	
16 - 4	102	.51	.0053	42	.28	.0030	
4 - 1	816	.07	.0007	240	.05	.0005	
1 - 1/4	2856	.02	.0002	780	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118 SAMPLE NO. _____ 9 DEPTH _____ 78.7' - 79.0' TEST NO. _____ C260.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	186	.11	.0011	<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL)</u>  INITIAL WATER CONTENT <u>27.8%</u> ATTERBERG LIMITS LIQUID LIMIT <u>42%</u> PLASTIC LIMIT <u>23%</u>  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80 IN 2.03CM.</u> INITIAL VOID RATIO <u>0.741</u> C <sub>c</sub> <u>0.24</u>
1/2 - 1	540	.15	.0016	138	.13	.0014	
1 - 2	378	.20	.0022	114	.16	.0017	
2 - 4	348	.21	.0023	96	.18	.0019	
4 - 1	318	.22	.0025	72	.23	.0025	
1 - 1/4	1008	.08	.0008	288	.06	.0006	
1/4 - 1/2	240	.31	.0034	78	.22	.0024	
1/2 - 1	288	.26	.0028	84	.21	.0022	
1 - 2	408	.19	.0020	108	.16	.0017	
2 - 4	264	.28	.0030	66	.25	.0027	
4 - 8	264	.26	.0028	90	.18	.0019	
8 - 16	348	.20	.0022	96	.17	.0017	
16 - 4	216	.28	.0031	48	.30	.0032	
4 - 1	738	.09	.0009	228	.07	.0007	
1 - 1/4	3198	.02	.0002	630	.03	.0003	

**CONSOLIDATION TEST**  
**SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**

SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_ %

ATTERBERG LIMITS

LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**

INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.

INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.14	.0015	180	.11	.0011
1/2 - 1	468	.16	.0017	156	.12	.0012
1 - 2	780	.10	.0010	216	.08	.0008
2 - 1/2	438	.16	.0017	96	.17	.0018
1/2 - 1/4	1110	.07	.0007	270	.07	.0007
1/4 - 1/2	540	.13	.0014	144	.12	.0012
1/2 - 1	318	.22	.0024	102	.16	.0017
1 - 2	264	.26	.0028	78	.20	.0022
2 - 4	738	.09	.0009	186	.08	.0008
4 - 8	738	.08	.0008	168	.08	.0008
8 - 16	540	.10	.0010	132	.09	.0009
16 - 4	288	.17	.0018	72	.15	.0016
4 - 1	1056	.05	.0005	264	.05	.0005
1 - 1/4	2779	.02	.0002	840	.01	.0001

BORING NO. 129

SAMPLE NO. 9

DEPTH 39.1' - 39.3'

TEST NO. C389

**SOIL PROPERTIES**

SOIL DESCRIPTION: \_\_\_\_\_

Silty CLAY (CL)

INITIAL WATER CONTENT 40.2%

ATTERBERG LIMITS

LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 1.083 C<sub>c</sub> 0.39

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-591

C-592

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							SOIL PROPERTIES SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____% ATTERBERG LIMITS LIQUID LIMIT _____% PLASTIC LIMIT _____%
							TEST DATA INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 129 SAMPLE NO. _____ 21 DEPTH _____ 103.7 - 104.0 TEST NO. _____ C395.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	348	.22	.0024	108	.17	.0018	SOIL PROPERTIES SOIL DESCRIPTION: _____ Silty CLAY, Sandy (CL) INITIAL WATER CONTENT 28.0% ATTERBERG LIMITS LIQUID LIMIT 39% PLASTIC LIMIT 21%
1/2 - 1	378	.20	.0022	120	.15	.0016	TEST DATA INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM. INITIAL VOID RATIO 0.730 C <sub>c</sub> .23
1 - 2	318	.23	.0026	96	.19	.0020	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
2 - 4	438	.17	.0018	96	.18	.0019	
4 - 1	288	.24	.0027	51	.32	.0035	
1 - 1/4	540	.14	.0015	192	.09	.0009	
1/4 - 1/2	288	.26	.0028	78	.22	.0024	
1/2 - 1	432	.17	.0018	96	.22	.0024	
1 - 2	240	.30	.0033	72	.23	.0025	
2 - 4	240	.29	.0032	60	.28	.0030	
4 - 8	438	.16	.0016	90	.18	.0019	
8 - 16	288	.21	.0023	78	.19	.0020	
16 - 4	120	.48	.0053	30	.47	.0050	
4 - 1	780	.09	.0009	186	.08	.0008	
1 - 1/4	2265	.02	.0002	480	.03	.0003	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	135		.0052	72		.0023
1/2 - 1	317		.0022	102		.0016
1 - 2	1009		.0007	348		.0005
2 - 4	913		.0007	270		.0006
4 - 8	738		.0008	216		.0007
8 - 16	778		.0007	180		.0007
16 - 4	346		.0016	66		.0020
4 - 1	960		.0006	330		.0004
1 - 1/4	4338		.0001	1440		.0001

BORING NO. 136  
SAMPLE NO. ST6  
DEPTH 13.0' to 16.0'  
TEST NO. C527.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: SILTY CLAY (CL)  
INITIAL WATER CONTENT 17.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 3.28 IN 8.33 CM.  
INITIAL VOID RATIO (0.675) C<sub>c</sub> 0.15

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %			
							<b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>142</u>	SAMPLE NO. <u>6</u>	DEPTH <u>20.1' to 20.5'</u>	TEST NO. <u>C535.1</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4-1/2	378	.21	.0022	84	.21	.0023	<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: <u>Silty CLAY (CL)</u> INITIAL WATER CONTENT <u>38.2%</u> ATTERBERG LIMITS LIQUID LIMIT <u>45%</u> PLASTIC LIMIT <u>22%</u>			
1/2-1	504	.15	.0016	114	.17	.0017	<b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.019</u> C <sub>c</sub> <u>0.41</u>			
1 - 2	576	.14	.0014	150	.12	.0012	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b> THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II			
2 - 1	812	.09	.0009	180	.10	.0010				
1 - 1/4	72	1.0	.0105	36	.50	.0050				
1/4-1/2	288	.25	.0027	108	.17	.0017				
1/2-1	345	.21	.0022	108	.17	.0017				
1 - 2	318	.23	.0024	102	.17	.0017				
2 - 4	696	.10	.0010	186	.09	.0009				
4 - 8	378	.17	.0017	108	.13	.0013				
8 - 16	290	.19	.0020	72	.17	.0017				

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/2 - 1	540	.12	.0013	228	.07	.0007
1 - 2	1440	.05	.0005	408	.04	.0004
2 - 4	1272	.05	.0005	306	.05	.0005
4 - 8	612	.09	.0010	216	.07	.0007
8 - 16	540	.10	.0011	150	.08	.0009
16 - 4	438	.12	.0013	96	.13	.0014
4 - 1	1752	.03	.0003	450	.03	.0003
1 - 1/4				1560	.01	.0001

BORING NO. 146  
SAMPLE NO. 7  
DEPTH 14.0' to 16.0'  
TEST NO. C542.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 15.9 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.679 C<sub>c</sub> 0.14

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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C-596

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.
1/4-1/2	194	.43	.0045	72	.26	.0028
1/2- 1	317	.25	.0027	96	.20	.0021
1 - 2	378	.21	.0022	96	.19	.0020
2 - 4	345	.23	.0024	72	.24	.0026
4 - 8	378	.19	.0020	84	.21	.0022
8-16	324	.20	.0021	108	.16	.0016

BORING NO. 185  
 SAMPLE NO. 3  
 DEPTH 7.9' to 8.1'  
 TEST NO. C552.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL-CH)

INITIAL WATER CONTENT 29.1%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 50% PLASTIC LIMIT 23%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.757 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_

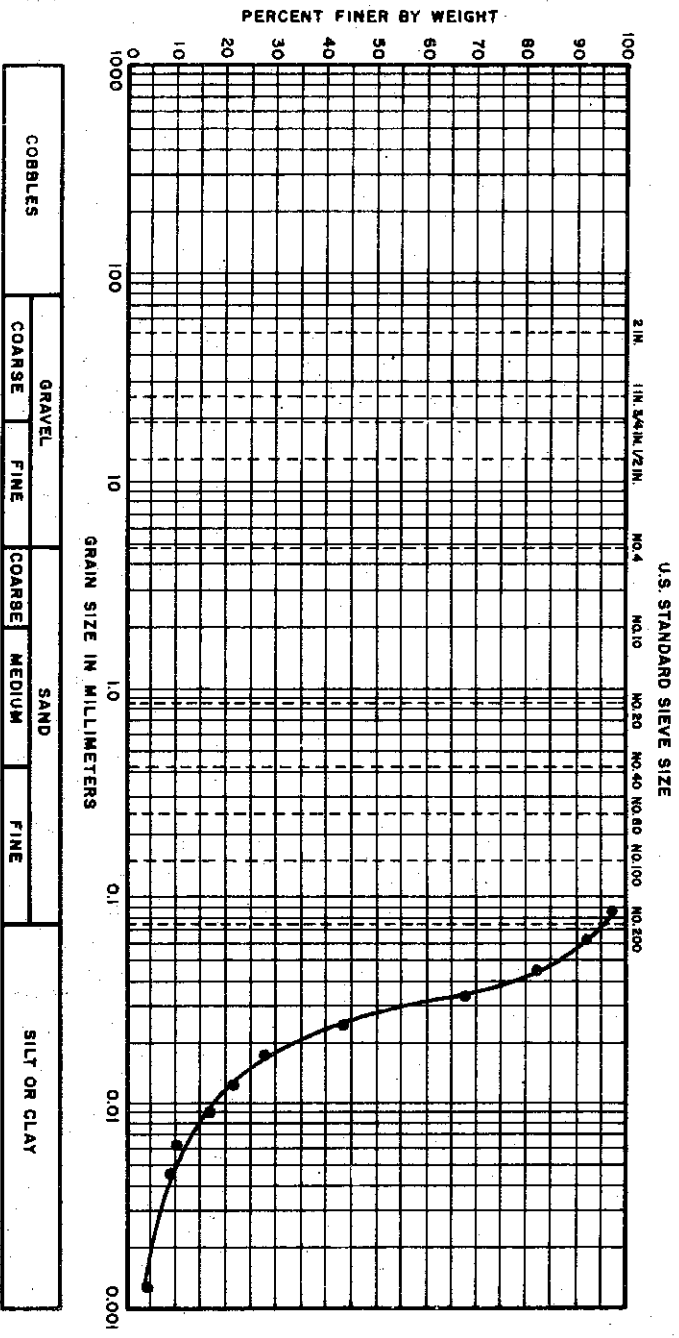
INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

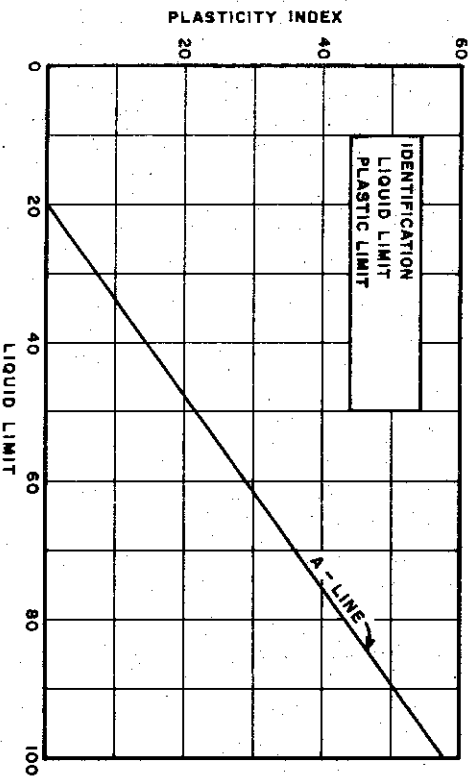
**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



## GRAIN SIZE DISTRIBUTION



## PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)

EXPLORATION: BORING 7

SAMPLE : SS28

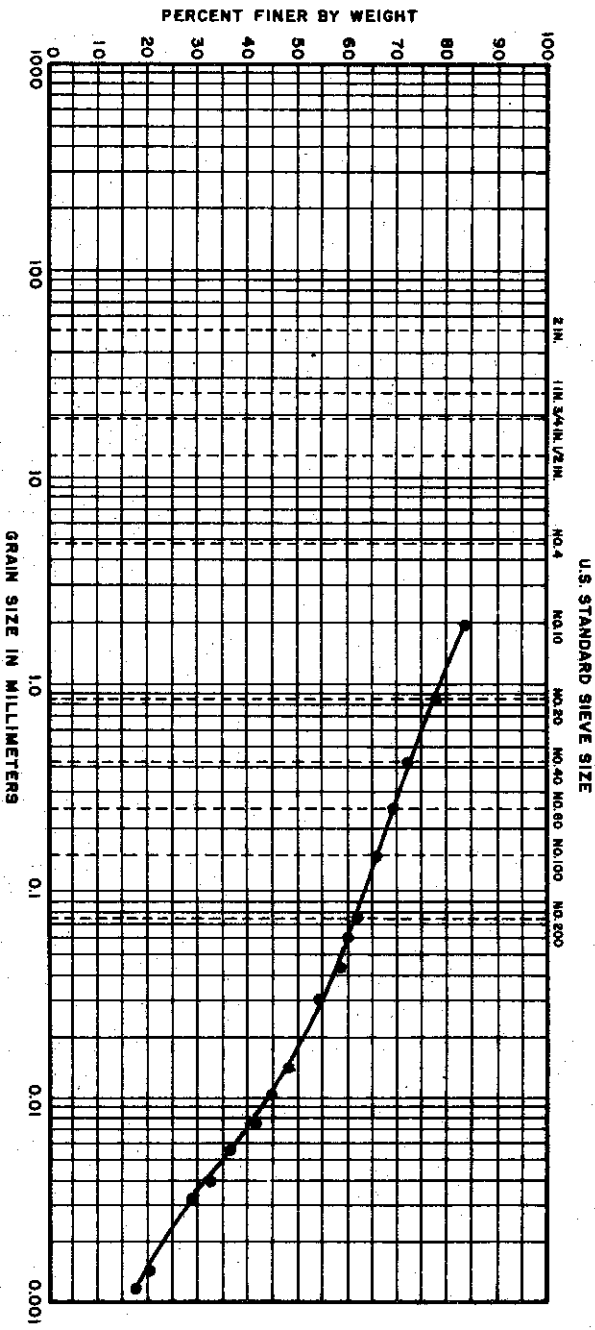
DEPTH : 129.6' TO 131.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255      DATE JAN. 74

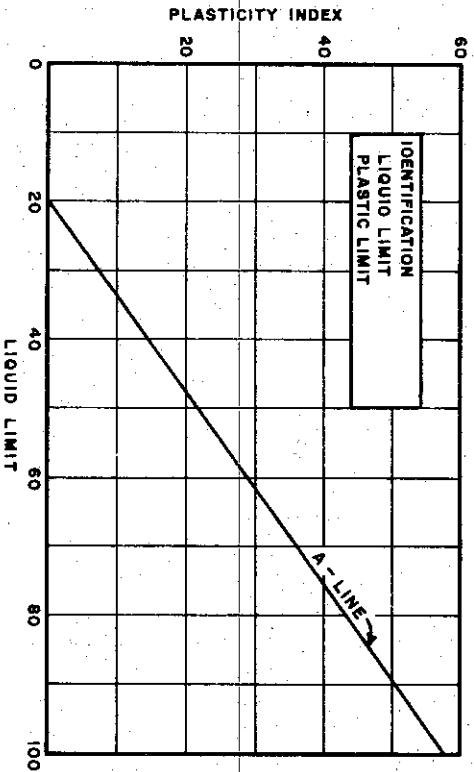
### GRAIN SIZE DISTRIBUTION



<b>COBBLES</b>	<b>GRAVEL</b>		<b>SAND</b>			<b>SILT OR CLAY</b>
	<b>COARSE</b>	<b>FINE</b>	<b>COARSE</b>	<b>MEDIUM</b>	<b>FINE</b>	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION  
LIQUID LIMIT  
PLASTIC LIMIT

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 7  
 SAMPLE : S630  
 DEPTH : 136.8' TO 140.3'  
 SPECIFIC GRAVITY : USED 2.70

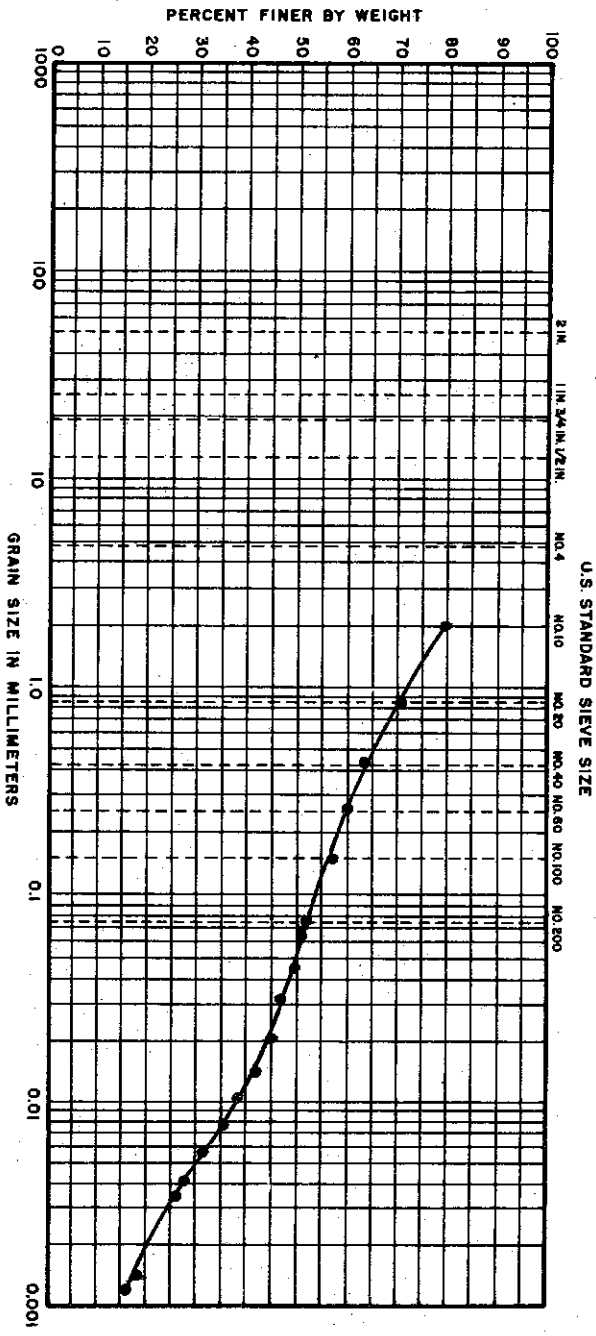
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-598

FILE NO. 1255

DATE JAN. 74

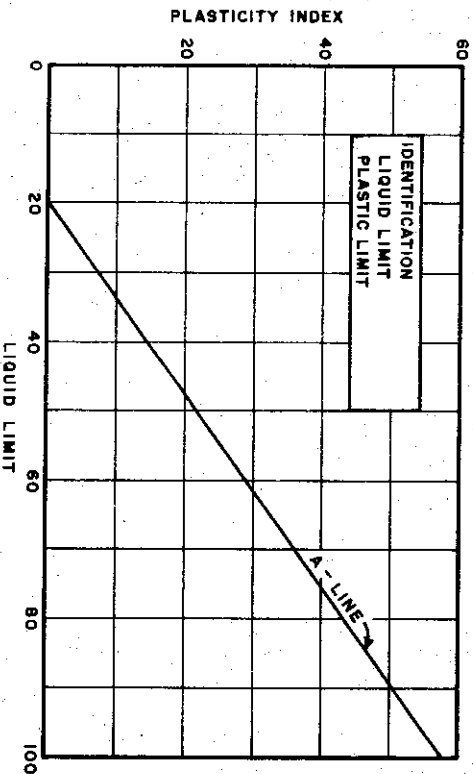
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)

EXPLORATION: BORING 10

SAMPLE : SS30

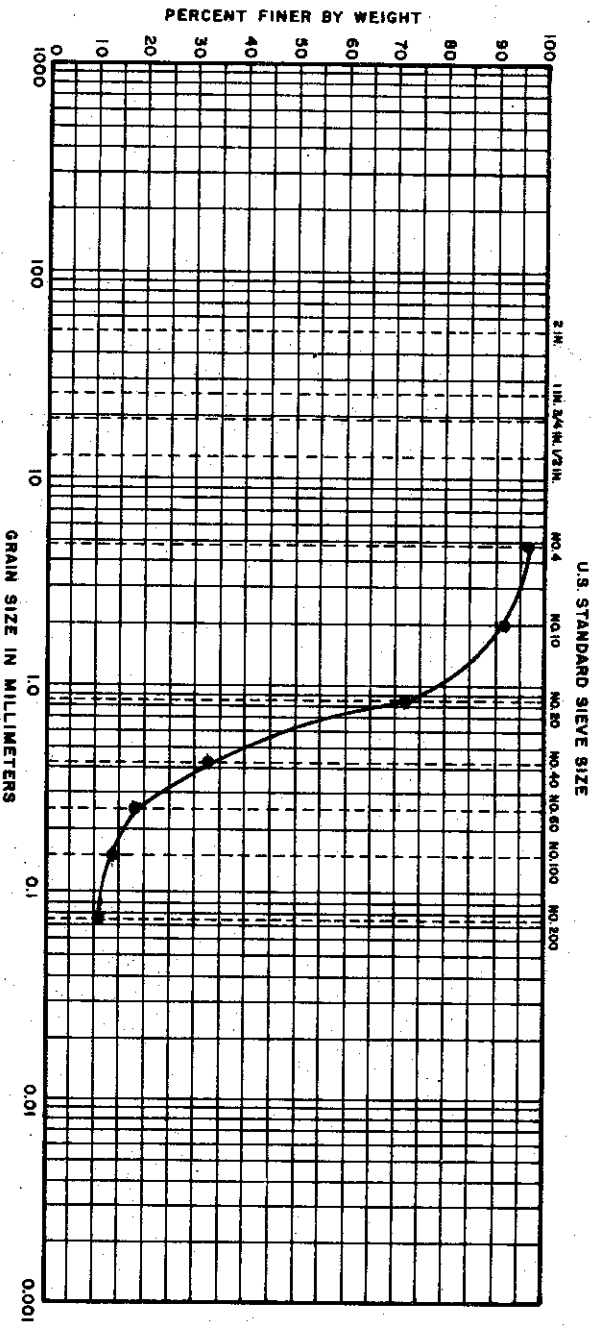
DEPTH : 141'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

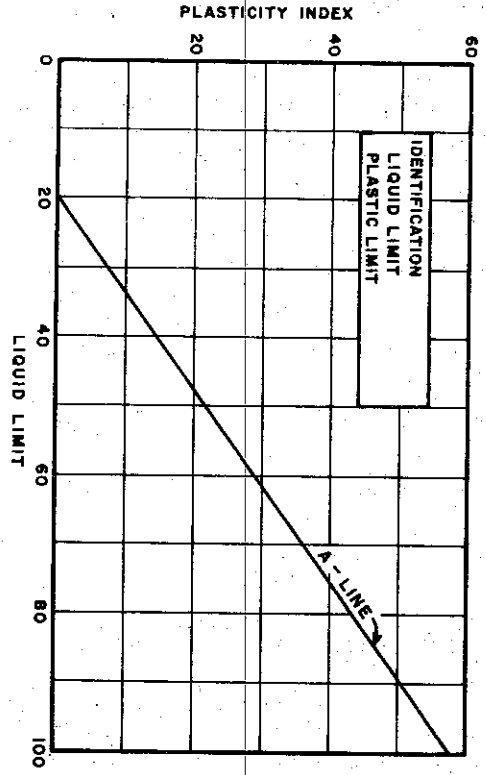
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY SAND (SM-SW)  
 EXPLORATION: BORING 18  
 SAMPLE : 11  
 DEPTH : 103.5' TO 105.0'  
 SPECIFIC GRAVITY: USED 2.70

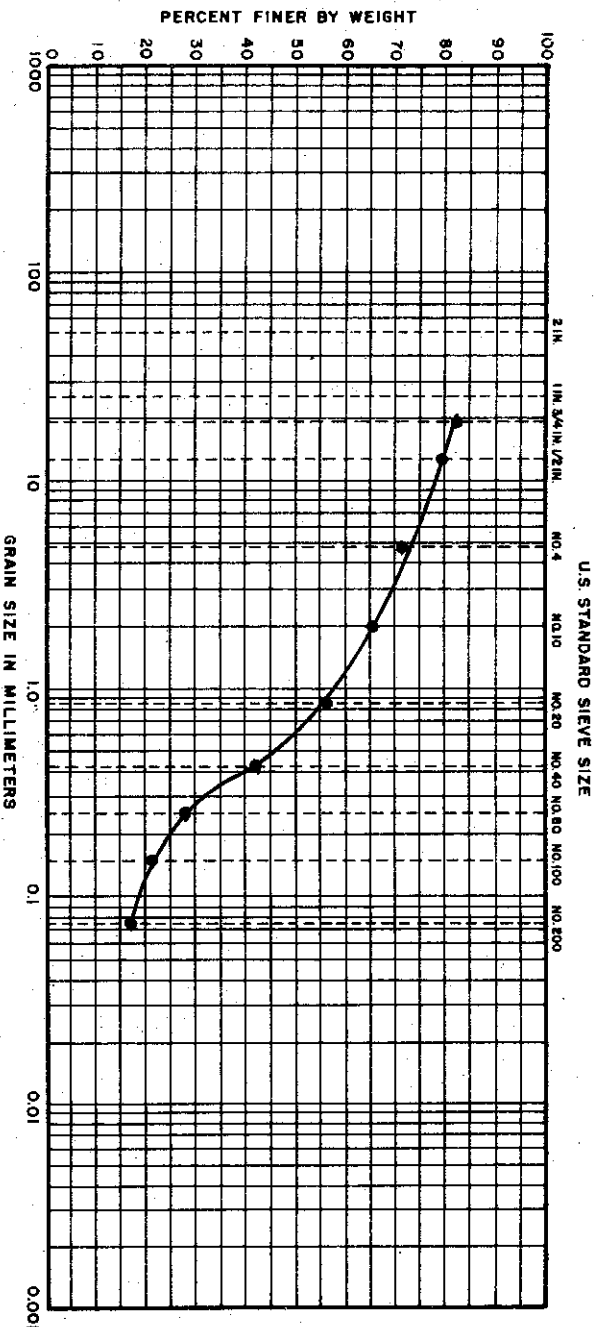
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-600

FILE NO. 1255

DATE JULY 1974

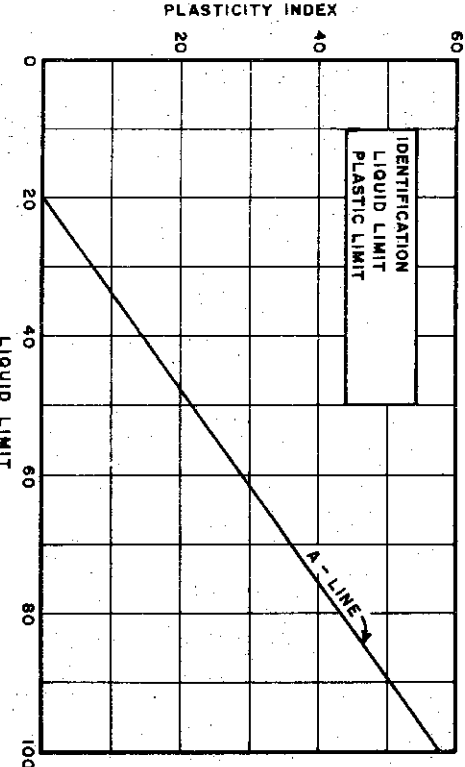
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

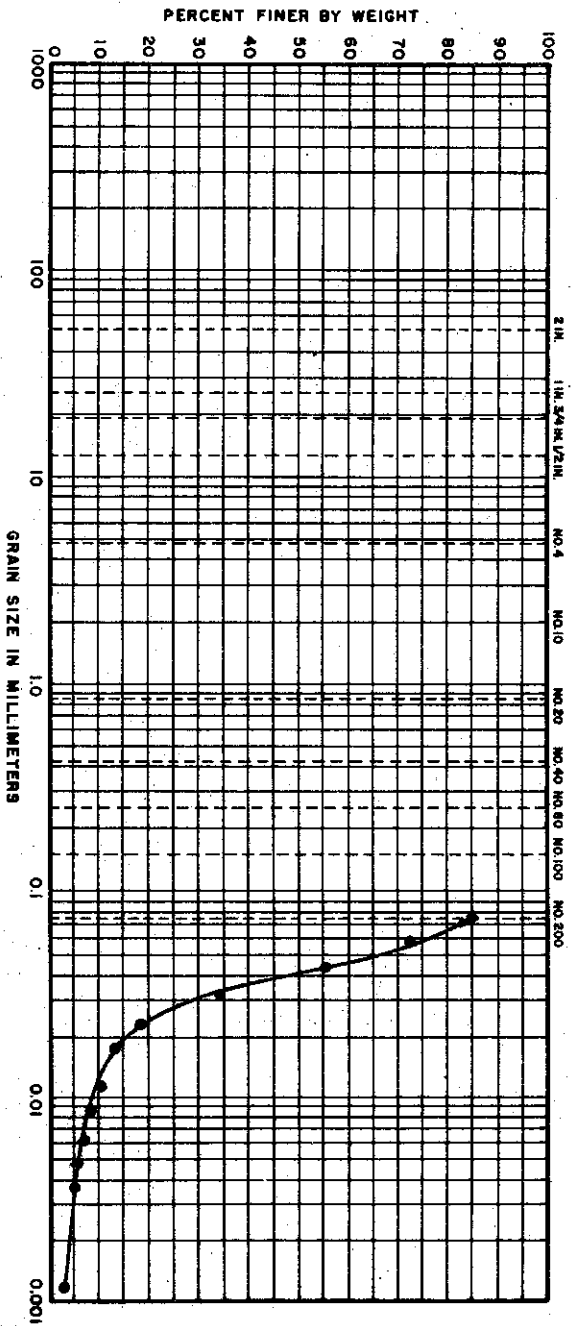
IDENTIFICATION : SILTY SAND, GRAVELLY (SM)  
 EXPLORATION : BORING 18  
 SAMPLE : 16  
 DEPTH : 139.6' TO 141.0'  
 SPECIFIC GRAVITY : USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

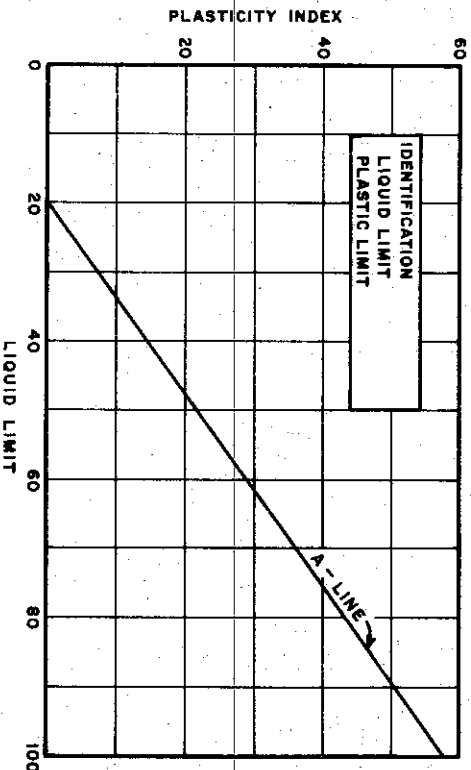
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

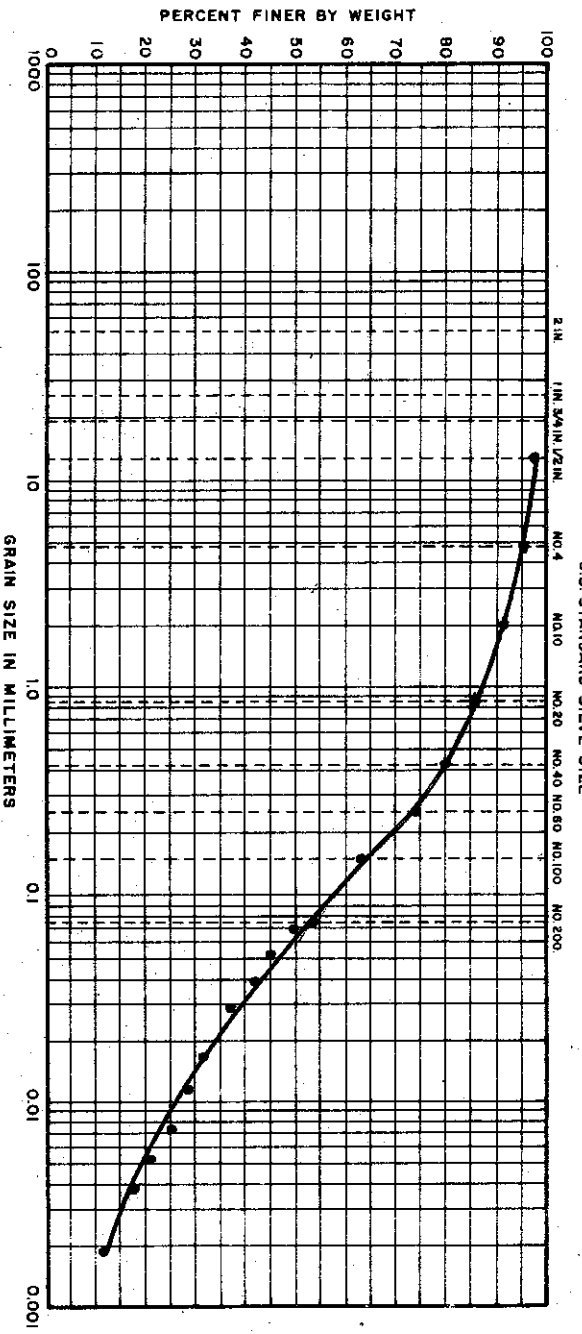
IDENTIFICATION : CLAYEY SILT (CL-ML)  
 EXPLORATION: BORING 22  
 SAMPLE : 5529  
 DEPTH : 133.5' TO 135.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-602

FILE NO. 1255 DATE JAN. 74

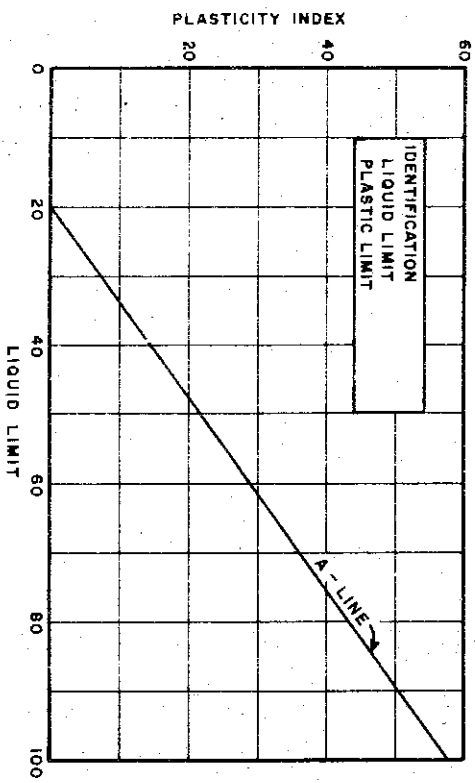
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



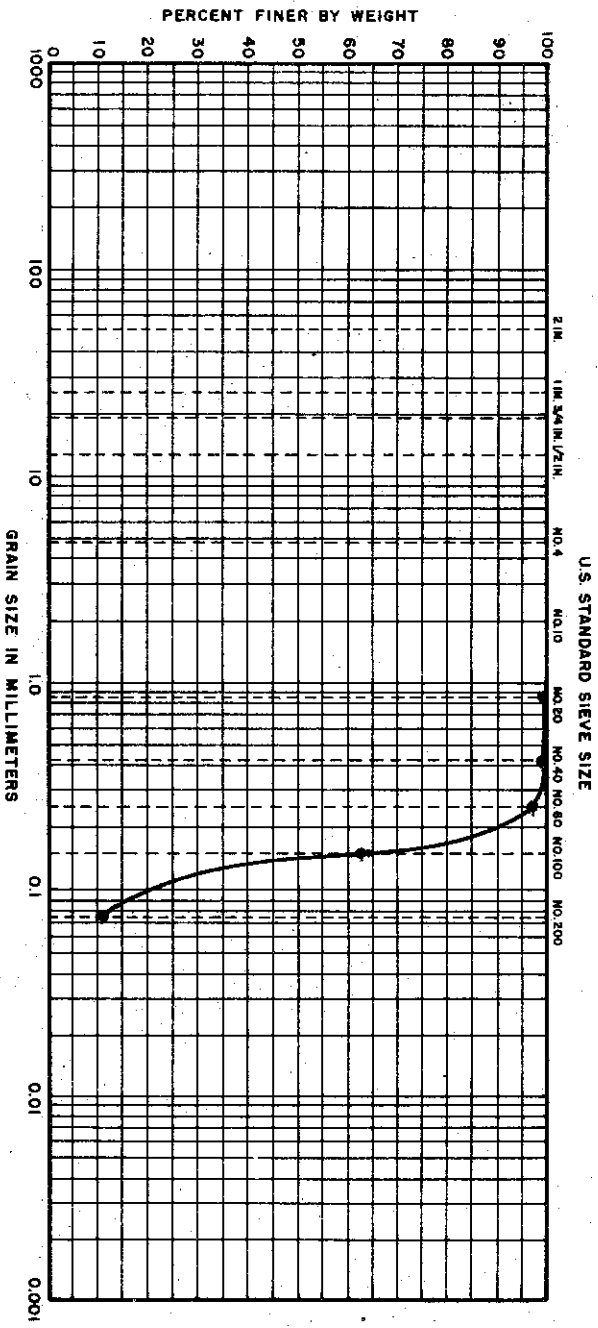
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)  
 EXPLORATION: BORING 27  
 SAMPLE : SS17  
 DEPTH : 68.8' TO 70.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

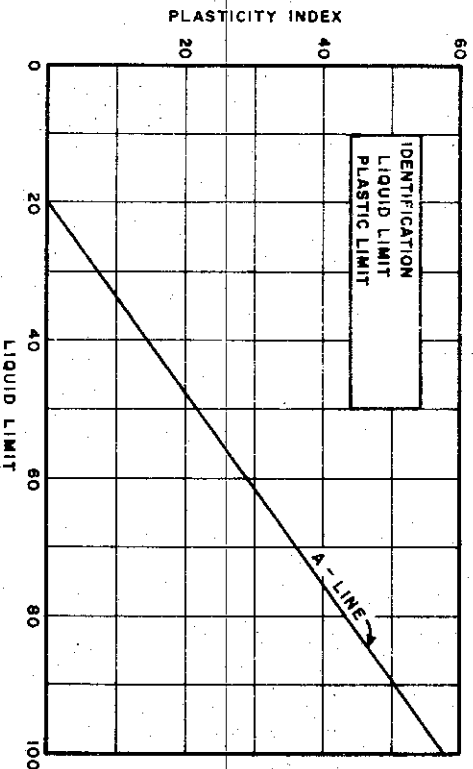
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM-SP)  
 EXPLORATION: BORING 27  
 SAMPLE : 26  
 DEPTH : 113.6' TO 114.4'  
 SPECIFIC GRAVITY : USED 2.70

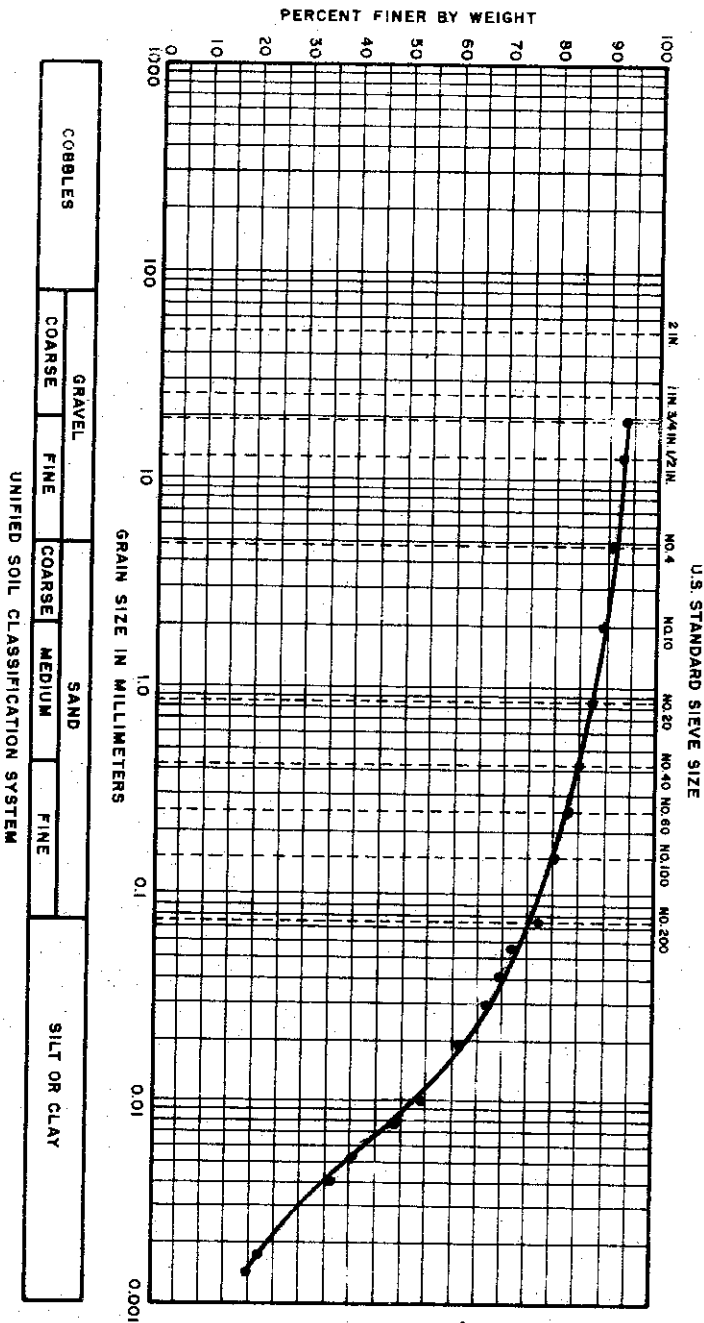
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-604

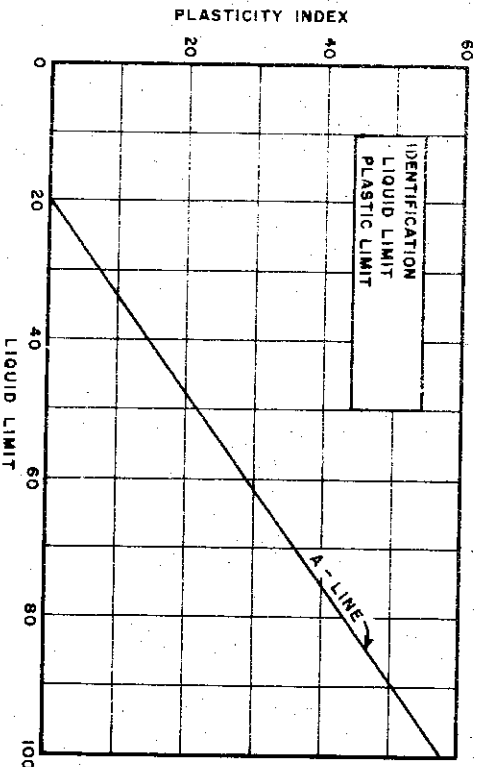
FILE NO. 1255 DATE JULY 1974



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

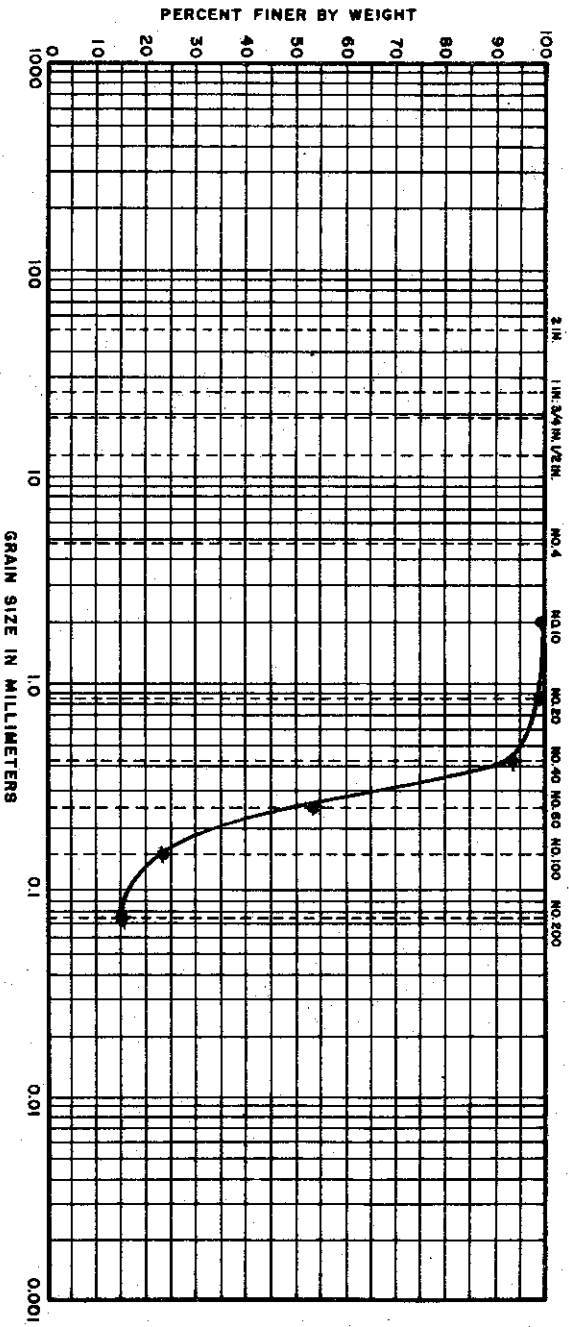
IDENTIFICATION : SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 30  
 SAMPLE : SS15  
 DEPTH : 68.5' TO 70.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

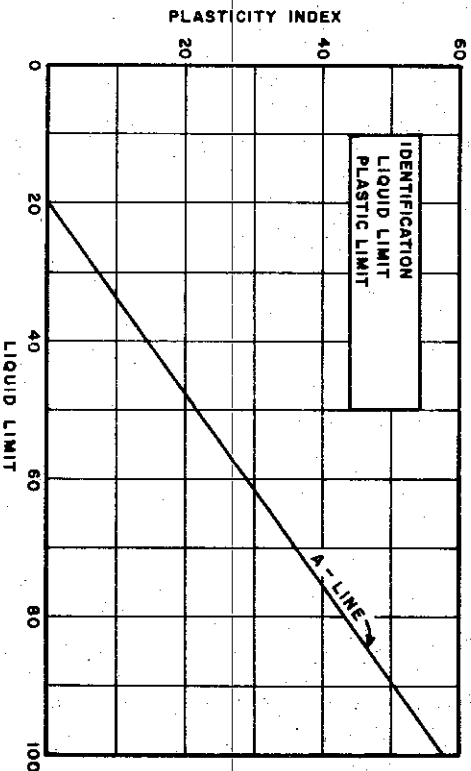
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 21  
 DEPTH : 98.5' TO 100.0'  
 SPECIFIC GRAVITY: USED 2.70

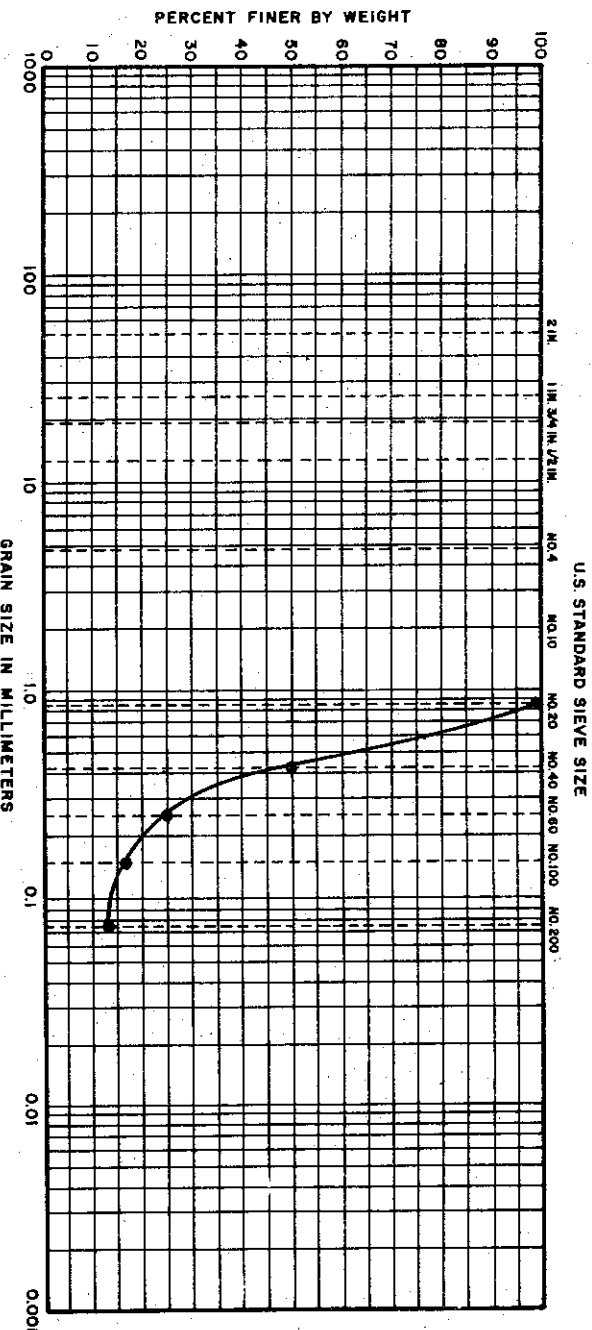
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-606

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974

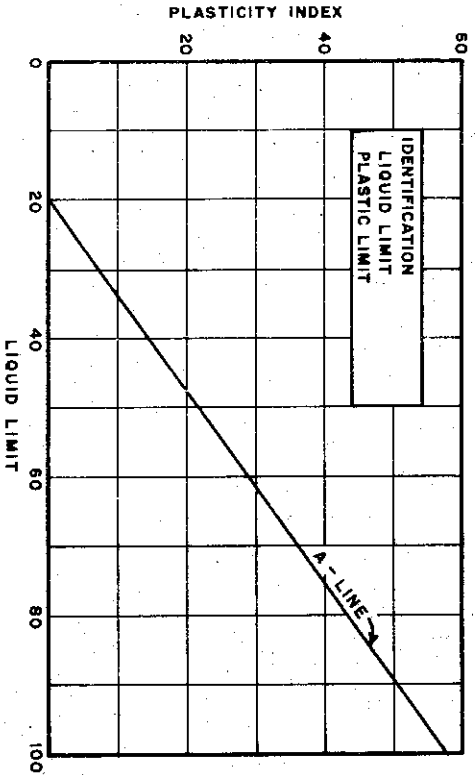
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

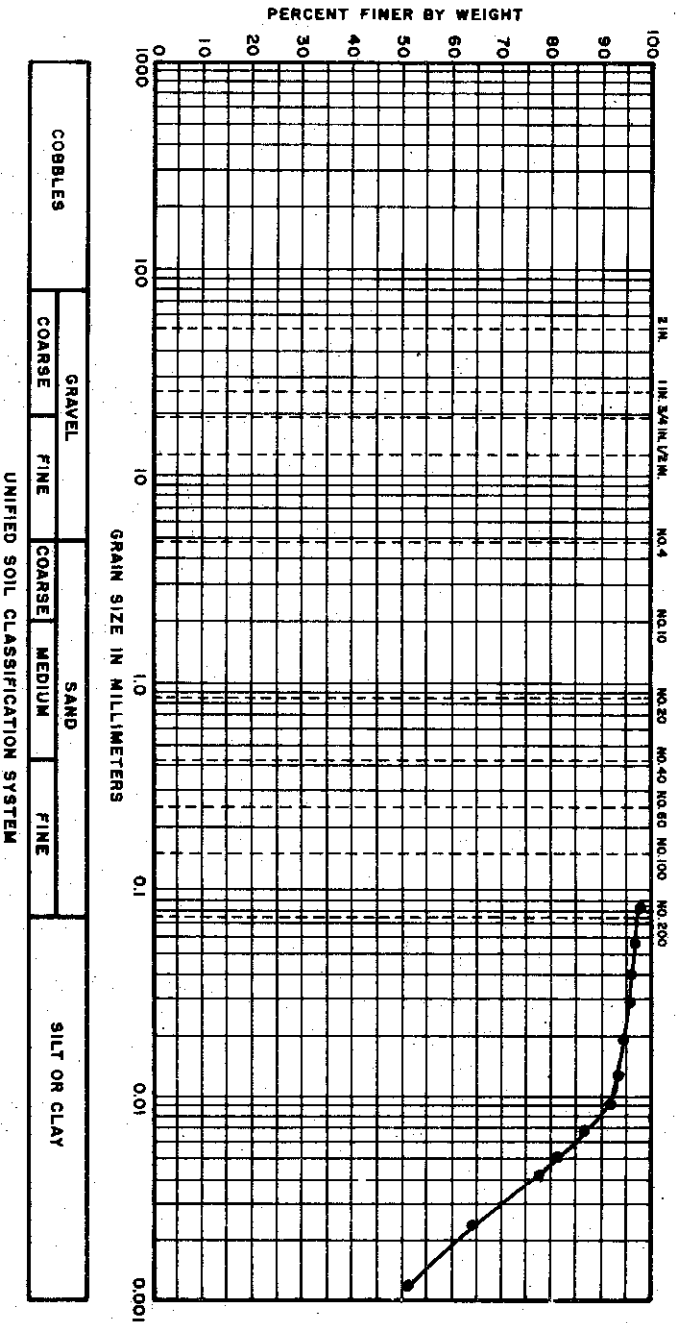
IDENTIFICATION : SILTY SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 25  
 DEPTH : 118.5' TO 120.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

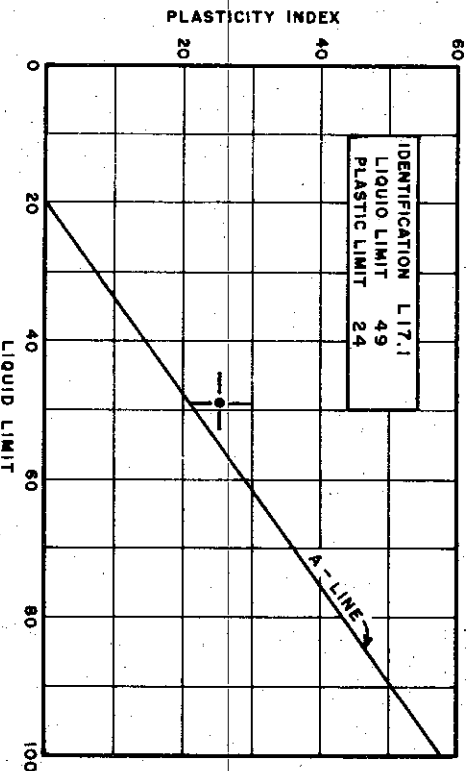
FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 3B  
 SAMPLE : 5  
 DEPTH : 8.7' TO 9.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

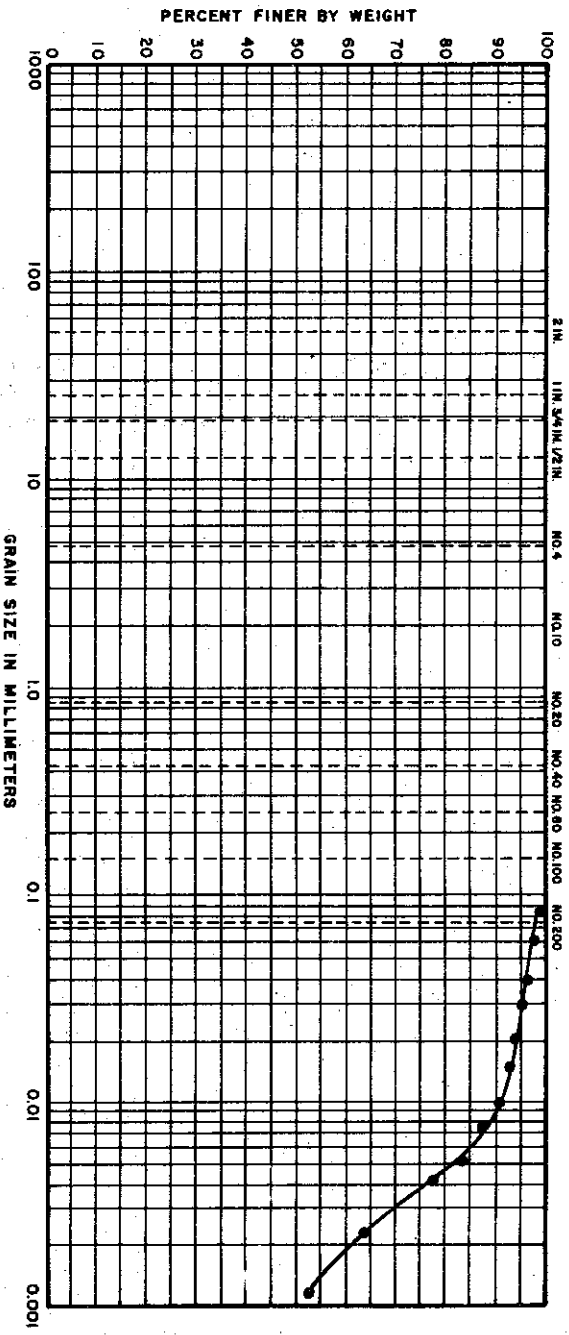
C-608

GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

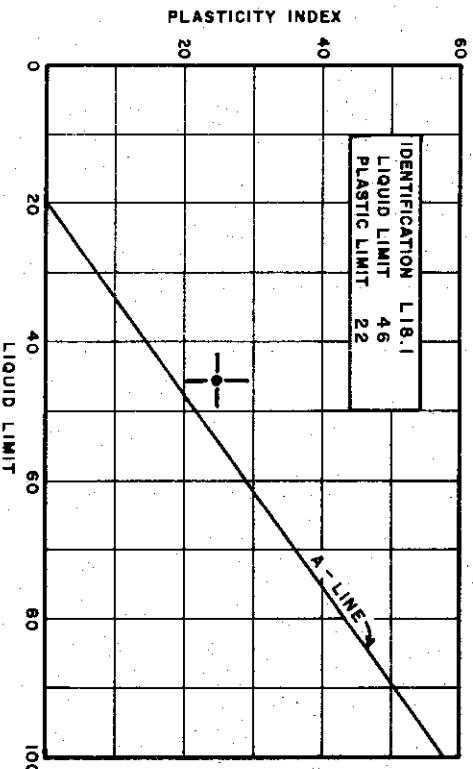
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)

EXPLORATION: BORING 3B

SAMPLE : 4

DEPTH : 14.3' TO 14.6'

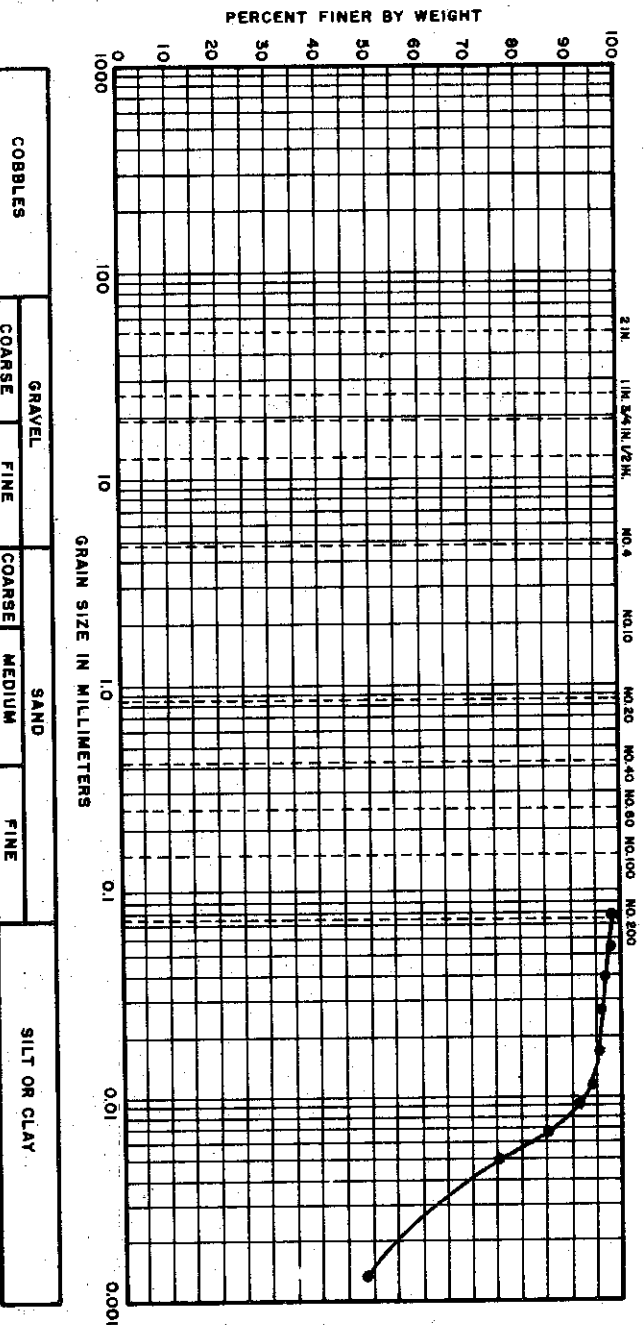
SPECIFIC GRAVITY = 2.71

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

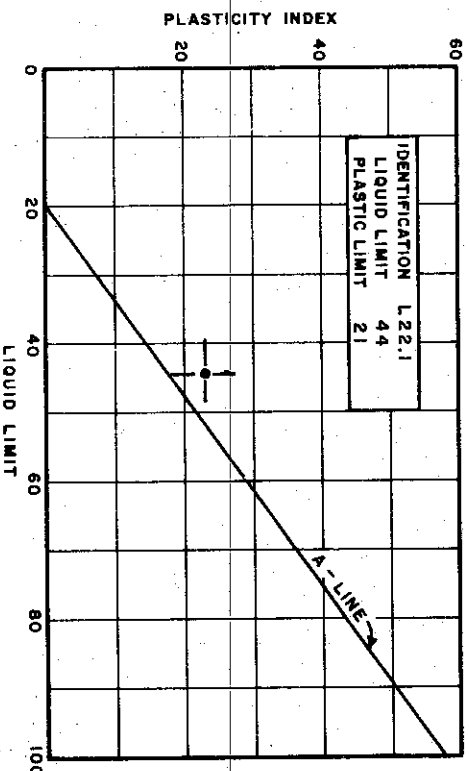
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE: 12  
 DEPTH: 54.1' TO 54.5'  
 SPECIFIC GRAVITY: USED 2.70

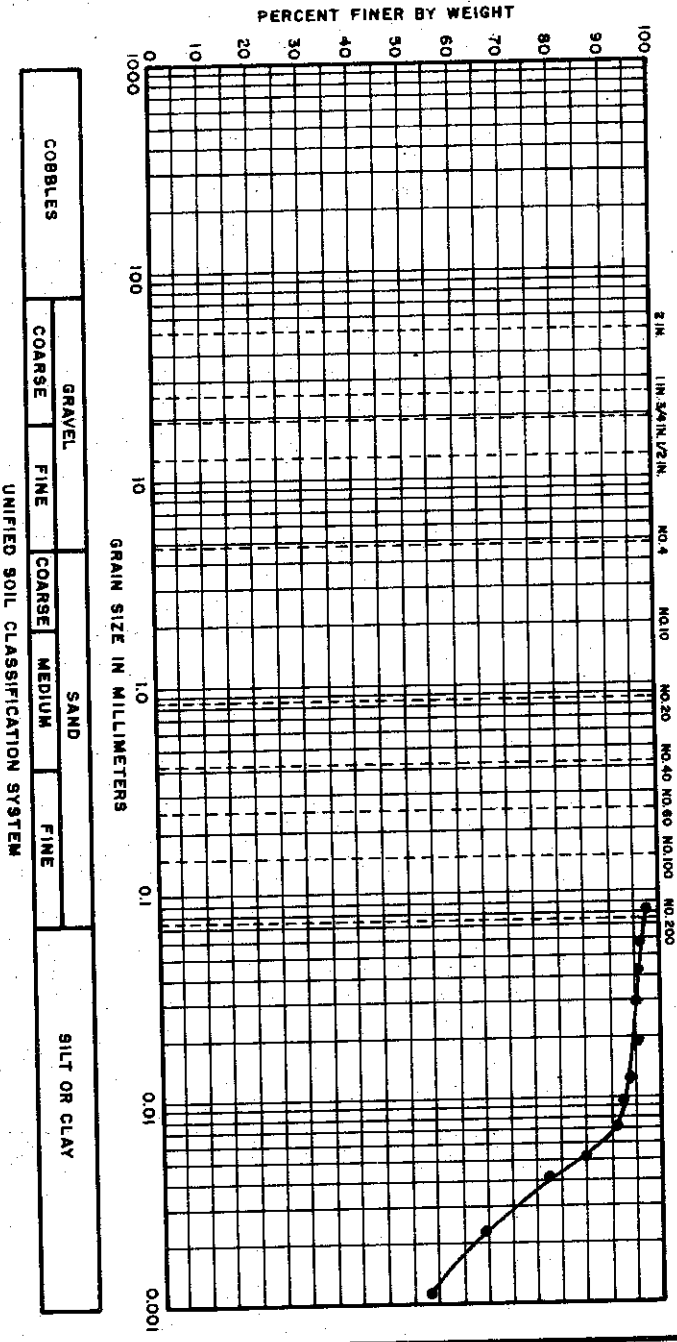
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-610

FILE NO. 1255 DATE JAN 74

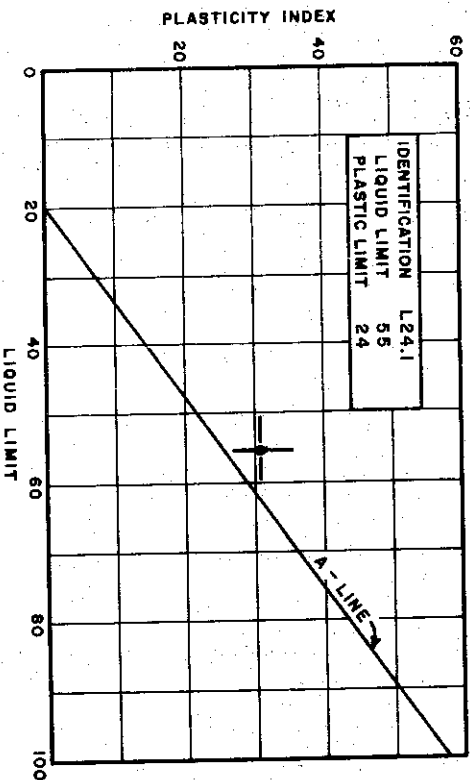
# GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



# PLASTICITY CHART

(COHESIVE SOIL ONLY)



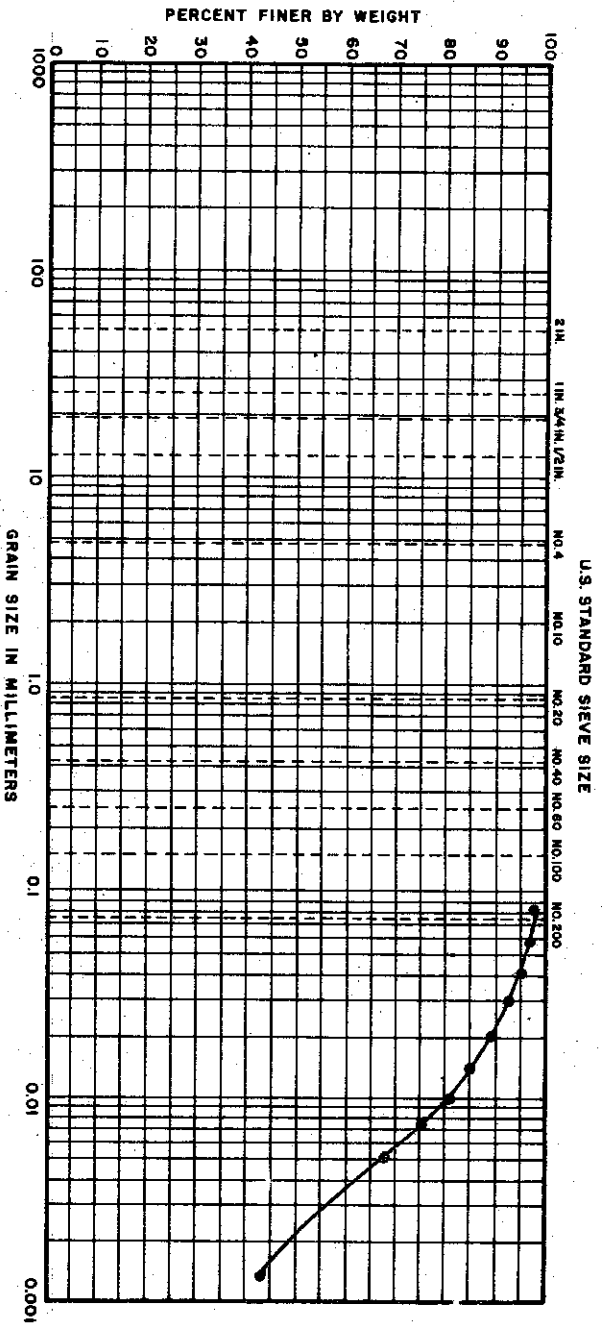
# MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 38  
 SAMPLE : 16  
 DEPTH : 74.0' TO 74.1'  
 SPECIFIC GRAVITY = 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

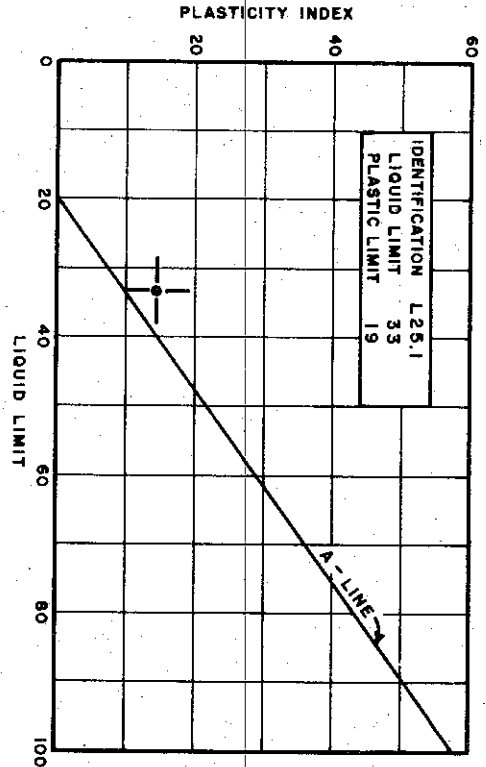
# GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## PLASTICITY CHART (COHESIVE SOIL ONLY)



## MATERIAL SOURCE

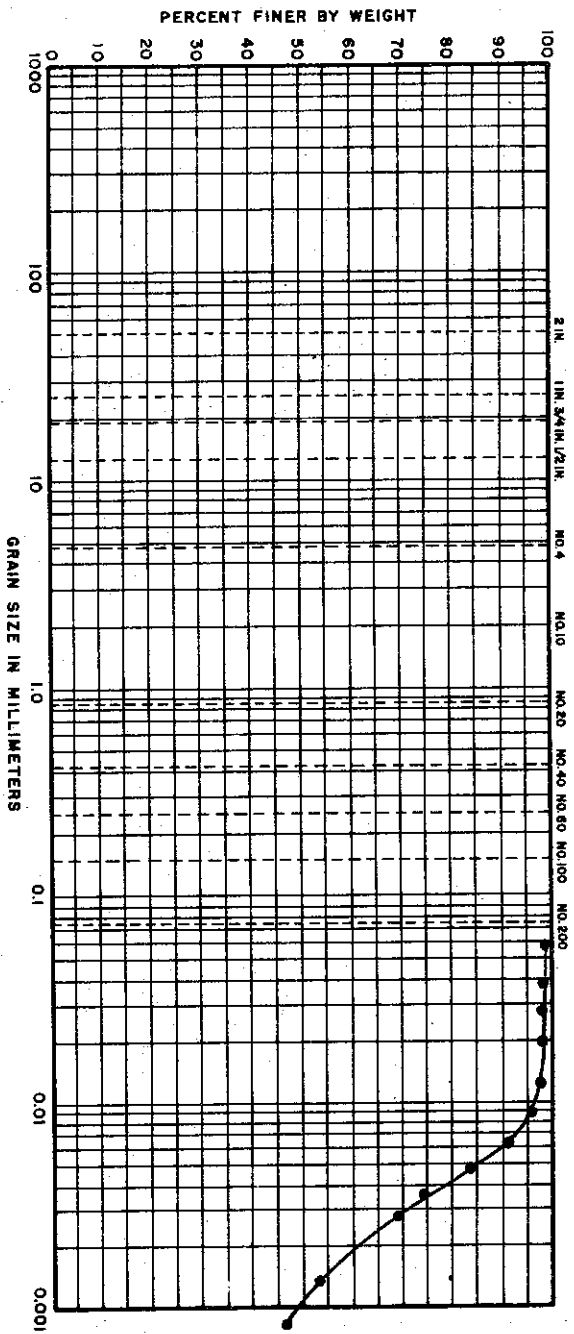
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE : 18  
 DEPTH : 84.6' TO 84.9'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS



### GRAIN SIZE DISTRIBUTION

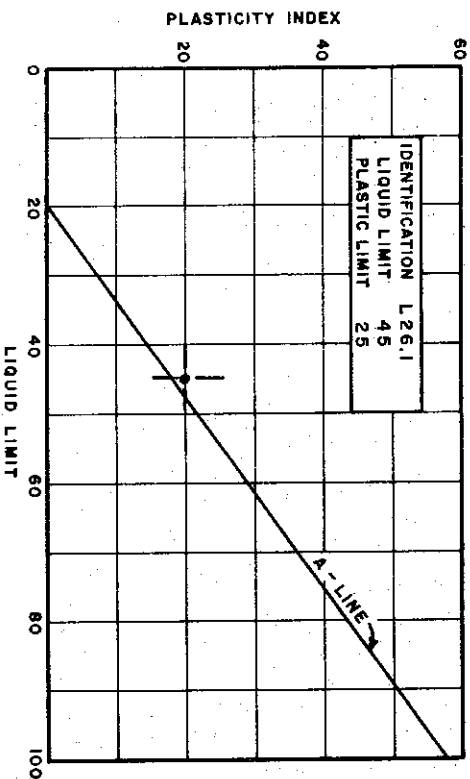
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L 26.1  
LIQUID LIMIT 45  
PLASTIC LIMIT 25

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 38

SAMPLE : 24

DEPTH : 114.2' TO 114.5'

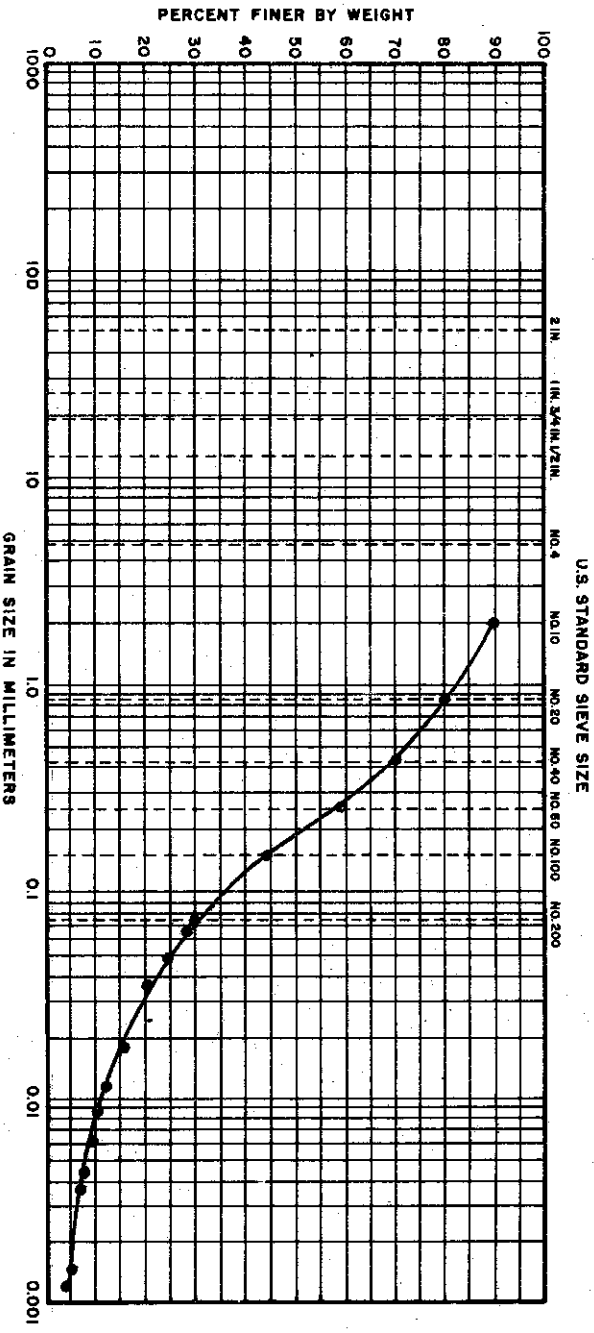
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255

DATE JAN. 74

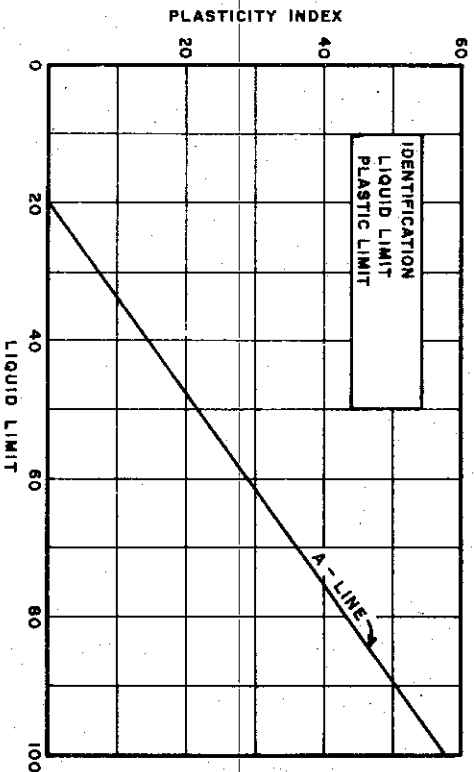
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

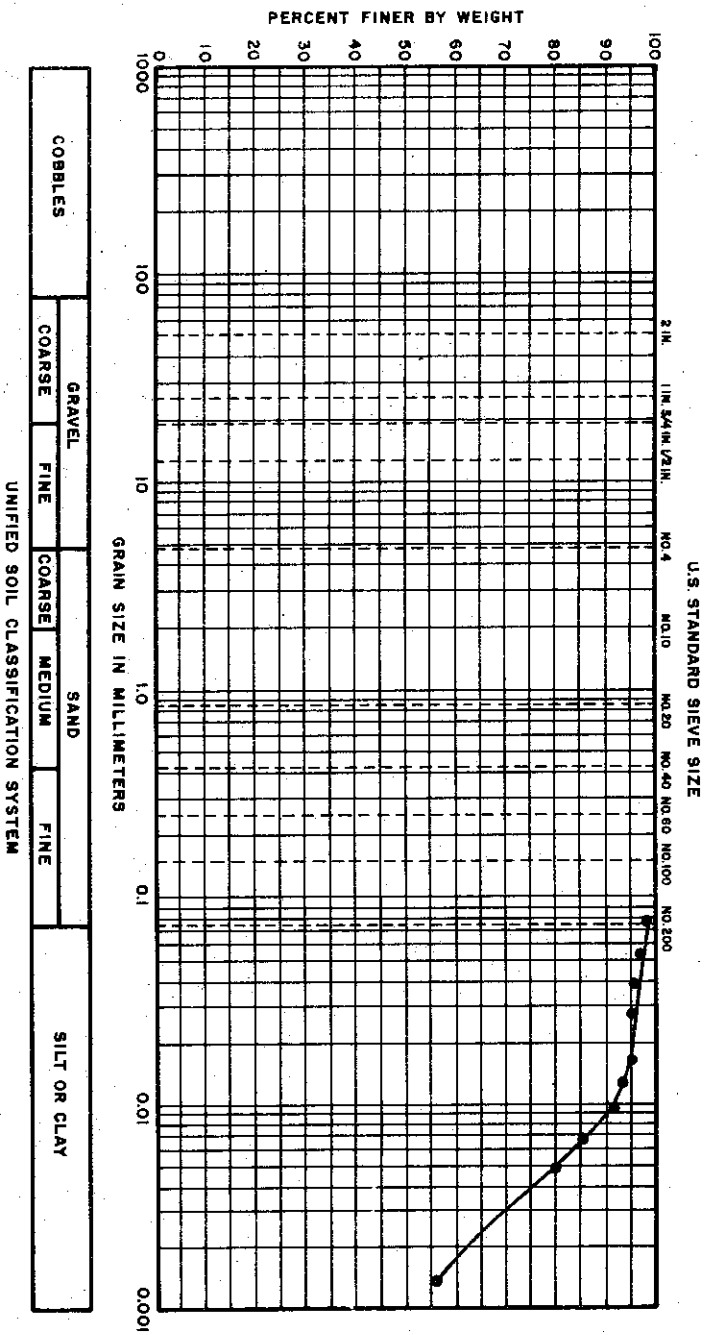
IDENTIFICATION: SILTY SAND (SM)  
 EXPLORATION: BORING 38  
 SAMPLE : SS30  
 DEPTH : 138.5' TO 140.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

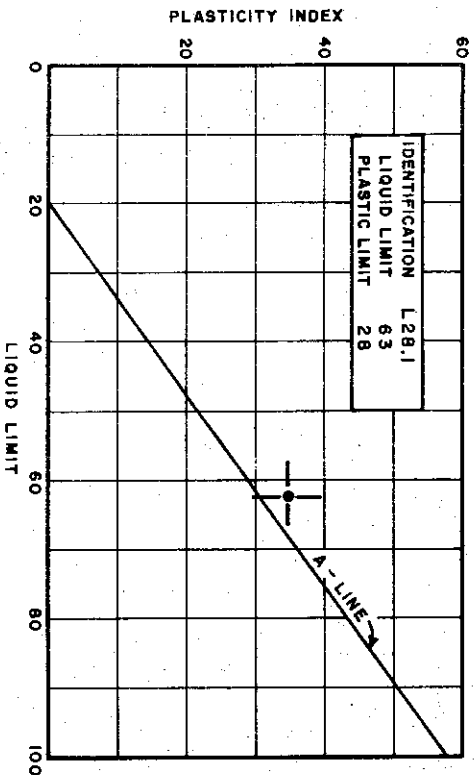
C-614

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



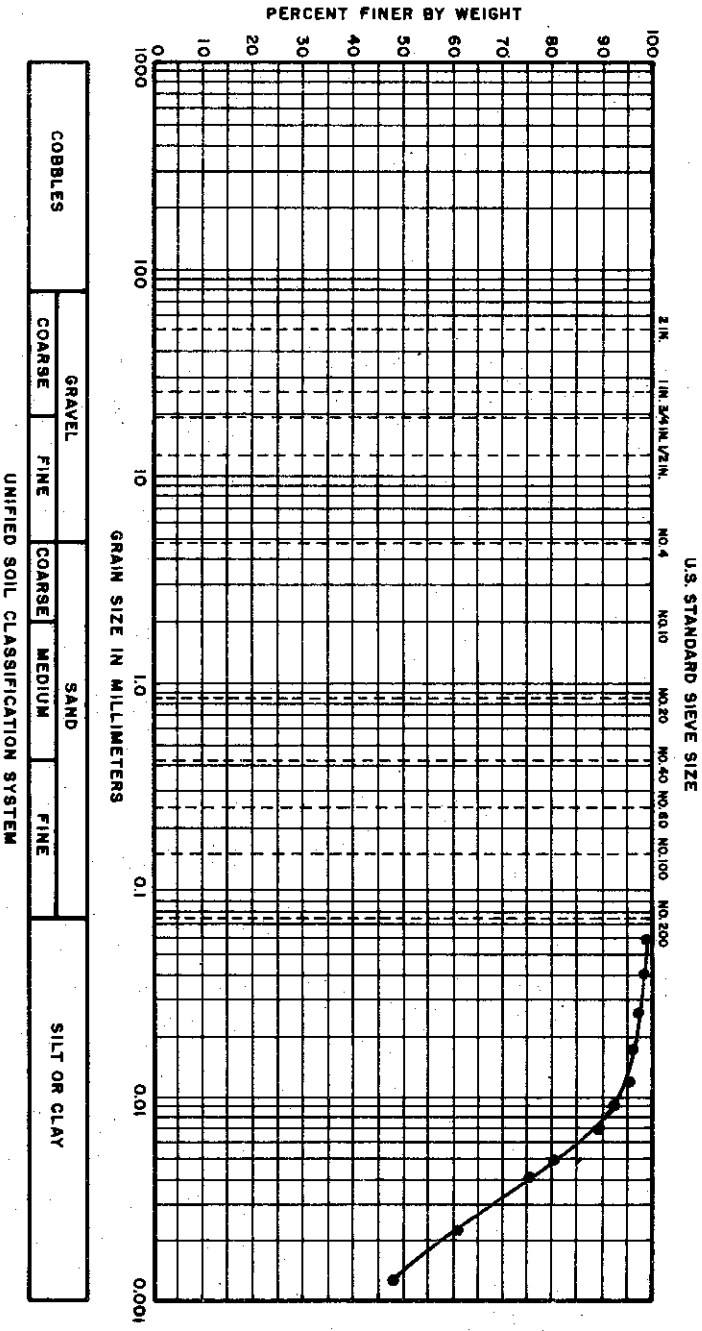
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 41  
 SAMPLE : 2  
 DEPTH : 4.5' TO 4.8'  
 SPECIFIC GRAVITY: USED 2.70

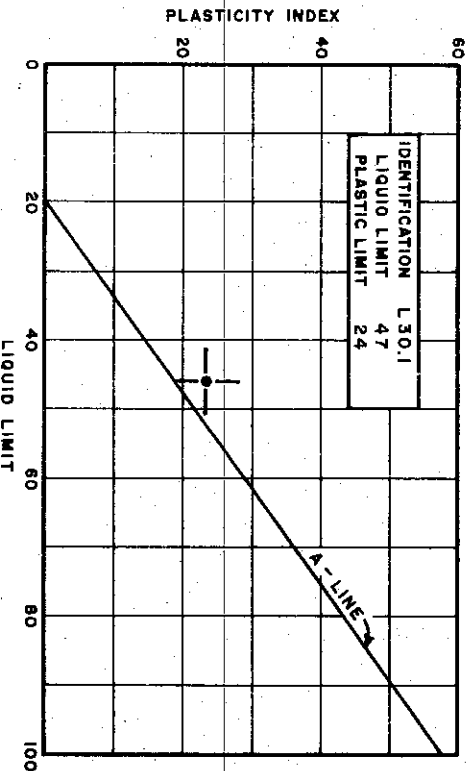
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

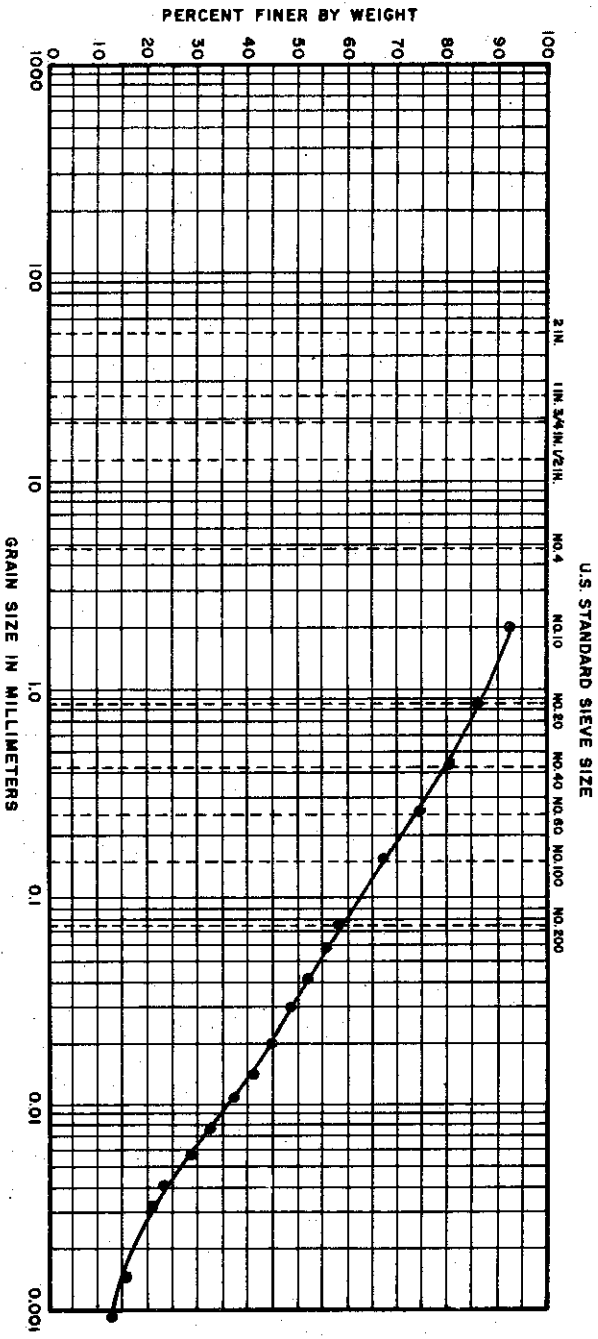
IDENTIFICATION: SILTY CLAY (CL)  
EXPLORATION: BORING 41  
SAMPLE: 7  
DEPTH: 20.6' TO 21.0'  
SPECIFIC GRAVITY = 2.66

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-616

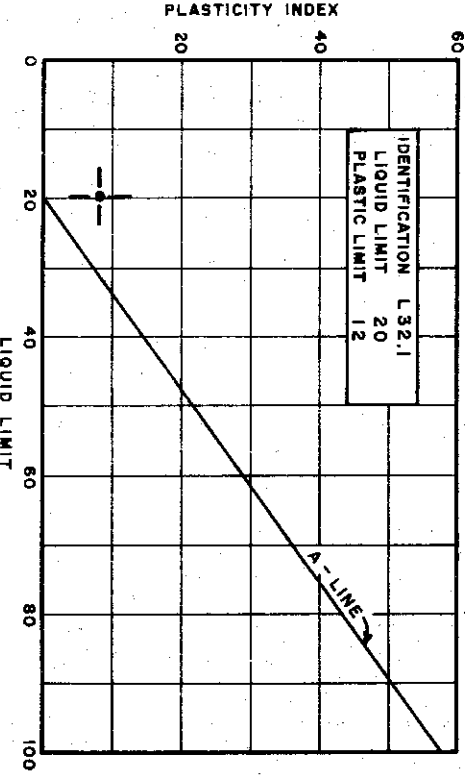
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



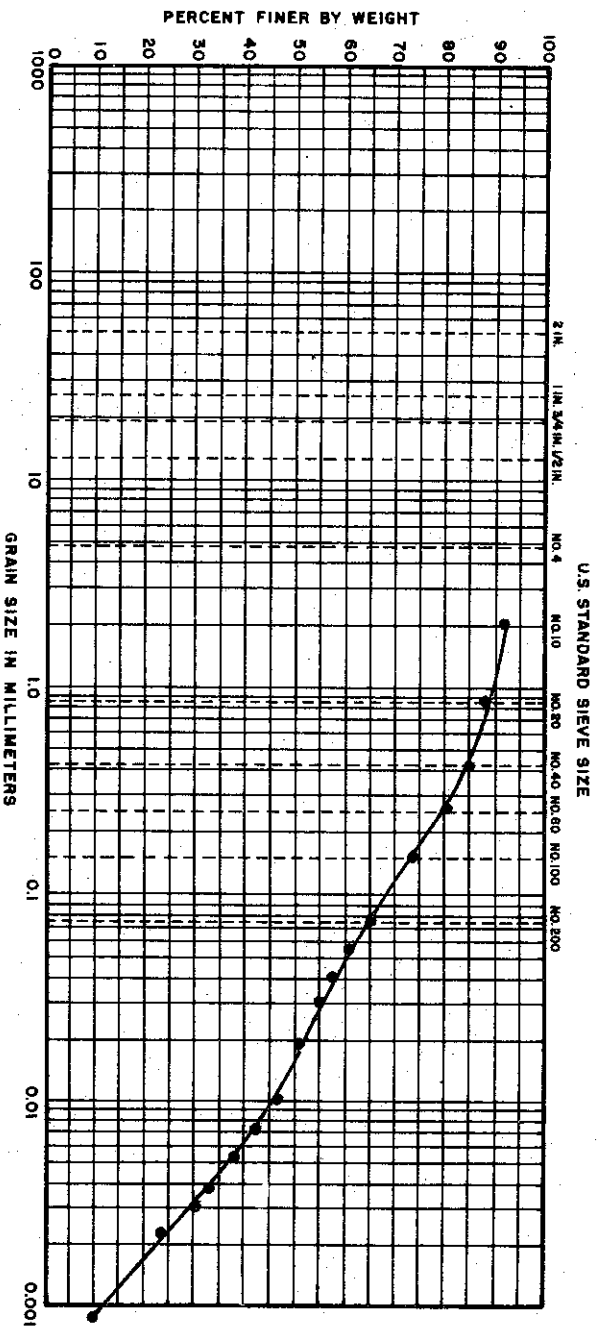
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (SC)  
 EXPLORATION: BORING 41  
 SAMPLE : II  
 DEPTH : 40.7' TO 41.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

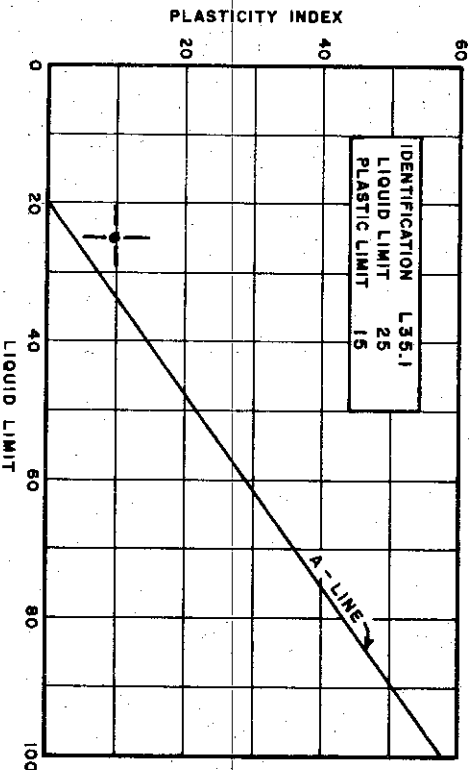
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

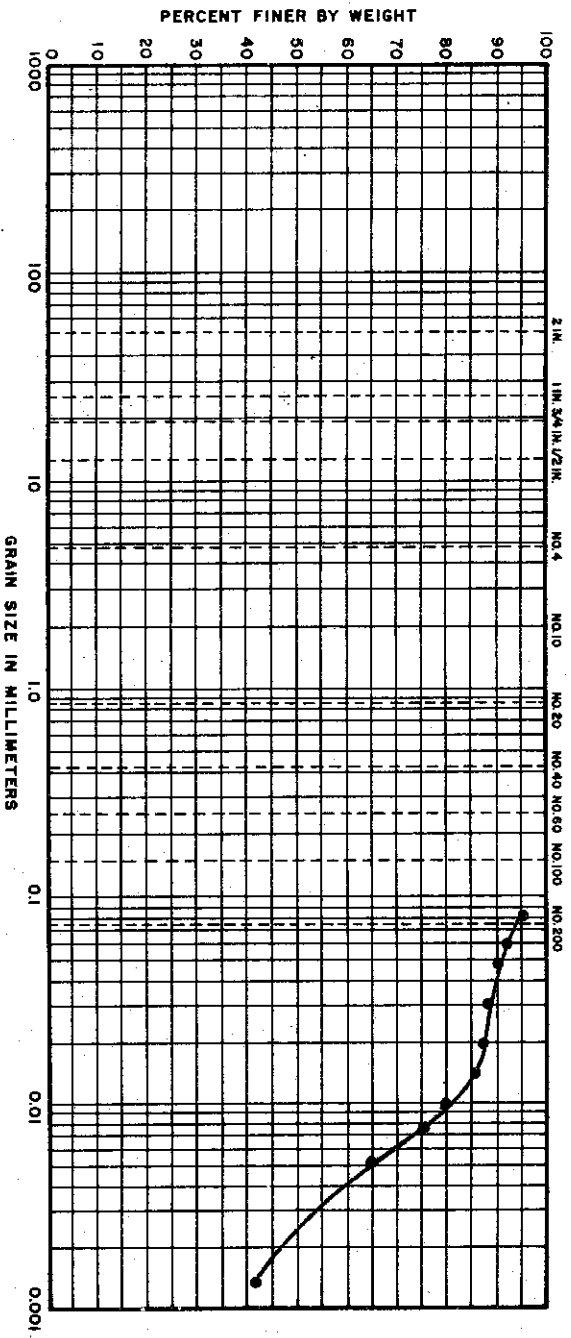
IDENTIFICATION : SILTY CLAY; ZONES OF SAND (CL-SC)  
 EXPLORATION: BORING 41  
 SAMPLE : 17  
 DEPTH : 72.9' TO 73.2'  
 SPECIFIC GRAVITY = 2.68

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-618

### GRAIN SIZE DISTRIBUTION

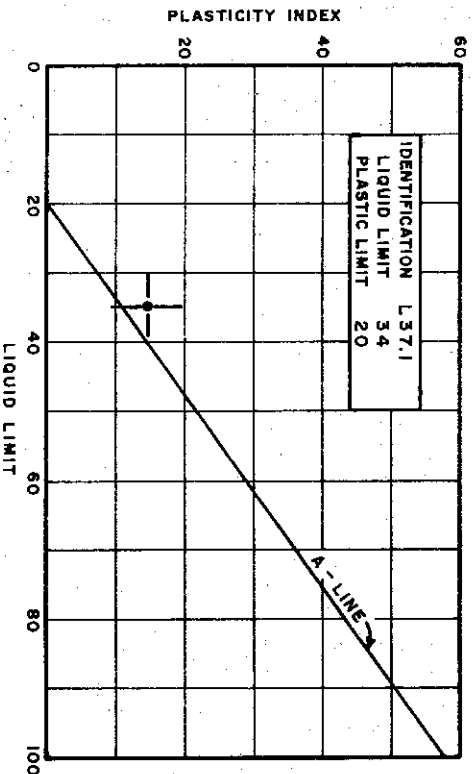
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



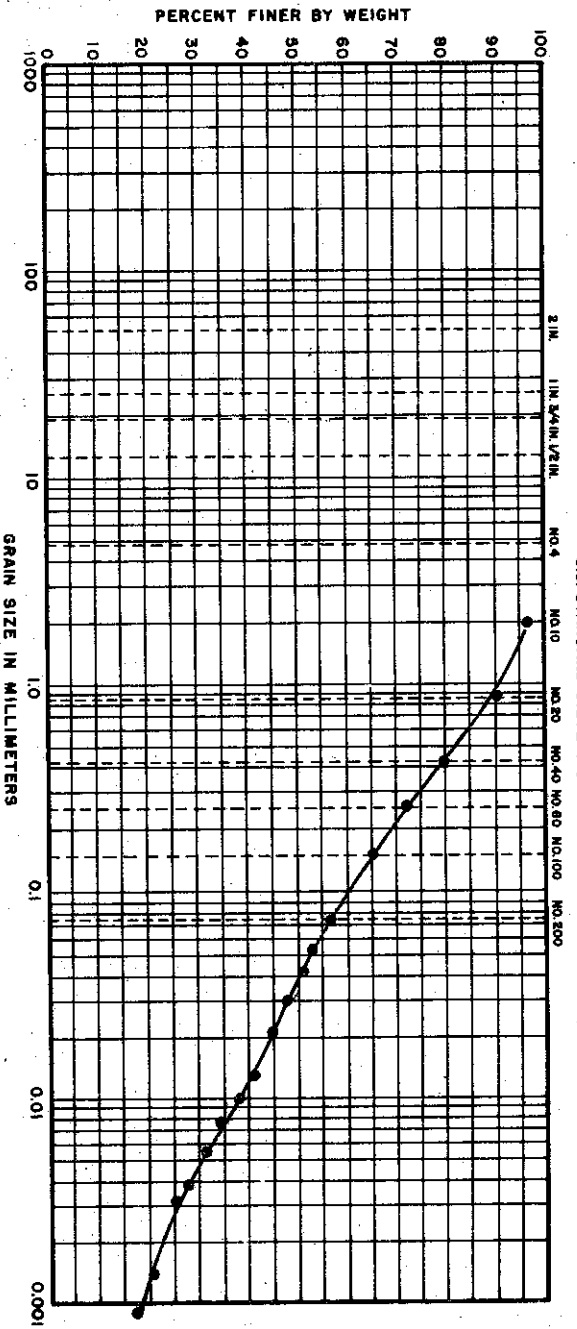
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 23  
 DEPTH : 101.9' TO 102.2'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

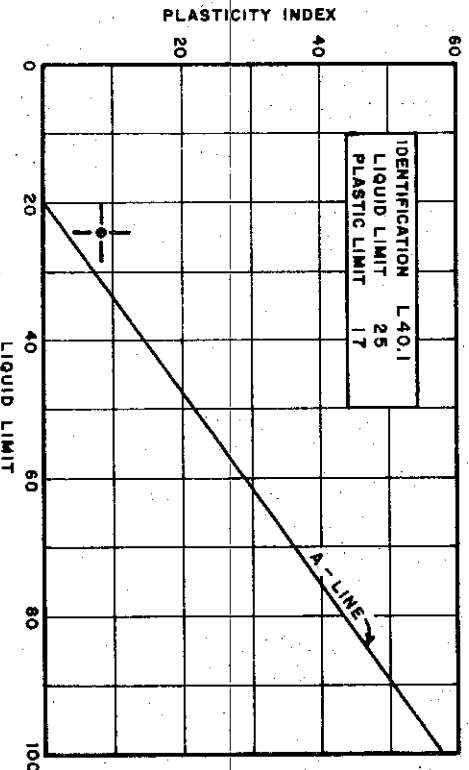
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L 40.1  
LIQUID LIMIT 25  
PLASTIC LIMIT 17

### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (GC-SC)  
EXPLORATION: BORING 41  
SAMPLE : 29  
DEPTH : 130.7' TO 130.9'  
SPECIFIC GRAVITY = 2.69

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

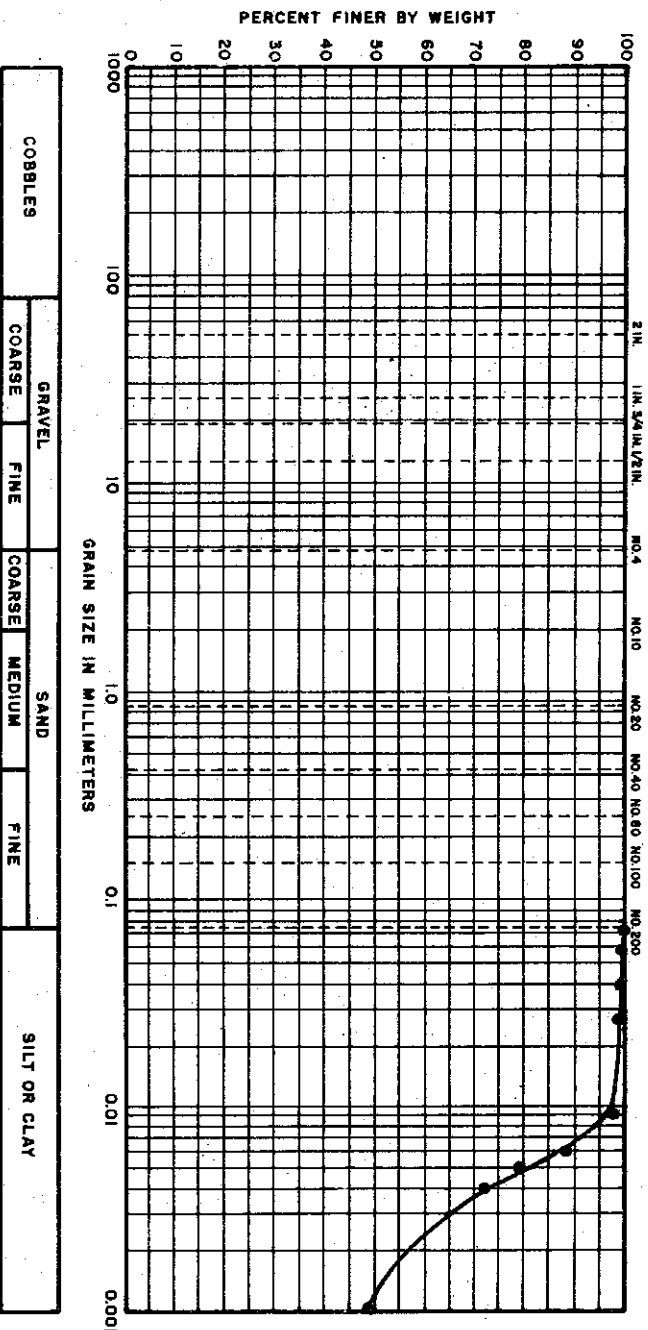
C-620

FILE NO. 1255 DATE JAN. 74



### GRAIN SIZE DISTRIBUTION

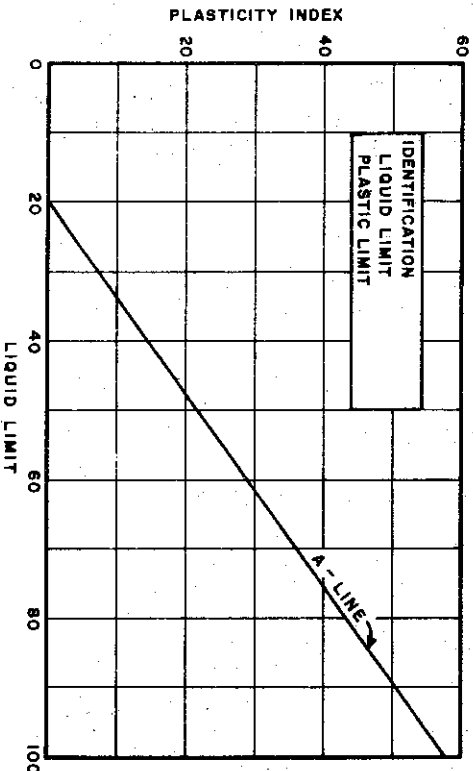
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



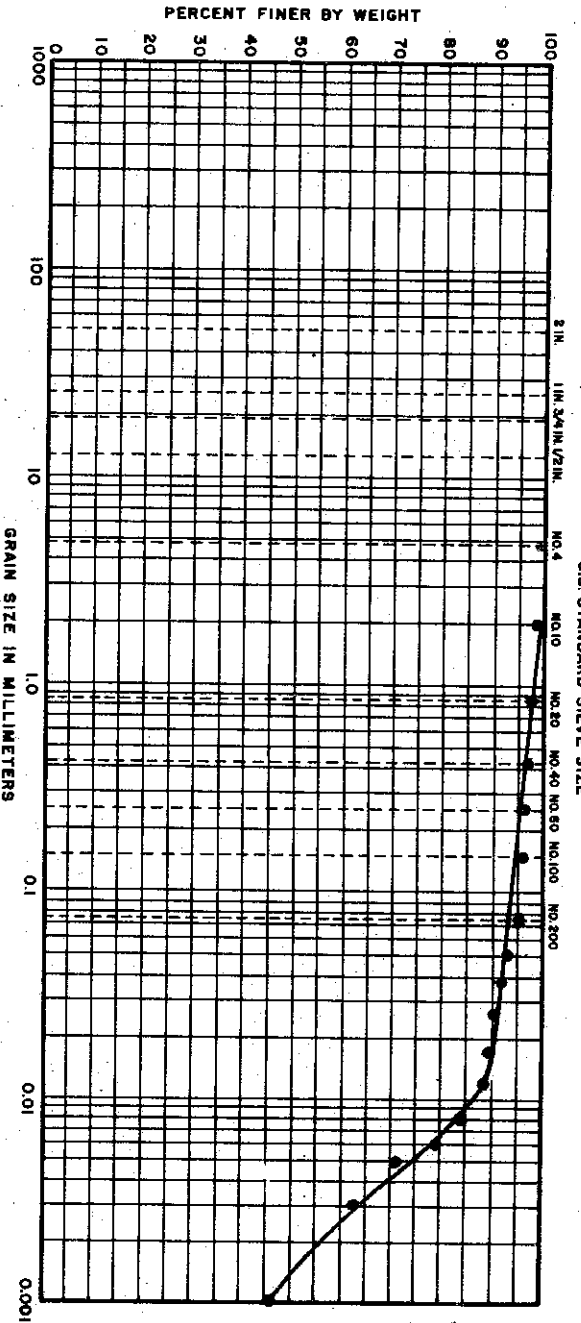
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 48  
 SAMPLE : 4  
 DEPTH : 8' - 10'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

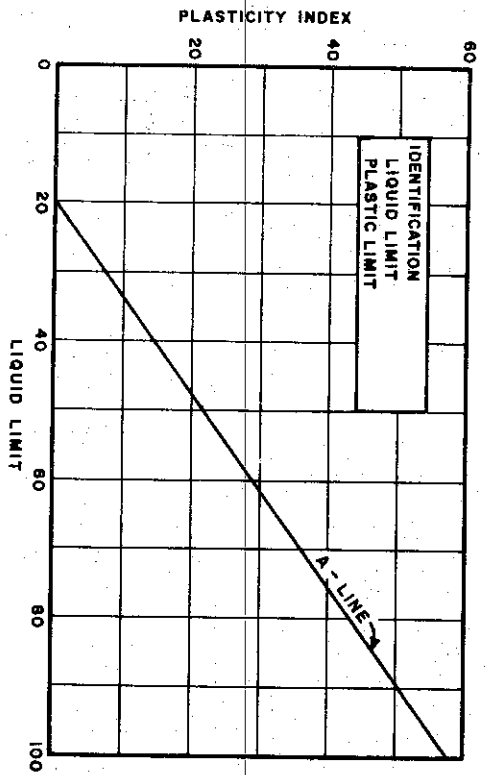
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 48  
 SAMPLE : 26  
 DEPTH : 118' - 120.6'  
 SPECIFIC GRAVITY : USED 2.70

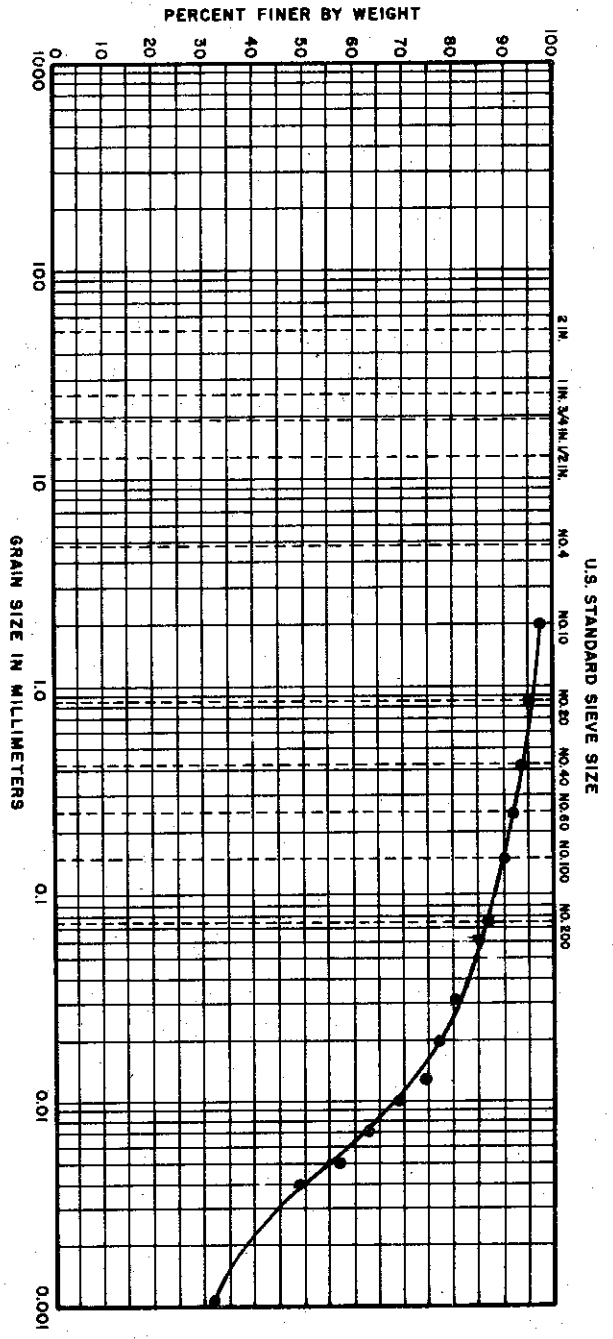
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-622

FILE NO. 1255

DATE MARCH 74

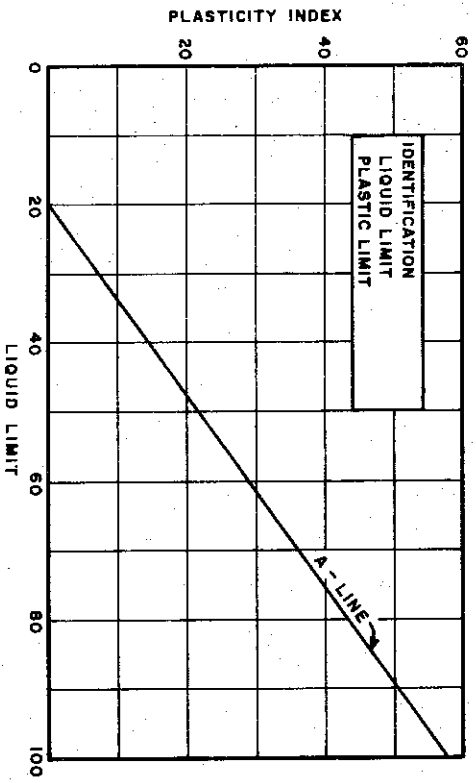
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

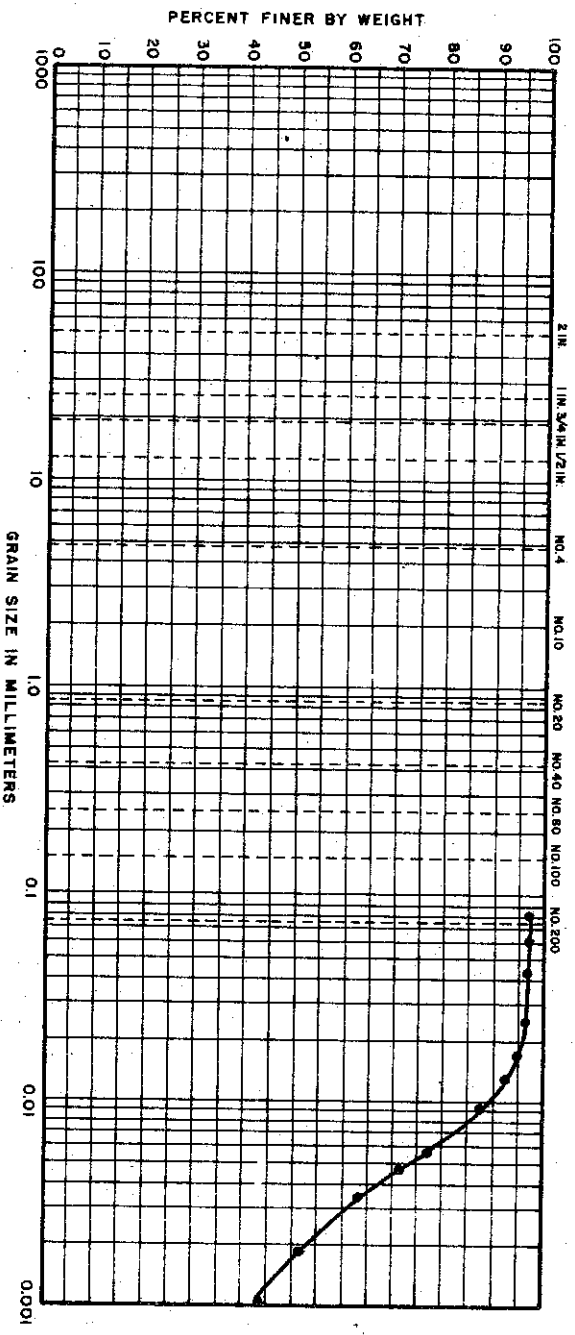
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 49  
 SAMPLE : 7  
 DEPTH : 53' - 55'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

### GRAIN SIZE DISTRIBUTION

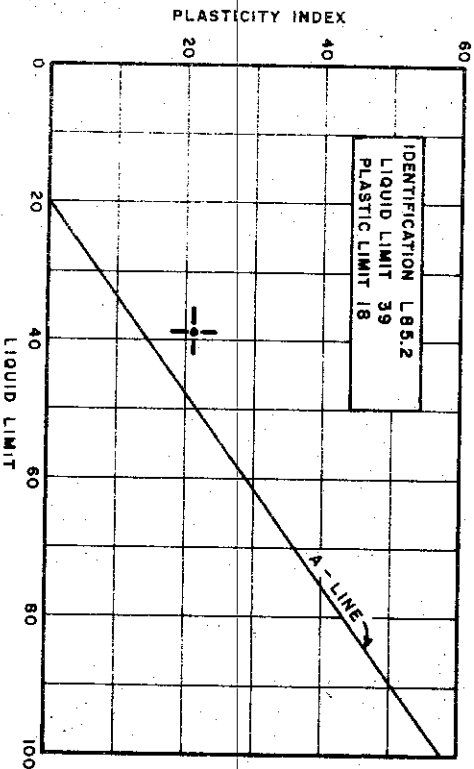
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE : 6  
 DEPTH : 28.3' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

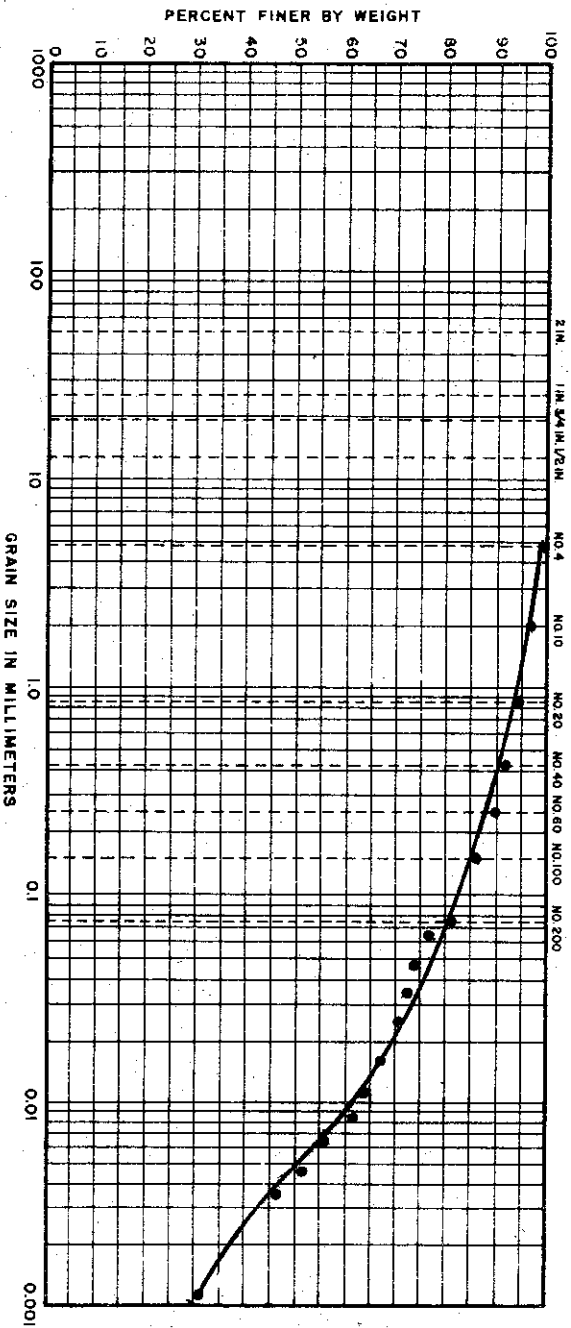
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-624

FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

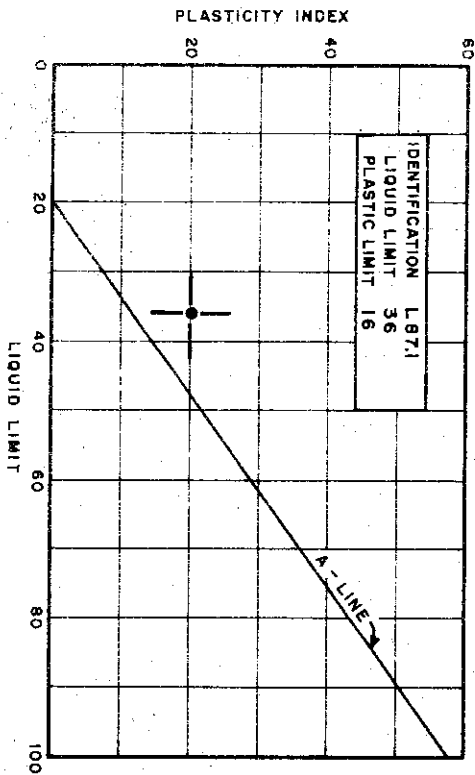
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

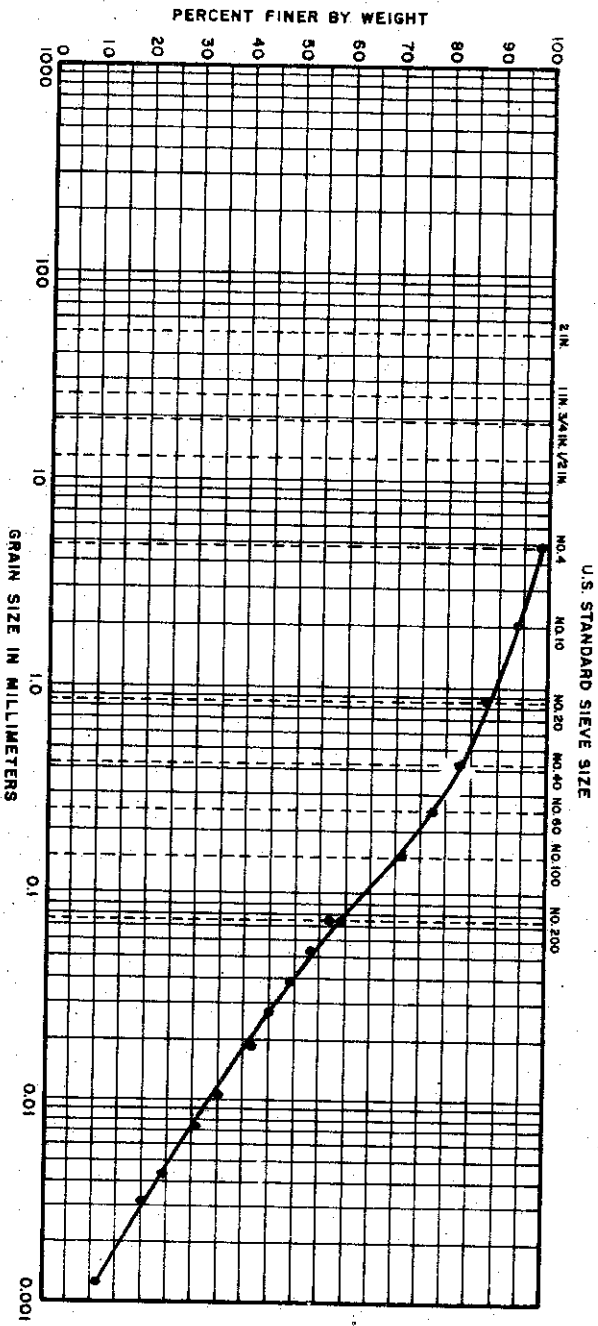


### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 10  
 DEPTH: 48.6' TO 48.8'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

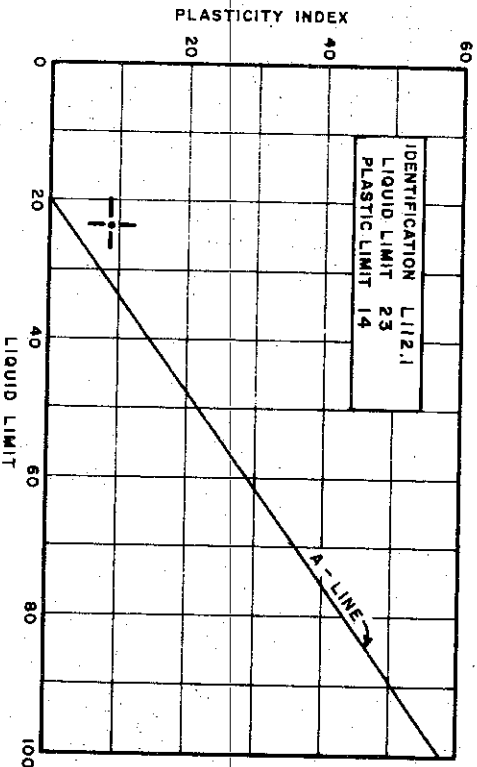
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

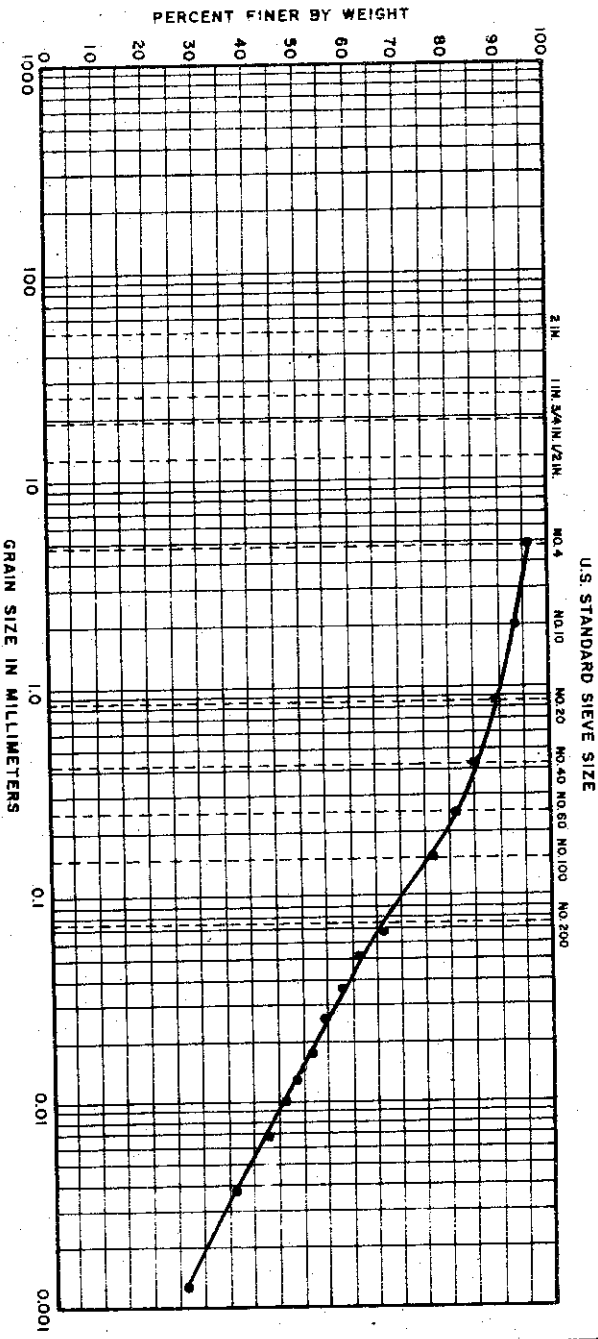
IDENTIFICATION : SILTY CLAY, SANDY (CL.)  
 EXPLORATION: BORING 52  
 SAMPLE : 7  
 DEPTH : 58.6' TO 58.9'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE JULY 1974

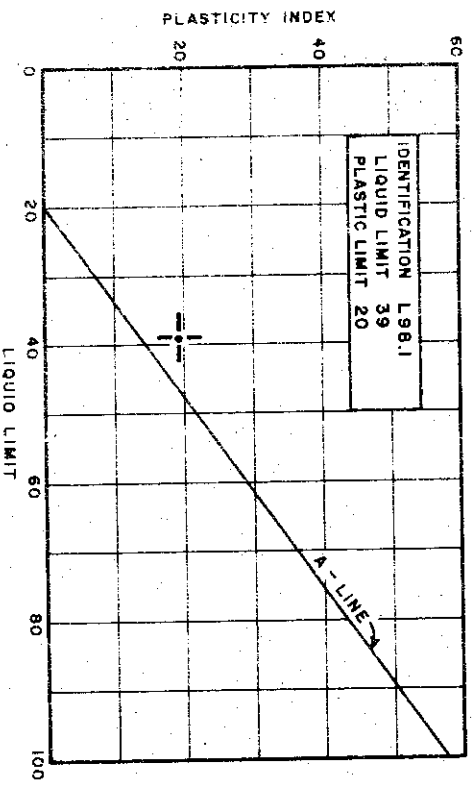
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

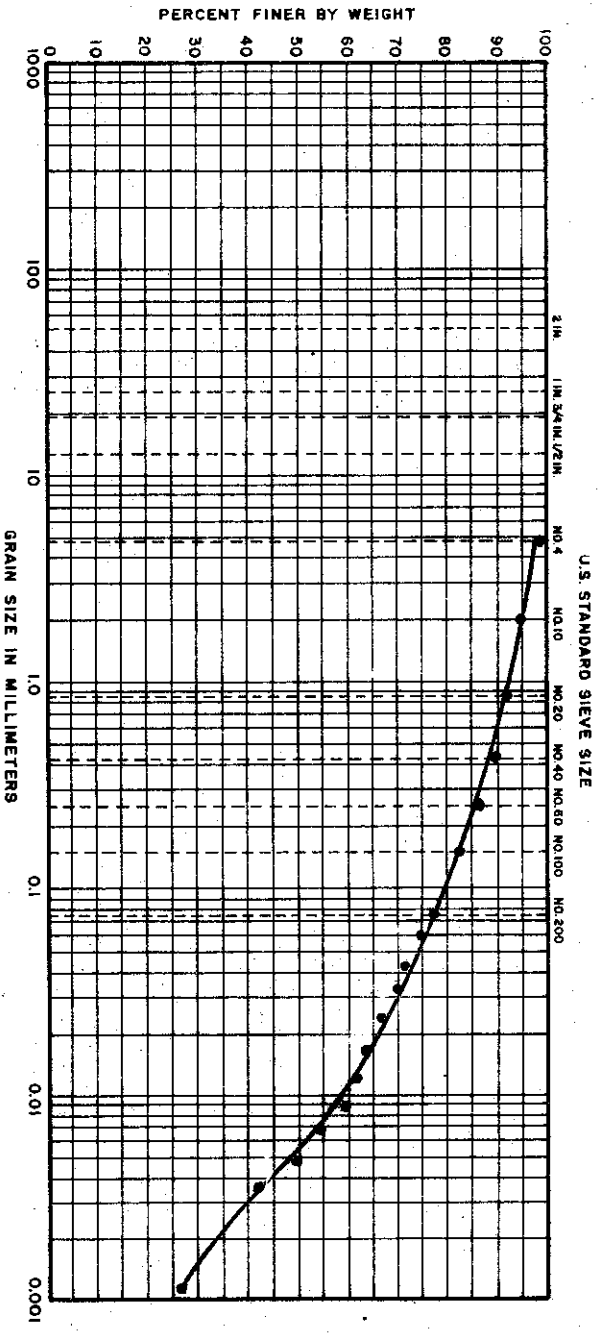


### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING: 53  
 SAMPLE: 5  
 DEPTH: 39.8' TO 39.8'  
 SPECIFIC GRAVITY: 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

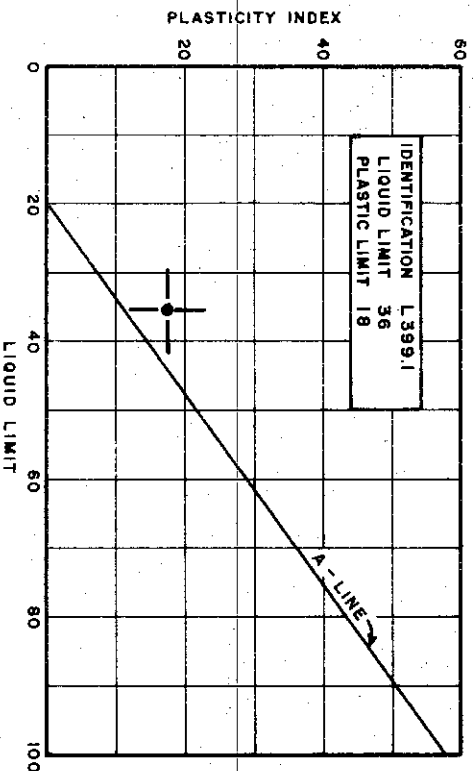
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)

EXPLORATION: BORING 54

SAMPLE: 6

DEPTH: 63.5' TO 63.8'

SPECIFIC GRAVITY: 2.71

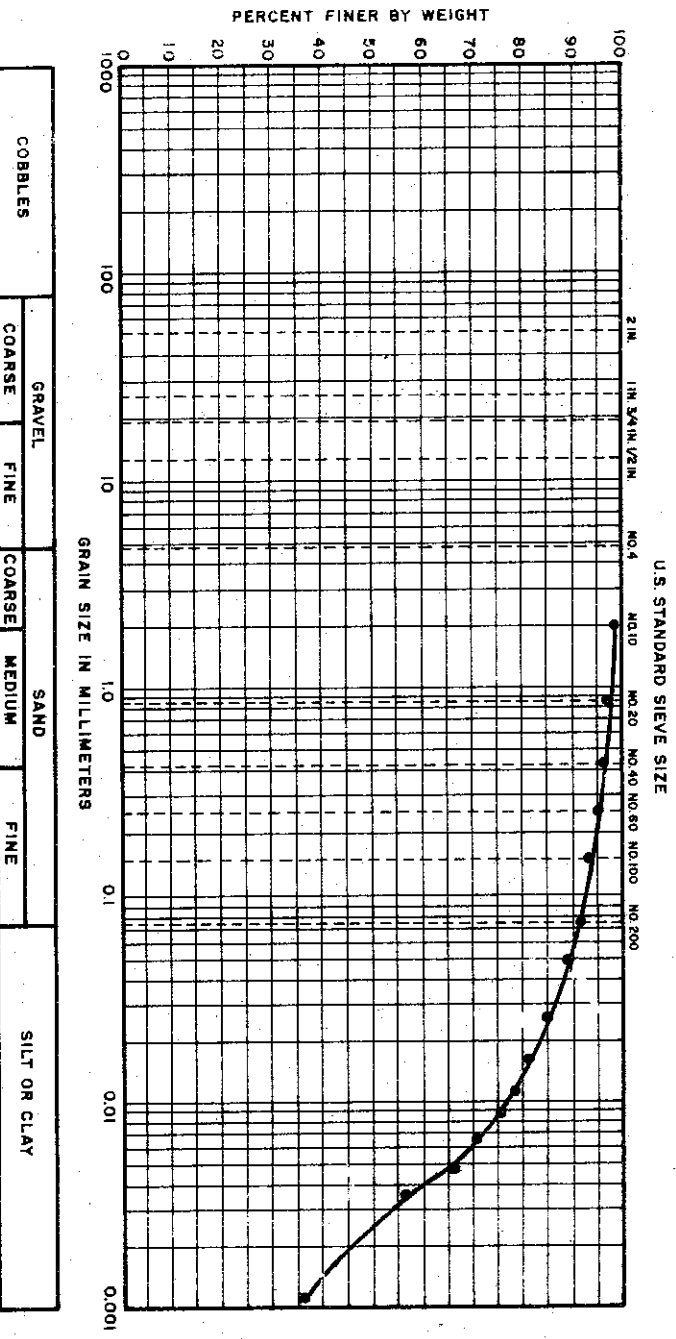
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-628

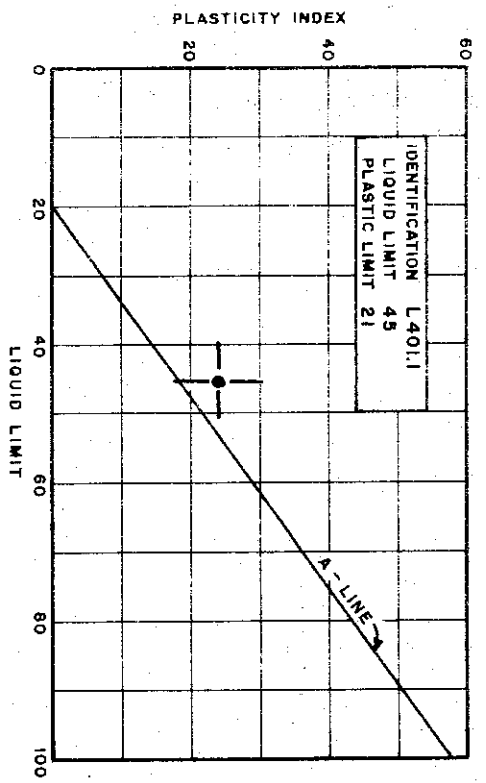
FILE NO. 1255 DATE JULY 1974



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



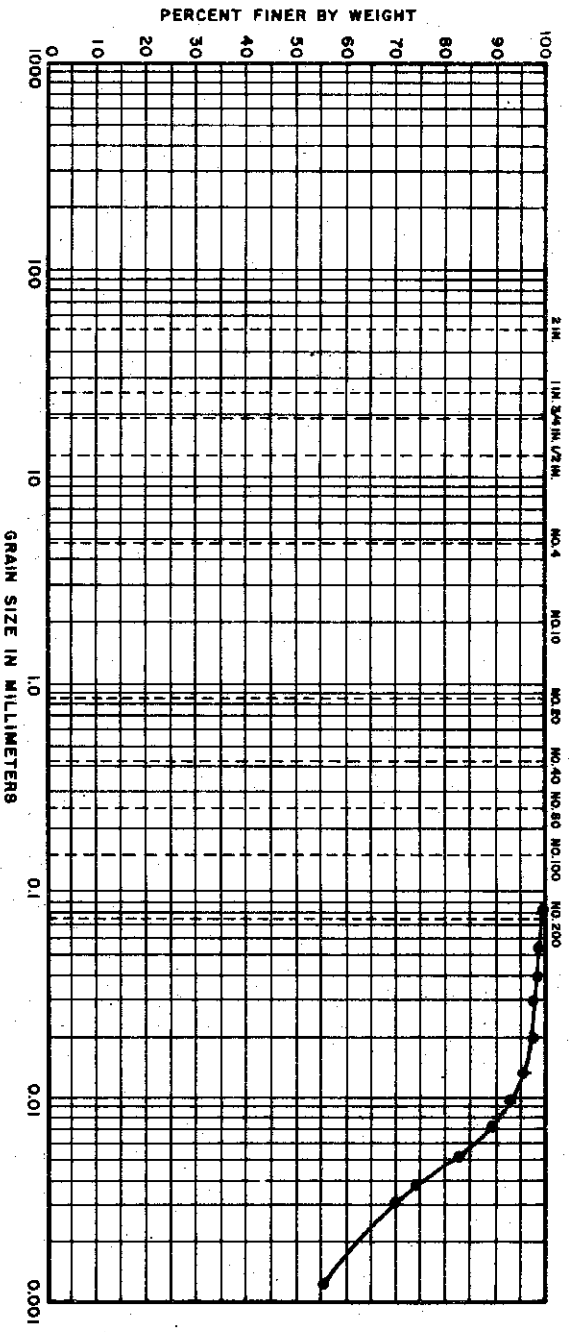
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
EXPLORATION: BORING 54  
SAMPLE : 8  
DEPTH : 73.7' TO 74.0'  
SPECIFIC GRAVITY : 2.73

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

### GRAIN SIZE DISTRIBUTION

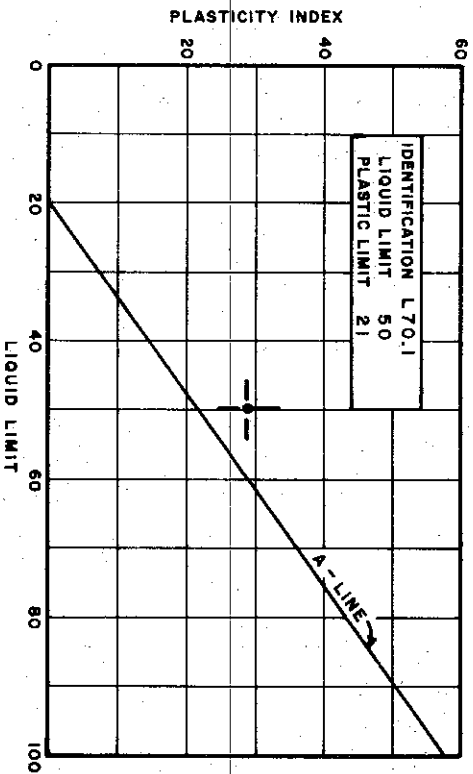
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

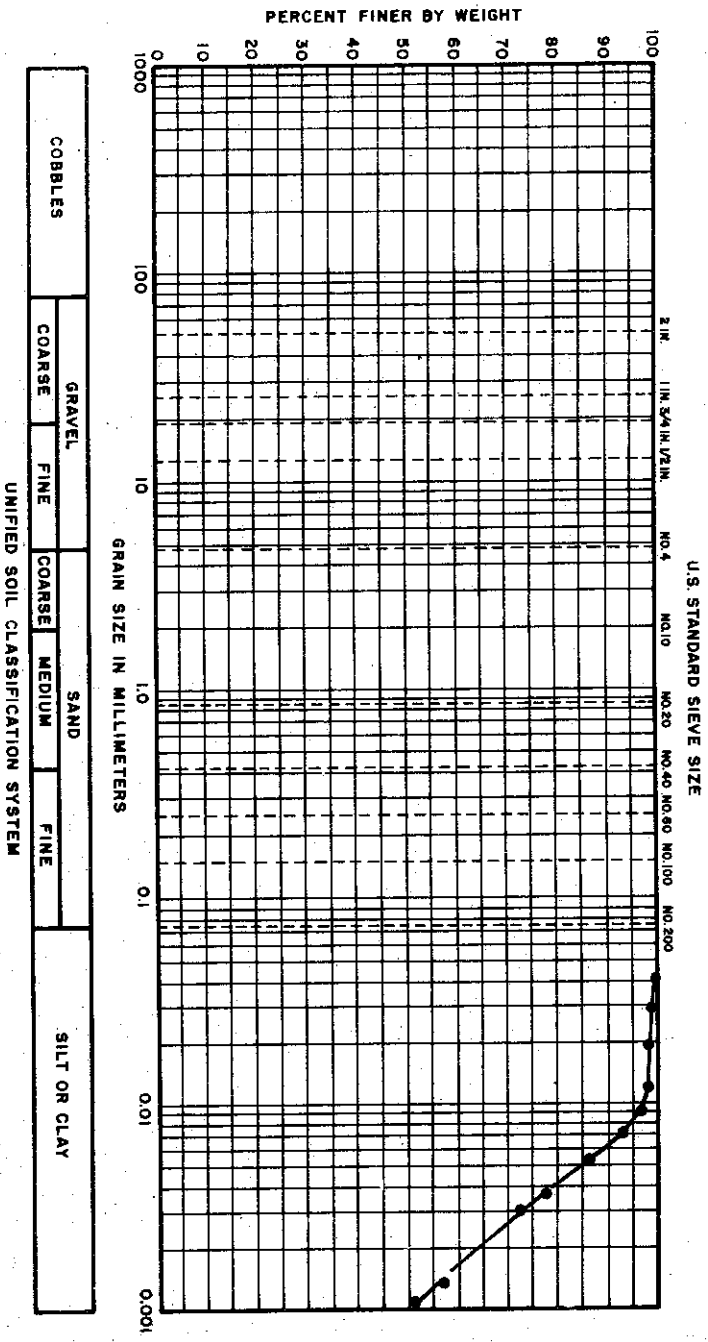
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS1  
 DEPTH : 5.0' TO 6.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

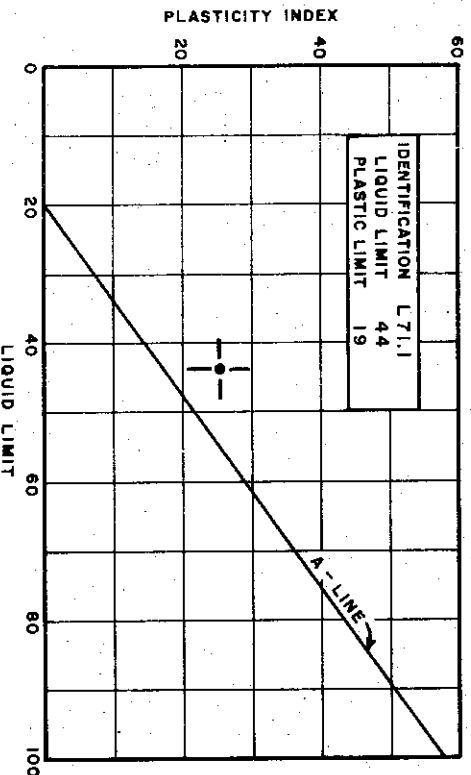
C-630

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 60

SAMPLE : SS2

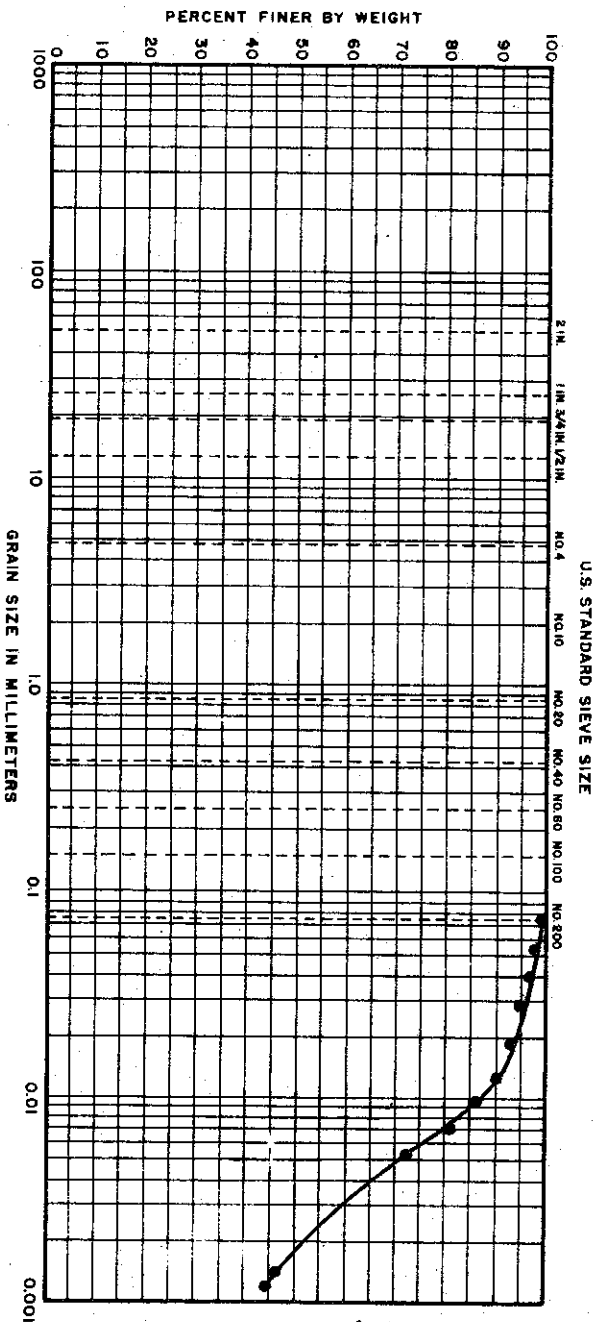
DEPTH : 10' TO 12.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

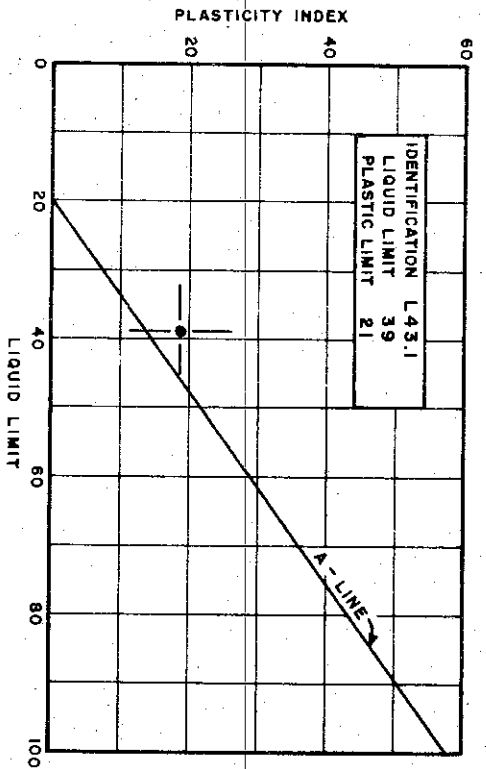
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

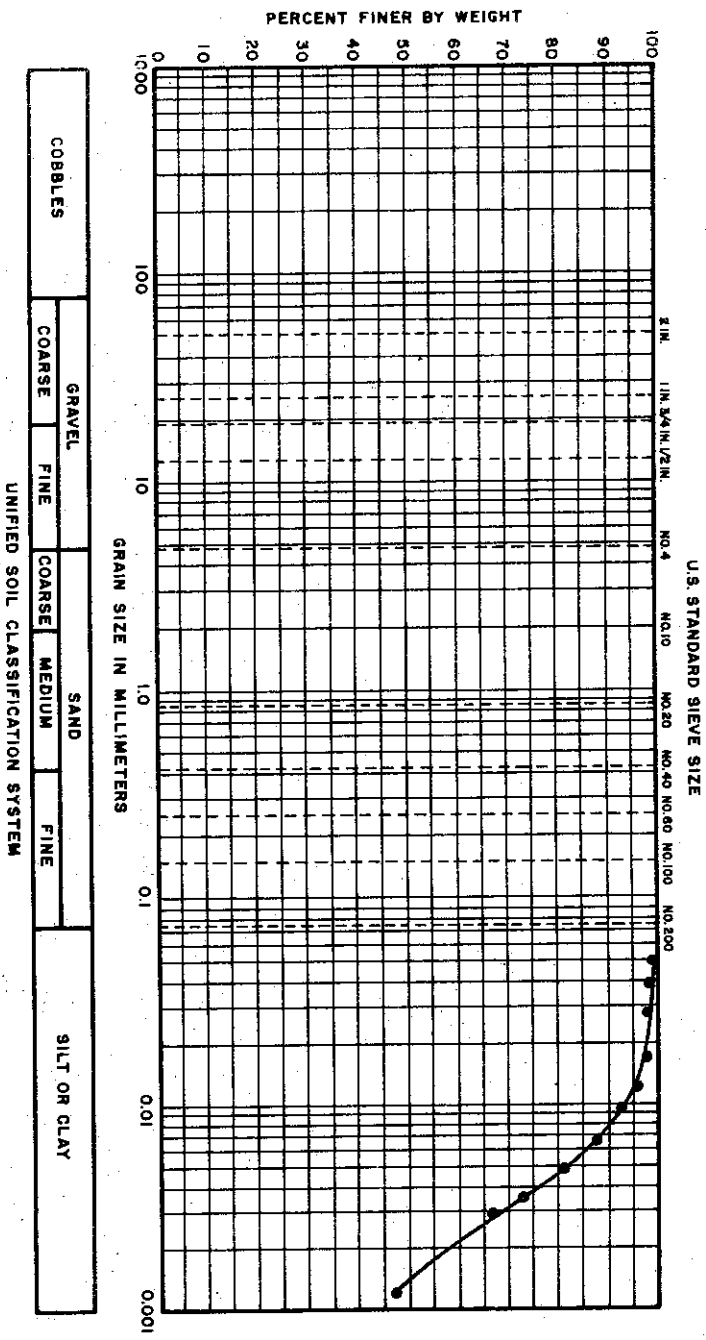


### MATERIAL SOURCE

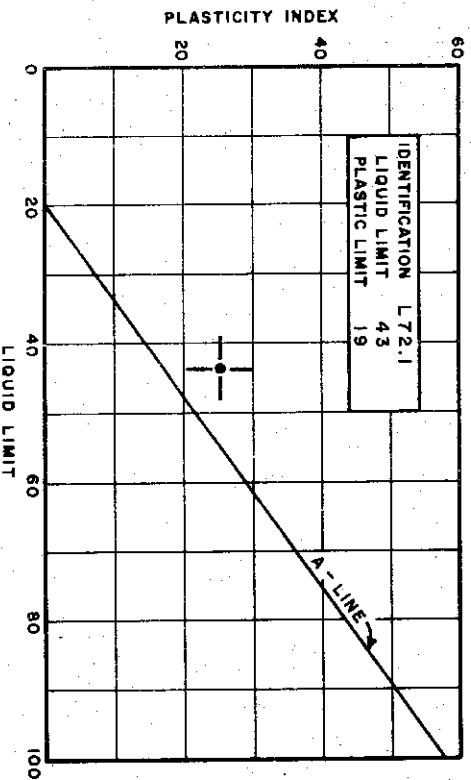
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE: 3  
 DEPTH: 18.1' TO 18.3'  
 SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

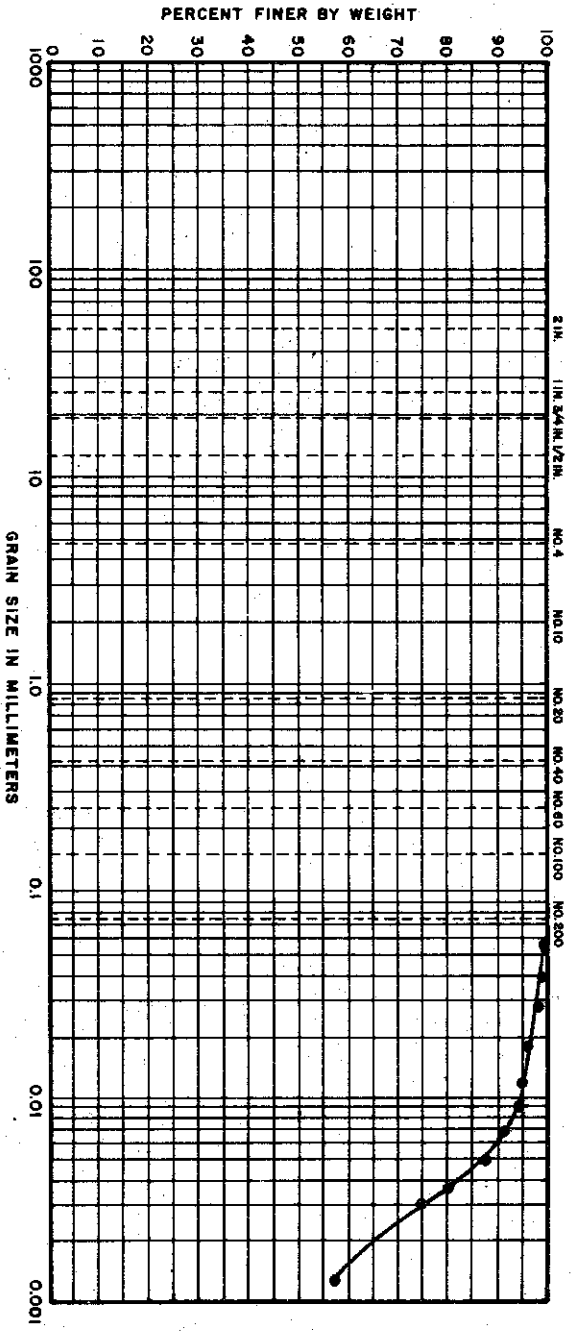
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 553  
 DEPTH : 19' TO 20.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

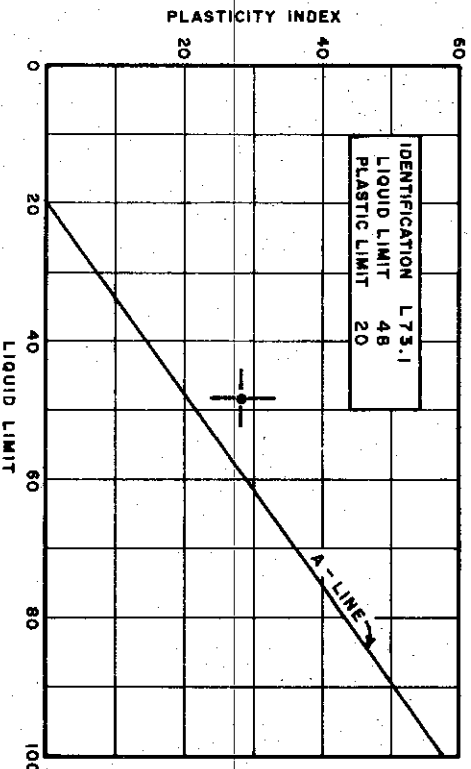
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

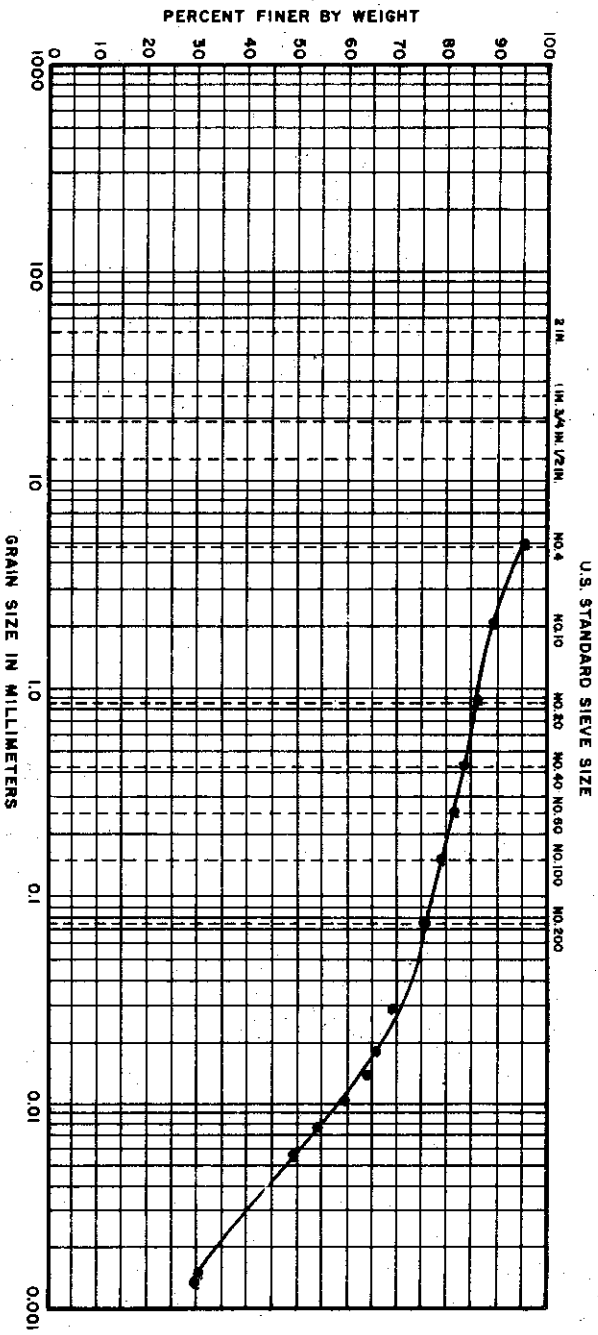
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS 5  
 DEPTH : 27' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE JAN. 74

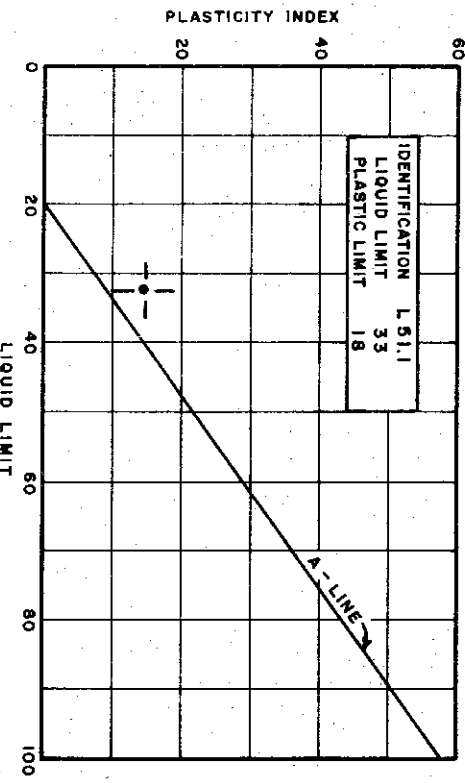
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



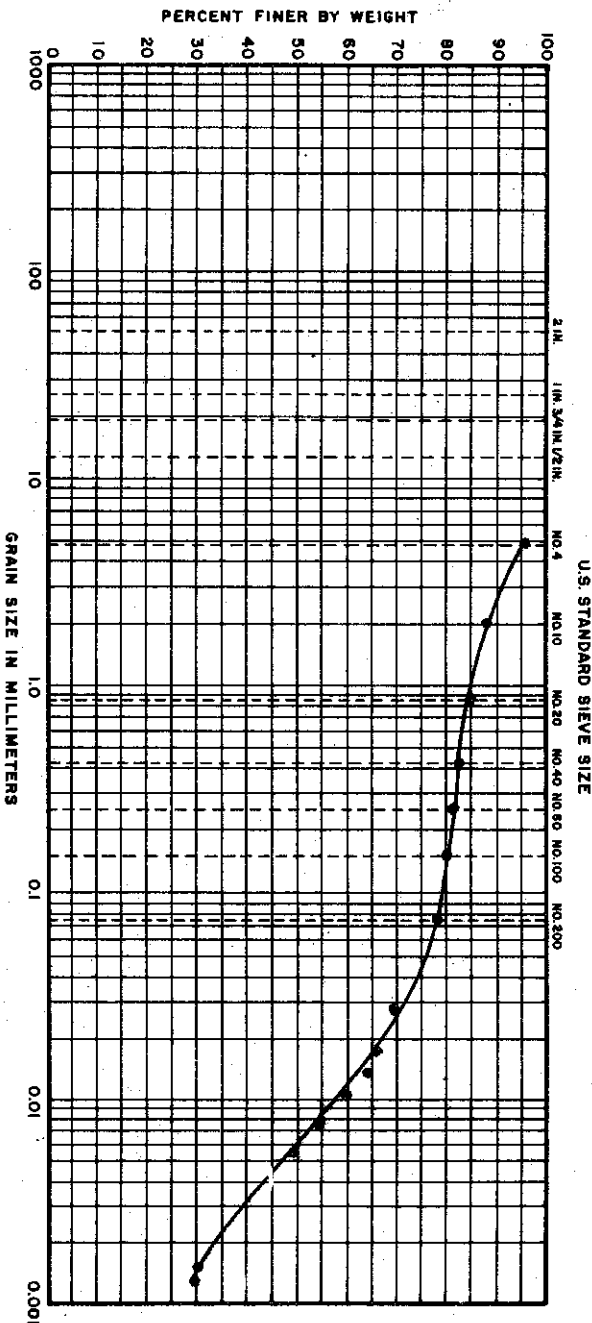
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 11  
 DEPTH : 56.1' TO 56.4'  
 SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE MARCH 74

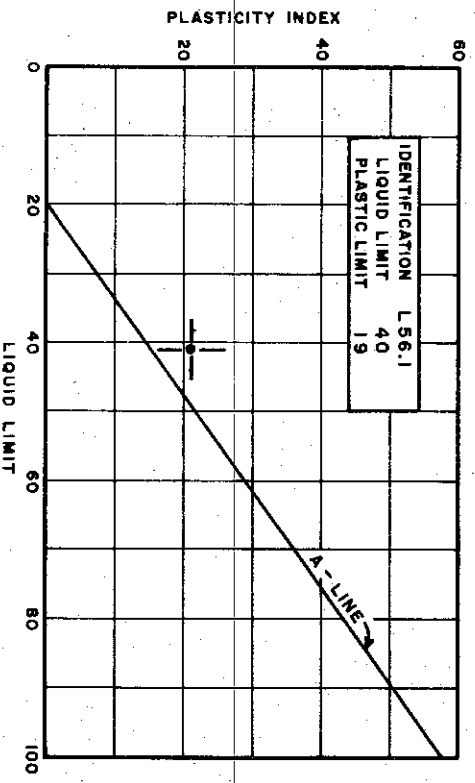
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 16  
 DEPTH : 85.6' TO 86.1'  
 SPECIFIC GRAVITY 2.73

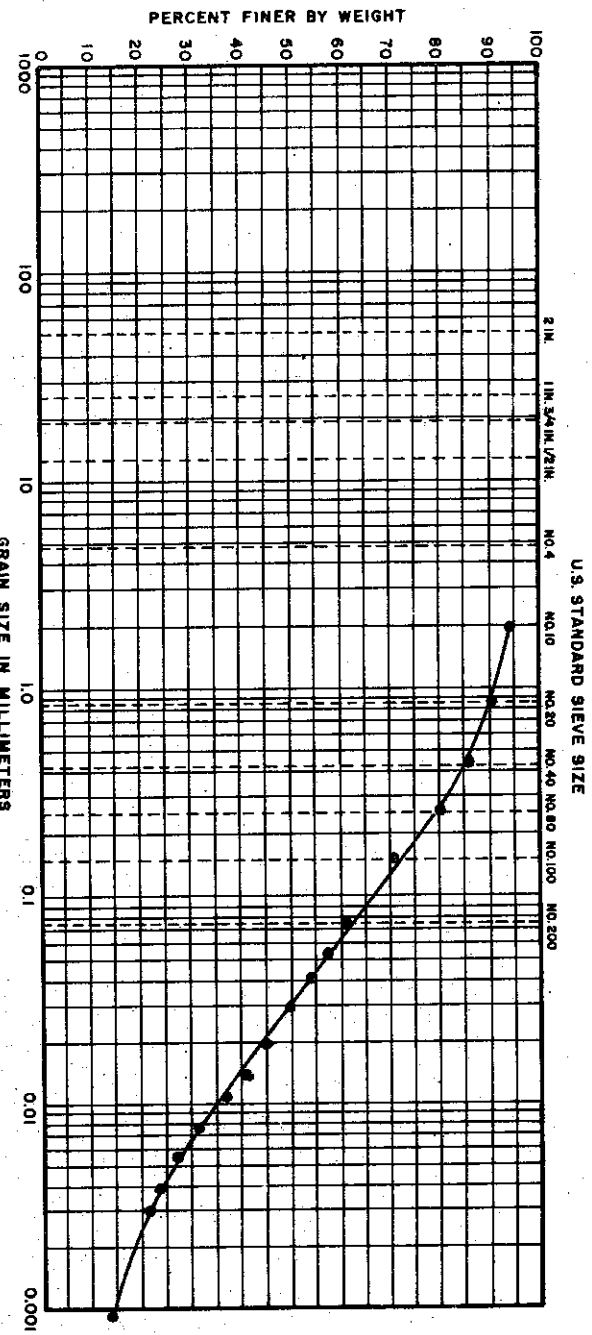
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-636

FILE NO. 1255 DATE MARCH 74



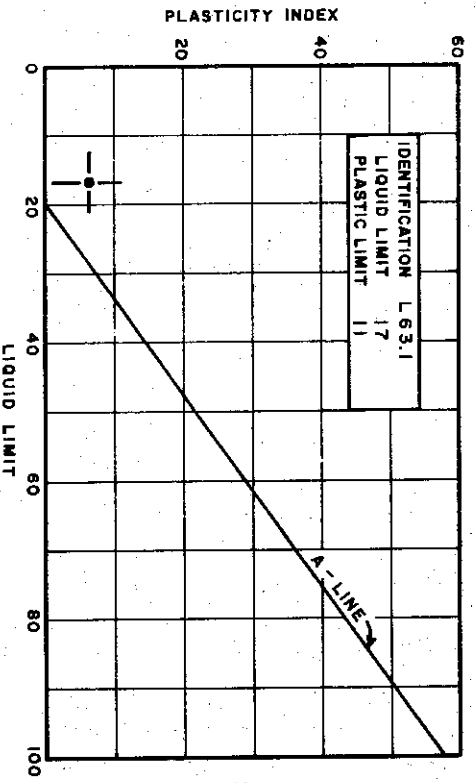
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL	SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION	L 63.1
LIQUID LIMIT	17
PLASTIC LIMIT	11

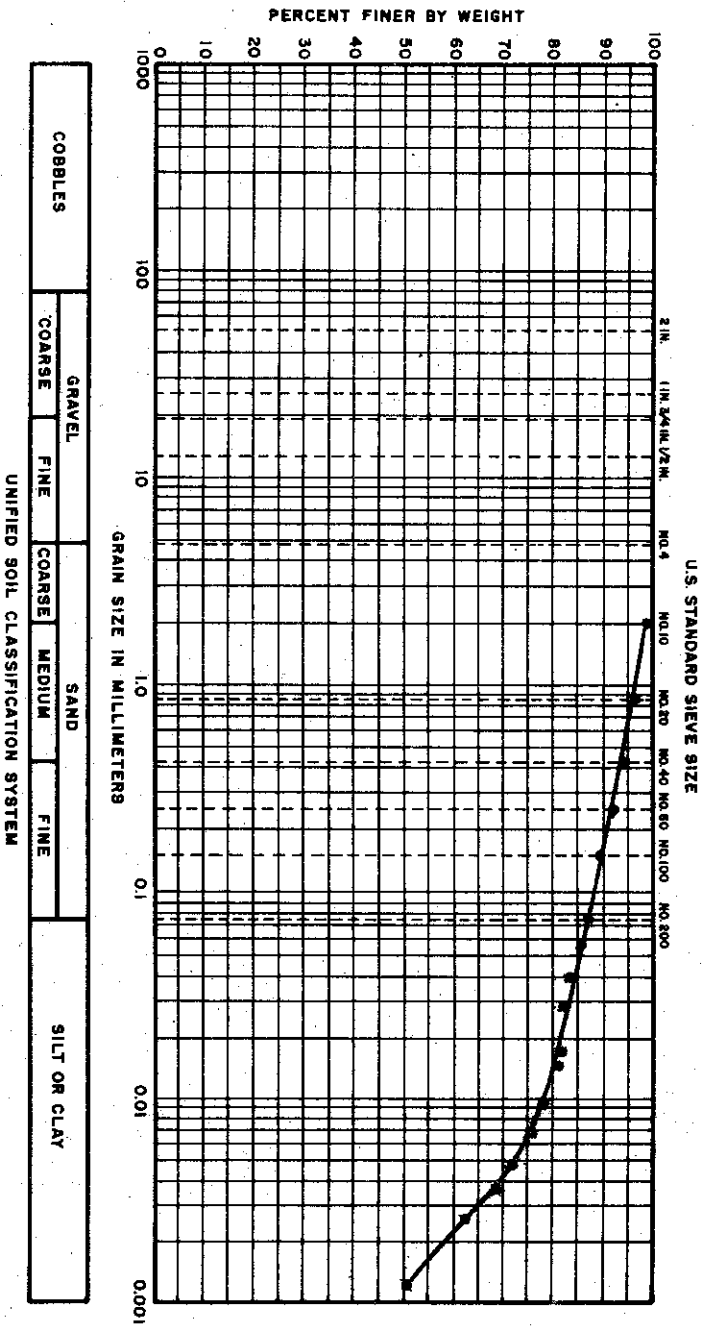
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 23  
 DEPTH : 119.5' TO 119.9'  
 SPECIFIC GRAVITY : USED 2.70

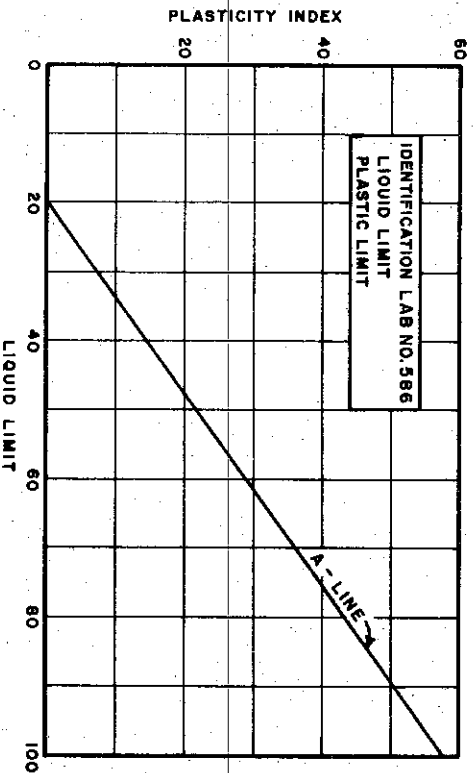
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 137  
 SAMPLE : SS1  
 DEPTH : 1.5' TO 3.0'  
 SPECIFIC GRAVITY : USED 2.70

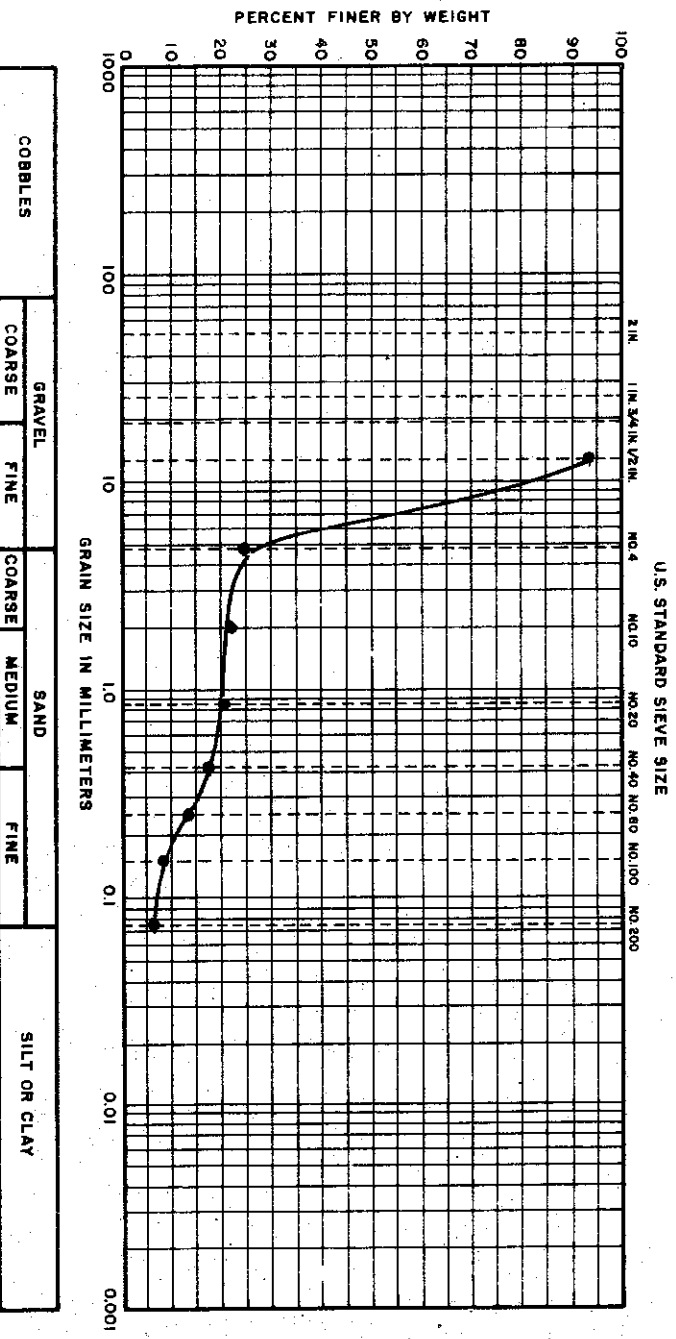
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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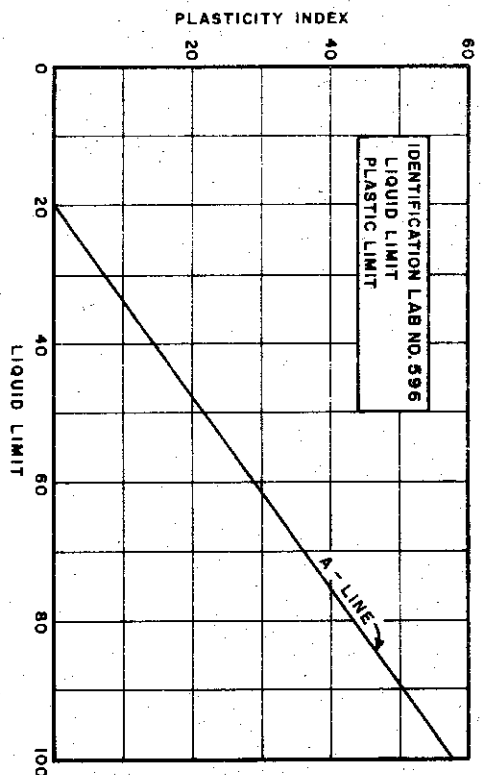
FILE NO. 1255

DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : GRAVEL (GP)  
 EXPLORATION: BORING 139  
 SAMPLE : SS22  
 DEPTH : 99.5' TO 101.0'

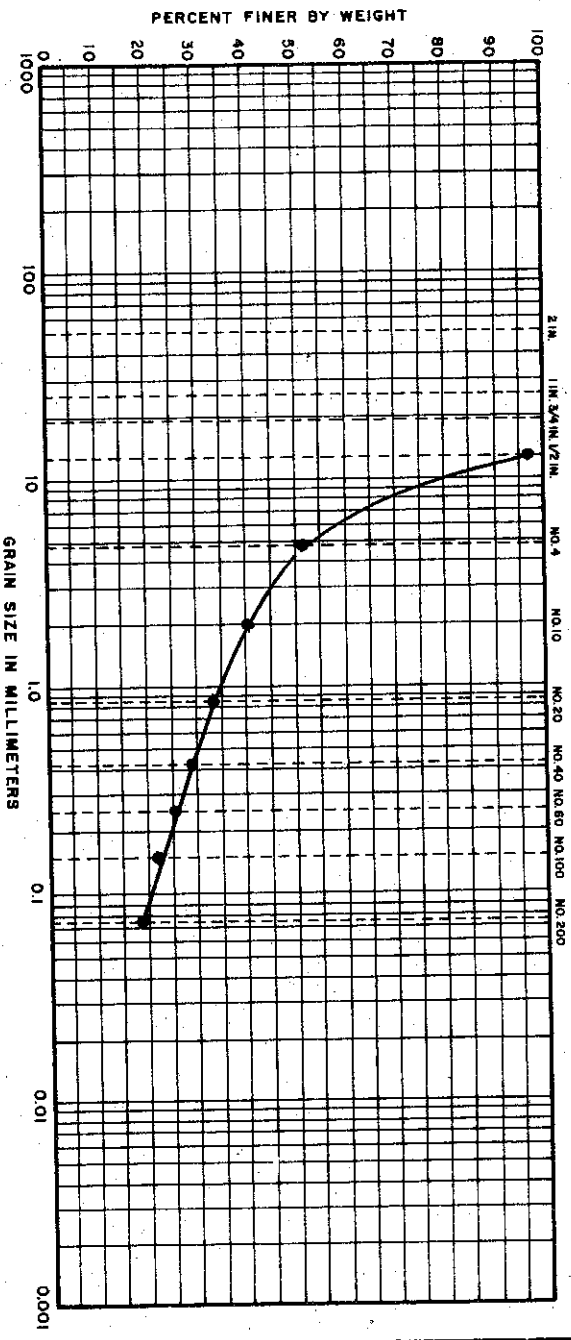
SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE

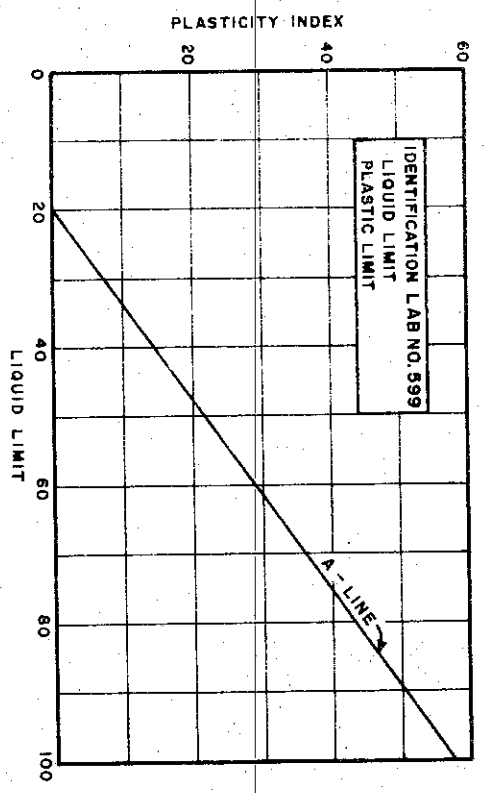


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART

(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SANDY GRAVEL (GM)  
EXPLORATION: BORING 141  
SAMPLE : SS21  
DEPTH : 114.6' TO 116.0'  
SPECIFIC GRAVITY

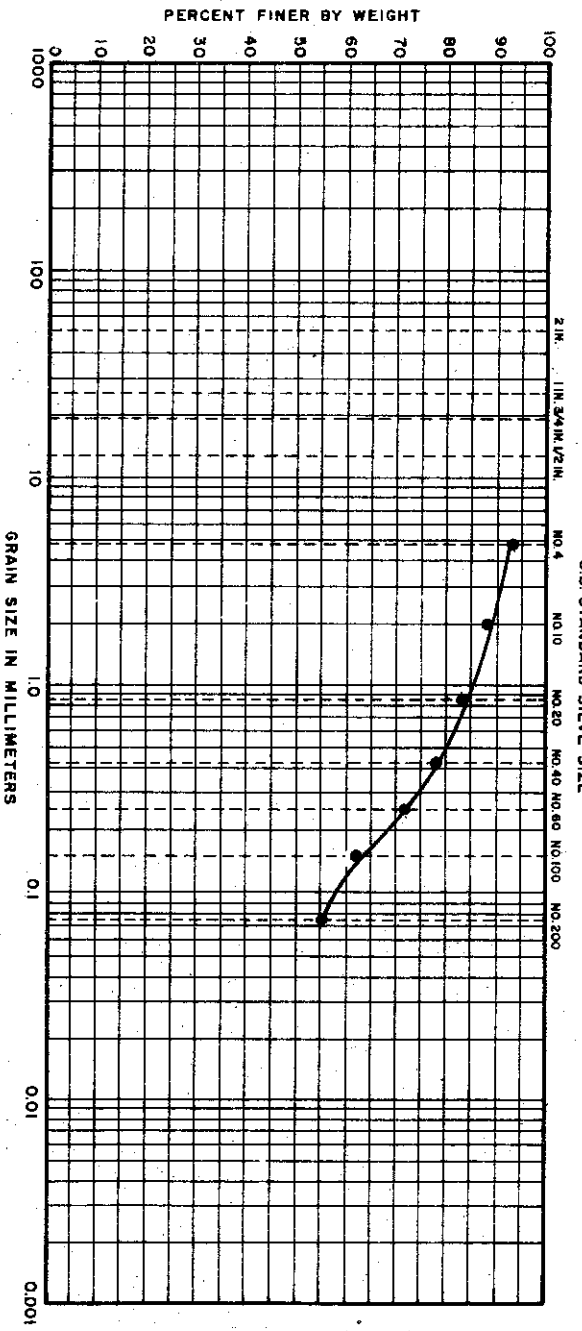
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-640

FILE NO. 1255

DATE NOV. 1974

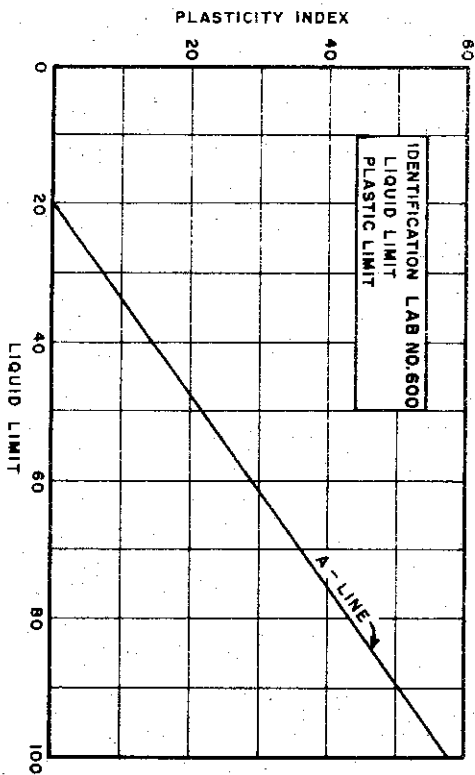
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

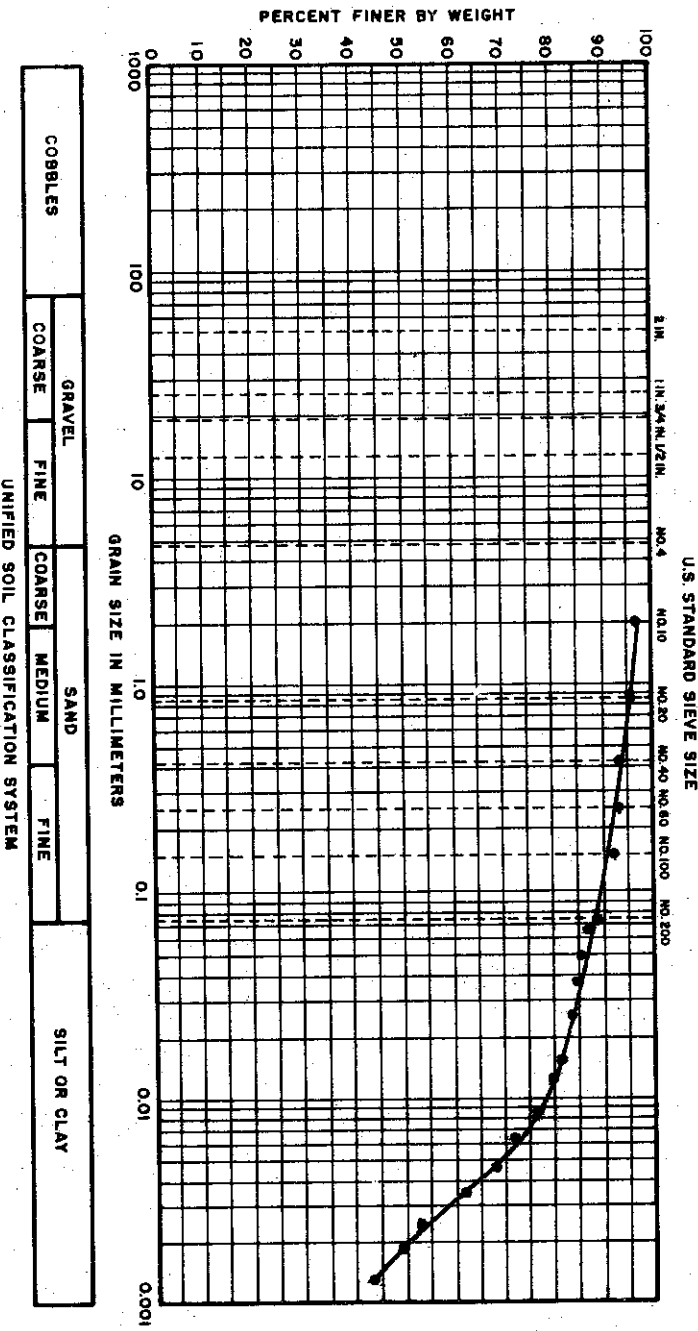


### MATERIAL SOURCE

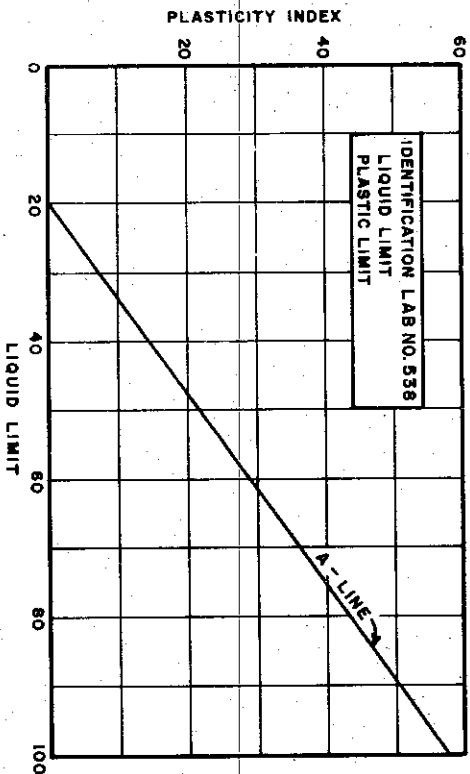
IDENTIFICATION: SANDY CLAY (SM-SC)  
 EXPLORATION: BORING 141  
 SAMPLE: SS27  
 DEPTH: 144.5' TO 146.0'  
 SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

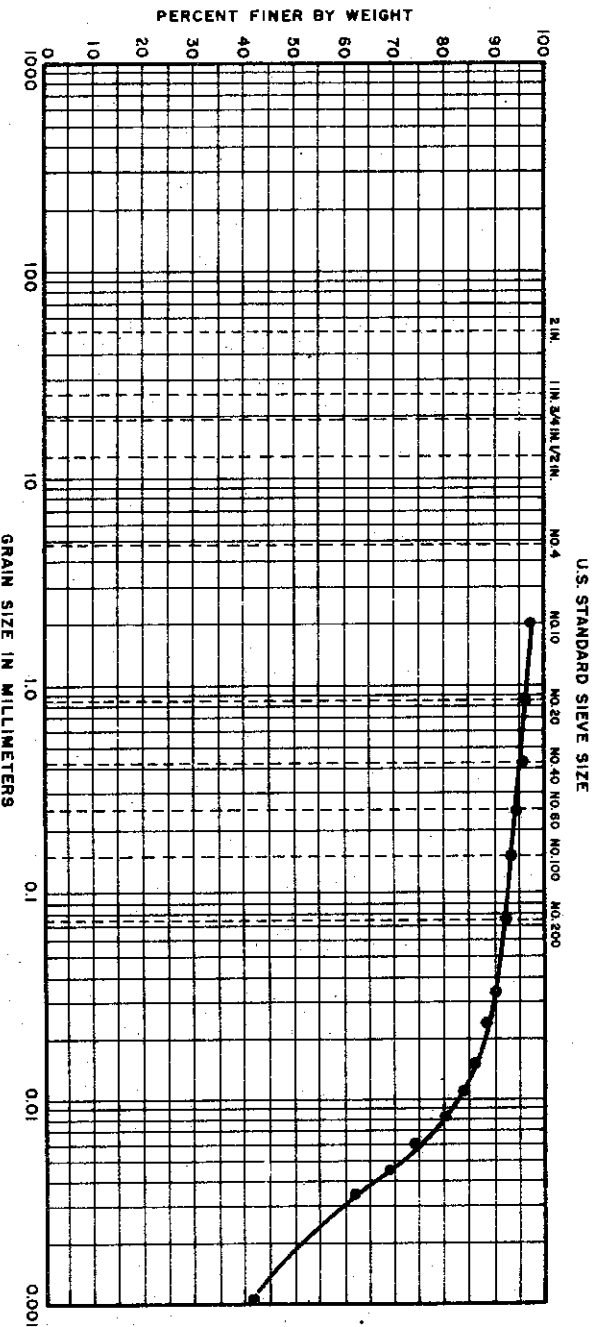
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 144  
 SAMPLE : 6  
 DEPTH : 13.8' TO 14.1'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE NOV. 1974

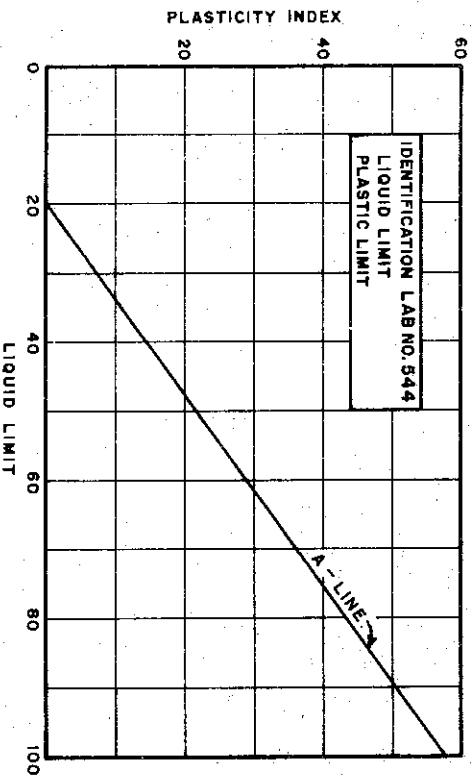
### GRAIN SIZE DISTRIBUTION



<b>COBBLES</b>	<b>GRAVEL</b>		<b>SAND</b>				<b>SILT OR CLAY</b>
	<b>COARSE</b>	<b>FINE</b>	<b>COARSE</b>	<b>MEDIUM</b>	<b>FINE</b>		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

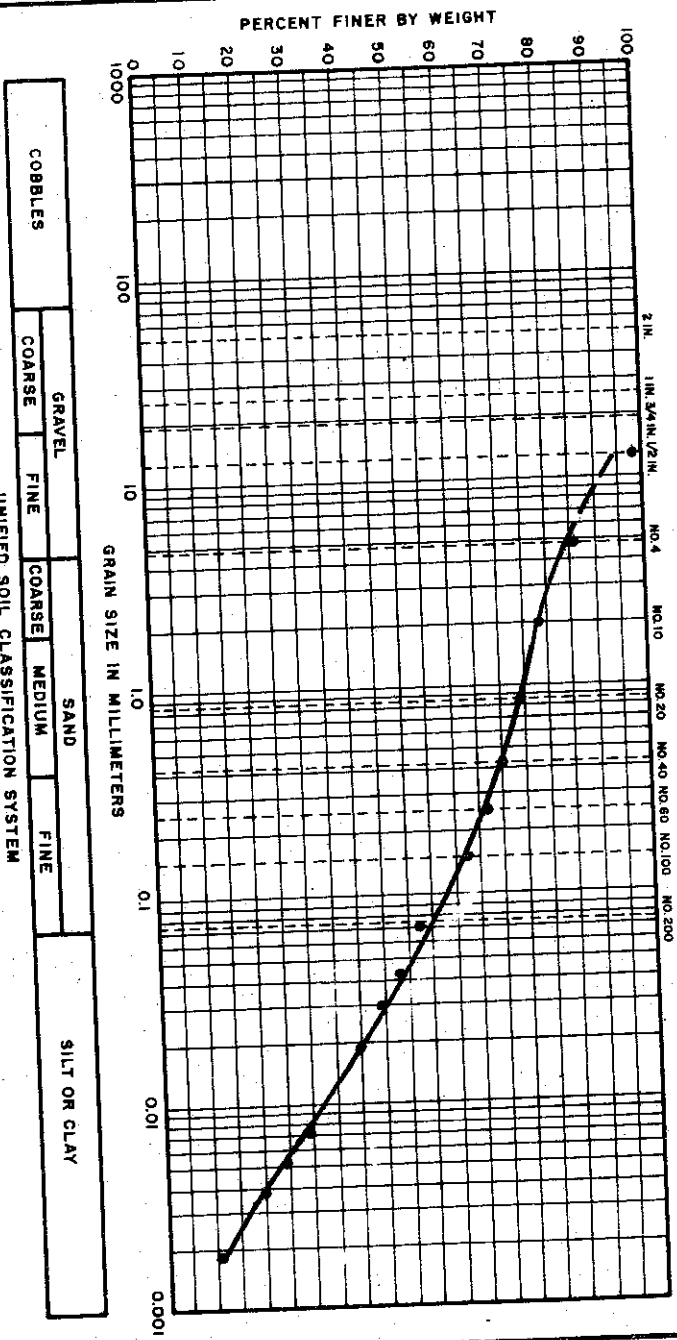
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 151A  
 SAMPLE : 2  
 DEPTH : 7.7' TO 8.0'  
 SPECIFIC GRAVITY : USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

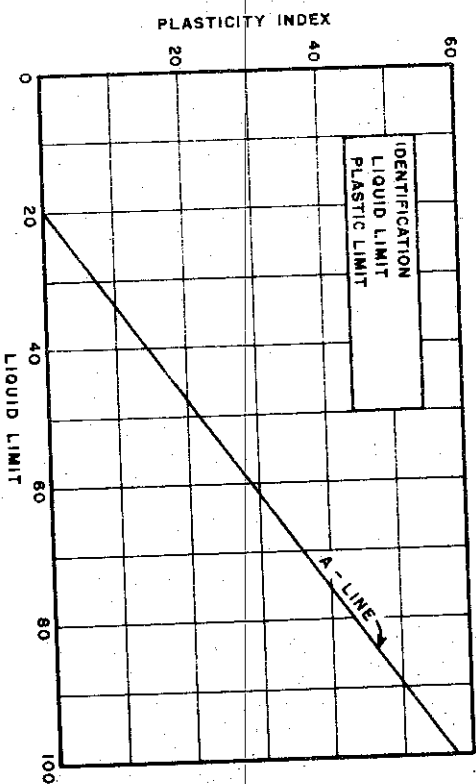
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



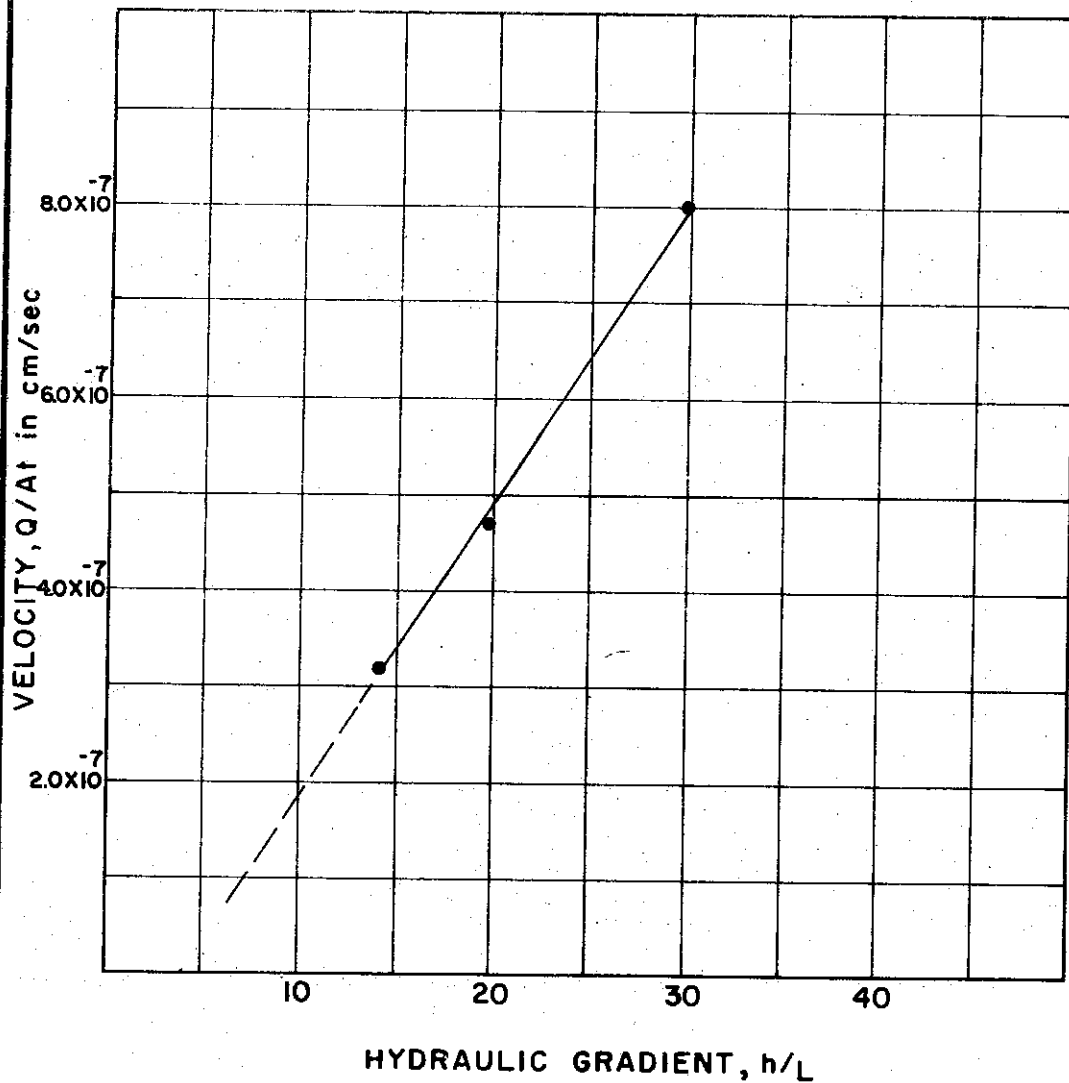
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-MI)  
 EXPLORATION: BORING 187  
 SAMPLE : SS14  
 DEPTH : 59.5' TO 60.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974





REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.875

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 84 pcf  
 INITIAL WATER CONTENT 37.2 % INITIAL VOID RATIO 1.002  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
				1.50	1.50	1.50
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		1.50	1.50	1.50	1.50
BACK PRESSURE TOP $\frac{kg}{cm^2}$	$u_{top}$			2.841	2.854	2.876
BACK PRESSURE BOTTOM $\frac{kg}{cm^2}$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.39	2.39	2.39	2.39
HYDRAULIC GRADIENT	i			14.72	20.6	29.44
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.94	4.00	6.85
TIME OF DISCHARGE sec	t			190,800	266,400	270,000
PERMEABILITY $cm/sec$	k			$2.18 \times 10^{-8}$	$2.30 \times 10^{-8}$	$2.72 \times 10^{-8}$

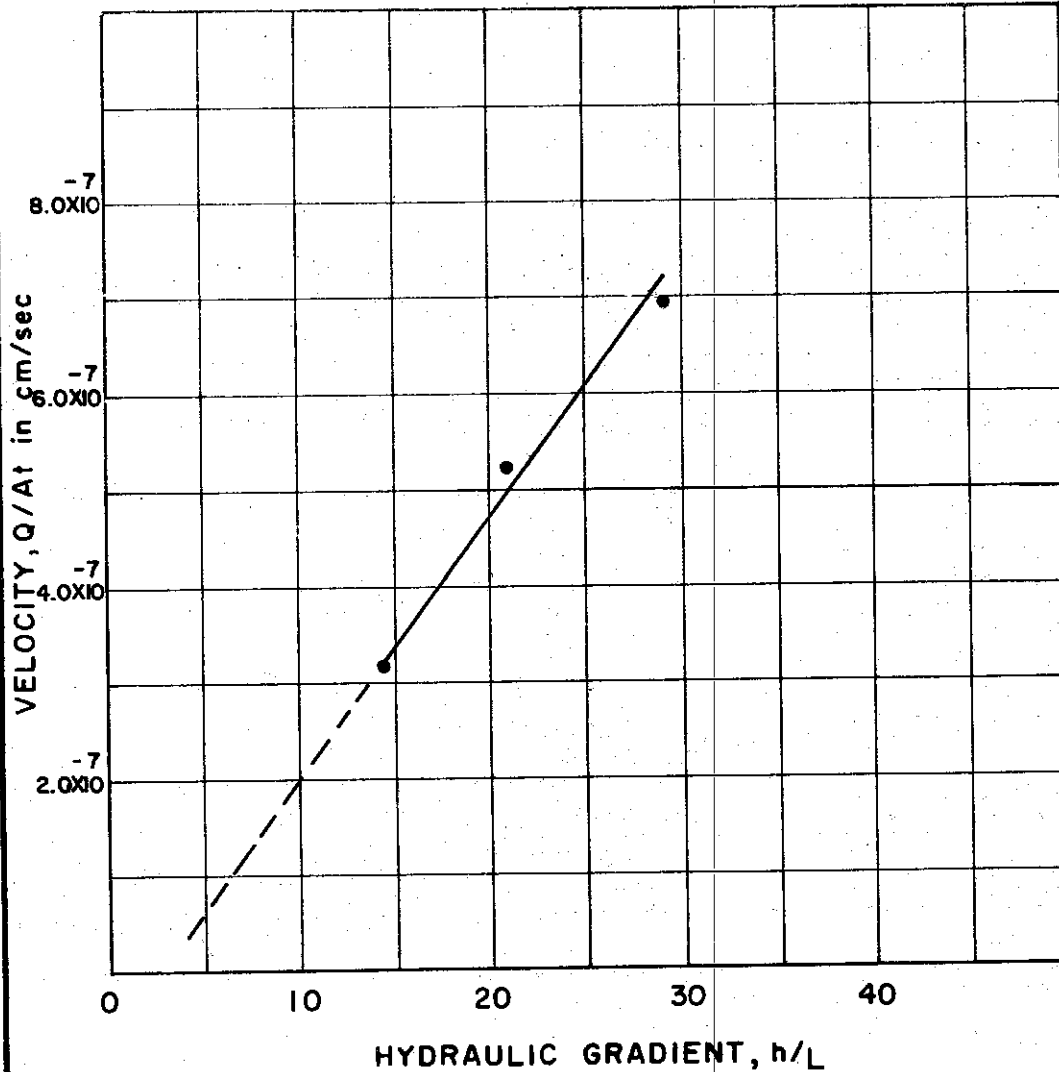
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.3' TO 28.5'

TEST NO. k 85.1  
 DATE JULY 74

FILE 1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.645

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 97 pcf  
 INITIAL WATER CONTENT 26.9 % INITIAL VOID RATIO 0.730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 16 %

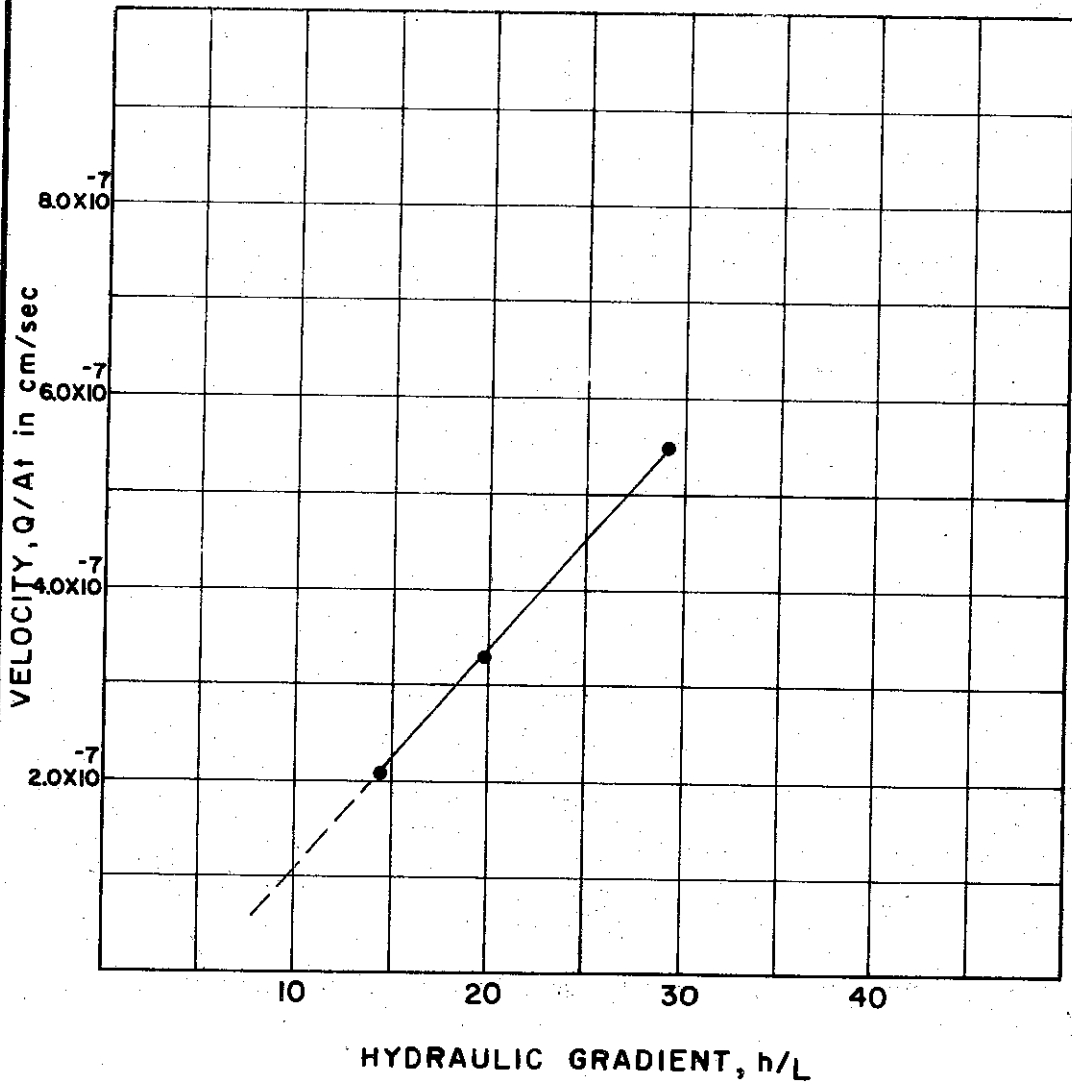
**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_1$ kg/cm <sup>2</sup>			2.00	2.00	2.00	2.00
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.31	29.00
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.94	1.38	1.66
TIME OF DISCHARGE sec. t				93,600	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.18x10	<sup>-8</sup> 2.58x10	<sup>-8</sup> 2.39x10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.6 TO 48.8'

TEST NO. K 87.1  
 DATE JULY 1974



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.374

C-647

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 119 pcf  
 INITIAL WATER CONTENT 15.1 % INITIAL VOID RATIO 0.411  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 23 % PLASTIC LIMIT 14 %

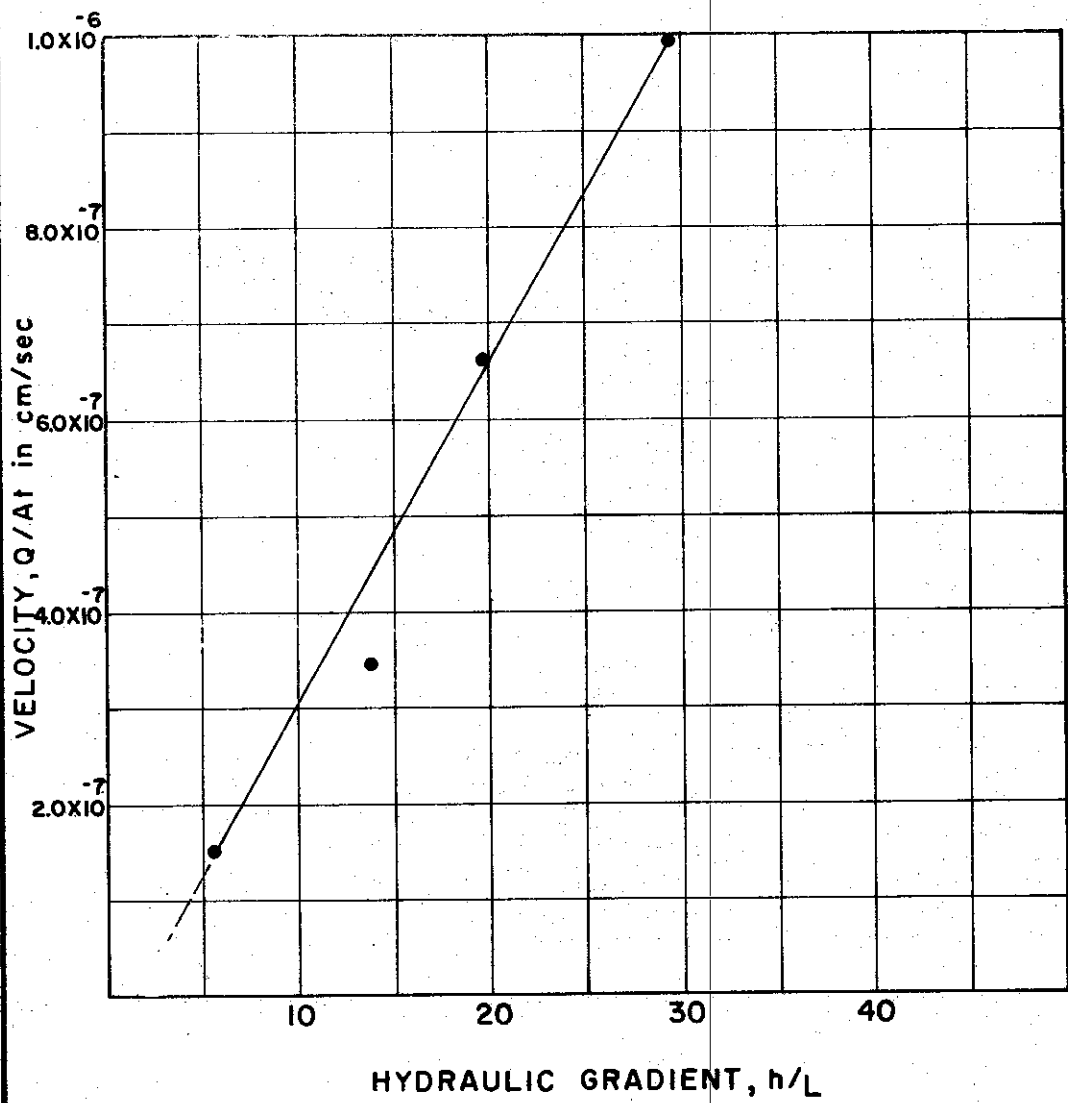
**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		2.30	2.30	2.30	2.30
BACK PRESSURE TOP $\frac{kg}{cm^2}$ $U_{top}$				2.841	2.854	2.876
BOTTOM $\frac{kg}{cm^2}$ $U_{bot}$				2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.47	2.47	2.47	2.47
HYDRAULIC GRADIENT	i			14.20	19.87	28.40
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $\frac{cm^3}{cm}$	Q			1.26	3.38	3.40
TIME OF DISCHARGE $sec$	t			190,800	320,400	198,000
PERMEABILITY $\frac{cm}{sec}$	k			$1.46 \times 10^{-8}$	$1.68 \times 10^{-8}$	$1.91 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 52  
 SAMPLE NO. 7  
 DEPTH 58.6' TO 58.9'

TEST NO. k112.1  
 DATE JULY 74



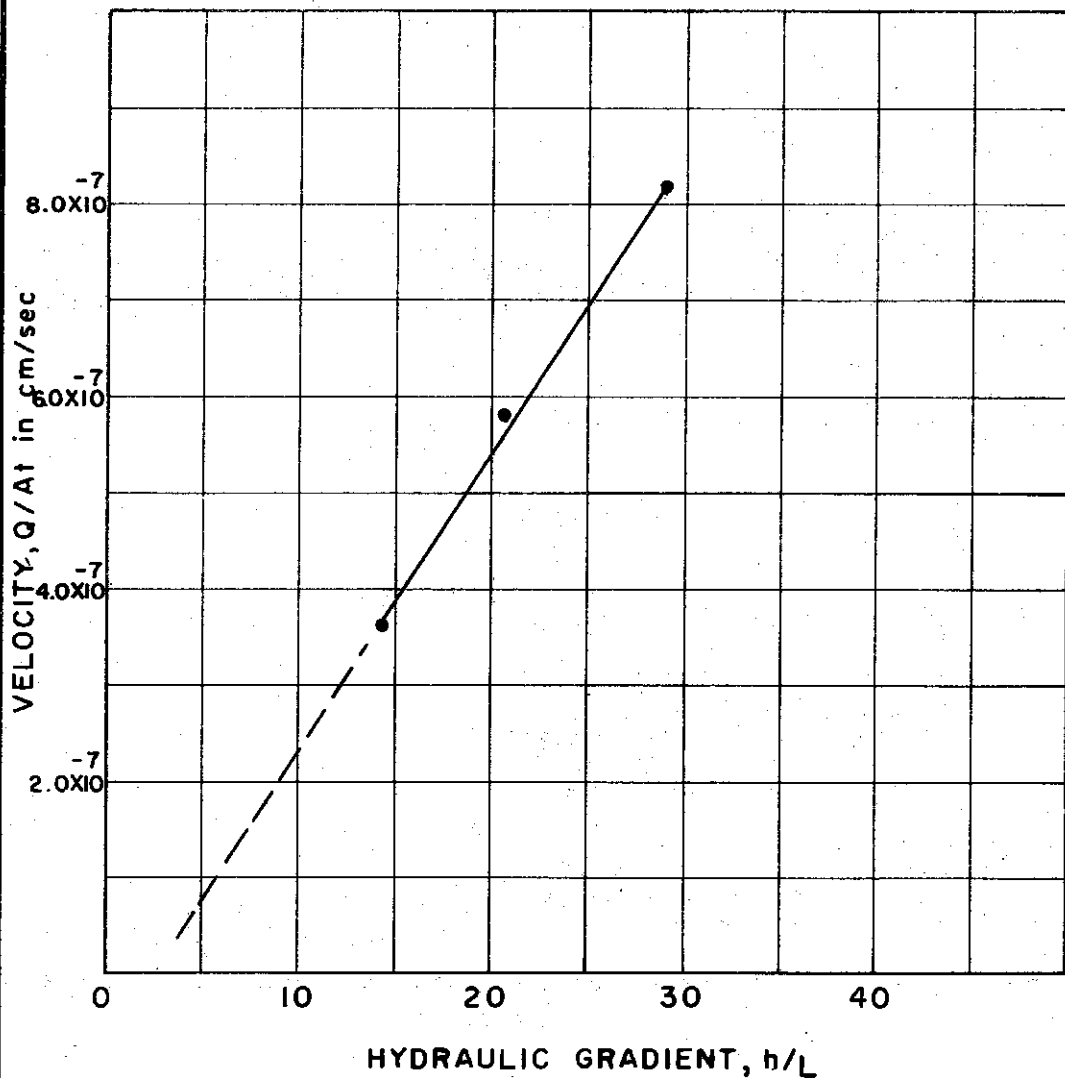
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.685

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
DRY UNIT WEIGHT	104 pcf
INITIAL WATER CONTENT	30.2 %
INITIAL VOID RATIO	0.732
ATTERBERG LIMITS:	
LIQUID LIMIT	39 %
PLASTIC LIMIT	20 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma$	kg/cm <sup>2</sup>		1.74	1.74	1.74	1.74	1.74
BACK PRESSURE TOP	kg/cm <sup>2</sup> <sup>u</sup> <sub>top</sub>			2.810	2.841	2.854	2.876
BOTTOM	kg/cm <sup>2</sup> <sup>u</sup> <sub>bot</sub>			2.806	2.806	2.806	2.806
DIFFERENTIAL HEAD	cm. h			14.06	35.16	49.21	70.31
SAMPLE LENGTH	cm. L	2.54	2.49	2.49	2.49	2.49	2.49
HYDRAULIC GRADIENT	i			5.64	14.11	19.75	28.22
SAMPLE AREA	cm <sup>2</sup> A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED	cm <sup>3</sup> Q			1.22	2.30	5.89	8.50
TIME OF DISCHARGE	sec t			248,400	212,400	277,200	270,000
PERMEABILITY	cm/sec k			2.75 × 10 <sup>-8</sup>	2.42 × 10 <sup>-8</sup>	3.40 × 10 <sup>-8</sup>	3.52 × 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 53 TEST NO. k 98.1  
 SAMPLE NO. 5 DATE JULY 74  
 DEPTH 39.5' TO 39.8'



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE=0.641

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2 % INITIAL VOID RATIO 0.724  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
				2.40	2.40	2.40
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.40	2.40	2.40	2.40
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BACK PRESSURE BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.33	29.0
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				1.08	1.52	1.76
TIME OF DISCHARGE sec t				93,800	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.52X10	<sup>-8</sup> 2.85X10	<sup>-8</sup> 2.53X10

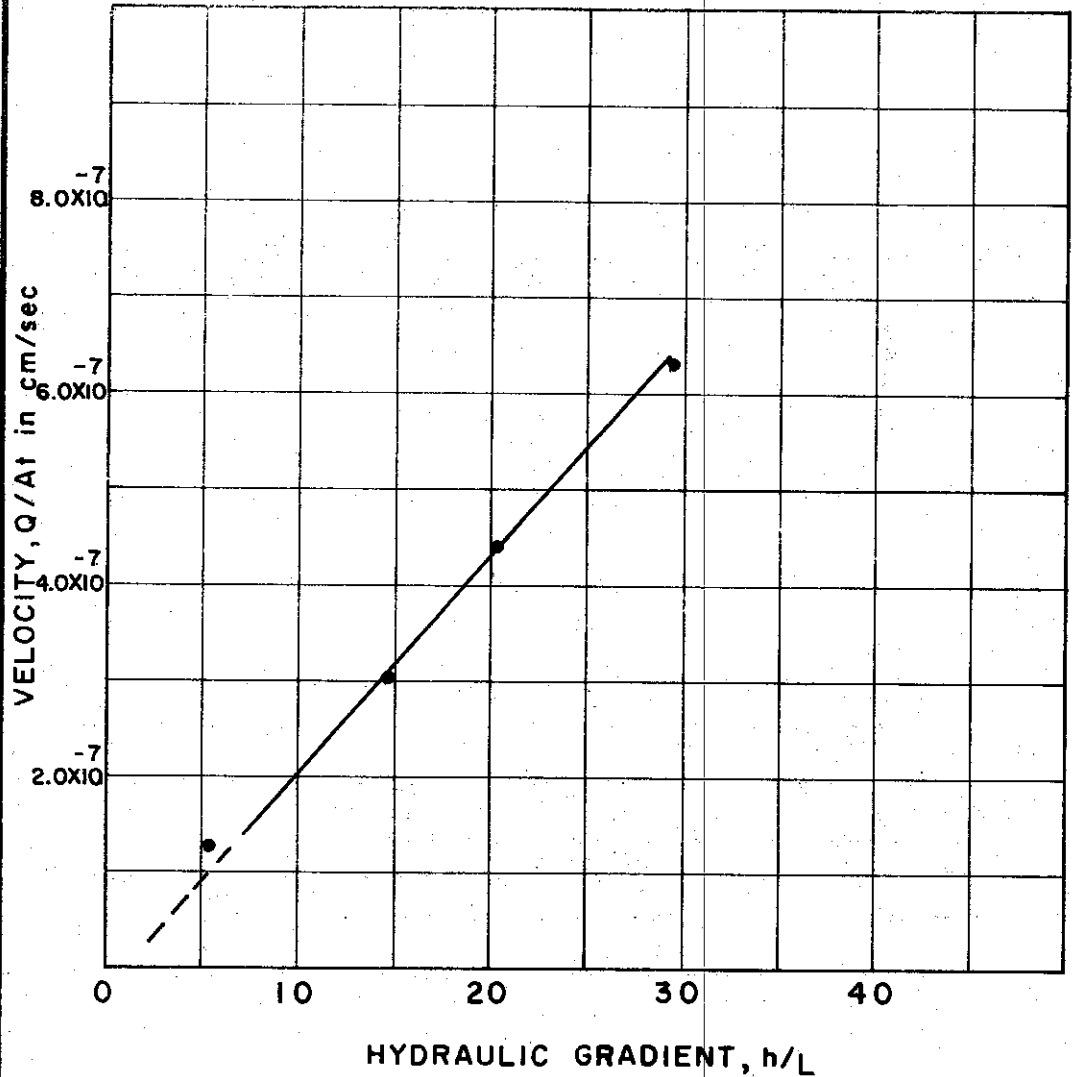
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5' TO 63.8'

TEST NO. K 399.1  
 DATE JULY 1974

C-650



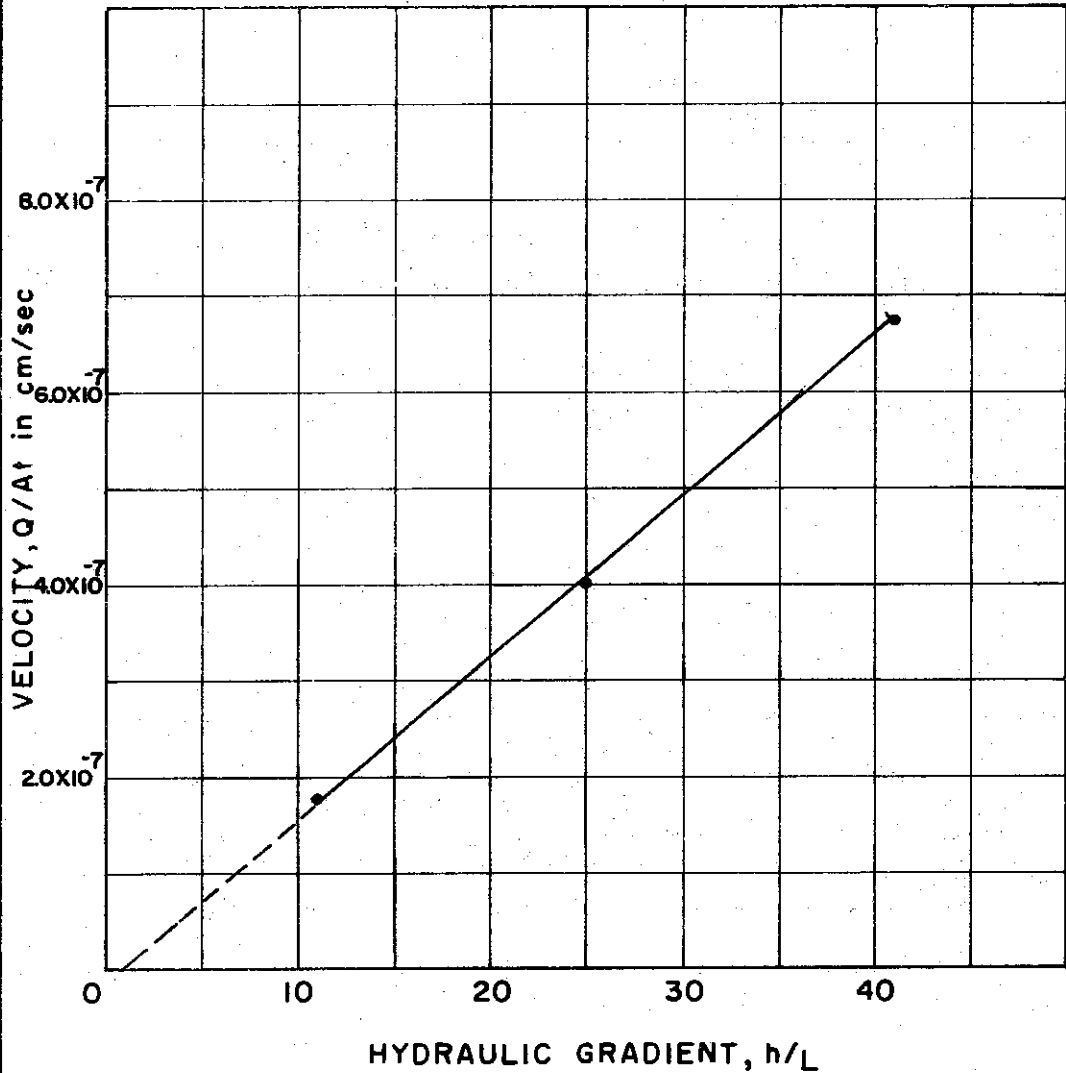
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.72

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
DRY UNIT WEIGHT	90 pcf
INITIAL WATER CONTENT	31.6 %
INITIAL VOID RATIO	0.851
ATTERBERG LIMITS:	
LIQUID LIMIT	45 %
PLASTIC LIMIT	21 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_c$			2.71	2.71	2.71	2.71	2.71
BACK PRESSURE				2826	2847	2862	2883
TOP $kg/cm^2$	$h_{top}$			2.812	2.812	2.812	2.812
BOTTOM $kg/cm^2$	$h_{bot}$						
DIFFERENTIAL HEAD cm.	h			14.06	35.15	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.376	2.376	2.376	2.376	2.376
HYDRAULIC GRADIENT	i			5.92	14.80	20.71	29.50
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			0.48	0.88	1.10	1.39
TIME OF DISCHARGE $sec$	t			108,000	90,000	79,200	75,600
PERMEABILITY $cm/sec$	k			$2.37 \times 10^{-8}$	$2.09 \times 10^{-8}$	$2.18 \times 10^{-8}$	$2.00 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 54 TEST NO. K 401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7 TO 74.0'



REMARKS:

C-651

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 103 pcf  
 INITIAL WATER CONTENT 26.1 % INITIAL VOID RATIO 0.707  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

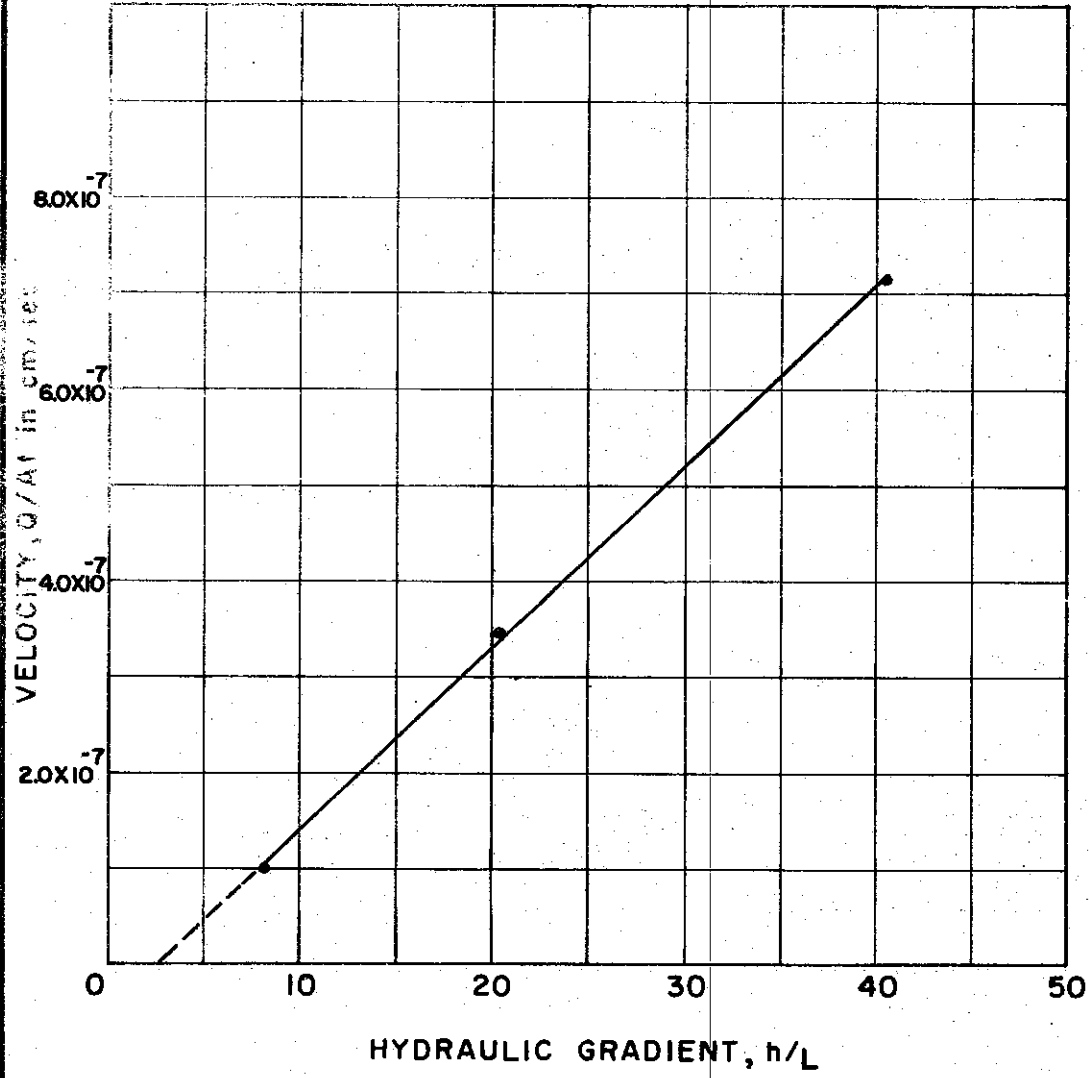
**TEST DATA**

	S Y M	INITIAL	CONSOL. STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			1.05	1.05	1.05	1.05
BACK PRESSURE TOP $u_{top}$ kg/cm <sup>2</sup>				2.488	2.521	2.565
BACK PRESSURE BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.460	2.460	2.460
DIFFERENTIAL HEAD cm. h				27.7	63.0	103.8
SAMPLE LENGTH cm. L		6.48	6.40	6.40	6.40	6.40
HYDRAULIC GRADIENT i				11.0	25.0	41.2
SAMPLE AREA cm <sup>2</sup> A		11.37	11.37	11.37	11.37	11.37
WATER DISCHARGED cm <sup>3</sup> Q				.13	.29	.58
TIME OF DISCHARGE sec t				72,000	72,000	86,000
PERMEABILITY cm/sec k				1.60 x 10 <sup>-8</sup>	1.61 x 10 <sup>-8</sup>	1.63 x 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 60 TEST NO. k43.1  
 SAMPLE NO. 3 DATE MARCH 74  
 DEPTH 18.1' TO 18.3'

C-652



REMARKS:

**SOIL PROPERTIES**

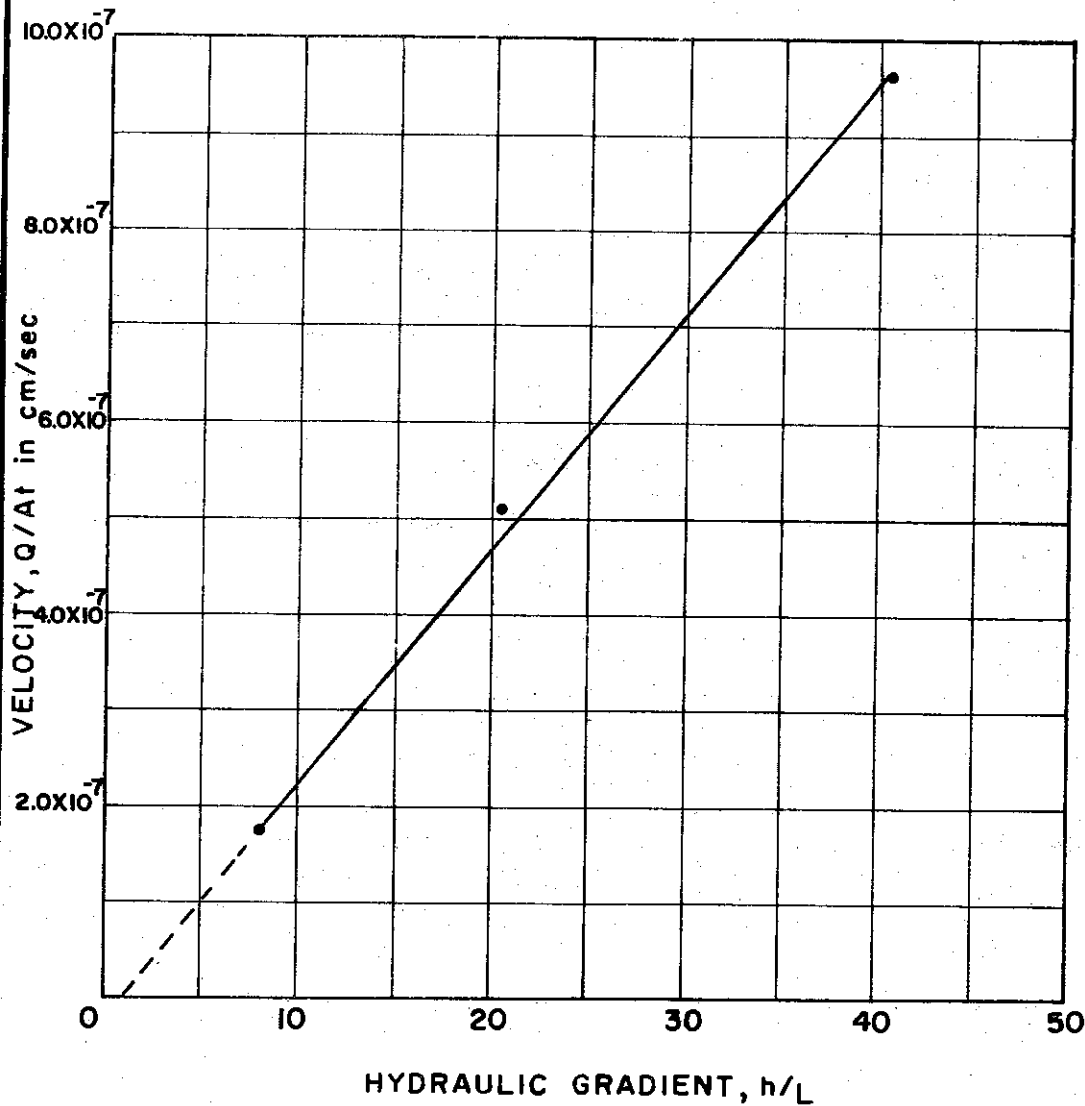
SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY ≈ 2.70 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2% INITIAL VOID RATIO .730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 33 % PLASTIC LIMIT 18 %

**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\text{kg/cm}^2$	$\sigma$		2.20	2.20	2.20	2.20
BACK PRESSURE TOP $\text{kg/cm}^2$	$u_{top}$			2.826	2.847	2.882
BOTTOM $\text{kg/cm}^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	h			14.06	35.16	70.30
SAMPLE LENGTH cm.	L	1.90	1.73	1.73	1.73	1.73
HYDRAULIC GRADIENT	i			8.13	20.32	40.63
SAMPLE AREA $\text{cm}^2$	A	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $\text{cm}^3$	Q			.21	.66	.23
TIME OF DISCHARGE sec	t			66,600	59,400	10,200
PERMEABILITY $\text{cm/sec}$	k			$1.25 \times 10^{-8}$	$1.75 \times 10^{-8}$	$1.76 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**  
 BORING NO. 60 TEST NO. k51.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 56.1' TO 56.4'





REMARKS:

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 96 pcf  
 INITIAL WATER CONTENT 29.1 % INITIAL VOID RATIO .753  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $kg/cm^2$	$\sigma$		3.00	3.00	3.00	3.00
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.836	2.847	2.882
BOTTOM $kg/cm^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	$h$			14.06	35.16	70.30
SAMPLE LENGTH cm.	$L$	1.90	1.74	1.74	1.74	1.74
HYDRAULIC GRADIENT	$i$			8.08	20.20	40.40
SAMPLE AREA $cm^2$	$A$	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $cm^3$	$Q$			.34	.97	.31
TIME OF DISCHARGE $sec$	$t$			63,000	59,400	10,200
PERMEABILITY $cm/sec$	$k$			$2.10 \times 10^{-8}$	$2.55 \times 10^{-8}$	$2.37 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

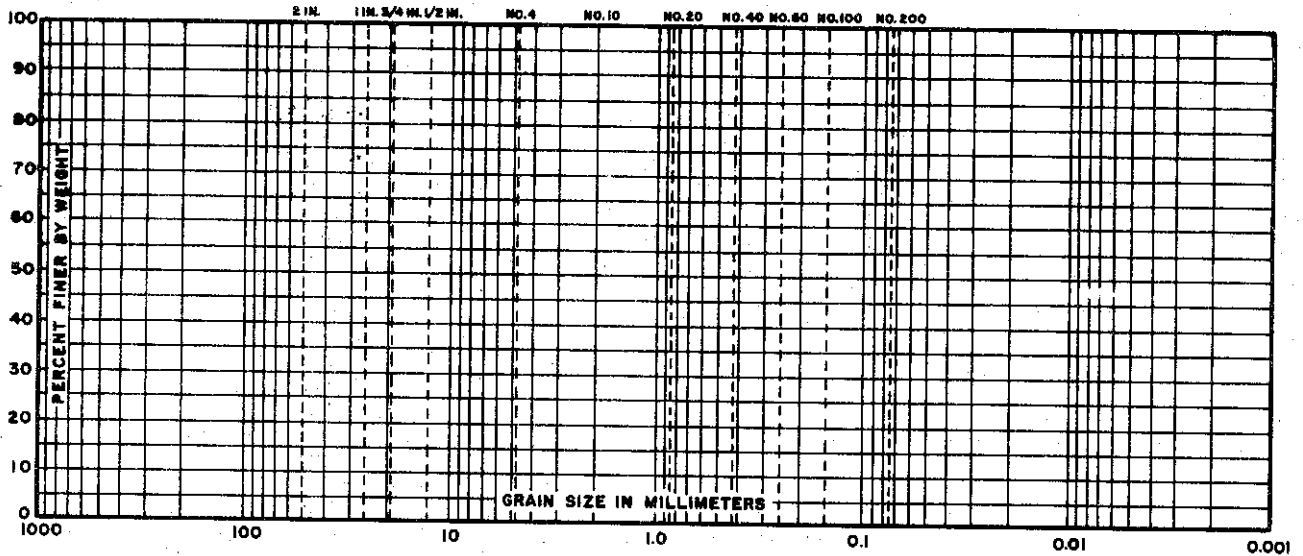
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.6' TO 86.1'

TEST NO. k 56.1  
 DATE MARCH 74

FILE 1255

# GRAIN SIZE DISTRIBUTION

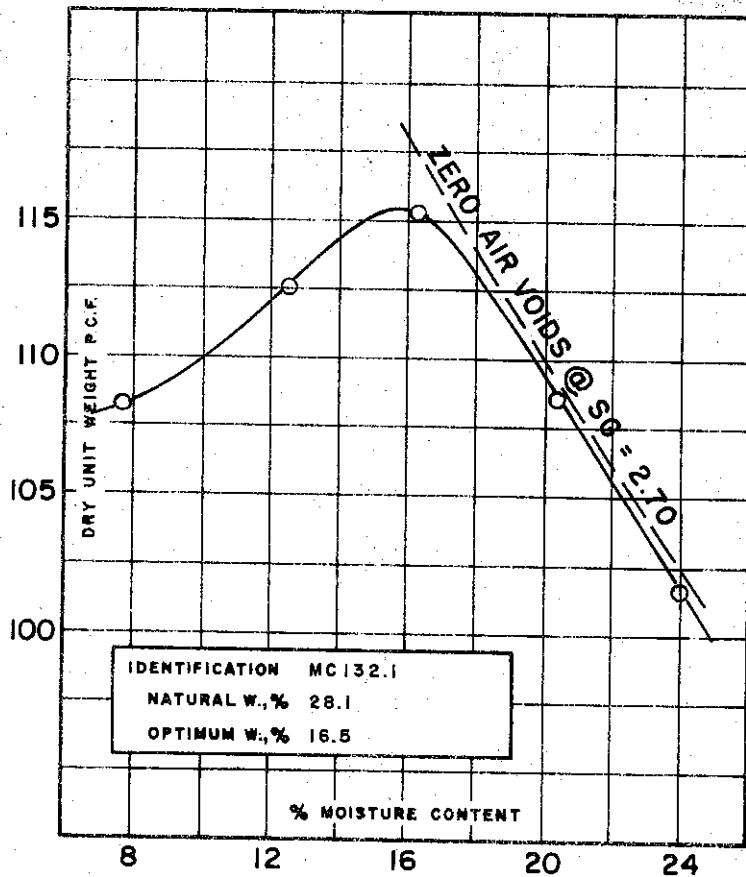
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 50  
 PLASTIC LIMIT 17

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 49  
 SAMPLE 2  
 DEPTH 6.0' TO 8.1'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

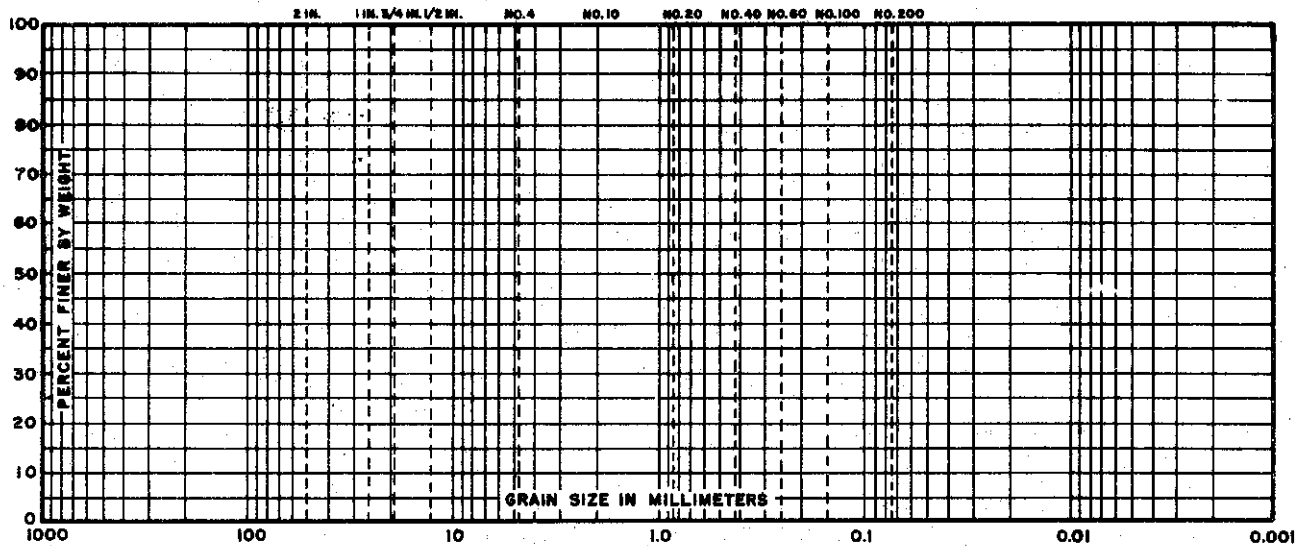
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE MARCH 74

# GRAIN SIZE DISTRIBUTION

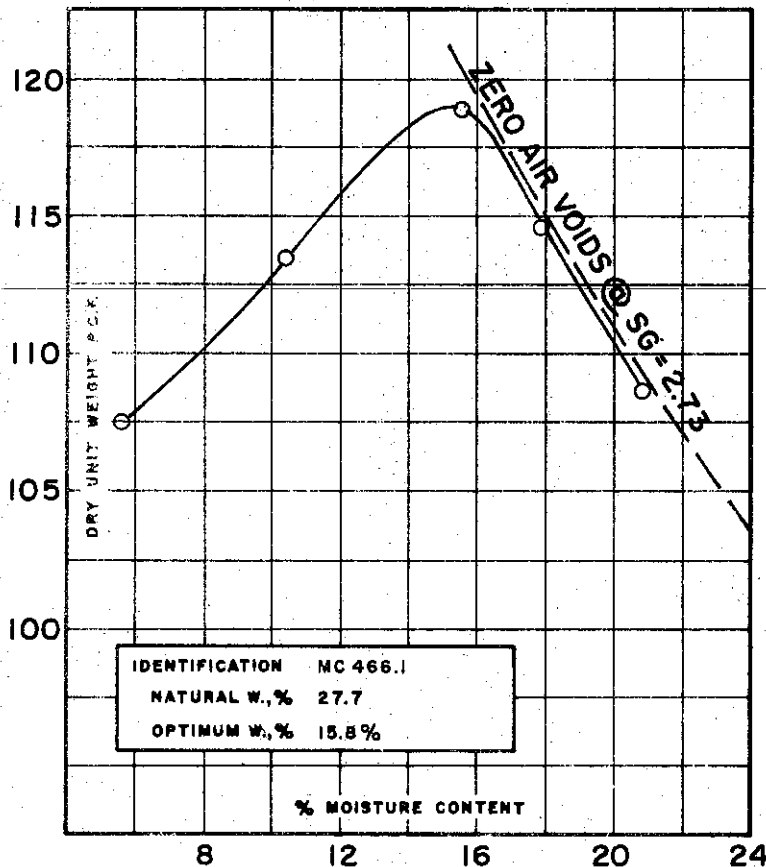
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SEE DATA FOR  
LIQUID LIMIT INDIVIDUAL  
PLASTIC LIMIT SAMPLES

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
EXPLORATION BORING 101, 105, 127, 128, 180 & 183  
SAMPLE COMBINED SAMPLES  
DEPTH 2.0' TO 10.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
AASHTO TEST  
MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
NO. LAYERS 5, BLOWS/LAYER 25,  
HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

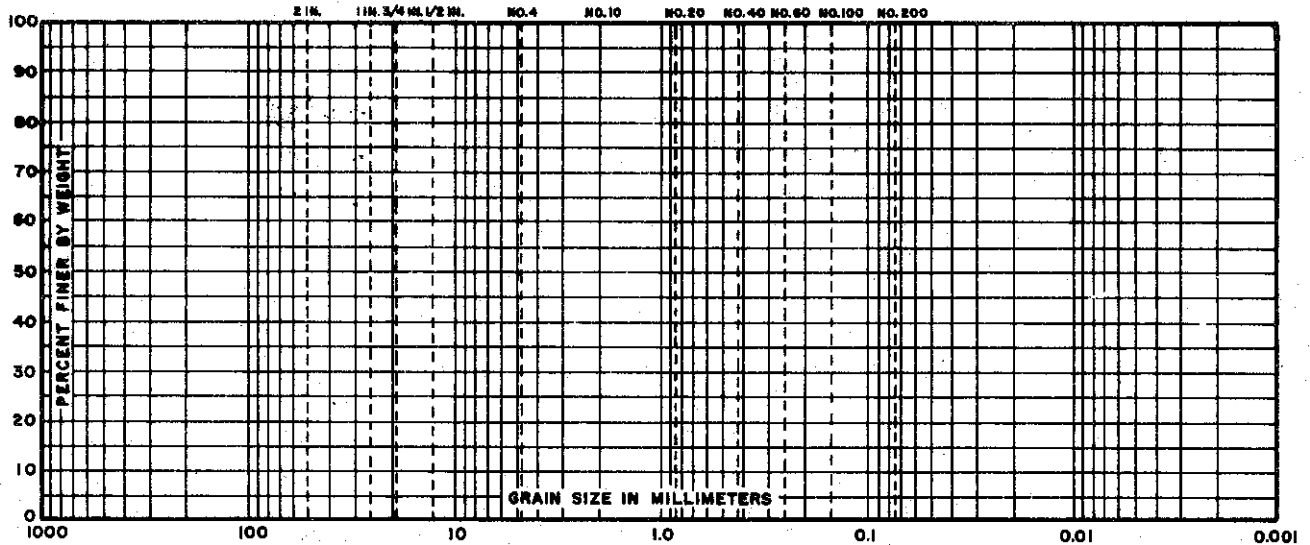
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
COMPACTION - GRADATION  
TESTS

C-656

FILE NO. 1255 DATE APRIL 74

# GRAIN SIZE DISTRIBUTION

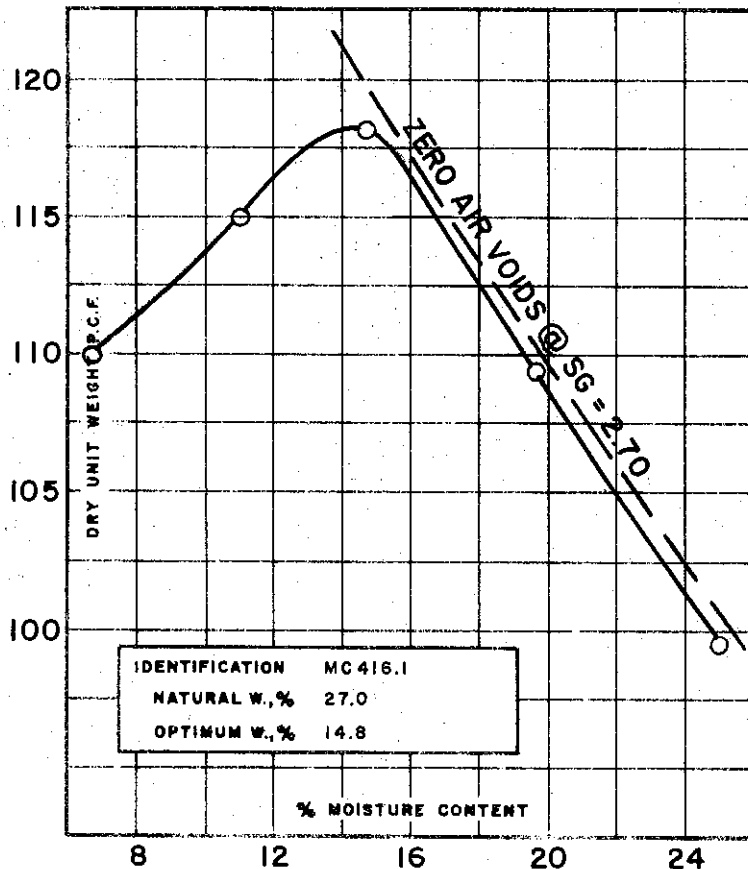
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49  
 PLASTIC LIMIT 22

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 127  
 SAMPLE 3  
 DEPTH 5.6' TO 7.0'

## COMPACTION METHOD

ASTM TEST 01557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.56", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

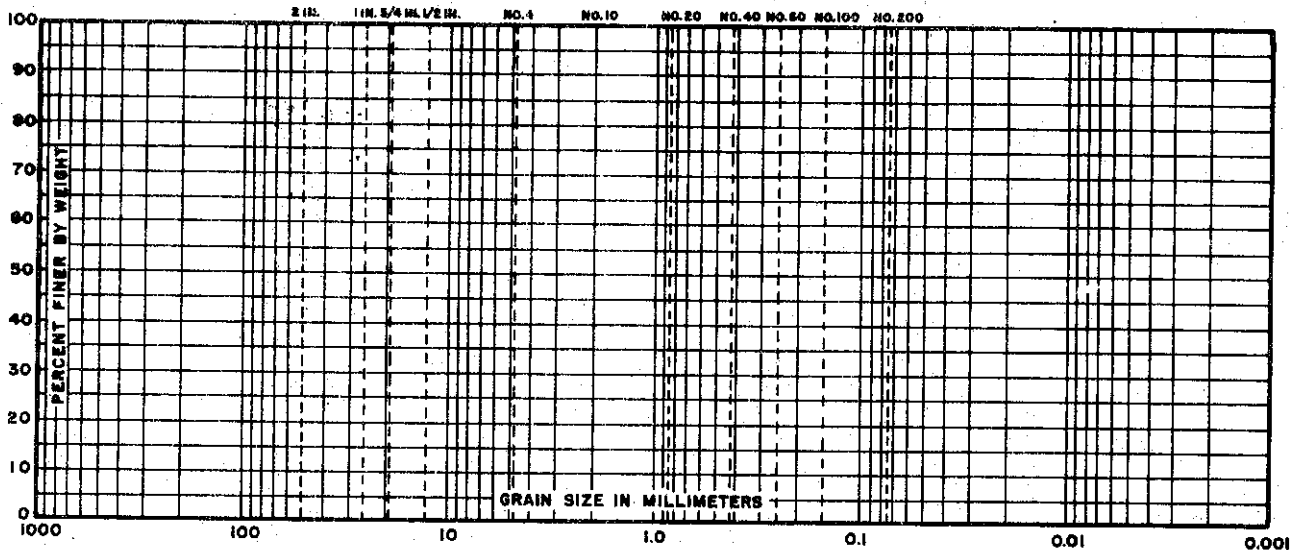
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE JULY 74

# GRAIN SIZE DISTRIBUTION

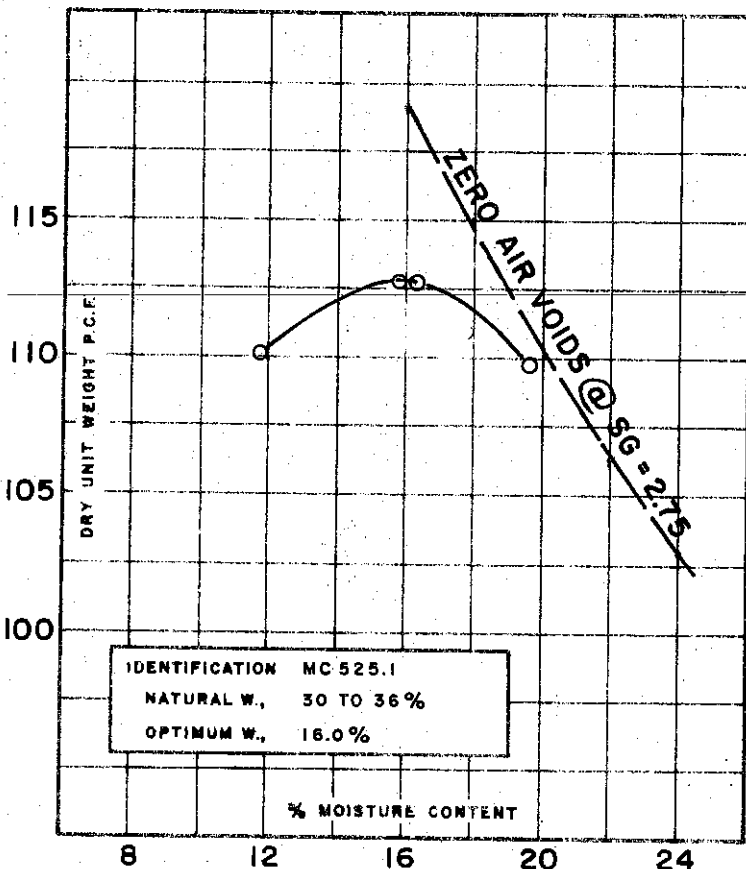
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION  
LIQUID LIMIT  
PLASTIC LIMIT

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
EXPLORATION BORING 136  
SAMPLE 2  
DEPTH 3:0' TO 5:0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
AASHTO TEST  
MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
NO. LAYERS 5, BLOWS/LAYER 25,  
HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

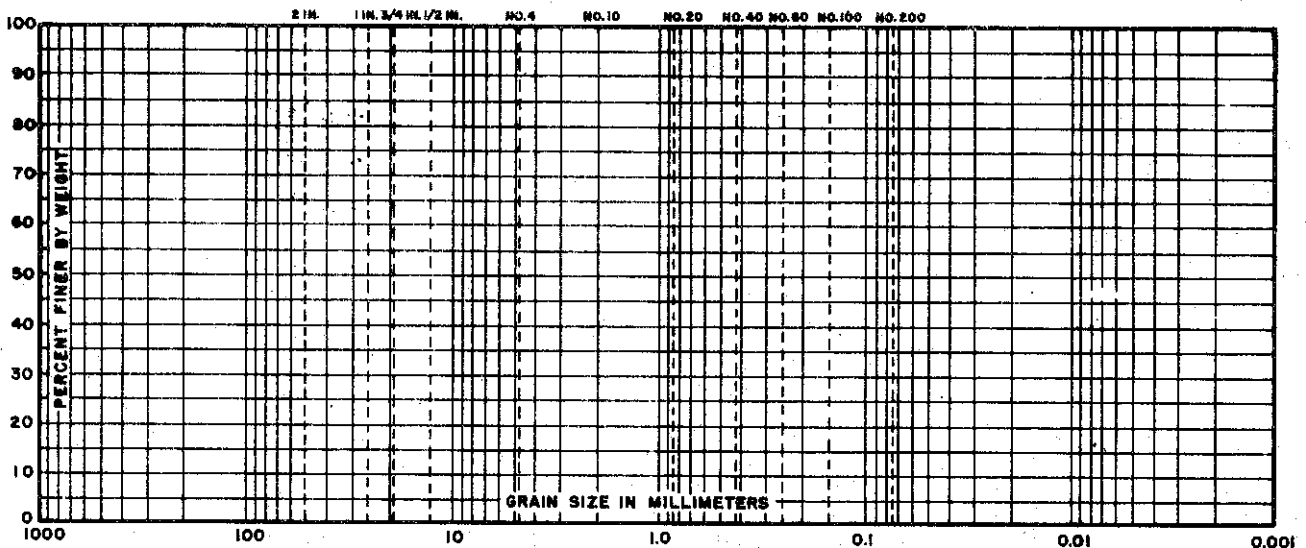
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
COMPACTION - GRADATION  
TESTS

C-658

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

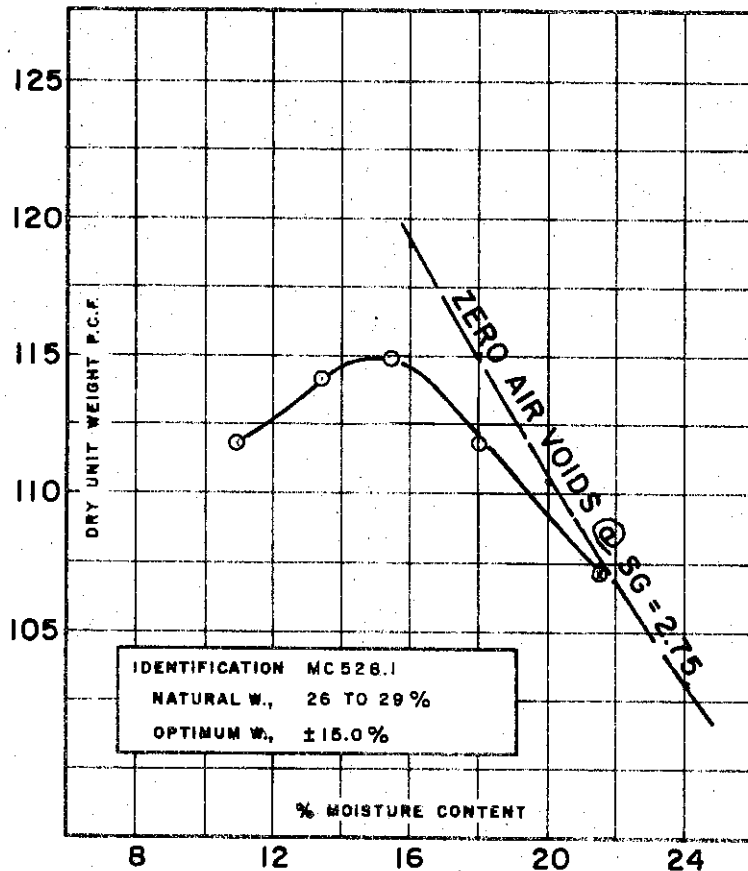
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 528.1  
 LIQUID LIMIT 56  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 141  
 SAMPLE 1  
 DEPTH 3.0' TO 5.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C.  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

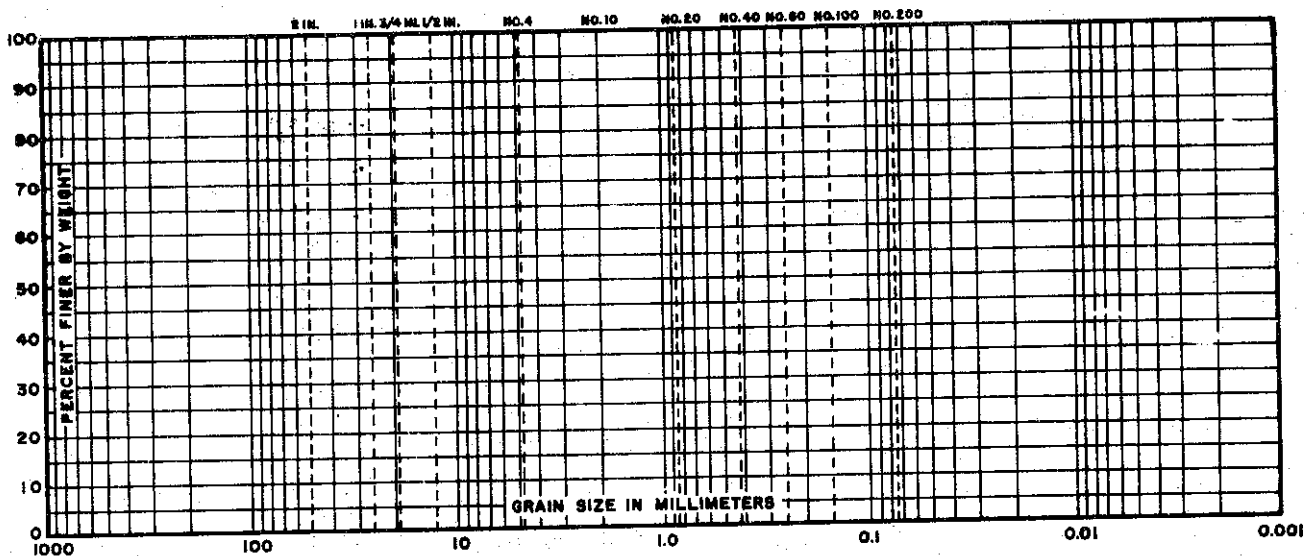
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

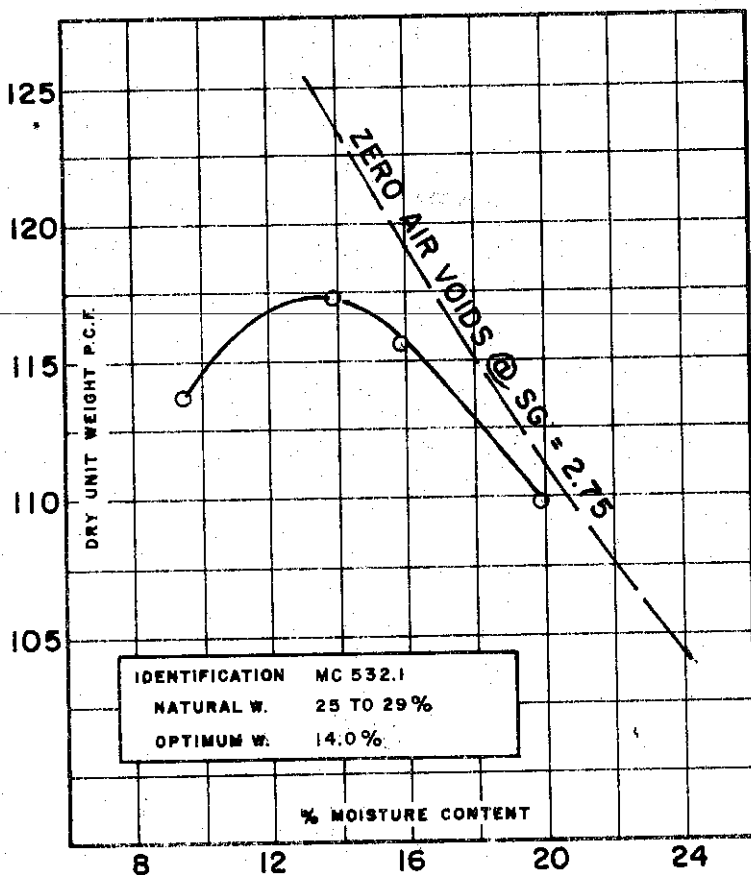
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 532.1  
 LIQUID LIMIT 54  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 142  
 SAMPLE 1  
 DEPTH 3.0' TO 5.5'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

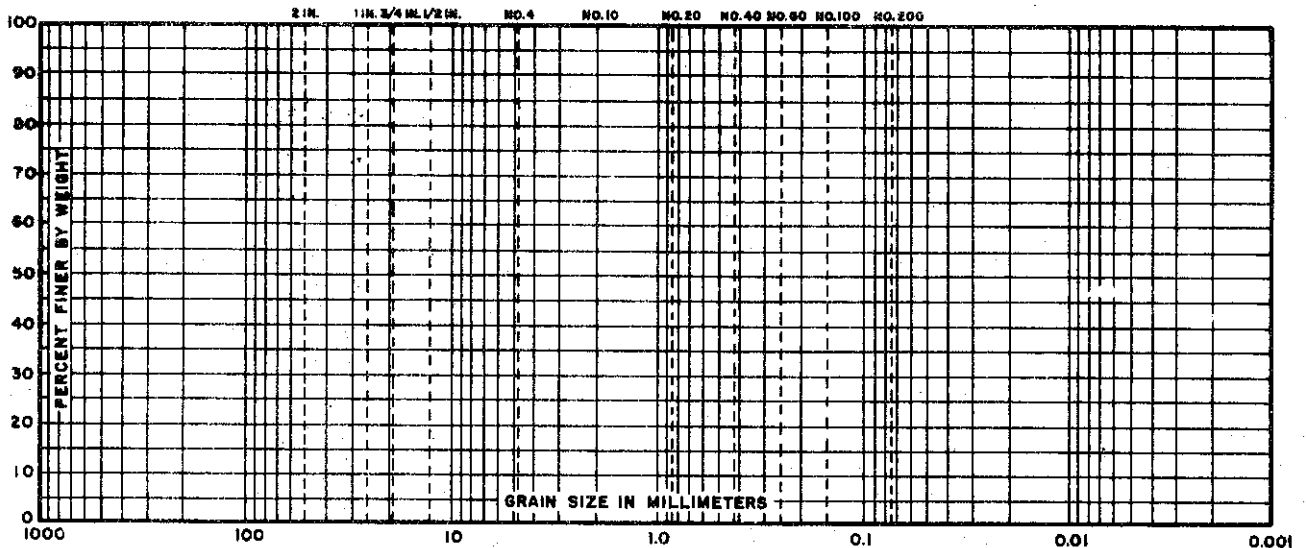
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

C-660

# GRAIN SIZE DISTRIBUTION

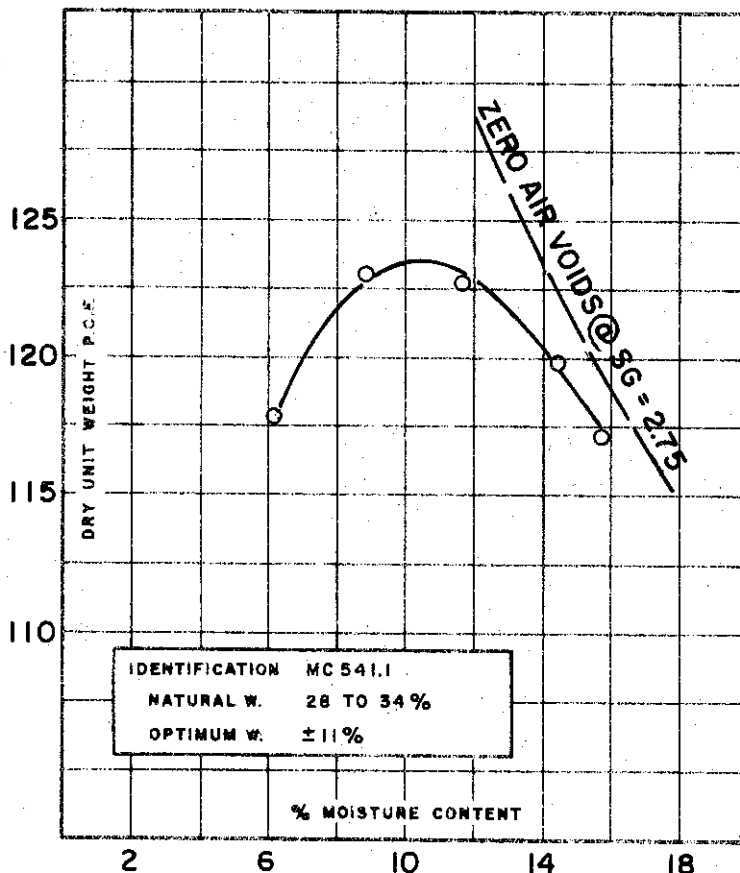
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 541.1  
 LIQUID LIMIT 38  
 PLASTIC LIMIT 19

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING 146  
 SAMPLE 5  
 DEPTH 10.0' TO 12.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

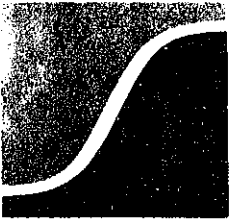
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE APRIL 74



## Appendix D



U.W. STOLL AND ASSOCIATES soil mechanics and foundation consultants  
111 WEST KINGSLEY STREET ANN ARBOR, MICHIGAN 48103 (313) 994-5055

ULRICH W. STOLL  
GARRETT EVANS  
IN-KUIN KIM

September 8, 1975

Mr. Sherif Afifi  
Bechtel Power Corporation  
P. O. Box 1000  
777 East Eisenhower Parkway  
Ann Arbor, Michigan 48106

SUBJECT: Soil Testing  
Hopper Investigation  
Belle River Coal Handling  
Detroit Edison Company  
Technical Specification, 10539-3-C-13  
REFERENCE: Purchase Order No. AA2184

Dear Sir:

Enclosed herewith is the summary of laboratory testing conducted on soil samples received from the subject site, as authorized by the referenced purchase order. The laboratory testing was performed in accordance with your technical specification 10539-3-C-13 and included the following tests:

	<u>Pages</u>
30 Visual Classification and In-Situ Moistures	B-1, B-2, B-9
10 Atterberg Limits	B-3, B-4, B-5
30 Unconfined Compression	B-6 through B-28
2 In-Situ Moisture and Density	B-6, B-8
5 Mechanical Analysis	B-29, B-30

We appreciate the opportunity of serving you and trust that this work has been performed to your satisfaction.

Very truly yours,

U. W. STOLL AND ASSOCIATES

In-Kuin Kim, P.E.

IKK/jb

Enclosures

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-1	23.2	GRAY-BROWN MOTTLED CLAY
	S-2	25.6	BROWN LAYERED CLAY
	S-3	38.6	GRAY CLAY WITH DRILL WASH
	S-4	35.9	GRAY CLAY WITH DRILL WASH
	S-5	39.6	GRAY CLAY WITH DRILL WASH
	S-6	43.1	GRAY CLAY WITH DRILL WASH
	S-7	39.4	GRAY CLAY
	S-8	32.5	GRAY CLAY
	S-9	34.6	GRAY CLAY
	S-10	37.1	GRAY CLAY
	S-11	33.4	GRAY CLAY
	S-12	30.7	GRAY CLAY WITH DRILL WASH
	S-13	28.7	GRAY CLAY WITH TRACE OF DRILL WASH
	S-14	27.2	GRAY CLAY WITH TRACE OF DRILL WASH
	S-15	27.1	GRAY CLAY
	S-16	24.2	GRAY CLAY
	S-17	24.0	GRAY CLAY
	S-18	24.8	GRAY CLAY
	S-19	26.8	GRAY CLAY WITH TRACE OF DRILL WASH
	S-20	25.4	GRAY CLAY
	S-21	25.9	GRAY CLAY
	S-22	27.8	GRAY CLAY
	S-23	26.7	GRAY CLAY
	S-24	25.9	GRAY CLAY
	S-25	32.2	GRAY CLAY

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BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-26	40.6	GRAY CLAY
	S-27	25.7	WET CLAYEY SILT
	S-28	12.6	SANDY SILT
	S-29	10.2	DECOMPOSED SHALE



**U. W. STOLL and ASSOCIATES**  
 SOIL MECHANICS AND FOUNDATION CONSULTANTS

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 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: LABORATORY TEST DATA SUMMARY

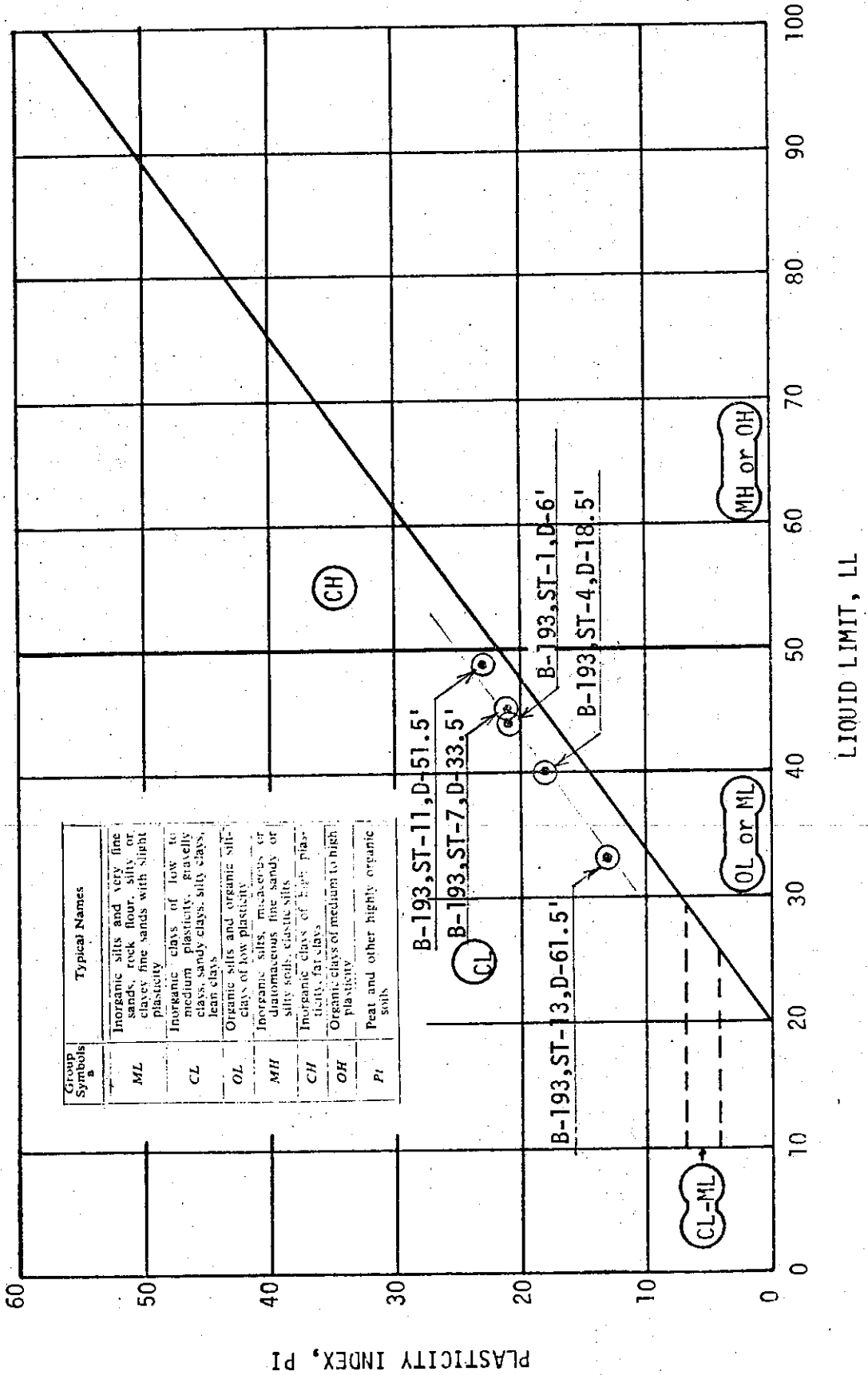
BORING NO.	SAMPLE NO.	DEPTH OF SAMPLE (FT.)	MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION (% OF TEST SAMPLE)							ATTERBERG LIMITS			STRENGTH TESTS			
			NATURAL MOISTURE (% OF DRY WTS.)	NATURAL DRY DENSITY (LBS/CU.FT.)	COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	TYPE OF TEST	MAX. PRINCIPAL STRESS (KG/SQ.CM.)	MIN. PRINCIPAL STRESS (KG/SQ.CM.)	AXIAL STRAIN AT FAILURE (%)
B-193	ST-1	6	13.4	103.6										UNCONF.			5%	4200
	ST-4	18.5	36.3	85.5										UNCONF.			3%	870
	ST-7	33.5	42.6	80.5										UNCONF.			3%	690
	ST-11	51.5	27.5	95.5										UNCONF.			6%	680
	ST-13	61.5	25.7	99.3										UNCONF.			16%	1190
	ST-15	72.5	22.2	103.6										UNCONF.			14%	1690
	ST-16	77.0	26.9	95.5										UNCONF.			5%	500
	ST-16	78.0	26.3	96.1										UNCONF.			4%	1560
	ST-19	98.0	23.6	99.3										UNCONF.				590
B-192	ST-1	20.0	31.9	88.7										UNCONF.			8%	460
	ST-4	35.0	33.1	88.0										UNCONF.			2%	710
	ST-6	45.0	39.2	78.7										UNCONF.			1%	630
	ST-7	52.0	34.5	87.4										UNCONF.			4%	660



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 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: PLASTICITY CHART



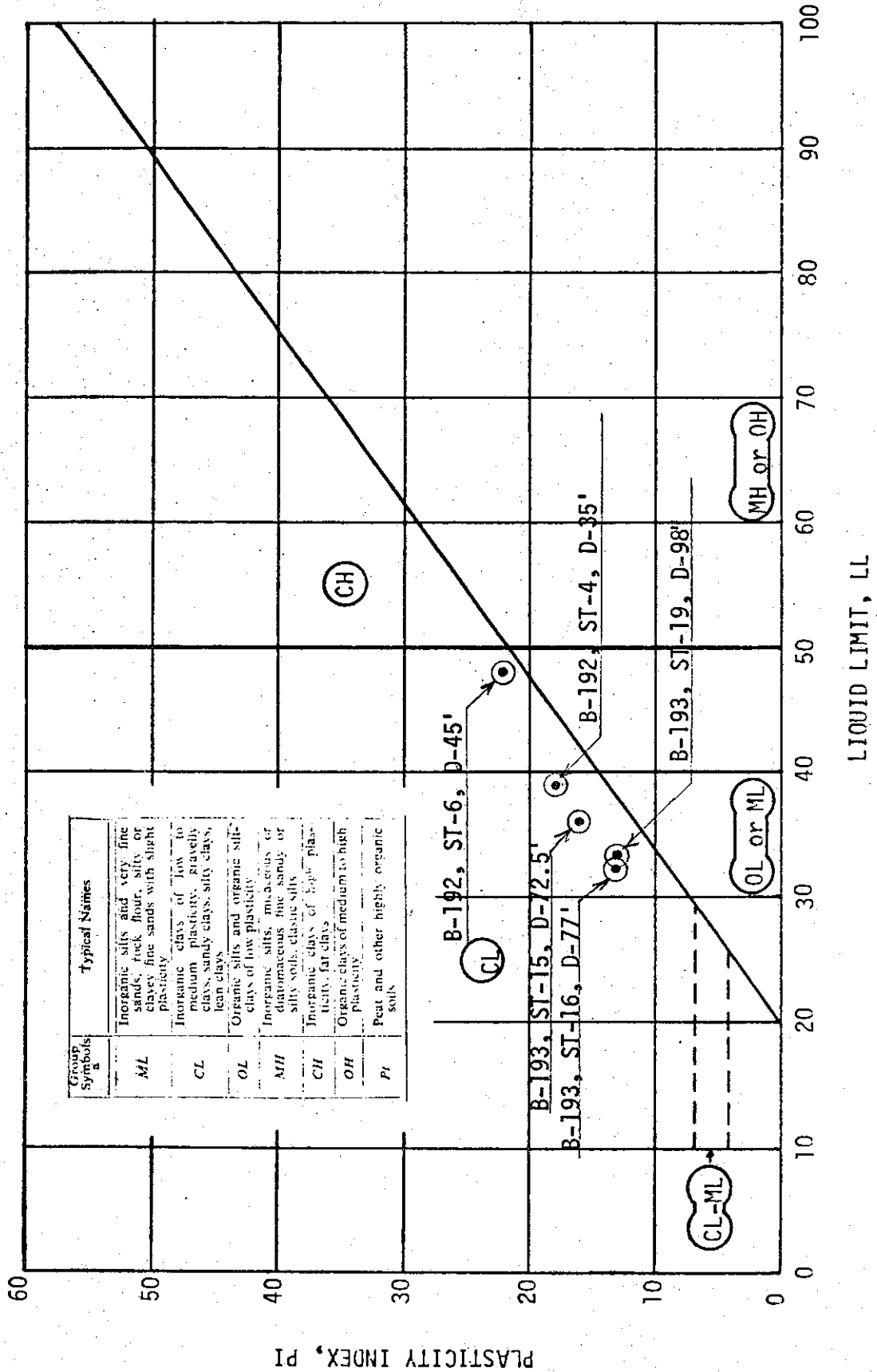


# U. W. STOLL and ASSOCIATES

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JOB: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION BLOW	DEPTH				STRENGTH UNDIST	MOISTURE
							REMOULD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	6.0			STIFF BROWN SILT CLAY WITH PEBBLE	UNCF		201.0	13.4%
ST-1	-6.0	PUSHED		QU=4.5 TSF	72.0	5%		1.66
B-193	10.0			BROWN MOTTLED CLAY WITH PEBBLE	NONE			30.0%
ST-2	-10.0	PUSHED		SAMPLING DISTURBED QU=1.75TSF	72.5			1.49
B-193	12.8			SOFT GRAY, CLAY WITH SEAM OF SILTY	UNCF		61.3	32.6%
ST-3	-12.8	PUSHED		DARK GRAY SANDY CLAY, TV=.57TSF	72.5	4%		1.44
B-193	18.5			TAN GRAY SOFT SILTY CLAY	UNCF		41.8	36.3%
ST-4	-18.5	PUSHED		(LACUSTRINE) TV=.32TSF	72.5	3%		1.37
B-193	23.5			TAN GRAY SOFT PLASTIC CLAY	UNCF		39.3	32.8%
ST-5	-23.5	PUSHED		(LACUSTRINE) TV=.29TSF	72.5	2%		1.38
B-193	28.5			TAN GRAY SOFT PLASTIC CLAY	UNCF		29.6	41.4%
ST-6	-28.5	PUSHED		(LACUSTRINE) TV=.27TSF	72.0	2%		1.32
B-193	33.5			TAN GRAY SOFT PLASTIC CLAY	UNCF		32.9	42.6%
ST-7	-33.5	PUSHED		(LACUSTRINE) TV=.27TSF	72.1	3%		1.29

UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)



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 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 SUBJECT:

DATE: 8/75

FIELD DATA			LABORATORY DATA				
BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW DEPTH	LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST ----- REMOLD (KN/SQ.M)	NATURAL MOISTURE ----- DRY DENS (MG/CU.M)
B-193	38.5	PUSHED	TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE)	UNCF	3%	42.9	38.4%
ST-8	-38.5		TV=.37TSF	72.9		1.33	
B-193	41.5	PUSHED	TAN GRAY SOFT LACUSTRINE CLAY	UNCF	2%	31.6	40.6%
ST-9	-41.5		TV=0.35TSF	72.3		1.30	
B-193	46.5	PUSHED	REDDISH-GRAY SOFT CLAY (LACUSTRINE)	UNCF	2%	40.4	46.5%
ST-10	-46.5		TV=0.35TSF	72.2		1.21	
B-193	51.5	PUSHED	SOFT GRAY MOTTLED LACUSTRINE CLAY	UNCF	6%	32.4	27.5%
ST-11	-51.5		TV=.29TSF	72.3		1.53	
B-193	56.5	PUSHED	SOFT GRAY PEBBLY SANDY CLAY	UNCF	16%	41.1	20.6%
ST-12	-56.5		TV=.41TSF	72.3		1.52	
B-193	61.5	PUSHED	PLASTIC GRAY SILTY CLAY WITH PEBBLES	UNCF	16%	56.9	25.7%
ST-13	-61.5		TV=.5 TSF	72.5		1.59	

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BY: IKK      DATE: 8/75  
 SUBJECT:

FIELD DATA      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
						STRENGTH UNDIST	MOISTURE
						REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	66.0		FIRM GRAY SILTY CLAY	UNCF		78.9	22.3%
ST-14	-66.0	PUSHED	WITH PEBBLES TV= 0.63 TSF	72.3	20%		1.67
B-193	72.5		GRAY SILTY CLAY	UNCF		80.8	22.2%
ST-15	-72.5	PUSHED	WITH PEBBLES TV=.67-.78 TSF	72.4	14%		1.66
B-193	77.0		FIRM V. SILTY GRAY CLAY	UNCF		24.1	26.9%
ST-16	-77.0	PUSHED	SAND SEAMS TV=.65 TSF	72.9	5%		1.53
B-193	78.0		GRAY SILTY CLAY	UNCF		74.9	26.3%
ST-16	-78.0	PUSHED	WITH PEBBLES TV= .77 TSF	72.1	4%		1.54
B-193	82.0		GRAY SILTY CLAY	UNCF		70.8	20.4%
ST-17	-82.0	PUSHED	WITH PEBBLES TV= .85 TSF	72.2	14%		1.72
B-193	93.5		GRAY SILTY CLAY	NONE			25.5%
ST-18	-93.5	PUSHED	WITH PEBBLES DRILL WASH	71.1			1.62

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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BY: IKK      DATE: 8/75  
 SUBJECT:

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL	
						UNDIST	MOISTURE	
						REMOLD	DRY DENS	
						(KN/SQ.M)	(MG/CU.M)	
B-193	98.0		GRAY SILTY CLAY WITH SOME PEBBLES & MOTTLE	UNCF		28.0	23.6%	
ST-19	-98.0	PUSHED	TV=.45 TSF	72.4	20%		1.59	
B-193, ST-20		PUSHED	GRAY SILTY CLAY WITH PEBBLES & DRILL WASH	NO TEST			31.1%	
B-193	112.0		SOFT GRAY SILTY CLAY WITH PEBBLES	UNCF		19.1	28.5%	
ST-21	-112.0	PUSHED	TV=0.22 TSF	72.7	20%		1.47	
B-193, ST-22		}	NO TESTS DUE TO DRILL WASH					
B-193, ST-23								

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SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD	DRY DENS
							(KN/SQ.M)	(MG/CU.M)
B-192	20.0			GRAYISH BROWN	UNCF		22.1	31.9%
		PUSHED		PLASTIC SOFT		8%		
ST-1	-20.0			LACUSTRINE CLAY	72.7			1.42
				TV=.27 TSF				
B-192	25.0			GRAYISH BROWN	UNCF		27.8	35.6%
		PUSHED		SOFT PLASTIC		4%		
ST-2	-25.0			LACUSTRINE CLAY	72.2			1.37
				TV=.27 TSF				
B-192	30.0			GRAYISH BROWN	UNCF		27.7	41.8%
		PUSHED		PLASTIC SOFT		3%		
ST-3	-30.0			LACUSTRINE CLAY	72.3			1.28
				TV=.25 TSF				
B-192	35.0			GRAYISH BROWN	UNCF		34.2	33.1%
		PUSHED		SOFT PLASTIC		2%		
ST-4	-35.0			CLAY(LACUSTRINE)	72.5			1.41
				TV=.28 TSF				
B-192	40.0			GRAYISH BROWN	UNCF		40.5	36.4%
		PUSHED		PLASTIC SOFT		2%		
ST-5	-40.0			LACUSTRINE CLAY	72.4			1.31
				TV=.28 TSF				
B-192	45.0			BROWNISH GRAY	UNCF		30.2	39.2%
		PUSHED		PLASTIC LACUSTRI		1%		
ST-6	-45.0			CLAY (MOTTLED)	72.3			1.26
				TV=.32 TSF				
B-192	52.0			FIRM GRAY	UNCF		31.4	34.5%
		PUSHED		SILTY CLAY		4%		
ST-7	-52.0			WITH PEBBLES	72.3			1.40
				TV= 0.26 TSF				

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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BY: IKK  
SUBJECT:

DATE: 8/75

F I E L D      D A T A                      L A B O R A T O R Y      D A T A

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-192	55.0			SOFT GRAY SILTY CLAY	UNCF		36.8	27.8%
		PUSHED				10%		
ST-8	-55.0			WITH PEBBLES TV=0.40 TSF	72.5			1.54
B-192	80.0			SOFT GRAY SILTY CLAY WITH	UNCF		84.5	26.6%
		PUSHED		FINE SAND LAYERS		7%		
ST-11	-80.0			TV=.52 TSF	72.5			1.55
B-192	60.0			PLASTIC GRAY SILTY CLAY	UNCF		46.0	26.5%
		PUSHED				16%		
ST-9	-60.0			WITH PEBBLES TV=0.50 TSF	72.5			1.57
B-192	70.0			FIRM GRAY SILTY CLAY	UNCF		85.2	24.3%
		PUSHED				20%		
ST-10	-70.0			WITH PEBBLES TV=0.82 TSF	72.3			1.64

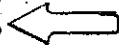
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BY: IKK DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION: B-193, ST-1, D-6

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.50	.0	.00	119.33
2.00	5.0	.33	1064.92
2.50	11.0	.66	2192.85
3.00	16.5	.98	3219.35
3.50	21.0	1.31	4051.68
4.00	25.0	1.64	4785.06
4.50	28.5	1.97	5420.41
5.00	31.8	2.29	6014.33
5.50	35.0	2.62	6585.65
6.00	37.5	2.95	7024.04
6.50	39.8	3.28	7422.60
7.00	41.8	3.60	7763.41
7.50	43.5	3.93	8047.02
8.00	44.9	4.26	8274.00
8.50	45.6	4.59	8372.46
9.00	45.9	4.91	8397.85
9.50	45.9	5.24	8368.92
10.00	44.0	5.57	7999.41
10.50	39.0	5.90	7078.55



SAMPLE IDENTIFICATION: B-193, ST-3, D-12.8

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	117.69
1.50	113.0	.35	595.39
2.00	222.0	.71	1052.83
2.50	332.0	1.06	1511.20
3.00	422.0	1.41	1882.54
3.50	485.0	1.77	2138.56
4.00	527.0	2.12	2305.42
4.50	558.0	2.48	2425.46
5.00	578.0	2.83	2499.18
5.50	590.0	3.18	2539.42
6.00	597.5	3.54	2560.86
6.50	600.0	3.89	2561.68
6.80	600.0	4.10	2556.02
7.00	599.0	4.24	2548.19
7.50	596.0	4.60	2526.63
8.00	593.0	4.95	2505.15



SAMPLE IDENTIFICATION: B-193, ST-4, D-18.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
6.50	.0	.00	117.69
7.00	87.0	.33	485.48
7.50	160.0	.67	791.74
8.00	230.0	1.00	1083.33
8.50	290.0	1.34	1331.04
9.00	336.0	1.67	1518.59
9.50	366.0	2.00	1638.26
10.00	385.0	2.34	1711.47
10.50	395.0	2.67	1746.94
11.00	396.5	3.01	1747.13
11.50	388.0	3.34	1706.22
12.00	364.0	3.67	1600.15



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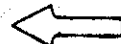
JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION;		B-193, ST-5, D-23.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.50	.0	.00	117.69
5.00	80.0	.33	455.87
5.50	175.0	.66	855.09
6.00	272.0	.99	1260.05
6.50	337.0	1.32	1528.21
7.00	363.0	1.65	1631.69
7.30	366.0	1.85	1640.91
7.50	355.0	1.98	1592.92
8.00	323.0	2.31	1454.83
8.50	310.0	2.64	1396.17



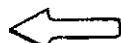
SAMPLE IDENTIFICATION;		B-193, ST-6, D-28.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.33
1.00	124.0	.64	649.00
1.50	200.0	.96	970.96
2.00	250.0	1.28	1180.32
2.50	264.0	1.60	1235.80
3.00	265.0	1.92	1236.00
4.00	260.0	2.56	1206.94
5.00	250.0	3.21	1157.33
6.00	244.0	3.85	1124.83



SAMPLE IDENTIFICATION;		B-193, ST-7, D-33.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
2.00	.0	.00	119.00
3.00	89.0	.65	497.86
4.00	177.0	1.30	867.51
5.00	260.0	1.95	1211.21
6.00	300.5	2.60	1372.55
7.00	290.0	3.25	1319.78
8.00	272.0	3.90	1236.66
9.00	262.0	4.55	1187.32



SAMPLE IDENTIFICATION;		B-193, ST-8, D-38.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
1.50	85.0	.35	471.73
2.00	138.0	.70	691.11
2.50	198.0	1.04	938.03
3.00	267.0	1.39	1220.47
3.50	331.0	1.74	1480.26
4.00	376.0	2.09	1660.05
4.50	400.0	2.44	1752.48
5.00	411.0	2.79	1791.13
5.50	412.5	3.13	1790.82
6.00	408.0	3.48	1766.14
6.50	399.0	3.83	1723.42



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 JOB LOCATION: BELLE RIVER, MICHIGAN  
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BY: IKK  
 SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-9, D-41.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	91.0	.32	505.25
1.00	151.0	.64	758.14
1.25	179.0	.81	875.50
1.50	203.0	.97	975.56
1.75	224.0	1.13	1062.62
2.00	244.0	1.29	1145.18
2.50	272.0	1.61	1259.07
3.00	288.0	1.93	1321.94
3.50	288.0	2.26	1317.60
3.80	286.0	2.45	1306.66
4.30	281.0	2.77	1281.59
4.50	278.0	2.90	1267.45
5.00	270.0	3.22	1230.19



SAMPLE IDENTIFICATION:		B-193, ST-10, D-46.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.25	69.0	.16	413.41
.50	116.0	.33	613.30
.75	160.0	.49	799.74
1.00	205.0	.66	989.82
1.25	245.0	.82	1158.03
1.50	285.0	.99	1325.68
2.00	349.0	1.32	1591.68
2.50	373.0	1.64	1687.44
3.00	358.0	1.97	1618.84
4.00	325.0	2.63	1470.41





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BY: IKK DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION;		B-193, ST-11, D-51.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	118.35
1.25	38.0	.17	280.13
1.50	60.0	.33	373.29
2.00	100.0	.66	541.71
2.50	138.0	.99	700.54
3.00	176.0	1.32	858.31
3.50	205.0	1.65	977.21
4.00	232.0	1.98	1086.93
4.50	252.0	2.31	1166.68
5.00	266.0	2.64	1220.93
5.50	277.0	2.97	1262.36
6.00	284.5	3.30	1289.03
6.50	290.5	3.63	1309.31
7.00	295.0	3.96	1323.28
7.50	299.0	4.29	1335.07
8.00	302.0	4.62	1342.68
8.50	303.5	4.95	1344.12
9.00	306.0	5.28	1349.56
9.50	307.5	5.61	1350.90
10.00	309.0	5.94	1352.20
10.50	309.5	6.27	1349.45
11.00	310.2	6.61	1347.49
11.50	310.9	6.94	1345.50
12.00	311.3	7.27	1342.31
12.50	311.6	7.60	1338.72
13.00	311.7	7.93	1334.32
13.50	311.7	8.26	1329.54
14.50	310.5	8.92	1315.30
15.00	310.0	9.25	1308.59

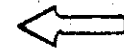


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SAMPLE IDENTIFICATION;		B-193, ST-12, D-56.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	44.0	.16	305.71
.50	63.0	.33	386.06
.75	81.0	.49	461.89
1.00	96.0	.66	524.75
1.75	135.0	1.15	686.75
2.00	150.0	1.32	748.81
2.50	177.0	1.64	859.69
3.00	204.0	1.97	969.82
3.50	227.0	2.30	1062.51
4.00	249.0	2.63	1150.39
4.50	268.0	2.96	1225.22
5.00	284.0	3.29	1287.14
6.00	309.0	3.95	1380.91
7.00	329.0	4.61	1452.91
8.00	345.0	5.26	1507.61
9.00	358.5	5.92	1551.37
10.00	369.5	6.58	1584.40
11.00	379.0	7.24	1610.86
12.00	387.5	7.89	1632.87
13.00	395.0	8.55	1650.49
14.00	401.5	9.21	1663.81
16.00	413.0	10.53	1683.63
17.00	418.0	11.18	1690.21
18.00	422.5	11.84	1694.63
19.00	428.0	12.50	1702.53
20.00	432.5	13.16	1706.41
21.00	437.0	13.82	1710.04
22.00	441.0	14.47	1711.60
24.00	449.5	15.79	1715.82
25.00	453.5	16.45	1716.69
27.00	461.0	17.76	1715.99
28.00	465.0	18.42	1716.19
29.00	468.0	19.08	1712.72
30.40	471.5	20.00	1705.18

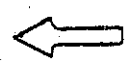


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SAMPLE IDENTIFICATION;		B-193, ST-13, D-61.5	
DIAL GAGE	LOAD GAGE	STRAIN	STRESS
		%	(PSF)
1.00	.0	.00	117.69
1.50	76.0	.33	438.93
2.00	113.0	.67	593.53
2.50	48.0	1.00	318.30
3.00	182.0	1.33	878.63
3.50	218.0	1.66	1025.99
4.00	255.0	2.00	1176.49
4.50	292.0	2.33	1325.94
5.00	323.0	2.66	1449.55
5.50	353.0	2.99	1568.17
6.00	378.0	3.33	1665.41
6.50	398.0	3.66	1741.49
7.00	414.0	3.99	1800.71
7.50	429.0	4.32	1855.40
8.00	443.0	4.66	1905.63
8.50	456.0	4.99	1951.42
9.00	467.5	5.32	1990.82
9.50	478.0	5.66	2025.89
10.00	487.0	5.99	2054.67
10.50	496.0	6.32	2083.20
11.00	504.5	6.65	2109.50
12.00	520.0	7.32	2155.46
13.00	534.0	7.98	2194.68
14.00	547.0	8.65	2229.24
15.00	558.0	9.31	2255.36
16.00	569.0	9.98	2280.86
17.00	579.5	10.65	2303.84
18.00	588.5	11.31	2320.58
19.00	597.0	11.98	2334.94
20.00	604.5	12.64	2345.11
21.00	612.0	13.31	2354.86
22.00	619.0	13.97	2362.35
23.00	626.5	14.64	2371.27
24.00	633.0	15.30	2376.16
25.00	639.0	15.97	2378.90
26.00	644.0	16.63	2377.77
27.00	648.5	17.30	2374.59
28.00	653.0	17.96	2371.16
29.00	657.0	18.63	2365.75
30.00	660.5	19.29	2358.40
31.06	664.0	20.00	2349.68



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SAMPLE IDENTIFICATION;		B-193, ST-14, D-66	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	105.0	.68	562.77
2.00	205.0	1.37	980.01
3.00	300.0	2.05	1370.48
4.00	382.0	2.74	1701.42
5.00	446.0	3.42	1953.33
6.00	495.0	4.11	2140.09
7.00	535.0	4.79	2287.40
8.00	570.0	5.48	2412.19
9.00	598.0	6.16	2506.89
10.00	625.0	6.85	2595.98
11.00	651.0	7.53	2679.54
12.00	675.0	8.22	2753.74
13.00	697.0	8.90	2818.76
14.00	717.0	9.59	2874.77
15.00	736.0	10.27	2925.78
16.00	755.0	10.96	2975.68
17.00	773.0	11.64	3020.69
18.00	788.0	12.33	3053.42
19.00	804.0	13.01	2088.99
20.00	818.0	13.70	3116.25
21.00	834.0	14.38	3150.01
22.00	848.0	15.07	3175.58
23.00	861.0	15.75	3196.73
24.00	875.0	16.44	3220.69
25.00	887.0	17.12	3236.75
26.00	900.0	17.81	3255.62
27.00	911.0	18.49	3266.77
28.00	923.0	19.18	3280.73
29.00	935.0	19.86	3293.99
29.20	937.0	20.00	3295.19
30.00	947.0	20.55	3306.54
31.00	958.0	21.23	3315.03



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SAMPLE IDENTIFICATION:		B-193, ST-15, D-72.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	80.0	.62	455.81
2.00	130.0	1.24	663.23
3.00	180.0	1.86	868.02
4.00	230.0	2.47	1070.18
5.00	290.0	3.09	1310.96
6.00	355.0	3.71	1569.09
7.00	418.0	4.33	1815.64
8.00	476.0	4.95	2038.64
9.00	529.0	5.57	2238.48
11.00	620.0	6.80	2570.27
12.00	659.0	7.42	2706.94
13.00	692.0	8.04	2818.07
14.00	722.0	8.66	2915.80
15.00	751.0	9.28	3008.08
16.00	776.0	9.89	3083.49
17.00	798.0	10.51	3146.15
18.00	818.0	11.13	3200.08
19.00	838.0	11.75	3252.97
20.00	857.0	12.37	3301.06
22.00	890.0	13.61	3375.86
24.00	902.5	14.84	3372.86
26.00	880.0	16.08	3243.47
28.00	850.0	17.32	3090.05



SAMPLE IDENTIFICATION:		B-193, ST-16, D-77	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
2.00	88.0	.61	483.01
3.00	145.0	1.22	716.51
4.00	187.0	1.83	885.24
5.00	210.0	2.44	973.98
7.00	217.0	3.66	990.13
8.00	222.0	4.27	1003.96
10.00	226.0	5.49	1007.05
11.00	225.0	6.10	996.61



SAMPLE IDENTIFICATION:		B-193, ST-16, D-78	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.00
1.00	250.0	.53	1186.01
2.00	420.0	1.06	1901.79
3.00	535.0	1.59	2377.45
4.00	610.0	2.12	2679.78
5.00	663.0	2.66	2886.75
6.00	698.0	3.19	3016.48
7.00	722.0	3.72	3099.14
8.00	733.0	4.25	3127.27



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SAMPLE IDENTIFICATION;		B-193, ST-17, D-82	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.00	.0	.00	118.67
4.50	105.0	.28	566.65
5.00	138.0	.56	705.57
6.00	192.0	1.11	930.26
7.00	242.0	1.67	1135.54
8.00	289.0	2.22	1325.88
9.00	333.0	2.78	1501.50
10.00	374.0	3.33	1662.61
11.00	412.0	3.89	1809.42
12.00	447.0	4.44	1942.15
13.00	481.0	5.00	2069.15
14.00	510.0	5.56	2174.32
15.00	538.0	6.11	2274.08
16.00	565.0	6.67	2368.52
17.00	590.0	7.22	2453.73
18.00	611.0	7.78	2521.95
19.00	634.0	8.33	2597.03
20.00	655.0	8.89	2663.21
22.00	692.0	10.00	2773.30
24.00	724.0	11.11	2860.85
26.00	751.0	12.22	2926.56
28.00	768.0	13.33	2952.59
30.00	780.0	14.44	2958.69
32.00	786.0	15.56	2941.96
34.00	789.5	16.67	2915.74
35.00	793.0	17.22	2908.70
36.00	796.0	17.78	2899.74



B-193, ST-1B NO STRENGTH TEST DUE TO DRILL WASH

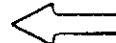
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JOB LOCATION: BELLE RIVER, MICHIGAN  
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DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-19, D-98	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	23.0	.66	214.53
2.00	49.0	1.32	322.35
3.00	68.0	1.97	399.51
4.00	85.0	2.63	467.31
5.00	98.0	3.29	517.68
6.00	112.0	3.95	571.41
7.00	124.0	4.61	616.24
8.00	136.0	5.26	660.40
9.00	147.0	5.92	699.87
10.00	158.0	6.58	738.73
11.00	169.0	7.24	776.98
12.00	179.0	7.89	810.68
13.00	188.0	8.55	839.94
14.00	198.0	9.21	872.55
15.00	207.0	9.87	900.77
16.00	215.0	10.53	924.67
17.00	224.0	11.18	951.90
18.00	233.0	11.84	978.64
19.00	241.0	12.50	1001.14
20.00	250.0	13.16	1026.89
21.00	257.0	13.82	1044.80
22.00	265.0	14.47	1065.95
23.00	272.0	15.13	1083.05
24.00	279.0	15.79	1099.75
25.00	285.0	16.45	1112.51
26.00	292.0	17.11	1128.45
27.00	297.0	17.76	1137.00
28.00	302.0	18.42	1145.27
29.00	307.0	19.08	1153.27
30.00	311.5	19.74	1159.27
30.40	316.0	20.00	1170.80



B-193, ST-20 No STRENGTH TEST DUE TO DRILL WASH  
(W<sub>m</sub> = 31.1%)

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SAMPLE IDENTIFICATION:		B-193, ST-21, D-112	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
1.00	10.0	.65	158.23
2.00	28.0	1.31	232.21
3.00	45.0	1.96	301.05
4.00	58.0	2.62	352.50
5.00	70.0	3.27	399.15
6.00	80.0	3.92	437.02
7.00	90.0	4.58	474.34
8.00	98.0	5.23	503.10
9.00	105.0	5.89	527.45
10.00	112.0	6.54	551.41
11.00	119.0	7.19	574.98
12.00	126.0	7.85	598.17
13.00	132.0	8.50	617.11
14.00	138.0	9.16	635.71
15.00	144.0	9.81	653.99
16.00	148.0	10.46	664.37
17.00	153.0	11.12	678.28
18.00	158.0	11.77	691.92
19.00	163.0	12.43	705.28
20.00	168.0	13.08	718.37
21.00	172.0	13.73	727.53
22.00	177.0	14.39	740.09
23.00	180.0	15.04	745.20
24.00	185.0	15.70	757.26
25.00	188.0	16.35	761.99
26.00	192.0	17.00	770.05
27.00	195.0	17.66	774.41
28.00	198.0	18.31	778.61
29.00	202.0	18.97	786.06
30.00	205.0	19.62	789.90
31.00	210.0	20.27	800.31
32.00	212.0	20.93	800.42
30.60	208.0	20.01	796.18



B-193 ST-22 } NO TEST DUE TO DRILL WASH  
B-193 ST-23 }



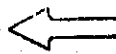
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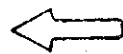
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SAMPLE IDENTIFICATION:		B-192, ST-1, D-20	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
.40	11.5	.26	165.17
.80	20.0	.52	200.45
1.20	28.0	.79	233.44
1.60	35.0	1.05	262.07
2.00	42.0	1.31	290.55
2.40	50.0	1.57	323.03
2.80	57.0	1.83	351.18
3.20	65.0	2.10	383.32
3.60	73.0	2.36	415.28
4.00	81.0	2.62	447.07
4.40	90.0	2.88	482.77
4.80	99.0	3.14	518.28
5.20	108.0	3.41	553.59
5.60	118.0	3.67	592.77
6.80	147.0	4.45	704.94
7.20	157.0	4.72	743.24
7.60	166.0	4.98	777.31
8.00	174.0	5.24	807.18
8.40	181.0	5.50	832.88
8.80	187.0	5.76	854.45
9.20	192.0	6.02	871.92
9.60	197.0	6.29	889.27
10.00	200.0	6.55	898.63
10.40	203.0	6.81	907.91
10.80	206.0	7.07	917.13
11.20	208.0	7.33	922.38
11.60	209.0	7.60	923.67
12.00	210.0	7.86	924.94



SAMPLE IDENTIFICATION:		B-192, ST-2, D-25	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.50	27.0	.33	233.50
1.00	51.0	.66	334.80
1.50	78.0	.99	448.15
2.00	105.0	1.32	560.73
2.50	135.0	1.65	685.17
3.00	165.0	1.98	808.78
3.50	192.0	2.31	918.98
4.00	213.0	2.64	1003.41
4.50	229.0	2.97	1066.48
5.00	242.0	3.30	1116.67
5.50	250.0	3.63	1145.87
6.00	255.0	3.96	1162.51
6.50	256.0	4.29	1162.61
7.00	251.0	4.62	1138.18



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soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION:		B-192, ST-3, D-30	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	45.0	.32	309.47
1.00	83.0	.65	469.65
1.50	118.0	.97	616.10
2.00	157.0	1.30	778.43
2.50	193.0	1.62	927.07
3.00	222.0	1.95	1045.42
3.50	241.0	2.27	1121.23
4.00	250.0	2.60	1154.93
4.30	251.0	2.79	1156.77
4.50	250.0	2.92	1151.08
5.00	247.0	3.25	1134.84



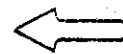
SAMPLE IDENTIFICATION:		B-192, ST-4, D-35	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	136.0	.65	690.61
2.00	275.0	1.31	1268.54
2.80	315.0	1.83	1428.53
4.00	254.0	2.62	1164.87



SAMPLE IDENTIFICATION:		B-192, ST-5, D-40	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
.50	86.0	.33	482.60
1.00	147.0	.66	739.02
1.50	205.0	.99	981.08
2.00	263.0	1.32	1221.51
2.50	313.0	1.65	1426.81
3.00	354.0	1.98	1593.15
3.50	377.0	2.31	1683.47
3.70	379.5	2.44	1691.58
4.10	372.0	2.70	1655.94
4.50	336.0	2.97	1502.71
5.00	310.0	3.30	1390.55



SAMPLE IDENTIFICATION:		B-192, ST-6, D-45	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	111.0	.33	590.33
1.00	194.0	.66	940.43
1.50	249.0	.99	1169.84
2.00	272.0	1.31	1262.87
2.15	272.0	1.41	1261.61
2.50	266.0	1.64	1233.47
3.00	254.0	1.97	1179.12
3.50	247.0	2.30	1145.97



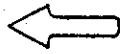
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION;		B-192, ST-7, D-52	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	100.0	.71	541.43
2.00	170.0	1.42	832.16
3.00	224.0	2.14	1051.79
4.00	262.0	2.85	1201.77
5.00	285.0	3.56	1287.67
6.00	293.0	4.27	1310.87
7.00	270.0	4.98	1207.81

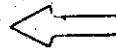


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JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION;		B-192, ST-8, D-55	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	103.0	.62	551.62
2.00	165.0	1.23	808.20
3.00	132.0	1.85	665.62
4.00	195.0	2.47	922.33
5.00	247.0	3.09	1130.48
6.00	282.0	3.70	1266.39
7.00	305.0	4.32	1351.71
8.00	322.0	4.94	1411.61
9.00	334.0	5.56	1450.56
11.00	352.0	6.79	1502.84
12.00	358.0	7.41	1516.48
13.00	363.0	8.02	1525.90
14.00	367.5	8.64	1533.11
15.00	370.0	9.26	1532.38
16.00	373.5	9.88	1535.35
18.00	379.0	11.11	1535.08
19.00	381.0	11.73	1531.92
20.00	382.0	12.35	1524.93
21.00	383.0	12.96	1517.88
22.00	384.0	13.58	1510.79
23.00	384.0	14.20	1500.00
24.00	383.5	14.81	1487.40
25.00	381.0	15.43	1467.64



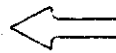
SAMPLE IDENTIFICATION;		B-192, ST-9, D-60	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	70.0	.63	412.31
2.00	130.0	1.26	661.26
3.00	185.0	1.89	886.18
4.00	235.0	2.52	1087.46
5.00	280.0	3.14	1265.51
6.00	317.0	3.77	1408.47
7.00	347.0	4.40	1521.04
8.00	371.0	5.03	1607.81
9.00	389.0	5.66	1669.27
10.00	404.0	6.29	1717.83
11.00	417.0	6.92	1757.68
12.00	429.0	7.55	1792.91
13.00	439.0	8.18	1819.70
14.00	447.0	8.81	1838.22
16.00	463.0	10.06	1873.96
17.00	471.0	10.69	1891.20
18.00	476.0	11.32	1896.70
19.00	482.0	11.95	1905.68
20.00	488.0	12.58	1914.34
21.00	493.0	13.21	1919.00
D-28 22.00	497.0	13.84	1919.73

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BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

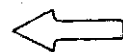
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
24.00	505.0	15.09	1920.54
25.00	509.0	15.72	1920.63
26.00	512.0	16.35	1916.95
27.00	516.0	16.98	1916.64
28.00	519.0	17.61	1912.62
29.00	523.0	18.24	1911.90
30.00	525.0	18.87	1904.09
31.80	530.5	20.00	1896.20



SAMPLE IDENTIFICATION:

B-192, ST-10, D-70

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	30.0	.16	246.05
.50	60.0	.31	373.36
.75	90.0	.47	500.27
1.00	117.0	.62	614.05
1.50	164.0	.93	810.94
2.00	209.0	1.24	998.14
2.50	252.0	1.55	1175.75
3.00	295.0	1.86	1352.21
3.50	336.0	2.17	1519.18
4.00	377.0	2.48	1685.06
4.50	417.0	2.80	1845.71
5.00	450.0	3.11	1976.33
5.50	482.0	3.42	2101.96
6.00	512.0	3.73	2218.52
6.50	537.0	4.04	2313.79
7.00	560.0	4.35	2400.23
7.50	582.0	4.66	2482.00
8.00	603.0	4.97	2559.12
9.00	639.0	5.59	2687.51
10.00	672.0	6.21	2801.97
11.00	702.0	6.83	2902.75
12.00	727.0	7.45	2982.19
13.00	751.0	8.07	3056.37
14.00	773.0	8.70	3121.48
15.00	792.0	9.32	3173.81
16.00	810.0	9.94	3221.29
17.00	827.0	10.56	3263.99
18.00	844.0	11.18	3305.79
19.00	859.0	11.80	3339.16
20.00	874.0	12.42	3371.74
22.00	900.0	13.66	3419.75
24.00	926.0	14.91	3465.01
26.00	949.0	16.15	3496.77
28.00	971.0	17.39	3522.56
30.00	992.0	18.63	3542.54
32.20	1014.0	20.00	3558.20
34.00	1037.0	21.12	3585.93



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BY: IKK DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

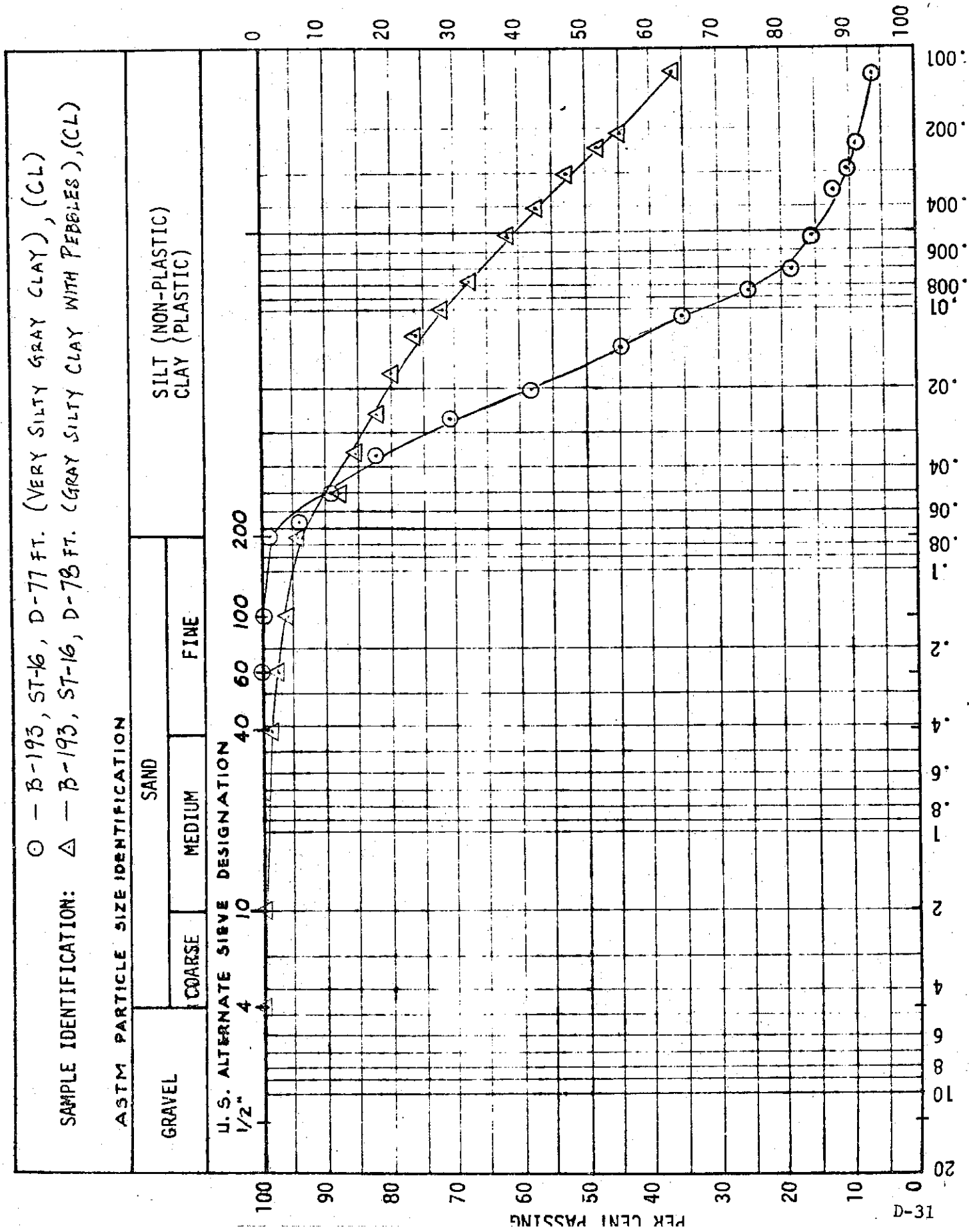
SAMPLE IDENTIFICATION;		B-192, ST-11, D-80	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
.25	42.0	.16	295.57
.50	92.0	.31	506.76
.75	137.0	.47	696.15
1.00	177.0	.62	863.86
1.25	216.0	.78	1026.83
1.50	253.0	.93	1180.87
1.75	288.0	1.09	1326.02
2.00	324.0	1.24	1474.90
2.25	360.0	1.40	1623.31
2.50	395.0	1.55	1767.07
3.00	460.0	1.86	2032.36
3.50	522.0	2.17	2283.48
4.00	578.0	2.48	2508.12
4.50	622.0	2.79	2681.75
5.00	664.0	3.10	2846.00
5.50	696.0	3.41	2968.13
6.00	726.0	3.72	3081.24
6.50	752.0	4.03	3177.26
7.00	774.0	4.34	3256.35
7.50	795.0	4.65	3330.81
8.00	810.0	4.96	3380.51
8.50	826.0	5.27	3433.83
9.00	838.0	5.58	3470.69
9.50	848.0	5.89	3499.25
10.00	856.0	6.20	3519.58
11.00	864.5	6.82	3529.93
11.50	850.0	7.13	3461.00
12.00	820.0	7.44	3331.54
12.50	795.0	7.75	3222.46



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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY  
DATE: 9/75



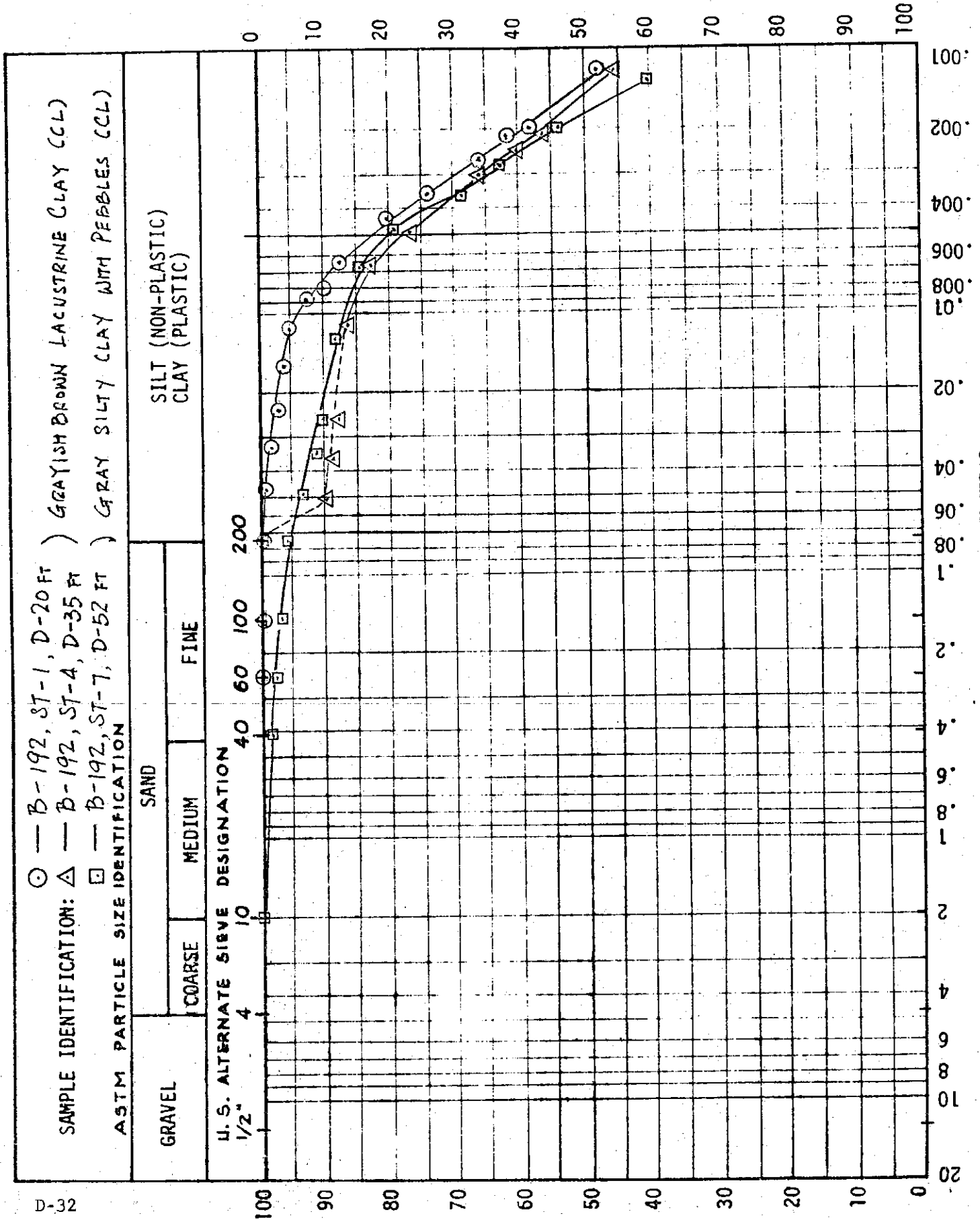
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK

DATE: 9/75

SUBJECT: PARTICLE SIZE DISTRIBUTION  
ANALYSIS SUMMARY





**APPENDIX G – 2016 LABORATORY TEST  
RESULTS**

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						8					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-01, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.9E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.87		Permeant: Water											
Sample Ht. (in)		3.02		3.02		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		775.10		649.20		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		562.60		471.50		Confining Pressure (psi): 100.0											
Tare (g)		88.86		88.64		Burette Diameter (in): 0.250											
Sample Wt. (g)		563.65		560.56		Burette Zero (cm): 100.0											
Moisture (%)		44.9		46.4		Maximum Gradient: 7.0											
Wet Density (pcf)		109.9		109.5		Average Gradient: 6.5											
Dry Density (pcf)		75.9		74.8		Max. Effect. Stress (psi): 5.7											
Saturation (%)		99.2		100.0		Min. Effect. Stress (psi): 4.3											
						Ave. Effect. Stress (psi): 4.8											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	10.00	0.0	95	95	55.40		3.45		102.60				
2	2016	3	15	11	15.00	11100	23.0	95	95	56.10	0.70	4.05	0.60	101.30	1.30	-36.8	4.7E-08
3	2016	3	15	14	16.00	10860	23.0	95	95	57.00	0.90	4.75	0.70	100.60	0.70	0.0	3.6E-08
4	2016	3	15	18	15.00	14340	23.0	95	95	57.75	0.75	5.55	0.80	99.75	0.85	-3.0	3.3E-08
5	2016	3	16	4	55.00	38400	22.0	95	95	59.30	1.55	7.65	2.10	97.50	2.25	-3.4	3.4E-08
6	2016	3	16	8	38.00	13380	23.0	95	95	59.80	0.50	8.35	0.70	96.80	0.70	0.0	3.2E-08
7	2016	3	16	11	56.00	11880	23.0	95	95	60.35	0.55	9.05	0.70	96.30	0.50	16.7	3.1E-08
8	2016	3	16	15	1.00	11100	23.0	95	95	60.40	0.05	9.60	0.55	95.70	0.60	-4.3	3.2E-08
9	2016	3	17	5	14.00	51180	22.0	95	95	61.30	0.90	12.10	2.50	93.20	2.50	0.0	3.2E-08
10	2016	3	17	8	17.00	10980	24.0	95	95	62.05	0.75	12.65	0.55	92.75	0.45	10.0	3.0E-08
11	2016	3	17	12	19.00	14520	23.0	95	95	62.15	0.10	13.25	0.60	92.05	0.70	-7.7	3.0E-08
12	2016	3	17	17	49.00	19800	23.0	95	95	62.60	0.45	14.15	0.90	91.30	0.75	9.1	2.9E-08
13	2016	3	18	5	23.00	41640	22.0	95	95	63.15	0.55	16.00	1.85	89.40	1.90	-1.3	3.3E-08
14	2016	3	18	8	58.00	12900	24.0	95	95	63.60	0.45	16.55	0.55	88.90	0.50	4.8	3.0E-08
15	2016	3	18	12	55.00	14220	23.0	95	95	63.80	0.20	17.10	0.55	88.30	0.60	-4.3	3.0E-08
16	2016	3	18	16	30.00	12900	23.0	95	95	64.10	0.30	17.65	0.55	87.90	0.40	15.8	2.8E-08
17	2016	3	21	4	58.00	217680	22.0	95	95	67.20	3.10	25.35	7.70	80.20	7.70	0.0	3.1E-08
18	2016	3	21	8	1.00	10980	24.0	95	95	67.60	0.40	25.70	0.35	79.85	0.35	0.0	3.1E-08
19	2016	3	21	12	10.00	14940	23.0	95	95	67.60	0.00	26.15	0.45	79.40	0.45	0.0	3.0E-08
20	2016	3	21	15	12.00	10920	23.0	95	95	67.70	0.10	26.40	0.25	79.15	0.25	0.0	2.3E-08 1
21	2016	3	21	19	36.00	15840	23.0	95	95	68.30	0.60	26.90	0.50	78.70	0.45	5.3	3.1E-08 1
22	2016	3	21	21	31.00	6900	23.0	95	95	68.10	-0.20	27.10	0.20	78.50	0.20	0.0	3.0E-08 1
23	2016	3	22	5	52.00	30060	25.0	95	95	68.90	0.80	28.05	0.95	77.65	0.85	5.6	3.1E-08 1
24	2016	3	22	10	31.00	16740	23.0	95	95	68.85	-0.05	28.45	0.40	77.20	0.45	-5.9	2.8E-08 1
25	2016	3	22	15	59.00	19680	24.0	95	95	69.40	0.55	29.00	0.55	76.70	0.50	4.8	2.9E-08 1
26	2016	3	22	22	32.00	23580	24.0	95	95	69.80	0.40	29.55	0.55	76.10	0.60	-4.3	2.7E-08 1
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.9E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-05, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.7E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.84		Permeant: Water											
Sample Ht. (in)		3.25		3.20		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		536.11		691.40		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		403.90		517.10		Confining Pressure (psi): 100.0											
Tare (g)		93.83		91.24		Burette Diameter (in): 0.250											
Sample Wt. (g)		610.40		600.16		Burette Zero (cm): 100.0											
Moisture (%)		42.6		40.9		Maximum Gradient: 7.3											
Wet Density (pcf)		110.6		112.8		Average Gradient: 6.9											
Dry Density (pcf)		77.5		80.0		Max. Effect. Stress (psi): 6.1											
Saturation (%)		98.2		100.0		Min. Effect. Stress (psi): 4.6											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	25.20		1.95		101.75				
2	2016	3	15	11	15.00	0.0	95	95	27.70		1.80		99.60				
3	2016	3	15	14	17.00	10920	23.0	95	95	29.40	1.70	2.00	0.20	98.65	0.95	-65.2	3.2E-08
4	2016	3	15	18	16.00	14340	23.0	95	95	30.65	1.25	2.40	0.40	97.60	1.05	-44.8	3.1E-08
5	2016	3	16	4	56.00	38400	22.0	95	95	32.20	1.55	3.85	1.45	95.40	2.20	-20.5	3.1E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	32.40	0.20	4.40	0.55	94.85	0.55	0.0	2.6E-08
7	2016	3	16	11	57.00	11880	23.0	95	95	33.85	1.45	4.95	0.55	94.40	0.45	10.0	2.7E-08
8	2016	3	16	15	2.00	11100	23.0	95	95	34.00	0.15	5.35	0.40	93.90	0.50	-11.1	2.7E-08
9	2016	3	17	5	15.00	51180	22.0	95	95	35.20	1.20	7.35	2.00	91.80	2.10	-2.4	2.8E-08
10	2016	3	17	8	17.00	10920	24.0	95	95	35.80	0.60	7.80	0.45	91.45	0.35	12.5	2.5E-08
11	2016	3	17	12	20.00	14580	23.0	95	95	35.90	0.10	8.30	0.50	89.85	1.60	-52.4	5.1E-08
12	2016	3	17	17	50.00	19800	23.0	95	95	36.40	0.50	9.10	0.80	89.25	0.60	14.3	2.6E-08
13	2016	3	18	5	23.00	41580	22.0	95	95	37.00	0.60	10.65	1.55	88.60	0.65	40.9	2.0E-08
14	2016	3	18	8	58.00	12900	24.0	95	95	37.50	0.50	11.15	0.50	88.15	0.45	5.3	2.7E-08
15	2016	3	18	12	55.00	14220	23.0	95	95	37.70	0.20	11.65	0.50	87.60	0.55	-4.8	2.8E-08
16	2016	3	18	16	31.00	12960	23.0	95	95	38.00	0.30	12.10	0.45	87.20	0.40	5.9	2.5E-08
17	2016	3	21	4	59.00	217680	22.0	95	95	41.00	3.00	19.25	7.15	79.85	7.35	-1.4	3.0E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	41.40	0.40	19.55	0.30	79.60	0.25	9.1	2.4E-08
19	2016	3	21	12	10.00	14880	23.0	95	95	41.40	0.00	19.95	0.40	79.15	0.45	-5.9	2.8E-08
20	2016	3	21	15	13.00	10980	23.0	95	95	41.60	0.20	20.25	0.30	78.85	0.30	0.0	2.7E-08
21	2016	3	21	19	37.00	15840	23.0	95	95	42.00	0.40	20.80	0.55	78.55	0.30	29.4	2.7E-08
22	2016	3	21	21	32.00	6900	23.0	95	95	41.80	-0.20	20.90	0.10	78.30	0.25	-42.9	2.6E-08
23	2016	3	22	5	53.00	30060	25.0	95	95	42.75	0.95	21.75	0.85	77.55	0.75	6.3	2.6E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	42.75	0.00	22.20	0.45	77.10	0.45	0.0	2.8E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	43.25	0.50	22.75	0.55	76.65	0.45	10.0	2.7E-08
26	2016	3	22	22	33.00	23580	24.0	95	95	43.60	0.35	23.35	0.60	76.10	0.55	4.3	2.6E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.7E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray sandy lean clay, with gravel						Average Kv =						2.9E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.86		2.83		Permeant: Water											
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity: 2.68 Est.											
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi): 100.0											
Tare (g)		92.18		89.22		Burette Diameter (in): 0.250											
Sample Wt. (g)		666.40		648.58		Burette Zero (cm): 100.0											
Moisture (%)		42.2		40.1													
Wet Density (pcf)		112.9		112.9													
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi): 6.2											
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.0											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	4	21	11	16.00	0.0	95	95	16.80		2.50		102.25				
2	2016	4	21	20	32.00	33360	27.0	95	95	27.60	10.80	1.25	-1.25	96.40	5.85	-154.3	4.1E-08
3	2016	4	22	9	22.00	46200	24.0	95	95	32.50	4.90	2.40	1.15	93.40	3.00	-44.6	3.0E-08
4	2016	4	22	12	18.00	10560	24.0	95	95	33.50	1.00	2.85	0.45	92.90	0.50	-5.3	3.1E-08
5	2016	4	22	18	33.00	22500	25.0	95	95	35.05	1.55	3.80	0.95	91.95	0.95	0.0	2.9E-08
6	2016	4	25	11	30.00	233820	23.0	95	95	44.30	9.25	12.75	8.95	83.10	8.85	0.6	3.1E-08
7	2016	4	25	17	41.00	22260	24.0	95	95	45.35	1.05	13.50	0.75	82.40	0.70	3.4	2.9E-08
8	2016	4	25	20	39.00	10680	24.0	95	95	45.30	-0.05	13.80	0.30	82.00	0.40	-14.3	3.0E-08
9	2016	4	25	23	15.00	9360	24.0	95	95	45.35	0.05	14.10	0.30	81.70	0.30	0.0	3.0E-08
10	2016	4	26	4	59.00	20640	25.0	95	95	46.00	0.65	14.75	0.65	81.00	0.70	-3.7	3.0E-08
11	2016	4	26	8	19.00	12000	24.0	95	95	45.95	-0.05	15.10	0.35	80.60	0.40	-6.7	3.0E-08
12	2016	4	26	13	18.00	17940	24.0	95	95	46.40	0.45	15.70	0.60	80.10	0.50	9.1	3.0E-08
13	2016	4	27	4	57.00	56340	23.0	95	95	47.60	1.20	17.40	1.70	78.60	1.50	6.2	2.9E-08
14	2016	4	27	12	47.00	28200	23.0	95	95	47.95	0.35	18.20	0.80	77.90	0.70	6.7	2.8E-08
15	2016	4	27	15	8.00	8460	23.0	95	95	47.90	-0.05	18.45	0.25	77.65	0.25	0.0	3.2E-08
16	2016	4	28	5	1.00	49980	22.0	95	95	48.80	0.90	19.80	1.35	76.35	1.30	1.9	3.0E-08
17	2016	4	28	8	5.00	11040	24.0	95	95	49.40	0.60	20.15	0.35	76.15	0.20	27.3	2.8E-08
18	2016	4	28	14	56.00	24660	23.0	95	95	49.60	0.20	20.75	0.60	75.55	0.60	0.0	2.8E-08
19	2016	4	28	20	48.00	21120	23.0	95	95	49.90	0.30	21.30	0.55	75.10	0.45	10.0	2.8E-08
20	2016	4	29	5	31.00	31380	26.0	95	95	51.05	1.15	22.10	0.80	74.35	0.75	3.2	2.8E-08
21	2016	4	29	10	27.00	17760	23.0	95	95	50.90	-0.15	22.50	0.40	73.90	0.45	-5.9	3.0E-08
22	2016	4	29	14	41.00	15240	23.0	95	95	51.25	0.35	22.90	0.40	73.60	0.30	14.3	2.9E-08
23	2016	4	29	18	0.00	11940	23.0	95	95	51.55	0.30	23.20	0.30	73.40	0.20	20.0	2.7E-08
24	2016	5	1	16	23.00	166980	22.0	95	95	54.25	2.70	26.95	3.75	70.05	3.35	5.6	3.0E-08
25	2016	5	2	4	58.00	45300	23.0	95	95	55.05	0.80	27.85	0.90	69.25	0.80	5.9	2.9E-08
26	2016	5	2	8	4.00	11160	23.0	95	95	55.30	0.25	28.10	0.25	69.05	0.20	11.1	3.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.				
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation												QC:	JPH					
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)												QA:	JPH					
Project Name: DTE - BRPP BAB and DB						Cell #:						9						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray sandy lean clay, with gravel																		
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.86		2.83		Permeant:						Water						
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity:						1.00						
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity:						2.68 Est.						
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi):						100.0						
Tare (g)		92.18		89.22		Burette Diameter (in):						0.250						
Sample Wt. (g)		666.40		648.58		Burette Zero (cm):						100.0						
Moisture (%)		42.2		40.1		Maximum Gradient:						3.8						
Wet Density (pcf)		112.9		112.9		Average Gradient:						3.6						
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi):						5.2						
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi):						4.6						
						Ave. Effect. Stress (psi):						4.9						
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1	
1	2016	5	2	8	4.00	0.0	95	95	55.30		28.10		69.05					
2	2016	5	2	13	15.00	18660	23.0	95	95	55.65	0.35	28.50	0.40	68.80	0.25	23.1	2.8E-08	
3	2016	5	2	20	45.00	27000	26.0	95	95	56.30	0.65	29.00	0.50	68.35	0.45	5.3	2.6E-08	
4	2016	5	3	4	50.00	29100	23.0	95	95	56.00	-0.30	29.50	0.50	67.75	0.60	-9.1	3.1E-08	
5	2016	5	3	8	0.00	11400	25.0	95	95	56.35	0.35	29.70	0.20	67.60	0.15	14.3	2.5E-08	
6	2016	5	3	11	10.00	11400	23.0	95	95	56.30	-0.05	29.90	0.20	67.35	0.25	-11.1	3.4E-08	
7	2016	5	3	14	12.00	10920	23.0	95	95	56.40	0.10	30.15	0.25	67.25	0.10	42.9	2.8E-08	
8	2016	5	3	19	36.00	19440	24.0	95	95	57.20	0.80	30.55	0.40	67.05	0.20	33.3	2.6E-08	
9	2016	5	4	5	24.00	35280	23.0	95	95	57.60	0.40	31.15	0.60	66.50	0.55	4.3	2.9E-08	
10	2016	5	4	9	48.00	15840	23.0	95	95	57.60	0.00	31.40	0.25	66.25	0.25	0.0	2.9E-08	
11	2016	5	4	14	50.00	18120	23.0	95	95	57.70	0.10	31.70	0.30	66.00	0.25	9.1	2.8E-08	
12	2016	5	4	20	0.00	18600	25.0	95	95	58.25	0.55	32.10	0.40	65.80	0.20	33.3	2.9E-08	
13	2016	5	5	5	24.00	33840	24.0	95	95	58.35	0.10	32.60	0.50	65.30	0.50	0.0	2.8E-08	1
14	2016	5	5	10	25.00	18060	24.0	95	95	58.60	0.25	32.90	0.30	65.10	0.20	20.0	2.7E-08	1
15	2016	5	5	14	42.00	15420	24.0	95	95	58.90	0.30	33.20	0.30	64.85	0.25	9.1	3.5E-08	1
16	2016	5	6	4	52.00	51000	23.0	95	95	59.50	0.60	34.00	0.80	64.25	0.60	14.3	2.8E-08	1
17	2016	5	6	9	32.00	16800	23.0	95	95	59.70	0.20	34.25	0.25	64.05	0.20	11.1	2.9E-08	1
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
**A zero in this column starts a series of measurements.												*Average Kv for those rows with a 1 in the Ave. column.				2.9E-08	cm/s	
(Termination determined by stable Kv and low flow differential.)												***Kv adjusted for temperature.						

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						10					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: SB-16-01, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.1E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.82		Permeant: Water											
Sample Ht. (in)		2.88		2.86		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		534.46		607.60		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		400.40		448.80		Confining Pressure (psi): 100.0											
Tare (g)		98.45		86.36		Burette Diameter (in): 0.250											
Sample Wt. (g)		532.36		521.24		Burette Zero (cm): 100.0											
Moisture (%)		44.4		43.8		Maximum Gradient: 8.9											
Wet Density (pcf)		109.0		111.0		Average Gradient: 8.4											
Dry Density (pcf)		75.5		77.2		Max. Effect. Stress (psi): 6.1											
Saturation (%)		97.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	24.00		1.65		102.30				
2	2016	3	15	11	16.00	0.0	95	95	27.35		1.15		99.70				
3	2016	3	15	14	17.00	0.0	95	95	29.50		1.15		98.60				
4	2016	3	15	18	17.00	14400	23.0	95	95	30.90	1.40	1.35	0.20	97.50	1.10	-69.2	2.5E-08
5	2016	3	16	4	56.00	38340	22.0	95	95	34.75	3.85	2.00	0.65	95.00	2.50	-58.7	2.4E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	35.00	0.25	2.50	0.50	94.55	0.45	5.3	2.0E-08
7	2016	3	16	11	58.00	11940	23.0	95	95	35.45	0.45	3.00	0.50	94.10	0.45	5.3	2.3E-08
8	2016	3	16	15	3.00	11100	23.0	95	95	35.80	0.35	3.35	0.35	93.60	0.50	-17.6	2.2E-08
9	2016	3	17	5	15.00	51120	22.0	95	95	38.75	2.95	4.55	1.20	91.10	2.50	-35.1	2.2E-08
10	2016	3	17	8	18.00	10980	24.0	95	95	38.25	-0.50	5.25	0.70	90.95	0.15	64.7	2.3E-08
11	2016	3	17	12	21.00	14580	23.0	95	95	38.60	0.35	5.65	0.40	90.35	0.60	-20.0	2.1E-08
12	2016	3	17	17	51.00	19800	23.0	95	95	38.50	-0.10	6.45	0.80	89.85	0.50	23.1	2.1E-08
13	2016	3	18	5	24.00	41580	22.0	95	95	40.80	2.30	7.40	0.95	87.95	1.90	-33.3	2.3E-08
14	2016	3	18	8	59.00	12900	24.0	95	95	40.40	-0.40	8.05	0.65	87.70	0.25	44.4	2.3E-08
15	2016	3	18	12	56.00	14220	23.0	95	95	40.70	0.30	8.40	0.35	87.25	0.45	-12.5	1.9E-08
16	2016	3	18	16	32.00	12960	23.0	95	95	40.70	0.00	8.95	0.55	86.90	0.35	22.2	2.4E-08
17	2016	3	21	4	59.00	217620	22.0	95	95	45.25	4.55	15.10	6.15	80.30	6.60	-3.5	2.2E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	45.25	0.00	15.50	0.40	80.10	0.20	33.3	2.2E-08
19	2016	3	21	12	11.00	14940	23.0	95	95	45.40	0.15	15.90	0.40	79.65	0.45	-5.9	2.4E-08
20	2016	3	21	15	13.00	10920	23.0	95	95	45.70	0.30	16.10	0.20	79.35	0.30	-20.0	1.9E-08
21	2016	3	21	19	38.00	15900	23.0	95	95	45.70	0.00	16.65	0.55	79.10	0.25	37.5	2.1E-08
22	2016	3	21	21	33.00	6900	23.0	95	95	46.10	0.40	16.70	0.05	78.80	0.30	-71.4	2.2E-08
23	2016	3	22	5	53.00	30000	25.0	95	95	47.20	1.10	17.35	0.65	78.00	0.80	-10.3	2.0E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	47.10	-0.10	17.80	0.45	77.60	0.40	5.9	2.2E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	47.40	0.30	18.35	0.55	77.15	0.45	10.0	2.2E-08
26	2016	3	22	22	34.00	23640	24.0	95	95	47.10	-0.30	19.10	0.75	76.80	0.35	36.4	2.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.1E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

**APPENDIX H – 2020 LABORATORY TEST  
RESULTS**



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

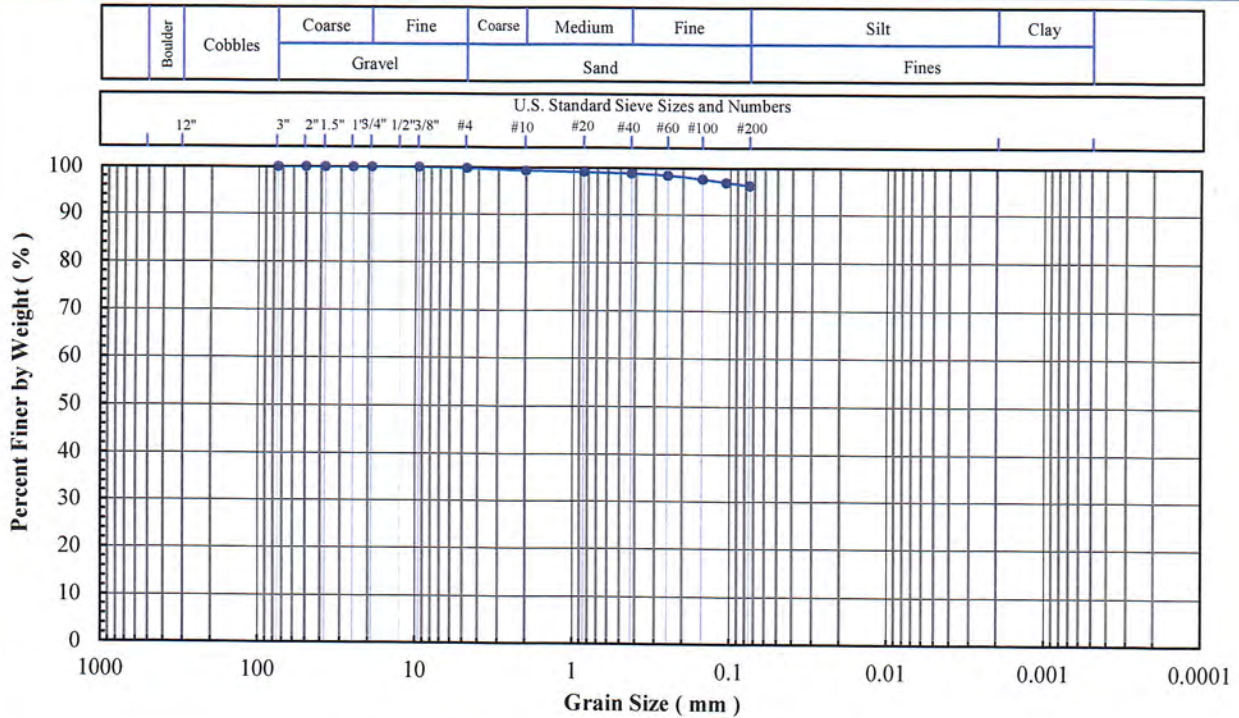
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-1 (3')  
Lab Sample No: 20L186

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

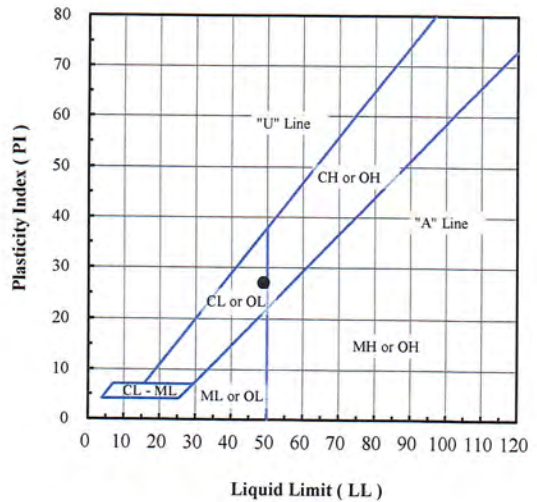


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	99.0
#40	0.425	98.7
#60	0.250	98.3
#100	0.150	97.5
#140	0.106	96.8
#200	0.075	96.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	3.7
Fines (%):	96.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-1 (3')	20L186	22.6	96.1	49	22	27	CL - Lean clay

Note(s):

01-25-2021  
AA1/MSR





**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

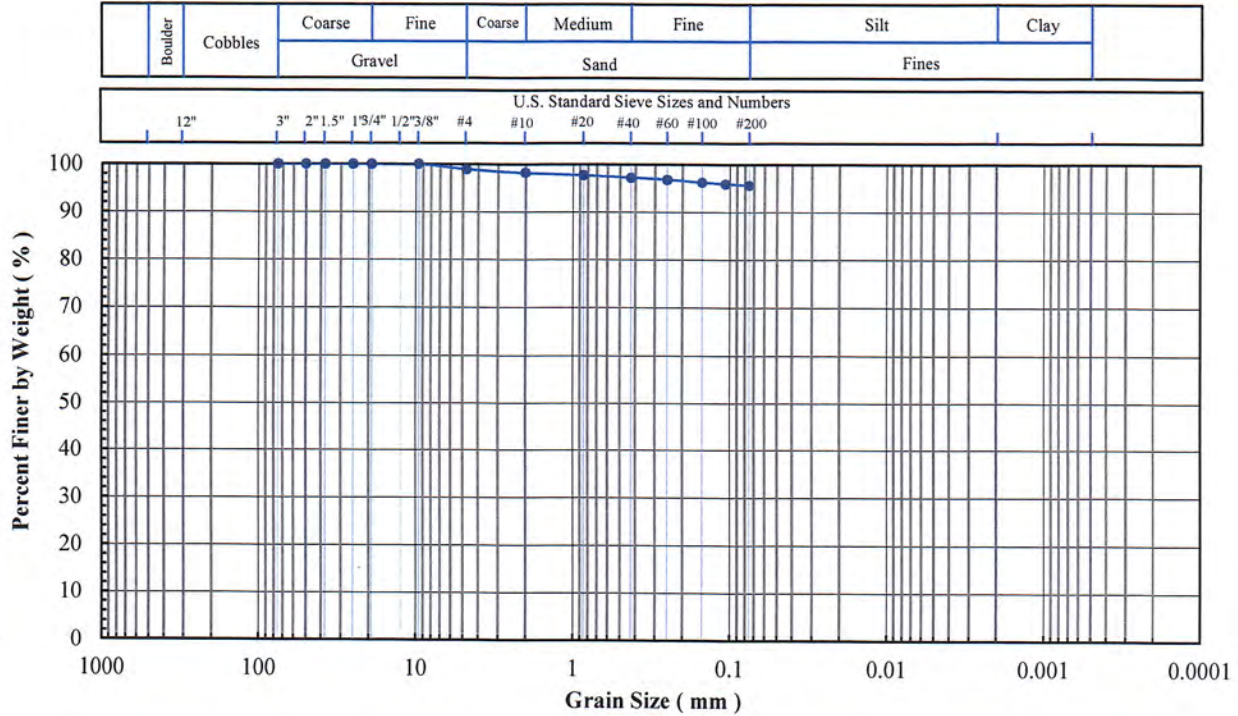
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B1-6 (25')  
Lab Sample No: 20L191

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

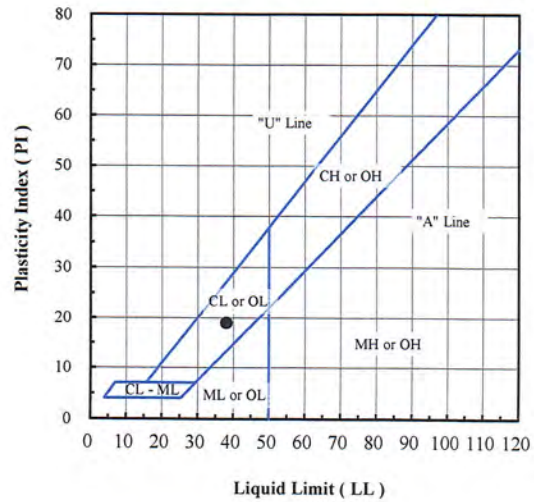


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	98.2
#20	0.850	97.7
#40	0.425	97.2
#60	0.250	96.8
#100	0.150	96.2
#140	0.106	95.9
#200	0.075	95.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	3.3
Fines (%):	95.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-6 (25')	20L191	35.5	95.6	38	19	19	CL - Lean clay

Note(s):

01-26-2021  
AAi NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

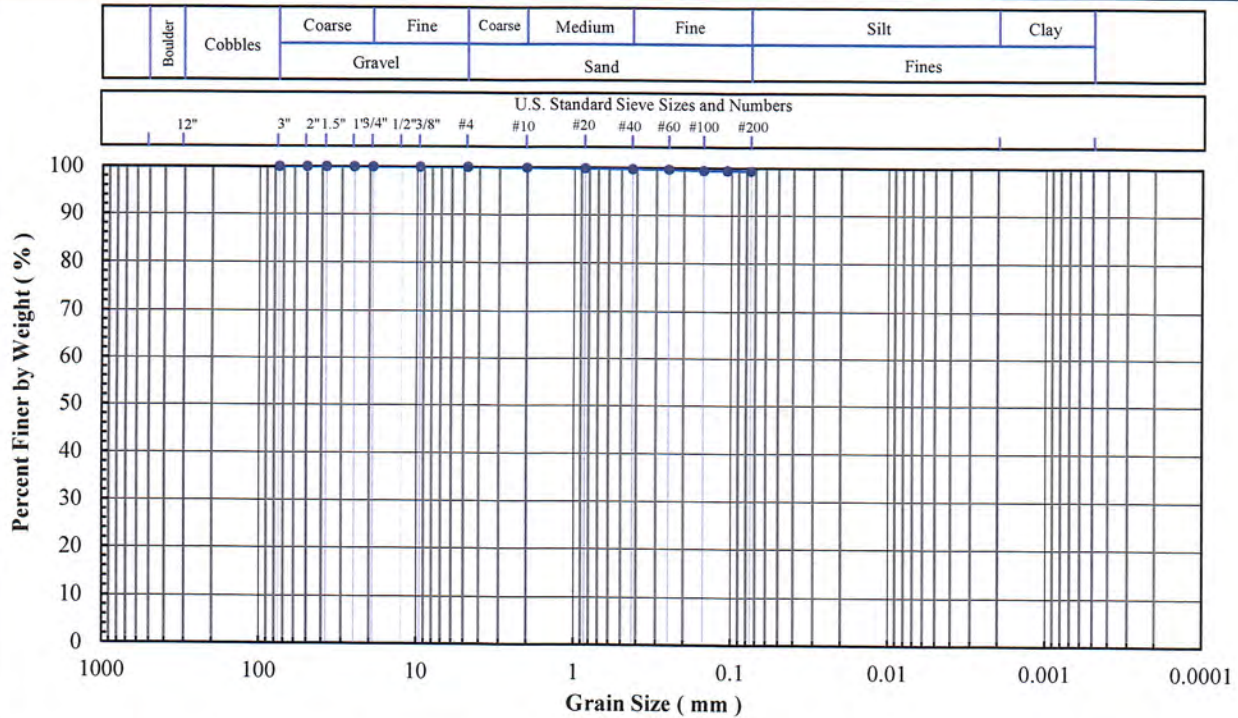
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-9 (48')  
 Lab Sample No: 20L194

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

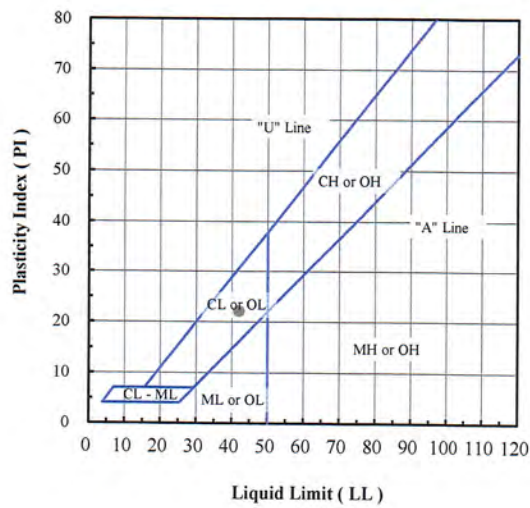


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.6
#100	0.150	99.4
#140	0.106	99.4
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-9 (48')	20L194	39.5	99.3	42	20	22	CL - Lean clay

Note(s):

01-21-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

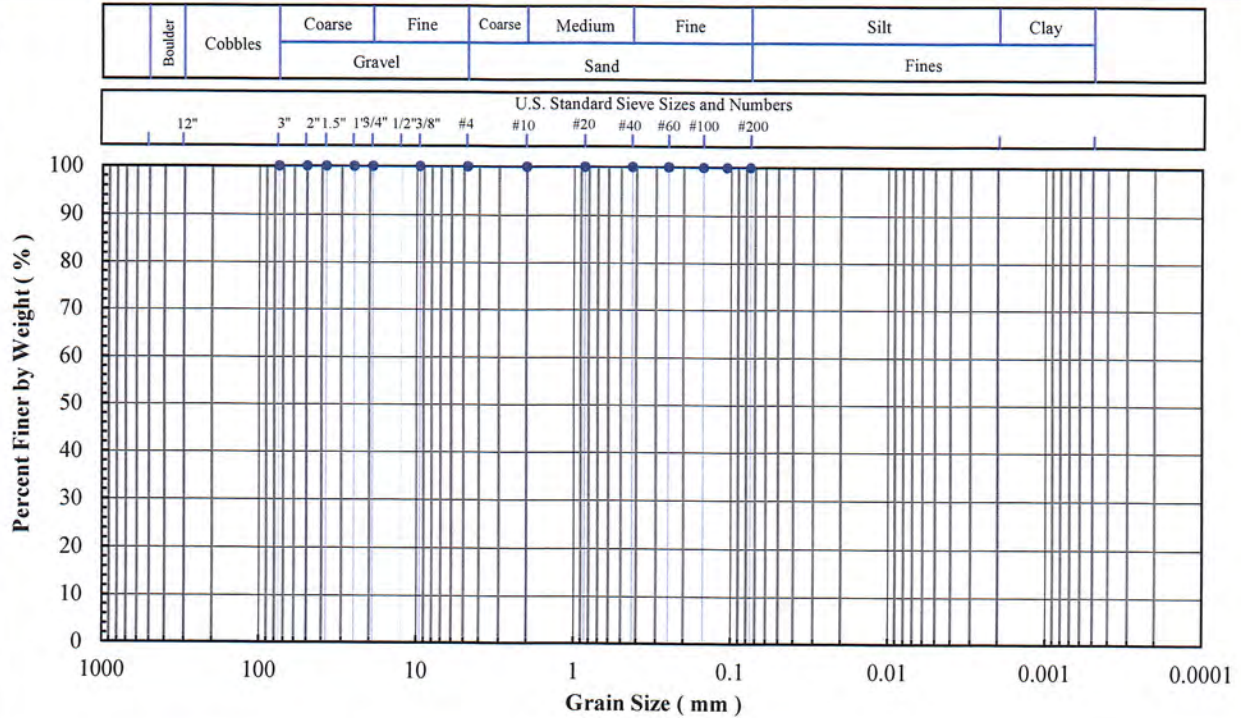
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-11 (59')  
Lab Sample No: 20L196

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

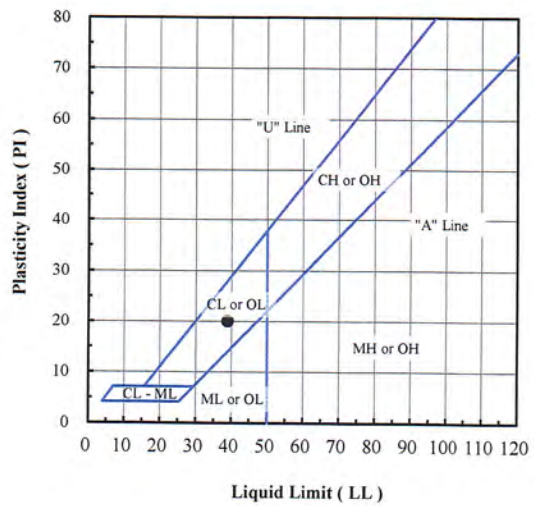


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	100.0
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-11 (59')	20L196	36.8	99.9	39	19	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, NSR



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953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

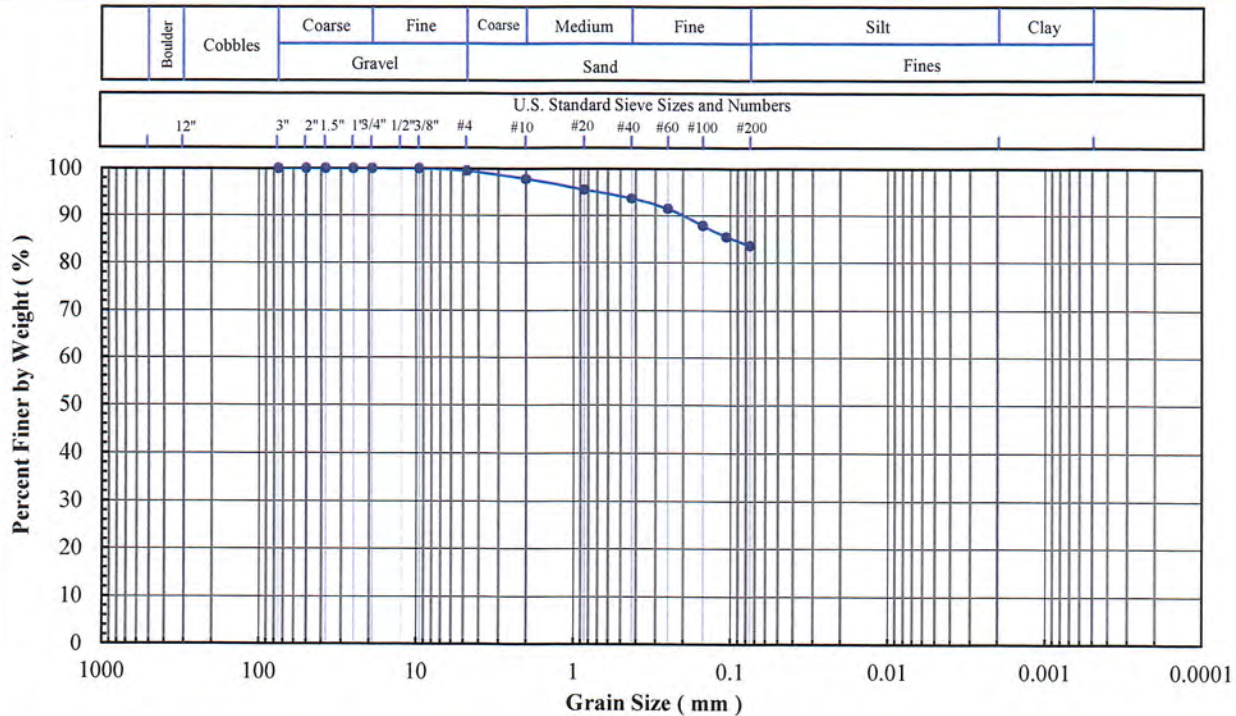
Client Sample ID: B1-14 (80')

Lab Sample No: 20L199

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

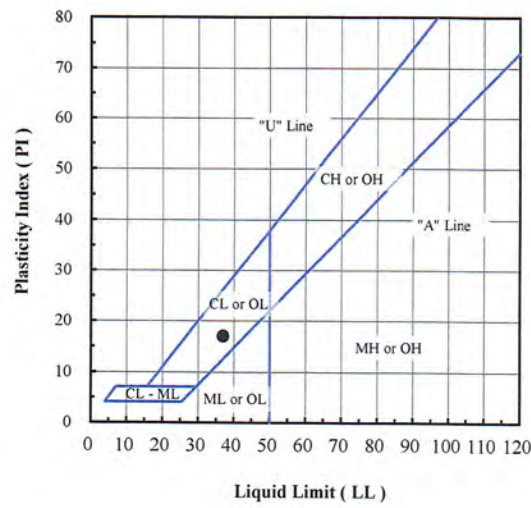


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.8
#20	0.850	95.5
#40	0.425	93.6
#60	0.250	91.4
#100	0.150	87.8
#140	0.106	85.4
#200	0.075	83.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	16.0
Fines (%):	83.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-14 (80')	20L199	24.6	83.5	37	20	17	CL - Lean clay with sand

Note(s):

01-25-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

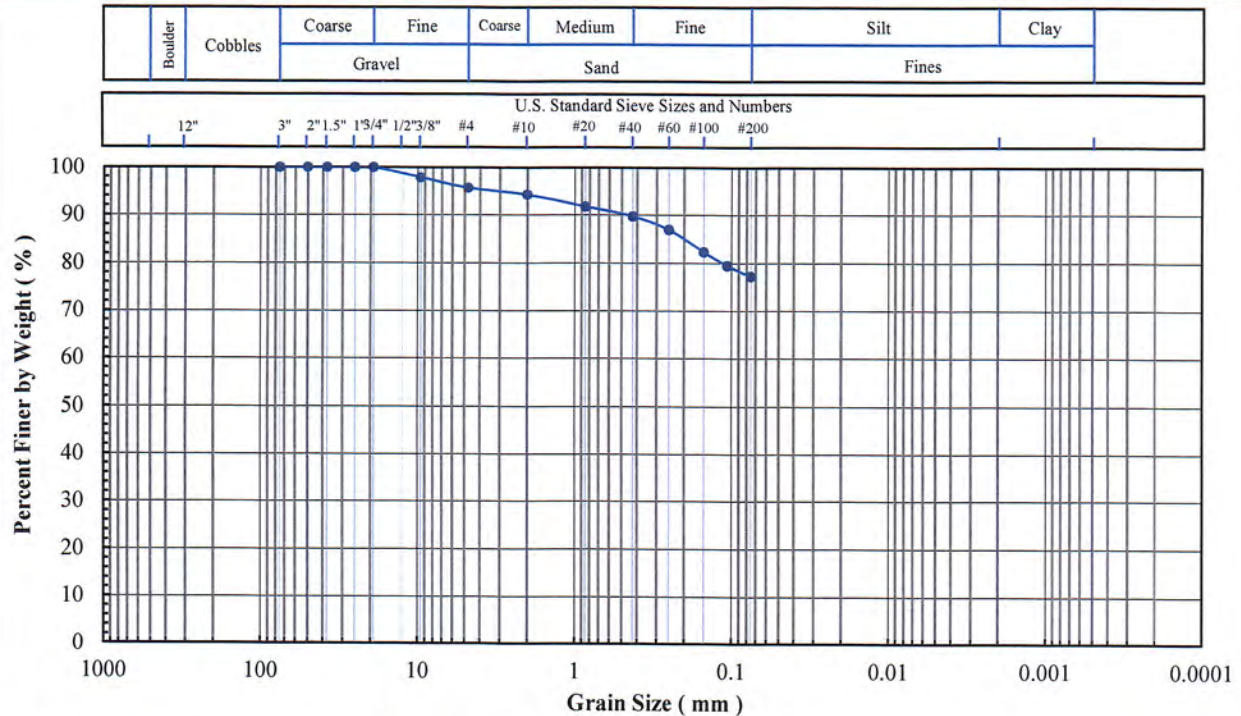
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Bell River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B1-16 (85')  
**Lab Sample No:** 20L201

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

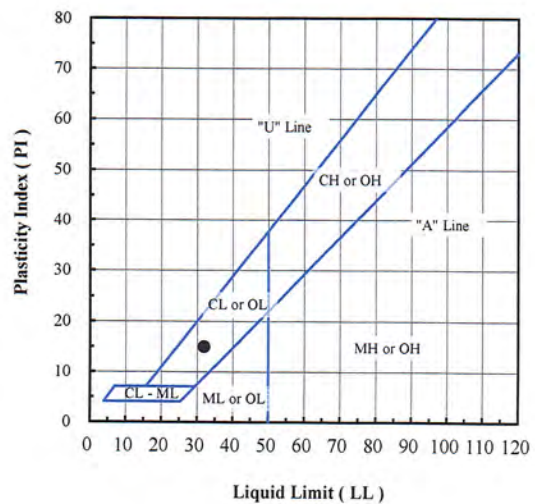


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	96
#10	2.00	94
#20	0.850	92
#40	0.425	90
#60	0.250	87
#100	0.150	82
#140	0.106	79
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	19
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-16 (85')	20L201	19.5	77	32	17	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

*01-26-2021  
AA1NSR*



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

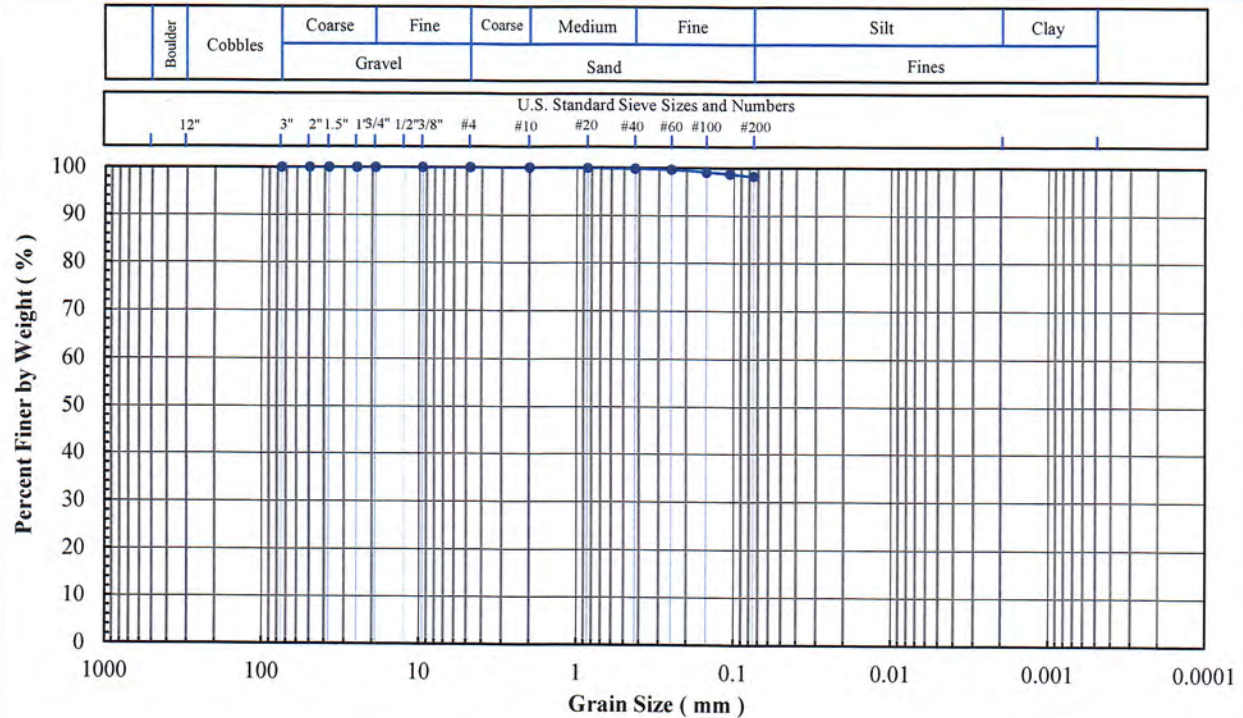
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, [www.excelgeotesting.com](http://www.excelgeotesting.com)

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-ST-1 (7-9)  
 Lab Sample No: 20L143

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

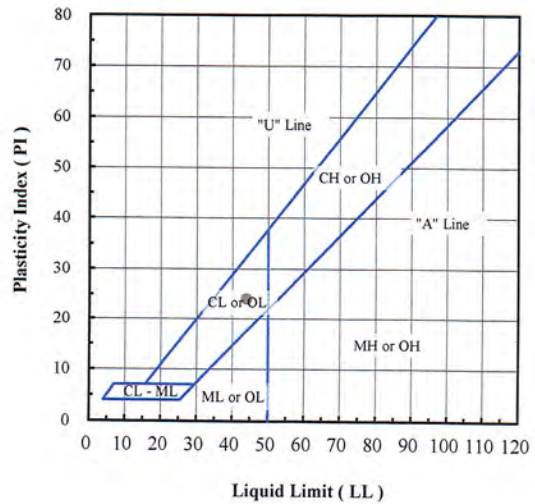


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	99.1
#140	0.106	98.7
#200	0.075	98.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	1.8
Fines (%):	98.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-1 (7-9)	20L143	22.7	98.2	44	20	24	CL - Lean clay

Note(s):

*02-01-2021  
 AA, NSB*



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

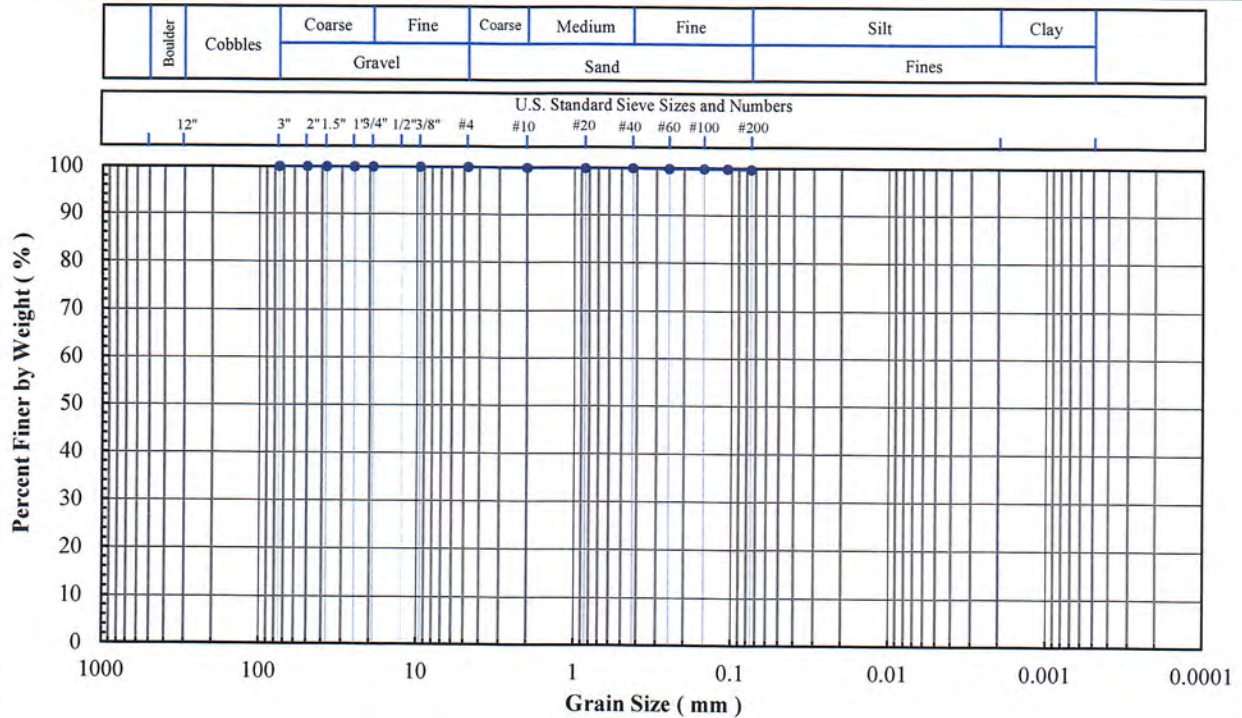
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B1-ST-3 (36-38')  
**Lab Sample No:** 20L145

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

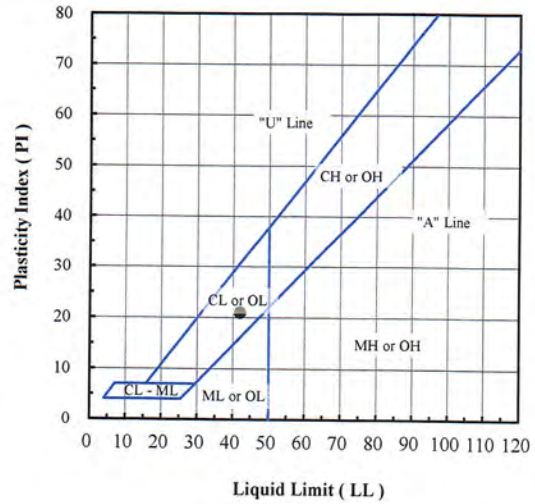


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.9
#40	0.425	99.9
#60	0.250	99.8
#100	0.150	99.8
#140	0.106	99.8
#200	0.075	99.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.3
Fines (%):	99.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (36-38')	20L145	35.2	99.7	42	21	21	CL - Lean clay

Note(s):

02-01-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

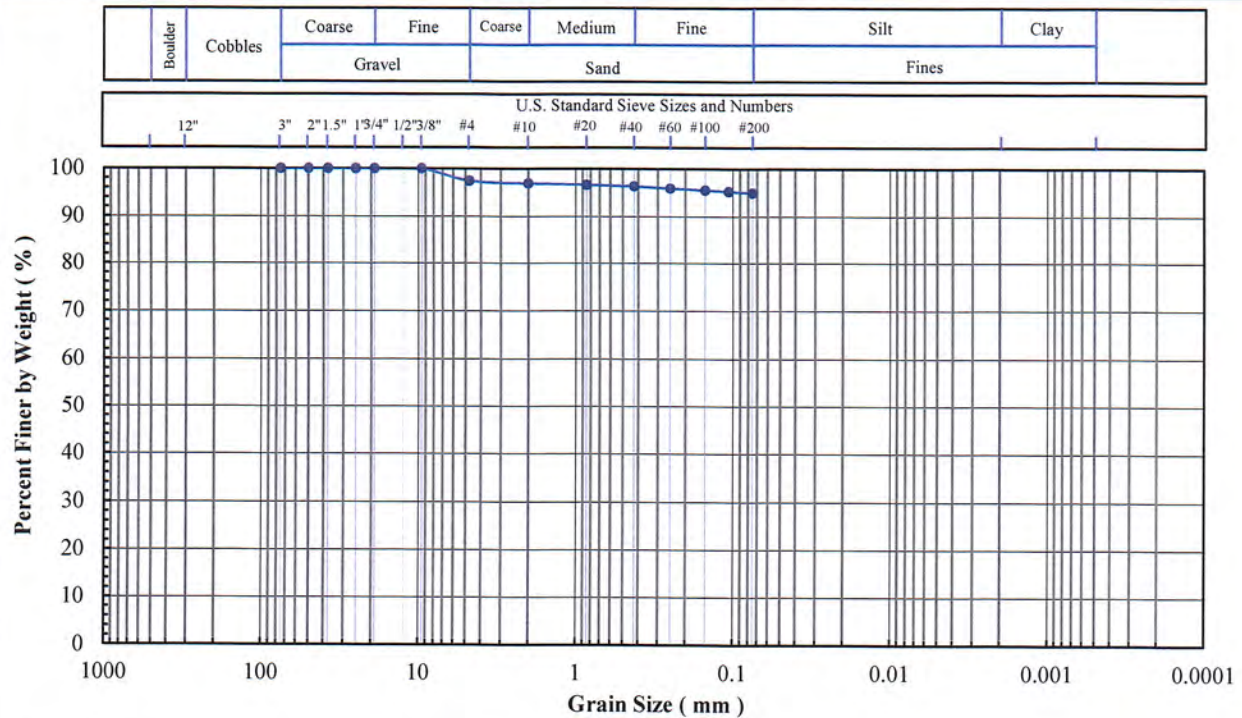
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-2 (5')  
Lab Sample No: 20L205

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

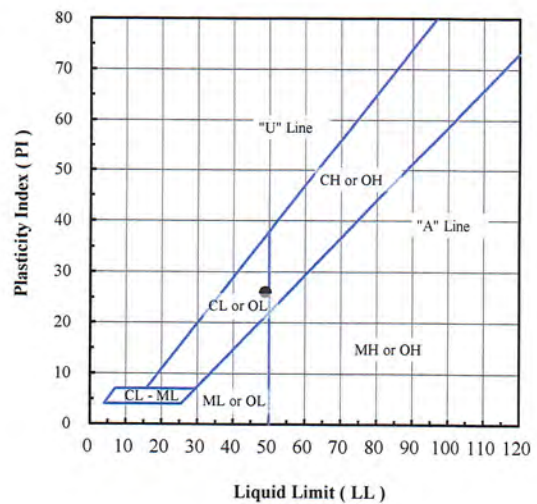


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	96.9
#20	0.850	96.6
#40	0.425	96.3
#60	0.250	95.9
#100	0.150	95.5
#140	0.106	95.2
#200	0.075	94.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	2.5
Fines (%):	94.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-2 (5')	20L205	26.9	94.9	49	23	26	CL - Lean clay

Note(s):

01-25-2021  
AA1NSR





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"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

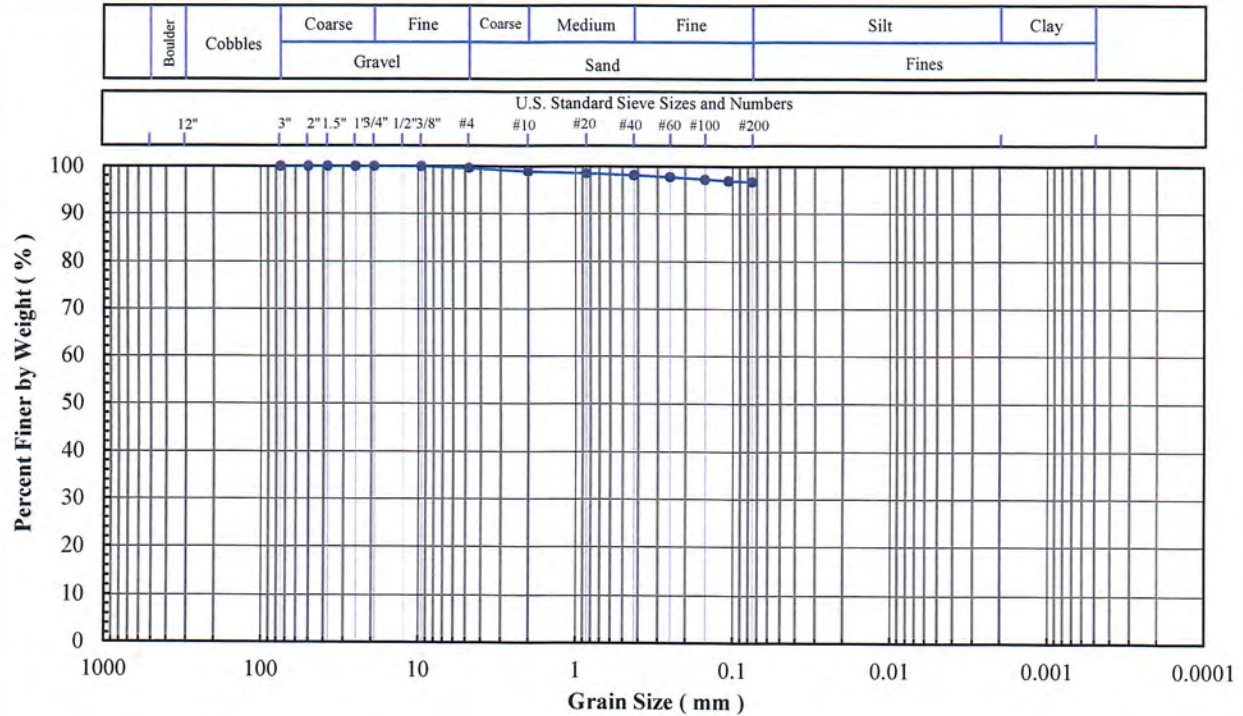
Client Sample ID: B2-5 (18')

Lab Sample No: 20L208

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

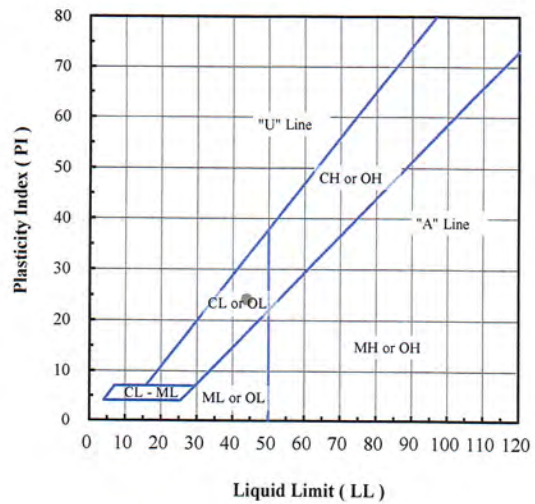


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	98.5
#40	0.425	98.1
#60	0.250	97.7
#100	0.150	97.2
#140	0.106	96.9
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	2.9
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-5 (18')	20L208	36.3	96.7	44	20	24	CL - Lean Clay

Note(s):

01-25-2021  
AA, N5R



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

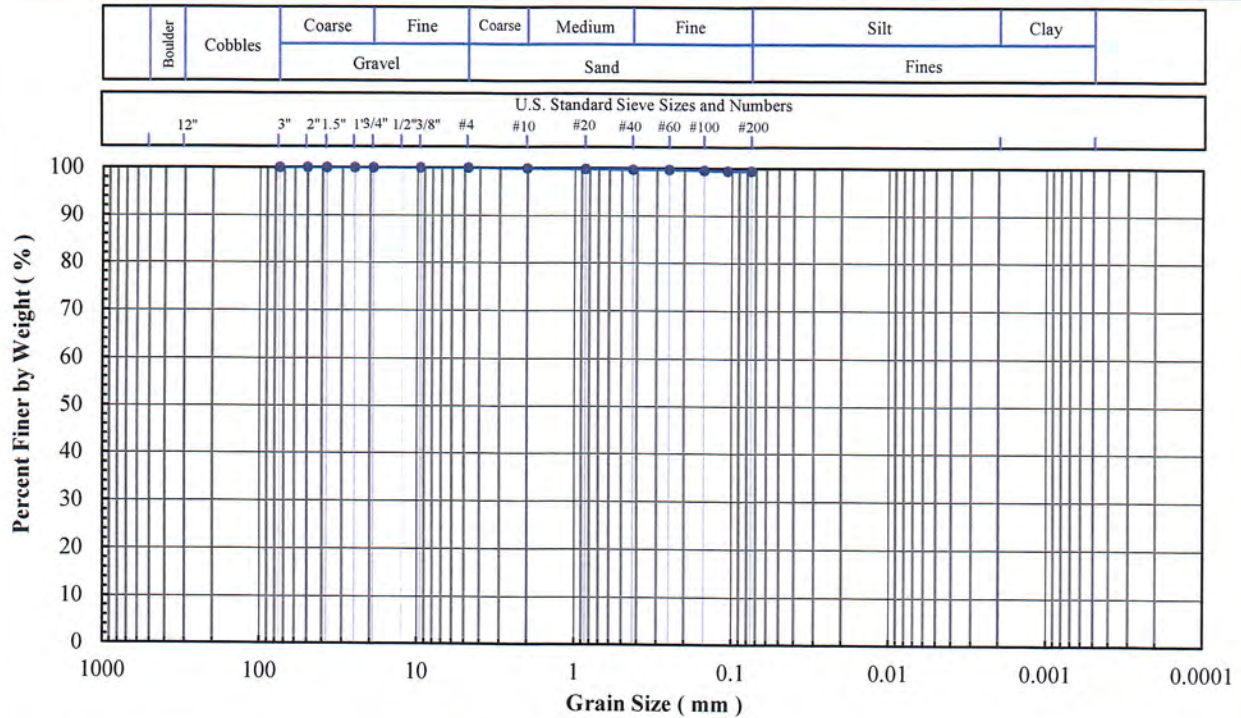
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-8 (40')  
Lab Sample No: 20L211

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

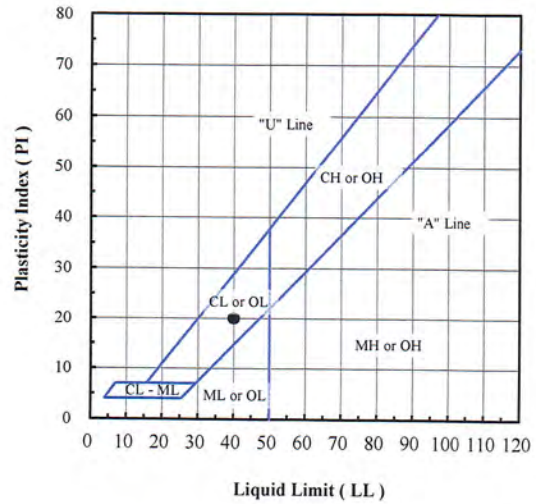


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.5
#140	0.106	99.4
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-8 (40')	20L211	37.5	99.4	40	20	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

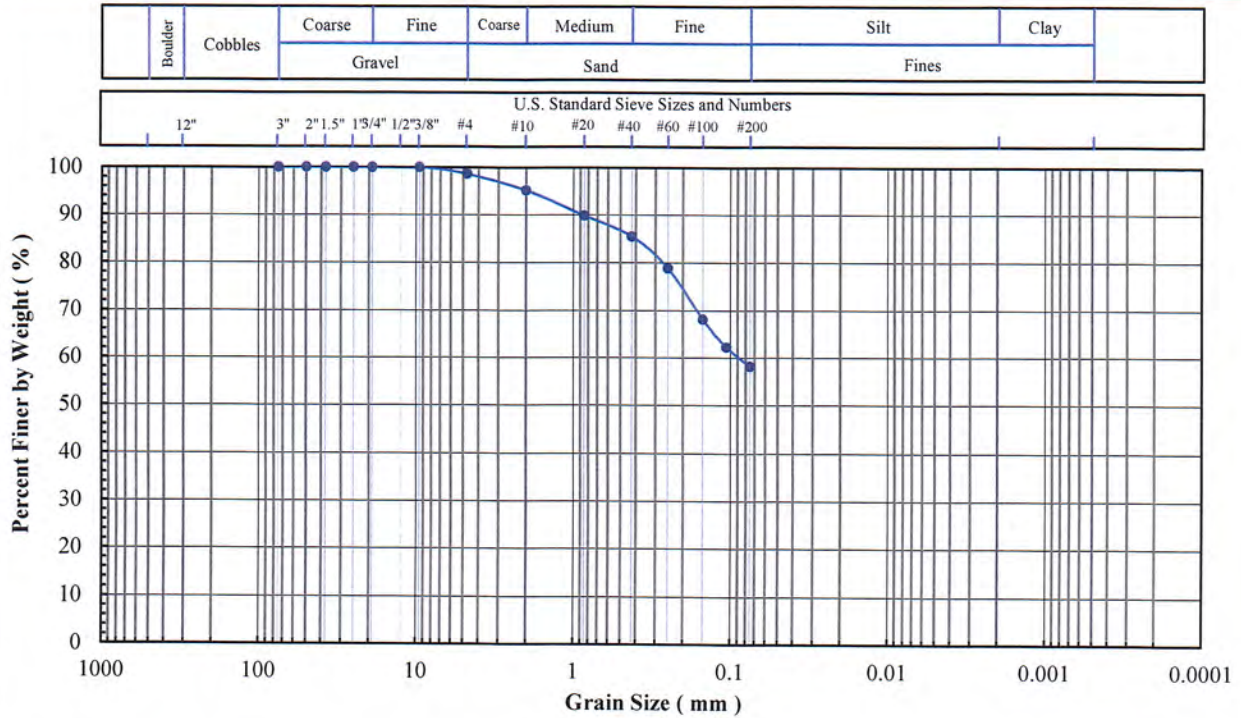
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-12 (60')  
Lab Sample No: 20L215

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

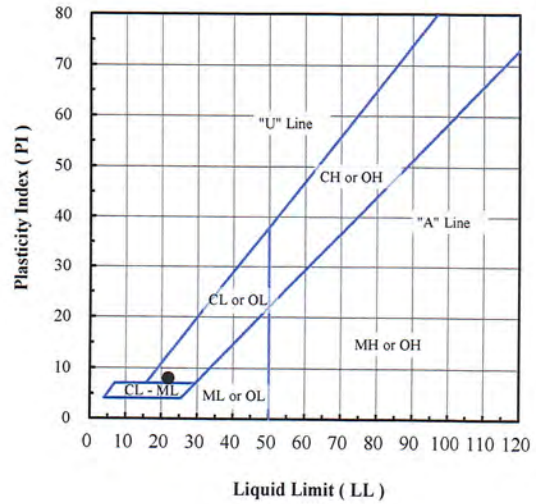


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	95.1
#20	0.850	89.8
#40	0.425	85.4
#60	0.250	78.8
#100	0.150	68.1
#140	0.106	62.2
#200	0.075	58.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	40.5
Fines (%):	58.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-12 (60')	20L215	17.4	58.1	22	14	8	CL - Sandy lean clay

Note(s):

01-25-2021  
AA1, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

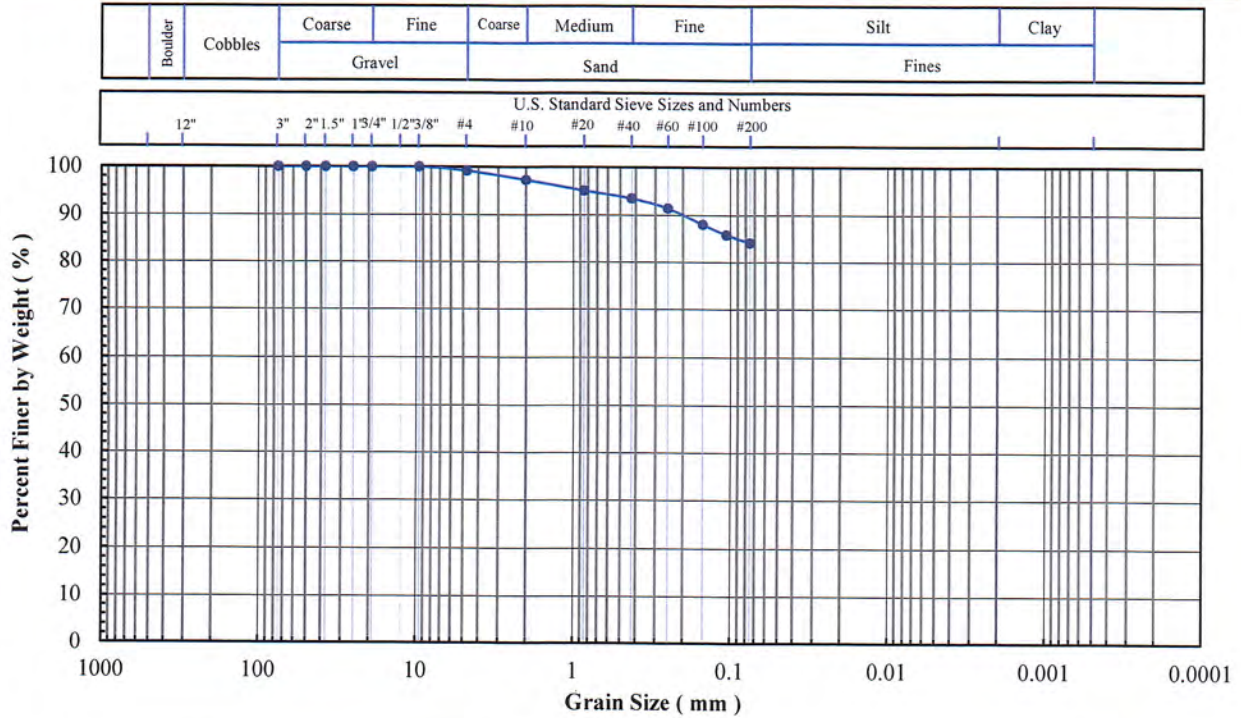
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-16 (80')  
 Lab Sample No: 20L219

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

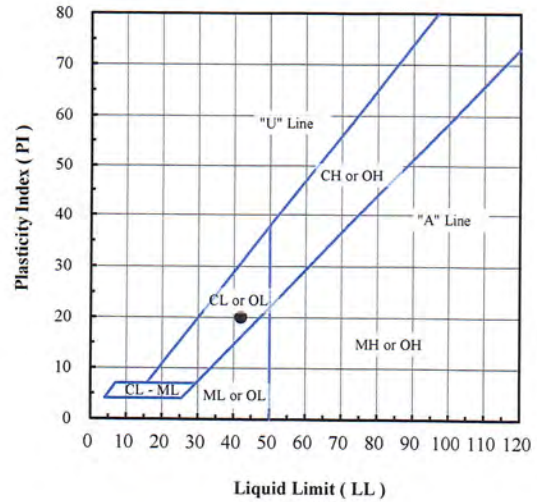


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	95.1
#40	0.425	93.5
#60	0.250	91.4
#100	0.150	88.0
#140	0.106	85.8
#200	0.075	84.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	15.1
Fines (%):	84.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-16 (80')	20L219	25.2	84.1	42	22	20	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA1 NSR



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 "Excellence in Testing"

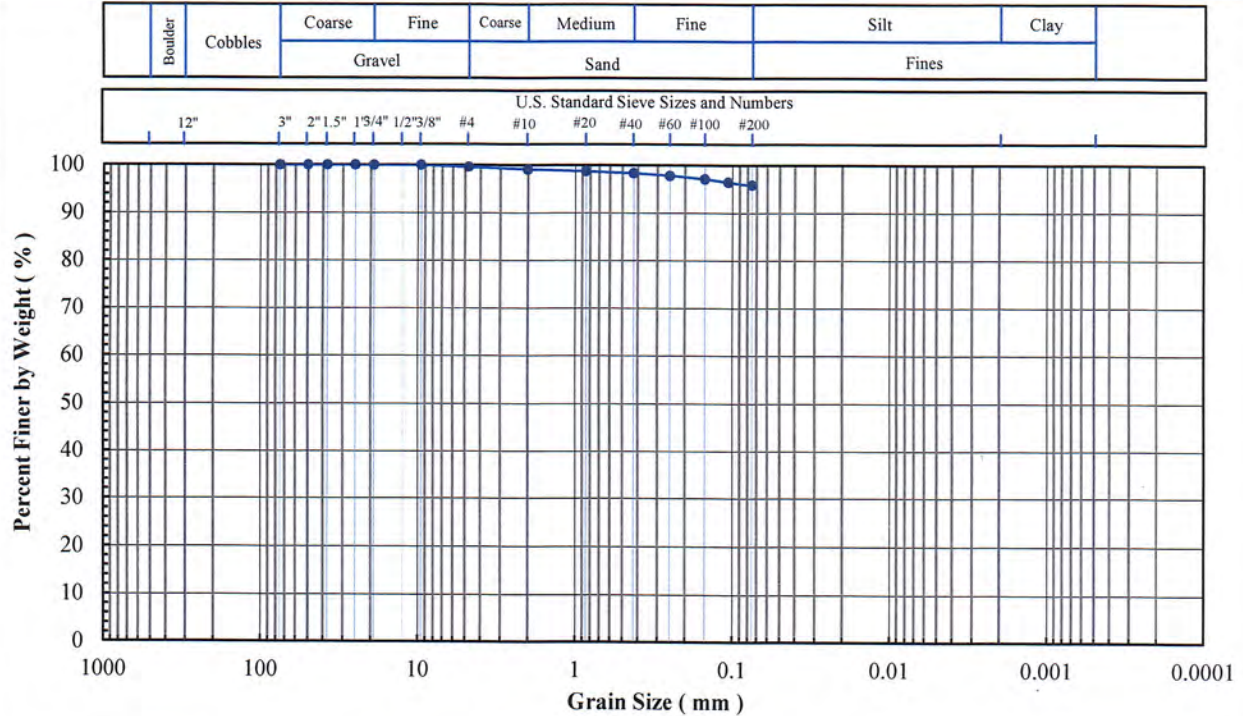
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-ST-1 (1-3')  
 Lab Sample No: 20L149

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

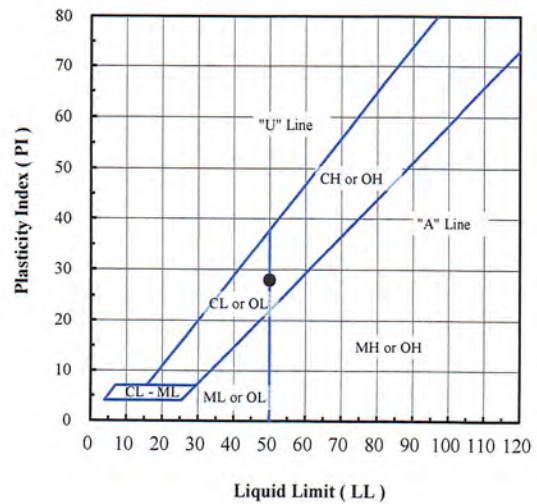


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	99.1
#20	0.850	98.7
#40	0.425	98.3
#60	0.250	97.8
#100	0.150	97.1
#140	0.106	96.4
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	3.8
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-ST-1 (1-3')	20L149	23.0	95.8	50	22	28	CL - Lean clay

Note(s):

02-01-2021  
 AA1NSA



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

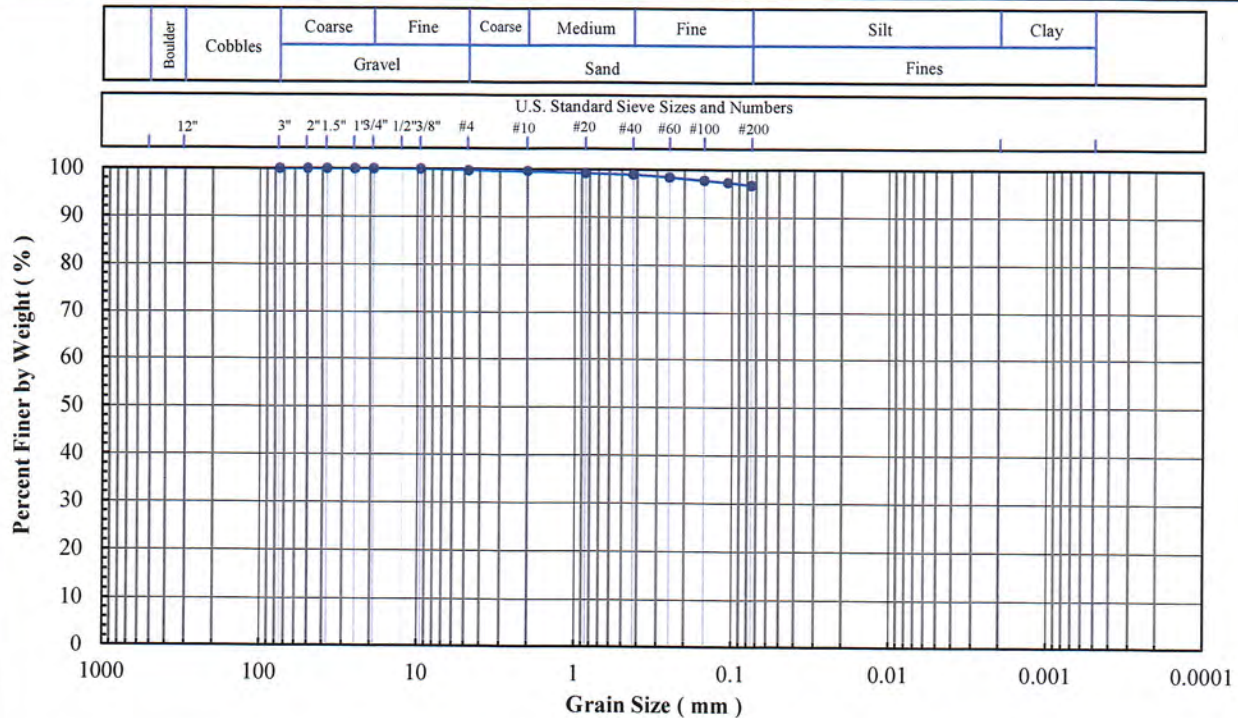
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-2 (5')  
 Lab Sample No: 20L224

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

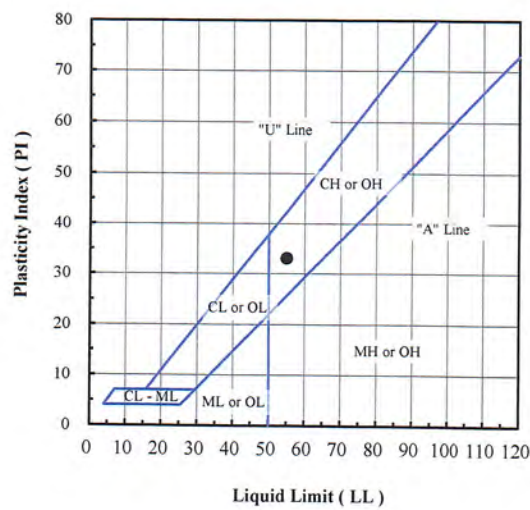


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.6
#20	0.850	99.2
#40	0.425	98.9
#60	0.250	98.4
#100	0.150	97.7
#140	0.106	97.3
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	3.0
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-2 (5')	20L224	24.1	96.7	55	22	33	CH - Fat clay

Note(s):

*01-25-2021  
 A.A. NSR*



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

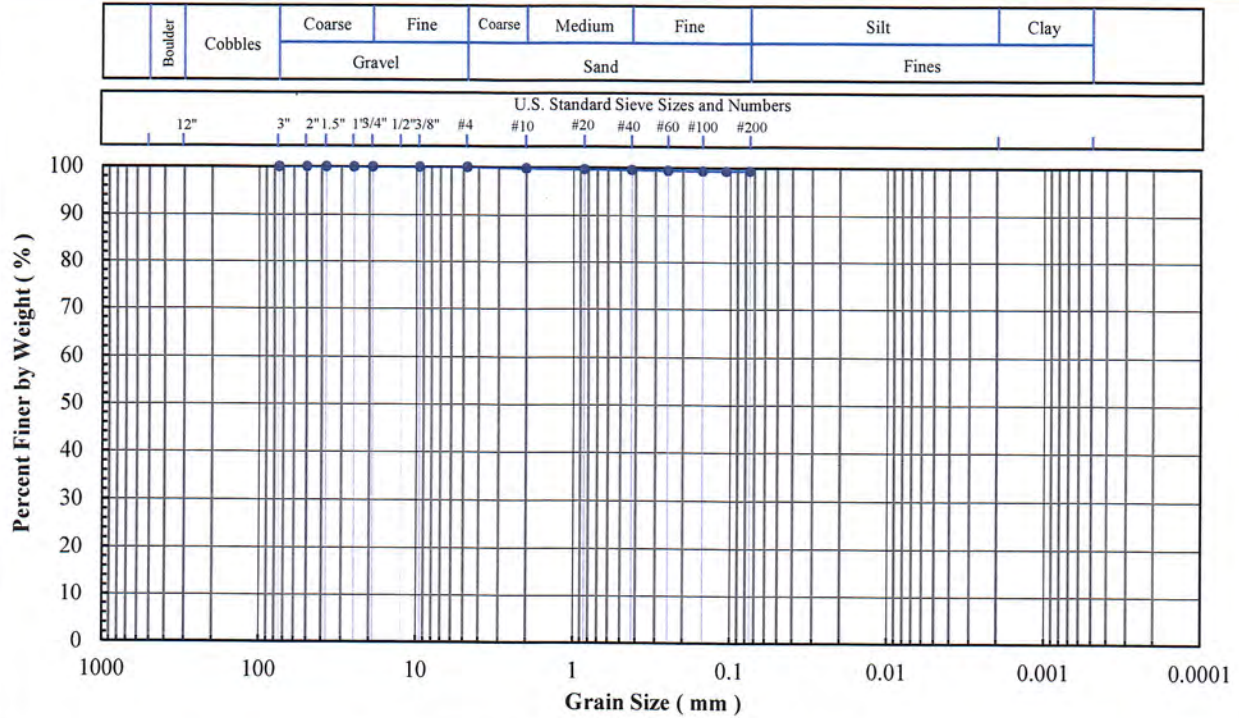
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-6 (25')  
 Lab Sample No: 20L228

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

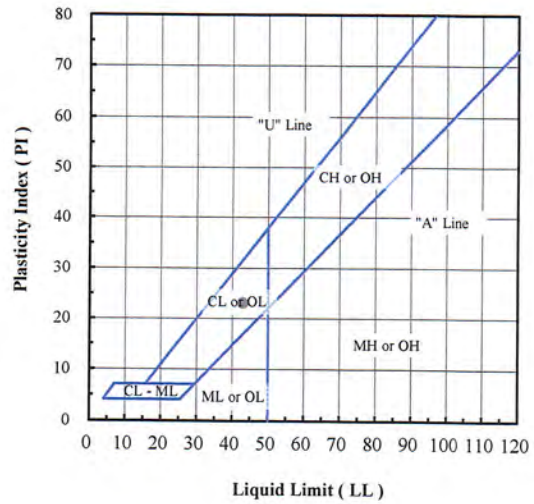


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.6
#40	0.425	99.5
#60	0.250	99.4
#100	0.150	99.3
#140	0.106	99.3
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (25')	20L228	37.7	99.3	43	20	23	CL - Lean clay

Note(s):

01-25-2021  
 AA, NSR



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953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

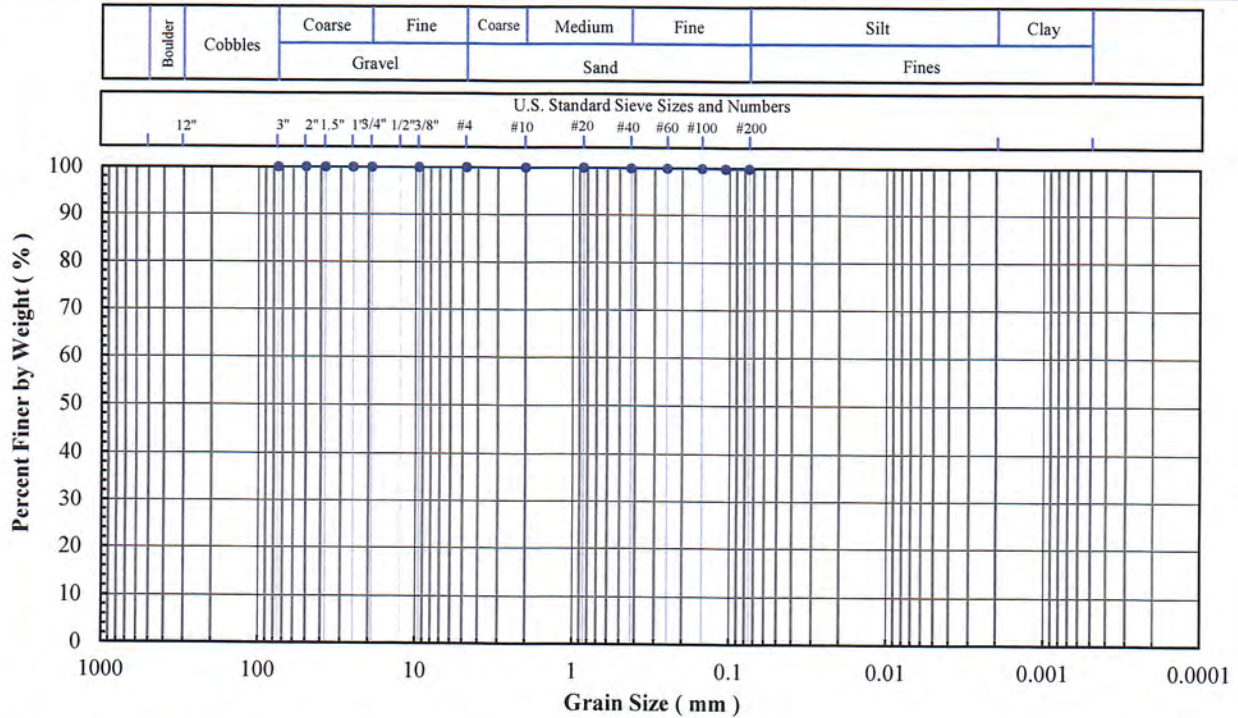
Client Sample ID: B3-10 (45')

Lab Sample No: 20L232

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

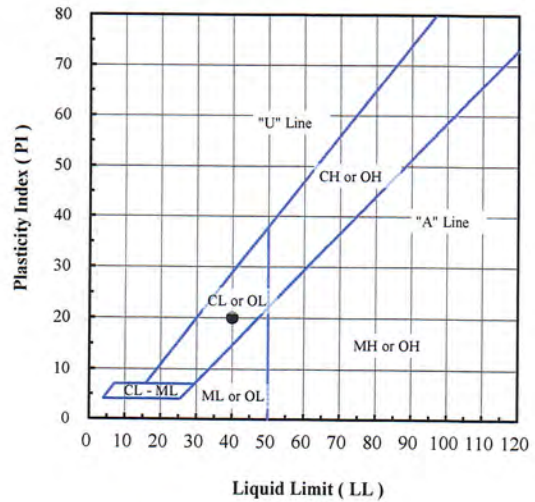


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.8
#200	0.075	99.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.2
Fines (%):	99.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-10 (45')	20L232	36.5	99.8	40	20	20	CL - Lean clay

Note(s):

*01-25-2021  
AA, NSK*





**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

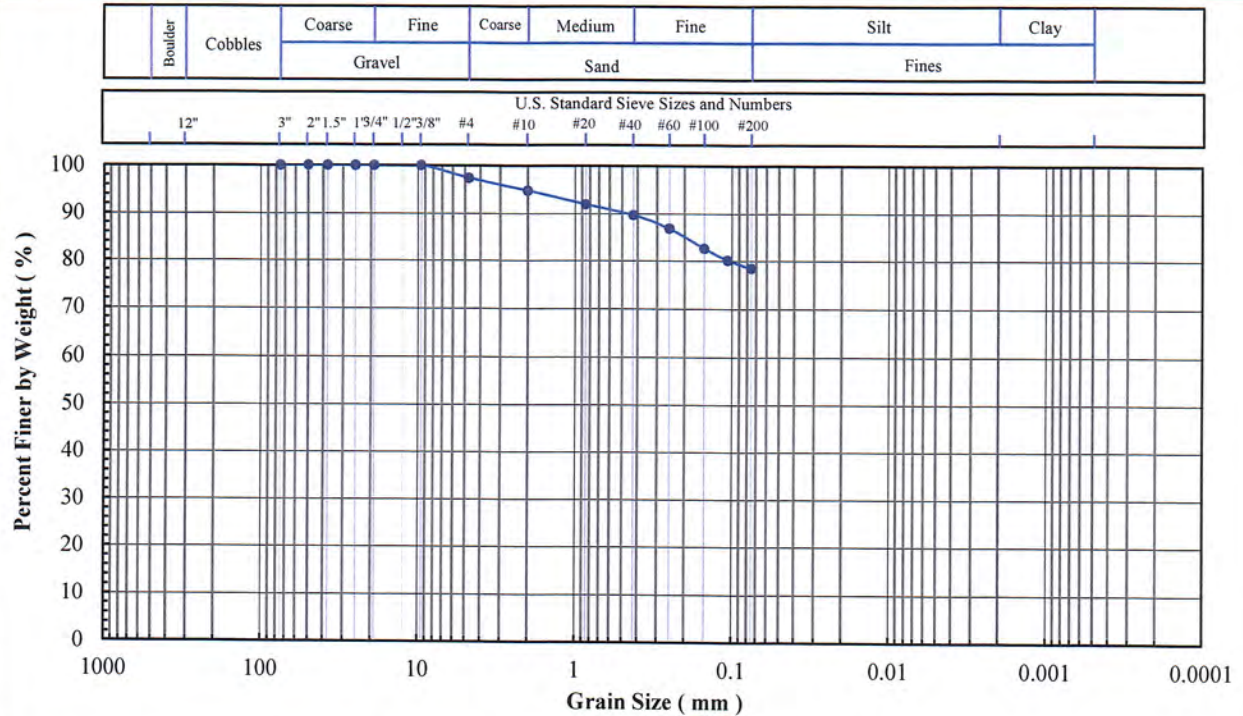
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-18 (85')  
Lab Sample No: 20L240

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

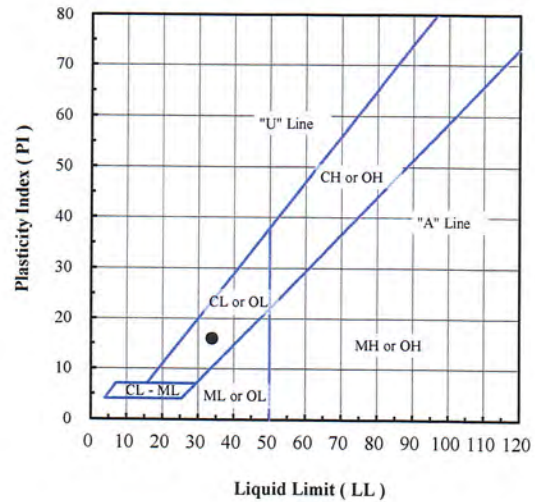


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	94.8
#20	0.850	91.9
#40	0.425	89.7
#60	0.250	86.8
#100	0.150	82.6
#140	0.106	80.1
#200	0.075	78.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	19.0
Fines (%):	78.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-18 (85')	20L240	21.9	78.4	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1159



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

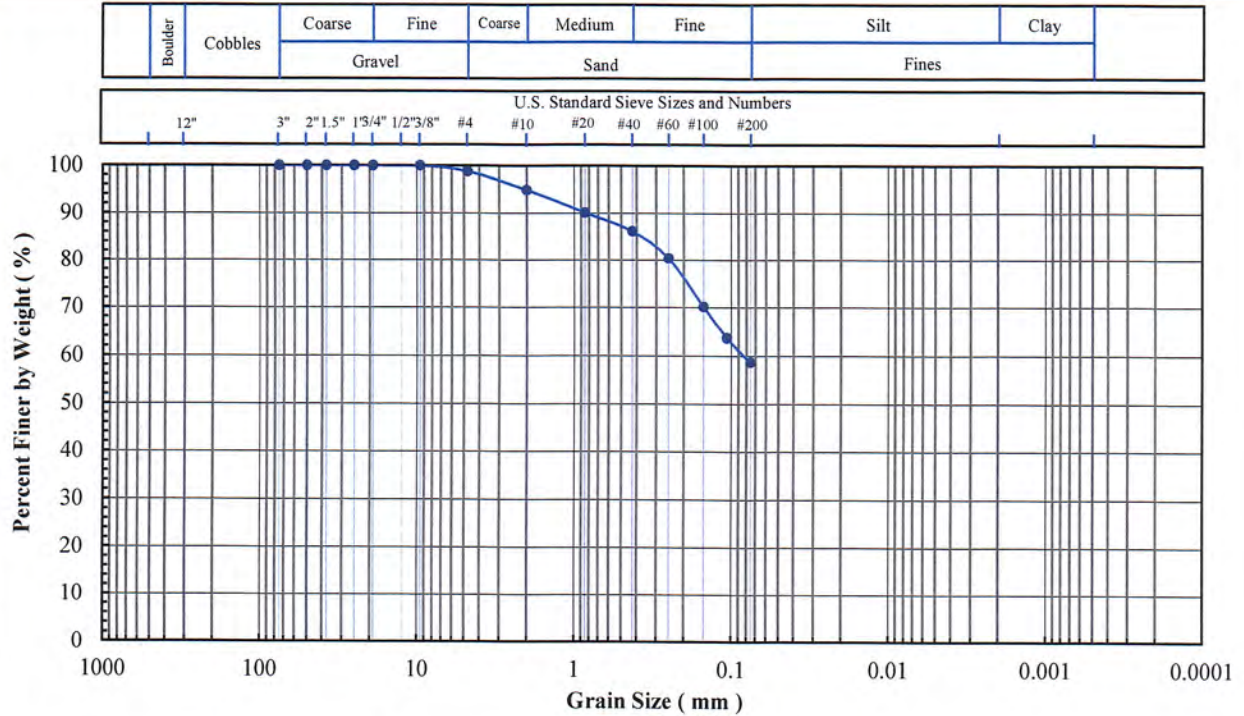
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B3-14 (67)  
Lab Sample No: 20L236

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

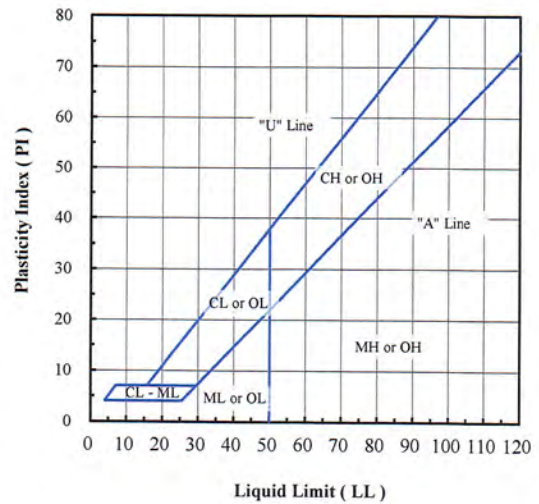


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	94.9
#20	0.850	90.1
#40	0.425	86.2
#60	0.250	80.4
#100	0.150	70.1
#140	0.106	63.7
#200	0.075	58.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	40.2
Fines (%):	58.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-14 (67)	20L236	15.2	58.6				

Note(s):

02-03-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

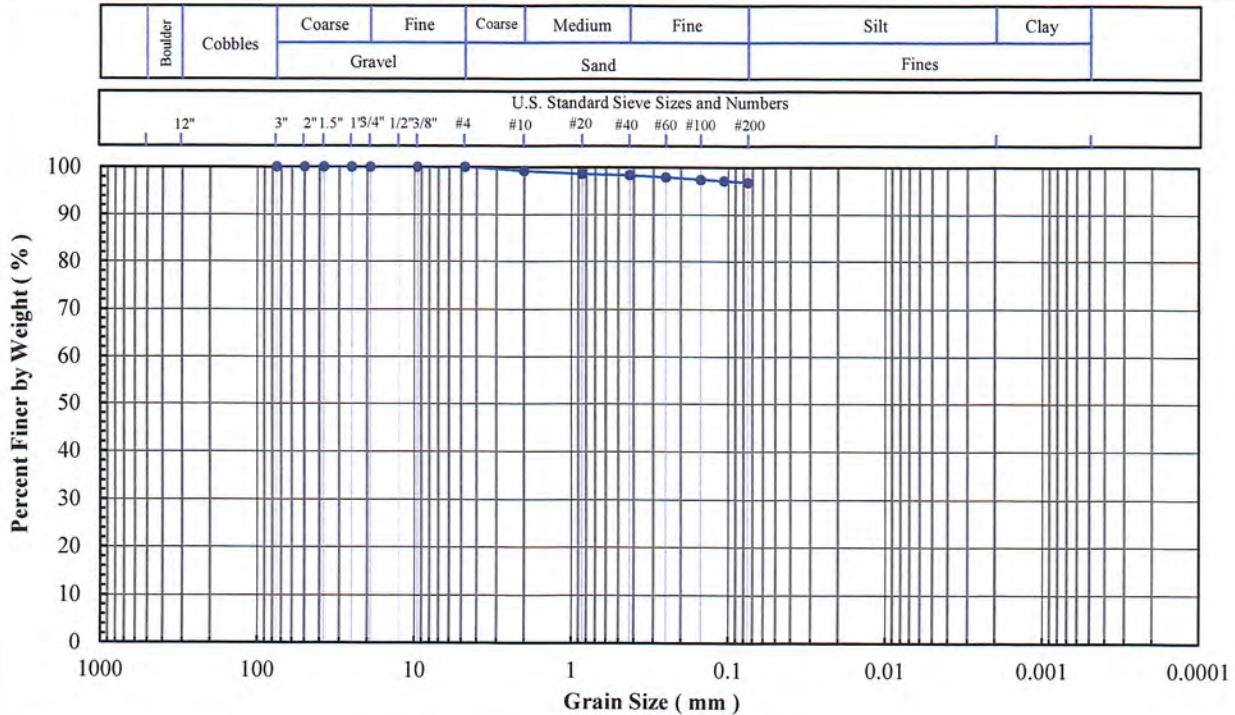
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-1 (10')  
Lab Sample No: 20L243

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

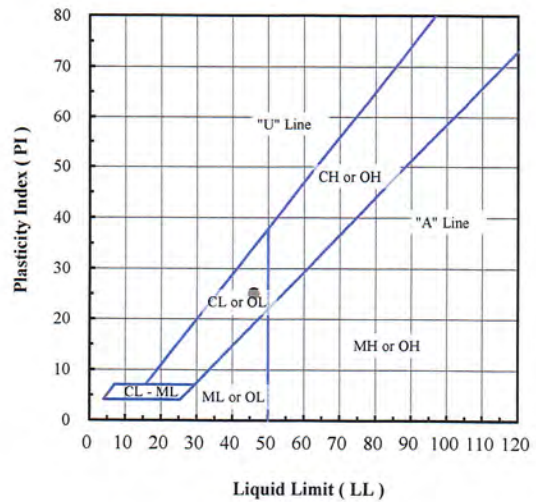


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.2
#20	0.850	98.6
#40	0.425	98.3
#60	0.250	97.9
#100	0.150	97.4
#140	0.106	97.1
#200	0.075	96.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	3.2
Fines (%):	96.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (10')	20L243	25.6	96.8	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

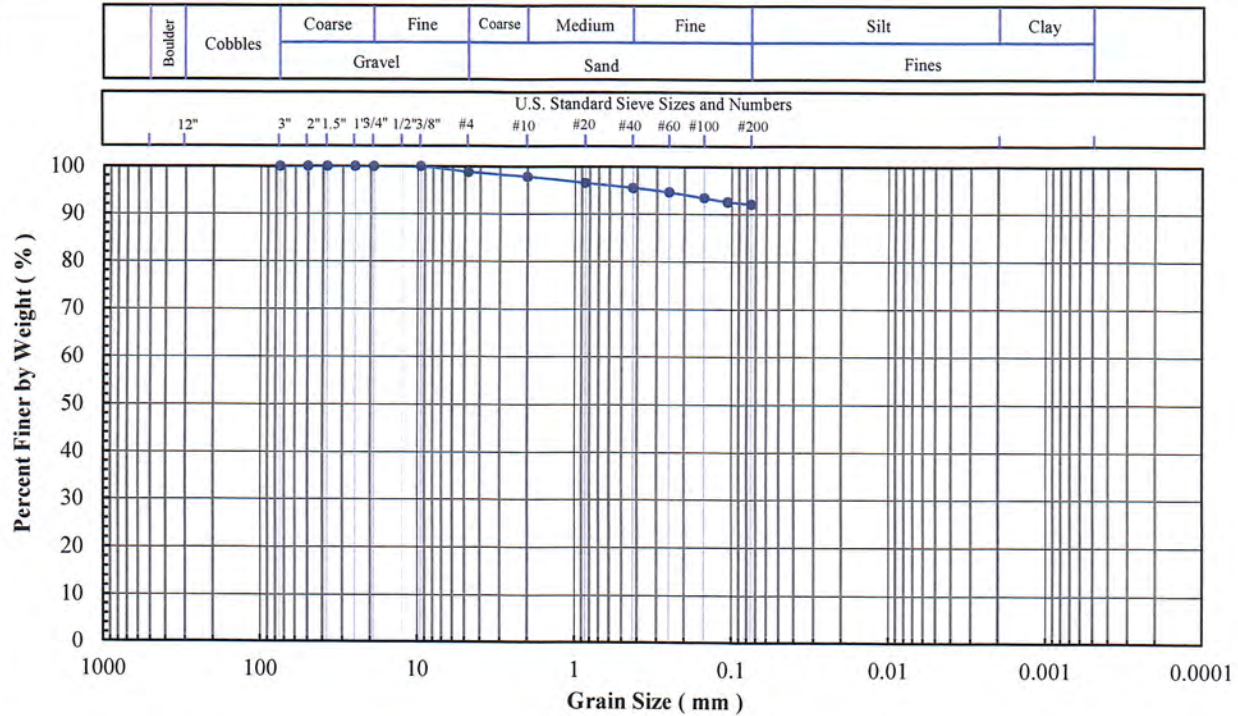
Client Sample ID: B4-7 (34')

Lab Sample No: 20L249

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

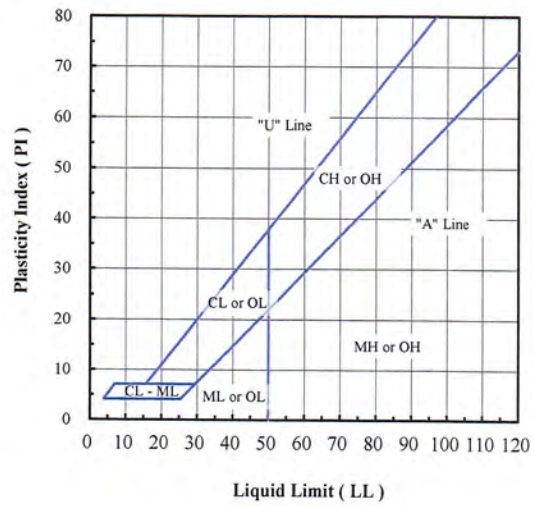


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.8
#20	0.850	96.4
#40	0.425	95.4
#60	0.250	94.5
#100	0.150	93.3
#140	0.106	92.5
#200	0.075	92.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	6.8
Fines (%):	92.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-7 (34')	20L249	33.9	92.0				

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

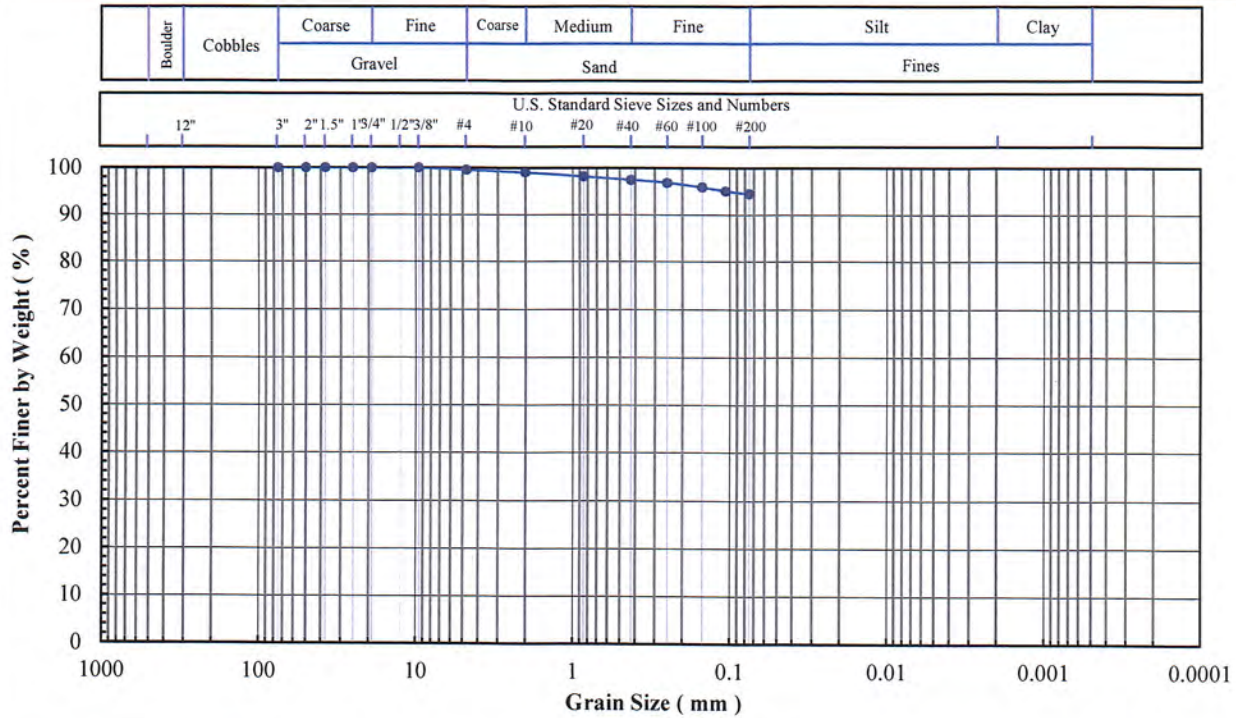
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-12 (55')  
Lab Sample No: 20L254

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

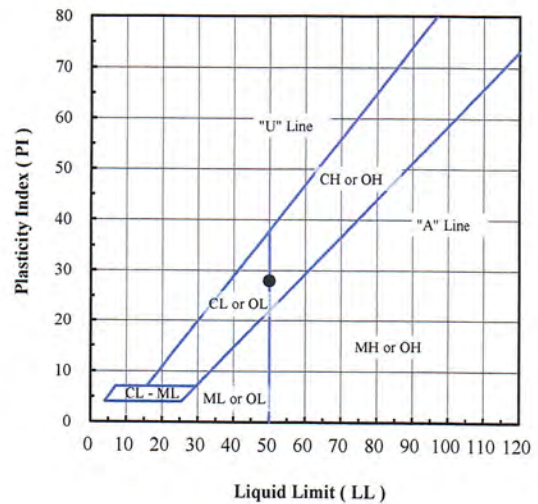


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	97.4
#60	0.250	96.8
#100	0.150	95.8
#140	0.106	95.0
#200	0.075	94.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	5.1
Fines (%):	94.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (55')	20L254	41.4	94.4	50	22	28	CH - Fat clay

Note(s):

01-25-2021  
AA1NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

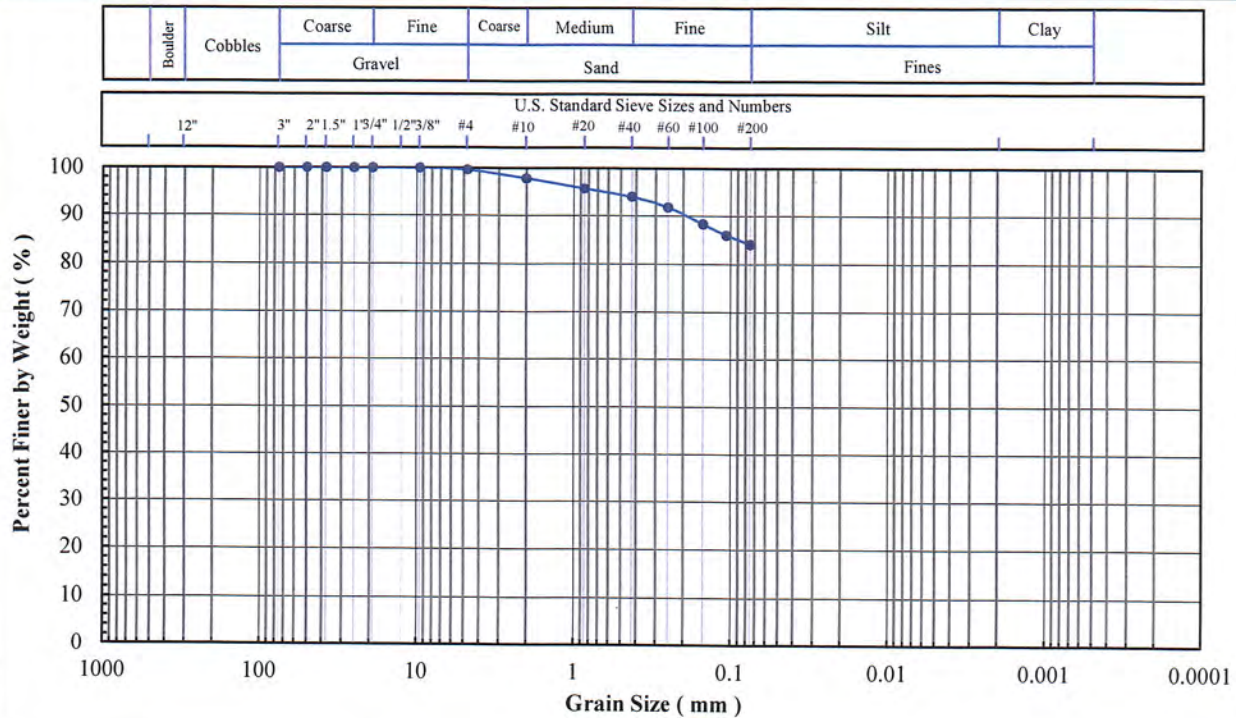
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-16 (75')  
Lab Sample No: 20L258

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

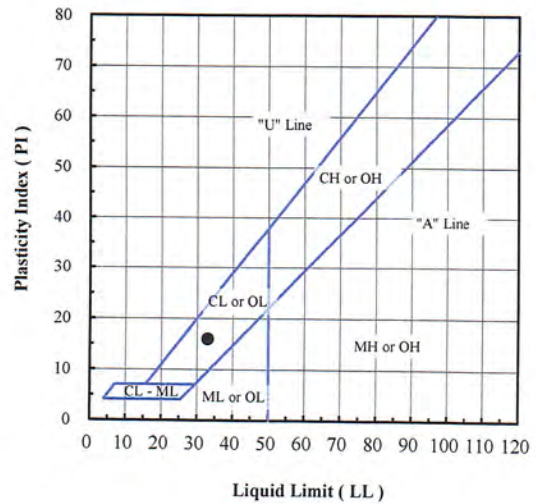


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	97.8
#20	0.850	95.6
#40	0.425	93.9
#60	0.250	91.7
#100	0.150	88.2
#140	0.106	85.9
#200	0.075	84.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	15.6
Fines (%):	84.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-16 (75')	20L258	24.0	84.0	33	17	16	CL - Lean clay with sand

Note(s):

*01-25-2021  
AA, NJSR*



**Excel Geotechnical Testing, Inc.**  
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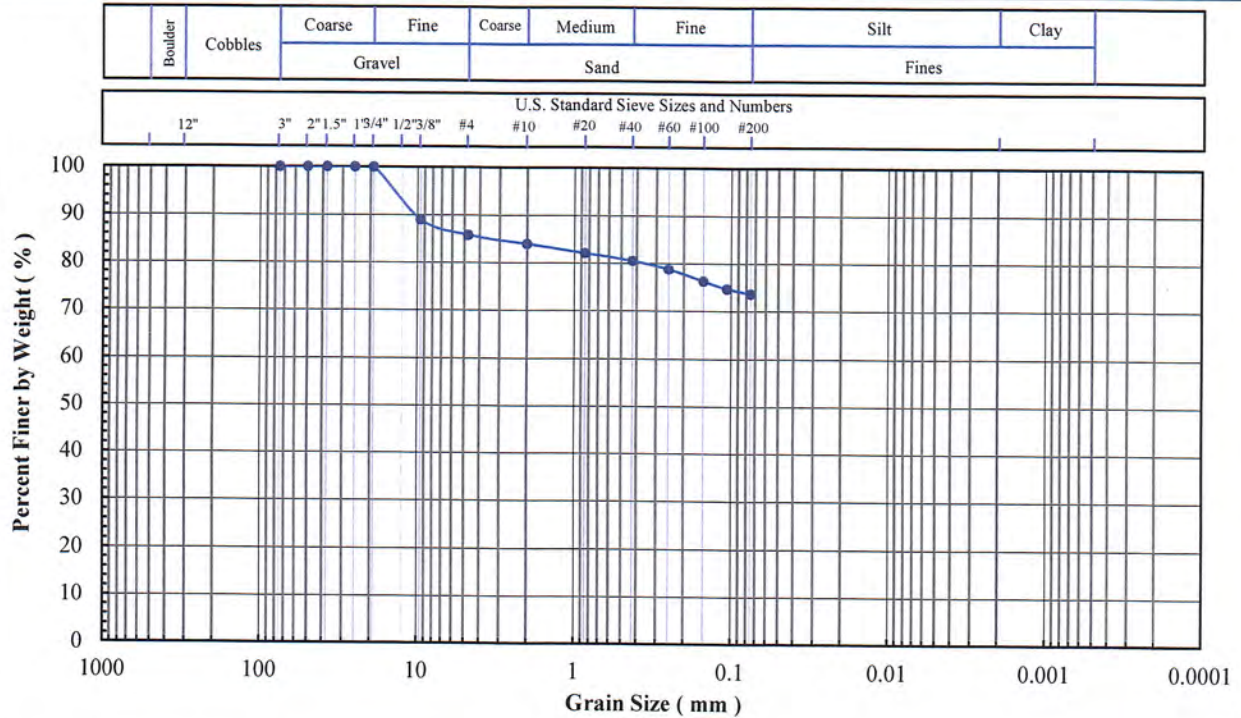
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B4-20 (95')  
 Lab Sample No: 20L262

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

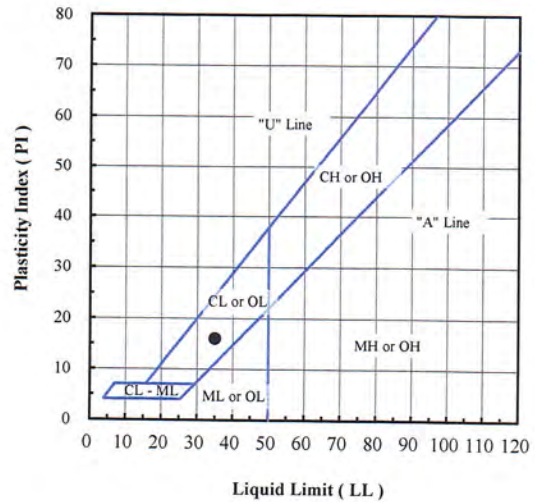


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	89
#4	4.75	86
#10	2.00	84
#20	0.850	82
#40	0.425	81
#60	0.250	79
#100	0.150	76
#140	0.106	75
#200	0.075	74

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	14
Sand (%):	12
Fines (%):	74
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-20 (95')	20L262	21.7	74	35	19	16	CL - Lean clay with gravel

Note(s): Sieve specimen was undersized.

01-25-2021  
AA1 NSR



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Project Name: Belle River ALD Support

Project No: PN1017

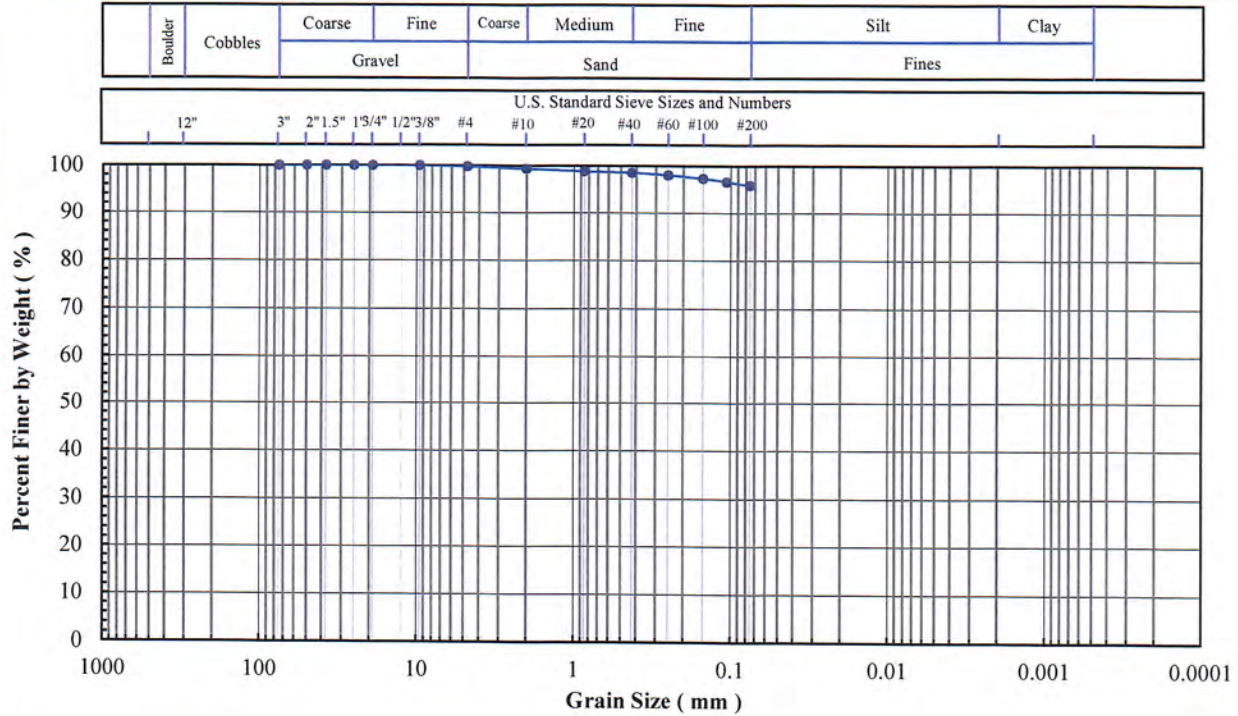
Client Sample ID: B5-1 (7')

Lab Sample No: 20L263

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

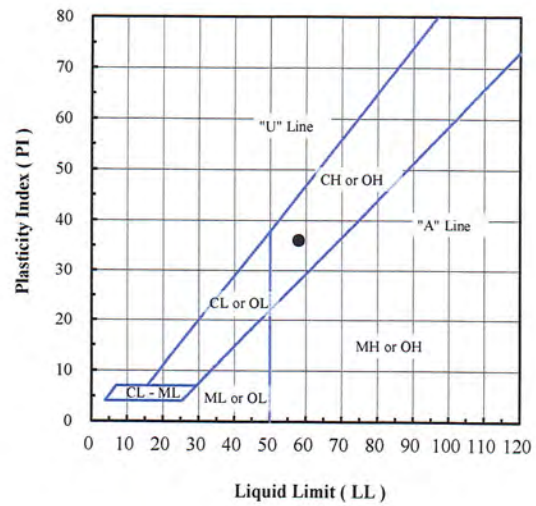


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	98.8
#40	0.425	98.5
#60	0.250	98.0
#100	0.150	97.3
#140	0.106	96.6
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	4.0
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-1 (7')	20L263	35.7	95.8	58	22	36	CH - Fat clay

Note(s):

01-25-2021  
AA, NSR





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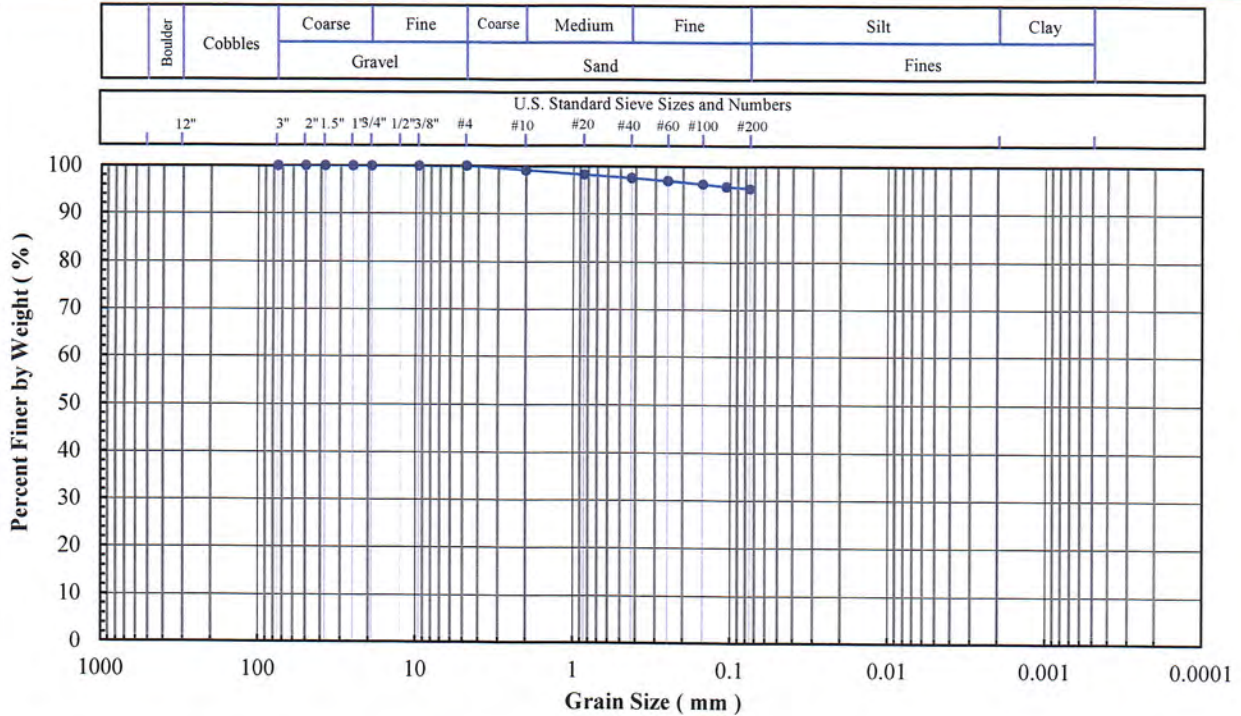
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-4 (29')  
Lab Sample No: 20L266

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

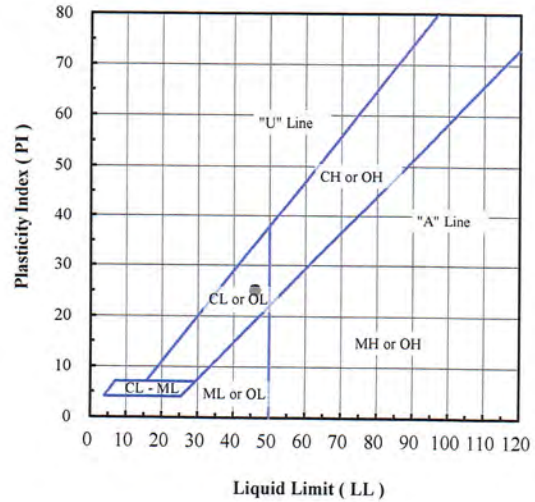


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.1
#20	0.850	98.2
#40	0.425	97.5
#60	0.250	96.9
#100	0.150	96.2
#140	0.106	95.7
#200	0.075	95.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	4.7
Fines (%):	95.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-4 (29')	20L266	39.1	95.3	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

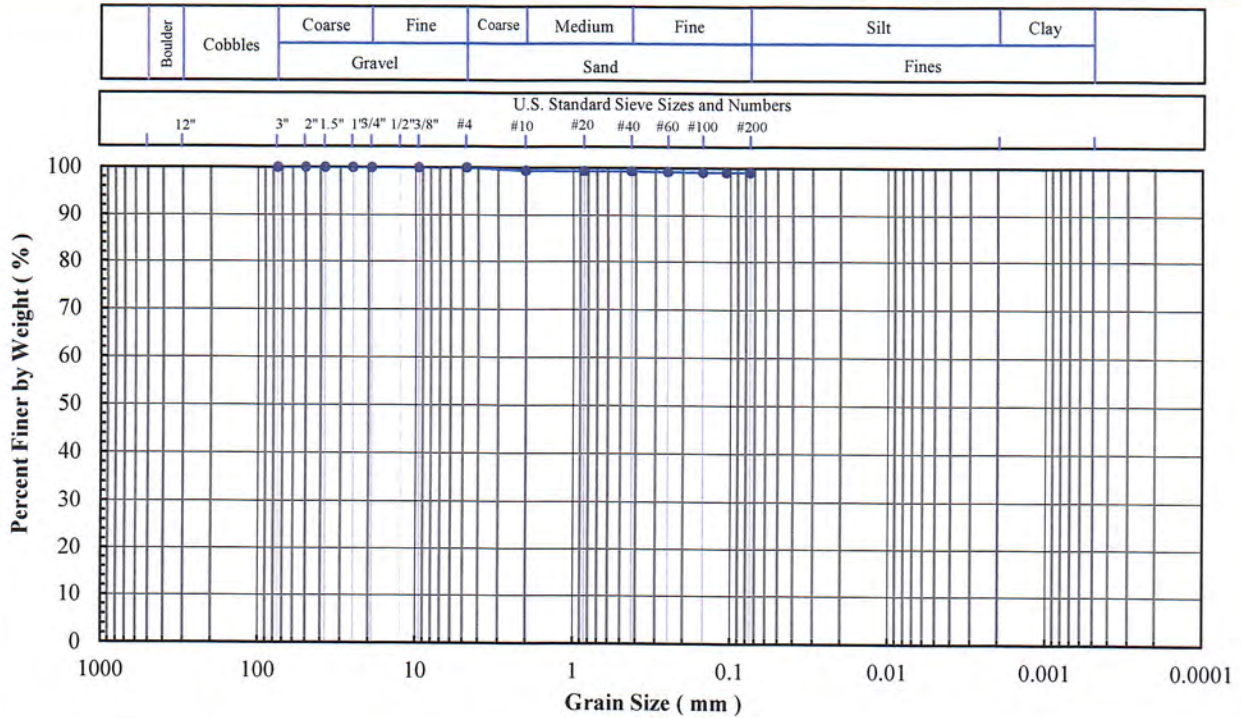
Client Sample ID: B5-9 (52')

Lab Sample No: 20L271

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

## SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

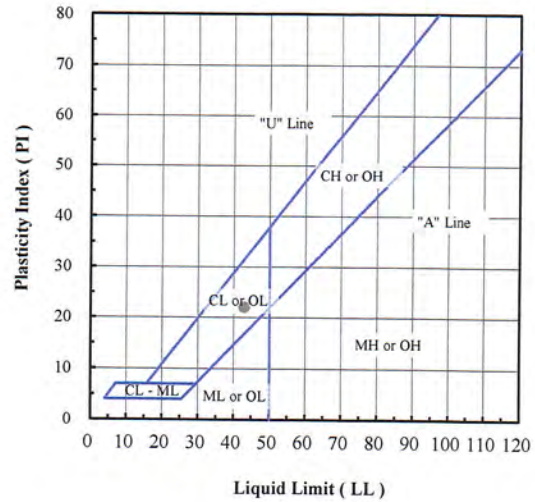


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.4
#20	0.850	99.3
#40	0.425	99.3
#60	0.250	99.2
#100	0.150	99.1
#140	0.106	99.1
#200	0.075	99.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.9
Fines (%):	99.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
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Carbon. Content (%):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-9 (52')	20L271	40.2	99.1	43	21	22	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR



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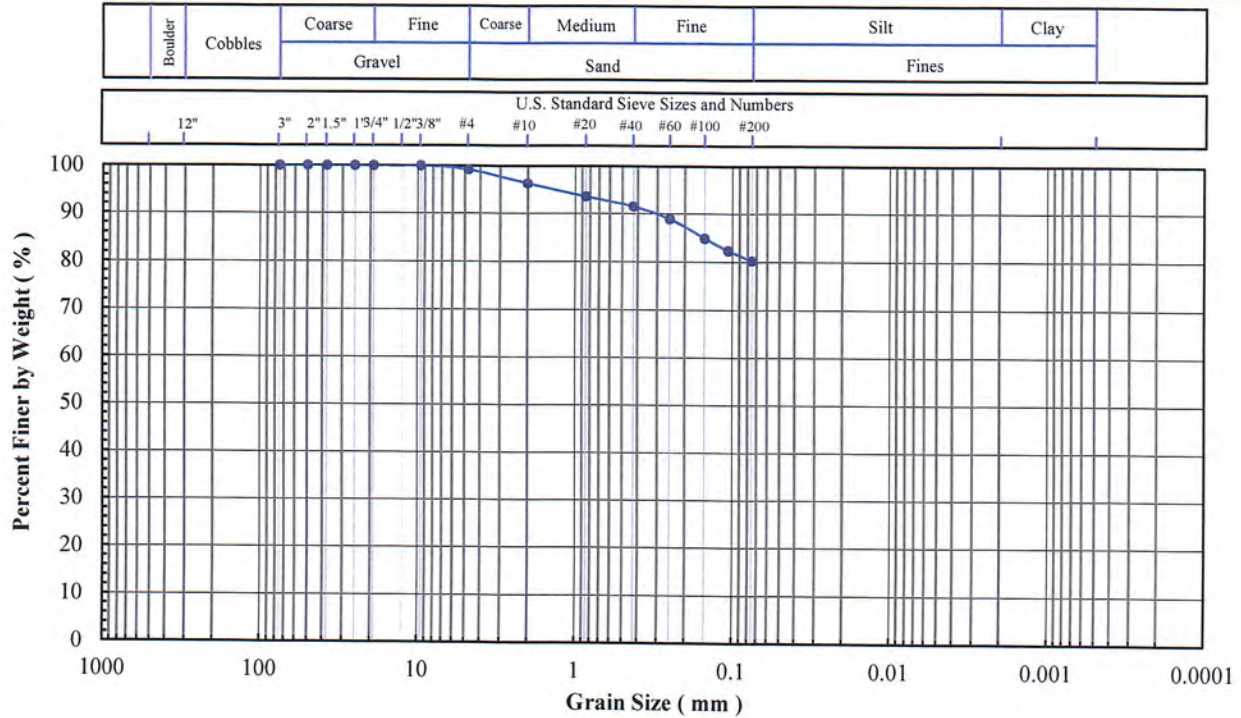
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-13 (72')  
Lab Sample No: 20L275

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

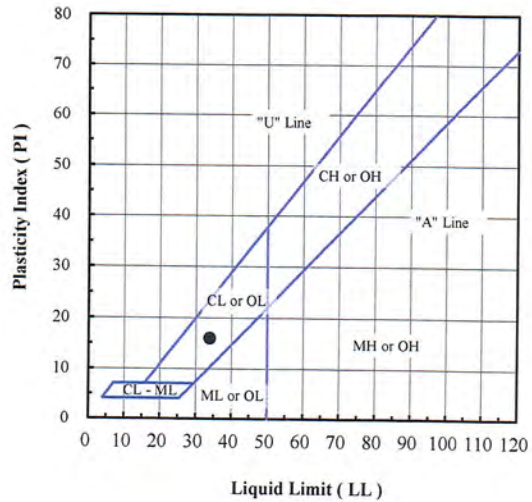


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	93.5
#40	0.425	91.4
#60	0.250	88.8
#100	0.150	84.8
#140	0.106	82.3
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	19.0
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-13 (72')	20L275	27.1	80.2	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1, NSR



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 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

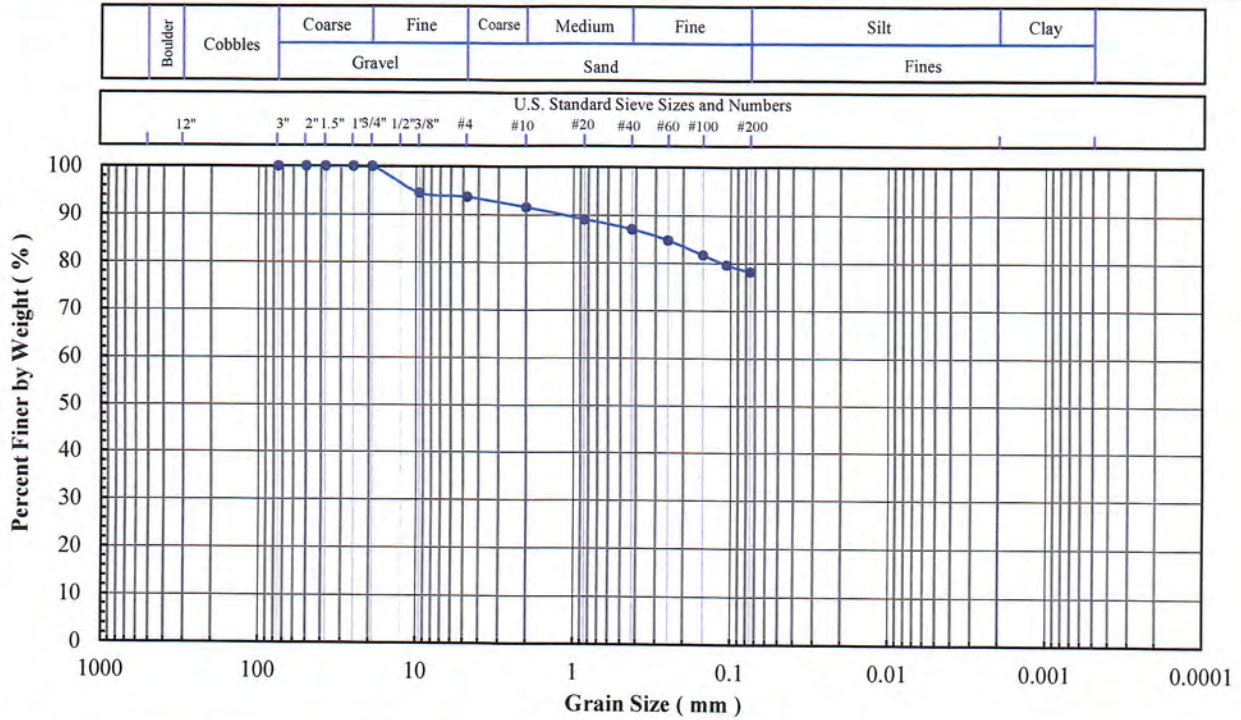
Client Sample ID: B5-17 (92')

Lab Sample No: 20L279

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

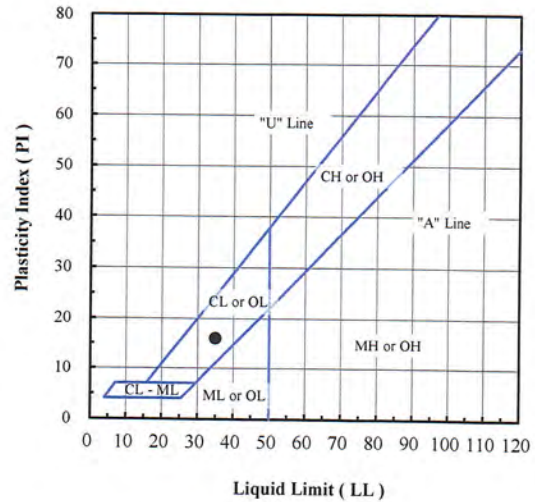


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	92
#20	0.850	89
#40	0.425	87
#60	0.250	85
#100	0.150	82
#140	0.106	80
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	16
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-17 (92')	20L279	22.0	78	35	19	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-25-2021  
AA, MSR



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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

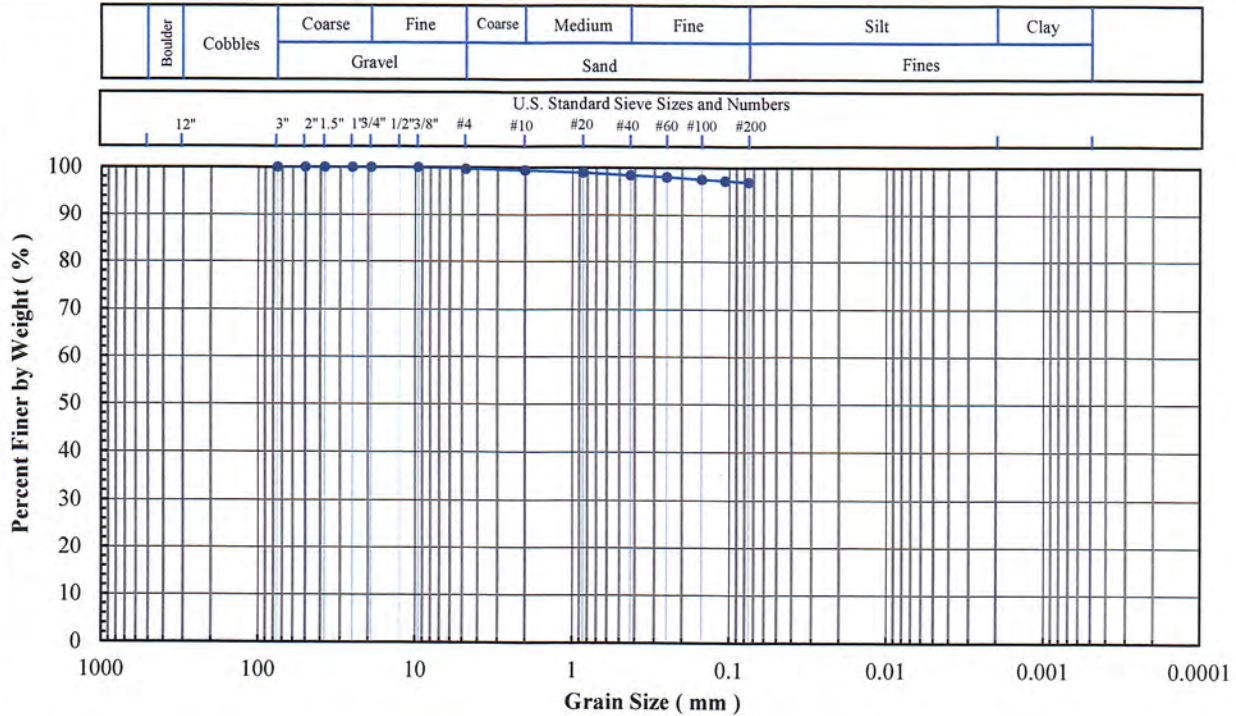
Client Sample ID: B6-3 (15')

Lab Sample No: 20L284

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

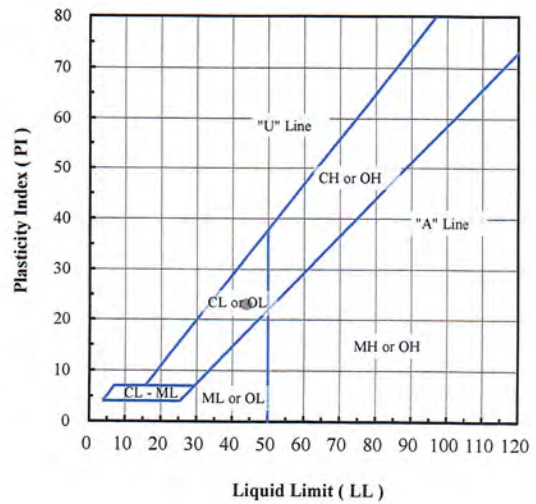


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.4
#20	0.850	98.9
#40	0.425	98.4
#60	0.250	98.0
#100	0.150	97.5
#140	0.106	97.2
#200	0.075	96.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	2.8
Fines (%):	96.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-3 (15')	20L284	36.7	96.9	44	21	23	CL - Lean clay

Note(s):

*01-26-2021  
AA, NSR*



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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

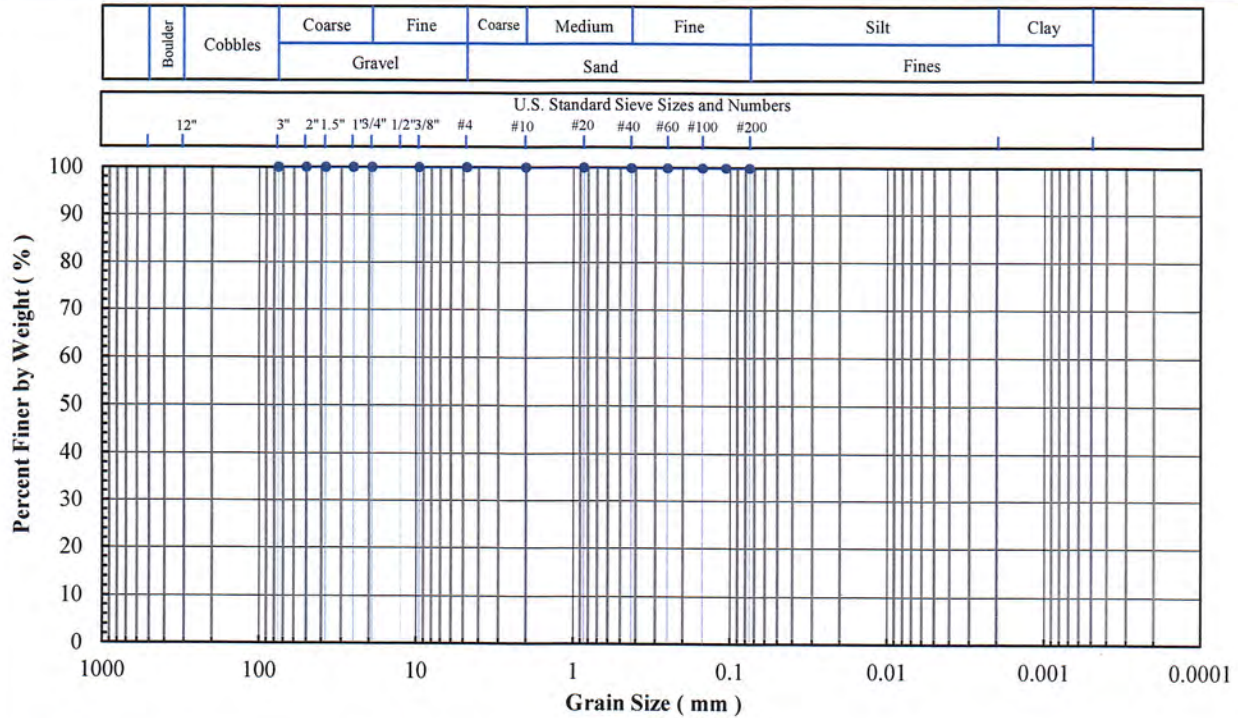
Client Sample ID: B6-7 (35')

Lab Sample No: 20L288

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

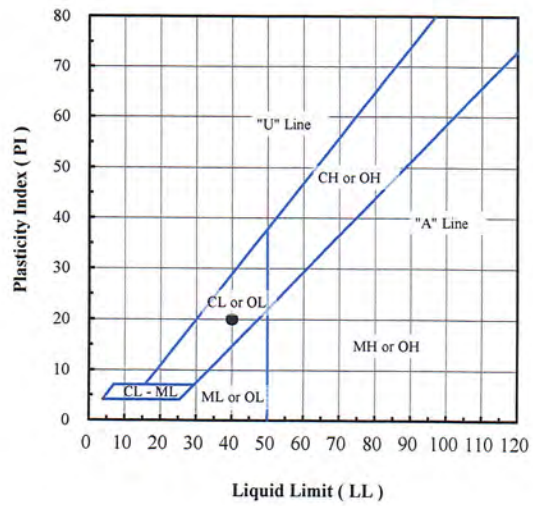


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (35')	20L288	37.8	99.9	40	20	20	CL - Lean clay

Note(s):

01-26-2021  
AAI/NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

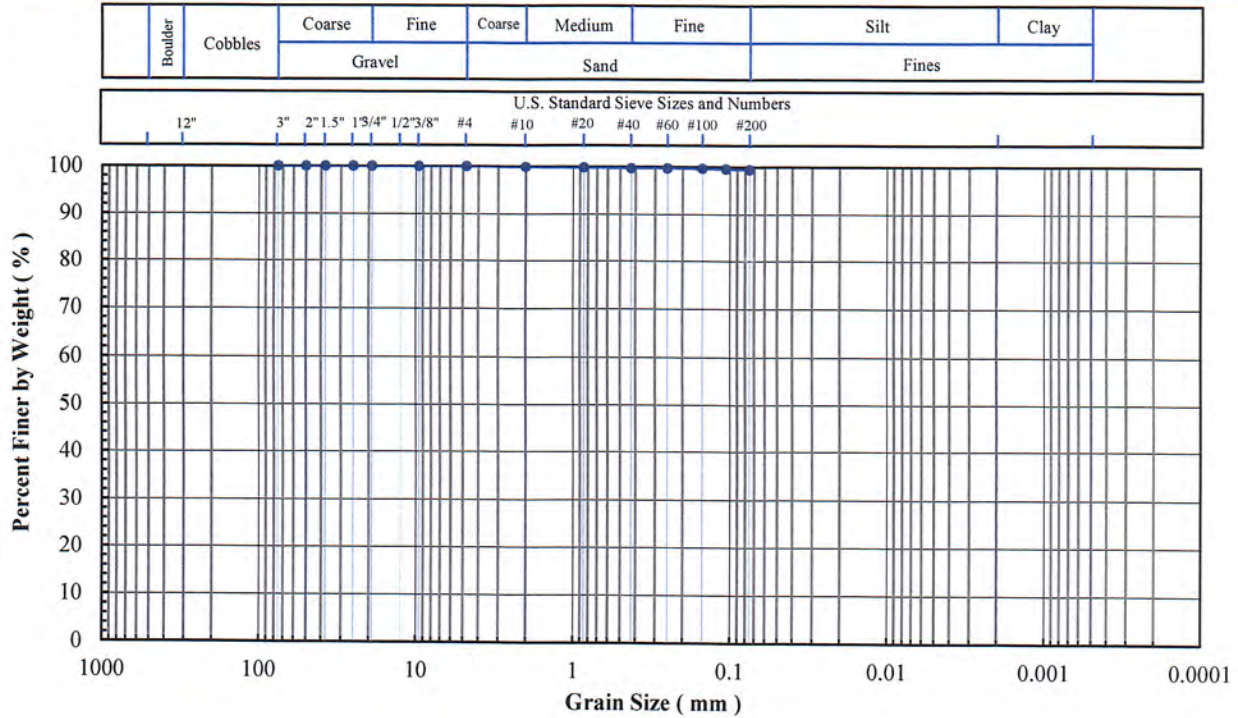
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-11 (55')  
Lab Sample No: 20L292

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

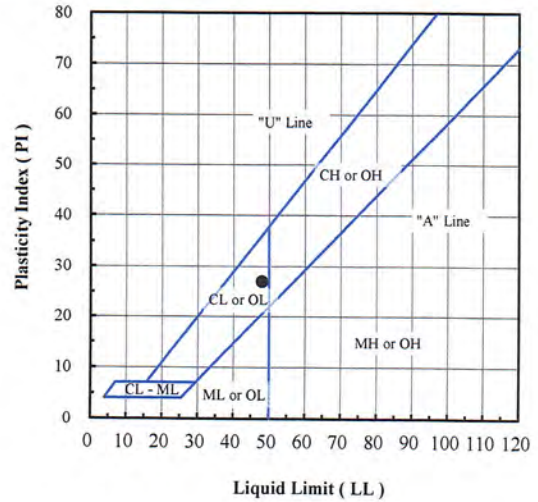


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.6
#140	0.106	99.5
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-11 (55')	20L292	38.7	99.4	48	21	27	CL - Lean Clay

Note(s):

01-26-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

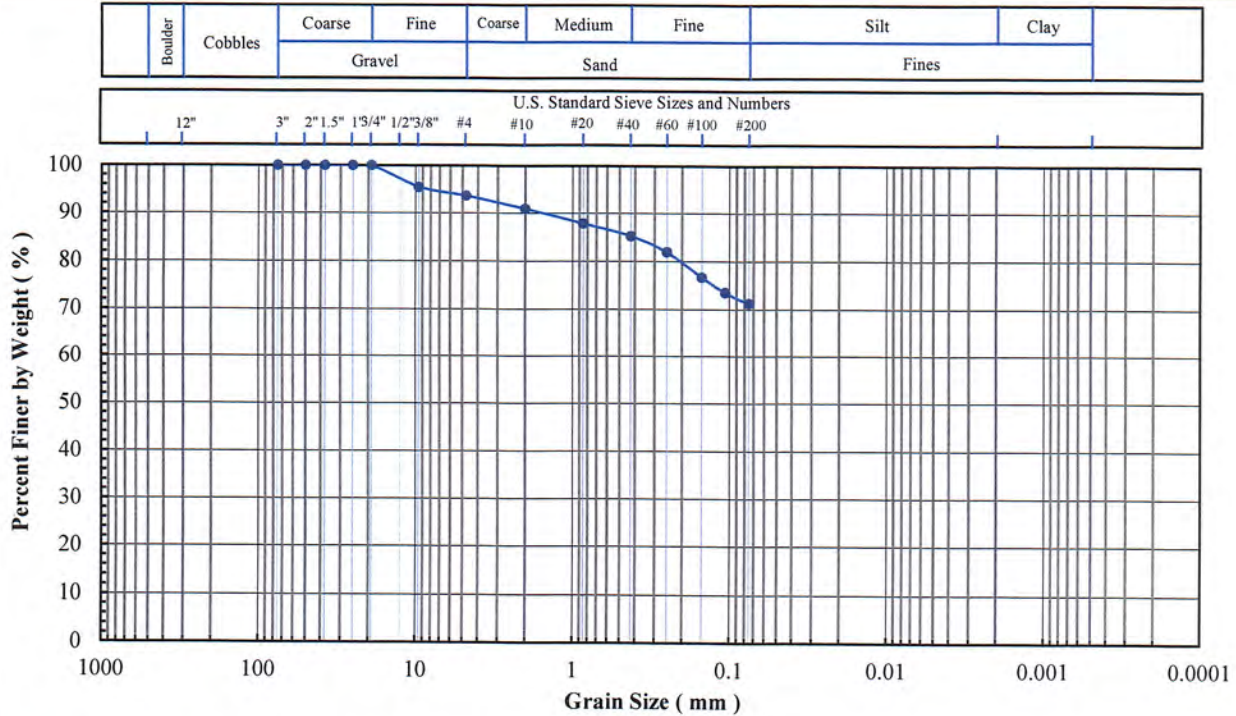
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B6-15 (75')  
 Lab Sample No: 20L296

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

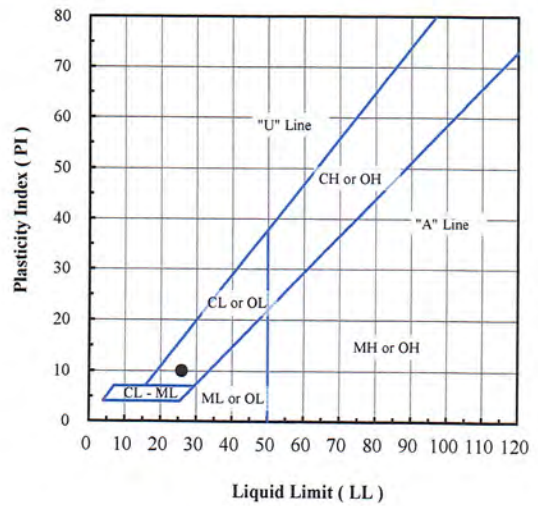


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	91
#20	0.850	88
#40	0.425	85
#60	0.250	82
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	23
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-15 (75')	20L296	20.5	71	26	16	10	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
 AA, MSR





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Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

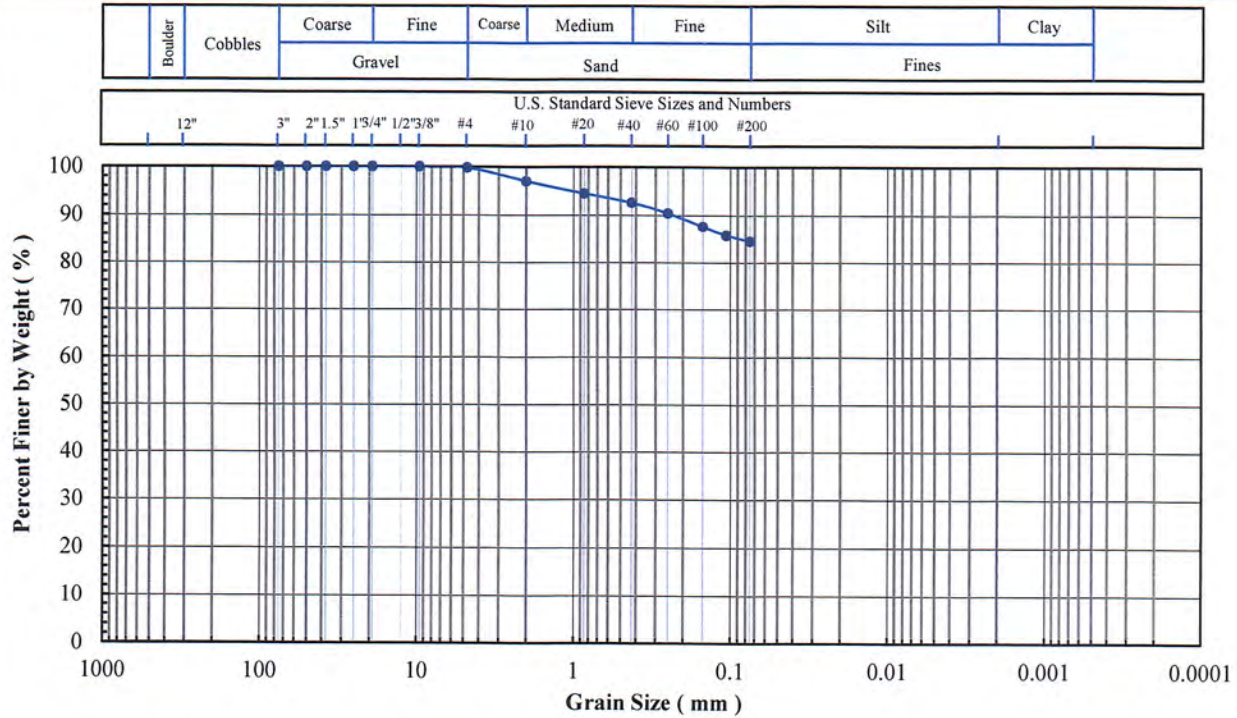
Client Sample ID: B6-19 (95')

Lab Sample No: 20L300

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

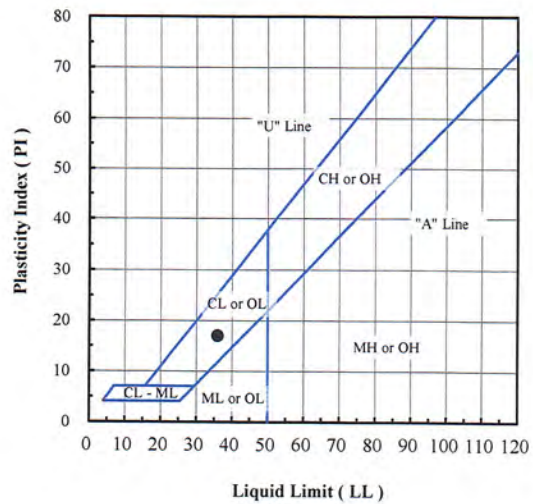


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	97.0
#20	0.850	94.5
#40	0.425	92.6
#60	0.250	90.4
#100	0.150	87.6
#140	0.106	85.8
#200	0.075	84.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	15.2
Fines (%):	84.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-19 (95')	20L300	26.5	84.6	36	19	17	CL - Lean clay with sand

Note(s):

*01-26-2021  
AAI, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B1-ST-3 (36-38')
<b>Lab Sample Number:</b>	20L145
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.43	7.37	89.5	35.0	53.0	50.0	3.0	DDW	12	2.2E-8
	3.47	7.04	97.4	27.6	63.00	50.0	13.0	DDW	10	2.7E-9

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
APK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-2 (7-9')
<b>Lab Sample Number:</b>	20L150
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.54	7.22	98.2	26.8	53.0	50.0	3.0	DDW	12	2.1E-8
	3.54	7.20	98.8	26.4	54.00	50.0	4.0	DDW	12	2.0E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, NSP*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L155
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.24	110.9	20.3	53.0	50.0	3.0	DDW	3	3.3E-8
	3.50	7.16	114.2	18.5	77.00	50.0	27.0	DDW	6	2.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

\* Deviations:

Laboratory temperature at 22±3 °C.

*7-21-2021  
APK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B3-ST-1 (1-3')
<b>Lab Sample Number:</b>	20L156
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/8/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.17	111.4	19.1	53.0	50.0	3.0	DDW	8	9.6E-9
	3.62	7.29	104.7	22.7						

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
APK, WSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B4-ST-4 (67-69')
<b>Lab Sample Number:</b>	20L165
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.23	129.8	11.6	53.0	50.0	3.0	DDW	5	2.8E-8
	3.55	7.21	129.5	11.1	69.00	50.0	19.0	DDW	10	1.8E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, ASB*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B5-ST-2 (27-29')
<b>Lab Sample Number:</b>	20L169
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.34	85.9	36.8	53.0	50.0	3.0	DDW	9	3.4E-8
	3.48	7.02	93.4	30.7	60.00	50.0	10.0	DDW	4	2.1E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
APK, ASR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-4 (47-49')
<b>Lab Sample Number:</b>	20L177
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.32	86.6	38.3	53.0	50.0	3.0	DDW	5	2.5E-8
	3.45	7.16	93.3	29.6	65.00	50.0	15.0	DDW	10	1.8E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 AFK, NSB*





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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L180
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.29	104.1	23.5	53.0	50.0	3.0	DDW	4	2.4E-8
	3.51	7.18	108.3	21.0	76.00	50.0	26.0	DDW	9	1.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, MSK*



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# LAST PAGE

## **Test Applicability and Limitations:**

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

## **Storage Policy:**

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of \$1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of \$1.30 per sample per day will be applied after the initial 3 months storage.

## **APPENDIX I1 – CPT LOGS**



GeoSyntec

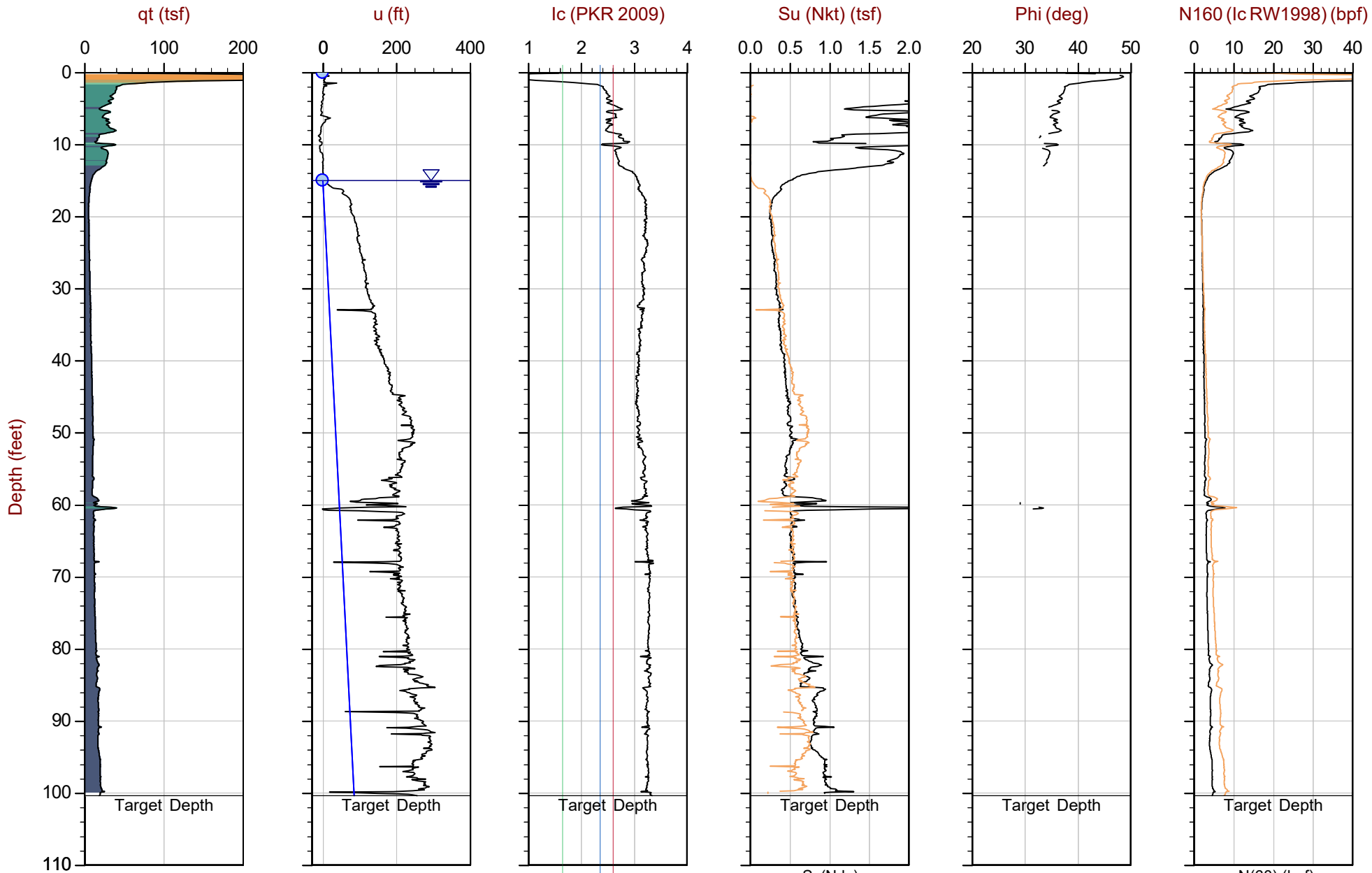
Job No: 20-61-21681

Date: 2020-12-10 14:55

Site: DTE Belle River Power Plant

Sounding: CPT20-01

Cone: 551:T1500F15U500



Max Depth: 30.600 m / 100.39 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP01.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470985ft E: 13625925ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

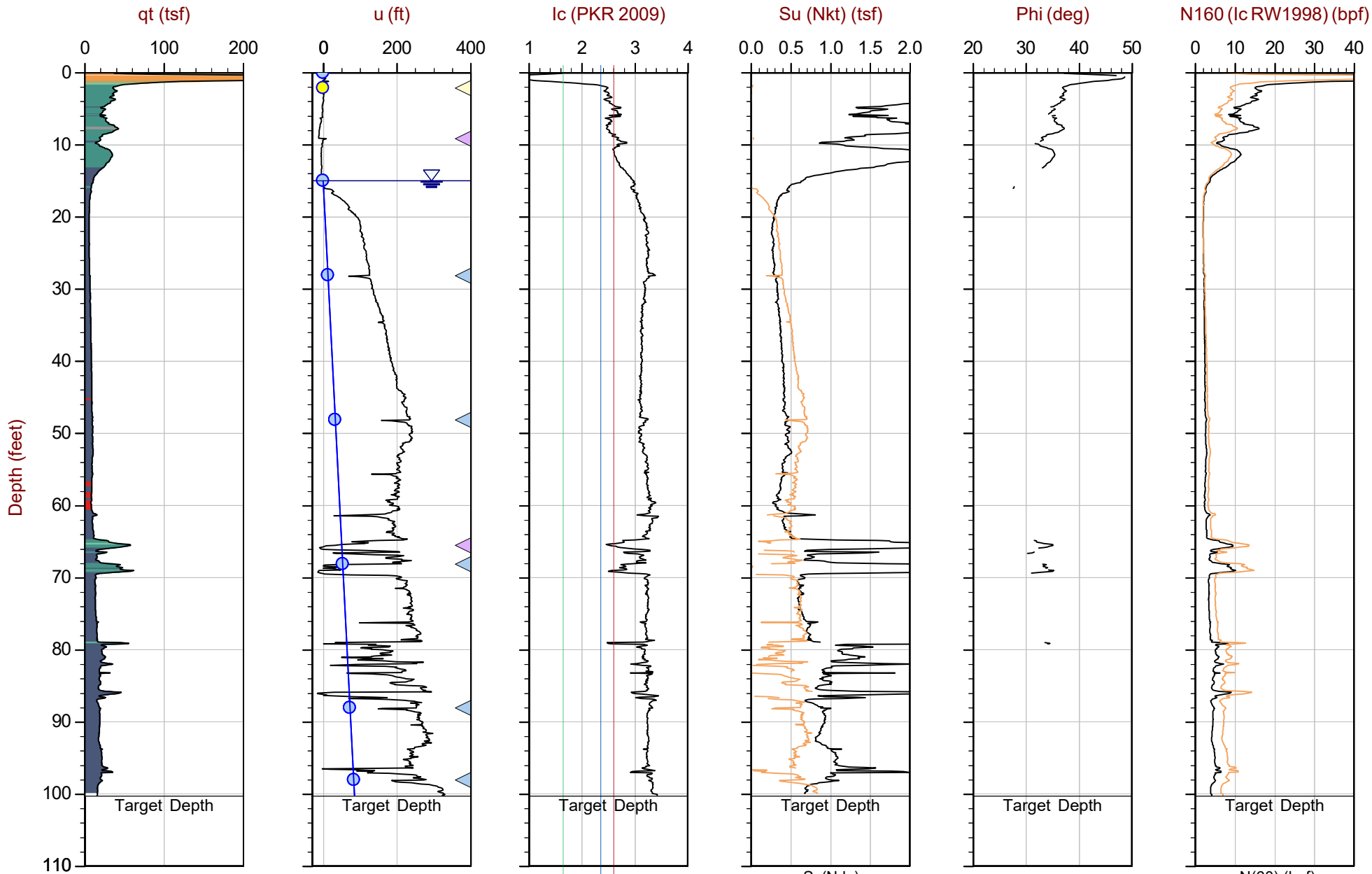
Job No: 20-61-21681

Date: 2020-12-11 08:28

Site: DTE Belle River Power Plant

Sounding: CPT20-01B

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP01B.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470980ft E: 13625906ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

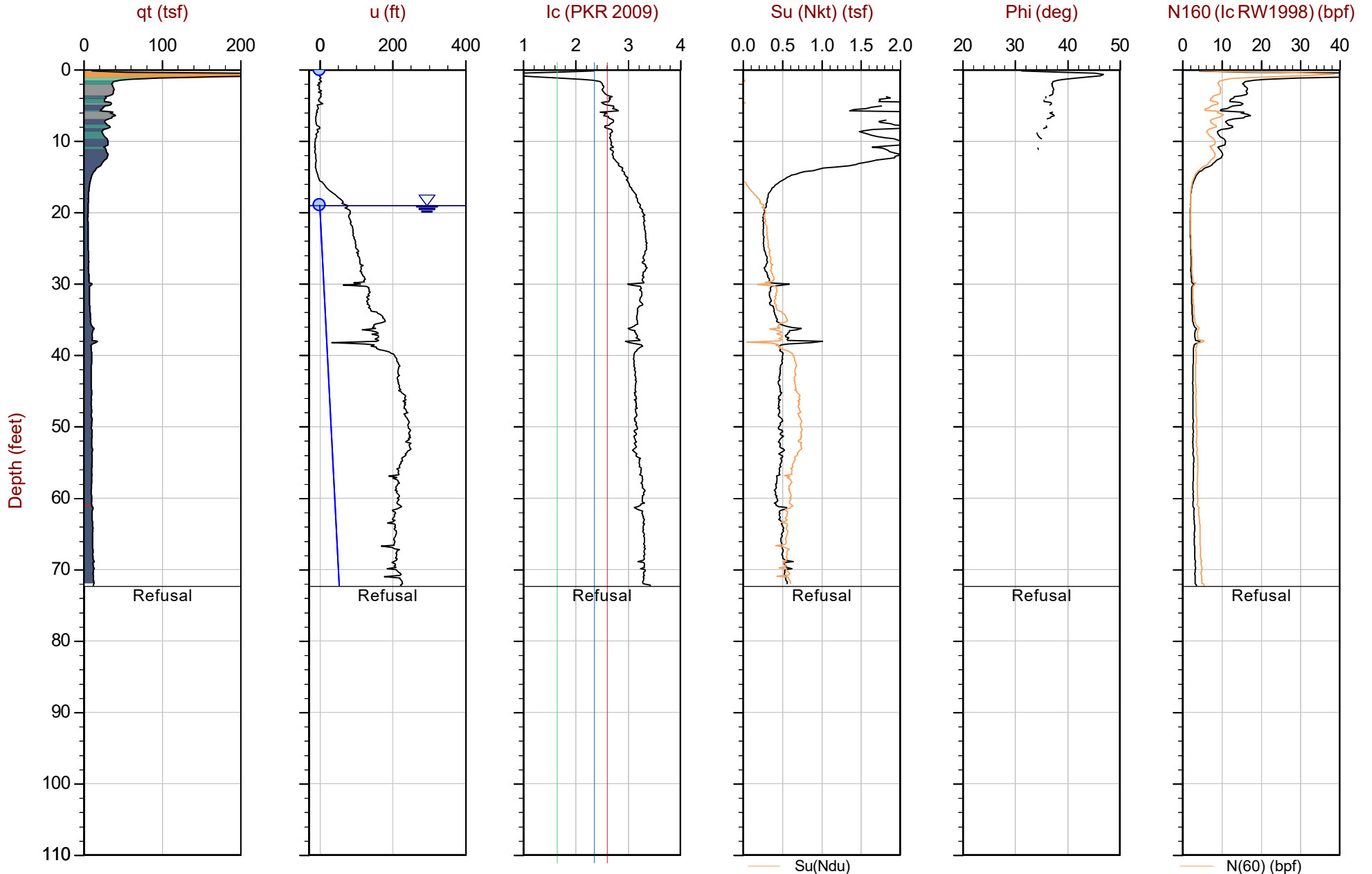
Job No: 20-61-21681

Date: 2020-12-09 12:28

Site: DTE Belle River Power Plant

Sounding: CPT20-02

Cone: 513:T1500F15U500



Max Depth: 22.050 m / 72.34 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP02.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470997ft E: 13626119ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

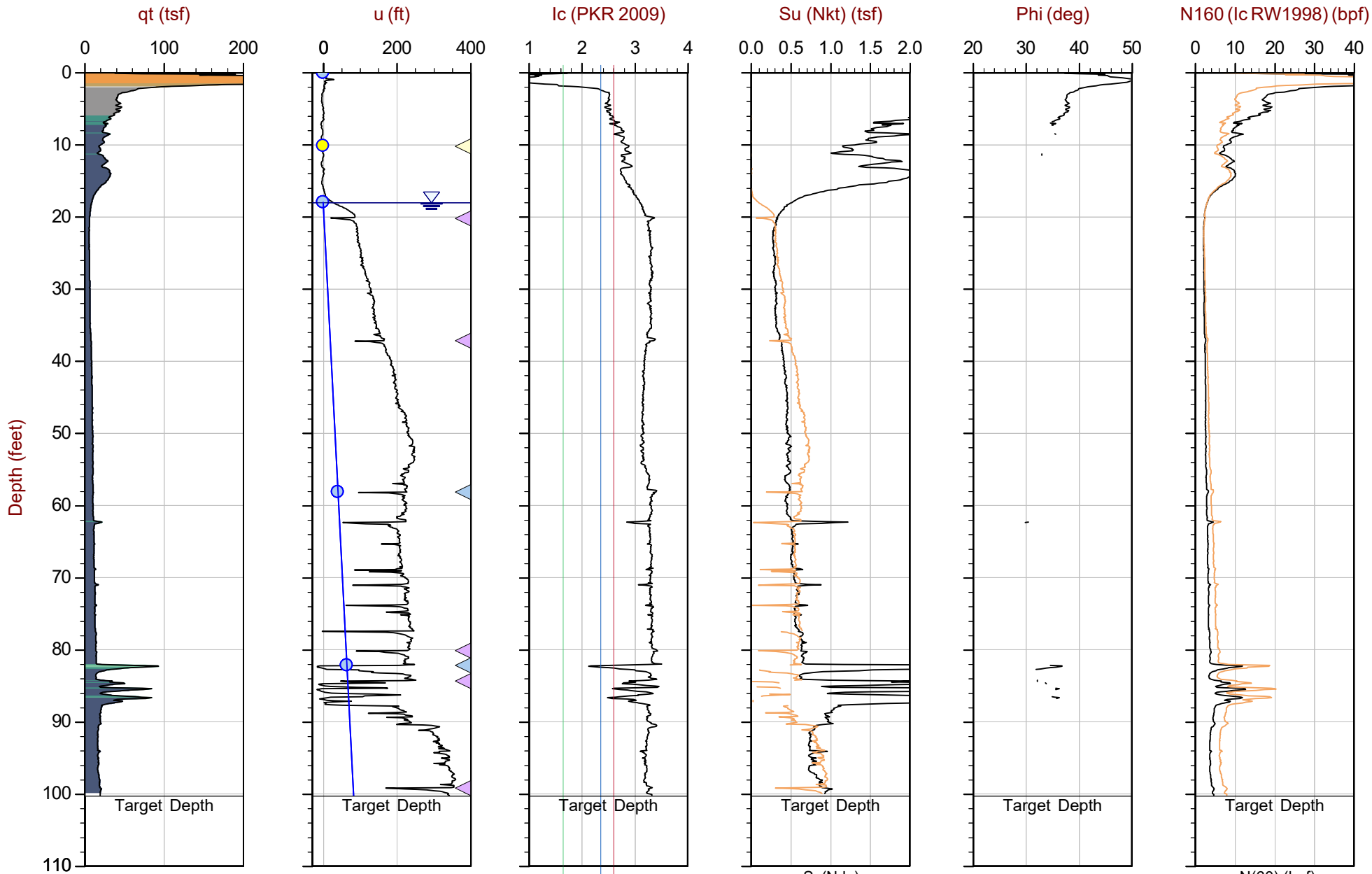
Job No: 20-61-21681

Date: 2020-12-09 14:00

Site: DTE Belle River Power Plant

Sounding: CPT20-03

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP03.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471039ft E: 13626171ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

— Su(N60) (bpf)



GeoSyntec

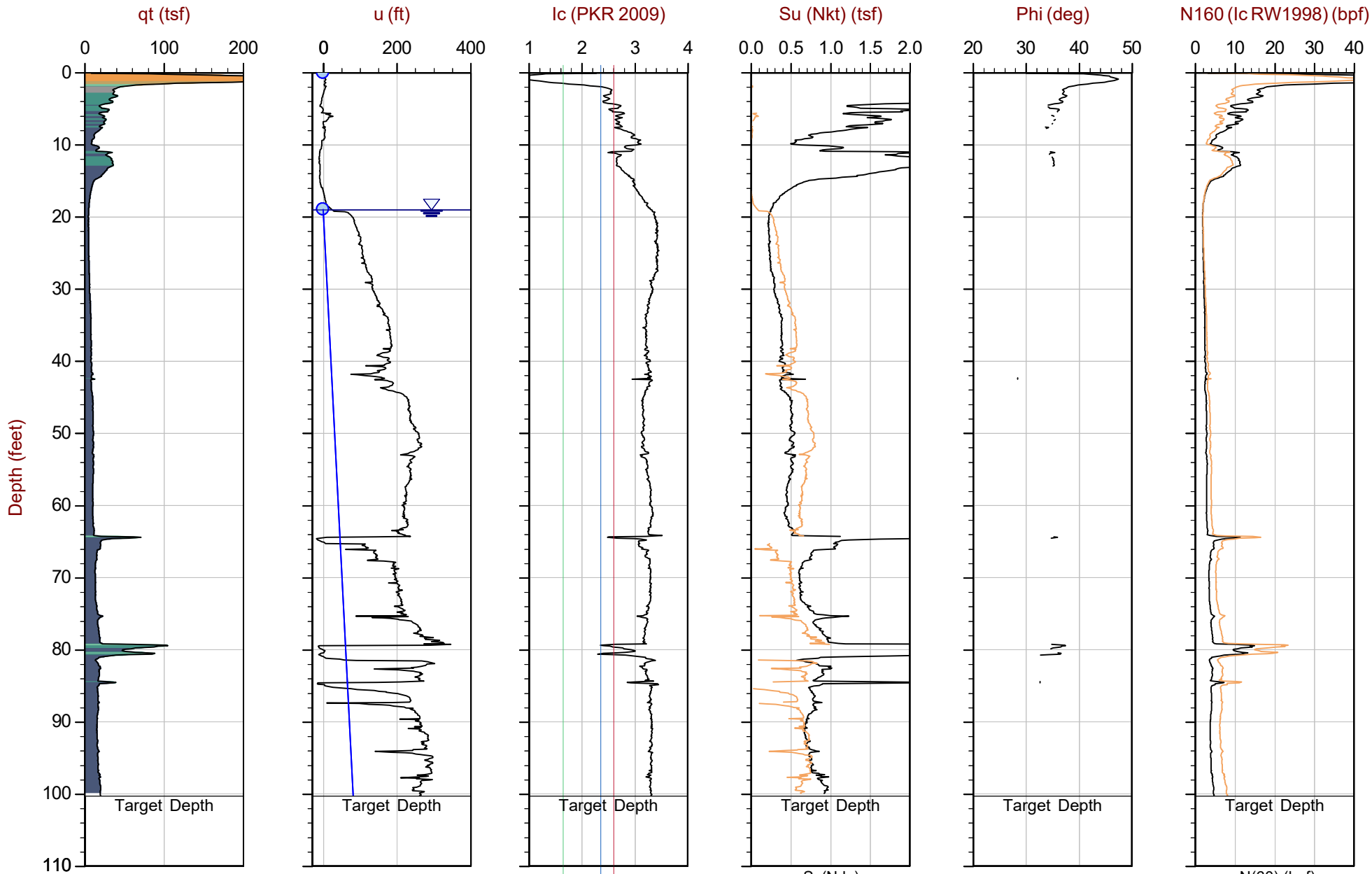
Job No: 20-61-21681

Date: 2020-12-09 11:05

Site: DTE Belle River Power Plant

Sounding: CPT20-04

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP04.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471237ft E: 13626152ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

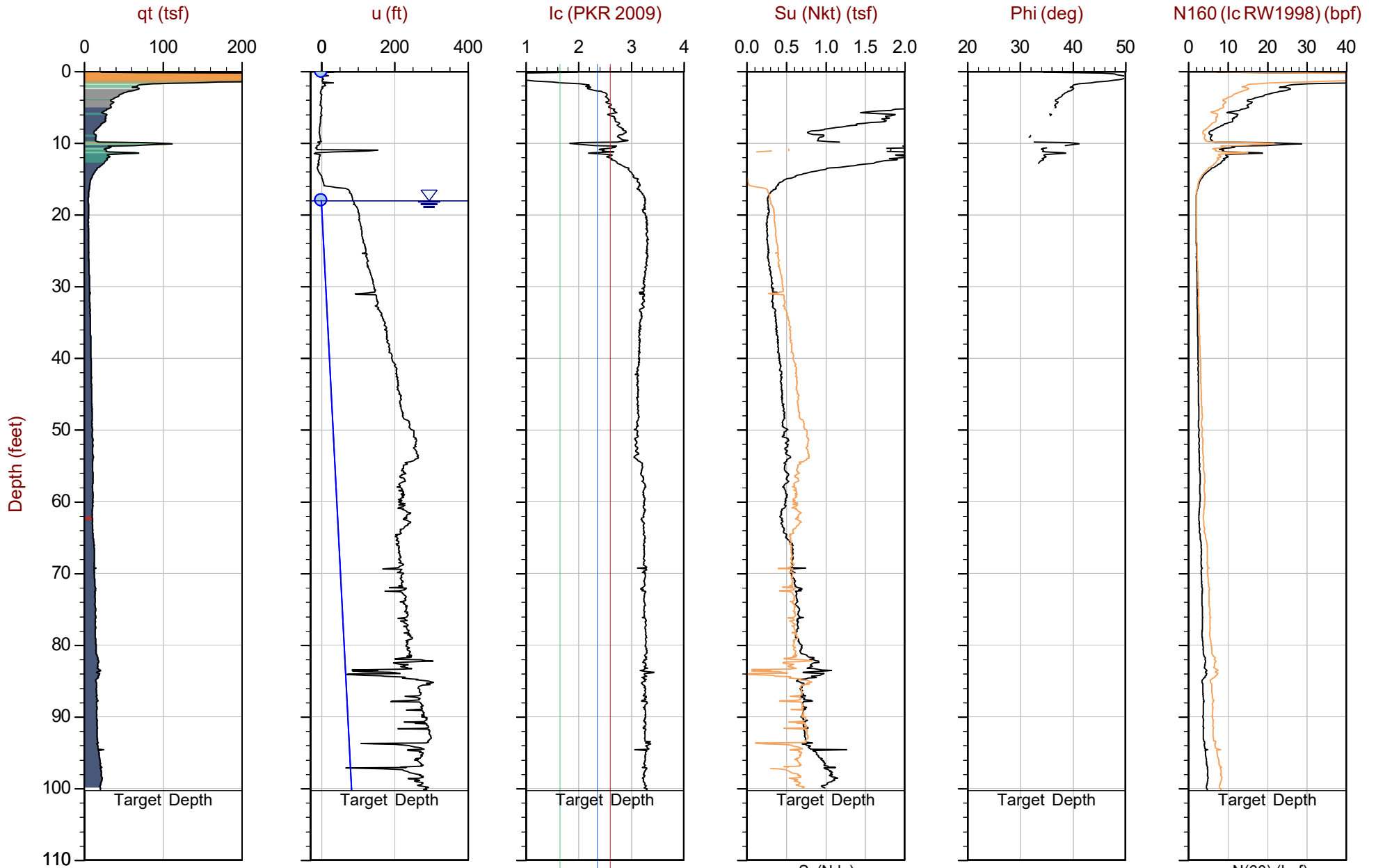
Job No: 20-61-21681

Date: 2020-12-09 12:02

Site: DTE Belle River Power Plant

Sounding: CPT20-05

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP05.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471243ft E: 13625954ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

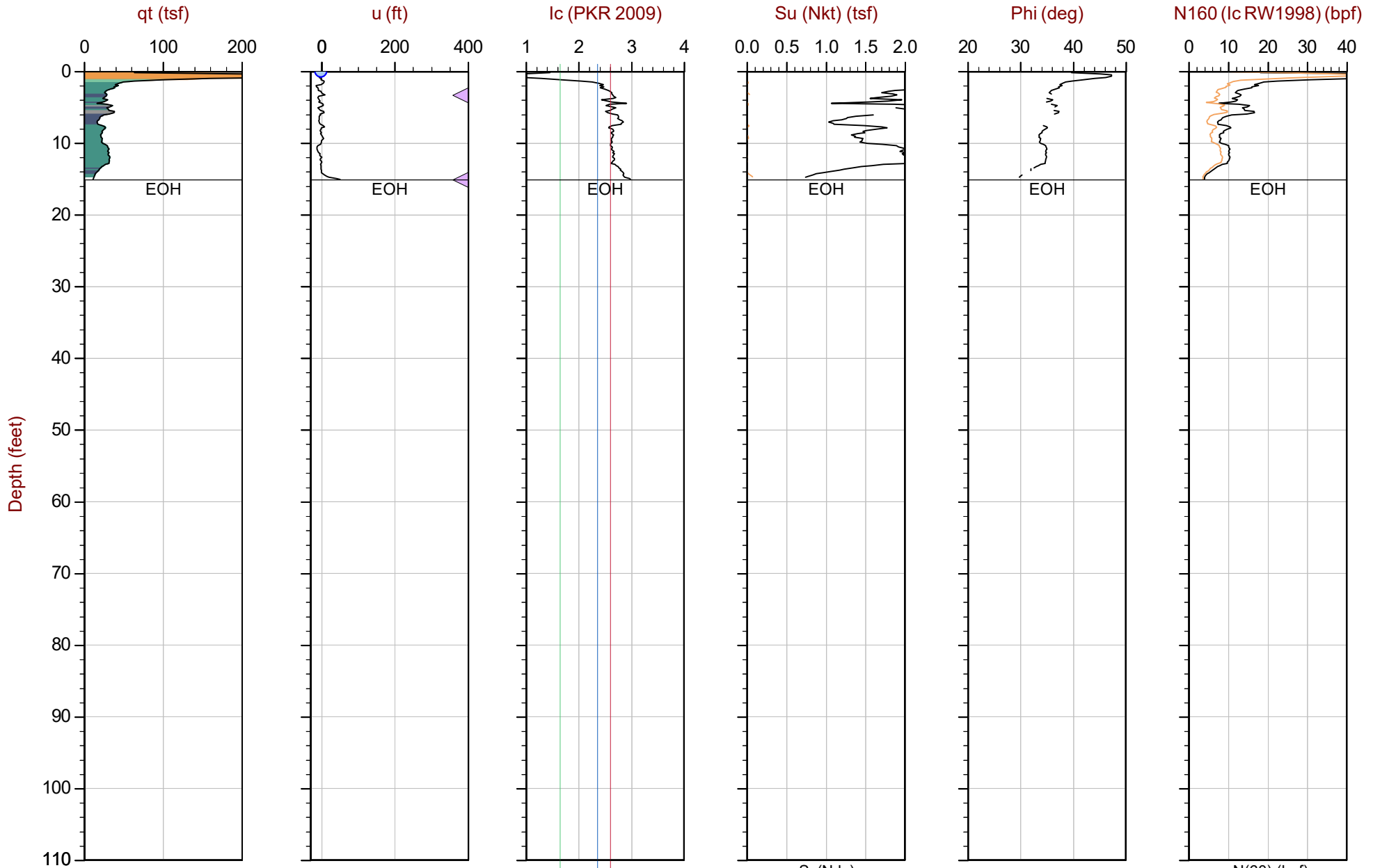
Job No: 20-61-21681

Date: 2020-12-09 13:54

Site: DTE Belle River Power Plant

Sounding: CPT20-06

Cone: 513:T1500F15U500



Max Depth: 4.600 m / 15.09 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471221ft E: 13625753ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

Su(Ndu)

N(60) (bpf)



GeoSyntec

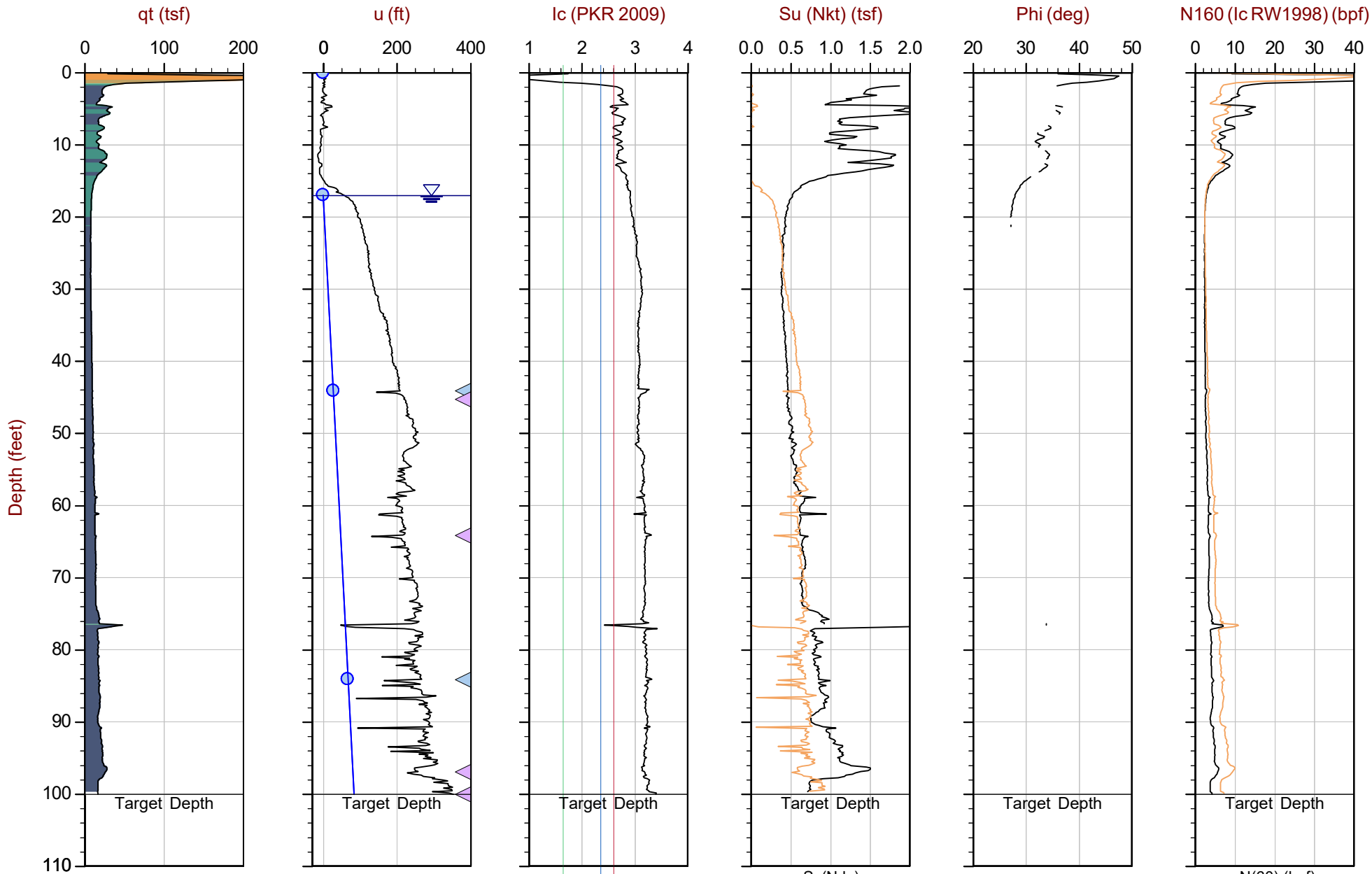
Job No: 20-61-21681

Date: 2020-12-10 08:43

Site: DTE Belle River Power Plant

Sounding: CPT20-06B

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471216ft E: 13625742ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

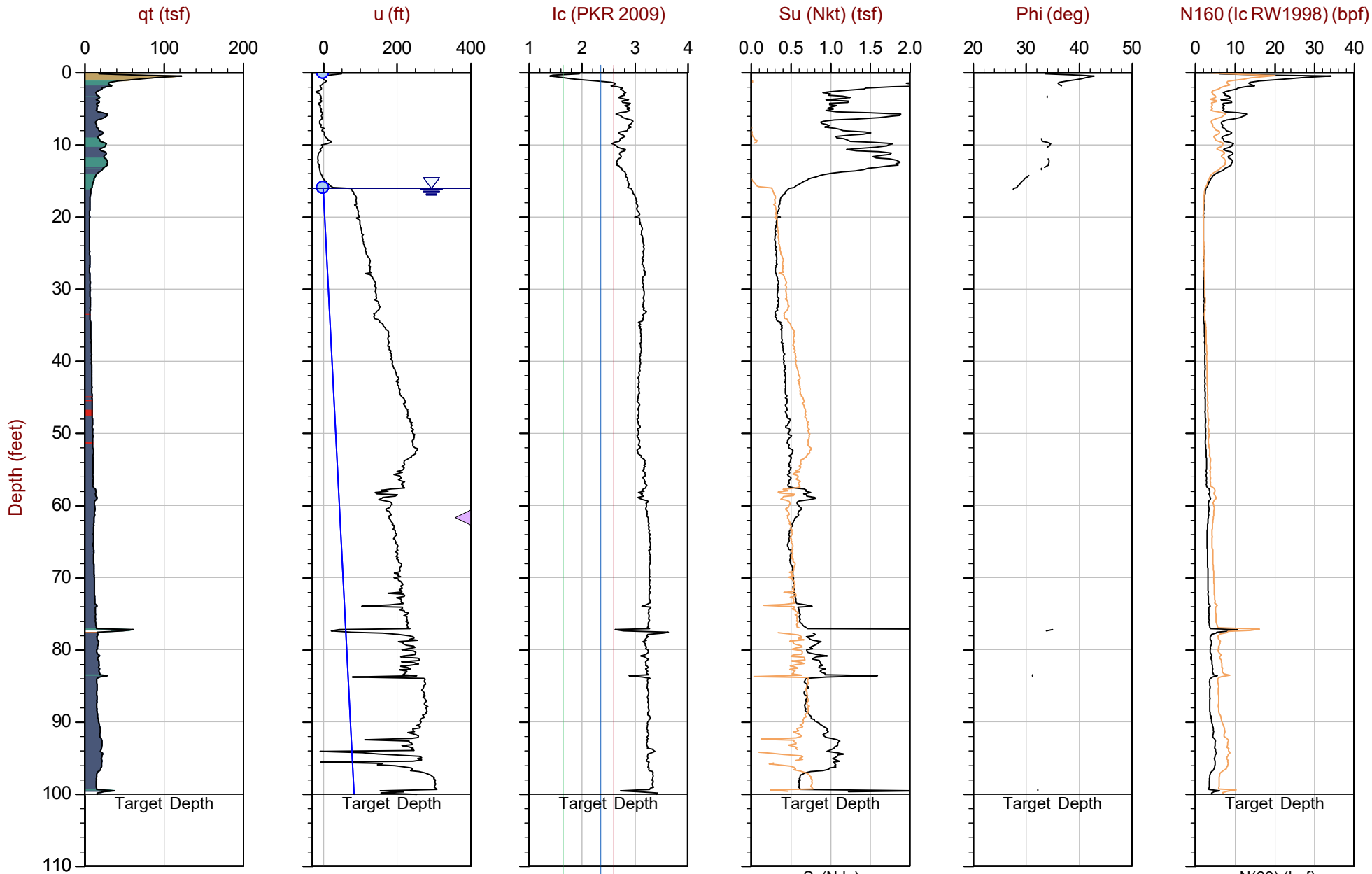
Job No: 20-61-21681

Date: 2020-12-09 11:04

Site: DTE Belle River Power Plant

Sounding: CPT20-07

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP07.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471015ft E: 13625752ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

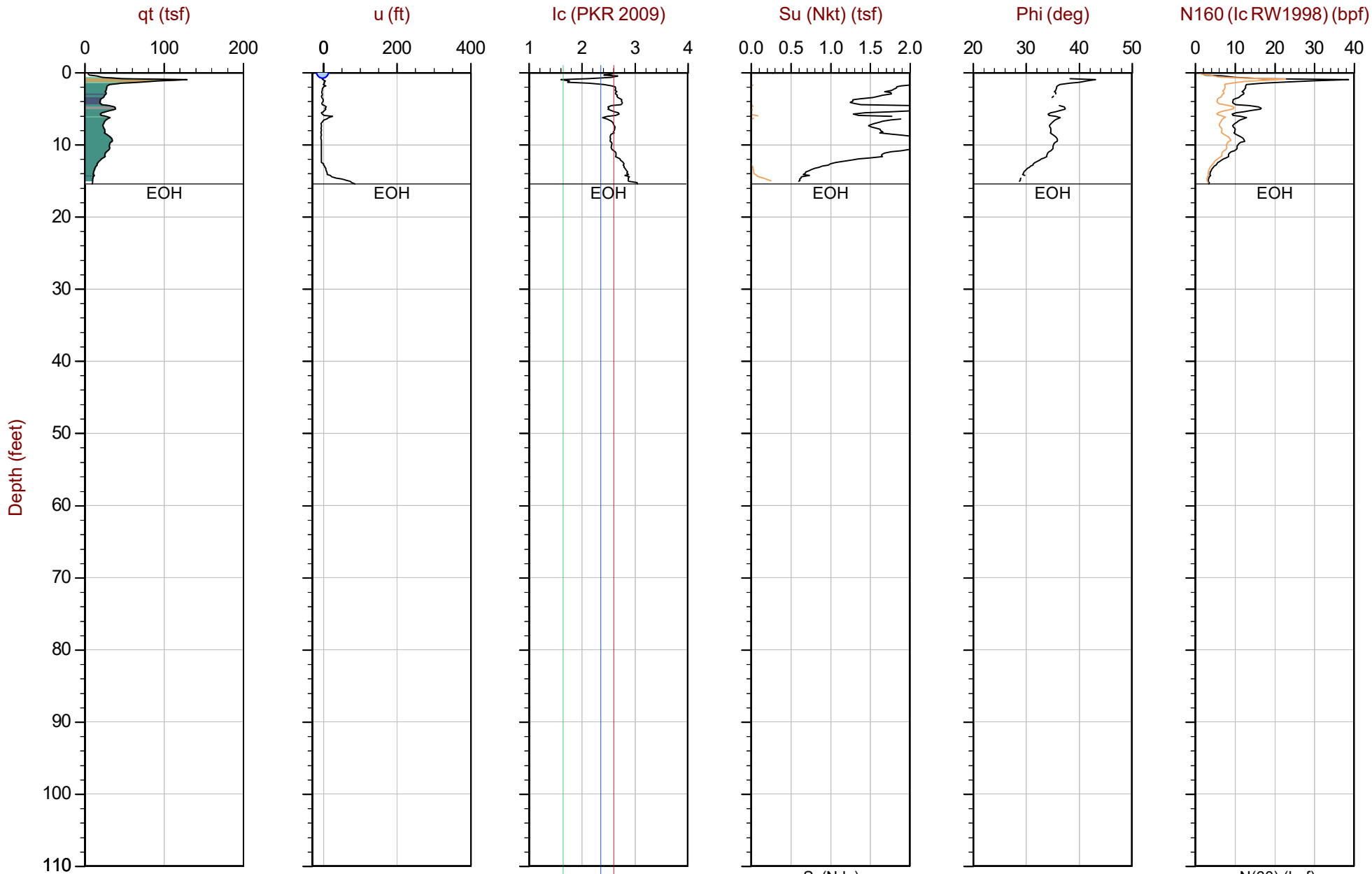
Job No: 20-61-21681

Date: 2020-12-11 12:09

Site: DTE Belle River Power Plant

Sounding: CPT20-08

Cone: 568:T1500F15U500



Max Depth: 4.700 m / 15.42 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470392ft E: 13626398ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

Su(Ndu)

N(60) (bpf)



GeoSyntec

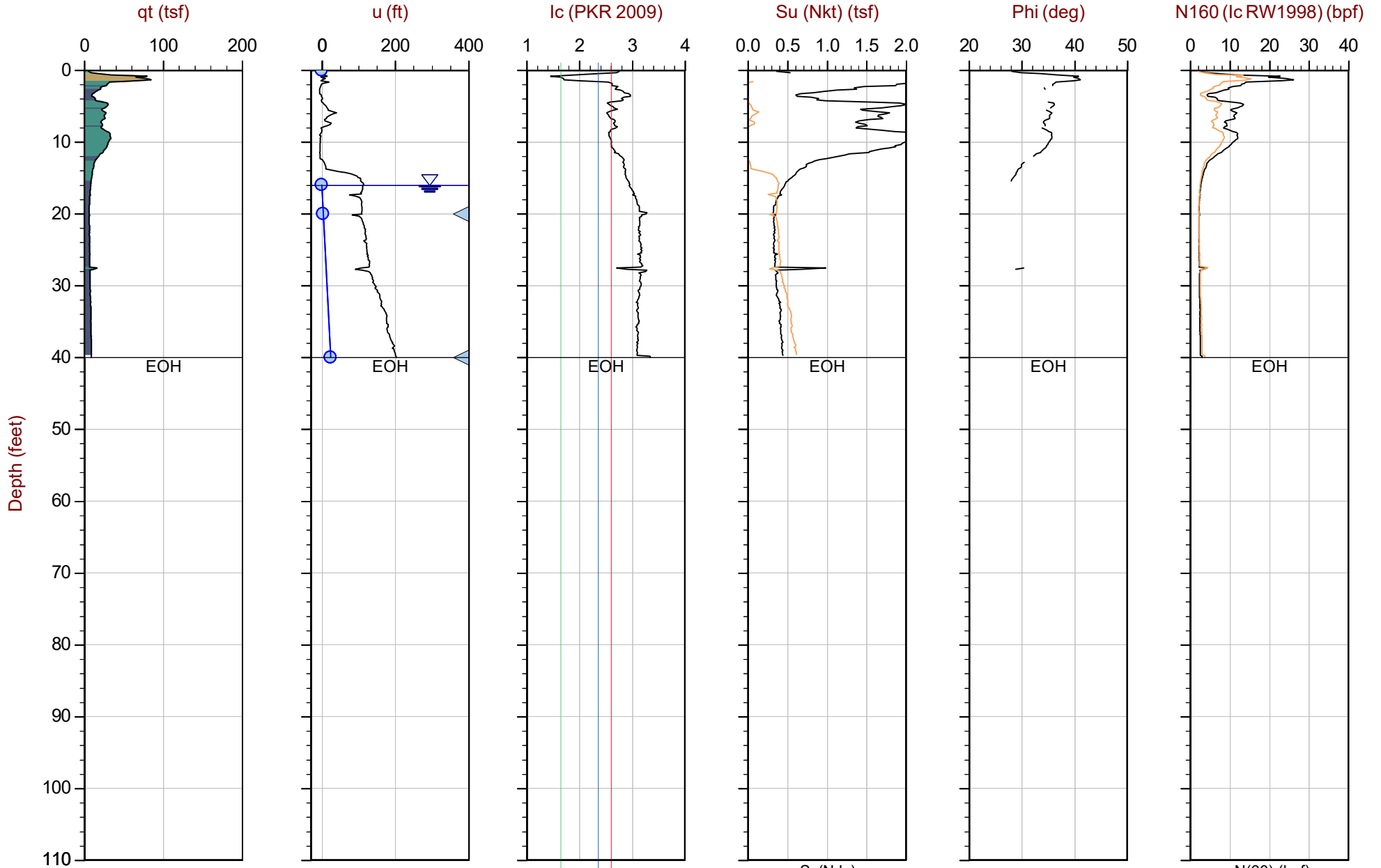
Job No: 20-61-21681

Date: 2020-12-11 12:35

Site: DTE Belle River Power Plant

Sounding: CPT20-08B

Cone: 568:T1500F15U500



Max Depth: 12.200 m / 40.03 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470382ft E: 13626396ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

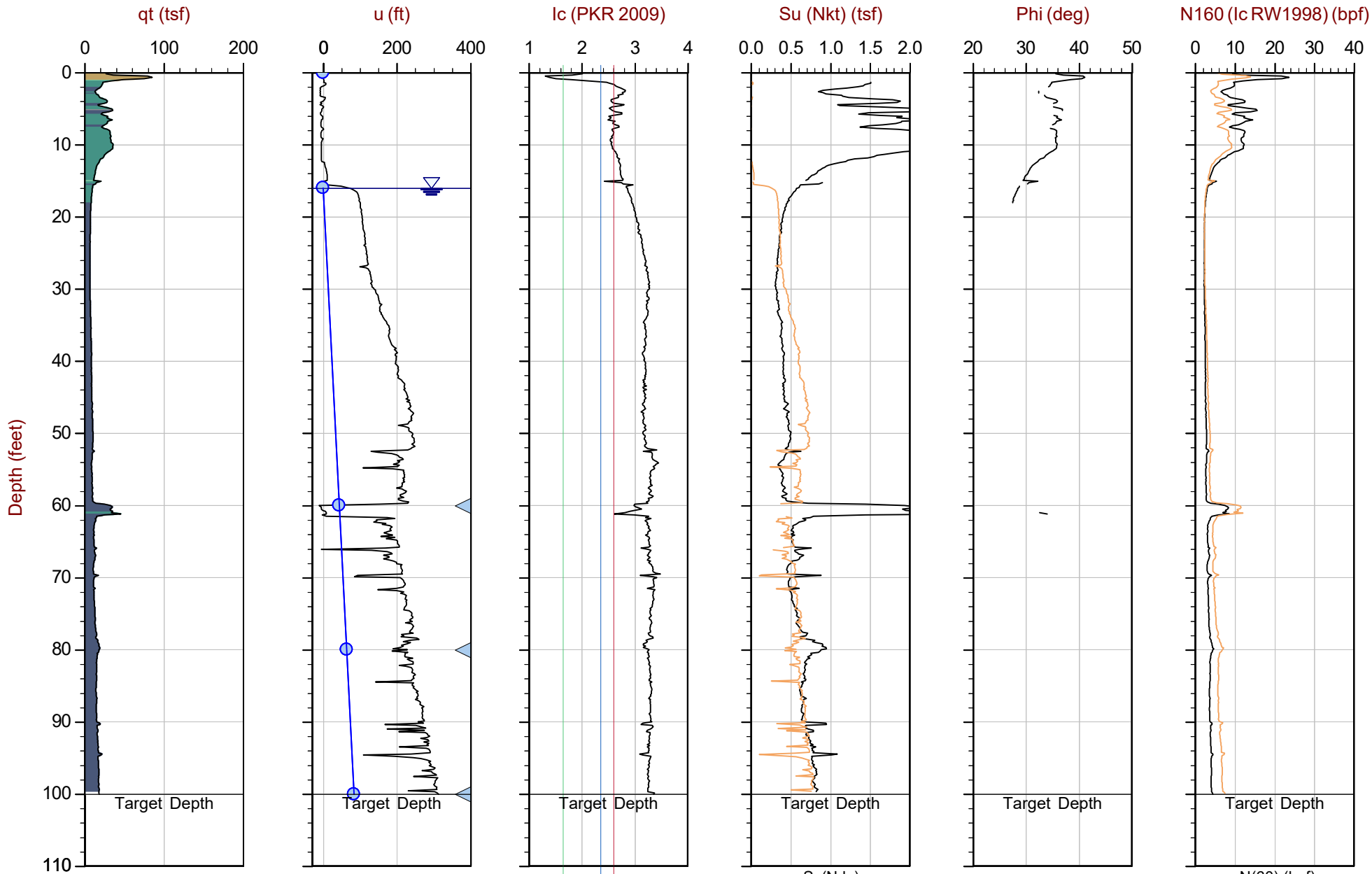
Job No: 20-61-21681

Date: 2020-12-15 08:41

Site: DTE Belle River Power Plant

Sounding: CPT20-08C

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08C.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470384ft E: 13626391ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

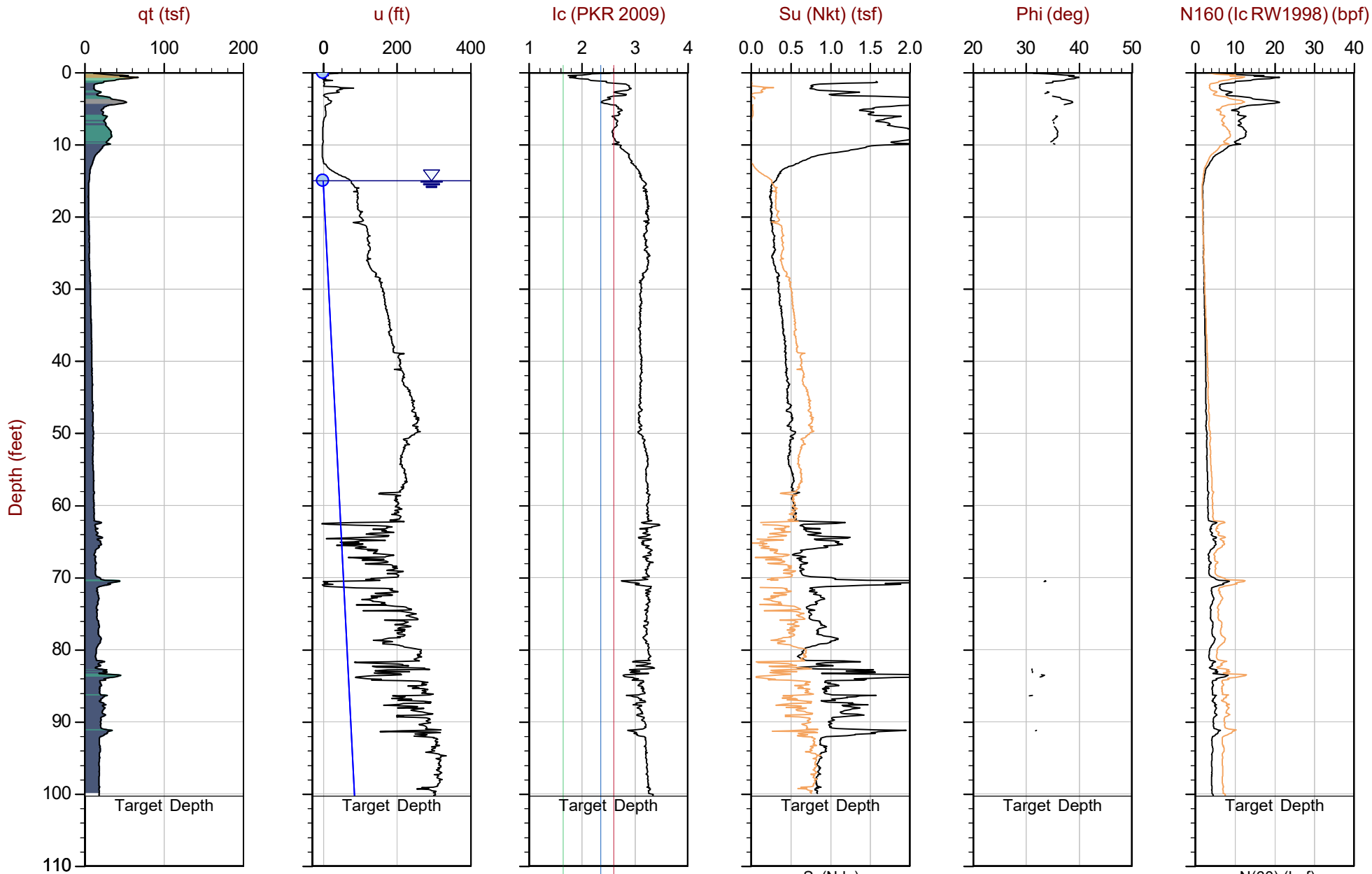
Job No: 20-61-21681

Date: 2020-12-16 11:02

Site: DTE Belle River Power Plant

Sounding: CPT20-10.1

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP10.1.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469861ft E: 13626732ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

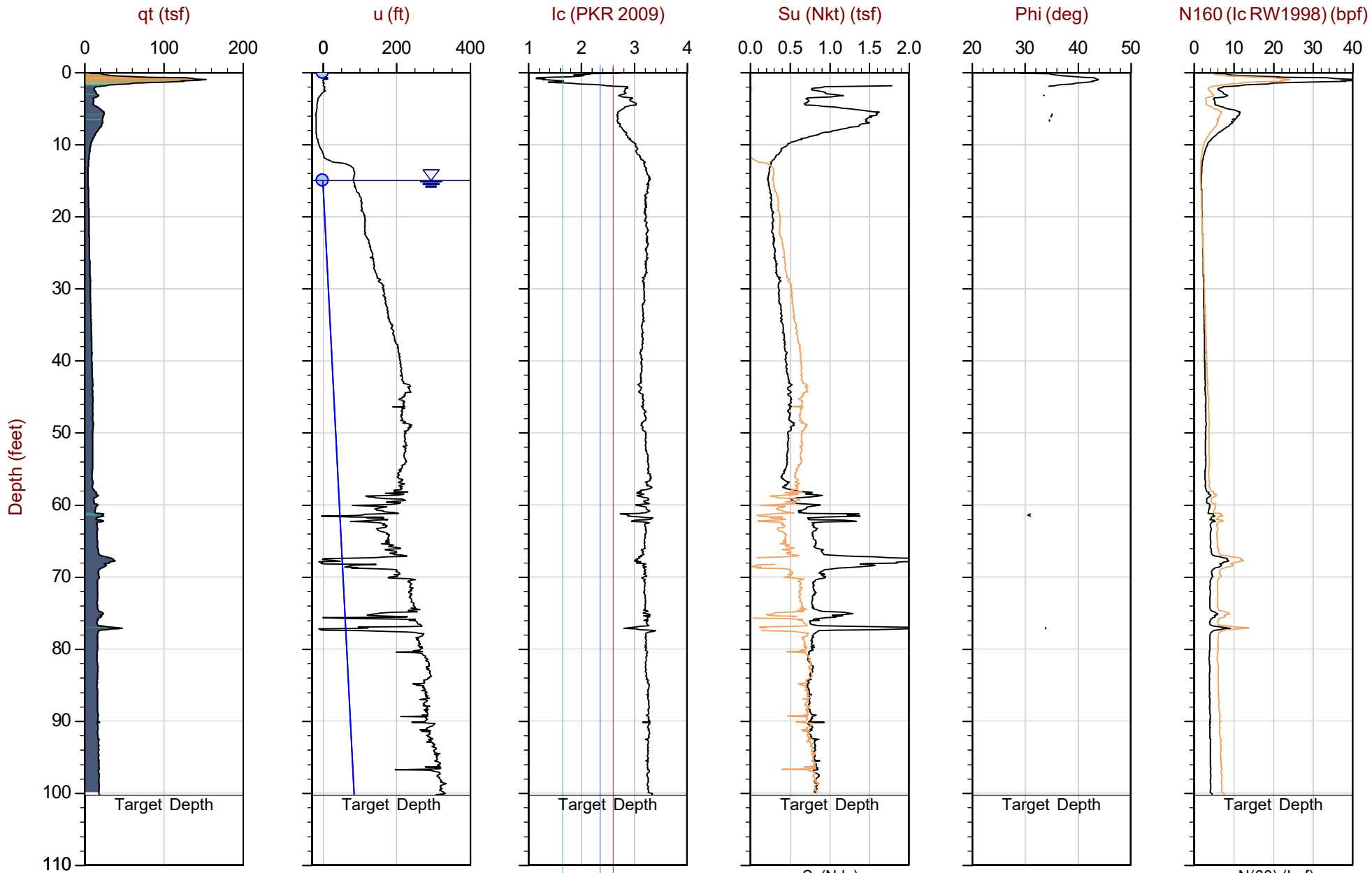
Job No: 20-61-21681

Date: 2020-12-16 11:53

Site: DTE Belle River Power Plant

Sounding: CPT20-10A

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP10A.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469934ft E: 13626592ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

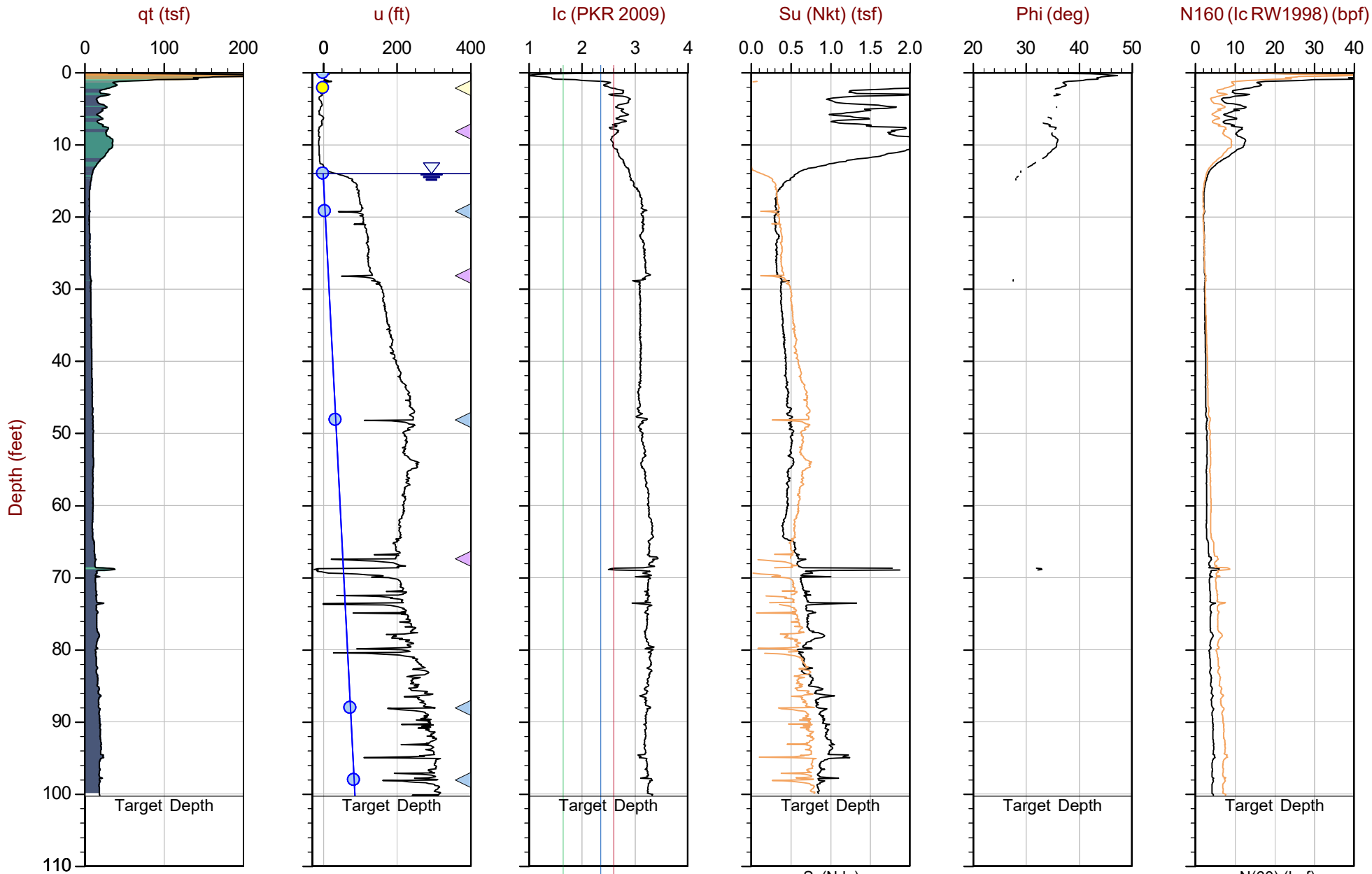
Job No: 20-61-21681

Date: 2020-12-15 11:07

Site: DTE Belle River Power Plant

Sounding: CPT20-11

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP11.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469979ft E: 13626765ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

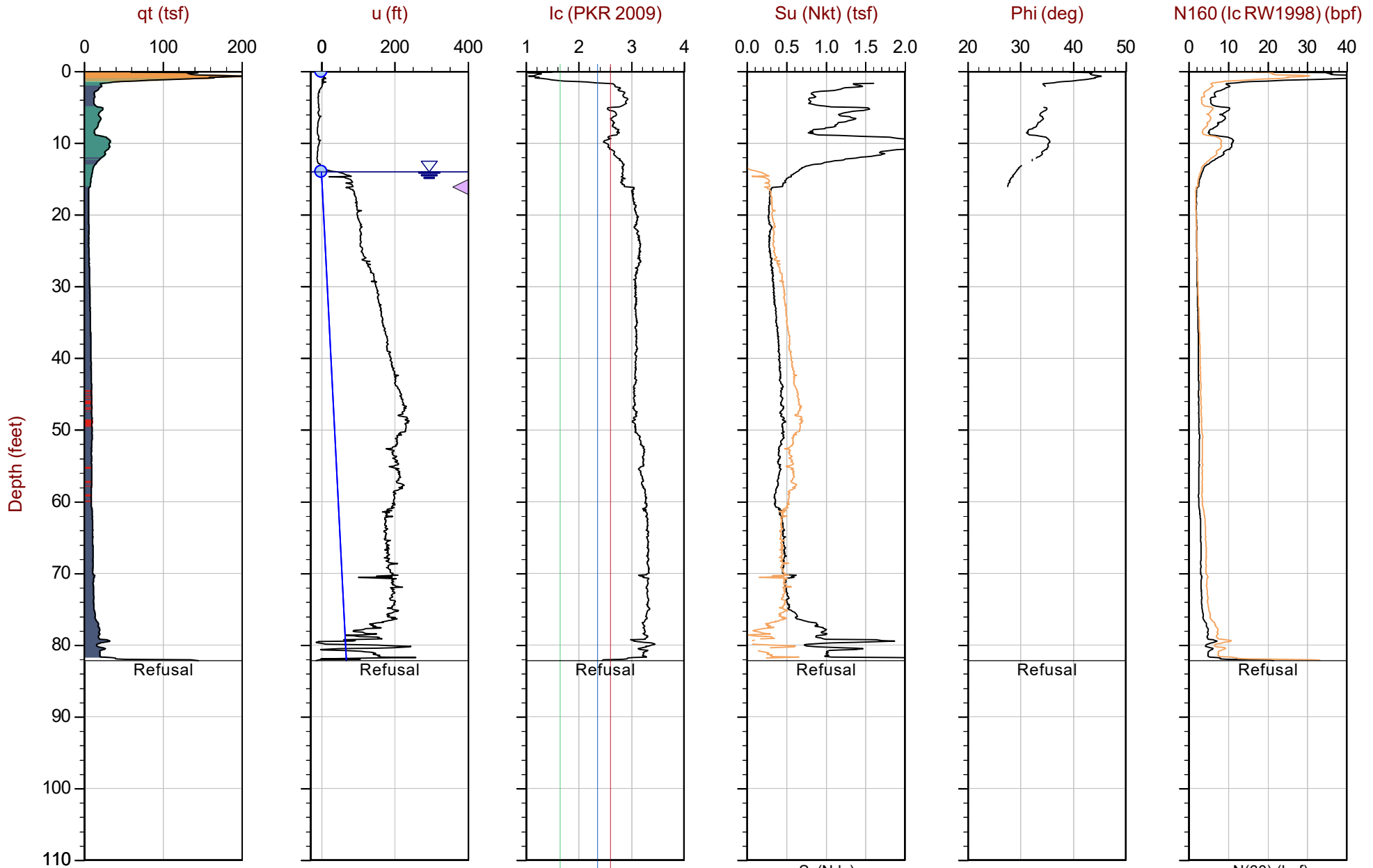
Job No: 20-61-21681

Date: 2020-12-15 08:44

Site: DTE Belle River Power Plant

Sounding: CPT20-12

Cone: 551:T1500F15U500



Max Depth: 25.050 m / 82.18 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP12.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470292ft E: 13626802ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

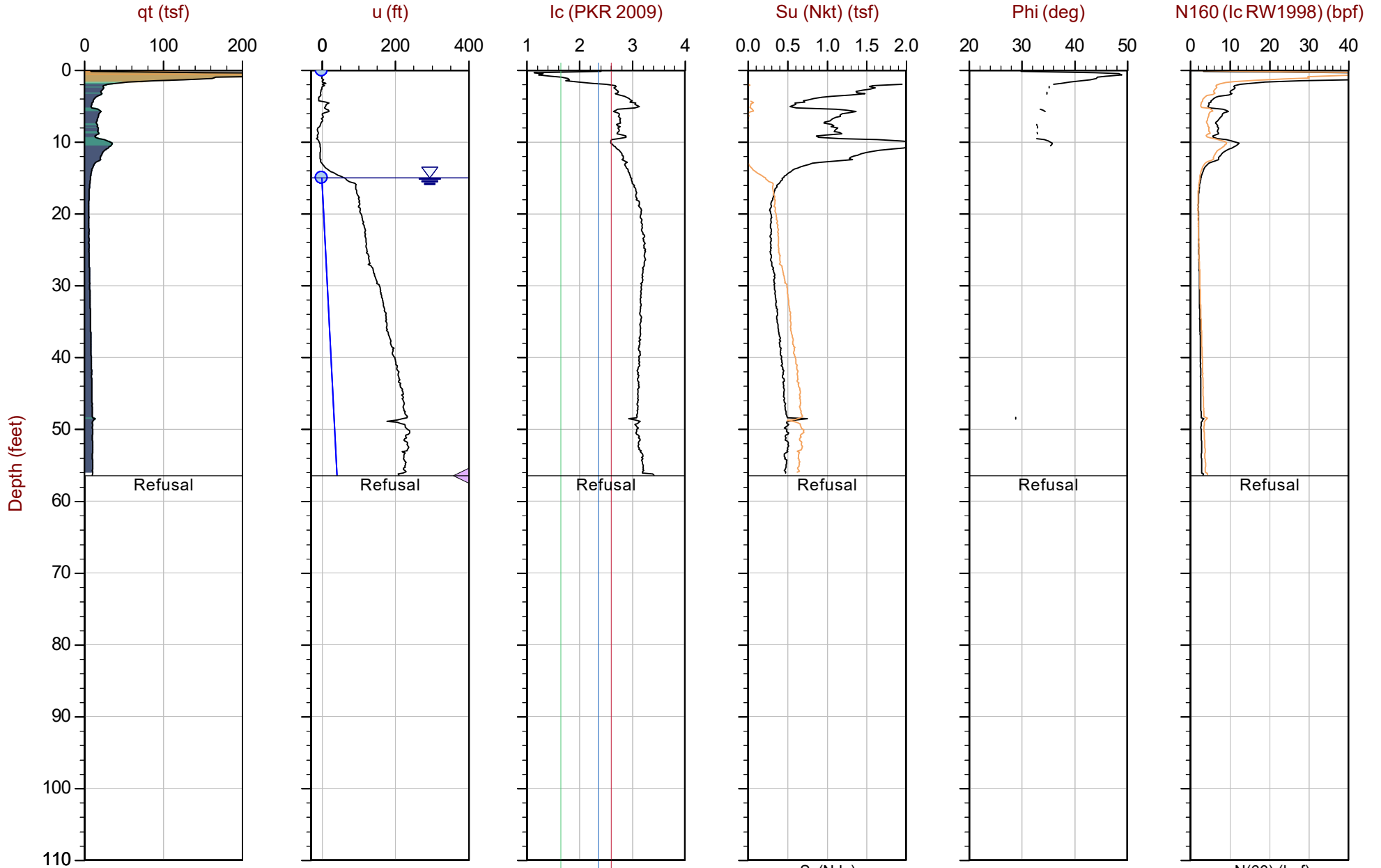
Job No: 20-61-21681

Date: 2020-12-10 15:00

Site: DTE Belle River Power Plant

Sounding: CPT20-13

Cone: 513:T1500F15U500



Max Depth: 17.200 m / 56.43 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470478ft E: 13626800ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

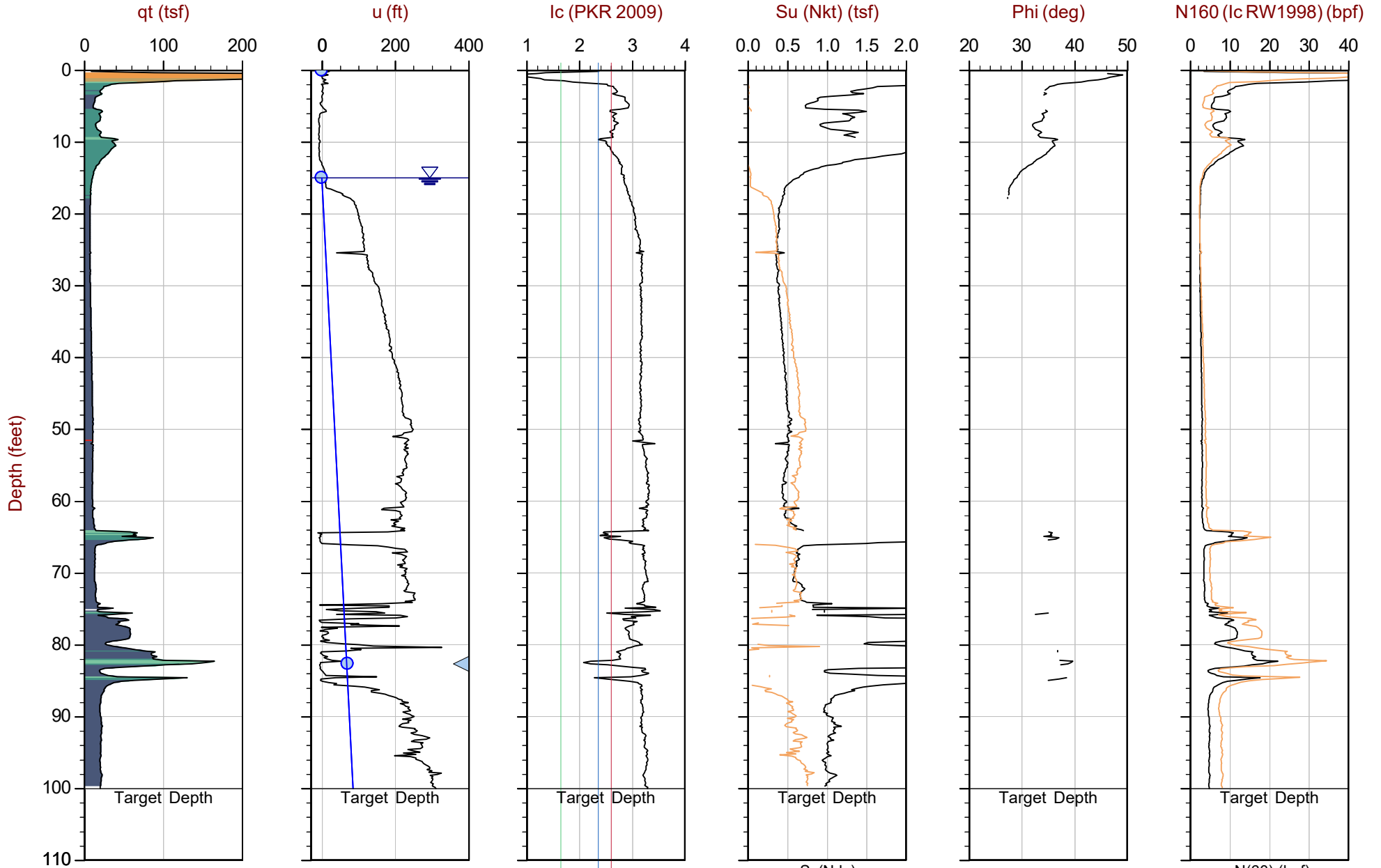
Job No: 20-61-21681

Date: 2020-12-11 09:09

Site: DTE Belle River Power Plant

Sounding: CPT20-13B

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470491ft E: 13626793ft

Sheet No: 1 of 1

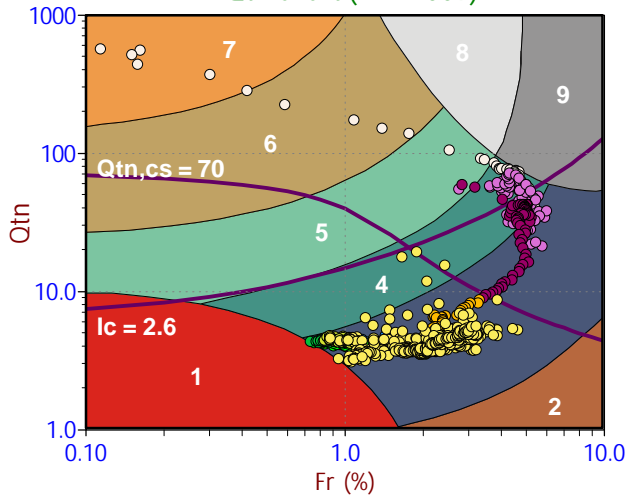
◀ Dissipation, Ueq assumed

— Hydrostatic Line

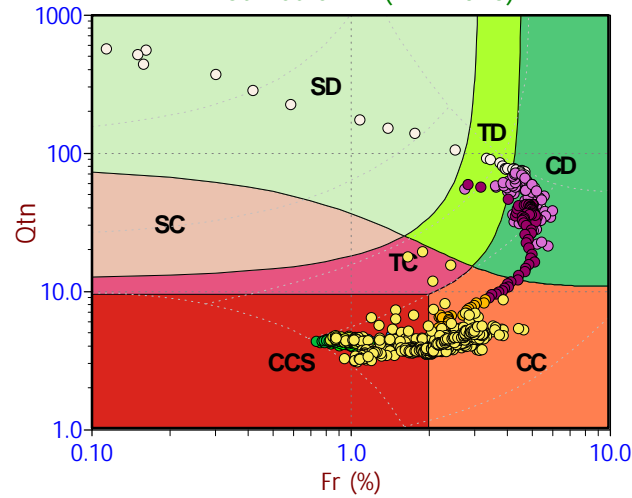
## Soil Behavior Type (SBT) Scatter Plots



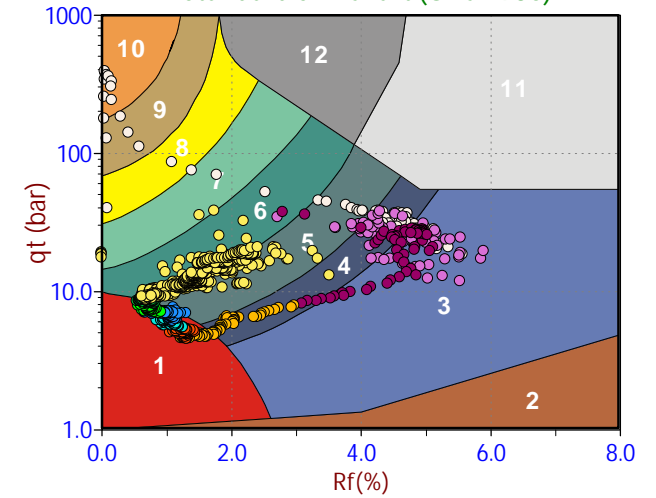
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

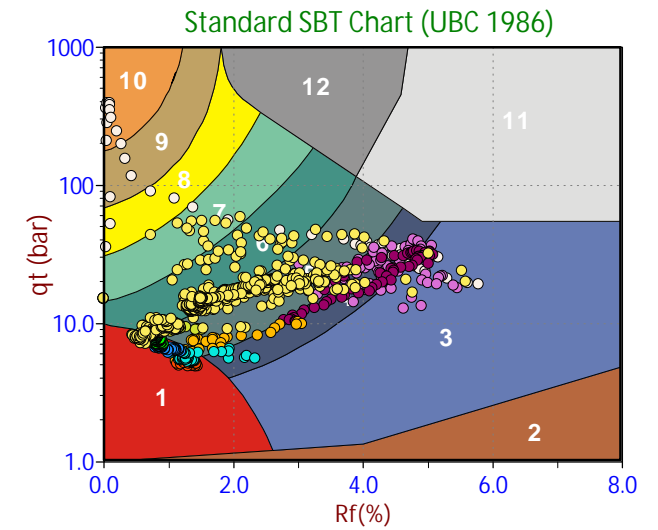
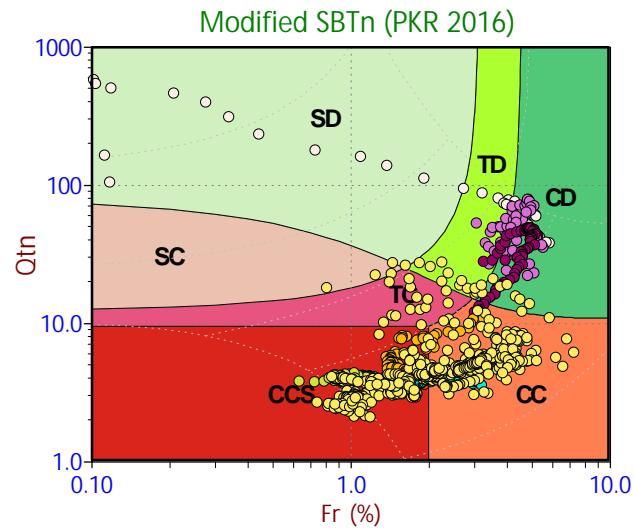
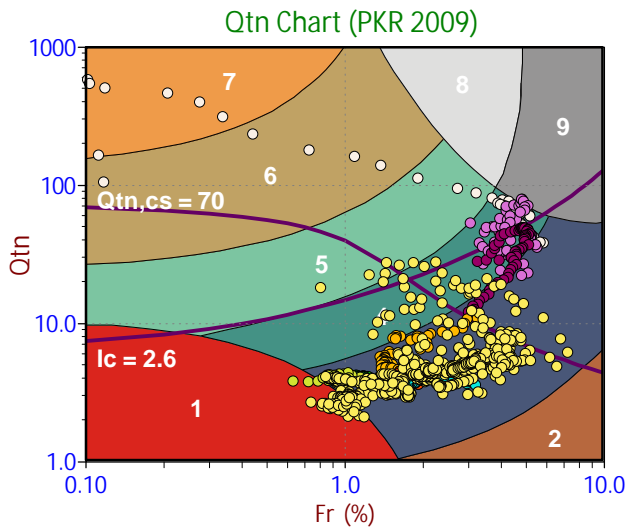
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

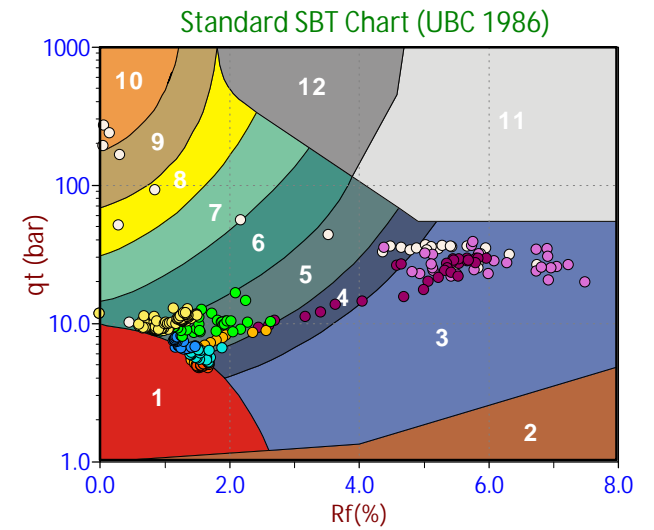
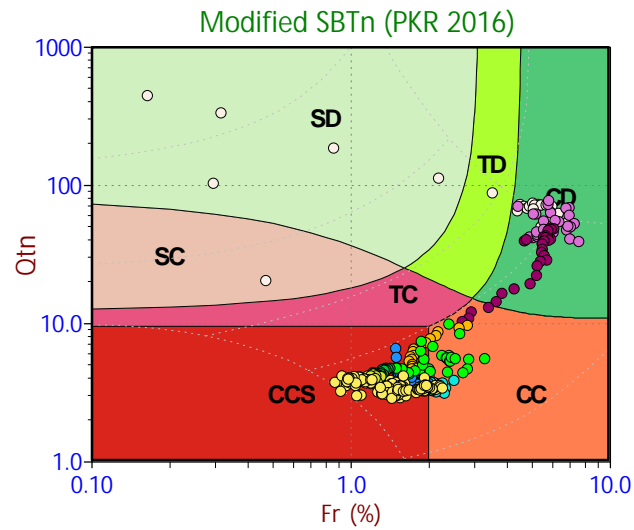
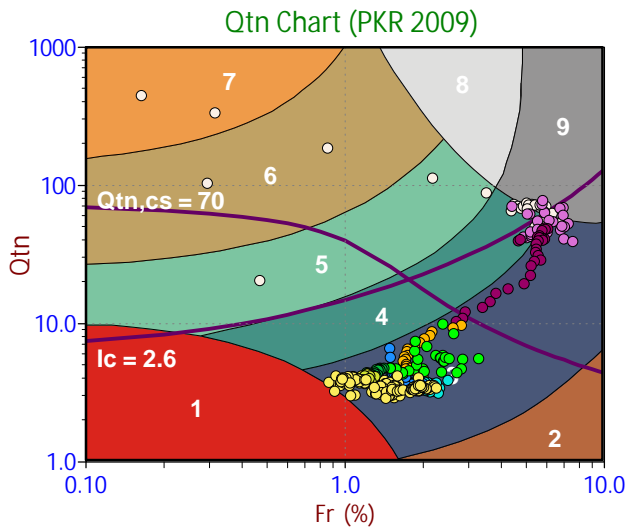
**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand





Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

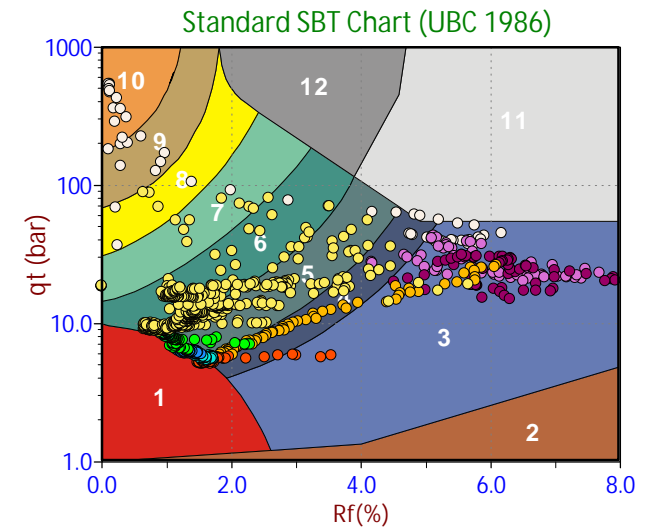
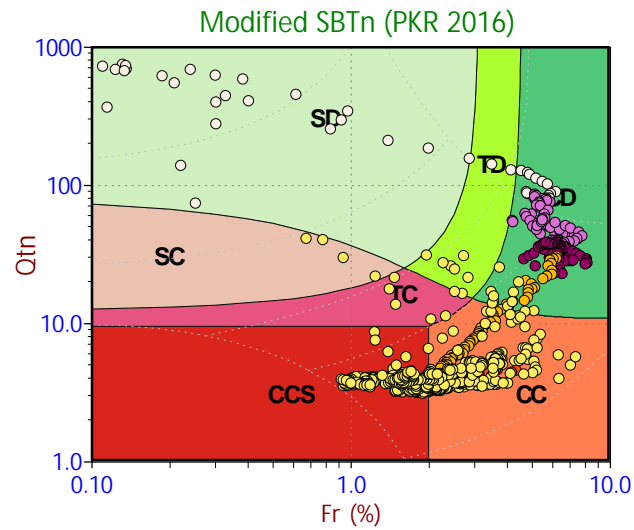
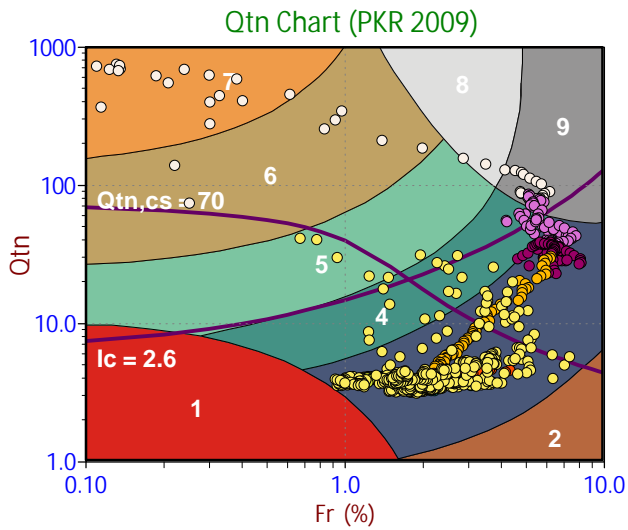
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

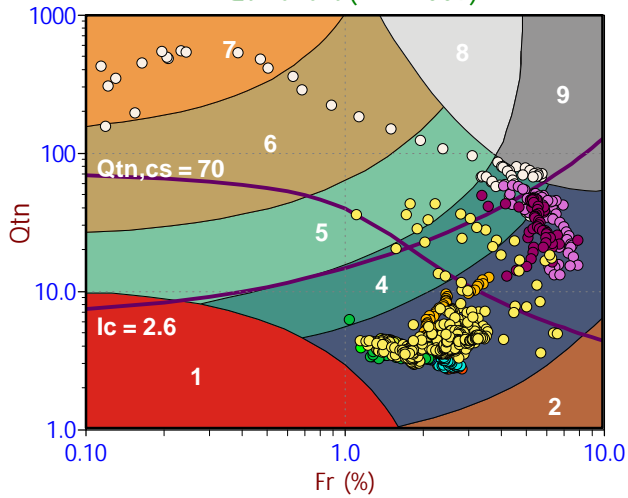
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

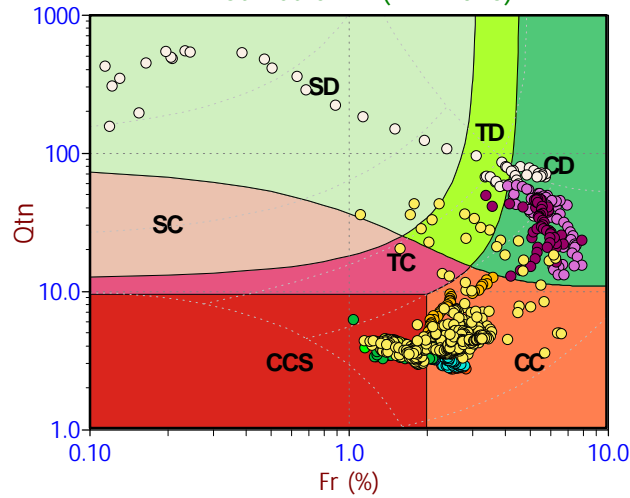
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

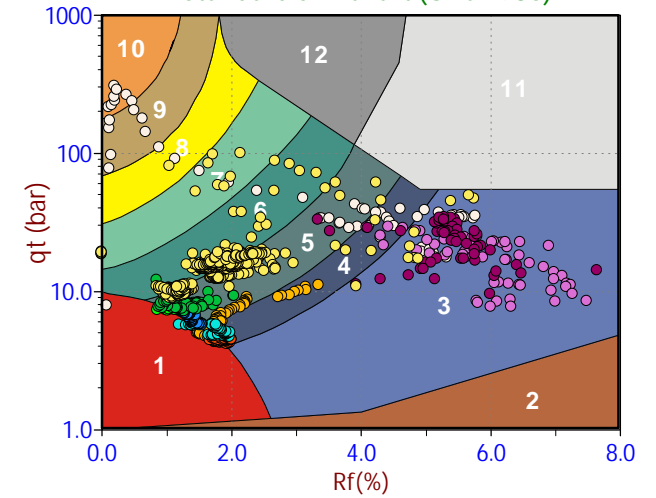
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

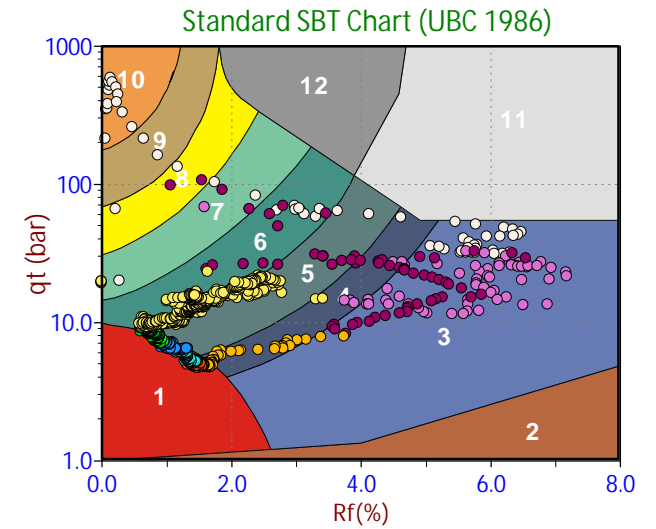
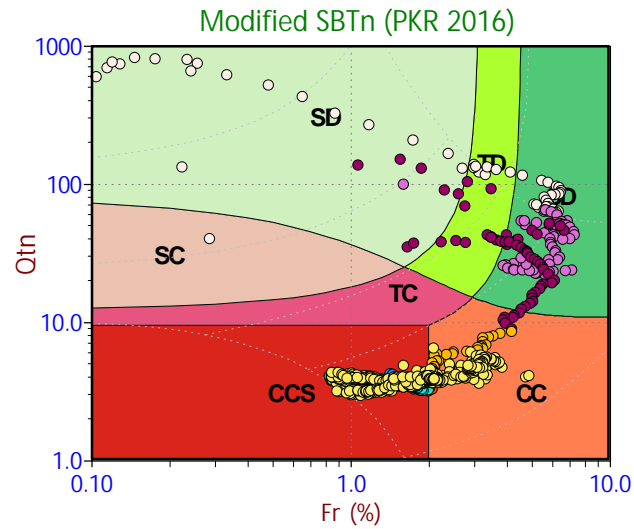
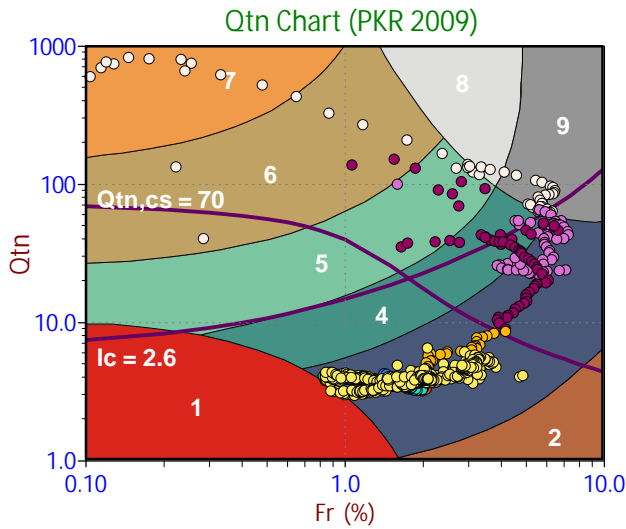
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

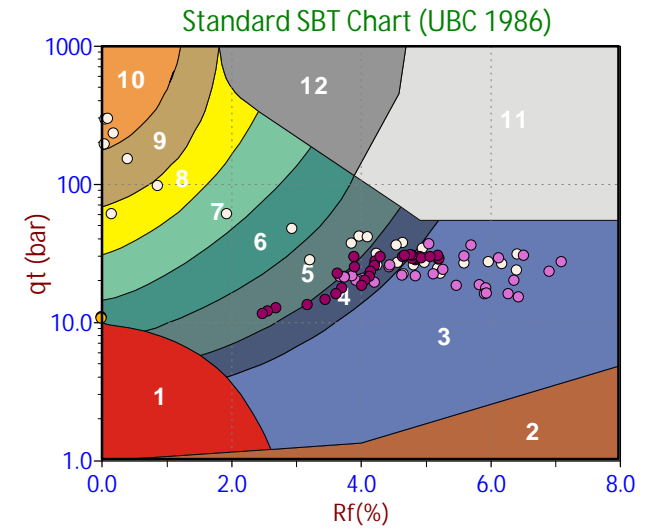
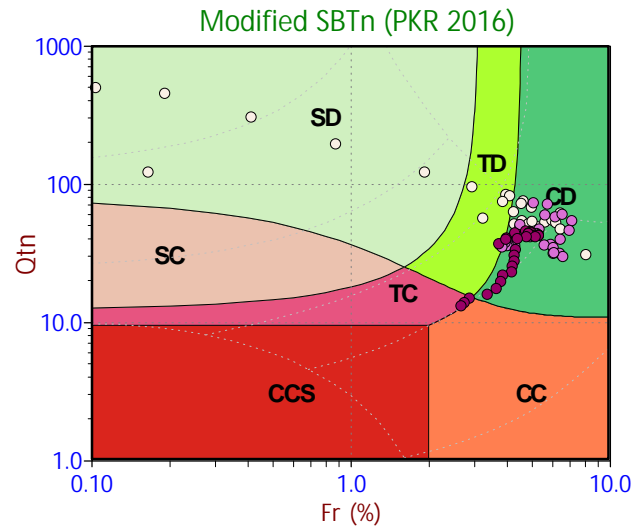
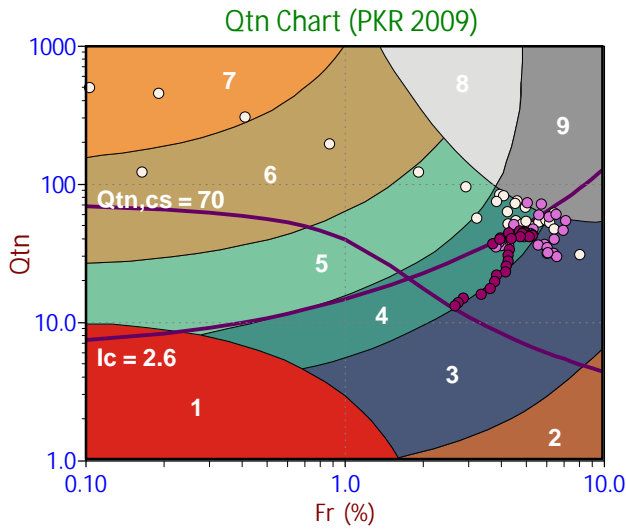
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

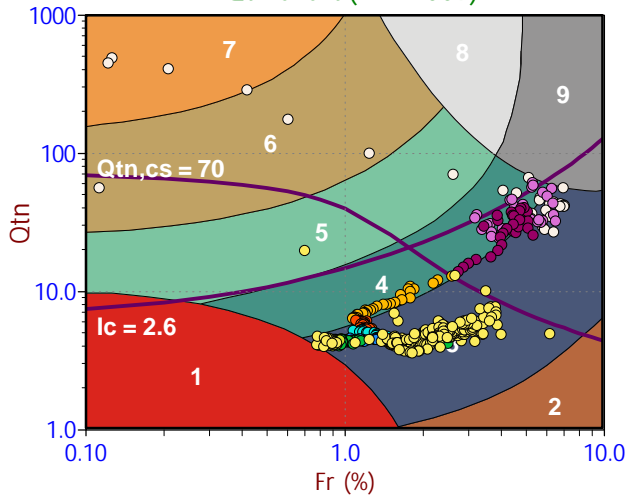
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

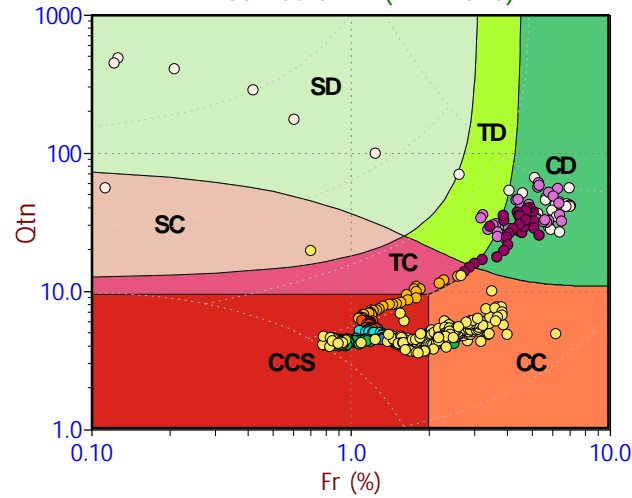
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



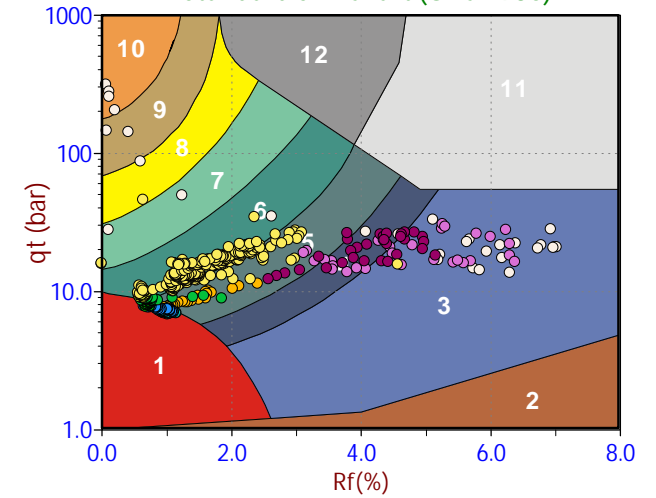
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

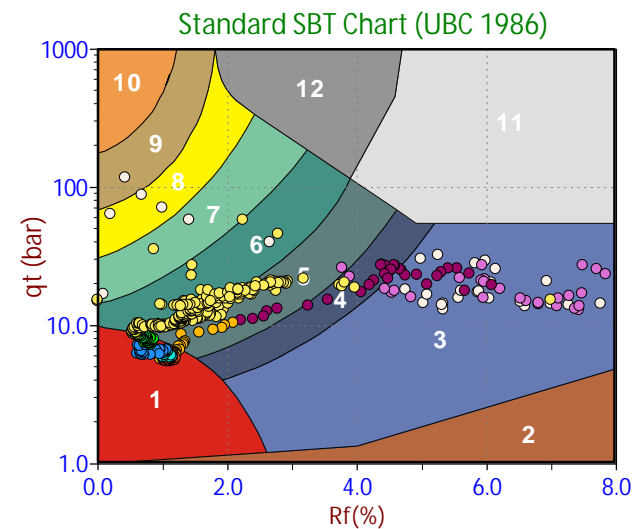
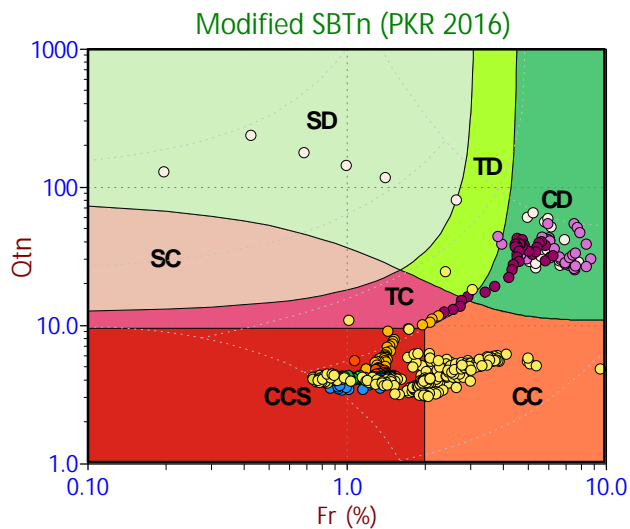
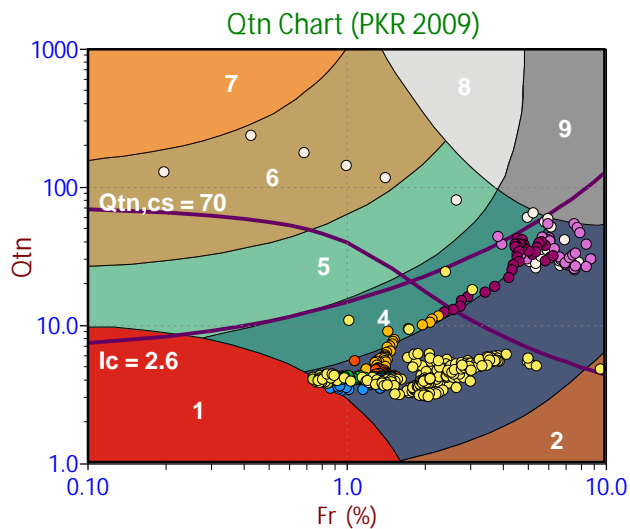
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

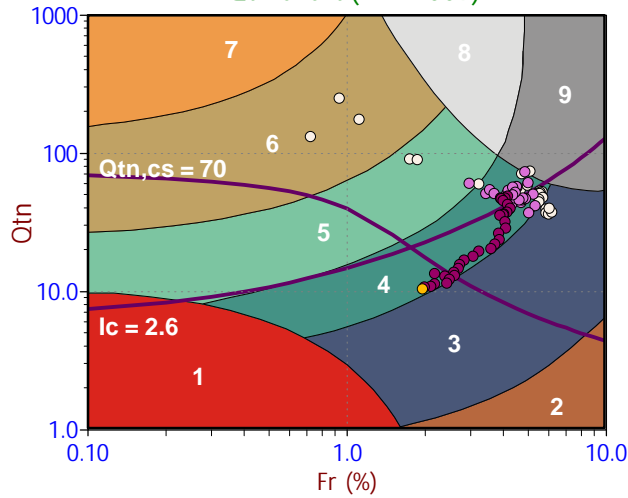
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

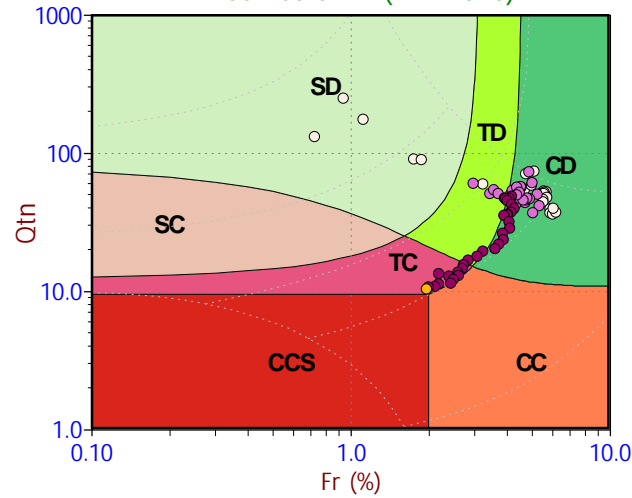
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

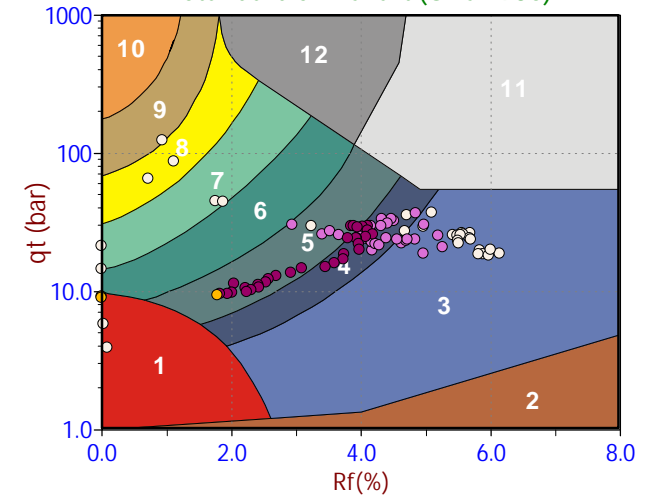
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

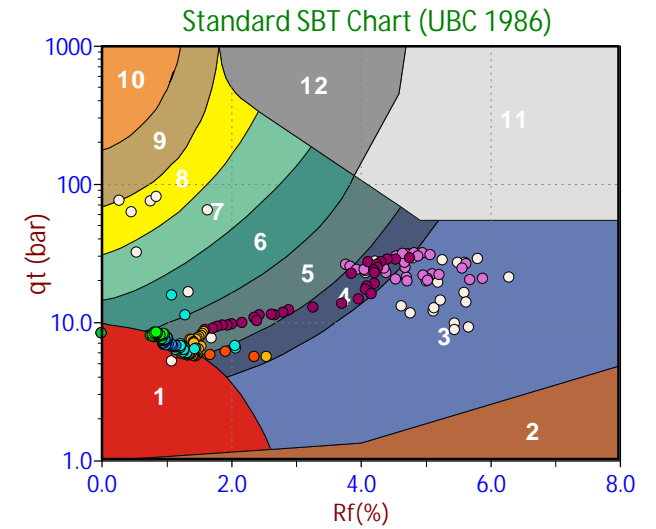
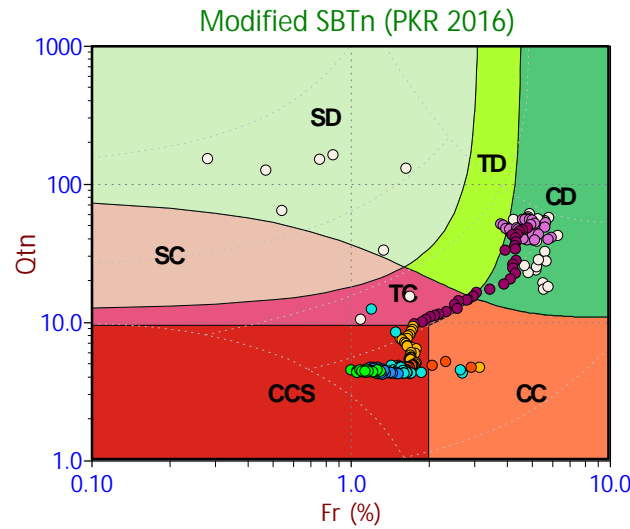
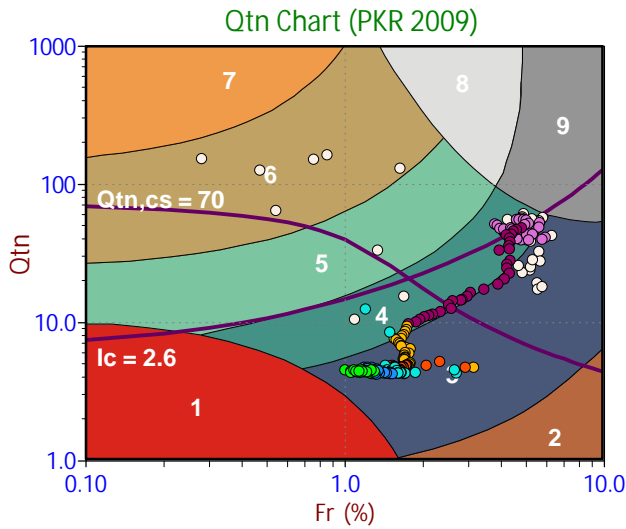
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand





Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

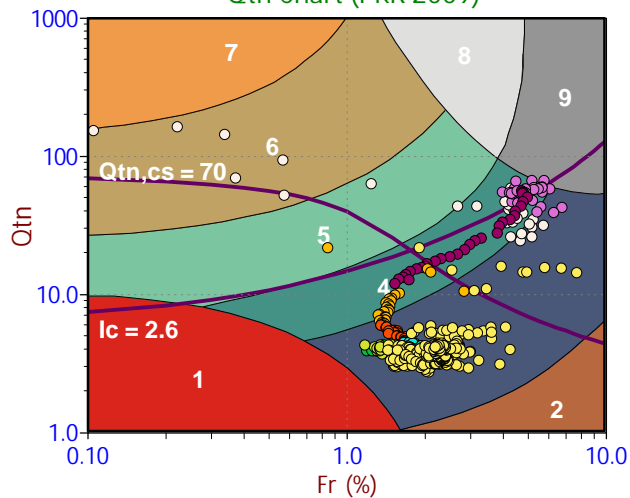
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

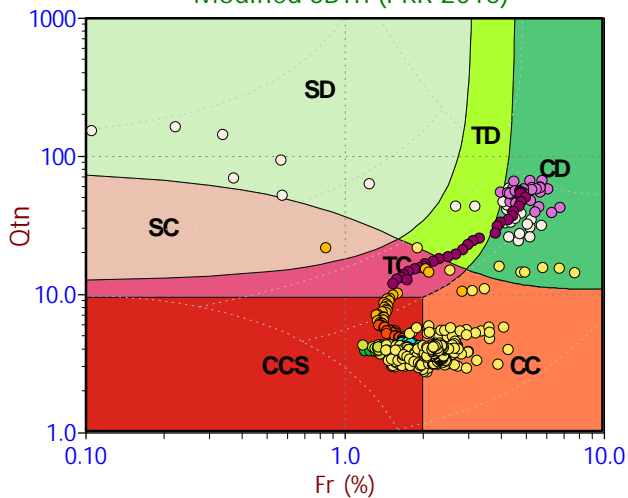
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

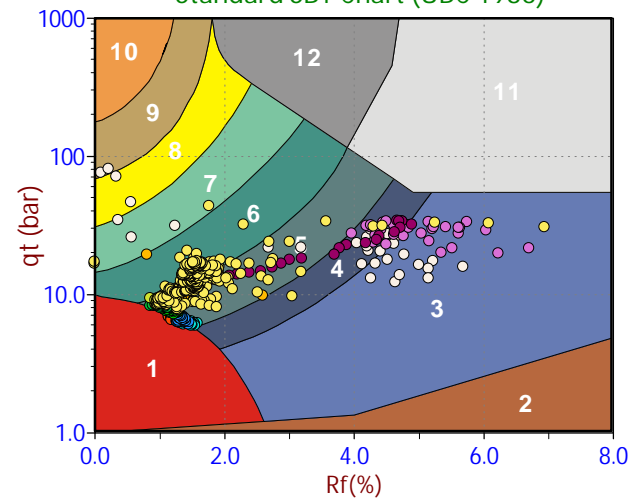
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

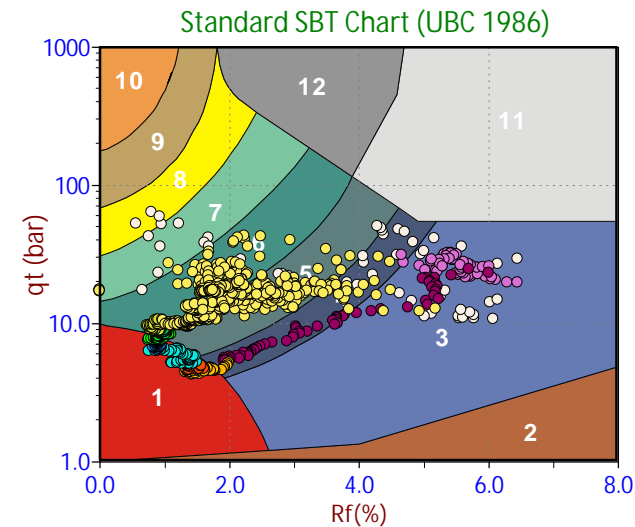
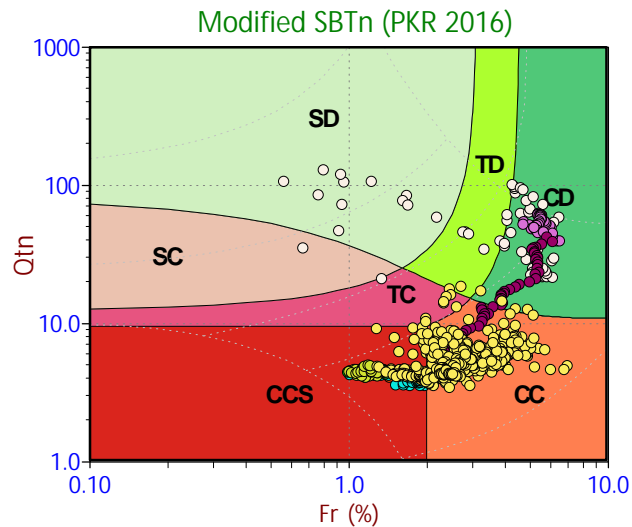
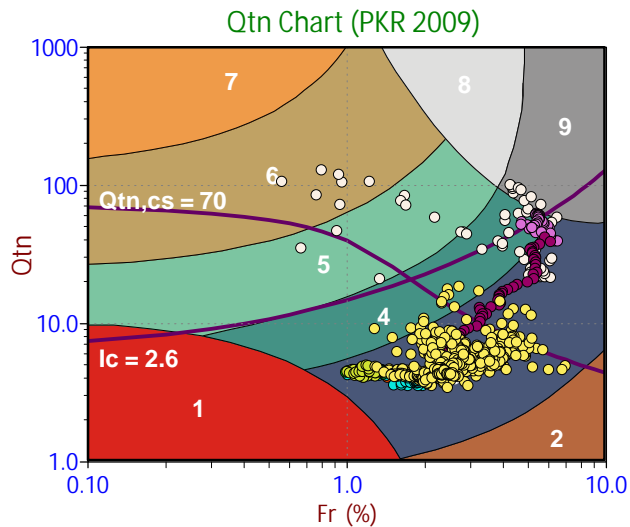
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

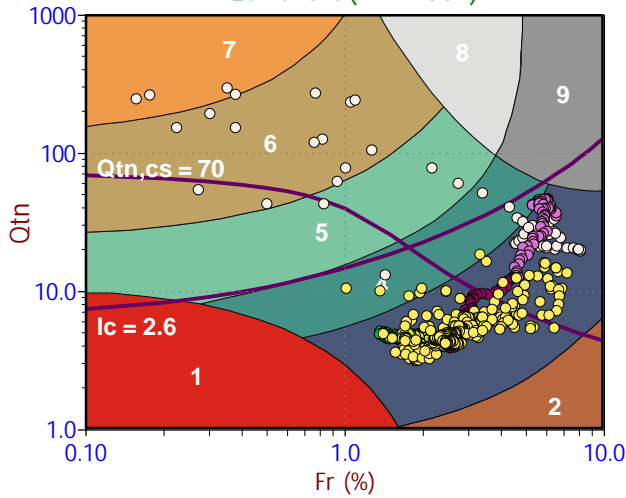
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

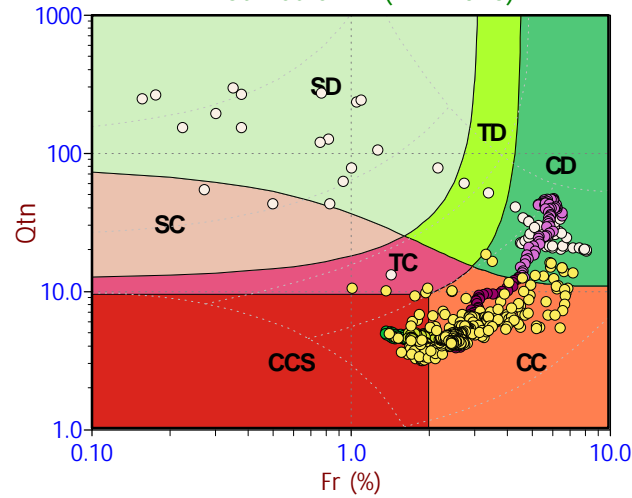
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

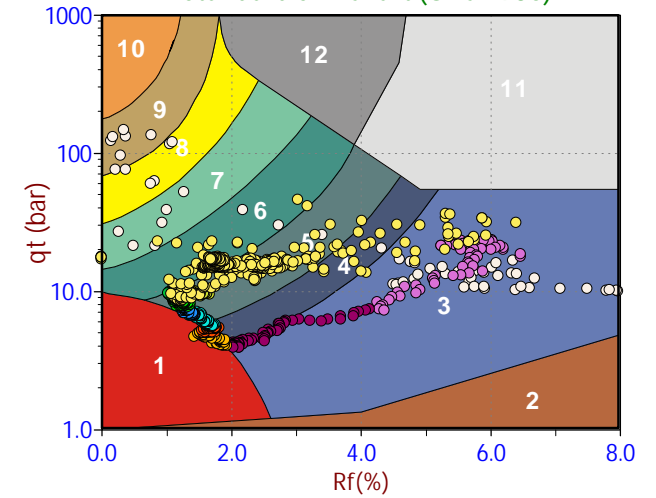
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

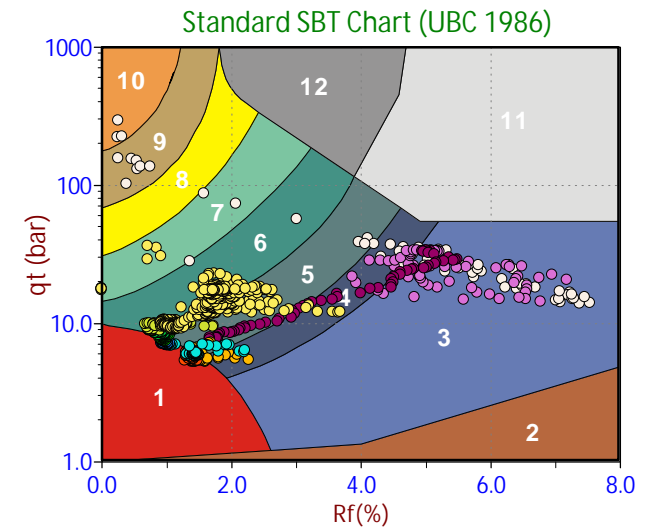
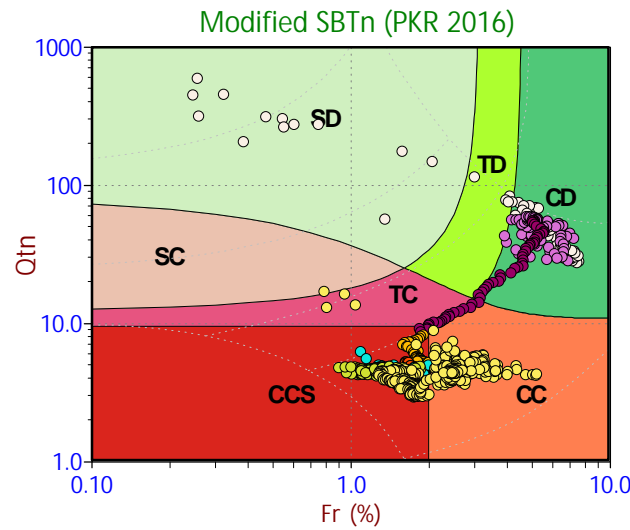
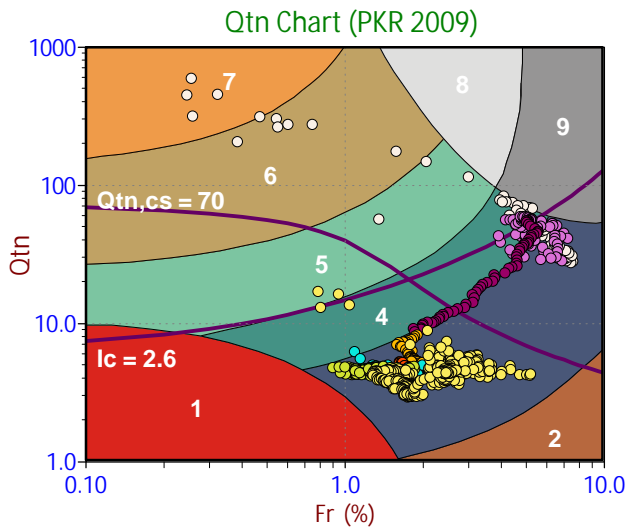
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
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Legend

- Sensitive Fines
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

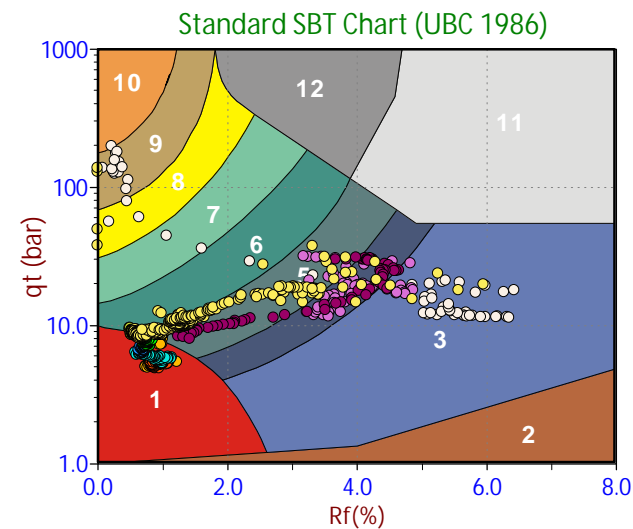
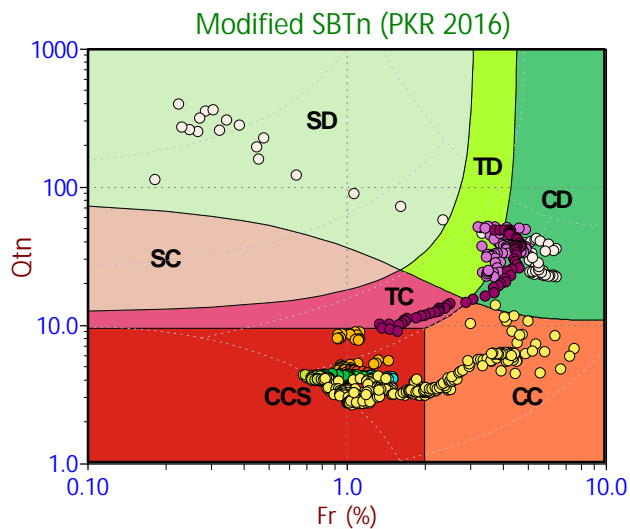
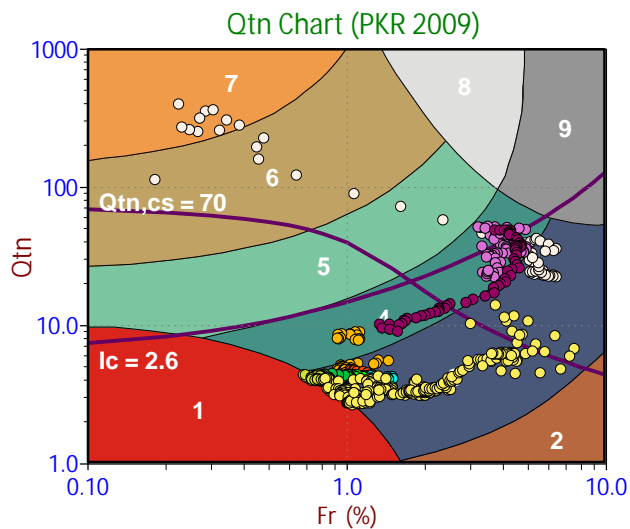
- Sensitive, Fine Grained
- Organic Soils
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- Sands
- Gravelly Sand to Sand
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- SD (Dil. sand like)

Legend

- Sensitive Fines
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

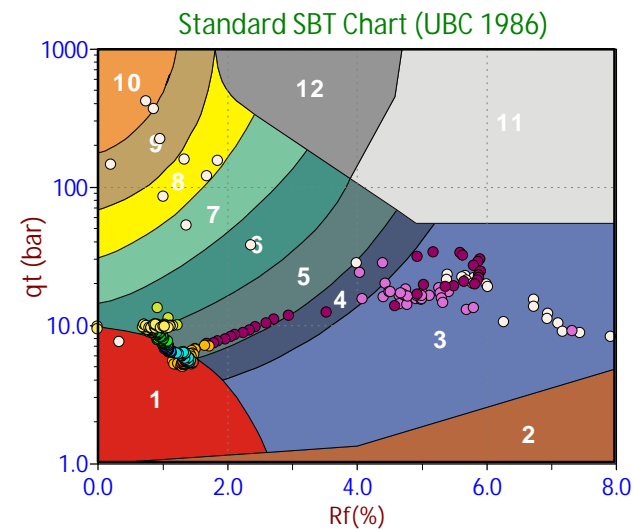
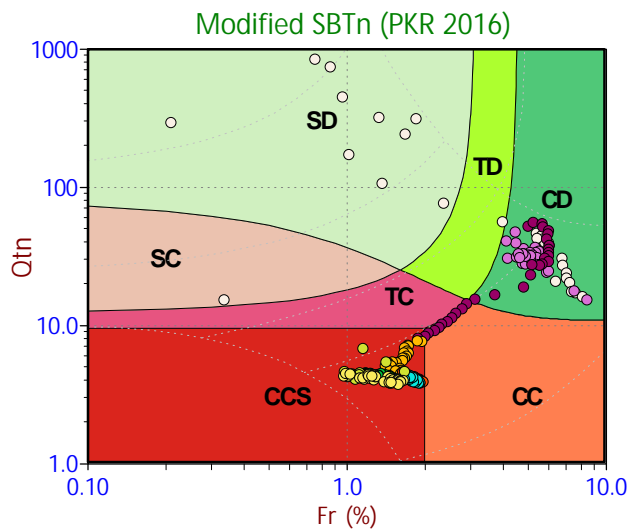
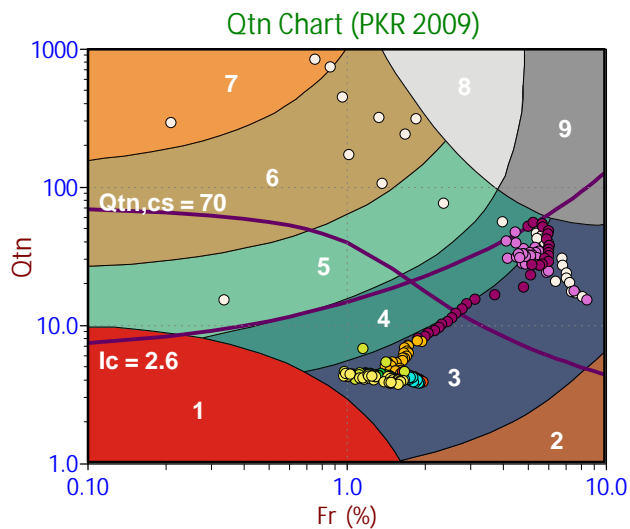
- Sensitive, Fine Grained
- Organic Soils
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- Silt Mixtures
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Legend

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- SC (Cont. sand like)
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Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
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Depth Ranges

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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

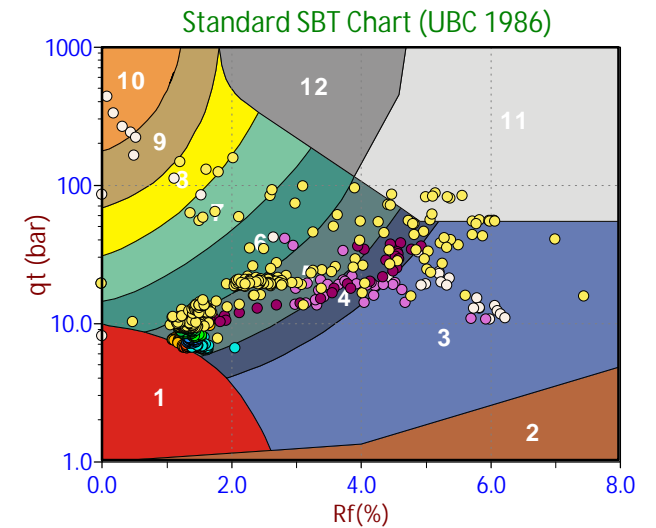
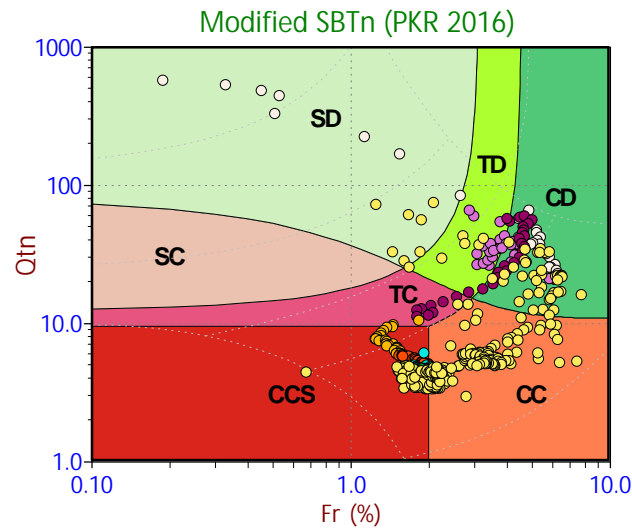
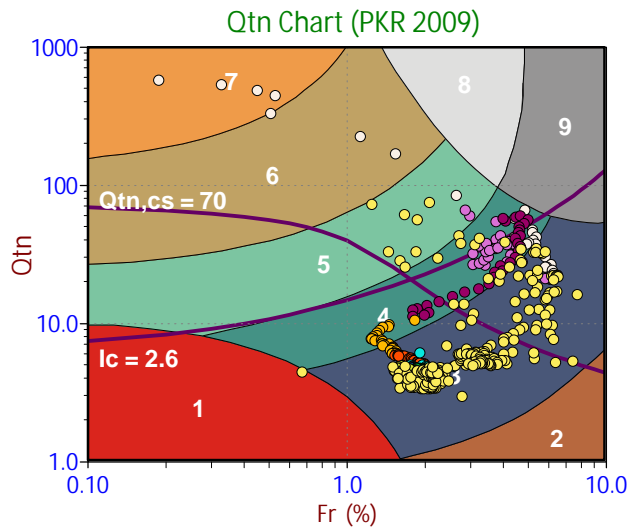
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
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- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



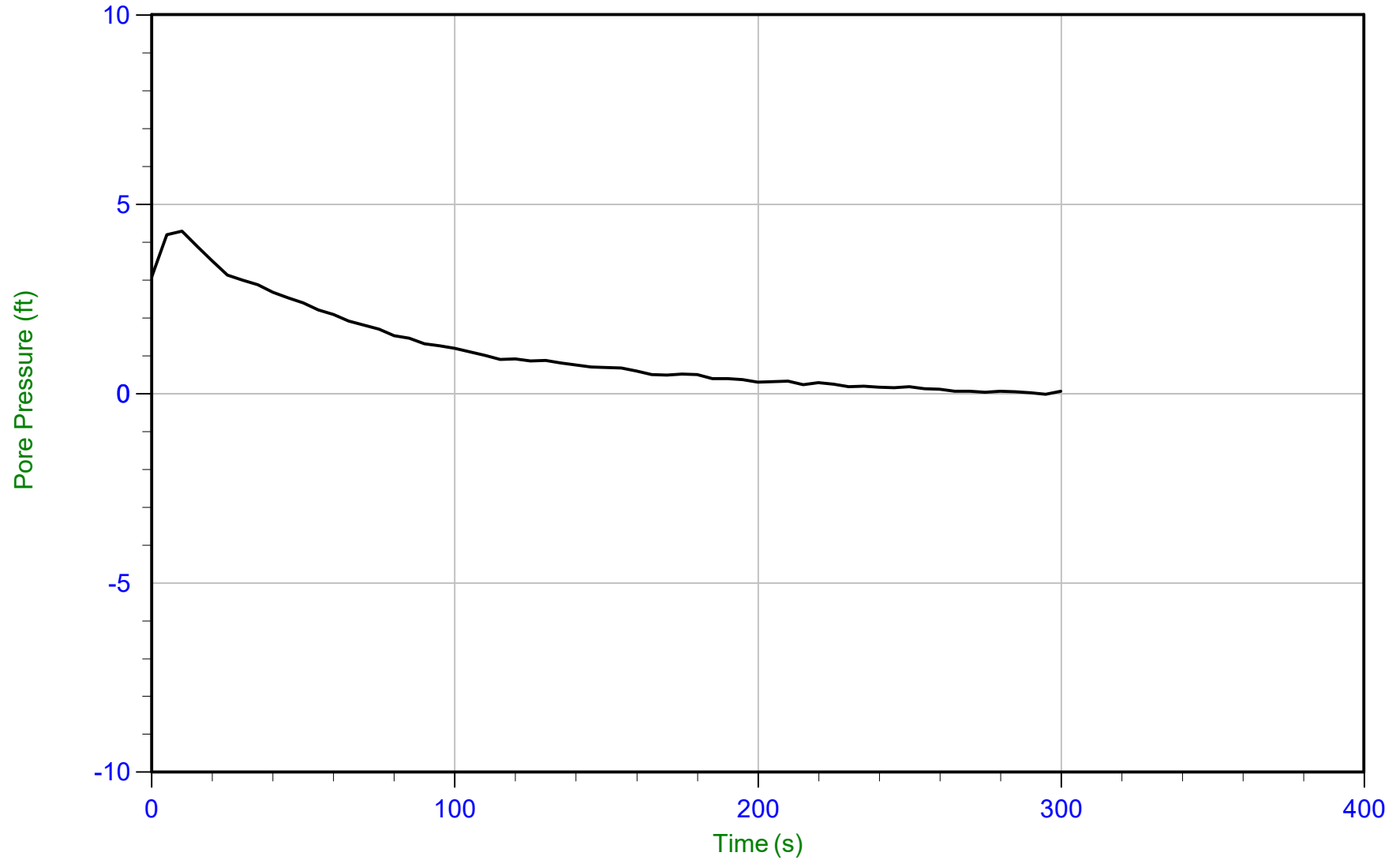
## **APPENDIX I2 – PPD TEST RESULTS**



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 300.0 s

u Min: -0.0 ft  
u Max: 4.3 ft  
u Final: 0.1 ft

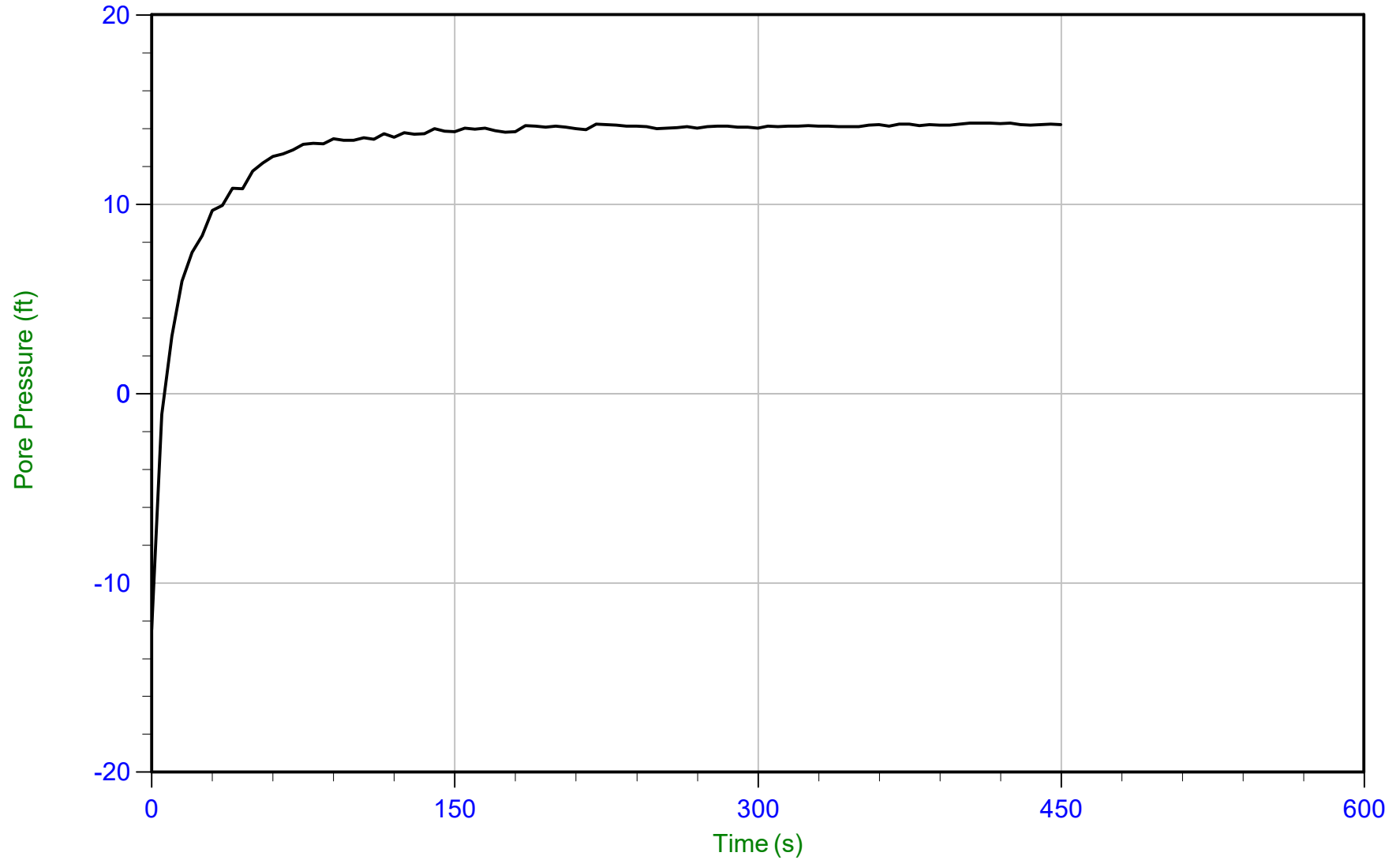
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 2.775 m / 9.104 ft  
Duration: 450.0 s

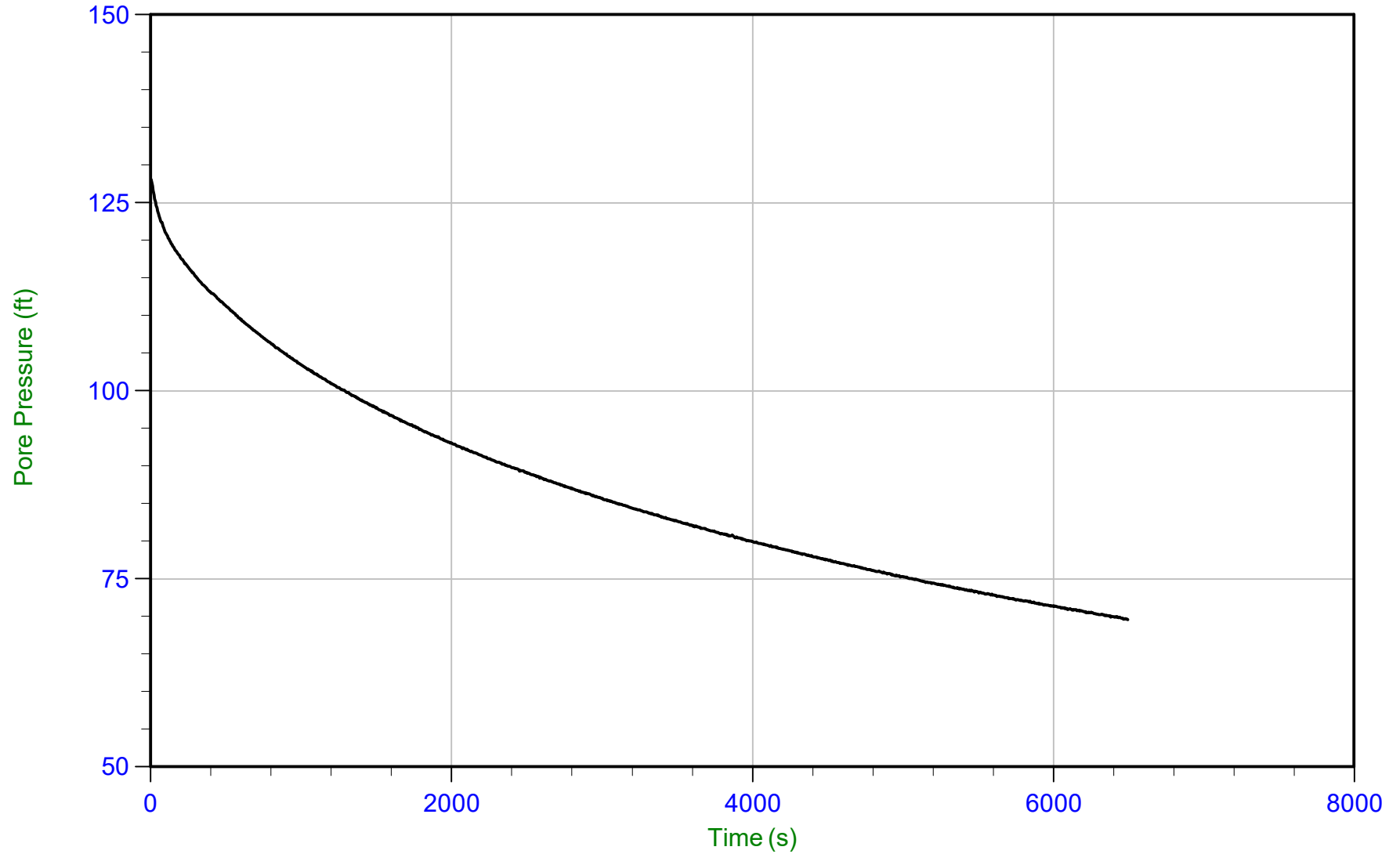
u Min: -12.5 ft  
u Max: 14.3 ft  
u Final: 14.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 6500.0 s

u Min: 69.6 ft  
u Max: 128.1 ft  
u Final: 69.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 13.1 ft  
U(50): 70.62 ft

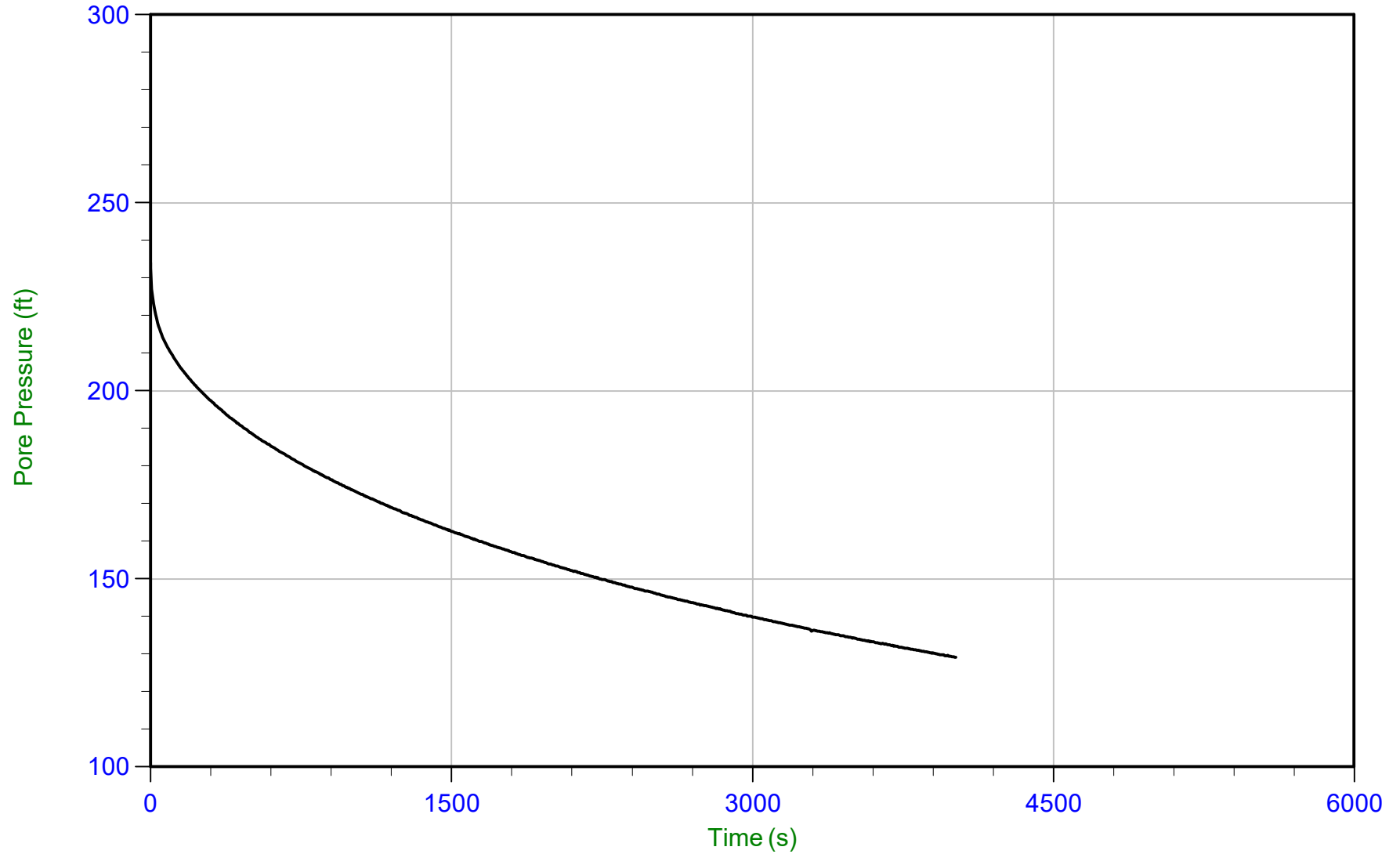
T(50): 6203.4 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 4015.0 s

u Min: 129.2 ft  
u Max: 234.0 ft  
u Final: 129.2 ft

WT: 4.572 m / 15.000 ft  
Ueq: 33.1 ft  
U(50): 133.60 ft

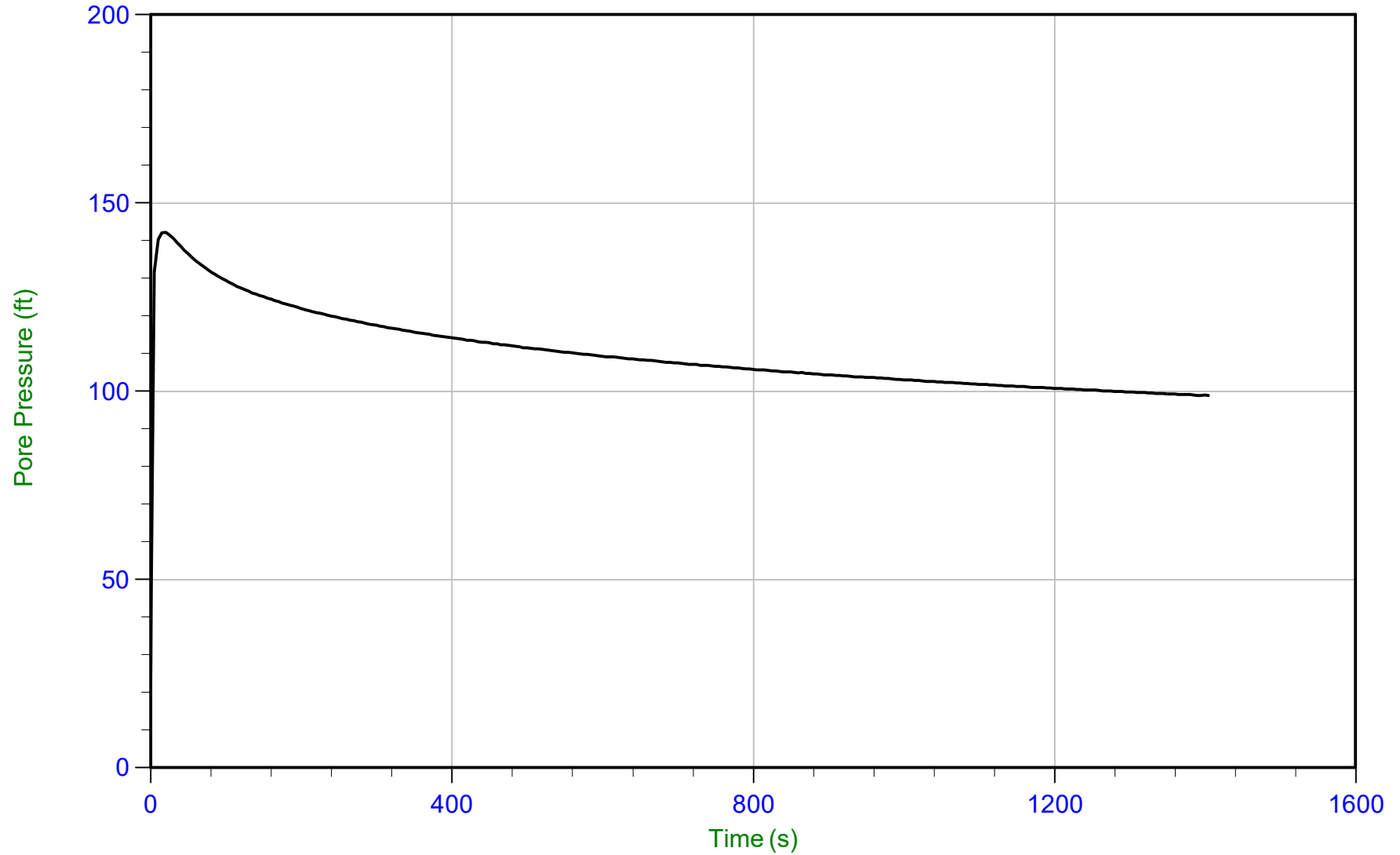
T(50): 3564.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 19.975 m / 65.534 ft  
Duration: 1405.0 s

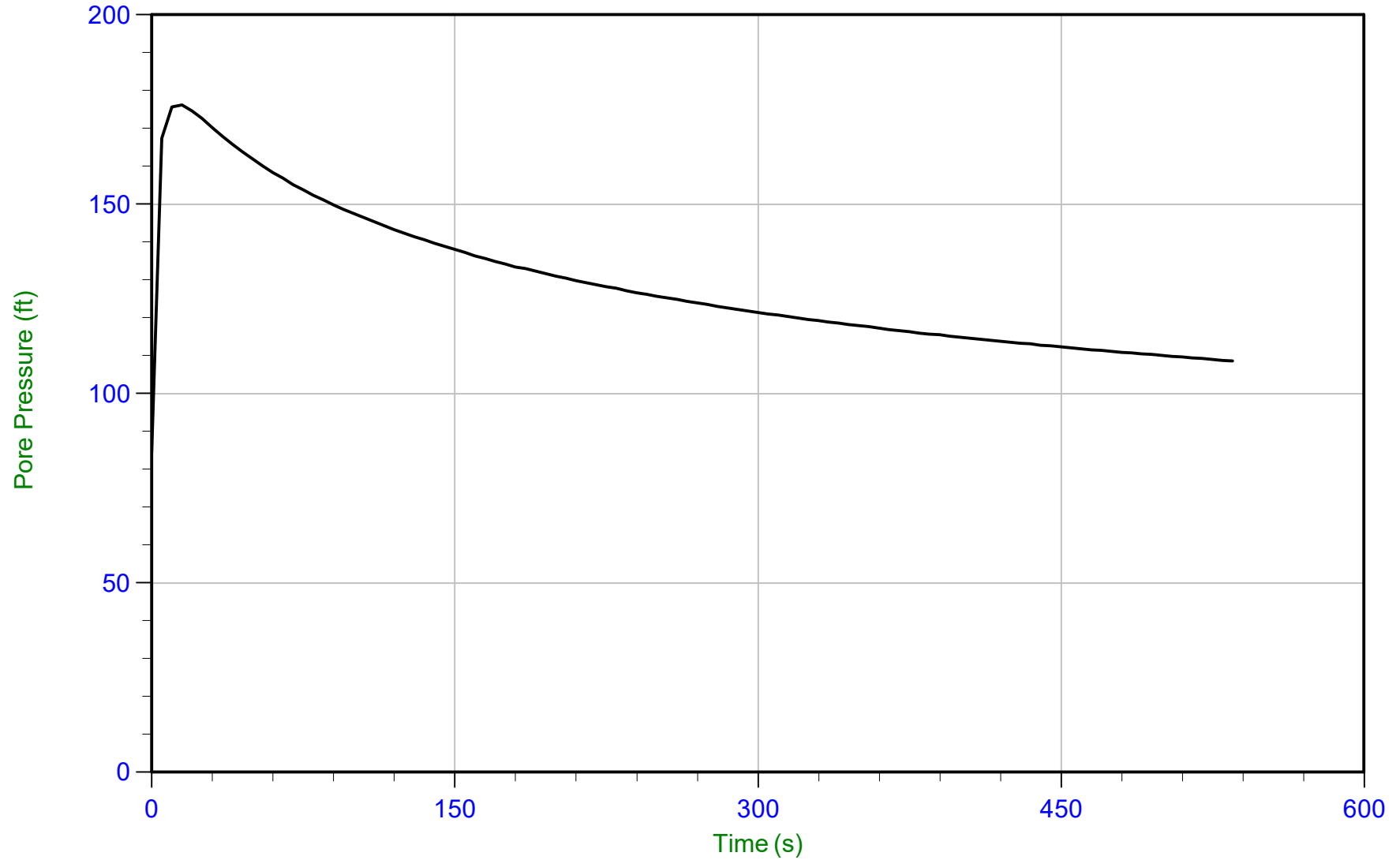
u Min: 25.2 ft  
u Max: 142.2 ft  
u Final: 98.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 20.775 m / 68.159 ft  
Duration: 535.0 s

u Min: 84.4 ft  
u Max: 176.2 ft  
u Final: 108.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 53.2 ft  
U(50): 114.66 ft

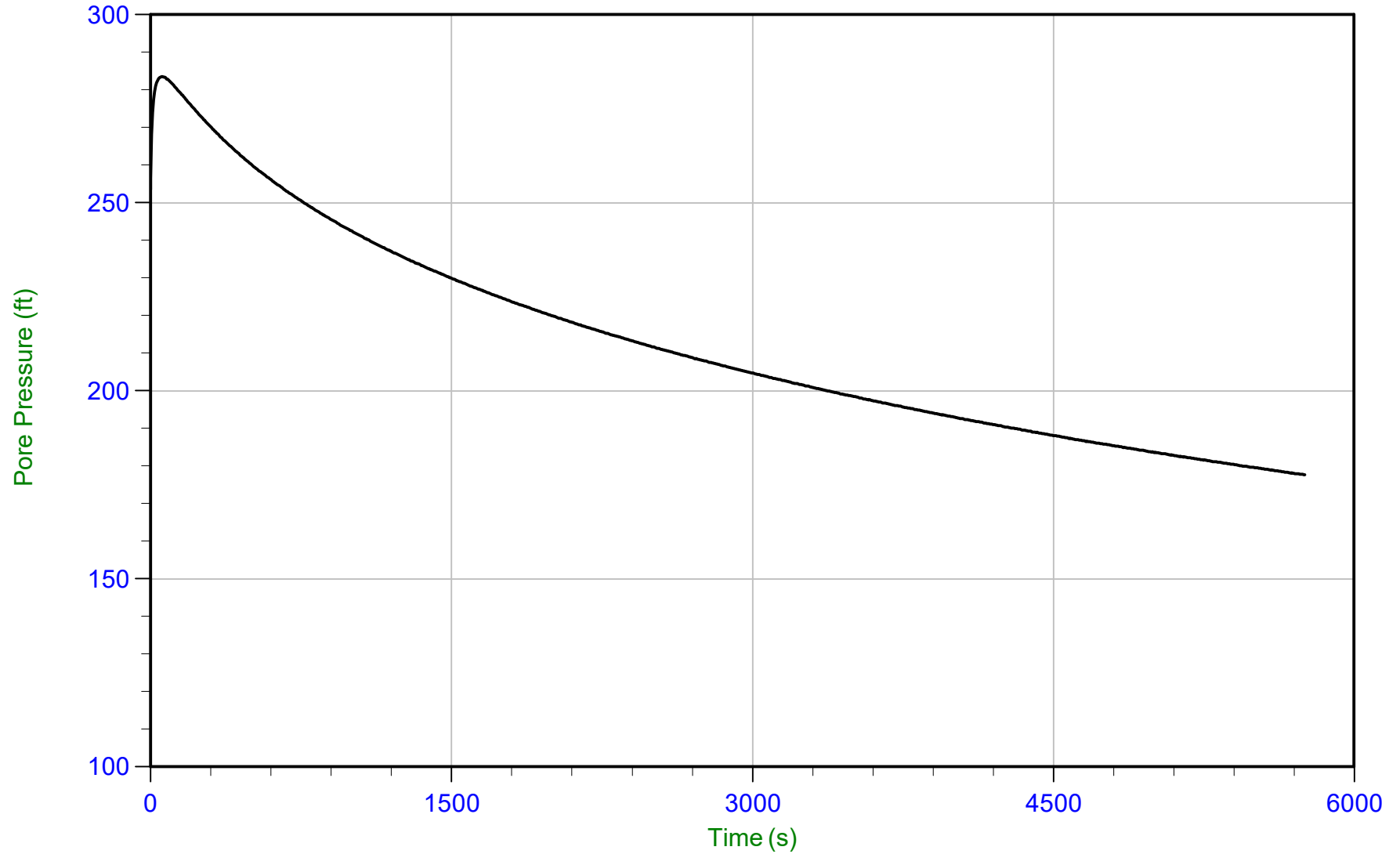
T(50): 389.0 s  
lr: 100  
Ch: 1.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 5755.0 s

u Min: 177.6 ft  
u Max: 283.6 ft  
u Final: 177.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 73.1 ft  
U(50): 178.34 ft

T(50): 5600.8 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min

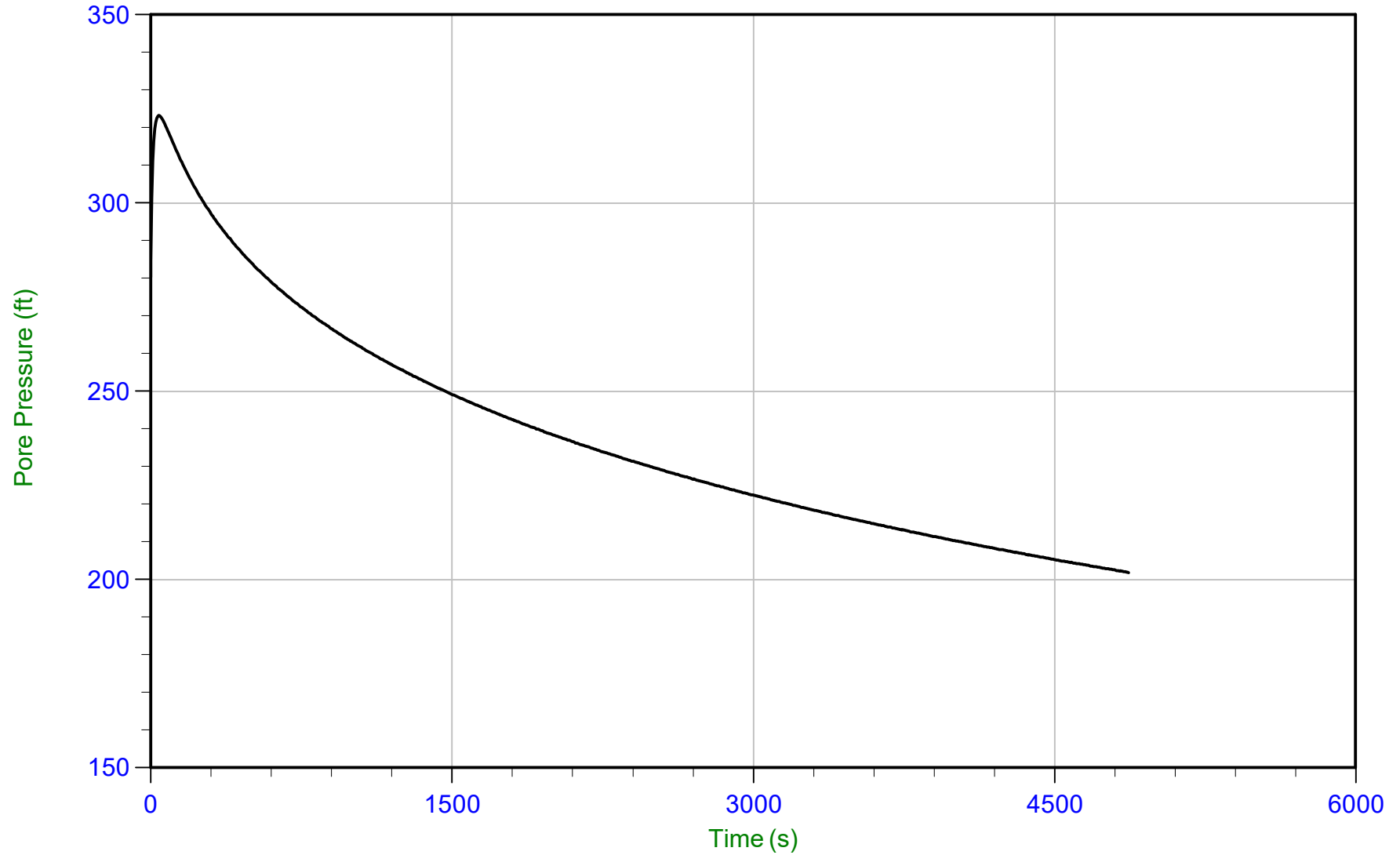




Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4870.0 s

u Min: 201.9 ft  
u Max: 323.3 ft  
u Final: 201.9 ft

WT: 4.572 m / 15.000 ft  
Ueq: 83.1 ft  
U(50): 203.21 ft

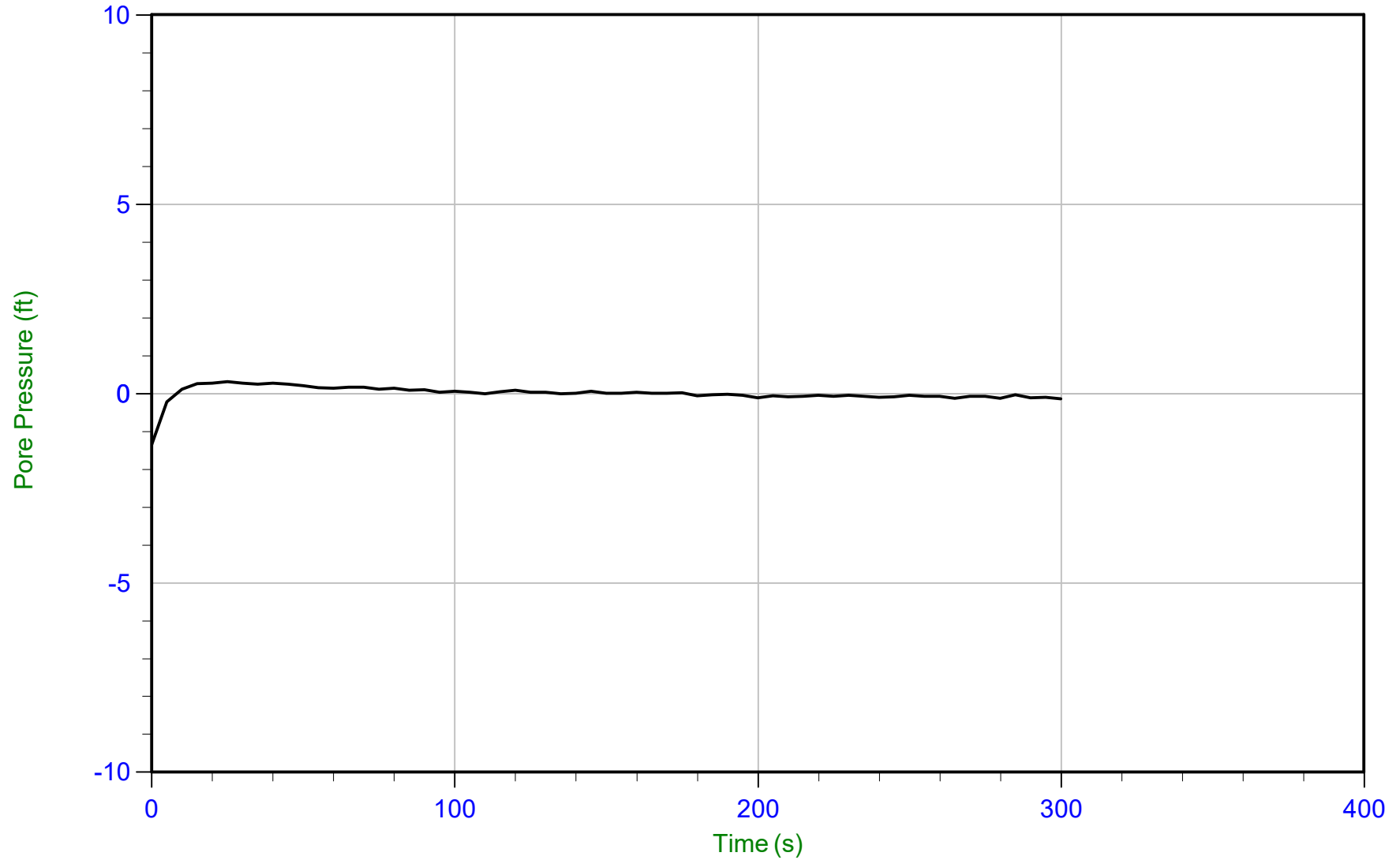
T(50): 4686.3 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 3.100 m / 10.170 ft  
Duration: 300.0 s

u Min: -1.4 ft  
u Max: 0.3 ft  
u Final: -0.1 ft

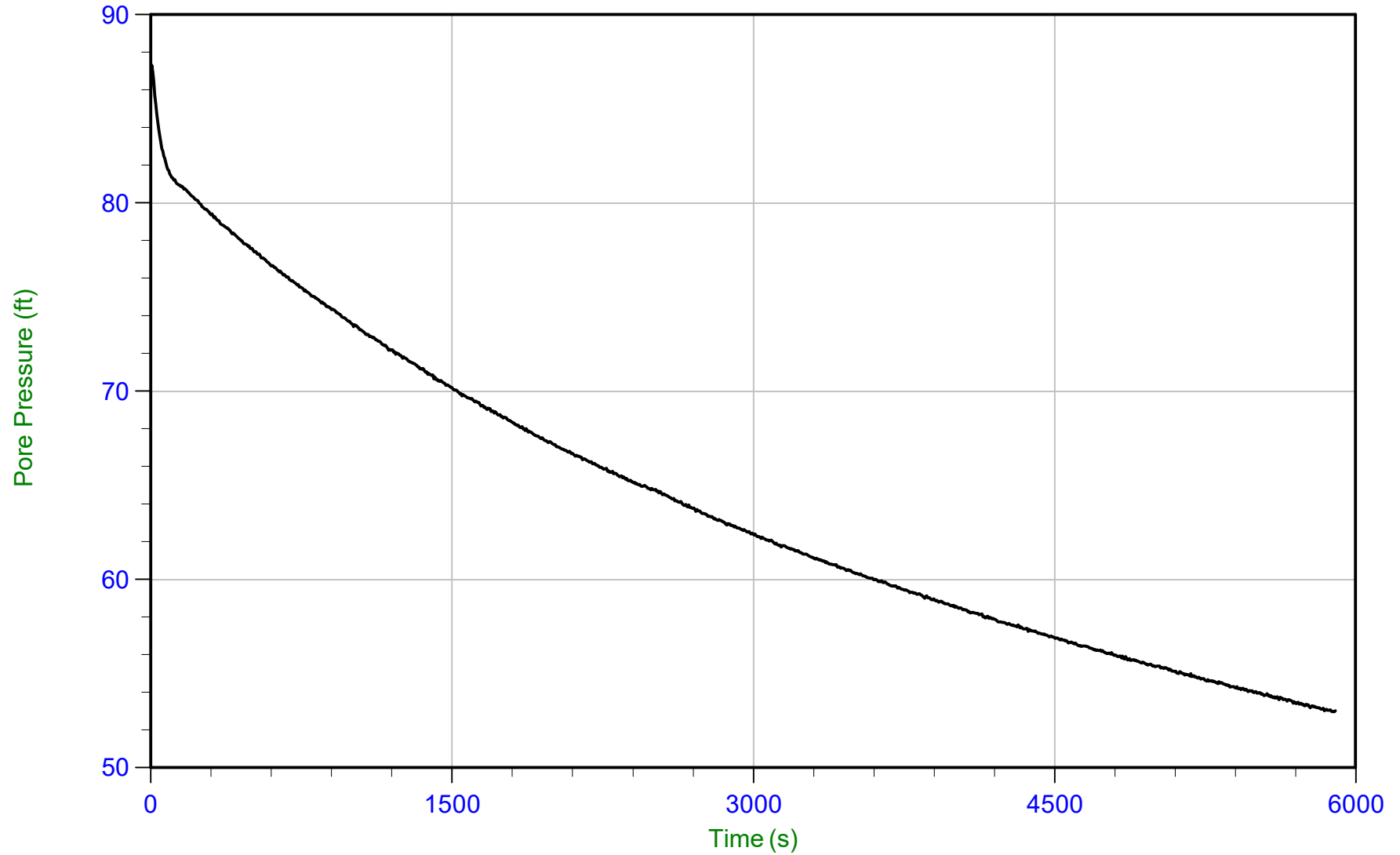
WT: 3.100 m / 10.170 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 6.150 m / 20.177 ft  
Duration: 5900.0 s

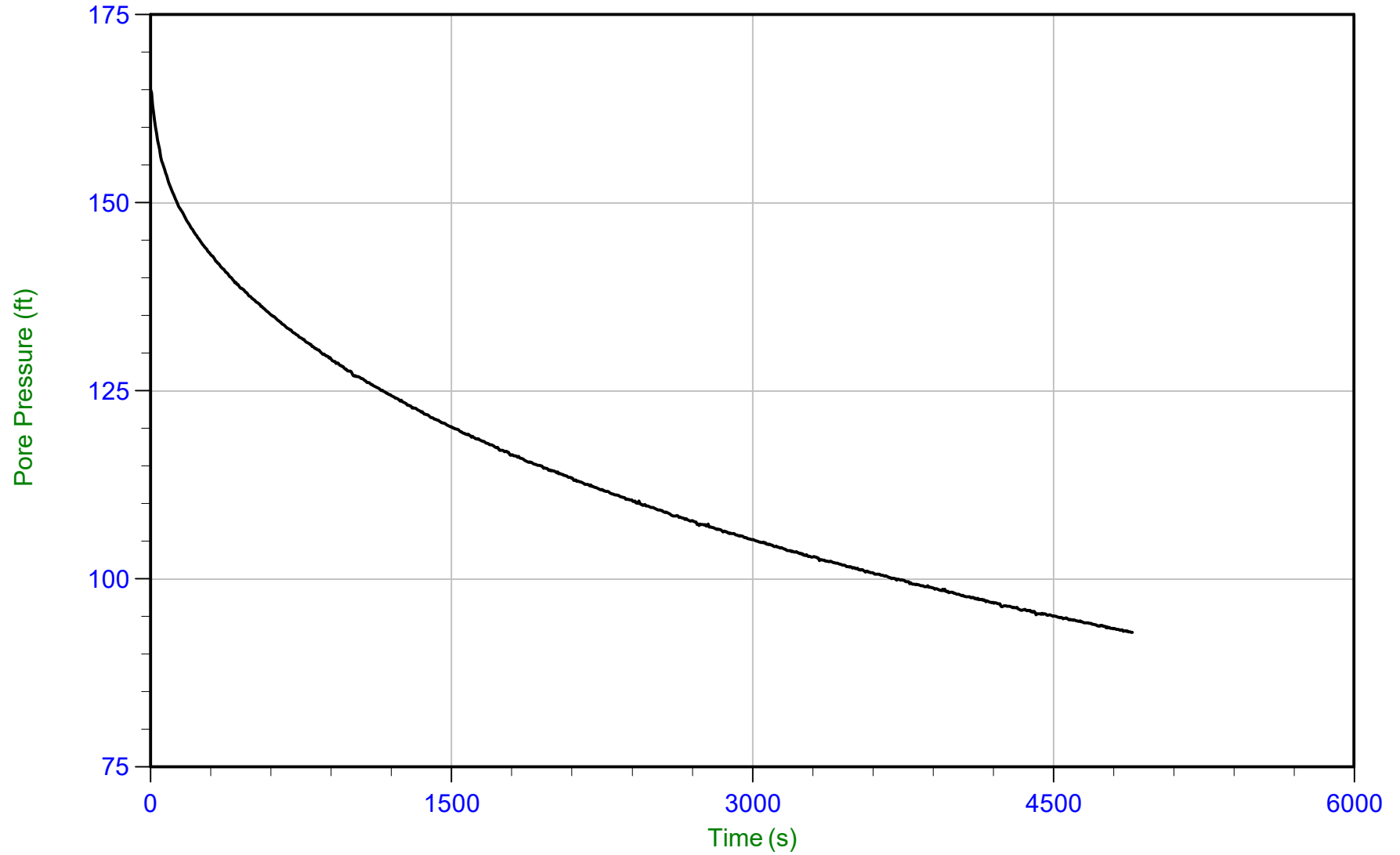
u Min: 53.0 ft  
u Max: 87.3 ft  
u Final: 53.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 11.325 m / 37.155 ft  
Duration: 4895.0 s

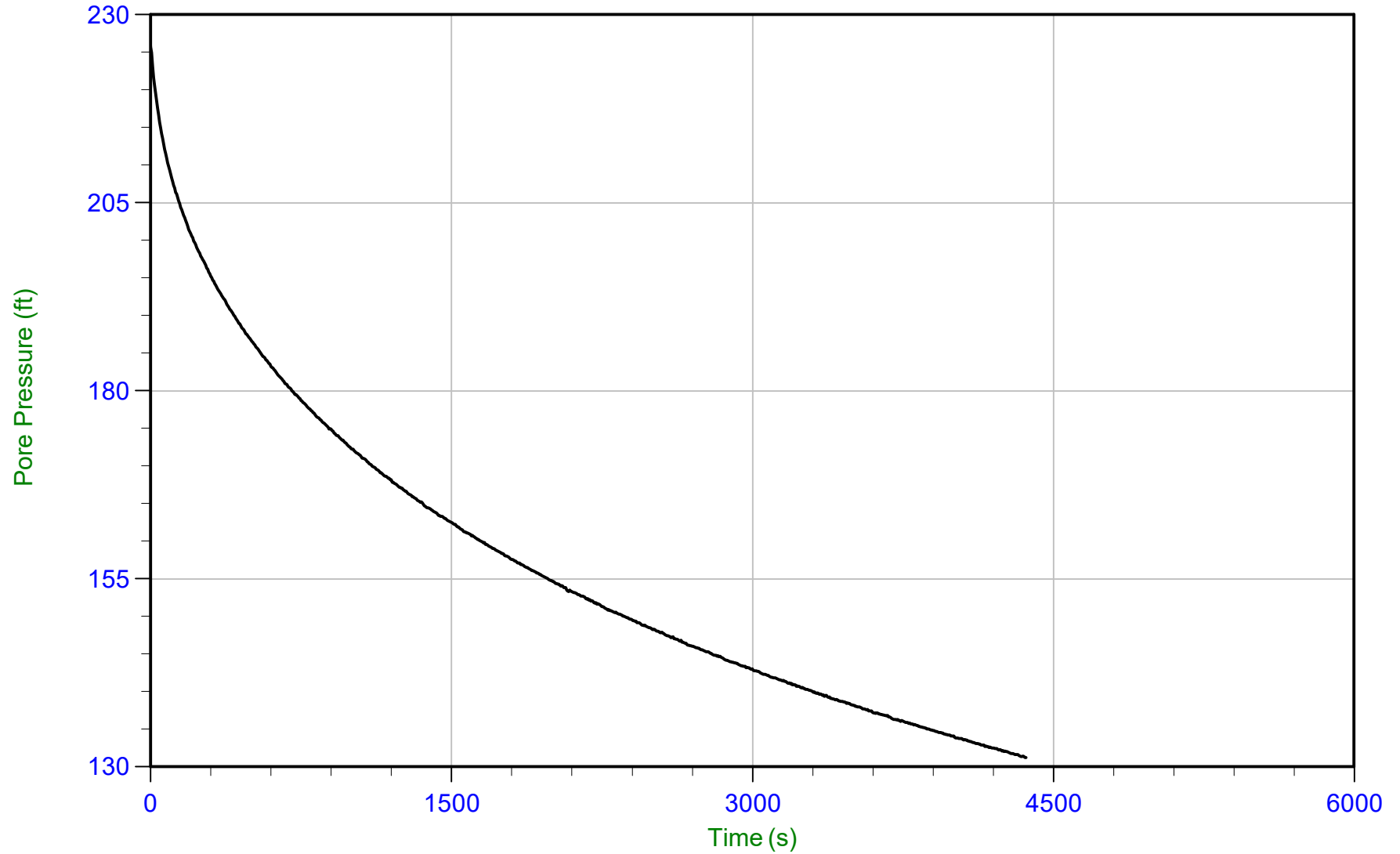
u Min: 92.9 ft  
u Max: 165.1 ft  
u Final: 92.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 17.725 m / 58.152 ft  
Duration: 4365.0 s

u Min: 131.3 ft  
u Max: 225.8 ft  
u Final: 131.3 ft

WT: 5.486 m / 17.998 ft  
Ueq: 40.2 ft  
U(50): 133.00 ft

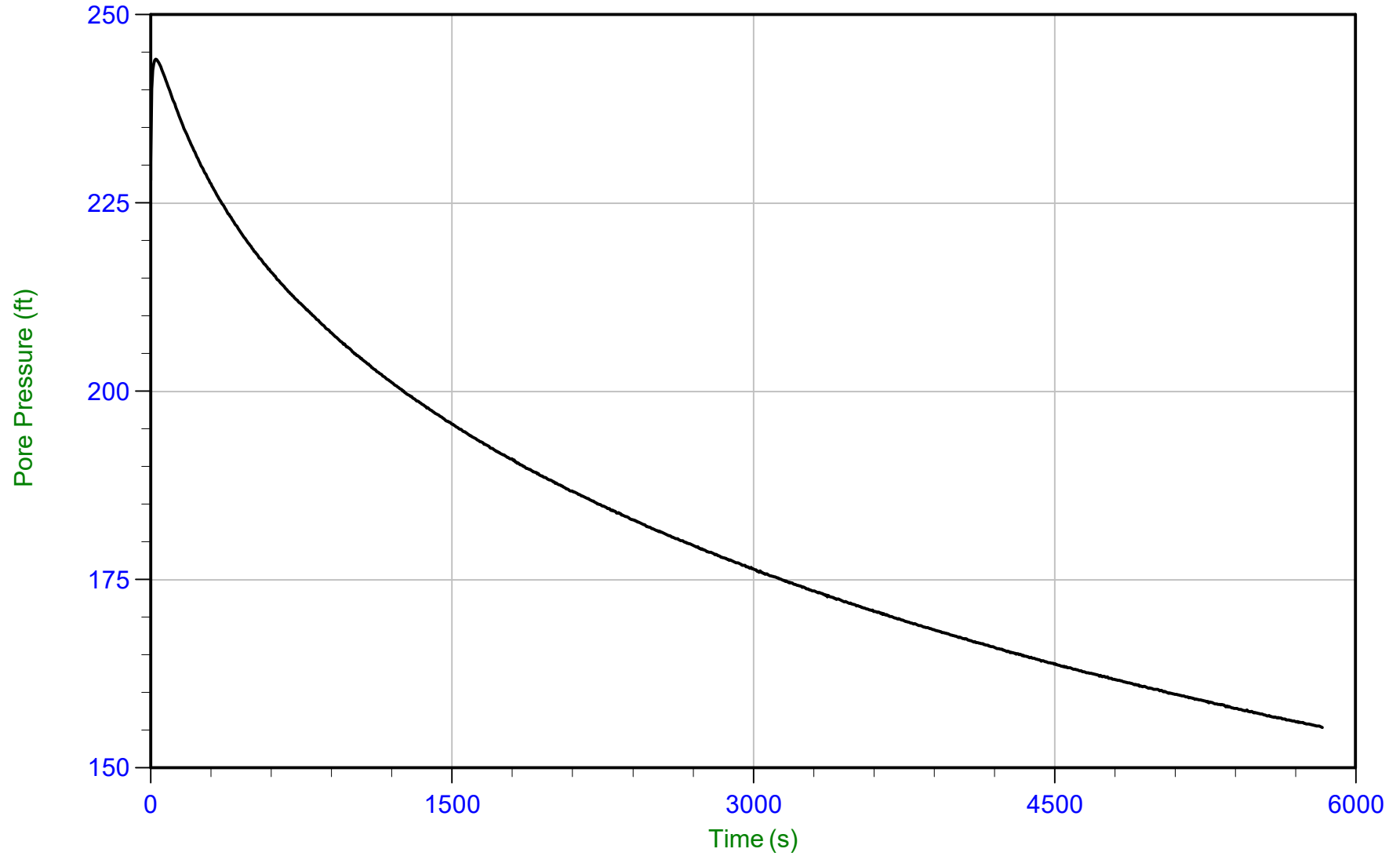
T(50): 4136.3 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 24.425 m / 80.134 ft  
Duration: 5835.0 s

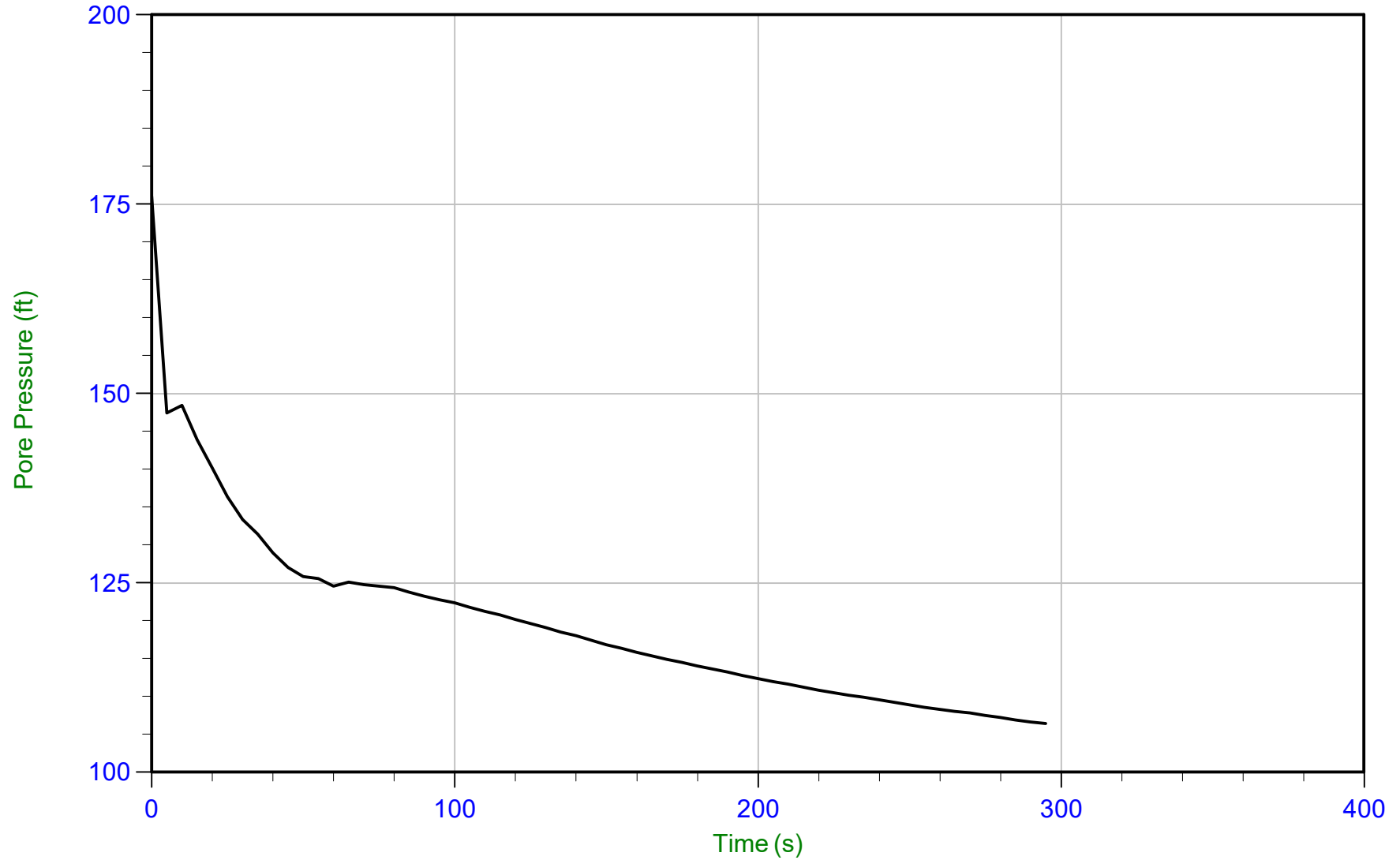
u Min: 155.4 ft  
u Max: 244.1 ft  
u Final: 155.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.050 m / 82.184 ft  
Duration: 295.0 s

u Min: 106.4 ft  
u Max: 176.0 ft  
u Final: 106.4 ft

WT: 5.486 m / 17.998 ft  
Ueq: 64.2 ft  
U(50): 120.10 ft

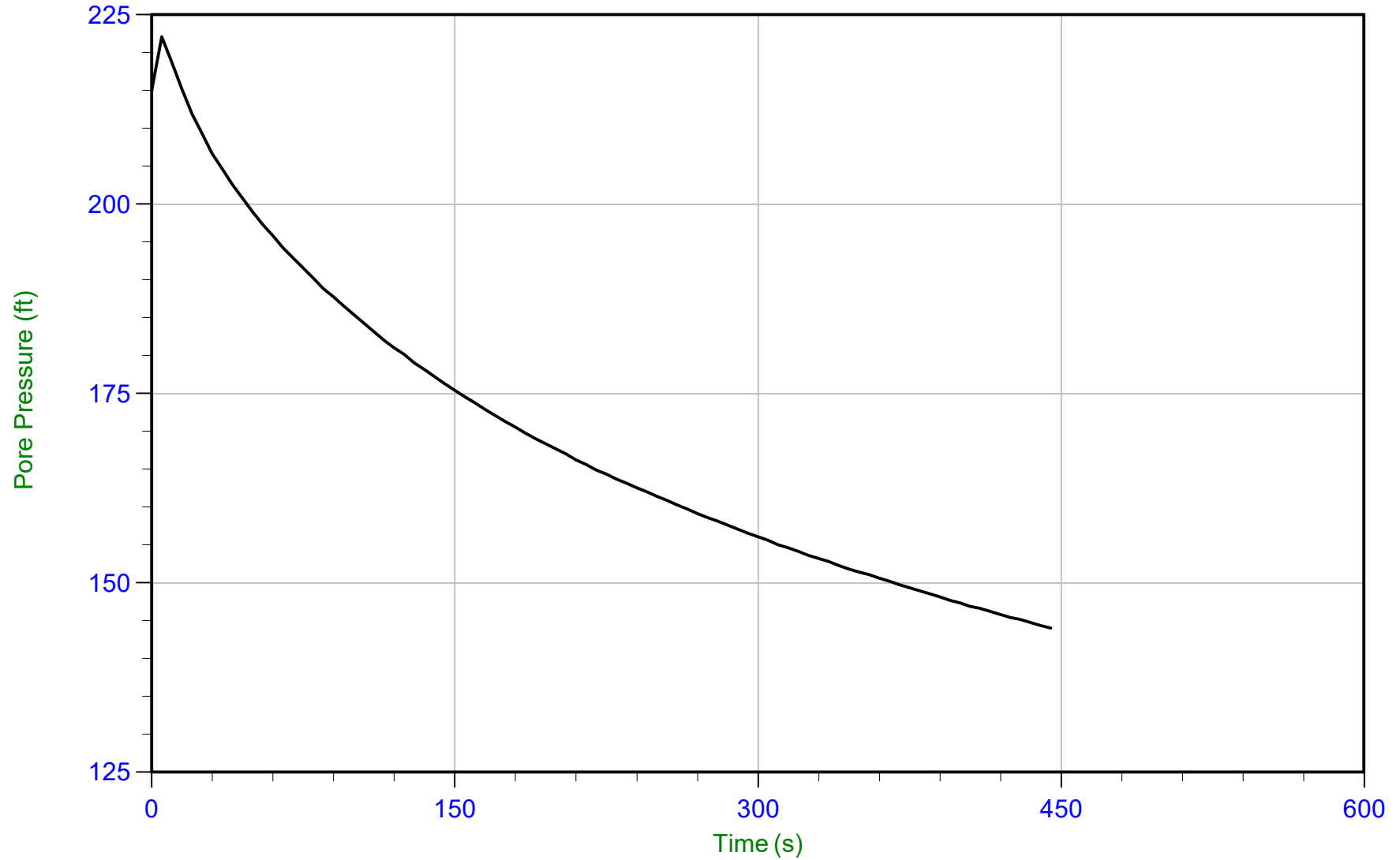
T(50): 120.6 s  
lr: 100  
Ch: 5.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.700 m / 84.317 ft  
Duration: 445.0 s

u Min: 144.0 ft  
u Max: 222.1 ft  
u Final: 144.0 ft

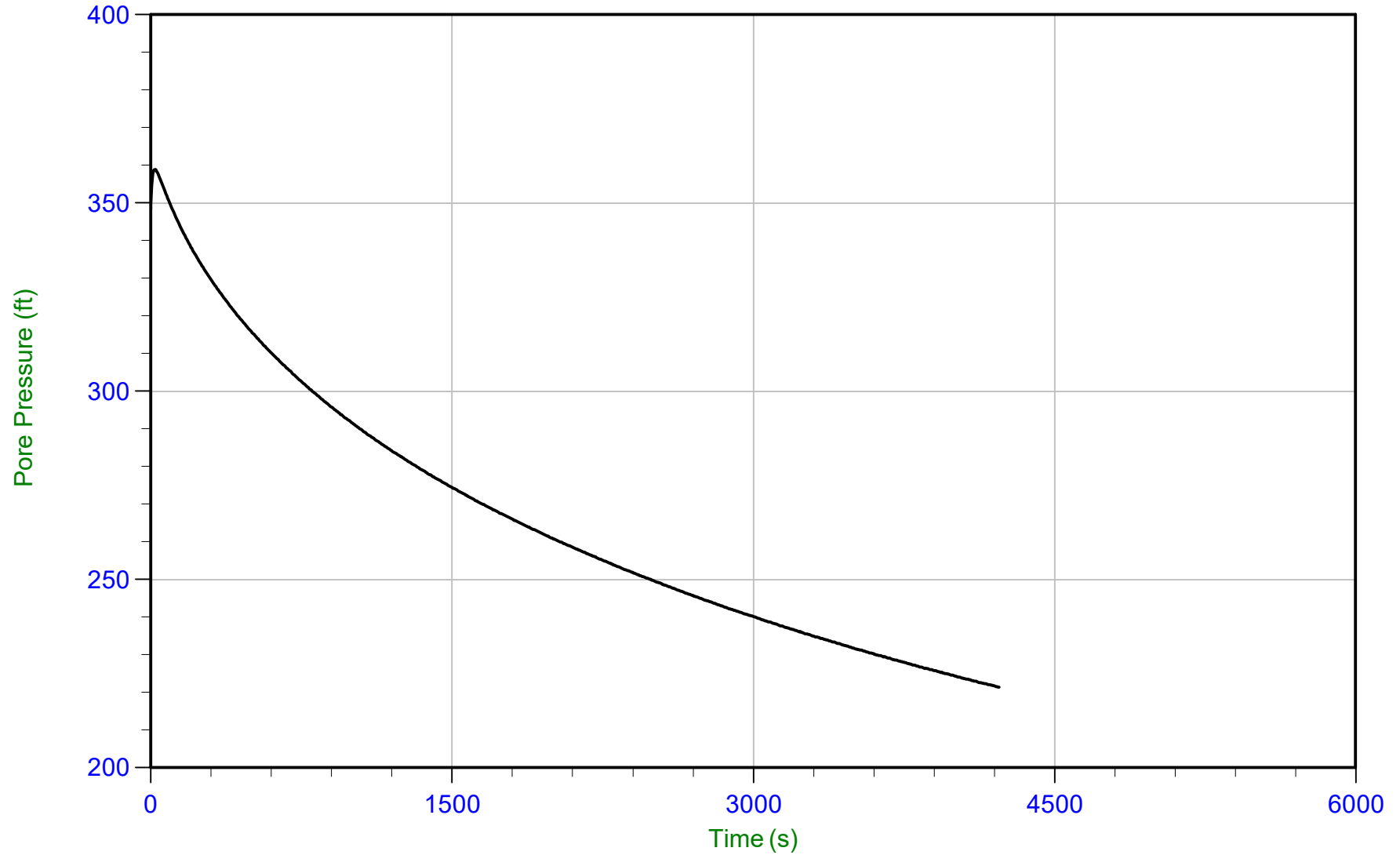




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 30.225 m / 99.162 ft  
Duration: 4225.0 s

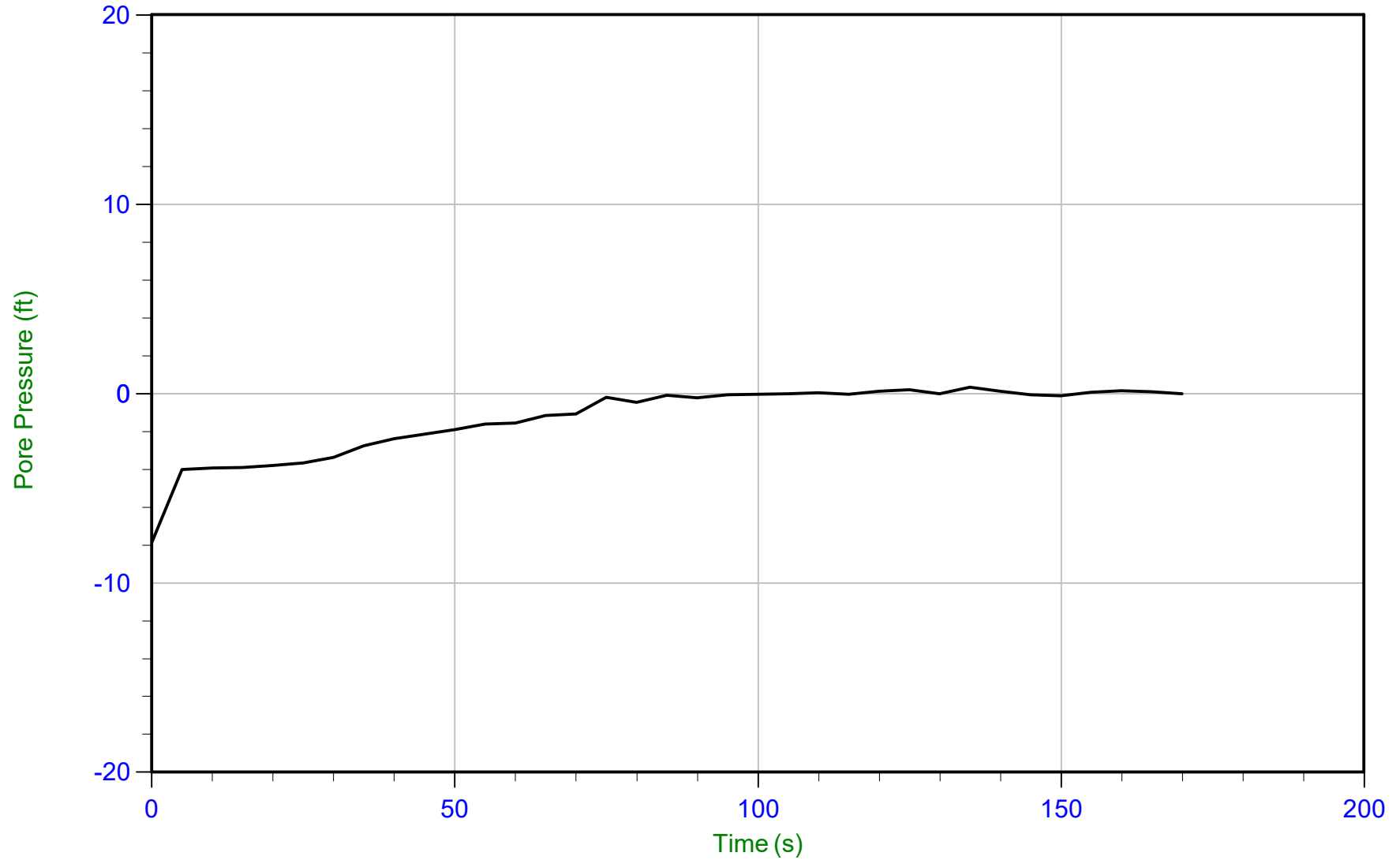
u Min: 221.4 ft  
u Max: 358.9 ft  
u Final: 221.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 170.0 s

u Min: -7.9 ft  
u Max: 0.3 ft  
u Final: -0.0 ft

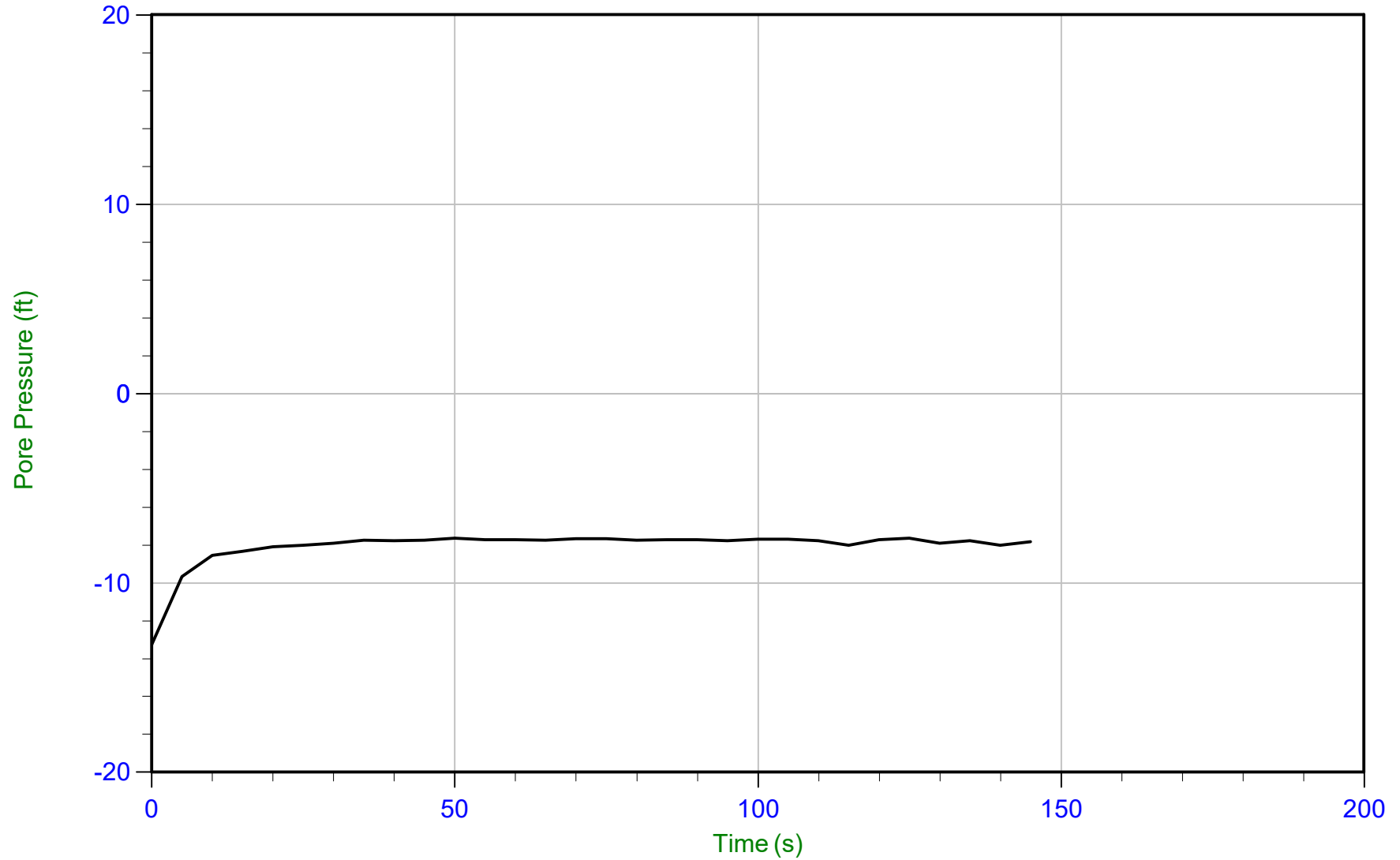
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 2.475 m / 8.120 ft  
Duration: 145.0 s

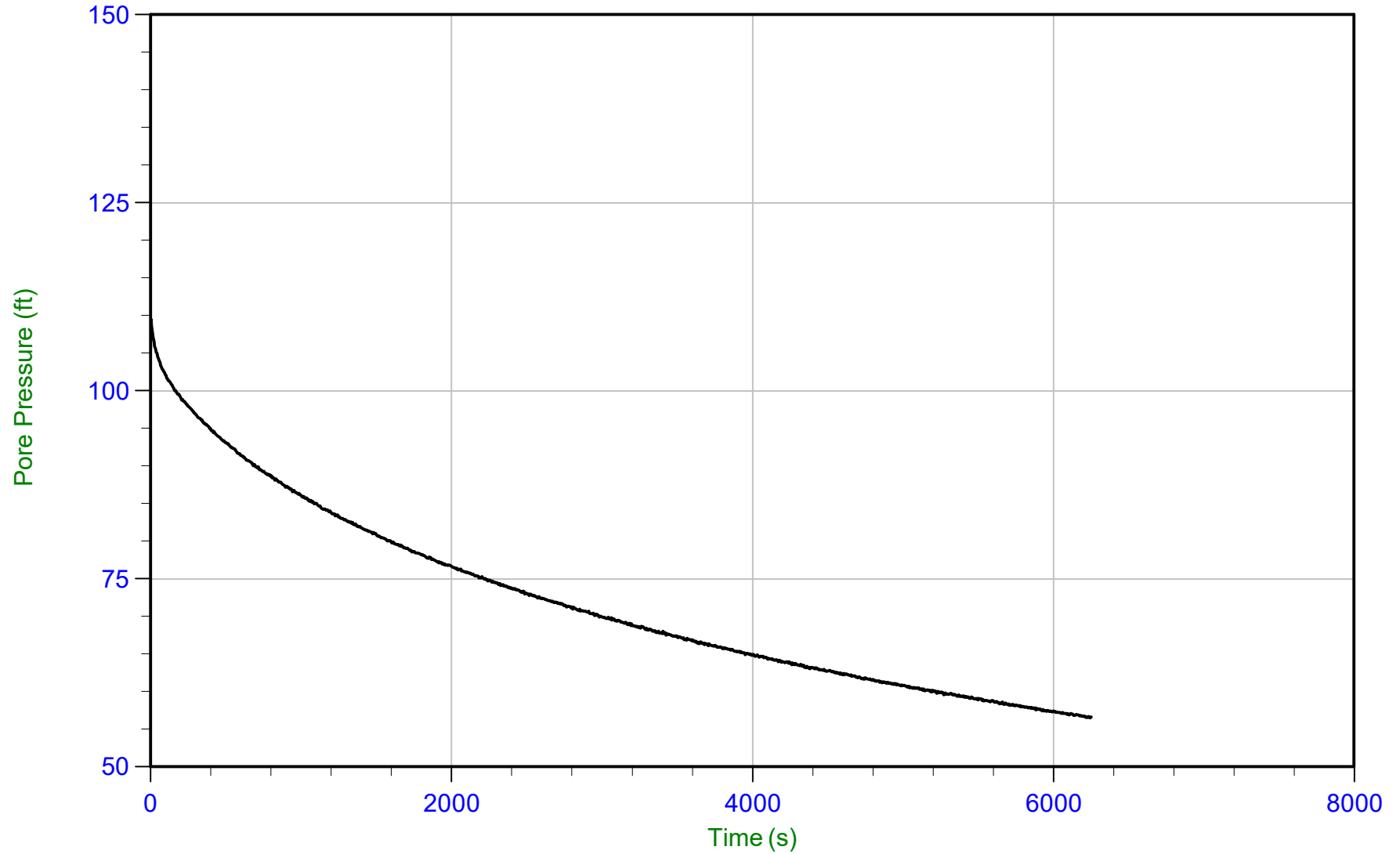
u Min: -13.3 ft  
u Max: -7.6 ft  
u Final: -7.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 5.850 m / 19.193 ft  
Duration: 6255.0 s

u Min: 56.5 ft  
u Max: 109.5 ft  
u Final: 56.6 ft

WT: 4.267 m / 13.999 ft  
Ueq: 5.2 ft  
U(50): 57.33 ft

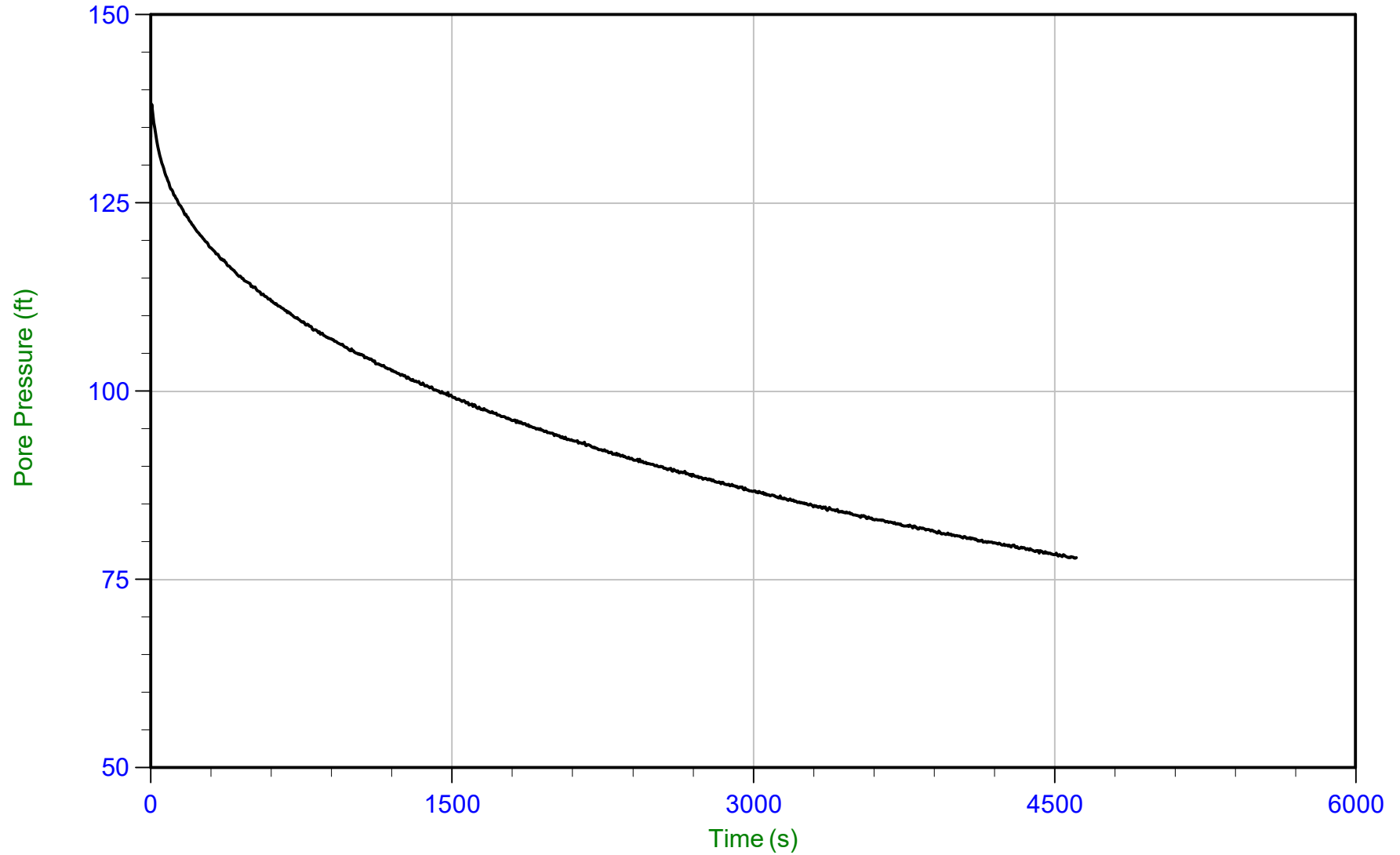
T(50): 5985.9 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 4610.0 s

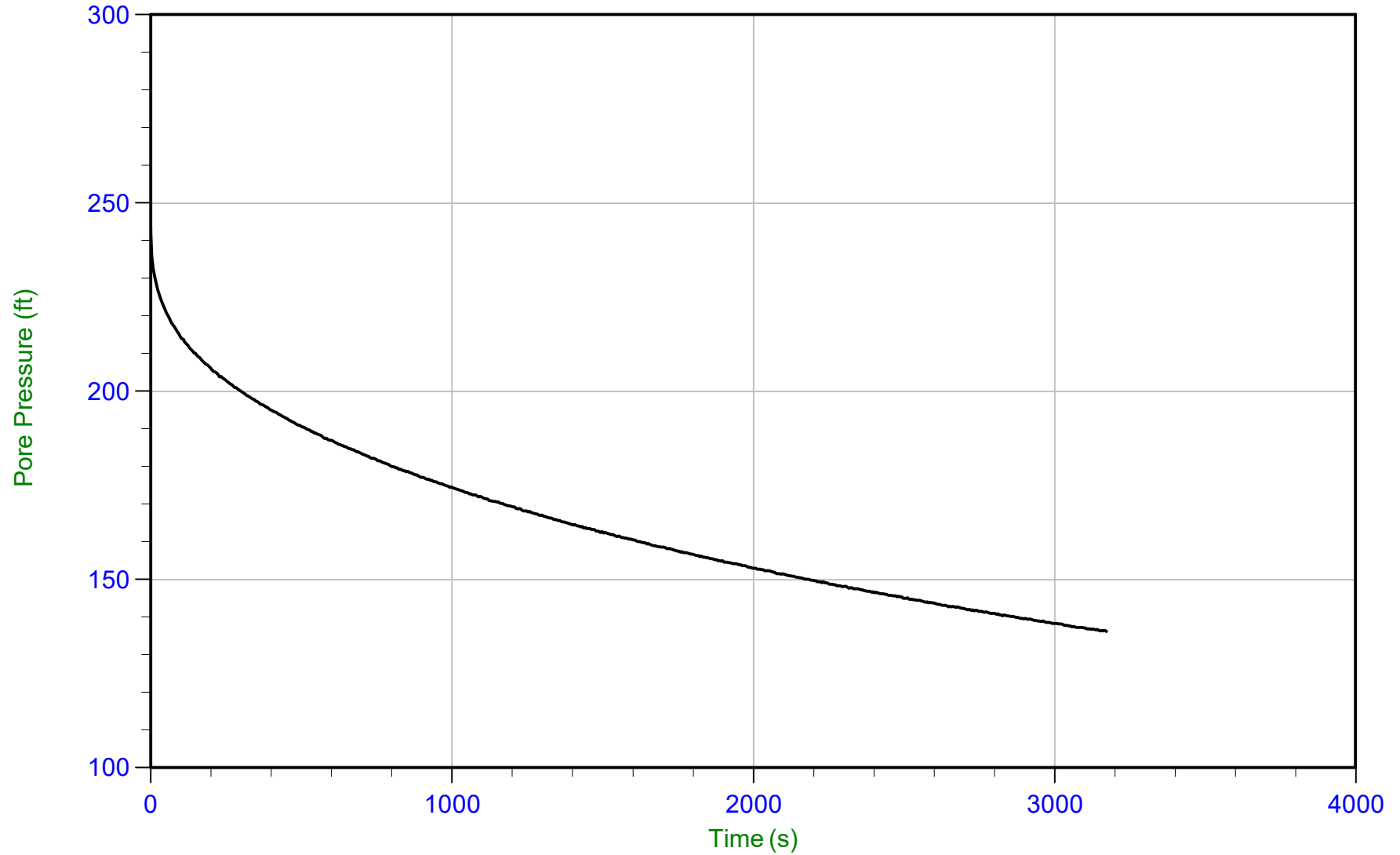
u Min: 77.8 ft  
u Max: 138.1 ft  
u Final: 77.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 3175.0 s

u Min: 136.1 ft  
u Max: 243.7 ft  
u Final: 136.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 34.1 ft  
U(50): 138.91 ft

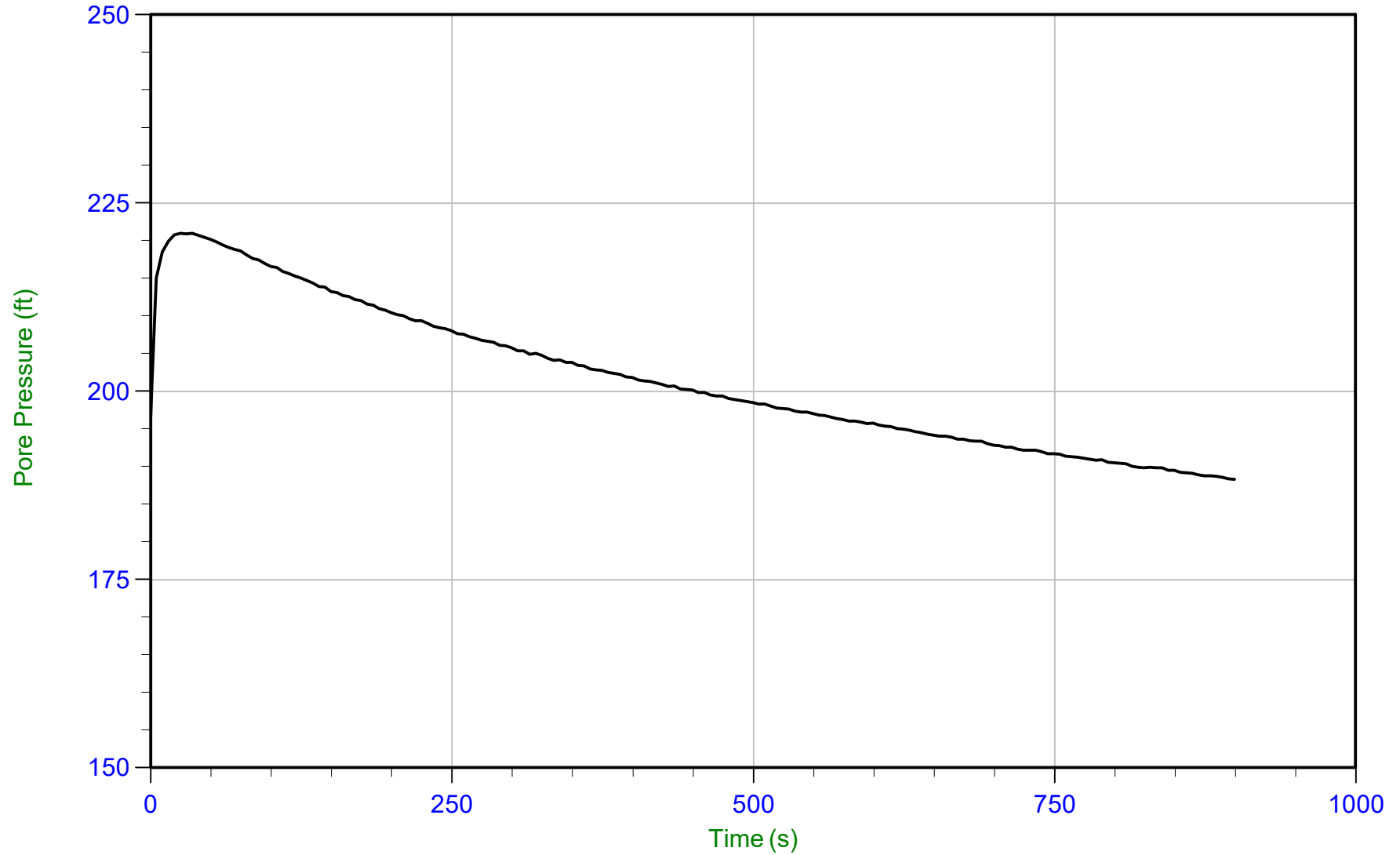
T(50): 2952.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 20.550 m / 67.420 ft  
Duration: 900.0 s

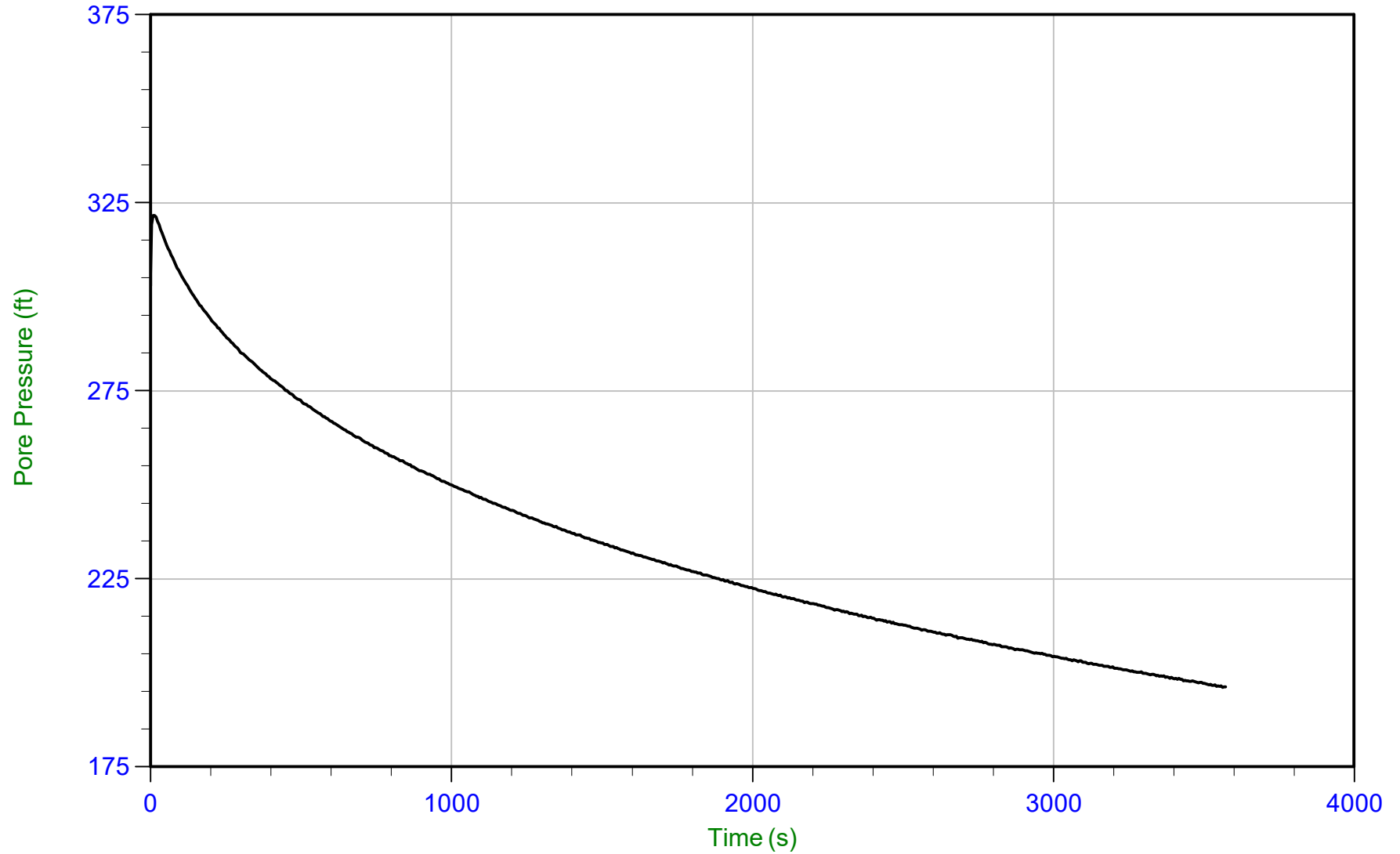
u Min: 188.3 ft  
u Max: 221.0 ft  
u Final: 188.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 3575.0 s

u Min: 196.1 ft  
u Max: 321.7 ft  
u Final: 196.3 ft

WT: 4.267 m / 13.999 ft  
Ueq: 74.1 ft  
U(50): 197.88 ft

T(50): 3435.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min

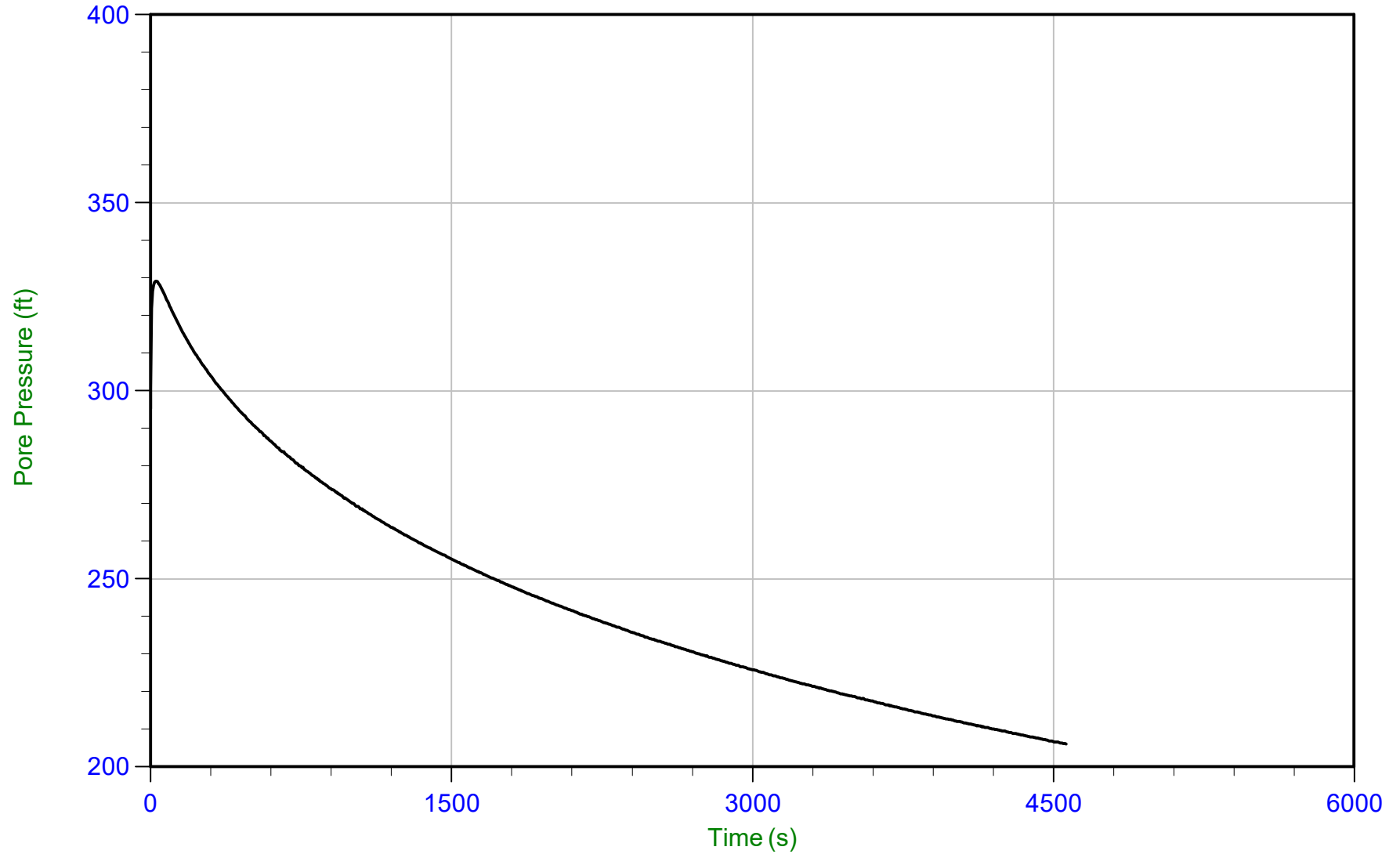




Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4565.0 s

u Min: 206.1 ft  
u Max: 329.2 ft  
u Final: 206.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 84.1 ft  
U(50): 206.63 ft

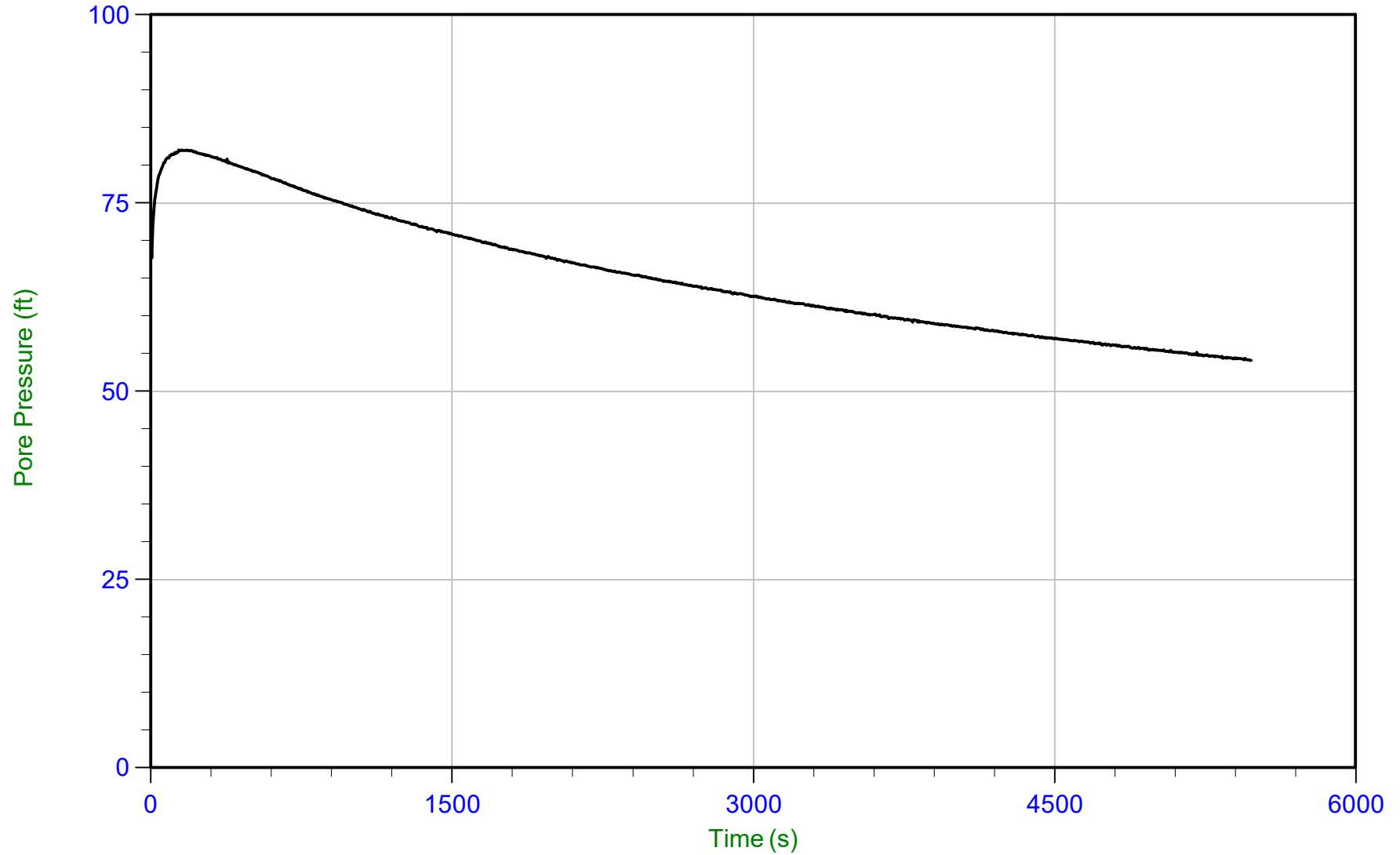
T(50): 4484.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:44  
Site: DTE Belle River Power Plant

Sounding: CPT20-12  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP12.PPF  
Depth: 4.900 m / 16.076 ft  
Duration: 5480.0 s

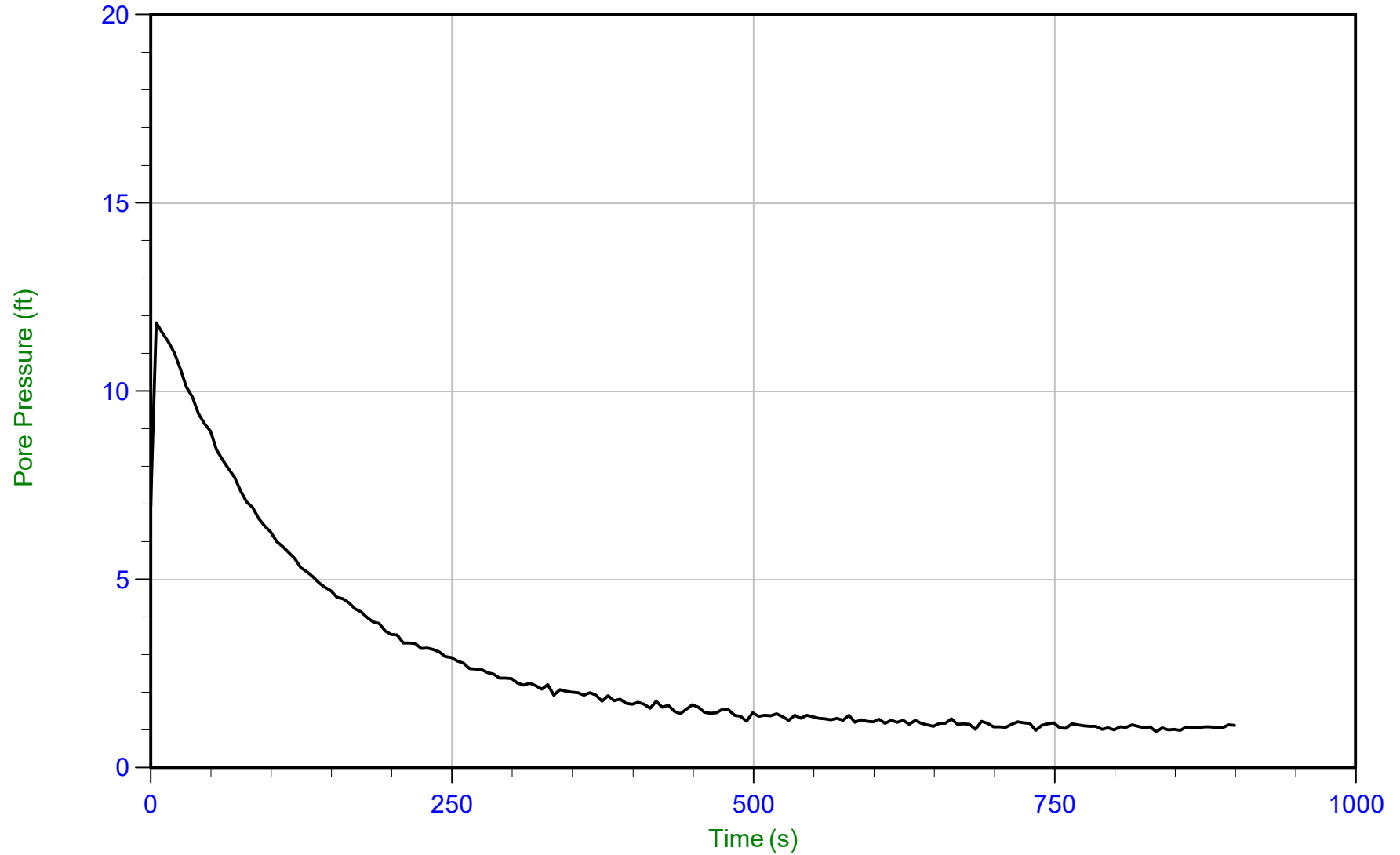
u Min: 54.1 ft  
u Max: 82.0 ft  
u Final: 54.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 1.000 m / 3.281 ft  
Duration: 900.0 s

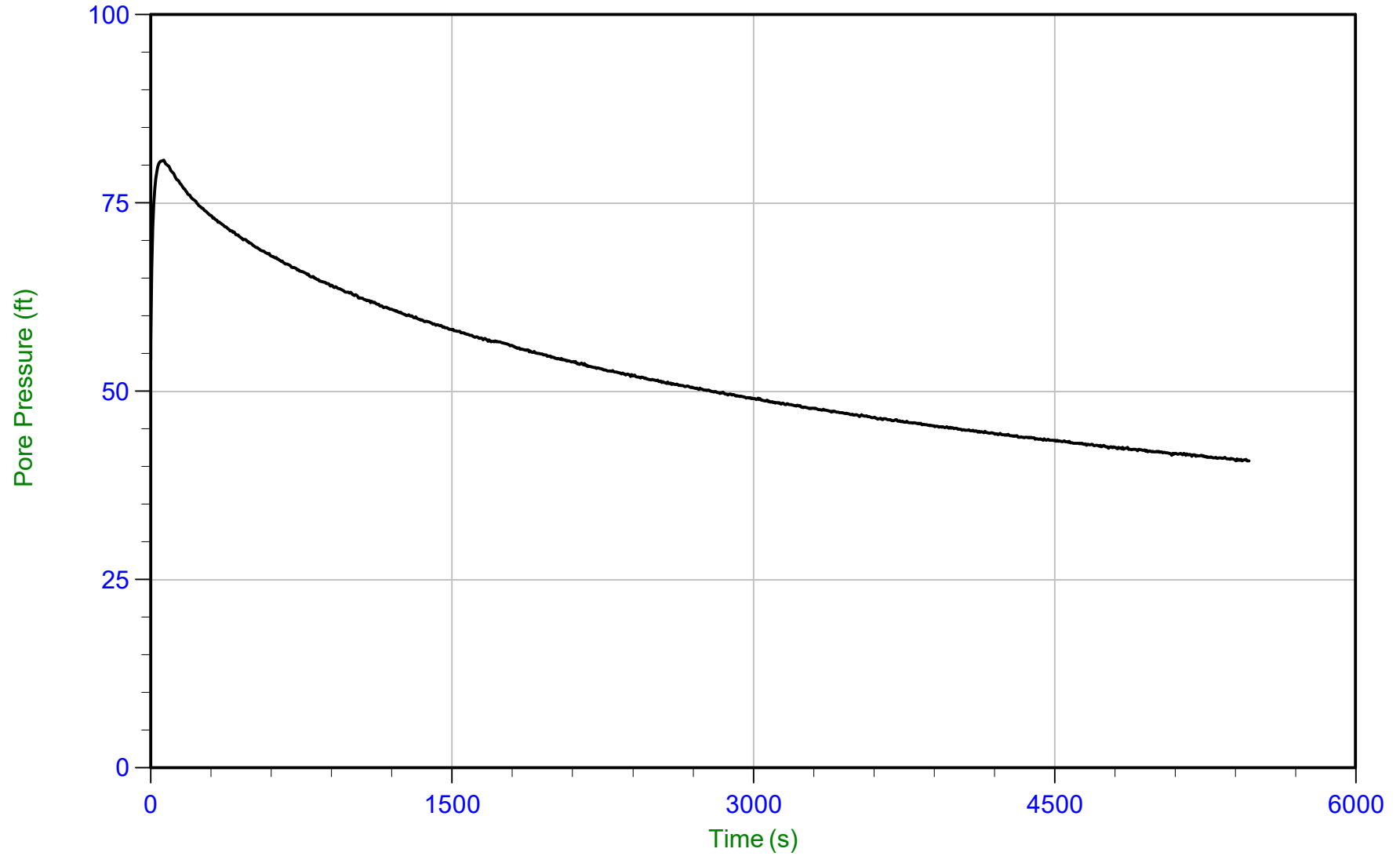
u Min: 1.0 ft  
u Max: 11.8 ft  
u Final: 1.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 4.600 m / 15.092 ft  
Duration: 5470.0 s

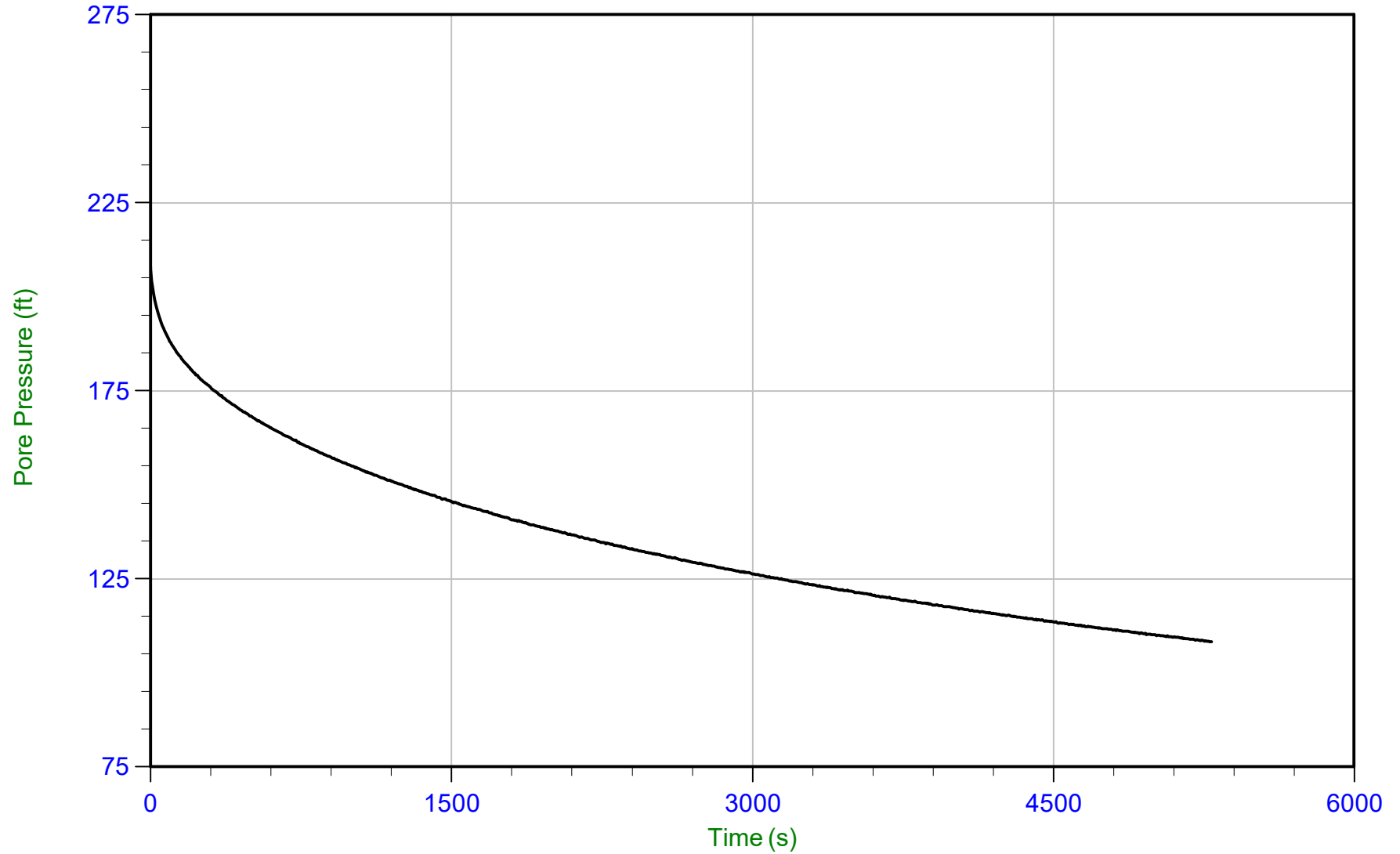
u Min: 40.7 ft  
u Max: 80.7 ft  
u Final: 40.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.450 m / 44.127 ft  
Duration: 5290.0 s

u Min: 108.2 ft  
u Max: 208.0 ft  
u Final: 108.3 ft

WT: 5.182 m / 17.000 ft  
Ueq: 27.1 ft  
U(50): 117.58 ft

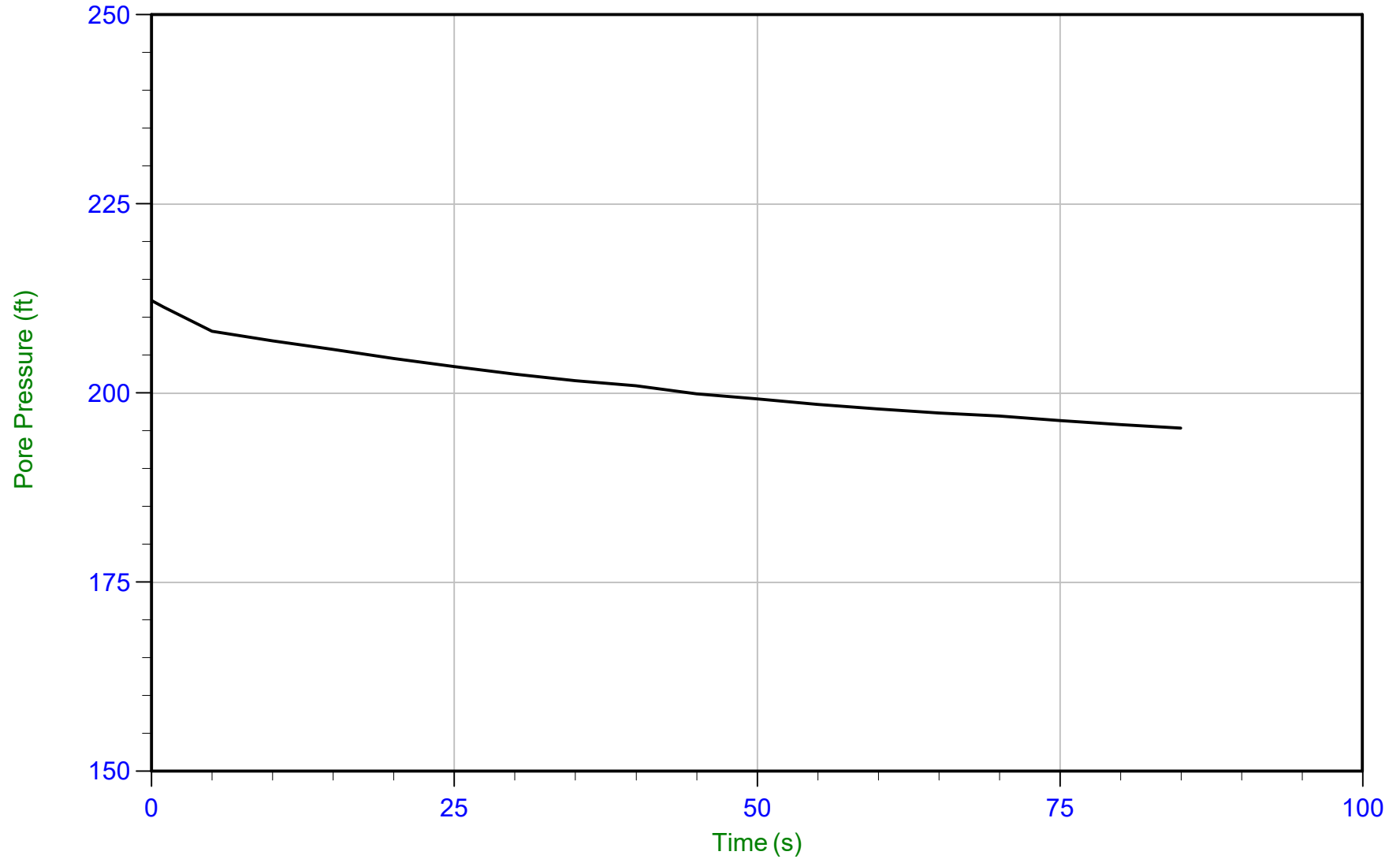
T(50): 3964.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.800 m / 45.275 ft  
Duration: 85.0 s

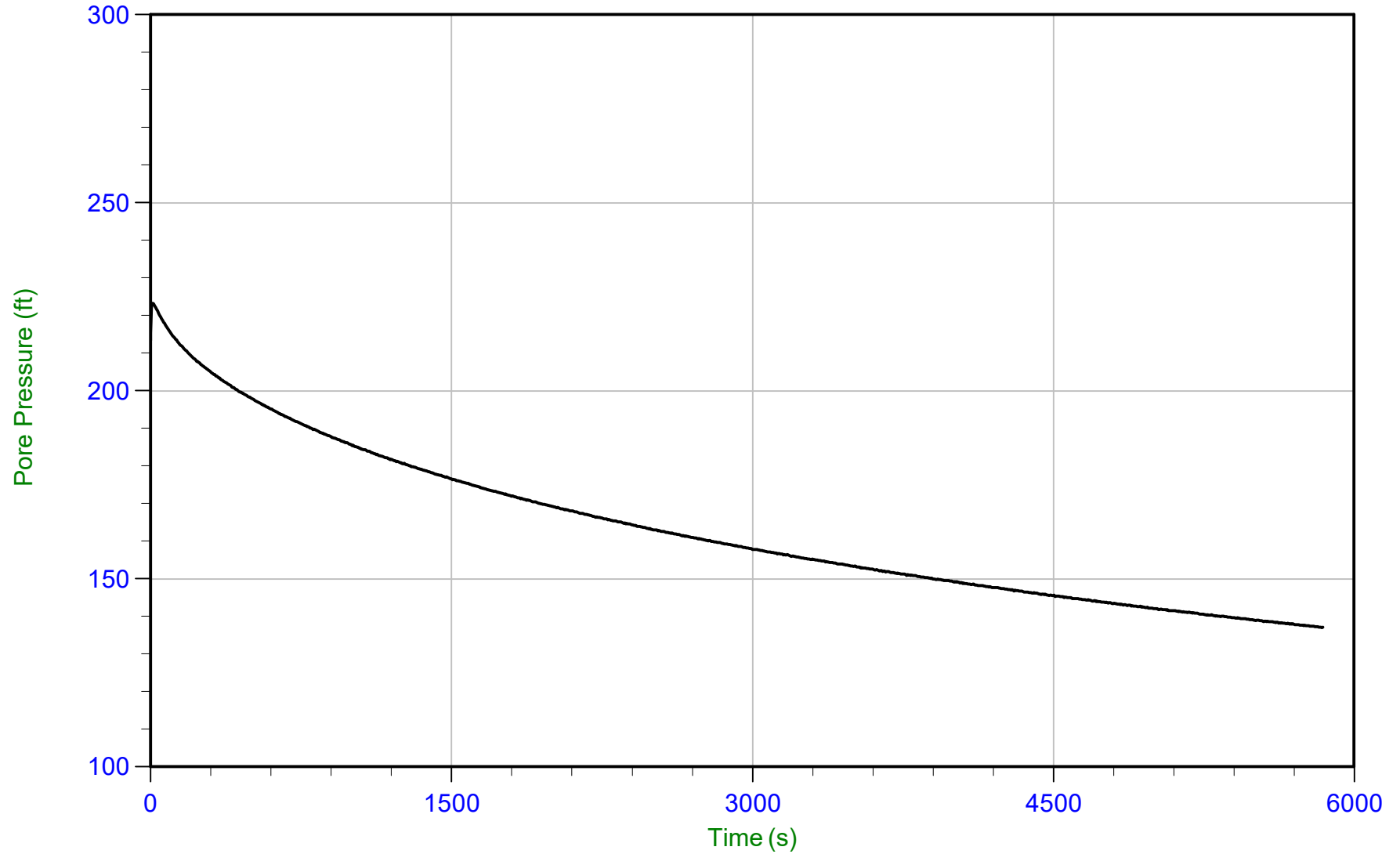
u Min: 195.3 ft  
u Max: 212.2 ft  
u Final: 195.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 19.550 m / 64.140 ft  
Duration: 5845.0 s

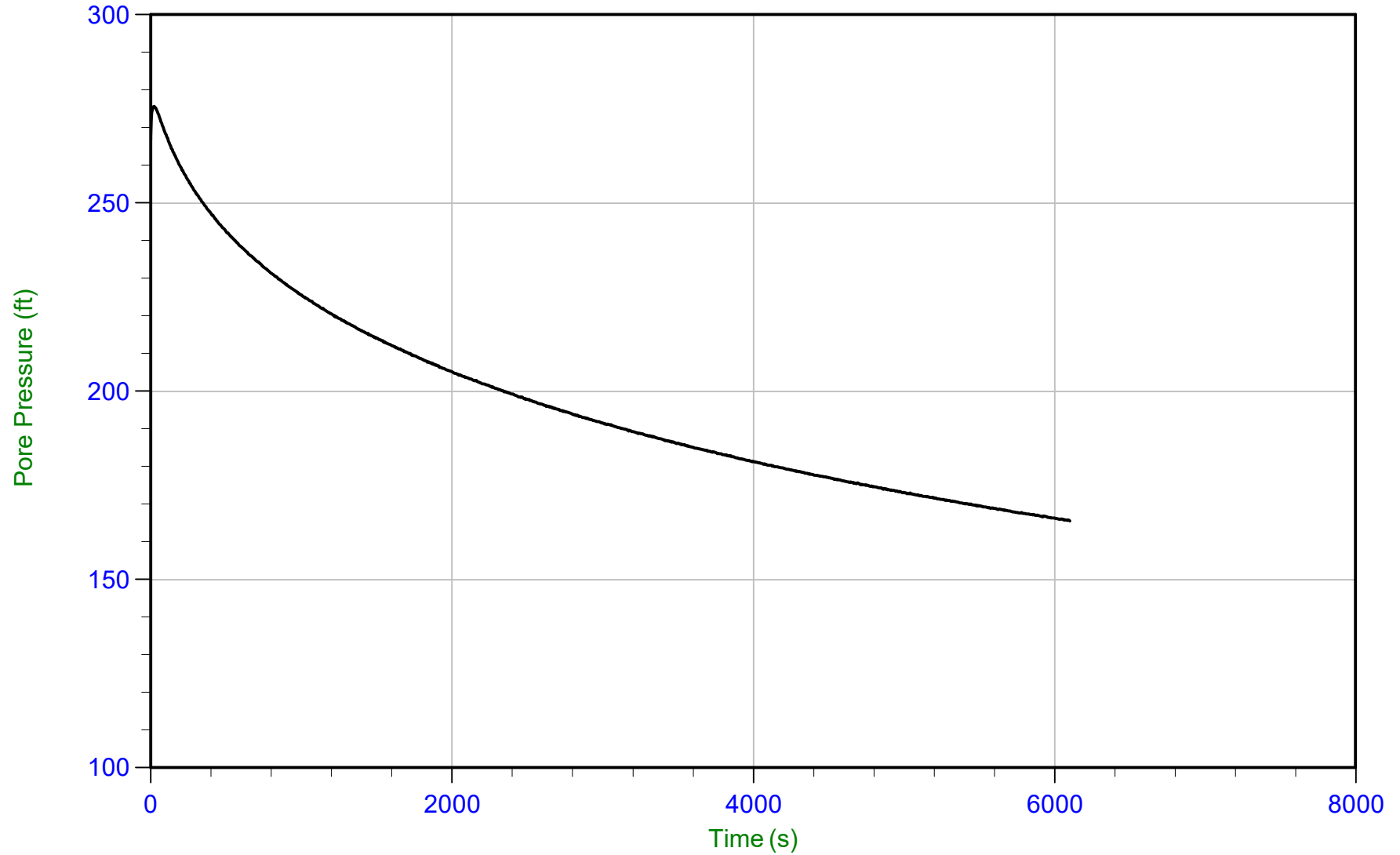
u Min: 137.0 ft  
u Max: 223.2 ft  
u Final: 137.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 25.650 m / 84.153 ft  
Duration: 6105.0 s

u Min: 165.5 ft  
u Max: 275.6 ft  
u Final: 165.5 ft

WT: 5.182 m / 17.000 ft  
Ueq: 67.2 ft  
U(50): 171.39 ft

T(50): 5203.0 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min

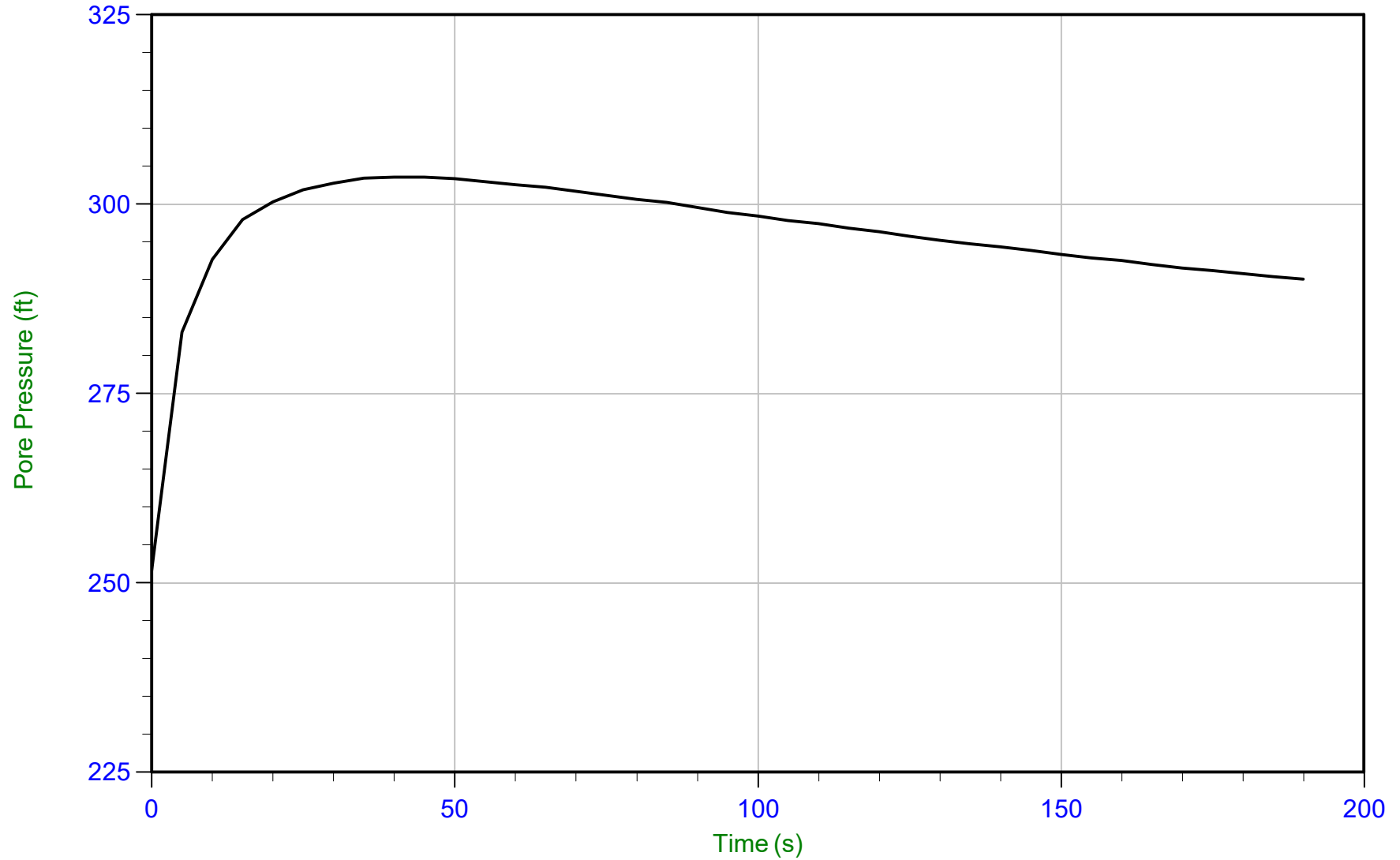




Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 29.550 m / 96.948 ft  
Duration: 190.0 s

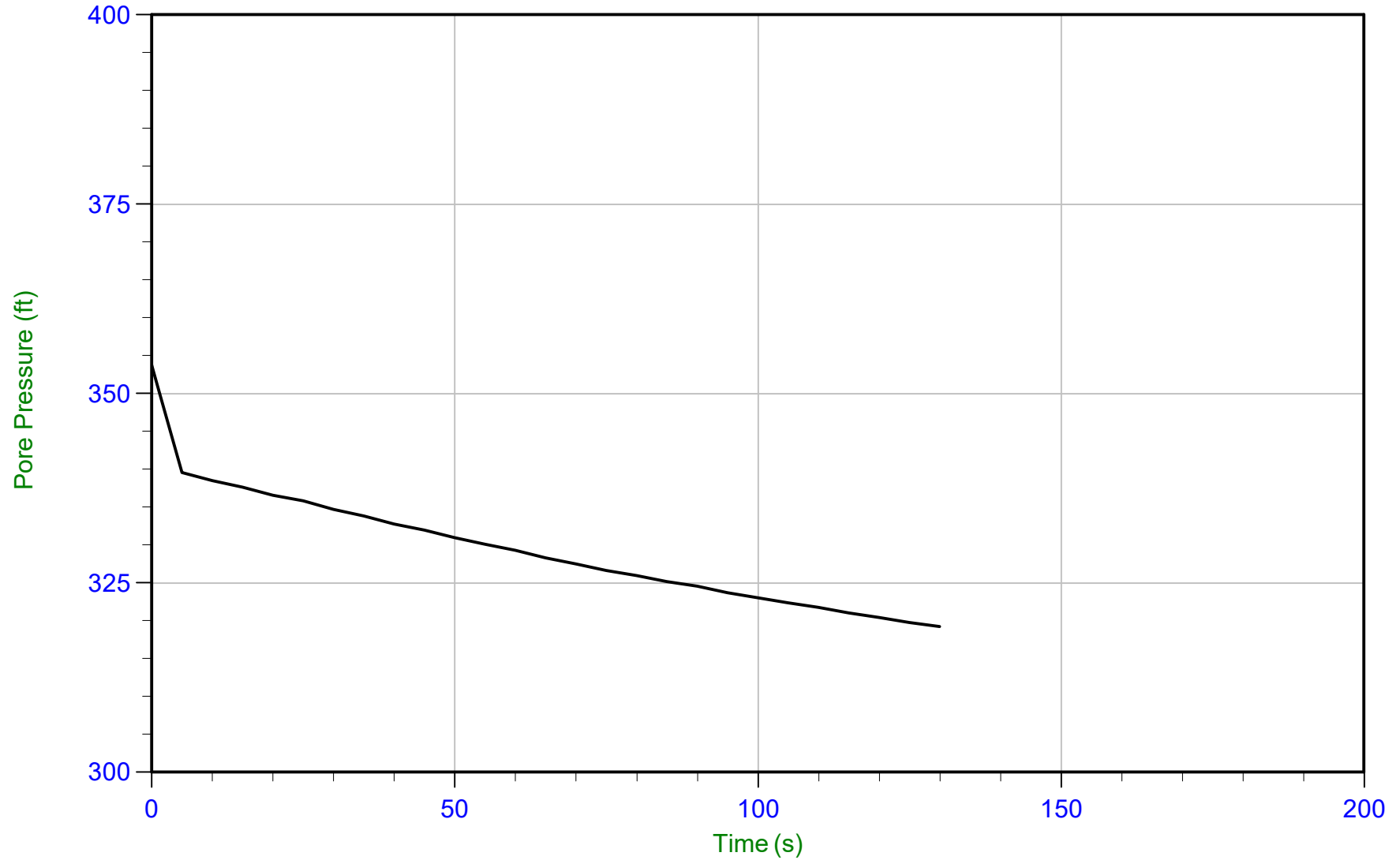
u Min: 251.6 ft  
u Max: 303.6 ft  
u Final: 290.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 130.0 s

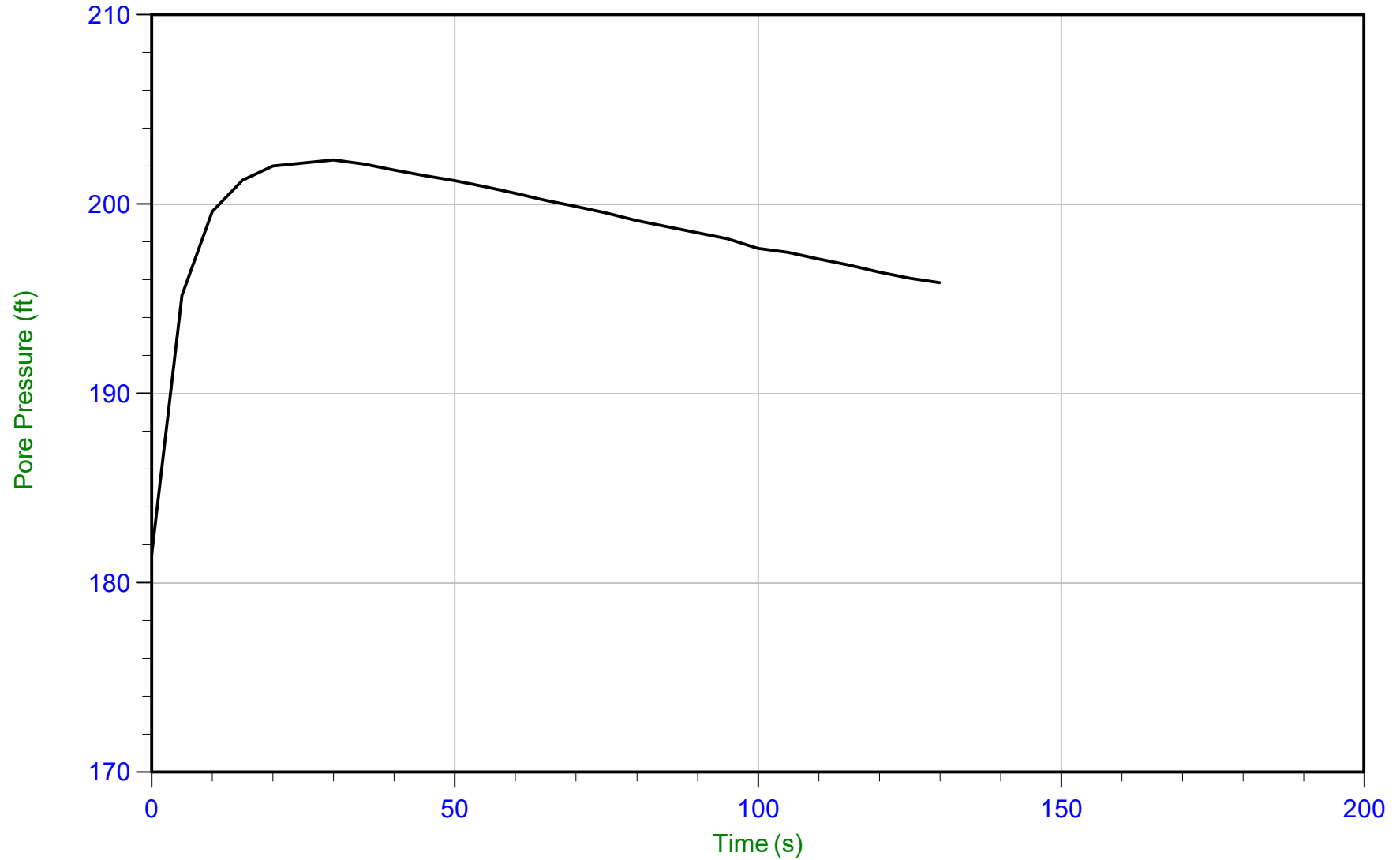
u Min: 319.2 ft  
u Max: 353.7 ft  
u Final: 319.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 11:04  
Site: DTE Belle River Power Plant

Sounding: CPT20-07  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP07.PPF  
Depth: 18.800 m / 61.679 ft  
Duration: 130.0 s

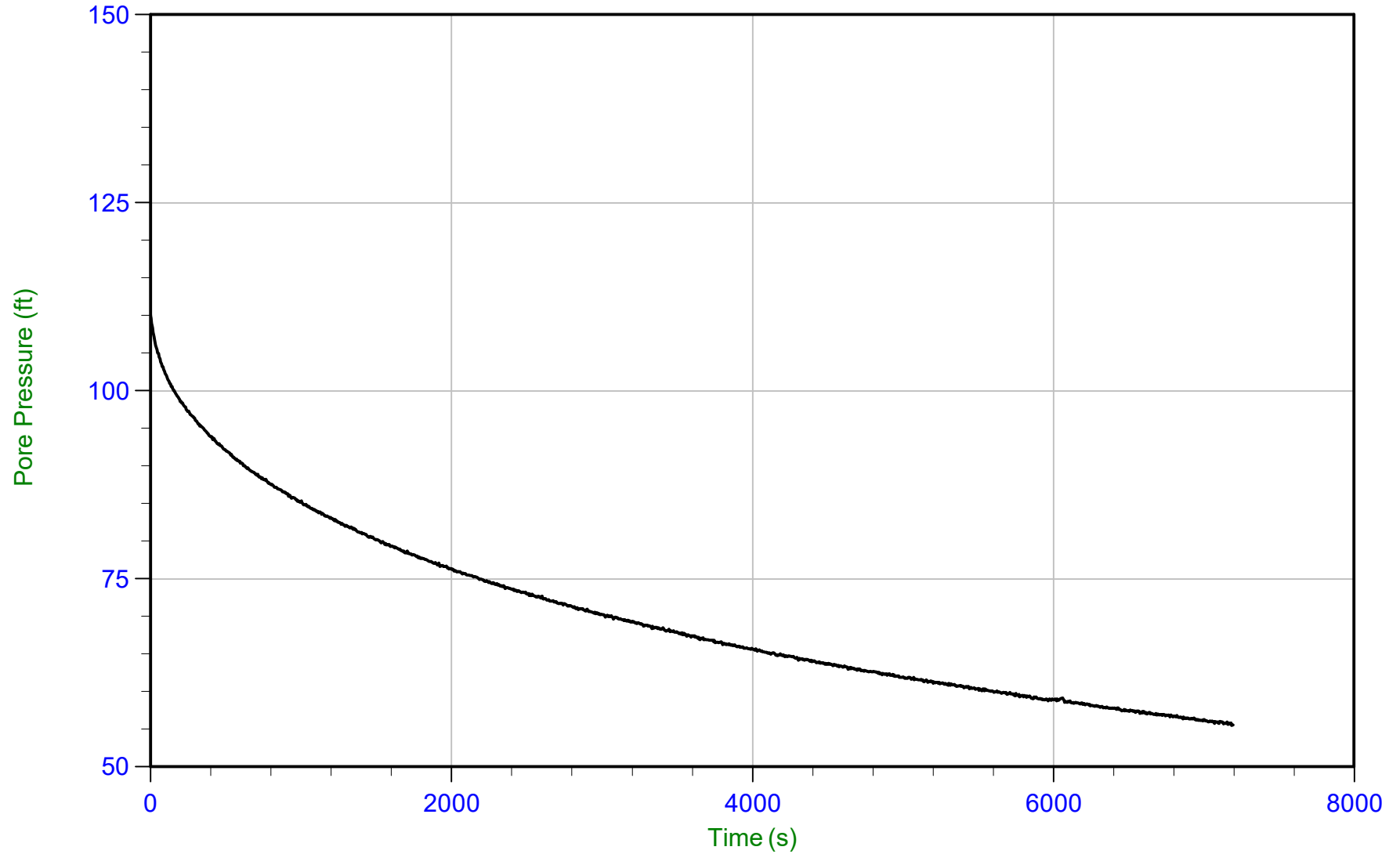
u Min: 181.5 ft  
u Max: 202.3 ft  
u Final: 195.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 6.100 m / 20.013 ft  
Duration: 7200.0 s

u Min: 55.5 ft  
u Max: 110.1 ft  
u Final: 55.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 4.0 ft  
U(50): 57.04 ft

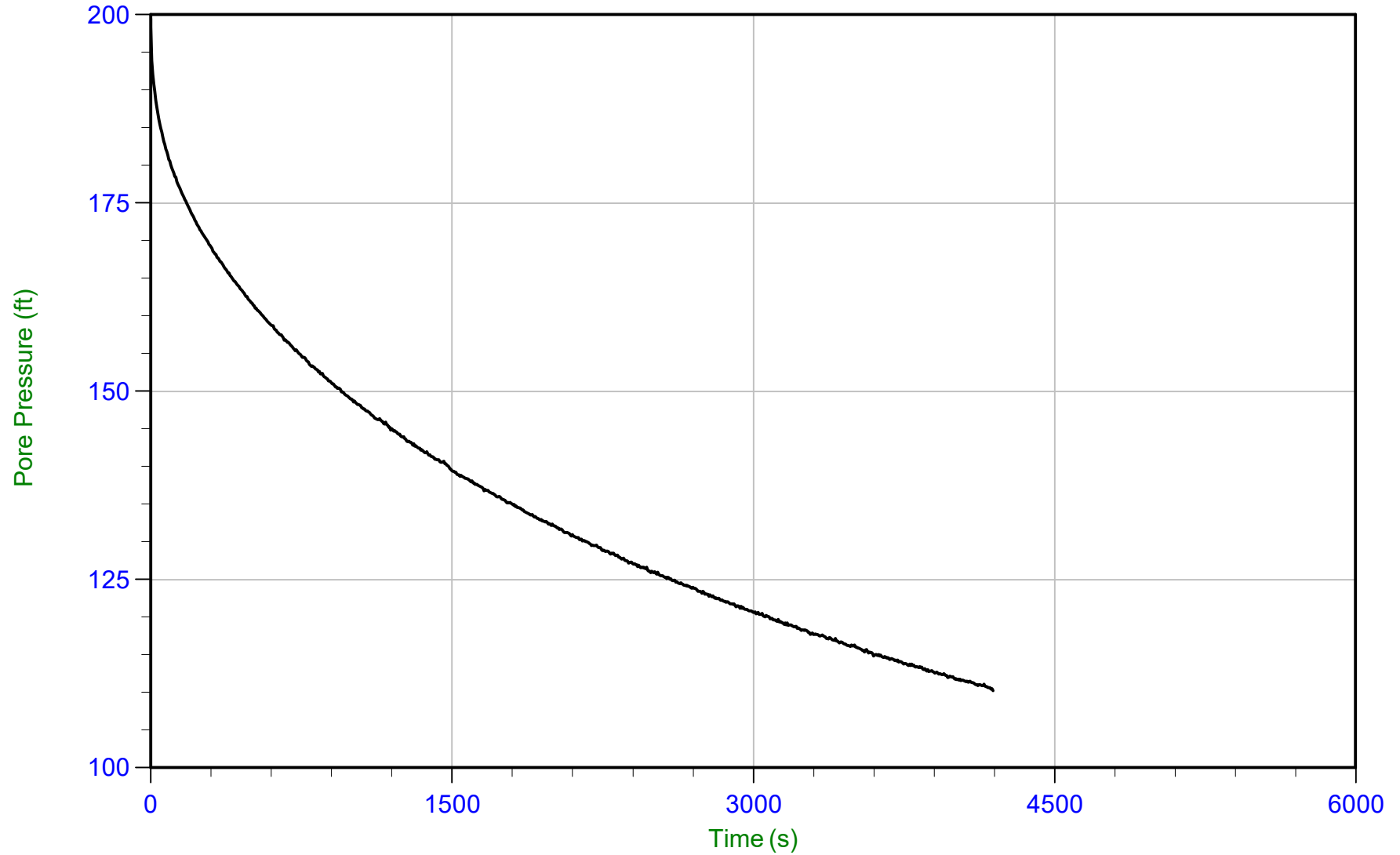
T(50): 6624.7 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 12.200 m / 40.026 ft  
Duration: 4195.0 s

u Min: 110.2 ft  
u Max: 199.5 ft  
u Final: 110.2 ft

WT: 4.877 m / 16.000 ft  
Ueq: 24.0 ft  
U(50): 111.76 ft

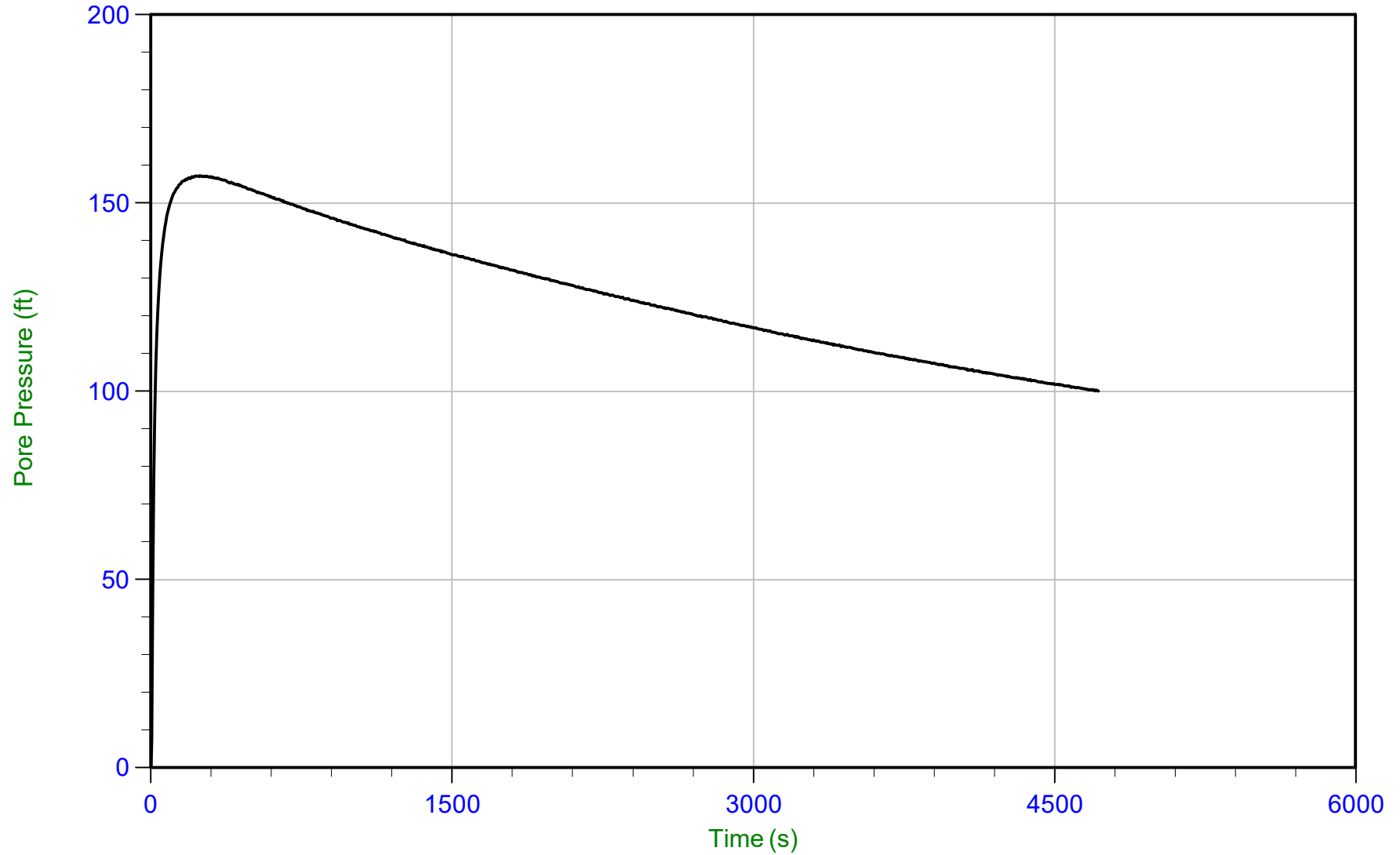
T(50): 4004.2 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 18.300 m / 60.039 ft  
Duration: 4720.0 s

u Min: -7.2 ft  
u Max: 157.2 ft  
u Final: 100.1 ft

WT: 4.877 m / 16.000 ft  
Ueq: 44.0 ft  
U(50): 100.63 ft

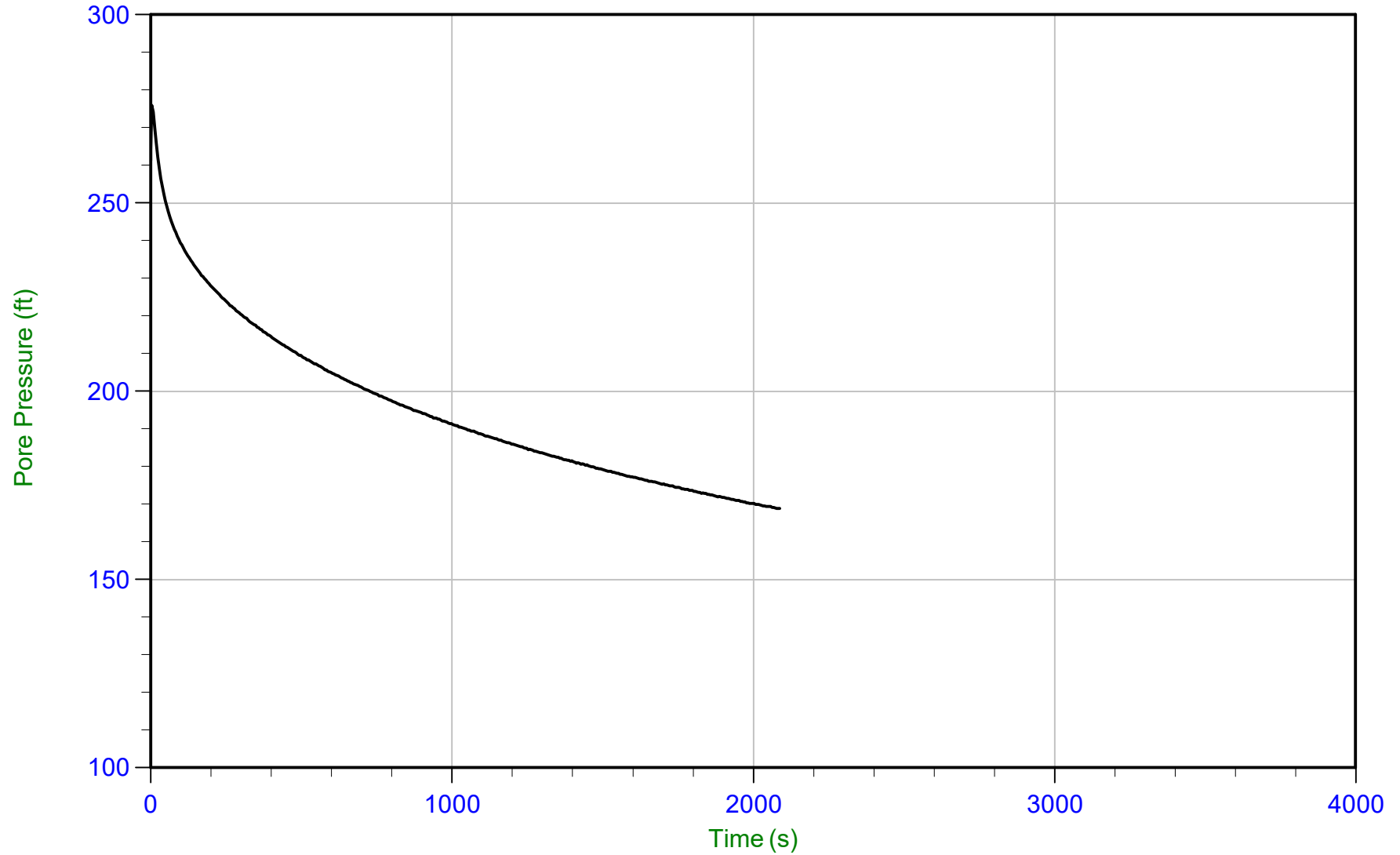
T(50): 4406.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 24.400 m / 80.052 ft  
Duration: 2090.0 s

u Min: 168.8 ft  
u Max: 276.0 ft  
u Final: 168.8 ft

WT: 4.877 m / 16.000 ft  
Ueq: 64.1 ft  
U(50): 170.02 ft

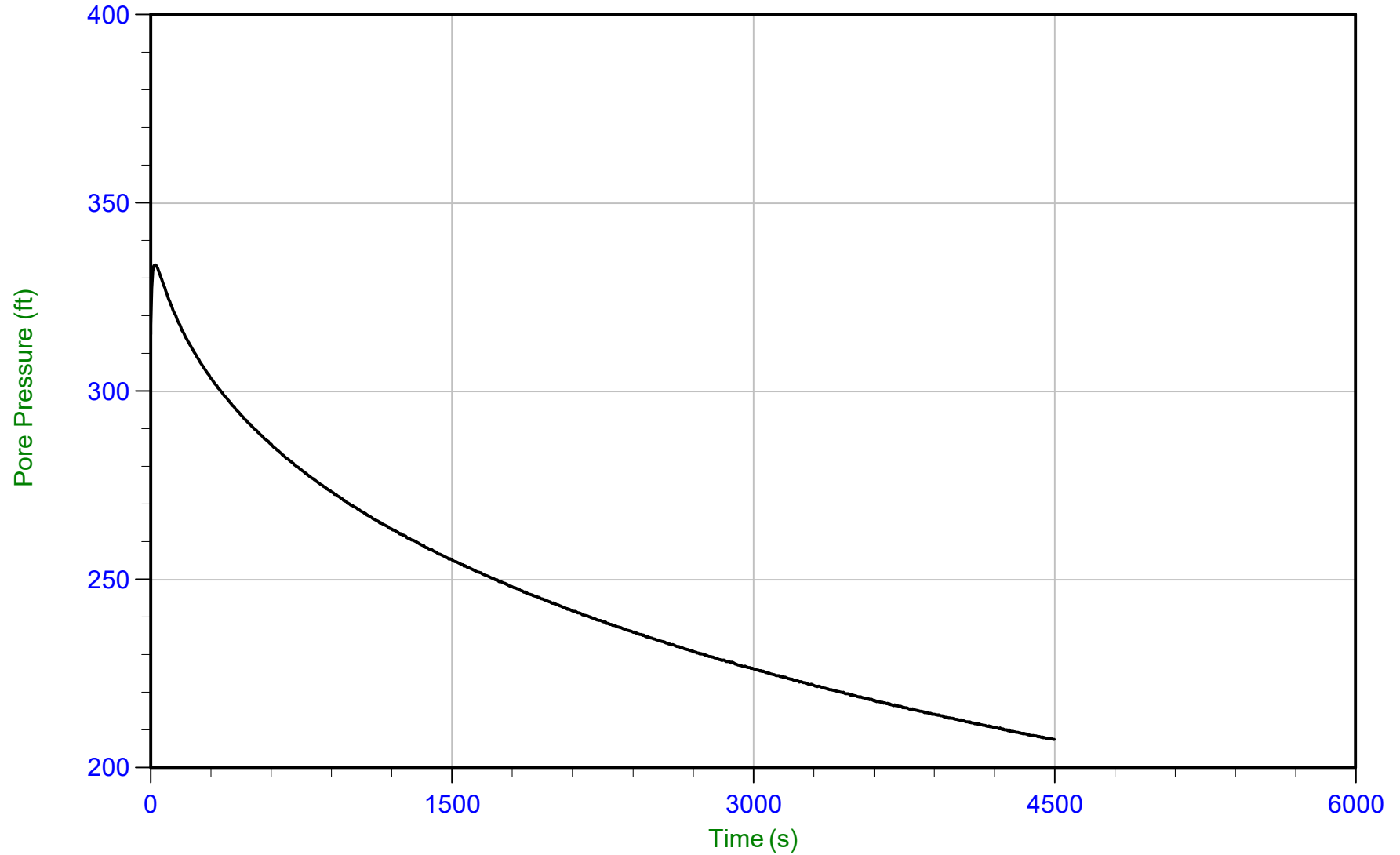
T(50): 2003.9 s  
lr: 100  
Ch: 0.4 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 4500.0 s

u Min: 207.5 ft  
u Max: 333.6 ft  
u Final: 207.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 84.1 ft  
U(50): 208.83 ft

T(50): 4346.6 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min

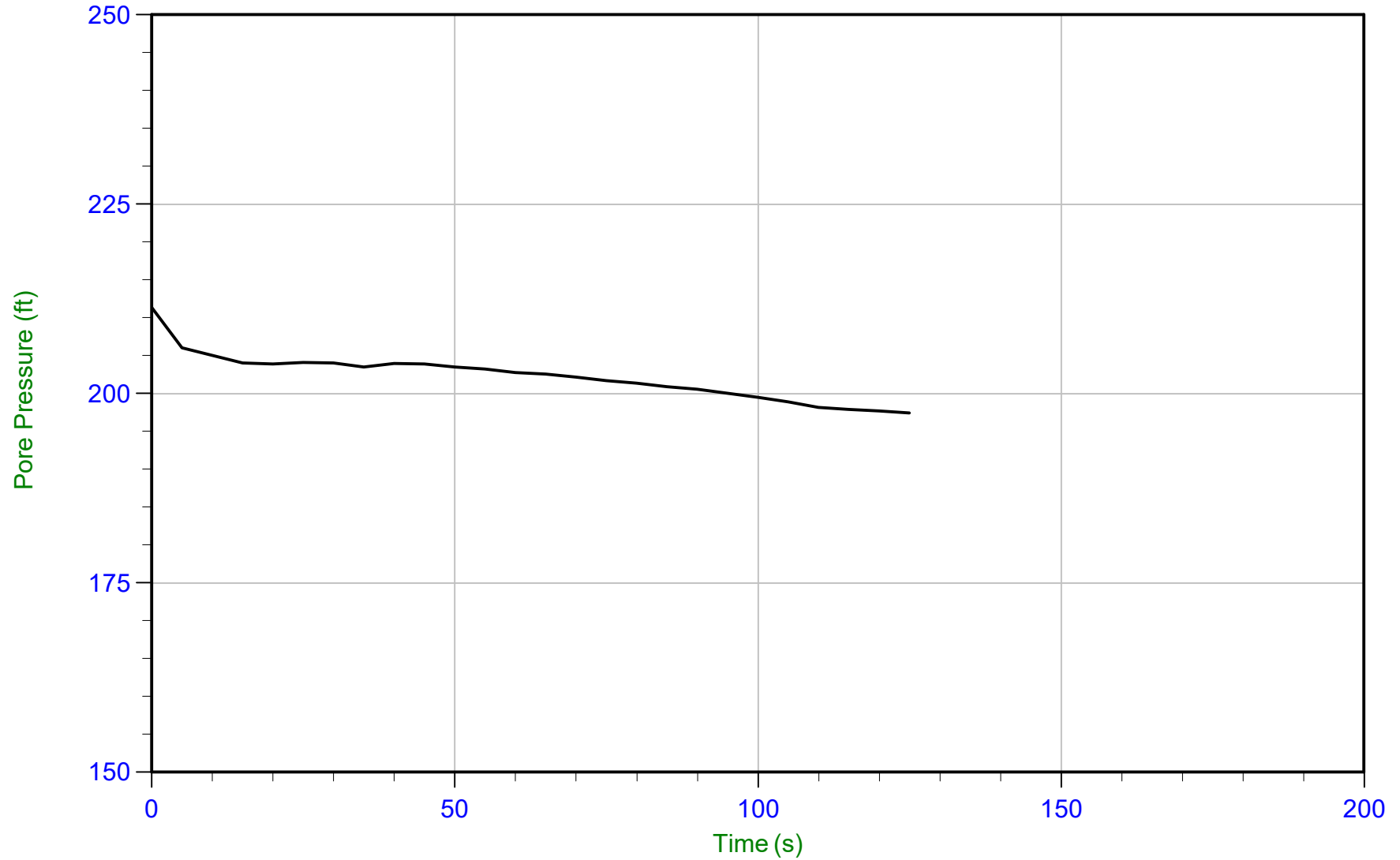




Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 15:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-13  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13.PPF  
Depth: 17.200 m / 56.430 ft  
Duration: 125.0 s

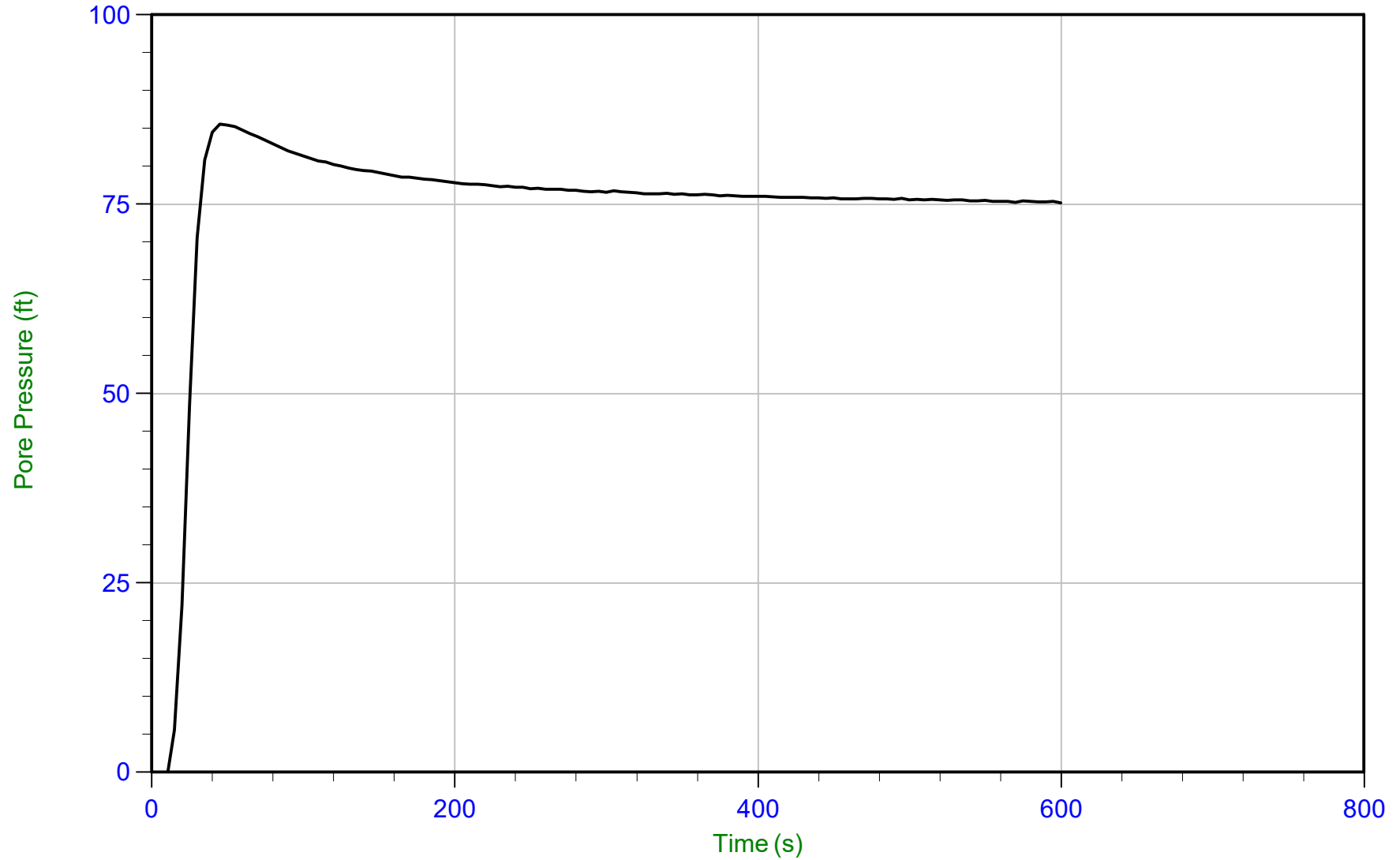
u Min: 197.4 ft  
u Max: 211.4 ft  
u Final: 197.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 09:09  
Site: DTE Belle River Power Plant

Sounding: CPT20-13B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13B.PPF  
Depth: 25.200 m / 82.676 ft  
Duration: 600.0 s

u Min: -3.9 ft  
u Max: 85.6 ft  
u Final: 75.2 ft

WT: 3.962 m / 13.000 ft  
Ueq: 69.7 ft  
U(50): 77.63 ft

T(50): 171.6 s  
I<sub>r</sub>: 100  
Ch: 4.1 cm<sup>2</sup>/min

**APPENDIX J – CHEMISTRY ANALYSIS OF SITE-SPECIFIC WATER**



05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental ALS

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

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**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>9.9</b>		<b>1.0</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Fluoride</b>	<b>0.22</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Sulfate</b>	<b>140</b>		<b>8.0</b>	<b>mg/L</b>	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.43</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>330</b>		<b>50</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	43		20	mg/L	20	12/30/2020 06:55 PM
Fluoride	0.44		0.10	mg/L	1	12/30/2020 07:49 PM
Sulfate	1,200		100	mg/L	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.32	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.1	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	2,100		300	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0				
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0				
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0				
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0				
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0				
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0				
Calcium	63.88	0.50	10	53.04	108	75-125	0			O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0				
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0				
Iron	8.964	0.080	10	0.02083	89.4	75-125	0				
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0				
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0				
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0				
Potassium	12.35	0.20	10	2.605	97.4	75-125	0				
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0				
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0				

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0				
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0				
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0				
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0				
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0				
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0				
Calcium	34.88	0.50	10	25.15	97.2	75-125	0				
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0				
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0				
Iron	9.488	0.080	10	0.143	93.5	75-125	0				
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0				
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0				
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0				
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0				
Potassium	12.88	0.20	10	3.03	98.5	75-125	0				
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0				
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO	

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO	

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20		
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20		
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20		
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20		
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20		
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20		
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O	
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20		
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20		
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20		
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20		
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20		
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O	
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20		
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20		
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20		
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O	
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:37 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043032		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20		
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20		
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20		
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20		
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20		
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20		
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20		
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20		
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20		
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20		
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20		
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20		
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20		
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20		
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20		
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20		
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O	
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20		

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:22 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046544		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO	

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:41 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046556		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO	

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>	Sample ID: <b>MBLK-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021476</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

<b>LCS</b>	Sample ID: <b>LCS-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021475</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

<b>DUP</b>	Sample ID: <b>20121752-03B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID: <b>DB</b>	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021469</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information			Project Information				Parameter/Method Request for Analysis										
Purchase Order		Project Name	DTE Belle River		A	Metals											
Work Order		Project Number	GLP 8017		B	pH, Anions, TDS, Alkalinity											
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants		C												
Send Report To	Michael Coram	Invoice Attn.	Michael Coram		D												
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.		E												
	Suite 100		Suite 100		F												
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105		G												
Phone	734-794-1547	Phone	734-794-1547		H												
Fax	734-332-8063	Fax	734-332-8063		I												
e-Mail Address					J												
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

Sampler(s): Please Print & Sign <i>Mike Coram</i>		Shipment Method: Carrier <i>FedEx</i>		Turnaround Time: (Business Days) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____			Results Due Date:	
Relinquished by: <i>[Signature]</i>	Date: 12/17	Time: 3:00	Received by:	Date:	Time:	Notes: <b>Separate Report</b>		
Relinquished by: <i>Fedex</i>	Date: 12/18/20	Time: 10:00	Received by (Laboratory): <i>[Signature]</i>	Date:	Time:	ALS Cooler ID	Cooler Temp	QC Package: (Check Box Below)
Logged by (Laboratory): <i>MTG</i>	Date: 12/18/20	Time: 13:46	Checked by (Laboratory): <i>[Signature]</i>				5.8°C	<input checked="" type="checkbox"/> Level II: Standard QC <input type="checkbox"/> Level III: Raw Data
							PA23	<input type="checkbox"/> TRRP LRC <input type="checkbox"/> TRRP Level IV
								<input type="checkbox"/> Level IV: SW846 Methods/CLP like
								<input type="checkbox"/> Other: _____

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752**

Received by: **MJG**

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No
- Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s):

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

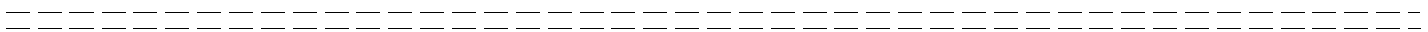
Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:



Client Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_ Person Contacted: \_\_\_\_\_

Contacted By: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments:

CorrectiveAction:





Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

**Client Project Name:** DTE - Belle River

**Client Project Number:** GLP-8017

**Client PO Number:**

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00



Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Chain of Custody Form  
Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

ALS Project Manager: Radium 226 and 228 combined

Customer Information		Project Information	
Purchase Order	Project Name	A	Parameter/Method Request for Analysis
Work Order	Project Number	B	Radium 226 and 228 combined
Company Name	Bill To Company	C	
Send Report To	Invoice Attn	D	
Address	Address	E	
City/State/Zip	City/State/Zip	F	
Phone	Phone	G	
Fax	Fax	H	
e-Mail Address	e-Mail Address	I	
		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16	3:00	SW	2	2	X										
2	BAB-W	12/16	2:00	SW	2	2	X										
3	DB	12/16	4:00	SW	2	2	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram - Cor

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box)  
 Std. 10 WK. Days  
 5 WK. Days  
 24 Hour  
 Other

Results Due Date:

Relinquished By: [Signature] Date: 12/17 Time: 3:00

Received by (Laboratory): [Signature] Date: Time:

Relinquished by: [Signature] Date: Time:

Checked by (Laboratory): [Signature] Date: Time:

QC Package: (Check One Box Below)  
 Level III Std. CC  
 Level III Std. CC/Pres. Data  
 Level IV SW/826-CLP  
 Other

Cooler ID: Cooler Temp. TRPP Check List  
 TRPP Level I  
 TRPP Level II  
 TRPP Level III  
 TRPP Level IV

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20

ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWGT: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-SS RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECEIVING**  
**225 COMMERCE DR**

12-1  
3.2

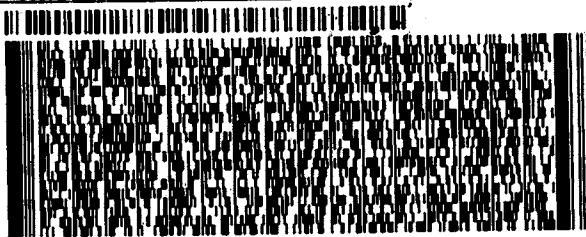
**FORT COLLINS CO 80524**

(616) 582-5201

REF:

THU:

DEPT:



**FedEx**  
Express



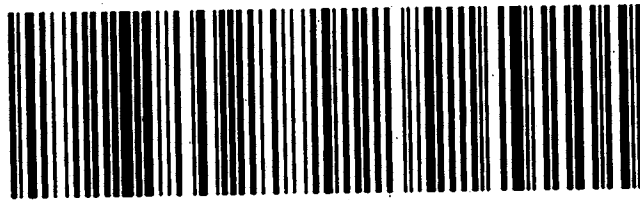
14107-100020207

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	45		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C

ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012397-1	2012397-2	2012397-3
-----------	-----------	-----------

Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3

**APPENDIX K – ALD HYDRAULIC  
CONDUCTIVITY TEST RESULTS**



**Excel Geotechnical Testing, Inc.**  
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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	3/15/2021	0	1.2E-08	0.0000	-	-	-	-	
						3/22/2021	7	9.3E-09	0.0417	-	-	-	-	
						3/29/2021	14	7.3E-09	0.0681	8.3	8.4	-	-	
						4/05/2021	21	7.0E-09	0.1077	-	-	-	-	
						4/12/2021	28	7.1E-09	0.1345	-	-	-	-	
						4/14/2021	30	6.9E-09	0.1408	8.2	8.5	-	-	
						4/19/2021	35	7.8E-09	0.1725	-	-	-	-	
						4/26/2021	42	6.4E-09	0.2022	-	-	-	-	
						4/27/2021	43	6.9E-09	0.2059	8.2	8.4	656	1614	
						5/3/2021	49	7.7E-09	0.2434	-	-	-	-	
						5/04/2021	50	7.8E-09	0.2487	-	-	-	-	
						5/07/2021	53	7.7E-09	0.2619	-	-	-	-	
						5/10/2021	56	6.9E-09	0.2728	8.3	8.2	-	-	
						5/14/2021	60	8.1E-09	0.2987	-	-	-	-	
						5/21/2021	67	7.2E-09	0.3323	-	-	-	-	
						5/24/2021	70	6.9E-09	0.3423	8.5	8.6	-	-	
						5/28/2021	74	8.1E-09	0.3684	-	-	-	-	
						6/04/2021	81	7.0E-09	0.4006	8.4	8.6	660	1411	
6/11/2021	88	7.6E-09	0.4404	-	-	-	-							
6/17/2021	94	6.5E-09	0.4634	8.3	8.2	-	-							
6/18/2021	95	7.3E-09	0.4729	-	-	-	-							
6/25/2021	102	7.6E-09	0.5139	-	-	-	-							
7/01/2021	108	6.4E-09	0.5375	8.5	8.2	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	7/02/2021	109	7.6E-09	0.5460	-	-	-	-	
						7/09/2021	116	7.0E-09	0.5870	-	-	-	-	
						7/16/2021	123	6.9E-09	0.6139	8.5	8.2	656	1230	
						7/23/2021	130	7.6E-09	0.6560	-	-	-	-	
						7/30/2021	137	7.0E-09	0.6827	8.6	8.5	-	-	
						8/06/2021	144	6.9E-09	0.7216	-	-	-	-	
						8/13/2021	151	6.8E-09	0.7489	8.5	8.1	-	-	
						8/20/2021	158	8.2E-09	0.7906	-	-	-	-	
						8/27/2021	165	6.0E-09	0.8165	-	-	-	-	
						8/30/2021	168	7.4E-09	0.8265	8.3	8.3	653	1141	
						9/03/2021	172	7.2E-09	0.8517	-	-	-	-	
						9/10/2021	179	6.5E-09	0.8827	-	-	-	-	
						9/14/2021	183	5.8E-09	0.8948	8.1	8.3	-	-	
						9/17/2021	186	6.9E-09	0.9131	-	-	-	-	
						9/24/2021	193	6.6E-09	0.9453	-	-	-	-	
						10/01/2021	200	5.7E-09	0.9663	-	-	-	-	
						10/04/2021	203	5.8E-09	0.9733	8.4	8.4	-	-	
						10/08/2021	207	7.2E-09	0.9990	-	-	-	-	
10/15/2021	214	6.3E-09	1.0291	-	-	-	-							
10/22/2021	221	5.5E-09	1.0485	8.2	8.3	622	1200							
10/29/2021	228	6.8E-09	1.0886	-	-	-	-							
11/05/2021	235	8.1E-09	1.1118	-	-	-	-							
11/12/2021	242	8.2E-09	1.1185	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	11/19/2021	249	7.7E-09	1.1187	-	-	-	-	
						11/21/2021	251	8.0E-09	1.1178	8.0	8.3	-	-	
						11/26/2021	256	8.1E-09	1.1372	-	-	-	-	
						12/03/2021	263	7.9E-09	1.1516	-	-	-	-	
						12/10/2021	270	6.7E-09	1.1553	-	-	-	-	
						12/17/2021	277	7.5E-09	1.1541	-	-	-	-	
						12/21/2021	281	6.2E-09	1.1606	8.8	8.6	-	-	
						12/24/2021	284	6.7E-09	1.1782	-	-	-	-	
						12/31/2021	291	6.5E-09	1.2109	-	-	-	-	
						1/7/2022	298	5.7E-09	1.2333	8.8	8.8	719	1274	
						1/14/2022	305	6.3E-09	1.2688	-	-	-	-	
						1/21/2022	312	5.8E-09	1.2956	-	-	-	-	
						1/26/2022	317	4.9E-09	1.3070	8.0	8.2	-	-	
						1/28/2022	319	5.3E-09	1.3176	-	-	-	-	
						2/4/2022	326	6.0E-09	1.3494	-	-	-	-	
						2/11/2022	333	5.2E-09	1.3714	8.7	8.7	1091	-	
						2/18/2022	340	6.4E-09	1.4082	-	-	-	-	
						2/25/2022	347	6.3E-09	1.4346	8.9	9.0	964	1310	
						3/4/2022	354	6.8E-09	1.4730	-	-	-	-	
						3/11/2022	361	6.7E-09	1.5008	-	-	-	-	
3/14/2022	364	6.8E-09	1.5103	8.4	9.0	1220	-							
3/18/2022	368	6.9E-09	1.5337	-	-	-	-							
3/25/2022	375	6.8E-09	1.5649	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	3/29/2022	379	6.4E-09	1.5786	9.1	9.1	1210	-	
						4/1/2022	382	7.2E-09	1.5978	-	-	-	-	
						4/8/2022	389	6.6E-09	1.6302	-	-	-	-	
						4/15/2022	396	6.1E-09	1.6525	8.3	8.3	1236	1256	
						4/22/2022	403	6.6E-09	1.6942	-	-	-	-	
						4/29/2022	410	6.3E-09	1.7236	-	-	-	-	
						5/2/2022	413	7.0E-09	1.7342	8.2	8.3	1257	-	
						5/6/2022	417	7.6E-09	1.7604	-	-	-	-	
						5/13/2022	424	7.1E-09	1.7937	-	-	-	-	
						5/17/2022	428	6.8E-09	1.8081	7.8	8.2	1252	-	
						5/20/2022	431	7.1E-09	1.8278	-	-	-	-	
						5/27/2022	438	7.1E-09	1.8623	-	-	-	-	
						6/1/2022	443	6.3E-09	1.8792	8.1	8.4	1254	-	
						6/3/2022	445	6.8E-09	1.8931	-	-	-	-	
						6/10/2022	452	7.0E-09	1.9301	-	-	-	-	
						6/16/2022	458	6.6E-09	1.9533	8.0	8.3	1294	-	
						6/17/2022	459	7.0E-09	1.9605	-	-	-	-	
						6/24/2022	466	7.1E-09	1.9994	-	-	-	-	
7/1/2022	473	7.0E-09	2.0260	8.3	8.3	1315	-							
7/8/2022	480	7.3E-09	2.0702	-	-	-	-							
7/15/2022	487	6.7E-09	2.0976	-	-	-	-							
7/18/2022	490	6.5E-09	2.1068	8.2	8.3	1257	1377							
7/22/2022	494	7.7E-09	2.1330	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	7/29/2022	501	7.1E-09	2.1668	-	-	-	-	
						8/3/2022	506	6.3E-09	2.1828	8.1	8.3	1253	-	
						8/5/2022	508	7.3E-09	2.1974	-	-	-	-	
						8/12/2022	515	7.5E-09	2.2351	-	-	-	-	
						8/18/2022	521	6.3E-09	2.2562	9.1	8.3	1315	-	
						8/19/2022	522	6.6E-09	2.2629	-	-	-	-	
						8/26/2022	529	7.1E-09	2.3023	-	-	-	-	
						8/31/2022	534	6.7E-09	2.3224	7.9	8.2	1256	1233	
						9/2/2022	536	7.4E-09	2.3356	-	-	-	-	
						9/9/2022	543	6.8E-09	2.3720	-	-	-	-	
						9/15/2022	549	6.7E-09	2.3940	8.5	8.6	1309	-	
						9/16/2022	550	7.0E-09	2.4009	-	-	-	-	
						9/23/2022	557	7.0E-09	2.4393	-	-	-	-	
						9/30/2022	564	6.5E-09	2.4657	8.7	8.6	1253	-	
						10/7/2022	571	7.1E-09	2.5058	-	-	-	-	
						10/14/2022	578	7.0E-09	2.5343	8.5	8.3	1209	1197	
						10/21/2022	585	6.6E-09	2.5730	-	-	-	-	
						10/28/2022	592	6.3E-09	2.6010	-	-	-	-	
10/31/2022	595	5.9E-09	2.6098	8.5	8.3	1209	1197							
11/4/2022	599	7.3E-09	2.6346	-	-	-	-							
11/11/2022	606	6.9E-09	2.6681	-	-	-	-							
11/18/2022	613	6.1E-09	2.6945	-	-	-	-							
11/25/2022	620	6.0E-09	2.7244	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143	26.7	98.1	28.7	96.6	12/2/2022	627	5.0E-09	2.7459	-	-	-	-	
						12/5/2022	630	5.0E-09	2.7534	8.5	8.5	1242	1200	
						12/9/2022	634	6.5E-09	2.7749	-	-	-	-	
						12/16/2022	641	5.1E-09	2.8008	-	-	-	-	
						12/23/2022	648	4.4E-09	2.8182	-	-	-	-	
						12/31/2022	656	4.9E-09	2.8525	-	-	-	-	

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	3/15/2021	0	1.8E-08		-	-	-	-	
						3/22/2021	7	1.6E-08	0.0846	8.5	8.1	-	-	
						3/29/2021	14	1.3E-08	0.1548	-	-	-	-	
						3/30/2021	15	1.3E-08	0.1595	8.5	8.3	-	-	
						4/05/2021	21	1.4E-08	0.2036	-	-	-	-	
						4/09/2021	25	1.3E-08	0.2270	8.0	8.1	782	3050	
						4/12/2021	28	1.4E-08	0.2608	-	-	-	-	
						4/16/2021	32	1.3E-08	0.2939	8.2	8.5	-	-	
						4/19/2021	35	1.3E-08	0.3273	-	-	-	-	
						4/26/2021	42	1.1E-08	0.3737	8.0	7.9	-	-	
						5/03/2021	49	1.3E-08	0.4429	8.2	8.5	560	2300	
						5/07/2021	53	1.3E-08	0.4826	-	-	-	-	
						5/12/2021	58	1.2E-08	0.5197	8.1	8.3	-	-	
						5/14/2021	60	1.3E-08	0.5444	-	-	-	-	
						5/21/2021	67	1.2E-08	0.6038	8.3	8.1	-	-	
						5/28/2021	74	1.2E-08	0.6683	8.4	8.2	621	1790	
						6/04/2021	81	1.2E-08	0.7309	-	-	-	-	
						6/11/2021	88	1.2E-08	0.7967	-	-	-	-	
6/14/2021	91	1.1E-08	0.8129	8.3	8.2	-	-							
6/18/2021	95	1.2E-08	0.8553	-	-	-	-							
6/22/2021	99	1.1E-08	0.8823	8.3	8.1	595	1982							
6/25/2021	102	1.3E-08	0.9169	-	-	-	-							
7/01/2021	108	1.1E-08	0.9601	8.5	8.5	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	7/02/2021	109	1.1E-08	0.9719	-	-	-	-	
						7/09/2021	116	1.1E-08	1.0337	8.8	8.4	-	-	
						7/16/2021	123	1.2E-08	1.0975	8.7	8.1	657	1988	
						7/23/2021	130	1.2E-08	1.1654	8.3	8.4	-	-	
						7/30/2021	137	1.2E-08	1.2287	-	-	-	-	
						8/02/2021	140	1.1E-08	1.2452	8.7	8.1	-	-	
						8/06/2021	144	1.2E-08	1.2857	-	-	-	-	
						8/13/2021	151	1.1E-08	1.3313	8.2	8.1	652	1764	
						8/20/2021	158	1.2E-08	1.3978	-	-	-	-	
						8/23/2021	161	1.1E-08	1.4132	8.1	8.3	-	-	
						8/27/2021	165	1.2E-08	1.4535	-	-	-	-	
						8/31/2021	169	1.2E-08	1.4815	8.4	8.2	-	-	
						9/03/2021	172	1.2E-08	1.5143	-	-	-	-	
						9/08/2021	177	1.1E-08	1.5516	8.1	8.0	596	1523	
						9/10/2021	179	1.1E-08	1.5740	-	-	-	-	
						9/17/2021	186	9.8E-09	1.6213	-	-	-	-	
						9/20/2021	189	1.0E-08	1.6353	8.2	8.3	-	-	
						9/24/2021	193	1.2E-08	1.6763	-	-	-	-	
						10/01/2021	200	9.0E-09	1.7155	8.3	8.3	-	-	
10/08/2021	207	1.1E-08	1.7778	-	-	-	-							
10/12/2021	211	1.2E-08	1.7970	8.3	8.4	585	1524							
10/15/2021	214	1.1E-08	1.8259	-	-	-	-							
10/22/2021	221	9.4E-09	1.8672	8.5	8.3	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	10/29/2021	228	1.1E-08	1.9280	-	-	-	-	
						11/01/2021	231	1.1E-08	1.9439	8.1	8.1	-	-	
						11/05/2021	235	1.2E-08	1.9864	-	-	-	-	
						11/12/2021	242	9.3E-09	2.0274	8.2	8.2	591	1510	
						11/19/2021	249	1.2E-08	2.0850	-	-	-	-	
						11/24/2021	254	9.8E-09	2.1108	8.2	8.1	-	-	
						11/26/2021	256	1.1E-08	2.1339	-	-	-	-	
						12/03/2021	263	1.0E-08	2.1827	-	-	-	-	
						12/08/2021	268	9.4E-09	2.2043	8.3	8.1	-	-	
						12/10/2021	270	9.9E-09	2.2227	-	-	-	-	
						12/14/2021	274	1.1E-08	2.2543	8.1	7.9	653	1120	
						12/17/2021	277	1.1E-08	2.2847	-	-	-	-	
						12/21/2021	281	1.1E-08	2.3157	8.5	8.3	-	-	
						12/24/2021	284	1.1E-08	2.3456	-	-	-	-	
						12/30/2021	290	1.1E-08	2.3880	8.3	8.2	-	-	
						12/31/2021	291	1.1E-08	2.3996	-	-	-	-	
						01/07/2022	298	1.0E-08	2.4543	8.7	8.2	609	1010	
						01/14/2022	305	1.1E-08	2.5129	-	-	-	-	
						1/18/2022	309	9.6E-09	2.5343	8.0	8.1	-	-	
						1/21/2022	312	1.0E-08	2.5652	-	-	-	-	
1/28/2022	319	9.0E-09	2.6069	8.3	8.5	-	-							
2/4/2022	326	1.0E-08	2.6650	-	-	-	-							
2/7/2022	329	9.8E-09	2.6820	8.5	8.7	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	2/11/2022	333	1.0E-08	2.7173	-	-	-	-	
						2/17/2022	339	9.8E-09	2.7561	8.5	8.8	1213	-	
						2/18/2022	340	1.0E-08	2.7674	-	-	-	-	
						2/25/2022	347	1.1E-08	2.8240	8.9	9.1	1224	856	
						3/4/2022	354	1.1E-08	2.8832	-	-	-	-	
						3/7/2022	357	1.1E-08	2.9016	8.7	8.6	1226	-	
						3/11/2022	361	1.1E-08	2.9381	-	-	-	-	
						3/17/2022	367	9.7E-09	2.9759	8.9	8.8	1198	-	
						3/18/2022	368	1.0E-08	2.9860	-	-	-	-	
						3/25/2022	375	1.2E-08	3.0436	-	-	-	-	
						3/28/2022	378	1.1E-08	3.0694	8.3	8.5	1229	903	
						4/1/2022	382	1.1E-08	3.0983	-	-	-	-	
						4/7/2022	388	1.0E-08	3.1386	8.6	8.5	1238	-	
						4/8/2022	389	1.1E-08	3.1494	-	-	-	-	
						4/16/2022	397	1.1E-08	3.2061	7.8	8.0	1261	-	
						4/22/2022	403	9.9E-09	3.2603	-	-	-	-	
						4/27/2022	408	9.8E-09	3.2895	7.9	8.0	1237	972	
						4/29/2022	410	1.0E-08	3.3101	-	-	-	-	
						5/6/2022	417	1.1E-08	3.3638	-	-	-	-	
						5/7/2022	418	1.1E-08	3.3704	7.9	8.0	1345	-	
5/13/2022	424	1.1E-08	3.4264	-	-	-	-							
5/17/2022	428	1.1E-08	3.4517	7.8	8.0	1267	-							
5/20/2022	431	1.1E-08	3.4836	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	5/26/2022	437	1.1E-08	3.5267	8.1	8.3	1262	942	
						5/27/2022	438	1.1E-08	3.5385	-	-	-	-	
						6/3/2022	445	1.1E-08	3.5964	-	-	-	-	
						6/6/2022	448	1.1E-08	3.6124	8.0	8.2	1304	-	
						6/10/2022	452	1.1E-08	3.6501	-	-	-	-	
						6/16/2022	458	1.1E-08	3.6906	7.9	8.0	1281	-	
						6/17/2022	459	1.1E-08	3.7017	-	-	-	-	
						6/24/2022	466	1.1E-08	3.7603	-	-	-	-	
						6/27/2022	469	9.9E-09	3.7753	8.2	8.3	1253	945	
						7/1/2022	473	1.2E-08	3.8170	-	-	-	-	
						7/6/2022	478	1.2E-08	3.8543	8.1	8.1	1245	-	
						7/8/2022	480	1.2E-08	3.8776	-	-	-	-	
						7/15/2022	487	1.1E-08	3.9311	8.0	8.0	1250	-	
						7/22/2022	494	1.2E-08	3.9951	-	-	-	-	
						7/25/2022	497	1.2E-08	4.0130	8.2	8.3	1191	1046	
						7/29/2022	501	1.2E-08	4.0552	-	-	-	-	
						8/3/2022	506	1.1E-08	4.0903	8.0	8.1	1259	-	
						8/5/2022	508	1.2E-08	4.1136	-	-	-	-	
						8/12/2022	515	1.1E-08	4.1683	8.0	8.1	1271	-	
						8/19/2022	522	1.1E-08	4.2329	-	-	-	-	
8/22/2022	525	1.1E-08	4.2503	8.1	8.2	1246	1109							
8/26/2022	529	1.2E-08	4.2918	-	-	-	-							
8/31/2022	534	1.1E-08	4.3273	8.2	8.2	1248	-							

3-29-2023  
Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	9/2/2022	536	1.1E-08	4.3504	-	-	-	-	
						9/9/2022	543	1.1E-08	4.4039	8.5	8.4	1290	-	
						9/16/2022	550	1.2E-08	4.4677	-	-	-	-	
						9/20/2022	554	1.1E-08	4.4846	8.2	8.3	1264	1136	
						9/23/2022	557	1.2E-08	4.5256	-	-	-	-	
						9/28/2022	562	1.1E-08	4.5602	8.4	8.4	1140	-	
						9/30/2022	564	1.1E-08	4.5827	-	-	-	-	
						10/7/2022	571	1.1E-08	4.6360	8.0	8.1	1240	-	
						10/14/2022	578	1.1E-08	4.7000	8.3	8.3	1200	1101	
						10/21/2022	585	1.1E-08	4.7606	-	-	-	-	
						10/24/2022	588	1.1E-08	4.7785	8.4	8.2	1253	-	
						10/28/2022	592	1.1E-08	4.8193	-	-	-	-	
						11/3/2022	598	1.1E-08	4.8590	8.3	8.3	1207	-	
						11/4/2022	599	1.1E-08	4.8705	-	-	-	-	
						11/11/2022	606	1.1E-08	4.9299	8.5	8.4	1224	926	
						11/18/2022	613	9.7E-09	4.9876	-	-	-	-	
						11/23/2022	618	8.3E-09	5.0109	8.5	8.7	-	-	
						11/25/2022	620	9.8E-09	5.0305	-	-	-	-	
12/2/2022	627	8.9E-09	5.0759	-	-	-	-							
12/5/2022	630	8.8E-09	5.0894	8.4	8.5	1257	-							
12/9/2022	634	1.0E-08	5.1250	-	-	-	-							
12/16/2022	641	7.9E-09	5.1618	8.4	8.5	1190	894							
12/23/2022	648	8.8E-09	5.2138	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

2-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	12/31/2022	656	8.7E-09	5.2624	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	3/15/2021	0	2.4E-08	0.0000	-	-	-	-	
						3/22/2021	7	1.9E-08	0.0762	8.2	8.0	-	-	
						3/29/2021	14	2.0E-08	0.1547	8.2	8.1	-	-	
						4/05/2021	21	1.8E-08	0.2164	8.1	8.2	523	1271	
						4/12/2021	28	2.0E-08	0.2904	-	-	-	-	
						4/13/2021	29	2.0E-08	0.2961	8.3	8.3	-	-	
						4/19/2021	35	2.0E-08	0.3672	8.2	8.1	-	-	
						4/26/2021	42	1.9E-08	0.4413	8.1	8.0	578	1313	
						4/30/2021	46	2.1E-08	0.4969	8.4	8.1	-	-	
						5/05/2021	51	2.1E-08	0.5617	8.4	8.2	-	-	
						5/07/2021	53	2.0E-08	0.5909	-	-	-	-	
						5/10/2021	56	1.9E-08	0.6224	8.3	8.0	607	1081	
						5/14/2021	60	2.1E-08	0.6759	-	-	-	-	
						5/19/2021	65	2.0E-08	0.7406	8.0	8.2	-	-	
						5/21/2021	67	2.1E-08	0.7738	-	-	-	-	
						5/24/2021	70	2.1E-08	0.8050	8.2	8.2	666	1197	
						5/28/2021	74	2.1E-08	0.8595	8.3	8.1	-	-	
						6/02/2021	79	2.0E-08	0.9233	8.2	8.2	-	-	
6/04/2021	81	2.1E-08	0.9549	-	-	-	-							
6/07/2021	84	2.1E-08	0.9865	8.6	8.3	598	1074							
6/11/2021	88	2.2E-08	1.0419	8.4	8.1	-	-							
6/16/2021	93	2.1E-08	1.1071	8.4	8.0	-	-							
6/18/2021	95	2.1E-08	1.1396	-	-	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	6/21/2021	98	2.0E-08	1.1710	8.4	8.2	665	944	
						6/25/2021	102	2.2E-08	1.2298	-	-	-	-	
						6/29/2021	106	2.1E-08	1.2848	8.6	8.4	-	-	
						7/02/2021	109	1.9E-08	1.3242	8.6	8.1	618	1000	
						7/07/2021	114	2.0E-08	1.3932	8.1	8.1	-	-	
						7/09/2021	116	1.9E-08	1.4223	-	-	-	-	
						7/13/2021	120	2.0E-08	1.4630	8.3	8.4	-	-	
						7/16/2021	123	2.1E-08	1.5068	-	-	-	-	
						7/19/2021	126	2.0E-08	1.5349	8.2	8.4	612	974	
						7/23/2021	130	2.1E-08	1.5898	8.2	8.1	-	-	
						7/29/2021	136	2.0E-08	1.6629	8.2	8.1	-	-	
						7/30/2021	137	2.1E-08	1.6798	-	-	-	-	
						8/04/2021	142	1.8E-08	1.7315	8.3	8.2	610	933	
						8/06/2021	144	1.8E-08	1.7593	-	-	-	-	
						8/10/2021	148	2.0E-08	1.8002	8.2	8.1	-	-	
						8/13/2021	151	2.1E-08	1.8459	-	-	-	-	
						8/16/2021	154	2.1E-08	1.8754	8.3	8.1	-	-	
						8/20/2021	158	2.2E-08	1.9341	-	-	-	-	
						8/23/2021	161	1.9E-08	1.9568	8.1	8.3	582	857	
						8/27/2021	165	2.1E-08	2.0127	-	-	-	-	
8/30/2021	168	2.1E-08	2.0365	8.5	8.3	-	-							
9/03/2021	172	2.0E-08	2.0908	8.7	8.2	-	-							
9/08/2021	177	2.1E-08	2.1424	8.2	8.1	622	844							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	9/10/2021	179	2.1E-08	2.1734	-	-	-	-	
						9/13/2021	182	1.9E-08	2.2019	8.2	8.2	-	-	
						9/17/2021	186	2.0E-08	2.2564	-	-	-	-	
						9/20/2021	189	1.9E-08	2.2802	8.2	8.3	-	-	
						9/24/2021	193	2.1E-08	2.3353	8.2	8.2	597	879	
						10/01/2021	200	1.7E-08	2.4097	8.4	8.4	-	-	
						10/07/2021	206	2.0E-08	2.4809	8.3	8.2	-	-	
						10/08/2021	207	1.9E-08	2.4941	-	-	-	-	
						10/14/2021	213	1.8E-08	2.5518	8.4	8.4	589	818	
						10/15/2021	214	1.8E-08	2.5654	-	-	-	-	
						10/22/2021	221	1.7E-08	2.6261	8.7	8.5	-	-	
						10/27/2021	226	2.0E-08	2.6889	8.6	8.4	-	-	
						10/29/2021	228	2.0E-08	2.7223	-	-	-	-	
						11/01/2021	231	2.1E-08	2.7543	8.1	8.1	610	831	
						11/05/2021	235	2.1E-08	2.8085	-	-	-	-	
						11/09/2021	239	1.8E-08	2.8361	8.8	8.5	-	-	
						11/12/2021	242	1.9E-08	2.8770	-	-	-	-	
						11/16/2021	246	1.8E-08	2.9080	8.8	8.3	-	-	
11/19/2021	249	2.2E-08	2.9551	-	-	-	-							
11/23/2021	253	2.2E-08	2.9935	8.8	8.3	661	783							
11/26/2021	256	2.2E-08	3.0400	-	-	-	-							
11/30/2021	260	1.9E-08	3.0726	8.8	8.3	-	-							
12/03/2021	263	2.1E-08	3.1182	-	-	-	-							

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Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	12/06/2021	266	2.0E-08	3.1463	8.3	8.1	-	-	
						12/10/2021	270	1.9E-08	3.1951	8.4	8.1	671	741	
						12/14/2021	274	1.9E-08	3.2281	7.8	8.0	-	-	
						12/17/2021	277	2.0E-08	3.2715	-	-	-	-	
						12/20/2021	280	2.1E-08	3.3014	8.3	8.1	-	-	
						12/24/2021	284	2.0E-08	3.3522	8.6	8.1	645	721	
						12/30/2021	290	2.0E-08	3.4220	8.6	8.4	-	-	
						12/31/2021	291	2.0E-08	3.4396	-	-	-	-	
						01/04/2022	295	2.0E-08	3.4863	8.1	8.0	-	-	
						01/07/2022	298	1.9E-08	3.5276	-	-	-	-	
						1/10/2022	301	1.7E-08	3.5536	8.2	8.0	649	720	
						1/14/2022	305	2.0E-08	3.6060	8.4	8.0	-	-	
						1/19/2022	310	1.9E-08	3.6684	8.5	8.1	-	-	
						1/21/2022	312	2.0E-08	3.7025	-	-	-	-	
						1/26/2022	317	1.8E-08	3.7442	8.3	8.4	1149	760	
						1/28/2022	319	1.8E-08	3.7723	-	-	-	-	
						2/1/2022	323	1.8E-08	3.8105	8.5	8.4	-	-	
						2/4/2022	326	1.9E-08	3.8526	-	-	-	-	
2/7/2022	329	1.9E-08	3.8801	8.7	8.5	-	-							
2/11/2022	333	1.9E-08	3.9313	-	-	-	-							
2/14/2022	336	1.8E-08	3.9571	8.8	8.2	1191	770							
2/18/2022	340	2.0E-08	4.0110	8.5	8.4	-	-							
2/23/2022	345	2.0E-08	4.0726	8.8	8.4	1180	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	2/25/2022	347	2.0E-08	4.1040	-	-	-	-	
						2/28/2022	350	2.0E-08	4.1370	8.9	8.7	1200	765	
						3/4/2022	354	2.1E-08	4.1917	-	-	-	-	
						3/7/2022	357	2.2E-08	4.2179	8.6	8.7	-	-	
						3/11/2022	361	2.1E-08	4.2733	-	-	-	-	
						3/14/2022	364	1.9E-08	4.2968	8.5	8.6	-	-	
						3/18/2022	368	2.0E-08	4.3514	-	-	-	-	
						3/21/2022	371	1.8E-08	4.3743	8.8	8.8	1211	800	
						3/25/2022	375	2.2E-08	4.4317	8.9	8.2	1230	-	
						3/30/2022	380	2.1E-08	4.4978	8.2	8.6	1220	-	
						4/1/2022	382	2.1E-08	4.5292	-	-	-	-	
						4/4/2022	385	2.1E-08	4.5628	8.1	8.6	1225	836	
						4/8/2022	389	2.1E-08	4.6180	-	-	-	-	
						4/9/2022	390	2.1E-08	4.6287	8.2	8.7	1222	-	
						4/14/2022	395	2.1E-08	4.6911	7.9	8.0	1278	-	
						4/15/2022	396	2.0E-08	4.7047	-	-	-	-	
						4/20/2022	401	1.8E-08	4.7578	7.8	7.9	1210		
						4/22/2022	403	1.9E-08	4.7842	-	-	-	-	
4/27/2022	408	1.9E-08	4.8344	7.9	8.0	1214	-							
4/29/2022	410	1.9E-08	4.8652	-	-	-	-							
5/2/2022	413	2.0E-08	4.8997	7.9	8.0	1220	-							
5/6/2022	417	2.1E-08	4.9558	-	-	-	-							
5/7/2022	418	2.1E-08	4.9674	7.8	7.8	1236	873							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	5/12/2022	423	2.1E-08	5.0318	7.7	7.9	1196	-	
						5/13/2022	424	2.1E-08	5.0504	-	-	-	-	
						5/17/2022	428	2.2E-08	5.1006	7.8	8.0	1239		
						5/20/2022	431	2.1E-08	5.1460	-	-	-	-	
						5/23/2022	434	2.1E-08	5.1748	7.9	8.3	1247	956	
						5/27/2022	438	2.2E-08	5.2328	-	-	-	-	
						5/28/2022	439	2.1E-08	5.2441	7.8	7.8	-	-	
						6/3/2022	445	2.1E-08	5.3162	8.0	8.1	1289	-	
						6/8/2022	450	2.1E-08	5.3852	8.0	8.1	1270	1536	
						6/10/2022	452	2.2E-08	5.4180	-	-	-	-	
						6/13/2022	455	2.2E-08	5.4529	8.2	8.3	1277	-	
						6/17/2022	459	2.2E-08	5.5106	8.1	8.1	1264	-	
						6/22/2022	464	2.1E-08	5.5783	7.9	8.1	1250	1771	
						6/24/2022	466	2.1E-08	5.6113	-	-	-	-	
						6/27/2022	469	2.1E-08	5.6448	8.4	8.3	1199	-	
						7/1/2022	473	2.2E-08	5.7032	-	-	-	-	
						7/5/2022	477	2.3E-08	5.7361	8.2	8.2	1276	-	
						7/8/2022	480	2.1E-08	5.7838	-	-	-	-	
7/11/2022	483	2.1E-08	5.8123	8.1	8.2	1271	1013							
7/15/2022	487	2.2E-08	5.8711	-	-	-	-							
7/18/2022	490	2.1E-08	5.8961	8.1	8.3	1251	-							
7/22/2022	494	2.3E-08	5.9550	-	-	-	-							
7/27/2022	499	2.2E-08	6.0271	8.5	8.6	1152	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	7/29/2022	501	2.2E-08	6.0446	8.0	8.2	1164	977	
						8/2/2022	505	2.2E-08	6.0952	7.9	8.2	1261	-	
						8/5/2022	508	2.2E-08	6.1437	-	-	-	-	
						8/8/2022	511	2.1E-08	6.1722	8.4	8.3	1264	-	
						8/12/2022	515	2.1E-08	6.2321	-	-	-	-	
						8/15/2022	518	2.2E-08	6.2569	8.9	8.4	1221	2090	
						8/19/2022	522	2.2E-08	6.3160	8.3	8.6	-	-	
						8/24/2022	527	2.1E-08	6.3850	7.9	8.1	1224	-	
						8/26/2022	529	2.2E-08	6.4180	-	-	-	-	
						8/29/2022	532	2.2E-08	6.4531	8.2	8.2	1244	1244	
						9/2/2022	536	2.2E-08	6.5122	8.3	8.3	1253	-	
						9/7/2022	541	2.1E-08	6.5807	8.1	8.1	1250	-	
						9/9/2022	543	2.1E-08	6.6150	-	-	-	-	
						9/12/2022	546	2.1E-08	6.6491	8.0	8.1	1168	1783	
						9/16/2022	550	2.2E-08	6.7092	8.6	8.5	1283	-	
						9/21/2022	555	2.1E-08	6.7757	8.5	8.6	1191	-	
						9/23/2022	557	2.1E-08	6.8100	-	-	-	-	
						9/26/2022	560	2.2E-08	6.8445	8.4	8.2	1239	1059	
9/30/2022	564	2.2E-08	6.9031	8.2	8.2	1196	-							
10/7/2022	571	2.1E-08	7.0035	-	-	-	-							
10/10/2022	574	2.1E-08	7.0365	8.9	8.3	1213	1045							
10/14/2022	578	2.2E-08	7.0950	8.2	8.1	1207	-							
10/19/2022	583	2.0E-08	7.1600	8.4	8.3	1201	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	10/21/2022	585	1.9E-08	7.1910	-	-	-	-	
						10/24/2022	588	2.1E-08	7.2276	8.2	8.1	1190	-	
						10/28/2022	592	2.1E-08	7.2259	8.6	8.3	1231	-	
						11/2/2022	597	2.1E-08	7.3513	7.9	8.1	1312	-	
						11/4/2022	599	2.2E-08	7.3849	-	-	-	-	
						11/7/2022	602	2.2E-08	7.4202	8.3	8.2	1218	997	
						11/11/2022	606	2.2E-08	7.4791	8.1	8.3	-	-	
						11/18/2022	613	1.9E-08	7.5493	8.2	8.4	1215	-	
						11/23/2022	618	1.7E-08	7.5999	8.6	8.7	1193	1011	
						11/25/2022	620	1.9E-08	7.6286	-	-	-	-	
						12/2/2022	627	1.8E-08	7.7056	-	-	-	-	
						12/3/2022	628	1.7E-08	7.7151	8.8	8.8	-	-	
						12/5/2022	630	1.7E-08	7.7292	8.6	8.6	1194	-	
						12/9/2022	634	1.9E-08	7.7785	-	-	-	-	
						12/13/2022	638	1.7E-08	7.8139	8.6	8.9	1238	1043	
						12/16/2022	641	1.8E-08	7.8475	-	-	-	-	
12/20/2022	645	1.6E-08	7.8684	9.4	9.0	1290	-							
12/23/2022	648	1.8E-08	7.9165	-	-	-	-							
12/31/2022	656	1.6E-08	7.9960	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	3/15/2021	0	2.2E-08	0.0000	-	-	-	-	
						3/22/2021	7	2.0E-08	0.1144	8.5	8.2	-	-	
						3/29/2021	14	1.9E-08	0.2120	8.1	8.2	-	-	
						4/05/2021	21	1.7E-08	0.3126	8.2	8.2	633	1118	
						4/12/2021	28	1.9E-08	0.4132	-	-	-	-	
						4/13/2021	29	1.9E-08	0.4221	8.3	8.1	-	-	
						4/19/2021	35	1.9E-08	0.5181	8.2	8.1	-	-	
						4/26/2021	42	1.7E-08	0.6197	8.4	8.0	648	1027	
						5/03/2021	49	1.9E-08	0.7283	8.5	8.1	-	-	
						5/10/2021	56	1.8E-08	0.8335	8.1	7.8	-	-	
						5/14/2021	60	1.9E-08	0.9042	8.5	8.1	719	980	
						5/20/2021	66	1.8E-08	1.0021	8.6	8.4	-	-	
						5/21/2021	67	1.8E-08	1.0259	-	-	-	-	
						5/25/2021	71	1.9E-08	1.0878	8.1	8.1	-	-	
						5/28/2021	74	1.9E-08	1.1473	8.3	8.2	611	1024	
						6/04/2021	81	1.8E-08	1.2549	8.6	8.0	-	-	
						6/10/2021	87	1.9E-08	1.3556	8.8	8.6	-	-	
						6/11/2021	88	1.9E-08	1.3775	-	-	-	-	
6/16/2021	93	1.8E-08	1.4522	8.5	8.1	699	927							
6/18/2021	95	1.8E-08	1.4956	-	-	-	-							
6/22/2021	99	1.8E-08	1.5517	8.2	7.9	-	-							
6/25/2021	102	2.0E-08	1.6200	-	-	-	-							
6/28/2021	105	1.9E-08	1.6642	8.3	8.6	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	7/02/2021	109	2.0E-08	1.7456	8.2	7.8	-	-	
						7/08/2021	115	1.8E-08	1.8481	8.2	8.2	735	816	
						7/09/2021	116	1.8E-08	1.8697	-	-	-	-	
						7/14/2021	121	1.9E-08	1.9475	8.3	8.1	-	-	
						7/16/2021	123	1.8E-08	1.9823	-	-	-	-	
						7/20/2021	127	1.9E-08	2.0134	8.2	8.2	-	-	
						7/23/2021	130	1.9E-08	2.0741	-	-	-	-	
						7/27/2021	134	1.8E-08	2.1274	8.7	8.2	681	862	
						7/30/2021	137	1.8E-08	2.1826	-	-	-	-	
						8/03/2021	141	1.6E-08	2.2278	8.4	8.3	-	-	
						8/06/2021	144	1.6E-08	2.2787	-	-	-	-	
						8/10/2021	148	1.7E-08	2.3263	8.1	8.1	-	-	
						8/13/2021	151	1.8E-08	2.3830	-	-	-	-	
						8/16/2021	154	1.9E-08	2.4223	8.1	8.1	714	817	
						8/20/2021	158	1.8E-08	2.4934	-	-	-	-	
						8/23/2021	161	1.6E-08	2.5242	8.1	8.1	-	-	
						8/27/2021	165	1.8E-08	2.5950	-	-	-	-	
						8/30/2021	168	1.9E-08	2.6279	8.1	8.2	-	-	
9/03/2021	172	1.8E-08	2.6980	8.4	8.1	647	811							
9/09/2021	178	1.7E-08	2.7929	8.1	8.0	-	-							
9/10/2021	179	1.7E-08	2.8139	-	-	-	-							
9/14/2021	183	1.8E-08	2.8731	8.0	7.9	-	-							
9/17/2021	186	1.7E-08	2.9252	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	9/21/2021	190	1.8E-08	2.9740	8.3	8.1	600	792	
						9/24/2021	193	1.8E-08	3.0317	-	-	-	-	
						9/28/2021	197	1.6E-08	3.0759	8.1	8.0	-	-	
						10/01/2021	200	1.6E-08	3.1277	-	-	-	-	
						10/05/2021	204	1.8E-08	3.1790	8.2	8.1	-	-	
						10/08/2021	207	1.8E-08	3.2357	-	-	-	-	
						10/12/2021	211	1.7E-08	3.2808	8.1	8.0	580	777	
						10/15/2021	214	1.8E-08	3.3342	-	-	-	-	
						10/19/2021	218	1.4E-08	3.3741	8.1	8.2	-	-	
						10/22/2021	221	1.6E-08	3.4245	-	-	-	-	
						10/26/2021	225	1.7E-08	3.4754	8.5	8.2	-	-	
						10/29/2021	228	1.8E-08	3.5315	-	-	-	-	
						11/01/2021	231	1.9E-08	3.5702	8.1	8.0	669	672	
						11/05/2021	235	1.9E-08	3.6440	-	-	-	-	
						11/09/2021	239	1.6E-08	3.6822	8.0	8.0	-	-	
						11/12/2021	242	1.7E-08	3.7371	-	-	-	-	
						11/16/2021	246	1.6E-08	3.7819	8.2	8.1	-	-	
						11/19/2021	249	2.1E-08	3.8441	-	-	-	-	
						11/24/2021	254	2.0E-08	3.9063	8.5	8.2	601	800	
						11/26/2021	256	2.1E-08	3.9536	-	-	-	-	
12/02/2021	262	1.7E-08	4.0228	8.1	8.2	-	-							
12/03/2021	263	1.7E-08	4.0475	-	-	-	-							
12/08/2021	268	1.8E-08	4.1201	8.1	7.9	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	12/10/2021	270	1.8E-08	4.1674	-	-	-	-	
						12/14/2021	274	1.8E-08	4.2369	7.9	7.7	579	758	
						12/17/2021	277	1.8E-08	4.2936	-	-	-	-	
						12/20/2021	280	1.8E-08	4.3333	8.3	7.9	-	-	
						12/24/2021	284	1.8E-08	4.4010	-	-	-	-	
						12/28/2021	288	1.8E-08	4.4449	8.8	8.5	-	-	
						12/31/2021	291	1.9E-08	4.5034	-	-	-	-	
						01/04/2022	295	1.8E-08	4.5510	8.1	7.8	652	786	
						01/07/2022	298	1.8E-08	4.6086	-	-	-	-	
						1/10/2022	301	1.7E-08	4.6449	8.4	7.9	-	-	
						01/14/2022	305	1.8E-08	4.7178	-	-	-	-	
						1/18/2022	309	1.6E-08	4.7602	8.0	7.9	-	-	
						1/21/2022	312	1.8E-08	4.8233	-	-	-	-	
						1/24/2022	315	1.8E-08	4.8581	8.2	7.9	1051	790	
						1/28/2022	319	1.8E-08	4.9267	-	-	-	-	
						1/31/2022	322	1.6E-08	5.0304	8.2	8.3	-	-	
						2/7/2022	329	1.7E-08	5.0640	8.4	8.2	-	-	
						2/11/2022	333	1.7E-08	5.1323	-	-	-	-	
						2/14/2022	336	1.7E-08	5.1676	8.5	8.5	1183	849	
						2/18/2022	340	1.9E-08	5.2408	8.5	8.0	-	-	
2/23/2022	345	1.9E-08	5.3296	8.5	8.5	-	-							
2/25/2022	347	1.9E-08	5.3705	-	-	-	-							
2/28/2022	350	1.9E-08	5.4168	8.5	8.5	1177	729							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	3/4/2022	354	1.9E-08	5.4927	-	-	-	-	
						3/7/2022	357	2.0E-08	5.5306	8.6	8.5	-	-	
						3/11/2022	361	2.0E-08	5.6092	-	-	-	-	
						3/14/2022	364	1.8E-08	5.6440	8.5	8.8	-	-	
						3/18/2022	368	1.9E-08	5.7181	-	-	-	-	
						3/21/2022	371	1.7E-08	5.7507	8.1	8.4	1150	783	
						3/25/2022	375	2.1E-08	5.8285	9.1	8.9	1230	-	
						3/31/2022	381	2.0E-08	5.9182	8.6	7.9	1208	-	
						4/1/2022	382	2.1E-08	5.9426	-	-	-	-	
						4/5/2022	386	1.9E-08	6.0087	8.2	8.6	1274	741	
						4/8/2022	389	2.0E-08	6.0719	-	-	-	-	
						4/11/2022	392	1.8E-08	6.1097	7.5	7.6	1249	-	
						4/16/2022	397	2.0E-08	6.2036	7.7	8.1	1223	-	
						4/22/2022	403	1.7E-08	6.2945	-	-	-	-	
						4/23/2022	404	1.8E-08	6.3079	7.9	7.9	1261	972	
						4/29/2022	410	1.9E-08	6.4110	8.3	8.0	1241	-	
						5/5/2022	416	1.9E-08	6.5156	8.2	8.1	1294	-	
						5/6/2022	417	2.0E-08	6.5409	-	-	-	-	
5/11/2022	422	1.9E-08	6.6190	7.9	8.0	1247	925							
5/13/2022	424	2.0E-08	6.6666	-	-	-	-							
5/16/2022	427	2.1E-08	6.7160	8.0	8.1	1284	-							
5/20/2022	431	2.0E-08	6.7928	-	-	-	-							
5/23/2022	434	1.9E-08	6.8273	7.9	8.1	1290	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR





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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	5/27/2022	438	2.1E-08	6.9063	-	-	-	-	
						5/28/2022	439	2.0E-08	6.9218	7.9	8.0	1250	-	
						6/3/2022	445	2.0E-08	7.0243	8.1	8.1	1241	-	
						6/8/2022	450	2.1E-08	7.1197	8.4	8.1	1247	-	
						6/10/2022	452	2.1E-08	7.1652	-	-	-	-	
						6/13/2022	455	2.1E-08	7.2155	8.2	8.2	1249	813	
						6/17/2022	459	2.1E-08	7.2969	-	-	-	-	
						6/20/2022	462	2.0E-08	7.3329	8.2	8.1	1287	-	
						6/24/2022	466	2.1E-08	7.4128	-	-	-	-	
						6/27/2022	469	1.9E-08	7.4476	8.2	8.3	1210	-	
						7/1/2022	473	2.1E-08	7.5290	-	-	-	-	
						7/5/2022	477	2.2E-08	7.5766	8.2	8.5	1183	1104	
						7/8/2022	480	2.1E-08	7.6424	-	-	-	-	
						7/11/2022	483	2.0E-08	7.6827	8.2	8.2	1250	-	
						7/15/2022	487	2.2E-08	7.7647	-	-	-	-	
						7/18/2022	490	2.0E-08	7.8010	8.1	8.2	1152	-	
						7/22/2022	494	2.2E-08	7.8825	-	-	-	-	
						7/25/2022	497	2.0E-08	7.9184	8.0	8.1	1118	834	
7/28/2022	500	2.1E-08	7.9828	8.3	8.2	1191	-							
7/29/2022	501	2.1E-08	8.0033	-	-	-	-							
8/2/2022	505	2.1E-08	8.0774	7.9	8.1	1249	-							
8/5/2022	508	2.1E-08	8.1445	-	-	-	-							
8/8/2022	511	2.0E-08	8.1856	8.2	8.3	1203	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	8/12/2022	515	2.2E-08	8.2683	-	-	-	-	
						8/15/2022	518	2.0E-08	8.3036	8.2	8.1	1224	-	
						8/19/2022	522	2.1E-08	8.3839	8.4	8.3	1178	-	
						8/24/2022	527	2.1E-08	8.4790	8.1	8.2	1231	801	
						8/26/2022	529	2.1E-08	8.5254	-	-	-	-	
						8/29/2022	532	2.1E-08	8.5751	8.1	8.3	1242	-	
						9/2/2022	536	2.2E-08	8.6559	8.1	8.3	1237	-	
						9/7/2022	541	2.0E-08	8.7501	8.1	8.2	1218	922	
						9/9/2022	543	2.0E-08	8.7965	-	-	-	-	
						9/12/2022	546	2.1E-08	8.8447	8.1	8.2	1194	-	
						9/16/2022	550	2.1E-08	8.9270	8.2	8.2	1179	-	
						9/22/2022	556	1.9E-08	9.0316	7.9	8.0	1238	1133	
						9/23/2022	557	2.0E-08	9.0584	-	-	-	-	
						9/27/2022	561	2.1E-08	9.1280	8.1	8.1	1224	-	
						9/30/2022	564	2.1E-08	9.1938	-	-	-	-	
						10/3/2022	567	2.0E-08	9.2344	8.4	8.3	1212	-	
						10/7/2022	571	2.1E-08	9.3149	8.2	8.2	1195	982	
						10/12/2022	576	1.9E-08	9.4067	8.8	8.3	1250	-	
10/14/2022	578	2.1E-08	9.4537	-	-	-	-							
10/18/2022	582	1.9E-08	9.5122	8.5	8.2	1191	-							
10/21/2022	585	1.9E-08	9.5717	-	-	-	-							
10/24/2022	588	2.0E-08	9.6153	8.6	8.3	1186	870							
10/28/2022	592	2.0E-08	9.6949	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79)	20L160	20.5	106.6	19.5	111.0	10/31/2022	595	2.0E-08	9.7324	8.0	8.1	1236	-	
						11/4/2022	599	2.1E-08	9.8135	-	-	-	-	
						11/7/2022	602	2.0E-08	9.8507	8.2	8.3	1195	-	
						11/11/2022	606	2.1E-08	9.9319	8.1	8.3	1331	907	
						11/18/2022	613	1.7E-08	10.0270	8.3	8.4	1397	-	
						11/25/2022	620	1.6E-08	10.1139	-	-	-	-	
						11/30/2022	625	1.6E-08	10.1911	8.6	8.8	1256	-	
						12/1/2022	626	1.6E-08	10.2008	8.5	8.6	1161	931	
						12/2/2022	627	1.5E-08	10.2170	-	-	-	-	
						12/8/2022	633	1.4E-08	10.2911	8.3	8.5	1376	-	
						12/9/2022	634	1.5E-08	10.3122	-	-	-	-	
						12/16/2022	641	1.5E-08	10.4070	8.6	8.7	1213	-	
						12/22/2022	647	1.3E-08	10.4771	8.6	8.6	1273	955	
						12/23/2022	648	1.5E-08	10.4994	-	-	-	-	
12/31/2022	656	1.6E-08	10.6189	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	3/15/2021	0	2.7E-08	0.0000	-	-	-	-	
						3/19/2021	4	3.0E-08	0.0694	8.6	8.4	-	-	
						3/22/2021	7	2.9E-08	0.1236	-	-	-	-	
						3/24/2021	9	3.0E-08	0.1481	8.7	8.2	-	-	
						3/29/2021	14	2.5E-08	0.2201	8.4	8.3	565	910	
						4/02/2021	18	2.3E-08	0.2835	8.5	8.1	-	-	
						4/05/2021	21	2.3E-08	0.3313	-	-	-	-	
						4/07/2021	23	2.4E-08	0.3526	7.9	8.0	-	-	
						4/12/2021	28	2.6E-08	0.4258	-	-	-	-	
						4/13/2021	29	2.5E-08	0.4337	7.7	8.0	661	930	
						4/19/2021	35	2.4E-08	0.5144	8.0	8.0	-	-	
						4/23/2021	39	2.5E-08	0.5782	8.5	8.7	-	-	
						4/26/2021	42	2.5E-08	0.6278	-	-	-	-	
						4/27/2021	43	2.5E-08	0.6412	8.1	8.0	586	823	
						5/03/2021	49	2.6E-08	0.7411	8.4	8.1	-	-	
						5/07/2021	53	2.7E-08	0.8047	8.7	8.1	-	-	
						5/12/2021	58	2.5E-08	0.8788	8.3	8.1	518	788	
						5/14/2021	60	2.6E-08	0.9138	-	-	-	-	
5/17/2021	63	2.5E-08	0.9507	8.2	8.2	-	-							
5/21/2021	67	2.6E-08	1.0152	7.7	7.8	-	-							
5/25/2021	71	2.6E-08	1.0790	7.8	7.8	584	746							
5/28/2021	74	2.7E-08	1.1324	7.8	8.0	-	-							
6/01/2021	78	2.7E-08	1.1968	7.9	7.9	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	6/04/2021	81	2.6E-08	1.2483	8.0	7.9	586	778	
						6/08/2021	85	2.6E-08	1.3136	8.1	8.2	-	-	
						6/11/2021	88	2.6E-08	1.3669	8.2	8.1	-	-	
						6/15/2021	92	2.6E-08	1.4316	8.2	8.2	597	730	
						6/18/2021	95	2.6E-08	1.4863	8.1	8.2	-	-	
						6/23/2021	100	2.5E-08	1.5629	8.4	8.3	-	-	
						6/25/2021	102	2.7E-08	1.6056	-	-	-	-	
						6/28/2021	105	2.6E-08	1.6453	8.5	8.3	650	774	
						7/02/2021	109	2.7E-08	1.7123	8.2	7.8	-	-	
						7/06/2021	113	2.7E-08	1.7795	8.3	8.4	-	-	
						7/09/2021	116	2.5E-08	1.8314	8.5	8.1	710	830	
						7/14/2021	121	2.6E-08	1.9130	8.3	8.2	-	-	
						7/16/2021	123	2.8E-08	1.9569	-	-	-	-	
						7/19/2021	126	2.7E-08	1.9941	8.3	8.2	-	-	
						7/23/2021	130	2.6E-08	2.0575	8.4	8.2	651	734	
						7/28/2021	135	2.6E-08	2.1330	8.2	8.2	-	-	
						7/30/2021	137	2.6E-08	2.1727	-	-	-	-	
						8/03/2021	141	2.3E-08	2.2186	8.3	8.2	-	-	
8/06/2021	144	2.4E-08	2.2681	-	-	-	-							
8/09/2021	147	2.5E-08	2.3002	8.3	8.2	651	749							
8/13/2021	151	2.7E-08	2.3653	8.1	8.1	-	-							
8/17/2021	155	2.8E-08	2.4344	8.3	8.3	-	-							
8/20/2021	158	2.7E-08	2.4869	8.3	8.2	611	671							

3-29-2023  
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Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	8/25/2021	163	2.5E-08	2.5687	8.0	8.0	-	-	
						8/27/2021	165	2.5E-08	2.6071	-	-	-	-	
						8/30/2021	168	2.7E-08	2.6423	7.9	8.0	-	-	
						9/03/2021	172	2.5E-08	2.7066	8.1	8.1	571	696	
						9/07/2021	176	2.7E-08	2.7704	8.2	8.2	-	-	
						9/10/2021	179	2.6E-08	2.8255	8.4	8.2	-	-	
						9/14/2021	183	2.5E-08	2.8889	8.0	8.0	631	651	
						9/17/2021	186	2.4E-08	2.9386	-	-	-	-	
						9/20/2021	189	2.5E-08	2.9693	8.1	8.2	-	-	
						9/24/2021	193	2.6E-08	3.0364	8.0	8.0	-	-	
						9/28/2021	197	2.5E-08	3.0976	8.1	8.2	571	632	
						10/01/2021	200	2.4E-08	3.1463	-	-	-	-	
						10/07/2021	206	2.6E-08	3.2321	8.2	8.1	-	-	
						10/08/2021	207	2.6E-08	3.2511	-	-	-	-	
						10/12/2021	211	2.4E-08	3.3017	8.1	8.1	568	659	
						10/15/2021	214	2.4E-08	3.3497	-	-	-	-	
						10/18/2021	217	2.1E-08	3.3766	8.4	8.2	-	-	
						10/22/2021	221	2.4E-08	3.4364	-	-	-	-	
						10/26/2021	225	2.6E-08	3.5019	8.2	8.1	527	653	
10/29/2021	228	2.5E-08	3.5514	-	-	-	-							
11/01/2021	231	2.5E-08	3.5824	8.2	8.2	-	-							
11/05/2021	235	2.5E-08	3.6451	8.4	8.3	-	-							
11/09/2021	239	2.4E-08	3.7083	8.5	8.2	667	662							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	11/12/2021	242	2.4E-08	3.7578	-	-	-	-	
						11/16/2021	246	2.2E-08	3.7928	8.4	8.2	-	-	
						11/19/2021	249	2.7E-08	3.8436	-	-	-	-	
						11/21/2021	251	2.6E-08	3.8675	8.5	8.2	-	-	
						11/26/2021	256	2.5E-08	3.9386	-	-	-	-	
						11/30/2021	260	2.3E-08	3.9661	8.4	8.2	669	665	
						12/03/2021	263	2.5E-08	4.0184	-	-	-	-	
						12/07/2021	267	2.4E-08	4.0560	8.6	8.4	-	-	
						12/10/2021	270	2.4E-08	4.0703	-	-	-	-	
						12/14/2021	274	2.3E-08	4.1083	8.7	8.2	-	-	
						12/17/2021	277	2.5E-08	4.1600	-	-	-	-	
						12/20/2021	280	2.5E-08	4.1905	8.2	8.0	580	688	
						12/24/2021	284	2.5E-08	4.2524	-	-	-	-	
						12/28/2021	288	2.4E-08	4.2850	8.2	8.1	-	-	
						12/31/2021	291	2.5E-08	4.3382	-	-	-	-	
						01/03/2022	294	2.5E-08	4.3687	8.9	8.5	-	-	
						01/07/2022	298	2.5E-08	4.4328	8.3	7.8	645	689	
						1/12/2022	303	2.5E-08	4.5079	8.7	8.8	-	-	
						1/14/2022	305	2.5E-08	4.5459	-	-	-	-	
						1/18/2022	309	2.5E-08	4.5933	8.1	8.0	-	-	
1/22/2022	313	2.5E-08	4.6599	7.7	8.0	1072	668							
1/28/2022	319	2.4E-08	4.7378	7.9	7.9	-	-							
2/2/2022	324	2.3E-08	4.8125	9.0	8.6	-	-							

3-29-2023  
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Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	2/4/2022	326	2.4E-08	4.8490	-	-	-	-	
						2/7/2022	329	2.4E-08	4.8863	8.4	8.5	1148	672	
						2/11/2022	333	2.3E-08	4.9476	8.6	8.6	-	-	
						2/16/2022	338	2.4E-08	5.0232	8.2	8.3	-	-	
						2/18/2022	340	2.5E-08	5.0614	-	-	-	-	
						2/21/2022	343	2.5E-08	5.0994	8.3	8.6	1167	696	
						2/25/2022	347	2.6E-08	5.1632	8.9	8.6	-	-	
						3/3/2022	353	2.5E-08	5.2479	8.4	8.5	-	-	
						3/4/2022	354	2.5E-08	5.2686	-	-	-	-	
						3/7/2022	357	2.8E-08	5.3156	8.6	8.7	1167	697	
						3/11/2022	361	2.7E-08	5.3830	8.8	8.6	-	-	
						3/16/2022	366	2.4E-08	5.4466	8.8	8.8	-	-	
						3/18/2022	368	2.6E-08	5.4857	-	-	-	-	
						3/21/2022	371	2.4E-08	5.5222	8.8	8.6	1174	726	
						3/25/2022	375	2.8E-08	5.5901	8.7	8.8	-	-	
						3/29/2022	379	2.6E-08	5.6584	8.6	8.8	-	-	
						4/1/2022	382	2.7E-08	5.7124	8.2	8.7	1196	811	
						4/5/2022	386	2.6E-08	5.7786	7.9	8.6	1232	-	
4/8/2022	389	2.7E-08	5.8324	-	-	-	-							
4/9/2022	390	2.7E-08	5.8467	7.9	8.3	1228	-							
4/14/2022	395	2.6E-08	5.9226	8.1	8.2	1228	923							
4/15/2022	396	2.6E-08	5.9412	-	-	-	-							
4/20/2022	401	2.2E-08	6.0010	7.7	7.7	1246	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR





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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	4/22/2022	403	2.0E-08	6.0228	-	-	-	-	
						4/27/2022	408	2.2E-08	6.0866	7.9	7.8	1228	-	
						4/29/2022	410	2.3E-08	6.1250	-	-	-	-	
						5/2/2022	413	2.6E-08	6.1651	7.8	8.0	1186	874	
						5/6/2022	417	2.7E-08	6.2322	8.0	8.0	1254	-	
						5/11/2022	422	2.6E-08	6.3207	7.9	8.0	1226	-	
						5/13/2022	424	2.6E-08	6.3694	-	-	-	-	
						5/17/2022	428	2.6E-08	6.4304	7.8	7.9	1214	871	
						5/20/2022	431	2.6E-08	6.4855	-	-	-	-	
						5/23/2022	434	2.5E-08	6.5173	8.1	8.1	1228	-	
						5/27/2022	438	2.8E-08	6.5863	7.9	8.0	1239	-	
						5/31/2022	442	2.6E-08	6.6531	8.0	8.0	1246	-	
						6/3/2022	445	2.7E-08	6.7084	-	-	-	-	
						6/4/2022	446	2.7E-08	6.7244	7.9	7.9	1282	-	
						6/9/2022	451	2.5E-08	6.7984	7.9	8.0	1228	-	
						6/10/2022	452	2.6E-08	6.8198	-	-	-	-	
						6/13/2022	455	2.8E-08	6.8685	8.3	8.2	1212	1296	
						6/17/2022	459	2.8E-08	6.9374	7.9	8.1	1251	-	
						6/21/2022	463	2.8E-08	7.0059	7.9	8.1	1259	-	
						6/24/2022	466	2.7E-08	7.0614	-	-	-	-	
6/27/2022	469	2.5E-08	7.0921	8.1	8.2	1229	1237							
7/1/2022	473	2.8E-08	7.1605	8.1	8.2	1222	-							
7/5/2022	477	3.0E-08	7.2337	8.0	8.2	1215	-							

3-29-2023  
Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	7/8/2022	480	2.8E-08	7.2913	-	-	-	-	
						7/11/2022	483	2.6E-08	7.3233	8.1	8.2	1203	938	
						7/15/2022	487	2.8E-08	7.3925	8.3	8.3	1242	-	
						7/19/2022	491	2.8E-08	7.4631	8.0	8.0	1228	-	
						7/22/2022	494	2.8E-08	7.5214	-	-	-	-	
						7/25/2022	497	2.8E-08	7.5536	8.1	8.2	1176	1521	
						7/28/2022	500	2.7E-08	7.6087	8.1	8.2	1187	-	
						7/29/2022	501	2.8E-08	7.6296	-	-	-	-	
						8/1/2022	504	2.8E-08	7.6770	8.2	8.3	1266	-	
						8/5/2022	508	2.8E-08	7.7479	7.9	8.0	1174	1637	
						8/9/2022	512	2.7E-08	7.8162	8.3	8.5	1245	-	
						8/12/2022	515	2.8E-08	7.8744	-	-	-	-	
						8/15/2022	518	2.7E-08	7.9059	8.1	8.2	1223	-	
						8/19/2022	522	2.7E-08	7.9746	8.2	8.3	1230	987	
						8/23/2022	526	2.8E-08	8.0433	8.1	8.2	1213	-	
						8/26/2022	529	2.7E-08	8.0997	8.3	8.3	1276	-	
						8/30/2022	533	2.8E-08	8.1695	7.9	8.0	1192	1371	
						9/2/2022	536	2.8E-08	8.2265	8.1	8.1	1228	-	
9/6/2022	540	2.7E-08	8.2946	8.3	8.3	1275	-							
9/9/2022	543	2.7E-08	8.3511	8.3	8.4	1208	977							
9/13/2022	547	2.4E-08	8.4179	8.1	8.2	1218	-							
9/16/2022	550	2.7E-08	8.4749	8.2	8.2	1204	-							
9/20/2022	554	2.6E-08	8.5417	8.3	8.3	1222	1156							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	9/23/2022	557	2.6E-08	8.5957	-	-	-	-	
						9/26/2022	560	2.7E-08	8.6288	8.2	8.1	1201	-	
						9/30/2022	564	2.7E-08	8.6993	8.3	8.2	1118	-	
						10/5/2022	569	2.6E-08	8.7768	8.2	8.2	1143	973	
						10/7/2022	571	2.6E-08	8.8152	-	-	-	-	
						10/14/2022	578	2.7E-08	8.9223	-	-	-	-	
						10/19/2022	583	2.4E-08	8.9966	8.2	8.3	1172	1000	
						10/21/2022	585	2.4E-08	9.0314	-	-	-	-	
						10/28/2022	592	2.4E-08	9.1356	-	-	-	-	
						11/1/2022	596	2.5E-08	9.2011	8.4	8.4	1214	1062	
						11/4/2022	599	2.6E-08	9.2557	-	-	-	-	
						11/11/2022	606	2.6E-08	9.3554	-	-	-	-	
						11/18/2022	613	2.2E-08	9.4592	8.0	8.1	1283	1042	
						11/25/2022	620	2.3E-08	9.5448	-	-	-	-	
						12/2/2022	627	2.1E-08	9.6363	-	-	-	-	
						12/9/2022	634	2.2E-08	9.7330	-	-	-	-	
						12/13/2022	638	2.1E-08	9.7763	-	-	-	-	
12/16/2022	641	2.1E-08	9.8143	-	-	-	-							
12/20/2022	645	1.9E-08	9.8368	8.5	8.5	1243	1090							
12/23/2022	648	2.1E-08	9.8920	-	-	-	-							
12/31/2022	656	2.1E-08	10.0045	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	3/15/2021	0	1.7E-08	0.0000	-	-	-	-	
						3/22/2021	7	1.6E-08	0.0979	8.4	8.0	-	-	
						3/29/2021	14	1.4E-08	0.1870	-	-	-	-	
						3/30/2021	15	1.4E-08	0.1939	8.4	8.3	-	-	
						4/02/2021	18	1.5E-08	0.2308	8.5	8.4	605	2010	
						4/05/2021	21	1.6E-08	0.2786	-	-	-	-	
						4/09/2021	25	1.5E-08	0.3212	7.9	8.0	-	-	
						4/12/2021	28	1.6E-08	0.3695	-	-	-	-	
						4/16/2021	32	1.5E-08	0.4124	8.6	8.5	-	-	
						4/19/2021	35	1.6E-08	0.4650	-	-	-	-	
						4/23/2021	39	1.3E-08	0.5034	8.5	8.3	676	1372	
						4/26/2021	42	1.1E-08	0.5235	-	-	-	-	
						5/05/2021	51	7.7E-09	0.5955	8.5	8.2	-	-	
						5/07/2021	53	1.2E-08	0.6300	-	-	-	-	
						5/12/2021	58	1.5E-08	0.6886	8.5	8.3	-	-	
						5/14/2021	60	1.6E-08	0.7225	-	-	-	-	
						5/18/2021	64	1.6E-08	0.7744	8.3	8.2	697	1569	
						5/21/2021	67	1.4E-08	0.8261	-	-	-	-	
5/24/2021	70	1.3E-08	0.8612	8.4	8.3	-	-							
5/28/2021	74	1.8E-08	0.9284	8.5	8.1	-	-							
6/04/2021	81	1.5E-08	1.0236	8.3	8.2	760	1192							
6/11/2021	88	1.6E-08	1.1178	8.2	8.5	-	-							
6/18/2021	95	1.5E-08	1.2151	8.1	8.4	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	6/24/2021	101	1.6E-08	1.3021	8.6	8.0	679	1067	
						6/25/2021	102	1.6E-08	1.3213	-	-	-	-	
						6/29/2021	106	1.6E-08	1.3805	8.3	8.0	-	-	
						7/02/2021	109	1.6E-08	1.4321	-	-	-	-	
						7/06/2021	113	1.6E-08	1.4840	8.6	8.1	-	-	
						7/09/2021	116	1.5E-08	1.5320	-	-	-	-	
						7/13/2021	120	1.5E-08	1.5750	8.3	8.3	598	1134	
						7/16/2021	123	1.6E-08	1.6254	-	-	-	-	
						7/21/2021	128	1.4E-08	1.6776	8.2	8.1	-	-	
						7/23/2021	130	1.5E-08	1.7109	-	-	-	-	
						7/28/2021	135	1.5E-08	1.7692	8.1	8.1	-	-	
						7/30/2021	137	1.3E-08	1.7980	-	-	-	-	
						8/06/2021	144	1.3E-08	1.8751	8.6	8.4	733	1040	
						8/13/2021	151	1.4E-08	1.9154	8.1	8.1	-	-	
						8/20/2021	158	1.4E-08	2.0174	8.2	8.1	-	-	
						8/26/2021	164	1.4E-08	2.1000	8.5	8.1	695	1100	
						8/27/2021	165	1.4E-08	2.1204	-	-	-	-	
						9/01/2021	170	1.5E-08	2.1843	8.1	8.2	-	-	
9/03/2021	172	1.4E-08	2.2170	-	-	-	-							
9/08/2021	177	1.4E-08	2.2738	8.1	8.1	-	-							
9/10/2021	179	1.4E-08	2.3071	-	-	-	-							
9/14/2021	183	1.4E-08	2.3527	8.2	8.1	569	832							
9/17/2021	186	1.4E-08	2.3959	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	9/21/2021	190	1.5E-08	2.4412	8.1	8.1	-	-	
						9/24/2021	193	1.5E-08	2.4917	-	-	-	-	
						9/28/2021	197	1.4E-08	2.5334	8.2	8.1	-	-	
						10/01/2021	200	1.4E-08	2.5769	-	-	-	-	
						10/05/2021	204	1.5E-08	2.6225	8.1	8.1	555	771	
						10/08/2021	207	1.5E-08	2.6685	-	-	-	-	
						10/14/2021	213	1.3E-08	2.7240	8.0	8.1	-	-	
						10/15/2021	214	1.4E-08	2.7402	-	-	-	-	
						10/22/2021	221	1.2E-08	2.8132	8.5	8.1	-	-	
						10/28/2021	227	1.4E-08	2.8936	8.0	8.0	578	725	
						10/29/2021	228	1.4E-08	2.9101	-	-	-	-	
						11/04/2021	234	1.4E-08	2.9821	8.2	8.1	-	-	
						11/05/2021	235	1.4E-08	2.9999	-	-	-	-	
						11/12/2021	242	1.2E-08	3.0737	8.3	8.3	-	-	
						11/19/2021	249	1.5E-08	3.1592	8.5	8.4	625	720	
						11/26/2021	256	1.1E-08	3.2346	-	-	-	-	
						12/02/2021	262	9.3E-09	3.2661	8.4	8.2	-	-	
						12/03/2021	263	1.1E-08	3.2826	-	-	-	-	
						12/08/2021	268	1.4E-08	3.3435	8.6	8.1	-	-	
						12/10/2021	270	1.3E-08	3.3706	-	-	-	-	
12/14/2021	274	1.4E-08	3.4204	8.0	8.0	626	655							
12/17/2021	277	1.4E-08	3.4663	-	-	-	-							
1/0/1900	280	1.5E-08	3.5011	8.1	8.0	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	12/24/2021	284	1.4E-08	3.5588	-	-	-	-	
						12/28/2021	288	1.4E-08	3.5990	8.3	8.1	-	-	
						12/31/2021	291	1.5E-08	3.6488	-	-	-	-	
						1/3/2022	294	1.5E-08	3.6845	8.3	8.2	623	693	
						1/7/2022	298	1.4E-08	3.7440	-	-	-	-	
						1/11/2022	302	1.3E-08	3.7812	8.9	8.6	-	-	
						1/14/2022	305	1.5E-08	3.8292	-	-	-	-	
						1/18/2022	309	1.4E-08	3.8721	8.9	8.2	-	-	
						1/21/2022	312	1.4E-08	3.9238	-	-	-	-	
						1/26/2022	317	1.3E-08	3.9709	8.0	8.1	1120	720	
						2/2/2022	324	1.3E-08	4.0573	8.6	8.5	-	-	
						2/4/2022	326	1.4E-08	4.0895	-	-	-	-	
						2/9/2022	331	1.3E-08	4.1462	8.2	8.4	1149	-	
						2/11/2022	333	1.3E-08	4.1762	-	-	-	-	
						2/16/2022	338	1.3E-08	4.2338	8.1	8.7	1192	715	
						2/18/2022	340	1.4E-08	4.2678	-	-	-	-	
						2/23/2022	345	1.4E-08	4.3260	8.7	8.3	-	-	
						2/25/2022	347	1.4E-08	4.3599	-	-	-	-	
						3/3/2022	353	1.3E-08	4.4259	8.3	8.4	-	-	
						3/4/2022	354	1.4E-08	4.4428	-	-	-	-	
3/10/2022	360	1.5E-08	4.5205	8.8	9.1	1204	690							
3/11/2022	361	1.5E-08	4.5388	-	-	-	-							
1/0/1900	368	1.3E-08	4.6205	8.5	9.2	1186	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	3/25/2022	375	1.5E-08	4.7141	7.6	8.4	-	-	
						4/1/2022	382	1.4E-08	4.8069	7.8	8.1	1223	685	
						4/8/2022	389	1.4E-08	4.9002	8.1	8.4	1227	-	
						4/15/2022	396	1.5E-08	4.9936	8.0	8.2	1242	-	
						4/22/2022	403	1.3E-08	5.0797	-	-	-	-	
						4/24/2022	405	1.3E-08	5.0977	7.7	7.9	1224	731	
						4/29/2022	410	1.4E-08	5.1686	-	-	-	-	
						5/2/2022	413	1.4E-08	5.1974	7.9	7.7	1206	-	
						5/6/2022	417	1.5E-08	5.2595	-	-	-	-	
						5/9/2022	420	1.4E-08	5.2913	8.0	8.0	1218	-	
						5/13/2022	424	1.6E-08	5.3559	-	-	-	-	
						5/16/2022	427	1.5E-08	5.3892	7.9	8.0	1246	754	
						5/20/2022	431	1.5E-08	5.4522	-	-	-	-	
						5/23/2022	434	1.4E-08	5.4840	7.9	8.0	1260	-	
						5/27/2022	438	1.5E-08	5.5468	-	-	-	-	
						5/31/2022	442	1.3E-08	5.5849	7.8	7.9	1244	-	
						6/3/2022	445	1.4E-08	5.6347	-	-	-	-	
						6/7/2022	449	1.4E-08	5.6785	7.9	8.1	1250	-	
6/10/2022	452	1.5E-08	5.7287	-	-	-	-							
6/14/2022	456	1.5E-08	5.7743	8.3	8.2	1286	-							
6/17/2022	459	1.6E-08	5.8244	-	-	-	-							
6/21/2022	463	1.4E-08	5.8685	7.9	8.1	1213	-							
1/0/1900	466	1.5E-08	5.9184	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	6/29/2022	471	1.4E-08	5.9709	8.2	8.2	1231	782	
						7/1/2022	473	1.5E-08	6.0063	-	-	-	-	
						7/6/2022	478	1.5E-08	6.0694	7.9	8.1	1241	-	
						7/8/2022	480	1.5E-08	6.1057	-	-	-	-	
						7/13/2022	485	1.4E-08	6.1651	8.0	8.1	1271	-	
						7/15/2022	487	1.4E-08	6.1651	-	-	-	-	
						7/22/2022	494	1.6E-08	6.3104	-	-	-	-	
						7/27/2022	499	1.4E-08	6.3650	8.9	8.2	1178	1219	
						7/29/2022	501	1.5E-08	6.4016	-	-	-	-	
						8/3/2022	506	1.4E-08	6.4599	8.0	8.1	1218	-	
						8/5/2022	508	1.5E-08	6.4953	-	-	-	-	
						8/10/2022	513	1.4E-08	6.5550	8.3	8.2	1291	-	
						8/12/2022	515	1.5E-08	6.5901	-	-	-	-	
						8/16/2022	519	1.5E-08	6.6409	7.8	7.9	1215	1021	
						8/19/2022	522	1.5E-08	6.6928	-	-	-	-	
						8/23/2022	526	1.4E-08	6.7393	8.0	8.1	1199	-	
						8/26/2022	529	1.5E-08	6.7931	-	-	-	-	
						8/30/2022	533	1.4E-08	6.8354	8.0	8.1	1246	-	
9/1/2022	535	1.5E-08	6.8882	-	-	-	-							
9/6/2022	540	1.4E-08	6.9314	8.4	8.2	1198	768							
9/9/2022	543	1.4E-08	6.9801	-	-	-	-							
9/12/2022	546	1.4E-08	7.0155	8.0	8.1	1112	-							
9/16/2022	550	1.5E-08	7.0797	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



**Excel Geotechnical Testing, Inc.**  
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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	9/19/2022	553	1.4E-08	7.1115	8.3	8.2	1213	-	
						9/23/2022	557	1.6E-08	7.1767	-	-	-	-	
						9/26/2022	560	1.5E-08	7.2082	8.2	8.2	1210	777	
						9/30/2022	564	1.5E-08	7.2718	-	-	-	-	
						10/3/2022	567	1.4E-08	7.3024	8.3	8.2	1218	-	
						10/7/2022	571	1.5E-08	7.3643	-	-	-	-	
						10/11/2022	575	1.3E-08	7.4012	8.8	8.3	1210	-	
						10/14/2022	578	1.4E-08	7.4510	-	-	-	-	
						10/19/2022	583	1.3E-08	7.5011	8.4	8.3	1200	755	
						10/21/2022	585	1.3E-08	7.5309	-	-	-	-	
						10/27/2022	591	1.3E-08	7.5975	8.6	8.4	1250	-	
						10/28/2022	592	1.3E-08	7.6149	-	-	-	-	
						11/3/2022	598	1.3E-08	7.6878	8.4	8.2	1193	-	
						11/4/2022	599	1.4E-08	7.7056	-	-	-	-	
						11/11/2022	606	1.4E-08	7.7986	8.0	8.0	1210	777	
						11/18/2022	613	1.1E-08	7.8742	8.4	8.3	1248	-	
						11/25/2022	620	1.3E-08	7.9526	-	-	-	-	
						11/30/2022	625	1.3E-08	8.0135	8.4	8.8	1203	-	
12/2/2022	627	1.2E-08	8.0318	-	-	-	-							
12/5/2022	630	1.2E-08	8.0552	8.5	8.5	1155	804							
12/9/2022	634	1.3E-08	8.1093	-	-	-	-							
12/13/2022	638	1.1E-08	8.1426	8.5	8.7	1204	-							
12/16/2022	641	1.2E-08	8.1834	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	12/22/2022	647	9.4E-09	8.2299	8.7	8.4	1244	-		
						12/23/2022	648	1.0E-08	8.2456	-	-	-	-		
						12/31/2022	656	9.7E-09	8.3209	-	-	-	-		

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

**APPENDIX L – GROUNDWATER PROTECTION  
STANDARD CALCULATIONS**

## Technical Memorandum

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**Date:** November 24, 2021

**To:** Chris Scieszka, DTE Electric Company

**From:** Vince Buening, TRC  
Sarah Holmstrom, TRC  
Kristin Lowery, TRC

**Project No.:** 413591.0003.0000 Phase 1 Task 1

**Subject:** Groundwater Protection Standard Calculation – DTE Electric Company, Belle River Power Plant Diversion Basin

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DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Belle River Power Plant (BRPP) Diversion Basin (DB) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule<sup>1</sup> (“Part B”) that allows a facility to prepare demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the BRPP DB remains in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)<sup>2</sup>, the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the BRPP DB CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the BRPP DB from August 2016 through September 2017, as part of initiating the

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<sup>1</sup> On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

<sup>2</sup> As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

## Technical Memorandum

detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to September 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the BRPP DB were evaluated in accordance with the *Groundwater Statistical Evaluation Plan (Stats Plan)* (TRC, October 2017). Per the Stats Plan, the BRPP DB CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL. The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for BRPP DB includes MW-16-05, MW-16-06, MW-16-07, MW-16-08, MW-16-10, and MW-16-11/A<sup>3</sup>. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of non-detects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

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<sup>3</sup> Monitoring well MW-16-11 was decommissioned and replaced by monitoring well MW-16-11A in May 2017 to repair a damaged casing. For the purposes of statistical evaluation, the data sets for the original and replacement well have been combined and referred to as "MW-16-11A"

## Technical Memorandum

### Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

### Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) indicated potential or suspect outliers for arsenic, chromium, cobalt, and lead at MW-16-07 on 8/3/2016, radium 226/228 at MW-16-11A on 8/2/2016, and chromium, cobalt, and lead at MW-16-11A on 9/22/2016. In addition, multiple sampling events were performed within a two to three-week timeframe during the background data collection in order to verify results and/or collect an adequate number of data points within the constraints of the limited CCR Rule implementation timeline. In order to maximize temporal independence within the background data set, several data points were removed from the MW-16-10 and MW-16-11A data sets as noted on Table 1. Data for the additional sampling events conducted in August 2017 for MW-16-10 were similar to the July and September results. Data for the additional sampling event conducted in June 2017 for MW-16-11A were similar to the May and July results. Thus, the June 2017 and August 2017 data were removed to avoid potential biasing of the two data sets for that time-frame.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

### Outlier Testing

Outlier removal from the background data set is summarized in Table 1. Probability plots of data residuals (Attachment A) were used to further evaluate the potential outliers for MW-16-07 that were identified in the T v. C graphs. In general, probability plots of the data residuals for MW-16-07 show that arsenic, chromium, cobalt, and lead data collected on 8/3/2016 were from a different distribution than the remaining data. Prior to outlier removal, many of the parameters exhibited a non-normal distribution. Subsequent to outlier removal, the data sets for the majority of the parameters exhibited a normal distribution. As such, data collected from monitoring well MW-16-07 on 8/3/2016 were removed from the data set.

After the removal of the data collected on 6/6/2017 from the background data set for MW-16-11A, probability plots of the data residuals for MW-16-11A show the radium 226/228 data collected on 8/2/2016, and the chromium, cobalt, and lead data collected on 9/22/2016 were from a different distribution than the remaining data. Prior to outlier removal, many of the parameters exhibited a non-normal distribution. Subsequent to outlier removal, the data sets for the majority of the parameters exhibited a normal distribution. As such, these data points were removed from the data set.

## Technical Memorandum

### Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 2.

### Tolerance Limits

Table 2 presents the calculated UTLs for the background/baseline data sets. As discussed above, the BRPP DB CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For nonnormal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

### Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 3.

### Attachments

Table 1 – Summary of Outlier Evaluation and Data Removal

Table 2 – Summary of Descriptive Statistics and Tolerance Limit Calculations

Table 3 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs



# Technical Memorandum

## Tables

**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Antimony	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	2.4	Removed to maintain temporal independence.
Arsenic	ug/L	MW-16-07	08/03/16	28	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 5.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 5.0	Removed to maintain temporal independence.
Barium	ug/L	MW-16-10	04/18/17	75	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	65	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	115	Removed to maintain temporal independence.
		MW-16-10	08/30/17	99.5	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	260	Removed to maintain temporal independence.
Beryllium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Cadmium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Chromium	ug/L	MW-16-07	08/03/16	53	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 2.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 2.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	7.35	Removed to maintain temporal independence.
		MW-16-10	08/30/17	8.7	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	39	Anomalously high value, failed Dixon's Test for outliers at 1% significance
MW-16-11A	06/06/17	3	Removed to maintain temporal independence.		

**Notes:**

ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Cobalt	ug/L	MW-16-07	08/03/16	21	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	3.6	Removed to maintain temporal independence.
		MW-16-10	08/30/17	2.95	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	14	Anomalously high value, failed Dixon's Test for outliers at 1% significance
Fluoride	mg/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.1	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.
Lead	ug/L	MW-16-07	08/03/16	23	Anomalously high value, failed Dixon's Test for outliers at 1% significance
		MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	2.45	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.7	Removed to maintain temporal independence.
		MW-16-11A	09/22/16	26	Anomalously high value, failed Dixon's Test for outliers at 1% significance
Lithium	ug/L	MW-16-10	04/18/17	120	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	130	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	86	Removed to maintain temporal independence.
		MW-16-10	08/30/17	73	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	34	Removed to maintain temporal independence.
Mercury	ug/L	MW-16-10	04/18/17	< 0.20	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 0.20	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 0.20	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 0.20	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 0.20	Removed to maintain temporal independence.

**Notes:**

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 1**  
 Summary of Outlier Evaluation and Data Removal  
 DTE Electric Company – Belle River Power Plant Diversion Basin

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Molybdenum	ug/L	MW-16-10	04/18/17	23	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	21	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	18	Removed to maintain temporal independence.
		MW-16-10	08/30/17	15.5	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	17	Removed to maintain temporal independence.
Radium 226/228	pCi/L	MW-16-10	04/18/17	0.900	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	1.32	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	1.48	Removed to maintain temporal independence.
		MW-16-10	08/30/17	1.375	Removed to maintain temporal independence.
		MW-16-11A	08/02/16	6.94	Anomalously high value, failed Dixon's Test for outliers at 1% significance
MW-16-11A	06/06/17	1.45	Removed to maintain temporal independence.		
Selenium	ug/L	MW-16-10	04/18/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 5.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 5.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 5.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 5.0	Removed to maintain temporal independence.
Thallium	ug/L	MW-16-10	04/18/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	06/06/17	< 1.0	Anomalous concentrations observed for multiple parameters.
		MW-16-10	08/09/17	< 1.0	Removed to maintain temporal independence.
		MW-16-10	08/30/17	< 1.0	Removed to maintain temporal independence.
		MW-16-11A	06/06/17	< 1.0	Removed to maintain temporal independence.

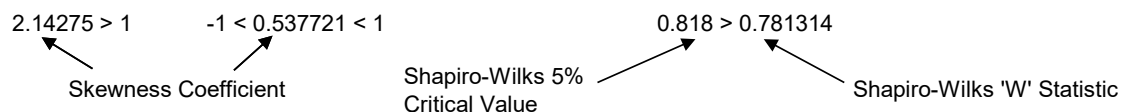
**Notes:**

ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Antimony (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0
MW-16-08	> 50% Non-Detect				N	Non-Parametric	2.1
MW-16-10	> 50% Non-Detect				Y	Non-Parametric	2.1
MW-16-11/A	> 50% Non-Detect				Y	Non-Parametric	3.2
<b>Arsenic (ug/L)</b>							
MW-16-05	> 50% Non-Detect				N	Non-Parametric	14
MW-16-06	> 50% Non-Detect				N	Non-Parametric	7.5
MW-16-07	-1 < 0.373835 < 1	--	--	--	Y	Parametric	19
MW-16-08	-1 < 0.897249 < 1	--	--	--	N	Parametric	30
MW-16-10	> 50% Non-Detect				Y	Non-Parametric	11
MW-16-11/A	-1 < 0.148067 < 1	--	--	--	Y	Parametric	24
<b>Barium (ug/L)</b>							
MW-16-05	1 < 1.01157	-1 < 0.95611 < 1	--	--	N	Parametric	370
MW-16-06	-1 < 0.516938 < 1	--	--	--	N	Parametric	330
MW-16-07	1 < 1.44883	1 < 1.21299	0.829 > 0.8055999	0.829 < 0.847205	N	Parametric	500
MW-16-08	-1 < 0.431717 < 1	--	--	--	N	Parametric	490
MW-16-10	-1 < 0.134164 < 1	--	--	--	Y	Parametric	200
MW-16-11/A	-1 < -0.0523964 < 1	--	--	--	Y	Parametric	620
<b>Beryllium (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	> 50% Non-Detect				N	Non-Parametric	1.7
MW-16-08	> 50% Non-Detect				N	Non-Parametric	1.6
MW-16-10	100% Non-Detect				Y	PQL	1.0
MW-16-11/A	> 50% Non-Detect				Y	Non-Parametric	1.6

**Notes:**

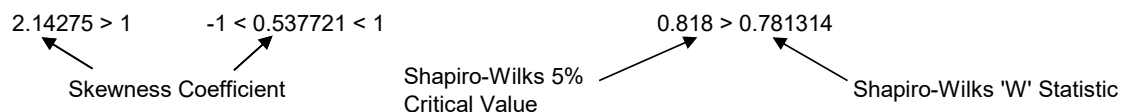


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Cadmium (ug/L)</b>							
MW-16-05		100% Non-Detect			N	PQL	1.0
MW-16-06		100% Non-Detect			N	PQL	1.0
MW-16-07		> 50% Non-Detect			N	Non-Parametric	1.3
MW-16-08		> 50% Non-Detect			N	Non-Parametric	1.5
MW-16-10		100% Non-Detect			Y	PQL	1.0
MW-16-11/A		100% Non-Detect			Y	PQL	1.0
<b>Chromium (ug/L)</b>							
MW-16-05	1 < 1.71747	-1 < 0.673789 < 1	--	--	N	Parametric	47
MW-16-06		> 50% Non-Detect			N	Non-Parametric	14
MW-16-07	-1 < 0.320197 < 1	--	--	--	Y	Parametric	27
MW-16-08	-1 < 0.995955 < 1	--	--	--	N	Parametric	55
MW-16-10	-1 < 0.236403 < 1	--	--	--	Y	Parametric	32
MW-16-11/A	-1 < -0.755706 < 1	--	--	--	Y	Parametric	18
<b>Cobalt (ug/L)</b>							
MW-16-05	1 < 1.66974	-1 < 0.486789 < 1	--	--	N	Parametric	21
MW-16-06		> 50% Non-detect			N	Non-Parametric	4.7
MW-16-07	-1 < 0.377399 < 1	--	--	--	Y	Parametric	13
MW-16-08	-1 < 0.710724 < 1	--	--	--	N	Parametric	22
MW-16-10	-1 < 0.989395 < 1	--	--	--	Y	Parametric	17
MW-16-11/A	-1 < 0.168083 < 1	--	--	--	Y	Parametric	7.1
<b>Fluoride (mg/L)</b>							
MW-16-05	-2.36014 < -1	-2.90896 < -1	0.887 > 0.696028	0.887 > 0.582757	N	Non-Parametric	1.3
MW-16-06	-2.19557 < -1	-2.80843 < -1	0.887 > 0.739569	0.887 > 0.617868	N	Non-Parametric	1.3
MW-16-07	-1.77484 < -1	-2.0008 < -1	0.887 > 0.68499	0.887 > 0.609979	N	Non-Parametric	1.2
MW-16-08	-1 < 0.229585 < 1	--	--	--	N	Parametric	1.3
MW-16-10	-1 < 0.281128 < 1	--	--	--	Y	Parametric	2.1
MW-16-11/A	-1 < 0.411854 < 1	--	--	--	Y	Parametric	1.9

**Notes:**

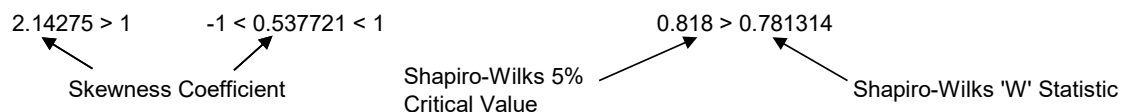


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Lead (ug/L)</b>							
MW-16-05	1 < 1.81739	-1 < 0.489817 < 1	--	--	N	Parametric	23
MW-16-06	> 50% Non-Detect				N	Non-Parametric	4.4
MW-16-07	-1 < 0.114555 < 1	--	--	--	Y	Parametric	12
MW-16-08	-1 < 0.878446 < 1	--	--	--	N	Parametric	22
MW-16-10	1 < 1.1556	-1 < -0.336561 < 1	--	--	Y	Parametric	35
MW-16-11/A	-1 < 0.741547 < 1	--	--	--	Y	Parametric	7.7
<b>Lithium (ug/L)</b>							
MW-16-05	-1 < 0.20306 < 1	--	--	--	N	Parametric	67
MW-16-06	-1 < 0.493967 < 1	--	--	--	N	Parametric	55
MW-16-07	-1 < 0.351593 < 1	--	--	--	N	Parametric	92
MW-16-08	-1 < 0.949387 < 1	--	--	--	N	Parametric	110
MW-16-10	-1 < -0.119962 < 1	--	--	--	Y	Parametric	120
MW-16-11/A	1 < 1.67414	1 < 1.10921	0.818 > 0.764918	0.818 < 0.87926	Y	Parametric	150
<b>Mercury (ug/L)</b>							
MW-16-05	100% Non-Detect				N	PQL	0.20
MW-16-06	100% Non-Detect				N	PQL	0.20
MW-16-07	100% Non-Detect				N	PQL	0.20
MW-16-08	100% Non-Detect				N	PQL	0.20
MW-16-10	100% Non-Detect				Y	PQL	0.20
MW-16-11/A	100% Non-Detect				Y	PQL	0.20
<b>Molybdenum (ug/L)</b>							
MW-16-05	1 < 2.11944	1 < 1.8128	0.829 > 0.650199	0.829 > 0.746132	N	Non-Parametric	43
MW-16-06	1 < 1.79557	1 < 1.57811	0.829 > 0.688295	0.829 > 0.73398	N	Non-Parametric	30
MW-16-07	1 < 1.90393	1 < 1.32689	0.829 > 0.697642	0.829 < 0.832132	N	Parametric	100
MW-16-08	-1 < 0.851996 < 1	--	--	--	N	Parametric	67
MW-16-10	1 < 1.25926	-1 < 0.873361 < 1	--	--	Y	Parametric	50
MW-16-11/A	1 < 1.04371	-1 < 0.974189 < 1	--	--	Y	Parametric	49

**Notes:**

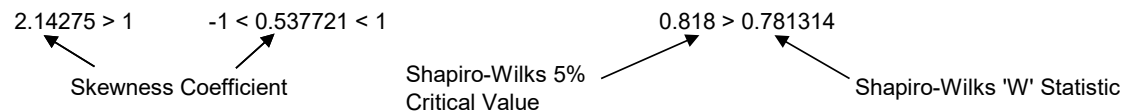


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Radium 226/228 (pCi/L)</b>							
MW-16-05	1 < 1.7901	1 < 1.07063	0.829 > 0.760667	0.829 < 0.907933	N	Parametric	5.49
MW-16-06	-1 < 0.713621 < 1	--	--	--	N	Parametric	2.60
MW-16-07	-1 < 0.761539 < 1	--	--	--	N	Parametric	5.80
MW-16-08	1 < 1.49391	-1 < -0.879177 < 1	--	--	N	Parametric	7.57
MW-16-10	-1 < -0.170195 < 1	--	--	--	Y	Parametric	3.15
MW-16-11/A	-1 < 0.818505 < 1	--	--	--	Y	Parametric	2.58
<b>Selenium (ug/L)</b>							
MW-16-05		100% Non-Detect			N	PQL	5.0
MW-16-06		100% Non-Detect			N	PQL	5.0
MW-16-07		> 50% Non-detect			N	Non-Parametric	5.3
MW-16-08		100% Non-Detect			N	PQL	5.0
MW-16-10		100% Non-Detect			Y	PQL	5.0
MW-16-11/A		100% Non-Detect			Y	PQL	5.0
<b>Thallium (ug/L)</b>							
MW-16-05		> 50% Non-detect			N	Non-Parametric	1.1
MW-16-06		100% Non-Detect			N	PQL	1.0
MW-16-07		> 50% Non-detect			N	Non-Parametric	2.3
MW-16-08		> 50% Non-detect			N	Non-Parametric	1.3
MW-16-10		100% Non-Detect			Y	PQL	1.0
MW-16-11/A		100% Non-Detect			Y	PQL	1.0

**Notes:**



PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter



**Table 3**  
 Summary of Groundwater Protection Standards  
 DTE Electric Company – Belle River Power Plant Diversion Pond

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11/A	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.1	<b>6.0</b>	2.1	<b>6.0</b>	3.2	<b>6.0</b>
Arsenic	ug/L	Background or MCL	10	14	<b>14</b>	7.5	<b>10</b>	19	<b>19</b>	30	<b>30</b>	11	<b>11</b>	24	<b>24</b>
Barium	ug/L	MCL	2000	370	<b>2,000</b>	330	<b>2,000</b>	500	<b>2,000</b>	490	<b>2,000</b>	200	<b>2,000</b>	620	<b>2,000</b>
Beryllium	ug/L	MCL	4	1.0	<b>4.0</b>	1.0	<b>4.0</b>	1.7	<b>4.0</b>	1.6	<b>4.0</b>	1.0	<b>4.0</b>	1.6	<b>4.0</b>
Cadmium	ug/L	MCL	5	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.3	<b>5.0</b>	1.5	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>
Chromium	ug/L	MCL	100	47	<b>100</b>	14	<b>100</b>	27	<b>100</b>	55	<b>100</b>	32	<b>100</b>	18	<b>100</b>
Cobalt	ug/L	Background or RSL	6	21	<b>21</b>	4.7	<b>6.0</b>	13	<b>13</b>	22	<b>22</b>	17	<b>17</b>	7.1	<b>7.1</b>
Fluoride	mg/L	MCL	4	1.3	<b>4.0</b>	1.3	<b>4.0</b>	1.2	<b>4.0</b>	1.3	<b>4.0</b>	2.1	<b>4.0</b>	1.9	<b>4.0</b>
Lead	ug/L	Background or RSL	15	23	<b>23</b>	4.4	<b>15</b>	12	<b>15</b>	22	<b>22</b>	35	<b>35</b>	7.7	<b>15</b>
Lithium	ug/L	Background	40	67	<b>67</b>	55	<b>55</b>	92	<b>92</b>	110	<b>110</b>	120	<b>120</b>	150	<b>150</b>
Mercury	ug/L	MCL	2	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>
Molybdenum	ug/L	RSL	100	43	<b>100</b>	30	<b>100</b>	100	<b>100</b>	67	<b>100</b>	50	<b>100</b>	49	<b>100</b>
Radium-226/228	pCi/L	Background or MCL	5	5.49	<b>5.49</b>	2.60	<b>5.00</b>	5.80	<b>5.80</b>	7.57	<b>7.57</b>	3.15	<b>5.00</b>	2.58	<b>5.00</b>
Selenium	ug/L	MCL	50	5.0	<b>50</b>	5.0	<b>50</b>	5.3	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>
Thallium	ug/L	Background or MCL	2	1.1	<b>2.0</b>	1.0	<b>2.0</b>	2.3	<b>2.3</b>	1.3	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>

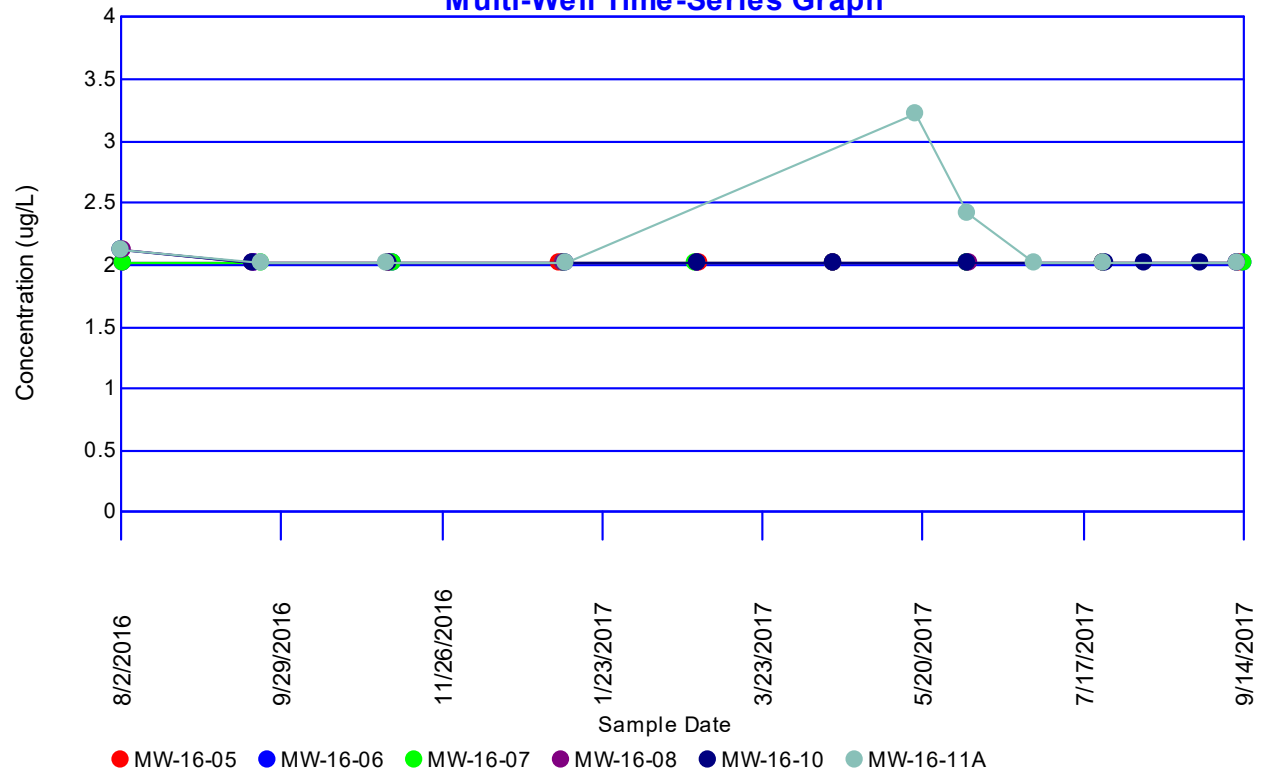
**Notes:**

- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
- ug/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

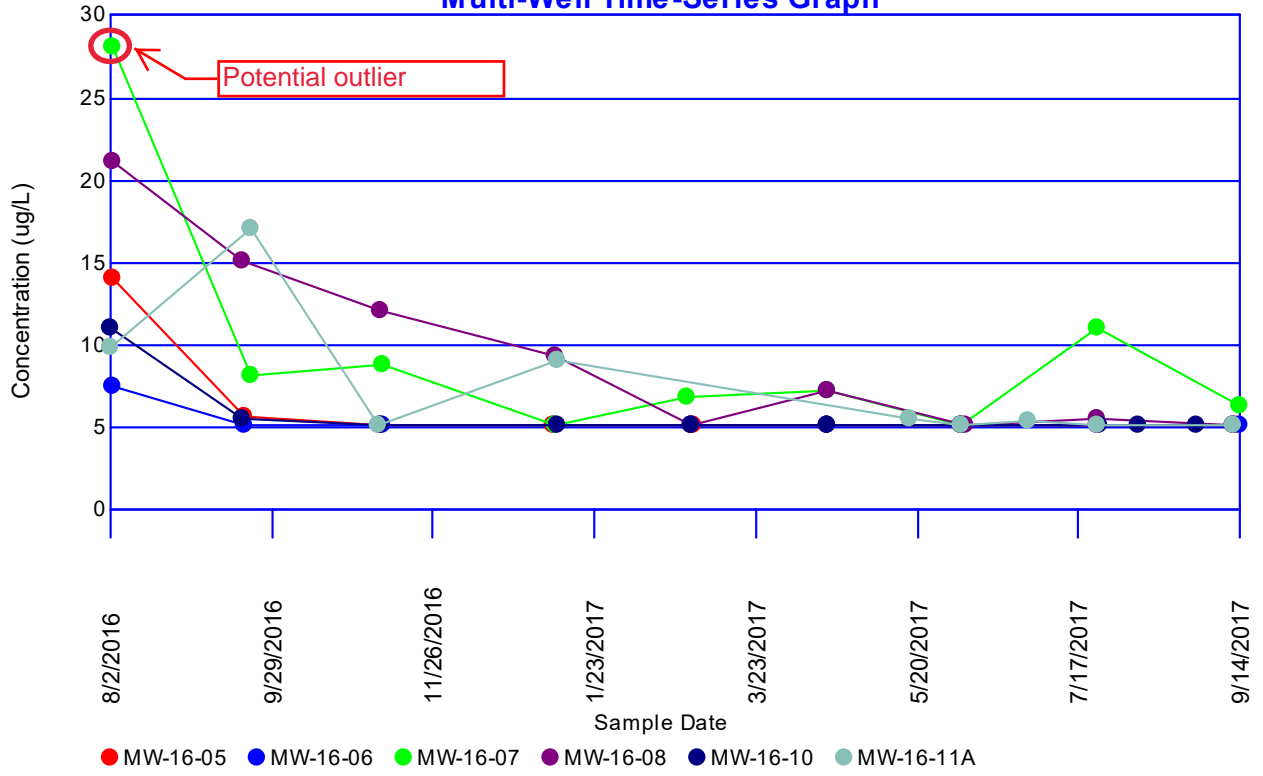
## Technical Memorandum

# Attachment A ChemStat™ Outputs

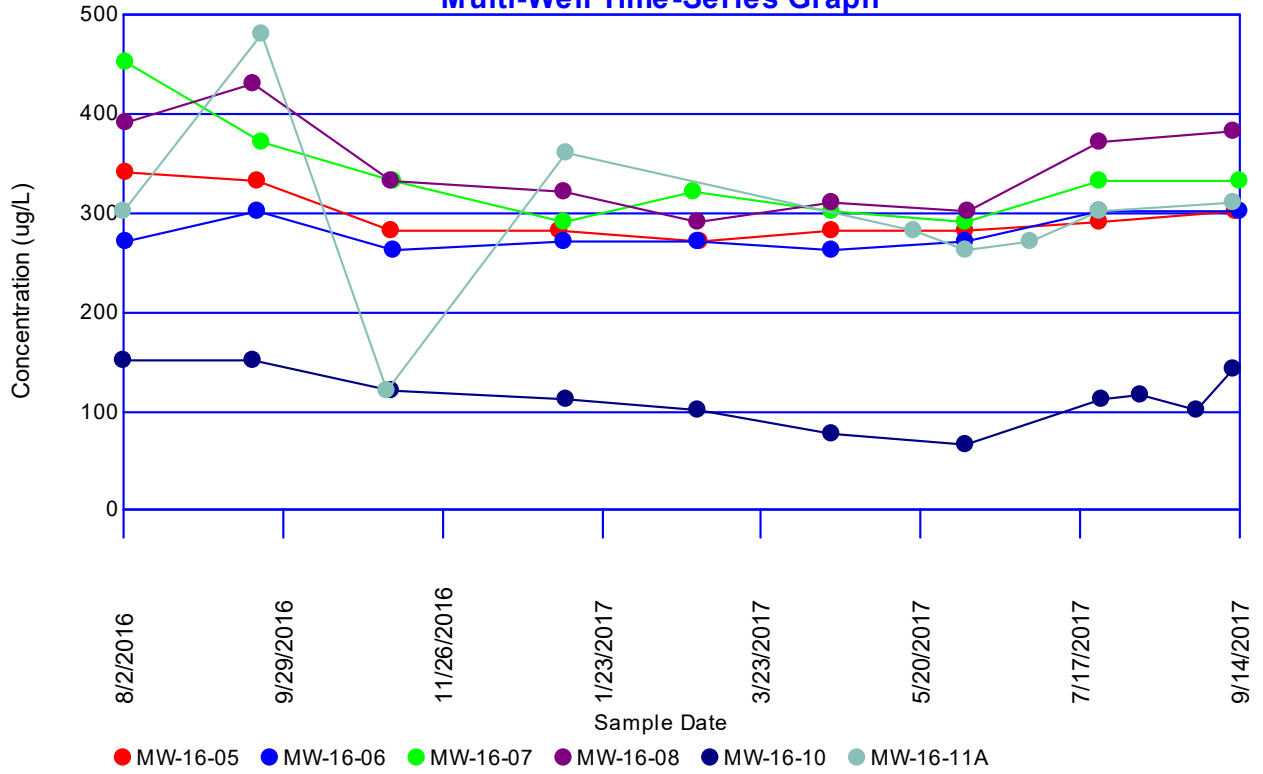
# Antimony Multi-Well Time-Series Graph



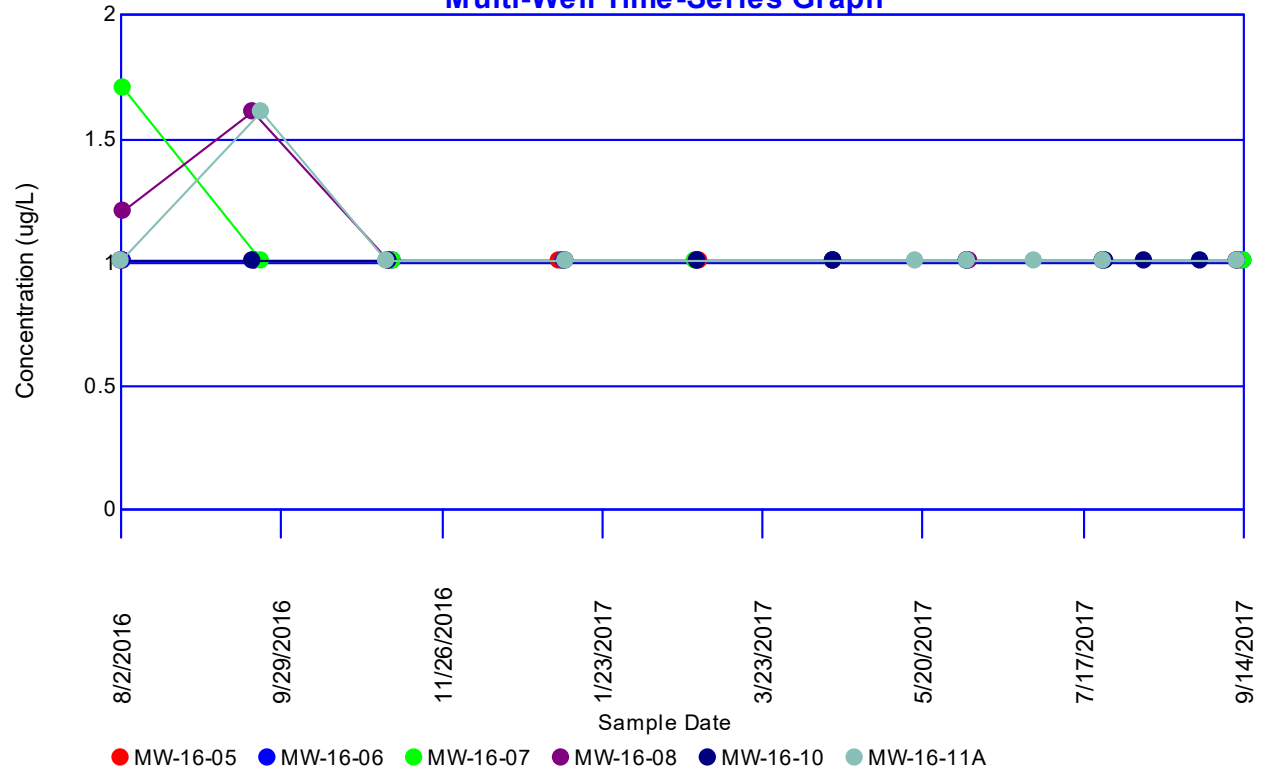
# Arsenic Multi-Well Time-Series Graph



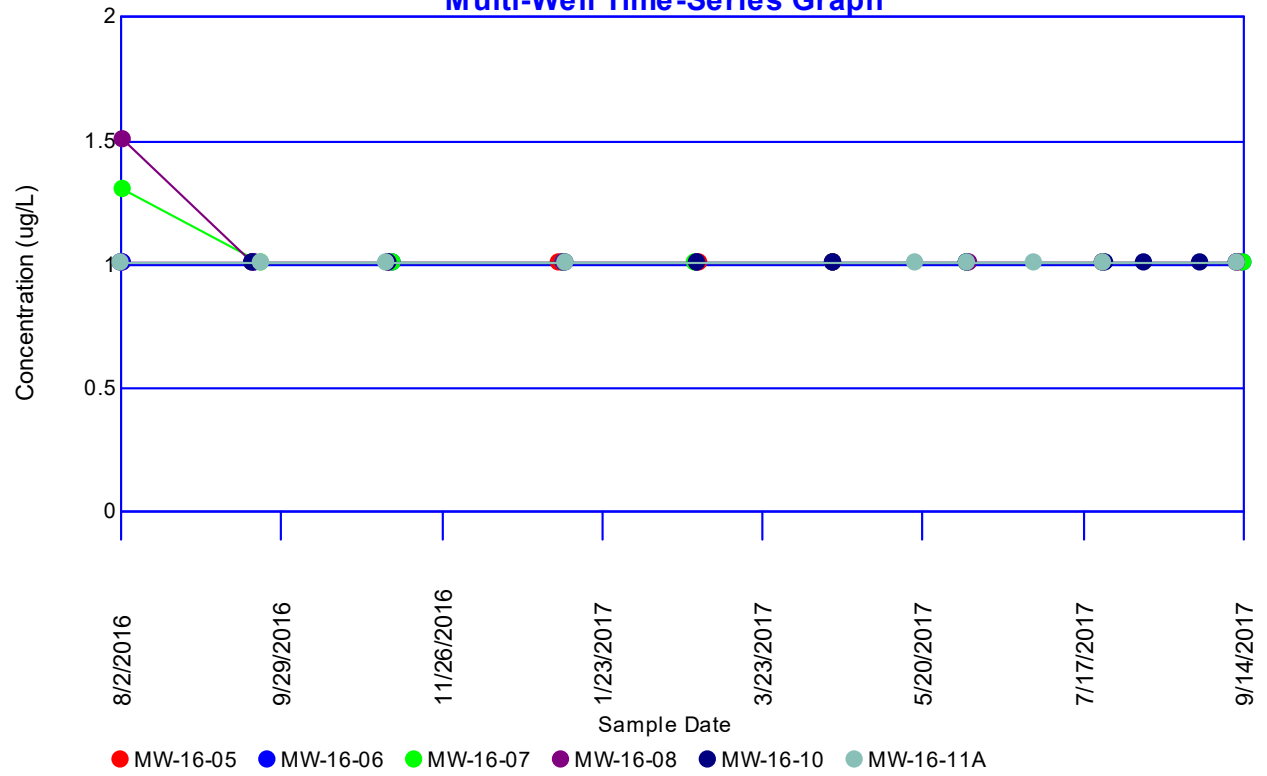
# Barium Multi-Well Time-Series Graph



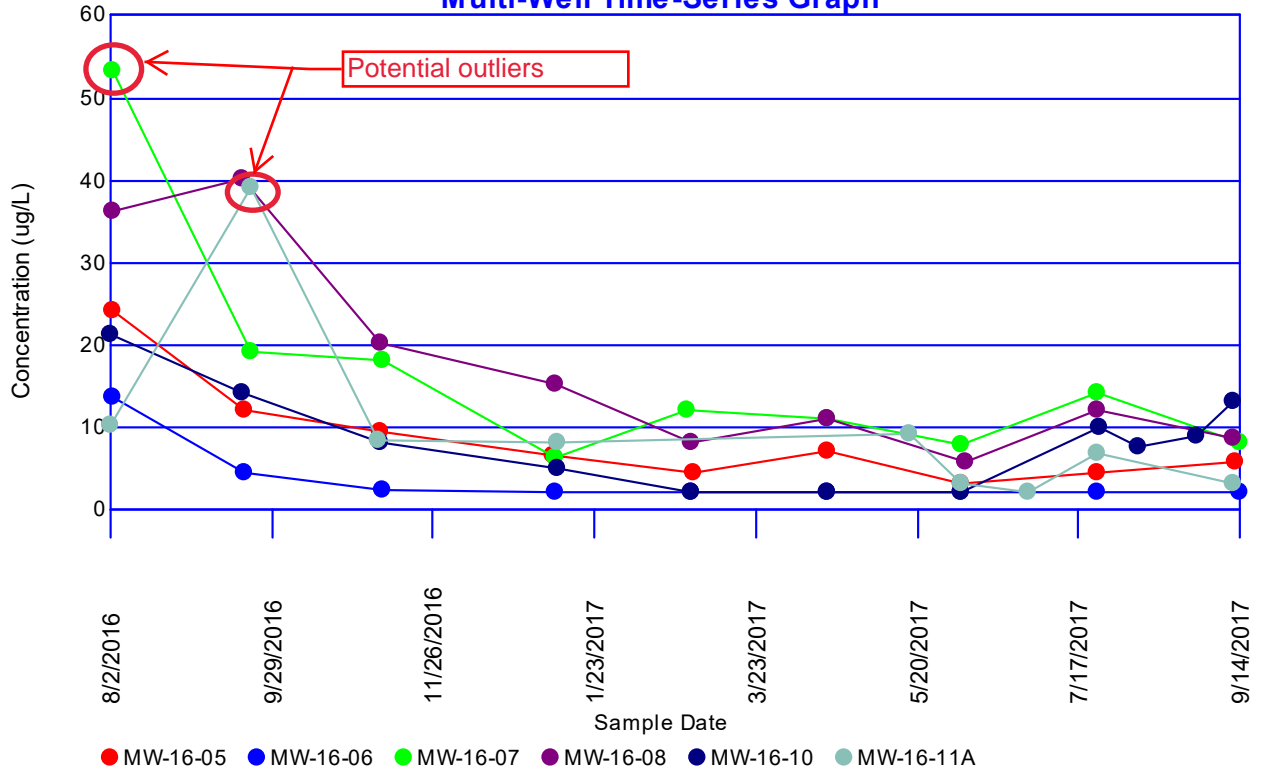
# Beryllium Multi-Well Time-Series Graph



# Cadmium Multi-Well Time-Series Graph

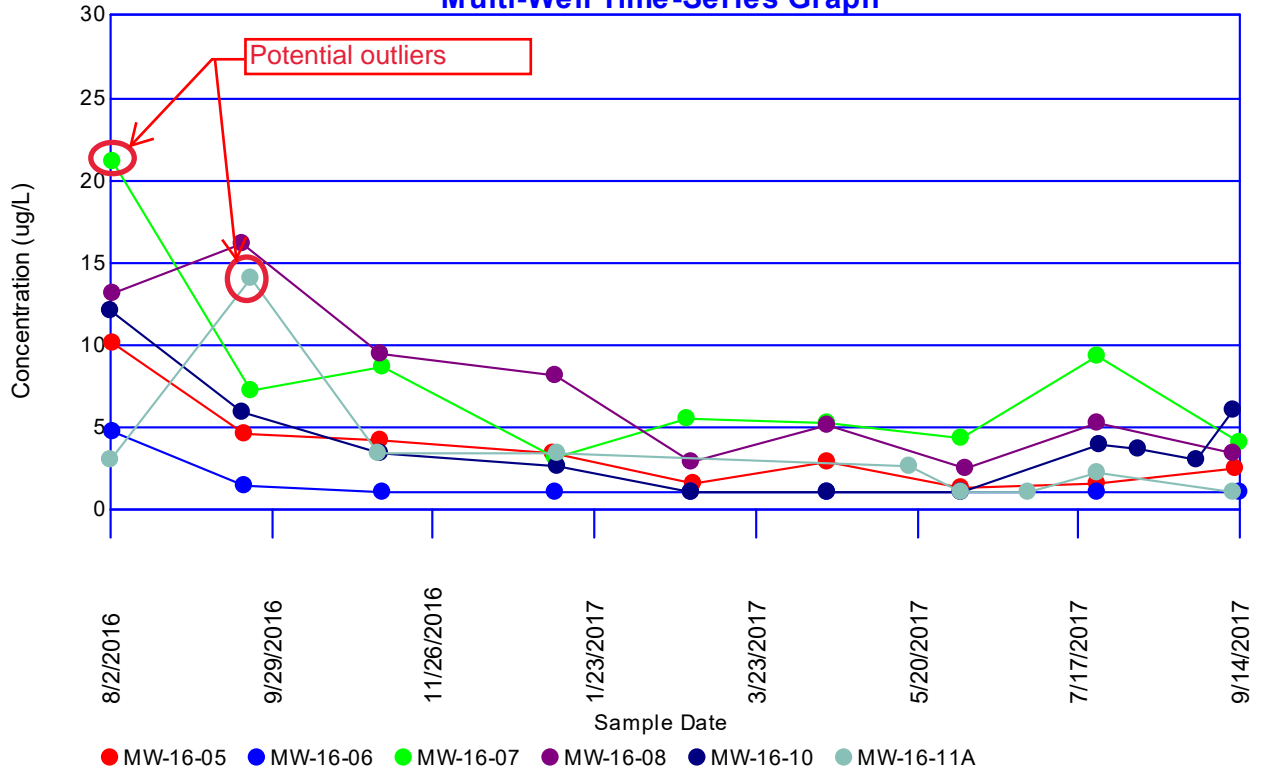


# Chromium Multi-Well Time-Series Graph

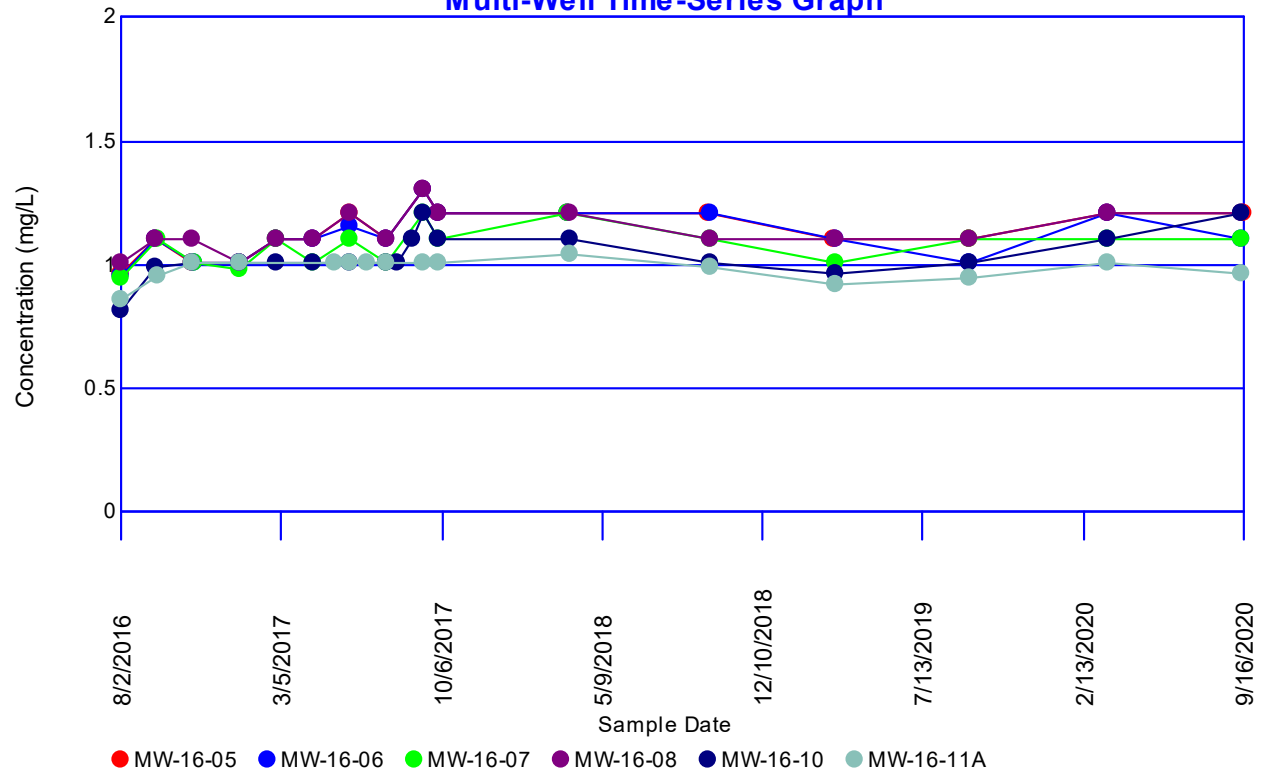




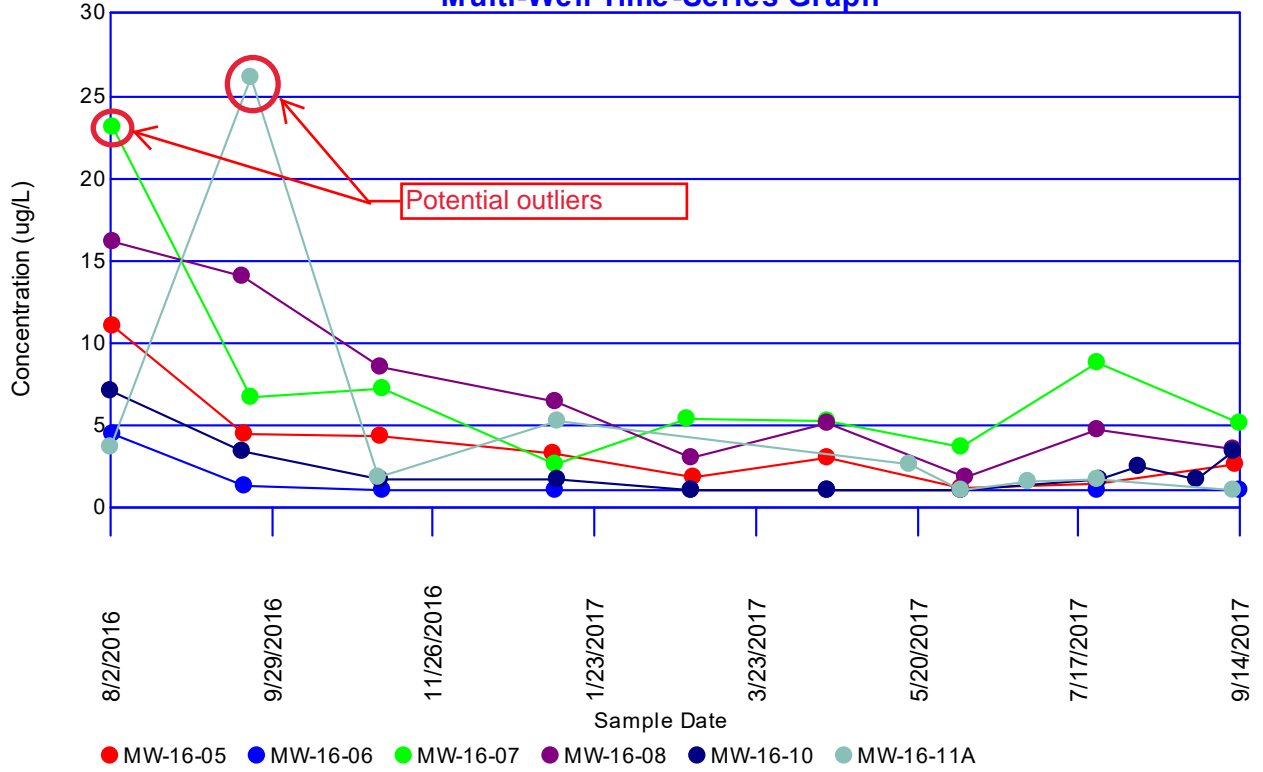
# Cobalt Multi-Well Time-Series Graph



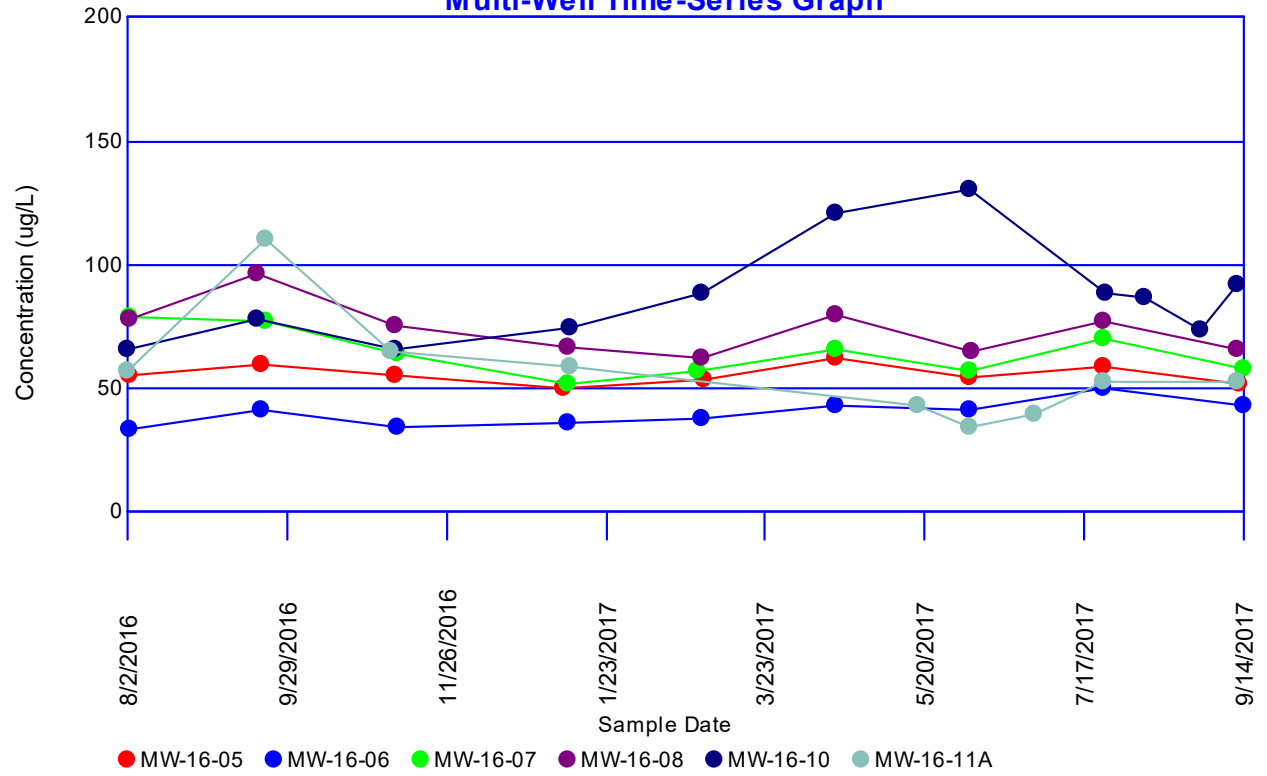
# Fluoride Multi-Well Time-Series Graph



# Lead Multi-Well Time-Series Graph

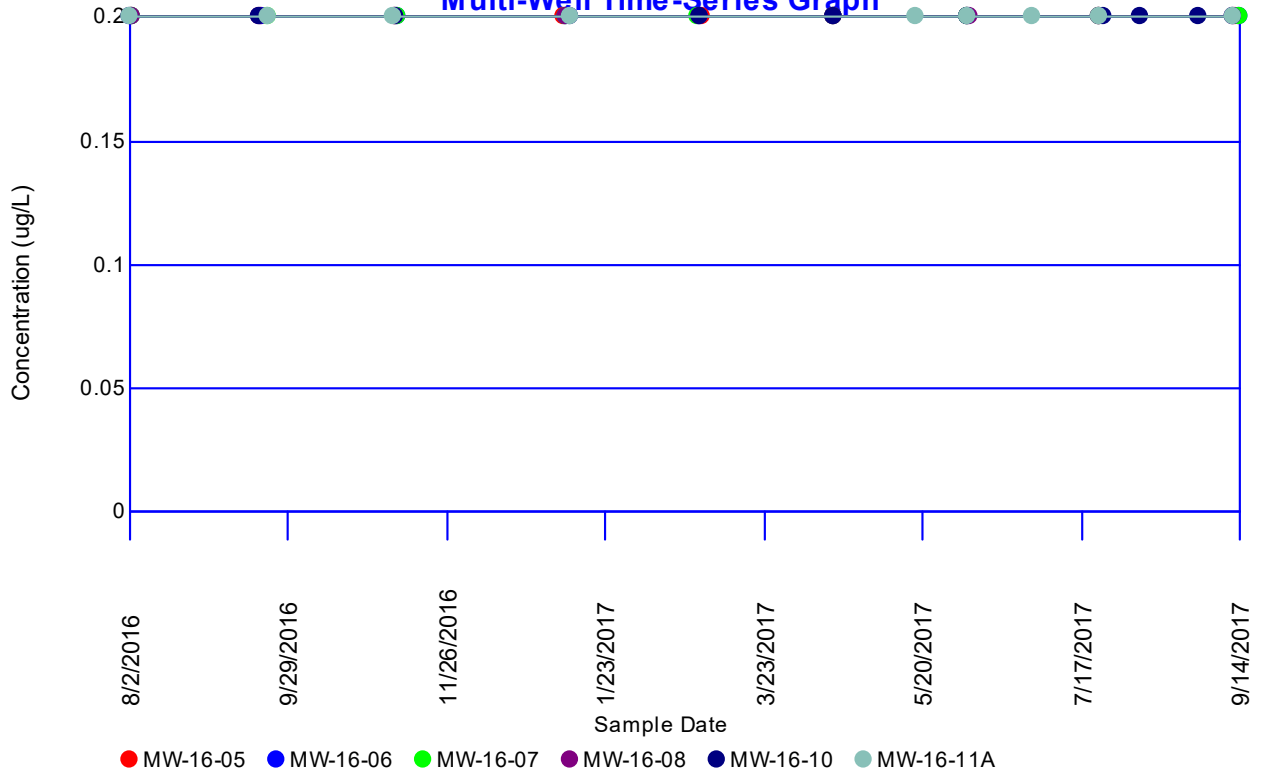


# Lithium Multi-Well Time-Series Graph

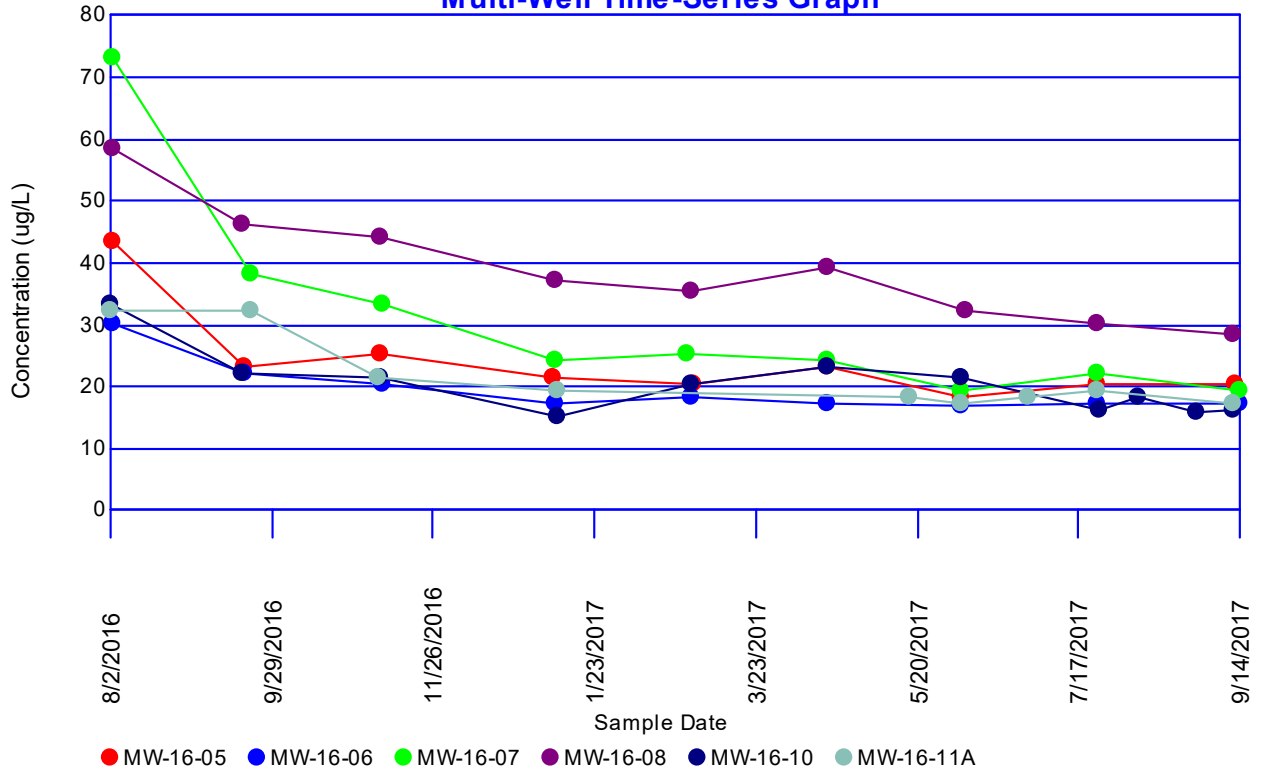


# Mercury

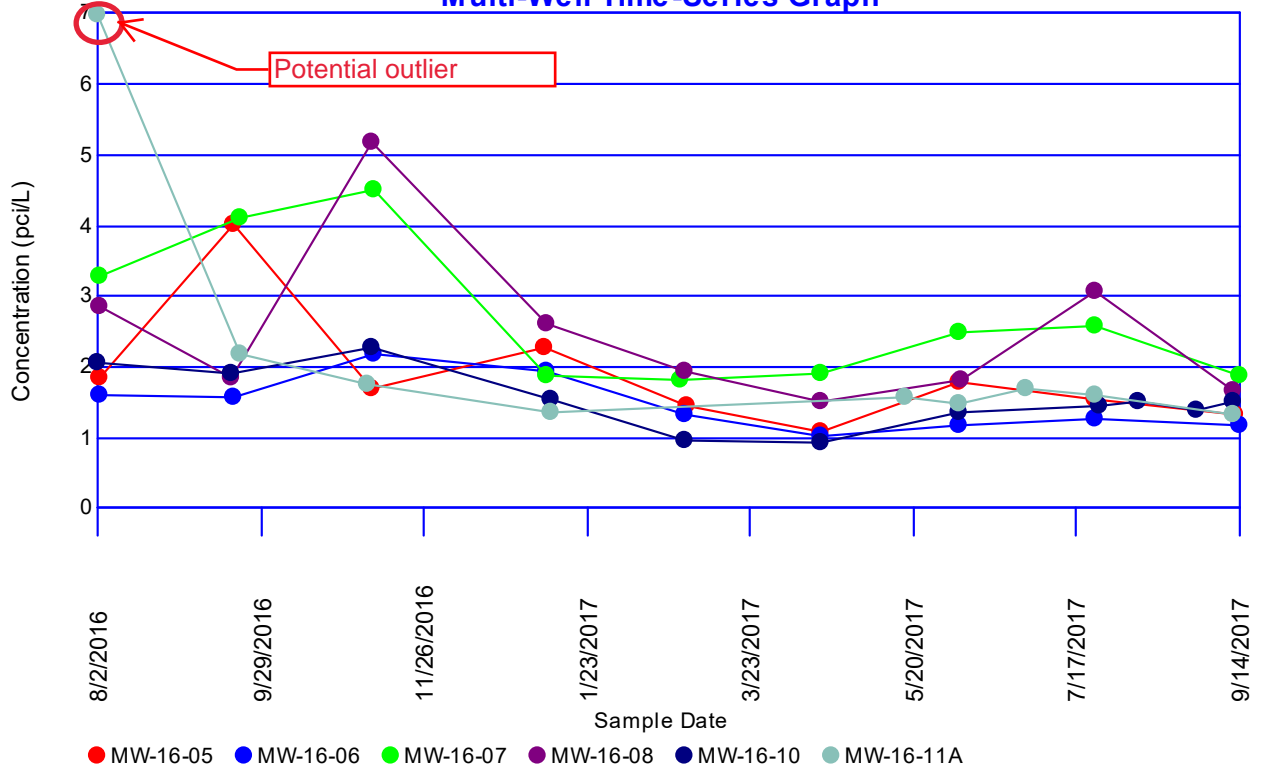
## Multi-Well Time-Series Graph



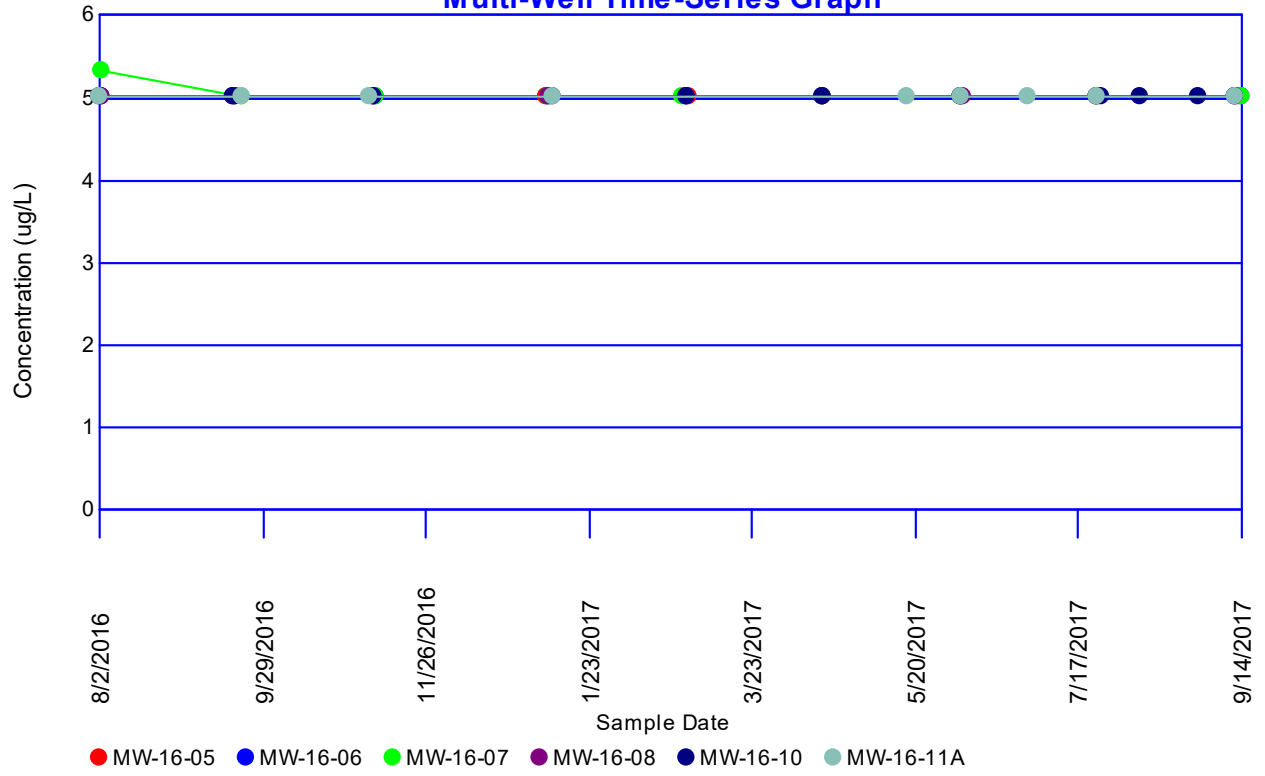
# Molybdenum Multi-Well Time-Series Graph



# Radium-226/228 Multi-Well Time-Series Graph

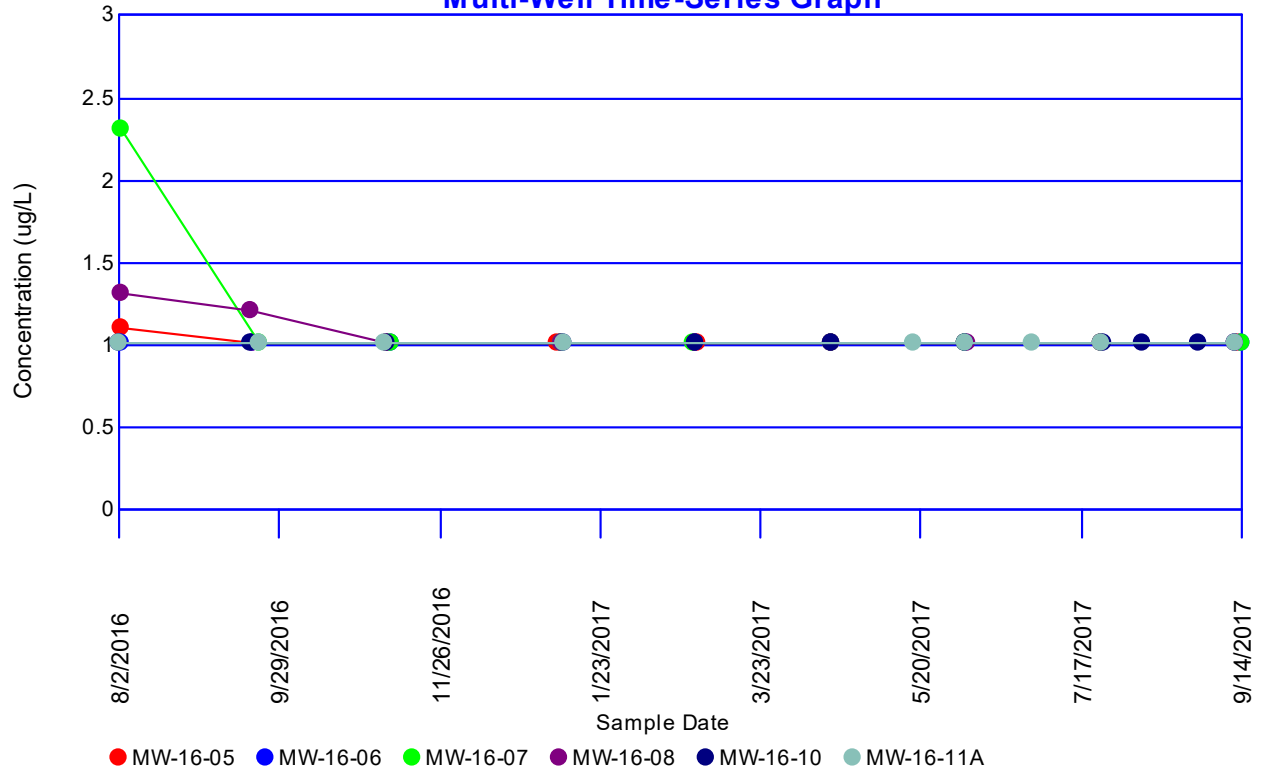


# Selenium Multi-Well Time-Series Graph

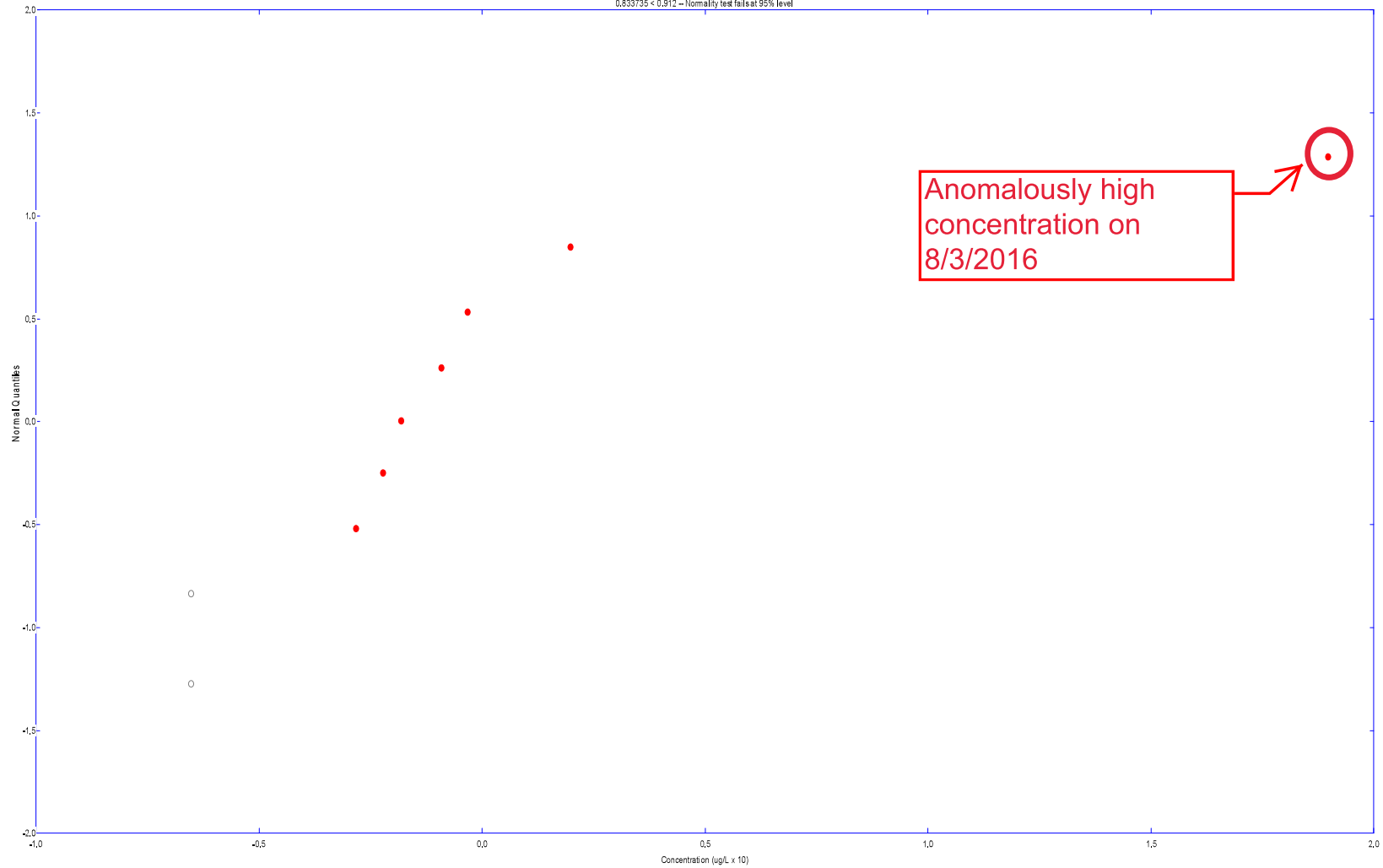




# Thallium Multi-Well Time-Series Graph



Arsenic  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0.833735  
0.833735 < 0.912 -- Normality test fails at 95% level



**Arsenic**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0.833735  
0.833735 < 0.912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Arsenic

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

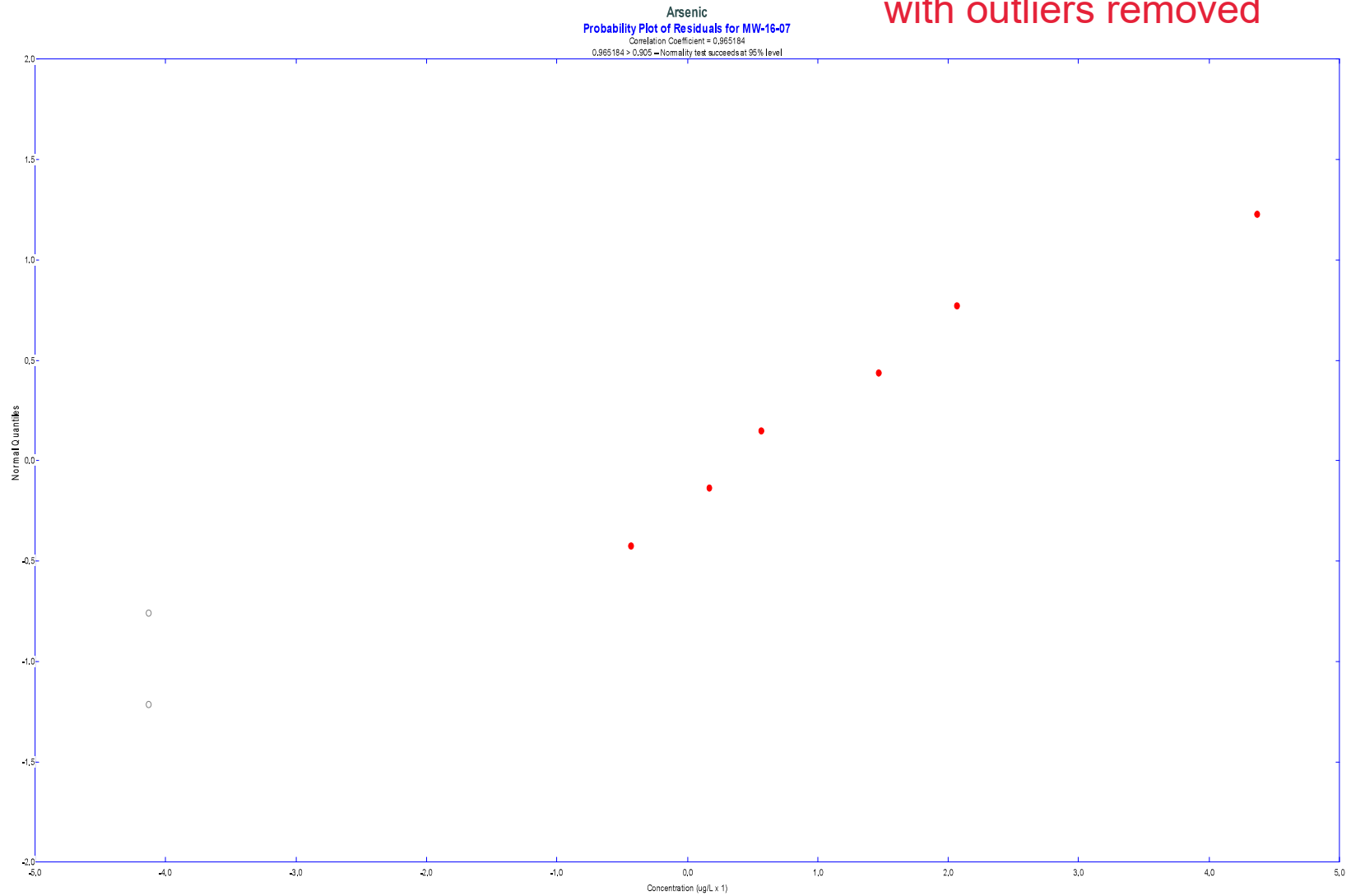
Iteration	Highest	Lowest	Critical	Outlier
1	0.666667	0	0.635	28
2	0.270588	0	0.683	None

Loc.	Date	Conc.	Outlier
------	------	-------	---------

---

MW-16-07	8/3/2016	<b>28</b>	<b>TRUE</b>
	9/22/2016	8.1	FALSE
	11/9/2016	8.7	FALSE
	1/10/2017	ND<2.5 U	FALSE
	2/27/2017	6.8	FALSE
	4/18/2017	7.2	FALSE
	6/6/2017	ND<2.5 U	FALSE
	7/25/2017	11	FALSE
	9/14/2017	6.2	FALSE

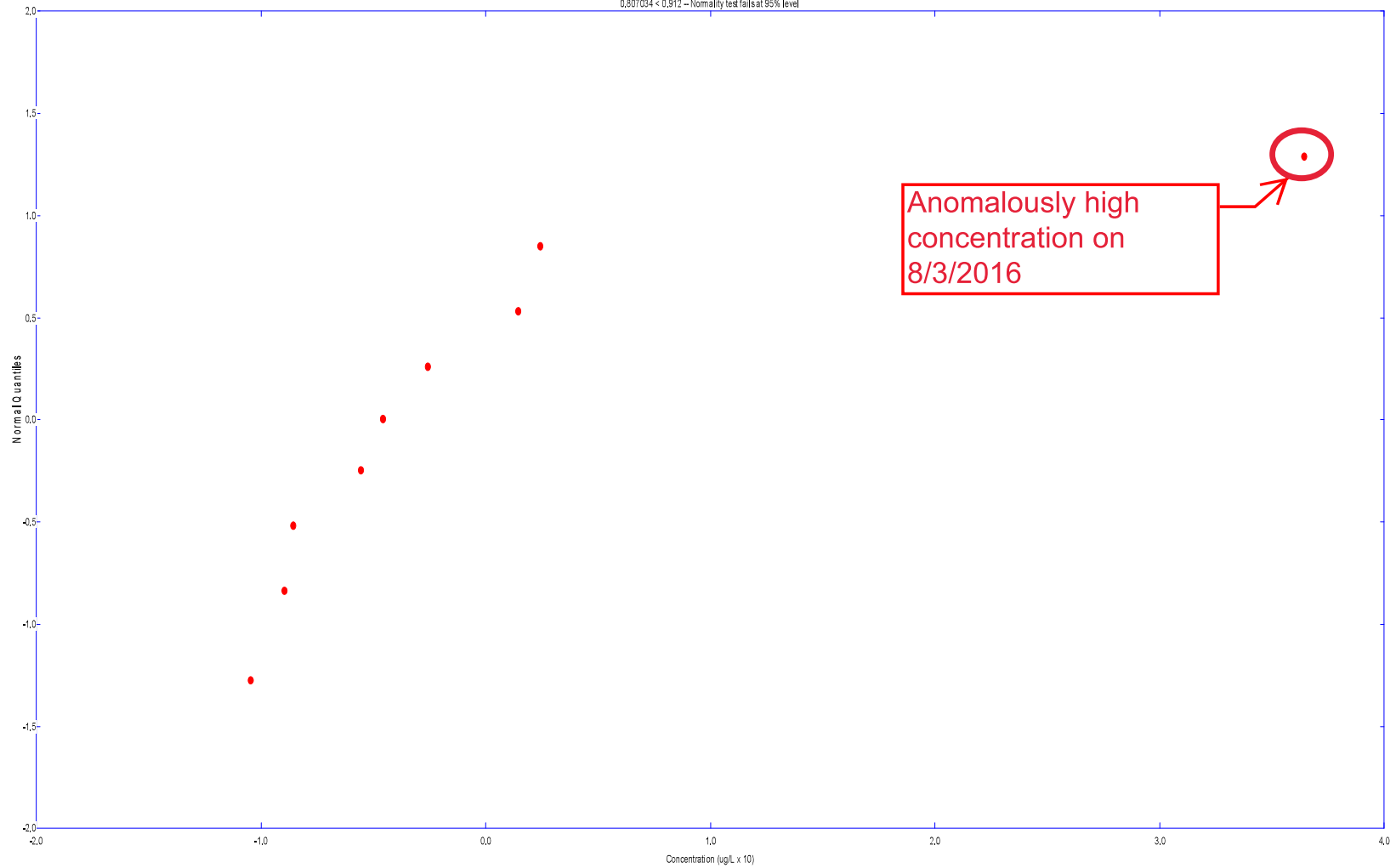
with outliers removed



**Arsenic**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0.965184  
0.965184 > 0.905 – Normality test succeeds at 95% level

Chromium  
Probability Plot of Residuals for MW-16-07

Correlation Coefficient = 0,807034  
0,807034 < 0,912 -- Normality test fails at 95% level



Anomalously high  
concentration on  
8/3/2016

**Chromium**  
**Probability Plot of Residuals for MW-16-07**

Correlation Coefficient = 0,807034  
0,807034 < 0,912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Chromium

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.748899	0.116279	0.635	53
2	0.0877193	0.12605	0.683	None

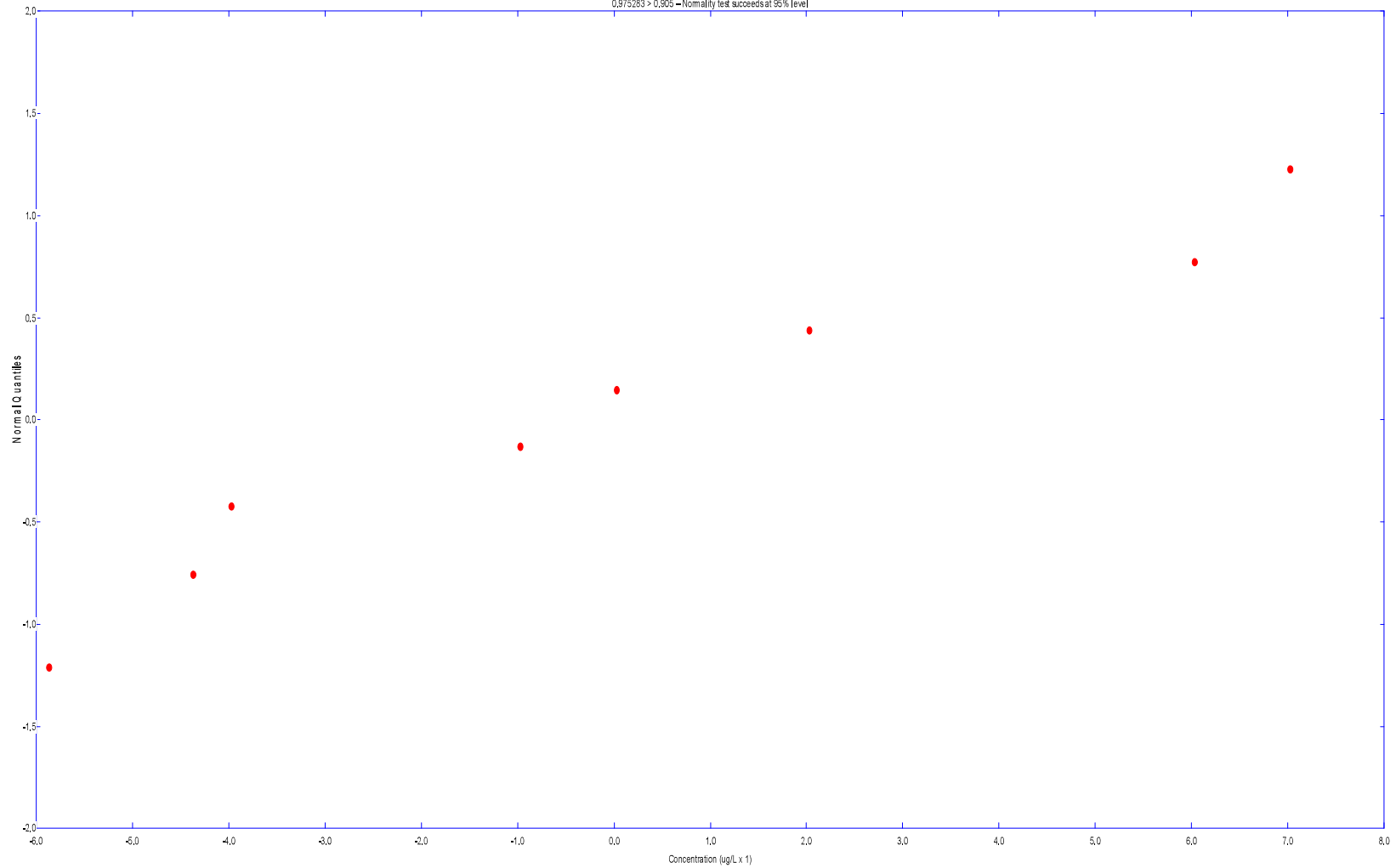
Loc.	Date	Conc.	Outlier
------	------	-------	---------

---

MW-16-07	8/3/2016	<b>53</b>	<b>TRUE</b>
	9/22/2016	19	FALSE
	11/9/2016	18	FALSE
	1/10/2017	6.1	FALSE
	2/27/2017	12	FALSE
	4/18/2017	11	FALSE
	6/6/2017	7.6	FALSE
	7/25/2017	14	FALSE
	9/14/2017	8	FALSE

Chromium  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,975283  
0,975283 > 0,905 – Normality test succeeds at 95% level

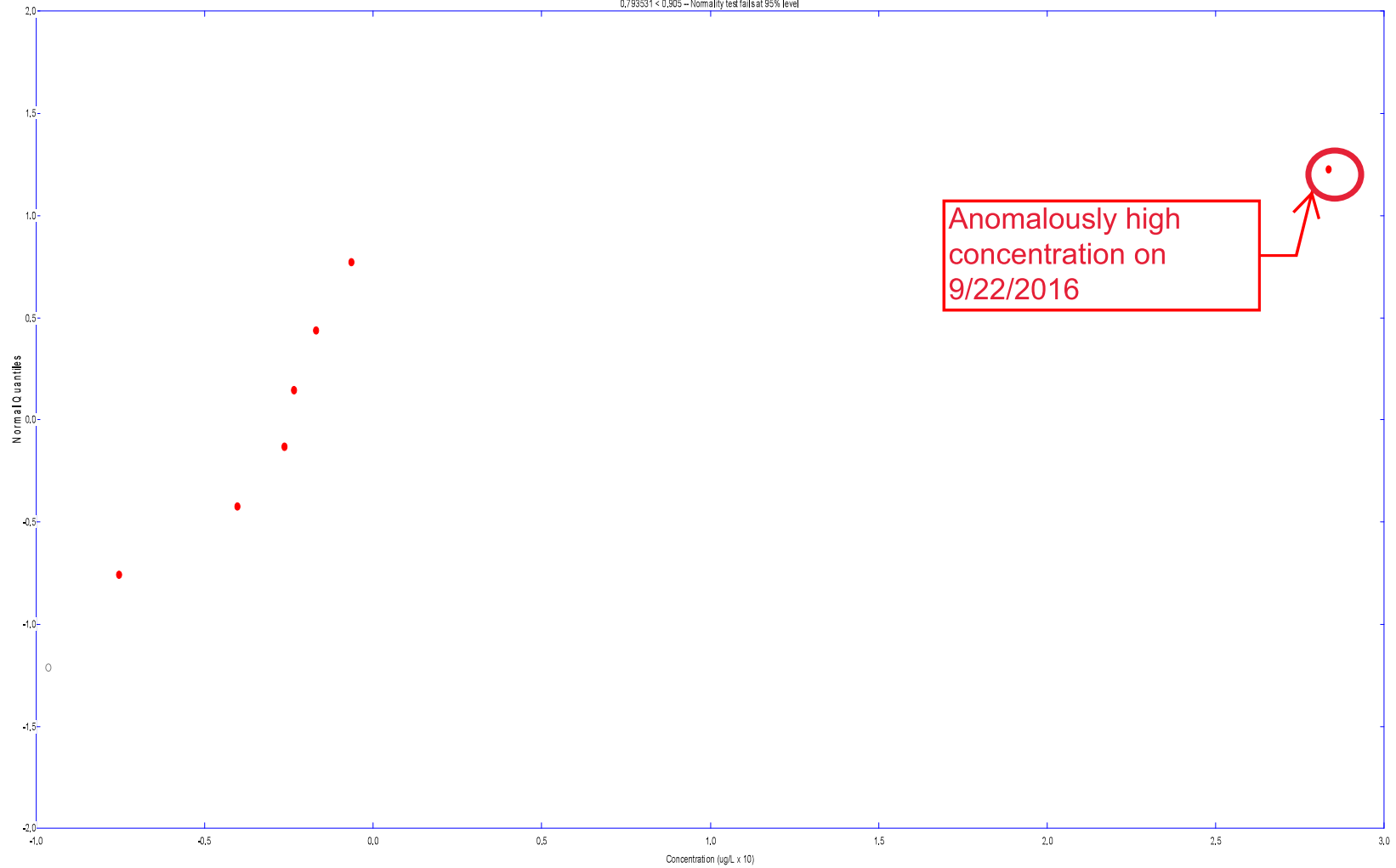
with outliers removed



**Chromium**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0,975283  
0,975283 > 0,905 – Normality test succeeds at 95% level

Chromium  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0.793531  
0.793531 < 0.905 -- Normality test fails at 95% level



**Chromium**  
**Probability Plot of Residuals for MW-16-11A**

Correlation Coefficient = 0.793531  
0.793531 < 0.905 -- Normality test fails at 95% level



## Dixon's Test for Outliers

Parameter: Chromium

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.807799	0.233333	0.683	39
2	0.116667	0.233333	0.637	None

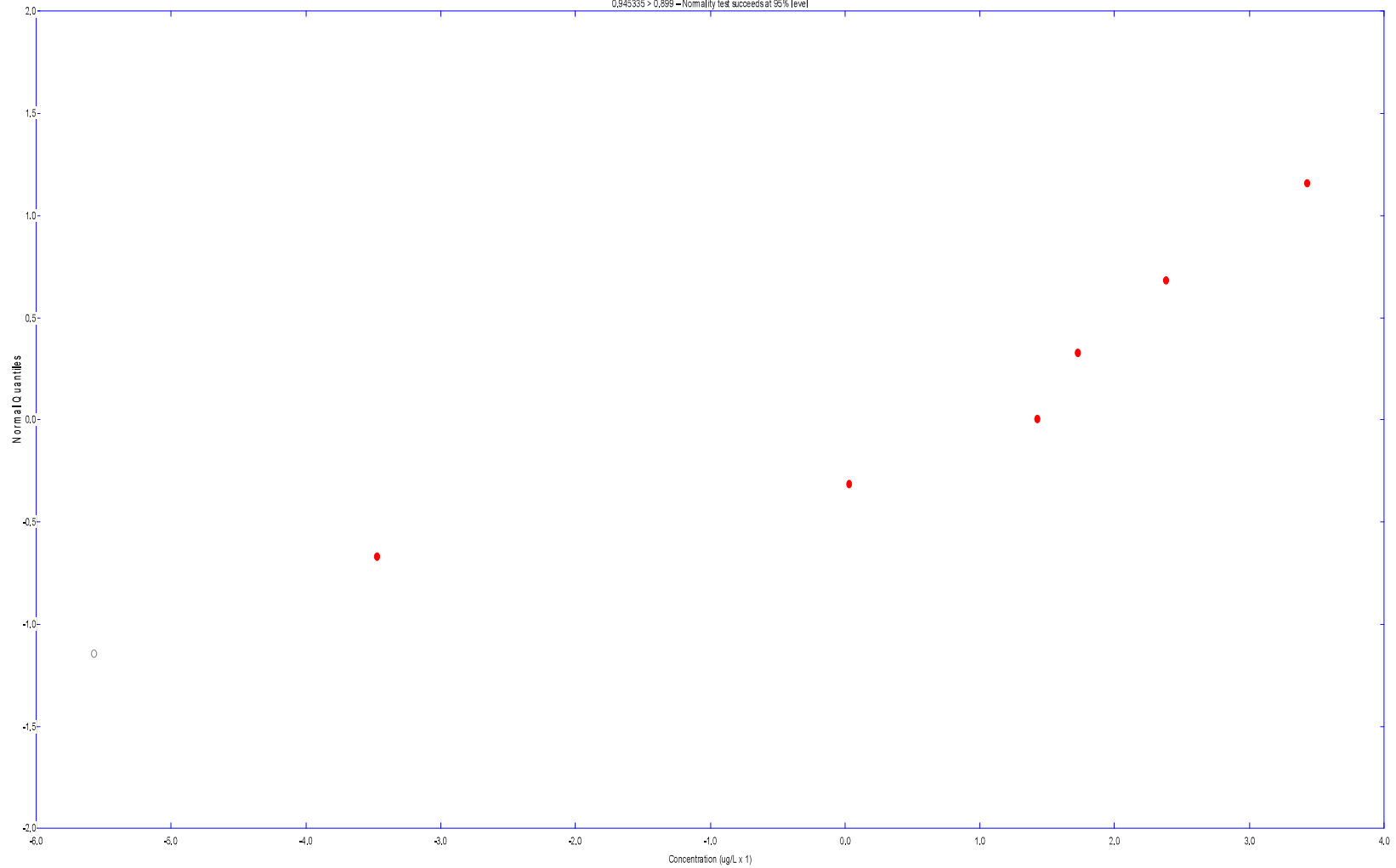
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	10	FALSE
	9/22/2016	39	TRUE
	11/7/2016	8.3	FALSE
	1/11/2017	8	FALSE
	5/18/2017 ~	8.95	FALSE
	6/30/2017 ~	ND<1 U	FALSE
	7/25/2017	6.6	FALSE
	9/12/2017	3.1	FALSE

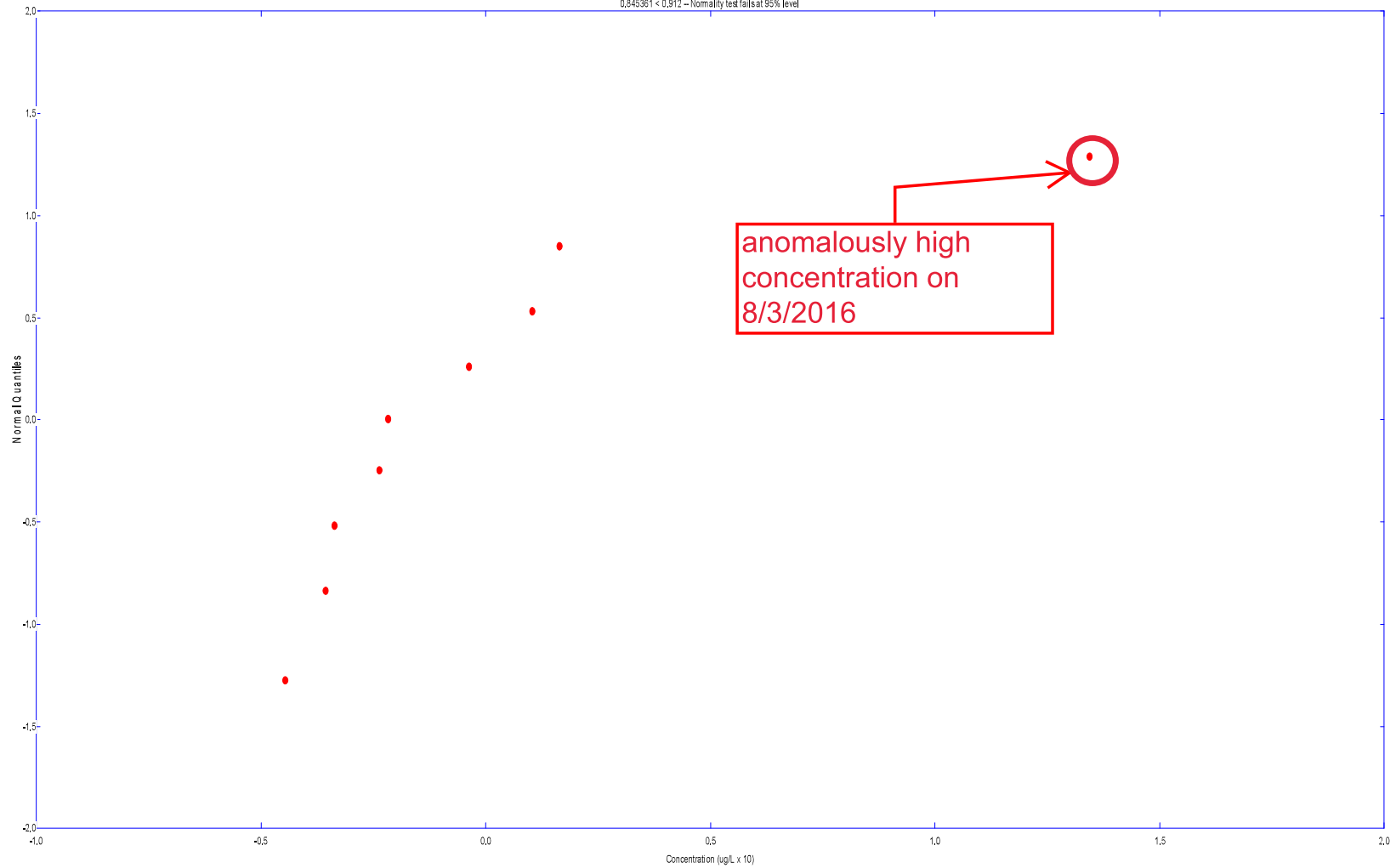
Chromium  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,945335  
0,945335 > 0,899 – Normality test succeeds at 95% level

with outliers removed



**Chromium**  
**Probability Plot of Residuals for MW-16-11A**  
Correlation Coefficient = 0,945335  
0,945335 > 0,899 – Normality test succeeds at 95% level

Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,845361  
0,845361 < 0,912 -- Normality test fails at 95% level



Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,845361  
0,845361 < 0,912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Cobalt

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.694118	0.147541	0.635	21
2	0.115385	0.163636	0.683	None

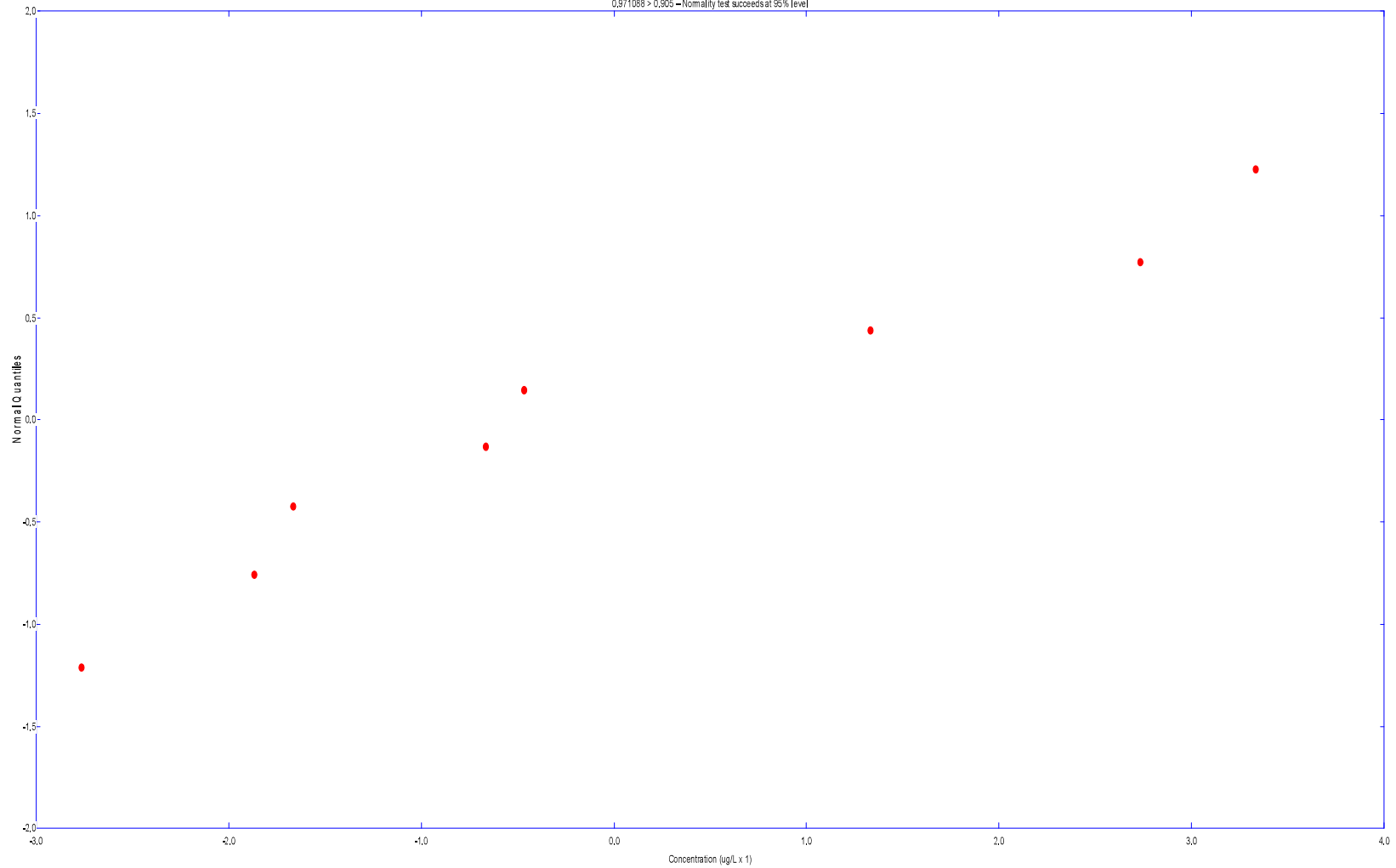
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>21</b>	<b>TRUE</b>
	9/22/2016	7.2	FALSE
	11/9/2016	8.6	FALSE
	1/10/2017	3.1	FALSE
	2/27/2017	5.4	FALSE
	4/18/2017	5.2	FALSE
	6/6/2017	4.2	FALSE
	7/25/2017	9.2	FALSE
	9/14/2017	4	FALSE

Cobalt  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,971088  
0,971088 > 0,905 – Normality test succeeds at 95% level

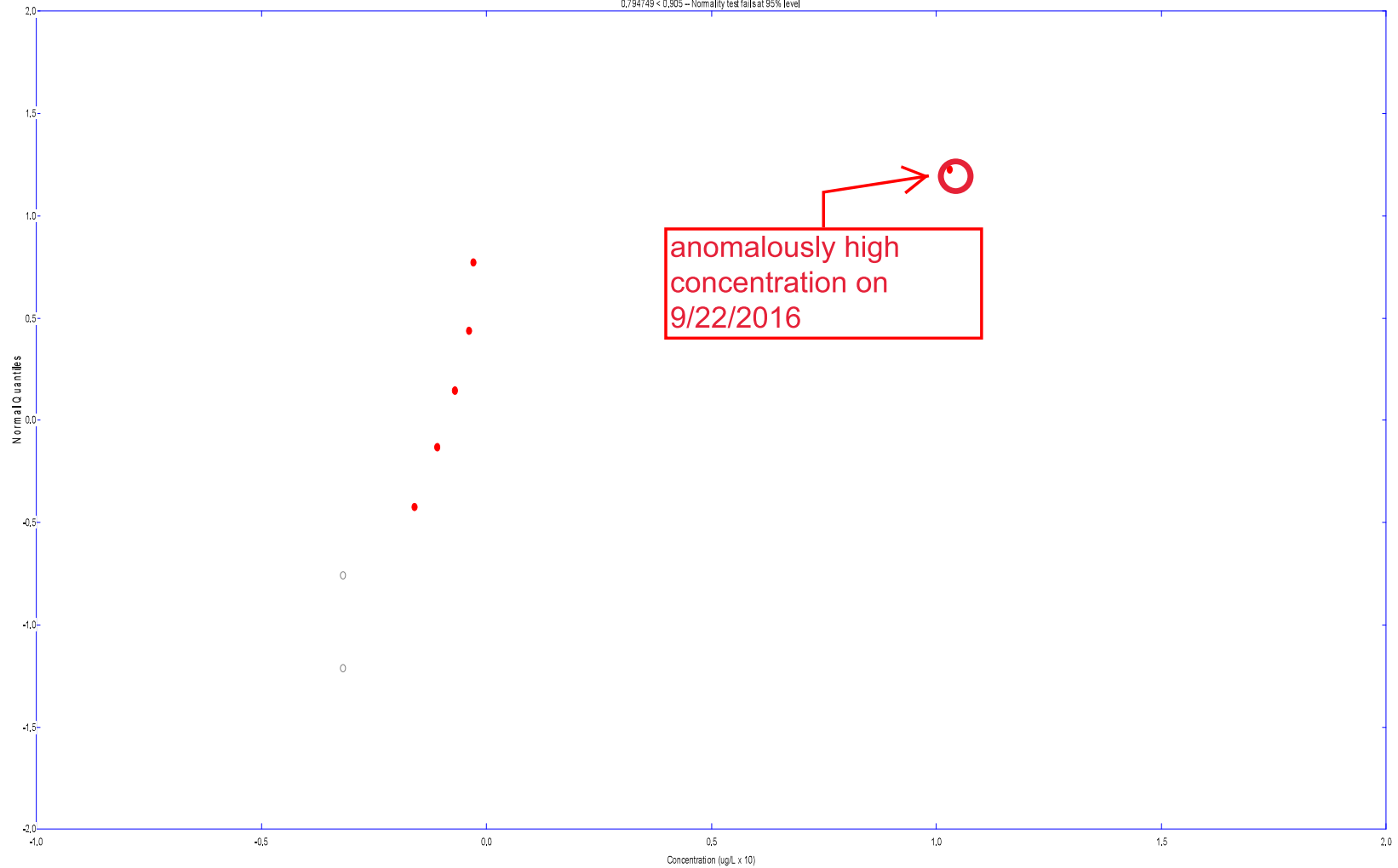
with outliers removed



**Cobalt**  
**Probability Plot of Residuals for MW-16-07**  
Correlation Coefficient = 0,971088  
0,971088 > 0,905 – Normality test succeeds at 95% level

Cobalt  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,794749  
0,794749 < 0,905 – Normality test fails at 95% level



Cobalt

Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,794749  
0,794749 < 0,905 – Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Cobalt

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.785185	0	0.683	14
2	0.0344828	0	0.637	None

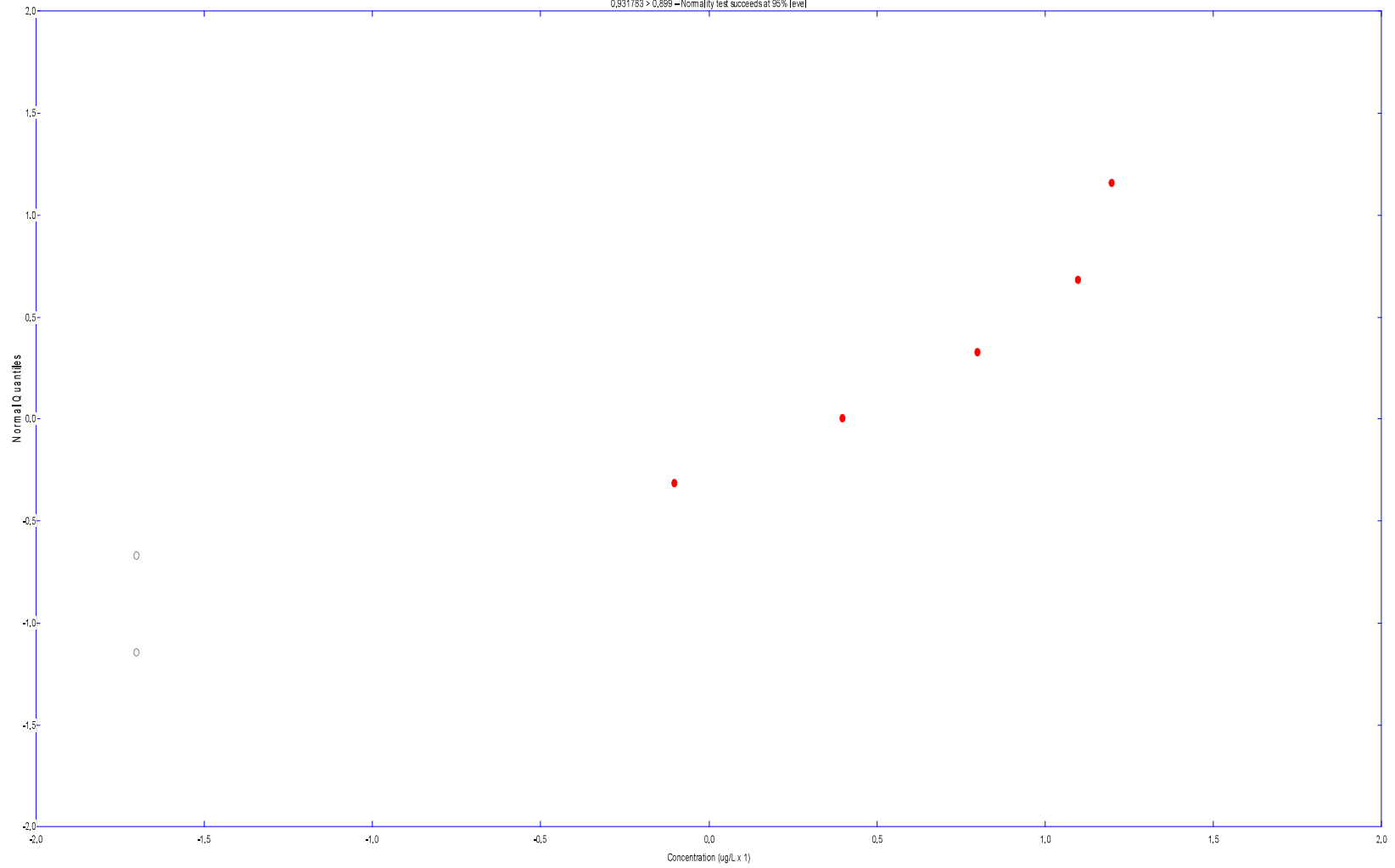
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	3	FALSE
	9/22/2016	14	TRUE
	11/7/2016	3.3	FALSE
	1/11/2017	3.4	FALSE
	5/18/2017 ~	2.6	FALSE
	6/30/2017 ~	ND<0.5 U	FALSE
	7/25/2017	2.1	FALSE
	9/12/2017	ND<0.5 U	FALSE

Cobalt  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,931783  
0,931783 > 0,899 – Normality test succeeds at 95% level

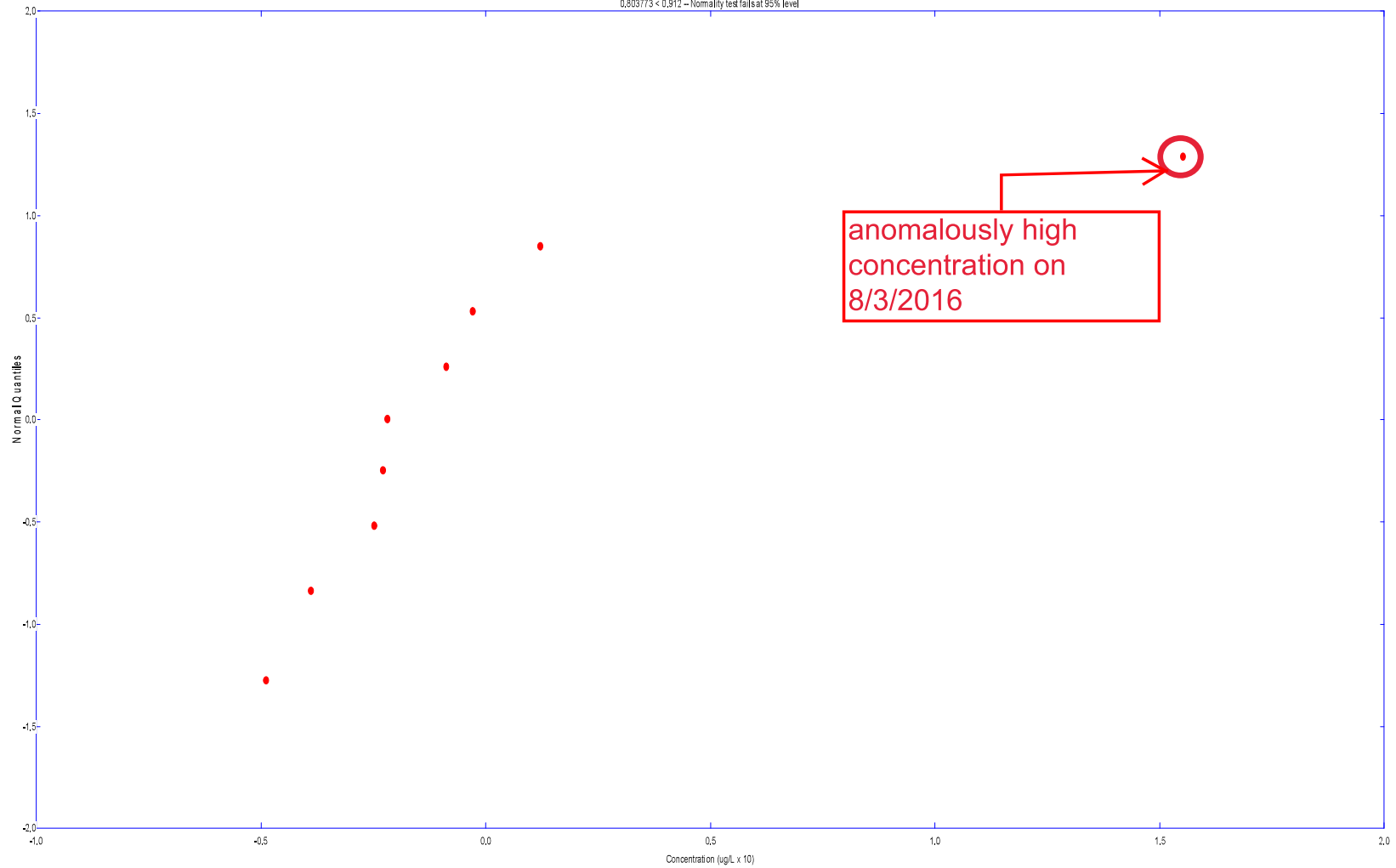
with outliers removed



Cobalt  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,931783  
0,931783 > 0,899 – Normality test succeeds at 95% level



Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,803773  
0,803773 < 0,912 -- Normality test fails at 95% level



Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,803773  
0,803773 < 0,912 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Lead

Location: MW-16-07

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 9 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.737113	0.163934	0.635	23
2	0.294118	0.217391	0.683	None

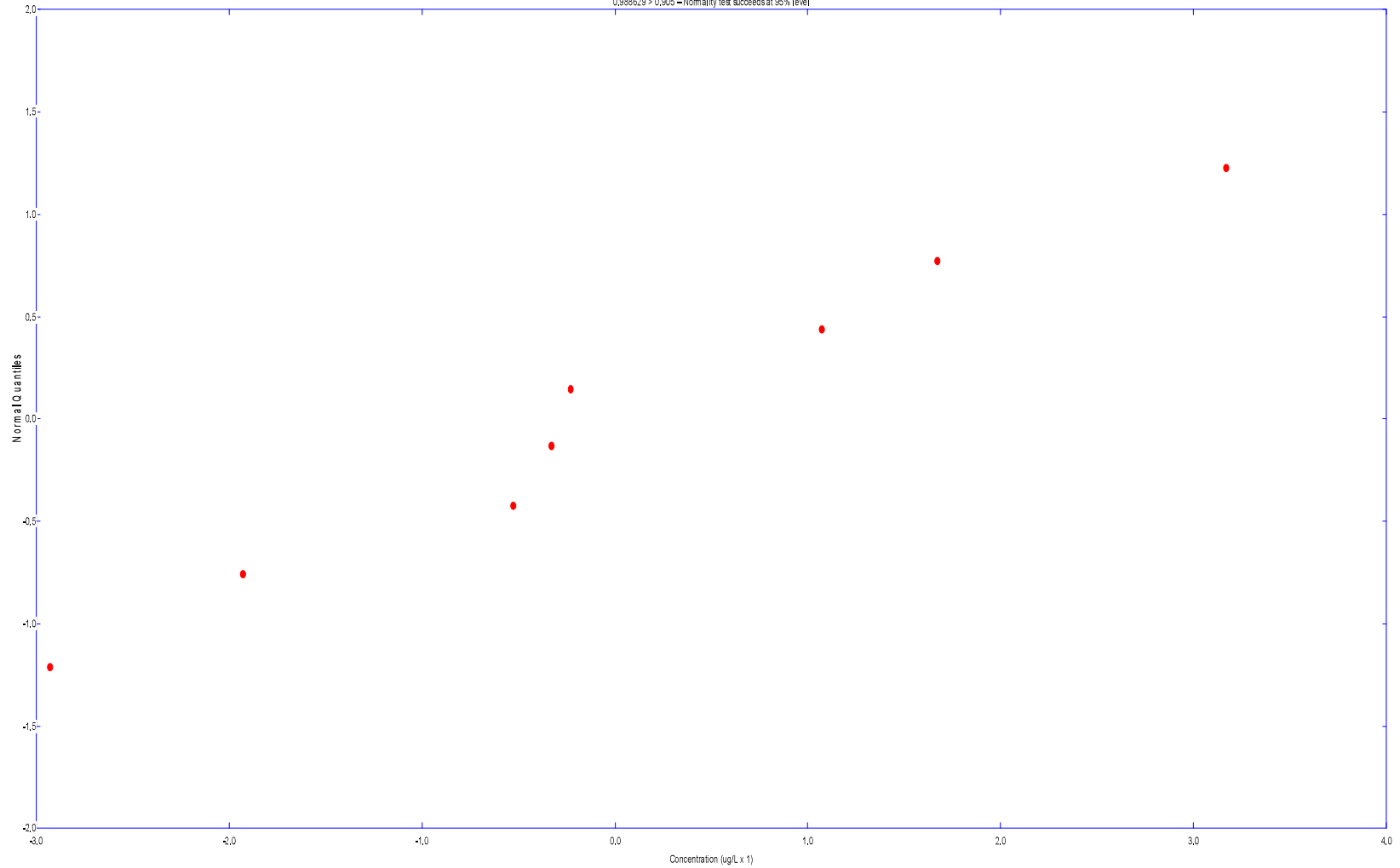
Loc.	Date	Conc.	Outlier
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MW-16-07	8/3/2016	<b>23</b>	<b>TRUE</b>
	9/22/2016	6.6	FALSE
	11/9/2016	7.2	FALSE
	1/10/2017	2.6	FALSE
	2/27/2017	5.3	FALSE
	4/18/2017	5.2	FALSE
	6/6/2017	3.6	FALSE
	7/25/2017	8.7	FALSE
	9/14/2017	5	FALSE

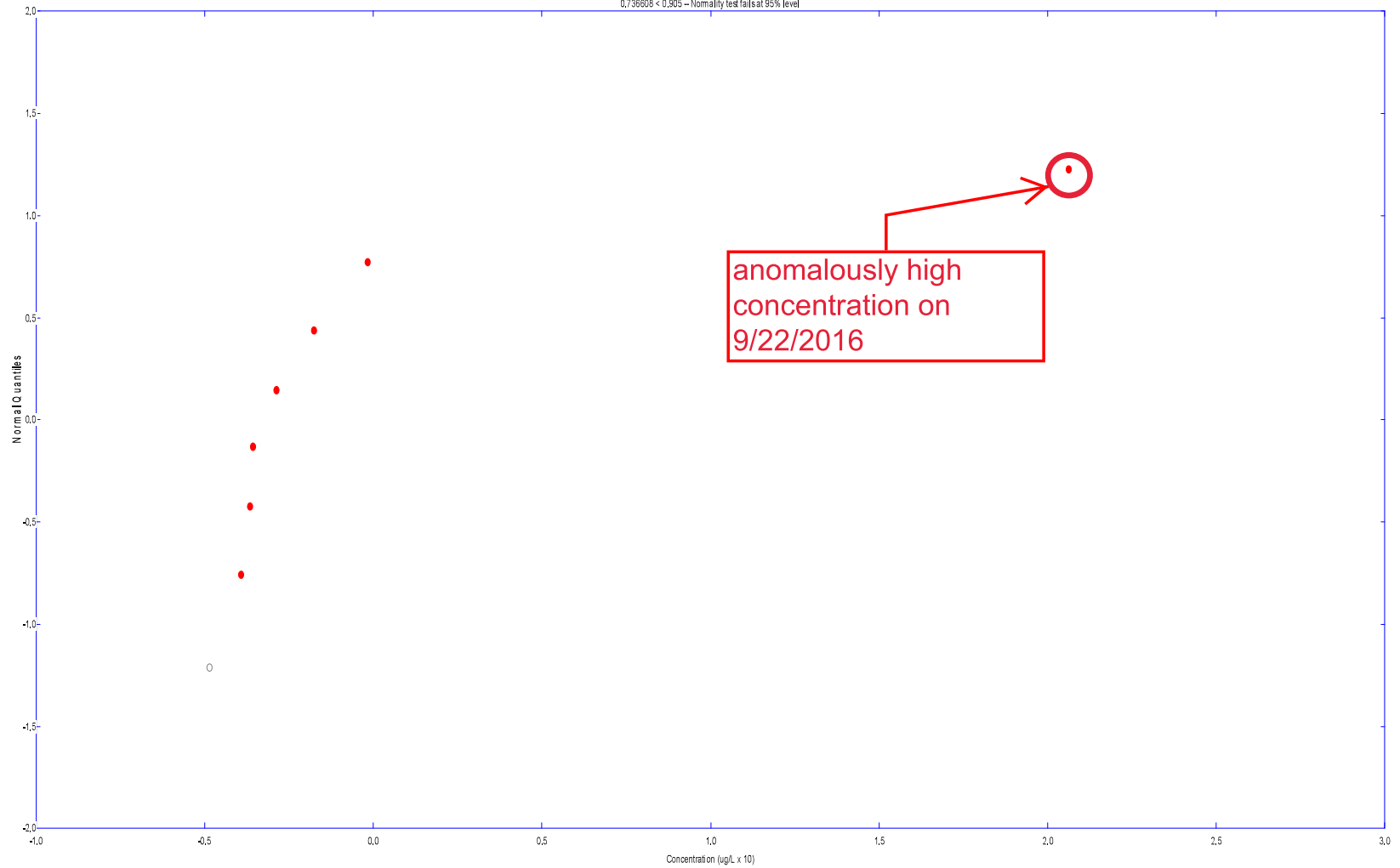
Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,988629  
0,988629 > 0,905 – Normality test succeeds at 95% level

with outliers removed



Lead  
Probability Plot of Residuals for MW-16-07  
Correlation Coefficient = 0,988629  
0,988629 > 0,905 – Normality test succeeds at 95% level

Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0.736608  
0.736608 < 0.905 -- Normality test fails at 95% level



Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0.736608  
0.736608 < 0.905 -- Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Lead

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.847251	0.202128	0.683	26
2	0.340426	0.202128	0.637	None

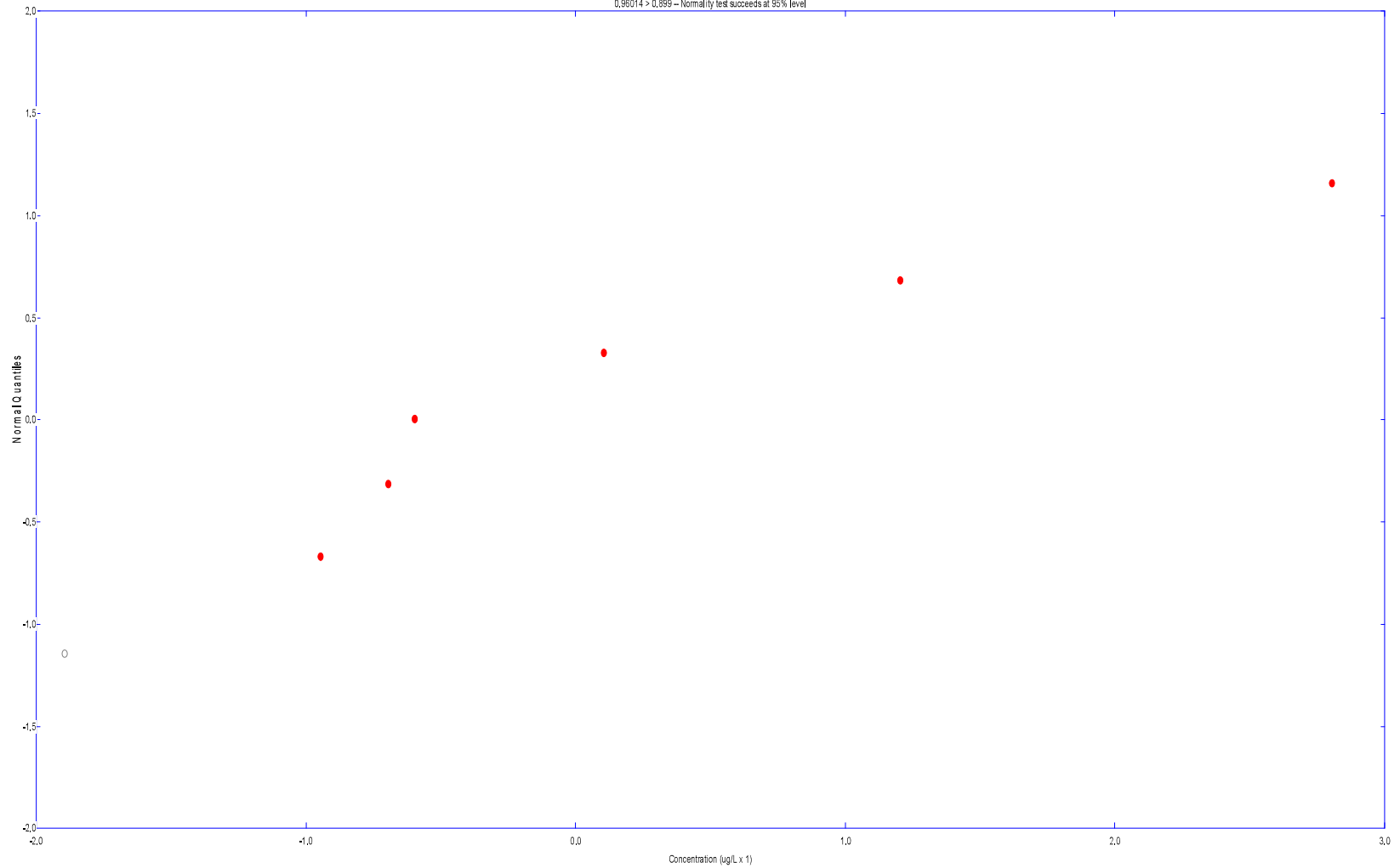
Loc.	Date	Conc.	Outlier
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MW-16-11A	8/2/2016	3.6	FALSE
	9/22/2016	<b>26</b>	<b>TRUE</b>
	11/7/2016	1.8	FALSE
	1/11/2017	5.2	FALSE
	5/18/2017 ~	2.5	FALSE
	6/30/2017 ~	1.45	FALSE
	7/25/2017	1.7	FALSE
	9/12/2017	ND<0.5 U	FALSE

Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,96014  
0,96014 > 0,899 – Normality test succeeds at 95% level

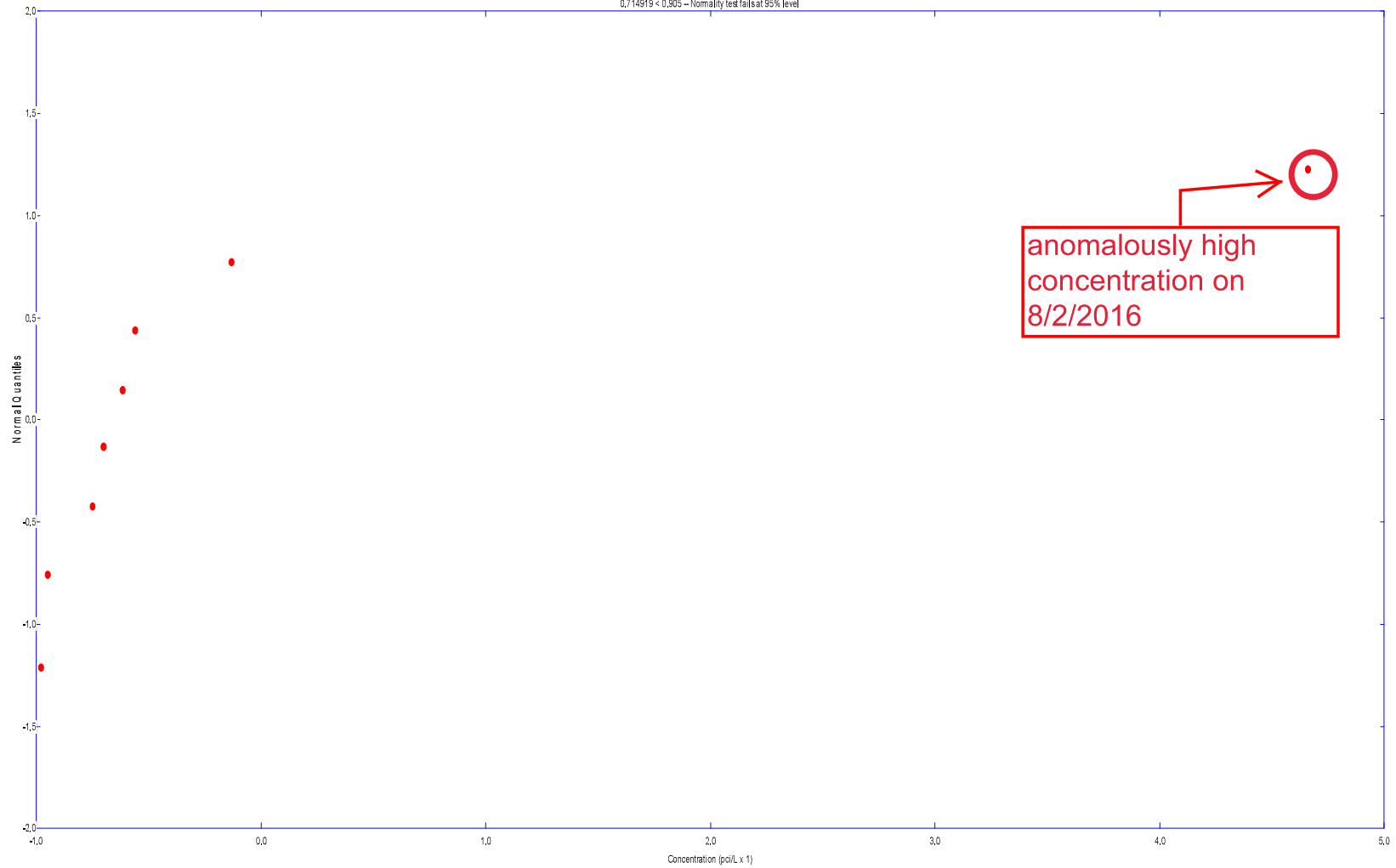
with outliers removed



Lead  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,96014  
0,96014 > 0,899 – Normality test succeeds at 95% level

Radium-226/228  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,714919  
0,714919 < 0,905 – Normality test fails at 95% level



anomalously high  
concentration on  
8/2/2016

Radium-226/228  
Probability Plot of Residuals for MW-16-11A

Correlation Coefficient = 0,714919  
0,714919 < 0,905 – Normality test fails at 95% level

## Dixon's Test for Outliers

Parameter: Radium-226/228

Location: MW-16-11A

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

For 8 Measurements...

1% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.853832	0.0352941	0.683	6.94
2	0.505882	0.0352941	0.637	None

Loc.	Date	Conc.	Outlier
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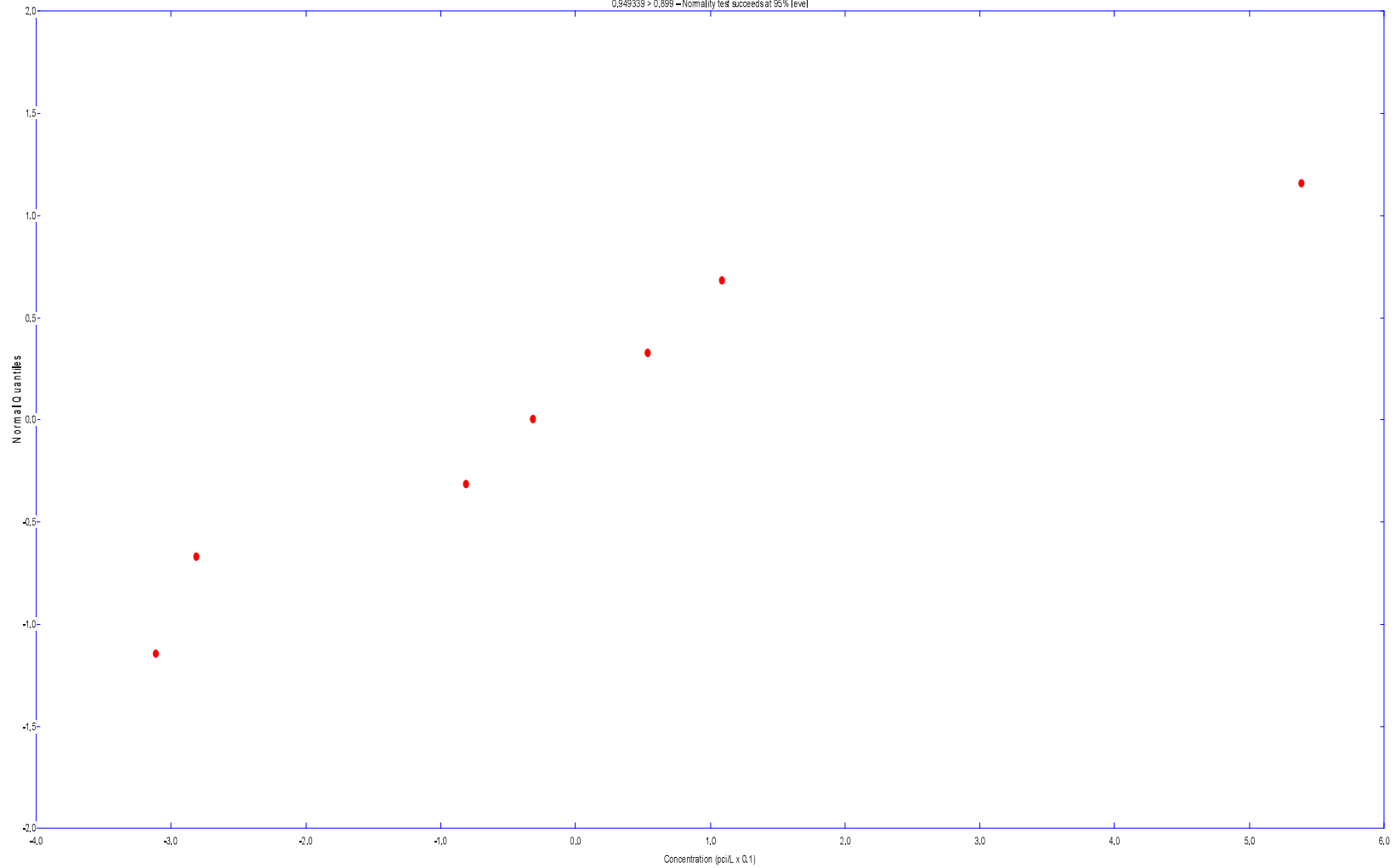
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MW-16-11A	8/2/2016	<b>6.94</b>	<b>TRUE</b>
	9/22/2016	2.15	FALSE
	11/7/2016	1.72	FALSE
	1/11/2017	1.33	FALSE
	5/18/2017 ~	1.53	FALSE
	6/30/2017 ~	1.665	FALSE
	7/25/2017	1.58	FALSE
	9/12/2017	1.3	FALSE



Radium-226/228  
Probability Plot of Residuals for MW-16-11A  
Correlation Coefficient = 0,949339  
0,949339 > 0,899 – Normality test succeeds at 95% level

with outliers removed



**Radium-226/228**  
**Probability Plot of Residuals for MW-16-11A**  
Correlation Coefficient = 0,949339  
0,949339 > 0,899 – Normality test succeeds at 95% level

## Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 46

Percent Non-Detects: 90.1961%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<1 U	ND<2 U
			9/20/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/9/2017	ND<1 U	ND<2 U
			3/1/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/13/2017	ND<1 U	ND<2 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<1 U	ND<2 U
			9/20/2016	ND<1 U	ND<2 U
			11/9/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017 ~	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017 ~	ND<1 U	ND<2 U

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MW-16-07	9	9 (100%)	8/3/2016	ND<1 U	ND<2 U
			9/22/2016	ND<1 U	ND<2 U
			11/9/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/27/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017	ND<1 U	ND<2 U

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MW-16-08	9	8 (88.8889%)	8/3/2016	2.1	2.1
			9/19/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/7/2017	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U

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MW-16-10	7	6 (85.7143%)	8/2/2016	2.1	2.1
			9/19/2016	ND<1 U	ND<2 U
			11/8/2016	ND<1 U	ND<2 U
			1/11/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			7/26/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U
			<b>4/18/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>			

			8/30/2017 ~	ND<1 U	ND<2 U
MW-16-11A	8	5 (62.5%)	8/2/2016	2.1	2.1
			9/22/2016	ND<1 U	ND<2 U
			11/7/2016	ND<1 U	ND<2 U
			1/11/2017	ND<1 U	ND<2 U
			5/18/2017 ~	3.2	3.2
			6/30/2017 ~	2	2
			7/25/2017	ND<1 U	ND<2 U
			9/12/2017	ND<1 U	ND<2 U
			<b>6/6/2017</b>	<b>2.4</b>	<b>2.4</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 50

Total Non-Detect: 27

Percent Non-Detects: 54%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	6 (66.6667%)	8/3/2016	14	14
			9/20/2016	5.6	5.6
			11/8/2016	5.1	5.1
			1/9/2017	ND<2.5 U	ND<5 U
			3/1/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/13/2017	ND<2.5 U	ND<5 U

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MW-16-06	9	8 (88.8889%)	8/3/2016 ~	7.45	7.45
			9/20/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
9/14/2017 ~	ND<2.5 U	ND<5 U			

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MW-16-07	8	2 (25%)	9/22/2016	8.1	8.1
			11/9/2016	8.7	8.7
			1/10/2017	ND<2.5 U	ND<5 U
			2/27/2017	6.8	6.8
			4/18/2017	7.2	7.2
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	11	11
			9/14/2017	6.2	6.2
			<b>8/3/2016</b>	<b>28</b>	<b>28</b>

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MW-16-08	9	3 (33.3333%)	8/3/2016	21	21
			9/19/2016	15	15
			11/8/2016	12	12
			1/10/2017	9.2	9.2
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	7.2	7.2
			6/7/2017	ND<2.5 U	ND<5 U
			7/25/2017	5.4	5.4
			9/12/2017	ND<2.5 U	ND<5 U

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MW-16-10	7	5 (71.4286%)	8/2/2016	11	11
			9/19/2016	5.5	5.5
			11/8/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			7/26/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			<b>4/18/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
			<b>6/6/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>			

			8/30/2017 ~	ND<2.5 U	ND<5 U
MW-16-11A	8	3 (37.5%)	8/2/2016	9.7	9.7
			9/22/2016	17	17
			11/7/2016	ND<2.5 U	ND<5 U
			1/11/2017	9	9
			5/18/2017 ~	5.4	5.4
			6/30/2017 ~	5.25	5.25
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	0 (0%)	8/3/2016	340	340
			9/20/2016	330	330
			11/8/2016	280	280
			1/9/2017	280	280
			3/1/2017	270	270
			4/18/2017	280	280
			6/6/2017	280	280
			7/25/2017	290	290
			9/13/2017	300	300

MW-16-06	9	0 (0%)	8/3/2016 ~	270	270
			9/20/2016	300	300
			11/9/2016	260	260
			1/10/2017	270	270
			2/28/2017	270	270
			4/18/2017	260	260
			6/6/2017 ~	270	270
			7/25/2017	300	300
9/14/2017 ~	300	300			

MW-16-07	9	0 (0%)	8/3/2016	450	450
			9/22/2016	370	370
			11/9/2016	330	330
			1/10/2017	290	290
			2/27/2017	320	320
			4/18/2017	300	300
			6/6/2017	290	290
			7/25/2017	330	330
			9/14/2017	330	330

MW-16-08	9	0 (0%)	8/3/2016	390	390
			9/19/2016	430	430
			11/8/2016	330	330
			1/10/2017	320	320
			2/28/2017	290	290
			4/18/2017	310	310
			6/7/2017	300	300
			7/25/2017	370	370
			9/12/2017	380	380

MW-16-10	7	0 (0%)	8/2/2016	150	150
			9/19/2016	150	150
			11/8/2016	120	120
			1/11/2017	110	110
			2/28/2017	100	100
			7/26/2017	110	110
			9/12/2017	140	140
			<b>4/18/2017</b>	<b>75</b>	<b>75</b>
			<b>6/6/2017</b>	<b>65</b>	<b>65</b>
<b>8/9/2017 ~</b>	<b>115</b>	<b>115</b>			

			8/30/2017 ~	99.5	99.5
MW-16-11A	8	0 (0%)	8/2/2016	300	300
			9/22/2016	480	480
			11/7/2016	120	120
			1/11/2017	360	360
			5/18/2017 ~	280	280
			6/30/2017 ~	270	270
			7/25/2017	300	300
			9/12/2017	310	310
			<b>6/6/2017</b>	<b>260</b>	<b>260</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 47

Percent Non-Detects: 92.1569%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U^	ND<1 U^
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	1.7	1.7
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	ND<0.5 U	ND<1 U

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MW-16-08	9	7 (77.7778%)	8/3/2016	1.2	1.2
			9/19/2016	1.6	1.6
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U^	ND<1 U^
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			8/9/2017 ~	ND<0.5 U	ND<1 U



			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	7 (87.5%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	1.6	1.6
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 49

Percent Non-Detects: 96.0784%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U	ND<1 U
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	1.3	1.3
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	ND<0.5 U	ND<1 U

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MW-16-08	9	8 (88.8889%)	8/3/2016	1.5	1.5
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>			

			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	ND<0.5 U	ND<1 U
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 8

Percent Non-Detects: 16.3265%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	24	24
			9/20/2016	12	12
			11/8/2016	9.2	9.2
			1/9/2017	6.3	6.3
			3/1/2017	4.2	4.2
			4/18/2017	6.9	6.9
			6/6/2017	2.9	2.9
			7/25/2017	4.4	4.4
			9/13/2017	5.6	5.6
MW-16-06	9	6 (66.6667%)	8/3/2016 ~	13.5	13.5
			9/20/2016	4.3	4.3
			11/9/2016	2.2	2.2
			1/10/2017	ND<1 U	ND<2 U
			2/28/2017	ND<1 U	ND<2 U
			4/18/2017	ND<1 U	ND<2 U
			6/6/2017 ~	ND<1 U	ND<2 U
			7/25/2017	ND<1 U	ND<2 U
			9/14/2017 ~	ND<1 U	ND<2 U
MW-16-07	8	0 (0%)	9/22/2016	19	19
			11/9/2016	18	18
			1/10/2017	6.1	6.1
			2/27/2017	12	12
			4/18/2017	11	11
			6/6/2017	7.6	7.6
			7/25/2017	14	14
			9/14/2017	8	8
			<b>8/3/2016</b>	<b>53</b>	<b>53</b>
MW-16-08	9	0 (0%)	8/3/2016	36	36
			9/19/2016	40	40
			11/8/2016	20	20
			1/10/2017	15	15
			2/28/2017	8	8
			4/18/2017	11	11
			6/7/2017	5.6	5.6
			7/25/2017	12	12
			9/12/2017	8.6	8.6
MW-16-10	7	1 (14.2857%)	8/2/2016	21	21
			9/19/2016	14	14
			11/8/2016	8.1	8.1
			1/11/2017	4.8	4.8
			2/28/2017	ND<1 U	ND<2 U
			7/26/2017	9.7	9.7
			9/12/2017	13	13
			<b>4/18/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;2 U</b>
<b>8/9/2017 ~</b>	<b>7.35</b>	<b>7.35</b>			

			<b>8/30/2017 ~</b>	<b>8.7</b>	<b>8.7</b>
MW-16-11A	7	1 (14.2857%)	8/2/2016	10	10
			11/7/2016	8.3	8.3
			1/11/2017	8	8
			5/18/2017 ~	8.95	8.95
			6/30/2017 ~	ND<1 U	ND<2 U
			7/25/2017	6.6	6.6
			9/12/2017	3.1	3.1
			<b>9/22/2016</b>	<b>39</b>	<b>39</b>
			<b>6/6/2017</b>	<b>3</b>	<b>3</b>

There are 0 unused locations

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 10

Percent Non-Detects: 20.4082%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	10	10
			9/20/2016	4.5	4.5
			11/8/2016	4.1	4.1
			1/9/2017	3.3	3.3
			3/1/2017	1.5	1.5
			4/18/2017	2.8	2.8
			6/6/2017	1.2	1.2
			7/25/2017	1.5	1.5
			9/13/2017	2.4	2.4
MW-16-06	9	7 (77.7778%)	8/3/2016 ~	4.7	4.7
			9/20/2016	1.4	1.4
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U
MW-16-07	8	0 (0%)	9/22/2016	7.2	7.2
			11/9/2016	8.6	8.6
			1/10/2017	3.1	3.1
			2/27/2017	5.4	5.4
			4/18/2017	5.2	5.2
			6/6/2017	4.2	4.2
			7/25/2017	9.2	9.2
			9/14/2017	4	4
			<b>8/3/2016</b>	<b>21</b>	<b>21</b>
MW-16-08	9	0 (0%)	8/3/2016	13	13
			9/19/2016	16	16
			11/8/2016	9.4	9.4
			1/10/2017	8.1	8.1
			2/28/2017	2.8	2.8
			4/18/2017	5.1	5.1
			6/7/2017	2.4	2.4
			7/25/2017	5.2	5.2
			9/12/2017	3.3	3.3
MW-16-10	7	1 (14.2857%)	8/2/2016	12	12
			9/19/2016	5.8	5.8
			11/8/2016	3.3	3.3
			1/11/2017	2.6	2.6
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	3.8	3.8
			9/12/2017	5.9	5.9
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>3.6</b>	<b>3.6</b>			

			8/30/2017 ~	2.95	2.95
MW-16-11A	7	2 (28.5714%)	8/2/2016	3	3
			11/7/2016	3.3	3.3
			1/11/2017	3.4	3.4
			5/18/2017 ~	2.6	2.6
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	2.1	2.1
			9/12/2017	ND<0.5 U	ND<1 U
			<b>9/22/2016</b>	<b>14</b>	<b>14</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 93

Total Non-Detect: 13

Percent Non-Detects: 13.9785%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	16	1 (6.25%)	8/3/2016	0.96	0.96
			9/20/2016	1.1	1.1
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	1	1
			3/1/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/6/2017	1.2	1.2
			7/25/2017	1.1	1.1
			9/13/2017	1.3	1.3
			10/2/2017	1.2	1.2
			3/27/2018	1.2	1.2
			10/1/2018	1.2	1.2
			3/18/2019	1.1	1.1
			9/17/2019	1.1	1.1
			3/19/2020	1.2	1.2
			9/16/2020	1.2	1.2

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MW-16-06	16	1 (6.25%)	8/3/2016 ~	0.95	0.95
			9/20/2016	1.1	1.1
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	1	1
			2/28/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/6/2017 ~	1.15	1.15
			7/25/2017	1.1	1.1
			9/14/2017 ~	1.3	1.3
			10/2/2017	1.2	1.2
			3/27/2018 ~	1.2	1.2
			10/2/2018	1.2	1.2
			3/20/2019	1.1	1.1
			9/17/2019	1	1
			3/19/2020	1.2	1.2
			9/15/2020	1.1	1.1

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MW-16-07	16	2 (12.5%)	8/3/2016	0.94	0.94
			9/22/2016	1.1	1.1
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	0.97	0.97
			2/27/2017	1.1	1.1
			4/18/2017	1	1
			6/6/2017	1.1	1.1
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017	1.2	1.2
			10/3/2017	1.1	1.1
			3/27/2018	1.2	1.2
			10/2/2018	1.1	1.1
			3/20/2019	1	1
			9/17/2019	1.1	1.1
			3/19/2020	1.1	1.1
			9/15/2020	1.1	1.1



MW-16-08	16	0 (0%)	8/3/2016	1	1
			9/19/2016	1.1	1.1
			11/8/2016	1.1	1.1
			1/10/2017	1	1
			2/28/2017	1.1	1.1
			4/18/2017	1.1	1.1
			6/7/2017	1.2	1.2
			7/25/2017	1.1	1.1
			9/12/2017	1.3	1.3
			10/4/2017	1.2	1.2
			3/28/2018	1.2	1.2
			10/4/2018	1.1	1.1
			3/19/2019	1.1	1.1
			9/17/2019	1.1	1.1
			3/18/2020	1.2	1.2
			9/15/2020	1.2	1.2

MW-16-10	14	4 (28.5714%)	8/2/2016	0.81	0.81
			9/19/2016	0.98	0.98
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	1.2	1.2
			10/4/2017	1.1	1.1
			3/28/2018	1.1	1.1
			10/3/2018	1	1
			3/19/2019	0.96	0.96
			9/17/2019	1	1
			3/18/2020	1.1	1.1
			9/15/2020	1.2	1.2
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>8/9/2017 ~</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>8/30/2017 ~</b>	<b>1.1</b>	<b>1.1</b>

MW-16-11A	15	5 (33.3333%)	8/2/2016	0.85	0.85
			9/22/2016	0.95	0.95
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 UF1	ND<1 UF1
			9/12/2017	1	1
			10/4/2017	1	1
			3/28/2018 ~	1.03333	1.03333
			10/4/2018	0.98	0.98
			3/19/2019	0.91	0.91
			9/17/2019	0.94	0.94
			3/18/2020	1	1
			9/15/2020	0.96	0.96
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 49

Total Non-Detect: 9

Percent Non-Detects: 18.3673%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	11	11
			9/20/2016	4.4	4.4
			11/8/2016	4.2	4.2
			1/9/2017	3.2	3.2
			3/1/2017	1.8	1.8
			4/18/2017	2.9	2.9
			6/6/2017	1.1	1.1
			7/25/2017	1.4	1.4
			9/13/2017	2.5	2.5
MW-16-06	9	7 (77.7778%)	8/3/2016 ~	4.4	4.4
			9/20/2016	1.3	1.3
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U
MW-16-07	8	0 (0%)	9/22/2016	6.6	6.6
			11/9/2016	7.2	7.2
			1/10/2017	2.6	2.6
			2/27/2017	5.3	5.3
			4/18/2017	5.2	5.2
			6/6/2017	3.6	3.6
			7/25/2017	8.7	8.7
			9/14/2017	5	5
			<b>8/3/2016</b>	<b>23</b>	<b>23</b>
MW-16-08	9	0 (0%)	8/3/2016	16	16
			9/19/2016	14	14
			11/8/2016	8.5	8.5
			1/10/2017	6.4	6.4
			2/28/2017	2.9	2.9
			4/18/2017	5	5
			6/7/2017	1.8	1.8
			7/25/2017	4.7	4.7
			9/12/2017	3.5	3.5
MW-16-10	7	1 (14.2857%)	8/2/2016	7	7
			9/19/2016	3.3	3.3
			11/8/2016	1.7	1.7
			1/11/2017	1.6	1.6
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	1.7	1.7
			9/12/2017	3.4	3.4
			<b>4/18/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>
<b>8/9/2017 ~</b>	<b>2.45</b>	<b>2.45</b>			

			8/30/2017 ~	1.7	1.7
MW-16-11A	7	1 (14.2857%)	8/2/2016	3.6	3.6
			11/7/2016	1.8	1.8
			1/11/2017	5.2	5.2
			5/18/2017 ~	2.5	2.5
			6/30/2017 ~	1.45	1.45
			7/25/2017	1.7	1.7
			9/12/2017	ND<0.5 U	ND<1 U
			<b>9/22/2016</b>	<b>26</b>	<b>26</b>
			<b>6/6/2017</b>	<b>ND&lt;0.5 U</b>	<b>ND&lt;1 U</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	55	55
			9/20/2016	59	59
			11/8/2016	55	55
			1/9/2017	49	49
			3/1/2017	53	53
			4/18/2017	62	62
			6/6/2017	54	54
			7/25/2017	58	58
			9/13/2017	51	51
MW-16-06	9	0 (0%)	8/3/2016 ~	33	33
			9/20/2016	41	41
			11/9/2016	34	34
			1/10/2017	35	35
			2/28/2017	37	37
			4/18/2017	42	42
			6/6/2017 ~	40.5	40.5
			7/25/2017	49	49
			9/14/2017 ~	42	42
MW-16-07	9	0 (0%)	8/3/2016	78	78
			9/22/2016	76	76
			11/9/2016	63	63
			1/10/2017	51	51
			2/27/2017	56	56
			4/18/2017	65	65
			6/6/2017	56	56
			7/25/2017	69	69
			9/14/2017	57	57
MW-16-08	9	0 (0%)	8/3/2016	77	77
			9/19/2016	96	96
			11/8/2016	75	75
			1/10/2017	66	66
			2/28/2017	62	62
			4/18/2017	79	79
			6/7/2017	64	64
			7/25/2017	76	76
			9/12/2017	65	65
MW-16-10	7	0 (0%)	8/2/2016	65	65
			9/19/2016	77	77
			11/8/2016	65	65
			1/11/2017	74	74
			2/28/2017	88	88
			7/26/2017	88	88
			9/12/2017	91	91
			4/18/2017	120	120
			6/6/2017	130	130
8/9/2017 ~	86	86			

			8/30/2017 ~	73	73
MW-16-11A	8	0 (0%)	8/2/2016	56	56
			9/22/2016	110	110
			11/7/2016	64	64
			1/11/2017	58	58
			5/18/2017 ~	42.5	42.5
			6/30/2017 ~	39	39
			7/25/2017	52	52
			9/12/2017	52	52
			<b>6/6/2017</b>	<b>34</b>	<b>34</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 51

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/20/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/9/2017	ND<0.1 U	ND<0.2 U
			3/1/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/13/2017	ND<0.1 U	ND<0.2 U
MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.1 U	ND<0.2 U
			9/20/2016	ND<0.1 U	ND<0.2 U
			11/9/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017 ~	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/14/2017 ~	ND<0.1 U	ND<0.2 U
MW-16-07	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/22/2016	ND<0.1 U	ND<0.2 U
			11/9/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/27/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/14/2017	ND<0.1 U	ND<0.2 U
MW-16-08	9	9 (100%)	8/3/2016	ND<0.1 U	ND<0.2 U
			9/19/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/10/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			4/18/2017	ND<0.1 U	ND<0.2 U
			6/7/2017	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
MW-16-10	7	7 (100%)	8/2/2016	ND<0.1 U	ND<0.2 U
			9/19/2016	ND<0.1 U	ND<0.2 U
			11/8/2016	ND<0.1 U	ND<0.2 U
			1/11/2017	ND<0.1 U	ND<0.2 U
			2/28/2017	ND<0.1 U	ND<0.2 U
			7/26/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
			<b>4/18/2017</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>
			<b>6/6/2017</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;0.1 U</b>	<b>ND&lt;0.2 U</b>			

			8/30/2017 ~	ND<0.1 U	ND<0.2 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.1 U	ND<0.2 U
			9/22/2016	ND<0.1 U	ND<0.2 U
			11/7/2016	ND<0.1 U	ND<0.2 U
			1/11/2017	ND<0.1 U	ND<0.2 U
			5/18/2017 ~	ND<0.1 U	ND<0.2 U
			6/30/2017 ~	ND<0.1 U	ND<0.2 U
			7/25/2017	ND<0.1 U	ND<0.2 U
			9/12/2017	ND<0.1 U	ND<0.2 U
			6/6/2017	ND<0.1 U	ND<0.2 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	43	43
			9/20/2016	23	23
			11/8/2016	25	25
			1/9/2017	21	21
			3/1/2017	20	20
			4/18/2017	23	23
			6/6/2017	18	18
			7/25/2017	20	20
			9/13/2017	20	20
MW-16-06	9	0 (0%)	8/3/2016 ~	30	30
			9/20/2016	22	22
			11/9/2016	20	20
			1/10/2017	17	17
			2/28/2017	18	18
			4/18/2017	17	17
			6/6/2017 ~	16.5	16.5
			7/25/2017	17	17
			9/14/2017 ~	17	17
MW-16-07	9	0 (0%)	8/3/2016	73	73
			9/22/2016	38	38
			11/9/2016	33	33
			1/10/2017	24	24
			2/27/2017	25	25
			4/18/2017	24	24
			6/6/2017	19	19
			7/25/2017	22	22
			9/14/2017	19	19
MW-16-08	9	0 (0%)	8/3/2016	58	58
			9/19/2016	46	46
			11/8/2016	44	44
			1/10/2017	37	37
			2/28/2017	35	35
			4/18/2017	39	39
			6/7/2017	32	32
			7/25/2017	30	30
			9/12/2017	28	28
MW-16-10	7	0 (0%)	8/2/2016	33	33
			9/19/2016	22	22
			11/8/2016	21	21
			1/11/2017	15	15
			2/28/2017	20	20
			7/26/2017	16	16
			9/12/2017	16	16
			4/18/2017	23	23
			6/6/2017	21	21
8/9/2017 ~	18	18			



			8/30/2017 ~	15.5	15.5
MW-16-11A	8	0 (0%)	8/2/2016	32	32
			9/22/2016	32	32
			11/7/2016	21	21
			1/11/2017	19	19
			5/18/2017 ~	18	18
			6/30/2017 ~	18	18
			7/25/2017	19	19
			9/12/2017	17	17
			<b>6/6/2017</b>	<b>17</b>	<b>17</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 50

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	0 (0%)	8/3/2016	1.81	1.81
			9/20/2016	3.99	3.99
			11/8/2016	1.67	1.67
			1/9/2017	2.26	2.26
			3/1/2017	1.41	1.41
			4/18/2017	1.06	1.06
			6/6/2017	1.77	1.77
			7/25/2017	1.51	1.51
			9/13/2017	1.3	1.3
MW-16-06	9	0 (0%)	8/3/2016 ~	1.56	1.56
			9/20/2016	1.53	1.53
			11/9/2016	2.15	2.15
			1/10/2017	1.9	1.9
			2/28/2017	1.31	1.31
			4/18/2017	0.99	0.99
			6/6/2017 ~	1.145	1.145
			7/25/2017	1.23	1.23
			9/14/2017 ~	1.14	1.14
MW-16-07	9	0 (0%)	8/3/2016	3.26	3.26
			9/22/2016	4.09	4.09
			11/9/2016	4.48	4.48
			1/10/2017	1.85	1.85
			2/27/2017	1.78	1.78
			4/18/2017	1.88	1.88
			6/6/2017	2.46	2.46
			7/25/2017	2.54	2.54
			9/14/2017	1.86	1.86
MW-16-08	9	0 (0%)	8/3/2016	2.84	2.84
			9/19/2016	1.82	1.82
			11/8/2016	5.14	5.14
			1/10/2017	2.58	2.58
			2/28/2017	1.91	1.91
			4/18/2017	1.47	1.47
			6/7/2017	1.8	1.8
			7/25/2017	3.05	3.05
			9/12/2017	1.65	1.65
MW-16-10	7	0 (0%)	8/2/2016	2.04	2.04
			9/19/2016	1.89	1.89
			11/8/2016	2.24	2.24
			1/11/2017	1.5	1.5
			2/28/2017	0.934	0.934
			7/26/2017	1.41	1.41
			9/12/2017	1.48	1.48
			4/18/2017	0.9	0.9
			6/6/2017	1.32	1.32
8/9/2017 ~	1.48	1.48			

			<b>8/30/2017 ~</b>	<b>1.375</b>	<b>1.375</b>
MW-16-11A	7	0 (0%)	9/22/2016	2.15	2.15
			11/7/2016	1.72	1.72
			1/11/2017	1.33	1.33
			5/18/2017 ~	1.53	1.53
			6/30/2017 ~	1.665	1.665
			7/25/2017	1.58	1.58
			9/12/2017	1.3	1.3
			<b>8/2/2016</b>	<b>6.94</b>	<b>6.94</b>
			<b>6/6/2017</b>	<b>1.45</b>	<b>1.45</b>

There are 0 unused locations

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 50

Percent Non-Detects: 98.0392%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 6 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-05	9	9 (100%)	8/3/2016	ND<2.5 U	ND<5 U
			9/20/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/9/2017	ND<2.5 U	ND<5 U
			3/1/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/13/2017	ND<2.5 U	ND<5 U

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MW-16-06	9	9 (100%)	8/3/2016 ~	ND<2.5 U	ND<5 U
			9/20/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/14/2017 ~	ND<2.5 U	ND<5 U

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MW-16-07	9	8 (88.8889%)	8/3/2016	5.3	5.3
			9/22/2016	ND<2.5 U	ND<5 U
			11/9/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/27/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/14/2017	ND<2.5 U	ND<5 U

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MW-16-08	9	9 (100%)	8/3/2016	ND<2.5 U	ND<5 U
			9/19/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/10/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			4/18/2017	ND<2.5 U	ND<5 U
			6/7/2017	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U

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MW-16-10	7	7 (100%)	8/2/2016	ND<2.5 U	ND<5 U
			9/19/2016	ND<2.5 U	ND<5 U
			11/8/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			2/28/2017	ND<2.5 U	ND<5 U
			7/26/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			<b>4/18/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
			<b>6/6/2017</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>
<b>8/9/2017 ~</b>	<b>ND&lt;2.5 U</b>	<b>ND&lt;5 U</b>			

			8/30/2017 ~	ND<2.5 U	ND<5 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<2.5 U	ND<5 U
			9/22/2016	ND<2.5 U	ND<5 U
			11/7/2016	ND<2.5 U	ND<5 U
			1/11/2017	ND<2.5 U	ND<5 U
			5/18/2017 ~	ND<2.5 U	ND<5 U
			6/30/2017 ~	ND<2.5 U	ND<5 U
			7/25/2017	ND<2.5 U	ND<5 U
			9/12/2017	ND<2.5 U	ND<5 U
			6/6/2017	ND<2.5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Measurements: 51

Total Non-Detect: 46

Percent Non-Detects: 90.1961%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 6 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-05	9	8 (88.8889%)	8/3/2016	1.1	1.1
			9/20/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/9/2017	ND<0.5 U	ND<1 U
			3/1/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/13/2017	ND<0.5 U	ND<1 U
MW-16-06	9	9 (100%)	8/3/2016 ~	ND<0.5 U	ND<1 U
			9/20/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/14/2017 ~	ND<0.5 U	ND<1 U
MW-16-07	9	7 (77.7778%)	8/3/2016	2.3	2.3
			9/22/2016	ND<0.5 U	ND<1 U
			11/9/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/27/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
			7/25/2017	1	1
			9/14/2017	ND<0.5 U	ND<1 U
MW-16-08	9	7 (77.7778%)	8/3/2016	1.3	1.3
			9/19/2016	1.2	1.2
			11/8/2016	ND<0.5 U	ND<1 U
			1/10/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/7/2017	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
MW-16-10	7	7 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/19/2016	ND<0.5 U	ND<1 U
			11/8/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			2/28/2017	ND<0.5 U	ND<1 U
			7/26/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			4/18/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U
8/9/2017 ~	ND<0.5 U^	ND<1 U^			

			8/30/2017 ~	ND<0.5 U	ND<1 U
MW-16-11A	8	8 (100%)	8/2/2016	ND<0.5 U	ND<1 U
			9/22/2016	ND<0.5 U	ND<1 U
			11/7/2016	ND<0.5 U	ND<1 U
			1/11/2017	ND<0.5 U	ND<1 U
			5/18/2017 ~	ND<0.5 U	ND<1 U
			6/30/2017 ~	ND<0.5 U	ND<1 U
			7/25/2017	ND<0.5 U	ND<1 U
			9/12/2017	ND<0.5 U	ND<1 U
			6/6/2017	ND<0.5 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Skewness Coefficient

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	2.74444	4.81641	1.81691
MW-16-06	9	0.827778	2.48333	7.54422
MW-16-07	8	6	3.97887	0.373835
MW-16-08	9	7.75556	7.36802	0.897249
MW-16-10	7	2.35714	4.32738	1.70824
MW-16-11A	8	5.79375	6.00324	1.05752

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	4.256	5.43931	1.36665



## Skewness Coefficient

Parameter: Arsenic

Original Data (Not Transformed)

Cohen's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-11A	8	9.27	4.77357	0.148067
MW-16-05	9	8.23333	5.00033	-0.0637032
MW-16-06	9	-0.292	4.35522	<b>2.64762</b>
MW-16-07	8	6.88705	2.51055	0.613695
MW-16-08	9	7.66396	7.68485	0.813109
MW-16-10	7	8.25	3.88909	-0.52529

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	4.03884	6.30378	0.931901

## Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	294.444	24.5515	1.01157
MW-16-06	9	277.778	17.1594	0.519638
MW-16-07	9	334.444	50.0278	1.44883
MW-16-08	9	346.667	47.697	0.431717
MW-16-10	7	125.714	20.702	0.134164
MW-16-11A	8	302.5	99.8213	-0.0523964

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	285.882	84.2894	-0.526493

## Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	5.68214	0.0804871	0.95611
MW-16-06	9	5.62516	0.0609499	0.49528
MW-16-07	9	5.80354	0.13808	1.21299
MW-16-08	9	5.84014	0.135293	0.297747
MW-16-10	7	4.82236	0.164934	0.0455551
MW-16-11A	8	5.65309	0.394627	-1.22778

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	5.59883	0.370072	-1.40006

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	290	450	160	0.5888	94.208
2	290	370	80	0.3244	25.952
3	300	330	30	0.1976	5.928
4	320	330	10	0.0947	0.947
5	330	330	0		
6	330	320	-10		
7	330	300	-30		
8	370	290	-80		
9	450	290	-160		

---

Sum of b values = 127.035

Sample Standard Deviation = 50.0278

W Statistic = 0.805999

**5% Critical value of 0.829 exceeds 0.805999**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.805999  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.66988	6.10925	0.439367	0.5888	0.258699
2	5.66988	5.9135	0.243622	0.3244	0.079031
3	5.70378	5.79909	0.0953102	0.1976	0.0188333
4	5.76832	5.79909	0.0307717	0.0947	0.00291408
5	5.79909	5.79909	0		
6	5.79909	5.76832	-0.0307717		
7	5.79909	5.70378	-0.0953102		
8	5.9135	5.66988	-0.243622		
9	6.10925	5.66988	-0.439367		

---

Sum of b values = 0.359477

Sample Standard Deviation = 0.13808

W Statistic = 0.847205

5% Critical value of 0.829 is less than 0.847205

Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.847205

Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-11A	7	6.56429	3.30488	-0.755706
MW-16-05	9	8.38889	6.47446	1.71747
MW-16-06	9	2.88889	4.13021	2.17688
MW-16-07	8	11.9625	4.78329	0.320197
MW-16-08	9	17.3556	12.4719	0.995955
MW-16-10	7	10.2286	6.54948	0.236403

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	9.61122	8.25515	1.7573

## Skewness Coefficient

Parameter: Chromium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.92871	0.631947	0.673789
MW-16-06	9	0.538862	0.929372	1.42792
MW-16-07	8	2.40907	0.412611	-0.0660623
MW-16-08	9	2.64588	0.670618	0.392812
MW-16-10	7	2.02588	1.00685	-1.22591
MW-16-11A	7	1.67263	0.83318	-1.3333

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	1.86088	1.01347	-0.631762

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.47778	2.70729	1.66974
MW-16-06	9	1.06667	1.39463	2.2839
MW-16-07	8	5.8625	2.23411	0.377399
MW-16-08	9	7.25556	4.77915	0.710724
MW-16-10	7	4.84286	3.66554	0.989395
MW-16-11A	7	2.2	1.24097	-0.583273

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	4.13061	3.56944	1.35901



## Skewness Coefficient

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.03443	0.665075	0.486789
MW-16-06	9	-0.329777	0.782029	<b>1.82308</b>
MW-16-07	8	1.70411	0.386072	0.0171255
MW-16-08	9	1.783	0.67782	0.0796129
MW-16-10	7	1.25843	0.994225	-0.980572
MW-16-11A	7	0.546781	0.862325	-0.838728

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	0.993026	1.02931	-0.459192

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.47778	2.70729	1.66974
MW-16-06	9	0.677778	1.5778	2.21712
MW-16-07	8	5.8625	2.23411	0.377399
MW-16-08	9	7.25556	4.77915	0.710724
MW-16-10	7	4.77143	3.76772	1.05097
MW-16-11A	7	2.05714	1.4718	0.168083

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	4.02857	3.6795	1.38805

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	1.0975	0.180647	-2.36014
MW-16-06	16	1.08125	0.178769	-2.19557
MW-16-07	16	1.00687	0.210356	-1.77484
MW-16-08	16	1.13125	0.07932	0.229585
MW-16-10	14	0.889286	0.274071	-0.560684
MW-16-11A	15	0.808222	0.229616	-0.604672

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	1.00692	0.225893	-1.39077

## Skewness Coefficient

Parameter: Fluoride

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	0.0746366	0.218445	-2.90896
MW-16-06	16	0.0599271	0.21625	-2.80843
MW-16-07	16	-0.021969	0.270443	-2.0008
MW-16-08	16	0.121028	0.0699272	0.0589912
MW-16-10	14	-0.170983	0.356557	-0.720364
MW-16-11A	15	-0.257598	0.322028	-0.647146

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	-0.0270942	0.283941	-1.6905

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-05

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.3	0.8	0.5056	0.40448
2	0.96	1.2	0.24	0.329	0.07896
3	1	1.2	0.2	0.2521	0.05042
4	1.1	1.2	0.1	0.1939	0.01939
5	1.1	1.2	0.1	0.1447	0.01447
6	1.1	1.2	0.1	0.1005	0.01005
7	1.1	1.2	0.1	0.0593	0.00593
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.2	1.1	-0.1		
11	1.2	1.1	-0.1		
12	1.2	1.1	-0.1		
13	1.2	1.1	-0.1		
14	1.2	1	-0.2		
15	1.2	0.96	-0.24		
16	1.3	0.5	-0.8		

---

Sum of b values = 0.5837

Sample Standard Deviation = 0.180647

W Statistic = 0.696028

**5% Critical value of 0.887 exceeds 0.696028**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.696028**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	-0.693147	0.262364	0.955511	0.5056	0.483107
2	-0.040822	0.182322	0.223144	0.329	0.0734142
3	0	0.182322	0.182322	0.2521	0.0459633
4	0.0953102	0.182322	0.0870114	0.1939	0.0168715
5	0.0953102	0.182322	0.0870114	0.1447	0.0125905
6	0.0953102	0.182322	0.0870114	0.1005	0.00874464
7	0.0953102	0.182322	0.0870114	0.0593	0.00515977
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.182322	0.0953102	-0.0870114		
11	0.182322	0.0953102	-0.0870114		
12	0.182322	0.0953102	-0.0870114		
13	0.182322	0.0953102	-0.0870114		
14	0.182322	0	-0.182322		
15	0.182322	-0.040822	-0.223144		
16	0.262364	-0.693147	-0.955511		

---

Sum of b values = 0.645851

Sample Standard Deviation = 0.218445

W Statistic = 0.582757

**5% Critical value of 0.887 exceeds 0.582757**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.582757**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.3	0.8	0.5056	0.40448
2	0.95	1.2	0.25	0.329	0.08225
3	1	1.2	0.2	0.2521	0.05042
4	1	1.2	0.2	0.1939	0.03878
5	1.1	1.2	0.1	0.1447	0.01447
6	1.1	1.15	0.05	0.1005	0.005025
7	1.1	1.1	0	0.0593	0
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.1	1.1	0		
11	1.15	1.1	-0.05		
12	1.2	1.1	-0.1		
13	1.2	1	-0.2		
14	1.2	1	-0.2		
15	1.2	0.95	-0.25		
16	1.3	0.5	-0.8		

---

Sum of b values = 0.595425

Sample Standard Deviation = 0.178769

W Statistic = 0.739569

**5% Critical value of 0.887 exceeds 0.739569**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.739569**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	-0.693147	0.262364	0.955511	0.5056	0.483107
2	-0.0512933	0.182322	0.233615	0.329	0.0768593
3	0	0.182322	0.182322	0.2521	0.0459633
4	0	0.182322	0.182322	0.1939	0.0353521
5	0.0953102	0.182322	0.0870114	0.1447	0.0125905
6	0.0953102	0.139762	0.0444518	0.1005	0.0044674
7	0.0953102	0.0953102	0	0.0593	0
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.0953102	0.0953102	0		
11	0.139762	0.0953102	-0.0444518		
12	0.182322	0.0953102	-0.0870114		
13	0.182322	0	-0.182322		
14	0.182322	0	-0.182322		
15	0.182322	-0.0512933	-0.233615		
16	0.262364	-0.693147	-0.955511		

---

Sum of b values = 0.658339

Sample Standard Deviation = 0.21625

W Statistic = 0.617868

**5% Critical value of 0.887 exceeds 0.617868**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.617868**

**Evidence of non-normality at 99% level of significance**



## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.5	1.2	0.7	0.5056	0.35392
2	0.5	1.2	0.7	0.329	0.2303
3	0.94	1.1	0.16	0.2521	0.040336
4	0.97	1.1	0.13	0.1939	0.025207
5	1	1.1	0.1	0.1447	0.01447
6	1	1.1	0.1	0.1005	0.01005
7	1.1	1.1	0	0.0593	0
8	1.1	1.1	0	0.0196	0
9	1.1	1.1	0		
10	1.1	1.1	0		
11	1.1	1	-0.1		
12	1.1	1	-0.1		
13	1.1	0.97	-0.13		
14	1.1	0.94	-0.16		
15	1.2	0.5	-0.7		
16	1.2	0.5	-0.7		

---

Sum of b values = 0.674283

Sample Standard Deviation = 0.210356

W Statistic = 0.68499

**5% Critical value of 0.887 exceeds 0.68499**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.68499**

**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 8 for 16 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	-0.693147	0.182322	0.875469	0.5056	0.442637
2	-0.693147	0.182322	0.875469	0.329	0.288029
3	-0.0618754	0.0953102	0.157186	0.2521	0.0396265
4	-0.0304592	0.0953102	0.125769	0.1939	0.0243867
5	0	0.0953102	0.0953102	0.1447	0.0137914
6	0	0.0953102	0.0953102	0.1005	0.00957867
7	0.0953102	0.0953102	0	0.0593	0
8	0.0953102	0.0953102	0	0.0196	0
9	0.0953102	0.0953102	0		
10	0.0953102	0.0953102	0		
11	0.0953102	0	-0.0953102		
12	0.0953102	0	-0.0953102		
13	0.0953102	-0.0304592	-0.125769		
14	0.0953102	-0.0618754	-0.157186		
15	0.182322	-0.693147	-0.875469		
16	0.182322	-0.693147	-0.875469		

---

Sum of b values = 0.818049

Sample Standard Deviation = 0.270443

W Statistic = 0.609979

**5% Critical value of 0.887 exceeds 0.609979**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.844 exceeds 0.609979**

**Evidence of non-normality at 99% level of significance**

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Aitchison's Adjustment

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	16	1.06625	0.296802	0.0673564
MW-16-06	16	1.05	0.293825	0.0800714
MW-16-07	16	0.944375	0.375499	0.0835742
MW-16-08	16	1.13125	0.07932	0.229585
MW-16-10	14	0.746429	0.49984	0.281128
MW-16-11A	15	0.641556	0.471515	0.411854

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
93	0.937025	0.39121	0.116362

## Skewness Coefficient

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.61111	2.99893	1.81739
MW-16-06	9	1.02222	1.294	2.29847
MW-16-07	8	5.525	1.9543	0.114555
MW-16-08	9	6.97778	4.97488	0.878446
MW-16-10	7	2.74286	2.13608	1.1556
MW-16-11A	7	2.39286	1.5627	0.741547

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	3.76837	3.41014	1.69528

## Skewness Coefficient

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.05315	0.690688	0.489817
MW-16-06	9	-0.34534	0.754472	<b>1.86086</b>
MW-16-07	8	1.64834	0.386411	-0.52269
MW-16-08	9	1.71892	0.717566	0.068632
MW-16-10	7	0.743103	0.827518	-0.336561
MW-16-11A	7	0.663245	0.748863	-0.563398

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
49	0.915748	0.981552	-0.302976

## Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	55.1111	4.04489	0.20306
MW-16-06	9	39.2778	5.05662	0.493967
MW-16-07	9	63.4444	9.4222	0.351593
MW-16-08	9	73.3333	10.6536	0.949387
MW-16-10	7	78.2857	10.9805	-0.119962
MW-16-11A	8	59.1875	22.0583	<b>1.67414</b>

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	60.8235	16.841	0.579078

## Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	4.00697	0.0731896	0.0789647
MW-16-06	9	3.66346	0.126602	0.278714
MW-16-07	9	4.14052	0.146804	0.200143
MW-16-08	9	4.28621	0.138705	0.696363
MW-16-10	7	4.35174	0.14266	-0.203025
MW-16-11A	8	4.03259	0.314509	1.10921

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	4.07054	0.278116	-0.112333

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-11A

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	39	110	71	0.6052	42.9692
2	42.5	64	21.5	0.3164	6.8026
3	52	58	6	0.1743	1.0458
4	52	56	4	0.0561	0.2244
5	56	52	-4		
6	58	52	-6		
7	64	42.5	-21.5		
8	110	39	-71		

---

Sum of b values = 51.042

Sample Standard Deviation = 22.0583

W Statistic = 0.764918

**5% Critical value of 0.818 exceeds 0.764918**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.764918  
Data is normally distributed at 99% level of significance



## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-11A

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.66356	4.70048	1.03692	0.6052	0.627543
2	3.7495	4.15888	0.409379	0.3164	0.129528
3	3.95124	4.06044	0.109199	0.1743	0.0190334
4	3.95124	4.02535	0.074108	0.0561	0.00415746
5	4.02535	3.95124	-0.074108		
6	4.06044	3.95124	-0.109199		
7	4.15888	3.7495	-0.409379		
8	4.70048	3.66356	-1.03692		

---

Sum of b values = 0.780262

Sample Standard Deviation = 0.314509

W Statistic = 0.87926

5% Critical value of 0.818 is less than 0.87926  
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.87926  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	23.6667	7.54983	2.11944
MW-16-06	9	19.3889	4.37163	1.79557
MW-16-07	9	30.7778	17.0278	1.90393
MW-16-08	9	38.7778	9.39119	0.851996
MW-16-10	7	20.4286	6.18755	1.25926
MW-16-11A	8	22	6.27922	1.04371

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	26.1275	11.4904	1.96117

## Skewness Coefficient

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	3.13035	0.256218	1.8128
MW-16-06	9	2.94606	0.195269	1.57811
MW-16-07	9	3.33105	0.42687	1.32689
MW-16-08	9	3.63358	0.230075	0.47356
MW-16-10	7	2.983	0.271862	0.873361
MW-16-11A	8	3.05985	0.257785	0.974189

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
51	3.19077	0.362574	0.990304

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	18	43	25	0.5888	14.72
2	20	25	5	0.3244	1.622
3	20	23	3	0.1976	0.5928
4	20	23	3	0.0947	0.2841
5	21	21	0		
6	23	20	-3		
7	23	20	-3		
8	25	20	-5		
9	43	18	-25		

---

Sum of b values = 17.2189

Sample Standard Deviation = 7.54983

W Statistic = 0.650199

**5% Critical value of 0.829 exceeds 0.650199**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.650199**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.89037	3.7612	0.870828	0.5888	0.512744
2	2.99573	3.21888	0.223144	0.3244	0.0723878
3	2.99573	3.13549	0.139762	0.1976	0.027617
4	2.99573	3.13549	0.139762	0.0947	0.0132355
5	3.04452	3.04452	0		
6	3.13549	2.99573	-0.139762		
7	3.13549	2.99573	-0.139762		
8	3.21888	2.99573	-0.223144		
9	3.7612	2.89037	-0.870828		

---

Sum of b values = 0.625984

Sample Standard Deviation = 0.256218

W Statistic = 0.746132

**5% Critical value of 0.829 exceeds 0.746132**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.746132**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-06

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	16.5	30	13.5	0.5888	7.9488
2	17	22	5	0.3244	1.622
3	17	20	3	0.1976	0.5928
4	17	18	1	0.0947	0.0947
5	17	17	0		
6	18	17	-1		
7	20	17	-3		
8	22	17	-5		
9	30	16.5	-13.5		

---

Sum of b values = 10.2583

Sample Standard Deviation = 4.37163

W Statistic = 0.688295

**5% Critical value of 0.829 exceeds 0.688295**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.688295**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.80336	3.4012	0.597837	0.5888	0.352006
2	2.83321	3.09104	0.257829	0.3244	0.0836398
3	2.83321	2.99573	0.162519	0.1976	0.0321137
4	2.83321	2.89037	0.0571584	0.0947	0.0054129
5	2.83321	2.83321	0		
6	2.89037	2.83321	-0.0571584		
7	2.99573	2.83321	-0.162519		
8	3.09104	2.83321	-0.257829		
9	3.4012	2.80336	-0.597837		

---

Sum of b values = 0.473173

Sample Standard Deviation = 0.195269

W Statistic = 0.73398

**5% Critical value of 0.829 exceeds 0.73398**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.73398**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-07

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	19	73	54	0.5888	31.7952
2	19	38	19	0.3244	6.1636
3	22	33	11	0.1976	2.1736
4	24	25	1	0.0947	0.0947
5	24	24	0		
6	25	24	-1		
7	33	22	-11		
8	38	19	-19		
9	73	19	-54		

---

Sum of b values = 40.2271

Sample Standard Deviation = 17.0278

W Statistic = 0.697642

**5% Critical value of 0.829 exceeds 0.697642**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.697642**  
**Evidence of non-normality at 99% level of significance**



## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.94444	4.29046	1.34602	0.5888	0.792537
2	2.94444	3.63759	0.693147	0.3244	0.224857
3	3.09104	3.49651	0.405465	0.1976	0.0801199
4	3.17805	3.21888	0.040822	0.0947	0.00386584
5	3.17805	3.17805	0		
6	3.21888	3.17805	-0.040822		
7	3.49651	3.09104	-0.405465		
8	3.63759	2.94444	-0.693147		
9	4.29046	2.94444	-1.34602		

---

Sum of b values = 1.10138

Sample Standard Deviation = 0.42687

W Statistic = 0.832132

5% Critical value of 0.829 is less than 0.832132  
Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.832132  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	1.86444	0.867613	1.7901
MW-16-06	9	1.43944	0.383849	0.713621
MW-16-07	9	2.68889	1.02732	0.761539
MW-16-08	9	2.47333	1.14409	1.49391
MW-16-10	7	1.642	0.443285	-0.170195
MW-16-11A	7	1.61071	0.285342	0.818505

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	1.97928	0.892146	1.80807

## Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-05	9	0.550291	0.380046	1.07063
MW-16-06	9	0.334522	0.255133	0.411715
MW-16-07	9	0.929541	0.358243	0.519467
MW-16-08	9	0.829284	0.394328	0.879177
MW-16-10	7	0.46126	0.293093	-0.630276
MW-16-11A	7	0.463979	0.169948	0.513871

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
50	0.605388	0.378112	0.807454

## Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	1.06	3.99	2.93	0.5888	1.72518
2	1.3	2.26	0.96	0.3244	0.311424
3	1.41	1.81	0.4	0.1976	0.07904
4	1.51	1.77	0.26	0.0947	0.024622
5	1.67	1.67	0		
6	1.77	1.51	-0.26		
7	1.81	1.41	-0.4		
8	2.26	1.3	-0.96		
9	3.99	1.06	-2.93		

---

Sum of b values = 2.14027

Sample Standard Deviation = 0.867613

W Statistic = 0.760667

**5% Critical value of 0.829 exceeds 0.760667**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.760667**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-05

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	0.0582689	1.38379	1.32552	0.5888	0.780468
2	0.262364	0.815365	0.553001	0.3244	0.179393
3	0.34359	0.593327	0.249737	0.1976	0.0493481
4	0.41211	0.57098	0.15887	0.0947	0.015045
5	0.512824	0.512824	0		
6	0.57098	0.41211	-0.15887		
7	0.593327	0.34359	-0.249737		
8	0.815365	0.262364	-0.553001		
9	1.38379	0.0582689	-1.32552		

---

Sum of b values = 1.02425

Sample Standard Deviation = 0.380046

W Statistic = 0.907933

5% Critical value of 0.829 is less than 0.907933

Data is normally distributed at 95% level of significance

1% Critical value of 0.764 is less than 0.907933

Data is normally distributed at 99% level of significance

# Non-Parametric Tolerance Interval MW-16-05

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 66.6667%

Background measurements (n) = 9

Maximum Background Concentration = 14

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 5.68214

Background standard deviation = 0.0804871

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 5.9261

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Chromium**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.92871

Background standard deviation = 0.631947

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.84414

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Cobalt**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.03443

Background standard deviation = 0.665075

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.05028

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 6.25%

Background measurements (n) = 16

Maximum Background Concentration = 1.3

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.05315

Background standard deviation = 0.690688

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.14662

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-05

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 55.1111

Background standard deviation = 4.04489

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 67.3712

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 43

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.550291

Background standard deviation = 0.380046

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 1.70221

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-05

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.1

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-06

**Parameter: Arsenic**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 7.45

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-06

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 277.778

Background standard deviation = 17.1594

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 329.788

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-06

**Parameter: Chromium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 66.6667%

Background measurements (n) = 9

Maximum Background Concentration = 13.5

Minimum Coverage = 71.7%

Average Coverage = 90%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Non-Parametric Tolerance Interval MW-16-06

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 4.7

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-06

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 6.25%

Background measurements (n) = 16

Maximum Background Concentration = 1.3

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Non-Parametric Tolerance Interval

MW-16-06

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 4.4

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-06

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 39.2778

Background standard deviation = 5.05662

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 54.6044

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-06

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 30

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.43944

Background standard deviation = 0.383849

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.60289

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 6

Background standard deviation = 3.97887

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 18.6846

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 5.80354

Background standard deviation = 0.13808

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 6.22207

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

MW-16-07

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.7

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-07

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.3

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 11.9625

Background standard deviation = 4.78329

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 27.2116

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 5.8625

Background standard deviation = 2.23411

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 12.9848

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-07

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 12.5%

Background measurements (n) = 16

Maximum Background Concentration = 1.2

Minimum Coverage = 82.9%

Average Coverage = 94.1176%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 5.525

Background standard deviation = 1.9543

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 11.7553

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 63.4444

Background standard deviation = 9.4222

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 92.0031

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.33105

Background standard deviation = 0.42687

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 4.62489

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.68889

Background standard deviation = 1.02732

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 5.8027

---

Location	Date	Value	Significant
----------	------	-------	-------------

## Non-Parametric Tolerance Interval

MW-16-07

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 5.3

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

## Non-Parametric Tolerance Interval

MW-16-07

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 2.3

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-08

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.1

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Arsenic

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 7.75556

Background standard deviation = 7.36802

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 30.088

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 346.667

Background standard deviation = 47.697

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 491.236

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Non-Parametric Tolerance Interval

MW-16-08

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 1.6

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

# MW-16-08

**Parameter: Cadmium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1.5

Minimum Coverage = 71.7%

Average Coverage = 90%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 17.3556

Background standard deviation = 12.4719

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 55.1578

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 7.25556

Background standard deviation = 4.77915

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 21.7412

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.13125

Background standard deviation = 0.07932

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.33137

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 6.97778

Background standard deviation = 4.97488

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 22.0566

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 73.3333

Background standard deviation = 10.6536

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 105.625

---

Location	Date	Value	Significant
----------	------	-------	-------------

## Parametric Tolerance Interval Analysis

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

### USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 38.7778

Background standard deviation = 9.39119

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 67.2425

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis

MW-16-08

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.829284

Background standard deviation = 0.394328

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.02449

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-08

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 1.3

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

## Non-Parametric Tolerance Interval

MW-16-10

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 85.7143%

Background measurements (n) = 7

Maximum Background Concentration = 2.1

Minimum Coverage = 65.2%

Average Coverage = 87.5%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

# MW-16-10

**Parameter: Arsenic**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 71.4286%

Background measurements (n) = 7

Maximum Background Concentration = 11

Minimum Coverage = 65.2%

Average Coverage = 87.5%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 125.714

Background standard deviation = 20.702

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 196.08

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 10.2286

Background standard deviation = 6.54948

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 32.4903

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 4.84286

Background standard deviation = 3.66554

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 17.302

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Fluoride

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 14

Background mean = 0.746429

Background standard deviation = 0.49984

One-sided normal tolerance factor (K) at 95% confidence = 2.614

Upper tolerance limit = 2.05301

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 0.743103

Background standard deviation = 0.827518

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.55584

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 78.2857

Background standard deviation = 10.9805

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 115.608

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.983

Background standard deviation = 0.271862

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.90706

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-10

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 1.642

Background standard deviation = 0.443285

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 3.14872

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-11/MW-16-11A

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 62.5%

Background measurements (n) = 8

Maximum Background Concentration = 3.2

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Arsenic

Original Data (Not Transformed)

Cohen's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 9.27

Background standard deviation = 4.77357

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 24.4882

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 302.5

Background standard deviation = 99.8213

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 620.73

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval MW-16-11/MW-16-11A

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%

Background measurements (n) = 8

Maximum Background Concentration = 1.6

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Chromium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 6.56429

Background standard deviation = 3.30488

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 17.7976

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Cobalt

Original Data (Not Transformed)

Aitchison's Adjustment

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.05714

Background standard deviation = 1.4718

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 7.05979

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Aitchison's Adjustment**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15

Background mean = 0.641556

Background standard deviation = 0.471515

One-sided normal tolerance factor (K) at 95% confidence = 2.566

Upper tolerance limit = 1.85146

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Lead**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 2.39286

Background standard deviation = 1.5627

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 7.70447

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

**Parameter: Lithium**

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 4.03259

Background standard deviation = 0.314509

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 5.03524

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 3.05985

Background standard deviation = 0.257785

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 3.88167

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-11/MW-16-11A

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 7

Background mean = 1.61071

Background standard deviation = 0.285342

One-sided normal tolerance factor (K) at 95% confidence = 3.399

Upper tolerance limit = 2.58059

---

Location	Date	Value	Significant
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# **APPENDIX M – FATE AND TRANSPORT MODEL INPUTS**




# Calculation Package


**COMPUTATION COVER SHEET**

Client:   DTE   Project:   BRPP ALD   Project/  
Proposal No.:   GLP8017    
Task No.


Title of Computations   Vertical Darcy Velocity and Travel Time Calculations  

Computations by: Signature  11/17/2021  
Printed Name   Nick Williams   Date  
Title   Senior Staff Professional  

Assumptions and Procedures Checked by: Signature  11/17/2021  
Printed Name   Jesse Varsho   Date  
(peer reviewer) Title \_\_\_\_\_

Computations Checked by: Signature  11/17/2021  
Printed Name   Isaiah Vaught   Date  
Title \_\_\_\_\_

Computations backchecked by: Signature  11/17/2021  
(originator) Printed Name   Nick Williams   Date  
Title \_\_\_\_\_

Approved by: Signature  11/24/2021  
(pm or designate) Printed Name   Omer Bozok   Date  
Title \_\_\_\_\_

Approval notes: \_\_\_\_\_

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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3. DARCY VELOCITY SOLUTION .....	3
4. TRAVEL TIME SOLUTION.....	4

## 1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Belle River Power Plant Diversion Basin (DB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the DB to the Uppermost Aquifer.

## 2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

## 3. SOLUTION

The Darcy velocity ( $q$ ) through the model lithologies or layers is expressed in m/year =

$$= K(i) = K \left( \frac{H_1 - H_2}{l_1 - l_2} \right)$$

Where,

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$H_1 - H_2$  = difference in hydraulic head between the DB water level and the uppermost aquifer potentiometric surface

$l_1 - l_2$  = distance in direction of flow

Thus:

$K$  = Geomean of Clay with Sand hydraulic conductivity value (data provided in Attachment 1) = Total  $2.15 \times 10^{-8}$  cm/s

$H_1$  = head at the bottom of DB = 579 ft

$H_2$  = Average water level elevation from monitoring wells (data provided in Attachment 2) = 575.16<sup>1</sup> ft

$l_1$  = Bottom of ash pond = 574 ft

$l_2$  = Average elevation of well screen midpoints = 449.88<sup>1</sup> ft

$q$  = **Darcy velocity in m/year (= cm/s \* 315360) =  $2.03 \times 10^{-4}$  m/year**

<sup>1</sup> Value is an average taken from all monitoring wells

#### 4. TRAVEL TIME SOLUTION

Travel time ( $T$ ) through the model lithology is expressed in years =

$$T = t / \left( \frac{K * i}{n} \right)$$

Where:

$t$  = minimum model thickness

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$n$  = effective porosity

Thus:

$t$  = Minimum model thickness per EVS model = 35.36 m

$K$  = Hydraulic conductivity =  $2.15 \times 10^{-8}$  cm/s

$i$  = Calculated using variables in Section 3 = 0.03

$n$  = Average of porosity data from Clay with Sand layer, converted to effective porosity using Sara (1994) = 0.34

$T$  = **Travel time in years (= s / 31536000) = 59,105 years**

**Note:** Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of DB to top of uppermost aquifer.

# Attachment 1

Location ID	Layer	Elevation (ft)	Vertical Hydraulic Conductivity, $k_v$ (cm/s)		Vertical Hydraulic Conductivity, $k_v$ (cm/s)		
			DDW	Site Water	Clay	Clay with Sand	Dike
B1-ST-3 (36-38)	Clay	555.8	2.20E-08		2.20E-08		
	Clay	555.8	2.60E-09		2.60E-09		
B2-ST-2 (7-9)	Dike	584.0	2.10E-08				2.10E-08
	Dike	584.0	1.90E-08				1.90E-08
B2-ST-7 (97-99)	Clay with Sand	494.0	3.30E-08			3.30E-08	
	Clay with Sand	494.0	2.00E-08			2.00E-08	
B3-ST-1 (1-3)	Dike	590.0	9.50E-09				9.50E-09
B4-ST-4 (67-69)	Clay with Sand	518.0	2.80E-08			2.80E-08	
	Clay with Sand	518.0	1.80E-08			1.80E-08	
B5-ST-2 (27-29)	Clay	563.3	3.40E-08		3.40E-08		
	Clay	563.3	2.30E-08		2.30E-08		
B6-ST-4 (47-49)	Clay	541.3	2.50E-08		2.50E-08		
	Clay	541.3	1.80E-08		1.80E-08		
B6-ST-7 (97-99)	Clay with Sand	491.3	2.40E-08			2.40E-08	
	Clay with Sand	491.3	1.20E-08			1.20E-08	
B1-ST-1 (7-9)	Dike	584.8		8.20E-09			8.20E-09
B2-ST-1 (1-3)	Dike	590.0		1.20E-08			1.20E-08
B2-ST-4 (47-49)	Clay	544.0		2.20E-08	2.20E-08		
B3-ST-5 (77-79)	Clay with Sand	514.0		1.90E-08		1.90E-08	
B4-ST-3 (47-49)	Clay	538.0		2.80E-08	2.80E-08		
B5-ST-5 (87-89)	Clay with Sand	503.3		1.50E-08		1.50E-08	
MW-16-01	Clay with Sand	537.2	2.90E-08			2.90E-08	
MW-16-05	Clay with Sand	537.3	2.70E-08			2.70E-08	
MW-16-07	Clay	538.9	2.90E-08		2.90E-08		
MW-16-02	Sand	491.7					
MW-16-03	Sand	453.7					
MW-16-06	Sand	452.5					
MW-16-08	Sand	453.8					
MW-16-09	Sand	449.9					
MW-16-10	Sand	441.8					
MW-16-11A	Sand	450.0					
SB-16-01	Clay	537.7	2.10E-08		2.10E-08		
<b>Statistical Parameter</b>					<b>Clay</b>	<b>Clay with Sand</b>	<b>Dike</b>
<b>Mean</b>					2.25E-08	2.25E-08	1.39E-08
<b>GeoMean</b>					<b>1.94E-08</b>	<b>2.15E-08</b>	<b>1.30E-08</b>
<b>Maximum</b>					3.40E-08	3.30E-08	2.10E-08
<b>Minimum</b>					2.60E-09	1.20E-08	8.20E-09
<b>Count</b>					10	10	5
<b>Standard Deviation</b>					8.37E-09	6.75E-09	5.74E-09

## Attachment 2



Table 1

Summary of Groundwater Elevation Data – March and September 2020  
 Belle River Power Plant Diversion Basin – RCRA CCR Monitoring Program  
 China Township, Michigan

Well ID	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11A	
Date Installed	3/4/2016		3/11/2016		3/9/2016		3/10/2016		6/6/2016		5/12/2017	
TOC Elevation	590.82		593.21		592.58		591.88		592.26		591.66	
Geologic Unit of Screened Interval	Clayey Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Gravelly Silt and Silty Clay		Silt and Silty Clay	
Screened Interval Elevation	449.3 to 444.3		455.0 to 450.0		456.9 to 451.9		456.3 to 451.3		444.3 to 439.3		452.5 to 447.5	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
03/17/2020	16.76	574.06	17.50	575.71	16.62	575.96	15.57	576.31	17.74	574.52	16.81	574.85
09/14/2020	16.85	573.97	17.60	575.61	16.71	575.87	15.60	576.28	17.83	574.43	16.88	574.78

**Notes:**

Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet Below top of casing

Well ID	MW-16-05	MW-16-06	MW-16-07	MW-16-08	MW-16-10	MW-16-11A
Screen Mid Point Elevation, $I_2$ (ft)	446.8	452.5	454.4	453.8	441.8	450
Aquifer Water Level, $H_2$ (ft)	574.0	575.6	575.9	576.3	574.4	574.8
Total Head Difference, $H_1 - H_2$ (ft)	5.03	3.4	3.1	2.7	4.6	4.22
Flow Distance, $I_1 - I_2$ (ft)	127.2	121.5	119.6	120.2	132.2	124
Gradient, $i$	0.04	0.03	0.03	0.02	0.03	0.03

Pond Water Elevation, $H_1$ (ft)	579
Elevation of Pond Outflow, $I_1$ (ft)	574

Average Gradient	0.03
------------------	------

# POLLUTE Model Inputs

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Dist. Coeff.	Dry Density (kg/m <sup>3</sup> )
DB	Clay	2.03E-04	4.07E-04	11.13	12.13	10.70	20	1.94E-08	0.019	0.02375	0.01425	0.37	0.45	0.28	0	1509.084
	Clay with Sand	2.03E-04	4.07E-04	25.66	26.82	24.66	50	2.15E-08	0.019	0.02375	0.01425	0.34	0.45	0.20	0	1509.084

Notes:

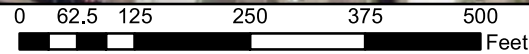
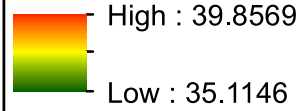
1. Kv = vertical hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table M-1
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. Kv of Clay with Sand selected for the calculation of the Darcy velocity as the higher and thus more conservative value of the two layers; POLLUTE only allows one input for Darcy velocity
4. CoHD = Coefficient of Hydrodynamic Dispersion
5. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994

## Model Thickness



**DB Clay Thickness (ft)**

**Value**



**Diversion Basin  
Clay Thickness**

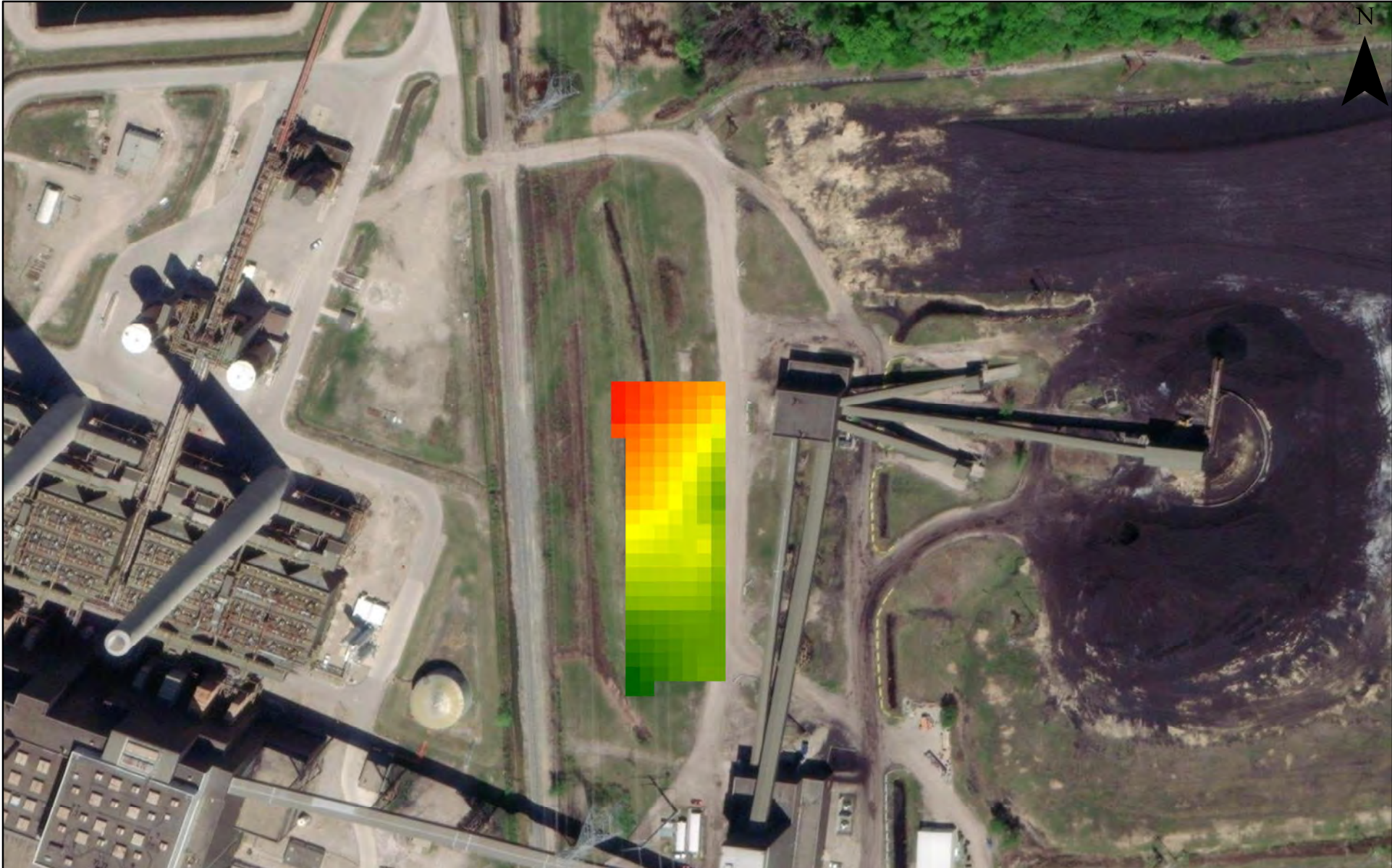


10/13/2021

Chicago, IL

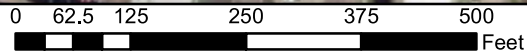
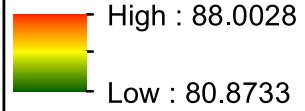
**Figure**

**M-1**



**DB Clay with Sand Thickness (ft)**

**Value**



**Diversion Basin  
Clay with Sand Thickness**



10/13/2021

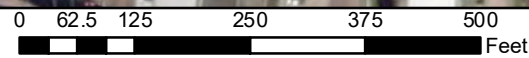
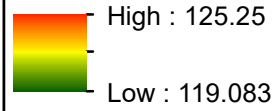
Chicago, IL

**Figure  
M-2**



**Model Interval Thickness**

**Value**

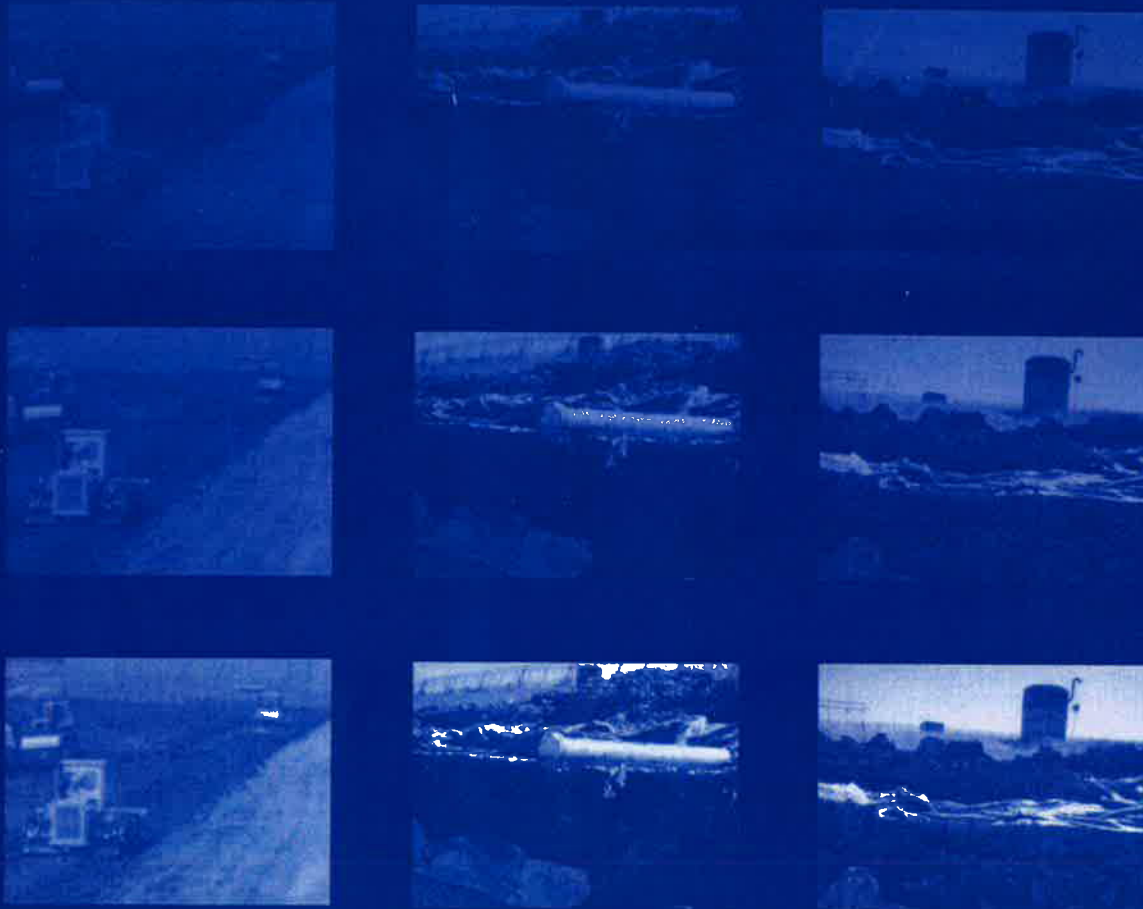


<b>Diversion Basin Model Interval Thickness</b>		<b>Figure M-3</b>
		
11/11/2021	Chicago, IL	

## Reference Material



 **CRC Press**  
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# **BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES**

2ND EDITION

**R. Kerry Rowe, Robert M. Quigley,  
Richard W.I. Brachman & John R. Booker**

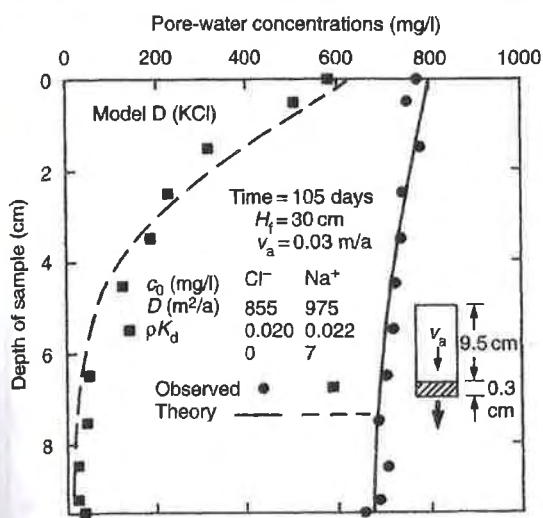


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe et al., 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some con-

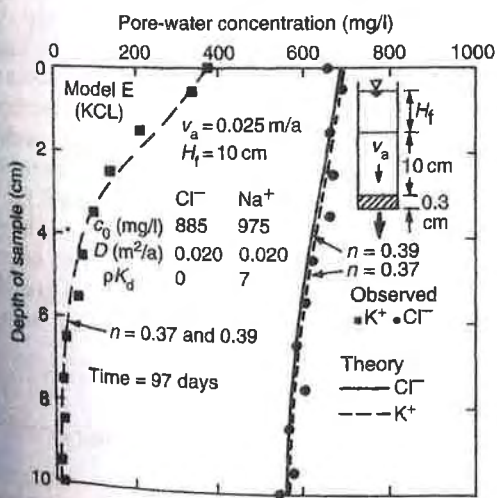


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe et al., 1988).

fidence in the parameters  $D$  and  $\rho K_d$  for the clay and source fluids examined.

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient,  $D$ , for chloride was deduced for each model and ranged between 0.018 and 0.02 m<sup>2</sup>/a with an average value of 0.019 m<sup>2</sup>/a. This small variation in  $D$  does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m<sup>2</sup>/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters  $D$  and  $K_d$ . Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

### 8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection-diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

# SITE ASSESSMENT and REMEDIATION Handbook **Second Edition**

**Martin N. Sara**



 **LEWIS PUBLISHERS**

**Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils**

Texture Class	Sample Size	Total	Residual	Effective
		Porosity ( $\phi$ ) cm <sup>3</sup> /cm <sup>3</sup>	Saturation ( $\phi_r$ ) cm <sup>3</sup> /cm <sup>3</sup>	Porosity ( $\phi_c$ ) cm <sup>3</sup> /cm <sup>3</sup>
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 (0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 (0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value

Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.

**APPENDIX N – FATE AND TRANSPORT  
MODEL OUTPUTS**

# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.163E+01	4.115E-42
1.215E+01	2.886E-44
1.266E+01	1.729E-46
1.317E+01	1.611E-48
1.369E+01	3.150E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
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3.113E+01	0.000E+00
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3.216E+01	0.000E+00

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	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.163E+01	1.536E-30
	1.215E+01	9.625E-32
	1.266E+01	8.577E-33
	1.317E+01	7.168E-34
	1.369E+01	5.323E-35
	1.420E+01	3.484E-36
	1.471E+01	2.002E-37
	1.523E+01	1.004E-38
	1.574E+01	4.381E-40
	1.625E+01	1.654E-41
	1.677E+01	5.396E-43
	1.728E+01	1.540E-44
	1.779E+01	4.101E-46
	1.830E+01	1.269E-47
	1.882E+01	6.022E-49
	1.933E+01	3.898E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00



	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.861E-21 1.862E-22 1.219E-23 6.752E-25 3.146E-26 1.242E-27 4.465E-29 2.066E-30 1.929E-31 2.619E-32 3.607E-33 4.641E-34 5.507E-35

1.728E+01	6.009E-36
1.779E+01	6.013E-37
1.830E+01	5.504E-38
1.882E+01	4.597E-39
1.933E+01	3.494E-40
1.984E+01	2.411E-41
2.036E+01	1.510E-42
2.087E+01	8.602E-44
2.138E+01	4.545E-45
2.190E+01	2.370E-46
2.241E+01	1.414E-47
2.292E+01	1.132E-48
2.344E+01	1.162E-49
2.395E+01	1.295E-50
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

20

0.000E+00	1.000E+00
5.560E-01	5.278E-01
1.112E+00	2.054E-01
1.668E+00	5.706E-02
2.224E+00	1.109E-02
2.780E+00	1.487E-03
3.336E+00	1.363E-04
3.892E+00	8.492E-06
4.448E+00	3.580E-07
5.004E+00	1.018E-08
5.560E+00	1.955E-10
6.116E+00	2.767E-12
6.672E+00	1.055E-13
7.228E+00	2.428E-14
7.784E+00	6.299E-15
8.340E+00	1.483E-15
8.896E+00	3.142E-16

	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.538E-18
	1.112E+01	2.150E-19
	1.163E+01	3.018E-20
	1.215E+01	3.793E-21
	1.266E+01	4.251E-22
	1.317E+01	4.231E-23
	1.369E+01	3.723E-24
	1.420E+01	2.882E-25
	1.471E+01	1.960E-26
	1.523E+01	1.179E-27
	1.574E+01	6.610E-29
	1.625E+01	4.258E-30
	1.677E+01	4.525E-31
	1.728E+01	7.420E-32
	1.779E+01	1.352E-32
	1.830E+01	2.396E-33
	1.882E+01	4.020E-34
	1.933E+01	6.345E-35
	1.984E+01	9.404E-36
	2.036E+01	1.307E-36
	2.087E+01	1.699E-37
	2.138E+01	2.065E-38
	2.190E+01	2.340E-39
	2.241E+01	2.470E-40
	2.292E+01	2.425E-41
	2.344E+01	2.212E-42
	2.395E+01	1.879E-43
	2.446E+01	1.500E-44
	2.498E+01	1.155E-45
	2.549E+01	9.196E-47
	2.600E+01	8.513E-48
	2.652E+01	9.956E-49
	2.703E+01	1.392E-49
	2.754E+01	2.081E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01

1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
3.336E+00  
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4.448E+00  
5.004E+00  
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6.116E+00  
6.672E+00  
7.228E+00  
7.784E+00  
8.340E+00  
8.896E+00  
9.452E+00  
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1.056E+01  
1.112E+01  
1.163E+01  
1.215E+01  
1.266E+01  
1.317E+01  
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3.011E+01  
3.062E+01

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6.142E-17  
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2.590E-29  
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3.638E-31  
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3.443E-33  
7.069E-34  
1.383E-34  
2.575E-35  
4.556E-36  
7.651E-37  
1.218E-37  
1.836E-38  
2.618E-39  
3.526E-40  
4.482E-41  
5.372E-42  
6.077E-43  
6.509E-44  
6.675E-45  
6.741E-46  
7.118E-47  
8.587E-48  
1.252E-48  
2.124E-49  
3.859E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.386E-15
	1.056E+01	6.986E-16
	1.112E+01	1.974E-16
	1.163E+01	5.564E-17
	1.215E+01	1.472E-17
	1.266E+01	3.645E-18
	1.317E+01	8.441E-19
	1.369E+01	1.824E-19
	1.420E+01	3.672E-20
	1.471E+01	6.868E-21
	1.523E+01	1.191E-21
	1.574E+01	1.911E-22
	1.625E+01	2.829E-23
	1.677E+01	3.855E-24
	1.728E+01	4.824E-25
	1.779E+01	5.537E-26
	1.830E+01	5.835E-27
	1.882E+01	5.711E-28
	1.933E+01	5.434E-29
	1.984E+01	5.762E-30
	2.036E+01	8.459E-31
	2.087E+01	1.766E-31
	2.138E+01	4.314E-32
	2.190E+01	1.076E-32
	2.241E+01	2.615E-33
	2.292E+01	6.129E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.379E-34 2.978E-35 6.163E-36 1.221E-36 2.316E-37 4.197E-38 7.265E-39 1.200E-39 1.889E-40 2.833E-41 4.046E-42 5.506E-43 7.163E-44 8.983E-45 1.108E-45 1.399E-46 1.933E-47 3.100E-48 5.784E-49 1.187E-49 2.521E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.121E-14 3.931E-15 1.344E-15 4.576E-16 1.478E-16 4.524E-17 1.311E-17 3.590E-18 9.281E-19 2.262E-19 5.186E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.117E-20 2.257E-21 4.268E-22 7.542E-23 1.242E-23 1.905E-24 2.713E-25 3.588E-26 4.414E-27 5.109E-28 5.789E-29 7.168E-30 1.158E-30 2.579E-31 6.848E-32 1.897E-32 5.189E-33 1.379E-33 3.545E-34 8.797E-35 2.107E-35 4.863E-36 1.082E-36 2.316E-37 4.771E-38 9.449E-39 1.798E-39 3.283E-40 5.752E-41 9.665E-42 1.558E-42 2.411E-43 3.598E-44 5.226E-45 7.536E-46 1.120E-46 1.812E-47 3.340E-48 7.017E-49 1.608E-49 3.823E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.628E-14
1.056E+01	1.434E-14
1.112E+01	5.636E-15
1.163E+01	2.204E-15
1.215E+01	8.241E-16
1.266E+01	2.945E-16
1.317E+01	1.005E-16
1.369E+01	3.270E-17
1.420E+01	1.014E-17
1.471E+01	2.992E-18
1.523E+01	8.391E-19
1.574E+01	2.235E-19
1.625E+01	5.643E-20
1.677E+01	1.349E-20
1.728E+01	3.050E-21
1.779E+01	6.511E-22
1.830E+01	1.310E-22
1.882E+01	2.480E-23
1.933E+01	4.413E-24
1.984E+01	7.366E-25
2.036E+01	1.152E-25
2.087E+01	1.689E-26
2.138E+01	2.330E-27
2.190E+01	3.067E-28
2.241E+01	4.023E-29
2.292E+01	5.849E-30
2.344E+01	1.092E-30
2.395E+01	2.694E-31
2.446E+01	7.770E-32
2.498E+01	2.338E-32
2.549E+01	6.985E-33
2.600E+01	2.038E-33
2.652E+01	5.777E-34
2.703E+01	1.589E-34
2.754E+01	4.236E-35
2.806E+01	1.094E-35
2.857E+01	2.737E-36
2.908E+01	6.623E-37
2.960E+01	1.550E-37
3.011E+01	3.507E-38
3.062E+01	7.664E-39
3.113E+01	1.617E-39
3.165E+01	3.291E-40
3.216E+01	6.460E-41
3.267E+01	1.222E-41
3.319E+01	2.230E-42
3.370E+01	3.926E-43
3.421E+01	6.687E-44
3.473E+01	1.108E-44
3.524E+01	1.811E-45
3.575E+01	2.989E-46
3.627E+01	5.181E-47
3.678E+01	9.874E-48



45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.163E+01	7.460E-15
1.215E+01	3.121E-15
1.266E+01	1.255E-15
1.317E+01	4.851E-16
1.369E+01	1.800E-16
1.420E+01	6.405E-17
1.471E+01	2.185E-17
1.523E+01	7.135E-18
1.574E+01	2.230E-18
1.625E+01	6.658E-19
1.677E+01	1.898E-19
1.728E+01	5.161E-20
1.779E+01	1.337E-20
1.830E+01	3.294E-21
1.882E+01	7.712E-22
1.933E+01	1.714E-22
1.984E+01	3.608E-23
2.036E+01	7.190E-24
2.087E+01	1.354E-24
2.138E+01	2.409E-25
2.190E+01	4.043E-26
2.241E+01	6.414E-27
2.292E+01	9.679E-28
2.344E+01	1.418E-28
2.395E+01	2.131E-29
2.446E+01	3.665E-30
2.498E+01	8.075E-31
2.549E+01	2.246E-31
2.600E+01	7.029E-32
2.652E+01	2.268E-32
2.703E+01	7.262E-33
2.754E+01	2.277E-33
2.806E+01	6.959E-34
2.857E+01	2.071E-34
2.908E+01	5.995E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.688E-35 4.617E-36 1.227E-36 3.166E-37 7.928E-38 1.925E-38 4.534E-39 1.034E-39 2.286E-40 4.891E-41 1.013E-41 2.031E-42 3.944E-43 7.439E-44 1.369E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 1.980E-14 9.036E-15 3.989E-15 1.701E-15 6.995E-16 2.774E-16 1.060E-16 3.900E-17 1.381E-17 4.698E-18 1.536E-18 4.819E-19 1.450E-19 4.179E-20 1.153E-20 3.040E-21 7.656E-22 1.839E-22 4.210E-23 9.173E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.900E-24 3.737E-25 6.979E-26 1.238E-26 2.093E-27 3.412E-28 5.533E-29 9.586E-30 1.978E-30 5.170E-31 1.613E-31 5.437E-32 1.861E-32 6.301E-33 2.092E-33 6.787E-34 2.149E-34 6.640E-35 2.000E-35 5.873E-36 1.680E-36 4.681E-37 1.270E-37 3.351E-38 8.601E-39 2.147E-39 5.206E-40 1.227E-40 2.807E-41 6.237E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.492E-14 2.160E-14 1.026E-14 4.735E-15 2.116E-15

1.420E+01	9.159E-16
1.471E+01	3.835E-16
1.523E+01	1.553E-16
1.574E+01	6.075E-17
1.625E+01	2.296E-17
1.677E+01	8.374E-18
1.728E+01	2.946E-18
1.779E+01	9.988E-19
1.830E+01	3.262E-19
1.882E+01	1.025E-19
1.933E+01	3.096E-20
1.984E+01	8.985E-21
2.036E+01	2.503E-21
2.087E+01	6.684E-22
2.138E+01	1.710E-22
2.190E+01	4.187E-23
2.241E+01	9.800E-24
2.292E+01	2.191E-24
2.344E+01	4.674E-25
2.395E+01	9.510E-26
2.446E+01	1.846E-26
2.498E+01	3.427E-27
2.549E+01	6.130E-28
2.600E+01	1.078E-28
2.652E+01	1.957E-29
2.703E+01	3.996E-30
2.754E+01	9.996E-31
2.806E+01	3.055E-31
2.857E+01	1.050E-31
2.908E+01	3.764E-32
2.960E+01	1.352E-32
3.011E+01	4.794E-33
3.062E+01	1.667E-33
3.113E+01	5.676E-34
3.165E+01	1.890E-34
3.216E+01	6.155E-35
3.267E+01	1.958E-35
3.319E+01	6.088E-36
3.370E+01	1.848E-36
3.421E+01	5.478E-37
3.473E+01	1.584E-37
3.524E+01	4.471E-38
3.575E+01	1.230E-38
3.627E+01	3.300E-39
3.678E+01	8.626E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ExtendedRun

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.163E+01	4.115E-42
1.215E+01	2.886E-44
1.266E+01	1.729E-46
1.317E+01	1.611E-48
1.369E+01	3.150E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.560E-01	4.652E-01
	1.112E+00	1.431E-01
	1.668E+00	2.781E-02
	2.224E+00	3.327E-03
	2.780E+00	2.407E-04
	3.336E+00	1.042E-05
	3.892E+00	2.682E-07
	4.448E+00	4.082E-09
	5.004E+00	3.709E-11
	5.560E+00	3.339E-13
	6.116E+00	3.550E-14
	6.672E+00	7.575E-15
	7.228E+00	1.435E-15
	7.784E+00	2.363E-16
	8.340E+00	3.365E-17
	8.896E+00	4.119E-18
	9.452E+00	4.309E-19
	1.001E+01	3.825E-20
	1.056E+01	2.861E-21
	1.112E+01	1.862E-22
	1.163E+01	1.219E-23
	1.215E+01	6.752E-25
	1.266E+01	3.146E-26
	1.317E+01	1.242E-27
	1.369E+01	4.465E-29
	1.420E+01	2.066E-30
	1.471E+01	1.929E-31
	1.523E+01	2.619E-32
	1.574E+01	3.607E-33
	1.625E+01	4.641E-34
	1.677E+01	5.507E-35
	1.728E+01	6.009E-36
	1.779E+01	6.013E-37
	1.830E+01	5.504E-38
	1.882E+01	4.597E-39
	1.933E+01	3.494E-40
	1.984E+01	2.411E-41
	2.036E+01	1.510E-42
	2.087E+01	8.602E-44
	2.138E+01	4.545E-45
	2.190E+01	2.370E-46
	2.241E+01	1.414E-47
	2.292E+01	1.132E-48
	2.344E+01	1.162E-49
	2.395E+01	1.295E-50
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
25	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 5.729E-01 2.580E-01 8.913E-02 2.324E-02 4.519E-03 6.506E-04 6.898E-05 5.363E-06 3.049E-07 1.265E-08 3.831E-10 8.758E-12 2.658E-13 4.643E-14 1.416E-14 4.118E-15 1.103E-15 2.717E-16 6.142E-17 1.319E-17 2.833E-18 5.612E-19 1.023E-19 1.709E-20 2.613E-21 3.643E-22 4.617E-23 5.301E-24 5.499E-25 5.141E-26 4.340E-27



	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.367E-28 2.590E-29 2.459E-30 3.638E-31 7.360E-32 1.607E-32 3.443E-33 7.069E-34 1.383E-34 2.575E-35 4.556E-36 7.651E-37 1.218E-37 1.836E-38 2.618E-39 3.526E-40 4.482E-41 5.372E-42 6.077E-43 6.509E-44 6.675E-45 6.741E-46 7.118E-47 8.587E-48 1.252E-48 2.124E-49 3.859E-50 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14

9.452E+00	3.054E-14
1.001E+01	1.121E-14
1.056E+01	3.931E-15
1.112E+01	1.344E-15
1.163E+01	4.576E-16
1.215E+01	1.478E-16
1.266E+01	4.524E-17
1.317E+01	1.311E-17
1.369E+01	3.590E-18
1.420E+01	9.281E-19
1.471E+01	2.262E-19
1.523E+01	5.186E-20
1.574E+01	1.117E-20
1.625E+01	2.257E-21
1.677E+01	4.268E-22
1.728E+01	7.542E-23
1.779E+01	1.242E-23
1.830E+01	1.905E-24
1.882E+01	2.713E-25
1.933E+01	3.588E-26
1.984E+01	4.414E-27
2.036E+01	5.109E-28
2.087E+01	5.789E-29
2.138E+01	7.168E-30
2.190E+01	1.158E-30
2.241E+01	2.579E-31
2.292E+01	6.848E-32
2.344E+01	1.897E-32
2.395E+01	5.189E-33
2.446E+01	1.379E-33
2.498E+01	3.545E-34
2.549E+01	8.797E-35
2.600E+01	2.107E-35
2.652E+01	4.863E-36
2.703E+01	1.082E-36
2.754E+01	2.316E-37
2.806E+01	4.771E-38
2.857E+01	9.449E-39
2.908E+01	1.798E-39
2.960E+01	3.283E-40
3.011E+01	5.752E-41
3.062E+01	9.665E-42
3.113E+01	1.558E-42
3.165E+01	2.411E-43
3.216E+01	3.598E-44
3.267E+01	5.226E-45
3.319E+01	7.536E-46
3.370E+01	1.120E-46
3.421E+01	1.812E-47
3.473E+01	3.340E-48
3.524E+01	7.017E-49
3.575E+01	1.608E-49
3.627E+01	3.823E-50
3.678E+01	0.000E+00

1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.163E+01	7.460E-15
1.215E+01	3.121E-15
1.266E+01	1.255E-15
1.317E+01	4.851E-16
1.369E+01	1.800E-16
1.420E+01	6.405E-17
1.471E+01	2.185E-17
1.523E+01	7.135E-18
1.574E+01	2.230E-18
1.625E+01	6.658E-19
1.677E+01	1.898E-19
1.728E+01	5.161E-20
1.779E+01	1.337E-20
1.830E+01	3.294E-21
1.882E+01	7.712E-22
1.933E+01	1.714E-22
1.984E+01	3.608E-23
2.036E+01	7.190E-24
2.087E+01	1.354E-24
2.138E+01	2.409E-25
2.190E+01	4.043E-26
2.241E+01	6.414E-27
2.292E+01	9.679E-28
2.344E+01	1.418E-28
2.395E+01	2.131E-29
2.446E+01	3.665E-30
2.498E+01	8.075E-31
2.549E+01	2.246E-31
2.600E+01	7.029E-32
2.652E+01	2.268E-32
2.703E+01	7.262E-33
2.754E+01	2.277E-33
2.806E+01	6.959E-34
2.857E+01	2.071E-34
2.908E+01	5.995E-35
2.960E+01	1.688E-35
3.011E+01	4.617E-36
3.062E+01	1.227E-36

	3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.166E-37 7.928E-38 1.925E-38 4.534E-39 1.034E-39 2.286E-40 4.891E-41 1.013E-41 2.031E-42 3.944E-43 7.439E-44 1.369E-44
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.492E-14 2.160E-14 1.026E-14 4.735E-15 2.116E-15 9.159E-16 3.835E-16 1.553E-16 6.075E-17 2.296E-17 8.374E-18 2.946E-18 9.988E-19 3.262E-19 1.025E-19 3.096E-20 8.985E-21 2.503E-21 6.684E-22 1.710E-22 4.187E-23 9.800E-24 2.191E-24

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	4.674E-25 9.510E-26 1.846E-26 3.427E-27 6.130E-28 1.078E-28 1.957E-29 3.996E-30 9.996E-31 3.055E-31 1.050E-31 3.764E-32 1.352E-32 4.794E-33 1.667E-33 5.676E-34 1.890E-34 6.155E-35 1.958E-35 6.088E-36 1.848E-36 5.478E-37 1.584E-37 4.471E-38 1.230E-38 3.300E-39 8.626E-40
85	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 7.631E-01 5.447E-01 3.619E-01 2.229E-01 1.269E-01 6.654E-02 3.209E-02 1.421E-02 5.765E-03 2.142E-03 7.277E-04 2.260E-04 6.410E-05 1.659E-05 3.919E-06 8.442E-07 1.658E-07 2.967E-08 4.842E-09 7.497E-10 1.193E-10 1.781E-11 2.630E-12 4.669E-13 1.378E-13 6.441E-14 3.518E-14 1.958E-14

1.574E+01	1.075E-14
1.625E+01	5.796E-15
1.677E+01	3.060E-15
1.728E+01	1.583E-15
1.779E+01	8.013E-16
1.830E+01	3.971E-16
1.882E+01	1.926E-16
1.933E+01	9.136E-17
1.984E+01	4.238E-17
2.036E+01	1.922E-17
2.087E+01	8.518E-18
2.138E+01	3.687E-18
2.190E+01	1.559E-18
2.241E+01	6.432E-19
2.292E+01	2.590E-19
2.344E+01	1.017E-19
2.395E+01	3.892E-20
2.446E+01	1.452E-20
2.498E+01	5.274E-21
2.549E+01	1.865E-21
2.600E+01	6.418E-22
2.652E+01	2.148E-22
2.703E+01	6.987E-23
2.754E+01	2.208E-23
2.806E+01	6.775E-24
2.857E+01	2.018E-24
2.908E+01	5.829E-25
2.960E+01	1.633E-25
3.011E+01	4.439E-26
3.062E+01	1.171E-26
3.113E+01	3.002E-27
3.165E+01	7.523E-28
3.216E+01	1.862E-28
3.267E+01	4.649E-29
3.319E+01	1.217E-29
3.370E+01	3.519E-30
3.421E+01	1.168E-30
3.473E+01	4.429E-31
3.524E+01	1.837E-31
3.575E+01	7.970E-32
3.627E+01	3.507E-32
3.678E+01	1.541E-32

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB Darcy

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000407$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.054E-01
	1.112E+00	1.109E-02
	1.668E+00	1.363E-04
	2.224E+00	3.580E-07

2.780E+00	1.955E-10
3.336E+00	1.055E-13
3.892E+00	6.301E-15
4.448E+00	3.143E-16
5.004E+00	1.016E-17
5.560E+00	2.064E-19
6.116E+00	2.544E-21
6.672E+00	1.826E-23
7.228E+00	7.295E-26
7.784E+00	1.647E-28
8.340E+00	6.015E-31
8.896E+00	1.285E-32
9.452E+00	2.817E-34
1.001E+01	4.648E-36
1.056E+01	5.650E-38
1.112E+01	5.184E-40
1.163E+01	4.873E-42
1.215E+01	3.446E-44
1.266E+01	2.081E-46
1.317E+01	1.954E-48
1.369E+01	3.852E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00



	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.730E-01
	1.112E+00	7.357E-02
	1.668E+00	7.149E-03
	2.224E+00	3.293E-04
	2.780E+00	7.033E-06
	3.336E+00	6.875E-08
	3.892E+00	3.058E-10
	4.448E+00	8.042E-13
	5.004E+00	3.626E-14
	5.560E+00	5.410E-15
	6.116E+00	6.675E-16
	6.672E+00	6.649E-17
	7.228E+00	5.295E-18
	7.784E+00	3.333E-19
	8.340E+00	1.637E-20
	8.896E+00	6.191E-22
	9.452E+00	1.773E-23
	1.001E+01	3.788E-25
	1.056E+01	5.977E-27
	1.112E+01	7.757E-29
	1.163E+01	1.818E-30
	1.215E+01	1.149E-31
	1.266E+01	1.032E-32
	1.317E+01	8.694E-34
	1.369E+01	6.508E-35
	1.420E+01	4.295E-36
	1.471E+01	2.487E-37
	1.523E+01	1.258E-38
	1.574E+01	5.534E-40
	1.625E+01	2.106E-41
	1.677E+01	6.927E-43
	1.728E+01	1.992E-44
	1.779E+01	5.350E-46
	1.830E+01	1.669E-47
	1.882E+01	7.981E-49
	1.933E+01	5.208E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.689E-01 1.454E-01 2.849E-02 3.435E-03 2.506E-04 1.094E-05 2.837E-07 4.353E-09 3.987E-11 3.618E-13 3.877E-14 8.340E-15 1.593E-15 2.644E-16 3.795E-17 4.683E-18 4.939E-19 4.420E-20 3.332E-21 2.187E-22 1.443E-23 8.059E-25 3.786E-26 1.506E-27 5.460E-29 2.546E-30 2.396E-31 3.280E-32 4.554E-33 5.906E-34 7.065E-35

	1.728E+01	7.772E-36
	1.779E+01	7.840E-37
	1.830E+01	7.235E-38
	1.882E+01	6.092E-39
	1.933E+01	4.669E-40
	1.984E+01	3.248E-41
	2.036E+01	2.050E-42
	2.087E+01	1.178E-43
	2.138E+01	6.272E-45
	2.190E+01	3.296E-46
	2.241E+01	1.982E-47
	2.292E+01	1.600E-48
	2.344E+01	1.655E-49
	2.395E+01	1.859E-50
	2.446E+01	0.000E+00
	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.560E-01	5.320E-01
	1.112E+00	2.087E-01
	1.668E+00	5.845E-02
	2.224E+00	1.145E-02
	2.780E+00	1.548E-03
	3.336E+00	1.430E-04
	3.892E+00	8.983E-06
	4.448E+00	3.817E-07
	5.004E+00	1.094E-08
	5.560E+00	2.118E-10
	6.116E+00	3.022E-12
	6.672E+00	1.161E-13
	7.228E+00	2.694E-14
	7.784E+00	7.046E-15
	8.340E+00	1.672E-15
	8.896E+00	3.572E-16

	9.452E+00	6.846E-17
	1.001E+01	1.173E-17
	1.056E+01	1.791E-18
	1.112E+01	2.524E-19
	1.163E+01	3.572E-20
	1.215E+01	4.525E-21
	1.266E+01	5.114E-22
	1.317E+01	5.131E-23
	1.369E+01	4.551E-24
	1.420E+01	3.553E-25
	1.471E+01	2.436E-26
	1.523E+01	1.477E-27
	1.574E+01	8.347E-29
	1.625E+01	5.419E-30
	1.677E+01	5.804E-31
	1.728E+01	9.593E-32
	1.779E+01	1.762E-32
	1.830E+01	3.149E-33
	1.882E+01	5.325E-34
	1.933E+01	8.473E-35
	1.984E+01	1.266E-35
	2.036E+01	1.773E-36
	2.087E+01	2.325E-37
	2.138E+01	2.848E-38
	2.190E+01	3.255E-39
	2.241E+01	3.464E-40
	2.292E+01	3.427E-41
	2.344E+01	3.152E-42
	2.395E+01	2.700E-43
	2.446E+01	2.172E-44
	2.498E+01	1.686E-45
	2.549E+01	1.353E-46
	2.600E+01	1.263E-47
	2.652E+01	1.488E-48
	2.703E+01	2.098E-49
	2.754E+01	3.160E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.775E-01

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1.668E+00  
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2.780E+00  
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1.735E-37  
2.637E-38  
3.790E-39  
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7.968E-42  
9.086E-43  
9.812E-44  
1.014E-44  
1.033E-45  
1.099E-46  
1.336E-47  
1.964E-48  
3.358E-49  
6.150E-50

	3.113E+01	1.136E-50
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.122E-01
	1.112E+00	3.073E-01
	1.668E+00	1.240E-01
	2.224E+00	3.972E-02
	2.780E+00	9.991E-03
	3.336E+00	1.961E-03
	3.892E+00	2.989E-04
	4.448E+00	3.525E-05
	5.004E+00	3.208E-06
	5.560E+00	2.248E-07
	6.116E+00	1.212E-08
	6.672E+00	5.022E-10
	7.228E+00	1.636E-11
	7.784E+00	5.732E-13
	8.340E+00	7.890E-14
	8.896E+00	2.597E-14
	9.452E+00	8.734E-15
	1.001E+01	2.756E-15
	1.056E+01	8.132E-16
	1.112E+01	2.316E-16
	1.163E+01	6.583E-17
	1.215E+01	1.755E-17
	1.266E+01	4.382E-18
	1.317E+01	1.023E-18
	1.369E+01	2.229E-19
	1.420E+01	4.523E-20
	1.471E+01	8.529E-21
	1.523E+01	1.491E-21
	1.574E+01	2.412E-22
	1.625E+01	3.600E-23
	1.677E+01	4.945E-24
	1.728E+01	6.239E-25
	1.779E+01	7.219E-26
	1.830E+01	7.670E-27
	1.882E+01	7.568E-28
	1.933E+01	7.259E-29
	1.984E+01	7.756E-30
	2.036E+01	1.148E-30
	2.087E+01	2.414E-31
	2.138E+01	5.945E-32
	2.190E+01	1.494E-32
	2.241E+01	3.663E-33
	2.292E+01	8.654E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.964E-34 4.274E-35 8.917E-36 1.782E-36 3.405E-37 6.222E-38 1.086E-38 1.808E-39 2.869E-40 4.338E-41 6.246E-42 8.570E-43 1.124E-43 1.421E-44 1.766E-45 2.249E-46 3.131E-47 5.061E-48 9.517E-49 1.968E-49 4.215E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.398E-01 3.458E-01 1.554E-01 5.735E-02 1.725E-02 4.205E-03 8.264E-04 1.305E-04 1.653E-05 1.676E-06 1.357E-07 8.775E-09 4.531E-10 1.904E-11 8.171E-13 1.035E-13 3.498E-14 1.294E-14 4.575E-15 1.577E-15 5.412E-16 1.762E-16 5.437E-17 1.588E-17 4.385E-18 1.143E-18 2.808E-19 6.491E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.410E-20 2.871E-21 5.474E-22 9.751E-23 1.620E-23 2.503E-24 3.595E-25 4.792E-26 5.943E-27 6.935E-28 7.922E-29 9.885E-30 1.609E-30 3.612E-31 9.666E-32 2.699E-32 7.443E-33 1.994E-33 5.168E-34 1.293E-34 3.121E-35 7.264E-36 1.629E-36 3.516E-37 7.303E-38 1.458E-38 2.796E-39 5.149E-40 9.095E-41 1.541E-41 2.503E-42 3.906E-43 5.877E-44 8.604E-45 1.251E-45 1.874E-46 3.055E-47 5.675E-48 1.202E-48 2.775E-49 6.651E-50 1.601E-50
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.625E-01 3.790E-01 1.847E-01 7.595E-02 2.615E-02 7.500E-03 1.784E-03 3.510E-04 5.699E-05 7.619E-06 8.378E-07 7.569E-08 5.613E-09



7.784E+00	3.422E-10
8.340E+00	1.748E-11
8.896E+00	9.140E-13
9.452E+00	1.207E-13
1.001E+01	4.187E-14
1.056E+01	1.669E-14
1.112E+01	6.611E-15
1.163E+01	2.606E-15
1.215E+01	9.824E-16
1.266E+01	3.539E-16
1.317E+01	1.217E-16
1.369E+01	3.994E-17
1.420E+01	1.248E-17
1.471E+01	3.713E-18
1.523E+01	1.050E-18
1.574E+01	2.819E-19
1.625E+01	7.177E-20
1.677E+01	1.730E-20
1.728E+01	3.943E-21
1.779E+01	8.485E-22
1.830E+01	1.721E-22
1.882E+01	3.285E-23
1.933E+01	5.892E-24
1.984E+01	9.915E-25
2.036E+01	1.564E-25
2.087E+01	2.311E-26
2.138E+01	3.214E-27
2.190E+01	4.264E-28
2.241E+01	5.639E-29
2.292E+01	8.261E-30
2.344E+01	1.554E-30
2.395E+01	3.864E-31
2.446E+01	1.123E-31
2.498E+01	3.407E-32
2.549E+01	1.026E-32
2.600E+01	3.018E-33
2.652E+01	8.625E-34
2.703E+01	2.392E-34
2.754E+01	6.428E-35
2.806E+01	1.674E-35
2.857E+01	4.221E-36
2.908E+01	1.030E-36
2.960E+01	2.430E-37
3.011E+01	5.542E-38
3.062E+01	1.221E-38
3.113E+01	2.597E-39
3.165E+01	5.329E-40
3.216E+01	1.055E-40
3.267E+01	2.012E-41
3.319E+01	3.700E-42
3.370E+01	6.567E-43
3.421E+01	1.128E-43
3.473E+01	1.884E-44
3.524E+01	3.104E-45
3.575E+01	5.163E-46
3.627E+01	9.019E-47
3.678E+01	1.732E-47

45

0.000E+00	1.000E+00
5.560E-01	6.814E-01
1.112E+00	4.079E-01
1.668E+00	2.120E-01
2.224E+00	9.486E-02
2.780E+00	3.630E-02
3.336E+00	1.182E-02
3.892E+00	3.264E-03
4.448E+00	7.619E-04
5.004E+00	1.500E-04
5.560E+00	2.489E-05
6.116E+00	3.472E-06
6.672E+00	4.070E-07
7.228E+00	4.004E-08
7.784E+00	3.306E-09
8.340E+00	2.295E-10
8.896E+00	1.370E-11
9.452E+00	8.618E-13
1.001E+01	1.278E-13
1.056E+01	4.646E-14
1.112E+01	2.014E-14
1.163E+01	8.819E-15
1.215E+01	3.719E-15
1.266E+01	1.508E-15
1.317E+01	5.875E-16
1.369E+01	2.197E-16
1.420E+01	7.884E-17
1.471E+01	2.711E-17
1.523E+01	8.927E-18
1.574E+01	2.812E-18
1.625E+01	8.466E-19
1.677E+01	2.433E-19
1.728E+01	6.670E-20
1.779E+01	1.741E-20
1.830E+01	4.326E-21
1.882E+01	1.021E-21
1.933E+01	2.287E-22
1.984E+01	4.856E-23
2.036E+01	9.755E-24
2.087E+01	1.853E-24
2.138E+01	3.322E-25
2.190E+01	5.621E-26
2.241E+01	8.989E-27
2.292E+01	1.367E-27
2.344E+01	2.020E-28
2.395E+01	3.058E-29
2.446E+01	5.300E-30
2.498E+01	1.177E-30
2.549E+01	3.298E-31
2.600E+01	1.040E-31
2.652E+01	3.385E-32
2.703E+01	1.092E-32
2.754E+01	3.453E-33
2.806E+01	1.064E-33
2.857E+01	3.192E-34
2.908E+01	9.317E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.644E-35 7.292E-36 1.954E-36 5.082E-37 1.283E-37 3.142E-38 7.458E-39 1.716E-39 3.822E-40 8.244E-41 1.721E-41 3.479E-42 6.812E-43 1.295E-43 2.403E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.977E-01 4.334E-01 2.373E-01 1.137E-01 4.735E-02 1.707E-02 5.312E-03 1.422E-03 3.270E-04 6.446E-05 1.088E-05 1.571E-06 1.938E-07 2.043E-08 1.839E-09 1.418E-10 9.642E-12 7.243E-13 1.265E-13 5.003E-14 2.341E-14 1.077E-14 4.792E-15 2.059E-15 8.539E-16 3.414E-16 1.315E-16 4.878E-17 1.741E-17 5.972E-18 1.968E-18 6.226E-19 1.889E-19 5.487E-20 1.526E-20 4.057E-21 1.030E-21 2.495E-22 5.757E-23 1.265E-23

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.640E-24 5.236E-25 9.858E-26 1.763E-26 3.004E-27 4.937E-28 8.071E-29 1.409E-29 2.929E-30 7.715E-31 2.426E-31 8.242E-32 2.844E-32 9.708E-33 3.249E-33 1.063E-33 3.393E-34 1.057E-34 3.210E-35 9.501E-36 2.740E-36 7.696E-37 2.104E-37 5.599E-38 1.449E-38 3.646E-39 8.914E-40 2.118E-40 4.885E-41 1.094E-41
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.117E-01 4.561E-01 2.608E-01 1.321E-01 5.901E-02 2.314E-02 7.940E-03 2.379E-03 6.208E-04 1.410E-04 2.781E-05 4.762E-06 7.072E-07 9.103E-08 1.015E-08 9.810E-10 8.256E-11 6.296E-12 5.673E-13 1.224E-13 5.308E-14 2.573E-14 1.232E-14 5.732E-15 2.583E-15

1.420E+01	1.127E-15
1.471E+01	4.756E-16
1.523E+01	1.941E-16
1.574E+01	7.658E-17
1.625E+01	2.918E-17
1.677E+01	1.073E-17
1.728E+01	3.805E-18
1.779E+01	1.301E-18
1.830E+01	4.281E-19
1.882E+01	1.356E-19
1.933E+01	4.131E-20
1.984E+01	1.209E-20
2.036E+01	3.394E-21
2.087E+01	9.138E-22
2.138E+01	2.357E-22
2.190E+01	5.817E-23
2.241E+01	1.373E-23
2.292E+01	3.094E-24
2.344E+01	6.654E-25
2.395E+01	1.365E-25
2.446E+01	2.671E-26
2.498E+01	4.999E-27
2.549E+01	9.014E-28
2.600E+01	1.598E-28
2.652E+01	2.924E-29
2.703E+01	6.015E-30
2.754E+01	1.516E-30
2.806E+01	4.668E-31
2.857E+01	1.617E-31
2.908E+01	5.843E-32
2.960E+01	2.116E-32
3.011E+01	7.564E-33
3.062E+01	2.652E-33
3.113E+01	9.103E-34
3.165E+01	3.056E-34
3.216E+01	1.003E-34
3.267E+01	3.218E-35
3.319E+01	1.009E-35
3.370E+01	3.087E-36
3.421E+01	9.223E-37
3.473E+01	2.690E-37
3.524E+01	7.651E-38
3.575E+01	2.123E-38
3.627E+01	5.740E-39
3.678E+01	1.513E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB CoHD High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.02375 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.02375 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7    N = 20    SIG = 0    RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.556E-01
	1.112E+00	2.279E-02
	1.668E+00	6.322E-04
	2.224E+00	5.160E-06

2.780E+00	1.206E-08
3.336E+00	8.267E-12
3.892E+00	4.341E-14
4.448E+00	3.814E-15
5.004E+00	2.492E-16
5.560E+00	1.150E-17
6.116E+00	3.663E-19
6.672E+00	7.867E-21
7.228E+00	1.106E-22
7.784E+00	9.861E-25
8.340E+00	5.432E-27
8.896E+00	2.108E-29
9.452E+00	2.215E-31
1.001E+01	7.694E-33
1.056E+01	2.479E-34
1.112E+01	6.626E-36
1.163E+01	1.818E-37
1.215E+01	4.015E-39
1.266E+01	7.073E-41
1.317E+01	9.870E-43
1.369E+01	1.106E-44
1.420E+01	1.141E-46
1.471E+01	1.768E-48
1.523E+01	5.105E-50
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	4.225E-01
	1.112E+00	1.080E-01
	1.668E+00	1.581E-02
	2.224E+00	1.284E-03
	2.780E+00	5.671E-05
	3.336E+00	1.347E-06
	3.892E+00	1.707E-08
	4.448E+00	1.155E-10
	5.004E+00	5.749E-13
	5.560E+00	3.720E-14
	6.116E+00	6.815E-15
	6.672E+00	1.083E-15
	7.228E+00	1.453E-16
	7.784E+00	1.634E-17
	8.340E+00	1.530E-18
	8.896E+00	1.182E-19
	9.452E+00	7.465E-21
	1.001E+01	3.813E-22
	1.056E+01	1.558E-23
	1.112E+01	5.248E-25
	1.163E+01	1.781E-26
	1.215E+01	4.986E-28
	1.266E+01	1.338E-29
	1.317E+01	6.167E-31
	1.369E+01	6.029E-32
	1.420E+01	6.949E-33
	1.471E+01	7.524E-34
	1.523E+01	7.411E-35
	1.574E+01	6.603E-36
	1.625E+01	5.304E-37
	1.677E+01	3.829E-38
	1.728E+01	2.475E-39
	1.779E+01	1.428E-40
	1.830E+01	7.331E-42
	1.882E+01	3.351E-43
	1.933E+01	1.379E-44
	1.984E+01	5.375E-46
	2.036E+01	2.308E-47
	2.087E+01	1.368E-48
	2.138E+01	1.110E-49
	2.190E+01	1.001E-50
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00



	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.560E-01	5.134E-01
	1.112E+00	1.901E-01
	1.668E+00	4.908E-02
	2.224E+00	8.638E-03
	2.780E+00	1.022E-03
	3.336E+00	8.049E-05
	3.892E+00	4.195E-06
	4.448E+00	1.440E-07
	5.004E+00	3.246E-09
	5.560E+00	4.841E-11
	6.116E+00	6.352E-13
	6.672E+00	5.377E-14
	7.228E+00	1.347E-14
	7.784E+00	3.200E-15
	8.340E+00	6.812E-16
	8.896E+00	1.294E-16
	9.452E+00	2.186E-17
	1.001E+01	3.268E-18
	1.056E+01	4.308E-19
	1.112E+01	5.187E-20
	1.163E+01	6.274E-21
	1.215E+01	6.724E-22
	1.266E+01	6.355E-23
	1.317E+01	5.270E-24
	1.369E+01	3.817E-25
	1.420E+01	2.407E-26
	1.471E+01	1.330E-27
	1.523E+01	6.776E-29
	1.574E+01	3.973E-30
	1.625E+01	3.966E-31
	1.677E+01	6.194E-32



	9.452E+00	1.074E-15
	1.001E+01	2.640E-16
	1.056E+01	5.959E-17
	1.112E+01	1.277E-17
	1.163E+01	2.740E-18
	1.215E+01	5.418E-19
	1.266E+01	9.856E-20
	1.317E+01	1.645E-20
	1.369E+01	2.510E-21
	1.420E+01	3.494E-22
	1.471E+01	4.421E-23
	1.523E+01	5.069E-24
	1.574E+01	5.249E-25
	1.625E+01	4.900E-26
	1.677E+01	4.130E-27
	1.728E+01	3.199E-28
	1.779E+01	2.456E-29
	1.830E+01	2.328E-30
	1.882E+01	3.439E-31
	1.933E+01	6.948E-32
	1.984E+01	1.515E-32
	2.036E+01	3.240E-33
	2.087E+01	6.641E-34
	2.138E+01	1.297E-34
	2.190E+01	2.411E-35
	2.241E+01	4.259E-36
	2.292E+01	7.141E-37
	2.344E+01	1.135E-37
	2.395E+01	1.708E-38
	2.446E+01	2.432E-39
	2.498E+01	3.270E-40
	2.549E+01	4.150E-41
	2.600E+01	4.966E-42
	2.652E+01	5.608E-43
	2.703E+01	5.997E-44
	2.754E+01	6.141E-45
	2.806E+01	6.192E-46
	2.857E+01	6.527E-47
	2.908E+01	7.862E-48
	2.960E+01	1.145E-48
	3.011E+01	1.939E-49
	3.062E+01	3.516E-50
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	6.138E-01

1.112E+00  
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5.135E-34  
1.186E-34  
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5.610E-36  
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2.246E-37  
4.215E-38  
7.566E-39  
1.298E-39  
2.128E-40  
3.330E-41  
4.971E-42  
7.085E-43  
9.662E-44  
1.269E-44

	3.113E+01	1.632E-45
	3.165E+01	2.123E-46
	3.216E+01	2.960E-47
	3.267E+01	4.710E-48
	3.319E+01	8.724E-49
	3.370E+01	1.805E-49
	3.421E+01	3.926E-50
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.455E-01
	1.112E+00	3.561E-01
	1.668E+00	1.655E-01
	2.224E+00	6.407E-02
	2.780E+00	2.051E-02
	3.336E+00	5.400E-03
	3.892E+00	1.164E-03
	4.448E+00	2.047E-04
	5.004E+00	2.931E-05
	5.560E+00	3.410E-06
	6.116E+00	3.220E-07
	6.672E+00	2.464E-08
	7.228E+00	1.528E-09
	7.784E+00	7.716E-11
	8.340E+00	3.384E-12
	8.896E+00	2.245E-13
	9.452E+00	5.382E-14
	1.001E+01	2.027E-14
	1.056E+01	7.604E-15
	1.112E+01	2.798E-15
	1.163E+01	1.024E-15
	1.215E+01	3.572E-16
	1.266E+01	1.186E-16
	1.317E+01	3.745E-17
	1.369E+01	1.123E-17
	1.420E+01	3.197E-18
	1.471E+01	8.619E-19
	1.523E+01	2.199E-19
	1.574E+01	5.301E-20
	1.625E+01	1.206E-20
	1.677E+01	2.582E-21
	1.728E+01	5.202E-22
	1.779E+01	9.838E-23
	1.830E+01	1.743E-23
	1.882E+01	2.890E-24
	1.933E+01	4.475E-25
	1.984E+01	6.464E-26
	2.036E+01	8.719E-27
	2.087E+01	1.105E-27
	2.138E+01	1.346E-28
	2.190E+01	1.689E-29
	2.241E+01	2.522E-30
	2.292E+01	5.106E-31

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.322E-31 3.773E-32 1.089E-32 3.079E-33 8.459E-34 2.251E-34 5.796E-35 1.443E-35 3.472E-36 8.068E-37 1.809E-37 3.912E-38 8.155E-39 1.637E-39 3.164E-40 5.883E-41 1.052E-41 1.809E-42 2.995E-43 4.788E-44 7.447E-45 1.144E-45 1.788E-46 2.978E-47 5.542E-48 1.173E-48 2.742E-49
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.706E-01 3.935E-01 1.996E-01 8.675E-02 3.209E-02 1.005E-02 2.657E-03 5.907E-04 1.102E-04 1.724E-05 2.256E-06 2.467E-07 2.254E-08 1.719E-09 1.098E-10 6.113E-12 4.098E-13 7.905E-14 3.049E-14 1.289E-14 5.460E-15 2.223E-15 8.691E-16 3.260E-16 1.172E-16 4.036E-17 1.330E-17 4.191E-18

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.261E-18 3.619E-19 9.901E-20 2.578E-20 6.382E-21 1.500E-21 3.343E-22 7.053E-23 1.407E-23 2.651E-24 4.710E-25 7.885E-26 1.244E-26 1.859E-27 2.664E-28 3.818E-29 6.006E-30 1.182E-30 3.023E-31 9.068E-32 2.865E-32 9.049E-33 2.803E-33 8.466E-34 2.488E-34 7.108E-35 1.973E-35 5.320E-36 1.392E-36 3.535E-37 8.704E-38 2.077E-38 4.801E-39 1.074E-39 2.327E-40 4.874E-41 9.874E-42 1.935E-42 3.669E-43 6.750E-44 1.211E-44 2.141E-45
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.911E-01 4.252E-01 2.306E-01 1.094E-01 4.514E-02 1.612E-02 4.967E-03 1.317E-03 2.999E-04 5.855E-05 9.788E-06 1.400E-06 1.710E-07

7.784E+00	1.785E-08
8.340E+00	1.591E-09
8.896E+00	1.215E-10
9.452E+00	8.186E-12
1.001E+01	6.093E-13
1.056E+01	1.055E-13
1.112E+01	4.133E-14
1.163E+01	1.915E-14
1.215E+01	8.725E-15
1.266E+01	3.846E-15
1.317E+01	1.637E-15
1.369E+01	6.721E-16
1.420E+01	2.661E-16
1.471E+01	1.015E-16
1.523E+01	3.729E-17
1.574E+01	1.318E-17
1.625E+01	4.478E-18
1.677E+01	1.462E-18
1.728E+01	4.579E-19
1.779E+01	1.375E-19
1.830E+01	3.958E-20
1.882E+01	1.090E-20
1.933E+01	2.870E-21
1.984E+01	7.216E-22
2.036E+01	1.731E-22
2.087E+01	3.955E-23
2.138E+01	8.603E-24
2.190E+01	1.779E-24
2.241E+01	3.494E-25
2.292E+01	6.514E-26
2.344E+01	1.153E-26
2.395E+01	1.947E-27
2.446E+01	3.169E-28
2.498E+01	5.132E-29
2.549E+01	8.876E-30
2.600E+01	1.829E-30
2.652E+01	4.772E-31
2.703E+01	1.487E-31
2.754E+01	5.003E-32
2.806E+01	1.709E-32
2.857E+01	5.780E-33
2.908E+01	1.916E-33
2.960E+01	6.205E-34
3.011E+01	1.962E-34
3.062E+01	6.052E-35
3.113E+01	1.820E-35
3.165E+01	5.335E-36
3.216E+01	1.524E-36
3.267E+01	4.239E-37
3.319E+01	1.148E-37
3.370E+01	3.024E-38
3.421E+01	7.751E-39
3.473E+01	1.931E-39
3.524E+01	4.676E-40
3.575E+01	1.100E-40
3.627E+01	2.513E-41
3.678E+01	5.575E-42



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0.000E+00	1.000E+00
5.560E-01	7.082E-01
1.112E+00	4.526E-01
1.668E+00	2.588E-01
2.224E+00	1.315E-01
2.780E+00	5.910E-02
3.336E+00	2.338E-02
3.892E+00	8.122E-03
4.448E+00	2.471E-03
5.004E+00	6.569E-04
5.560E+00	1.524E-04
6.116E+00	3.084E-05
6.672E+00	5.432E-06
7.228E+00	8.325E-07
7.784E+00	1.110E-07
8.340E+00	1.285E-08
8.896E+00	1.294E-09
9.452E+00	1.136E-10
1.001E+01	8.929E-12
1.056E+01	7.543E-13
1.112E+01	1.322E-13
1.163E+01	5.276E-14
1.215E+01	2.535E-14
1.266E+01	1.221E-14
1.317E+01	5.720E-15
1.369E+01	2.600E-15
1.420E+01	1.145E-15
1.471E+01	4.884E-16
1.523E+01	2.017E-16
1.574E+01	8.053E-17
1.625E+01	3.109E-17
1.677E+01	1.160E-17
1.728E+01	4.177E-18
1.779E+01	1.451E-18
1.830E+01	4.863E-19
1.882E+01	1.570E-19
1.933E+01	4.877E-20
1.984E+01	1.458E-20
2.036E+01	4.186E-21
2.087E+01	1.154E-21
2.138E+01	3.054E-22
2.190E+01	7.741E-23
2.241E+01	1.879E-23
2.292E+01	4.362E-24
2.344E+01	9.677E-25
2.395E+01	2.050E-25
2.446E+01	4.147E-26
2.498E+01	8.018E-27
2.549E+01	1.487E-27
2.600E+01	2.679E-28
2.652E+01	4.822E-29
2.703E+01	9.237E-30
2.754E+01	2.065E-30
2.806E+01	5.702E-31
2.857E+01	1.864E-31
2.908E+01	6.621E-32

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.406E-32 8.698E-33 3.096E-33 1.081E-33 3.692E-34 1.235E-34 4.037E-35 1.291E-35 4.033E-36 1.231E-36 3.672E-37 1.069E-37 3.038E-38 8.422E-39 2.277E-39
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 7.229E-01 4.766E-01 2.845E-01 1.528E-01 7.356E-02 3.160E-02 1.208E-02 4.104E-03 1.235E-03 3.292E-04 7.758E-05 1.615E-05 2.967E-06 4.810E-07 6.873E-08 8.657E-09 9.612E-10 9.444E-11 8.432E-12 8.379E-13 1.630E-13 6.293E-14 3.097E-14 1.556E-14 7.657E-15 3.667E-15 1.708E-15 7.729E-16 3.398E-16 1.450E-16 6.005E-17 2.412E-17 9.390E-18 3.542E-18 1.293E-18 4.570E-19 1.561E-19 5.155E-20 1.643E-20 5.055E-21

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.499E-21 4.284E-22 1.178E-22 3.118E-23 7.927E-24 1.935E-24 4.535E-25 1.019E-25 2.198E-26 4.553E-27 9.113E-28 1.785E-28 3.533E-29 7.502E-30 1.853E-30 5.538E-31 1.922E-31 7.191E-32 2.752E-32 1.050E-32 3.956E-33 1.465E-33 5.322E-34 1.897E-34 6.626E-35 2.269E-35 7.610E-36 2.500E-36 8.043E-37 2.533E-37
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.355E-01 4.978E-01 3.079E-01 1.732E-01 8.822E-02 4.055E-02 1.678E-02 6.236E-03 2.078E-03 6.204E-04 1.657E-04 3.954E-05 8.427E-06 1.603E-06 2.721E-07 4.118E-08 5.555E-09 6.685E-10 7.210E-11 7.464E-12 9.420E-13 1.869E-13 7.117E-14 3.566E-14 1.854E-14

1.420E+01	9.492E-15
1.471E+01	4.745E-15
1.523E+01	2.313E-15
1.574E+01	1.098E-15
1.625E+01	5.081E-16
1.677E+01	2.289E-16
1.728E+01	1.003E-16
1.779E+01	4.280E-17
1.830E+01	1.775E-17
1.882E+01	7.154E-18
1.933E+01	2.801E-18
1.984E+01	1.065E-18
2.036E+01	3.928E-19
2.087E+01	1.405E-19
2.138E+01	4.873E-20
2.190E+01	1.637E-20
2.241E+01	5.323E-21
2.292E+01	1.674E-21
2.344E+01	5.092E-22
2.395E+01	1.496E-22
2.446E+01	4.242E-23
2.498E+01	1.161E-23
2.549E+01	3.061E-24
2.600E+01	7.777E-25
2.652E+01	1.903E-25
2.703E+01	4.482E-26
2.754E+01	1.017E-26
2.806E+01	2.231E-27
2.857E+01	4.761E-28
2.908E+01	1.005E-28
2.960E+01	2.177E-29
3.011E+01	5.142E-30
3.062E+01	1.417E-30
3.113E+01	4.637E-31
3.165E+01	1.718E-31
3.216E+01	6.759E-32
3.267E+01	2.707E-32
3.319E+01	1.081E-32
3.370E+01	4.263E-33
3.421E+01	1.656E-33
3.473E+01	6.324E-34
3.524E+01	2.373E-34
3.575E+01	8.744E-35
3.627E+01	3.164E-35
3.678E+01	1.124E-35

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB CoHD Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.01425 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.01425 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	1.423E-01
	1.112E+00	3.291E-03
	1.668E+00	1.026E-05
	2.224E+00	3.995E-09

2.780E+00	3.251E-13
3.336E+00	7.337E-15
3.892E+00	2.276E-16
4.448E+00	3.947E-18
5.004E+00	3.646E-20
5.560E+00	1.694E-22
6.116E+00	3.702E-25
6.672E+00	3.681E-28
7.228E+00	5.171E-31
7.784E+00	6.216E-33
8.340E+00	6.939E-35
8.896E+00	5.242E-37
9.452E+00	2.607E-39
1.001E+01	8.317E-42
1.056E+01	1.699E-44
1.112E+01	3.109E-47
1.163E+01	2.144E-49
1.215E+01	0.000E+00
1.266E+01	0.000E+00
1.317E+01	0.000E+00
1.369E+01	0.000E+00
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.008E-01
	1.112E+00	3.806E-02
	1.668E+00	1.839E-03
	2.224E+00	3.236E-05
	2.780E+00	2.020E-07
	3.336E+00	4.417E-10
	3.892E+00	4.936E-13
	4.448E+00	2.190E-14
	5.004E+00	2.274E-15
	5.560E+00	1.796E-16
	6.116E+00	1.058E-17
	6.672E+00	4.580E-19
	7.228E+00	1.428E-20
	7.784E+00	3.138E-22
	8.340E+00	4.747E-24
	8.896E+00	4.828E-26
	9.452E+00	3.340E-28
	1.001E+01	2.500E-30
	1.056E+01	7.400E-32
	1.112E+01	3.721E-33
	1.163E+01	2.004E-34
	1.215E+01	9.161E-36
	1.266E+01	3.525E-37
	1.317E+01	1.134E-38
	1.369E+01	3.027E-40
	1.420E+01	6.661E-42
	1.471E+01	1.209E-43
	1.523E+01	1.884E-45
	1.574E+01	3.104E-47
	1.625E+01	8.368E-49
	1.677E+01	3.520E-50
	1.728E+01	0.000E+00
	1.779E+01	0.000E+00
	1.830E+01	0.000E+00
	1.882E+01	0.000E+00
	1.933E+01	0.000E+00
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00





	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.425E-41 5.637E-43 1.979E-44 6.503E-46 2.374E-47 1.243E-48 9.053E-50 0.000E+00
20	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 4.664E-01 1.438E-01 2.804E-02 3.362E-03 2.439E-04 1.059E-05 2.732E-07 4.170E-09 3.799E-11 3.429E-13 3.656E-14 7.821E-15 1.486E-15 2.453E-16 3.502E-17 4.298E-18

	9.452E+00	4.509E-19
	1.001E+01	4.013E-20
	1.056E+01	3.009E-21
	1.112E+01	1.964E-22
	1.163E+01	1.290E-23
	1.215E+01	7.160E-25
	1.266E+01	3.346E-26
	1.317E+01	1.324E-27
	1.369E+01	4.773E-29
	1.420E+01	2.214E-30
	1.471E+01	2.073E-31
	1.523E+01	2.823E-32
	1.574E+01	3.897E-33
	1.625E+01	5.027E-34
	1.677E+01	5.982E-35
	1.728E+01	6.545E-36
	1.779E+01	6.567E-37
	1.830E+01	6.027E-38
	1.882E+01	5.048E-39
	1.933E+01	3.847E-40
	1.984E+01	2.662E-41
	2.036E+01	1.671E-42
	2.087E+01	9.547E-44
	2.138E+01	5.058E-45
	2.190E+01	2.644E-46
	2.241E+01	1.582E-47
	2.292E+01	1.270E-48
	2.344E+01	1.307E-49
	2.395E+01	1.460E-50
	2.446E+01	0.000E+00
	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.156E-01

1.112E+00	1.918E-01
1.668E+00	4.971E-02
2.224E+00	8.787E-03
2.780E+00	1.044E-03
3.336E+00	8.258E-05
3.892E+00	4.322E-06
4.448E+00	1.490E-07
5.004E+00	3.373E-09
5.560E+00	5.053E-11
6.116E+00	6.657E-13
6.672E+00	5.659E-14
7.228E+00	1.424E-14
7.784E+00	3.396E-15
8.340E+00	7.261E-16
8.896E+00	1.385E-16
9.452E+00	2.350E-17
1.001E+01	3.529E-18
1.056E+01	4.672E-19
1.112E+01	5.649E-20
1.163E+01	6.862E-21
1.215E+01	7.386E-22
1.266E+01	7.011E-23
1.317E+01	5.839E-24
1.369E+01	4.247E-25
1.420E+01	2.690E-26
1.471E+01	1.493E-27
1.523E+01	7.638E-29
1.574E+01	4.497E-30
1.625E+01	4.508E-31
1.677E+01	7.070E-32
1.728E+01	1.221E-32
1.779E+01	2.038E-33
1.830E+01	3.201E-34
1.882E+01	4.711E-35
1.933E+01	6.480E-36
1.984E+01	8.316E-37
2.036E+01	9.941E-38
2.087E+01	1.105E-38
2.138E+01	1.139E-39
2.190E+01	1.088E-40
2.241E+01	9.616E-42
2.292E+01	7.861E-43
2.344E+01	5.974E-44
2.395E+01	4.293E-45
2.446E+01	3.068E-46
2.498E+01	2.428E-47
2.549E+01	2.412E-48
2.600E+01	3.008E-49
2.652E+01	4.185E-50
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	5.535E-01
	1.112E+00	2.341E-01
	1.668E+00	7.356E-02
	2.224E+00	1.687E-02
	2.780E+00	2.788E-03
	3.336E+00	3.292E-04
	3.892E+00	2.763E-05
	4.448E+00	1.641E-06
	5.004E+00	6.873E-08
	5.560E+00	2.028E-09
	6.116E+00	4.252E-11
	6.672E+00	8.040E-13
	7.228E+00	7.030E-14
	7.784E+00	1.950E-14
	8.340E+00	5.408E-15
	8.896E+00	1.372E-15
	9.452E+00	3.169E-16
	1.001E+01	6.646E-17
	1.056E+01	1.263E-17
	1.112E+01	2.254E-18
	1.163E+01	4.028E-19
	1.215E+01	6.558E-20
	1.266E+01	9.692E-21
	1.317E+01	1.296E-21
	1.369E+01	1.562E-22
	1.420E+01	1.690E-23
	1.471E+01	1.636E-24
	1.523E+01	1.413E-25
	1.574E+01	1.087E-26
	1.625E+01	7.540E-28
	1.677E+01	5.001E-29
	1.728E+01	3.904E-30
	1.779E+01	4.853E-31
	1.830E+01	8.844E-32
	1.882E+01	1.781E-32
	1.933E+01	3.516E-33
	1.984E+01	6.621E-34
	2.036E+01	1.181E-34
	2.087E+01	1.994E-35
	2.138E+01	3.180E-36
	2.190E+01	4.785E-37
	2.241E+01	6.782E-38
	2.292E+01	9.042E-39

	2.344E+01	1.133E-39
	2.395E+01	1.331E-40
	2.446E+01	1.466E-41
	2.498E+01	1.512E-42
	2.549E+01	1.466E-43
	2.600E+01	1.347E-44
	2.652E+01	1.205E-45
	2.703E+01	1.113E-46
	2.754E+01	1.174E-47
	2.806E+01	1.524E-48
	2.857E+01	2.349E-49
	2.908E+01	3.904E-50
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
35	0.000E+00	1.000E+00
	5.560E-01	5.839E-01
	1.112E+00	2.713E-01
	1.668E+00	9.799E-02
	2.224E+00	2.709E-02
	2.780E+00	5.673E-03
	3.336E+00	8.926E-04
	3.892E+00	1.050E-04
	4.448E+00	9.199E-06
	5.004E+00	5.984E-07
	5.560E+00	2.885E-08
	6.116E+00	1.030E-09
	6.672E+00	2.759E-11
	7.228E+00	7.151E-13
	7.784E+00	7.527E-14
	8.340E+00	2.270E-14
	8.896E+00	7.005E-15
	9.452E+00	2.007E-15
	1.001E+01	5.309E-16
	1.056E+01	1.296E-16
	1.112E+01	3.022E-17
	1.163E+01	7.041E-18
	1.215E+01	1.521E-18
	1.266E+01	3.037E-19
	1.317E+01	5.595E-20
	1.369E+01	9.485E-21
	1.420E+01	1.476E-21
	1.471E+01	2.101E-22
	1.523E+01	2.728E-23

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	3.222E-24 3.452E-25 3.350E-26 2.954E-27 2.420E-28 2.011E-29 2.125E-30 3.451E-31 7.374E-32 1.676E-32 3.733E-33 7.982E-34 1.631E-34 3.176E-35 5.895E-36 1.041E-36 1.748E-37 2.787E-38 4.213E-39 6.035E-40 8.181E-41 1.049E-41 1.272E-42 1.463E-43 1.607E-44 1.721E-45 1.877E-46 2.251E-47 3.199E-48 5.384E-49 1.001E-49 1.919E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.090E-01 3.041E-01 1.221E-01 3.888E-02 9.727E-03 1.899E-03 2.879E-04 3.377E-05 3.057E-06 2.131E-07 1.142E-08 4.709E-10 1.526E-11

7.784E+00	5.318E-13
8.340E+00	7.284E-14
8.896E+00	2.384E-14
9.452E+00	7.977E-15
1.001E+01	2.503E-15
1.056E+01	7.348E-16
1.112E+01	2.082E-16
1.163E+01	5.884E-17
1.215E+01	1.560E-17
1.266E+01	3.875E-18
1.317E+01	8.998E-19
1.369E+01	1.950E-19
1.420E+01	3.935E-20
1.471E+01	7.380E-21
1.523E+01	1.283E-21
1.574E+01	2.064E-22
1.625E+01	3.064E-23
1.677E+01	4.187E-24
1.728E+01	5.254E-25
1.779E+01	6.047E-26
1.830E+01	6.389E-27
1.882E+01	6.271E-28
1.933E+01	5.983E-29
1.984E+01	6.360E-30
2.036E+01	9.361E-31
2.087E+01	1.959E-31
2.138E+01	4.799E-32
2.190E+01	1.200E-32
2.241E+01	2.925E-33
2.292E+01	6.873E-34
2.344E+01	1.551E-34
2.395E+01	3.358E-35
2.446E+01	6.968E-36
2.498E+01	1.385E-36
2.549E+01	2.632E-37
2.600E+01	4.784E-38
2.652E+01	8.302E-39
2.703E+01	1.375E-39
2.754E+01	2.170E-40
2.806E+01	3.263E-41
2.857E+01	4.673E-42
2.908E+01	6.378E-43
2.960E+01	8.319E-44
3.011E+01	1.046E-44
3.062E+01	1.293E-45
3.113E+01	1.638E-46
3.165E+01	2.269E-47
3.216E+01	3.649E-48
3.267E+01	6.825E-49
3.319E+01	1.404E-49
3.370E+01	2.991E-50
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

45

0.000E+00	1.000E+00
5.560E-01	6.301E-01
1.112E+00	3.332E-01
1.668E+00	1.454E-01
2.224E+00	5.171E-02
2.780E+00	1.487E-02
3.336E+00	3.435E-03
3.892E+00	6.345E-04
4.448E+00	9.342E-05
5.004E+00	1.093E-05
5.560E+00	1.016E-06
6.116E+00	7.472E-08
6.672E+00	4.352E-09
7.228E+00	2.010E-10
7.784E+00	7.638E-12
8.340E+00	3.617E-13
8.896E+00	6.614E-14
9.452E+00	2.339E-14
1.001E+01	8.339E-15
1.056E+01	2.818E-15
1.112E+01	9.263E-16
1.163E+01	3.033E-16
1.215E+01	9.400E-17
1.266E+01	2.754E-17
1.317E+01	7.617E-18
1.369E+01	1.986E-18
1.420E+01	4.873E-19
1.471E+01	1.124E-19
1.523E+01	2.431E-20
1.574E+01	4.924E-21
1.625E+01	9.322E-22
1.677E+01	1.646E-22
1.728E+01	2.705E-23
1.779E+01	4.129E-24
1.830E+01	5.844E-25
1.882E+01	7.657E-26
1.933E+01	9.297E-27
1.984E+01	1.054E-27
2.036E+01	1.149E-28
2.087E+01	1.319E-29
2.138E+01	1.907E-30
2.190E+01	3.878E-31
2.241E+01	9.842E-32
2.292E+01	2.664E-32
2.344E+01	7.161E-33
2.395E+01	1.872E-33
2.446E+01	4.726E-34
2.498E+01	1.151E-34
2.549E+01	2.702E-35
2.600E+01	6.105E-36
2.652E+01	1.327E-36
2.703E+01	2.774E-37
2.754E+01	5.572E-38
2.806E+01	1.074E-38
2.857E+01	1.986E-39
2.908E+01	3.520E-40



	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	5.977E-41 9.716E-42 1.513E-42 2.259E-43 3.251E-44 4.557E-45 6.370E-46 9.268E-47 1.488E-47 2.748E-48 5.768E-49 1.307E-49 3.046E-50 0.000E+00 0.000E+00
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.482E-01 3.591E-01 1.676E-01 6.517E-02 2.096E-02 5.540E-03 1.199E-03 2.118E-04 3.045E-05 3.559E-06 3.375E-07 2.594E-08 1.615E-09 8.191E-11 3.608E-12 2.403E-13 5.785E-14 2.188E-14 8.243E-15 3.046E-15 1.120E-15 3.922E-16 1.308E-16 4.148E-17 1.250E-17 3.571E-18 9.670E-19 2.478E-19 5.998E-20 1.370E-20 2.948E-21 5.964E-22 1.133E-22 2.016E-23 3.356E-24 5.219E-25 7.571E-26 1.026E-26 1.305E-27 1.597E-28

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.013E-29 3.017E-30 6.134E-31 1.595E-31 4.571E-32 1.325E-32 3.763E-33 1.038E-33 2.775E-34 7.175E-35 1.794E-35 4.335E-36 1.012E-36 2.278E-37 4.948E-38 1.036E-38 2.089E-39 4.054E-40 7.570E-41 1.359E-41 2.348E-42 3.904E-43 6.268E-44 9.790E-45 1.510E-45 2.371E-46 3.965E-47 7.410E-48 1.574E-48 3.697E-49
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 6.640E-01 3.825E-01 1.887E-01 7.897E-02 2.783E-02 8.219E-03 2.025E-03 4.152E-04 7.068E-05 9.968E-06 1.163E-06 1.122E-07 8.940E-09 5.886E-10 3.237E-11 1.668E-12 1.634E-13 4.951E-14 1.986E-14 8.052E-15 3.250E-15 1.257E-15 4.651E-16 1.647E-16 5.570E-17

1.420E+01	1.798E-17
1.471E+01	5.537E-18
1.523E+01	1.624E-18
1.574E+01	4.532E-19
1.625E+01	1.202E-19
1.677E+01	3.024E-20
1.728E+01	7.214E-21
1.779E+01	1.629E-21
1.830E+01	3.475E-22
1.882E+01	6.997E-23
1.933E+01	1.327E-23
1.984E+01	2.369E-24
2.036E+01	3.972E-25
2.087E+01	6.253E-26
2.138E+01	9.251E-27
2.190E+01	1.294E-27
2.241E+01	1.747E-28
2.292E+01	2.413E-29
2.344E+01	3.855E-30
2.395E+01	8.077E-31
2.446E+01	2.163E-31
2.498E+01	6.499E-32
2.549E+01	1.999E-32
2.600E+01	6.073E-33
2.652E+01	1.800E-33
2.703E+01	5.185E-34
2.754E+01	1.450E-34
2.806E+01	3.936E-35
2.857E+01	1.036E-35
2.908E+01	2.641E-36
2.960E+01	6.522E-37
3.011E+01	1.559E-37
3.062E+01	3.607E-38
3.113E+01	8.068E-39
3.165E+01	1.744E-39
3.216E+01	3.641E-40
3.267E+01	7.337E-41
3.319E+01	1.427E-41
3.370E+01	2.679E-42
3.421E+01	4.859E-43
3.473E+01	8.532E-44
3.524E+01	1.459E-44
3.575E+01	2.458E-45
3.627E+01	4.174E-46
3.678E+01	7.407E-47

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.035E-01
	1.112E+00	1.088E-02
	1.668E+00	1.325E-04
	2.224E+00	3.447E-07

2.780E+00	1.865E-10
3.336E+00	9.968E-14
3.892E+00	5.897E-15
4.448E+00	2.914E-16
5.004E+00	9.329E-18
5.560E+00	1.877E-19
6.116E+00	2.292E-21
6.672E+00	1.629E-23
7.228E+00	6.449E-26
7.784E+00	1.442E-28
8.340E+00	5.218E-31
8.896E+00	1.104E-32
9.452E+00	2.398E-34
1.001E+01	3.920E-36
1.056E+01	4.720E-38
1.112E+01	4.689E-40
1.163E+01	4.372E-42
1.215E+01	3.066E-44
1.266E+01	1.837E-46
1.317E+01	1.711E-48
1.369E+01	3.347E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.695E-01
	1.112E+00	7.219E-02
	1.668E+00	6.949E-03
	2.224E+00	3.171E-04
	2.780E+00	6.708E-06
	3.336E+00	6.495E-08
	3.892E+00	2.862E-10
	4.448E+00	7.456E-13
	5.004E+00	3.331E-14
	5.560E+00	4.922E-15
	6.116E+00	6.016E-16
	6.672E+00	5.936E-17
	7.228E+00	4.682E-18
	7.784E+00	2.919E-19
	8.340E+00	1.421E-20
	8.896E+00	5.321E-22
	9.452E+00	1.510E-23
	1.001E+01	3.194E-25
	1.056E+01	4.993E-27
	1.112E+01	7.016E-29
	1.163E+01	1.632E-30
	1.215E+01	1.023E-31
	1.266E+01	9.112E-33
	1.317E+01	7.616E-34
	1.369E+01	5.655E-35
	1.420E+01	3.702E-36
	1.471E+01	2.127E-37
	1.523E+01	1.067E-38
	1.574E+01	4.655E-40
	1.625E+01	1.757E-41
	1.677E+01	5.733E-43
	1.728E+01	1.636E-44
	1.779E+01	4.357E-46
	1.830E+01	1.348E-47
	1.882E+01	6.397E-49
	1.933E+01	4.141E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.560E-01	4.645E-01
	1.112E+00	1.427E-01
	1.668E+00	2.769E-02
	2.224E+00	3.308E-03
	2.780E+00	2.390E-04
	3.336E+00	1.033E-05
	3.892E+00	2.655E-07
	4.448E+00	4.035E-09
	5.004E+00	3.661E-11
	5.560E+00	3.292E-13
	6.116E+00	3.495E-14
	6.672E+00	7.447E-15
	7.228E+00	1.409E-15
	7.784E+00	2.316E-16
	8.340E+00	3.294E-17
	8.896E+00	4.026E-18
	9.452E+00	4.206E-19
	1.001E+01	3.729E-20
	1.056E+01	2.785E-21
	1.112E+01	1.978E-22
	1.163E+01	1.295E-23
	1.215E+01	7.173E-25
	1.266E+01	3.343E-26
	1.317E+01	1.319E-27
	1.369E+01	4.743E-29
	1.420E+01	2.195E-30
	1.471E+01	2.049E-31
	1.523E+01	2.783E-32
	1.574E+01	3.832E-33
	1.625E+01	4.930E-34
	1.677E+01	5.851E-35





9.452E+00	5.832E-17
1.001E+01	9.898E-18
1.056E+01	1.499E-18
1.112E+01	2.284E-19
1.163E+01	3.206E-20
1.215E+01	4.029E-21
1.266E+01	4.517E-22
1.317E+01	4.495E-23
1.369E+01	3.955E-24
1.420E+01	3.062E-25
1.471E+01	2.082E-26
1.523E+01	1.253E-27
1.574E+01	7.022E-29
1.625E+01	4.523E-30
1.677E+01	4.807E-31
1.728E+01	7.883E-32
1.779E+01	1.436E-32
1.830E+01	2.546E-33
1.882E+01	4.271E-34
1.933E+01	6.741E-35
1.984E+01	9.990E-36
2.036E+01	1.388E-36
2.087E+01	1.805E-37
2.138E+01	2.194E-38
2.190E+01	2.486E-39
2.241E+01	2.624E-40
2.292E+01	2.576E-41
2.344E+01	2.350E-42
2.395E+01	1.996E-43
2.446E+01	1.593E-44
2.498E+01	1.227E-45
2.549E+01	9.770E-47
2.600E+01	9.045E-48
2.652E+01	1.058E-48
2.703E+01	1.479E-49
2.754E+01	2.210E-50
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

1.112E+00	2.573E-01
1.668E+00	8.876E-02
2.224E+00	2.310E-02
2.780E+00	4.487E-03
3.336E+00	6.451E-04
3.892E+00	6.829E-05
4.448E+00	5.302E-06
5.004E+00	3.010E-07
5.560E+00	1.247E-08
6.116E+00	3.771E-10
6.672E+00	8.610E-12
7.228E+00	2.609E-13
7.784E+00	4.552E-14
8.340E+00	1.387E-14
8.896E+00	4.025E-15
9.452E+00	1.077E-15
1.001E+01	2.649E-16
1.056E+01	6.001E-17
1.112E+01	1.401E-17
1.163E+01	3.010E-18
1.215E+01	5.962E-19
1.266E+01	1.086E-19
1.317E+01	1.816E-20
1.369E+01	2.776E-21
1.420E+01	3.870E-22
1.471E+01	4.905E-23
1.523E+01	5.632E-24
1.574E+01	5.842E-25
1.625E+01	5.462E-26
1.677E+01	4.611E-27
1.728E+01	3.577E-28
1.779E+01	2.751E-29
1.830E+01	2.612E-30
1.882E+01	3.865E-31
1.933E+01	7.820E-32
1.984E+01	1.708E-32
2.036E+01	3.658E-33
2.087E+01	7.510E-34
2.138E+01	1.470E-34
2.190E+01	2.736E-35
2.241E+01	4.840E-36
2.292E+01	8.128E-37
2.344E+01	1.294E-37
2.395E+01	1.951E-38
2.446E+01	2.782E-39
2.498E+01	3.746E-40
2.549E+01	4.762E-41
2.600E+01	5.708E-42
2.652E+01	6.456E-43
2.703E+01	6.915E-44
2.754E+01	7.092E-45
2.806E+01	7.162E-46
2.857E+01	7.562E-47
2.908E+01	9.123E-48
2.960E+01	1.330E-48
3.011E+01	2.257E-49
3.062E+01	4.100E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.065E-01
	1.112E+00	3.016E-01
	1.668E+00	1.206E-01
	2.224E+00	3.825E-02
	2.780E+00	9.531E-03
	3.336E+00	1.853E-03
	3.892E+00	2.798E-04
	4.448E+00	3.269E-05
	5.004E+00	2.947E-06
	5.560E+00	2.045E-07
	6.116E+00	1.092E-08
	6.672E+00	4.483E-10
	7.228E+00	1.447E-11
	7.784E+00	5.023E-13
	8.340E+00	6.852E-14
	8.896E+00	2.234E-14
	9.452E+00	7.443E-15
	1.001E+01	2.327E-15
	1.056E+01	6.845E-16
	1.112E+01	2.097E-16
	1.163E+01	5.912E-17
	1.215E+01	1.563E-17
	1.266E+01	3.873E-18
	1.317E+01	8.968E-19
	1.369E+01	1.938E-19
	1.420E+01	3.901E-20
	1.471E+01	7.296E-21
	1.523E+01	1.265E-21
	1.574E+01	2.030E-22
	1.625E+01	3.005E-23
	1.677E+01	4.095E-24
	1.728E+01	5.125E-25
	1.779E+01	5.882E-26
	1.830E+01	6.199E-27
	1.882E+01	6.067E-28
	1.933E+01	5.773E-29
	1.984E+01	6.121E-30
	2.036E+01	8.987E-31
	2.087E+01	1.876E-31
	2.138E+01	4.583E-32
	2.190E+01	1.143E-32
	2.241E+01	2.779E-33
	2.292E+01	6.511E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.465E-34 3.164E-35 6.548E-36 1.298E-36 2.460E-37 4.459E-38 7.718E-39 1.275E-39 2.007E-40 3.009E-41 4.298E-42 5.850E-43 7.610E-44 9.543E-45 1.177E-45 1.486E-46 2.053E-47 3.294E-48 6.145E-49 1.261E-49 2.678E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.339E-01 3.394E-01 1.510E-01 5.523E-02 1.646E-02 3.974E-03 7.736E-04 1.210E-04 1.519E-05 1.525E-06 1.223E-07 7.833E-09 4.007E-10 1.668E-11 7.092E-13 8.908E-14 2.982E-14 1.094E-14 3.864E-15 1.428E-15 4.862E-16 1.570E-16 4.806E-17 1.393E-17 3.814E-18 9.860E-19 2.403E-19 5.510E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.187E-20 2.398E-21 4.535E-22 8.012E-23 1.320E-23 2.024E-24 2.883E-25 3.812E-26 4.689E-27 5.428E-28 6.151E-29 7.616E-30 1.231E-30 2.740E-31 7.276E-32 2.015E-32 5.513E-33 1.465E-33 3.766E-34 9.347E-35 2.238E-35 5.167E-36 1.149E-36 2.461E-37 5.069E-38 1.004E-38 1.910E-39 3.488E-40 6.111E-41 1.027E-41 1.655E-42 2.561E-43 3.823E-44 5.552E-45 8.006E-46 1.190E-46 1.925E-47 3.549E-48 7.455E-49 1.708E-49 4.062E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.563E-01 3.719E-01 1.796E-01 7.315E-02 2.495E-02 7.088E-03 1.670E-03 3.255E-04 5.234E-05 6.932E-06 7.551E-07 6.757E-08 4.964E-09

7.784E+00	2.997E-10
8.340E+00	1.516E-11
8.896E+00	7.859E-13
9.452E+00	1.029E-13
1.001E+01	3.542E-14
1.056E+01	1.414E-14
1.112E+01	5.988E-15
1.163E+01	2.341E-15
1.215E+01	8.756E-16
1.266E+01	3.129E-16
1.317E+01	1.068E-16
1.369E+01	3.474E-17
1.420E+01	1.077E-17
1.471E+01	3.178E-18
1.523E+01	8.915E-19
1.574E+01	2.374E-19
1.625E+01	5.995E-20
1.677E+01	1.433E-20
1.728E+01	3.241E-21
1.779E+01	6.917E-22
1.830E+01	1.392E-22
1.882E+01	2.635E-23
1.933E+01	4.688E-24
1.984E+01	7.825E-25
2.036E+01	1.224E-25
2.087E+01	1.795E-26
2.138E+01	2.475E-27
2.190E+01	3.258E-28
2.241E+01	4.274E-29
2.292E+01	6.214E-30
2.344E+01	1.160E-30
2.395E+01	2.863E-31
2.446E+01	8.255E-32
2.498E+01	2.484E-32
2.549E+01	7.421E-33
2.600E+01	2.165E-33
2.652E+01	6.138E-34
2.703E+01	1.688E-34
2.754E+01	4.501E-35
2.806E+01	1.163E-35
2.857E+01	2.907E-36
2.908E+01	7.037E-37
2.960E+01	1.647E-37
3.011E+01	3.726E-38
3.062E+01	8.143E-39
3.113E+01	1.718E-39
3.165E+01	3.497E-40
3.216E+01	6.863E-41
3.267E+01	1.299E-41
3.319E+01	2.369E-42
3.370E+01	4.171E-43
3.421E+01	7.104E-44
3.473E+01	1.178E-44
3.524E+01	1.924E-45
3.575E+01	3.175E-46
3.627E+01	5.504E-47
3.678E+01	1.049E-47

45

0.000E+00	1.000E+00
5.560E-01	6.751E-01
1.112E+00	4.003E-01
1.668E+00	2.061E-01
2.224E+00	9.137E-02
2.780E+00	3.463E-02
3.336E+00	1.117E-02
3.892E+00	3.055E-03
4.448E+00	7.065E-04
5.004E+00	1.378E-04
5.560E+00	2.265E-05
6.116E+00	3.130E-06
6.672E+00	3.634E-07
7.228E+00	3.541E-08
7.784E+00	2.896E-09
8.340E+00	1.992E-10
8.896E+00	1.178E-11
9.452E+00	7.341E-13
1.001E+01	1.082E-13
1.056E+01	3.950E-14
1.112E+01	1.825E-14
1.163E+01	7.926E-15
1.215E+01	3.316E-15
1.266E+01	1.334E-15
1.317E+01	5.154E-16
1.369E+01	1.912E-16
1.420E+01	6.805E-17
1.471E+01	2.321E-17
1.523E+01	7.581E-18
1.574E+01	2.369E-18
1.625E+01	7.074E-19
1.677E+01	2.017E-19
1.728E+01	5.483E-20
1.779E+01	1.420E-20
1.830E+01	3.499E-21
1.882E+01	8.193E-22
1.933E+01	1.820E-22
1.984E+01	3.833E-23
2.036E+01	7.639E-24
2.087E+01	1.439E-24
2.138E+01	2.559E-25
2.190E+01	4.295E-26
2.241E+01	6.814E-27
2.292E+01	1.028E-27
2.344E+01	1.507E-28
2.395E+01	2.264E-29
2.446E+01	3.893E-30
2.498E+01	8.580E-31
2.549E+01	2.386E-31
2.600E+01	7.468E-32
2.652E+01	2.410E-32
2.703E+01	7.715E-33
2.754E+01	2.419E-33
2.806E+01	7.394E-34
2.857E+01	2.200E-34
2.908E+01	6.370E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.793E-35 4.905E-36 1.304E-36 3.364E-37 8.423E-38 2.046E-38 4.817E-39 1.099E-39 2.429E-40 5.196E-41 1.076E-41 2.157E-42 4.190E-43 7.904E-44 1.455E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.912E-01 4.254E-01 2.307E-01 1.095E-01 4.518E-02 1.614E-02 4.973E-03 1.319E-03 3.004E-04 5.866E-05 9.807E-06 1.403E-06 1.714E-07 1.790E-08 1.596E-09 1.219E-10 8.211E-12 6.119E-13 1.075E-13 4.534E-14 2.104E-14 9.601E-15 4.239E-15 1.807E-15 7.432E-16 2.947E-16 1.126E-16 4.144E-17 1.467E-17 4.992E-18 1.632E-18 5.120E-19 1.541E-19 4.440E-20 1.225E-20 3.230E-21 8.134E-22 1.954E-22 4.473E-23 9.745E-24



	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.018E-24 3.971E-25 7.414E-26 1.315E-26 2.223E-27 3.624E-28 5.878E-29 1.018E-29 2.101E-30 5.493E-31 1.714E-31 5.776E-32 1.977E-32 6.695E-33 2.223E-33 7.211E-34 2.284E-34 7.055E-35 2.125E-35 6.240E-36 1.785E-36 4.974E-37 1.349E-37 3.560E-38 9.139E-39 2.281E-39 5.531E-40 1.303E-40 2.982E-41 6.627E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.052E-01 4.476E-01 2.535E-01 1.273E-01 5.631E-02 2.187E-02 7.434E-03 2.206E-03 5.703E-04 1.283E-04 2.507E-05 4.252E-06 6.255E-07 7.976E-08 8.810E-09 8.434E-10 7.031E-11 5.313E-12 4.781E-13 1.109E-13 4.773E-14 2.295E-14 1.090E-14 5.031E-15 2.249E-15

1.420E+01	9.731E-16
1.471E+01	4.074E-16
1.523E+01	1.650E-16
1.574E+01	6.455E-17
1.625E+01	2.439E-17
1.677E+01	8.897E-18
1.728E+01	3.130E-18
1.779E+01	1.061E-18
1.830E+01	3.465E-19
1.882E+01	1.089E-19
1.933E+01	3.289E-20
1.984E+01	9.546E-21
2.036E+01	2.659E-21
2.087E+01	7.102E-22
2.138E+01	1.817E-22
2.190E+01	4.448E-23
2.241E+01	1.041E-23
2.292E+01	2.328E-24
2.344E+01	4.966E-25
2.395E+01	1.010E-25
2.446E+01	1.961E-26
2.498E+01	3.641E-27
2.549E+01	6.513E-28
2.600E+01	1.146E-28
2.652E+01	2.079E-29
2.703E+01	4.245E-30
2.754E+01	1.062E-30
2.806E+01	3.246E-31
2.857E+01	1.116E-31
2.908E+01	3.999E-32
2.960E+01	1.437E-32
3.011E+01	5.093E-33
3.062E+01	1.771E-33
3.113E+01	6.031E-34
3.165E+01	2.008E-34
3.216E+01	6.539E-35
3.267E+01	2.081E-35
3.319E+01	6.468E-36
3.370E+01	1.964E-36
3.421E+01	5.820E-37
3.473E+01	1.683E-37
3.524E+01	4.750E-38
3.575E+01	1.307E-38
3.627E+01	3.506E-39
3.678E+01	9.164E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.28	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.560E-01	2.043E-01	
	1.112E+00	1.097E-02	
	1.668E+00	1.341E-04	
	2.224E+00	3.503E-07	

2.780E+00	1.902E-10
3.336E+00	1.021E-13
3.892E+00	6.065E-15
4.448E+00	3.009E-16
5.004E+00	9.671E-18
5.560E+00	1.954E-19
6.116E+00	2.395E-21
6.672E+00	1.709E-23
7.228E+00	6.794E-26
7.784E+00	1.525E-28
8.340E+00	5.541E-31
8.896E+00	1.177E-32
9.452E+00	2.567E-34
1.001E+01	4.212E-36
1.056E+01	5.092E-38
1.112E+01	4.027E-40
1.163E+01	3.755E-42
1.215E+01	2.634E-44
1.266E+01	1.578E-46
1.317E+01	1.469E-48
1.369E+01	2.874E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.710E-01
	1.112E+00	7.277E-02
	1.668E+00	7.033E-03
	2.224E+00	3.222E-04
	2.780E+00	6.843E-06
	3.336E+00	6.653E-08
	3.892E+00	2.943E-10
	4.448E+00	7.698E-13
	5.004E+00	3.453E-14
	5.560E+00	5.123E-15
	6.116E+00	6.286E-16
	6.672E+00	6.228E-17
	7.228E+00	4.932E-18
	7.784E+00	3.087E-19
	8.340E+00	1.509E-20
	8.896E+00	5.672E-22
	9.452E+00	1.616E-23
	1.001E+01	3.433E-25
	1.056E+01	5.387E-27
	1.112E+01	6.026E-29
	1.163E+01	1.401E-30
	1.215E+01	8.782E-32
	1.266E+01	7.825E-33
	1.317E+01	6.540E-34
	1.369E+01	4.856E-35
	1.420E+01	3.179E-36
	1.471E+01	1.826E-37
	1.523E+01	9.165E-39
	1.574E+01	3.998E-40
	1.625E+01	1.509E-41
	1.677E+01	4.924E-43
	1.728E+01	1.405E-44
	1.779E+01	3.742E-46
	1.830E+01	1.158E-47
	1.882E+01	5.494E-49
	1.933E+01	3.556E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00



1.728E+01	5.482E-36
1.779E+01	5.486E-37
1.830E+01	5.022E-38
1.882E+01	4.194E-39
1.933E+01	3.188E-40
1.984E+01	2.200E-41
2.036E+01	1.377E-42
2.087E+01	7.848E-44
2.138E+01	4.146E-45
2.190E+01	2.162E-46
2.241E+01	1.290E-47
2.292E+01	1.033E-48
2.344E+01	1.060E-49
2.395E+01	1.181E-50
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

20

0.000E+00	1.000E+00
5.560E-01	5.292E-01
1.112E+00	2.064E-01
1.668E+00	5.750E-02
2.224E+00	1.120E-02
2.780E+00	1.506E-03
3.336E+00	1.384E-04
3.892E+00	8.646E-06
4.448E+00	3.654E-07
5.004E+00	1.042E-08
5.560E+00	2.006E-10
6.116E+00	2.846E-12
6.672E+00	1.088E-13
7.228E+00	2.511E-14
7.784E+00	6.529E-15
8.340E+00	1.541E-15
8.896E+00	3.274E-16

	9.452E+00	6.241E-17
	1.001E+01	1.063E-17
	1.056E+01	1.611E-18
	1.112E+01	1.962E-19
	1.163E+01	2.753E-20
	1.215E+01	3.460E-21
	1.266E+01	3.879E-22
	1.317E+01	3.860E-23
	1.369E+01	3.396E-24
	1.420E+01	2.630E-25
	1.471E+01	1.788E-26
	1.523E+01	1.076E-27
	1.574E+01	6.031E-29
	1.625E+01	3.884E-30
	1.677E+01	4.128E-31
	1.728E+01	6.769E-32
	1.779E+01	1.233E-32
	1.830E+01	2.186E-33
	1.882E+01	3.667E-34
	1.933E+01	5.788E-35
	1.984E+01	8.579E-36
	2.036E+01	1.192E-36
	2.087E+01	1.550E-37
	2.138E+01	1.884E-38
	2.190E+01	2.135E-39
	2.241E+01	2.254E-40
	2.292E+01	2.212E-41
	2.344E+01	2.018E-42
	2.395E+01	1.714E-43
	2.446E+01	1.368E-44
	2.498E+01	1.054E-45
	2.549E+01	8.390E-47
	2.600E+01	7.767E-48
	2.652E+01	9.083E-49
	2.703E+01	1.270E-49
	2.754E+01	1.898E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.744E-01



1.112E+00  
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2.224E+00  
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3.011E+01  
3.062E+01

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2.347E-02  
4.577E-03  
6.608E-04  
7.023E-05  
5.474E-06  
3.120E-07  
1.298E-08  
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9.033E-12  
2.748E-13  
4.812E-14  
1.472E-14  
4.290E-15  
1.153E-15  
2.845E-16  
6.415E-17  
1.203E-17  
2.585E-18  
5.120E-19  
9.329E-20  
1.559E-20  
2.384E-21  
3.323E-22  
4.212E-23  
4.837E-24  
5.017E-25  
4.690E-26  
3.960E-27  
3.072E-28  
2.363E-29  
2.243E-30  
3.319E-31  
6.714E-32  
1.466E-32  
3.141E-33  
6.449E-34  
1.262E-34  
2.349E-35  
4.156E-36  
6.980E-37  
1.111E-37  
1.675E-38  
2.389E-39  
3.217E-40  
4.089E-41  
4.901E-42  
5.544E-43  
5.938E-44  
6.090E-45  
6.150E-46  
6.494E-47  
7.834E-48  
1.142E-48  
1.938E-49  
3.520E-50

	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.089E-01
	1.112E+00	3.040E-01
	1.668E+00	1.220E-01
	2.224E+00	3.886E-02
	2.780E+00	9.723E-03
	3.336E+00	1.898E-03
	3.892E+00	2.877E-04
	4.448E+00	3.375E-05
	5.004E+00	3.054E-06
	5.560E+00	2.129E-07
	6.116E+00	1.141E-08
	6.672E+00	4.703E-10
	7.228E+00	1.524E-11
	7.784E+00	5.311E-13
	8.340E+00	7.273E-14
	8.896E+00	2.381E-14
	9.452E+00	7.964E-15
	1.001E+01	2.497E-15
	1.056E+01	7.266E-16
	1.112E+01	1.801E-16
	1.163E+01	5.076E-17
	1.215E+01	1.342E-17
	1.266E+01	3.325E-18
	1.317E+01	7.700E-19
	1.369E+01	1.664E-19
	1.420E+01	3.350E-20
	1.471E+01	6.265E-21
	1.523E+01	1.087E-21
	1.574E+01	1.743E-22
	1.625E+01	2.581E-23
	1.677E+01	3.517E-24
	1.728E+01	4.401E-25
	1.779E+01	5.051E-26
	1.830E+01	5.323E-27
	1.882E+01	5.210E-28
	1.933E+01	4.958E-29
	1.984E+01	5.256E-30
	2.036E+01	7.717E-31
	2.087E+01	1.611E-31
	2.138E+01	3.935E-32
	2.190E+01	9.812E-33
	2.241E+01	2.386E-33
	2.292E+01	5.591E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.258E-34 2.717E-35 5.622E-36 1.114E-36 2.113E-37 3.829E-38 6.628E-39 1.095E-39 1.723E-40 2.584E-41 3.691E-42 5.023E-43 6.535E-44 8.195E-45 1.010E-45 1.276E-46 1.763E-47 2.828E-48 5.277E-49 1.083E-49 2.300E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.364E-01 3.421E-01 1.528E-01 5.612E-02 1.679E-02 4.070E-03 7.955E-04 1.250E-04 1.574E-05 1.587E-06 1.278E-07 8.218E-09 4.221E-10 1.764E-11 7.530E-13 9.493E-14 3.190E-14 1.172E-14 4.070E-15 1.226E-15 4.174E-16 1.348E-16 4.126E-17 1.196E-17 3.275E-18 8.466E-19 2.063E-19 4.731E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.019E-20 2.059E-21 3.894E-22 6.880E-23 1.133E-23 1.738E-24 2.475E-25 3.273E-26 4.027E-27 4.661E-28 5.282E-29 6.539E-30 1.057E-30 2.353E-31 6.247E-32 1.730E-32 4.733E-33 1.258E-33 3.233E-34 8.025E-35 1.922E-35 4.436E-36 9.867E-37 2.113E-37 4.352E-38 8.620E-39 1.640E-39 2.995E-40 5.248E-41 8.817E-42 1.421E-42 2.200E-43 3.283E-44 4.768E-45 6.875E-46 1.022E-46 1.653E-47 3.047E-48 6.401E-49 1.467E-49 3.487E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.589E-01 3.749E-01 1.817E-01 7.432E-02 2.545E-02 7.259E-03 1.717E-03 3.361E-04 5.426E-05 7.215E-06 7.890E-07 7.089E-08 5.228E-09

7.784E+00	3.170E-10
8.340E+00	1.610E-11
8.896E+00	8.377E-13
9.452E+00	1.101E-13
1.001E+01	3.789E-14
1.056E+01	1.477E-14
1.112E+01	5.141E-15
1.163E+01	2.010E-15
1.215E+01	7.517E-16
1.266E+01	2.686E-16
1.317E+01	9.166E-17
1.369E+01	2.983E-17
1.420E+01	9.248E-18
1.471E+01	2.729E-18
1.523E+01	7.655E-19
1.574E+01	2.039E-19
1.625E+01	5.148E-20
1.677E+01	1.231E-20
1.728E+01	2.783E-21
1.779E+01	5.940E-22
1.830E+01	1.195E-22
1.882E+01	2.263E-23
1.933E+01	4.026E-24
1.984E+01	6.720E-25
2.036E+01	1.051E-25
2.087E+01	1.541E-26
2.138E+01	2.126E-27
2.190E+01	2.798E-28
2.241E+01	3.670E-29
2.292E+01	5.336E-30
2.344E+01	9.959E-31
2.395E+01	2.458E-31
2.446E+01	7.088E-32
2.498E+01	2.133E-32
2.549E+01	6.371E-33
2.600E+01	1.859E-33
2.652E+01	5.270E-34
2.703E+01	1.449E-34
2.754E+01	3.864E-35
2.806E+01	9.982E-36
2.857E+01	2.496E-36
2.908E+01	6.042E-37
2.960E+01	1.414E-37
3.011E+01	3.199E-38
3.062E+01	6.992E-39
3.113E+01	1.475E-39
3.165E+01	3.002E-40
3.216E+01	5.893E-41
3.267E+01	1.115E-41
3.319E+01	2.035E-42
3.370E+01	3.582E-43
3.421E+01	6.100E-44
3.473E+01	1.011E-44
3.524E+01	1.652E-45
3.575E+01	2.727E-46
3.627E+01	4.726E-47
3.678E+01	9.008E-48

45

0.000E+00	1.000E+00
5.560E-01	6.778E-01
1.112E+00	4.035E-01
1.668E+00	2.086E-01
2.224E+00	9.283E-02
2.780E+00	3.533E-02
3.336E+00	1.144E-02
3.892E+00	3.142E-03
4.448E+00	7.294E-04
5.004E+00	1.429E-04
5.560E+00	2.357E-05
6.116E+00	3.270E-06
6.672E+00	3.812E-07
7.228E+00	3.730E-08
7.784E+00	3.063E-09
8.340E+00	2.115E-10
8.896E+00	1.256E-11
9.452E+00	7.854E-13
1.001E+01	1.156E-13
1.056E+01	4.097E-14
1.112E+01	1.567E-14
1.163E+01	6.804E-15
1.215E+01	2.846E-15
1.266E+01	1.145E-15
1.317E+01	4.425E-16
1.369E+01	1.642E-16
1.420E+01	5.842E-17
1.471E+01	1.993E-17
1.523E+01	6.509E-18
1.574E+01	2.034E-18
1.625E+01	6.073E-19
1.677E+01	1.732E-19
1.728E+01	4.708E-20
1.779E+01	1.219E-20
1.830E+01	3.005E-21
1.882E+01	7.035E-22
1.933E+01	1.563E-22
1.984E+01	3.292E-23
2.036E+01	6.560E-24
2.087E+01	1.236E-24
2.138E+01	2.197E-25
2.190E+01	3.689E-26
2.241E+01	5.851E-27
2.292E+01	8.830E-28
2.344E+01	1.294E-28
2.395E+01	1.944E-29
2.446E+01	3.343E-30
2.498E+01	7.366E-31
2.549E+01	2.048E-31
2.600E+01	6.411E-32
2.652E+01	2.069E-32
2.703E+01	6.624E-33
2.754E+01	2.077E-33
2.806E+01	6.348E-34
2.857E+01	1.889E-34
2.908E+01	5.469E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.539E-35 4.212E-36 1.119E-36 2.888E-37 7.232E-38 1.756E-38 4.136E-39 9.437E-40 2.085E-40 4.462E-41 9.240E-42 1.852E-42 3.598E-43 6.787E-44 1.249E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.939E-01 4.288E-01 2.335E-01 1.112E-01 4.608E-02 1.653E-02 5.114E-03 1.362E-03 3.114E-04 6.104E-05 1.025E-05 1.471E-06 1.806E-07 1.893E-08 1.694E-09 1.299E-10 8.787E-12 6.556E-13 1.115E-13 3.891E-14 1.806E-14 8.241E-15 3.639E-15 1.551E-15 6.380E-16 2.530E-16 9.668E-17 3.557E-17 1.259E-17 4.286E-18 1.401E-18 4.396E-19 1.323E-19 3.812E-20 1.052E-20 2.773E-21 6.984E-22 1.678E-22 3.841E-23 8.368E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.733E-24 3.409E-25 6.367E-26 1.129E-26 1.909E-27 3.112E-28 5.048E-29 8.745E-30 1.804E-30 4.716E-31 1.471E-31 4.959E-32 1.697E-32 5.748E-33 1.908E-33 6.191E-34 1.961E-34 6.057E-35 1.825E-35 5.358E-36 1.533E-36 4.270E-37 1.158E-37 3.057E-38 7.846E-39 1.958E-39 4.749E-40 1.119E-40 2.561E-41 5.690E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.079E-01 4.512E-01 2.566E-01 1.293E-01 5.744E-02 2.240E-02 7.644E-03 2.277E-03 5.911E-04 1.335E-04 2.619E-05 4.460E-06 6.588E-07 8.434E-08 9.354E-09 8.990E-10 7.524E-11 5.704E-12 5.058E-13 9.520E-14 4.096E-14 1.970E-14 9.359E-15 4.318E-15 1.930E-15



1.420E+01	8.353E-16
1.471E+01	3.498E-16
1.523E+01	1.416E-16
1.574E+01	5.541E-17
1.625E+01	2.094E-17
1.677E+01	7.638E-18
1.728E+01	2.687E-18
1.779E+01	9.111E-19
1.830E+01	2.975E-19
1.882E+01	9.348E-20
1.933E+01	2.824E-20
1.984E+01	8.196E-21
2.036E+01	2.283E-21
2.087E+01	6.098E-22
2.138E+01	1.560E-22
2.190E+01	3.819E-23
2.241E+01	8.940E-24
2.292E+01	1.999E-24
2.344E+01	4.264E-25
2.395E+01	8.675E-26
2.446E+01	1.684E-26
2.498E+01	3.126E-27
2.549E+01	5.592E-28
2.600E+01	9.837E-29
2.652E+01	1.785E-29
2.703E+01	3.645E-30
2.754E+01	9.118E-31
2.806E+01	2.786E-31
2.857E+01	9.579E-32
2.908E+01	3.433E-32
2.960E+01	1.233E-32
3.011E+01	4.372E-33
3.062E+01	1.521E-33
3.113E+01	5.177E-34
3.165E+01	1.724E-34
3.216E+01	5.614E-35
3.267E+01	1.786E-35
3.319E+01	5.553E-36
3.370E+01	1.686E-36
3.421E+01	4.997E-37
3.473E+01	1.445E-37
3.524E+01	4.078E-38
3.575E+01	1.122E-38
3.627E+01	3.010E-39
3.678E+01	7.868E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## DB SandPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	3.821E-40
1.163E+01	3.556E-42
1.215E+01	2.489E-44
1.266E+01	1.489E-46
1.317E+01	1.384E-48
1.369E+01	2.701E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	5.718E-29
	1.163E+01	1.327E-30
	1.215E+01	8.302E-32
	1.266E+01	7.383E-33
	1.317E+01	6.158E-34
	1.369E+01	4.564E-35
	1.420E+01	2.982E-36
	1.471E+01	1.710E-37
	1.523E+01	8.562E-39
	1.574E+01	3.727E-40
	1.625E+01	1.404E-41
	1.677E+01	4.572E-43
	1.728E+01	1.302E-44
	1.779E+01	3.461E-46
	1.830E+01	1.069E-47
	1.882E+01	5.062E-49
	1.933E+01	3.270E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.859E-21 1.612E-22 1.054E-23 5.823E-25 2.708E-26 1.067E-27 3.828E-29 1.768E-30 1.647E-31 2.233E-32 3.069E-33 3.940E-34 4.666E-35

	1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	5.081E-36 5.075E-37 4.636E-38 3.865E-39 2.932E-40 2.019E-41 1.262E-42 7.175E-44 3.783E-45 1.969E-46 1.172E-47 9.367E-49 9.595E-50 1.067E-50 0.000E+00
20	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00	1.000E+00 5.278E-01 2.054E-01 5.706E-02 1.109E-02 1.487E-03 1.363E-04 8.492E-06 3.580E-07 1.018E-08 1.955E-10 2.767E-12 1.055E-13 2.428E-14 6.299E-15 1.483E-15 3.142E-16

	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.535E-18
	1.112E+01	1.862E-19
	1.163E+01	2.608E-20
	1.215E+01	3.271E-21
	1.266E+01	3.659E-22
	1.317E+01	3.635E-23
	1.369E+01	3.192E-24
	1.420E+01	2.467E-25
	1.471E+01	1.674E-26
	1.523E+01	1.005E-27
	1.574E+01	5.623E-29
	1.625E+01	3.615E-30
	1.677E+01	3.834E-31
	1.728E+01	6.275E-32
	1.779E+01	1.141E-32
	1.830E+01	2.019E-33
	1.882E+01	3.380E-34
	1.933E+01	5.324E-35
	1.984E+01	7.875E-36
	2.036E+01	1.092E-36
	2.087E+01	1.417E-37
	2.138E+01	1.719E-38
	2.190E+01	1.945E-39
	2.241E+01	2.048E-40
	2.292E+01	2.007E-41
	2.344E+01	1.827E-42
	2.395E+01	1.549E-43
	2.446E+01	1.234E-44
	2.498E+01	9.484E-46
	2.549E+01	7.536E-47
	2.600E+01	6.963E-48
	2.652E+01	8.127E-49
	2.703E+01	1.134E-49
	2.754E+01	1.692E-50
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01

1.112E+00  
1.668E+00  
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3.673E-41  
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4.960E-43  
5.303E-44  
5.427E-45  
5.471E-46  
5.765E-47  
6.942E-48  
1.010E-48  
1.710E-49  
3.101E-50



	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.385E-15
	1.056E+01	6.920E-16
	1.112E+01	1.709E-16
	1.163E+01	4.809E-17
	1.215E+01	1.269E-17
	1.266E+01	3.138E-18
	1.317E+01	7.252E-19
	1.369E+01	1.564E-19
	1.420E+01	3.142E-20
	1.471E+01	5.865E-21
	1.523E+01	1.015E-21
	1.574E+01	1.626E-22
	1.625E+01	2.402E-23
	1.677E+01	3.266E-24
	1.728E+01	4.080E-25
	1.779E+01	4.673E-26
	1.830E+01	4.915E-27
	1.882E+01	4.801E-28
	1.933E+01	4.560E-29
	1.984E+01	4.825E-30
	2.036E+01	7.070E-31
	2.087E+01	1.473E-31
	2.138E+01	3.591E-32
	2.190E+01	8.938E-33
	2.241E+01	2.169E-33
	2.292E+01	5.072E-34

	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.139E-34 2.455E-35 5.071E-36 1.003E-36 1.898E-37 3.433E-38 5.931E-39 9.775E-40 1.536E-40 2.299E-41 3.277E-42 4.451E-43 5.779E-44 7.233E-45 8.900E-46 1.122E-46 1.547E-47 2.477E-48 4.612E-49 9.443E-50 2.002E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.120E-14 3.876E-15 1.164E-15 3.954E-16 1.275E-16 3.894E-17 1.126E-17 3.078E-18 7.942E-19 1.931E-19 4.420E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	9.504E-21 1.916E-21 3.617E-22 6.378E-23 1.049E-23 1.605E-24 2.281E-25 3.011E-26 3.696E-27 4.270E-28 4.829E-29 5.968E-30 9.624E-31 2.139E-31 5.668E-32 1.567E-32 4.278E-33 1.135E-33 2.911E-34 7.210E-35 1.723E-35 3.970E-36 8.812E-37 1.883E-37 3.872E-38 7.653E-39 1.453E-39 2.649E-40 4.632E-41 7.767E-42 1.249E-42 1.930E-43 2.874E-44 4.167E-45 5.997E-46 8.896E-47 1.436E-47 2.643E-48 5.541E-49 1.267E-49 3.007E-50 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.619E-14
1.056E+01	1.407E-14
1.112E+01	4.880E-15
1.163E+01	1.904E-15
1.215E+01	7.108E-16
1.266E+01	2.535E-16
1.317E+01	8.633E-17
1.369E+01	2.804E-17
1.420E+01	8.676E-18
1.471E+01	2.555E-18
1.523E+01	7.153E-19
1.574E+01	1.901E-19
1.625E+01	4.791E-20
1.677E+01	1.143E-20
1.728E+01	2.580E-21
1.779E+01	5.495E-22
1.830E+01	1.103E-22
1.882E+01	2.085E-23
1.933E+01	3.703E-24
1.984E+01	6.168E-25
2.036E+01	9.630E-26
2.087E+01	1.409E-26
2.138E+01	1.940E-27
2.190E+01	2.548E-28
2.241E+01	3.336E-29
2.292E+01	4.841E-30
2.344E+01	9.018E-31
2.395E+01	2.221E-31
2.446E+01	6.394E-32
2.498E+01	1.920E-32
2.549E+01	5.725E-33
2.600E+01	1.667E-33
2.652E+01	4.716E-34
2.703E+01	1.295E-34
2.754E+01	3.445E-35
2.806E+01	8.881E-36
2.857E+01	2.217E-36
2.908E+01	5.354E-37
2.960E+01	1.251E-37
3.011E+01	2.824E-38
3.062E+01	6.159E-39
3.113E+01	1.297E-39
3.165E+01	2.634E-40
3.216E+01	5.161E-41
3.267E+01	9.747E-42
3.319E+01	1.775E-42
3.370E+01	3.118E-43
3.421E+01	5.300E-44
3.473E+01	8.769E-45
3.524E+01	1.430E-45
3.575E+01	2.355E-46
3.627E+01	4.075E-47
3.678E+01	7.751E-48

45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.519E-13
1.001E+01	1.104E-13
1.056E+01	3.903E-14
1.112E+01	1.487E-14
1.163E+01	6.447E-15
1.215E+01	2.691E-15
1.266E+01	1.080E-15
1.317E+01	4.167E-16
1.369E+01	1.543E-16
1.420E+01	5.481E-17
1.471E+01	1.866E-17
1.523E+01	6.082E-18
1.574E+01	1.897E-18
1.625E+01	5.653E-19
1.677E+01	1.609E-19
1.728E+01	4.365E-20
1.779E+01	1.128E-20
1.830E+01	2.775E-21
1.882E+01	6.484E-22
1.933E+01	1.438E-22
1.984E+01	3.022E-23
2.036E+01	6.010E-24
2.087E+01	1.130E-24
2.138E+01	2.005E-25
2.190E+01	3.359E-26
2.241E+01	5.319E-27
2.292E+01	8.011E-28
2.344E+01	1.171E-28
2.395E+01	1.757E-29
2.446E+01	3.015E-30
2.498E+01	6.632E-31
2.549E+01	1.841E-31
2.600E+01	5.750E-32
2.652E+01	1.852E-32
2.703E+01	5.917E-33
2.754E+01	1.851E-33
2.806E+01	5.648E-34
2.857E+01	1.678E-34
2.908E+01	4.847E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.362E-35 3.718E-36 9.861E-37 2.539E-37 6.346E-38 1.538E-38 3.615E-39 8.232E-40 1.816E-40 3.877E-41 8.013E-42 1.603E-42 3.108E-43 5.851E-44 1.075E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.260E-13 1.062E-13 3.694E-14 1.711E-14 7.793E-15 3.434E-15 1.461E-15 5.998E-16 2.374E-16 9.053E-17 3.324E-17 1.174E-17 3.989E-18 1.302E-18 4.076E-19 1.224E-19 3.521E-20 9.692E-21 2.551E-21 6.412E-22 1.537E-22 3.512E-23 7.637E-24

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.579E-24 3.099E-25 5.776E-26 1.022E-26 1.725E-27 2.807E-28 4.544E-29 7.856E-30 1.618E-30 4.221E-31 1.314E-31 4.422E-32 1.510E-32 5.104E-33 1.691E-33 5.476E-34 1.731E-34 5.337E-35 1.605E-35 4.702E-36 1.342E-36 3.733E-37 1.010E-37 2.661E-38 6.819E-39 1.698E-39 4.111E-40 9.667E-41 2.208E-41 4.896E-42
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.446E-12 4.817E-13 9.038E-14 3.882E-14 1.863E-14 8.834E-15 4.068E-15 1.815E-15

1.420E+01	7.837E-16
1.471E+01	3.275E-16
1.523E+01	1.323E-16
1.574E+01	5.168E-17
1.625E+01	1.949E-17
1.677E+01	7.096E-18
1.728E+01	2.492E-18
1.779E+01	8.431E-19
1.830E+01	2.748E-19
1.882E+01	8.616E-20
1.933E+01	2.598E-20
1.984E+01	7.525E-21
2.036E+01	2.092E-21
2.087E+01	5.576E-22
2.138E+01	1.424E-22
2.190E+01	3.479E-23
2.241E+01	8.127E-24
2.292E+01	1.813E-24
2.344E+01	3.861E-25
2.395E+01	7.840E-26
2.446E+01	1.519E-26
2.498E+01	2.814E-27
2.549E+01	5.024E-28
2.600E+01	8.820E-29
2.652E+01	1.598E-29
2.703E+01	3.256E-30
2.754E+01	8.129E-31
2.806E+01	2.480E-31
2.857E+01	8.507E-32
2.908E+01	3.043E-32
2.960E+01	1.091E-32
3.011E+01	3.861E-33
3.062E+01	1.340E-33
3.113E+01	4.553E-34
3.165E+01	1.513E-34
3.216E+01	4.918E-35
3.267E+01	1.562E-35
3.319E+01	4.845E-36
3.370E+01	1.468E-36
3.421E+01	4.343E-37
3.473E+01	1.254E-37
3.524E+01	3.530E-38
3.575E+01	9.695E-39
3.627E+01	2.596E-39
3.678E+01	6.771E-40

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.2	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	5.498E-40
1.163E+01	5.155E-42
1.215E+01	3.636E-44
1.266E+01	2.191E-46
1.317E+01	2.052E-48
1.369E+01	4.036E-50
1.420E+01	0.000E+00
1.471E+01	0.000E+00
1.523E+01	0.000E+00
1.574E+01	0.000E+00
1.625E+01	0.000E+00
1.677E+01	0.000E+00
1.728E+01	0.000E+00
1.779E+01	0.000E+00
1.830E+01	0.000E+00
1.882E+01	0.000E+00
1.933E+01	0.000E+00
1.984E+01	0.000E+00
2.036E+01	0.000E+00
2.087E+01	0.000E+00
2.138E+01	0.000E+00
2.190E+01	0.000E+00
2.241E+01	0.000E+00
2.292E+01	0.000E+00
2.344E+01	0.000E+00
2.395E+01	0.000E+00
2.446E+01	0.000E+00
2.498E+01	0.000E+00
2.549E+01	0.000E+00
2.600E+01	0.000E+00
2.652E+01	0.000E+00
2.703E+01	0.000E+00
2.754E+01	0.000E+00
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00

	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	8.226E-29
	1.163E+01	1.924E-30
	1.215E+01	1.213E-31
	1.266E+01	1.087E-32
	1.317E+01	9.132E-34
	1.369E+01	6.819E-35
	1.420E+01	4.489E-36
	1.471E+01	2.594E-37
	1.523E+01	1.309E-38
	1.574E+01	5.741E-40
	1.625E+01	2.180E-41
	1.677E+01	7.151E-43
	1.728E+01	2.052E-44
	1.779E+01	5.496E-46
	1.830E+01	1.710E-47
	1.882E+01	8.161E-49
	1.933E+01	5.312E-50
	1.984E+01	0.000E+00
	2.036E+01	0.000E+00
	2.087E+01	0.000E+00
	2.138E+01	0.000E+00
	2.190E+01	0.000E+00
	2.241E+01	0.000E+00
	2.292E+01	0.000E+00
	2.344E+01	0.000E+00
	2.395E+01	0.000E+00
	2.446E+01	0.000E+00

	2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.863E-21 2.320E-22 1.527E-23 8.506E-25 3.986E-26 1.582E-27 5.720E-29 2.661E-30 2.499E-31 3.413E-32 4.726E-33 6.114E-34 7.297E-35

	1.728E+01	8.006E-36
	1.779E+01	8.057E-37
	1.830E+01	7.417E-38
	1.882E+01	6.230E-39
	1.933E+01	4.762E-40
	1.984E+01	3.305E-41
	2.036E+01	2.081E-42
	2.087E+01	1.192E-43
	2.138E+01	6.335E-45
	2.190E+01	3.321E-46
	2.241E+01	1.993E-47
	2.292E+01	1.604E-48
	2.344E+01	1.656E-49
	2.395E+01	1.856E-50
	2.446E+01	0.000E+00
	2.498E+01	0.000E+00
	2.549E+01	0.000E+00
	2.600E+01	0.000E+00
	2.652E+01	0.000E+00
	2.703E+01	0.000E+00
	2.754E+01	0.000E+00
	2.806E+01	0.000E+00
	2.857E+01	0.000E+00
	2.908E+01	0.000E+00
	2.960E+01	0.000E+00
	3.011E+01	0.000E+00
	3.062E+01	0.000E+00
	3.113E+01	0.000E+00
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.560E-01	5.278E-01
	1.112E+00	2.054E-01
	1.668E+00	5.706E-02
	2.224E+00	1.109E-02
	2.780E+00	1.487E-03
	3.336E+00	1.363E-04
	3.892E+00	8.492E-06
	4.448E+00	3.580E-07
	5.004E+00	1.018E-08
	5.560E+00	1.955E-10
	6.116E+00	2.767E-12
	6.672E+00	1.055E-13
	7.228E+00	2.428E-14
	7.784E+00	6.299E-15
	8.340E+00	1.483E-15
	8.896E+00	3.142E-16

9.452E+00	5.974E-17
1.001E+01	1.016E-17
1.056E+01	1.544E-18
1.112E+01	2.678E-19
1.163E+01	3.780E-20
1.215E+01	4.778E-21
1.266E+01	5.386E-22
1.317E+01	5.390E-23
1.369E+01	4.769E-24
1.420E+01	3.714E-25
1.471E+01	2.540E-26
1.523E+01	1.537E-27
1.574E+01	8.661E-29
1.625E+01	5.610E-30
1.677E+01	5.995E-31
1.728E+01	9.885E-32
1.779E+01	1.811E-32
1.830E+01	3.229E-33
1.882E+01	5.447E-34
1.933E+01	8.646E-35
1.984E+01	1.289E-35
2.036E+01	1.801E-36
2.087E+01	2.355E-37
2.138E+01	2.878E-38
2.190E+01	3.280E-39
2.241E+01	3.482E-40
2.292E+01	3.437E-41
2.344E+01	3.153E-42
2.395E+01	2.694E-43
2.446E+01	2.162E-44
2.498E+01	1.675E-45
2.549E+01	1.341E-46
2.600E+01	1.248E-47
2.652E+01	1.468E-48
2.703E+01	2.064E-49
2.754E+01	3.101E-50
2.806E+01	0.000E+00
2.857E+01	0.000E+00
2.908E+01	0.000E+00
2.960E+01	0.000E+00
3.011E+01	0.000E+00
3.062E+01	0.000E+00
3.113E+01	0.000E+00
3.165E+01	0.000E+00
3.216E+01	0.000E+00
3.267E+01	0.000E+00
3.319E+01	0.000E+00
3.370E+01	0.000E+00
3.421E+01	0.000E+00
3.473E+01	0.000E+00
3.524E+01	0.000E+00
3.575E+01	0.000E+00
3.627E+01	0.000E+00
3.678E+01	0.000E+00

1.112E+00  
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2.446E+01  
2.498E+01  
2.549E+01  
2.600E+01  
2.652E+01  
2.703E+01  
2.754E+01  
2.806E+01  
2.857E+01  
2.908E+01  
2.960E+01  
3.011E+01  
3.062E+01

2.580E-01  
8.913E-02  
2.324E-02  
4.519E-03  
6.506E-04  
6.898E-05  
5.363E-06  
3.049E-07  
1.265E-08  
3.831E-10  
8.758E-12  
2.658E-13  
4.643E-14  
1.416E-14  
4.118E-15  
1.103E-15  
2.718E-16  
6.202E-17  
1.643E-17  
3.549E-18  
7.069E-19  
1.295E-19  
2.177E-20  
3.347E-21  
4.693E-22  
5.981E-23  
6.907E-24  
7.205E-25  
6.774E-26  
5.751E-27  
4.487E-28  
3.470E-29  
3.313E-30  
4.929E-31  
1.003E-31  
2.202E-32  
4.744E-33  
9.795E-34  
1.928E-34  
3.609E-35  
6.420E-36  
1.084E-36  
1.736E-37  
2.632E-38  
3.774E-39  
5.112E-40  
6.533E-41  
7.876E-42  
8.958E-43  
9.650E-44  
9.952E-45  
1.011E-45  
1.073E-46  
1.302E-47  
1.909E-48  
3.256E-49  
5.948E-50

	3.113E+01	1.096E-50
	3.165E+01	0.000E+00
	3.216E+01	0.000E+00
	3.267E+01	0.000E+00
	3.319E+01	0.000E+00
	3.370E+01	0.000E+00
	3.421E+01	0.000E+00
	3.473E+01	0.000E+00
	3.524E+01	0.000E+00
	3.575E+01	0.000E+00
	3.627E+01	0.000E+00
	3.678E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.389E-15
	1.056E+01	7.107E-16
	1.112E+01	2.459E-16
	1.163E+01	6.970E-17
	1.215E+01	1.854E-17
	1.266E+01	4.617E-18
	1.317E+01	1.075E-18
	1.369E+01	2.337E-19
	1.420E+01	4.730E-20
	1.471E+01	8.897E-21
	1.523E+01	1.552E-21
	1.574E+01	2.503E-22
	1.625E+01	3.727E-23
	1.677E+01	5.107E-24
	1.728E+01	6.428E-25
	1.779E+01	7.419E-26
	1.830E+01	7.863E-27
	1.882E+01	7.739E-28
	1.933E+01	7.406E-29
	1.984E+01	7.895E-30
	2.036E+01	1.166E-30
	2.087E+01	2.447E-31
	2.138E+01	6.010E-32
	2.190E+01	1.507E-32
	2.241E+01	3.685E-33
	2.292E+01	8.684E-34



	2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.965E-34 4.268E-35 8.882E-36 1.770E-36 3.375E-37 6.152E-38 1.071E-38 1.778E-39 2.816E-40 4.246E-41 6.099E-42 8.348E-43 1.092E-43 1.377E-44 1.708E-45 2.169E-46 3.013E-47 4.860E-48 9.117E-49 1.881E-49 4.019E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.055E-14 1.124E-14 4.032E-15 1.674E-15 5.731E-16 1.862E-16 5.730E-17 1.670E-17 4.598E-18 1.196E-18 2.930E-19 6.756E-20

	1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01 2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	1.464E-20 2.974E-21 5.655E-22 1.005E-22 1.665E-23 2.567E-24 3.677E-25 4.889E-26 6.049E-27 7.041E-28 8.023E-29 9.989E-30 1.623E-30 3.634E-31 9.702E-32 2.702E-32 7.434E-33 1.987E-33 5.136E-34 1.282E-34 3.087E-35 7.166E-36 1.603E-36 3.452E-37 7.151E-38 1.424E-38 2.725E-39 5.004E-40 8.818E-41 1.490E-41 2.415E-42 3.759E-43 5.642E-44 8.240E-45 1.195E-45 1.786E-46 2.905E-47 5.385E-48 1.137E-48 2.620E-49 6.266E-50 1.504E-50
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.055E-13
1.001E+01	3.644E-14
1.056E+01	1.483E-14
1.112E+01	7.020E-15
1.163E+01	2.760E-15
1.215E+01	1.038E-15
1.266E+01	3.730E-16
1.317E+01	1.280E-16
1.369E+01	4.189E-17
1.420E+01	1.306E-17
1.471E+01	3.875E-18
1.523E+01	1.093E-18
1.574E+01	2.927E-19
1.625E+01	7.434E-20
1.677E+01	1.787E-20
1.728E+01	4.064E-21
1.779E+01	8.723E-22
1.830E+01	1.765E-22
1.882E+01	3.361E-23
1.933E+01	6.013E-24
1.984E+01	1.009E-24
2.036E+01	1.588E-25
2.087E+01	2.341E-26
2.138E+01	3.247E-27
2.190E+01	4.298E-28
2.241E+01	5.670E-29
2.292E+01	8.289E-30
2.344E+01	1.555E-30
2.395E+01	3.860E-31
2.446E+01	1.119E-31
2.498E+01	3.387E-32
2.549E+01	1.018E-32
2.600E+01	2.985E-33
2.652E+01	8.512E-34
2.703E+01	2.354E-34
2.754E+01	6.312E-35
2.806E+01	1.640E-35
2.857E+01	4.124E-36
2.908E+01	1.004E-36
2.960E+01	2.363E-37
3.011E+01	5.375E-38
3.062E+01	1.181E-38
3.113E+01	2.506E-39
3.165E+01	5.130E-40
3.216E+01	1.013E-40
3.267E+01	1.927E-41
3.319E+01	3.536E-42
3.370E+01	6.260E-43
3.421E+01	1.072E-43
3.473E+01	1.787E-44
3.524E+01	2.937E-45
3.575E+01	4.873E-46
3.627E+01	8.494E-47
3.678E+01	1.628E-47

45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.522E-13
1.001E+01	1.114E-13
1.056E+01	4.162E-14
1.112E+01	2.139E-14
1.163E+01	9.344E-15
1.215E+01	3.931E-15
1.266E+01	1.590E-15
1.317E+01	6.179E-16
1.369E+01	2.305E-16
1.420E+01	8.250E-17
1.471E+01	2.830E-17
1.523E+01	9.294E-18
1.574E+01	2.921E-18
1.625E+01	8.771E-19
1.677E+01	2.515E-19
1.728E+01	6.876E-20
1.779E+01	1.791E-20
1.830E+01	4.437E-21
1.882E+01	1.045E-21
1.933E+01	2.335E-22
1.984E+01	4.944E-23
2.036E+01	9.908E-24
2.087E+01	1.877E-24
2.138E+01	3.357E-25
2.190E+01	5.666E-26
2.241E+01	9.039E-27
2.292E+01	1.372E-27
2.344E+01	2.021E-28
2.395E+01	3.054E-29
2.446E+01	5.280E-30
2.498E+01	1.170E-30
2.549E+01	3.271E-31
2.600E+01	1.030E-31
2.652E+01	3.341E-32
2.703E+01	1.076E-32
2.754E+01	3.392E-33
2.806E+01	1.043E-33
2.857E+01	3.120E-34
2.908E+01	9.084E-35

	2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.571E-35 7.075E-36 1.891E-36 4.906E-37 1.235E-37 3.018E-38 7.146E-39 1.640E-39 3.644E-40 7.840E-41 1.633E-41 3.292E-42 6.431E-43 1.220E-43 2.258E-44
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01 1.420E+01 1.471E+01 1.523E+01 1.574E+01 1.625E+01 1.677E+01 1.728E+01 1.779E+01 1.830E+01 1.882E+01 1.933E+01 1.984E+01 2.036E+01 2.087E+01 2.138E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.413E-12 6.289E-13 1.132E-13 5.315E-14 2.480E-14 1.138E-14 5.053E-15 2.166E-15 8.959E-16 3.573E-16 1.373E-16 5.080E-17 1.808E-17 6.189E-18 2.035E-18 6.420E-19 1.942E-19 5.630E-20 1.562E-20 4.142E-21 1.049E-21 2.534E-22 5.834E-23 1.278E-23

	2.190E+01 2.241E+01 2.292E+01 2.344E+01 2.395E+01 2.446E+01 2.498E+01 2.549E+01 2.600E+01 2.652E+01 2.703E+01 2.754E+01 2.806E+01 2.857E+01 2.908E+01 2.960E+01 3.011E+01 3.062E+01 3.113E+01 3.165E+01 3.216E+01 3.267E+01 3.319E+01 3.370E+01 3.421E+01 3.473E+01 3.524E+01 3.575E+01 3.627E+01 3.678E+01	2.662E-24 5.267E-25 9.890E-26 1.764E-26 2.999E-27 4.917E-28 8.019E-29 1.397E-29 2.898E-30 7.615E-31 2.389E-31 8.098E-32 2.787E-32 9.491E-33 3.169E-33 1.034E-33 3.293E-34 1.023E-34 3.099E-35 9.151E-36 2.633E-36 7.376E-37 2.012E-37 5.340E-38 1.378E-38 3.460E-39 8.439E-40 1.999E-40 4.601E-41 1.028E-41
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.163E+01 1.215E+01 1.266E+01 1.317E+01 1.369E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.453E-12 4.975E-13 1.300E-13 5.626E-14 2.721E-14 1.300E-14 6.031E-15 2.711E-15

1.420E+01	1.180E-15
1.471E+01	4.967E-16
1.523E+01	2.022E-16
1.574E+01	7.957E-17
1.625E+01	3.024E-17
1.677E+01	1.109E-17
1.728E+01	3.924E-18
1.779E+01	1.338E-18
1.830E+01	4.393E-19
1.882E+01	1.388E-19
1.933E+01	4.218E-20
1.984E+01	1.231E-20
2.036E+01	3.448E-21
2.087E+01	9.261E-22
2.138E+01	2.383E-22
2.190E+01	5.866E-23
2.241E+01	1.381E-23
2.292E+01	3.104E-24
2.344E+01	6.660E-25
2.395E+01	1.363E-25
2.446E+01	2.660E-26
2.498E+01	4.967E-27
2.549E+01	8.934E-28
2.600E+01	1.580E-28
2.652E+01	2.884E-29
2.703E+01	5.921E-30
2.754E+01	1.489E-30
2.806E+01	4.575E-31
2.857E+01	1.582E-31
2.908E+01	5.700E-32
2.960E+01	2.059E-32
3.011E+01	7.342E-33
3.062E+01	2.568E-33
3.113E+01	8.792E-34
3.165E+01	2.945E-34
3.216E+01	9.641E-35
3.267E+01	3.085E-35
3.319E+01	9.645E-36
3.370E+01	2.945E-36
3.421E+01	8.777E-37
3.473E+01	2.553E-37
3.524E+01	7.245E-38
3.575E+01	2.005E-38
3.627E+01	5.408E-39
3.678E+01	1.422E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12.13 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.065E-01	1.655E-01
	1.213E+00	5.484E-03
	1.820E+00	3.070E-05
	2.426E+00	2.705E-08



3.033E+00	3.911E-12
3.639E+00	2.047E-14
4.245E+00	9.250E-16
4.852E+00	2.531E-17
5.459E+00	4.027E-19
6.065E+00	3.565E-21
6.672E+00	1.665E-23
7.278E+00	3.878E-26
7.885E+00	4.754E-29
8.491E+00	1.723E-31
9.098E+00	2.907E-33
9.704E+00	3.953E-35
1.031E+01	3.779E-37
1.092E+01	2.484E-39
1.152E+01	1.099E-41
1.213E+01	3.391E-44
1.264E+01	2.030E-46
1.316E+01	1.841E-48
1.367E+01	3.552E-50
1.418E+01	0.000E+00
1.470E+01	0.000E+00
1.521E+01	0.000E+00
1.572E+01	0.000E+00
1.624E+01	0.000E+00
1.675E+01	0.000E+00
1.726E+01	0.000E+00
1.778E+01	0.000E+00
1.829E+01	0.000E+00
1.880E+01	0.000E+00
1.931E+01	0.000E+00
1.983E+01	0.000E+00
2.034E+01	0.000E+00
2.085E+01	0.000E+00
2.137E+01	0.000E+00
2.188E+01	0.000E+00
2.239E+01	0.000E+00
2.291E+01	0.000E+00
2.342E+01	0.000E+00
2.393E+01	0.000E+00
2.445E+01	0.000E+00
2.496E+01	0.000E+00
2.547E+01	0.000E+00
2.599E+01	0.000E+00
2.650E+01	0.000E+00
2.701E+01	0.000E+00
2.753E+01	0.000E+00
2.804E+01	0.000E+00
2.855E+01	0.000E+00
2.907E+01	0.000E+00
2.958E+01	0.000E+00
3.009E+01	0.000E+00
3.061E+01	0.000E+00
3.112E+01	0.000E+00
3.163E+01	0.000E+00
3.214E+01	0.000E+00
3.266E+01	0.000E+00
3.317E+01	0.000E+00

	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
10	0.000E+00	1.000E+00
	6.065E-01	3.280E-01
	1.213E+00	4.996E-02
	1.820E+00	3.245E-03
	2.426E+00	8.598E-05
	3.033E+00	9.071E-07
	3.639E+00	3.758E-09
	4.245E+00	6.375E-12
	4.852E+00	5.766E-14
	5.459E+00	7.165E-15
	6.065E+00	7.474E-16
	6.672E+00	6.052E-17
	7.278E+00	3.754E-18
	7.885E+00	1.758E-19
	8.491E+00	6.110E-21
	9.098E+00	1.548E-22
	9.704E+00	2.799E-24
	1.031E+01	3.543E-26
	1.092E+01	3.189E-28
	1.152E+01	3.044E-30
	1.213E+01	1.040E-31
	1.264E+01	9.257E-33
	1.316E+01	7.764E-34
	1.367E+01	5.788E-35
	1.418E+01	3.804E-36
	1.470E+01	2.195E-37
	1.521E+01	1.106E-38
	1.572E+01	4.847E-40
	1.624E+01	1.838E-41
	1.675E+01	6.026E-43
	1.726E+01	1.726E-44
	1.778E+01	4.596E-46
	1.829E+01	1.408E-47
	1.880E+01	6.586E-49
	1.931E+01	4.242E-50
	1.983E+01	0.000E+00
	2.034E+01	0.000E+00
	2.085E+01	0.000E+00
	2.137E+01	0.000E+00
	2.188E+01	0.000E+00
	2.239E+01	0.000E+00
	2.291E+01	0.000E+00
	2.342E+01	0.000E+00
	2.393E+01	0.000E+00
	2.445E+01	0.000E+00
	2.496E+01	0.000E+00
	2.547E+01	0.000E+00

	2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	0.000E+00 0.000E+00
15	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01 1.521E+01 1.572E+01 1.624E+01 1.675E+01 1.726E+01 1.778E+01	1.000E+00 4.255E-01 1.100E-01 1.638E-02 1.359E-03 6.167E-05 1.513E-06 1.992E-08 1.406E-10 7.023E-13 4.093E-14 7.586E-15 1.227E-15 1.680E-16 1.931E-17 1.851E-18 1.468E-19 9.536E-21 5.024E-22 2.123E-23 7.416E-25 3.475E-26 1.378E-27 4.955E-29 2.253E-30 2.060E-31 2.785E-32 3.842E-33 4.954E-34 5.895E-35 6.450E-36 6.472E-37

	1.829E+01 1.880E+01 1.931E+01 1.983E+01 2.034E+01 2.085E+01 2.137E+01 2.188E+01 2.239E+01 2.291E+01 2.342E+01 2.393E+01 2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	5.942E-38 4.977E-39 3.795E-40 2.627E-41 1.650E-42 9.427E-44 4.990E-45 2.598E-46 1.539E-47 1.220E-48 1.245E-49 1.387E-50 0.000E+00
20	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00	1.000E+00 4.909E-01 1.670E-01 3.786E-02 5.581E-03 5.267E-04 3.151E-05 1.187E-06 2.802E-08 4.139E-10 4.085E-12 1.057E-13 2.157E-14 4.887E-15 9.832E-16 1.744E-16 2.714E-17

	1.031E+01	3.689E-18
	1.092E+01	4.356E-19
	1.152E+01	4.445E-20
	1.213E+01	4.054E-21
	1.264E+01	4.562E-22
	1.316E+01	4.558E-23
	1.367E+01	4.026E-24
	1.418E+01	3.130E-25
	1.470E+01	2.138E-26
	1.521E+01	1.291E-27
	1.572E+01	7.236E-29
	1.624E+01	4.613E-30
	1.675E+01	4.813E-31
	1.726E+01	7.828E-32
	1.778E+01	1.426E-32
	1.829E+01	2.531E-33
	1.880E+01	4.254E-34
	1.931E+01	6.728E-35
	1.983E+01	9.992E-36
	2.034E+01	1.391E-36
	2.085E+01	1.813E-37
	2.137E+01	2.208E-38
	2.188E+01	2.509E-39
	2.239E+01	2.654E-40
	2.291E+01	2.611E-41
	2.342E+01	2.388E-42
	2.393E+01	2.033E-43
	2.445E+01	1.625E-44
	2.496E+01	1.252E-45
	2.547E+01	9.942E-47
	2.599E+01	9.142E-48
	2.650E+01	1.061E-48
	2.701E+01	1.478E-49
	2.753E+01	2.208E-50
	2.804E+01	0.000E+00
	2.855E+01	0.000E+00
	2.907E+01	0.000E+00
	2.958E+01	0.000E+00
	3.009E+01	0.000E+00
	3.061E+01	0.000E+00
	3.112E+01	0.000E+00
	3.163E+01	0.000E+00
	3.214E+01	0.000E+00
	3.266E+01	0.000E+00
	3.317E+01	0.000E+00
	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
25	0.000E+00	1.000E+00
	6.065E-01	5.384E-01

1.213E+00	2.171E-01
1.820E+00	6.358E-02
2.426E+00	1.327E-02
3.033E+00	1.946E-03
3.639E+00	1.990E-04
4.245E+00	1.410E-05
4.852E+00	6.888E-07
5.459E+00	2.315E-08
6.065E+00	5.348E-10
6.672E+00	8.789E-12
7.278E+00	2.109E-13
7.885E+00	3.731E-14
8.491E+00	1.020E-14
9.098E+00	2.580E-15
9.704E+00	5.909E-16
1.031E+01	1.222E-16
1.092E+01	2.275E-17
1.152E+01	3.803E-18
1.213E+01	5.910E-19
1.264E+01	1.080E-19
1.316E+01	1.810E-20
1.367E+01	2.775E-21
1.418E+01	3.880E-22
1.470E+01	4.933E-23
1.521E+01	5.683E-24
1.572E+01	5.914E-25
1.624E+01	5.547E-26
1.675E+01	4.698E-27
1.726E+01	3.652E-28
1.778E+01	2.803E-29
1.829E+01	2.630E-30
1.880E+01	3.837E-31
1.931E+01	7.720E-32
1.983E+01	1.685E-32
2.034E+01	3.615E-33
2.085E+01	7.432E-34
2.137E+01	1.457E-34
2.188E+01	2.716E-35
2.239E+01	4.813E-36
2.291E+01	8.096E-37
2.342E+01	1.291E-37
2.393E+01	1.950E-38
2.445E+01	2.785E-39
2.496E+01	3.758E-40
2.547E+01	4.786E-41
2.599E+01	5.747E-42
2.650E+01	6.512E-43
2.701E+01	6.987E-44
2.753E+01	7.173E-45
2.804E+01	7.243E-46
2.855E+01	7.626E-47
2.907E+01	9.150E-48
2.958E+01	1.326E-48
3.009E+01	2.242E-49
3.061E+01	4.068E-50
3.112E+01	0.000E+00
3.163E+01	0.000E+00

	3.214E+01	0.000E+00
	3.266E+01	0.000E+00
	3.317E+01	0.000E+00
	3.368E+01	0.000E+00
	3.420E+01	0.000E+00
	3.471E+01	0.000E+00
	3.522E+01	0.000E+00
	3.574E+01	0.000E+00
	3.625E+01	0.000E+00
	3.676E+01	0.000E+00
	3.728E+01	0.000E+00
	3.779E+01	0.000E+00
30	0.000E+00	1.000E+00
	6.065E-01	5.750E-01
	1.213E+00	2.604E-01
	1.820E+00	9.070E-02
	2.426E+00	2.390E-02
	3.033E+00	4.710E-03
	3.639E+00	6.890E-04
	4.245E+00	7.442E-05
	4.852E+00	5.911E-06
	5.459E+00	3.442E-07
	6.065E+00	1.467E-08
	6.672E+00	4.574E-10
	7.278E+00	1.074E-11
	7.885E+00	3.121E-13
	8.491E+00	5.049E-14
	9.098E+00	1.545E-14
	9.704E+00	4.542E-15
	1.031E+01	1.232E-15
	1.092E+01	3.073E-16
	1.152E+01	7.044E-17
	1.213E+01	1.535E-17
	1.264E+01	3.810E-18
	1.316E+01	8.843E-19
	1.367E+01	1.915E-19
	1.418E+01	3.864E-20
	1.470E+01	7.245E-21
	1.521E+01	1.260E-21
	1.572E+01	2.026E-22
	1.624E+01	3.007E-23
	1.675E+01	4.108E-24
	1.726E+01	5.156E-25
	1.778E+01	5.934E-26
	1.829E+01	6.270E-27
	1.880E+01	6.149E-28
	1.931E+01	5.848E-29
	1.983E+01	6.158E-30
	2.034E+01	8.927E-31
	2.085E+01	1.848E-31
	2.137E+01	4.503E-32
	2.188E+01	1.123E-32
	2.239E+01	2.734E-33
	2.291E+01	6.415E-34
	2.342E+01	1.446E-34
	2.393E+01	3.126E-35

	2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	6.477E-36 1.285E-36 2.441E-37 4.430E-38 7.680E-39 1.270E-39 2.003E-40 3.008E-41 4.303E-42 5.865E-43 7.641E-44 9.591E-45 1.183E-45 1.491E-46 2.052E-47 3.275E-48 6.084E-49 1.246E-49 2.645E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01 1.521E+01 1.572E+01 1.624E+01	1.000E+00 6.042E-01 2.980E-01 1.177E-01 3.667E-02 8.932E-03 1.689E-03 2.467E-04 2.773E-05 2.392E-06 1.581E-07 7.989E-09 3.091E-10 9.447E-12 3.514E-13 5.884E-14 1.947E-14 6.369E-15 1.948E-15 5.564E-16 1.531E-16 4.696E-17 1.363E-17 3.740E-18 9.687E-19 2.365E-19 5.434E-20 1.173E-20 2.375E-21



	1.675E+01 1.726E+01 1.778E+01 1.829E+01 1.880E+01 1.931E+01 1.983E+01 2.034E+01 2.085E+01 2.137E+01 2.188E+01 2.239E+01 2.291E+01 2.342E+01 2.393E+01 2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	4.501E-22 7.969E-23 1.316E-23 2.022E-24 2.887E-25 3.827E-26 4.718E-27 5.470E-28 6.195E-29 7.629E-30 1.220E-30 2.693E-31 7.127E-32 1.974E-32 5.403E-33 1.438E-33 3.699E-34 9.191E-35 2.203E-35 5.093E-36 1.134E-36 2.431E-37 5.015E-38 9.944E-39 1.894E-39 3.464E-40 6.077E-41 1.023E-41 1.650E-42 2.557E-43 3.821E-44 5.553E-45 8.005E-46 1.188E-46 1.915E-47 3.514E-48 7.354E-49 1.682E-49 3.997E-50 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00	1.000E+00 6.282E-01 3.309E-01 1.437E-01 5.084E-02 1.453E-02 3.331E-03 6.103E-04 8.904E-05 1.032E-05 9.476E-07 6.889E-08 3.960E-09 1.804E-10

8.491E+00	6.777E-12
9.098E+00	3.263E-13
9.704E+00	6.182E-14
1.031E+01	2.186E-14
1.092E+01	7.751E-15
1.152E+01	2.603E-15
1.213E+01	8.499E-16
1.264E+01	3.042E-16
1.316E+01	1.039E-16
1.367E+01	3.388E-17
1.418E+01	1.052E-17
1.470E+01	3.109E-18
1.521E+01	8.735E-19
1.572E+01	2.330E-19
1.624E+01	5.894E-20
1.675E+01	1.412E-20
1.726E+01	3.198E-21
1.778E+01	6.838E-22
1.829E+01	1.378E-22
1.880E+01	2.615E-23
1.931E+01	4.662E-24
1.983E+01	7.797E-25
2.034E+01	1.222E-25
2.085E+01	1.796E-26
2.137E+01	2.481E-27
2.188E+01	3.269E-28
2.239E+01	4.284E-29
2.291E+01	6.193E-30
2.342E+01	1.145E-30
2.393E+01	2.805E-31
2.445E+01	8.066E-32
2.496E+01	2.426E-32
2.547E+01	7.253E-33
2.599E+01	2.118E-33
2.650E+01	6.010E-34
2.701E+01	1.655E-34
2.753E+01	4.416E-35
2.804E+01	1.142E-35
2.855E+01	2.858E-36
2.907E+01	6.925E-37
2.958E+01	1.623E-37
3.009E+01	3.675E-38
3.061E+01	8.040E-39
3.112E+01	1.698E-39
3.163E+01	3.460E-40
3.214E+01	6.800E-41
3.266E+01	1.288E-41
3.317E+01	2.353E-42
3.368E+01	4.147E-43
3.420E+01	7.070E-44
3.471E+01	1.173E-44
3.522E+01	1.917E-45
3.574E+01	3.160E-46
3.625E+01	5.466E-47
3.676E+01	1.038E-47
3.728E+01	2.223E-48
3.779E+01	5.297E-49

45

0.000E+00	1.000E+00
6.065E-01	6.484E-01
1.213E+00	3.598E-01
1.820E+00	1.685E-01
2.426E+00	6.582E-02
3.033E+00	2.130E-02
3.639E+00	5.679E-03
4.245E+00	1.241E-03
4.852E+00	2.219E-04
5.459E+00	3.235E-05
6.065E+00	3.839E-06
6.672E+00	3.704E-07
7.278E+00	2.901E-08
7.885E+00	1.845E-09
8.491E+00	9.561E-11
9.098E+00	4.268E-12
9.704E+00	2.689E-13
1.031E+01	6.041E-14
1.092E+01	2.274E-14
1.152E+01	8.619E-15
1.213E+01	3.207E-15
1.264E+01	1.291E-15
1.316E+01	4.997E-16
1.367E+01	1.856E-16
1.418E+01	6.616E-17
1.470E+01	2.260E-17
1.521E+01	7.391E-18
1.572E+01	2.313E-18
1.624E+01	6.916E-19
1.675E+01	1.975E-19
1.726E+01	5.378E-20
1.778E+01	1.395E-20
1.829E+01	3.443E-21
1.880E+01	8.074E-22
1.931E+01	1.797E-22
1.983E+01	3.791E-23
2.034E+01	7.568E-24
2.085E+01	1.428E-24
2.137E+01	2.544E-25
2.188E+01	4.279E-26
2.239E+01	6.800E-27
2.291E+01	1.028E-27
2.342E+01	1.506E-28
2.393E+01	2.258E-29
2.445E+01	3.858E-30
2.496E+01	8.430E-31
2.547E+01	2.331E-31
2.599E+01	7.280E-32
2.650E+01	2.349E-32
2.701E+01	7.523E-33
2.753E+01	2.361E-33
2.804E+01	7.222E-34
2.855E+01	2.151E-34
2.907E+01	6.232E-35
2.958E+01	1.756E-35
3.009E+01	4.808E-36

	3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	1.279E-36 3.303E-37 8.280E-38 2.013E-38 4.745E-39 1.084E-39 2.397E-40 5.134E-41 1.064E-41 2.136E-42 4.153E-43 7.840E-44 1.444E-44 2.620E-45 4.773E-46
50	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01 1.521E+01 1.572E+01 1.624E+01 1.675E+01 1.726E+01 1.778E+01 1.829E+01 1.880E+01 1.931E+01 1.983E+01 2.034E+01 2.085E+01 2.137E+01 2.188E+01 2.239E+01	1.000E+00 6.657E-01 3.855E-01 1.918E-01 8.119E-02 2.905E-02 8.736E-03 2.200E-03 4.628E-04 8.108E-05 1.181E-05 1.429E-06 1.435E-07 1.194E-08 8.232E-10 4.743E-11 2.478E-12 2.084E-13 5.626E-14 2.252E-14 9.258E-15 4.092E-15 1.746E-15 7.191E-16 2.855E-16 1.092E-16 4.024E-17 1.426E-17 4.860E-18 1.591E-18 4.998E-19 1.506E-19 4.346E-20 1.201E-20 3.170E-21 7.997E-22 1.924E-22 4.411E-23 9.626E-24 1.997E-24 3.935E-25

	2.291E+01 2.342E+01 2.393E+01 2.445E+01 2.496E+01 2.547E+01 2.599E+01 2.650E+01 2.701E+01 2.753E+01 2.804E+01 2.855E+01 2.907E+01 2.958E+01 3.009E+01 3.061E+01 3.112E+01 3.163E+01 3.214E+01 3.266E+01 3.317E+01 3.368E+01 3.420E+01 3.471E+01 3.522E+01 3.574E+01 3.625E+01 3.676E+01 3.728E+01 3.779E+01	7.360E-26 1.307E-26 2.214E-27 3.612E-28 5.854E-29 1.010E-29 2.070E-30 5.372E-31 1.669E-31 5.619E-32 1.923E-32 6.516E-33 2.165E-33 7.029E-34 2.228E-34 6.888E-35 2.077E-35 6.103E-36 1.747E-36 4.872E-37 1.323E-37 3.494E-38 8.976E-39 2.242E-39 5.443E-40 1.284E-40 2.940E-41 6.539E-42 1.413E-42 2.967E-43
55	0.000E+00 6.065E-01 1.213E+00 1.820E+00 2.426E+00 3.033E+00 3.639E+00 4.245E+00 4.852E+00 5.459E+00 6.065E+00 6.672E+00 7.278E+00 7.885E+00 8.491E+00 9.098E+00 9.704E+00 1.031E+01 1.092E+01 1.152E+01 1.213E+01 1.264E+01 1.316E+01 1.367E+01 1.418E+01 1.470E+01	1.000E+00 6.807E-01 4.085E-01 2.137E-01 9.664E-02 3.754E-02 1.247E-02 3.527E-03 8.474E-04 1.726E-04 2.975E-05 4.332E-06 5.326E-07 5.523E-08 4.829E-09 3.562E-10 2.249E-11 1.378E-12 1.585E-13 5.100E-14 2.208E-14 1.050E-14 4.850E-15 2.170E-15 9.400E-16 3.940E-16

1.521E+01	1.597E-16
1.572E+01	6.255E-17
1.624E+01	2.367E-17
1.675E+01	8.642E-18
1.726E+01	3.044E-18
1.778E+01	1.033E-18
1.829E+01	3.378E-19
1.880E+01	1.063E-19
1.931E+01	3.215E-20
1.983E+01	9.342E-21
2.034E+01	2.605E-21
2.085E+01	6.968E-22
2.137E+01	1.785E-22
2.188E+01	4.377E-23
2.239E+01	1.026E-23
2.291E+01	2.297E-24
2.342E+01	4.908E-25
2.393E+01	1.000E-25
2.445E+01	1.944E-26
2.496E+01	3.614E-27
2.547E+01	6.471E-28
2.599E+01	1.138E-28
2.650E+01	2.062E-29
2.701E+01	4.187E-30
2.753E+01	1.040E-30
2.804E+01	3.161E-31
2.855E+01	1.084E-31
2.907E+01	3.884E-32
2.958E+01	1.396E-32
3.009E+01	4.950E-33
3.061E+01	1.723E-33
3.112E+01	5.869E-34
3.163E+01	1.956E-34
3.214E+01	6.373E-35
3.266E+01	2.029E-35
3.317E+01	6.314E-36
3.368E+01	1.918E-36
3.420E+01	5.690E-37
3.471E+01	1.647E-37
3.522E+01	4.651E-38
3.574E+01	1.281E-38
3.625E+01	3.439E-39
3.676E+01	8.996E-40
3.728E+01	2.292E-40
3.779E+01	5.689E-41

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB ClayThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	10.69 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	25.66 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.345E-01	2.218E-01	
	1.069E+00	1.441E-02	
	1.603E+00	2.399E-04	
	2.138E+00	9.640E-07	

2.672E+00	9.079E-10
3.207E+00	3.346E-13
3.741E+00	1.252E-14
4.276E+00	7.814E-16
4.810E+00	3.292E-17
5.345E+00	9.126E-19
5.879E+00	1.615E-20
6.414E+00	1.764E-22
6.948E+00	1.142E-24
7.483E+00	4.249E-27
8.017E+00	1.106E-29
8.552E+00	1.127E-31
9.086E+00	3.133E-33
9.621E+00	7.263E-35
1.016E+01	1.284E-36
1.069E+01	1.777E-38
1.120E+01	2.111E-40
1.172E+01	1.877E-42
1.223E+01	1.263E-44
1.274E+01	7.682E-47
1.326E+01	8.223E-49
1.377E+01	1.703E-50
1.428E+01	0.000E+00
1.480E+01	0.000E+00
1.531E+01	0.000E+00
1.582E+01	0.000E+00
1.634E+01	0.000E+00
1.685E+01	0.000E+00
1.736E+01	0.000E+00
1.787E+01	0.000E+00
1.839E+01	0.000E+00
1.890E+01	0.000E+00
1.941E+01	0.000E+00
1.993E+01	0.000E+00
2.044E+01	0.000E+00
2.095E+01	0.000E+00
2.147E+01	0.000E+00
2.198E+01	0.000E+00
2.249E+01	0.000E+00
2.301E+01	0.000E+00
2.352E+01	0.000E+00
2.403E+01	0.000E+00
2.455E+01	0.000E+00
2.506E+01	0.000E+00
2.557E+01	0.000E+00
2.609E+01	0.000E+00
2.660E+01	0.000E+00
2.711E+01	0.000E+00
2.763E+01	0.000E+00
2.814E+01	0.000E+00
2.865E+01	0.000E+00
2.917E+01	0.000E+00
2.968E+01	0.000E+00
3.019E+01	0.000E+00
3.070E+01	0.000E+00
3.122E+01	0.000E+00
3.173E+01	0.000E+00



	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.345E-01	3.889E-01
	1.069E+00	8.418E-02
	1.603E+00	9.507E-03
	2.138E+00	5.402E-04
	2.672E+00	1.512E-05
	3.207E+00	2.060E-07
	3.741E+00	1.355E-09
	4.276E+00	4.568E-12
	4.810E+00	6.778E-14
	5.345E+00	1.065E-14
	5.879E+00	1.532E-15
	6.414E+00	1.816E-16
	6.948E+00	1.758E-17
	7.483E+00	1.377E-18
	8.017E+00	8.637E-20
	8.552E+00	4.284E-21
	9.086E+00	1.659E-22
	9.621E+00	4.948E-24
	1.016E+01	1.120E-25
	1.069E+01	2.003E-27
	1.120E+01	3.431E-29
	1.172E+01	9.202E-31
	1.223E+01	6.482E-32
	1.274E+01	5.780E-33
	1.326E+01	4.745E-34
	1.377E+01	3.453E-35
	1.428E+01	2.214E-36
	1.480E+01	1.245E-37
	1.531E+01	6.107E-39
	1.582E+01	2.603E-40
	1.634E+01	9.596E-42
	1.685E+01	3.059E-43
	1.736E+01	8.570E-45
	1.787E+01	2.292E-46
	1.839E+01	7.502E-48
	1.890E+01	3.817E-49
	1.941E+01	2.524E-50
	1.993E+01	0.000E+00
	2.044E+01	0.000E+00
	2.095E+01	0.000E+00
	2.147E+01	0.000E+00
	2.198E+01	0.000E+00
	2.249E+01	0.000E+00
	2.301E+01	0.000E+00
	2.352E+01	0.000E+00
	2.403E+01	0.000E+00

	2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	0.000E+00 0.000E+00
15	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01 1.531E+01 1.582E+01 1.634E+01	1.000E+00 4.827E-01 1.592E-01 3.447E-02 4.773E-03 4.161E-04 2.261E-05 7.605E-07 1.576E-08 2.012E-10 1.795E-12 7.167E-14 1.567E-14 3.369E-15 6.387E-16 1.061E-16 1.538E-17 1.935E-18 2.101E-19 1.956E-20 1.616E-21 1.211E-22 7.720E-24 4.158E-25 1.884E-26 7.262E-28 2.627E-29 1.340E-30 1.381E-31 1.906E-32 2.602E-33 3.305E-34

	1.685E+01 1.736E+01 1.787E+01 1.839E+01 1.890E+01 1.941E+01 1.993E+01 2.044E+01 2.095E+01 2.147E+01 2.198E+01 2.249E+01 2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	3.870E-35 4.164E-36 4.108E-37 3.706E-38 3.049E-39 2.282E-40 1.550E-41 9.551E-43 5.366E-44 2.812E-45 1.480E-46 9.189E-48 7.733E-49 8.128E-50 0.000E+00
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20	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00	1.000E+00 5.440E-01 2.235E-01 6.740E-02 1.463E-02 2.258E-03 2.455E-04 1.871E-05 9.942E-07 3.675E-08 9.436E-10 1.716E-11 3.504E-13 4.748E-14 1.322E-14 3.475E-15 8.310E-16
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	9.086E+00	1.801E-16
	9.621E+00	3.528E-17
	1.016E+01	6.230E-18
	1.069E+01	1.027E-18
	1.120E+01	1.576E-19
	1.172E+01	2.174E-20
	1.223E+01	2.682E-21
	1.274E+01	2.950E-22
	1.326E+01	2.879E-23
	1.377E+01	2.482E-24
	1.428E+01	1.882E-25
	1.480E+01	1.253E-26
	1.531E+01	7.412E-28
	1.582E+01	4.161E-29
	1.634E+01	2.844E-30
	1.685E+01	3.312E-31
	1.736E+01	5.625E-32
	1.787E+01	1.025E-32
	1.839E+01	1.802E-33
	1.890E+01	2.994E-34
	1.941E+01	4.679E-35
	1.993E+01	6.863E-36
	2.044E+01	9.435E-37
	2.095E+01	1.214E-37
	2.147E+01	1.458E-38
	2.198E+01	1.634E-39
	2.249E+01	1.705E-40
	2.301E+01	1.654E-41
	2.352E+01	1.491E-42
	2.403E+01	1.253E-43
	2.455E+01	9.914E-45
	2.506E+01	7.631E-46
	2.557E+01	6.171E-47
	2.609E+01	5.919E-48
	2.660E+01	7.176E-49
	2.711E+01	1.021E-49
	2.763E+01	1.531E-50
	2.814E+01	0.000E+00
	2.865E+01	0.000E+00
	2.917E+01	0.000E+00
	2.968E+01	0.000E+00
	3.019E+01	0.000E+00
	3.070E+01	0.000E+00
	3.122E+01	0.000E+00
	3.173E+01	0.000E+00
	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.345E-01	5.879E-01

1.069E+00  
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4.513E-44  
4.605E-45  
4.661E-46  
4.997E-47  
6.207E-48  
9.320E-49  
1.608E-49

	3.070E+01	2.934E-50
	3.122E+01	0.000E+00
	3.173E+01	0.000E+00
	3.224E+01	0.000E+00
	3.276E+01	0.000E+00
	3.327E+01	0.000E+00
	3.378E+01	0.000E+00
	3.430E+01	0.000E+00
	3.481E+01	0.000E+00
	3.532E+01	0.000E+00
	3.584E+01	0.000E+00
	3.635E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.345E-01	6.214E-01
	1.069E+00	3.216E-01
	1.603E+00	1.363E-01
	2.138E+00	4.665E-02
	2.672E+00	1.280E-02
	3.207E+00	2.794E-03
	3.741E+00	4.833E-04
	4.276E+00	6.600E-05
	4.810E+00	7.099E-06
	5.345E+00	6.001E-07
	5.879E+00	3.981E-08
	6.414E+00	2.071E-09
	6.948E+00	8.489E-11
	7.483E+00	2.957E-12
	8.017E+00	1.789E-13
	8.552E+00	4.462E-14
	9.086E+00	1.579E-14
	9.621E+00	5.397E-15
	1.016E+01	1.739E-15
	1.069E+01	5.439E-16
	1.120E+01	1.615E-16
	1.172E+01	4.507E-17
	1.223E+01	1.180E-17
	1.274E+01	2.890E-18
	1.326E+01	6.620E-19
	1.377E+01	1.414E-19
	1.428E+01	2.814E-20
	1.480E+01	5.199E-21
	1.531E+01	8.905E-22
	1.582E+01	1.410E-22
	1.634E+01	2.061E-23
	1.685E+01	2.770E-24
	1.736E+01	3.418E-25
	1.787E+01	3.868E-26
	1.839E+01	4.023E-27
	1.890E+01	3.902E-28
	1.941E+01	3.731E-29
	1.993E+01	4.111E-30
	2.044E+01	6.437E-31
	2.095E+01	1.398E-31
	2.147E+01	3.448E-32
	2.198E+01	8.576E-33
	2.249E+01	2.074E-33

	2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.828E-34 1.079E-34 2.315E-35 4.757E-36 9.361E-37 1.762E-37 3.170E-38 5.446E-39 8.925E-40 1.394E-40 2.074E-41 2.939E-42 3.970E-43 5.130E-44 6.404E-45 7.899E-46 1.007E-46 1.421E-47 2.341E-48 4.456E-49 9.226E-50 1.963E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01	1.000E+00 6.480E-01 3.594E-01 1.682E-01 6.575E-02 2.129E-02 5.678E-03 1.243E-03 2.224E-04 3.247E-05 3.861E-06 3.733E-07 2.932E-08 1.869E-09 9.717E-11 4.345E-12 2.712E-13 6.015E-14 2.260E-14 8.569E-15 3.189E-15 1.133E-15 3.825E-16 1.225E-16 3.717E-17 1.067E-17 2.896E-18 7.416E-19 1.790E-19

	1.531E+01 1.582E+01 1.634E+01 1.685E+01 1.736E+01 1.787E+01 1.839E+01 1.890E+01 1.941E+01 1.993E+01 2.044E+01 2.095E+01 2.147E+01 2.198E+01 2.249E+01 2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.063E-20 8.663E-21 1.732E-21 3.240E-22 5.660E-23 9.218E-24 1.397E-24 1.966E-25 2.568E-26 3.125E-27 3.590E-28 4.086E-29 5.219E-30 8.910E-31 2.066E-31 5.561E-32 1.540E-32 4.197E-33 1.110E-33 2.836E-34 6.999E-35 1.666E-35 3.823E-36 8.451E-37 1.798E-37 3.681E-38 7.244E-39 1.369E-39 2.484E-40 4.322E-41 7.214E-42 1.155E-42 1.776E-43 2.637E-44 3.819E-45 5.517E-46 8.282E-47 1.365E-47 2.574E-48 5.504E-49 1.273E-49 3.033E-50
40	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00	1.000E+00 6.697E-01 3.919E-01 1.979E-01 8.548E-02 3.137E-02 9.728E-03 2.541E-03 5.571E-04 1.023E-04 1.572E-05 2.016E-06 2.157E-07 1.924E-08



7.483E+00	1.430E-09
8.017E+00	8.900E-11
8.552E+00	4.858E-12
9.086E+00	3.412E-13
9.621E+00	7.269E-14
1.016E+01	2.851E-14
1.069E+01	1.198E-14
1.120E+01	4.857E-15
1.172E+01	1.886E-15
1.223E+01	7.000E-16
1.274E+01	2.483E-16
1.326E+01	8.408E-17
1.377E+01	2.715E-17
1.428E+01	8.351E-18
1.480E+01	2.444E-18
1.531E+01	6.799E-19
1.582E+01	1.795E-19
1.634E+01	4.494E-20
1.685E+01	1.065E-20
1.736E+01	2.385E-21
1.787E+01	5.044E-22
1.839E+01	1.005E-22
1.890E+01	1.884E-23
1.941E+01	3.317E-24
1.993E+01	5.480E-25
2.044E+01	8.482E-26
2.095E+01	1.231E-26
2.147E+01	1.682E-27
2.198E+01	2.204E-28
2.249E+01	2.913E-29
2.301E+01	4.369E-30
2.352E+01	8.561E-31
2.403E+01	2.189E-31
2.455E+01	6.393E-32
2.506E+01	1.925E-32
2.557E+01	5.734E-33
2.609E+01	1.665E-33
2.660E+01	4.699E-34
2.711E+01	1.286E-34
2.763E+01	3.411E-35
2.814E+01	8.764E-36
2.865E+01	2.180E-36
2.917E+01	5.249E-37
2.968E+01	1.222E-37
3.019E+01	2.749E-38
3.070E+01	5.973E-39
3.122E+01	1.253E-39
3.173E+01	2.535E-40
3.224E+01	4.947E-41
3.276E+01	9.306E-42
3.327E+01	1.688E-42
3.378E+01	2.955E-43
3.430E+01	5.008E-44
3.481E+01	8.272E-45
3.532E+01	1.351E-45
3.584E+01	2.241E-46
3.635E+01	3.932E-47

45

0.000E+00	1.000E+00
5.345E-01	6.880E-01
1.069E+00	4.201E-01
1.603E+00	2.252E-01
2.138E+00	1.052E-01
2.672E+00	4.259E-02
3.207E+00	1.486E-02
3.741E+00	4.454E-03
4.276E+00	1.144E-03
4.810E+00	2.513E-04
5.345E+00	4.711E-05
5.879E+00	7.531E-06
6.414E+00	1.025E-06
6.948E+00	1.188E-07
7.483E+00	1.170E-08
8.017E+00	9.806E-10
8.552E+00	7.026E-11
9.086E+00	4.515E-12
9.621E+00	3.672E-13
1.016E+01	8.112E-14
1.069E+01	3.385E-14
1.120E+01	1.505E-14
1.172E+01	6.497E-15
1.223E+01	2.701E-15
1.274E+01	1.079E-15
1.326E+01	4.144E-16
1.377E+01	1.527E-16
1.428E+01	5.398E-17
1.480E+01	1.829E-17
1.531E+01	5.930E-18
1.582E+01	1.840E-18
1.634E+01	5.453E-19
1.685E+01	1.543E-19
1.736E+01	4.162E-20
1.787E+01	1.069E-20
1.839E+01	2.614E-21
1.890E+01	6.068E-22
1.941E+01	1.337E-22
1.993E+01	2.790E-23
2.044E+01	5.510E-24
2.095E+01	1.028E-24
2.147E+01	1.812E-25
2.198E+01	3.013E-26
2.249E+01	4.738E-27
2.301E+01	7.101E-28
2.352E+01	1.039E-28
2.403E+01	1.582E-29
2.455E+01	2.817E-30
2.506E+01	6.480E-31
2.557E+01	1.852E-31
2.609E+01	5.851E-32
2.660E+01	1.889E-32
2.711E+01	6.030E-33
2.763E+01	1.883E-33
2.814E+01	5.731E-34
2.865E+01	1.698E-34

	2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	4.894E-35 1.371E-35 3.734E-36 9.876E-37 2.536E-37 6.319E-38 1.527E-38 3.578E-39 8.121E-40 1.785E-40 3.800E-41 7.827E-42 1.561E-42 3.017E-43 5.666E-44
50	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01 1.377E+01 1.428E+01 1.480E+01 1.531E+01 1.582E+01 1.634E+01 1.685E+01 1.736E+01 1.787E+01 1.839E+01 1.890E+01 1.941E+01 1.993E+01 2.044E+01 2.095E+01	1.000E+00 7.036E-01 4.448E-01 2.504E-01 1.247E-01 5.458E-02 2.093E-02 7.008E-03 2.043E-03 5.179E-04 1.139E-04 2.171E-05 3.585E-06 5.120E-07 6.322E-08 6.747E-09 6.226E-10 5.002E-11 3.692E-12 3.524E-13 8.702E-14 3.765E-14 1.748E-14 7.937E-15 3.485E-15 1.477E-15 6.039E-16 2.381E-16 9.042E-17 3.306E-17 1.163E-17 3.932E-18 1.277E-18 3.980E-19 1.189E-19 3.404E-20 9.321E-21 2.440E-21 6.099E-22 1.454E-22 3.302E-23

	2.147E+01 2.198E+01 2.249E+01 2.301E+01 2.352E+01 2.403E+01 2.455E+01 2.506E+01 2.557E+01 2.609E+01 2.660E+01 2.711E+01 2.763E+01 2.814E+01 2.865E+01 2.917E+01 2.968E+01 3.019E+01 3.070E+01 3.122E+01 3.173E+01 3.224E+01 3.276E+01 3.327E+01 3.378E+01 3.430E+01 3.481E+01 3.532E+01 3.584E+01 3.635E+01	7.135E-24 1.466E-24 2.859E-25 5.294E-26 9.313E-27 1.563E-27 2.539E-28 4.137E-29 7.317E-30 1.567E-30 4.243E-31 1.349E-31 4.572E-32 1.564E-32 5.280E-33 1.747E-33 5.645E-34 1.781E-34 5.479E-35 1.644E-35 4.806E-36 1.369E-36 3.798E-37 1.026E-37 2.694E-38 6.885E-39 1.710E-39 4.129E-40 9.683E-41 2.205E-41
55	0.000E+00 5.345E-01 1.069E+00 1.603E+00 2.138E+00 2.672E+00 3.207E+00 3.741E+00 4.276E+00 4.810E+00 5.345E+00 5.879E+00 6.414E+00 6.948E+00 7.483E+00 8.017E+00 8.552E+00 9.086E+00 9.621E+00 1.016E+01 1.069E+01 1.120E+01 1.172E+01 1.223E+01 1.274E+01 1.326E+01	1.000E+00 7.171E-01 4.667E-01 2.736E-01 1.435E-01 6.704E-02 2.779E-02 1.019E-02 3.295E-03 9.392E-04 2.354E-04 5.185E-05 1.002E-05 1.699E-06 2.524E-07 3.284E-08 3.743E-09 3.740E-10 3.306E-11 2.763E-12 3.225E-13 8.911E-14 3.985E-14 1.919E-14 9.077E-15 4.167E-15

1.377E+01	1.853E-15
1.428E+01	7.975E-16
1.480E+01	3.321E-16
1.531E+01	1.337E-16
1.582E+01	5.204E-17
1.634E+01	1.955E-17
1.685E+01	7.091E-18
1.736E+01	2.480E-18
1.787E+01	8.357E-19
1.839E+01	2.712E-19
1.890E+01	8.468E-20
1.941E+01	2.542E-20
1.993E+01	7.328E-21
2.044E+01	2.027E-21
2.095E+01	5.378E-22
2.147E+01	1.366E-22
2.198E+01	3.321E-23
2.249E+01	7.715E-24
2.301E+01	1.712E-24
2.352E+01	3.624E-25
2.403E+01	7.318E-26
2.455E+01	1.410E-26
2.506E+01	2.600E-27
2.557E+01	4.629E-28
2.609E+01	8.149E-29
2.660E+01	1.497E-29
2.711E+01	3.146E-30
2.763E+01	8.155E-31
2.814E+01	2.556E-31
2.865E+01	8.884E-32
2.917E+01	3.191E-32
2.968E+01	1.145E-32
3.019E+01	4.047E-33
3.070E+01	1.403E-33
3.122E+01	4.759E-34
3.173E+01	1.579E-34
3.224E+01	5.123E-35
3.276E+01	1.624E-35
3.327E+01	5.029E-36
3.378E+01	1.521E-36
3.430E+01	4.490E-37
3.481E+01	1.294E-37
3.532E+01	3.635E-38
3.584E+01	9.962E-39
3.635E+01	2.661E-39

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	26.82 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.560E-01	2.037E-01
	1.112E+00	1.091E-02
	1.668E+00	1.331E-04
	2.224E+00	3.467E-07

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.166E+01	3.308E-42
1.219E+01	1.821E-44
1.273E+01	8.759E-47
1.327E+01	7.615E-49
1.380E+01	1.335E-50
1.434E+01	0.000E+00
1.487E+01	0.000E+00
1.541E+01	0.000E+00
1.595E+01	0.000E+00
1.648E+01	0.000E+00
1.702E+01	0.000E+00
1.756E+01	0.000E+00
1.809E+01	0.000E+00
1.863E+01	0.000E+00
1.917E+01	0.000E+00
1.970E+01	0.000E+00
2.024E+01	0.000E+00
2.078E+01	0.000E+00
2.131E+01	0.000E+00
2.185E+01	0.000E+00
2.238E+01	0.000E+00
2.292E+01	0.000E+00
2.346E+01	0.000E+00
2.399E+01	0.000E+00
2.453E+01	0.000E+00
2.507E+01	0.000E+00
2.560E+01	0.000E+00
2.614E+01	0.000E+00
2.668E+01	0.000E+00
2.721E+01	0.000E+00
2.775E+01	0.000E+00
2.828E+01	0.000E+00
2.882E+01	0.000E+00
2.936E+01	0.000E+00
2.989E+01	0.000E+00
3.043E+01	0.000E+00
3.097E+01	0.000E+00
3.150E+01	0.000E+00
3.204E+01	0.000E+00
3.258E+01	0.000E+00
3.311E+01	0.000E+00

	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.166E+01	1.327E-30
	1.219E+01	7.713E-32
	1.273E+01	6.164E-33
	1.327E+01	4.520E-34
	1.380E+01	2.907E-35
	1.434E+01	1.627E-36
	1.487E+01	7.882E-38
	1.541E+01	3.289E-39
	1.595E+01	1.176E-40
	1.648E+01	3.584E-42
	1.702E+01	9.341E-44
	1.756E+01	2.153E-45
	1.809E+01	5.109E-47
	1.863E+01	1.750E-48
	1.917E+01	9.274E-50
	1.970E+01	0.000E+00
	2.024E+01	0.000E+00
	2.078E+01	0.000E+00
	2.131E+01	0.000E+00
	2.185E+01	0.000E+00
	2.238E+01	0.000E+00
	2.292E+01	0.000E+00
	2.346E+01	0.000E+00
	2.399E+01	0.000E+00
	2.453E+01	0.000E+00
	2.507E+01	0.000E+00



	2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	0.000E+00 0.000E+00
15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01 1.595E+01 1.648E+01 1.702E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.861E-21 1.862E-22 1.074E-23 5.154E-25 2.049E-26 6.821E-28 2.135E-29 1.012E-30 1.010E-31 1.286E-32 1.581E-33 1.789E-34 1.850E-35

	1.756E+01	1.743E-36
	1.809E+01	1.491E-37
	1.863E+01	1.156E-38
	1.917E+01	8.093E-40
	1.970E+01	5.102E-41
	2.024E+01	2.892E-42
	2.078E+01	1.477E-43
	2.131E+01	6.902E-45
	2.185E+01	3.136E-46
	2.238E+01	1.621E-47
	2.292E+01	1.147E-48
	2.346E+01	1.064E-49
	2.399E+01	1.075E-50
	2.453E+01	0.000E+00
	2.507E+01	0.000E+00
	2.560E+01	0.000E+00
	2.614E+01	0.000E+00
	2.668E+01	0.000E+00
	2.721E+01	0.000E+00
	2.775E+01	0.000E+00
	2.828E+01	0.000E+00
	2.882E+01	0.000E+00
	2.936E+01	0.000E+00
	2.989E+01	0.000E+00
	3.043E+01	0.000E+00
	3.097E+01	0.000E+00
	3.150E+01	0.000E+00
	3.204E+01	0.000E+00
	3.258E+01	0.000E+00
	3.311E+01	0.000E+00
	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00

20	0.000E+00	1.000E+00
	5.560E-01	5.278E-01
	1.112E+00	2.054E-01
	1.668E+00	5.706E-02
	2.224E+00	1.109E-02
	2.780E+00	1.487E-03
	3.336E+00	1.363E-04
	3.892E+00	8.492E-06
	4.448E+00	3.580E-07
	5.004E+00	1.018E-08
	5.560E+00	1.955E-10
	6.116E+00	2.767E-12
	6.672E+00	1.055E-13
	7.228E+00	2.428E-14
	7.784E+00	6.299E-15
	8.340E+00	1.483E-15
	8.896E+00	3.142E-16

	9.452E+00	5.974E-17
	1.001E+01	1.015E-17
	1.056E+01	1.538E-18
	1.112E+01	2.150E-19
	1.166E+01	2.754E-20
	1.219E+01	3.127E-21
	1.273E+01	3.131E-22
	1.327E+01	2.752E-23
	1.380E+01	2.112E-24
	1.434E+01	1.408E-25
	1.487E+01	8.154E-27
	1.541E+01	4.170E-28
	1.595E+01	2.085E-29
	1.648E+01	1.435E-30
	1.702E+01	1.787E-31
	1.756E+01	2.944E-32
	1.809E+01	4.920E-33
	1.863E+01	7.796E-34
	1.917E+01	1.157E-34
	1.970E+01	1.605E-35
	2.024E+01	2.075E-36
	2.078E+01	2.497E-37
	2.131E+01	2.791E-38
	2.185E+01	2.892E-39
	2.238E+01	2.773E-40
	2.292E+01	2.456E-41
	2.346E+01	2.008E-42
	2.399E+01	1.519E-43
	2.453E+01	1.075E-44
	2.507E+01	7.373E-46
	2.560E+01	5.346E-47
	2.614E+01	4.703E-48
	2.668E+01	5.326E-49
	2.721E+01	7.054E-50
	2.775E+01	0.000E+00
	2.828E+01	0.000E+00
	2.882E+01	0.000E+00
	2.936E+01	0.000E+00
	2.989E+01	0.000E+00
	3.043E+01	0.000E+00
	3.097E+01	0.000E+00
	3.150E+01	0.000E+00
	3.204E+01	0.000E+00
	3.258E+01	0.000E+00
	3.311E+01	0.000E+00
	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.560E-01	5.729E-01

1.112E+00  
1.668E+00  
2.224E+00  
2.780E+00  
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1.166E+01  
1.219E+01  
1.273E+01  
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2.353E-23  
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4.980E-36  
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2.023E-39  
2.466E-40  
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3.027E-42  
3.050E-43  
2.904E-44  
2.658E-45  
2.444E-46  
2.461E-47  
2.983E-48  
4.399E-49  
7.260E-50  
1.234E-50  
0.000E+00

	3.204E+01	0.000E+00
	3.258E+01	0.000E+00
	3.311E+01	0.000E+00
	3.365E+01	0.000E+00
	3.419E+01	0.000E+00
	3.472E+01	0.000E+00
	3.526E+01	0.000E+00
	3.579E+01	0.000E+00
	3.633E+01	0.000E+00
	3.687E+01	0.000E+00
	3.740E+01	0.000E+00
	3.794E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
	6.116E+00	1.109E-08
	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
	7.784E+00	5.124E-13
	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
	1.001E+01	2.386E-15
	1.056E+01	6.986E-16
	1.112E+01	1.974E-16
	1.166E+01	5.247E-17
	1.219E+01	1.301E-17
	1.273E+01	3.001E-18
	1.327E+01	6.432E-19
	1.380E+01	1.278E-19
	1.434E+01	2.347E-20
	1.487E+01	3.978E-21
	1.541E+01	6.201E-22
	1.595E+01	8.871E-23
	1.648E+01	1.161E-23
	1.702E+01	1.386E-24
	1.756E+01	1.507E-25
	1.809E+01	1.490E-26
	1.863E+01	1.350E-27
	1.917E+01	1.156E-28
	1.970E+01	1.047E-29
	2.024E+01	1.272E-30
	2.078E+01	2.322E-31
	2.131E+01	5.246E-32
	2.185E+01	1.230E-32
	2.238E+01	2.812E-33
	2.292E+01	6.178E-34
	2.346E+01	1.299E-34

	2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	2.609E-35 5.005E-36 9.154E-37 1.595E-37 2.645E-38 4.171E-39 6.245E-40 8.871E-41 1.195E-41 1.526E-42 1.851E-43 2.146E-44 2.416E-45 2.737E-46 3.334E-47 4.713E-48 7.906E-49 1.492E-49 2.948E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
35	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01	1.000E+00 6.348E-01 3.403E-01 1.517E-01 5.555E-02 1.658E-02 4.008E-03 7.813E-04 1.224E-04 1.538E-05 1.547E-06 1.243E-07 7.968E-09 4.082E-10 1.702E-11 7.245E-13 9.112E-14 3.054E-14 1.121E-14 3.931E-15 1.344E-15 4.353E-16 1.331E-16 3.837E-17 1.041E-17 2.658E-18 6.366E-19 1.429E-19 2.998E-20

	1.595E+01 1.648E+01 1.702E+01 1.756E+01 1.809E+01 1.863E+01 1.917E+01 1.970E+01 2.024E+01 2.078E+01 2.131E+01 2.185E+01 2.238E+01 2.292E+01 2.346E+01 2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	5.874E-21 1.072E-21 1.818E-22 2.860E-23 4.164E-24 5.597E-25 6.937E-26 7.936E-27 8.451E-28 8.667E-29 9.510E-30 1.359E-30 2.767E-31 6.897E-32 1.802E-32 4.642E-33 1.158E-33 2.783E-34 6.438E-35 1.432E-35 3.059E-36 6.274E-37 1.234E-37 2.326E-38 4.199E-39 7.251E-40 1.197E-40 1.888E-41 2.844E-42 4.098E-43 5.664E-44 7.576E-45 1.000E-45 1.355E-46 2.001E-47 3.400E-48 6.664E-49 1.433E-49 3.198E-50 0.000E+00 0.000E+00 0.000E+00
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

7.784E+00	3.058E-10
8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.628E-14
1.056E+01	1.434E-14
1.112E+01	5.636E-15
1.166E+01	2.110E-15
1.219E+01	7.523E-16
1.273E+01	2.552E-16
1.327E+01	8.231E-17
1.380E+01	2.520E-17
1.434E+01	7.317E-18
1.487E+01	2.012E-18
1.541E+01	5.232E-19
1.595E+01	1.285E-19
1.648E+01	2.976E-20
1.702E+01	6.487E-21
1.756E+01	1.329E-21
1.809E+01	2.556E-22
1.863E+01	4.602E-23
1.917E+01	7.746E-24
1.970E+01	1.217E-24
2.024E+01	1.781E-25
2.078E+01	2.427E-26
2.131E+01	3.092E-27
2.185E+01	3.729E-28
2.238E+01	4.454E-29
2.292E+01	5.908E-30
2.346E+01	1.028E-30
2.399E+01	2.415E-31
2.453E+01	6.640E-32
2.507E+01	1.894E-32
2.560E+01	5.335E-33
2.614E+01	1.462E-33
2.668E+01	3.880E-34
2.721E+01	9.958E-35
2.775E+01	2.470E-35
2.828E+01	5.916E-36
2.882E+01	1.368E-36
2.936E+01	3.049E-37
2.989E+01	6.552E-38
3.043E+01	1.356E-38
3.097E+01	2.701E-39
3.150E+01	5.176E-40
3.204E+01	9.533E-41
3.258E+01	1.687E-41
3.311E+01	2.868E-42
3.365E+01	4.689E-43
3.419E+01	7.391E-44
3.472E+01	1.131E-44
3.526E+01	1.702E-45
3.579E+01	2.594E-46
3.633E+01	4.188E-47
3.687E+01	7.539E-48
3.740E+01	1.548E-48
3.794E+01	3.538E-49



45

0.000E+00	1.000E+00
5.560E-01	6.761E-01
1.112E+00	4.015E-01
1.668E+00	2.070E-01
2.224E+00	9.189E-02
2.780E+00	3.488E-02
3.336E+00	1.127E-02
3.892E+00	3.086E-03
4.448E+00	7.146E-04
5.004E+00	1.396E-04
5.560E+00	2.297E-05
6.116E+00	3.179E-06
6.672E+00	3.696E-07
7.228E+00	3.608E-08
7.784E+00	2.955E-09
8.340E+00	2.035E-10
8.896E+00	1.205E-11
9.452E+00	7.520E-13
1.001E+01	1.107E-13
1.056E+01	3.994E-14
1.112E+01	1.718E-14
1.166E+01	7.178E-15
1.219E+01	2.879E-15
1.273E+01	1.106E-15
1.327E+01	4.067E-16
1.380E+01	1.430E-16
1.434E+01	4.804E-17
1.487E+01	1.540E-17
1.541E+01	4.709E-18
1.595E+01	1.371E-18
1.648E+01	3.797E-19
1.702E+01	9.993E-20
1.756E+01	2.495E-20
1.809E+01	5.904E-21
1.863E+01	1.322E-21
1.917E+01	2.797E-22
1.970E+01	5.583E-23
2.024E+01	1.050E-23
2.078E+01	1.856E-24
2.131E+01	3.084E-25
2.185E+01	4.810E-26
2.238E+01	7.050E-27
2.292E+01	9.780E-28
2.346E+01	1.314E-28
2.399E+01	1.822E-29
2.453E+01	2.964E-30
2.507E+01	6.362E-31
2.560E+01	1.727E-31
2.614E+01	5.200E-32
2.668E+01	1.594E-32
2.721E+01	4.817E-33
2.775E+01	1.419E-33
2.828E+01	4.064E-34
2.882E+01	1.130E-34
2.936E+01	3.046E-35
2.989E+01	7.963E-36

	3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	2.017E-36 4.949E-37 1.175E-37 2.700E-38 5.997E-39 1.287E-39 2.668E-40 5.338E-41 1.031E-41 1.921E-42 3.458E-43 6.031E-44 1.025E-44 1.720E-45 2.919E-46
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01 1.434E+01 1.487E+01 1.541E+01 1.595E+01 1.648E+01 1.702E+01 1.756E+01 1.809E+01 1.863E+01 1.917E+01 1.970E+01 2.024E+01 2.078E+01 2.131E+01 2.185E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 1.913E-14 8.404E-15 3.561E-15 1.452E-15 5.694E-16 2.145E-16 7.757E-17 2.691E-17 8.947E-18 2.849E-18 8.676E-19 2.525E-19 7.017E-20 1.859E-20 4.692E-21 1.127E-21 2.570E-22 5.562E-23 1.141E-23 2.214E-24

	2.238E+01 2.292E+01 2.346E+01 2.399E+01 2.453E+01 2.507E+01 2.560E+01 2.614E+01 2.668E+01 2.721E+01 2.775E+01 2.828E+01 2.882E+01 2.936E+01 2.989E+01 3.043E+01 3.097E+01 3.150E+01 3.204E+01 3.258E+01 3.311E+01 3.365E+01 3.419E+01 3.472E+01 3.526E+01 3.579E+01 3.633E+01 3.687E+01 3.740E+01 3.794E+01	4.063E-25 7.044E-26 1.154E-26 1.796E-27 2.690E-28 4.038E-29 6.641E-30 1.354E-30 3.549E-31 1.090E-31 3.536E-32 1.150E-32 3.674E-33 1.146E-33 3.485E-34 1.032E-34 2.971E-35 8.321E-36 2.266E-36 5.993E-37 1.540E-37 3.840E-38 9.290E-39 2.180E-39 4.957E-40 1.092E-40 2.331E-41 4.817E-42 9.645E-43 1.874E-43
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.166E+01 1.219E+01 1.273E+01 1.327E+01 1.380E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.343E-14 2.021E-14 9.257E-15 4.103E-15 1.756E-15

1.434E+01	7.256E-16
1.487E+01	2.891E-16
1.541E+01	1.110E-16
1.595E+01	4.106E-17
1.648E+01	1.462E-17
1.702E+01	5.004E-18
1.756E+01	1.646E-18
1.809E+01	5.198E-19
1.863E+01	1.575E-19
1.917E+01	4.571E-20
1.970E+01	1.270E-20
2.024E+01	3.377E-21
2.078E+01	8.576E-22
2.131E+01	2.078E-22
2.185E+01	4.801E-23
2.238E+01	1.056E-23
2.292E+01	2.209E-24
2.346E+01	4.391E-25
2.399E+01	8.289E-26
2.453E+01	1.486E-26
2.507E+01	2.540E-27
2.560E+01	4.179E-28
2.614E+01	6.811E-29
2.668E+01	1.173E-29
2.721E+01	2.377E-30
2.775E+01	6.087E-31
2.828E+01	1.879E-31
2.882E+01	6.327E-32
2.936E+01	2.174E-32
2.989E+01	7.409E-33
3.043E+01	2.477E-33
3.097E+01	8.096E-34
3.150E+01	2.584E-34
3.204E+01	8.046E-35
3.258E+01	2.444E-35
3.311E+01	7.235E-36
3.365E+01	2.088E-36
3.419E+01	5.869E-37
3.472E+01	1.606E-37
3.526E+01	4.279E-38
3.579E+01	1.109E-38
3.633E+01	2.796E-39
3.687E+01	6.849E-40
3.740E+01	1.631E-40
3.794E+01	3.772E-41

### NOTICE

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# POLLUTEv7

Version 7.13

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## DB SandThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.000203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.12 m	20	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	24.65 m	50	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L	
5	0.000E+00	1.000E+00	
	5.560E-01	2.037E-01	
	1.112E+00	1.091E-02	
	1.668E+00	1.331E-04	
	2.224E+00	3.467E-07	

2.780E+00	1.878E-10
3.336E+00	1.005E-13
3.892E+00	5.956E-15
4.448E+00	2.947E-16
5.004E+00	9.449E-18
5.560E+00	1.904E-19
6.116E+00	2.329E-21
6.672E+00	1.657E-23
7.228E+00	6.570E-26
7.784E+00	1.471E-28
8.340E+00	5.331E-31
8.896E+00	1.130E-32
9.452E+00	2.457E-34
1.001E+01	4.021E-36
1.056E+01	4.849E-38
1.112E+01	4.414E-40
1.161E+01	4.974E-42
1.211E+01	4.304E-44
1.260E+01	3.147E-46
1.309E+01	3.164E-48
1.358E+01	6.662E-50
1.408E+01	0.000E+00
1.457E+01	0.000E+00
1.506E+01	0.000E+00
1.556E+01	0.000E+00
1.605E+01	0.000E+00
1.654E+01	0.000E+00
1.704E+01	0.000E+00
1.753E+01	0.000E+00
1.802E+01	0.000E+00
1.851E+01	0.000E+00
1.901E+01	0.000E+00
1.950E+01	0.000E+00
1.999E+01	0.000E+00
2.049E+01	0.000E+00
2.098E+01	0.000E+00
2.147E+01	0.000E+00
2.197E+01	0.000E+00
2.246E+01	0.000E+00
2.295E+01	0.000E+00
2.344E+01	0.000E+00
2.394E+01	0.000E+00
2.443E+01	0.000E+00
2.492E+01	0.000E+00
2.542E+01	0.000E+00
2.591E+01	0.000E+00
2.640E+01	0.000E+00
2.690E+01	0.000E+00
2.739E+01	0.000E+00
2.788E+01	0.000E+00
2.837E+01	0.000E+00
2.887E+01	0.000E+00
2.936E+01	0.000E+00
2.985E+01	0.000E+00
3.035E+01	0.000E+00
3.084E+01	0.000E+00
3.133E+01	0.000E+00

	3.183E+01	0.000E+00
	3.232E+01	0.000E+00
	3.281E+01	0.000E+00
	3.330E+01	0.000E+00
	3.380E+01	0.000E+00
	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
10	0.000E+00	1.000E+00
	5.560E-01	3.700E-01
	1.112E+00	7.240E-02
	1.668E+00	6.979E-03
	2.224E+00	3.189E-04
	2.780E+00	6.756E-06
	3.336E+00	6.551E-08
	3.892E+00	2.891E-10
	4.448E+00	7.541E-13
	5.004E+00	3.374E-14
	5.560E+00	4.993E-15
	6.116E+00	6.111E-16
	6.672E+00	6.039E-17
	7.228E+00	4.770E-18
	7.784E+00	2.978E-19
	8.340E+00	1.451E-20
	8.896E+00	5.443E-22
	9.452E+00	1.547E-23
	1.001E+01	3.277E-25
	1.056E+01	5.130E-27
	1.112E+01	6.604E-29
	1.161E+01	1.748E-30
	1.211E+01	1.169E-31
	1.260E+01	1.142E-32
	1.309E+01	1.068E-33
	1.358E+01	8.967E-35
	1.408E+01	6.711E-36
	1.457E+01	4.457E-37
	1.506E+01	2.616E-38
	1.556E+01	1.351E-39
	1.605E+01	6.113E-41
	1.654E+01	2.418E-42
	1.704E+01	8.383E-44
	1.753E+01	2.621E-45
	1.802E+01	8.286E-47
	1.851E+01	3.443E-48
	1.901E+01	2.144E-49
	1.950E+01	1.604E-50
	1.999E+01	0.000E+00
	2.049E+01	0.000E+00
	2.098E+01	0.000E+00
	2.147E+01	0.000E+00
	2.197E+01	0.000E+00
	2.246E+01	0.000E+00
	2.295E+01	0.000E+00
	2.344E+01	0.000E+00
	2.394E+01	0.000E+00

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15	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01 1.408E+01 1.457E+01 1.506E+01 1.556E+01 1.605E+01 1.654E+01	1.000E+00 4.652E-01 1.431E-01 2.781E-02 3.327E-03 2.407E-04 1.042E-05 2.682E-07 4.082E-09 3.709E-11 3.339E-13 3.550E-14 7.575E-15 1.435E-15 2.363E-16 3.365E-17 4.119E-18 4.309E-19 3.825E-20 2.861E-21 1.862E-22 1.362E-23 8.532E-25 4.560E-26 2.086E-27 8.567E-29 4.037E-30 3.484E-31 4.861E-32 7.327E-33 1.050E-33 1.400E-34



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	1.309E+01	6.134E-23
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	1.654E+01	1.111E-30
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	1.950E+01	3.397E-35
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	2.197E+01	1.739E-39
	2.246E+01	1.989E-40
	2.295E+01	2.128E-41
	2.344E+01	2.128E-42
	2.394E+01	1.992E-43
	2.443E+01	1.760E-44
	2.492E+01	1.501E-45
	2.542E+01	1.307E-46
	2.591E+01	1.288E-47
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	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
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	3.084E+01	1.877E-50
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	3.183E+01	0.000E+00
	3.232E+01	0.000E+00
	3.281E+01	0.000E+00
	3.330E+01	0.000E+00
	3.380E+01	0.000E+00
	3.429E+01	0.000E+00
	3.478E+01	0.000E+00
	3.528E+01	0.000E+00
	3.577E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.560E-01	6.074E-01
	1.112E+00	3.024E-01
	1.668E+00	1.211E-01
	2.224E+00	3.847E-02
	2.780E+00	9.599E-03
	3.336E+00	1.869E-03
	3.892E+00	2.826E-04
	4.448E+00	3.306E-05
	5.004E+00	2.985E-06
	5.560E+00	2.075E-07
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	6.672E+00	4.560E-10
	7.228E+00	1.474E-11
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	8.340E+00	7.000E-14
	8.896E+00	2.285E-14
	9.452E+00	7.625E-15
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	1.112E+01	1.974E-16
	1.161E+01	5.856E-17
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	1.358E+01	2.480E-19
	1.408E+01	5.397E-20
	1.457E+01	1.098E-20
	1.506E+01	2.085E-21
	1.556E+01	3.687E-22
	1.605E+01	6.059E-23
	1.654E+01	9.231E-24
	1.704E+01	1.301E-24
	1.753E+01	1.695E-25
	1.802E+01	2.037E-26
	1.851E+01	2.269E-27
	1.901E+01	2.388E-28
	1.950E+01	2.529E-29
	1.999E+01	3.160E-30
	2.049E+01	5.549E-31
	2.098E+01	1.300E-31
	2.147E+01	3.392E-32
	2.197E+01	8.916E-33
	2.246E+01	2.283E-33

	2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	5.649E-34 1.346E-34 3.088E-35 6.812E-36 1.444E-36 2.938E-37 5.735E-38 1.073E-38 1.923E-39 3.299E-40 5.411E-41 8.485E-42 1.272E-42 1.826E-43 2.524E-44 3.395E-45 4.563E-46 6.419E-47 1.006E-47 1.824E-48 3.758E-49 8.315E-50 1.881E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00
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	1.556E+01 1.605E+01 1.654E+01 1.704E+01 1.753E+01 1.802E+01 1.851E+01 1.901E+01 1.950E+01 1.999E+01 2.049E+01 2.098E+01 2.147E+01 2.197E+01 2.246E+01 2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	1.938E-20 4.269E-21 8.851E-22 1.725E-22 3.154E-23 5.402E-24 8.652E-25 1.294E-25 1.808E-26 2.367E-27 2.948E-28 3.664E-29 5.103E-30 9.314E-31 2.264E-31 6.377E-32 1.858E-32 5.350E-33 1.500E-33 4.079E-34 1.074E-34 2.735E-35 6.737E-36 1.604E-36 3.686E-37 8.177E-38 1.750E-38 3.609E-39 7.169E-40 1.371E-40 2.523E-41 4.467E-42 7.613E-43 1.251E-43 1.993E-44 3.108E-45 4.851E-46 7.868E-47 1.394E-47 2.794E-48 6.303E-49 1.535E-49
40	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00	1.000E+00 6.572E-01 3.730E-01 1.804E-01 7.356E-02 2.513E-02 7.148E-03 1.687E-03 3.292E-04 5.302E-05 7.032E-06 7.670E-07 6.873E-08 5.056E-09

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8.340E+00	1.549E-11
8.896E+00	8.040E-13
9.452E+00	1.054E-13
1.001E+01	3.628E-14
1.056E+01	1.434E-14
1.112E+01	5.636E-15
1.161E+01	2.289E-15
1.211E+01	8.919E-16
1.260E+01	3.334E-16
1.309E+01	1.194E-16
1.358E+01	4.094E-17
1.408E+01	1.343E-17
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3.330E+01	1.504E-42
3.380E+01	2.815E-43
3.429E+01	5.114E-44
3.478E+01	9.074E-45
3.528E+01	1.592E-45
3.577E+01	2.823E-46

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8.637E-32  
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3.228E-33  
1.042E-33  
3.284E-34



	2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	1.009E-34 3.020E-35 8.810E-36 2.502E-36 6.919E-37 1.861E-37 4.869E-38 1.238E-38 3.060E-39 7.345E-40 1.711E-40 3.870E-41 8.492E-42 1.809E-42 3.741E-43
50	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01 1.408E+01 1.457E+01 1.506E+01 1.556E+01 1.605E+01 1.654E+01 1.704E+01 1.753E+01 1.802E+01 1.851E+01 1.901E+01 1.950E+01 1.999E+01 2.049E+01 2.098E+01	1.000E+00 6.922E-01 4.266E-01 2.317E-01 1.101E-01 4.550E-02 1.628E-02 5.023E-03 1.334E-03 3.043E-04 5.950E-05 9.962E-06 1.427E-06 1.746E-07 1.826E-08 1.630E-09 1.247E-10 8.412E-12 6.270E-13 1.087E-13 4.267E-14 2.041E-14 9.623E-15 4.402E-15 1.950E-15 8.355E-16 3.463E-16 1.387E-16 5.365E-17 2.003E-17 7.215E-18 2.505E-18 8.375E-19 2.695E-19 8.339E-20 2.479E-20 7.075E-21 1.936E-21 5.077E-22 1.274E-22 3.057E-23

	2.147E+01 2.197E+01 2.246E+01 2.295E+01 2.344E+01 2.394E+01 2.443E+01 2.492E+01 2.542E+01 2.591E+01 2.640E+01 2.690E+01 2.739E+01 2.788E+01 2.837E+01 2.887E+01 2.936E+01 2.985E+01 3.035E+01 3.084E+01 3.133E+01 3.183E+01 3.232E+01 3.281E+01 3.330E+01 3.380E+01 3.429E+01 3.478E+01 3.528E+01 3.577E+01	7.007E-24 1.532E-24 3.195E-25 6.350E-26 1.204E-26 2.183E-27 3.825E-28 6.653E-29 1.219E-29 2.586E-30 6.817E-31 2.158E-31 7.499E-32 2.675E-32 9.504E-33 3.322E-33 1.138E-33 3.812E-34 1.249E-34 3.997E-35 1.250E-35 3.816E-36 1.137E-36 3.308E-37 9.384E-38 2.596E-38 6.997E-39 1.838E-39 4.701E-40 1.171E-40
55	0.000E+00 5.560E-01 1.112E+00 1.668E+00 2.224E+00 2.780E+00 3.336E+00 3.892E+00 4.448E+00 5.004E+00 5.560E+00 6.116E+00 6.672E+00 7.228E+00 7.784E+00 8.340E+00 8.896E+00 9.452E+00 1.001E+01 1.056E+01 1.112E+01 1.161E+01 1.211E+01 1.260E+01 1.309E+01 1.358E+01	1.000E+00 7.061E-01 4.489E-01 2.546E-01 1.280E-01 5.671E-02 2.206E-02 7.508E-03 2.231E-03 5.777E-04 1.301E-04 2.546E-05 4.325E-06 6.372E-07 8.136E-08 9.000E-09 8.628E-10 7.203E-11 5.449E-12 4.873E-13 1.044E-13 4.626E-14 2.288E-14 1.122E-14 5.359E-15 2.486E-15

	1.408E+01	1.119E-15
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	1.556E+01	8.504E-17
	1.605E+01	3.381E-17
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	2.049E+01	1.801E-21
	2.098E+01	5.020E-22
	2.147E+01	1.344E-22
	2.197E+01	3.455E-23
	2.246E+01	8.521E-24
	2.295E+01	2.014E-24
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	2.394E+01	9.876E-26
	2.443E+01	2.049E-26
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	2.640E+01	2.831E-29
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	2.985E+01	8.033E-33
	3.035E+01	2.941E-33
	3.084E+01	1.057E-33
	3.133E+01	3.722E-34
	3.183E+01	1.284E-34
	3.232E+01	4.339E-35
	3.281E+01	1.435E-35
	3.330E+01	4.645E-36
	3.380E+01	1.471E-36
	3.429E+01	4.555E-37
	3.478E+01	1.379E-37
	3.528E+01	4.081E-38
	3.577E+01	1.180E-38

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*Prepared for*

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Detroit, Michigan 48226

# **ALTERNATE LINER DEMONSTRATION BOTTOM ASH BASINS**

**BELLE RIVER POWER PLANT  
East China Township, Michigan**

*Prepared by*

**Geosyntec**   
consultants

Geosyntec Consultants of Michigan

3011 West Grand Boulevard, Suite 2300  
Ann Arbor, Michigan 48105

GLP8017

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Appendix D – 2016 Boring Logs

Appendix E – 2020 Boring Logs

Appendix F – 1970s Laboratory Test Results

Appendix G – 2016 Laboratory Test Results

Appendix H – 2020 Laboratory Test Results

Appendix I1 – CPT Logs

Appendix I2 – PPD Test Results

Appendix J – Chemistry Analysis of Site-Specific Water

Appendix K – ALD Hydraulic Conductivity Test Results

Appendix L – Groundwater Protection Standard Calculations

Appendix M – Fate and Transport Model Inputs

Appendix N – Fate and Transport Model Outputs

## 1. INTRODUCTION

This report has been prepared to provide the Preliminary Alternate Liner Demonstration (ALD) of Belle River Power Plant Bottom Ash Basins (BABs), one of two coal combustion residuals (CCR) units at the site, in accordance with 40 CFR Part 257 as amended on November 12, 2020 (CCR Part B Rule). **Figure 1-1** provides a site location.

This report concludes that there is no reasonable probability that water from the BABs will cause a release to the groundwater that will exceed the groundwater protection standards (GWPS) at the waste boundary over the projected active life of the CCR unit.

### 1.1 Background

DTE Electric Company (DTE) submitted the Alternate Liner Demonstration Application for BABs to the United States Environmental Protection Agency (USEPA) on November 30, 2020 [1] in accordance with the CCR Rule. Soon after, DTE started the field and laboratory investigation studies to meet the requirements of the CCR Rule.

One of the requirements of the CCR Rule is to conduct hydraulic conductivity testing using site-specific permeant liquid. The CCR Rule acknowledges that these tests may last a long time such that the operator of the CCR unit may need to submit an extension request for the laboratory testing program, and submit a preliminary ALD.

DTE submitted extension requests due to “analytical limitation” under separate covers, dated September 1, 2021 [2] and September 1, 2022 [3]. The extension requests detailed the compatibility testing program results through August 12, 2022. The USEPA has not yet responded to the extension request.

The Part B Rule does not require the submittal of a preliminary ALD (PALD) by November 30, 2021, if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A). However, DTE provided a PALD [4] out of an abundance of caution and with confidence in the performance of the liner system as a “place holder” to comply with the requirement to submit an ALD by November 30, 2021.

The PALD detailed the site investigation, conceptual site model, laboratory study, and fate and transport model concluding that there is no reasonable probability that water from the BABs will cause a release to the groundwater that will exceed the GWPS at the waste boundary over the projected active life of the CCR unit. This ALD includes additional data analyzed subsequent to the submittal of the PALD, and confirms the appropriateness of the hydraulic conductivities used in the PALD fate and transport model.

## **1.2 Purpose**

The purpose of this report is to provide the final ALD including the approach, analysis details, and results in accordance with the CCR Rule.

## **1.3 Report Organization**

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific porewater, and discussion of results.
- Section 4 – provides analysis approach, details, GWPS, and evaluation of results as to whether the BABs meet the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification.
- Section 7 – provides references.

## **1.4 Terms of Reference**

This report was prepared by Mike Coram C.P.G., Clinton Carlson Ph.D., P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec Consultants of Michigan, Inc.(Geosyntec).

## 2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

*§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*

*(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*

*(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*

*(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*

*(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*

*(i) Samples are advanced to a depth less than the top of the groundwater table or 20 ft beneath the bottom of the nearest water body, whichever is greater, and/or*

*(ii) Samples are spaced further apart than 200 ft around the impoundment perimeter;*

*(5) A narrative description of site geological history; and*

*(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*

*(i) The relative location of the impoundment with depth of ponded water noted;*

*(ii) Monitoring wells with screening depth noted;*

*(iii) Depiction of the location of other samples used in the development of the model;*

*(iv) The upper and lower limits of the uppermost aquifer across the site;*

*(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and*

*(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.*

## **2.1 Introduction**

This section provides information on site geology and hydrogeology, data used in site characterization, a summary of ALD-specific field and laboratory study, and a conceptual site model built using the Environmental Visualization System (EVS).

## **2.2 Site Geology**

The surficial topography of St. Clair County is characterized by a low-relief floodplain, stream terrace, and lakeshore deposits. The subsurface geology of the area is defined by glacial deposits, which range in thickness from 100- to 400-feet (ft) thick. These glacial sediments, including lacustrine, till, and sand and gravel outwash deposits, were deposited on the underlying bedrock. Throughout St. Clair County the underlying bedrock varies but is primarily fine-grained siliclastic rock, mostly shale with some sandstone [1].

The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Shallow regional groundwater flow would be expected to be to the east towards the St. Clair River. The BABs are located approximately one mile west of the St. Clair River.

### **2.2.1 Bottom Ash Basin Site-Specific Geology**

The geology of St. Clair County consists of approximately 100 to 400 ft of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces. The glacial material underlying the BABs appears to be glaciolacustrine clays with local sand lenses. The uppermost aquifer unit (sandy rich interval) appears to be deposits from glaciofluvial outwash deposited directly above the bedrock surface.

The BABs are underlain by more than 100 ft of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 140 to 150 ft below ground surface (bgs). In general, the BABs are initially underlain by approximately 90 ft in the western portion of the BABs and 130 ft in the eastern portion of the BABs of laterally extensive low hydraulic conductivity clay-rich deposits. During Geosyntec's ALD investigation in December 2020, cone penetration test

(CPT) dissipation tests were performed to determine hydraulic conductivity of the underlying clay-rich deposits. The results of the dissipation tests are summarized in Section 2.5.1. The CPT data confirmed that the underlying deposits are consistently low hydraulic conductivity units.

The uppermost aquifer unit within the BABs is a confined, sand-rich interval (within the footprint of the BABs) that directly overlies the Bedford Shale. It is thicker in the western portion of the BABs and decreases to the southeast. From west to east/southeast the uppermost aquifer increases in fines from a sandy unit to a silty unit. For the purposes of this report, the saturated unit directly overlying the Bedford Shale (sandy and silty) is considered the “uppermost aquifer unit” and is further discussed in Section 2.6.

### **2.3 Uppermost Aquifer Field Testing and Hydrogeology**

TRC calculated the hydraulic conductivities within the CCR monitoring wells set within the upper portion of the uppermost aquifer using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 and 2021 by TRC [1]. Test results are provided in **Appendix A** and included in the conceptual site model. The monitoring well logs and construction details are presented in **Appendix B**.

As calculated by TRC, the hydraulic conductivity of the uppermost aquifer using wells at the BABs (MW-16-01 and MW-16-09) is approximately 1.2 ft/day (4.0E-4 centimeters per second [cm/s]). This relatively low hydraulic conductivity indicates that the uppermost aquifer has low groundwater yield potential across the site. As discussed in the TRC Initial Application for Alternative Liner Demonstration, the potential horizontal groundwater flow is to the west-northwest. The uppermost aquifer is further discussed in Section 2.3.

### **2.4 Summary of Data Used for Site Characterization**

Data from three separate investigations were used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, which are included in the initial ALD Application [1]. Data from Geosyntec’s 2020 ALD Investigation were used to supplement the previous data sets. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. **Figure 2-1** provides investigation locations.

Boring logs from the 1970s, 2016, and 2020 field investigations are provided in **Appendices C** through **E**, respectively. These investigations extend across the site and include the BABs and DB, which is approximately 400 ft southeast of the BABs. Considering the proximity of both CCR units, field investigation data are used for both the BABs and DB.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and PPD tests at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices F** through **H** for the 1970s, 2016, and 2020 laboratory studies, respectively.

It is Geosyntec's opinion that the combined data used in building the site model are sufficient to capture the variability that may exist in soil conditions.

## **2.5 ALD-Specific Site Investigation Details**

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the embankment and native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to supplement the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted generally at 200-ft intervals but adjusted in the field as necessary to avoid underground utility lines, overhead power lines, and access issues, as needed. Investigations extended down to 100 ft bgs to an elevation of approximately 490 ft, which is lower than the groundwater elevation, and 20 ft below the nearest water body that is St. Clair River with a bottom elevation of approximately 525 ft.

The following sections provide a summary of the fieldwork completed during the SI.

### **2.5.1 Cone Penetration Tests**

Eight CPTs were completed around the berms of the BABs in 200 ft intervals to characterize the BABs embankment and native soils. Similarly, eight CPTs were completed around the DB. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or to approximately 100 ft bgs. PPD tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted near the sonic borings and at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 16 PPD tests were completed at CPTs advanced around the BABs, and 12 PPD tests were completed at CPTs advanced around the DB. Hydraulic conductivity values were estimated to range between  $9.76\text{E-}9$  cm/s and  $2.81\text{E-}6$  cm/s around the BABs, and range between  $7.97\text{E-}9$  cm/s and  $1.63\text{E-}6$  cm/s around the DB. Hydraulic conductivity values are similar between soils underlying the BABs and DB. Results are summarized in **Table 2-2**. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

CPT logs are provided in **Appendix I1**, and PPD tests are provided in **Appendix I2**.



## 2.5.2 Sonic Drilling

In December 2020, six soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples for characterization of native soils and the embankment. Soil samples were collected continuously in 2- to 10-foot sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS).

Shelby tubes were collected from the BABs embankment soils and native soils at approximately 20 ft intervals from each of the sonic borings in accordance with ASTM D1587 [5]. The soil borings were advanced to depths of approximately 100 ft-bgs to within the uppermost aquifer and/or into the top of the underlying shale bedrock. Sonic drilling locations are provided in **Figure 2-1**. Boring logs are provided in **Appendix E**. Soil stratigraphy is discussed in Section 2.6.

## 2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. Fourteen soil samples were collected from six borings from depths between 5 ft-bgs and 90 ft-bgs for hydraulic conductivity testing to capture soft to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 24 Moisture Content tests (ASTM D2216)
- 4 Specific Gravity tests (ASTM D854)
- 22 Grain Size Mechanical Sieve tests (ASTM D6913)
- 21 Atterberg Limits tests (ASTM D4318)

Note that these tests are included in **Table 2-1**. Test results are provided in **Appendix H**.

## 2.6 Conceptual Site Model

An EVS model was developed for the site based on data collected during the field investigations from the 1970s, 2016, and 2020. The EVS model centralized all the data to develop a comprehensive conceptual site model. Based on the EVS model, the overall conceptual site model of the BABs lithology is relatively consistent with low hydraulic conductivity clay-rich deposits with non-interconnected sand seams at greater depths. Within the footprint of the BABs, the

uppermost aquifer unit sits directly above the bedrock and appears to thin and increase in silt from west to east/southeast across the BABs.

Specific to the BABs, cross-sections (**Figures 2-2 through 2-7**) were created from the EVS model and analyzed to determine the various changes in lithology within the clay confining unit directly underlying the BABs and the characteristics of the uppermost aquifer unit which sits directly on the bedrock. Upon review of the transects, the lithology beneath the BABs consists of (from the ground surface downward) (1) clay, (2) clay with sand, (3) uppermost aquifer unit, and (4) shale bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]. There were some discrepancies, in that the second clay unit was described as silty instead of sandy. Based on CPT and geotechnical index testing during Geosyntec's 2020 ALD investigation, the lower clay was re-interpreted as "clay with sand" mainly due to sand seams that were encountered. The clay within the "clay with sand" unit is relatively consistent stiff gray clay. Therefore, the lithology directly underlying the BABs consists of the following:

- (1) Clay – 50 to 60 ft thick directly beneath the BABs. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered an aquifer unit.
- (2) Clay with sand – This unit was encountered at approximately 50 to 60 ft bgs with increasing thickness from west to east. At the west end of the BABs, this unit is approximately 40-ft thick and increases in thickness to 80-ft thick at the eastern edge of the BABs. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 1-ft thick and have hydraulic conductivity values greater than  $1.0E-7$  cm/s except for one location which is discussed in more detail below. The data supports that none of the sand seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.
- (3) Uppermost Aquifer Unit – This unit was encountered at approximately 90 ft bgs in the west and increases in depth to 140 ft bgs in the east. The thickness of the unit corresponds to the overlying unit and thins from west to east and directly sits atop the bedrock. The thickness changes from approximately 50-ft thick in the western edge of the BABs to 10-ft thick in the eastern/southeastern edge of the BABs. This sandy unit is saturated and considered the uppermost aquifer unit within the BABs. There is a transition from sandy aquifer beneath the BABs to a thin saturated silty aquifer south/southeast of the BABs. Specifically, this silty aquifer extends beneath the DB. Both are considered the "uppermost aquifer unit" on the cross sections and within the EVS model.

- (4) Shale bedrock – This unit was encountered at approximately 140-150 ft bgs.

During Geosyntec’s 2020 investigation, CPT tests were conducted, and PPD tests were completed at CPT-01B, CPT-03, and CPT-06 to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around BABs for long-term breakthrough potential and is further discussed in Section 3. Based on the review of the PPD test data, values ranged between  $9.76\text{E-}9$  cm/s and  $2.81\text{E-}6$  cm/s. The CPT-derived highest hydraulic conductivity value of  $2.81\text{E-}6$  cm/s was calculated at CPT-03 from a sand seam at 510 ft above mean sea level (AMSL) (approximately 80 ft bgs) within the (2) clay with sand unit. PPD tests at CPT-03 directly above and below the sand seam indicated hydraulic conductivities less than  $1.0\text{E-}7$  cm/s. Therefore, the (1) clay and (2) clay with sand lithologies beneath the BABs have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with TRC’s 2018 Natural Clay Liner Equivalency Evaluation Report [1].

Below the clay with sand is the uppermost aquifer unit that mainly consists of sand. This unit directly overlies the Bedford shale and decreases in thickness from west to south/southeast across the BABs. In the western portion of the BABs, the uppermost aquifer unit is approximately 50-ft thick (near MW-16-01) and thins to approximately 10-ft thick to the southeast. Beyond the BABs, the EVS model predicts this unit extending to the DB with increasing fines/silts. The hydraulic head in the (3) uppermost aquifer unit associated with the BABs is approximately 574 ft AMSL [1] with an almost flat horizontal gradient.

The bottom of the BABs is at an elevation of approximately 580 ft and the bottom of the clay underlying the BABs is at an elevation of approximately 500 ft (western portion), thus more than 80 ft of low hydraulic conductivity clay-rich deposits ((1) clay and (2) clay with sand) separate the bottom of the BABs from the underlying (3) uppermost aquifer unit.

### 3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

*§257.71(d)(ii)(B) Potential for infiltration. A characterization of the potential for infiltration through any soil-based liner components and/or naturally occurring soil that control release and transport of leachate. All samples collected in the field for measurement of saturated hydraulic conductivity must be sent to a certified laboratory for analysis under controlled conditions and analyzed using recognized and generally accepted methodology. Facilities must document how the selected method is designed to simulate on-site conditions. The owner or operator must also provide documentation of the following as part of this line of evidence:*

- (1) The location, number, depth, and spacing of samples relied upon is supported by the data collected in paragraph (d)(1)(ii)(A) of this section and is sufficient to capture the variability of saturated hydraulic conductivity for the soil-based liner components and/or naturally occurring soil;*
- (2) The liquid used to pre-hydrate the samples and measure long-term hydraulic conductivity reflects the pH and major ion composition of the CCR surface impoundment porewater;*
- (3) That samples intended to represent the hydraulic conductivity of naturally occurring soils (i.e., not mechanically compacted) are handled in a manner that will ensure the macrostructure of the soil is not disturbed during collection, transport, or analysis; and*
- (4) Any test for hydraulic conductivity relied upon includes, in addition to other relevant termination criteria specified by the method, criteria that equilibrium has been achieved between the inflow and outflow, within acceptable tolerance limits, for both electrical conductivity and pH.*

#### 3.1 Site-Specific Soil and Porewater Details

##### 3.1.1 Soil Samples for Hydraulic Conductivity Testing

Fourteen site-specific soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs with PPDs and earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in the natural soils present at the BABs.

### 3.1.2 Site-Specific Porewater Testing and Results

Site-specific CCR porewater samples were collected from both the BABs and the DB for geochemical analyses to assess the representative composition of an “aggressive” solution for use in the hydraulic conductivity compatibility testing. Due to the high turbidity of basin waters, samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific porewater samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All porewater samples were found to be slightly basic, with pH concentrations ranging from 7.87 to 9.01 SU. Total dissolved solids (TDS) concentrations of all three samples are similar, ranging from 200 to 300 milligrams per liter (mg/L). All three samples have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as “freshwater”. The BABs and DB samples have similar major ion compositions, as illustrated on the Piper diagram in **Figure 3-1**. The anion composition is very similar for all three samples and consists of predominantly sulfate with some alkalinity and very little chloride. The cation composition is predominantly calcium and monovalent cations (potassium/sodium), with a smaller proportion of magnesium. The DB sample has a slightly higher relative percentage of calcium and lower monovalent cations compared to the BAB samples.

The analytical results are provided in **Appendix J** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist’s Workbench (GWB) v12.0.4. The GWB thermodynamic dataset ‘thermo.com.V8.R6\_.tdat’ was used for the calculations in order to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of mg/L and the ionic strength of each sample was calculated in units of molality (m).

Both BAB samples contained similar ionic strength values (0.0088 and 0.0080 m) compared to the slightly higher ionic strength of the DB sample (0.0106 m). Thus, the DB sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

### 3.2 Hydraulic Conductivity Testing Procedure

Eight soil samples were tested for hydraulic conductivity,  $k$  using deionized water in accordance with ASTM D5084 [6] to establish a baseline hydraulic conductivity. The other six samples were selected for compatibility testing in accordance with ASTM D7100 [7] using site-specific water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25.
- The hydraulic conductivity is steady, defined as four or more consecutive hydraulic conductivity measurements falling within  $\pm 25\%$  of the mean value for hydraulic conductivity if the mean hydraulic conductivity is greater than or equal to  $1.0\text{E-}8$  cm/s or within  $\pm 50\%$  if the mean hydraulic conductivity is less than  $1.0\text{E-}8$  cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;
- At least 2 pore volumes (PV) of flow have passed through the sample; and
- pH and electrical conductivity of effluent are within 10% of that for the influent with no significant increasing or decreasing trends.

### 3.3 Hydraulic Conductivity Test Results and Assessment

The final measured hydraulic conductivities based on ASTM D5084 for the samples range from  $2.7\text{E-}9$  to  $2.2\text{E-}8$  cm/s. **Table 3-2** presents a summary of the measured hydraulic conductivities for the samples and more details are provided in **Appendix H**.

Results for the hydraulic conductivity compatibility tests are provided in **Appendix K** with measurements through December 23, 2022 and summarized in and summarized in **Table 3-3**. The table provides sample ID, the start date for testing, amount of PV passed through the sample, and hydraulic conductivity measurements.

A set of figures are included to present:

- PV passed with time;
- hydraulic conductivity with time;
- hydraulic conductivity versus PV passed;
- pH of inflow and outflow with time; and
- electrical conductivity (EC) of inflow and outflow with time.

These plots are provided in **Figures 3-2** through **3-31**.

The final measured hydraulic conductivities of samples range between  $4.4\text{E-}09$  and  $2.1\text{E-}08$  cm/s. The amount of PV that passed through the samples ranges from 2.8 to 10.5. All samples have

passed more than 2 PV to satisfy the termination criterion. The hydraulic conductivities generally remained steady with time and PV passed.

pH measurements are provided in **Table 3-4**. The average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.2 to 8.4. The average pH of outflow was within 10 percent of the average of pH of inflow.

EC measurements are provided in **Table 3-5**. The average EC of inflow ranges from 1,030 to 1,098, and the average EC of outflow ranges from 874 to 1,381. The EC measurements of outflow are within the 10% of the EC measurements of inflow for sample B1-ST-1. The EC measurements of outflow were within 10% of the EC measurements of inflow for the other samples for at least one measurement; however, the outflow and inflow EC measurements are not within 10% as of December 2022.

**Table 3-6** summarizes if the samples have reached the termination criteria for PV, hydraulic conductivity, pH, and EC in December 2022. As summarized in the table, all samples have reached the termination criteria for PV passed, hydraulic conductivity, and pH. One sample (B1-ST-1) has reached the termination criterion for EC, though the other samples satisfied this criterion at some point during testing. Overall, the average hydraulic conductivity measurements for the samples ( $6.9\text{E-}9$  to  $2.6\text{E-}8$  cm/s) have remained steady or slightly decreased from the average measurements ( $8.2\text{E-}9$  to  $2.2\text{E-}8$  cm/s) presented in the PALD [4]. Only the average hydraulic conductivity measured for sample B4-ST-3 ( $1.8\text{E-}8$  to  $2.6\text{E-}8$  cm/s) increased from the PALD [4].

The results do not include inflow versus outflow data. The project team decided to keep the inflow constant to provide a more stable hydraulic gradient across the sample, more accurate estimation of hydraulic conductivity, faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion was satisfied during the two years of testing because of the consistently low hydraulic conductivity results and constant hydraulic conductivity measurements (not significantly increasing or decreasing).

#### 4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

*§257.71(d)(ii) (C) Mathematical model to estimate the potential for releases. Owners or operators must incorporate the data collected for paragraphs (d)(1)(ii)(A) and (d)(1)(ii)(B) of this section into a mathematical model to calculate the potential groundwater concentrations that may result in downgradient wells as a result of the impoundment. Facilities must also, where available, incorporate the national-scale data on constituent concentrations and behavior provided by the existing risk record. Application of the model must account for the full range of site current and potential future conditions at and around the site to ensure that high-end groundwater concentrations have been effectively characterized. All the data and assumptions incorporated into the model must be documented and justified.*

*(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*

*(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*

*(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

##### 4.1 Introduction

A fate and transport model analysis was performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the BABs exceeds the GWPS at the waste boundary throughout its active life.

The model considers flow of CCR pore water Constituents of Concern (COCs) migrating through the bottom of the BABs down to the uppermost aquifer. The model does not consider additional migration of COCs horizontally to the waste boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COCs; thus, the model presents a conservative assessment.

According to §257.71(2)(ii)(C)(3), the owner must submit “...a final demonstration that updates only the finalized hydraulic conductivity data to confirm that the model results in the preliminary demonstration are accurate.” The hydraulic conductivity used in the calculation of the Darcy



velocity for the baseline fate and transport model corresponds to the geometric mean of all available data. For the PALD [4], a hydraulic conductivity of  $2.15E-8$  cm/s was used for the baseline model. The recalculated geometric mean hydraulic conductivity based on the updated laboratory test results presented in Section 3.3 is approximately  $2.14E-8$  cm/s, or a decrease of less than 1%. Furthermore, a sensitivity analysis was performed as part of the fate and transport analyses in the PALD [4] that captured this change in hydraulic conductivity data within the range of hydraulic conductivities evaluated. Therefore, the model results for the fate and transport analysis presented in the PALD [4] are considered accurate and not updated for this ALD. The following sections summarize the fate and transport analyses from the PALD for convenience.

As discussed in Section 4.6.1, the results of the model predict COC concentrations that are very low such that there is no reasonable probability that water from the BABs will cause releases to groundwater that will exceed the GWPS at the waste boundary over the projected active life of the BABs.

#### **4.2 Groundwater Protection Standards**

Groundwater samples from TRC's 2016 and 2017 sampling events were tested for Appendix IV COCs and represent eight rounds of background groundwater data. The data were used to calculate site-specific background levels (background) for Appendix IV COCs. **Appendix L** provides the memorandum describing the statistical calculations.

To develop GWPS for the ALD, the federal Maximum Contaminant Level (MCL), Regional Screening Levels, and background were evaluated and the highest value was selected as the GWPS in accordance with the CCR Rule. Where MCL are not available Regional Screening Levels were used. GWPS are provided in **Table 4-1**.

#### **4.3 Consideration of Background Groundwater Concentrations**

The site-specific background has been considered and is a factor when determining if GWPS have been exceeded. At the BABs, naturally occurring background concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and the peak background concentrations are further discussed in Section 4.6.1.

#### **4.4 CCR Porewater Quality Results**

CCR porewater quality samples from the BABs and the DB were collected in December of 2020 and January of 2021. Samples were analyzed for Appendix III and IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest CCR porewater concentration was used as the established concentration of the constituent ( $C_o$ ) when calculating the predicted groundwater concentrations (PGC<sub>i</sub>), as discussed further below. The CCR porewater quality data is summarized in **Table 4-2**.

In addition to the site-specific CCR porewater concentrations, 90<sup>th</sup> percentile concentrations from the 2014 EPA study [8] were considered in the analysis. This data is summarized in **Table 4-2**.

## 4.5 Fate and Transport Model

### 4.5.1 Analysis Model

A one-dimensional fate and transport model was designed to further understand the potential for contaminant transport from the BABs to the uppermost aquifer. The model was developed with a contaminant transport process through the clay and clay with sand layers under the BABs. Contaminant transport processes are discussed in Section 4.5.2.1.

The modeling program POLLUTE [9] was selected for the one-dimensional fate and transport evaluation. POLLUTE uses the input parameters to perform calculations for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

Model setup and inputs are discussed in detail in the following sections and are summarized by layer in **Figure 4-1**.

### 4.5.2 Proposed Mathematical and Associated Computer Model

#### 4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the BABs for the various modeled layers include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [10]:

$$\text{Equation No. 1: } n \frac{\delta c}{\delta t} = nD \frac{\delta^2 c}{\delta z^2} - V_{\alpha} \frac{\delta c}{\delta z} - \rho K_d \frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

K<sub>d</sub> = distribution coefficient

V<sub>α</sub> = Darcy velocity in the vertical direction

$\rho$  = dry density of soil

$\lambda$  = decay constant of the contaminant species

t = time

POLLUTE utilizes the transport phenomena as governed by Equation No. 1.

#### 4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the CCR porewater. The results from the model can thus be used as a prediction factor for estimating the future concentration of any constituent of concern in groundwater. Multiplying the output prediction factor by the initial CCR porewater concentration provides the predicted groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

$$\text{Equation No. 2: } \text{PGC}_t = \text{PF}_t * C_o$$

Where:

$\text{PGC}_t$  = predicted groundwater concentration after t years.

$\text{PF}_t$  = prediction factored after t years, which is the output of the model.

$C_o$  = established CCR porewater concentration of the constituent of concern.

### 4.5.3 Fate and Transport Model Inputs

#### 4.5.3.1 *Initial CCR Porewater or Source Concentration*

The initial CCR porewater concentration input value used was unity (1). This value is unitless because it represents unit CCR porewater concentration of any given constituent. Therefore, the model results represent a fraction of the initial CCR porewater concentration for any constituent.

#### 4.5.3.2 *Number of Layers and Layer Thickness*

Two layers were modeled at the site: the clay layer and the clay with sand layer. At the BABs, the clay layer has an average thickness of 40 ft; the clay with sand layer has an average thickness of 63 ft. The average thickness of each layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top

of the layer, and averaging the difference over the footprint of the BABs footprint; model documentation for the average thickness of each layer can be found in **Appendix M**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The clay layer was divided into 25 sublayers at the BABs. The clay with sand layer was divided into 40 sublayers at the BABs.

#### 4.5.3.3 *Modeling Period*

The model was run for the operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when operations started at the BABs, to 2034, which is the end of the projected active life of the BABs.

#### 4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters or they can be selected by the user. The default Talbot parameter were used in this demonstration [11].

#### 4.5.3.5 *Boundary Conditions*

POLLUTE allows the user to select between multiple upper and lower boundary conditions. The top boundary condition typically represents the bottom of the CCR unit as a potential source. The top boundary can be specified as either zero flux, constant concentration, or finite mass. A constant concentration was assumed as it provides conservative model results because it assumes that the leachate quality will remain constant at the maximum measured values over time.

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used. Therefore, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the clay with sand layer and the underlying uppermost aquifer.

#### 4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model as a whole. The Darcy velocity was calculated for the BABs using a vertical gradient and the vertical hydraulic conductivity of the clay with sand layer. For the BABs, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the elevation of the typical operation water level as controlled by the outflow structure within the BABs. These parameters were chosen to produce a conservative value for the Darcy velocity. A Darcy velocity value of 1.02E-3 m/year was calculated for the BABs as provided in **Appendix M**. The hydraulic conductivity value used for the calculation of

Darcy velocity is the average (geometric mean) of historical and current lab testing for the vertical hydraulic conductivity data.

#### 4.5.3.7 *Hydrodynamic Dispersion Coefficient*

The vertical coefficient of hydrodynamic dispersion is a required input for each layer within the POLLUTE model. The hydrodynamic dispersion coefficient is calculated using Equation No. 3:

$$\text{Equation No. 3: } D = D^* + av$$

Where:

D = the hydrodynamic dispersion coefficient (m<sup>2</sup>/year);

D\* = the effective diffusion coefficient (m<sup>2</sup>/year).

a = the dispersivity (m);

v = the groundwater seepage velocity (m/year).

For this demonstration, a coefficient of hydrodynamic dispersion value (D) of 0.19 m<sup>2</sup>/year was input into the model. This value was based on the effective diffusion coefficient (D\*) for chloride (0.19 m<sup>2</sup>/yr), as calculated by Rowe et al. [12]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest. Therefore, it is a conservative constituent to model among the COCs.

The second part of Equation 3, the product of dispersivity and groundwater seepage velocity, is related to dispersion. Rowe et al. [12] discusses when the seepage velocity (1.02E-3 m/year) is low (i.e., clay soils), diffusion will control the parameter hydrodynamic dispersion (D) and dispersion is negligible.

#### 4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. The model shows good agreement between porosity values and geologic layers, with the overlying clay unit having lower porosities than the underlying clay with sand unit. An average of 46 percent porosity was used for the clay layer, while an average of 42 percent porosity was used for the clay with sand layer.

Based on empirical data provided by Sara (1994) [10], the laboratory porosity data was converted to effective porosities. Effective porosity values of 0.37 and 0.34 were used for the clay and clay with sand layers, respectively.

Density values from laboratory testing were also used to determine a suitable model input. The average density of  $1,500 \text{ kg/m}^3$  (94.2 pcf) was estimated from the available data. This value was used in the POLLUTE model.

#### 4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of contaminants in the modeled layers, while degradation simulates the breakdown of contaminants over time. In this model, adsorption and degradation are assumed to be zero, which provides a more conservative model result.

### 4.6 Fate and Transport Analysis Results and Evaluation

#### 4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. At the BABs, the baseline model calculated a  $PF_t$  of  $2.66\text{E-}33$ . With both the  $C_o$  and  $PF_t$  established, the  $PGC_t$  (i.e. predicted concentration) was calculated and compared to the established GWPS for the BABs. As provided in **Table 4-3**, the predicted groundwater quality results, and the 90<sup>th</sup> percentile concentrations from the 2014 EPA study [8] are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in 2016-2017 groundwater sampling event and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Tables 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of the active life of the BABs.

The driving mechanism for the transport is chemical diffusion, because the advective flow would take more than a thousand years for a water molecule to travel from the bottom of BABs to upper most aquifer. **Appendix M** provides calculations for the time of travel.

The baseline model outputs for the BABs are included in **Appendix N**.

#### 4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or  $PF_t$ , given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**.

The resulting  $PF_i$ , from each sensitivity analysis was compared to a threshold prediction value,  $PF_{\text{threshold}}$ . The  $PF_{\text{threshold}}$  value represents the  $PF_i$  at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the CCR unit. The threshold value is 0.2 for the northern BAB and 0.6 for the southern BAB.  $PF_{\text{threshold}}$  is calculated using Equation 4:

**Equation No. 4:** 
$$PF_{\text{threshold}} = \min \left\{ \frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \dots, \frac{GWPS_i}{C_i}, \dots, \frac{GWPS_n}{C_n} \right\}$$

Where:

$PF_{\text{threshold}}$  = threshold prediction factor

$GWPS_i$  = groundwater protection standard for constituent ‘i’

$C_i$  = maximum porewater concentration of the COC ‘i’

#### 4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity. A Darcy velocity of 2.03E-3 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

#### 4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing [12], and thus a 25% increase and decrease is considered a satisfactory variation for the purposes of a sensitivity analysis.

#### 4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results.

#### 4.6.2.4 *Layer Thickness*

The isopach maps (**Appendix M**) were used to calculate the maximum and minimum thickness for the clay and clay with sand layers. Using those values as inputs, four additional models were run for the BABs to evaluate model sensitivities to layer thickness. In each model only one variable was changed.

#### 4.6.2.5 *Modeling Period*

The modeling period used was 55 years (the “baseline”). To further evaluate the impact of modeling runtime on the resultant PF<sub>t</sub>, one model was run with a modeling period of 85 years, to capture the post-closure care period, though DTE intends to close the BABs by removal.

#### 4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5**, using more conservative model input parameters resulted in PF<sub>t</sub> values ranging from 6.23E-38 to 1.30E-26. This demonstrates that the BABs will not impact groundwater quality assuming conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix N**.

### 4.6.3 **Reliability of Computer Model**

The computer-based fate and transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications ([11], [14], [15], [10], [16]) demonstrate the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

### 4.6.4 **Degree of Conservativeness in Model Results**

Input parameters for the baseline models were based on site-specific data whenever possible. When not possible, input values were derived from an understanding of the site and relevant peer-reviewed literature. If a high degree of uncertainty was present, conservative input values were selected. A summary of the various conservative assumptions is listed below:

- The maximum measured CCR porewater concentration for each constituent was used for the fate and transport model prediction table;
- Constant CCR porewater concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decrease CCR porewater concentrations over time but to be conservative the model assumed constant CCR porewater concentration over time;



- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays which would retard or slow down migration. To be conservative, the model assumed no adsorption would occur over time;
- Degradation of concentrations (input values) through either the biologic or chemical process was assumed not to occur during the modelling period. By assuming no degradation, the model overestimates the predicted groundwater quality over time; and
- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of the DB to the top of the uppermost aquifer; the analysis does not consider a horizontal flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

## 5. SUMMARY

This Preliminary ALD has been prepared to assess if the BABs meets the ALD requirements per the CCR Rule. The data included comprehensive field and laboratory investigation data collected from the 1970s to 2020. The 2020 field and laboratory investigation studies were conducted specifically to fill data gaps and to address the CCR Rule requirements. The data were incorporated into an EVS model to create a comprehensive conceptual site model to understand the lithology beneath the BABs and as a basis for the fate and transport analysis. The EVS model was relatively consistent with historical representations of the geology associated with the BABs.

Site-specific water was collected from the BABs and DB and tested to assess which one of the CCR units had the more aggressive water. Water from DB was deemed to be more aggressive and used for compatibility testing to estimate the impacts on the hydraulic conductivity of site-specific soil samples. The results of the testing program are presented in this ALD.

A comprehensive subsurface stratigraphy model was created using the available data set incorporated into the conceptual site model. Fate and transport analyses were conducted to assess whether there is a reasonable probability that water from the BABs may result in a release to the groundwater during its active life that would exceed the GWPS at the waste boundary. The baseline fate and transport analysis was conducted using the available site-specific data and an operating period of 55 years, which captures the period from the 1980s, when operations started, to 2034, which is the end of the projected active life of BABs.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than a thousand years for a water molecule to travel from the bottom of the BABs to the uppermost aquifer. Therefore, the analyses results indicate that, due to the low hydraulic conductivity of the in-situ soils, chemical diffusion is the dominant transport mechanism compared to advection or seepage flow. Consequently, the hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow.

A sensitivity analysis was performed as part of additional fate and transport analyses to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The sensitivity analyses show that there is no reasonable probability that water from the BABs will result in a release to the groundwater that would exceed the GWPS at the waste boundary over the projected active life of the BABs.

**6. CERTIFICATION**

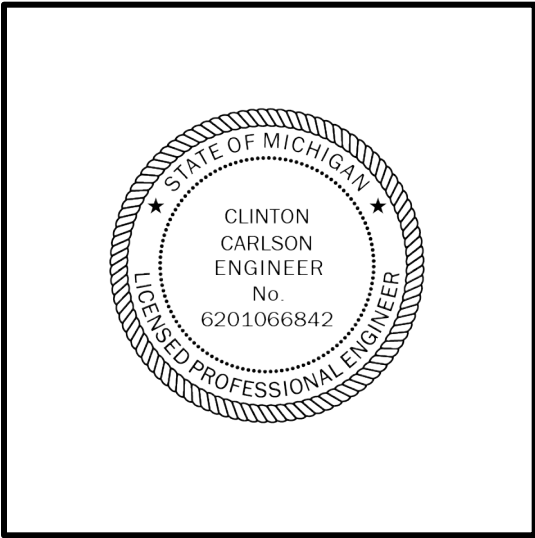
**CCR Unit:** DTE Electric Company; Belle River Power Plant, Bottom Ash Basins (BABs)

I, Clinton P. Carlson, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify in accordance with the CCR Rule, to the best of my knowledge, information, and belief, that the information contained in this plan has been prepared in accordance with the accepted practice of engineering and that the BABs meets the requirements of the Alternative Liner Demonstration per the CCR Rule.

Clinton P. Carlson, Ph.D.  
 Printed Name

Clinton Carlson                      April 10, 2023  
 Signature    Date

6201066842                      Michigan                      February 16, 2025  
 Registration Number    State                      Expiration Date



*Affix Seal*

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# **TABLES**

**Table 2-1 – Field and Laboratory Testing Summary**

<b>Test</b>	<b>Current ASTM</b>	<b>Number Used in Characterization</b>
Pocket Penetrometer	WK27337	194
Slug Test	D4044	4
Grain Size Distribution	D6913	43
Atterberg Limits	D4318	72
Water Content	D2216	96
Unit Weight	D7263	64
Specific Gravity	D854	10
Hydraulic Conductivity	D5084/D7100	19/6
Cone Penetration Test	D3441	16

**Table 2-2 – Pore Pressure Dissipation Tests Results**

<b>CPT ID</b>	<b>Lithology Unit</b>	<b>Hydraulic Conductivity (cm/s)</b>
CPT-01B	Clay	1.80E-8
CPT-01B	Clay	3.61E-8
CPT-01B	Seam 2	8.54E-8
CPT-01B	Seam2	5.78E-7
CPT-01B	Seam 3	2.05E-8
CPT-01B	Seam 4	2.57E-8
CPT-03	Clay	9.76E-9
CPT-03	Clay	2.48E-8
CPT-03	Clay with Sand	3.14E-8
CPT-03	Clay with Sand	1.97E-8
CPT-03	Seam 3	2.81E-6
CPT-03	Seam 3	5.19E-7
CPT-03	Clay with Sand	2.96E-8
CPT-06B	Clay	3.33E-8
CPT-06B	Clay with Sand	1.96E-8
CPT-06B	Clay with Sand	2.34E-8
CPT-08B	Clay	1.91E-8
CPT-08B	Clay 2	3.35E-8
CPT-08C	Seam 2	2.97E-8
CPT-08C	Clay with Sand 2	8.03E-8
CPT-08C	Clay with Sand 2	2.97E-8
CPT-11	Clay	1.97E-8
CPT-11	Clay	2.64E-8
CPT-11	Clay with Sand 2	4.68E-8
CPT-11	Clay with Sand 4	3.86E-8
CPT-11	Clay with Sand 4	2.76E-8
CPT-12	Clay	7.97E-9
CPT-13B	Seam 3	1.63E-6



**Table 3-1 – Chemistry Results of Site-Specific Filtered CCR Porewater**

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	88	60	100
Antimony	mg/L	0.01 U	0.01 U	0.01 U
Arsenic	mg/L	0.0085	0.007	0.0093
Barium	mg/L	0.94	0.58	0.59
Beryllium	mg/L	0.004	0.00216	0.004
Boron	mg/L	0.38	0.83	1.29
Cadmium	mg/L	0.004 U	0.004 U	0.004 U
Calcium	mg/L	83	54	80
Chloride	mg/L	9.0	9.6	14
Chromium	mg/L	0.0087	0.0049	0.01
Cobalt	mg/L	0.01	0.00554	0.0052
Fluoride	mg/L	0.26	0.52	0.31
Iron	mg/L	0.16	1.05	0.34

<b>Sample ID</b>	<b>Unit</b>	<b>Bottom Ash Basin - North</b>	<b>Bottom Ash Basin - South</b>	<b>Diversion Basin</b>
Lead	mg/L	0.006	0.0061	0.01
Lithium	mg/L	0.034	0.0174	0.031
Magnesium	mg/L	15.9	13.8	17.5
Manganese	mg/L	0.01	0.0145	0.0137
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	0.035	0.046	0.058
pH	SU	7.87	8.71	9.01
Potassium	mg/L	5.9	7.5	7.6
Selenium	mg/L	0.00582	0.0057	0.0061
Sodium	mg/L	55	86	115
Sulfate	mg/L	100	110	130
Thallium	mg/L	0.01	0.00117	0.00516
Total Dissolved Solids	mg/L	200	220	300
<b>Ionic Strength</b>	<b>molal (m)</b>	<b>0.0088</b>	<b>0.0080</b>	<b>0.0106</b>

Notes: U – Analyzed but not detected above the method detection limit. The method detection limit is shown.

**Table 3-2 – Summary of Hydraulic Conductivity Tests Results [6]**

ID	Date	Hydraulic Conductivity (cm/s)
B1-ST-3 (36-38')	January 26, 2021	2.7E-9
B2-ST-2 (7-9')	January 26, 2021	2.0E-8
B2-ST-7 (97-99')	February 15, 2021	2.2E-8
B3-ST-1 (1-3')	February 8, 2021	9.6E-9
B4-ST-4 (67-69')	February 15, 2021	1.8E-8
B5-ST-2 (27-29')	February 15, 2021	2.1E-8
B6-ST-4 (47-49')	February 17, 2021	1.8E-8
B6-ST-7 (97-99')	February 17, 2021	1.2E-8

**Table 3-3 – Summary of Compatibility Tests [7] - Hydraulic Conductivity and Pore Volumes Passed Results**

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection
B1-ST-1 (7-9')	March 15, 2021	0	1.2E-8	0
	December 23, 2022	648	4.4E-9	2.84
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-8	0
	December 23, 2022	648	8.8E-9	5.21
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-8	0
	December 23, 2022	648	1.8E-8	7.94
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-8	0
	December 23, 2022	648	1.5E-8	10.55
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-8	0
	December 23, 2022	648	2.1E-8	9.89
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-8	0
	December 23, 2022	648	1.0E-8	8.36

**Table 3-4 – Summary of Compatibility Tests [7] - pH Results**

Sample ID	Parameter	pH Inflow	pH Outflow
B1-ST-1 (7-9')	Min	7.8	8.1
	Max	9.1	9.1
	Average	8.4	8.4
B2-ST-1 (1-3')	Min	7.8	7.9
	Max	8.9	9.1
	Average	8.3	8.3
B2-ST-4 (47-49')	Min	7.7	7.8
	Max	9.4	9.0
	Average	8.3	8.3
B3-ST-5 (77-79')	Min	7.5	7.6
	Max	9.1	8.9
	Average	8.3	8.2
B4-ST-3 (47-49')	Min	7.7	7.8
	Max	9.0	8.8
	Average	8.2	8.2
B5-ST-5 (87-89')	Min	7.6	7.7
	Max	8.9	9.2
	Average	8.3	8.2

**Table 3-5 – Summary of Compatibility Tests [7] - Electrical Conductivity Results**

Sample ID	Parameter	EC Inflow ( $\mu\text{s}/\text{cm}$ )	EC Outflow ( $\mu\text{s}/\text{cm}$ )
B1-ST-1 (7-9')	Min	622	1141
	Max	1315	1614
	Average	1094	1280
B2-ST-1 (1-3')	Min	560	856
	Max	1345	3050
	Average	1081	1381
B2-ST-4 (47-49')	Min	523	720
	Max	1312	2090
	Average	1070	1035
B3-ST-5 (77-79')	Min	579	672
	Max	1397	1133
	Average	1098	879
B4-ST-3 (47-49')	Min	518	632
	Max	1283	1637
	Average	1033	874
B5-ST-5 (87-89')	Min	555	655
	Max	1291	2010
	Average	1070	931

**Table 3-6 – Summary of Compatibility Tests [7] - Termination Criteria**

Sample ID	Termination Criterion Reached (as of December 23, 2022)			
	Pore Volumes Passed	Steady Hydraulic Conductivity	pH	Electrical Conductivity
B1-ST-1 (7-9')	Yes	Yes	Yes	Yes
B2-ST-1 (1-3')	Yes	Yes	Yes	No
B2-ST-4 (47-49')	Yes	Yes	Yes	No
B3-ST-5 (77-79')	Yes	Yes	Yes	No
B4-ST-3 (47-49')	Yes	Yes	Yes	No
B5-ST-5 (87-89')	Yes	Yes	Yes	No

**Table 4-1 – Groundwater Protection Standards**

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11/A	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.0E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	2.1E-03	<b>6.0E-03</b>	3.2E-03	<b>6.0E-03</b>
Arsenic	mg/L	Background or MCL	1.0E-02	1.4E-02	<b>1.4E-02</b>	7.5E-03	<b>1.0E-02</b>	1.9E-02	<b>1.9E-02</b>	3.0E-02	<b>3.0E-02</b>	1.1E-02	<b>1.1E-02</b>	2.4E-02	<b>2.4E-02</b>
Barium	mg/L	MCL	2.0E+00	3.7E-01	<b>2.0E+00</b>	3.3E-01	<b>2.0E+00</b>	5.0E-01	<b>2.0E+00</b>	4.9E-01	<b>2.0E+00</b>	2.0E-01	<b>2.0E+00</b>	6.2E-01	<b>2.0E+00</b>
Beryllium	mg/L	MCL	4.0E-03	1.0E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.7E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>	1.0E-03	<b>4.0E-03</b>	1.6E-03	<b>4.0E-03</b>
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.3E-03	<b>5.0E-03</b>	1.5E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>	1.0E-03	<b>5.0E-03</b>
Chromium	mg/L	MCL	1.0E-01	4.7E-02	<b>1.0E-01</b>	1.4E-02	<b>1.0E-01</b>	2.7E-02	<b>1.0E-01</b>	5.5E-02	<b>1.0E-01</b>	3.2E-02	<b>1.0E-01</b>	1.8E-02	<b>1.0E-01</b>
Cobalt	mg/L	Background or RSL	6.0E-03	2.1E-02	<b>2.1E-02</b>	4.7E-03	<b>6.0E-03</b>	1.3E-02	<b>1.3E-02</b>	2.2E-02	<b>2.2E-02</b>	1.7E-02	<b>1.7E-02</b>	7.1E-03	<b>7.1E-03</b>
Fluoride	mg/L	MCL	4.0E+00	1.3E+00	<b>4.0E+00</b>	1.3E+00	<b>4.0E+00</b>	1.2E+00	<b>4.0E+00</b>	1.3E+00	<b>4.0E+00</b>	2.1E+00	<b>4.0E+00</b>	1.9E+00	<b>4.0E+00</b>
Lead	mg/L	Background or RSL	1.5E-02	2.3E-02	<b>2.3E-02</b>	4.4E-03	<b>1.5E-02</b>	1.2E-02	<b>1.5E-02</b>	2.2E-02	<b>2.2E-02</b>	3.5E-02	<b>3.5E-02</b>	7.7E-03	<b>1.5E-02</b>
Lithium	mg/L	Background	4.0E-02	6.7E-02	<b>6.7E-02</b>	5.5E-02	<b>5.5E-02</b>	9.2E-02	<b>9.2E-02</b>	1.1E-01	<b>1.1E-01</b>	1.2E-01	<b>1.2E-01</b>	1.5E-01	<b>1.5E-01</b>
Mercury	mg/L	MCL	2.0E-03	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>	2.0E-04	<b>2.0E-03</b>
Molybdenum	mg/L	RSL	1.0E-01	4.3E-02	<b>1.0E-01</b>	3.0E-02	<b>1.0E-01</b>	1.0E-01	<b>1.0E-01</b>	6.7E-02	<b>1.0E-01</b>	5.0E-02	<b>1.0E-01</b>	4.9E-02	<b>1.0E-01</b>
Radium-226/228	pCi/L	Background or MCL	5.0E+00	5.5E+00	<b>5.5E+00</b>	2.6E+00	<b>5.0E+00</b>	5.8E+00	<b>5.8E+00</b>	7.6E+00	<b>7.6E+00</b>	3.2E+00	<b>5.0E+00</b>	2.6E+00	<b>5.0E+00</b>
Selenium	mg/L	MCL	5.0E-02	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.3E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>	5.0E-03	<b>5.0E-02</b>
Thallium	mg/L	Background or MCL	2.0E-03	1.1E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	2.3E-03	<b>2.3E-03</b>	1.3E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>	1.0E-03	<b>2.0E-03</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter



**Table 4-2 – Baseline Fate and Transport Results**

Constituent	Units	Maximum Observed Concentration		90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer			Most Conservative GWPS	Outcome - Site (Pass/Fail)		Outcome - 90th Percentile	
		BAB-North	BAB-South			BAB	BAB-North	BAB-South		90th Percentile	BAB-North		BAB-South
Appendix IV	Antimony	mg/L	1.0E-02	1.0E-02	4.0E-02	2.66E-33	2.7E-35	2.7E-35	1.1E-34	6.0E-03	PASS	PASS	PASS
	Arsenic	mg/L	8.5E-03	7.0E-03	7.8E-01	2.66E-33	2.3E-35	1.9E-35	2.1E-33	1.0E-02	PASS	PASS	PASS
	Barium	mg/L	9.4E-01	5.8E-01	2.1E-01	2.66E-33	2.5E-33	1.5E-33	5.6E-34	2.0E+00	PASS	PASS	PASS
	Beryllium	mg/L	4.0E-03	2.2E-03	1.0E-03	2.66E-33	1.1E-35	5.7E-36	2.7E-36	4.0E-03	PASS	PASS	PASS
	Cadmium	mg/L	4.0E-03	4.0E-03	6.0E-02	2.66E-33	1.1E-35	1.1E-35	1.6E-34	5.0E-03	PASS	PASS	PASS
	Chromium	mg/L	8.7E-03	4.9E-03	2.0E-01	2.66E-33	2.3E-35	1.3E-35	5.3E-34	1.0E-01	PASS	PASS	PASS
	Cobalt	mg/L	1.0E-02	5.5E-03	5.0E-02	2.66E-33	2.7E-35	1.5E-35	1.3E-34	6.0E-03	PASS	PASS	PASS
	Fluoride	mg/L	2.6E-01	5.2E-01	2.1E+01	2.66E-33	6.9E-34	1.4E-33	5.7E-32	4.0E+00	PASS	PASS	PASS
	Lead	mg/L	6.0E-03	6.1E-03	1.0E-01	2.66E-33	1.6E-35	1.6E-35	2.7E-34	1.5E-02	PASS	PASS	PASS
	Lithium	mg/L	3.4E-02	1.7E-02	4.5E-01	2.66E-33	9.0E-35	4.6E-35	1.2E-33	4.0E-02	PASS	PASS	PASS
	Mercury	mg/L	4.0E-04	4.0E-04	7.0E-06	2.66E-33	1.1E-36	1.1E-36	1.9E-38	2.0E-03	PASS	PASS	PASS
	Molybdenum	mg/L	3.5E-02	4.6E-02	7.1E+00	2.66E-33	9.3E-35	1.2E-34	1.9E-32	1.0E-01	PASS	PASS	PASS
	Combined Radium	pCi/L	1.8E+00	6.7E-40	-	2.66E-33	4.7E-33	1.8E-72	-	5.0E+00	PASS	PASS	NA
	Selenium	mg/L	5.8E-03	5.7E-03	3.2E-01	2.66E-33	1.5E-35	1.5E-35	8.5E-34	5.0E-02	PASS	PASS	PASS
Thallium	mg/L	1.0E-02	1.2E-03	3.0E-03	2.66E-33	2.7E-35	3.1E-36	8.0E-36	2.0E-03	PASS	PASS	PASS	

**Notes:**

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RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Maximum Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-01				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	6.2E-42	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0	Pass
Beryllium	mg/L	MCL	2.8E-03	2.7E-42	2.8E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.0E-03	6.7E-42	1.0E-03	1.0E-01	Pass
Cobalt	mg/L	RSL	3.6E-03	3.5E-42	3.6E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.80	2.9E-40	1.8	4.0	Pass
Lead	mg/L	RSL	3.5E-03	6.7E-42	3.5E-03	1.5E-02	Pass
Lithium	mg/L	Background	2.3E-02	4.1E-41	2.3E-02	4.2E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	8.9E-02	2.0E-40	8.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	1.8E-03	1.2E-39	1.8E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-02				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	6.2E-42	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.3E-01	3.9E-40	3.3E-01	2.0	Pass
Beryllium	mg/L	MCL	2.8E-03	2.7E-42	2.8E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.9E-02	6.7E-42	1.9E-02	1.0E-01	Pass
Cobalt	mg/L	RSL	3.9E-03	3.5E-42	3.9E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.30	2.9E-40	1.3E+00	4.0	Pass
Lead	mg/L	RSL	2.9E-03	6.7E-42	2.9E-03	1.5E-02	Pass
Lithium	mg/L	RSL	1.9E-02	4.1E-41	1.9E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	6.5E-02	2.0E-40	6.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	2.7E-03	1.2E-39	3.4E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-03				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	5.0E-03	6.2E-42	5.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	1.0E-01	Pass
Cobalt	mg/L	RSL	1.0E-03	3.5E-42	1.0E-03	6.0E-03	Pass
Fluoride	mg/L	MCL	1.80	2.9E-40	1.8	4.0	Pass
Lead	mg/L	RSL	1.0E-03	6.7E-42	1.0E-03	1.5E-02	Pass
Lithium	mg/L	RSL	1.9E-02	4.1E-41	1.9E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	Background	1.0E-01	2.0E-40	1.0E-01	1.1E-01	Pass
Radium-226/228	pCi/L	MCL	2.0E-03	1.2E-39	2.7E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-04				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.0E-03	6.2E-42	7.0E-03	1.0E-02	Pass
Barium	mg/L	MCL	4.4E-01	3.9E-40	4.4E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	2.7E-02	6.7E-42	2.7E-02	1.0E-01	Pass
Cobalt	mg/L	Background	7.4E-03	3.5E-42	7.4E-03	1.3E-02	Pass
Fluoride	mg/L	MCL	1.80	2.9E-40	1.8	4.0	Pass
Lead	mg/L	RSL	7.1E-03	6.7E-42	7.1E-03	1.5E-02	Pass
Lithium	mg/L	RSL	3.7E-02	4.1E-41	3.7E-02	4.0E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	Background	1.1E-01	2.0E-40	1.1E-01	1.2E-01	Pass
Radium-226/228	pCi/L	MCL	2.7E-03	1.2E-39	3.5E-03	5.0E-03	Pass
Selenium	mg/L	MCL	2.0E-03	5.8E-42	2.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-3  
Background and Predicted Concentrations Compared to GWPS**

Constituent	Unit	GWPS Selection	MW-16-09				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	Pass
Arsenic	mg/L	MCL	7.2E-03	6.2E-42	7.2E-03	1.0E-02	Pass
Barium	mg/L	MCL	3.1E-01	3.9E-40	3.1E-01	2.0	Pass
Beryllium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	4.0E-03	Pass
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	Pass
Chromium	mg/L	MCL	1.8E-02	6.7E-42	1.8E-02	1.0E-01	Pass
Cobalt	mg/L	Background	5.9E-03	3.5E-42	5.9E-03	7.7E-03	Pass
Fluoride	mg/L	MCL	1.60	2.9E-40	1.6	4.0	Pass
Lead	mg/L	RSL	5.4E-03	6.7E-42	5.4E-03	1.5E-02	Pass
Lithium	mg/L	Background	5.5E-02	4.1E-41	5.5E-02	6.5E-02	Pass
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	Pass
Molybdenum	mg/L	RSL	6.5E-02	2.0E-40	6.9E-02	1.0E-01	Pass
Radium-226/228	pCi/L	MCL	3.2E-03	1.2E-39	4.0E-03	5.0E-03	Pass
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	Pass
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	Pass

**Notes:**

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RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 4-4 – Sensitivity Analysis Model Inputs**

	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis	Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis		Baseline	Sensitivity Analysis
	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr)	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)
<i>Layer Properties</i>																
Clay	12.01	13.99	11.03	1.02E-03	2.03E-03	0.019	0.024	0.014	0.46	0.56	0.34	0.37	0.45	0.28	55	85
Clay with Sand	19.29	23.62	15.18	1.02E-03	2.03E-03	0.019	0.024	0.014	0.42	0.55	0.24	0.34	0.45	0.20	55	85

Dv = Vertical Darcy Velocity

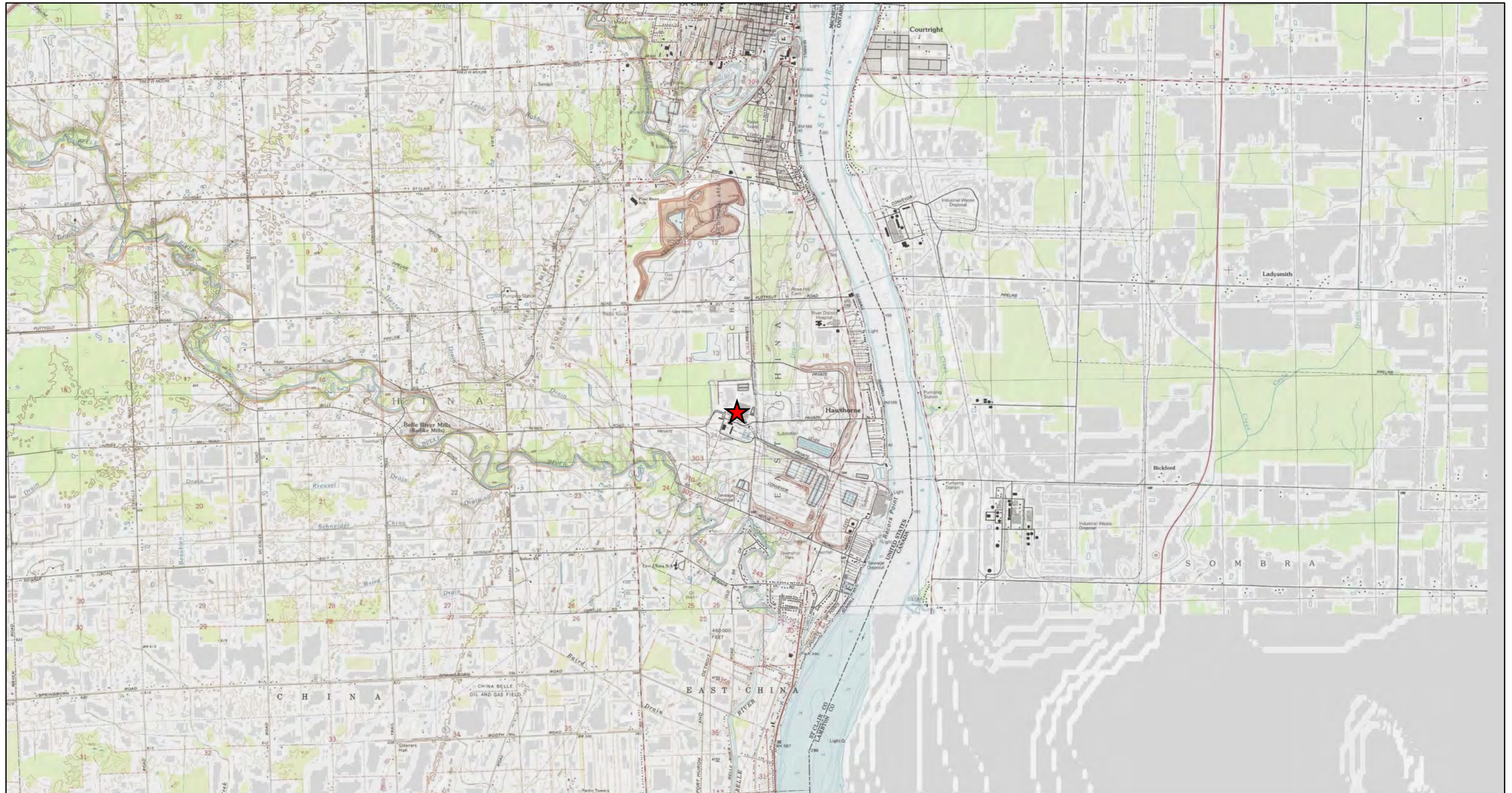
CoHD = Coefficient of Hydrodynamic Dispersion

**Table 4-5 – Sensitivity Analysis Model Results**

<b>Bottom Ash Basins Sensitivity Analysis</b>			
<b>Model Name</b>	<b>Description</b>	<b>Prediction Factor</b>	<b>Pass?*</b>
BAB_Baseline	Baseline model for the Bottom Ash Basins.	2.66E-33	YES
BAB_ExtendedRun	Model runtime was extended from 55 years to 85 years.	1.30E-26	YES
BAB_Darcy	Darcy velocity was doubled.	2.52E-32	YES
BAB_CoHD_High	Coefficient of Hydrodynamic Dispersion was increased by 25%.	1.53E-30	YES
BAB_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	6.23E-38	YES
BAB_ClayPoro_High	Used the highest effective porosity in clay interval; derived from laboratory data in project database.	2.50E-33	YES
BAB_ClayPoro_Low	Used the lowest effective porosity in clay interval; derived from laboratory data in project database.	3.08E-33	YES
BAB_SandPoro_High	Used the highest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.67E-33	YES
BAB_SandPoro_Low	Used the lowest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.06E-32	YES
BAB_ClayThick	Used thickest clay interval seen in boring/well; derived from project database.	3.60E-35	YES
BAB_ClayThin	Used thinnest clay interval seen in boring/well; derived from project database.	1.92E-32	YES
BAB_SandThick	Used thickest clay with sand interval seen in boring/well; derived from project database.	1.48E-37	YES
BAB_SandThin	Used thinnest clay with sand interval seen in boring/well; derived from project database.	1.36E-29	YES
* Indicates value less than $PF_{\text{threshold}}$ , as discussed in Section 4.6.2.			



# FIGURES



Legend

★ Site Location



Site Location

DTE Energy  
 Belle River Power Plant  
 4505 King Road  
 China Township, Michigan

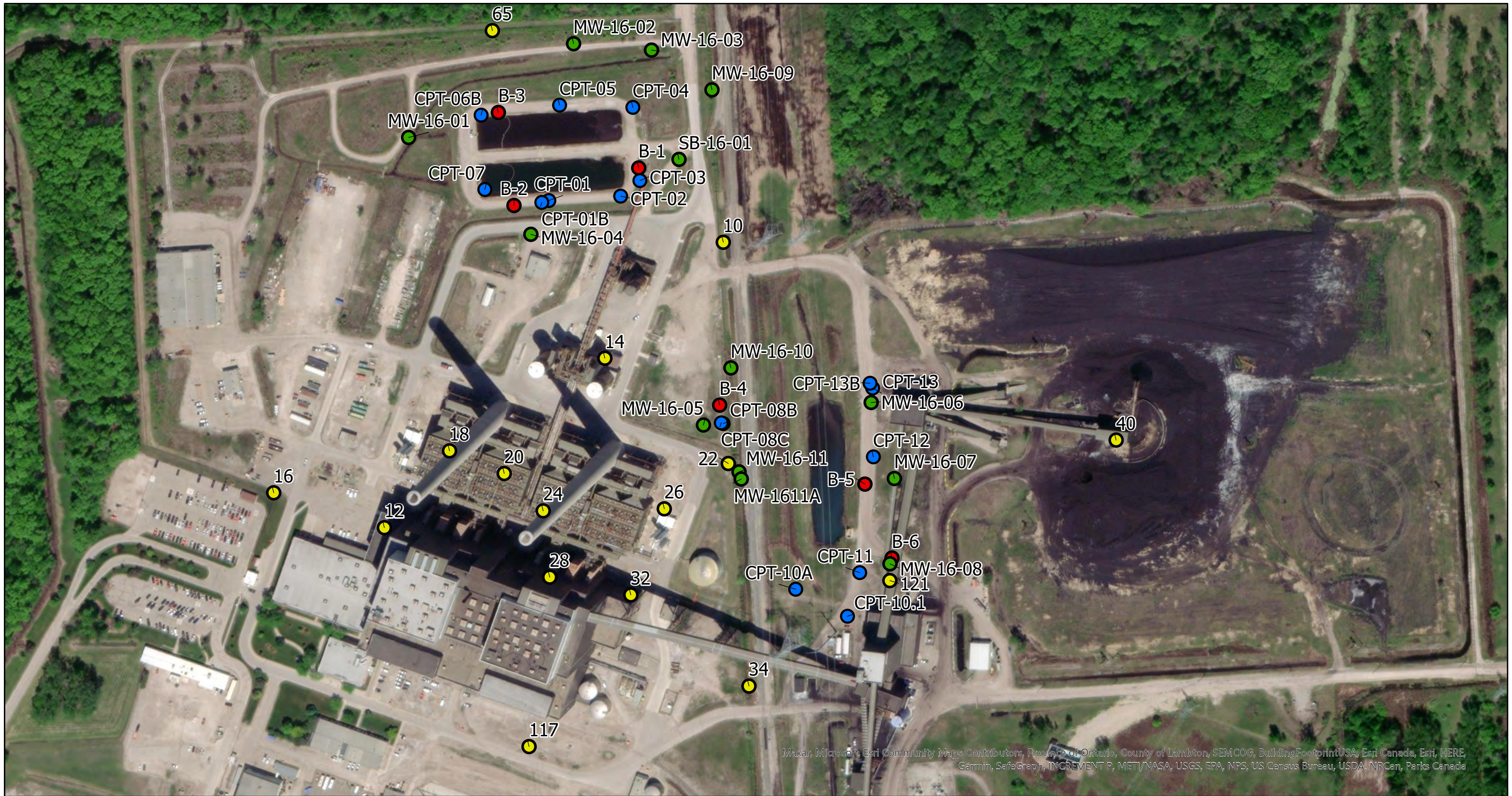
**Geosyntec**  
 consultants  
Geosyntec Consultants of Michigan

Figure

**1-1**

Detroit, Michigan

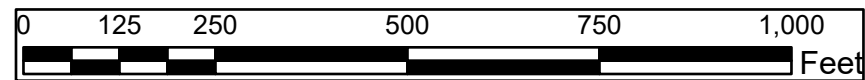
April 2023



Maxar, Microsoft, Esri Community Maps Contributors, Province of Ontario, County of Lambton, SEMCOG, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



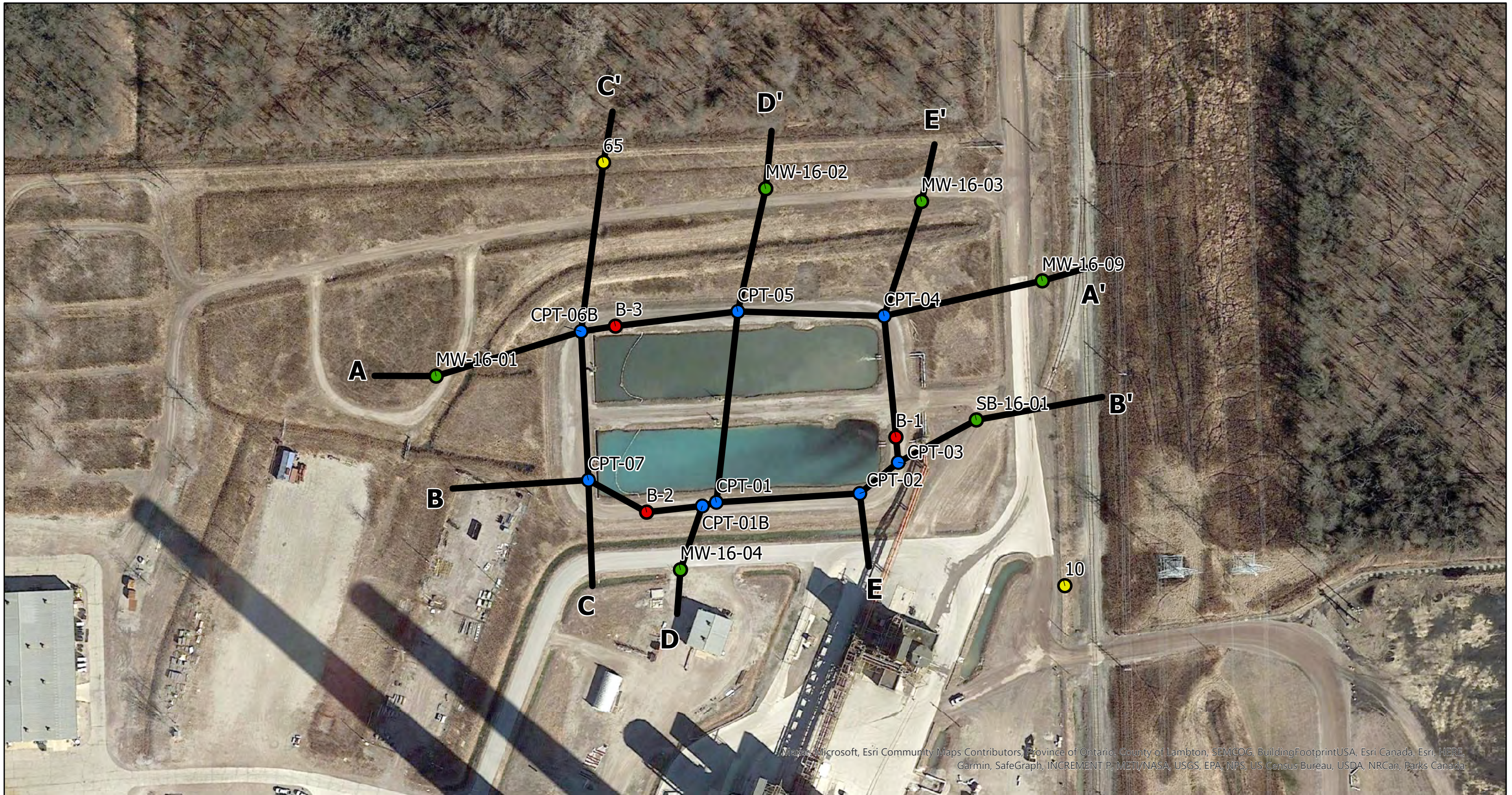
**Field Investigation Locations  
Bell River Power Plant  
China Township, MI**

**Geosyntec**  
consultants  
Geosyntec Consultants of Michigan

GLP8017

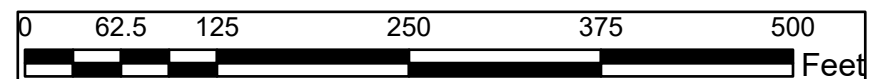
April 2023

**Figure  
2-1**



**Boring Locations**

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel



**Cross Section Locations**  
**Bell River Power Plant - Bottom Ash Basins**  
**China Township, MI**

**Geosyntec**  
 consultants  
 Geosyntec Consultants of Michigan

**Figure**  
**2-2**

GLP8017

April 2023



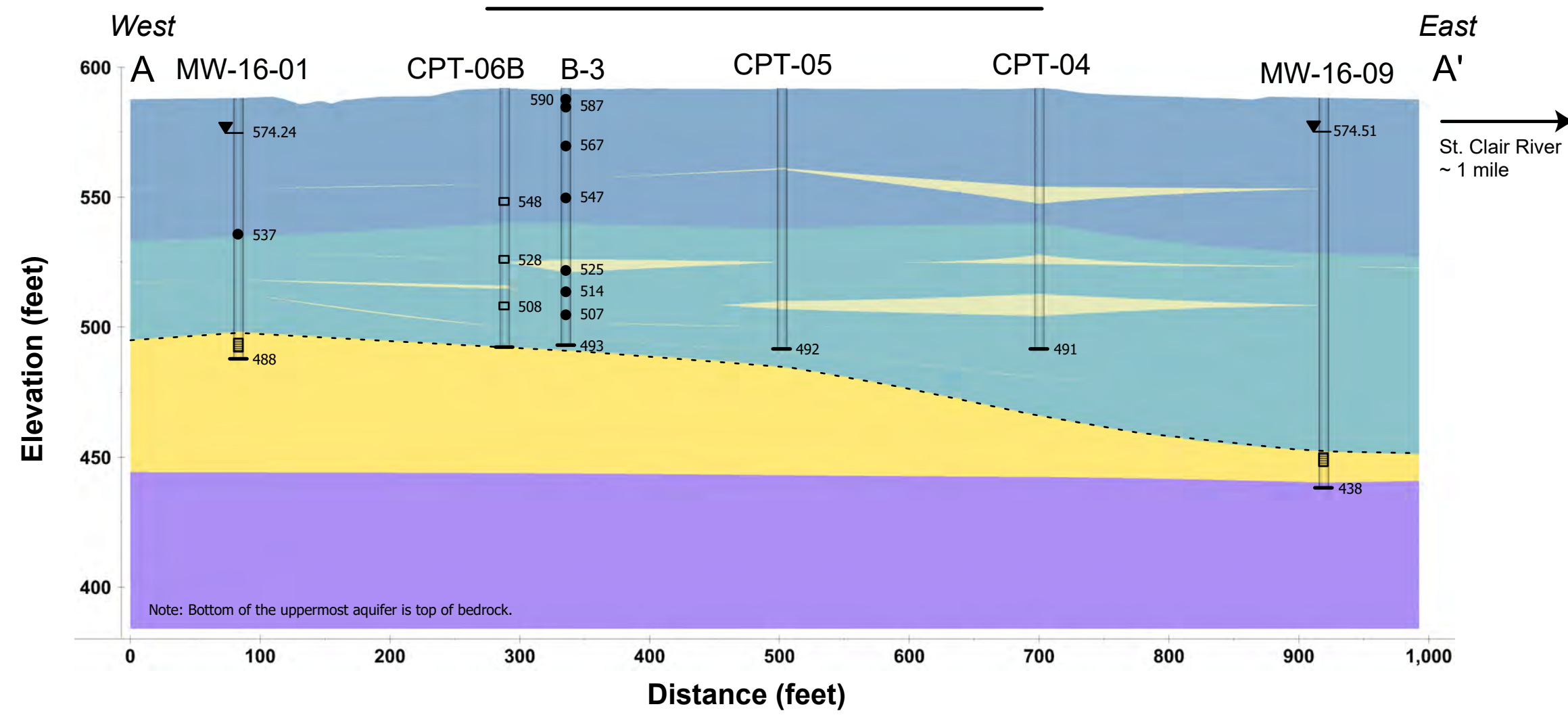
### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019

### Ash Basin Extent



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

### Cross Section A - A' Belle River Power Plant - Bottom Ash Basins China Township, MI



Figure

2-3

GLP8017

April 2023

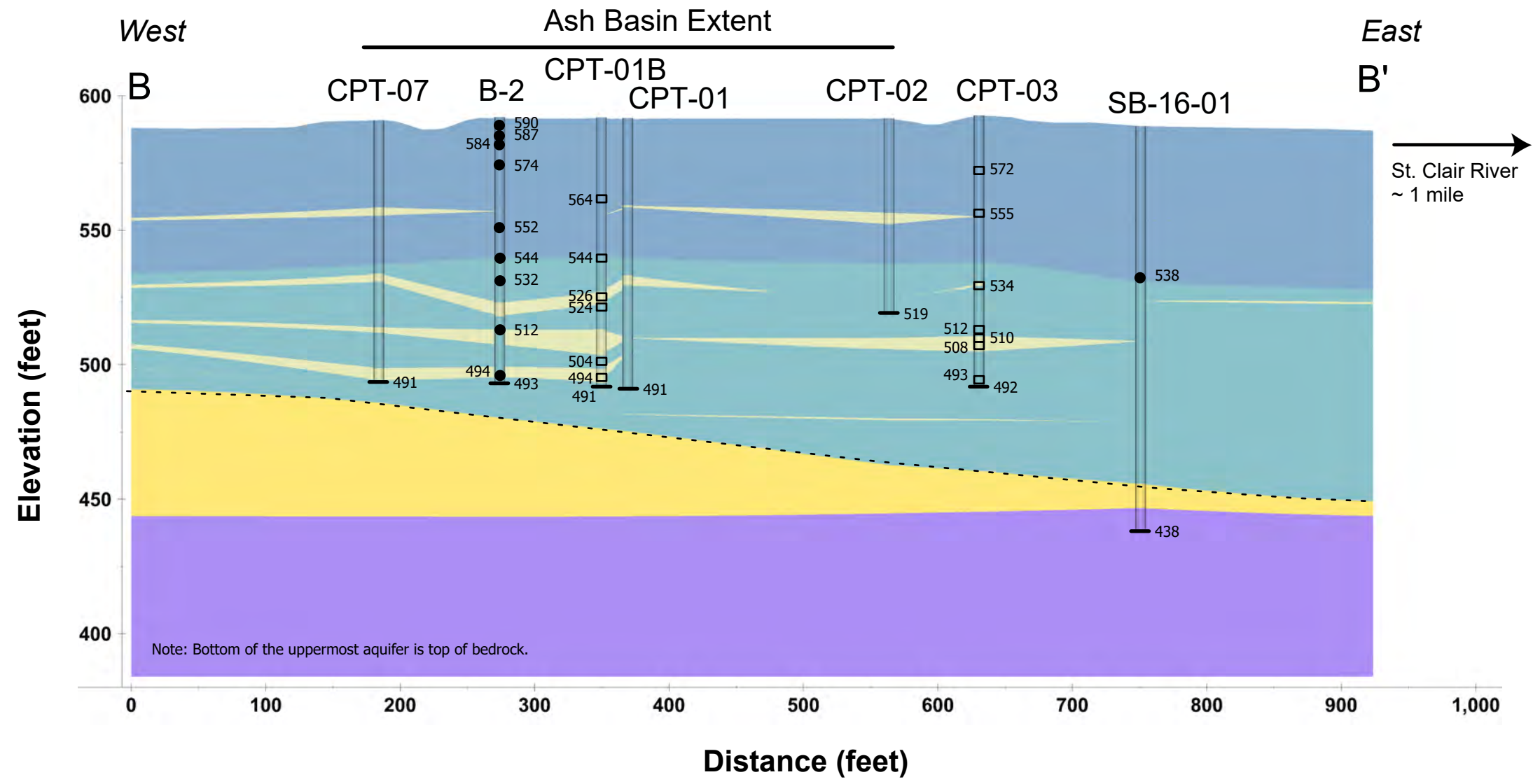


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW- TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



- Lithology**
- Clay
  - Clay with Sand
  - Sandy Seams
  - Uppermost Aquifer
  - Shale Bedrock
- ▼ Water Level of Uppermost Aquifer
  - End of Investigation
  - Well Screen Interval
  - Top of Uppermost Aquifer Unit
  - CPT Pore Pressure Dissipation Test
  - Geotechnical Sample Elevation
- Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section B - B'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**

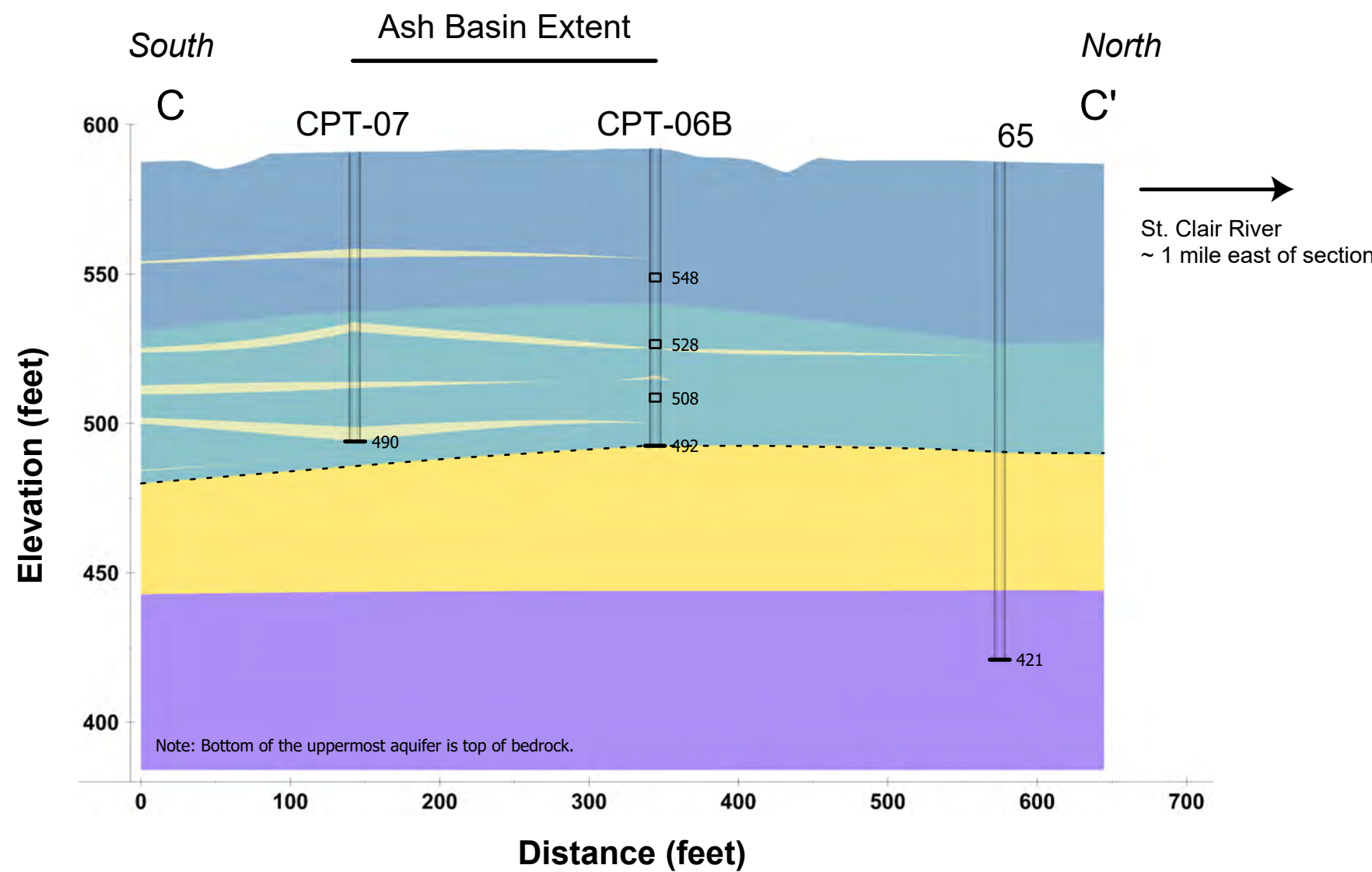


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth Imagery dated 03/24/2019



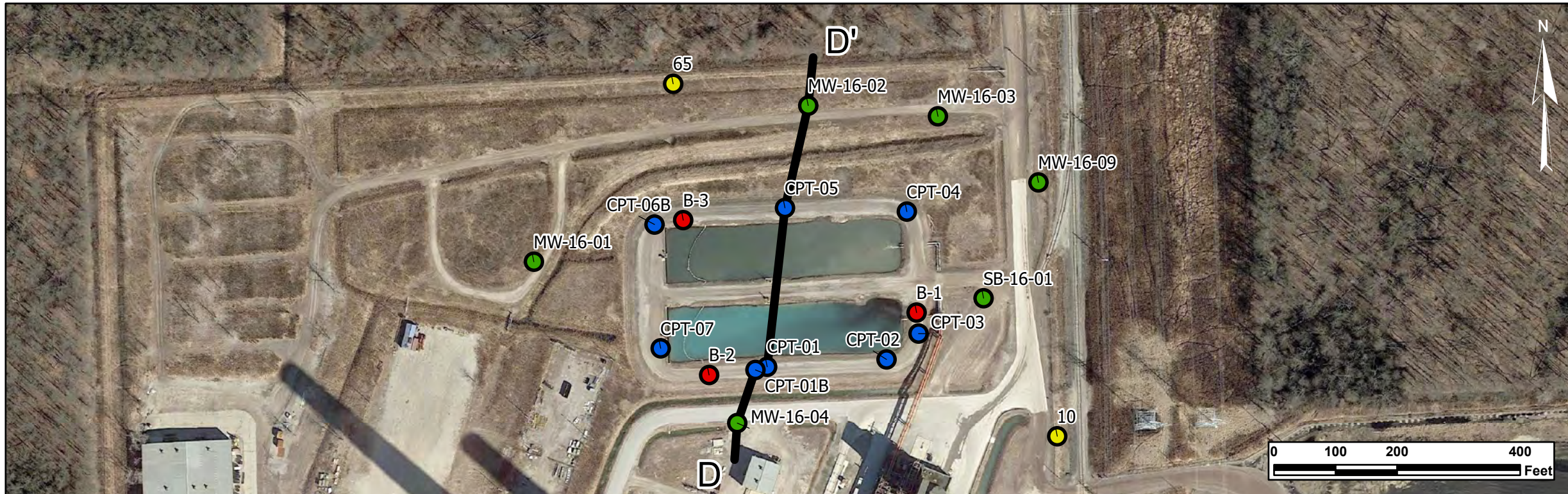
#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
 Horizontal Scale: 1-inch = 100-feet  
 Elevations are in Average Mean Sea Level  
 Unit interfaces are interpreted from limited data and are approximate.

**Cross Section C - C'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**

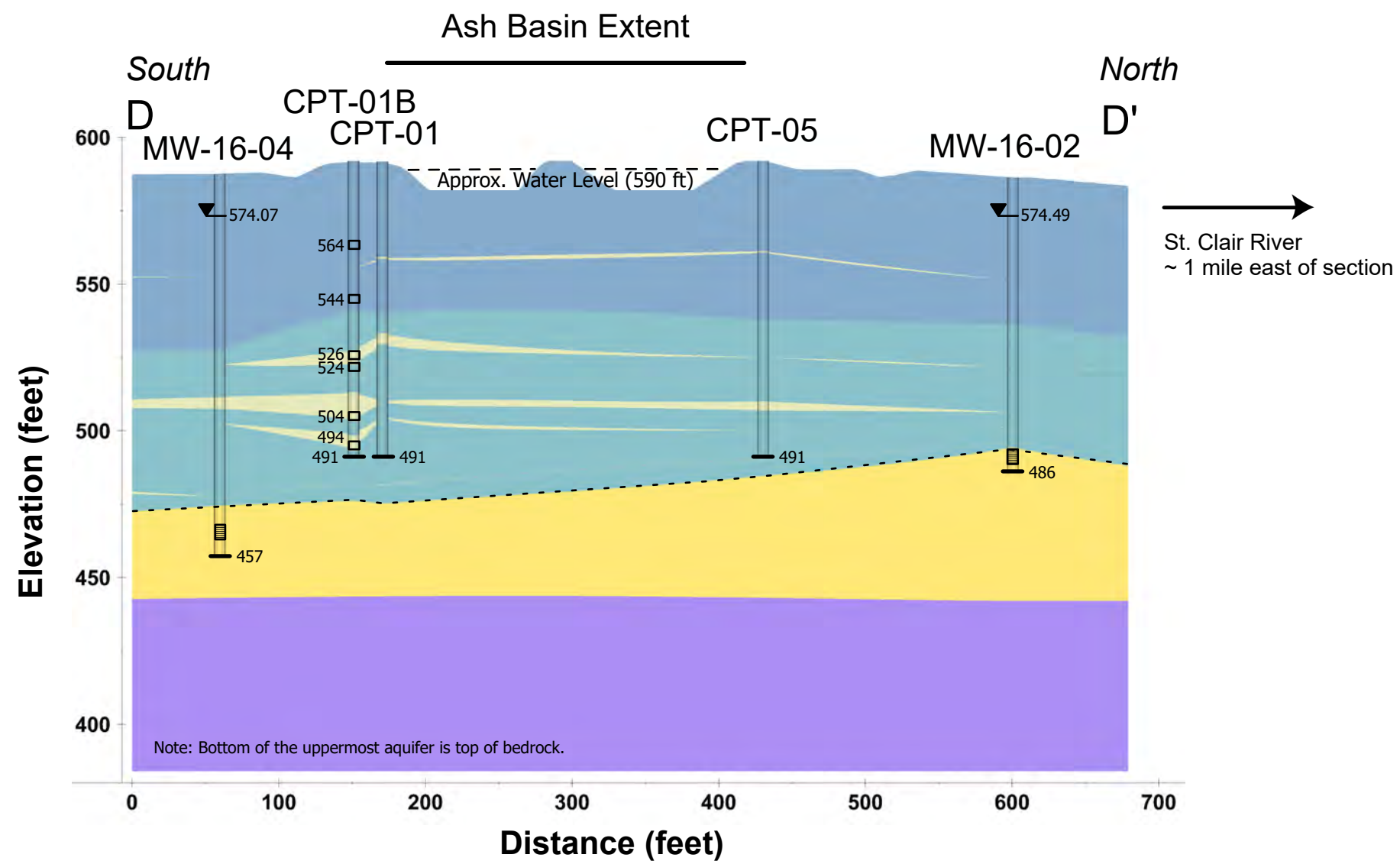


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- - - Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section D - D'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**



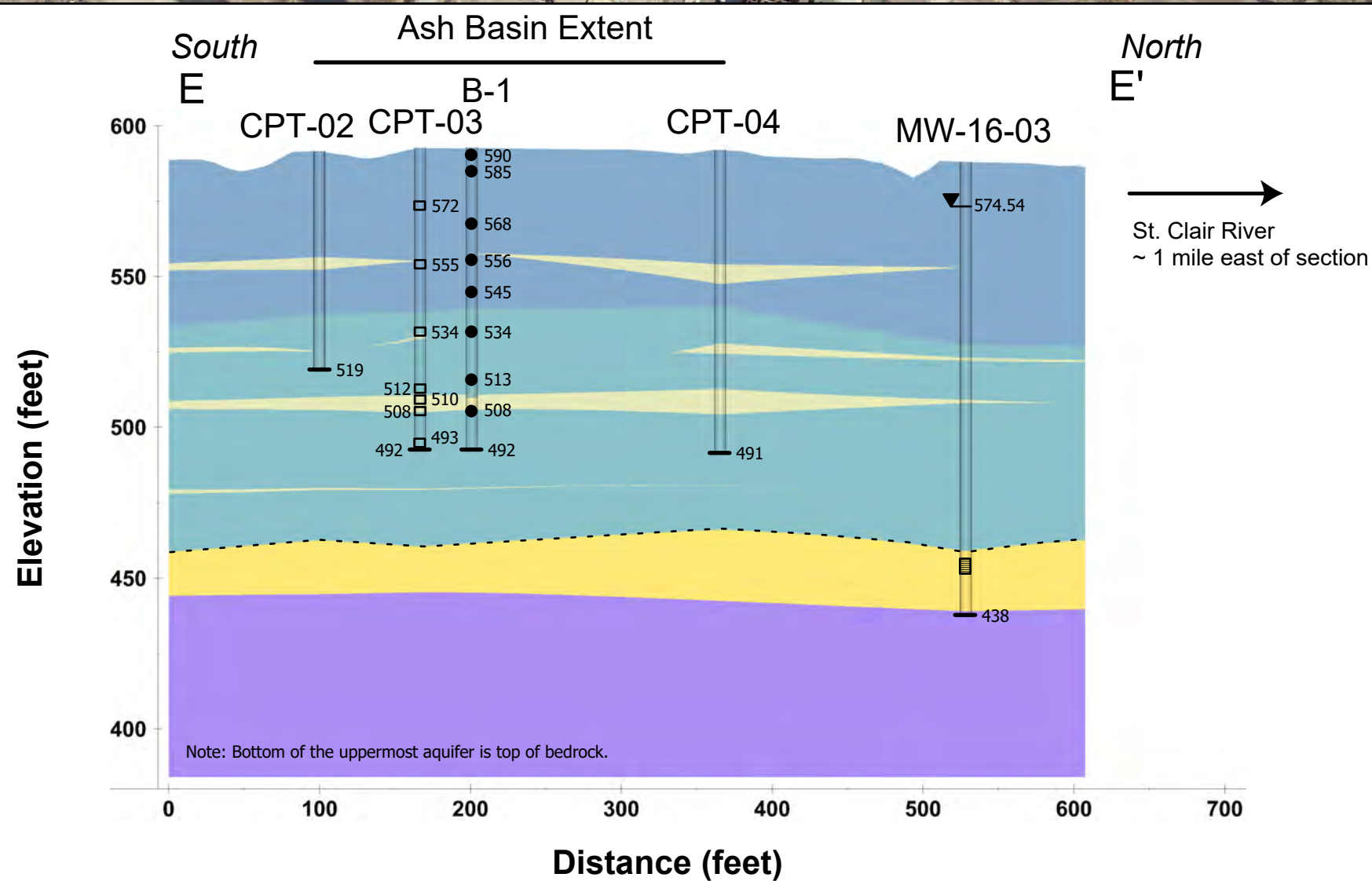


### Legend

#### Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth  
Imagery dated 03/24/2019



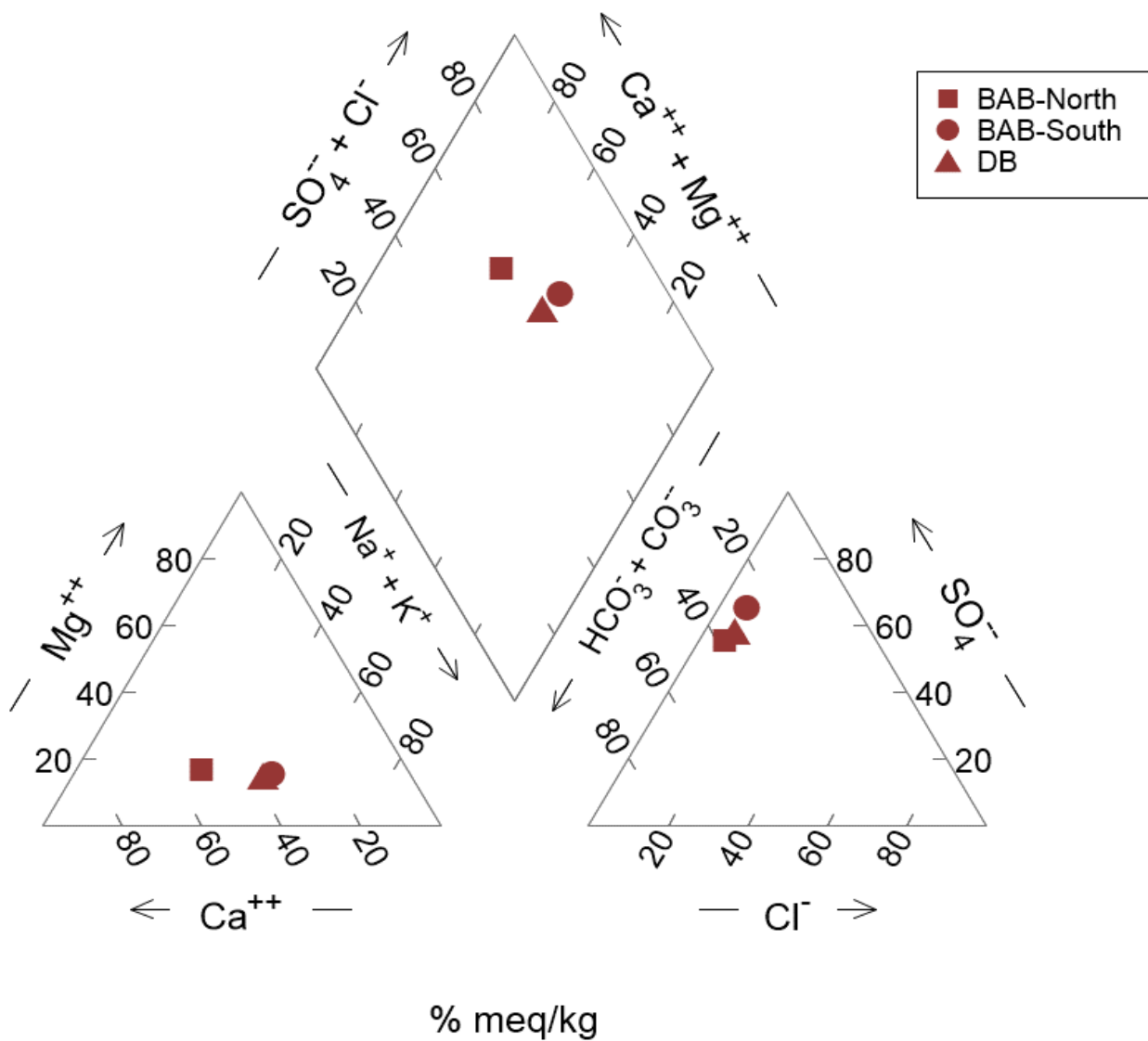
#### Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock


- ▼ Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

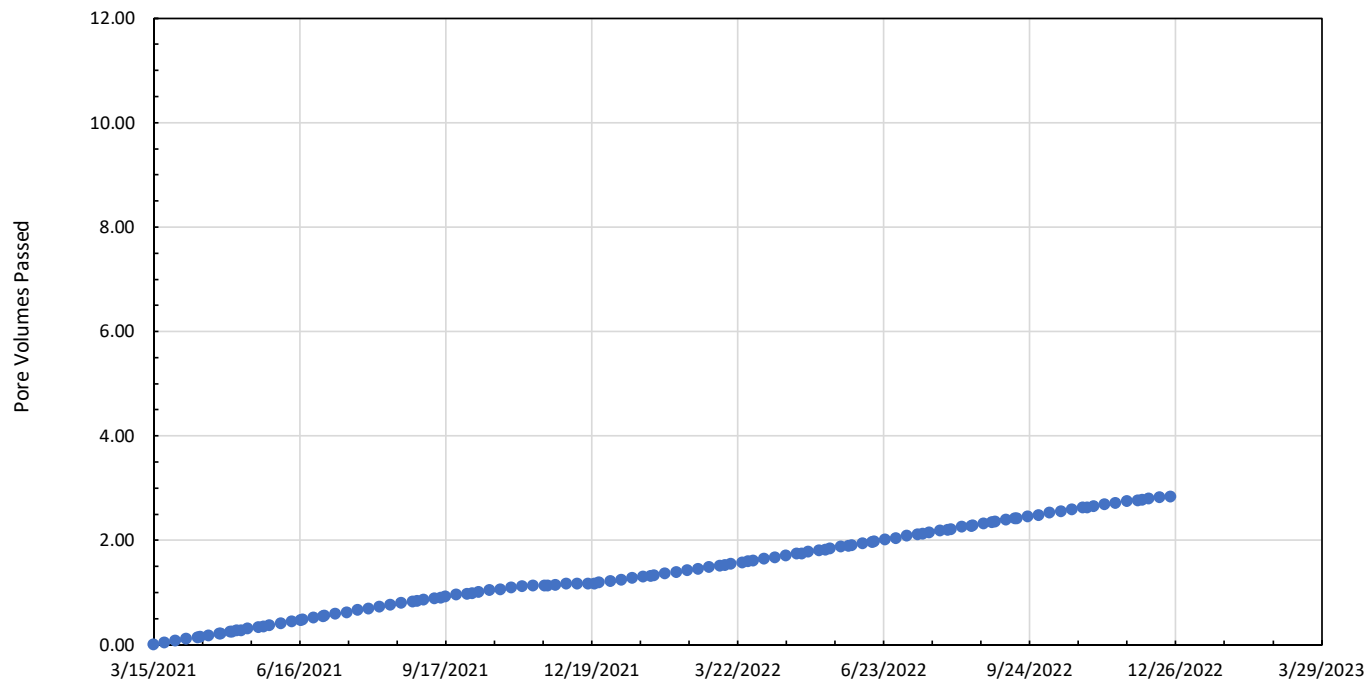
Vertical Scale: 1-inch = 50-feet  
Horizontal Scale: 1-inch = 100-feet  
Elevations are in Average Mean Sea Level  
Unit interfaces are interpreted from limited data and are approximate.

**Cross Section E - E'**  
**Belle River Power Plant - Bottom Ash Basins**  
**China Township, MI**



**Note:**  
Results are shown in the relative percentage of milliequivalents per kilogram (meq/kg).

<b>Filtered BAB and DB Porewater Sample</b> <b>Piper Diagram</b> Belle River Power Plant St. Clair County, MI	
 Geosyntec Consultants of Michigan	
GLP8017	April 2023
<b>Figure 3-1</b>	



**B1-ST-1 (7-9') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

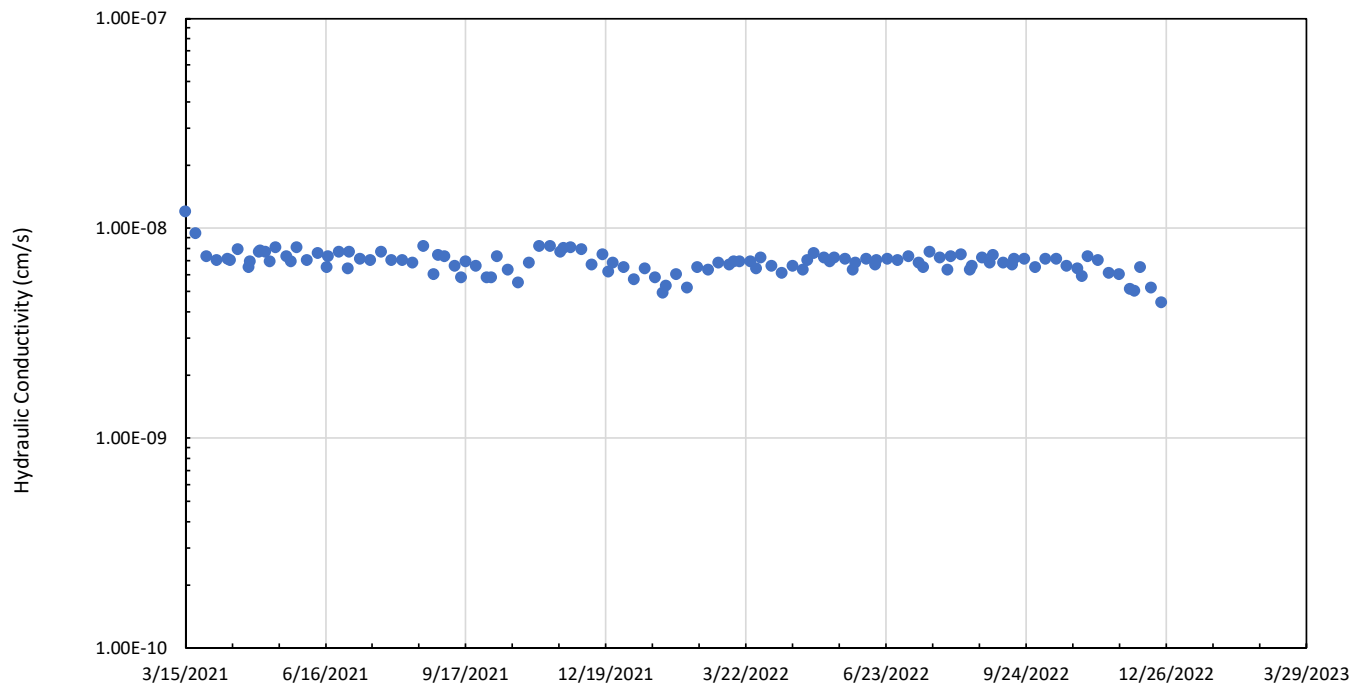


**Figure**

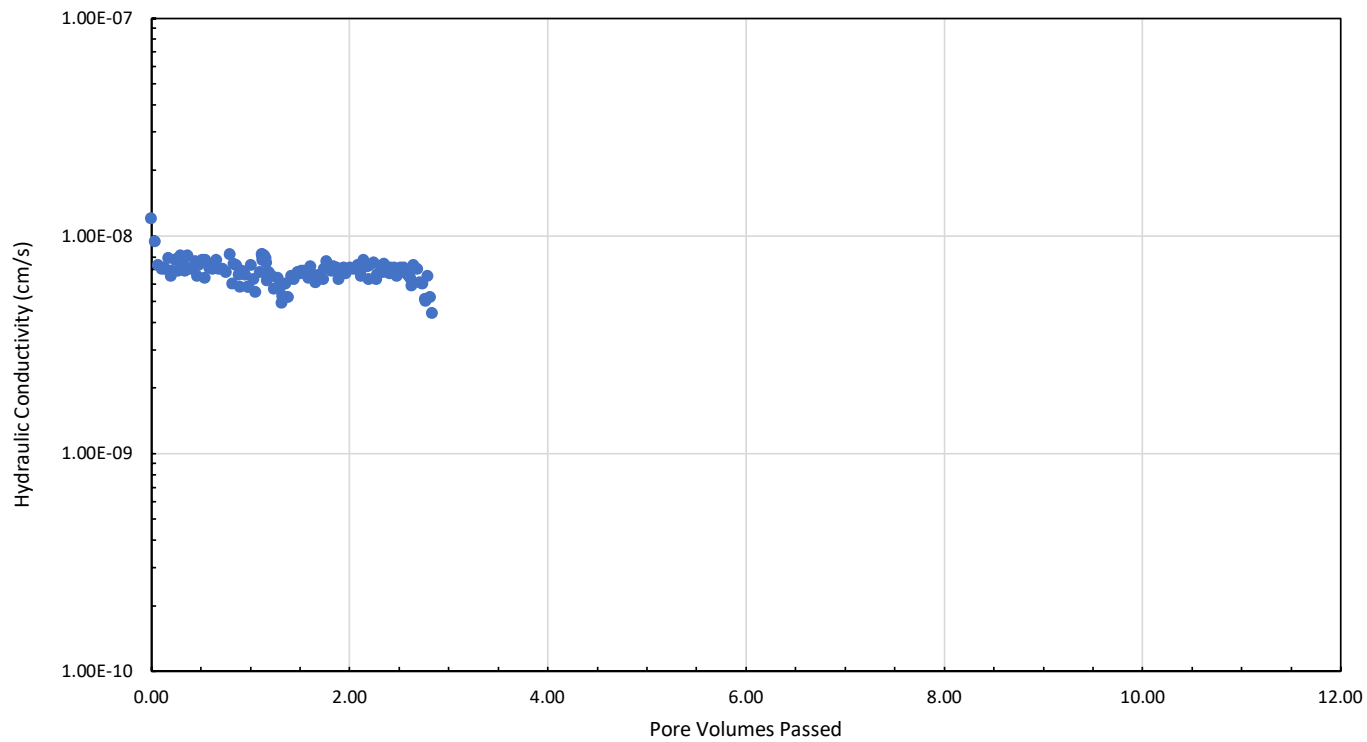
**3-2**

Detroit, MI

April 2023



<b>B1-ST-1 (7-9') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	<b>Figure</b>
Detroit, MI	<b>3-3</b>
April 2023	



**B1-ST-1 (7-9') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

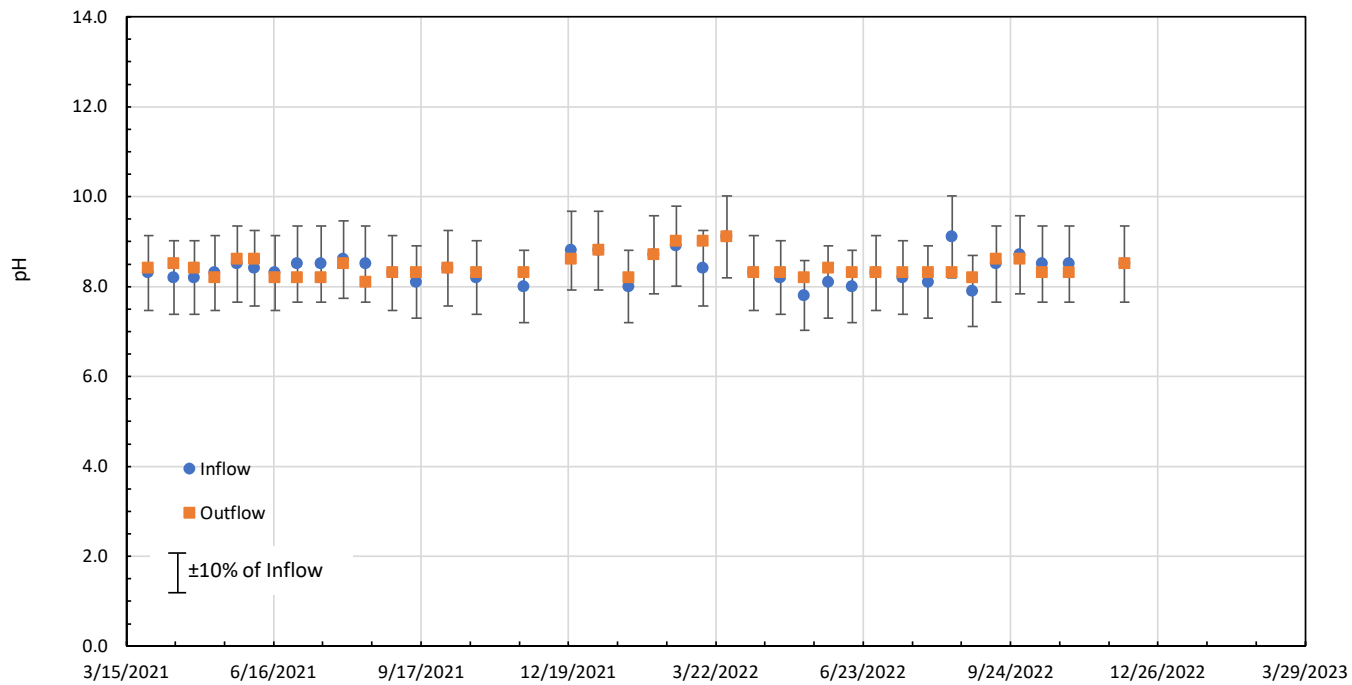



**Figure**

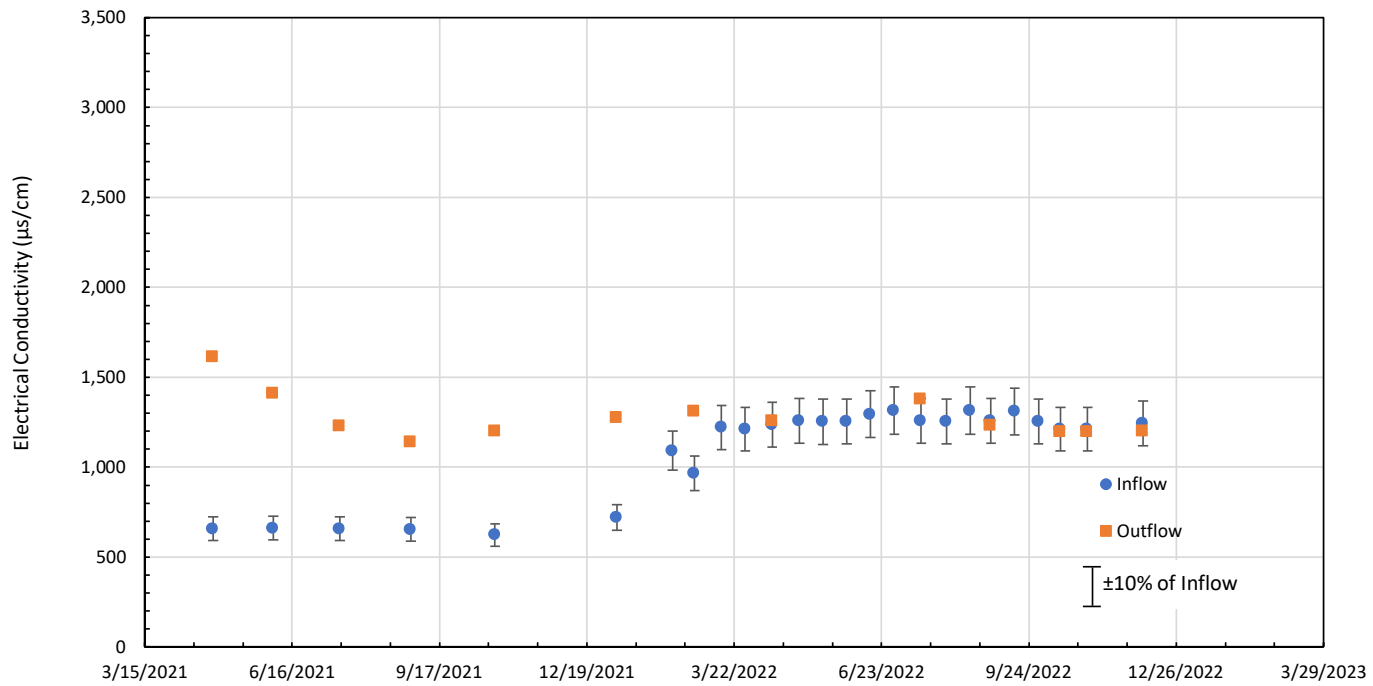
**3-4**


Detroit, MI

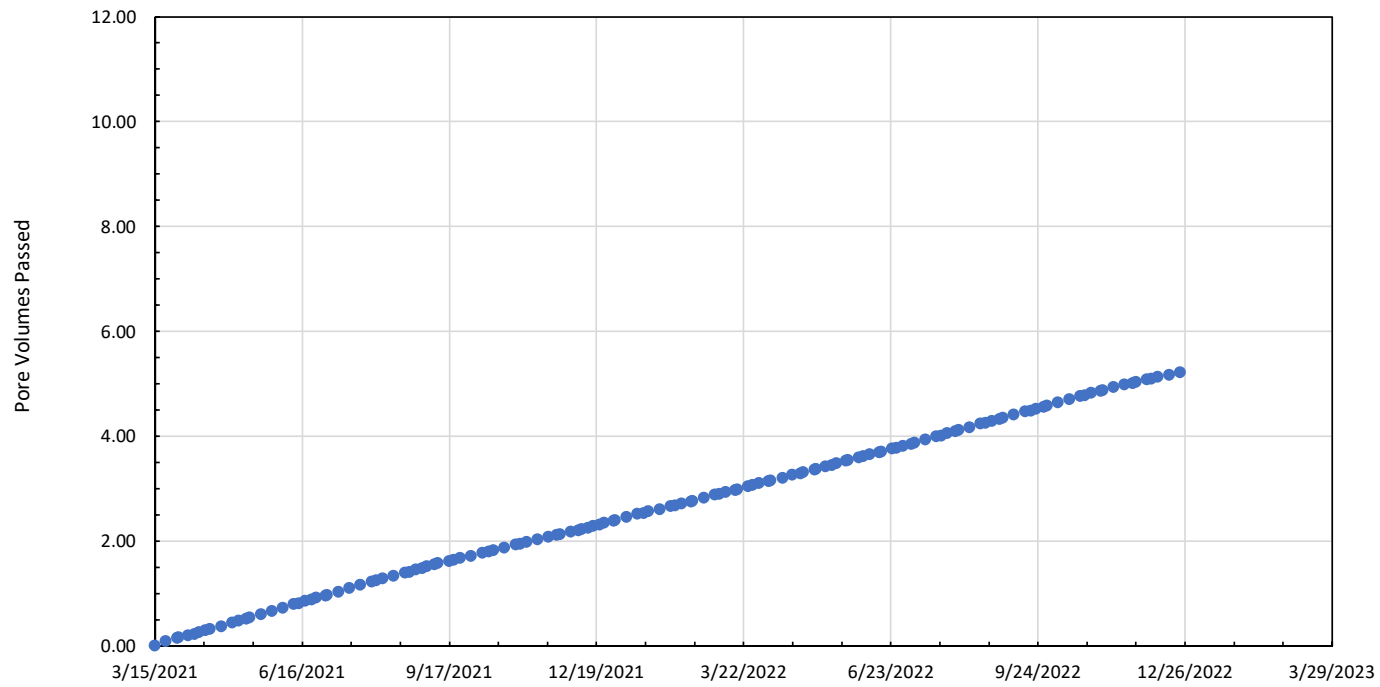
April 2023



<b>B1-ST-1 (7-9') pH of Inflow and Outflow with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	April 2023
<b>Figure 3-5</b>	



<b>B1-ST-1 (7-9') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	<b>Figure</b>
Detroit, MI	<b>3-6</b>
April 2023	



**B2-ST-1 (1-3') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



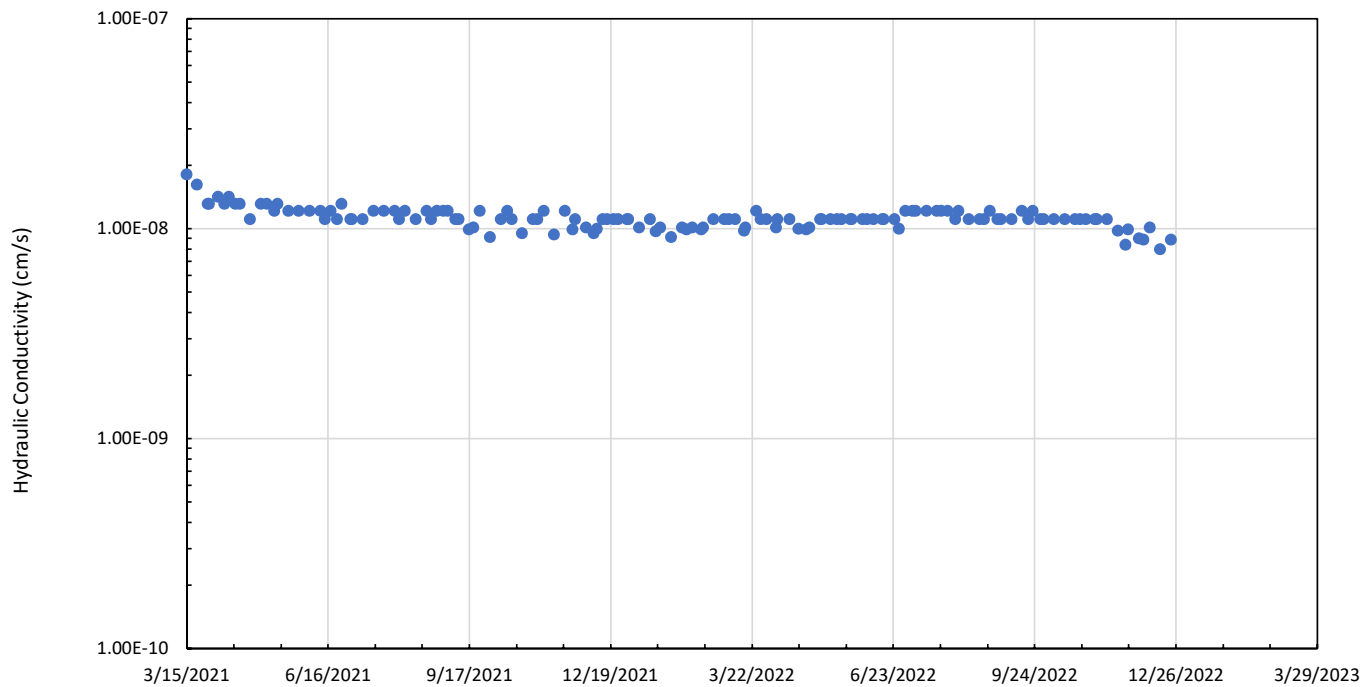
**Figure**


**3-7**

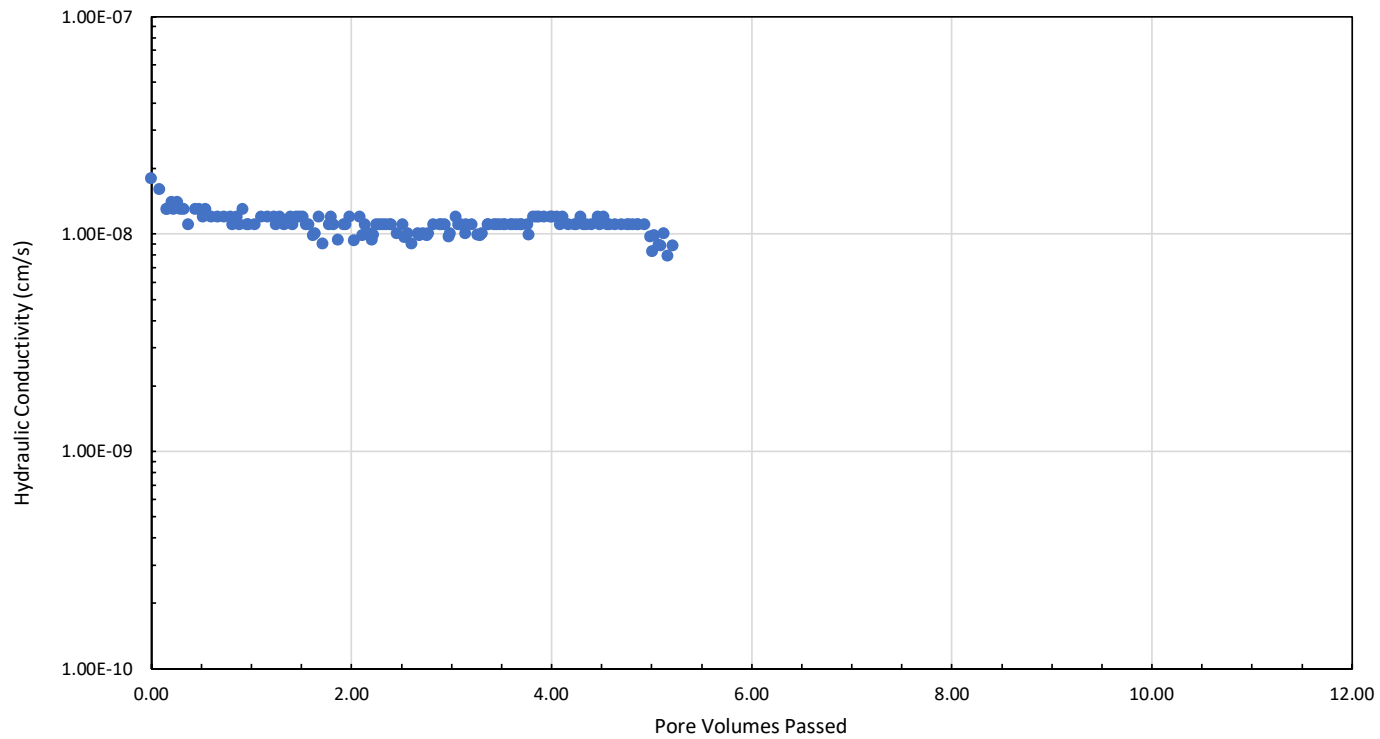
Detroit, MI

April 2023





<b>B2-ST-1 (1-3') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-8</b>	



**B2-ST-1 (1-3') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

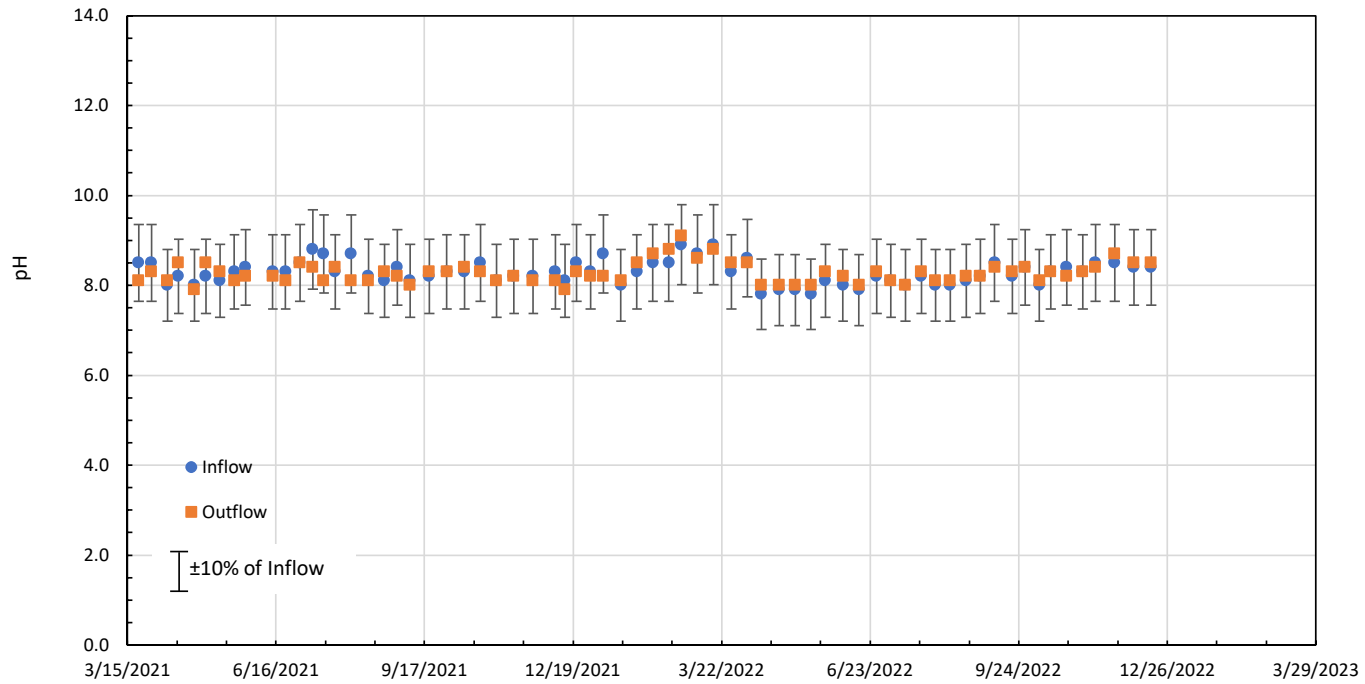


**Figure**

**3-9**

Detroit, MI

April 2023



**B2-ST-1 (1-3') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

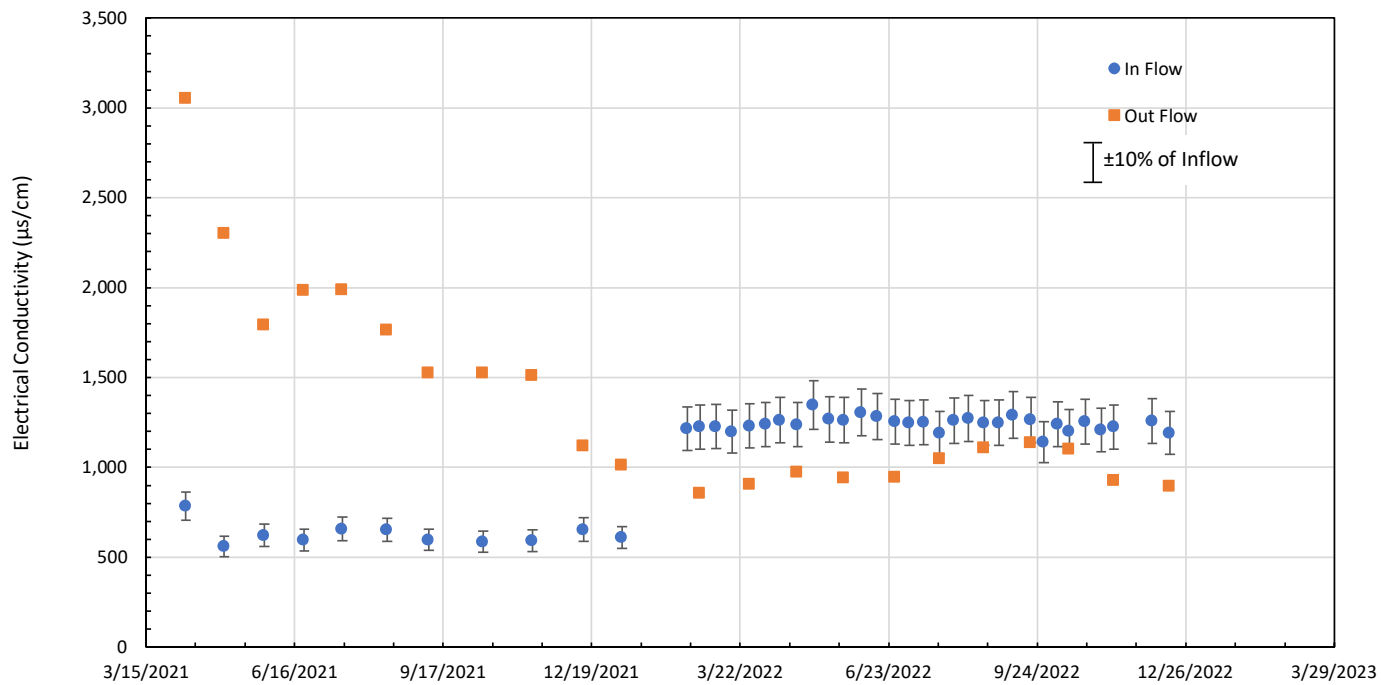
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Detroit, MI

April 2023

**Figure**

**3-10**



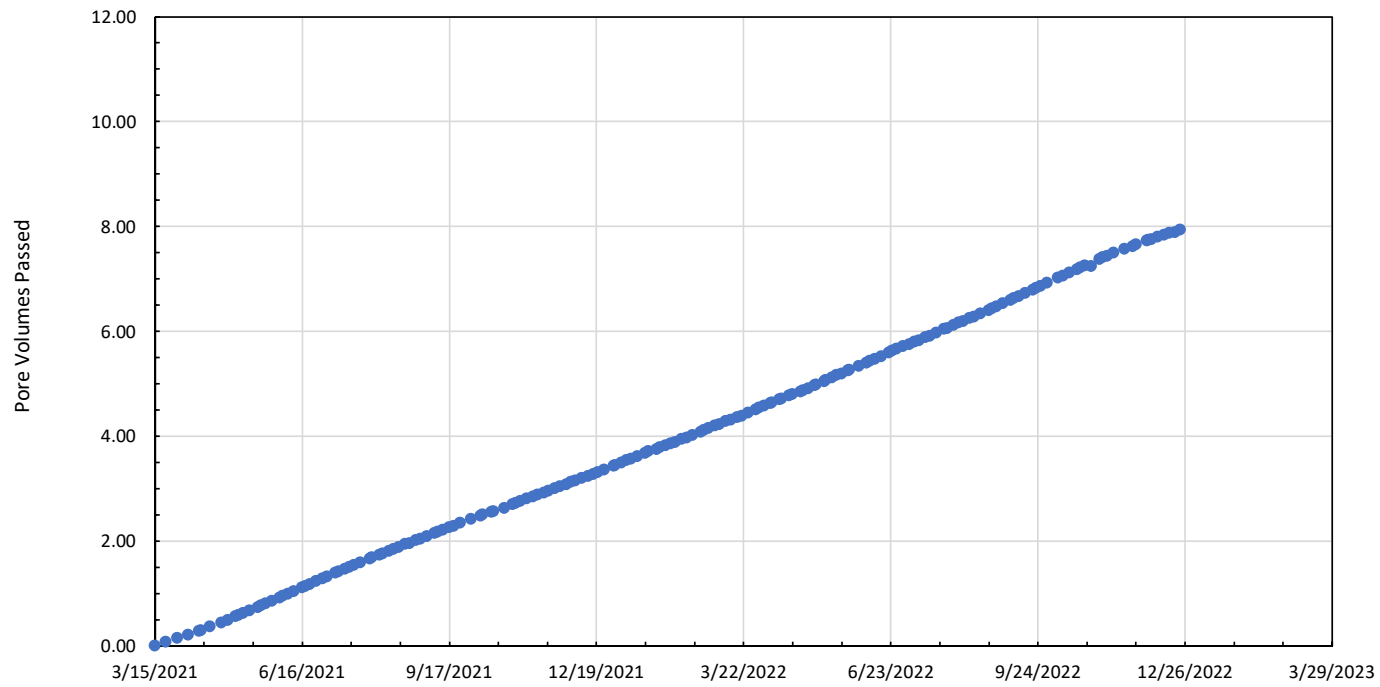
**B2-ST-1 (1-3') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

**Geosyntec**  
consultants  
Geosyntec Consultants of Michigan

Detroit, MI      April 2023

**Figure 3-11**



**B2-ST-4 (47-49') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

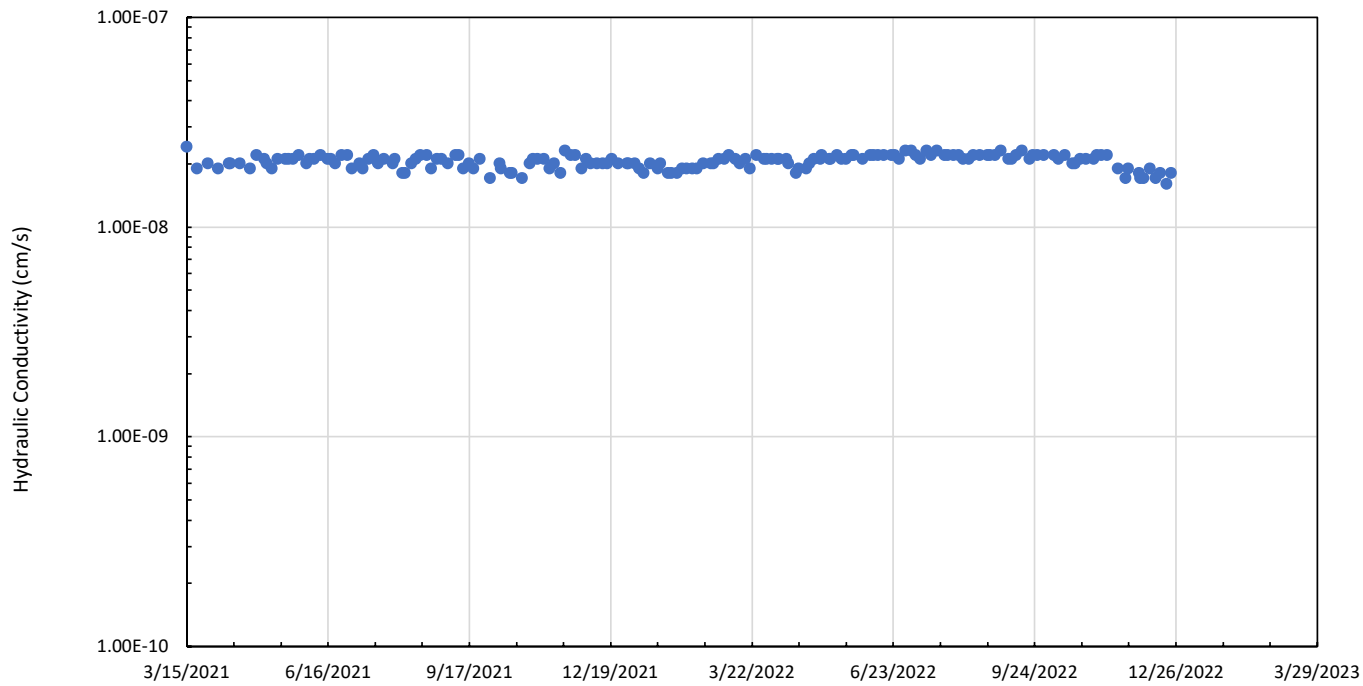



**Figure**

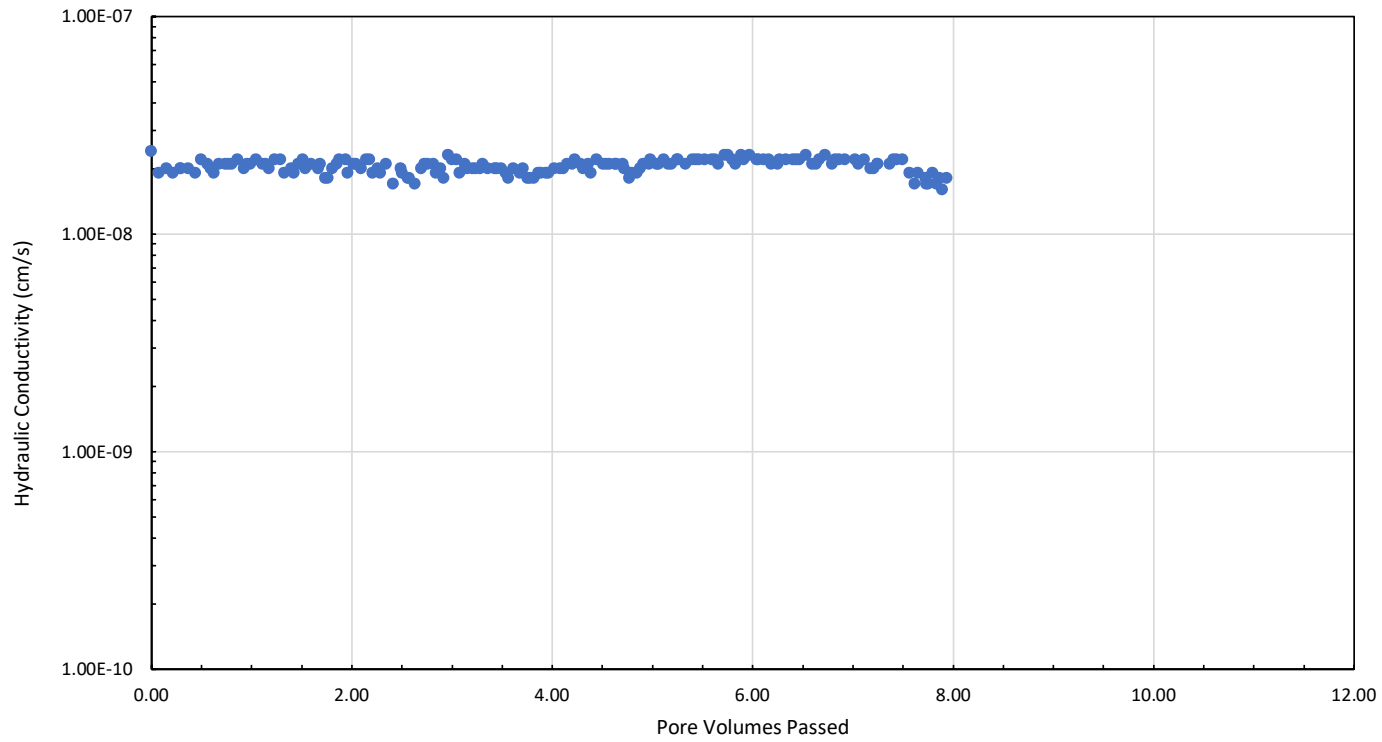
**3-12**


Detroit, MI

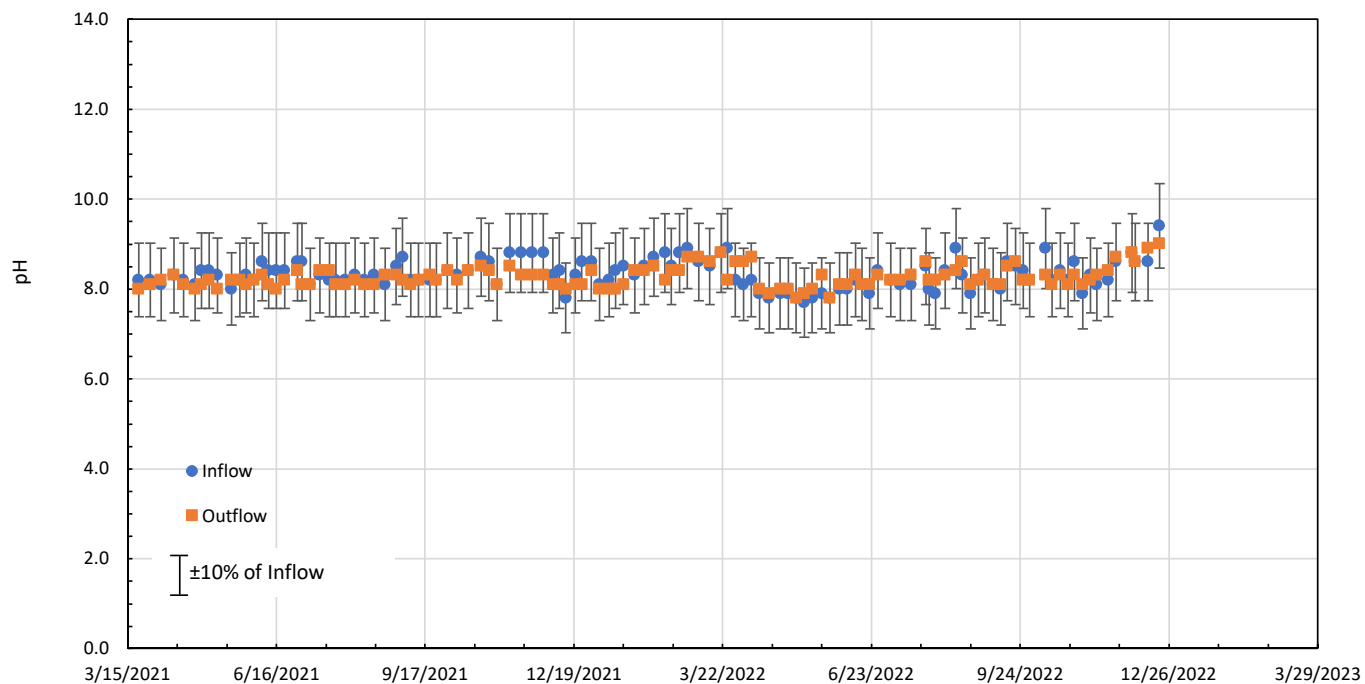
April 2023



<b>B2-ST-4 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-13</b>	



<b>B2-ST-4 (47-49') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	<b>Figure</b>
Detroit, MI	April 2023
<b>3-14</b>	



**B2-ST-4 (47-49') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



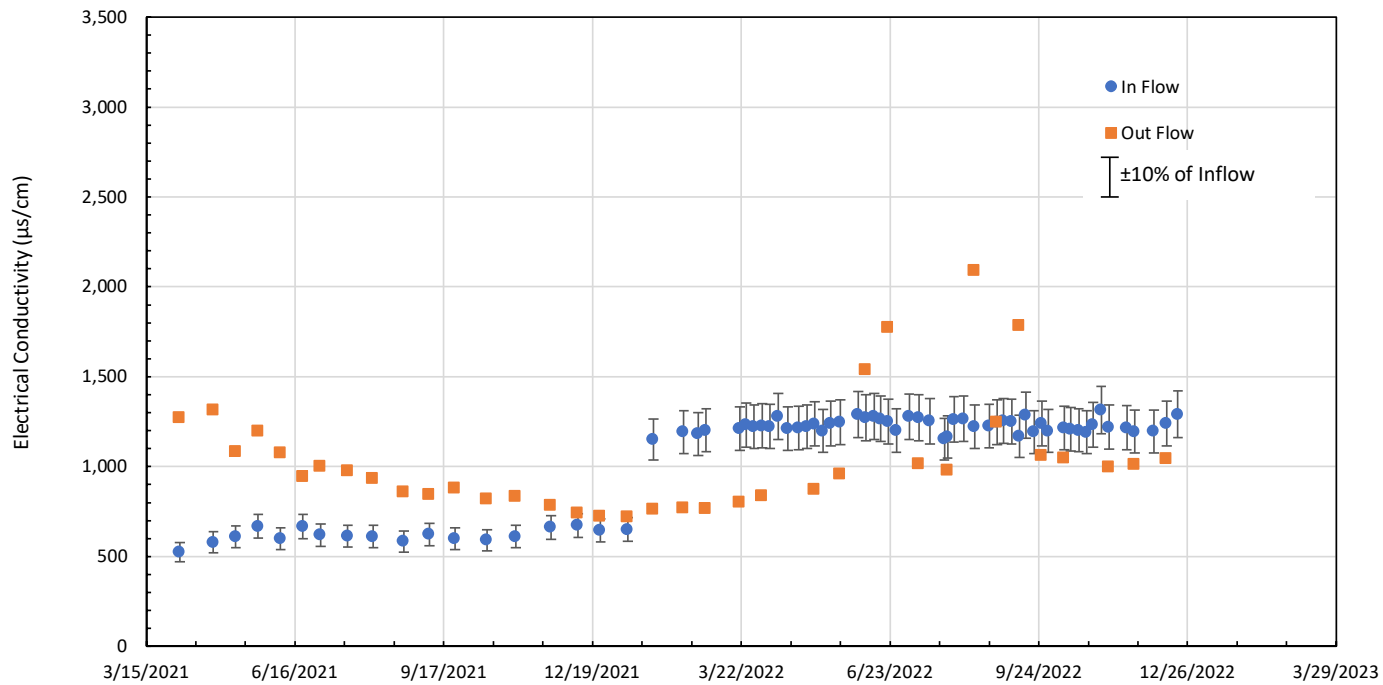
**Figure**


**3-15**

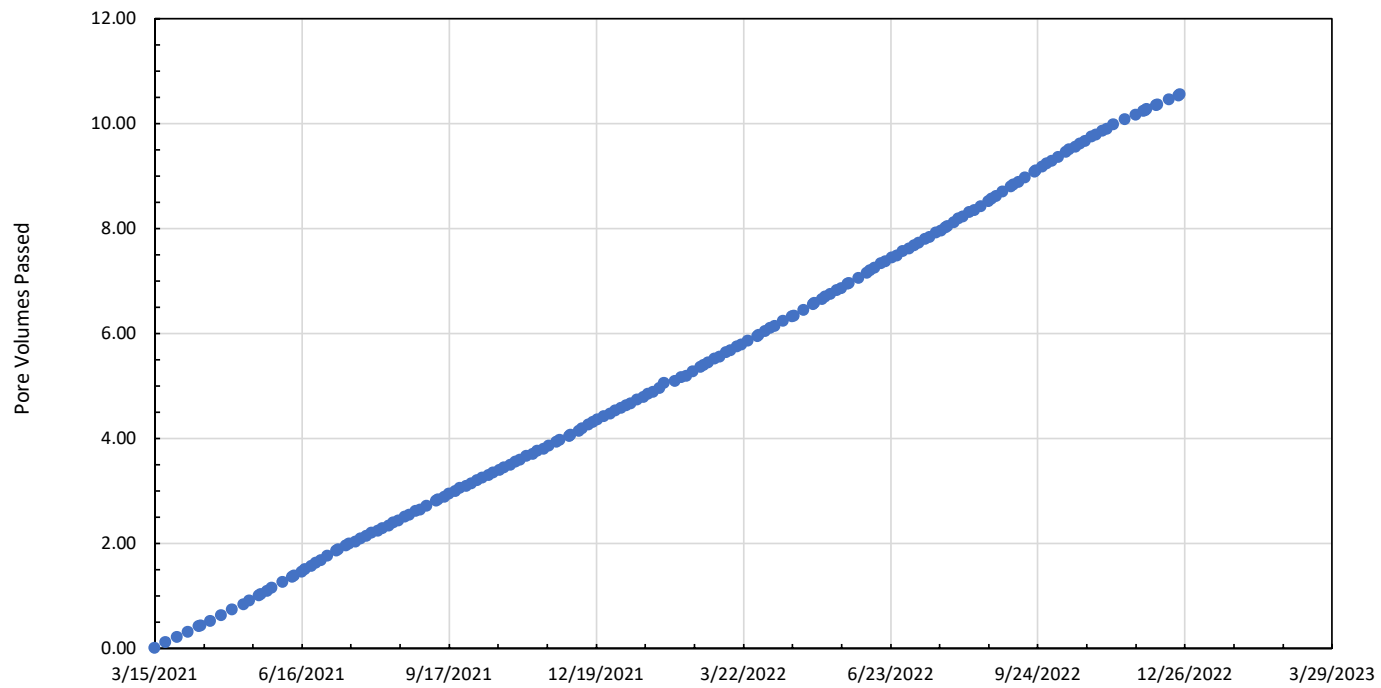
Detroit, MI

April 2023





<b>B2-ST-4 (47-49') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	Figure <b>3-16</b>
April 2023	



**B3-ST-5 (77-79') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

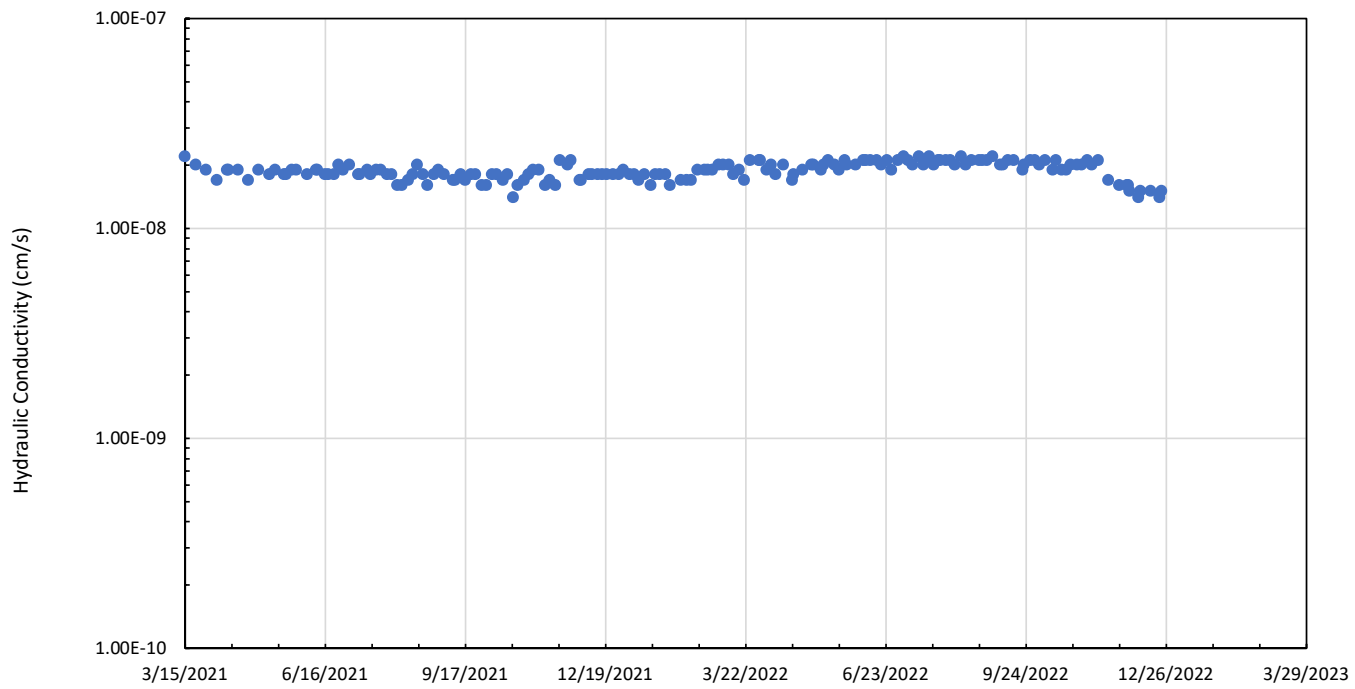



**Figure**

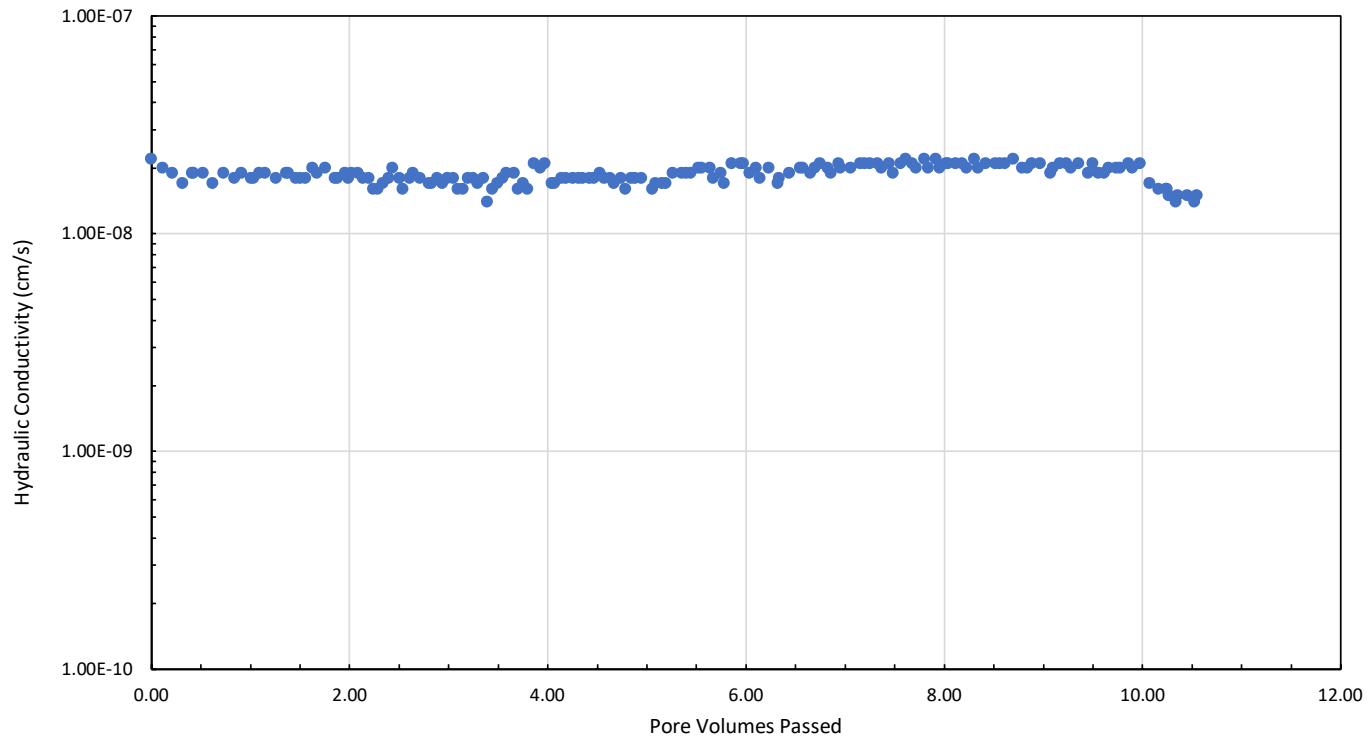
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Detroit, MI

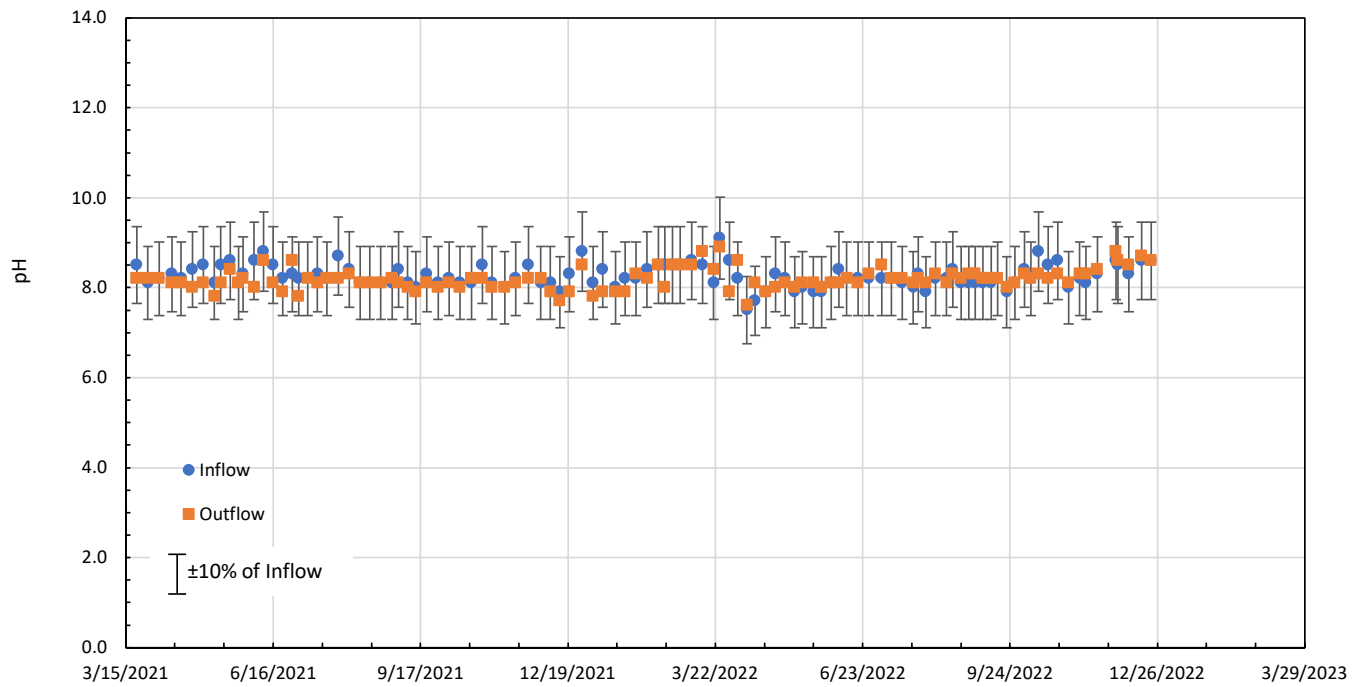
April 2023



<b>B3-ST-5 (77-79') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-18</b>	



<b>B3-ST-5 (77-79') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-19</b>	



**B3-ST-5 (77-79) pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

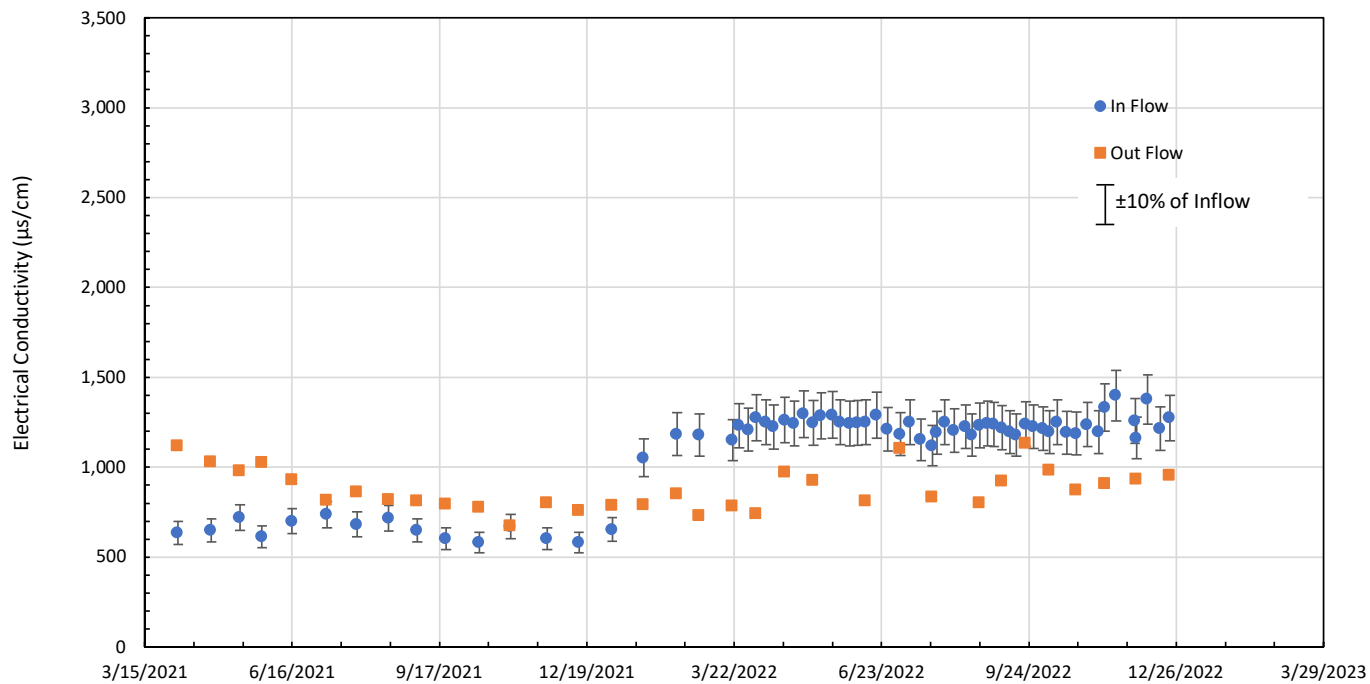
**Geosyntec**  
consultants  
Geosyntec Consultants of Michigan

Detroit, MI

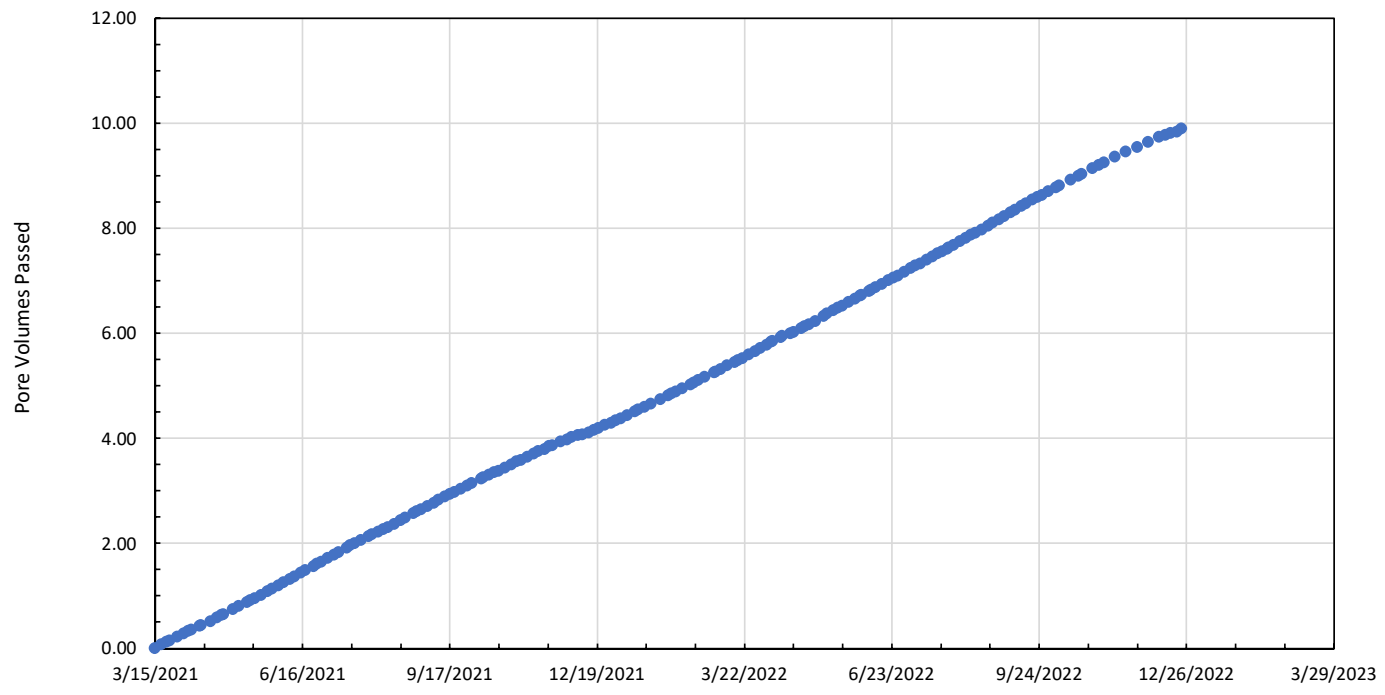
April 2023

**Figure**

**3-20**



<b>B3-ST-5 (77-79') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-21</b>	



**B4-ST-3 (47-49') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

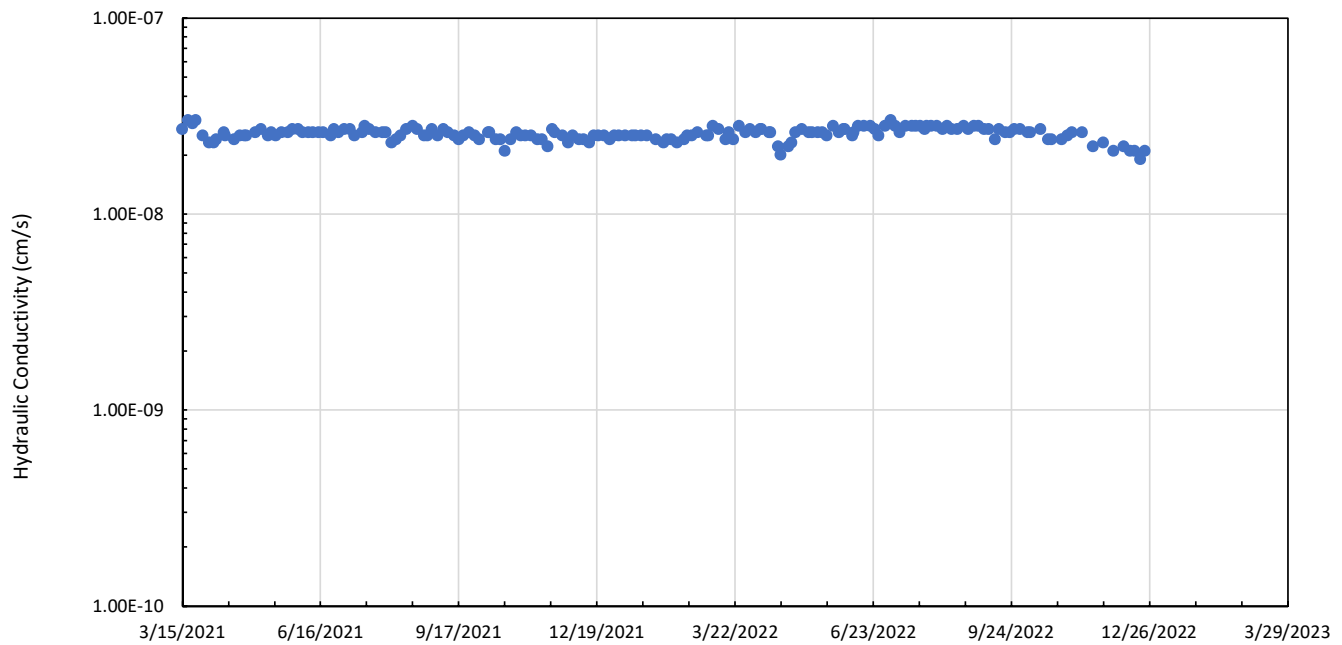



**Figure**

**3-22**

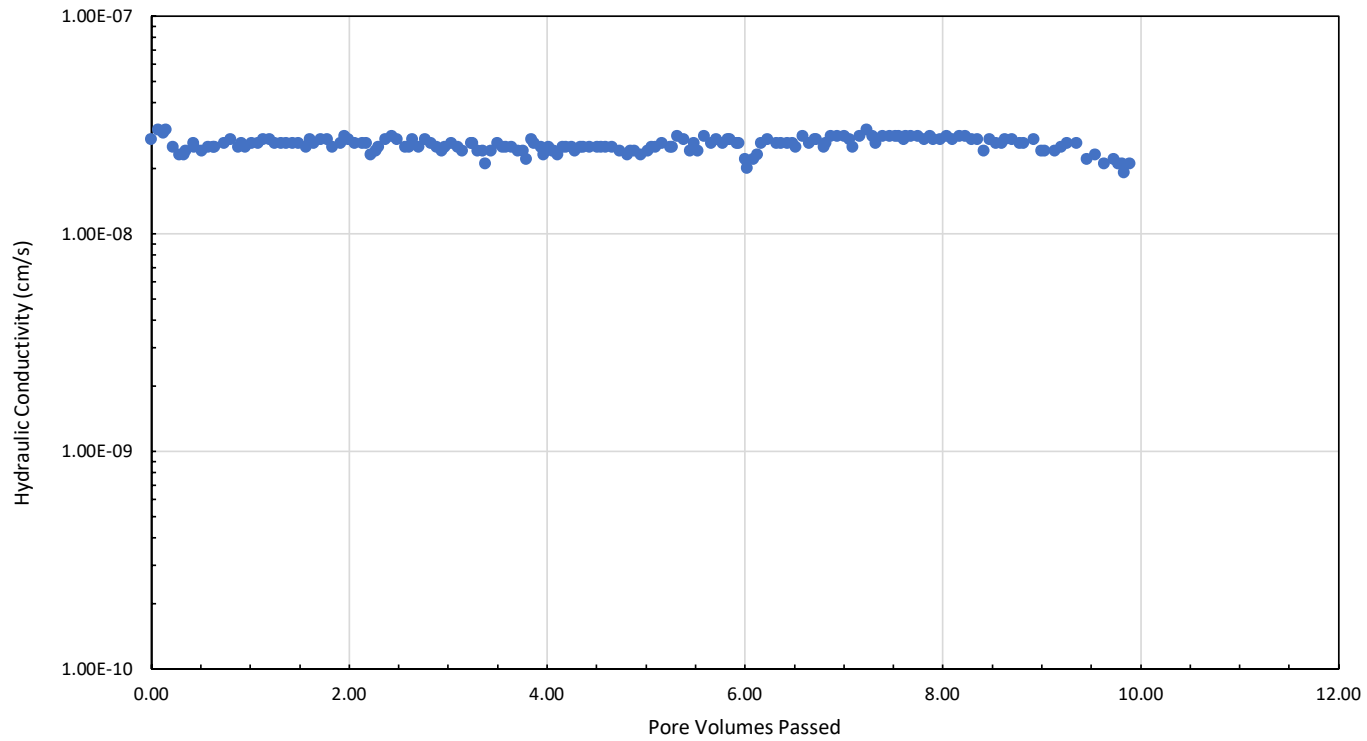
Detroit, MI


April 2023

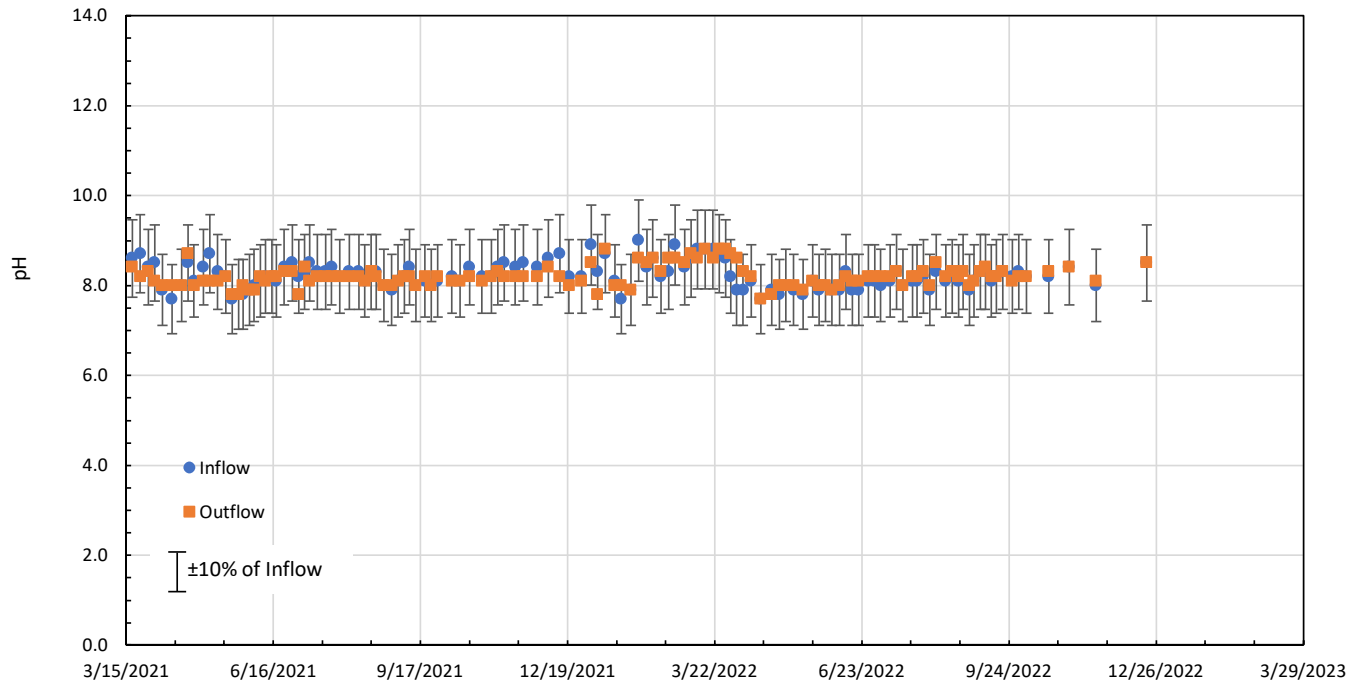



<b>B4-ST-3 (47-49') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-23</b>	

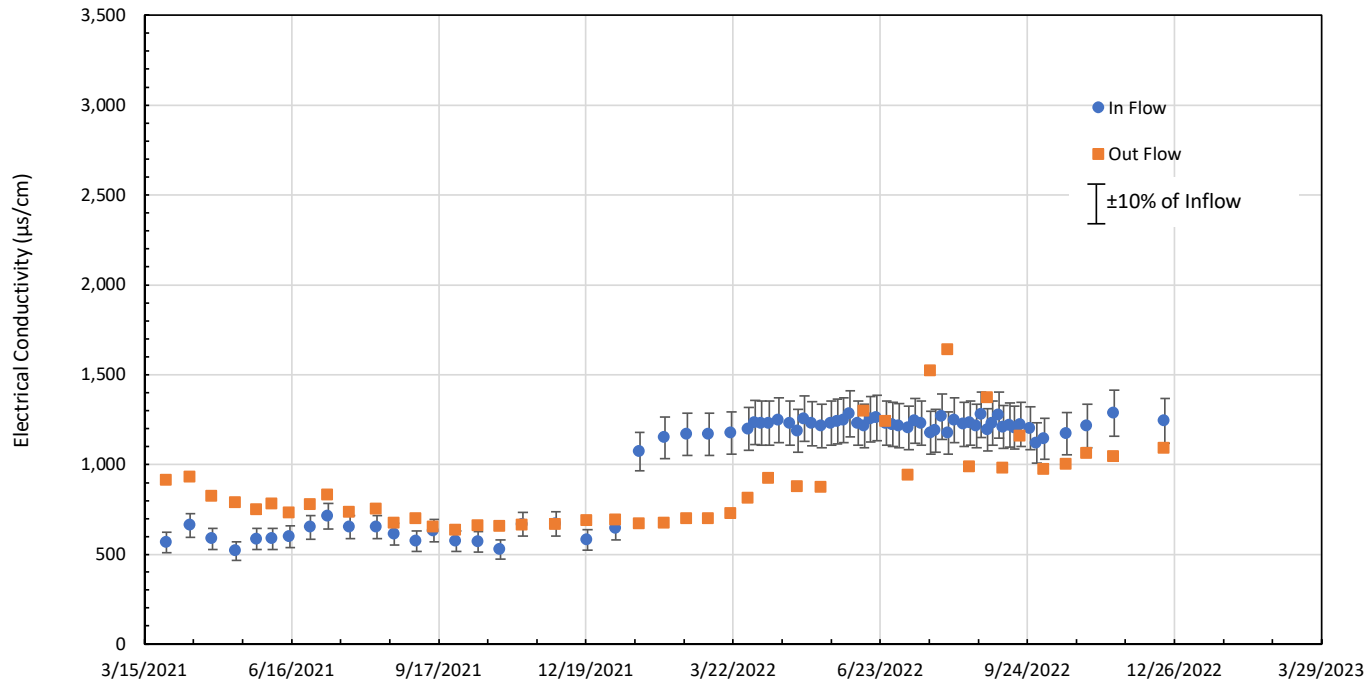




<b>B4-ST-3 (47-49') Hydraulic Conductivity with PV</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	<b>Figure</b>
	<b>3-24</b>
Detroit, MI	April 2023



<b>B4-ST-3 (47-49') pH of Inflow and Outflow with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 Geosyntec Consultants of Michigan	
Detroit, MI	April 2023
<b>Figure 3-25</b>	



**B4-ST-3 (47-49') Electrical Conductivity (EC) with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

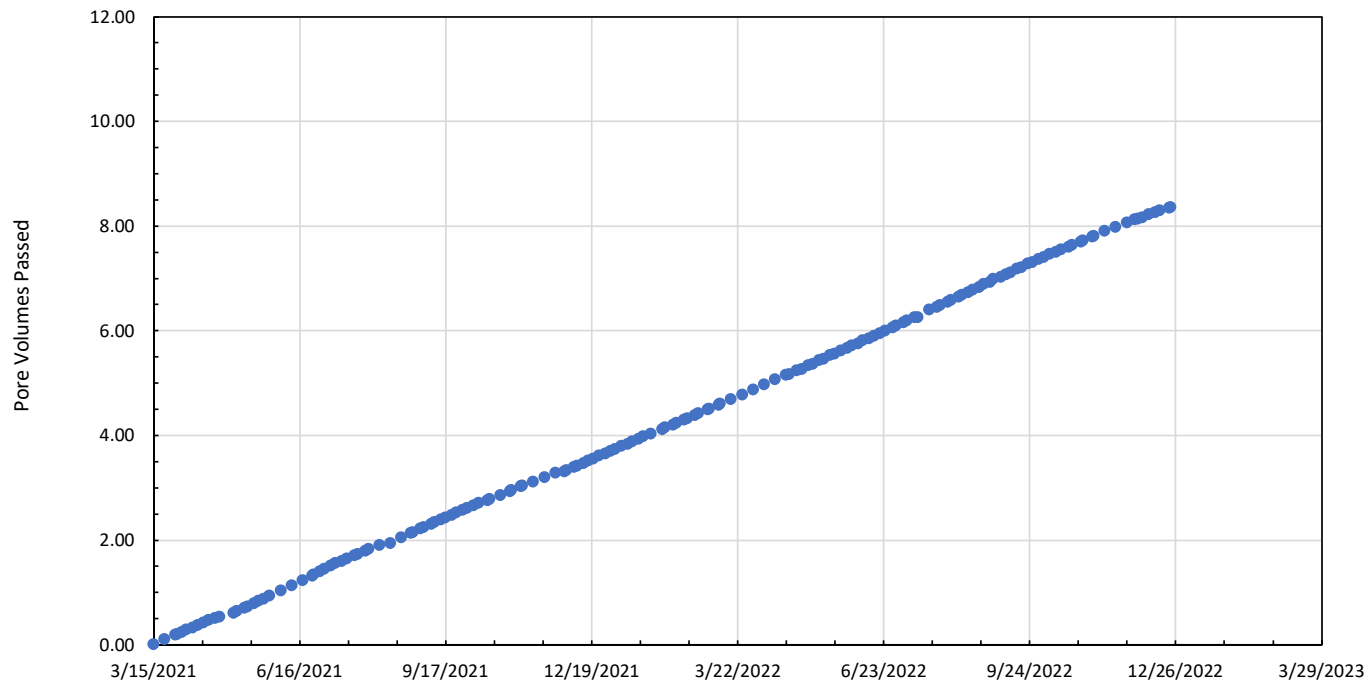


**Figure**

**3-26**

Detroit, MI

April 2023



**B5-ST-5 (87-89') PV Passed with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

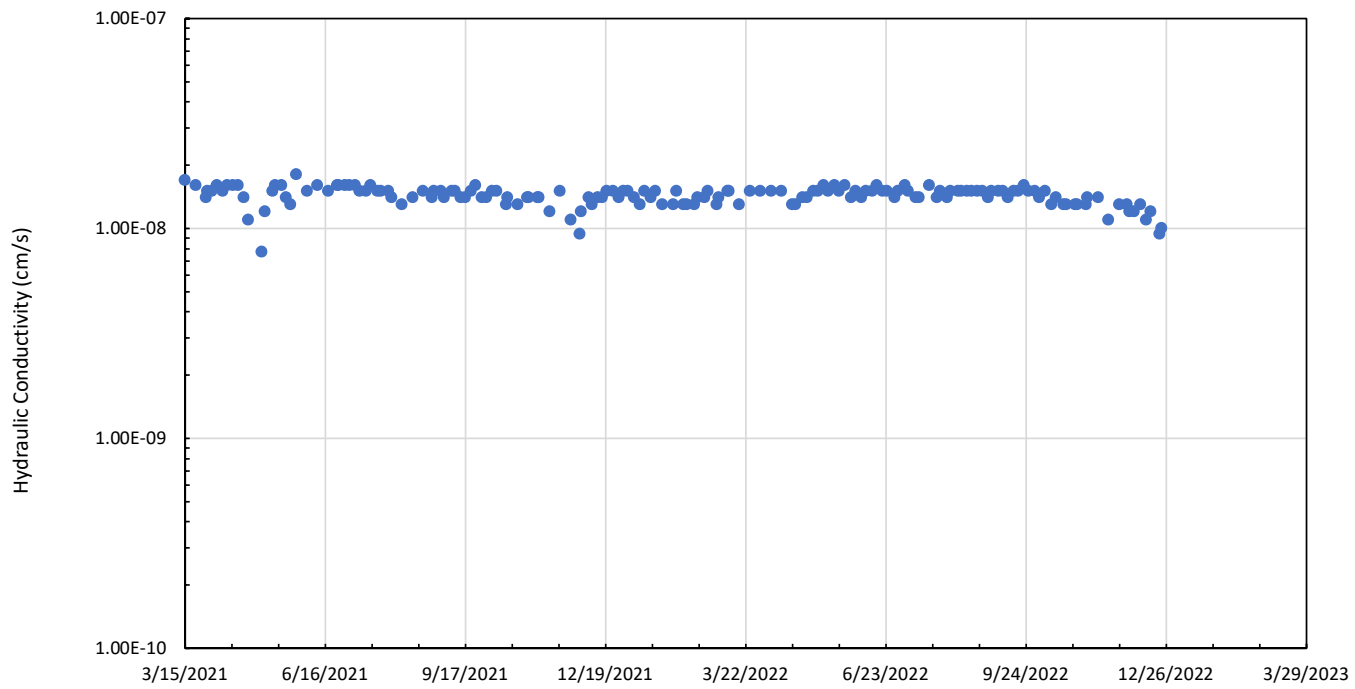



**Figure**

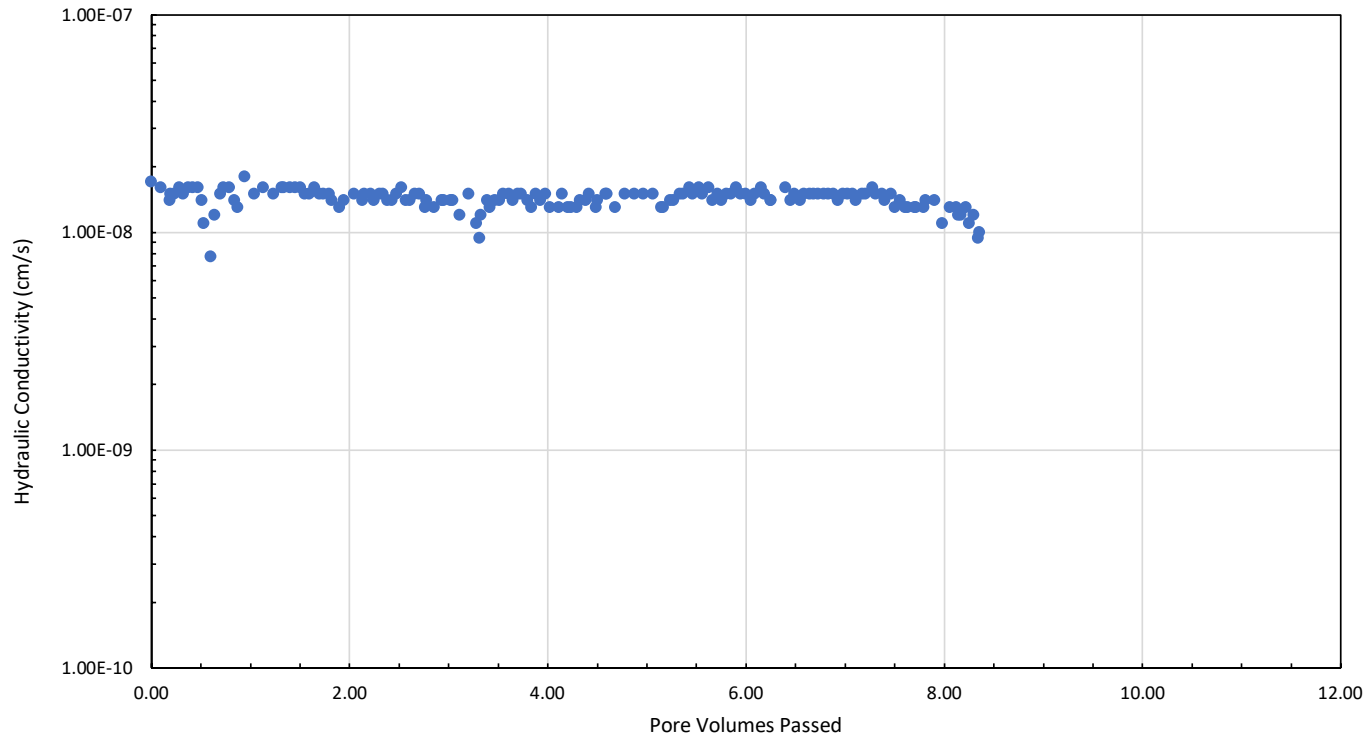
**3-27**

Detroit, MI

April 2023



<b>B5-ST-5 (87-89') Hydraulic Conductivity with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	April 2023
<b>Figure 3-28</b>	



**B5-ST-5 (87-89') Hydraulic Conductivity with PV**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN

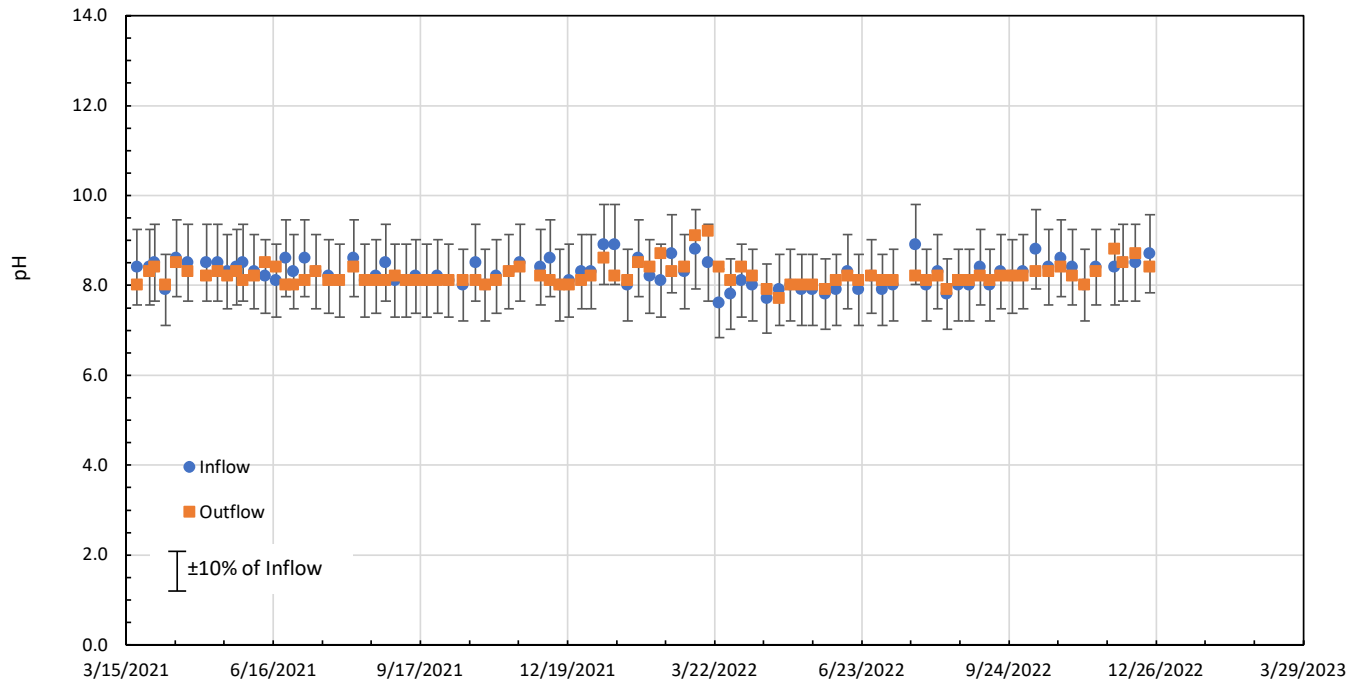


**Figure**

**3-29**

Detroit, MI

April 2023

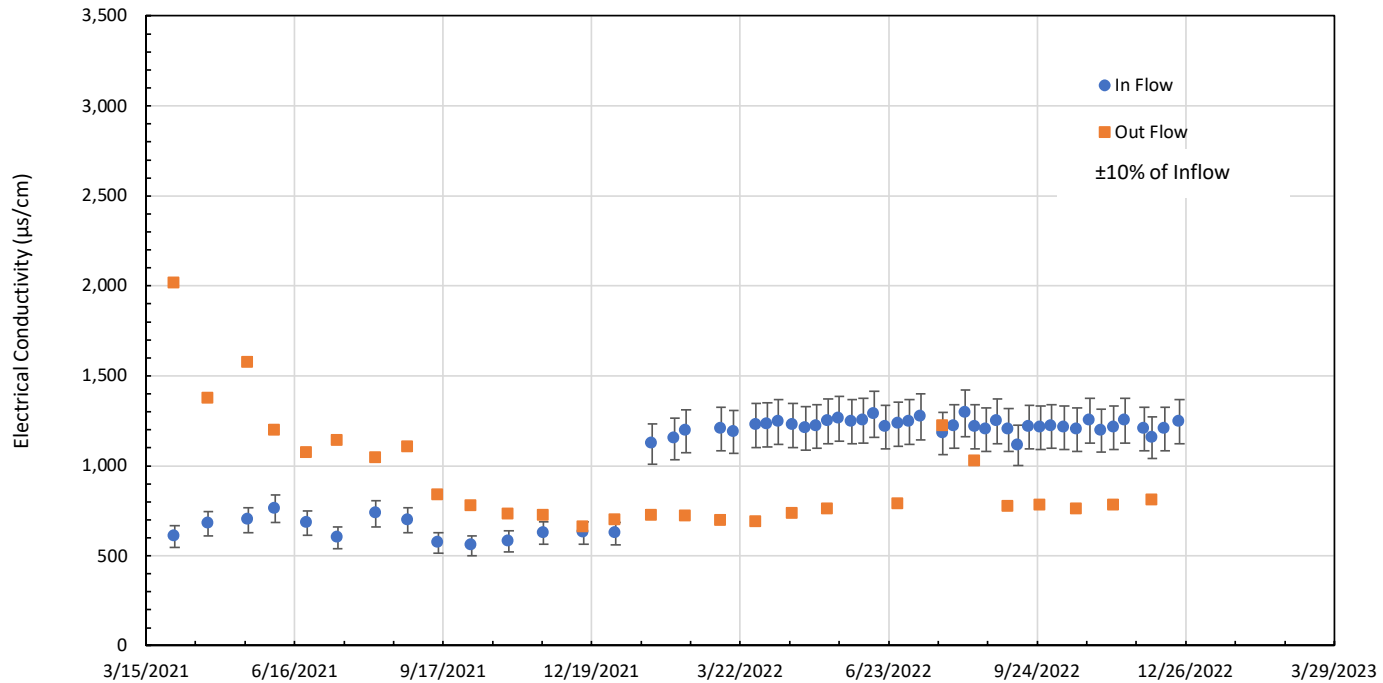



**B5-ST-5 (87-89') pH of Inflow and Outflow with Time**

BELLE RIVER POWER PLANT  
EAST CHINA TOWNSHIP, MICHIGAN



**Figure**  
**3-30**



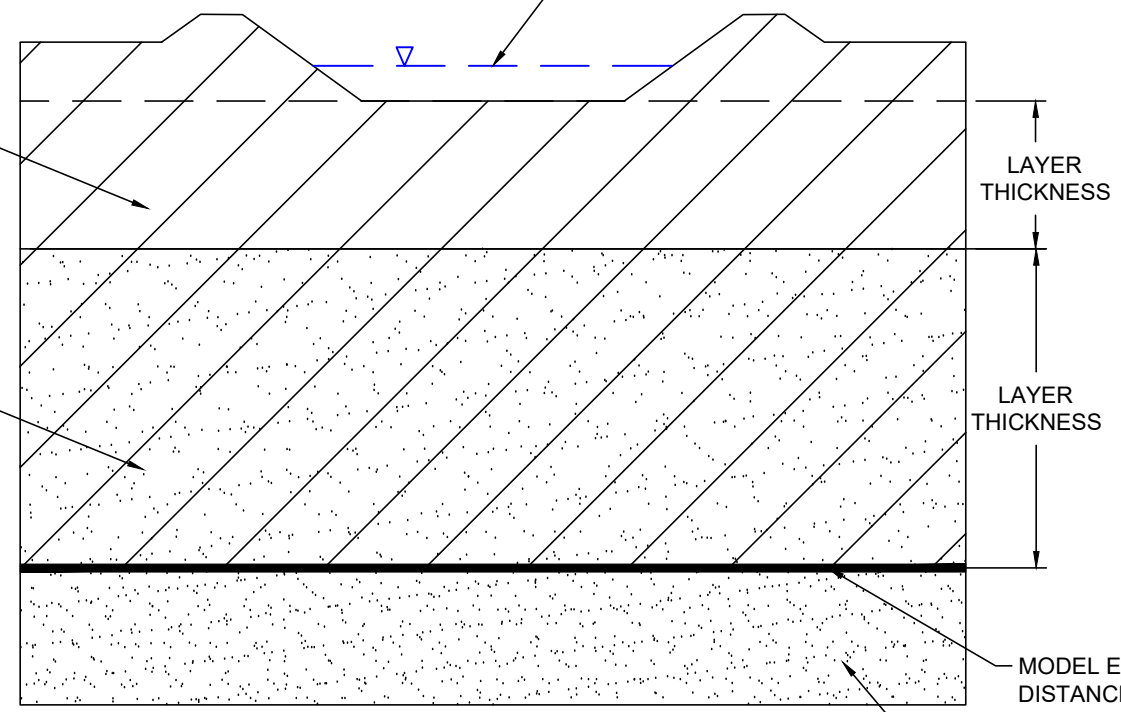
<b>B5-ST-5 (87-89') Electrical Conductivity (EC) with Time</b>	
BELLE RIVER POWER PLANT EAST CHINA TOWNSHIP, MICHIGAN	
 <small>Geosyntec Consultants of Michigan</small>	
Detroit, MI	Figure <b>3-31</b>
April 2023	



BOTTOM ASH BASIN (BAB)  
CCR SURFACE IMPOUNDMENT UNIT

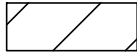


CLAY LAYER - LAYER 1		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	12.01
COEFFICIENT OF HYDODYNAMIC DISPERSION	$M^2/a$	0.019
EFFECTIVE POROSITY		0.42
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	$M^2/KG$	0
DEGRADATION		0


CLAY WITH SAND LAYER - LAYER 2		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	19.29
COEFFICIENT OF HYDODYNAMIC DISPERSION	$M^2/a$	0.019
EFFECTIVE POROSITY		0.51
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	$M^2/KG$	0
DEGRADATION		0



NOT TO SCALE

LEGEND

-  CLAY UNIT
-  CLAY WITH SAND UNIT
-  UPPER MOST AQUIFER

FATE AND TRANSPORT CONCEPTUAL MODEL BELLE RIVER ALD - BAB	
 <small>Geosyntec Consultants of Michigan</small>	
PROJECT NO: GLP8017	April 2023
FIGURE 4-1	

**APPENDIX A – MONITORING WELL SLUG TEST  
RESULTS**

## **2016 Slug Test Results**

**Hydraulic Conductivity Results**  
DTE Electric Company Belle River Power Plant  
ChinaTownship, Michigan

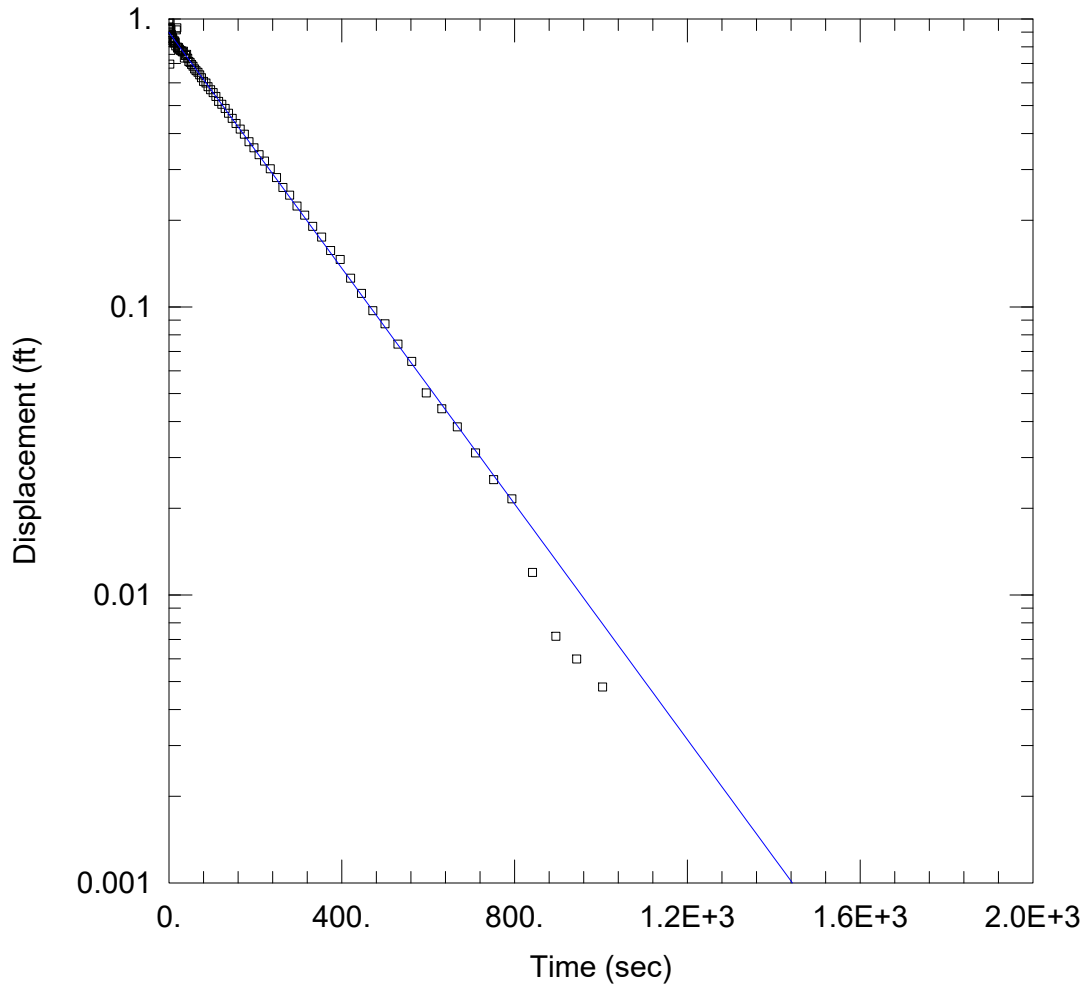
Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01b	3/1/2016	Falling Head	3.58E-04	1.015
		Rising Head	2.72E-04	0.770
		<b>Average</b>	<b>3.15E-04</b>	<b>0.892</b>
MW-16-04	3/1/2016	Falling Head	7.93E-05	0.225
		Rising Head	4.11E-05	0.116
		<b>Average</b>	<b>6.02E-05</b>	<b>0.171</b>
MW-16-05	3/1/2016	Falling Head	4.26E-05	0.121
		Rising Head	2.13E-05	0.060
		<b>Average</b>	<b>3.19E-05</b>	<b>0.090</b>
MW-16-07	3/1/2016	Falling Head	1.24E-04	0.350
		Rising Head	7.21E-05	0.204
		<b>Average</b>	<b>9.79E-05</b>	<b>0.277</b>
<b>Minimum</b>			<b>3.19E-05</b>	<b>9.05E-02</b>
<b>Maximum</b>			<b>3.15E-04</b>	<b>8.92E-01</b>
<b>Geometric Mean</b>			<b>8.77E-05</b>	<b>0.249</b>

**Conversion:**

$$\frac{1 \text{ cm}}{1 \text{ sec}} \times \frac{86,400 \text{ sec}}{1 \text{ day}} \times \frac{1 \text{ ft}}{30.48 \text{ cm}} = 2.83\text{E}+03 \frac{\text{ft}}{\text{day}}$$

**Notes:**

Slug test results calculated using the Bower-Rice (1976) Solution.



MW-16-01 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_IN.aqt  
 Date: 05/22/17

Time: 13:38:07

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-01  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

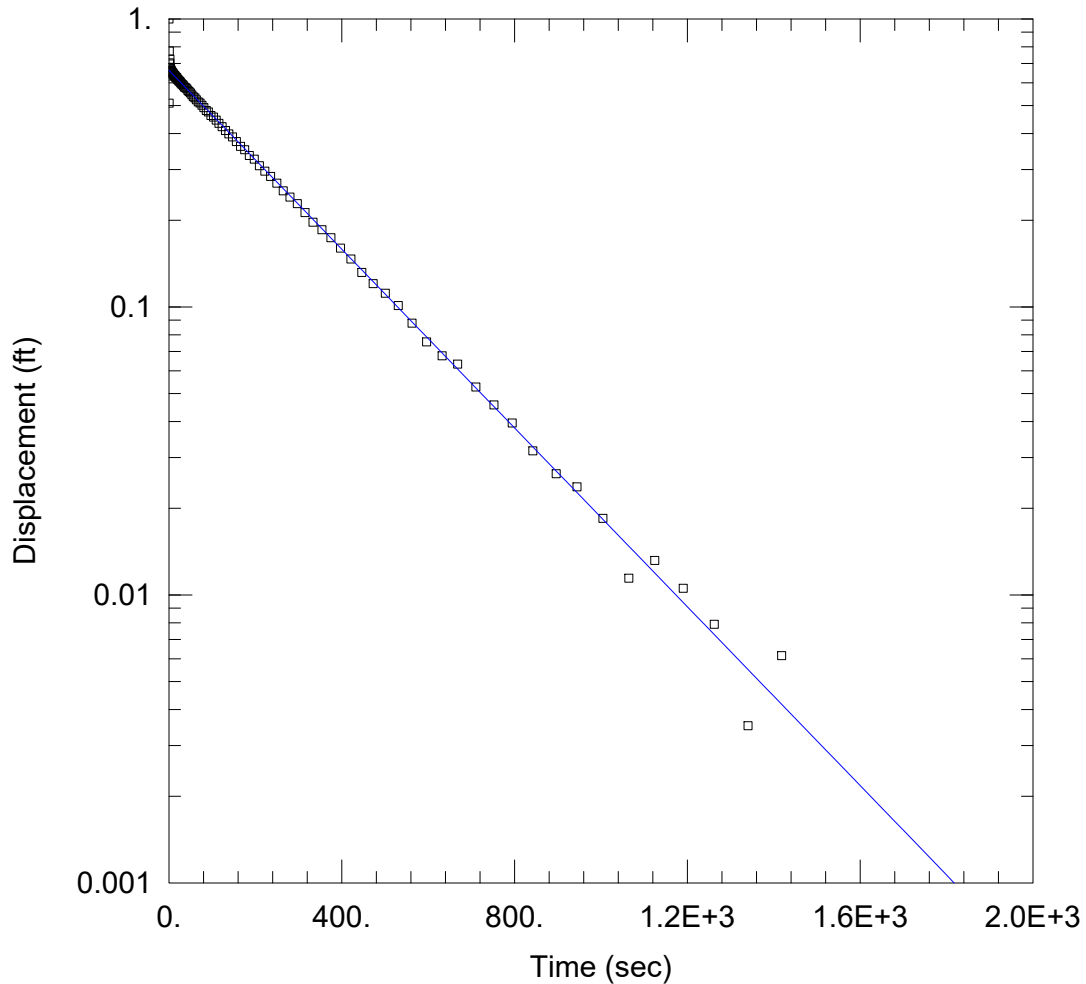
Initial Displacement: 0.835 ft  
 Total Well Penetration Depth: 84.12 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 84.12 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 0.0003581 cm/sec

Solution Method: Bowser-Rice  
 y0 = 0.7491 ft



MW-16-01 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01\_OUT.aqt  
 Date: 05/22/17

Time: 13:40:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-01  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 52. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

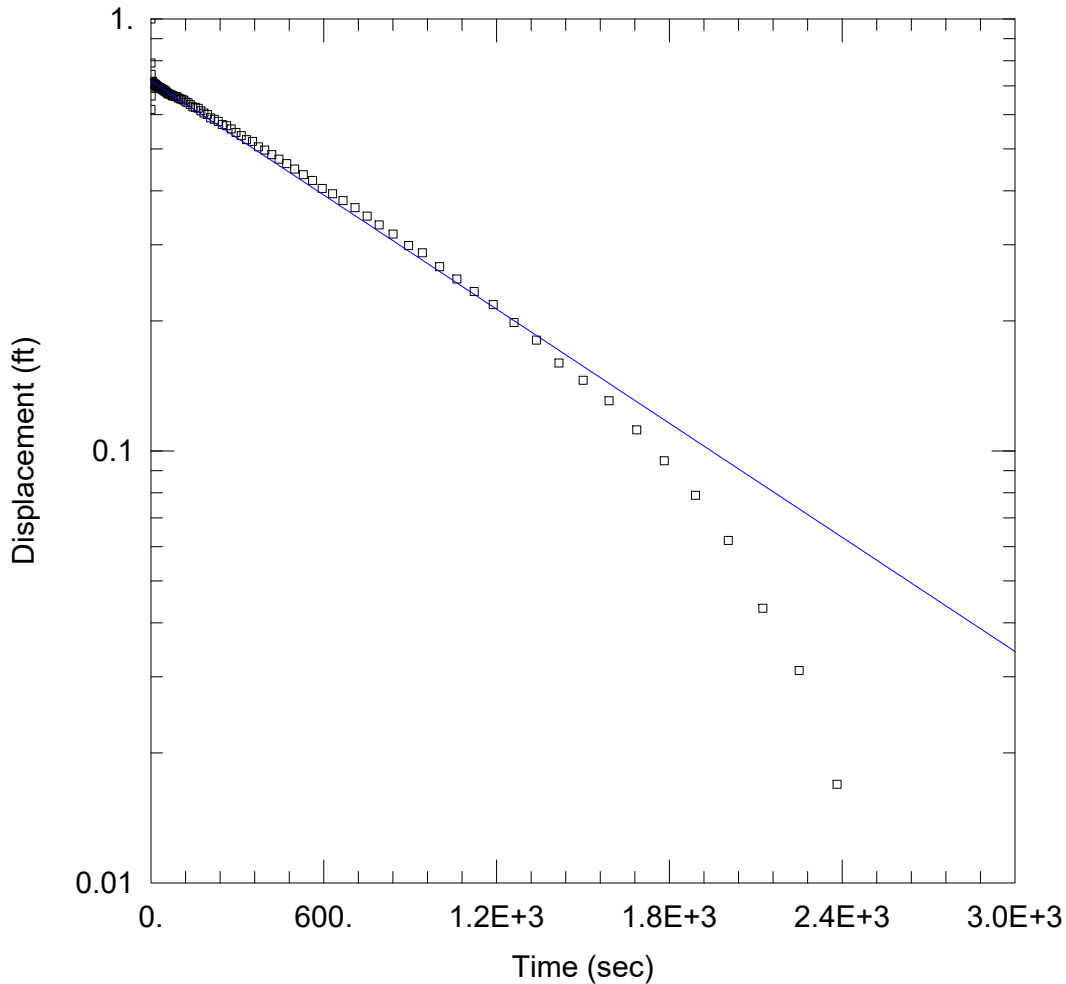
Initial Displacement: 1.138 ft  
 Total Well Penetration Depth: 84.07 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 84.07 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 0.0002716 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7541 ft



MW-16-04 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_IN.aqt  
 Date: 05/22/17

Time: 13:41:00

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

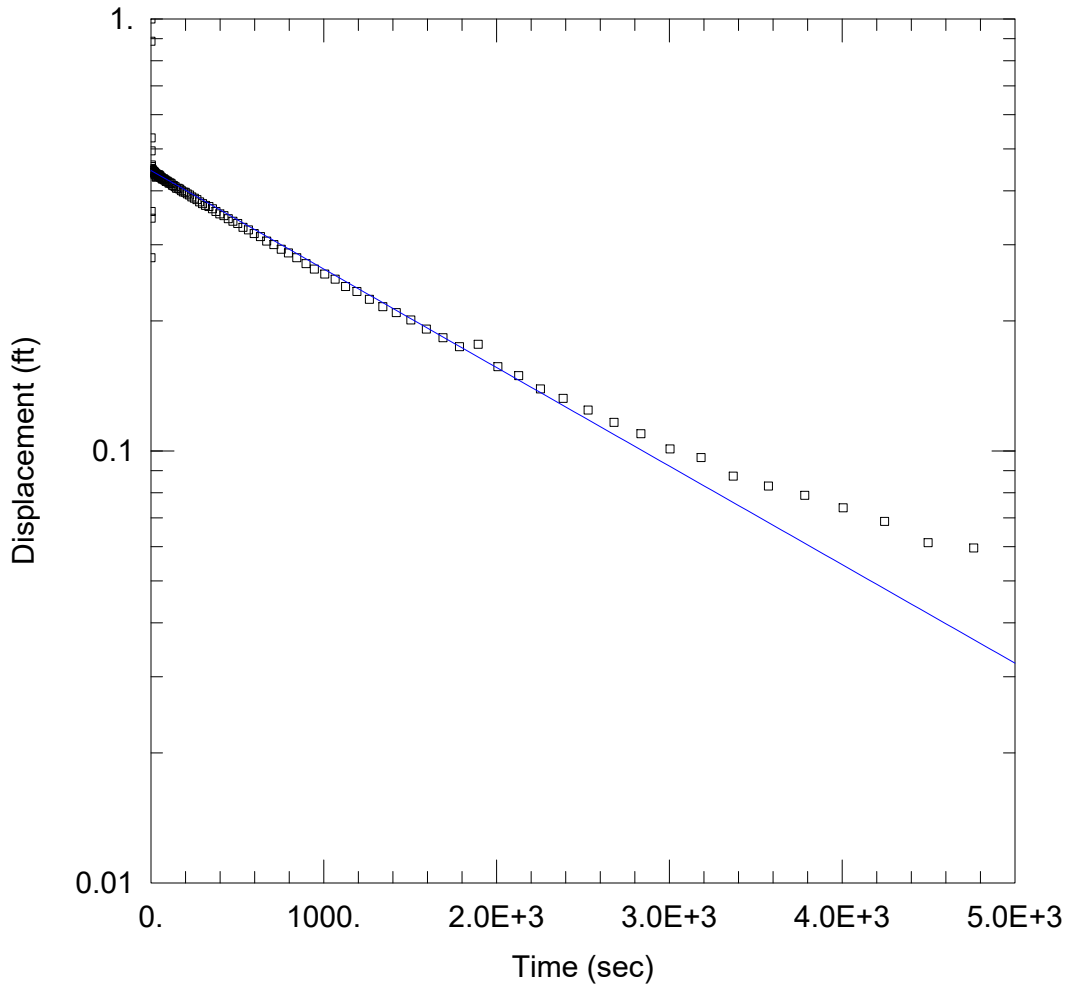
Initial Displacement: 1.064 ft  
 Total Well Penetration Depth: 109.9 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.9 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.93E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7646 ft



MW-16-04 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-04\_OUT.aqt  
 Date: 05/22/17

Time: 13:42:08

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-04  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-04)

Initial Displacement: 1.761 ft  
 Total Well Penetration Depth: 109.7 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 109.7 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 4.108E-5 cm/sec

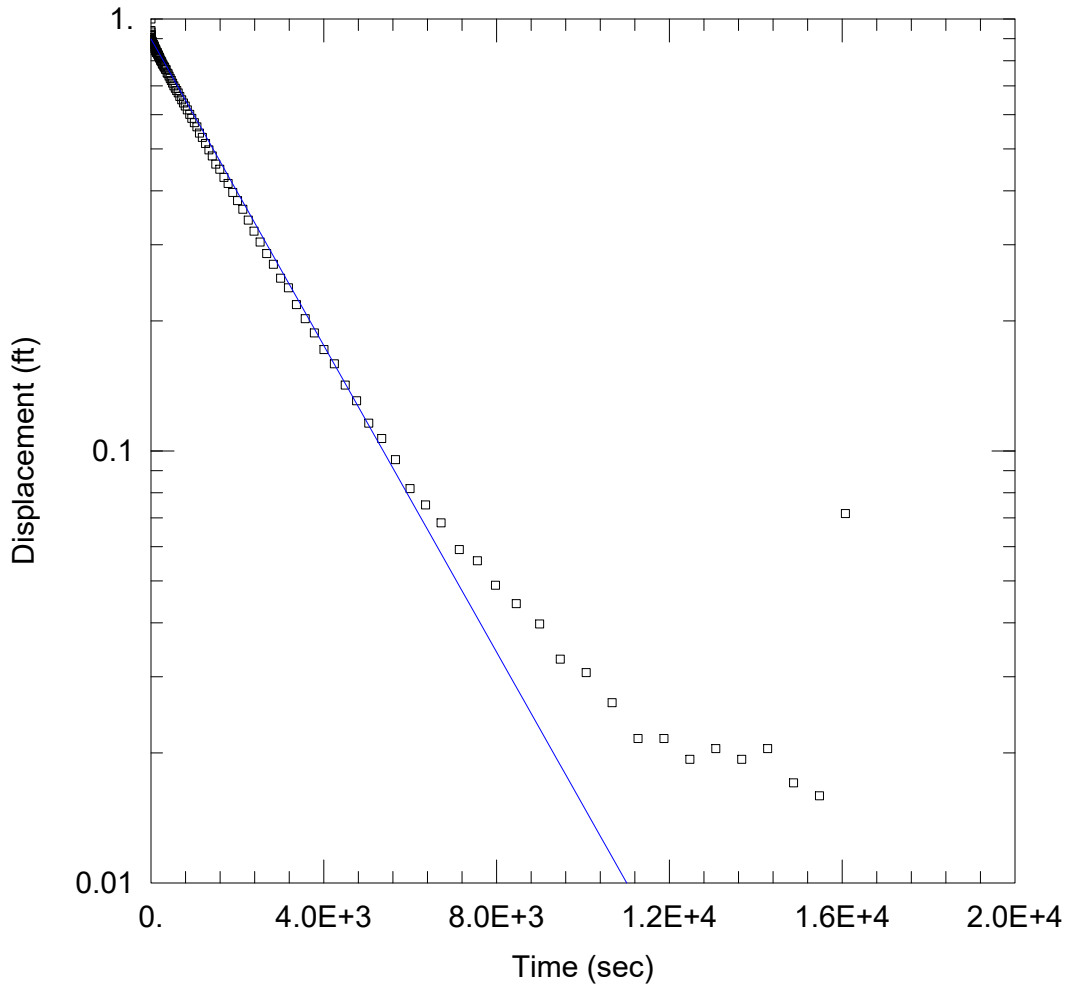
Solution Method: Bouwer-Rice  
 y0 = 0.7851 ft











MW-16-07 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-07\_OUT.aqt  
 Date: 05/22/17

Time: 13:44:45

PROJECT INFORMATION

Company: TRC Environmental Corporation  
 Client: DTE EC BRPP CCR  
 Project: 231828.0003.0000  
 Location: China Township, MI  
 Test Well: MW-16-07  
 Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.88 ft  
 Total Well Penetration Depth: 124.4 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 124.4 ft  
 Screen Length: 5. ft  
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined  
 K = 7.212E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 0.7909 ft

## **2021 Slug Test Results**

**2021 Hydraulic Conductivity Results Summary**  
**DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin**  
**4505 King Road, China Township, Michigan**

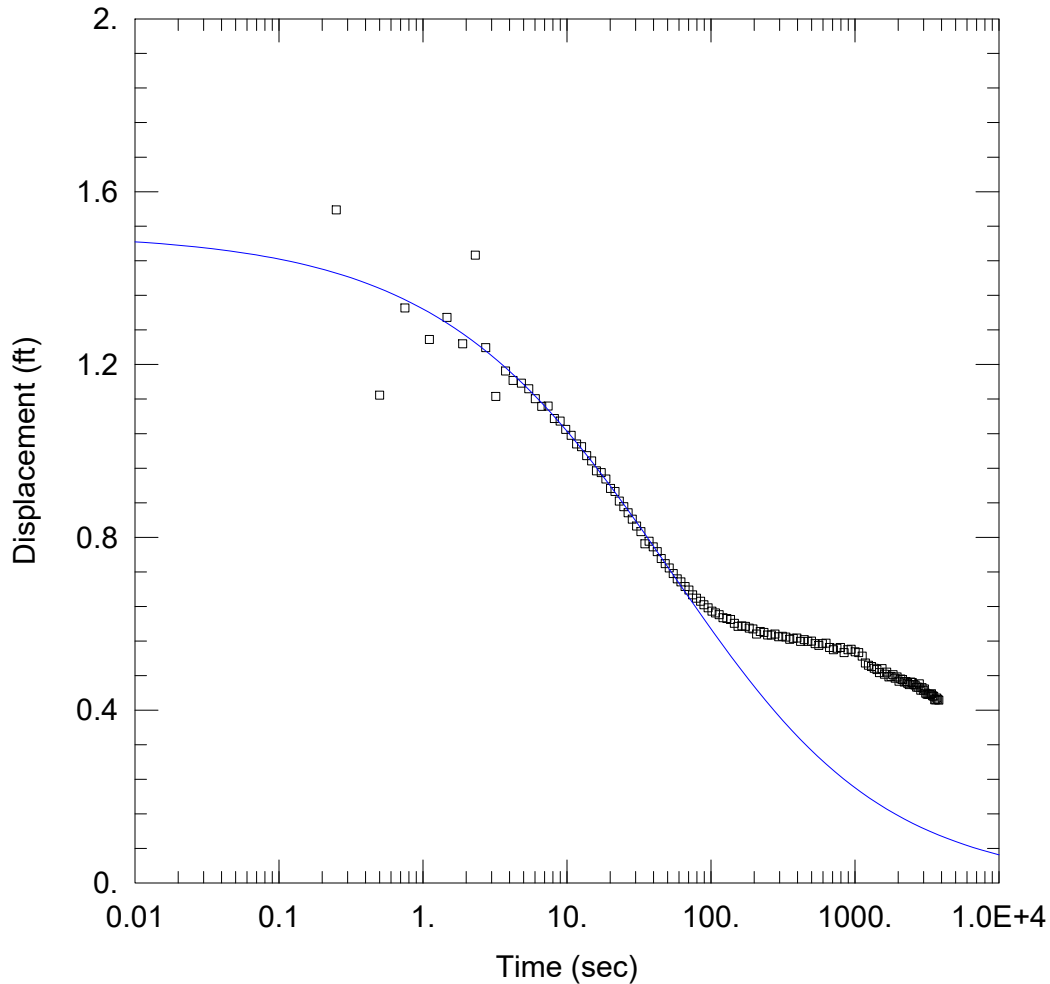
Test	WC (ft)	K (cm/s)	K (ft/day)	Comment/K Geometric mean (cm/s)	K Geometric mean (ft/day)
MW-16-02 Slug In	85.8	NA	NA	Not a good match, use slug out test	NA
MW-16-02 Slug Out	85.8	4.2E-04	1.2	4.2E-04	1.2
MW-16-03 Slug In	123.1	9.8E-03	27.8	9.6E-03	27.4
MW-16-03 Slug Out	123.1	9.5E-03	26.9		
MW-16-06 Slug In	125.6	1.0E-04	0.28	1.0E-04	0.30
MW-16-06 Slug Out	125.6	1.1E-04	0.31		
MW-16-08 Slug In	124.9	1.2E-05	0.03	1.1E-05	0.03
MW-16-08 Slug Out	124.9	1.1E-05	0.03		
MW-16-09 Slug In	126.9	1.5E-04	0.43	1.5E-04	0.43
MW-16-09 Slug Out	126.9	1.5E-04	0.43		
MW-16-10 Slug In	135.3	3.6E-05	0.10	3.6E-05	0.10
MW-16-10 Slug Out	135.3	3.7E-05	0.10		
MW-16-11A Slug In	127.3	6.1E-05	0.17	6.3E-05	0.18
MW-16-11A Slug Out	127.3	6.5E-05	0.18		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A 5' long by 1" diameter slug was utilized to complete slug tests in these wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 In.aqt  
 Date: 10/29/21 Time: 11:44:26

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

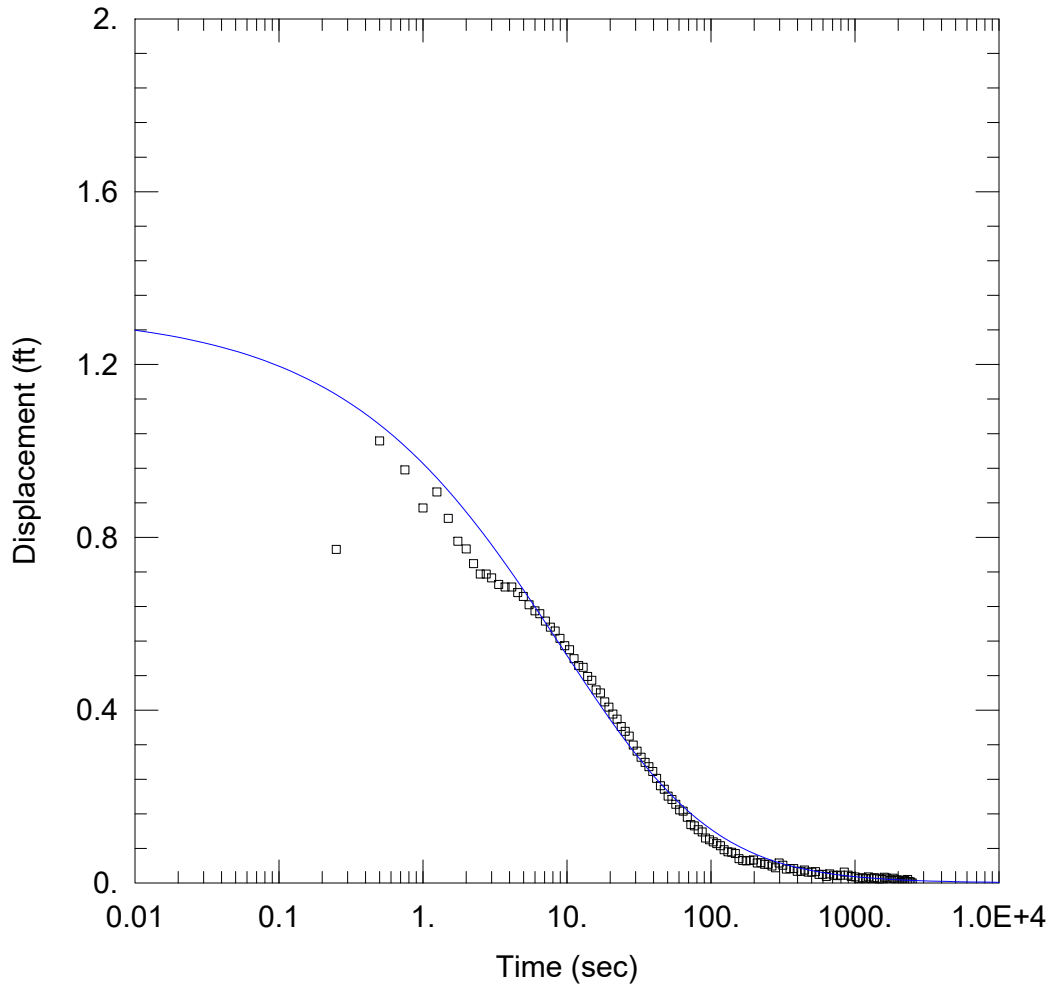
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 1.503 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.0006905 cm<sup>2</sup>/sec S = 3.692



WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 Out.aqt  
 Date: 10/29/21 Time: 11:46:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-02  
 Test Date: 9/17/2021

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

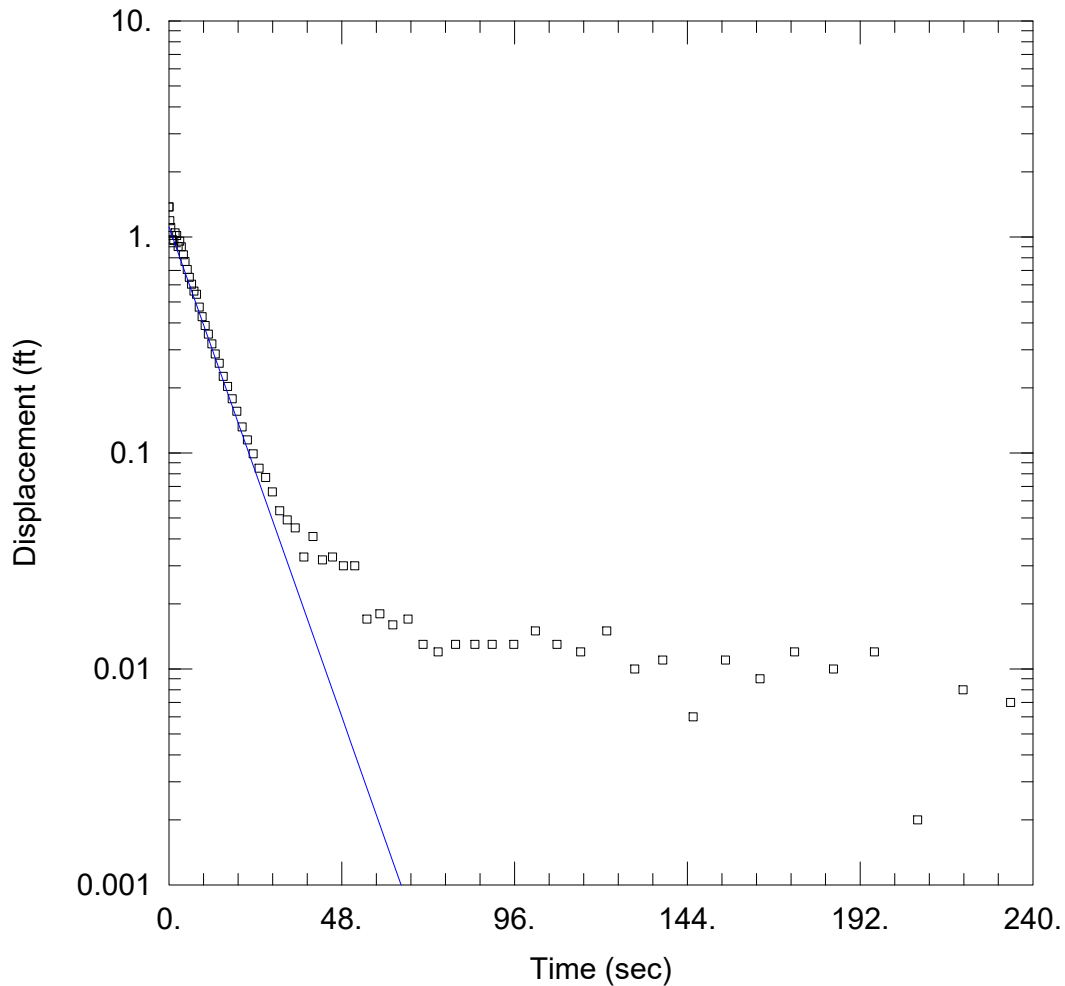
WELL DATA (MW-16-02)

Initial Displacement: 1.32 ft Static Water Column Height: 85.8 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.1533 cm<sup>2</sup>/sec S = 0.1





WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 In.aqt  
 Date: 10/29/21 Time: 11:52:09

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

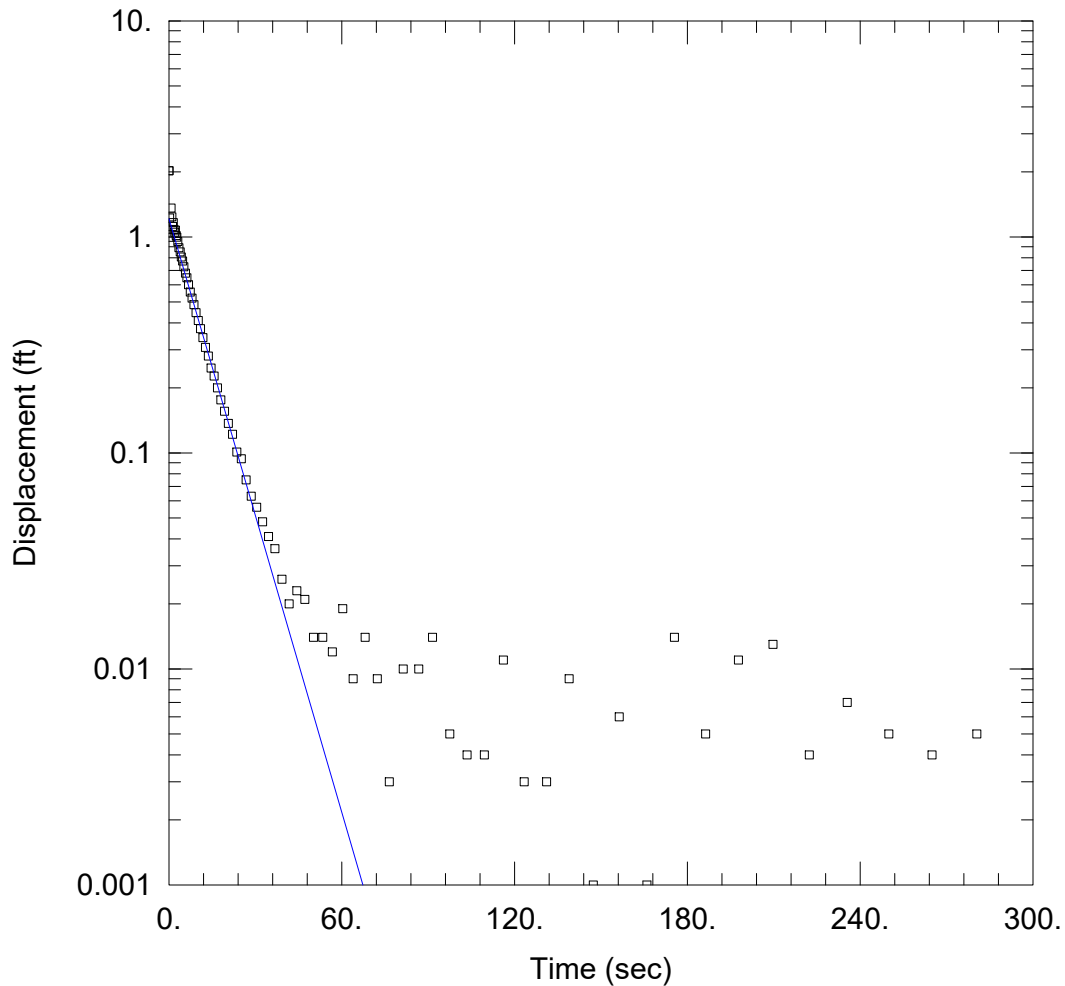
Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 1.376 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.009782$  cm/sec  $y_0 = 1.113$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 Out.aqt  
 Date: 10/29/21 Time: 11:53:59

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-03  
 Test Date: 9/17/2021

AQUIFER DATA

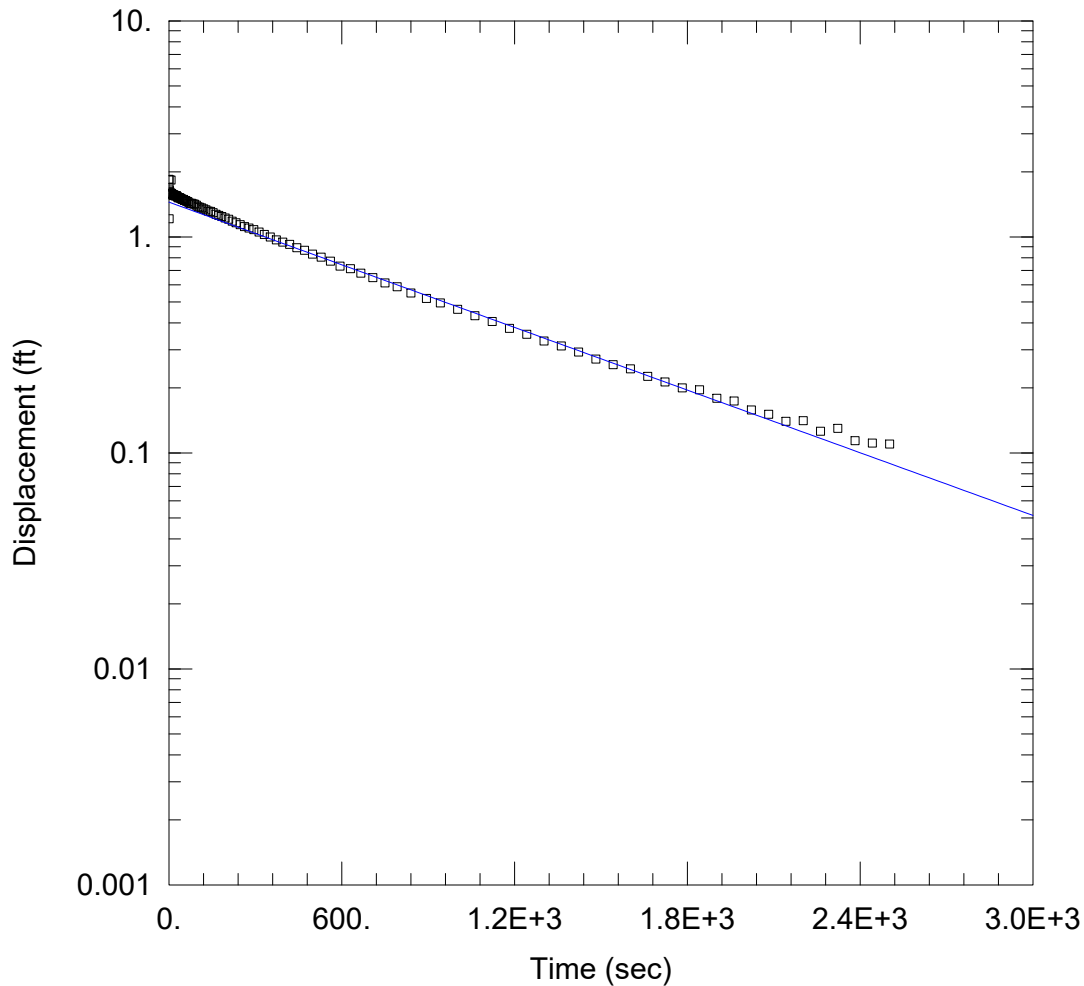
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 2.023 ft Static Water Column Height: 123.1 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.009488 cm/sec y0 = 1.215 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 In.aqt  
 Date: 10/29/21 Time: 11:57:18

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

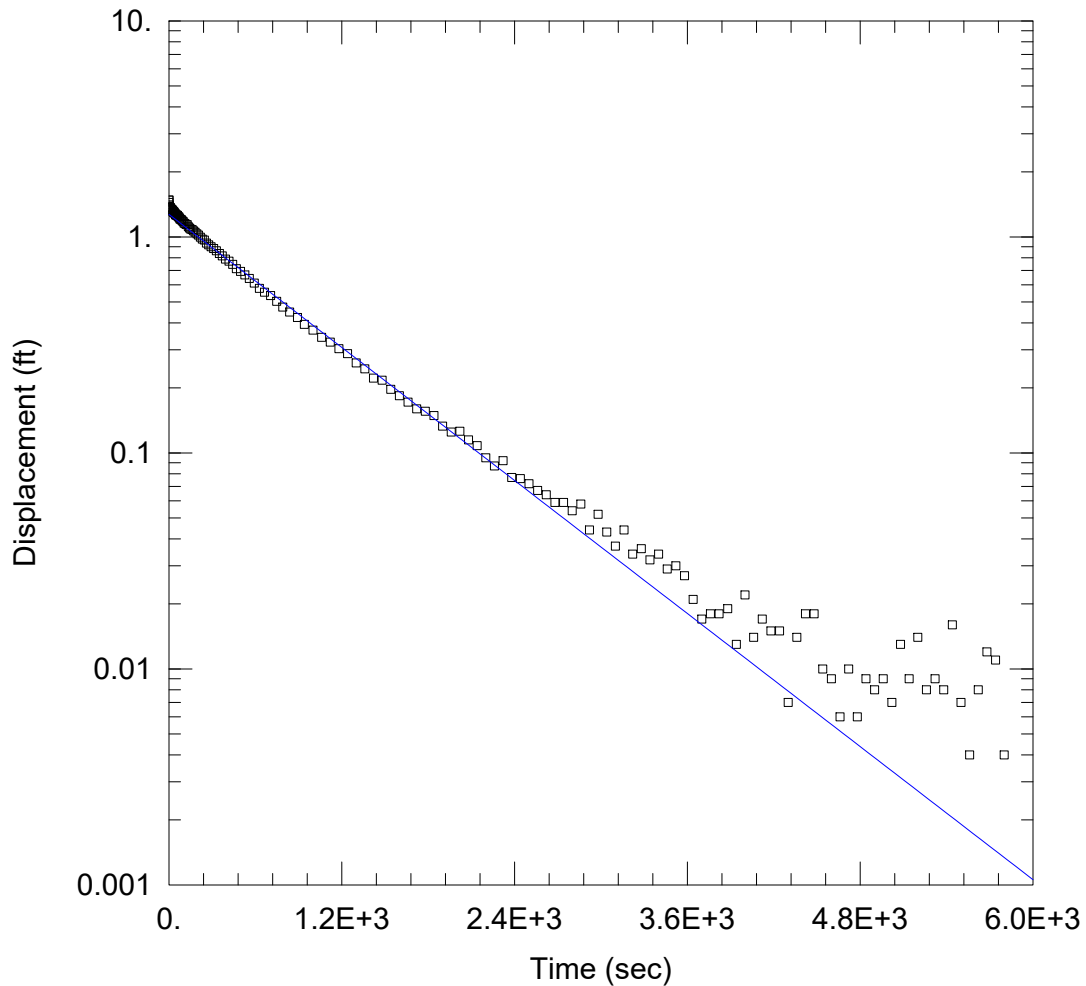
Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.847 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001002$  cm/sec  $y_0 = 1.449$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 Out.aqt  
 Date: 10/29/21 Time: 11:58:41

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-06  
 Test Date: 9/17/2021

AQUIFER DATA

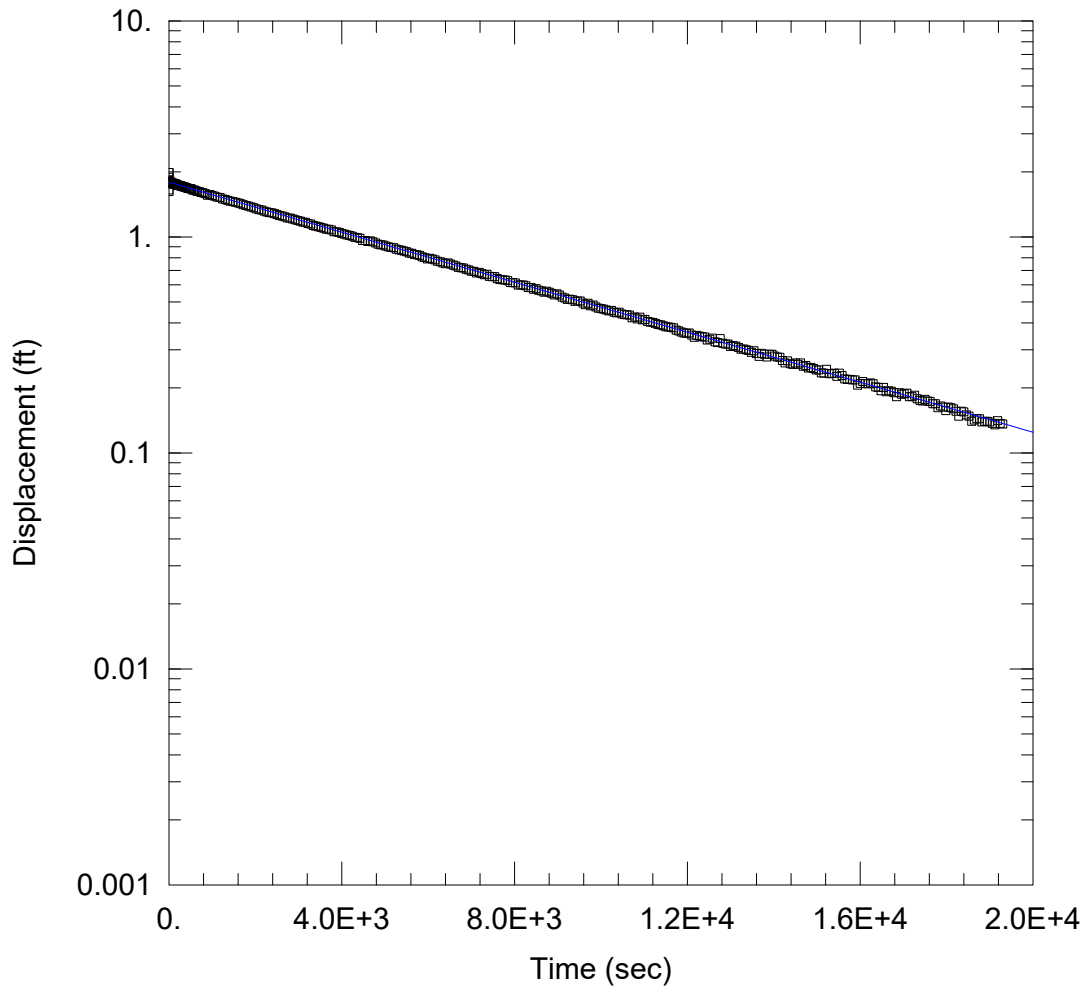
Saturated Thickness: 6. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.481 ft Static Water Column Height: 125.6 ft  
 Total Well Penetration Depth: 6. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001063$  cm/sec  $y_0 = 1.271$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 In.aqt  
 Date: 10/29/21 Time: 12:36:01

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

AQUIFER DATA

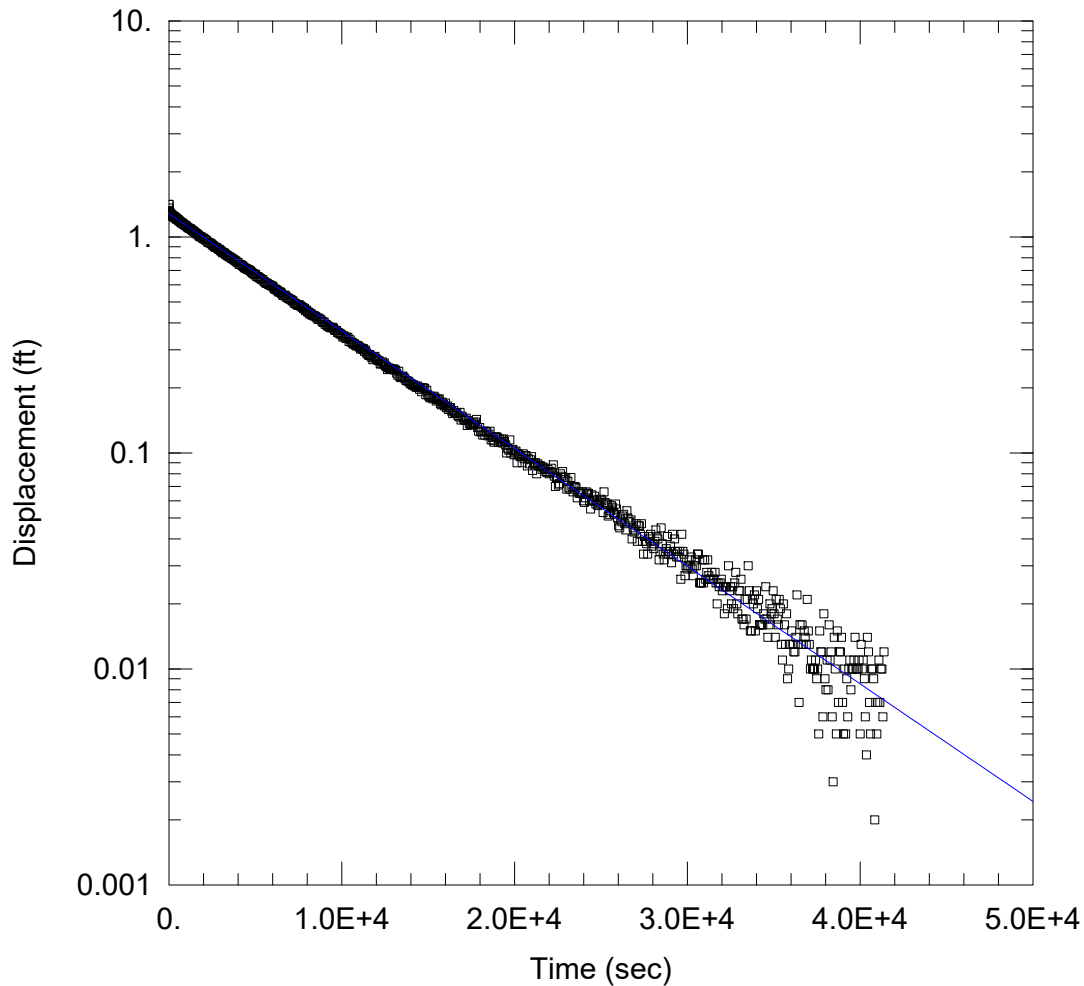
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-08)

Initial Displacement: 1.987 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 1.199E-5 cm/sec y0 = 1.791 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 Out.aqt  
 Date: 10/29/21 Time: 12:38:13

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-08  
 Test Date: 9/16/2021

### AQUIFER DATA

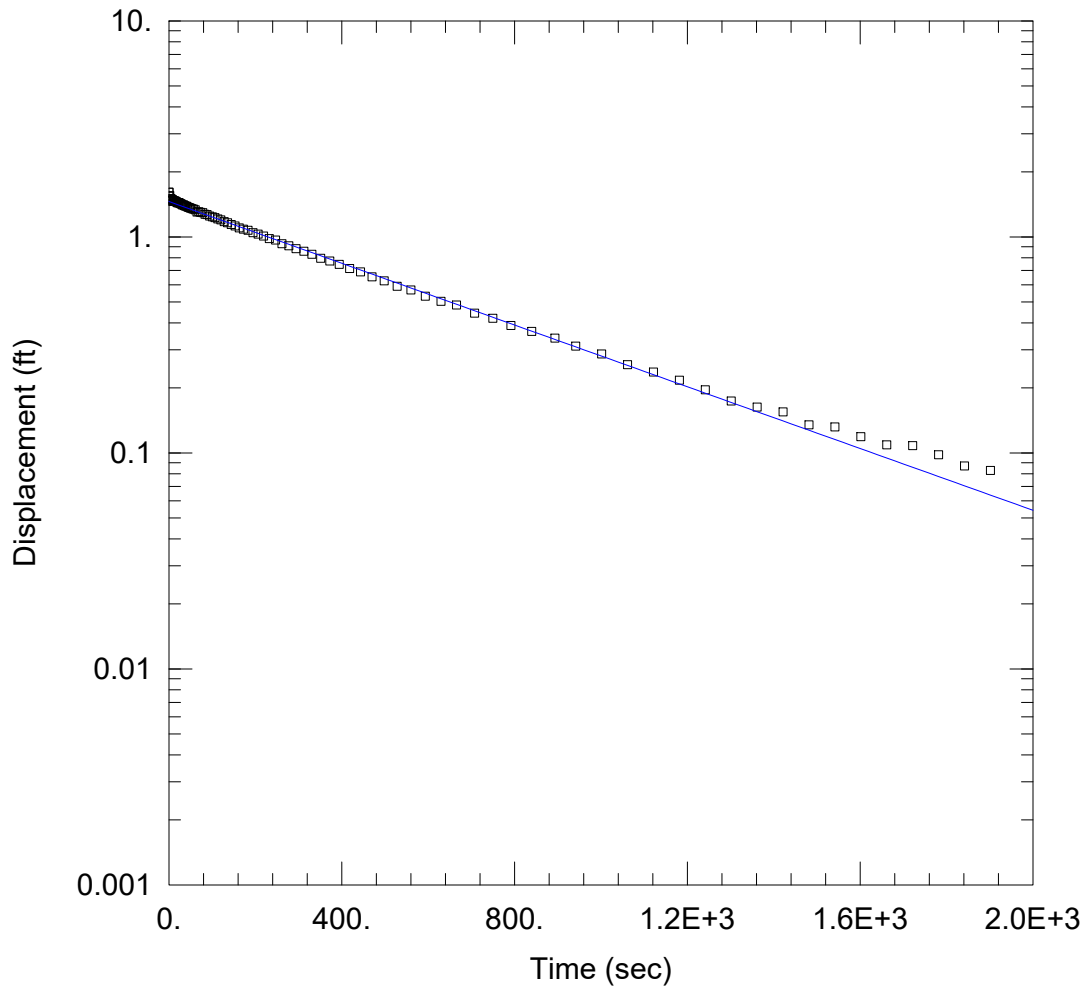
Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

### WELL DATA (MW-16-08)

Initial Displacement: 1.415 ft Static Water Column Height: 124.9 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 1.127E-5$  cm/sec  $y_0 = 1.279$  ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 In.aqt  
 Date: 10/29/21 Time: 12:41:12

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

AQUIFER DATA

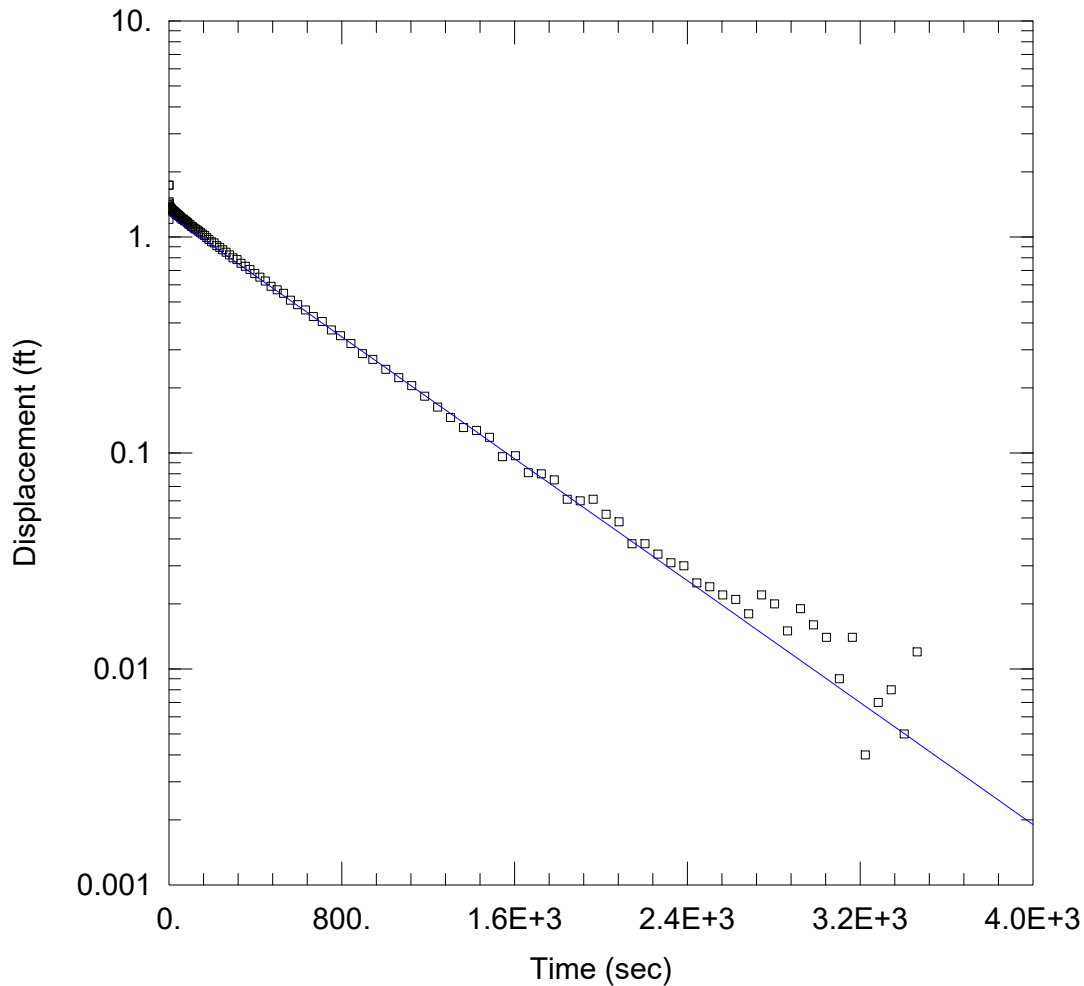
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.611 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 0.000148 cm/sec y0 = 1.458 ft



### WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 Out.aqt  
 Date: 10/29/21 Time: 12:43:28

### PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-09  
 Test Date: 9/16/2021

### AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

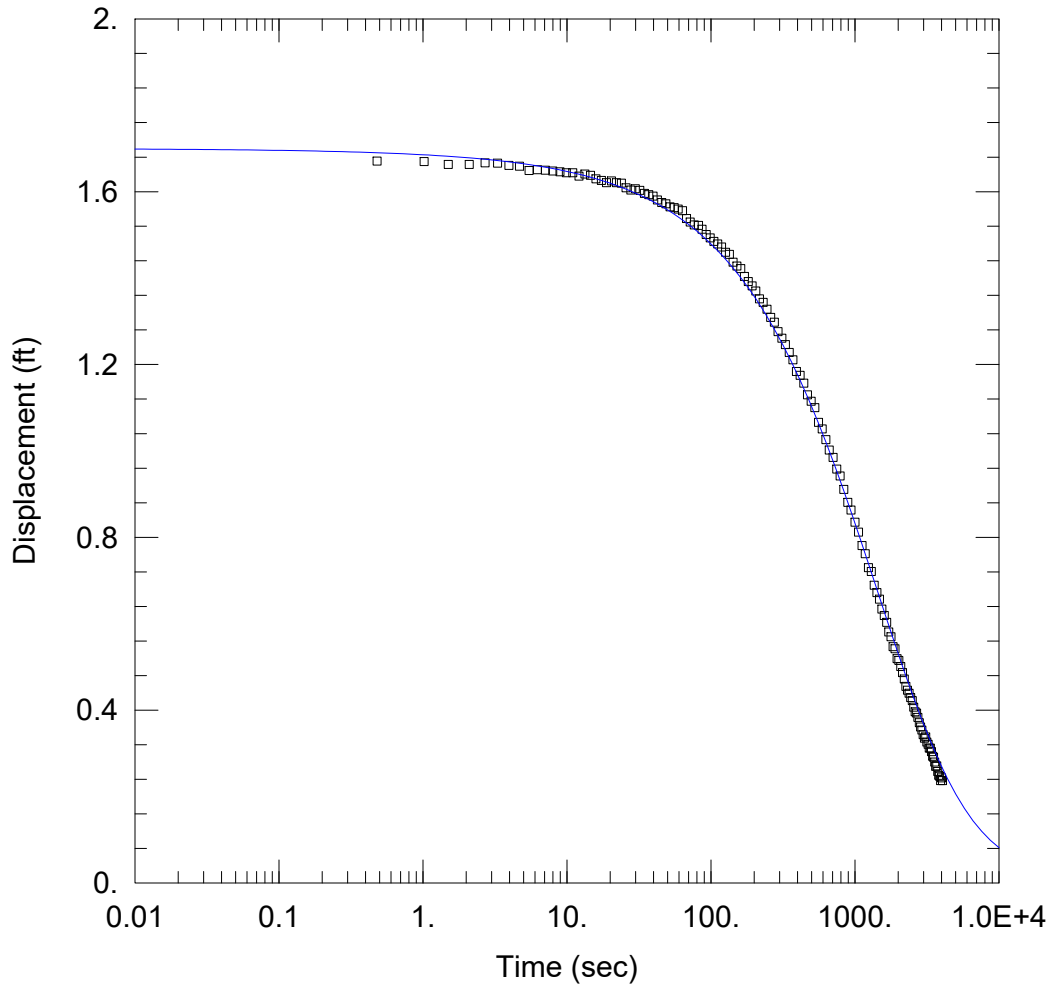
### WELL DATA (MW-16-09)

Initial Displacement: 1.736 ft Static Water Column Height: 126.9 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 0.0001461$  cm/sec  $y_0 = 1.265$  ft





WELL TEST ANALYSIS

Data Set: P:\\_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 In.aqt  
 Date: 10/29/21 Time: 12:52:23

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

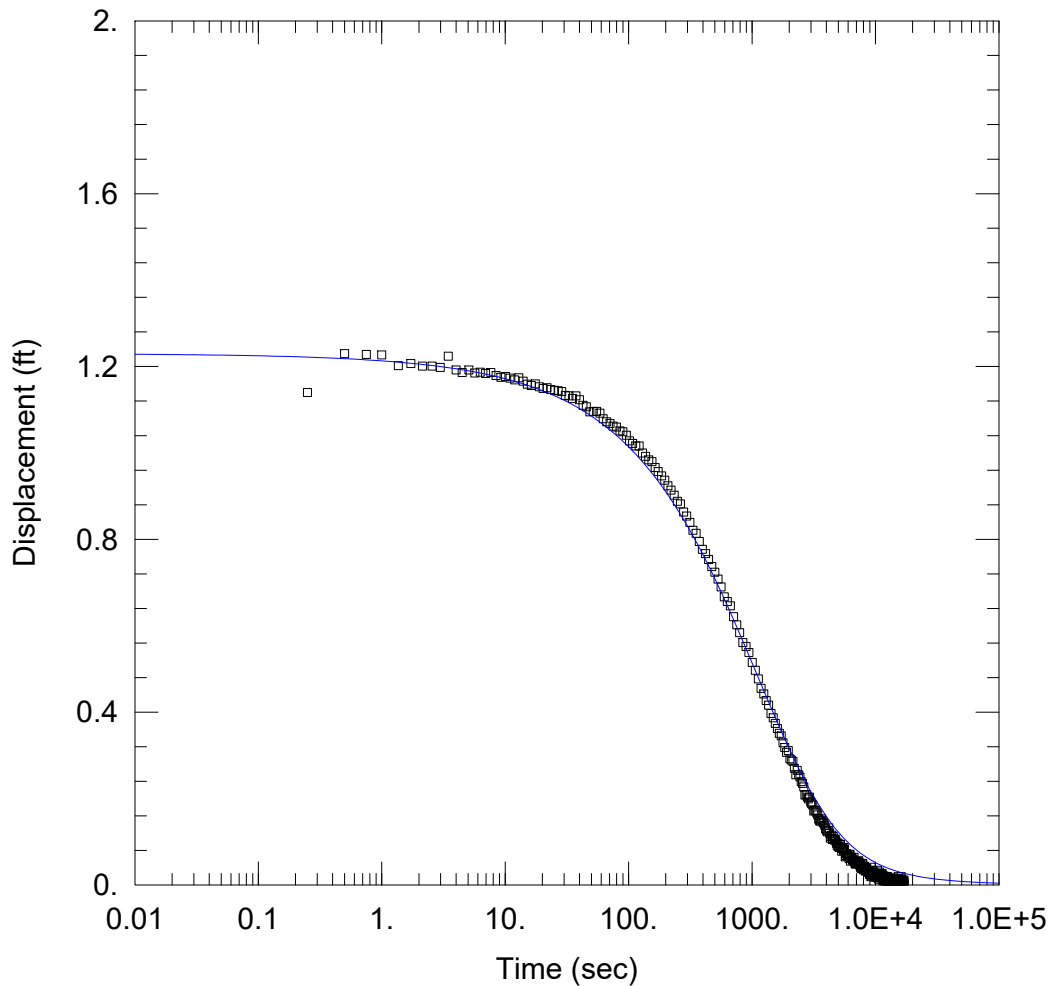
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.7 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005538 cm<sup>2</sup>/sec S = 0.001701



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 Out.aqt  
 Date: 10/29/21 Time: 12:54:58

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-10  
 Test Date: 9/16/2021

AQUIFER DATA

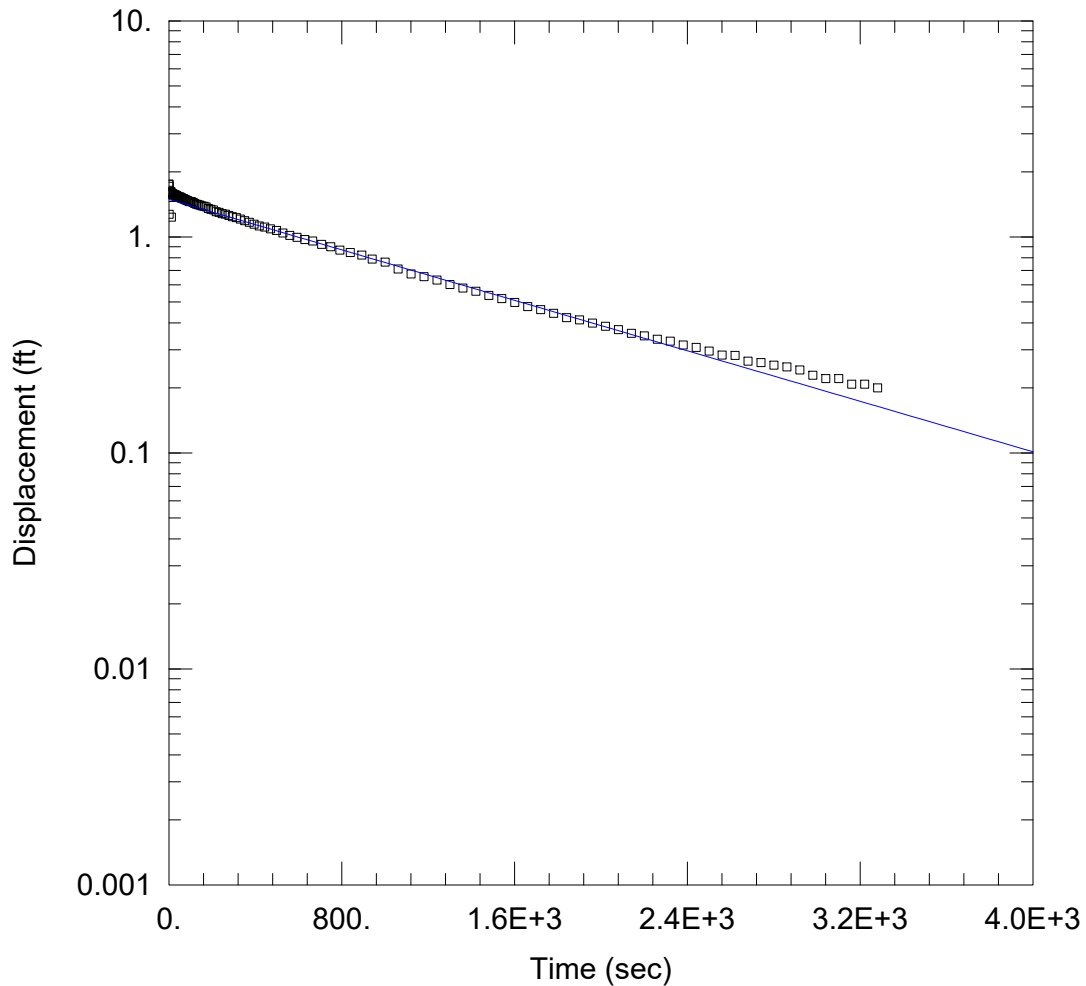
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.23 ft Static Water Column Height: 135.3 ft  
 Total Well Penetration Depth: 5. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopoulos  
 T = 0.005626 cm<sup>2</sup>/sec S = 0.004752



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A In.aqt  
 Date: 10/29/21 Time: 12:59:49

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

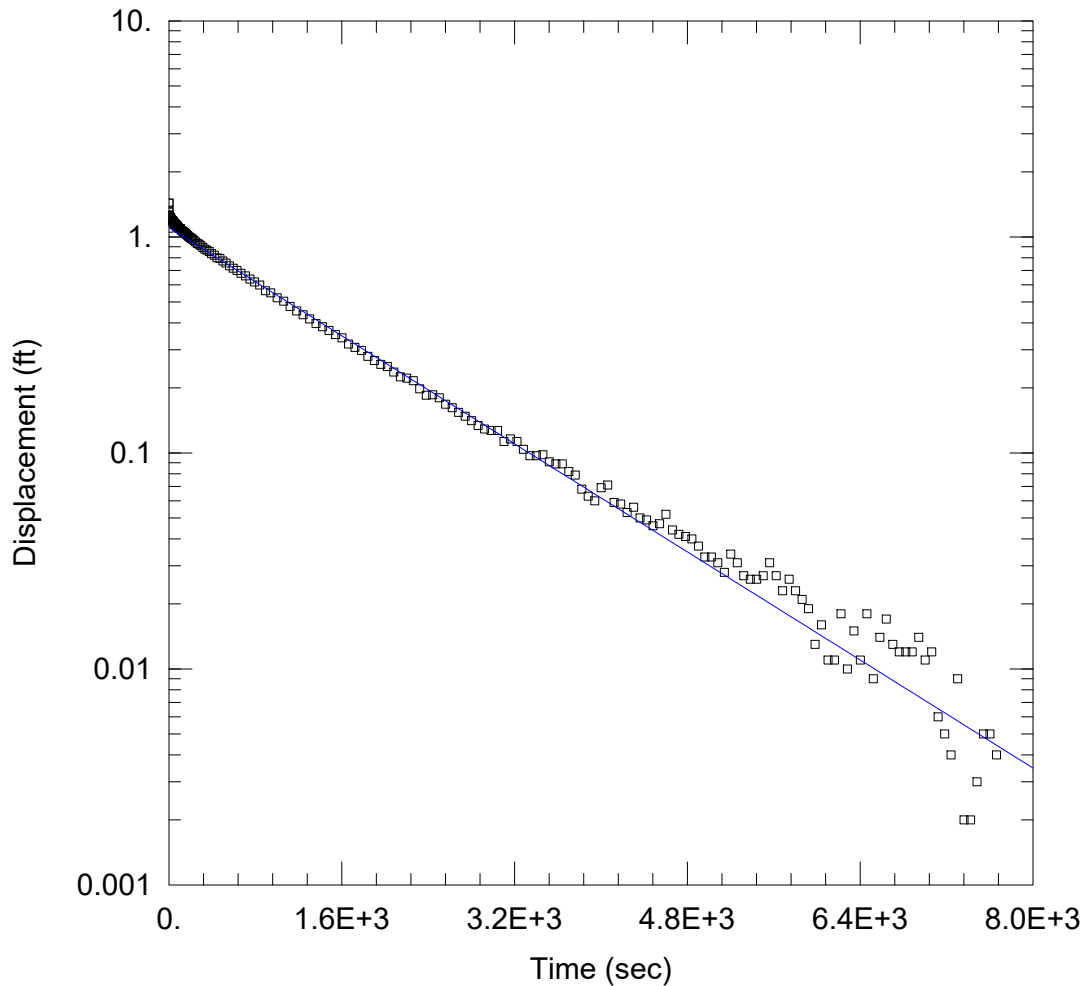
Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.753 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev  
 K = 6.051E-5 cm/sec y0 = 1.492 ft



WELL TEST ANALYSIS

Data Set: P:\\_ Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A Out.aqt  
 Date: 10/29/21 Time: 13:00:15

PROJECT INFORMATION

Company: TRC  
 Client: DTE  
 Location: Belle River PP  
 Test Well: MW-16-11A  
 Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio ( $K_z/K_r$ ): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.434 ft Static Water Column Height: 127.3 ft  
 Total Well Penetration Depth: 7. ft Screen Length: 5. ft  
 Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

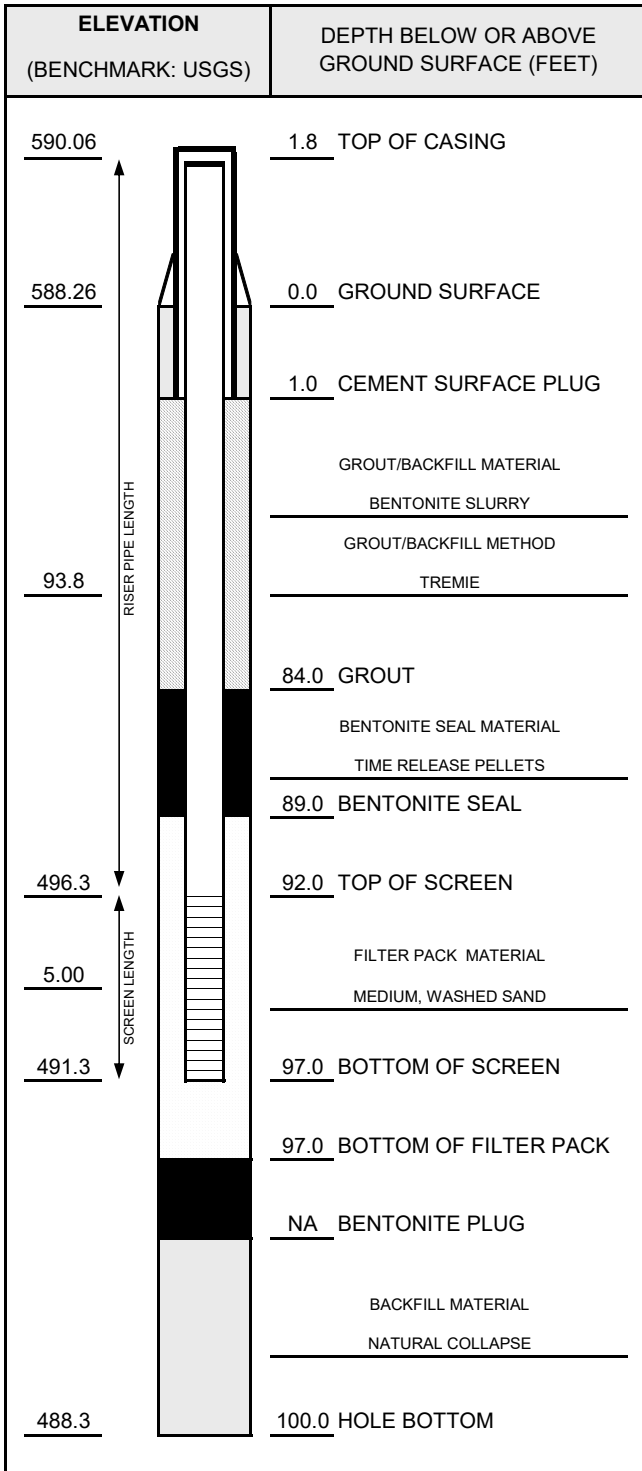
Aquifer Model: Confined Solution Method: Hvorslev  
 $K = 6.477E-5$  cm/sec  $y_0 = 1.103$  ft

## **APPENDIX B – MONITORING WELL LOGS**



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-01</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/17/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	98.20	T/PVC	3/21/2016	--
DTB AFTER DEVELOPING:	100.32	T/PVC	4/13/2016	845
SWL BEFORE DEVELOPING:	12.92	T/PVC	3/21/2016	--
SWL AFTER DEVELOPING:	16.32	T/PVC	4/13/2016	845
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

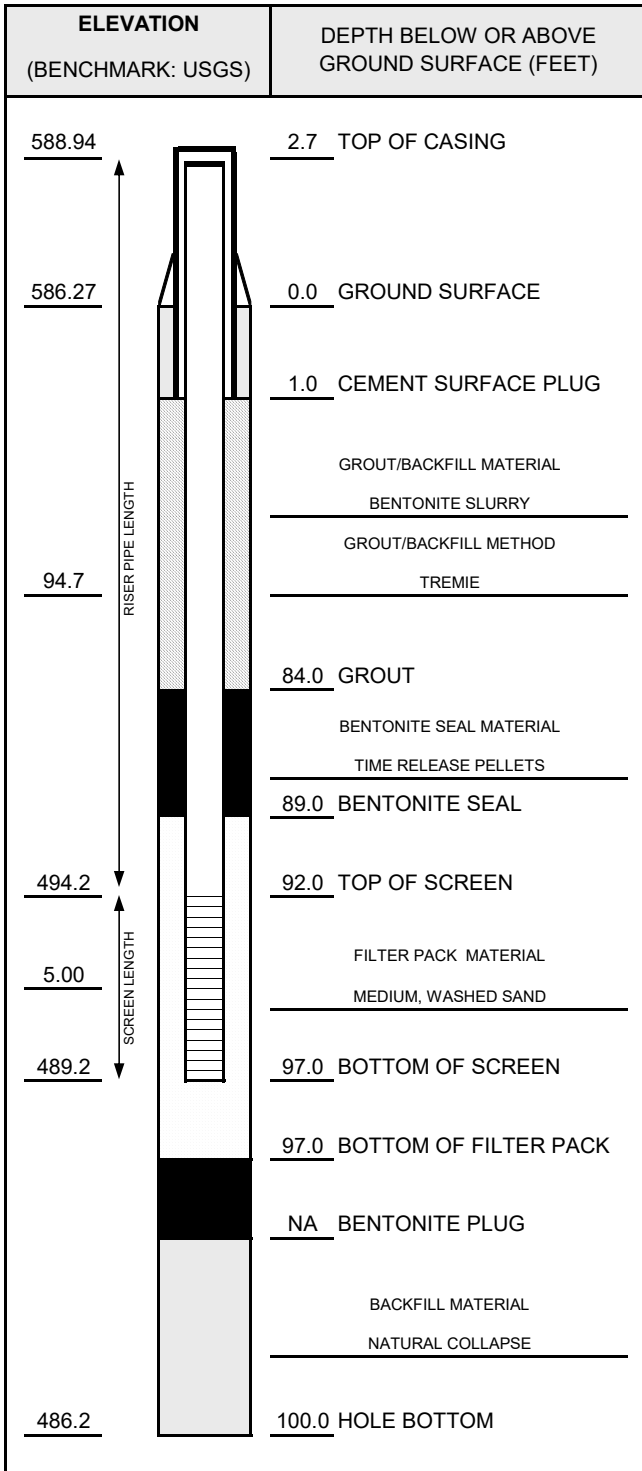
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-02</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>97</u> FT. <u>4</u> IN. FROM <u>97</u> TO <u>100</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>460</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
OTHER SWL:		T/PVC		

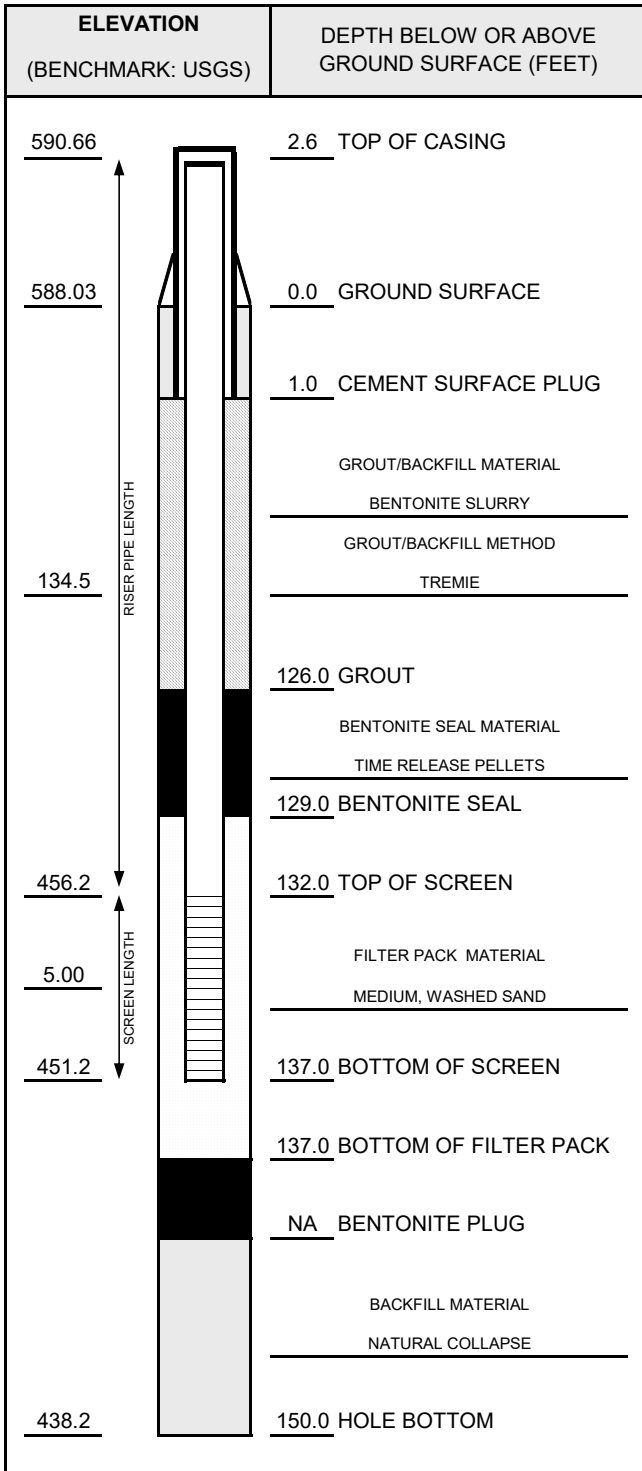
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-03</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>4</u> IN. FROM <u>140</u> TO <u>150</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>60</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>LIGHT GRAY</u>
CLARITY AFTER:	<u>SLIGHTLY TURBID</u>
COLOR AFTER:	<u>VERY LIGHT GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
OTHER SWL:		T/PVC		

NOTES:

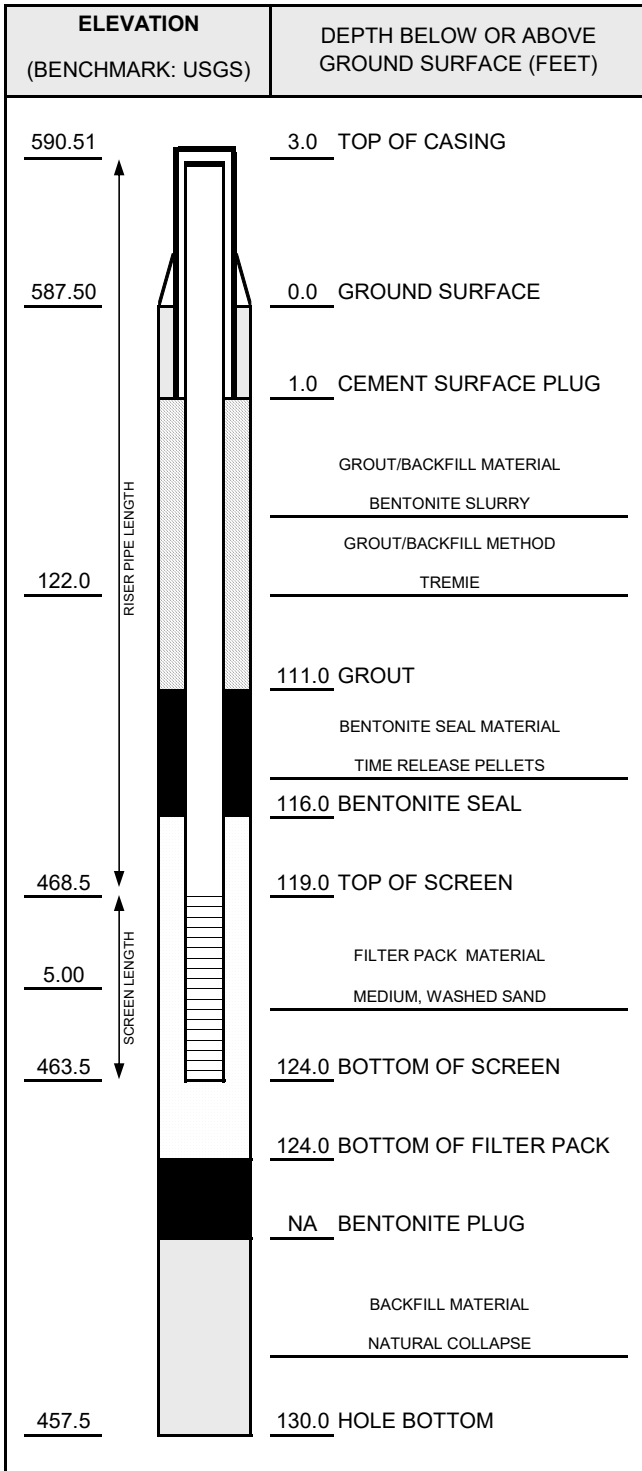
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-04</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
SCREEN TYPE:	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>124</u> FT. <u>4</u> IN. FROM <u>124</u> TO <u>130</u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>288</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

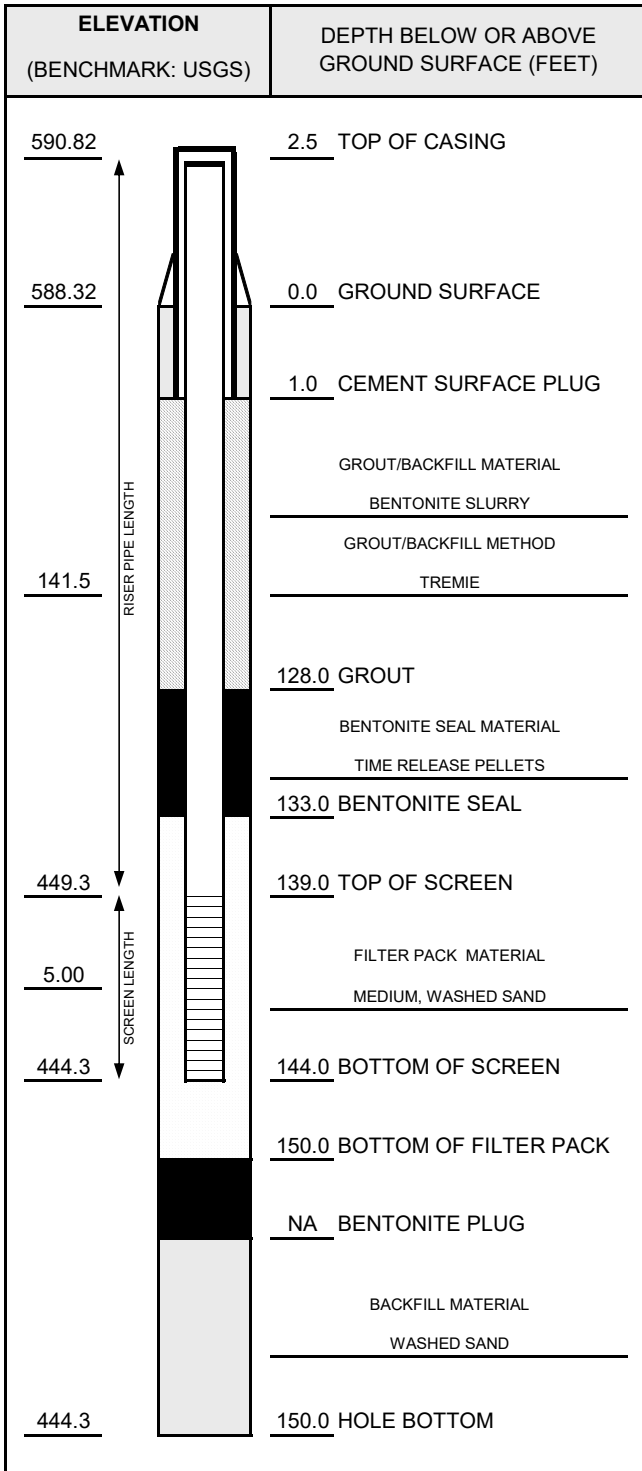
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-05</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016
INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>300</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
OTHER SWL:		T/PVC		

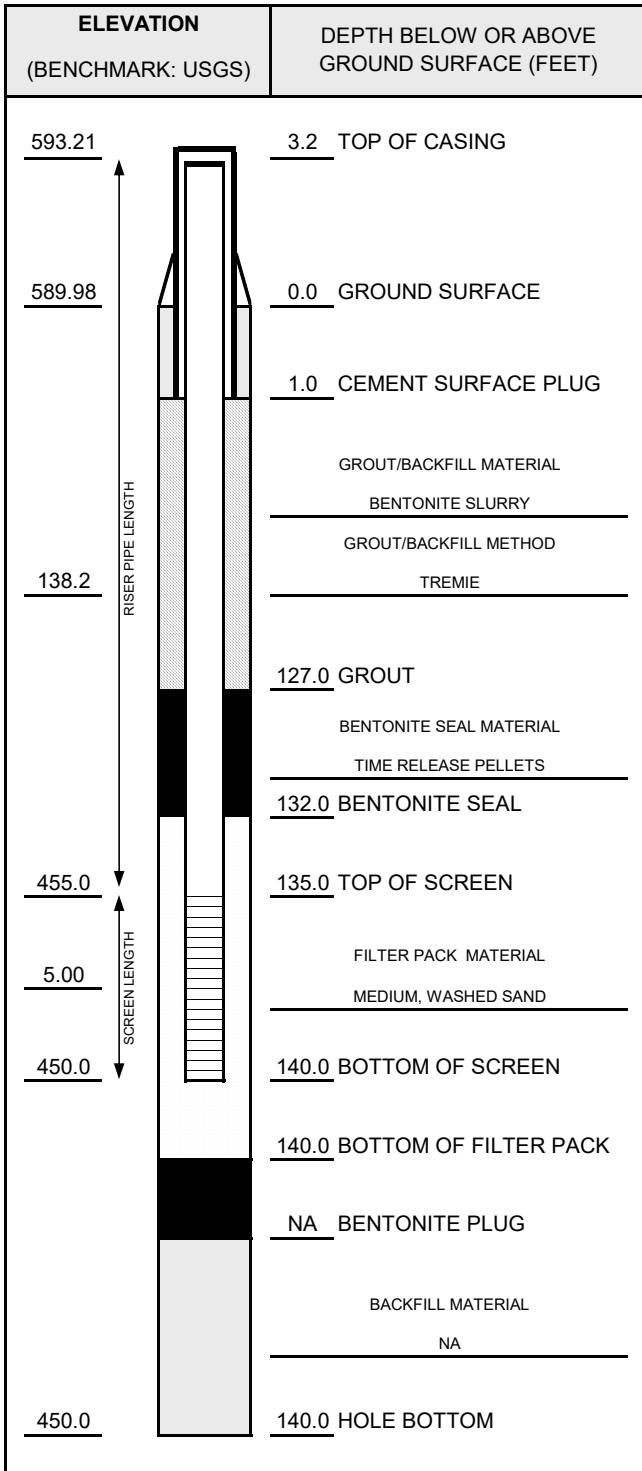
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-06</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>50</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NOT MEASURED</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
OTHER SWL:		T/PVC		

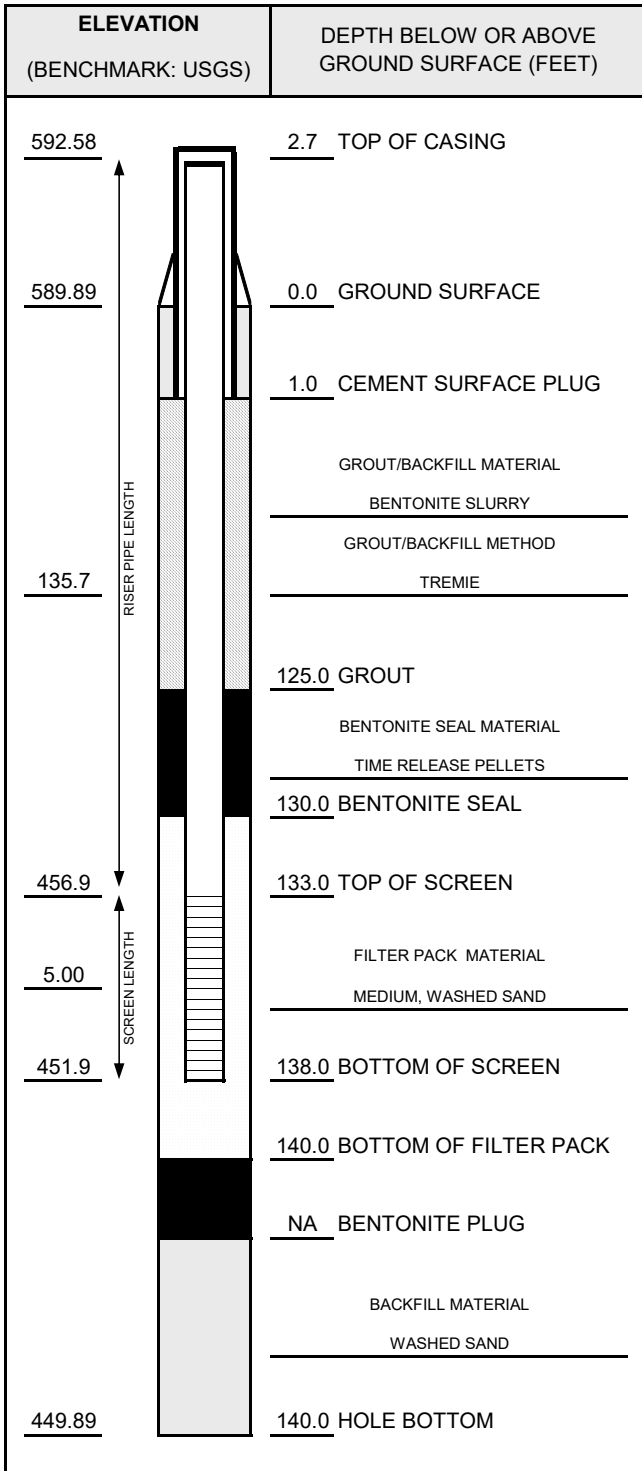
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-07</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>120</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
OTHER SWL:		T/PVC		

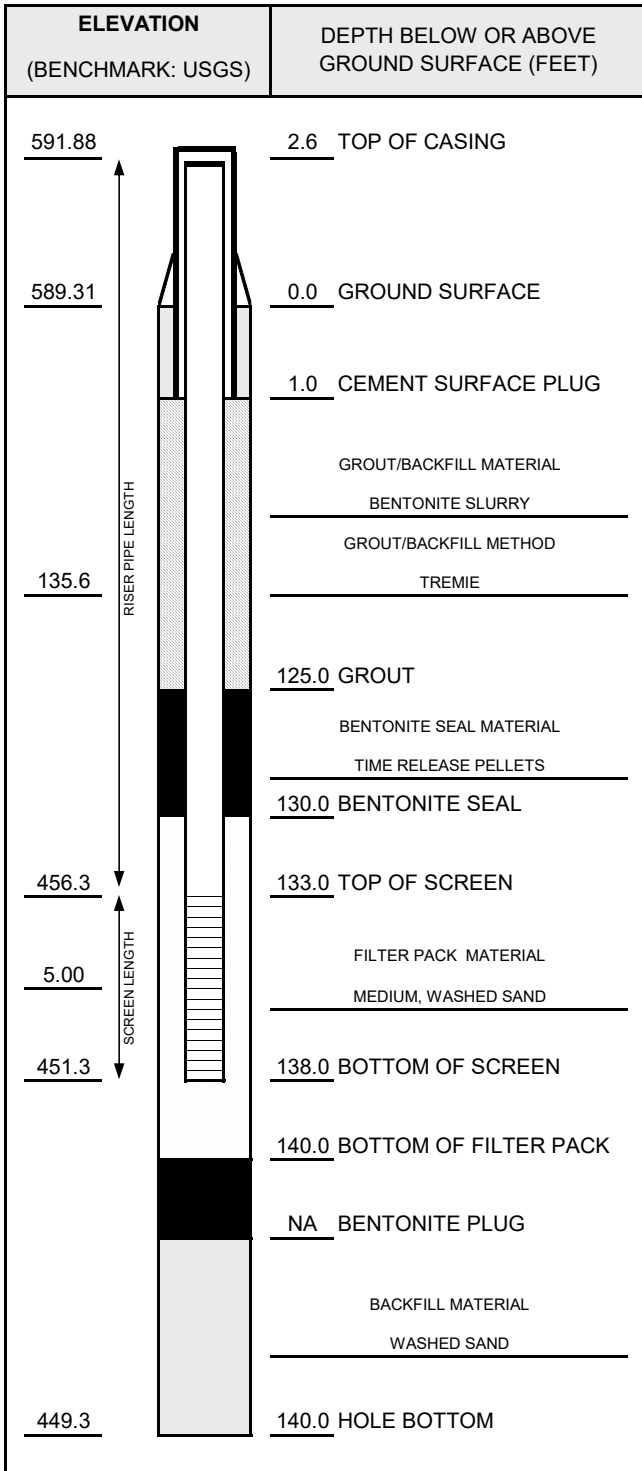
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-08</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016    INSTALLED BY: A. Knutson    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>140</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4</u> HOURS
WATER REMOVED:	<u>125</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>BROWN /GREY</u>
CLARITY AFTER:	<u>CLEAR</u>
COLOR AFTER:	<u>NONE</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
OTHER SWL:		T/PVC		

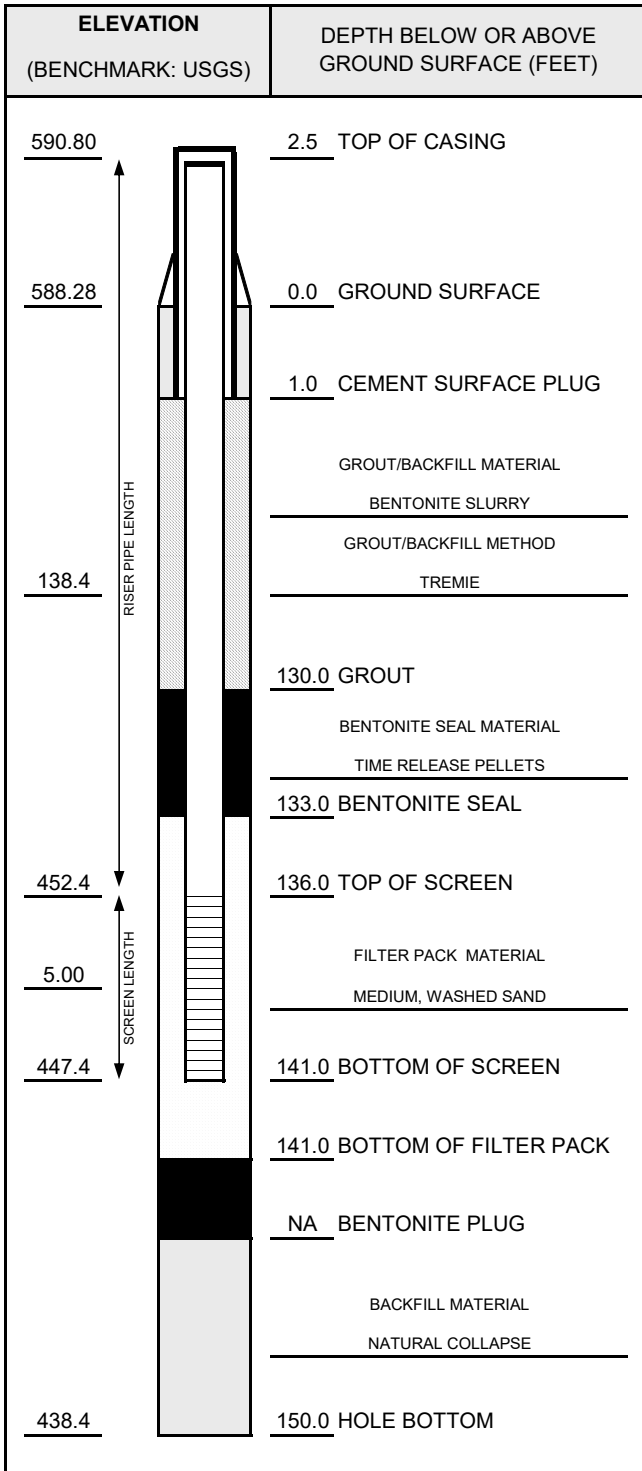
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-09</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>7</u> HOURS
WATER REMOVED:	<u>30</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>TURBID</u>
COLOR BEFORE:	<u>GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/7/2016	12:00
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	10:25
SWL BEFORE DEVELOPING:	7.00	T/PVC	6/7/2016	12:00
SWL AFTER DEVELOPING:	117.42	T/PVC	6/8/2016	10:25
OTHER SWL:	16.76	T/PVC	6/9/2016	15:13
OTHER DTB:	144.30	T/PVC	6/9/2016	15:13

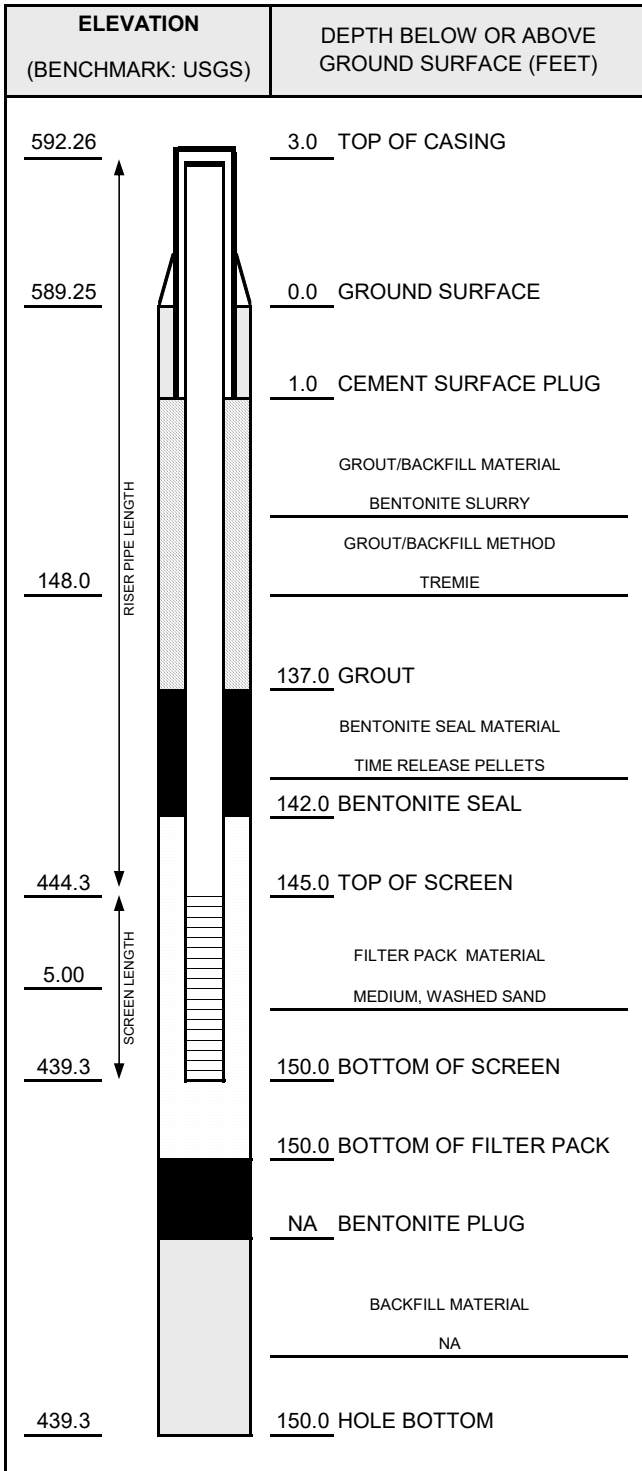
NOTES:

PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-10</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/6/2016    INSTALLED BY: J. Reed    CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>4.5</u> HOURS
WATER REMOVED:	<u>85</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>DARK GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

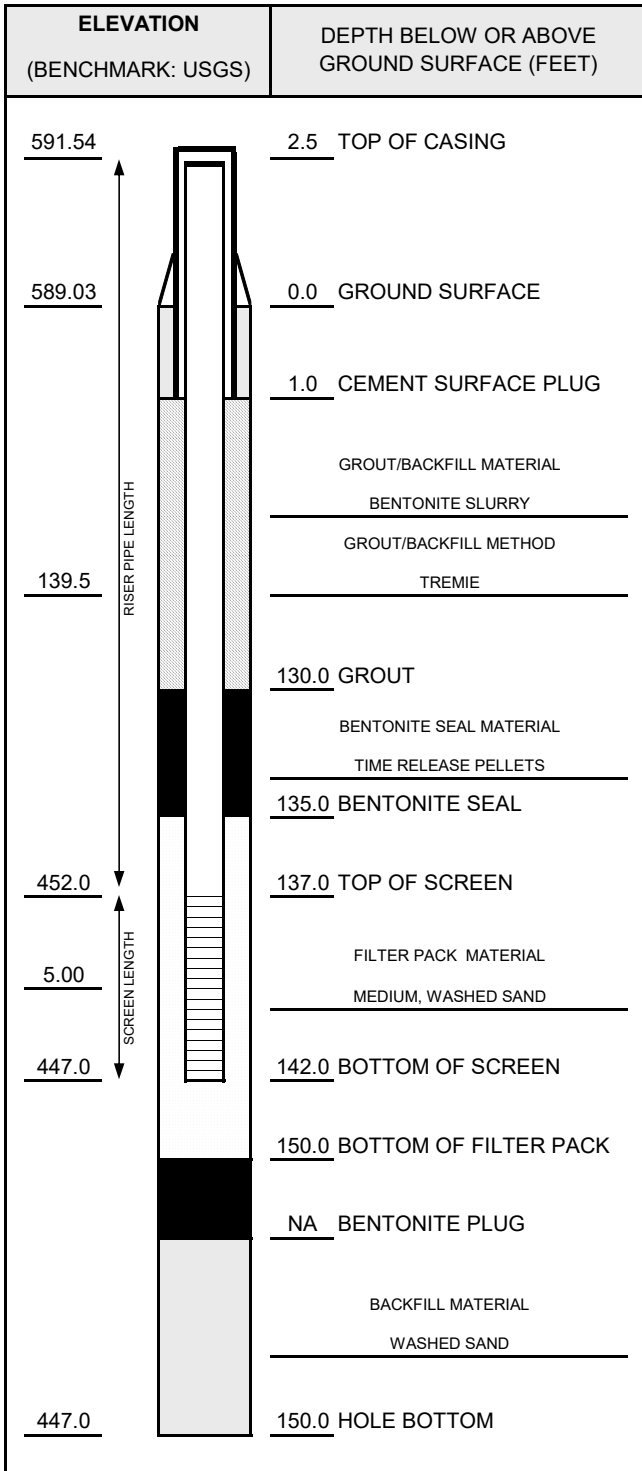
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	

NOTES:



# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11</b>
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016
INSTALLED BY: J. Reed	CHECKED BY: M. Powers



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>150</u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.
SURF. CASING DIAMETER:	<u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT. <u>      </u> IN. FROM <u>      </u> TO <u>      </u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>3</u> HOURS
WATER REMOVED:	<u>84</u> GALLONS
WATER ADDED:	<u>60</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>VERY TURBID</u>
COLOR BEFORE:	<u>DARK GRAY</u>
CLARITY AFTER:	<u>VERY TURBID</u>
COLOR AFTER:	<u>GRAY</u>
ODOR (IF PRESENT):	<u>NONE</u>

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.36	T/PVC	6/9/2016	12:35
DTB AFTER DEVELOPING:	142.00	T/PVC	6/9/2016	15:45
SWL BEFORE DEVELOPING:	9.65	T/PVC	6/9/2016	12:35
SWL AFTER DEVELOPING:	116.00	T/PVC	6/9/2016	15:45
OTHER SWL:	16.67	T/PVC	6/21/2016	7:45
OTHER SWL:		T/PVC		

NOTES:

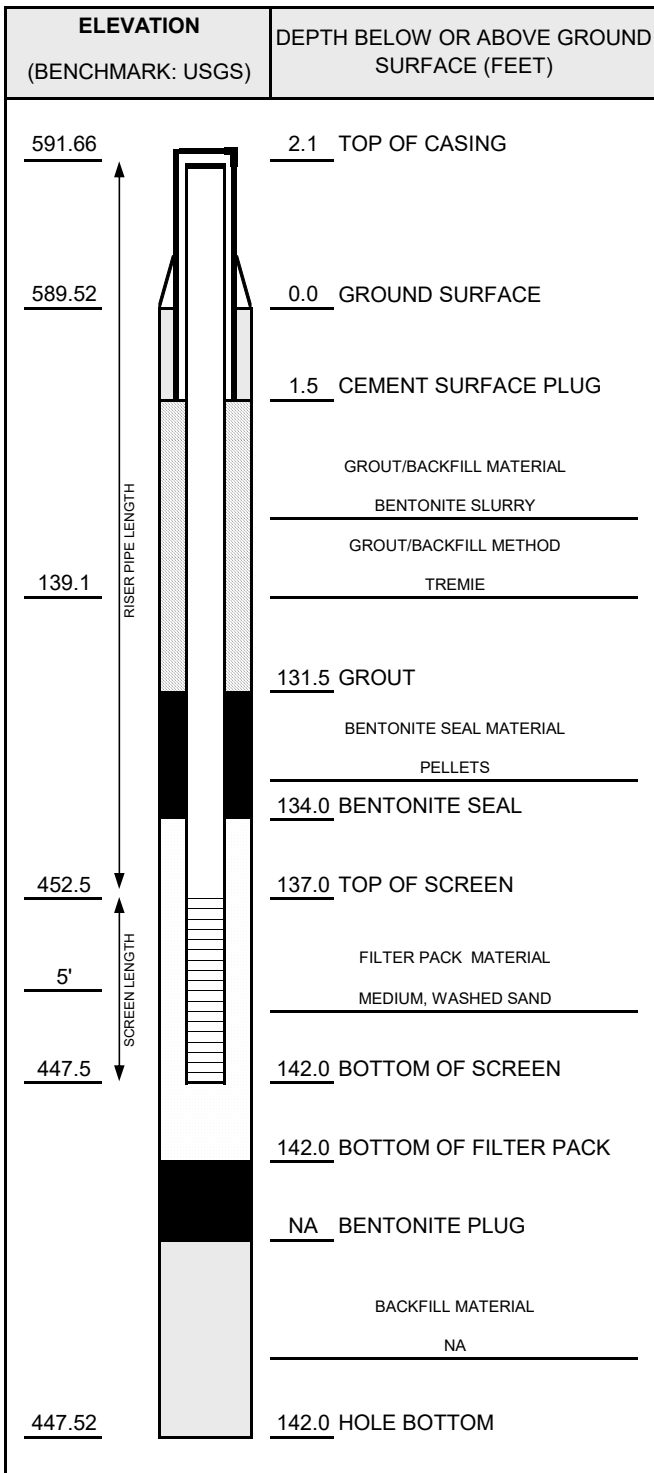
PROTECTIVE CASING DETAILS		
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>	





# WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant	WELL ID: <b>MW-16-11A</b>
PROJ. NO: 265996.0003	DATE INSTALLED: 5/12/2017    INSTALLED BY: Jake Krenz    CHECKED BY: C. Scieszka



CASING AND SCREEN DETAILS	
<b>TYPE OF RISER:</b>	<u>2-INCH PVC</u>
PIPE SCHEDULE:	<u>40</u>
PIPE JOINTS:	<u>THREADED O-RINGS</u>
SOLVENT USED?	<u>NO</u>
<b>SCREEN TYPE:</b>	<u>2-INCH PVC</u>
SCR. SLOT SIZE:	<u>0.01-INCH</u>
BOREHOLE DIAMETER:	<u>6</u> IN. FROM <u>0</u> TO <u>142</u> FT. <u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT.
SURF. CASING DIAMETER:	<u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT. <u>NA</u> IN. FROM <u>NA</u> TO <u>NA</u> FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	<u>AIR LIFT</u>
TIME DEVELOPING:	<u>3</u> HOURS
WATER REMOVED:	<u>110</u> GALLONS
WATER ADDED:	<u>0</u> GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	<u>Very Turbid</u>
COLOR BEFORE:	<u>Dark Gray</u>
CLARITY AFTER:	<u>Very Turbid</u>
COLOR AFTER:	<u>Light Gray</u>
ODOR (IF PRESENT):	<u>None</u>

WATER LEVEL SUMMARY				
	MEASUREMENT (FEET)		DATE	TIME
DTB BEFORE DEVELOPING:	141.98	T/PVC	5/15/2017	0838
DTB AFTER DEVELOPING:	145.45	T/PVC	5/15/2017	1612
SWE BEFORE DEVELOPING:	17.79	T/PVC	5/15/2017	0838
SWE AFTER DEVELOPING:	90.12	T/PVC	5/15/2017	1612
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

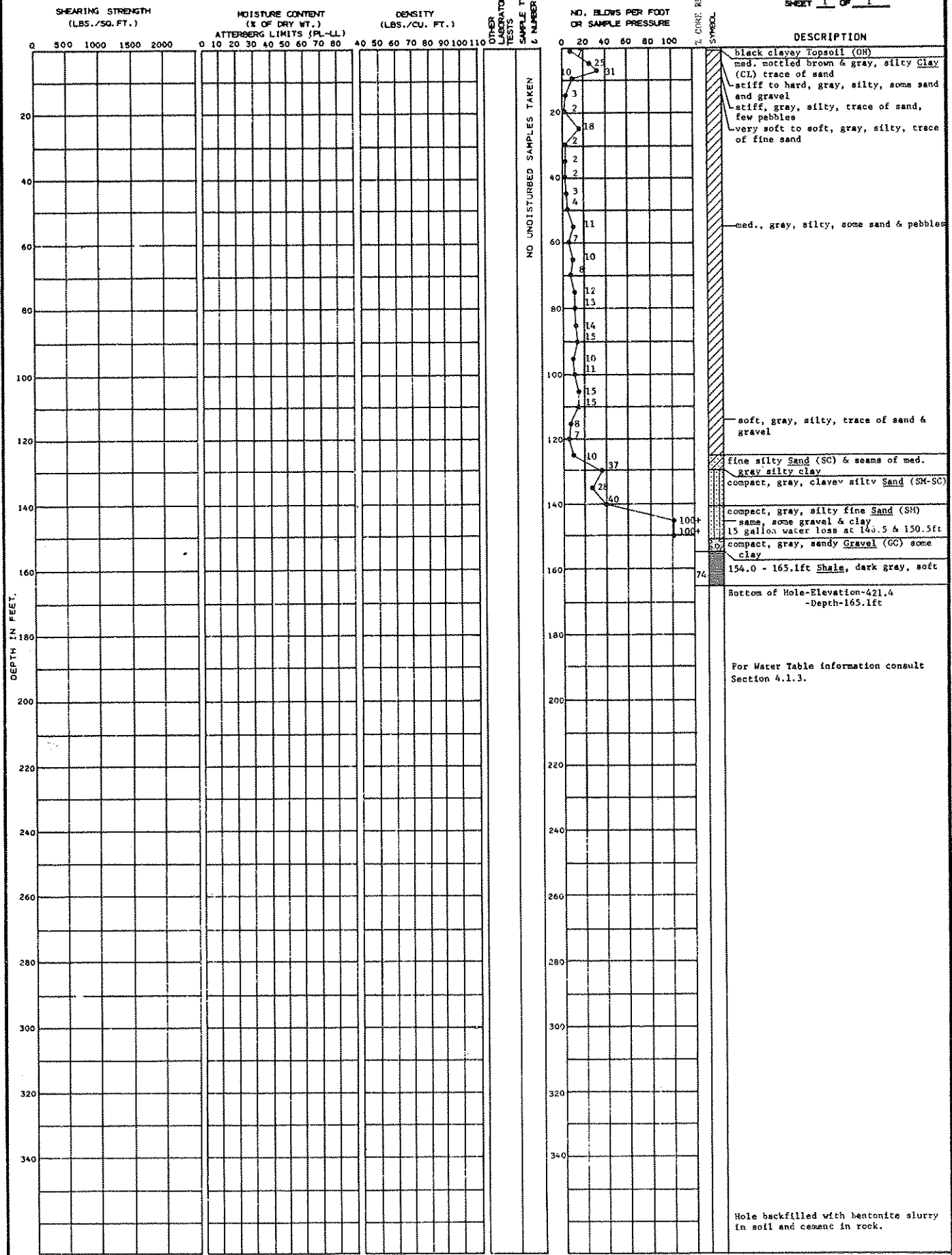
PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PROTECTIVE COVER AND LOCK INSTALLED?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
LOCK KEY NUMBER:	<u>3120</u>

NOTES:

## **APPENDIX C - 1970s BORING LOGS**

LOCATION: N 7,495 E 8,304 GROUND ELEVATION 586.5

DATE DRILLED: 11-26-73 12-3-73  
 SHEET 1 OF 1



Hole backfilled with bentonite slurry in soil and cement in rock.

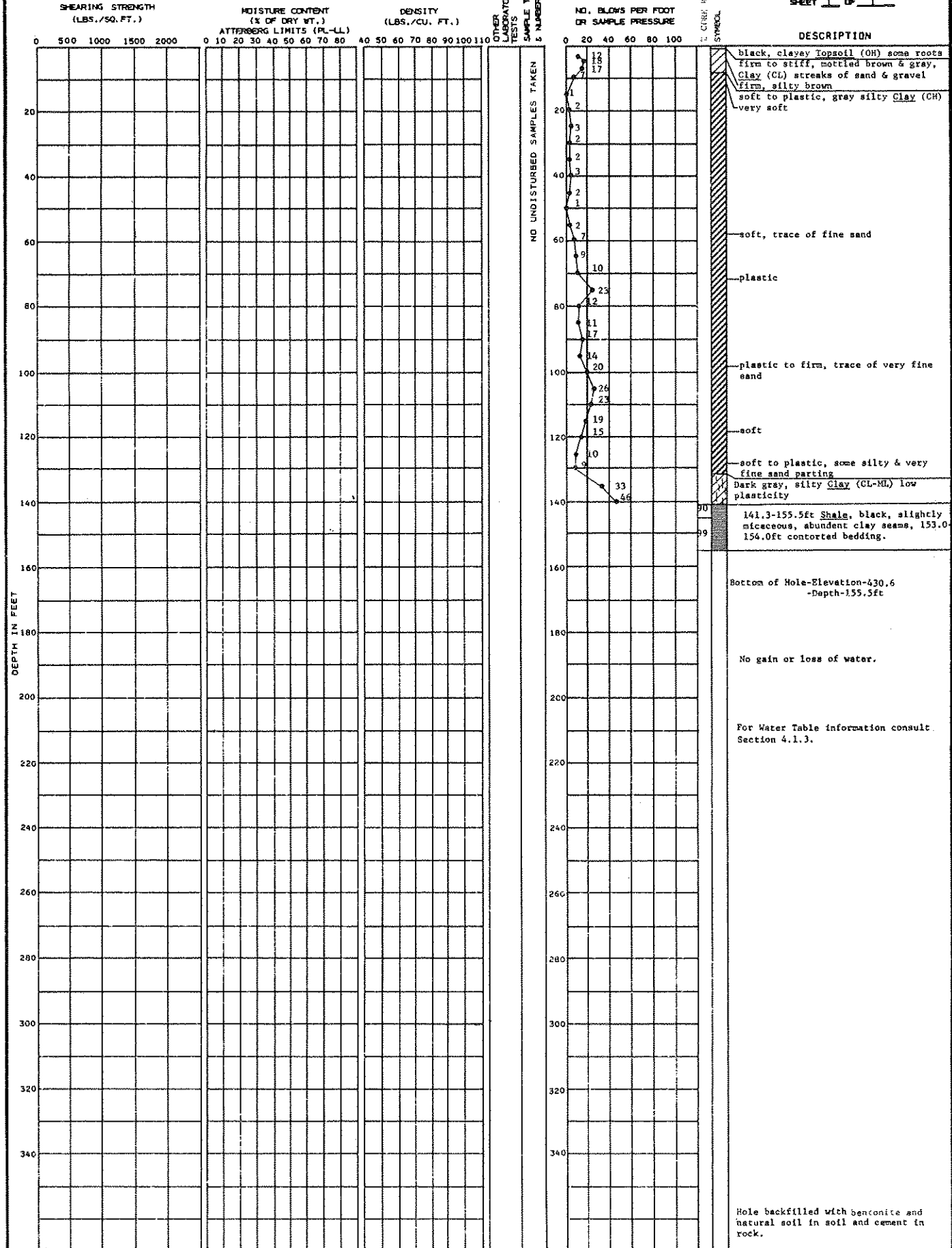
LOCATION: N 8,600  
E 9,965

GROUND ELEVATION

SC9.1

DATE DRILLED: 11-9-73

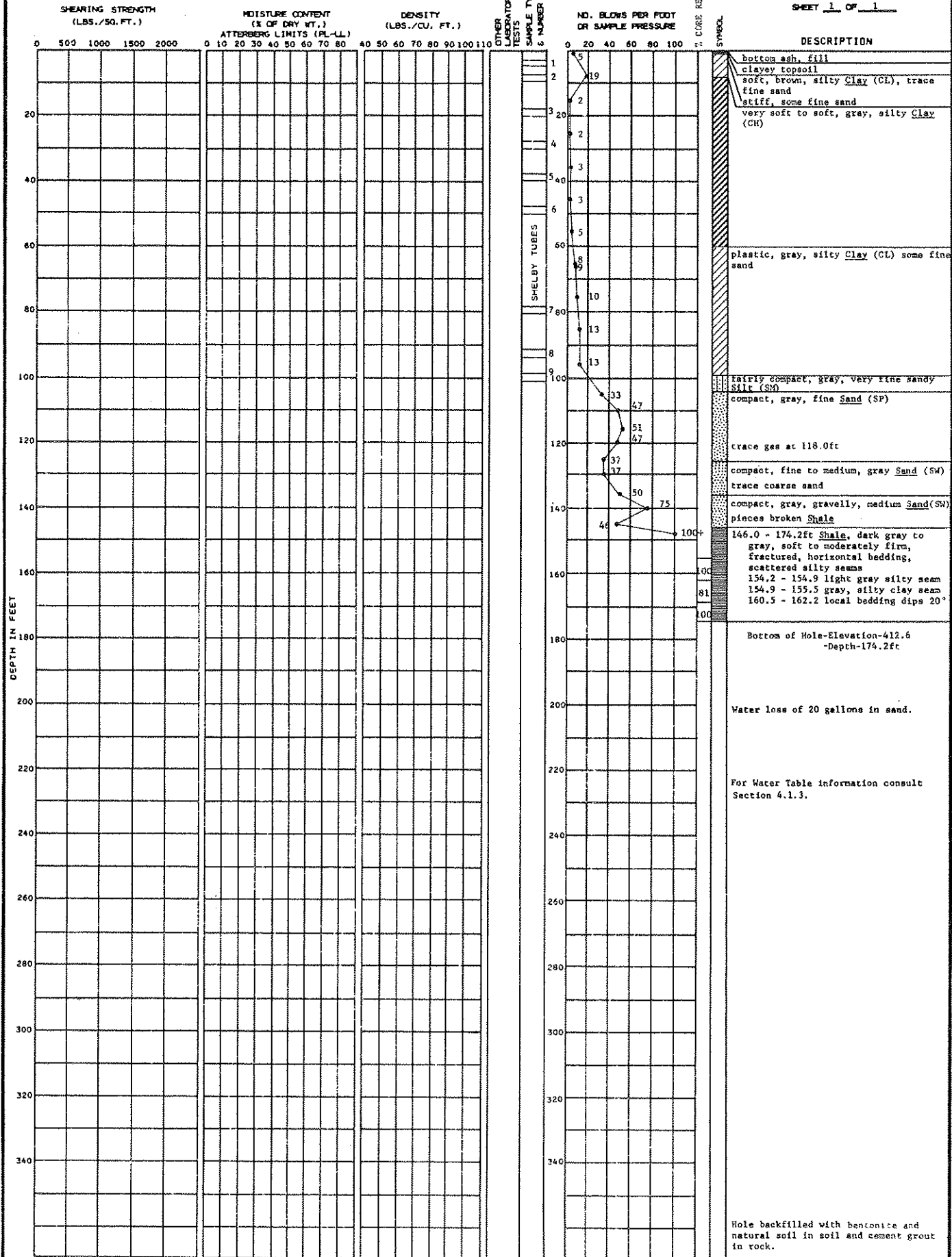
SHEET 1 OF 1



LOCATION: N 7,884 E 9,005 GROUND ELEVATION 586.8

DATE DRILLED: 2-11-74  
2-18-74

SHEET 1 OF 1

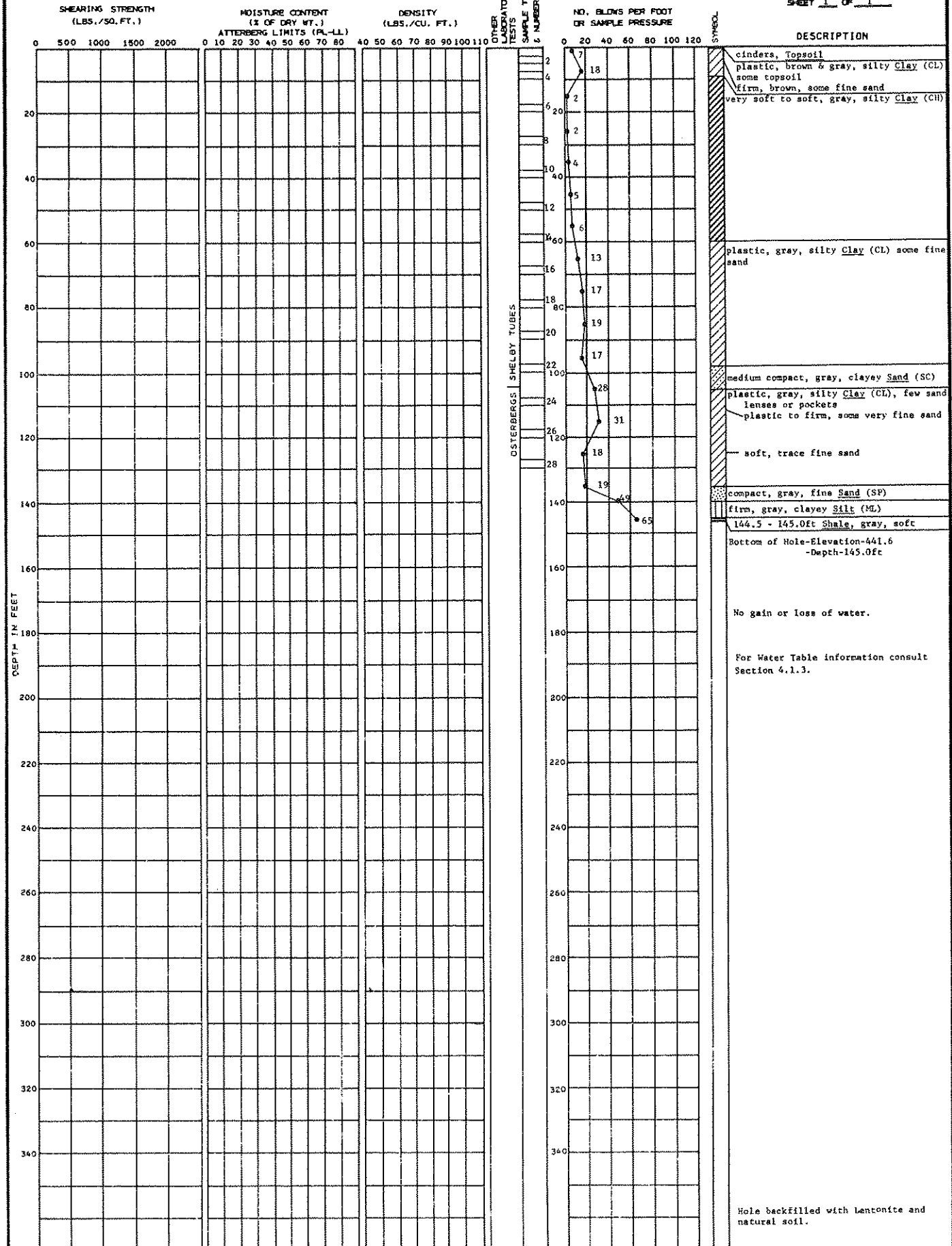


LOCATION: N 8,306  
E 9,627

GROUND ELEVATION 586.6

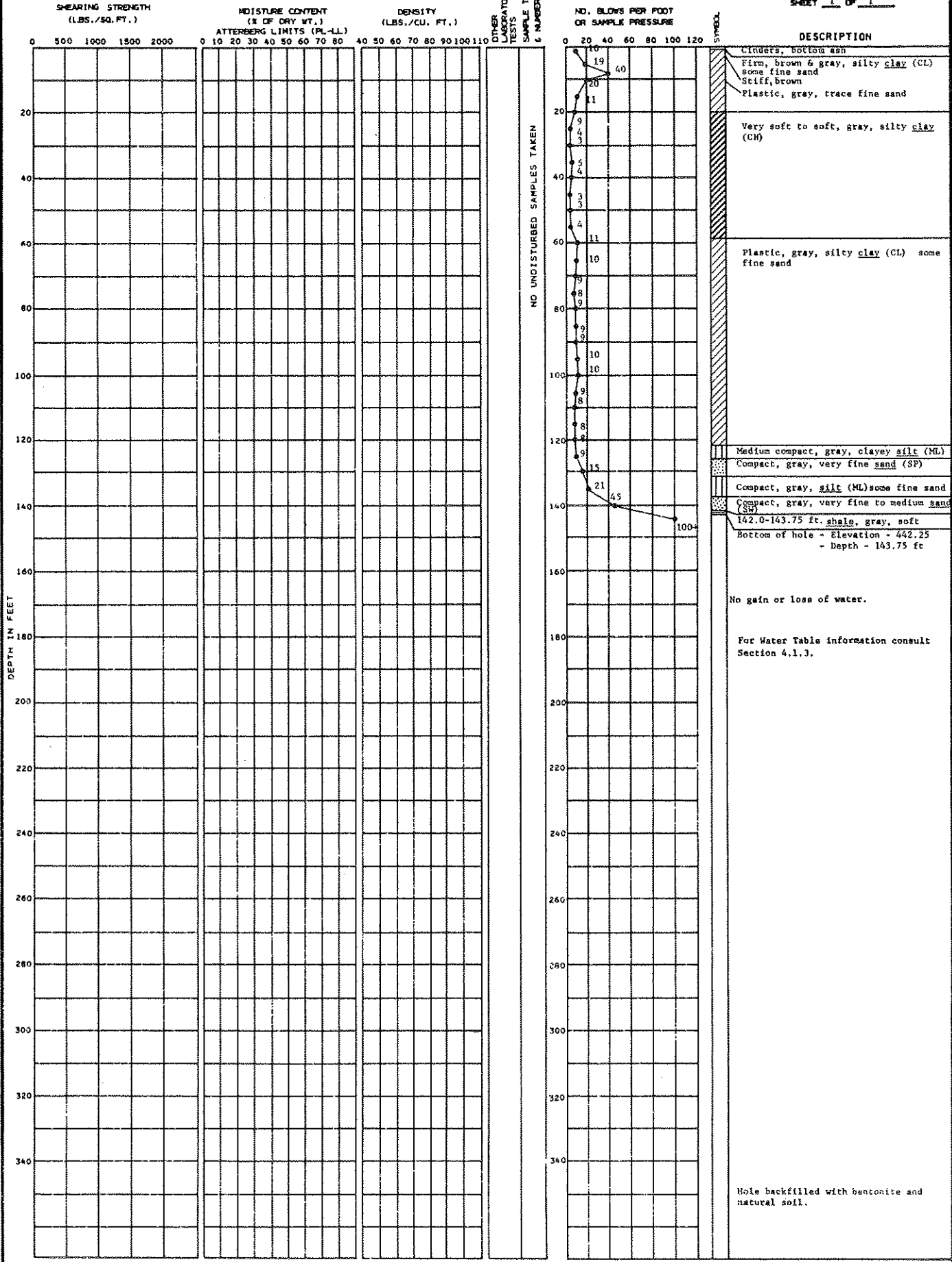
DATE DRILLED: 1-28-74  
1-31-76

SHEET 1 OF 1



SOIL BORING NO. 14

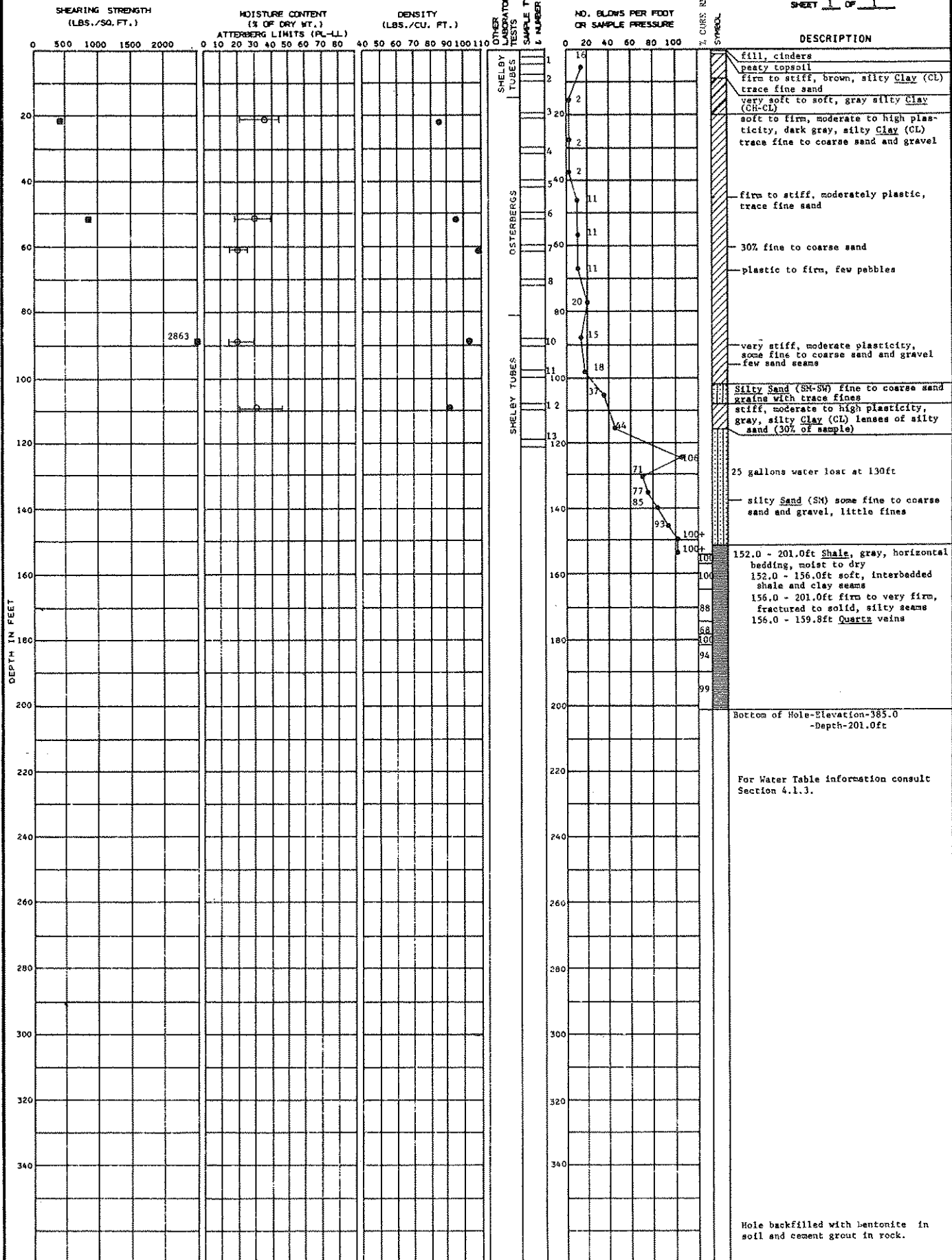
BECHTEL Belle River



LOCATION: N 8,081 E 9,193 GROUND ELEVATION 586.0

DATE DRILLED: 1-16-74 1-29-74

SHEET 1 OF 1



■ Unconsolidated Undrained    — Atterberg Limits  
○ Moisture Content

SOIL BORING NO. 18

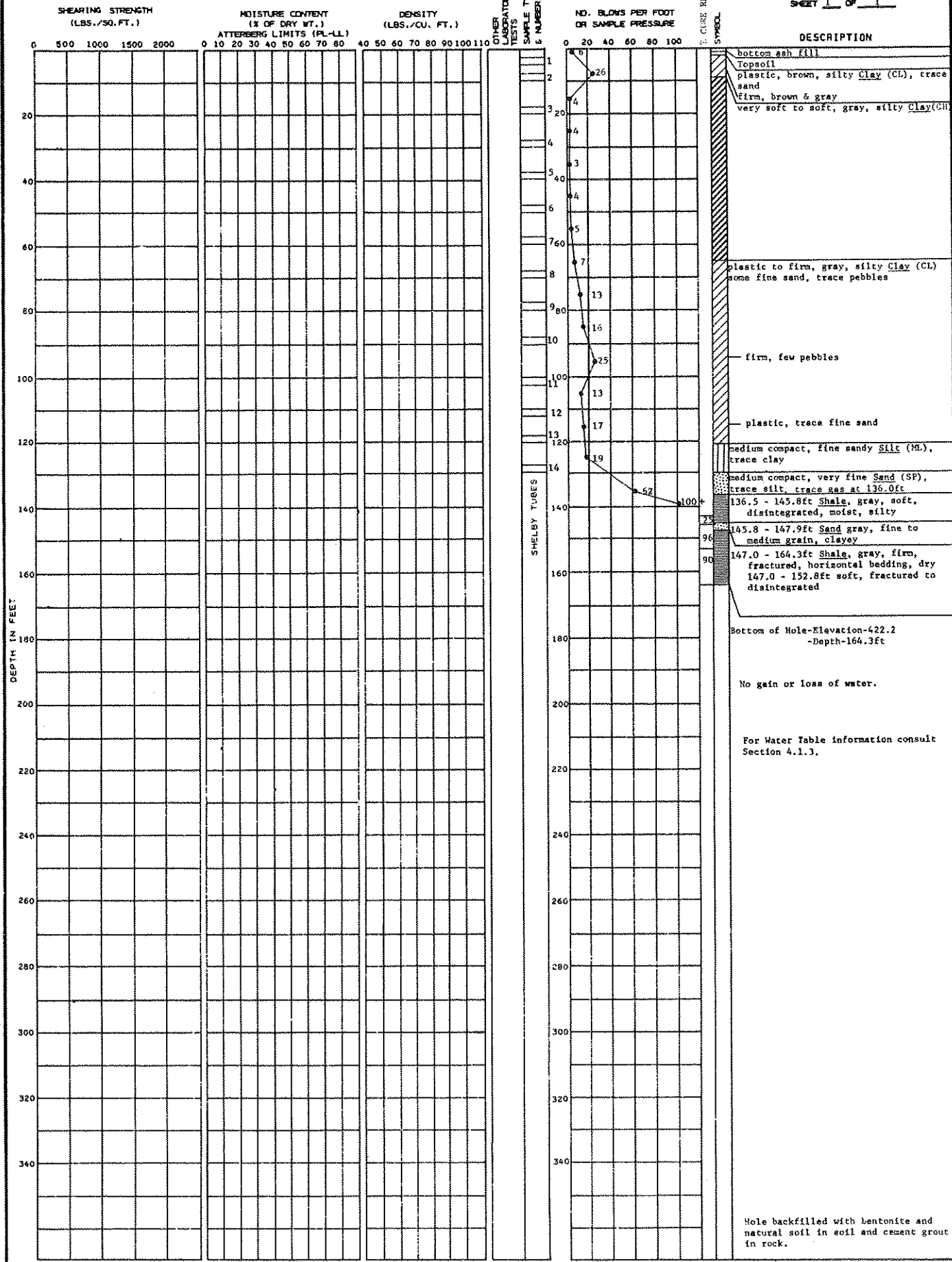
BECHTEL Belle River



LOCATION: N 9,011 E 9,337 GROUND ELEVATION 586.5

DATE DRILLED: 1-17-74  
1-23-74

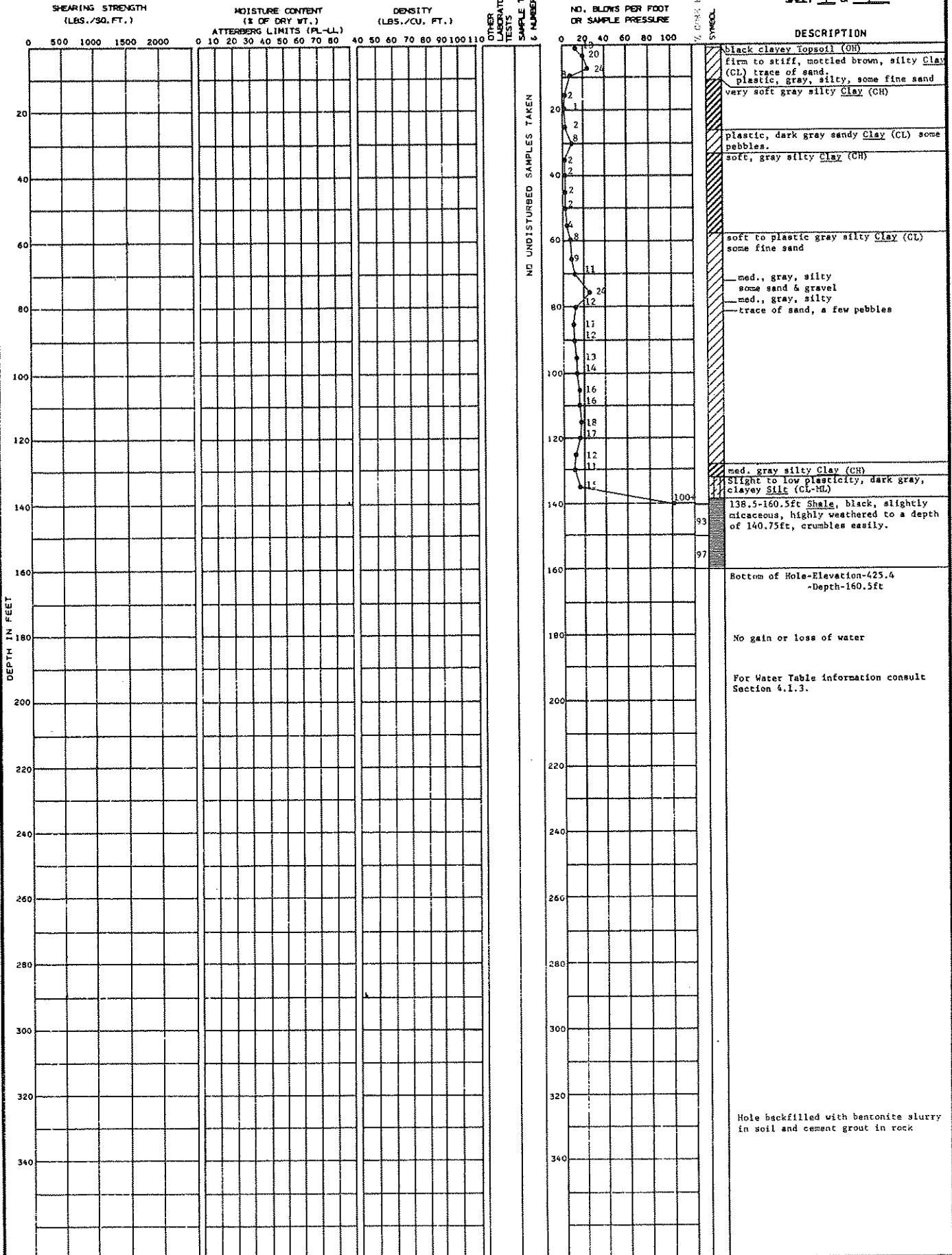
SHEET 1 OF 1



LOCATION: N.8,002 E.9,943 GROUND ELEVATION 385.9

DATE DRILLED: 11-20-73

SHEET 1 OF 1



LOCATION: N 7,904  
E 9,436

GROUND ELEVATION 586.3

DATE DRILLED: 1-30-74  
2-5-74

SHEET 1 OF 1

SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

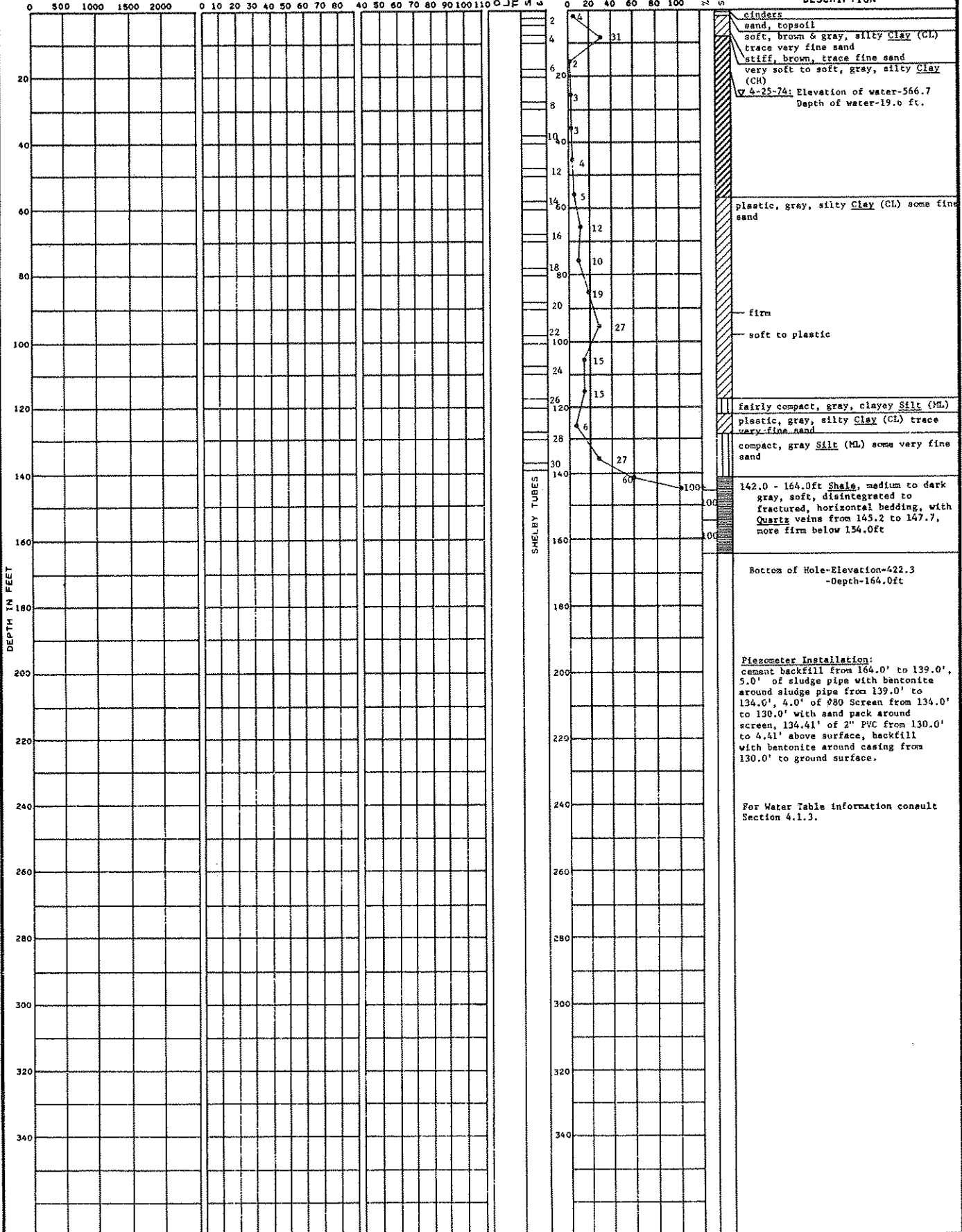
DENSITY  
(LBS./CU. FT.)

LABORATORY TESTS  
SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

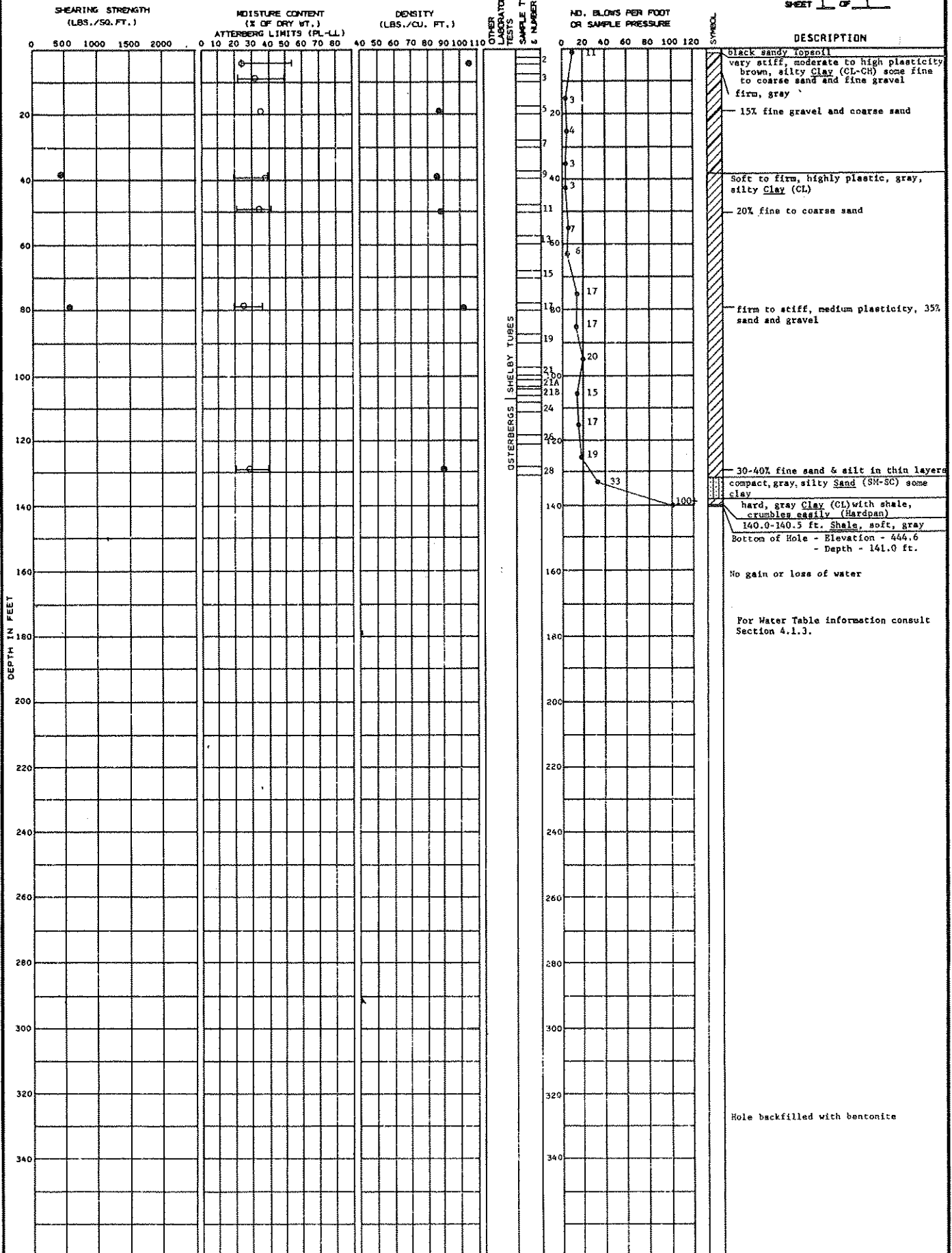
% CORE RECOVERY  
SYMBOL

DESCRIPTION



LOCATION: N 7,890 E 9,763 GROUND ELEVATION 585.6

DATE DRILLED: 12-12-73  
12-19-73  
SHEET 1 OF 1

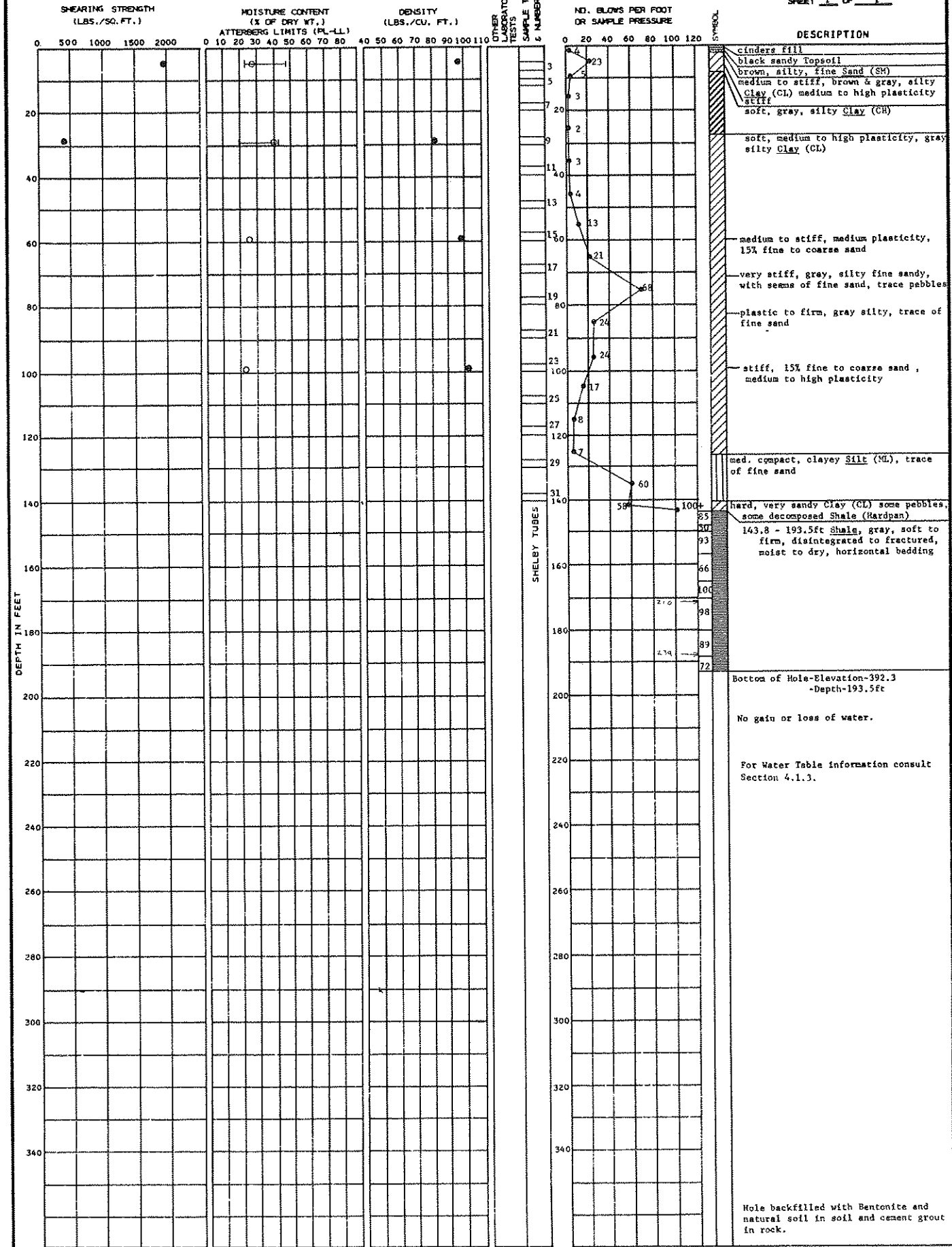


SOIL BORING NO. 26

BECHTEL Belle River

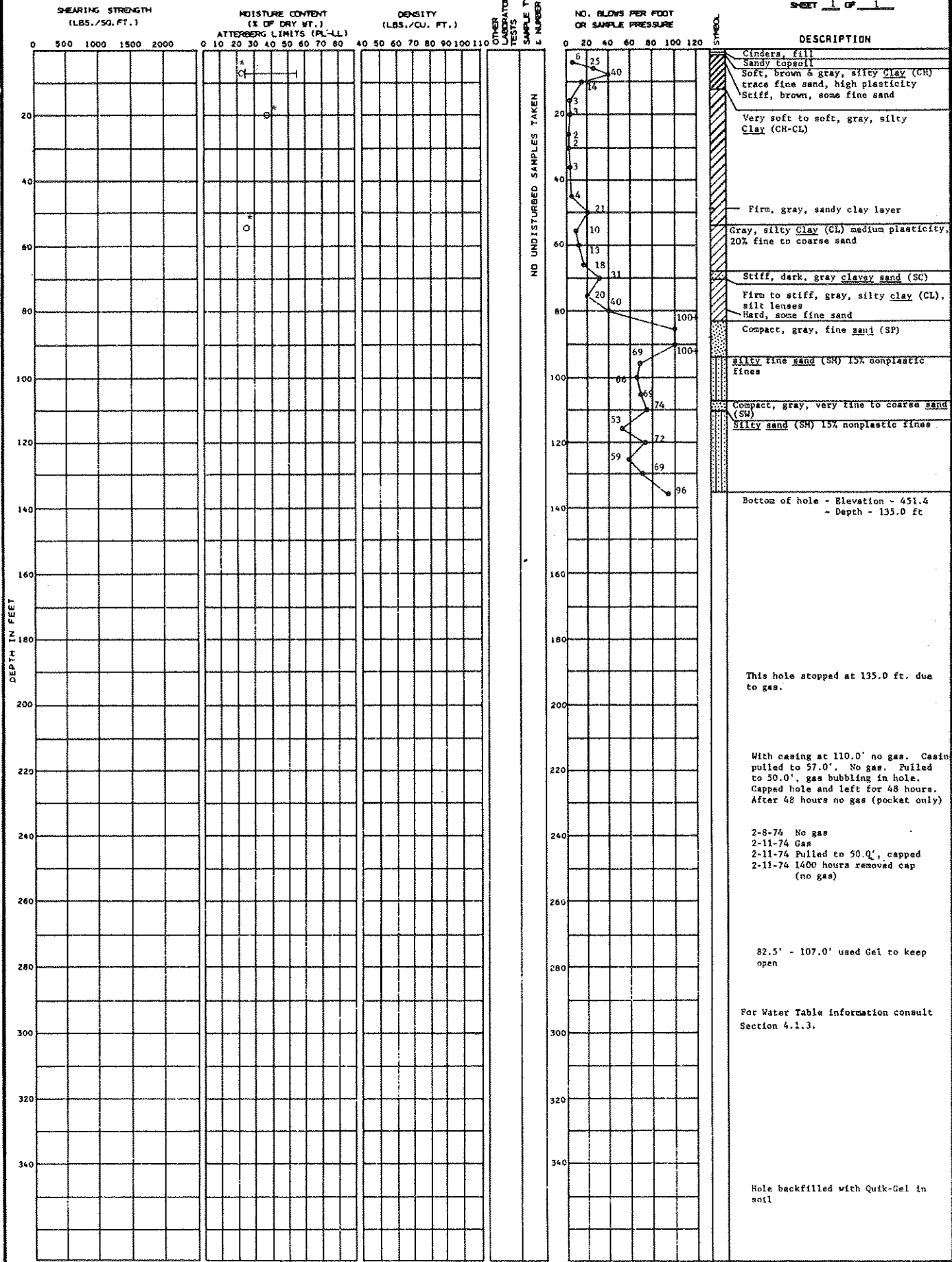
LOCATION: N 7,724 E 9,443 GROUND ELEVATION 585.8

DATE DRILLED: 1-15-74 1-22-74 SHEET 1 OF 1



SOIL BORING NO. 28

BECHTEL Belle River



DESCRIPTION

Cinders, fill  
Sandy topsoil  
Soft, brown & gray, silty Clay (CH)  
trace fine sand, high plasticity  
Stiff, brown, some fine sand

Very soft to soft, gray, silty Clay (CH-CL)

Firm, gray, sandy clay layer

Gray, silty Clay (CL) medium plasticity, 20% fine to coarse sand

Stiff, dark, gray clayey sand (SC)

Firm to stiff, gray, silty clay (CL), silt lenses  
Hard, some fine sand

Compact, gray, fine sand (SP)

silty fine sand (SM) 15% nonplastic fines

Compact, gray, very fine to coarse sand (SW)

Silty sand (SM) 15% nonplastic fines

Bottom of hole - Elevation - 451.4  
- Depth - 135.0 ft

This hole stopped at 135.0 ft. due to gas.

With casing at 110.0' no gas. Casing pulled to 57.0'. No gas. Pulled to 50.0', gas bubbling in hole. Capped hole and left for 48 hours. After 48 hours no gas (pocket only)

2-8-74 No gas  
2-11-74 Gas  
2-11-74 Pulled to 50.0', capped  
2-11-74 1400 hours removed cap (no gas)

82.5' - 107.0' used Gel to keep open

For Water Table Information consult Section 4.1.3.

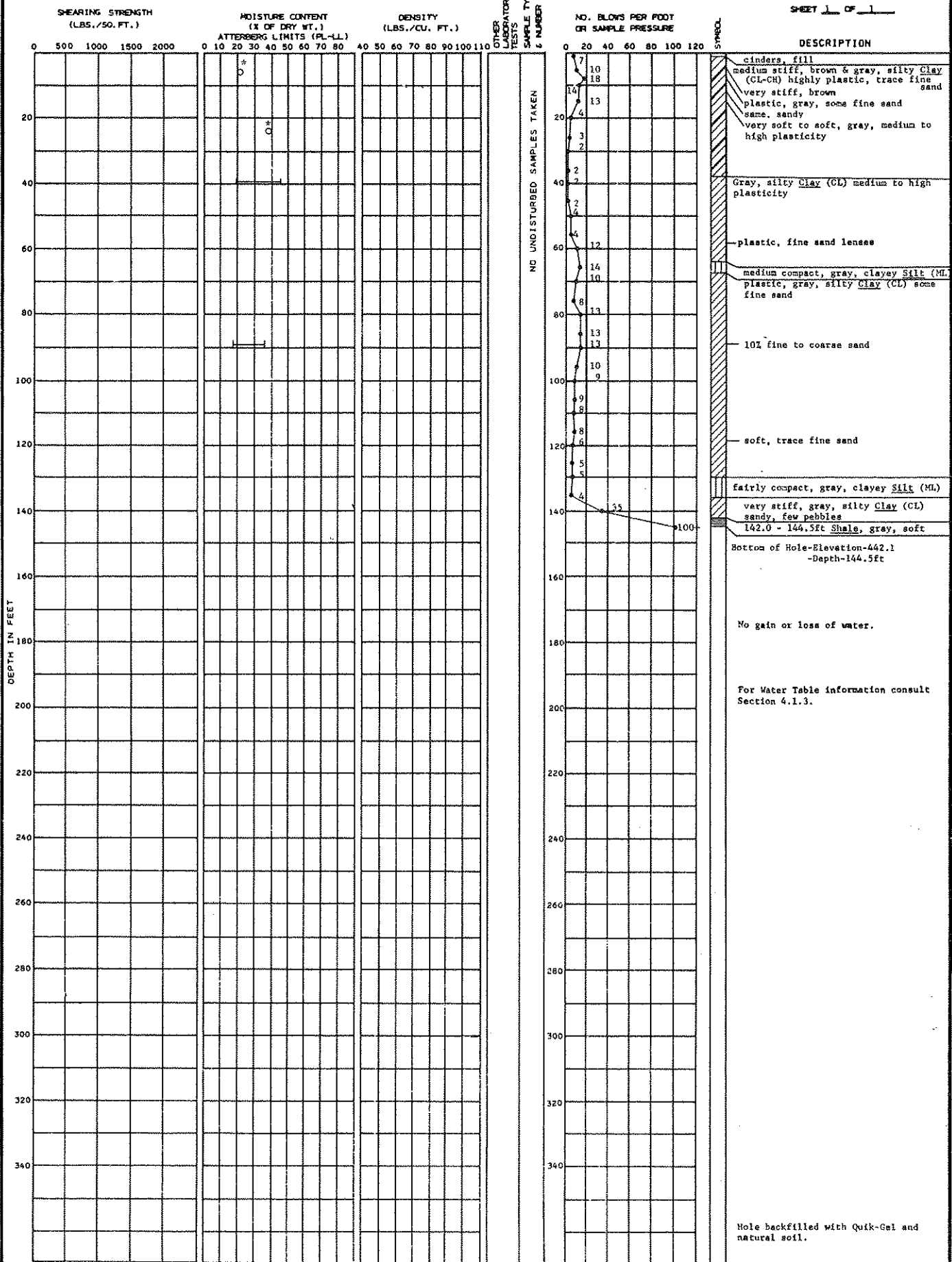
Hole backfilled with Quik-Gel in soil

Atterberg Limits  
O Moisture Content  
\* Sample Jar Unsealed

LOCATION: N 7,663 E 2,659 GROUND ELEVATION 586.6

DATE DRILLED: 2-6-74  
2-12-74

SHEET 1 OF 1



Atterberg Limits  
 ○ Moisture Content  
 \* Sample Jar Unsealed

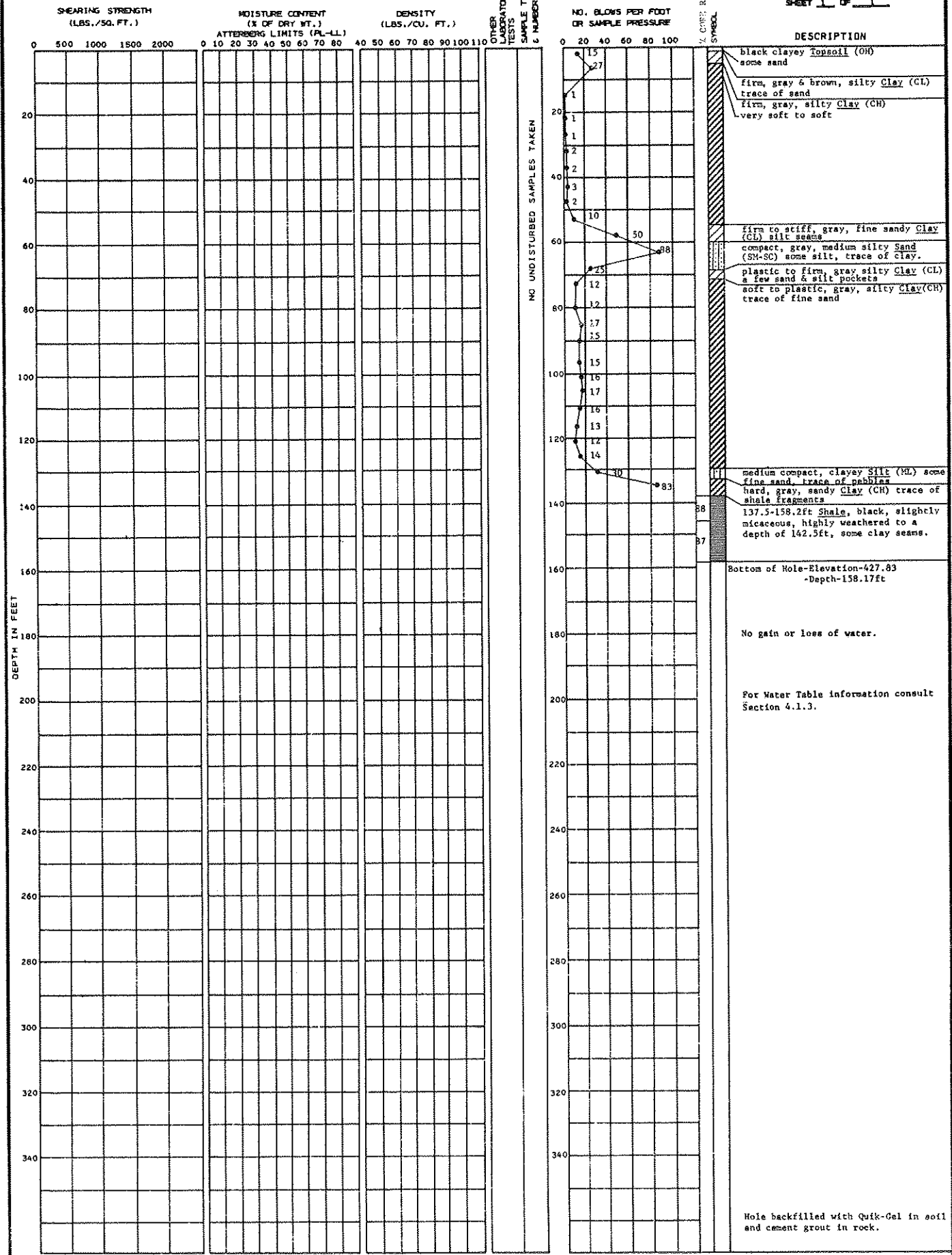
SOIL BORING NO. 32  
 BECHTEL Belle River

LOCATION: N 7,398  
E 9,963

GROUND ELEVATION: 586.0

DATE DRILLED: 11-8-73

SHEET 1 OF 1



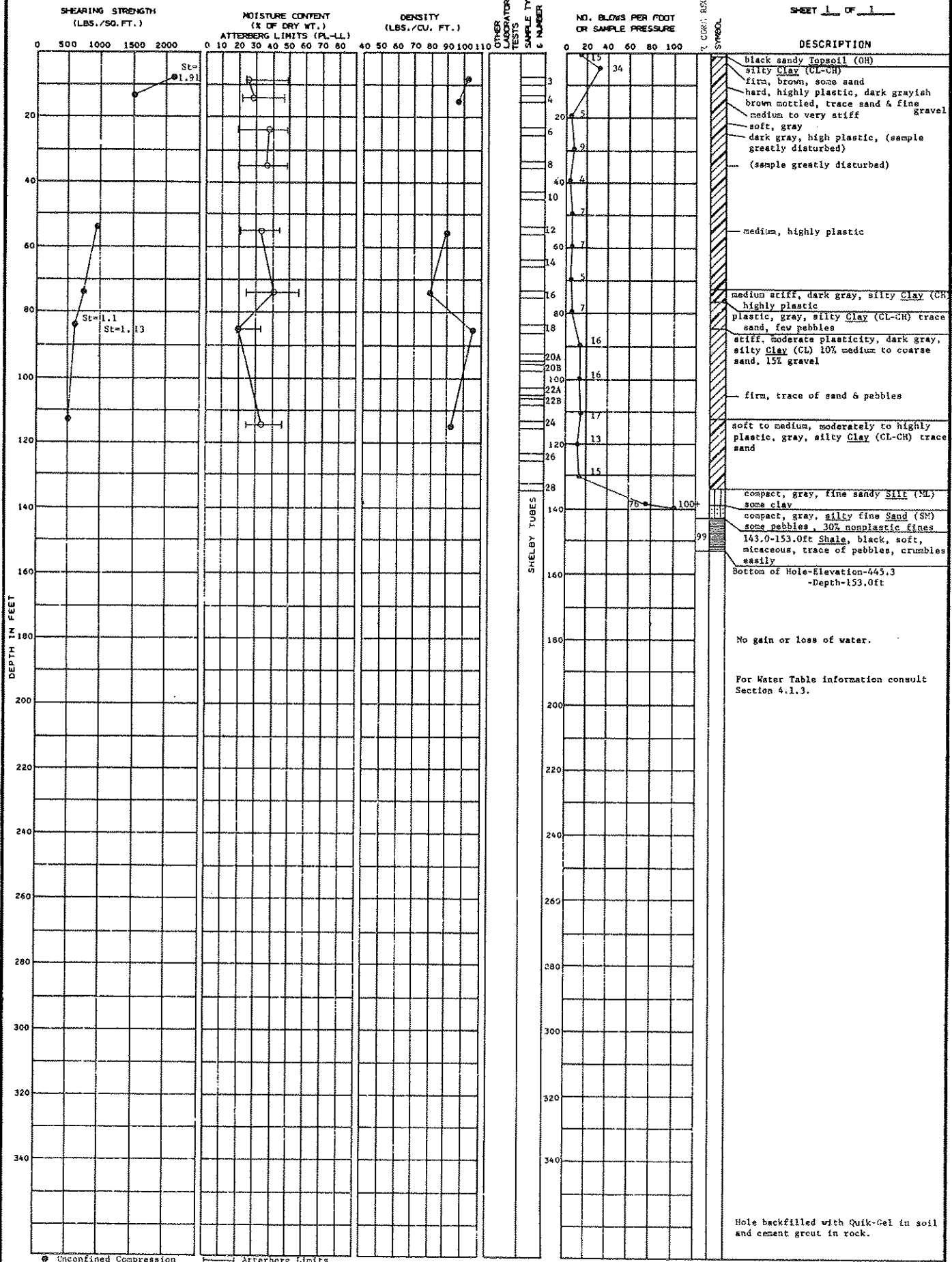


LOCATION: N 9,007  
E 13,035

GROUND ELEVATION: 598.3

DATE DRILLED: 12-6-73  
12-12-73

SHEET 1 OF 1



● Unconfined Compression  
St = Sensitivity

○ Atterberg Limits  
Moisture Content

SOIL BORING NO. 38

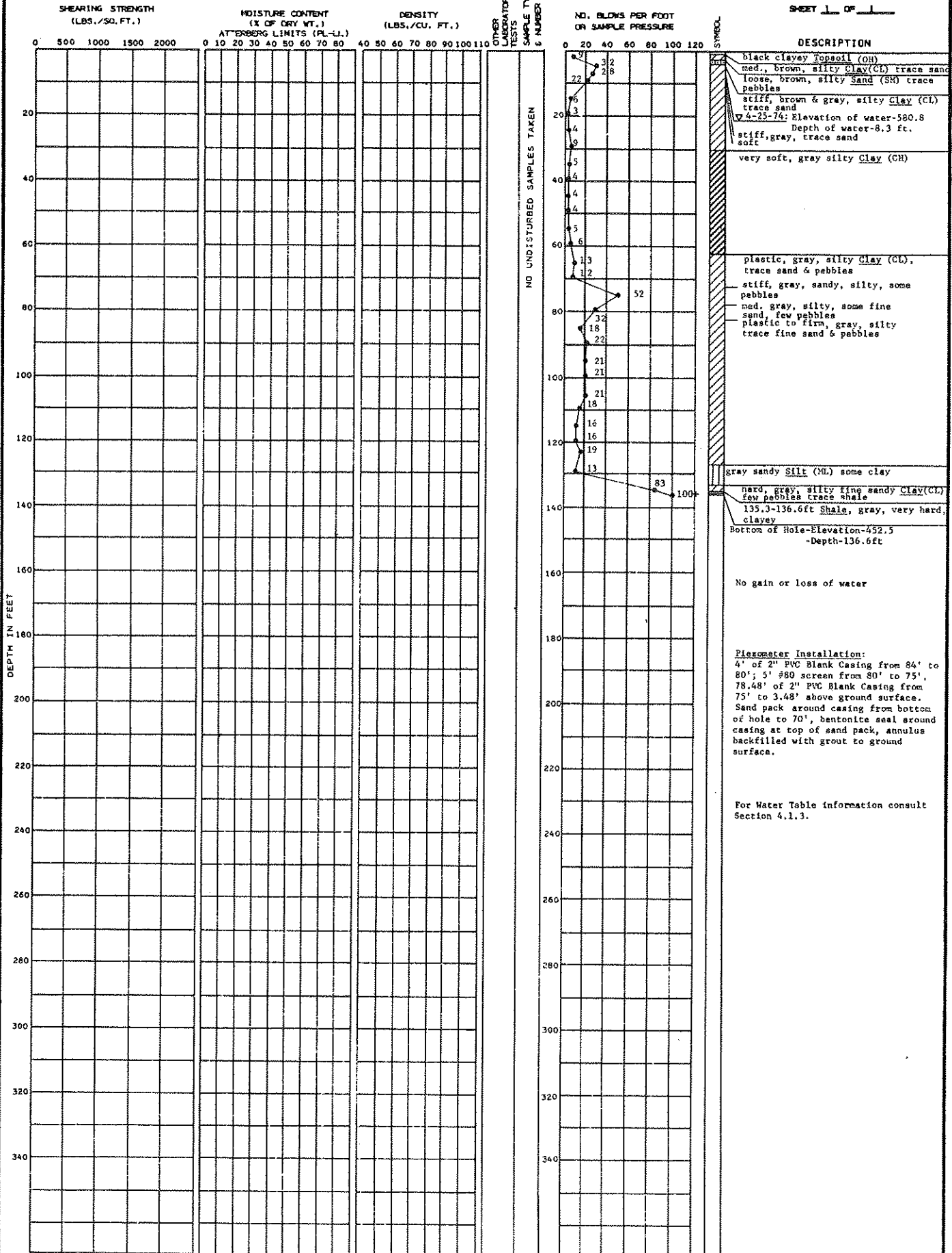
BECHTEL Belle River

B-43

LOCATION: N 8,003 E10,993 GROUND ELEVATION: 589.1

DATE DRILLED: 12-14-73 12-18-73

SHEET 1 OF 1

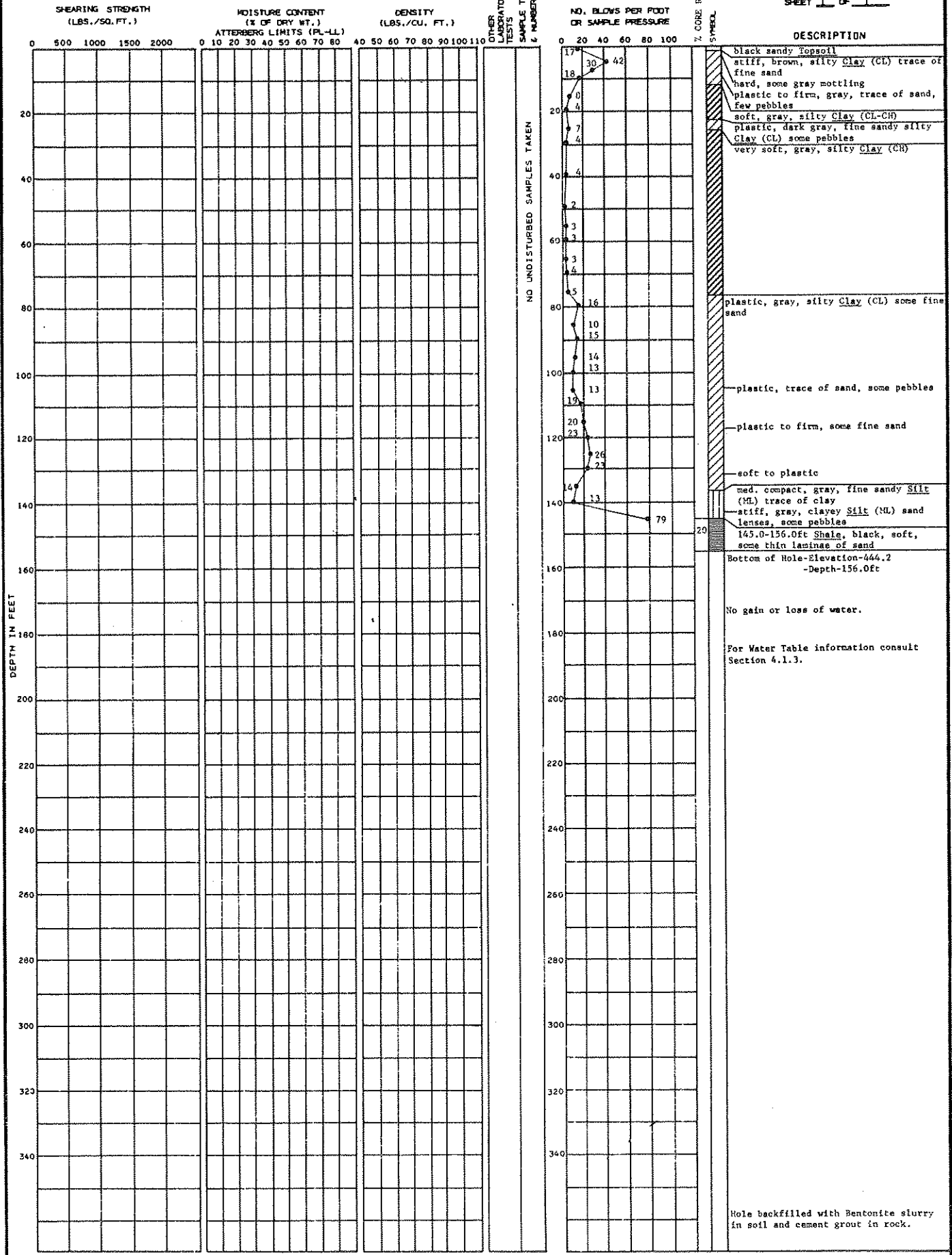


LOCATION: N 8,016  
E 12,991

GROUND ELEVATION 500.2

DATE DRILLED: 11-19-73  
11-21-73

SHEET 1 OF 1

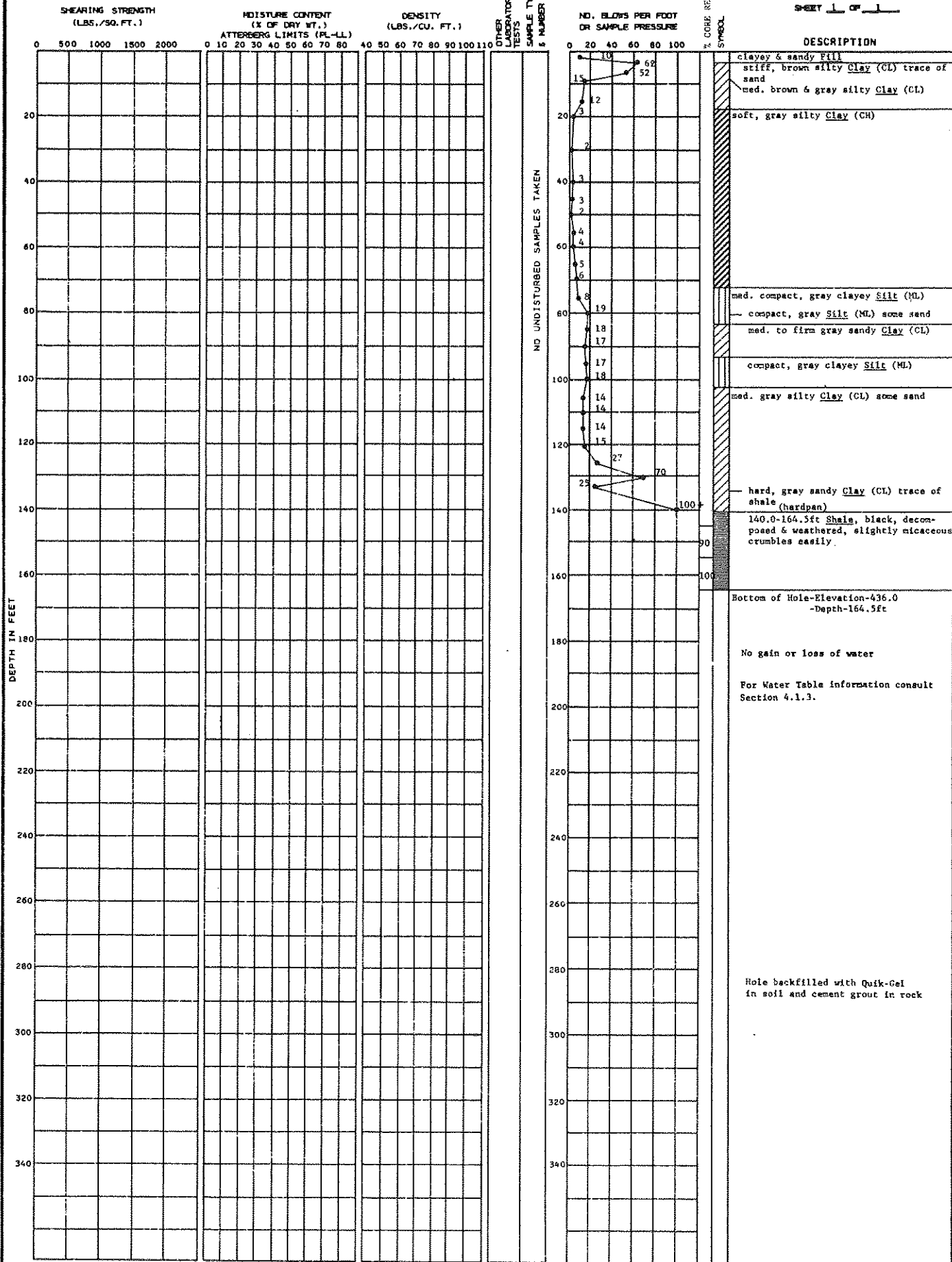


SOIL BORING NO. 42  
BECHTEL Belle River

LOCATION: N 7,004  
E13,000 GROUND ELEVATION 600.5

DATE DRILLED: 11-20-73

SHEET 1 OF 1

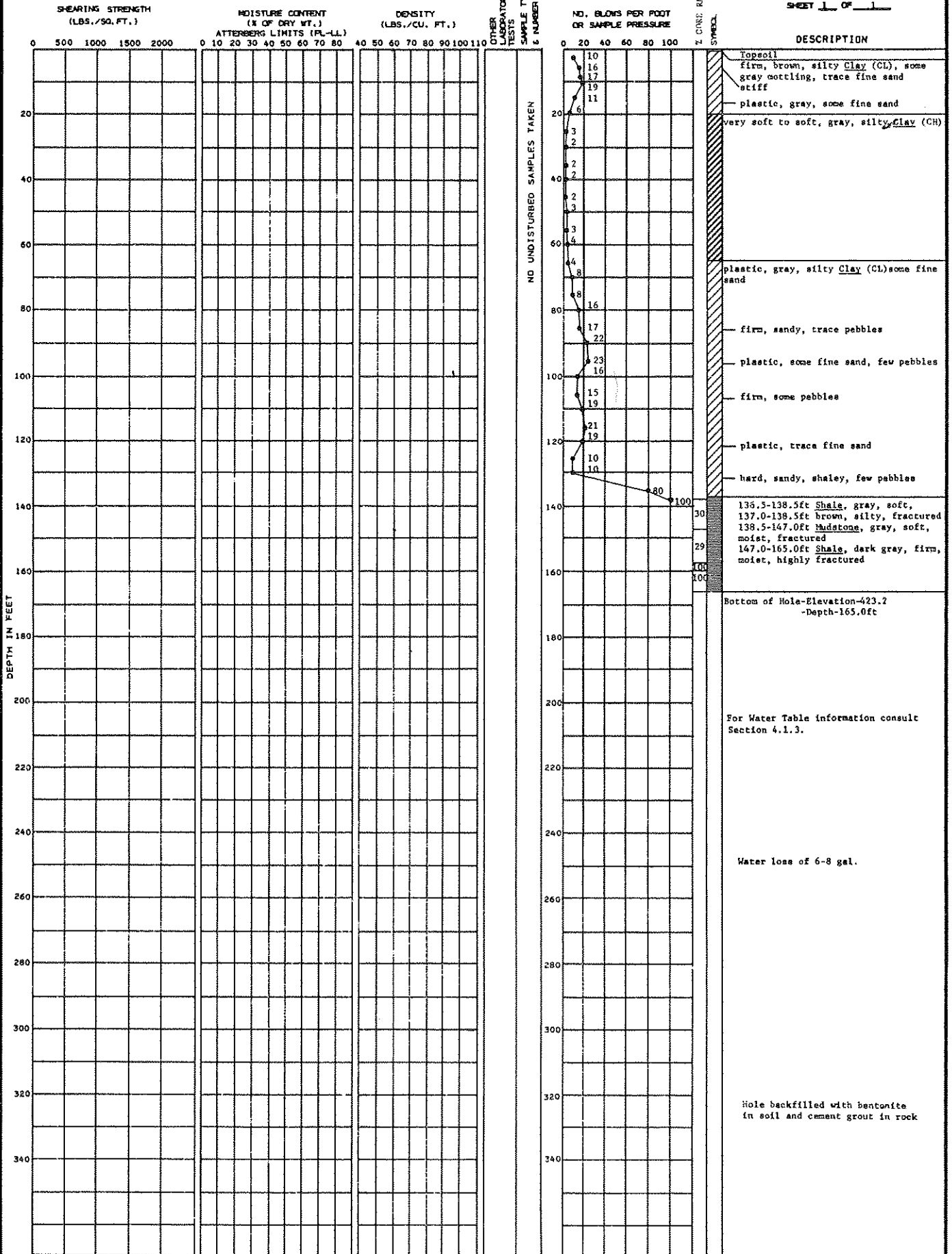


LOCATION: N 5,344  
E 12,319

GROUND ELEVATION 588.2

DATE DRILLED: 1-22-74  
1-28-74

SHEET 1 OF 1



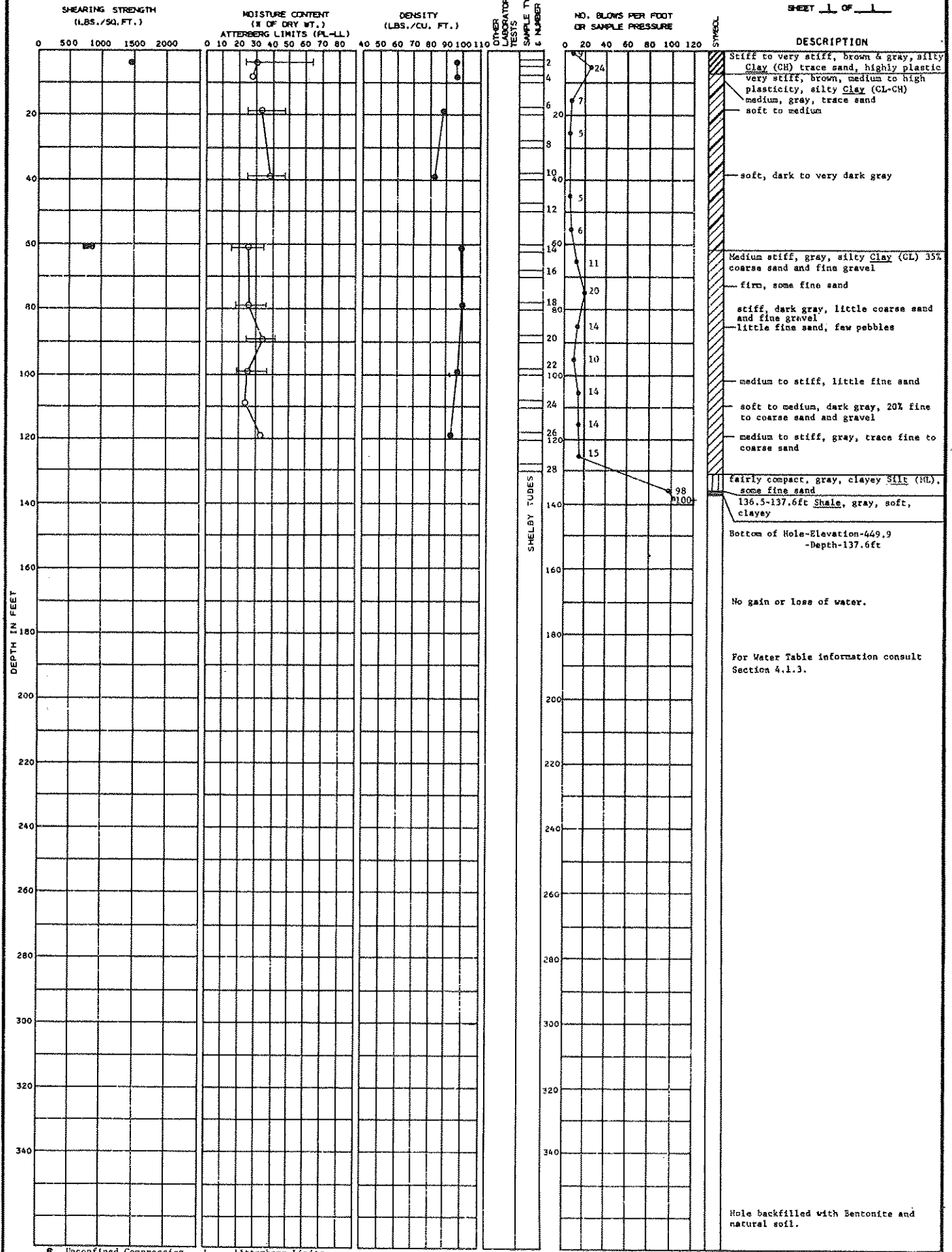
SOIL BORING NO. 46-A

BECHTEL Belle River

LOCATION: N 3,950 E 12,584 GROUND ELEVATION 587.5

DATE DRILLED: 1-14-74  
1-23-74

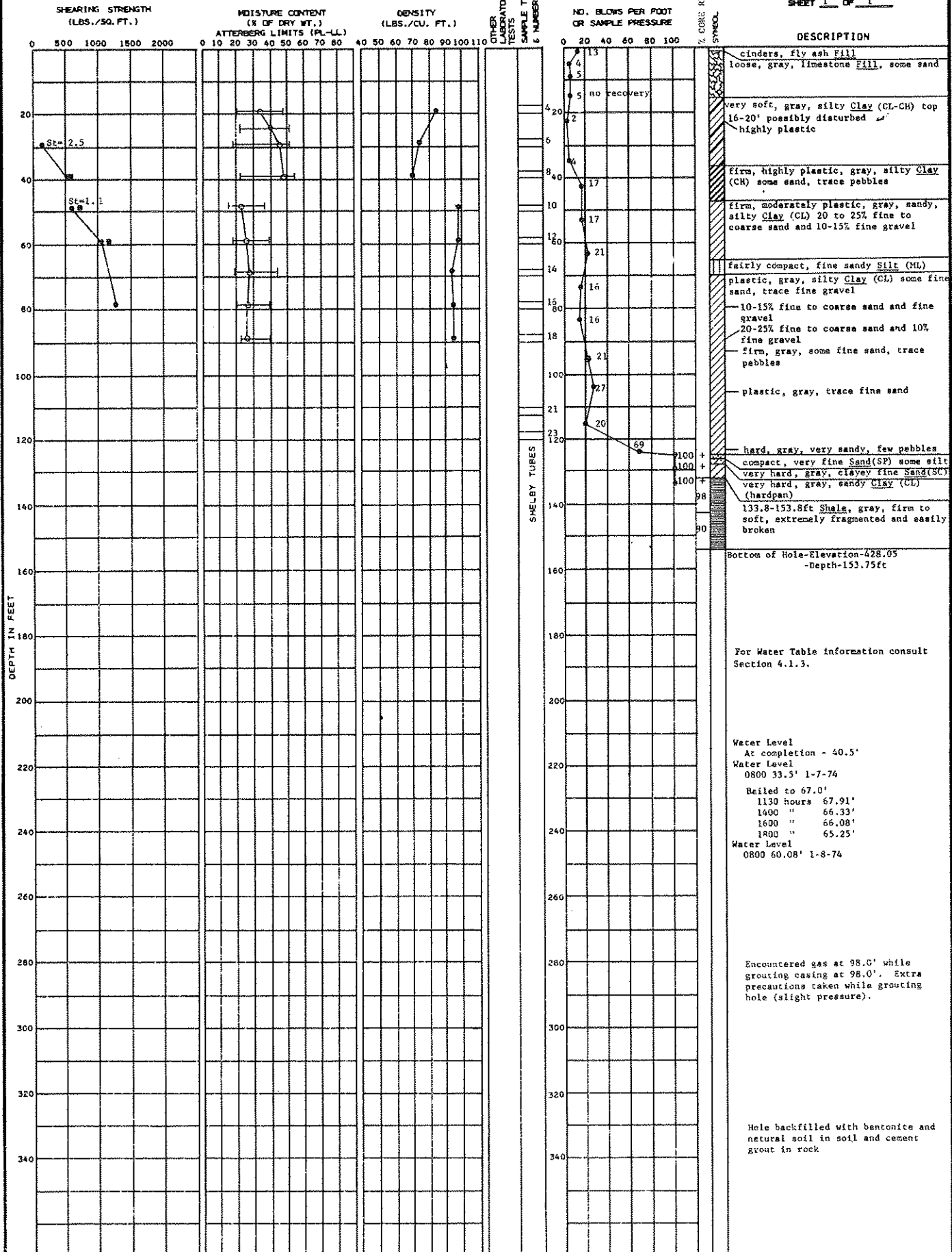
SHEET 1 OF 1



● Unconfined Compression  
 ■ Unconsolidated Undrained  
 ———— Atterberg Limits  
 ○ Moisture Content

SOIL BORING NO. 48

BECHTEL Belle River



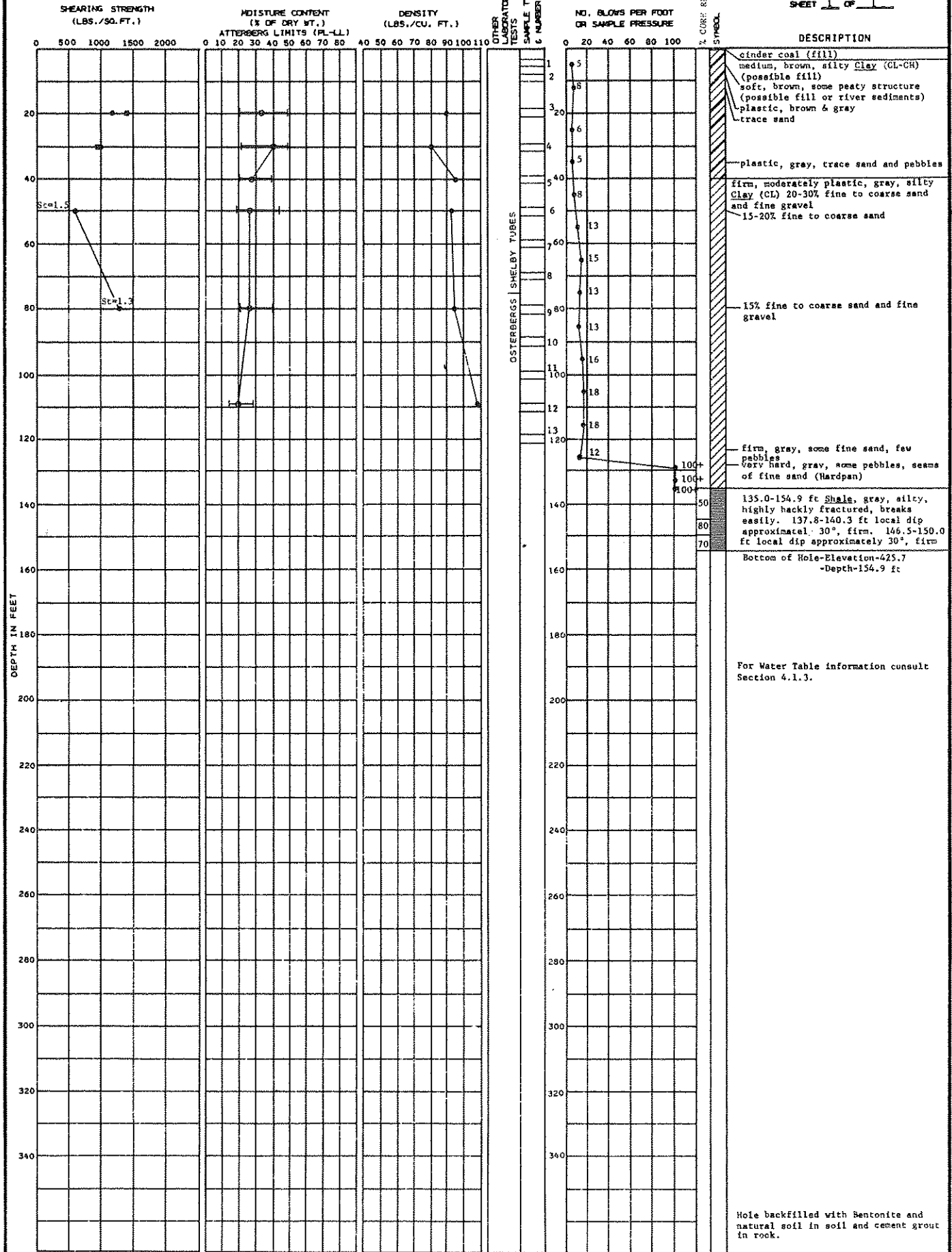
● Unconfined  
 ■ Unconsolidated Undrained  
 St = Sensitivity  
 ○ Moisture Content  
 — Atterberg Limits

LOCATION: N 2,052  
E15,176

GROUND ELEVATION: 580.6

DATE DRILLED: 12-21-73  
1-7-76

SHEET 1 OF 1



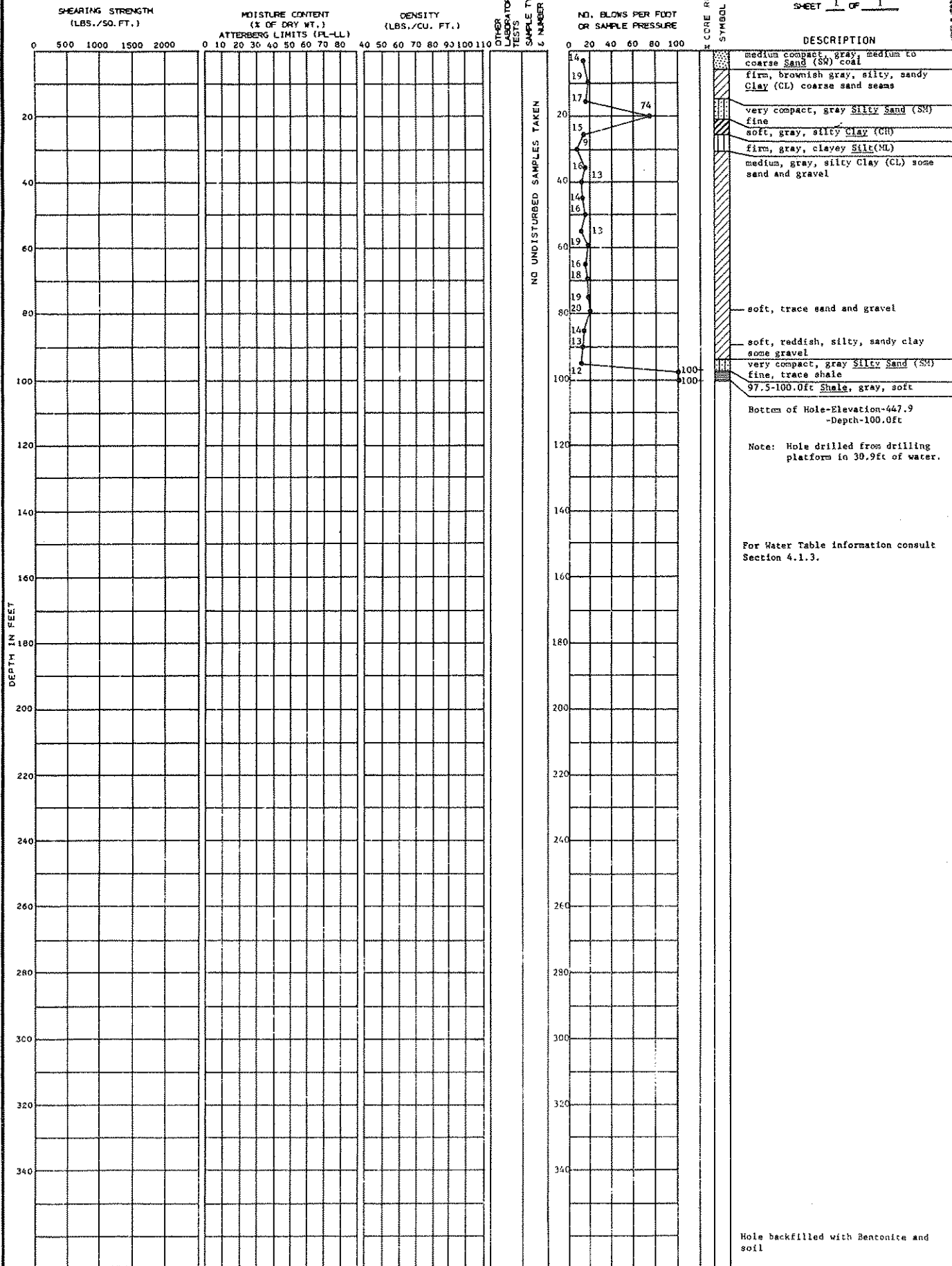


LOCATION: N 2,645  
E 15,306

GROUND ELEVATION 547.9

DATE DRILLED: 3-29-74

SHEET 1 OF 1



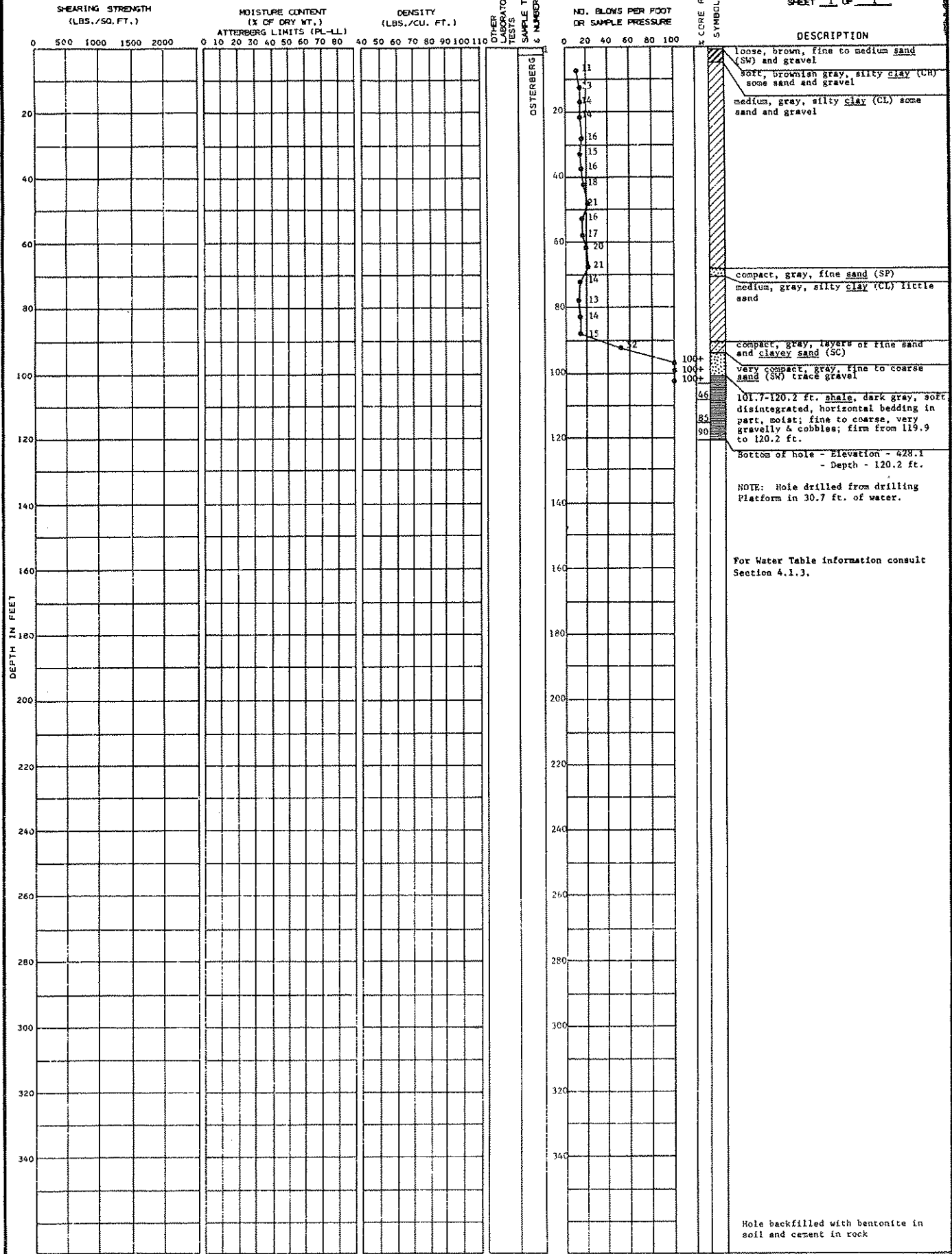
SOIL BORING NO. 55

BECHTEL Belle River

LOCATION: N 1,907  
E 15,269 GROUND ELEVATION 543.3

DATE DRILLED: 3-20-74  
3-25-74

SHEET 1 OF 1



Hole backfilled with bentonite in soil and cement in rock

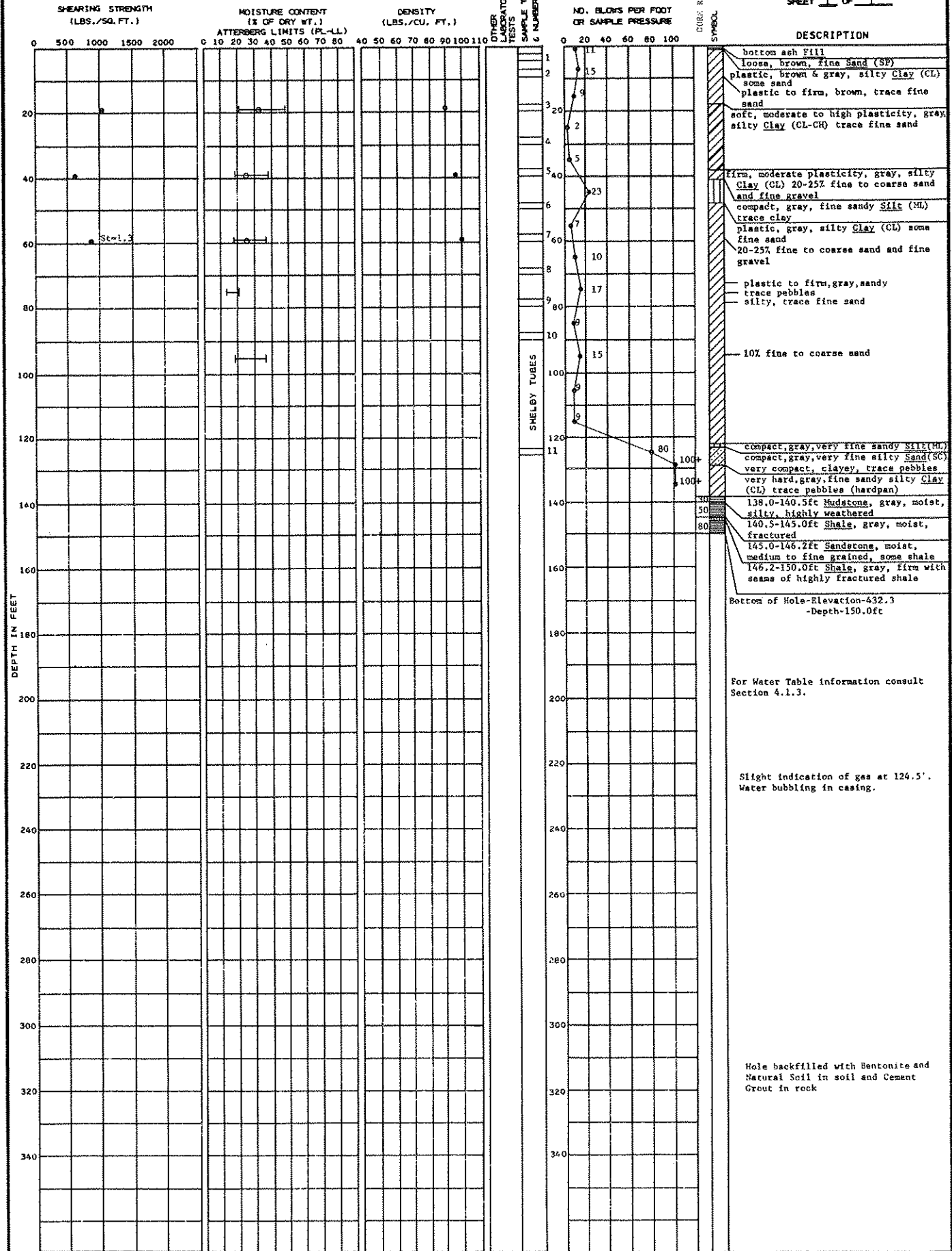
SOIL BORING NO. 57

BECHTEL Belle River

LOCATION: N 2393 E15140 GROUND ELEVATION 582.3

DATE DRILLED: 1-10-74  
1-16-74

SHEET 1 OF 1



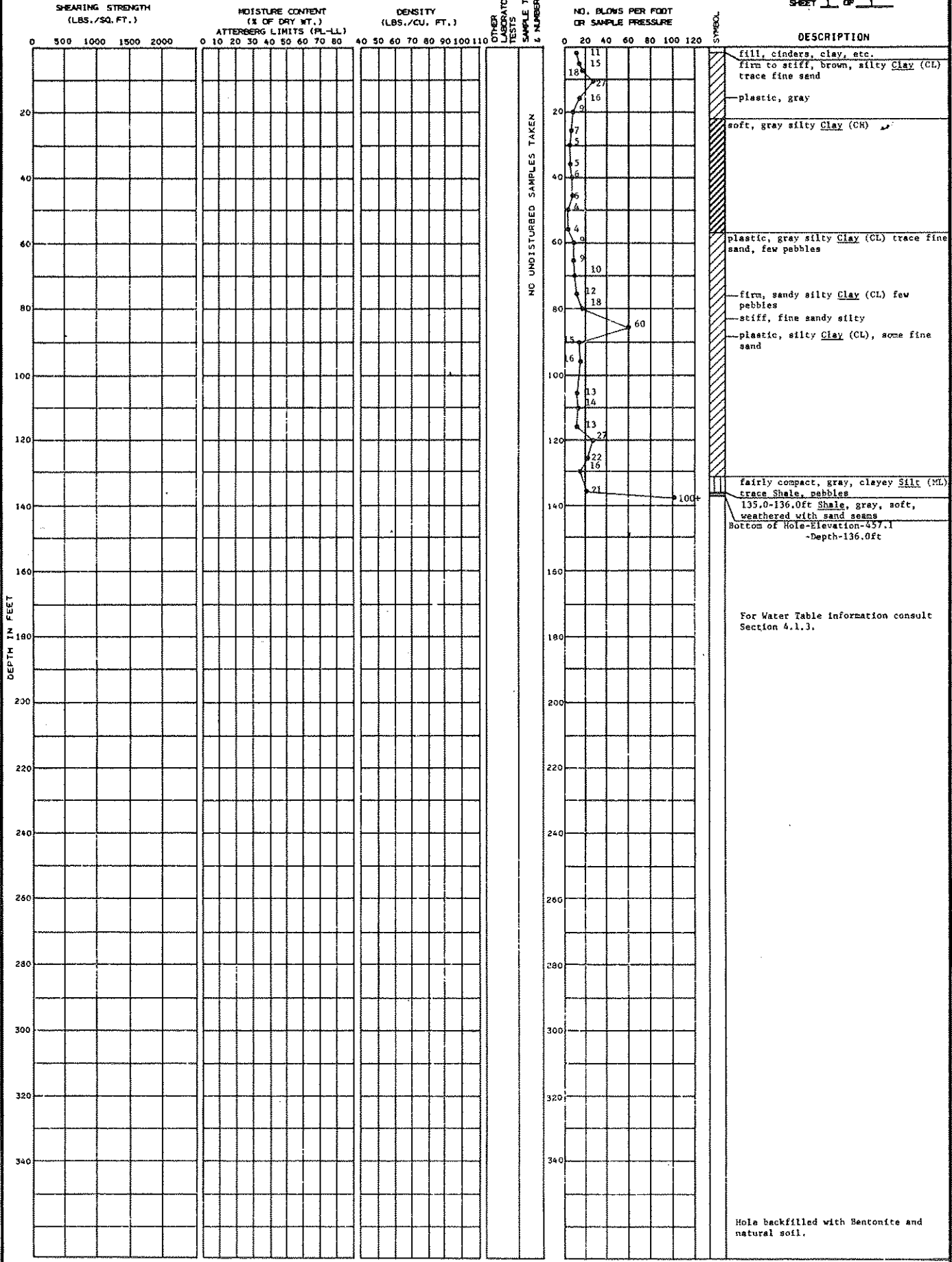
• Unconfined  
 Sr = Sensitivity  
 ○ Moisture Content  
 — Atterberg Limits

LOCATION: N 5,283  
E 14,042

GROUND ELEVATION 593.1

DATE DRILLED: 1-23-74  
1-29-74

SHEET 1 OF 1

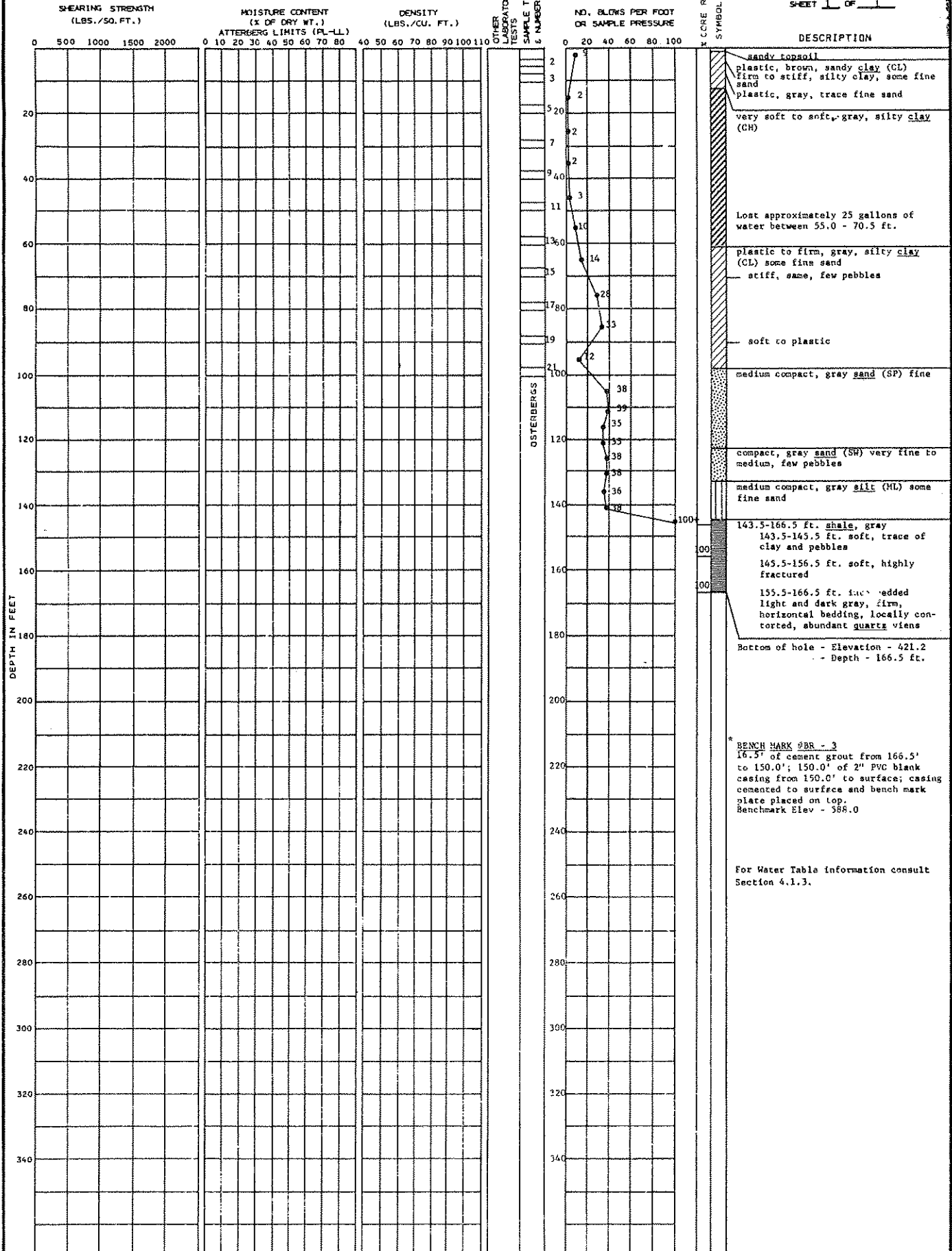


SOIL BORING NO. 63  
BECHTEL Belle River

LOCATION: N 9,208.32  
E 9,376.12 GROUND ELEVATION 587.6

DATE DRILLED: 2-28-74  
3-7-74

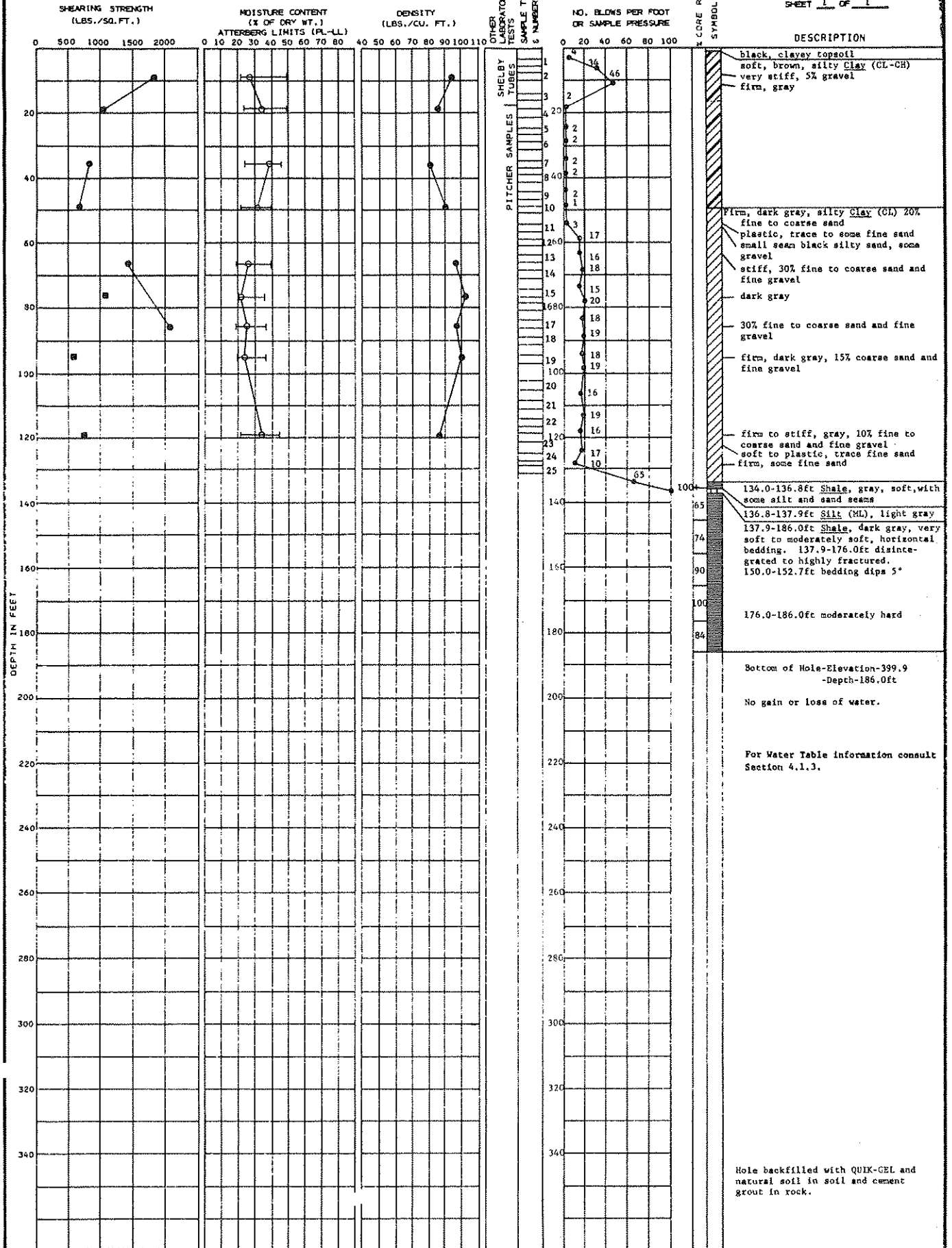
SHEET 1 OF 1



LOCATION: N 3,800 E 12,060 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74  
2-26-74

SHEET 1 OF 1



● Unconfined Compression  
■ Unconsolidated Undrained  
— Atterberg Limits  
○ Moisture Content

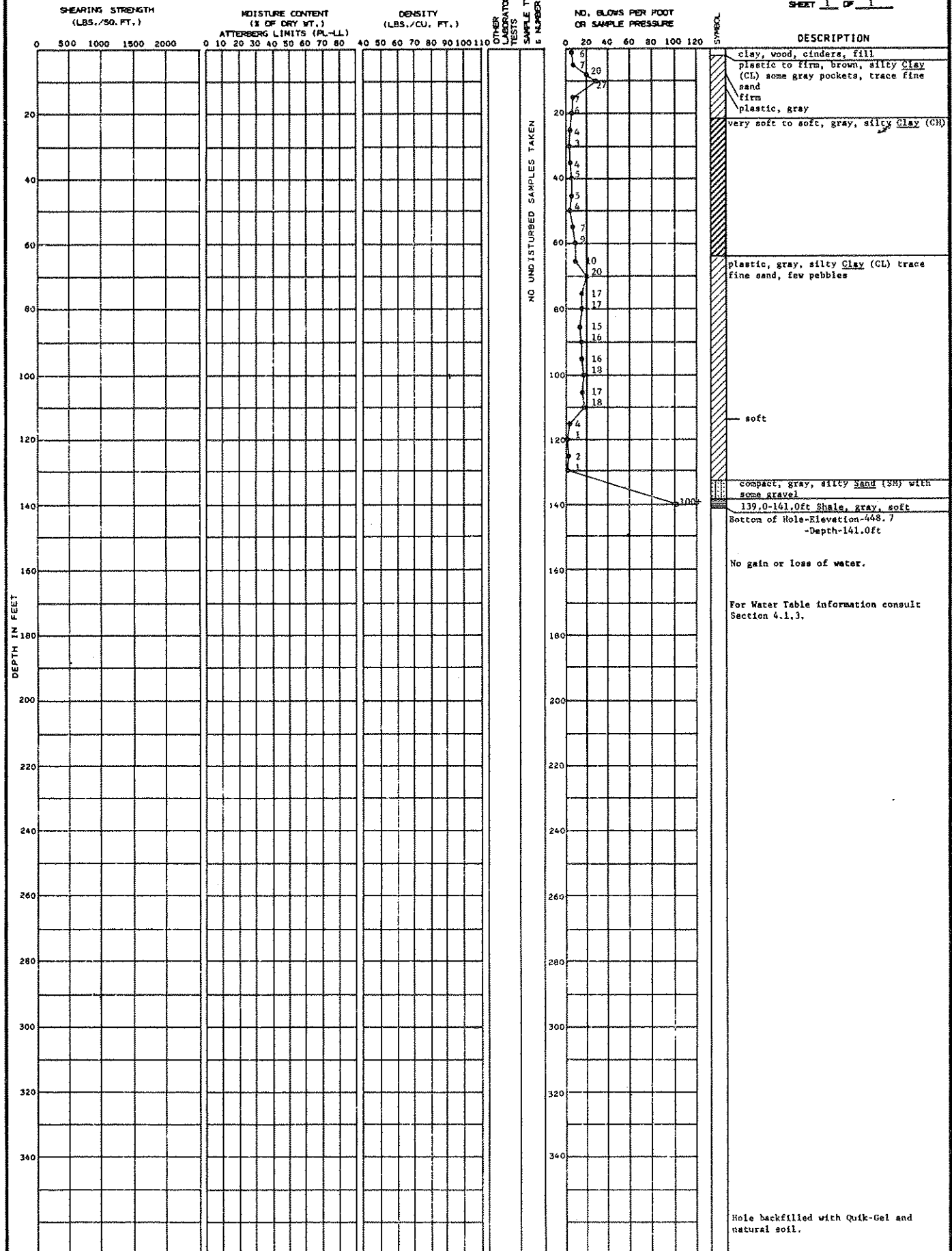
SOIL BORING NO. 101  
BECHTEL Belle River

LOCATION: N 4,435  
E 12,350

GROUND ELEVATION 589.7

DATE DRILLED: 2-5-74  
2-7-74

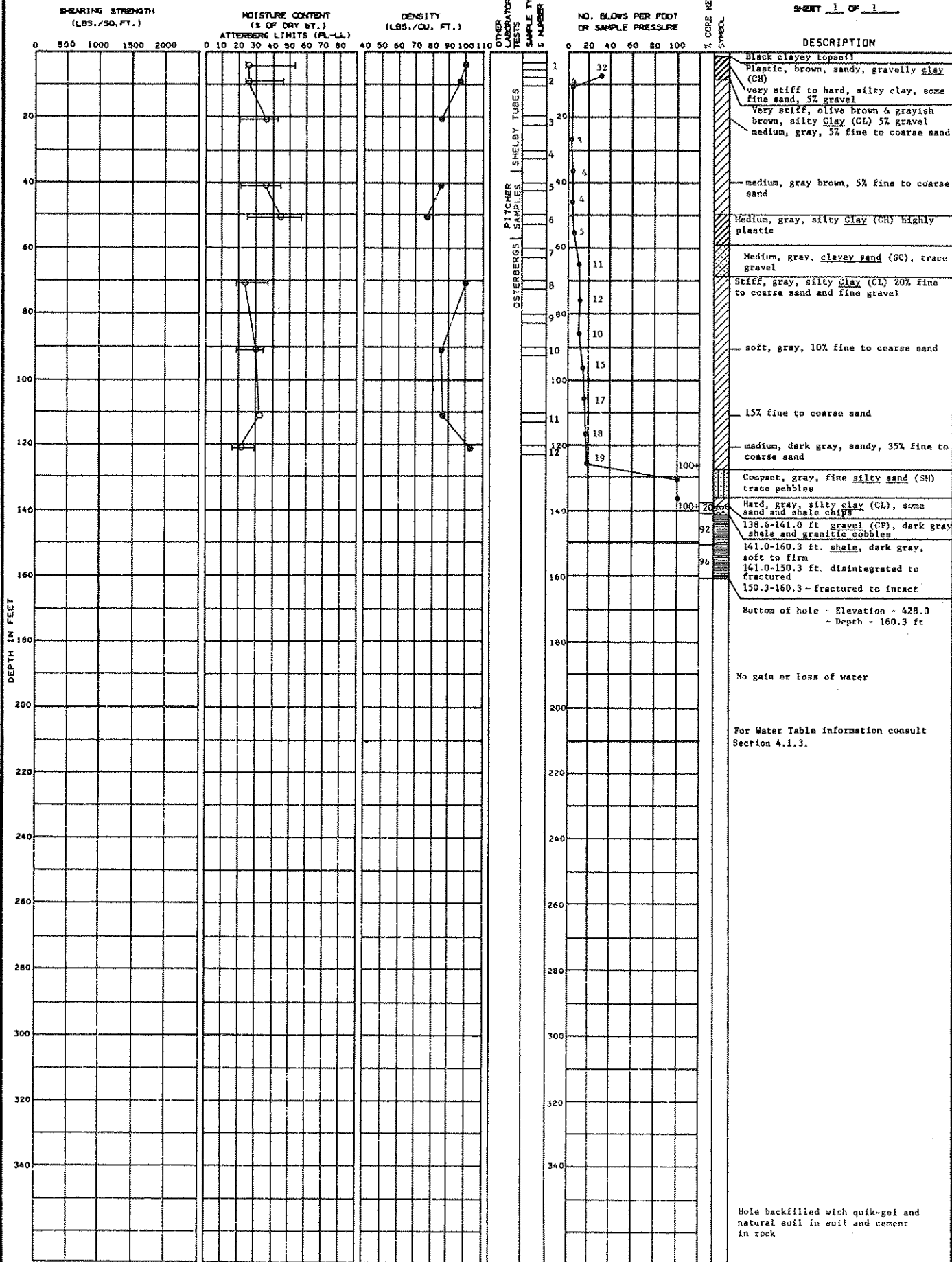
SHEET 1 OF 1



LOCATION: N 5,000 E 11,000 GROUND ELEVATION 588.3

DATE DRILLED: 2-26-74 3-5-74

SHEET 1 OF 1



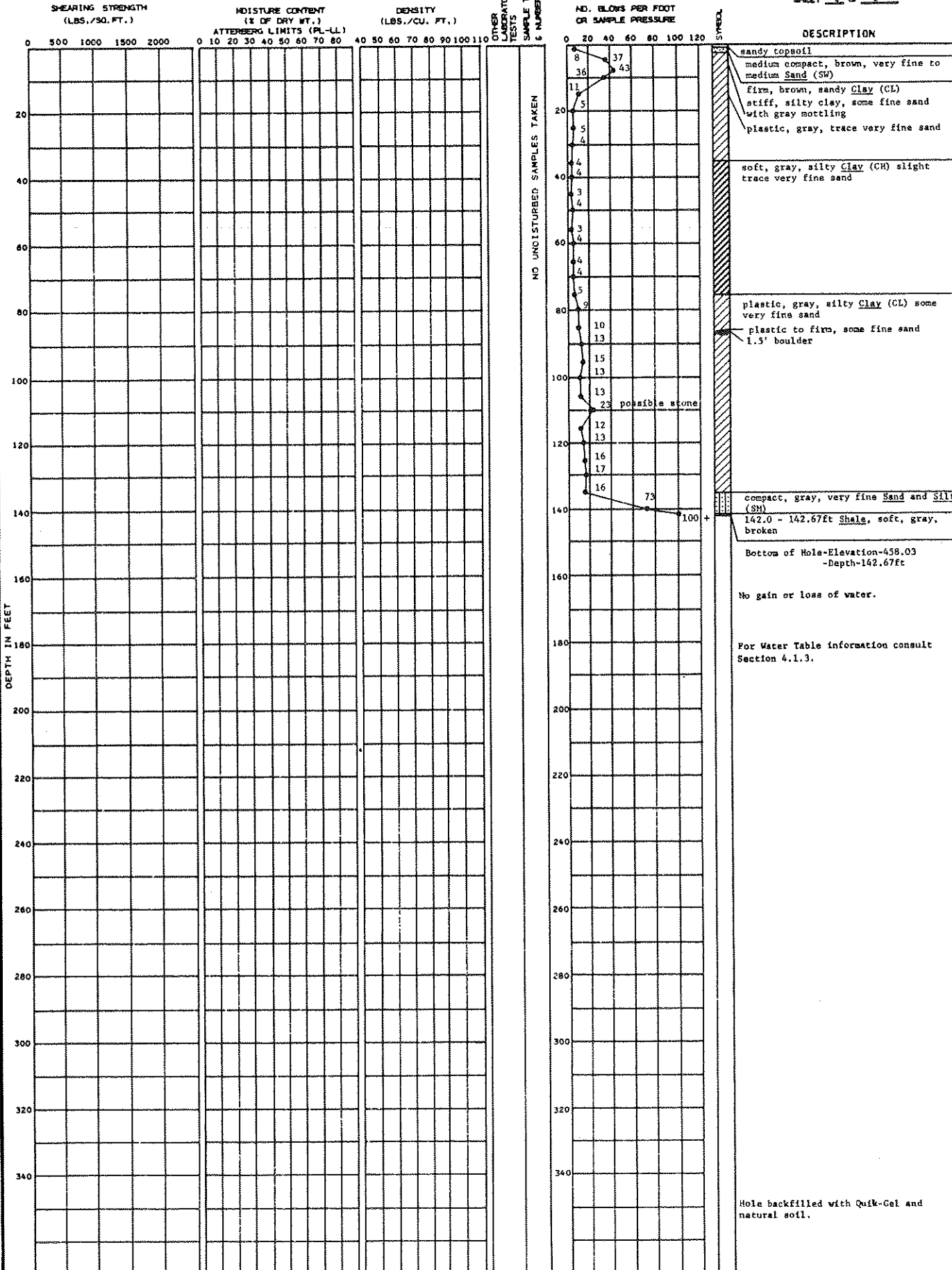
Atterberg Limits  
○ Moisture Content



LOCATION: S 6,450 E 13,140 GROUND ELEVATION 600.7

DATE DRILLED: 2-26-74 3-6-74

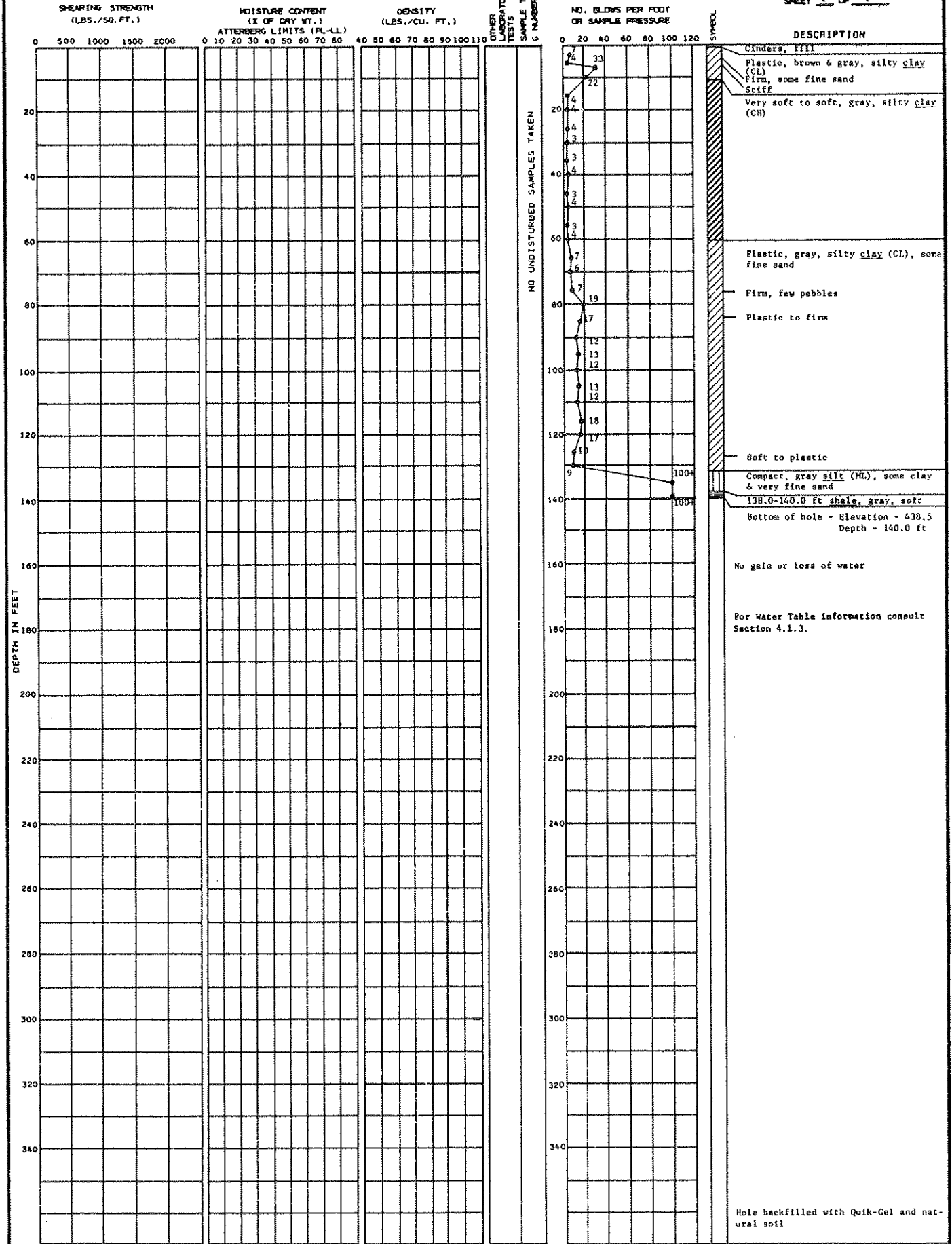
SHEET 1 OF 1



LOCATION: N 6,600  
E 11,000 GROUND ELEVATION 588.5

DATE DRILLED: 2-21-74  
2-26-74

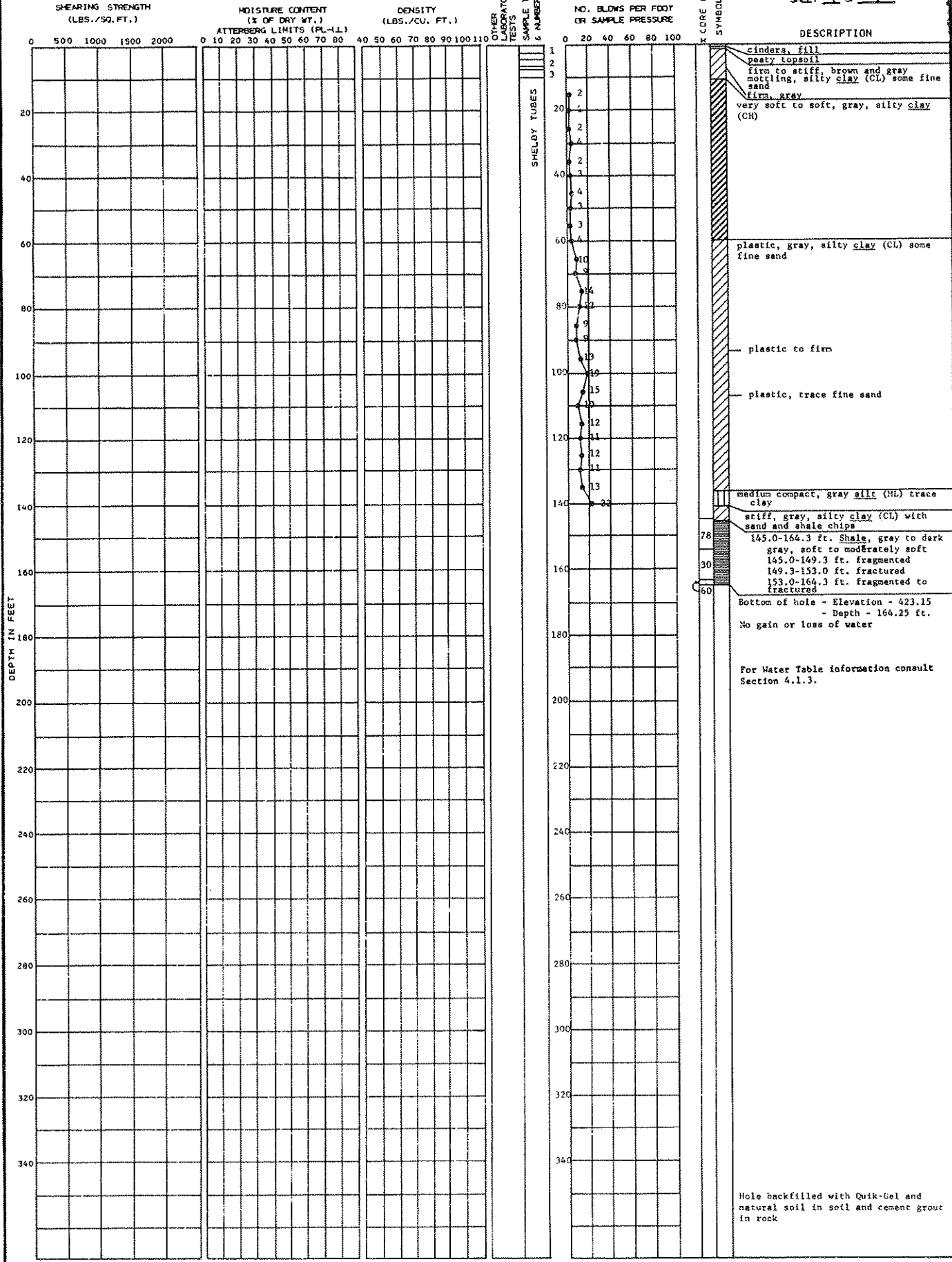
SHEET 1 OF 1



LOCATION: N 6,800 E 9,350 GROUND ELEVATION 587.4

DATE DRILLED: 2-27-74  
3-5-74

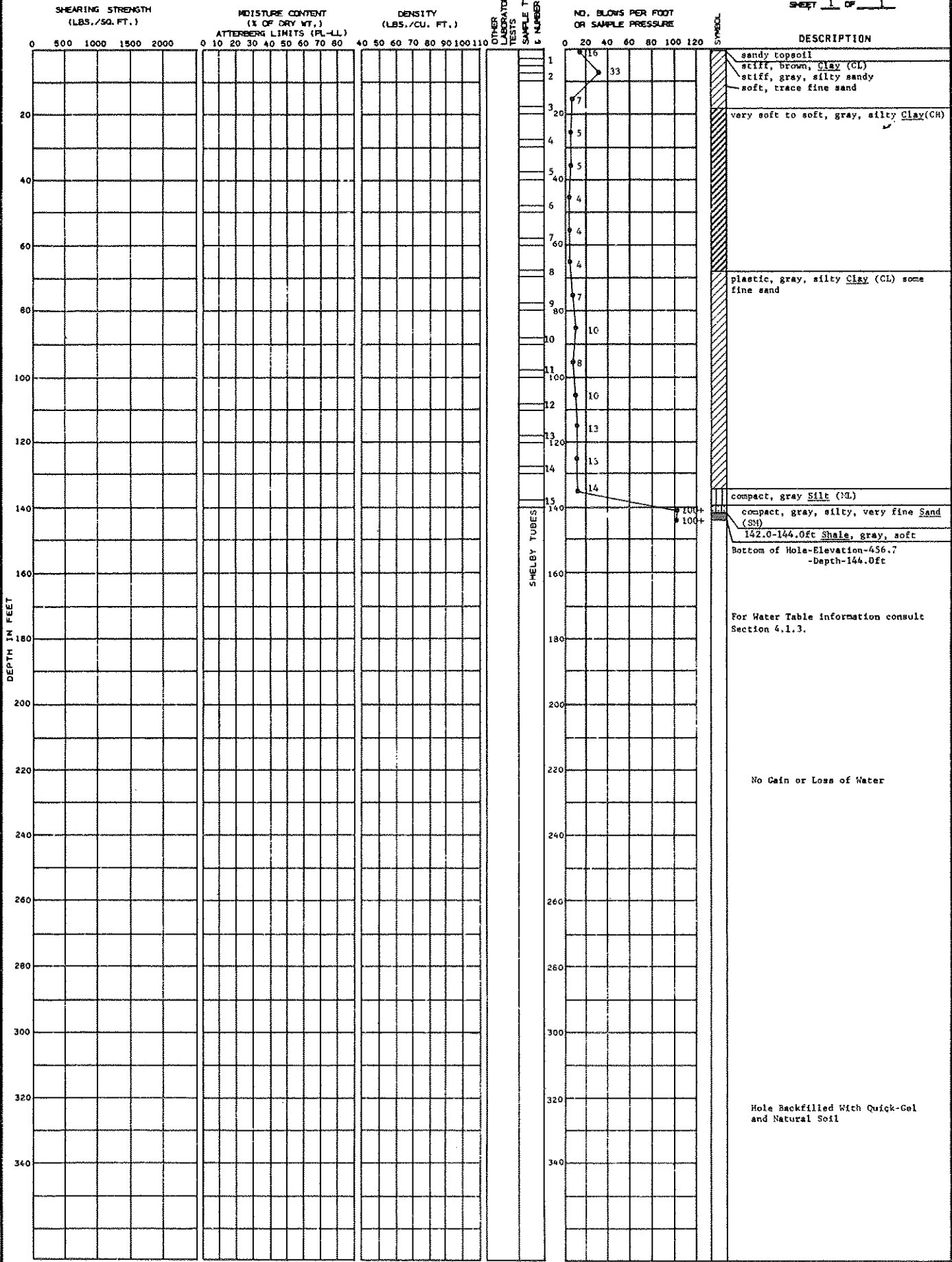
SHEET 1 OF 1



LOCATION: N 7,100 E13,260 GROUND ELEVATION 600.7

DATE DRILLED: 1-30-74 2-6-74

SHEET 1 OF 1



SOIL BORING NO. 115

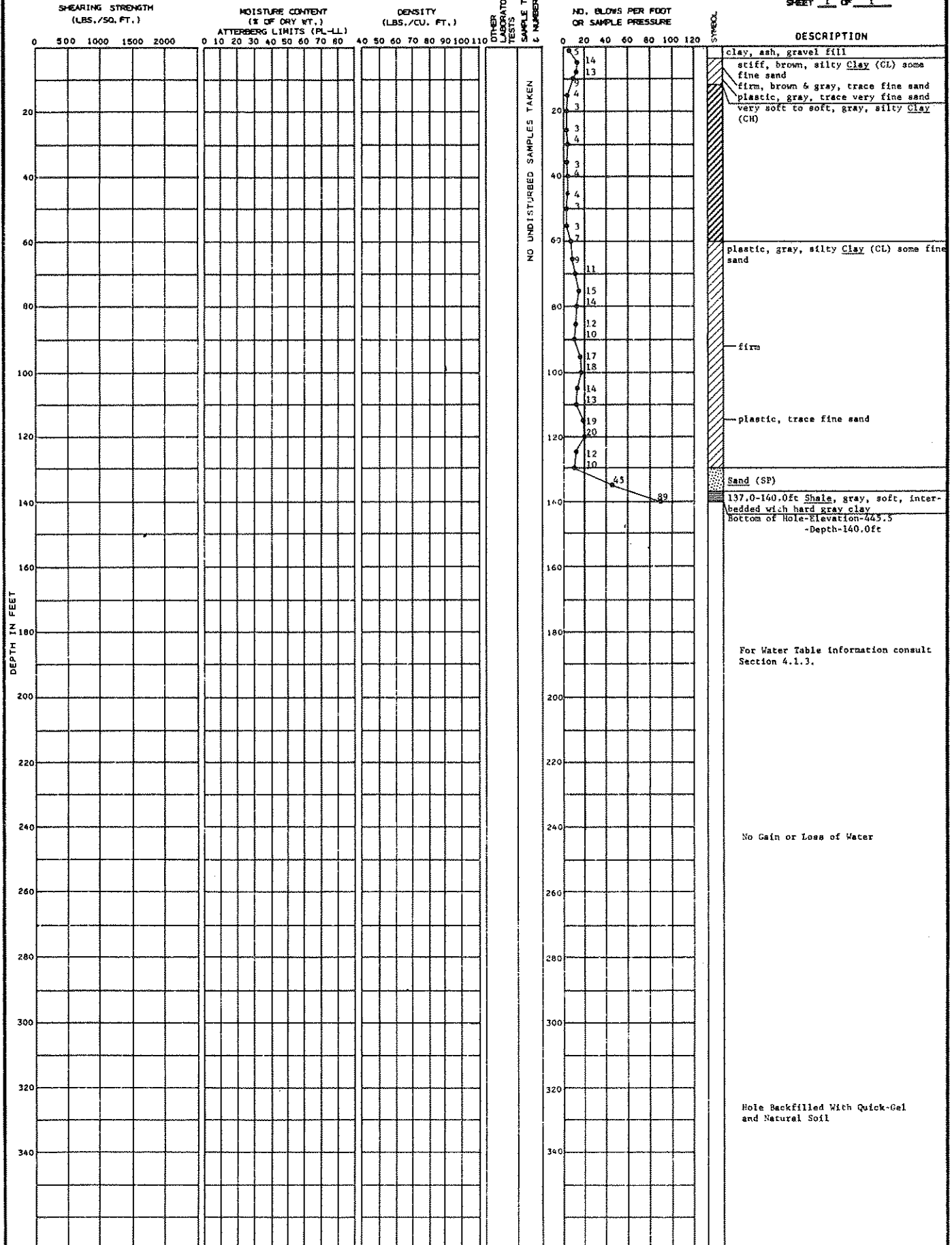
BECHTEL Belle River

LOCATION: N 7,270  
E 9,360

GROUND ELEVATION 585.5

DATE DRILLED: 2-5-74  
2-12-74

SHEET 1 OF 1

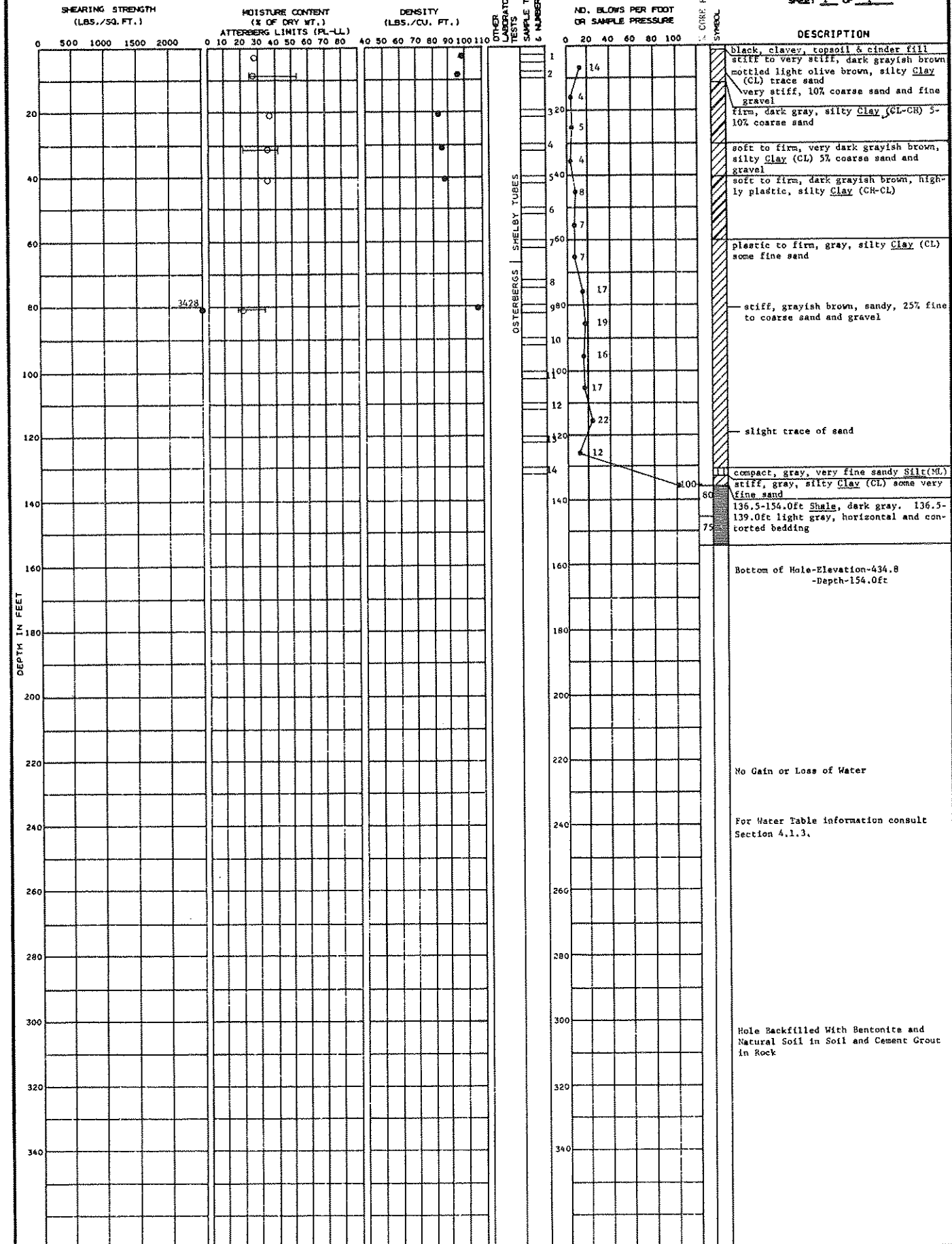


LOCATION: N 7,510  
E11,380

GROUND ELEVATION: 588.8

DATE DRILLED: 1-29-74  
2-5-74

SHEET 1 OF 1



● Unconfined Compression

— Atterberg Limits  
○ Moisture Content

SOIL BORING NO. 119

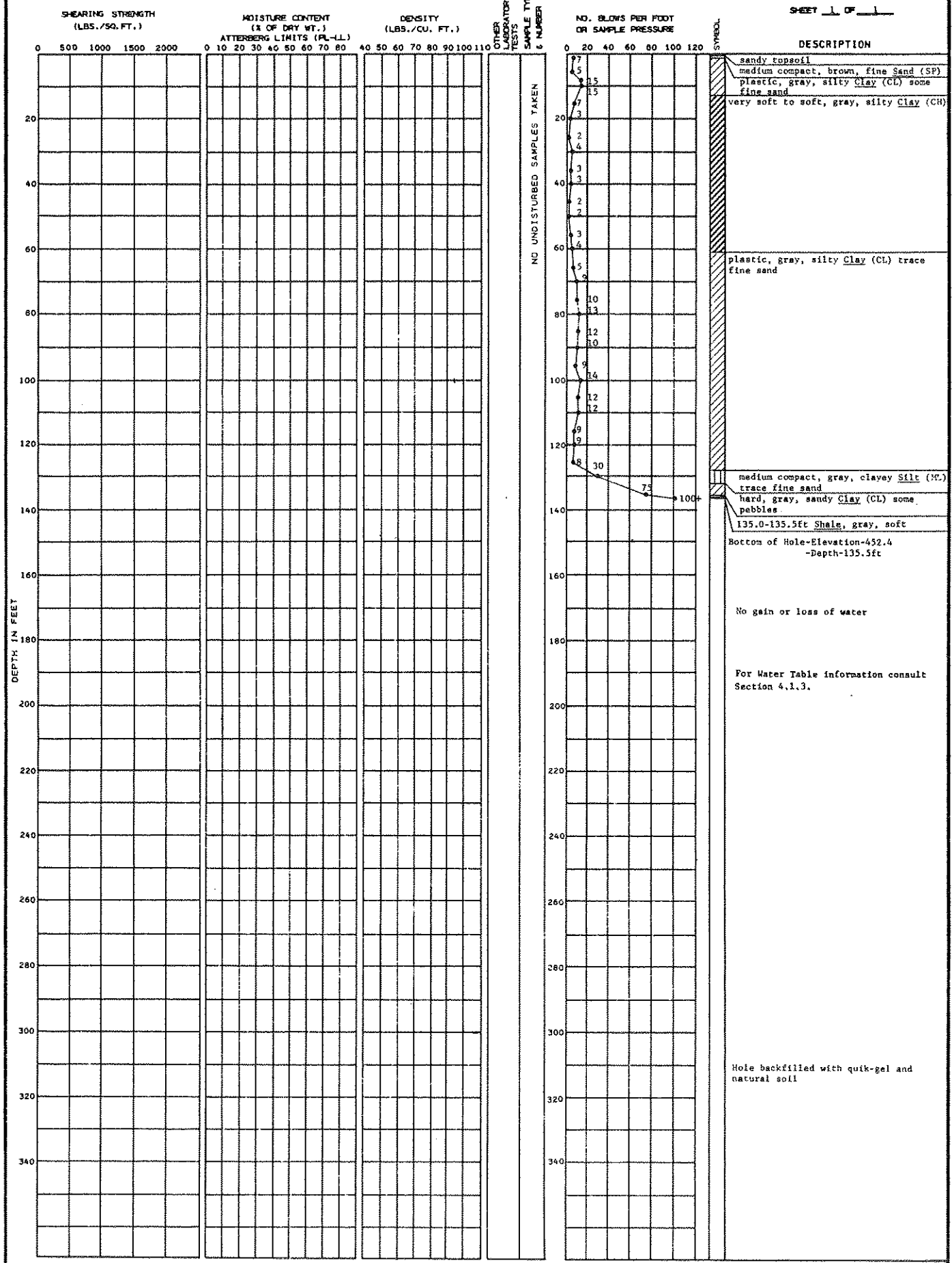
BECHTEL Belle River

B-85

LOCATION: N 7,680 E 10,630 GROUND ELEVATION 587.9

DATE DRILLED: 2-14-74 2-19-74

SHEET 1 OF 1



SOIL BORING NO. 121  
BECHTEL Belle River

LOCATION: N 8,017  
E 4,999

GROUND ELEVATION 588.9

DATE DRILLED: 3-25-74

SHEET 1 OF 1

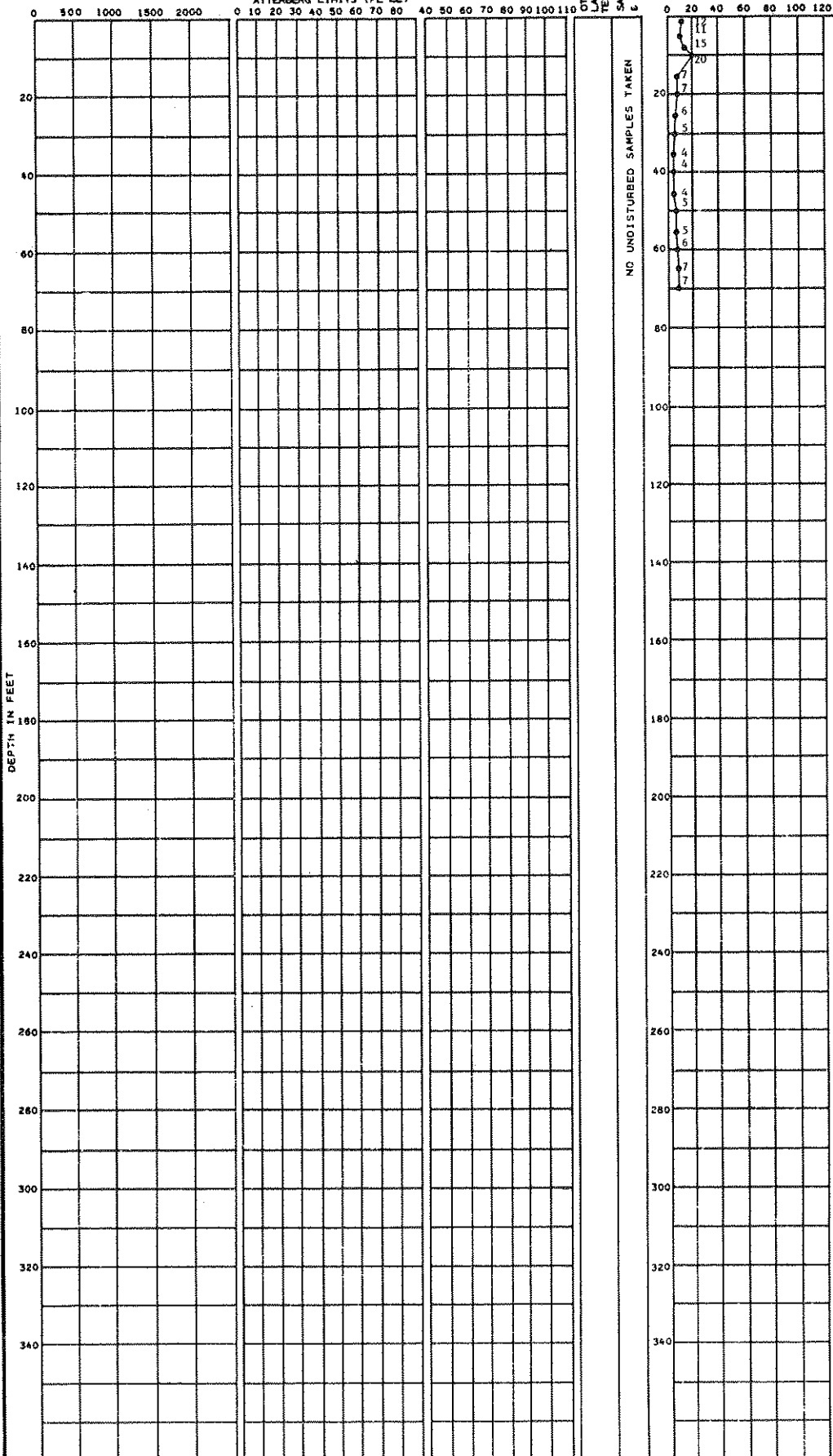
SHEARING STRENGTH  
(LBS./SQ. FT.)

MOISTURE CONTENT  
(% OF DRY WT.)  
ATTERBERG LIMITS (PL-LL)

DENSITY  
(LBS./CU. FT.)

NO. BLOWS PER FOOT  
OR SAMPLE PRESSURE

DESCRIPTION



OTHER  
LABORATORY  
TESTS  
SAMPLE TYPE  
& NUMBER

STEEL

Gray, silty topsoil  
Medium, mottled brown & gray, silty  
sandy clay (CL), trace of pebbles  
Soft, gray, silty clay (CH), trace  
of sand

Bottom of hole - Elevation - 518.9  
- Depth - 70.0 ft

No gain or loss of water

For Water Table information consult  
Section 4.1.3.

Hole backfilled with Quik-Gel and  
natural soil

SOIL BORING NO. 123

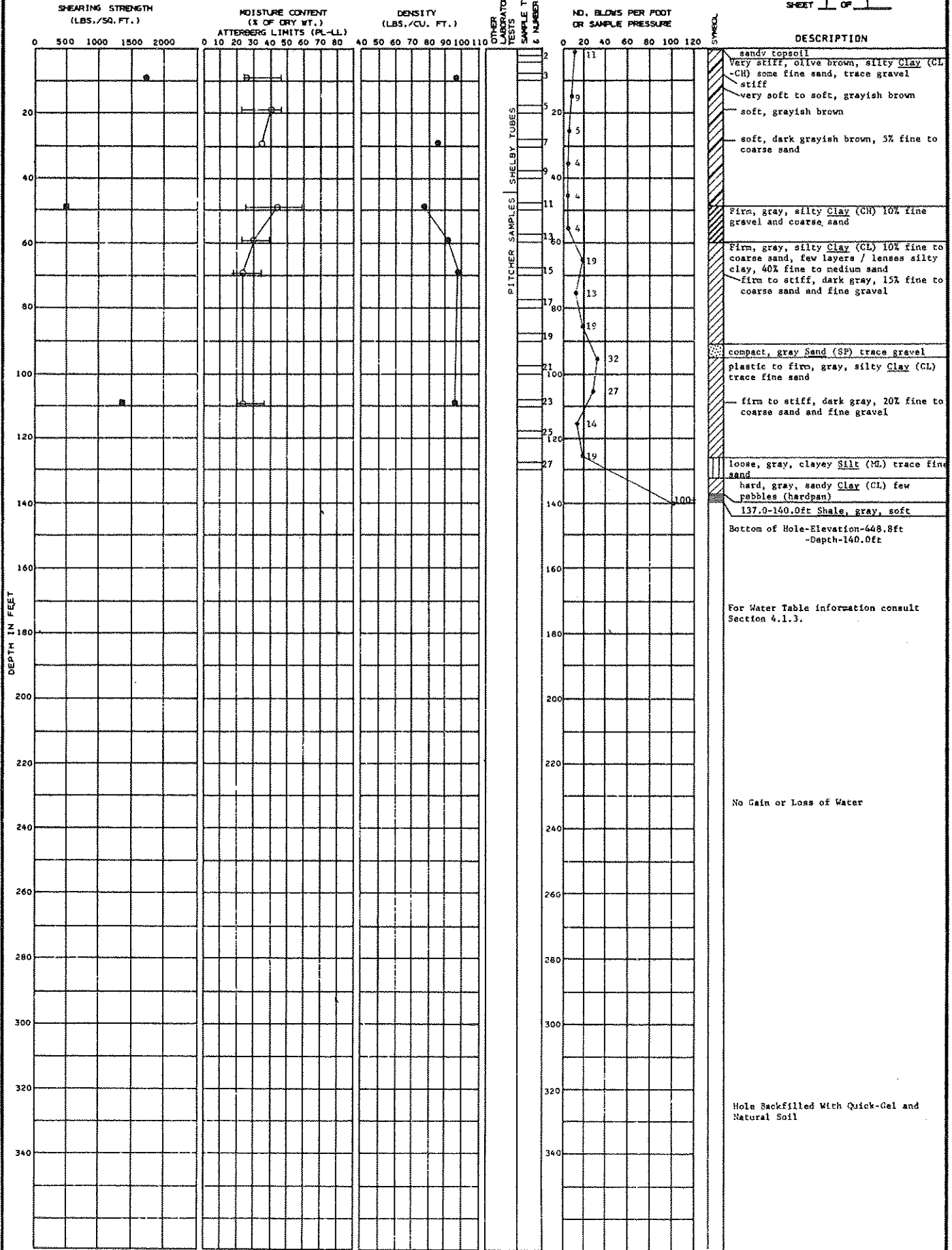
BECHTEL Belle River



LOCATION: R 7,950 GROUND ELEVATION 588.8  
 E 11,140

DATE DRILLED: 2-1-74  
 2-6-74

SHEET 1 OF 1



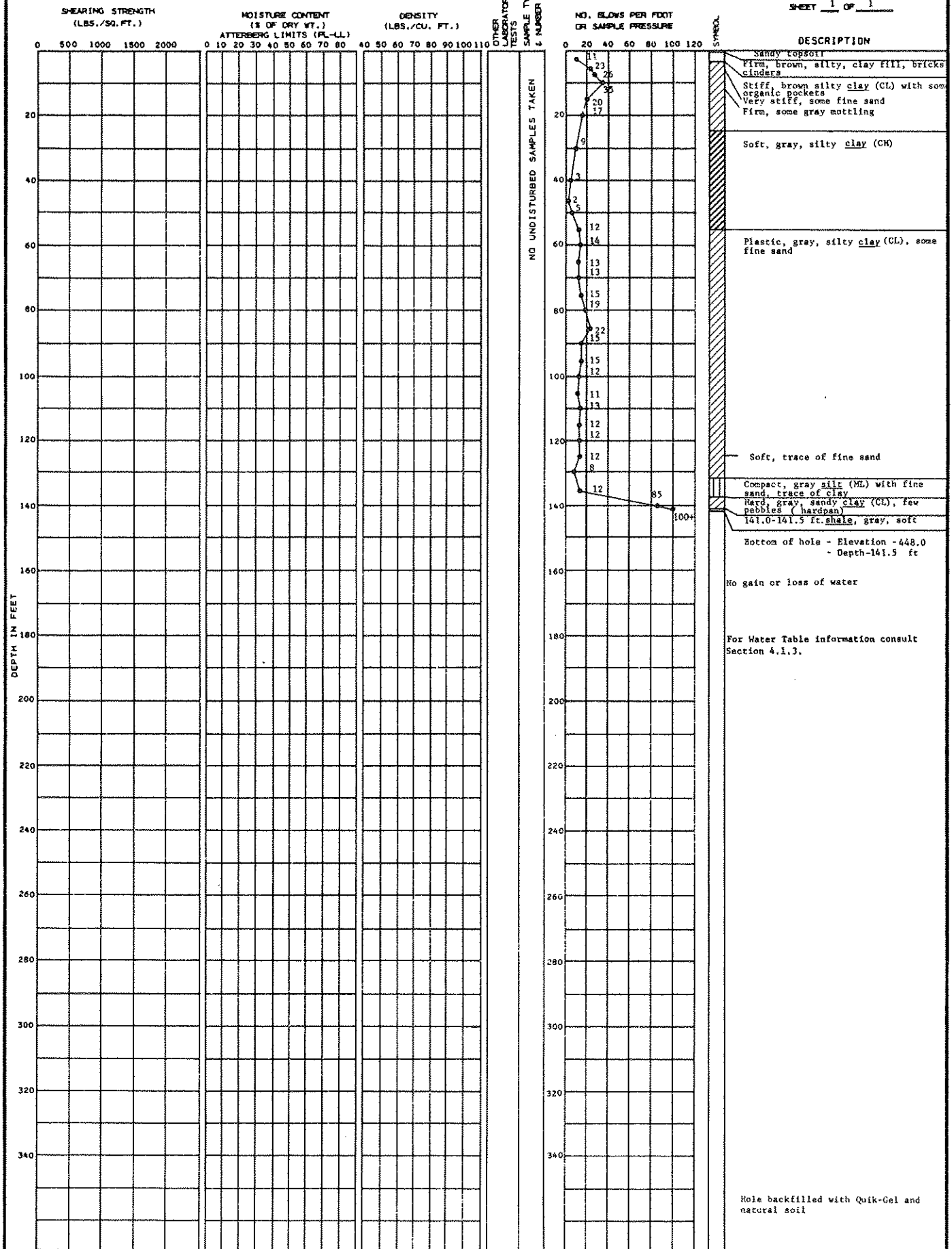
● Unconfined Compression  
 ■ Unconsolidated Undrained  
 ○ Atterberg Limits  
 ○ Moisture Content

SOIL BORING NO. 126

BECHTEL Belle River

LOCATION: N 3,000  
E 11,000 GROUND ELEVATION 589.5

DATE DRILLED: 2-7-74  
2-13-74  
SHEET 1 OF 1

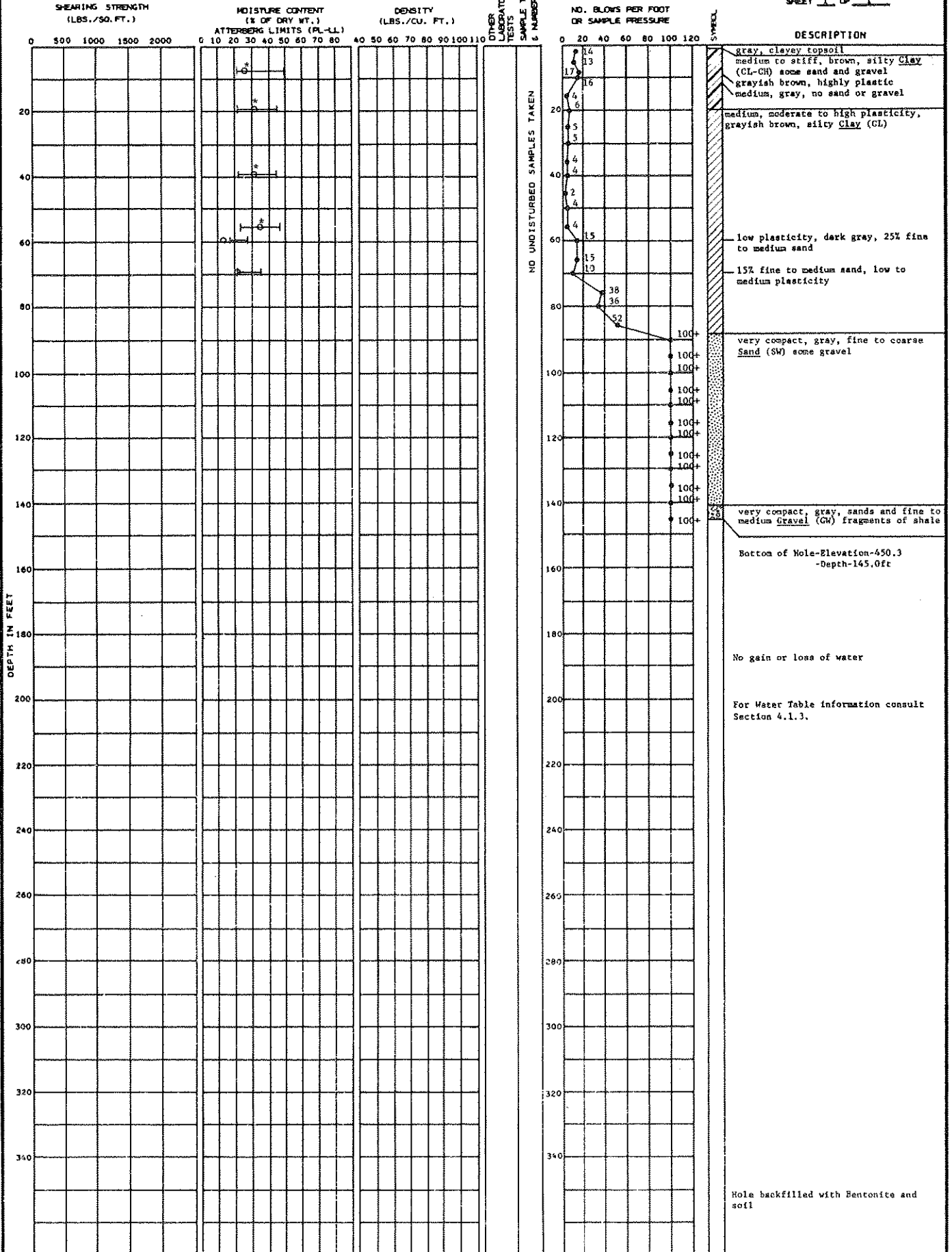


LOCATION: N 9,014 E 4,993 GROUND ELEVATION 595.3

DATE DRILLED: 3-26-74

3-28-74

SHEET 1 OF 1



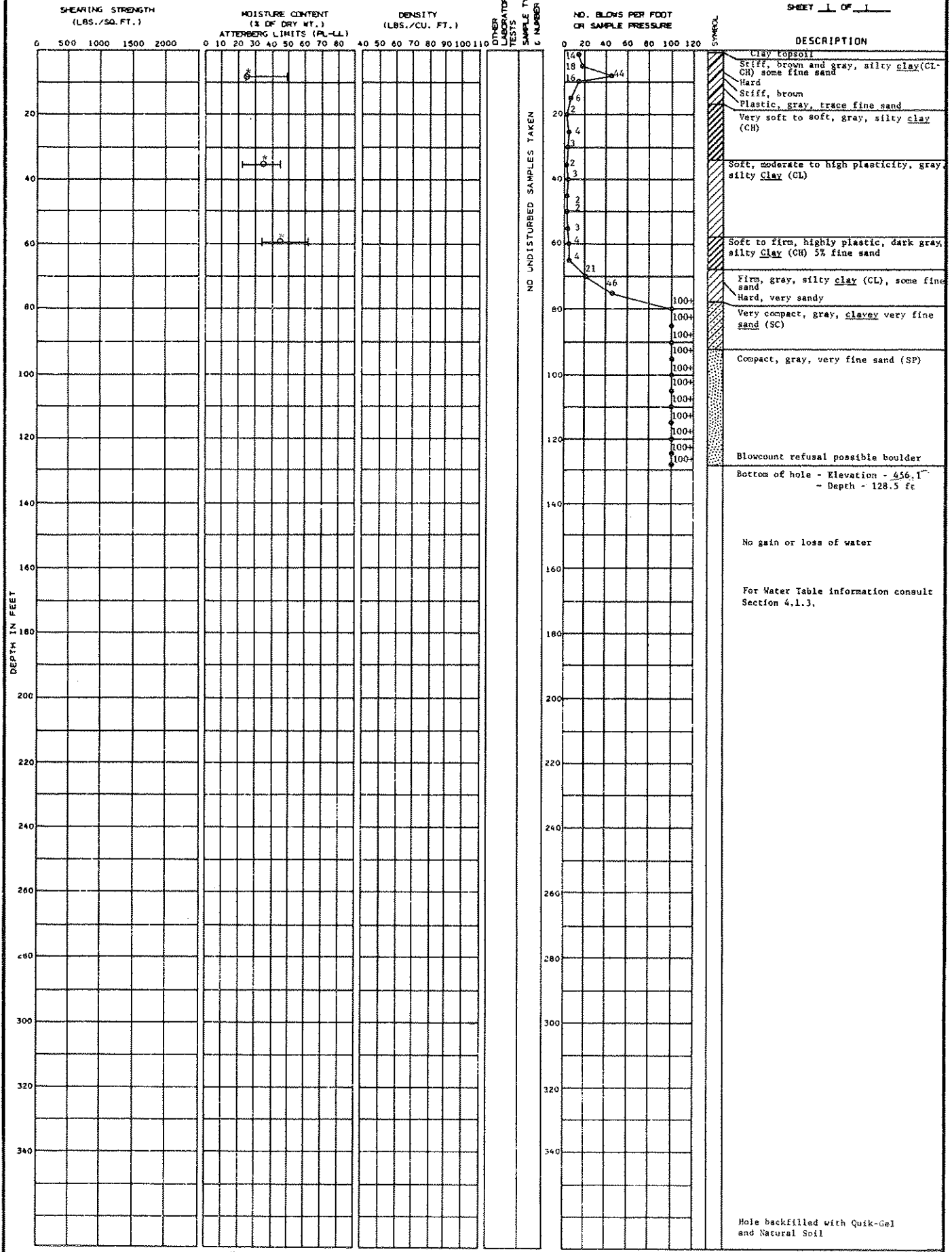
○ Water Content  
 — Atterburg Limiter  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 130

BECHTEL Bella River

LOCATION: N 10,050 E 4,995 GROUND ELEVATION 594.6

DATE DRILLED: 3-5-74 3-7-74 SHEET 1 OF 1

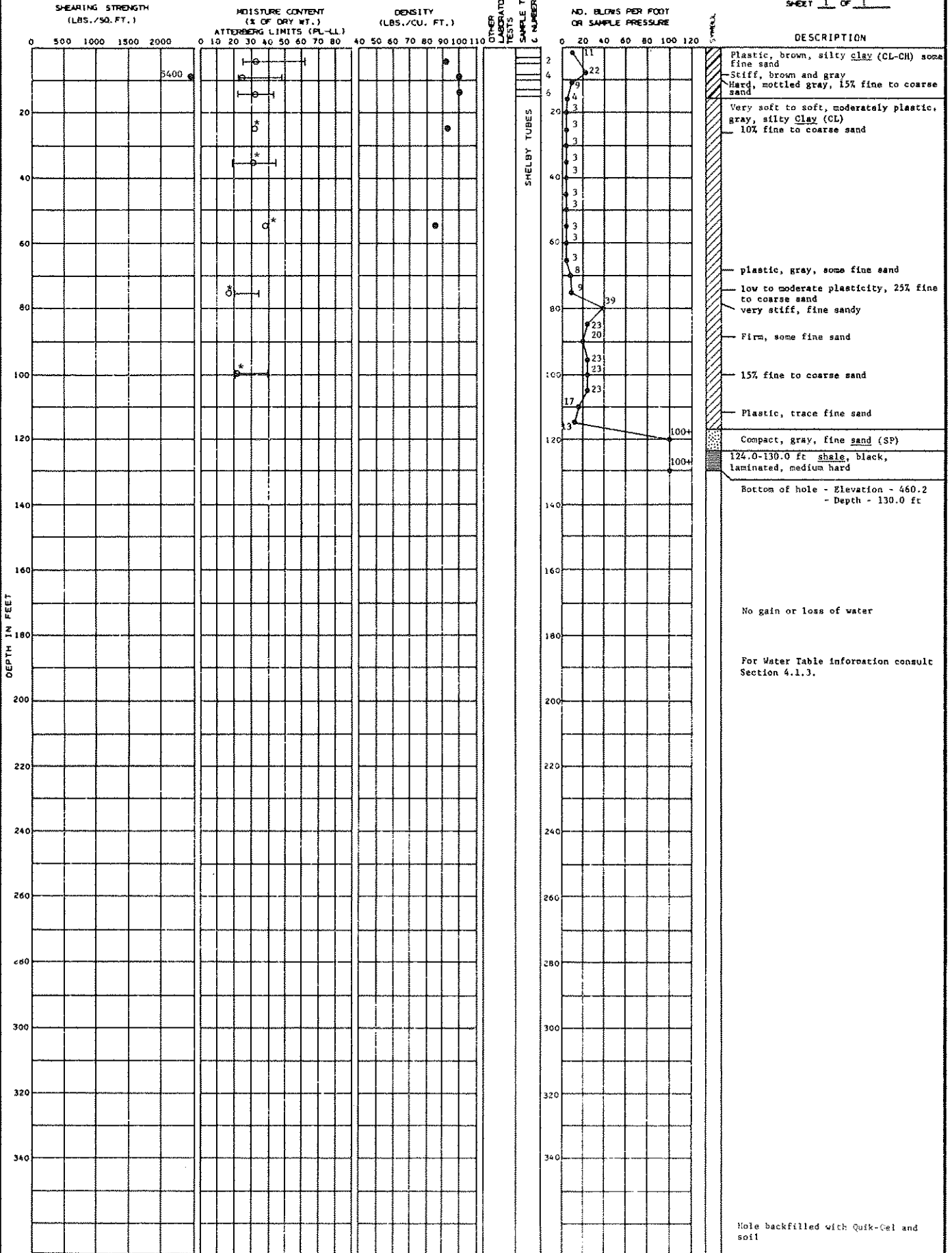


○ Water Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 10,050 E 7,000 GROUND ELEVATION 590.2

DATE DRILLED: 3-8-74  
3-13-74

SHEET 1 OF 1



● Unconfined Compression  
○ Moisture Content  
— Atterburg Limits  
\* Water content taken from unsealed jar sample.

SOIL BORING NO. 136

BECHTEL Belle River

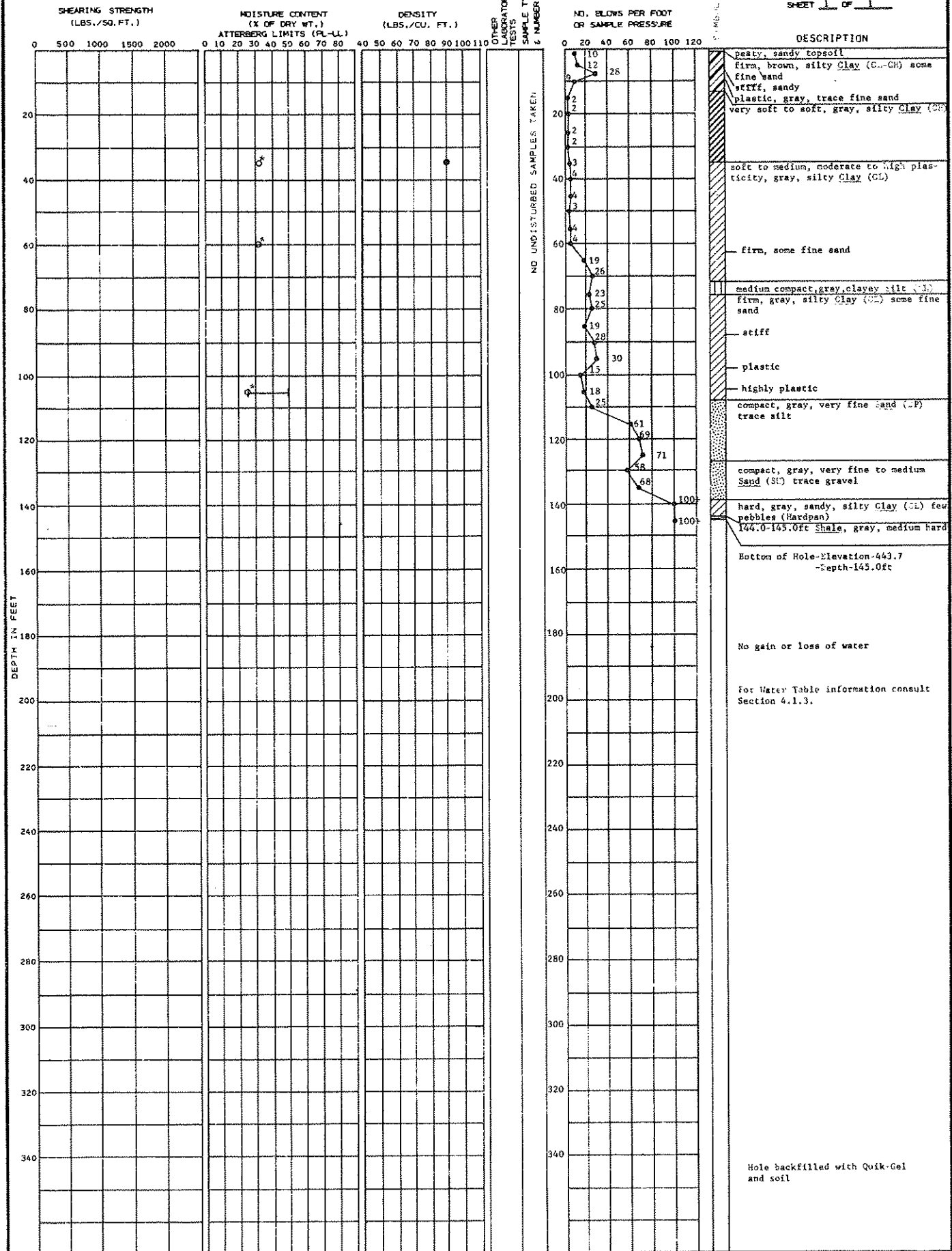
LOCATION: 10,030  
S.977

GROUND ELEVATION

582.7

DATE DRILLED: 3-11-74  
3-14-74

SHEET 1 OF 1

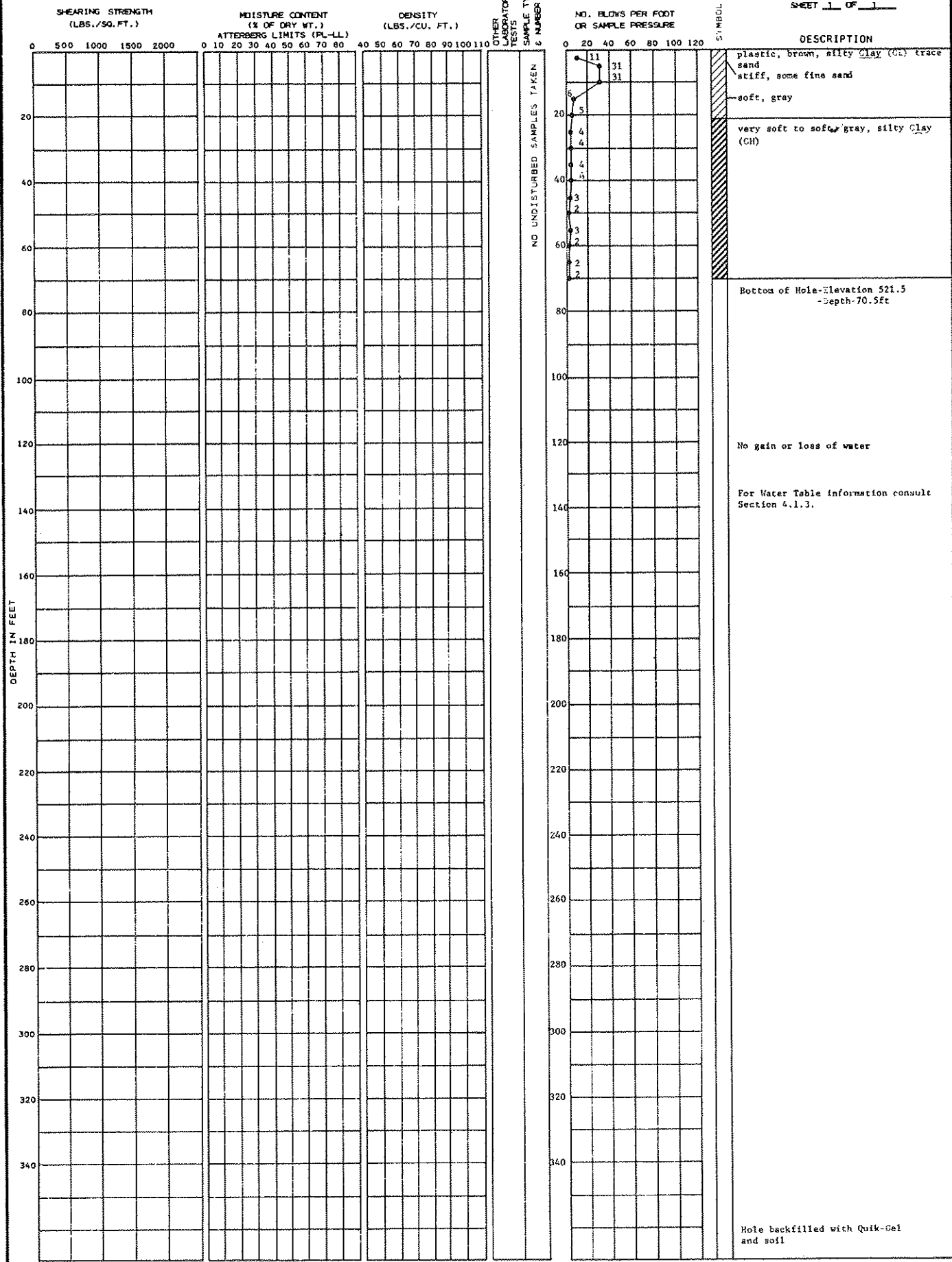


○ Water Content  
Atterburg Limits  
Water content taken from unsealed jar sample.

LOCATION: 10,850 GROUND ELEVATION: 592.0

DATE DRILLED: 3-19-74  
3-20-74

SHEET 1 OF 1



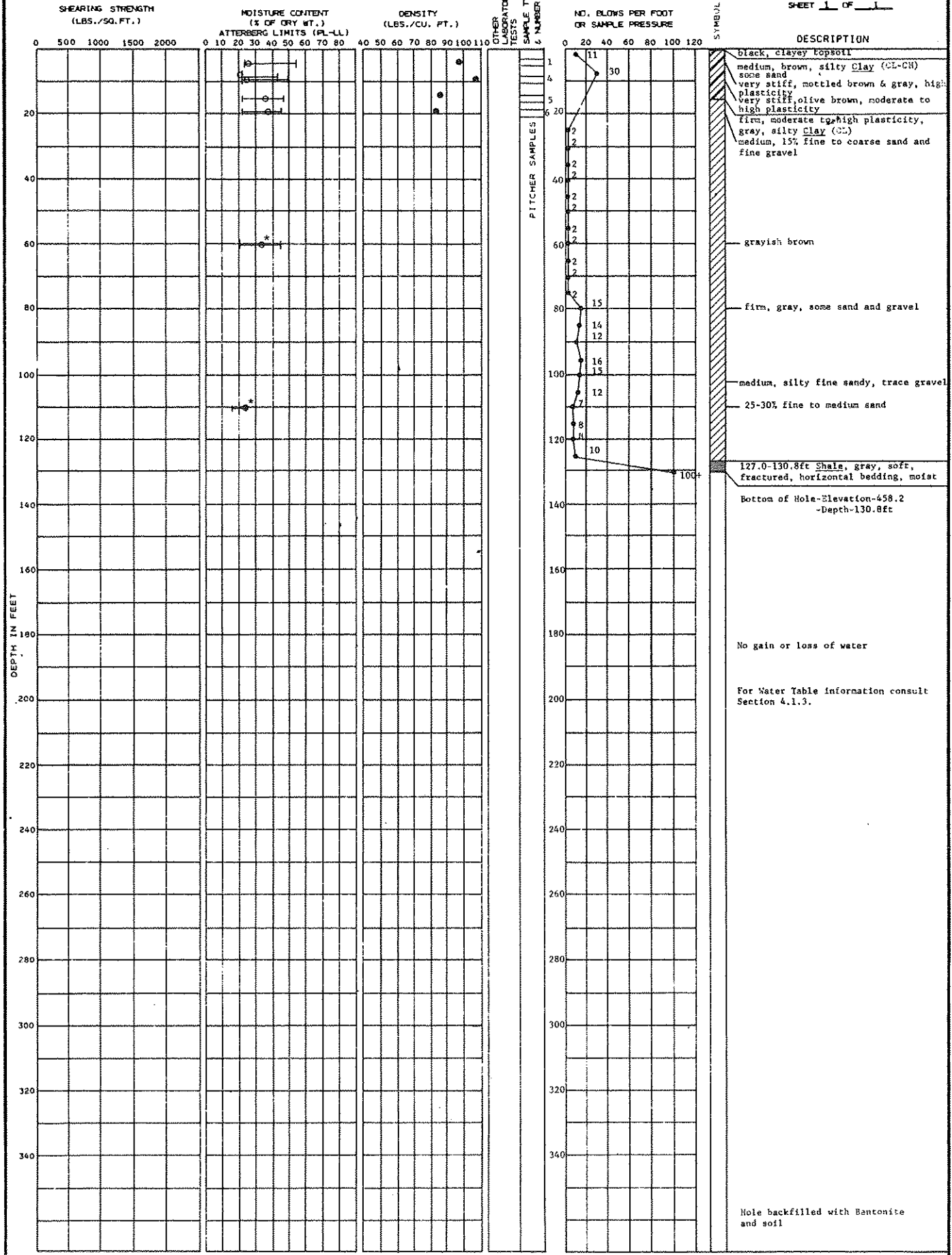
SOIL BORING NO. 140

BECHTEL Belle River

LOCATION: 11,146 GROUND ELEVATION 589.0  
 7,995

DATE DRILLED: 3-25-74  
 3-27-74

SHEET 1 OF 1



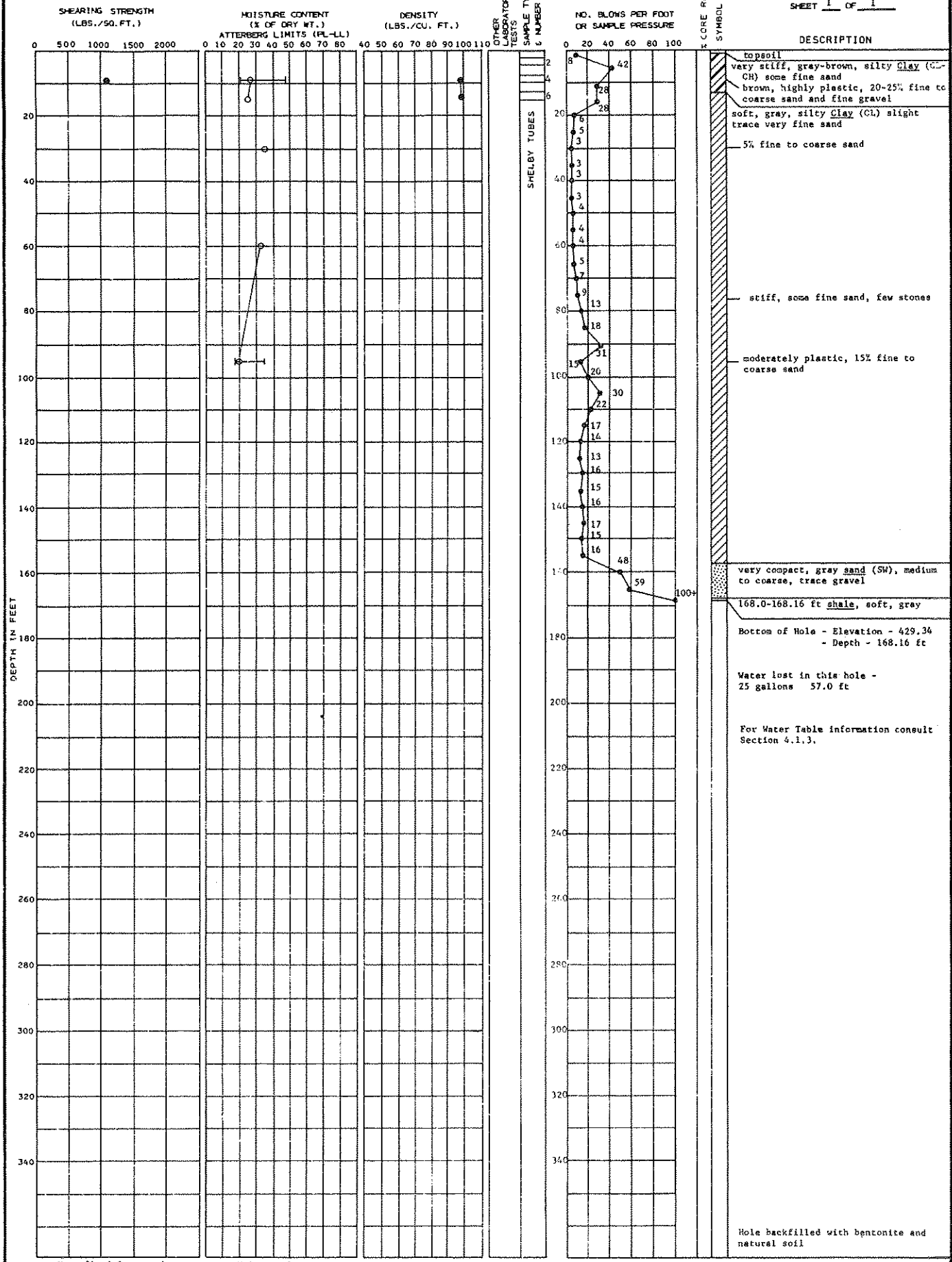
○ Moisture Content  
 — Atterburg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 142  
 BECHTEL Keller



LOCATION: N 12,000 E 5,000 GROUND ELEVATION: 597.5

DATE DRILLED: 3-13-74  
3-15-74  
SHEET 1 OF 1

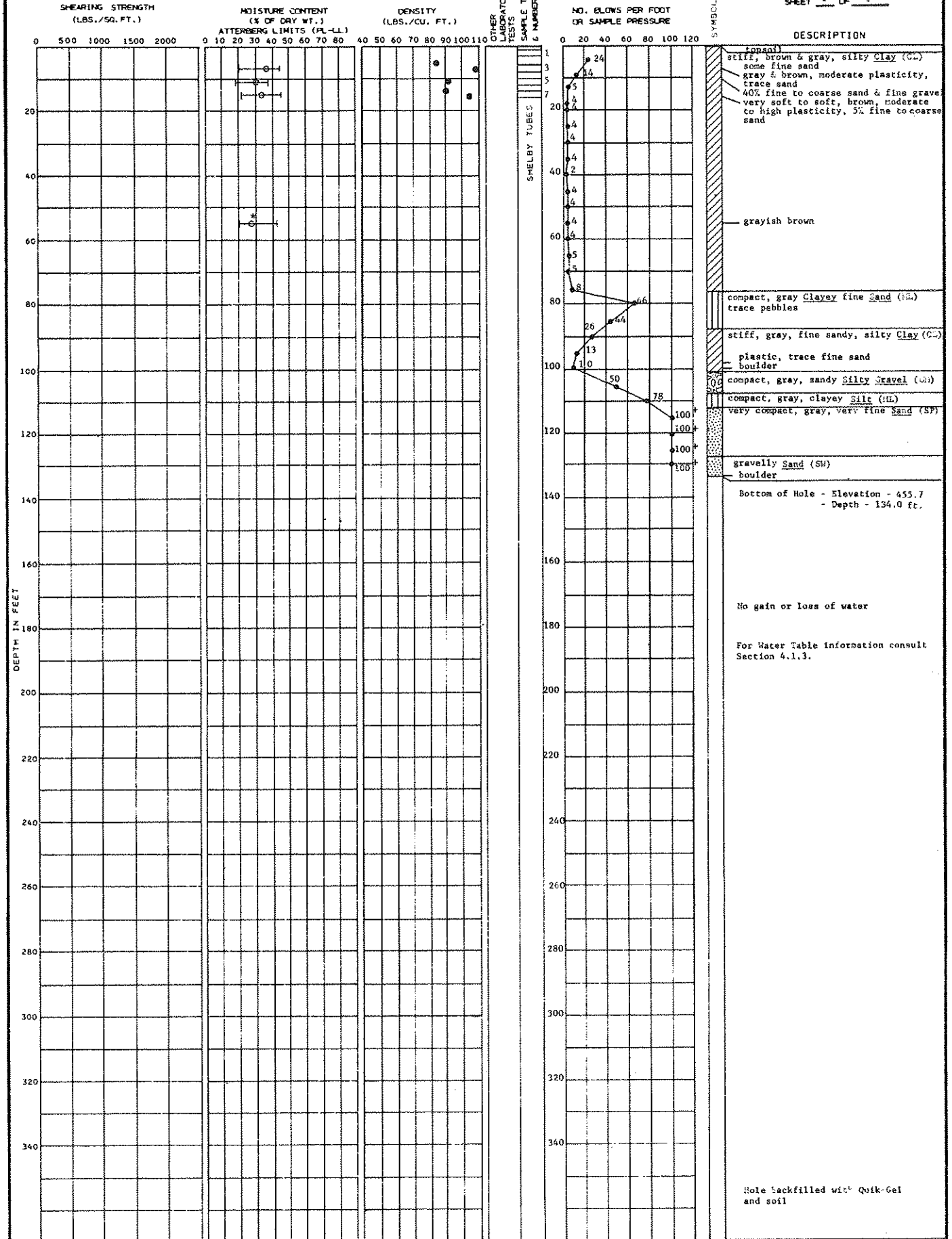


● Unconfined Compression ○ Moisture Content  
— Atterburg Limits

LOCATION: N 12,000  
E 7,000 GROUND ELEVATION 589.7

3-18-74  
DATE DRILLED: 3-19-74

SHEET 1 OF 1



Moisture Content  
Atterburg Limits  
\* Water content taken from unsealed jar sample.

LOCATION: N 13,061 E 5,006 GROUND ELEVATION 598.6

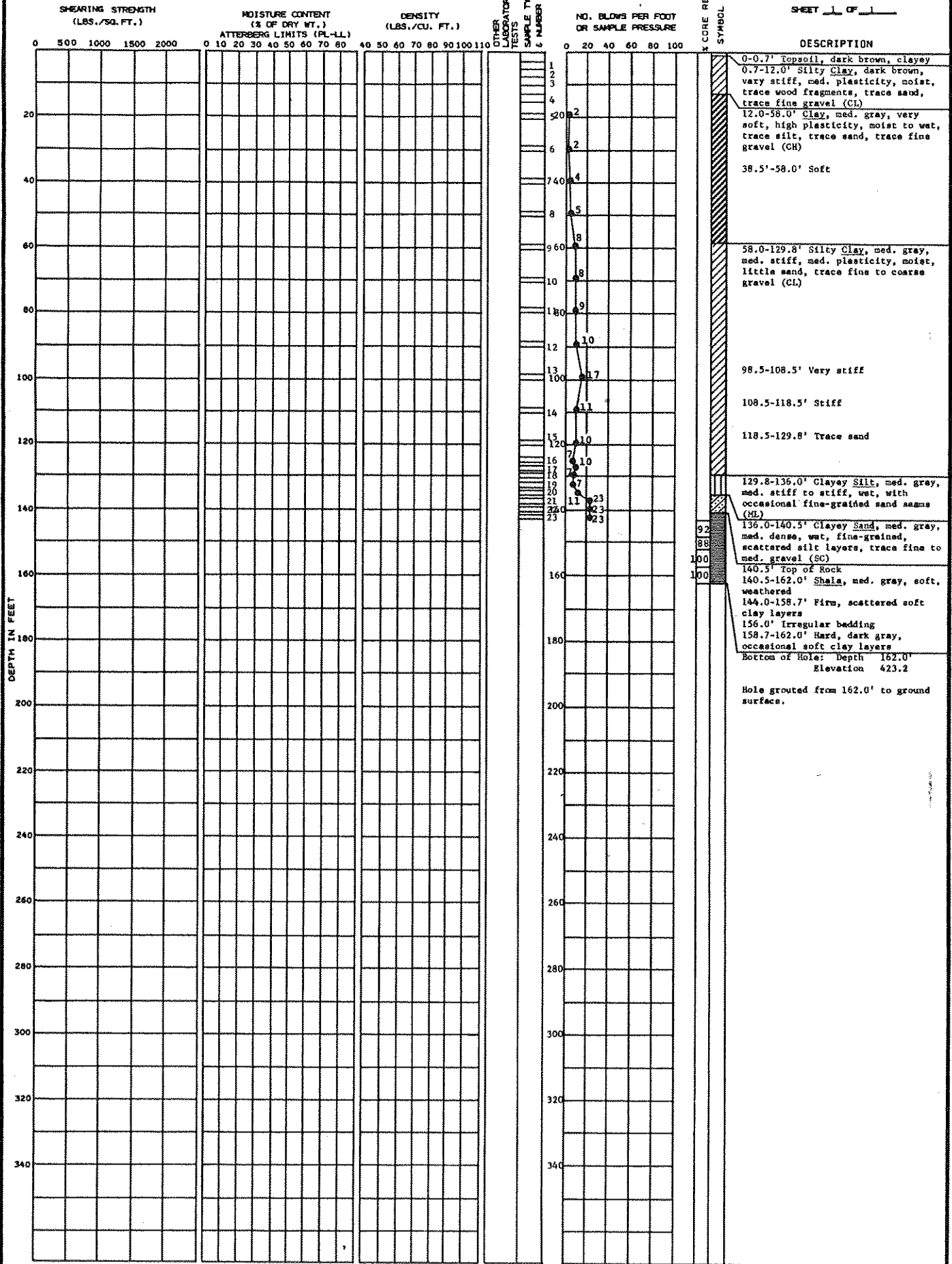
DATE DRILLED: 3-28-74 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)				MOISTURE CONTENT (% OF DRY WT.)				DENSITY (LBS./CU. FT.)				OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION													
	0	500	1000	1500	2000	0	10	20	30	40	50	60					70	80	40	50	60	70	80	90	100	110			
0																													Black, clayey topsoil
1																													Firm, brown & gray, silty, sandy clay (CL), trace of pebbles
2																													Soft, gray, silty clay (CH), trace of sand
20																													
40																													
60																													
80																													Bottom of hole - Elevation - 528.6 - Depth - 70.0 ft
100																													No gain or loss of water
120																													For Water Table information consult Section 4.1.3.
140																													
160																													
180																													
200																													
220																													
240																													
260																													
280																													
300																													
320																													
340																													
																													Hole backfilled with Quik-Gel and natural soil

SOIL BORING NO. 148  
BECHTEL Belle River

LOCATION: N 7455 E 9535 GROUND ELEVATION 585.2

DATE DRILLED: 9/28/77 9/30/77 SHEET 1 OF 1

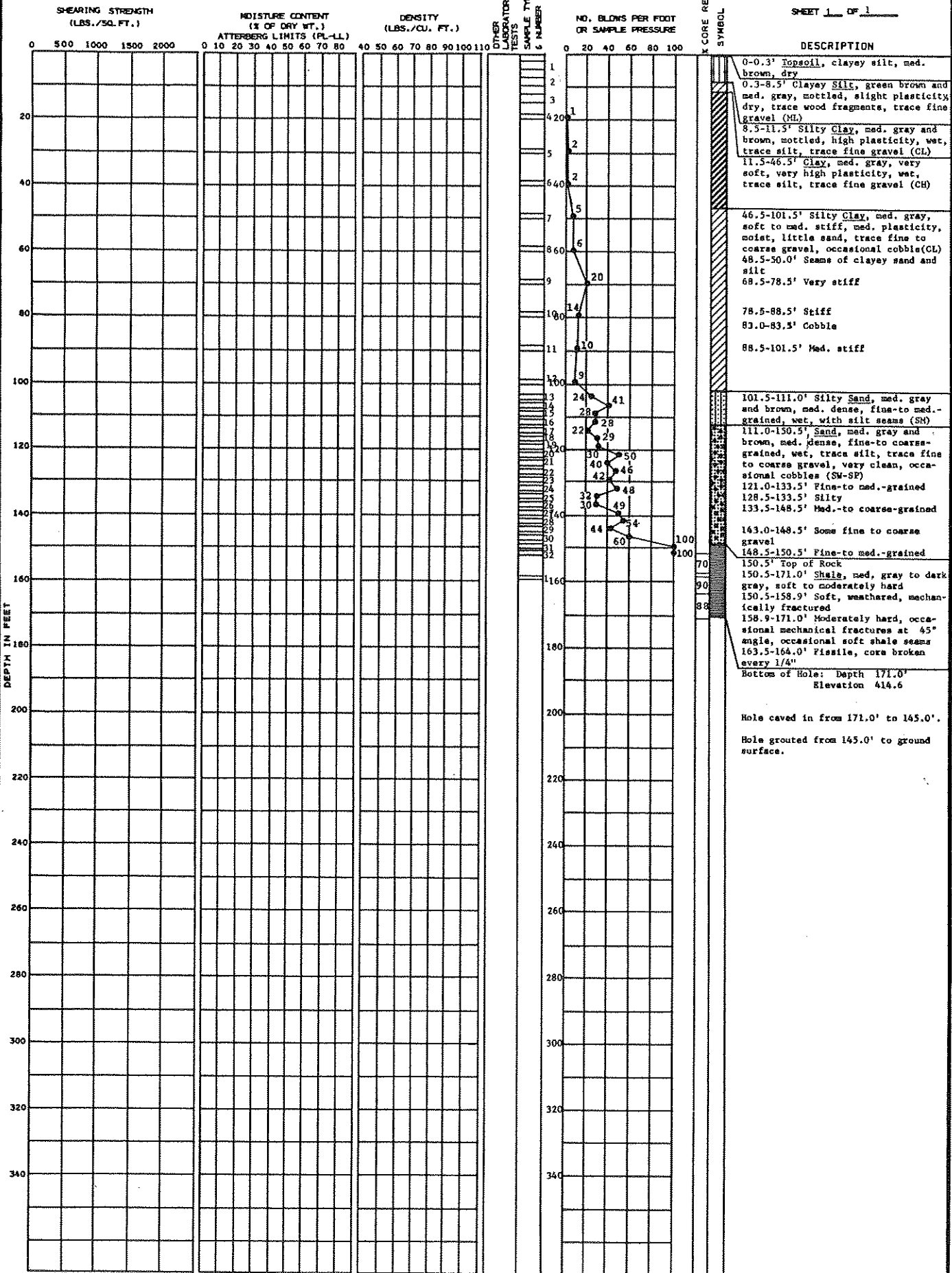


SOIL BORING NO. B-8 BECHTEL Belle River

LOCATION: N 7675 E 9100 GROUND ELEVATION 585.6

DATE DRILLED: 8/8/77 8/11/77

SHEET 1 OF 1



SOIL BORING NO. B-9

BECHTEL Belle River

LOCATION: N 7500 E 9388.7 GROUND ELEVATION 585.3

DATE DRILLED: 7/21/77  
7/23/77  
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0						0-1.0' Clayey Silt, topsoil, light gray to dark brown, med. dense, dry, with wood fragments (ML)
1				16		1.0-6.0' Silty Clay, med. brown and light gray, mottled, very stiff, med. plasticity, moist, trace sand (CL)
2				23		6.0-11.0' Clay, med. brown, very stiff, med. plasticity, moist, trace silt, trace sand (CL-CH)
3				6		7.5-11.0' Light gray, med. stiff, high plasticity
4				2		11.0-54.0' Clay, light gray, very soft, very high plasticity, wet (CH)
5				2		
6				2		
7				2		
8				2		
9				3		
10				13		
11				17		54.0-131.0' Silty Clay, med. gray, stiff, high plasticity, moist, trace sand, trace cobble (CL)
12				8		63.5-73.5' Very stiff
13				11		73.5-83.5' Med. stiff
14				17		83.5-93.5' Stiff, trace fine to coarse gravel
15				21		93.5-113.5' Very stiff
16				12		100.5-123.5' Med. plasticity, little sand
17				6		113.5-126.0' Stiff
18				19		123.5-124.0' Fine-grained clayey sand seam
19				23		126.0-131.0' Very stiff
20				27		126.5-127.0' Fine-grained silty sand seam
21				47		131.0-138.0' Silty Sand, med. gray, dense, wet, fine-grained (SM)
22				37		Cobble on top of rock
23				87		138.0' Top of Rock
24						138.0-160.0' Shale, dark gray, soft to firm, fissile mechanically fractured in areas
25						138.0-141.4' Soft, weathered
26						141.4-160.0' Hard, fissile
27						Bottom of Hole: Depth 160.0'
28						Elevation 425.3
29						Hole grouted from 160.0' to ground surface.

LOCATION: N 13,000 E 7,000 GROUND ELEVATION 590.6

DATE DRILLED: 3-27-74  
3-28-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0							black, clayey topsoil
0-10					20		medium, brown, silty Clay (CL) trace of sand and gravel
10-20					20		gray, silty
20-30					13		soft, gray, sandy, silty Clay (CH)
30-40					7		no sand
40-50					2		
50-60					2		
60-70					2		
70-80					2		
80-90					2		
90-100					2		
100-110					2		
110-120					2		
120-130					2		
130-140					2		
140-150					2		
150-160					2		
160-170					2		
170-180					2		
180-190					2		
190-200					2		
200-210					2		
210-220					2		
220-230					2		
230-240					2		
240-250					2		
250-260					2		
260-270					2		
270-280					2		
280-290					2		
290-300					2		
300-310					2		
310-320					2		
320-330					2		
330-340					2		
340-350					2		
350-360					2		
360-370					2		
370-380					2		
380-390					2		
390-400					2		
400-410					2		
410-420					2		
420-430					2		
430-440					2		
440-450					2		
450-460					2		
460-470					2		
470-480					2		
480-490					2		
490-500					2		
500-510					2		
510-520					2		
520-530					2		
530-540					2		
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550-560					2		
560-570					2		
570-580					2		
580-590					2		
590-600					2		
600-610					2		
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660-670					2		
670-680					2		
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760-770					2		
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790-800					2		
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820-830					2		
830-840					2		
840-850					2		
850-860					2		
860-870					2		
870-880					2		
880-890					2		
890-900					2		
900-910					2		
910-920					2		
920-930					2		
930-940					2		
940-950					2		
950-960					2		
960-970					2		
970-980					2		
980-990					2		
990-1000					2		

Bottom of Hole-Elevation-520.1  
-Depth-70.5ft

No gain or loss of water

For Water Table information consult  
Section 4.1.3.

Hole backfilled with Bentonite  
and soil

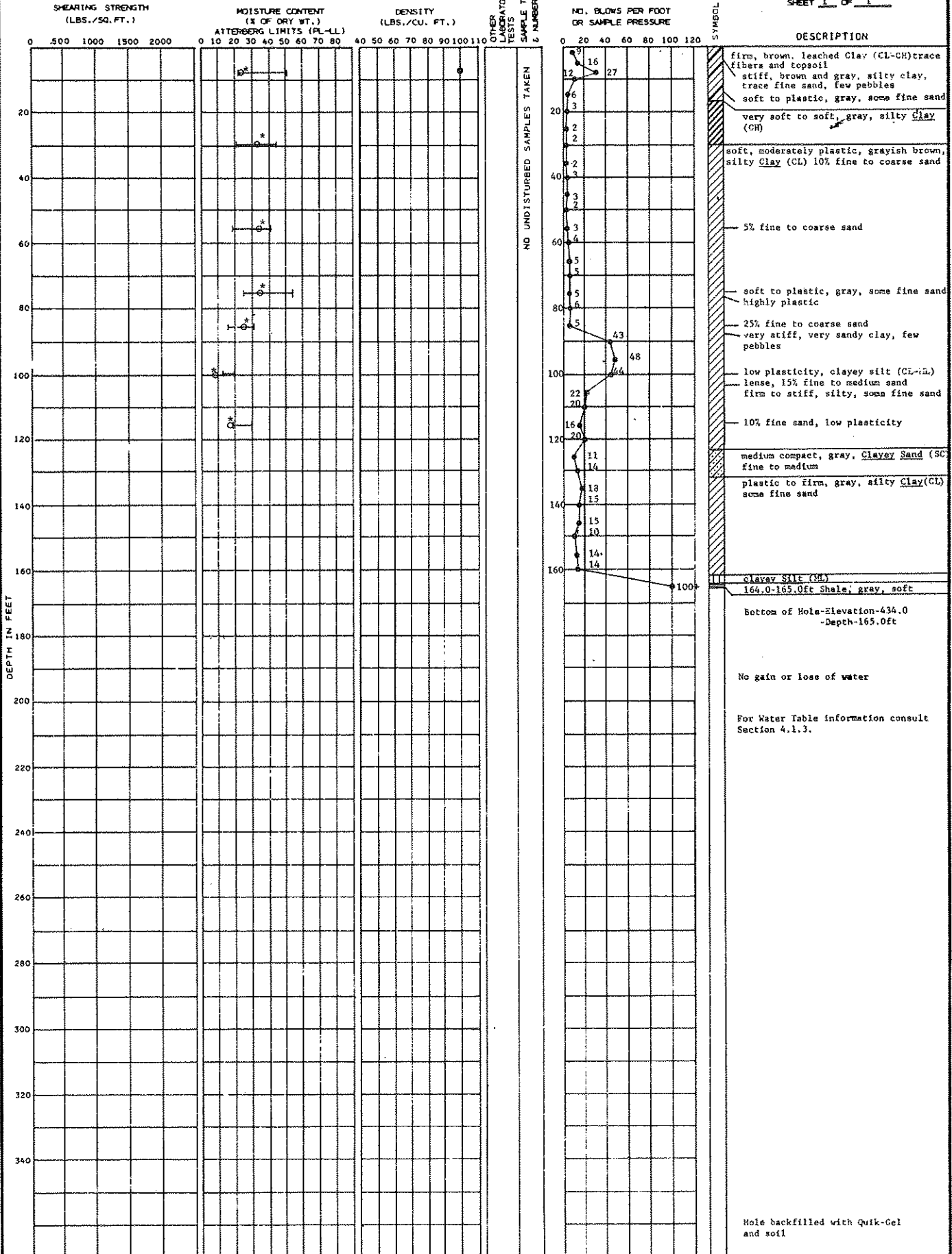
SOIL BORING NO. 150

BECHTEL Belle River

LOCATION: N 13,785 E 5,006 GROUND ELEVATION 599.0

DATE DRILLED: 3-7-74 3-14-74

SHEET 1 OF 1



○ Moisture Content  
 — Atterberg Limits  
 \* Water content taken from unsealed jar sample.



LOCATION: N 14,000 E 8,000 GROUND ELEVATION 591.5

DATE DRILLED: 4-5-74

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (X OF DRY WT.) ATTENBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0						Consol firm to stiff, brown, silty clay (CL) very stiff, trace gravel plastic to firm, gray
20				14 30 22		soft, gray, silty clay (CH)
40				4 3 2 2 2 2 2 2		
60						
80						Bottom of Hole - Elevation - 521.5 - Depth - 70.0 ft.
100						
120						No gain or loss of water
140						For Water Table information consult Section 4.1.3.
160						
180						
200						
220						
240						
260						
280						
300						
320						
340						

SOIL BORING NO. 157

BECHTEL Belle River

LOCATION: N 14,000 E 9,950 GROUND ELEVATION 591.3

DATE DRILLED: 4-3-74

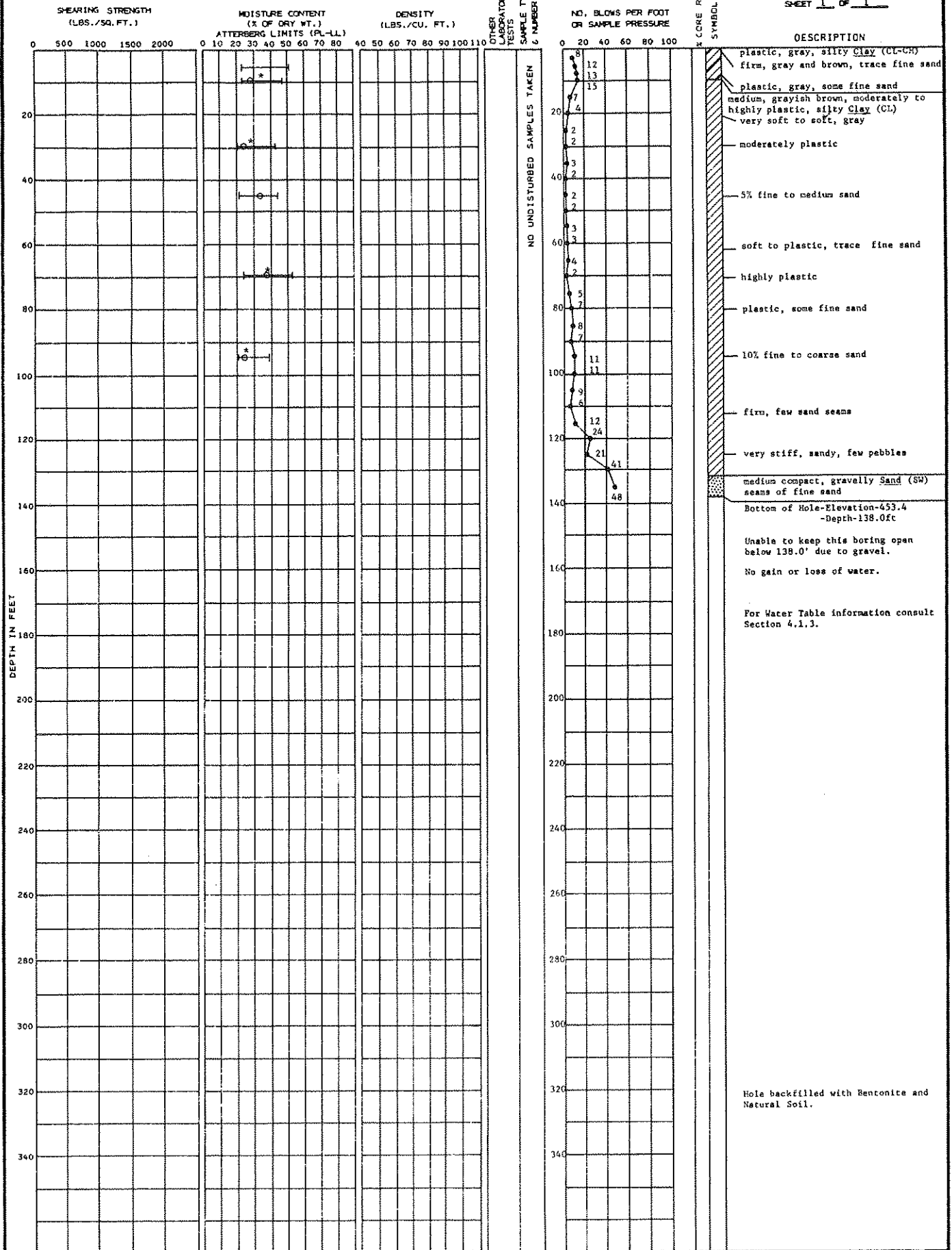
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. OF LABORATORY TESTS	SAMPLE TYPE	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0								GRAY SILT (ML)
0						17		loose to medium compact, brown to gray, silty sand (SM) fine to medium
0						15		firm, gray, silty clay (CL)
0						4		soft, gray, silty clay (CH)
20						2		
40						2		
60						3		
80						4		
100						5		
120								
140								No gain or loss of water
160								For Water Table information consult Section 4.1.3.
180								
200								
220								
240								
260								
280								
300								
320								
340								Hole backfilled with Quik-Gel in soil

LOCATION: N 15,000 E 8,000 GROUND ELEVATION 591.4

DATE DRILLED: 4-8-76

SHEET 1 OF 1

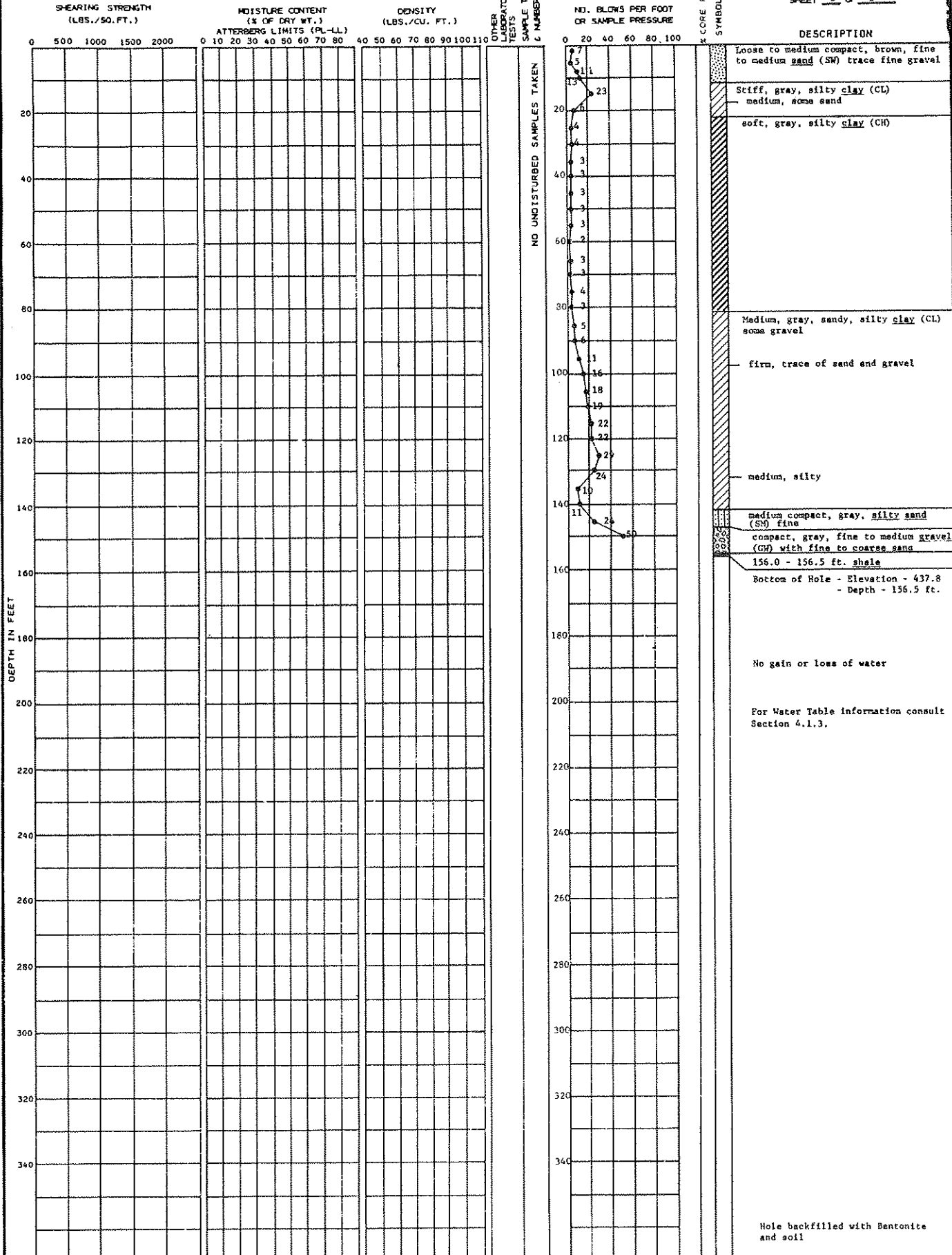


○ Moisture Content  
 — Atterbury Limits  
 \* Water content taken from unsealed jar sample.

LOCATION: N 14,830 GROUND ELEVATION 594.3  
E 9,938

DATE DRILLED: 3-26-74  
3-27-74

SHEET 1 OF 1

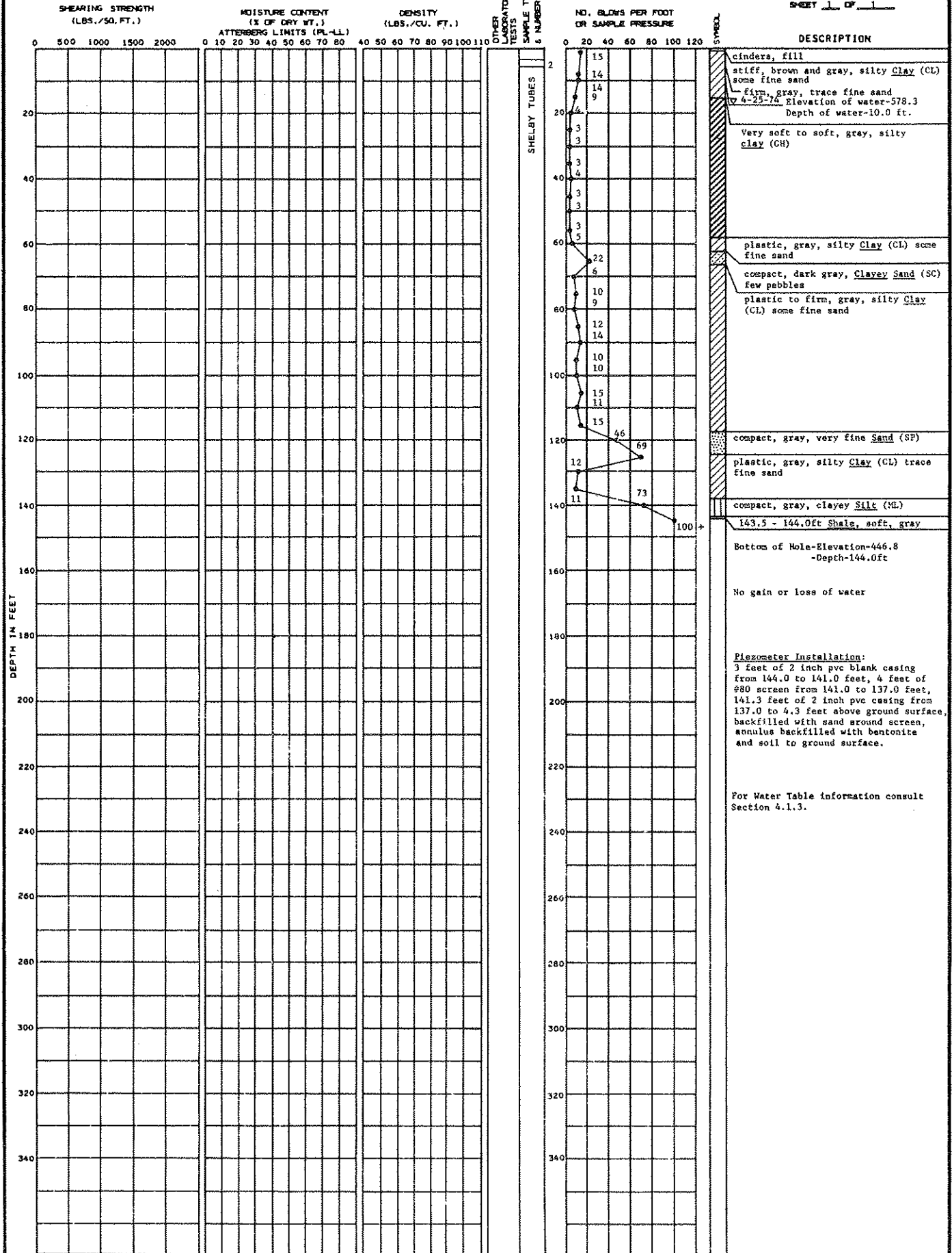


LOCATION: N 3,525  
E 12,533

GROUND ELEVATION 590.8

DATE DRILLED: 3-5-74  
3-7-74

SHEET 1 OF 1

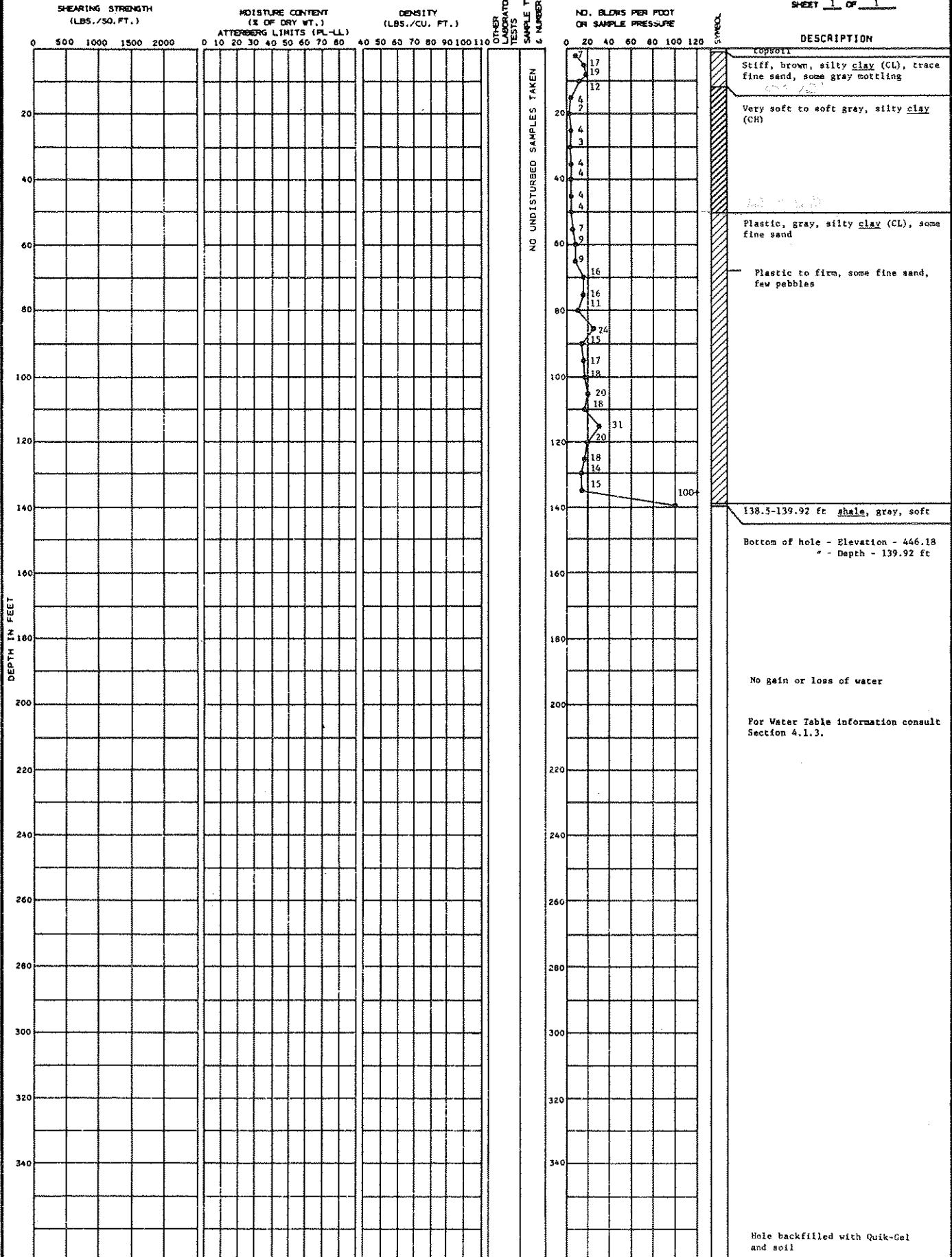


SOIL BORING NO. 181

BECHTEL Belle River

LOCATION: N 3,556 E 9,564 GROUND ELEVATION 586.1

DATE DRILLED: 3-15-74 3-19-74 SHEET 1 OF 1



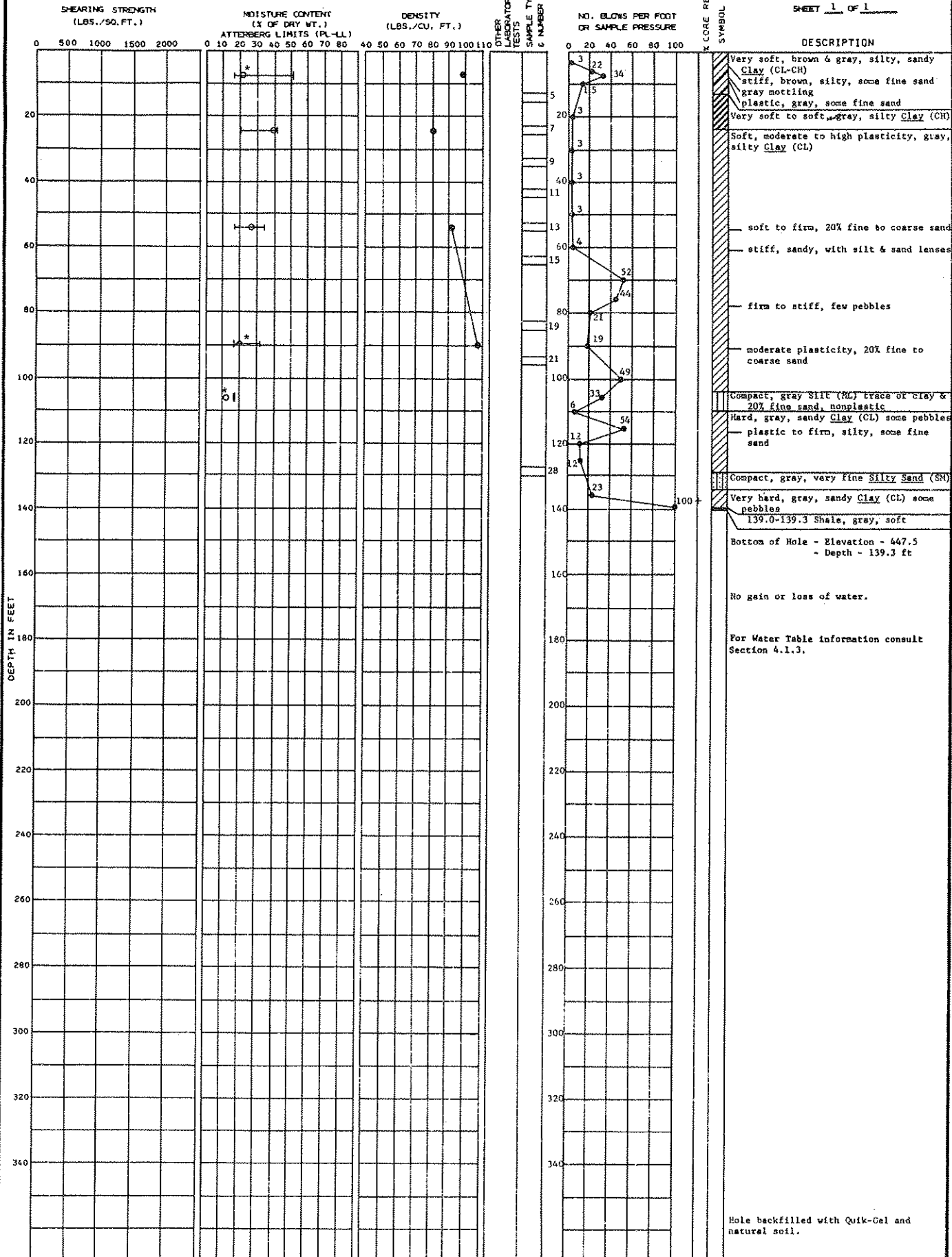
SOIL BORING NO. 184

BECHTEL Belle River

LOCATION: N 5,500  
E 9,797 GROUND ELEVATION: 586.8

DATE DRILLED: 2-26-74  
2-27-74

SHEET 1 OF 1



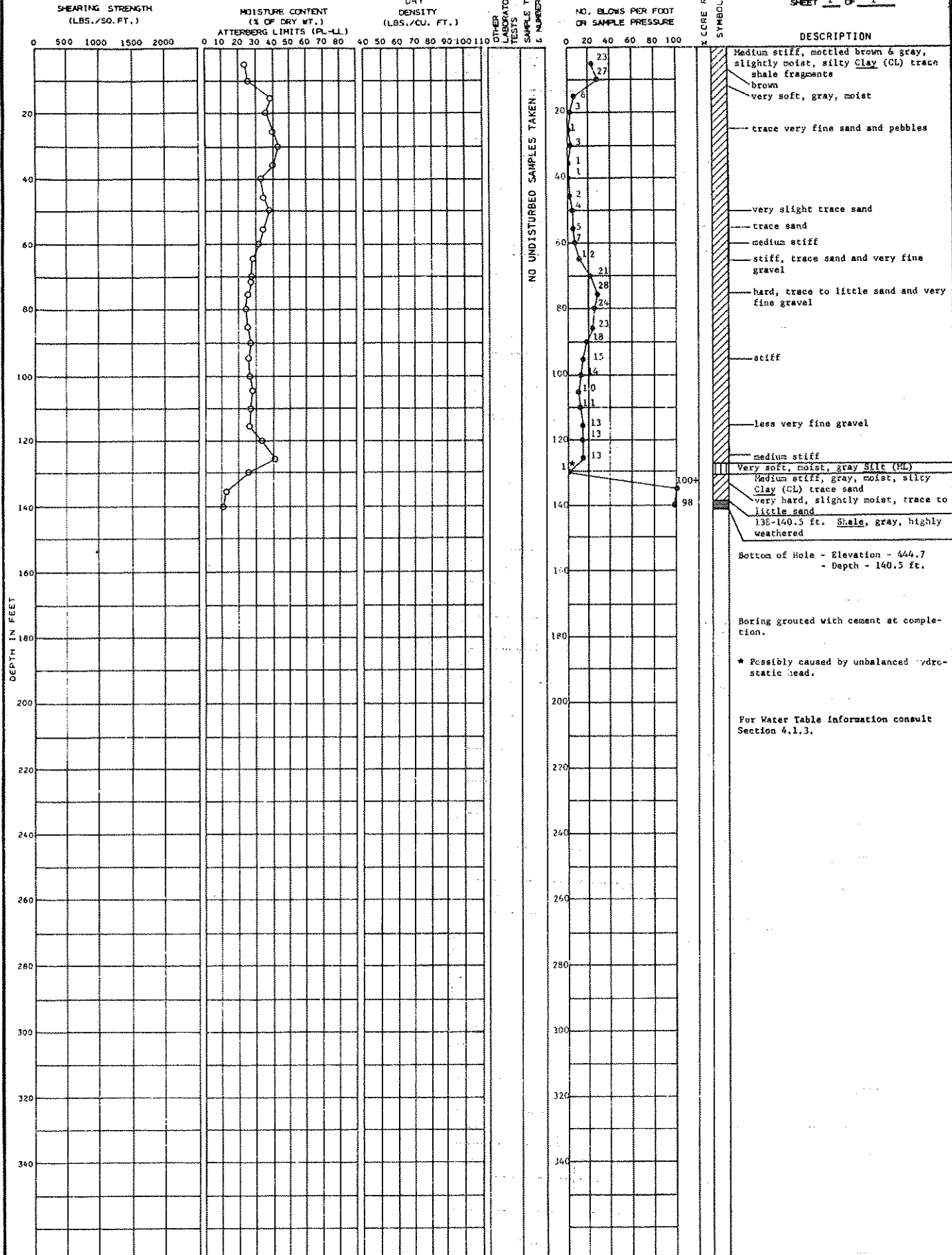
○ Moisture Content  
 ← Atterberg Limits  
 \* Water content taken from unsealed jar sample.

SOIL BORING NO. 186  
 BECHTEL Belle River

LOCATION: N 3500 E 11741 GROUND ELEVATION: 585.2

DATE DRILLED: 8/6/75 8/8/75

SHEET 1 OF 1



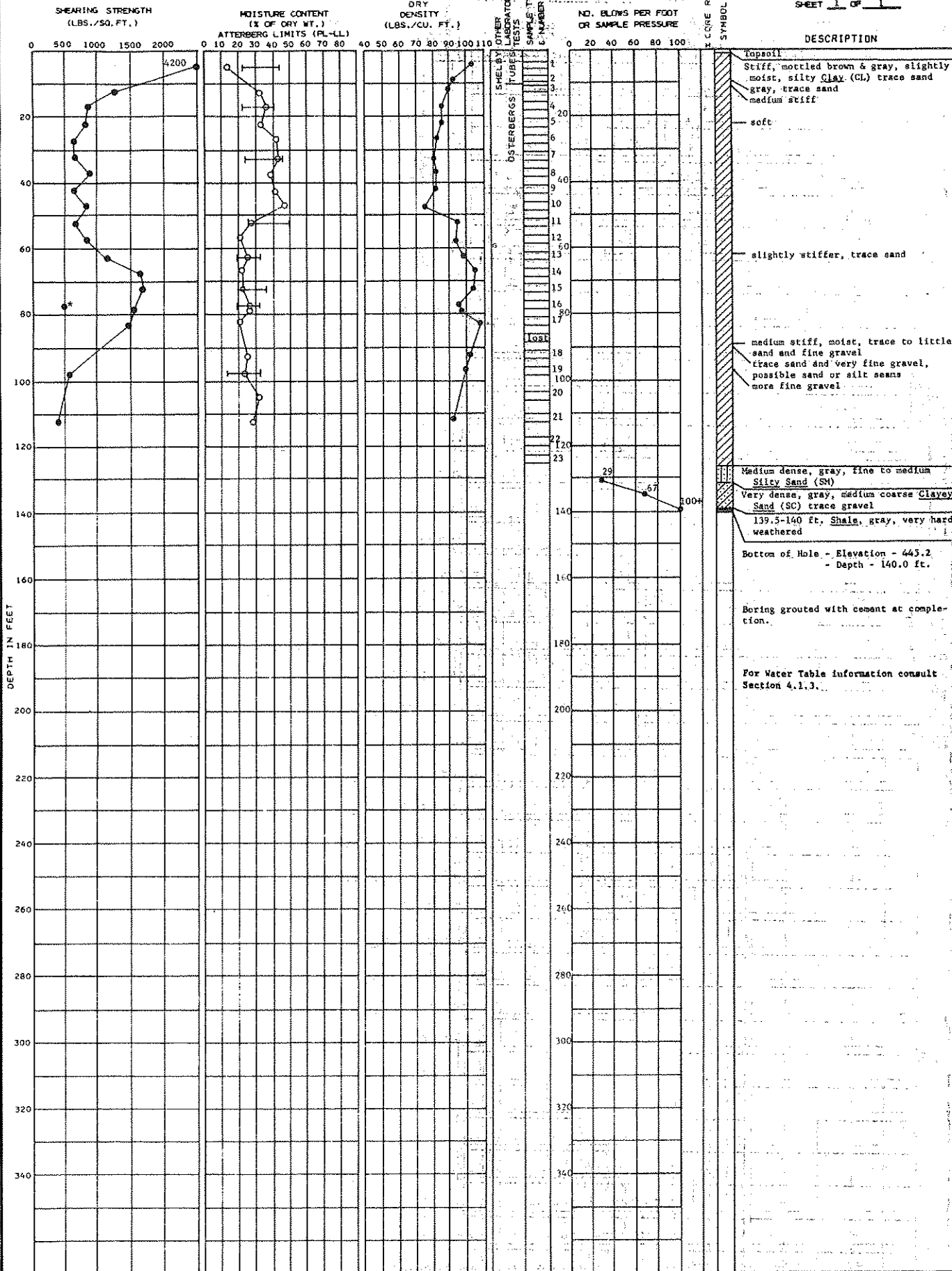
SOIL BORING NO. 191  
BECHTEL BELLE RIVER



H 3558 GROUND ELEVATION 385.2  
 LOCATION: E 11701

DATE DRILLED: 8/11/75  
 8/14/75

SHEET 1 OF 1



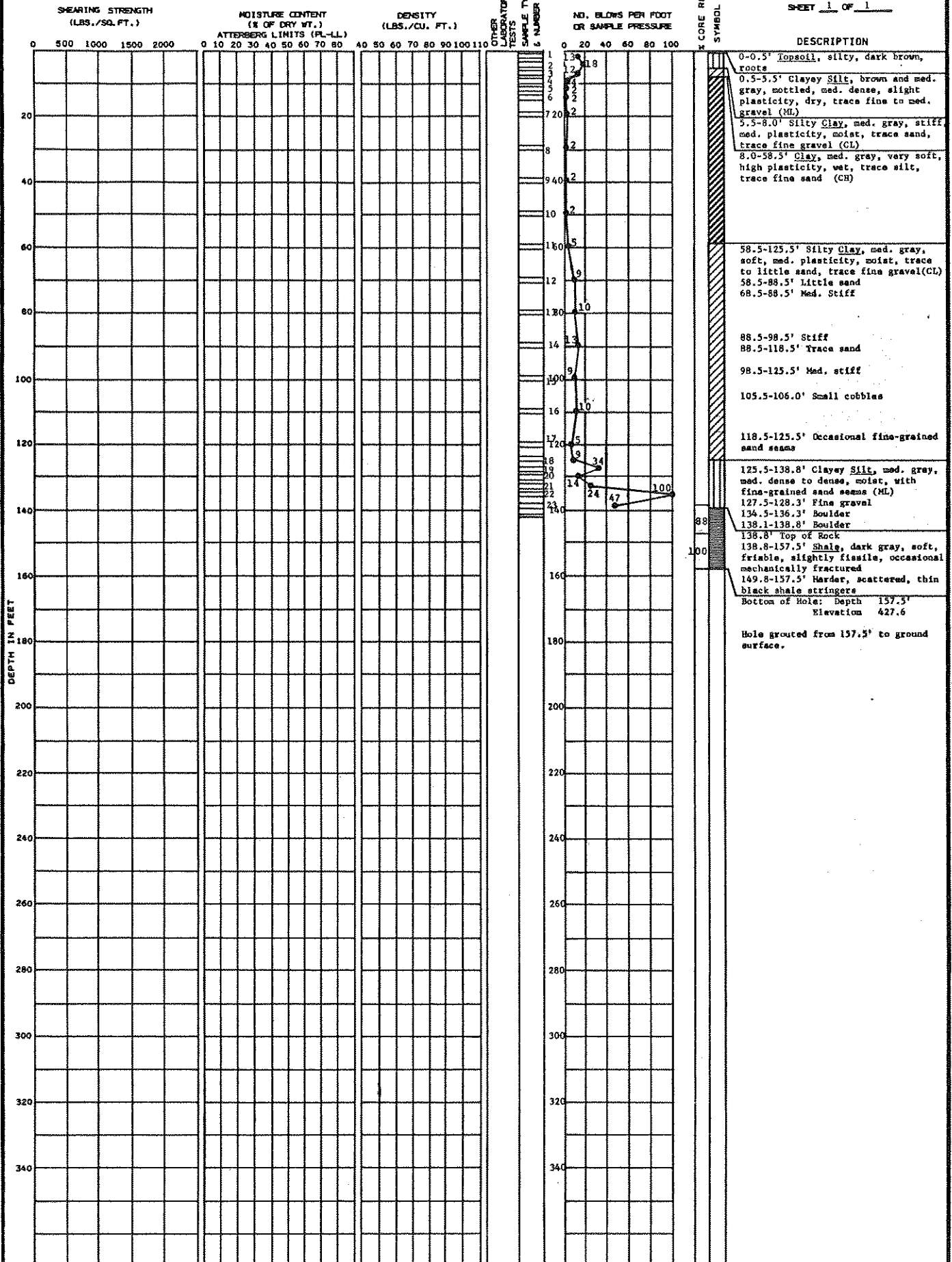
● Unconfined Compression  
 \* Sample contained sand seams.  
 ○ Moisture Content  
 — Atterberg Limits

SOIL BORING NO. 193  
 BECHTEL BELLE RIVER

LOCATION: N 7800 E 9400 GROUND ELEVATION 585.1

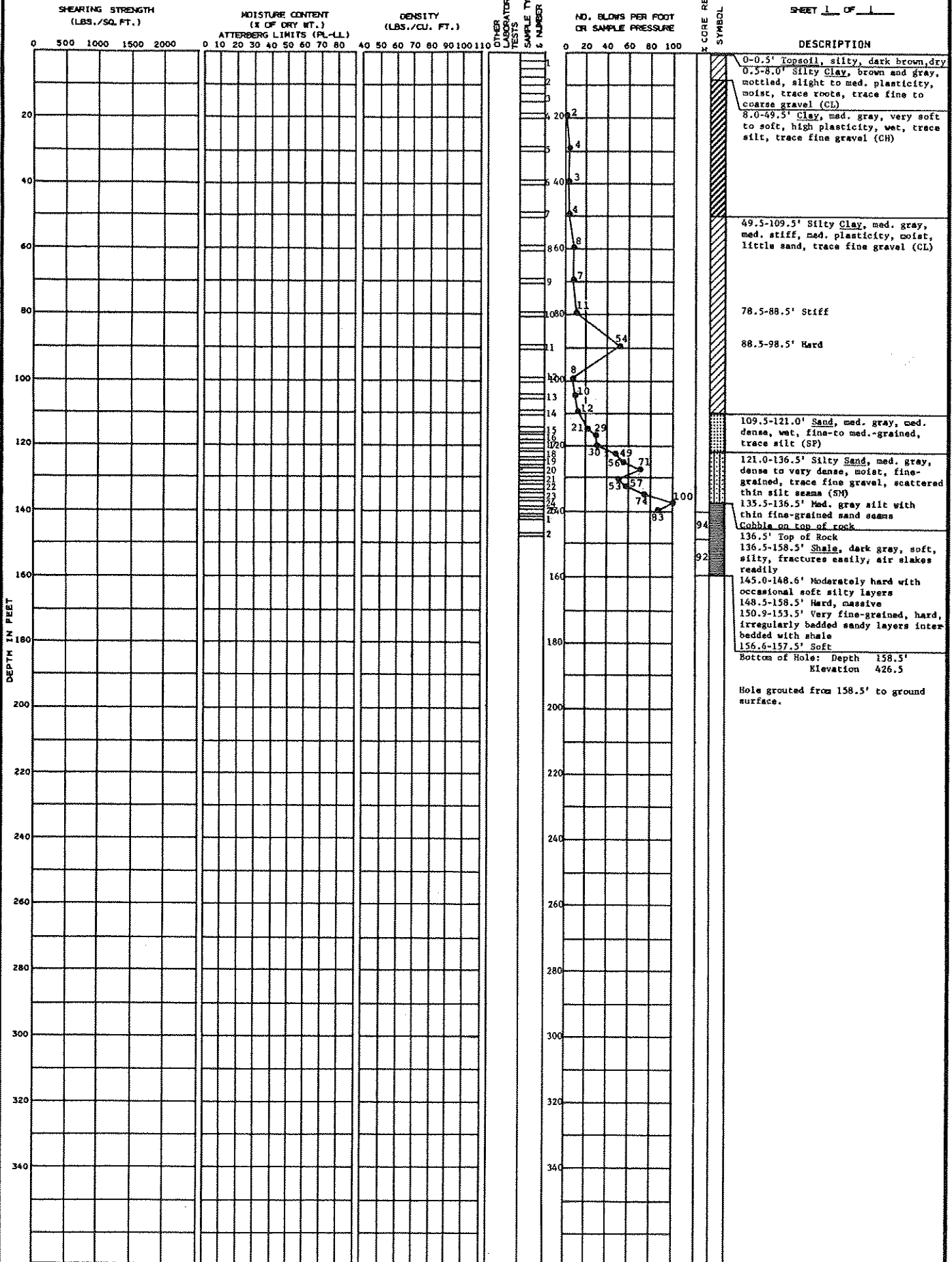
DATE DRILLED: 8/17/77 8/22/77

SHEET 1 OF 1



LOCATION: N 7500 E 9200 GROUND ELEVATION 585.0

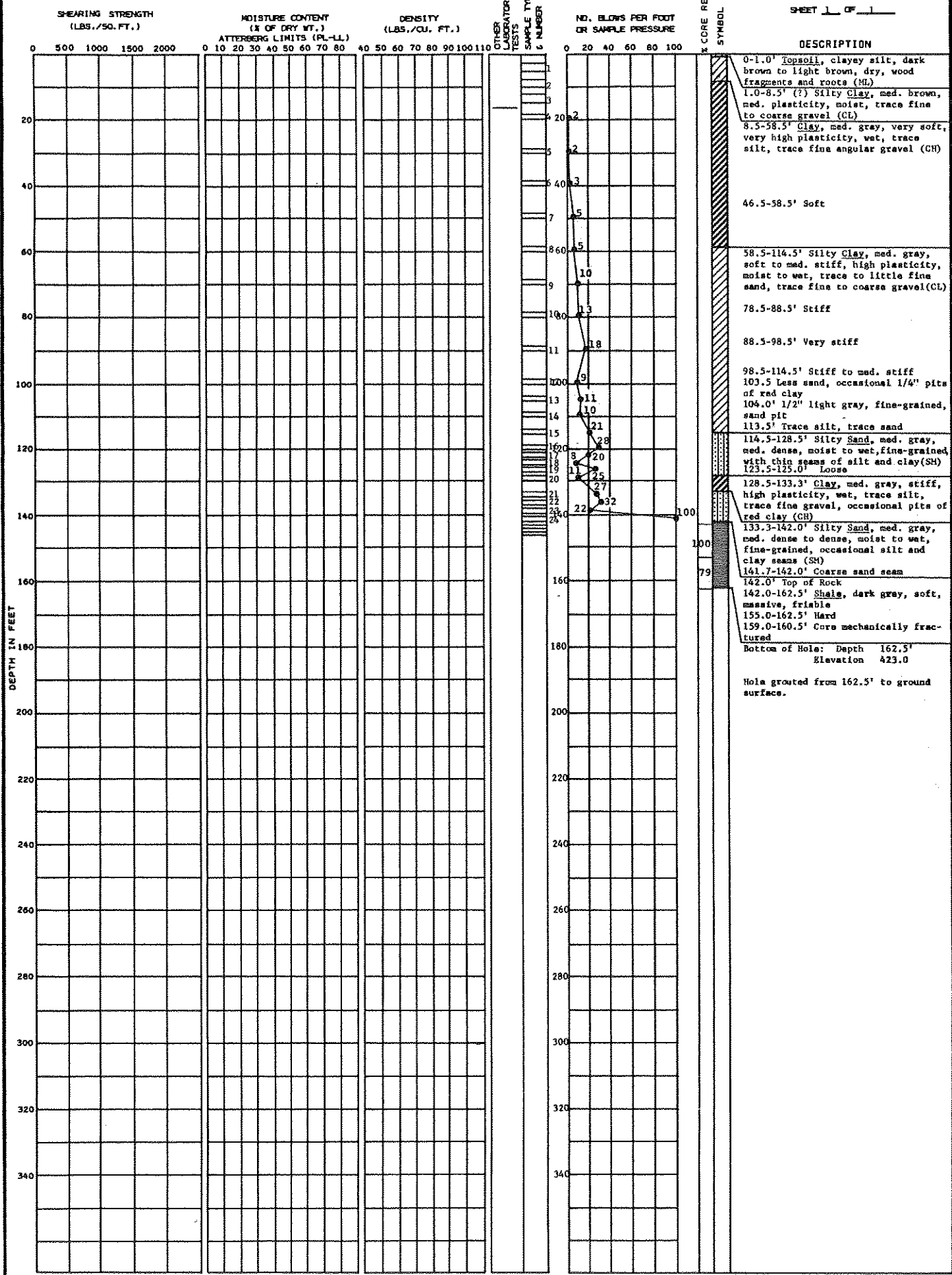
DATE DRILLED: 8/23/77 8/25/77



LOCATION: N 7850 E 9200 GROUND ELEVATION 585.5

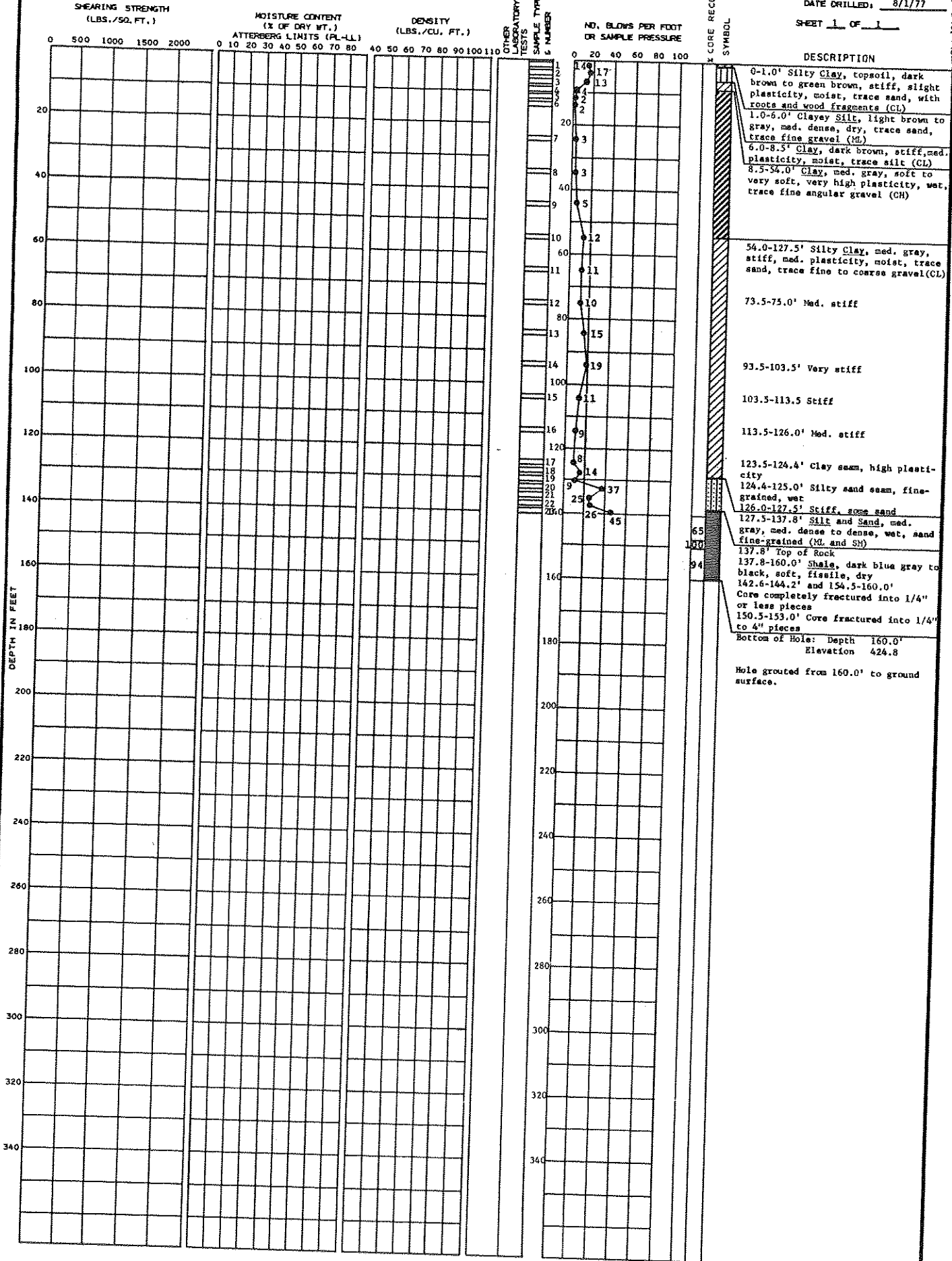
DATE DRILLED: 8/2/77  
8/4/77

SHEET 1 OF 1



LOCATION: N 7600 E 9400 GROUND ELEVATION 584.8

DATE DRILLED: 7/26/77 8/1/77 SHEET 1 OF 1

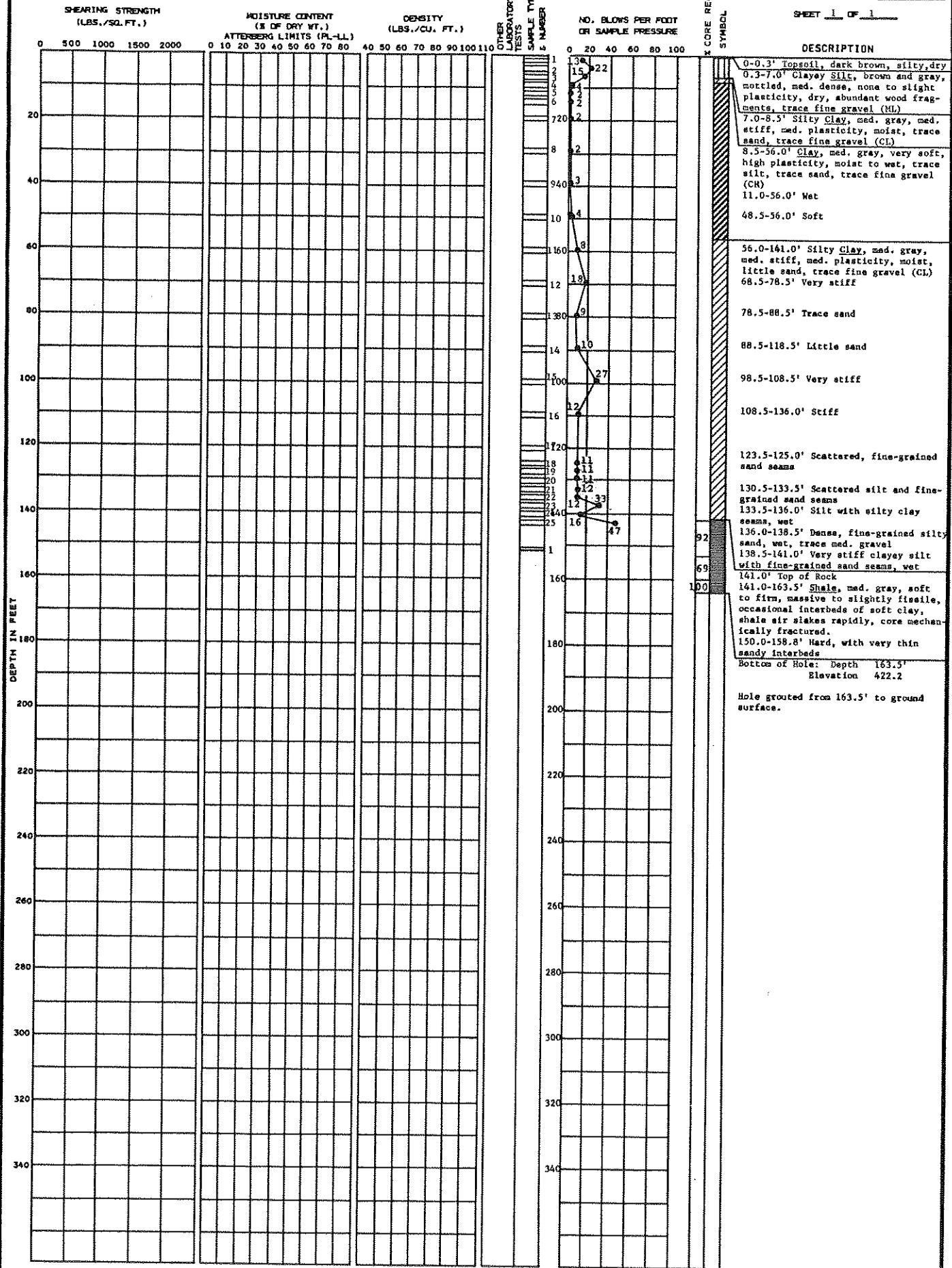


SOIL BORING NO. B-5 BECHTEL Belle River

LOCATION: N 7650 E 9550 GROUND ELEVATION 585.7

DATE DRILLED: 8/25/77 8/31/77

SHEET 1 OF 1



SOIL BORING NO. 8-6 BECHTEL Belle River

LOCATION: N 8180 E 9550 GROUND ELEVATION 585.3

DATE DRILLED: 8/12/77 8/17/77

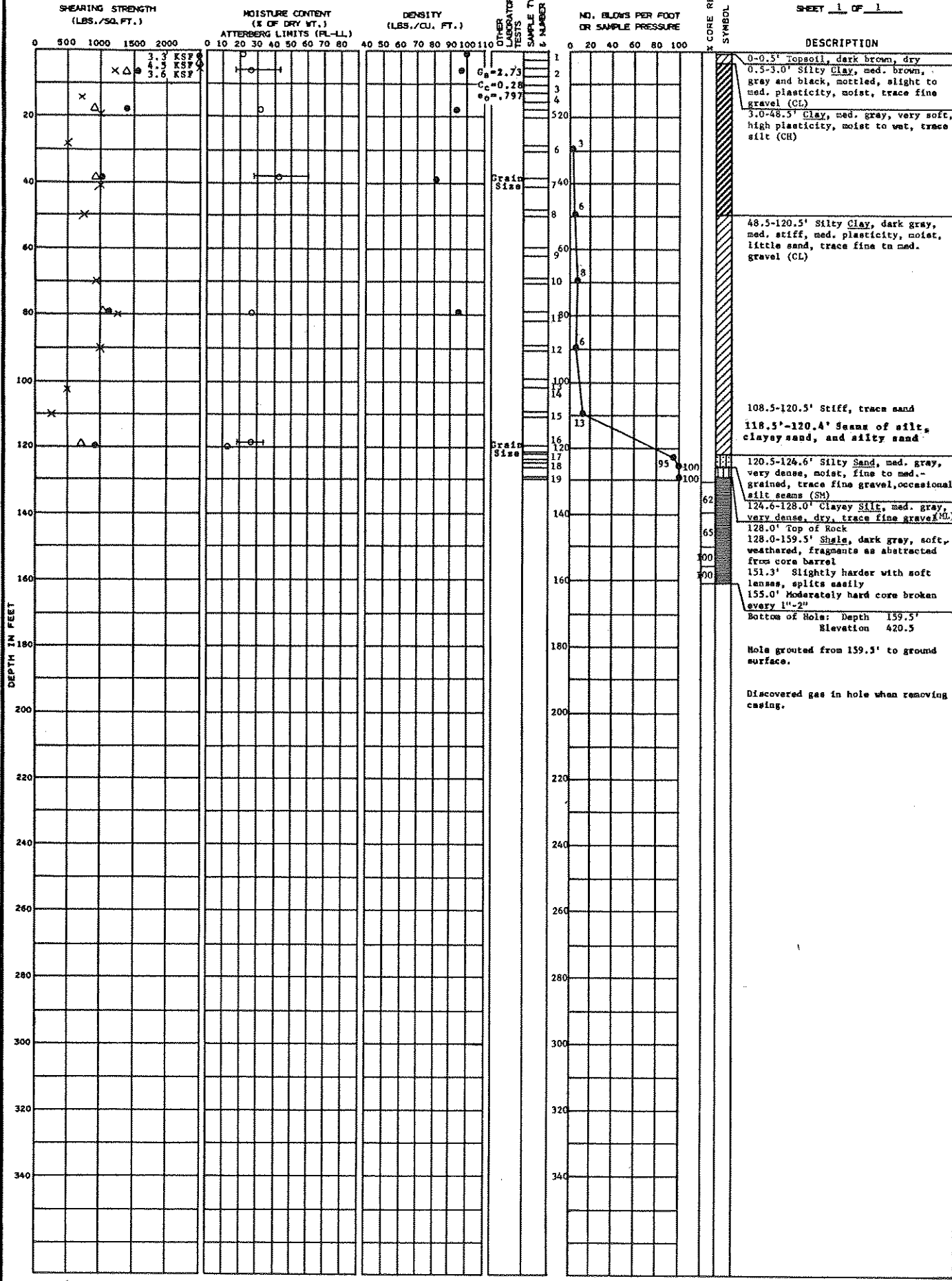
SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	LABORATORY TESTS	SAMPLE TYPE NUMBER	CORE RECOVERY SYMBOL	DESCRIPTION
0								0-0.5' Topsoil, silty dark brown
0.5				17		29		0.5-8.0' Clayey Silt, light gray and med. brown, mottled, med. dense, slight plasticity, dry, trace fine gravel, roots (MH)
8				20				8.0-8.5' Silty Clay, med. brown, very stiff, med. plasticity, very stiff, med. plasticity, moist, trace fine gravel (CH)
8.5				20				8.5-57.0' Clay, med. gray, soft to very soft, high plasticity, wet, trace silt (CH)
48.5								48.5' Trace fine to med. gravel
57.0				16		11		57.0-118.5' Silty Clay, med. gray, stiff, med. plasticity, moist, trace to little sand, trace fine gravel (CL)
68.5				2		46		68.5-88.5' Med. stiff
78.5				13		7		78.5-118.5' Little fine sand
108.5				17		11		108.5-118.5' Very stiff
118.5				16		16		118.5-125.5' Clay, med. gray, very stiff, med. plasticity, moist, trace silt (OL-CH)
123.5				10		7		123.5-125.5' Med. stiff
125.5				11		24		125.5-135.5' Clayey Silt, med. gray, loose to med. dense, wet, trace sand occasional fine to med.-grained sand seams (MH)
128.5				19		24		128.5-131.0' Sandy silt
131.0				24		43		131.0-132.0' Fine-grained silty sand seam
135.5				36				135.5-145.0' Sand, gray and brown, med. dense to dense, wet, fine-to med. grained, trace silt (SP)
143.5				30				143.5-144.5' Clayey sand
145.0								145.0' Top of Rock
145.0-164.0								145.0-164.0' Shale, green-gray, hard, occasional irregular bedding with very fine black coal stringers, predominately massive
148.7-149.3								148.7-149.3' Very fine-grained, hard, irregularly bedded sandy layers interbedded with shale
162.7-164.0								162.7-164.0' Soft dark gray, dry, friable
164.0								Bottom of Hole: Depth 164.0' Elevation 421.3
								Hole grouted from 164.0' to ground surface.

LOCATION: N 5270 E 15660 GROUND ELEVATION 580.0

DATE DRILLED: 9/7/77  
9/14/77

SHEET 1 OF 1



Δ Torvane  
 ○ Unconsolidated Undrained  
 ⊙ Unconfined Compression  
 — Atterberg Limits  
 G<sub>s</sub> Specific Gravity  
 C<sub>c</sub> Compression Index  
 e<sub>0</sub> Initial Void Ratio  
 × Pocket Penetrometer

SOIL BORING NO. B-17  
BECHTEL Bells River

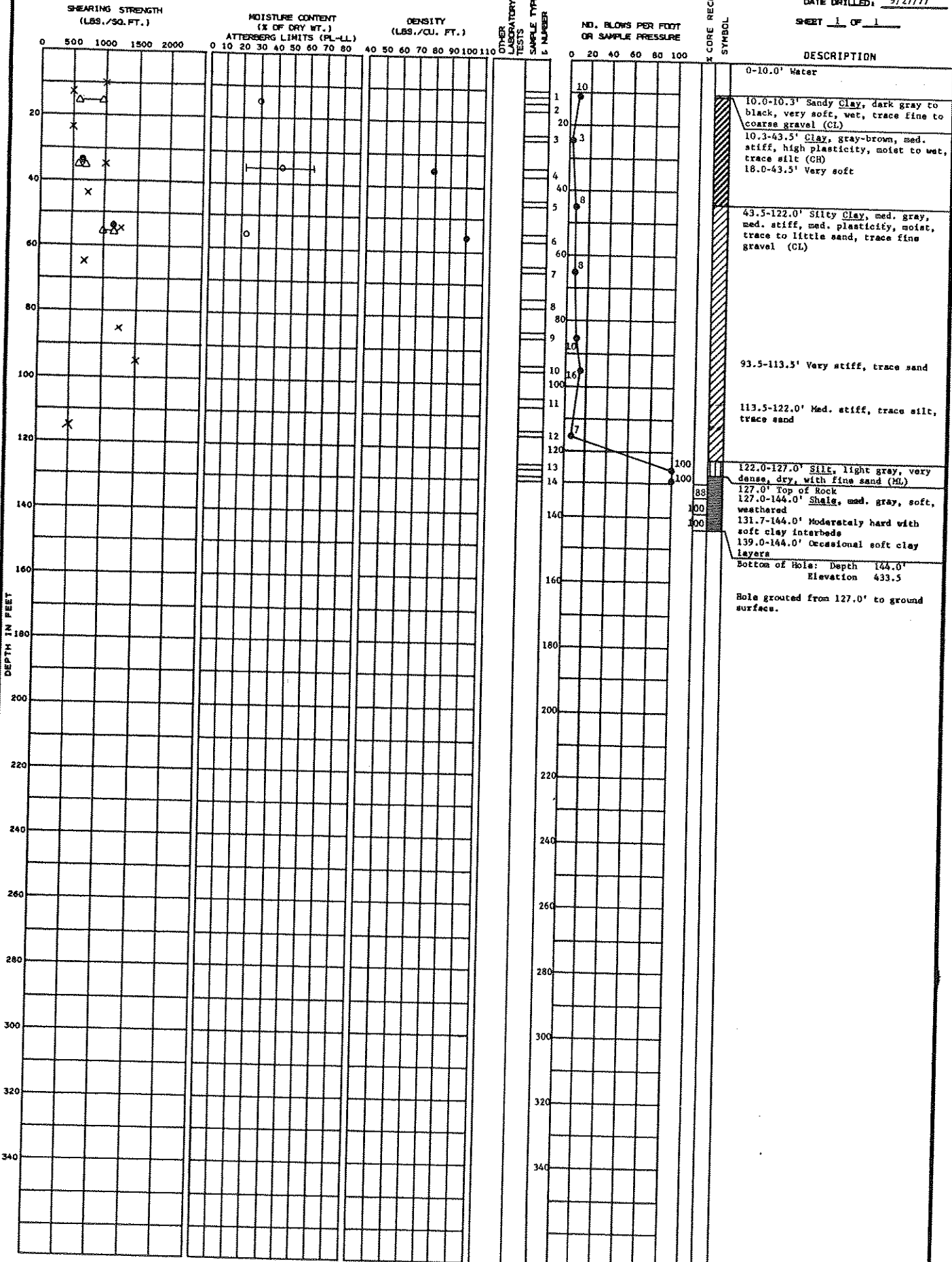


LOCATION: N 5163  
E 15744

GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/21/77  
9/27/77

SHEET 1 OF 1



Δ Torvane  
 I Atterberg Limits  
 ● Unconfined Compression  
 ○ Unconsolidated Undrained  
 X Pocket Penetrometer

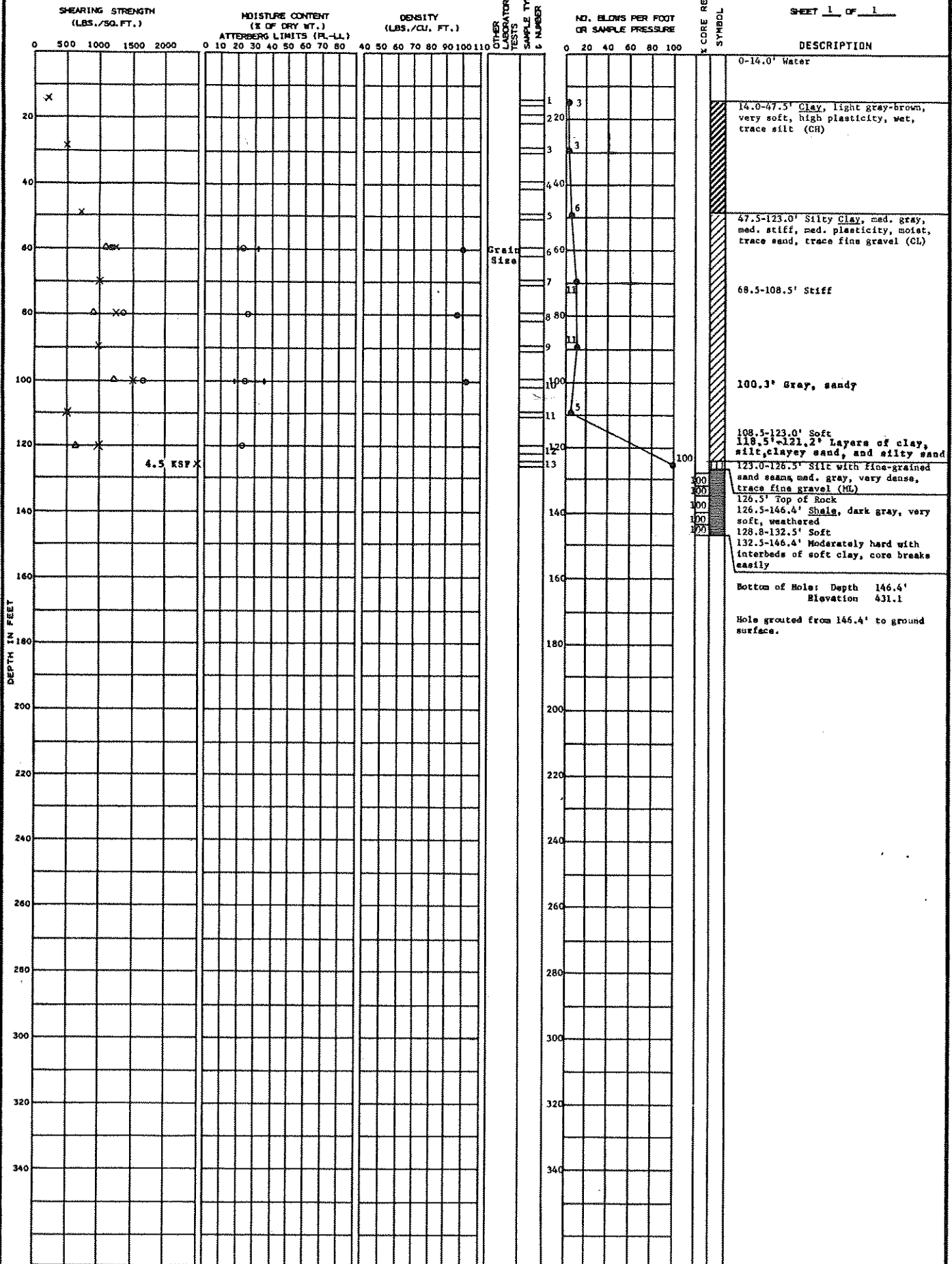
SOIL BORING NO. B-22  
BECHTEL Belle River

LOCATION: N 5364  
E 15750

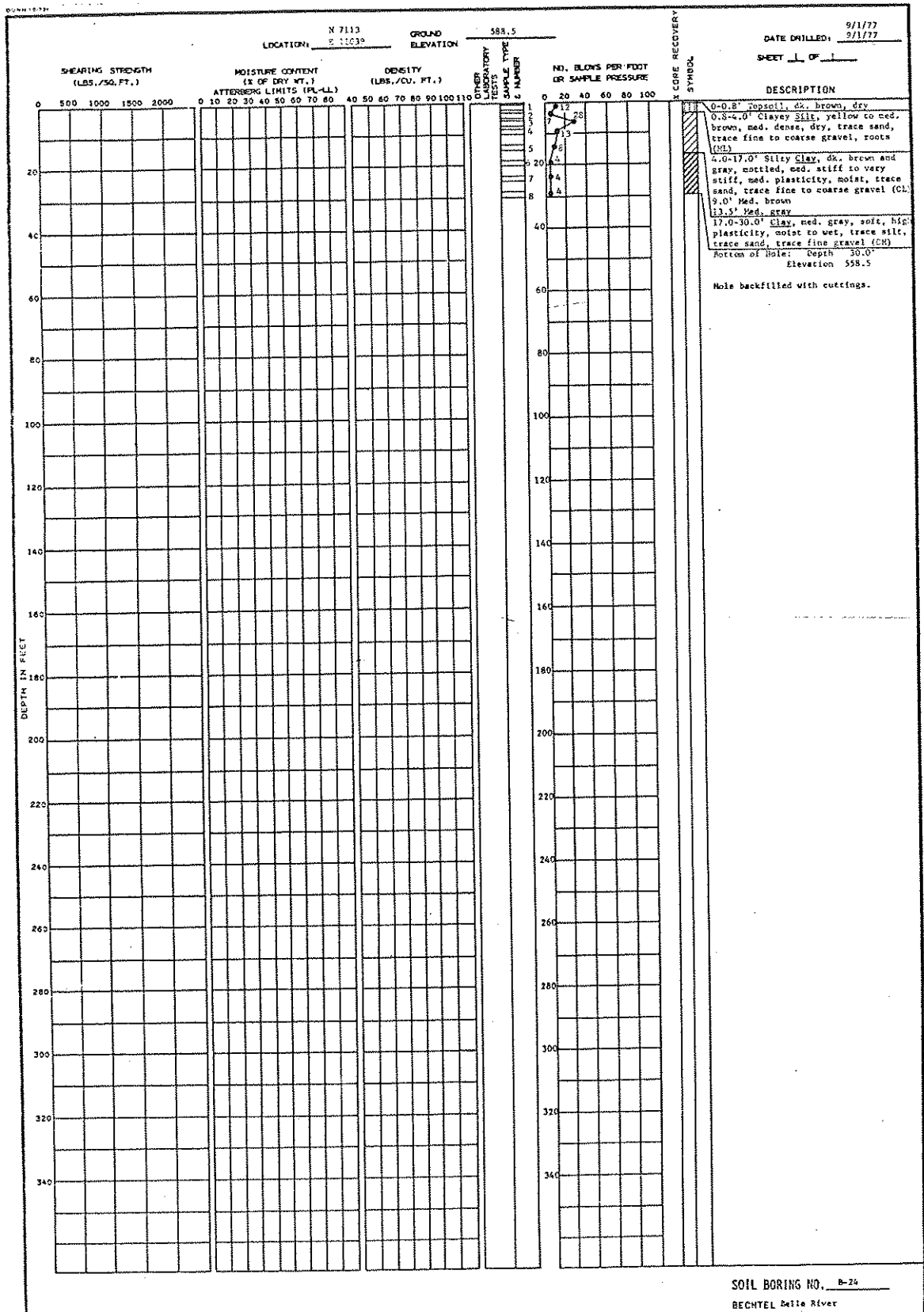
GROUND ELEVATION 577.5 (Top of Water)

DATE DRILLED: 9/15/77  
9/21/77

SHEET 1 OF 1



Δ Teryans  
 ○ Unconsolidated Undrained  
 □ Unconfined Compression  
 — Atterberg Limits  
 × Pocket Faunometer



LOCATION: H 6921 Z 11501 GROUND ELEVATION: 587.5

DATE DRILLED: 9/1/77  
 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY BY/WHEN	DESCRIPTION
0							0-0.7' Topsoil, dk. brown, dry
0.7					26		0.7-4.5' Silty Sand, tan and yellow, mottled, loose, damp, fine-grained (SM)
4.5							4.5-9.0' Silty Clay, brown and gray, mottled, stiff to very stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CI)
9.0							9.0-30.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace sand, trace fine gravel, trace silt (CH)
30.0							Bottom of Hole: Depth 30.0' Elevation 557.5
							Hole backfilled with cuttings.

LOCATION: N 6730 E 11963 GROUND ELEVATION 588.1

DATE DRILLED, 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.7' Topsoil, dr. brown, dry
0.7					11		0.7-4.0' Silty Sand, tan and gold, mottled, med. dense, dry, fine-grained, roots (SM)
4.0					21		4.0-13.5' Silty Clay, gray and brown, mottled, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5					3		6.0' Green brown
19.5					3		13.5-30.0' Clay, med. gray, soft, high plasticity, moist to wet, trace silt, trace fine gravel (CH)
30.0					3		Bottom of Hole: Depth 30.0' Elevation 558.1
340							Hole backfilled with cuttings.

LOCATION: N 6539 E 12425 GROUND ELEVATION 588.2

DATE DRILLED: 9/2/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY	SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, fine to med. gravel, dry (GM)
1				16			1.0-5.0' Clayey Silt, dk. brown, med. dense to dense, dry, trace sand, trace fine gravel (ML)
2				37			
3				21			
4							
5				14			
6				22			
7				12			5.0-30.0' Silty Clay, dk. brown, hard to very stiff, dry, med. plasticity, trace sand, trace fine to med. gravel (CL)
8				7			13.5' Moist, dipping parting in sample med. brown with med. gray filling, with roots
19.0							19.0-28.3' Med. gray, stiff
23.5							23.5' green-brown and gray, mottled
28.5							28.5-30.0' Med. gray, med. stiff
30.0							Bottom of Hole: Depth 30.0' Elevation 558.2
							Hole backfilled with cuttings.

LOCATION: N 6348 E 12890 GROUND ELEVATION 600.0

DATE DRILLED: 9/1/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-1.0' Topsoil, dk. brown, silty, dry, sandy fill with coarse gravel
1							
2							
3							
4					17, 23, 28, 24		1.0-6.0' Clayey Silt, green brown, med. dense, dry, trace sand (ML)
5							
6					10		6.0-30.0' Silty Clay, green brown, very stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)
7					9		13.5' Med. gray, stiff to med. stiff, med. plasticity
8					7		28.5-30.0' Med. to high plasticity
40							Bottom of Hole: Depth 30.0' Elevation 570.0
60							Hole backfilled with cuttings.
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

BURN 12-34

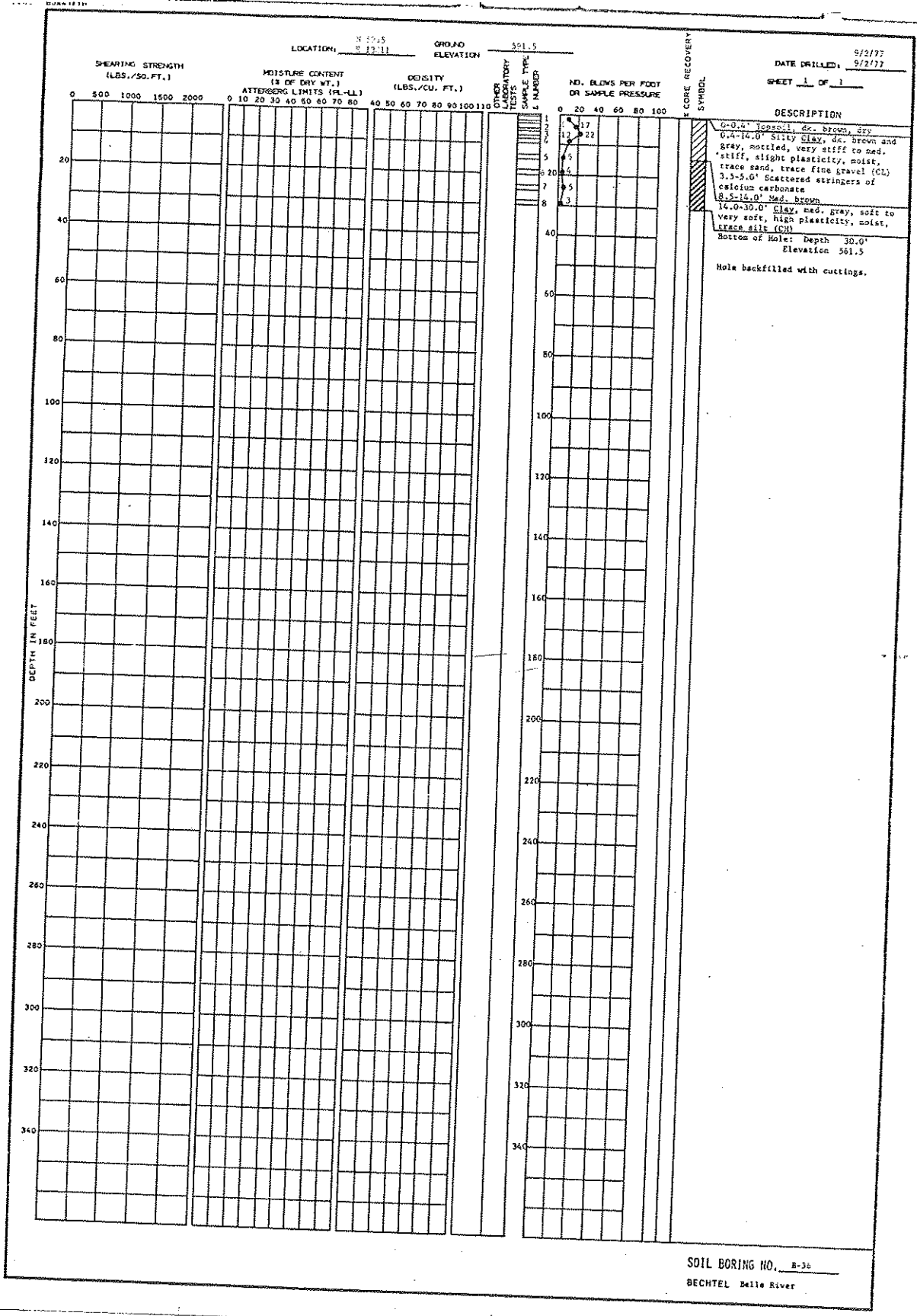
LOCATION: N 6156  
E 13309 GROUND ELEVATION 528.8

DATE DRILLED: 9/2/77  
9/2/77

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTENDING LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	NO. BLINDS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.3' Topsoil, dk. brown, dry
1							0.3-3.5' Clayey Silt, light brown and gray, mottled, med. dense, none to slight plasticity, dry, trace sand, trace fine to coarse gravel (G)
2							3.5-23.5' Silty Clay, med. brown and gray, lightly mottled, very stiff to hard, med. plasticity, moist, trace sand, trace fine gravel (CL)
3							23.5-30.0' Med. Gray, med. stiff to very soft, high plasticity, moist, trace silt (CH)
30.0'							Bottom of Hole: Depth 30.0' Elevation 568.8
30.0'							Note backfilled with cuttings.
340							

SOIL BORING NO. B-34  
BECTEL Belle River





SOIL BORING NO. B-30  
BECHTEL Belle River

BUNN 11-12

LOCATION: J 5774 E 14272 GROUND ELEVATION: 591.2

DATE DRILLED: 9/6/77 SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)				MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)				DENSITY (LBS./CU. FT.)				LABORATORY TESTS & NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION										
	0	500	1000	1500	2000	0	10	20	30	40	50	60					70	80	40	80	60	70	80	90	100	110
0																							1	24		0-0.3' Topsoil, dk. brown, moist
20																										0.5-13.5' Silty clay, med. brown and gray, mottled, med. stiff, med. plasticity, trace sand, trace fine gravel (GL)
40																										6.0-8.5' Med. brown, very stiff
60																										8.5-13.5' Med. brown, stiff
80																										13.5-30.0' Clay, med. gray, med. stiff, high plasticity, moist, trace silt (CH)
100																										23.5-28.5' Very soft, moist to wet
120																										18.5-30.0' Soft
140																										Bottom of Hole: Depth 50.0'
160																										Elevation 561.2
180																										Hole backfilled with cuttings.
200																										
220																										
240																										
260																										
280																										
300																										
320																										
340																										

SOIL BORING NO. B-39  
BECHTEL Belle River

QUMA 1872A

LOCATION: N 5532 E 14735 GROUND ELEVATION 590.2

DATE DRILLED: 9/6/77 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	LABORATORY TESTS SAMPLE TYPE & NUMBER	NO. BLOWS PER FOOT ON SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION
0							0-0.4' Topsoil, dk. brown, dry
0.4					21		0.4-13.5' Silty Clay, med. brown, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
13.5					3		13.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist to wet, trace silt (CH)
30.0					4		Bottom of Hole: Depth 30.0' Elevation 560.2
30.0							Hole backfilled with cuttings.
40							
60							
80							
100							
120							
140							
160							
180							
200							
220							
240							
260							
280							
300							
320							
340							

SOIL BORING NO. E-50  
BECHTEL Belle River

LOCATION: N 5355      GROUND ELEVATION: 559.9  
 S 15258

DATE DRILLED: 9/6/77  
 9/6/77

SHEET 1 OF 1

DEPTH IN FEET	SHEARING STRENGTH (LBS./SQ. FT.)				MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)				DENSITY (LBS./CU. FT.)				NO. BLOWS PER FOOT OR SAMPLE PRESSURE	CORE RECOVERY SYMBOL	DESCRIPTION											
	0	500	1000	1500	2000	0	10	20	30	40	50	60				70	80	0	20	40	60	80	100	110	0	20
0																										0-0.3' Topsoil, dk. brown, dry
0.3-4.0'																										Clayey silt, light brown, med. dense, dry, trace sand, trace fine to coarse gravel (G)
4.0-18.5'																										Silty clay, med. brown and gray, mottled, very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
18.5-30.0'																										Med. stiff clay, med. gray, very soft, high plasticity, moist to wet, trace silt (CH)
30.0-30.0'																										Soft
																										Bottom of Hole: Depth 30.0' Elevation 559.9
																										Hole backfilled with cuttings.

SOIL BORING NO. 2-42  
 BECHTEL, Balls River

## **APPENDIX D – 2016 BORING LOGS**



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-01**

Page 1 of 2

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>2/29/16</b>	Date Drilling Completed: <b>2/29/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.17</b>	TOC Elevation (ft) <b>591.30</b>	Total Depth (ft bgs) <b>120.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins. N: 471155.70 E: 13625546.02		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 08:45</b>		Depth (ft bgs) <b>14.52</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	<p><b>SILTY CLAY WITH GRAVEL</b> mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.</p> <p><b>CLAY</b> mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.</p> <p>Change to dark gray (10YR 4/1), very stiff at 5.0 feet.</p> <p>Change to soft at 8.0 feet.</p>	CL-ML			<p>Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.</p> <p>Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.</p>
2 CS	50		10	<p>Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.</p>				
3 CS	100		20	<p>Change to dark gray (10YR 4/1) at 20.0 feet.</p>	CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS					
NUMBER AND TYPE	RECOVERY (%)												
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.	CL								
6 ST	100		50										
7 CS	100		55										
8 CS	80		65										
9 CS	100		75										
10 CS	100		85										
11 CS	100		95						<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			100										
									End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



# WELL CONSTRUCTION LOG

## WELL NO. MW-16-02

Page 1 of 2

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/14/16</b>	Date Drilling Completed: <b>3/15/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>586.27</b>	TOC Elevation (ft) <b>588.94</b>	Total Depth (ft bgs) <b>100.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins. N: 471409.06 E: 13625991.78		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time <b>4/13/16 09:24</b>		Depth (ft bgs) <b>16.07</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<b>CLAY</b> mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			7.0	Change to no gravel at 7.0 feet.				
2 CS	80		10	Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.				
			15					
			25					
3 CS	100		25					
			30					
			35					
4 CS	90		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka





WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 2 of 2

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	SILTY CLAY mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.				
7 CS	50		55					
8 CS	100		60					
9 CS	100		65		CL-ML			
10 CS	100		70					
			75					
			80					
			85					
			90	CLAYEY SILT mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	SAND mostly fine to coarse sand, dark gray (10YR 4/1), saturated.				
			96.0	Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-03**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>5/25/16</b>	Date Drilling Completed: <b>5/31/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.03</b>	TOC Elevation (ft) <b>590.66</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins. N: 471391.78 E: 13626202.49		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time _____ Depth (ft bgs) _____ After Drilling: Date/Time <b>6/8/16 14:30</b> Depth (ft bgs) <b>12.82</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	100		5	<b>TOPSOIL</b> <b>SILTY CLAY</b> mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10.5	Change to gray (10YR 5/1) at 10.5 feet. <b>CLAY</b> mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.	CL			
3 CS	100		25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
4 CS	100		41.5	Change to trace fine to coarse sand at 41.5 feet.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
6 CS	90		50					
			55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	<b>SANDY CLAY</b> mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			70	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.	CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	<b>SANDY SILT</b> mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
			85	<b>CLAY</b> mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
			90	Change to medium soft at 90.0 feet.	CL			
			95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
10 CS	100		100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-03

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	CLAY mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12 CS	100		115		CL			
			120					
13 CS	100		125					
			130	<b>SANDY CLAY</b> mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff. <b>SILTY SAND</b> mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	CL SM			
14 CS	90		135	<b>SAND</b> mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
			140	<b>SILTY SAND</b> mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			145	<b>SAND</b> mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
15 CS	100		150	<b>SILT</b> mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense. <b>SHALE</b> weathered shale bedrock, dark gray. End of boring at 150 feet below ground surface.	ML			
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-04**

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Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/7/16</b>	Date Drilling Completed: <b>3/8/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>587.50</b>	TOC Elevation (ft) <b>590.51</b>	Total Depth (ft bgs) <b>130.0</b>	Borehole Dia. (in) <b>6/4</b>
Boring Location: 200 feet from W corner of road, S of bottom ash basins. N: 470893.74 E: 13625876.34		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 09:31</b>		Depth (ft bgs) Depth (ft bgs) <b>13.91</b>

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
	1	CS	80	5	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.  Change to stiff at 10.5 feet. Change to dark gray (10YR 4/1), very soft at 12.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
	2	CS	100	15					
	3	CS	100	25					
	4	CS	100	35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *C. Scieszka* Firm: TRC Environmental Corporation 734.971.7080  
 1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.				
6 CS	100		55					
			60	Change to few coarse gravel at 60.0 feet.				
7 CS	100		65					
			70					
			75	SILTY CLAY mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
8 CS	100		75	SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	SAND mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
			80	SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
			85	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
9 CS	100		85	CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	SILTY CLAY mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.				
			95		CL-ML			
10 CS	100		95					
			100	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828 0003 0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-04

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
12 CS	100		115	<b>SILT</b> mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
13 CS	100		125	<b>SAND</b> mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/3/16	Date Drilling Completed: 3/4/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 588.32	TOC Elevation (ft) 590.82	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W of diversion basin. N: 470378.15 E: 13626342.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55		
			Depth (ft bgs)	Depth (ft bgs) 14.37	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard.</p> <p>Change to no gravel, very stiff at 4.0 feet.</p>	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15					
			20					
			25	Change to medium stiff at 26.0 feet.				
			30	Change to very soft at 28.0 feet.				
3 CS	100		25					
			35					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: 	Firm: TRC Environmental Corporation 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
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Checked By: C. Scieszka





WELL CONSTRUCTION LOG

WELL NO. MW-16-05

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
				SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
6 ST	100		50	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
7 CS	100		55					
			60	Change to few fine to coarse gravel at 60.0 feet.	CL			
8 CS	100		65	Change to medium stiff at 65.0 feet.				
			67.5	Change to stiff at 67.5 feet.				
			70	SILTY CLAY mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
9 CS	100		75	Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.				
			80		CL-ML			
10 CS	60		85	Change to few to little fine sand at 85.5 feet.				
			90	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			93.5	Change to medium stiff at 93.5 feet.				
11 CS	100		95	Change to soft at 97.5 feet.	CL			
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	CLAY mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110-115					
14 CS	100		120-125					
15 CS	100		135	CLAYEY SILT mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
16 CS	90		145	SHALE dark gray (10YR 4/1), dry.				
			150	End of boring at 150.0 feet below ground surface.				
			155					



**WELL CONSTRUCTION LOG**


**WELL NO. MW-16-06**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/10/16</b>	Date Drilling Completed: <b>3/11/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.98</b>	TOC Elevation (ft) <b>593.21</b>	Total Depth (ft bgs) <b>140.0</b>
Boring Location: 123 feet S of road connecting to haul road, E of diversion basin. N: 470439.03 E: 13626796.04		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 10:01</b> Depth (ft bgs) <b>14.45</b>	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	GRAVEL WITH SAND mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense. CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to few coarse gravel at 10.0 feet.				
2 CS	100		15	Change to dark gray (10YR 4/1), stiff at 12.0 feet. Change to very soft at 13.0 feet.				
			20					
3 CS	100		25					
			30					
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
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 Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
6 CS	100		55		CL			
7 CS	100		65					
			70	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				<b>SAND</b> mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.				
			80		CL-ML			
9 CS	80		85					
			90	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
10 CS	70		95		CL			
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
12 CS	100		110 115					
13 CS	100		125	<b>SILTY CLAY</b> mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
14 CS	100		130 135					
			135	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			140	<b>SHALE</b> dark gray (10YR 4/1), hard, brittle.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-07**

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/8/16</b>	Date Drilling Completed: <b>3/9/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.89</b>	TOC Elevation (ft) <b>592.58</b>	Total Depth (ft bgs) <b>140.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: 326 feet S of road connecting to haul road, E of diversion basin. N: 470233.47 E: 13626858.79		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>4/13/16 11:56</b> Depth (ft bgs) <b>14.13</b>		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	CLAY mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
			10	Change to dark gray (10YR 4/1) at 11.0 feet.				
			13	▼ Change to moist, very soft at 13.0 feet.				
2 CS	100		15					
3 CS	100		25					
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

Page 2 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		65	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			66	<b>SAND</b> mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
			67	<b>CLAYEY SILT</b> mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
			70	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.				
9 CS	100		75					
10 CS	100		85		CL-ML			
11 CS	100		95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231825.0003.GPJ TRC\_CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

WELL NO. MW-16-07

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
12 CS	100		105	<b>SILTY CLAY</b> mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		125					
15 CS	100		135					
			130	<b>SILT</b> mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
			135	<b>SHALE</b> dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16





WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 3/9/16	Date Drilling Completed: 3/10/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.31	TOC Elevation (ft) 591.88	Total Depth (ft bgs) 140.0	Borehole Dia. (in) 6
Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin. N: 470002.90 E: 13626846.85		Personnel Logged By - A. Knutson Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 4/13/16 12:00		
			Depth (ft bgs)	Depth (ft bgs) 13.19	

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	CLAY WITH GRAVEL mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
2 CS	100		15	CLAY mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
3 CS	100		25		CL			
4 CS	100		35					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
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Checked By: C. Scieszka



# WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		55					
7 CS	80		65					
8 CS	100		75	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
9 CS	100		85					
10 CS	60		95					
			100					



WELL CONSTRUCTION LOG

WELL NO. MW-16-08

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>SILTY CLAY</b> mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.  Change to few fine sand at 105.5 feet.	CL-ML			
12 CS	100		110	Change to no sand at 110.0 feet.				
13 CS	100		125					
14 CS	100		135	<b>SILT</b> mostly silt, dark gray (10YR 4/1), saturated, very soft.  <b>SHALE</b> dark gray (10YR 4/1), brittle, hard.	ML			
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/1/16</b>	Date Drilling Completed: <b>6/1/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.28</b>	TOC Elevation (ft) <b>590.80</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: _____ Date/Time _____ After Drilling: _____ Date/Time <b>6/9/16 15:13</b>		Depth (ft bgs) <b>14.36</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	75		5	<p><b>TOPSOIL</b></p> <p><b>SILTY CLAY</b> mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.</p>	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	<p><b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.</p>				
2 CS	85		15					
3 CS	100		25		CL			
4 CS	100		35	Change to trace to few fine gravel at 30.0 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-09

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5	CS	100	45	CLAY mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
			50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6	CS	100	70	Change to soft at 70.0 feet.				
			75		CL			
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
			90					
			95					
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



WELL CONSTRUCTION LOG

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
8 CS	75		105	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.	CL			
9 CS	80		110					
10 CS	100		120					
			125	<b>SAND</b> mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
			130					
11 CS	80		140	<b>SAND WITH GRAVEL</b> mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
			145	<b>SHALE</b> weathered, gray (10YR 5/1), brittle.				
			150	End of boring at 150.0 feet below ground surface.				
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

Page 1 of 3

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 6/2/16	Date Drilling Completed: 6/3/16	Project Number: 231828.0003	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.25	TOC Elevation (ft) 592.26	Total Depth (ft bgs) 150.0	Borehole Dia. (in) 6
Boring Location: S end of haul road, W/NW of diversion basin. N: 470532.54 E: 13626417.00		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: TSi 150cc	
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 6/9/16 07:45		Depth (ft bgs) Depth (ft bgs) 15.30

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	TOPSOIL CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	90		15	Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
3 CS	95		25	Change to soft at 25.0 feet.				
4 CS	100		35	Change to few fine to coarse sand, medium stiff at 30.0 feet. Change to dark gray (10YR 4/1) at 32.0 feet. Change to soft at 35.0 feet.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

Signature: *M. Powers* Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	100		45	<b>CLAY</b> mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
6 CS	100		55		CL			
7 CS	100		65					
8 CS	100		75	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.  Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
9 CS	100		85	<b>CLAYEY SAND</b> mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.  <b>SAND</b> mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SC SP			
10 CS	100		95	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			100	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			





WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	100		105	<b>CLAY WITH SAND</b> mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	<b>SANDY CLAY</b> mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100		115	<b>SAND</b> mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			120	<b>CLAY</b> mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		125					
			130		CL			
14 CS	95		135					
			140					
15 CS	50		145	<b>GRAVELLY SILT</b> mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
			150	<b>SILTY CLAY</b> hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	<b>SHALE</b> dark gray. End of boring at 150.0 feet below ground surface.				
			155					
			160					



**WELL CONSTRUCTION LOG**

**WELL NO. MW-16-11**

Page 1 of 3

Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>6/3/16</b>	Date Drilling Completed: <b>6/6/16</b>	Project Number: <b>231828.0003</b>	
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>589.03</b>	TOC Elevation (ft) <b>591.54</b>	Total Depth (ft bgs) <b>150.0</b>	Borehole Dia. (in) <b>6</b>
Boring Location: S of haul road, W of diversion basin. N: 470251.34 E: 13626438.92		Personnel Logged By - J. Reed Driller - A. Goldsmith		Drilling Equipment: <b>TSi 150cc</b>	
Civil Town/City/or Village: <b>China Township</b>	County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time <b>6/21/16 07:45</b>		Depth (ft bgs) Depth (ft bgs) <b>14.47</b>

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	<b>TOPSOIL</b> CLAY mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to trace gravel at 8.0 feet.				
2 CS	70		15	Change to gray (10YR 5/1) at 12.0 feet. Change to no gravel at 13.0 feet.				
			20	Change to medium stiff at 21.0 feet.	CL			
3 CS	90		25					
			30					
4 CS	90		35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP.GDT 7/14/16

Signature:  Firm: TRC Environmental Corporation 734.971.7080  
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers



WELL CONSTRUCTION LOG

WELL NO. MW-16-11

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
5 CS	90		45	CLAY mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.	CL			
			50	Change to medium stiff at 49.0 feet.				
6 CS	100		55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.				
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16



# WELL CONSTRUCTION LOG

WELL NO. MW-16-11

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
11 CS	85		105	<p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.</p> <p>Change to medium stiff at 110.0 feet.</p>	CL			
12 CS	80		115					
13 CS	85		125					
14 CS	90		135					
15 CS	90		145					
			140	<p><b>SANDY CLAY</b> mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.</p> <p><b>CLAY</b> mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.</p> <p><b>SHALE</b> dark gray.</p>	CL			
			150	End of boring 150.0 feet below ground surface.				
			155					



WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

Facility/Project Name: DTE Electric Company Belle River Power Plant		Date Drilling Started: 5/11/17	Date Drilling Completed: 5/12/17	Project Number: 231828.0003
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 589.5	TOC Elevation (ft) 591.66	Total Depth (ft bgs) 142.0
Boring Location: North of fuel oil tank number 2, between berm and fence.		Personnel Logged By - J. Krenz Driller - A. Goldsmith		Drilling Equipment: TSi 150cc
Civil Town/City/or Village: China Township	County: St. Clair	State: MI	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 5/15/17 08:38	
				Depth (ft bgs) 17.79

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90			CLAY mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60		10					
			19.0	▼ Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.				
3 CS	70		20					
4 CS	70		30		CL			
5 CS	100		40					
6 CS	100		50					
7			60					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC CORP.GDT 8/21/17

Signature: *Paul Krenz* Firm: TRC Environmental Fax

Checked By: C. Scieszka



WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 8/21/17

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS		
NUMBER AND TYPE	RECOVERY (%)									
CS	100			CLAY mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.	CL					
			70	Change to few fine to coarse gravel at 70.0 feet.						
8 CS	100									
			80	Change to trace fine sand at 80.0 feet.						
9 CS	90									
			90							
10 CS	70									
			100							
11 CS	100									
			110							
12 CS	100									
			120							
13 CS	100									
			130	Change to trace medium to coarse gravel at 126.0 feet.						
14 CS	60			SILT mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.				ML		
15 CS	100		140	SILTY CLAY mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML					
			142	BEDROCK shale, weathered, gray (10YR 4/1). End of boring at 142.0 feet below ground surface.						
			150							





**SOIL BORING LOG**

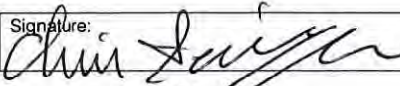
**BORING NO. SB-16-01**

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Facility/Project Name: <b>DTE Electric Company Belle River Power Plant</b>		Date Drilling Started: <b>3/1/16</b>	Date Drilling Completed: <b>3/1/16</b>	Project Number: <b>231828.0003</b>
Drilling Firm: <b>Stock Drilling</b>	Drilling Method: <b>Sonic</b>	Surface Elev. (ft) <b>588.69</b>	TOC Elevation (ft) <b>---</b>	Total Depth (ft bgs) <b>150.0</b>
Boring Location: <b>Corner of E connecting road off haul road, E of bottom ash basins.</b>		Personnel Logged By - <b>A. Knutson</b> Driller - <b>A. Goldsmith</b>		Drilling Equipment: <b>TSi 150cc</b>
Civil Town/City/or Village: <b>China Township</b>		County: <b>St. Clair</b>	State: <b>MI</b>	Water Level Observations: While Drilling:      Date/Time After Drilling:      Date/Time
				Depth (ft bgs) Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	<p><b>CLAY WITH GRAVEL</b> mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p> <p><b>CLAY</b> mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.</p>	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
			10	Change to stiff at 10.0 feet.			
2 CS	100		15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
3 CS	100		25		CL		
4 CS	100		35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.GPJ TRC\_CORP\_GDT 7/14/16

Signature: 	Firm: <b>TRC Environmental Corporation</b> 1540 Eisenhower Place Ann Arbor, Michigan	734.971.7080 Fax 734.971.9022
Checked By: <u>M. Powers</u>		



SOIL BORING LOG

BORING NO. SB-16-01

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SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC\_CORP.GDT 7/14/16

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
5 CS	100		45	CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
			60	CLAY WITH SAND mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
				CLAY mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		65	SANDY SILT mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
			70	CLAY mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
				Change to no gravel, soft at 72.5 feet.			
9 CS	100		75				
			80				
				Change to few coarse gravel at 80.0 feet.			
10 CS	100		85		CL		
			90				
11 CS	100		95				
			100				





SOIL BORING LOG

BORING NO. SB-16-01

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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
12 CS	100		105	CLAY mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		120				
15 CS	100		125	SILT mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
16 CS	100		130				
			135	SHALE dark gray (10YR 4/1), dry.			
			140				
			145	End of boring at 150.0 feet below ground surface.			
			150				
			155				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC CORP.GDT 7/14/16

## **APPENDIX E – 2020 BORING LOGS**

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.8			Lean CLAY - brown, hard, dry	4.5	Gravel road at surface
		6/7'	B-1-1 (3')			
5	587.8		B-1-2 (6')	Gravelly SAND - brown, poorly graded, fine gravel, coarse sand, silt, dry		
		100%	B-1-ST-1	Lean CLAY - brown, hard, dry		
10	582.8	3/3'	B-1-3 (10')	Same as above	4.5	
		6/7'	B-1-4 (15')	Very stiff from 14 to 16 ft.	2.5	
				Lean CLAY - Gray, soft - medium stiff, moist	0.5	
20	572.8	100%	B-1-ST-2			
		6/6'	B-1-5 (22')	Same as above	0.5	
25	567.8		B-1-6 (25')			

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.8	4/9'	B-1-7 (34')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
35	557.8	75%	B-1-ST-3		< 0.5	
40	552.8	4/8'	B-1-8 (40')	Same as above		
45	547.8	2/4'	B-1-9 (48')	Same as above	< 0.5	

**Boring B-1**

<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109   13626167.862

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	542.8	4'7'	B-1-10 (52')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
55	537.8		B-1-ST-4			
60	532.8	50%	B-1-11 (59')	Same as above	0.5	
		6'6'	B-1-12 (63')	Same as above	0.5	
65	527.8					
70	522.8	2'10'	B-1-13 (74')	Consistency increases to stiff	1.0	
75	517.8	1'5'	B-1-14 (80')	Lean CLAYwith Sand - Gray, medium stiff - stiff, moist	0.5	
						1.5

Boring B-1					
<b>Drilling Start Date:</b>	12/8/2020	<b>Boring Depth (ft):</b>	100		
<b>Drilling End Date:</b>	12/9/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.8		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane):</b>	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.8	25%	B-1-ST-5	Lean CLAY with Sand - Gray, medium stiff - stiff, moist		
			B-1-15 (82')	Becomes very stiff, trace coarse-fine gravel	2.0	
85	507.8	3/6'	B-1-16 (85')			
			B-1-17 (87')	Becomes stiff, no gravel	1.5	
90	502.8	2/8'			1	
			B-1-18 (94')		1	
95	497.8	0%				Shelby tube sample attempted, near zero recovery
		100%	B-1-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
100	492.8			Boring Terminated @ 100'		

Boring B-2					
Drilling Start Date:	12/9/2020	Drilling End Date:	12/10/2020	Boring Depth (ft):	99
Drilling Company:	Cascade Drilling	Drilling Method:	Sonic	Boring Diameter (in.):	4.25
Drilling Equipment:	600T	Sampling Method(s):	Shelby Tube, Grab Sample		
Driller Name:	Joe Lary III	GW During Drilling (ft bgs):	-		
Logged By:	Brian Ares	GW After Drilling (ft bgs):	-		
		Ground Surface Elev. (ft):	592.0		
		Northing, Easting (MI State Plane)	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-2-1 (1')	Fat CLAY - brown, hard, some fine gravel and coarse sand, dry	4.5+	Gravel road at surface
		100%	B-2-ST-1			
				Becomes lean	4.5	
5	587.0	4/4'	B-2-2 (5')	Same as above	4.5	
		100%	B-2-ST-2			
10	582.0	3/3'	B-2-3 (10')	Lean CLAY - gray, very stiff, dry	2.0	
			B-2-4 (12')			
15	577.0	8/8'	B-2-5 (18')	Becomes soft - medium stiff, moist	0.5	
20	572.0				0.5	
		7/7'	B-2-6 (24')		0.5	
25	567.0					
		100%	B-2-ST-3			

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	562.0	8'8"	B-2-7 (32')	Lean CLAY - gray, soft, wet	< 0.5	
35	557.0				< 0.5	
40	552.0	10'10"	B-2-8 (40')	Becomes moist	< 0.5	
45	547.0				< 0.5	
			B-2-9 (46')	Becomes soft-stiff	1.0	
		100%	B-2-ST-4		< 0.5	
50	542.0	4'4"	B-2-10 (50')		1.0	
					0.5	



Boring B-2				
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0	
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
55	537.0	8'8"	B-2-11 (54')	Sandy Lean CLAY - gray, stiff, moist	1.0	
60	532.0		B-2-12 (60')	Same as above	1.0	
65	527.0	6'6"	B-2-13 (64')		1.0	
		100%	B-2-ST-5		1.5	
70	522.0	6'6"	B-2-14 (70')	Some coarse gravel (69' - 74')	1.0 1.5	
75	517.0		B-2-15 (75')	Lean CLAY with Sand - gray, stiff, moist	1.0	
80	512.0	8'8"	B-2-16 (80')		1.0	

Boring B-2					
<b>Drilling Start Date:</b>	12/9/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/10/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0		
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470971.736	13625830.745	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	507.0	4'4'	B-2-17 (86')	Lean CLAY with Sand - gray, stiff, moist	1.0	
		100%	B-2-ST-6		1.0	
90	502.0	5'5'	B-2-18 (91')	Becomes very stiff	2	
					2	
95	497.0	3'3'	B-2-19 (96')	Same as above	2.5	
					2.5	
99	493.0	100%	B-2-ST-7	Boring Terminated @ 99'		

Boring B-3			
Drilling Start Date:	12/10/2020	Boring Depth (ft):	99
Drilling End Date:	12/11/2020	Boring Diameter (in.):	4.25
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	592.0
Logged By:	Brian Ares	Northing, Easting (MI State Plane)	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1/1'	B-3-1 (1')	GRAVELY SAND - tan, well graded, mostly coarse to fine gravel and coarse sand		Gravel road at surface
		100%	B-3-ST-1			
5	587.0	4/4'	B-3-2 (5')	Lean CLAY - brown, trace fine gravel, hard, dry	4.5	
		100%	B-3-ST-2			
10	582.0	7/7'	B-3-3 (10')	Becomes very stiff	2.5	
			Becomes medium stiff	2.5		
			0.5			
			0.5			
15	577.0		B-3-4 (15')	Transition to moist	0.5	
20	572.0	6/6'	B-3-5 (20')		0.5	
					0.5	
					0.5	
25	567.0	5/5'	B-3-6 (25')		0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-3-ST-3	Lean CLAY - gray, medium stiff, moist		
30	562.0	4 1/4'	B-3-7 (30')		0.5	
					0.5	
				Same as above	0.5	
35	557.0	8 7/8'	B-3-8 (35')		0.5	
					0.5	
40	552.0		B-3-9 (40')		0.5	
				Same as above	0.5	
		6 1/6'	B-3-10 (45')		0.5	
45	547.0				0.5	
					0.5	
		100%	B-3-ST-4			
				Same as above	0.5	
50	542.0	7 1/7'	B-3-11 (50')		0.5	
					0.5	
					0.5	
55	537.0		B-3-12 (55')		0.5	
					0.5	

**Boring B-3**

<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
60	532.0	8/8'	B-3-13 (60')	CLAY - gray, medium stiff, moist	0.5	
65	527.0	4/4'	B-3-14 (67')	Sandy Lean CLAY - gray, very fine - fine sand and silt, some fine gravel, moderate grading, moist	0.5	
70	522.0	0%	B-3-15 (70')	Lean CLAY with Sand - gray, stiff - very stiff, moist	2.0	Shelby tube sample attempted - no recovery
75	517.0	4/4'	B-3-16 (75')	Same as above	1.5	
		100%	B-3-ST-5			

Boring B-3			
<b>Drilling Start Date:</b>	12/10/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/11/2020	<b>Boring Diameter (in.):</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	592.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	471223.201 13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.0	9'9"	B-3-17 (80')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
85	507.0	5'5"	B-3-18 (85')	Same as above	1.5	
					2.0	
90	502.0	4'4"	B-3-19 (90')	Same as above	2.0	
					2.0	
95	497.0	100%	B-3-20 (95')	Boring Terminated @ 99'	2.0	
					1.5	
99	493.0		B-3-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	586.0	0/1'		Lean CLAY - brown, very stiff, dry		
		0%				Shelby tube sample attempted from 1-3', no recovery
				Same as above	2.5	Very little recovery. This assessment comes from verbal description from drilling crew
5	581.0	0.5/4'				
		100%	B-4-ST-1			
				Becomes hard	4.5	
10	576.0		B-4-1 (10)	Lean CLAY - gray, stiff, dry	1	
		6/6'	B-4-2 (12)		1	
				Becomes medium stiff, moist	0.5	
15	571.0		B-4-3 (15)		0.5	
		6/6'			0.5	
					0.5	
20	566.0		B-4-4 (20)			
				Same as above	0.5	
		6/6'			0.5	
25	561.0		B-4-5 (25)		0.5	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-4-ST-2	Lean CLAY - gray, medium stiff, moist		
30	556.0		B-4-6 (30')	Same as above	0.5	
		6'6"	B-4-7 (34')		0.5	
					0.5	
35	551.0		B-4-8 (36')	SILTY SAND - gray, mostly very fine - fine sand and silt, some fine gravel, well graded, moist		
		6'6"	B-4-9 (40')	Lean CLAY - gray, medium stiff, moist	0.5	
40	546.0			Same as above	0.5	
		6'6"	B-4-10 (45')		0.5	
45	541.0			Same as above		
		100%	B-4-ST-3			
50	536.0		B-4-11 (50')	Same as above	0.5	
		7'7"			0.5	
55	531.0		B-4-12 (55')		0.5	



Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - gray, medium stiff, moist	0.5	
60	526.0	6'6"	B-4-13 (60')		0.5	
				Same as above	0.5	
65	521.0	5'5"	B-4-14 (65')		0.5	
		100%	B-4-ST-4			
70	516.0		B-4-15 (70')			
		8'8"		Same as above		
75	511.0		B-4-16 (75')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
80	506.0	5'5"	B-4-17 (80')		2.0	

Boring B-4			
<b>Drilling Start Date:</b>	12/11/2020	<b>Boring Depth (ft):</b>	99
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	586.0
<b>Logged By:</b>	Brian Ares	<b>Northing, Easting (MI State Plane)</b>	470431.940 13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
85	501.0	5'5'	B-4-18 (85')	Lean CLAY with Sand - gray, stiff - very stiff, dry	1.5	
					2.0	
		100%	B-4-ST-5		1.0	
90	496.0	5'5'	B-4-19 (90')	Same as above	1.0	
					1.5	
95	491.0	3'3'	B-4-20 (95')	Same as above	1.5	
99	487.0	100%	B-4-ST-6	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-5					
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99		
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25		
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-		
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-		
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3		
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	591.3	0.75/1'		Lean CLAY - light brown, little gravel, little sand, hard, moist	4.0	
		50%	B-5-ST-1	Lean CLAY - gray, very stiff - hard, moist	2.0	
					3.5	
5	586.3	4/4'			> 4.5	
			B-5-1 (7')	Fat CLAY - gray to brown, some fine gravel, medium stiff - very stiff	2.5	
					0.5	
					0.5	
					1.0	
10	581.3	7/7'				
			B-5-2 (14')	Lean CLAY - gray, medium stiff, moist	0.5	
					0.5	
15	576.3	7/7'				
					0.5	
20	571.3					
			B-5-3 (21')	Same as above	0.5	
					0.5	
25	566.3	5/6'				
					0.5	
		100%	B-5-ST-2		0.5	

Boring B-5			
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99
Drilling End Date:	12/14/2020	Boring Diameter (in.)	4.25
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324 13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
30	561.3		B-5-4 (29')	Lean CLAY - gray, medium stiff - stiff, moist	1.0	
		7/7'	B-5-5 (32')		1.0	
35	556.3			Same as above	1.0	
		5/5'	B-5-6 (37')		0.5	
40	551.3			Same as above	1.0	
		6/6'	B-5-7 (42')		1.0	
45	546.3		B-5-8 (46')		1.0	
		100%	B-5-ST-3		1.0	
50	541.3			color transition to darker gray	0.5	
		4/4'				1 cm sand seam observed
			B-5-9 (52')	Becomes stiff	1.5	

Boring B-5				
Drilling Start Date:	12/14/2020	Boring Depth (ft):	99	
Drilling End Date:	12/14/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	591.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane)	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
55	536.3	8'8'	B-5-10 (57')	Lean CLAY - dark gray, medium stiff - stiff, moist	1.0	Some fine black gravel observed	
							0.5
60	531.3	6'6'	B-5-11 (62')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, medium stiff - stiff, moist	1.0		
							0.5
							1.0
65	526.3	100%	B-5-12 (66')		1.5		
							1.5
			B-5-ST-4		1.0		
70	521.3	9'9'	B-5-13 (72')	Same as above	1.5		
							1.0
75	516.3		B-5-14 (77')		1.0		
					1.5		

Boring B-5				
<b>Drilling Start Date:</b>	12/14/2020	<b>Boring Depth (ft):</b>	99	
<b>Drilling End Date:</b>	12/14/2020	<b>Boring Diameter (in.)</b>	4.25	
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample	
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-	
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-	
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	591.3	
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane)</b>	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS	
80	511.3	9/9'	B-5-15 (82')	Lean CLAY with Sand - dark gray, trace fine and coarse gravel, stiff - very stiff, moist	1.0		
					2.0		
85	506.3	100%	B-5-16 (86')		1.0		
			B-5-ST-5		1.5		
90	501.3	8/8'	B-5-17 (92')		Same as above		2.5
					2.5		
95	496.3		B-5-18 (96')	2.0			
		100%	B-5-ST-6 B-5-19 (99')	Boring Terminated @ 99'	2.0	Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite	
99	492.3						

Boring B-6				
Drilling Start Date:	12/15/2020	Boring Depth (ft):	99	
Drilling End Date:	12/15/2020	Boring Diameter (in.):	4.25	
Drilling Company:	Cascade Drilling	Sampling Method(s):	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	GW During Drilling (ft bgs):	-	
Drilling Equipment:	600T	GW After Drilling (ft bgs):	-	
Driller Name:	Joe Lary III	Ground Surface Elev. (ft):	589.3	
Logged By:	Sean Karoly	Northing, Easting (MI State Plane):	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	589.3	1/1'		GRAVEL - light gray to gray, mostly coarse and fine gravel and sand		
		50%	B-6-ST-1	Lean CLAY - gray to brown, trace gravel, very stiff - hard, moist		
5	584.3	3.5/4'	B-6-1 (5')		3.0 4.5 3.5 3.0	
		100%	B-6-ST-2	Lean CLAY - gray, very stiff, moist	3.0	
10	579.3	7/7'	B-6-2 (10')	Becomes medium stiff - stiff	3.0 1.0 0.5	
15	574.3		B-6-3 (15')	Same as above	0.5	
		4/4'			0.5	
20	569.3		B-6-4 (20')	Same as above	0.5	
		7/7'			1.0	
25	564.3		B-6-5 (25')		0.5	
					1.0	

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-6-ST-3	Lean CLAY - gray, medium stiff - stiff, moist		
30	559.3		B-6-6 (30')	Same as above	0.5	
		9/9'			0.5	
35	554.3		B-6-7 (35')		1.0	
					0.5	
40	549.3		B-6-8 (40')	Same as above	0.5	
		9/9'			0.5	
45	544.3		B-6-9 (45')		0.5	
					1.0	
		100%	B-6-ST-4			



Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.):</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	539.3	9/9'	B-6-10 (50')	Lean CLAY - gray, medium stiff - stiff, moist Color transition to darker gray	1.0	
55	534.3	9/9'	B-6-11 (55')	Lean CLAY with Sand - gray, stiff, moist	1.0	
60	529.3	9/9'	B-6-12 (60')	Same as above	1.0	
65	524.3	100%	B-6-13 (65')	Same as above	1.5	
			B-6-ST-5			
70	519.3	9/9'	B-6-14 (70')	Same as above	1.0	
75	514.3	9/9'	B-6-15 (75')	Same as above	1.5	

Boring B-6					
<b>Drilling Start Date:</b>	12/15/2020	<b>Boring Depth (ft):</b>	99		
<b>Drilling End Date:</b>	12/15/2020	<b>Boring Diameter (in.)</b>	4.25		
<b>Drilling Company:</b>	Cascade Drilling	<b>Sampling Method(s):</b>	Shelby Tube, Grab Sample		
<b>Drilling Method:</b>	Sonic	<b>GW During Drilling (ft bgs):</b>	-		
<b>Drilling Equipment:</b>	600T	<b>GW After Drilling (ft bgs):</b>	-		
<b>Driller Name:</b>	Joe Lary III	<b>Ground Surface Elev. (ft):</b>	589.3		
<b>Logged By:</b>	Sean Karoly	<b>Northing, Easting (MI State Plane):</b>	470018.376	13626852.319	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	509.3	9'9"	B-6-16 (80')	Lean CLAY with Sand - gray, stiff, moist	1.5	
85	504.3		B-6-17 (85')	Becomes very stiff	2.0	
		100%	B-6-ST-6			
90	499.3	8'8"	B-6-18 (90')	Becomes stiff	1.5	
95	494.3		B-6-19 (95')	Some gravel observed	1.5	
99	490.3	100%	B-6-ST-7 B-6-20 (99')	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

**APPENDIX F – 1970s LABORATORY TEST  
RESULTS**

4-9-5-2

# **SUBSURFACE INVESTIGATION AND FOUNDATION REPORT**

THE DETROIT

EDISON COMPANY



**BELLE RIVER  
UNITS 1 & 2  
JOB 10539  
VOLUME 2 OF 2**

P. H. COOK

AUG 31 1978

**GEOLOGY AND SOIL PROPERTIES**

**AUGUST 1976**

**BECHTEL  
ANN ARBOR, MICHIGAN**



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## Appendix C

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B7/28	Jar Sample Clayey SILT; dark gray, low plasticity (CL-ML)	129.5 to 131.0	64								
			H64.1								See plot
B7/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	138.88 to 140.33	65								
			S/H								
			65.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$	$C_c$
B10/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	—										
		66										
		SH 66.1										See plot



BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
15/2	1.6' Recovery; say 3.0' to 4.6' depth	3.0-5.0	119									
		3.3-3.6	Saved									
	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL)	3.6-3.7	W119.1	25.5		97						
		3.7	TV								TV=1.00tsf	
		3.7-4.1	W119.01	25.4		101		UU	8.0	2386	σ <sub>c</sub> =475 psf	
		3.7-4.1	L119.1	23.6	45	21						
		4.1-4.2	W119.2	25.3		97						
		4.2	TV								TV=1.20tsf	
		4.2-4.5	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255			
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS			
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>				
15/4	1.3' Recovery: say 8.0' to 9.3' depth	8.0-10.0	120												
		8.1-8.4	saved												
	Silty CLAY, dark gray, stiff consistency, moderate to highly plastic (CL)	8.4	TV									TV=0.70 tsf			
		8.4-8.6	W120.1			90									
		8.6-8.9	U120.1			93	U	6.0	1257						
		8.6-8.9	L120.1			44	19								
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)	8.9	TV									TV=0.61 tsf			
		9.0-9.4	saved												

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
15/6	1.2' Recovery; say 18.0' to 19.2' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to highly plastic (CL)	18.0-20.0	—									
		18.1-18.4	L12L.1	35.0	42	20						
		18.1-18.4	J12L.1	34.1			87	U	15.0	508		@20% strain s= 546 psf
		18.4-18.5	W12L.1	36.1			83					
		18.5	TV									TV=0.28tsf
		18.8-18.9	W12L.2	36.3			83					
		18.9	TV									TV=0.22tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
15/14	2.5' Recovery; say 58.0' to 60.5' depth	58.0-60.5	125								
	Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Void occurs along outside edge of upper 1.3' of sample	58.3-	Saved								
		58.7-	W125.1	23.4							
		58.9	TV								TV = 0.46tsf
		58.9-									
		59.2	Saved								
		59.2-	W125.1	22.5	104	U	15.2	1067			@ 20% strain s = 1260 psf
		59.2-									
		59.6	L125.1	22.6	34	18					
		59.6-									
		59.7	W125.2	22.4	103						TV = 0.61tsf
	59.7	TV									
	60.0-										
	60.4	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/3	2.4' Recovery; say 20.0' to 22.4' depth  Silty CLAY, dark grey, soft to firm consistency, moderate to high plasticity (CL)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	20.0 - 22.5	—									
		20.1 - 20.4	176									
		20.4 - 20.6	WI76.1	39.1	82							
		20.6	TV									TV=0.26tsf
		20.6 - 20.9	WI76.1	39.9	83							σ <sub>c</sub> -2448psf
		20.6 - 20.9	L176.1	38.3	44	21						
		20.9 - 21.2	Saved									
		21.2 - 21.4	WI76.2	32.1	88							
		21.4	TV									TV=0.26tsf
		21.7 - 22.0	Saved									
		22.0 - 22.4	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/6	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	—									
		50.0 to 52.5	345								
		50.3 to 50.5	W345.1	35.8							
		50.5	TV								TV=0.38tsf
		50.5 to 50.8	345.1								
		51.2 to 51.4	W345.1	24.6	98						
		51.4	TV								TV=0.50tsf
		51.4 to 51.7	1345.0.1	31.0	92	UU	3.0	827			
		51.4 to 51.7	1345.1	29.6	39						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974  
SHEET OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
18/7	2.4' Recovery; say 60.0' to 62.4' depth  Silty CLAY, Sandy, dark gray, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 30% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	60.0-62.5										
		60.6	TV									TV=0.46 tsf
		60.6-61.0	saved									
		61.0-61.3	L346.1	20.2	26	16						
		61.4-61.6	W346.2	19.9		109						
		61.6	TV									TV=0.65 tsf
		61.6-62.0	saved									

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>		
18/10	1.3' Recovery; say 88.0' to 89.3' depth	179									TV=1.3 tsf	
	Silty CLAY, sandy, gray, very stiff consistency, moderate plasticity (CL)	TV			99							
		W179.1	22.9									
		W179.2	21.9		98							
	Sample includes about 25% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)	TV									TV=1.1 tsf	
		L179.1	17.3	29	15							
		L179.01	17.3		110	UU	15.0	2863			σ <sub>c</sub> =6336 psf	



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub> c <sub>c</sub>	
18/11	Jar Sample	—								
	Silty SAND, subrounded to subangular fine to coarse Sand grains with about 10% non-plastic fines (SM-SW)	103.5-105.0								
		430								
		S430.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE July 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
18/12	1.7' Recovery; say 108.0' to 109.7' depth	108.0-110.0	181										
		108.2-108.5	1181.1	34.2	46 22								
	Silty CLAY, grey, stiff consistency, moderate to highly plastic (CL)	108.2-108.5	1181.1.1	34.5		87	CU	5.9	1952		$\bar{\sigma}_c=3744$ psf		
		108.5-108.6	1181.1	32.3		90					TV=0.71tsf		
		108.6	TV										
	Sample includes lenses/layers of Silty Sand, subrounded to subangular fine to medium Sand grains with about 40% non-plastic fines (SM)	108.6-108.9	1181.1.2	31.0		92	CU	6.2	2601		$\bar{\sigma}_c=7488$ psf		
		108.6-108.9	1181.1.3	30.7		92	CU	6.8	4088		$\bar{\sigma}_c=15120$ psf		
		108.9-109.3	Saved										
		109.3-109.4	1181.2	26.8		94							
	Layers/lenses comprise ±30% of total sample below 108.9' depth	109.4	TV								TV=0.51tsf		

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SHEET 1 OF 1

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
18/16	Jar Sample		139.5-141.0	431								
	Silty SAND, gravelly; about 25% hard subrounded to subangular gravel size particles (3/4" max. size), subrounded to subangular fine to coarse Sand grains, about 15% non-plastic fines (SM)			S431.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
19/1	Silty CLAY, dark greyish brown, very stiff consistency moderate to high plasticity (CL-CH)  Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	3.0-5.0	290									
		3.4-3.6	W290.1	25.7	95							
		3.6	TV									TV=1.15tsf
		3.6-3.9	Saved									
		3.9-4.2	Saved									
		4.2-4.3	W290.2	31.4	87							
		4.3	TV									TV=1.13tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
19/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0-20.0	292										
		18.1-18.5	L292.1	40.2	49	24							
	Silty CLAY, gray, soft to firm consistency moderate to high plasticity (CL-CH)	18.5-18.6	W292.1	39.1			85						
		18.6	TV									TV=0.27 tsf	
		18.6-19.0	saved										
		19.1-19.3	W292.2		35.3			83					
		19.3	St									TV=0.23 tsf	
		19.4-19.7	saved										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974

SHEET        OF       

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$	
19/8	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)		68.0-70.0	297										
			68.4-68.5	W297.1	23.1	1.03								
			68.5	TV									TV=0.80tsf	
			68.5-68.8	Saved										
			69.2-69.3	W297.2	22.2	1.03								
			69.3	TV									TV=0.73tsf	
			69.3-69.7	Saved										

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
19/9	1.9' Recovery; say 78.0' to 79.9' depth	78.0-80.0	298								
		78.2-78.6	saved								
	Silty CLAY, gray, stiff consistency, moderate plasticity (CL)	78.6-78.7	W298.1	21.4		106					TV=0.63 tsf
		78.7	TV								
		78.7-79.0	L298.1	24.4	33	17					
		79.0-79.5	saved								
	Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	79.6-79.7	W298.2	24.9		101					TV=0.67 tsf
		79.7	TV								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
19/11	1.8' Recovery; say 100.0' to 101.8' depth  Silty CLAY, grey, firm consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	100.0-	—								
		102.0	300								
		100.5	TV								TV-0.43tsf
		100.5-									
		100.6	W300.1		22.7		100				
		100.6-									
		100.9	Saved								
		101.3-									
		101.4	W300.2		27.3		94				TV=0.42 tsf
		101.4-									
	101.7	Saved									



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT WATER CONTENT (%)			ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
19/12	1.9' Recovery; say 118.0' to 119.9' depth		118.0-120.0	30J								
			118.4									
	Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL)		118.5	W30L1	35.1		86					
				118.5	TV							TV=0.55tsf
	Sample includes few thin lenses/layers of SILT, sandy (ML) comprising ±5% of total		118.9	Saved								
			119.2									
			119.3	W30L2	80	41.4						
			119.3	TV								TV=0.68tsf
			119.3	Saved								
			119.6									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974  
SHEET        OF       

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B22/29	Jar Sample Clayey SILT; dark gray, slight to low plasticity (CL-ML)	13.5 to 15.5	67								See plot
			S/H 67.1								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$
25/1	Silly CLAY, grayish brown, very stiff consistency, highly plastic (CH)  Sample includes about 5% hard subrounded gravel size particles  Note: upper 1.0' of sample disturbed (Wash?)	3.0 to 5.0	266								
		4.0	TV								TV=0.4tsf
		4.0 to 4.3	save								
		4.3 to 4.5	266.1								
		4.5 to 4.8	W266.1		24.1	100					
		4.5 to 4.8	U266.1		22.4	108	U	5.0	3456		
		4.5 to 4.8	1266.1		24.5	59	23				
		4.8	TV								TV=1.8tsf

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FILE NO. 1255

DATE July 1974

SHEET 07 OF 07

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>	
25/3	1. 9' Recovery; say 18.0' to 19.9' depth, upper 0.8' disturbed (WASH??) Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)		18.0-20.0	268										
			18.8-19.2	Saved										
			19.2-19.3	W268.1	39.1			80						
			19.3	TV										TV=0.30tsf
			19.3-19.6	Saved										
			19.6-19.7	W268.2	38.1			81						
			19.7	TV										TV=0.27tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
25/4	Silty CLAY, Sandy, dark grey, soft to firm consistency, moderately plastic (CL)  Sample includes about 30% fine to coarse SAND and fine Gravel size particles (sub-rounded to subangular in shape)  few thin lenses/layers of Silty CLAY (CL-CH) throughout comprising ±10% of total  Note: Entire sample slightly disturbed	28.0-30.0	—								
		28.1-28.5	269								
		28.5-28.7	W269.1		18.1		111				
		28.7	TV								TV=0.27tsf
		28.7-29.1	Saved								
		29.1-29.3	W269.2		22.6		102				
		29.3	TV								TV=0.25 tsf
		29.3-29.7	W269.1		31.0	25	16				

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET OF								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$	MAX. SHEAR STRESS (PSF)	
25/6	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	48.0-50.0	271							
		48.3-48.7	saved							
		48.7-48.8	W271.1	80						
		48.8	TV							TV=0.37 tsf
		48.8-49.2	saved							
		49.2-49.4	W271.2	82						
		49.4	TV							TV=0.30 tsf
		49.4-49.8	L271.1		38.0	39	19			

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FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET 1 OF 1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
25/7	Silty CLAY, grey, firm to stiff consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	58.0-								
		60.0	272							
		58.4-								
		58.5	W272.1	24.1	98					
		58.5	TV							TV=0.45 tsf
		58.5-								
		58.8	Saved							
		59.2-								
		59.3	W272.1	24.4	99					
		59.3	TV							TV=0.58tsf
	59.3-									
	59.6	Saved								

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
25/10	1.8' Recovery; Say 88.0' to 89.8' depth		88.0 to 90.0	275								
			88.1 to 88.4	save 275.1								
			88.4 to 88.6	WZ75.1	19.7		106					
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)		88.6	TV								TV=0.74tsf
			88.6 to 88.9	save 275.2								
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)		88.9 to 89.2	TZ75.0	22.5		104	UU	11.0	2213		
			88.9 to 89.2	I275.1	21.4	36	19					
			89.2 to 89.4	WZ75.2	22.3		103					
			89.4	TV								TV=0.80tsf



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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
25/12	2.4' Recovery; say 118.0' to 120.4' depth  Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	118.0-120.5	277									
		118.6-118.7	W277.1	77								
		118.7	TV									TV=0.70tsf
		118.7-119.0	Saved									
		119.0-119.4	Saved									
		119.4-119.5	W277.2	82	36.4							
		119.8	TV									TV=0.68tsf

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TABLE        SUMMARY OF LABORATORY TEST RESULTS SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B26/2	Recovery 1.6', say 3.5' to 5.1' depth	1									
		TV	25.4								TV=0.88 tsf
	Silty CLAY, grayish brown, moderate to high plasticity, very stiff consistency (CL-CH) Includes about 15% subangular to subrounded fine gravel and coarse sand particles	WL.1	25.4								
		save									
		1.1									
		TV		23.9							TV=1.4 tsf
		4.0	WL.2	23.9							
		4.0 to 4.3	TL.1.1	23.0		104	CU	15.0	1100		
		4.0 to 4.3	LL.1.	23.0	53 24						
		4.3	TV								TV=1.13 tsf
		4.3 to 4.7	TL.1.2	23.9		103	CU	15.0	1725		
		4.7	TV	21.9							TV= 1.3 tsf
	4.7	WL.3	21.9								
	4.7 to 5.0	TL.1.3	22.3		108	CU	15.0	2400			

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
B26/3	1.5' Recovery; say 8.0' to 9.5' depth	8.0 to 10.0	2								
		8.2	TV	31.5						TV=0.9 tsf	
	Silty CLAY; dark gray, moderately to highly plastic, firm consistency (CL-CH).  Includes about 10% subangular to subrounded fine gravel size particles and $\pm 5\%$ fine to coarse sand size particles.	8.2	W2.1	31.5							
		8.3 to 8.7	save 2.1								
		8.7	TV	33.0							TV=0.6 tsf
		8.7	W2.2	33.0							
		8.8 to 8.9	L2.1	32.0	50	22					
		8.9 to 9.2	save 2.2								
		9.2	TV	32.7							TV=0.4 tsf
		9.2	W2.3	32.7							

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET      OF     

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	
B26/5	1.2' Recovery; say 18.0' to 19.2' depth	18.0 to 20.0	3								
		18.0 to 18.3	T3.13	35.7		86	CU	15.2	2175		
	Silty CLAY, gray, soft consistency, highly plastic (CL-CH)	18.3	TV	35.9							TV=0.17 tsf
		18.3	W3.1	35.9							
		18.3 to 18.7	T3.12	35.3		86	CU	10.7	839		
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	18.7 to 19.0	T3.11	35.4		89	CU	15.1	676		
		19.0	TV	35.6							TV=0.24 tsf
		19.0	W3.2	35.6							

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B26/9	1.9' Recovery; say 38.0' to 39.9' depth	38.0 to 40.0	5									
		38.4	TV	40.6								TV=0.20 tsf
	Silty CLAY; gray, soft to firm consistency, highly plastic (CL)	38.4 to 38.5	W5.1	40.6								
		38.5 to 38.8	save 5.1									
		38.8	TV	39.5								TV=0.23 tsf
		38.8 to 38.9	W5.2	39.5								
		38.9 to 39.3	save 5.2									
		39.3	TV	36.0								TV=0.34 tsf
		39.3 to 39.4	W5.3	36.0								
		39.4 to 39.8	U5.1	36.6			86		U	1.6	443	
		39.4 to 39.8	L5.1	36.6	38	20						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_o$	$c_c$
B26/11	Silty CLAY: dark gray, firm consistency, highly plastic (CL)  Sample includes about 20% coarse to fine sand grains (subangular to subrounded in shape)		48.0 to 50.0									
		6	48.0 to 48.3									
		save 6.1	48.3									
		TV	48.3 to 48.4	31.0								TV=0.28 tsf
		W6.1	48.4 to 48.7	31.0								
		save 6.2	48.7									
		TV	48.7 to 49.0									TV=0.32 tsf
		T6.1.3	49.0	30.0		93	CU	4.6	2206			
		TV	49.0 to 49.1	36.3								TV=0.29 tsf
		W6.2	49.1 to 49.4	36.3								
		T6.1.2	49.4	36.5		86	CU	3.9	1222			TV-0.33 tsf
		TV	49.4 to 49.5	34.5								
	W6.3	49.5 to 49.8	34.5									
	T6.1.1	49.8	36.1		88	CU	3.8	896				
	L6.1	49.8	36.1	41	21							

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>				
B26/17	1.0' Recovery; say 78.0' to 79.0' depth  Silty CLAY, dark gray, firm to stiff consistency, highly plastic (CL)  Includes about 35% subangular to subrounded fine Gravel and coarse Sand particles	78.0 to 80.0	9										
		78.2	TV		25.1						TV=0.46		
		78.2	W9.1		25.1								
		78.2 to 78.5	U9.1	101	24.8			U	12.0	580			
		78.2 to 78.5	L9.1		24.8	36	20						
		78.5	TV		25.8						TV=0.52 tsf		
		78.5 to 78.6	W9.2		25.8								
		78.6 to 78.9	save 9.1										
		78.9	TV		25.0						TV=0.38 tsf		
		78.9 to 79.0	W9.3		25.0								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
26/28	Recovery 2.4'; say 128.0' to 130.4' depth  Silty CLAY, dark grey firm to stiff consistency, moderate to highly plastic (CL)  Bottom third of sample includes 30 to 40% fine Sand and non-plastic Silt particles occurring in thin layers (1/16" to 1/4" thick)	—									
		128.0-									
		131.0	13								
		128.0-									
		128.3	TI3.1.3	34.0		90	CU	3.4	4652		$\bar{\sigma}_c=16,704$ psf
		128.4-									
		128.8	TI3.1.2	35.6		86	CU	4.5	2442		$\bar{\sigma}_c=8352$ psf
		128.4-									
		128.8	LI3.1	35.4	39	21					
		128.8-									
		128.9	WI3.2	32.1							
		128.8-									
		128.9	TV	32.1							TV=0.60tsf
	129.7	TV	27.5							TV=0.50tsf	
	129.7-										
	129.8	WI3.3	27.5								
	129.8-										
	130.2	TI3.1.1	22.9		96	CU	15.0	4500		$\bar{\sigma}_c=4176$ psf	



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
27/2	1. 4' Recovery; say 3.5' to 4.9' depth  Silty CLAY; greyish brown, stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% coarse sand and fine gravel sized particles (subrounded to subangular in shape)	3.5-5.5										
		3.6-4.0										
		4.0-4.2	W302.1	24.2		99						
		4.2	TV									TV=0.87 tsf
		4.2-4.5										
		4.5-4.8	T302.2	24.9		103	UU	8.0	2099			
		4.5-4.8	L302.1	23.1	48	24						

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
27/4	1.7' Recovery; Say 8.0' to 9.7' depth	8.0 to 10.0	303								
		8.1 to 8.4	save 303.1								
		8.4 to 8.6	W303.1	31.5		88					
		8.6	TV								TV=0.66tsf
		8.6 to 8.9	U303.1	30.6		94	U	20.0	1772		@15.0% strain s=1722psf
		8.6 to 8.9	L303.1	30.4	51	23					
		8.9 to 9.2	save 303.2								
		9.2 to 9.4	W303.2	33.5		87					
		9.4	TV								TV=0.47tsf

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974								
IDENTIFICATION		SHEET ___ OF ___								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w/L w/P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	
27/10	2.4' Recovery; Say 33.0' to 35.4' depth	33.0 to 35.5	306							
		33.1 to 33.4	save 306.1							
		33.4 to 33.6	W306.1	37.9		84				
	Silty CLAY, gray, firm consistency, moderately plastic (CL)	33.6	st							TV=0.3ltsf TVR=0.09tsf
		34.0 to 34.3	C306.1	38.6					1.016	.44
		34.0 to 34.3	L306.1	37.4	41	22				
		34.0 to 34.3	SC306.1							
		34.3 to 34.6	save 306.2							
		34.6 to 34.8	W306.2	36.3		86				
		34.8 to 35.2	save 306.3							

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
27/14	1.9' Recovery; say 53.0' to 54.9' depth	308								
	Silty CLAY, Sandy, very dark gray, stiff consistency, low to moderate plasticity (CL)	saved								
	Sample includes about 40% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	W308.1	13.0		120					TV=0.78 tsf
		TV								
		saved								
		W308.2	25.9		98					
		saved								
		W308.1	24.2	32	17					TV=0.34 tsf
		TV								
	At 53.9' change to Silty CLAY, gray, firm consistency, moderate plasticity (CL)									
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)									

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SUMMARY OF LABORATORY TEST RESULTS

SHEET 01 OF 01

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
27/17	Jar Sample	68.5-70.0	432								
	Clayey SILT, Sandy, dark gray, low plasticity (CL-ML)		S/H 432.1								See plot
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)										

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TABLE: SUMMARY OF LABORATORY TEST RESULTS

DATE: April 1974  
SHEET: OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
27/24	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)  Sample includes about 25% coarse to fine sand grains and fine gravel sized particles (subrounded to subangular in shape)	103.0 to 105.5									
		103.2 to save									
		103.5 to 313.1									
		103.5 TV									TV=0.61tsf
		103.5 to 103.7	W3B.1	27.4		98					
		103.7 to save									
		104.1 to 313.2									
		104.2 to	C3B.1	33.9						0.90	.30
		104.2 to 104.5	L3B.1	31.1	43 25						
		104.2 to 104.5	SC3B.1								specific gravity=2.74

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>	
			ω <sub>L</sub>	ω <sub>P</sub>		ε %					
27/26	1.5' Recovery; say 113.0' to 114.5' depth	113.0-115.0	314								
		113.1	TV								TV=0.16 tsf
	Silty CLAY, gray, soft consistency, moderate plasticity (CL)	113.1-113.5	W314.1		89						
	Sample includes few thin lenses/layers of Silty SAND (± 1/8" thick) comprising ± 10% of total	113.6-114.4	S314.1	21.4							See plot
	At 113.6' change to - Silty fine SAND, uniform fine Sand grains with about 10% non-plastic fines (SM-SP)										

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
27/30	2.4' Recovery; say 129.0' to 131.4' depth; upper 0.8' possibly disturbed  Silty CLAY, grey, stiff consistency, moderate plasticity (CL)  Sample includes Silty fine Sand lenses/layers throughout comprising about 10% of total sample	129.0-	---									
		131.5	315									
		129.1-	Saved									
		129.4										
		129.5-										
		129.6	W315.1	84	34.0							Clay portion
		129.9-										
		130.1	L315.1		34.3	40	21					
		130.2	TV									TV=0.75tsf
		130.2-										
		130.6	Saved									
		130.6-										
		131.1	Saved									
	131.1-											
	131.3	W315.2	99	24.1							Silty Sand and Clay portion	



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DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS ωL      ωP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
28/3	1.2' Recovery; say 5.0' to 6.2' depth	183									
	5.0-7.0										
	5.0-5.3	saved									
	5.3-5.5	W183.1	33.3		95						
	5.5	TV								TV=1.30 tsf	
	5.5-5.8	saved									
	5.8-6.1	U183.1	25.3		100	U	4.0	1981			
	5.8-6.1	L183.1	25.5	47	23						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
28/9	Silly CLAY, dark gray, soft consistency, moderate to highly plastic (CL)	28.0-30.0								
		186								
		28.1-28.4	saved							
		28.4-28.5	WI86.1	40.0	80					
		28.5	TV							TV=0.20 tsf
		28.5-28.8	saved							
		28.8-29.1	UI86.1	38.0	84	U	7.0	425		
		28.8-29.1	LI86.1	39.2	42	20				
		29.1-29.3	WI86.2	41.4	78					
		29.3	TV							TV=0.20 tsf
		29.3-29.6	saved							

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
28/15	2.1' Recovery: say 58.0' to 60.1' depth Silty CLAY, dark gray, firm consistency, moderate plasticity (CL) Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	58.0-60.0	189									
		58.2-58.5	saved									
		58.5-58.6	W189.1	25.5	98							TV=0.38 tsf
		58.6	TV									
		59.0-59.3	saved									
		59.3-59.4	W189.2	25.1	99							
		59.4-59.7	saved									
		59.7	TV									TV=0.43 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
28/23	2.1' Recovery, say 98.0' to 100.1' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL)  Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	98.0-100.0	193									
		98.1-98.4	saved									
		98.4-98.5	W193.1		23.0	104						
		98.5	TV									TV=0.71 tsf
		98.5-98.9	saved									
		99.2-99.3	W193.2		23.8	98						
		99.3	TV									TV=0.93 tsf
		99.3-99.6	saved									

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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE \_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>	
30/3	Jar Sample		433										
	Silty CLAY, dark grayish brown, high plasticity (CH)		L433.1	22.4*	55 25								
	*Note: Water content taken from unsealed jar sample												

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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DATE July 1972  
SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
30/6	Jar Sample	434								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)	W434.1	37.7*							

\*Note: Water content taken from unsealed jar sample

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DATE July 1974

SHEET

OF

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
30/12	Jar Sample	53.5-55.0	435									
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subangular to subrounded in shape)  *Note: Water content taken from unsealed jar sample		W435.1	*								

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE: <u>SUMMARY OF LABORATORY TEST RESULTS</u> DATE <u>July 1974</u> SHEET <u>OF</u>											
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc
30/15	Jar Sample	—	68.5-70.0								
	Silty CLAY, Sandy, gray moderate plasticity (CL)	436									
	Sample includes about 25% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	S/H									See plot
		436.1									



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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
SHEET 1 OF 1												
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>	
30/21	Jar Sample	98.5 - 100.0	437									
	Silty fine SAND, uniform fine Sand grains with about 15% non plastic fines (SM)		S437.1									See plot

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
30/25	Jar Sample	118.5 120.0	438								
	Silty SAND, subrounded to subangular fine to medium Sand grains, about 15% non-plastic fines (SM)		S438.1								See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
32/3	Jar Sample	439							
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)	W499.1	20.3*						

\*Note: Water content taken from unsealed jar sample

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/7	Jar Sample	23.5-25.0	440								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-GH)		W440.1	37.9*							

\*Note: Water content taken from unsealed jar sample

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
32/10	Jar Sample	38.5-40.0	441								
	Silty CLAY, gray, moderate to high plasticity (CL)		L41.1	44	19						

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET        OF       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub> c <sub>c</sub>
32/20	Jar Sample	88.5 - 90.0	—								
	Silty CLAY, gray, moderate plasticity (CL)		442								
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		L442.1	36	17						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
33/3*	1.4' Recovery; say 8.0' to 9.4' depth	280								
	Silty CLAY, dark grey, firm to stiff consistency, moderate to high plasticity (CL-CH)  Sample includes about 5% fine to medium Sand grains (sub-rounded to subangular in shape)  *Note: This sample labeled B33/2, 8'-10'6"	8.0-10.5								
		8.1-8.4	Saved							
		8.4-8.5	W280.1	30.6		92				
		8.5	TV							TV = 0.78tsf
		8.5-8.8	Saved							
		8.8	TV							TV = 0.68tsf
		8.8-9.2	L280.1	31.6	48	25				
		9.2-9.3	W280.2	33.3		89				

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
33/5	<p>Silly CLAY, gray, firm consistency, moderate to high plasticity (CL)</p> <p>Sample includes about 5% fine to coarse Sand grains (sub-rounded to subangular in shape)</p> <p>Note: This sample and 33/9 labeled B33/5, 38-40'6"</p>	18.0-18.5	—									
		18.2-18.5	282									
		18.5-18.6	Saved									
			W282.1	86								
			18.6	TV								TV=0.29 tsf
			18.6-19.0	L282.1	37.6	43	23					
			19.7-19.8	W282.1	36.2		84					
			19.8	TV								TV=0.32 tsf
			19.8-20.3	Saved								



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SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
33/7*	2.1' Recovery, say 28.0' to 30.1' depth		28.0-30.5	281								
	Silty CLAY, gray, soft to firm consistency, moderate to high plasticity (CL)		28.1-28.4	save								
			28.4-28.6	W281.1	40.3	81						
			28.6	TV								TV=0.20 tsf
			28.6-28.9	T281.11	39.0	82		CU	13.4	739		$\bar{\sigma}_c=1440$ psf
			28.9-29.3	T281.12	39.7	82		CU	4.6	966		$\bar{\sigma}_c=2880$ psf
	Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)		29.3-29.4	W281.1	37.7	83						
			29.4	TV								TV=0.26 tsf
			29.4-29.7	T281.13	38.3	84		CU	6.3	1521		$\bar{\sigma}_c=5760$ psf
	* Note: This sample labeled B33/4, 28'-30'6"		29.4-29.7	L281.1	38.7	46	22					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
33/9*	2.1' Recovery; say 38.0' to 40.1' depth	38.0-40.5	283								
		38.3-38.6	Saved								
	Silty CLAY, grey, soft to firm consistency, moderate to high plasticity (CL)	38.6-38.7	W283.1	36.8		85					
		38.7	TV								TV = 0.27tsf
		38.7-									
		39.1	T283.1.1	37.4		83	CU	6.9	798		$\bar{\sigma}_c = 1728 \text{psf}$
		38.7-									
		39.1	T283.1.2	37.1		85	CU	5.5	1081		$\bar{\sigma}_c = 3456 \text{psf}$
		39.1-									
	* Note: This sample labeled B33/5, 38'-40'6"	39.5	T283.1.3	36.2		86	CU	5.2	1662		$\bar{\sigma}_c = 6912 \text{psf}$
		39.1-									
		39.5	L283.1	37.2	43	23					
		39.5-									
		39.6	W283.2	37.3		85					
		39.6	TV								TV = 0.28tsf
		39.6-									
		39.9	Saved								
		39.9	St								TV = 0.35tsf TV <sub>r</sub> = 0.09tsf

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DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
33/11*	1.9' Recovery; say 48.0' to 49.9' depth	48.0-50.5	284								
		48.1-48.4	saved								
	Silty CLAY, dark gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W284.1	45.1		76					
		48.5	TV								TV = 0.30 tsf
		48.5-48.8	saved								
	Sample contains about 10% fine to coarse SAND grains (subrounded to subangular in shape)	48.8-49.0	L284.1	41.8	48 25						
		49.0-49.3	saved								
		49.3-49.4	W284.2	34.5		81					
	* Note: This sample labeled B33/6 48'-50'6"										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B38/3	Silty CLAY; dark grayish brown mottled with blue gray, highly plastic; hard consistency with a blocky structure.  Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape) (CL-GH)	8.0 to 10.0										
		8.5	W17.1	25.3								
		8.5	TV	25.3								TV=2.4 tsf
		8.6 to 8.9	L17.1	24.9	49	24						
		8.6 to 8.9	U17.1	24.3		102	U	3.0	212.3			
		8.6 to 8.9	UR17.1	24.2		103	UR	7.0	761			see plot
		8.6 to 8.9	H17.1									
		9.0	W17.2	26.3								
		9.0	ST	26.3								TV=2.1 tsf TV <sub>p</sub> =1.1
		9.1 to 9.5	save 17.1									
		9.6	W17.3	27.3								
		9.9	TV	27.3								TV-2.1 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974			
IDENTIFICATION												SHEET		OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS				
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>			
B38/4	1.8' Recovery; say 13.5' to 15.3' depth; upper 0.2' disturbed	13.5 to 15.5	18												
		13.8 to 14.2	save 18.1												
		14.2	W18.1	28.6											
	Silty CLAY; dark grayish brown, highly plastic, stiff to very stiff consistency.	14.2	TV	28.6							TV=1.1 tsf				
		14.3 to 14.6	UI8.1	28.5		96	U	4.0	1506						
	Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	14.3 to 14.6	L18.1	28.5	46	22									
	(CL-CH)	14.6	H18.1								see plot				
		14.6	C18.1	29.0					.770	.19	specific gravity=2.71				
		14.6	SG18.1												
		14.7	W18.2	28.8											
		14.7	TV	28.8							TV=0.9 t sf				
		14.8 to 15.2	save 18.2												

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B38/6	Recovery 0.7'; say 23.5' to 24.2' depth	23.5 to 25.5	19								
		23.7 to 24.1	119.1	37.6	48 19						
	Silty CLAY, dark gray, highly plastic (CL-CH)	24.1	W19.1	37.6							
	Note: Entire sample greatly disturbed										

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DATE Jan. 1974

SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B38/8	0.8' Recovery; say 33.5' to 34.3' depth	33.5 to 35.5	20								
		34.1	W20.1	35.7							
		34.1 to 34.3	L20.1	36.3	48	20					
	Silty CLAY, dark gray, highly plastic (CL-CH)										
	Note: Entire sample greatly disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 DATE Jan. 1974  
 SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	
B38/12	1.8' Recovery; say 53.5' to 55.3'	22								
		W22.1	33.7							
		TV	33.7							IV=0.36 tsf
		save								
		22.1								
		W22.2	33.1							
		TV	33.1							IV=0.41 tsf
		54.1 to 54.4								
		U22.1	33.4		90	U	5.0	985		
		54.1 to 54.4								
		54.4	32.9	44	21					
		54.1 to 54.4								See plot
		H22.1								
		54.5	33.5							
		W22.3	33.5							
		54.5	33.5							
		5.45 to 54.9								IV=0.44 tsf
		22.2								



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B38/16	SOIL DESCRIPTION	DEPTH (FEET)									
	0.6' Recovery; say 73.5' to 74.1' depth  Silty CLAY, dark gray, highly plastic, soft to firm consistency (CH)	73.5 to 75.5									
		73.6	43.5								TV=0.27 tsf
		73.6	43.5								
		73.7 to 74.0	41.3	79	U	4.8	704				
		73.7 to 74.0	41.3	55	24						
		73.7 to 74.0									See plot
		74.0 to 74.1	36.0						.935	.33	specific gravity=2.72
		74.0 to 74.1									
		74.0 to 74.1	40.7								

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PROJECT: BELLE RIVER PLANT UNITS I & II

SUMMARY OF LABORATORY TEST RESULTS

TABLE

IDENTIFICATION

TEST NO.

PROPERTIES

STRENGTH

CONSOLIDATION

OTHER TESTS AND REMARKS

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	NAT. WATER CONTENT (%)		ATTERBERG LIMITS		DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	OTHER TESTS AND REMARKS	
				w <sub>L</sub>	w <sub>P</sub>	w <sub>L</sub>	w <sub>P</sub>							
B38/18	1.5' Recovery; say 83.5' to 85.0' depth  Silty CLAY; gravelly dark gray, moderate plasticity, stiff consistency (CL)  Includes ±10 % medium to coarse Sand and ±15% sub-angular to subrounded Gravel size particles (1/4" to 1" size)	83.5 to 85.5	25											
		83.7	TV			14.4							TV=0.78 tsf	
		83.7	W25.1			14.4								
		83.7 to 84.1	save											
		84.1	25.1											
		84.1	TV			17.8								TV=0.82 tsf
		84.1	W25.2			17.8								
		84.2 to 84.6	save											
		84.6	25.2											
		84.6	St			22.8								
		84.6	W25.3			22.8								
		84.6 to 85.0	U25.1			22.2			104	U	14.0	603		
		84.6 to 85.0	U25.1			22.2			105	Ur	17.4	548		
		84.6 to 85.0	L25.1			22.2	33	19						
	84.6 to 85.0	H25.1											See plot	

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DATE Jan. 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B38/24	1.9' Recovery; say 113.0' to 114.9' depth		113.0 to 115.0	26								
	Silty CLAY; gray, moderately to highly plastic, soft to firm consistency (CL-CH) Includes about 5% fine Sand size particles		113.3	TV	34.5							TV=0.32 tsf
			113.3	W26.1	34.5							
			113.3 to 113.7	save 26.1								
			113.7	TV	32.2							TV=0.48 tsf
			113.7	W26.2	32.2							
			113.7 to 114.1	save 26.2								
			114.1	TV	33.1							TV=0.44 tsf
			114.1	W26.3	33.1							
			114.1 to 114.6	U26.1	31.9				U	6.0	500	
			114.1 to 114.6	L26.1	31.9	45	25					
			114.1 to 114.6	H26.1								See plot
			114.6	TV								TV=0.52 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	cc	
B38/30	Jar Sample Silty SAND; subrounded to subangular fine to coarse Sand grains, about 30% non-plastic fines (SM)	69 S/H 69.1								See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/2	1.1' Recovery; say 4.0' to 5.1' depth	4.0 to 6.0	28								
		4.1	W28.1	33.6							
	Silty CLAY; olive gray mottled with yellowish brown, highly plastic, very stiff consistency throughout	4.1	TV	33.6							TV=1.0 tsf
		4.1 to 4.4	save 28.1								
		4.4	W28.2	31.1							
	Soil includes 2 to 5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	4.4	TV	31.1							TV=1.1 tsf
		4.5 to 4.8	U28.1	29.4		94	U	5.0	1024		
		4.5 to 4.8	Up28.1	29.4		95	Up	9.0	974		
	(CH)	4.5 to 4.8	L28.1	29.4	63	28					
		4.5 to 4.8	H28.1								See plot
		4.8	W28.3	39.5							
		4.8	ST	39.5							TV=1.4 tsf TV <sub>R</sub> =1.0 tsf
		4.9 to 5.1	save 28.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B41/5	1.2' Recovery: say 10.0' to 11.2' depth	10.0 to 12.0	29								
		10.3	TV	29.0							TV=1.25 tsf
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	10.3	W29.1	29.0							
		10.3 to 10.7	save 29.1								
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	10.7	TV	27.5							TV=1.43 tsf
		10.7 to 10.8	W29.2	27.5							
		10.8 to 11.0	C29.1	29.5						.799	.23
		10.8 to 11.0	I29.1	29.5	46	23					
		11.1 to 11.2	W29.3	28.9							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B 41/7	Silty CLAY, dark gray, highly plastic; soft to firm consistency throughout (CL-CH)	20.0 to 22.0	30									
		20.5	W30.1	39.7								
		20.5	TV	39.7								TV=0.28 tsf
		20.6 to 20.9	U30.1	39.2			83	3.0	338			
		20.6 to 20.9	L30.1	39.2	47	24						
		20.6 to 20.9	H30.1									See plot
		21.0 to 21.1	C30.1	38.1						1.055	.34	Specific gravity=2.70
		21.0 to 21.1	SG30.1									
		21.1	W30.2	39.4								TV=0.30 tsf
		21.1	TV	39.4								
		21.1 to 21.5	save 30.1									
		21.5	W30.3	38.2								
		21.5	TV	38.2								TV=0.30 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B41/9	1.7' Recovery; say 30.0' to 31.7' depth		30.0 to 32.0	31								
			30.4	TV	36.6							TV=0.30 tsf
			30.4 to 30.5	W31.1	36.6							
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)		30.5 to save 30.8	31.1								
			30.8	TV	35.6							TV=0.28 tsf
	Includes about 5% subangular to subrounded coarse Sand particles		30.8 to 30.9	W31.2	35.6							
			30.9 to 30.9 to 31.2	U31.1	36.9	86	U	15.0	696			
	Note: Upper 0.4' of sample disturbed		31.2	I31.1	36.9	45	21					
			31.2	TV	36.1							TV=0.32 tsf
			31.2 to 31.3	W31.3	36.1							
			31.3 to save 31.6	31.2								



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DATE Jan. 1974

SHEET \_\_\_ OF \_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>		
B41/11	1.1' Recovery; say 40.0' to 41.1' depth  Silty CLAY, sandy, very dark gray, about 35% fine to coarse Sand, ±10% sub-angular to subrounded fine Gravel size particles, fines of low plasticity  (CL-SC)	40.0 to 42.0	32									
		40.2	TV		16.8							TV=0.30 tsf
		40.2	W32.1		16.8							
		40.2 to 40.6	save 32.1									
		40.6	ST		16.5							TV=0.34 tsf TV=0.28 tsf
		40.6	W32.2		16.5							
		40.6 to 41.0	U32.1		16.0		118	U 20.0	884			@15.0% strain s = 648 psf
		40.6 to 41.0	L32.1		16.0	20 12						
		40.6 to 41.0	S/H 32.1									See plot

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$	
B41/13	1.5' Recovery; say 52.0' to 53.5' depth; upper 0.3' disturbed	52.0 to 54.0	33										
		52.3	TV	47.5							TV=0.21 tsf		
		52.3 to 52.4	W33.1	47.5									
	Silty CLAY, gray, soft to firm consistency, highly plastic (CL-CH)	52.4 to 52.7	save 33.1			76							
		52.7	TV	45.5							TV=0.23 tsf		
		52.7 to 52.8	W33.2	45.5									
		53.0 to 53.2	C33.1	46.5					1.235	.35			
		53.0 to 53.2	L33.1	46.5	52	25					TV=0.27 tsf TVR=0.16 tsf		
		53.2	ST	44.1									
		53.2 to 53.3	W33.3	44.1									

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FILE NO. 1255

DATE March 10, 1974  
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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	cc	
B41/17	1.0' Recovery; say 72.5' to 73.5' depth; upper 0.1' is 'wash' disturbed sample (?)	72.5 to 74.5	35								
		72.8	W35.1	17.1							
		72.8	TV								TV=0.15 tsf
		72.9 to 73.2	T35.0	19.6		105	UU	14.0	454		
		72.9 to 73.2	L35.1	19.6	25	15					
		72.9 to 73.2	S/H 35.1								See plot
		73.3	C35.1	26.7						697	Specific Gravity=2.68
		73.3	SG35.1								

PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE        SUMMARY OF LABORATORY TEST RESULTS DATE Jan. 1974  
 SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	c <sub>c</sub>
B41/23	Silty CLAY, dark gray, moderate plasticity, firm consistency (CL); includes 10% to 15% fine to coarse Sand and fine Gravel size particles	101.0 to 103.0										
		101.3	TV	23.2								TV=0.46 tsf
		101.3	W37.1	23.2								
		101.3 to 101.8	save 37.1									
		101.8	TV	25.4								TV=0.62 tsf
		101.8	W37.2	25.4								
		101.9 to 102.3	U37.1	26.4		99	U	10.0	534			
		101.9 to 102.3	L37.1	26.4	34	20						
		101.9 to 102.3	HB7.1									See plot

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B41/25	1.7 Recovery; say 112.0' to 113.7' depth	112.0 to 114.0	38								
		112.3	TV	20.9							TV=0.65 tsf
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	112.3 to 112.4	W38.1	20.9							
		112.4 to 112.7	save 38.1								
		112.7	TV	24.0							TV=0.60 tsf
	Includes about 35% subrounded to subangular fine Gravel and coarse Sand particles	112.7 to 112.8	W38.2	24.0							
		113.0 to 113.2	C38.1	24.2					.642	.18	
		113.0 to 113.2	L38.1	24.2	29	19	104				
		113.2	TV	19.4							TV=1.0 tsf
		113.2 to 113.3	W38.3	19.4							
		113.3 to 113.7	save 38.2								

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B41/29	1.1' Recovery; say 130.0' to 131.1' depth	130.0 to 132.0	40									
	Clayey SAND, gravelly, dark gray; about 35% fine to coarse Sand particles and ±10% sub-rounded Gravel size particles; fines of low plasticity (GC-SC)	130.2	TV	14.7							TV=0.50 tsf	
		130.2 to 130.6	W40.1	14.7								
		130.6 to 130.9	U40.1	10.9								
		130.9 to 131.1	L40.1	13.8	25	17	124	8.0	1749			
		131.1 to 131.1	S/H									
			40.1									
			C40.1	11.3						.370	.09	See plot
			SC40.1									Specific Gravity = 2.69

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B48/2	0.9' Recovery; say 3.0' to 3.9' depth	3.0 to 5.0	198									
		3.1	TV	32.4							TV=0.68 tsf	
	Silty CLAY, dark grayish brown mottled light gray, stiff to very stiff consistency, highly plastic (CH)  Sample includes 5-10% medium to coarse Sand grains (subrounded to sub-angular in shape)	3.1 to 3.2	W198.1	32.4								
		3.2 to 3.5	L198.1	27.3	63	24						
		3.2 to 3.5	U198.1	27.3			97	U	3.2	1466		TV=1.18 tsf
			3.5	TV								
			3.5 to 3.9	save 198.1								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$C_c$
B48/4	Silty CLAY; dark grayish brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	8.0 to 10.0										
		8.5 to 8.7	H199.1									See plot
		8.7	TV	27.5								TV=1.23 tsf
		8.7 to 8.8	W199.1	27.5								
		8.8 to 9.1	save 199.1			97						
		9.1	TV	28.9								TV=1.23 tsf
		9.1 to 9.2	W199.2	28.9								
		9.2 to 9.5	save 199.2									
		9.5	TV									TV=1.43 tsf
		9.5 to 9.9	save 199.3									



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IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		C <sub>c</sub>
B48/6	Recovery 2.3'; say 18.0' to 20.3' depth; upper 0.4' disturbed	18.0 to 20.0	—									
		18.3	TV	34.4							TV=0.26 tsf	
	Silty CLAY; dark gray, firm consistency, highly plastic (CL-GH)	18.3 to 18.4	W200.1	34.4								
		18.4 to 18.7	save 200.1									
		18.7	TV									TV=0.49 tsf
		18.7 to 19.1	T200.1.1		32.8	90	CU	6.5	928			
	Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	18.7 to 19.1	L200.1	34.3	47	25						
		19.1	TV		32.7							TV=0.42 tsf
		19.1 to 19.2	W200.2	32.7								
		19.2 to 19.5	T200.1.2	34.2			CU	4.5	1304			
		19.5	TV	34.1							TV=0.38 tsf	
		19.5 to 19.6	W200.3	34.1								
		19.6 to 19.9	T200.1.3	35.6			CU	10.6	1579			

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TABLE \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/10	1.5' Recovery; say 38.0' to 39.5' depth; Upper 1.0' disturbed	38.0 to 40.0	202								
		38.4	TV	40.4							TV = 0.10 tsf
		38.4 to 38.5	W202.1	40.4							
	Silty CLAY, dark gray to very dark gray, soft consistency, highly plastic (CL-CH)	39.0	TV								TV = 0.15 tsf
		39.0 to 39.2	save								
		39.2 to 39.4	202.1								
		39.2 to 39.4	C202.1	38.8					1.027	.33	
		39.2 to 39.4	L202.1	38.8	47	24					
		39.2 to 39.4	SC202.1								
		39.2 to 39.4	Y202.1	38.8		82					Specific Gravity=2.73
		39.4	TV	40.0							TV = 0.25 tsf
		39.4 to 39.5	W202.2	40.0							

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SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B48/14	2.0' Recovery; say 60.0' to 62.6' depth. Upper 0.4' depth disturbed	—								
		204								
		TV	26.0							TV = 0.34 tsf
		W204.1	26.0							
		L204.1	26.3	34	16					
		UU								
		204.1	26.3		99	UU	15.0	746		
		TV	25.8							TV = 0.42 tsf
		W204.2	25.8							
		U204.1	25.2		100	U	15.0	745		
		TV	25.3							TV = 0.38 tsf
		W204.3	25.3							
		204.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1971									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
B48/18	1.5' Recovery: say 78.0' to 79.5' depth	78.0 to 80.0	206								
		78.1	TV	25.6							TV=0.56 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)  Sample includes about 15% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	78.1 to 78.2	W206.1	25.6							
		78.2 to 78.5	save 206.1								
		78.5 to 78.6	L206.1		25.6	36	18				
		78.6	TV		25.6						TV=0.70 tsf
		78.6 to 78.7	W206.2		25.6						
		78.7 to 79.0	save 206.2				100				
		79.0	TV		26.0						TV=0.73 tsf
		79.0 to 79.1	W206.3		26.0						
		79.1 to 79.4	save 206.3								
		79.4	TV								TV=0.63 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS				DATE Jan. 1974		SHEET _____ OF _____		
IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSO-	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %      e <sub>o</sub> c <sub>c</sub>	OTHER TESTS AND REMARKS
B48/20	1. 3' Recovery; say 88.0' to 89.3' depth	88.0 to 90.0						
		88.2 to 88.3	44.51					
	Silty CLAY, dark gray, very soft consistency, highly plastic (CL-CH)	88.9 to 89.0	30.2					
		89.0 to 89.2	28.2	41   25				

Sample includes ±10% coarse Sand or fine Gravel size particles (subrounded to subangular)

Note: Entire sample much disturbed

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	c <sub>c</sub>	
B48/22	2.0' Recovery; say 98.0' to 100.0' depth, upper 0.4' disturbed	98.0 to 100.0	208								
		98.4	TV	27.5							TV=0.45 tsf
		98.4 to 98.5	W208.1	27.5							
	Silty CLAY; dark gray, firm to stiff consistency, moderately to highly plastic (CL)	98.5 to 98.9	T208.1	27.6		97	CU	11.4	4410		TV=0.54 tsf
		98.9	TV								
		98.9 to 99.2	T208.1	26.8		99	CU	11.5	2017		
	Sample includes 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	98.9 to 99.2	L208.1	26.8	36	19					
		99.2	TV	26.1							
		99.2 to 99.3	W208.2	26.1							
		99.3 to 99.6	T208.1	26.0		96	CU	11.8	2880		TV=0.52 tsf
		99.6	TV	24.0							
		99.6 to 99.7	W208.3	24.0							
		99.7 to save	208.1								
		100.0									

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
48/24	Silty CLAY; dark gray, soft to medium consistency, moderately plastic (CL)  Sample contains ±20% coarse to fine Sand and fine Gravel particles (subrounded to sub-angular in shape)  Note: Entire sample thoroughly disturbed	108.0 to 110.0	209								
		108.6	TV		25.6						TV=0.26 tsf
		108.6 to 108.7	W209.1		25.6						
		108.7 to 109.1	save 209.1								
		109.1	TV		23.0						TV=0.31 tsf
		109.1 to 109.2	W209.2		23.0						
		109.6 to 110.0	save 209.2								

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
B48/26	2.1' Recovery; say 118.0' to 120.1' depth		118.0 to 120.5	210									
	Silty CLAY, gray, medium to stiff consistency, moderate to highly plastic (CL)		118.1	TV	33.2							TV = 0.43 tsf	
	Sample includes about 5% fine to coarse Sand sized particles (subrounded to subangular in shape)		118.1 to 118.2	W210.1	33.2								
			118.2 to 118.5	210.1									
			118.5 to 118.9	210.2									
			118.9	TV	32.8								TV = 0.51 tsf
			118.9 to 119.0	W210.2	32.8								
			119.0 to 119.4	W210.1	32.9		91						
			119.0 to 119.4	S/H 210.1									See Plot
			119.4	TV	33.0							TV = 0.60 tsf	
			119.4 to 119.5	W210.3	33.0								
			119.5 to 119.9	210.3									



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
B49/2	2.1' Recovery; say 6.0' to 8.1' depth  Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)  Sample includes about 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	6.0 to 8.0	—									
		6.5	TV	29.3								TV=1.6 tsf
		6.5 to 6.6	W132.1	29.3								
		7.1	TV	28.8								TV=1.4 tsf
		7.1 to 7.2	W132.2	28.8								
		7.2 to 7.6	γ132.1	28.0		95						
		7.6	TV									TV=1.85 tsf
		7.6 to 7.8	L132.1	26.2	50	17						
		6.0 to 8.1	M132.1	28.1								γ <sub>dry</sub> Max=116 W <sub>opt</sub> =16.5

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B49/3	Silty CLAY; dark grayish brown, firm to stiff consistency, highly plastic (CL-CH)	13.0 to 15.0	133									
		13.2	IV		29.0							TV=0.73tsf
		13.2 to 13.3	MB3.1		29.0							
		13.3 to 13.7	save 133.1				92					
		13.7	IV									TV=0.53tsf
		13.7 to 14.0	CB3.1		33.3					0.823	0.26	
		13.7 to 14.0	MB3.1		31.8	47	23					
		13.7 to 14.0	save 133.1									
		14.0	IV		31.3							TV=0.42tsf
		14.0 to 14.1	MB3.2		31.3							
		14.1 to 14.4	save 133.2									
		14.4	IV		30.4							TV=0.45tsf
		14.4 to 14.5	MB3.3		30.4							
		14.5 to 14.9	save 133.3									

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B49/4	1.9' Recovery; say 23.0 to 24.9' depth	23.0 to 25.0	134								
		23.1	TV	32.2							TV=0.34 tsf
		23.1 to 23.2	W134.1	32.2							
	Silty CLAY; grayish brown, firm consistency, moderately to highly plastic (CL)	23.2 to 23.5	save 134.1								
		23.5	TV								TV=0.37 tsf
		23.5 to 23.9	save 134.2								
		23.9	TV	34.0							TV=0.41 tsf
		23.9 to 24.0	W134.2	34.0							
		24.0 to 24.3	U134.1	34.0	90		U	6.0	1028		
		24.0 to 24.3	L134.1	32.8	42	22					
		24.4	TV								TV=0.42 tsf
		24.4 to 24.8	save 134.3								
		24.8	TV	34.0							TV=0.37 tsf
		24.8 to 24.9	W134.3	34.0							

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
49/6	1.9' Recovery; say 43.0' to 44.9' depth	43.0-45.0	136								
	Silty CLAY; dark greyish brown, firm consistency, highly plastic (CH-CL)	43.1-43.2	WI36.1	39.9							
		43.5	TV								TV=0.42tsf
		43.8-43.9	WI36.2	35.2							
	Sample includes ±5% coarse Sand grains (subrounded to subangular in shape)	43.9-44.2	TI36.12	46.3		75	CU	2.9	1356		σ <sub>c</sub> =3744psf
		43.9-44.2	LI36.1	45.5	53	22					
	Lower portions of sample appear to be "sensitive", i.e. became soft and sticky on remolding	44.2	TV	45.7							TV=0.37tsf
		44.2-44.3	WI36.3	45.7							
		44.3-44.7	TI36.11	43.5		78	CU	5.8	921		σ <sub>c</sub> =1872psf
		44.3-44.7	TI36.13	44.9		77	CU	4.7	1928		σ <sub>c</sub> =7488psf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	e <sub>0</sub> c <sub>c</sub>	
B49/7	1.9' Recovery; say 53.0' to 54.6' depth	137	25.9						
		TV							TV = 0.34 tsf
		W							
		137.1	25.7						
		save							
		137.1							
		γ							
		137.1							
		S/H	25.0						
		137.1							See Plot
		TV	25.9						TV = 0.65 tsf
		W							
		137.2	25.9						
		save							
		137.1							

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub> c <sub>c</sub>	
B49/9	1.5' Recovery; say 73.0' to 74.5' depth	73.0 to 75.0	139							
		73.1	TV	25.7						TV=0.68 tsf
	Silty CLAY, sandy; dark gray, stiff consistency, moderately plastic (CL)	73.1 to 73.2	W139.1	25.7						
		73.2 to 73.5	save 139.1			99				
	Sample includes ±30% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	73.5	TV	24.1						TV=0.75 tsf
		73.5 to 73.6	W139.2	24.1						
		73.6 to 73.9	save 139.2							
		73.9	TV							TV=0.80 tsf
		73.9 to 74.3	U139.1	25.6		100	U	20.0	2513	@ 15% strain s=2254 psf
		73.9 to 74.3	L139.1	18.2	33	22				
		74.3	TV	22.8						TV=0.76 tsf
		74.3 to 74.4	W139.3	22.8						

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE SHEET OF								
IDENTIFICATION		TEST NO.	PROPERTIES	STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	cc	
B49/111	1.5' Recovery; say 93.0' to 94.5' depth	93.0 to 95.0								
		93.1	26.6							TV = 0.62 tsf
	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	93.1 to 93.2	26.6							
		93.2 to 93.5			98					
	Sample includes ±20% coarse Sand and fine Gravel size particles (subangular to subrounded in shape)	93.5	26.2							TV = 0.70 tsf
		93.5 to 93.6								
		93.6 to 93.8	26.2							
		94.0	28.6					0.701	0.20	
		93.8 to 94.0								
		94.0	24.3	37	22					
		93.8 to 94.0								Specific Gravity=2.68
		94.0	27.0							TV = 0.68 tsf
		94.0 to 94.1								
		94.1	27.0							
		94.1 to 94.5								

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B49/13	1.6' Recovery; say 113.0' to 114.6' depth  Silty CLAY: sandy, dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 25% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	113.0 to 115.0	—								
		113.1	TV								TV=0.55 tsf
		113.1 to 113.2	W143.1								
		113.2 to 113.5	W143.1.3		93	CU	11.1	4132			
		113.5	TV								TV=0.62 tsf
		113.5 to 113.8	W143.1.2		95	CU	11.8	2426			
		113.8	TV								TV=0.64 tsf
		113.8 to 113.9	W143.2								
		113.9 to 114.2	W143.1.1		100	CU	12.7	1787			
		113.9 to 114.2	L143.1								
		114.2	TV								TV=0.64 tsf
		114.2 to 114.3	W143.3								
		114.3 to 114.6	save 143.1								



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
50/4	1.5' Recovery; say 18.0' to 19.5' depth - disturbed		18.0 to 20.0	84										
			18.7 to 19.0	saved										
	Silty CLAY, gray, moderate to high plasticity (CL)		19.0 to 19.1	W84.1	34.6		84							
			19.1	TV										TV = 0.13tsf
	Note: Entire sample disturbed		19.1 to 19.4	L84.1	34.6	45	20							

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
50/5	Jar Sample	453									
	Silty CLAY, gray, high plasticity (CH-CL)	L453.1	* 39.8	52	22						
	*Note: Water content taken from unsealed jar sample										

PROJECT: GREENWOOD ENERGY CENTER UNITS 2 & 3

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
50/6	1.9' Recovery; say 28.0' to 29.9' depth  Silty CLAY, gray, firm consistency, moderate plasticity (CL)  Note: Below 29.4' depth sample becomes softer, more sensitive on remolding	28.0 to 30.0	85								
		28.1 to 28.3	V85.1	35.2			VS	443			St = 2.1
		28.3 to 28.5	k85.1	37.2		84			1.002		hydrometer - see plot
		28.5 to 28.6	W85.1	35.2							
		28.6 to 28.9	T85.1	33.0		88	CU	13.1	842		σ <sub>c</sub> = 1440 psf
		28.6 to 28.9	T85.12	33.1		90	CU	14.5	1050		σ <sub>c</sub> = 2880 psf
		29.0 to 29.1	W85.2	34.3							TV = 0.28 tsf
		29.1 to 29.4	L85.2	34.3	39	18					
		29.1 to 29.4	T85.13	34.3		86	CU	14.0	1718		σ <sub>c</sub> = 5760 psf
		29.4 to 29.7	U85.1	45.8		75	U	2.4	197		
		29.4 to 29.7	L85.1	45.7	51	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE SHEET OF										
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BDRING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$		
50/8	2.0' Recovery	38.0 to 40.0										
	Silty CLAY, gray, firm consistency, highly plastic (CH)	38.1 to 38.4	46.2		74	UU	4.0	643			$\sigma_c = 3456$ psf	
		38.4 to 38.5	47.6		71							
		38.5										
		38.5 to 38.9		51.6						1.383	0.55	TV = 0.39 tsf
		38.9 to 39.2		51.3		70	U	2.0	550			Specific Gravity = 2.75
		38.9 to 39.2		51.2	55 23							
		39.2 to 39.3		48.6		71						
		39.3 to 39.6										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
50/10	1.8' Recovery; say 48.0' to 49.8' depth		48.0 to 50.0 48.1 to 48.4	87								
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)		48.5 48.6 to 48.8	W87.1 k87.1	25.9		96		VS FVS	518 484		St = 1.1
	Sample includes 20 to 25% fine to coarse Sand particles and 10 to 15% subrounded to subangular Gravel size particles to 1/2 inch maximum		48.8 48.9	W87.2	26.9		97				.730	sieve/hydrometer see plot
			48.9	TV	24.2		97					TV = 0.41 tsf
			49.0 to 49.3	U87.1	23.6		99		U	15.0	527	
			49.0 to 49.3	L87.1	23.4	36	16					
			49.3 to 49.6	T87.0.1	23.2		100		UU	15.0	721	σ <sub>c</sub> = 4320

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
50/12	1.9' Recovery; say 58.0' to 59.9' depth	58.0 to 60.0	88								
		58.1 to 58.5	saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.5	W88.1	23.8		99					
		58.5	TV	23.8							TV = 0.53 tsf
		58.6 to 58.9	U88.1	25.8		99	U	9.0	1008		
	Sample includes about 20% fine to coarse Sand particles and about 10% subrounded to subangular Gravel particles to 1/2 inch maximum size	58.6 to 58.9	L88.1	24.2	39	18					
		59.0	W88.2	24.8		97					
		59.0	TV	24.8							TV = 0.54 tsf
		59.1 to 59.4	T88.0.1	24.3		101	UU	10.0	1132		σ <sub>c</sub> = 4608 psf
		59.4 to 59.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$	CC
50/14	1. 9' Recovery; say 68.0' to 69.9' depth  Silty CLAY, sandy; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes 20 to 25% fine to coarse Sand particles and subrounded to subangular Gravel size particles	68.0 to 70.0										
		68.0 to 68.4										
		68.4	W89.1	27.3		93						
		68.4	TV	27.3								IV = 0.48 tsf
		68.5 to 68.9	saved									
		69.0 to 69.2	L89.1	27.9	43	18						
		69.2	W89.2	29.5		94						
		69.2	TV	29.5								IV = 0.54 tsf
		69.3 to 69.7	saved									

IDENTIFICATION		TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
50/16	1.9' Recovery; say 78.0' to 79.9' depth	90	78.0 to 80.0									
		saved	78.2 to 78.5									
	Silty CLAY, gray, firm to stiff consistency, moderate plasticity (CL)	W90.1	78.5	27.7		95						
		IV	78.5	27.7								TV = 0.56 tsf
	Sample includes 10 to 15% fine to coarse Sand particles and subrounded to subangular Gravel particles to 1/2 inch maximum size	U90.1	78.6 to 78.9	27.9		95		U 10.0	1271			
		L90.1	78.6 to 78.9	27.9	39	20						
		W90.2	79.0	27.8		92						TV = 0.63 tsf
		IV	79.0	27.8								
		saved	79.1 to 79.7									

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
50/18	1.9' Recovery, say 88.0' to 89.9' depth; upper 0.3' disturbed	88.0 to 90.0	91								
		88.3 to 88.6	T9L1.1	28.0		97	CU	14.6	1923		$\bar{\sigma}_c = 3456$ psf
		88.6	W9L1.1	27.6		95					
		88.6	TV	27.6							TV = 0.59 tsf
	Silty CLAY, sandy, gray, firm to stiff consistency, moderate plasticity (CL)	88.7 to 89.0	T9L1.2	27.6		97	CU	11.7	2590		$\bar{\sigma}_c = 6912$ psf
		88.7 to 89.0	L9L1.1	29.5	39	23					
	Sample includes 20 to 25% fine to coarse Sand size particles and about 10% subrounded to subangular Gravel size particles	89.0	W9L1.2	27.0		95					
		89.0	TV	27.0							TV = 0.69 tsf
		89.1 to 89.4	T9L1.3	27.6		96	CU	11.8	3989		$\bar{\sigma}_c = 13,824$ psf
		89.5 to 89.8	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/3	Recovery; say 20.0' to 22.3' depth	20.0 to 22.3'	108								
		20.1 to 20.5	saved								
	Silty CLAY; gray, very stiff consistency, moderate to high plasticity (CL - CH)	20.5	W108.1	31.1		92					TV = 1.2 tsf
		20.5	TV								
		20.5 to 20.9	U108.1	30.3		92		U	4.0	2737	
		20.5 to 20.9	L108.1	30.9	49	20					
		20.9 to 21.0	W108.2	30.4		92					
		21.2 to 21.5	T								
		21.5 to 21.6	108.0.1	31.1		92		UU	8.0	1591	σ <sub>c</sub> = 2016 psf
		21.6	W108.3	31.4		91					
		21.6	TV								TV = 0.7 tsf
		21.6 to 21.9	saved								

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS      DATE <u>      </u> OF <u>      </u> SHEET <u>      </u> OF <u>      </u>												
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)			e <sub>o</sub>
52/4	2.5' Recovery; say 28.0' to 30.5' depth	109										
	Silty CLAY, gray, firm consistency, of moderate plasticity (CL)	WI09.1	28.5	32.5	89							
		UI09.1	28.6 to 28.9	31.8	94							
		LI09.1	28.6 to 28.9	29.4	35	18		U	9.0	489		
	Sample includes lenses or layers of non-plastic sandy Silt (about 15% of total sample)	VI09.1	28.9 to 29.2	30.5				VS		568		St = 2.1
	Note change in physical properties of soil below 29.5' depth - is Silty CLAY (CL-CH)	WI09.2	29.2 to 29.3	30.5	89							
			29.4 to 29.7									
		WI09.3	29.8	41.3	79							
		CI09.1	29.9 to 30.2	40.5							1.013	0.45
		SG109.1	30.2									Specific Gravity = 2.70
		LI09.2	29.9 to 30.2	40.5	49	20						

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
52/6	2.4' Recovery; say 48.0' to 50.4' depth		48.0 to 50.5	III								
			48.1 to 48.4	THI.11	22.1		101	CU	10.2	15159		$\bar{\sigma}_c = 2160$ psf
	SILT, dark gray, firm consistency, non-plastic to slightly plastic (ML)		48.4	WIII.1	22.9		99					
			48.4	TV	22.9							TV = 0.27 tsf
			48.5 to 48.8	THI.12	22.7		99	CU	15.0	17508		$\bar{\sigma}_c = 4320$ psf
			48.8 to 49.1	THI.13	22.1		104	CU	13.3	27777		$\bar{\sigma}_c = 8640$ psf
	Becomes more plastic with depth,		49.1	WIII.2	21.5		103					
	At ±49.5' depth-change to Silty CLAY, sandy; dark gray, stiff consistency; moderately plastic (CL)		49.1	TV	21.5							TV = 0.35 tsf
			49.2 to 49.5	UIII.1	25.2		100	U	2.5	317		
			49.2 to 49.5	LIII.1	25.2	22	18					
	Includes 15 to 20% fine to coarse Sand size particles with less than 5% fine Gravel size pieces to 1/4 inch maximum size		49.5	WIII.3	23.6		101					
			49.5	TV	23.6							TV = 0.73 tsf
			49.6 to 49.8	VIII.1	23.6			VS		2160		
								FVS		1950		St = 1.1

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____										
IDENTIFICATION		SHEET _____ OF _____										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
52/7	2.4' Recovery; say 58.0' to 60.4' depth  Silty CLAY; sandy, very dark gray, very stiff consistency, moderate plasticity (CL)  Sample includes about 30 - 35% fine to coarse subrounded to rounded Sand grains; also about 10 - 15% Gravel pieces (subrounded to subangular, 1-1/2" max. size)	58.0 - 60.4	112									
		58.2 - 58.5	saved									
		58.5 - 58.6	W1121	16.0			112					
		58.6'	TV									TV = 1.10 tsf
		58.6 - 58.9	K12-1	15.1								sieve/hydro-meter see plot
		59.0 - 59.3	U1121	13.0			116					
		59.0 - 59.3	L1121	12.9	23	14						
		59.3 - 59.7	saved									
		59.7	W1122	14.6			115					
		59.7	TV									TV = 1.20 tsf

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRG SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
52/8	1.5' Recovery; say 68.0' to 69.5' depth	113								
		W113.1	14.5		111					
	Silty CLAY, sandy, very dark gray, stiff to very stiff consistency, moderate plasticity (CL)	TV								TV = 1.0 tsf
		U113.1	14.2		115	U	13.0	1677		
		L113.1	13.8	24	14					
		W113.2	14.3							
	Includes about 30% fine to coarse rounded to subrounded Sand grains, and about $\pm 10\%$ subrounded to subangular Gravel pieces (3/4" max. size)	TV								TV = 1.2 tsf
		T								
		113.0.1	16.2		111	UU	15.0	1891		$\sigma_c = 5184$ psf
		W113.3	19.4							
		TV								TV = 0.8 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/9	2.5' Recovery; say 78.0' to 80.5' depth		78.0 to 80.5'	114								
	Silty CLAY; gray, stiff consistency, moderately plastic (CL)		78.2 to 78.5'	saved								
			78.5 to 78.6'	W114.1	23.3		105					
			78.6 to 78.6'	TV								TV = 0.5 tsf
			78.6 to 78.9'	T								
	Sample includes about 20% fine to coarse Sand and fine Gravel particles (subangular to subrounded)		78.9 to 79.0'	W14.0.1	21.8		105	UU	14.0	1157		σ <sub>c</sub> = 5760 psf
			78.9 to 79.0'	L114.1	23.5	35 18						
			79.0 to 79.0'	W114.2	22.1		106					
			79.0 to 79.0'	TV								TV = 0.8 tsf
			79.0 to 79.3'	saved								
			79.3 to 79.7'	saved								
			79.7 to 79.8'	W114.3	21.9		103					
			79.8 to 79.8'	TV								TV = 0.95 tsf

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
52/10	2.5' Recovery; say 88.0' to 90.5' depth		88.0 to 90.5	115								
			88.2 to 88.5	saved								
	Silty CLAY; sandy, gray, stiff consistency, moderate plasticity (CL)		88.5	W115.1	26.7		97					
			88.6 to 88.9	U115.1	27.2		97	U	8.0	2435		
			88.6 to 88.9	L115.1	26.4	39	18					
	Sample includes 25 to 30% fine to coarse Sand size particles and subrounded to subangular Gravel particles		89.0	W115.2	26.4		96					
			89.1 to 89.4	V115.1	26.4			VS		1662		
			89.5 to 89.8	saved				rVS		1529		St = 1.1
			89.8	W115.3	27.0		95					
			89.9 to 90.3	saved								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/12	2.5' Recovery; say 108.0' to 110.5' depth	108.0 - 110.5	117								
		108.1 - 108.5	saved								
	Silty CLAY; gray, medium to stiff consistency, moderate to high plasticity (CL)	108.5	W117.1	29.7		83					TV = 0.55 tsf
		108.5	TV								
		108.5 - 108.8	saved								
	Sample includes about 10% fine to coarse subrounded to rounded Sand grains	108.8 - 109.1	saved								
		109.1	W117.2	35.1							
		109.1	TV								TV = 0.35 tsf
		109.3 - 109.6'	T 117.0.1	35.8		87		UU	3.0	1596	$\sigma_c = 7632$ psf
		109.3 - 109.6	L117.1	36.2	46	22					
		109.6 - 109.9	saved								
		110.0	W117.3	35.5		87					
		110.0	TV								TV = 0.51 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
52/12	Jar Sample	115.5	567								
	Silty CLAY, grey, moderate plasticity (CL)  Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)		L567.1	34	18						

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
53/3	1.7' Recovery; say 19.0' to 20.7' depth  Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL-CH)										
		19.0 to 21.0	96								
		19.2 to 19.5	saved								
		19.5	W96.1	32.0		87					
		19.5	TV								
		19.6 to 19.9	U96.1	31.8		88	U	5.0	1156		
		19.6 to 19.9	L96.1	31.7	49	20					
		20.0	W96.2	32.1		87					
		20.0	TV								
		20.1 to 20.4	T96.0.1	32.2		91	UU	8.9	1425		

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 TABLE SUMMARY OF LABORATORY TEST RESULTS DATE OF  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
53/4	1.8' Recovery; say 29.0' to 30.8' depth	29.0 to 31.0	97								
		29.1 to 29.4	saved								
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	29.5	W97.1	42.5	77						
		29.5	TV	42.5							
		29.6 to 29.9	U97.1	40.7	80	U	5.0	1006			TV = 0.53 tsf
		29.6 to 29.9	L97.1	41.1	49	22					
		30.0	W97.2	38.8	91						
		30.0	TV	38.8							TV = 0.47 tsf
		30.1 to 30.4	T97.0.1	34.2	88	UU	2.4	973			σ <sub>c</sub> = 3024 psf
		30.4 to 30.7	saved								

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TABLE        SUMMARY OF LABORATORY TEST RESULTS SHEET        OF        DATE       

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
53/5	1.7' Recovery; say 39.0' to 40.7' depth	39.0 to 41.0	98								
		39.1 to 39.4	saved								
		39.4 to 39.5	W98.1	26.3	97						
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	39.5	TV	26.3							TV = 0.49 tsf
		39.5 to 39.8	C98.1	30.9					0.872	0.35	
	Sample includes 20 to 30% coarse to fine Sand and fine Gravel size particles	39.5 to 39.8	CG98.1								Specific Gravity = 2.72
	(subrounded to subangular in shape)	39.5 to 39.8	L98.1	30.5	39	20					
		39.5 to 39.8	k98.1	30.2							Sieve Hydro-meter seepbt
		39.8 to 40.1	saved								
		40.1 to 40.2	W98.2	29.6		92					
		40.2	TV	29.6							TV = 0.34 tsf
		40.2 to 40.6	saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
53/6	1.5' Recovery; say 49.0' to 50.5' depth	49.0-51.0	99									
	Silty CLAY, grey, soft to firm consistency, moderately plastic (CL)  Sample includes 15 to 20% fine to coarse Sand size particles and subrounded to subangular gravel size pieces  Sample slightly disturbed throughout	49.1	W99.1	36.2		89						
		49.2	U99.1	27.9		94	14.9	561				
		49.2	L99.1	27.8	43	18						
		49.6	W99.2	27.3		94						
		49.7	V99.1	27.3						540		
		50.0	V99.1	27.3						340		
		50.0-50.3	50.3	Saved								

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION

BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$
53/9	2.5' Recovery; say 79.0' to 81.5' depth	79.0 to 81.5	101								
	Silty CLAY; mottled gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel size particles	79.4	W10L1	27.6		97					
		79.5 to 79.8	V10L1	27.9		95	VS	1371			
		80.1 to 80.4	U01.1	27.9		95	rVS	1025		St = 1.3	
		80.1 to 80.4	L10L1	28.0	39	21	U	6.0	1275		
		80.5 to 80.8	saved								
		80.9 to 81.2	saved								

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IDENTIFICATION				TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$		
53/12	2.5' Recovery; say 109.0' to 111.5' depth	109.0 - 111.5'										
		109.2 - 109.5										
		109.5 - 109.7	20.0		108							
	Silty CLAY; dark gray, stiff consistency, moderate plasticity (CL)	109.7 - 109.7				TV						TV = 0.68 tsf
		109.7 - 110.0										
		110.0 - 110.4	20.5	29	15							
	Sample includes about 15% fine to coarse Sand and fine Gravel size particles	110.4 - 110.5										
	(subrounded to subangular in shape)	110.5 - 110.5	20.1			107						TV = 0.85 tsf
		110.5 - 110.8				TV						
						saved						



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TABLE      SUMMARY OF LABORATORY TEST RESULTS

SHEET      OF     

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	
53/12	Jar Sample Silty CLAY, grey, moderate plasticity (CL) Sample includes about 15% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)	116.0	568							
			L568.1	36	19					

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SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
54/4	1.8' Recovery, say 53.0' to 54.8' depth	397								
		T397.1.1	23.6		102	CU	10.7	488		$\bar{\sigma}_c = 2160$ psf
	Clayey SILT, dark gray, firm consistency, slightly plastic to non-plastic (CL - ML)	T397.0.1	24.4		99	UU	15.0	533		$\bar{\sigma}_c = 4320$ psf
		L397.1	22.8	21	17					
		W397.1	25.7							
	@± 53.5' depth, change to Silty CLAY sandy very dark gray, firm to stiff consistency, moderately plastic (CL)	TV								TV = 0.36 tsf
		T397.1.4	22.6		101	CU	14.9	1430		$\bar{\sigma}_e = 2160$ psf
	Sample includes few lenses/ layers of clayey SILT; also about 15% fine to coarse sand size particles and subrounded to subangular gravel size pieces	T397.1.2	23.2		102	CU	14.8	2022		$\bar{\sigma}_c = 4320$ psf
		T397.1.3	23.2		102	CU	13.8	3867		$\bar{\sigma}_c = 8640$ psf
		W397.2	23.3							
		T397.1.5	24.0		100	CU	10.6	2805		$\bar{\sigma}_c = 6480$ psf
		L397.2	24.0	31	18					
		TV								TV = 0.47 tsf

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
54/5	2.0' Recovery	—									
		398	58.5 to 60.5								
		saved	58.6 to 58.9								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	W398.1	58.9	25.2		93					
		TV	58.9	25.2							TV = 0.44 tsf
		T398.0.I	59.0 to 59.3	25.4		99	UU	15.0	768		σ <sub>c</sub> = 4464 psf
		U398.1	59.3 to 59.6	25.8		99	U	11.0	557		
		L398.1	59.3 to 59.6	26.2	38	17					
		W398.2	59.6	27.5		92					
		TV	59.6	27.5							
		V398.I	59.7 to 60.0	27.5		92	VS		1100		TV = 0.55 tsf
		saved	60.0 to 60.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/6	2.0' Recovery	63.0 to 65.0	399									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 25% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	63.1 to 63.4	T399.0.1	26.1		98	UU	13.0	796		$\bar{\sigma}_c = 5040$ psf	
		63.4 to 63.5	W399.1	24.3		92						
		63.5	TV	24.3							TV = 0.46 tsf	
		63.5 to 63.8	C399.1	26.0						0.696	0.24	
		63.5 to 63.8	SG399.1									Specific Gravity = 2.71 Sieve/hydrometer See plot
		63.5 to 63.8	k399.1	27.2		98				.724		
		63.5 to 63.8	L399.1	26.0	36	18						
		63.8 to 64.1	T399.1.1	26.4		98	CU	12.0	1362			$\bar{\sigma}_c = 2448$ psf
		64.1 to 64.2	W399.2	25.0		98						TV = 0.52 tsf
		64.2	TV	25.0								$\bar{\sigma}_c = 4896$ psf
		64.2 to 64.5	T399.1.2	25.2		98	CU	12.1	2008			$\bar{\sigma}_c = 2792$ psf
		64.5 to 64.8	T399.1.3	25.8		98	CU	11.6	2929			TV = 0.48 tsf
	64.8	TV										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)		$e_0$	$c_c$
54/7	2.0' Recovery	400	68.0 to 70.0									
	Silty CLAY, sandy, gray, stiff consistency, moderately plastic (CL)  Sample includes 30 to 40% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	V400.1	68.1 to 68.4	26.3		VS		1300			St = 1.5	
		W400.1	68.4 to 68.5	26.3		96						
		TV	68.5	26.3							TV = 0.58 tsf	
		U400.1	68.5 to 68.8	25.9		98	U	8.9	788			
		L400.1	68.5 to 68.8	26.2	37							
		P400.0.1	68.8 to 69.1	25.9		98	UU	12.0	1148		$\sigma_c = 5112$ psf	
		W400.2	69.1 to 69.2	22.5		102						
		TV	69.2	22.5							TV = 0.54 tsf	
			saved	69.2 to 69.8								
			TV	69.8							TV = 0.56 tsf	

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
54/8	2.0' Recovery	73.0 to 75.0	401								
	Silty CLAY, gray, stiff consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains and silty fine Sand lenses	73.0 to 73.3	saved								
		73.3 to 73.4	W40L1	81							
		73.4	TV								TV = 0.54 tsf
		73.4 to 73.7	saved								
		73.7 to 74.0	C40L1						0.982	0.41	
		73.7 to 74.0	SC40L1								Specific Gravity=2.73
		73.7 to 74.0	L40L1		31.6	45	21				
		73.7 to 74.0	K40L1		31.6					0.851	see hydrometer see plot
		74.0 to 74.1	W40L2		30.0						
		74.1	TV		30.0						TV = 0.50 tsf
	74.1 to 74.7	saved									

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)		e <sub>o</sub>
BORING SAMPLE	SOIL DESCRIPTION										
58/2	Jar Sample Silty CLAY, dark greyish brown, moderate to high plasticity (CL)	562	6.0'		42    19						
		L562.1									

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

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BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
58/6	Jar Sample		25.0'	563								
	Silty CLAY, grey, moderate to high plasticity (CL-CH)			L563.1	48	20						



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TABLE SUMMARY OF LABORATORY TEST RESULTS			DATE July 1974									
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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	cc		
58/10	Jar Sample	45.0'	564	w <sub>L</sub>	w <sub>p</sub>							
	Silty CLAY, Sandy, low to moderate plasticity (CL) Sample includes about 35% fine Sand grains		1564.1	27	19							

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub> c <sub>c</sub>	
58/13	Jar Sample Silty CLAY, Sandy, gray, moderately plastic (CL) Sample includes about 45% fine to coarse Sand grains (Subrounded to subangular in shape)	565		34 17					
		L565.1							

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IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
58/17	Jar Sample Silty CLAY, dark gray, moderate to high plasticity (CL)	80.0'	566		43    20						

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B59/3	1.8' Recovery; say 18.0' to 19.8' depth	76									
		saved									
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	18.4 to 18.5	32.1		83						
		18.5	32.1								TV = 0.58 tsf
		18.5 to 18.8	W76.1	32.8			VS		1260		
		18.8 to 19.1	U76.1	32.8		90	U	6.9	1056		
		18.8 to 19.1	L76.1	32.7	48	20					
		19.1 to 19.3	W76.1	31.6		90					
		19.3	TV	31.6							TV = 0.56 tsf
		19.3 to 19.7	saved								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>c</sub>
59/5	1.9' Recovery; say 38.0' to 39.9' depth; upper 0.5' disturbed	78									
		W78.1	38.7	26.7		94					
		TV	38.7	26.7							TV = 0.46 tsf
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)	U78.1	38.7 to 39.0	26.2		99	U	14.9	626		
		L78.1	38.7 to 39.0	26.2	38	18					
		saved	39.0 to 39.3								
	Sample includes 20 to 25% fine to coarse Sand and fine Gravel size particles, subrounded to subangular in shape	W78.2	39.3 to 39.4	25.6		96					
		TV	39.4	25.6							TV = 0.47 tsf
		V78.1	39.4 to 39.7	25.6			VS		637		

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
59/7	1.5' Recovery; say 58.0' to 59.5' depth	58.0 to 60.0	80								
		58.1 to 58.4	saved								
		58.4 to 58.6	W80.1	25.0		100					
	Silty CLAY, sandy, dark gray, firm to stiff consistency, moderately plastic (CL)	58.6	TV	25.0							TV = 0.49 tsf
		58.6 to 58.9	U80.1	26.3		98		U 8.0	835		
	Sample includes 20 to 25% coarse to fine Sand and fine Gravel size particles	58.6 to 58.9	L80.1	24.5	36	18					
	(subrounded to subangular in shape)	58.9 to 59.0	W80.2	24.1		102					
		59.0	TV	24.1							TV = 0.51 tsf
		59.0 to 59.3	V80.1	24.1				VS	734		
								rVS	(969)		

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
59/9	Jar Sample	75.0	569								
	Clayey SAND, subrounded to subangular fine to coarse Sand and fine Gravel size particles with 35 to 40% low to moderately plastic fines (SC)		L569.1	22	14						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE        SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET        OF       

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLI- DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST $\epsilon$ TYPE %	MAX. SHEAR STRESS (PSF)	$e_0$	
59/11	Jar Sample	95.0	570							
	Silty CLAY, grey, moderate plasticity (CL)		L570.1	37	19					
	Sample includes about 10% fine to coarse Sand size particles (subrounded to sub-angular in shape)									



PROJECT: BELLE RIVER PLANT UNITS I & II												FILE NO. 1255	
TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE Jan. 1974	
IDENTIFICATION												SHEET ___ OF ___	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
B60/1	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	5.0 to 6.5	70										
			L70.1	27.3	50	20							
			H70.1								See plot		
B60/2	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	10.0 to 12.5	71										
			L71.1	28.0	44	19							
			H71.1								See plot		
B60/3	Jar Sample Silty CLAY; dark gray, moderately to highly plastic (CL)	19.0 to 20.5	72										
			L72.1	30.3	43	19							
			H72.1								See plot		
B60/5	Jar Sample Silty CLAY; dark gray, highly plastic (CL-CH)	27.0 to 28.5	73										
			L73.1	34.3	48	20							
			H73.1								See plot		

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
DATE Jan. 1974  
SHEET OF

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B60/2	Silty CLAY; grayish brown, stiff to very stiff consistency, highly plastic (CL-CH)		8.0 to 10.0	42								
			8.0 to 8.3	save 42.1								
			8.3	TV	28.3							TV=1.1tsf
			8.3 to 8.4	W42.1	28.3							
			8.4 to 8.7	save 42.2								
			8.7 to 9.0	T42.1.3	28.9		96	CU	5.3	1336		
			8.7 to 9.0	T42.1.3	28.9		98	CU <sub>p</sub>	11.6	1751		Remolded sample
			9.0	TV	29.0							TV=0.88tsf
			9.0 to 9.1	W42.2	29.0							
			9.1 to 9.4	T42.1.2	29.3		95	CU	5.2	882		Remolded sample
			9.1 to 9.4	T42.1.2	29.3		99	CU <sub>p</sub>	10.8	1244		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		94	CU	3.6	530		Remolded sample
			9.4 to 9.7	T42.1.1	29.8		96	CU <sub>p</sub>	15.0	875		Remolded sample
			9.7	TV	29.7							TV=1.1tsf
			9.7 to 9.8	W42.3	29.7							
			9.8 to 10.0	C42.1	30.0							Specific Gravity=2.71
			9.8 to 10.0	L42.1	29.7	53	26					

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/3	2.0 Recovery; say 17.0' to 19.0' depth. Upper 0.5' disturbed		17.0 to 19.0	43								
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)		17.5 to 17.6	TV	29.9							TV=0.27 tsf
			17.6 to 18.0	W43.1	29.9							
			17.6 to 18.0	U43.1	24.3		105	U	20.0	1143		@15.0% strain s=1029 psf
			17.6 to 18.0	Ur43.1	24.3		103	Ur	20.0	1053		@15.0% strain s=879 psf
	Sample includes about 10% fine to coarse Sand grains (sub-rounded to subangular in shape)		17.6 to 18.0	L43.1	24.3	39	21					
			18.0	TV	19.2							TV=0.87 tsf
			18.0 to 18.1	W43.2	19.2							
			18.1 to 18.3	L43.1	26.1							
			18.1 to 18.3	H43.1								See plot
			18.6	TV	19.5							TV=0.46 tsf
			18.6 to 18.7	W43.3	19.5							
			18.7 to 19.0	save 43.1								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
B60/4	1.8' Recovery; say 21.0' to 22.8' depth  Silty CLAY, grayish brown, stiff consistency, highly plastic (CL-CH)  Includes about 5% coarse Sand and fine Gravel particles	21.0 to 23.0	44										
		21.1	TV	31.8									TV=0.52 tsf
		21.1 to 21.2	W44.1		31.8								
		21.2 to 21.5	T44.1.3		31.0		94	CU	3.8	2658			
		21.8	TV		30.9								TV=0.71 tsf
		21.8 to 21.9	W44.2		30.9								
		21.9 to 22.3	T44.1.1		30.4		94	CU	6.7	1389			
		21.9 to 22.3	I44.1		30.4	43	17						
		22.3	TV		29.9								TV=0.68 tsf
		22.3 to 22.4	W44.3		29.9								
		22.4 to 22.8	T44.1.4		30.6		95	CU	7.6	1588			

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE Jan. 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$C_c$
B60/5	1.9' Recovery; say 25.0' to 26.9' depth  Silty CLAY; gray, moderate to high plasticity, firm to stiff consistency (CH-CL)	25.0 to 27.0	45									
		25.1	TV		34.8							TV=0.53 tsf
		25.1	W45.1		34.8							
		25.2 to 25.6	save 45.1									
		25.6	TV		35.5							TV=0.55 tsf
		25.6	W45.2		35.5							
		25.7 to 26.1	U45.1		36.8	86	U	4.0	1002			
		25.7 to 26.1	save 45.1		36.8	51	22					
		26.2	TV		36.3							
		26.2	W45.3		36.3							
		26.2 to 26.5	save 45.2									
		26.5	TV									TV=0.50 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>		
60/6	Silty CLAY, gray, firm to stiff consistency, high plasticity (CL-CH)	30.0-	—										
		32.0	46										
		30.1-	Saved										
		30.4	W46.1	40.4	81								
		30.4	TV										TV=0.47tsf
		30.5-	U46.1	35.0	88		U	3.7	1577				
		30.5-	L46.1	34.7	48	25							
		31.0	V46.1	34.0			VS		1000				
		31.3	TV				rVS		550				TV=0.40tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/8	1.7' Recovery; say 40.0' to 41.7' depth	—								
		48								
		TV	23.6							TV=0.46 tsf
	Silty CLAY; dark gray, moderate to high plasticity, firm consistency (CL-GH)	W48.1	23.6							
		48.1								
		TV	33.7							TV=0.40 tsf
		W48.2	33.7							
		48.1	39.7		83	U	3.0	338		
		L48.1	39.7	47	25					
		TV	41.4							TV=0.40 tsf
		W48.3	41.4							
		48.2								
		TV								TV=0.33 tsf

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/9	1.9' Recovery; say 45.0' to 46.9' depth		45.0 to 47.0	49								
			45.1	TV	25.9							TV=0.45tsf
	Silty CLAY, sandy, dark gray, firm to stiff consistency, highly plastic (CL)		45.1 to 45.2	W49.1	25.9							
	Includes about 30% subangular to subrounded fine Gravel to coarse Sand size particles		45.2 to 45.5	T49.1.3	26.0	102	CU	8.5	2510			
			45.5 to 45.8	T49.1.2	27.0	98	CU	8.2	1499			TV=0.50tsf
			45.8	TV	25.4							
			45.8 to 45.9	W49.2	25.4							
			45.9 to 46.3	T49.1.1	26.6	99	CU	12.9	1267			
			45.9 to 46.3	L49.1	24.8	38	16					
			46.3	TV	25.3							TV=0.52tsf
			46.3 to 46.4	W49.3	25.3							
			46.4 to 46.7	save 49.1								



PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
60/10	1.7' Recovery; say 50.0' to 51.7' depth; upper 0.5' disturbed  Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)  Sample includes about 10% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)  Few thin (± 1/16" thick) lenses/layers of SILT, grey, non-plastic (ML) appear throughout comprising 5% of total sample	50.0-52.0										
		50.3-50.4	W50.1	29.3								
		50.5-50.9	saved									
		50.9	TV									TV=0.36 tsf
		50.9-51.2	U50.1	25.5		100	U	15.2	1255			@20% strain s=1367 psf
		50.9-51.2	L50.1	25.7	34	16						
		51.2-51.3	W50.2	25.9		97						
		51.3	TV									TV=0.42 tsf
		51.3-51.6	V50.1									

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE March 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/11	1.8' Recovery; say 55.0' to 56.8' depth	55.0 to 57.0	51								
		55.1	TV	25.9							TV=0.33 tsf
	Silty CLAY, dark gray, moderate plasticity, firm to stiff consistency (CL)	55.1 to 55.2	W51.1	25.9							
		55.2 to 55.5	save 51.1								
		55.5	TV	24.8							TV=0.63 tsf
		55.5 to 55.9	U51.1	24.8		103	U	24.0	1407		@15.0% strain s=1299 psf
		55.5 to 55.9	J <sub>r</sub> 51.1	24.8		103	U <sub>r</sub>	20.0	1002		@15.0% strain s=817 psf
		55.5 to 55.9	L51.1	24.8	33	18					
		56.0	TV	25.9							TV=0.50 tsf
		56.0	W51.2	25.9							
		56.1 to 56.4	K51.1	25.5							
		56.1 to 56.4	S/H 51.1								See plot
		56.4	TV	25.9							TV=0.46 tsf
		56.4	W51.3	25.9							
		56.4 to 56.7	save 51.3								

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %		MAX. SHEAR STRESS (PSF)	e <sub>0</sub>
B60/12	0.5' Recovery; say 60.0' to 60.5' depth  Silty CLAY, dark gray, moderate plasticity (CL) Entire sample disturbed		60.0 to 62.0								
			60.0 to 60.2	28.9							
			W52.2								
			W52.1	27.9							
			L52.1	27.9	36	18					

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET 1 OF 1									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B60/13	1.9' Recovery; say 67.0' to 68.9' depth	67.0 to 69.0	53								
		67.1	TV	24.7							TV=0.63 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	67.1 to 67.2	W53.1	24.7							
	Sample includes zones of Silty CLAY, gravelly, stiff to very stiff consistency, moderately plastic (CL) and Clayey GRAVEL, sandy, slightly plastic (GC)	67.2 to 67.5	T53.1.4	15.5		114	CU	12.9	4613		
		67.2 to 67.5	T53.1.5	21.0		104	CU	11.9	3178		TV=0.95 tsf
		67.5	TV	16.4							
		67.5 to 67.6	W53.2	16.4							
		67.6 to 67.9	T53.1.3	19.7		104	CU	15.0	4060		
		67.9	TV								TV=0.48tsf
		67.9 to 68.3	L53.1	29.4	40	19					
		68.3 to 68.6	T53.1.1	23.6		104	CU	15.0	1945		
		68.3 to 68.6	T53.1.2	31.9		91	CU	6.2	1723		
		68.6	TV								TV=0.50 tsf
		68.6 to 68.7	W53.3	33.2							

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974										
IDENTIFICATION		SHEET 1 OF 1										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$		$c_c$
B60/14	2.2' Recovery; say 74.0' to 76.2' depth	74.0 to 76.5	54									
		74.4	TV	25.9							TV=0.54tsf	
	Silty CLAY, dark gray, moderately to highly plastic, medium consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	74.4	W54.1	25.9								
		74.5 to 75.0	save 54.1									
		75.0	TV	26.8								TV=0.70tsf
		75.0	W54.2	26.8								
		75.1 to 75.6	U54.1	26.9	97			U	5.0	652		
		75.1 to 75.6	L54.1	26.9	40	20						
		75.6	TV	26.0								TV=0.70tsf
		75.6	W54.3	26.0								
		75.6 to 76.0	save 54.2									
		76.0	TV									TV=0.63tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE March 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/16	2.4' Recovery; say 84.0' to 86.4' depth	84.0 to 86.5	56.0								
	Silty CLAY, dark gray, moderate to high plasticity, firm consistency (CL)  Includes about 20% fine to coarse sand particles and ±15% subangular to subrounded Gravel particles	84.2	TV	27.4							TV=0.62 tsf
		84.2	W56.1	27.4							
		84.2 to 84.6	save 56.1								
		84.6	TV	26.7							TV=0.73 tsf
		84.6	W56.2	26.7							
		84.7 to 85.1	save 56.2								
		85.2 to 85.4	C56.1	27.9					.744	.27	
		85.2 to 85.4	L56.1	26.9	40	19					
		85.2 to 85.4	SC56.1								Specific Gravity=2.73
		85.6	TV	26.1							TV=0.65 tsf
	85.6	W56.3	26.1								
	85.6 to 86.1	k56.1	29.1								
	85.6 to 86.1	S/H 56.1								See plot	
	86.1	TV								TV=0.65 tsf	

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
B60/19	2.5' Recovery; say 99.0' to 101.5' depth	59									
		TV	27.6								TV=0.61 tsf
	Silty CLAY; dark gray, highly plastic, firm to stiff consistency (CL)	W59.1	27.6								
	Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	99.5 to 99.9									
		TV	26.9								TV=0.80 tsf
		W59.2	26.9								
		100.0 to 100.4	U59.1	27.1		101	U	7.0	1132		
		100.0 to 100.4	L59.1	27.1	38 20						
		100.4	TV	26.8							TV=0.80 tsf
		100.4	W59.3	26.8							
		100.5 to 100.9	save 59.2								
		100.9	TV								TV=0.66 tsf
		100.9 to 101.4	save 59.3								

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B60/23	Soil DESCRIPTION		119.0 to 121.5	63								
	2.3' Recovery; say 119.0' to 121.3' depth		119.6	TV	32.9							TV=0.35 tsf
	Silty CLAY, gray mottled reddish brown, low plasticity, soft consistency; includes about 40% fine to coarse Sand grains (subrounded to subangular) (CL-ML)		119.6 to 120.0	W63.1	32.9							
			120.0	U63.1	15.4		115	U	6.0	335		
			119.6 to 120.0	L63.1	15.4	17	11					
	At 120.0' change to Clayey SAND about 10% hard, subrounded to subangular Gravel particles, about 15% plastic and non-plastic fines (SC)		120.0	TV	12.9							TV=0.10 test performed on sand lens
			120.0	W63.2	12.9							
			120.1 to 120.5	save 63.1								
			120.5	TV	17.2							TV=0.21 tsf
			120.5	W63.3	17.2							
			120.5 to 121.0	save 63.2								



PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255										
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET 0F										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
101/2	Silty CLAY, olive brown very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard, subrounded to rounded gravel size particles	8.0 to 10.0	349									
		8.1 to 8.7	save 349.1									sample used for T466.1, 2, 3
		8.7 to 8.9	W349.1	27.7	94							
		8.9 to 9.2	U349.1	27.8	96			U	2.4	1828		
		8.9 to 9.2	L349.1	27.8	50	22						
		9.2	TV									
		9.2 to 10.0	save 349.2									TV=1.8tsf sample used for T466.1, 2, 3

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FILE NO. 1255

DATE April 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/4	2.3' Recovery; Say 19.0' to 21.3' depth  Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	19.0 to 21.5	—								
		19.0 to 19.3	save 351.1								
		19.3 to 19.5	W351.1	33.3		89					
		19.5	TV								TV=0.48tsf
		19.5 to 19.9	save 351.2								
		19.9 to 20.2	U351.1	35.8		86	U	6.0	1014		
		19.9 to 20.2	L351.1	35.8	49	24					
		20.2 to 20.4	W351.2	35.0		88					
		20.4	TV								TV=0.38tsf
		20.4 to 20.8	save 351.3								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE April 1974

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
101/7	2.1' Recovery; Say 34.0' to 36.1' depth  Silty CLAY, gray, firm consistency, moderately to highly plastic (CL-CH)	34.0 to 36.5	—								
		34.1 to save	354								
		34.4	354.1								
		34.4 to 34.6	W354.1		39.9	81					
		34.6	TV								TV=0.27tsf
		34.6 to 34.9	save 354.2								
		34.9 to 35.2	U354.1		40.0	81		U	2.4	796	
		34.9 to 35.2	L354.1		37.8	46	24				
		35.2 to 35.4	W354.2		38.6	83					
		35.4	TV								TV=0.34tsf
		35.4 to 35.7	save 354.3								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/10	2.4' Recovery; Say 49.0' to 51.4' depth	49.0 to 51.6	357								
		49.1 to 49.4	save 357.1								
		49.4 to 49.6	W357.1	33.0		88					
	Silty CLAY; dark gray, firm consistency, moderately plastic (CL)	49.6	TV								TV=0.32tsf
		46.6 to 49.9	save 357.2								
	Sample includes about 20% coarse to fine sand grains (subrounded to subangular in shape)	50.1 to 50.4	U357.1	32.8		90			5.0	722	
		50.1 to 50.4	U357.1	31.0	40	22					
		50.4	TV								TV=0.44tsf
		50.6 to 50.8	W357.2	28.8		93					
		50.8	TV								TV=0.30tsf
		50.8 to 51.2	save 357.3								

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/13	2.4' Recovery; say 64.0' to 66.4' depth	64.0 to 66.5	360								
		64.6 to save									
		64.9	360.1								
	Silty CLAY; sandy, gray, stiff consistency, moderately plastic (CL)	64.9	TV								TV=0.49tsf
		64.9 to 65.1	W360.1	26.3		97					
		65.2 to 65.6	U360.1	26.6		97	U	20.0	1430		@15.0%strain s=1337 psf
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	65.2 to 65.6	360.1	26.6	39	19					
		65.6 to 65.8	W360.2	26.2		96					
		65.8	TV								TV=0.52tsf
		65.8 to 66.1	save								
		66.1	360.2								

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
101/15	1.0' Recovery; Say 74.0' to 75.0' depth	362								
		save								
		362.1								
			24.5		99					
	Silty CLAY; sandy, dark gray, stiff consistency, moderately plastic (CL)	TV								TV=0.69tsf
										@15.0% strain
	Sample includes about 30% coarse sand and fine gravel size particles (subrounded to subangular in shape)	362.01	22.8		105	UU	17.0	1098		s=1054 psf
		L362.1	22.8	36	21					

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PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE: SUMMARY OF LABORATORY TEST RESULTS

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
101/17	2.3' Recovery; Say 84.0' to 86.3' depth	84.0 to 86.5	364								
		84.1 to save									
		84.4 to 364.1									
		84.4 to W364.1									
		84.6	W364.1	23.9		98					
	Silty CLAY; sandy, dark gray, stiff consistency. moderately plastic (CL)	84.6	TV								TV=0.60tsf
		84.6 to save									
		84.9	364.2								
	Sample includes about 30% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	85.2 to 85.5	UB364.1	25.2		97	U	20.0	2072		@15.0% strain s=1923 psf
		85.2 to 85.5	UB364.1	25.2	37	19					
		85.5 to 85.7	W364.2	26.2		99					
		85.7	TV								TV=0.57tsf
		85.7 to save									
		86.1	364.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS															DATE April 1974		
IDENTIFICATION															SHEET 1 OF 1		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS					
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>						
101/19	1.3' Recovery; say 94.0' to 95.3' depth; upper 0.9' disturbed (Wash?)	94.0 to 96.5	366														
		94.9	TV														
		94.9 to 95.3	366.0.1	24.5	36	20	100	UU	20.0	572							TV=0.36tsf @15.0%strain s=548 psf
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	94.9 to 95.3	1366.1	24.5	36	20											
	Sample includes about 15% coarse sand and fine gravel size particles (subrounded to subangular in shape)																



PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

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DATE April 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
101/23	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 10% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	119.0 to 121.5	370									
		119.1 to 119.4	370.1									
		119.4 to 119.5	W370.1	91								
		119.5 to 119.8	TV									TV=0.42 tsf
		119.8 to 120.2	370.2									
		119.8 to 120.2	U370.0.1	85					UU	8.0	721	
		120.2 to 120.4	L370.1		44	22						
		120.2 to 120.4	W370.2	88								
		120.4 to 120.7	TV									TV=0.55tsf
		120.7 to 121.1	370.3									
		121.1 to 121.4	370.4									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
105/1	Silty CLAY; olive brown and grayish brown, very stiff to hard consistency, highly plastic (CH)  Sample includes about 5% hard, rounded gravel sized particles	4.0 to 6.0										
		4.2 to 4.5	373									
		4.5 to 4.7	save 373.1									
		4.7 to 5.0	W373.1	23.4		100						
		5.0 to 5.1	save 373.2									
		5.1 to 5.4	TV									TV=2.00tsf
		5.4 to 5.6	C373.1	23.6					.642	.10		
		5.6 to 5.9	L373.1	23.6	53	24						
			SC373.1									specific gravity=2.72
			W373.2	24.2		101						
			save 373.3									

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/2	<p>Silty CLAY, olive brown and greyish brown, very stiff consistency, moderate to highly plastic (CL)</p> <p>Sample includes about 5% hard subrounded gravel particles to 3/4" max. size</p> <p>Note: Saved material used as part of MC466.1 and T466.1.1, 2, 3 test series</p>	9.0-11.0	—									
		9.1-9.4	T374.14	27.7		98	CU	5.8	1189			$\bar{\sigma}_c = 864 \text{psf}$
		9.4-9.7	L374.1	27.6	46	24						
		9.7-9.9	W374.1	26.1		100						
		9.9-10.2	T374.1.1	26.3		97	CU	3.0	1273			$\bar{\sigma}_c = 576 \text{psf}$
		10.2	TV									TV-1.1tsf
		10.2-10.6	T374.1.2	26.4		99	CU	4.4	1227			$\bar{\sigma}_c = 1152 \text{psf}$
		10.6-10.9	T374.1.3	26.9		96	CU	10.5	2191			$\bar{\sigma}_c = 2304 \text{psf}$

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>	cc <sup>*</sup>
105/3	Silty CLAY, grey, medium consistency, moderately plastic (CL)  Sample includes about 5% fine to coarse Sand grain (subrounded to subangular in shape)	—										
		20.0-22.0	375									
		20.1-20.4	Saved									
		20.4-20.6	W375.1	36.0		85						
		20.6	TV									TV=0.39tsf
		20.6-20.9	Saved									
		20.9-21.2	L375.1	33.4	42	20						
		21.2-21.4	W375.2	33.3		86						TV=0.41tsf
		21.4	TV									
		21.4-21.7	Saved									

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 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET \_\_\_\_ OF \_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES				STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
105/4	SOIL DESCRIPTION		30.0-32.0	376									
	1.1' Recovery; say 30.0' to 31.1' depth		30.7-31.0	Saved									
	Silty CLAY, grey, moderately plastic (CL)												
	Note: Entire Sample much disturbed.												

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
105/5	2.2' Recovery; say 40.0' to 42.2' depth	40.0-42.5	377								
		40.1-40.4	T377.1A	39.2		84	CU	7.6	1902		$\bar{\sigma}_c = 7200$ psf
		40.4	TV								TV=0.35 tsf
		40.4-									
		40.6	W377.1	35.7							
		40.6-41.0	T377.1I	35.9		84	CU	5.9	1068		$\bar{\sigma}_c = 1800$ psf
		40.6-									
		41.0	L377.1	35.9	44	21					
		41.0-41.3	T377.1J	35.9		85	CU	3.1	1376		$\bar{\sigma}_c = 3600$ psf
		41.3-									
		41.5	W377.2	34.9		86					
		41.5	TV								TV=0.37 tsf
		41.5-41.8	T377.1K	35.1		85	CU	3.8	1830		$\bar{\sigma}_c = 7200$ psf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BDRING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
105/6	1.7' Recovery; say 50.0' to 51.7' depth	378								
	Silty CLAY, grey, medium consistency, highly plastic (CH)	50.0-52.5								
		50.0-50.3	Saved							
		50.3-50.5	W378.1	42.8	76					
		50.5	TV							TV=0.35tsf
		50.5-50.8	Saved							
		50.8-51.1	L378.2	46.2	57	25				
		51.1-51.3	W378.2	41.2	78					
		51.3	TV							TV=0.33tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE July 1974	
IDENTIFICATION										SHEET OF	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
105/8	2.3' Recovery; say 70.0' to 72.3' depth	70.0-72.5	380								
		70.1-70.4	Saved								
	Silty CLAY, dark grey, stiff consistency, moderate plasticity (CL)	70.4-70.6	W380.1	23.9		100					
		70.6	TV								TV=0.65tsf
		70.6-70.9	Saved								
	Sample includes about 20% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	70.9-71.2	C380.1	23.7					0.625	.21	
		70.9-71.2	L380.1	23.8	37	19					Specific Gravity-2.70
		70.9-71.2	SG 380.1								
		71.3-71.5	W380.2	23.5		100					
		71.5	TV								TV=0.70tsf
		71.5-71.8	Saved								
		71.8-72.2	Saved								



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET ___ OF ___										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_o$	$c_c$		
105/10	1.6' Recovery; say 90.0' to 91.6' depth	90.0-92.0	382									
		90.5-90.6	W382.1	31.0		84						
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)	90.6	TV								TV=0.17tsf	
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	90.6-90.9	L382.1	29.4	34	19						
		90.9-91.2	Saved									
		91.2-91.3	W382.2	30.3			88					
		91.3	TV									TV=0.18tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$c_c$
105/11	1.7' Recovery; say 110.0' to 111.7' depth; upper 0.7' disturbed, WASH? ?	110.0- 111.5	383									
		110.7- 110.9	W383.1	31.7		86						
	Silly CLAY, grey, soft consistency, moderately plastic (CL)	110.9	TV								TV-0.25tsf	
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire Sample disturbed.	110.9-										
		111.3	Saved									

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
105/12	SOIL DESCRIPTION	DEPTH (FEET)								
	0.7' Recovery; say 120.0' to 120.7' depth	120.0- 122.5 120.2- 120.3	384							
			W384.1	22.1	102					
	Silty CLAY, Sandy, dark gray, medium consistency, moderate plasticity (CL)	120.3- 120.6 120.6- 120.7	saved							
	Sample includes about 35% fine to coarse SAND grains (subrounded to subangular in shape)		I384.1	20.4	17					
	Note: Entire sample slightly disturbed									

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
118/1	2.1' Recovery; say 3.0' to 5.1' depth; upper 1.0' disturbed (WASH??)	3.0-5.0	252								
		4.0-4.3	L252.1	21.4	49 26						
	Silty CLAY, greyish brown, hard consistency, moderate to highly plastic (CL-CH)	4.4-4.5	W252.1	22.3		101					
		4.5	TV								TV > 2.5tsf
		4.6-5.0	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
118/2	1.5' Recovery; say 8.0' to 9.5' depth	8.0 - 10.0'	253								
		8.1'	W253.1	23.8							
	Silty CLAY, dark grayish brown, very stiff to hard consistency, highly plastic (CL - CH)	8.2 - 8.5'	T253.2	23.0	107	CD	4.3	754		$\bar{\sigma}_c = 576$ psf	
		8.2 - 8.5'	L253.1	23.3	49	23					
		8.5'	W253.2	21.5							
		8.6 - 8.9'	T253.2	23.3		105	CD	3.6	1248		$\bar{\sigma}_c = 1152$ psf
	Sample includes ±5% coarse Sand and fine Gravel size particles	8.9 - 9.2'	T253.3	24.2		103	CD	2.2	2156		$\bar{\sigma}_c = 2304$ psf
		9.2 - 9.5'	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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 SHEET 1 OF 1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>
118/3	2.1' Recovery; say 18.0' to 20.1' depth; upper 0.5' disturbed	254										
		18.0-20.0	W254.1	35.5		84						
	Silly CLAY, grey, firm consistency, moderate to high plasticity (CL)	TV									TV=0.37tsf	
		18.9	Saved									
		18.9-19.3	W254.2	31.6		89						
		TV									TV=0.40tsf	
		19.5										
		L254.1	35.3	45	23							

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
118/4	21.4' Recovery; say 28.0' to 30.1' depth	28.0-30.0	255								
		28.5-28.6	W255.1	25.3		94					
	Silty CLAY, gray, mottled very dark gray, firm to stiff consistency, moderate plasticity (CL)	28.6	TV								TV= 0.28 tsf
		28.6-28.9	saved								
		28.9-29.3	saved								
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	29.3-29.4	W255.2	20.6		103					
		29.4	TV								TV=0.64 tsf
	Note: Upper 1.3' of sample slightly disturbed	29.4-29.8	saved								

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SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
					NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>	
118/5	Silty CLAY, greyish brown, firm consistency, moderately plastic (CL)		38.0-	—										
			40.0	256										
			38.1-	Saved										
			38.4	TV									TV=0.34tsf	
			38.4-											
			38.6	W256.1			36.9		85					
			38.6-											
			38.9	Saved										
			38.9-											
			39.3	C256.1			36.9					0.969	0.39	
			38.9-	I256.1			36.9	41	22					Specific Gravity-2.70
			39.3	256.1										TV-0.35tsf
			39.3	TV										
			39.3-											
	39.5	W256.2			36.6		86							
	39.5-													
	39.8	Saved												



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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
118/6	2.1' Recovery; say 48.0' to 50.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes few thin lenses/layers of SILT, Sandy (ML) comprising ±5% of total	48.0-50.0	—									
		48.4-48.5	W257.1	42.6	76							
		48.5	TV								TV=0.30tsf	
		48.5-48.8	Saved									
		48.8-49.2	Saved									
		49.2-49.3	W257.2	43.9	76							
		49.3	TV								TV=0.43tsf	

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
118/9	1.9' Recovery; say 78.0' to 79.9' depth; upper 0.3' disturbed	78.0-80.0	260								
		78.1-78.4	Saved								
	Silty CLAY; dark grey, stiff consistency, moderately plastic (CL)	78.4-78.7	W260.1	22.1		103					TV=0.68tsf
		78.7	TV								
		78.7-									
		79.0	C260.1	27.8					0.741	.24	
	Sample includes about 20% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	78.7-79.0	L260.1	25.3	42	23					
		78.7-	SG								Specific Gravity -2.70
		79.0	260.1								
	Note: Proportions of Sand and fine Gravel increase with depth approaching 40% near bottom of sample.	79.0-79.4	Saved								
		79.4-									
		79.7	W260.2	13.1		123					

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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
B119/1	0.8' Recovery; say 3.0' to 3.8' depth	331								
		TV	32.4							TV=1.0 tsf
	Silty CLAY; dark grayish brown mottled light olive brown, stiff to very stiff consistency, moderately to highly plastic (CL)	W33L1	32.4							
		save								
		33L1								
		TV	25.4							TV=1.34 tsf
		3.4 to								
		3.8	25.4		98					

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Jan. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B119/2	Recovery 2.2'; say 8.0' to 10.2' depth	8.0 to 10.0	332								
	Silty CLAY, dark, grayish brown, very stiff consistency, moderately to highly plastic (CL)	8.2	TV								TV=1.25 tsf
	Sample includes about 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	8.2 to 8.3	W332.1	28.4							
		8.3 to 8.6	I332.1.3	27.9	98	CU	2.2	2012			
		8.6	TV								TV=1.43 tsf
		8.6 to 9.0	I332.1.4	29.2	94	CU	1.5	1240			
		9.0	TV								TV=1.43 tsf
		9.0 to 9.1	W332.2	27.5							
		9.1 to 9.4	I332.1.1	28.3	95	CU	2.2	887			
		9.4	TV								TV=1.50 tsf
		9.4 to 9.5	W332.3	29.2							
		9.5 to 9.7	I332.1	30.8	53	26					
	9.7 to 10.1	save 332.1									

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SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
B119/3	1.9' Recovery; say 20.0' to 21.9' depth; upper 0.3' disturbed  Silty CLAY: dark gray, firm consistency, highly plastic (CL-CH)  Sample includes about 5 to 10% coarse Sand grains (subrounded to subangular in shape)	20.0 to 22.0	333								
		20.3 St			37.3						TV=0.31 tsf TV <sub>R</sub> =0.17 tsf
		20.3 to 20.4 W333.1			37.3						
		20.4 to 20.7 333.1									
		20.7 TV									TV=0.32 tsf
		20.7 to 21.1 333.2									
		21.1 TV			37.2						TV=0.31 tsf
		21.1 to 21.2 W333.2			37.2						
		21.2 to 21.5 333.3									
		21.5 TV									TV=0.29 tsf
		21.5 to 21.9 333.1			36.3						

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TABLE: SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
B119/4	<p>Silty CLAY: very dark grayish brown, soft to firm consistency, highly plastic (CL)</p> <p>Sample includes ±5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)</p>	—									
		30.0 to 32.0									
		30.1	TV	35.4							TV=0.24 tsf
		30.1 to 30.2	W334.1	35.4							
		30.2 to 30.5	save 334.1								
		30.5	TV								TV=0.26 tsf
		30.5 to 30.8	T334.13	35.3		87	CU	5.6	1655		TV=0.29 tsf TV=0.11 tsf
		30.8	St	37.8							
		30.8 to 30.9	W334.2	37.8							
		30.9 to 31.2	T334.12	38.5		85	CU	1.5	1229		
		31.2	TV								TV=0.30 tsf
		31.2 to 31.6	T334.11	36.9		86	CU	1.5	985		
		31.2 to 31.6	I334.1	36.4	41	22					
		31.6 to 31.9	save 334.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B119/5	Silty CLAY: dark grayish brown, soft to firm consistency, highly plastic (CL-CH)		40.0 to 42.5	335								
			40.2	TV								TV=0.26 tsf
			40.2 to 40.5	335.1	35.4		88					
			40.5	TV	35.6							TV=0.27 tsf
			40.5 to 40.6	W335.1	35.6							
			40.6 to 40.9	save 335.1								
			40.9	TV								TV=0.29 tsf
			40.9 to 41.3	save 335.2								
			41.3	St	36.0							TV=0.27 tsf
			41.3 to 41.4	W335.2	36.0							TV <sub>R</sub> =0.14 tsf
			41.4 to 41.7	save 335.3								
			41.7	TV								TV=0.31 tsf
			41.7 to 42.1	save 335.4								
			42.1	TV								TV=0.30 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____									
IDENTIFICATION		SHEET _____ OF _____									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
B119/9	2.1' Recovery; say 80.0' to 82.1' depth	80.0 to 82.5	339								
		80.1	TV	22.4							TV = 0.90 tsf
		80.1 to 80.2	W339.1	22.4							
		80.2 to 80.5	save 339.1								
		80.5 to 80.8	W339.1	21.6		107					
		80.5 to 80.8	save 339.2								
		80.8	TV	21.0							TV = 1.0 tsf
		80.8 to 80.9	W339.2	21.0							
		80.9 to 81.2	save 339.3								
		81.2 to 81.5	save 339.4								
		81.5	TV	22.1							TV = 0.73 tsf
		81.5 to 81.6	W339.1	22.1							
		81.6 to 81.9	U339.1	20.7		107					@15% Strain s = 3072 psf
		81.6 to 81.9	L339.1	20.7	33	20					



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 TABLE        SUMMARY OF LABORATORY TEST RESULTS

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SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
126/3	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% hard subrounded to subangular gravel particles	8.0 to 10.0								
		8.2 to 8.6	26.2	99	U	2.4	1735			
		8.2 to 8.6	26.6	47	24					
		8.6 to 8.8	27.1	97						
		9.1	TV							TV=1.12tsf
		9.4 to 9.6	W24.2	27.0	96					
		9.6 to 9.9	save 24.2							

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TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
126/5	1.9' Recovery: Say 18.0' to 19.9' depth		18.0 to 20.0	242								
			18.4 to 18.5	W242.1	49.3							
			19.2 to 19.3	W242.2	34.7							
	Silty CLAY, grayish brown soft consistency, moderately to highly plastic (CL-CH)		19.6 to 19.8	L242.1	35.6	47 23						
	Note: Entire sample disturbed											

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SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/7	Silty CLAY, dark grayish brown, soft consistency, moderately to highly plastic (CL-CH)  Sample includes about 5% coarse to fine sand grains (subrounded to subangular in shape)  Note: Entire sample disturbed	28.0 to 30.0									
		28.5									
		28.5 to 28.7	35.4		86						TV=0.18tsf
		29.0 to 29.3									
		29.3 to 29.5	34.9		86						
		29.5									TV=0.19tsf
		29.5 to 29.9									

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE April 1974		
												SHEET OF		
IDENTIFICATION		TEST NO.			PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>				
126/11	2.3' Recovery; Say 48.0' to 50.3' depth	48.0 to 50.5 48.2 to save 48.5 48.5 to 48.7			76									
	Silty CLAY, gray, firm consistency, highly plastic (CH)	48.7										TV=0.35tsf		
	Sample includes about 10% fine gravel and coarse sand size particles (subrounded to subangular in shape)	48.7 to 49.1												
		49.1 to 49.4	41.1		81	UU	4.0	498						
		49.1 to 49.4	41.2	59 25										
		49.4 to 49.6	41.4		80									
		49.6											TV=0.40tsf	
		49.6 to 49.9												

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/13	Silty CLAY, dark grey, firm consistency, moderately plastic (CL)  Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)  few layers/lenses ±1" thick of Silty CLAY, Sandy, very stiff consistency, low to moderate plasticity (CL)  Sample includes about 40% fine to medium Sand grains (subrounded to subangular in shape)	58.0-60.5										
		58.2-58.5	246									
		58.5-58.7	W246.1	38.8		79						Silty Clay Portion
		58.7	TV									TV=0.32tsf
		59.0-59.3	L246.1	32.9	40	23						
		59.9-60.0	W246.2	22.1		104						Silty clay, Sandy layer
		60.0	TV									TV=0.46tsf
		60.0-60.3	Saved									

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
126/15	2.4' Recovery; say 68.0' to 70.4' depth  Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse Sand and fine Gravel sized particles (sub-rounded to subangular in shape)	68.0-70.5										
		68.3-68.7										
		68.7-68.8	W247.1	24.1		99						
		68.8	TV									TV=0.50tsf
		68.8-69.3	L247.1	23.2	34	18						
		69.6-69.9	Saved									
		70.1-70.2	W247.2	24.0		100						
		70.2	TV									TV=0.47tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE April 1974										
IDENTIFICATION		SHEET OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>		c <sub>c</sub>
126/23	Silty CLAY; dark gray, firm to stiff consistency, moderately plastic (CL)  Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	108.0 to 110.0	251									
		108.1 to 108.4	save 251.1									
		108.4 to 108.6	W251.1		25.1		97					
		108.6	TV									TV=0.48tsf
		108.6 to 108.9	I251.0.1		25.3		96					@15.0%strain
		108.6 to 108.9	I251.1		23.6	36 20						s=1539 psf
		109.2 to 109.4	W251.2		24.2		97					
		109.4	TV									TV=0.48 tsf
		109.4 to 109.8	save 251.3									

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

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SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/2	1.4' Recovery; Say 3.5' to 4.9' depth	3.5 to 5.5	302								
		3.6 to 4.0	save 302.1								
	Silty CLAY; grayish brown, stiff consistency, moderately to highly plastic (CL-CH)	4.0 to 4.2	W302.1	24.2	99						
		4.2	TV								TV=0.87tsf
		4.2 to 4.5	save 302.2								
		4.5 to 4.8	I302.0.1	24.9	103	UU	8.0	2099			
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	4.5 to 4.8	I302.1	23.1	48	24					



BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
127/3	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL-CH) @ 5.2' change to - Clayey SAND, dark grey, fine to coarse Sand grains with about 40% moderately plastic fines (SC) roots and fibers evident @5.6' change to - Silty CLAY, olive grey, firm to stiff consistency, moderate to high plasticity (CL-CH) Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)	5.0-7.0										
		5.1	TV									TV=1.20tsf
		5.4-5.5	W416.1	29.3		77						
		5.0-5.2	MC									See plot
		5.6-7.0	416.1									TV=0.68tsf
		5.9	TV									
		6.2-6.3	W416.2	27.0		94						
		6.6	TV									TV=1.1tsf
		6.6-7.0	L416.1	25.8	49	22						
		6.6-7.0	416.1	13.5		113	rU	3.2	9403			Test at 95% of MC 416.1

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TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/4	1.6' Recovery; Say 8.0' to 9.6' depth		8.0 to 10.0	417								
			8.1 to 8.7	save 417.1								sample used for T466.1, 2, 3
			8.7 to 8.9	W417.1	21.9		107					
	Silty CLAY, olive brown mottled grayish brown, very stiff to hard consistency, moderately to highly plastic (CL-CH)		8.9 to 9.6	save 417.2								sample used for T466.1, 2, 3
			9.1	TV								TV=2.0 tsf

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
127/8	2.1' Recovery; say 16.0' to 18.1' depth  Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)  Sample includes lenses/layers which contain about 20% fine to coarse Sand grains (sub-rounded to subangular in shape)	16.0-18.0										
		16.2-16.5	421									
		16.6-16.7	W421.1	28.0		91						
		16.7	TV									TV=0.77tsf
		16.7-17.0	Saved									
		17.0-17.3	Saved									
		17.3-17.4	W421.2	30.7		93						
		17.4	TV									TV=0.40tsf
		17.4-17.7	Saved									

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
127/11	Jar Sample	28.5 - 30.0	456								
	Silty CLAY, grey, moderate plasticity (CL)		W456.1	22.8							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/13	Jar Sample	38.0-40.0	457								
	Silty CLAY, grey, moderate plasticity (CL)		W457.1	21.4							
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS DATE <u>July 1974</u> SHEET <u>      </u> OF <u>      </u>										
IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
127/14	Jar Sample	458		32      18						
	Silty CLAY, dark grey, moderate plasticity (CL)	L458.1								
	Sample includes < 5% fine to coarse Sand grains (subrounded to subangular in shape)									

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FILE NO. 1255

DATE July 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
				w <sub>L</sub>	w <sub>p</sub>						
127/15	Jar Sample	48.5-50.0	459								
	Silty CLAY, dark grey, moderate plasticity (CL)		W459.1	20.6							
	Sample includes 10 to 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %		MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	C <sub>c</sub>
127/18	Jar Sample	—	63.5-65.0									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10 to 15% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)  *Note: Water content taken from unsealed jar sample	W460.1		20.3								

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 TABLE: SUMMARY OF LABORATORY TEST RESULTS

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (pcf)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
127/19	Jar Sample	—									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		68.5-								
			70.0								
			L461.1		33	16					

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BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
127/24	Jar Sample	93.5 - 95.0	462								
	SILT, grey, non-plastic (ML)		W462.1	24.9*							
	Sample includes about 25% fine Sand grains										

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
127/29	Jar Sample	113.5- 115.0									
	Silty CLAY, dark gray, moderate plasticity (CL)		L463.1	41	21						
	Sample includes 5 to 10% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)										

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
127/32	Jar Sample	128.5-130.0	464								
	Silty CLAY, dark gray, moderate plasticity (CL)		W464.1	30.9*							

\*Note: Water content taken from unsealed jar sample.

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TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
129/3	1.1' Recovery; Say 8.0' to 9.1' depth; upper 0.3' disturbed (Wash?)	386	8.0 to 10.5								
		save 386.1	8.3 to 8.6								
		TV	8.6								TV = 1.5tsf
	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)	W386.1	8.6 to 8.7	22.9		108					
		T386.0	8.7 to 9.0	22.3		108	UU	6.0	3381		
		L386.1	8.7 to 9.0	22.9	48 23						

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TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE: July 1974										
IDENTIFICATION		SHEET: OF										
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$	$c_c$
129/5	2.1' Recovery; say 18.0' to 20.1' depth	18.0-21.0	387									
		18.1-18.4	Saved									
	Silty CLAY, greyish brown, stiff consistency, moderate to highly plastic (CL-CH)	18.4-18.7	T387.1.1	33.5		90	CU	6.8	1102		$\bar{\sigma}_c=1152$ psf	
		18.7-18.8	T387.1.2	30.8	48	21						
		18.7-18.8	W387.1	31.7								
		18.8	TV									TV=0.63tsf
		18.8-19.1	T387.1.4	33.1			90	CU	9.7	1276		$\bar{\sigma}_c=2304$ psf
		19.1-19.4	T387.1.3	31.9			90	CU	3.6	2087		$\bar{\sigma}_c=4608$ psf
		19.4-19.6	W387.2	33.1			89					
		19.6	TV									TV=0.53tsf
	19.6-20.0	Saved										

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
129/7	SOIL DESCRIPTION	DEPTH (FEET)										
	2.0' Recovery; Say 28.0' to 30.0' depth  Silty CLAY, gray, moderately to highly plastic (CL-CH) Note: Entire sample highly disturbed	28.0 to 30.5	388									
		28.3 to 28.4	W388.1	35.8	88							
		28.4 to 28.6	L388.1	35.6	45	20						

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 TABLE SUMMARY OF LABORATORY TEST RESULTS

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 SHEET OF

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/9	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL)	38.0 to 40.5	389								
		38.1 to 38.4	save 389.1								
		38.4 to 38.6	W389.1	87							
		38.6	TV								TV=0.29tsf
		38.6 to 38.9	save 389.2								
		39.1 to 39.3	L389.1		41	22					
		39.1 to 39.3	C389.1						1.083	.39	
		39.1 to 39.3	SC389.1								specific gravity=2.73
		39.3 to 39.6	save 389.3								
		39.6	TV								TV=0.31tsf
		39.6 to 39.8	W389.2	88							
		39.8 to 40.0	save 389.4								



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	---							
			129/11	1.8' Recovery; say 48.0' to 49.81' depth	48.0-50.5	390				
	Silty CLAY, grey, soft consistency, moderate to highly plastic (CL)  Note: Sample much disturbed below 48.8' depth				Saved					
			48.2-48.5							
			48.5			TV				
			48.5-48.6		45.2	W390.1	77			

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TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
129/13	0.6' Recovery; say 58.5' to 59.1' depth	58.5-60.5	391								
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)  Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)  Note: Entire sample slightly disturbed	58.6-58.7	W391.1	25.7		97					
		58.7-58.9	L391.1	31.7	35	18					
		58.9-59.1	Saved								

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
129/15	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)  Sample includes about 15% fine to coarse sand and fine gravel sized particles (subrounded to subangular in shape)  Note: Upper 0.8' of sample disturbed (Wash?)	DEPTH (FEET)	—									
			73.0 to 75.5	392								
			73.8 to 74.0	W392.1	24.6	99						
			74.0 to 74.3	L392.1	22.8	36	21					
			74.0 to 74.3	T392.01	24.8	101		UU	7.0	954		
			74.3 to 74.7	save 392.1								
			74.7 to 74.9	W392.2	23.2	102						TV=0.68tsf
			74.9	TV								
			74.9 to 75.2	save 392.2								

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 TABLE      SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
129/19	1.8' Recovery; say 93.0' to 94.8' depth		93.0-95.5	394								
			93.1-93.4	T394.1.1	23.7		99	CU	15.0	1518		$\bar{\sigma}_c = 3240$ psf
			93.1-93.4	L394.1	23.7	41	21					
	Silty CLAY, grey, firm to stiff consistency, moderate to high plasticity (CL)		93.4	TV								TV=0.50tsf
			93.4-93.5	W394.1	25.8							
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)		93.5-93.8	T394.1.2	25.9		99	CU	15.0	3047		$\bar{\sigma}_c = 6480$ psf
			93.8-94.1	I394.1.3	27.0		99	CU	13.2	4450		$\bar{\sigma}_c = 12960$ psf
			94.1-94.3	W394.2	26.8		98					TV=0.44tsf
			94.3	TV								
			94.3-94.6	Saved								

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TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
129/21	2.2' Recovery; Say 103.0' to 105.2' depth		103.0 to 105.5	395								
			103.2 to 103.5	save 395.1								
			103.5 to 103.7	W395.1	27.3		97					
	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)		103.7	TV								TV=0.68tsf
			103.7 to 104.0	C395.1	28.0					.703	.23	
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)		103.7 to 104.0	SC395.1								specific gravity=2.71
			104.0	L395.1	26.1		39 21					
			104.1 to 104.4	save 395.2								
			104.4 to 104.6	W395.2	25.1		102					
			104.6	TV								TV=0.51tsf
			104.6 to 104.9	save 395.3								

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE July 1974								
IDENTIFICATION		SHEET 1 OF		OTHER TESTS AND REMARKS						
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH	CONSOLIDATION			
				NAT* WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$		DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	$e_o$ $c_c$
129/22	Jar Sample	108.5	—							
		110.0	465							
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (sub angular to subrounded in shape)		W465, 1	26.6	*					
			L465, 1	39	19					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
DATE April 1974  
SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS			
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	cc	
129/24	1.8' Recovery; Say 123.0' to 124.8' depth; upper 0.5' disturbed (Wash?)	123.0 to 125.5											
		123.5											
		123.5 to 123.9										IV=0, 36tsf	
	Silty CLAY, gray, stiff consistency, moderately to highly plastic (CL-CH)	123.9 to 124.1			90								
		124.1 to 124.4				95							
		124.4 to 124.4					UU	8.0	679				
		Sample includes about 10% hard subrounded gravel size particles	124.1 to 124.4										
			124.4										
		124.4										IV=0, 34tsf	

FILE NO. 1255

DATE \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
130/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)		7.5'	571								
				L571.1	24.9*	49	21					
130/SS6	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		20.0'	572								
				L572.1	30.1*	44	22					
130/SS10	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		40.0'	573								
				L573.1	30.7*	44	23					
130/SS13	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)		55.0'	574								
				L574.1	34.3*	46	23					

\*Not: Water content taken from unsealed jar sample



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE 12/74

SUMMARY OF LABORATORY TEST RESULTS

SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
130/SS14	Jar Sample Silty CLAY, dark gray, low plasticity (CL)		60	575								
	Sample includes ±25% fine to medium Sand size particles											
130/SS16	Jar Sample Silty CLAY, dark gray, low to moderate plasticity (CL)		70	576								
	Sample includes about 15% fine to medium Sand size particles											

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	
134/SS4	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	578	8.5- 10.0'							
		L578.1		24.2*	49	24				
134/SS9	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	579	33.5- 35.0'							
		L579.1		34.5*	45	22				
134/SSL4	Jar Sample Silty CLAY, dark gray, highly plastic (CH) Sample includes ±5% fine Sand	580	58.5- 60.0'							
		L580.1		44.1*	52	33				

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Nov., 1974

SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B136/2	1.9' Recovery; say 3.0' to 4.9' depth	525								
		MC								
		W525.1	36.2							
		TV								Used for processor. See plot
		MC								
		W525.2	29.8		92					TV = 1.28 tsf
		TV								Used for processor. See plot
		MC								
		I525.1		62 25						TV = 1.62 tsf
										Used for processor. See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255  
 DATE Nov. 1974  
 SHEET \_\_\_ OF \_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
B136/4	SOIL DESCRIPTION  1.8' Recovery; say 8.0' to 9.8' depth  Silty CLAY, mottled gray, gray-brown and yellow brown, hard consistency, moderate to high plasticity (CL-CH)  Upper 0.5' of sample includes about ±15% fine to coarse Sand size particles (subrounded to subangular in shape)										
		DEPTH (FEET)									
			8.0'-10.0'								
			8.5'-8.8'								
			saved								
			U526.1	24.3	102	U	3.0	5446			
			L526.1	25.1	48	22					
			9.2'-9.3'								
			W526.2	25.7	98						
			TV								TV > 2.5 tsf
		saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	$c_c$	
136/6	1.6' Recovery; say 13.0' to 14.6' depth	13.0-15.0'	527									
		13.1-13.5'	FC / rU									
		13.5'	W527.1	31.5	90							used for compacted C/U
		13.5'	TV									
		13.6-14.1'	FC / rU									TV = 0.62 tsf used for compacted C/U
		14.1'	TV									
		14.1-14.6'	FC / rU									
		13.0-14.6'	L527.1	43	22							
		13.0-14.6'	C527.1	17.3	101				0.675	.15		
		13.0-14.6'	U1527.1	17.5	100							
		13.0-14.6'	SC527.1									Specific Gravity=2.74

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
136/SS9	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±10% fine to coarse Sand size particles (CL)	23.5 - 25.0'	581								
			W5811	31.1*		93*					
136/SS11	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	33.5 - 35.0'	582								
			L5821	31.9* 43	19						
136/SS15	Jar Sample Silty CLAY, gray-brown, moderate plasticity (CL)	53.5 - 55.0'	583								
			W5831	38.5*		85*					
136/SS19	Jar Sample Silty CLAY dark gray, of low to moderate plasticity. Sample includes about 25% fine to coarse Sand size particles (CL)	73.5 - 75.0'	584								
			L5841	17.0* 34	21						

\* Water content taken from unsealed jar samples

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255								
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____ SHEET _____ OF _____								
IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>
136/SS24	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)  Sample includes ±15% fine to coarse Sand size particles	98.5- 100.0'	21.0%	40 21						

\*Note: Water content taken from unsealed jar sample

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
137/SS1	Jar Sample Silty CLAY, yellow-brown, moderately to highly plastic (CL-CH)	—	1.5 to 3.0								
		586									
		S/H									
		586.1									See plot
	Sample includes ±15% fine to coarse Sand size particles										
137/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH)	—	9.5 to 11.0								
		587									
		1587.1		24.8*	53	24					

Note: Water content taken from unsealed jar sample



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	€ %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
138/SS4	Jar Sample Silty CLAY, dark gray, moderate to high plasticity. Sample includes about 10% fine to coarse Sand size particles occurring as pockets (CL-CH)	588	8.5 - 10.0'								
138/SS9	Jar Sample Silty CLAY, light gray-brown, moderate to high plasticity (CL)	W589.1	33.5 - 35.0'	32.0*	90						
138/SS14	Jar Sample Silty CLAY, dark gray-brown, high plasticity (CL-CH)	W590.1	58.5 - 60.0'	31.9*							
138/SS23	Jar Sample Silty CLAY, dark gray, high plasticity (CL-CH)	W591.1	103.5 - 105.0'	26.7*	49 25						

\* Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II										FILE NO. 1255		
TABLE SUMMARY OF LABORATORY TEST RESULTS										DATE _____ OF _____		
IDENTIFICATION			TEST NO.		PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>
139/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CH-CL) Sample includes ±5% fine to medium Sand size particles		6.5- 8.0'	593								
				L593.1	23.5*	50    24						
139/SS8	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)		29.5- 31.0'	594								
				L594.1	25.2*	42    22						
139/SS12	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)		49.5- 51.0'	595								
				L595.1	31.4*	43    20						
139/SS22	Jar Sample GRAVEL, subangular to sub-rounded Gravel particles, 1/2" to 1-1/2" in size with about 15% fine to coarse Sand, less than 10% non-plastic fines (GP)		99.5- 101.0'	596								
				S596.1								See plot

\*Note: Water content taken from unsealed jar sample

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL    WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$		$C_c$
B141/1	1.9' Recovery; say 3.0' to 4.9' depth  Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH)  Includes ±5% Gravel size pieces (subrounded to sub-angular in shape)  Breaks vertical and laterally in a blocky manner	3.0-5.0'									
		3.1-3.4'									
		3.4-3.5'	W5281	28.9		90					
		3.5'	TV								Used for processor. See plot
		3.5-4.1'	MC								
		4.1-4.2'	W5282	25.7		88					TV=1.50 tsf Used for processor. See plot
		4.2-4.5'	MC								
		4.5'	TV								Used for processor. See plot
		4.5-4.9'	MC								
		3.0-4.9'	W5281		56    23						TV -1.00 tsf Used for processor. See plot

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
					WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		c <sub>c</sub>
141/2	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH-CL)  Sample includes ±20% fine to coarse Sand size particles		8.0-10.0'	529									
			8.1-8.7'	rU									Used for compacted U
			8.7'	W529.1	26.3	95							
			8.7'	TV									TV = 1.77 tsf Used for compacted U
			8.8-9.2'	rU									
			9.2'	W529.2	25.0	95							
			9.2'	TV									TV = 1.02 tsf Used for compacted U
			9.3-10.0'	rU									
			8.0-10.0'	U529.1			49	23					
			8.0-10.0'	U529.1	17.5	103			rU	2.0	5558		

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	NAT. WATER CONTENT (%)			ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX SHEAR STRESS (PSF)	$e_0$	$c_c$	
B141/4	1.9' Recovery, say 18.0 to 19.9' depth  Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)  Sample includes $\pm 5\%$ fine to coarse Sand grains and fine subangular to subrounded Gravel pieces (1/4" max. size)		18.1-20.1	531								
			18.0-18.3	Saved								
			18.3-18.4	W531.1		35.3	86					
			18.4	TV								TV=0.37 tsf.
			18.4-									
			18.7	T531.1		35.5	87		CU	3.2	1393	$\bar{\sigma}_c = 2304$ psf
			18.4-									
			18.7	L531.1		35.2	45	21				
			18.7-									
			19.1	T531.1		36.3	86		CU	3.0	1040	$\bar{\sigma}_c = 1152$ psf
			19.1-19.2	W531.2		36.6	85					
			19.2	TV								TV=0.32 tsf
		19.2-										
		19.5	T531.1	b	37.3	84		CU	9.6	1626	$\bar{\sigma}_c = 46.37$ psf	
		19.5-		a								
		19.9	T531.1		35.1	85		CU	4.2	1625	$\bar{\sigma}_c = 46.08$ psf	

FILE NO. 1255

PROJECT: BELLE RIVER PLANT UNITS I & II

DATE \_\_\_\_\_ OF \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>	c <sub>c</sub>	
141/SS4	Jar Sample Silty CLAY, brown, moderate to high plasticity (CL)	29.5- 31.0'	597								
			L597.1	33.8*	47 21						
141/SS10	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	59.5- 61.0'	598								
			L598.1	30.2*	41 19						
141/SS21	Jar Sample Sandy GRAVEL, hard sub-angular to subrounded Gravel size particles to 3/4" maximum about 30% fine to coarse Sand and 20% non-plastic fines (GM)	114.5- 116.0'	599								
			S599.1								See plot
141/SS27	Jar Sample Sandy CLAY, gray, low plasticity; about 45% fine to coarse Sand and fine Gravel size particles to 1/4" max. size (SM-SC)	144.5- 146.0'	600								
			S600.1								See plot

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B142/1	0.9' Recovery; say 3.0' to 3.9' depth		3.0-5.5'	532								
			3.0-3.4'	MC								
	Silty CLAY, mottled brown and gray, very stiff consistency high plasticity (CH)		3.4-3.5'	W532.1	28.9		98					
	Includes ±10% subrounded to subangular fine to coarse Sand grains		3.5'	TV								Used for processor. See plot
			3.5-3.7'	MC								
			3.7-3.8'	W532.2	25.1		97					TV=1.53 tsf Used for processor. See plot
			3.8'	TV								
			3.8-3.9'	MC								
			3.0-3.9'	I532.1		54	23					TV=1.58 tsf Used for processor. See plot

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u> TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS DATE <u>Nov. 1974</u> SHEET <u>      </u> OF <u>      </u>											
BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS		TEST TYPE	MAX. SHEAR STRESS (PSF)	$e_0$	$C_c$	
				WL	WP		$\epsilon$ %				
B142/4	0.7' Recovery; say 8.0' to 8.6' depth	8.0'-10.5'	533			22.8				106	
		8.0'-8.3'	L533.2	42	22						
		8.3'-8.4'	W533.1			24.8					
		8.4'	TV								
		8.4'-8.6'	L533.1	49	22						

Silty CLAY, olive brown to dark brown with layers of Sandy CLAY; very stiff consistency, moderate to high plasticity (CL) at 8.3'

CHANGE TO:  
Olive-gray/brown Silty CLAY, very stiff consistency, highly plastic (CL-CH)

Sample includes ±10% fine to coarse Sand and Gravel size particles (subrounded to sub-angular in shape; 1/2 inch maximum size)



PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE: SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE: \_\_\_\_\_  
 SHEET: \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub>
142/5	2.1' Recovery: say 14.0' to 16.1' depth	—									
	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)	534									
		14.1' - 14.4' CU									
		14.4' W534.1		36.5		82					
		14.4' TV									
		14.5' - 15.1' CU									
		15.1' W534.2		34.0		86					
		15.1' TV									
		15.2' - 15.6' CU									
		15.6' W534.3		35.1		88					
		15.6' TV									
		15.7' - 16.1' CU									
		14.0' - 16.1' L534.1			47 22						
		14.0' - 16.1' T534.1.2		15.3		105	CU	15.0	1475		
	14.0' - 16.1' T534.1.3		15.1		105	CU	15.0	2625			

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B142/6	2.3' Recovery; say 19.0' to 21.4' depth	19.0'- 21.5'	535								
		19.2'	TV								TV = 0.30 tsf
		19.2'- 19.5'	saved								
	Silty CLAY, gray-brown, medium consistency, moderate to high plasticity (CL)	19.5'- 19.6'	W535.1	38.5							
		19.6	TV								TV = 0.32 tsf
	Sample includes ±15% fine to coarse Sand and fine Gravel size pieces (1/2 inch maximum size)	19.6'- 19.9'	saved								
		20.1'- 20.5	C535.1	38.2					1.019	.41	Specific gravity = 2.69
		20.1'- 20.5'	SC535.1								
		20.1'- 20.5'	L535.1	37.9	45	22					
		20.5'- 20.6'	W535.2	37.7			83				
		20.6'	TV								TV = 0.36 tsf
		20.6'- 20.9'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE: SUMMARY OF LABORATORY TEST RESULTS

DATE: \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL      wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>c</sub>	
142/SS14	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)		61.0'	601		44      20						
142/SS24	Jar Sample Silty CLAY, sandy, gray, of low plasticity (CL-ML)  Sample includes 25-30% fine to medium Sand size particles		111.0'	602								

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
143/SS2	Jar Sample Silty CLAY, yellow-brown, of moderate to high plasticity (CL)	6.0'	603	23.1*	45 20						
143/SS4	Jar Sample Silty CLAY, gray, moderately plastic (CL)	16.0'	604	26.7*	43 22						
143/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	36.0'	605	36.1*	46 23						
143/SS11	Jar Sample Silty CLAY, grayish-brown, of moderate plasticity (CL)	51.0'	606	31.6	43 22						

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II		FILE NO. 1255									
TABLE: SUMMARY OF LABORATORY TEST RESULTS		DATE									
IDENTIFICATION		SHEET ___ OF ___									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS WL      WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
143/SS15	Jar Sample Silty CLAY, grayish-brown, highly plastic (CL-CH)	71.0'	607								
			L607.1	29.9*	48	21					
143/SS20	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes 20-25% fine to coarse Sand size particles	96.0'	608								
			L608.1	19.3*	38	20					
143/SS27	Jar Sample Sandy CLAY, gray, of low plasticity (SC) Sample includes ±35% fine to coarse Sand and ±5% fine Gravel size particles to 1/4" maximum	131.0'	609								
			L609.1	14.7*	27	17					

\*Note: Water content taken from unsealed jar sample

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SUMMARY OF LABORATORY TEST RESULTS

SHEET 1 OF 1

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS													
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>	c <sub>c</sub>											
B144/4	2' Recovery; say 8.0' to 10.0'	537	8.0-																				
		TV	8.2'																			TV = 1.80 tsf	
		saved	8.2-																				
		U537.1	8.5'																				
		U537.1	8.5-	26.3			97			U	1.7	861											
		U537.1	8.8'	24.1			99			U	15.0	1482											
		L537.1	8.5-																				
		L537.1	8.8'	27.3	48	21																	
		W537.1	8.8-																				
		W537.1	8.9'	28.1																			TV = 1.70 tsf
		TV	8.9'																				
		U537.2	8.9-																				
		U537.2	9.2'	24.1			100			U	3.0	1002											
		W537.2	9.2-																				
		W537.2	9.3'	27.1																			

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TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	ε	e <sub>0</sub>		C <sub>c</sub>
B144/6	1.7' Recovery; say 13.0' to 14.7' depth  Silty CLAY, brown and gray- ish brown, very stiff consistency, moderate to high plasticity (CL)  Sample includes 15 to 20% fine to coarse Sand size particles	13.0-	—									
		15.0'	538	25.7		99						
		13.3-										
		13.7'	saved									
		13.7-										
		13.8'	W538.1	25.7								
		13.8'	TV									TV = 1.53 tsf
		13.8-										sieve/hydro-
		14.1'	S/H538.1									meter. See plot
		14.1-										
		14.2'	W538.2	25.7								
		14.2'	TV									TV = 1.88 tsf
		14.2-										
		14.5'	saved									

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	ε %	e <sub>o</sub>	
144/SS10	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±5% fine to coarse sand size particles (CL)		28.5 to 30	610								
				W610.1	35.5							
144/SS16	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity (CL)		58.5 to 60	611								
				W611.1	32.4							
144/SS23	Jar Sample Silty CLAY, gray, moderate plasticity (CL) Sample includes 15% fine to coarse sand size particles		93.5 to 95	612								
				I612.1	19.8	35	18					



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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE _____ SHEET _____ OF _____									
IDENTIFICATION		TEST NO.		PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>	
B146/3	1.8' Recovery: say 6.0' to 7.8' depth	6.0 - 8.0'									
	Silty CLAY, brown & gray mottled, very stiff to hard consistency, moderate plasticity (CL)  Sample includes ±5% fine to medium Sand size particles (subangular to subrounded in shape)	6.1 - 6.4'				r CU					Used for compacted CU
		6.4 - 6.5'	36.2		84	W540.1					
		6.5'				TV					TV = 2.03 tsf
		6.5' - 6.9'				r CU					Used for compacted CU
		6.9' - 7.0'	37.8			W540.2					
		7.0'				TV					TV = 2.03 tsf
		7.0' - 7.3'				r CU					Used for compacted CU
		7.4' - 7.5'	37.2	44	21	W540.1					
		7.5' - 7.8'				r CU					Used for compacted CU
		6.0' - 7.8'	14.4			T540.1.2	CU	15.0	2163		
	6.0' - 7.8'	14.2			T540.1.3	CU	10.9	3173			$\bar{\sigma}_c = 3888$ psf

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SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
B146/5	1.6' Recovery; say 10.0' to 11.6' depth	10.0-12.0'	541								
		10.1-10.4'	MC								Used for proc-tor. See plot
	Silty CLAY, mottled brown and gray, firm consistency, moderate plasticity (CL) includes $\pm 10\%$ fine to coarse Sand size particles	10.4'	W541.1	33.9		90					
		10.4'	TV								TV = 0.67 tsf
		10.5-11.0'	MC								Used for proc-tor. See plot
		11.0'	W541.1	27.5		92					
	@ $\pm 11.1'$ depth changes to Silty CLAY, Sandy, firm consistency, moderately plastic (CL) Includes $\pm 40\%$ fine to coarse Sand and Gravel size pieces	11.0'	TV								TV = 0.73 tsf
		11.1-11.6'	MC								Used for proc-tor. See plot
		10.0-11.6'	L541.1		38 19						

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TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
	SOIL DESCRIPTION				WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> / w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>		C <sub>c</sub>
146/7	2.1' Recovery; say 14.0' to 16.1' depth  Silty CLAY, brown, firm to stiff consistency, moderate to high plasticity (CL)  Sample includes ±5% fine to coarse Sand size particles		14.0-16.0'	—									
			14.1-14.5'	rC / rU									used for compacted C/U
			14.5'	W542.1		32.2		88					
			14.5'	TV									TV = 0.48 tsf used for compacted C/U
			14.6-15.1'	rC / rU									
			15.1'	W542.2		33.3		90					
			15.1'	TV									TV = 0.50 tsf used for compacted C/U
			15.2-15.6'	rC / rU									
			15.6'	W542.3		34.0		85					
			15.6'	TV									TV = 0.49 tsf used for compacted C/U
			15.7-16.1'	rC / rU									
			14.0-16.1'	L542.1			46	22					
			14.0-16.1'	C542.1		15.9		103			(.679)	.15	
			14.0-16.1'	U542.1		16.6		104	rU	2.0	3282		
		14.0-16.1'	S0542.1									Specific Gravity = 2.75	

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TABLE SUMMARY OF LABORATORY TEST RESULTS

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DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
146/SSI6	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	— 614 L64.1	28.7*	43   20						

\*Note: Water content taken from unsealed jar sample

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT* WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	C <sub>c</sub>	
147/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH) Sample includes ±10% fine to coarse Sand size particles	6.0'- 7.5'	624	58	24						
147/SS7	Jar Sample Silty CLAY, gray, of moderate to high plasticity (CL) Sample includes ±5% fine to coarse Sand size particles	23.5'- 25.0'	616	46	23						

\*Note: Water content taken from unsealed jar sample

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TABLE        SUMMARY OF LABORATORY TEST RESULTS

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SHEET        OF       

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS		
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_0$	$C_c$
B151A/2	1.2' Recovery; say 7.5' to 8.7' depth	—										
		544	7.5'-10.0'									
		544 S/H	7.7'-8.0'									
	Silty CLAY, mottled yellow-brown and gray, very stiff consistency, moderate to high plasticity	W544.1	8.0'	25.0		94						
		TV	8.0'									TV = 1.40 tsf
		saved	8.1'-8.4'									
	Sample includes 5-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape- to 1/2 inch maximum size)	W544.2	8.5'	24.8		98						
		TV	8.5'									TV = 1.40 tsf

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SUMMARY OF LABORATORY TEST RESULTS

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B151A/3	1.2' Recovery; say 12.5' to 13.7' depth	12.5'-13.7'	—								
	—	12.6'-12.9'	545 saved								
	Silty CLAY, gray, very stiff consistency, highly plastic (CL-CH)	12.9'	W345.1	27.5	94						
		12.9'	TV								TV = 1.13 tsf
		13.0'-13.3'	545.0.1	28.3	95	UU	10.0	2325			σ <sub>c</sub> = 1555 psf
	Sample includes 10-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/4 inch maximum size)	13.3'	1545.1	27.7	20						
		13.3'-13.6'	—	saved							
		13.7'	W345.2	31.5	93						TV = 0.55 tsf
		13.7'	TV								

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TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
154/SS3	Jar Sample Silty CLAY, yellow brown, highly plastic (CH-CL) Sample includes ±10% fine to coarse Sand size particles	6.0'- 7.5'	617								
			L617.1	23.2*	51	23					
			W617.1				100				
154/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±10% fine to coarse Sand size particles	28.5'- 30.0'	618								
			L618.1	33.3*	44	21					
154/SS13	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to coarse Sand size particles	53.5'- 55.0'	619								
			L619.1	33.4*	40	19					
154/SS17	Jar Sample Silty CLAY, gray, highly plastic (CH)	73.5'- 75.0'	620								
			L620.1	33.1*	54	25					

Note: Water content taken from unsealed jar sample



IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
154/SS19	Jar Sample Silty CLAY, Sandy, dark gray, of low to moderate plasticity (CL)	83.5- 85.0'	621	25.7*	31 16						
	Sample includes ±25% fine to coarse Sand size particles										
154/SS22	Jar Sample Clayey SILT, gray, of low plasticity (CL-ML)	98.5- 100.0'	622	9.6*	20 13						
	Sample includes ±15% fine to medium Sand size particles										
154/SS25	Jar Sample Silty CLAY, gray, of low plasticity, (CL)	113.5- 115.0'	623	18.4*	30 19						
	Sample includes ±10% fine Sand size particles										

Note: Water content taken from unsealed jar sample

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SHEET \_\_\_\_\_ OF \_\_\_\_\_

TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
158/2	2.2' Recovery; say 7.5' to 9.7' depth; upper 1.5' disturbed  Silty CLAY, mottled gray-brown and grayish brown, stiff to very stiff consistency, moderately to highly plastic (CL-CH)  Sample includes fine to medium Sand size particles; 30% or more near top of sample, ±10% near bottom	7.5-10.0'	548								
		7.6-8.1'	rU								used for compacted U
		8.1'	W548.1		29.0		94				
		8.2-8.5'	rU								used for compacted U
		8.5'	W548.2		28.2		95				
		8.6-8.9'	rU								used for compacted U
		9.0'	W548.3		24.3						
		9.0'	TV								
		9.1-9.4'	rU								used for compacted U
		9.4'	W548.4		21.6		101				
	9.4'	TV									
	9.5-9.7'	rU								used for compacted U	
	7.5-9.7'	L548.1		50	21						
	7.5-9.7'	Ur548.1		16.8		104	rU	2.0	347		

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TABLE: SUMMARY OF LABORATORY TEST RESULTS

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IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)		e <sub>0</sub> c <sub>c</sub>
B158/4	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)  Sample includes 5-10% fine to coarse Sand size particles	17.5-20.0'									
		17.5-17.8'	550								
			saved								
			W550.1	36.2		84					
			TV								TV = 0.34 tsf
			18.0-18.5'								
			saved								
			W550.2	37.8		83					
			TV								TV = 0.37 tsf
			18.6-18.9'								
			W550.1.1	37.5		83	CU	3.2	885		σ <sub>c</sub> = 1080 psf
			18.6-18.9'		46 19						
			W550.1								
			19.0-19.3'	33.5		87	CU	5.1	971		σ <sub>c</sub> = 2160 psf
		W550.1.2									
		19.3-19.6'	37.1		83	CU	5.7	1297		σ <sub>c</sub> = 4320 psf	
		W550.1.3									
		19.8	37.2								

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TABLE SUMMARY OF LABORATORY TEST RESULTS												DATE		SHEET		OF	
IDENTIFICATION		TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS								
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	c <sub>c</sub>							
163/SS2	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH-CL) Sample includes ±5% fine to coarse Sand size particles	3.5-5.0' L615.1		51 24													
163/SS4	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	8.5-10.0' L625.1	28.4*	47 23													
163/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	28.5-30.0' L626.1	23.9*	42 20													
163/SS11	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to medium Sand size particles	43.5-45.0' L627.1	33.5	45 21													

\*Note: Water content taken from unsealed jar sample

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DATE \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT.* WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
163/SS16	Jar Sample Silty CLAY, grayish-brown, highly plastic (CH)		628		52 24						
			L628.1	36.9*							
163/SS21	Jar Sample Silty CLAY, gray, moderately plastic (CL)		629								
	Sample includes ±10% fine to coarse Sand size particles		L629.1	22.3*	39 20						

\*Note: Water content taken from unsealed jar sample

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TABLE SUMMARY OF LABORATORY TEST RESULTS		DATE Nov. 1974									
IDENTIFICATION		SHEET OF									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
B185/3	2.7' Recovery; say 6.0' to 8.7' depth	6.0' 9.0'	552								
		6.5'- 6.8'	saved								
		6.8'	W552.1	25.2		99					
		6.9'- 7.2'	saved								
		7.5'- 7.8'	U552.1	23.9		104	4.0	2948			
		7.5'- 7.8'	I552.1	24.7	50	23					
		7.8'	W552.2	26.9		99					
		7.8'	TV								TV = 1.75 tsf
		7.9'- 8.1'	C552.1	29.1					.757	0.18	
		7.9'- 8.1'	SG552.1								Specific Gravity = 2.72
		8.2'- 8.5'	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE \_\_\_\_\_ OF \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>o</sub>	cc		
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)									
B185/7	2.7' Recovery; say 18.0' to 20.7' depth  Silty CLAY, gray, medium consistency, highly plastic (CL-CH)  Sample includes less than 5% fine Sand size particles	18.0-21.0'									
		18.2-18.5'	554								
		18.5-18.8'	saved								
		18.8-18.5'	U554.1	39.3		81	U	2.4	416		
		18.8'	L554.1	39.0	49 22						
		18.9'	W554.1	38.8		81					TV = 0.35 tsf
		18.9'	TV								
		19.2-19.8'	saved								
		19.9'	W554.2	35.4		82					
		19.9'	TV								TV = 0.32 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE \_\_\_\_\_ SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL      PL	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
B185/13	2.8' Recovery; say 48.0' to 50.8' depth	48.0-51.0'	556								
		48.2-48.5'	saved								
	Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)	48.5'	W556.1	34.7		85					TV = 0.44 tsf
		48.5'	TV								
	Sample includes varying amounts of fine to medium Sand, ±10% at top of sample to ±40% near bottom; less than 5% subangular to subrounded Gravel particles to 1/4" size occur throughout	48.6-48.9'	L556.1	37.1	47 22						
		49.4'	W556.2	31.5		87					
		49.5-49.9'	L556.2	25.9	28 17						



PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>o</sub>	
186/3	Jar Sample	6.0	---								
	Silty CLAY, dark greyish brown, high plasticity (CH-CL)	7.5	443								
			L443.1	52	18						
			W443.1	21.5*		99					

\*Note: Water content taken from unsealed jar sample

FILE NO. 1255  
DATE July 1974  
SHEET OF

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION				NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
186/7	0.8' Recovery; say 23.0' to 23.8' depth		23.0 - 25.0	423								
			23.0 - 23.3	I423.1	40.5	42	21					
	Silty CLAY, grey, soft consistency, moderate to high plasticity (CL)		23.3 - 23.5	W423.1	39.0		80					
			23.5 - 23.8	Saved								
	Note: Entire sample much disturbed											

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1971

SHEET OF

BORING SAMPLE	IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
	SOIL DESCRIPTION	DEPTH (FEET)		NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL Wp	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
186/13	1.5' Recovery; say 53.0' to 54.5' depth	53.0-55.0	426								
	Silty CLAY, grey, soft to firm consistency, moderate plasticity (CL)  below 53.8' depth, sample includes about 20% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	53.2-53.5	Saved								
		53.5-53.6	W426.1	40.7		80					
		53.6	TV								TV = 0.28tsf
		53.6-54.0	Saved								
		54.0-54.3	L426.1	27.0	33	17					
		54.3-54.4	W426.2	28.6		92					
		54.4	TV								TV = 0.21tsf

FILE NO. 1255  
DATE July 1974

PROJECT: BELLE RIVER PLANT UNITS I & II  
TABLE SUMMARY OF LABORATORY TEST RESULTS SHEET OF

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION		NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_p$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_o$	
186/20	Jar Sample	—								
		444								
	Silty CLAY, grey, moderate plasticity (CL)	W444.1	20.2*		107					
		L444.1		32	17					
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)									
	*Note: Water content taken from unsealed jar sample									

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS $\omega_L$ $\omega_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
186/23	Jar Sample		103.5 105.0	— 445								
	SILT, grey, non-plastic (ML)			W445.1	12.0*							
	Sample includes about 20% fine Sand grains			L445.1		18	18					

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II  
 SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	IDENTIFICATION	DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)	$e_0$	
187/6	Jar Sample	18.5-20.0	446								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)		W446.1	35.9*							

\*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE SUMMARY OF LABORATORY TEST RESULTS

SHEET 0F

IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
BORING SAMPLE	SOIL DESCRIPTION		DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS $w_L$ $w_P$	DRY UNIT WEIGHT (PCF)	TEST TYPE	$\epsilon$ %	MAX. SHEAR STRESS (PSF)		$e_o$
187/7	Jar Sample	447									
	Silty CLAY, gray, moderate to high plasticity (CL-CH)	1447.1	37.9*	47 20							
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II  
 TABLE SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255  
 DATE July 1974  
 SHEET OF

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT. WATER CONTENT (%)	ATTERBERG LIMITS WL WP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>o</sub>	
187/13	Jar Sample		53.5 - 55.0	448								
	Silty CLAY, grey, moderate to high plasticity (CL)			W448.1	39.5*							
	*Note: Water content taken from unsealed jar sample											



IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
			NAT. WATER CONTENT (%)	ATTURBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e <sub>0</sub>	
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)								
187/14	Jar Sample	58.5- 60.0								
	Clayey SILT, Sandy, gray, low to moderate plasticity (CL-ML)									See plot
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)									

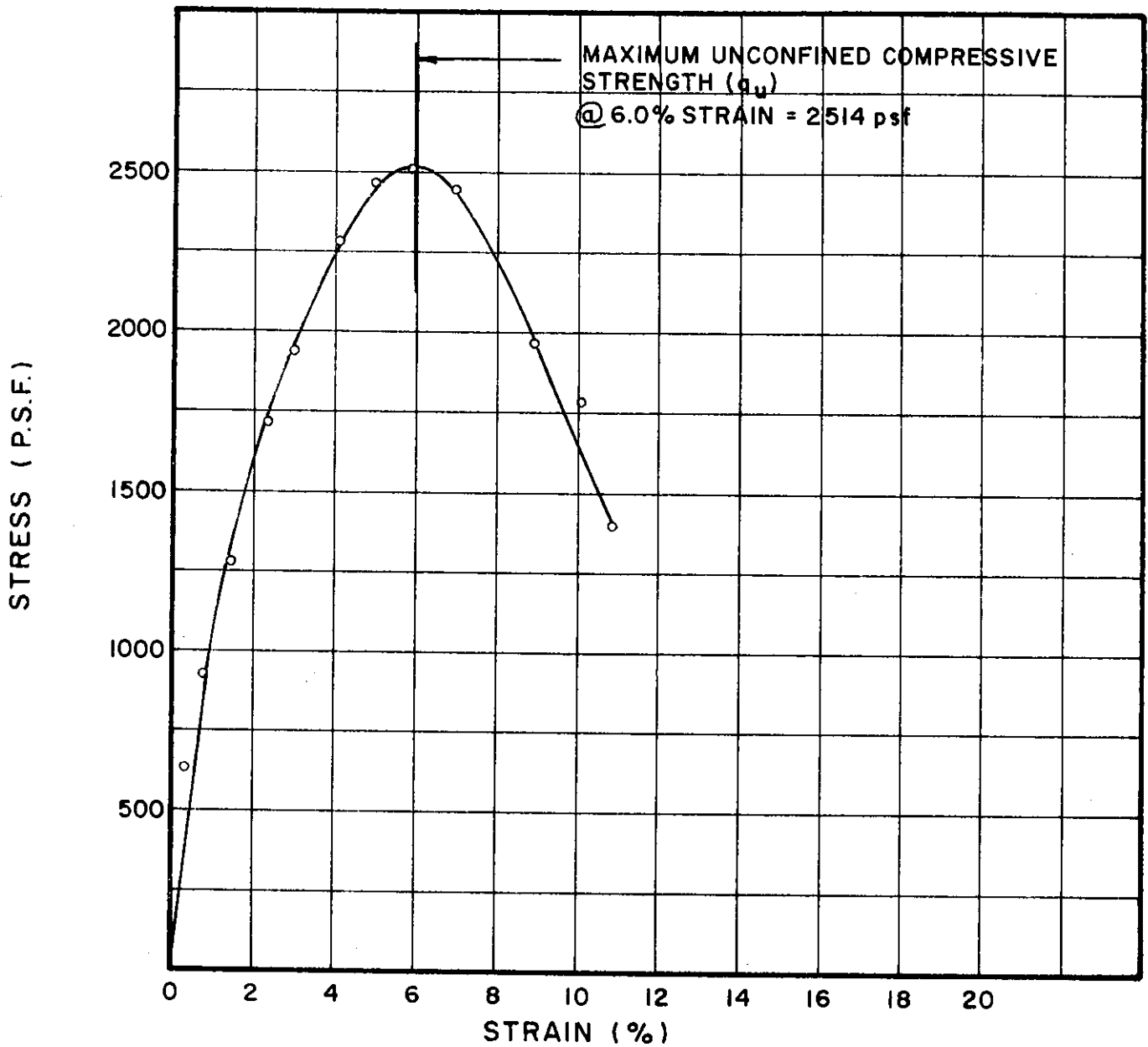
PROJECT: BELLE RIVER PLANT UNITS I & II FILE NO. 1255  
 TABLE      SUMMARY OF LABORATORY TEST RESULTS DATE July 1974  
 SHEET      OF     

BORING SAMPLE	IDENTIFICATION		DEPTH (FEET)	TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
					NAT* WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>p</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX SHEAR STRESS (PSF)	e <sub>0</sub>	
187/17	Jar Sample		73.5- 75.0	450								
	Silty CLAY, dark grey, moderate plasticity (CL)			W450.1	25.6							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)											
	*Note: Water content taken from unsealed jar sample											

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u>		FILE NO. <u>1255</u>									
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS		DATE <u>July 1974</u>									
IDENTIFICATION		SHEET <u>      </u> OF <u>      </u>									
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	TEST NO.	PROPERTIES		STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
				NAT. WATER CONTENT (%)	ATTERBERG LIMITS wL    wP	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε	MAX. SHEAR STRESS (PSF)		e <sub>o</sub>
187/22	Jar Sample	98.5 - 100.0	451								
	Silty CLAY, dark grey, moderate plasticity (CL)		W45L1	24.1							
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: <u>BELLE RIVER PLANT UNITS I &amp; II</u> FILE NO. <u>1255</u>											
DATE <u>July 1974</u>											
TABLE <u>      </u> SUMMARY OF LABORATORY TEST RESULTS SHEET <u>      </u> OF <u>      </u>											
IDENTIFICATION		TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS	
			DEPTH (FEET)	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w <sub>L</sub> w <sub>P</sub>	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	e <sub>0</sub>		
BORING SAMPLE	SOIL DESCRIPTION										
187/23	Jar Sample	—	103.5 105.0								
	Silty CLAY, gray, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	1452.1		28.8*34	19						

\*Note: Water content taken from unsealed jar sample

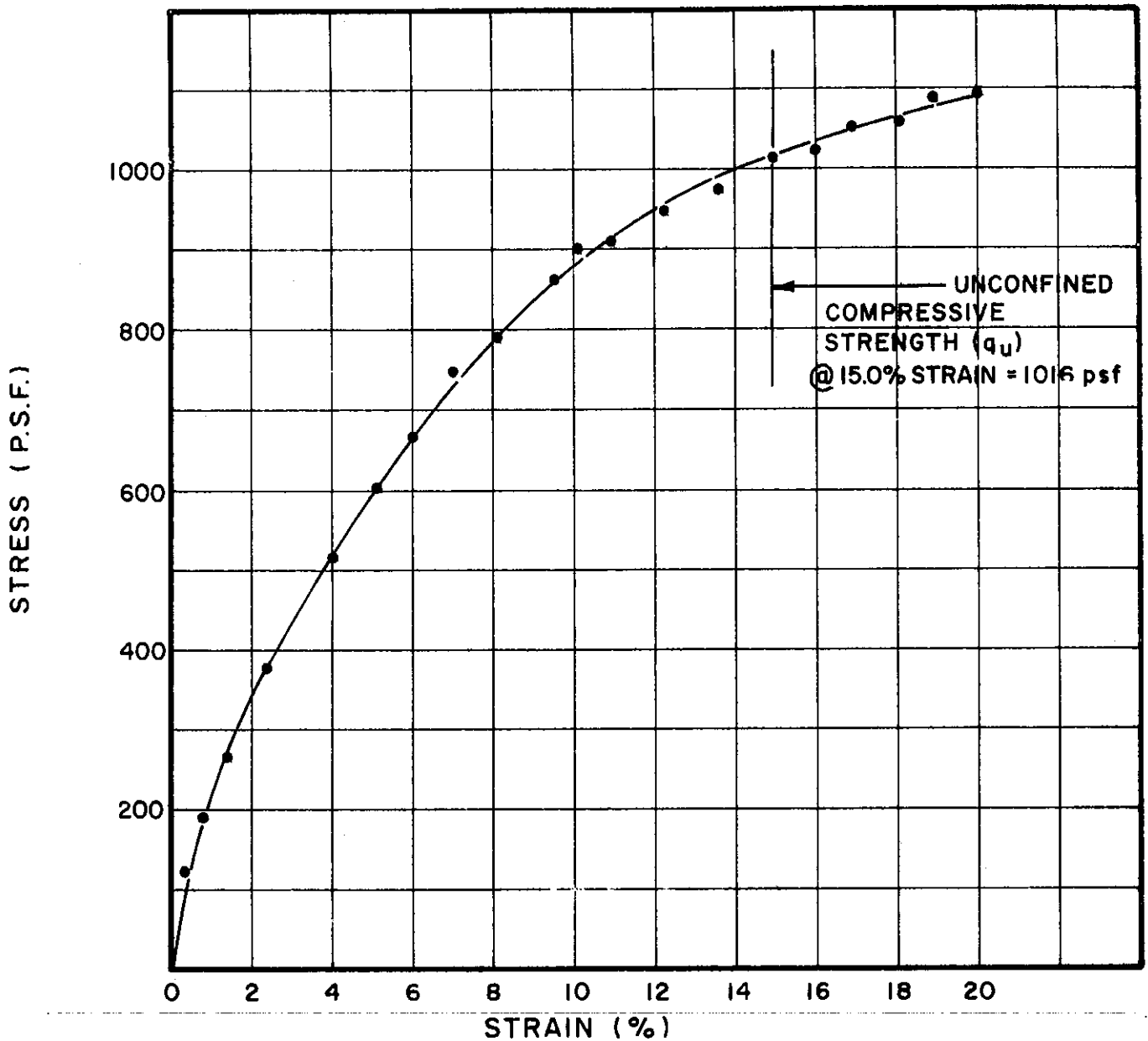


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI20.2	1.40	3.50	0.26	31.6	93	44	19	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



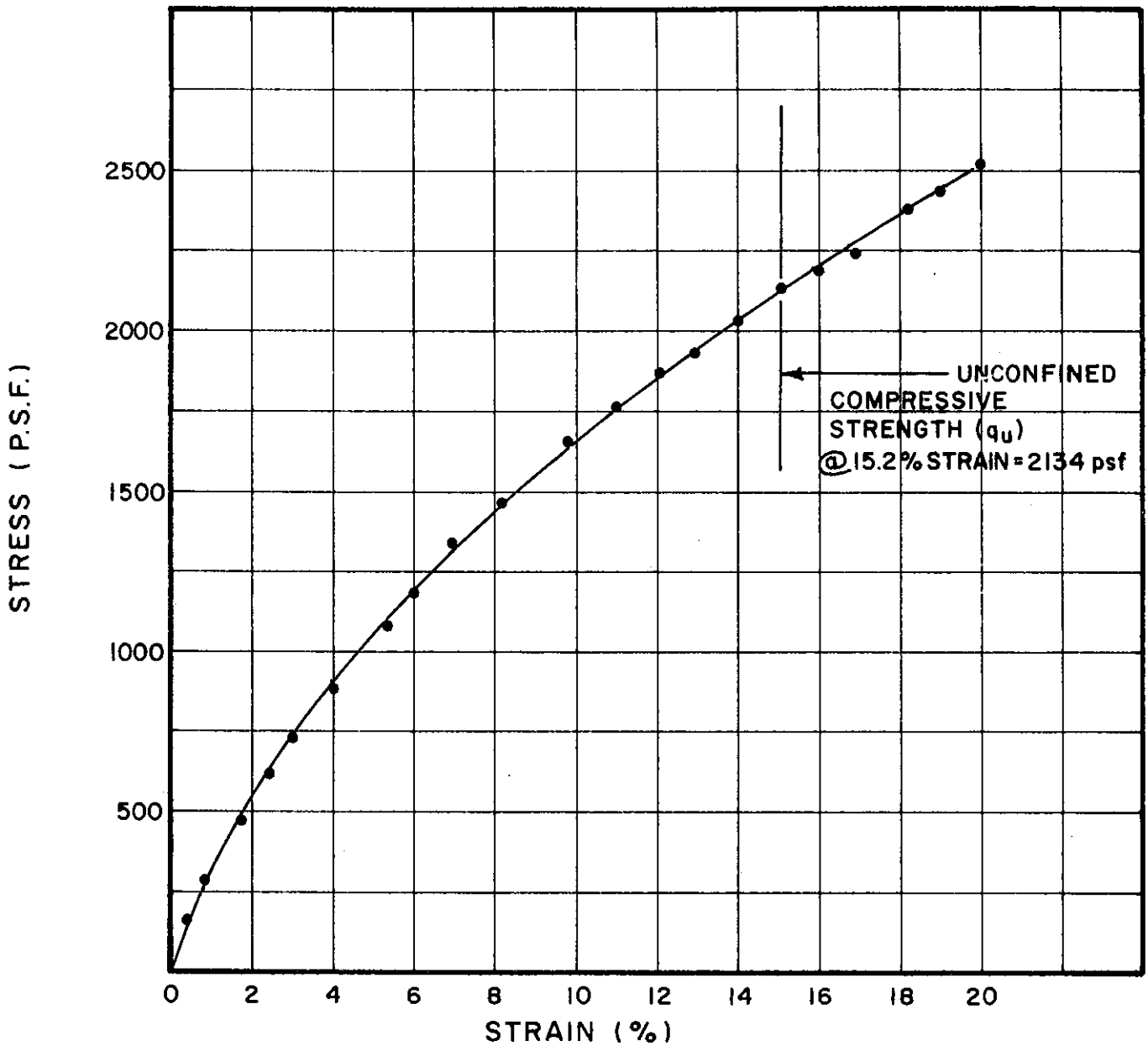
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
UI21.1	1.40	3.50	0.26	34.1	87	42	20	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 6  
 DEPTH 18.1' TO 18.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

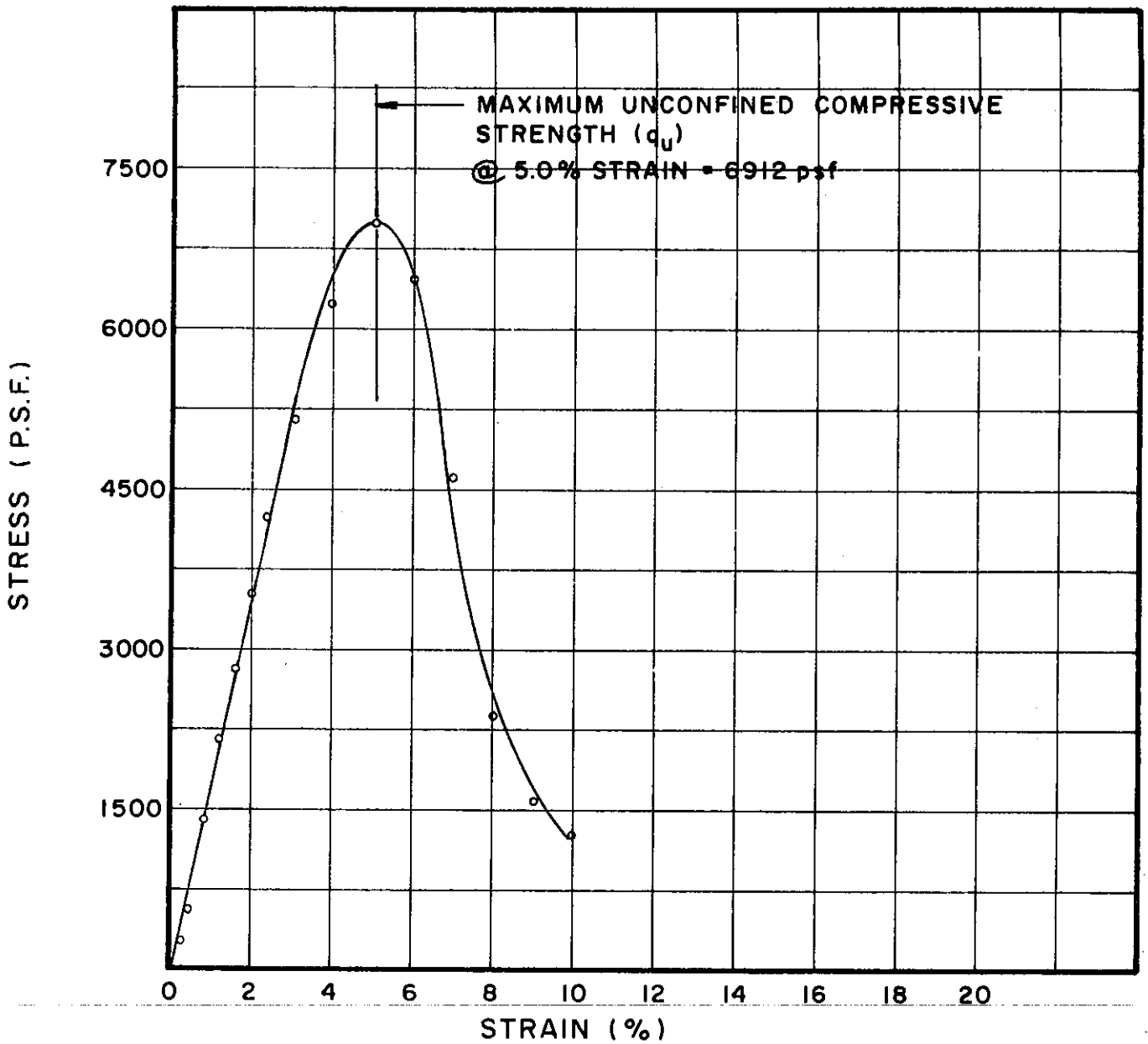


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI25.1	1.40	3.50	0.26	22.5	104	34	18	SILTY CLAY (CL)

BORING NO. 15  
 SAMPLE NO. 14  
 DEPTH 59.2' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U266.1	1.44	3.46	.260	22.4	108	59	23	SILTY CLAY (CH)

BORING NO. 25

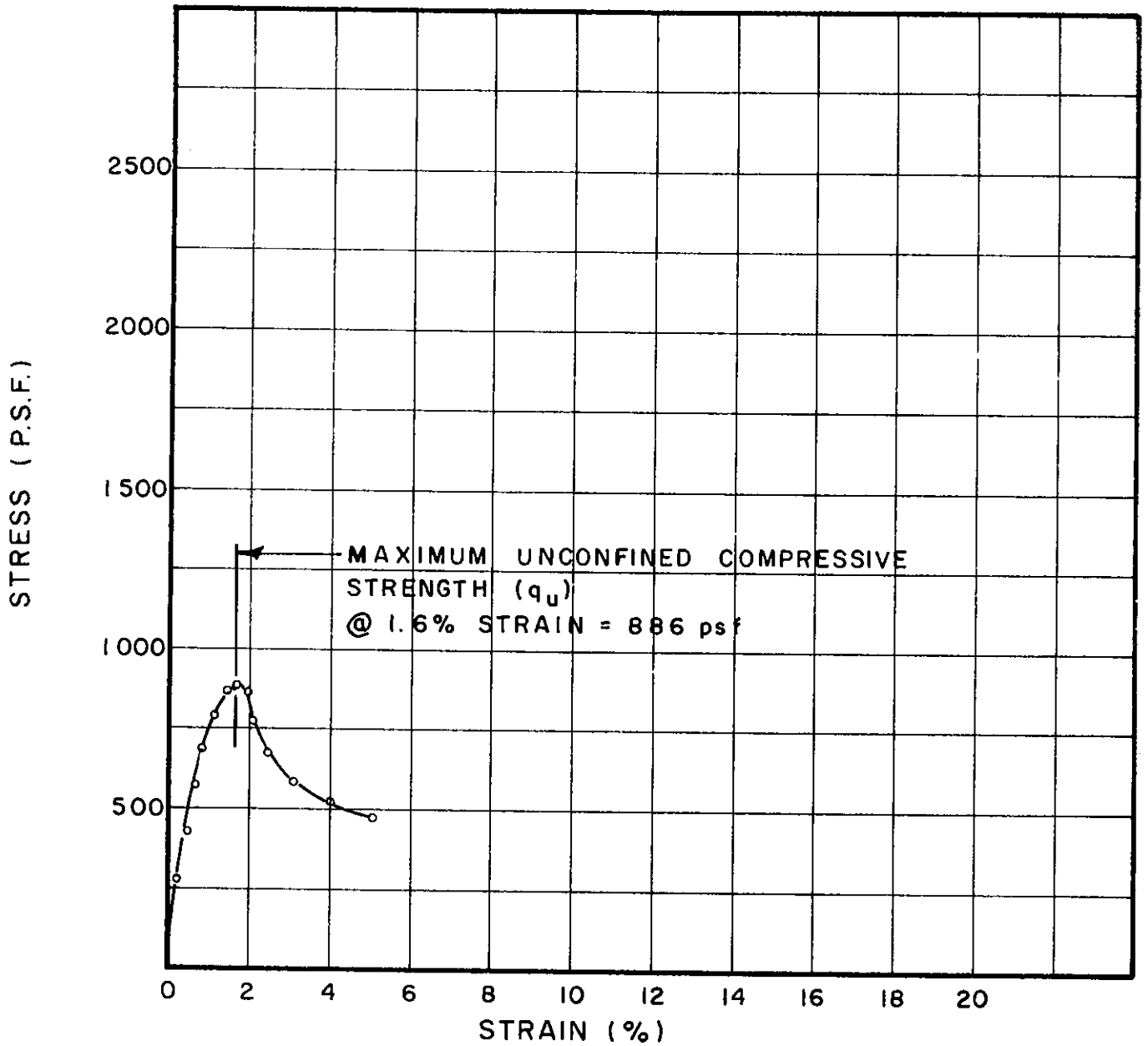
SAMPLE NO. 1

DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



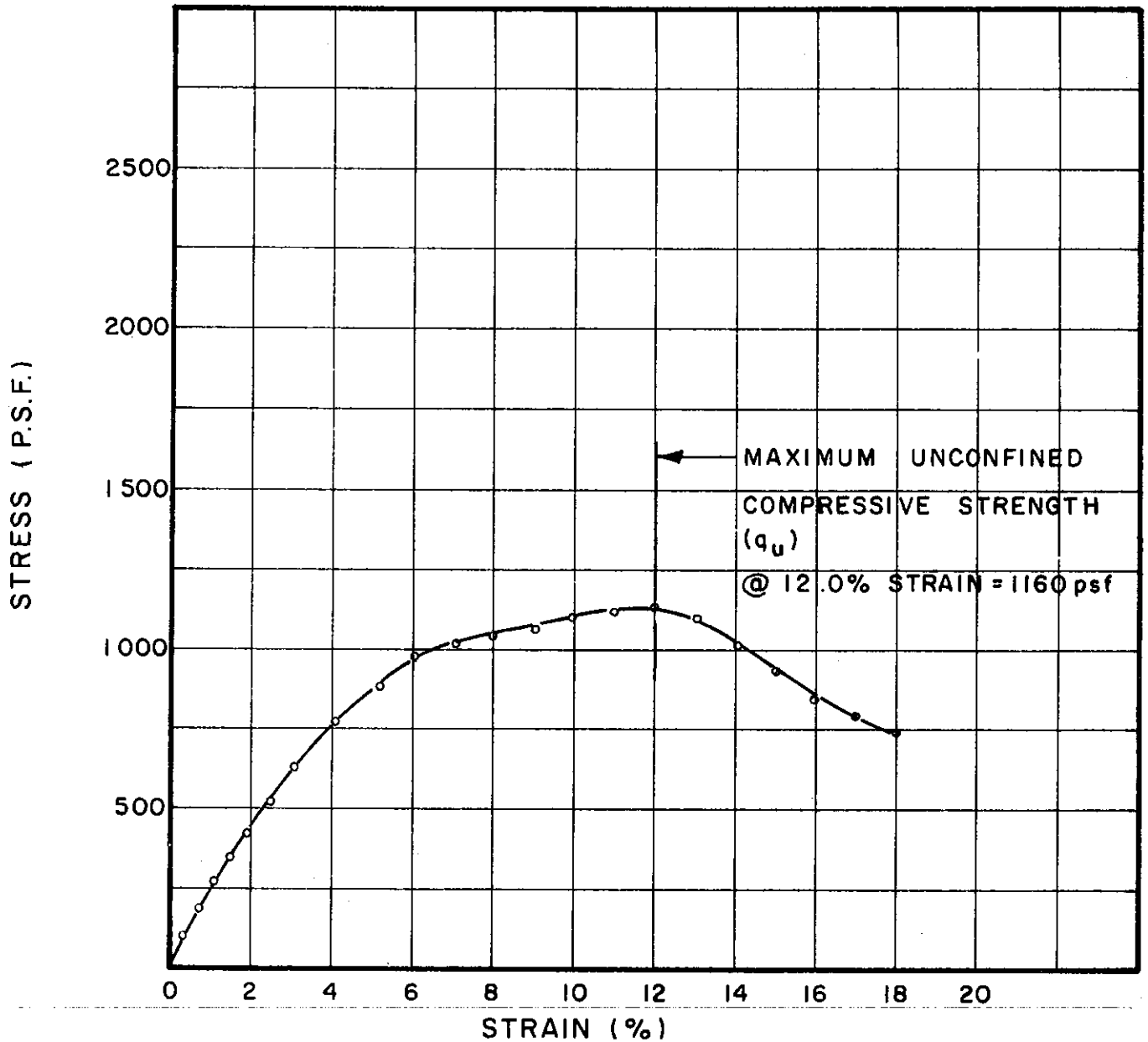


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U5.1	1.41	3.50	.257	36.6	86	38	20	SILTY CLAY (CL)

BORING NO. 26  
 SAMPLE NO. 9  
 DEPTH 39.4' TO 39.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U9.1	1.41	3.45	.261	24.8	101	36	20	SILTY CLAY, SANDY (CL)

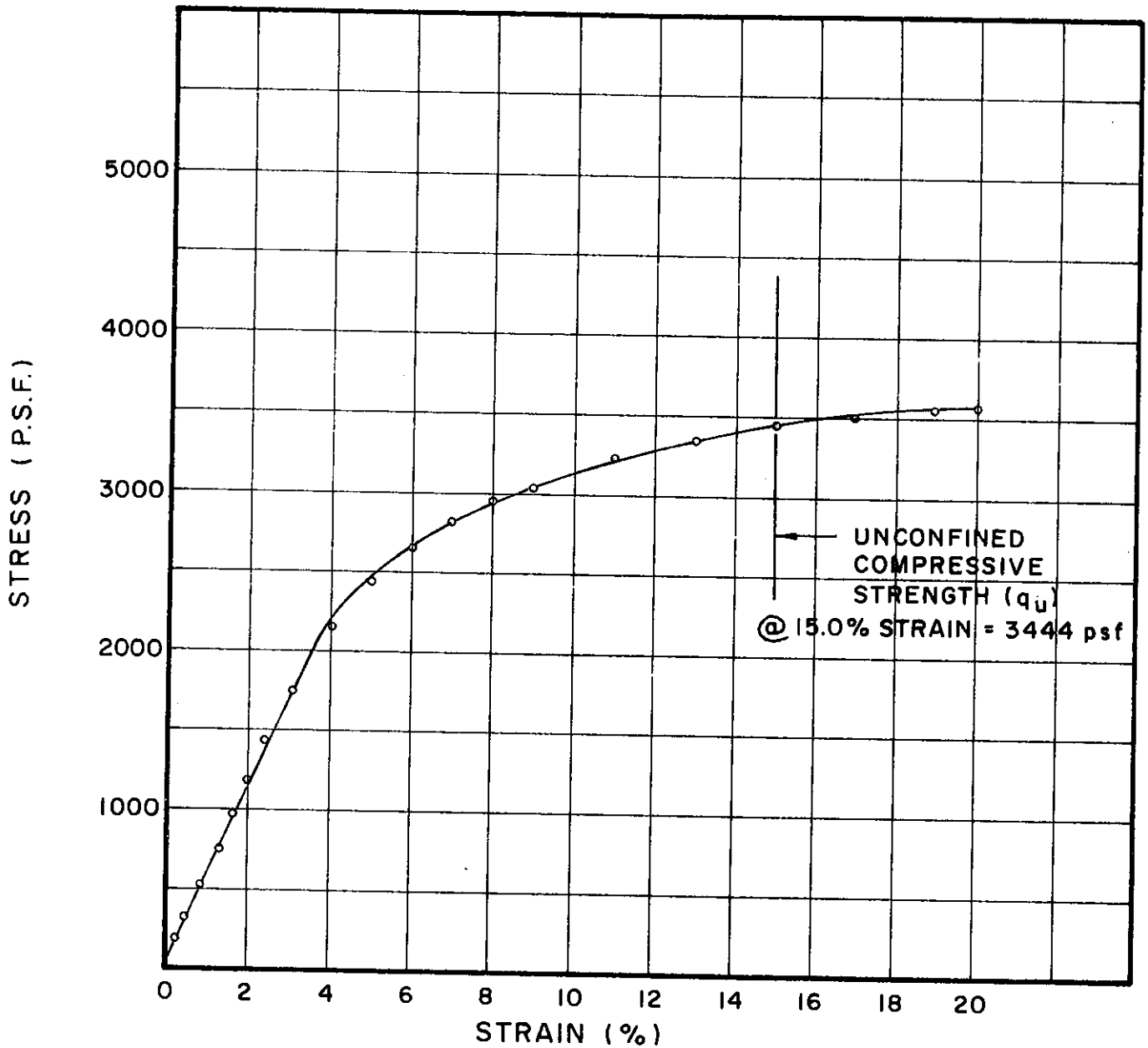
BORING NO. 26

SAMPLE NO. 17

DEPTH 78.2' TO 78.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

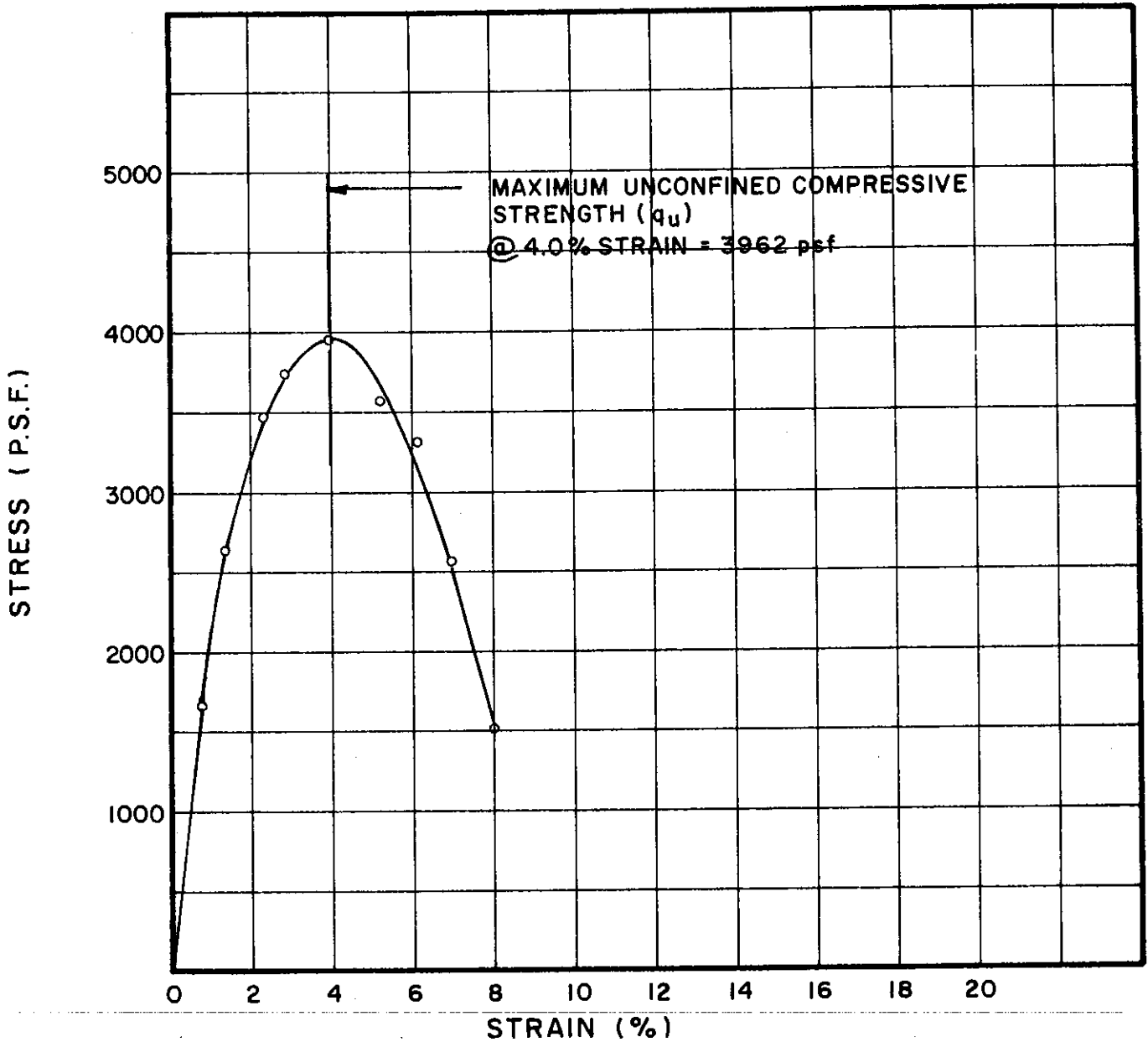


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U303.1	1.41	3.45	.261	30.6	94	51	23	SILTY CLAY (CL-CH)

BORING NO. 27  
 SAMPLE NO. 4  
 DEPTH 8.6' TO 8.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U183.1	1.39	3.49	0.26	25.3	100	47	23	SILTY CLAY (CL)

BORING NO. 28

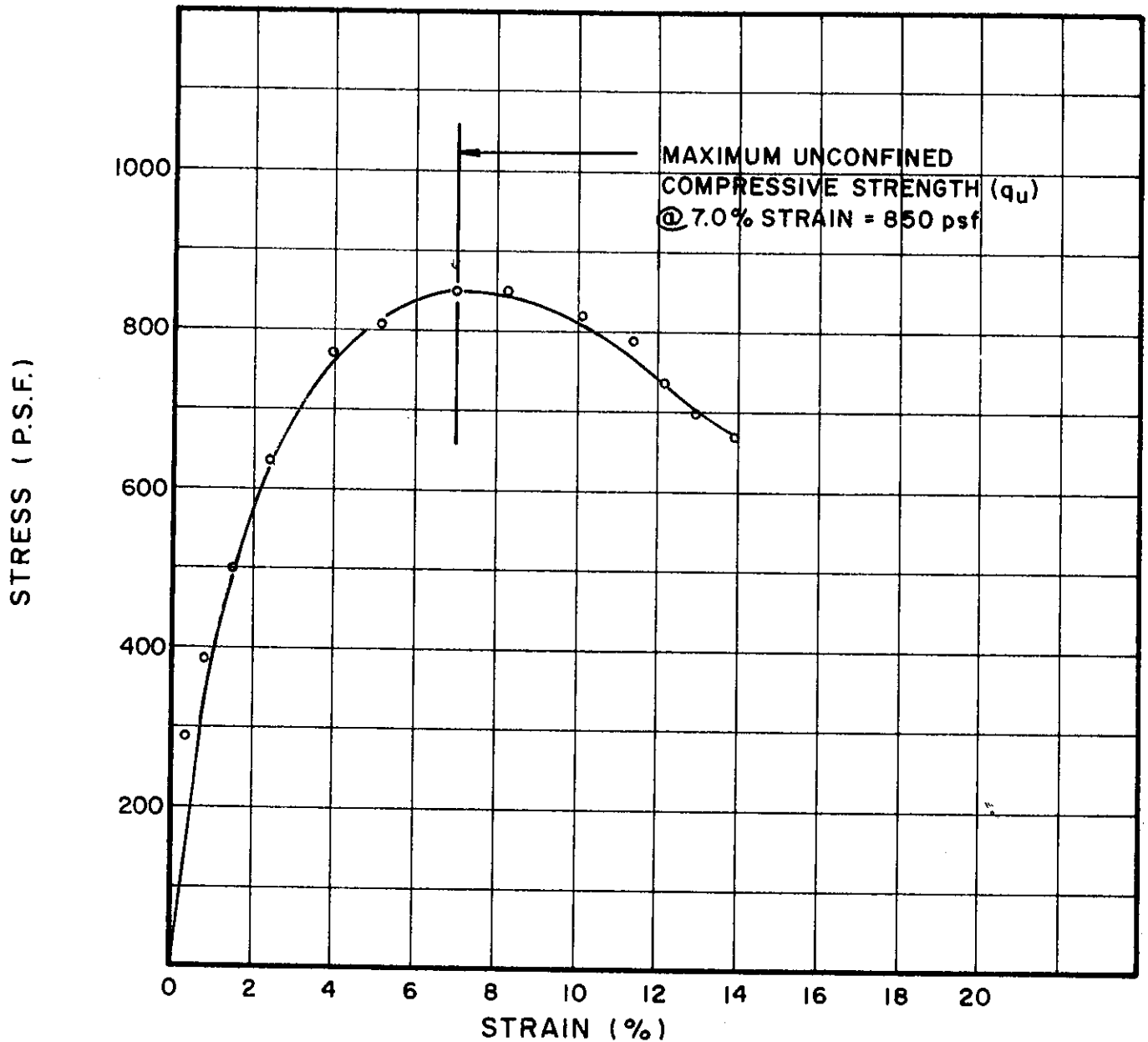
SAMPLE NO. 3

DEPTH 5.8' TO 6.1'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
UI86.2	1.40	3.50	0.26	38.0	84	42	20	SILTY CLAY (CL)

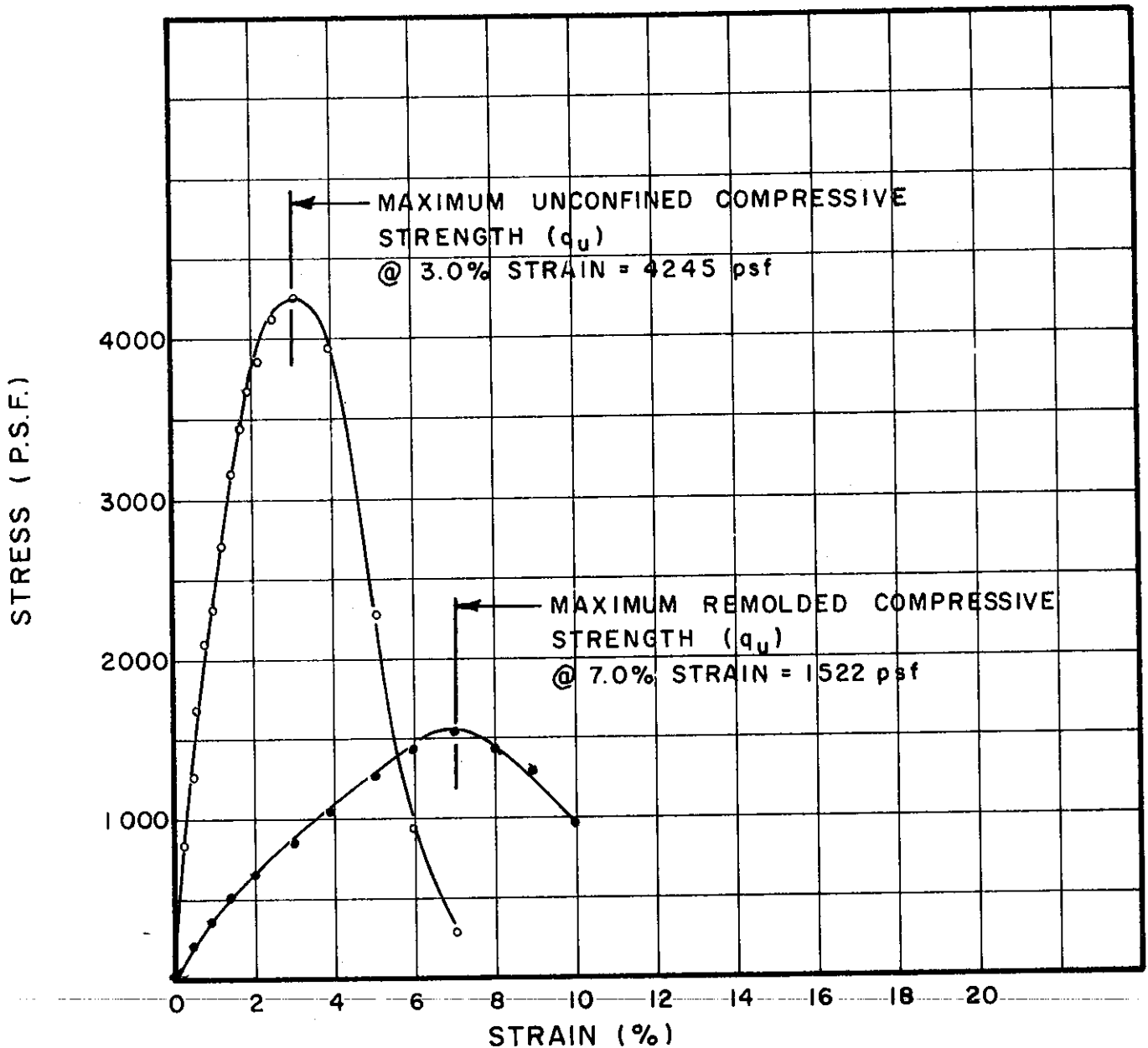
BORING NO. 28

SAMPLE NO. 9

DEPTH 28.8' TO 29.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



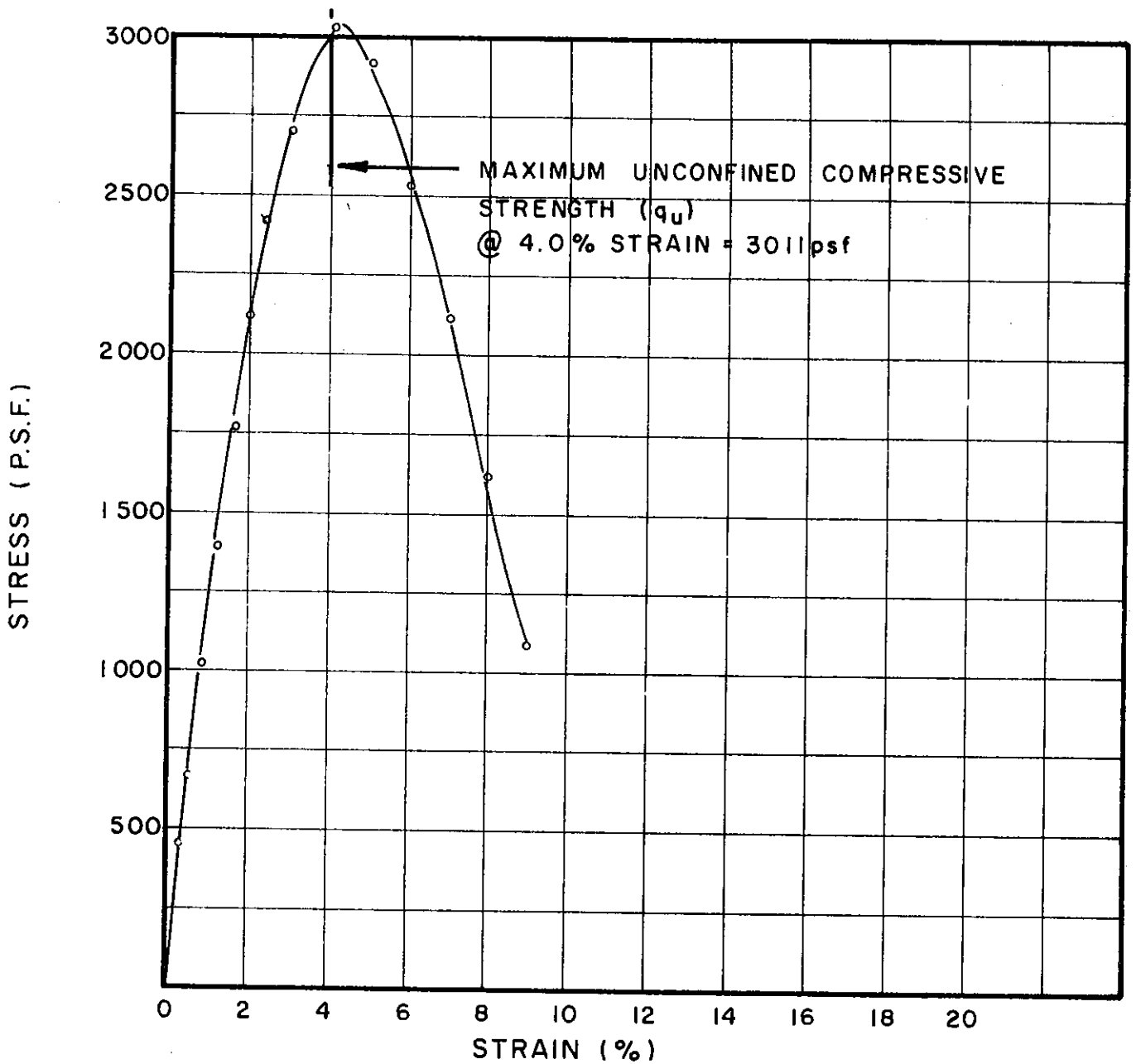
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI7.1	1.44	3.54	.254	24.3	102	49	24	SILTY CLAY (CL-CH)
UI7.1	1.40	3.50	.257	24.3	103	49	24	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 3  
 DEPTH 8.7' TO 9.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

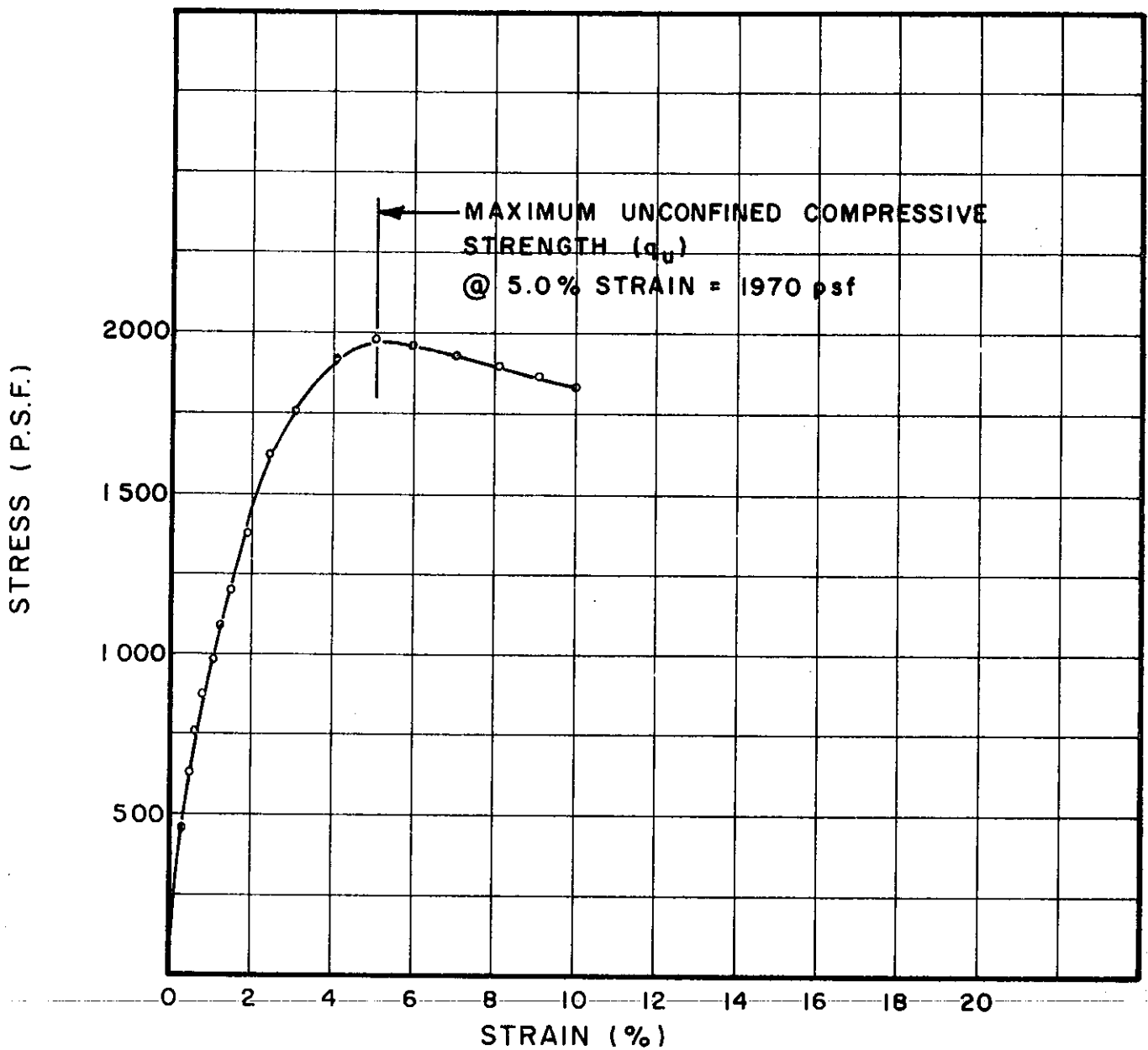


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI8.1	1.42	3.50	.257	28.5	96	46	22	SILTY CLAY (CL-CH)

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.3' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U22.1	1.41	3.50	.257	33.4	90	44	21	SILTY CLAY (CL-CH)

BORING NO. 38

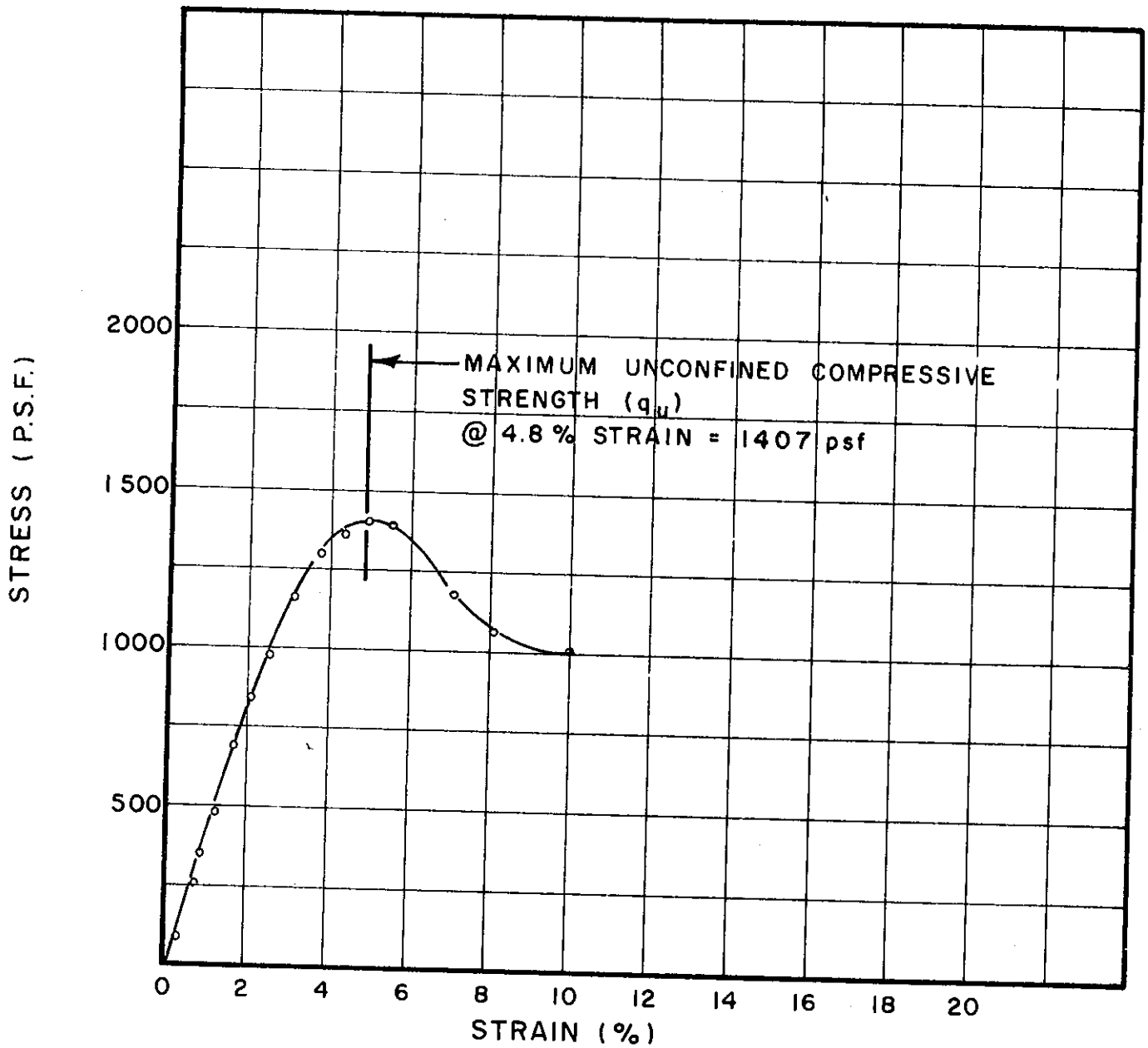
SAMPLE NO. 12

DEPTH 54.2' TO 54.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U24.1	1.40	3.50	.257	41.3	79	55	24	SILTY CLAY (CL-CH)

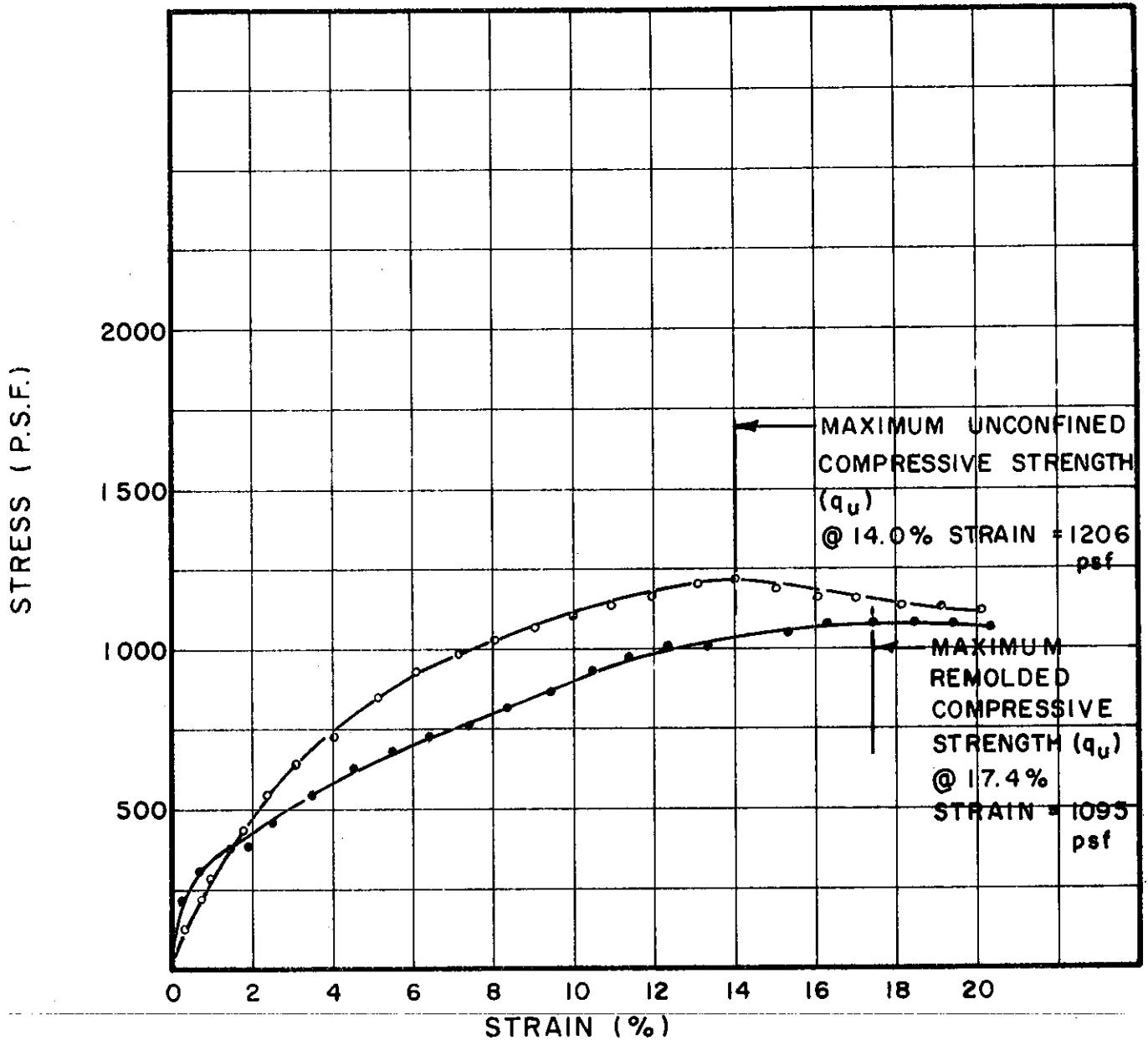
BORING NO. 38

SAMPLE NO. 16

DEPTH 73.7' TO 74.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U25.1	1.41	3.50	.257	22.2	104	33	19	SILTY CLAY GRAVELLY (CL)
U <sub>r</sub> 25.1	1.40	3.52	.256	22.2	105	33	19	SILTY CLAY GRAVELLY (CL)

BORING NO. 38

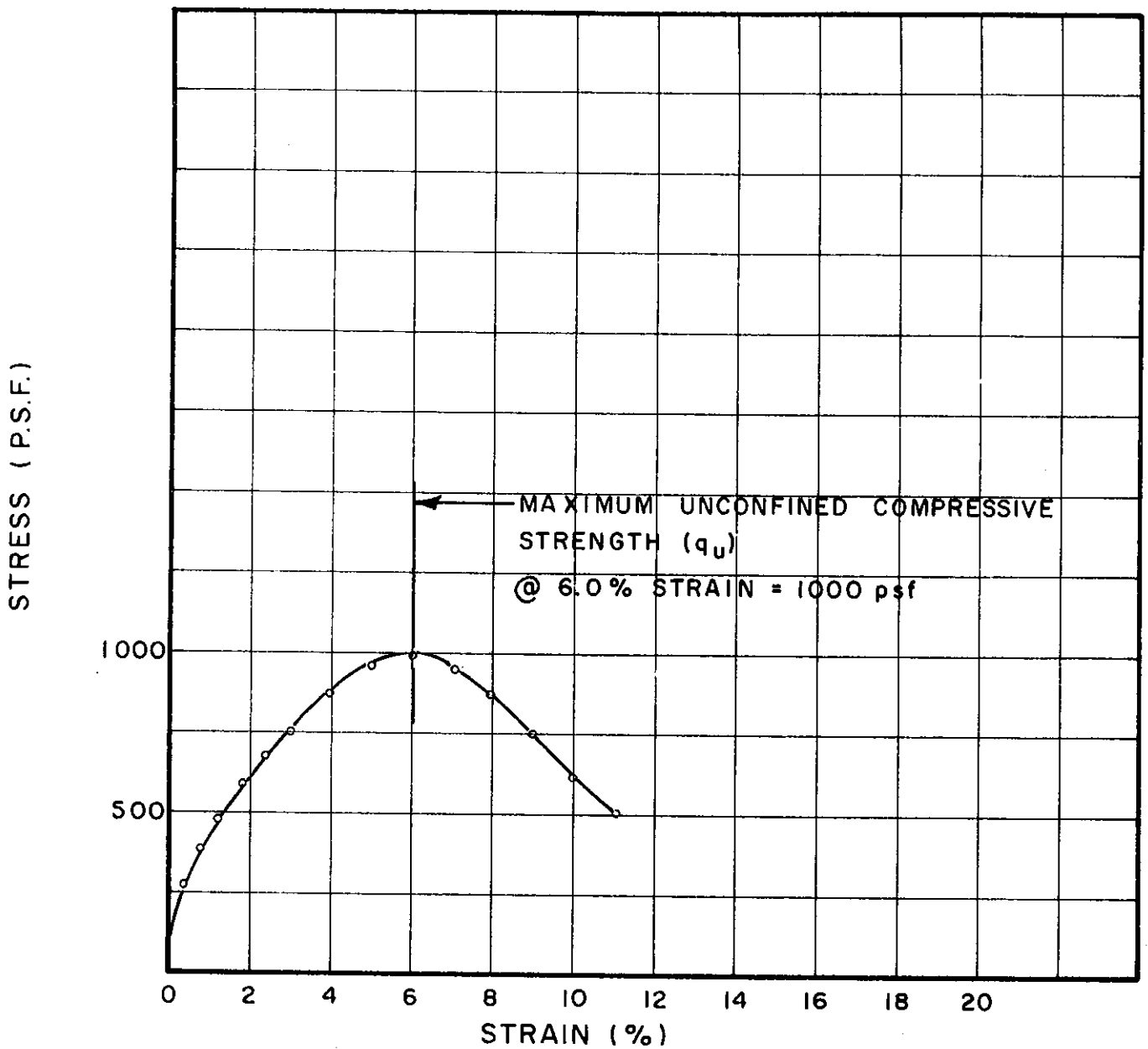
SAMPLE NO. 18

DEPTH 84.6' TO 84.9'

## UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

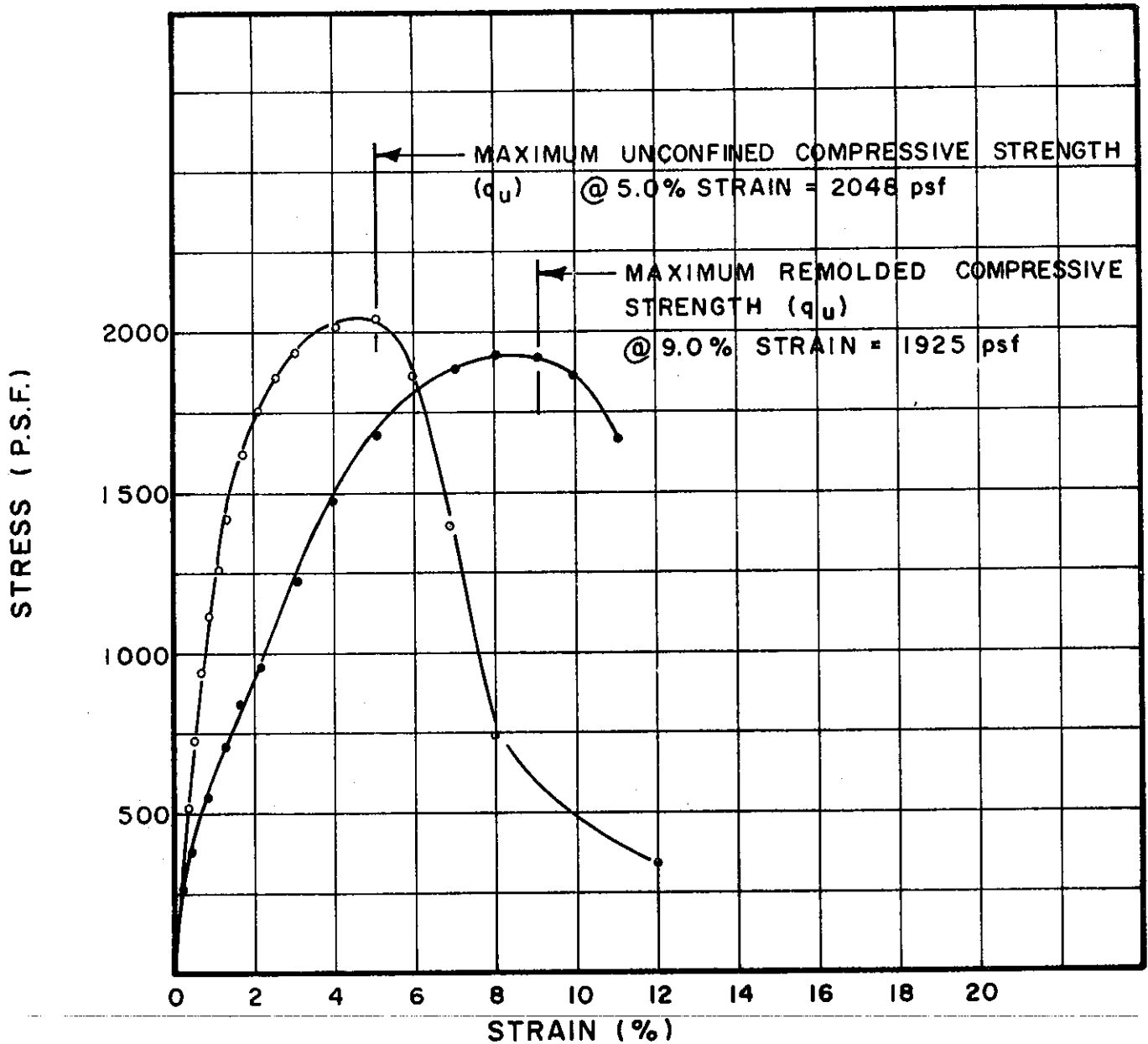


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U26.1	1.42	3.50	.257	31.9	92	45	25	SILTY CLAY (CL)

BORING NO. 38  
 SAMPLE NO. 24  
 DEPTH 114.2' TO 114.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U28.1	1.43	3.50	.257	29.4	94	63	28	SILTY CLAY (CH)
U <sub>r</sub> 28.1	1.40	3.38	.266	29.4	95	63	28	SILTY CLAY (CH)

BORING NO. 41

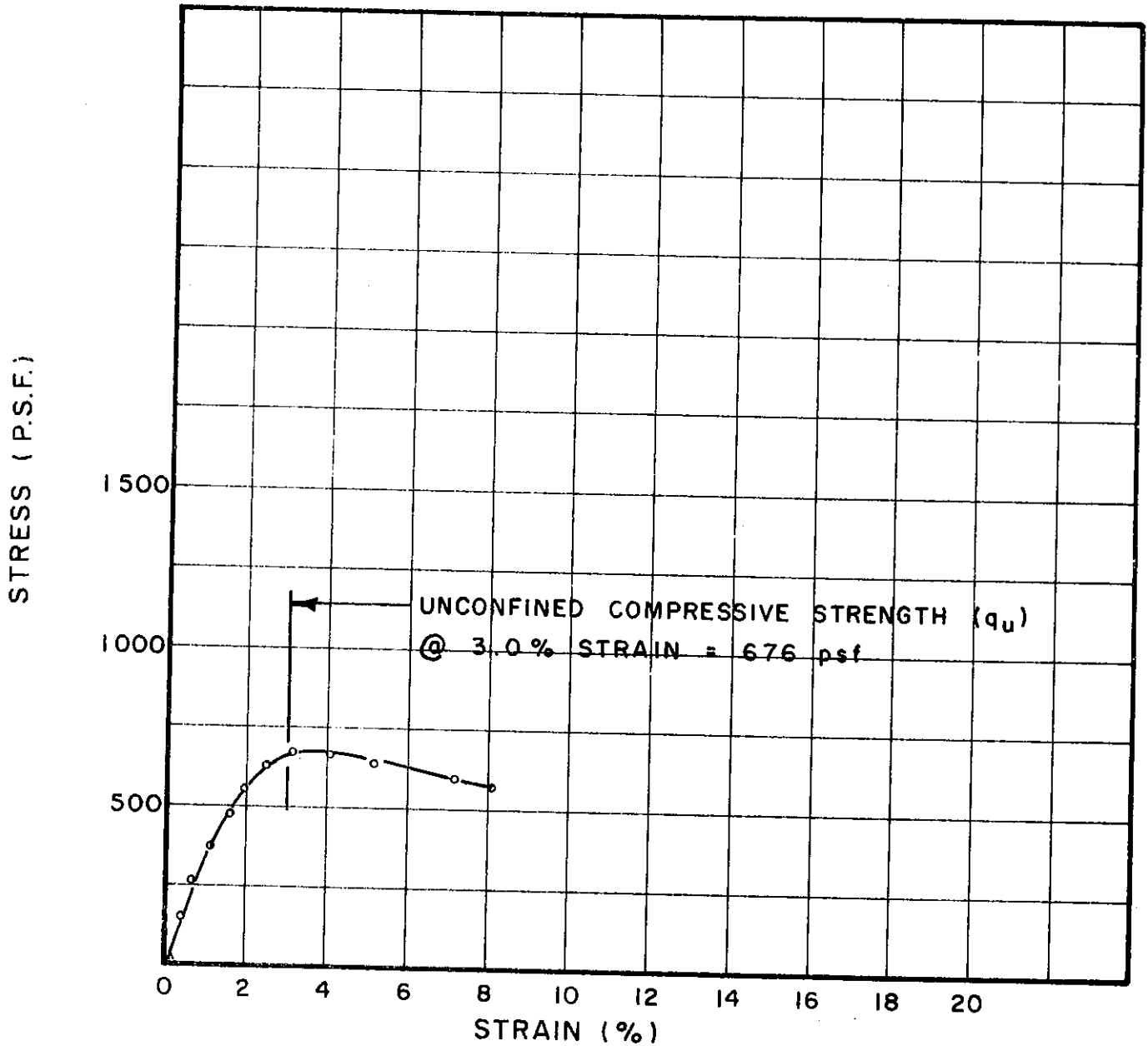
SAMPLE NO. 2

DEPTH 4.5' TO 4.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

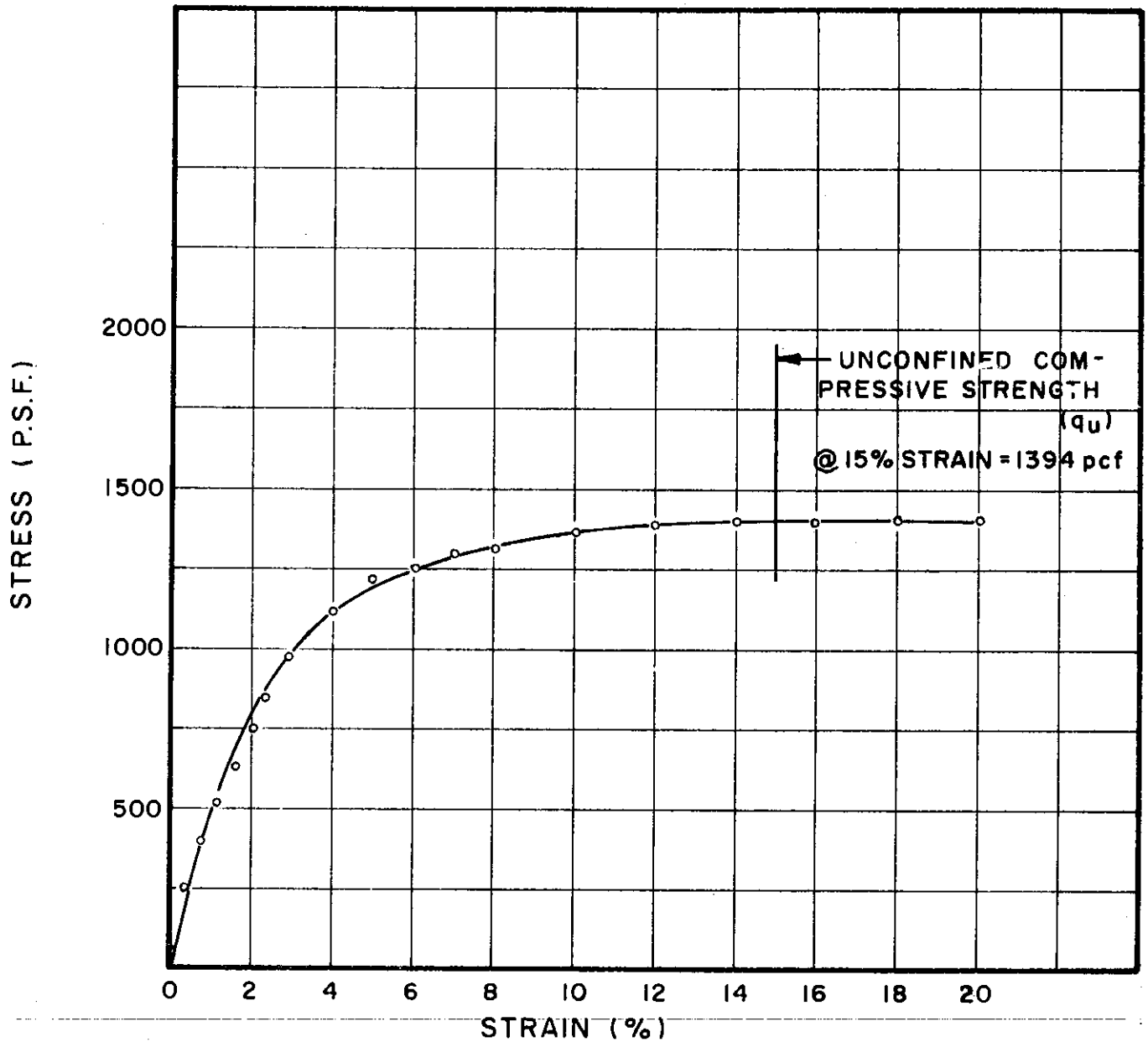


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U30.1	1.42	3.50	.257	39.2	83	47	24	SILTY CLAY (CL-CH)

BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 20.6' TO 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



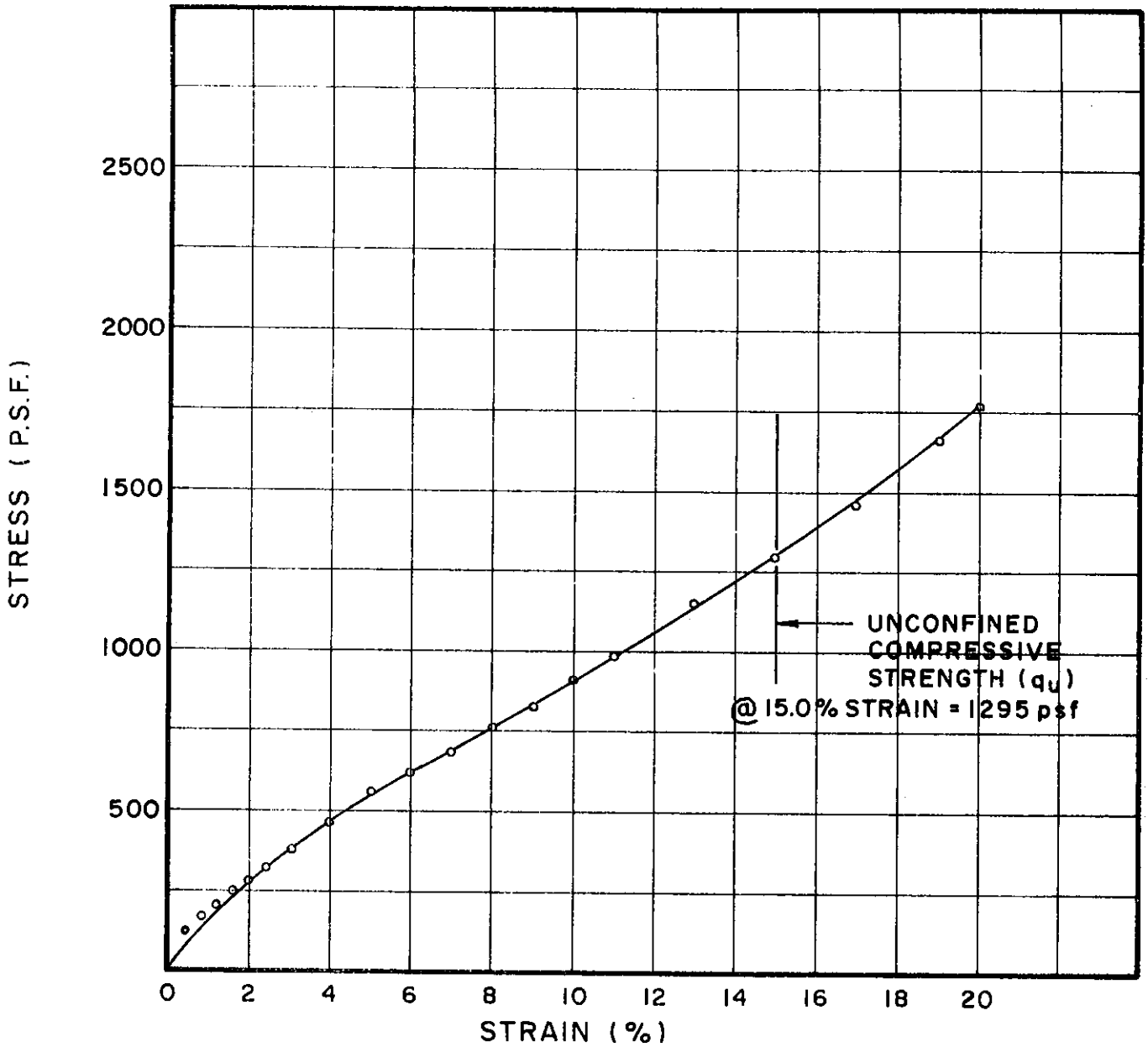
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U31.1	1.40	3.50	.257	36.9	86	45	21	SILTY CLAY, (CL-CH)

BORING NO. 41  
 SAMPLE NO. 9  
 DEPTH 30.9' TO 31.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

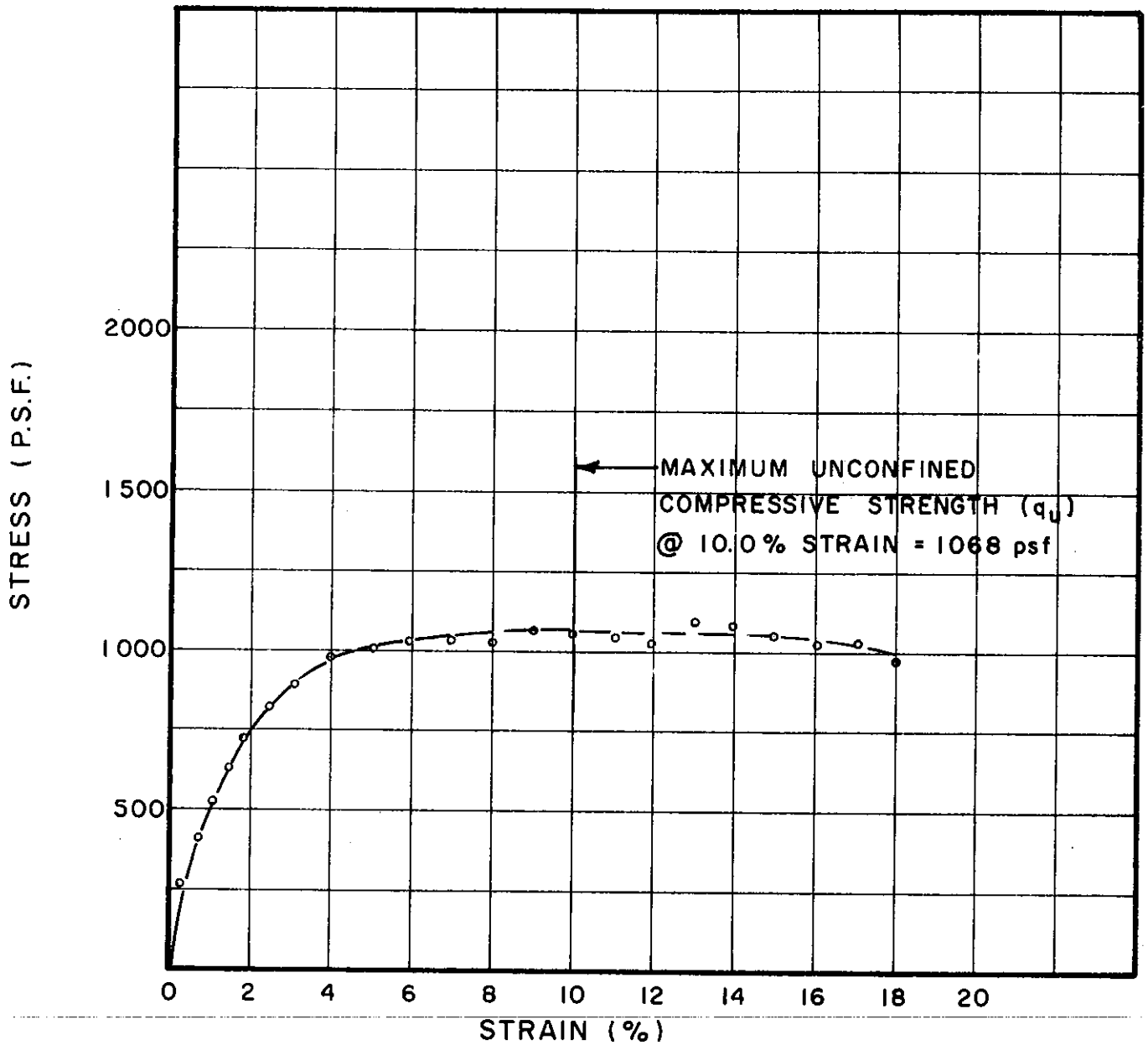


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U32.1	1.37	3.45	.260	16.0	118	20	12	SILTY CLAY, SANDY (CL-SC)
								(SAMPLE SLIGHTLY DISTURBED)

BORING NO. 41  
 SAMPLE NO. 11  
 DEPTH 40.6' TO 41.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



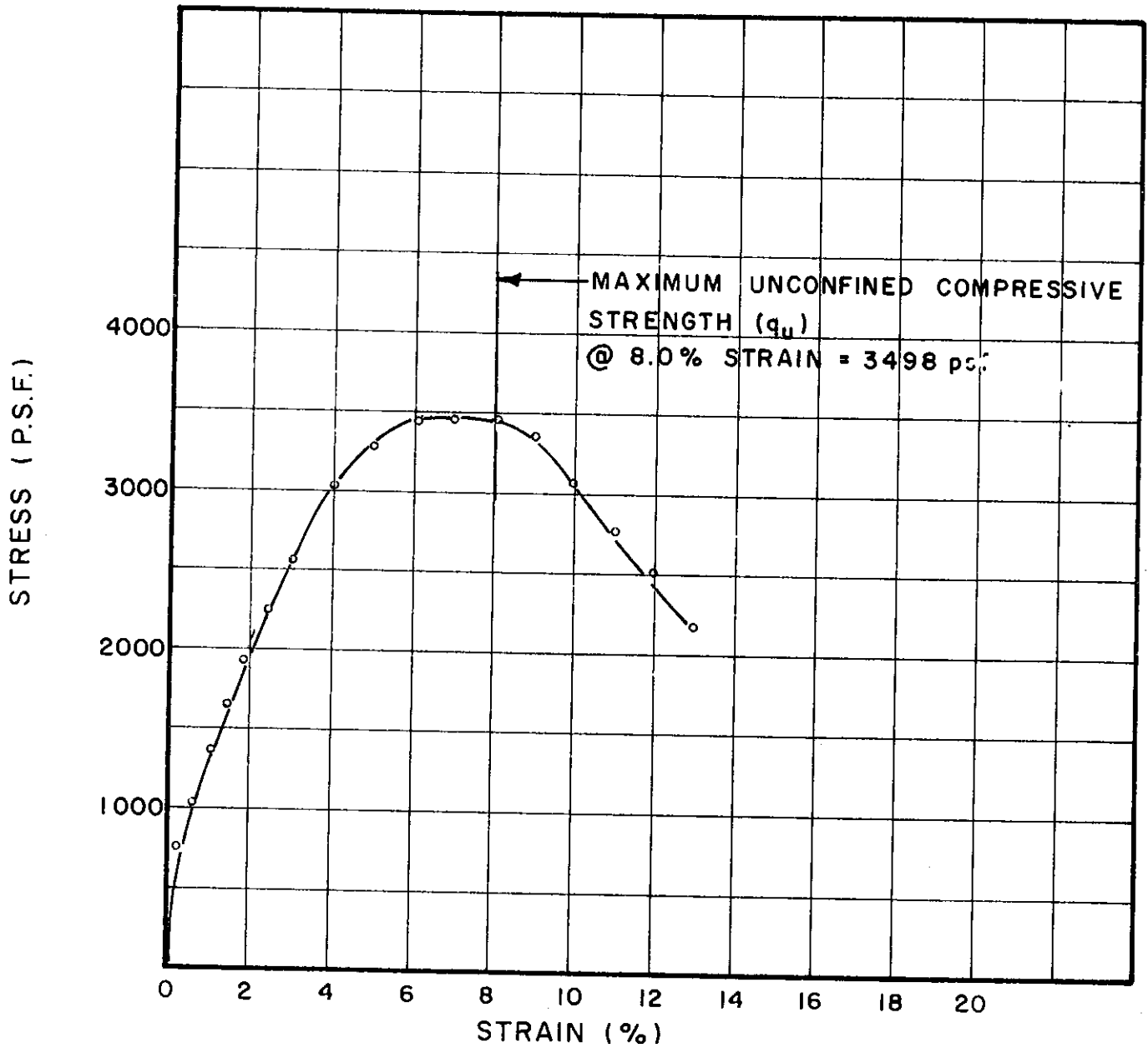
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U37.1	1.41	3.47	.259	26.4	99	34	20	SILTY CLAY, SANDY (CL)

BORING NO. 41  
 SAMPLE NO. 23  
 DEPTH 101.8' TO 102.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



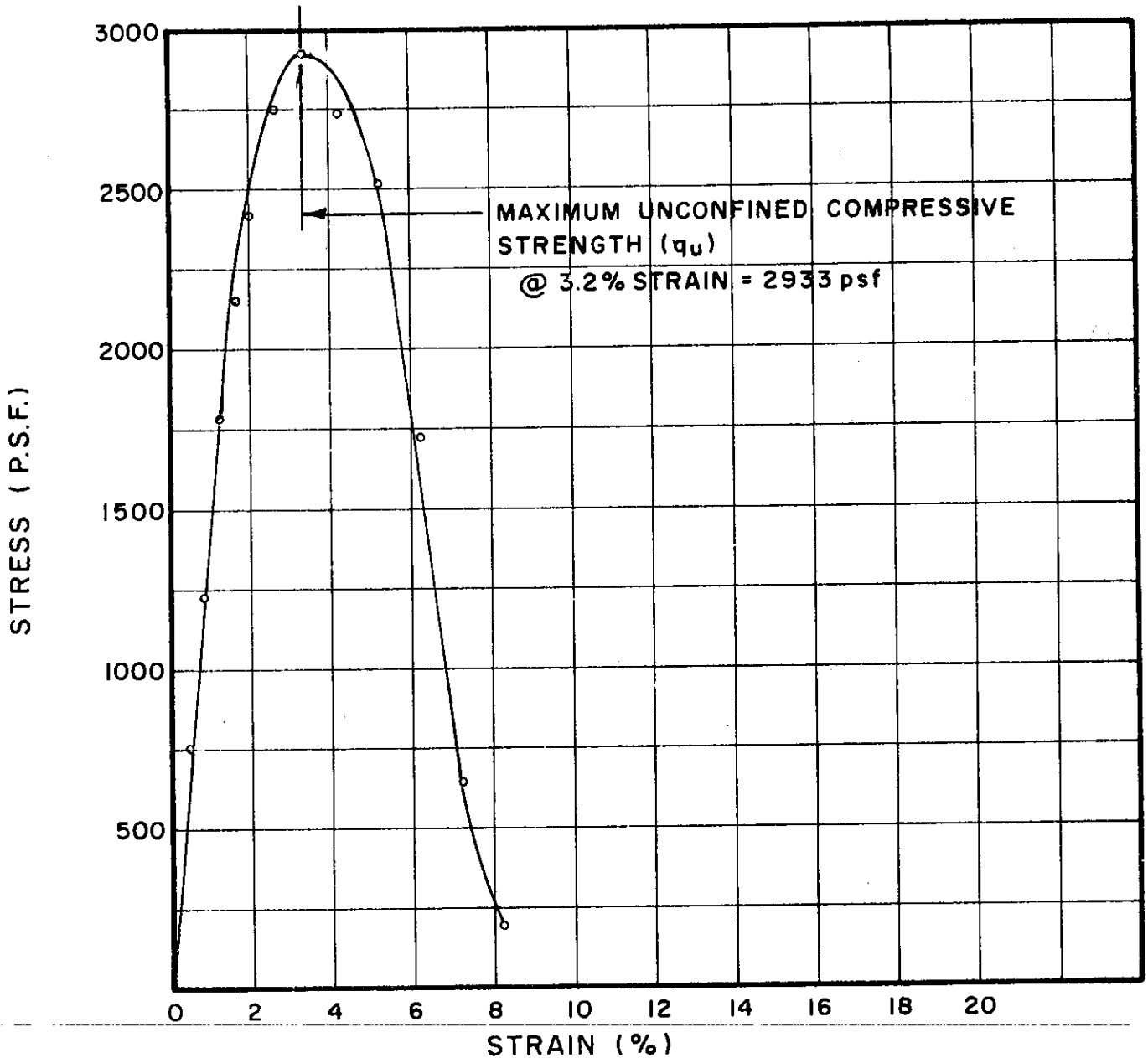


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U40.1	1.44	3.13	.29	13.8	124	25	17	CLAYEY SAND (GC-SC)

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.7' TO 131.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI98.1	1.43	3.50	.257	27.3	97	63	24	SILTY CLAY (CH)

BORING NO. 48

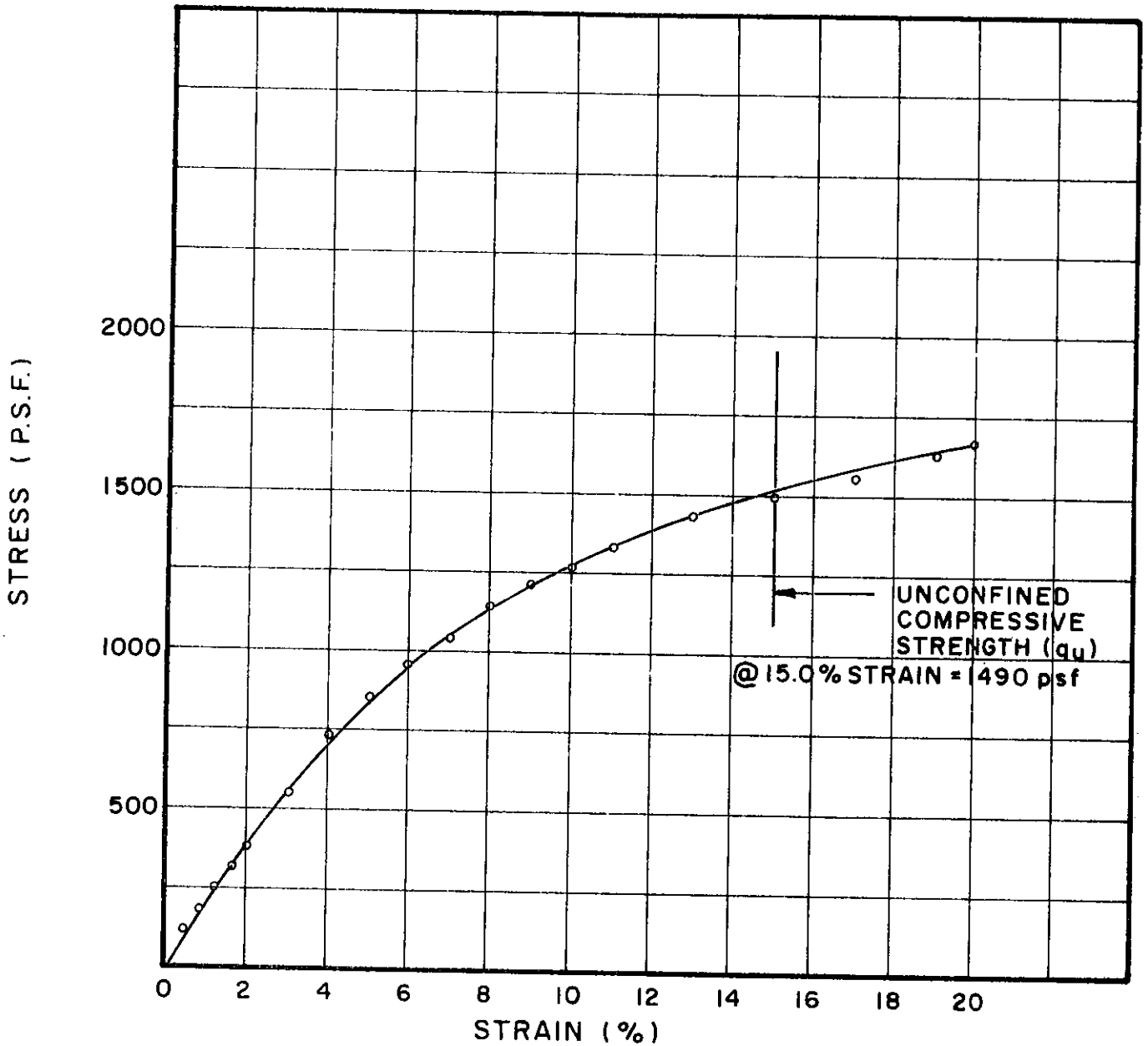
SAMPLE NO. 2

DEPTH 3.2' TO 3.5'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

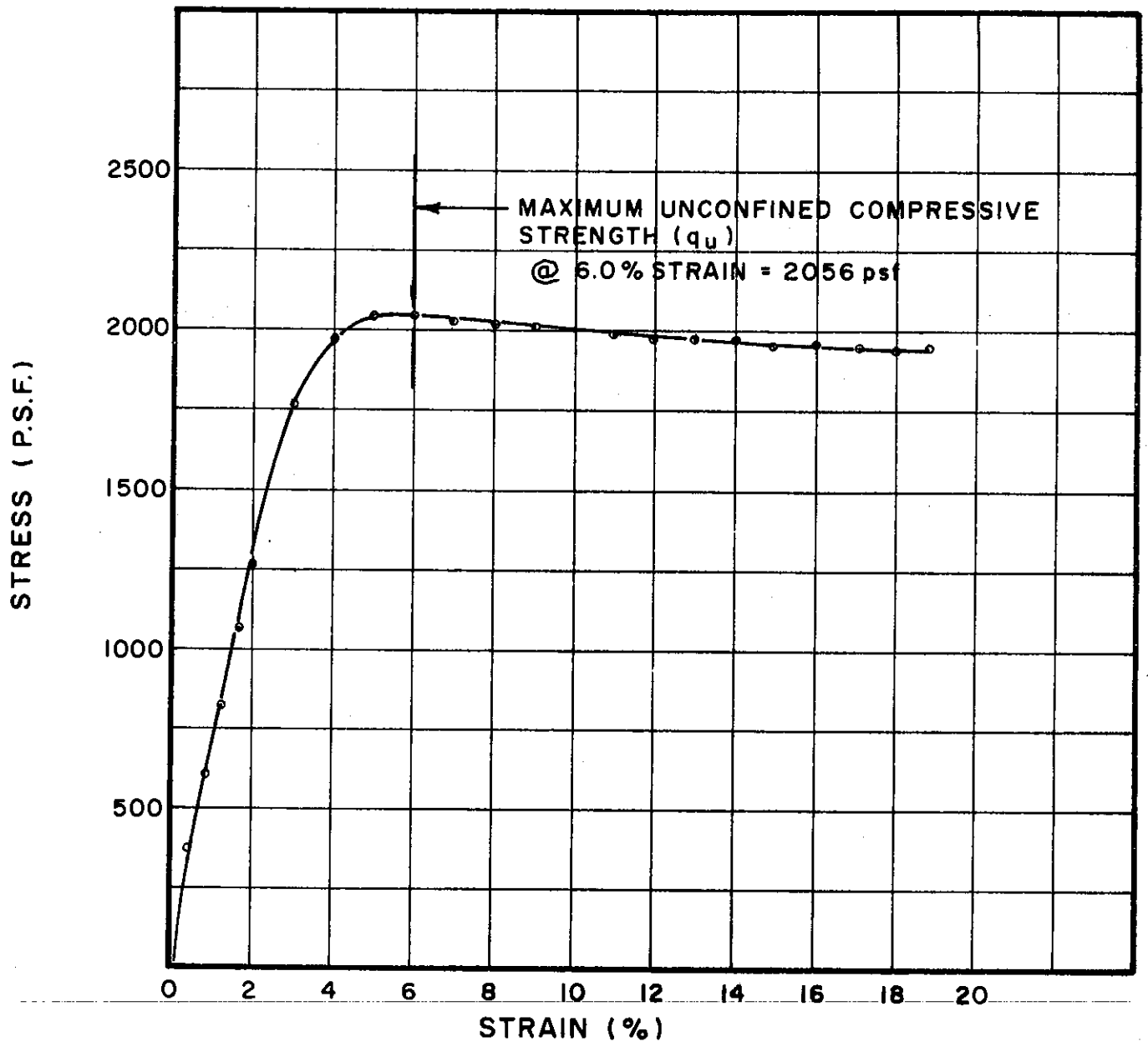


TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U204.1	1.41	3.41	.264	25.2	100	34	16	SILTY CLAY, SANDY (CL)

BORING NO. 48  
 SAMPLE NO. 14  
 DEPTH 61.2' TO 61.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U134.1	1.41	3.51	.256	34.0	90	42	22	SILTY CLAY (CL)

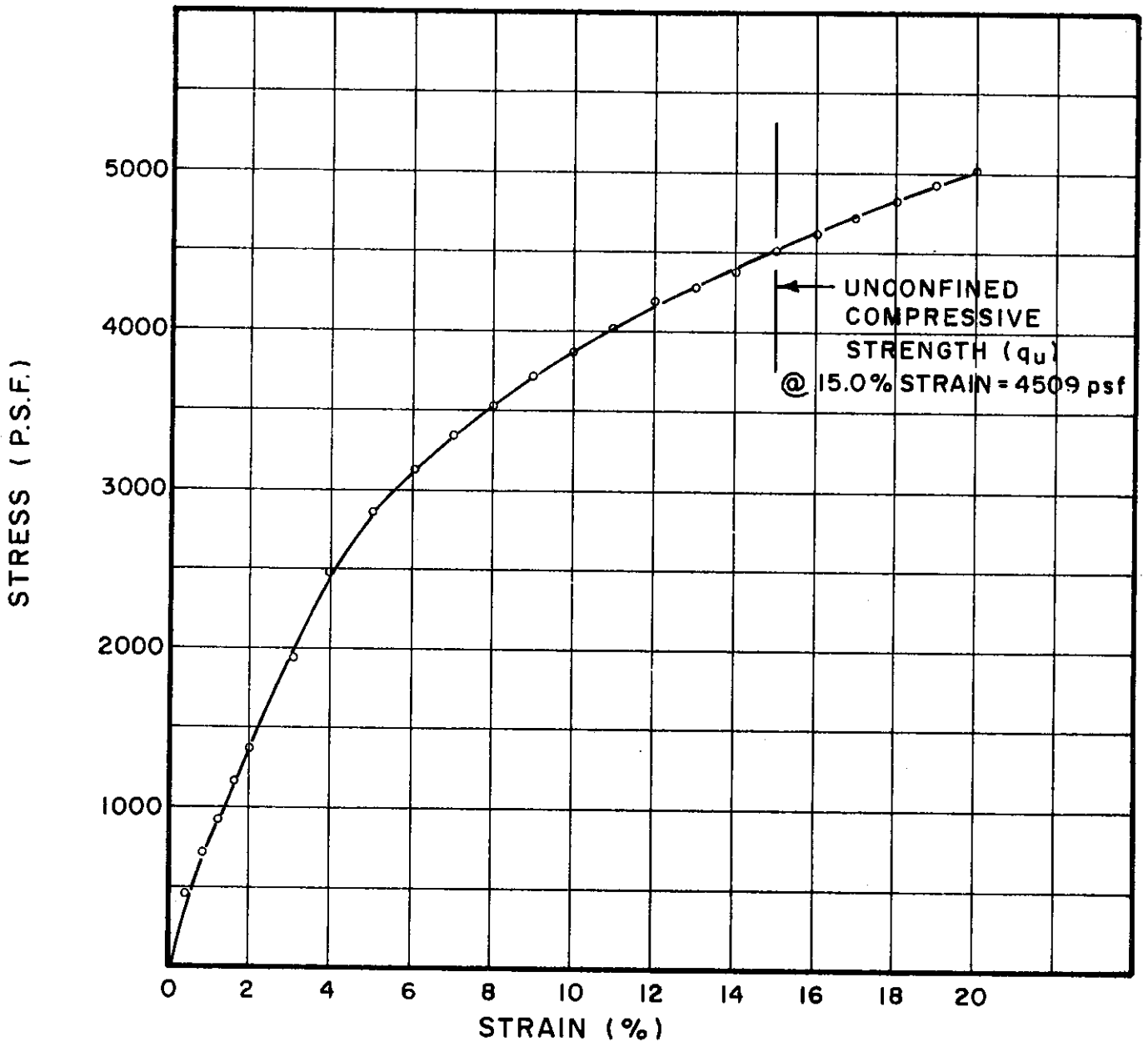
BORING NO. 49

SAMPLE NO. 4

DEPTH 24.0' TO 24.3'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI39.1	1.41	3.36	.268	25.6	100	33	22	SILTY CLAY; SANDY
								(CL)

BORING NO. 49

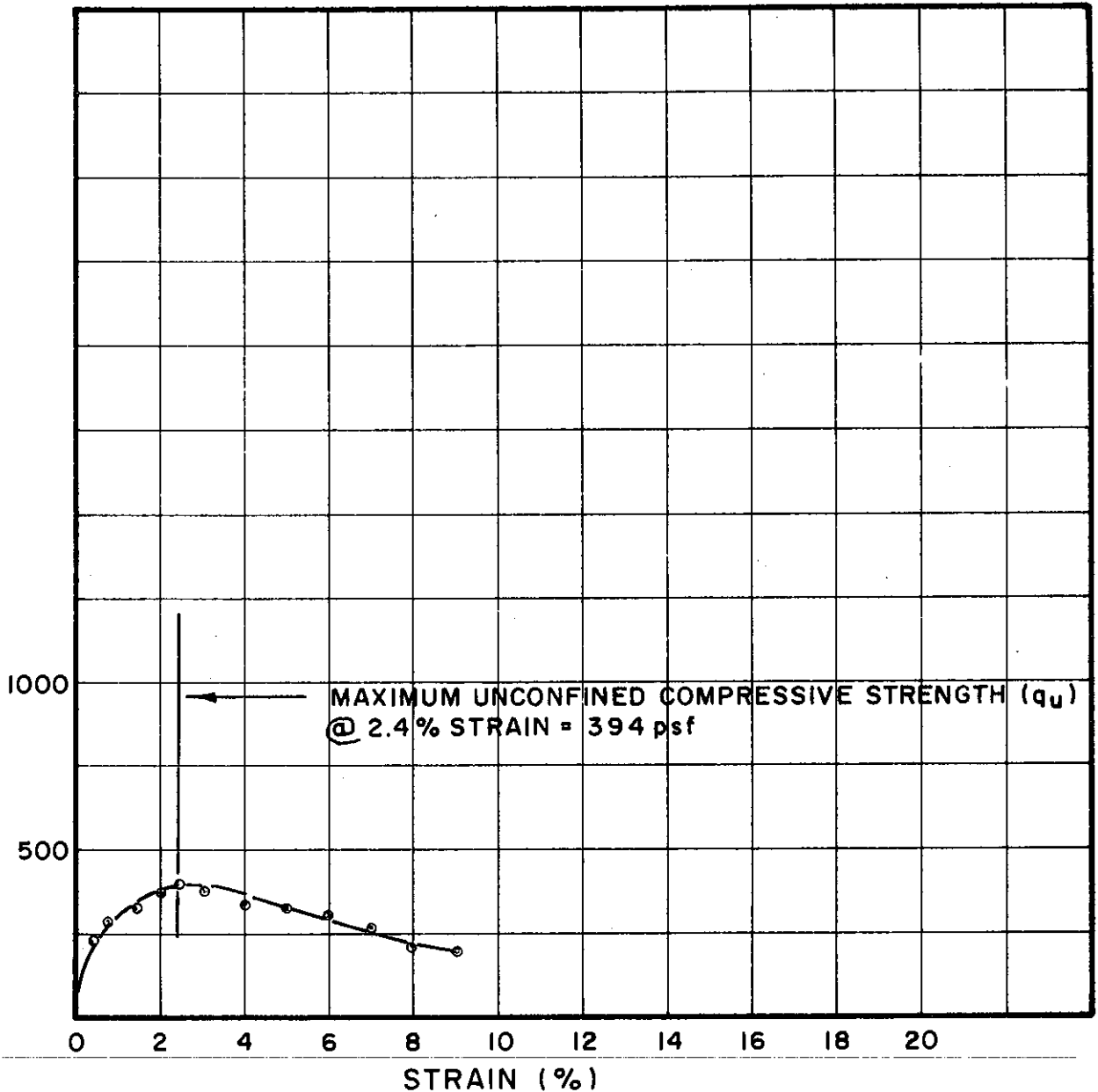
SAMPLE NO. 9

DEPTH 73.9' TO 74.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

STRESS (PSF)



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U85.1	1.39	3.21	.25	45.8	75	51	18	SILTY CLAY (CH-CL)

BORING NO. 50

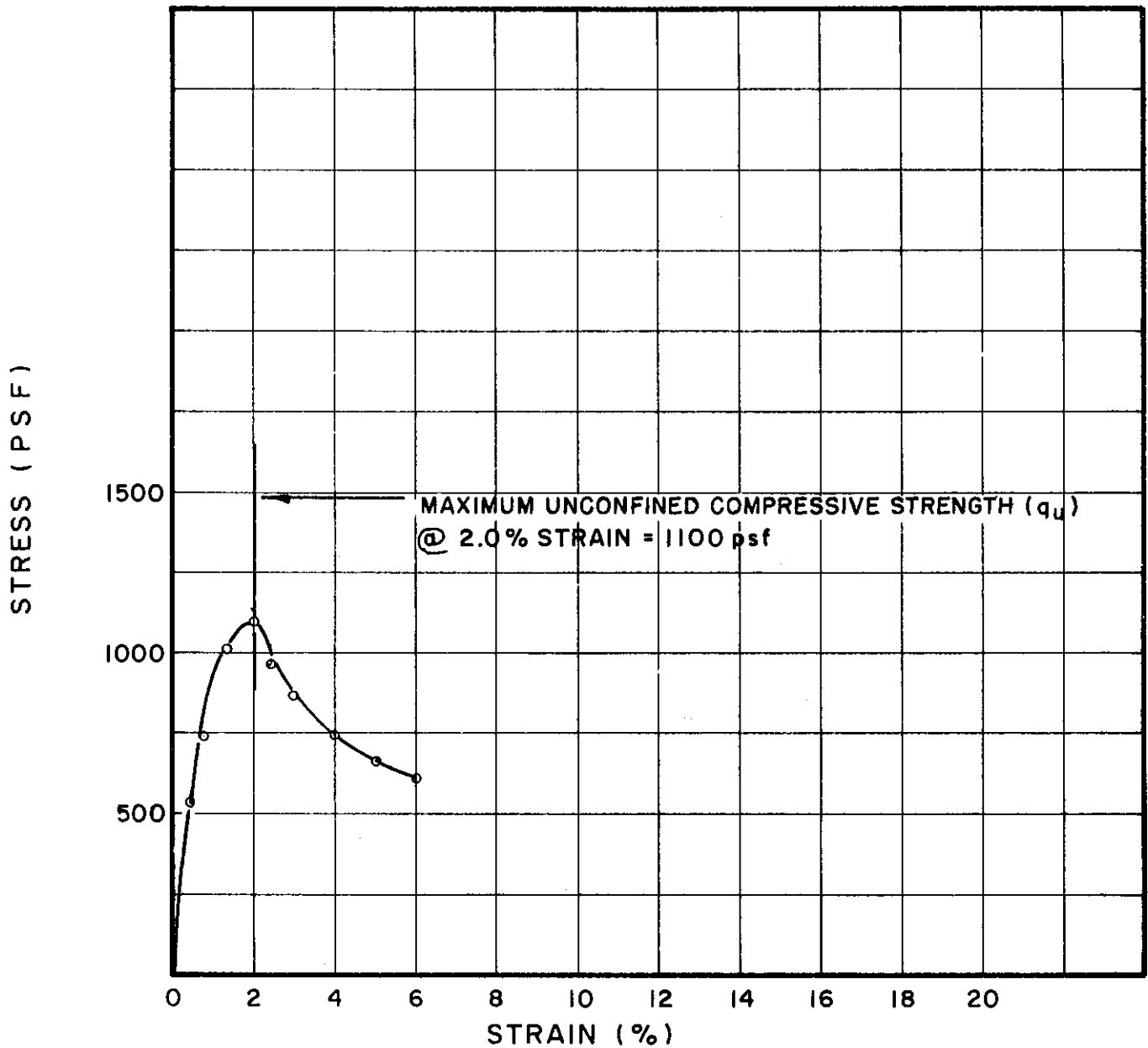
SAMPLE NO. 6

DEPTH 29.3' TO 29.7'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

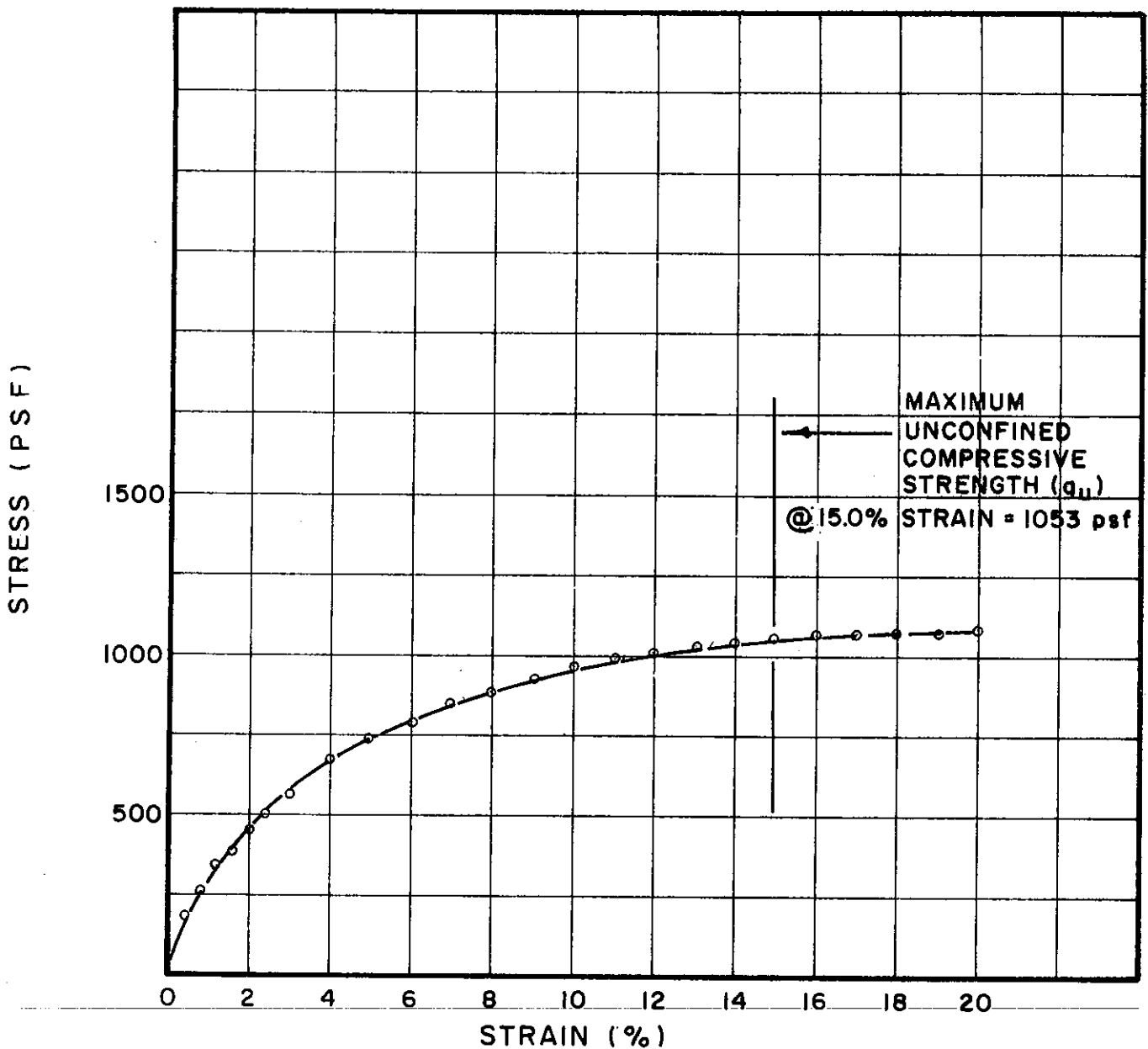


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U86.1	1.40	3.27	0.25	51.3	70	55	23	SILTY CLAY (CH)

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.9' TO 39.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U87.1	1.40	3.25	.25	23.6	99	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50

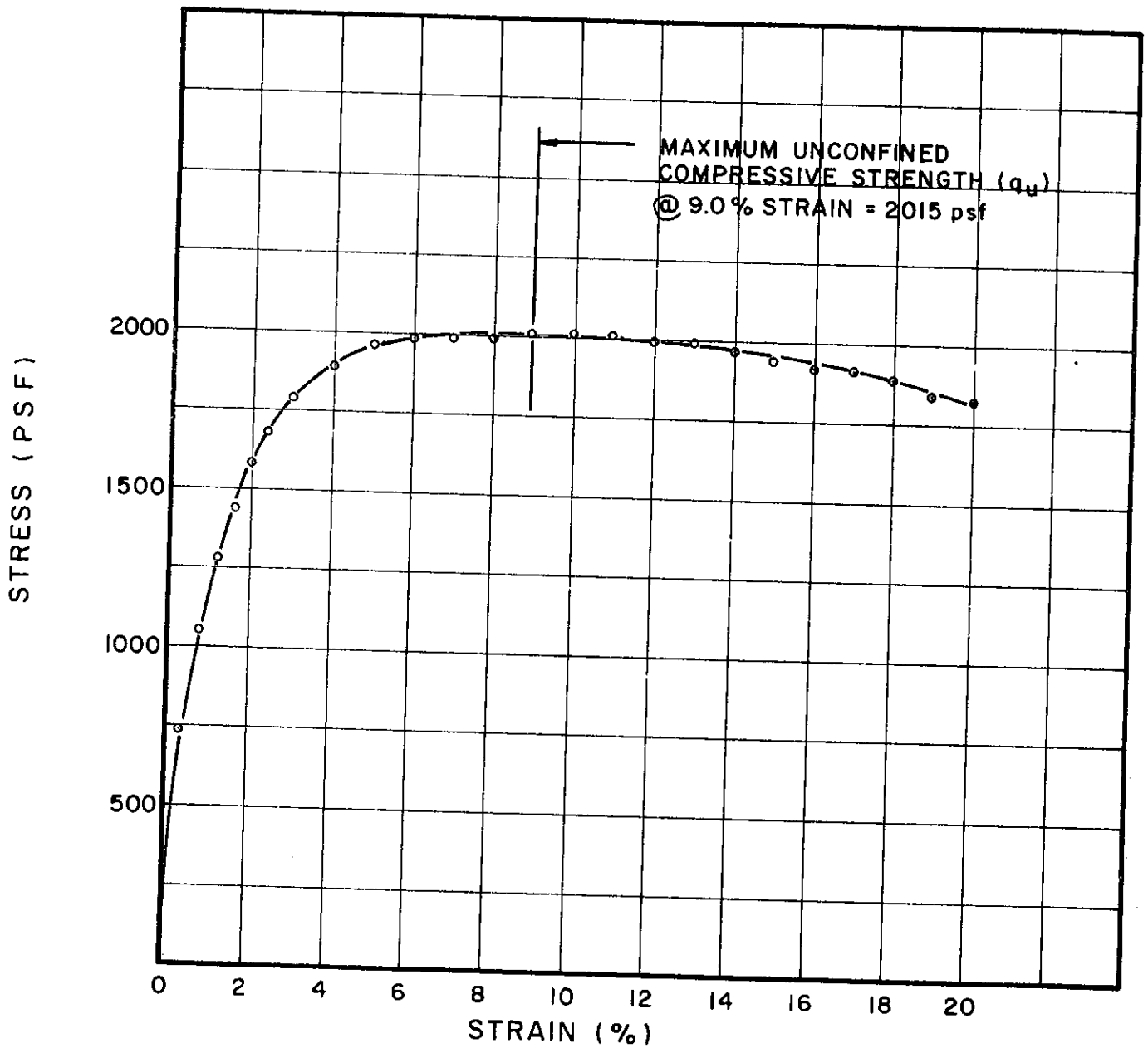
SAMPLE NO. 10

DEPTH 49.0' TO 49.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U88.1	1.38	3.20	.25	25.8	99	39	18	SILTY CLAY (CL)

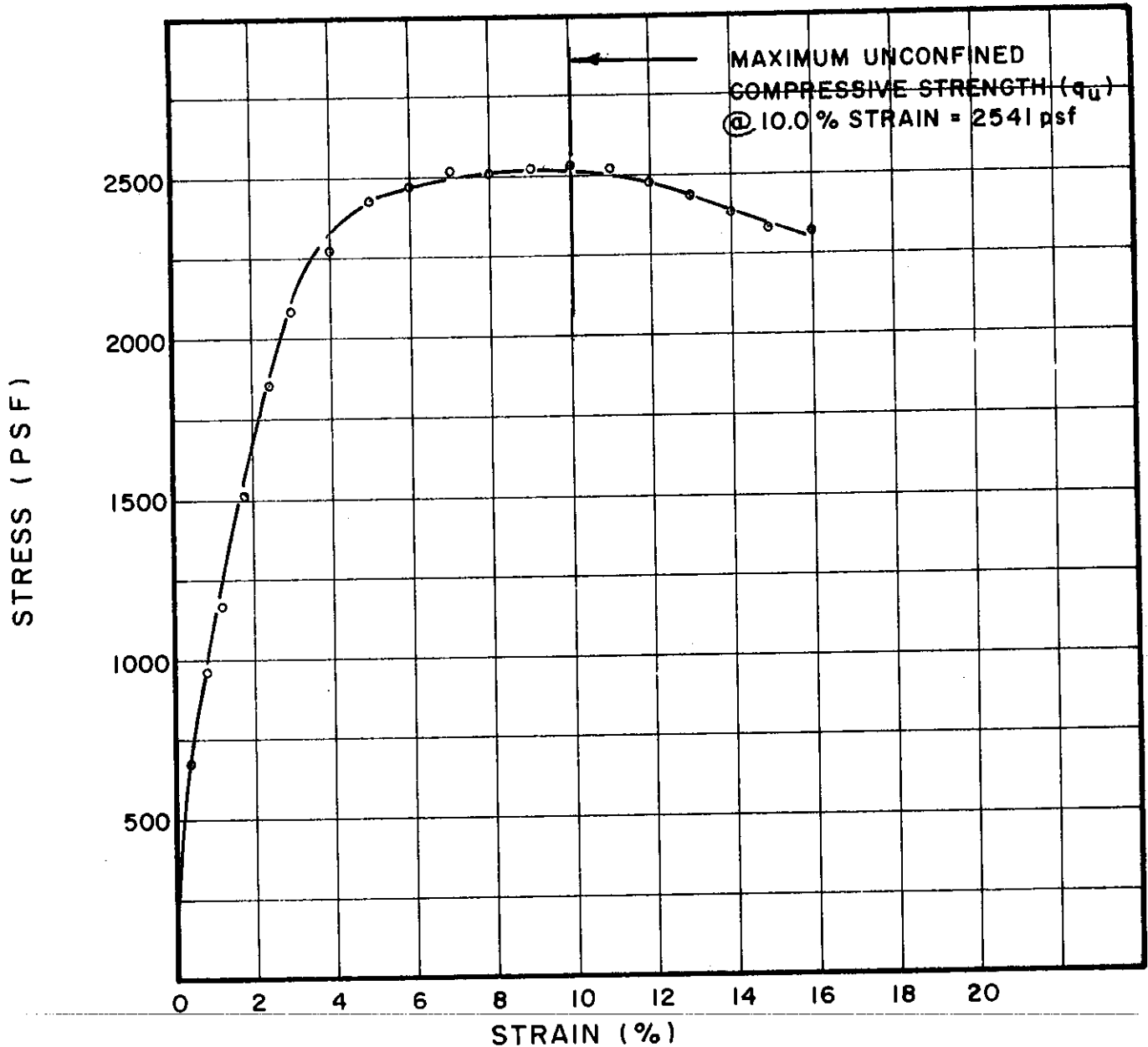
BORING NO. 50

SAMPLE NO. 12

DEPTH 58.6' - 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U90.1	1.39	3.20	.25	27.9	95	39	20	SILTY CLAY (CL)

BORING NO. 50

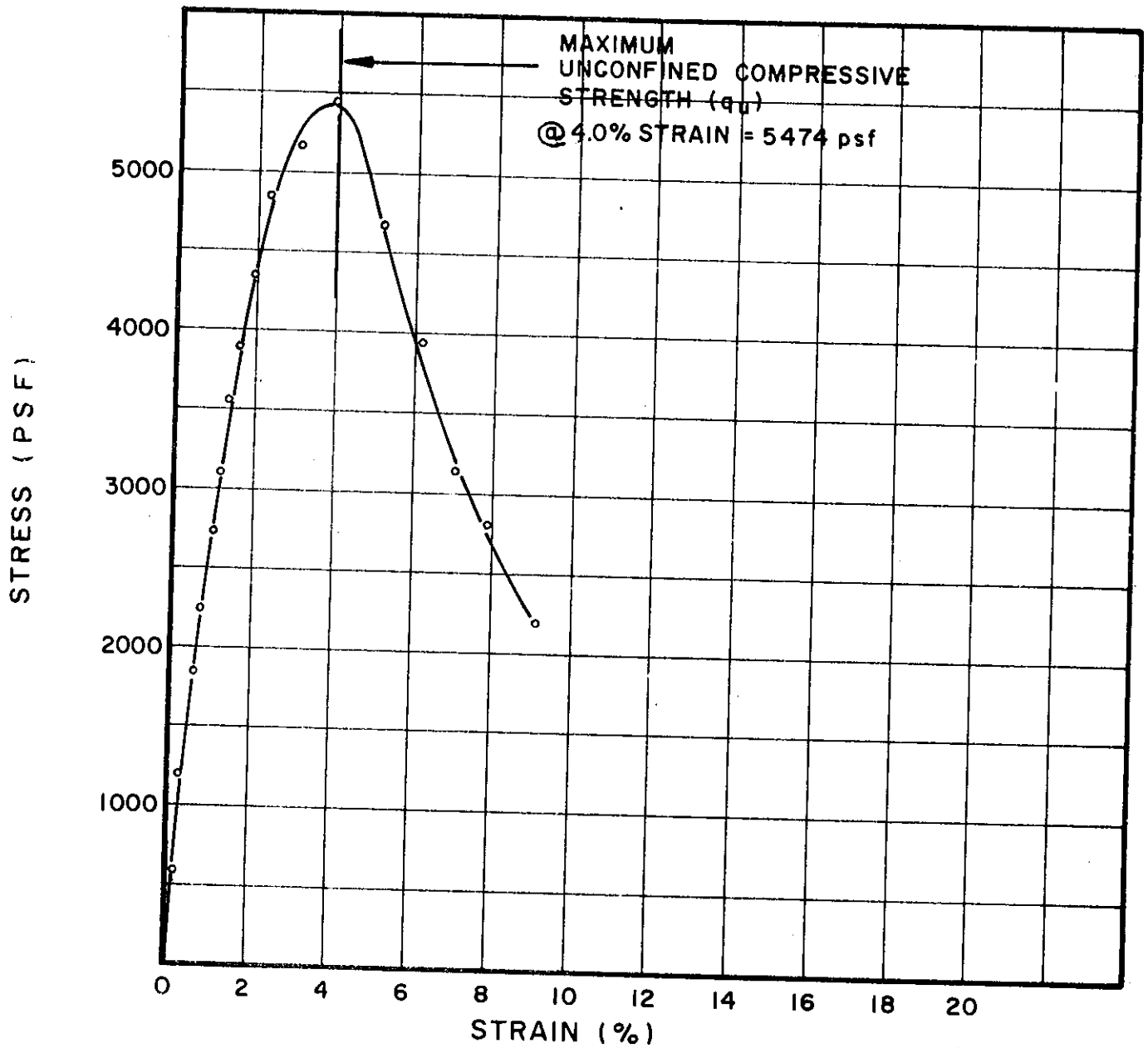
SAMPLE NO. 16

DEPTH 78.6' - 78.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
UI08.1	1.37	3.48	.25	30.3	92	49	20	SILTY CLAY (CL-CH)

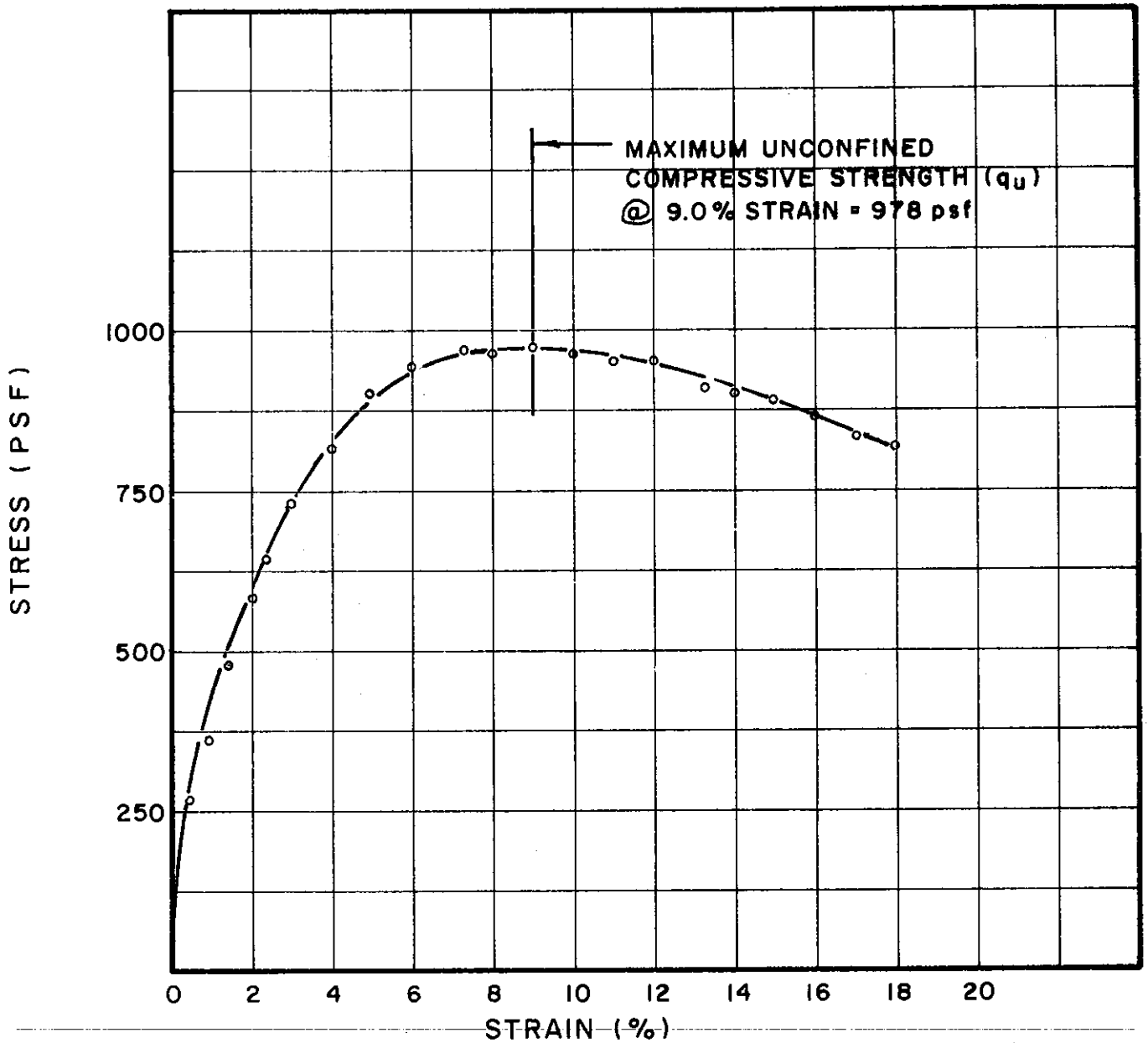
BORING NO. 52

SAMPLE NO. 3

DEPTH 20.5' - 20.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
UI09.1	1.37	3.25	.25	31.8	94	35	18	SILTY CLAY (CL)

BORING NO. 52

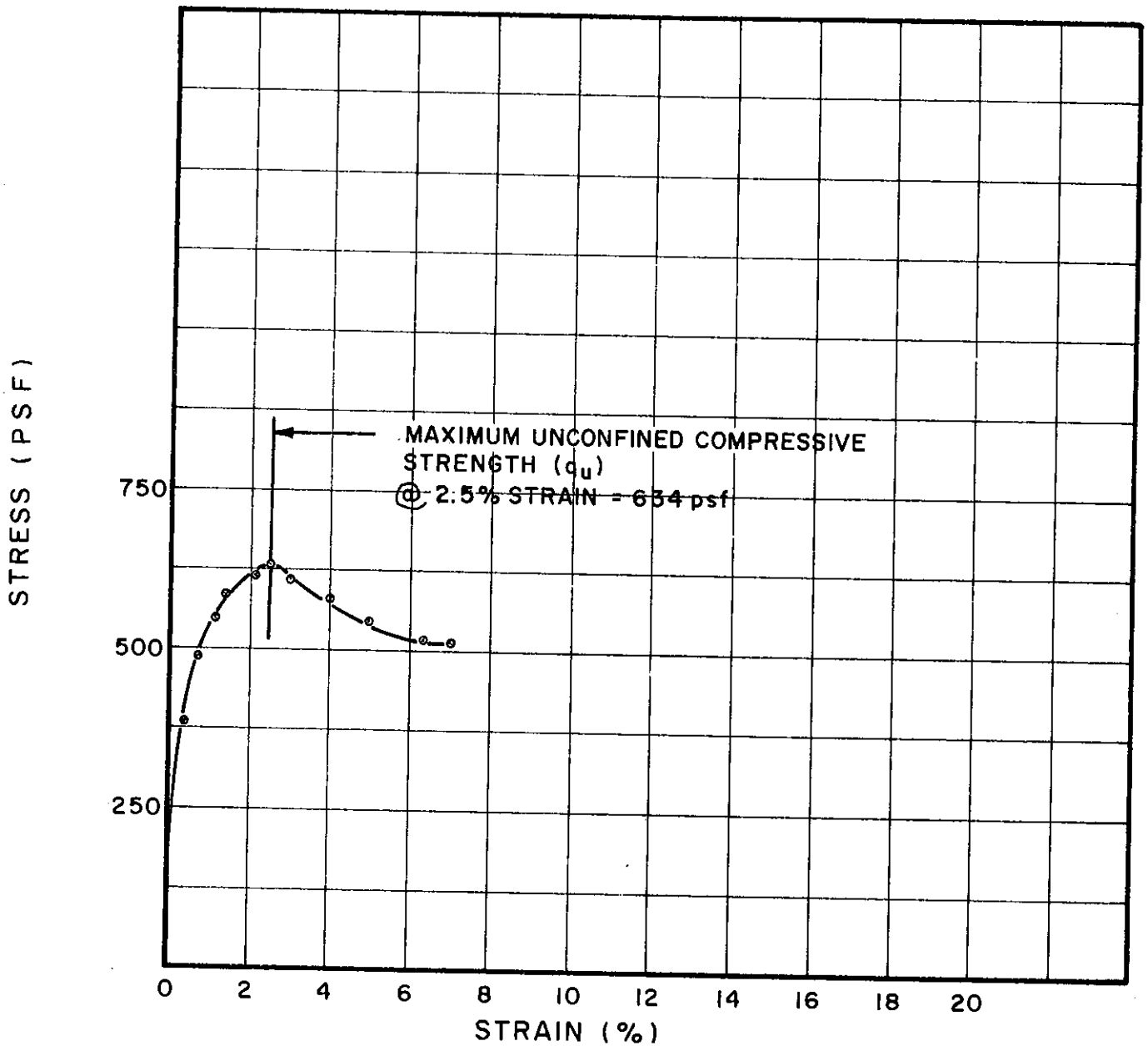
SAMPLE NO. 4

DEPTH 28.6' TO 28.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U111.1	1.38	3.02	.29	25.2	100	22	18	SILTY CLAY (CL-ML)

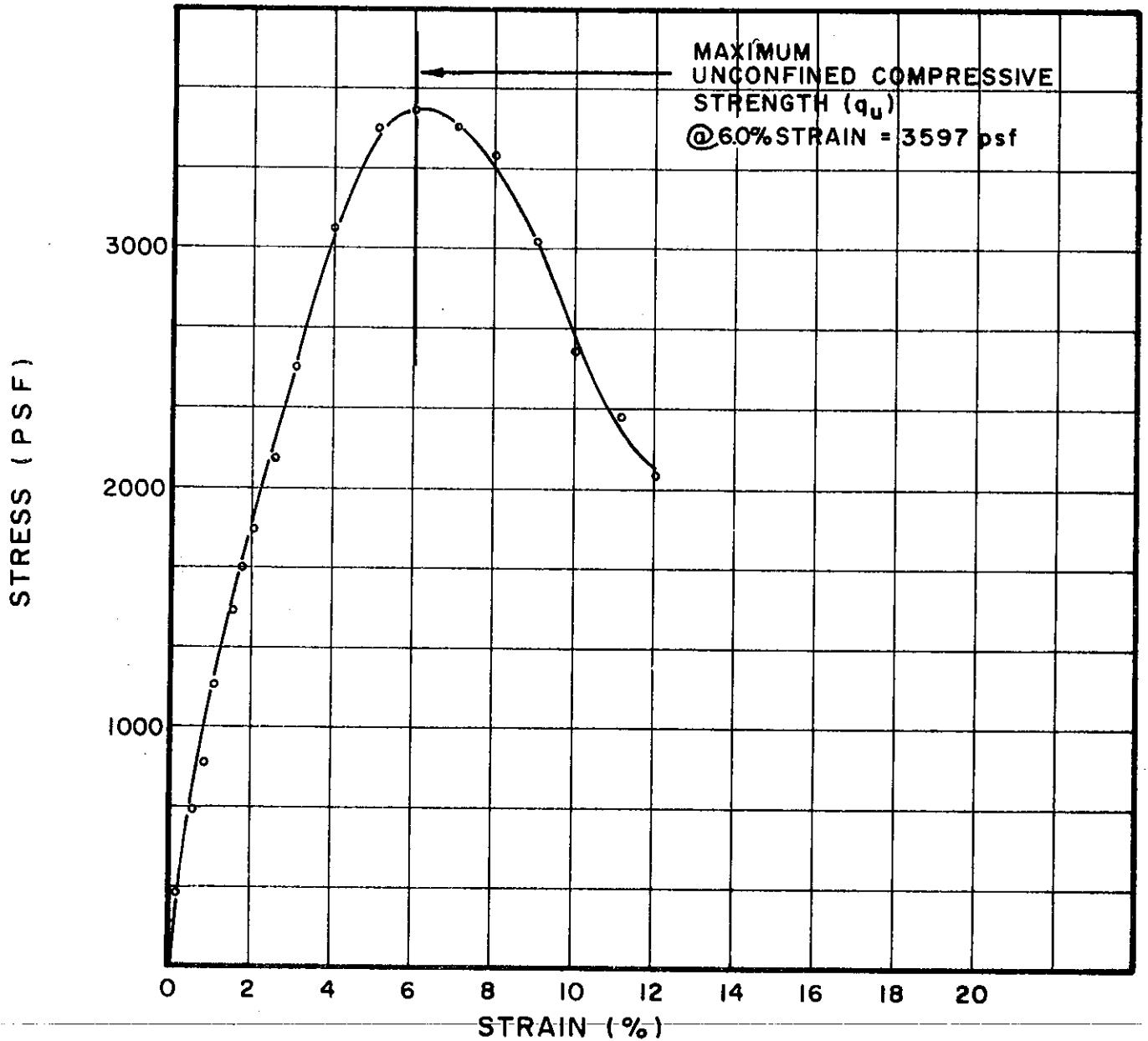
BORING NO. 52

SAMPLE NO. 6

DEPTH 49.2' - 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U112.1	1.36	3.37	.25	13.0	116	23	14	SILTY CLAY, SANDY
								(CL)

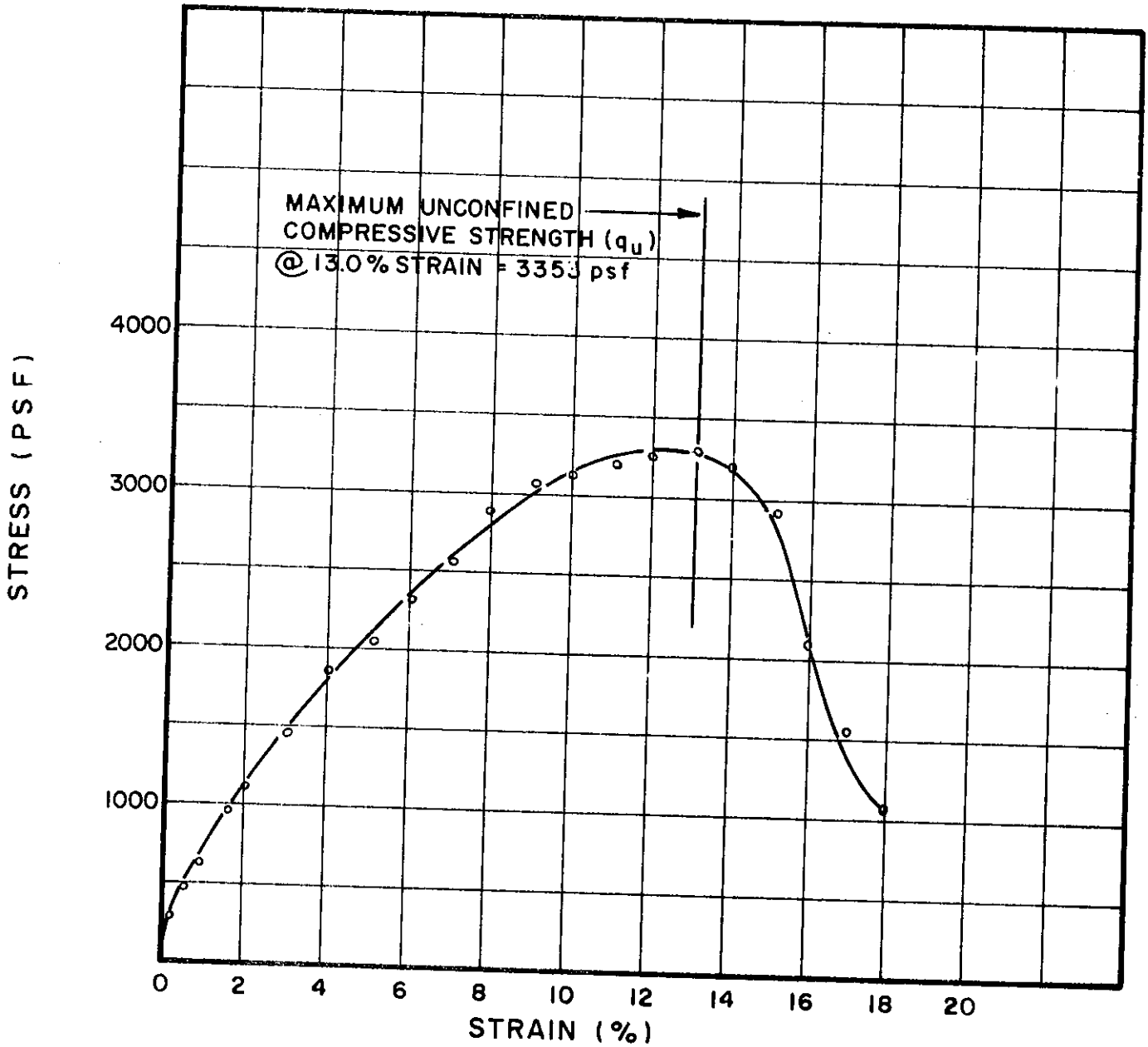
BORING NO. 52

SAMPLE NO. 7

DEPTH 59.0' - 59.3'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U113.1	1.34	3.50	.25	14.2	115	24	14	SILTY CLAY, SANDY
								(CL)

BORING NO. 52  
 SAMPLE NO. 8  
 DEPTH 68.2' TO 68.5'

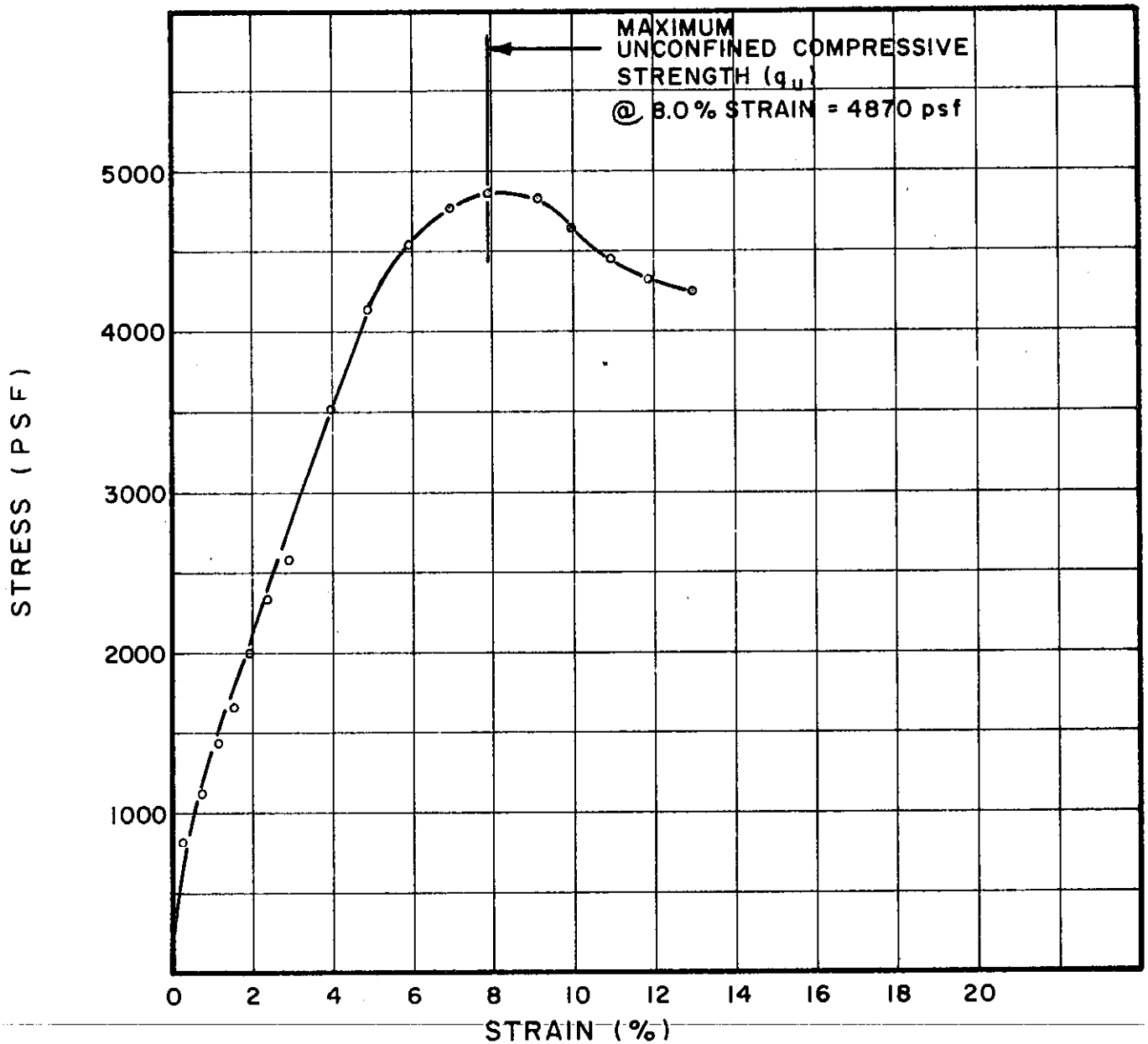
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-305



TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U115.1	1.39	3.27	.28	27.2	97	39	18	SILTY CLAY, SANDY (CL)

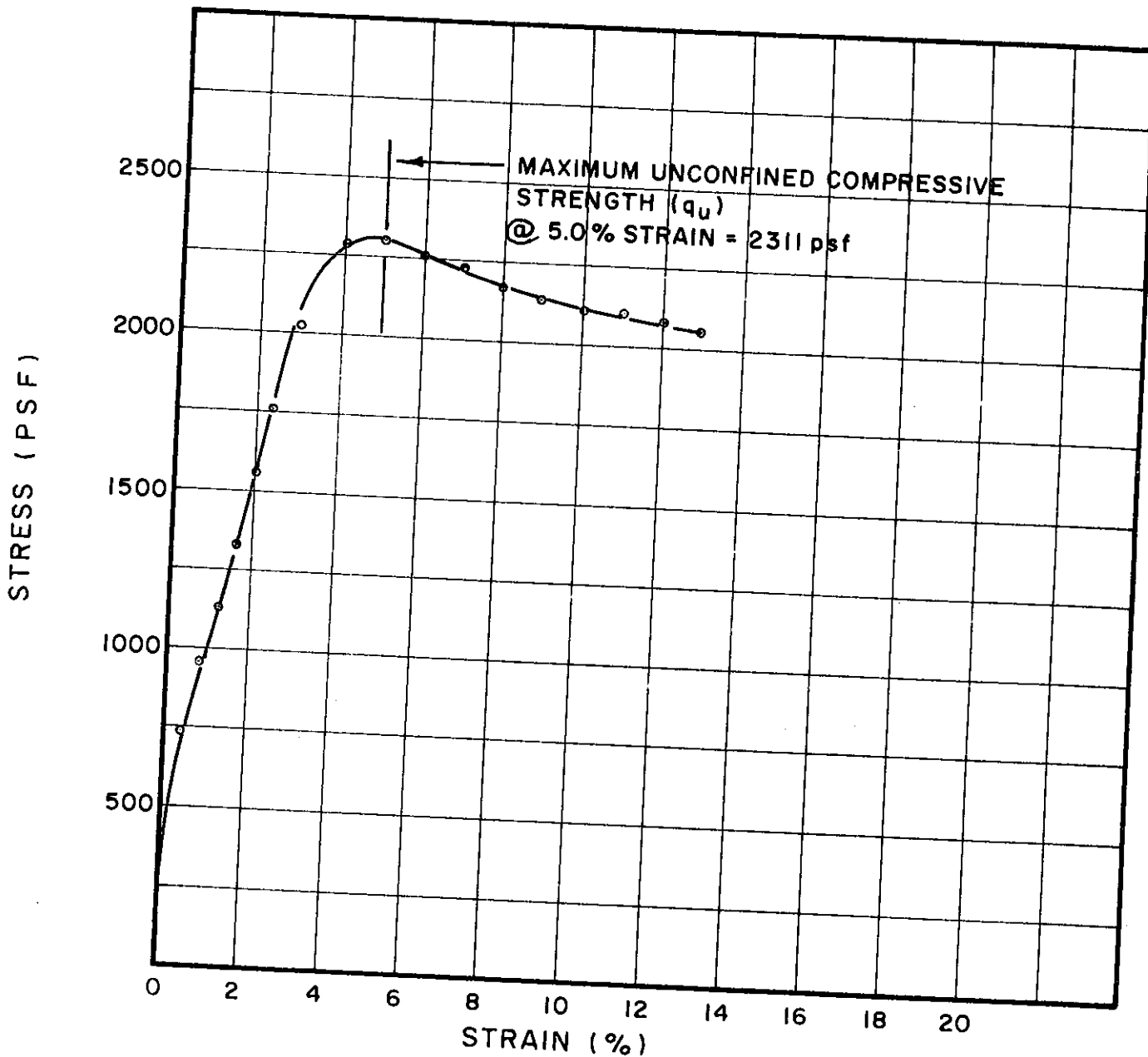
BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 88.6' - 88.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U96.1	1.40	3.20	.25	31.8	88	49	20	SILTY CLAY (CL-CH)

BORING NO. 53  
 SAMPLE NO. 3  
 DEPTH 19.6' TO 19.9'

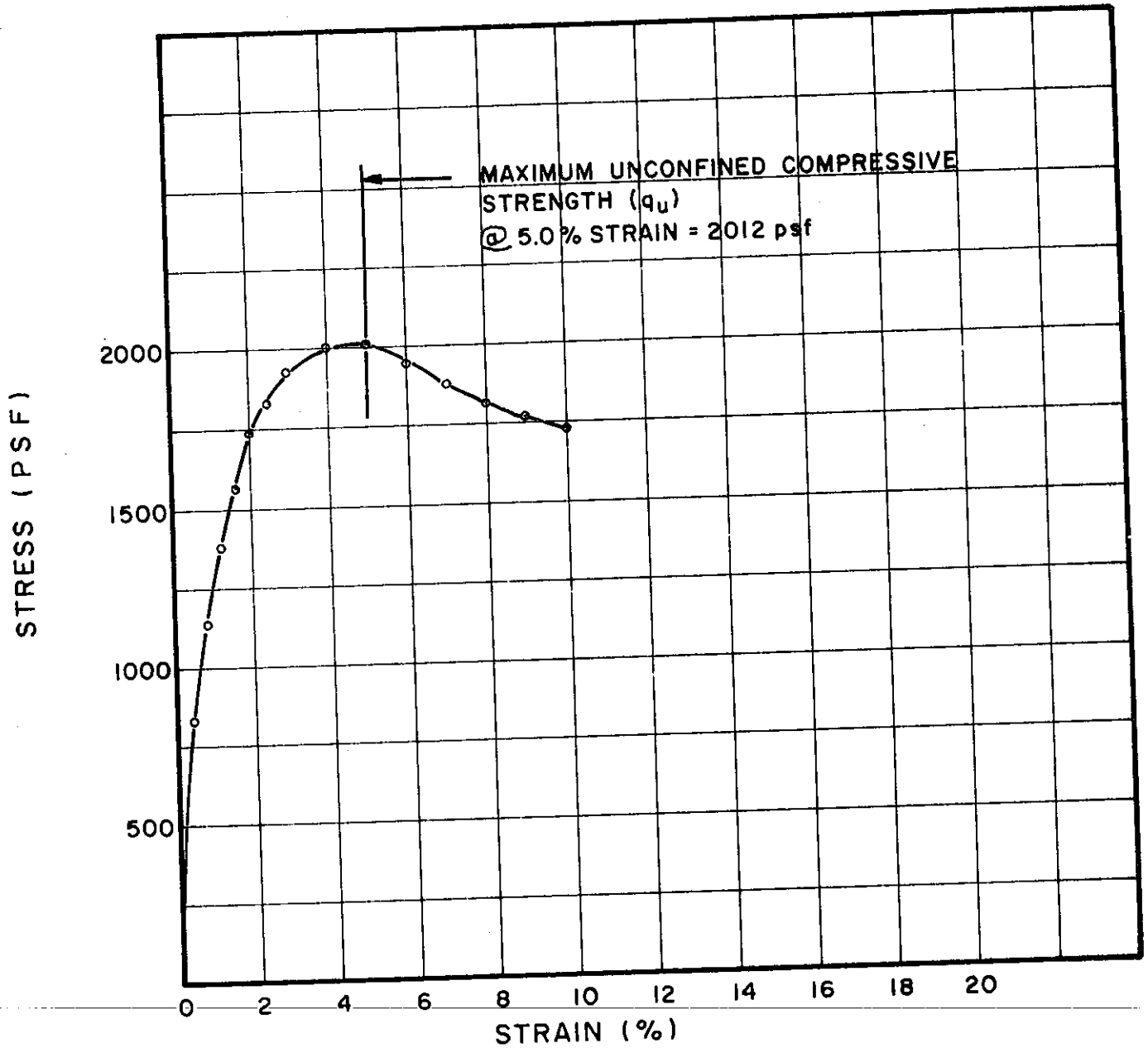
### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-307



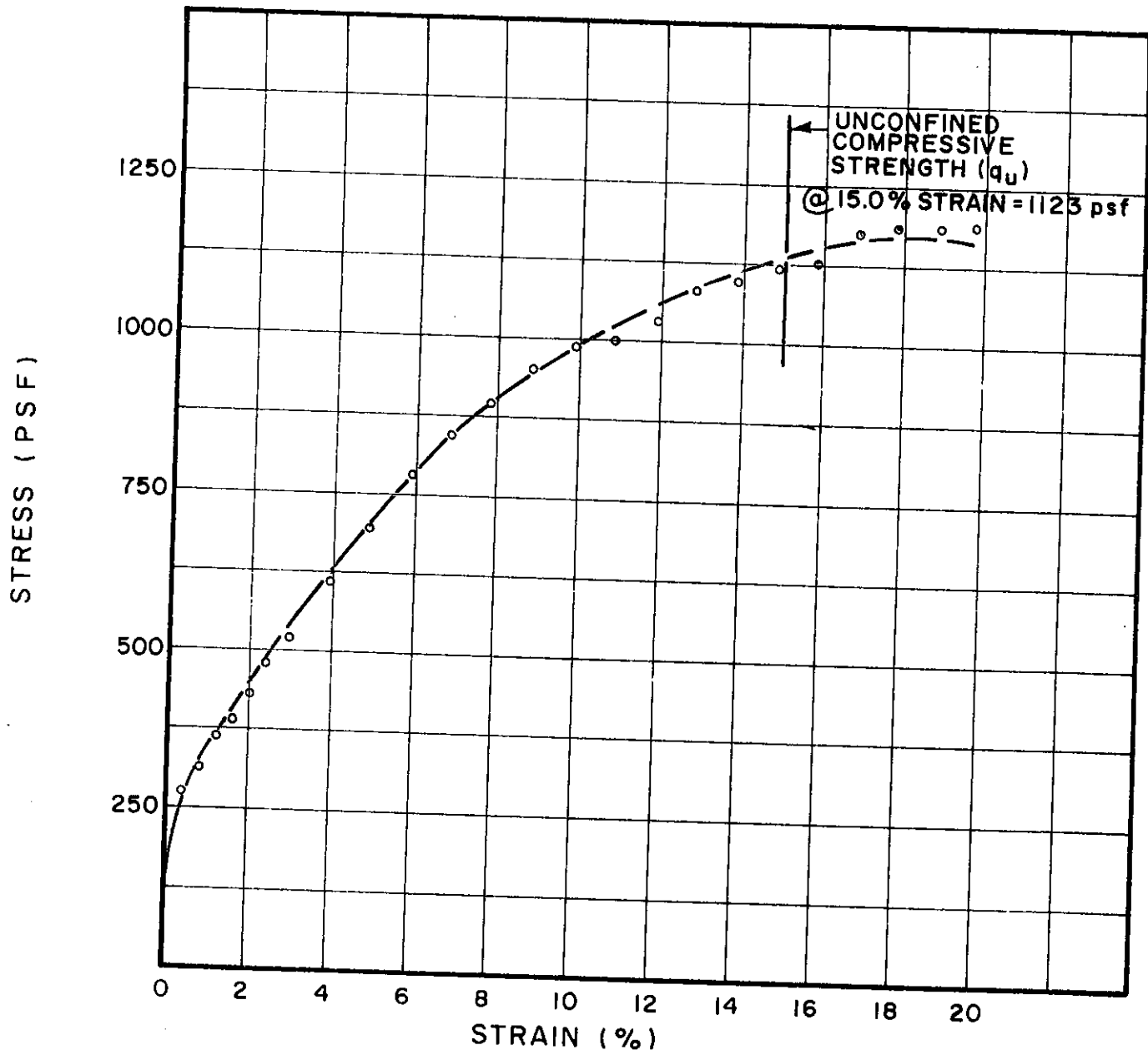
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U97.1	1.38	3.24	.25	40.7	80	49	22	SILTY CLAY (CL-CH)

BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 29.6' - 29.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U99.1	1.37	3.17	.25	27.9	94	43	18	SILTY CLAY (CL)

BORING NO. 53

SAMPLE NO. 6

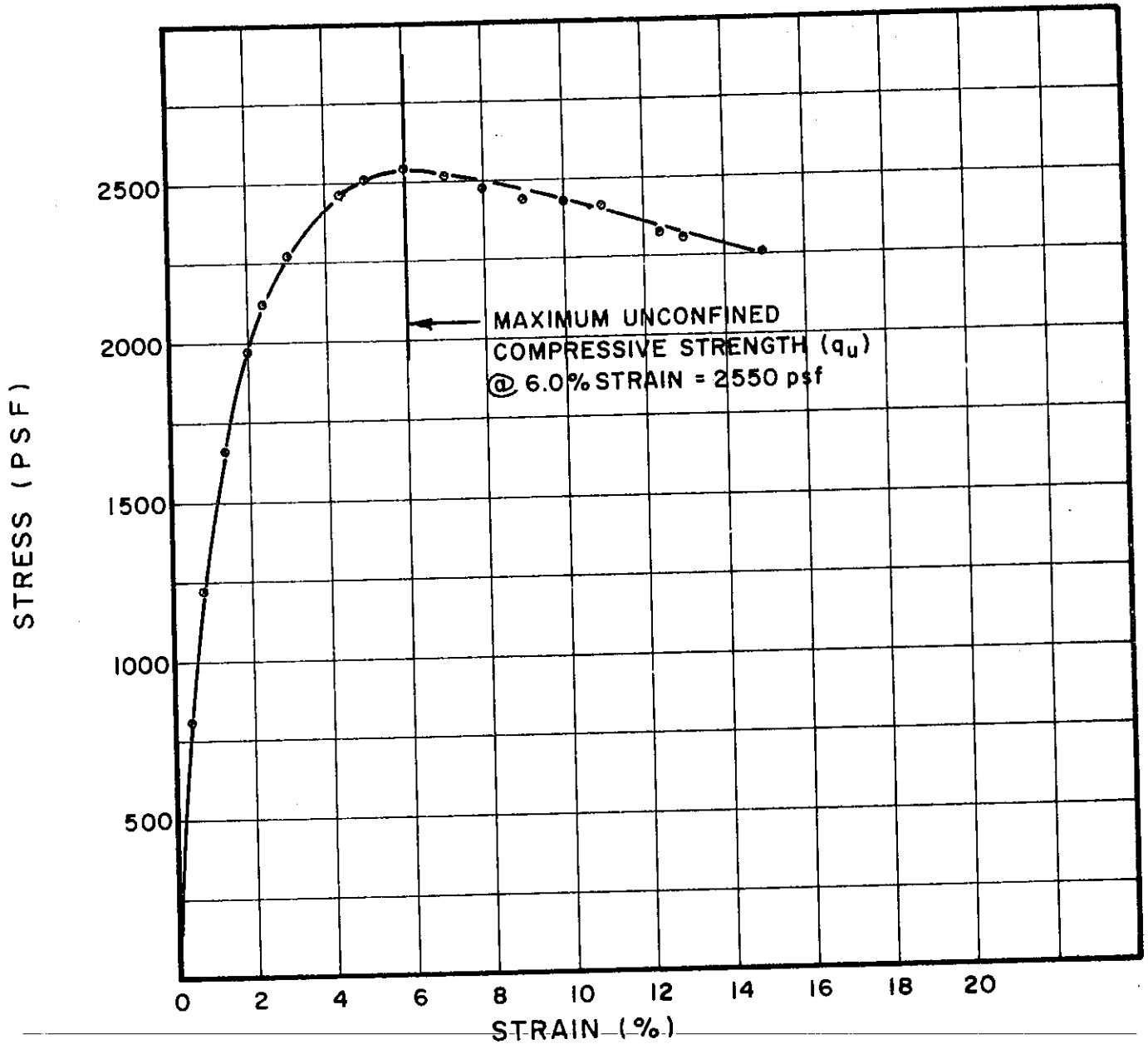
DEPTH 49.2' TO 49.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-309



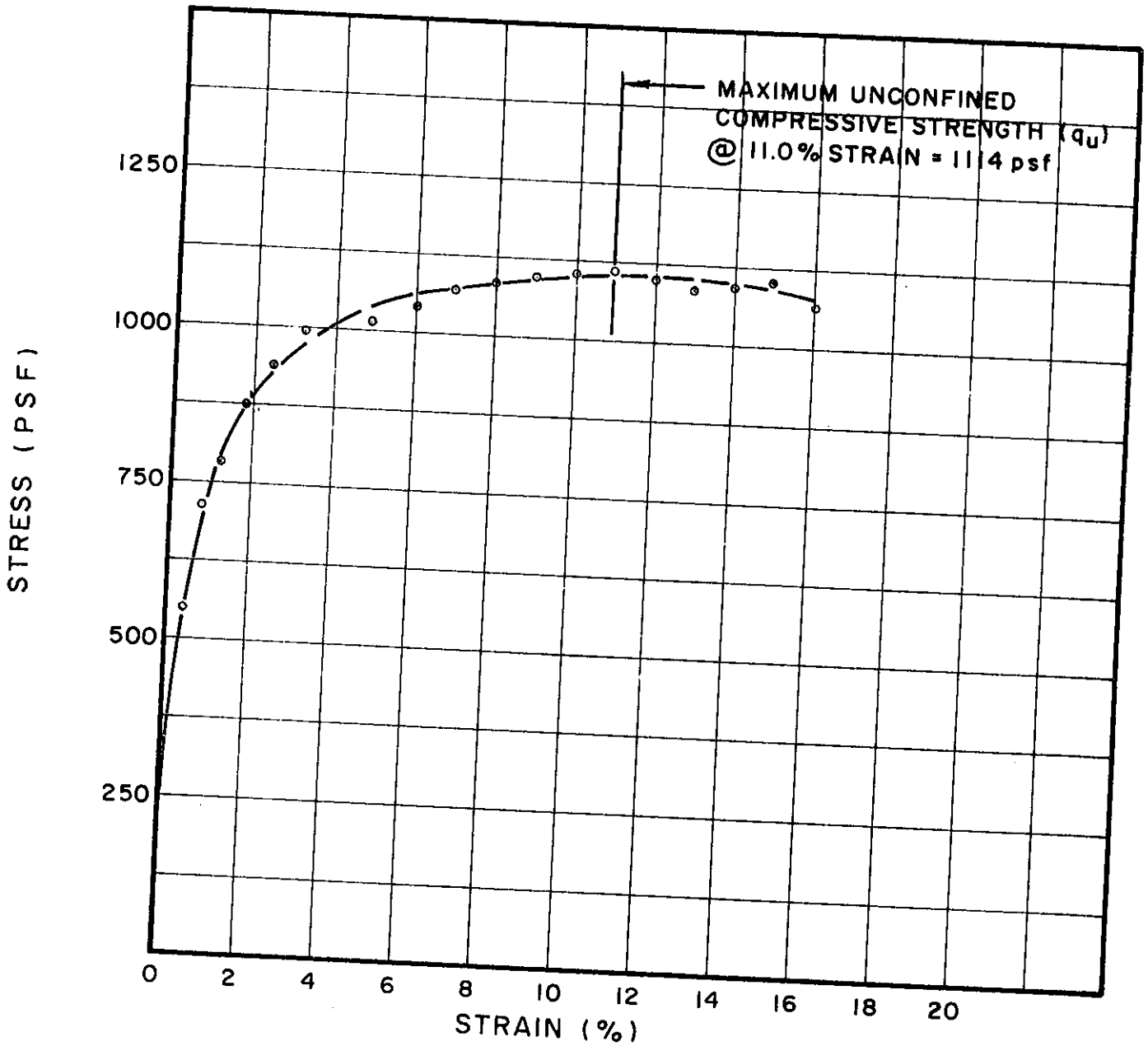
TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U101.1	1.40	3.20	.25	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 80.1' - 80.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

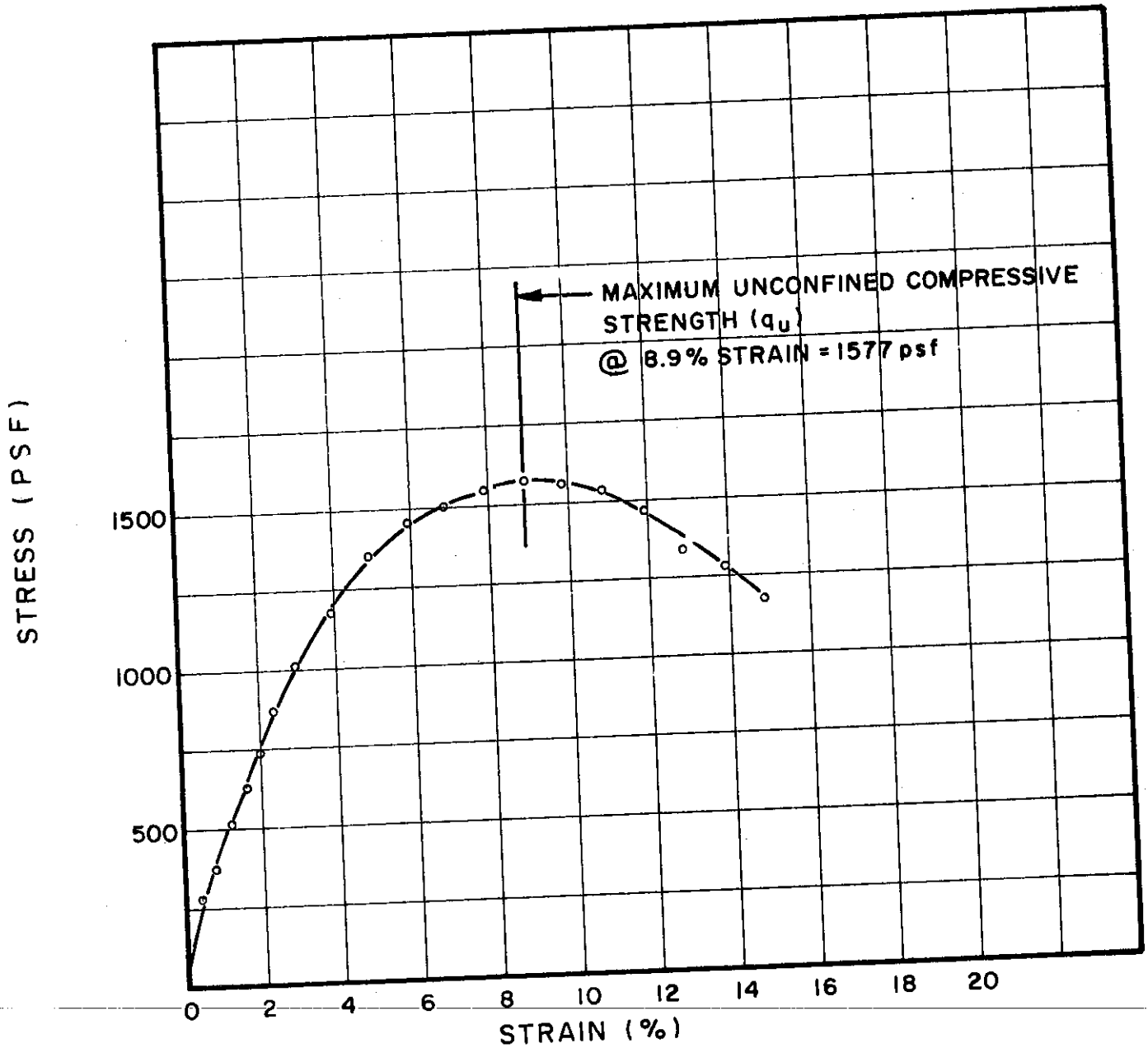


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U398.1	1.38	3.25	.25	25.8	99	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 5  
 DEPTH 59.3' TO 59.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



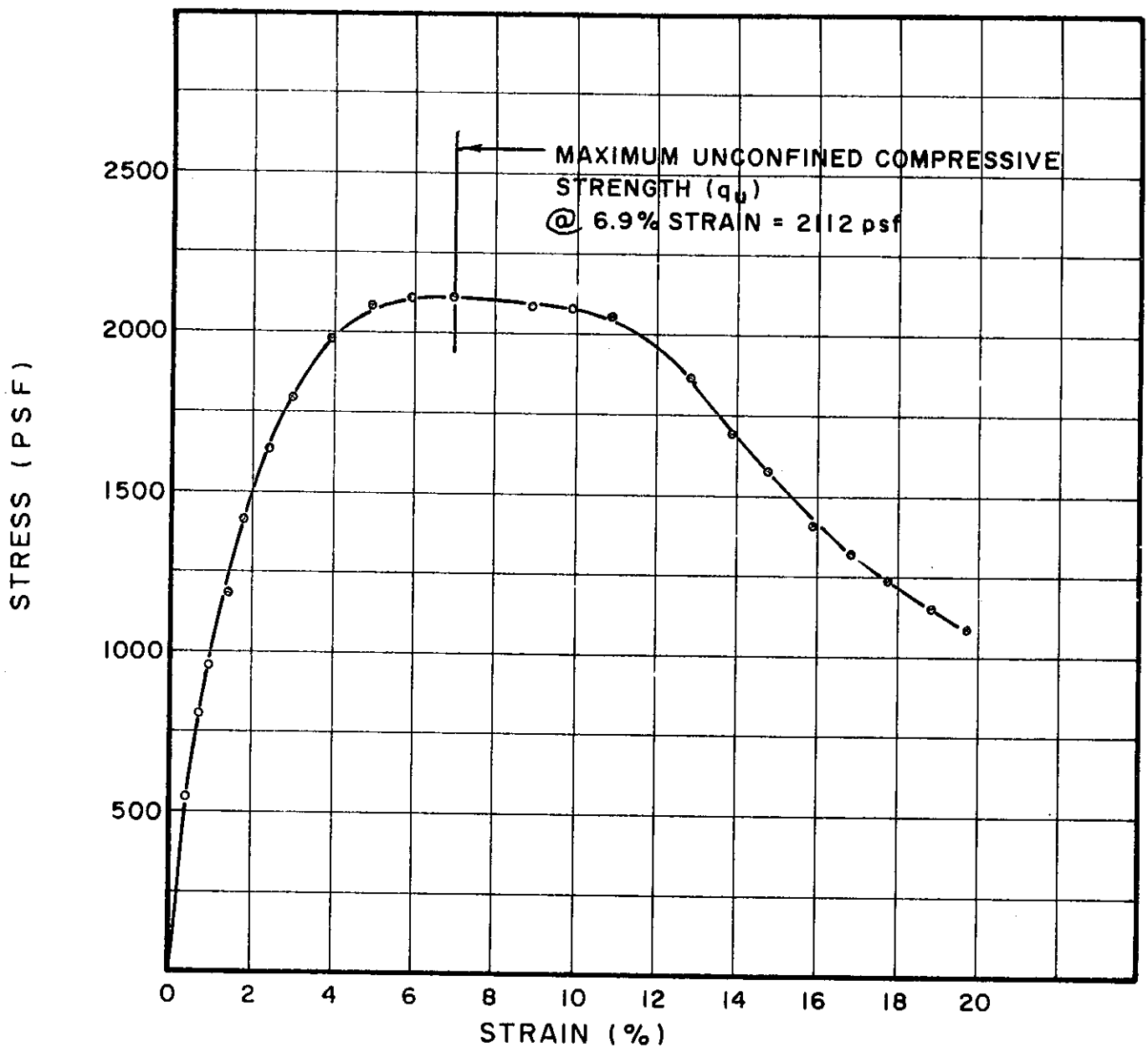
TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U400.1	1.39	3.17	.25	25.9	98	37	18	SILTY CLAY, SANDY (CL)

BORING NO. 54  
 SAMPLE NO. 7  
 DEPTH 68.5' TO 68.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

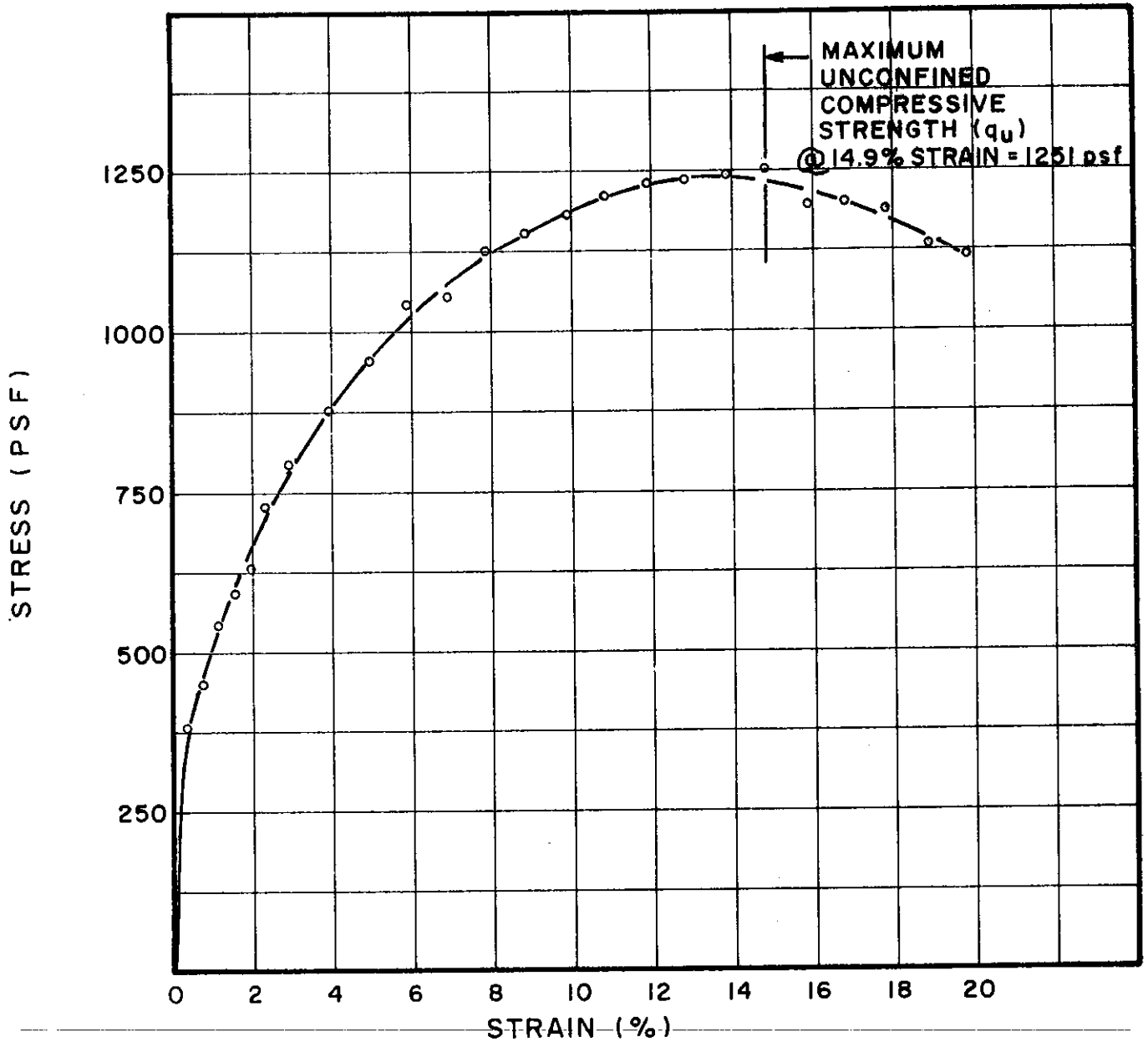


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U76.1	1.38	3.22	.25	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.8' TO 19.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U78.1	1.38	3.27	.25	26.2	99	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

SAMPLE NO. 5

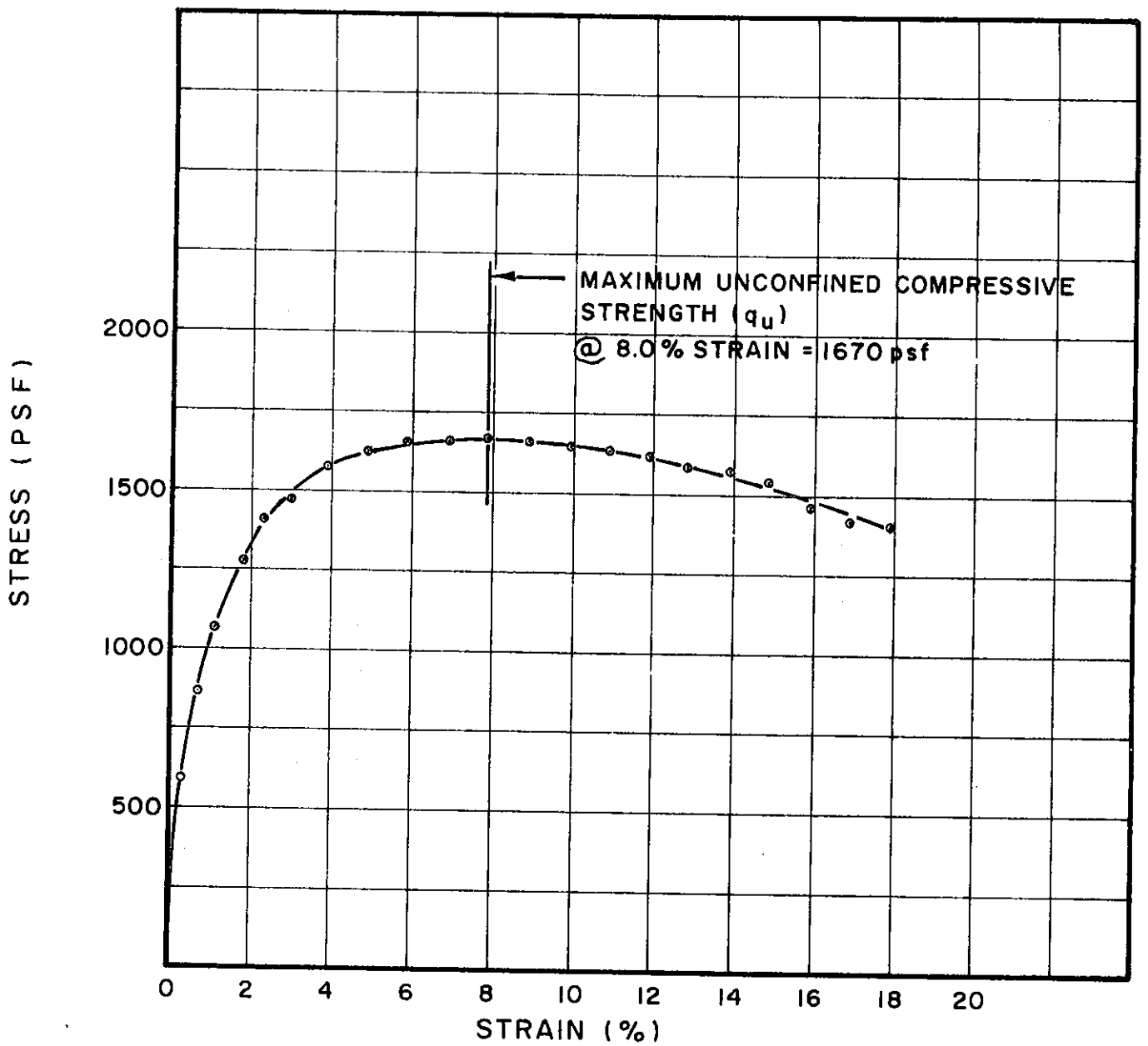
DEPTH 38.7' TO 39.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	
U80.1	1.38	3.26	.25	26.3	98	36	18	SILTY CLAY, SANDY (CL)

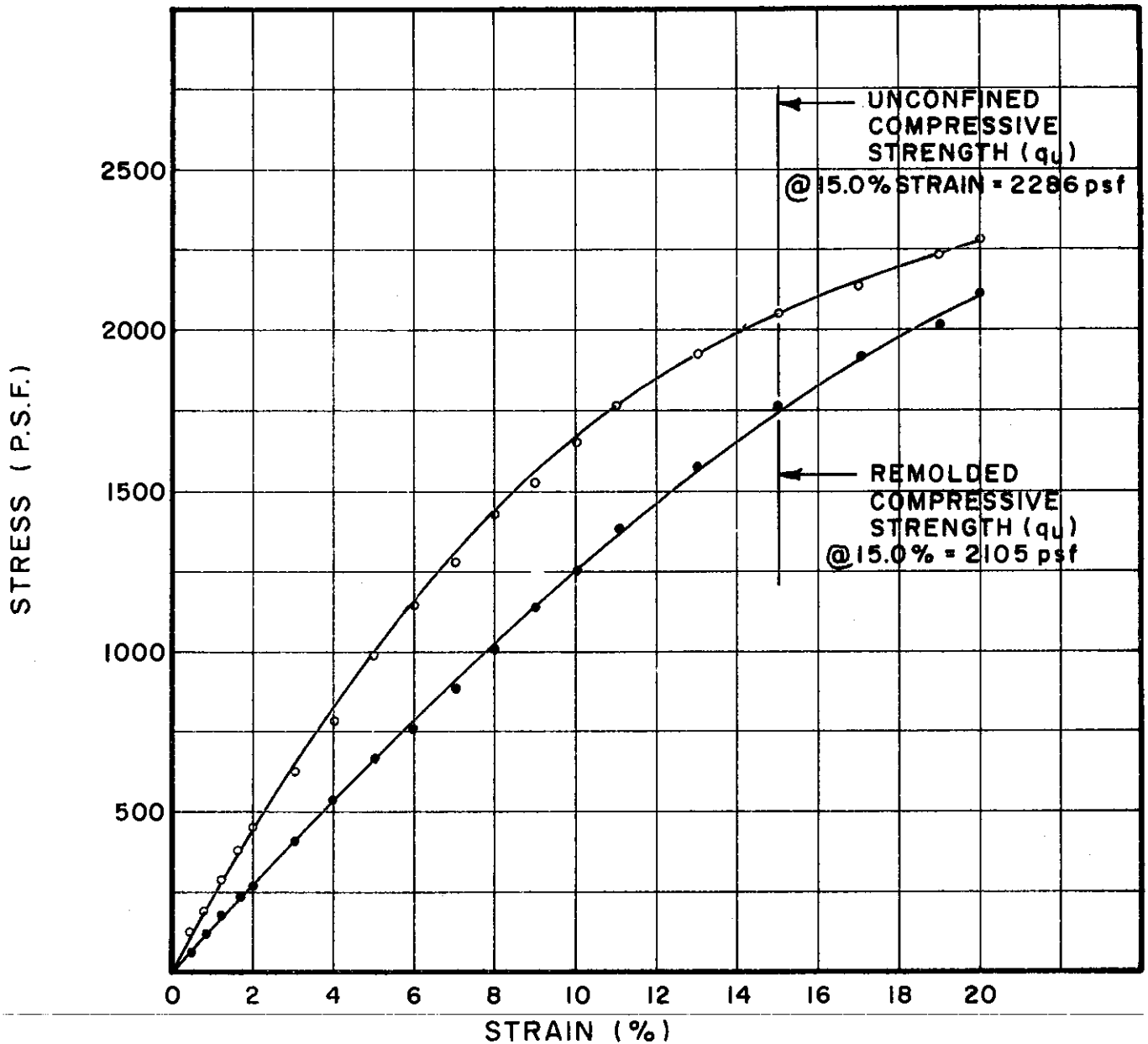
BORING NO. 59

SAMPLE NO. 7

DEPTH 58.6' TO 58.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



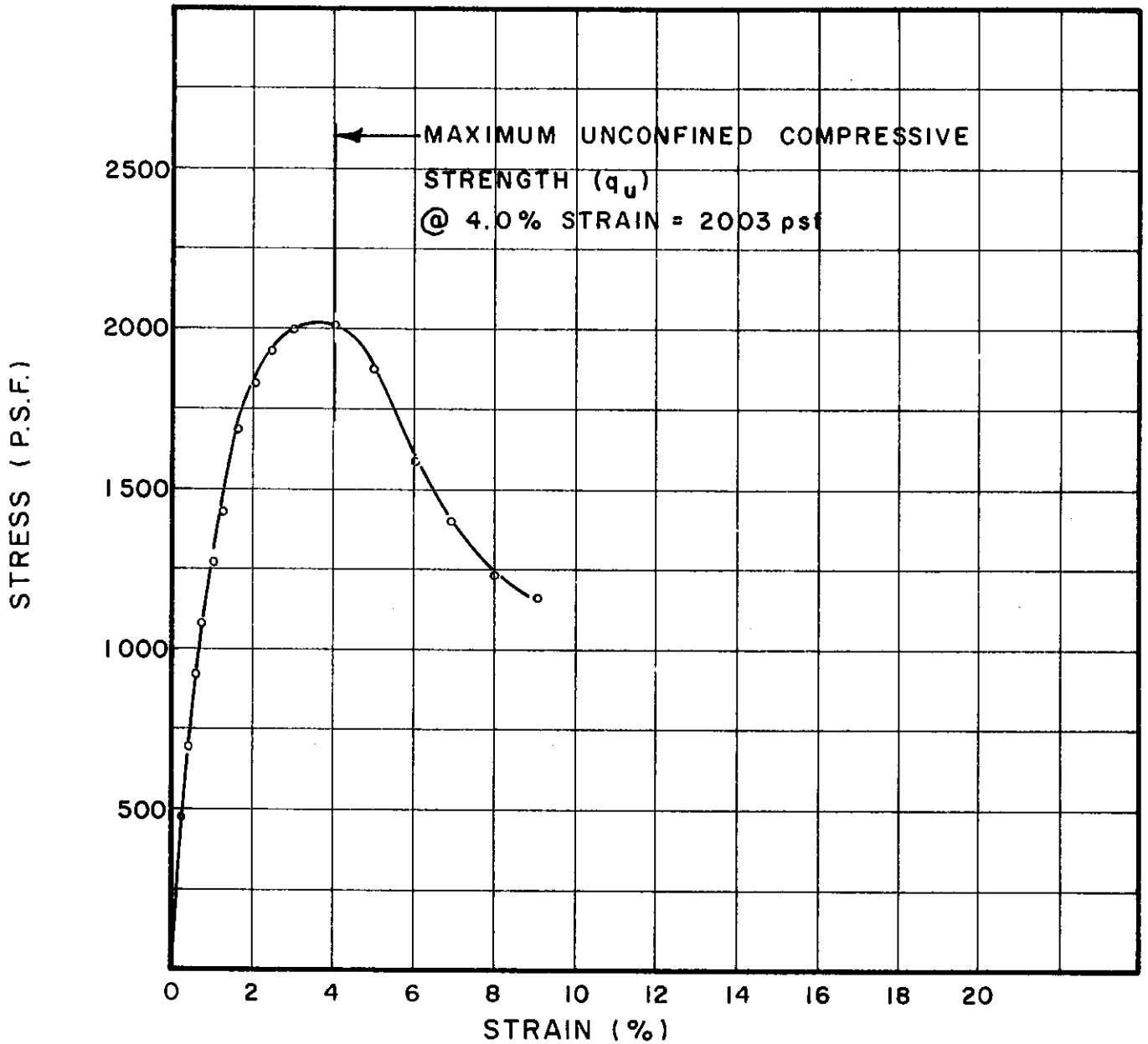
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U43.1	1.40	2.85	.316	24.3	105	39	21	SILTY CLAY (CL)
U <sub>R</sub> 43.1	1.44	2.70	.333	24.3	103	39	21	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 3  
 DEPTH 17.6' TO 18.0'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U45.1	1.43	3.50	.257	36.8	86	51	22	SILTY CLAY (CH)

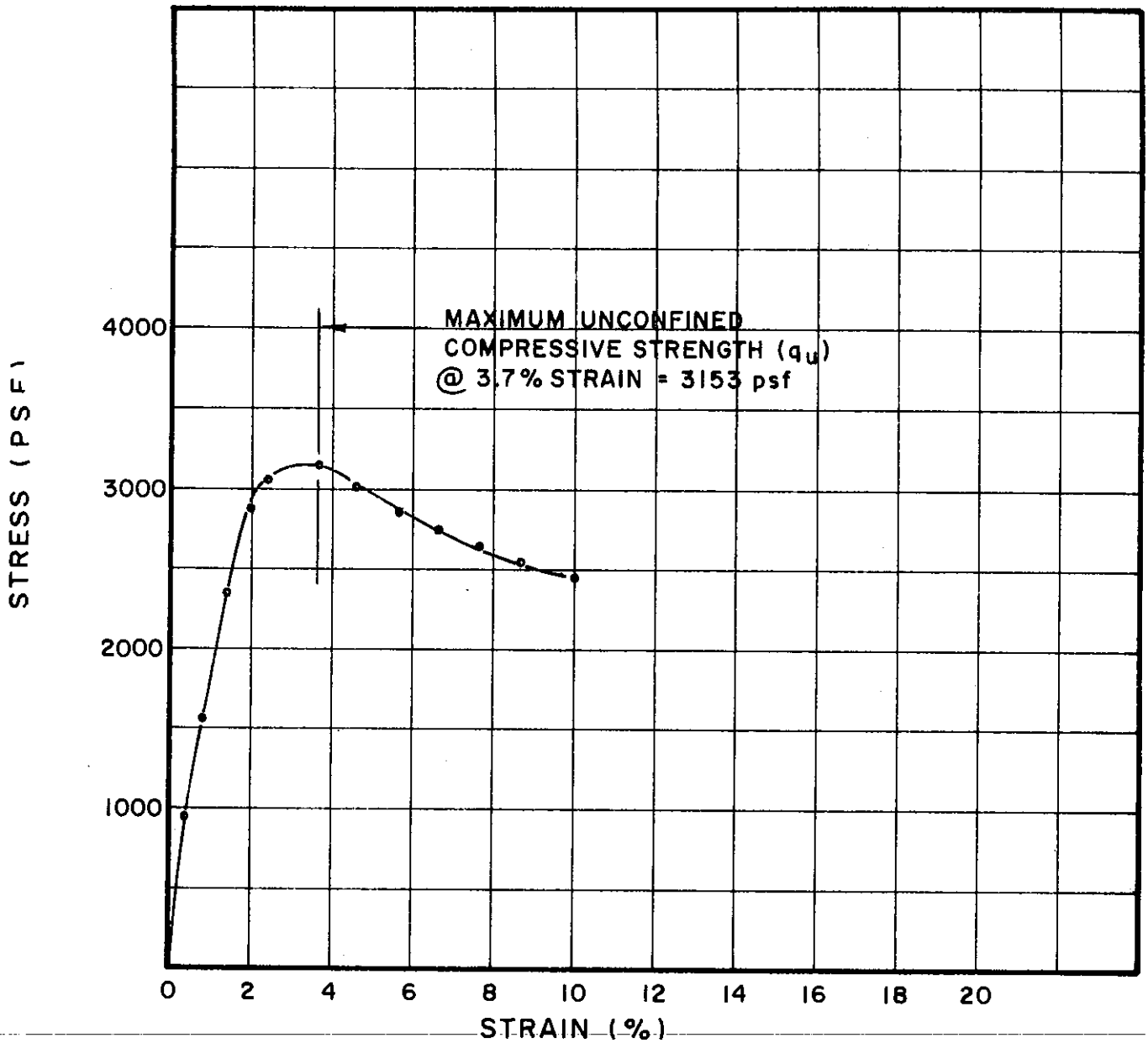
BORING NO. 60

SAMPLE NO. 5

DEPTH 25.6' TO 25.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



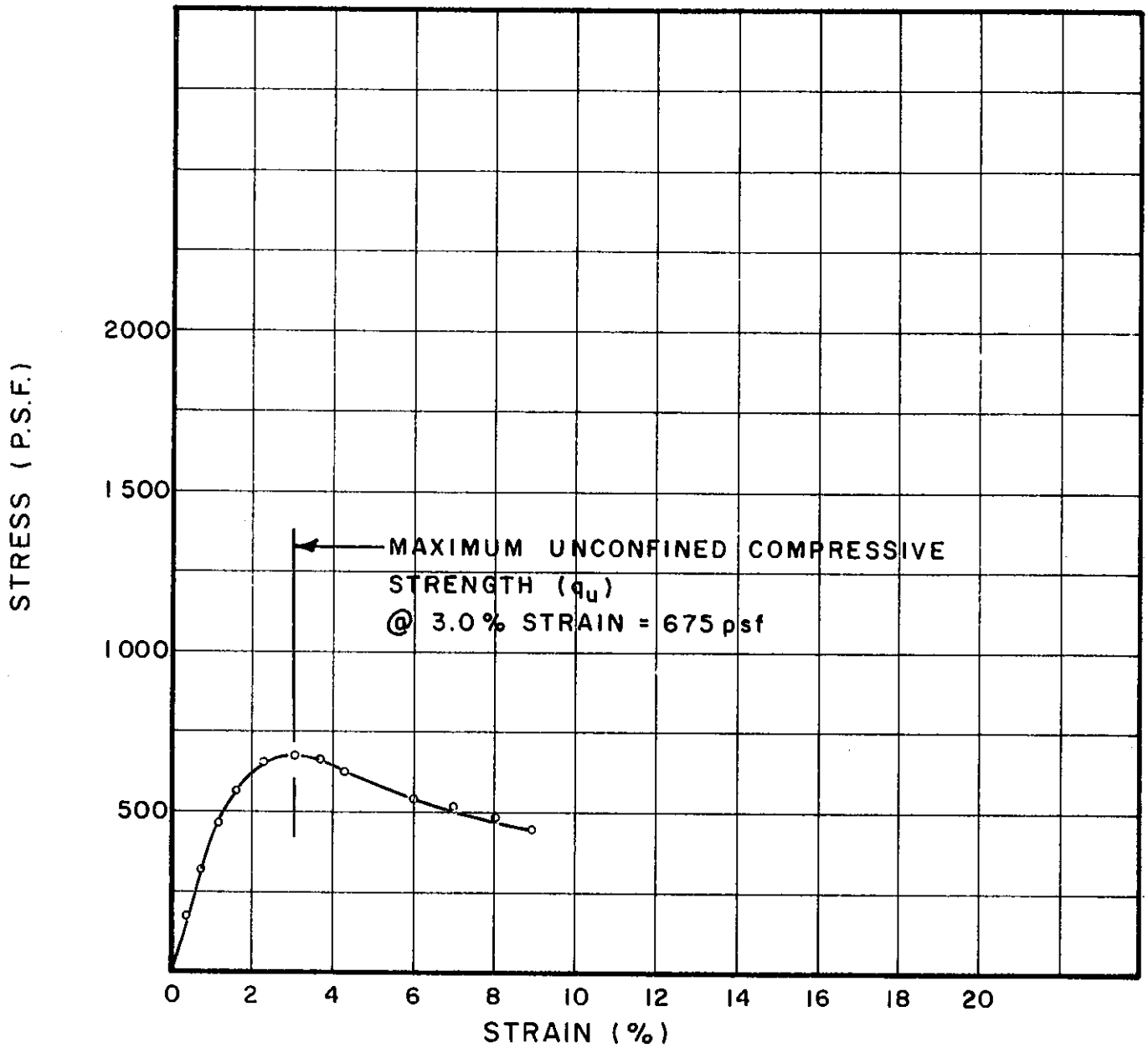
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U46.1	1.41	3.06	.26	35.0	88	48	25	SILTY CLAY (CL-CH)

BORING NO. 60  
 SAMPLE NO. 6  
 DEPTH 30.5' TO 30.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

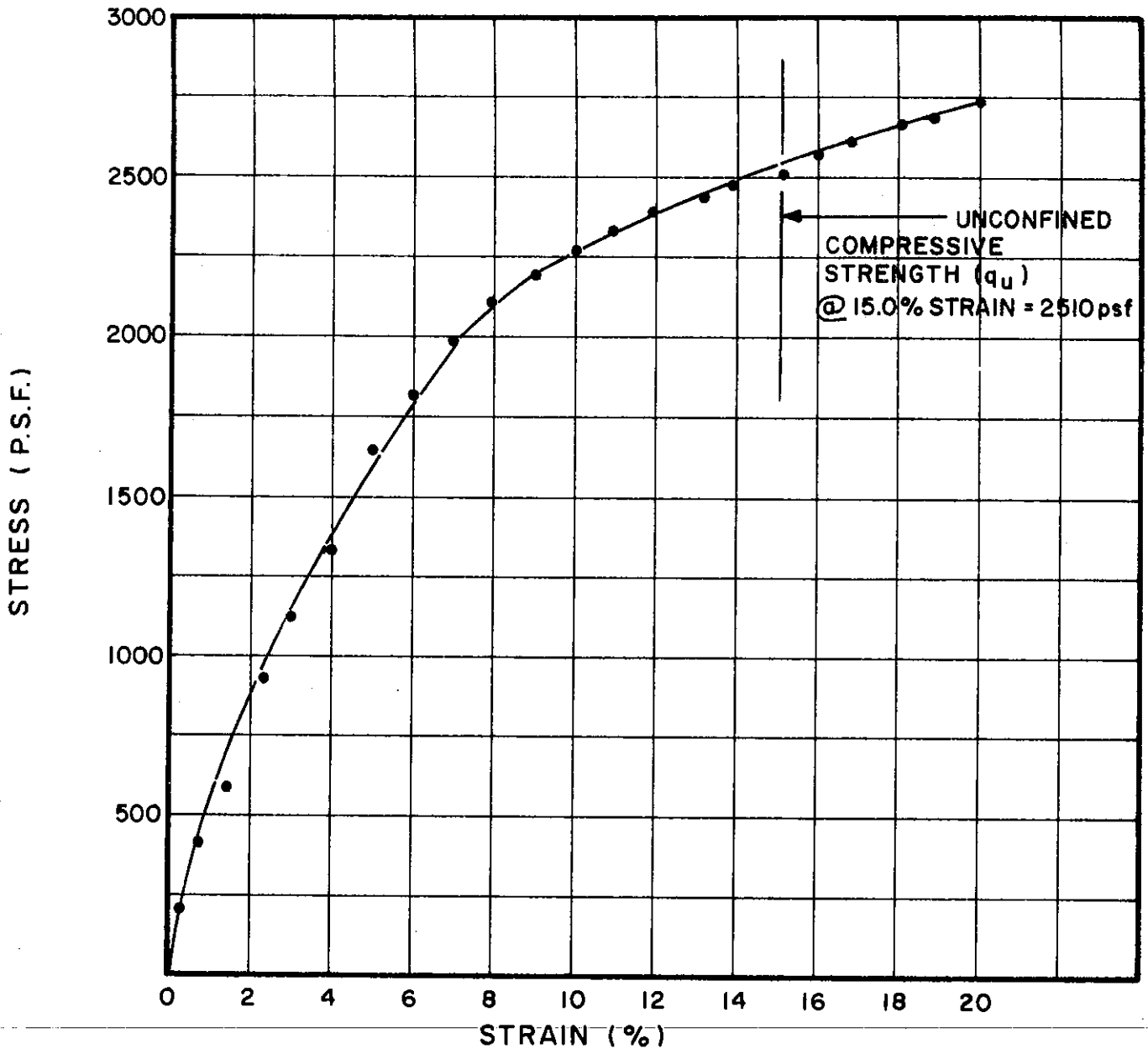


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U48.1	1.41	3.50	.257	39.7	83	47	25	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 8  
 DEPTH 40.6' TO 41.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

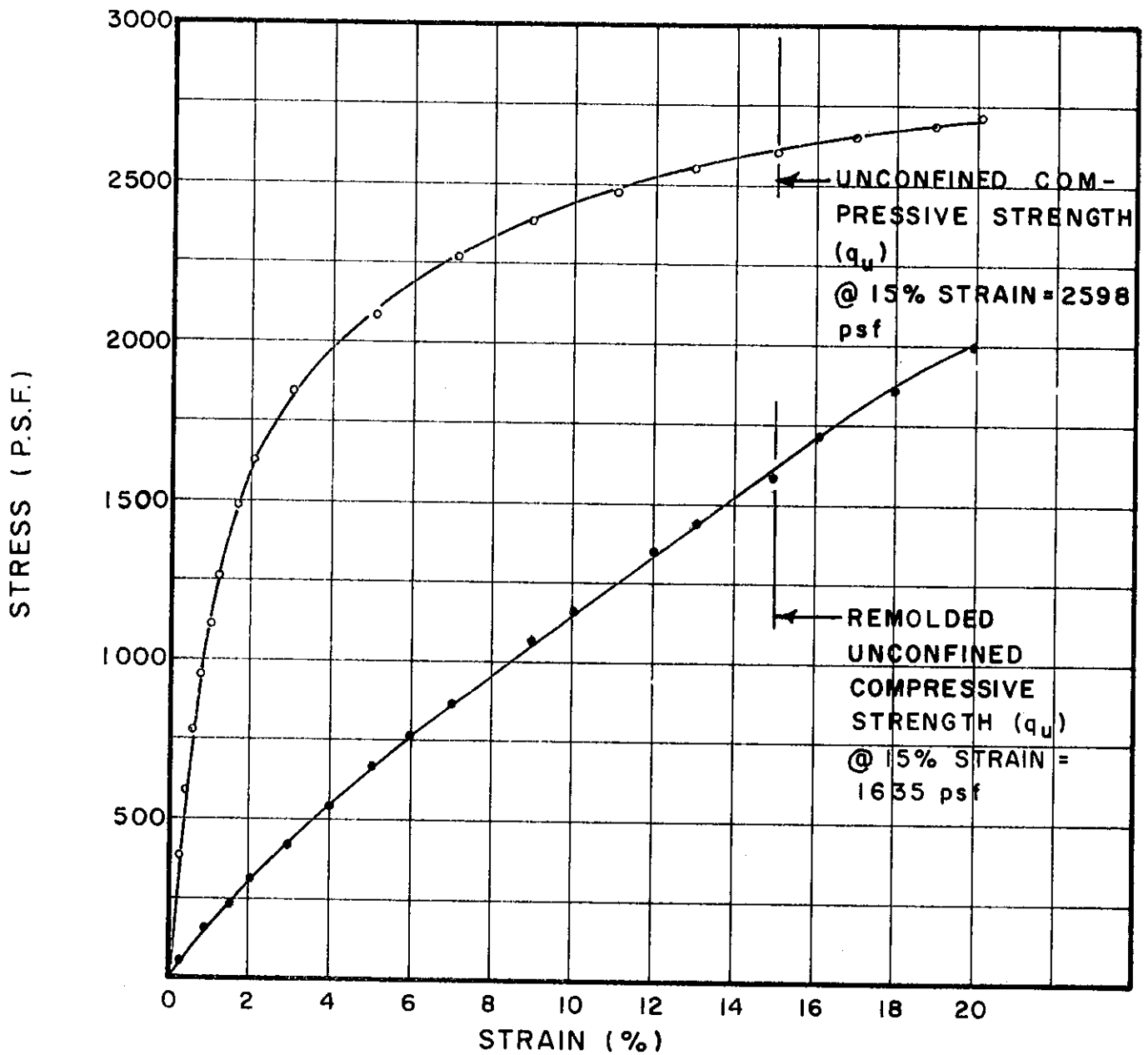


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U50.1	1.40	3.50	0.26	25.5	100	34	16	SILTY CLAY (CL)

BORING NO. 60  
 SAMPLE NO. 10  
 DEPTH 50.9' TO 51.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

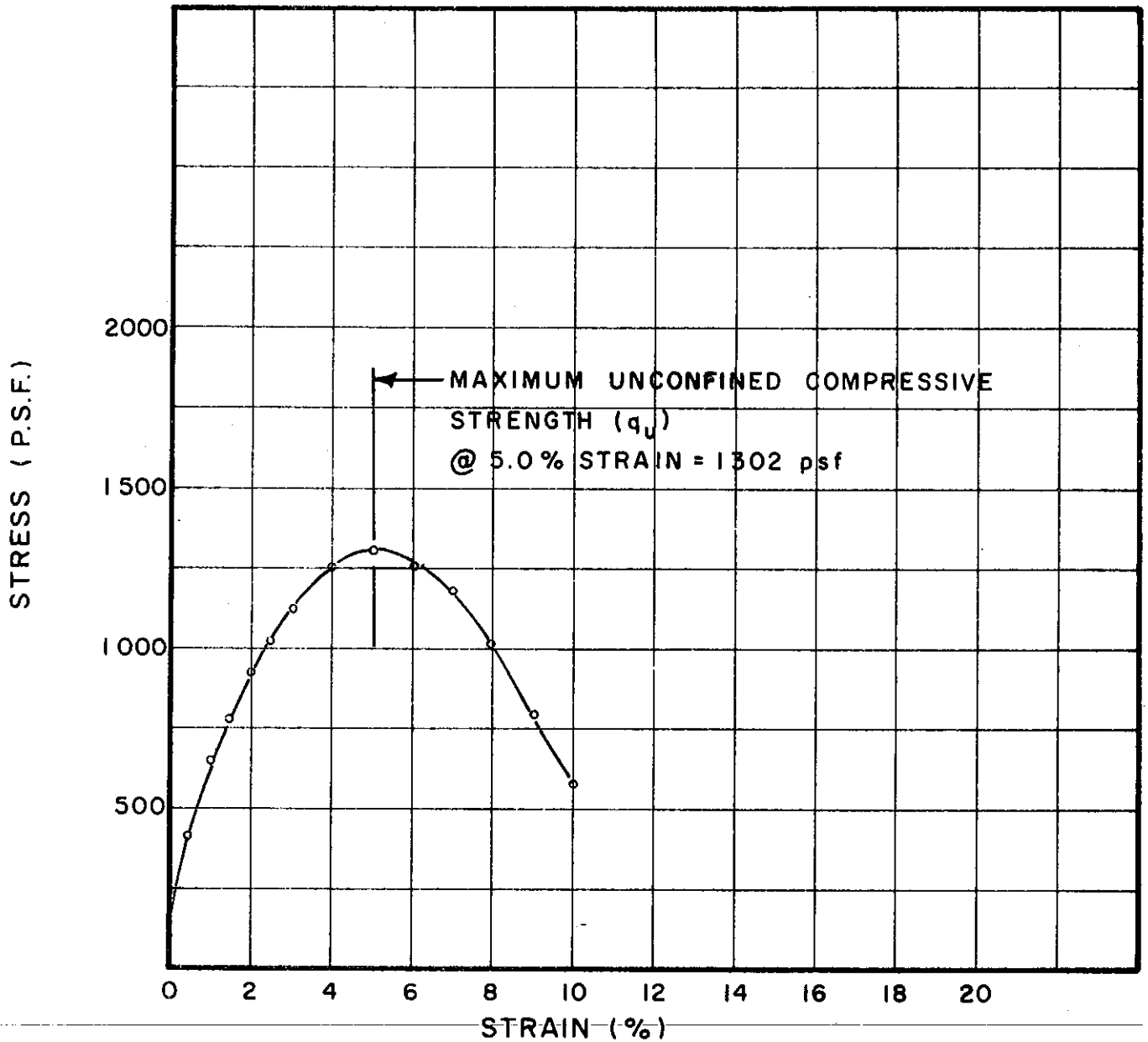


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U51.1	1.41	3.49	.258	24.8	103	33	18	SILTY CLAY, SANDY (CL)
U51.1	1.41	3.30	.273	24.8	103	33	18	SILTY CLAY, SANDY (CL)

BORING NO. 60  
 SAMPLE NO. 11  
 DEPTH 55.6' TO 56.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U54.1	1.42	3.50	.257	26.9	97	40	20	SILTY CLAY (CL)

BORING NO. 60

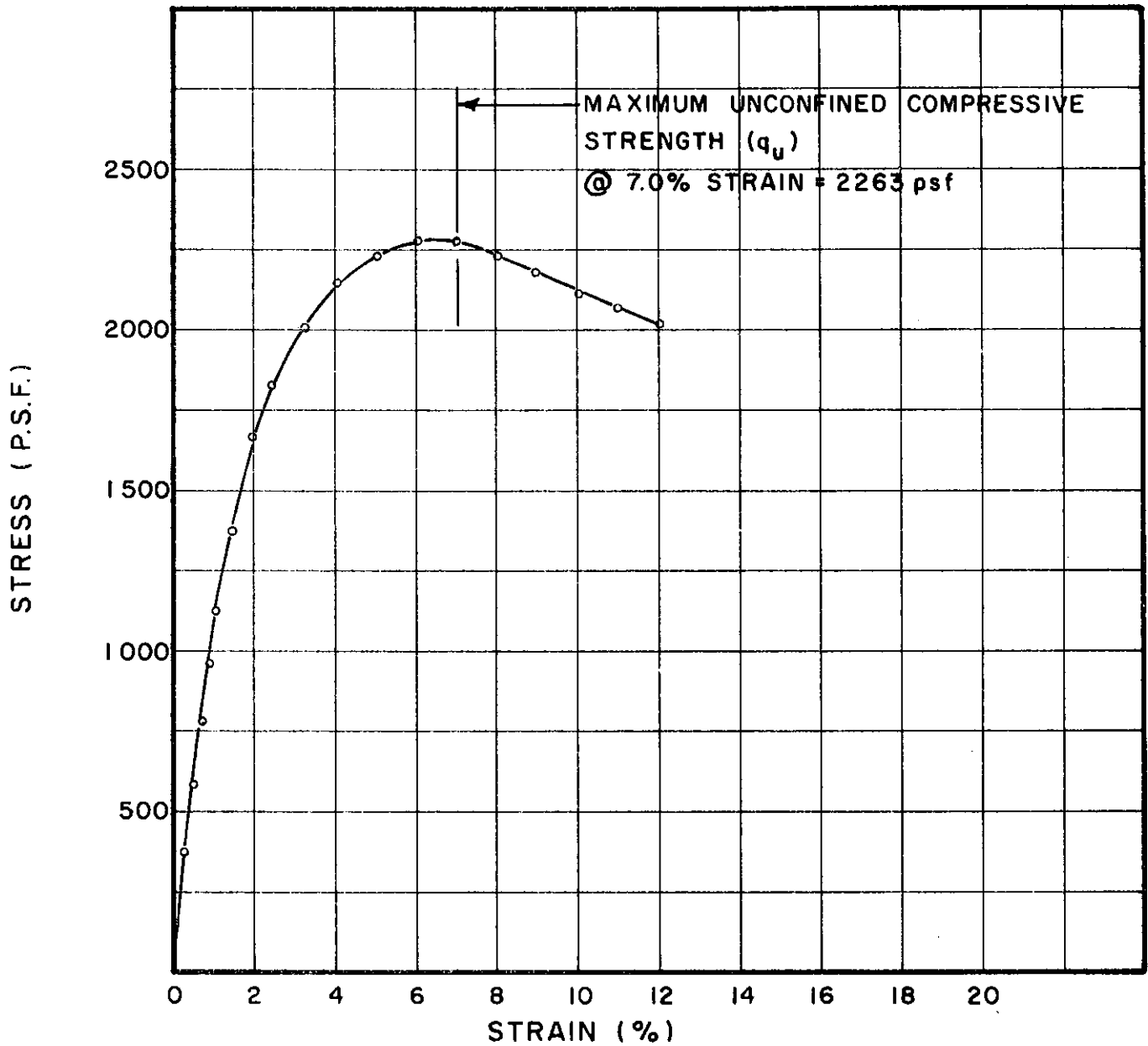
SAMPLE NO. 14

DEPTH 75.1' TO 75.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U59.1	1.41	3.50	.257	27.1	101	38	20	SILTY CLAY SANDY (CL)

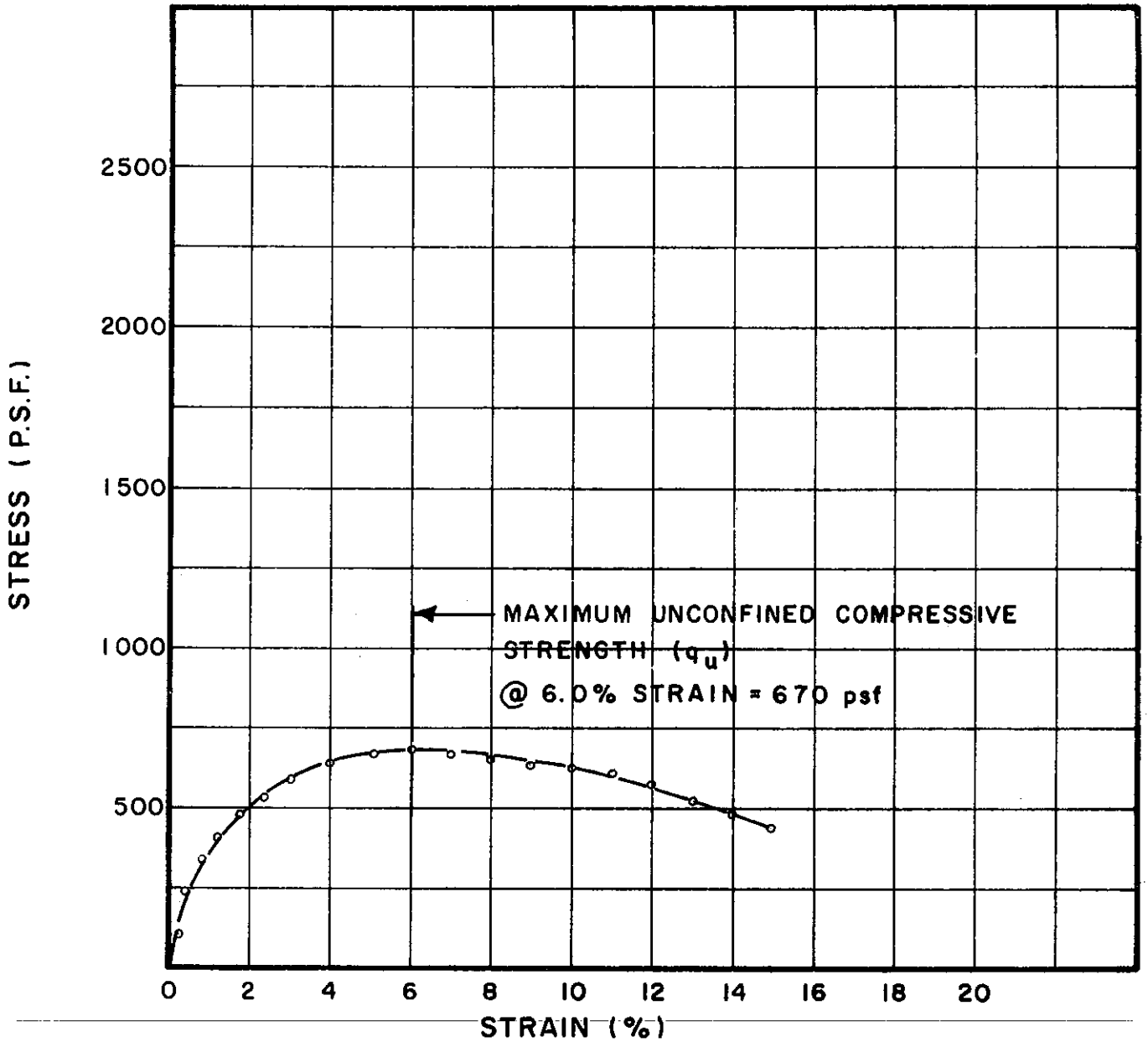
BORING NO. 60

SAMPLE NO. 19

DEPTH 100.1' TO 100.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



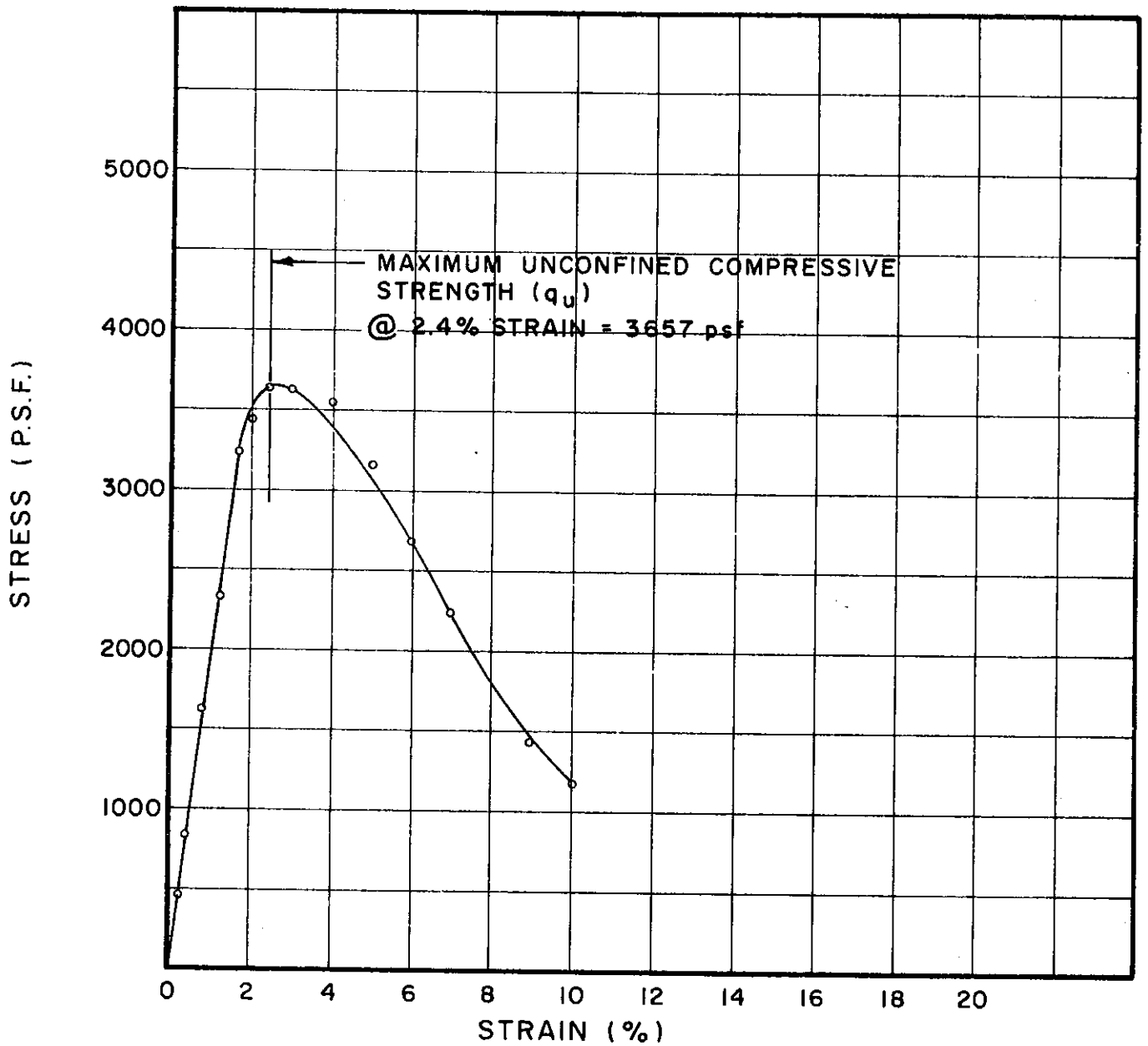
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U63.1	1.44	3.50	.257	15.4	115	17	11	SILTY CLAY, SANDY (CL - ML)

BORING NO. 60  
 SAMPLE NO. 23  
 DEPTH 119.6' TO 120.0

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

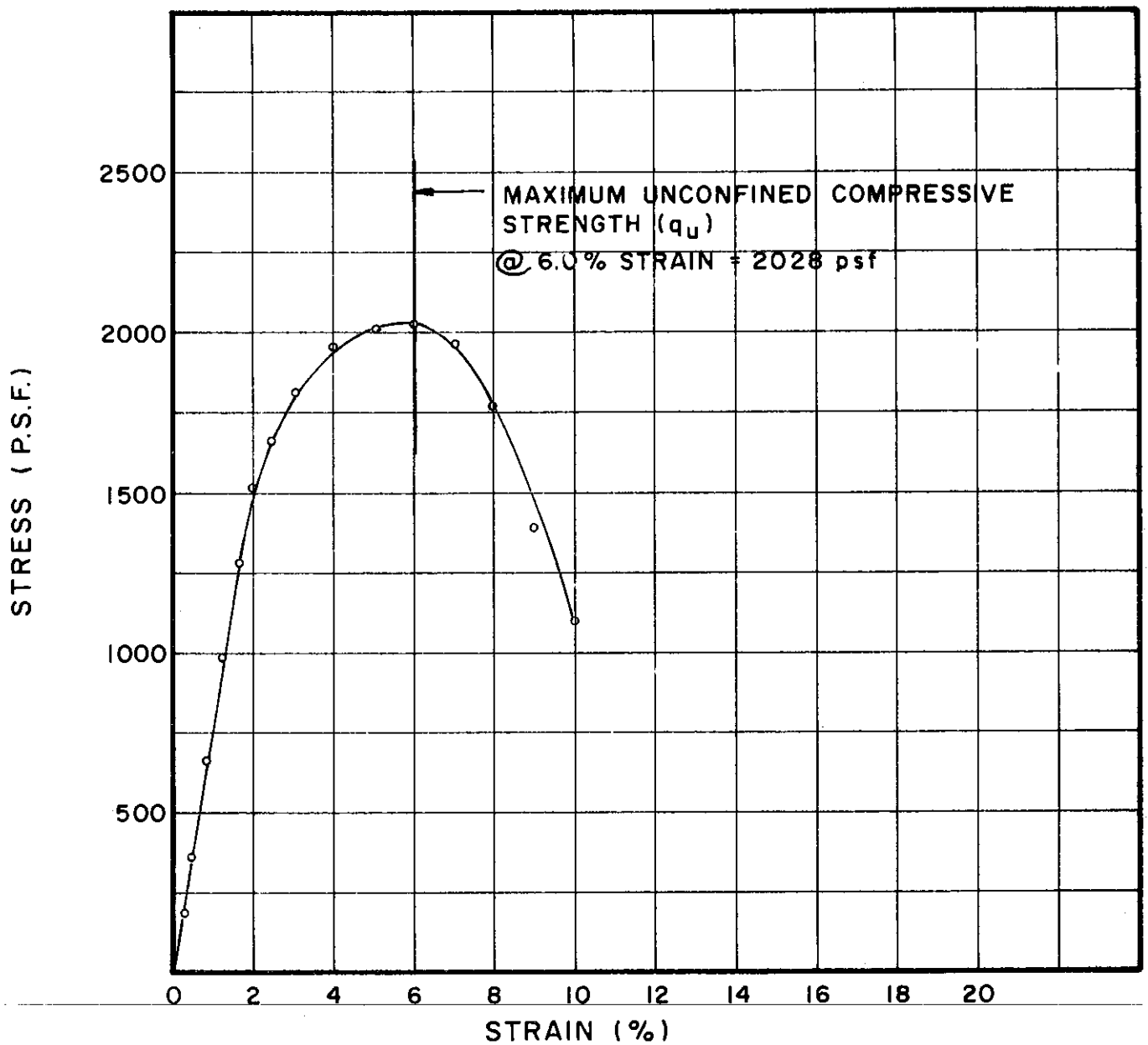


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U349.1	1.44	3.15	.286	27.8	96	50	22	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 2  
 DEPTH 8.9' TO 9.2'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



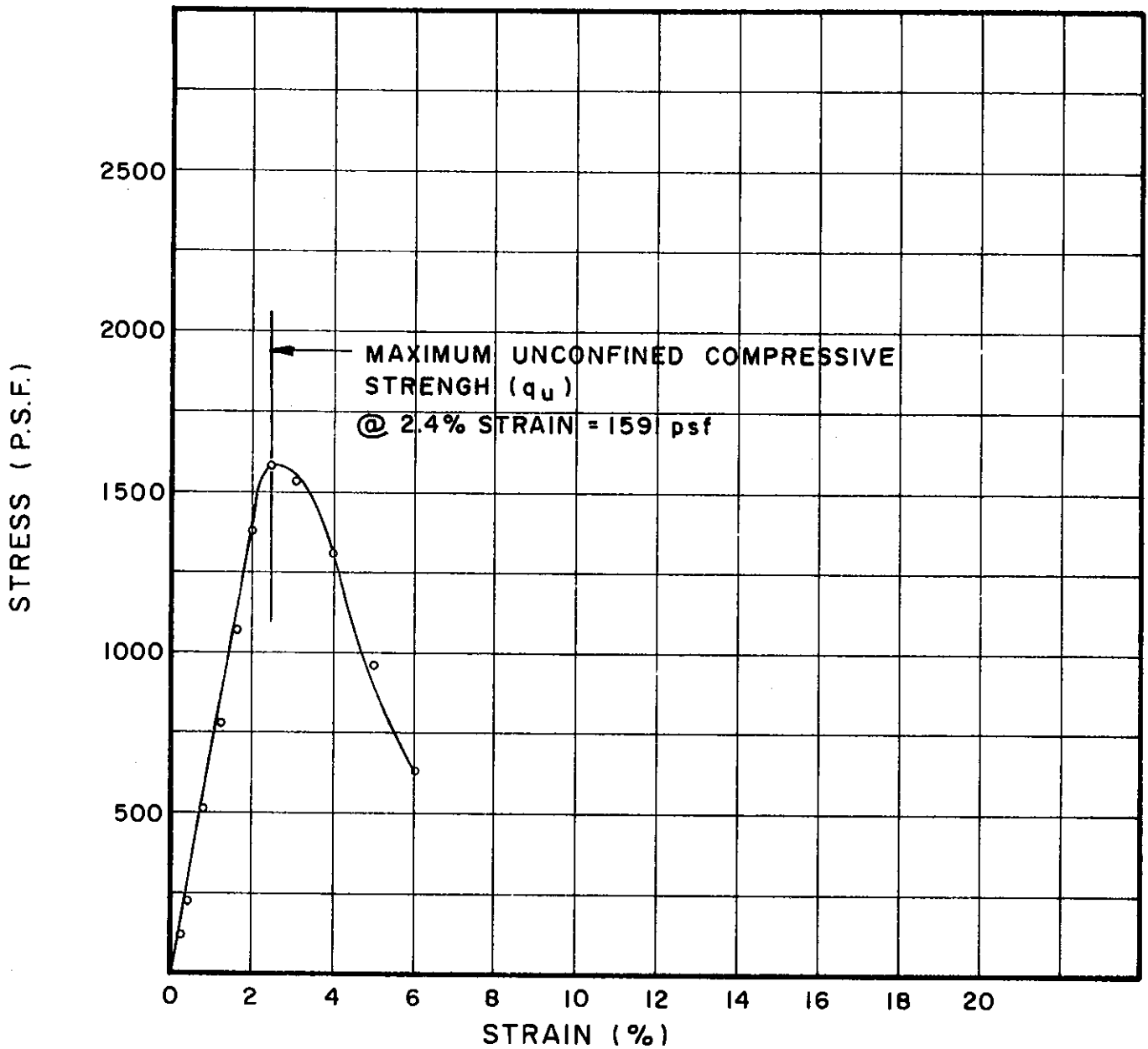
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U351.1	1.41	3.29	.274	35.8	86	49	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 4  
 DEPTH 19.9' TO 20.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

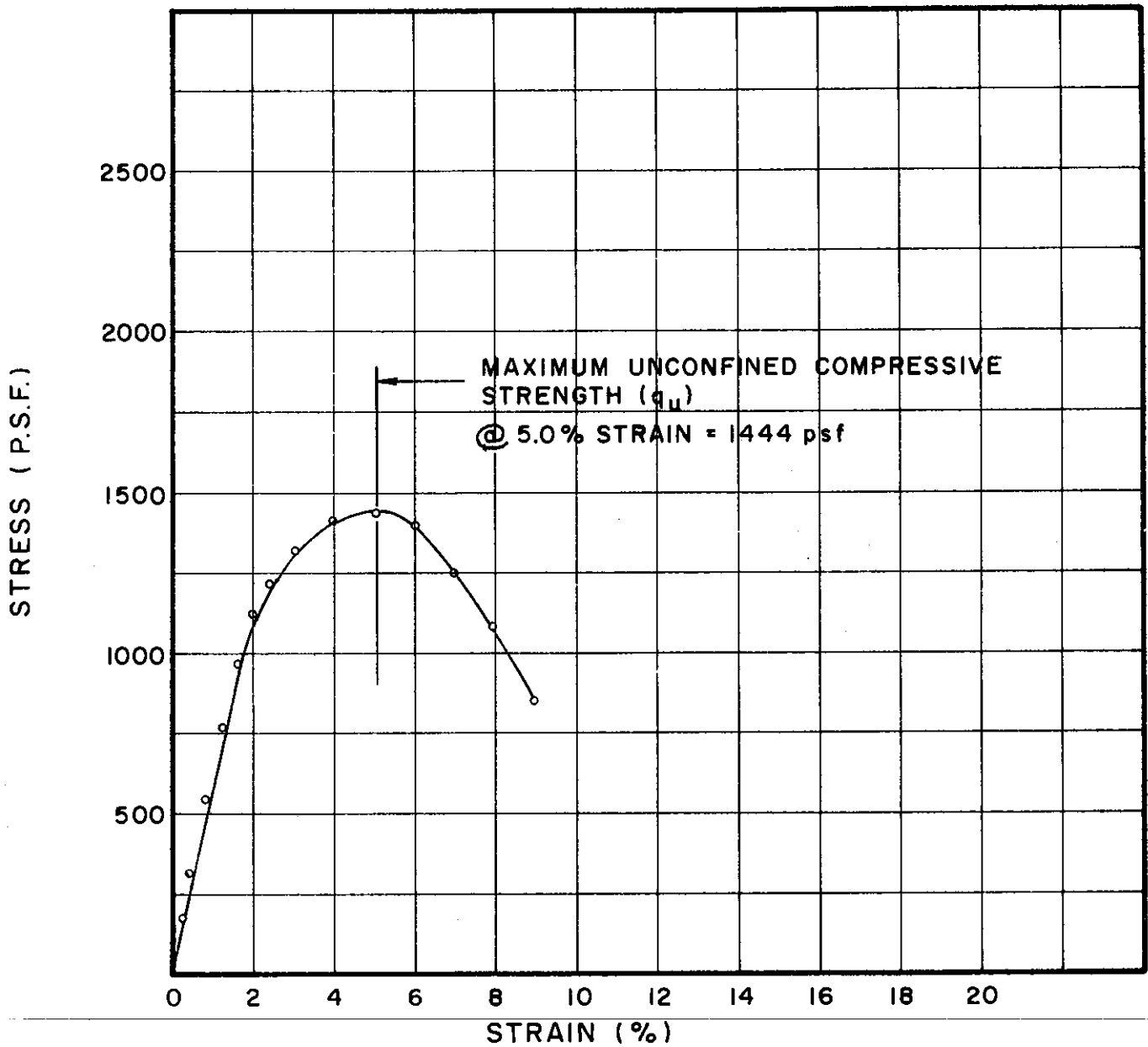


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U354.1	1.41	3.37	.267	40.0	81	46	24	SILTY CLAY (CL-CH)

BORING NO. 101  
 SAMPLE NO. 7  
 DEPTH 34.9' TO 35.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U357.1	1.40	3.30	.273	32.8	90	40	22	SILTY CLAY (CL-CH)

BORING NO. 101

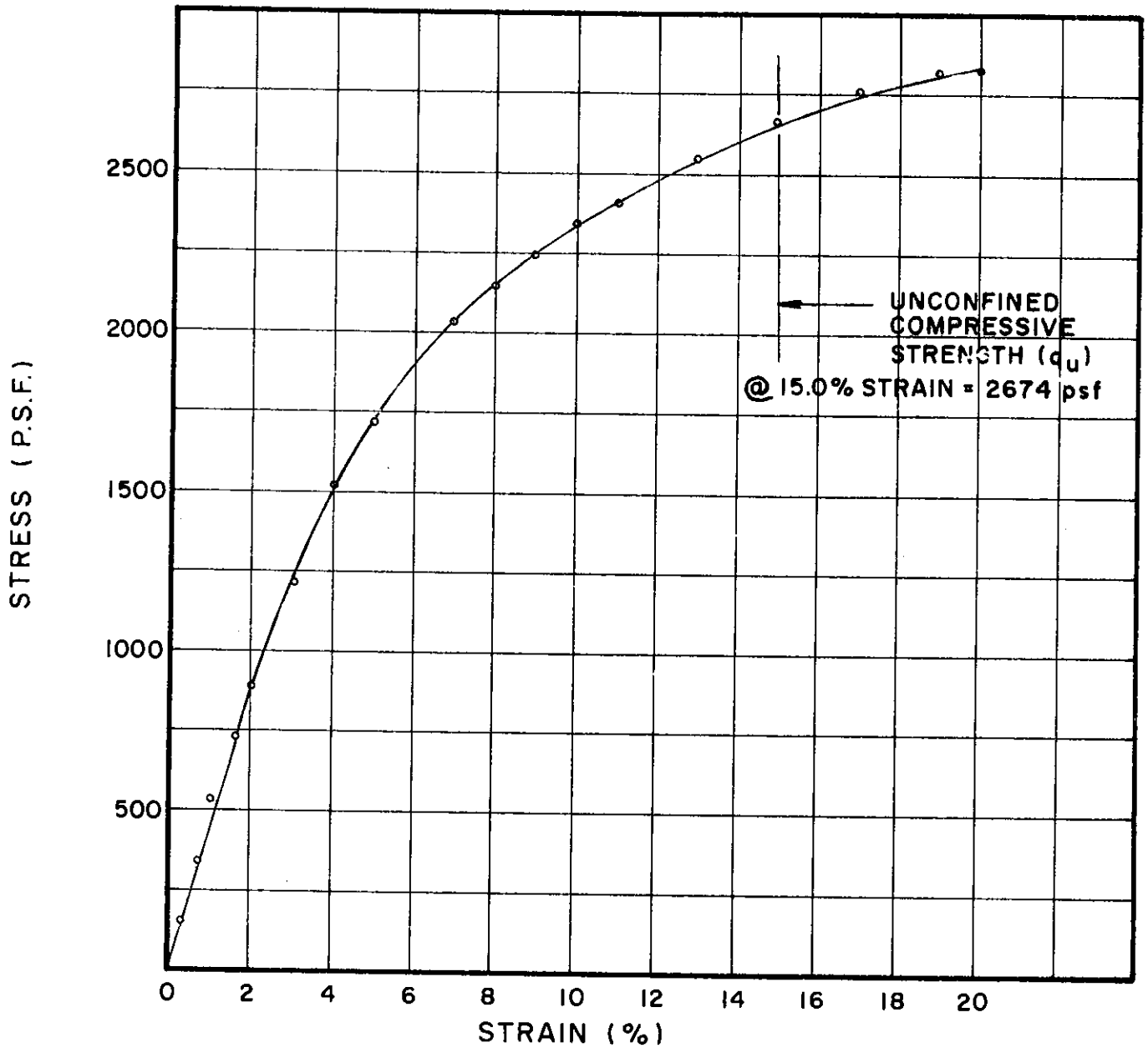
SAMPLE NO. 10

DEPTH 50.1' TO 50.4'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

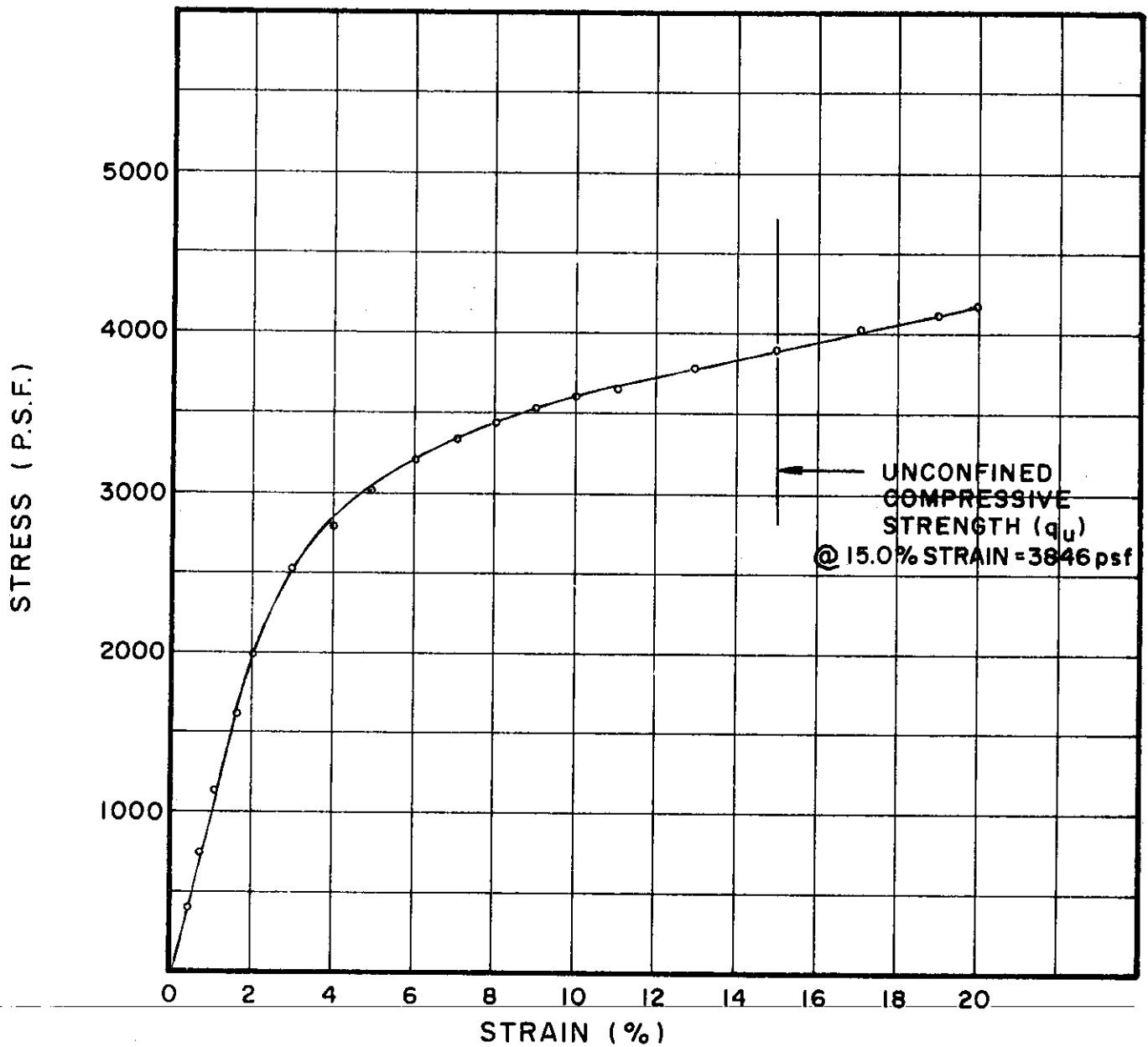


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U360.1	1.39	3.28	.274	26.6	97	36	19	SILTY CLAY, SANDY (CL)

BORING NO. 101  
 SAMPLE NO. 13  
 DEPTH 65.2' TO 65.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U364.1	1.41	3.35	.269	25.2	97	37	19	SILTY CLAY, SANDY (CL)

BORING NO. 101

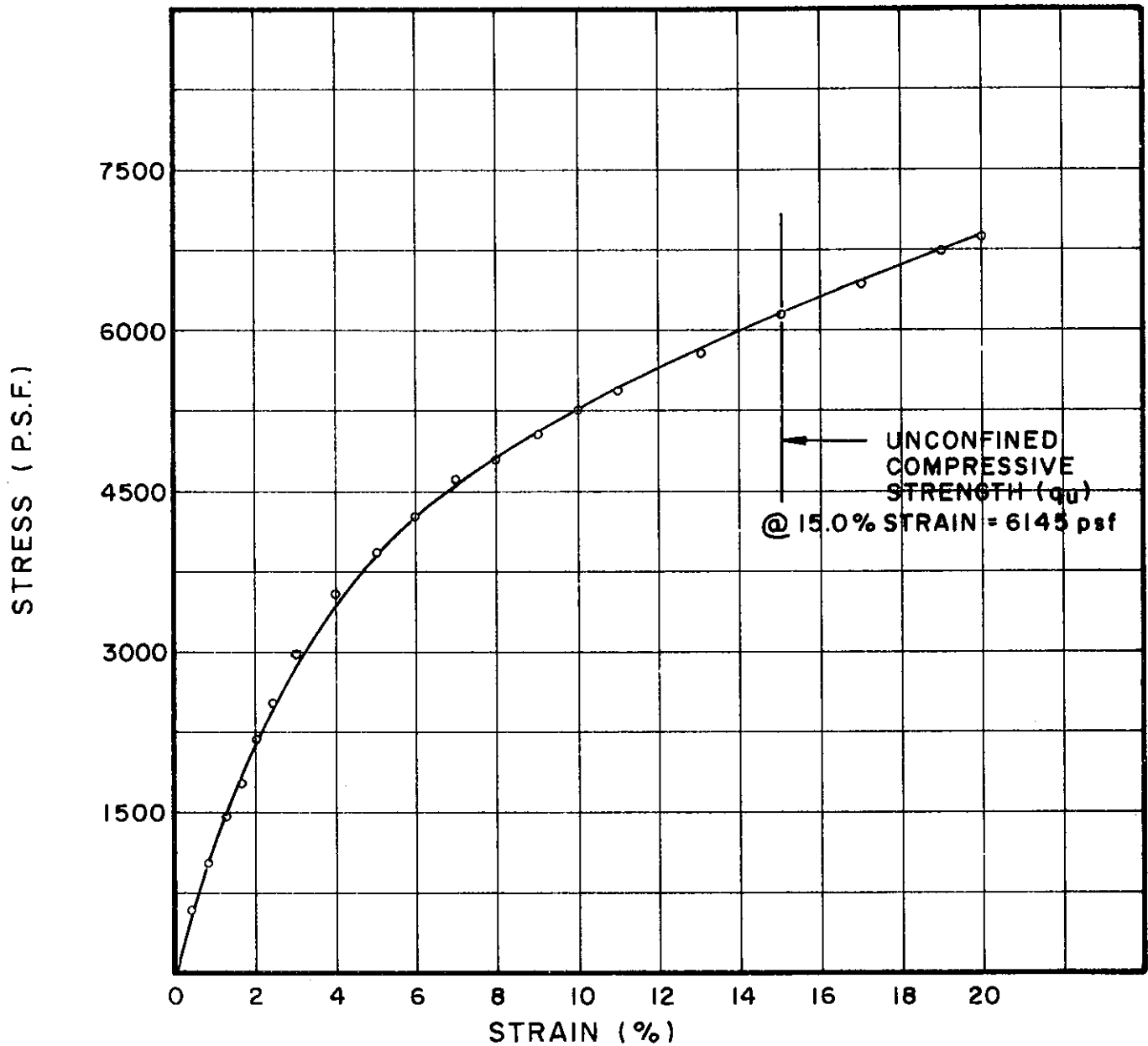
SAMPLE NO. 17

DEPTH 85.2' TO 85.5'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U339.1	1.41	3.35	.268	20.7	107	33	20	SILTY CLAY, SANDY (CL)

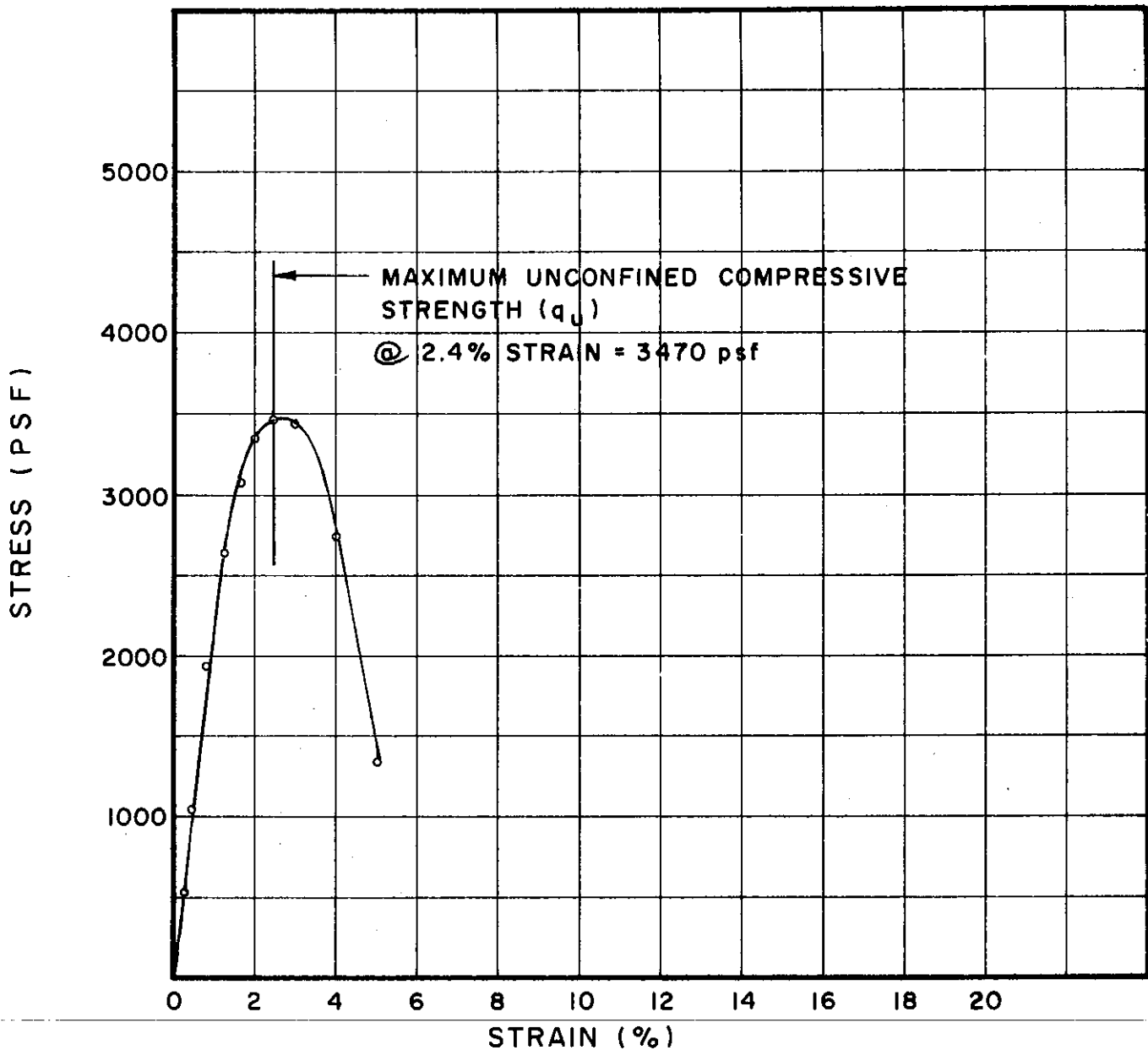
BORING NO. 119

SAMPLE NO. 9

DEPTH 81.6' TO 81.9'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

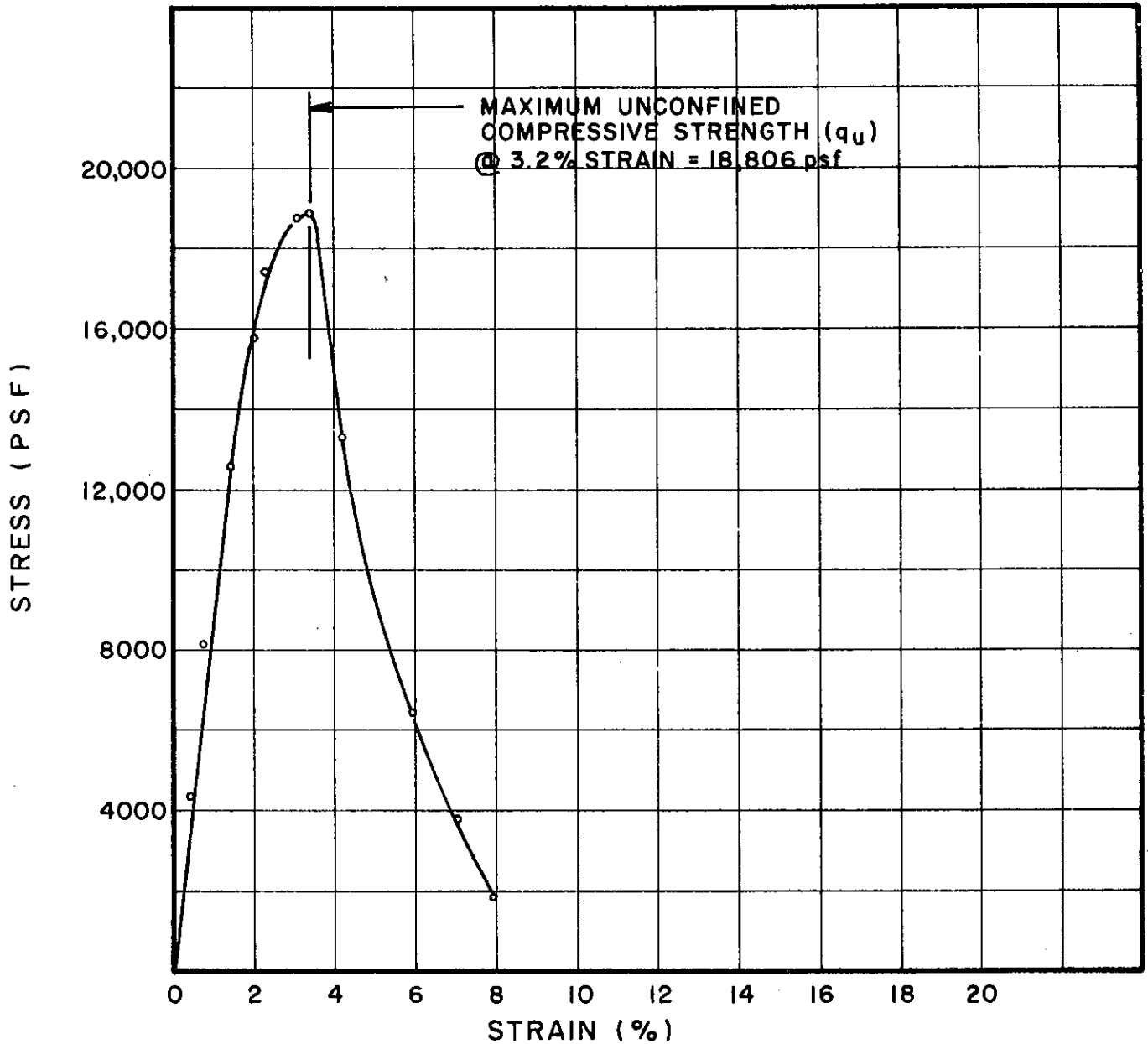


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U241.1	1.46	3.50	.257	26.2	99	47	24	SILTY CLAY (CL-CH)

BORING NO. 126  
 SAMPLE NO. 3  
 DEPTH 8.2' TO 8.6'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

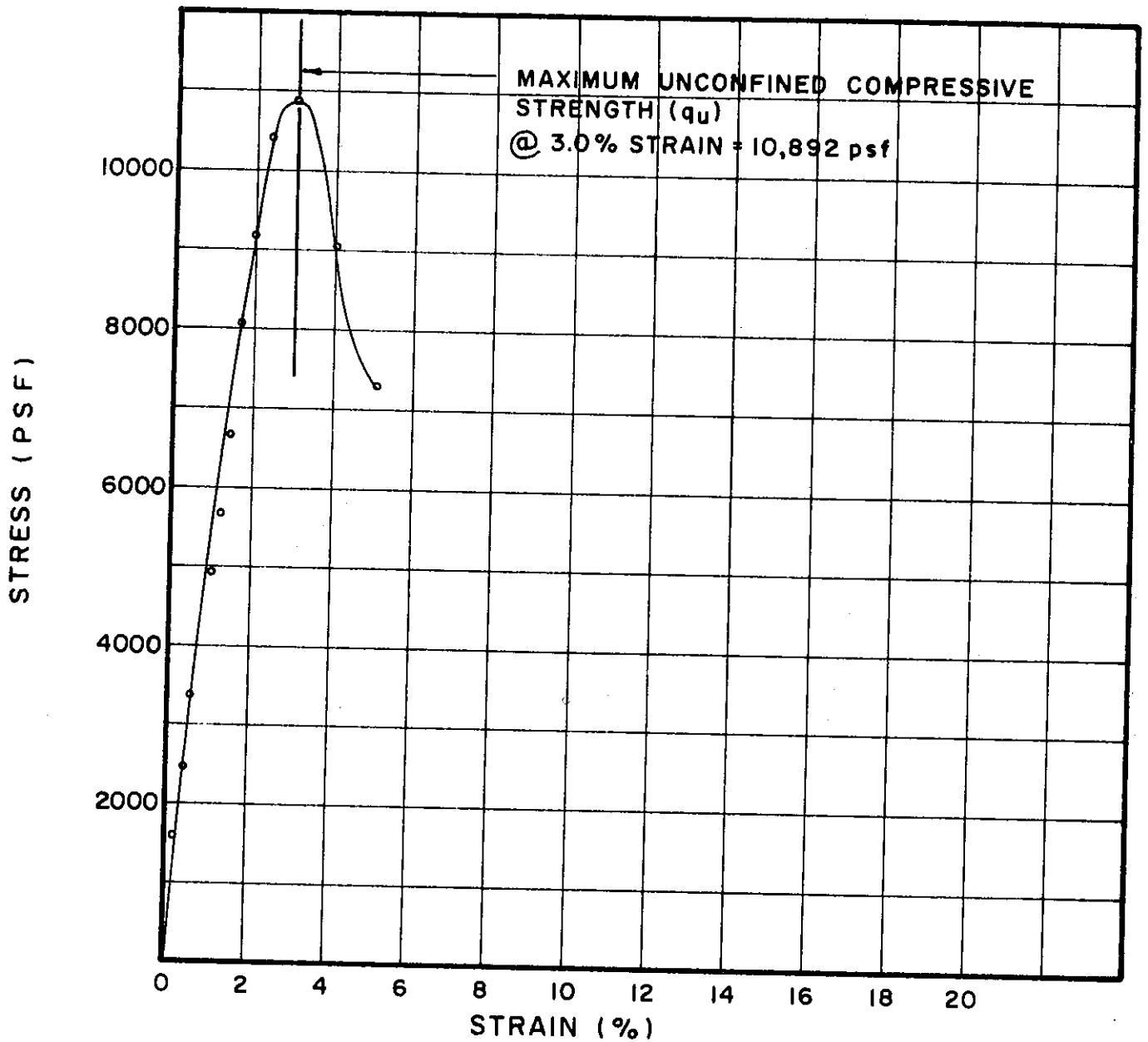


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U416.2	1.42	3.55	0.26	13.5	113	49	22	SILTY CLAY (CL-CH)
								"COMPACTED SAMPLE"

BORING NO. 127  
 SAMPLE NO. 3  
 DEPTH 5.6' TO 7.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U526.1	1.42	3.46	0.25	24.3	102	48	22	SILTY CLAY (CL-CH)

BORING NO. 136

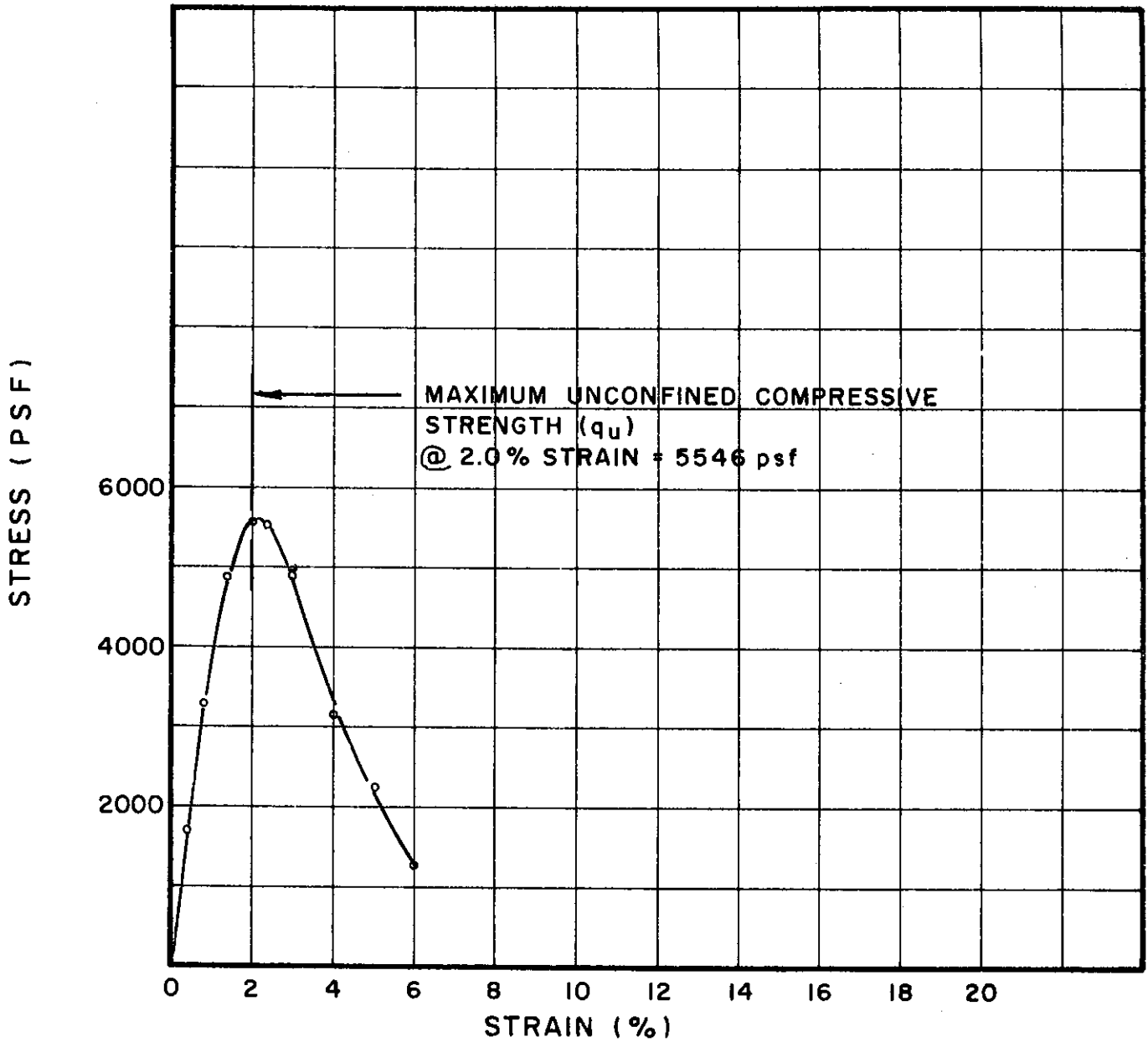
SAMPLE NO. 4

DEPTH 8.8' TO 9.2'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

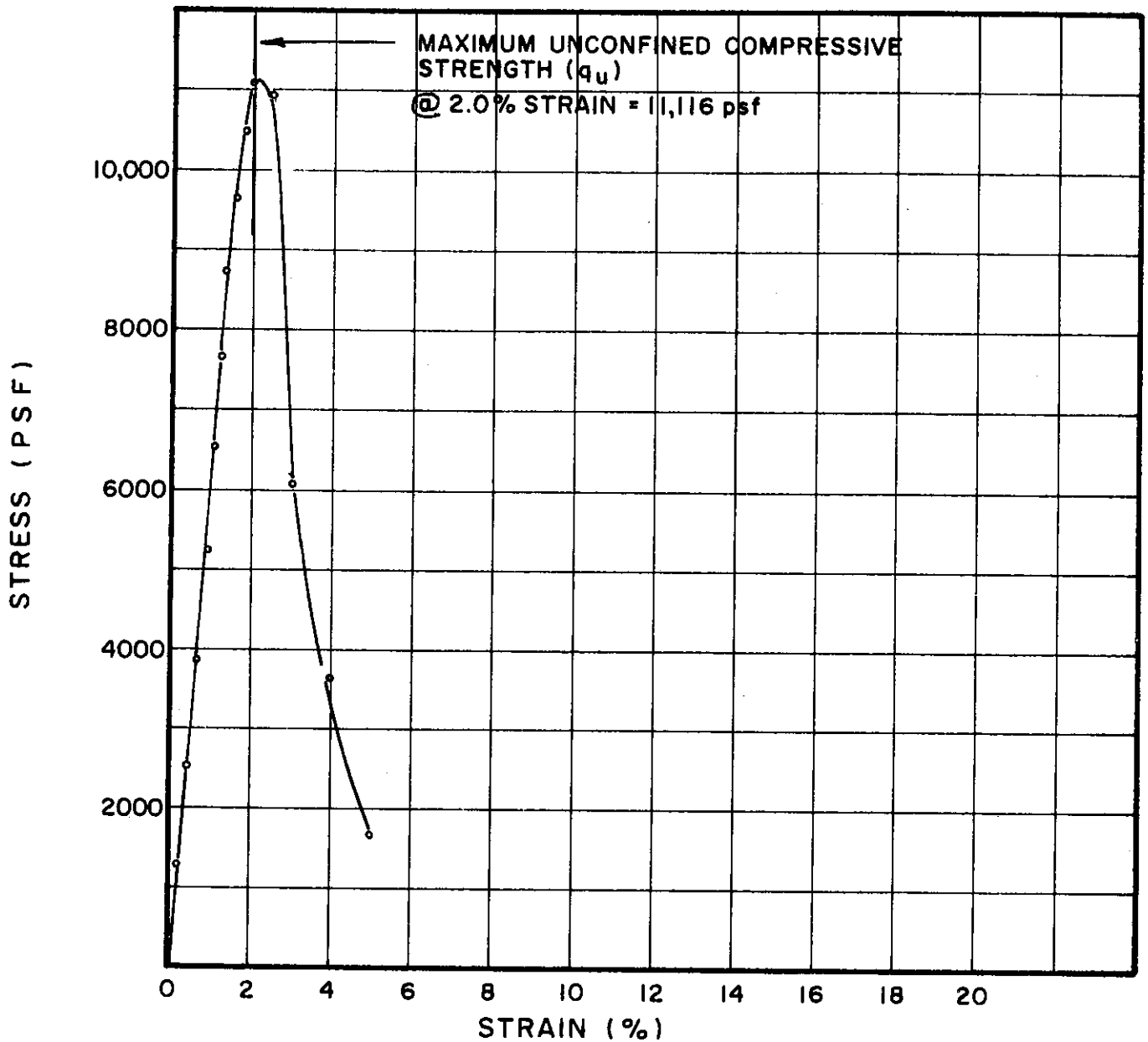


TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>p</sub> 527.1	1.40	3.28	.274	17.5	100	43	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U529.1	1.41	3.05	.28	17.5	103	49	23	SILTY CLAY (CL-CH)

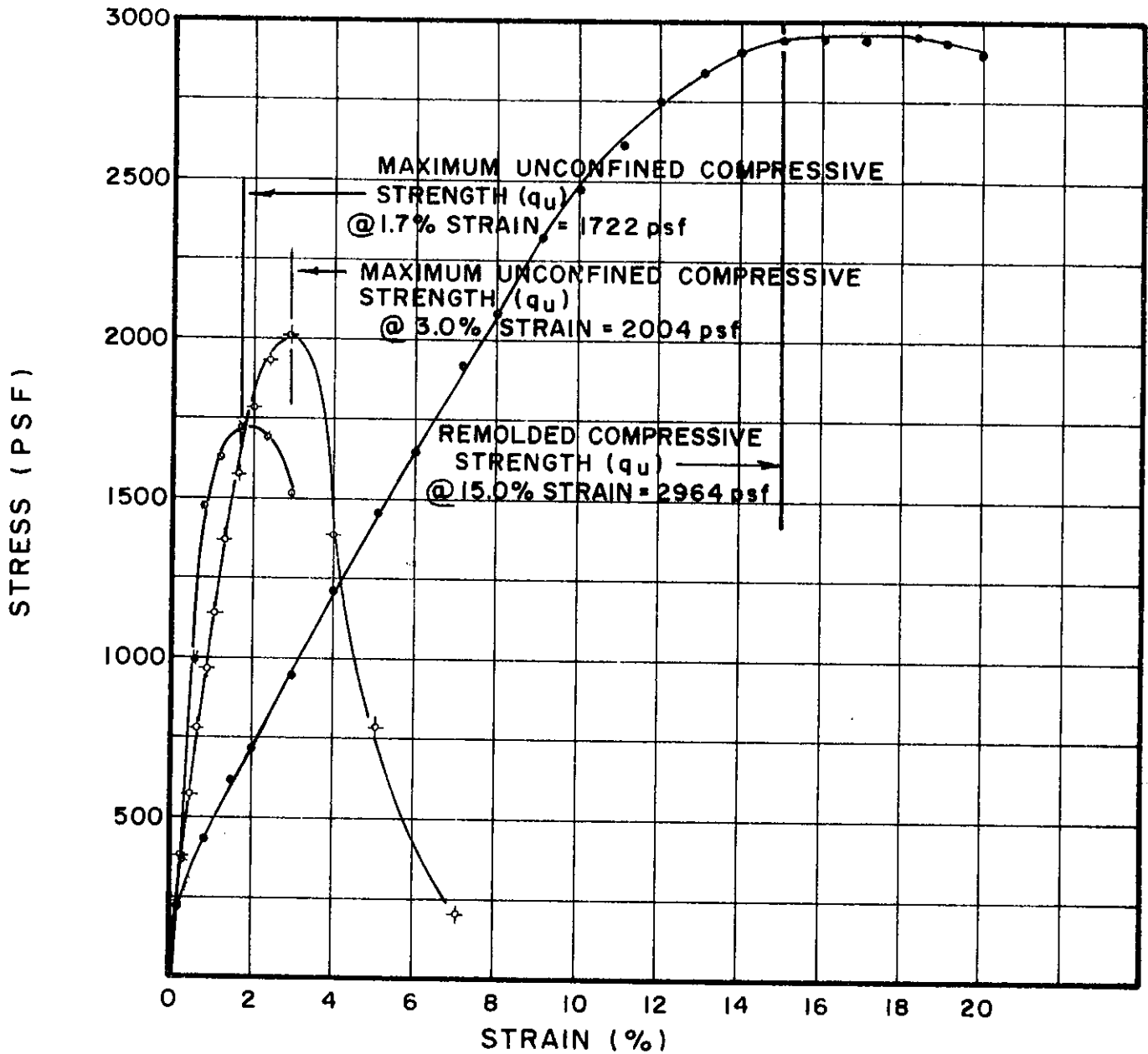
BORING NO. 141

SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

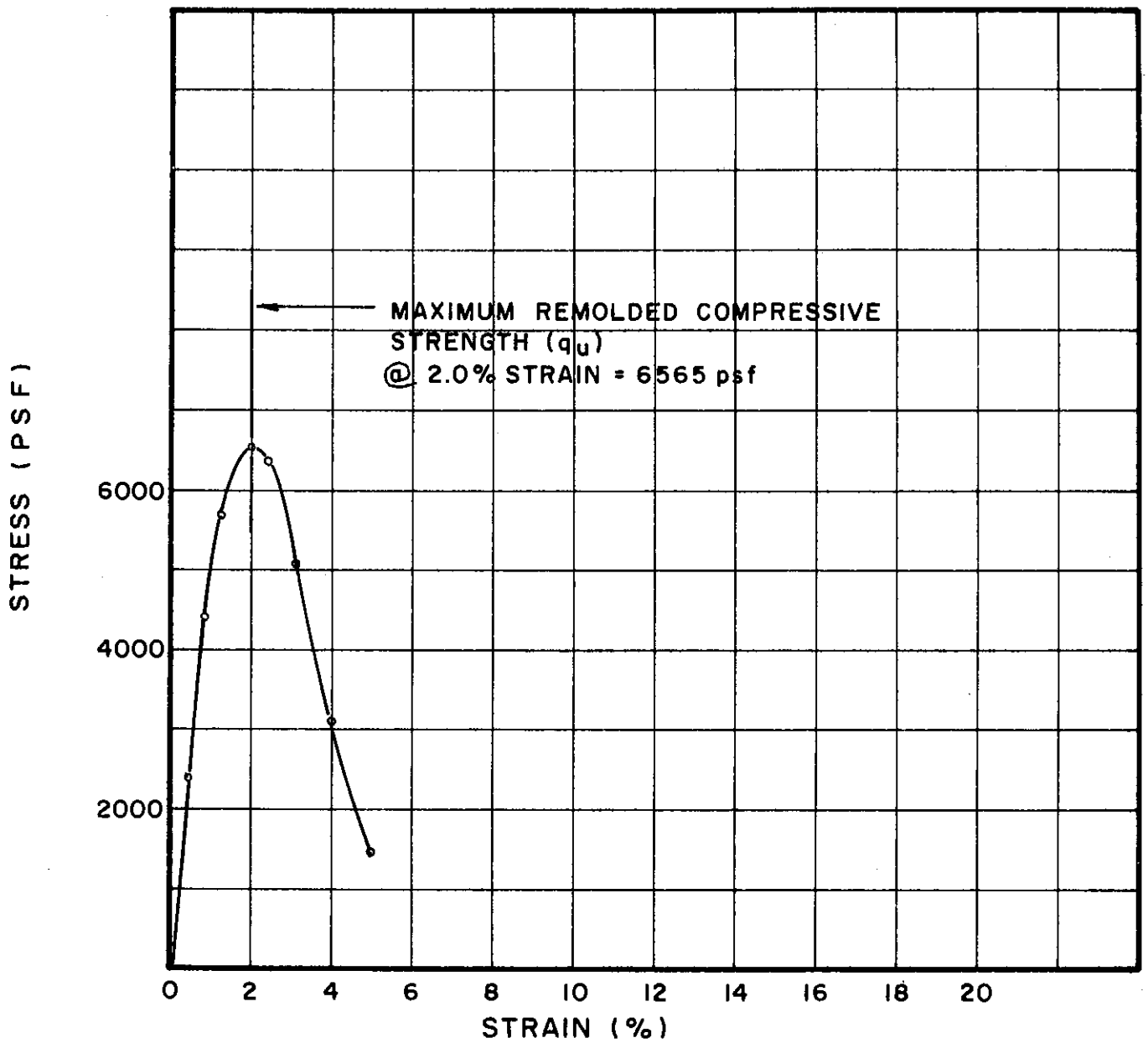


TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%) PL(%)	
U537.1	1.41	3.24	.28	26.3	97	48 21	SILTY CLAY (CL-CH)
U537.2	1.39	3.23	.28	24.1	99		
rU537.1	1.42	3.15	.28	24.1	100		

BORING NO. 144  
 SAMPLE NO. 4  
 DEPTH 8.0' TO 10.0'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U <sub>r</sub> 542.1	1.40	3.18	.283	16.6	104	46	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 146

SAMPLE NO. ST 7

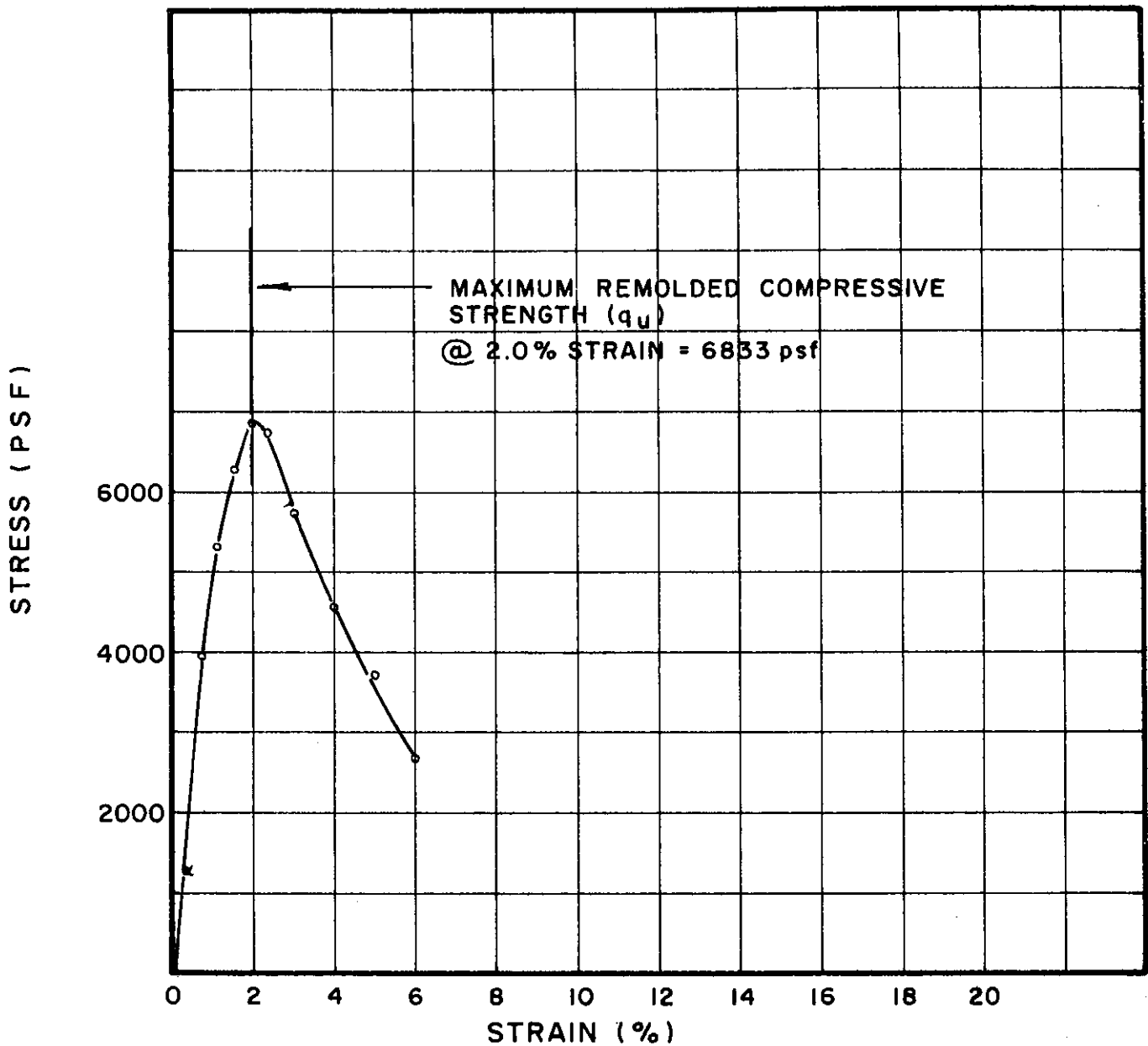
DEPTH 14.0' TO 16.1'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO.	TEST DATA			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	SOIL PROPERTIES		SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)			ATTERBERG LL (%)	LIMITS PL (%)	
U <sub>r</sub> 548.1	1.37	3.20	.281	16.8	104	50	21	SILTY CLAY (CL-CH)
								COMPACTED SAMPLE

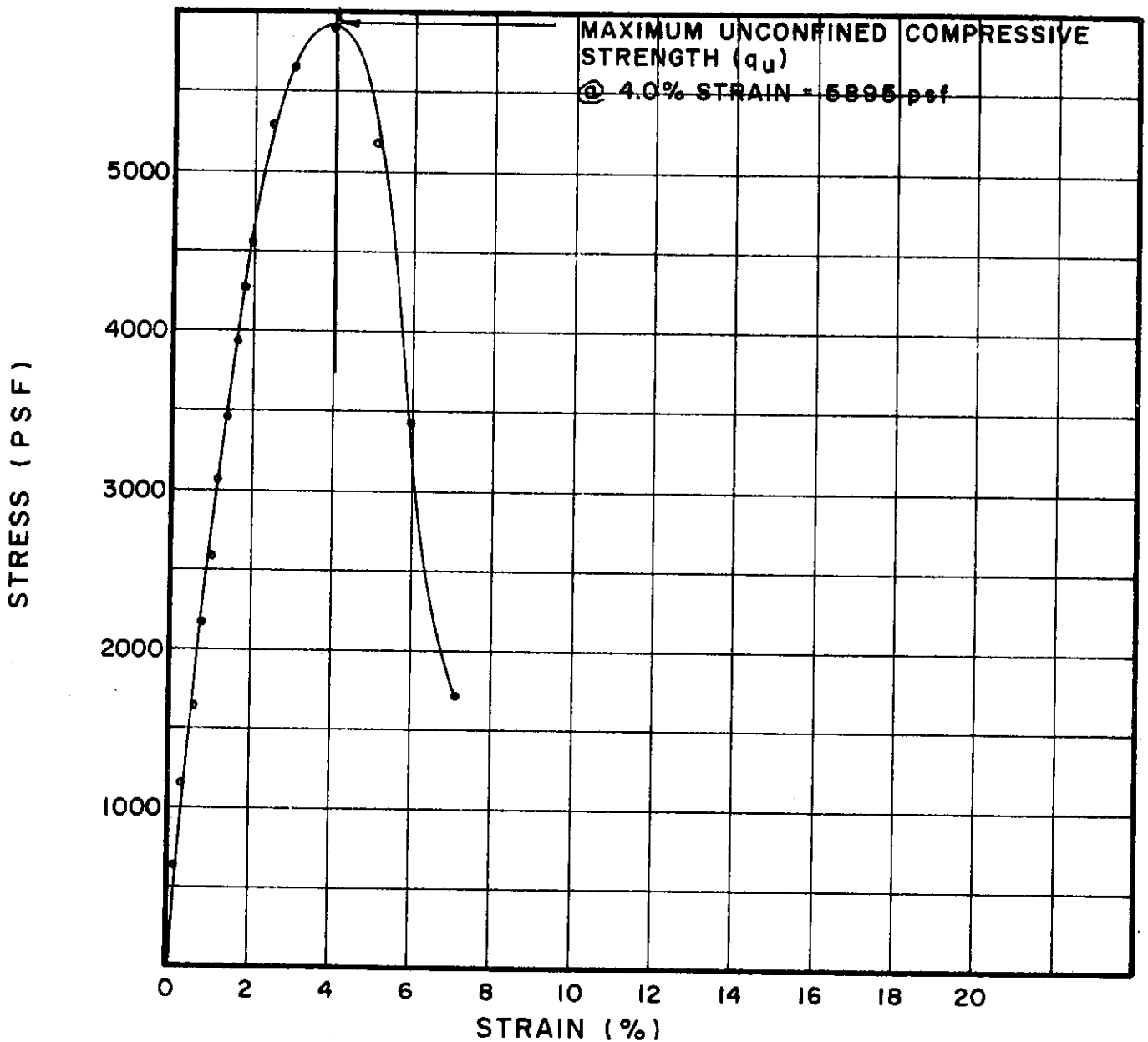
BORING NO. 158

SAMPLE NO. ST 2

DEPTH 7.5' TO 9.7'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U552.1	1.40	3.43	0.25	23.9	104	50	23	SILTY CLAY (CL-CH)

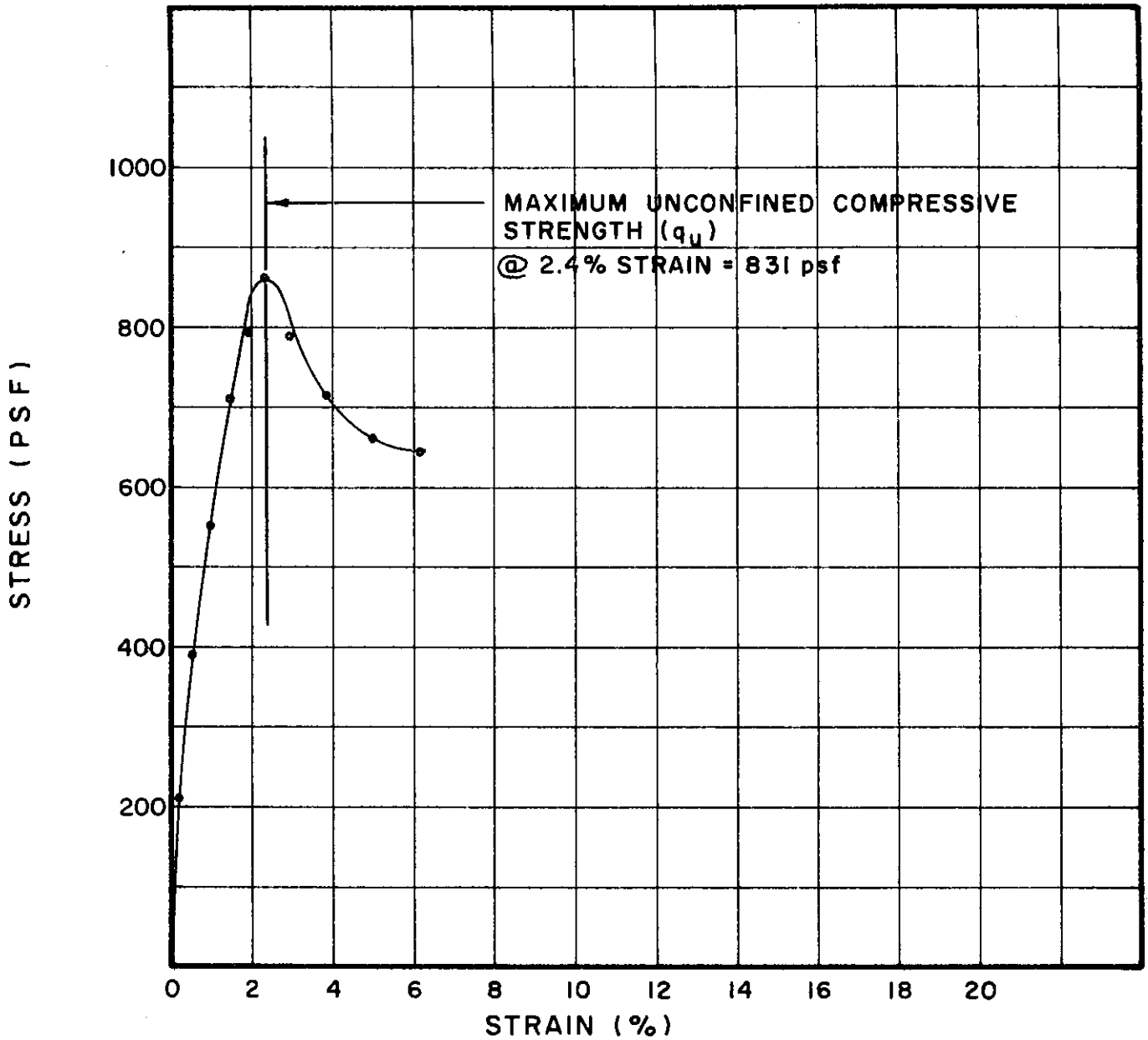
BORING NO. 185

SAMPLE NO. 3

DEPTH 7.5' TO 7.8'

**UNCONFINED COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



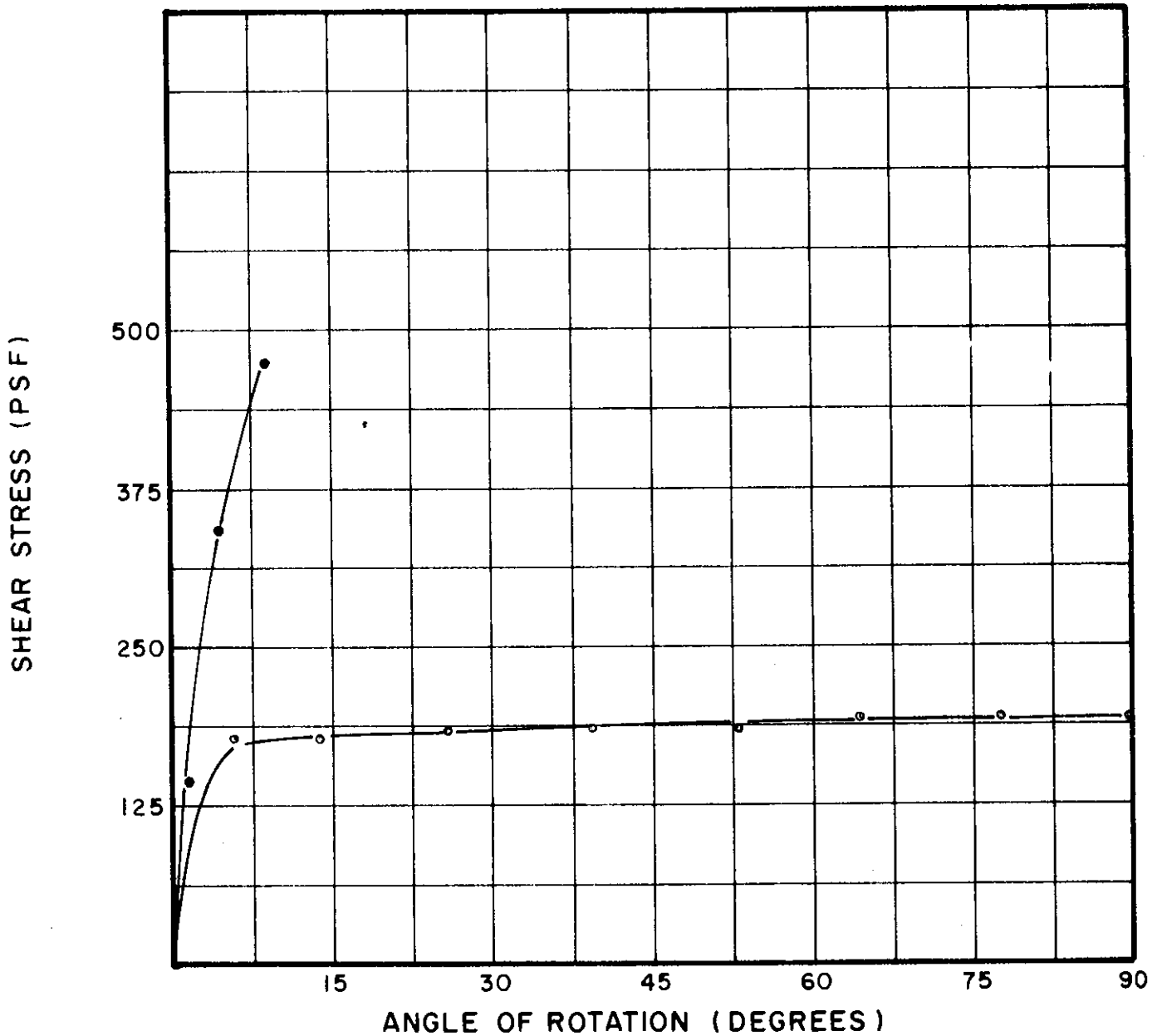
TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U554.1	1.41	3.33	0.25	39.3	81	49	22	SILTY CLAY (CL-CH)

BORING NO. 185  
 SAMPLE NO. 7  
 DEPTH 18.5' TO 18.8'

### UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)
VS85.1	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)

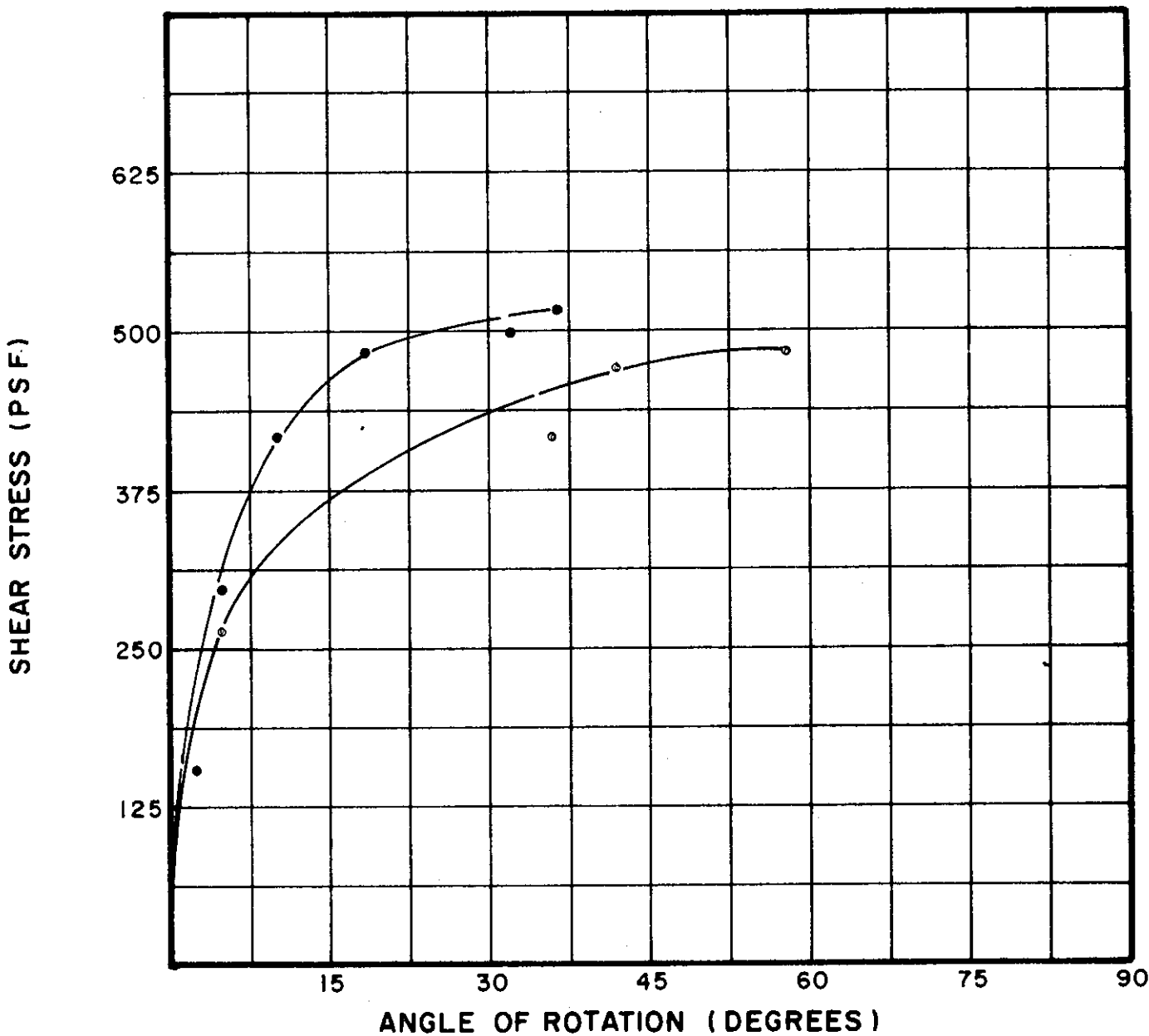
BORING NO. 50

SAMPLE NO. 6

DEPTH 28.1' - 28.3'

### LABORATORY VANE SHEAR TESTS

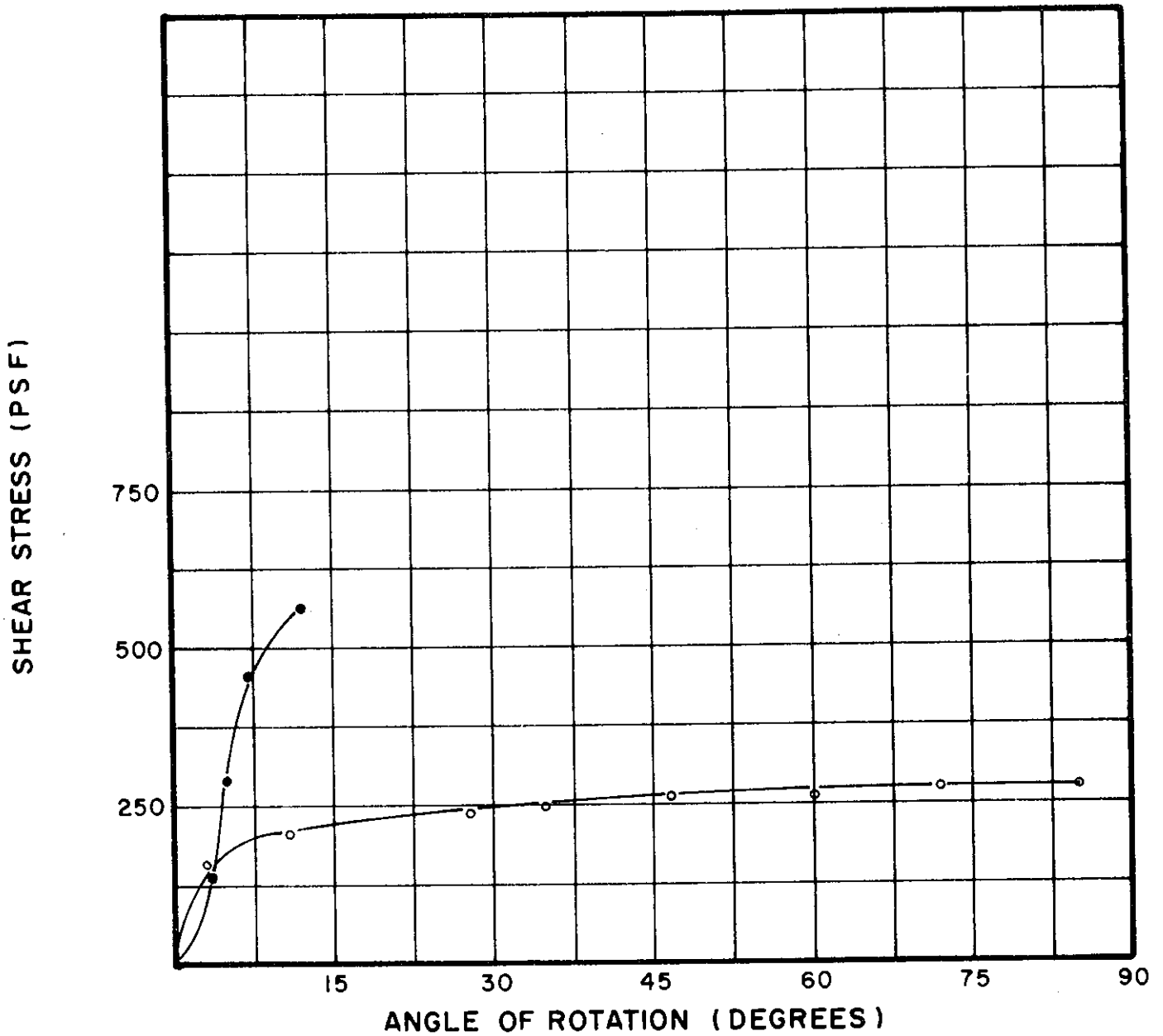
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)
VS87.1	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.1' - 48.4'

LABORATORY VANE SHEAR TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

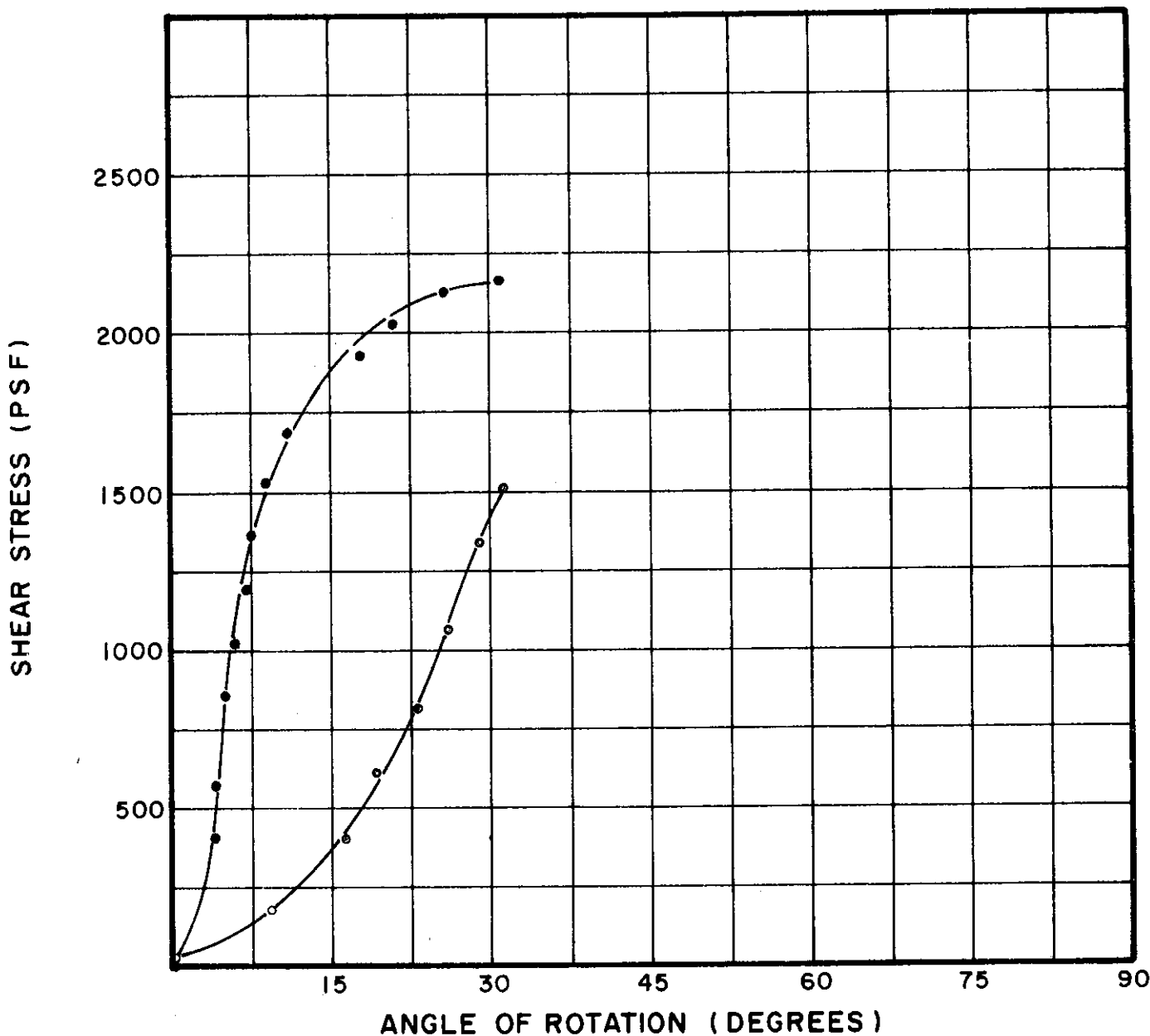


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VSI09.1 ●	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)
rVSI09.1 ○	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 28.9' - 29.2'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES			SOIL DESCRIPTION
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%) PL (%)	
VS111.1 ●	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)
VS111.1 ○	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY (CL)

BORING NO. 52

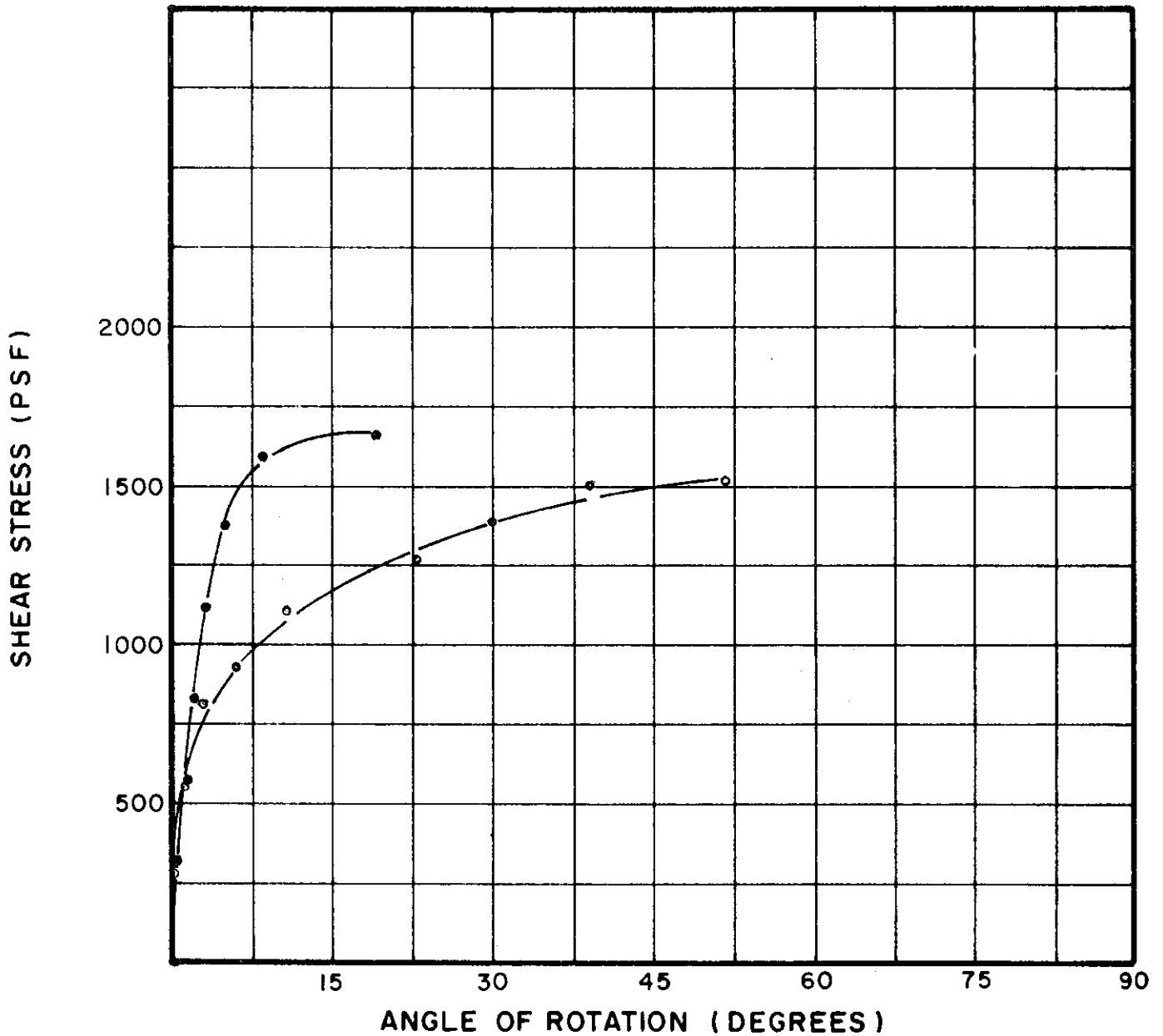
SAMPLE NO. 6

DEPTH 49.6' - 49.8'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



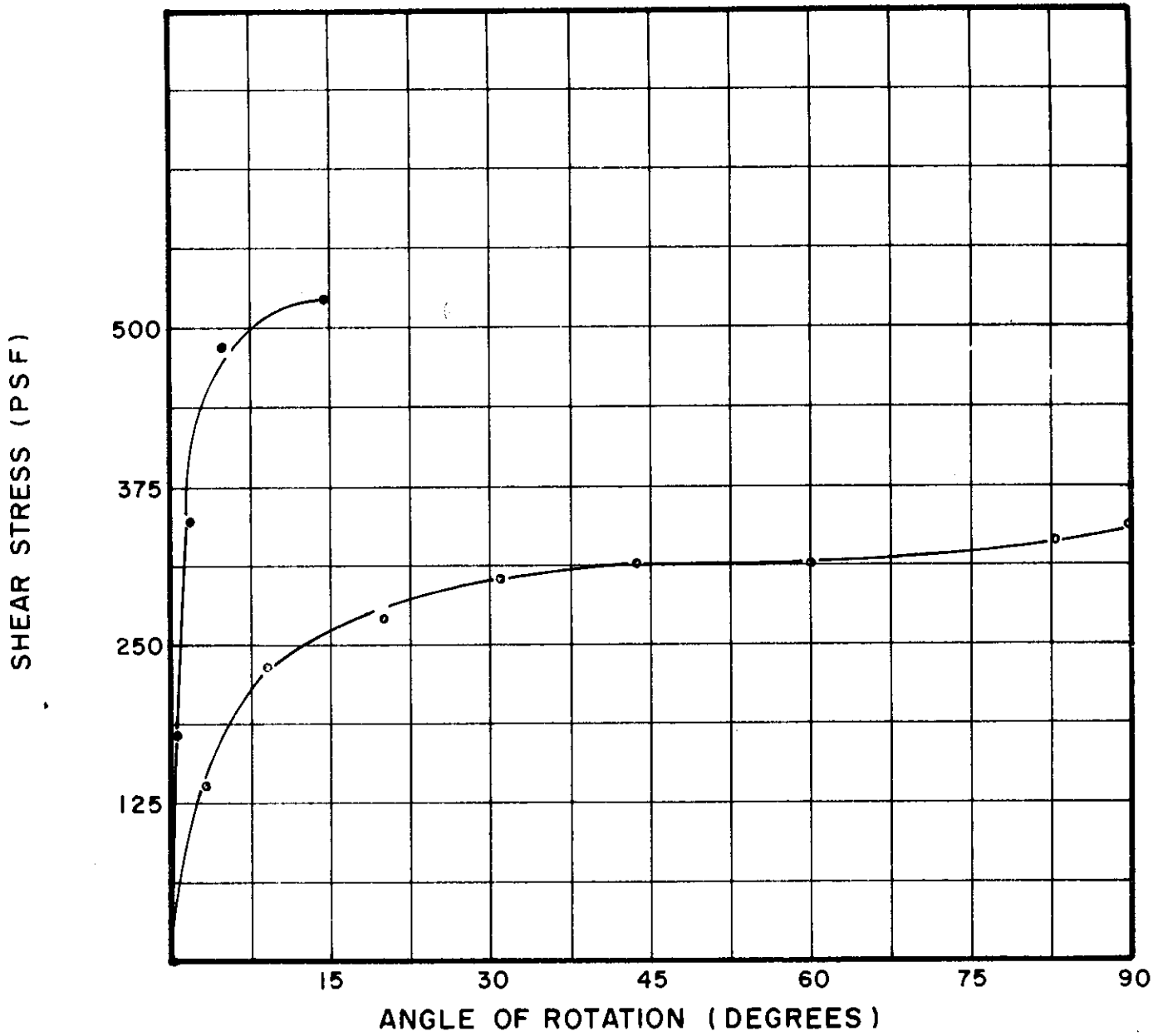


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)
VS115.1	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52  
 SAMPLE NO. 10  
 DEPTH 89.1' - 89.4'

**LABORATORY VANE SHEAR TESTS**

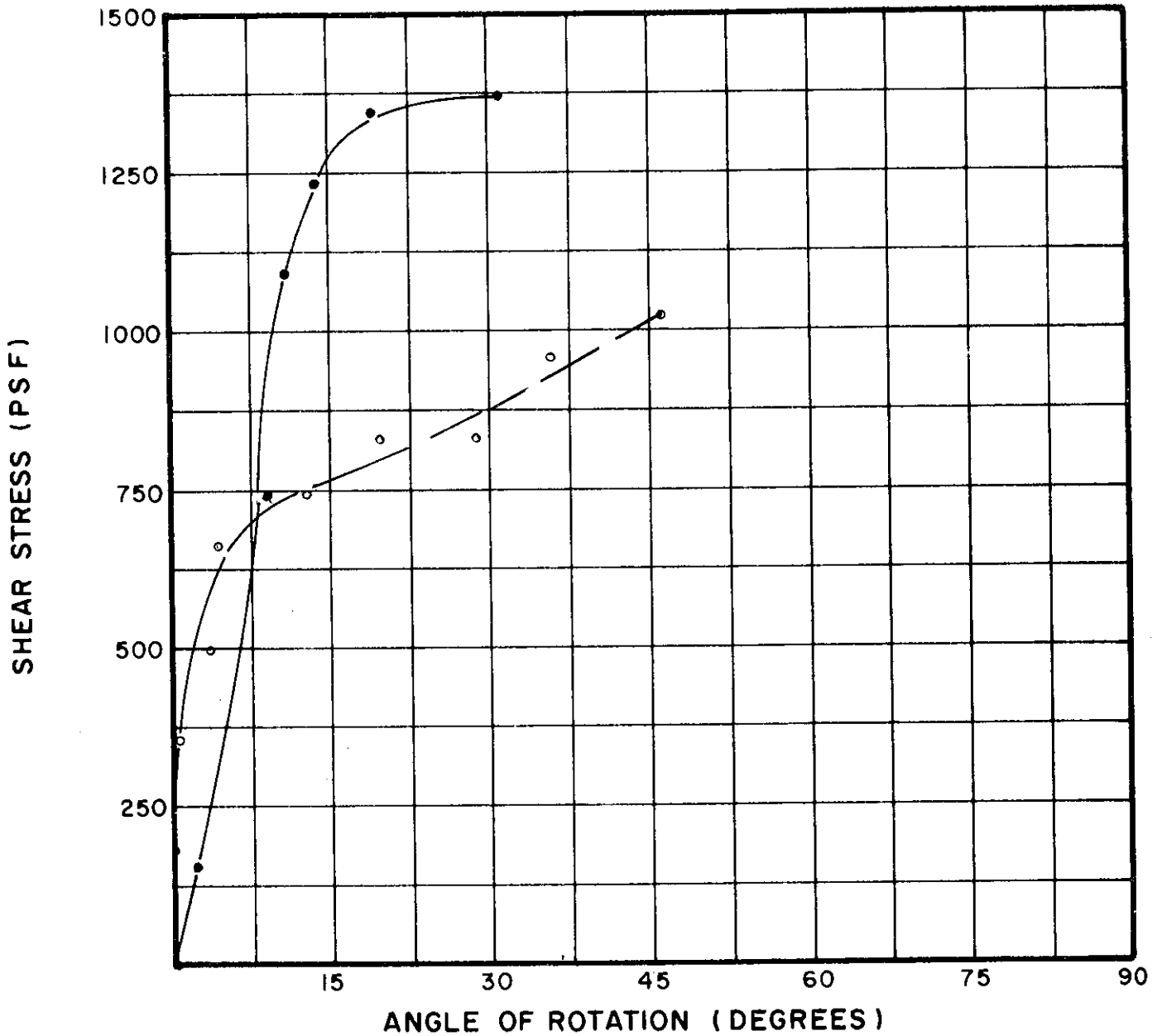
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS99.2 ●	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)
rVS99.2 ○	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 6  
 DEPTH 49.7' - 50.0'

LABORATORY VANE SHEAR TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

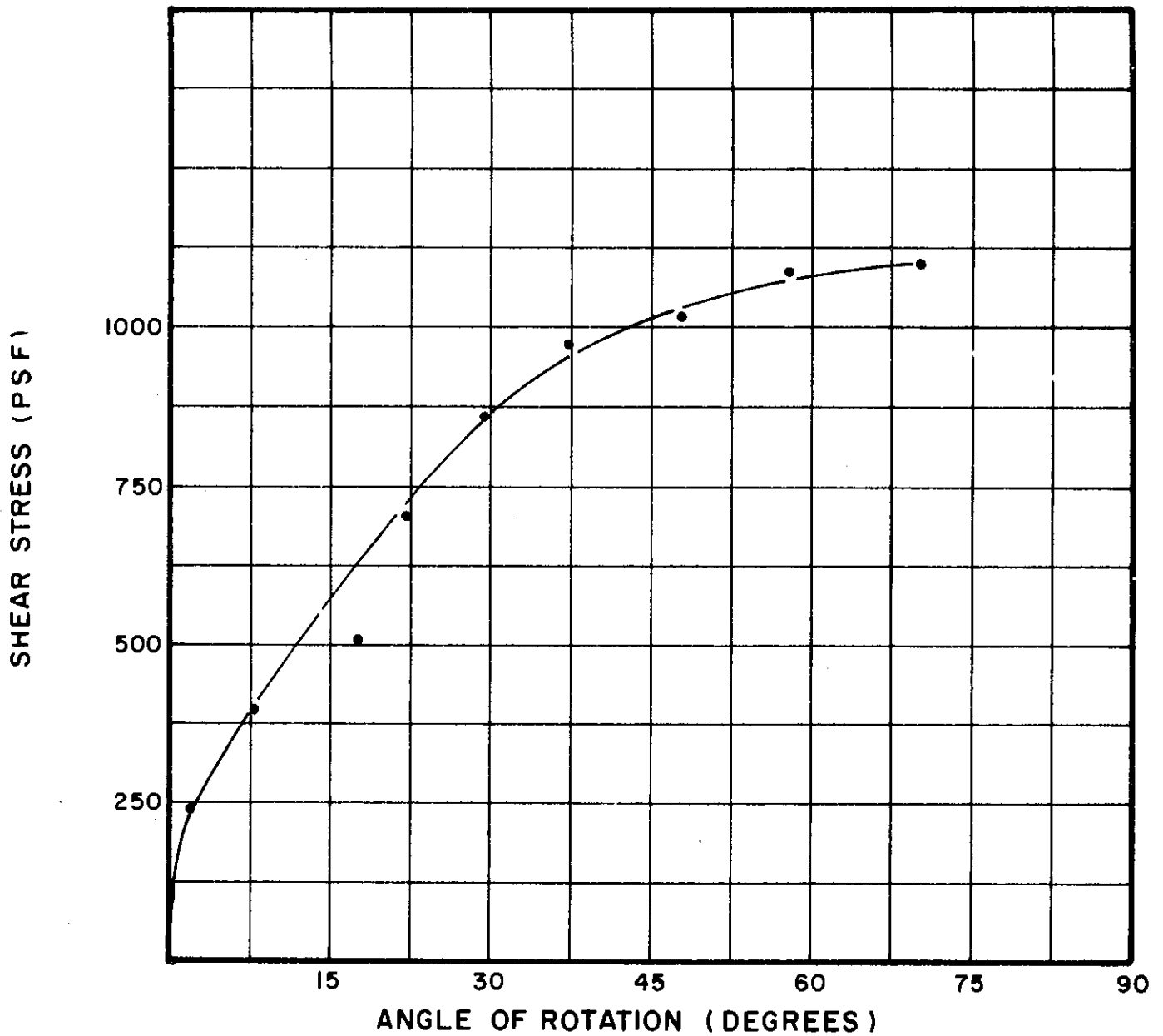


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)
VS101.1	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53  
 SAMPLE NO. 9  
 DEPTH 79.5' - 79.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS398.1	.50	.25	6.0	27.5	92	38	17	SILTY CLAY, SANDY (CL)

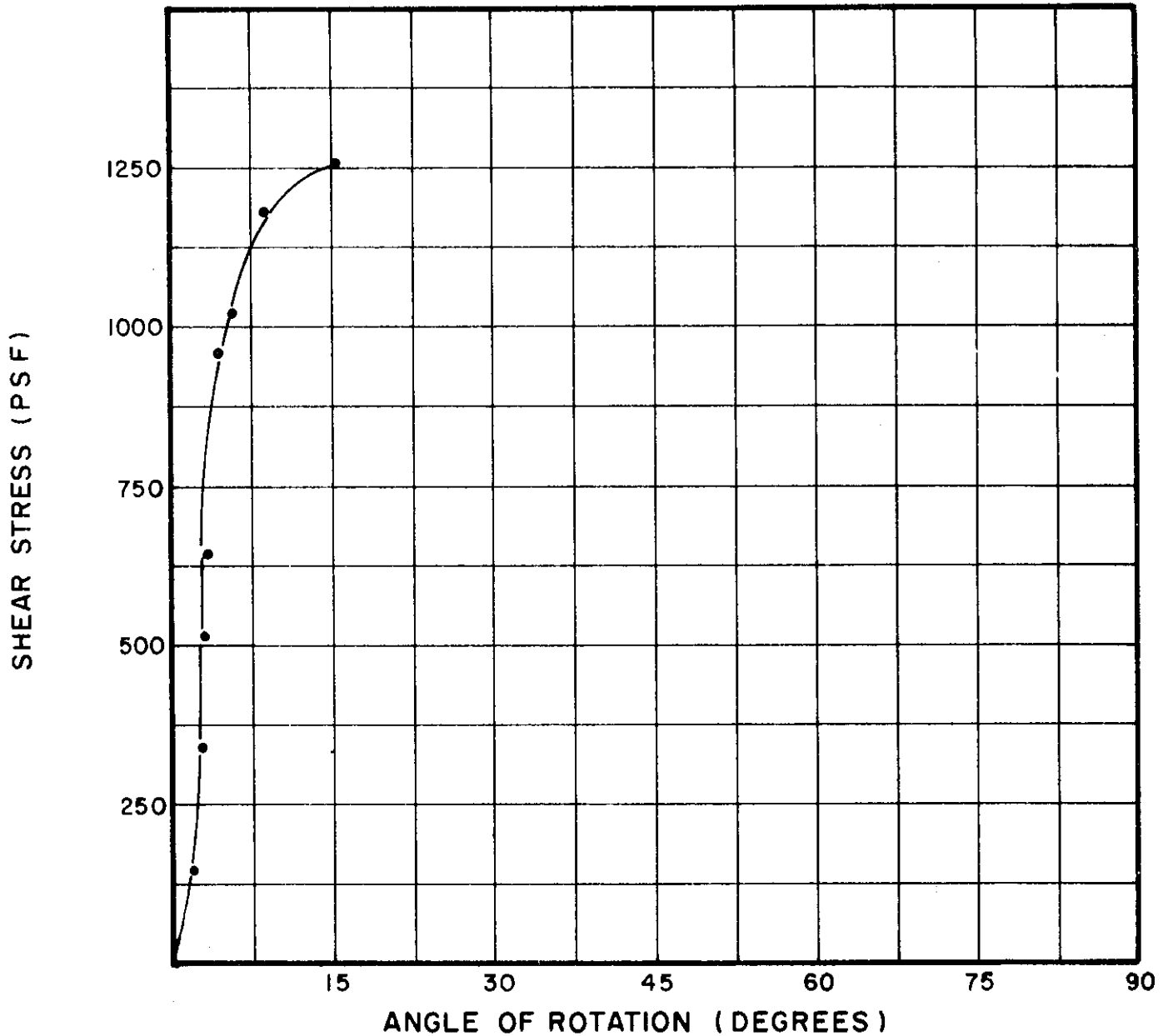
BORING NO. 54

SAMPLE NO. 5

DEPTH 59.7' - 60.0'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

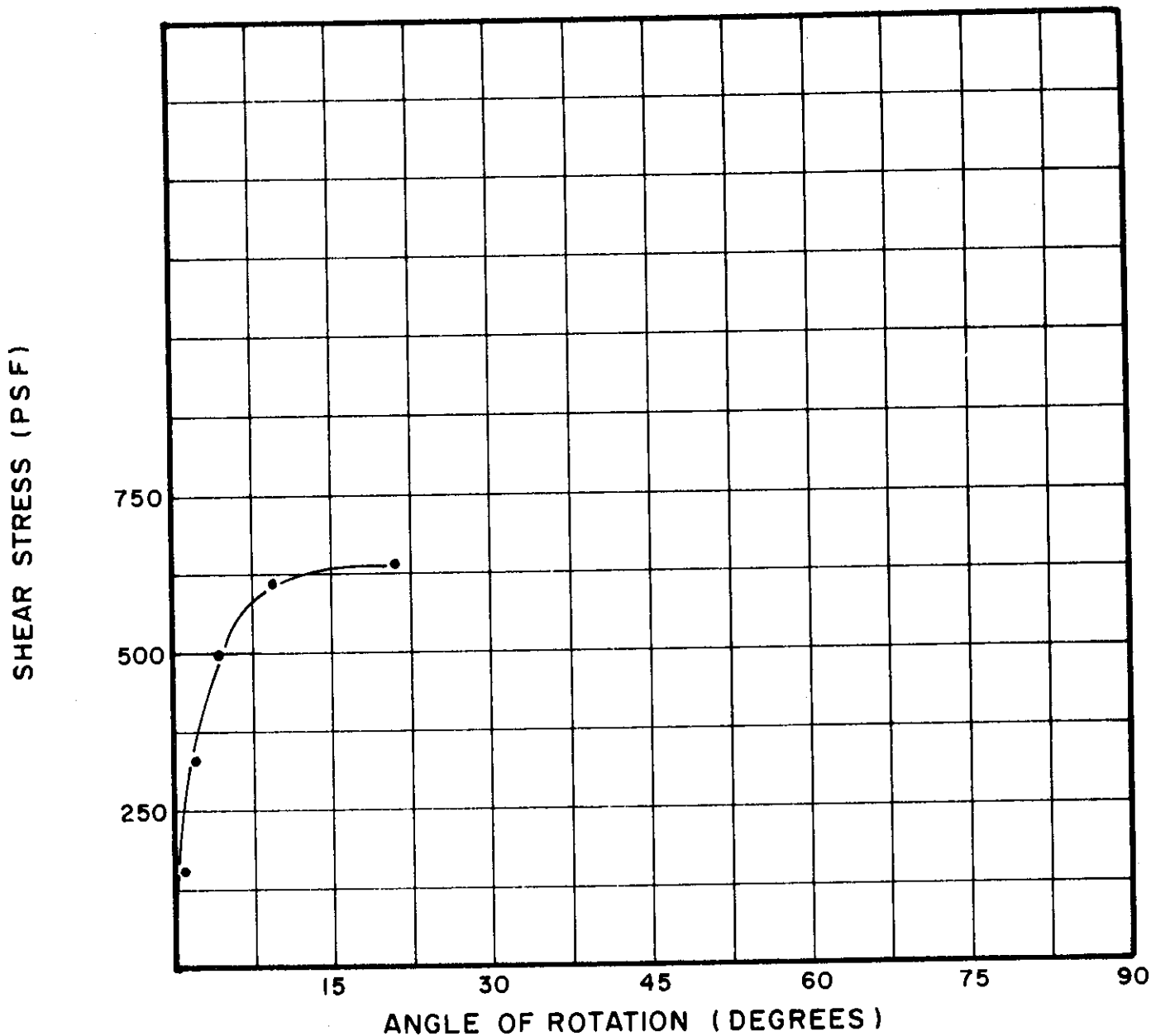


TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS76.1	.50	.25	6.0	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59  
 SAMPLE NO. 3  
 DEPTH 18.5' - 18.8'

**LABORATORY VANE SHEAR TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS78.1	.50	.25	6.0	25.6	96	38	18	SILTY CLAY, SANDY (CL)

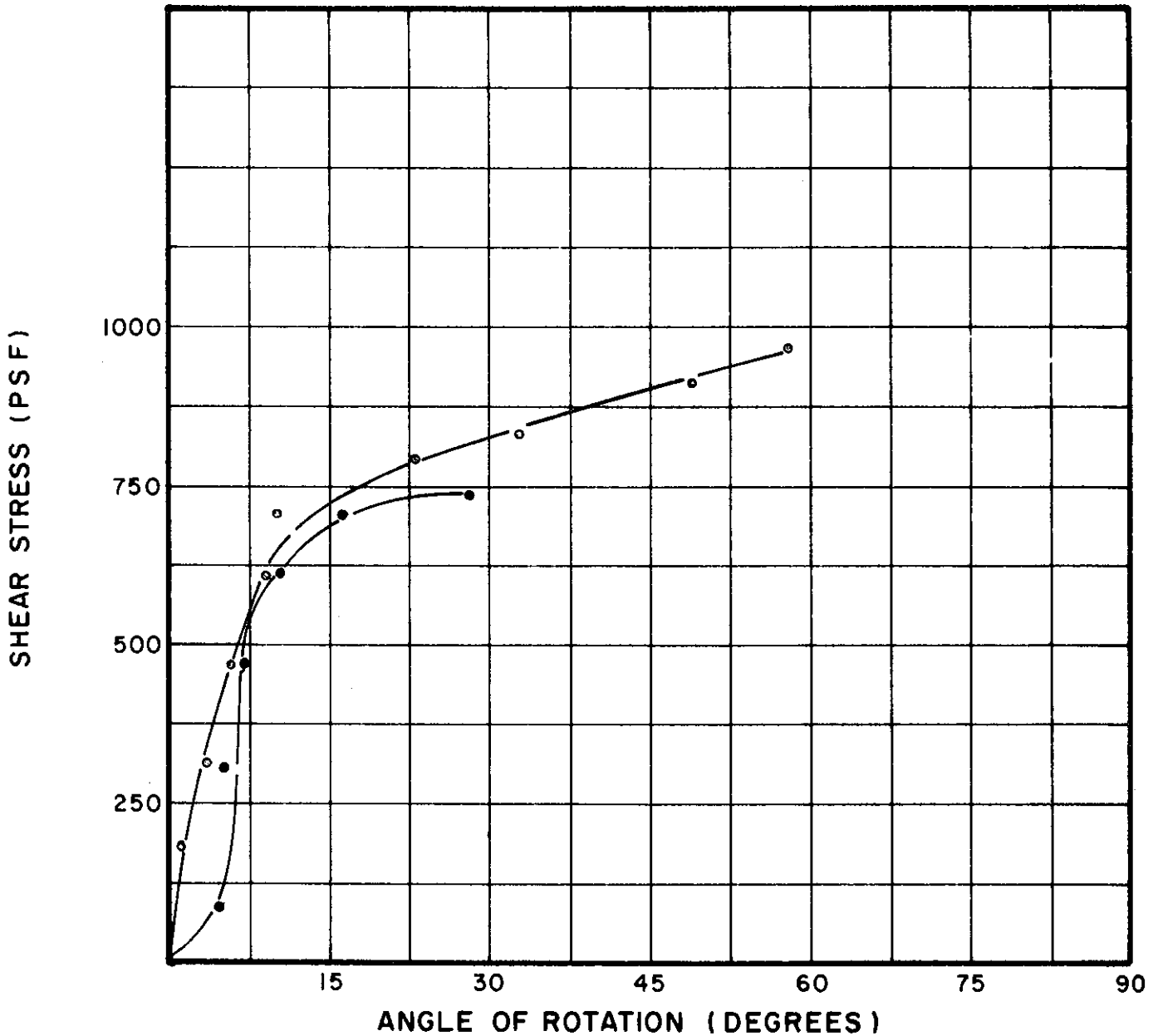
BORING NO. 59

SAMPLE NO. 5

DEPTH 39.4' - 39.7'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
VS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)
rVS80.1	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)

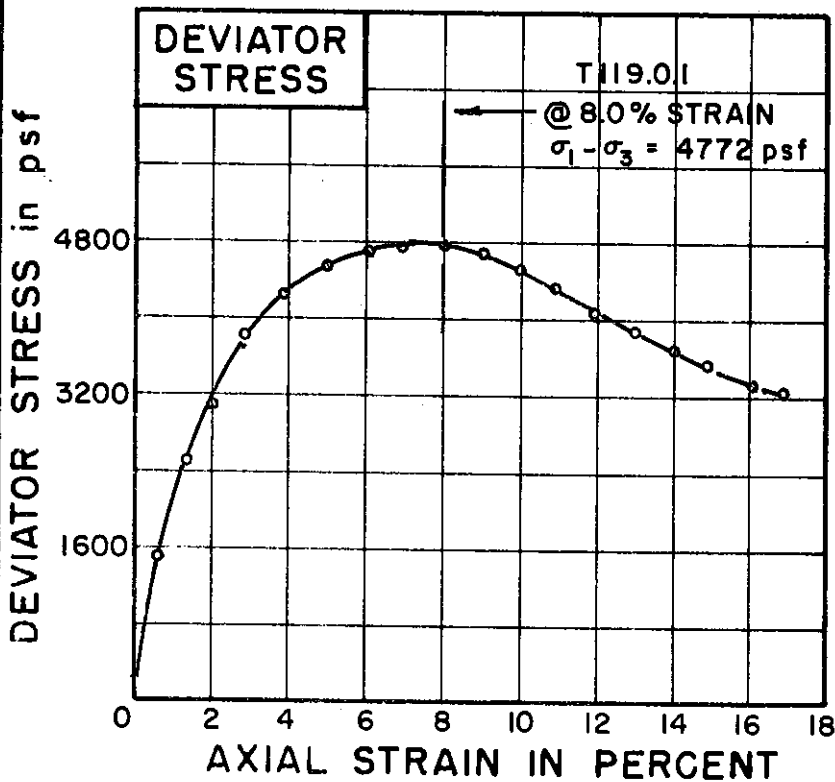
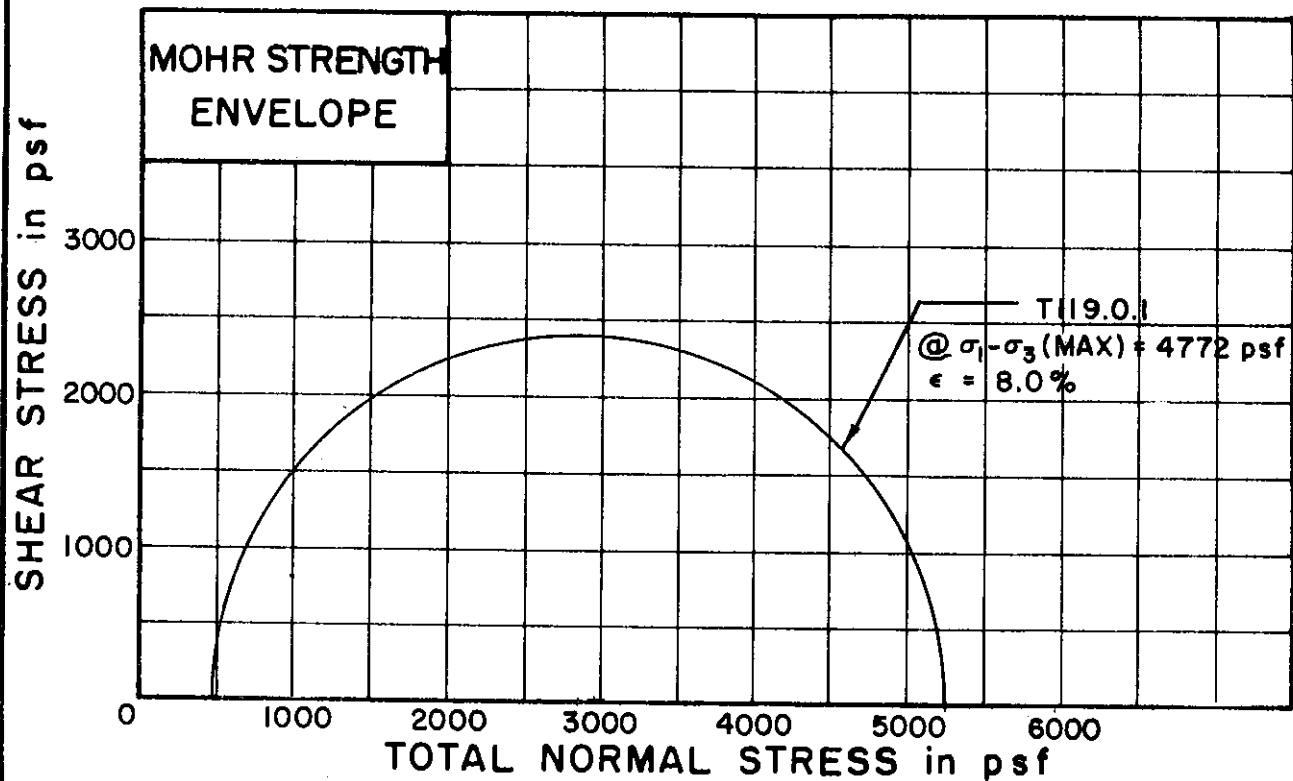
BORING NO. 59  
 SAMPLE NO. 7  
 DEPTH 59.0' - 59.3'

### LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II







TEST NO./SYMBOL	T119.01		
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	101	
SAMPLE DIAMETER in.	$D_o$	1.40	
SAMPLE HEIGHT in.	$H_o$	3.41	

CONFINING PRESSURE psf	$\sigma_3$	475	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	25.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 15

SAMPLE NO. 2

DEPTH 3.7' TO 4.1'

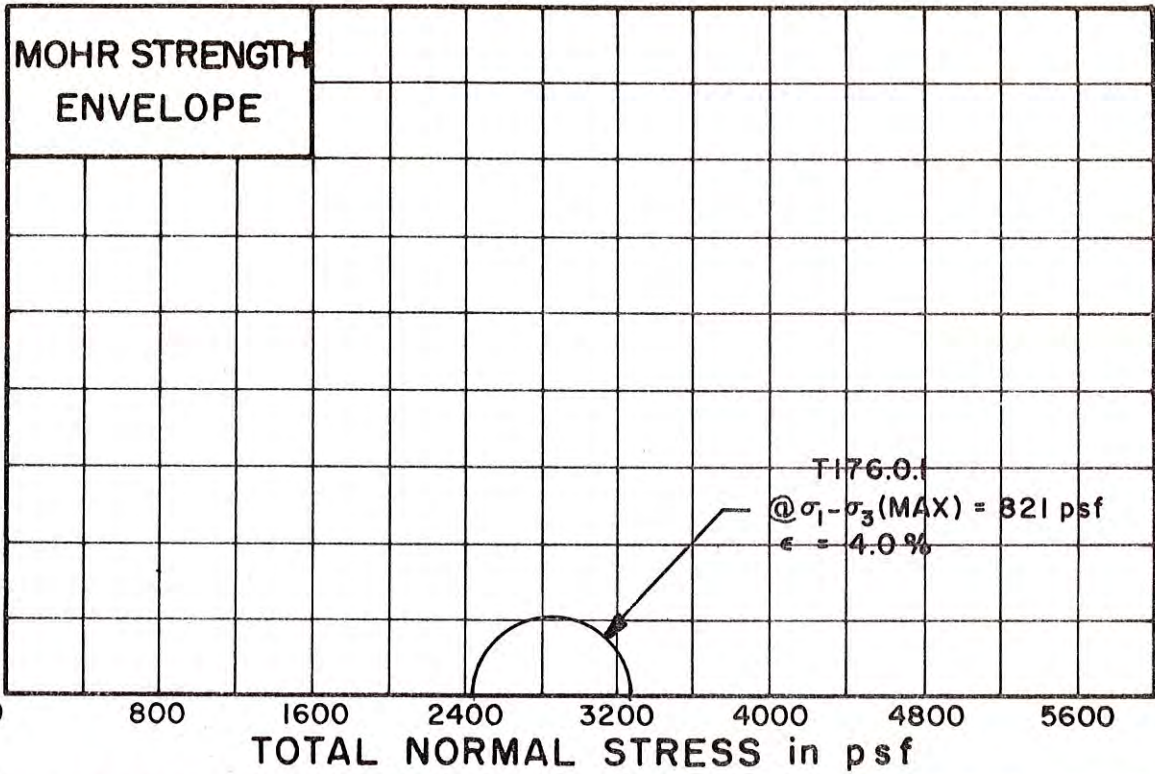
SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

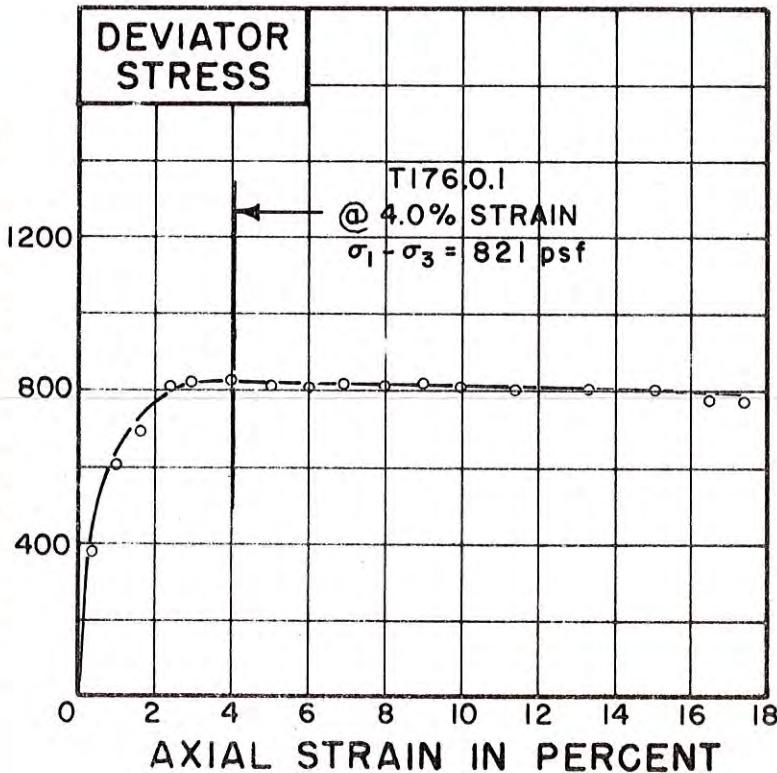
UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T176.0.1
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INITIAL WATER CONTENT	w <sub>o</sub>	399%
DRY DENSITY pcf	γ <sub>d</sub>	83
SAMPLE DIAMETER, in.	D <sub>o</sub>	1.37
SAMPLE HEIGHT in.	H <sub>o</sub>	3.29

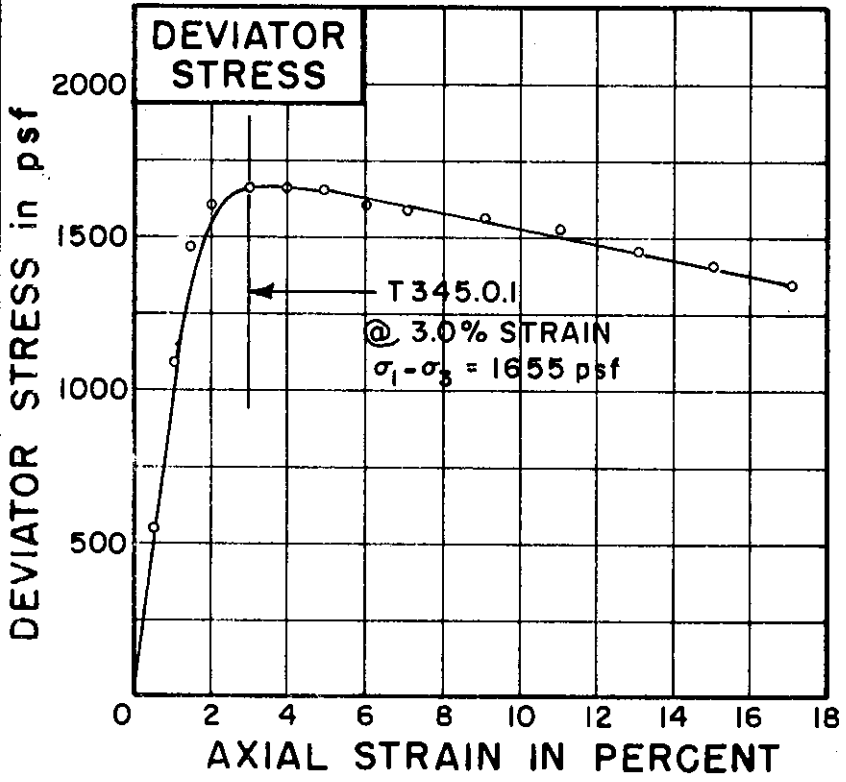
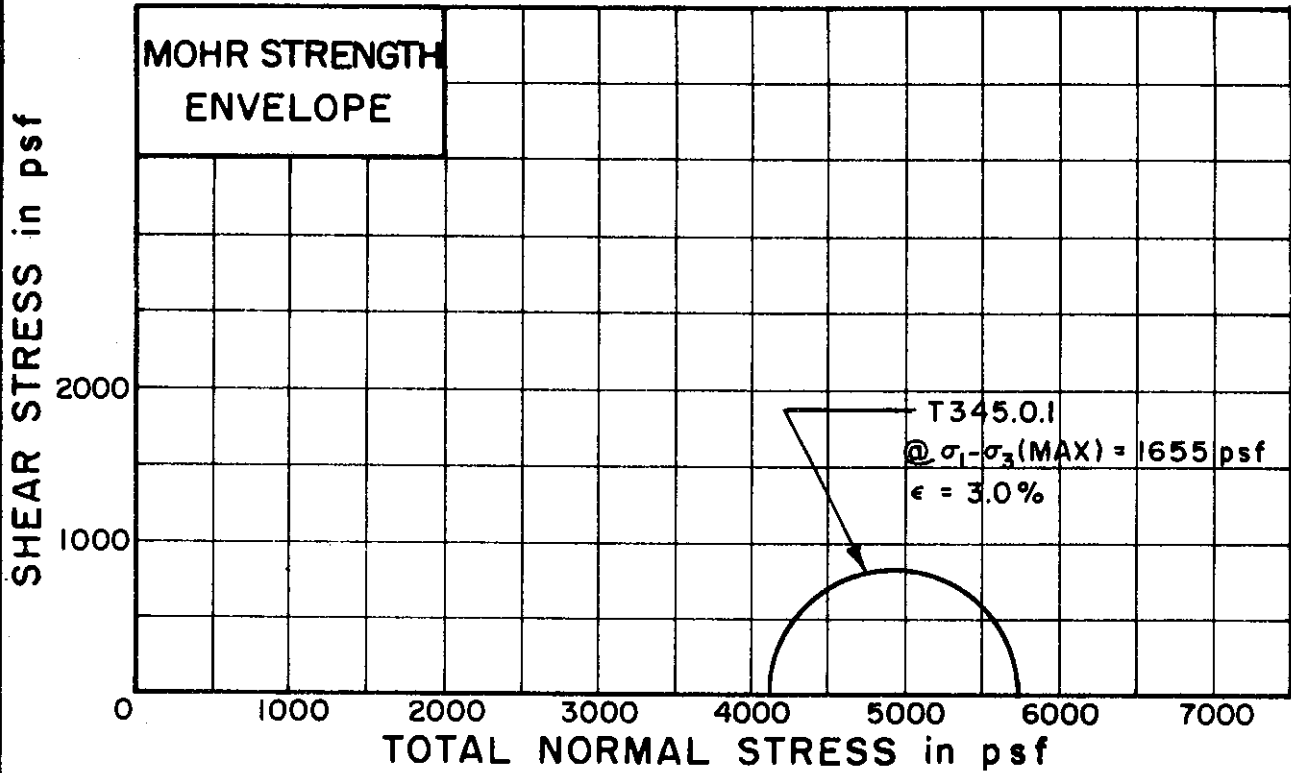
CONFINING PRESSURE psf	σ <sub>3</sub>	2448
RATE OF STRAIN PERCENT/MINUTE		0.26

FINAL WATER CONTENT	w <sub>f</sub>	39.8%
SKETCH OF SAMPLE AT END OF TEST		

BORING NO. 18  
 SAMPLE NO. 3  
 DEPTH 20.6' TO 20.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T345.0.1		
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INITIAL WATER CONTENT	$w_0$	31.0%		
DRY DENSITY pcf	$\gamma_d$	92		
SAMPLE DIAMETER in.	$D_0$	1.41		
SAMPLE HEIGHT in.	$H_0$	3.34		

CONFINING PRESSURE psf	$\sigma_3$	4104		
RATE OF STRAIN PERCENT/MINUTE		0.27		

FINAL WATER CONTENT	$w_f$	30.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 6

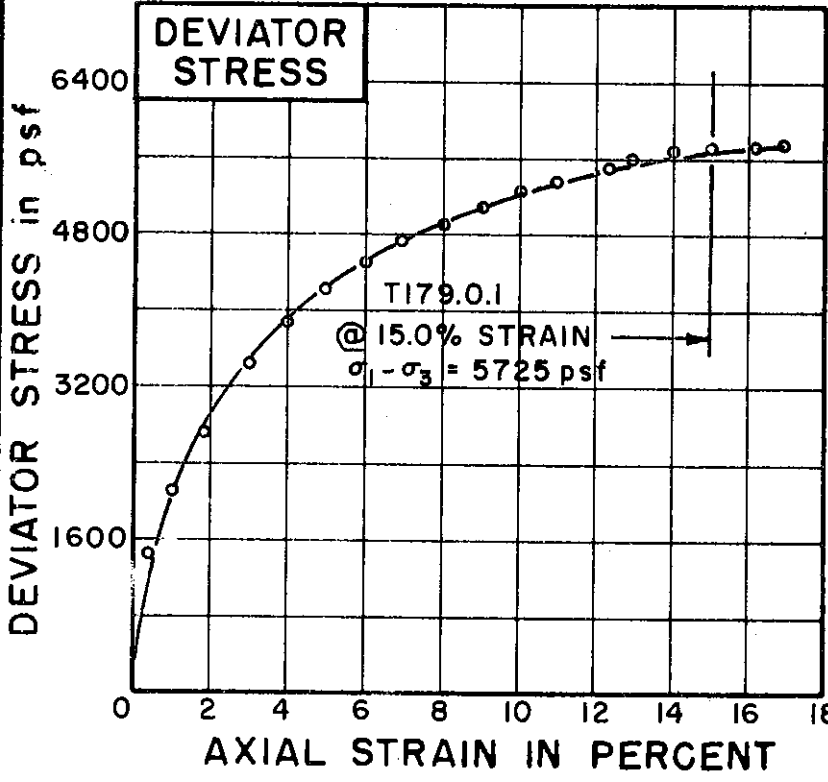
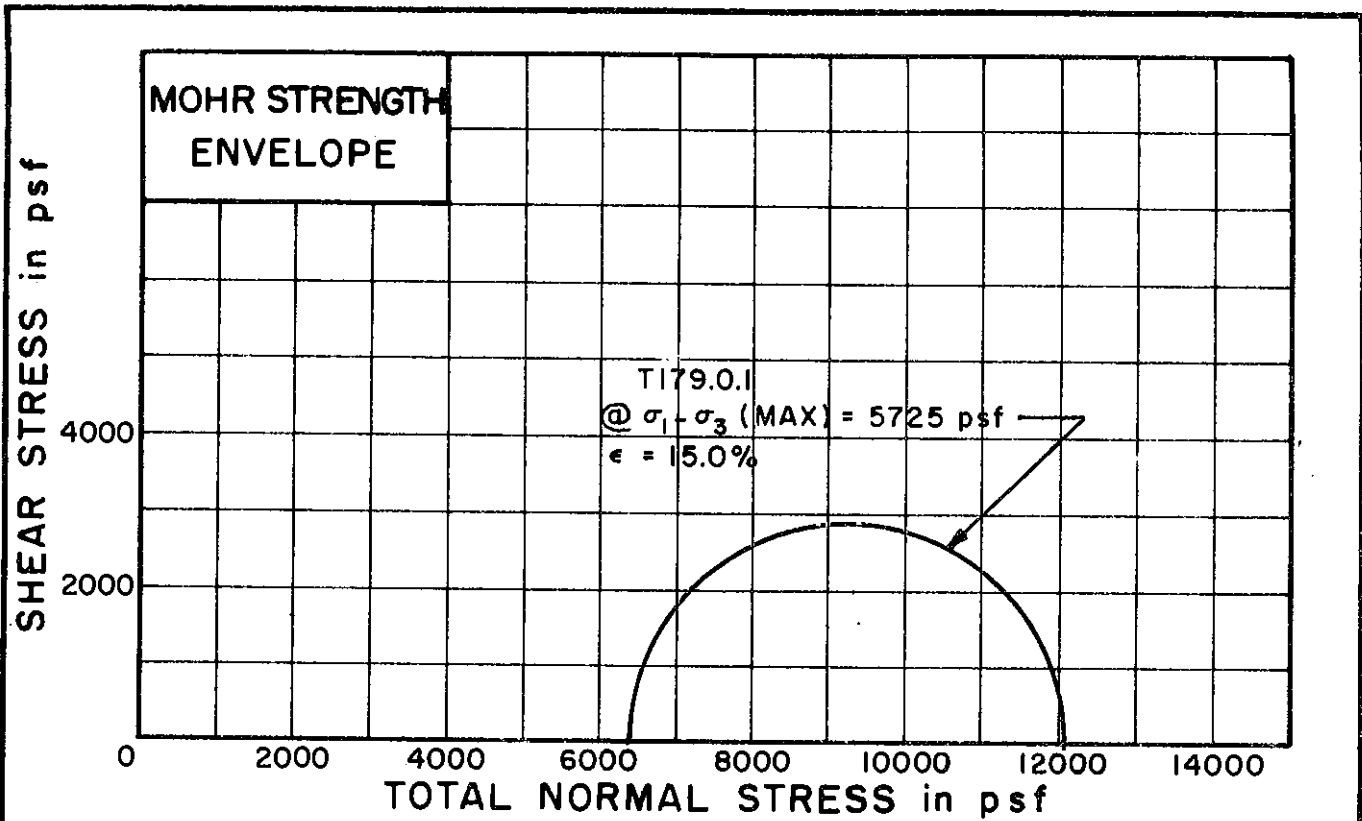
DEPTH 51.4' TO 51.7'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T179.0.1		
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INITIAL WATER CONTENT	$w_0$	17.3%	
DRY DENSITY	$\rho_d$	111	
SAMPLE DIAMETER	$D_0$	1.36	
SAMPLE HEIGHT	$H_0$	3.22	

CONFINING PRESSURE	$\sigma_3$	6336	
RATE OF STRAIN		0.26	

FINAL WATER CONTENT	$w_f$	17.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 18

SAMPLE NO. 10

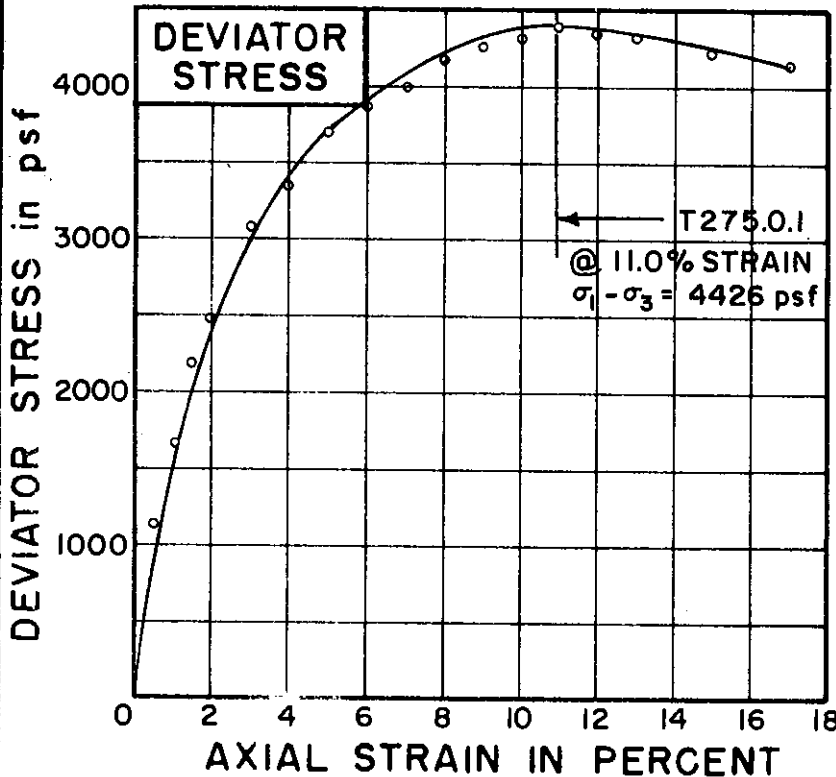
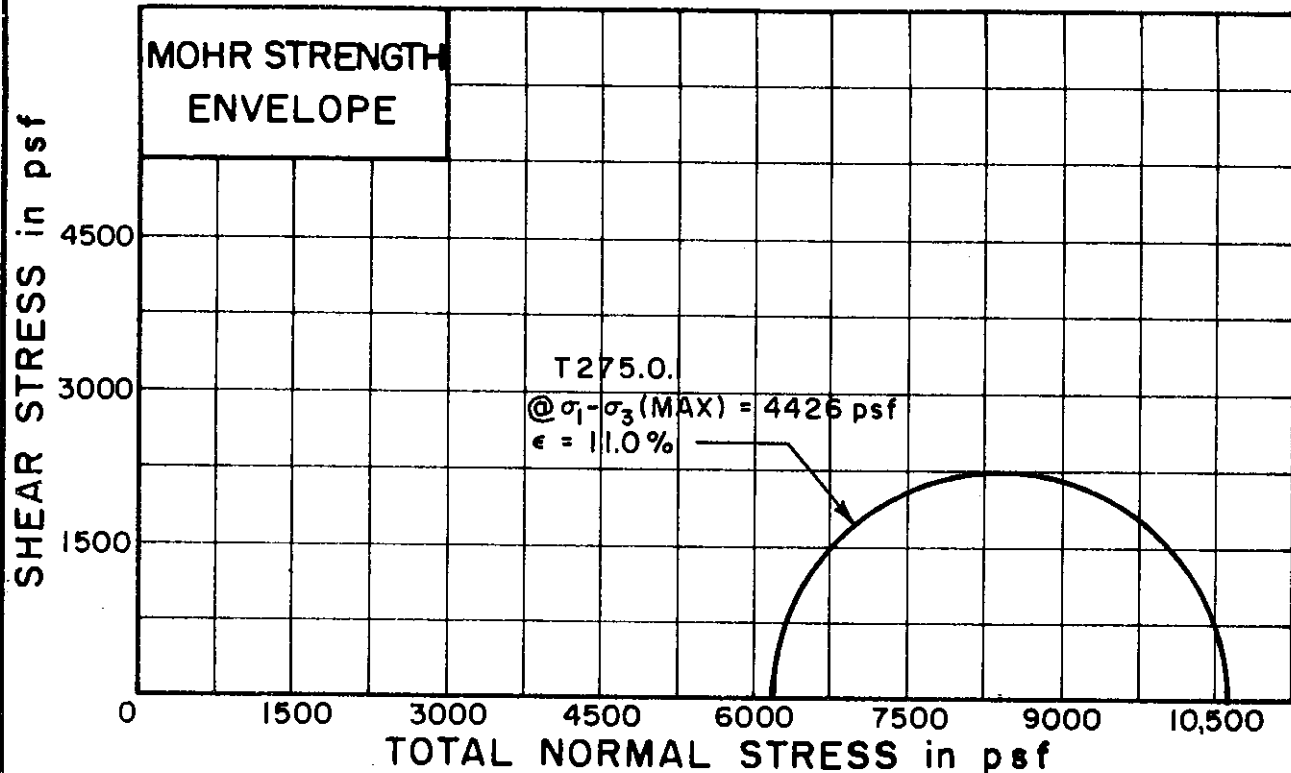
DEPTH 88.8' TO 90.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 29 PLASTIC LIMIT 15

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T275.0.		
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INITIAL WATER CONTENT	$w_o$	22.5%	
DRY DENSITY pcf	$\gamma_d$	104	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.35	

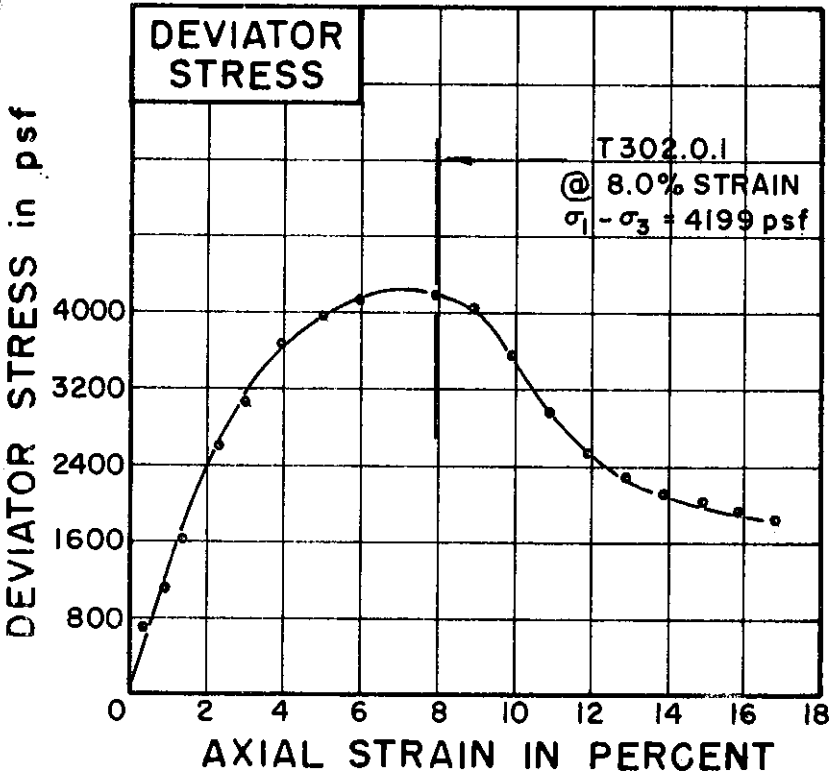
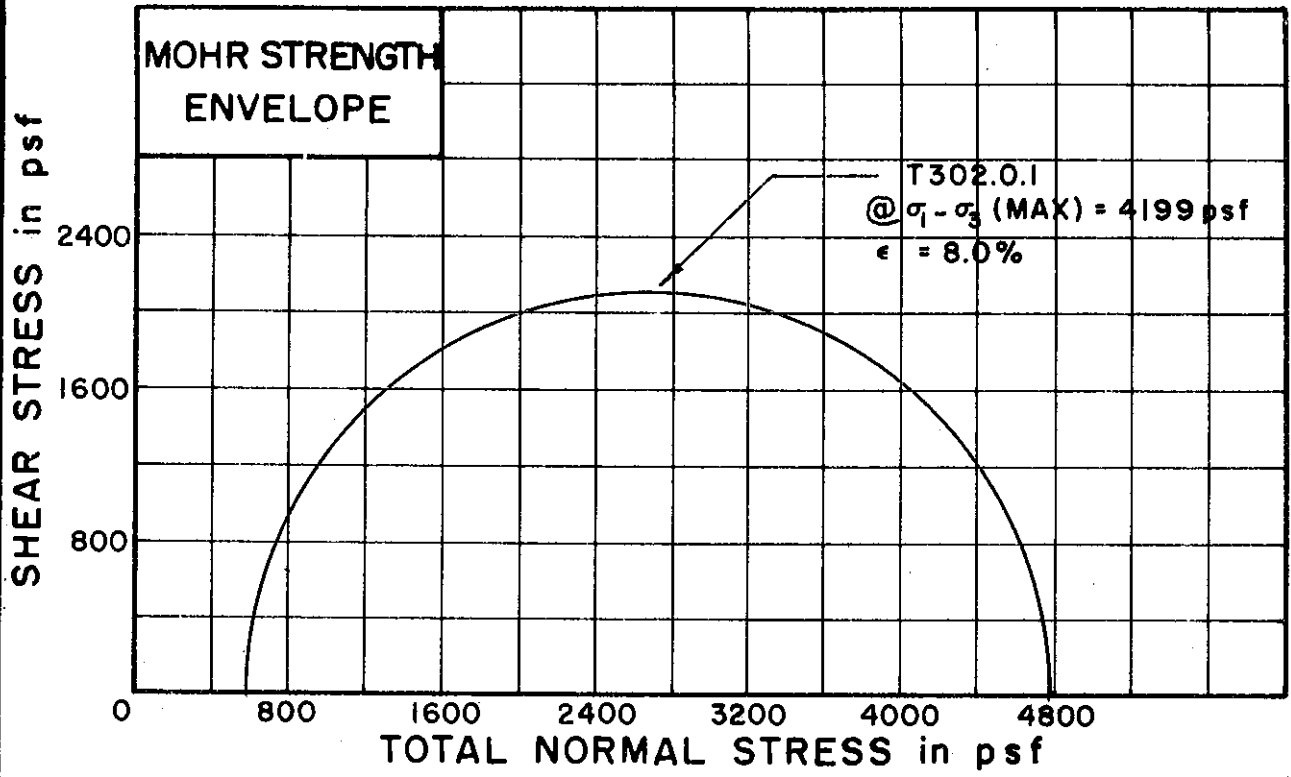
CONFINING PRESSURE psf	$\sigma_3$	6192	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	22.4%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 25  
 SAMPLE NO. 10  
 DEPTH 88.9' TO 89.2'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T302.0.		
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INITIAL WATER CONTENT	$w_o$	24.9%		
DRY DENSITY	$\gamma_d$ pcf	103		
SAMPLE DIAMETER	$D_o$ in.	1.40		
SAMPLE HEIGHT	$H_o$ in.	3.33		

CONFINING PRESSURE	$\sigma_3$ psf	576		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	24.7%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 27

SAMPLE NO. 2

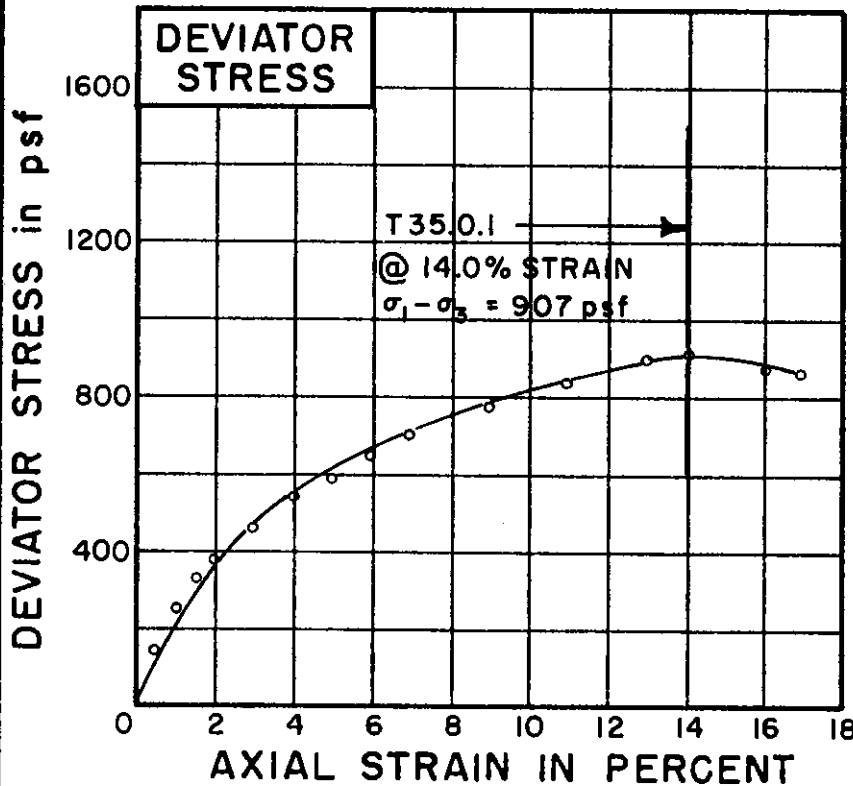
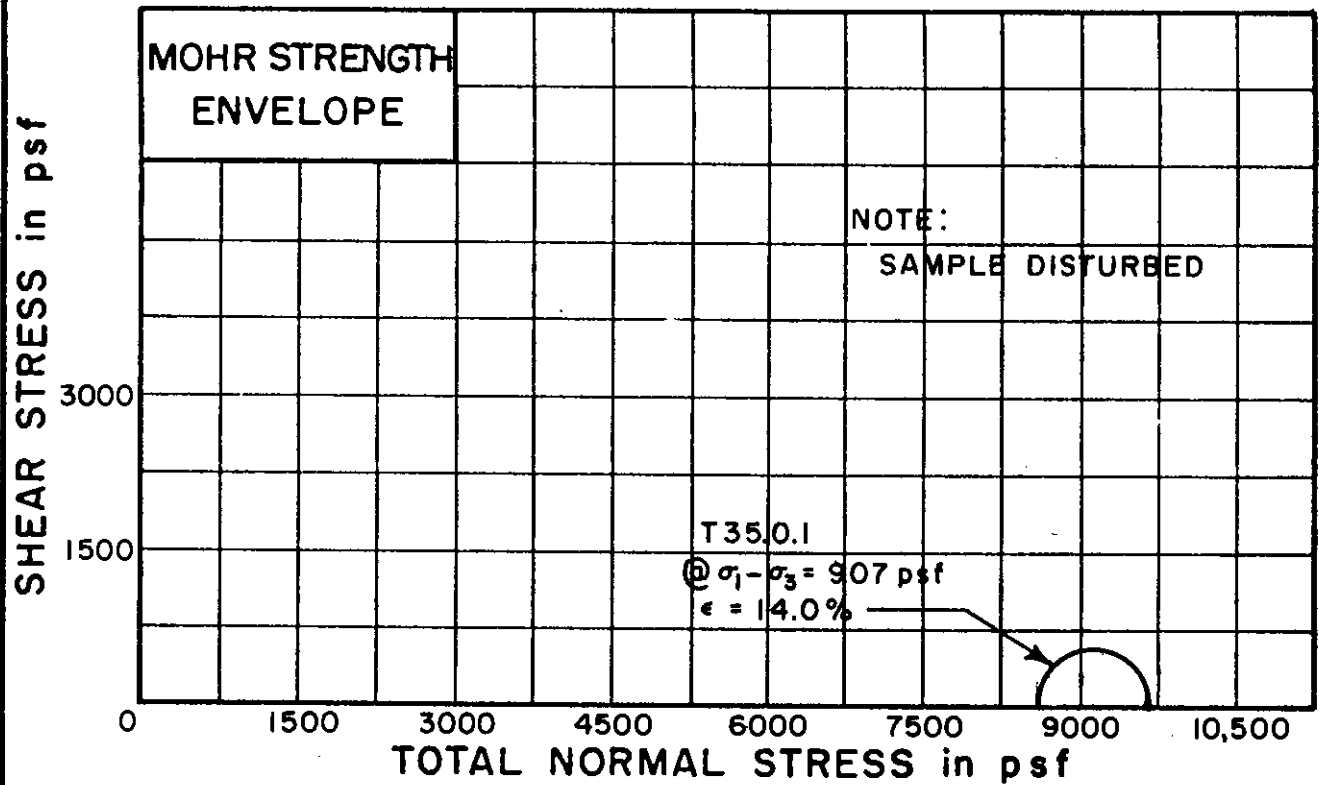
DEPTH 4.5' TO 4.8'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 24

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T35.0.1		
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INITIAL WATER CONTENT	$w_0$	19.6%	
DRY DENSITY pcf	$\gamma_d$	105	
SAMPLE DIAMETER, in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.50	

CONFINING PRESSURE psf	$\sigma_3$	8654	
RATE OF STRAIN PERCENT/MINUTE		0.26	

FINAL WATER CONTENT	$w_f$	19.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 41

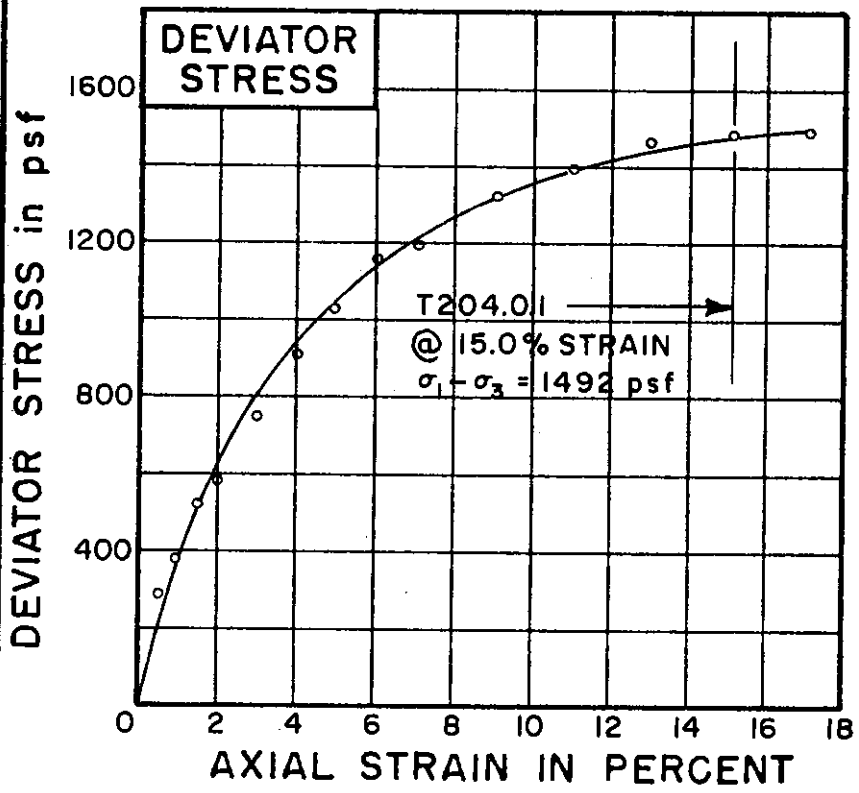
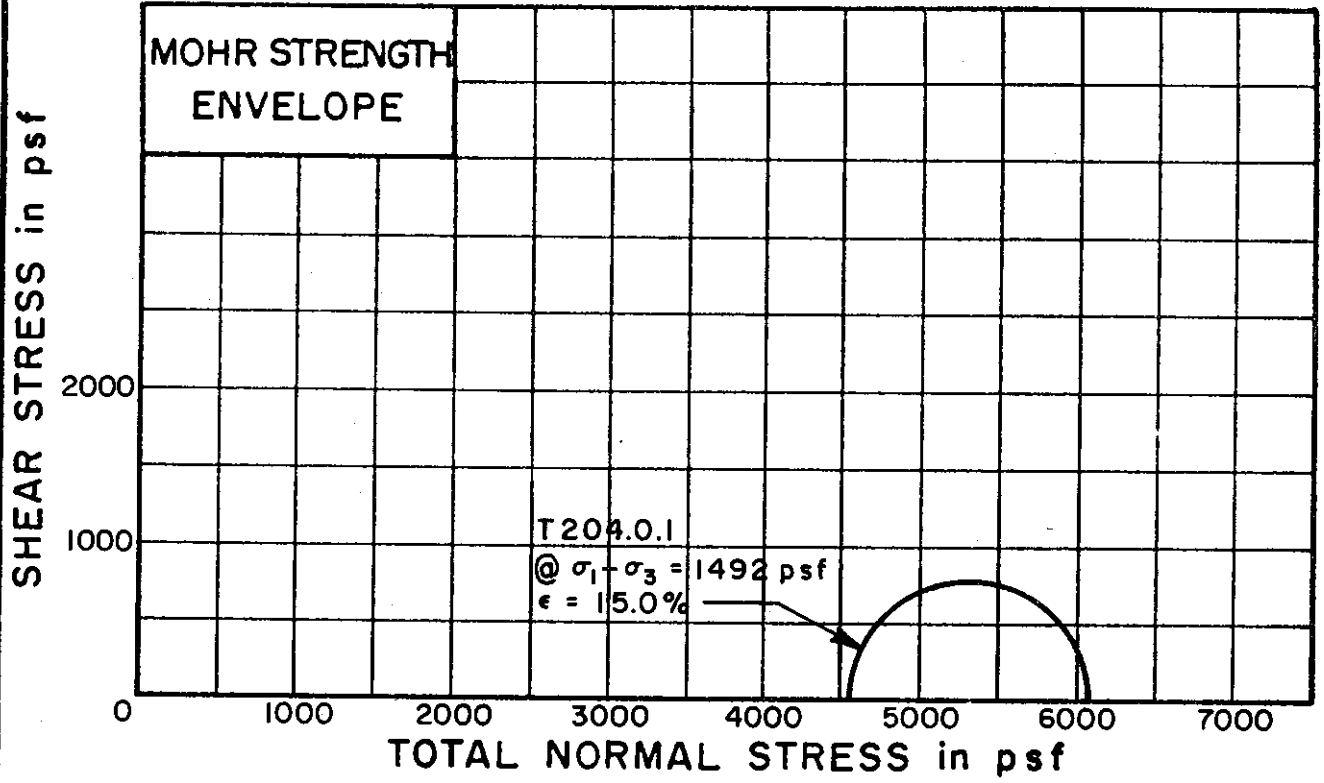
SAMPLE NO. 17

DEPTH 72.9' TO 73.2'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T204.0.1		
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INITIAL WATER CONTENT	$w_0$	26.3%	
DRY DENSITY	$\gamma_d$ pcf	99	
SAMPLE DIAMETER	$D_0$ in.	1.40	
SAMPLE HEIGHT	$H_0$ in.	3.43	

CONFINING PRESSURE	$\sigma_3$ psf	4608	
RATE OF STRAIN	PERCENT/MINUTE	0.26	

FINAL WATER CONTENT	$w_f$	25.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 48

SAMPLE NO. 14

DEPTH 60.8' TO 61.1'

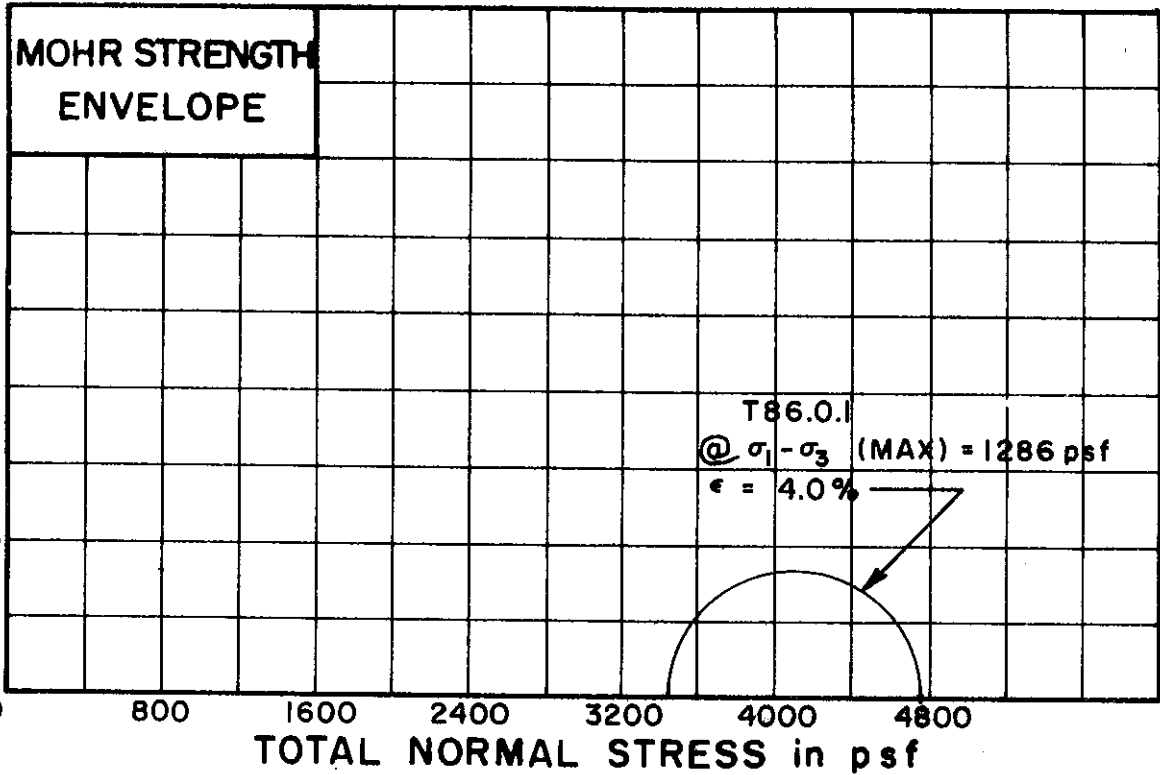
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 34% PLASTIC LIMIT 16%

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

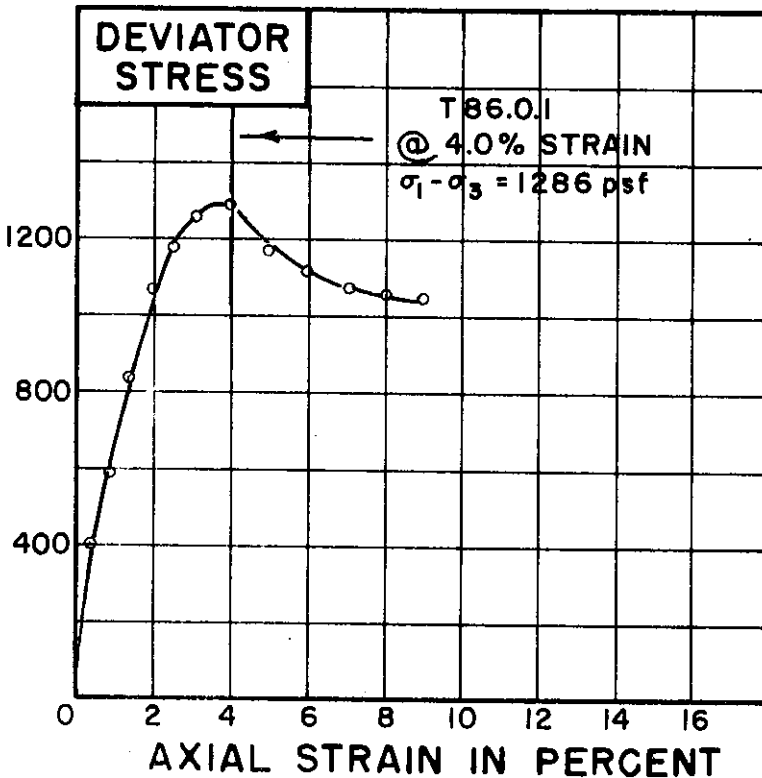
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T86.0.1	
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INITIAL WATER CONTENT	w <sub>o</sub>	46.2%
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DRY DENSITY pcf	γ <sub>d</sub>	74
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SAMPLE DIAMETER in.	D <sub>o</sub>	1.40
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SAMPLE HEIGHT in.	H <sub>o</sub>	3.27
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CONFINING PRESSURE psf	σ <sub>3</sub>	3456
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RATE OF STRAIN PERCENT/MINUTE		.25
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FINAL WATER CONTENT	w <sub>f</sub>	46.3%
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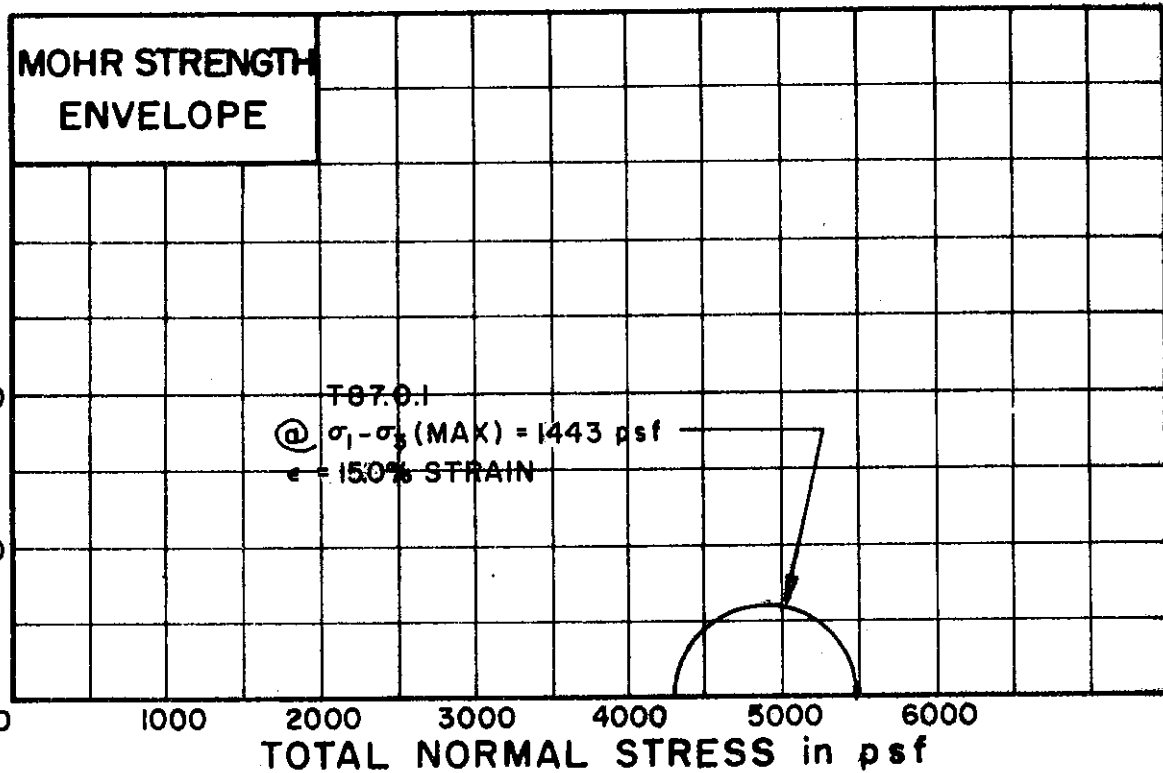
SKETCH OF SAMPLE AT END OF TEST		
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BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.1' TO 38.4'  
 SOIL DESCRIPTION: SILTY CLAY (CH)  
 LIQUID LIMIT 55 PLASTIC LIMIT 23

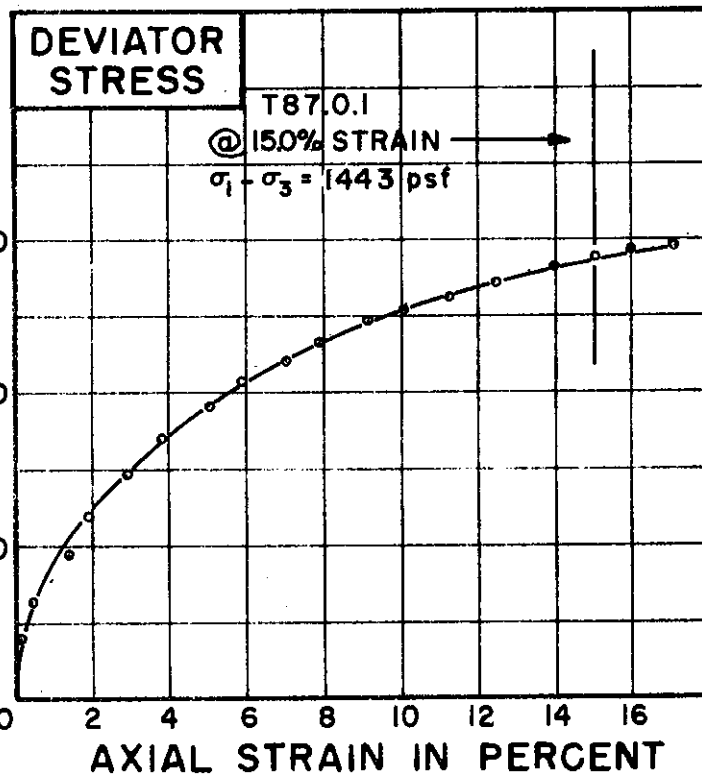
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T87.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	23.2	
DRY DENSITY	γ <sub>d</sub>	100	
SAMPLE DIAMETER	D <sub>o</sub>	1.40	
SAMPLE HEIGHT	H <sub>o</sub>	3.12	

CONFINING PRESSURE	σ <sub>3</sub>	4320	
RATE OF STRAIN		.25	

FINAL WATER CONTENT	w <sub>f</sub>	23.0	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 10

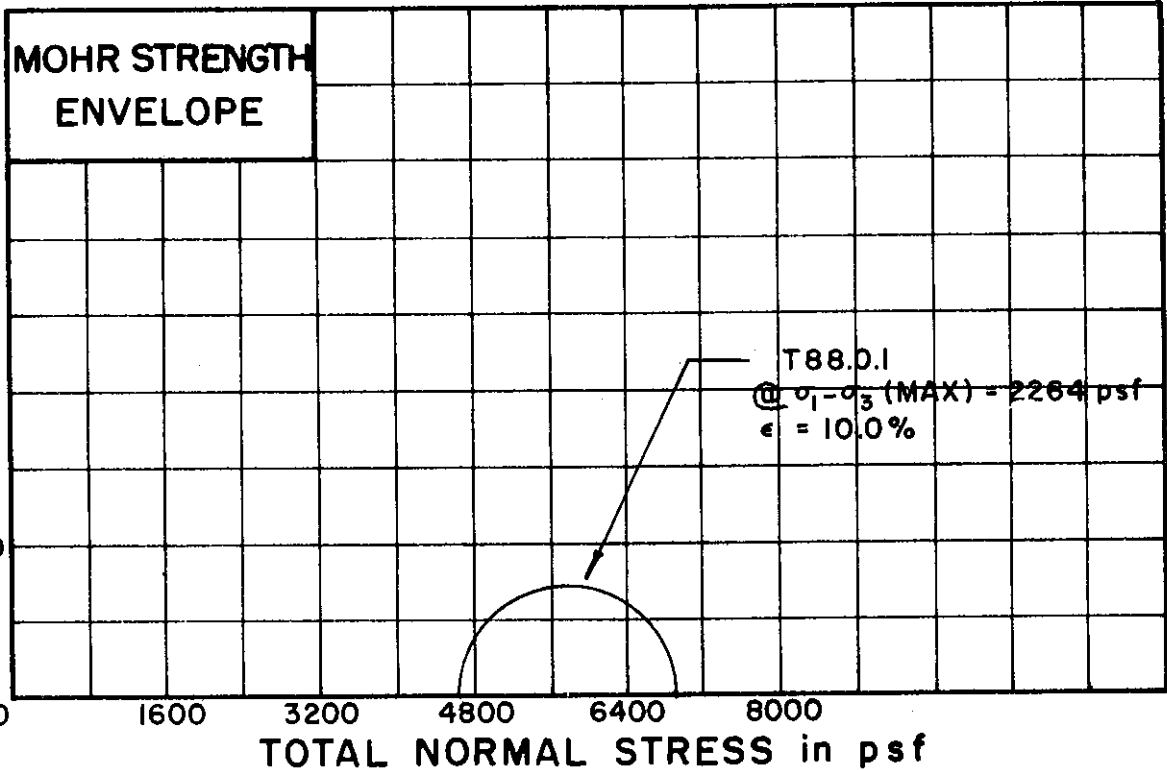
DEPTH 49.3' TO 49.6'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 16 (CL)

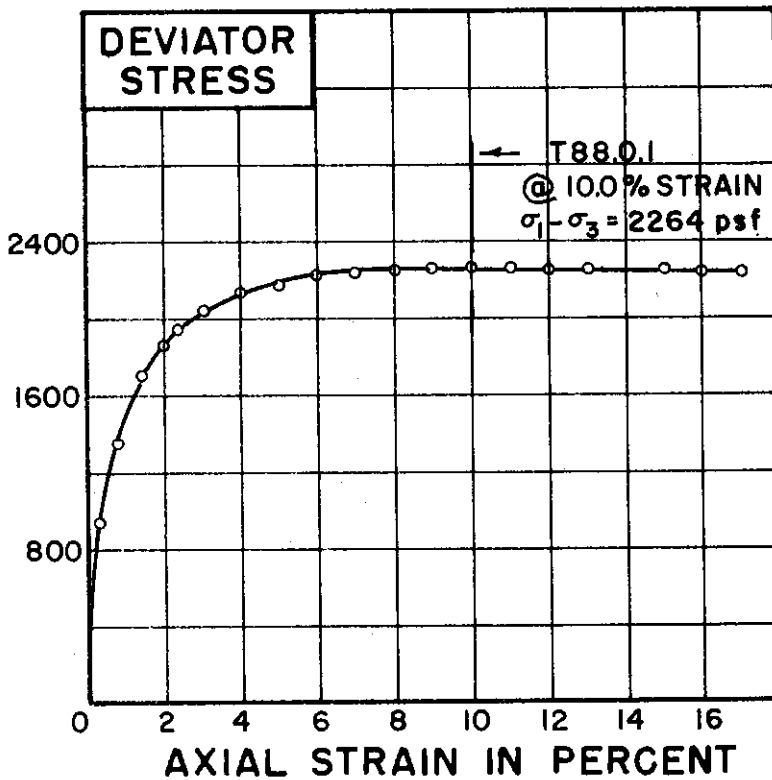
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T88.0.1		
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INITIAL WATER CONTENT	$w_0$	24.3	
DRY DENSITY pcf	$\gamma_d$	101	
SAMPLE DIAMETER in.	$D_0$	1.38	
SAMPLE HEIGHT in.	$H_0$	3.11	

CONFINING PRESSURE psf	$\sigma_3$	4608	
RATE OF STRAIN PERCENT/MINUTE		.26	

FINAL WATER CONTENT	$w_f$	23.5	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 12

DEPTH 59.1' TO 59.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

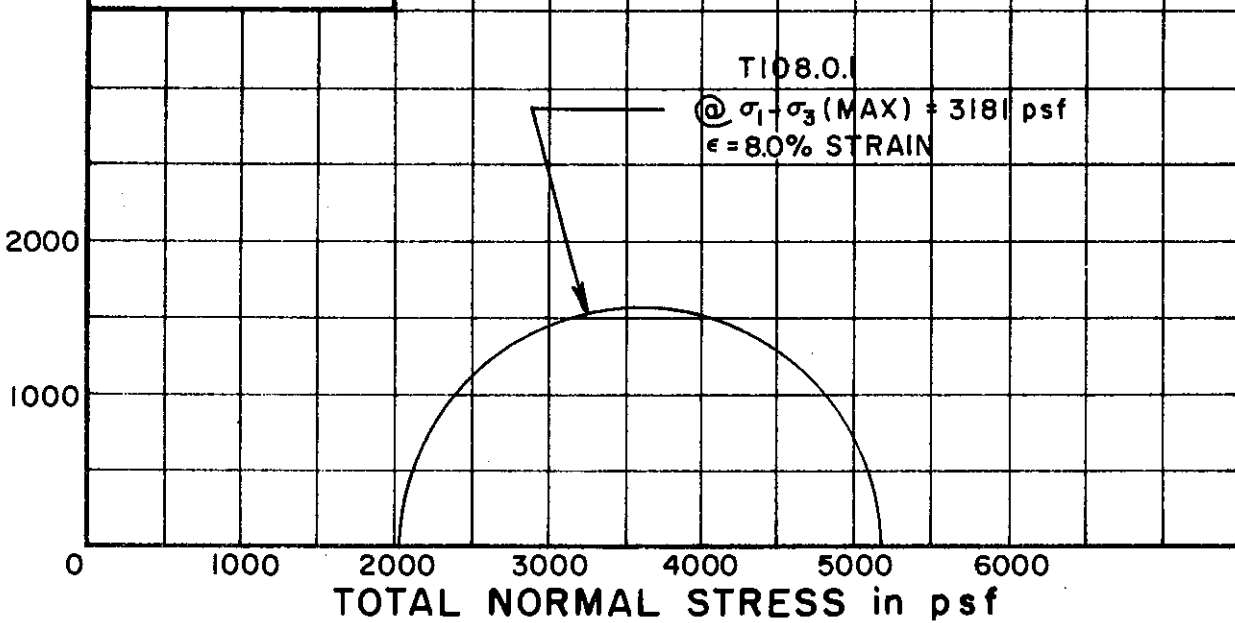
LIQUID LIMIT 39 PLASTIC LIMIT 18

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

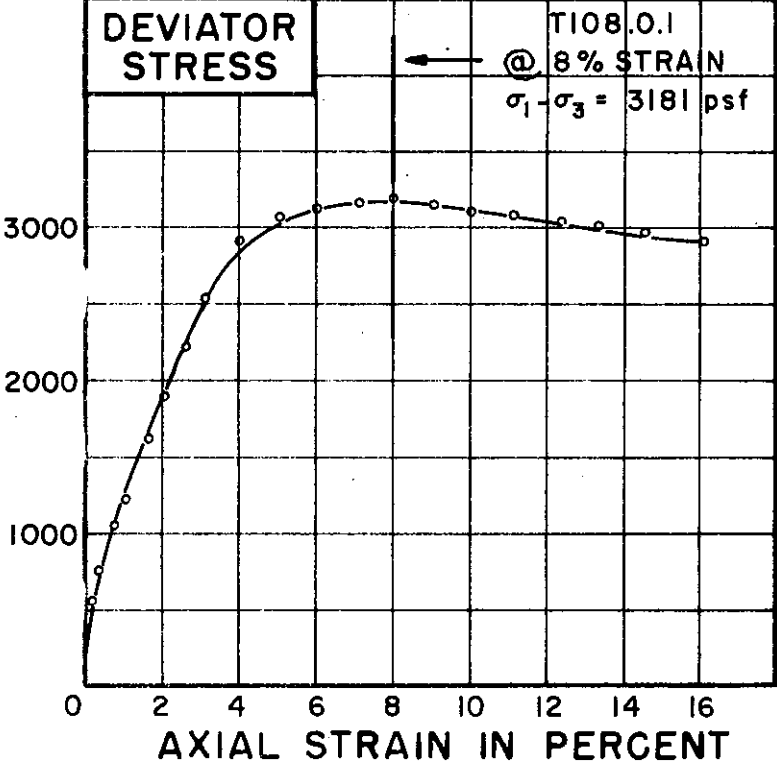
SHEAR STRESS in psf

**MOHR STRENGTH ENVELOPE**



DEVIATOR STRESS in psf

**DEVIATOR STRESS**



TEST NO./SYMBOL	T108.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	31.1		
DRY DENSITY p <sub>cf</sub>	γ <sub>d</sub>	92		
SAMPLE DIAMETER in.	D <sub>o</sub>	1.41		
SAMPLE HEIGHT in.	H <sub>o</sub>	3.25		

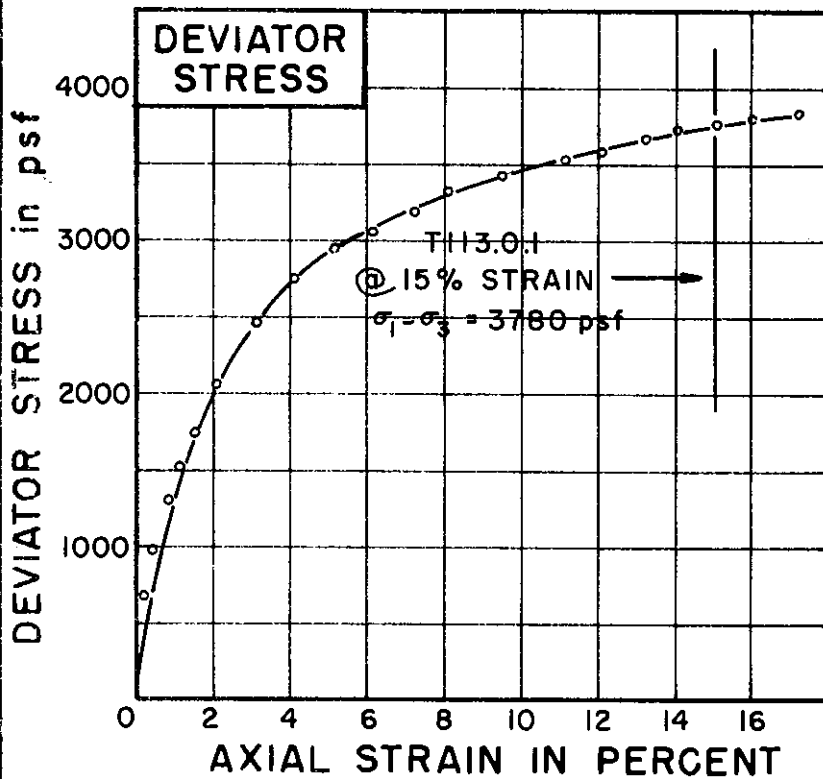
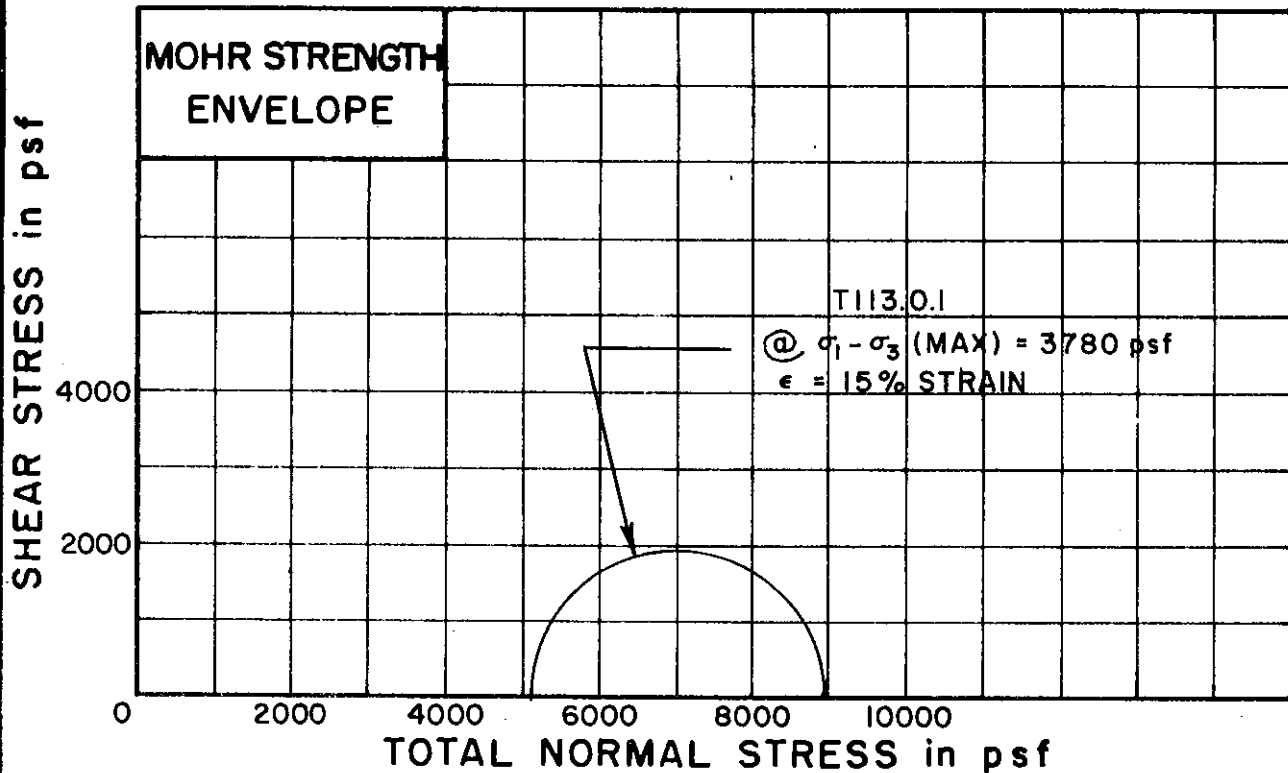
CONFINING PRESSURE p <sub>sf</sub>	σ <sub>3</sub>	2016		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	30.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 3  
 DEPTH 21.2' TO 21.5'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T113.0.1		
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INITIAL WATER CONTENT	$w_0$	16.2		
DRY DENSITY pcf	$\gamma_d$	111		
SAMPLE DIAMETER, in.	$D_0$	1.38		
SAMPLE HEIGHT in.	$H_0$	3.18		

CONFINING PRESSURE psf	$\sigma_3$	5184		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	16.1		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

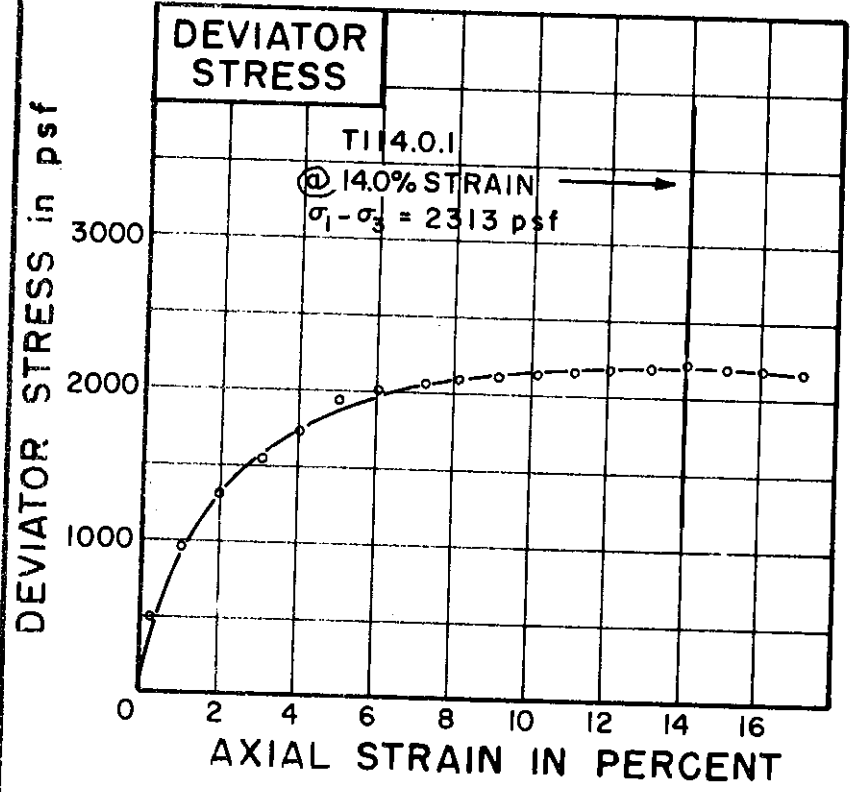
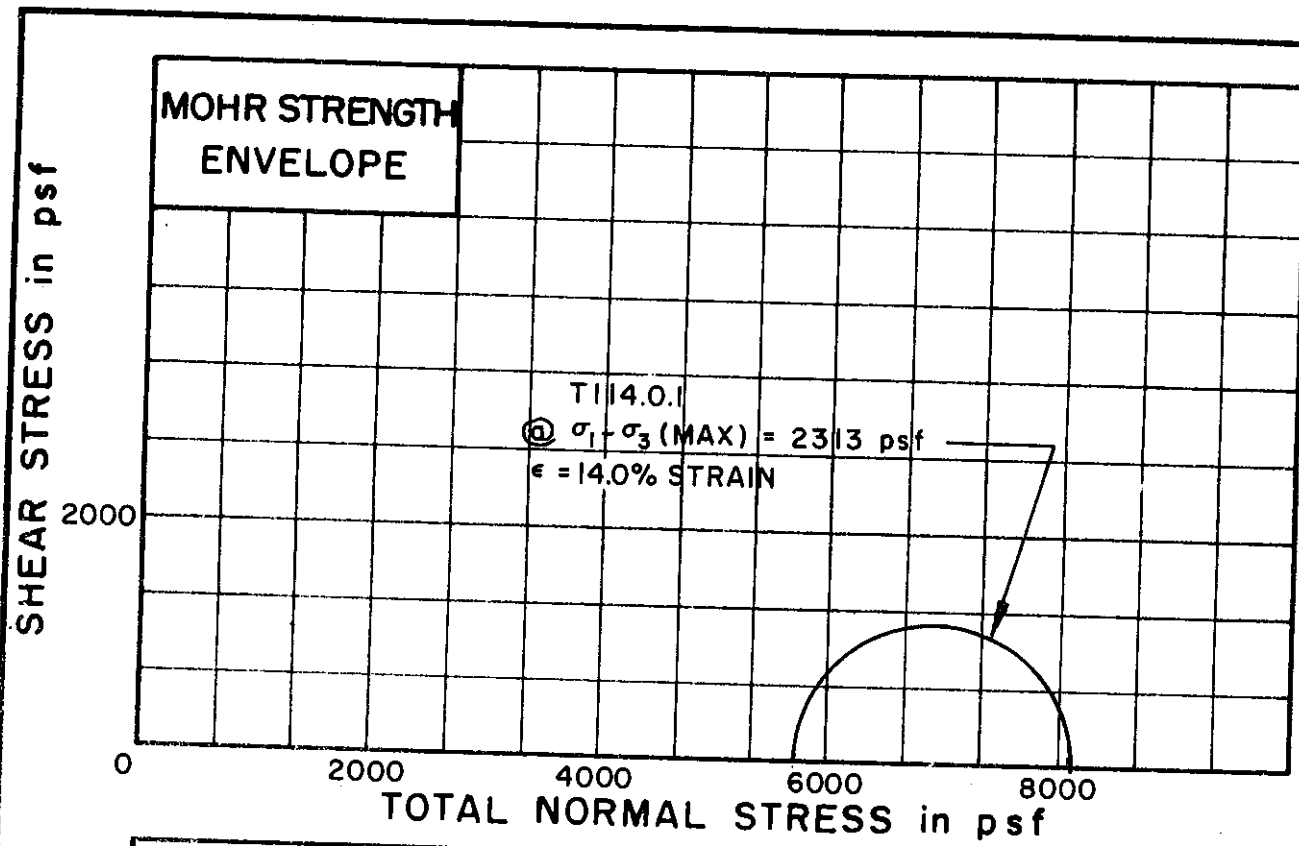
SAMPLE NO. 8

DEPTH 69.0 TO 69.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 24 PLASTIC LIMIT 14 (CL)

**UNCONSOLIDATED UNDRAINED  
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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T114.0.1		
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INITIAL WATER CONTENT	$w_o$	21.8		
DRY DENSITY	$\gamma_d$ pcf	105		
SAMPLE DIAMETER	$D_o$ in.	1.38		
SAMPLE HEIGHT	$H_o$ in.	3.31		

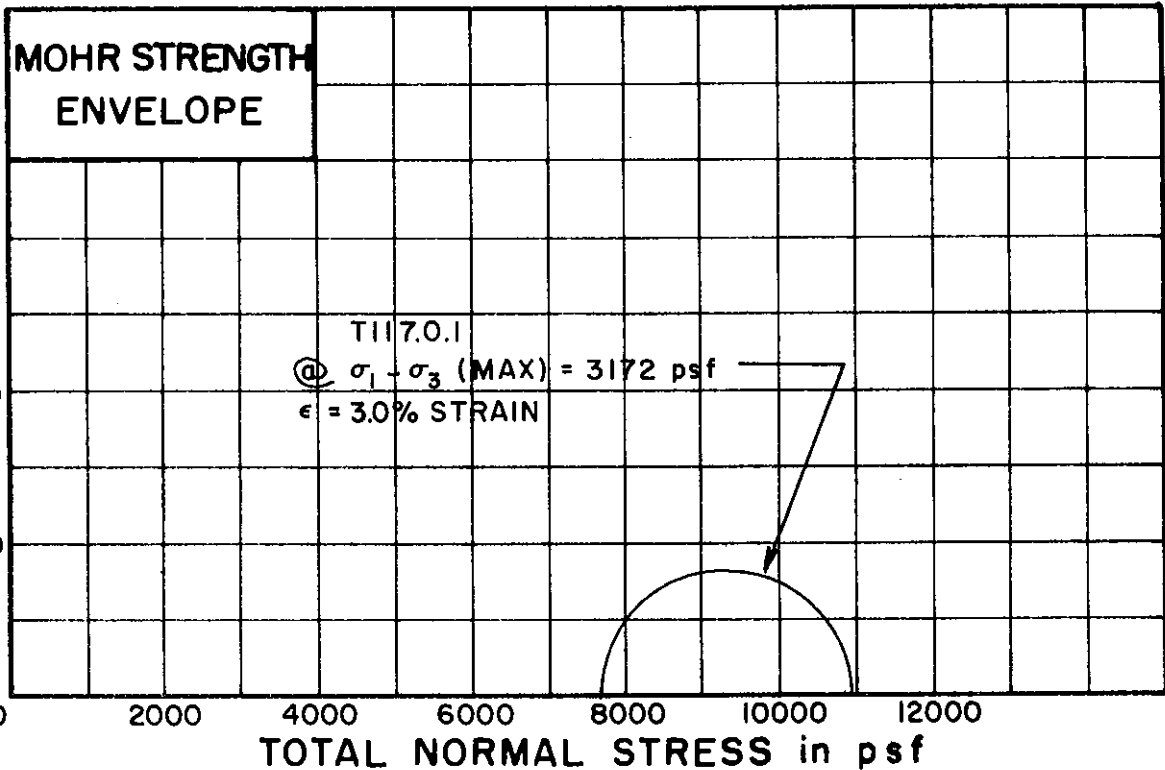
CONFINING PRESSURE	$\sigma_3$ psf	5760		
RATE OF STRAIN	PERCENT/MINUTE	.25		

FINAL WATER CONTENT	$w_f$	21.7		
SKETCH OF SAMPLE AT END OF TEST				

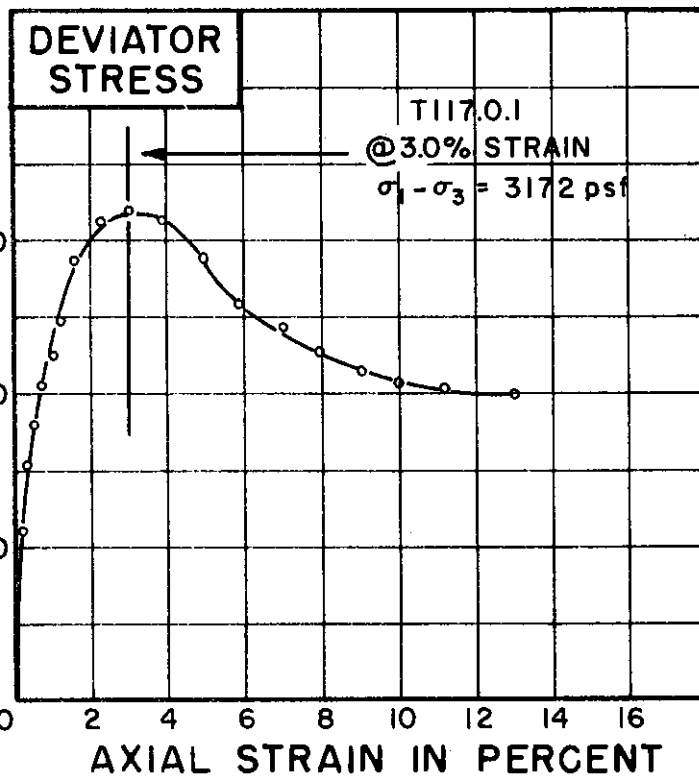
BORING NO. 52  
 SAMPLE NO. 9  
 DEPTH 78.6' TO 78.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 35 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T117.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	35.8		
DRY DENSITY pcf	γ <sub>d</sub>	87		
SAMPLE DIAMETER in.	D <sub>o</sub>	1.38		
SAMPLE HEIGHT in.	H <sub>o</sub>	3.45		

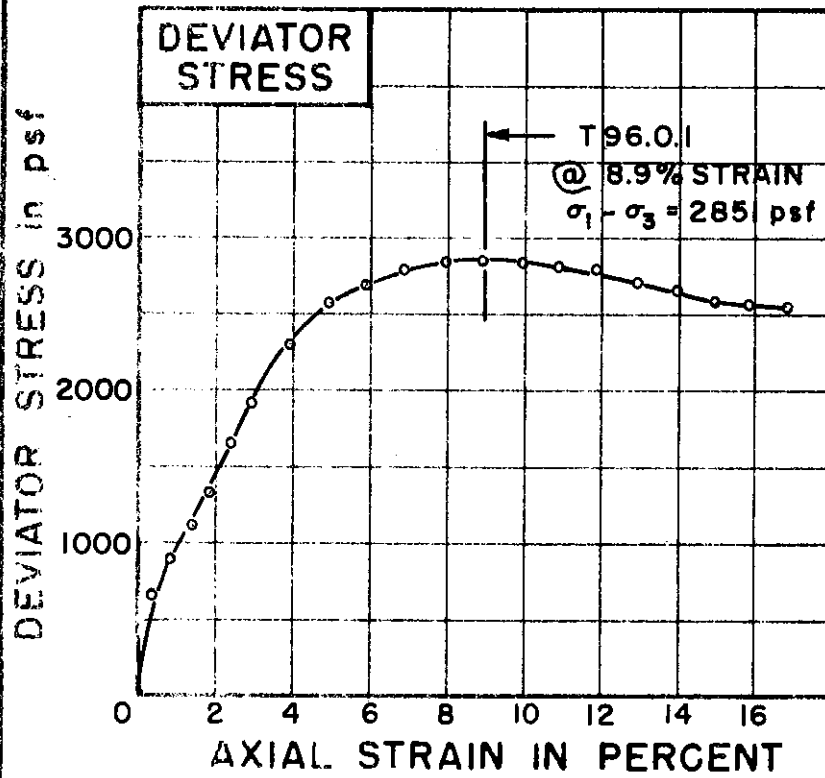
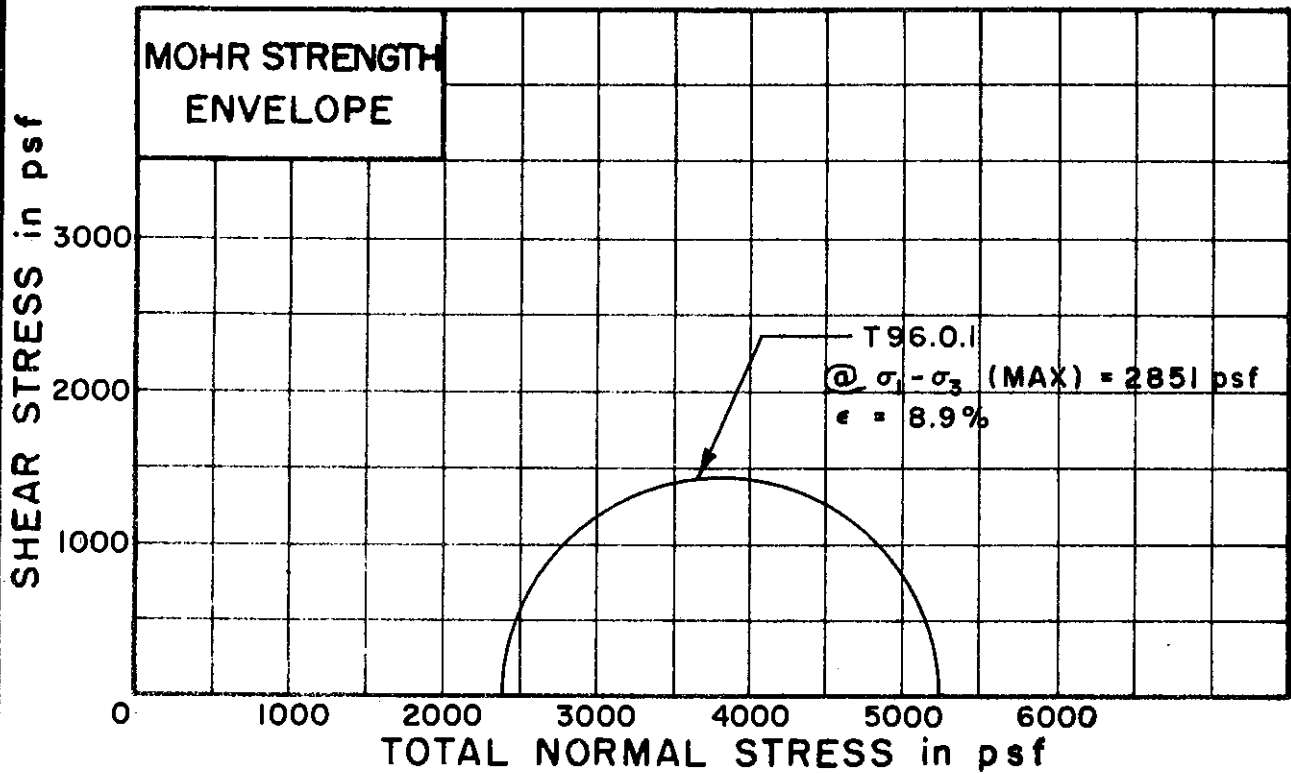
CONFINING PRESSURE psf	σ <sub>3</sub>	7632		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	35.7		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52  
 SAMPLE NO. 12  
 DEPTH 109.3' TO 109.6'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T96.0.1		
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INITIAL WATER CONTENT	$w_0$	32.2%		
DRY DENSITY pcf	$\gamma_d$	91		
SAMPLE DIAMETER in.	$D_0$	1.39		
SAMPLE HEIGHT in.	$H_0$	3.26		

CONFINING PRESSURE psf	$\sigma_3$	2405		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	$w_f$	31.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 53

SAMPLE NO. 3

DEPTH 20.1' TO 20.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

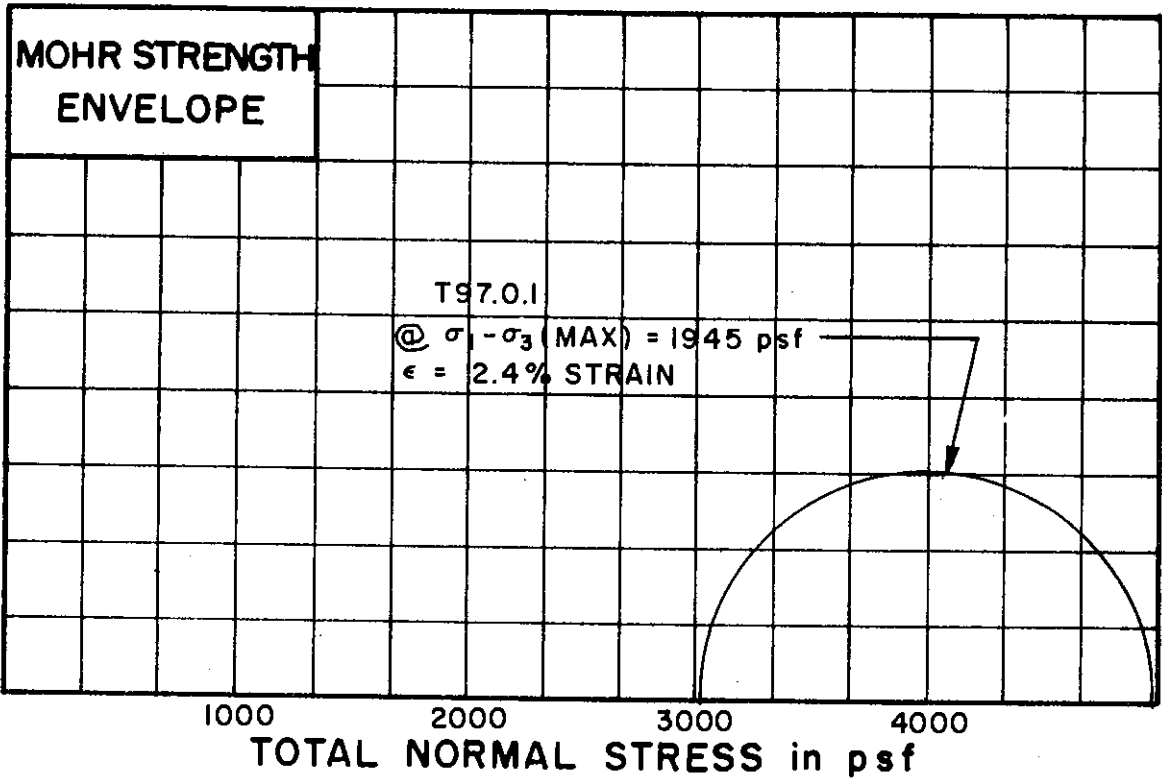
LIQUID LIMIT 49 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
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 TESTS

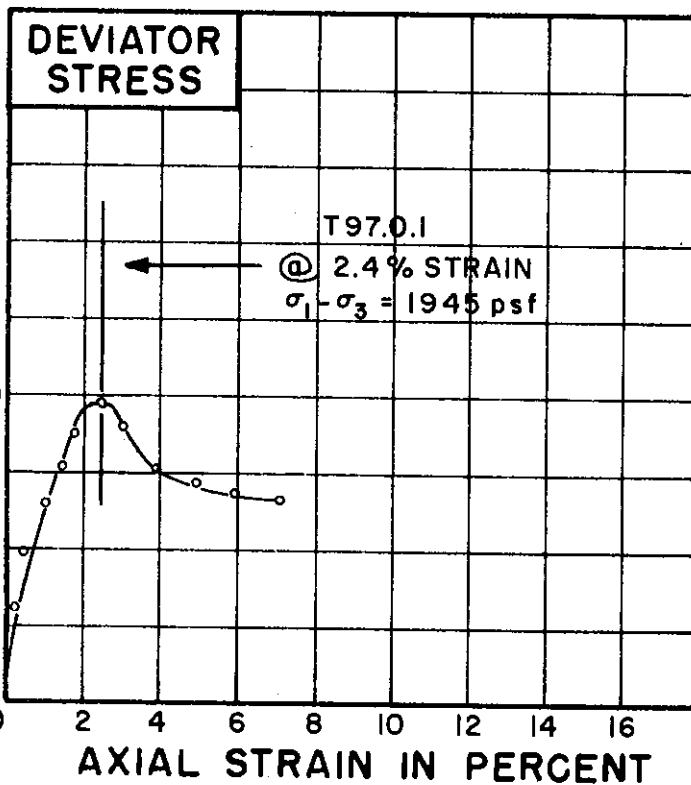
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T97.0.1		
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INITIAL WATER CONTENT	w <sub>0</sub>	34.0	
DRY DENSITY pcf	γ <sub>d</sub>	88	
SAMPLE DIAMETER, in.	D <sub>0</sub>	1.39	
SAMPLE HEIGHT in.	H <sub>0</sub>	3.21	

CONFINING PRESSURE psf	σ <sub>3</sub>	3024	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	w <sub>f</sub>	3.42	
SKETCH OF SAMPLE AT END OF TEST			

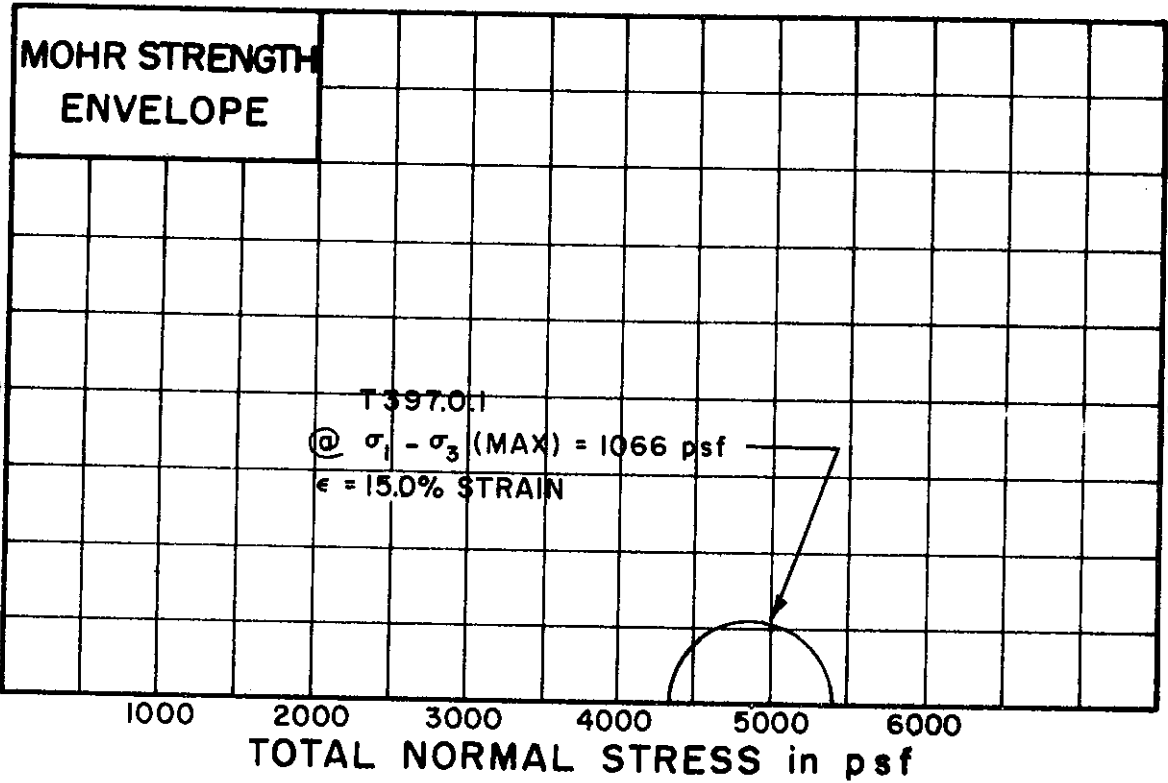
BORING NO. 53  
 SAMPLE NO. 4  
 DEPTH 30.1' TO 30.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49 PLASTIC LIMIT 22

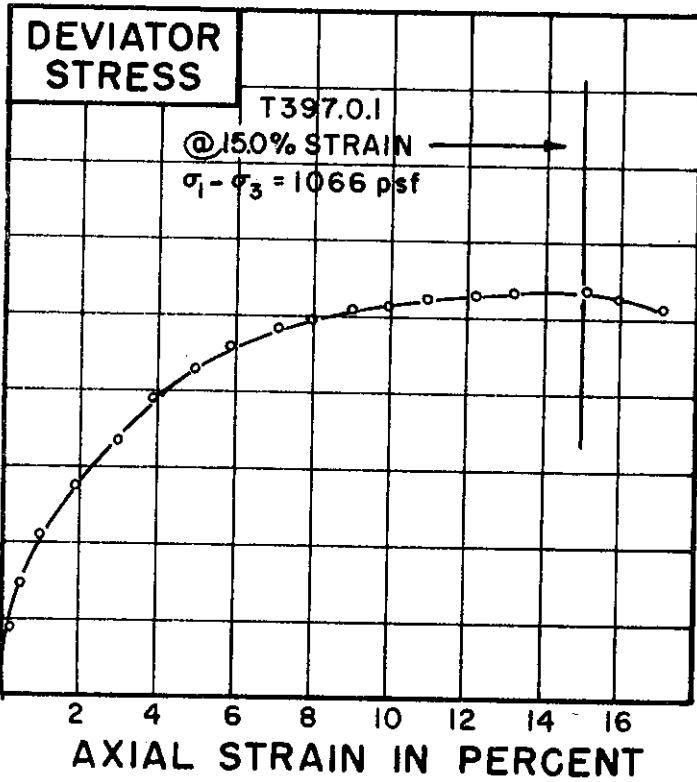
**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T397.0.1		
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INITIAL WATER CONTENT	$w_o$	24.4	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.39	
SAMPLE HEIGHT in.	$H_o$	3.24	

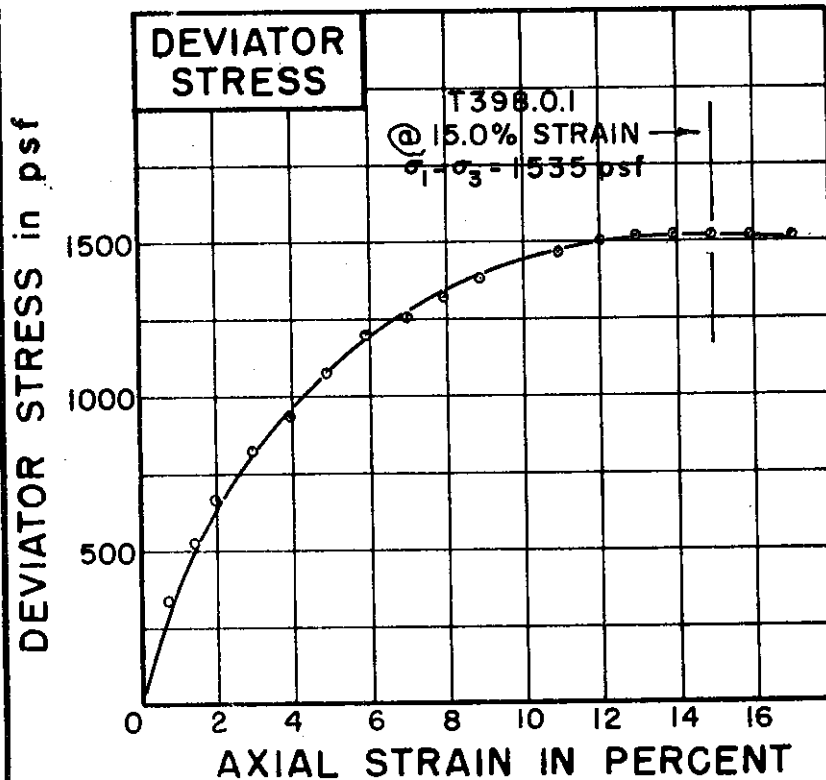
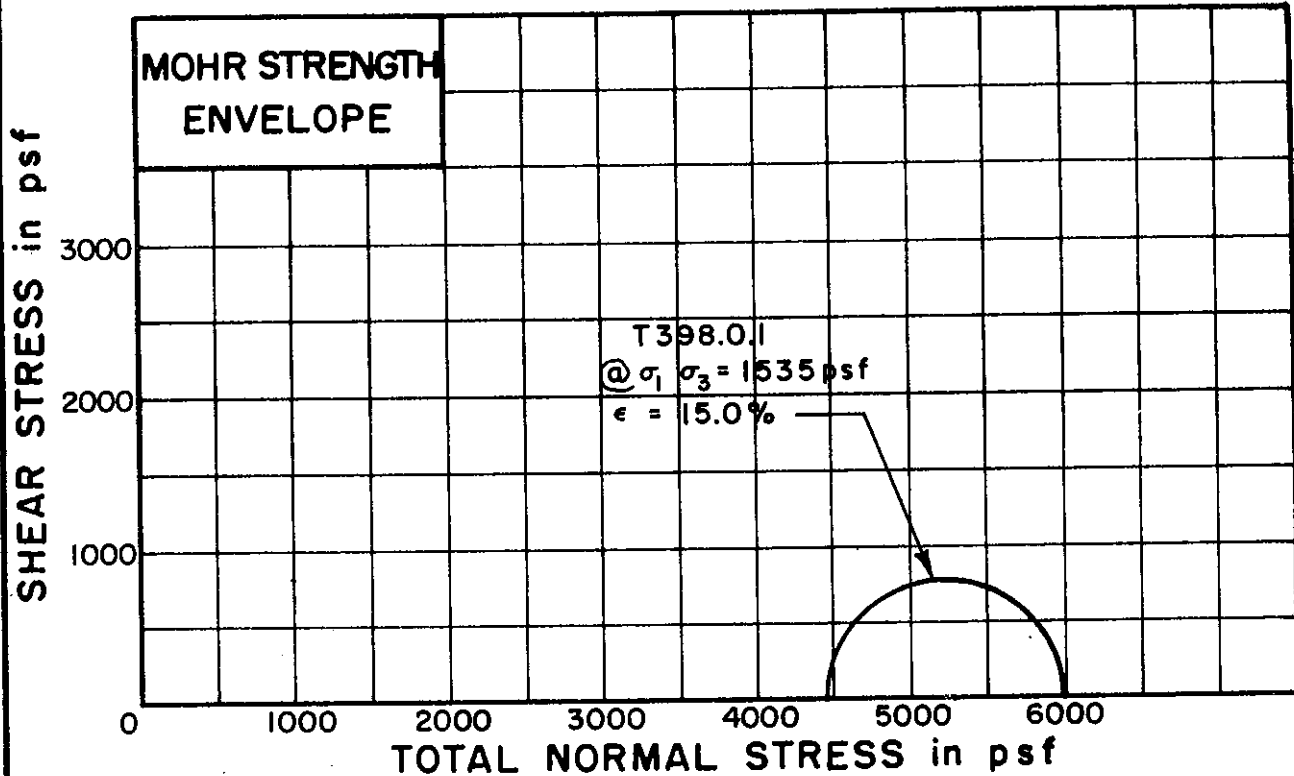
CONFINING PRESSURE psf	$\sigma_3$	4320	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	23.9	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.2' TO 53.5'  
 SOIL DESCRIPTION: CLAYEY SILT (ML-CL)  
 LIQUID LIMIT 21 PLASTIC LIMIT 17

**UNCONSOLIDATED UNDRAINED  
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THE DETROIT EDISON COMPANY  
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TEST NO./SYMBOL	T398.0.1	
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INITIAL WATER CONTENT	$w_o$	25.4%	
DRY DENSITY pcf	$\gamma_d$	99	
SAMPLE DIAMETER in.	$D_o$	1.38	
SAMPLE HEIGHT in.	$H_o$	3.26	

CONFINING PRESSURE psf	$\sigma_3$	4464	
RATE OF STRAIN PERCENT/MINUTE		.25	

FINAL WATER CONTENT	$w_f$	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 5

DEPTH 59.0' TO 59.3'

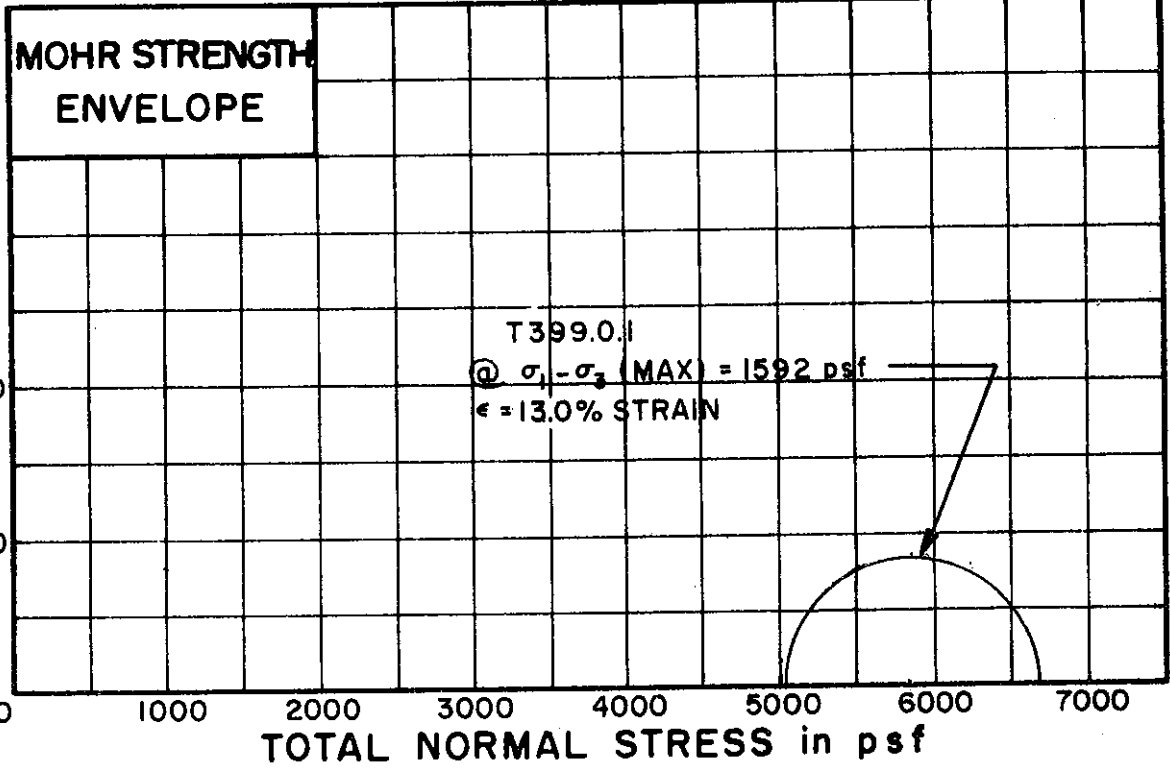
SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 17

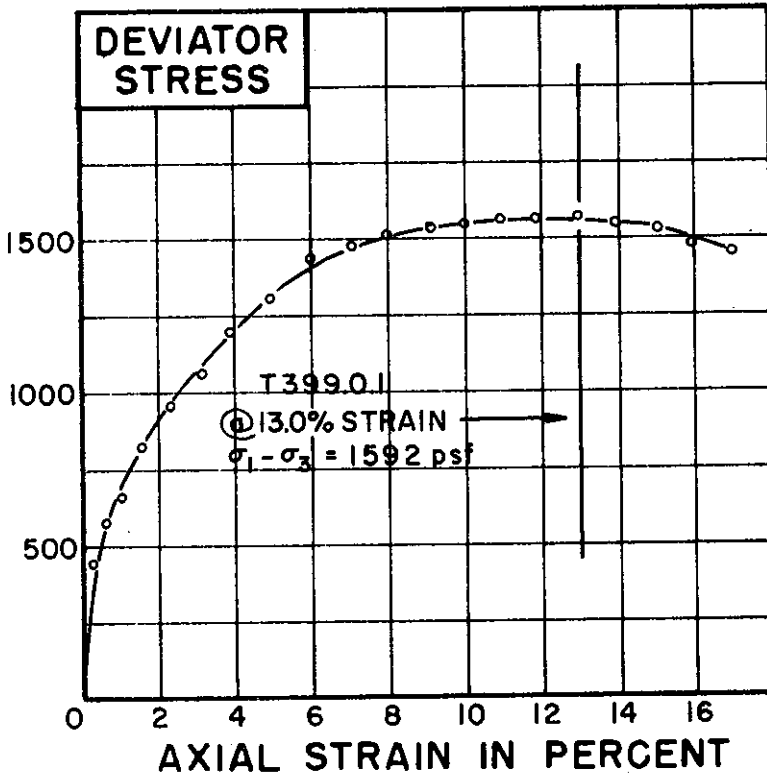
**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
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THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T399.0.1		
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INITIAL WATER CONTENT	w <sub>0</sub>	26.1		
DRY DENSITY pcf	γ <sub>d</sub>	98		
SAMPLE DIAMETER in.	D <sub>0</sub>	1.38		
SAMPLE HEIGHT in.	H <sub>0</sub>	3.33		

CONFINING PRESSURE psf	σ <sub>3</sub>	5040		
RATE OF STRAIN PERCENT/MINUTE		.25		

FINAL WATER CONTENT	w <sub>f</sub>	25.8		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

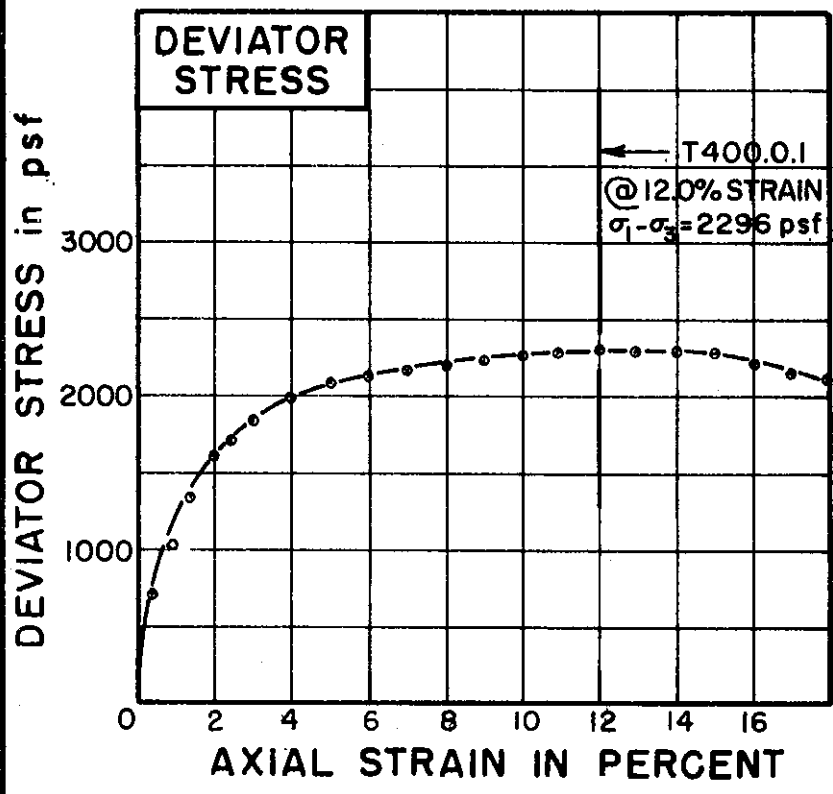
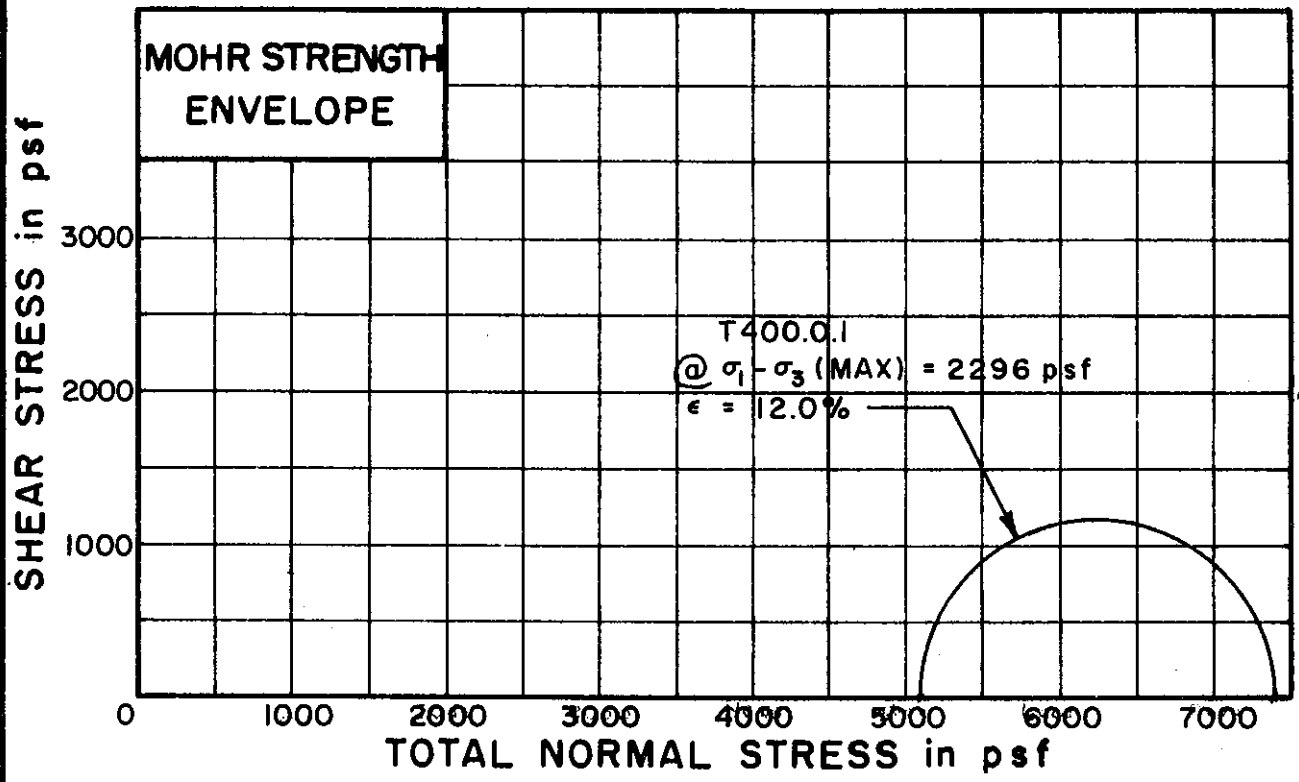
SAMPLE NO. 6

DEPTH 63.1' TO 63.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY  
 LIQUID LIMIT 36 PLASTIC LIMIT 18 (CL)

UNCONSOLIDATED UNDRAINED  
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 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T400.0.		
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INITIAL WATER CONTENT	w <sub>0</sub>	25.9%	
DRY DENSITY pcf	γ <sub>d</sub>	98	
SAMPLE DIAMETER in.	D <sub>0</sub>	1.39	
SAMPLE HEIGHT in.	H <sub>0</sub>	3.25	

CONFINING PRESSURE psf	σ <sub>3</sub>	5112	
RATE OF STRAIN PERCENT/MINUTE		.25	

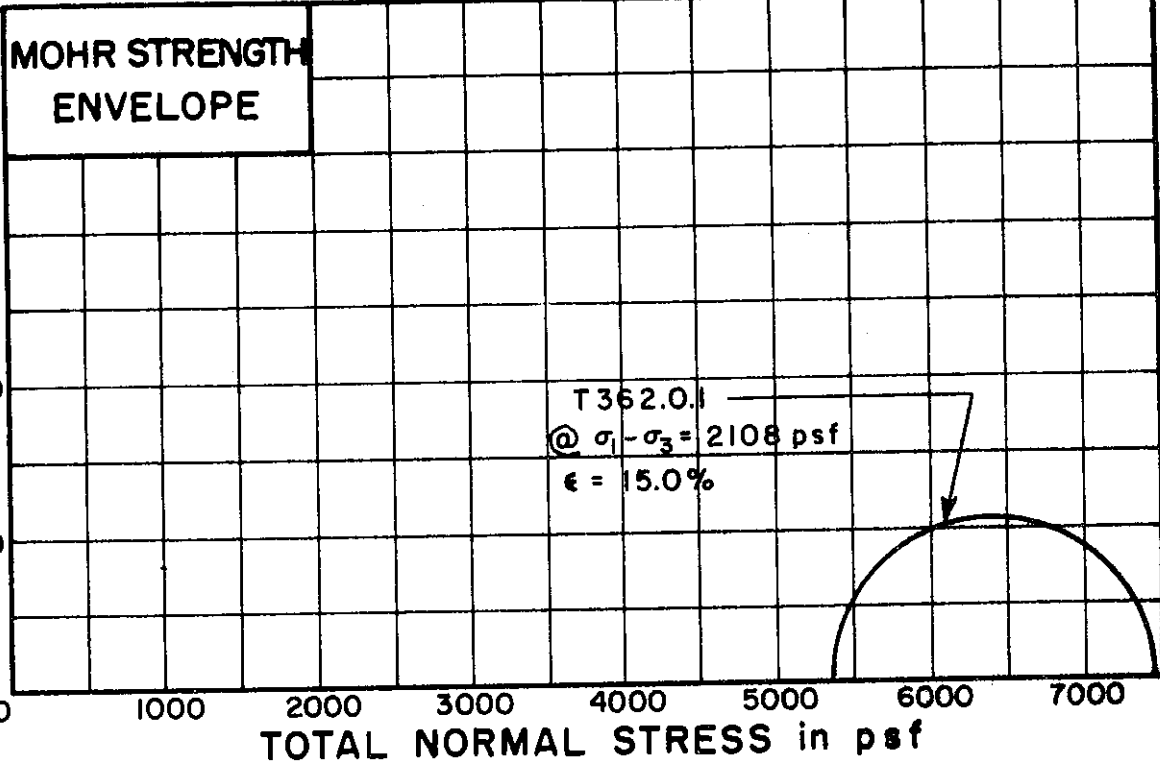
FINAL WATER CONTENT	w <sub>f</sub>	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54  
 SAMPLE NO. 7  
 DEPTH 68.8' TO 69.1'  
 SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 37 PLASTIC LIMIT 18

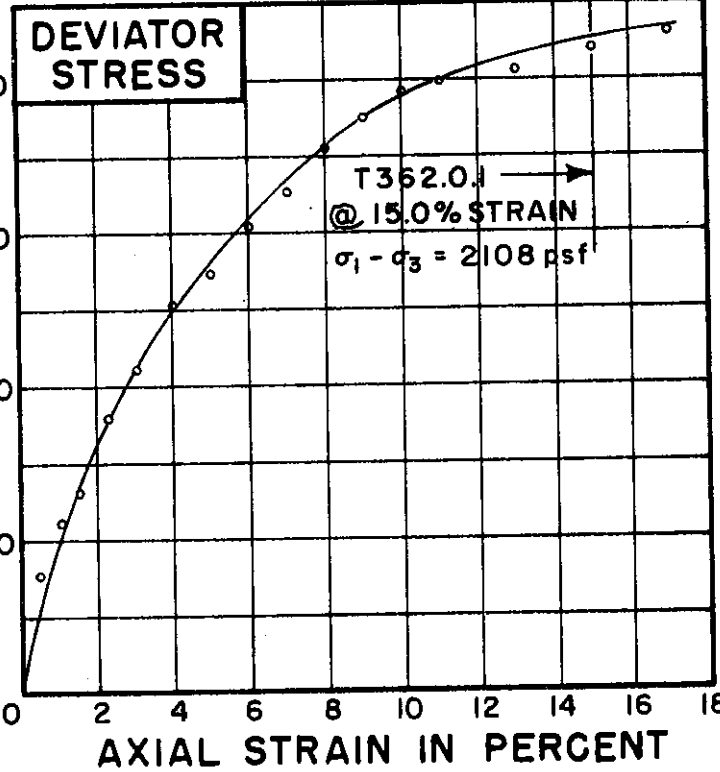
**UNCONSOLIDATED UNDRAINED  
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 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T362.0.1		
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INITIAL WATER CONTENT	w <sub>o</sub>	22.6%	
DRY DENSITY	pcf	γ <sub>d</sub>	105
SAMPLE DIAMETER	in.	D <sub>o</sub>	1.40
SAMPLE HEIGHT	in.	H <sub>o</sub>	3.31

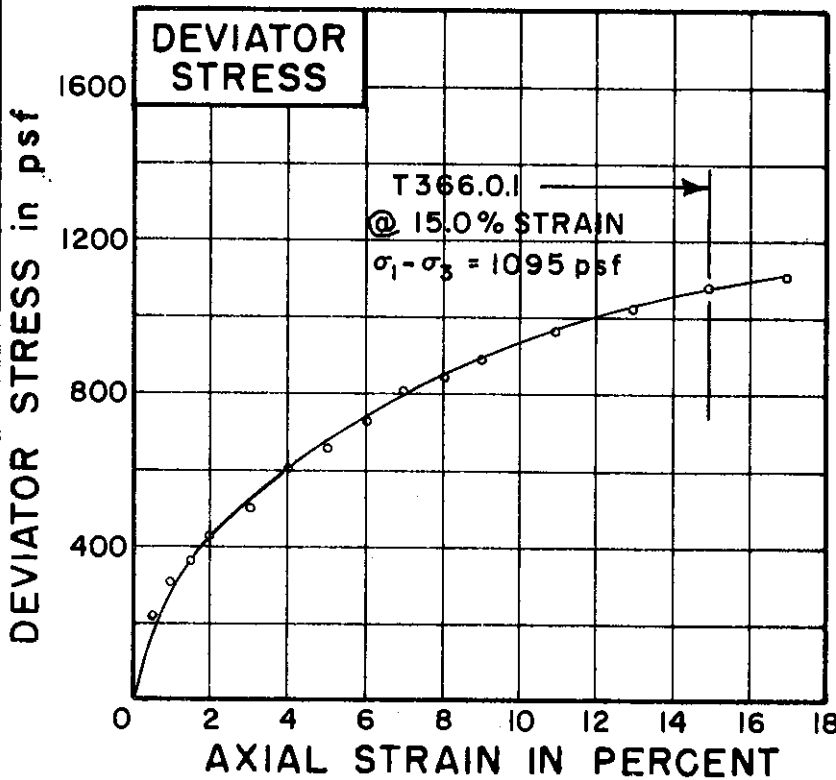
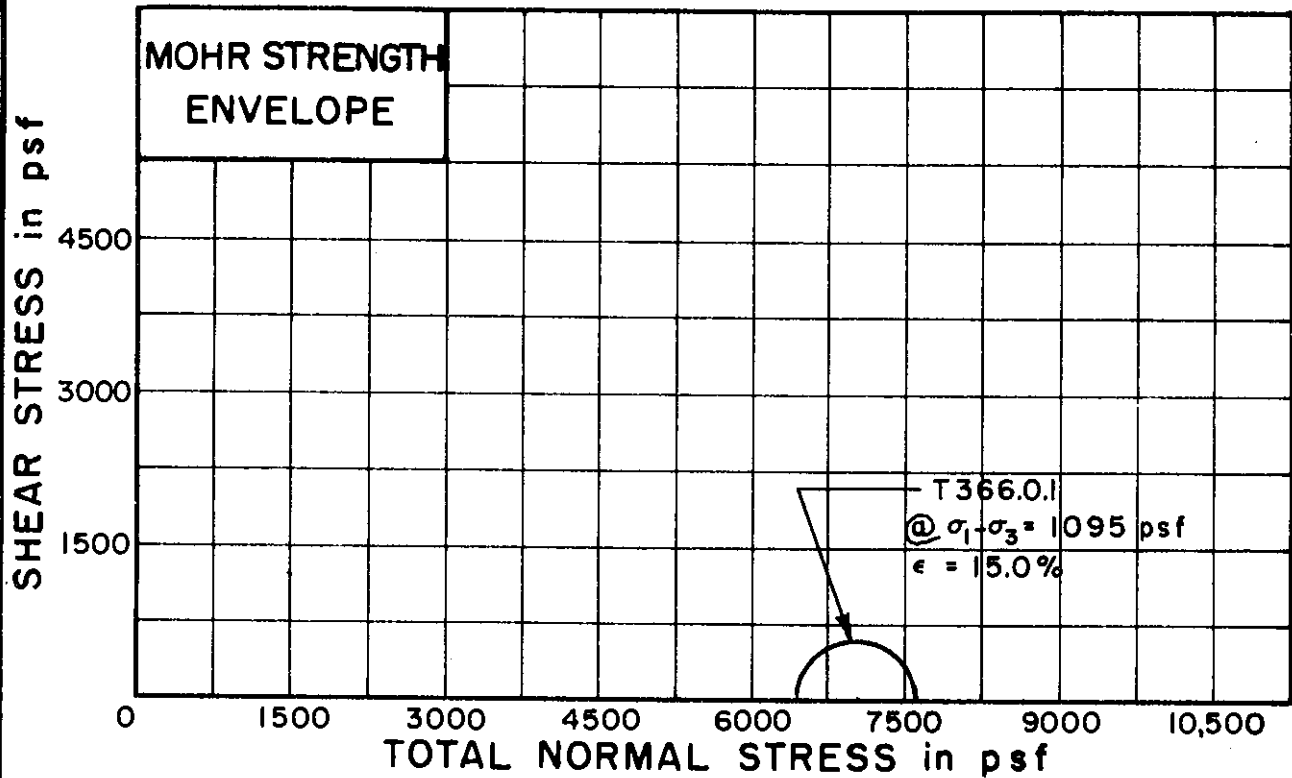
CONFINING PRESSURE	psf	σ <sub>3</sub>	5328
RATE OF STRAIN	PERCENT/MINUTE		0.27

FINAL WATER CONTENT	w <sub>f</sub>	22.6%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 15  
 DEPTH 74.6' TO 74.9'  
 SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
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TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T366.0.1		
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INITIAL WATER CONTENT	$w_0$	24.5%	
DRY DENSITY pcf	$\gamma_d$	100	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.27	

CONFINING PRESSURE psf	$\sigma_3$	6480	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_1$	24.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 19

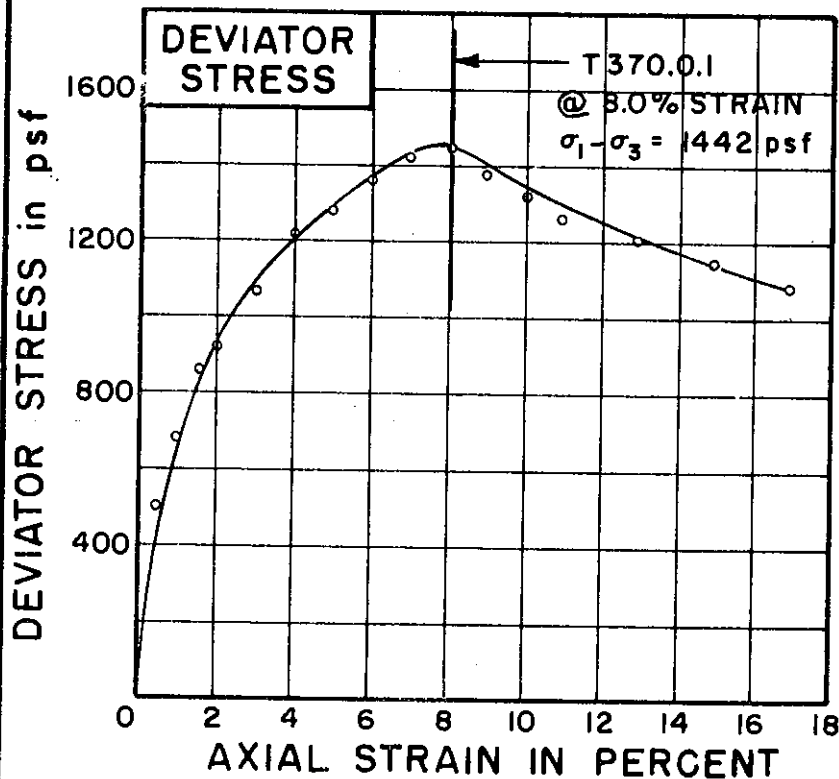
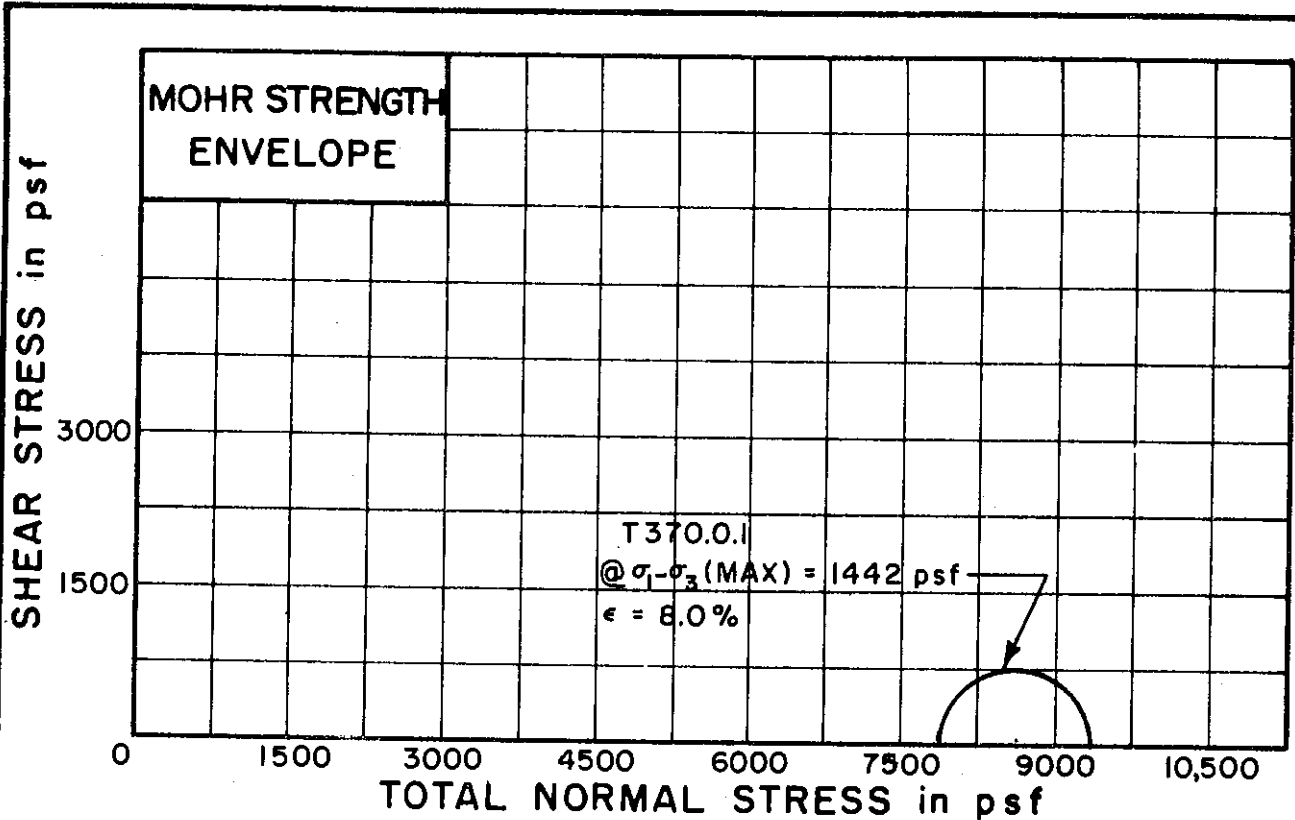
DEPTH 94.9' TO 95.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

**UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T370.0.1		
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INITIAL WATER CONTENT	$w_0$	37.2%	
DRY DENSITY $\rho_{cf}$	$\gamma_d$	85	
SAMPLE DIAMETER, in.	$D_0$	1.40	
SAMPLE HEIGHT, in.	$H_0$	3.23	

CONFINING PRESSURE $\rho_{cf}$	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.27	

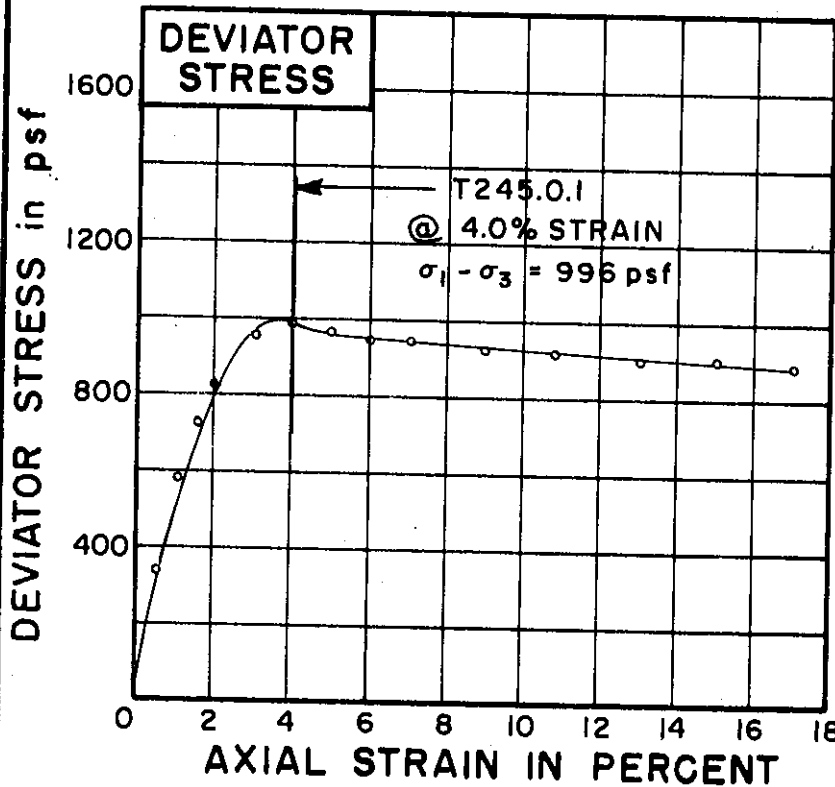
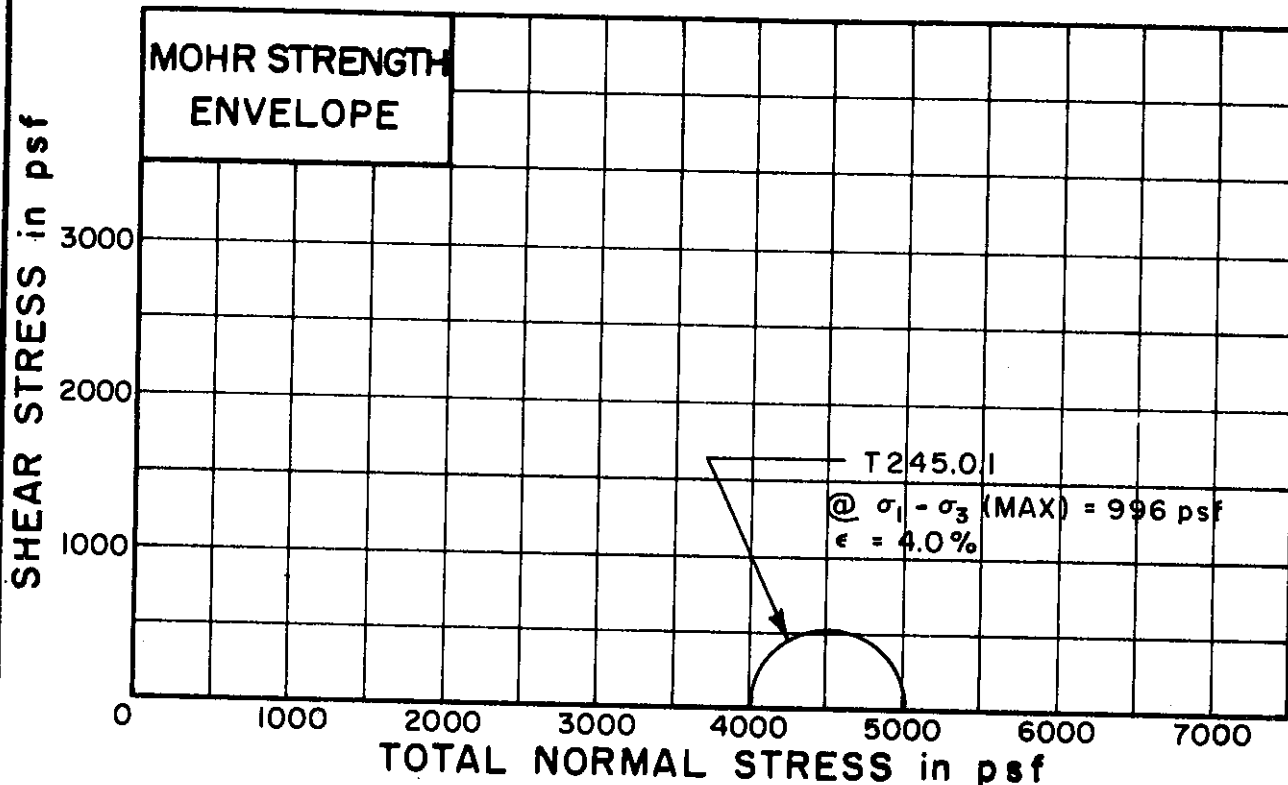
FINAL WATER CONTENT	$w_f$	36.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101  
 SAMPLE NO. 23  
 DEPTH 119.8' TO 120.2'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 22

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





TEST NO./SYMBOL	T245.0.1		
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INITIAL WATER CONTENT	$w_0$	41.1%	
DRY DENSITY psf	$\gamma_d$	81	
SAMPLE DIAMETER in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.25	

CONFINING PRESSURE psf	$\sigma_3$	4032	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	40.9%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126

SAMPLE NO. 11

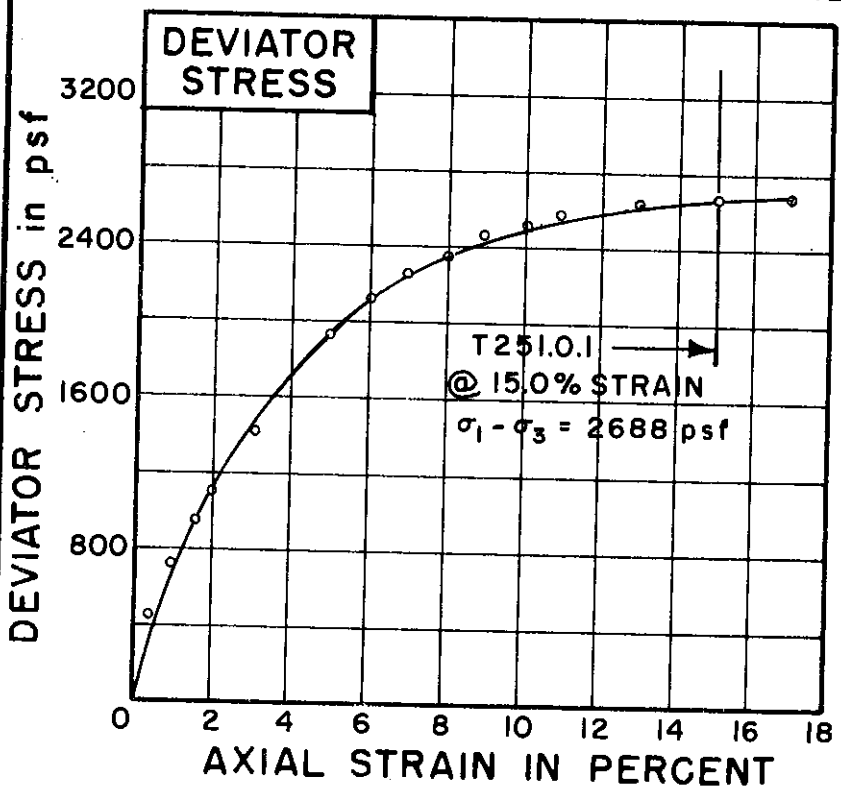
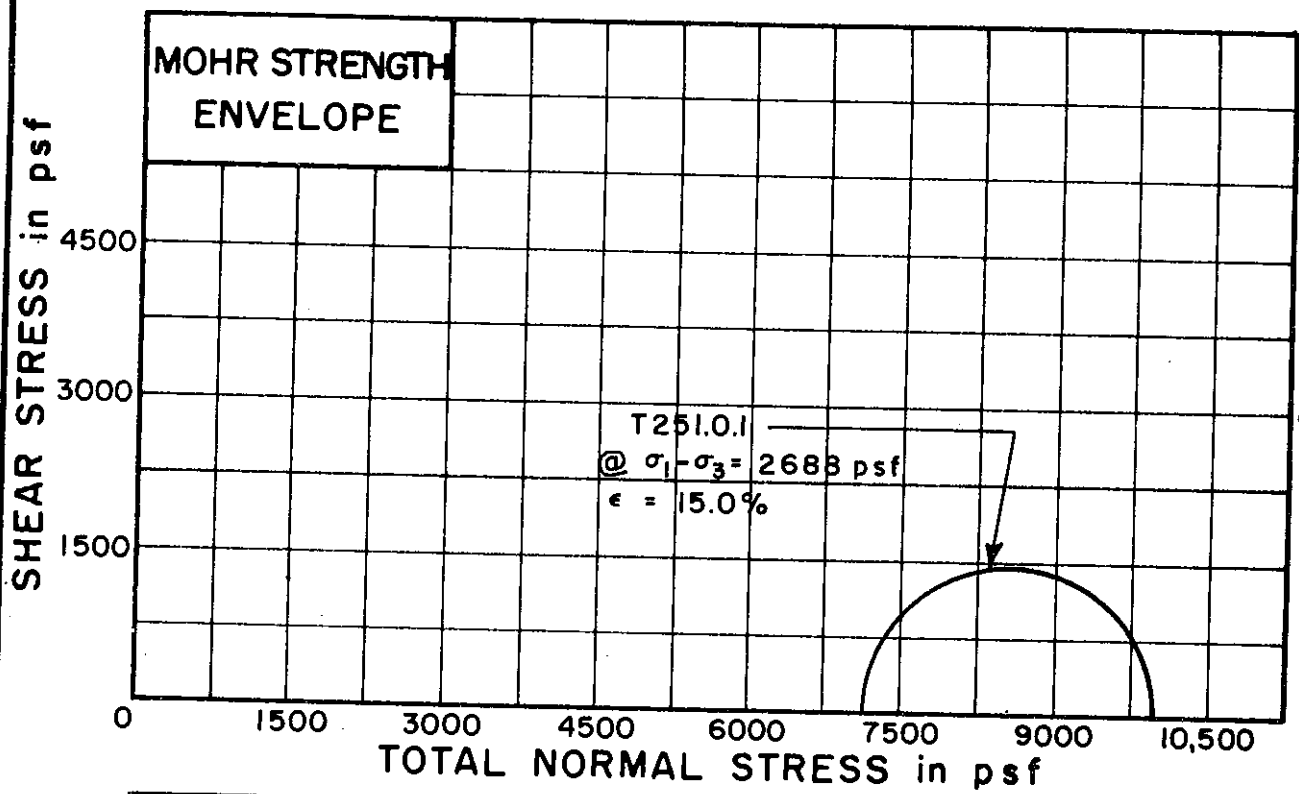
DEPTH 49.1' TO 49.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 59 PLASTIC LIMIT 25

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T251.0.1		
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INITIAL WATER CONTENT	$w_0$	25.3%	
DRY DENSITY pcf	$\gamma_d$	96	
SAMPLE DIAMETER in.	$D_0$	1.40	
SAMPLE HEIGHT in.	$H_0$	3.33	

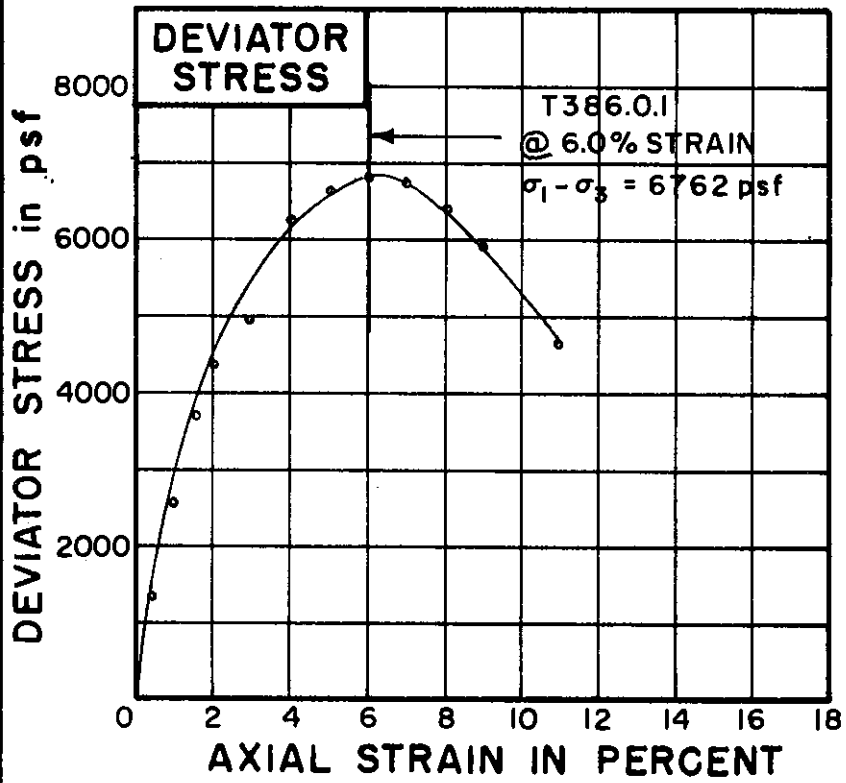
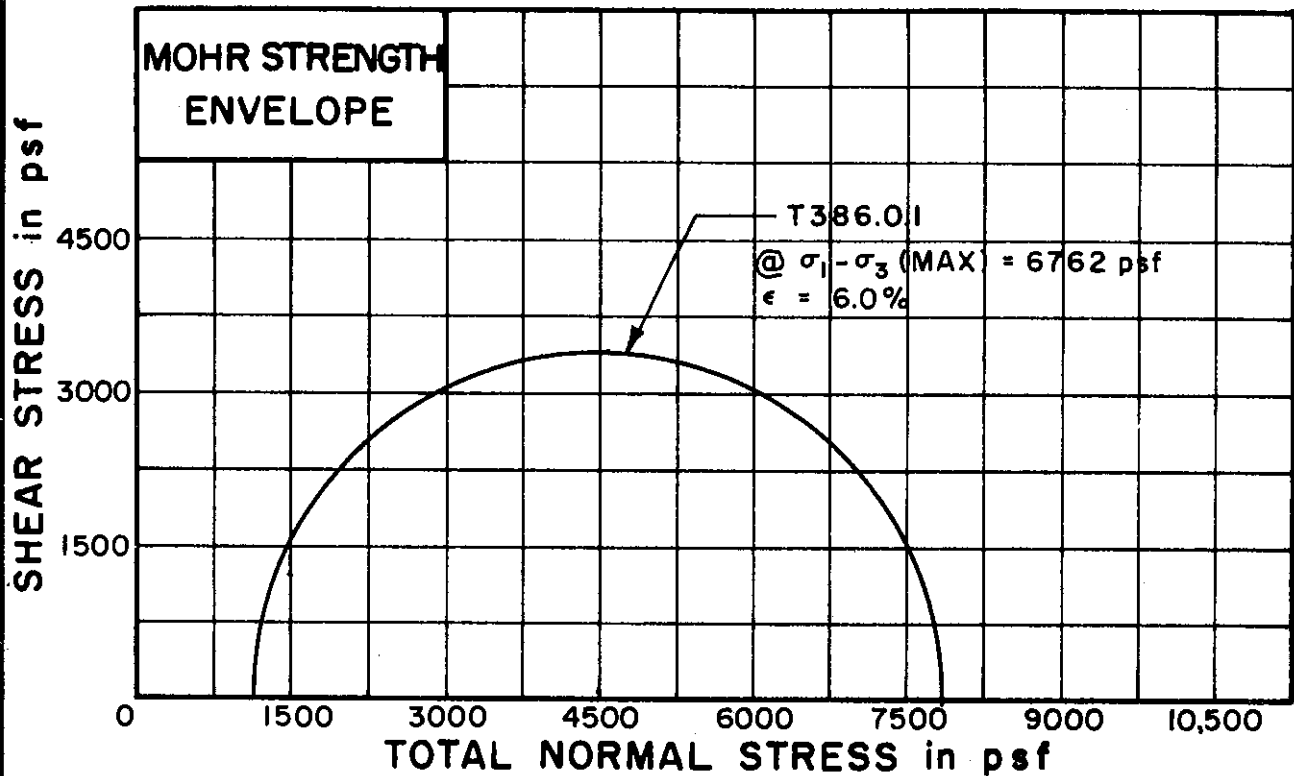
CONFINING PRESSURE psf	$\sigma_3$	7200	
RATE OF STRAIN PERCENT/MINUTE		0.27	


FINAL WATER CONTENT	$w_f$	25.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126  
 SAMPLE NO. 23  
 DEPTH 108.6' TO 108.9'  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
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 TESTS

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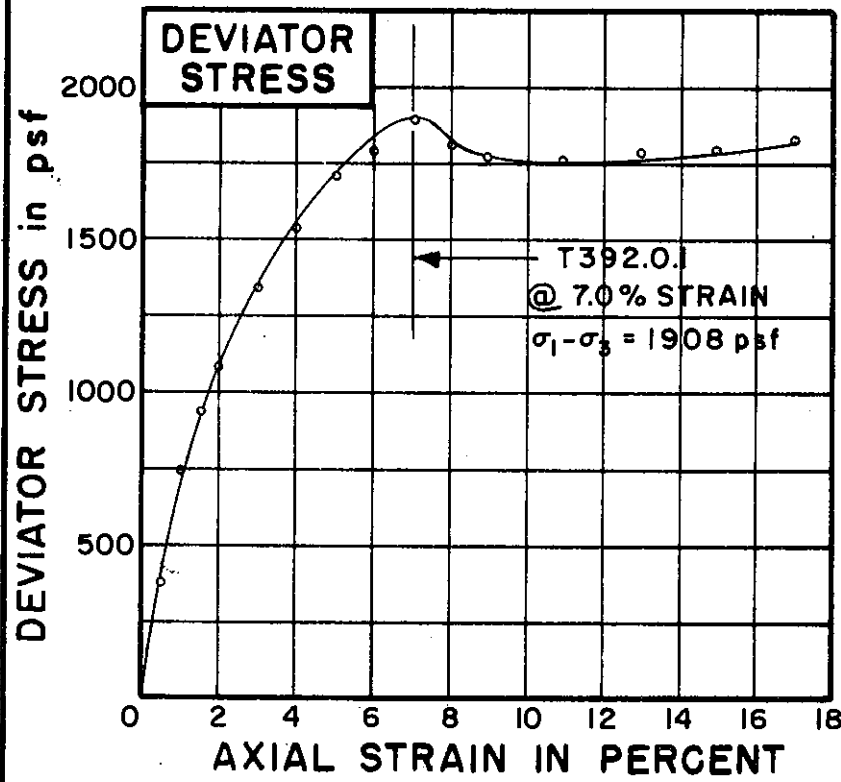
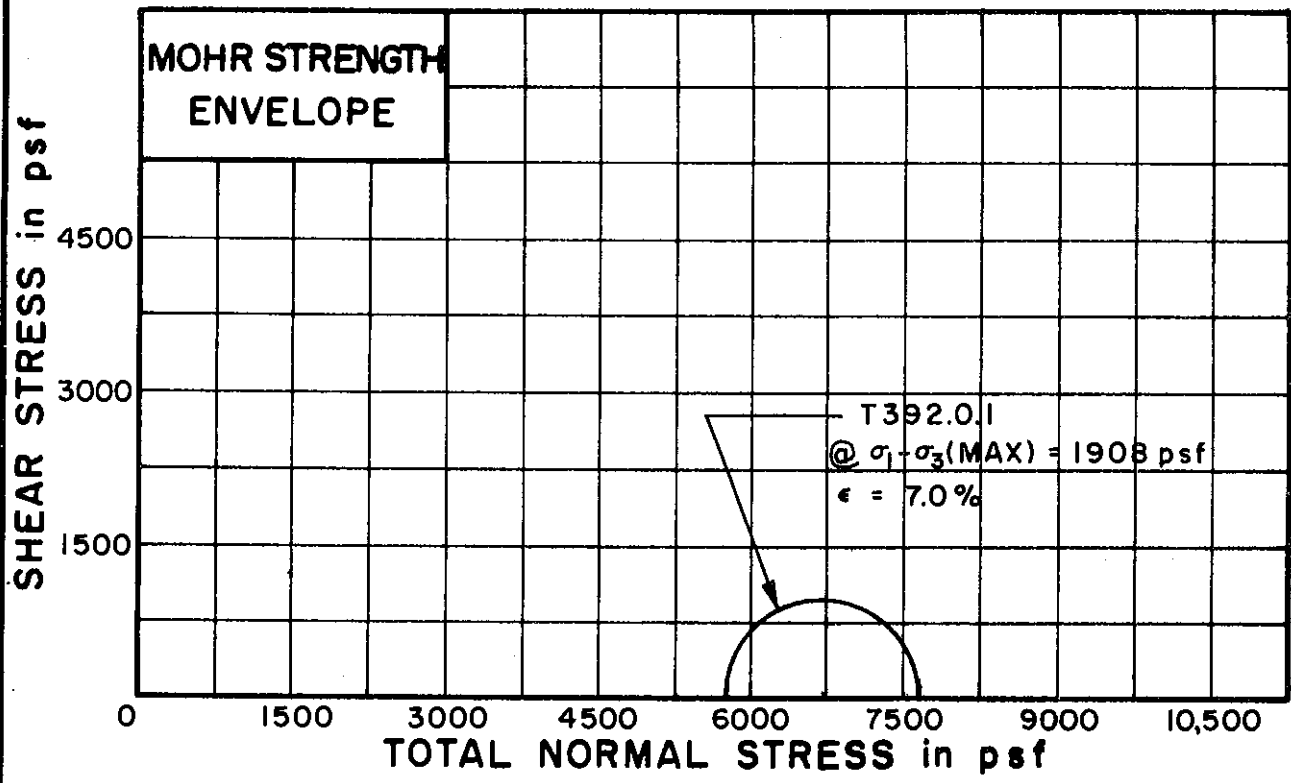


TEST NO./SYMBOL	T386.0.1		
INITIAL WATER CONTENT	$w_0$ 22.3%		
DRY DENSITY pcf	$\gamma_d$ 108		
SAMPLE DIAMETER in.	$D_0$ 1.45		
SAMPLE HEIGHT in.	$H_0$ 3.50		
CONFINING PRESSURE psf	$\sigma_3$ 1080		
RATE OF STRAIN PERCENT/MINUTE	0.26		
FINAL WATER CONTENT	$w_f$ 22.2%		
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129  
 SAMPLE NO. 3  
 DEPTH 8.7' TO 9.0'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 48 PLASTIC LIMIT 23

**UNCONSOLIDATED UNDRAINED  
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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T392.0.1		
INITIAL WATER CONTENT	w <sub>o</sub> 24.8%		
DRY DENSITY pcf	γ <sub>d</sub> 101		
SAMPLE DIAMETER in.	D <sub>o</sub> 1.41		
SAMPLE HEIGHT in.	H <sub>o</sub> 3.35		
CONFINING PRESSURE psf	σ <sub>3</sub> 5760		
RATE OF STRAIN PERCENT/MINUTE	0.27		
FINAL WATER CONTENT	w <sub>f</sub> 24.6%		
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129

SAMPLE NO. 15

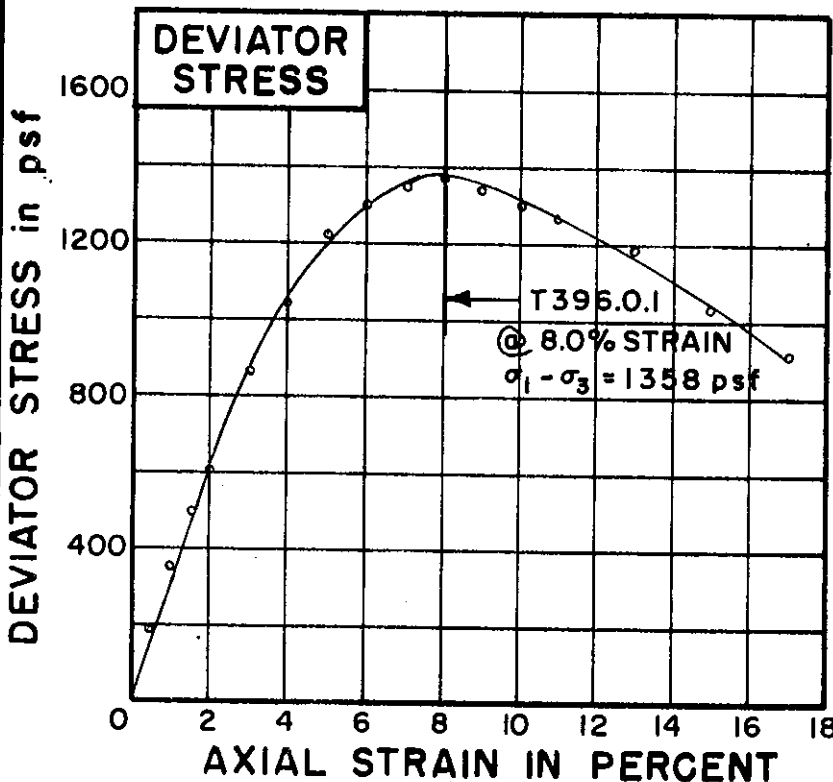
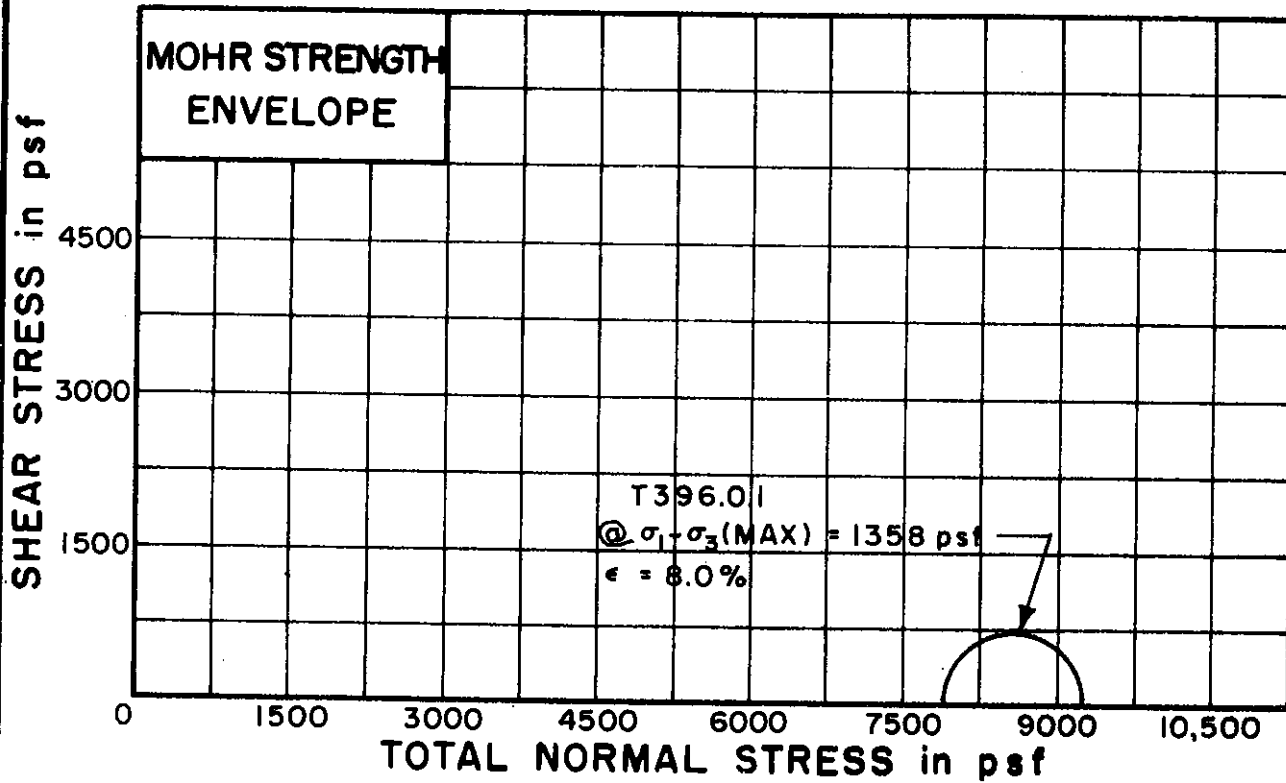
DEPTH 74.0' TO 74.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 21

**UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO./SYMBOL	T396.01		
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INITIAL WATER CONTENT	$w_0$	30.6%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER, in.	$D_0$	1.41	
SAMPLE HEIGHT in.	$H_0$	3.20	

CONFINING PRESSURE psf	$\sigma_3$	7920	
RATE OF STRAIN PERCENT/MINUTE		0.28	

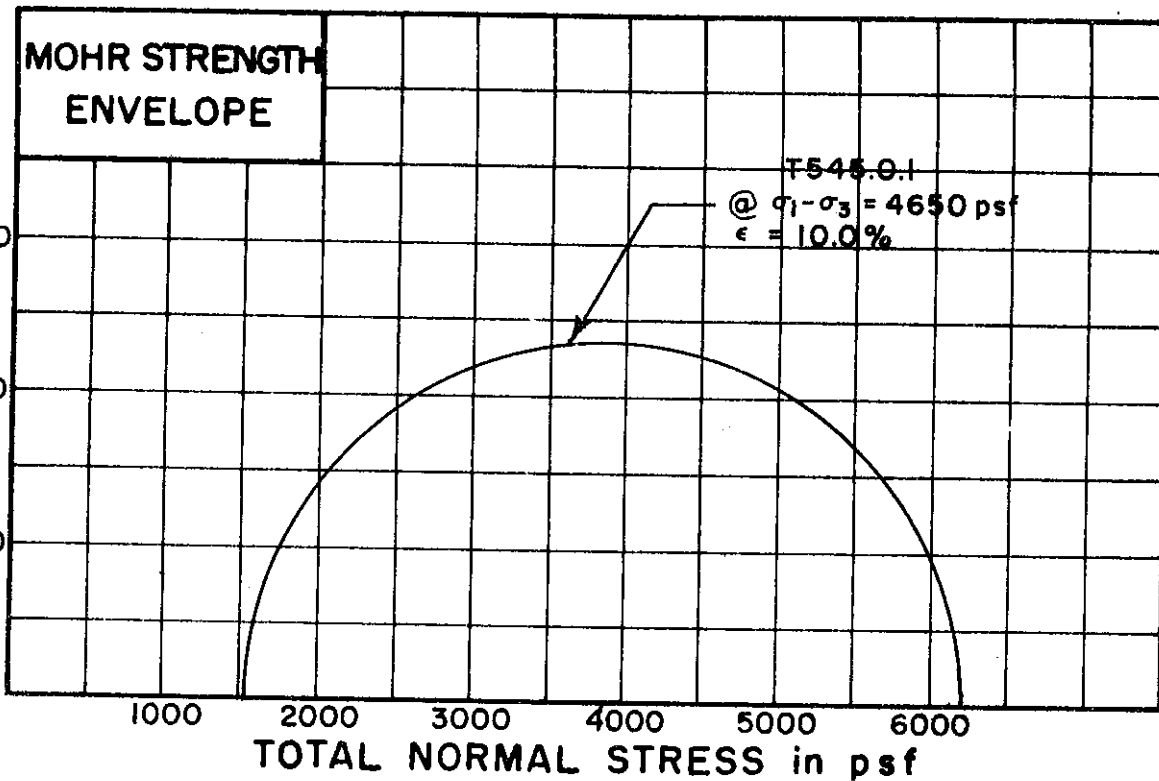
FINAL WATER CONTENT	$w_f$	30.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 129  
 SAMPLE NO. 24  
 DEPTH 124.1' TO 124.4'  
 SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

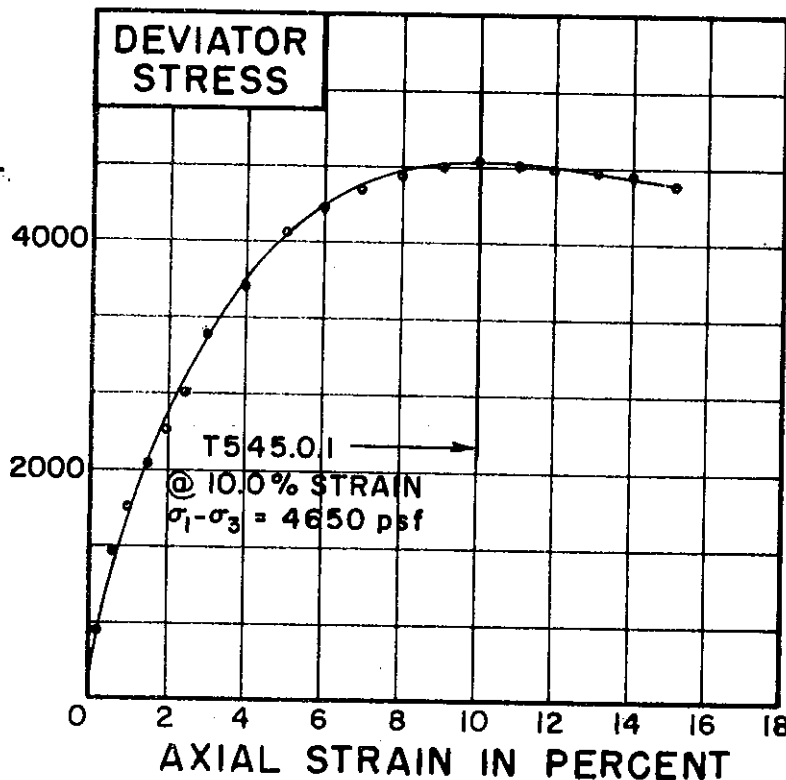
UNCONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS in psf



DEVIATOR STRESS in psf



TEST NO./SYMBOL	T545.0.1		
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INITIAL WATER CONTENT	$w_o$	28.3%	
DRY DENSITY pcf	$\gamma_d$	95	
SAMPLE DIAMETER in.	$D_o$	1.41	
SAMPLE HEIGHT in.	$H_o$	3.32	

CONFINING PRESSURE psf	$\sigma_3$	1555	
RATE OF STRAIN PERCENT/MINUTE		0.27	

FINAL WATER CONTENT	$w_f$	28.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 151A

SAMPLE NO. 3

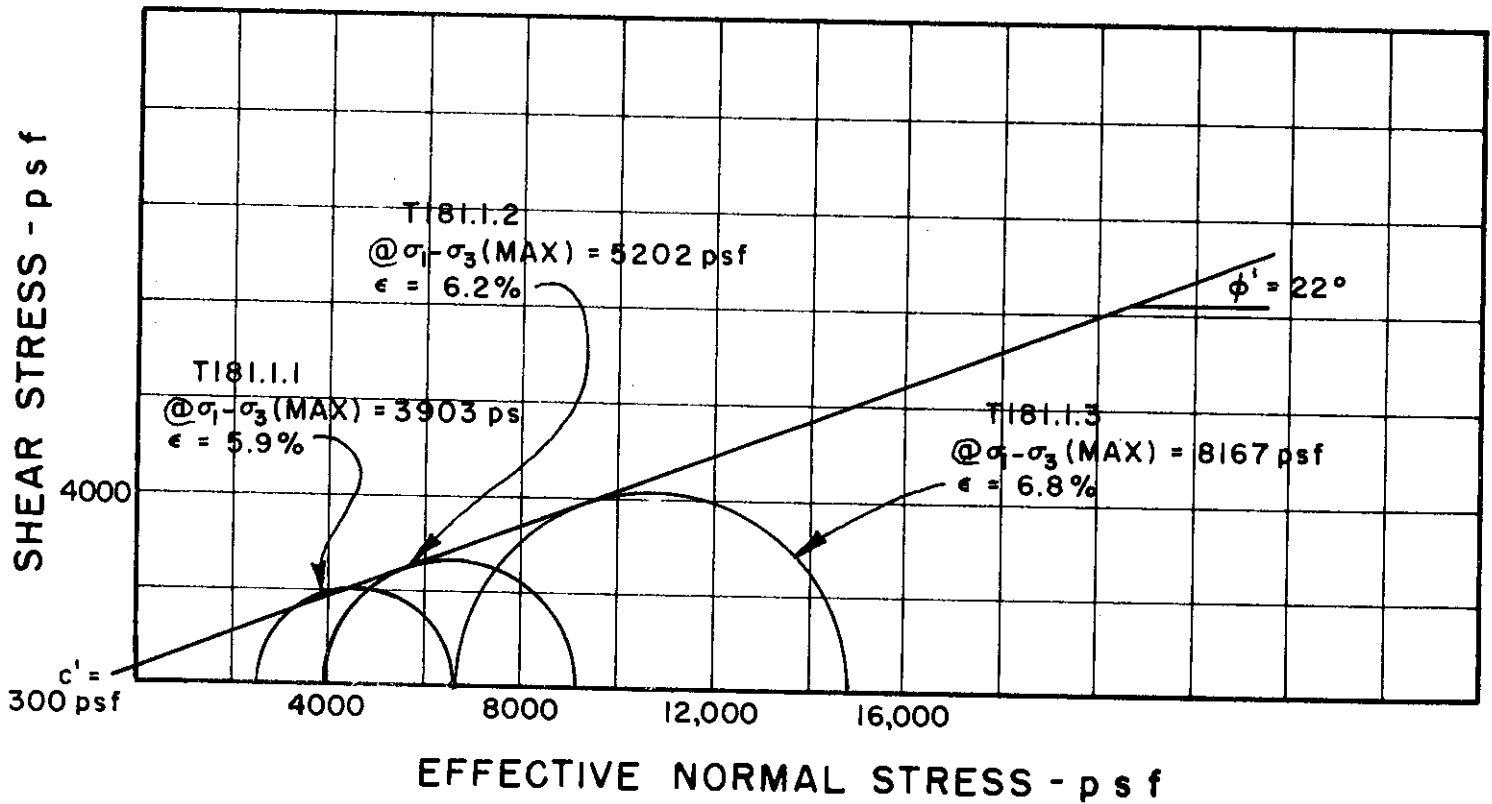
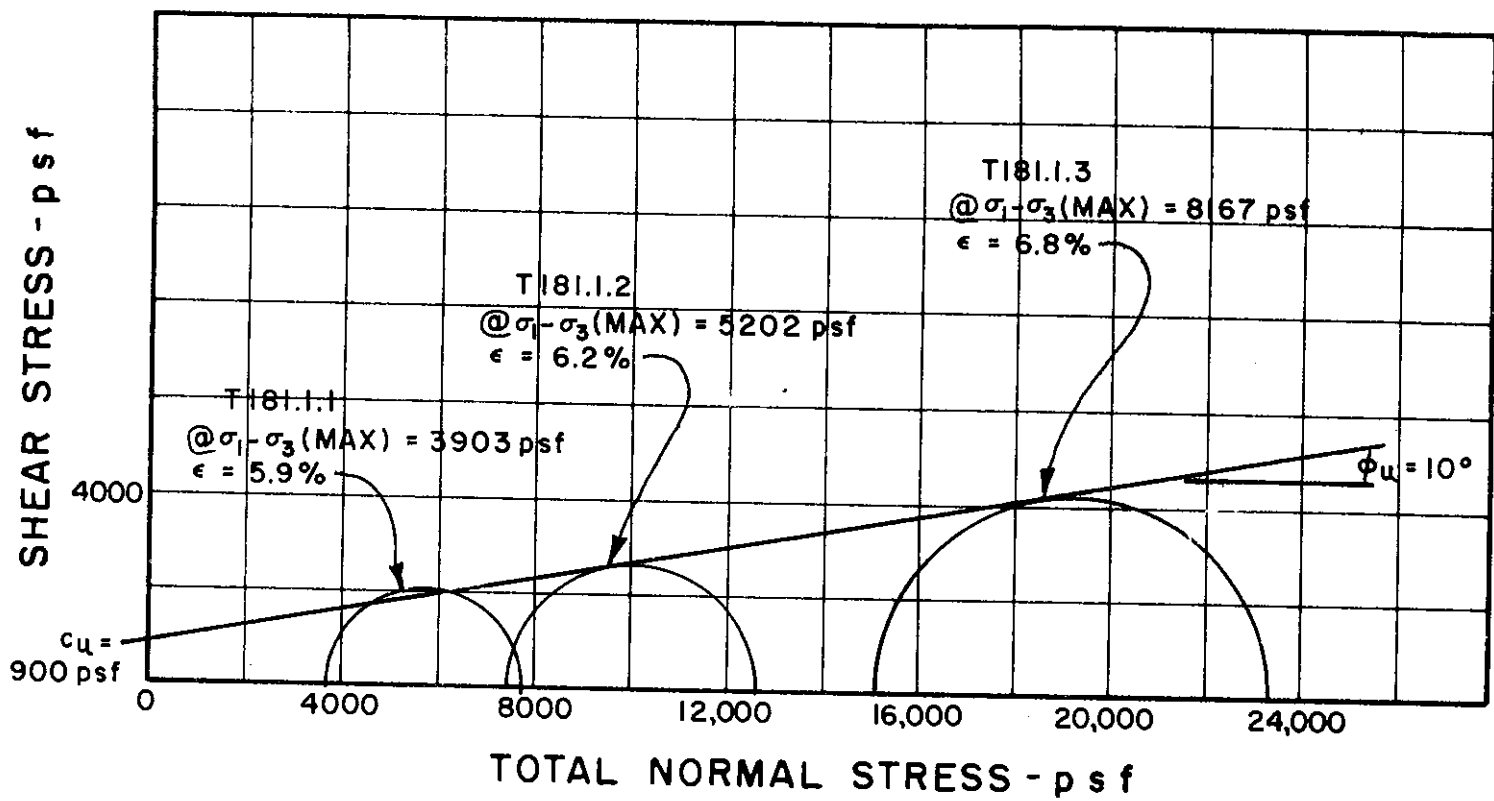
DEPTH 13.0' TO 13.3'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 18

SAMPLE NO. 12

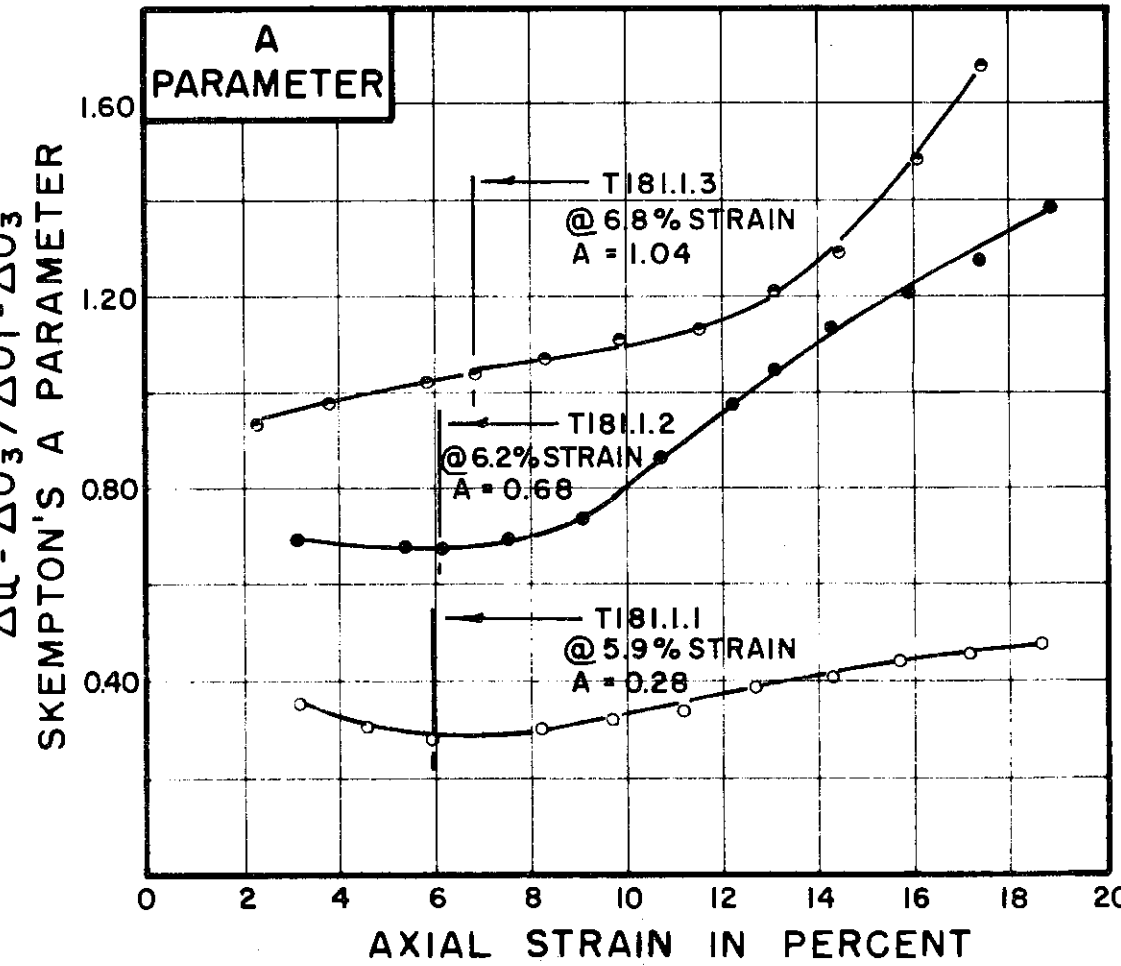
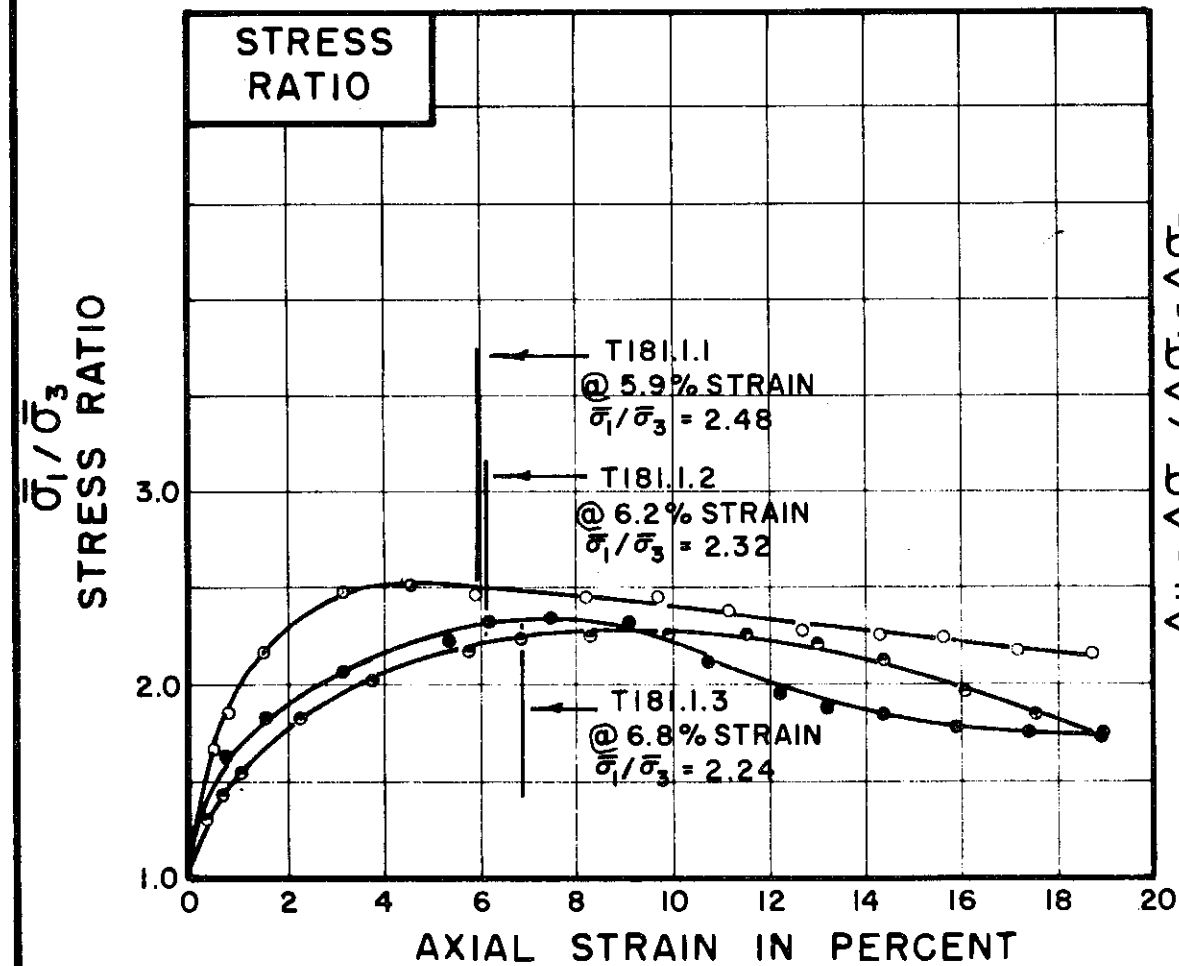
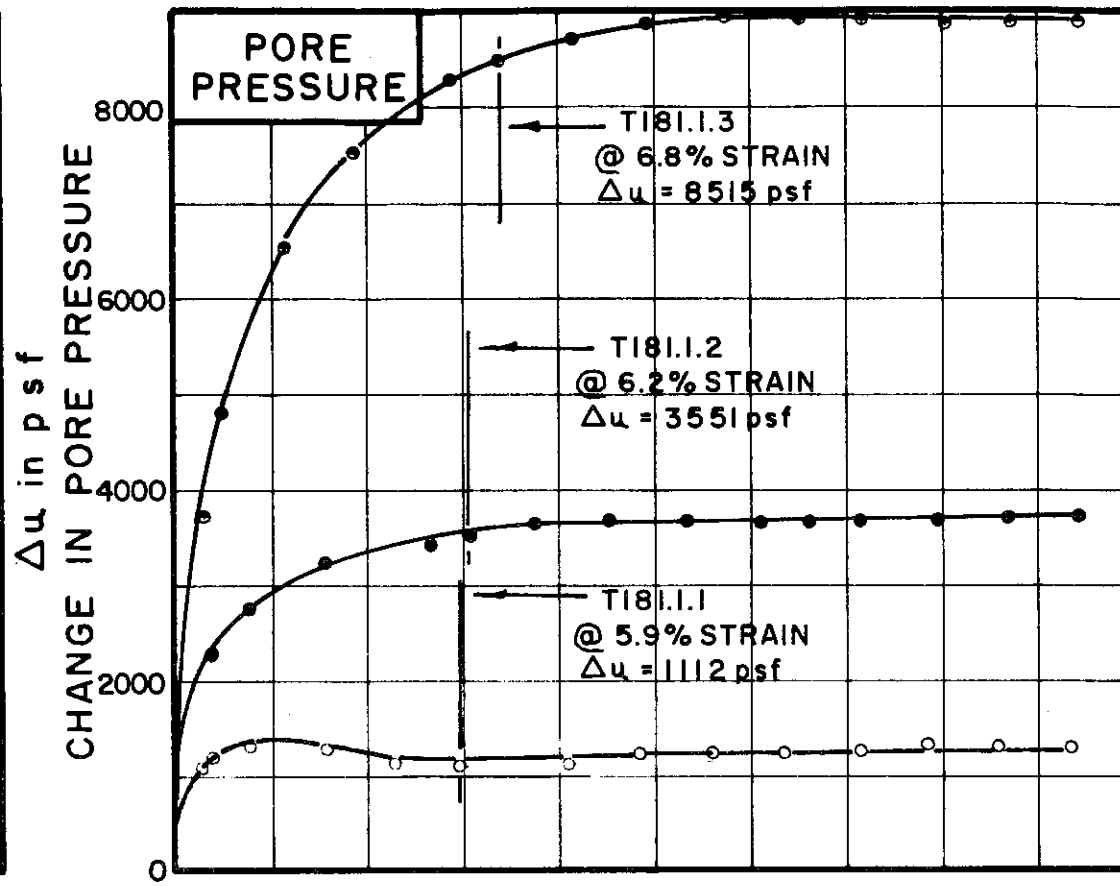
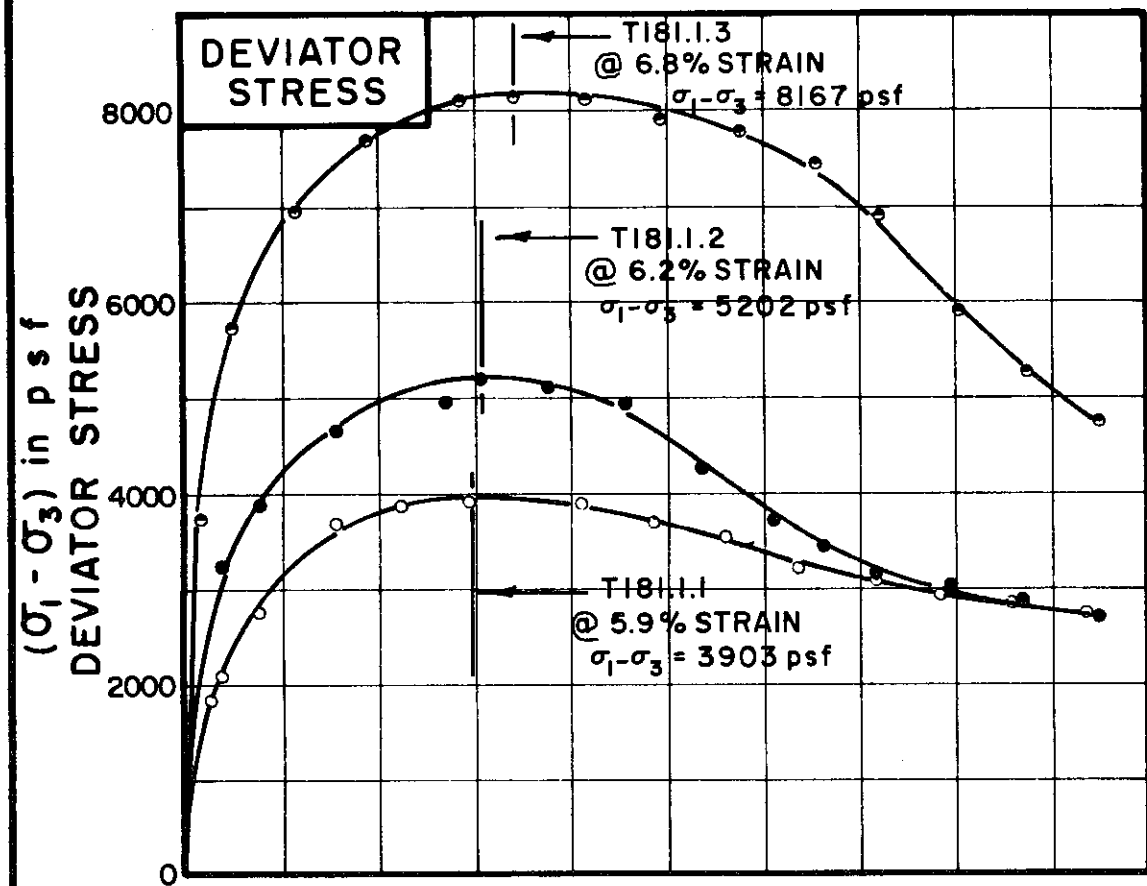
DEPTH 108.0' TO 110.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



TEST NO. / SYMBOL	T181.1.1	T181.1.2	T181.1.3
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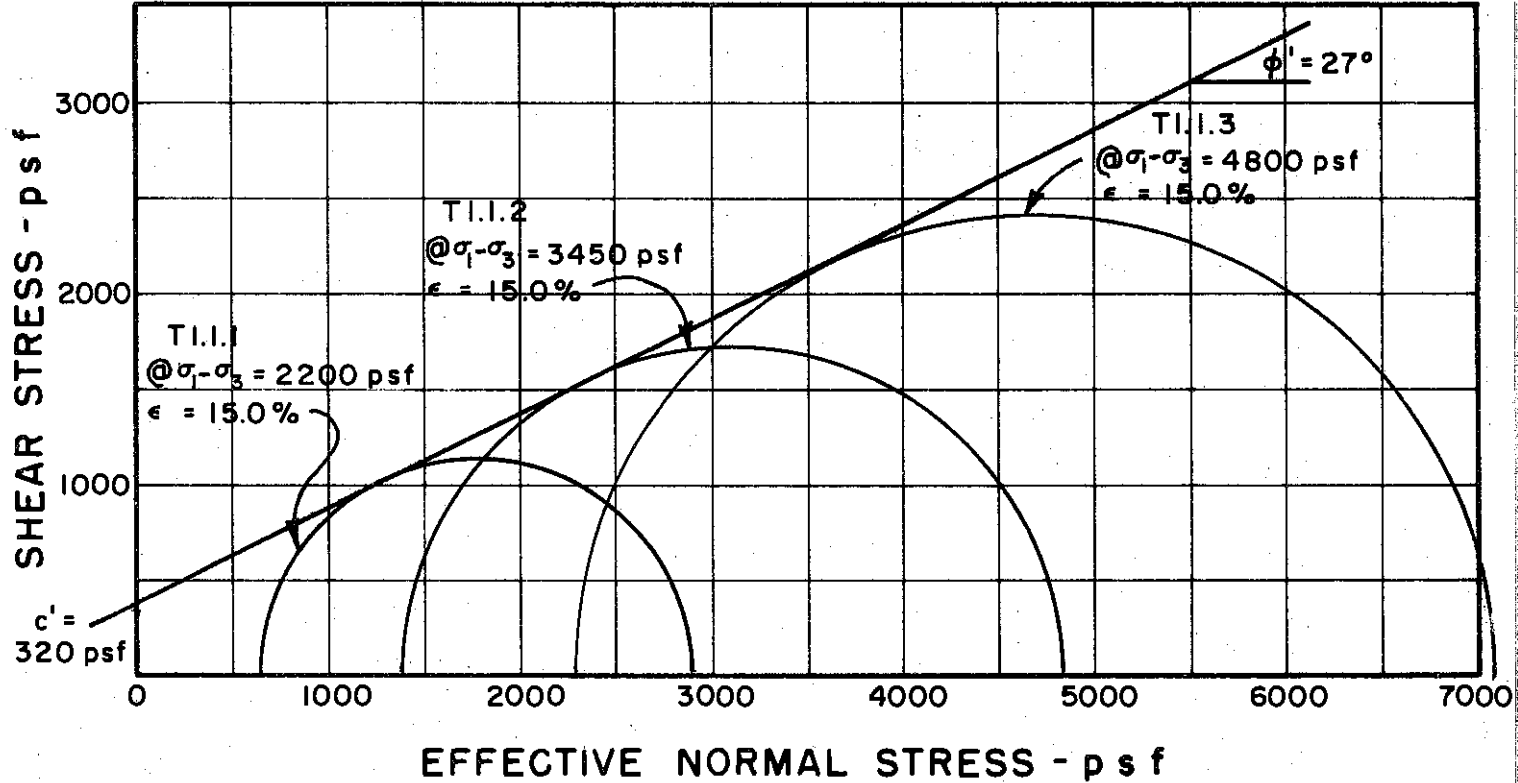
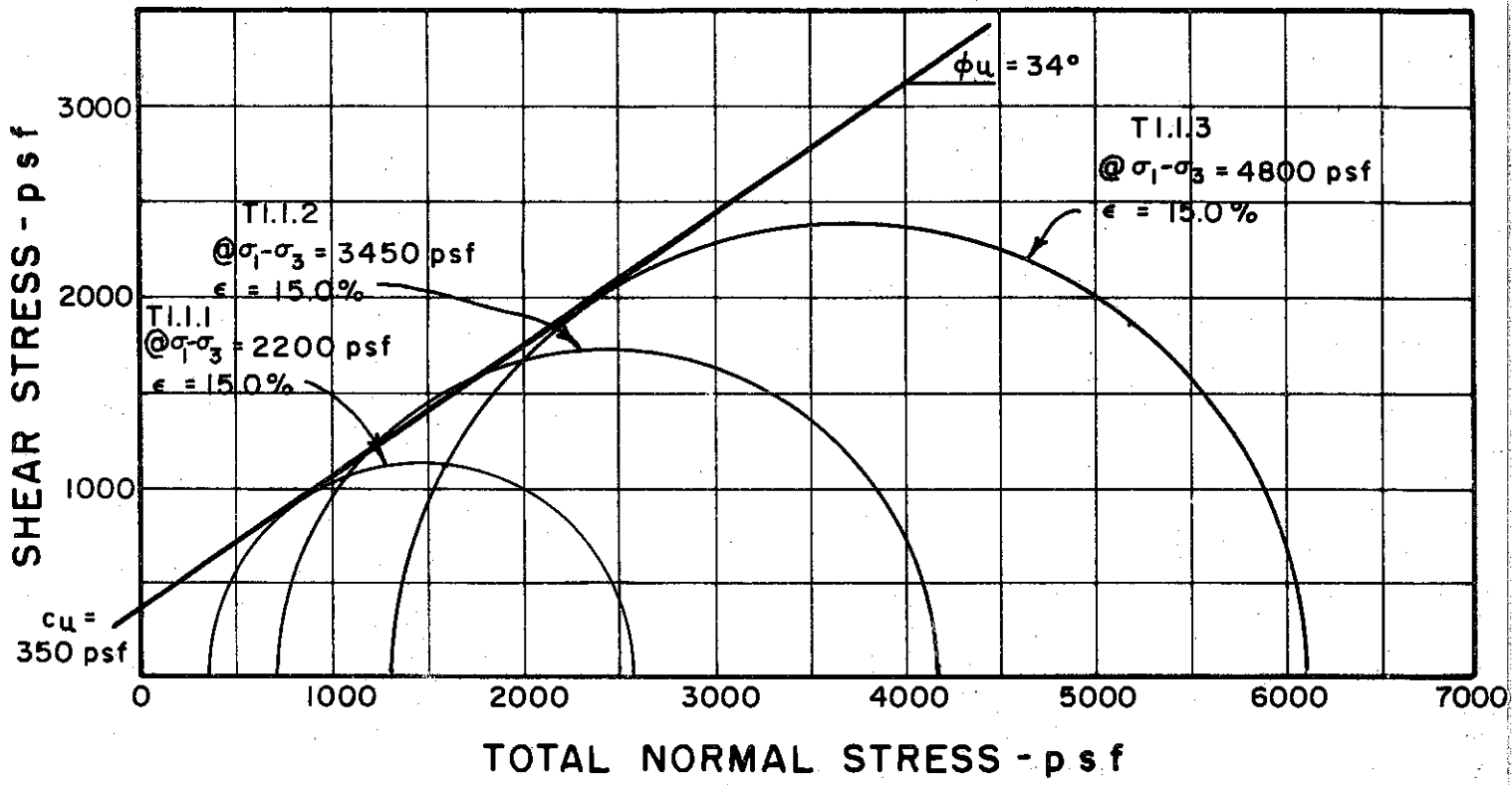
INITIAL CONDITIONS	WATER CONTENT	$w_0$	34.5%	31.0%	30.7%
	DRY DENSITY	$\gamma_d$	87	92	92
	lb/cu ft				
CONDITIONS BEFORE SHEAR	SAMPLE DIAMETER	$D_0$	1.40	1.39	1.37
	in.				
	SAMPLE HEIGHT	$H_0$	3.37	3.35	3.37
FINAL CONDITIONS	FINAL BACK PRESSURE	$u_0$	10080	7200	6480
	psf				
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	3744	7488	15120
CONDITIONS AT END OF TEST	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.32%	4.19%	6.61%
	PORE PRESSURE RESPONSE		95%	97%	93%
	WATER CONTENT	$w_f$	33.7%	29.3%	27.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 18  
SAMPLE NO. 12  
DEPTH 108.0' TO 110.0'  
SOIL DESCRIPTION SILTY CLAY (CL)  
LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255



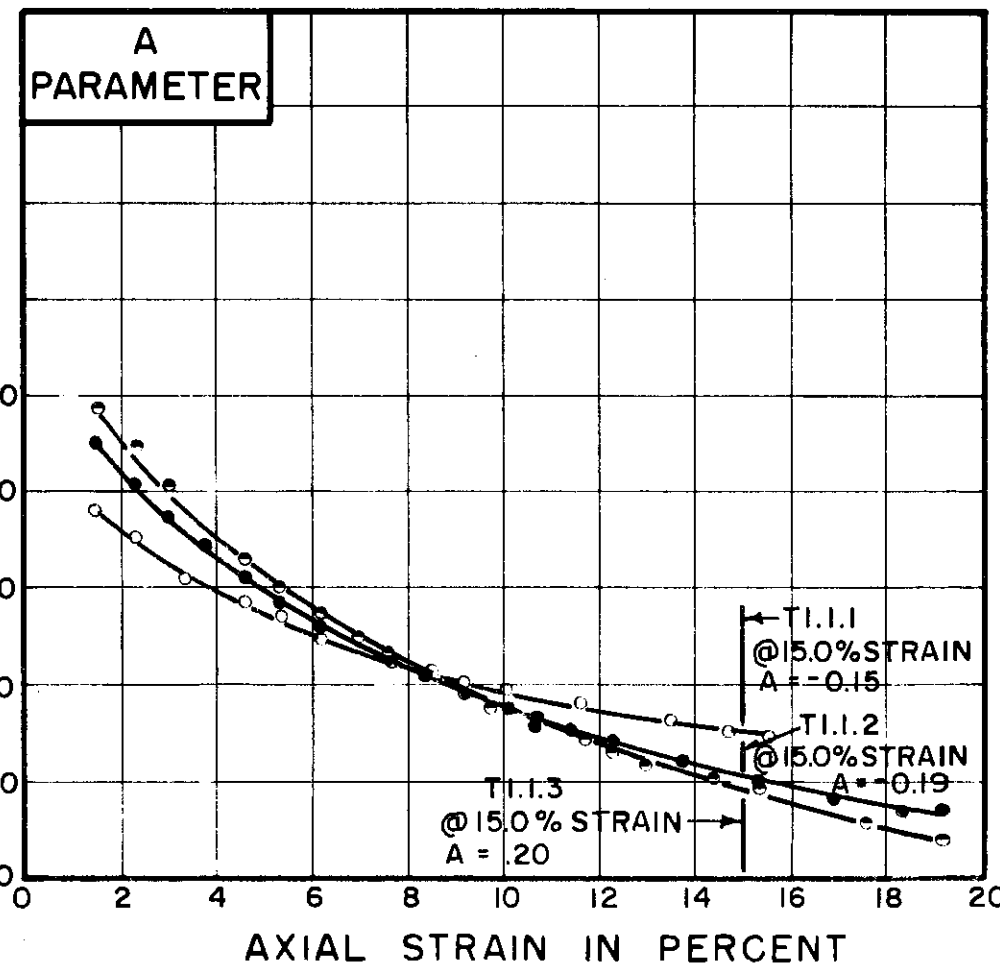
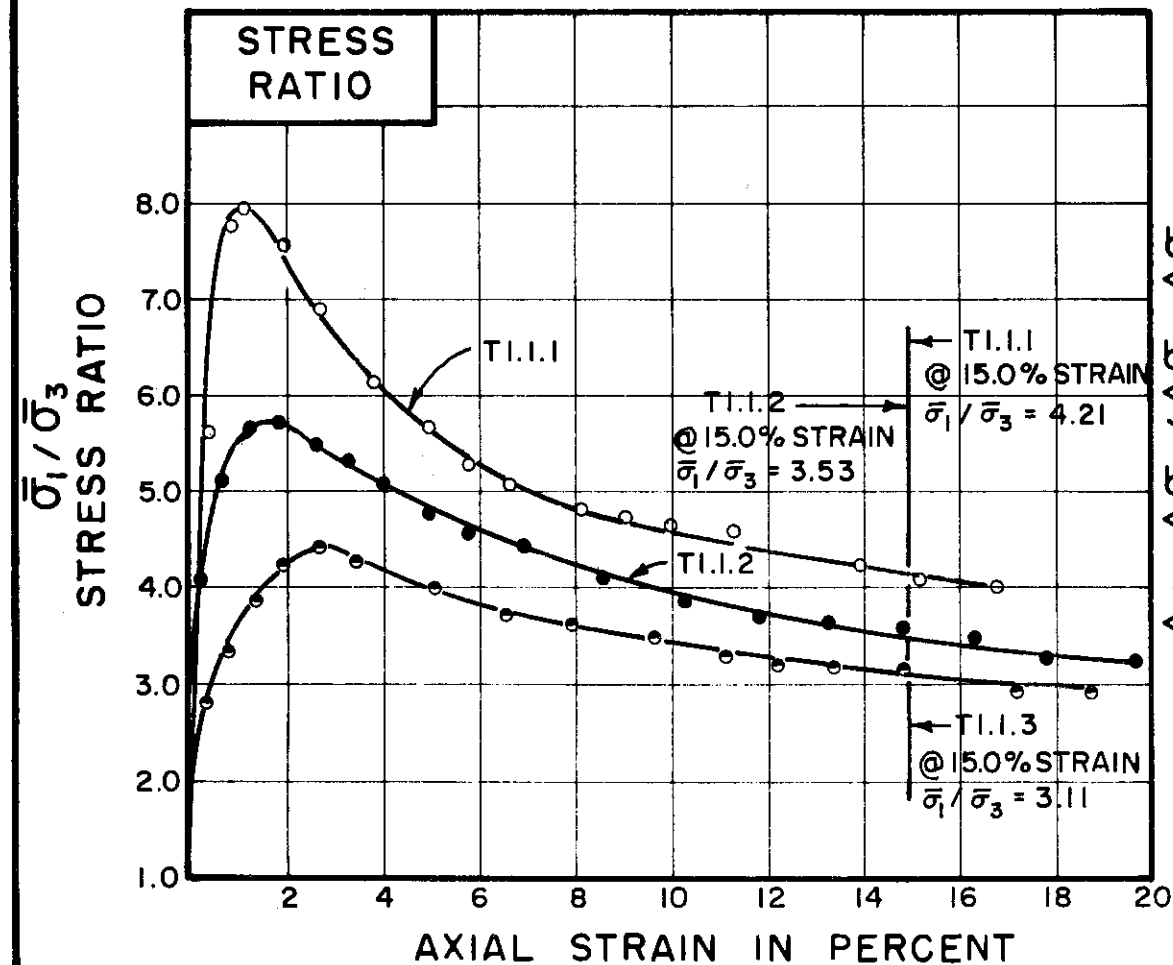
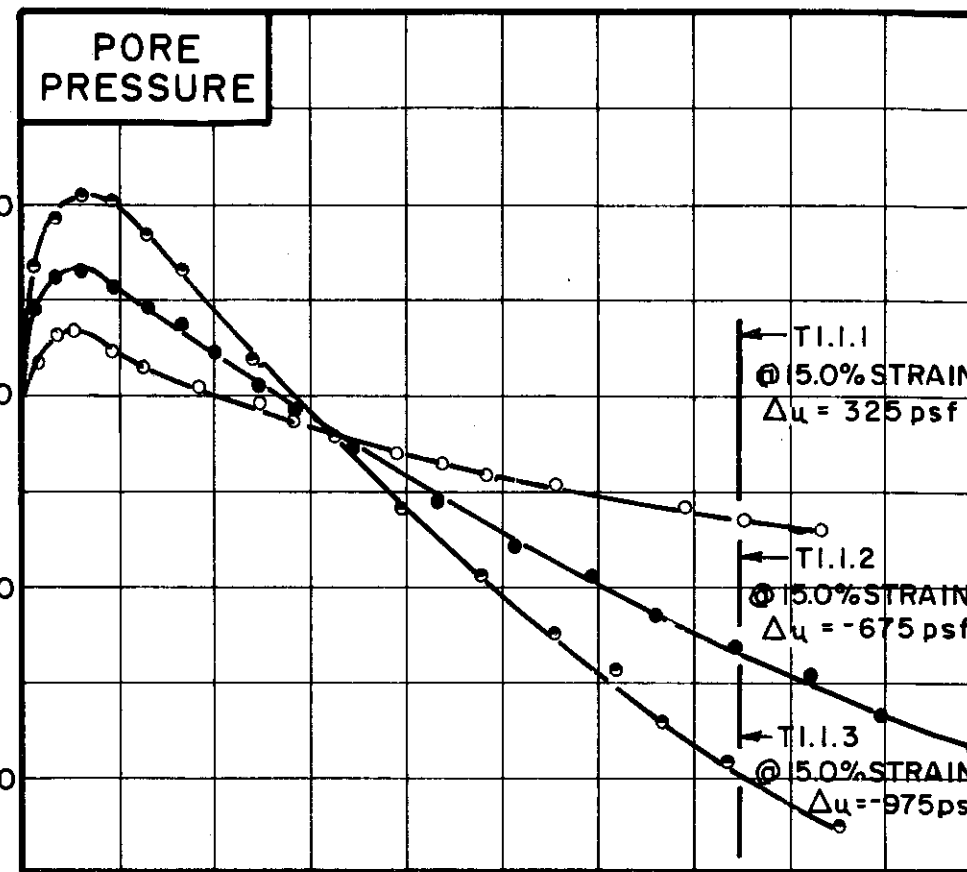
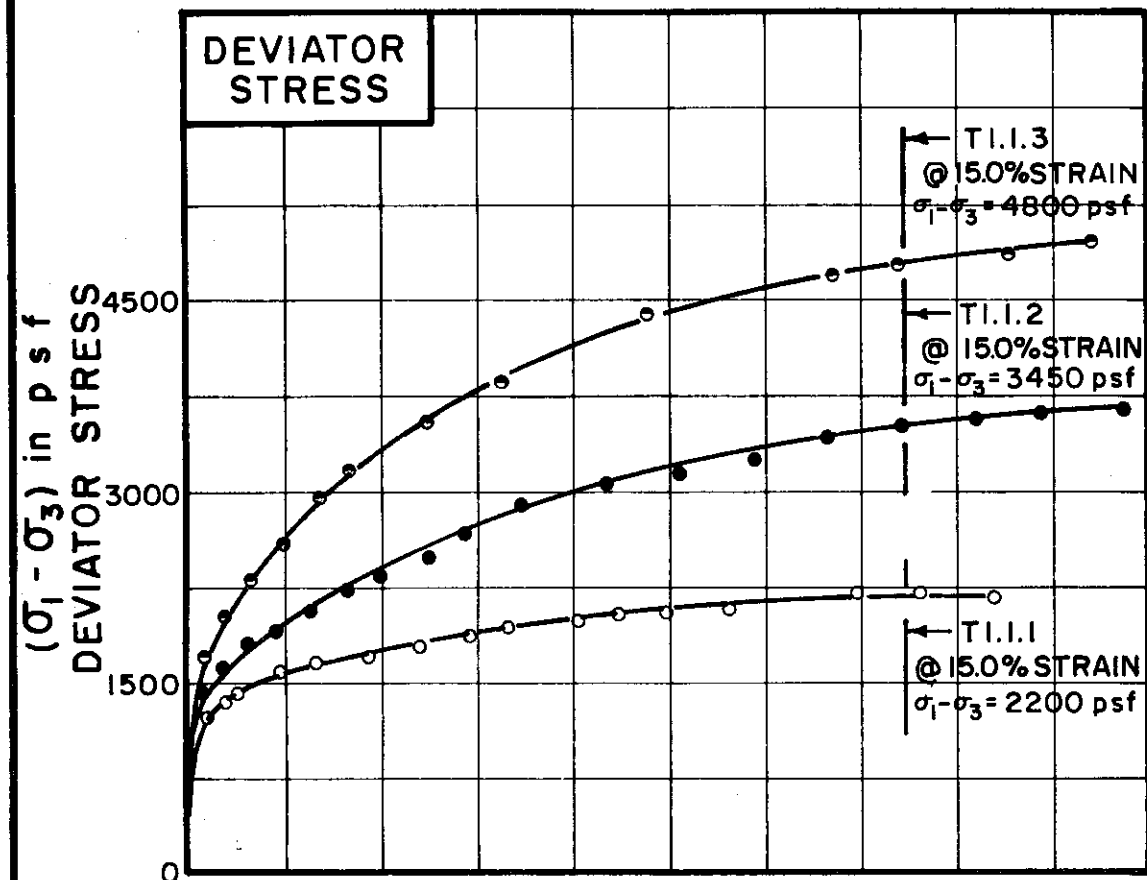


BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-387



TEST NO. / SYMBOL	T1.1.1	T1.1.2	T1.1.3
	○	●	○

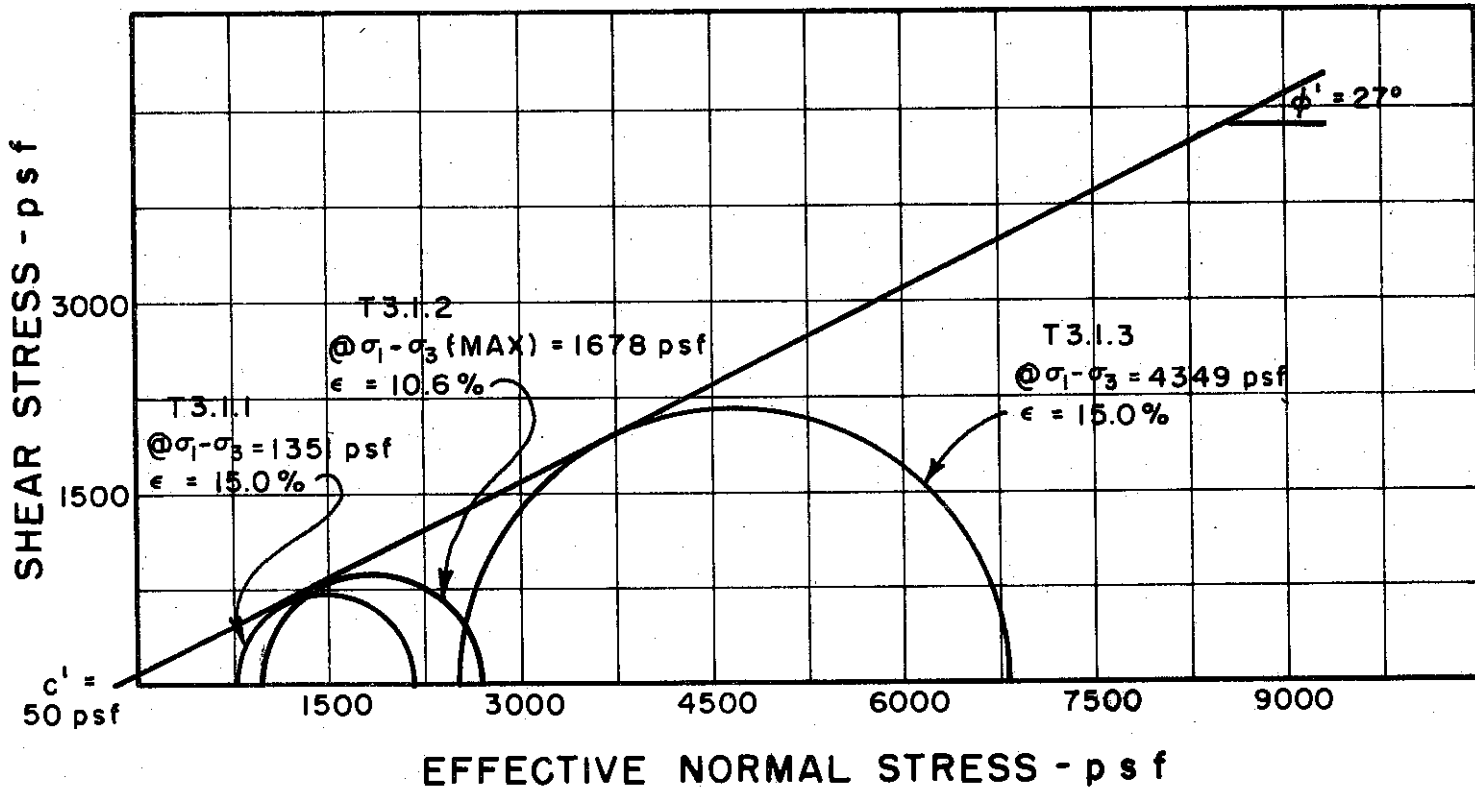
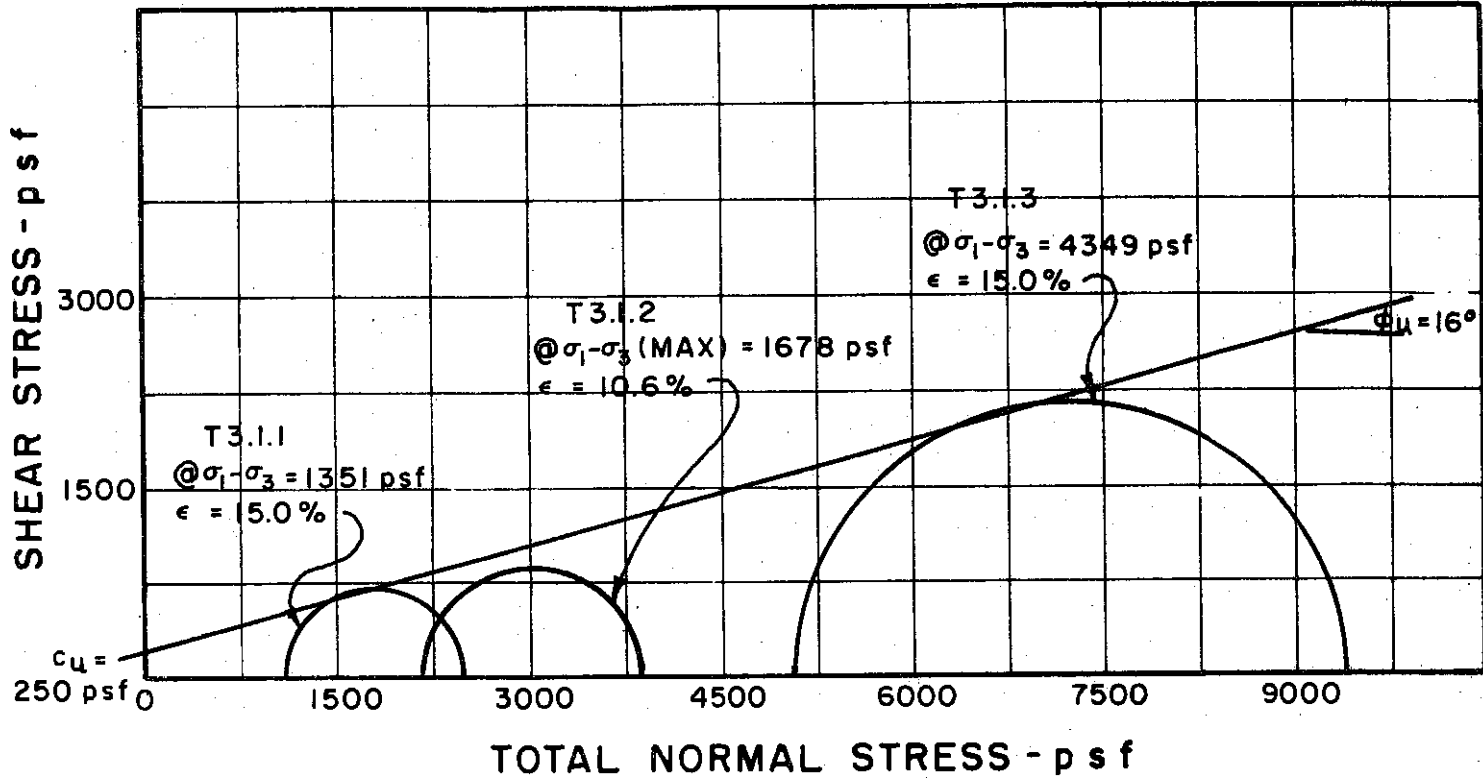
INITIAL CONDITIONS		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_0$	23.0%	23.9%	22.3%
DRY DENSITY	$\gamma_d$ pcf	104	103	108
SAMPLE DIAMETER	$D_0$ in.	1.39	1.39	1.47
SAMPLE HEIGHT	$H_0$ in.	3.22	3.25	3.26
FINAL CONDITIONS BEFORE SHEAR		T1.1.1	T1.1.2	T1.1.3
FINAL BACK PRESSURE	$u_0$ psf	8740	8352	8410
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$ psf	360	691	1296
VOLUMETRIC STRAIN	$\epsilon_{vol}$	.4%	1.0%	1.4%
PORE PRESSURE RESPONSE		100%	98%	94%
FINAL CONDITIONS AFTER SHEAR		T1.1.1	T1.1.2	T1.1.3
WATER CONTENT	$w_f$	26.7%	26.7%	25.3%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 26  
 SAMPLE NO. 2  
 DEPTH 3.5 TO 5.5  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

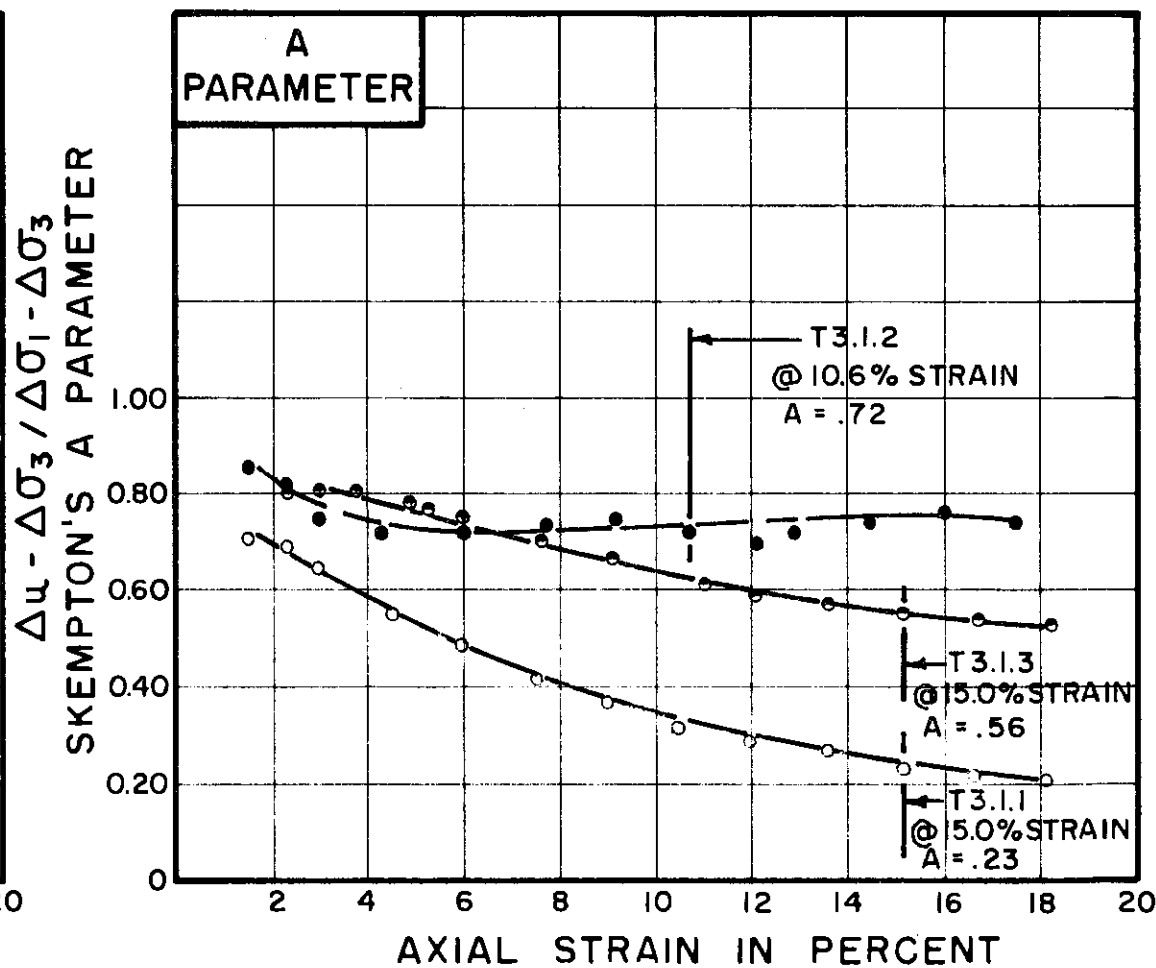
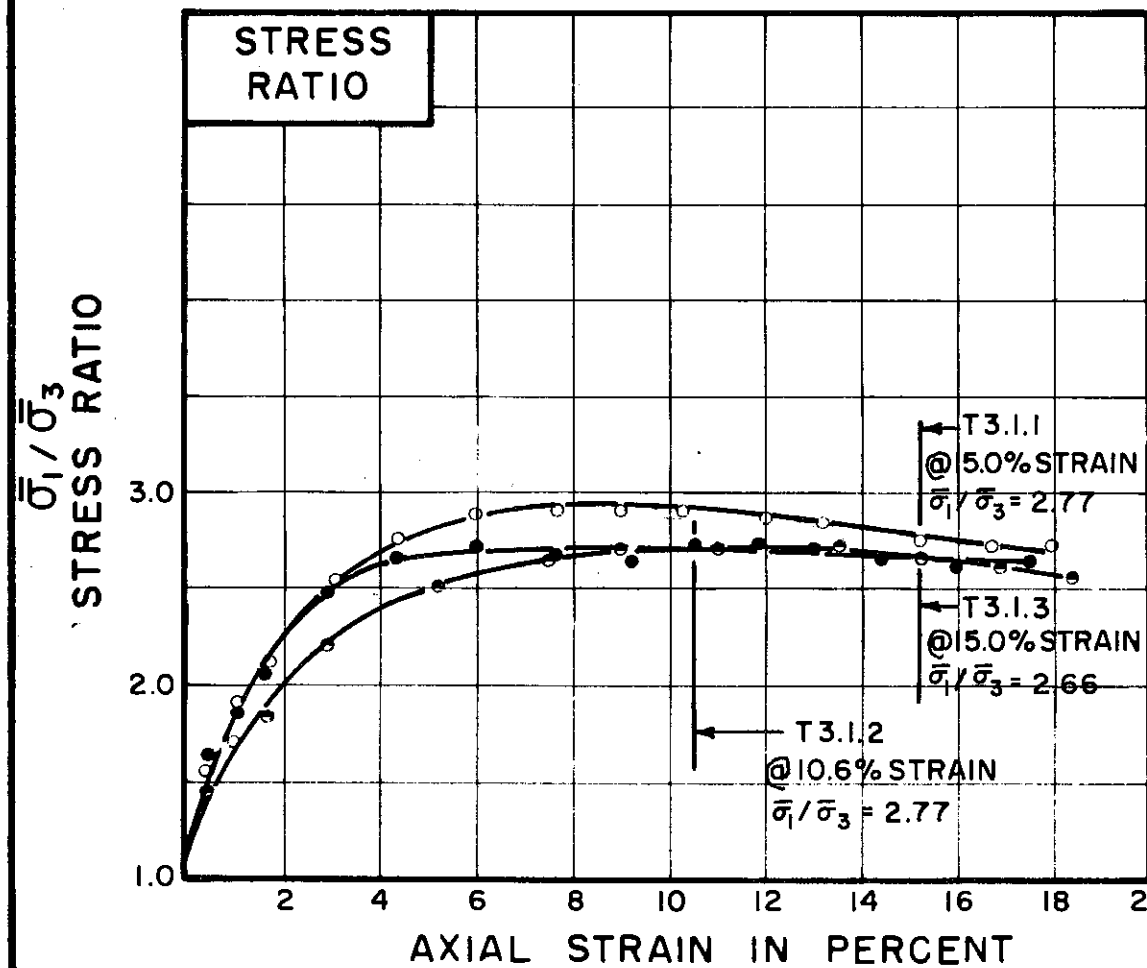
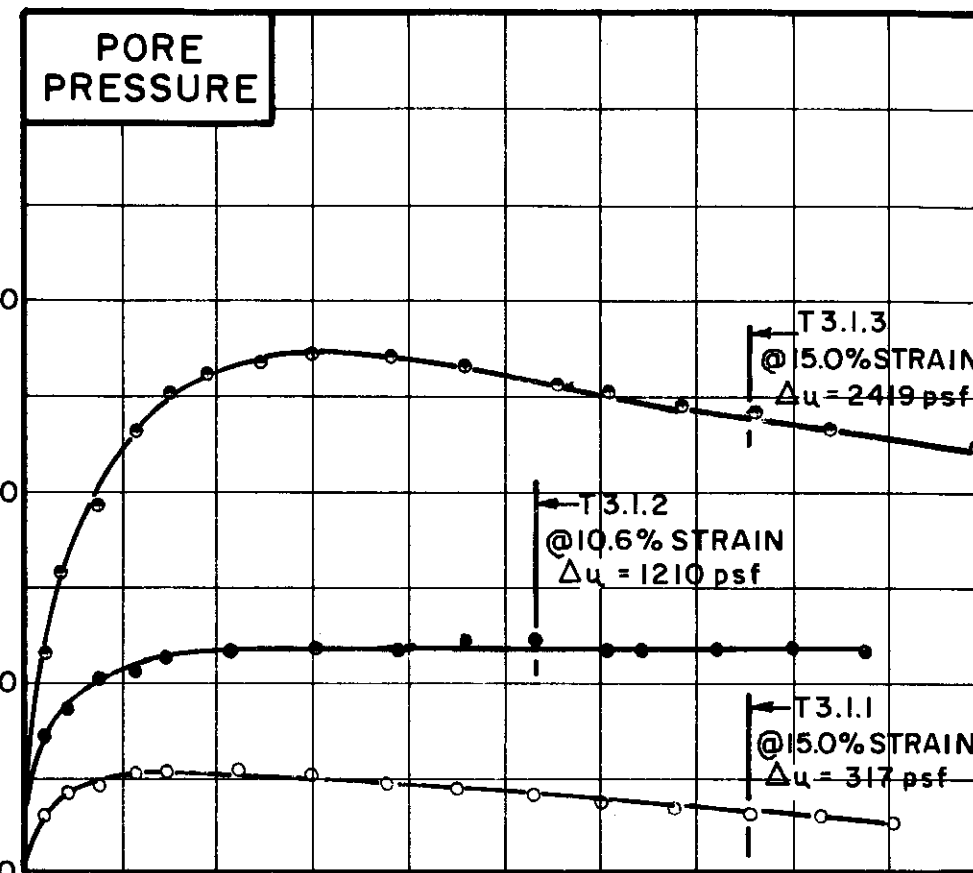
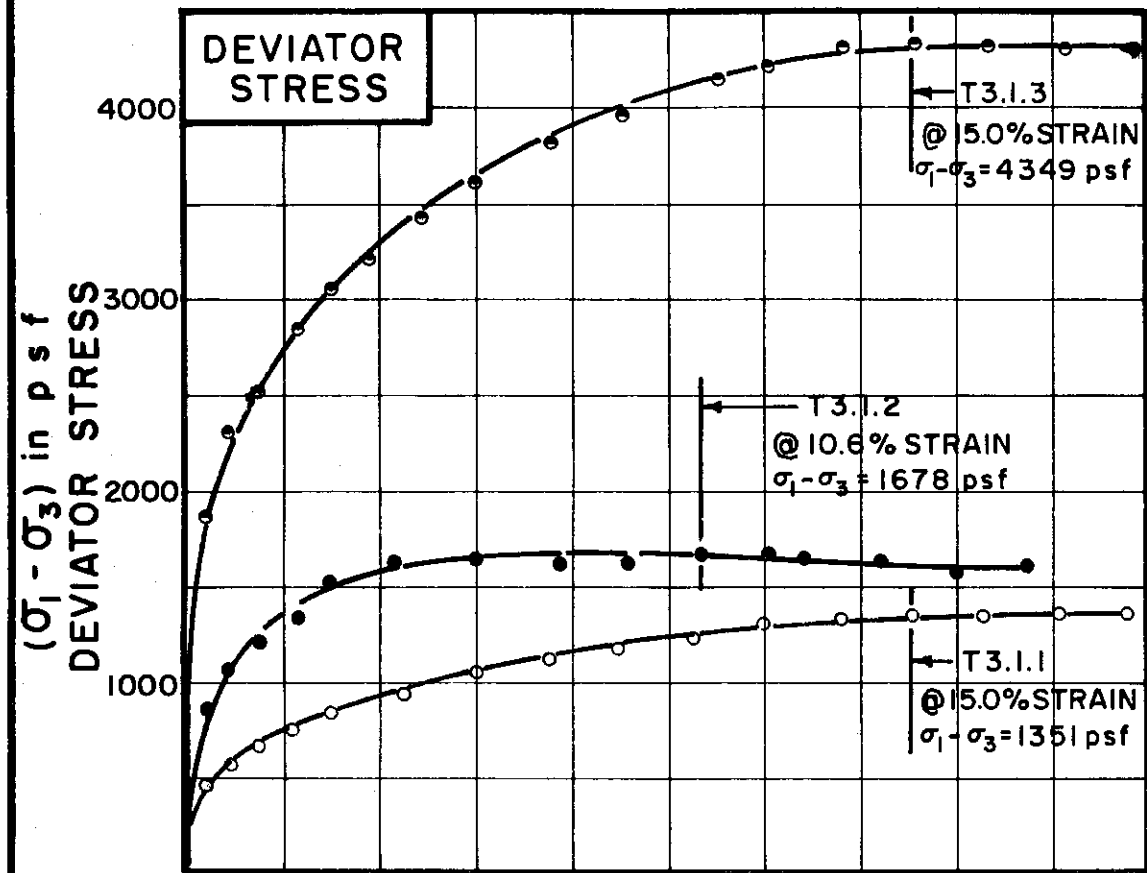
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T3.1.1 ○	T3.1.2 ●	T3.1.3 ◉
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INITIAL CONDITIONS		WATER CONTENT	W <sub>0</sub>	35.4%	35.3%	35.7%	
DRY DENSITY		pcf	γ <sub>d</sub>	89	86	86	
SAMPLE DIAMETER		in.	D <sub>0</sub>	1.40	1.40	1.41	
SAMPLE HEIGHT		in.	H <sub>0</sub>	3.36	3.35	3.35	
FINAL CONDITIONS BEFORE SHEAR		FINAL BACK PRESSURE	psf	u <sub>0</sub>	7200	7200	10800
		INITIAL EFFECTIVE STRESS	psf	$\bar{\sigma}_1 / \bar{\sigma}_3$	1080	2160	5040
		VOLUMETRIC STRAIN	ε <sub>vol</sub>	5.3%	6.2%	8.7%	
		PORE PRESSURE RESPONSE		100%	98%	95%	
FINAL CONDITIONS		WATER CONTENT	w <sub>f</sub>	31.1%	30.8%	28.4%	
SKETCH OF SAMPLE AT END OF TEST							

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

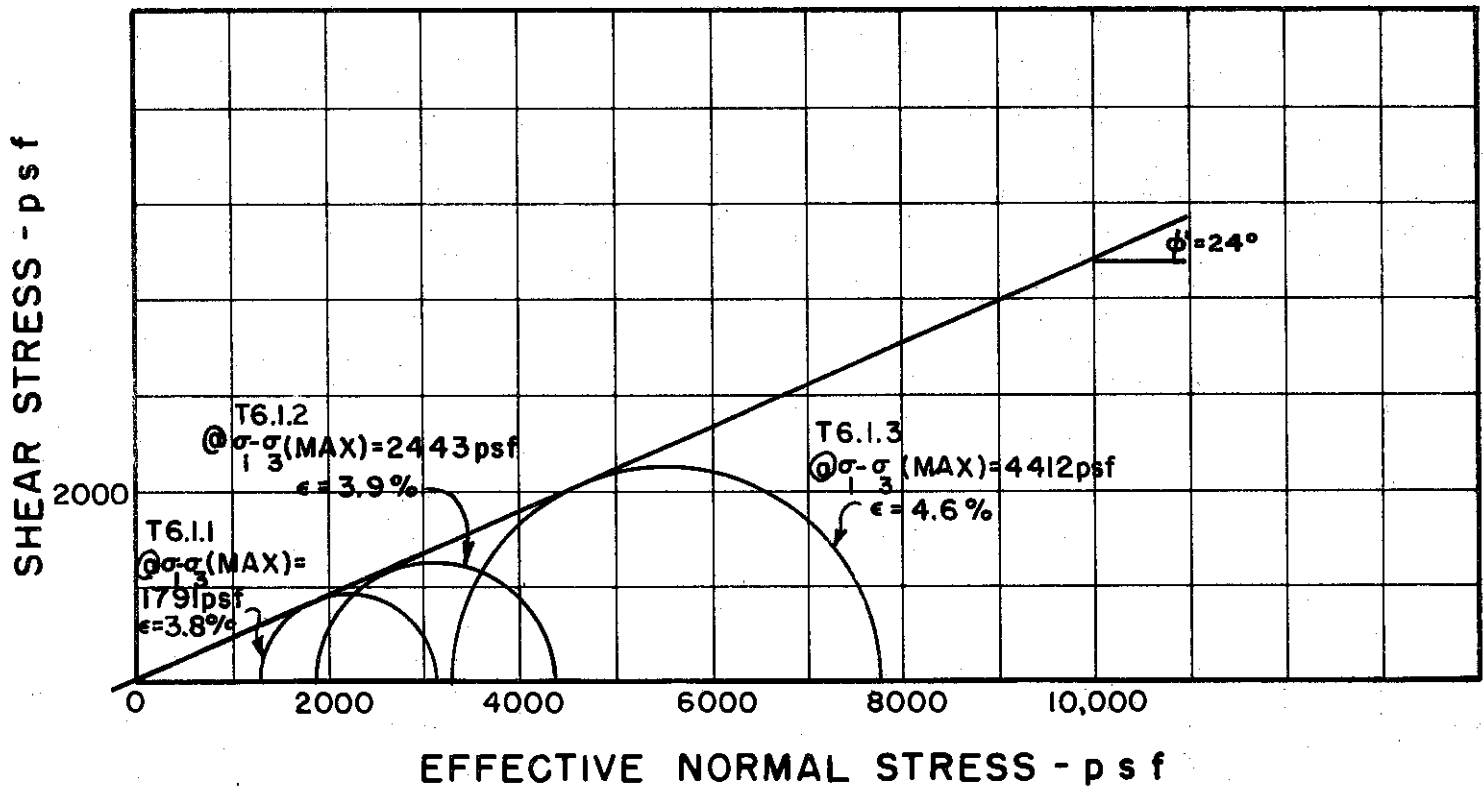
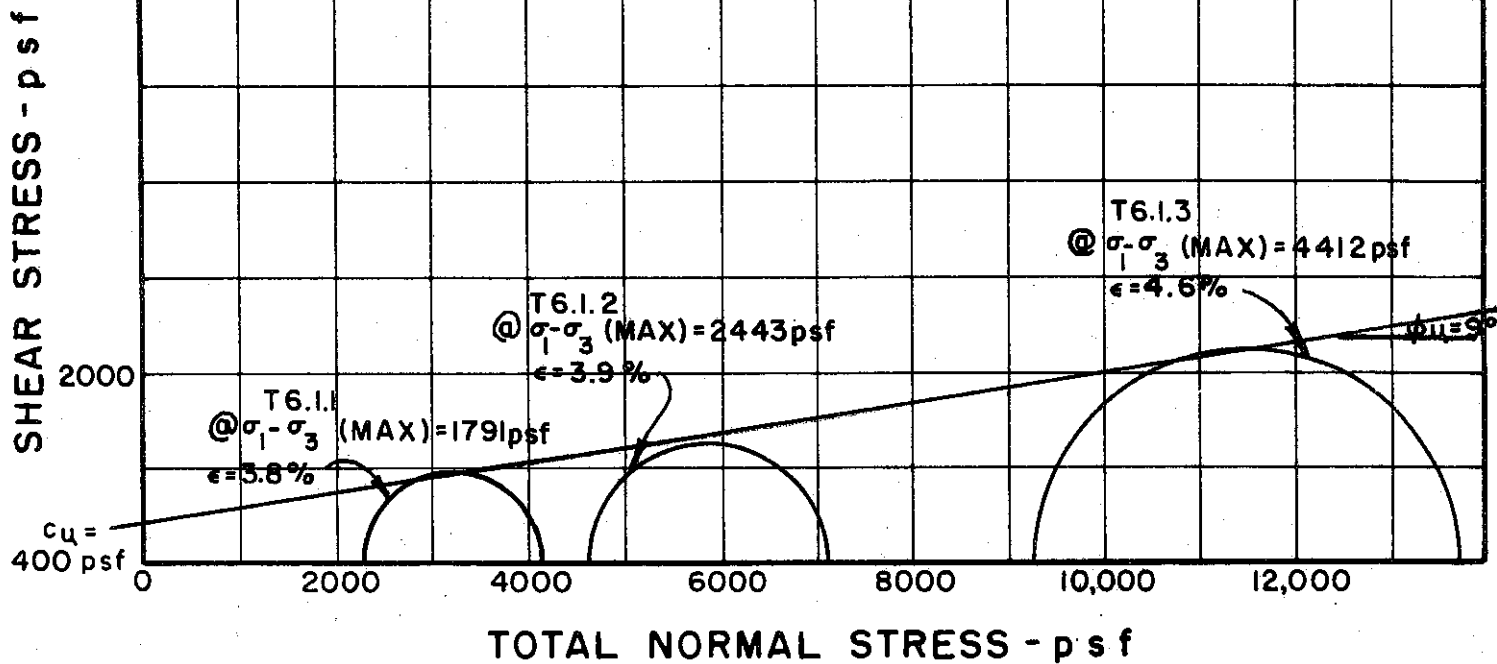
SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 26

SAMPLE NO. 11

DEPTH 48.0 TO 50.0

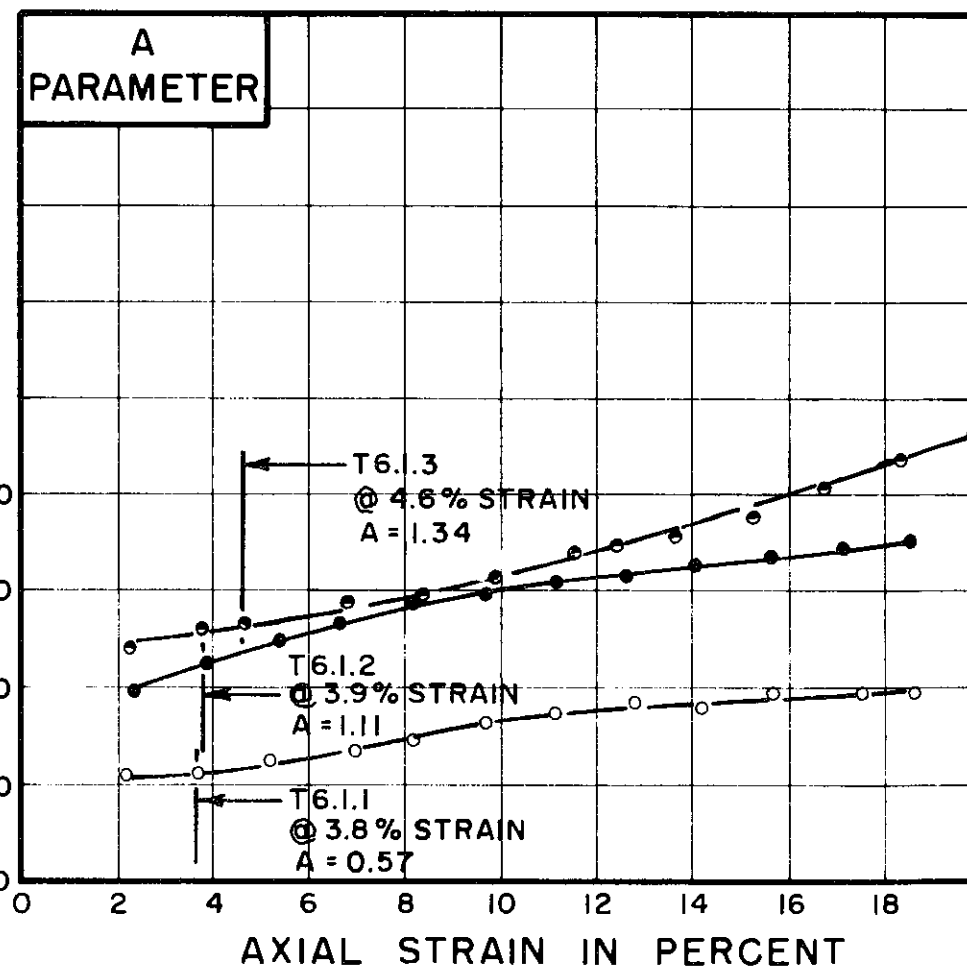
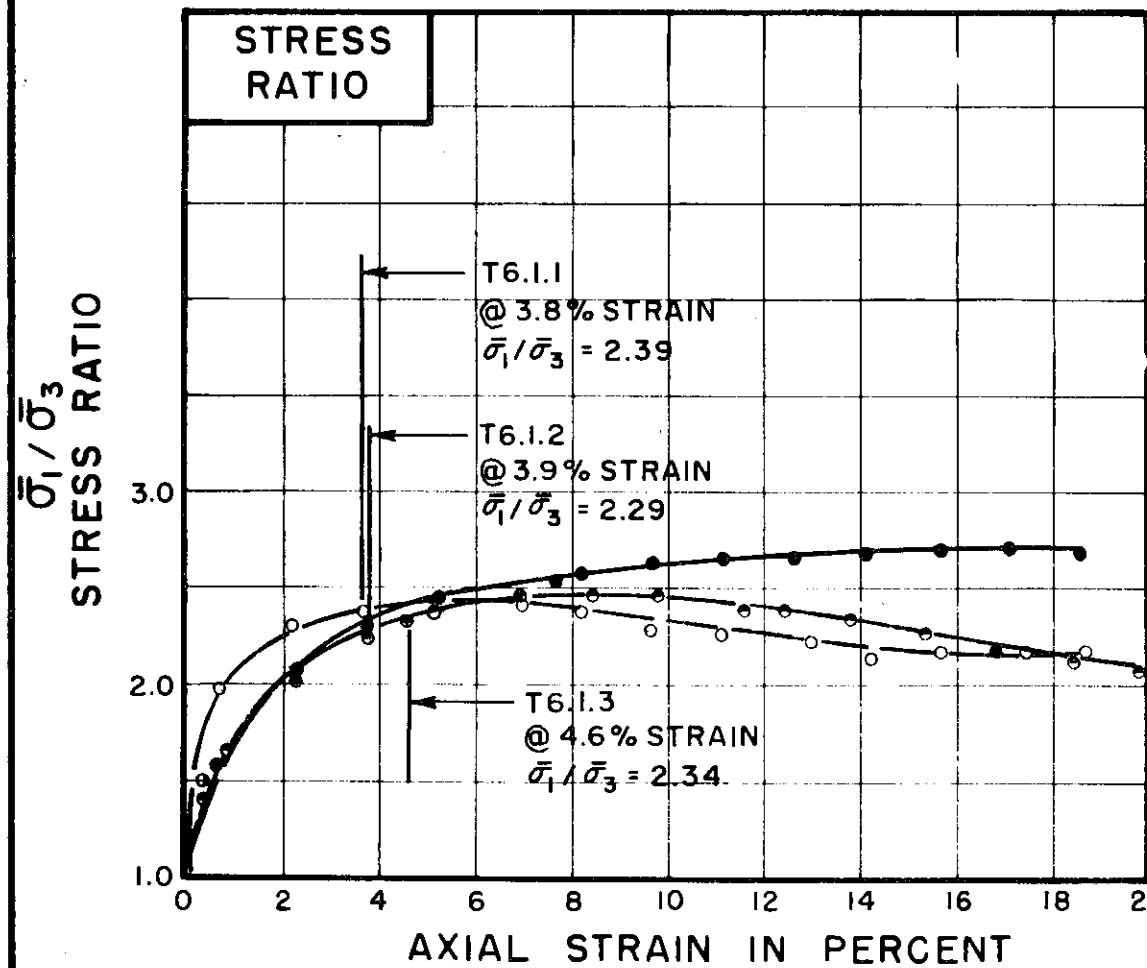
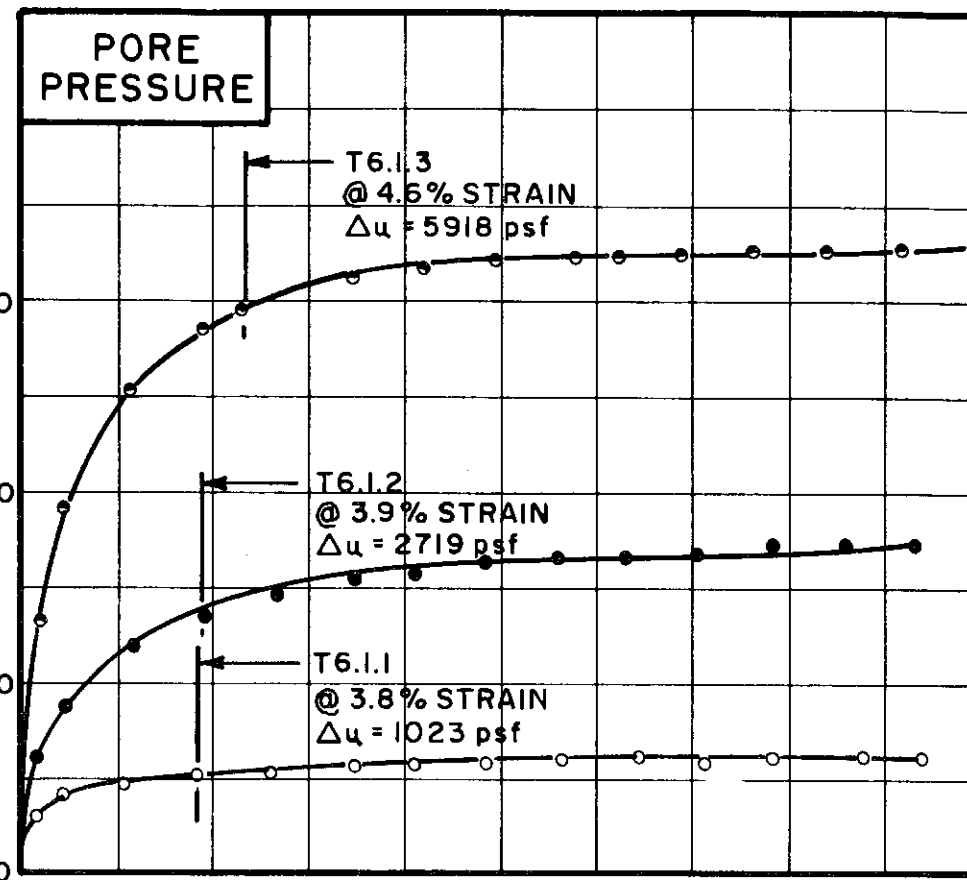
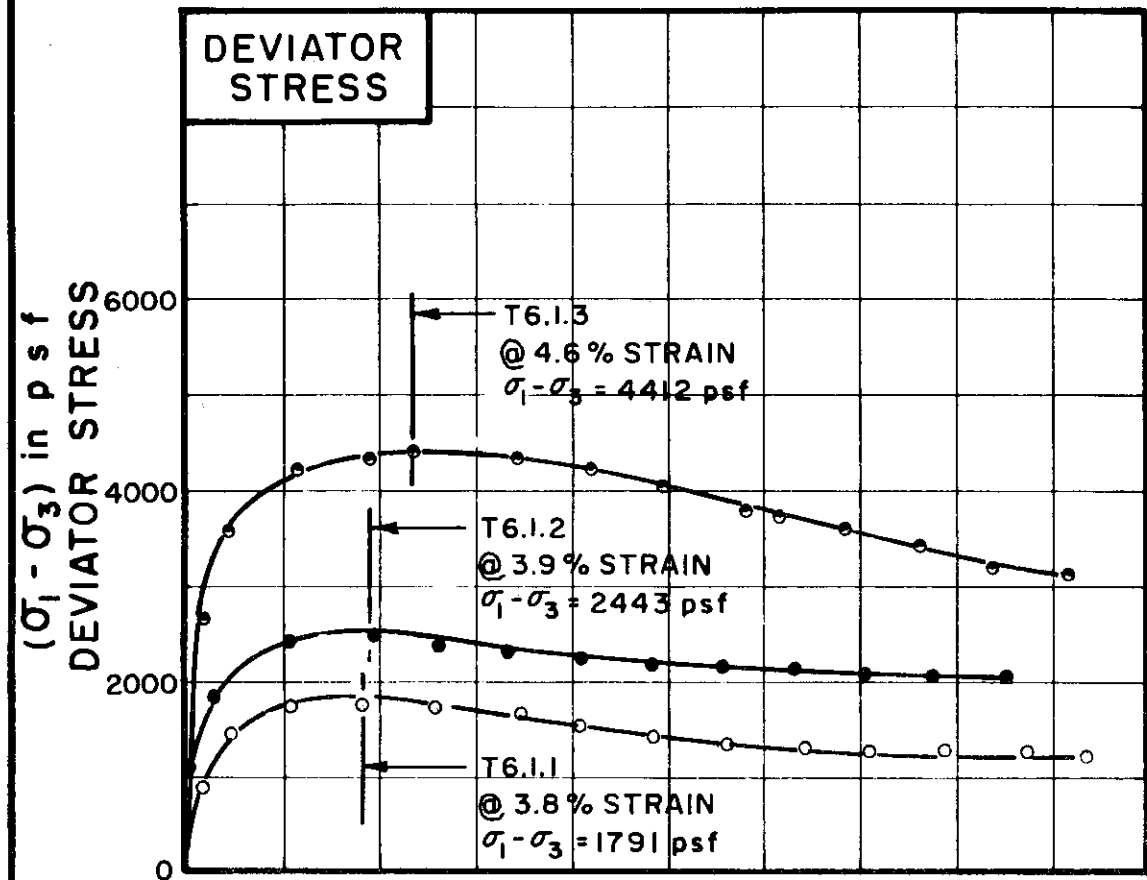
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS

AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255



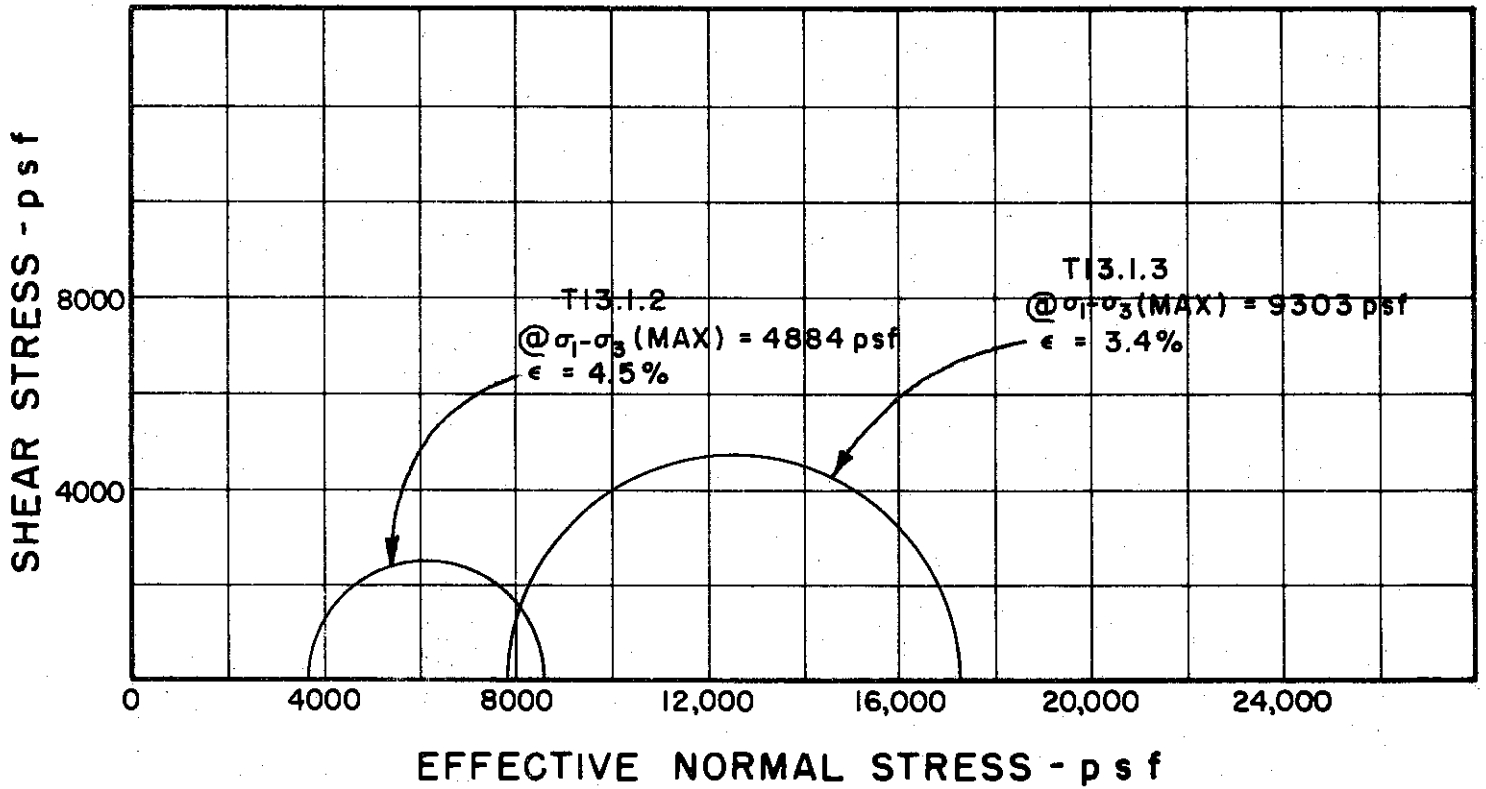
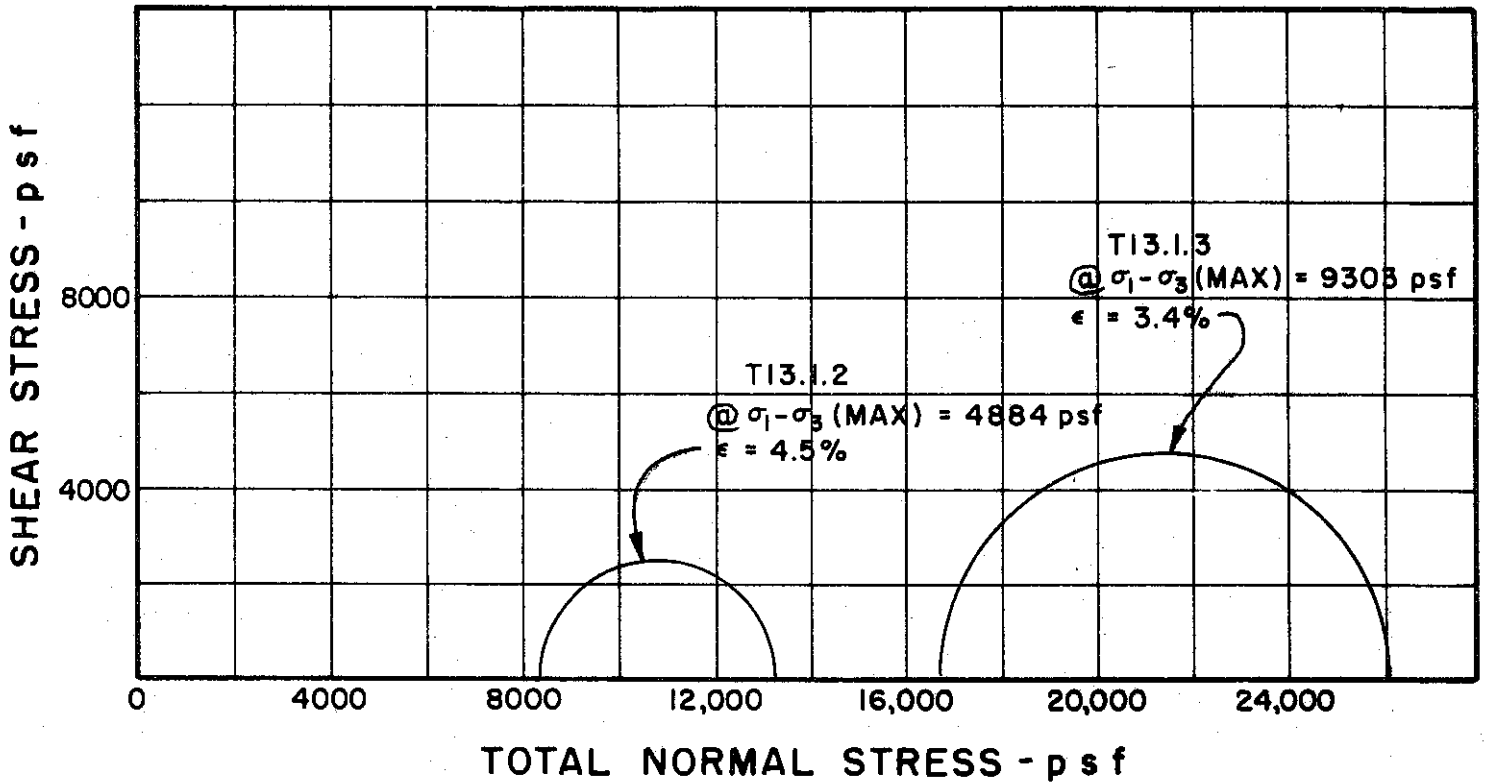
TEST NO. / SYMBOL	T6.1.1	T6.1.2	T6.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	$w_0$	36.1%	36.5%	30.0%
	DRY DENSITY	$\gamma_d$	88	86	93
	SAMPLE DIAMETER	$D_0$	1.40	1.40	1.40
	SAMPLE HEIGHT	$H_0$	3.35	3.40	3.36
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	5760	7200	7200
	INITIAL EFFECTIVE STRESS	$\sigma_{1/3}$	2304	4608	9216
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.0%	4.8%	8.5%
PORE PRESSURE RESPONSE			99%	95%	100%
FINAL CONDITIONS	WATER CONTENT	$w_f$	34.3%	32.9%	23.8%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025
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BORING NO. 26  
SAMPLE NO. 11  
DEPTH 48.0 TO 50.0  
SOIL DESCRIPTION SILTY CLAY (CL)  
LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

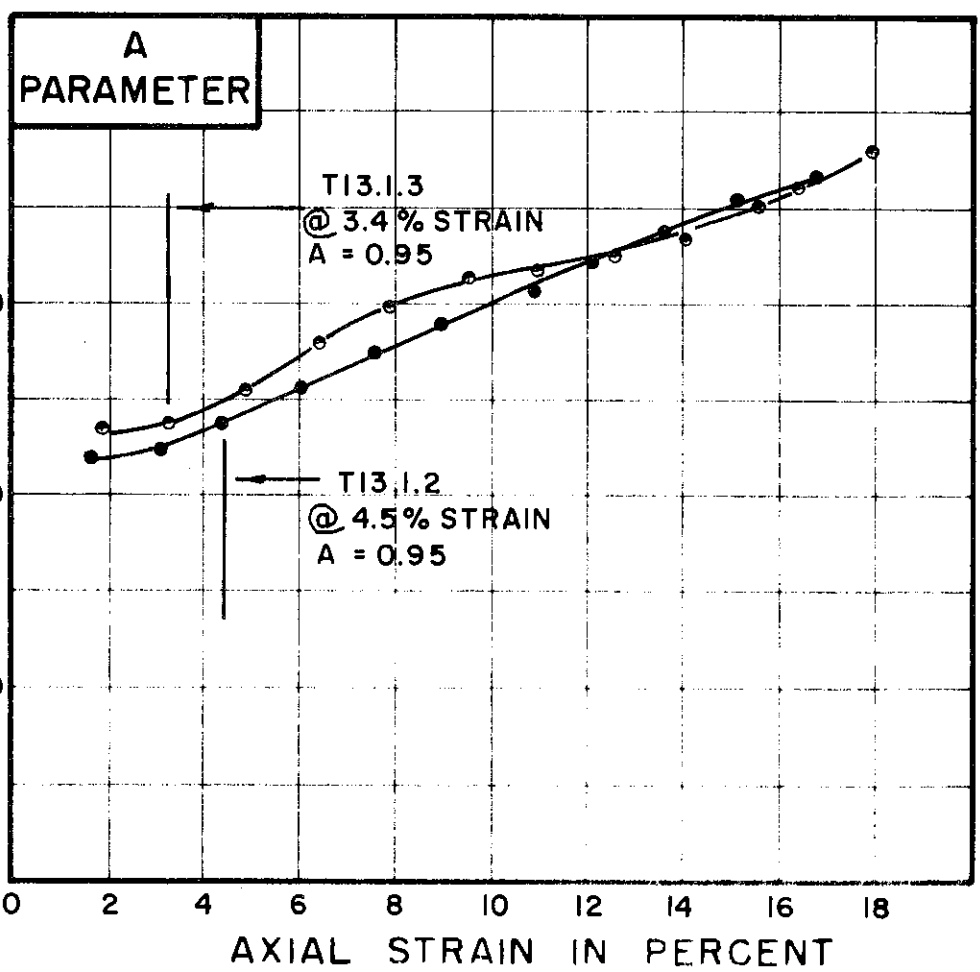
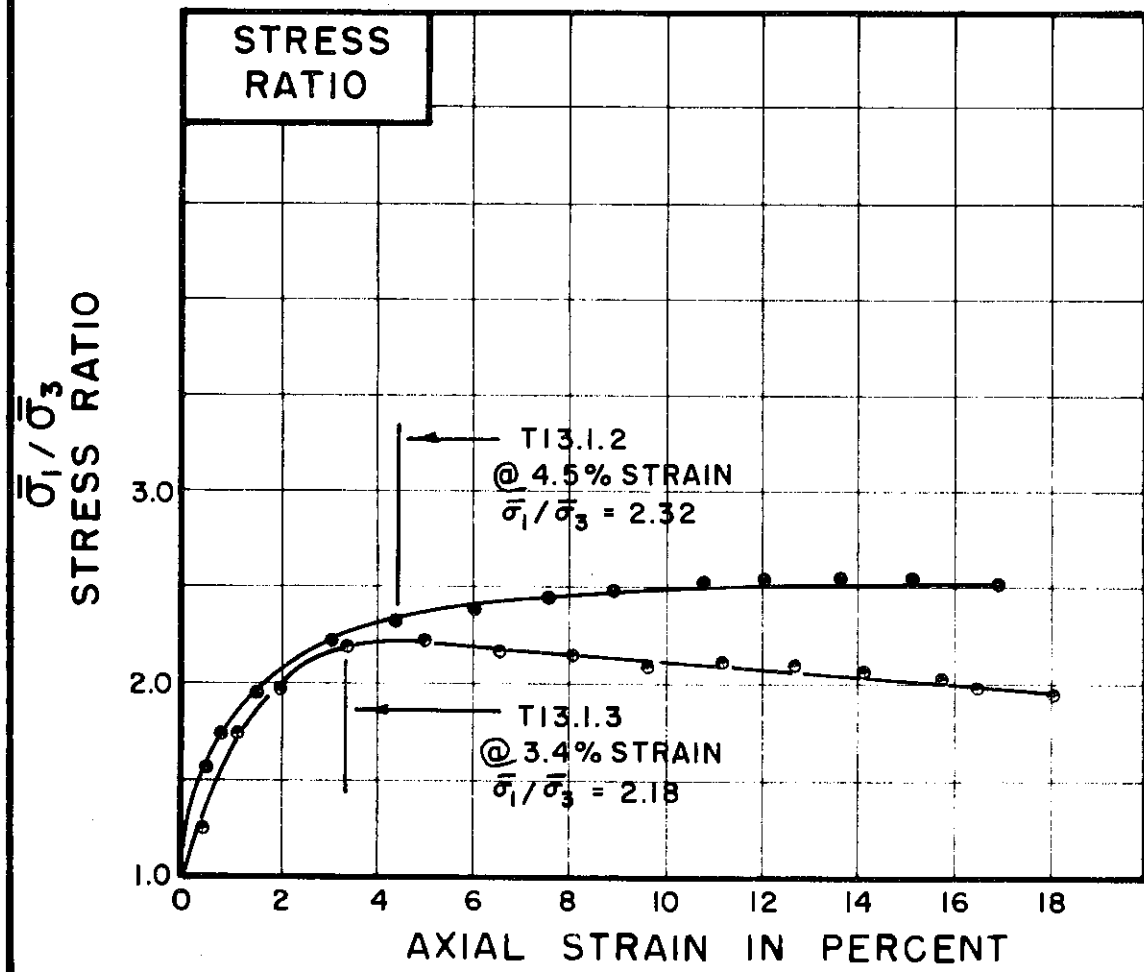
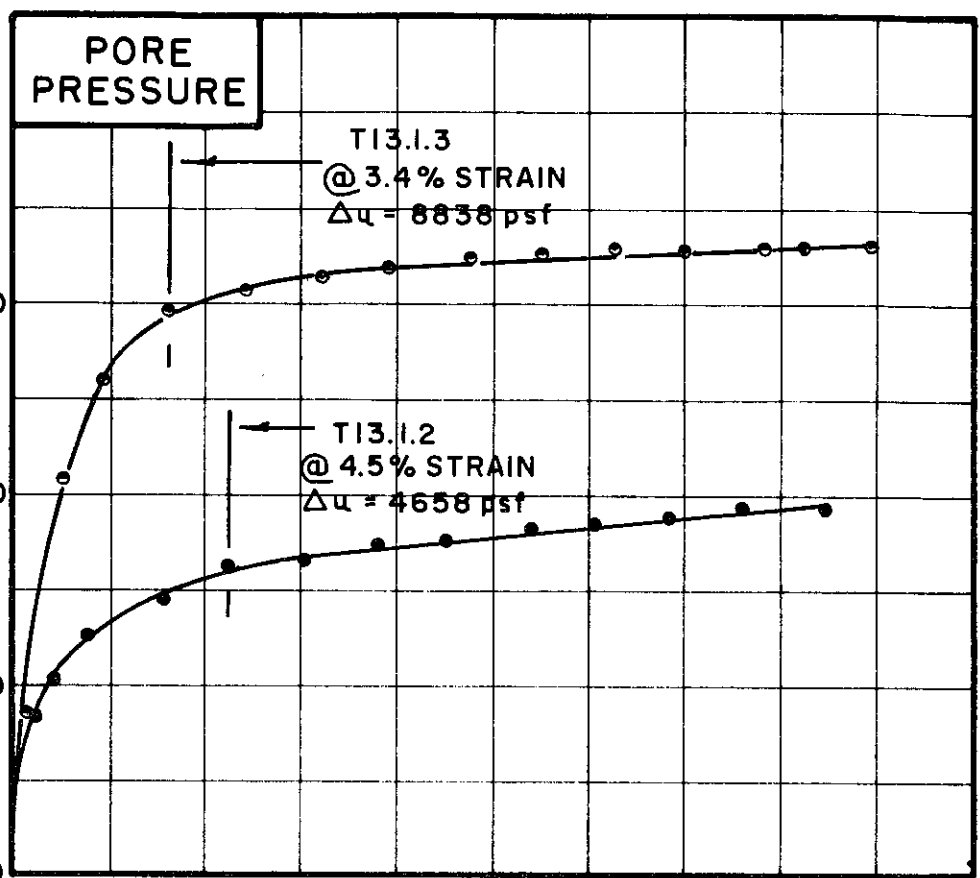
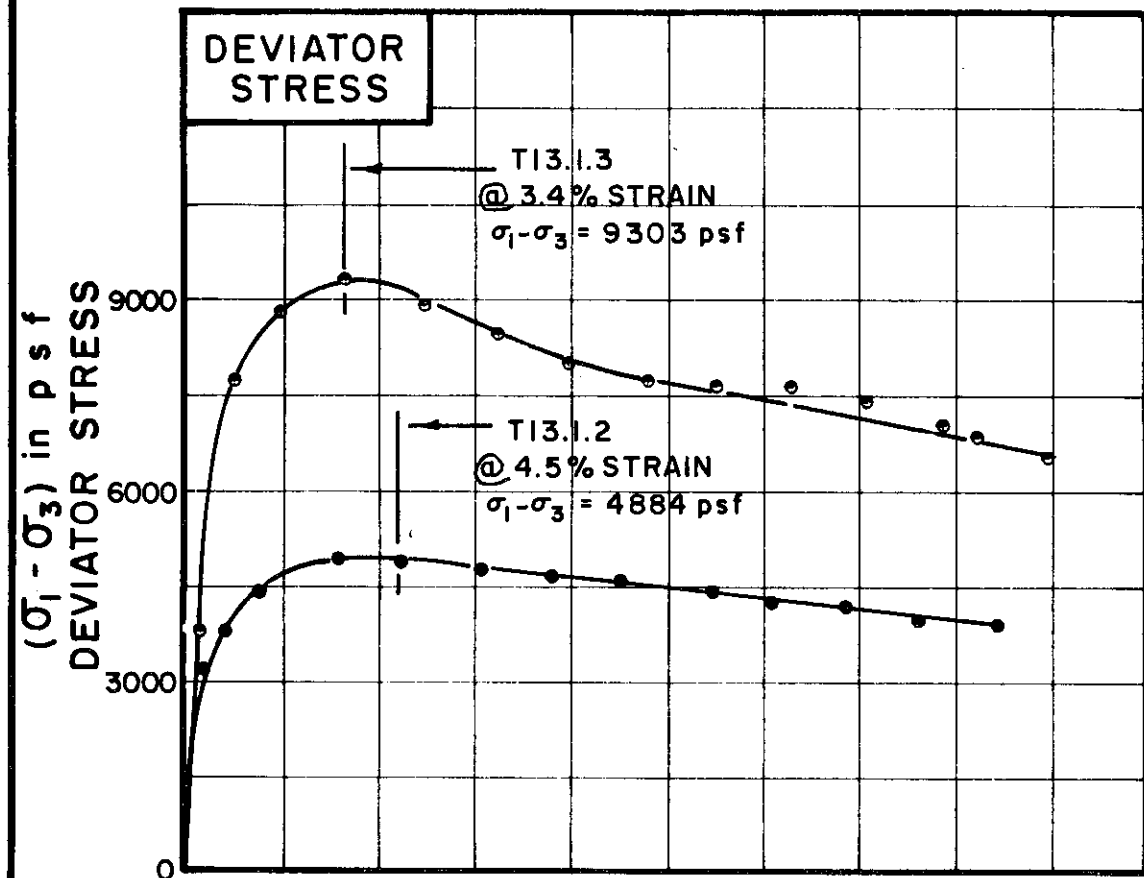
REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.1

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T13.1.2	T13.1.3
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INITIAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_0$		35.6%	34.0%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	86	90	
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	
SAMPLE HEIGHT	$H_0$	in.	3.35	3.38	
FINAL CONDITIONS BEFORE SHEAR			T13.1.2	T13.1.3	
FINAL BACK PRESSURE	$u_0$	psf	6480	8640	
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1$ $\bar{\sigma}_3$	psf	8352	16704	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		60.9%	10.9%	%
PORE PRESSURE RESPONSE			98%	98%	
FINAL CONDITIONS			T13.1.2	T13.1.3	
WATER CONTENT	$w_f$		31.4%	27.6%	%
SKETCH OF SAMPLE AT END OF TEST					

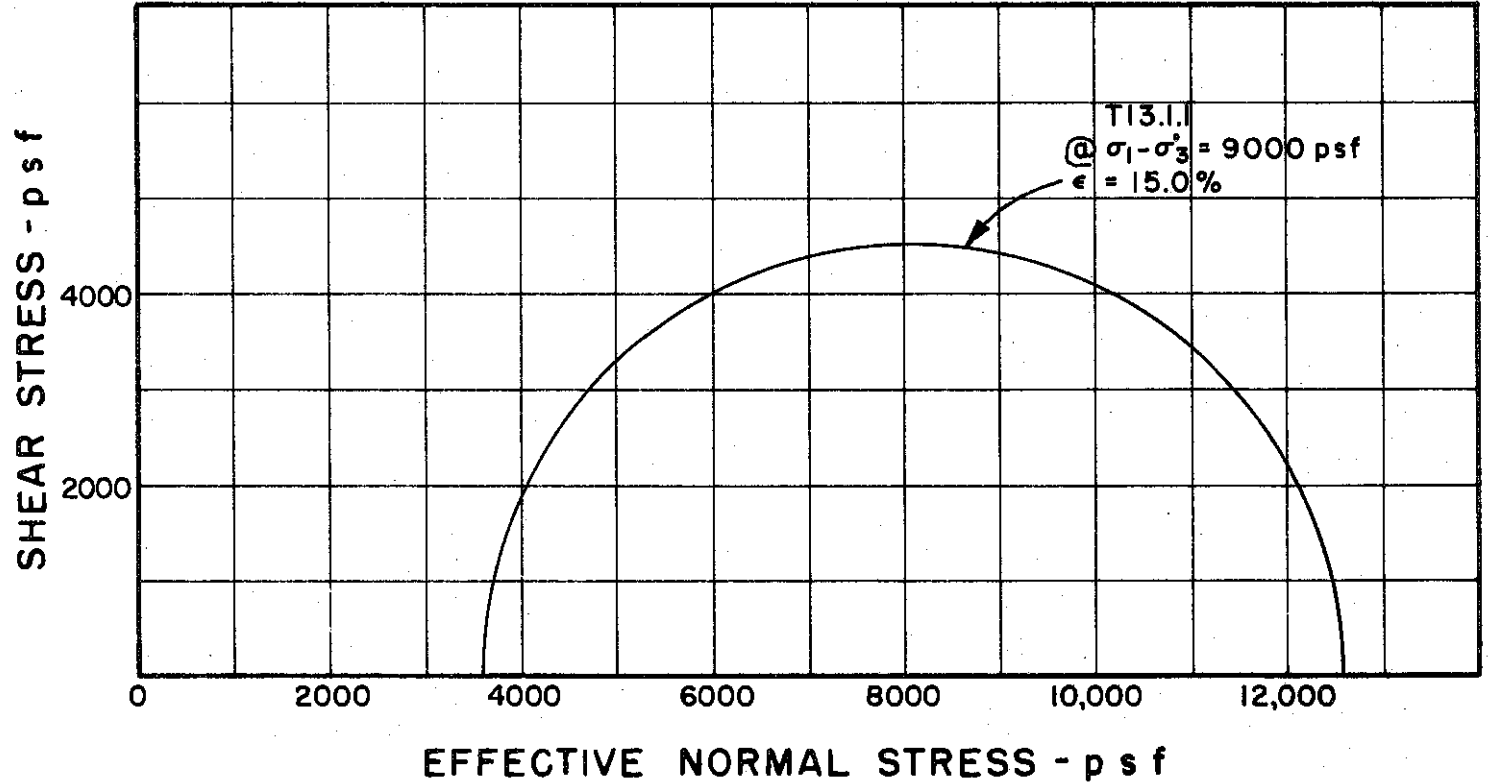
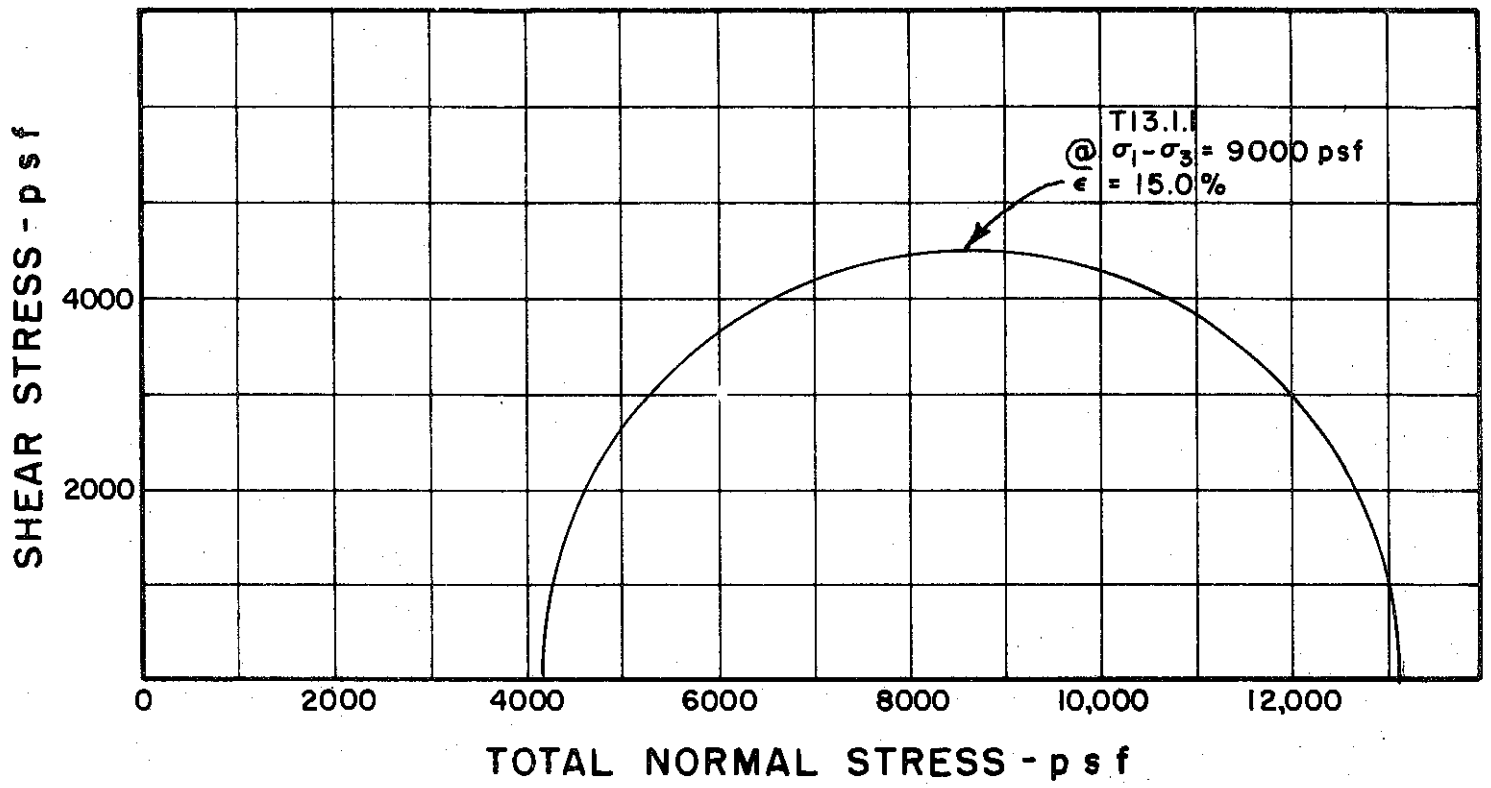
RATE OF STRAIN PERCENT/MINUTE	.024	.025
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BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 21  
 NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



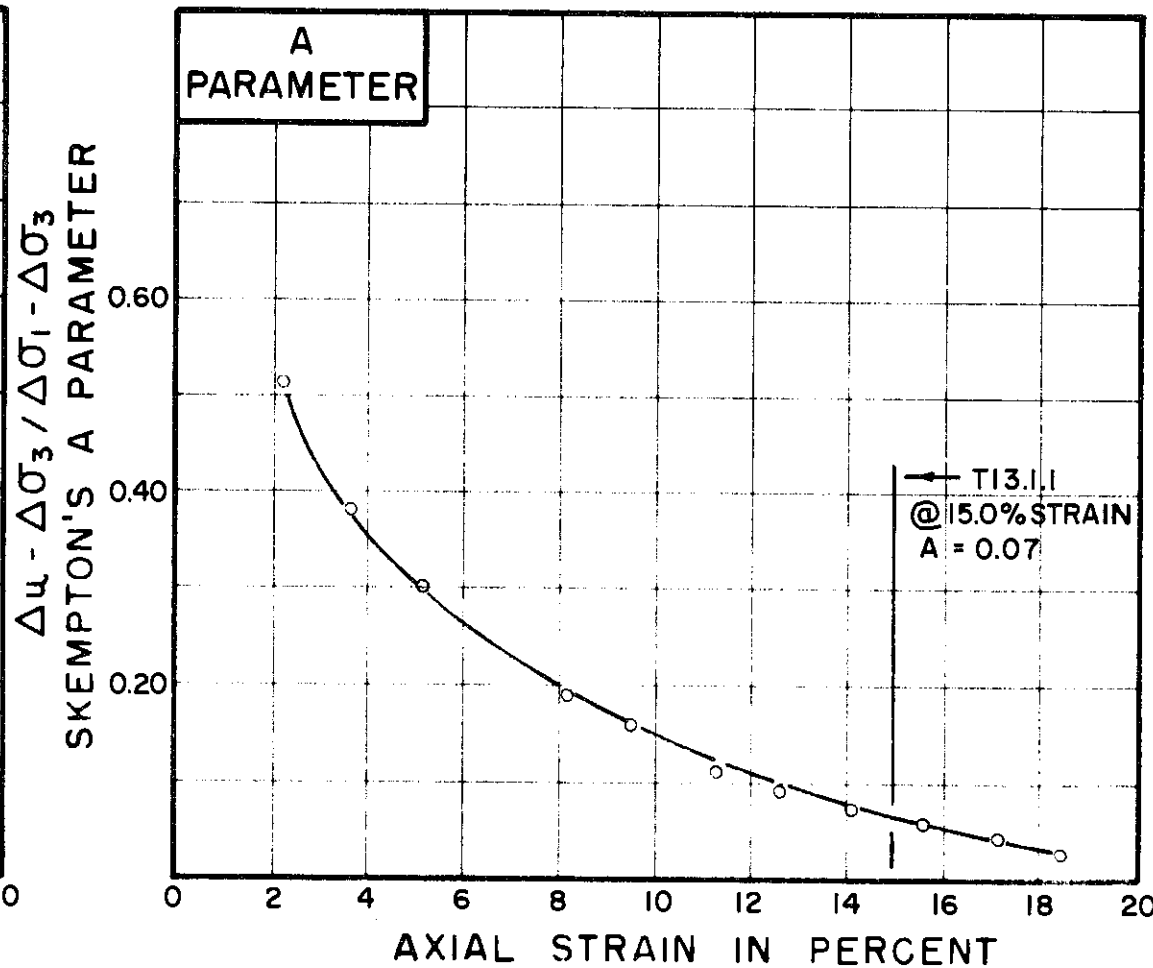
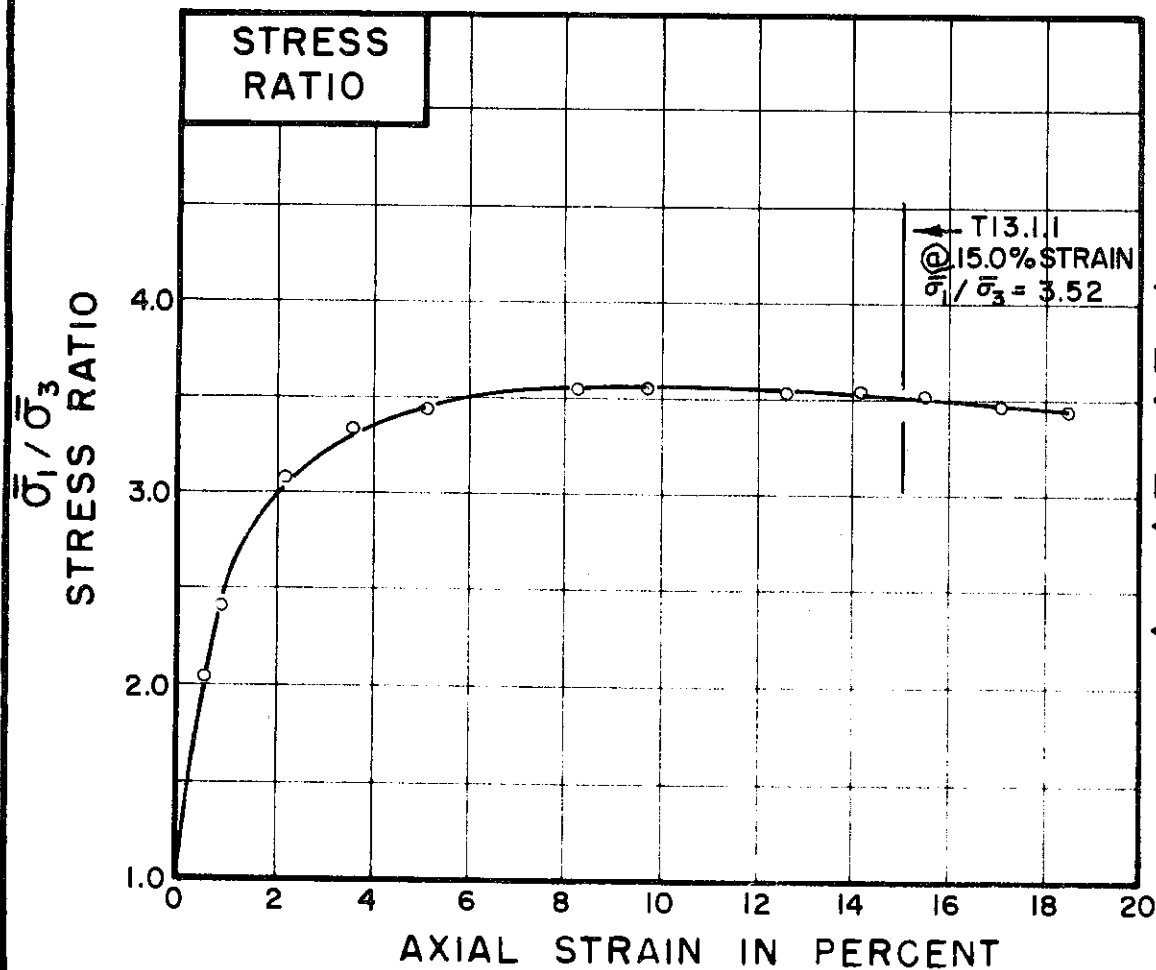
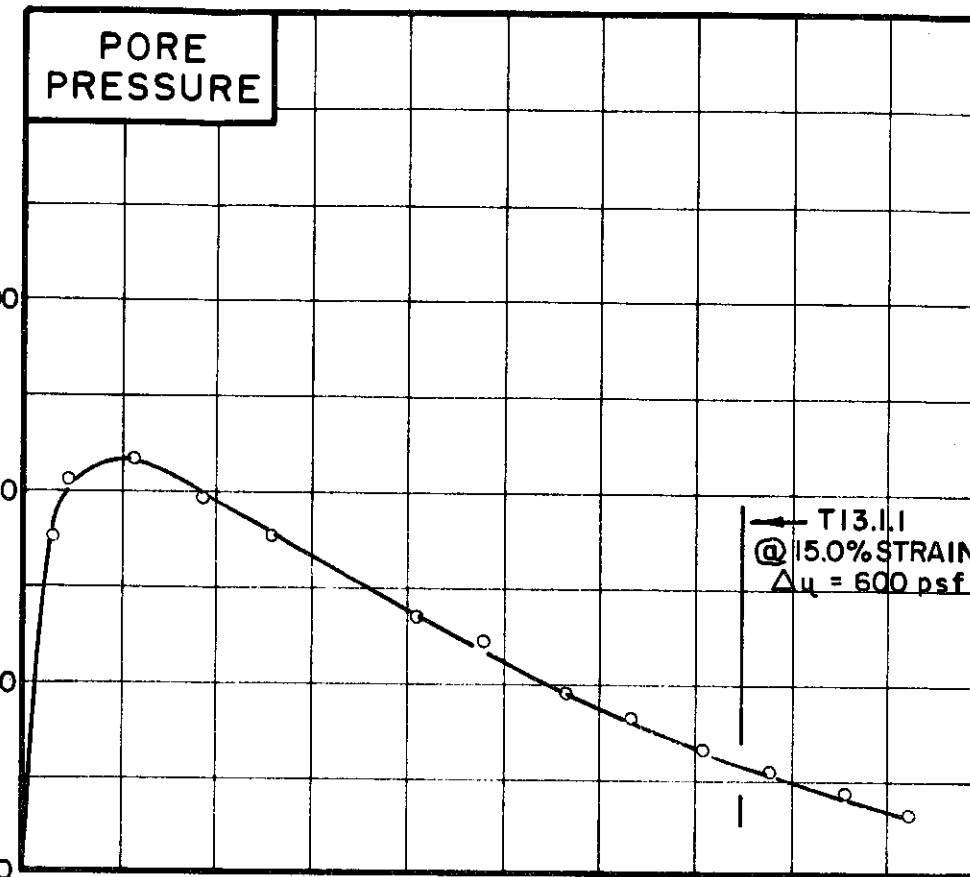
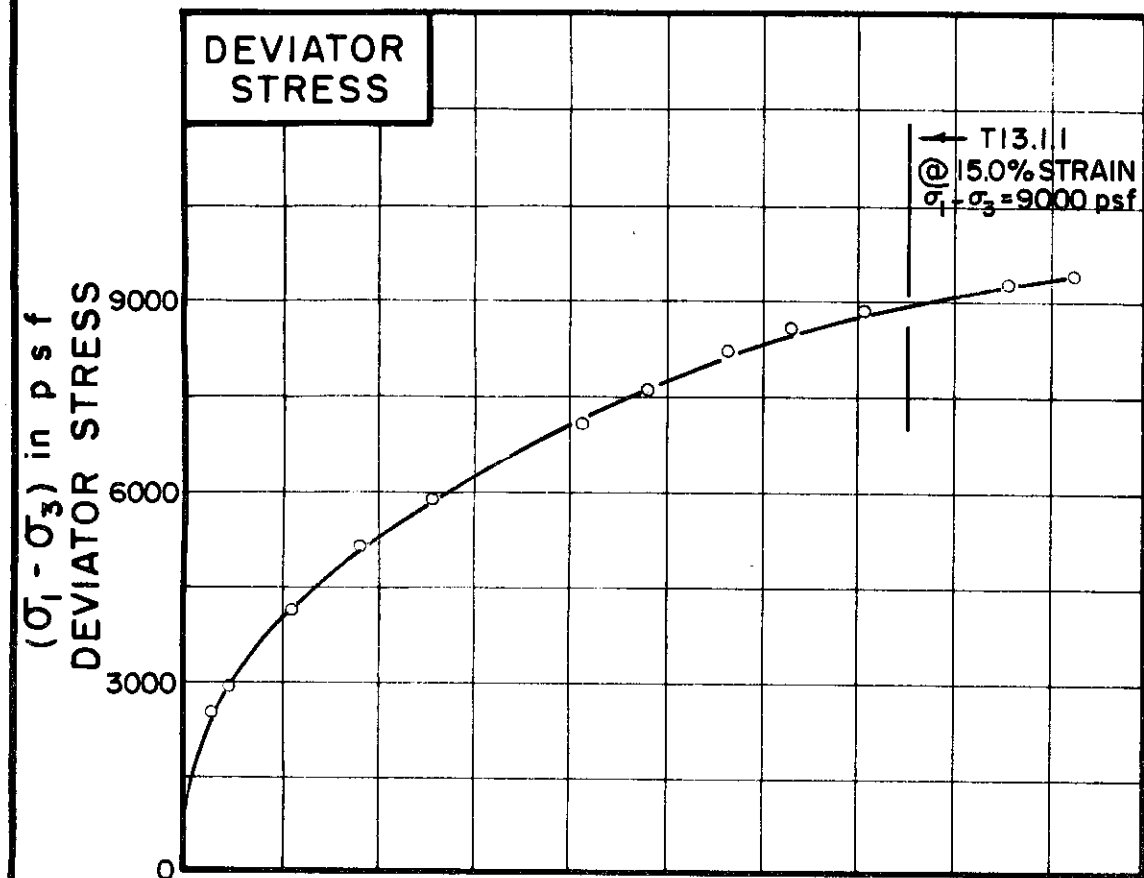


BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS SOILS WITHIN THIS  
SAMPLE ARE VARIABLE - SEE TEST  
RESULTS FOR T13.1.2 & T13.1.3  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-395



TEST NO. / SYMBOL T13.1.1

INITIAL CONDITIONS	WATER CONTENT	w <sub>0</sub>	22.9%	%	%
	DRY DENSITY	γ <sub>d</sub>	96		
	SAMPLE DIAMETER	D <sub>0</sub>	1.40		
	SAMPLE HEIGHT	H <sub>0</sub>	3.38		
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	u <sub>0</sub>	6480		
	INITIAL EFFECTIVE STRESS	σ <sub>1</sub> / σ <sub>3</sub>	4176		
	VOLUMETRIC STRAIN	ε <sub>vol</sub>	1.77%	%	%
	PORE PRESSURE RESPONSE		96%		
FINAL CONDITIONS	WATER CONTENT	w <sub>f</sub>	22.9%	%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE .024

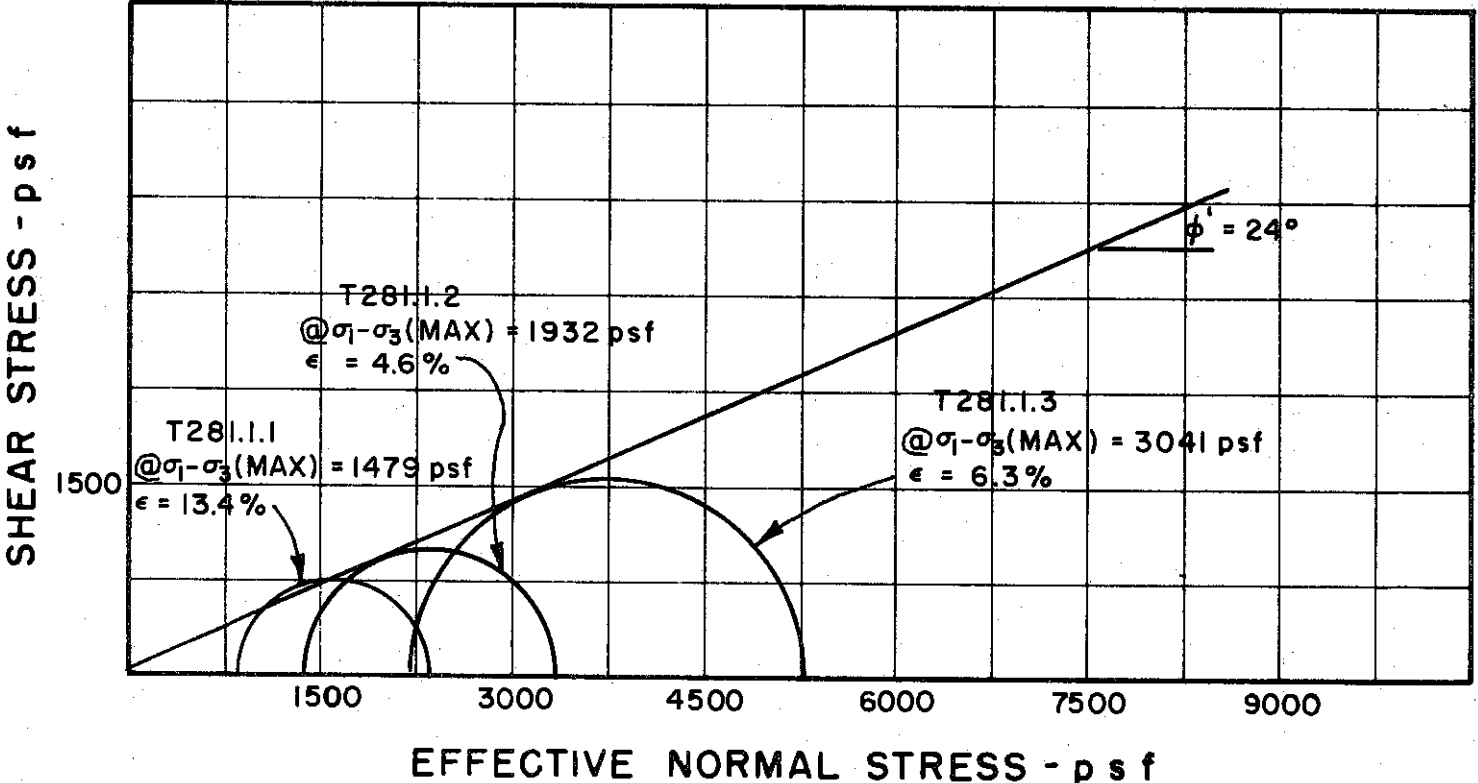
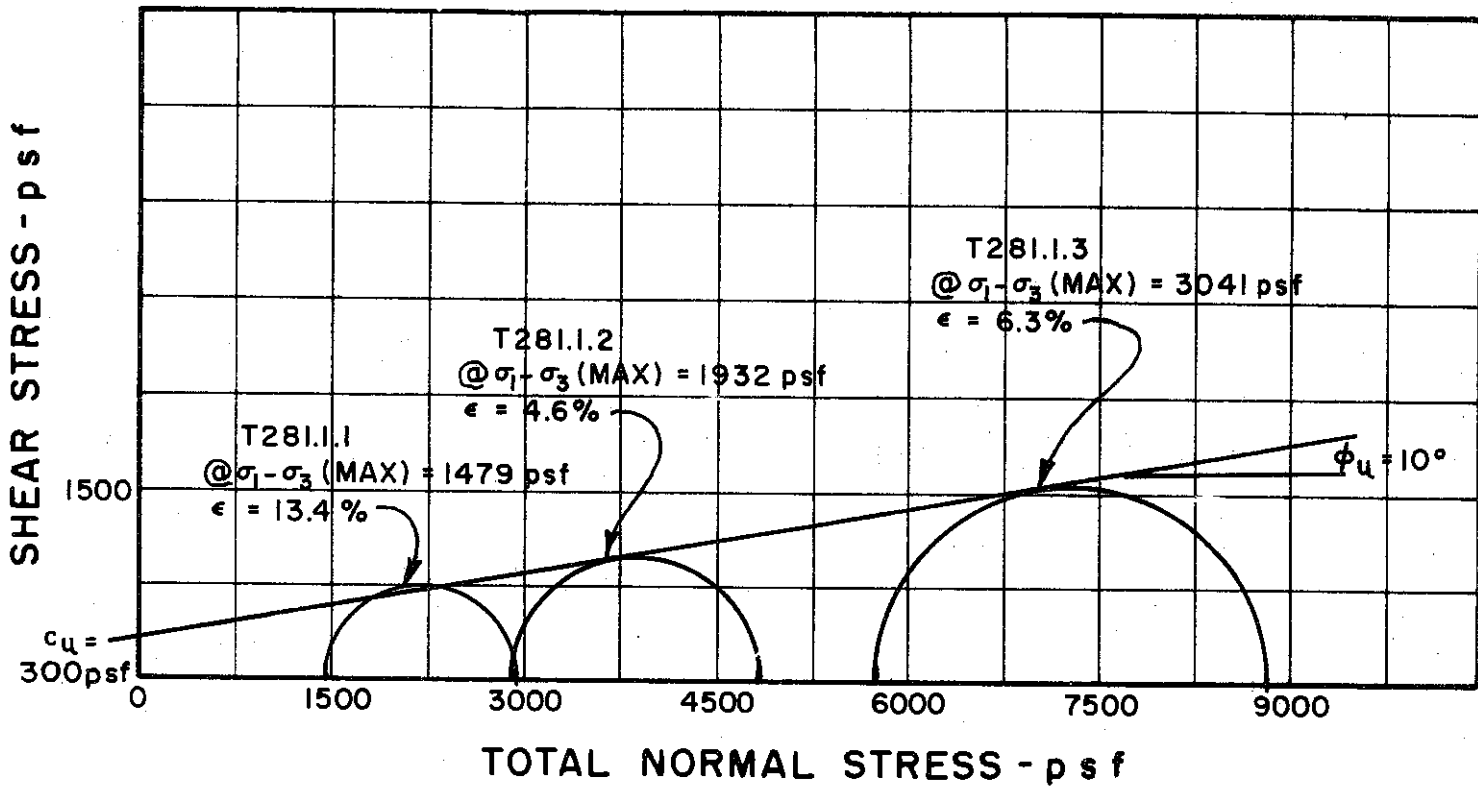
BORING NO. 26  
 SAMPLE NO. 28  
 DEPTH 128.0' TO 130.0'

SOIL DESCRIPTION SILTY CLAY WITH LAYERS OF FINE SAND & SILT

LIQUID LIMIT — PLASTIC LIMIT —

NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 7

DEPTH 28.0' TO 30.5'

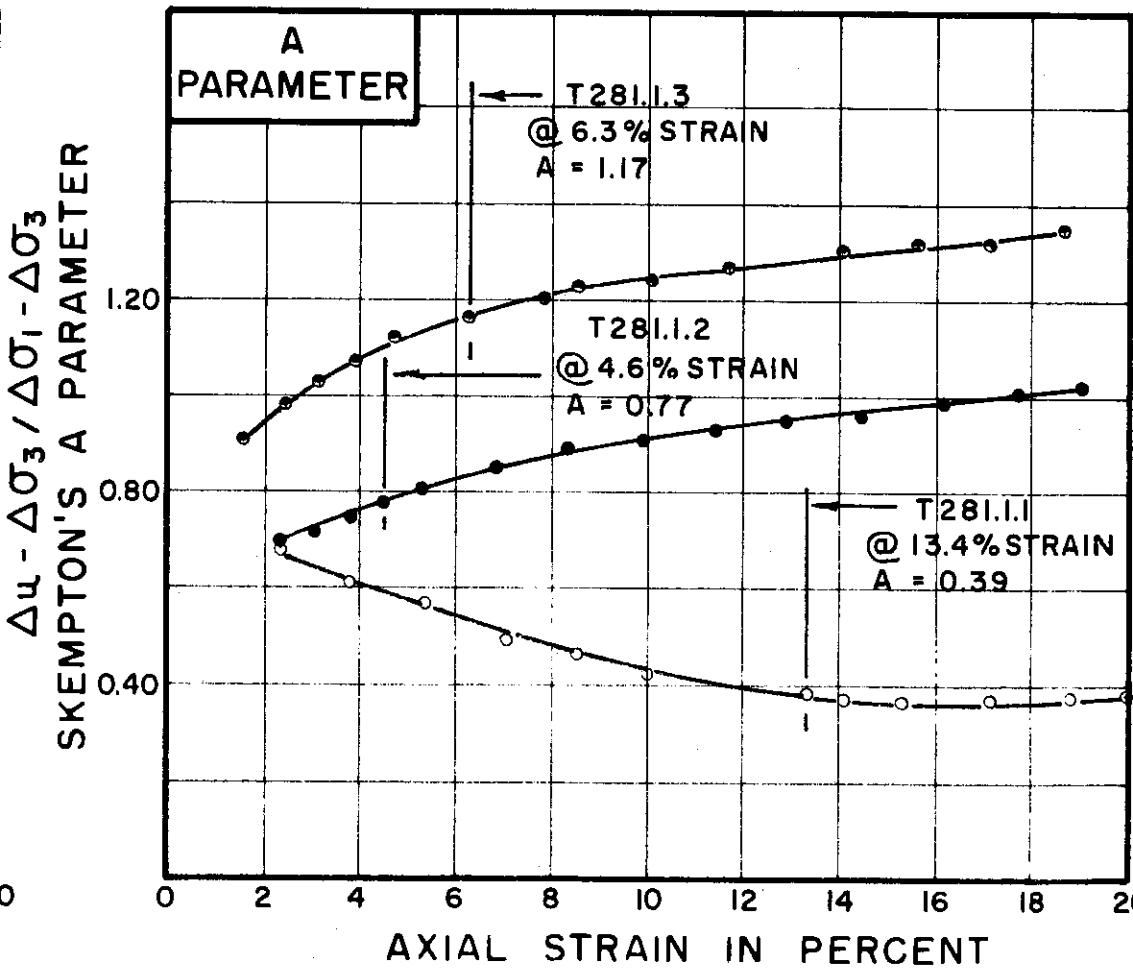
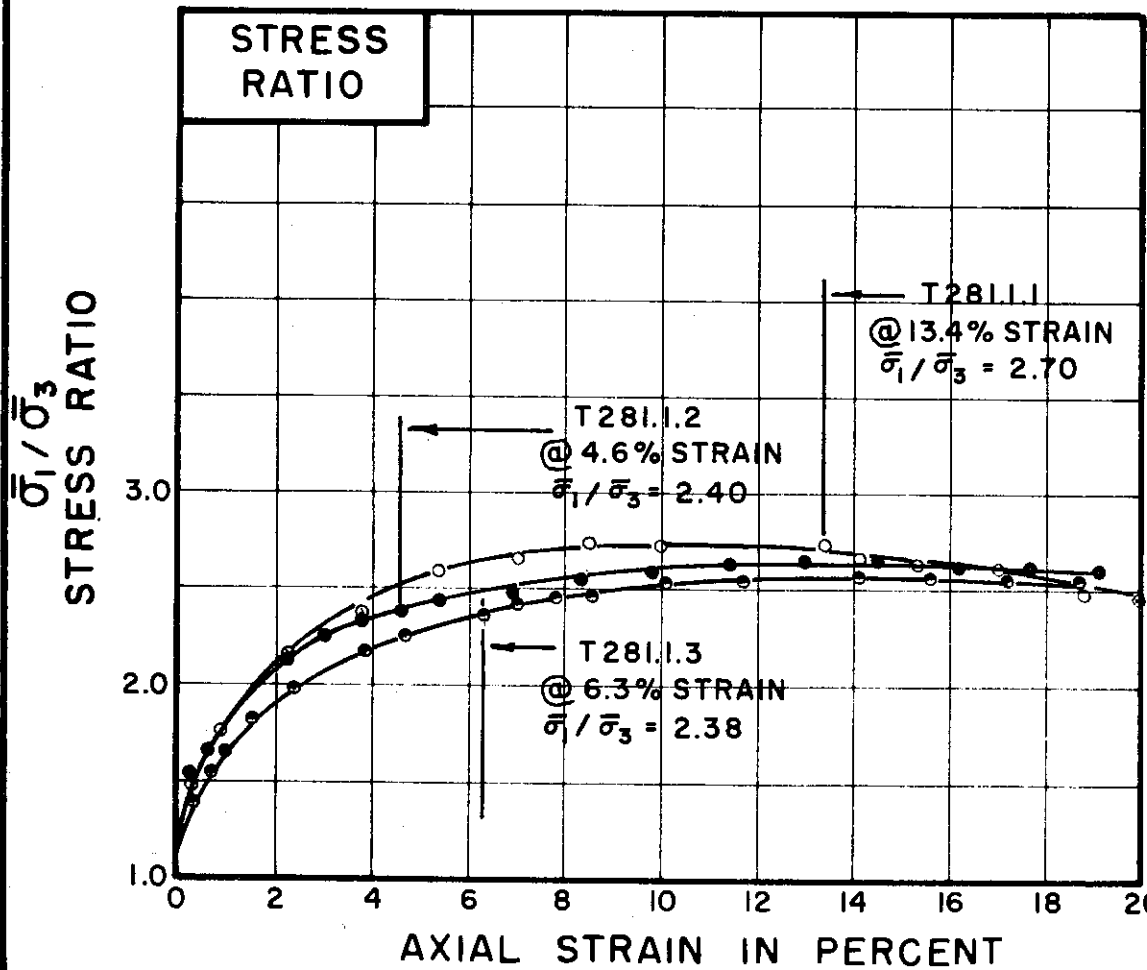
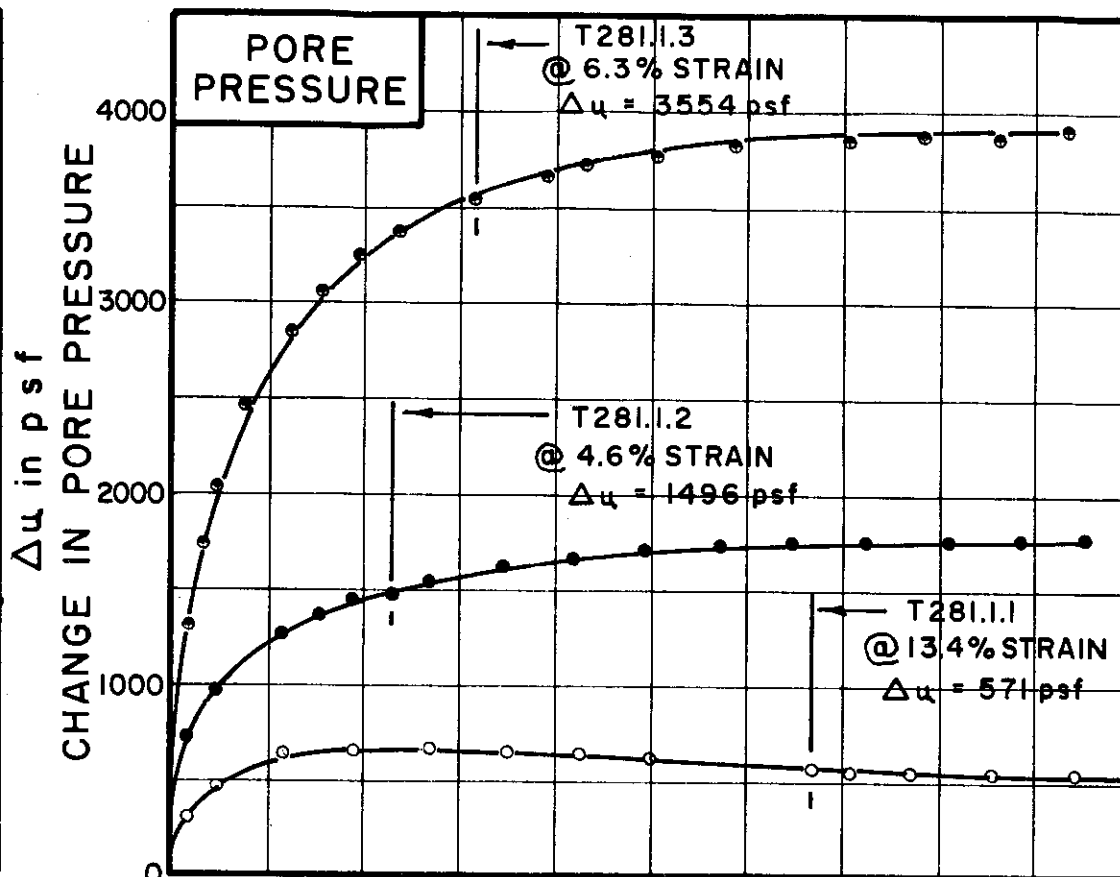
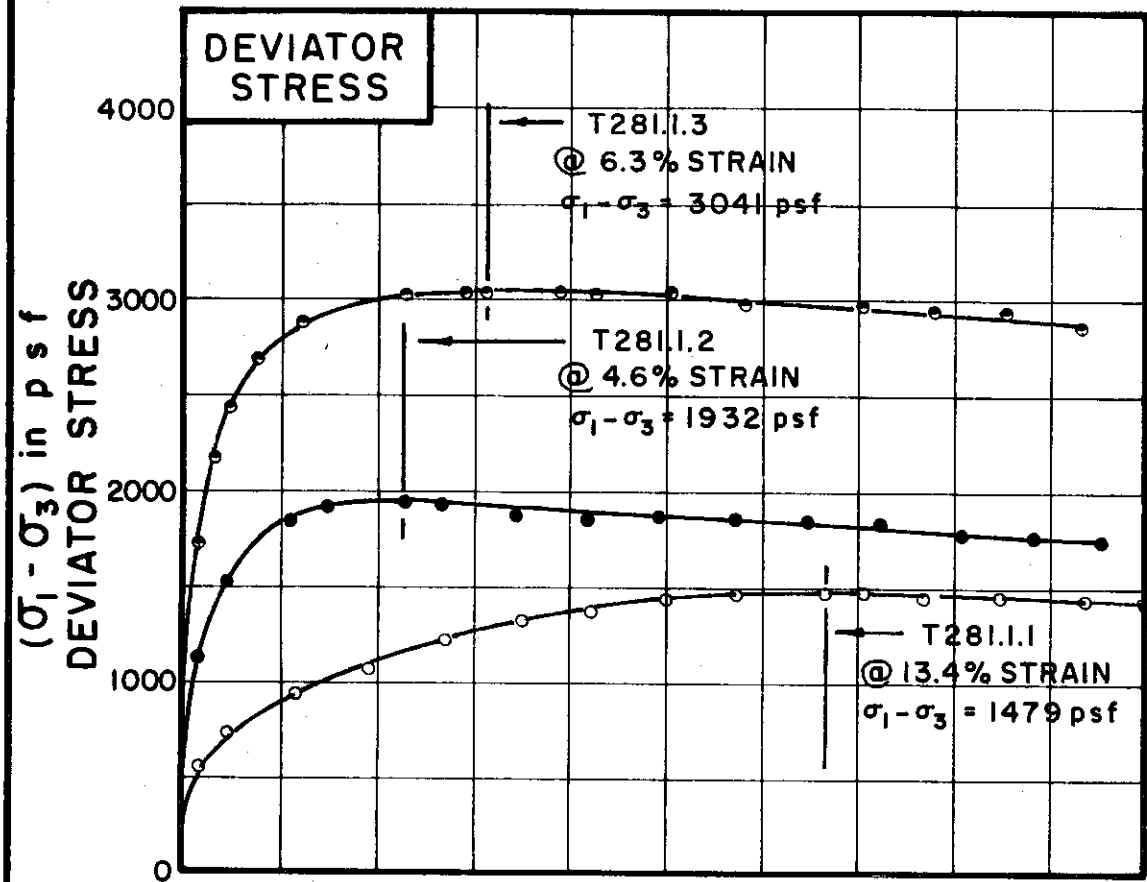
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



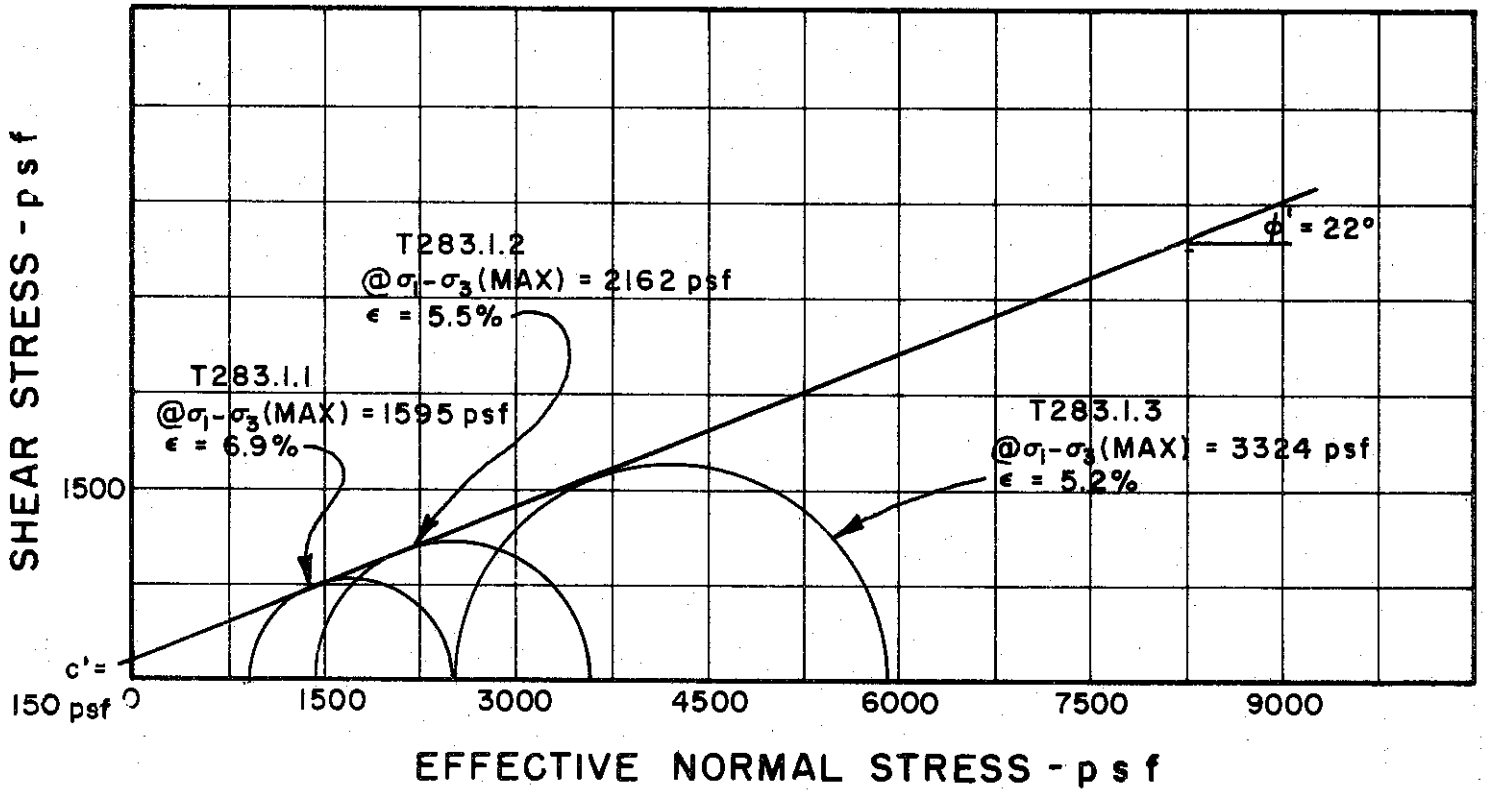
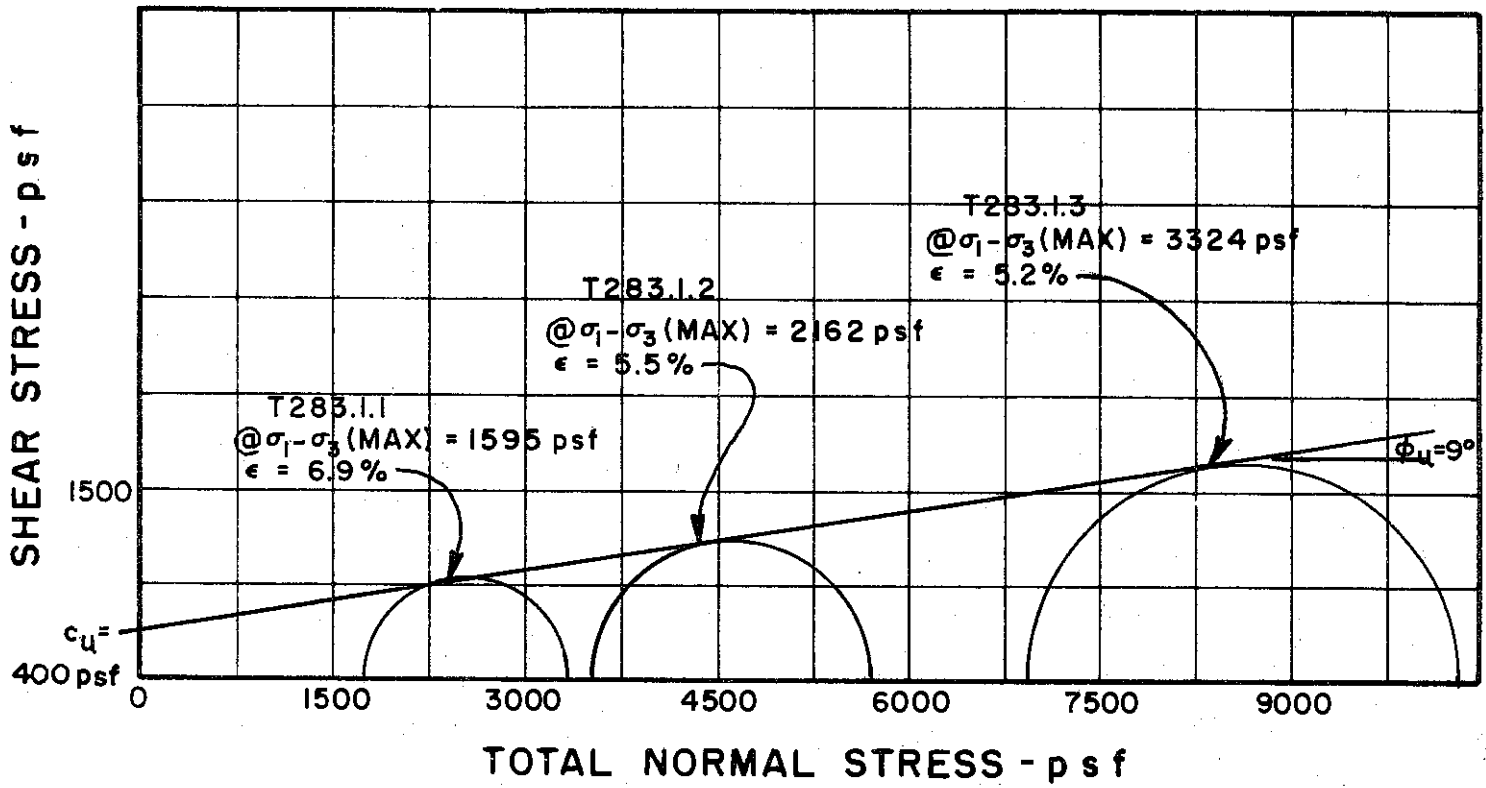
TEST NO. / SYMBOL	T281.1.1	T281.1.2	T281.1.3
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INITIAL CONDITIONS			T281.1.1	T281.1.2	T281.1.3
WATER CONTENT	w <sub>0</sub>		39.0%	39.7%	38.3%
DRY DENSITY	γ <sub>d</sub>	lb/cu ft	82	82	84
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.38	1.38	1.38
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.28	3.27	3.28
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	u <sub>0</sub>	psf	7200	7200	11520
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	psf	1440 / 2880	2880 / 5760	5760
VOLUMETRIC STRAIN	ε <sub>vol</sub>		2.96%	4.10%	7.21%
PORE PRESSURE RESPONSE			98%	98%	96%
FINAL CONDITIONS					
WATER CONTENT	w <sub>f</sub>		37.3%	36.6%	31.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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BORING NO. 33  
 SAMPLE NO. 7  
 DEPTH 28.0' TO 30.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 33

SAMPLE NO. 9

DEPTH 38.0' TO 40.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

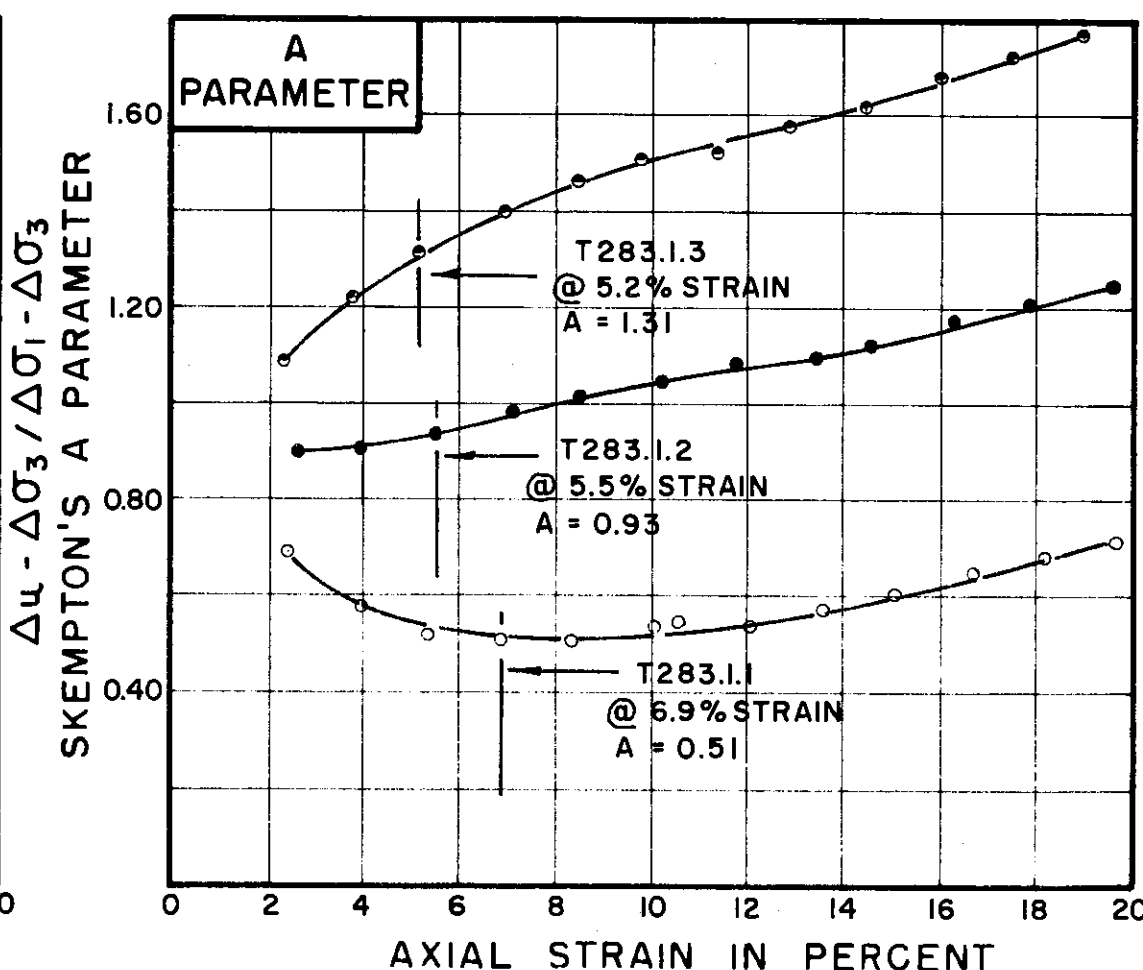
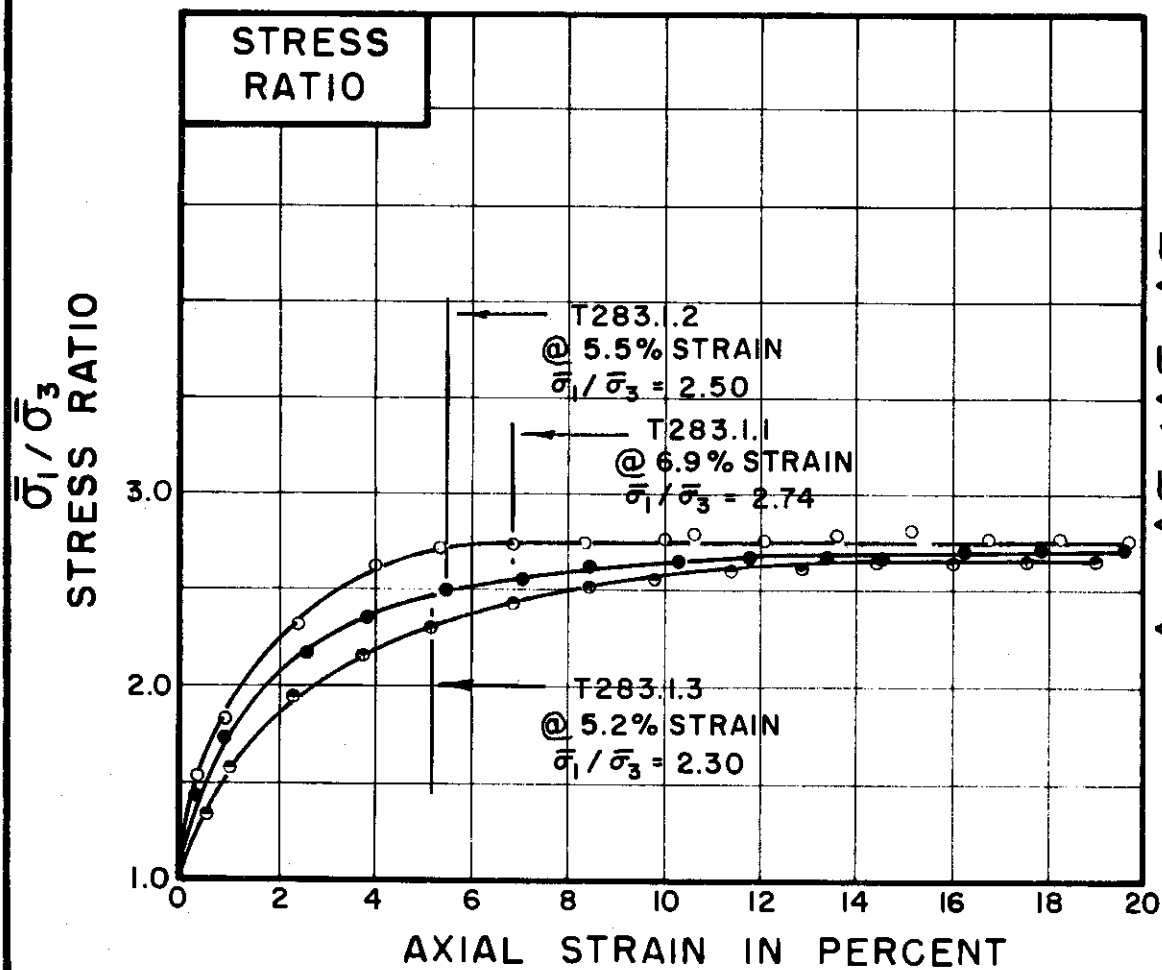
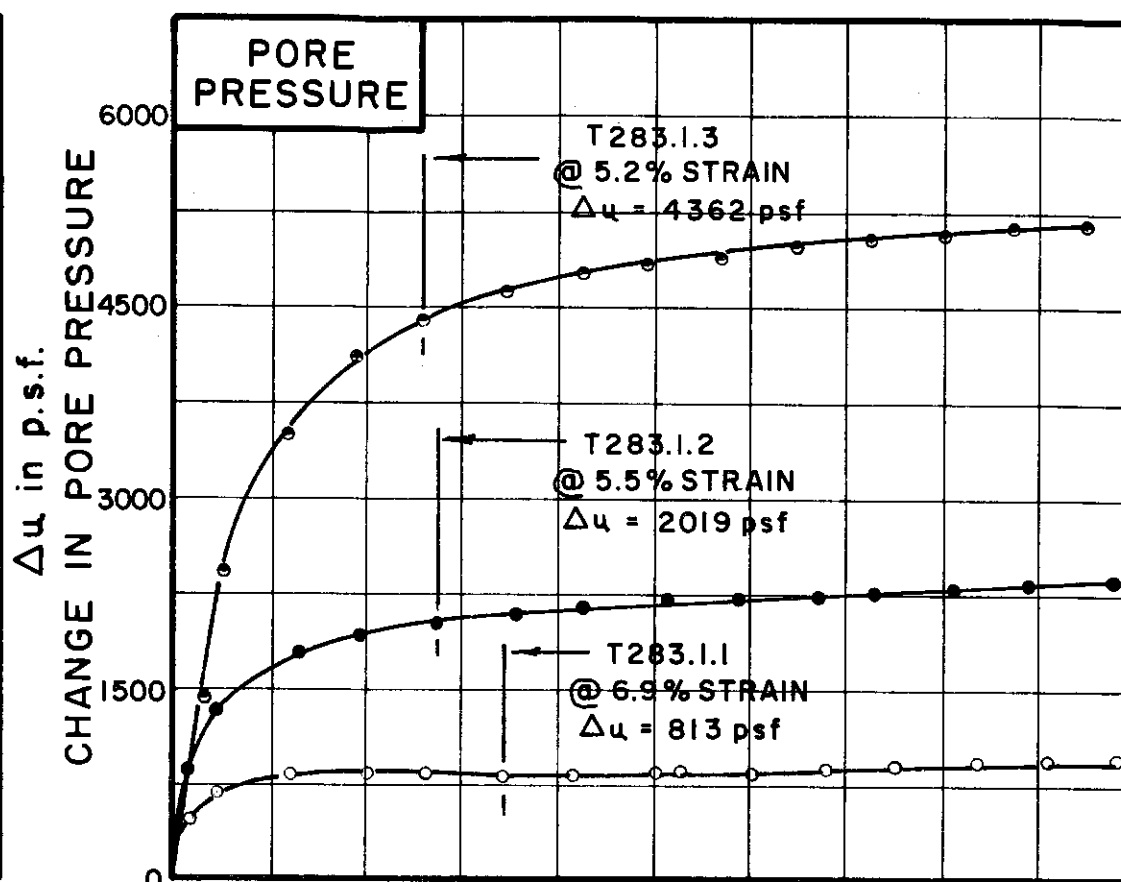
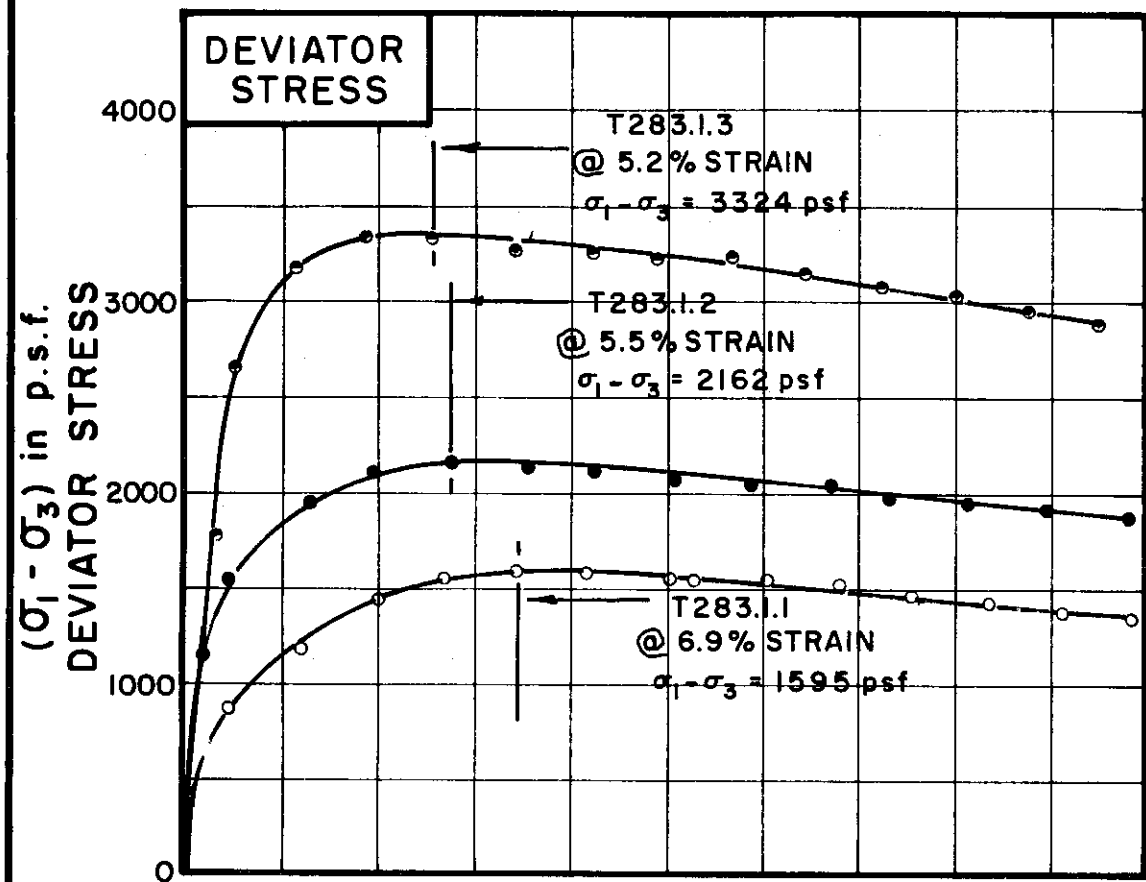
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-399



TEST NO. / SYMBOL	T283.1.1	T283.1.2	T283.1.3
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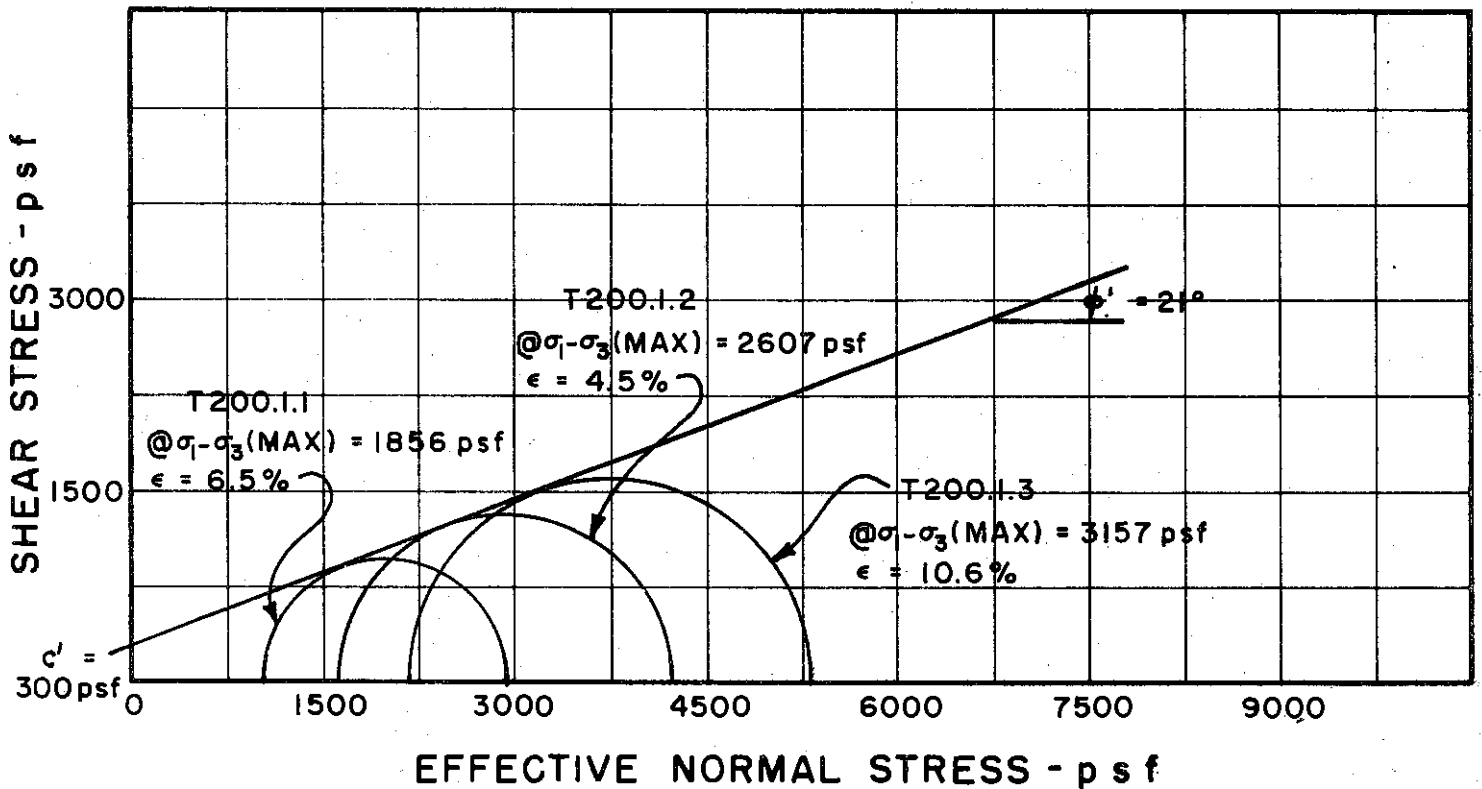
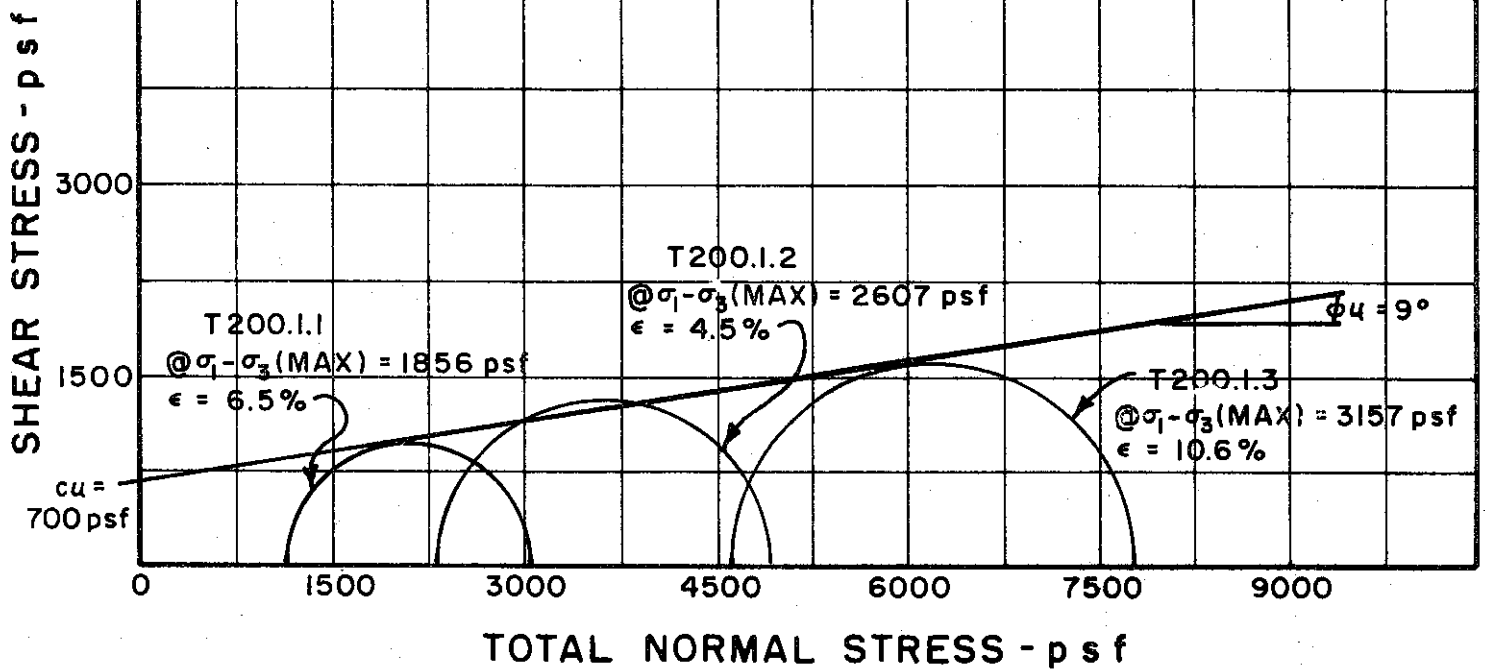
INITIAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_0$		37.4%	37.1%	36.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	85	86
SAMPLE DIAMETER	$D_0$	in.	1.40	1.39	1.39
SAMPLE HEIGHT	$H_0$	in.	3.31	3.25	3.32
CONDITIONS BEFORE SHEAR			T283.1.1	T283.1.2	T283.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	12960
INITIAL EFFECTIVE STRESS	$\frac{\bar{\sigma}_1}{\bar{\sigma}_3}$	p.s.f.	1728	3456	6912
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.35%	5.16%
PORE PRESSURE RESPONSE			96%	98%	95%
FINAL CONDITIONS			T283.1.1	T283.1.2	T283.1.3
WATER CONTENT	$w_f$		35.5%	33.6%	30.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.025	.024
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BORING NO. 33  
 SAMPLE NO. 9  
 DEPTH 38.0' TO 40.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 43 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

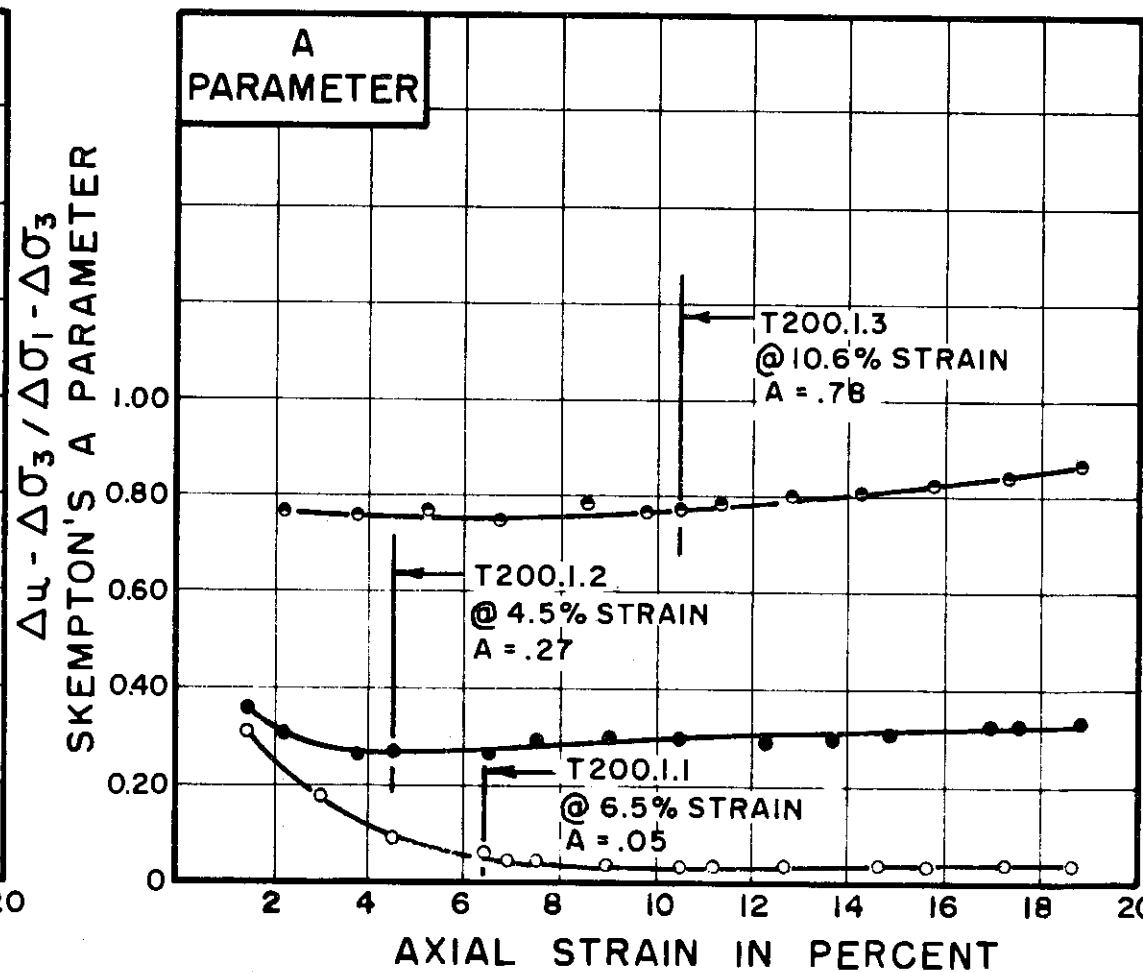
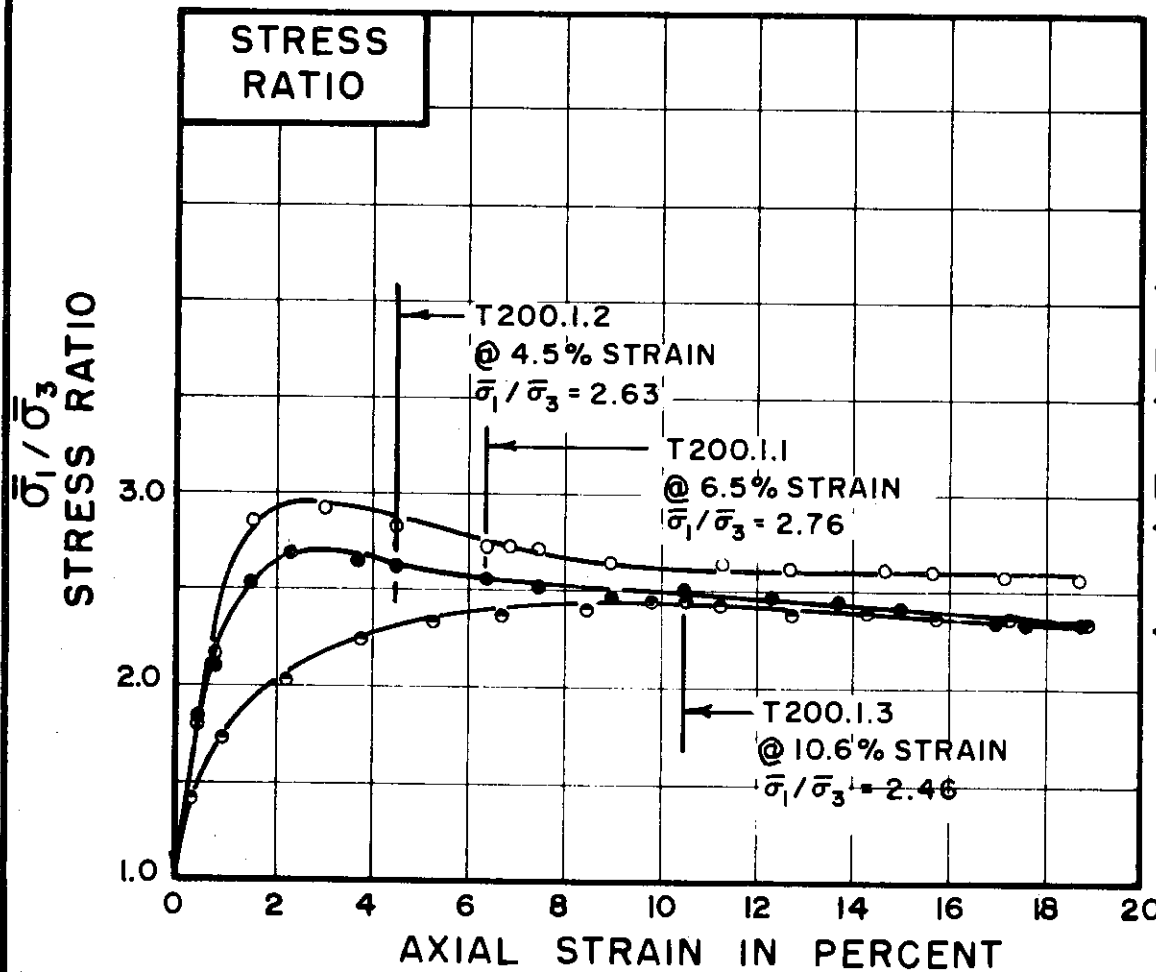
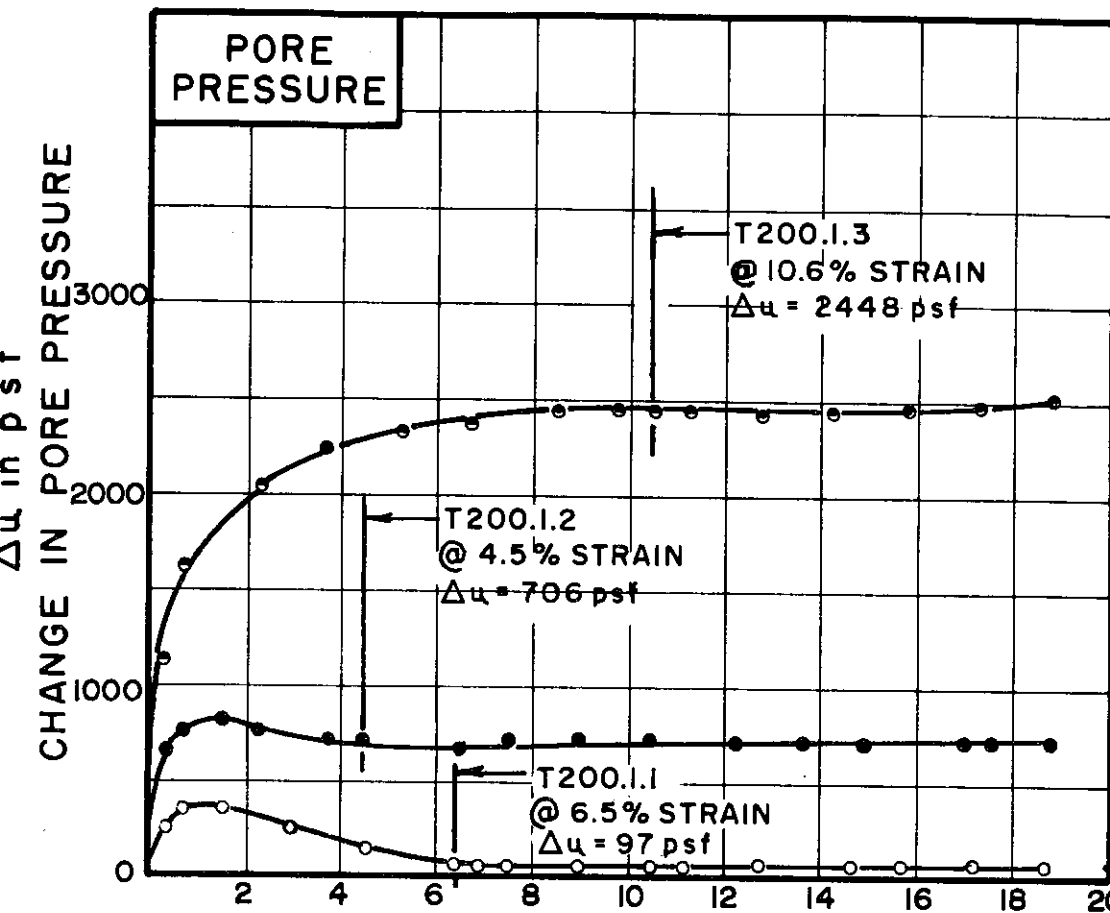
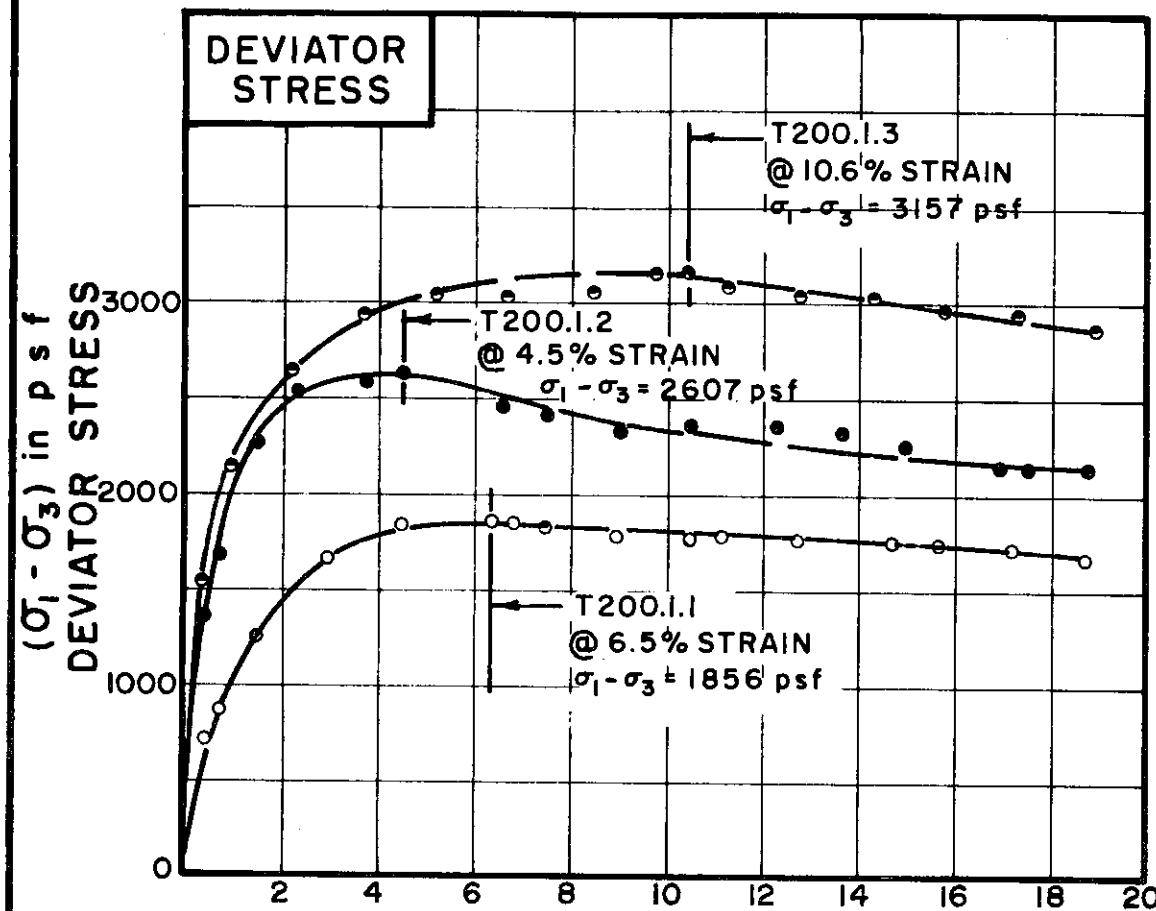
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-401



TEST NO. / SYMBOL	T200.1.1	T200.1.2	T200.1.3
	○	●	○

INITIAL CONDITIONS		T200.1.1	T200.1.2	T200.1.3
WATER CONTENT	$w_0$	32.8%	34.2%	35.6%
DRY DENSITY	$\gamma_d$ pcf	90	89	88
SAMPLE DIAMETER	$D_0$ in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$ in.	3.35	3.35	3.38
FINAL CONDITIONS BEFORE SHEAR		T200.1.1	T200.1.2	T200.1.3
FINAL BACK PRESSURE	$u_0$ psf	8640	8640	8640
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$ psf	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.6%	2.7%	5.9%
PORE PRESSURE RESPONSE		96%	99%	100%
FINAL CONDITIONS		T200.1.1	T200.1.2	T200.1.3
WATER CONTENT	$w_f$	32.1%	33.4%	31.0%
SKETCH OF SAMPLE AT END OF TEST				

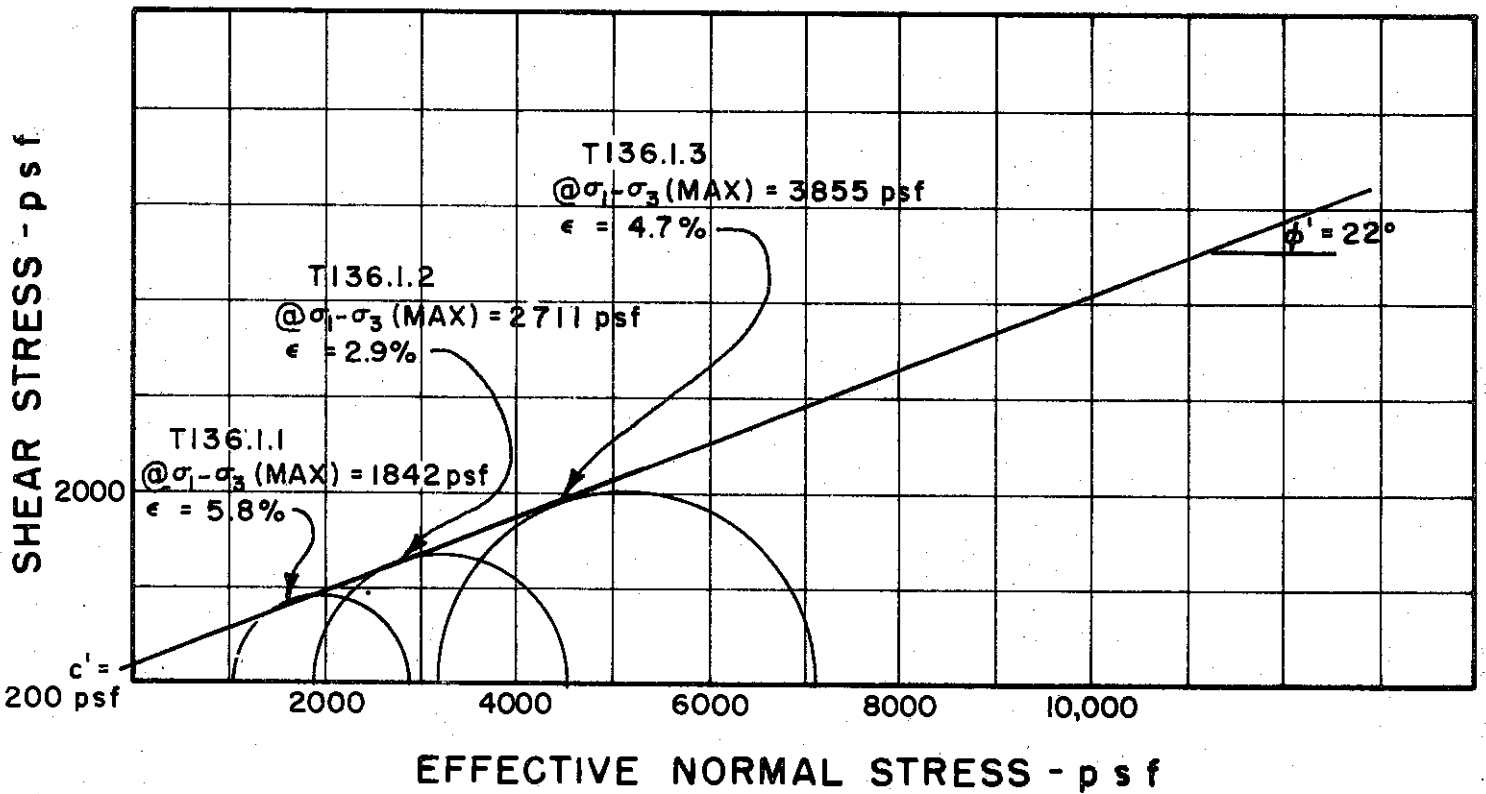
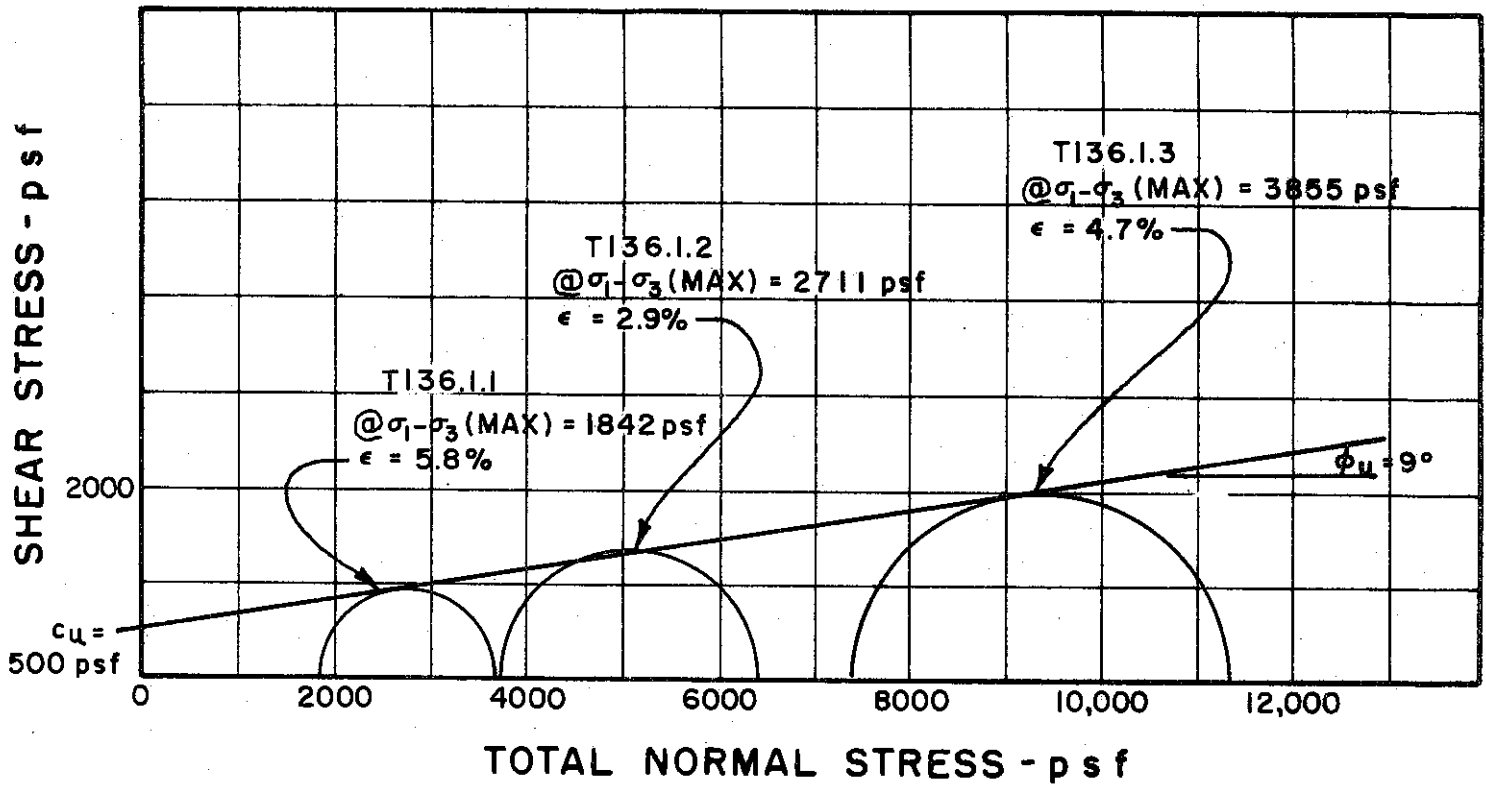
RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 48  
 SAMPLE NO. 6  
 DEPTH 18.0 TO 20.0  
 SOIL DESCRIPTION SILTY CLAY, (CL-CH)  
 LIQUID LIMIT 47 PLASTIC LIMIT 25

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 49

SAMPLE NO. 6

DEPTH 43.0' TO 45.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

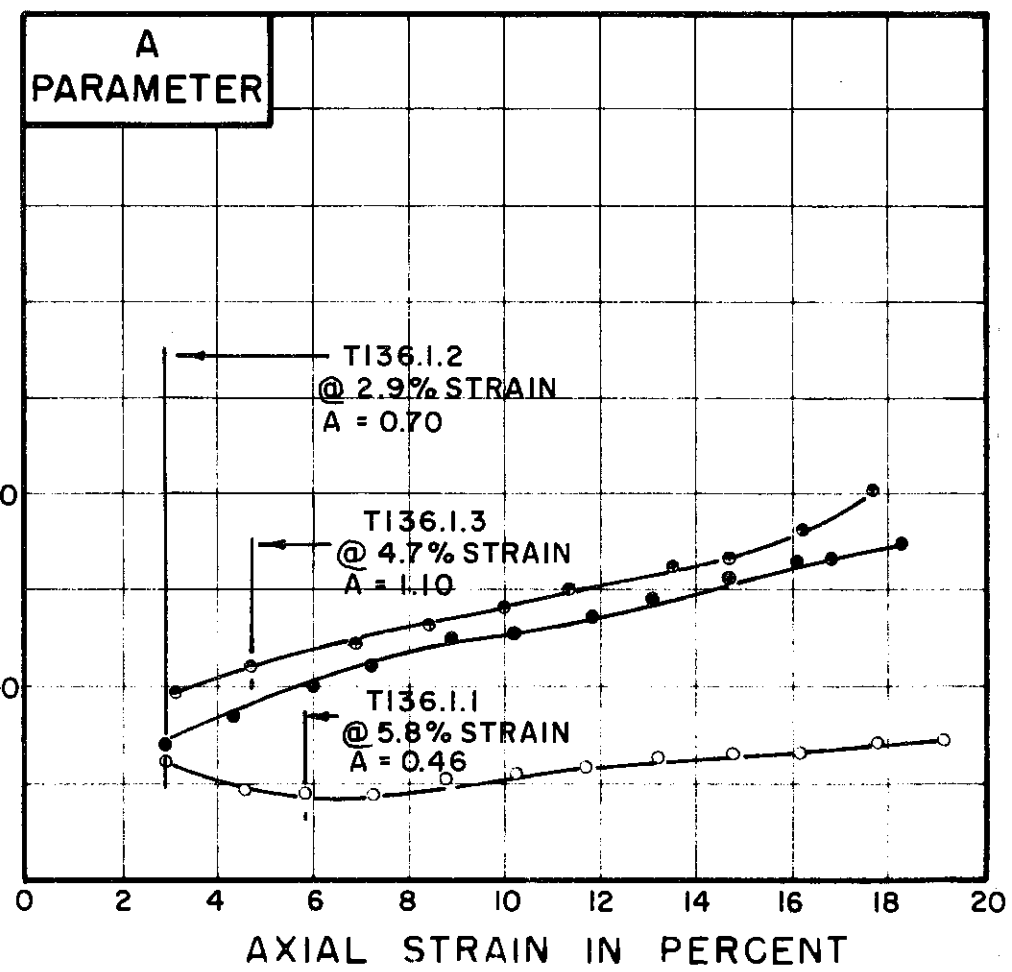
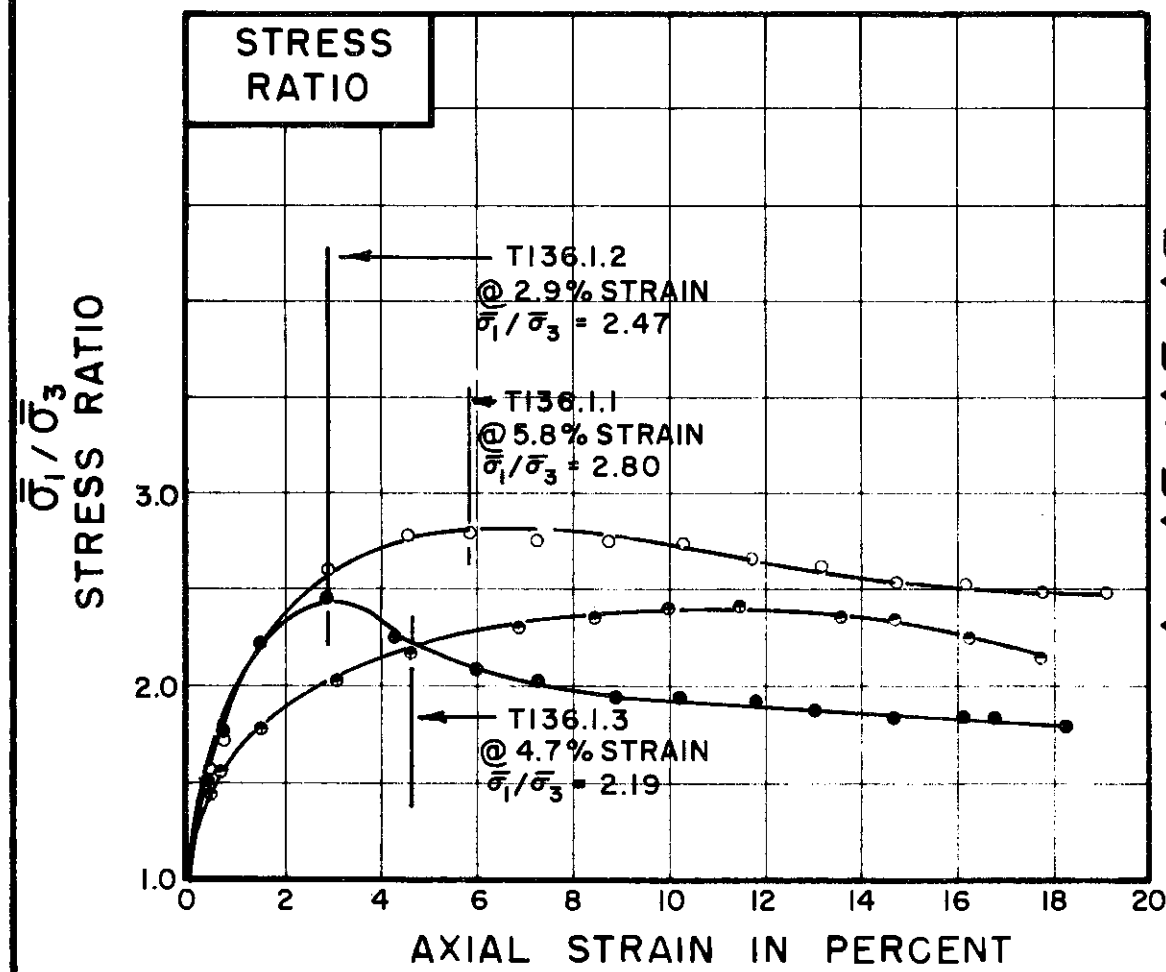
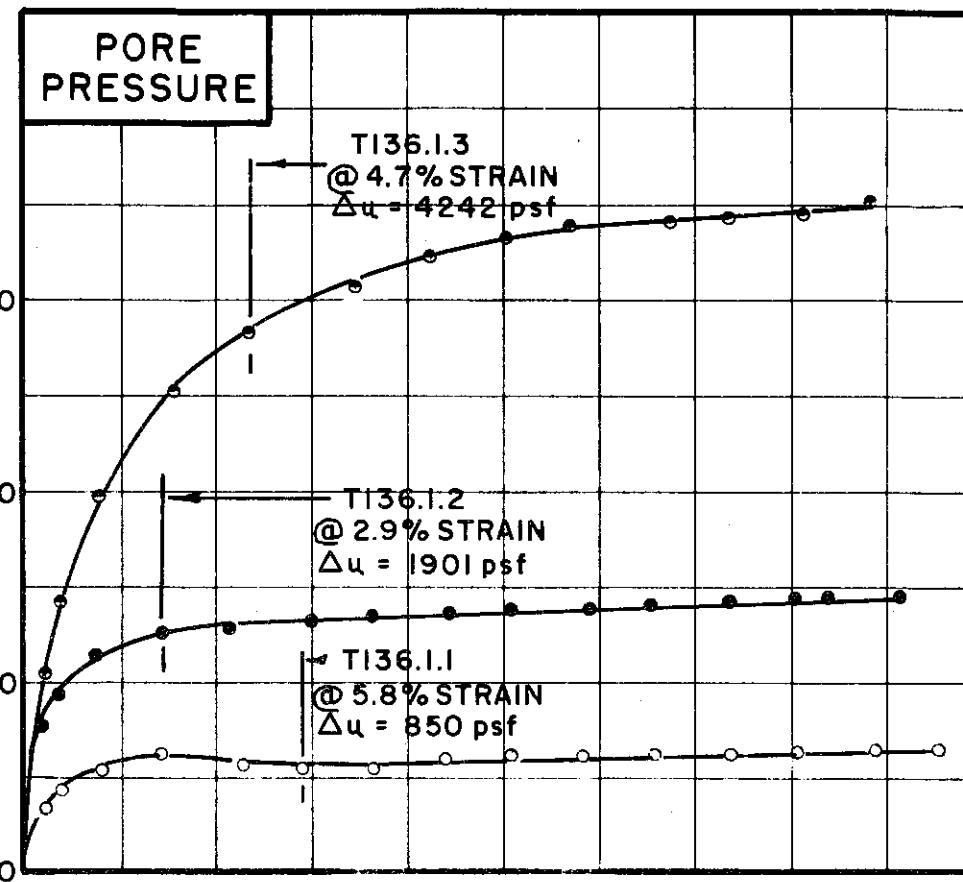
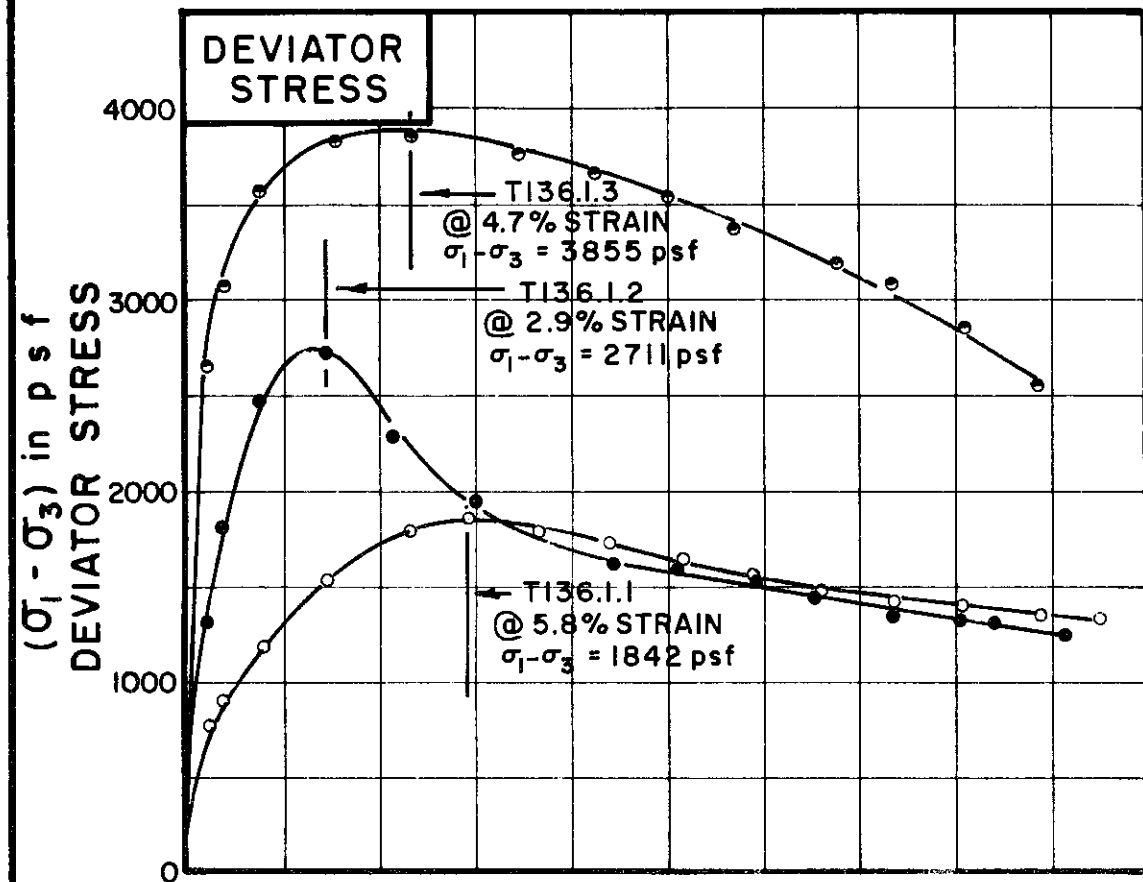
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-403



TEST NO. / SYMBOL	T136.1.1	T136.1.2	T136.1.3
	○	●	○

INITIAL CONDITIONS	WATER CONTENT	$w_0$	43.5%	46.3%	44.9%
		DRY DENSITY lb/cu ft	$\gamma_d$	78	75
	SAMPLE DIAMETER in.	$D_0$	1.40	1.40	1.41
	SAMPLE HEIGHT in.	$H_0$	3.43	3.45	3.34
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	11520	8640	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1872	3744	7488
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.55%	2.88%	8.59%
	PORE PRESSURE RESPONSE		98%	100%	96%
FINAL CONDITIONS	WATER CONTENT	$w_f$	41.5%	44.7%	38.5%
	SKETCH OF SAMPLE AT END OF TEST				

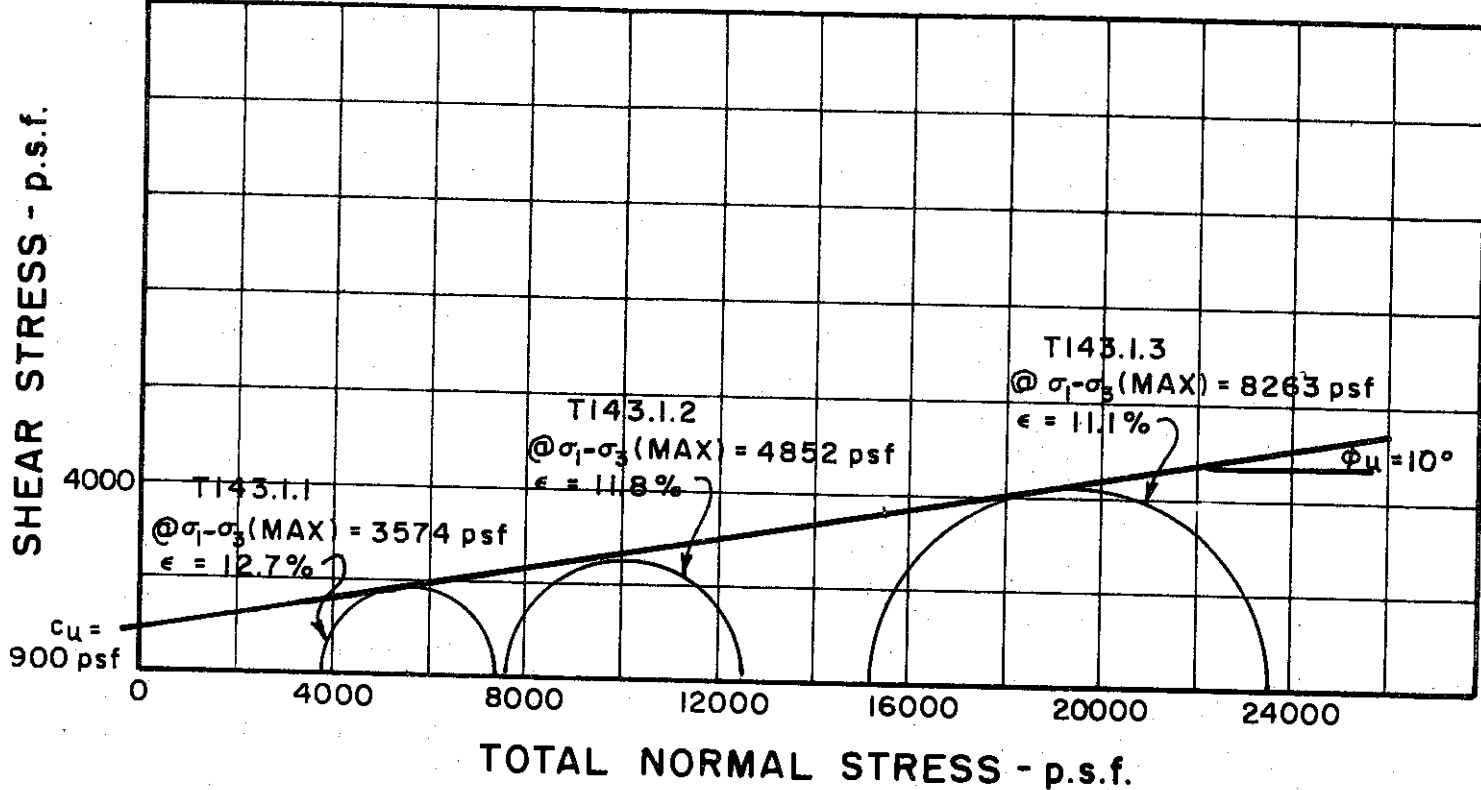
RATE OF STRAIN PERCENT/MINUTE	.024	.023	.025
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BORING NO. 49  
 SAMPLE NO. 6  
 DEPTH 43.0' TO 45.0'  
 SOIL DESCRIPTION SILTY CLAY (CH-CL)  
 LIQUID LIMIT 53 PLASTIC LIMIT 22

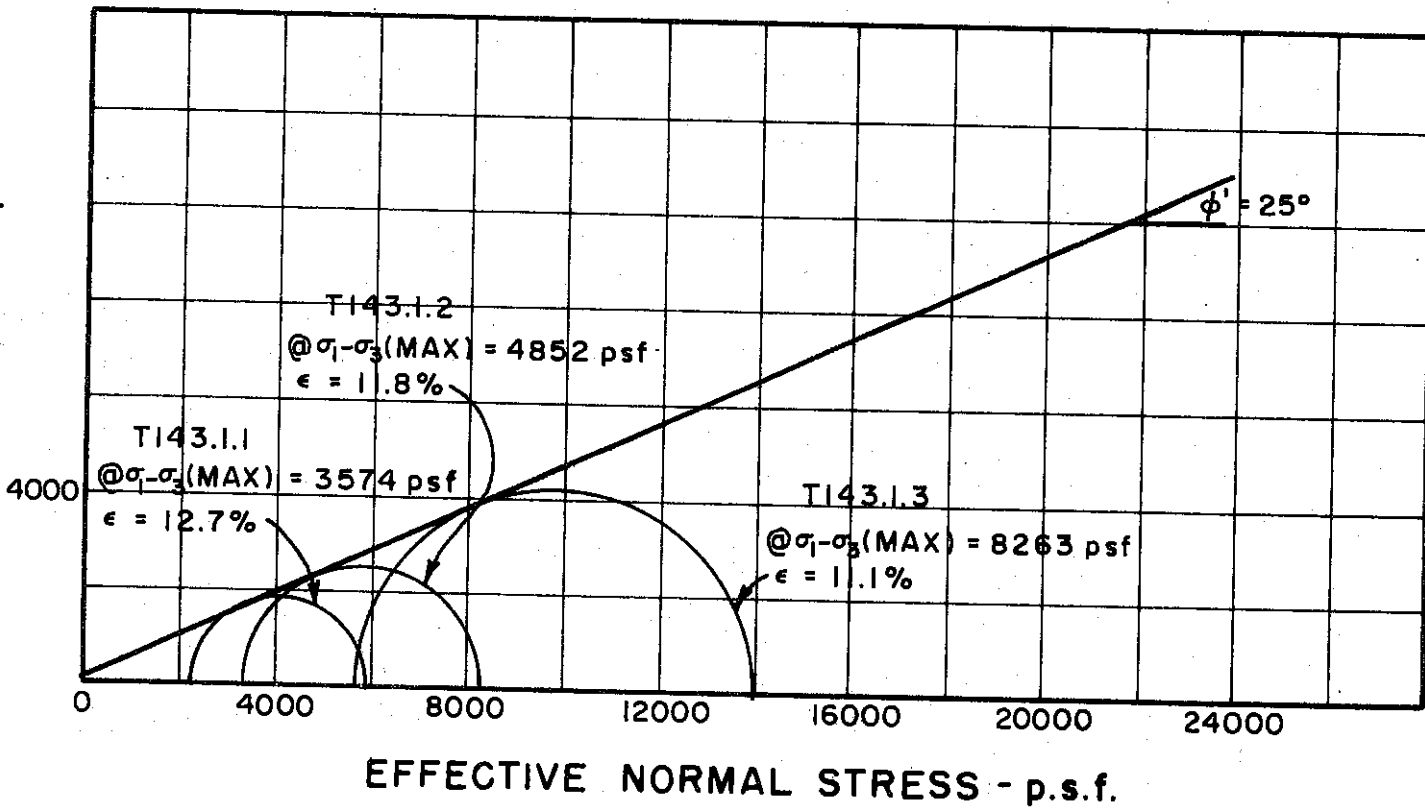
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p.s.f.



SHEAR STRESS - p.s.f.



BORING NO. 49

SAMPLE NO. 13

DEPTH 113.0' TO 115.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

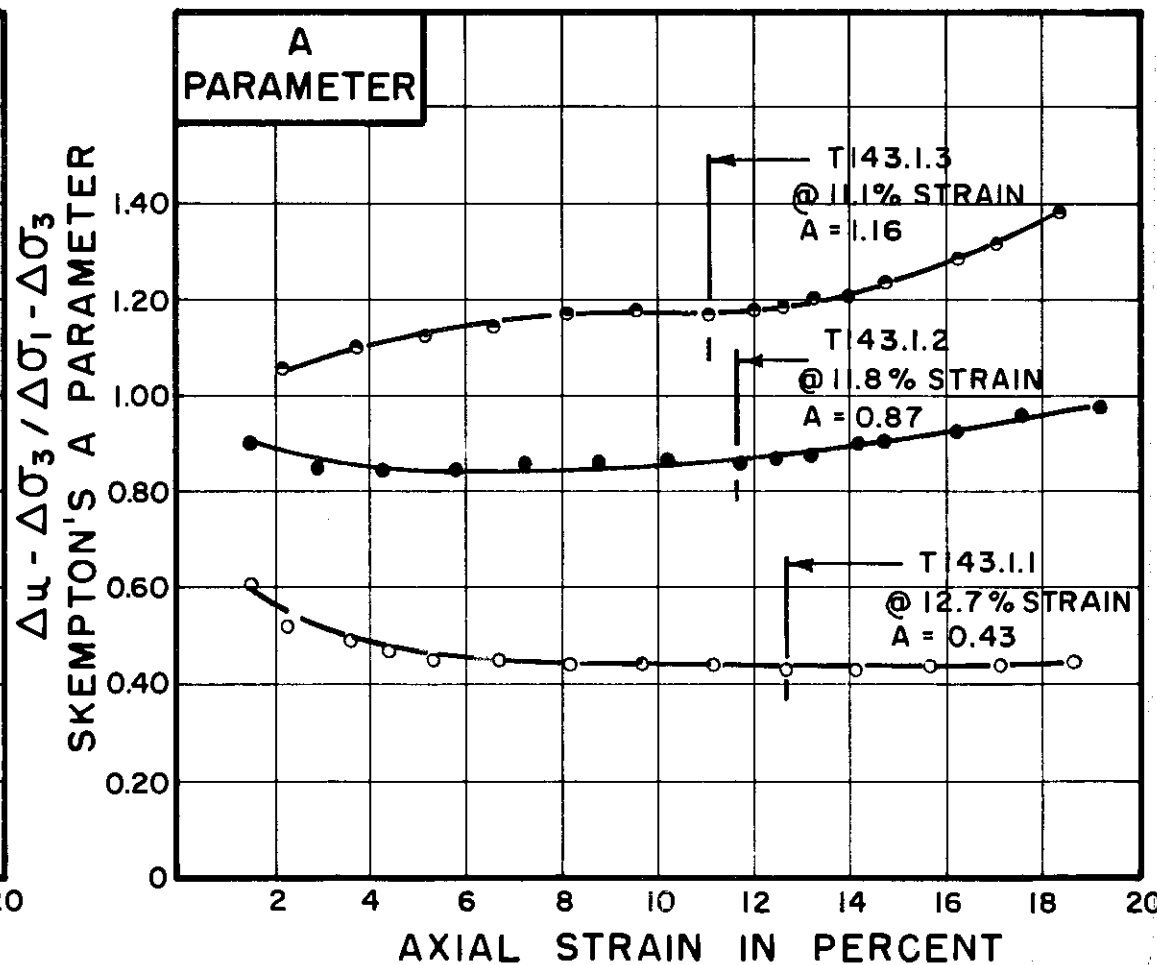
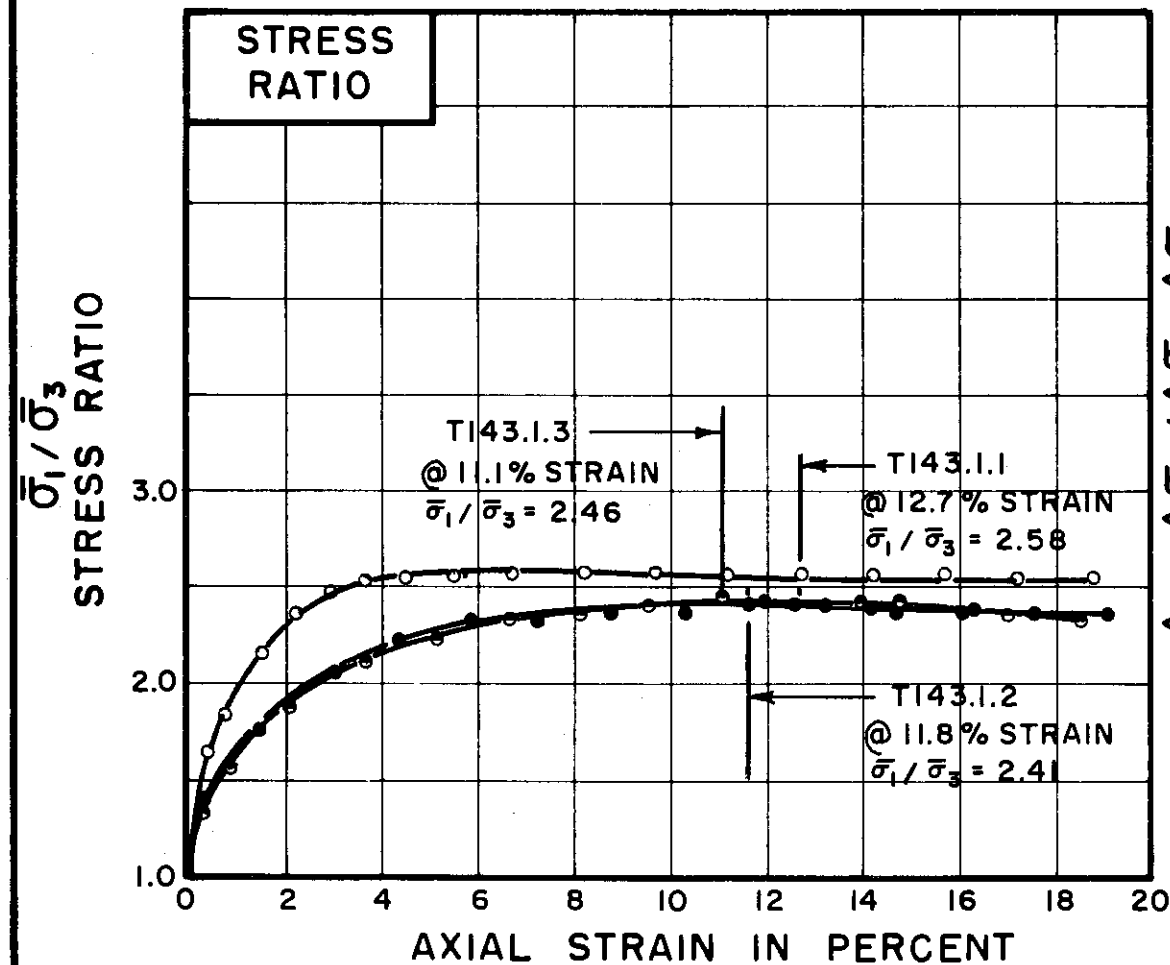
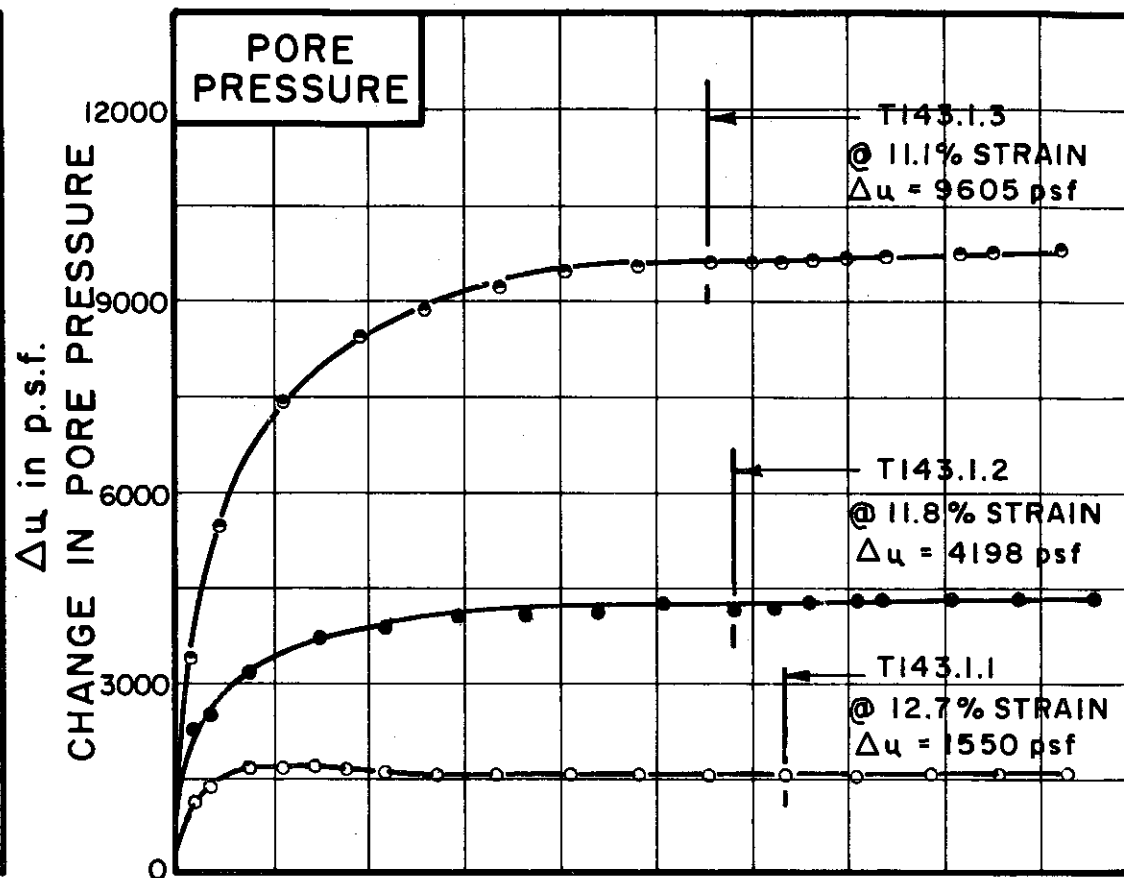
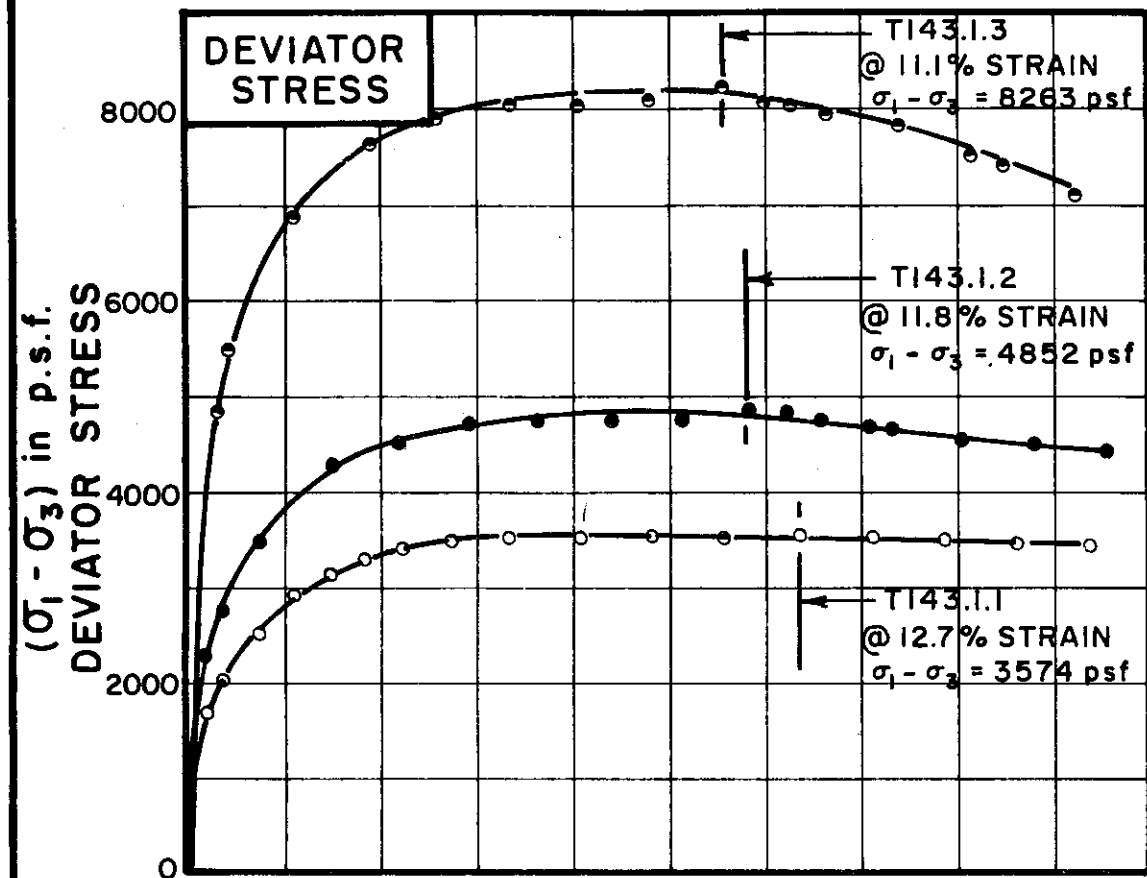
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-405



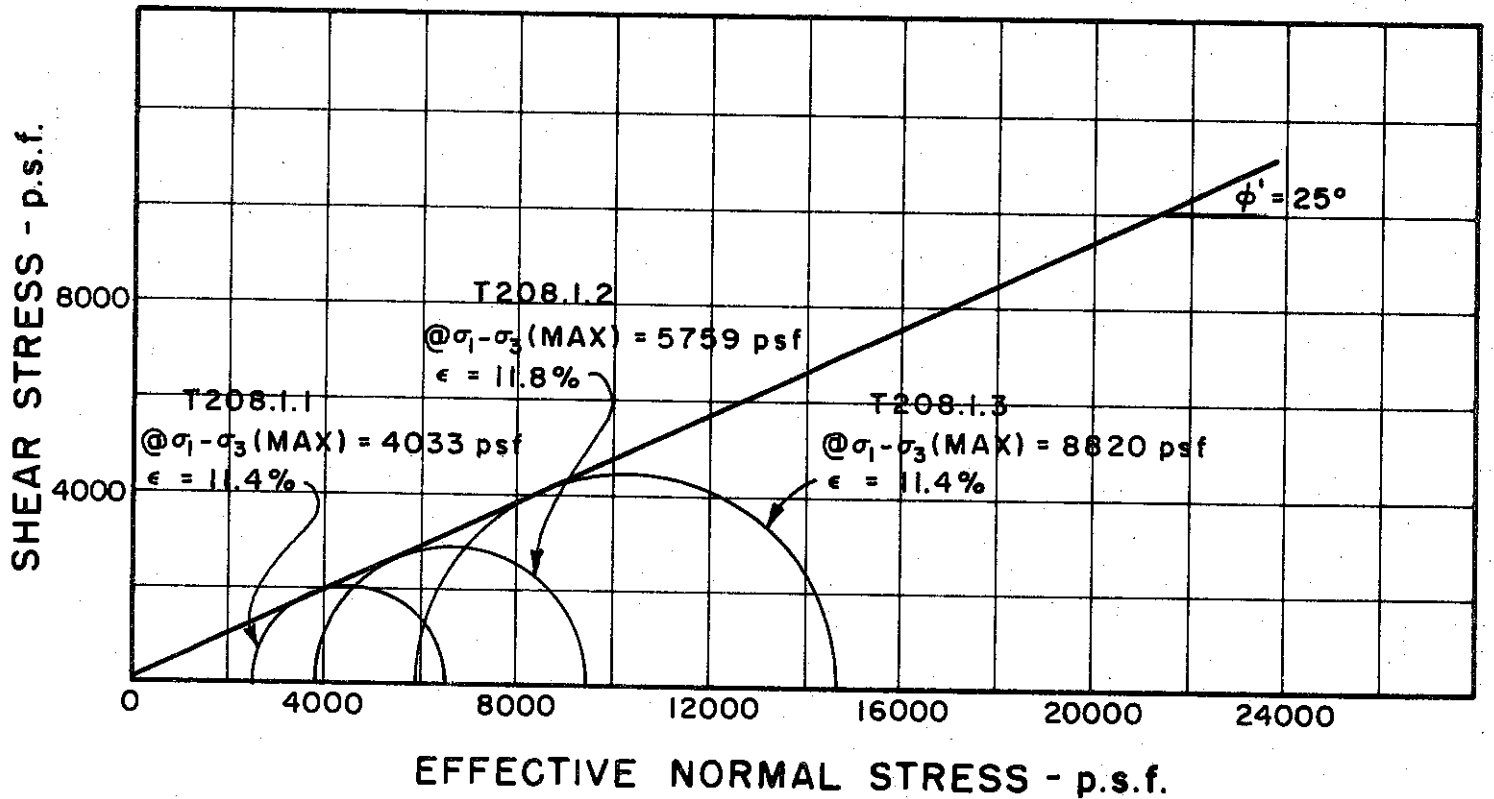
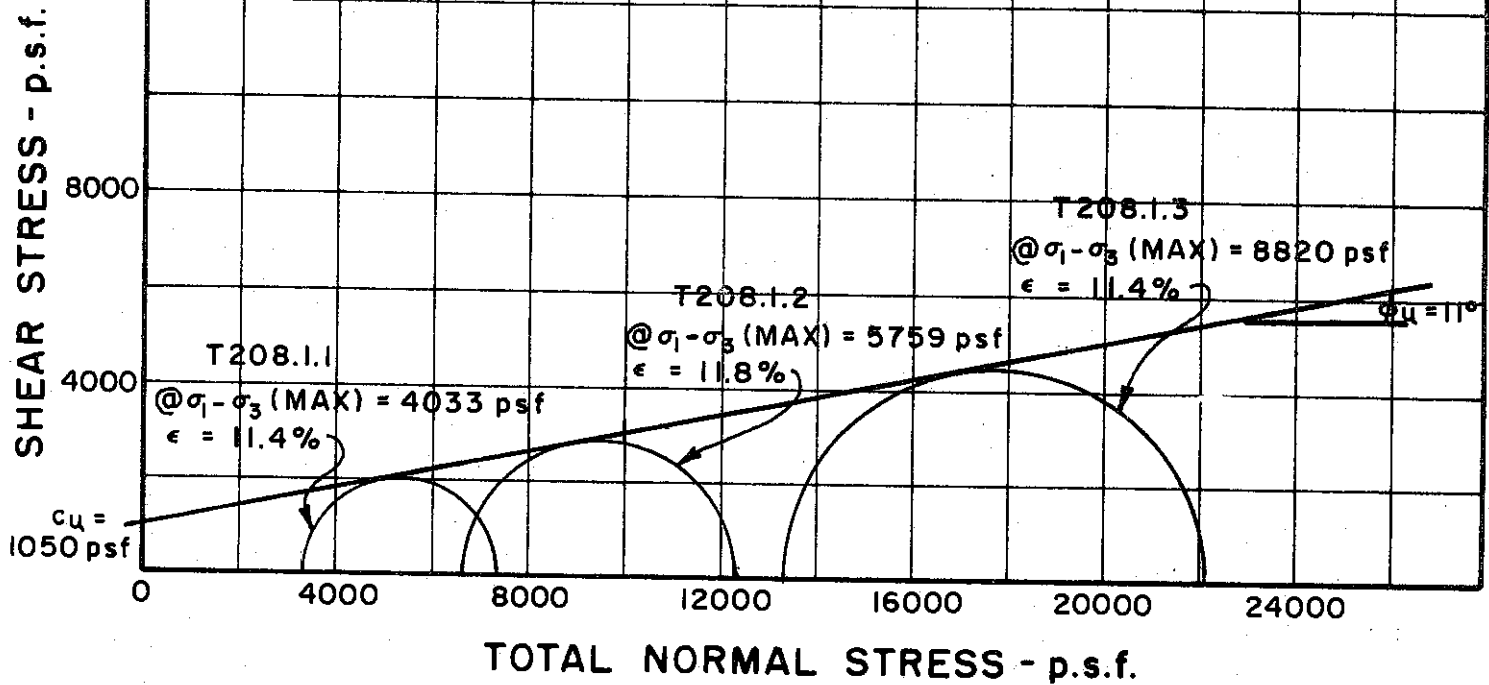
TEST NO. / SYMBOL	T143.1.1	T143.1.2	T143.1.3
	○	●	○

INITIAL CONDITIONS			T143.1.1	T143.1.2	T143.1.3
WATER CONTENT	$w_0$		24.0%	28.7%	29.2%
DRY DENSITY	$\gamma_d$	pcf	100	95	93
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.41
SAMPLE HEIGHT	$H_0$	in.	3.37	3.46	3.44
FINAL CONDITIONS BEFORE SHEAR			T143.1.1	T143.1.2	T143.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	11520	7200	7200
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	p.s.f.	3816	7632	15264
VOLUMETRIC STRAIN	$\epsilon_{vol}$		2.6%	5.1%	6.3%
PORE PRESSURE RESPONSE			95	100	100
FINAL CONDITIONS AFTER SHEAR			T143.1.1	T143.1.2	T143.1.3
WATER CONTENT	$w_f$		23.1%	26.5%	24.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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BORING NO. 49  
 SAMPLE NO. 13  
 DEPTH 113.0' TO 115.0'  
 SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 LIQUID LIMIT 33 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 48

SAMPLE NO. 22

DEPTH 98.0' TO 100.0'

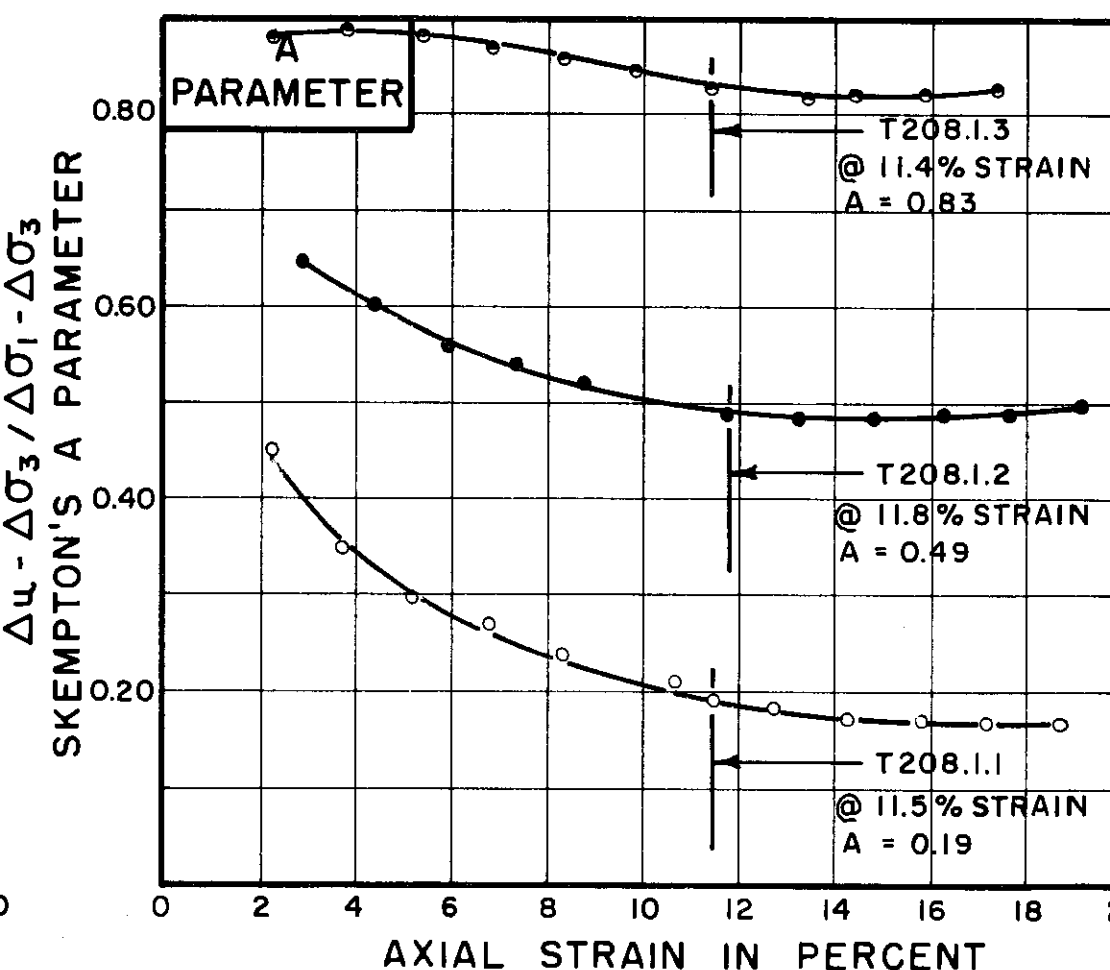
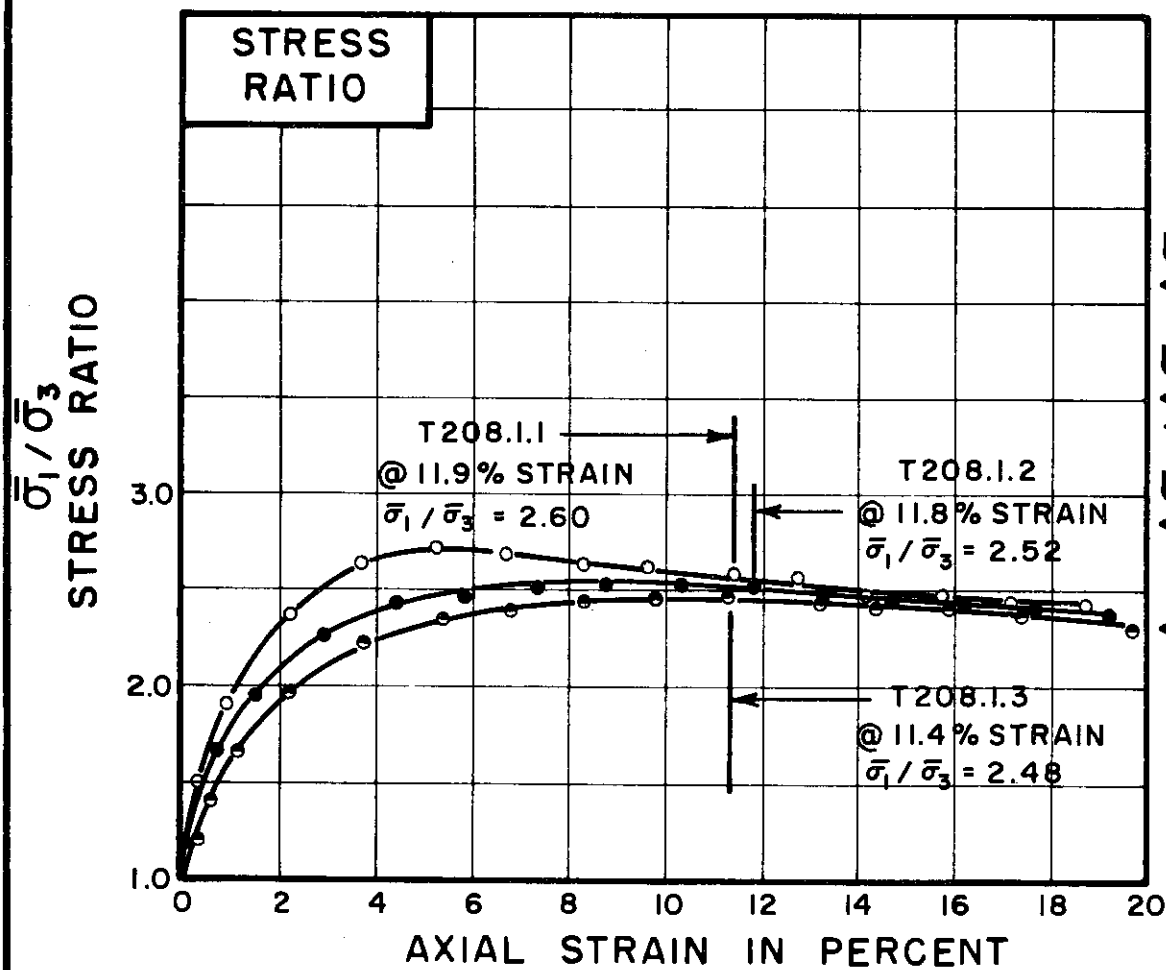
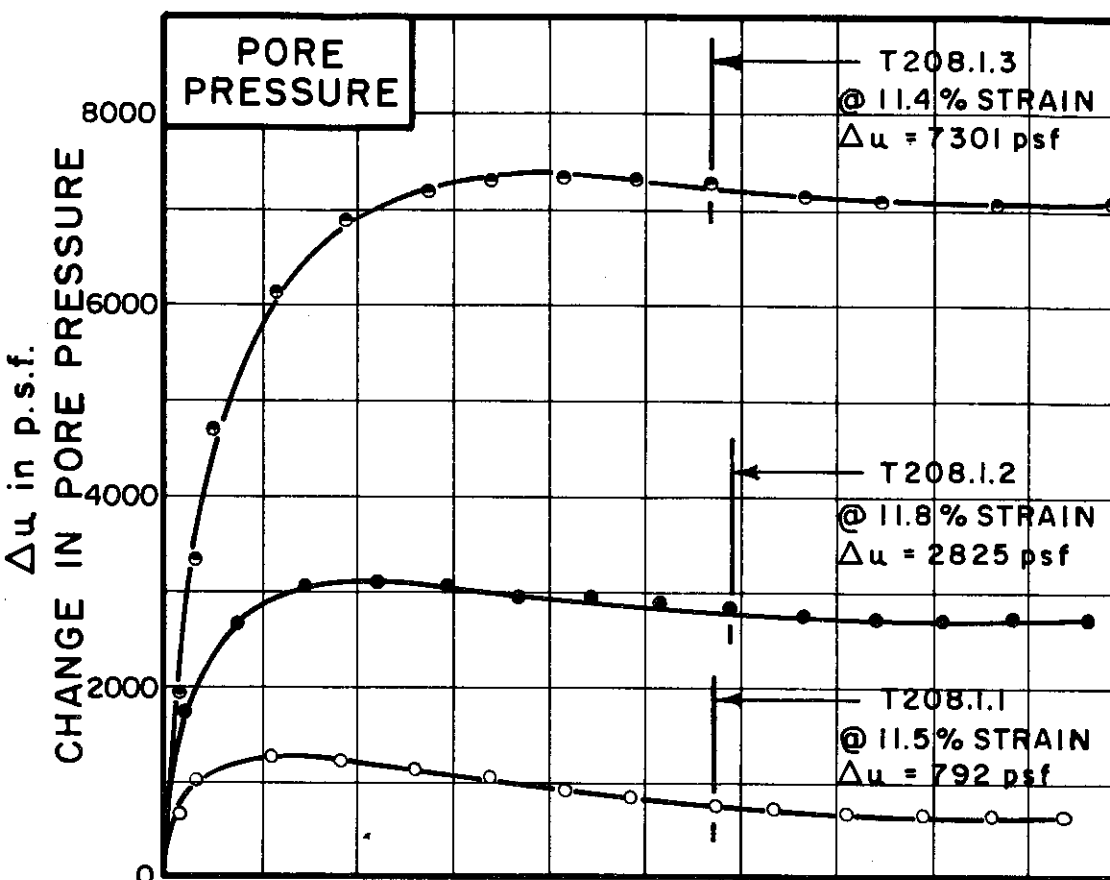
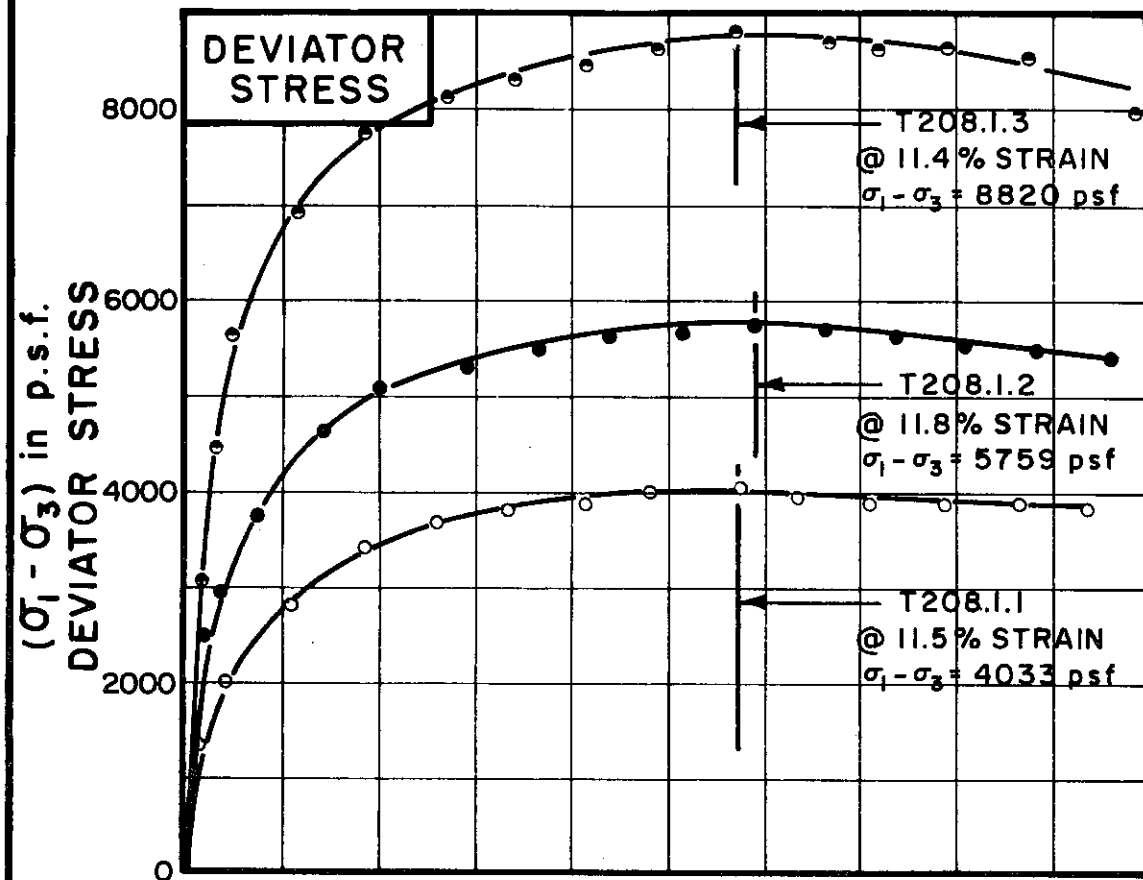
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T208.1.1	T208.1.2	T208.1.3
	○	●	○

INITIAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>0</sub>		26.8%	26.0%	27.6%
DRY DENSITY	γ <sub>d</sub>	pcf	99	96	97
SAMPLE DIAMETER	D <sub>0</sub>	in.	1.40	1.40	1.40
SAMPLE HEIGHT	H <sub>0</sub>	in.	3.36	3.44	3.32
FINAL CONDITIONS BEFORE SHEAR			T208.1.1	T208.1.2	T208.1.3
FINAL BACK PRESSURE	u <sub>0</sub>	p.s.f.	8640	11520	7200
INITIAL EFFECTIVE STRESS	σ̄ <sub>1</sub> / σ̄ <sub>3</sub>	p.s.f.	3312	6624	13248
VOLUMETRIC STRAIN	ε <sub>vol</sub>		3.0%	5.2%	7.8%
PORE PRESSURE RESPONSE			95%	94%	98%
FINAL CONDITIONS			T208.1.1	T208.1.2	T208.1.3
WATER CONTENT	w <sub>f</sub>		25.3%	23.7%	22.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024
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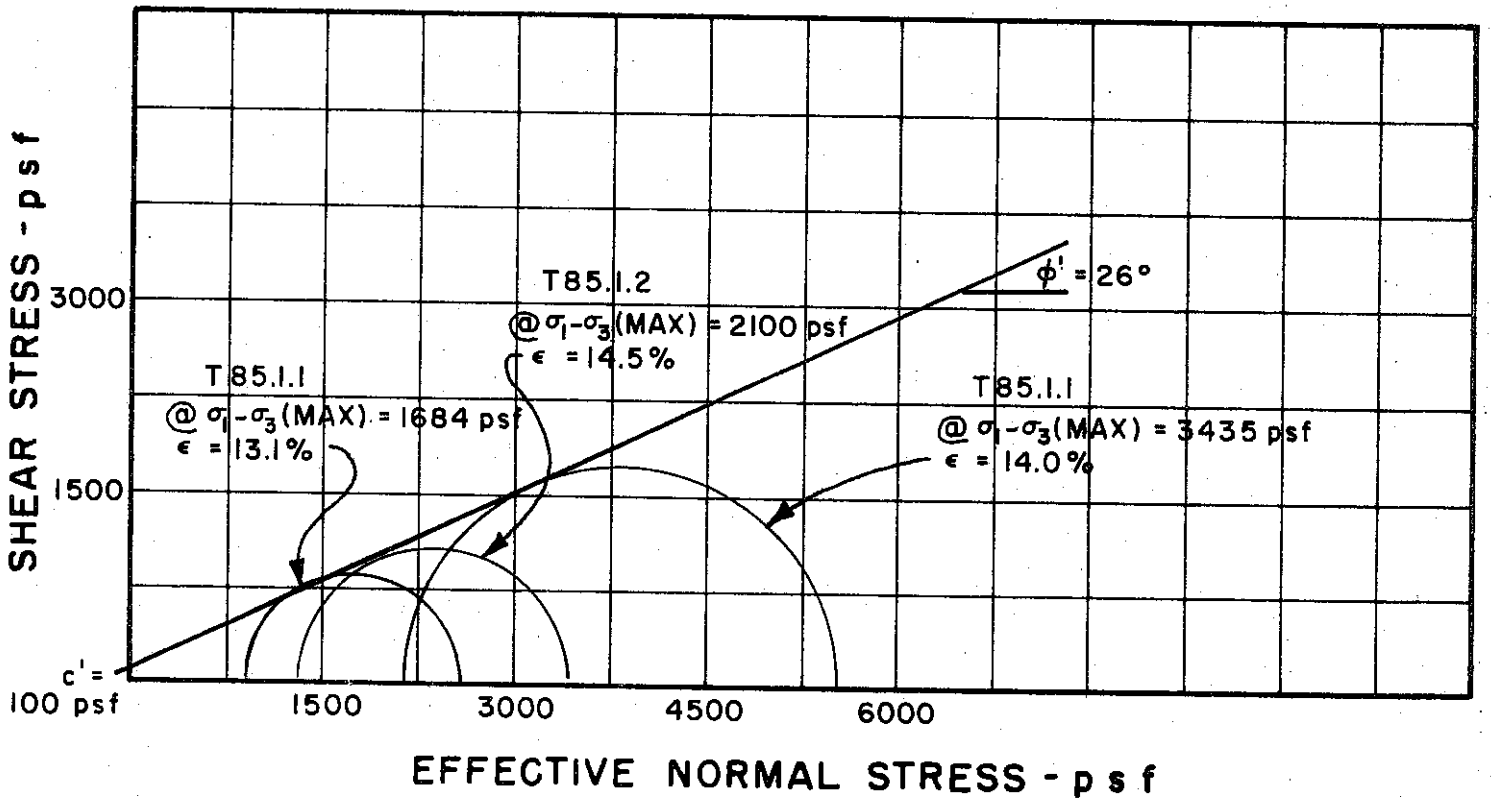
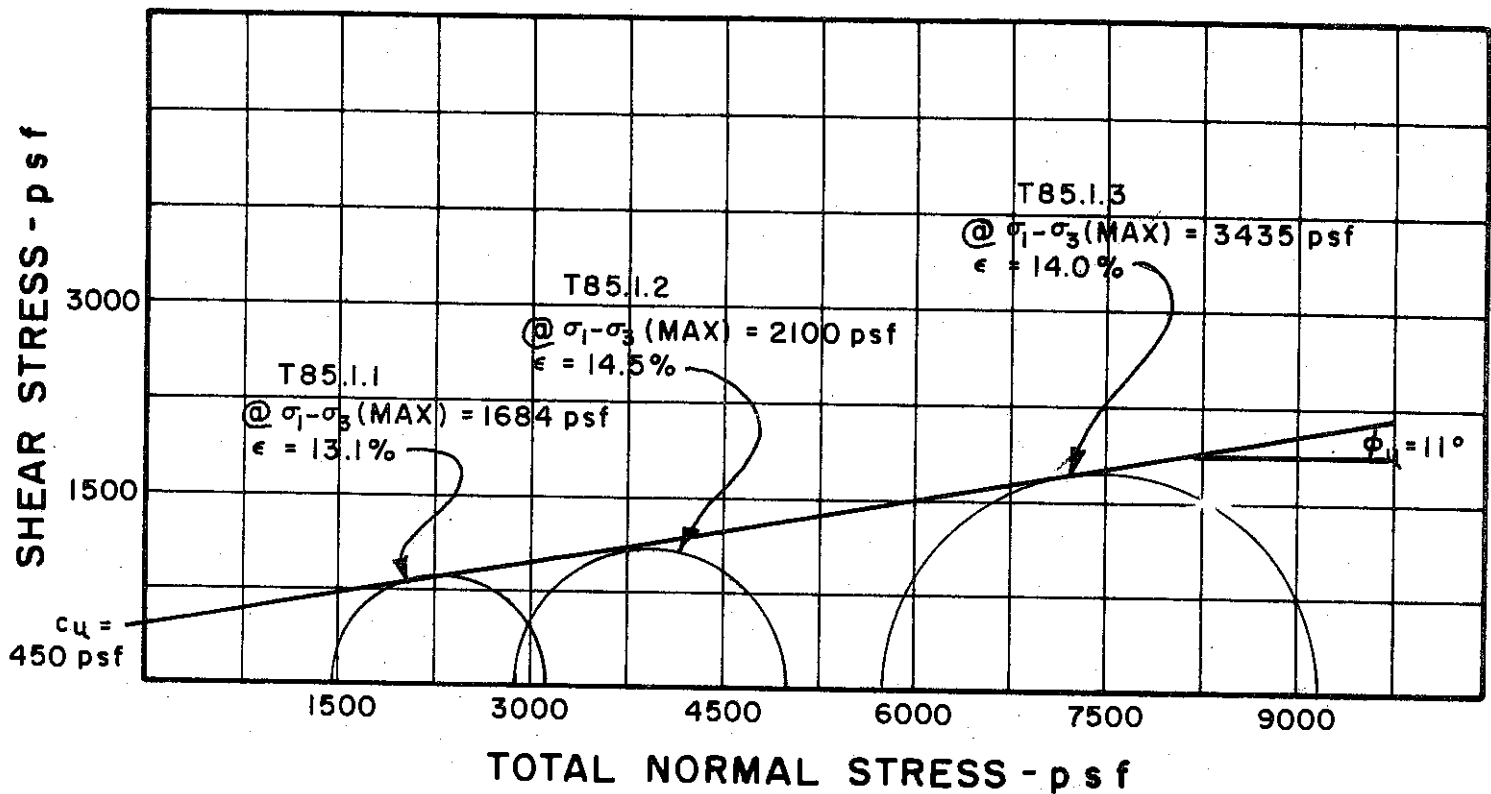
BORING NO. 48  
 SAMPLE NO. 22  
 DEPTH 98.0' TO 100.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 36 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-408



BORING NO. 50

SAMPLE NO. 6

DEPTH 28.0' TO 30.0'

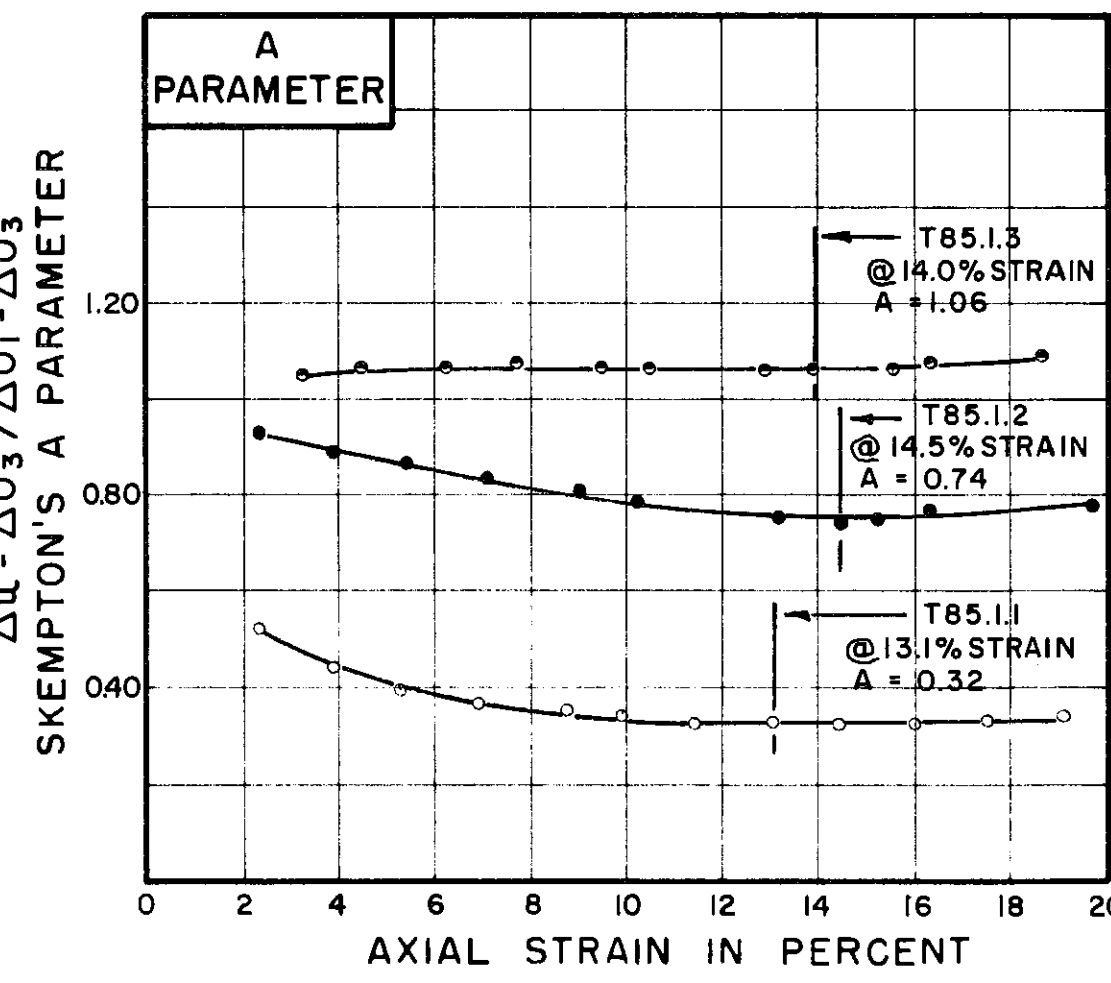
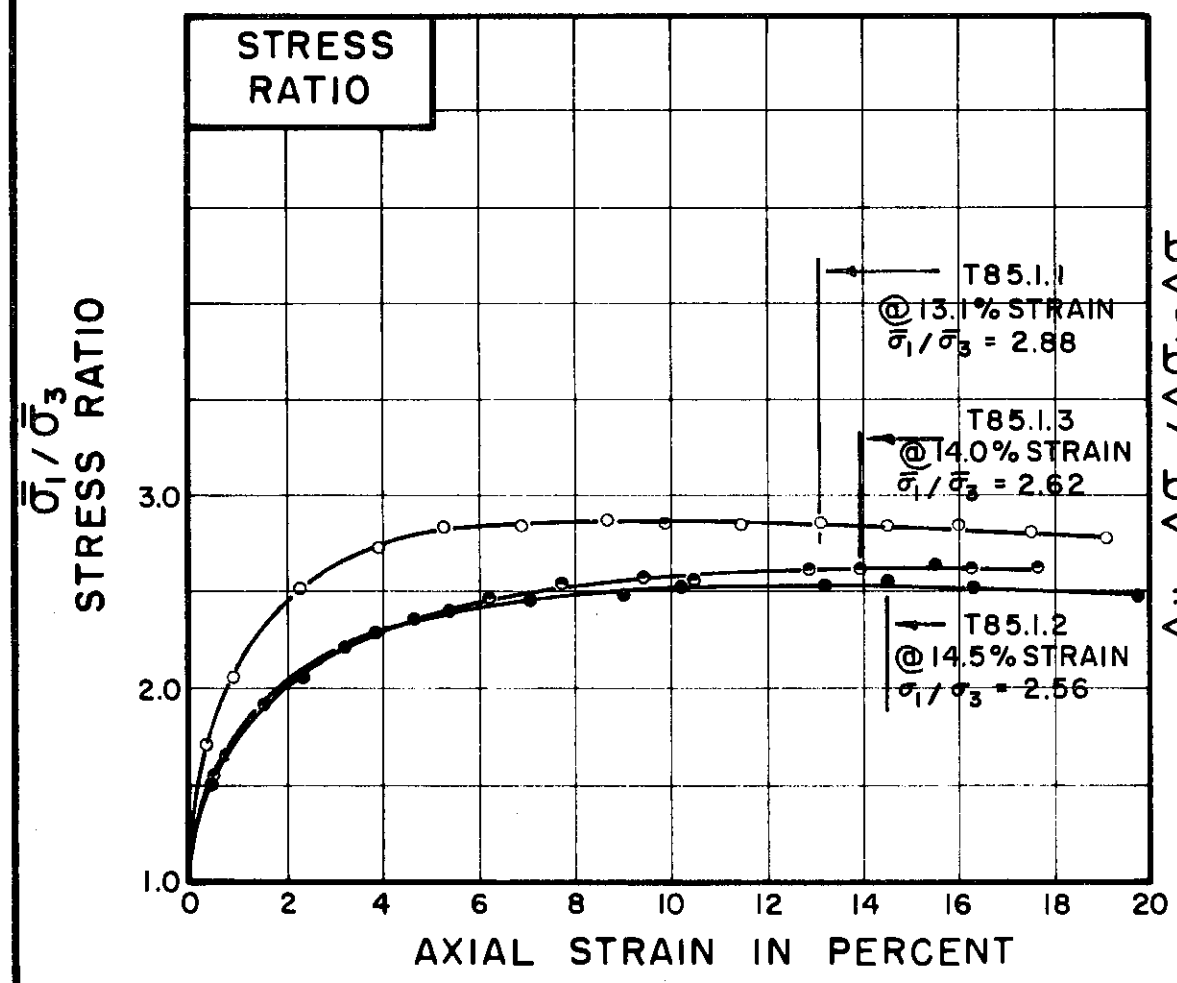
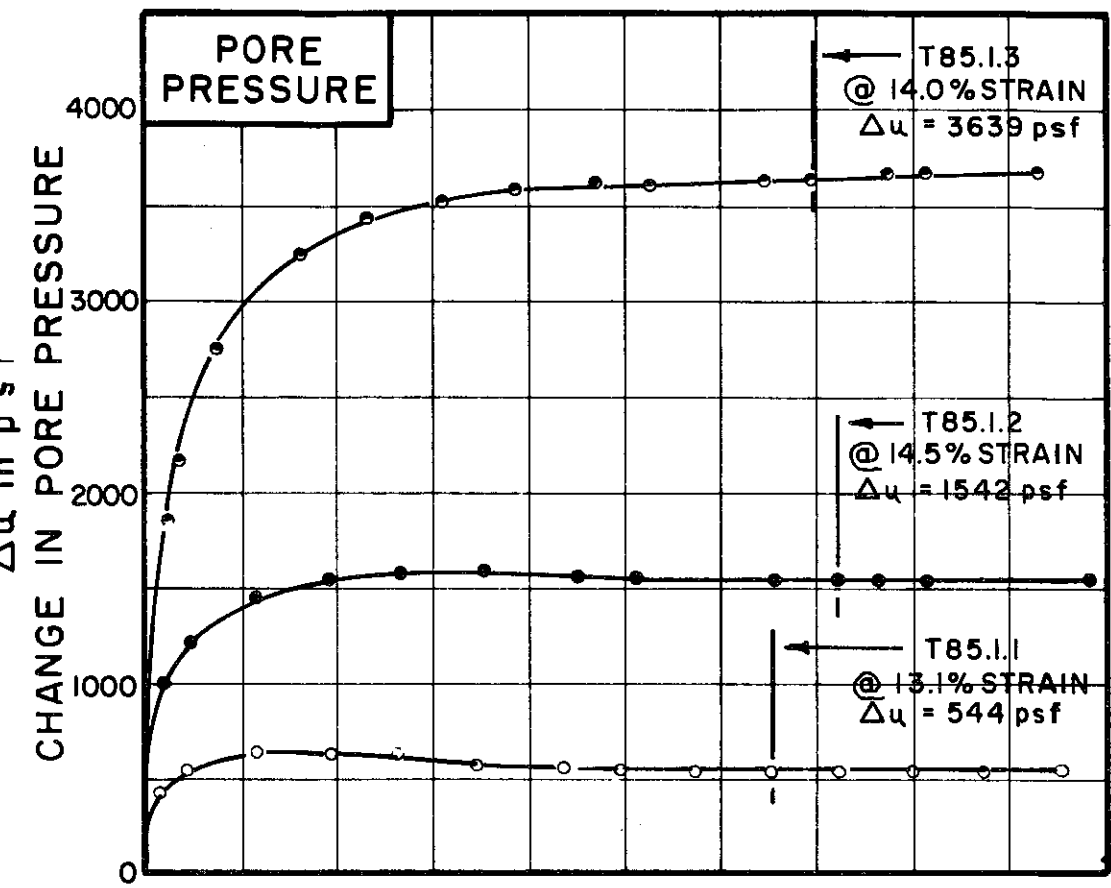
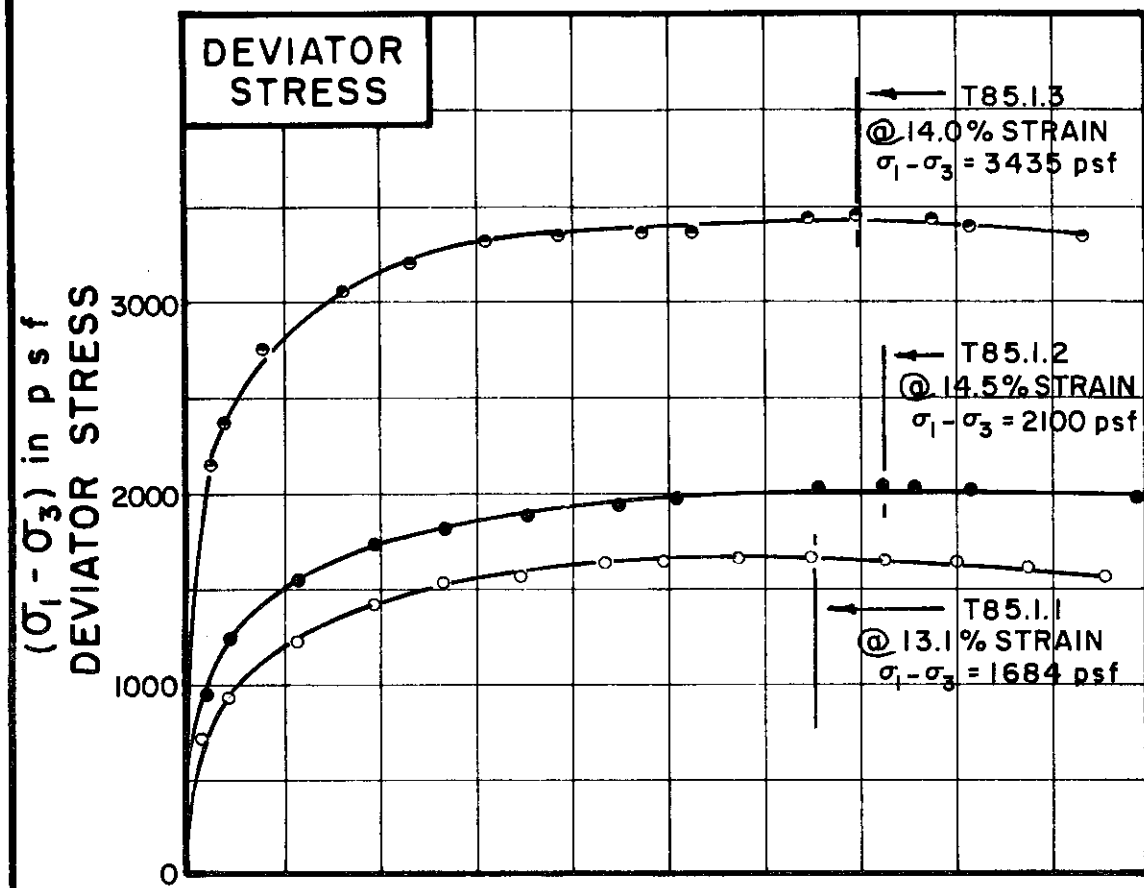
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T85.1.1	T85.1.2	T85.1.3
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	33.0%	33.1%	34.3%
	DRY DENSITY lb/cu ft	$\gamma_d$	88	90	86
SAMPLE DIAMETER in.	$D_0$	1.38	1.39	1.39	
SAMPLE HEIGHT in.	$H_0$	3.30	3.25	3.27	
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	$u_0$	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1, \bar{\sigma}_3$	1440	2880	5760
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	2.58%	3.18%	4.86%
	PORE PRESSURE RESPONSE		96%	95%	100%
FINAL CONDITIONS	WATER CONTENT	$w_f$	31.5%	27.3%	28.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.024
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BORING NO. 50

SAMPLE NO. 6

DEPTH 28.0' TO 30.0'

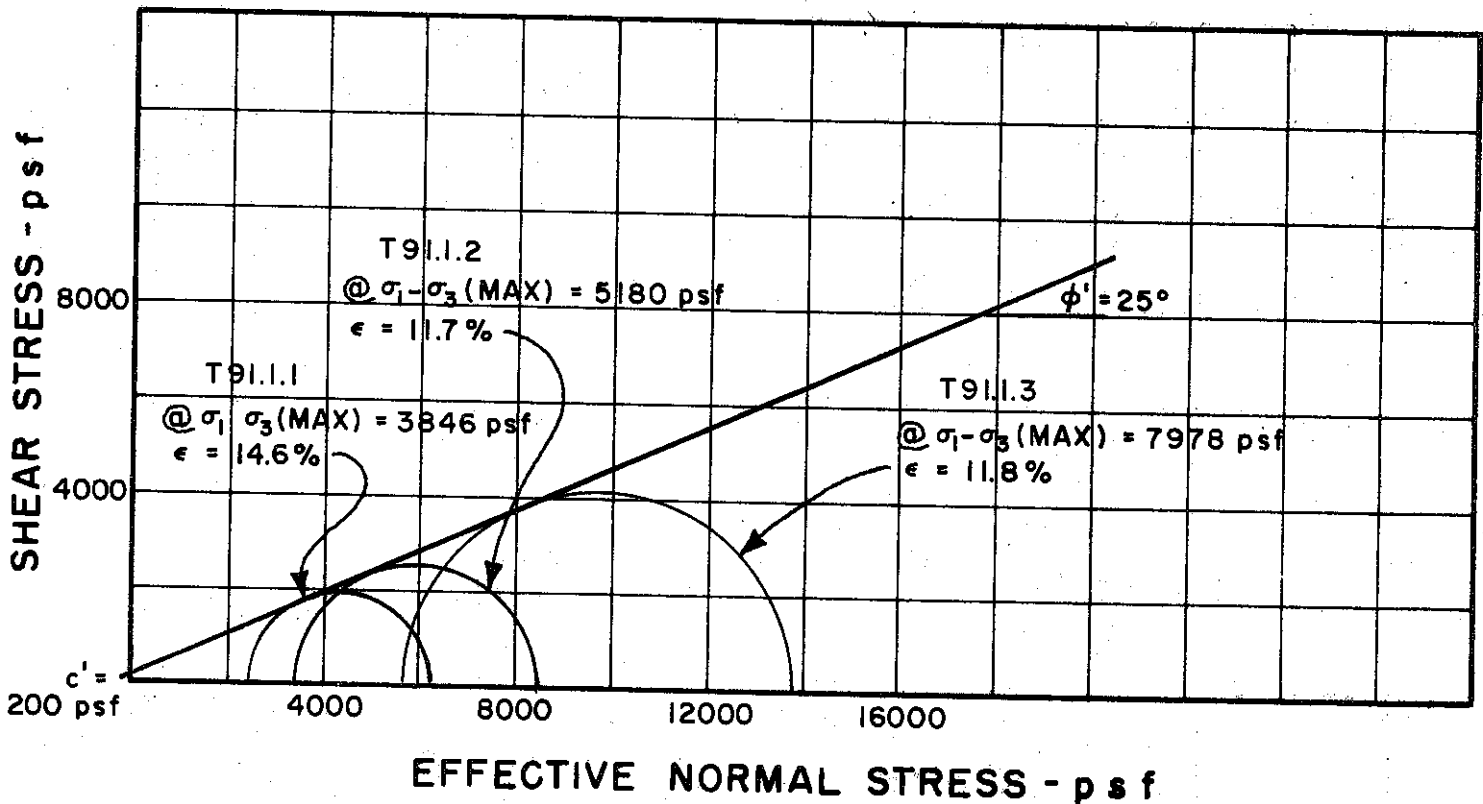
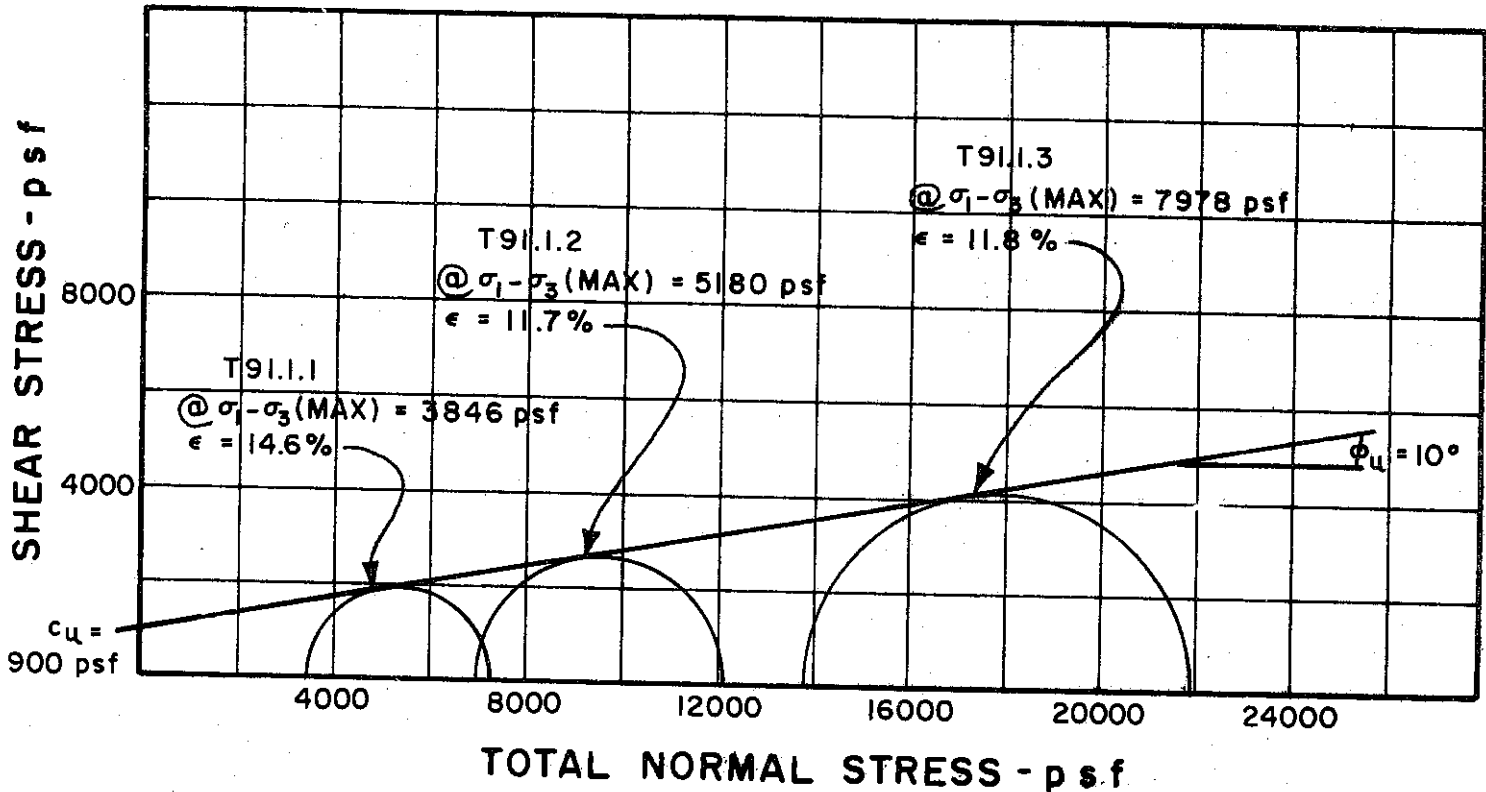
SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



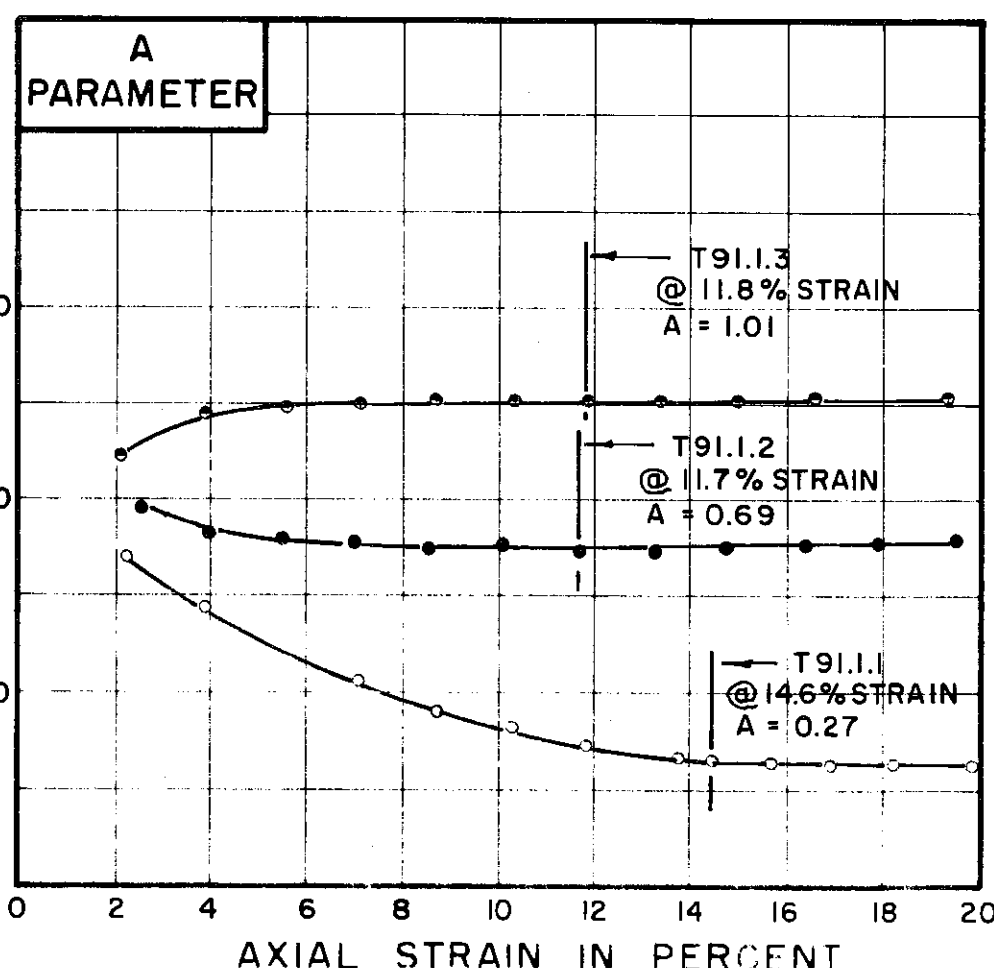
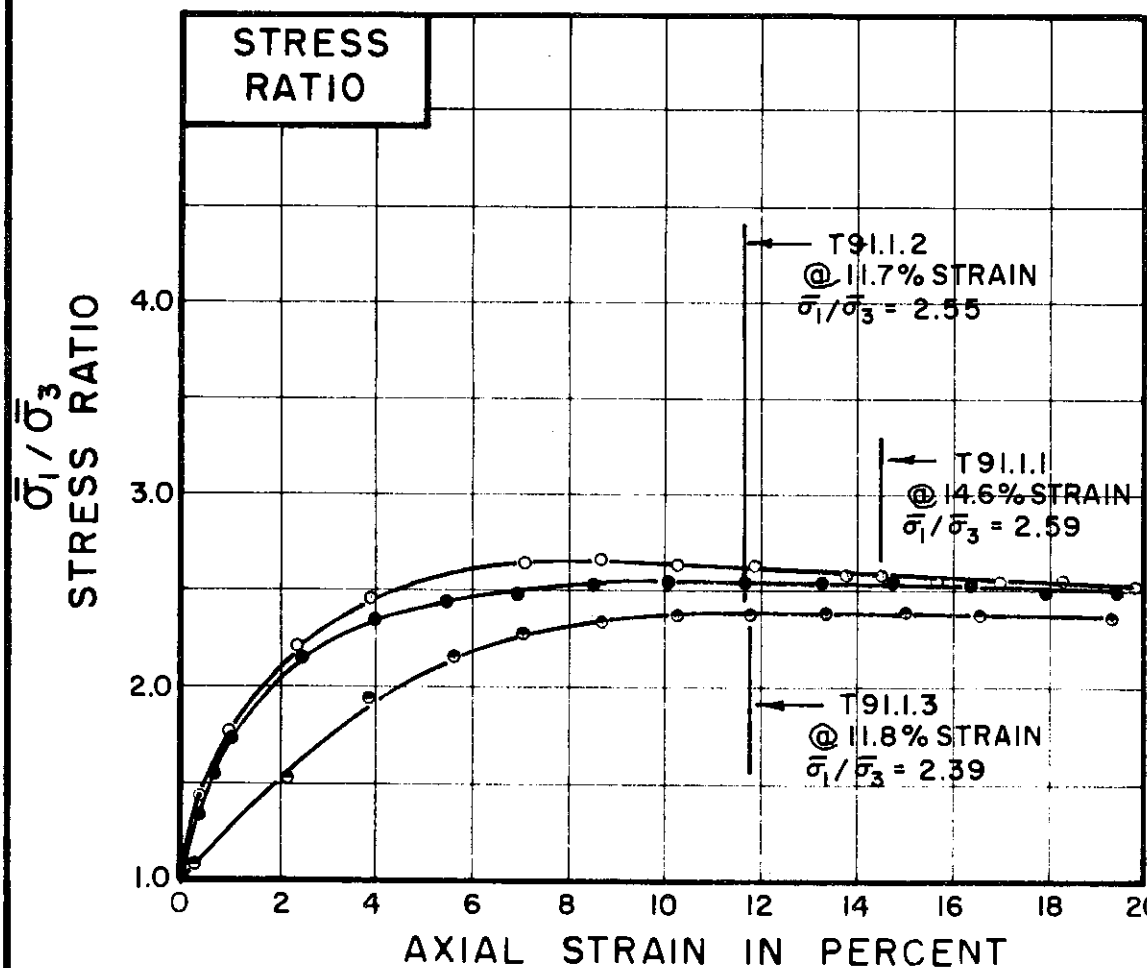
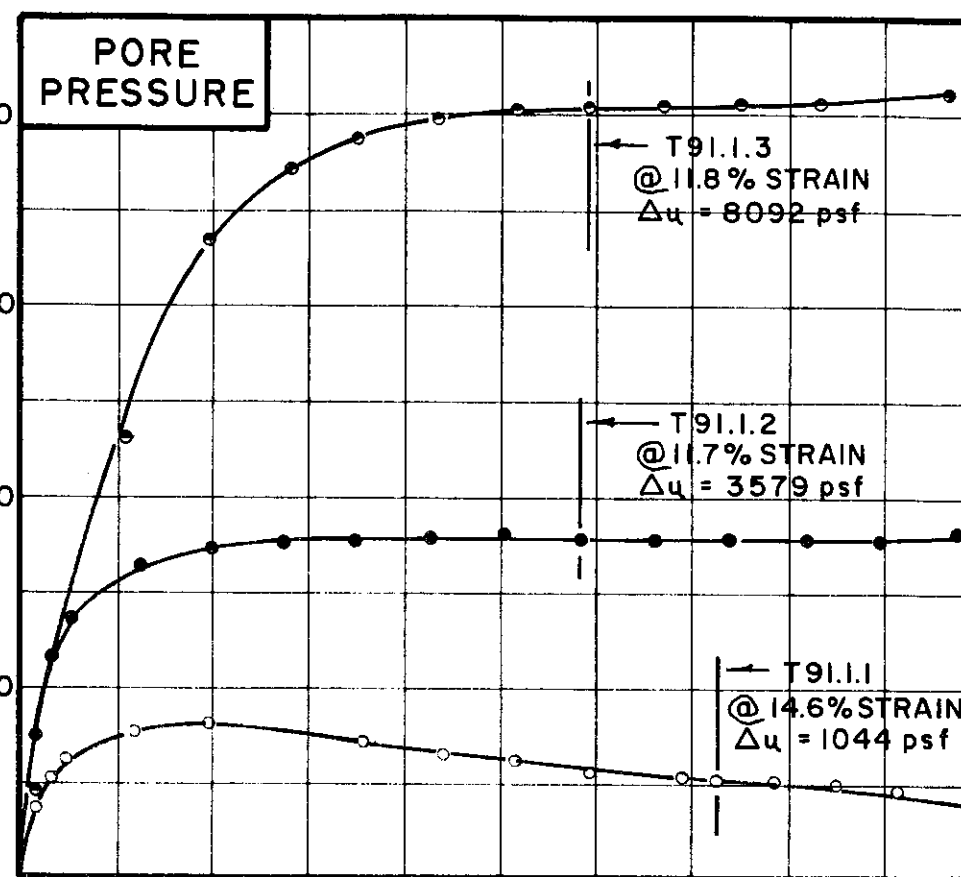
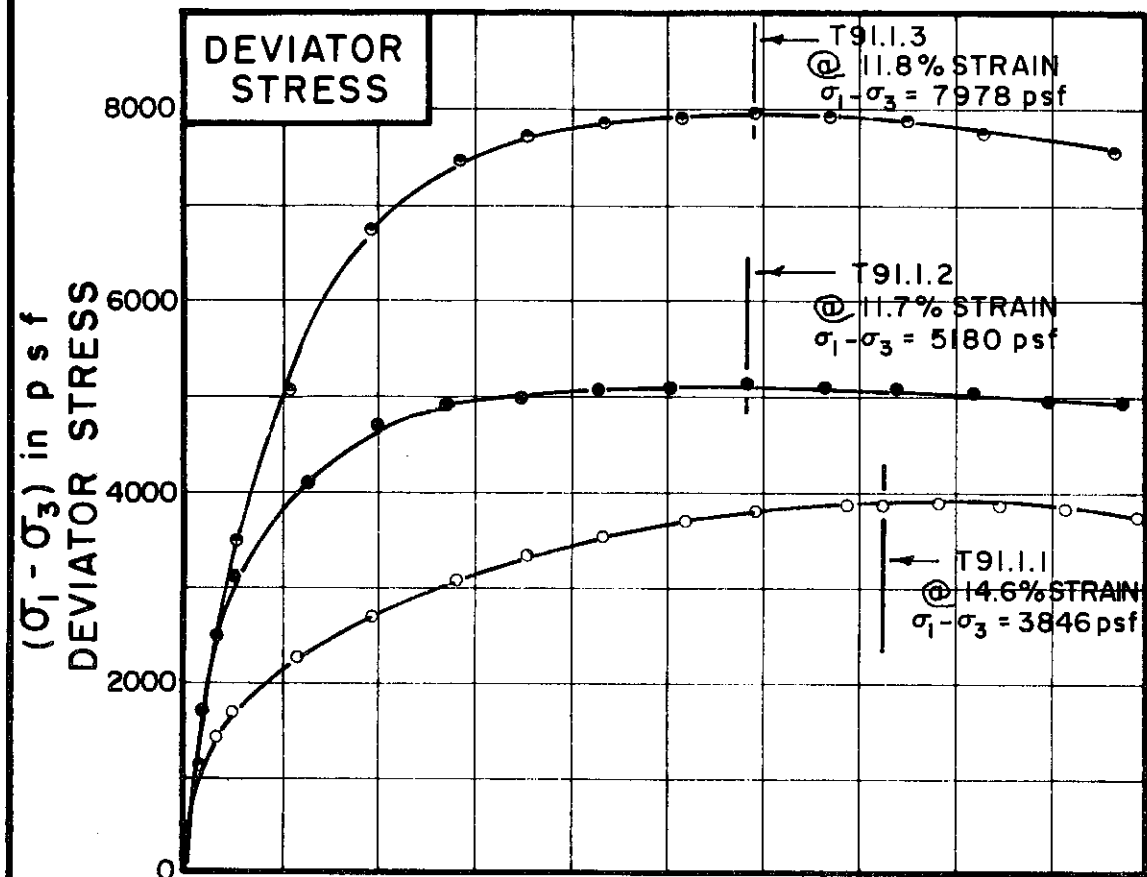


BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-411



TEST NO. / SYMBOL	T91.1.1	T91.1.2	T91.1.3
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INITIAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_0$		28.0%	27.6%	27.6%
DRY DENSITY	$\gamma_d$	lb/cu ft	97	97	96
SAMPLE DIAMETER	$D_0$	in.	1.37	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.18	3.25	3.25
FINAL CONDITIONS BEFORE SHEAR			T91.1.1	T91.1.2	T91.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	8640	12960
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	3456	6912	13824
VOLUMETRIC STRAIN	$\epsilon_{vol}$		3.54%	4.24%	6.87%
PORE PRESSURE RESPONSE			96%	95%	96%
FINAL CONDITIONS			T91.1.1	T91.1.2	T91.1.3
WATER CONTENT	$w_f$		25.5%	26.0%	22.7%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025
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BORING NO. 50  
 SAMPLE NO. 18  
 DEPTH 88.0' TO 90.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

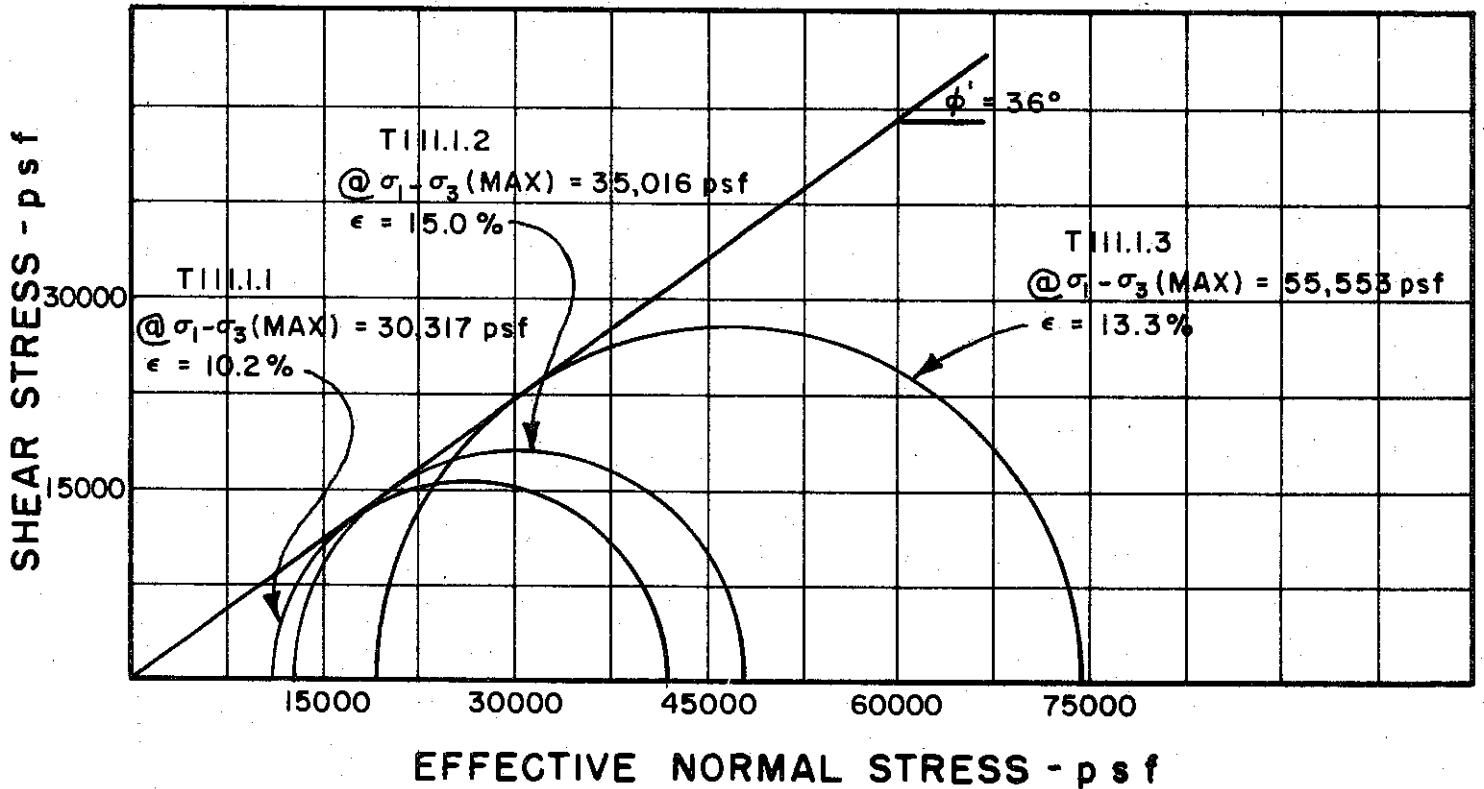
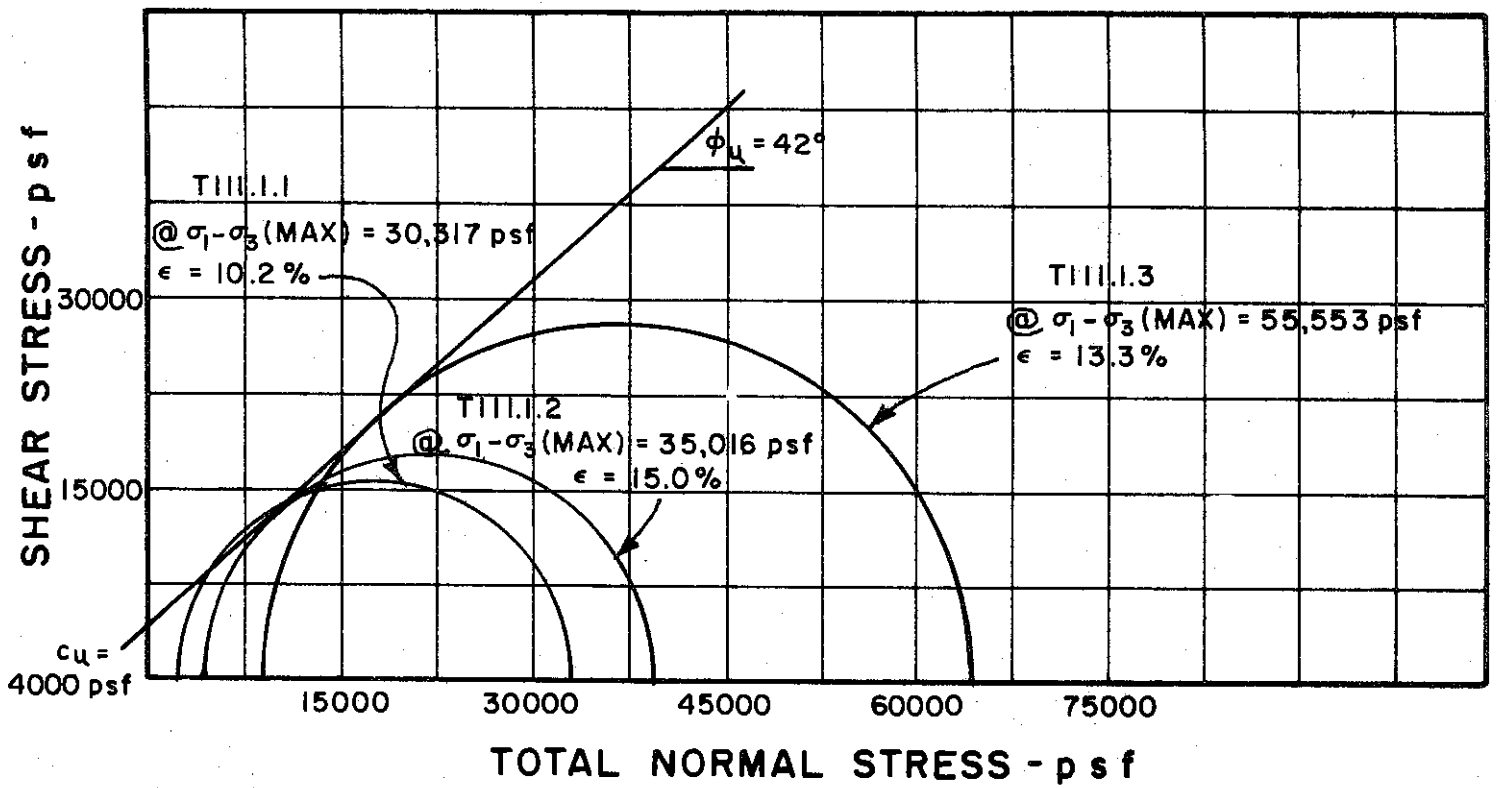
LIQUID LIMIT 39 PLASTIC LIMIT 23

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-412



BORING NO. 52

SAMPLE NO. 6

DEPTH 48.0' TO 50.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

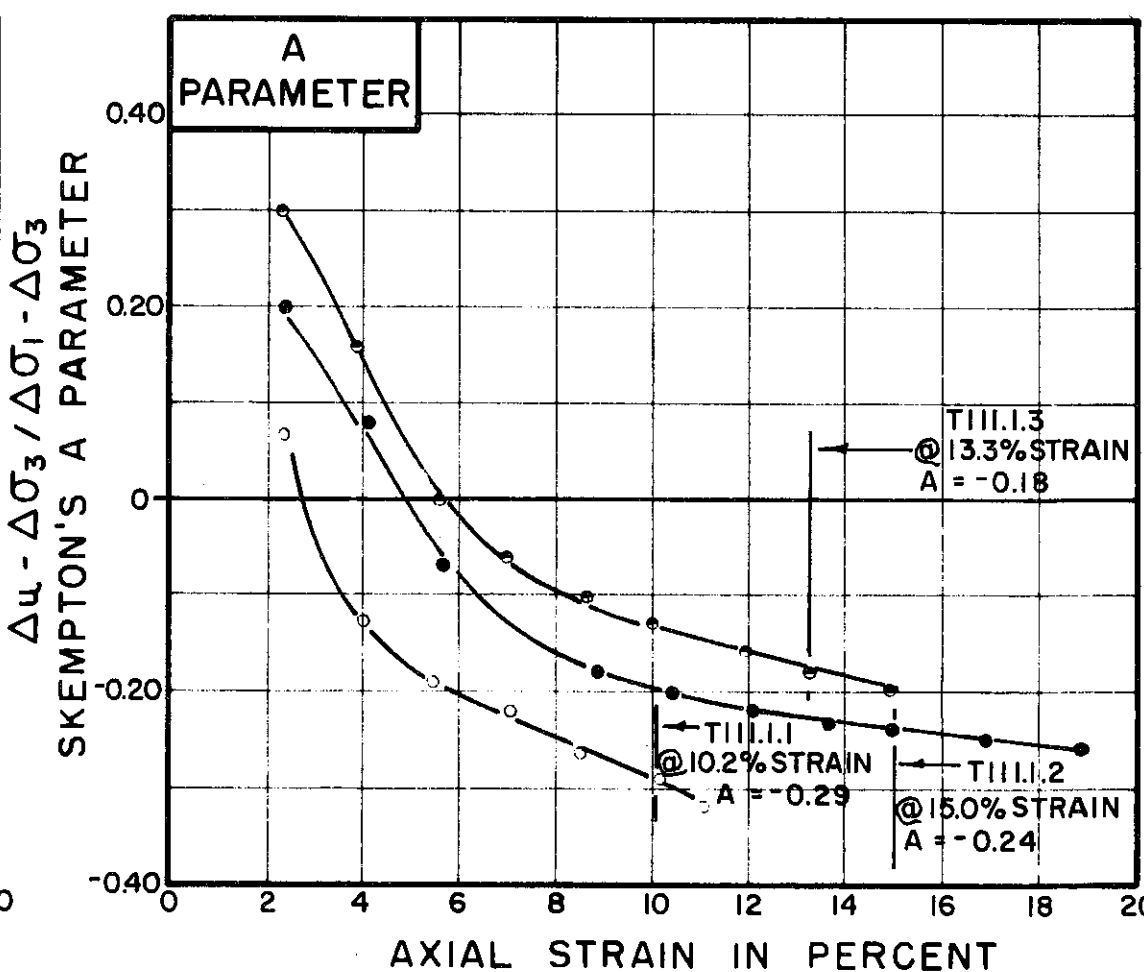
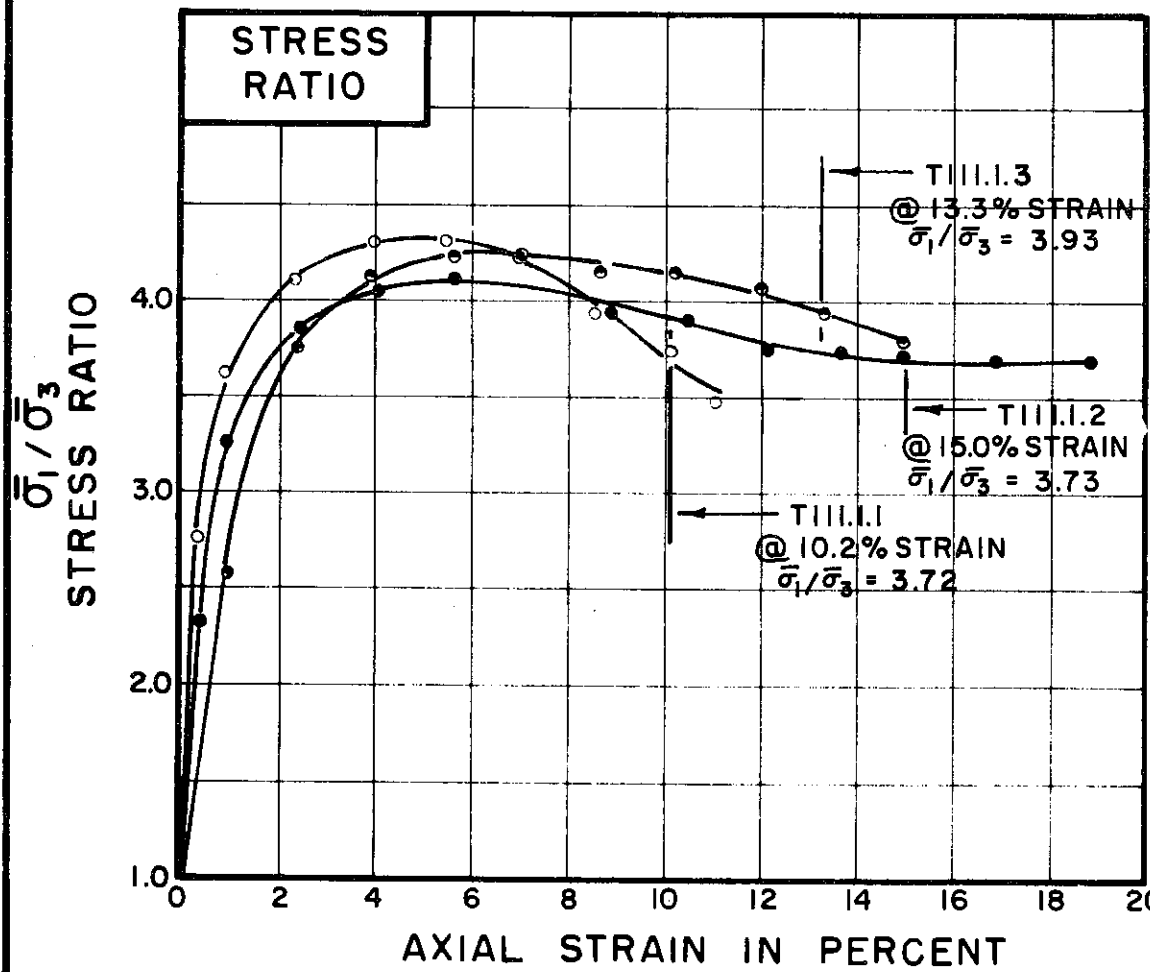
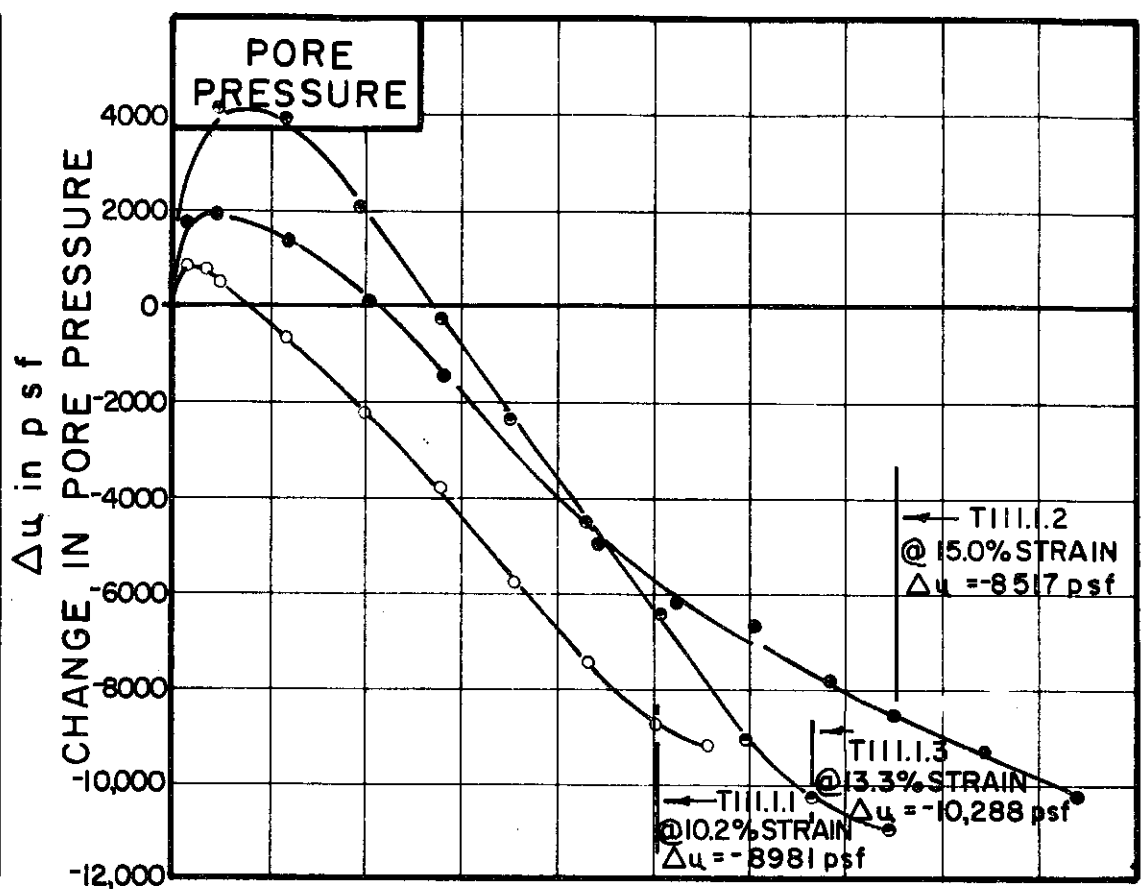
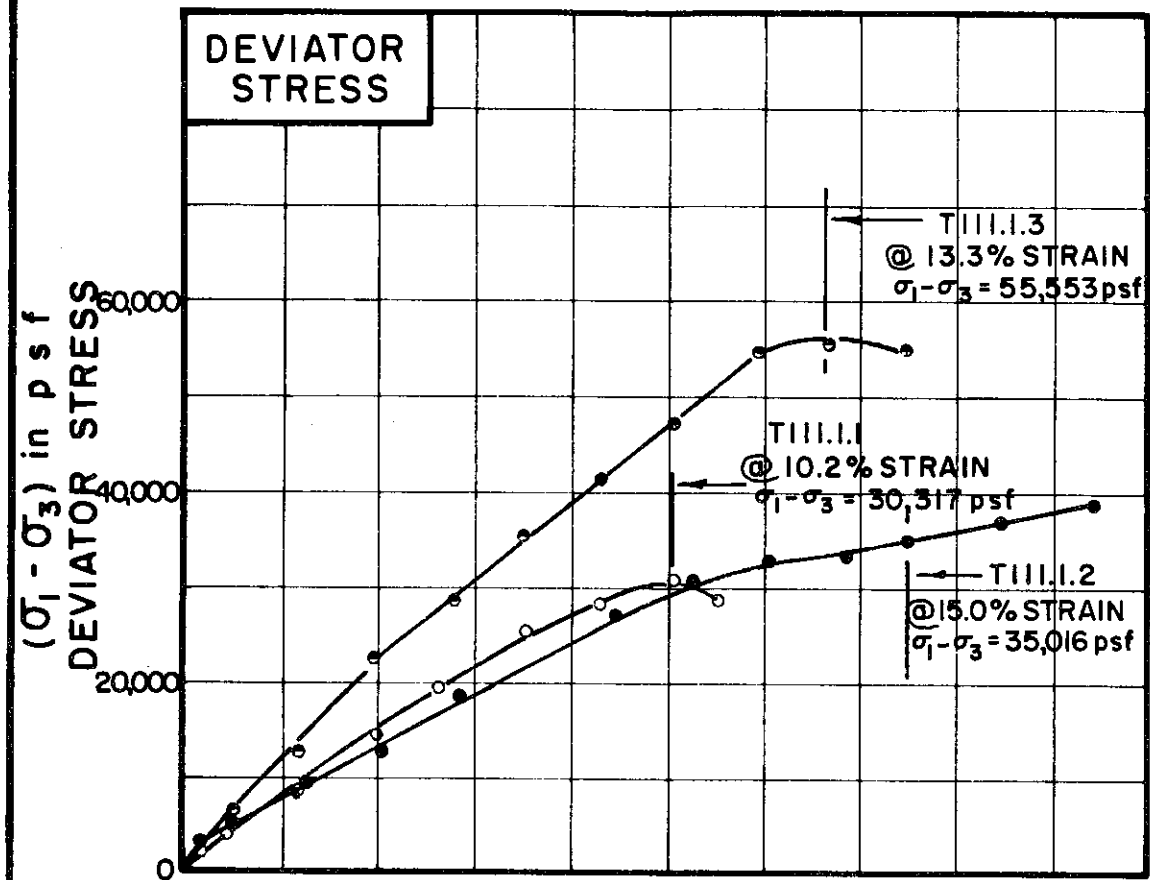
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-413



TEST NO. / SYMBOL	TIII.1.1	TIII.1.2	TIII.1.3
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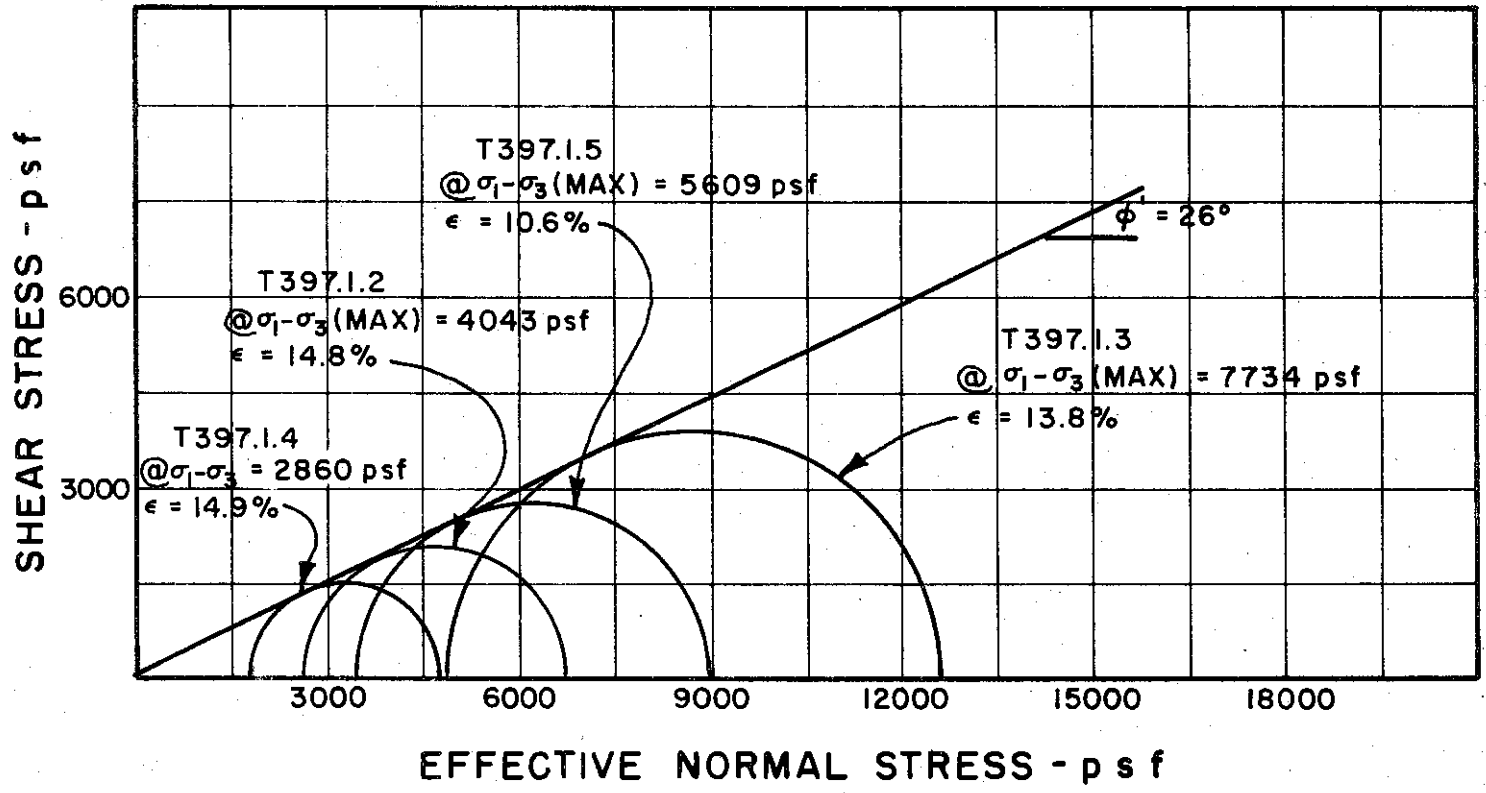
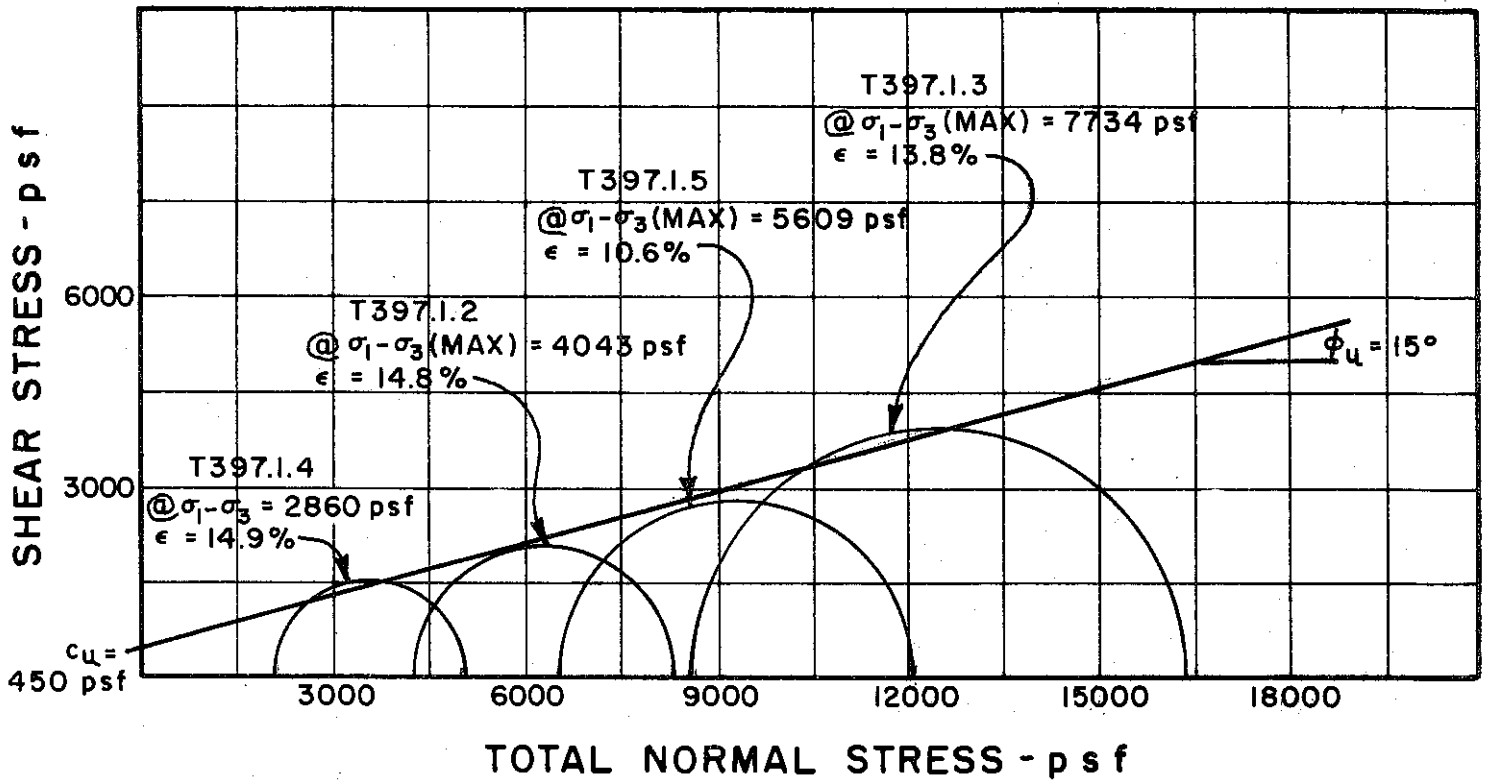
INITIAL CONDITIONS		TIII.1.1	TIII.1.2	TIII.1.3
WATER CONTENT	$w_0$	22.1%	22.7%	22.1%
DRY DENSITY	$\gamma_d$ lb/cu ft	101	99	104
SAMPLE DIAMETER	$D_0$ in.	1.39	1.38	1.38
SAMPLE HEIGHT	$H_0$ in.	3.20	3.10	3.21
FINAL CONDITIONS BEFORE SHEAR		TIII.1.1	TIII.1.2	TIII.1.3
FINAL BACK PRESSURE	$u_0$ psf	9360	11,520	11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$ psf	2160	4320	8640
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.62%	1.22%	1.78%
PORE PRESSURE RESPONSE		99%	97%	97%
FINAL CONDITIONS		TIII.1.1	TIII.1.2	TIII.1.3
WATER CONTENT	$w_f$	21.8%	21.8%	21.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.026	.025
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BORING NO. 52  
 SAMPLE NO. 6  
 DEPTH 48.0' TO 50.5'  
 SOIL DESCRIPTION SILT (ML)  
 LIQUID LIMIT NON-PLASTIC  
 PLASTIC LIMIT PLASTIC LIMIT

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

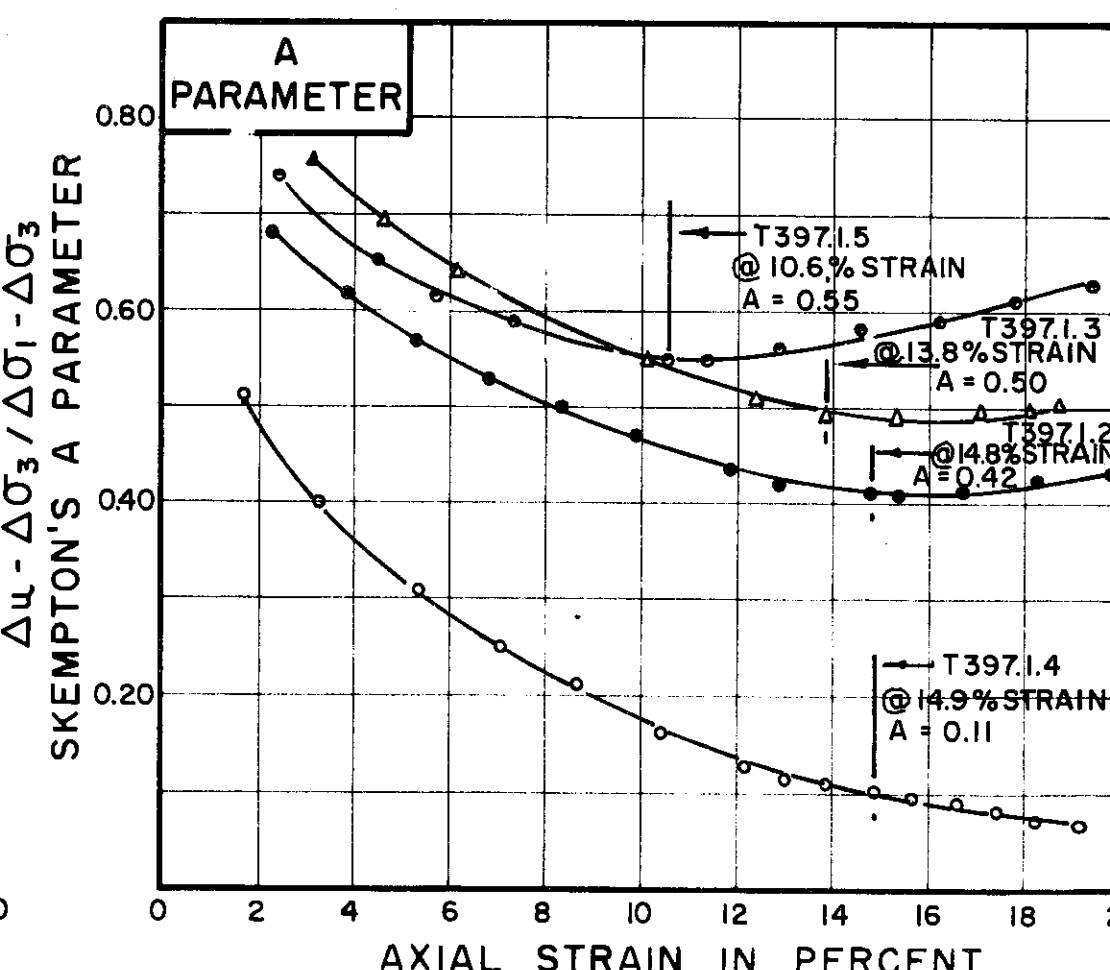
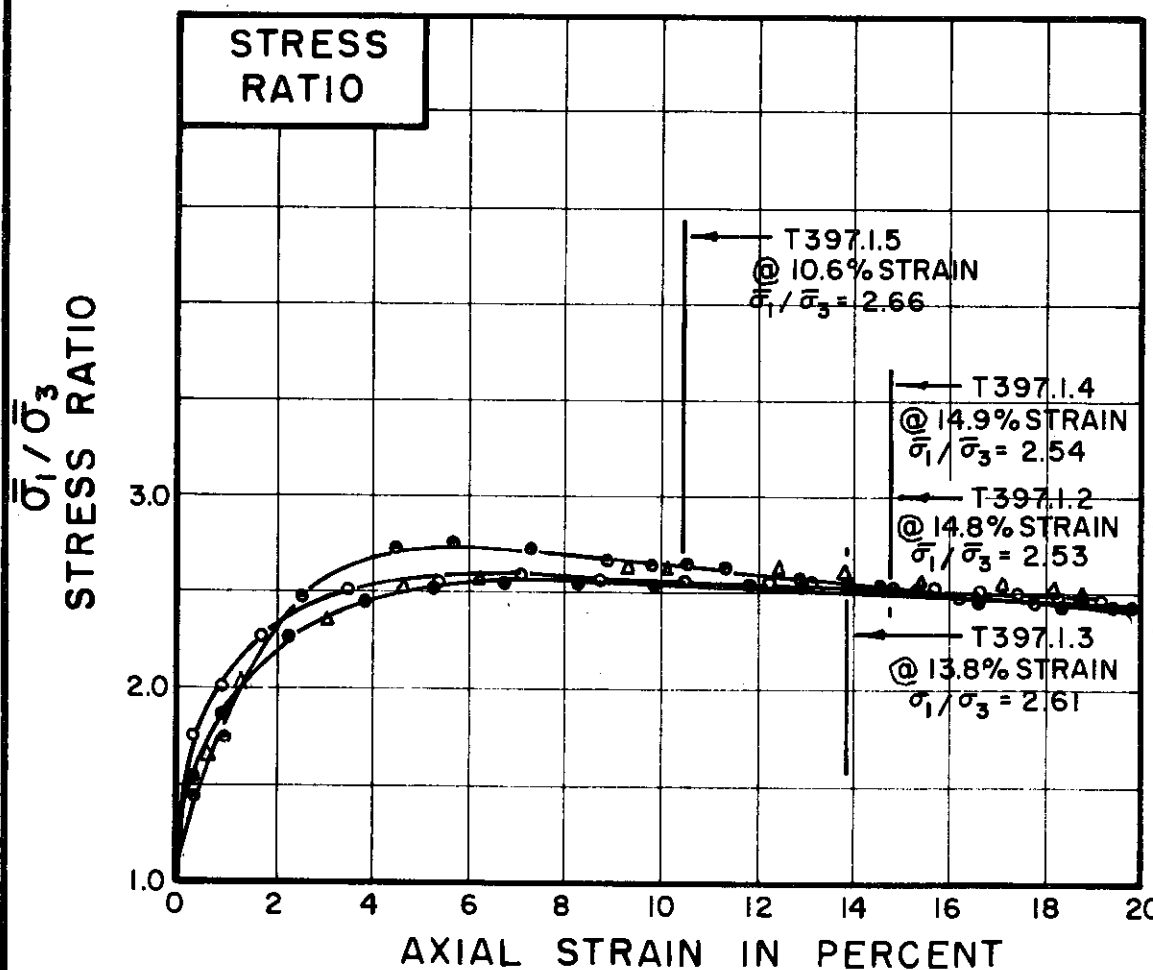
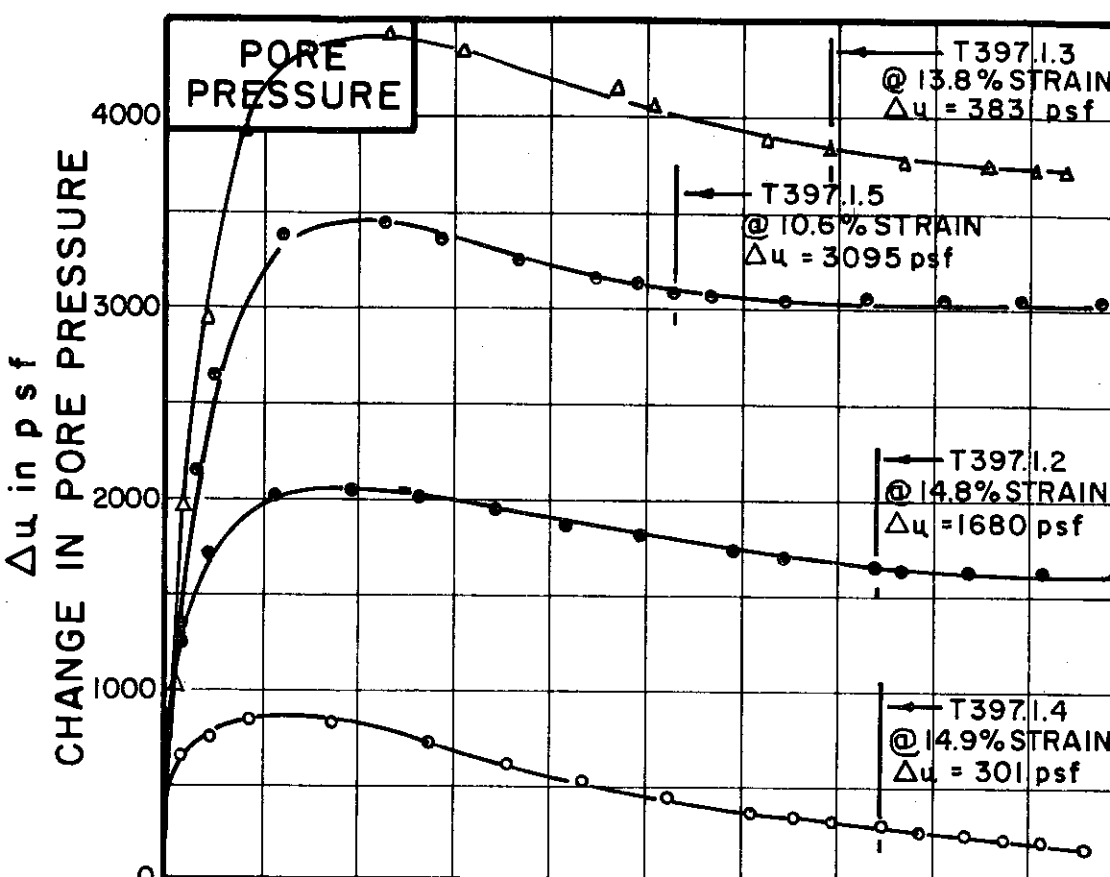
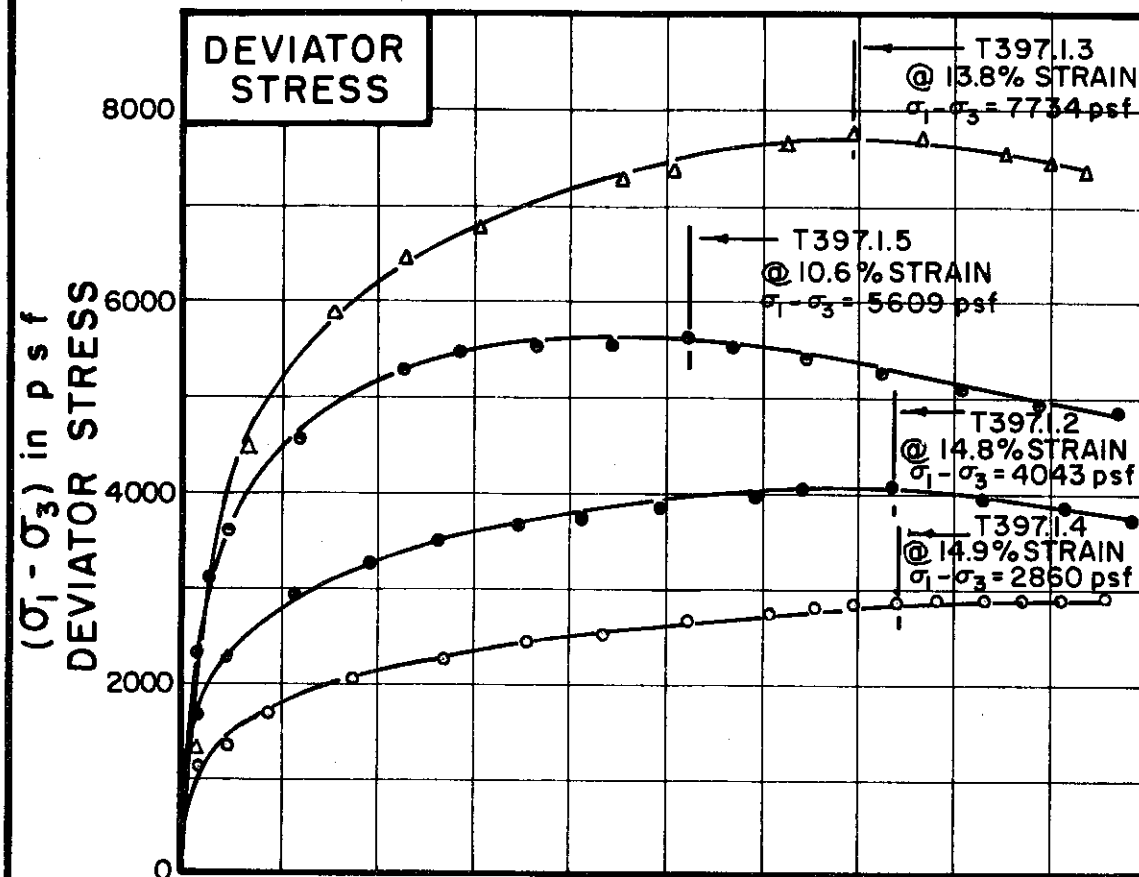


BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE,  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-415



TEST NO. / SYMBOL	T397.1.4	T397.1.2	T397.1.5	T397.1.3
	○	●	●	△

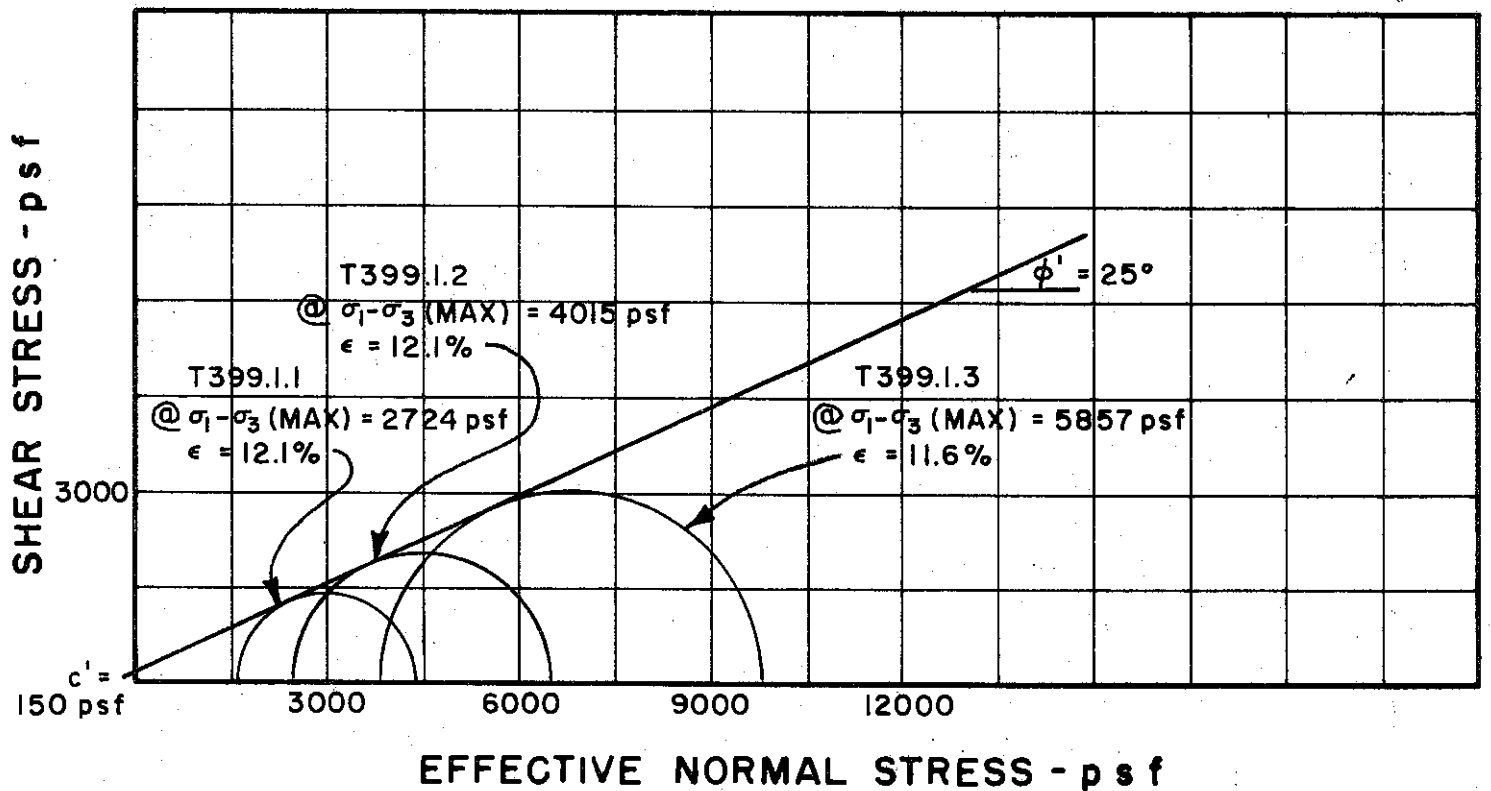
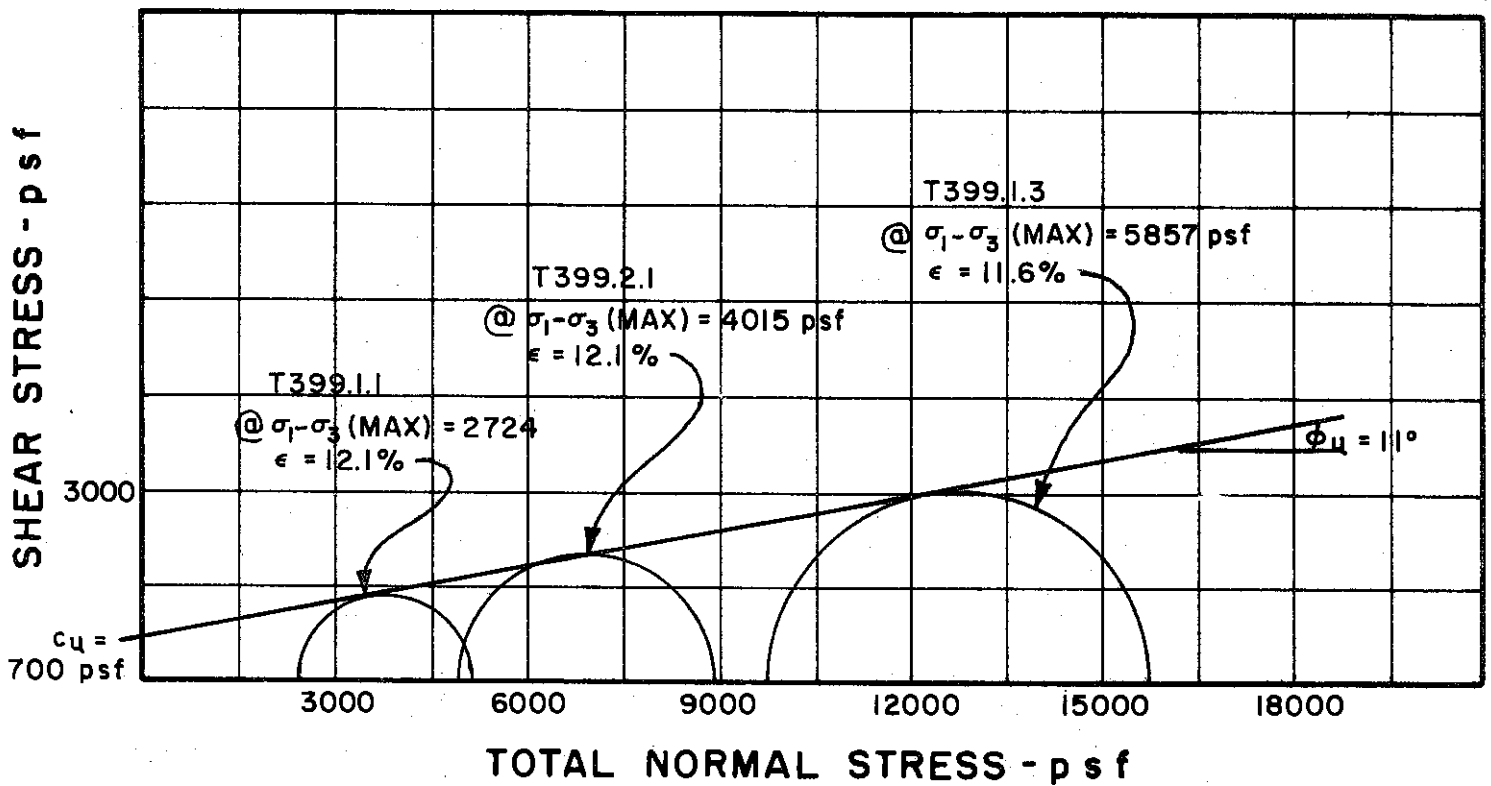
INITIAL CONDITIONS	WATER CONTENT	$w_0$	22.6%	23.2%	24.0%	23.2%
	DRY DENSITY	$\gamma_d$	101	102	100	102
	SAMPLE DIAMETER	$D_0$	1.37	1.37	1.37	1.38
	SAMPLE HEIGHT	$H_0$	2.88	3.30	3.12	3.30
	FINAL BACK PRESSURE	$u_0$	7200	10080	8640	7200
	INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	2160	4320	6480	8640
CONDITIONS BEFORE SHEAR	VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.68%	1.94%	3.33%	4.95%
	PORE PRESSURE RESPONSE		95%	96%	98%	95%
	WATER CONTENT	$w_f$	21.5%	21.3%	19.9%	19.8%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT / MINUTE	.028	.024	.026	.025
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BORING NO. 54  
 SAMPLE NO. 4  
 DEPTH 53.0' TO 55.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 31 PLASTIC LIMIT 18

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

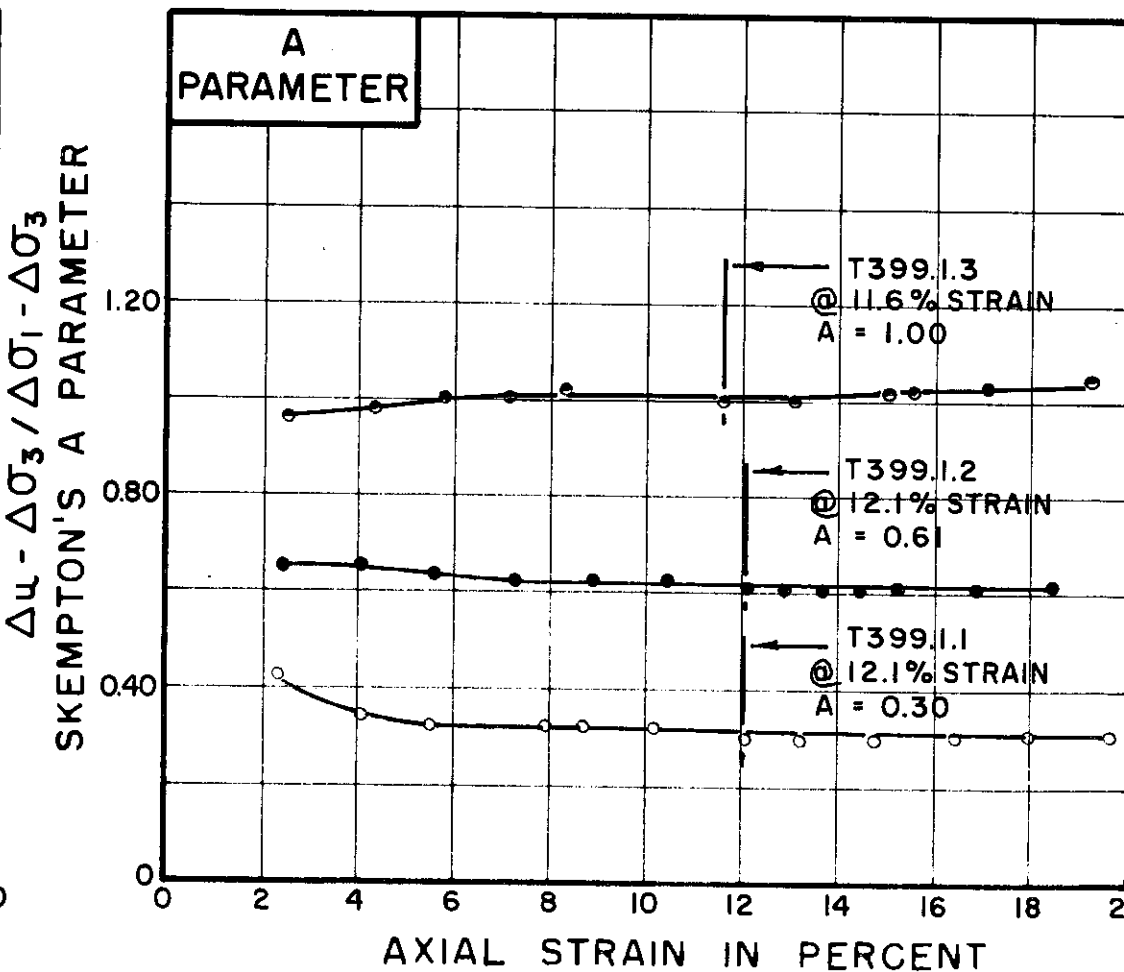
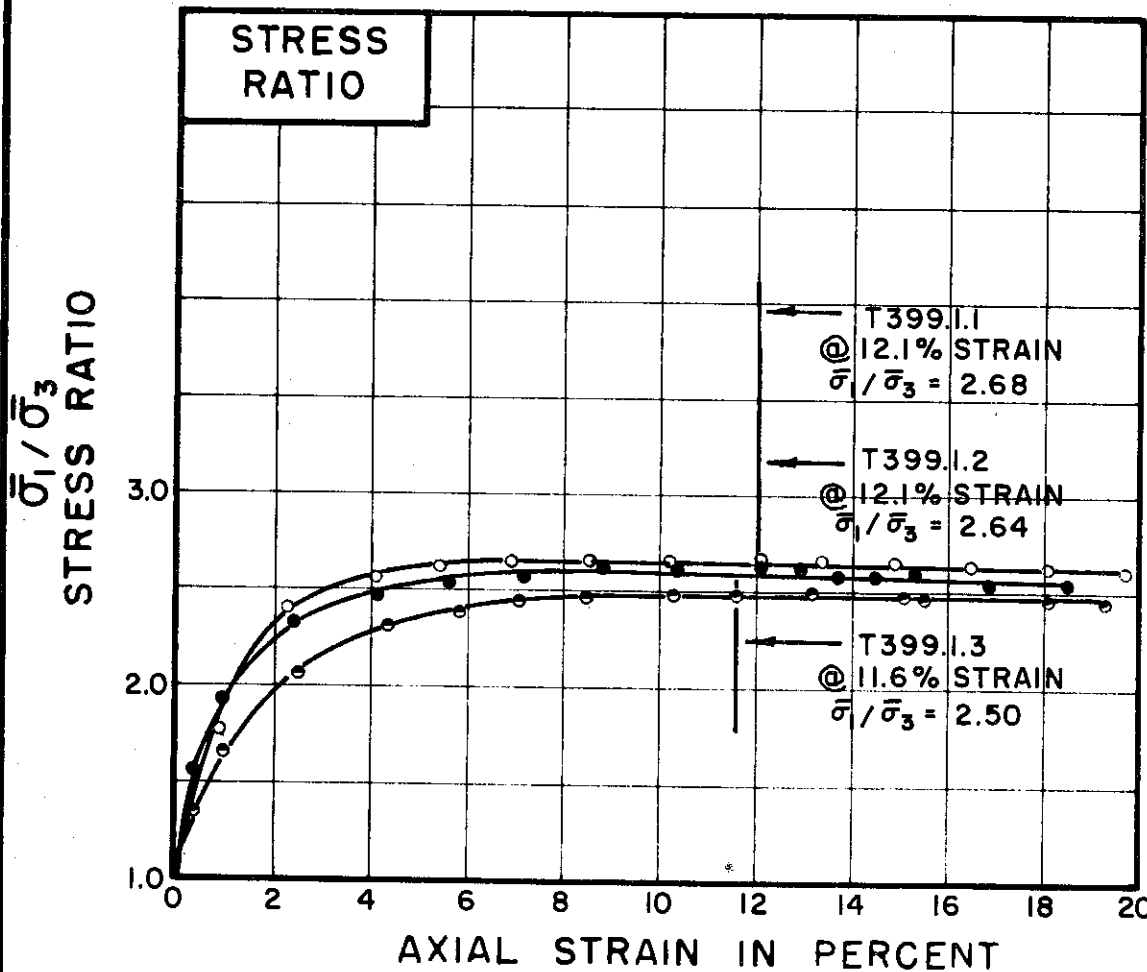
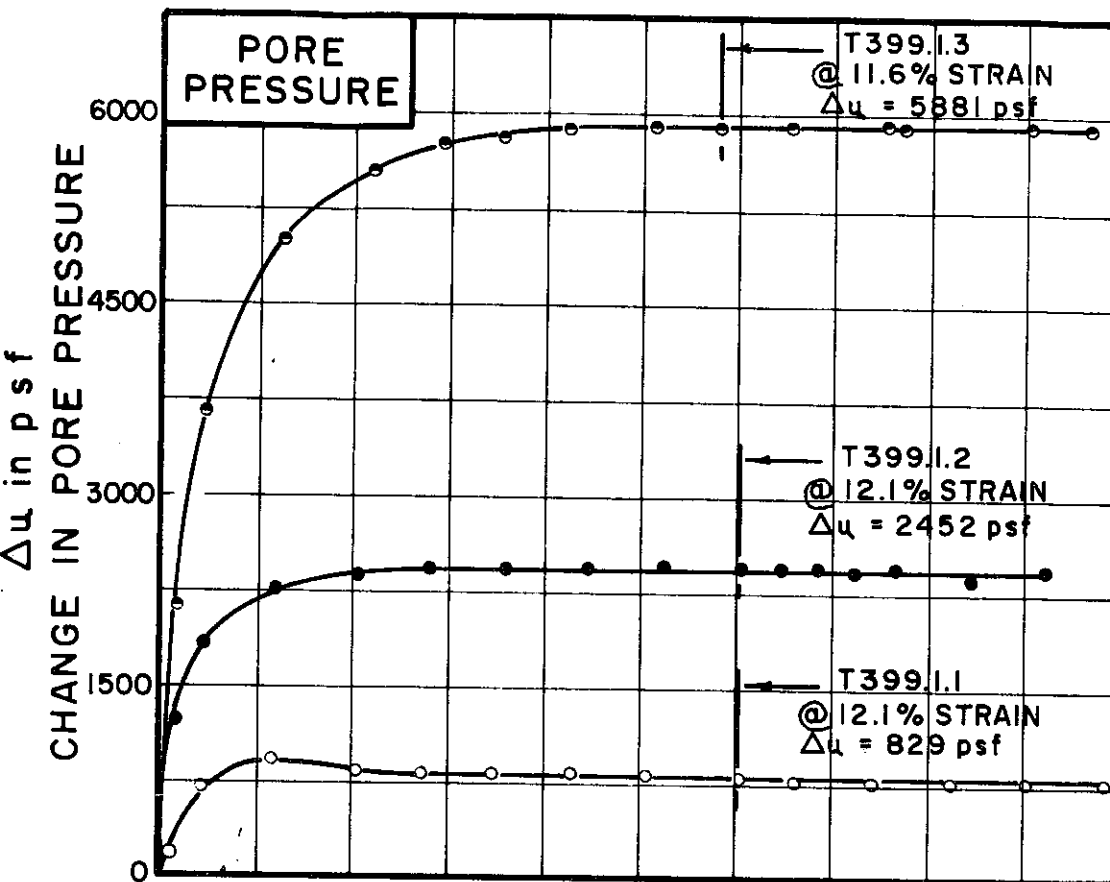
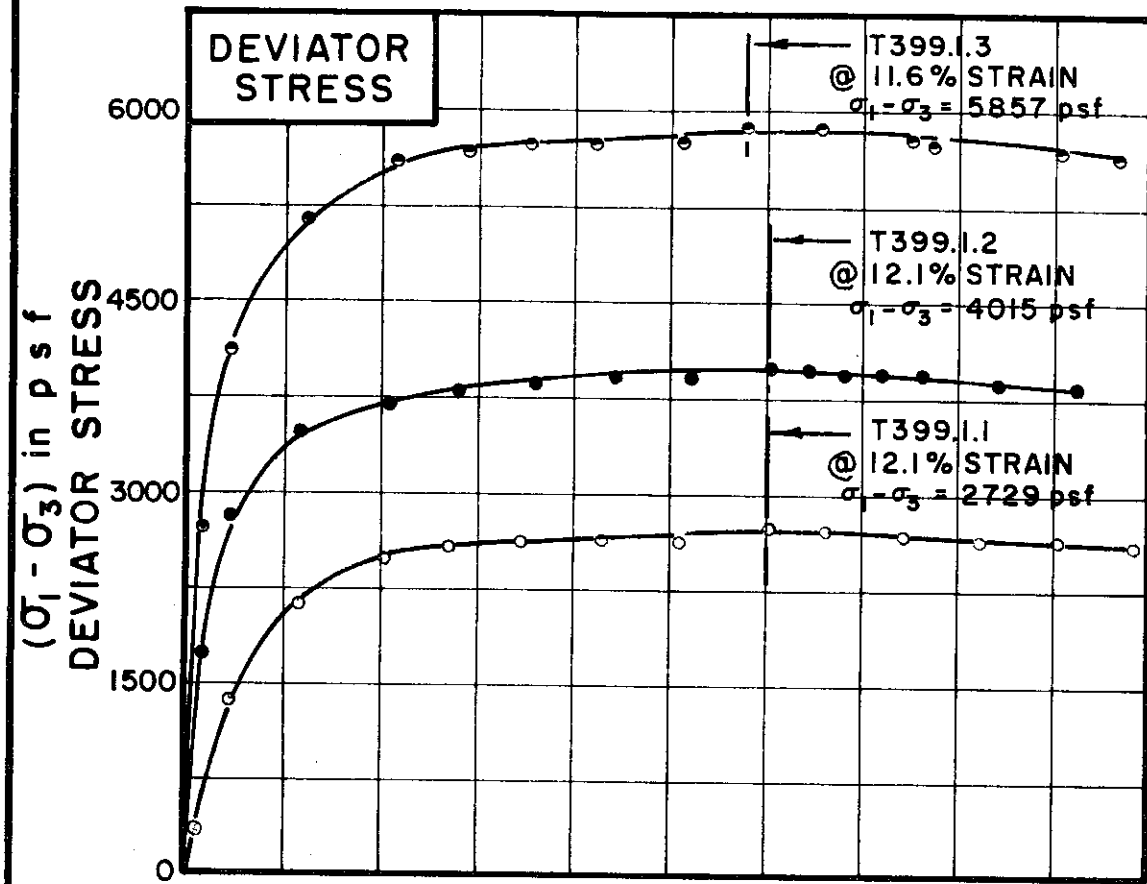
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-417



TEST NO. / SYMBOL	T399.1.1	T399.1.2	T399.1.3
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INITIAL CONDITIONS			T399.1.1	T399.1.2	T399.1.3
WATER CONTENT	$w_0$		26.4%	25.2%	25.8%
DRY DENSITY	$\gamma_d$	lb/cu ft	98	98	98
SAMPLE DIAMETER	$D_0$	in.	1.39	1.38	1.39
SAMPLE HEIGHT	$H_0$	in.	3.20	3.14	3.29
FINAL CONDITIONS BEFORE SHEAR			T399.1.1	T399.1.2	T399.1.3
FINAL BACK PRESSURE	$u_0$	psf	10,080	10,080	10,080
INITIAL EFFECTIVE STRESS	$\frac{\sigma'_1}{\sigma'_3}$	psf	2448	4896	9792
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.77%	3.48%	5.79%
PORE PRESSURE RESPONSE			96%	95%	98%
WATER CONTENT	$w_f$		25.5%	22.8%	22.2%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.025	.026	.025
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BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 18

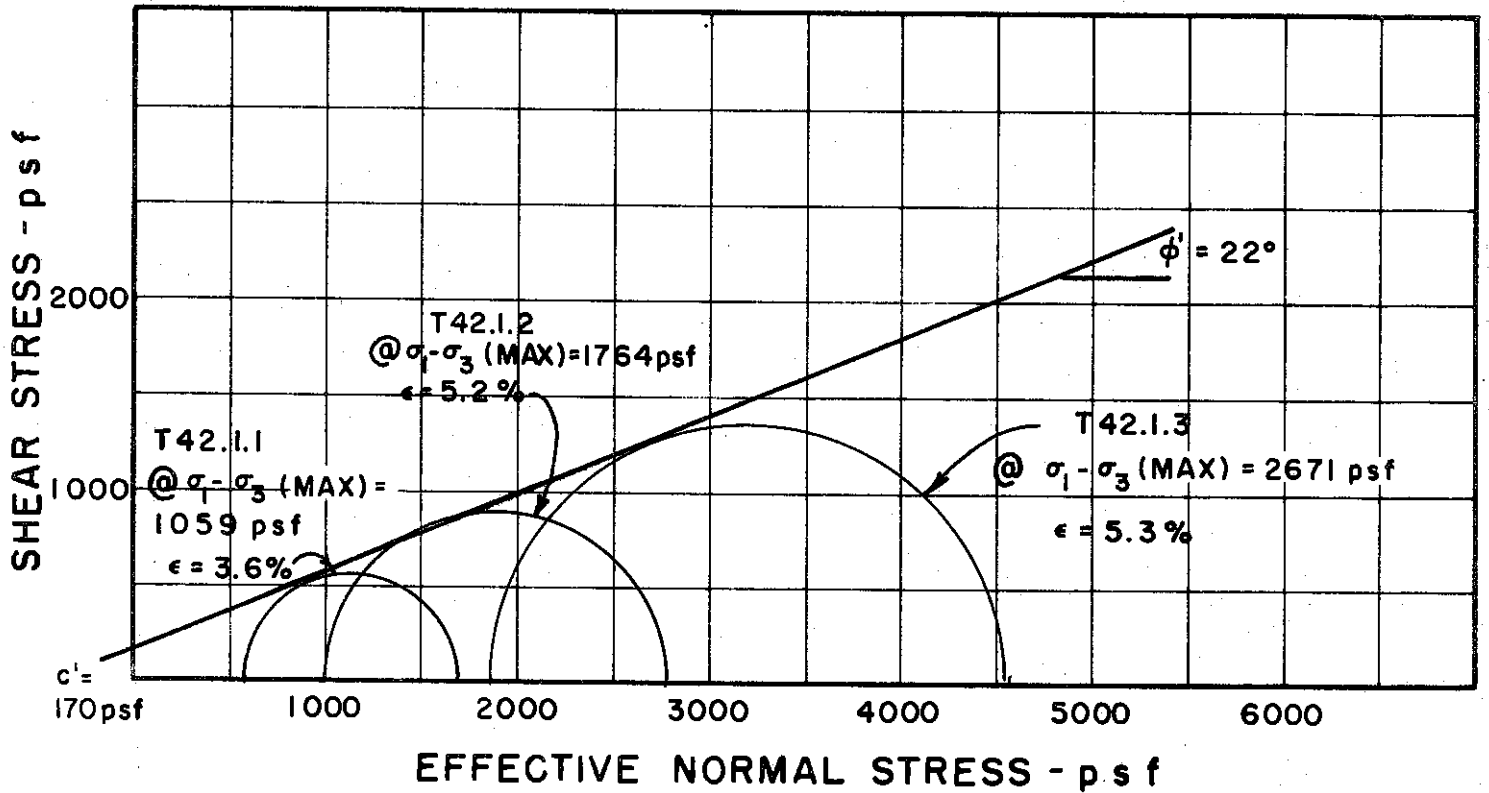
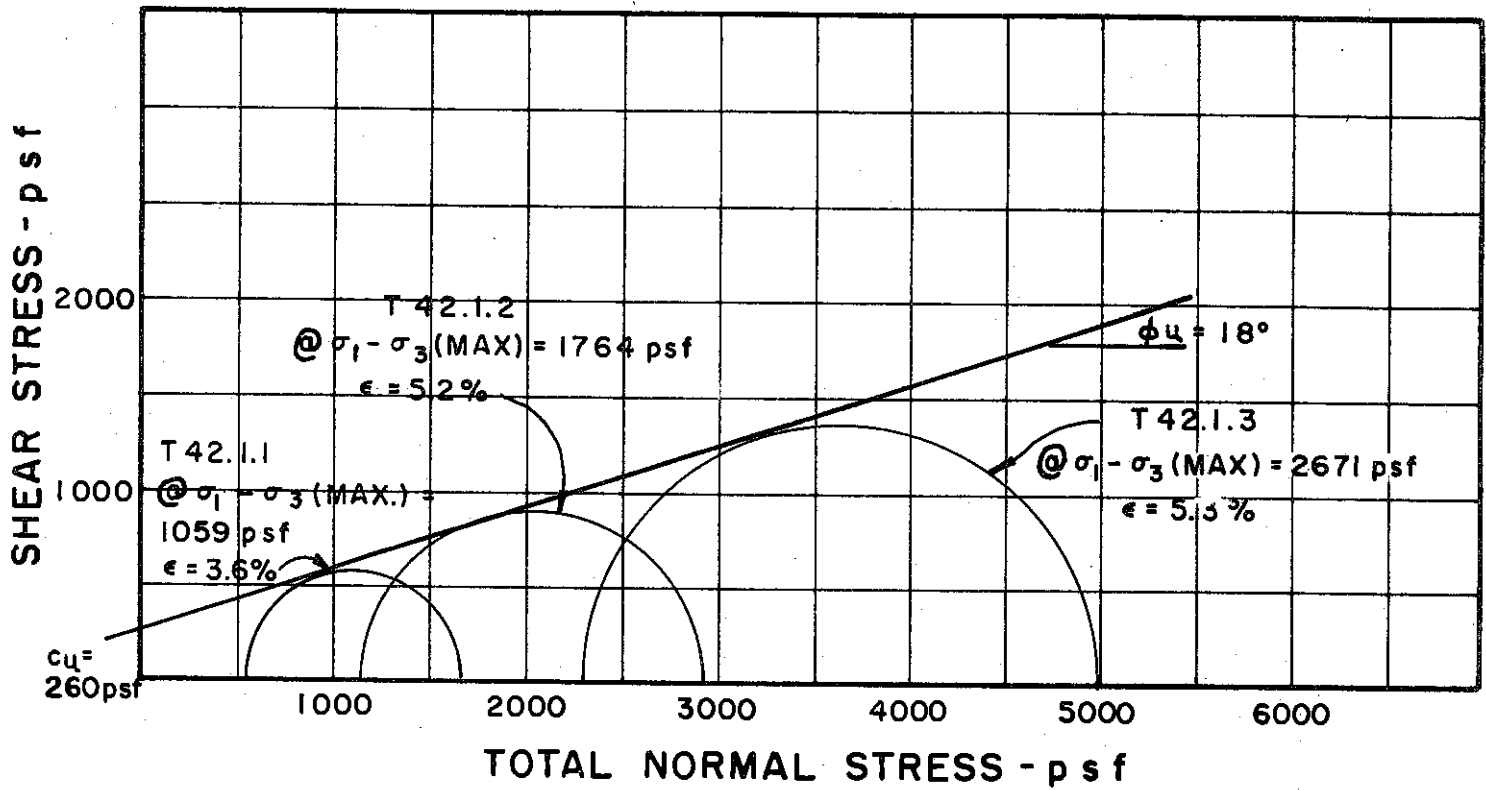
CONSOLIDATED UNDRAINED  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-418





BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

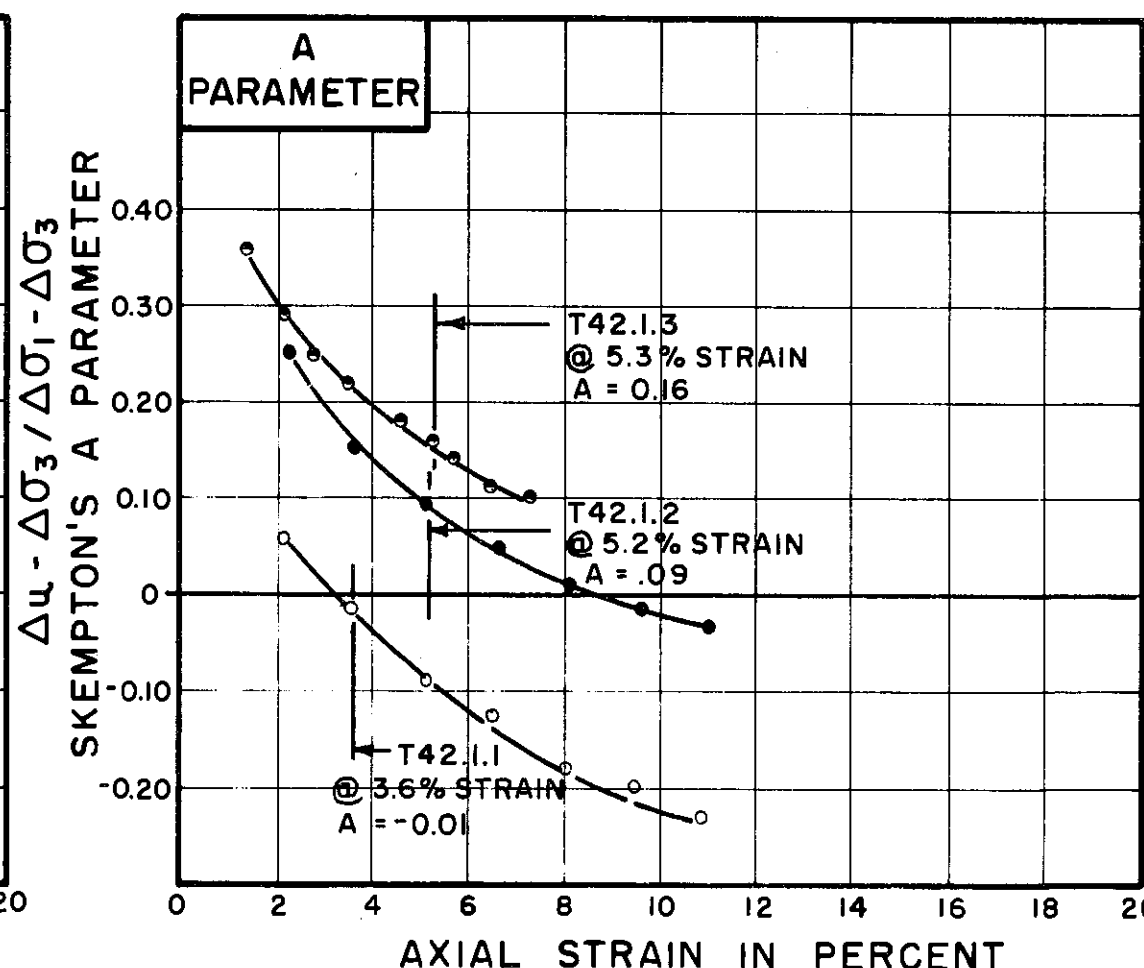
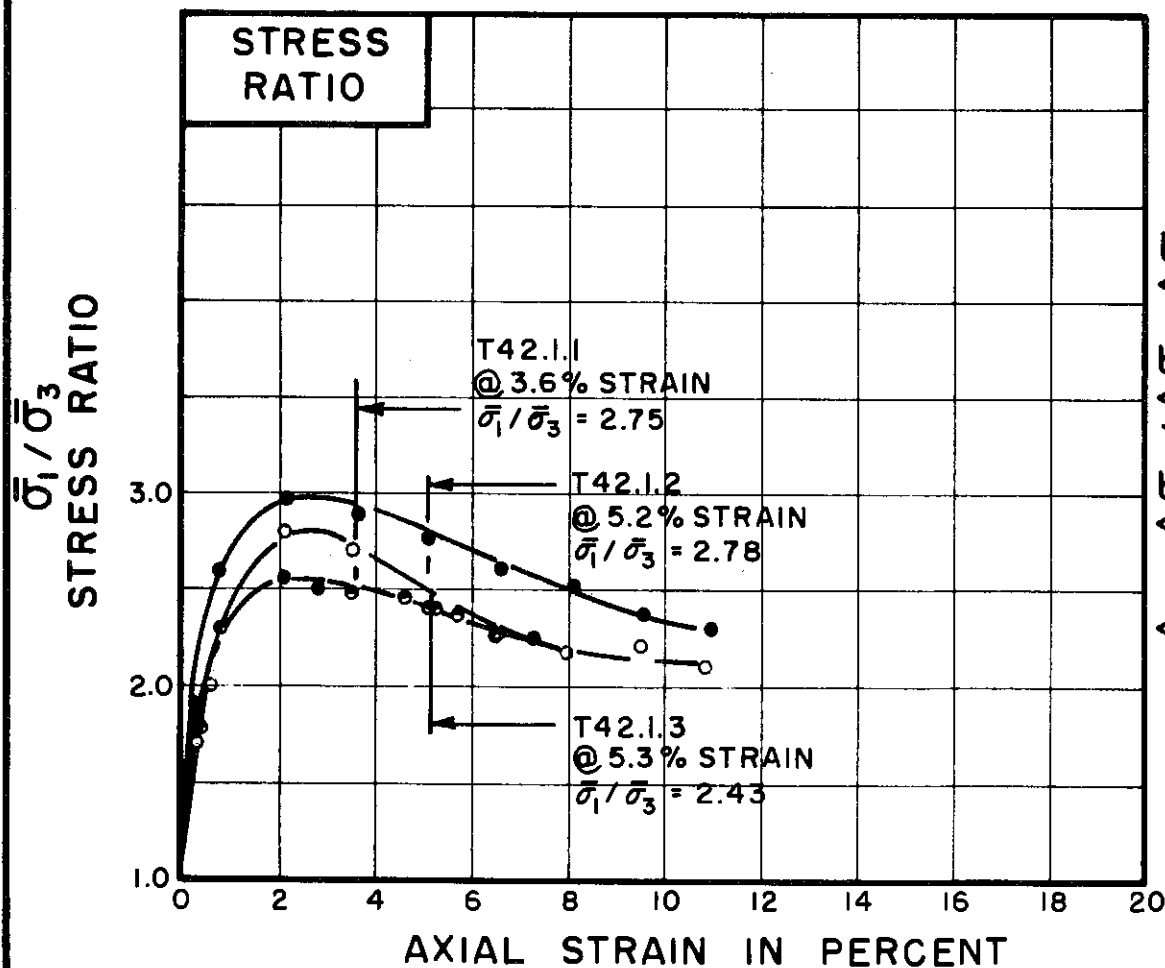
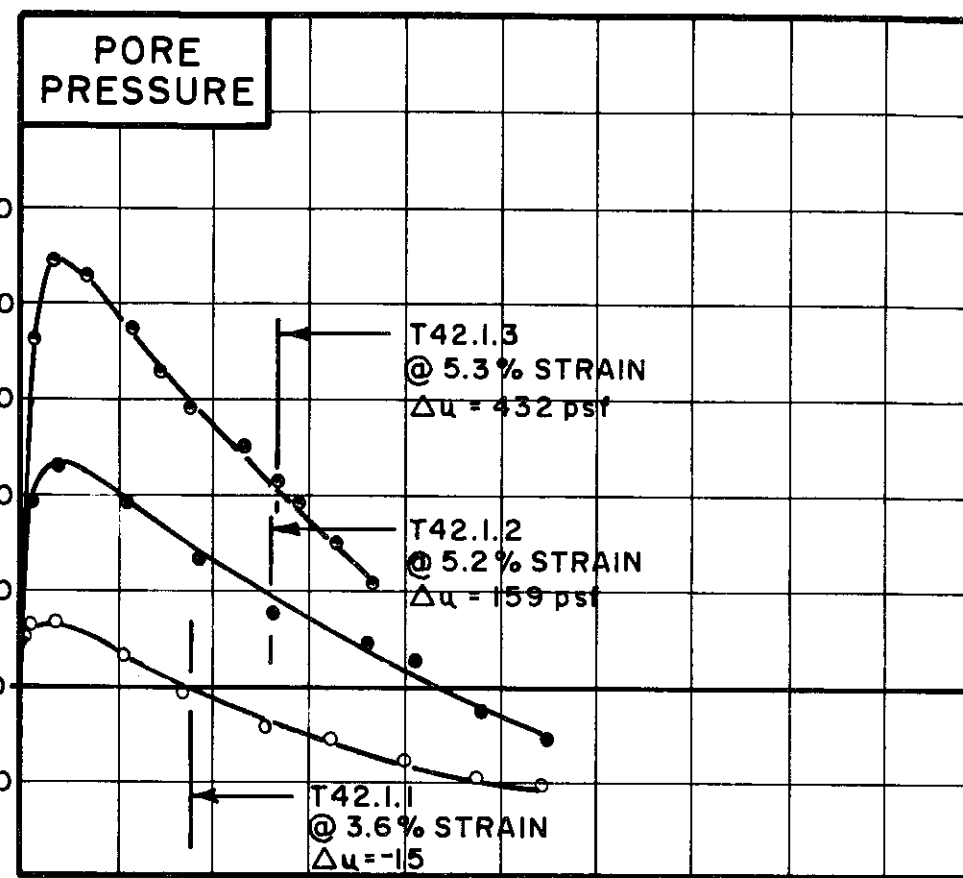
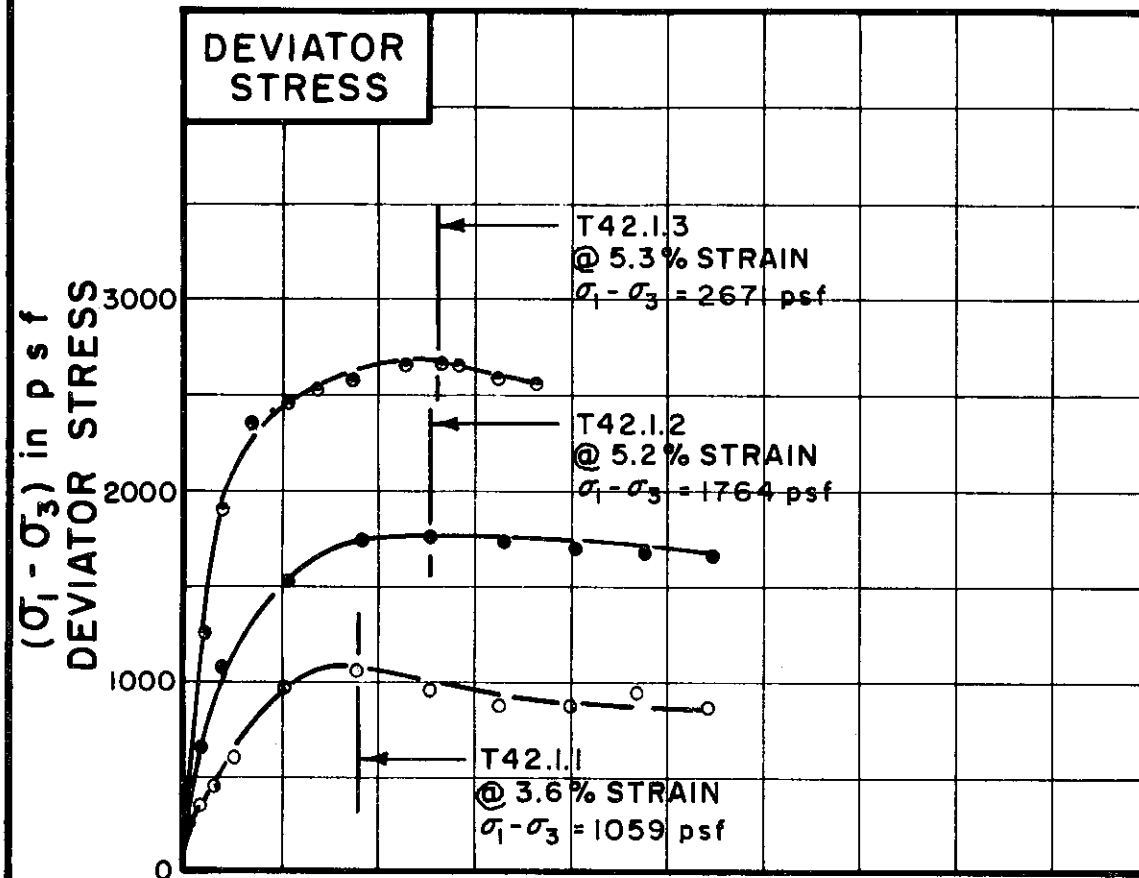
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T42.1.1	T42.1.2	T42.1.3
	○	●	○

INITIAL CONDITIONS		WATER CONTENT	$w_0$	29.8%	29.3%	28.9%
DRY DENSITY		$\gamma_d$	pcf	94	95	96
SAMPLE DIAMETER		$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT		$H_0$	in.	3.43	3.40	3.42
FINAL BACK PRESSURE		$u_0$	psf	7200	7200	8784
INITIAL EFFECTIVE STRESS		$\bar{\sigma}_1 / \bar{\sigma}_3$	psf	590	1152	2304
VOLUMETRIC STRAIN		$\epsilon_{vol}$		0.2%	1.6%	1.4%
PORE PRESSURE RESPONSE				98%	99%	98%
FINAL CONDITIONS BEFORE SHEAR		WATER CONTENT	$w_f$	32.3%	30.9%	29.6%
SKETCH OF SAMPLE AT END OF TEST						

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.023
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BORING NO. 60

SAMPLE NO. 2

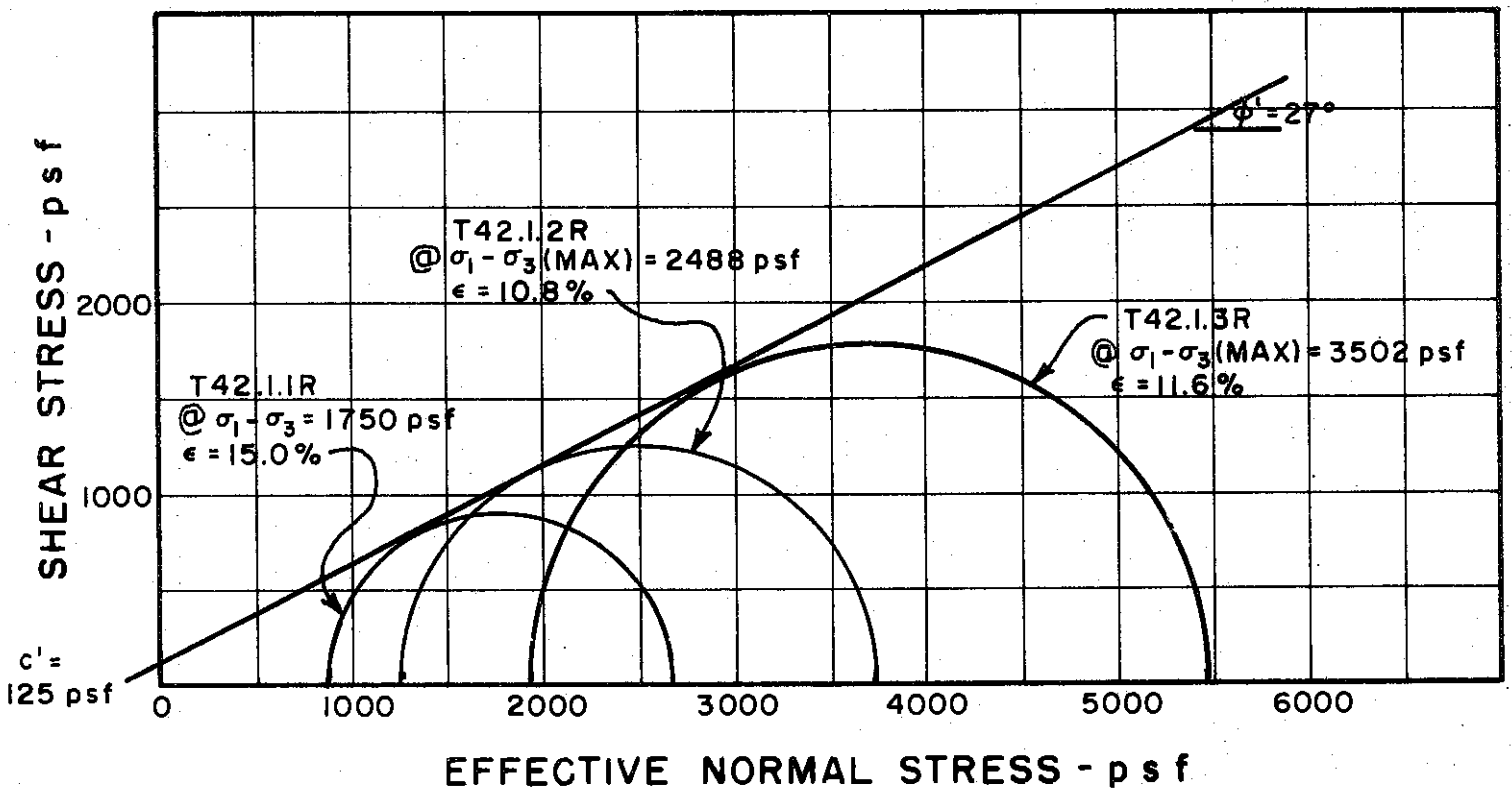
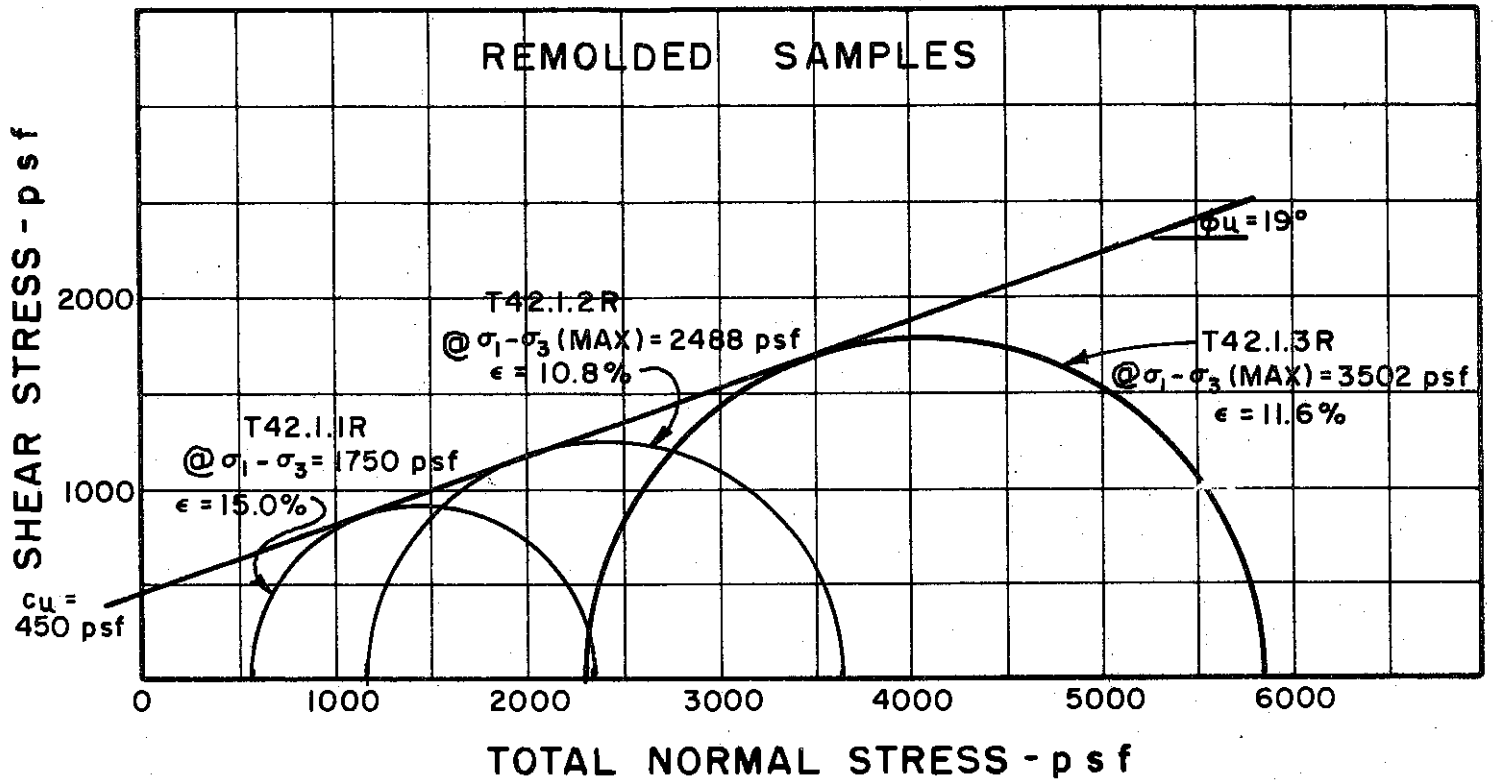
DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CH)

LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

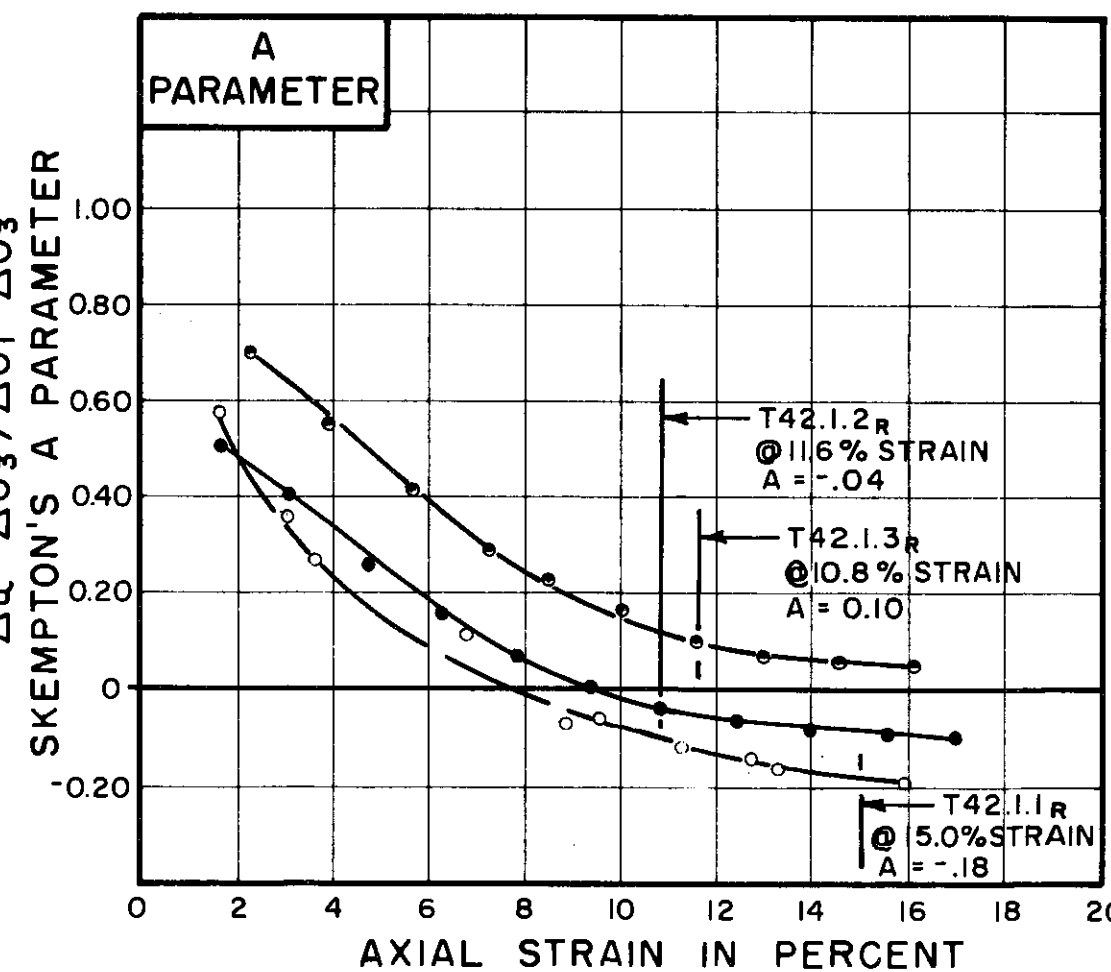
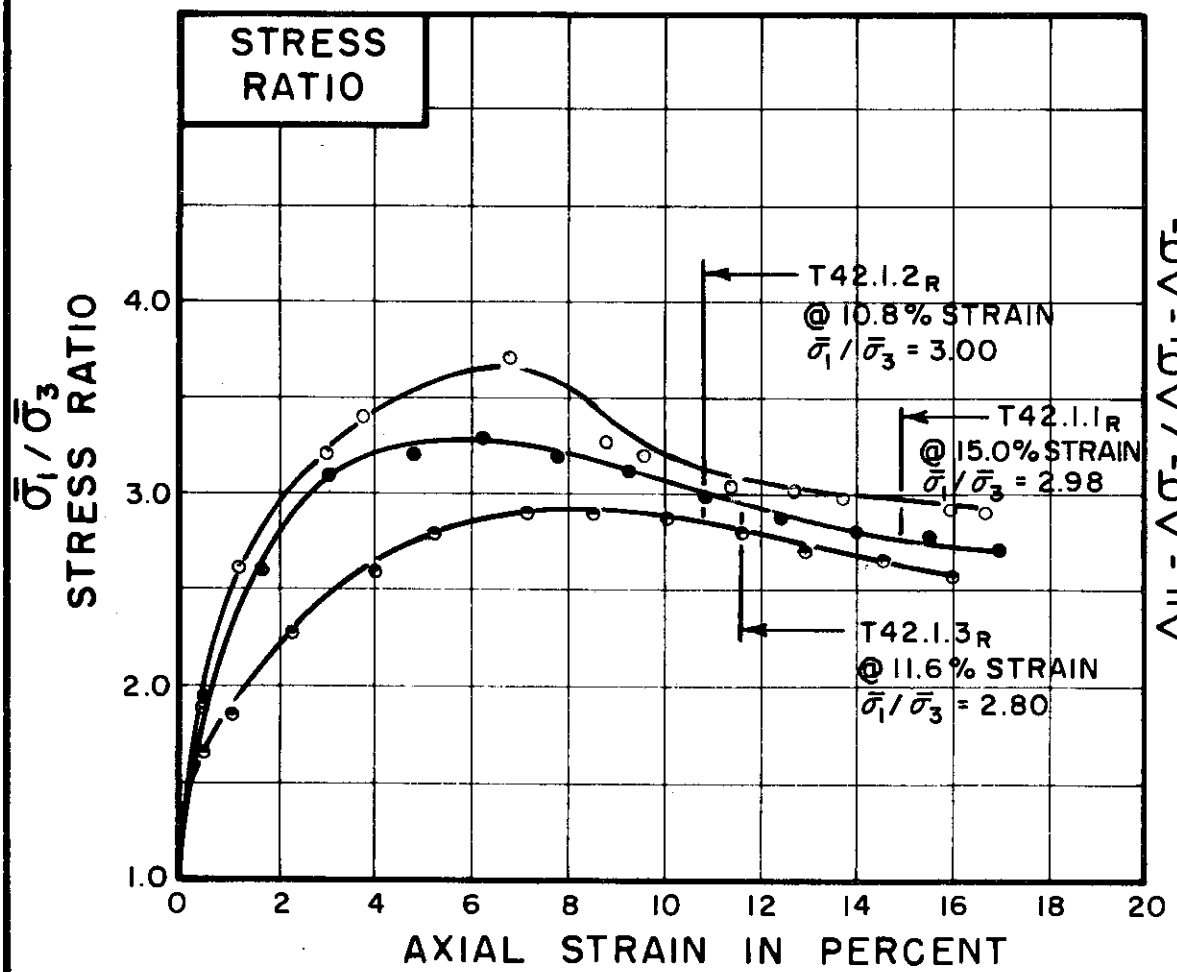
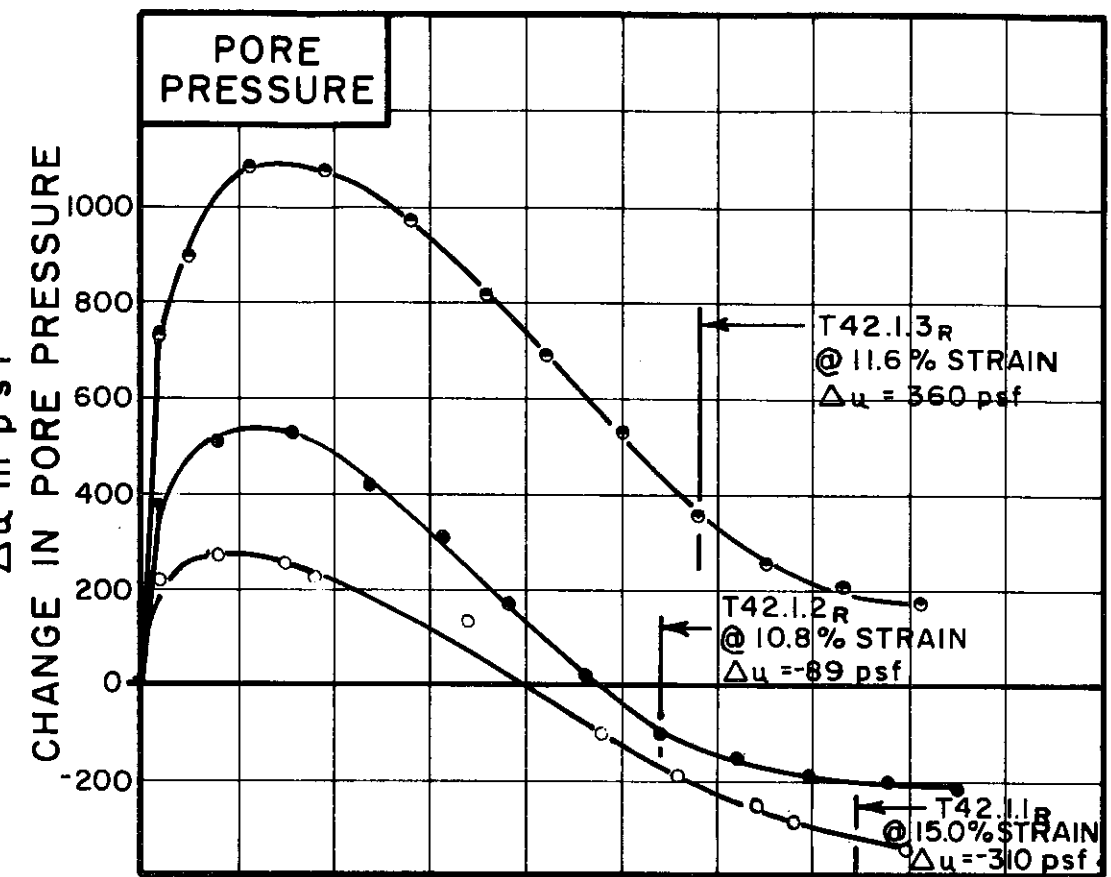
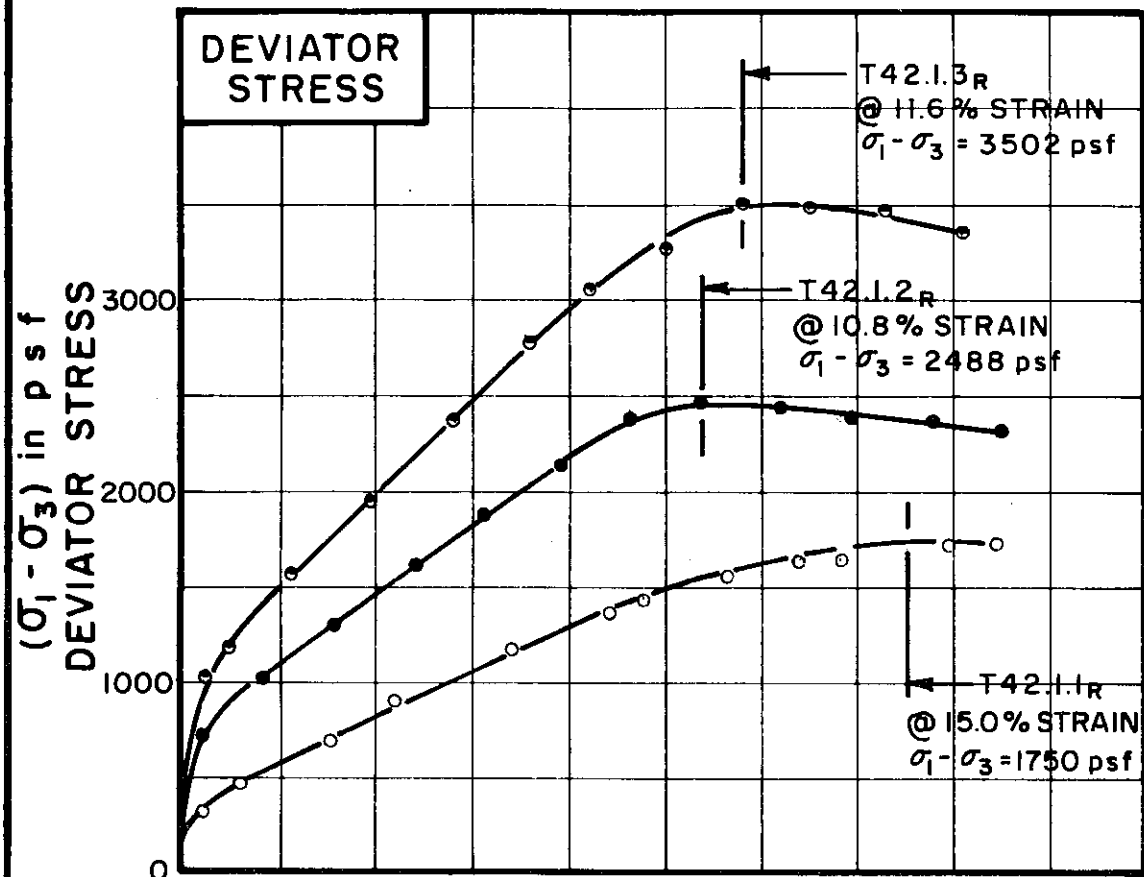
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

**MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-421



TEST NO. / SYMBOL	T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
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INITIAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_0$	29.3%	29.3%	29.3%
DRY DENSITY	$\gamma_d$	96	99	98
pcf				
SAMPLE DIAMETER	$D_0$	1.40	1.40	1.40
in.				
SAMPLE HEIGHT	$H_0$	3.30	3.25	3.29
in.				
FINAL CONDITIONS BEFORE SHEAR		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
FINAL BACK PRESSURE	$u_0$	8640	8640	8640
psf				
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1152	2304
psf				
VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.7%	2.4%	3.3%
PORE PRESSURE RESPONSE		97%	97%	97%
FINAL CONDITIONS		T42.1.1 <sub>R</sub>	T42.1.2 <sub>R</sub>	T42.1.3 <sub>R</sub>
WATER CONTENT	$w_f$	29.0%	26.1%	25.8%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.025	.025
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BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CL)

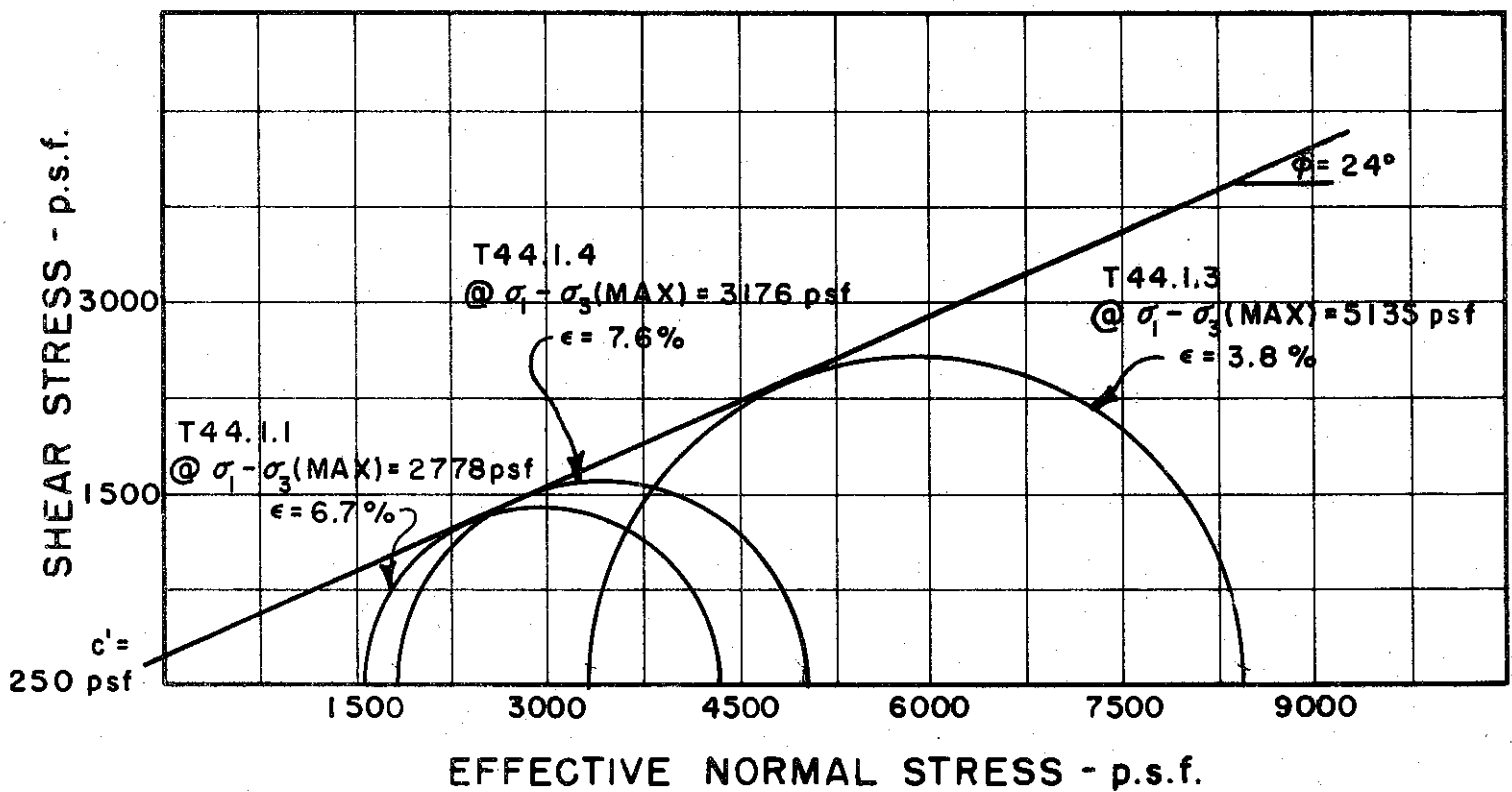
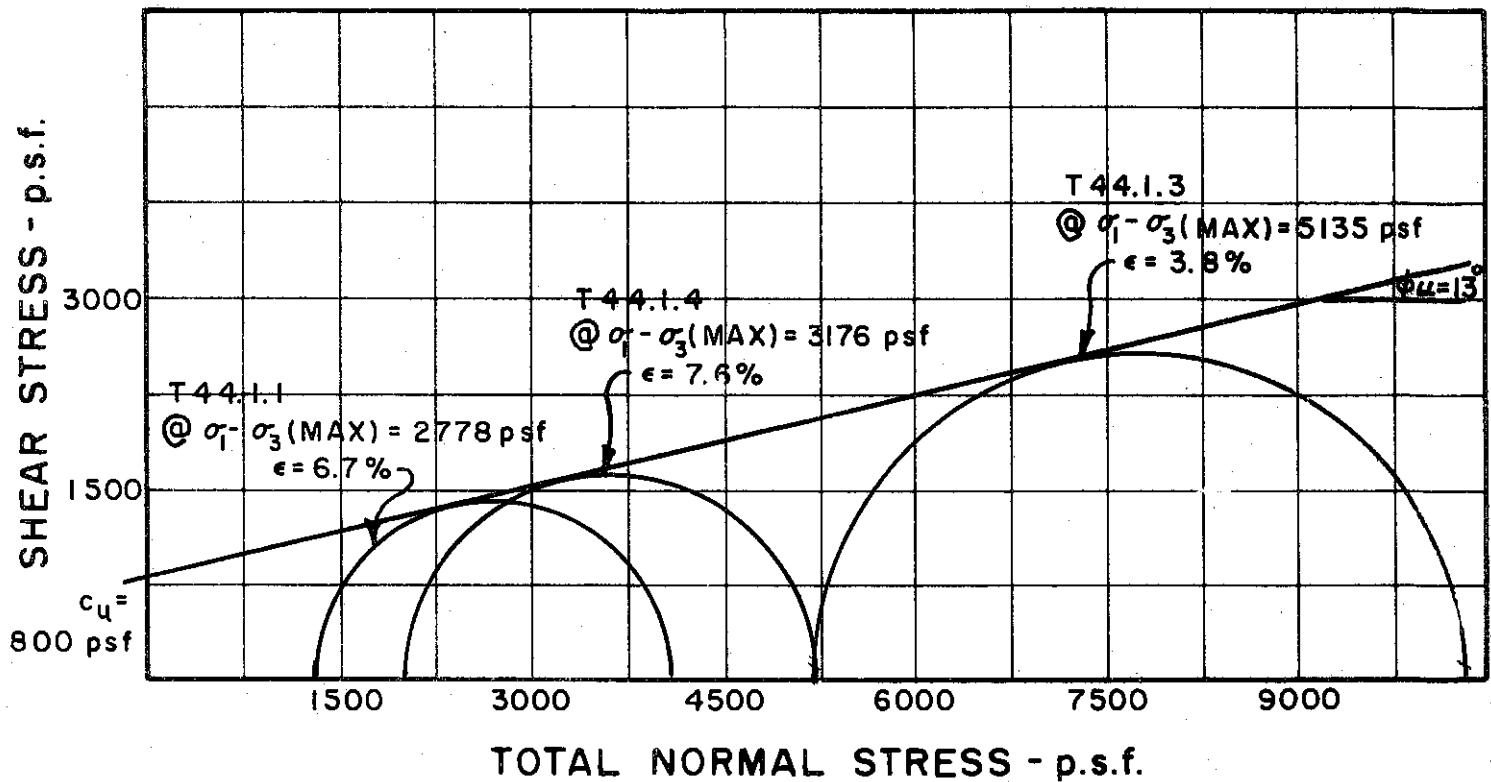
LIQUID LIMIT 53 PLASTIC LIMIT 26

REMOLED SAMPLES

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255



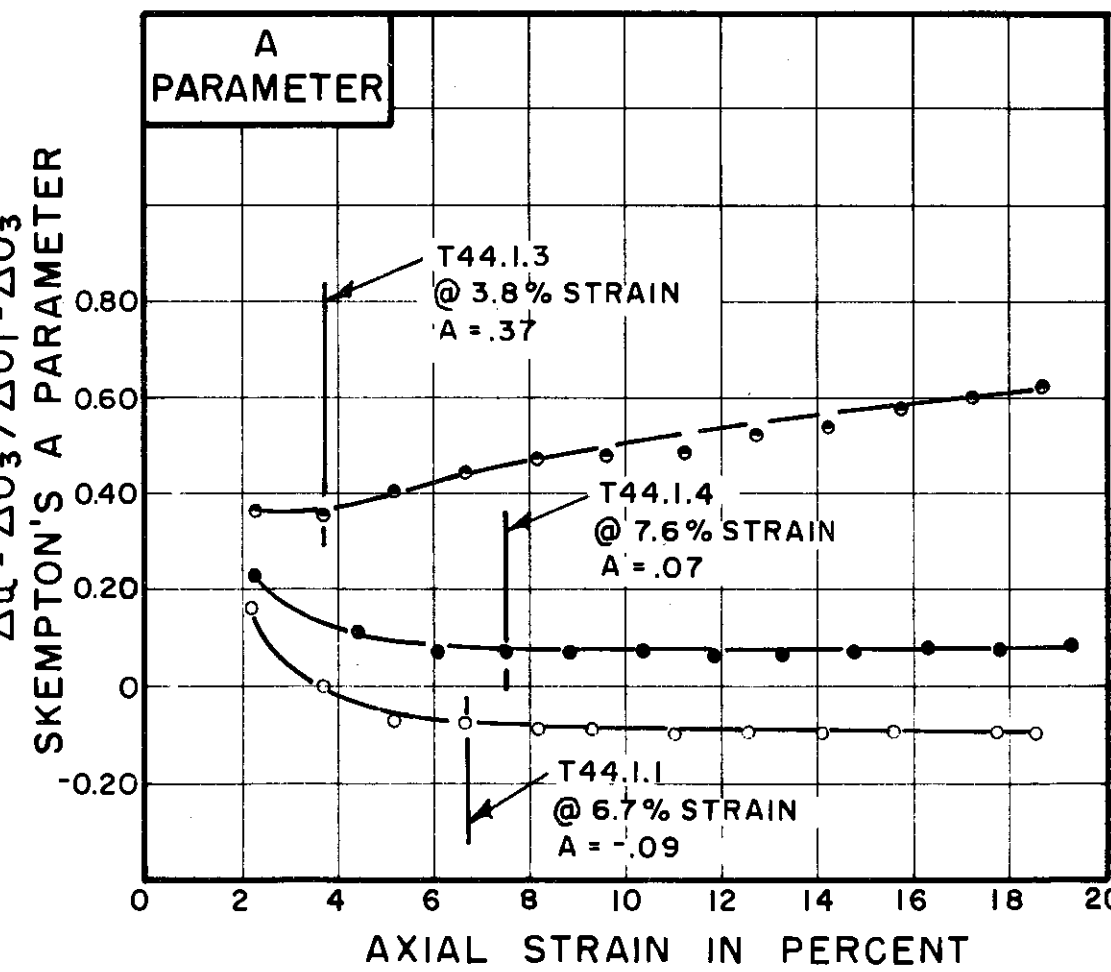
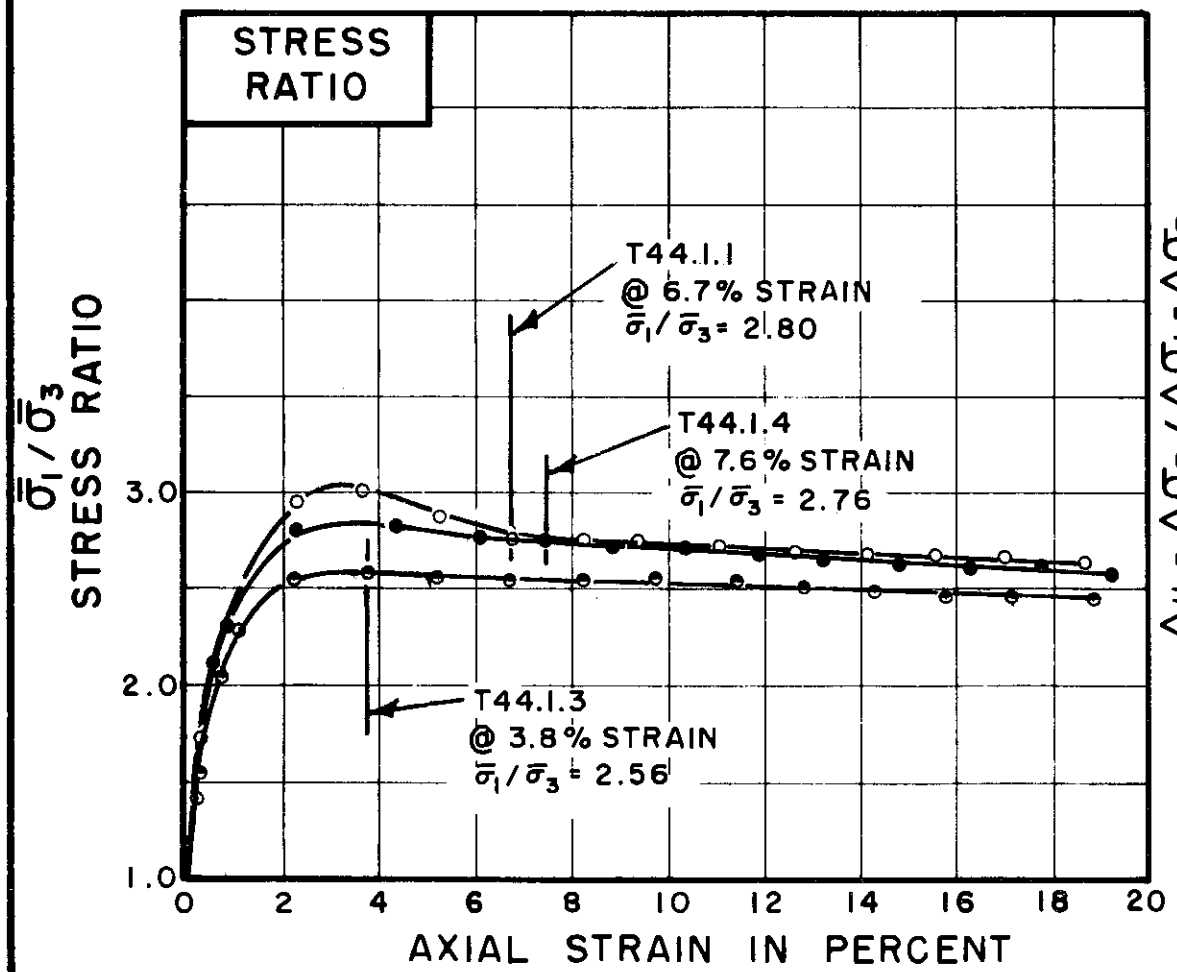
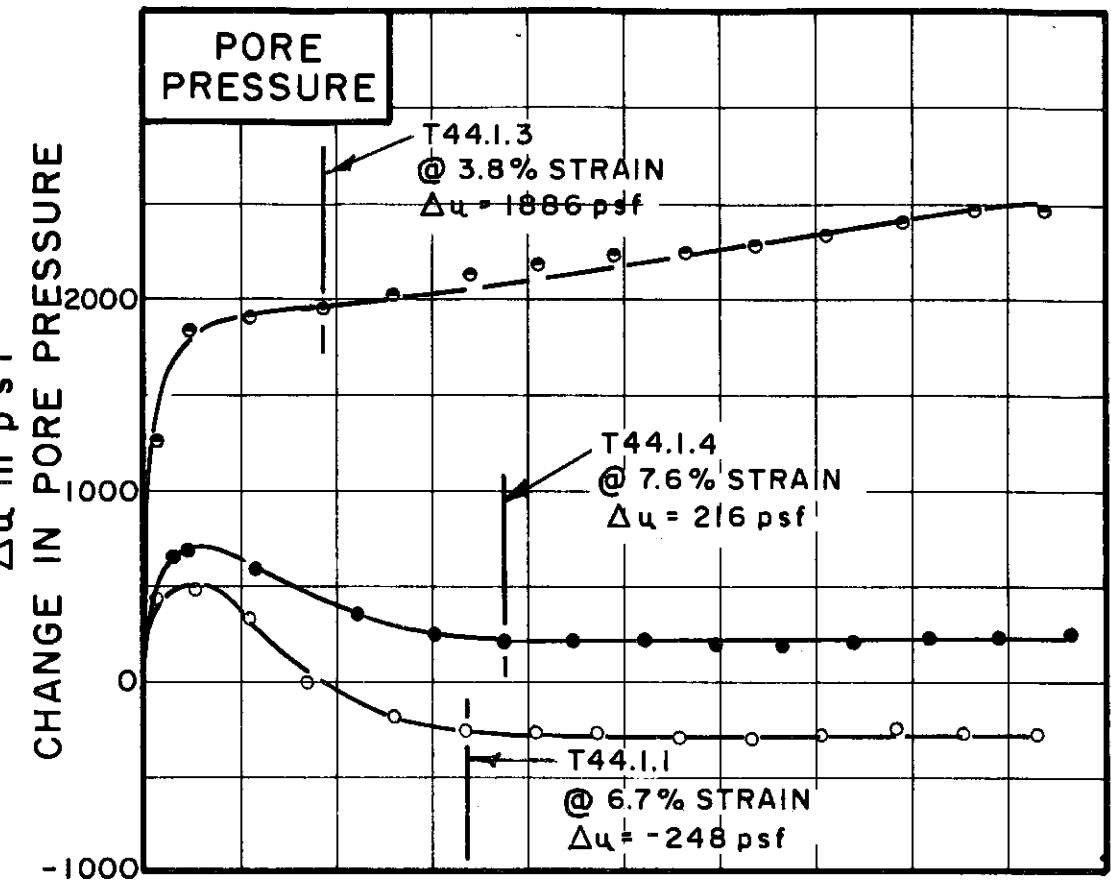
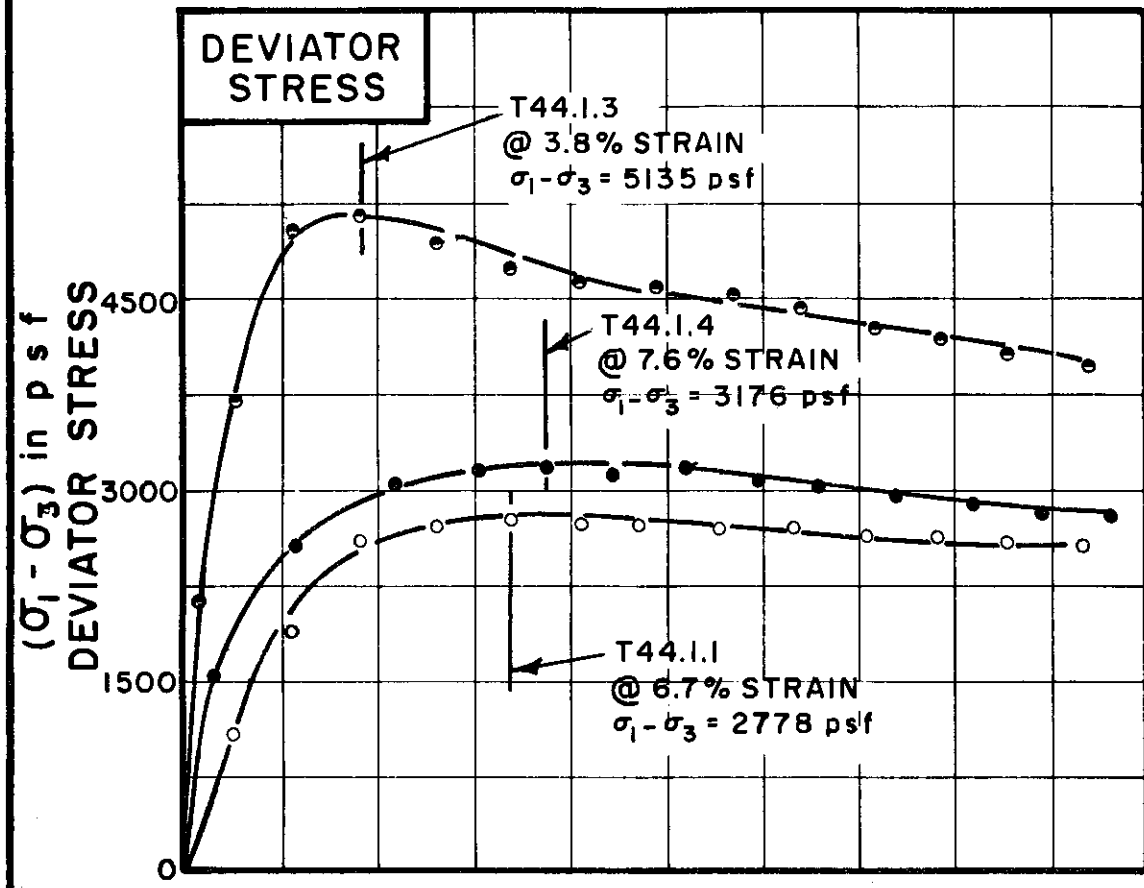
BORING NO. 60  
 SAMPLE NO. 4  
 DEPTH 21.0 TO 23.0

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE  
 GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T44.1.1	T44.1.4	T44.1.3
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INITIAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_0$		30.4%	30.6%	31.0%
DRY DENSITY	$\gamma_d$	pcf	94	95	94
SAMPLE DIAMETER	$D_0$	in.	1.43	1.42	1.43
SAMPLE HEIGHT	$H_0$	in.	3.37	3.40	3.36
CONDITIONS BEFORE SHEAR			T44.1.1	T44.1.4	T44.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	8640	10080
INITIAL EFFECTIVE STRESS	$\sigma'_{1,0}$ $\sigma'_{3,0}$	psf	1296 5184	2016 5184	5184 5184
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.5%	3.6%	3.8%
PORE PRESSURE RESPONSE			98%	97%	96%
FINAL CONDITIONS			T44.1.1	T44.1.4	T44.1.3
WATER CONTENT	$w_f$		31.2%	30.1%	29.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024
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BORING NO. 60

SAMPLE NO. 4

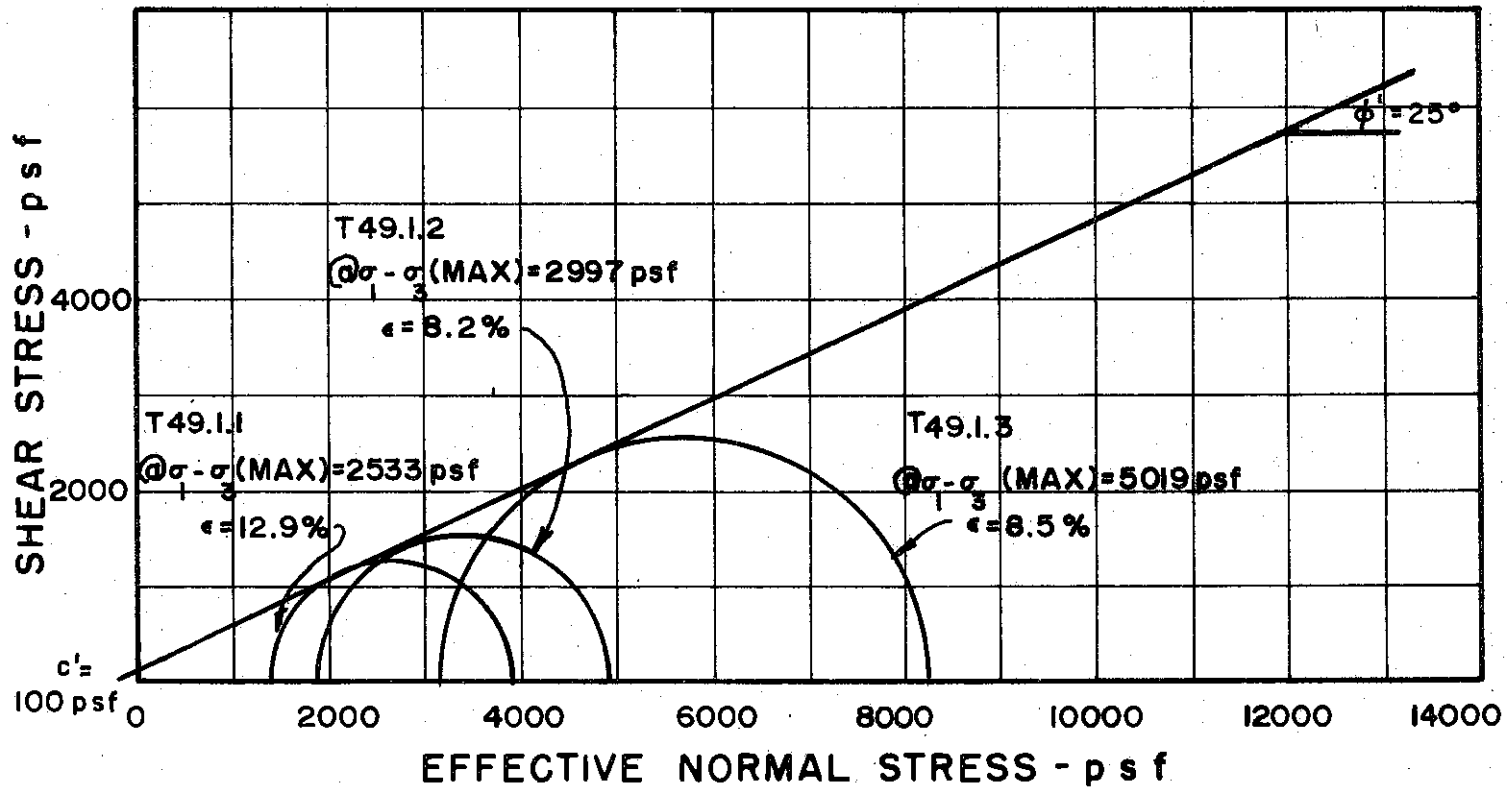
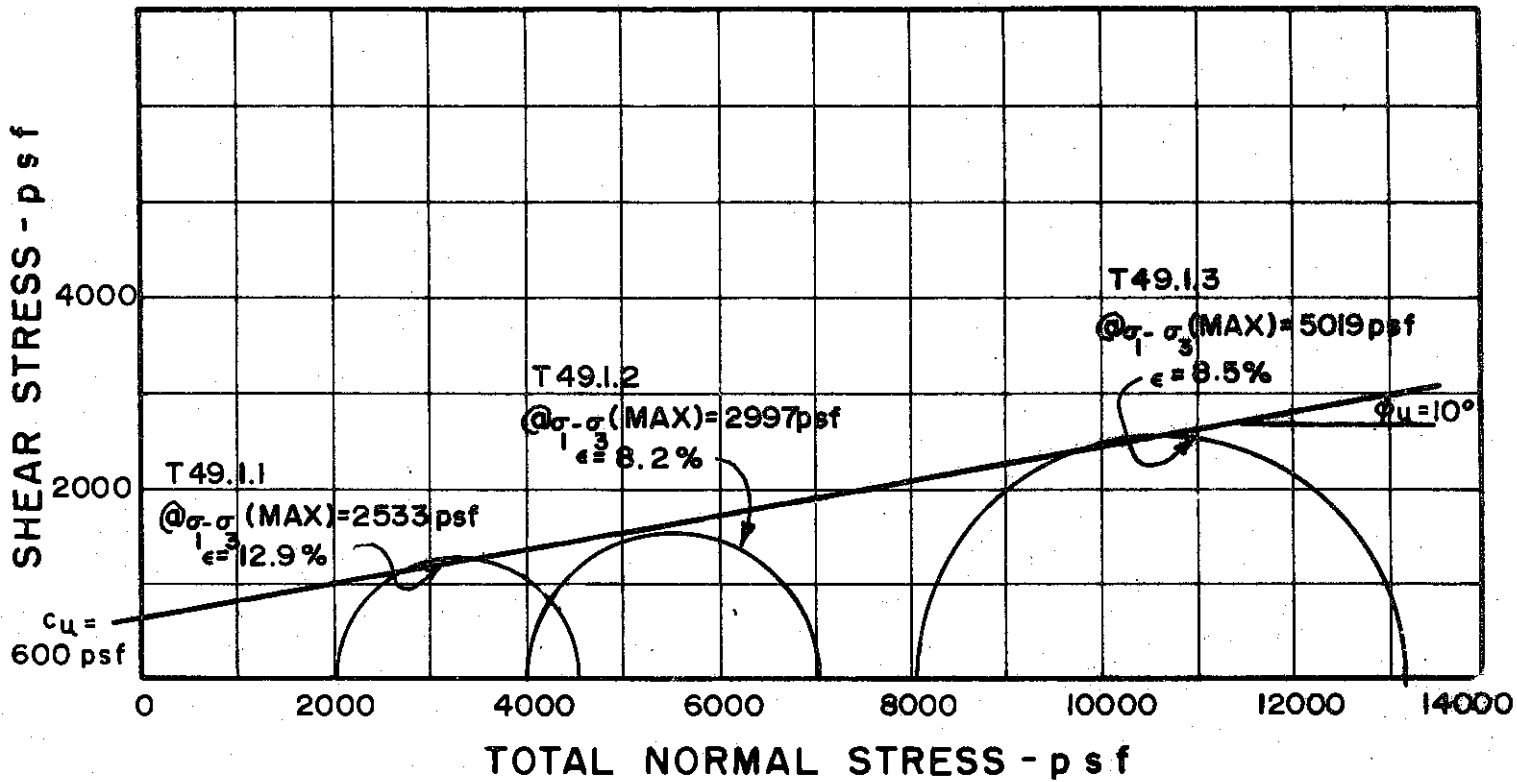
DEPTH 21.0 TO 23.0

SOIL DESCRIPTION SILTY CLAY, (CL)

LIQUID LIMIT 43 PLASTIC LIMIT 17

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

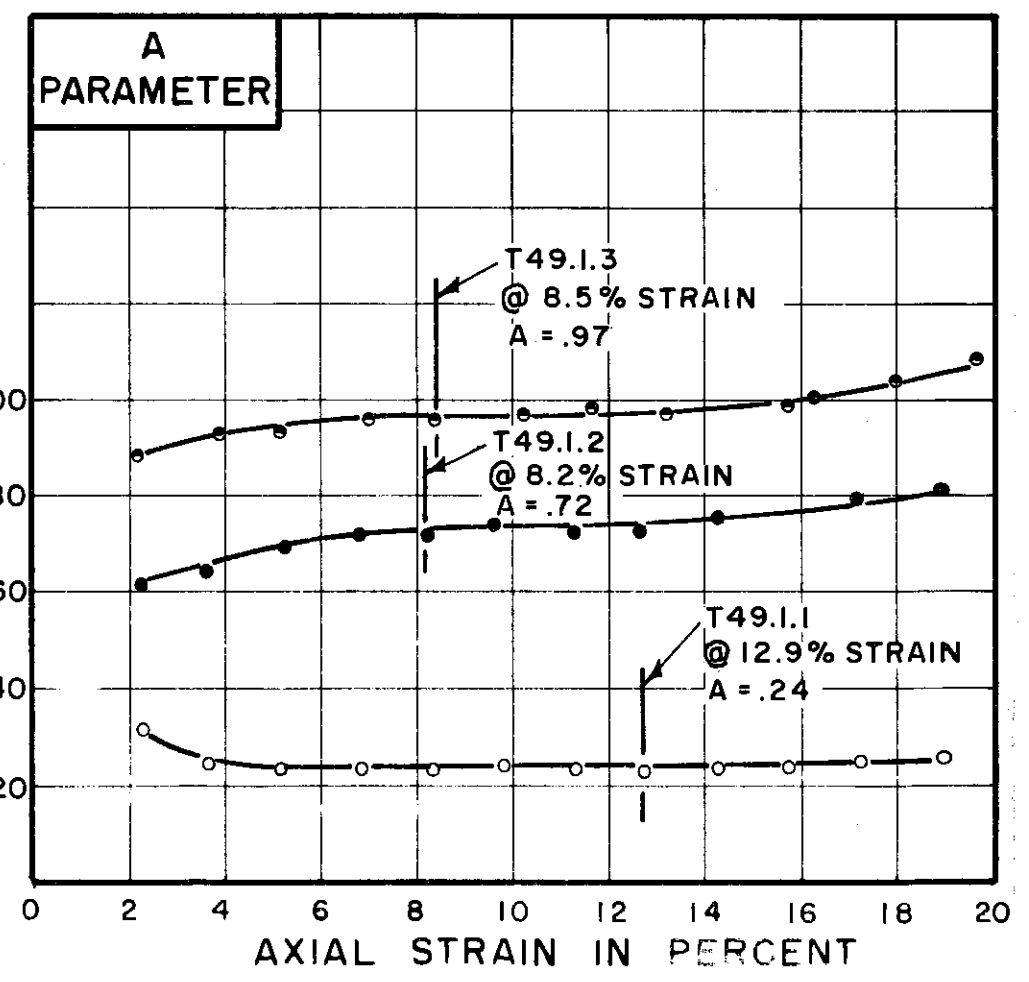
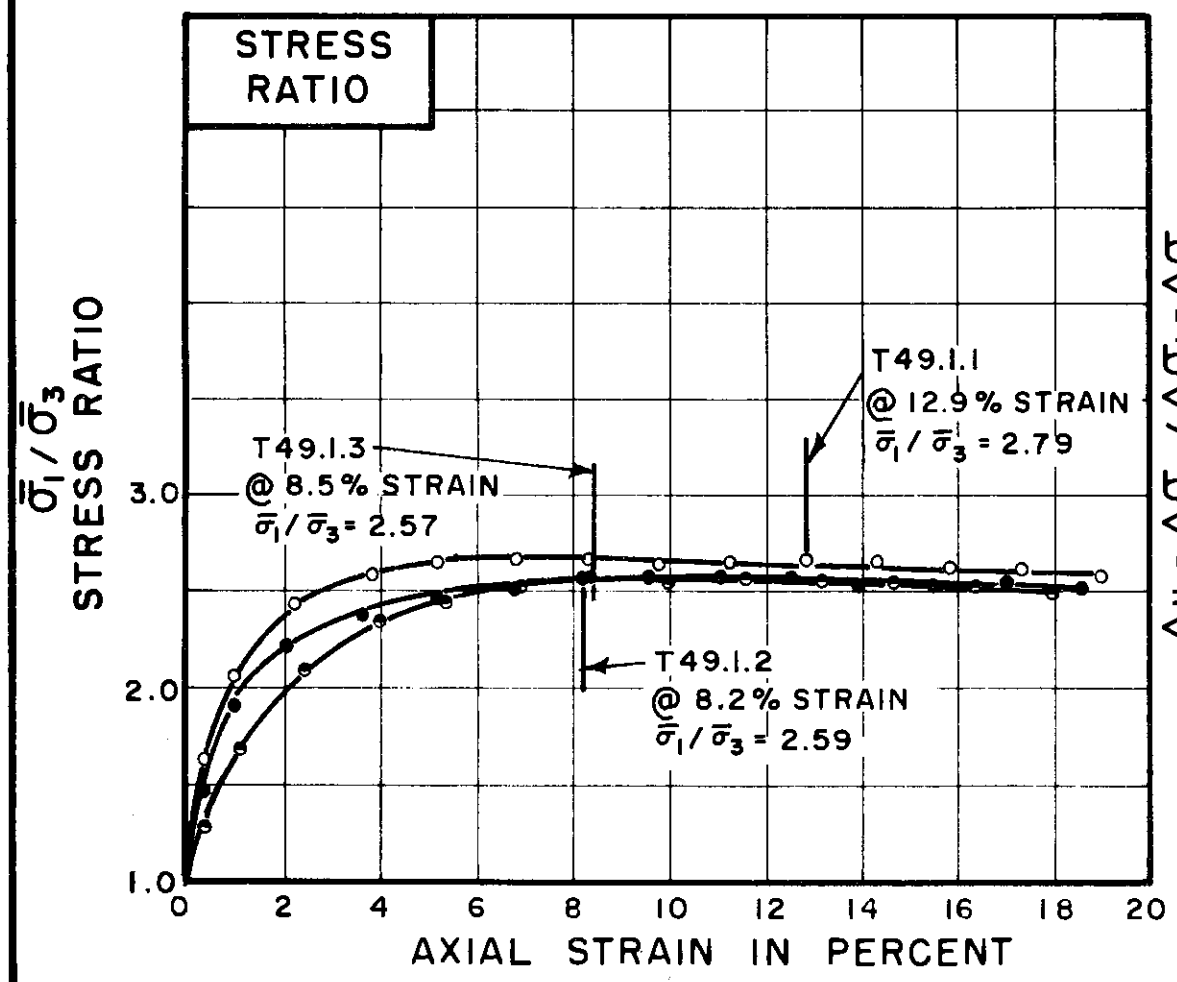
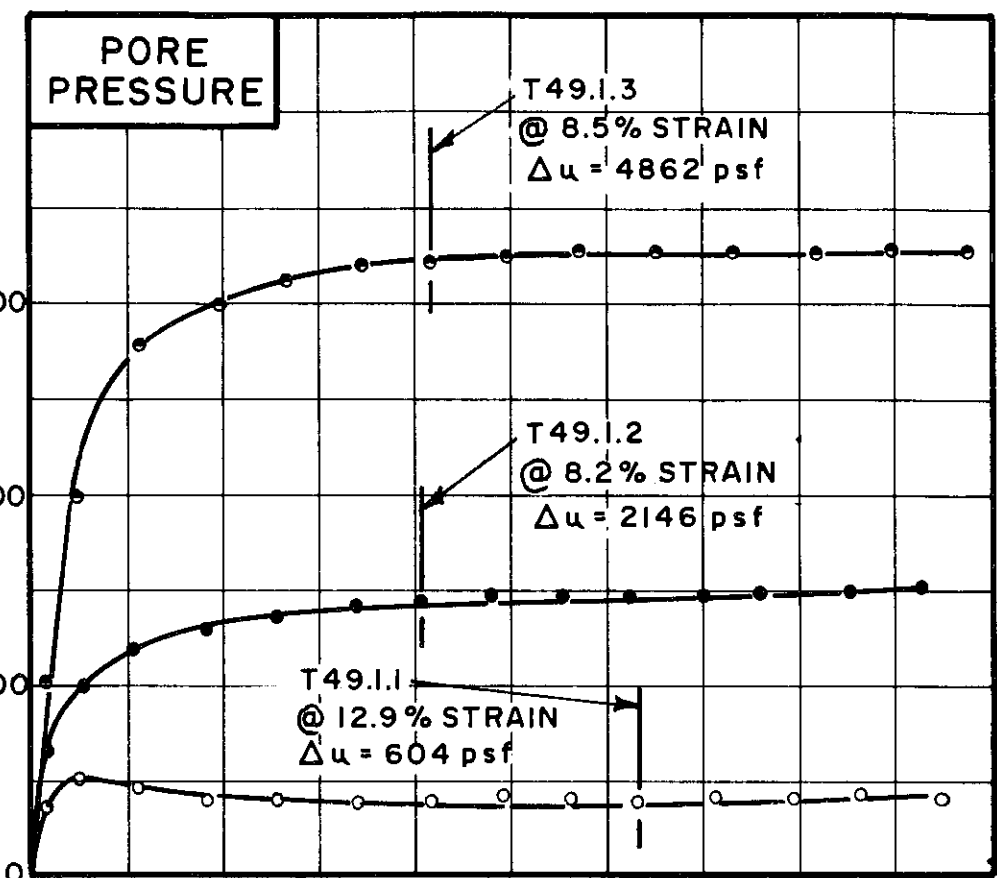
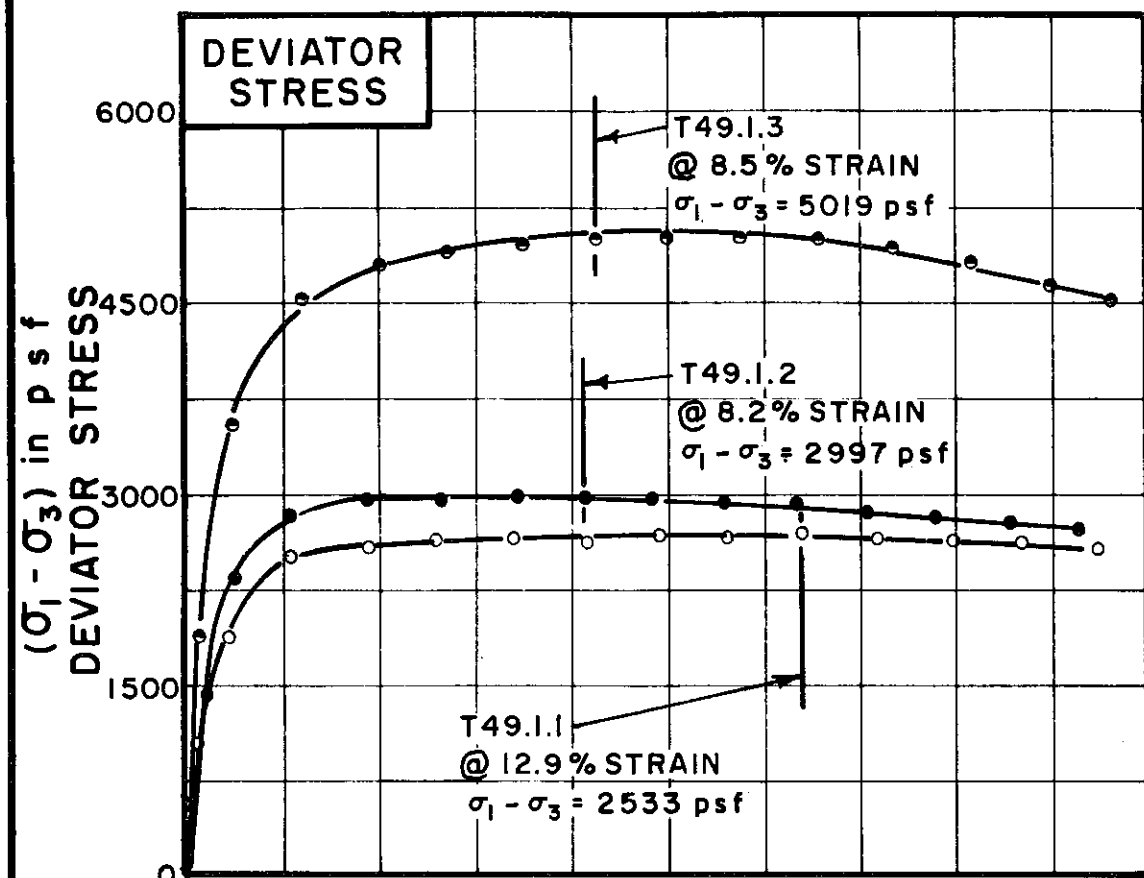
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-425



TEST NO. / SYMBOL	T49.1.1	T49.1.2	T49.1.3
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INITIAL CONDITIONS			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_0$		26.6%	27.0%	26.0%
DRY DENSITY	$\gamma_d$	pcf	99	98	102
SAMPLE DIAMETER	$D_0$	in.	1.42	1.40	1.39
SAMPLE HEIGHT	$H_0$	in.	3.32	3.40	3.26
FINAL CONDITIONS BEFORE SHEAR			T49.1.1	T49.1.2	T49.1.3
FINAL BACK PRESSURE	$u_0$	psf	10080	10080	11520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1^*$ $\bar{\sigma}_3^*$	psf	2016	4032	8064
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.9%	3.5%	5.7%
PORE PRESSURE RESPONSE			97%	96%	91%
FINAL CONDITIONS AT END OF TEST			T49.1.1	T49.1.2	T49.1.3
WATER CONTENT	$w_f$		26.0%	25.5%	22.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.025
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BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 16

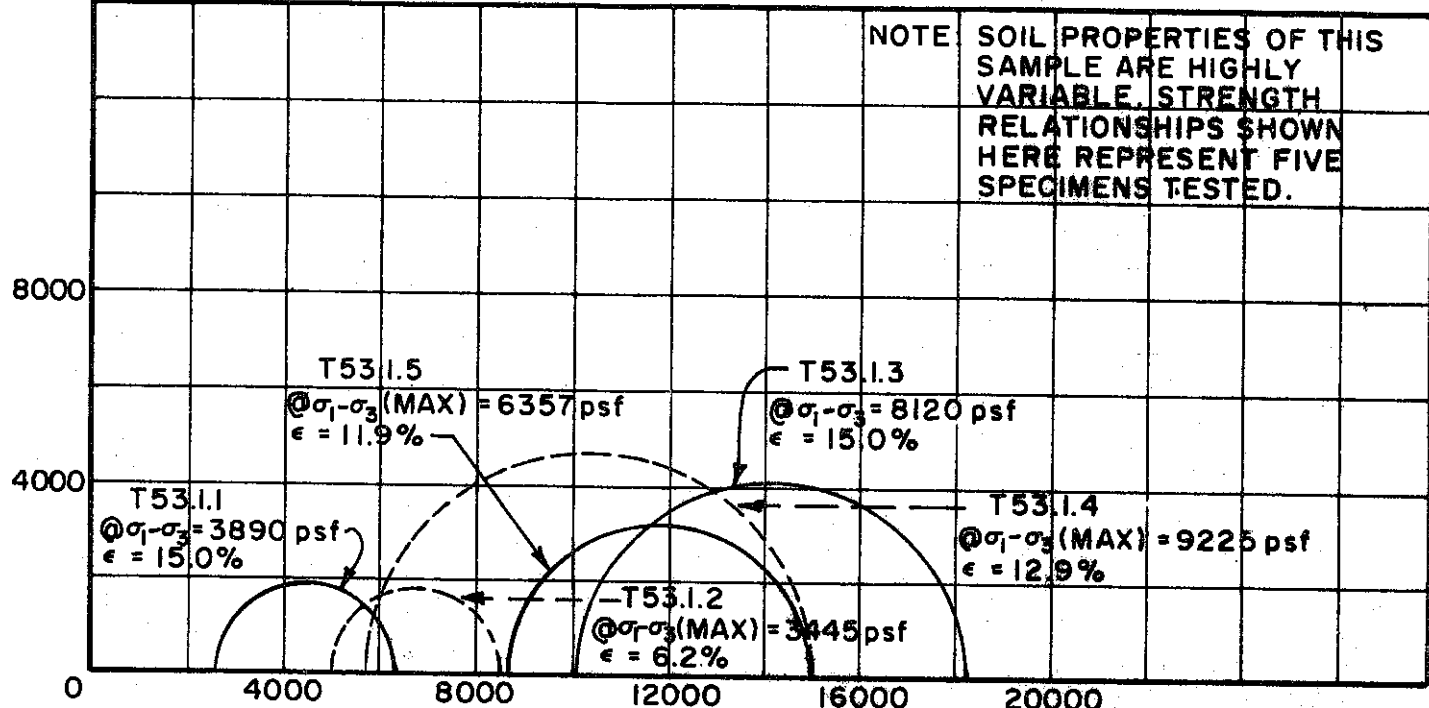
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



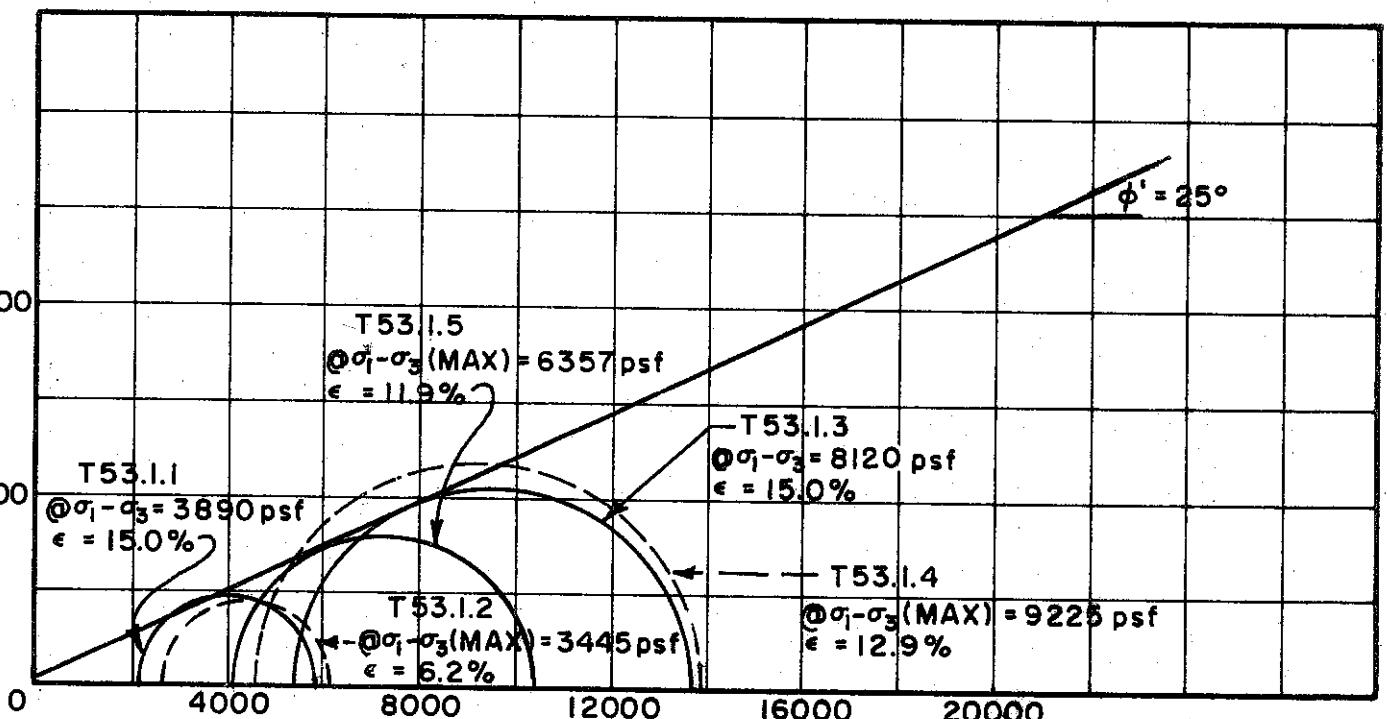
NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE. STRENGTH RELATIONSHIPS SHOWN HERE REPRESENT FIVE SPECIMENS TESTED.

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f

SHEAR STRESS - p s f



EFFECTIVE NORMAL STRESS - p s f

BORING NO. 60

SAMPLE NO. 13

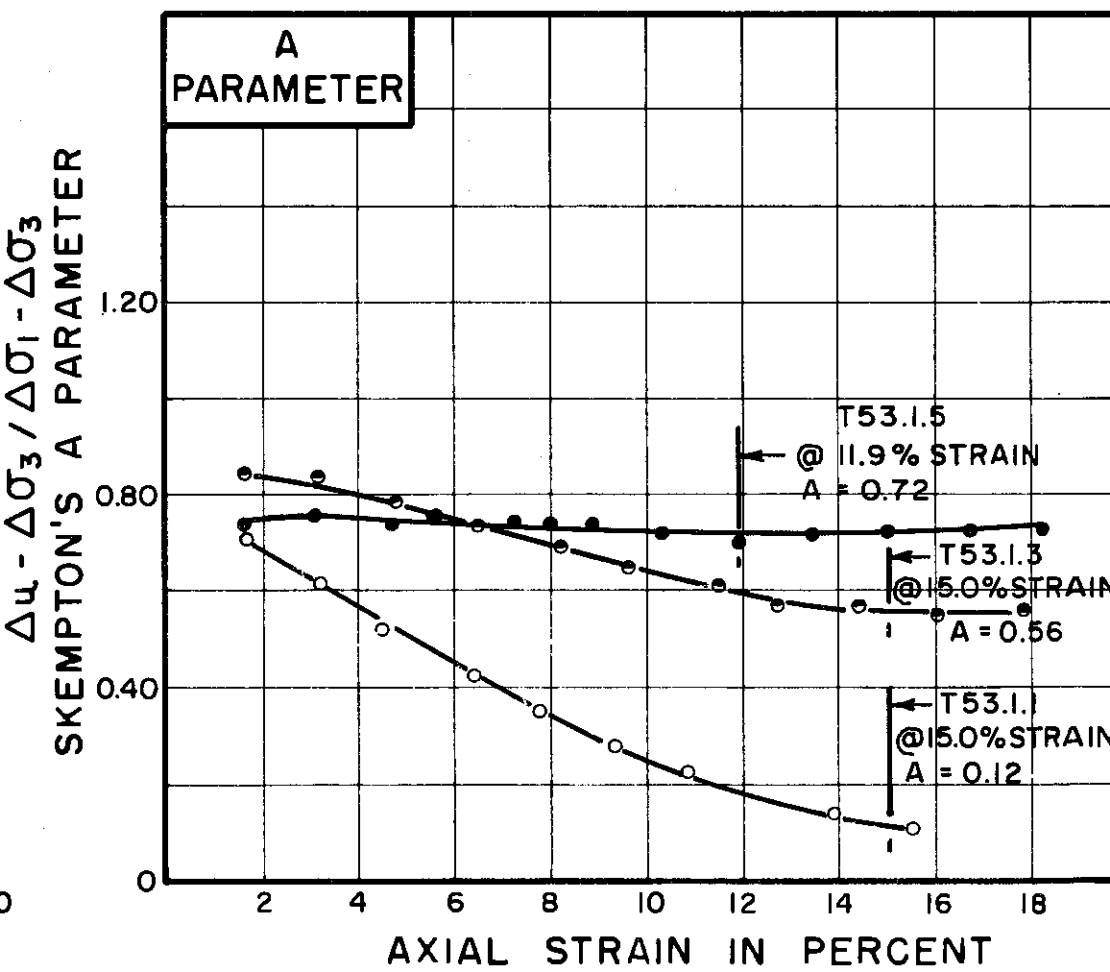
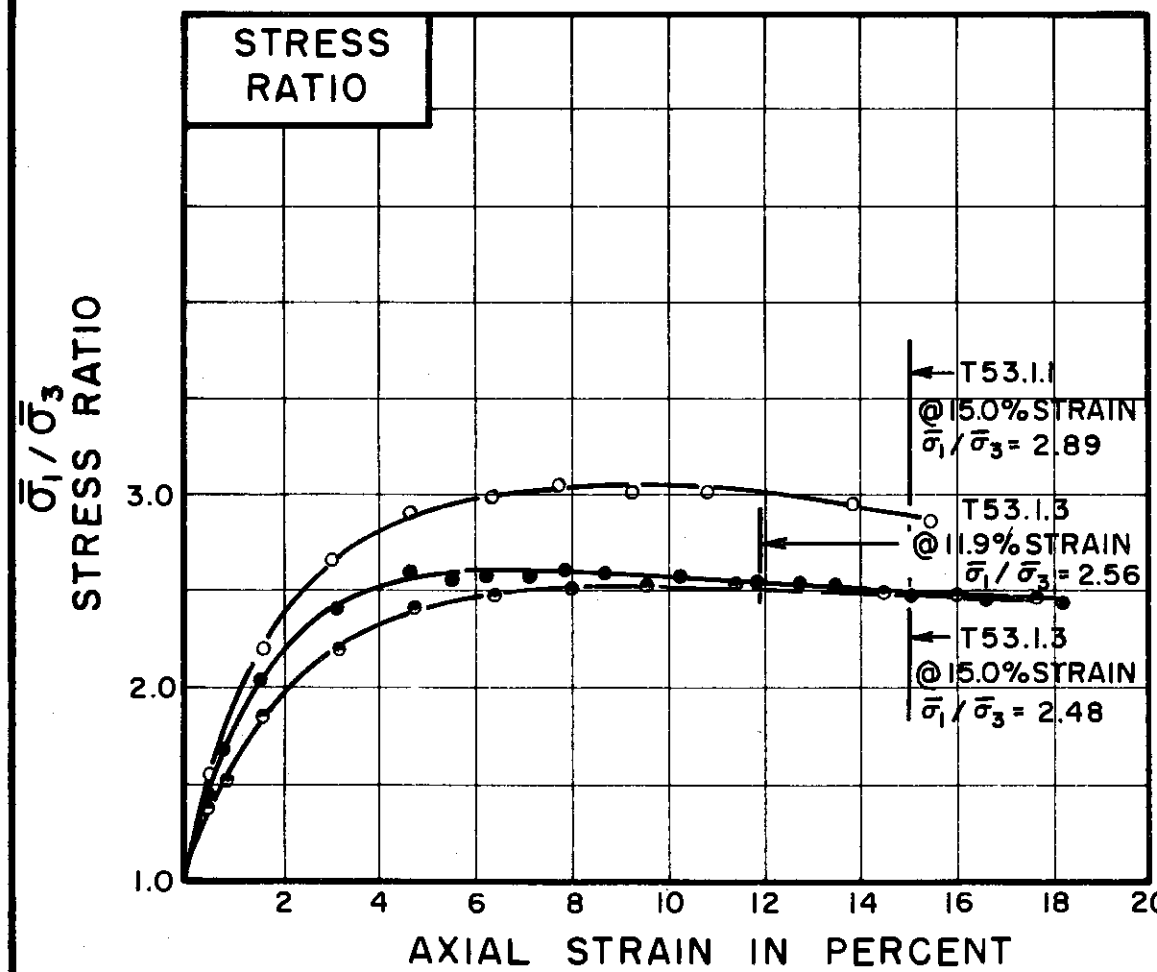
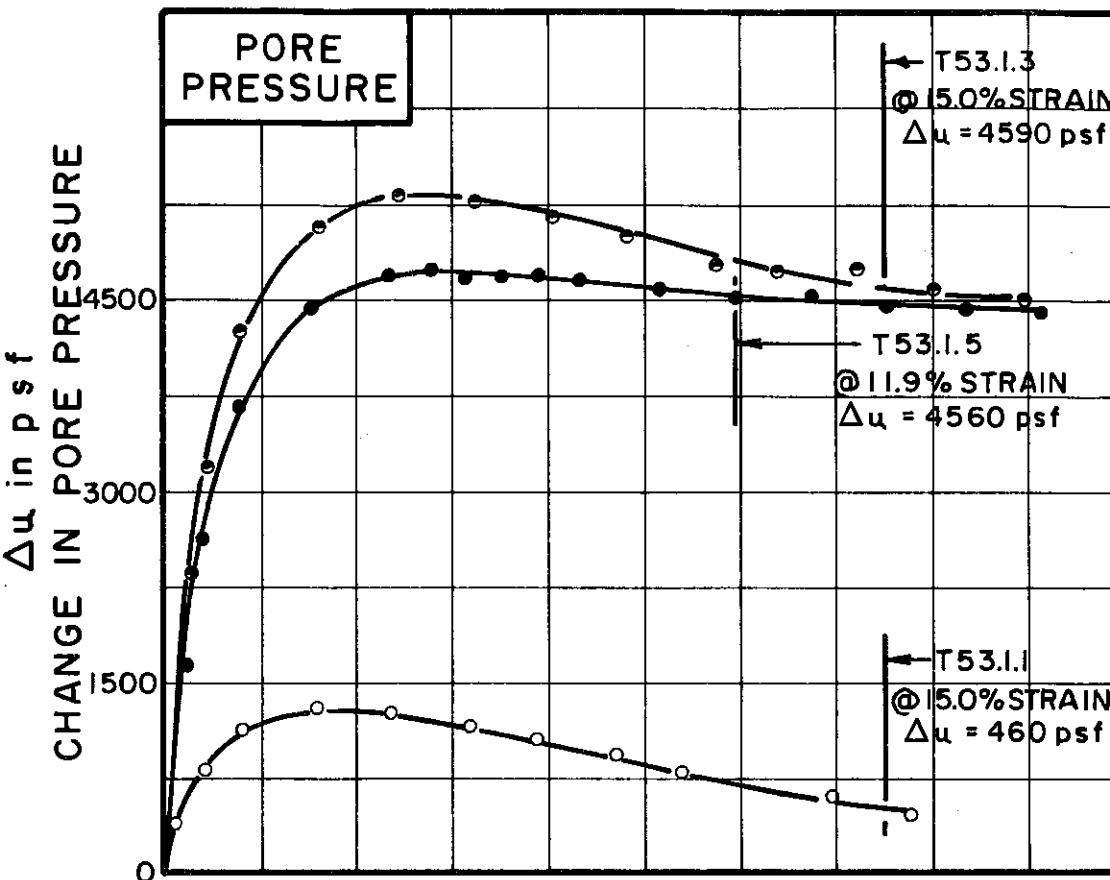
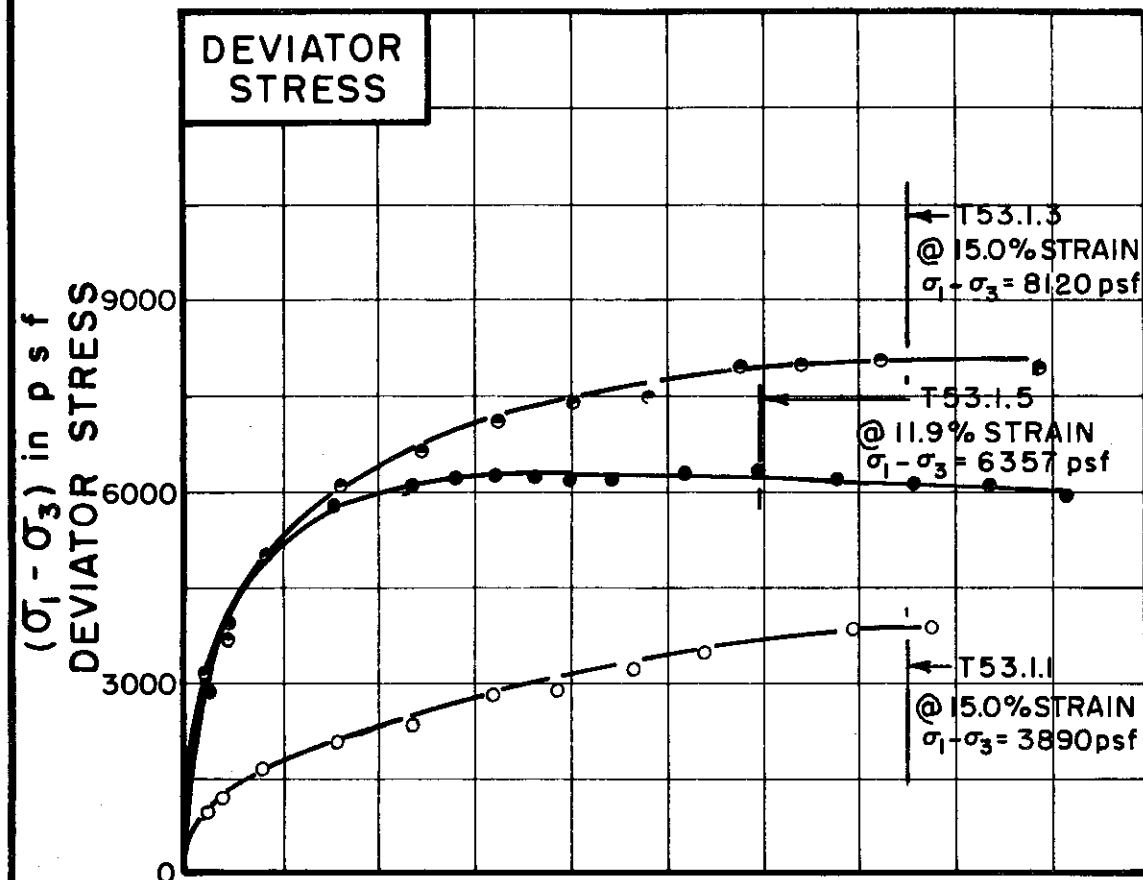
DEPTH 67.0' TO 69.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
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MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
FILE 1255



TEST NO.*/SYMBOL	T53.1.1	T53.1.5	T53.1.3
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INITIAL CONDITIONS		T53.1.1	T53.1.5	T53.1.3
WATER CONTENT	$w_0$	23.6%	21.0%	19.7%
DRY DENSITY	$\gamma_d$ pcf	103	104	104
SAMPLE DIAMETER	$D_0$ in.	1.42	1.42	1.41
SAMPLE HEIGHT	$H_0$ in.	3.25	3.19	3.20
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$ p.s.f.	7200	8640	7200
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$ p.s.f.	2520	8640	10080
VOLUMETRIC STRAIN	$\epsilon_{vol}$	3.0%	5.0%	6.1%
PORE PRESSURE RESPONSE		97%	100%	100%
FINAL CONDITIONS AT END OF TEST				
WATER CONTENT	$w_f$	21.7%	18.9%	17.6%
SKETCH OF SAMPLE				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025
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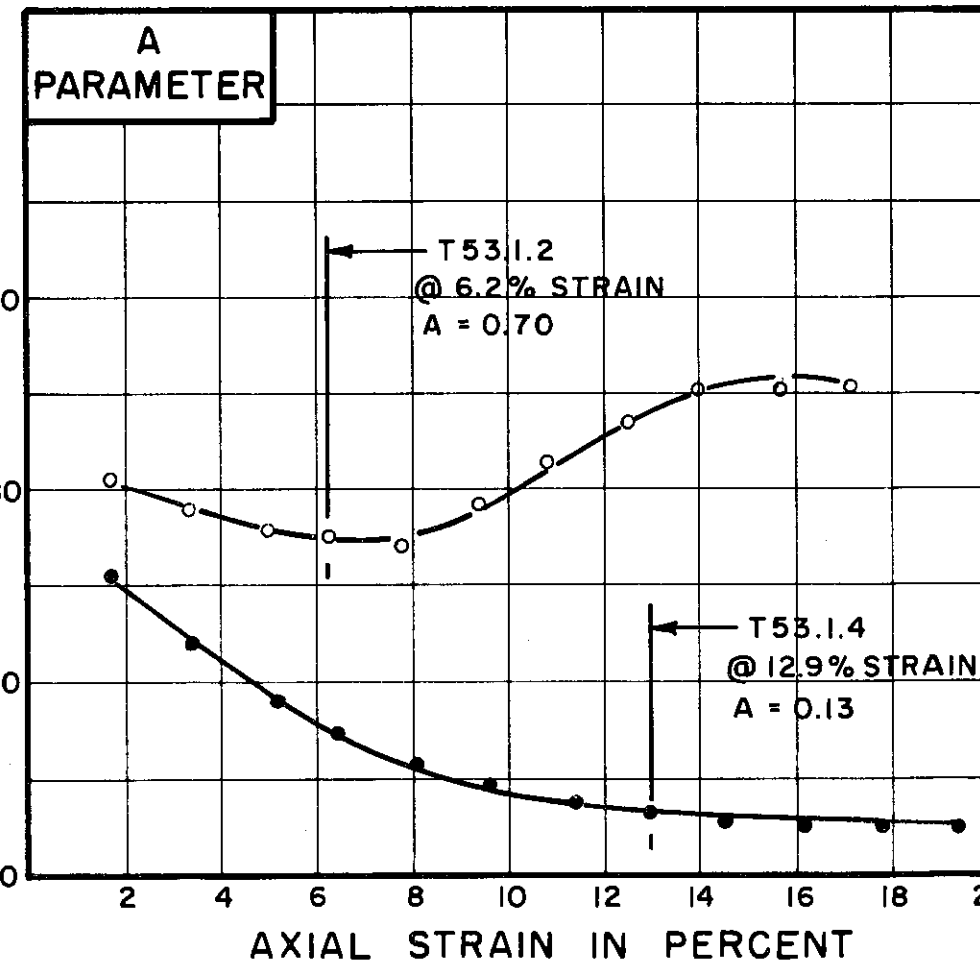
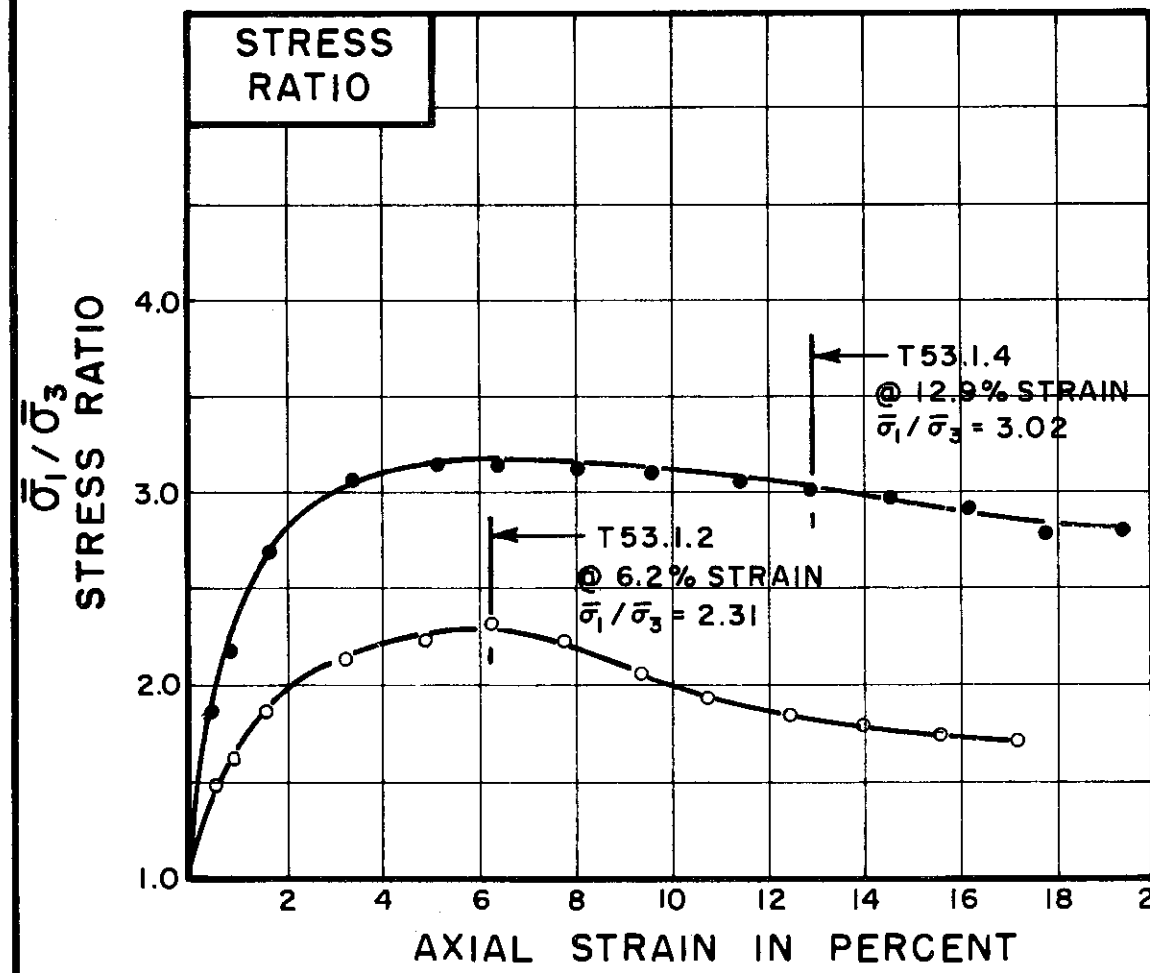
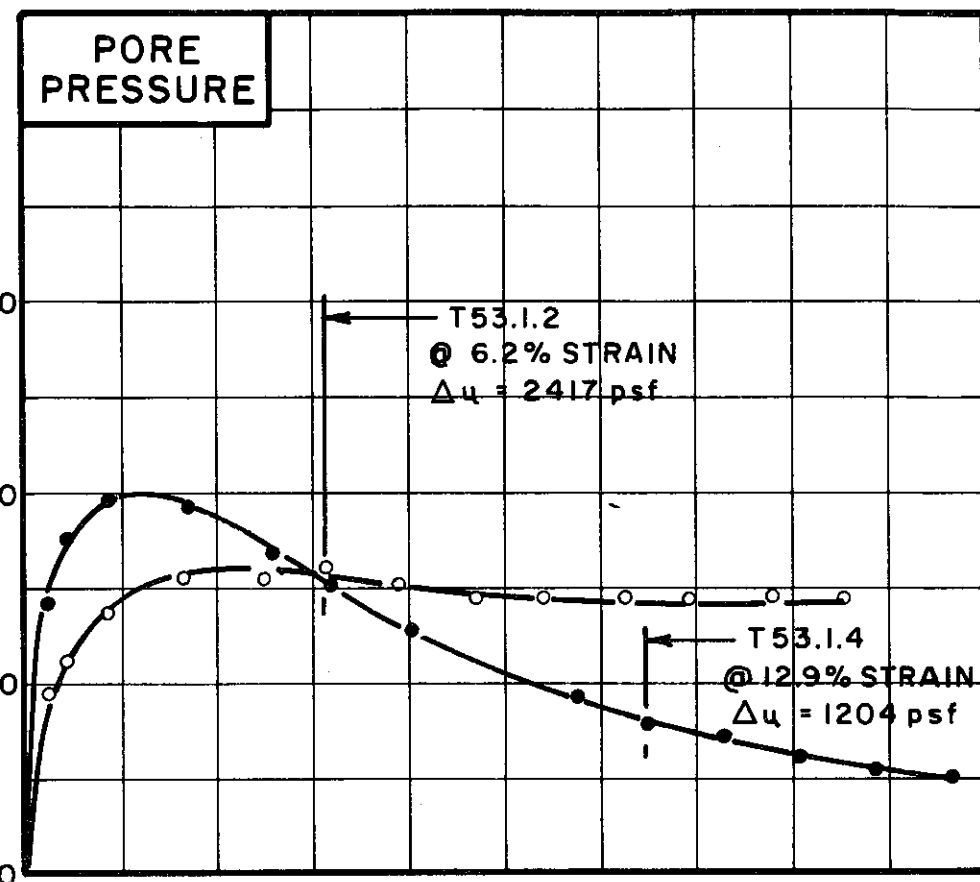
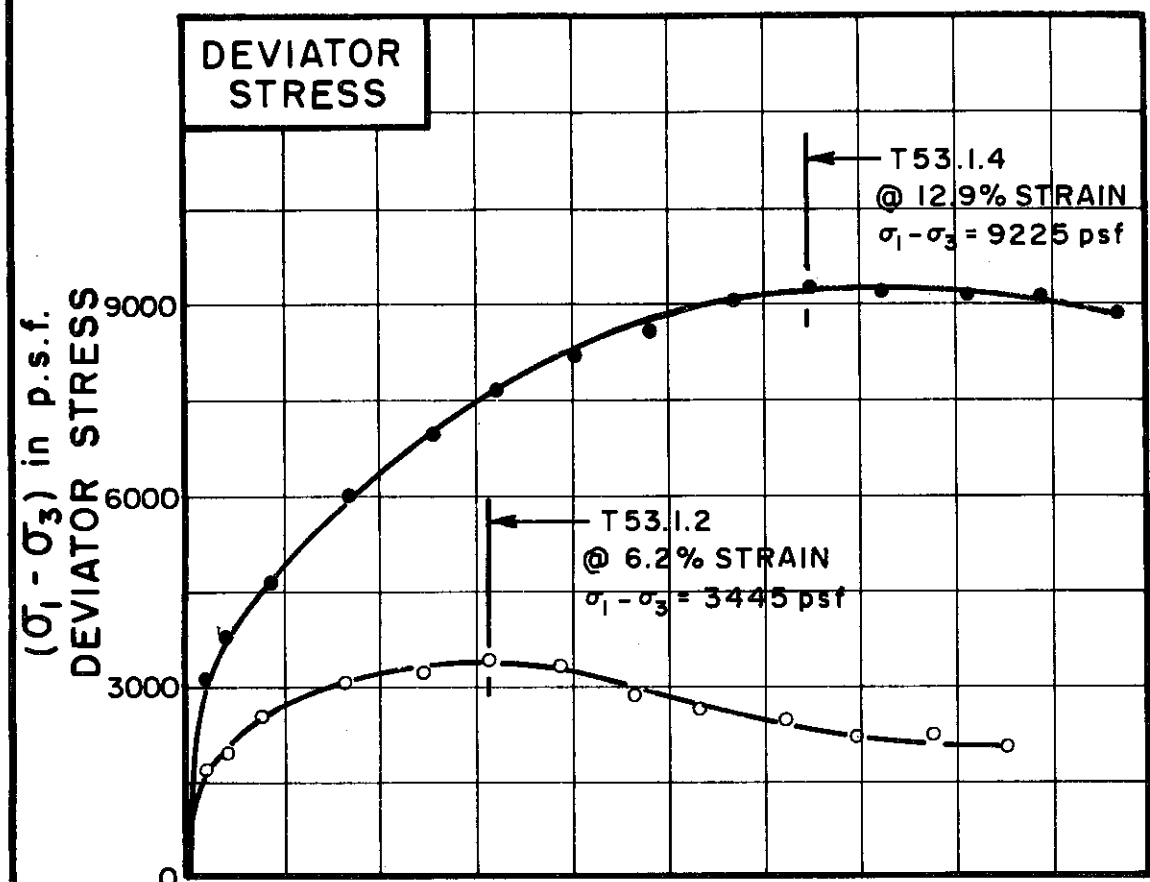
BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

SOIL DESCRIPTION SILTY CLAY, GRAVELLY (CL-ML)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 \* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE-SEE DATA FOR TESTS T53.1.2 AND T53.1.4

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



TEST NO. 7	SYMBOL	T53.1.2	T53.1.4
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INITIAL CONDITIONS			T53.1.2	T53.1.4
WATER CONTENT	$w_0$	31.9%	%	15.5%
DRY DENSITY	$\gamma_d$	91		114
SAMPLE DIAMETER	$D_0$	1.41		1.40
SAMPLE HEIGHT	$H_0$	3.28		3.15
FINAL CONDITIONS BEFORE SHEAR			T53.1.2	T53.1.4
FINAL BACK PRESSURE	$u_0$	8640		11,520
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	5040		5760
VOLUMETRIC STRAIN	$\epsilon_{vol}$	5.3%	%	2.4%
PORE PRESSURE RESPONSE		97%		93%
FINAL CONDITIONS			T53.1.2	T53.1.4
WATER CONTENT	$w_f$	28.4%	%	14.9%
SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.026
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BORING NO. 60  
 SAMPLE NO. 13  
 DEPTH 67.0' TO 69.0'

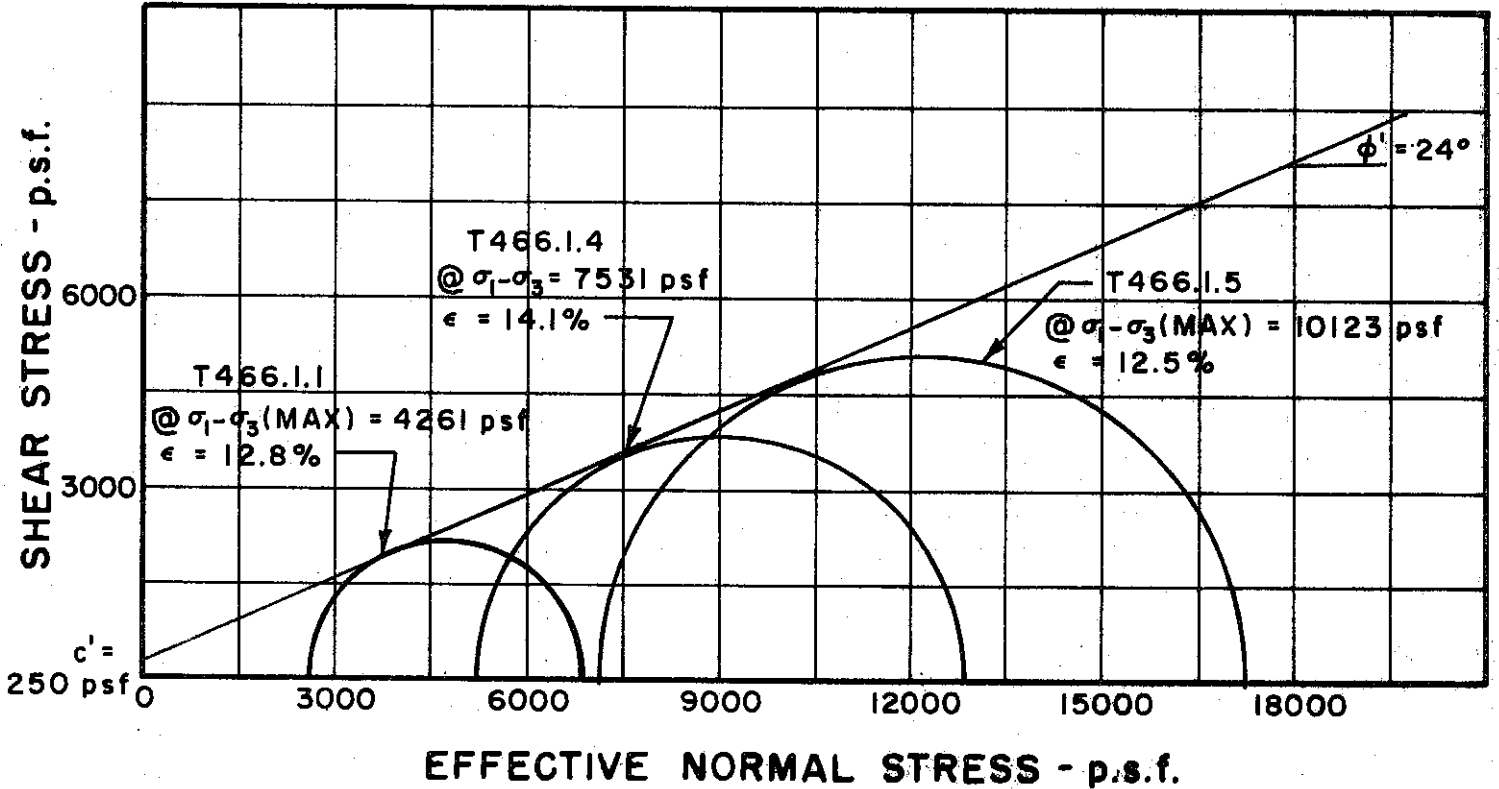
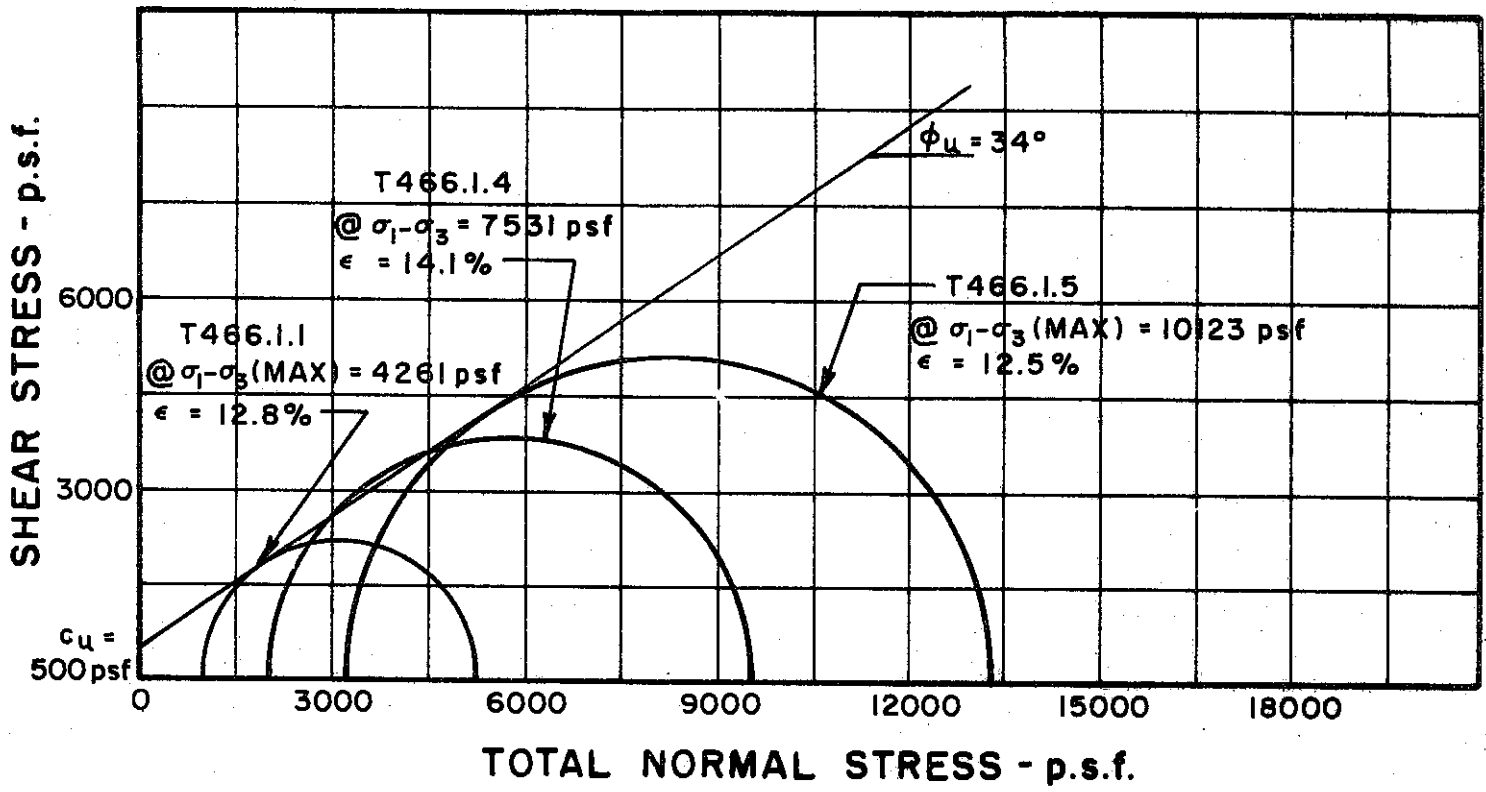
SOIL DESCRIPTION T53.1.2-CLAYEY GRAVEL(GC)  
T53.1.4-SILTY CLAY(CL)

LIQUID LIMIT (40) PLASTIC LIMIT (19)

\* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR T53.1.1, T53.1.3 AND T53.1.5

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 101,105,127,128,180 & 183

SAMPLE NO. COMBINED SAMPLES

DEPTH 2.0' TO 10.0'

REMARKS ENVELOPE IS INTERPRETIVE  
BASED ON LIMITED DATA POINTS  
AVAILABLE

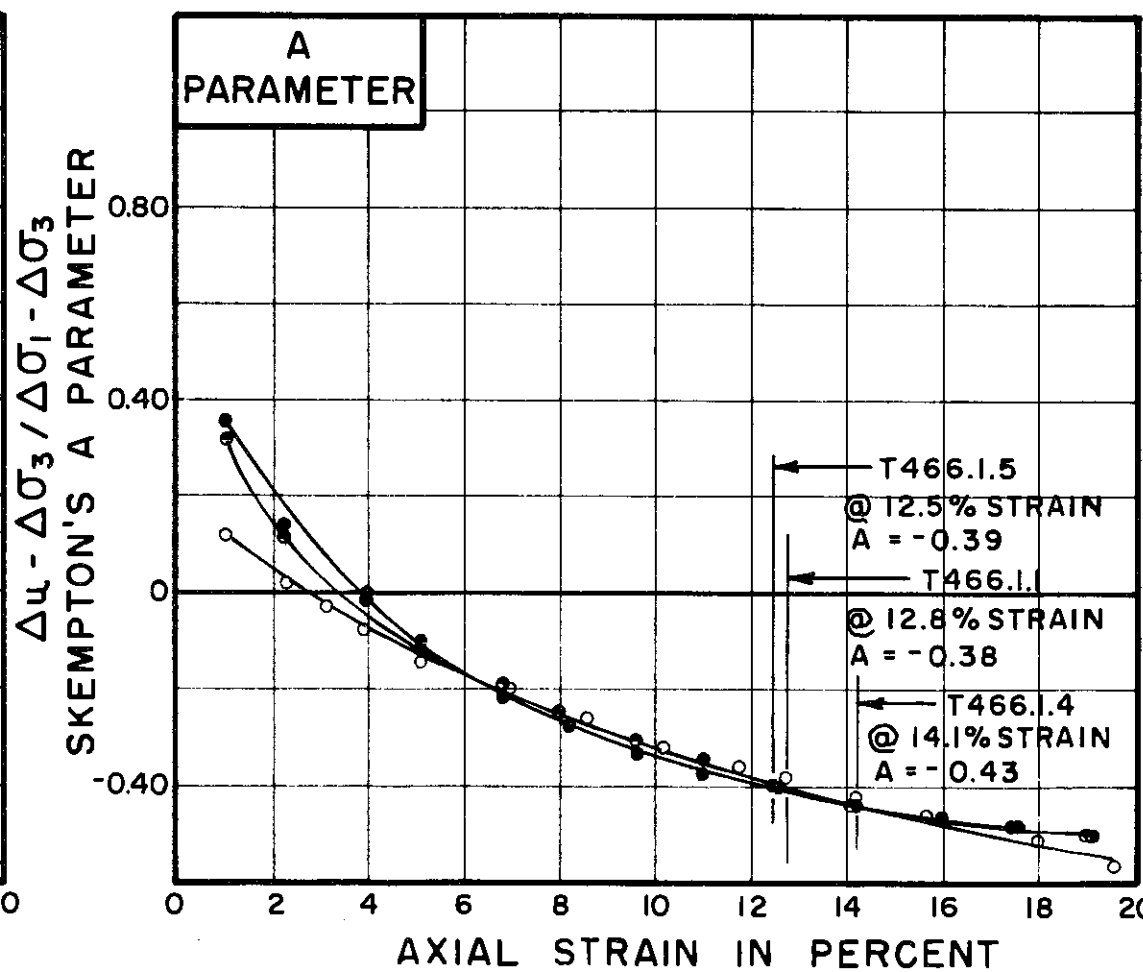
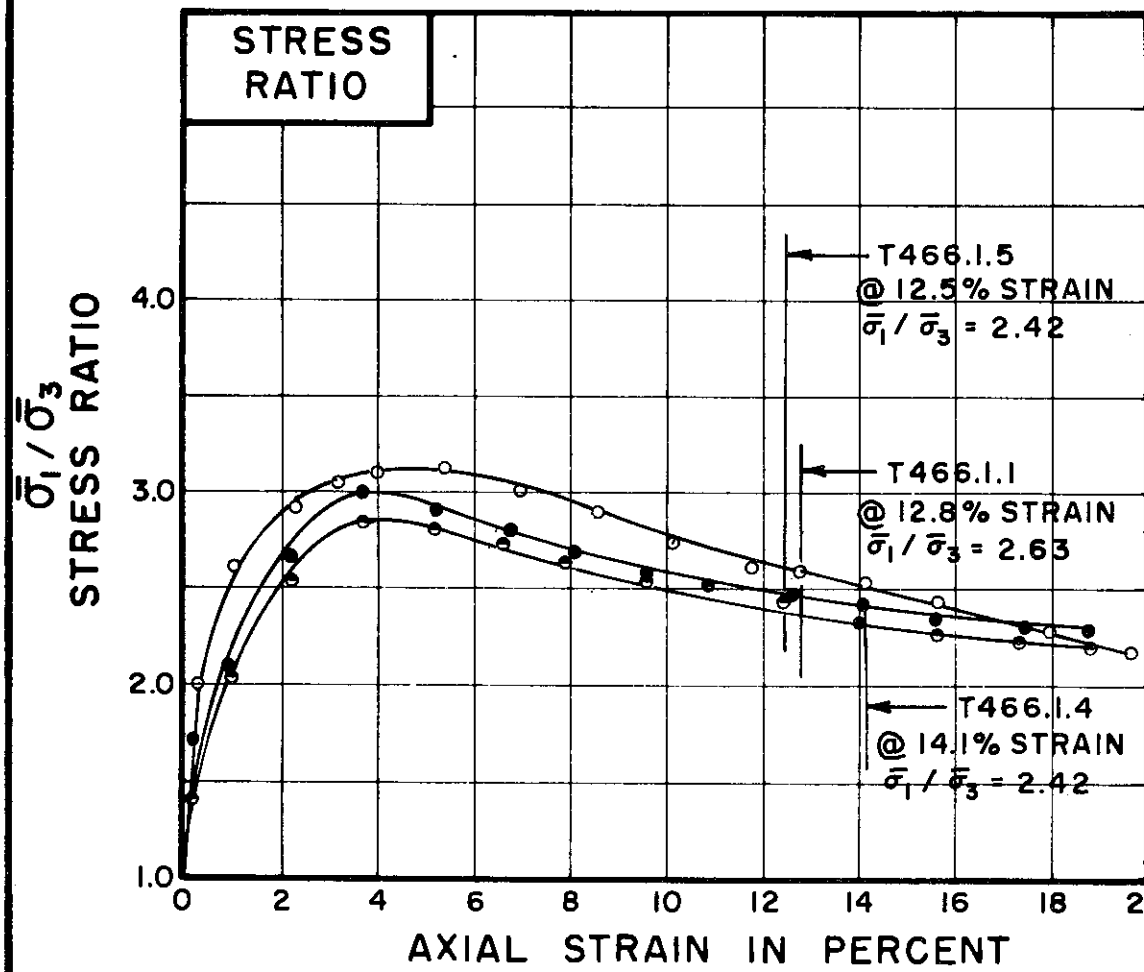
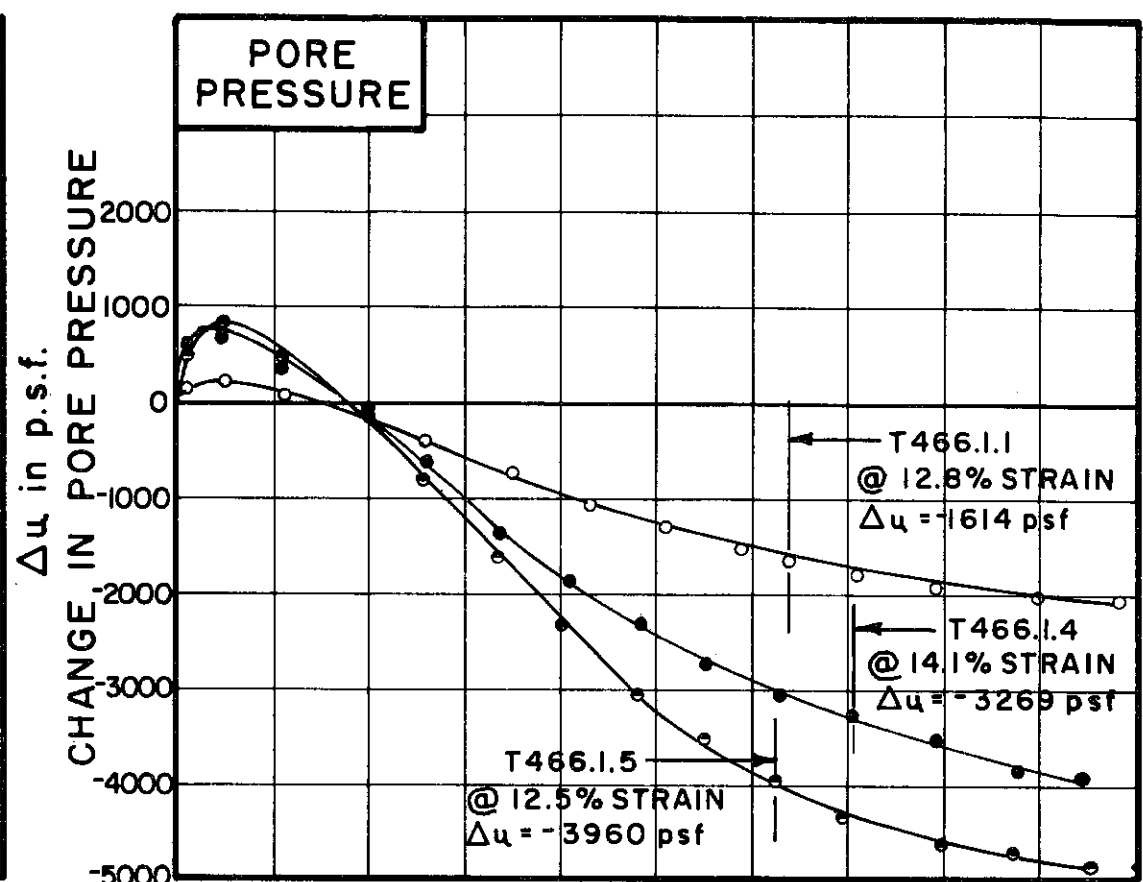
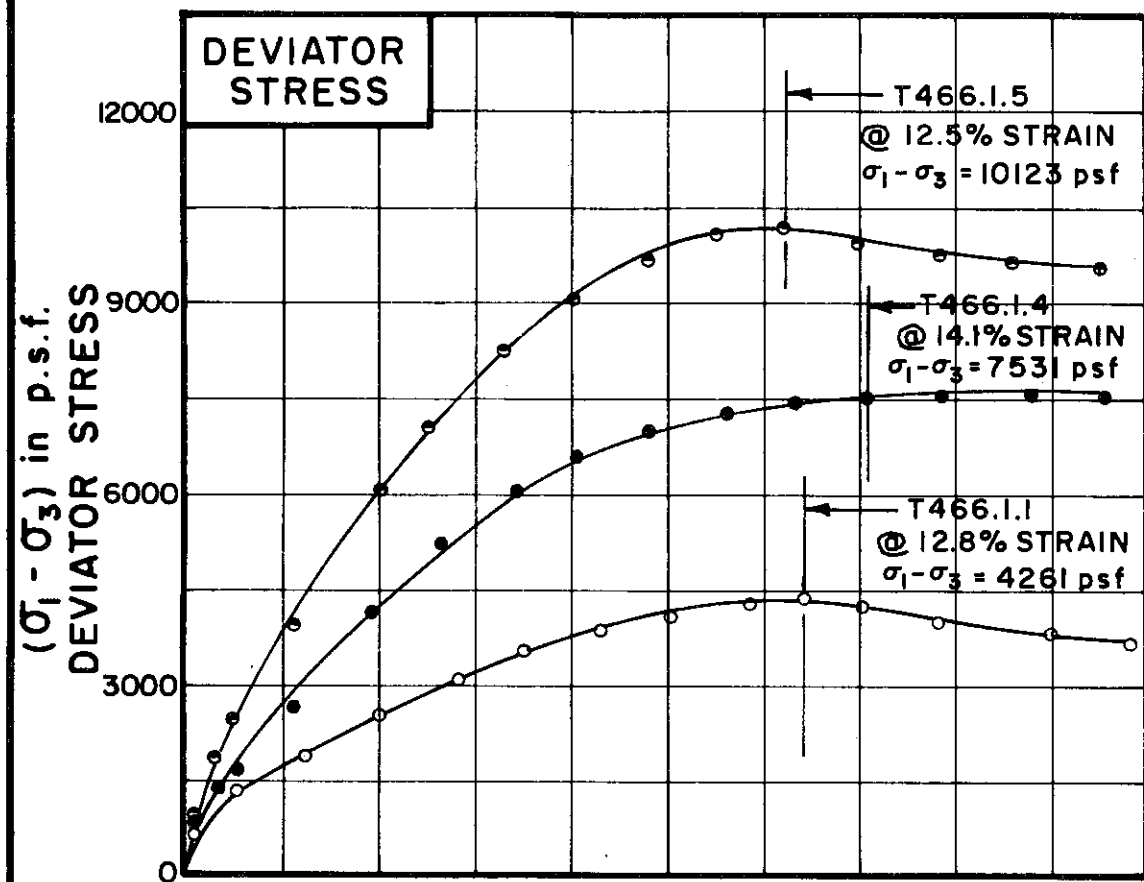
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**MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-430



TEST NO. / SYMBOL	T466.1.1	T466.1.4	T466.1.5
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INITIAL CONDITIONS	WATER CONTENT	$w_0$	15.3%	15.5%	15.9%
	DRY DENSITY	$\gamma_d$	113	114	114
	SAMPLE DIAMETER	$D_0$	1.38	1.39	1.40
	SAMPLE HEIGHT	$H_0$	3.19	3.36	3.44
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	7200	7200	7200
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 = \bar{\sigma}_3$	1008	2016	3168
	VOLUMETRIC STRAIN	$\epsilon_{vol}$	— %	.14 %	.14 %
PORE PRESSURE RESPONSE			98%	99%	98%
FINAL CONDITIONS	WATER CONTENT	$w_f$	21.3%	19.1%	18.4%
	SKETCH OF SAMPLE AT END OF TEST				

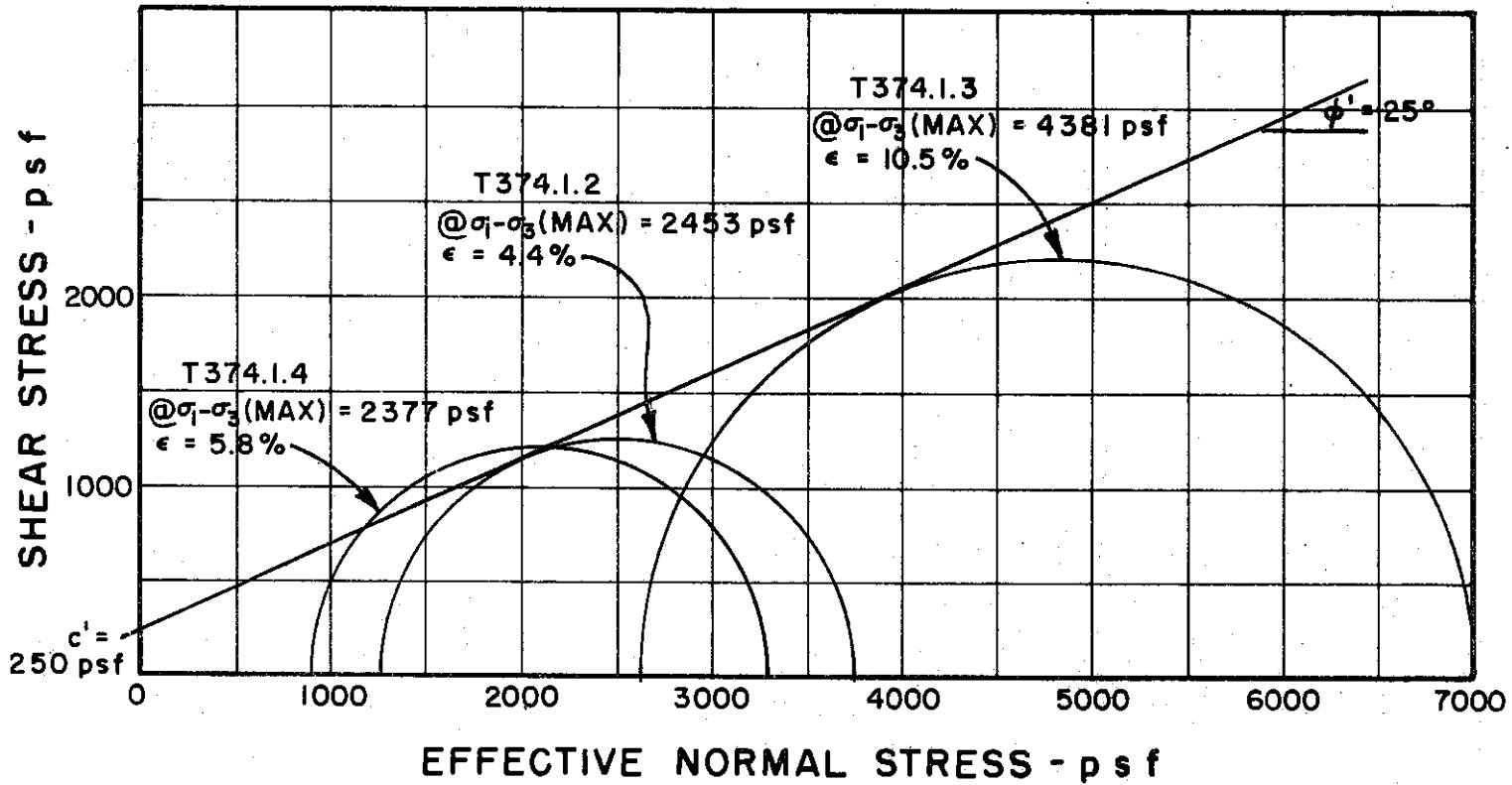
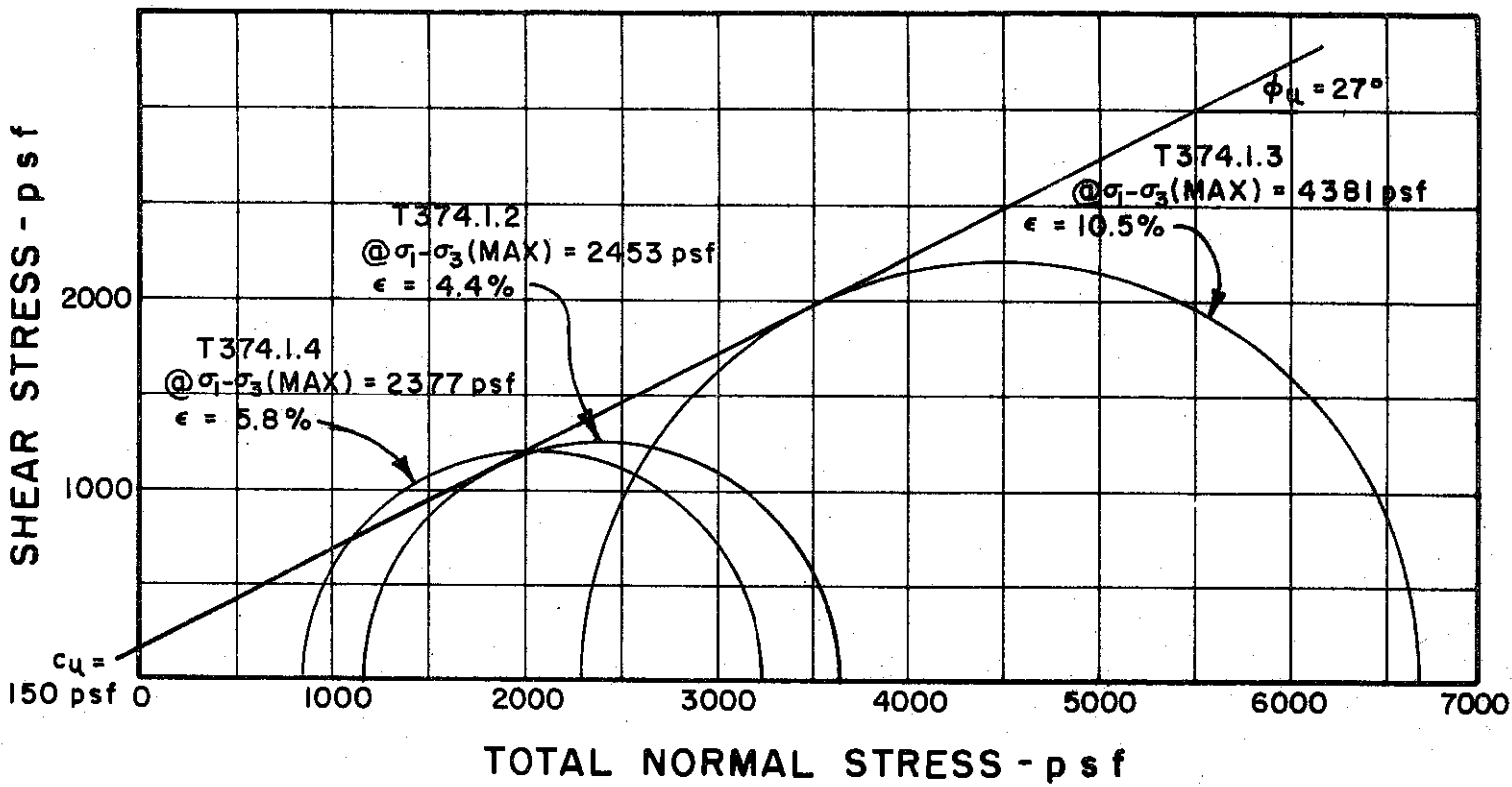
RATE OF STRAIN PERCENT/MINUTE	.025	.024	.023
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BORING NO. 101, 105, 127, 128, 180 & 183  
 SAMPLE NO. COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT \_\_\_\_\_ PLASTIC LIMIT \_\_\_\_\_  
 SEE DATA FOR INDIVIDUAL SAMPLES

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 2

DEPTH 9.0' TO 11.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

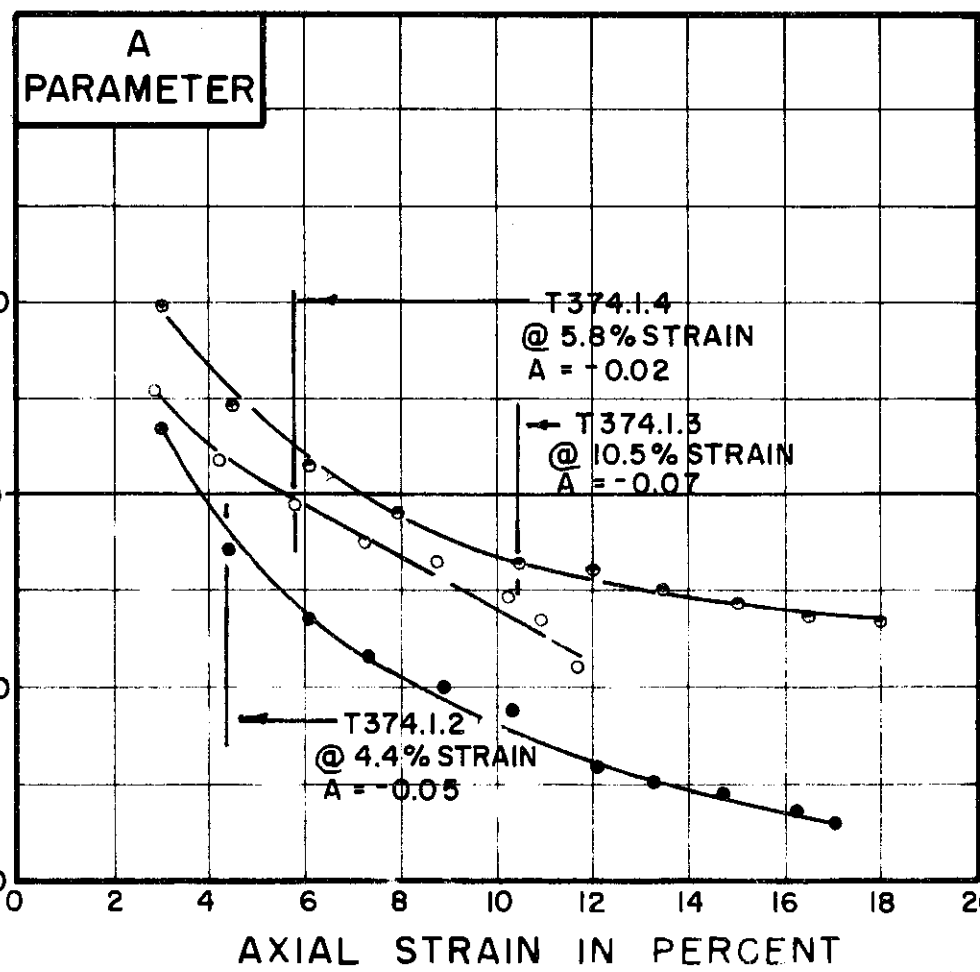
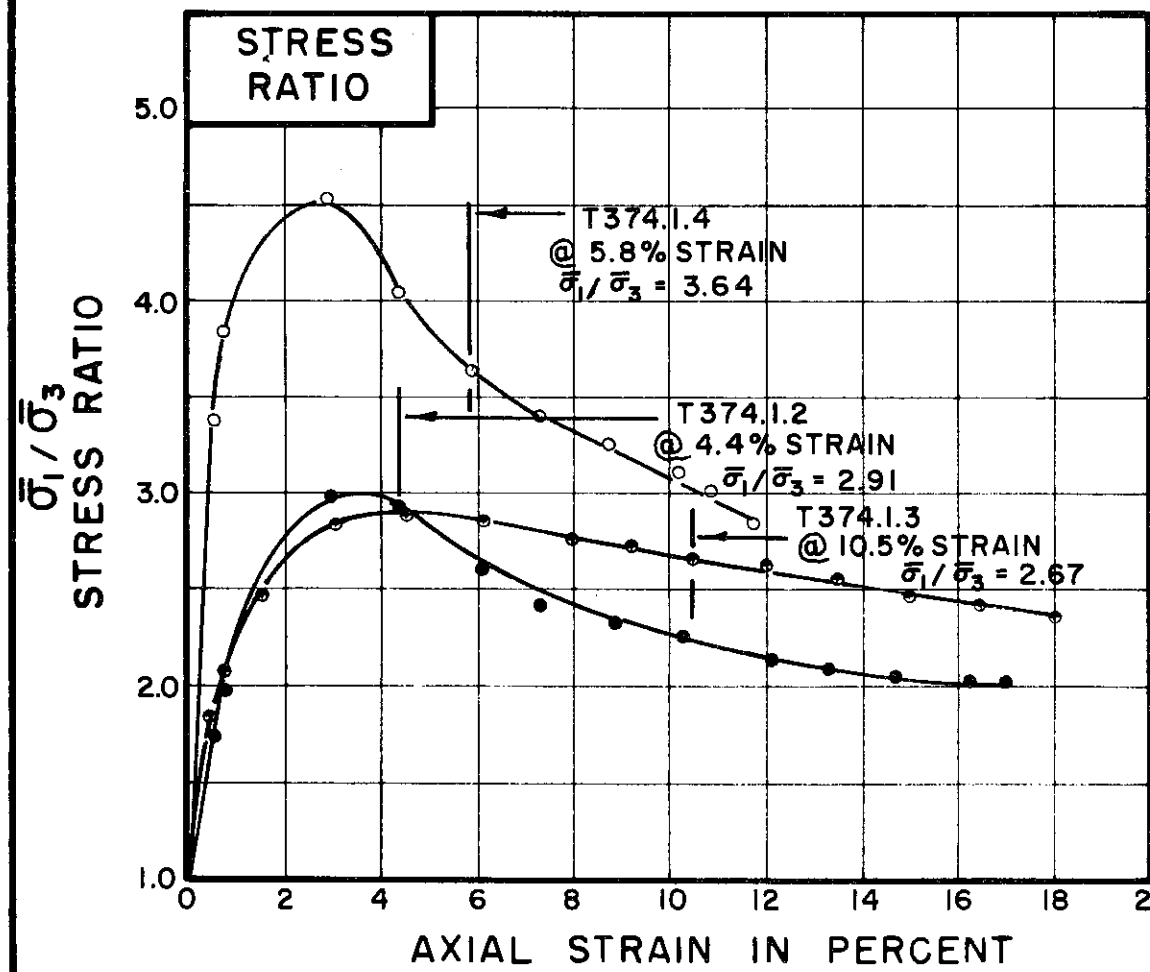
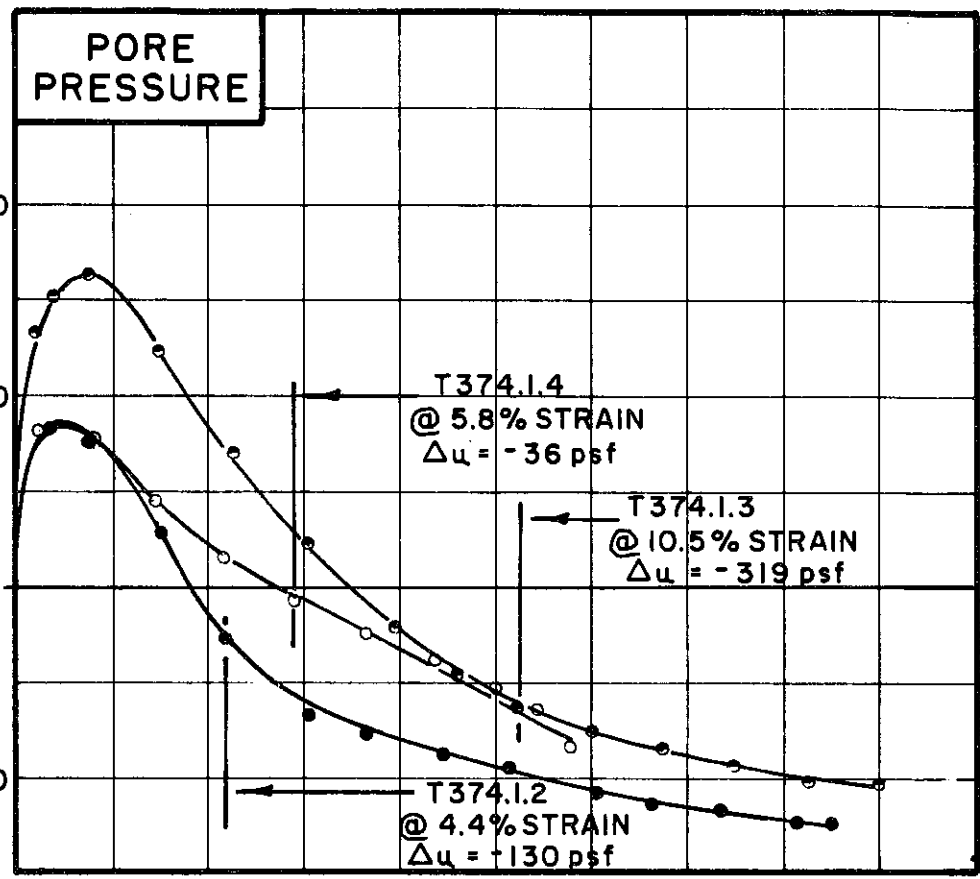
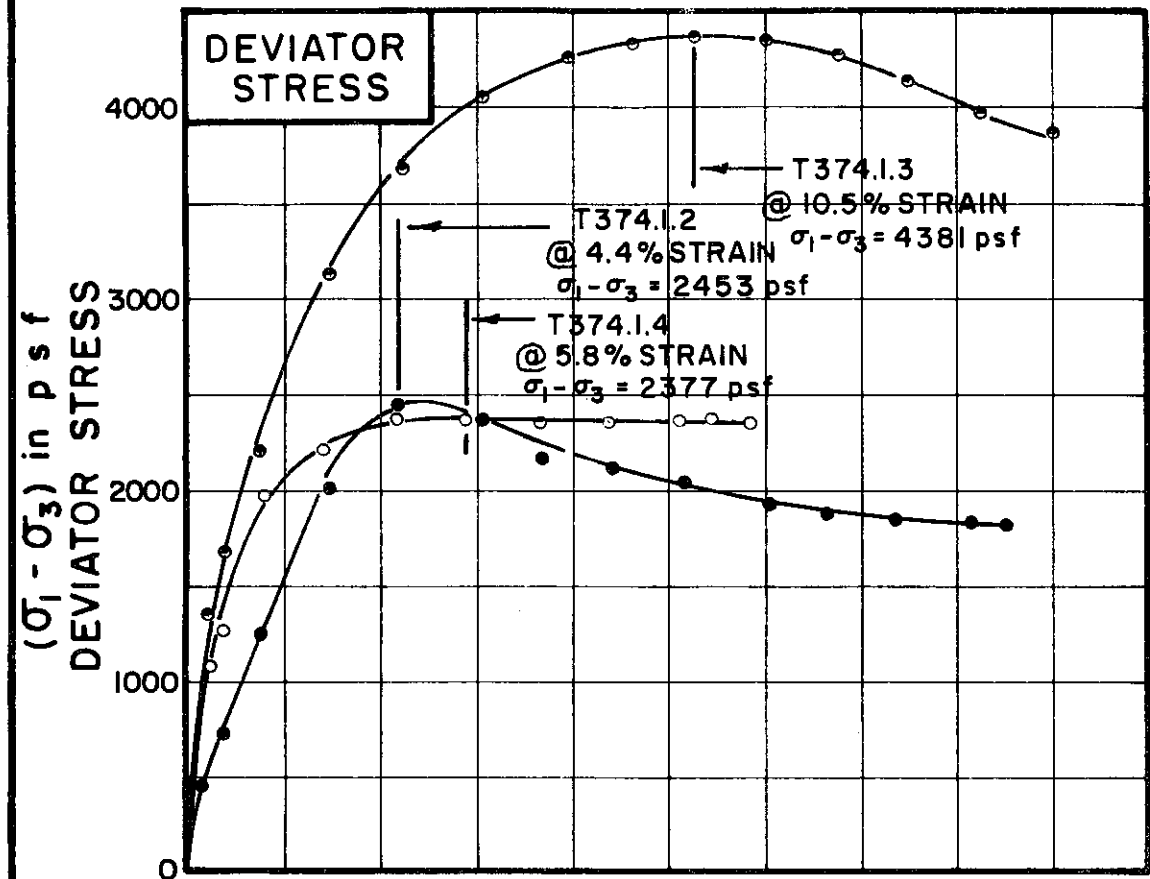
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MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-432



TEST NO. / SYMBOL	T374.1.4	T374.1.2	T374.1.3
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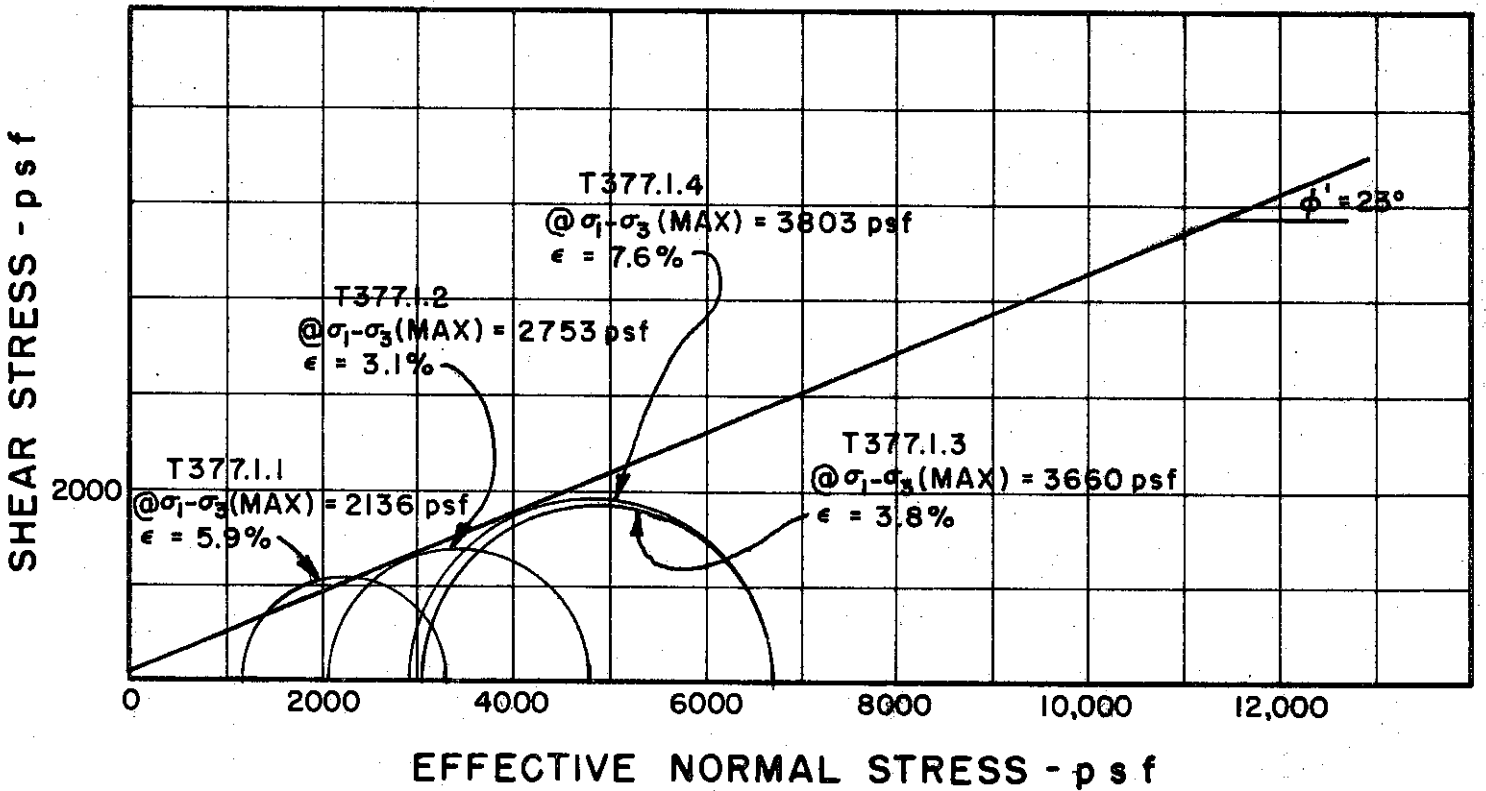
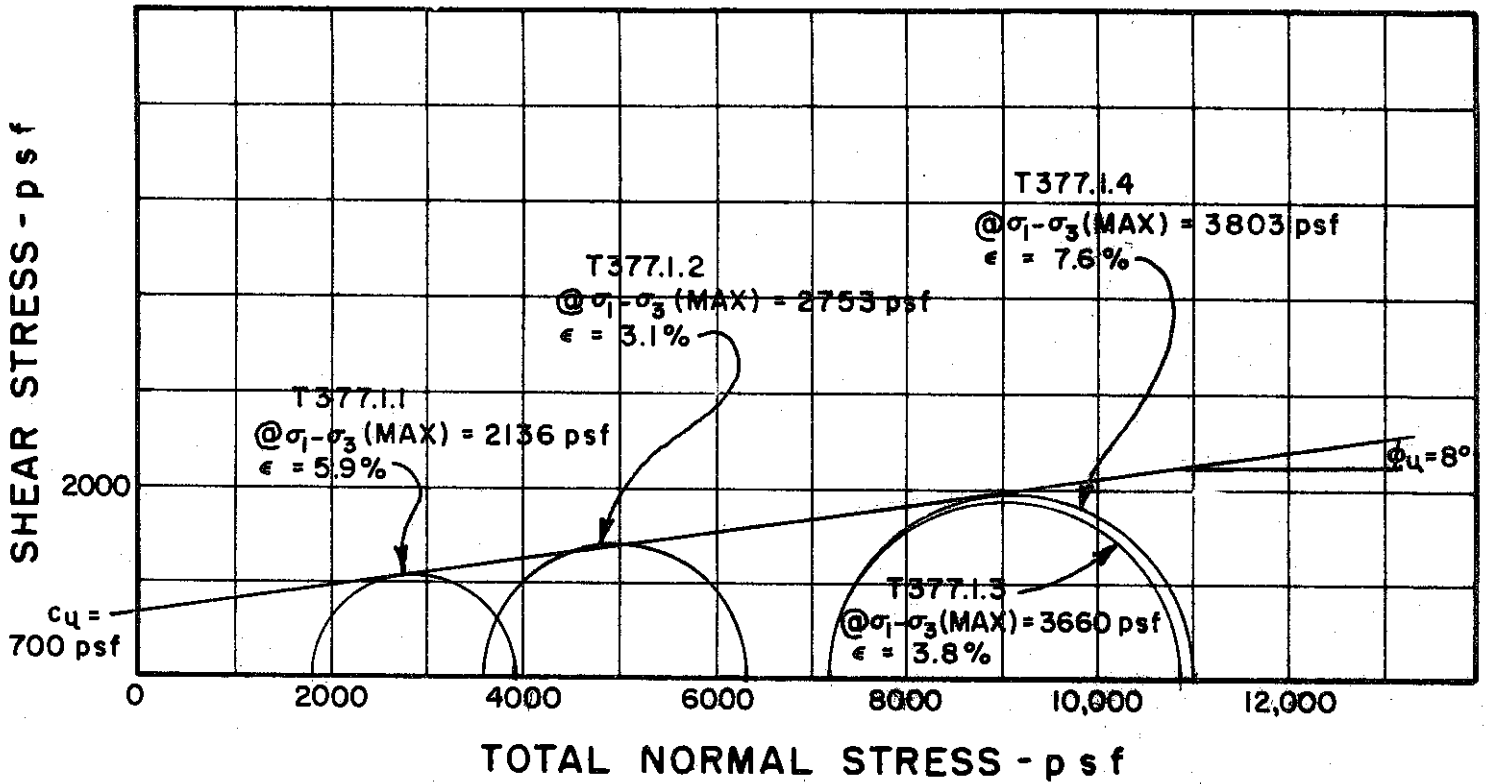
INITIAL CONDITIONS			T374.1.4	T374.1.2	T374.1.3
WATER CONTENT	$w_0$		27.7%	26.4%	26.9%
DRY DENSITY	$\gamma_d$	lb/cu ft	98	99	96
SAMPLE DIAMETER	$D_0$	in.	1.42	1.40	1.38
SAMPLE HEIGHT	$H_0$	in.	3.44	3.39	3.35
FINAL CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	5760	6480	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	864	1152	2304
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.60%	0.50%	1.35%
PORE PRESSURE RESPONSE			98%	95%	95%
FINAL CONDITIONS					
WATER CONTENT	$w_f$		28.5%	27.7%	27.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.023	.024	.024
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BORING NO. 105  
 SAMPLE NO. 2  
 DEPTH 9.0' TO 11.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 24

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 105

SAMPLE NO. 5

DEPTH 40.0' TO 42.5'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
CONSULTANTS IN GEOTECHNICAL ENGINEERING

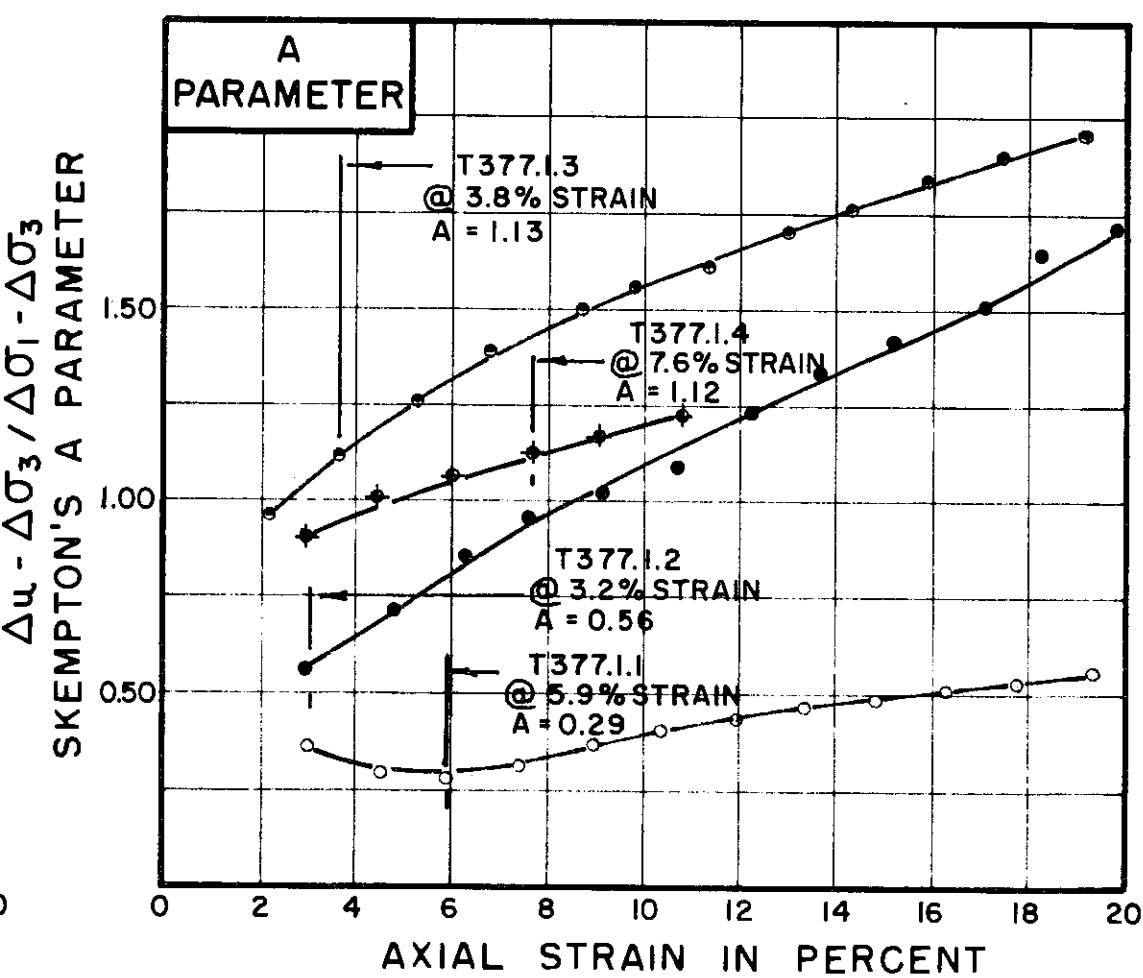
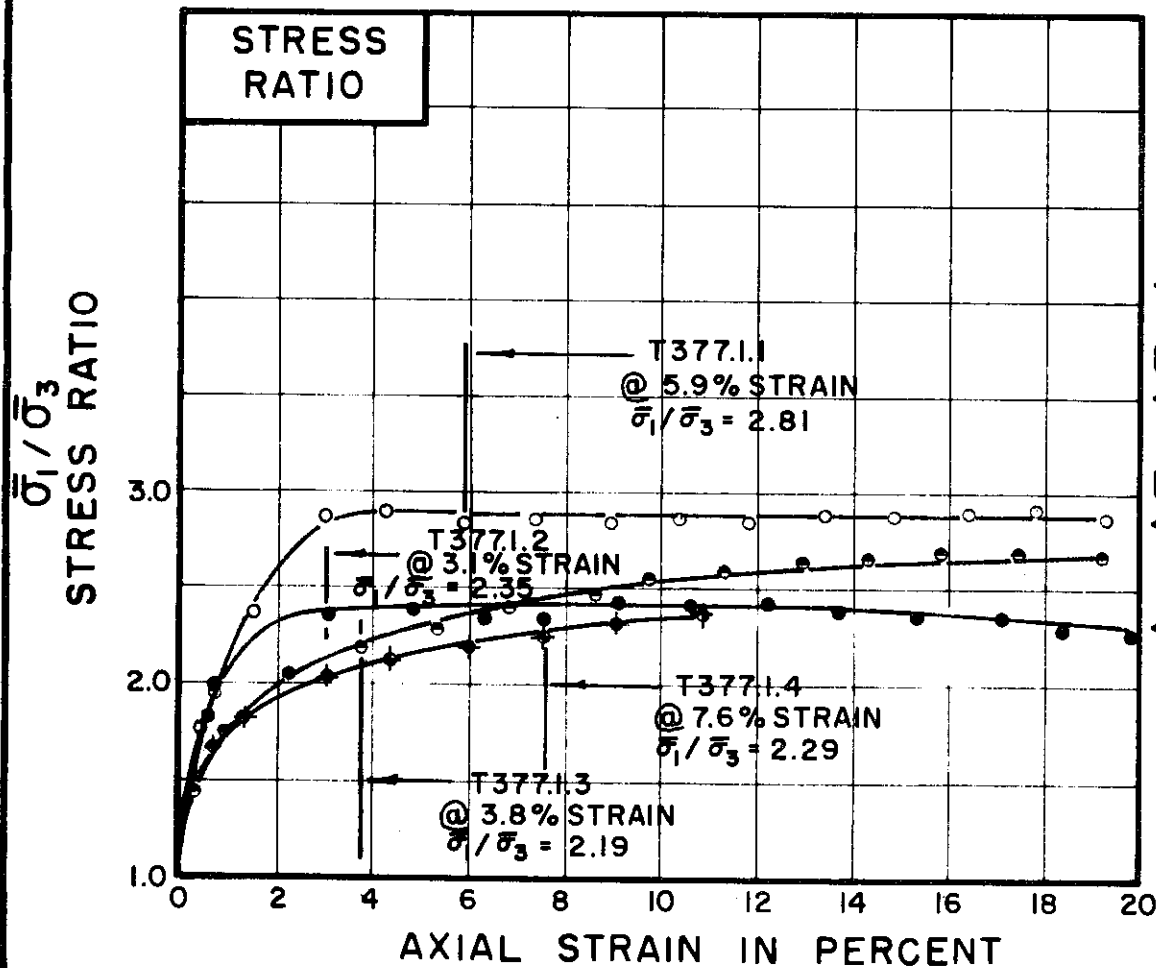
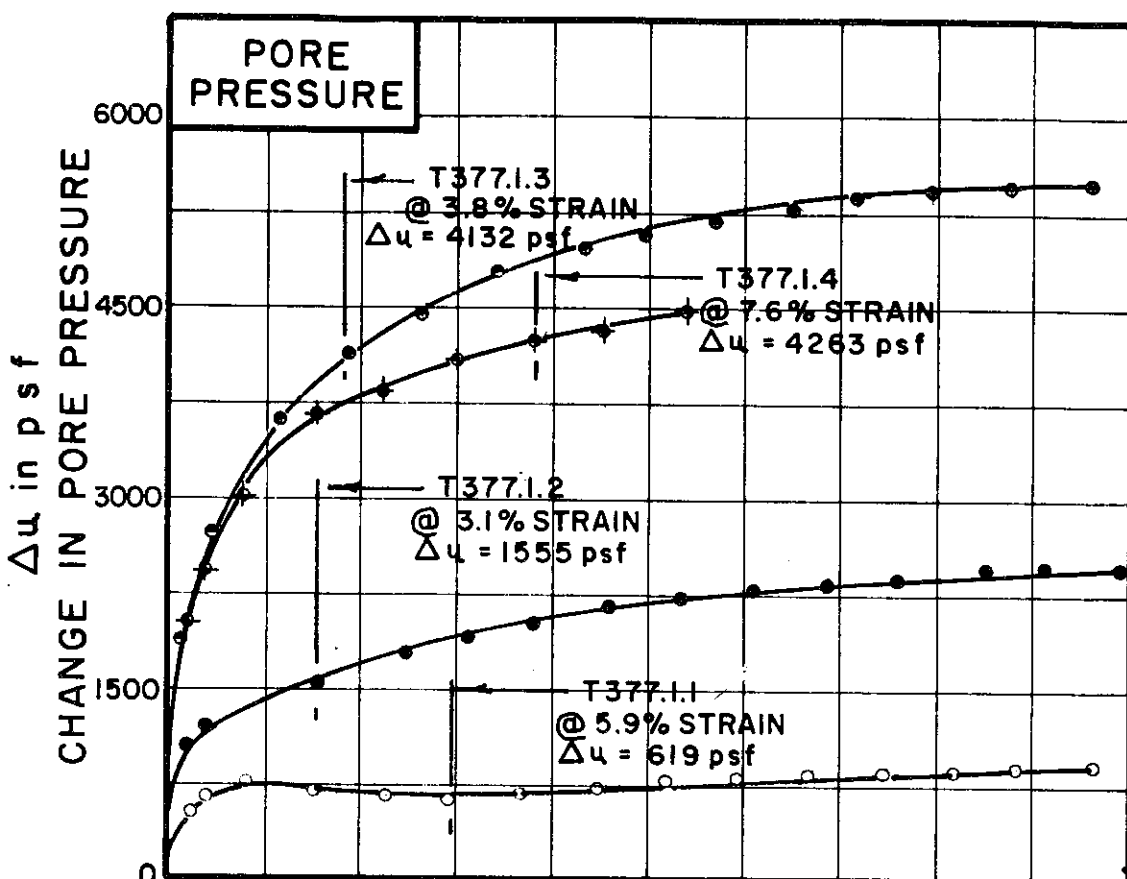
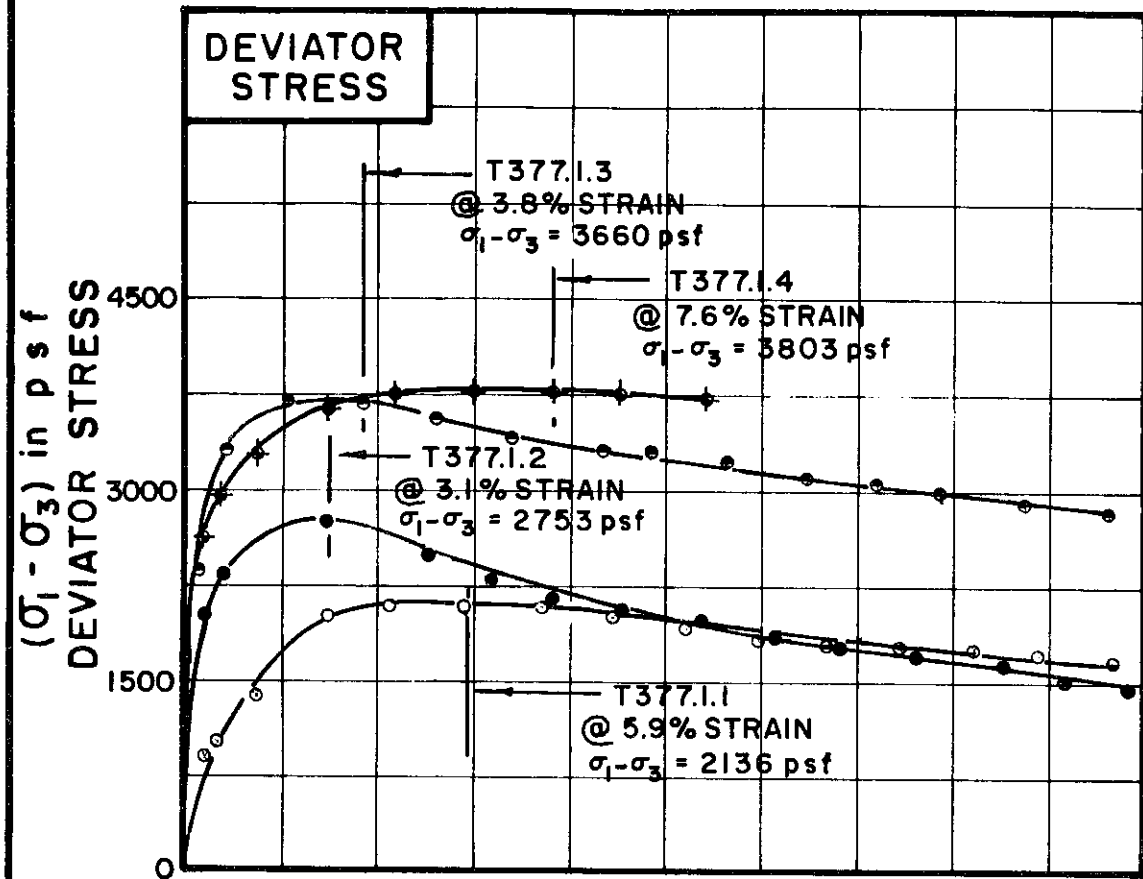
MOHR STRENGTH ENVELOPE  
TRIAXIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-434





TEST NO. / SYMBOL	T377.1.1	T377.1.2	T377.1.3	T377.1.4
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INITIAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_0$		35.9%	35.9%	35.1%	39.2%
DRY DENSITY	$\gamma_d$	lb/cu ft	84	85	85	84
SAMPLE DIAMETER	$D_0$	in.	1.39	1.42	1.38	1.41
SAMPLE HEIGHT	$H_0$	in.	3.38	3.30	3.34	3.37
CONDITIONS BEFORE SHEAR			T377.1.1	T377.1.2	T377.1.3	T377.1.4
FINAL BACK PRESSURE	$u_0$	psf	7200	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\sigma_1 / \sigma_3$	psf	1800	3600	7200	7200
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.49%	2.38%	4.36%	7.47%
PORE PRESSURE RESPONSE			97%	96%	96%	96%
FINAL CONDITIONS			T377.1.1	T377.1.2	T377.1.3	T377.1.4
WATER CONTENT	$w_f$		35.3%	34.1%	30.9%	33.4%
SKETCH OF SAMPLE AT END OF TEST						

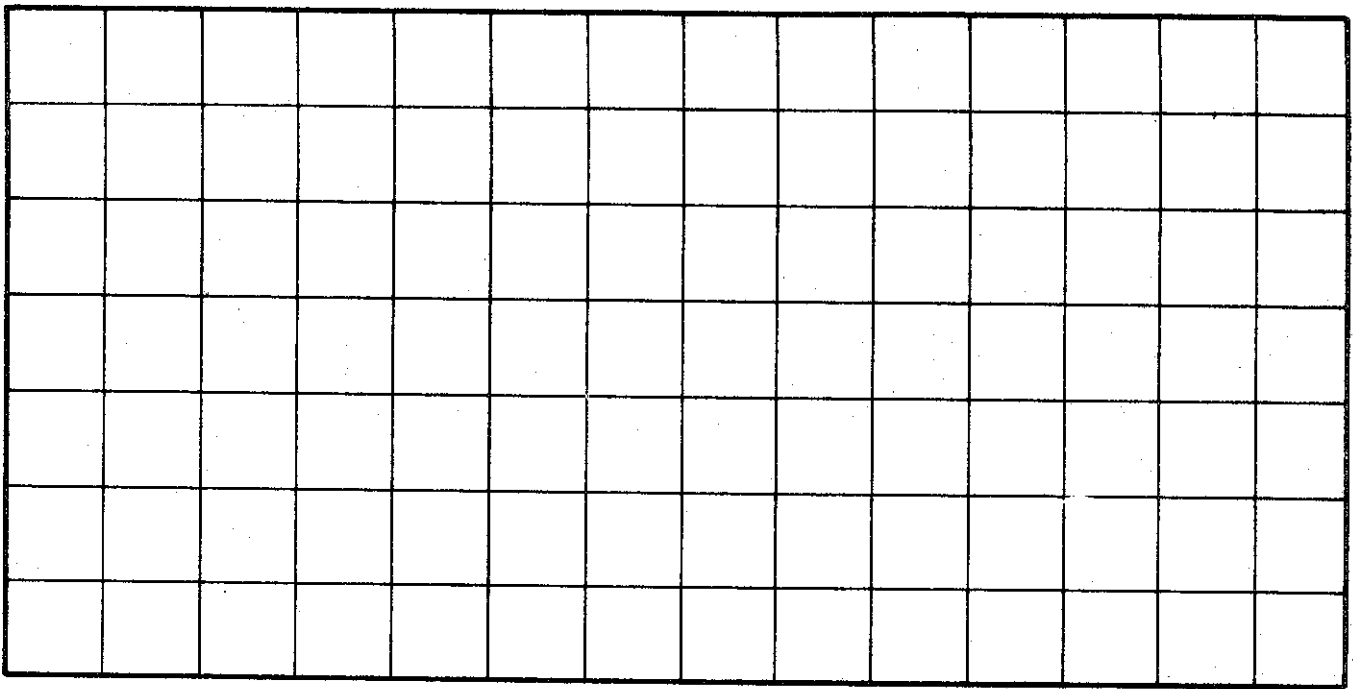
RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024	.024
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BORING NO. 105  
 SAMPLE NO. 5  
 DEPTH 40.0' TO 42.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

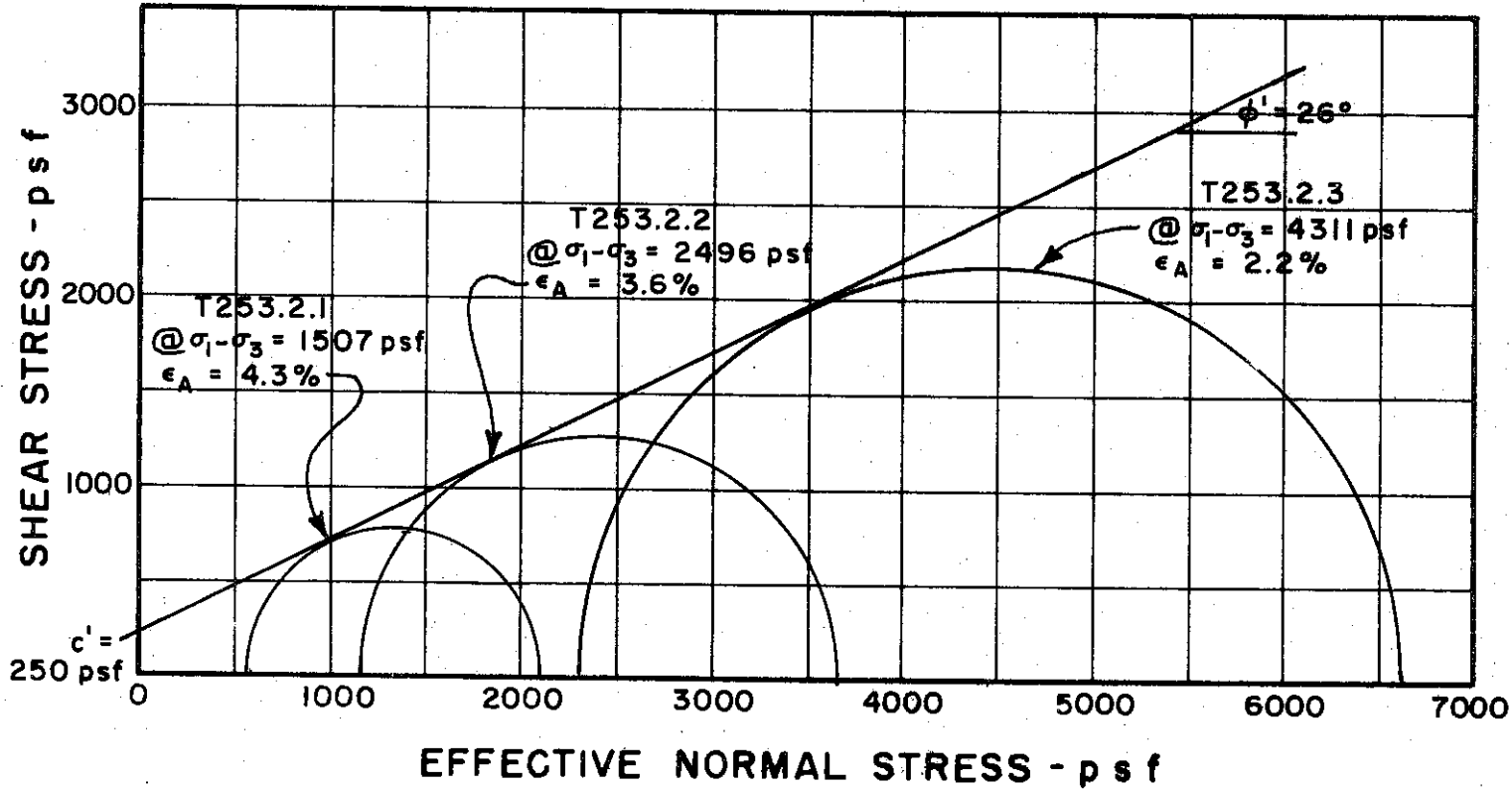
CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

SHEAR STRESS - p s f



TOTAL NORMAL STRESS - p s f



BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

REMARKS \_\_\_\_\_

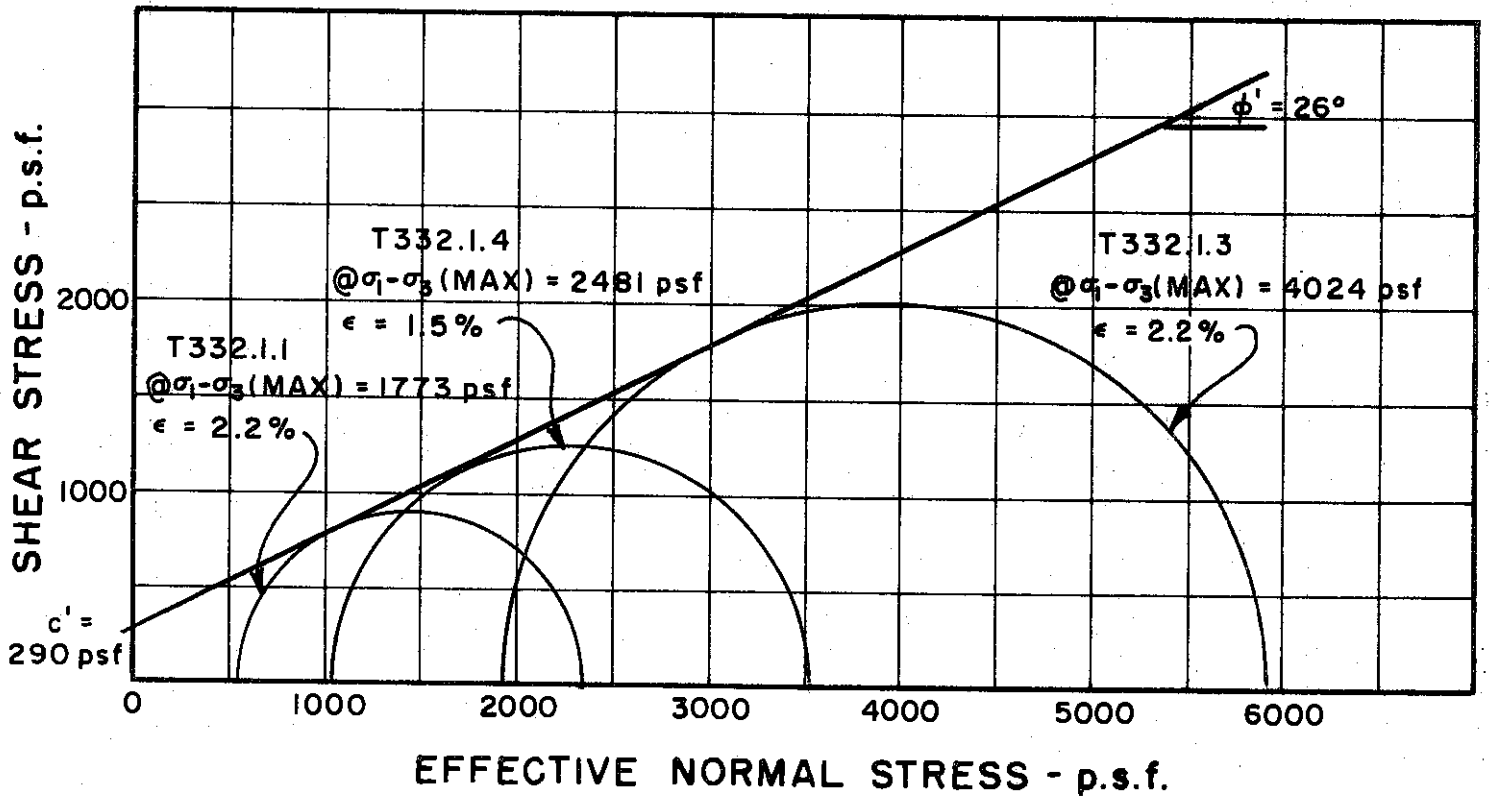
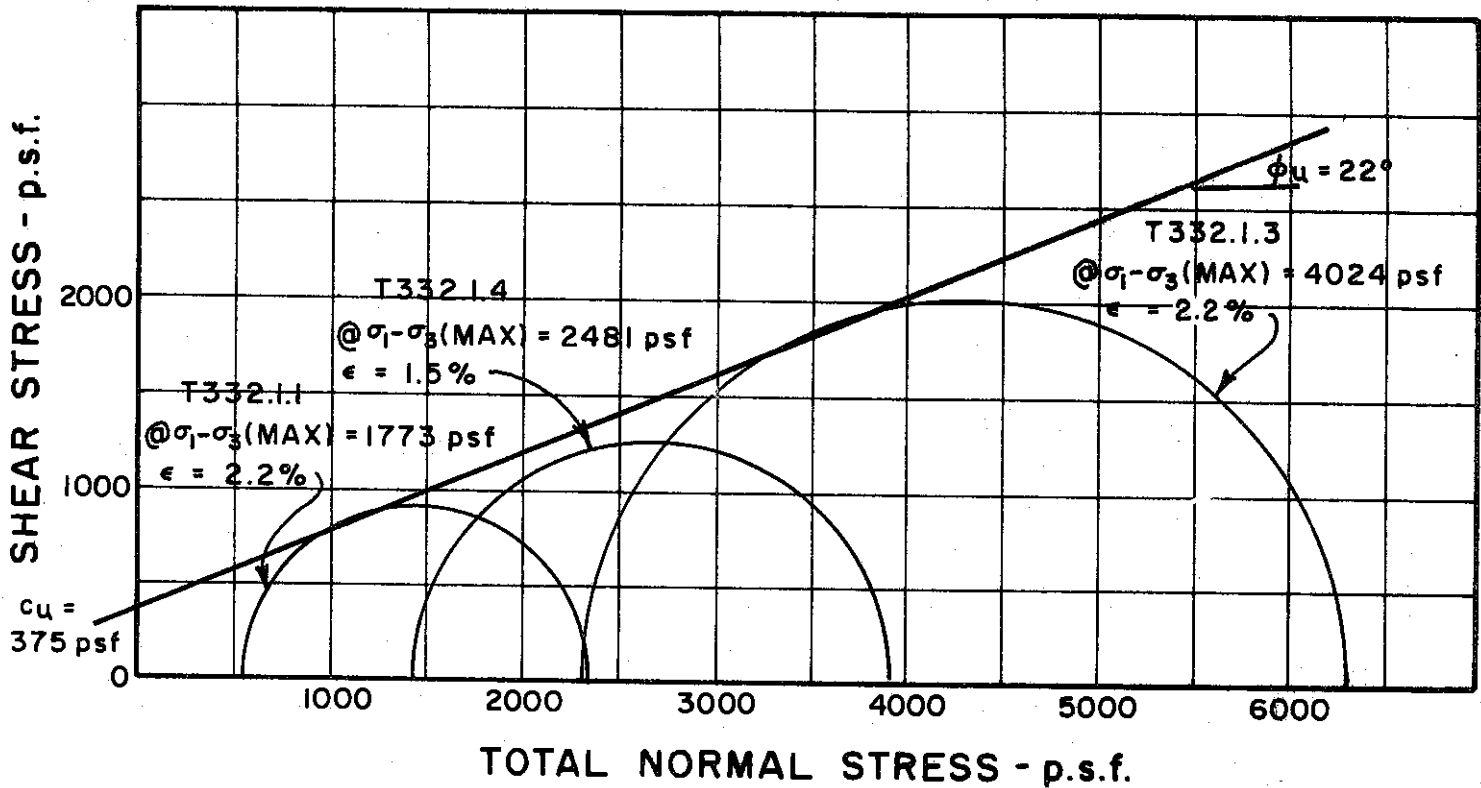
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MOHR STRENGTH ENVELOPE  
TRIAxIAL COMPRESSION  
TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-436



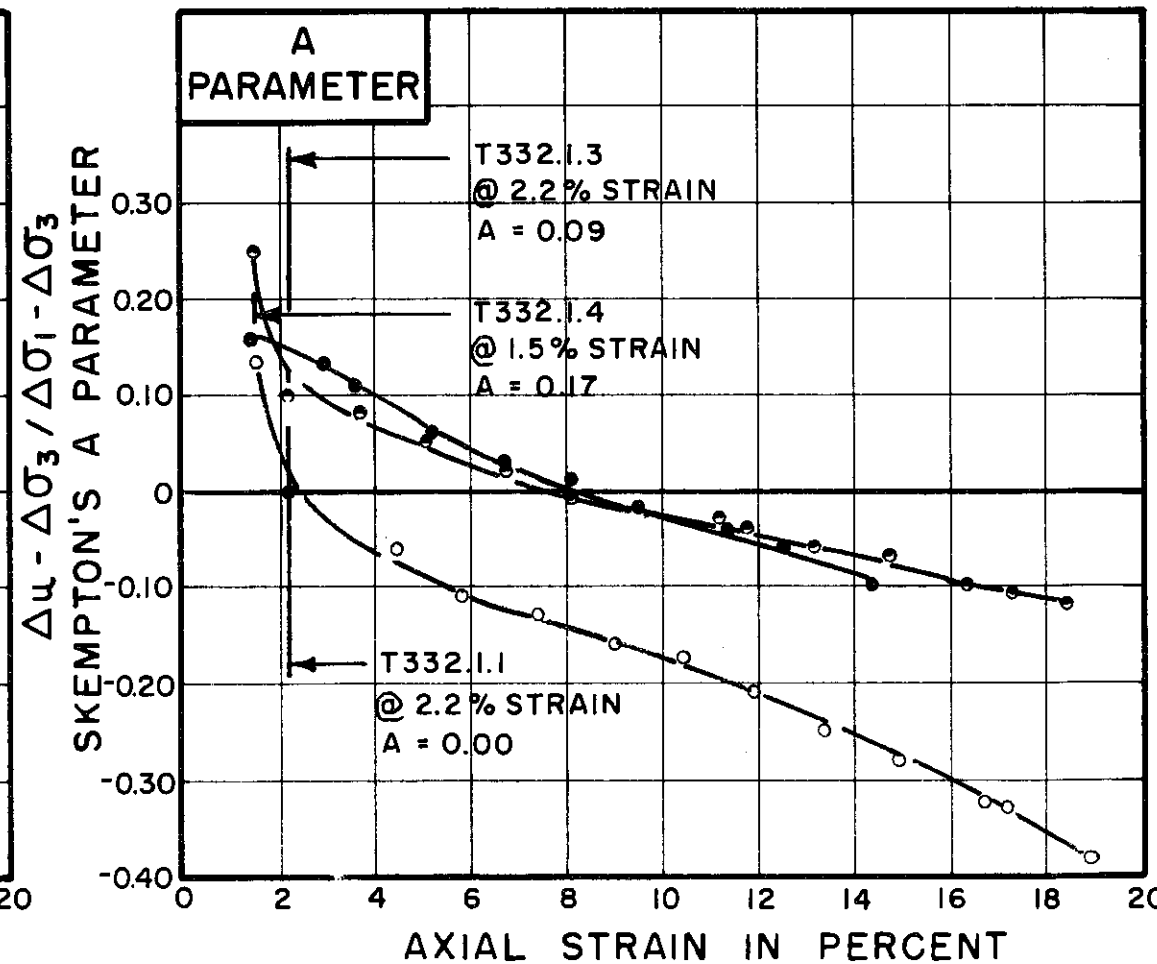
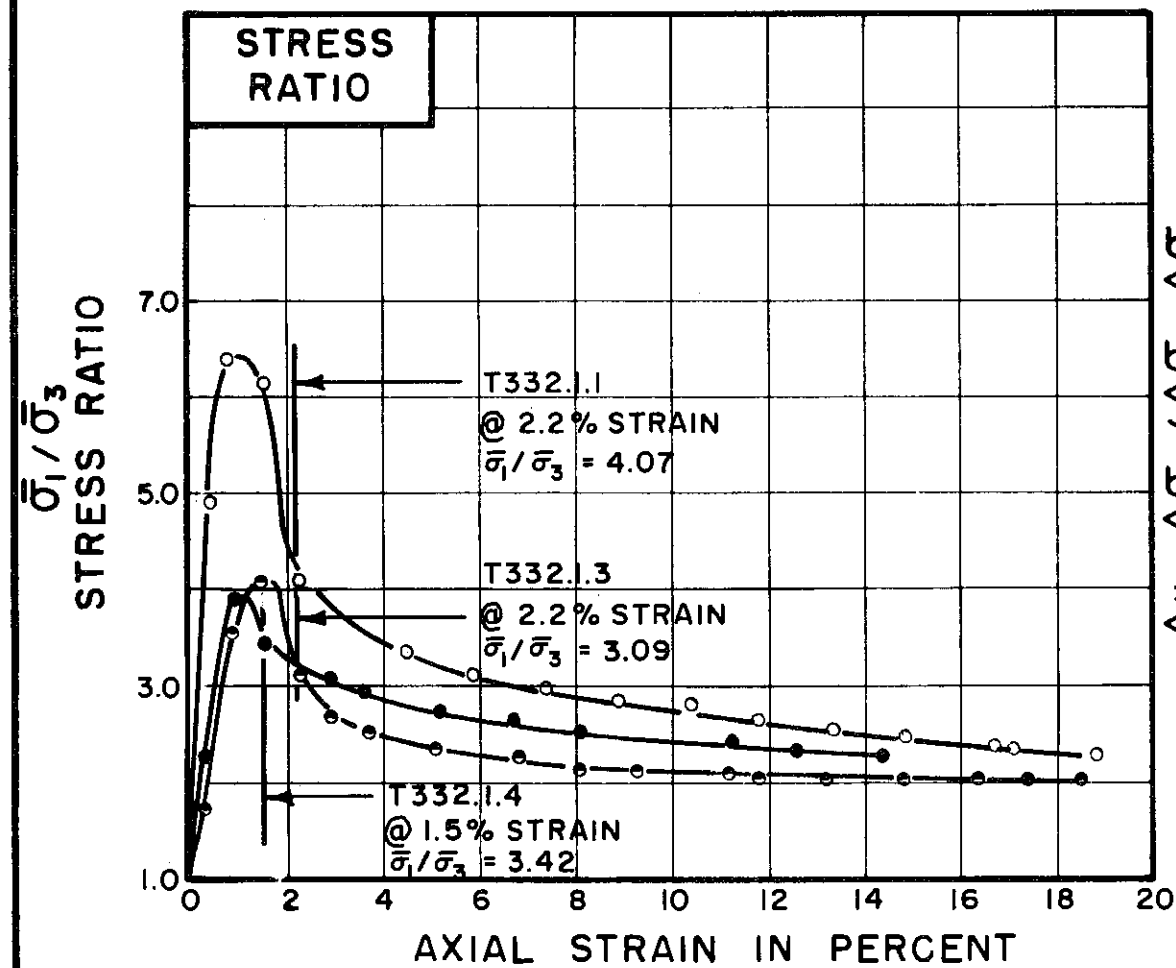
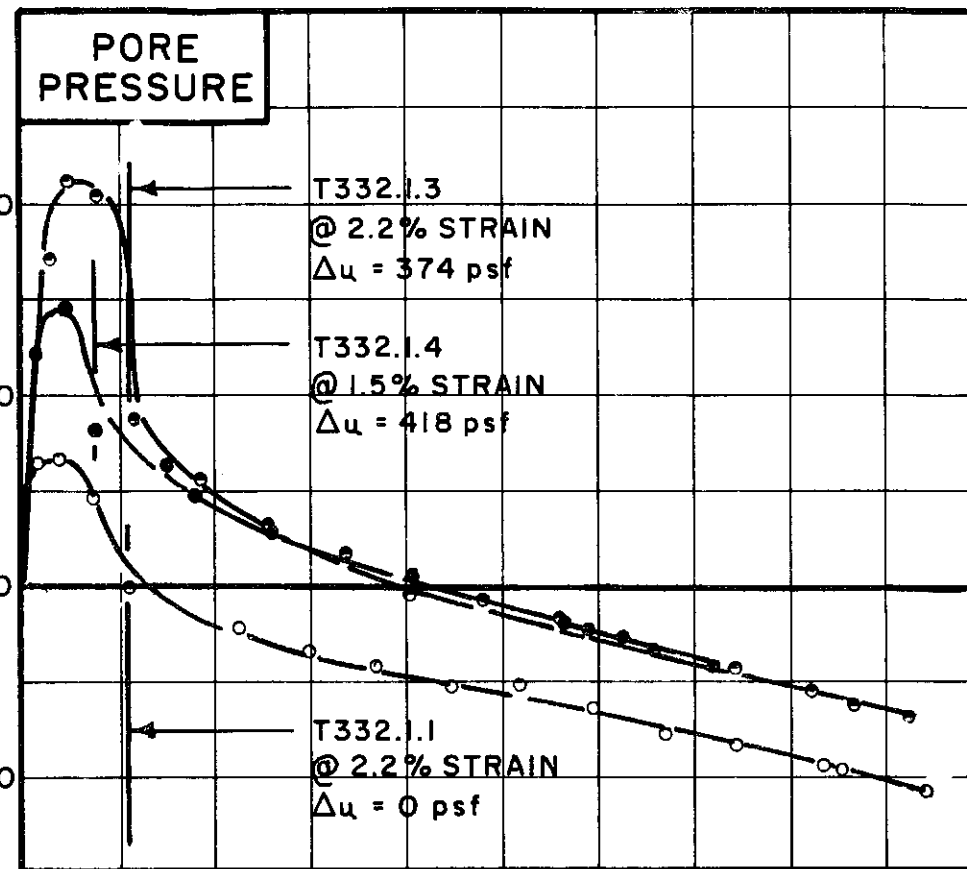
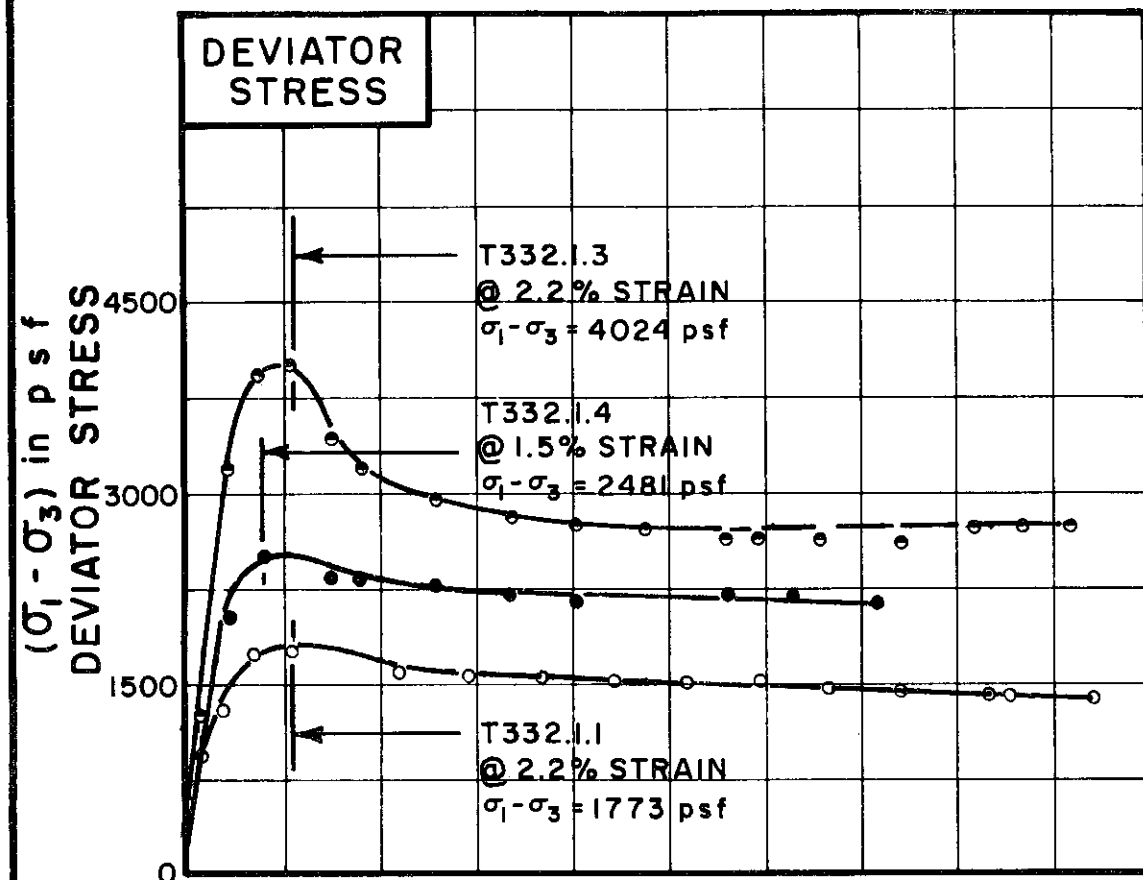
BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'

**MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS**

REMARKS ENVELOPE IS INTERPRETIVE  
 BASED ON LIMITED DATA POINTS  
 AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
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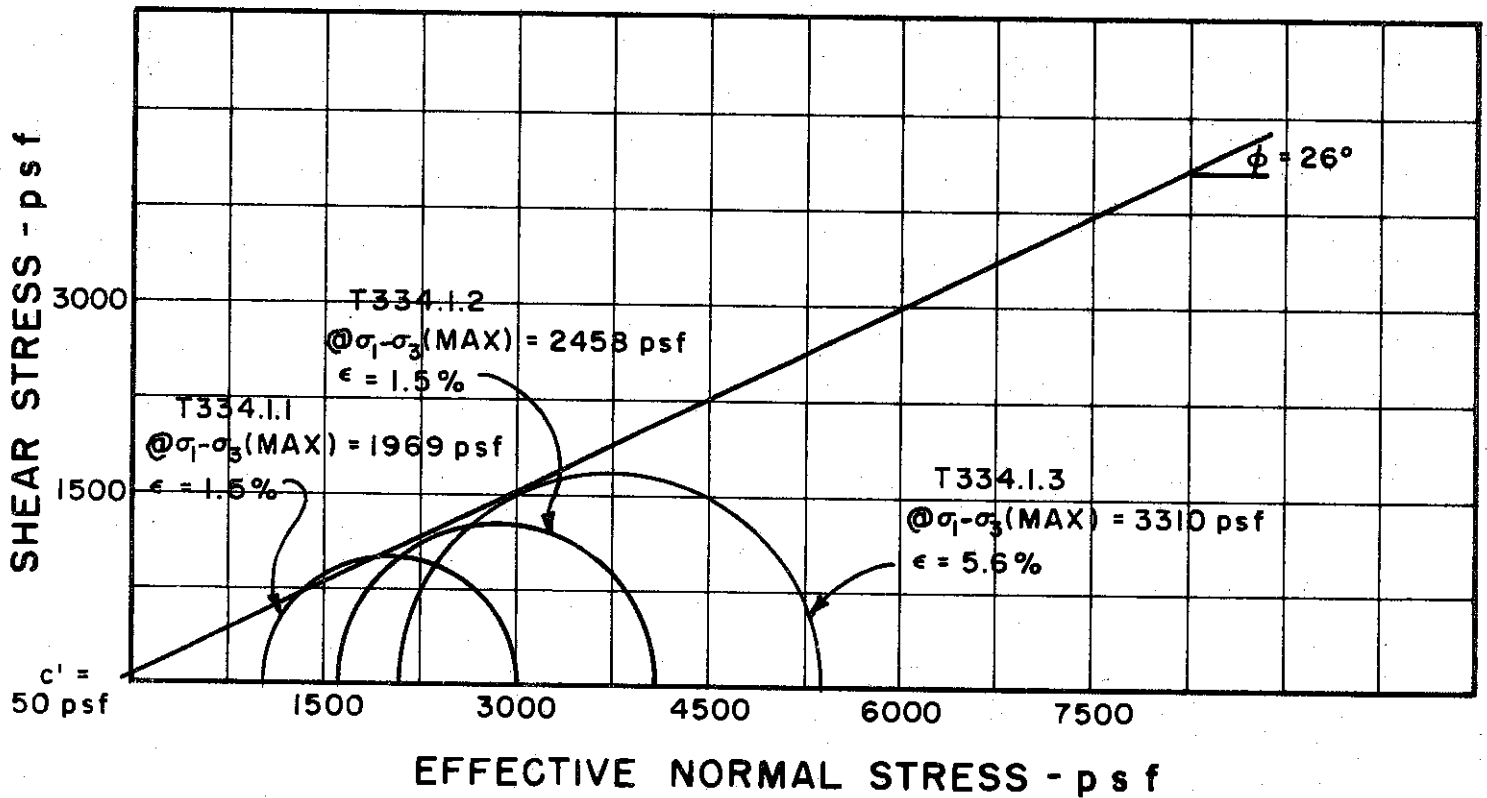
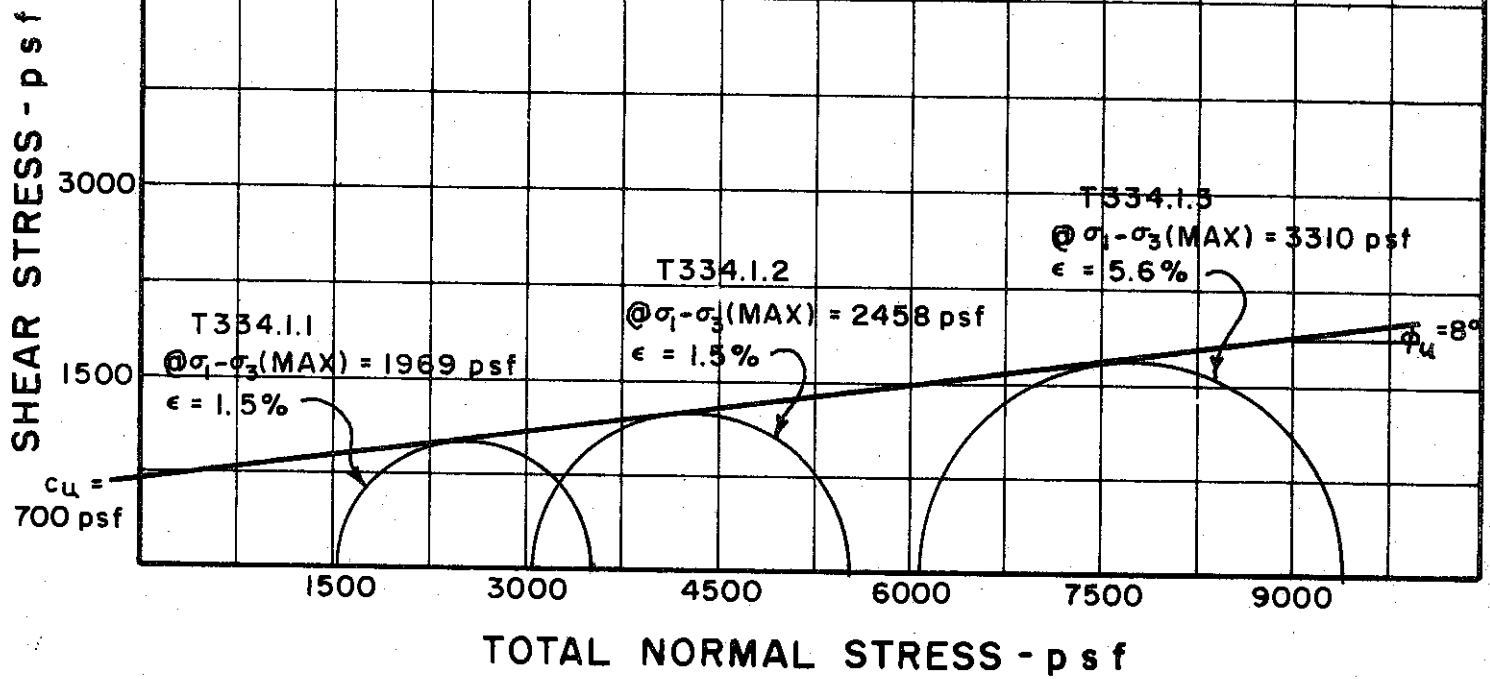
TEST NO. / SYMBOL	T332.1.1	T332.1.4	T332.1.3
	○	●	●

INITIAL CONDITIONS	WATER CONTENT	$w_0$	28.3%	29.2%	27.9%
	DRY DENSITY	$\gamma_d$	95	94	99
	pcf				
SAMPLE DIMENSIONS	SAMPLE DIAMETER	$D_0$	1.42	1.41	1.41
	in.				
	SAMPLE HEIGHT	$H_0$	3.36	3.38	3.40
in.					
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	8640	7200	8640
	psf				
	INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	576	1440	2304
psf					
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.4%	1.7%	1.9%
PORE PRESSURE RESPONSE			98%	98%	99%
FINAL CONDITIONS AFTER SHEAR	WATER CONTENT	$w_f$	29.4%	29.5%	27.6%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 2  
 DEPTH 8.0' TO 10.0'  
 SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 53 PLASTIC LIMIT 26

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 119

SAMPLE NO. 4

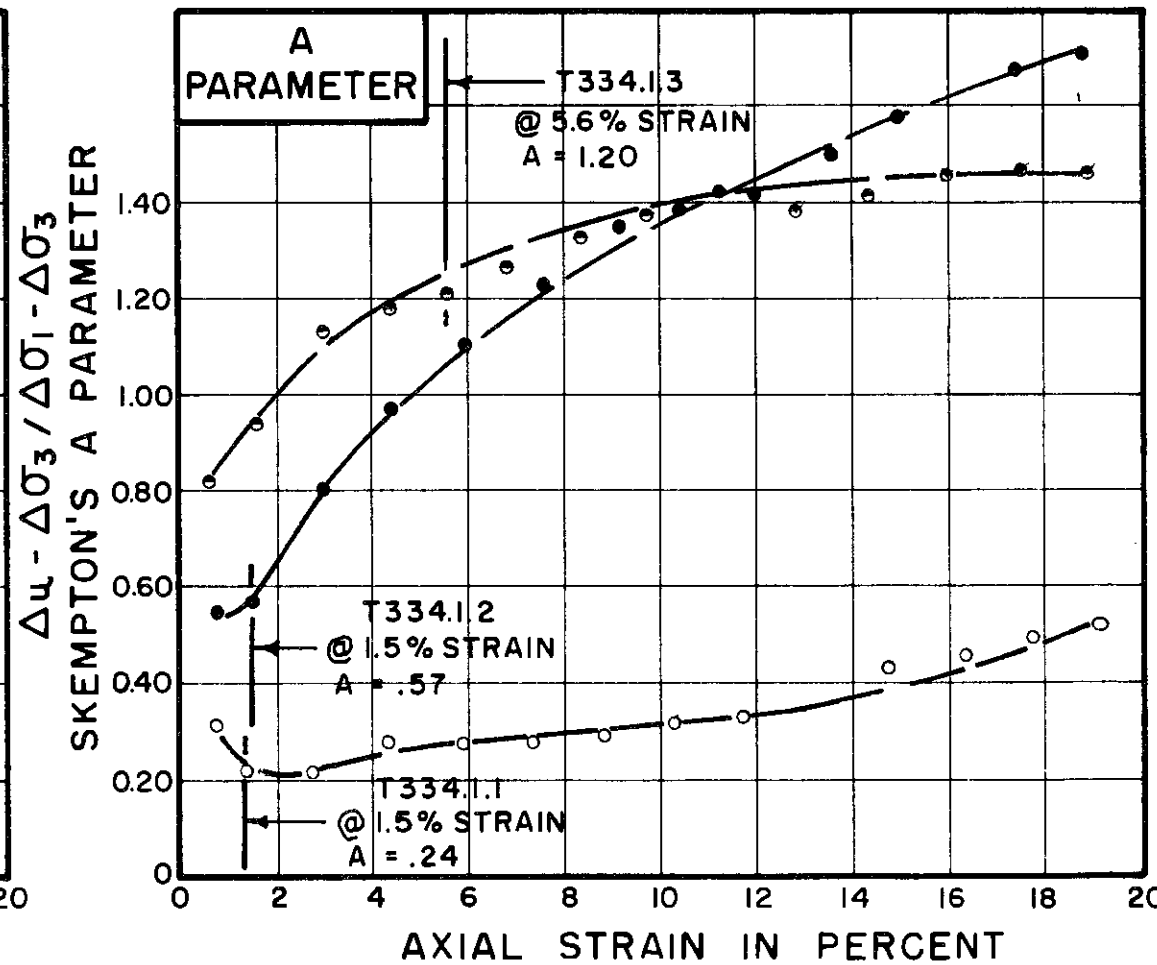
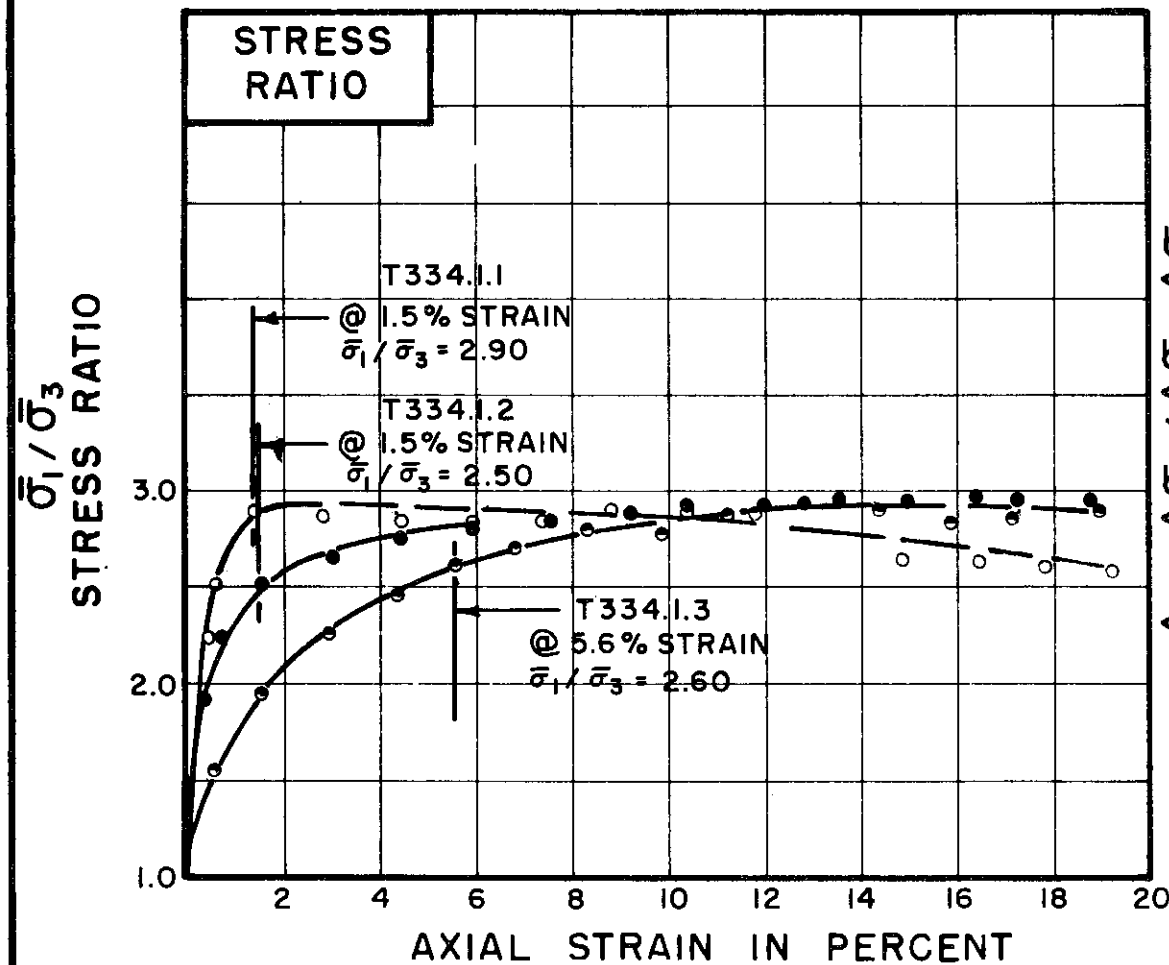
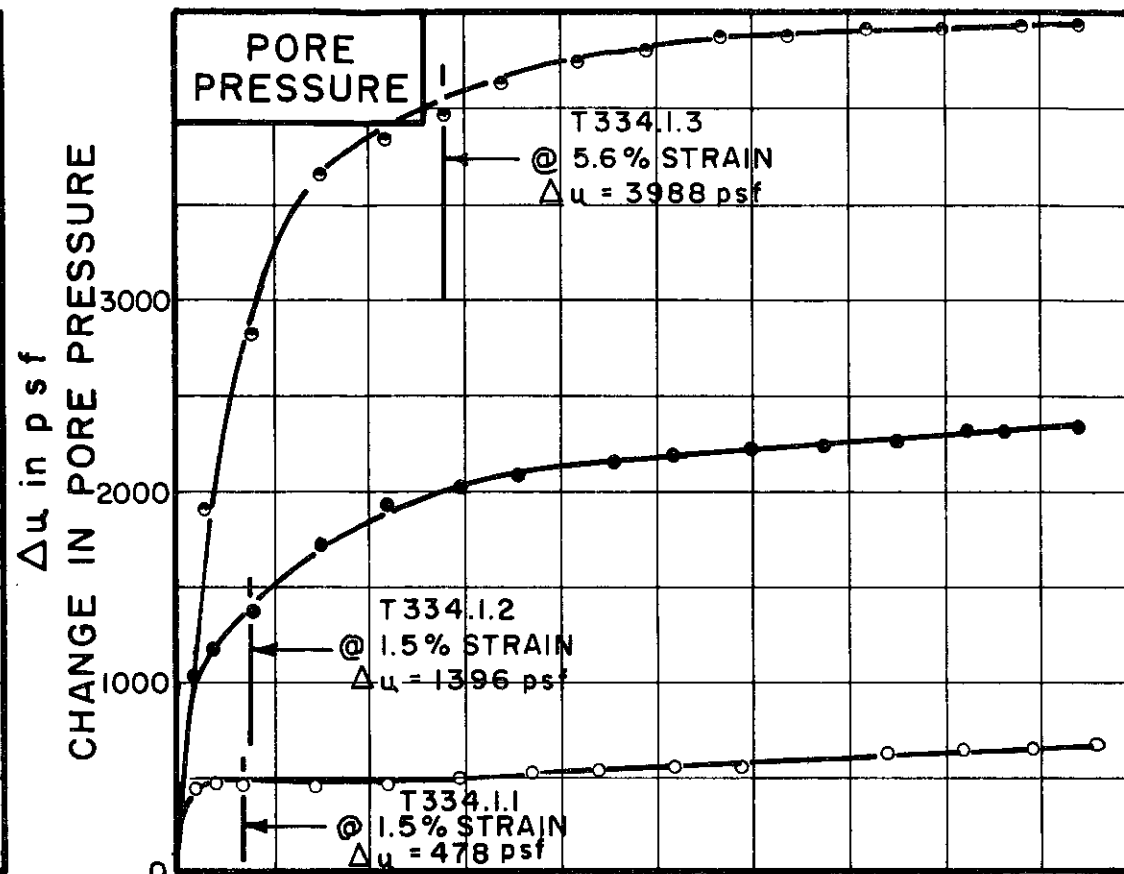
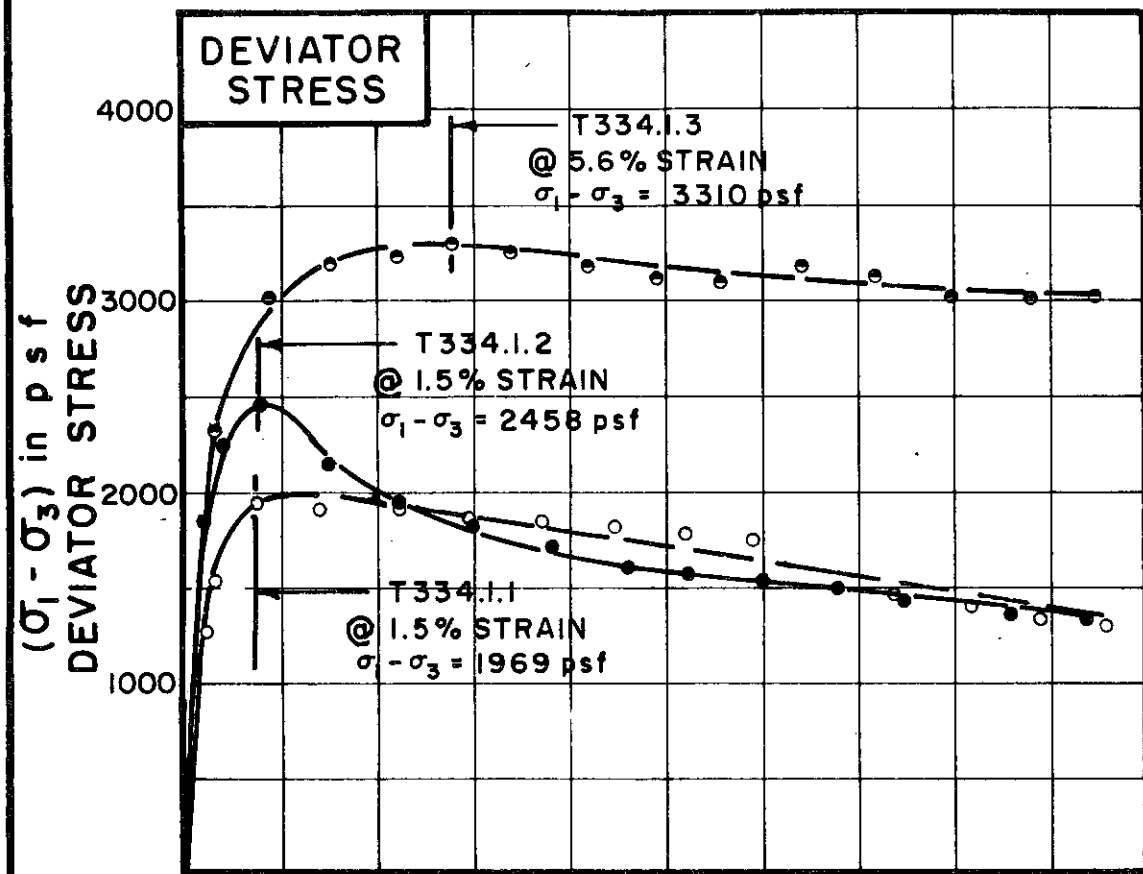
DEPTH 30.0 TO 32.0

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

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 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255  
 C-439



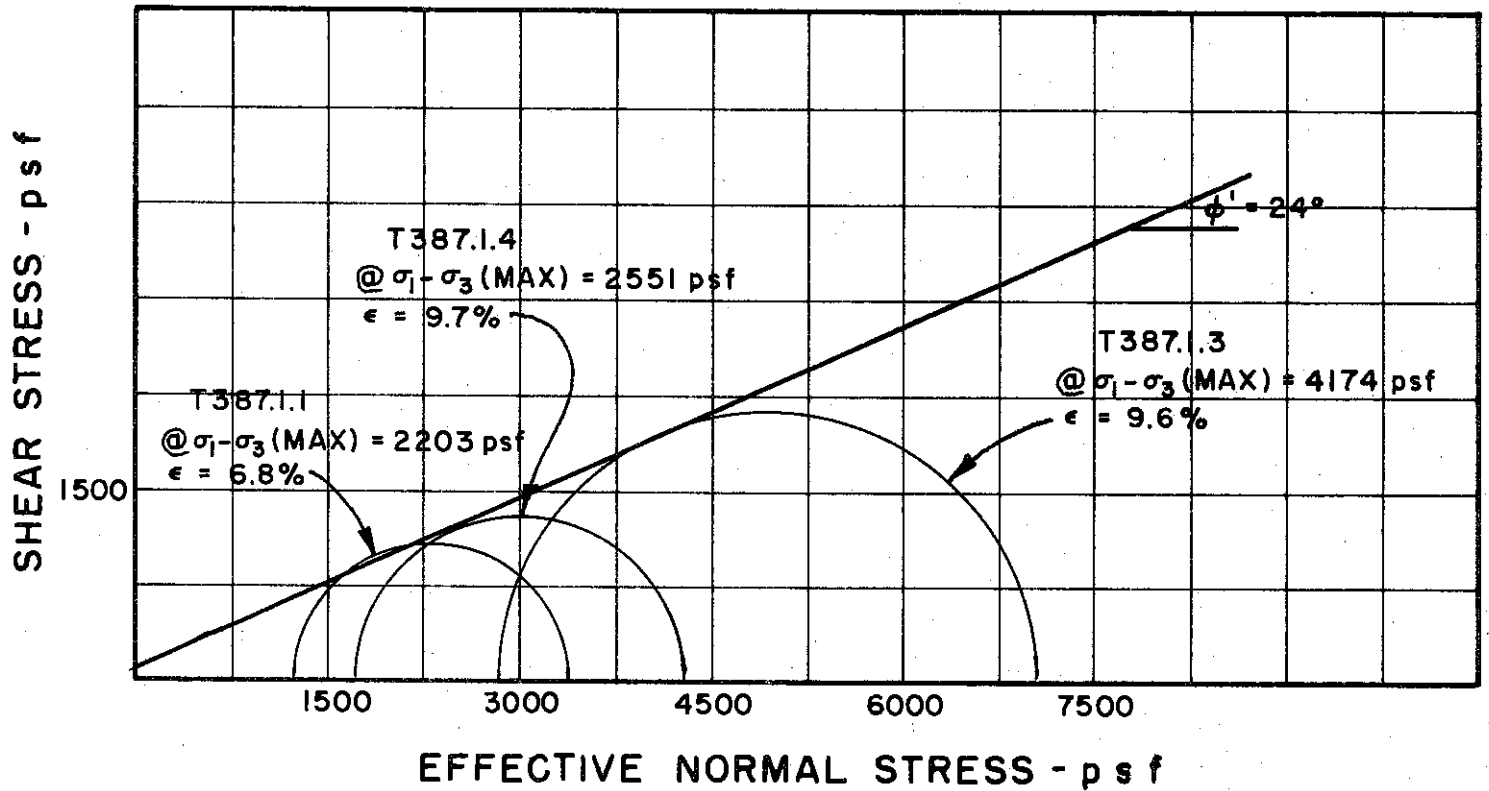
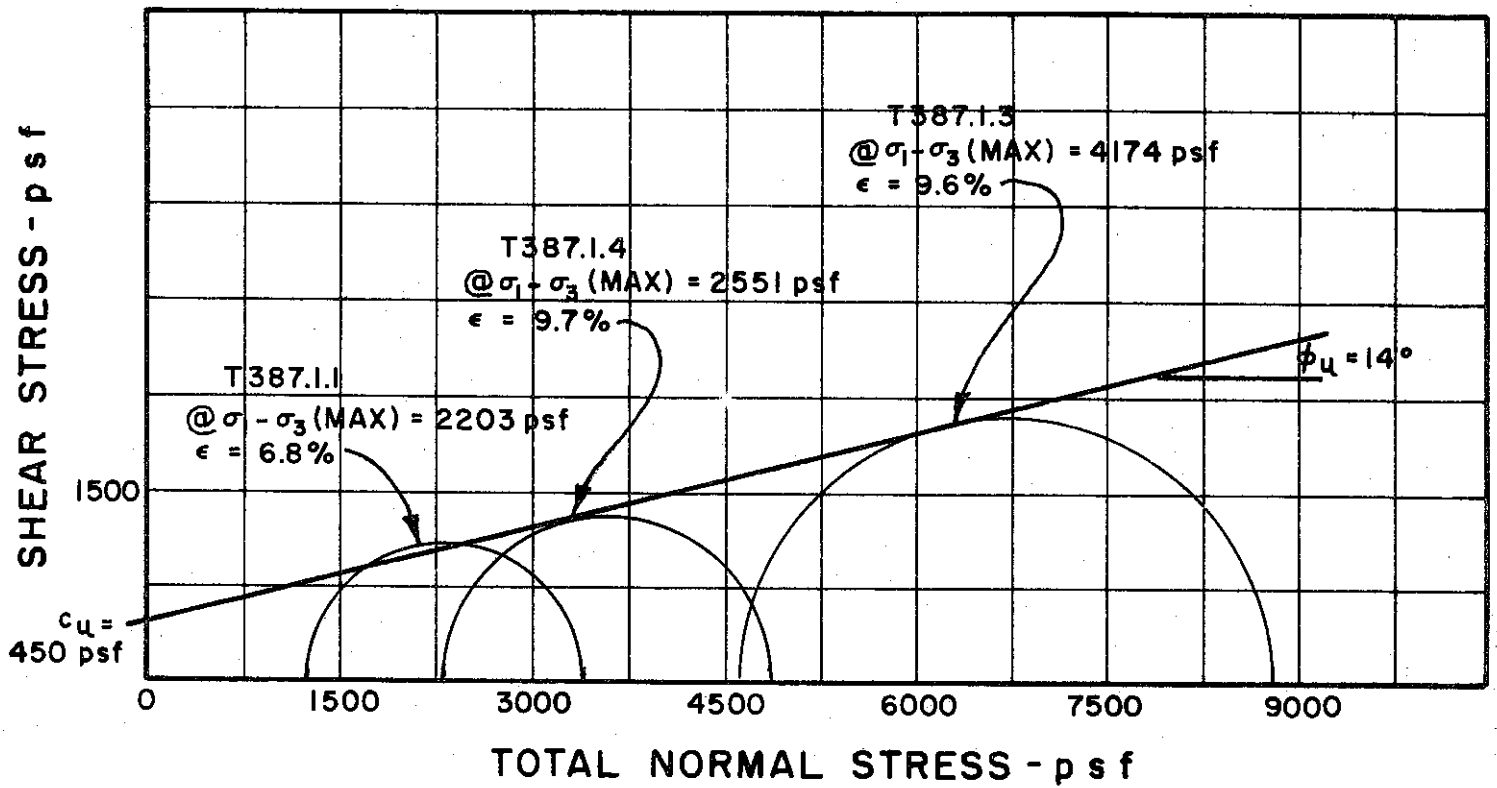
TEST NO. / SYMBOL	T334.1.1	T334.1.2	T334.1.3
	○	●	○

INITIAL CONDITIONS			T334.1.1	T334.1.2	T334.1.3
WATER CONTENT	$w_0$		36.9%	38.5%	35.3%
DRY DENSITY	$\gamma_d$	pcf	86	85	87
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.35	3.36
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	11520	7200	11520
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	psf	1512	3024	6048
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.7%	6.4%
PORE PRESSURE RESPONSE			95%	99%	100%
FINAL CONDITIONS					
WATER CONTENT	$w_f$		35.2%	36.1%	29.8%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024
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BORING NO. 119  
 SAMPLE NO. 4  
 DEPTH 30.0 TO 32.0  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

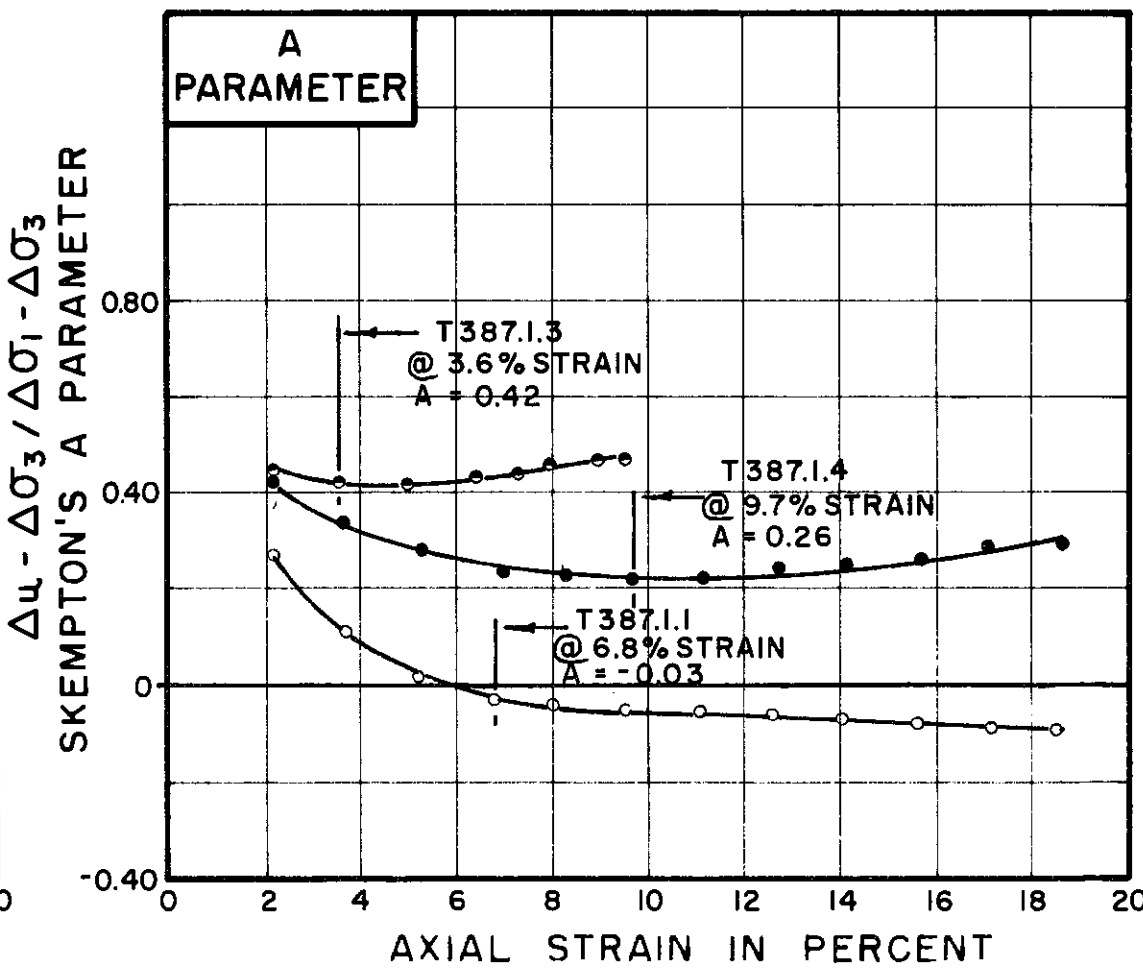
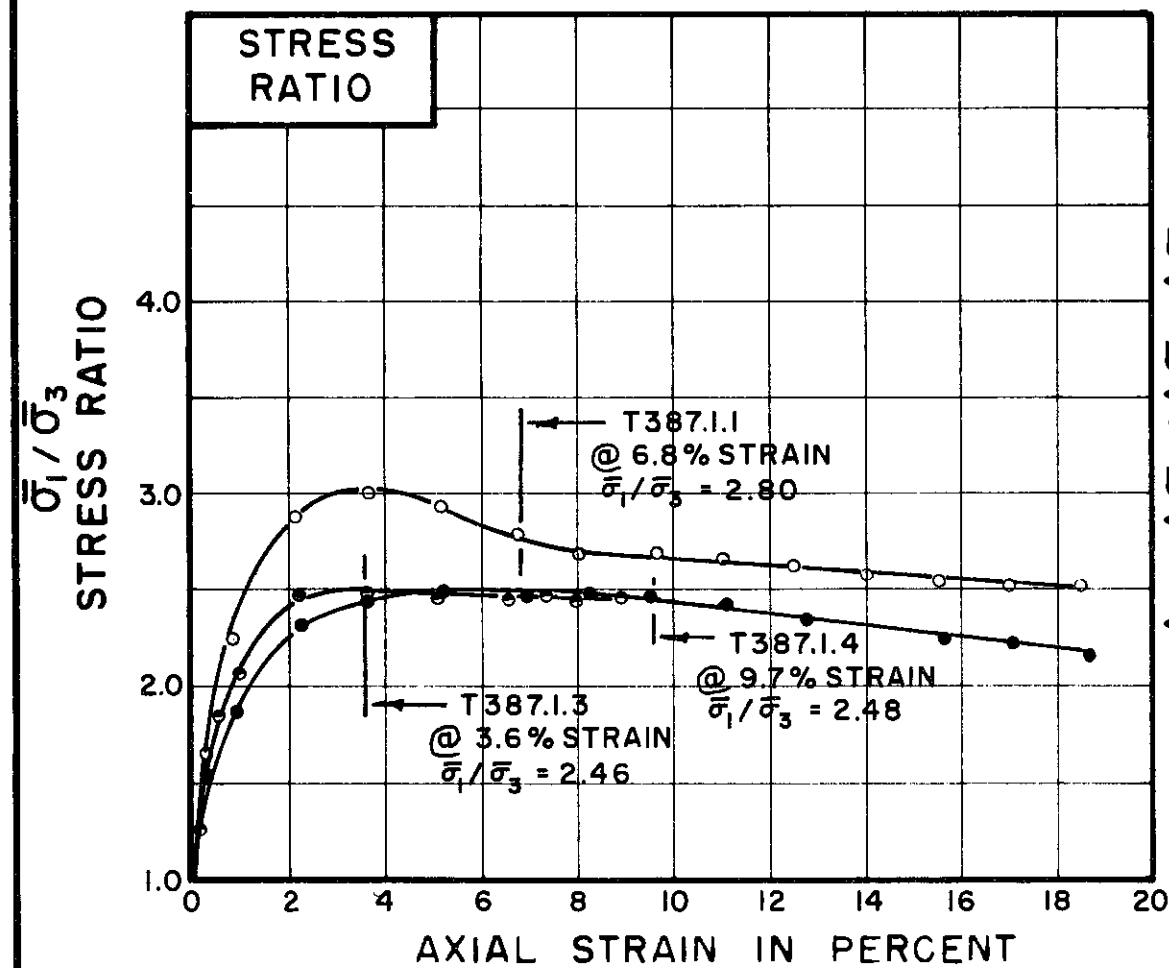
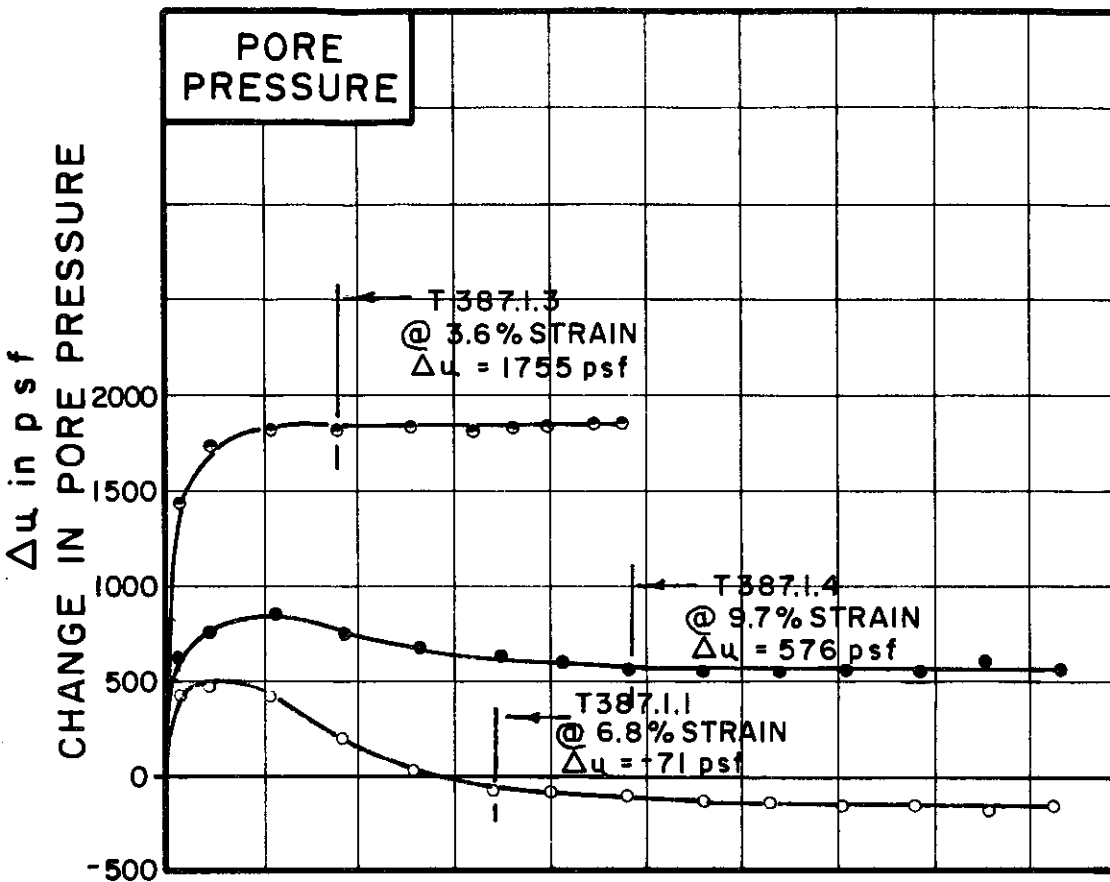
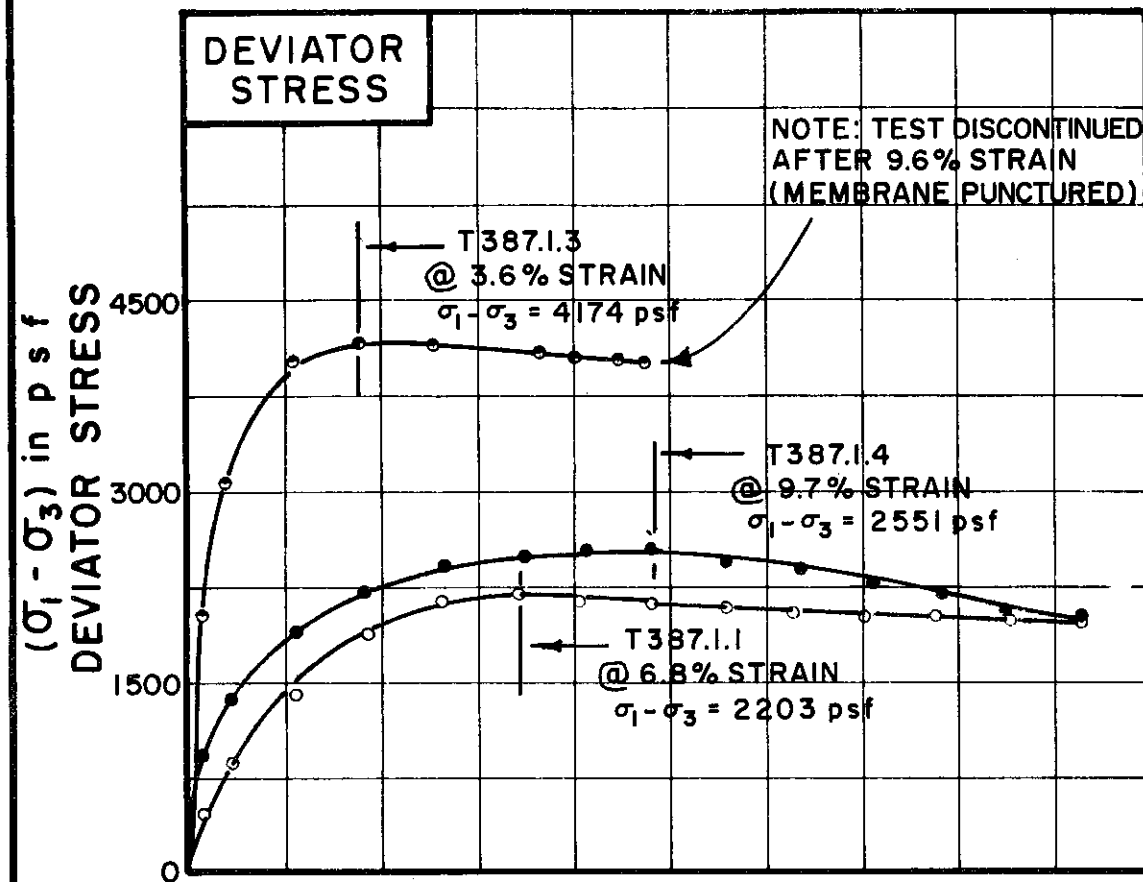
GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

C-441



TEST NO. / SYMBOL	T387.1.1	T387.1.4	T387.1.3
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INITIAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_0$		33.5%	33.1%	31.9%
DRY DENSITY	$\gamma_d$	lb/cu ft	90	90	90
SAMPLE DIAMETER	$D_0$	in.	1.41	1.41	1.41
SAMPLE HEIGHT	$H_0$	in.	3.39	3.38	3.45
FINAL CONDITIONS BEFORE SHEAR			T387.1.1	T387.1.4	T387.1.3
FINAL BACK PRESSURE	$u_0$	p.s.f.	6480	5760	6480
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1 / \bar{\sigma}_3$	p.s.f.	1152	2304	4608
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.31%	2.94%	3.20%
PORE PRESSURE RESPONSE			98%	99%	97%
FINAL CONDITIONS			T387.1.1	T387.1.4	T387.1.3
WATER CONTENT	$w_f$		33.4%	31.9%	—%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.023
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BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

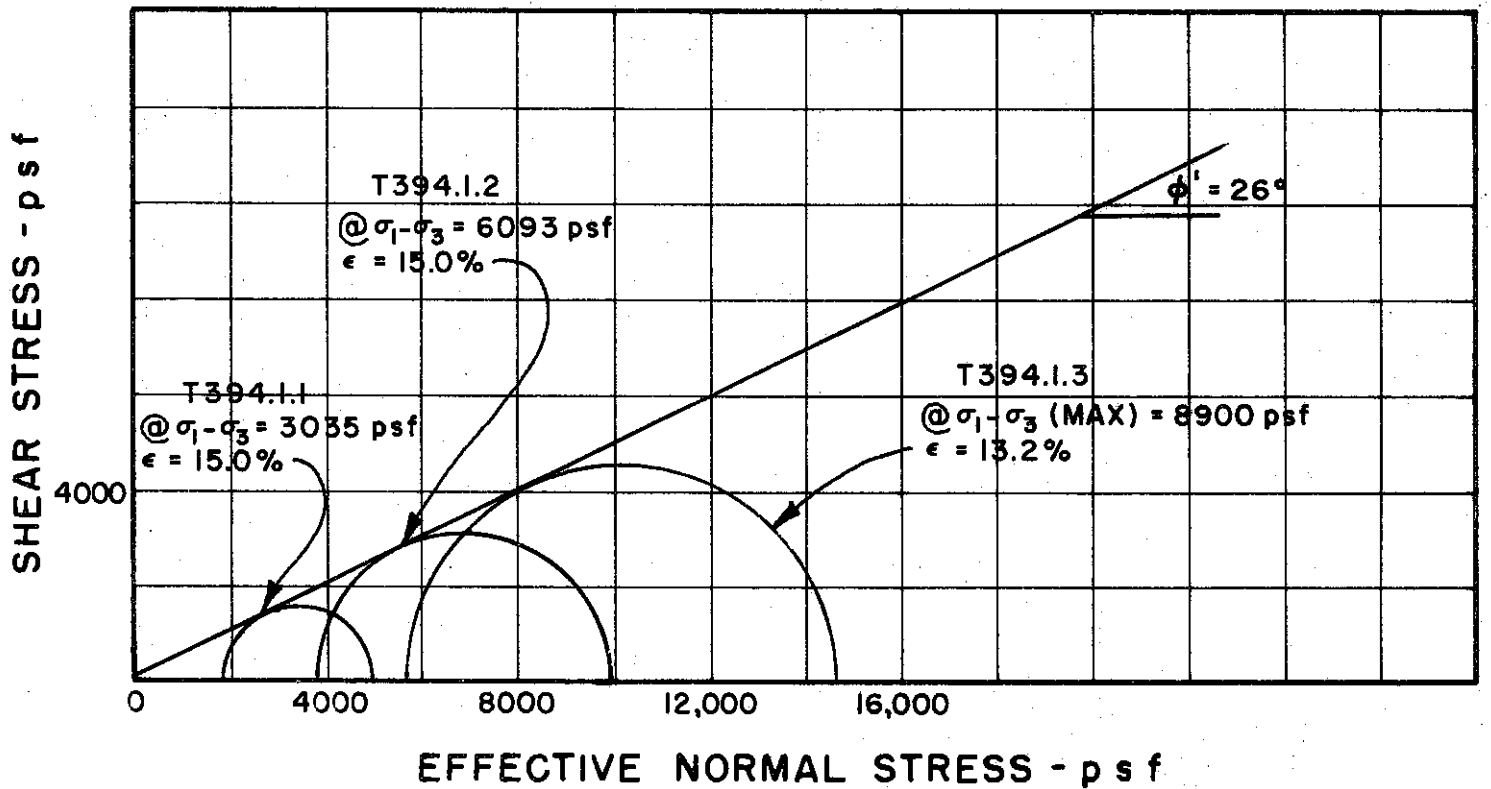
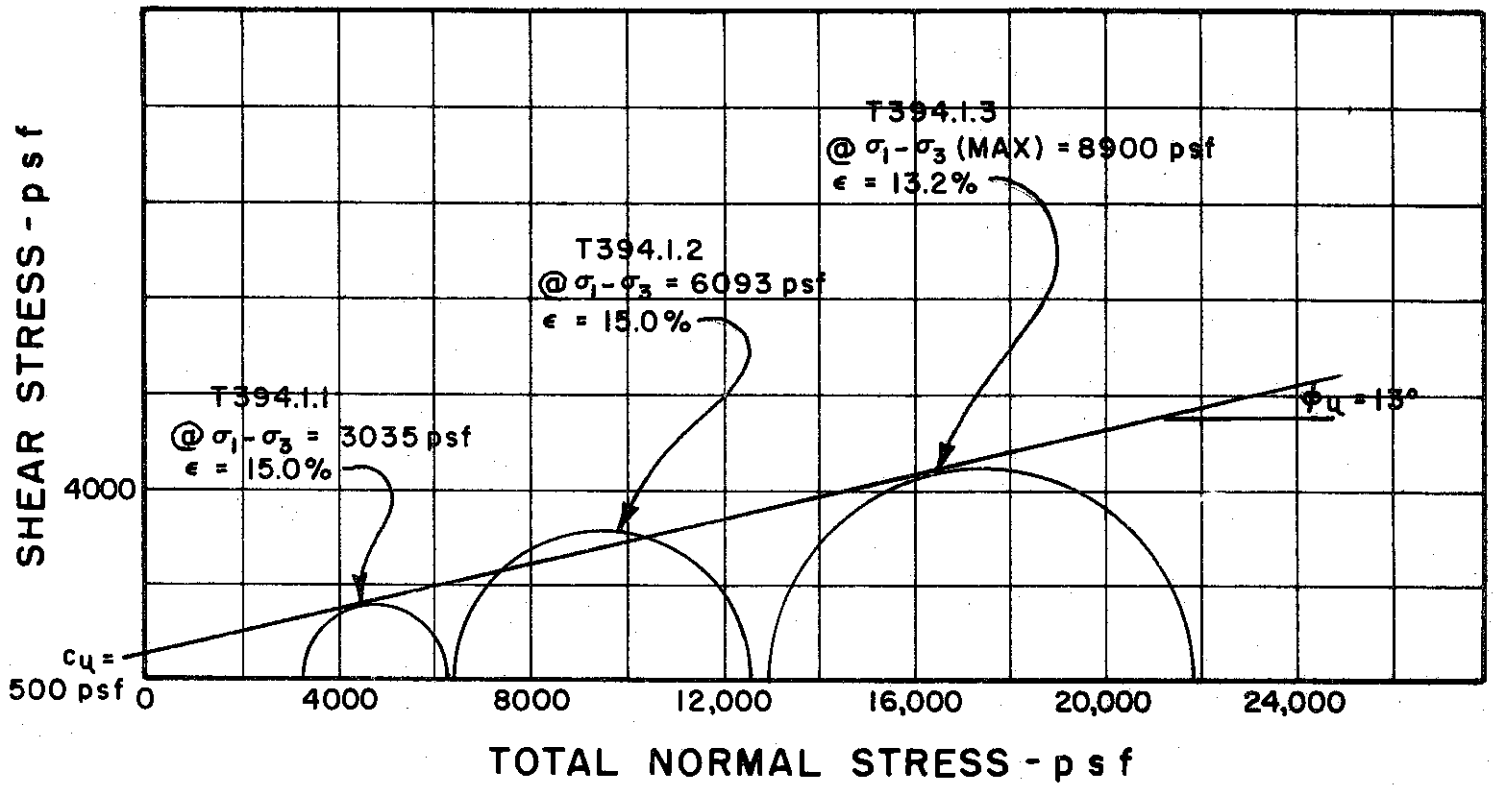
SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





BORING NO. 129

SAMPLE NO. 19

DEPTH 93.0' TO 95.5'

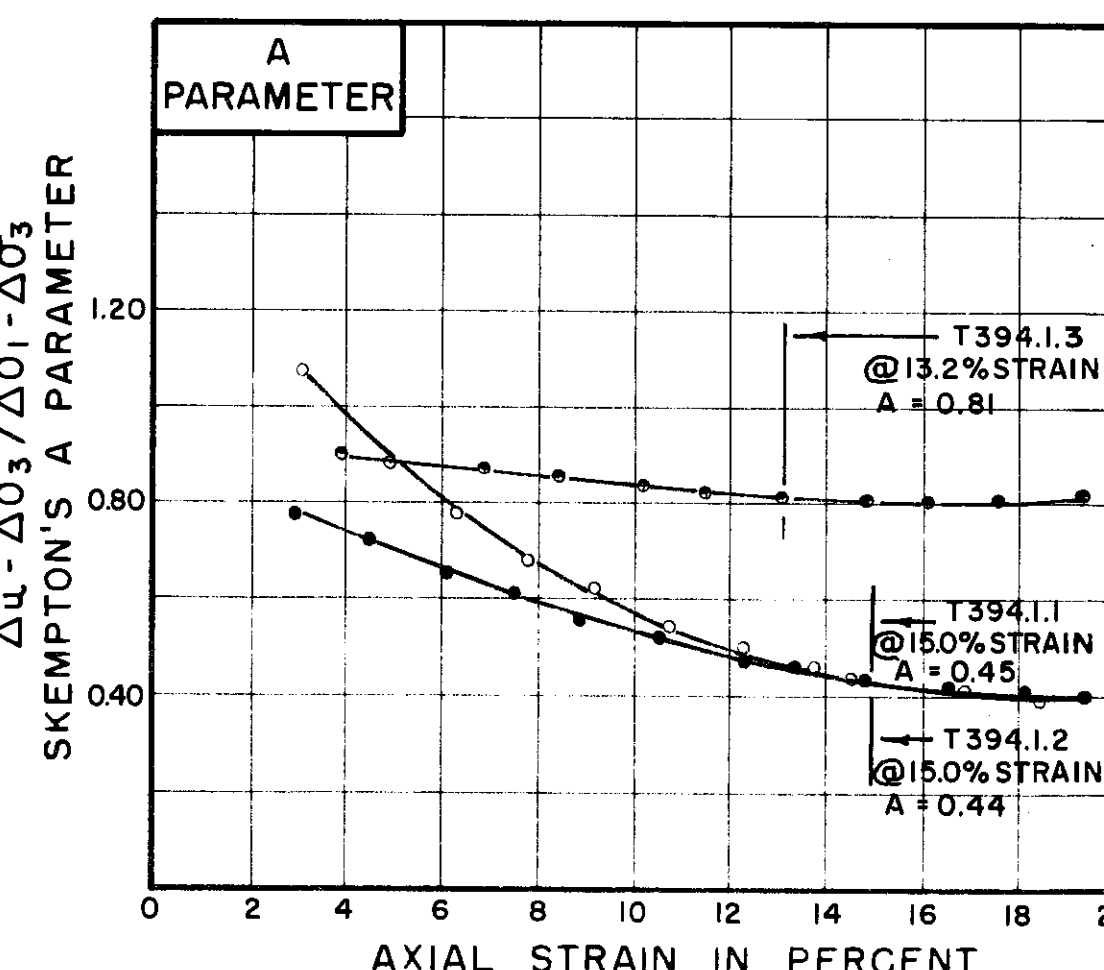
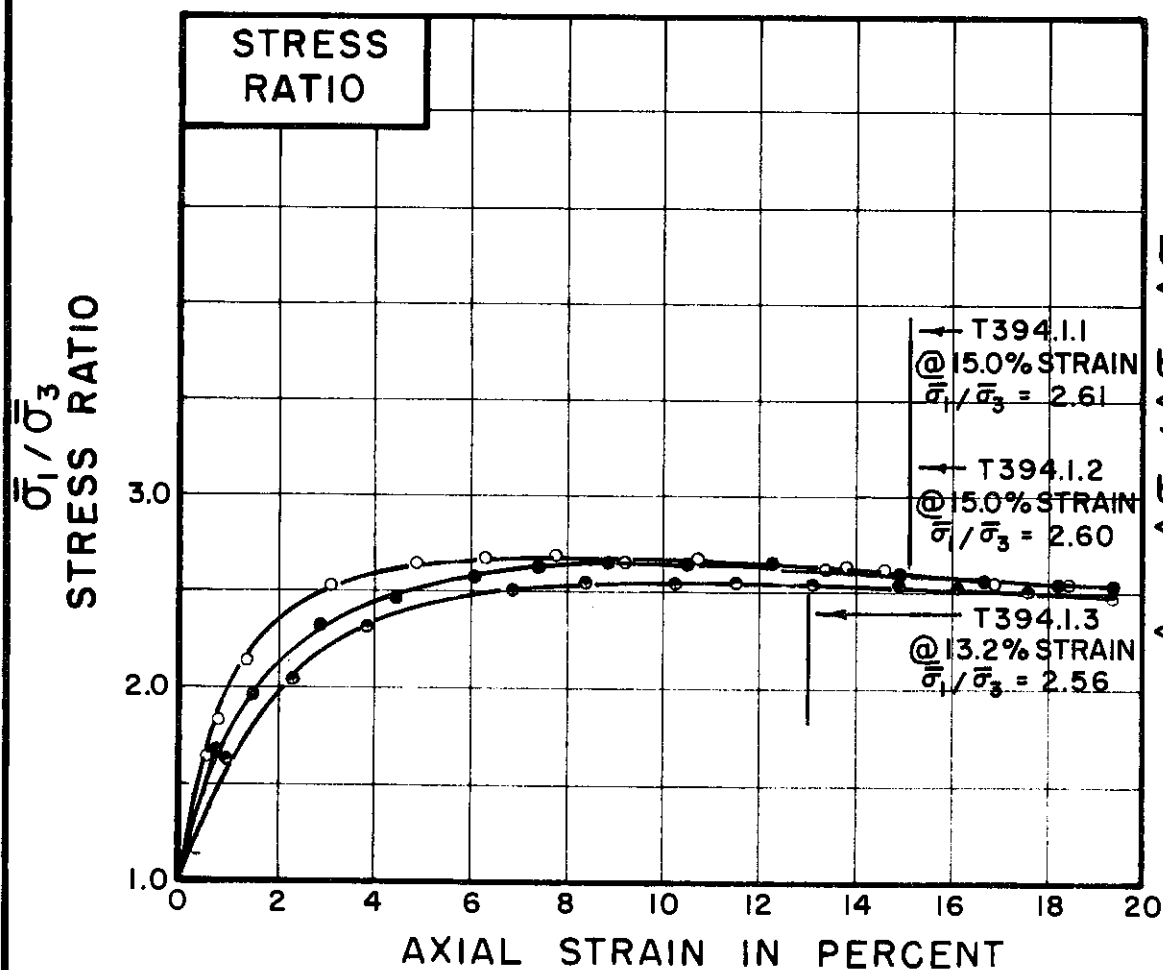
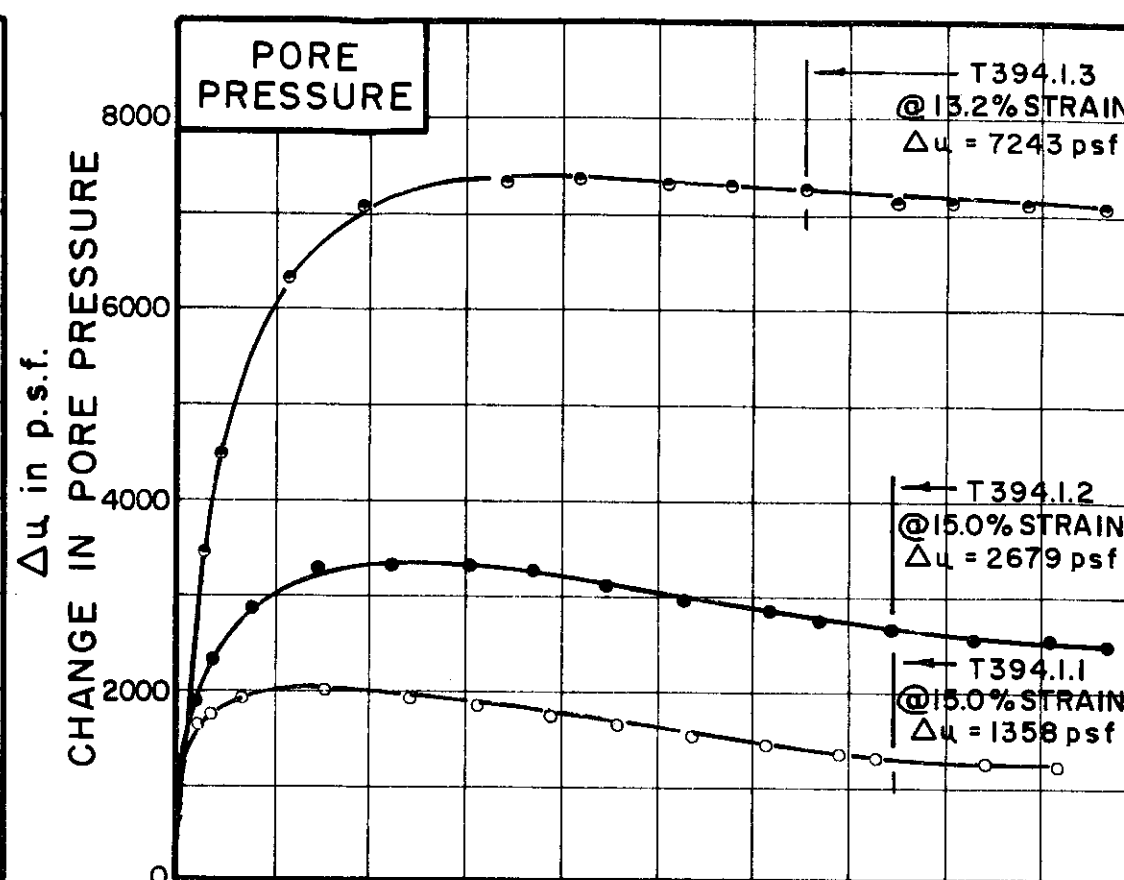
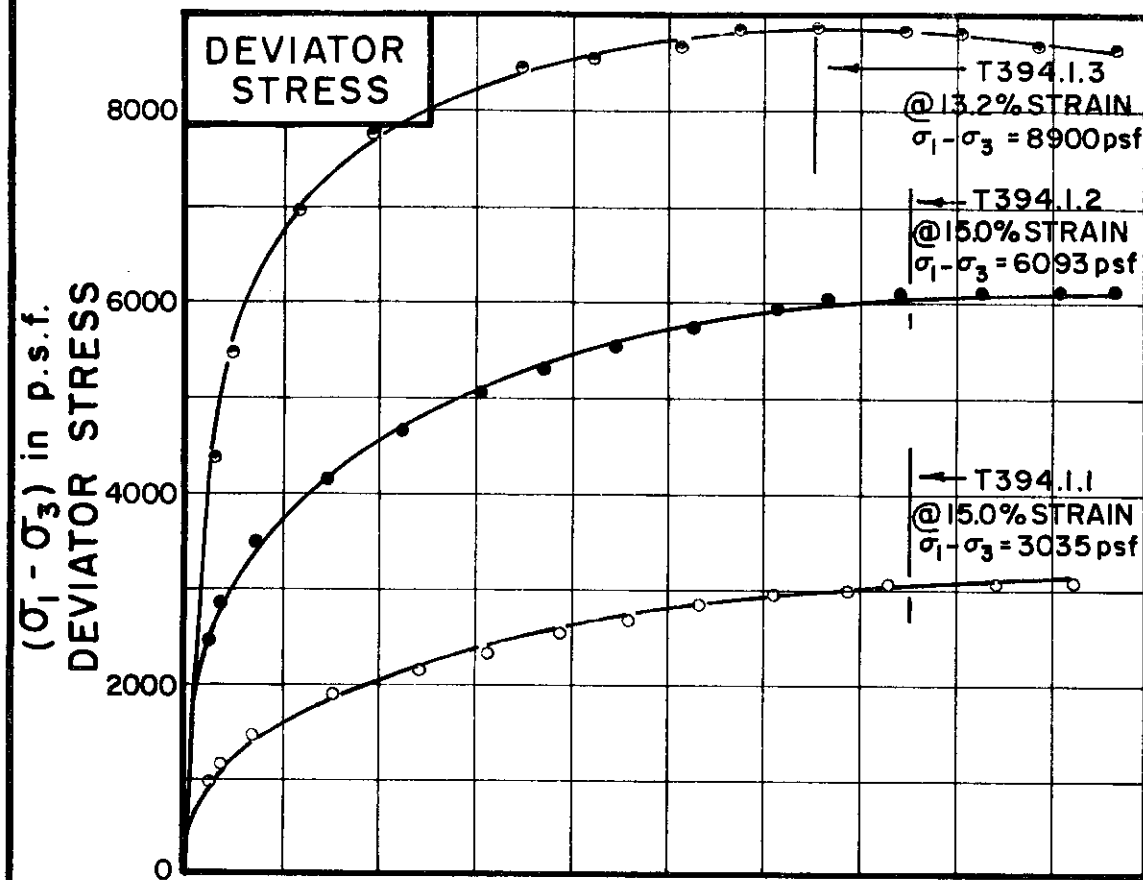
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T394.1.1	T394.1.2	T394.1.3
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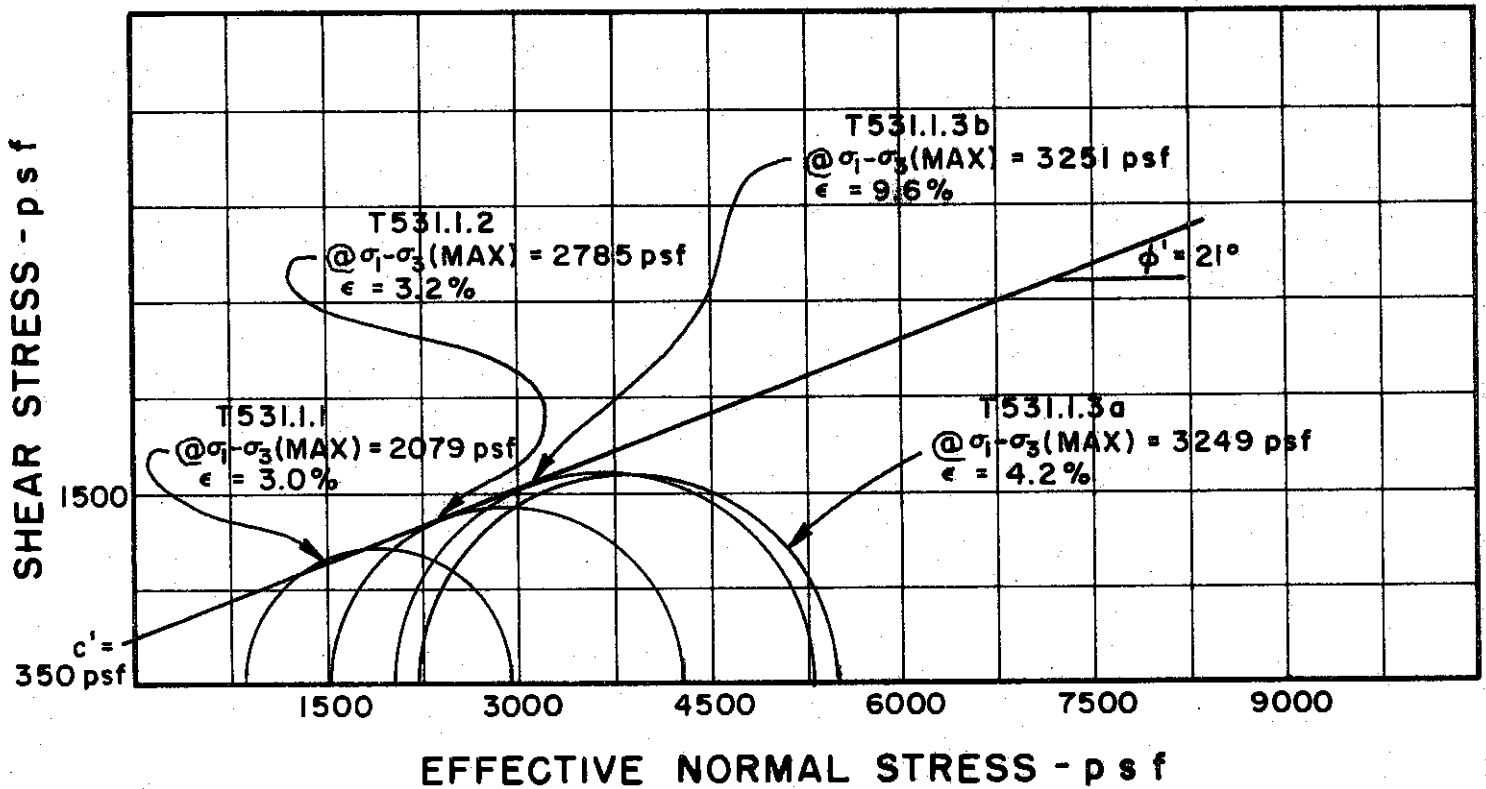
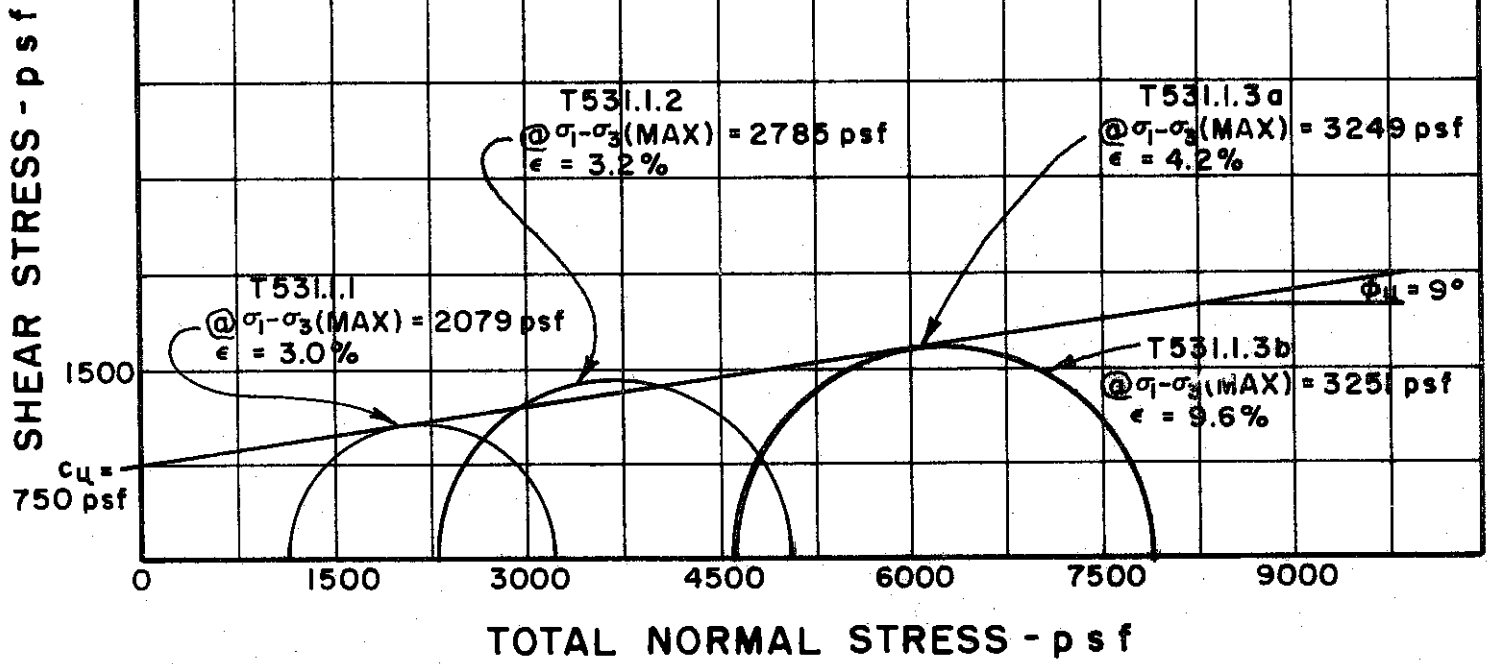
INITIAL CONDITIONS			T394.1.1	T394.1.2	T394.1.3
WATER CONTENT	$w_0$		23.7%	25.9%	27.0%
DRY DENSITY	$\gamma_d$	lb/cu ft	99	99	99
SAMPLE DIAMETER	$D_0$	in.	1.39	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.27	3.38	3.32
FINAL CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	p.s.f.	7200	7200	7200
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	p.s.f.	3240	6480	12960
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.73%	2.61%	5.03%
PORE PRESSURE RESPONSE			99%	98%	98%
FINAL CONDITIONS AT END OF TEST					
WATER CONTENT	$w_f$		22.2%	22.7%	21.5%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.025	.024	.025
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BORING NO. 129  
 SAMPLE NO. 19  
 DEPTH 93.0' TO 95.5'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 41 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



BORING NO. 141  
 SAMPLE NO. 4  
 DEPTH 18.0' TO 20.0'

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

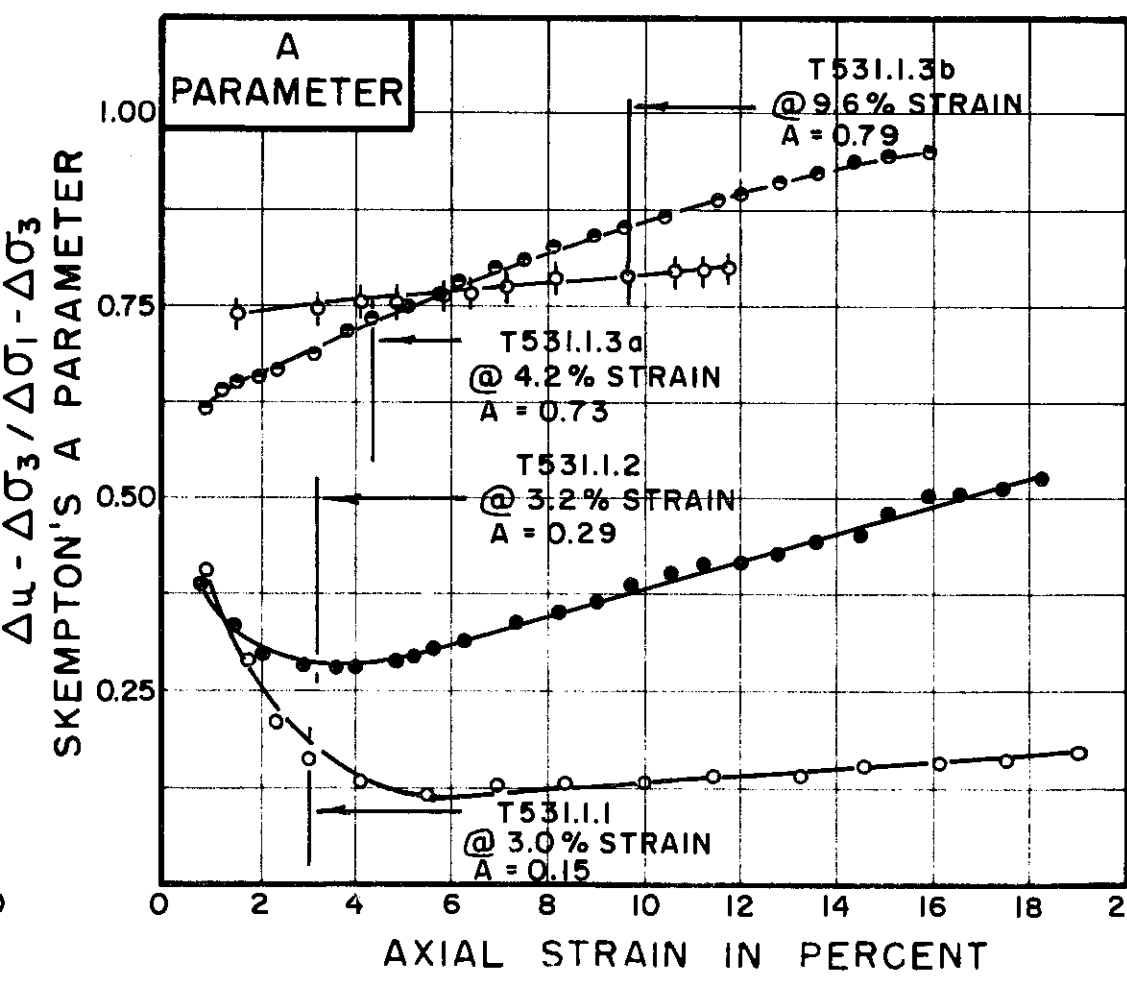
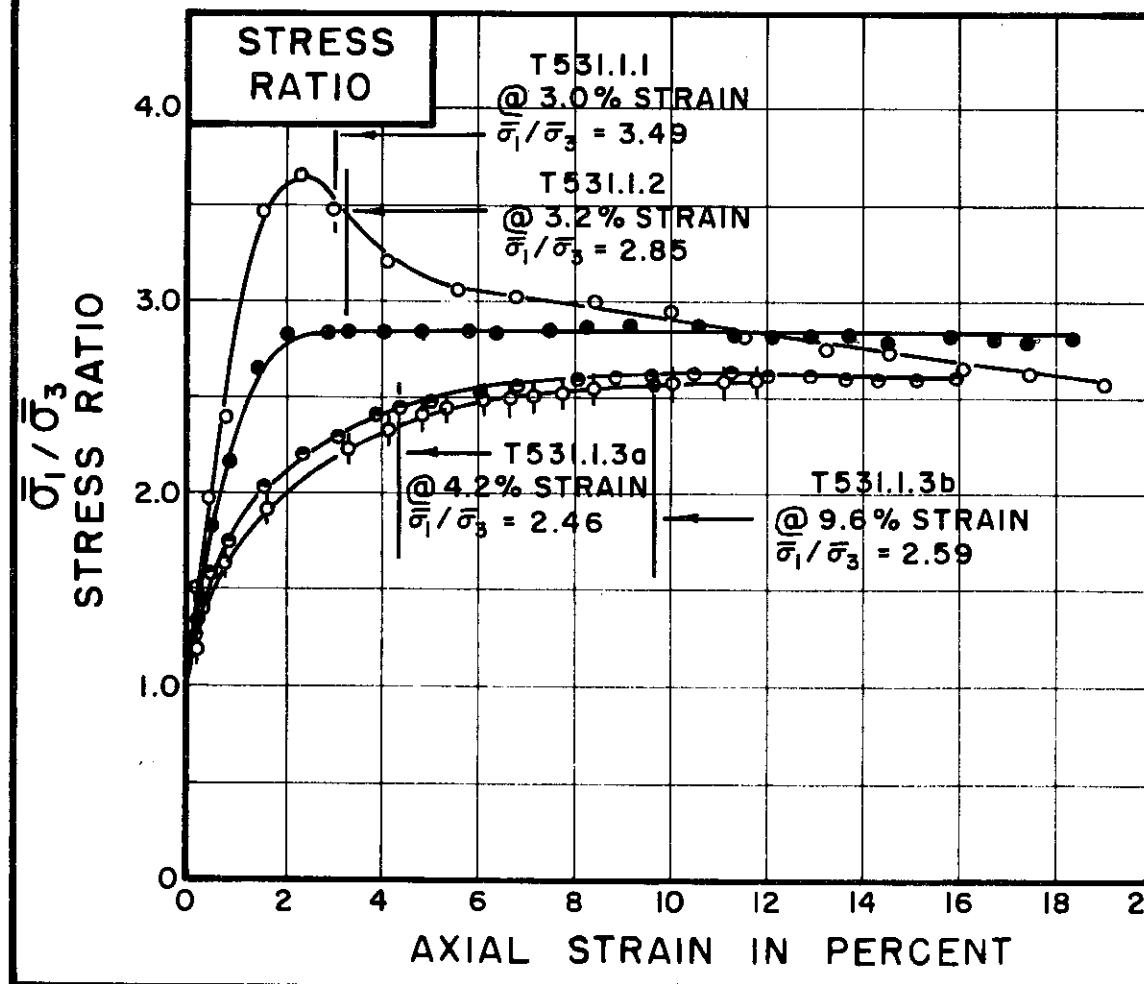
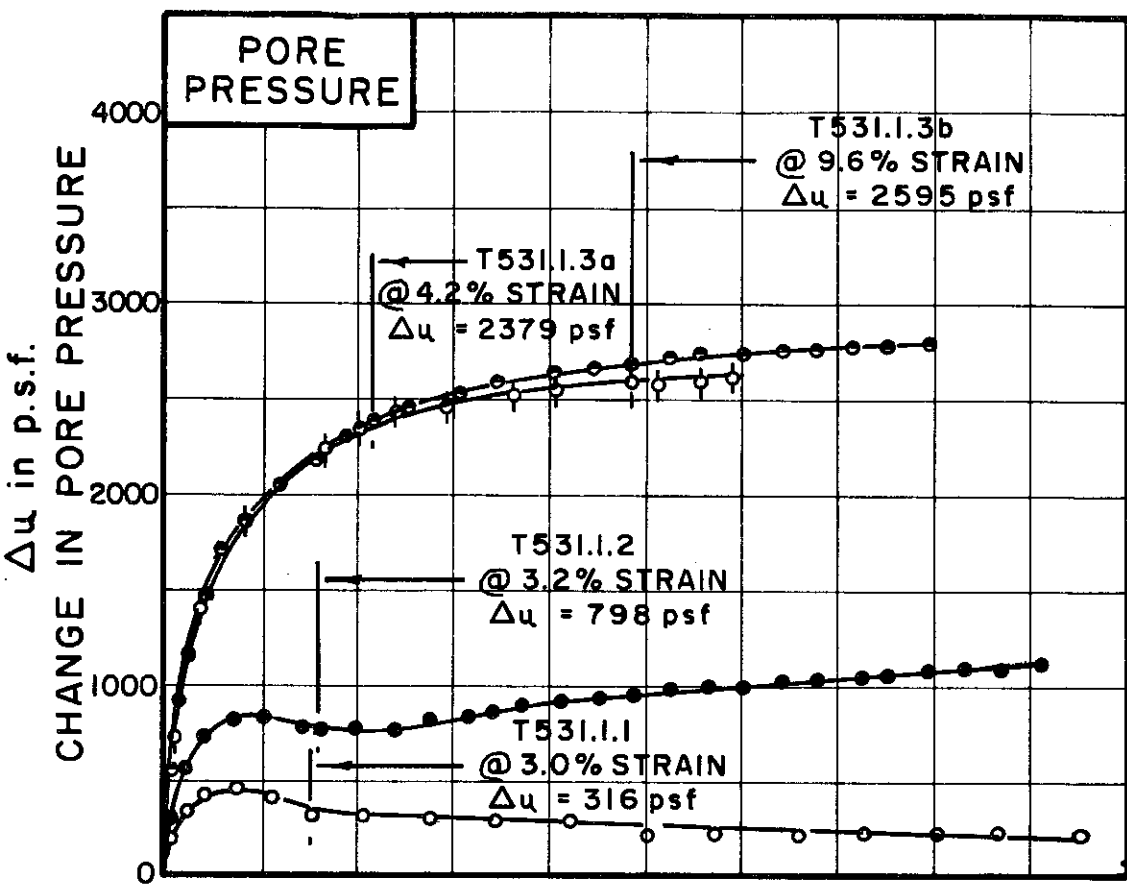
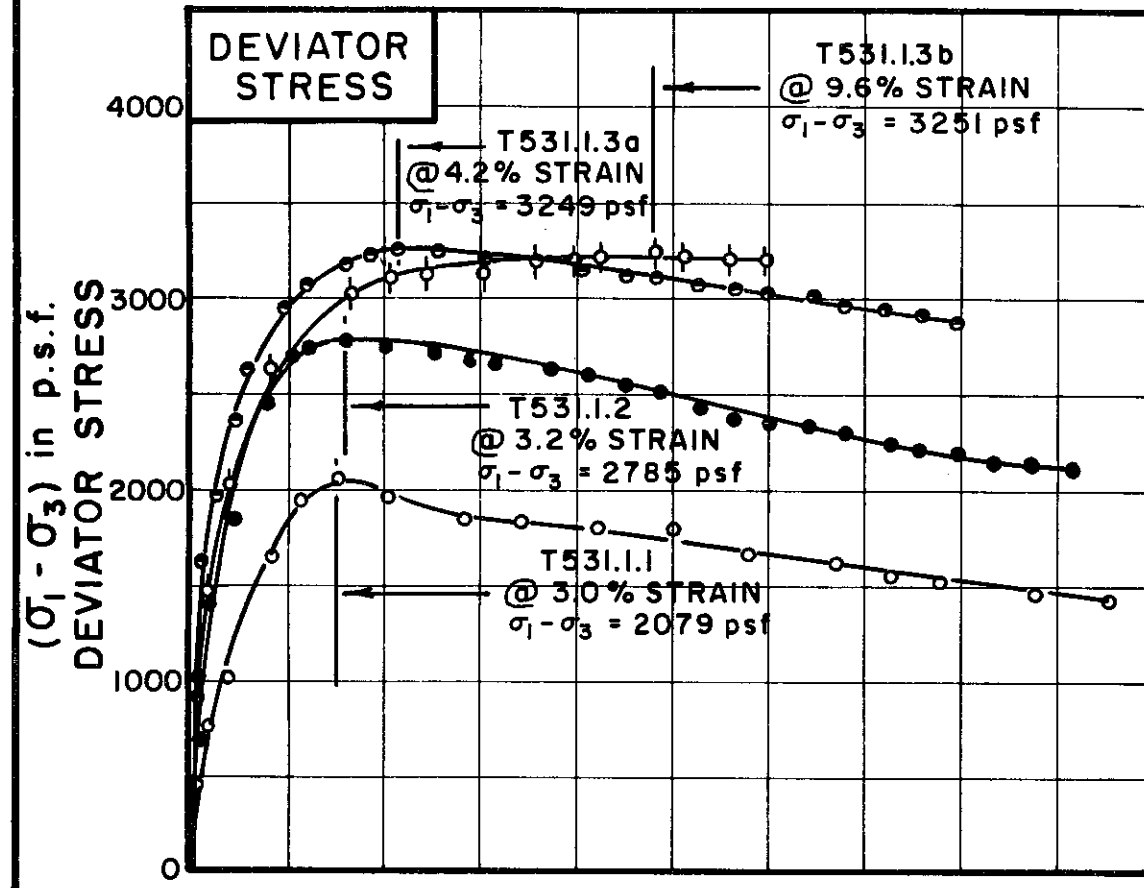
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-445

TEST NO. / SYMBOL	T531.1.1	T531.1.2	T531.1.3a
	○	●	◊



INITIAL CONDITIONS	WATER CONTENT	$w_0$	36.3%	35.5%	35.1%
INITIAL CONDITIONS	DRY DENSITY	$\gamma_d$	86	87	85
					84
INITIAL CONDITIONS	SAMPLE DIAMETER	$D_0$	1.39	1.40	1.41
					1.39
INITIAL CONDITIONS	SAMPLE HEIGHT	$H_0$	3.30	3.20	3.33
					3.28
FINAL CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE	$u_0$	10080	8640	11520
					14400
FINAL CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS	$\sigma'_1, \sigma'_3$	1152	2304	4608
					4637
FINAL CONDITIONS BEFORE SHEAR	VOLUMETRIC STRAIN	$\epsilon_{vol}$	0.9%	1.2%	4.3%
					5.1%
FINAL CONDITIONS BEFORE SHEAR	PORE PRESSURE RESPONSE		96%	95%	96%
					91%
FINAL CONDITIONS BEFORE SHEAR	WATER CONTENT	$w_f$	35.5%	34.5%	30.9%
					34.4%
SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	0.24	.010	.010
			.007

BORING NO. 141

SAMPLE NO. 4

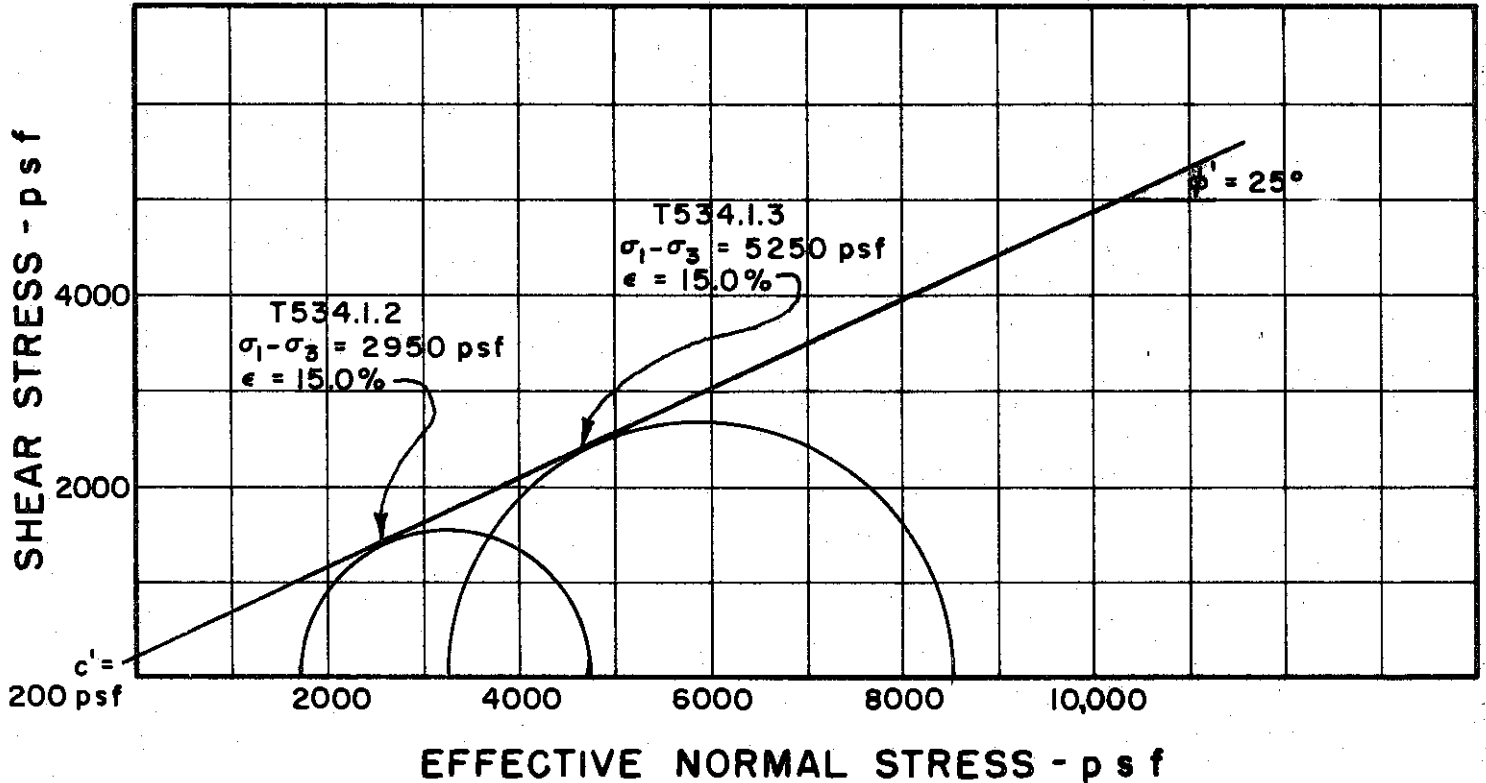
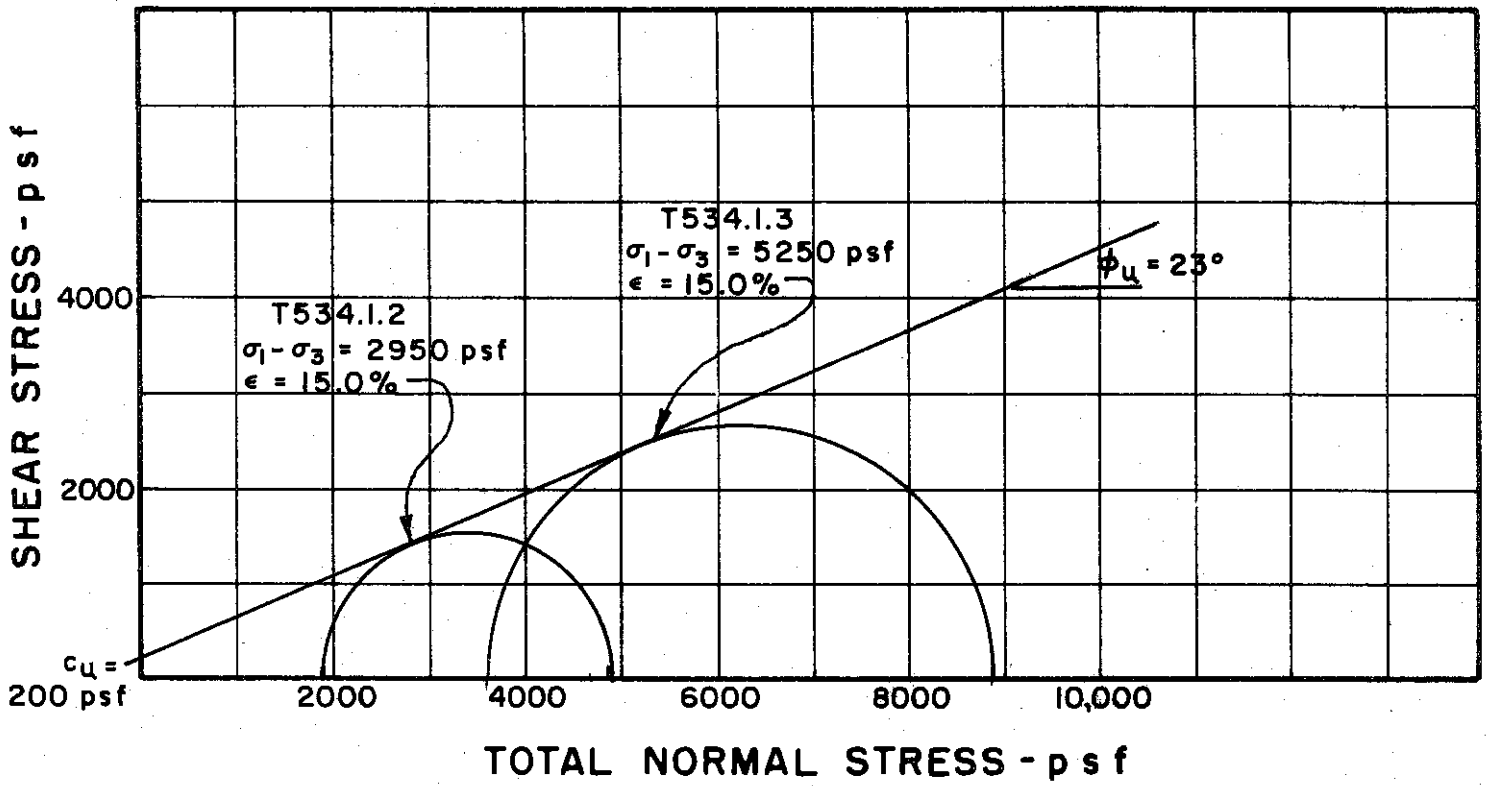
DEPTH 18.0' TO 20.0'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'

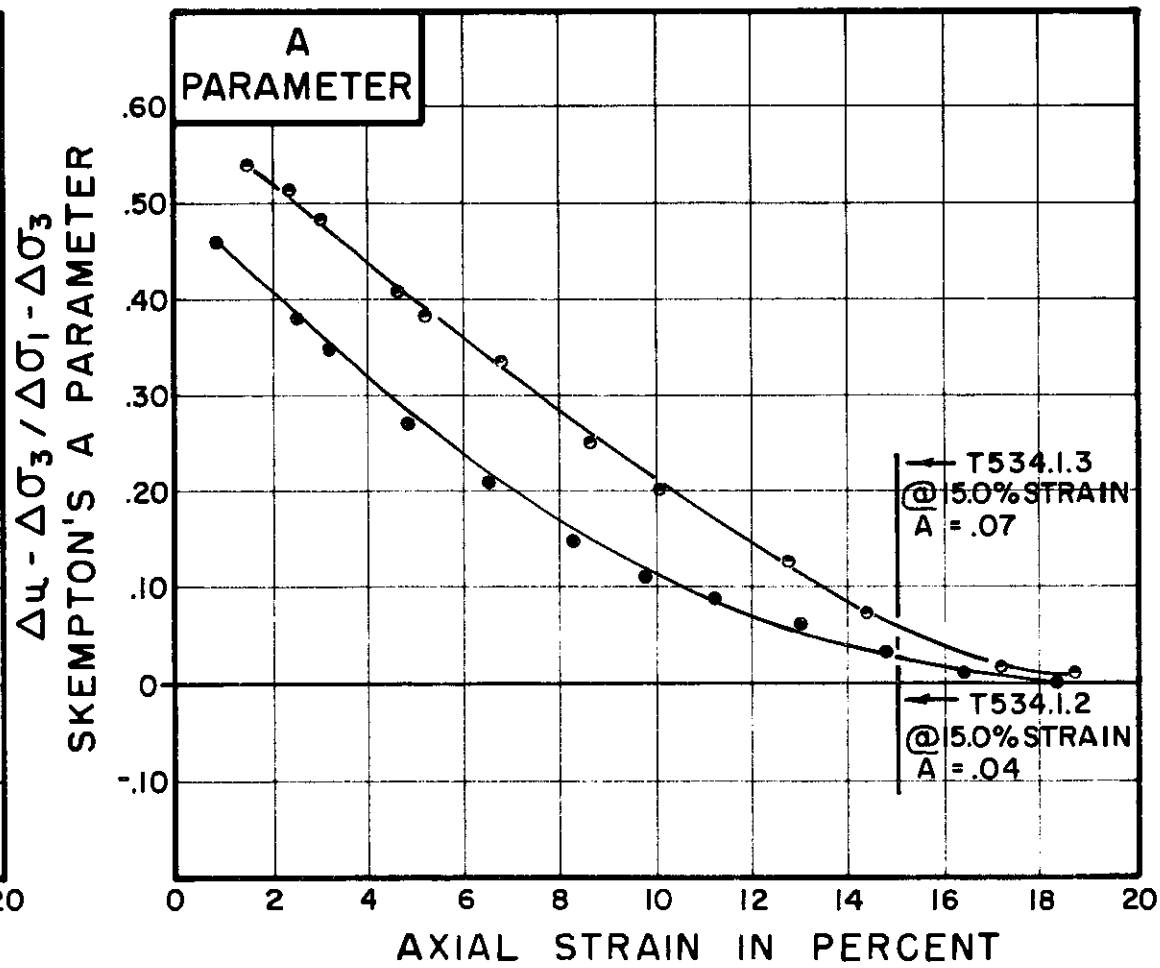
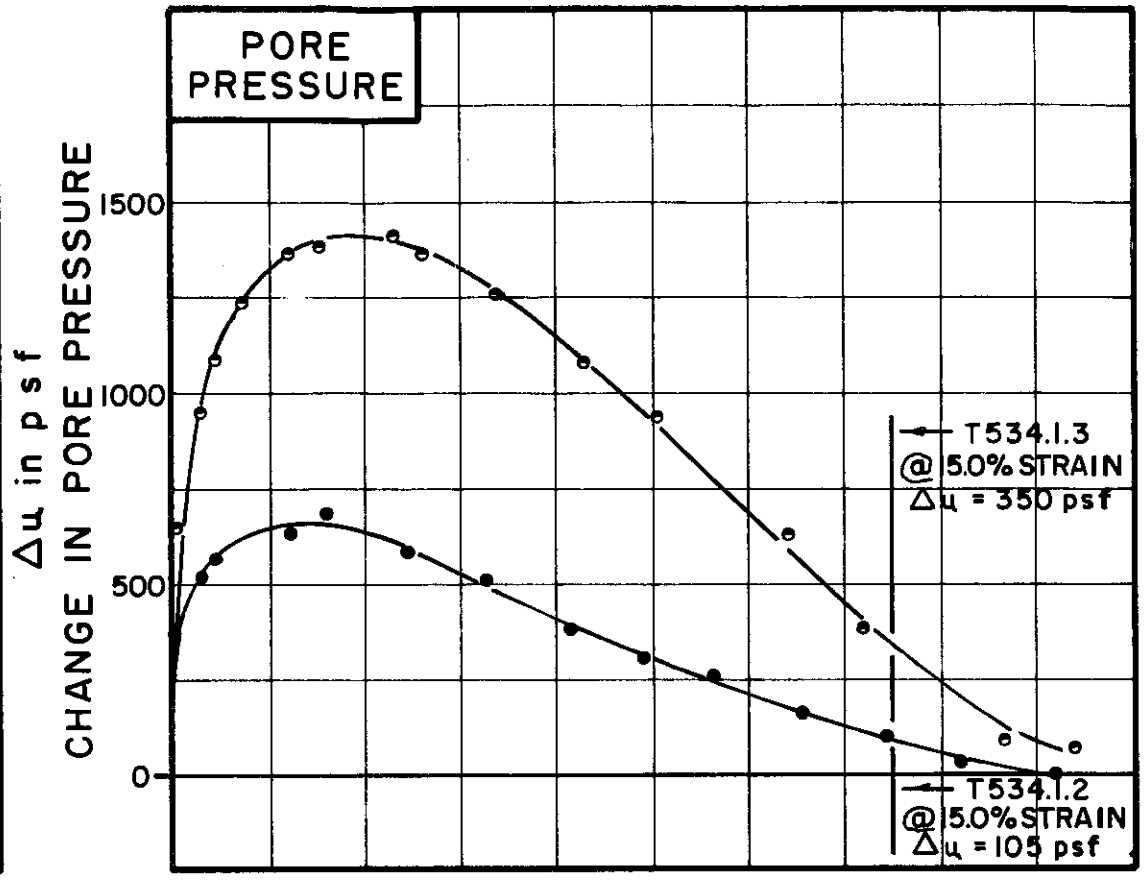
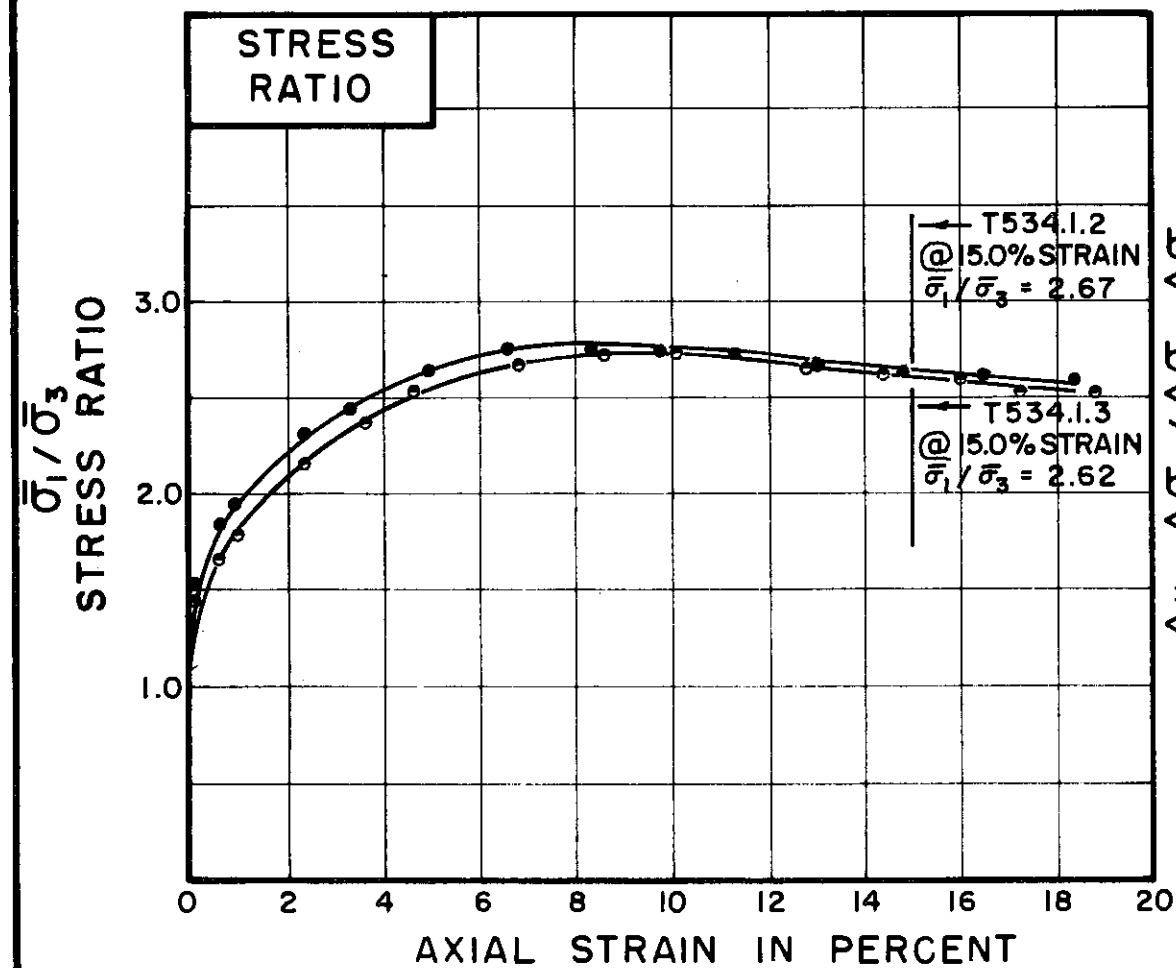
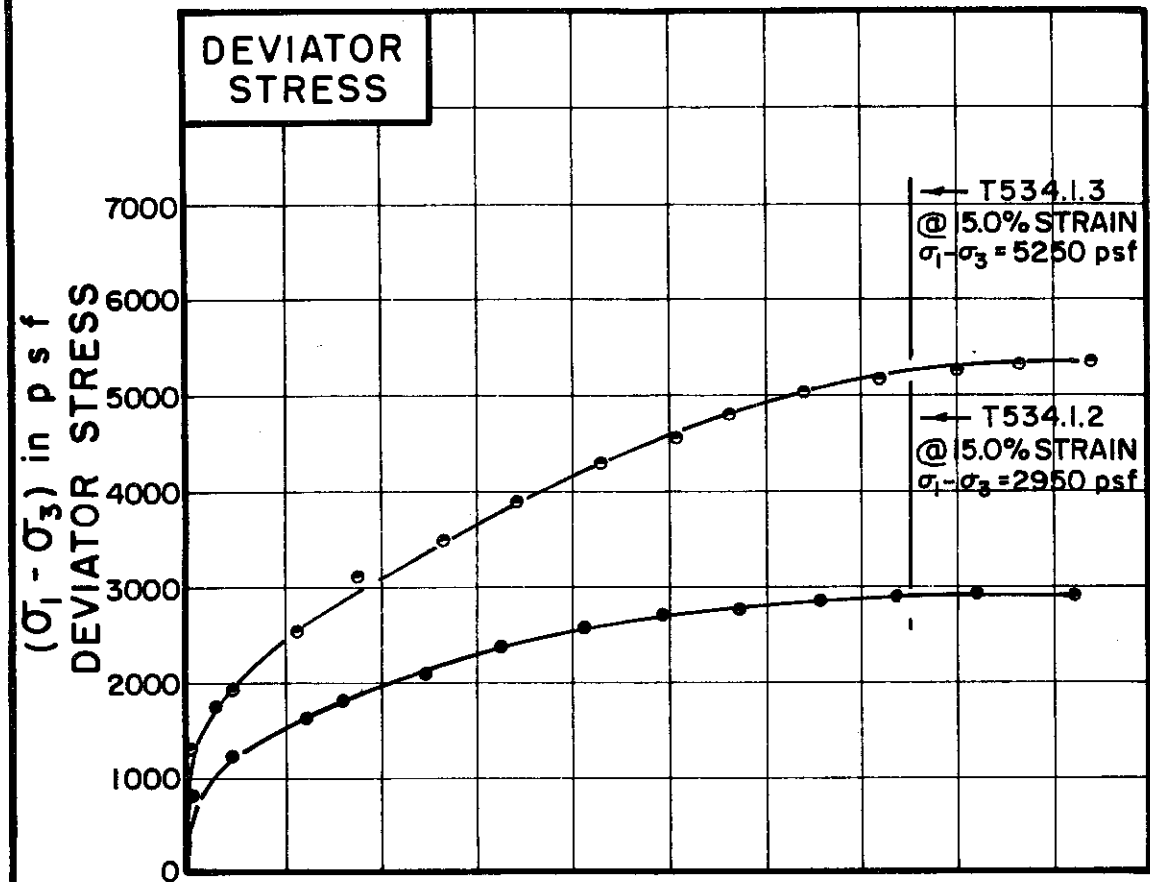
MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255  
 C-447



TEST NO. / SYMBOL	T534.1.2	T534.1.3
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INITIAL CONDITIONS			T534.1.2	T534.1.3	
WATER CONTENT	$w_0$		15.3%	15.1%	%
DRY DENSITY	$\gamma_d$	lb/cu ft	105	105	
SAMPLE DIAMETER	$D_0$	in.	1.385	1.37	
SAMPLE HEIGHT	$H_0$	in.	3.05	3.31	
CONDITIONS BEFORE SHEAR					
FINAL BACK PRESSURE	$u_0$	psf	20160	23155	
INITIAL EFFECTIVE STRESS	$\sigma_1, \sigma_3$	psf	1872	3600	
VOLUMETRIC STRAIN	$\epsilon_{vol}$		0.13%	0.13%	%
PORE PRESSURE RESPONSE			97%	94%	
FINAL CONDITIONS					
WATER CONTENT	$w_f$		29.0%	24.1%	%
SKETCH OF SAMPLE AT END OF TEST					

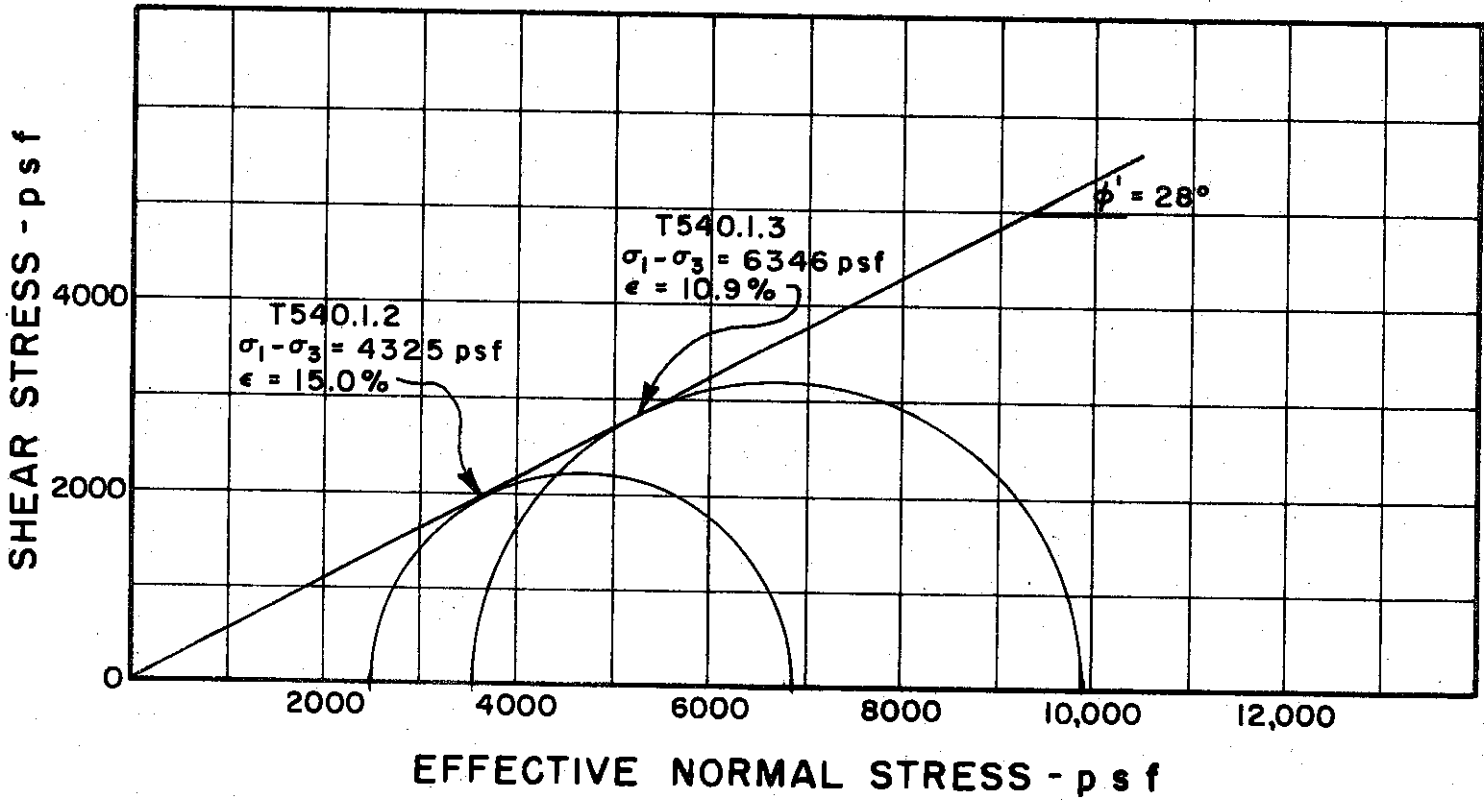
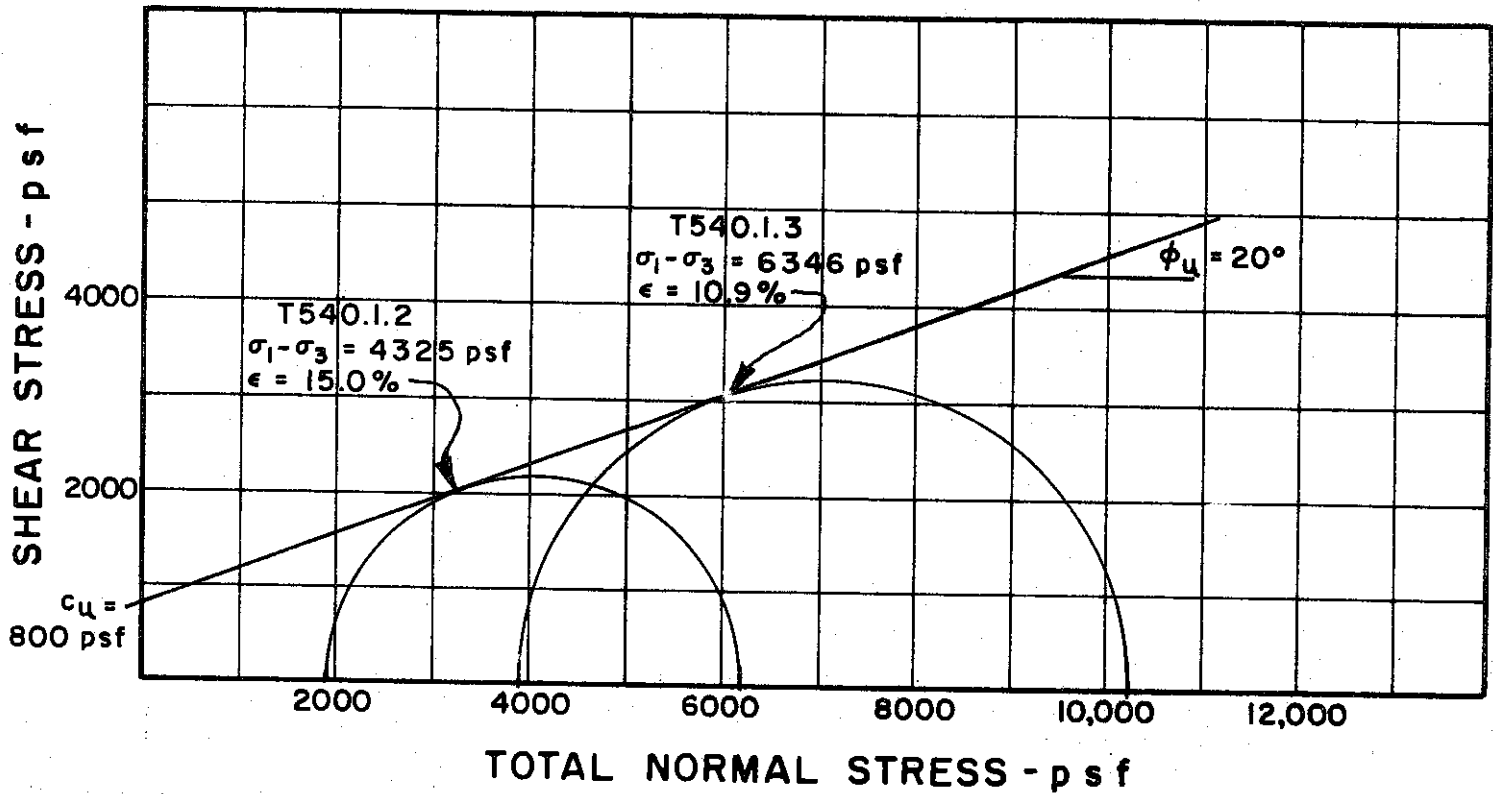
RATE OF STRAIN PERCENT / MINUTE	.0078	.0072
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BORING NO. 142  
 SAMPLE NO. 3  
 DEPTH 14.0' TO 16.1'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 47 PLASTIC LIMIT 22

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



BORING NO. 146

SAMPLE NO. ST 3

DEPTH 6.0' TO 7.8'

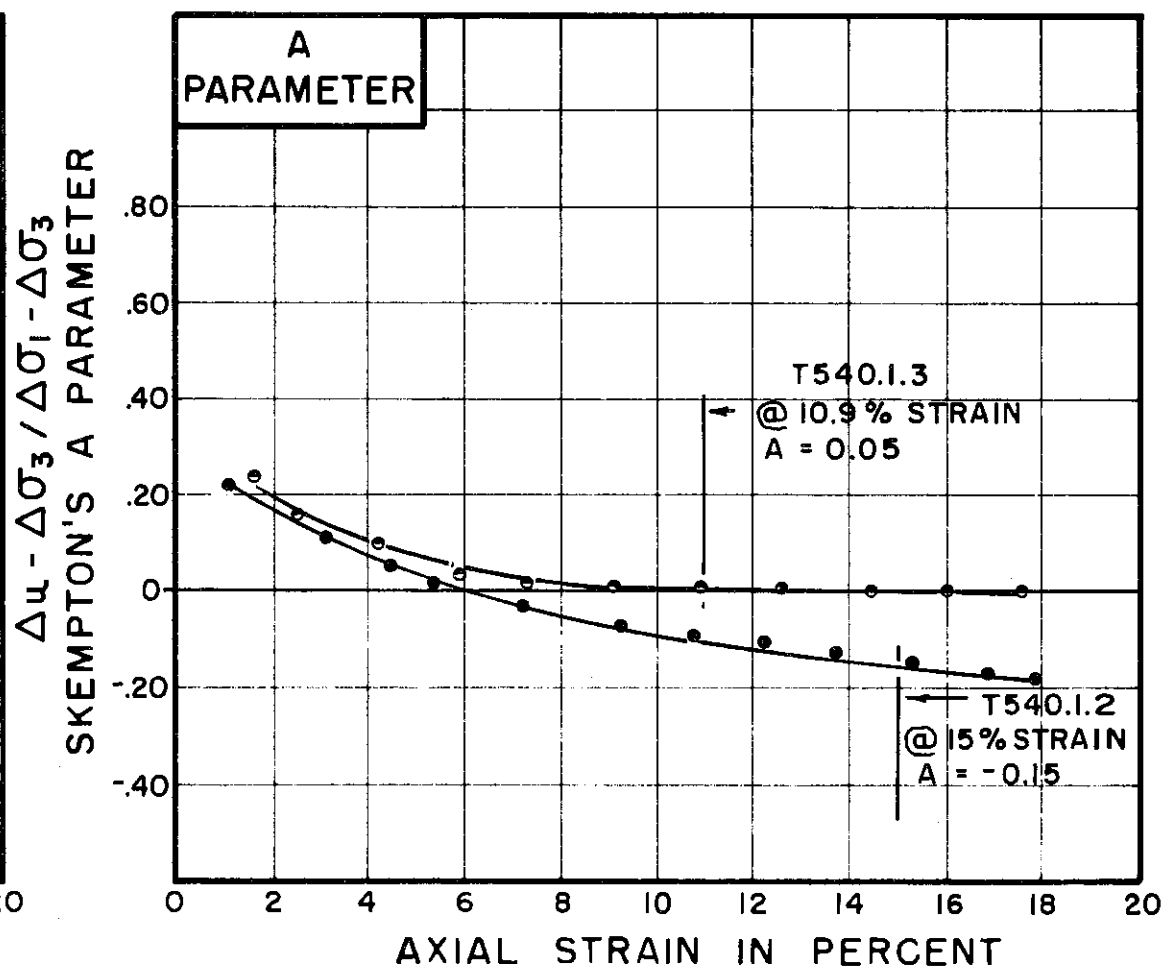
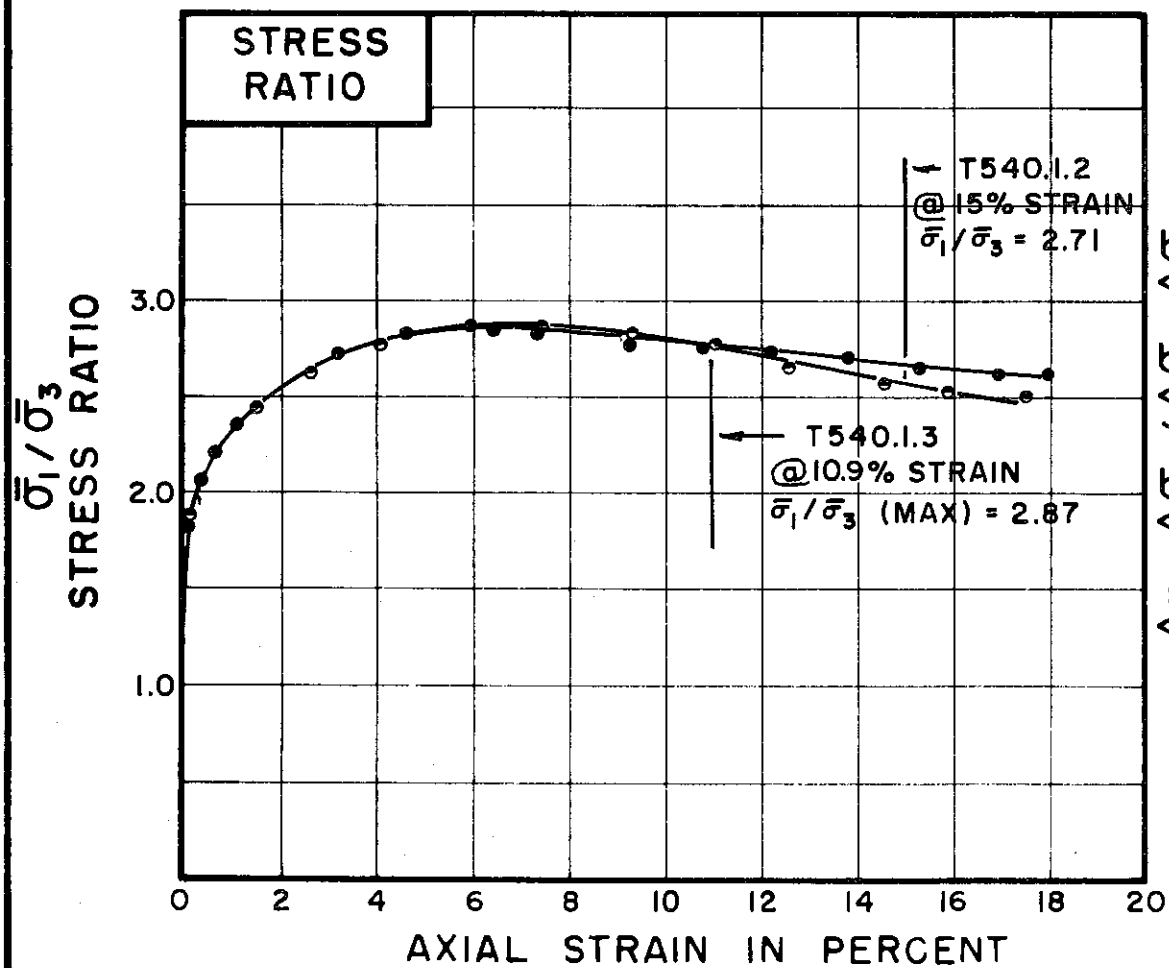
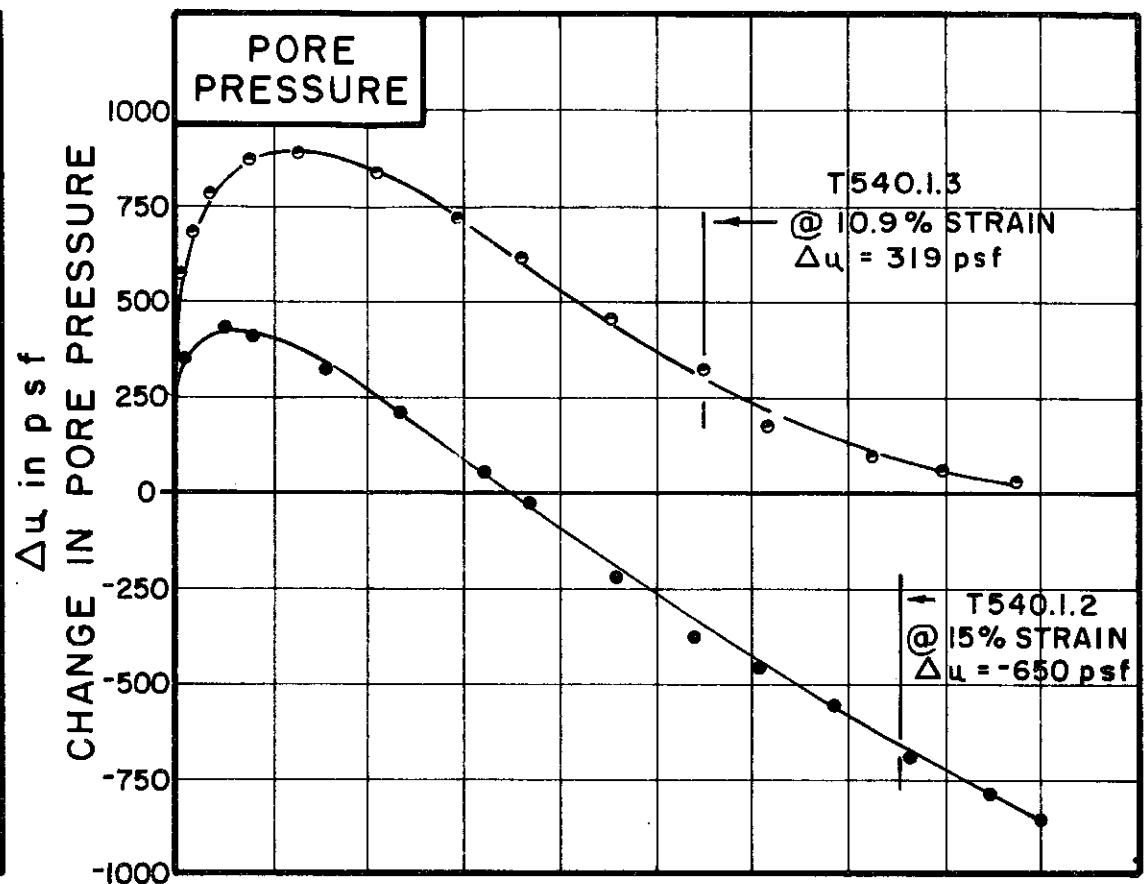
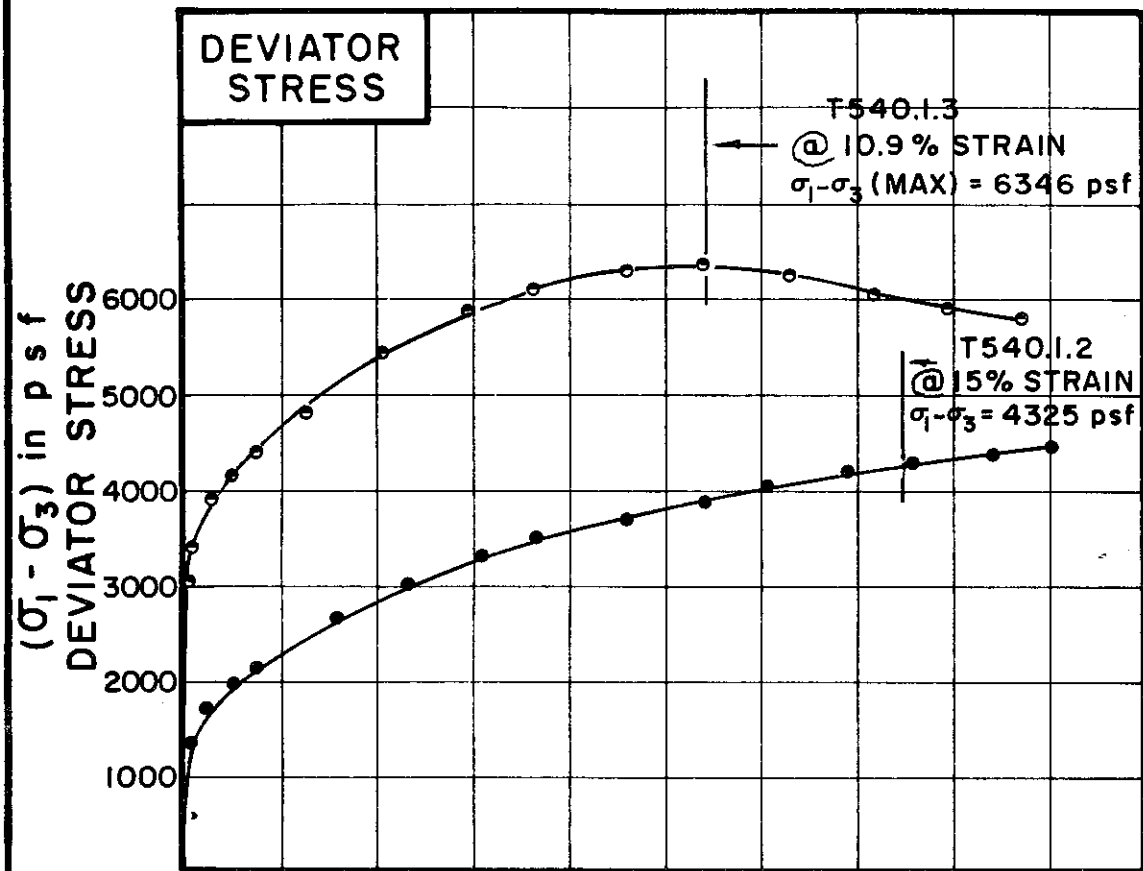
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T540.1.2	T540.1.3
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INITIAL CONDITIONS		T540.1.2	T540.1.3	
WATER CONTENT	$w_0$	14.4%	14.2%	%
DRY DENSITY	$\gamma_d$	108	108	lb/cu ft
SAMPLE DIAMETER	$D_0$	1.35	1.37	in.
SAMPLE HEIGHT	$H_0$	3.27	3.02	in.
FINAL CONDITIONS BEFORE SHEAR				
FINAL BACK PRESSURE	$u_0$	25344	25344	psf
INITIAL EFFECTIVE STRESS	$\frac{\sigma_1}{\sigma_3}$	1872	3888	psf
VOLUMETRIC STRAIN	$\epsilon_{vol}$	1.82%	4.12%	%
PORE PRESSURE RESPONSE		97%	96%	
FINAL CONDITIONS				
WATER CONTENT	$w_f$	24.4%	23.2%	%
SKETCH OF SAMPLE AT END OF TEST				

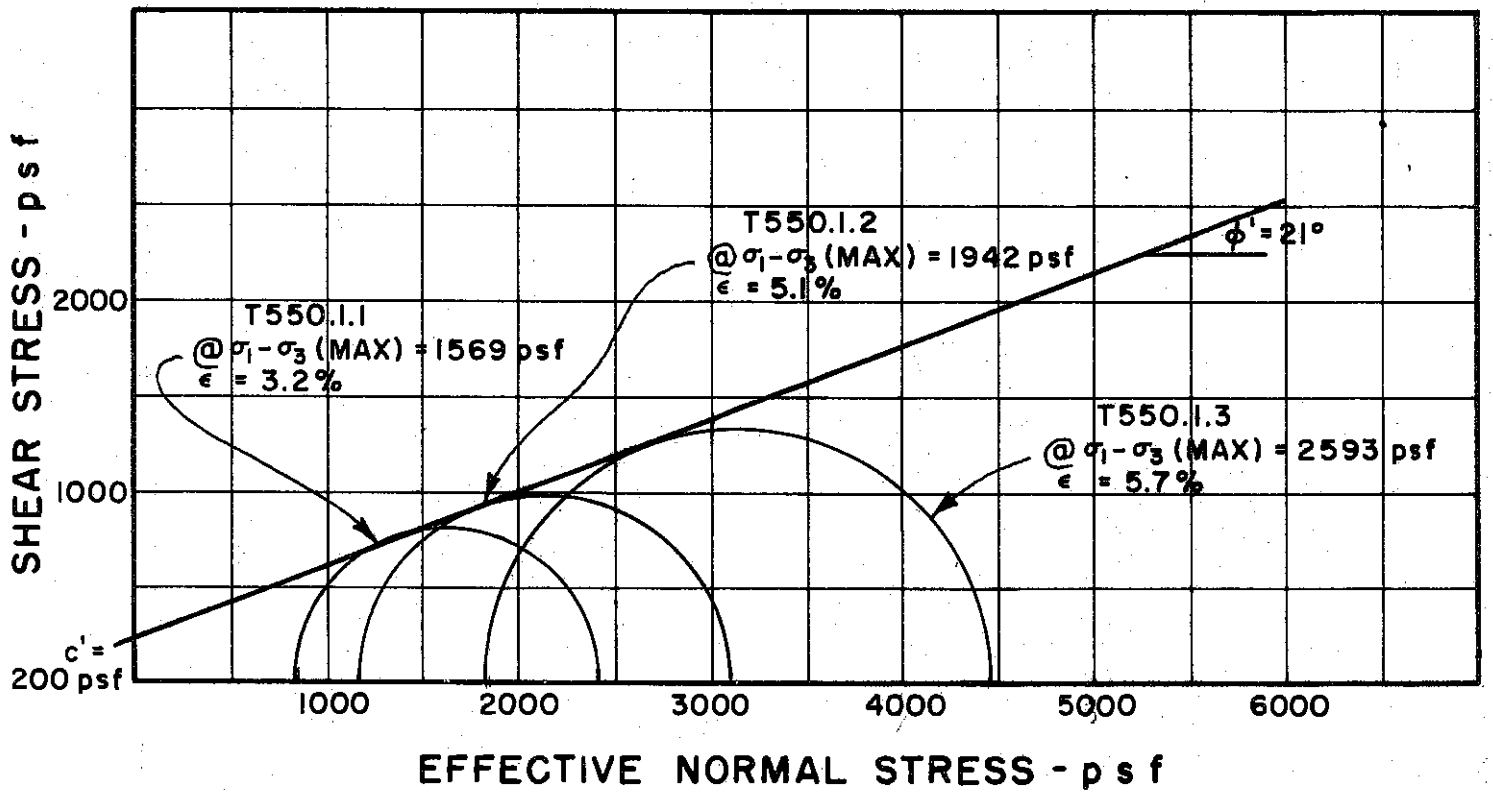
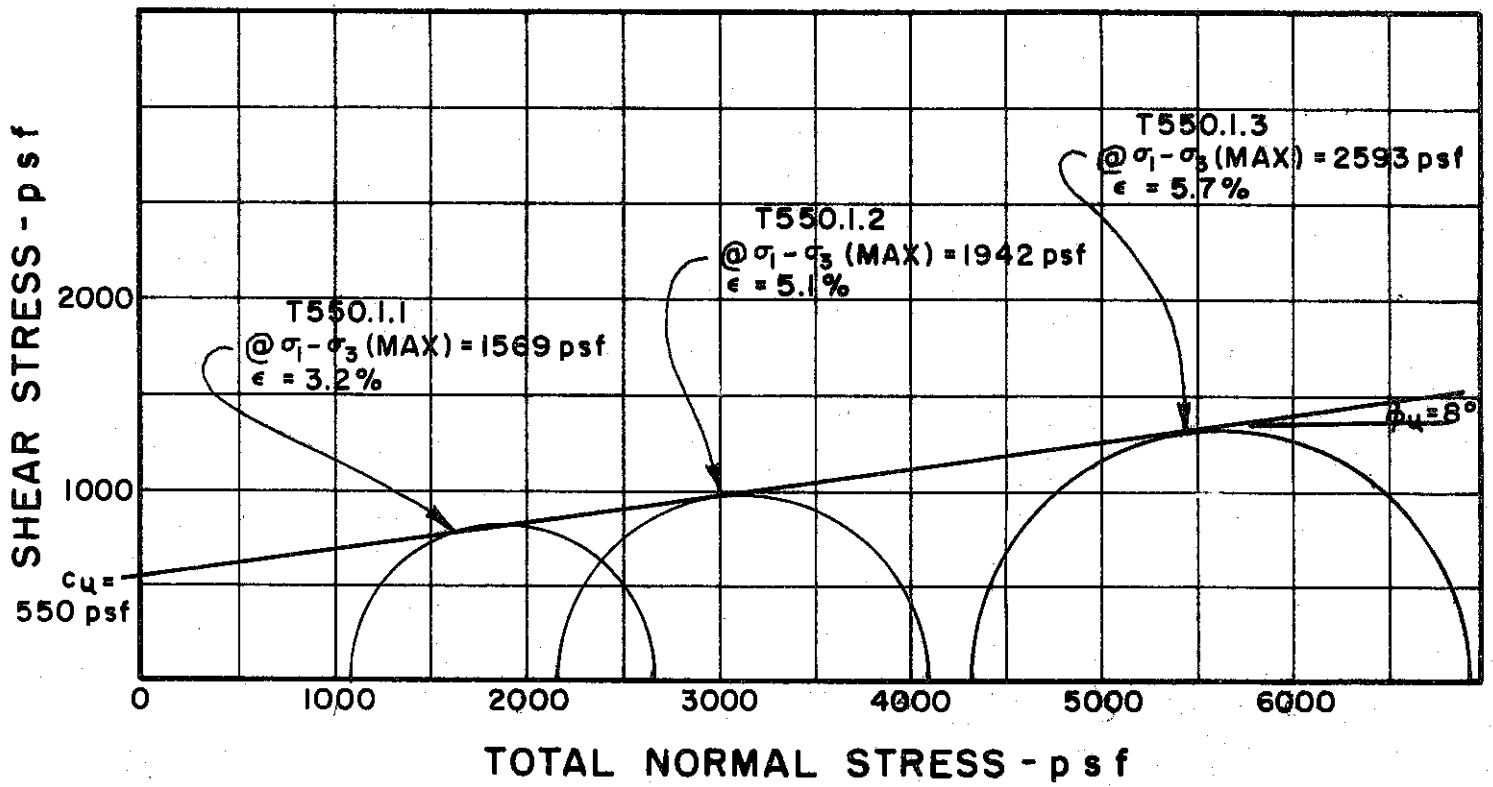
RATE OF STRAIN PERCENT/MINUTE	.0073	.0079
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BORING NO. 146  
 SAMPLE NO. ST 3  
 DEPTH 6.0' TO 7.8'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 44 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

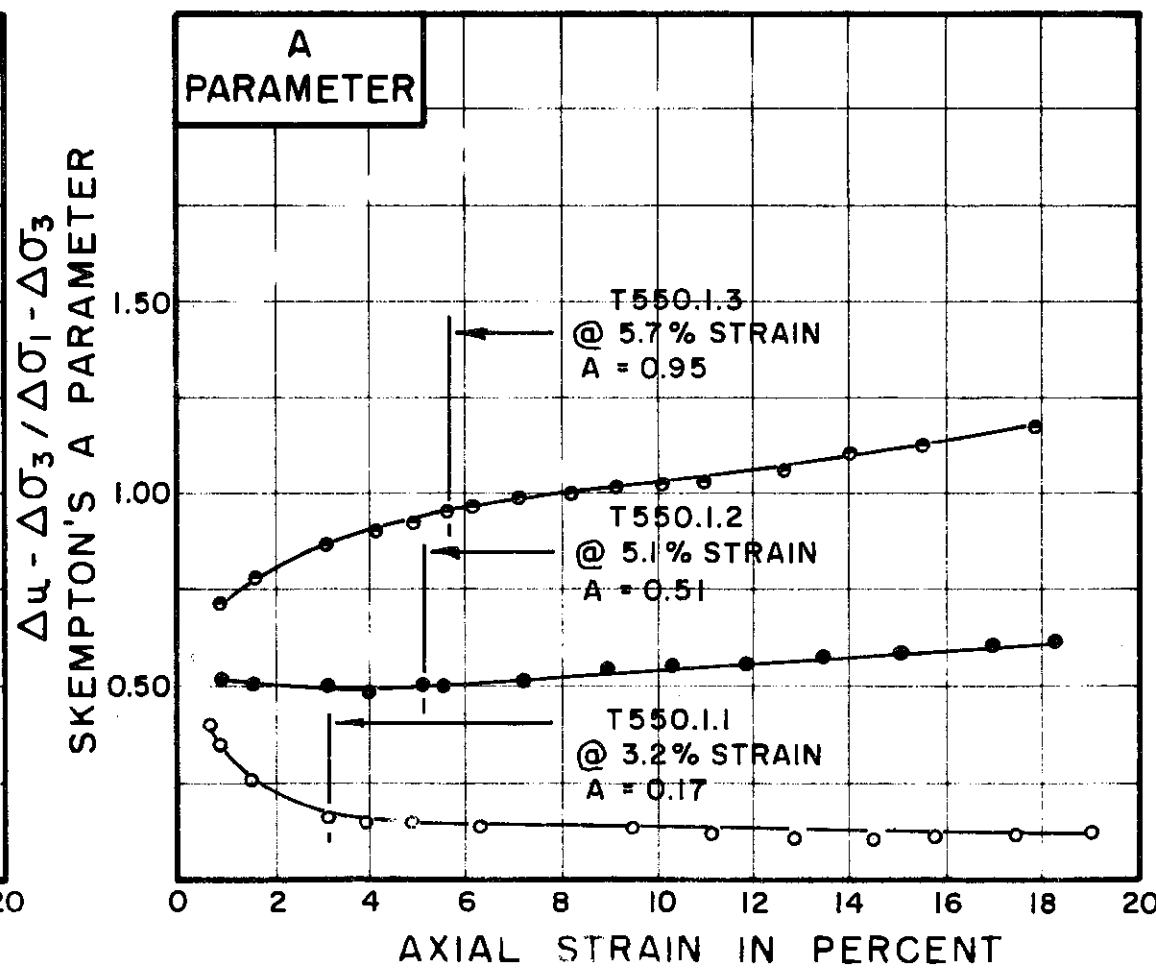
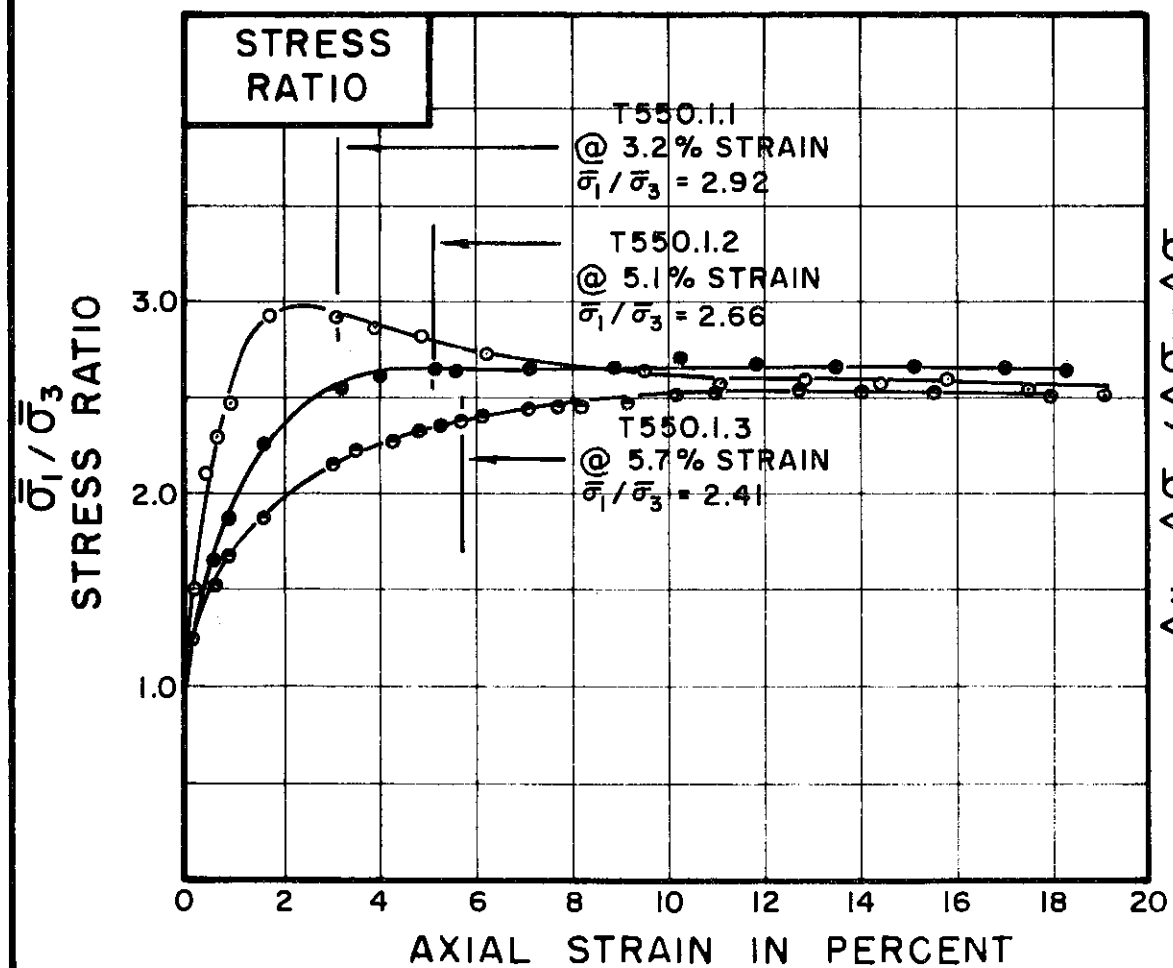
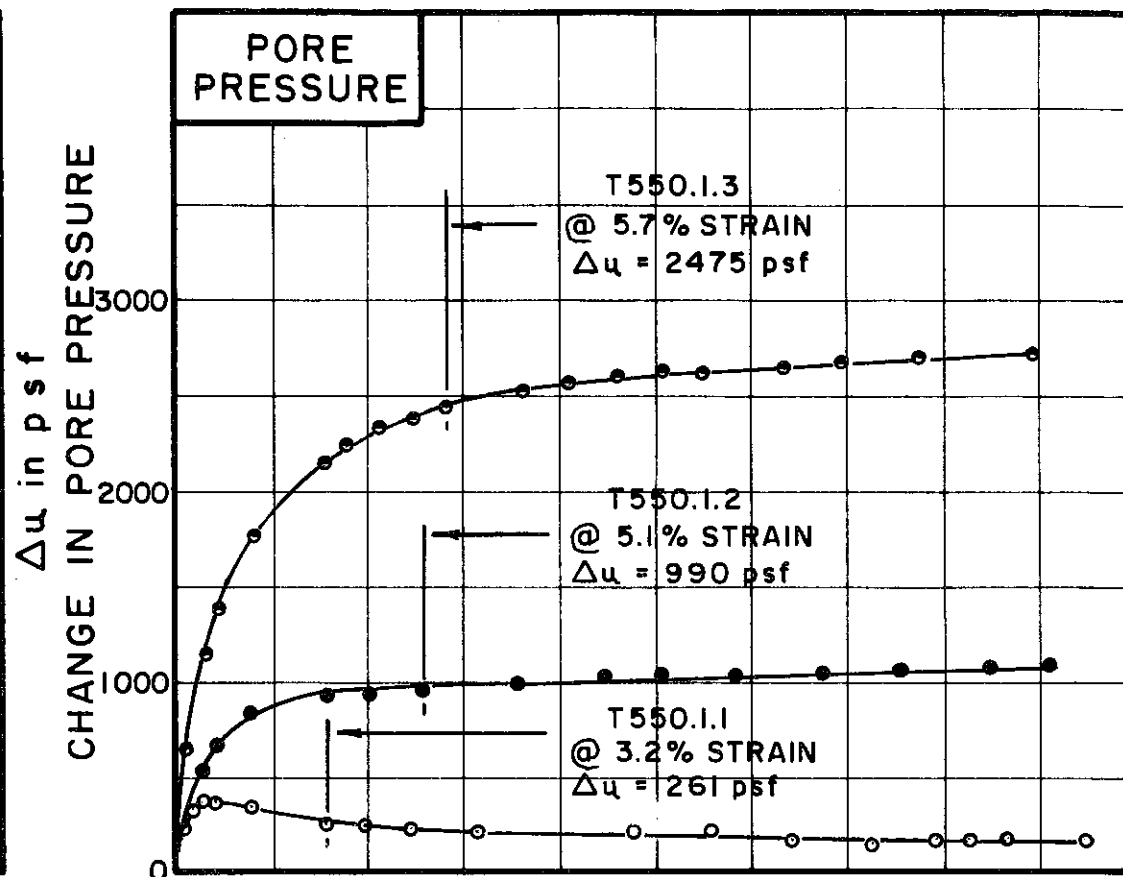
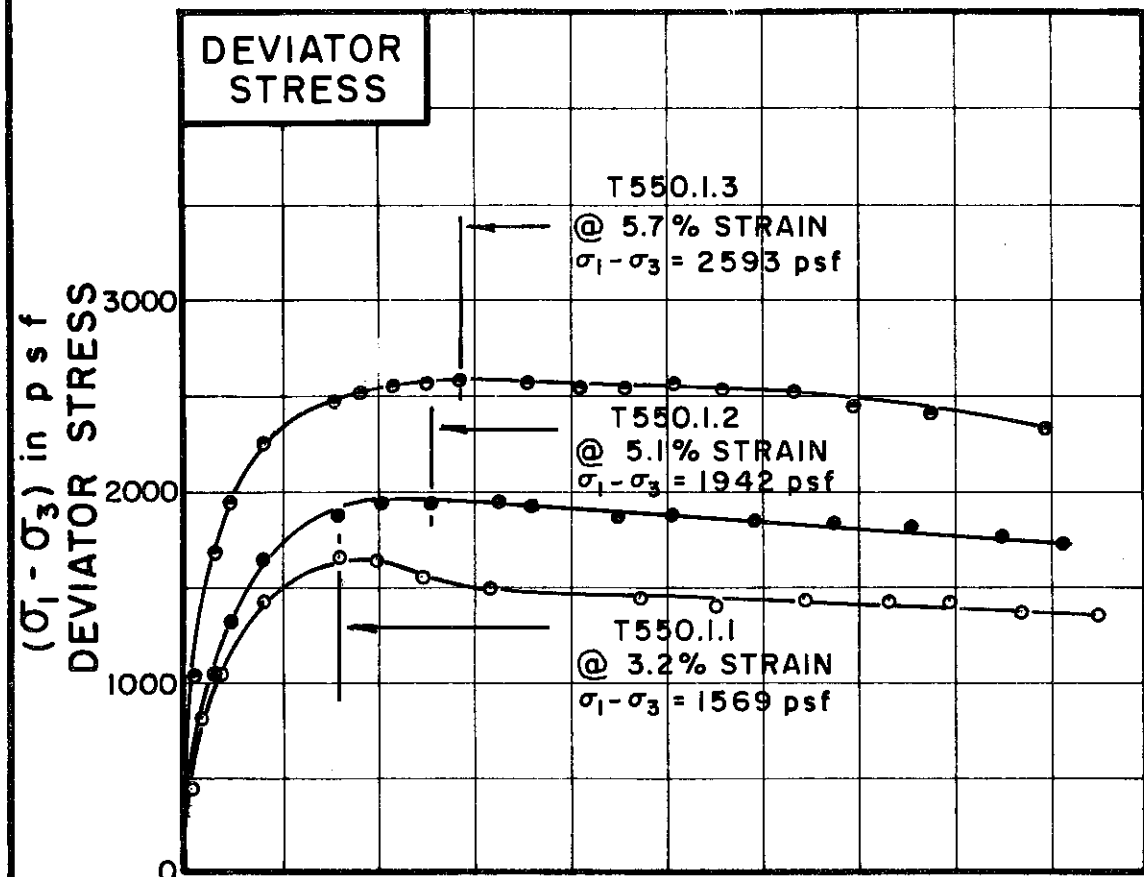
REMARKS ENVELOPE IS INTERPRETIVE,  
BASED ON LIMITED DATA POINTS  
AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE  
 TRIAXIAL COMPRESSION  
 TESTS

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO. / SYMBOL	T550.1.1	T550.1.2	T550.1.3
	○	●	●

INITIAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	$w_0$		37.5%	33.5%	37.1%
DRY DENSITY	$\gamma_d$	lb/cu ft	83	87	83
SAMPLE DIAMETER	$D_0$	in.	1.40	1.40	1.40
SAMPLE HEIGHT	$H_0$	in.	3.16	3.18	3.19
FINAL CONDITIONS BEFORE SHEAR			T550.1.1	T550.1.2	T550.1.3
FINAL BACK PRESSURE	$u_0$	psf	8640	10080	15840
INITIAL EFFECTIVE STRESS	$\bar{\sigma}_1, \bar{\sigma}_3$	psf	1080	2160	4320
VOLUMETRIC STRAIN	$\epsilon_{vol}$		1.4%	2.4%	4.2%
PORE PRESSURE RESPONSE			95%	95%	96%
FINAL CONDITIONS			T550.1.1	T550.1.2	T550.1.3
WATER CONTENT	$w_f$		37.4%	32.2%	33.4%
SKETCH OF SAMPLE AT END OF TEST					

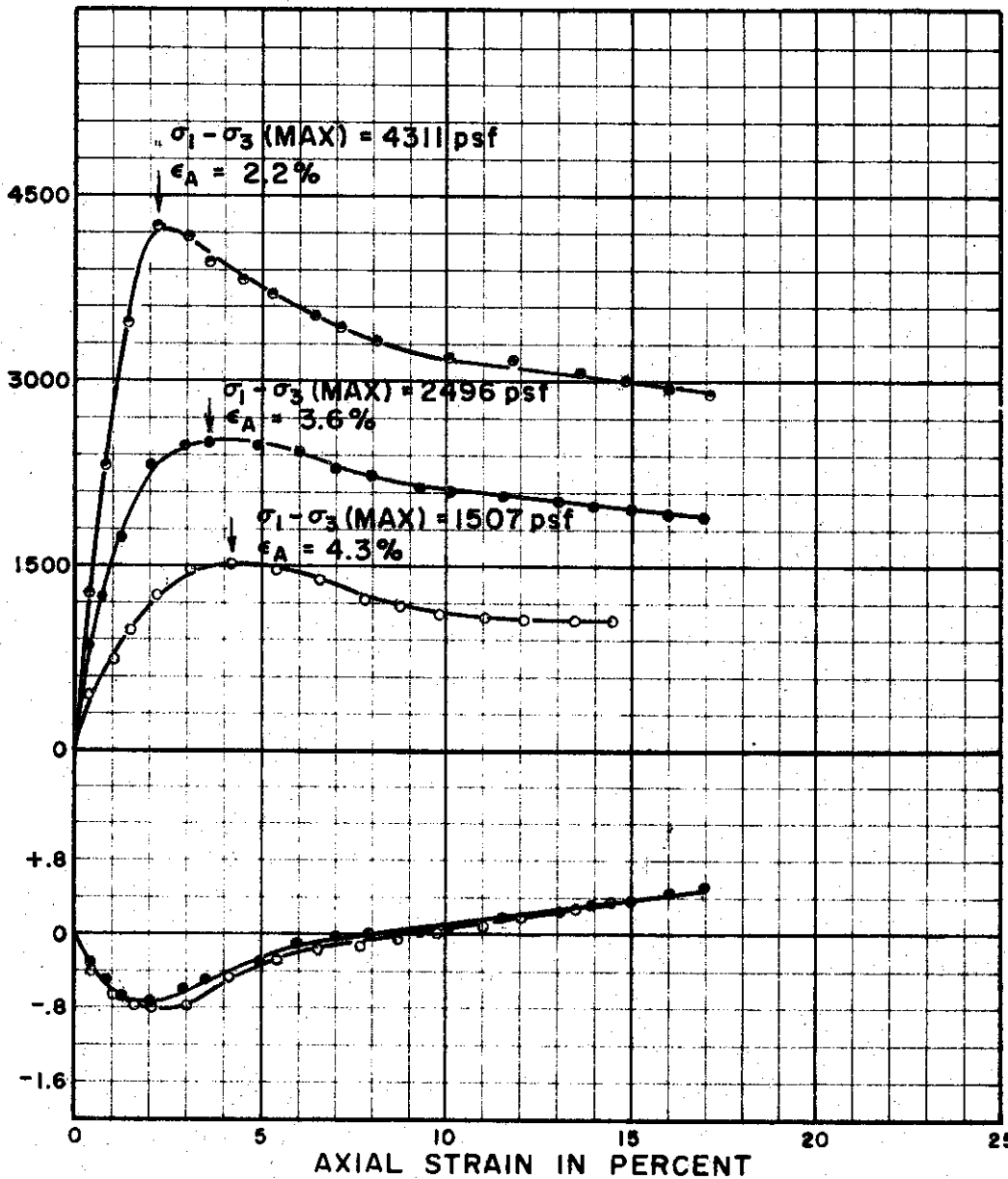
RATE OF STRAIN PERCENT/MINUTE	.025	.025	.008
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BORING NO. 158  
 SAMPLE NO. 4  
 DEPTH 17.5' TO 20.0'  
 SOIL DESCRIPTION SILTY CLAY (CL)  
 LIQUID LIMIT 46 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED  
 TRIAXIAL COMPRESSION  
 TESTS  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

DEVIATOR STRESS,  $\sigma_1 - \sigma_3$  IN psf

VOLUMETRIC STRAIN,  $\Delta V/V_0$  IN PERCENT



SKETCHES AT FAILURE



TEST NO. 253.23



TEST NO. 253.22



TEST NO. 253.21

TEST NO./SYMBOL		253.21	253.22	253.23	
INITIAL CONDITIONS	INITIAL WATER CONTENT %	$w_0$ 23.0	23.3	24.2	
	INITIAL UNIT WEIGHT pcf	$\gamma_d$ 107	105	103	
	SAMPLE HEIGHT & DIAMETER in	$D_0$	1.39	1.39	1.41
		$H_0$	3.51	3.46	3.43
CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS psf	$\sigma_1 = \sigma_3$ 576	1152	2304	
	FINAL BACK PRESSURE psf	$u_0$ 7776	8352	7776	
	VOLUMETRIC STRAIN %	$\epsilon_{vol}$ .94	1.28	2.74	
	PORE PRESSURE RESPONSE %	$\sigma_1$	99	97	96
		$\sigma_3$			
FINAL CONDITIONS	FINAL WATER CONTENT %	$w_f$ 26.8	26.1	25.8	
	FINAL UNIT WEIGHT pcf	$\gamma_d$ 107	106	—	
RATE OF STRAIN PERCENT PER MINUTE		.002	.002	.002	

BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)

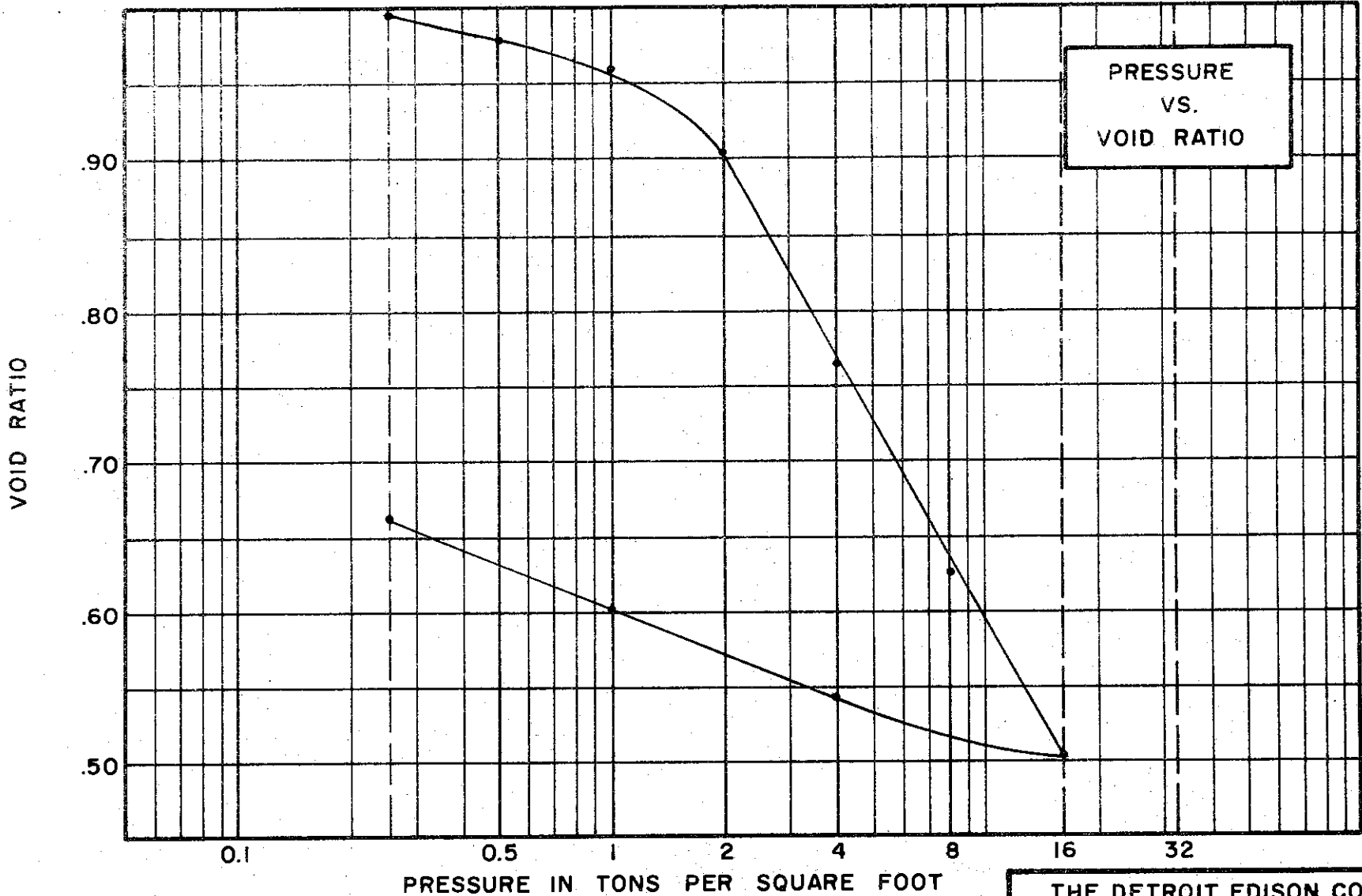
LIQUID LIMIT 49 PLASTIC LIMIT 23

**CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TESTS**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

FILE 1255





**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.6% FINAL 27.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

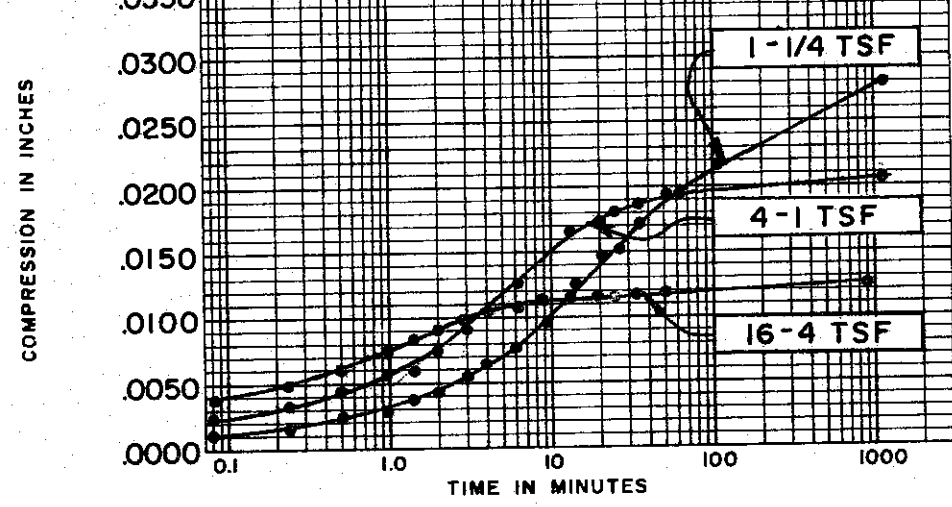
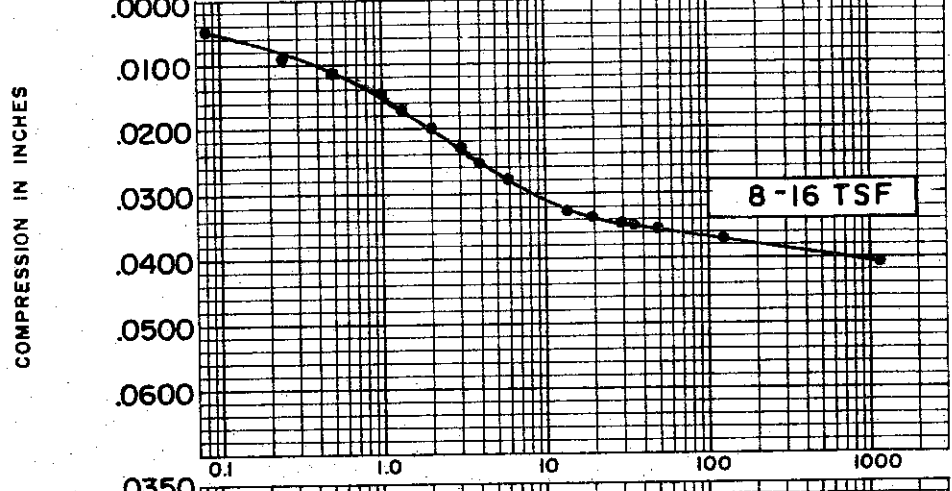
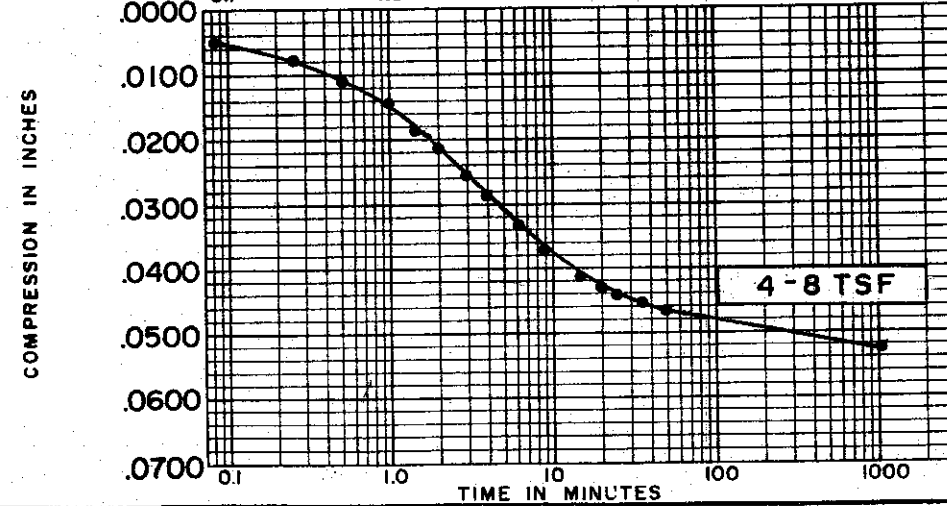
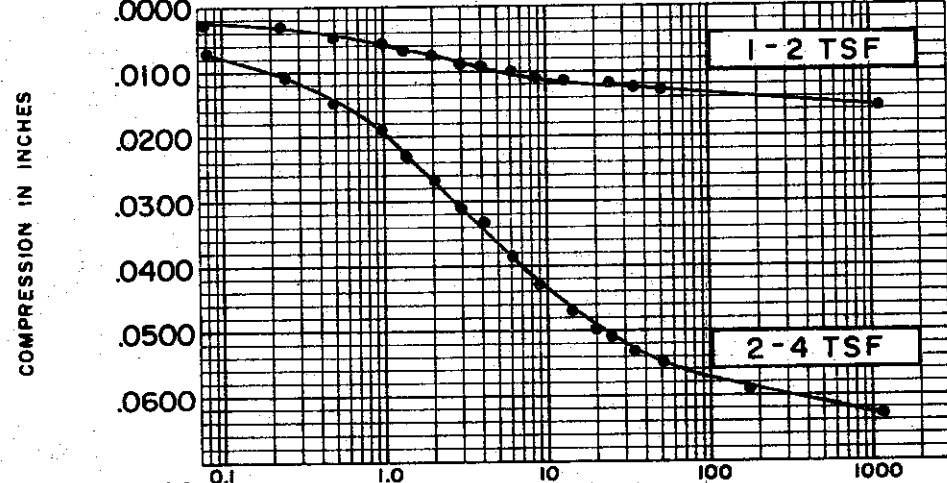
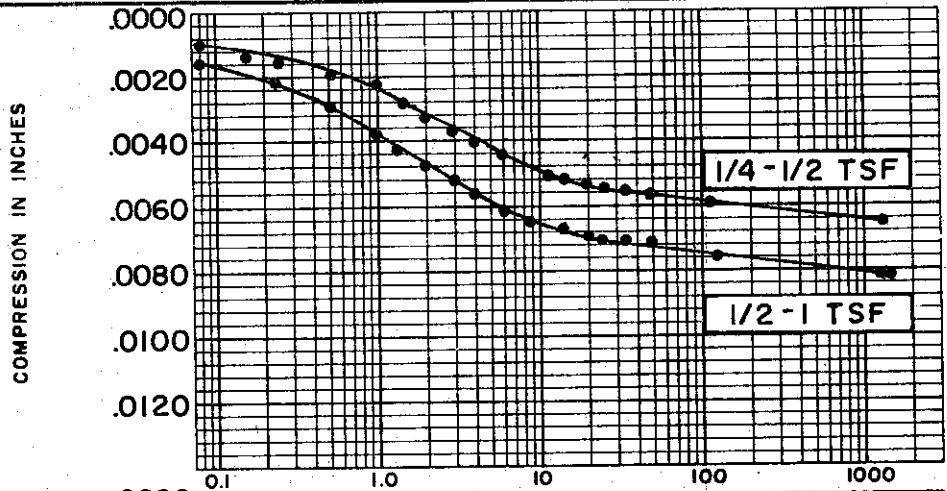
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C306.1  
 SAMPLE NO. 10 DATE APRIL 74  
 DEPTH 34.0' TO 34.3'

C-455



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.6%  
 FINAL WATER CONTENT 27.9%

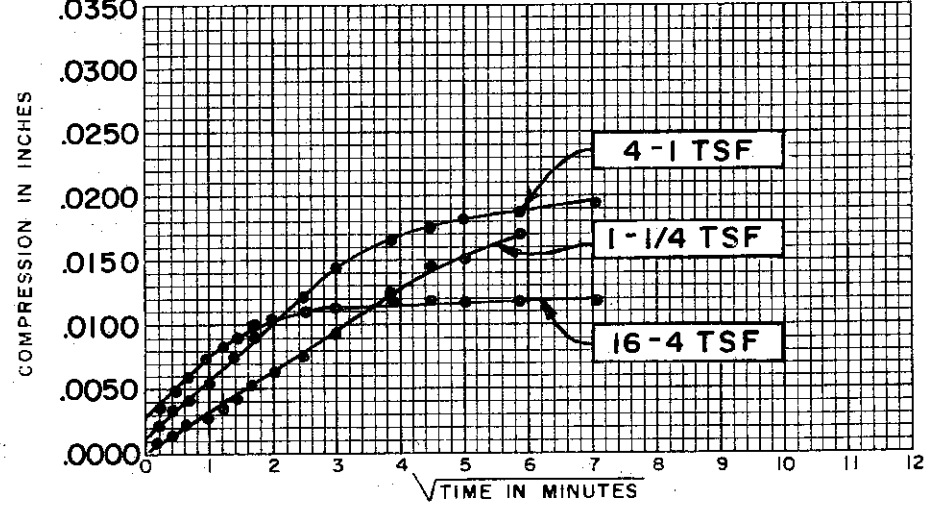
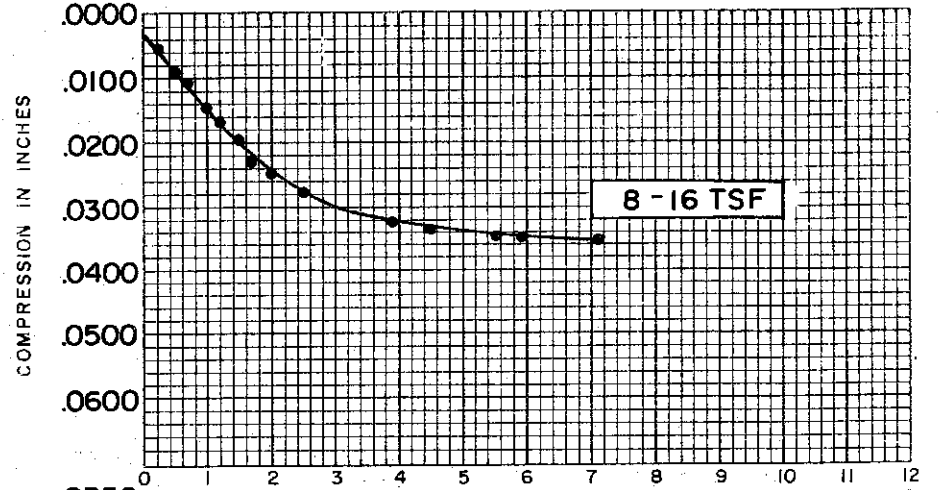
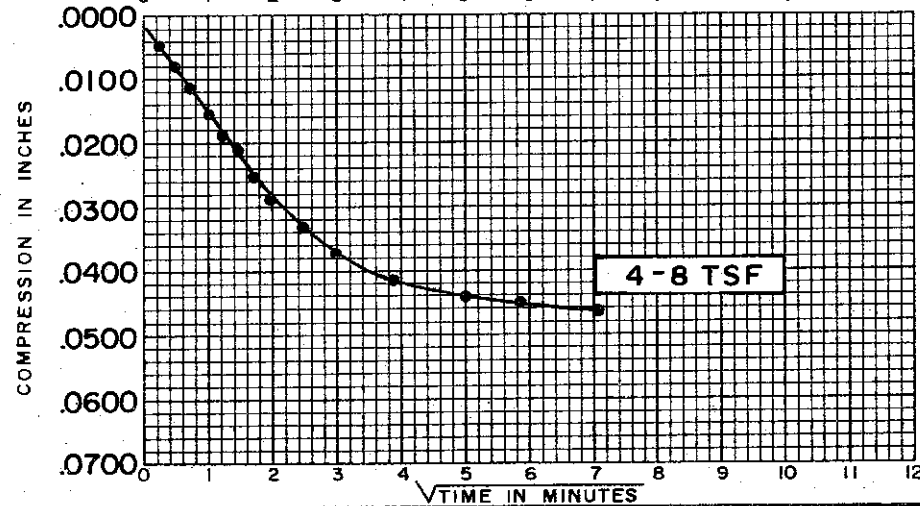
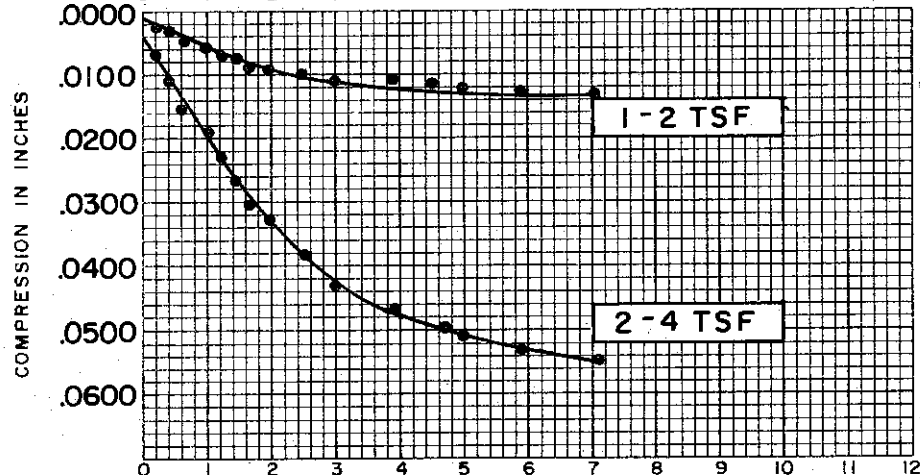
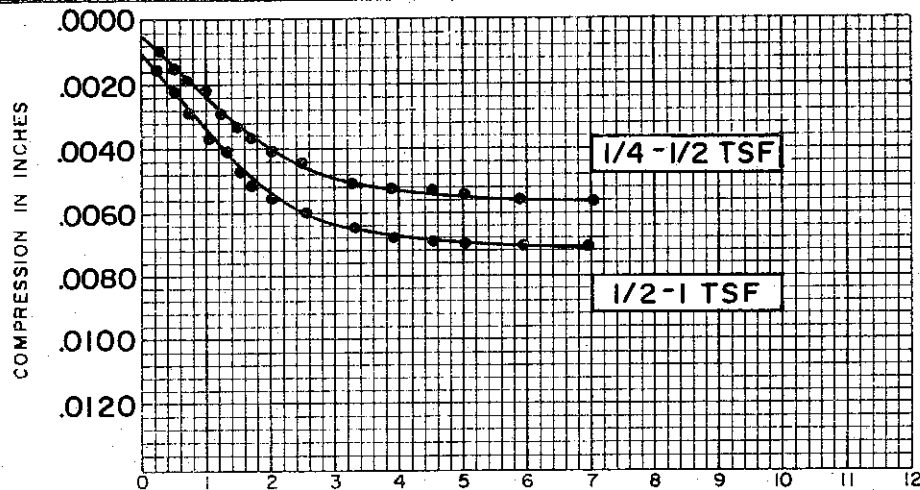
BORING NO. 27  
 SAMPLE NO. 10  
 DEPTH 34.0' TO 34.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.016

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



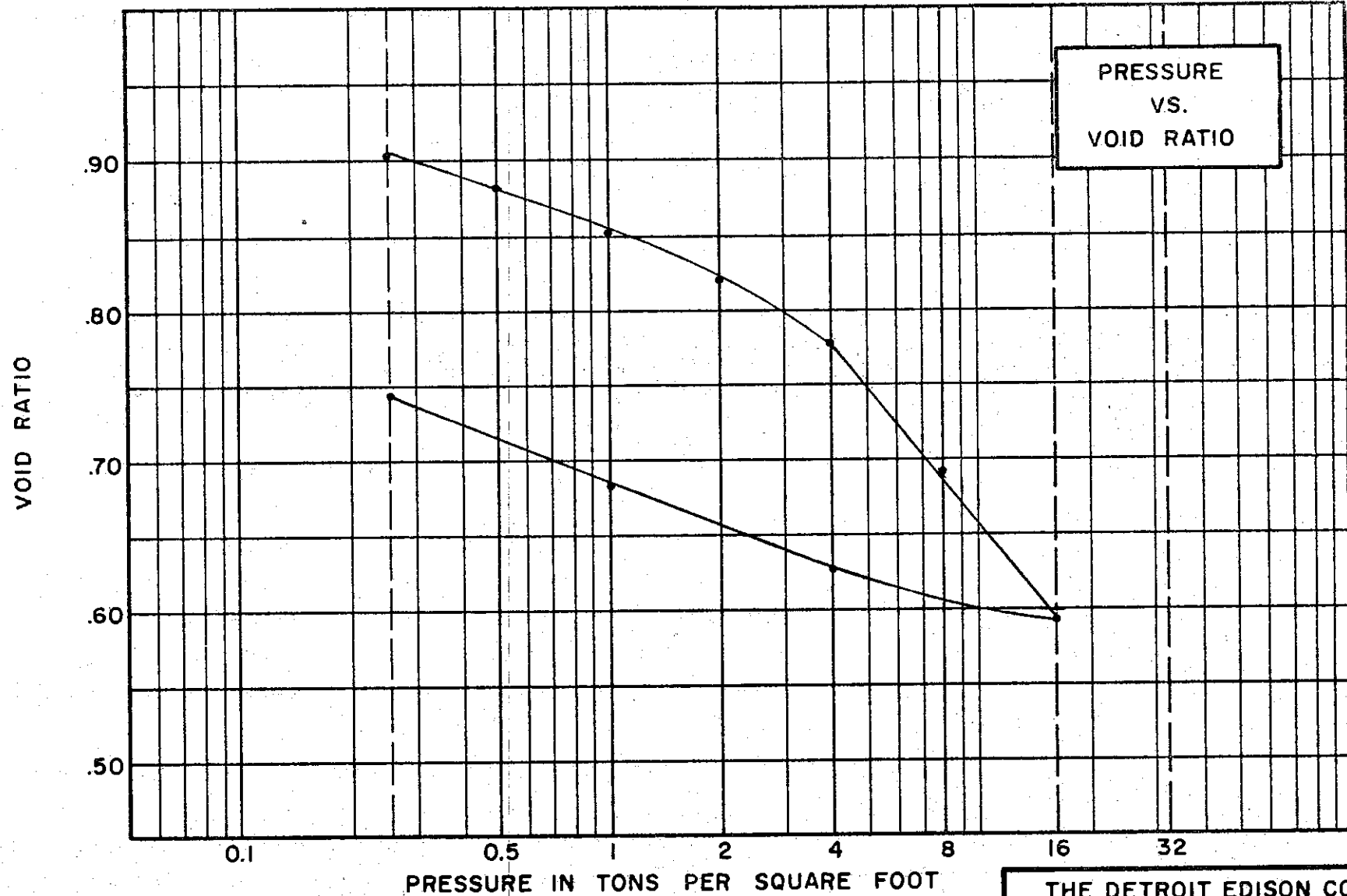
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.6%
FINAL WATER CONTENT	27.9%

BORING NO. 27  
 SAMPLE NO. 10  
 DEPTH 34.0' TO 34.3'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.016

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-457



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL 33% FINAL 30%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 25 %

**TEST DATA**

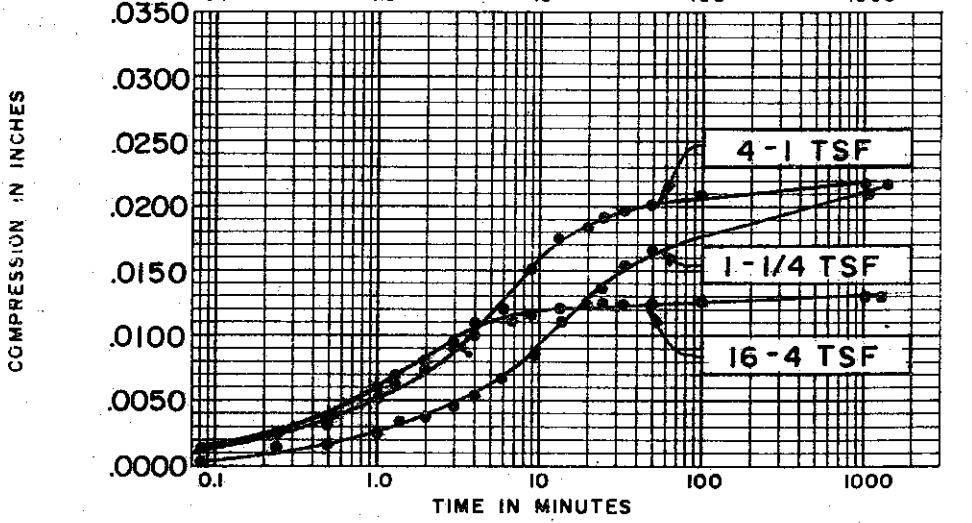
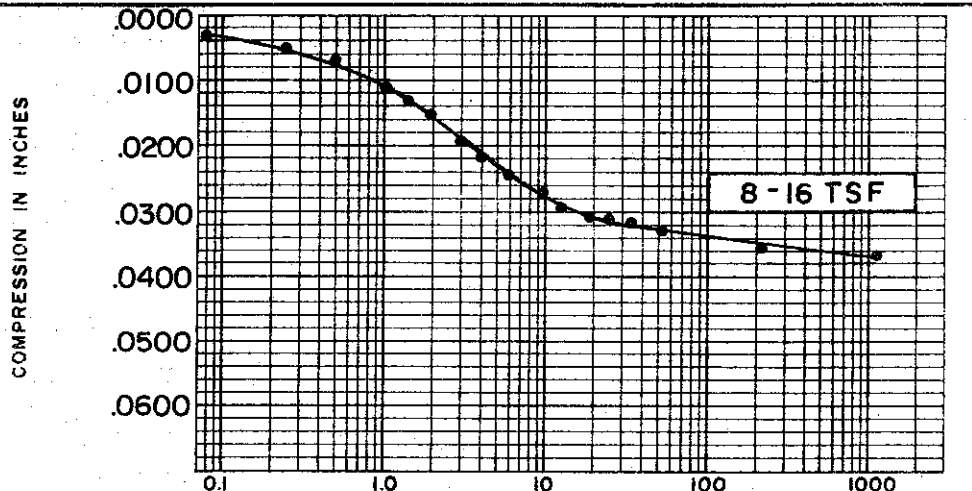
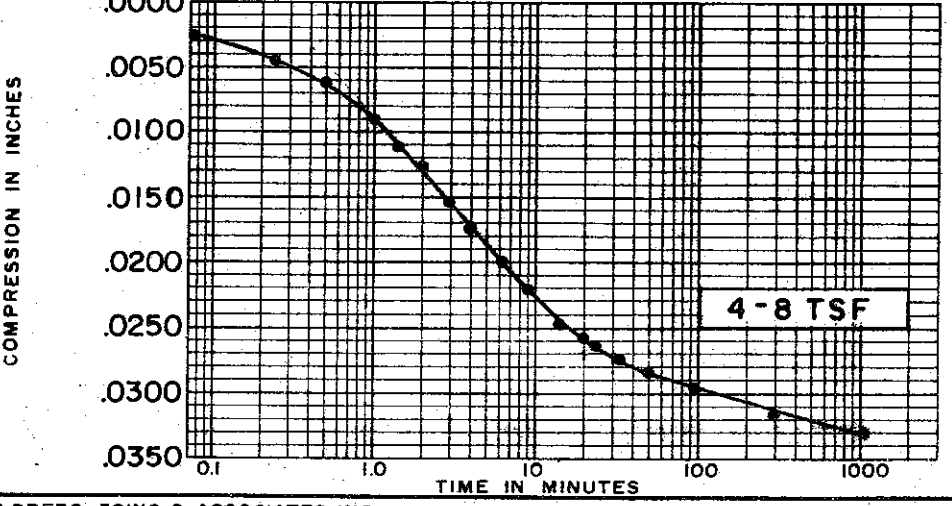
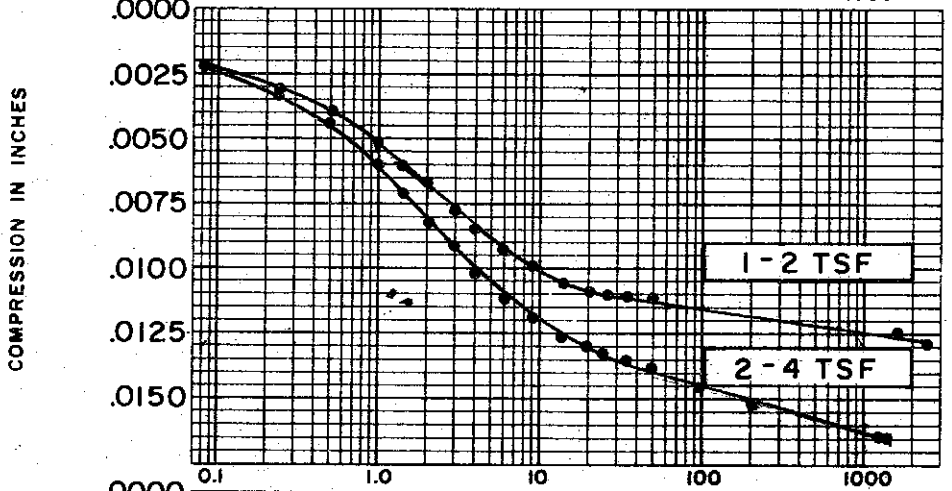
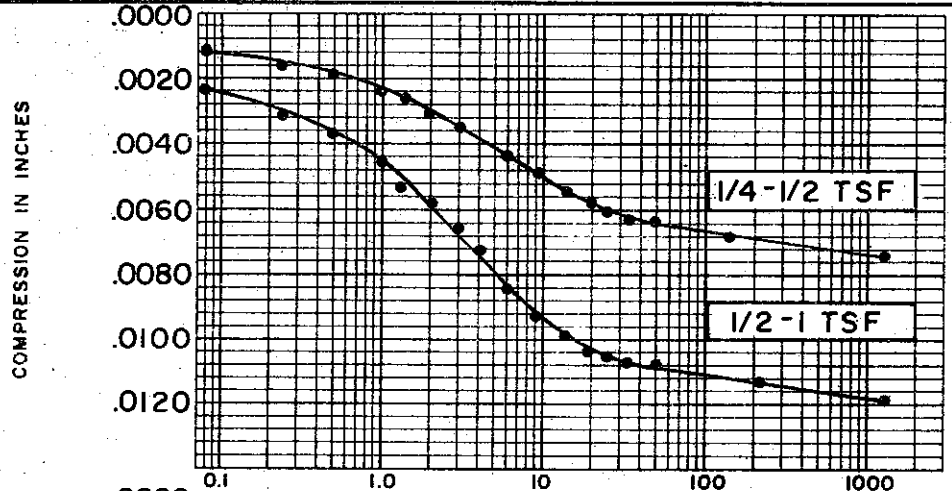
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 27 TEST NO. C313.1  
 SAMPLE NO. 24 DATE APRIL 74  
 DEPTH 104.2' TO 104.5'





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT 33.9%  
 FINAL WATER CONTENT 30.0%

BORING NO. 27  
 SAMPLE NO. 24  
 DEPTH 104.2' TO 104.5'

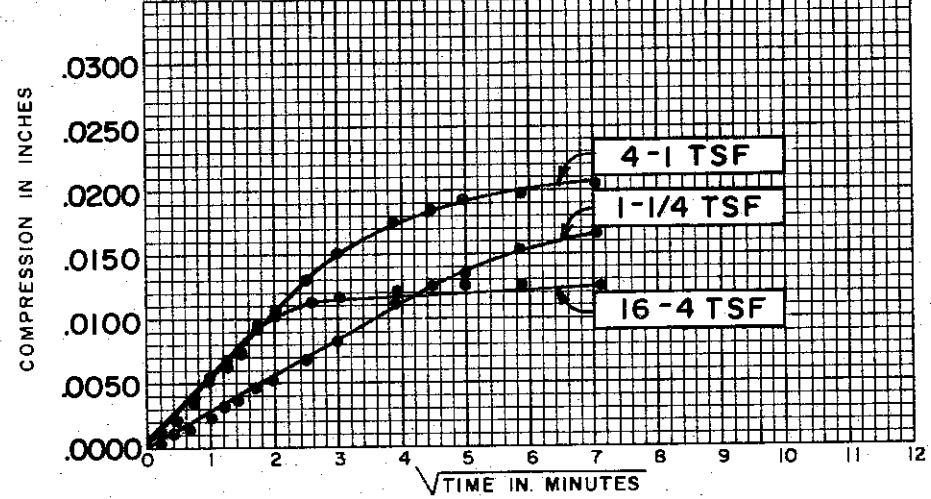
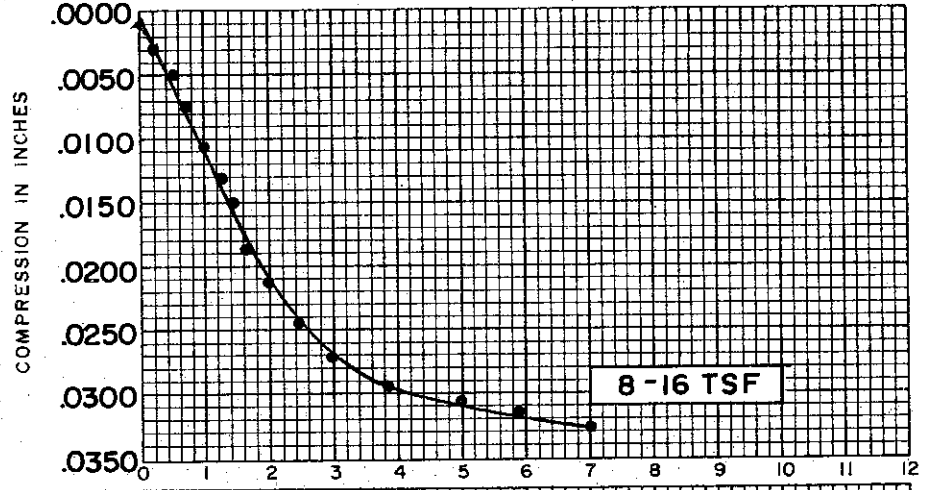
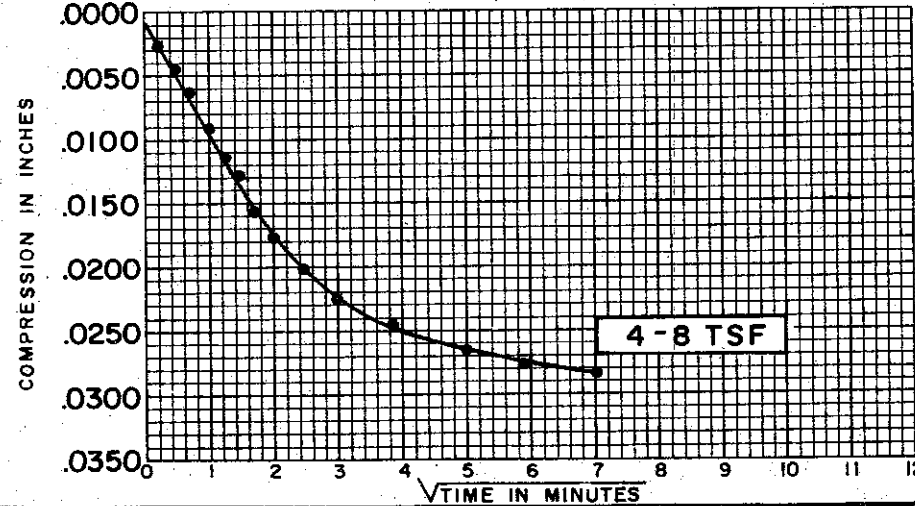
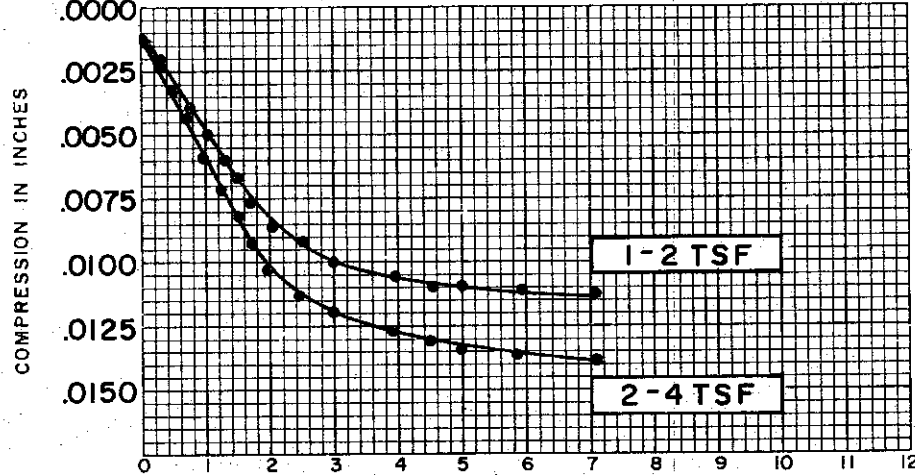
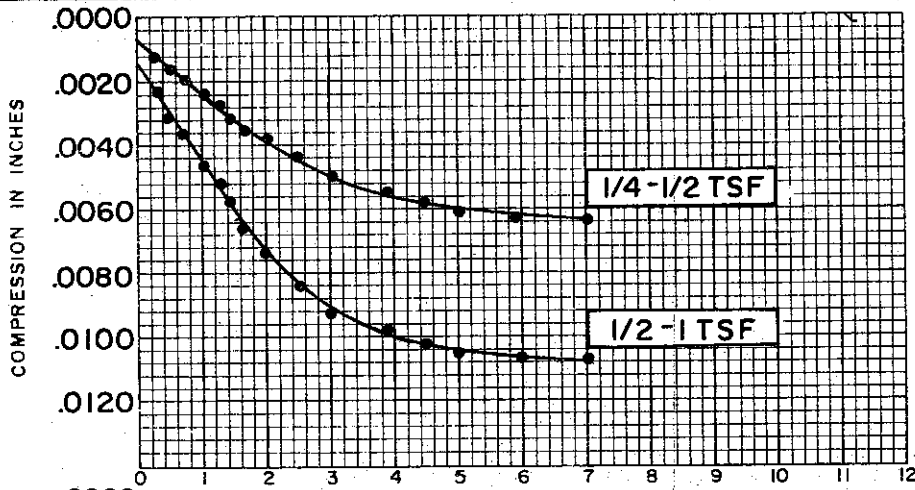
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.910

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE:**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

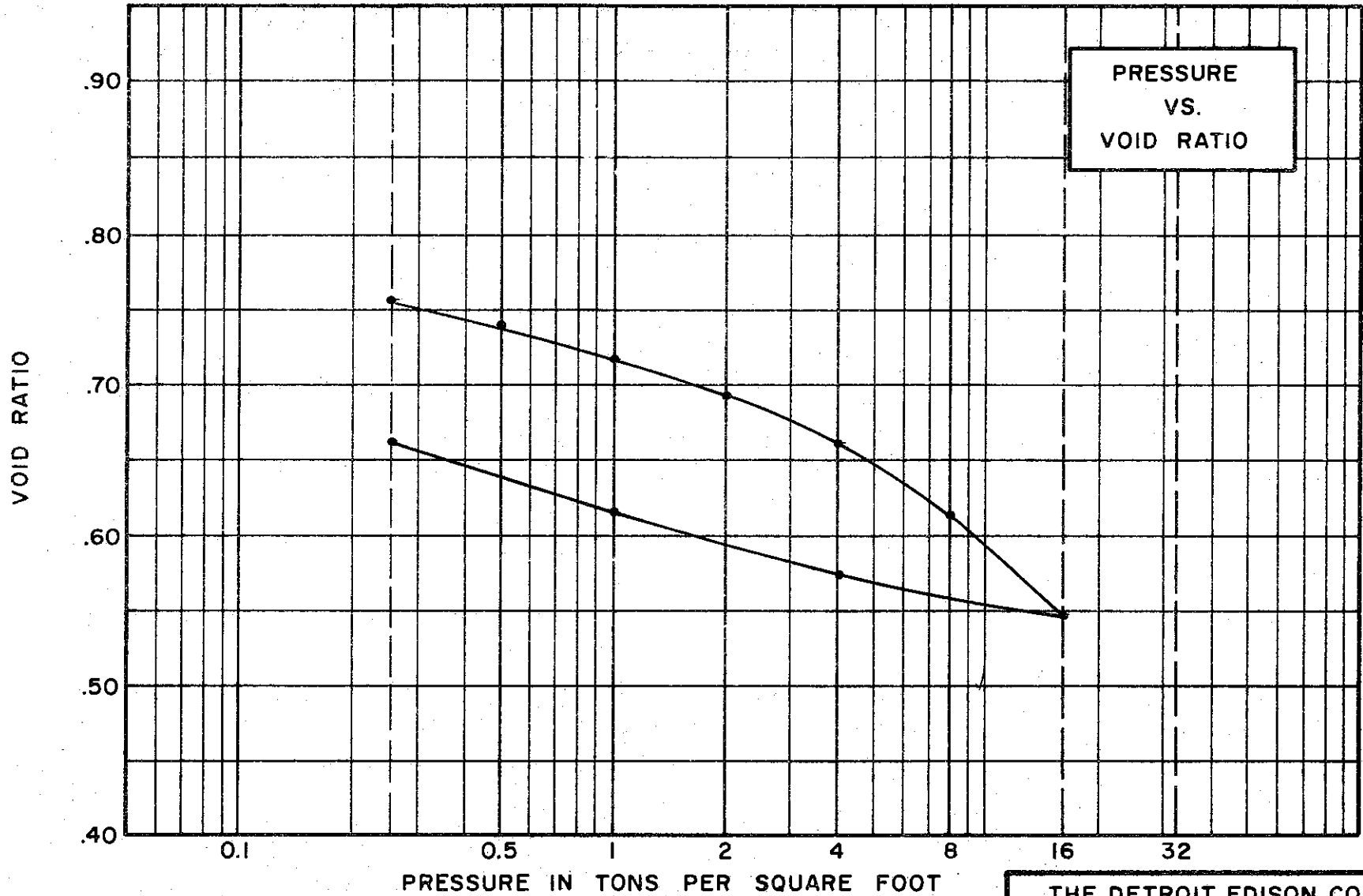
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SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY	2.74
INITIAL WATER CONTENT	33.9%
FINAL WATER CONTENT	30.0%
BORING NO.	27
SAMPLE NO.	24
DEPTH	104.2' TO 104.5'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.910

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 29.0% FINAL 28.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

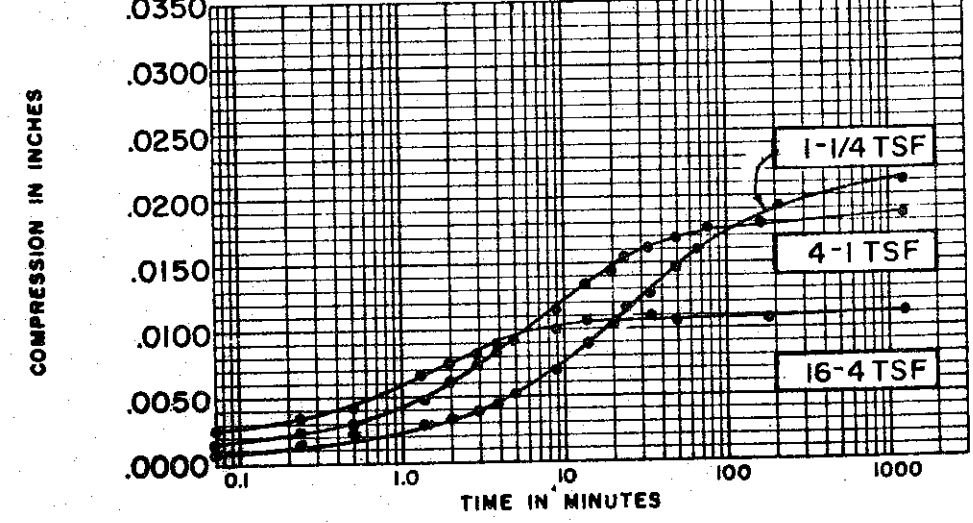
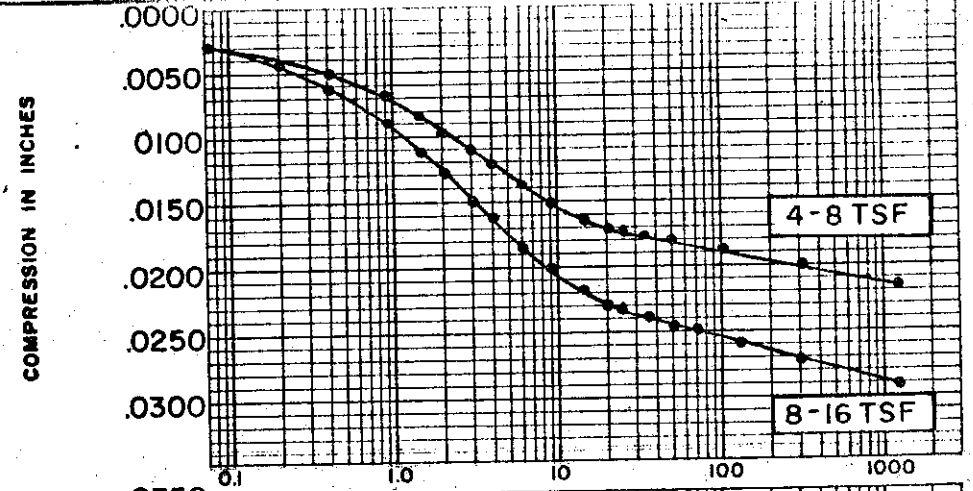
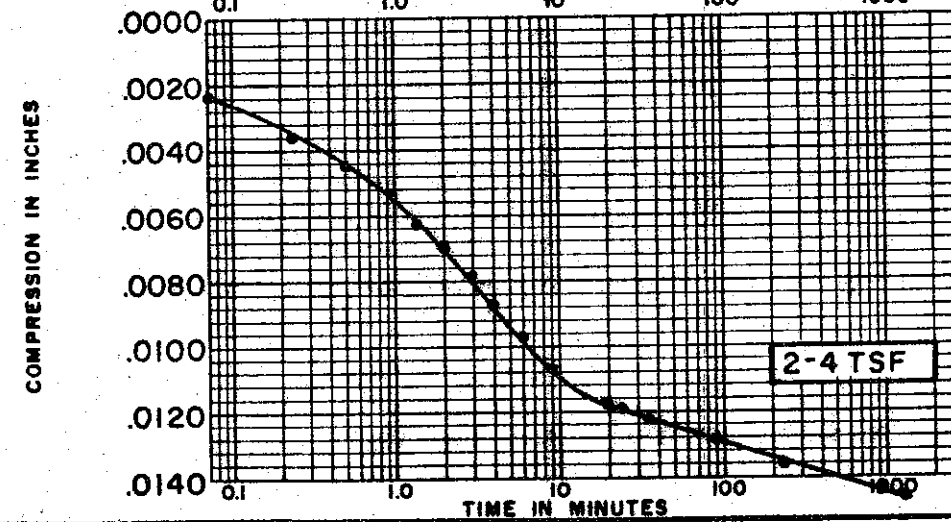
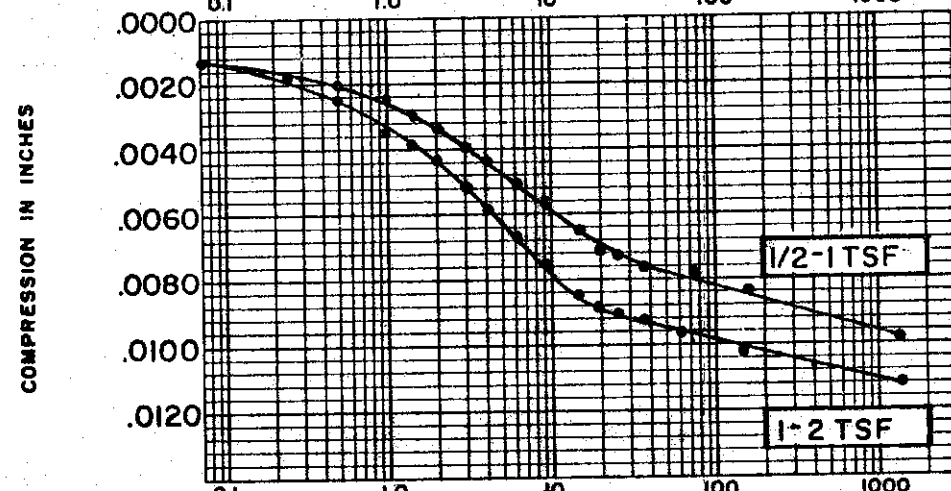
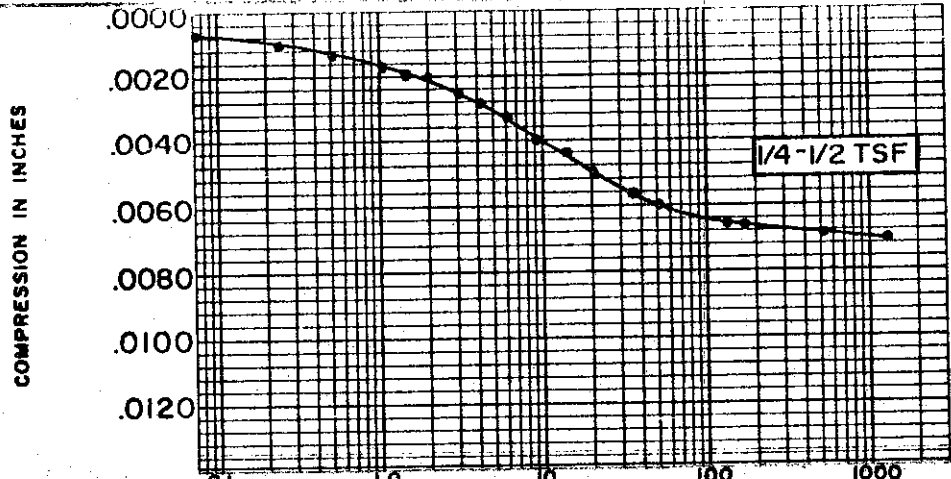
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C18.1  
 SAMPLE NO. 4 DATE JAN. 1974  
 DEPTH 14.6' TO 14.7'

T94-C-461



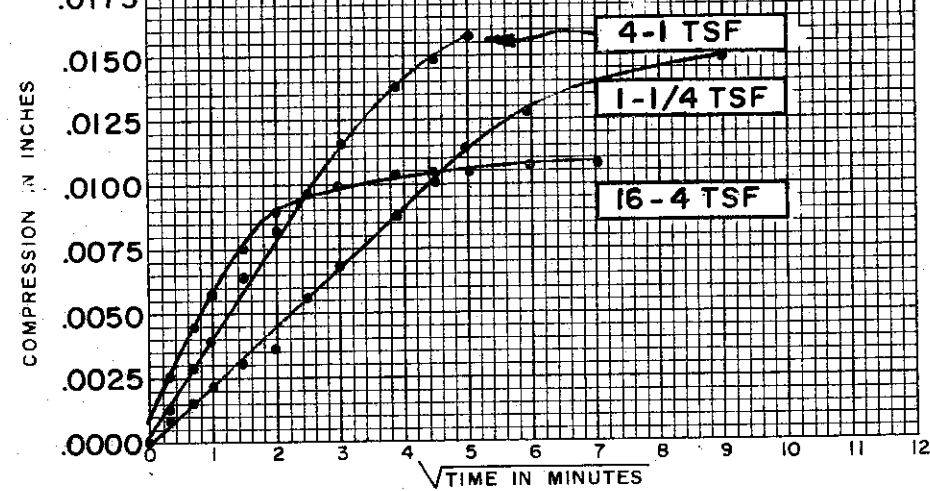
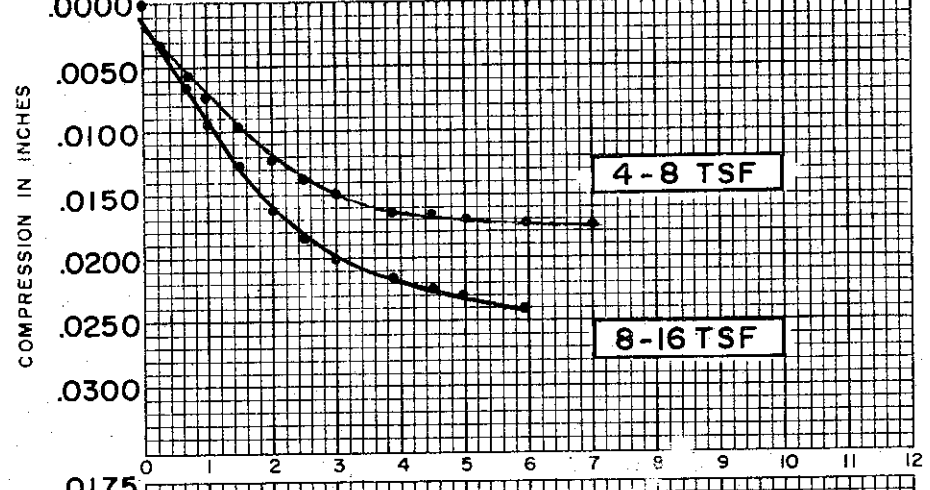
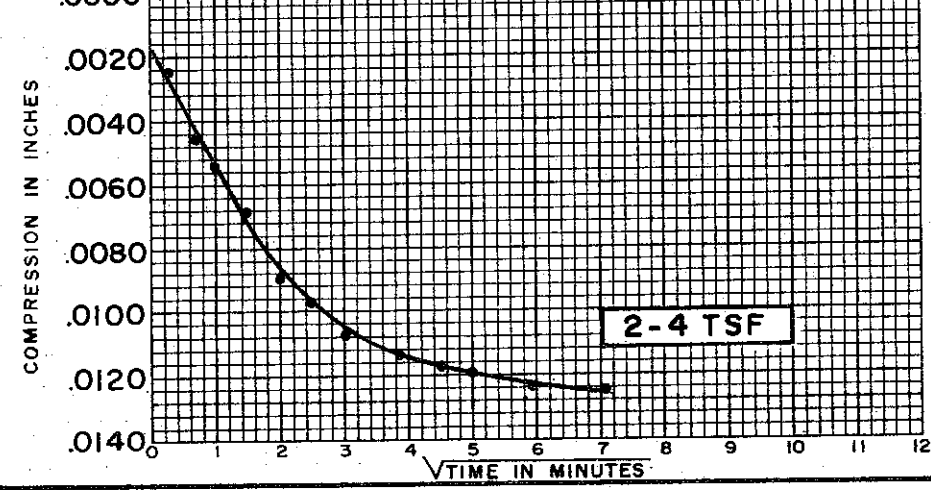
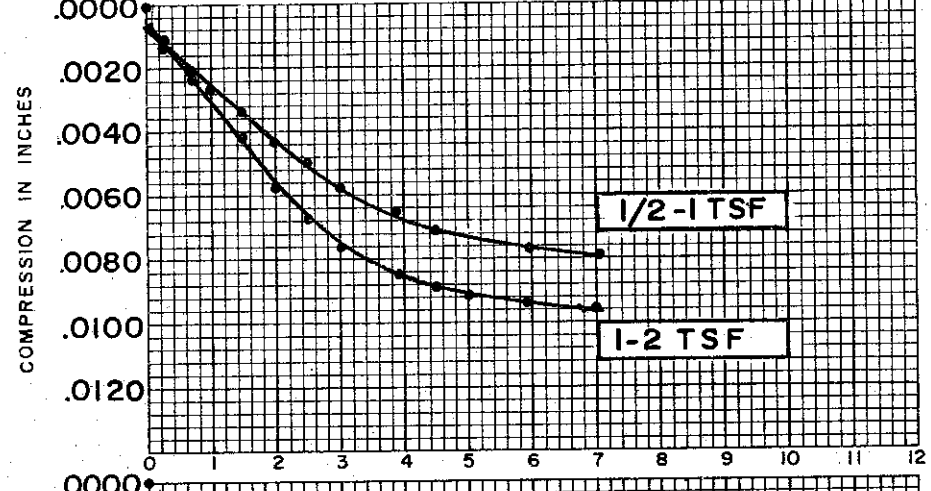
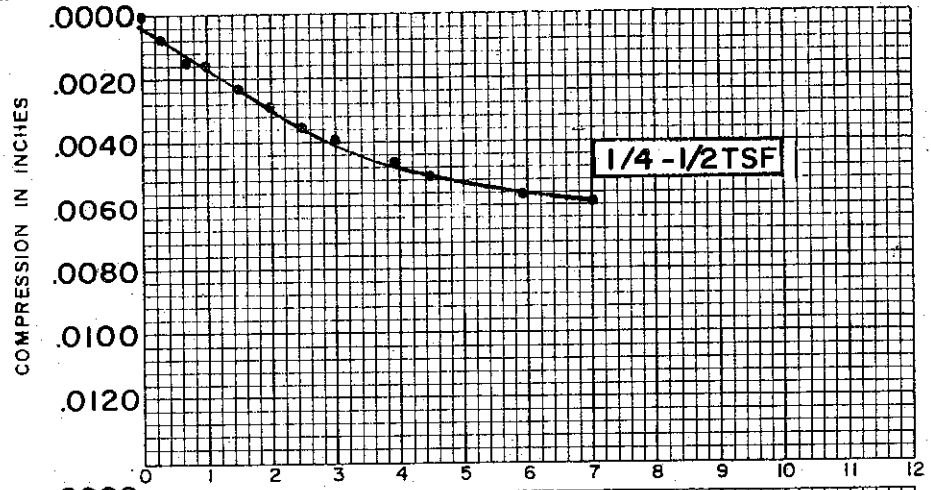
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 29.0%  
 FINAL WATER CONTENT 28.0%

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' TO 14.7'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.800"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.770

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVE**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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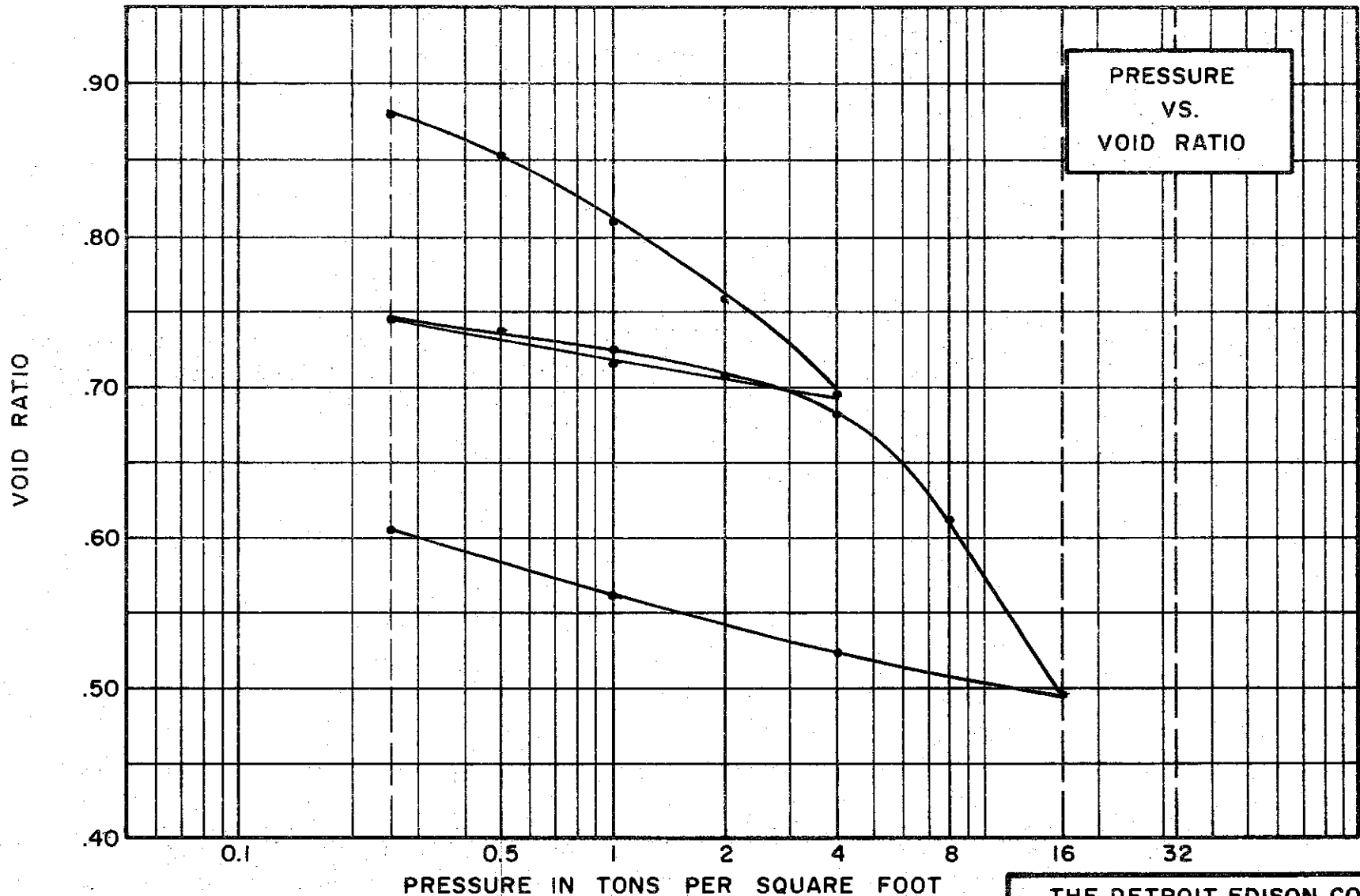


SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>4</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>14.6' TO 14.7'</u>
INITIAL WATER CONTENT	<u>29.0 %</u>	
FINAL WATER CONTENT	<u>28.0 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.770</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 36.0% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55% PLASTIC LIMIT 24%

**TEST DATA**

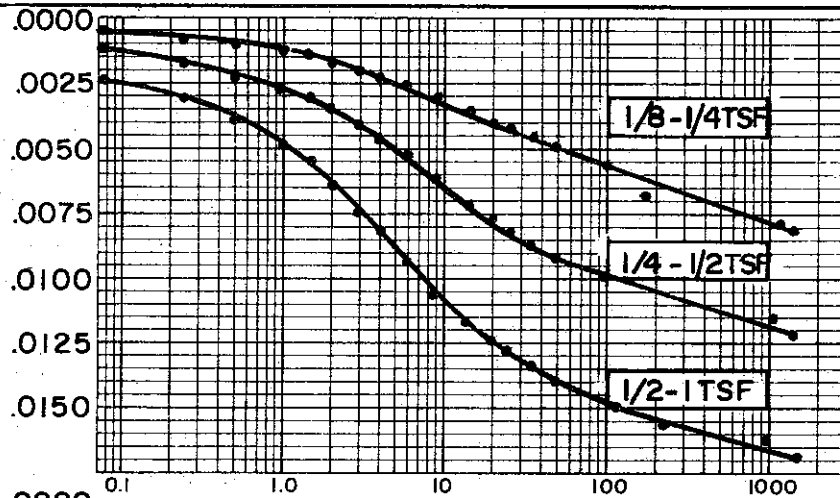
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

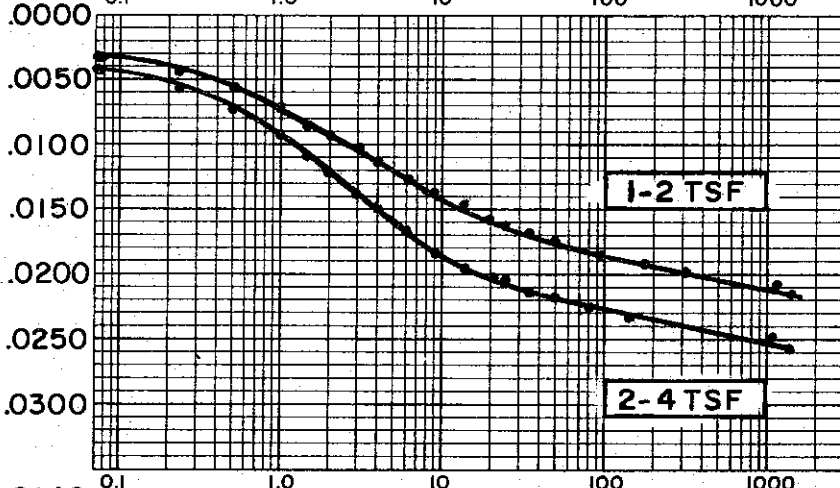
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 38 TEST NO. C24.1  
 SAMPLE NO. 16 DATE JAN. 1974  
 DEPTH 74.0' TO 74.1'

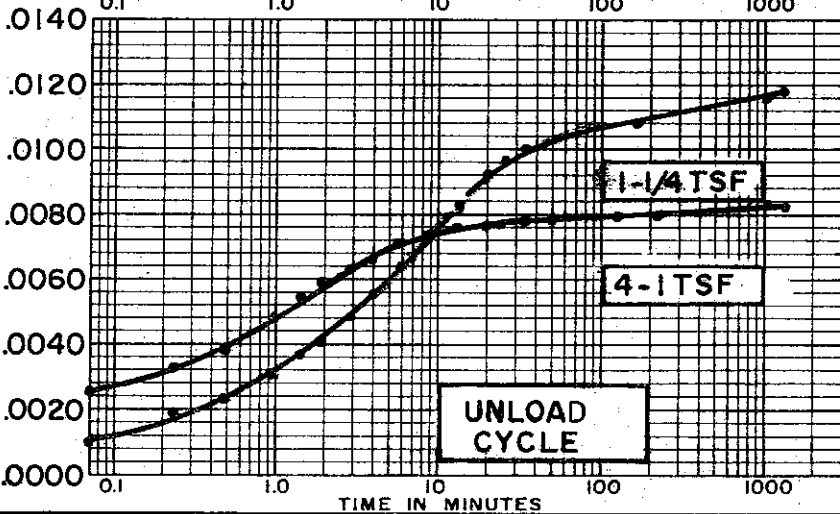
COMPRESSION IN INCHES



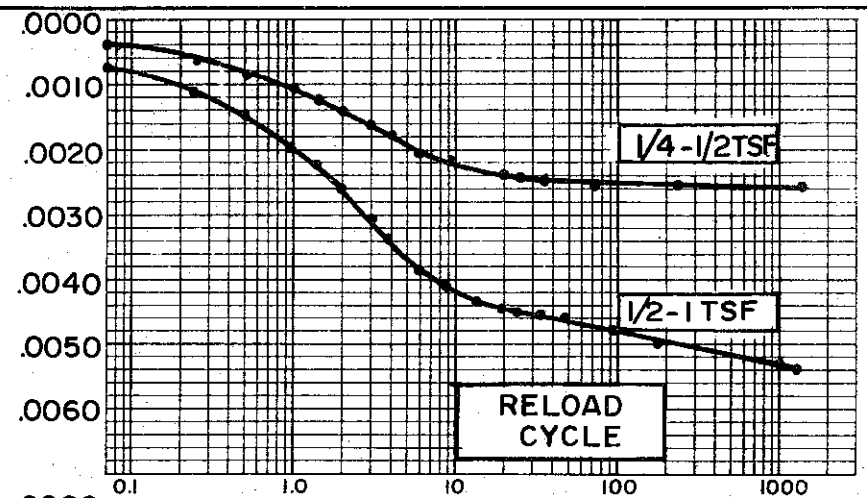
COMPRESSION IN INCHES



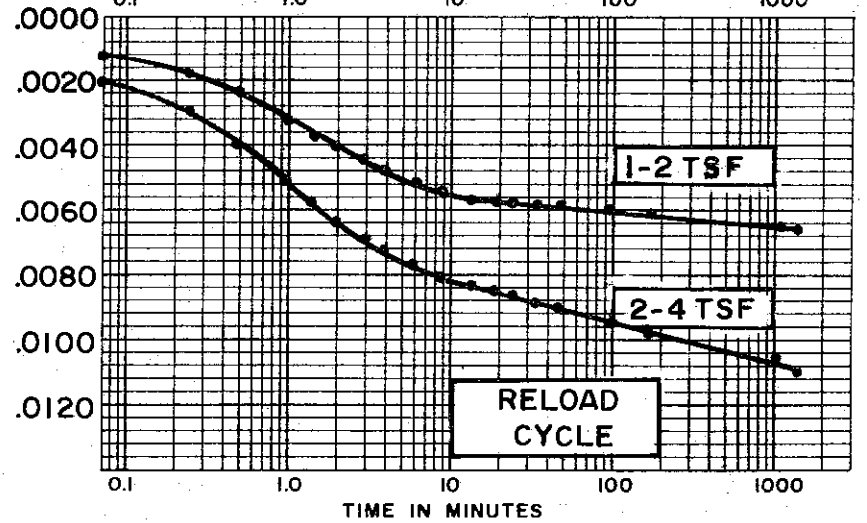
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 36.0 %  
 FINAL WATER CONTENT 27.0 %

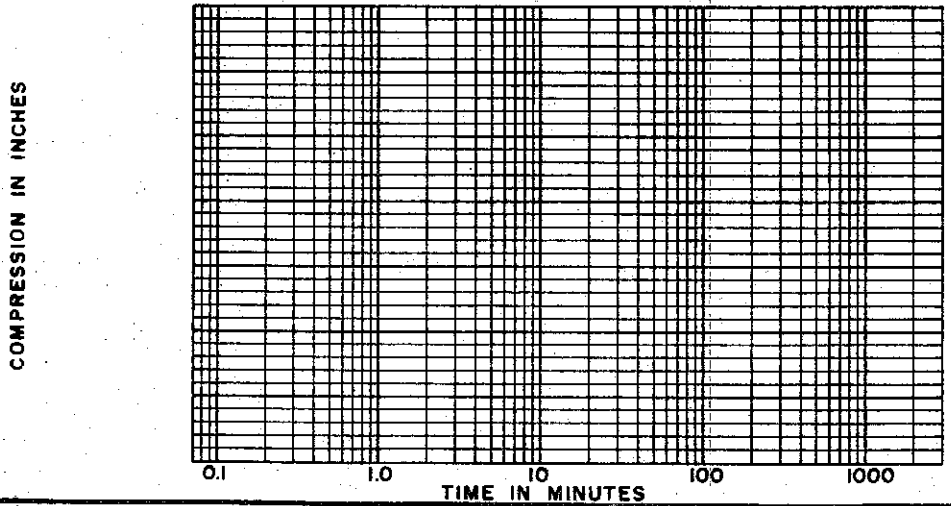
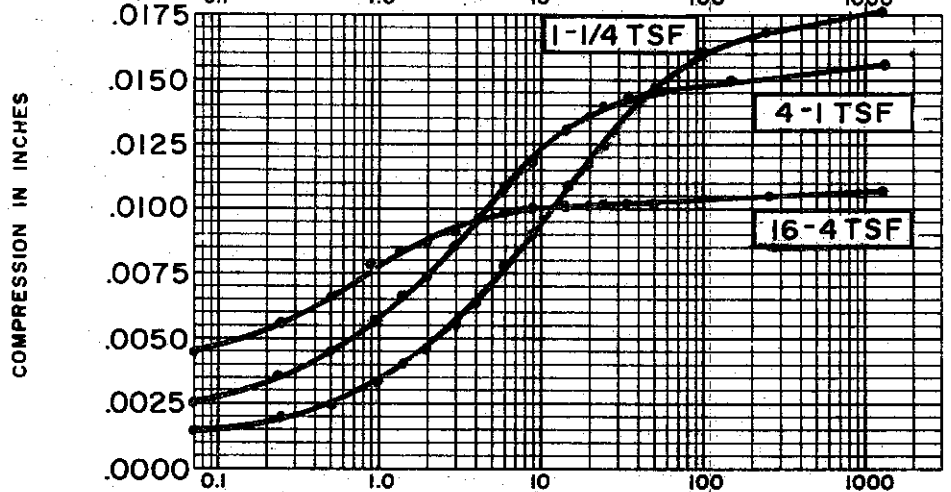
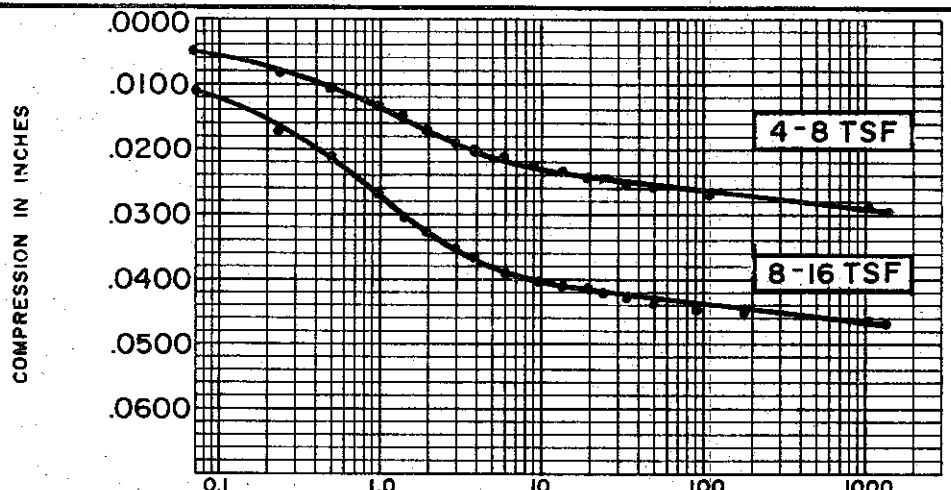
BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' TO 74.1'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.935

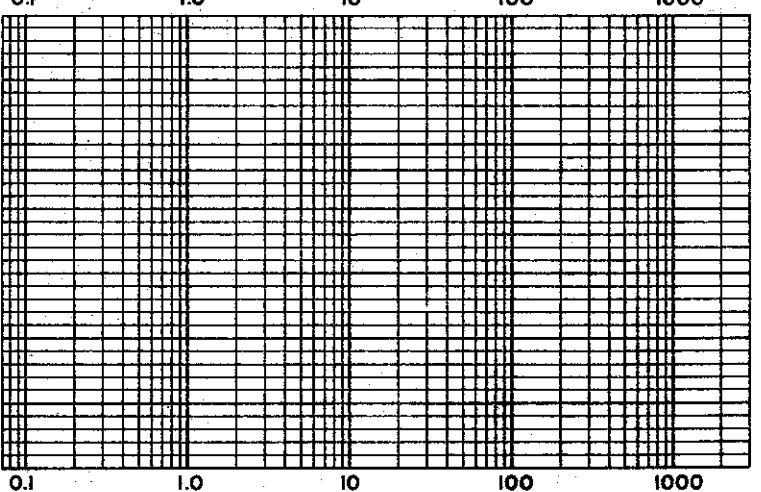
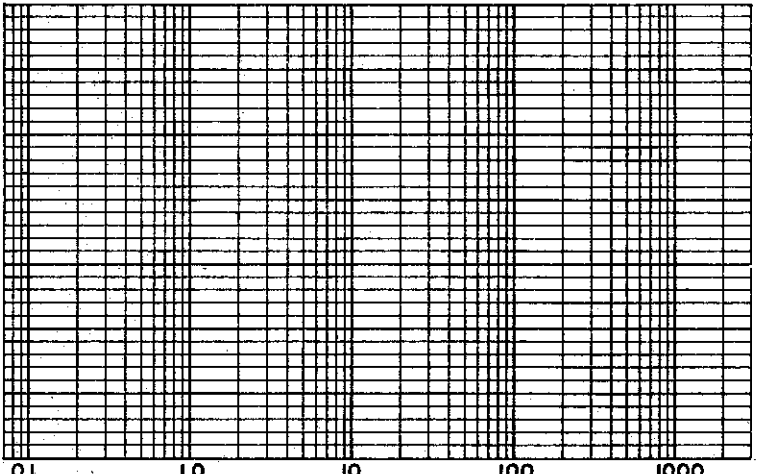
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



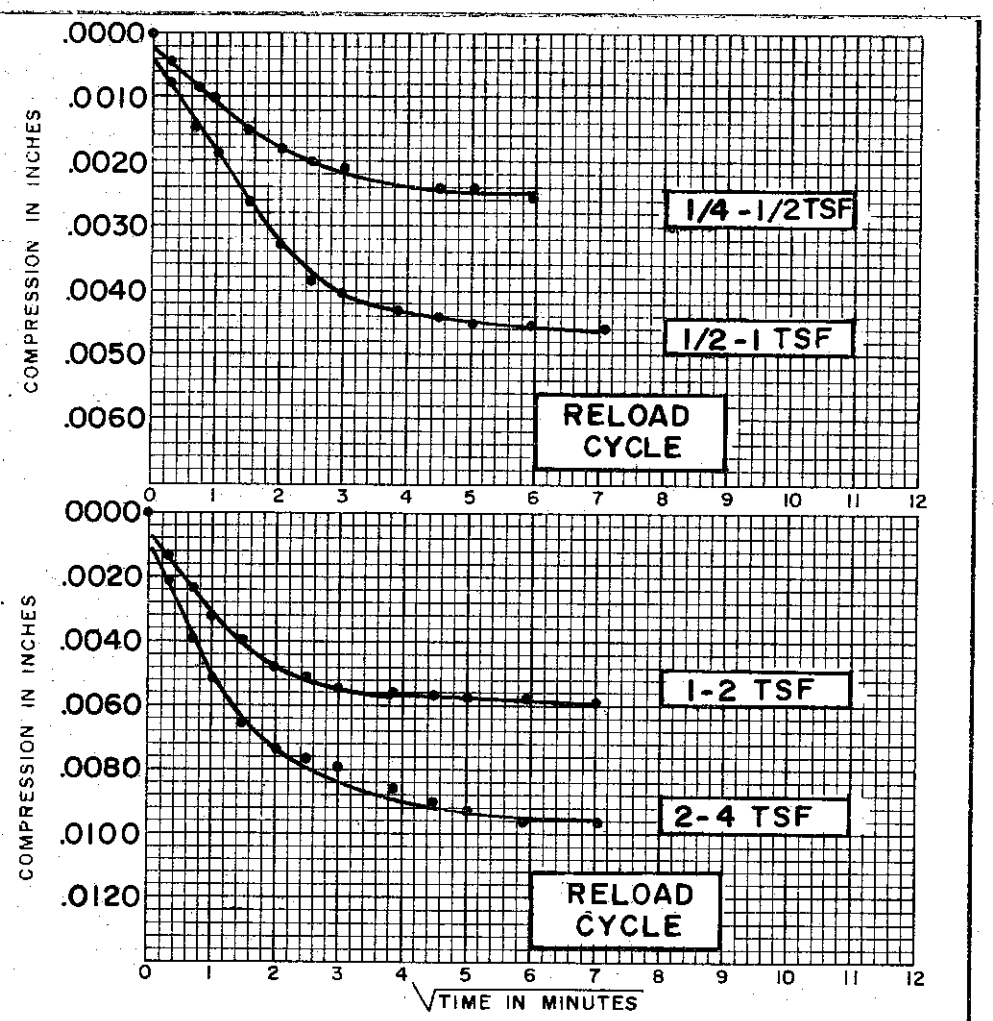
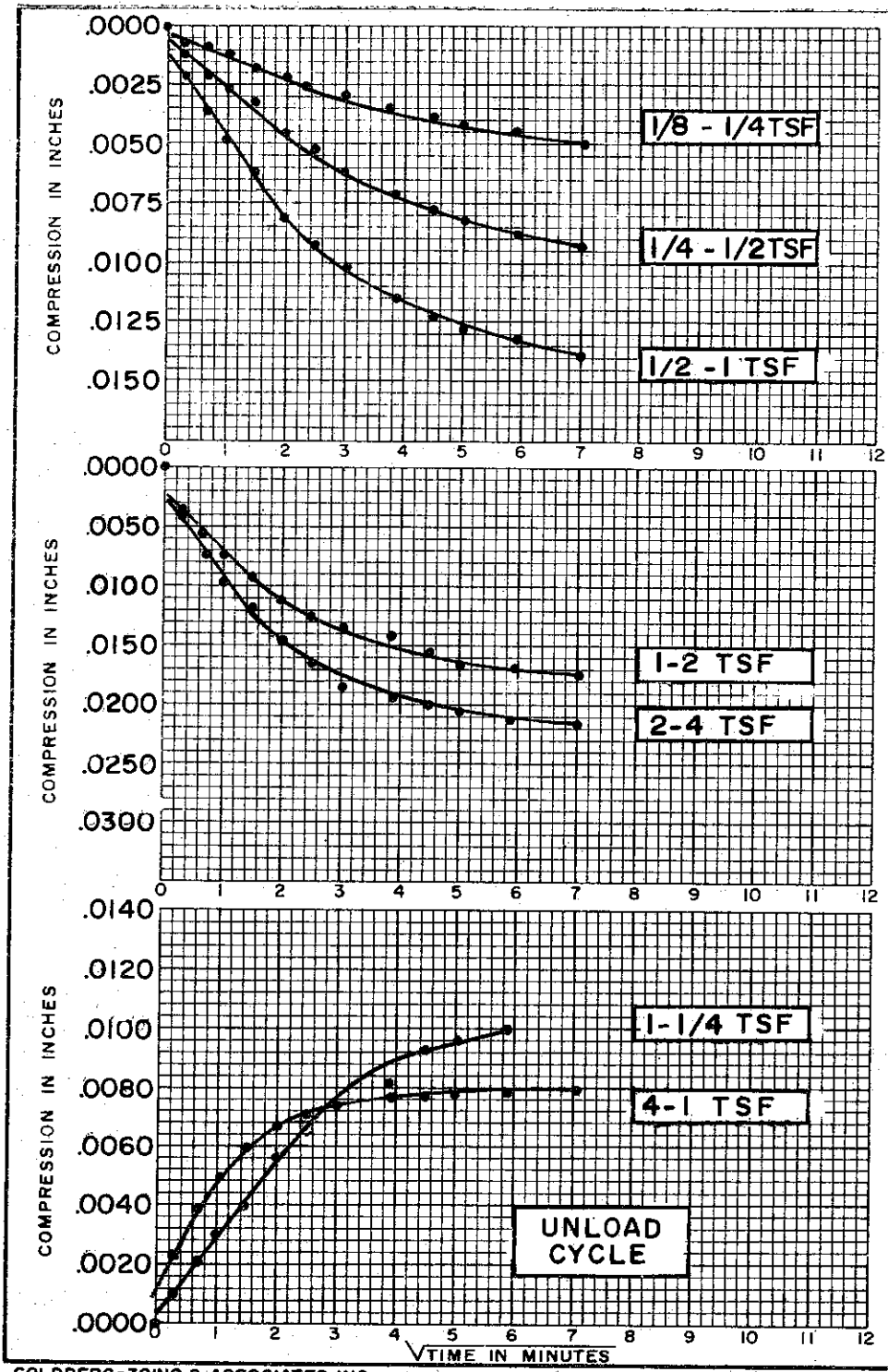
TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CH)</u>
SPECIFIC GRAVITY	<u>2.72</u>
INITIAL WATER CONTENT	<u>36.0%</u>
FINAL WATER CONTENT	<u>27.7%</u>
BORING NO.	<u>38</u>
SAMPLE NO.	<u>16</u>
DEPTH	<u>74.0 TO 74.1</u>

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.935</u>

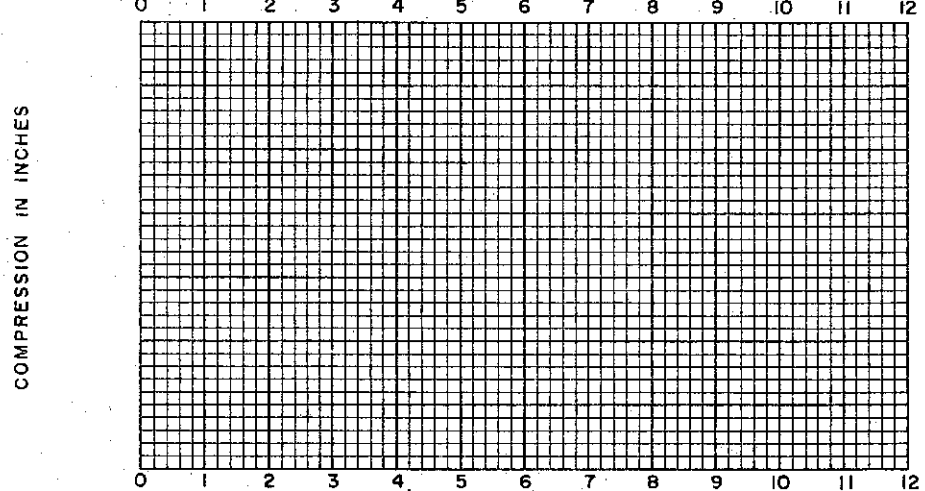
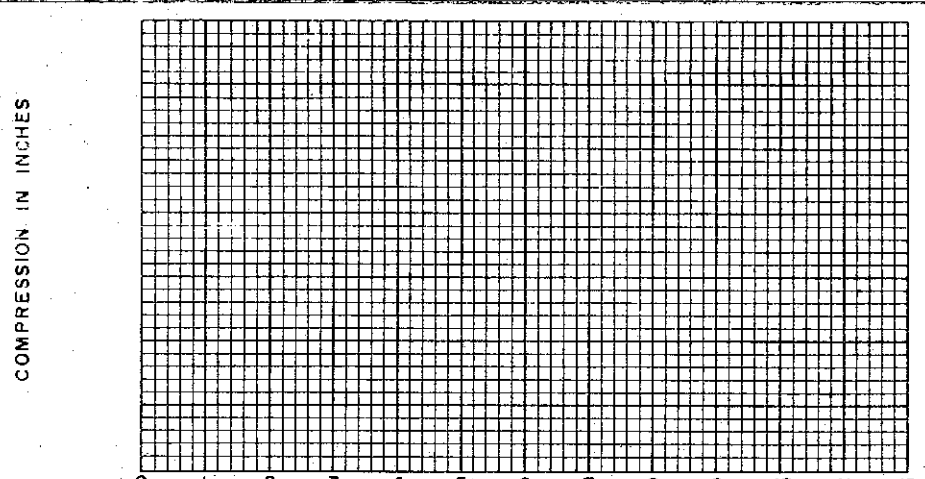
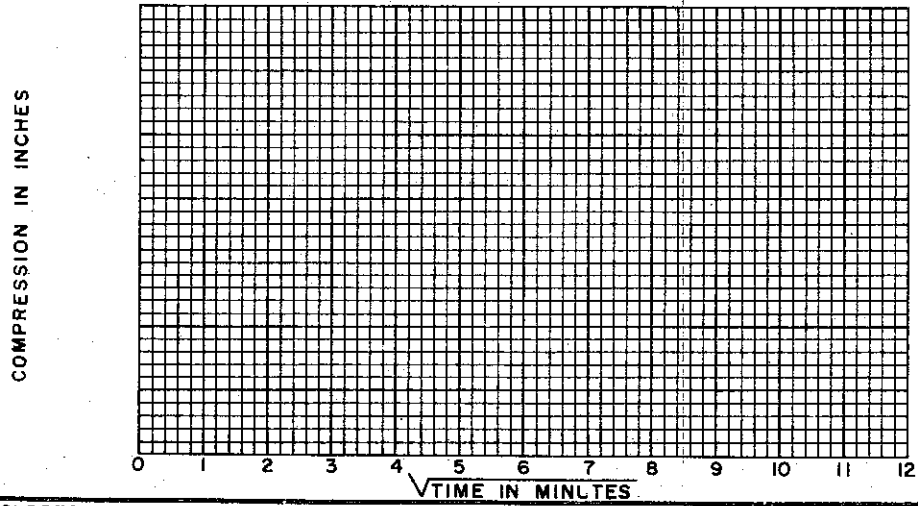
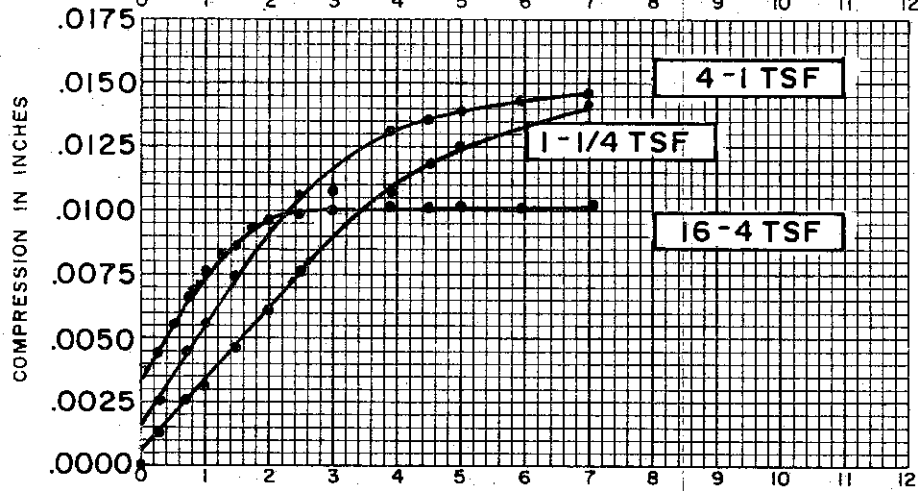
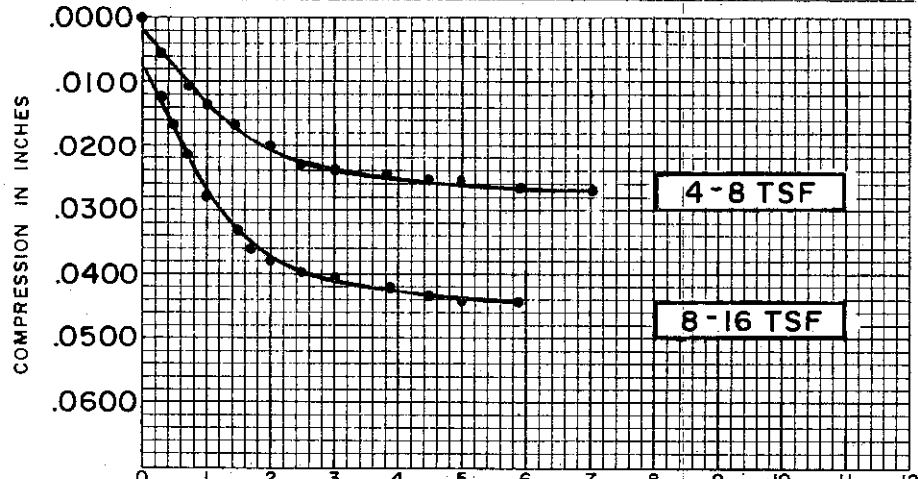
**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





SOIL PROPERTIES		BORING NO. <u>38</u>
SOIL DESCRIPTION:	SILTY CLAY (CH)	SAMPLE NO. <u>16</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>74.0' TO 74.1'</u>
INITIAL WATER CONTENT	<u>36.0%</u>	
FINAL WATER CONTENT	<u>27.7%</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.935</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		

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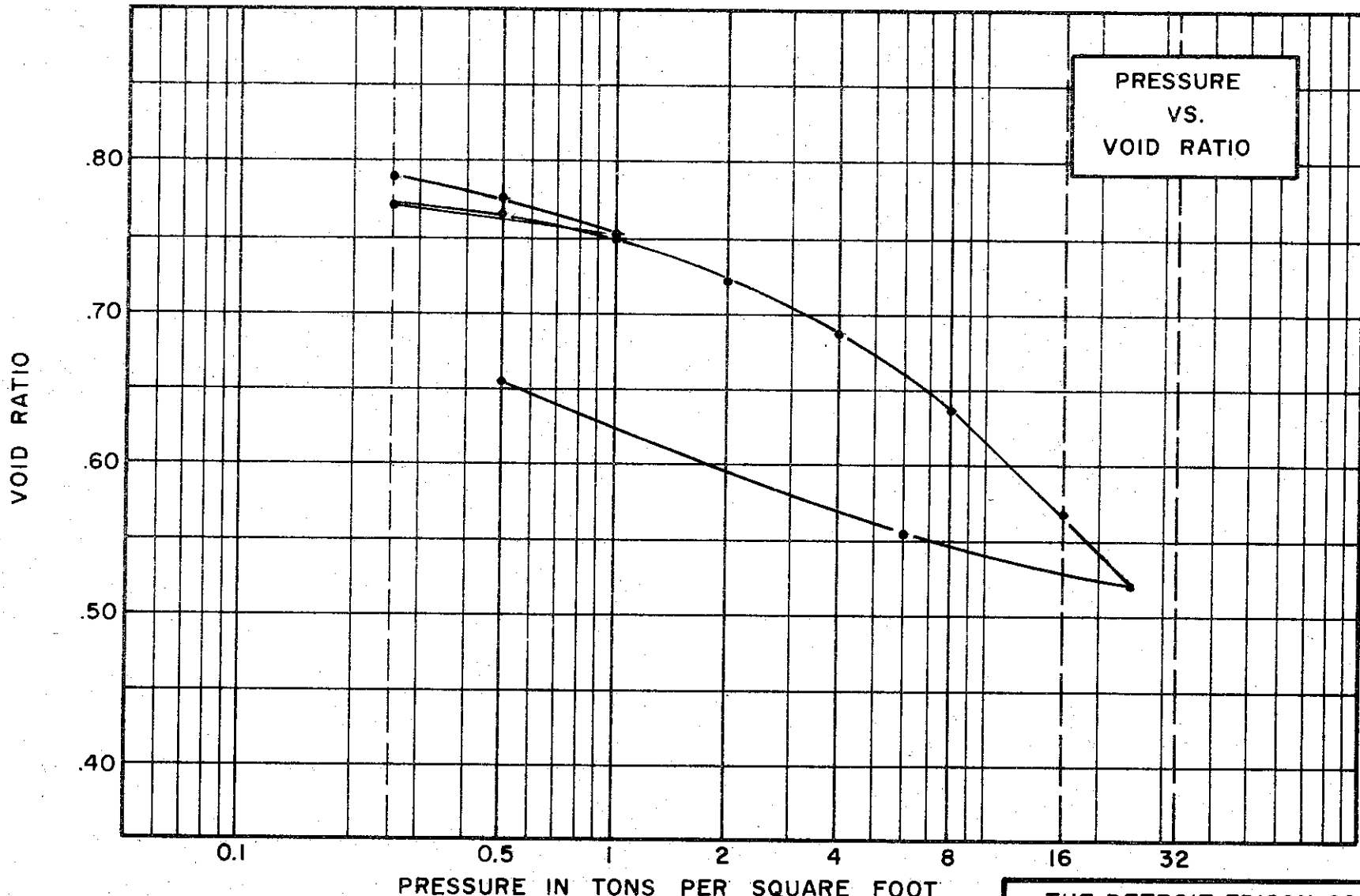


√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION: <u>SILTY CLAY (CH)</u>	BORING NO. <u>38</u>
SPECIFIC GRAVITY <u>2.72</u>	SAMPLE NO. <u>16</u>
INITIAL WATER CONTENT <u>36.0%</u>	DEPTH <u>74.0 TO 74.1</u>
FINAL WATER CONTENT <u>27.7%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.935</u>

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.5% FINAL 27.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 23%

**TEST DATA**

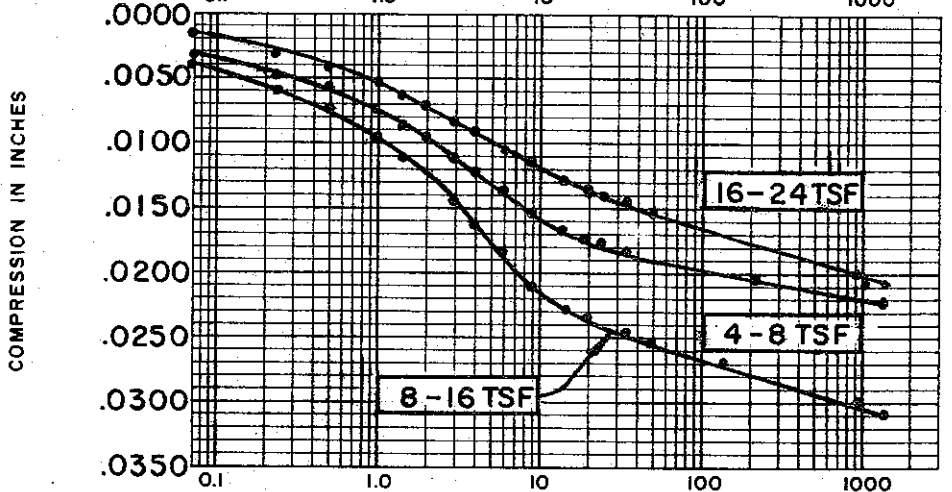
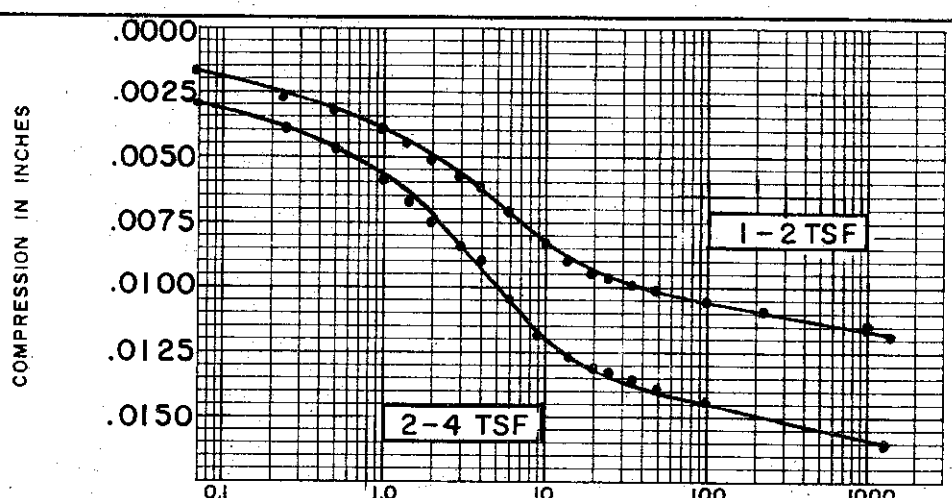
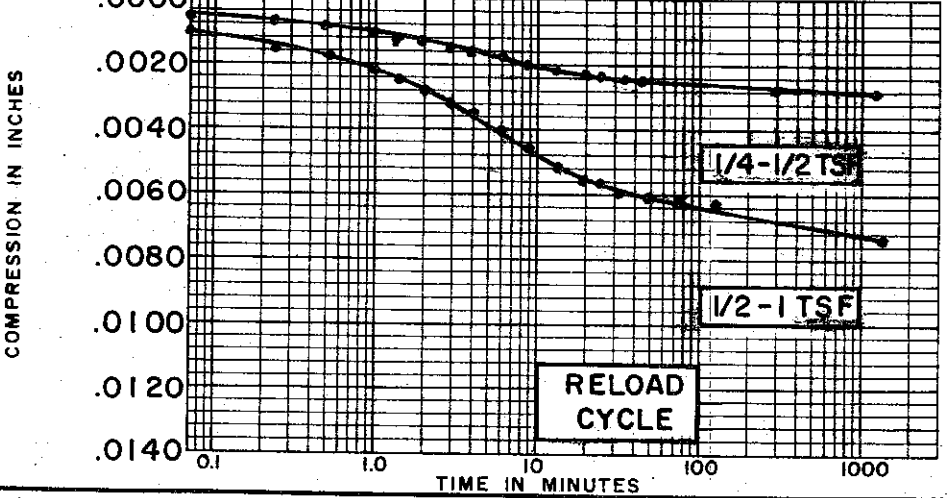
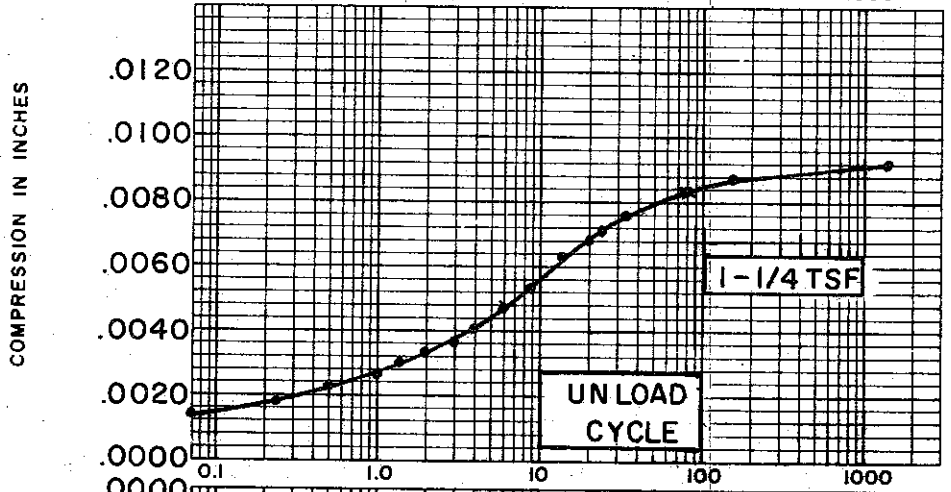
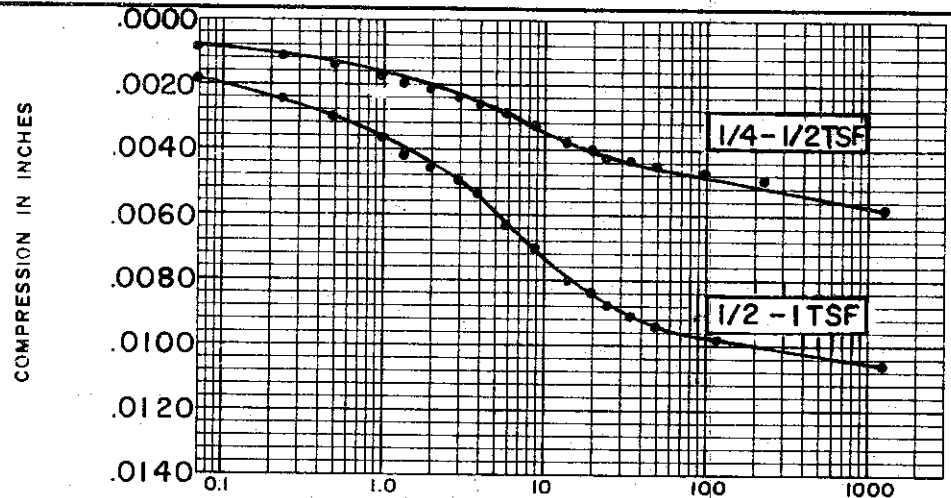
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C29.1  
 SAMPLE NO. 5 DATE JAN 74  
 DEPTH 10.8'

694-C-469

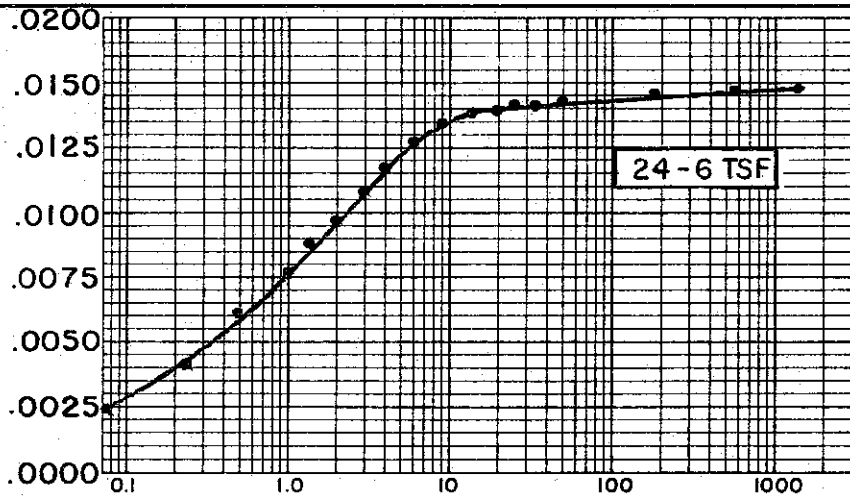


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	23.5 %
FINAL WATER CONTENT	27.7 %
BORING NO.	41
SAMPLE NO.	5
DEPTH	10.8'

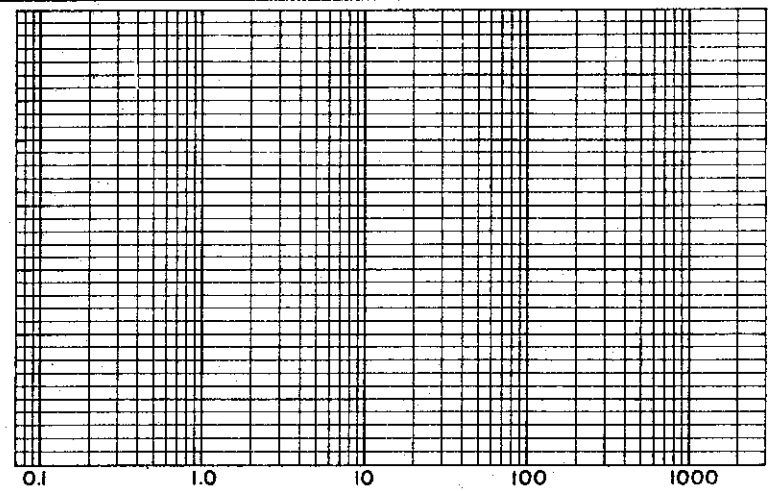
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.799

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

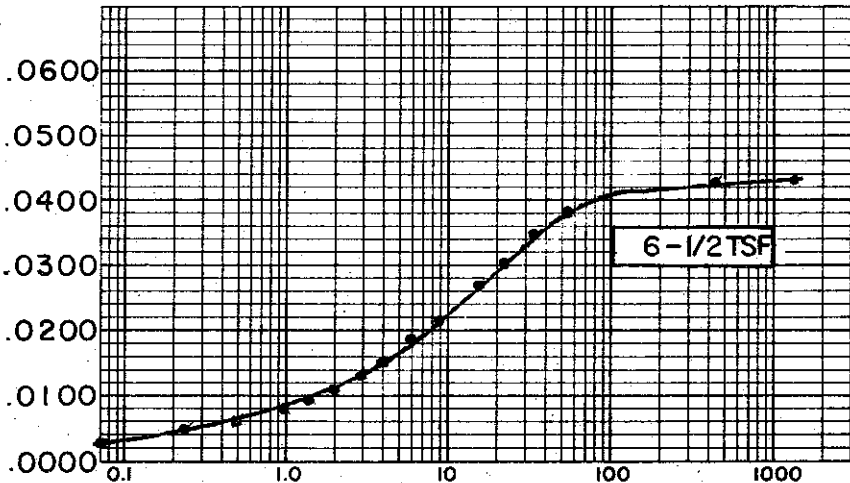
COMPRESSION IN INCHES



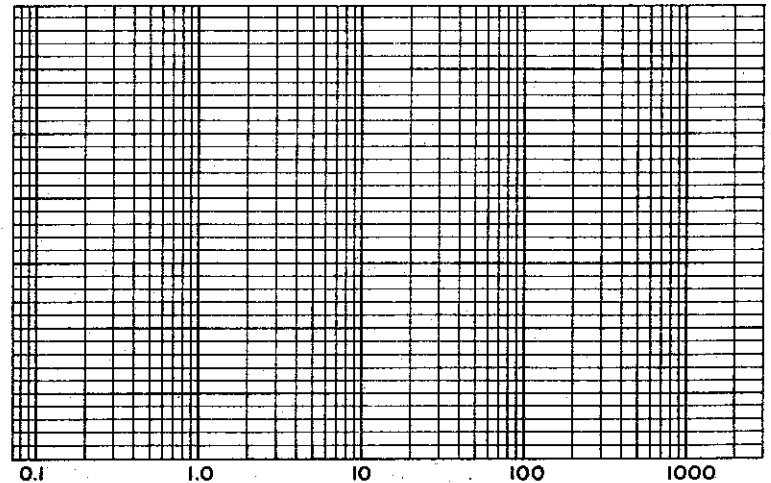
COMPRESSION IN INCHES



COMPRESSION IN INCHES

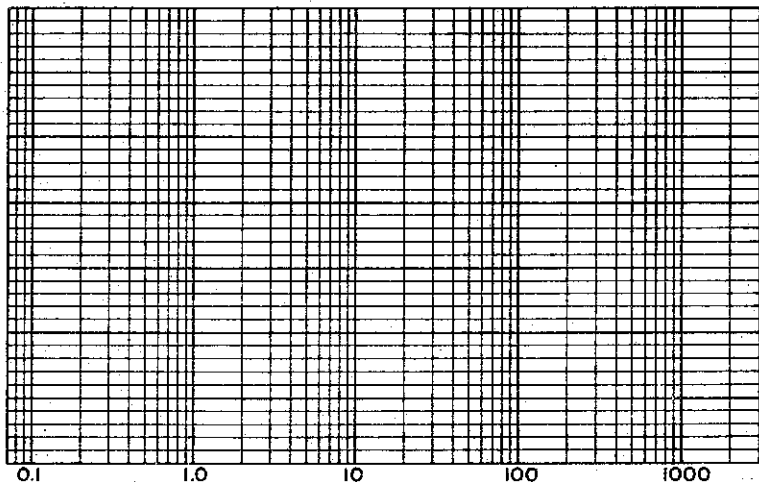


COMPRESSION IN INCHES



TIME IN MINUTES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5 %  
 FINAL WATER CONTENT 27.7 %

BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.6'

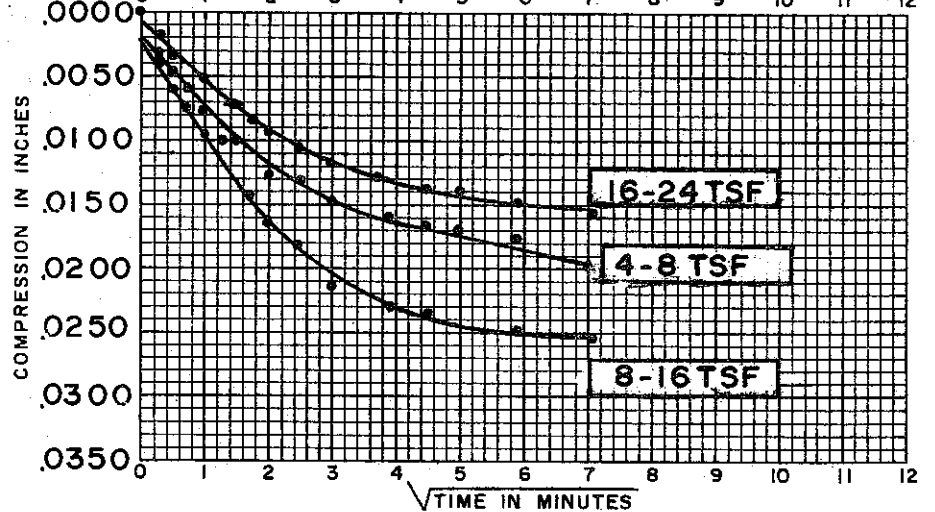
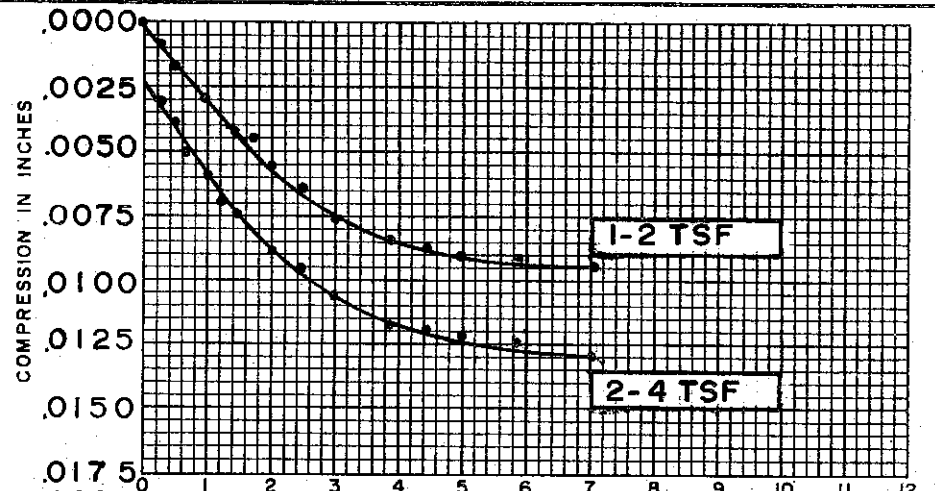
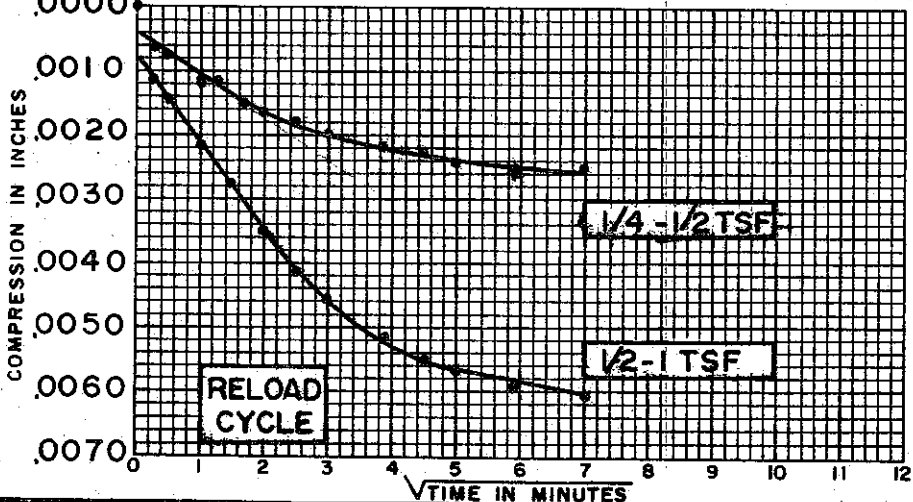
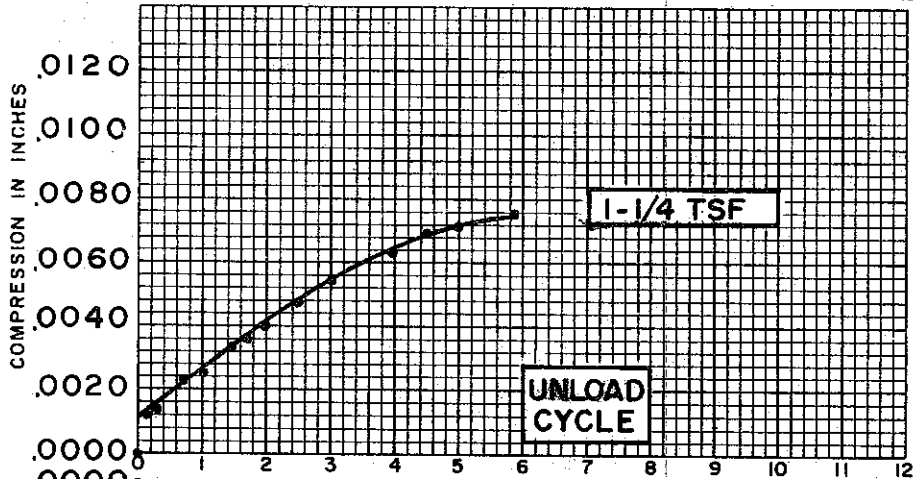
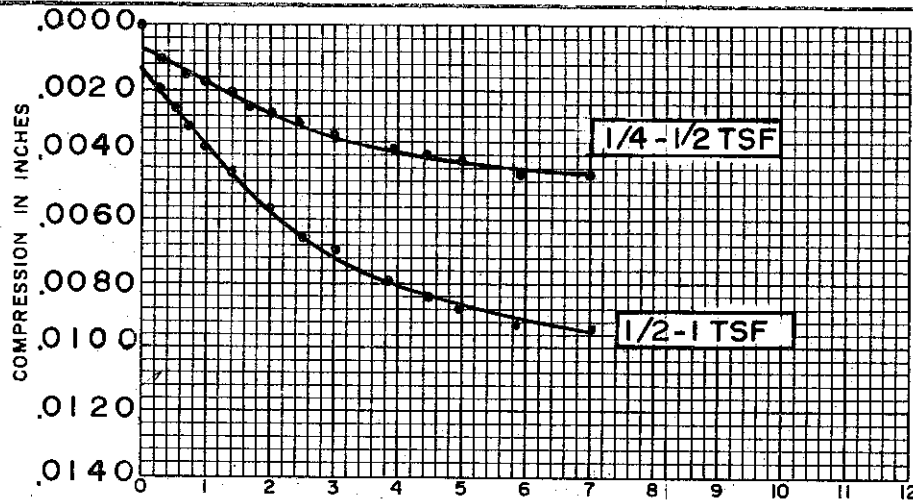
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.799

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 29.5%  
 FINAL WATER CONTENT 27.7%

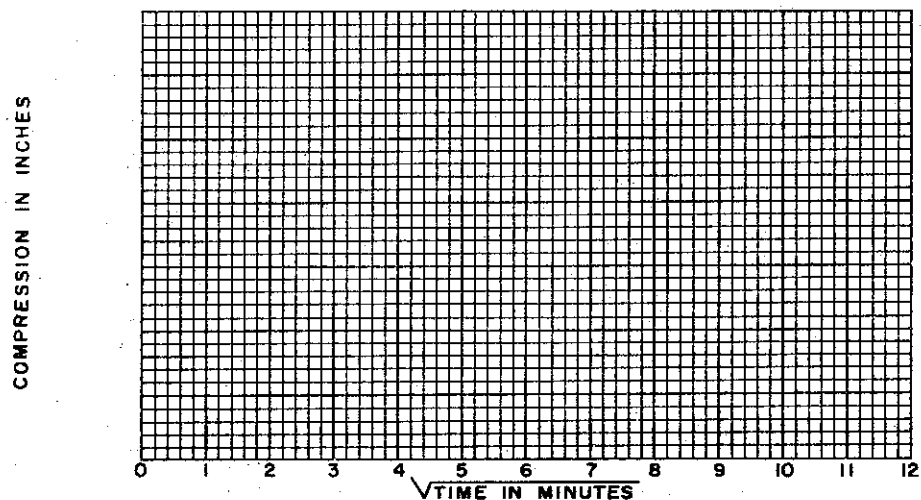
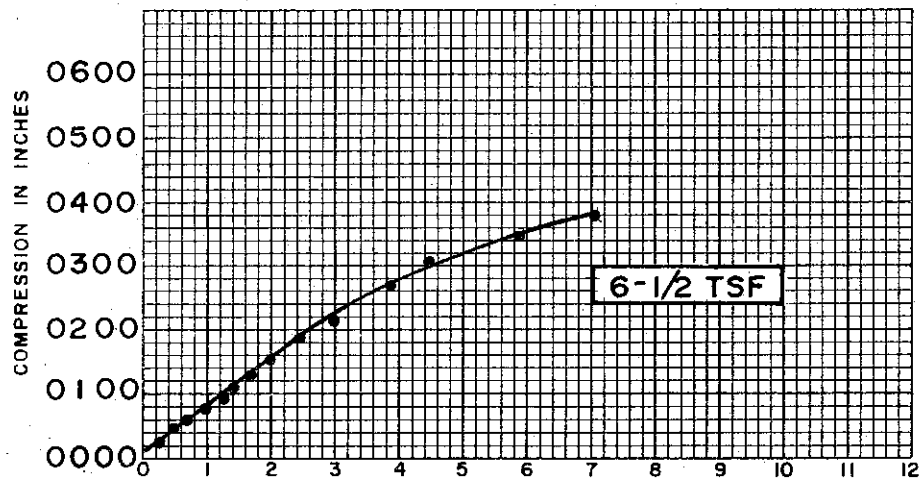
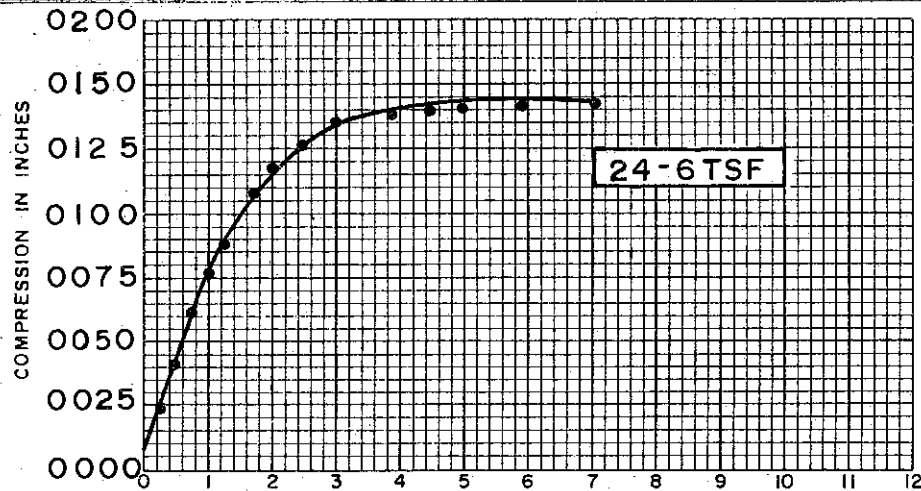
BORING NO. 41  
 SAMPLE NO. 5  
 DEPTH 10.8'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .789

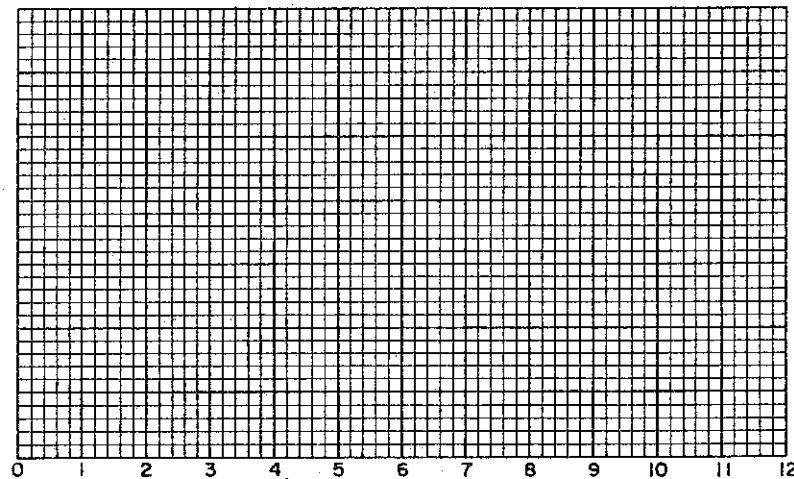
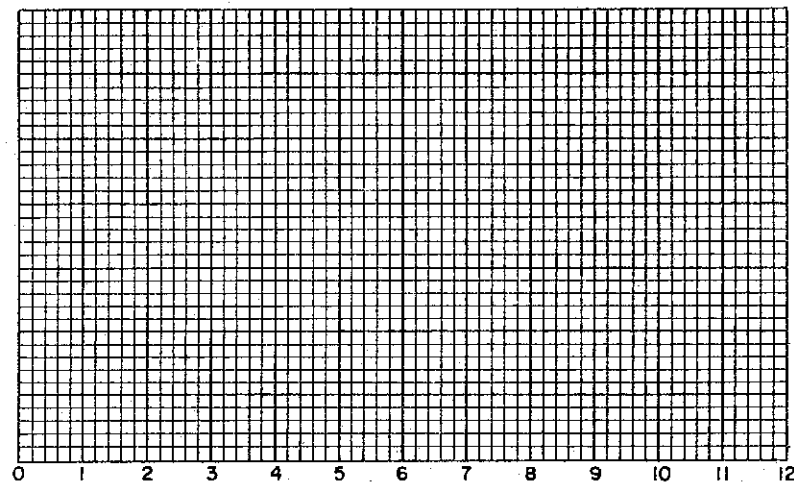
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES

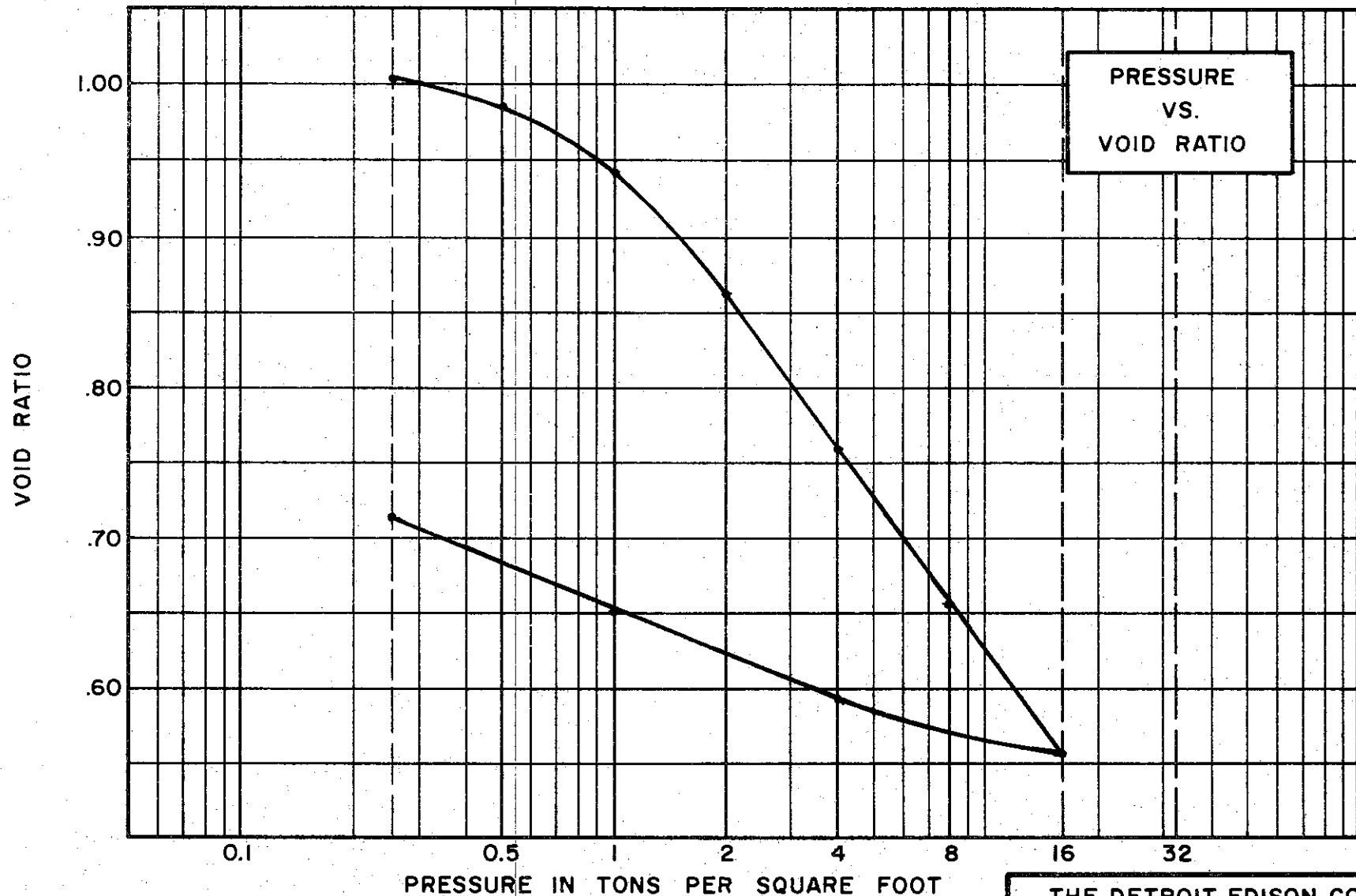


√TIME IN MINUTES

SOIL PROPERTIES		BORING NO.	41
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	5
SPECIFIC GRAVITY	2.72	DEPTH	10.8'
INITIAL WATER CONTENT	29.5 %		
FINAL WATER CONTENT	27.7 %		
TEST DATA			
INITIAL SAMPLE HEIGHT	0.80"		
INITIAL SAMPLE DIAMETER	2.50"		
INITIAL VOID RATIO	.799		

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY  
(CL-CH)  
SPECIFIC GRAVITY 2.70  
WATER CONTENT, INITIAL 38.1% FINAL 30.1%  
ATTERBERG LIMITS:  
LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.055

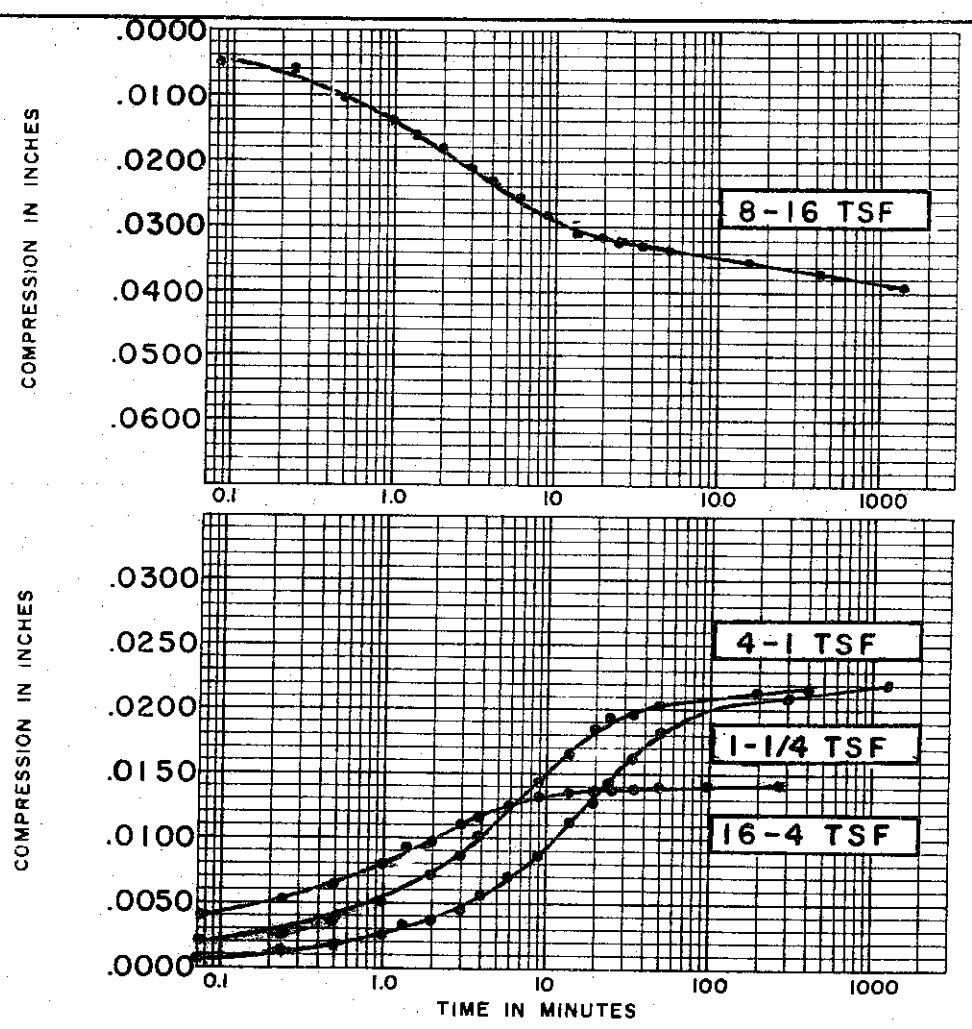
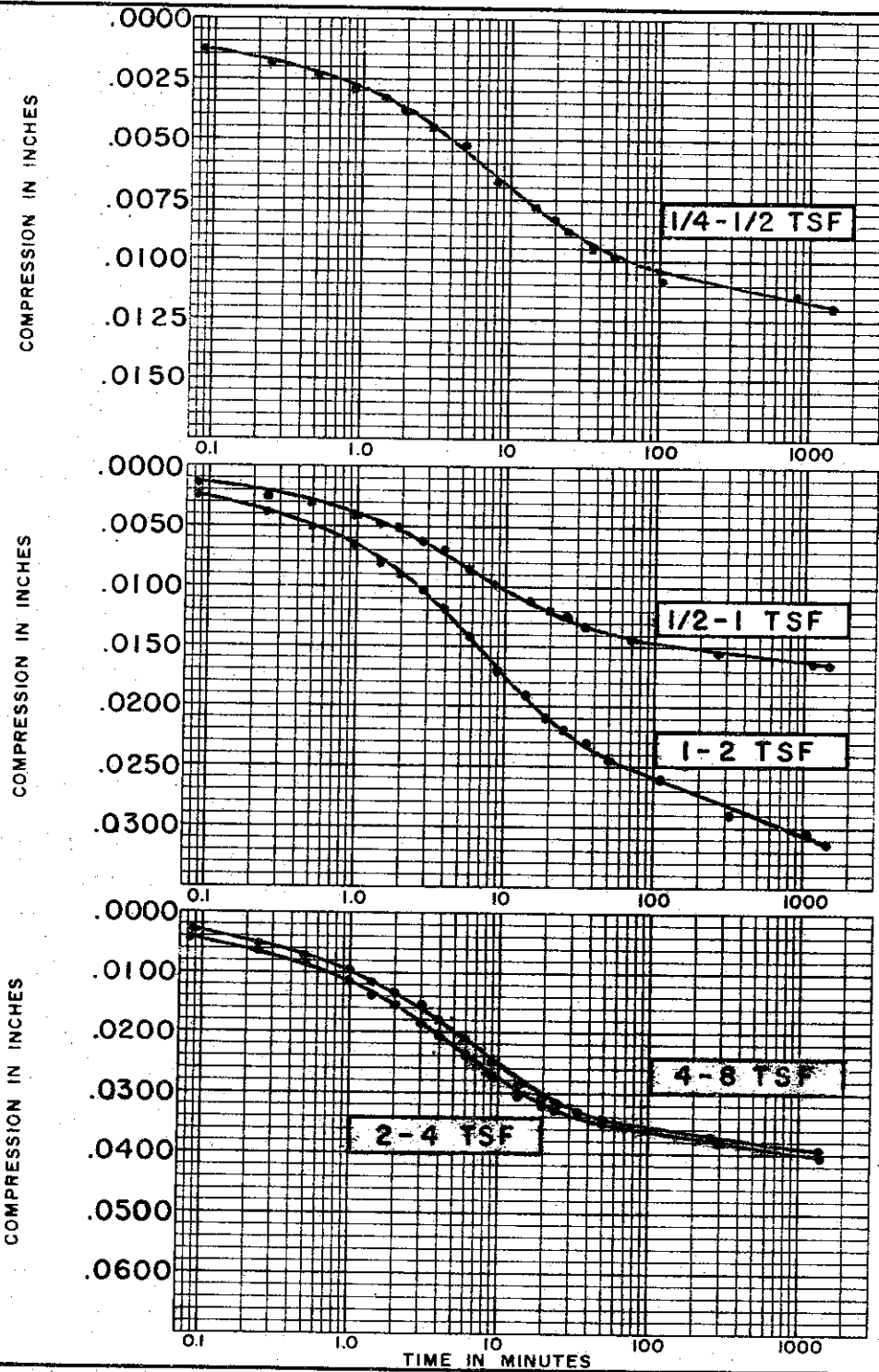
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C 30.1  
SAMPLE NO. 7 DATE FEB 74  
DEPTH 21.0' TO 21.1'



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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

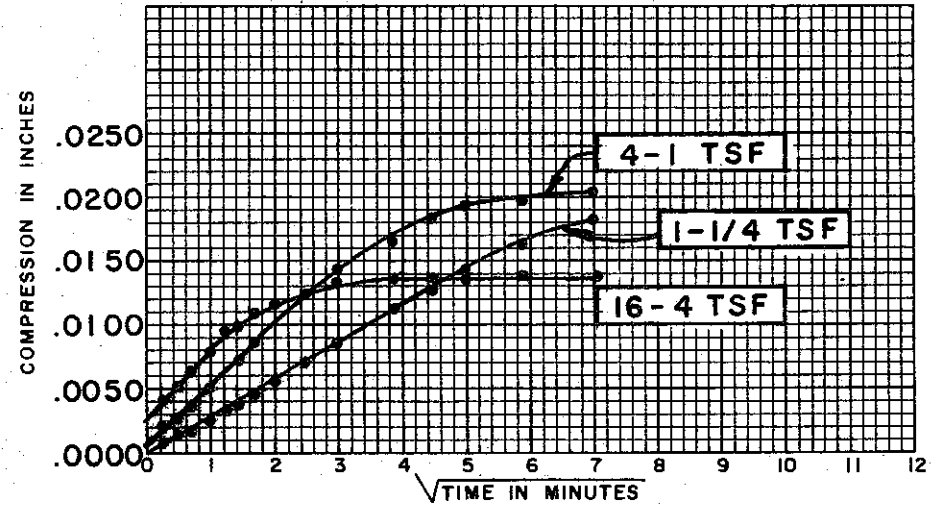
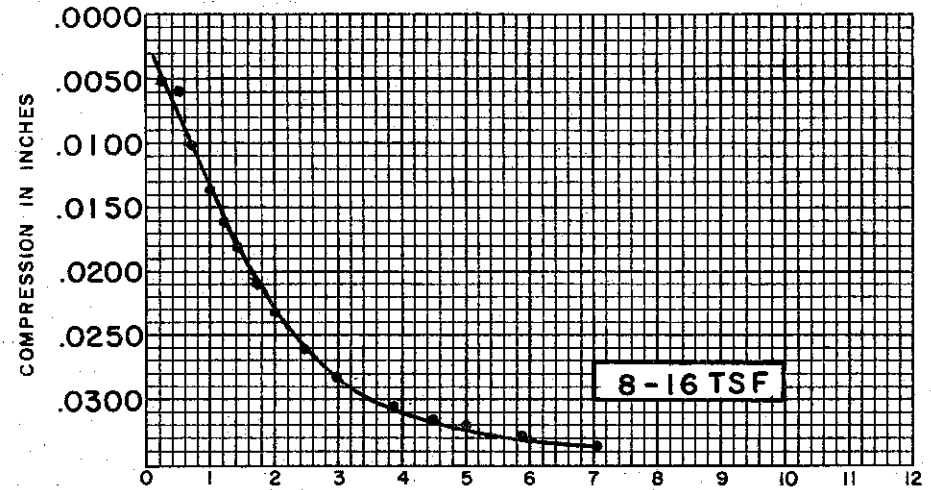
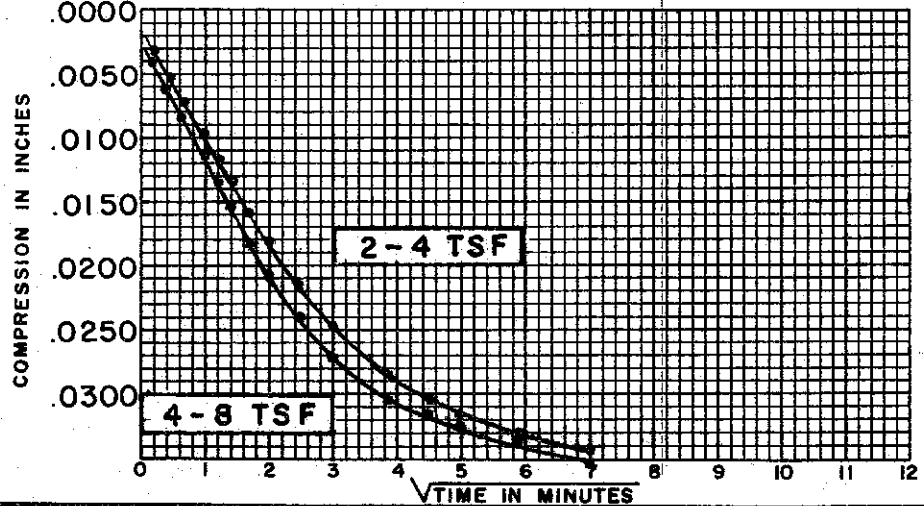
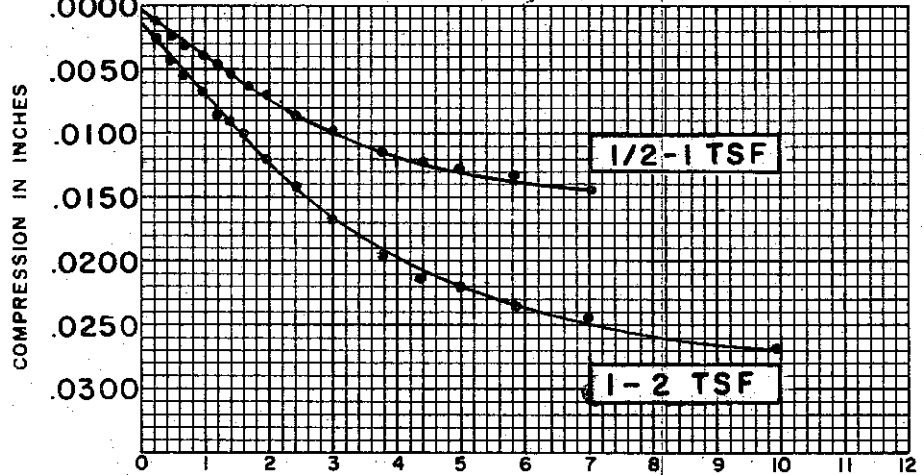
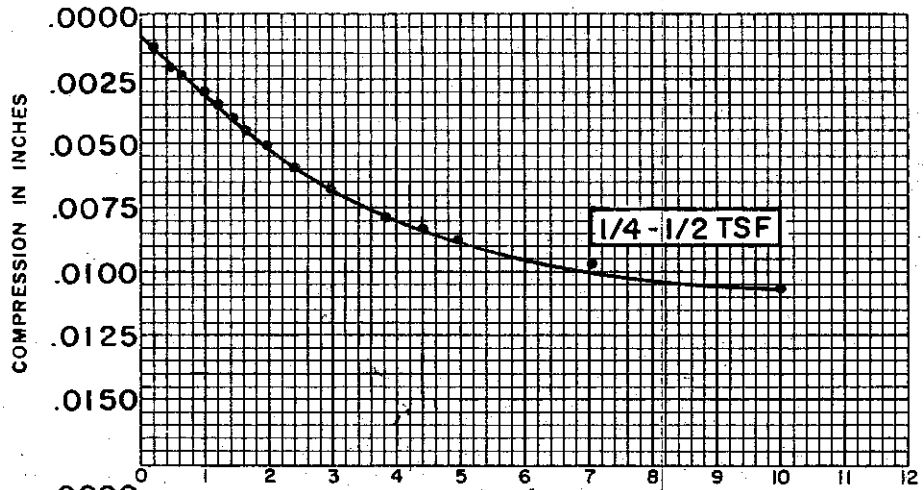
BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.1

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.1 %  
 FINAL WATER CONTENT 30.1 %

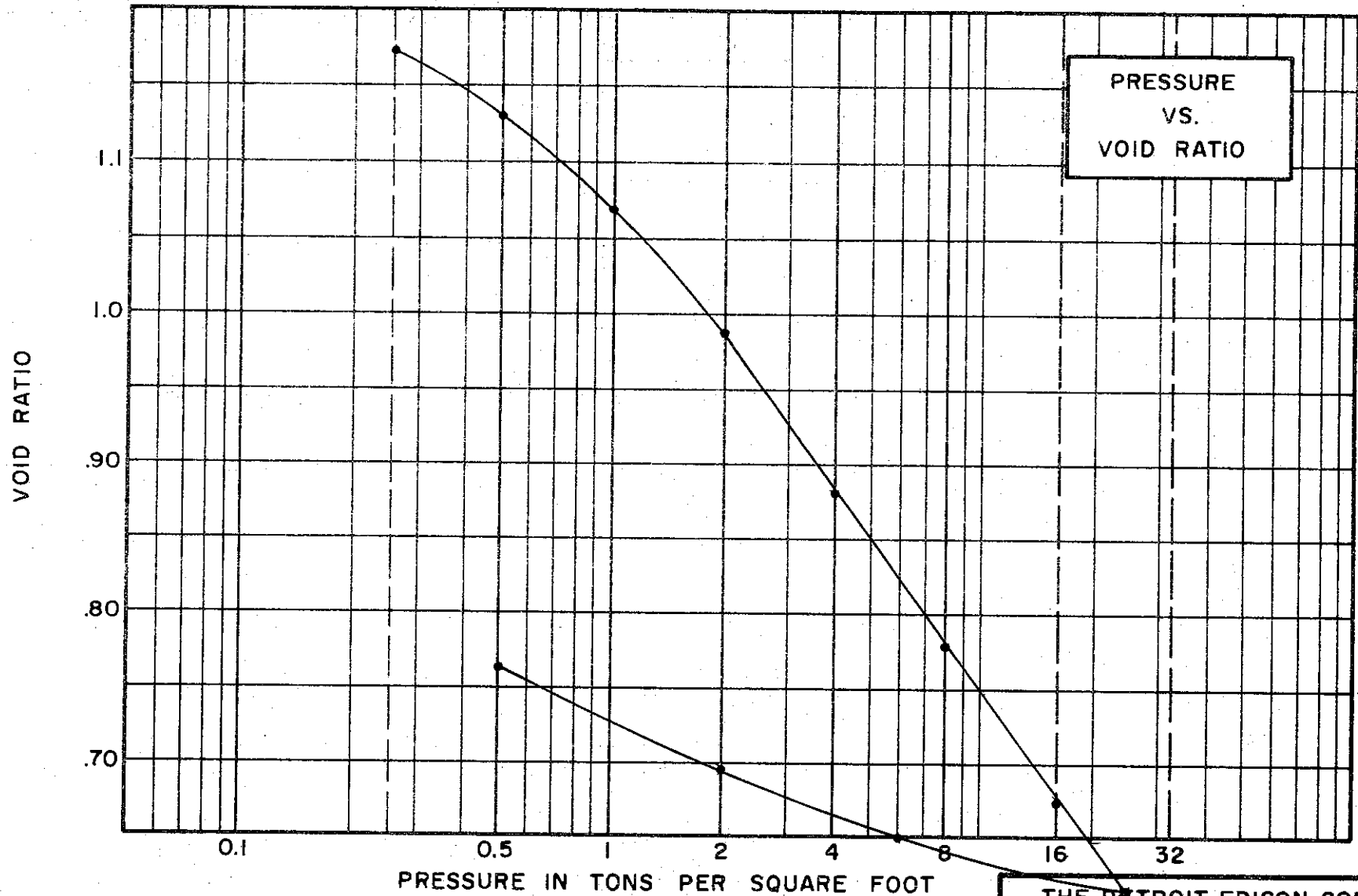
BORING NO. 41  
 SAMPLE NO. 7  
 DEPTH 21.0

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.055

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 46.5% FINAL 31.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 52% PLASTIC LIMIT 25%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

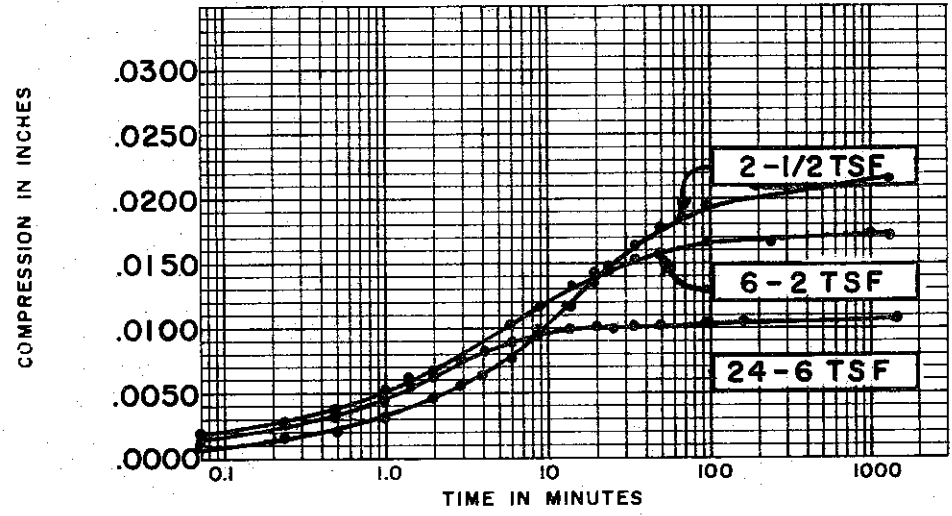
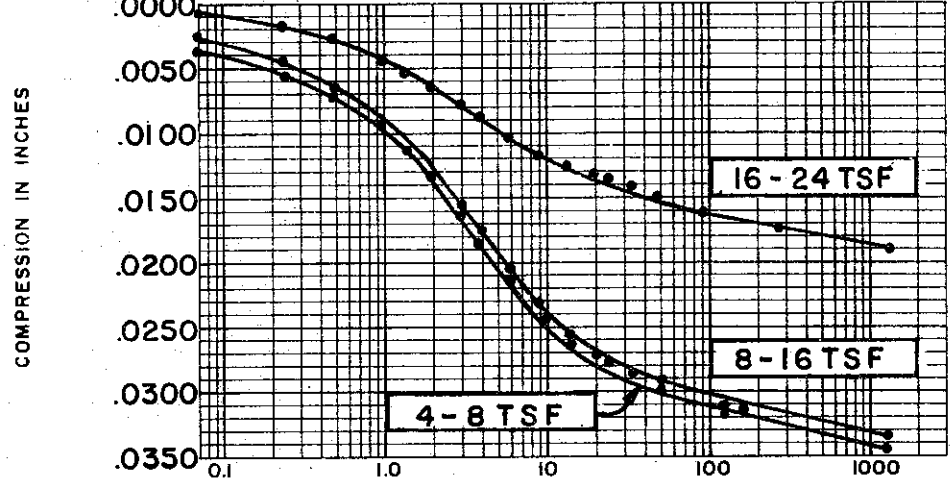
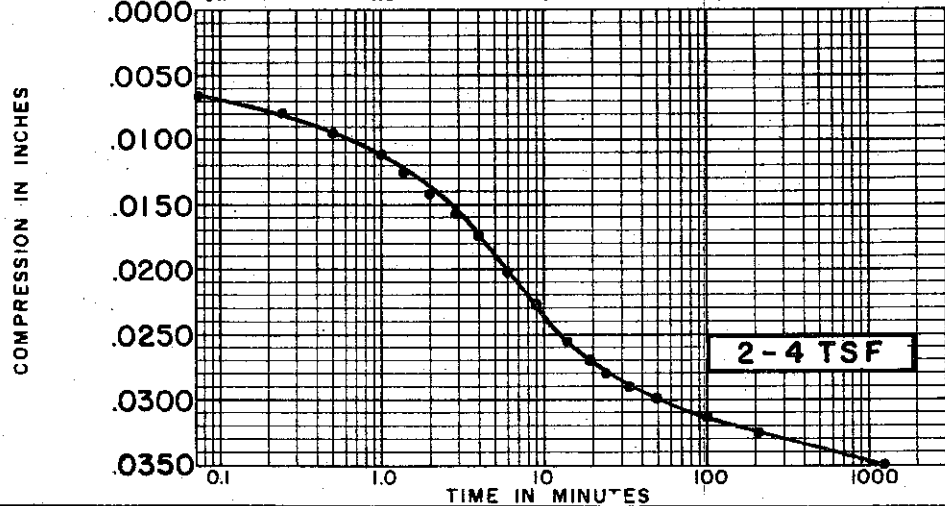
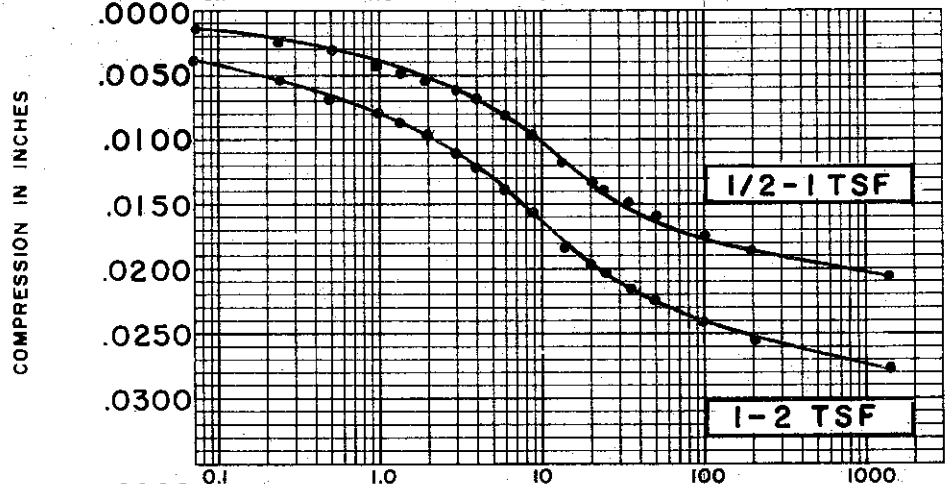
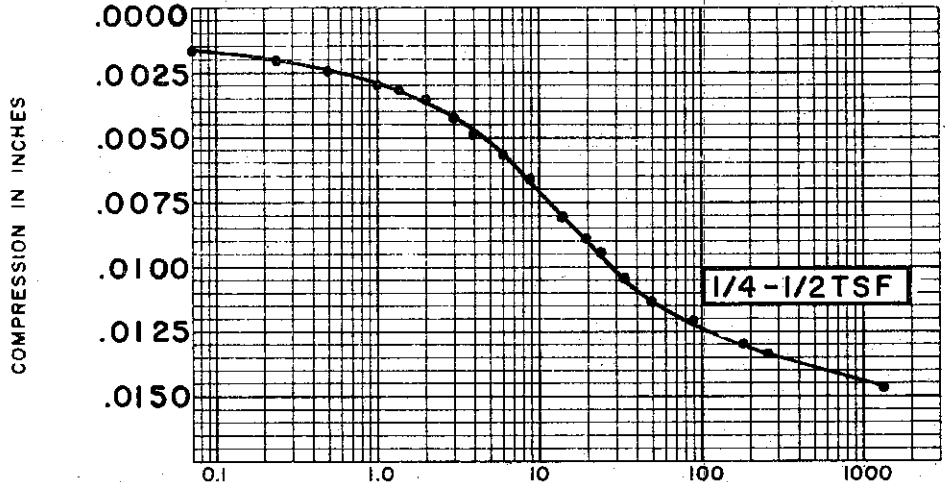
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C33.1  
 SAMPLE NO. 13 DATE JAN. 1974  
 DEPTH 53'

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0-7-0



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL - CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 43.5 %  
 FINAL WATER CONTENT 31.9 %

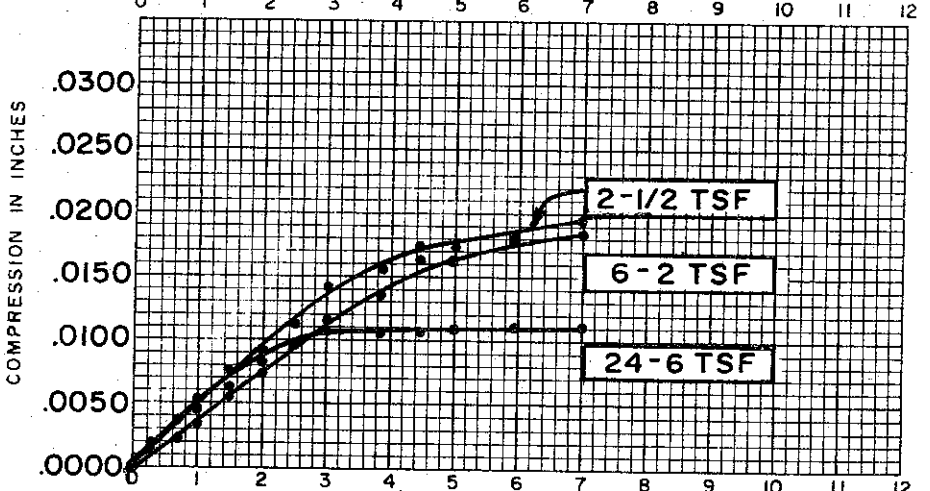
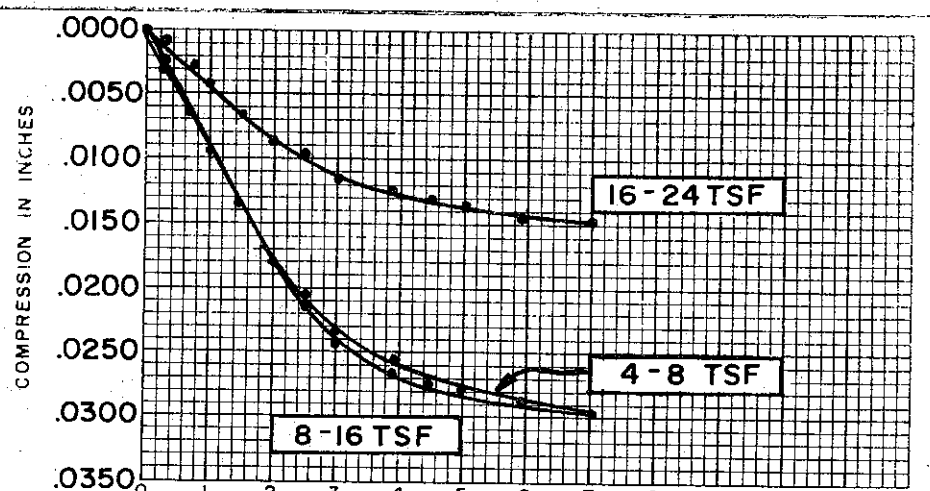
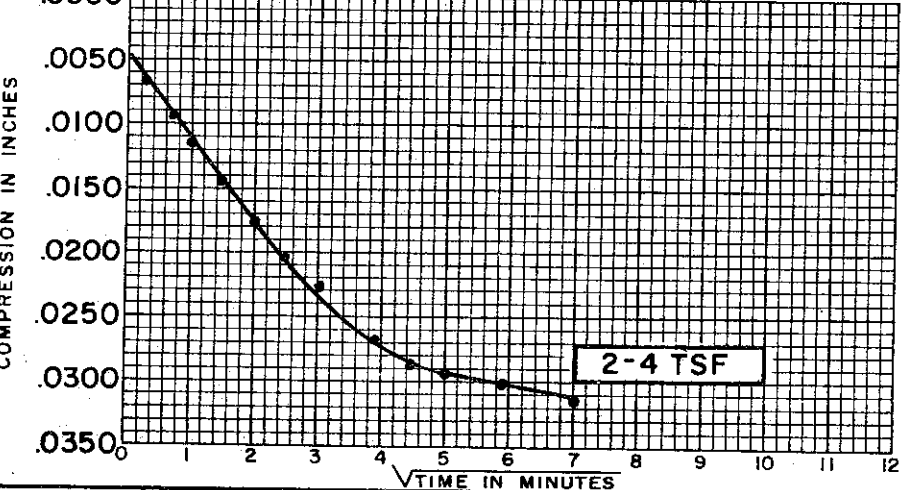
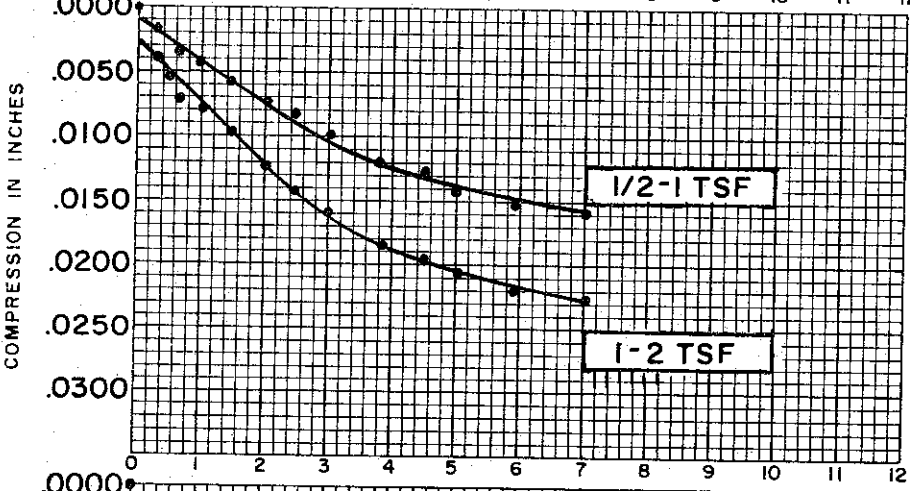
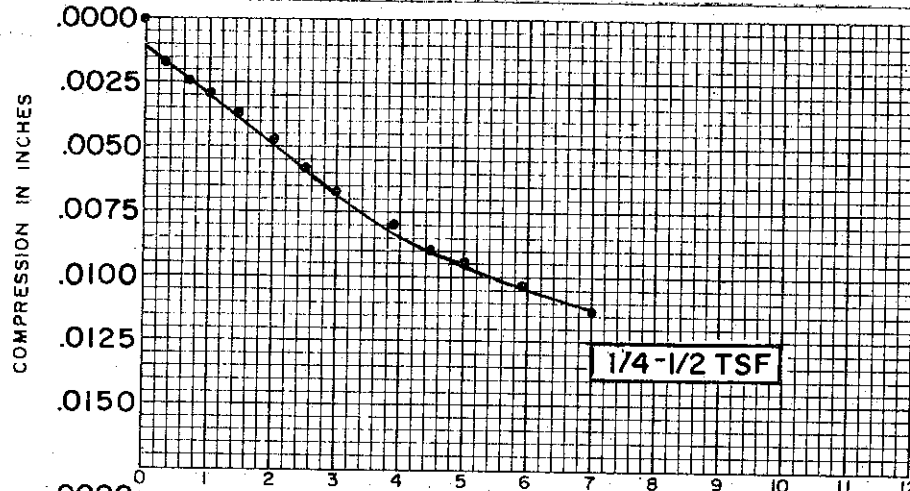
BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 46.5%  
 FINAL WATER CONTENT 31.9%

BORING NO. 41  
 SAMPLE NO. 13  
 DEPTH 53.0'

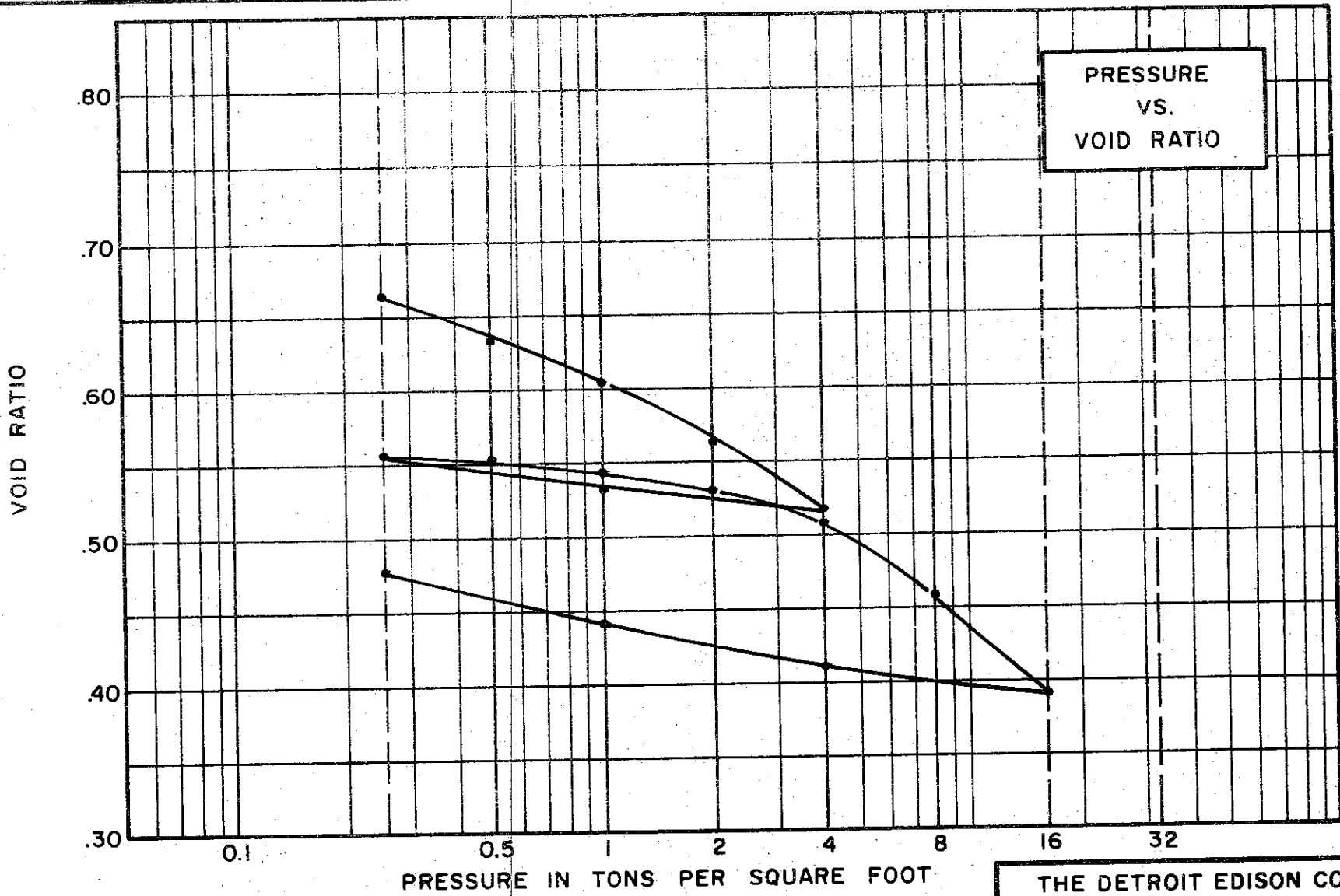
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.235

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C35.1  
 SAMPLE NO. 17 DATE JAN. 1974  
 DEPTH 73.5'

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY;  
SANDY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 26.7% FINAL 19.7%

ATTERBERG LIMITS:  
 LIQUID LIMIT 25% PLASTIC LIMIT 15%

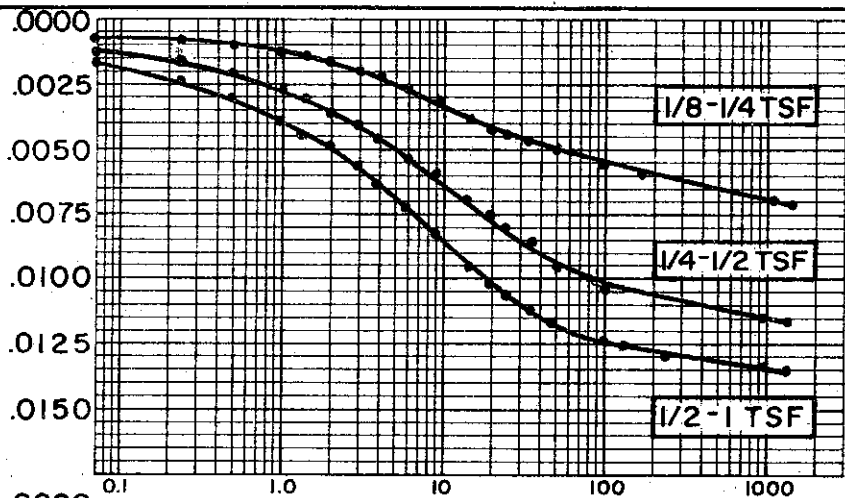
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

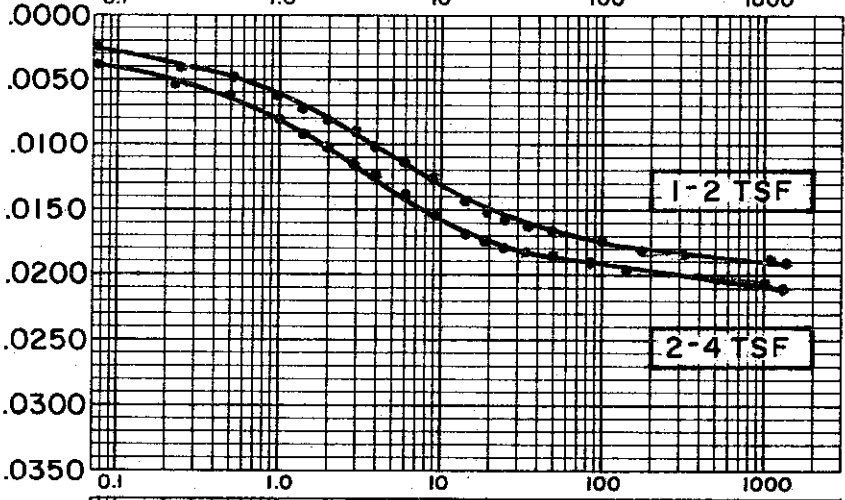
INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.697

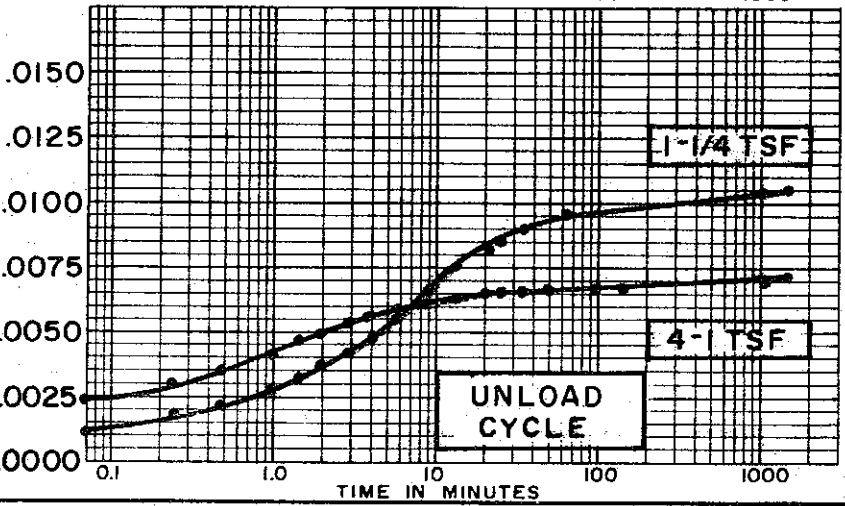
COMPRESSION IN INCHES



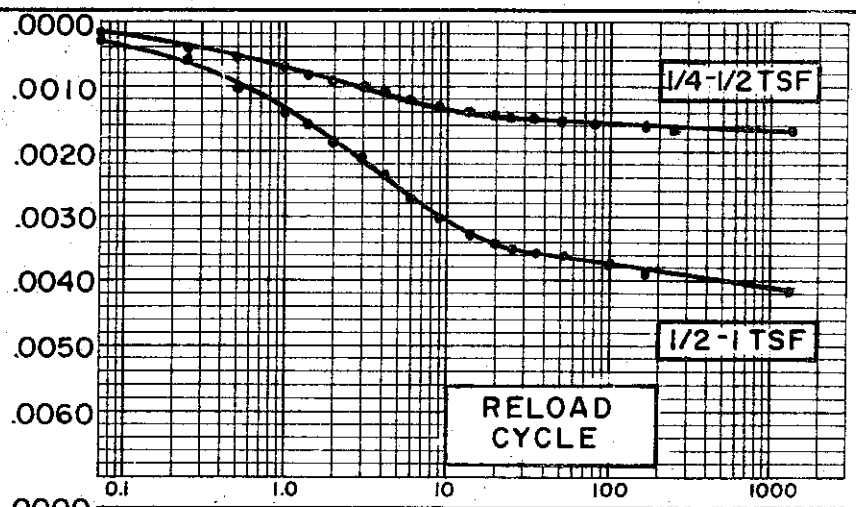
COMPRESSION IN INCHES



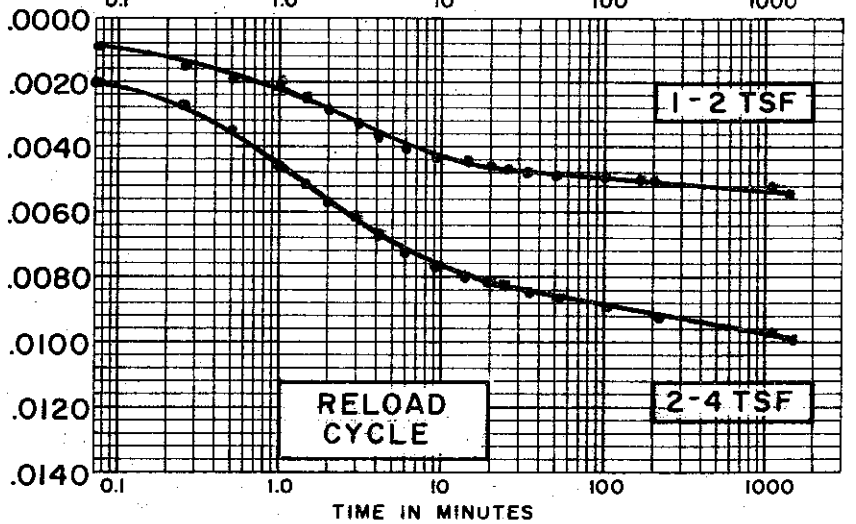
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7%  
 FINAL WATER CONTENT 19.7%

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5'

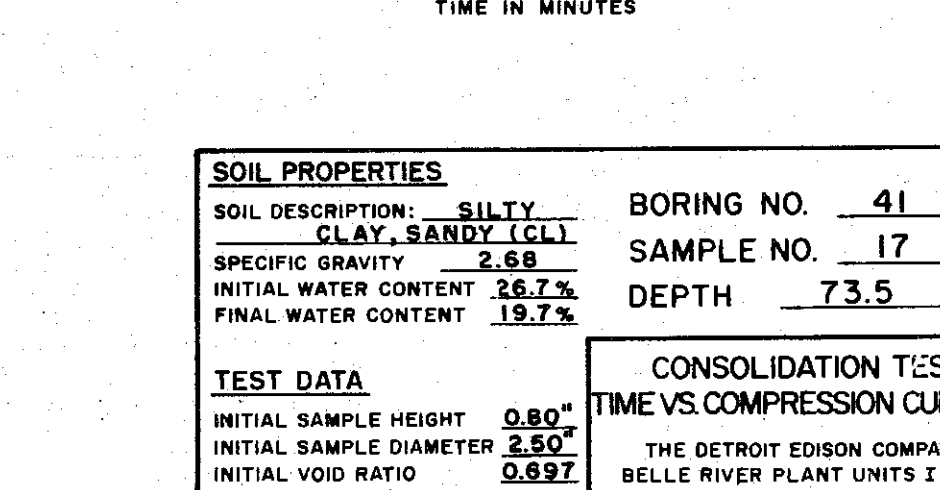
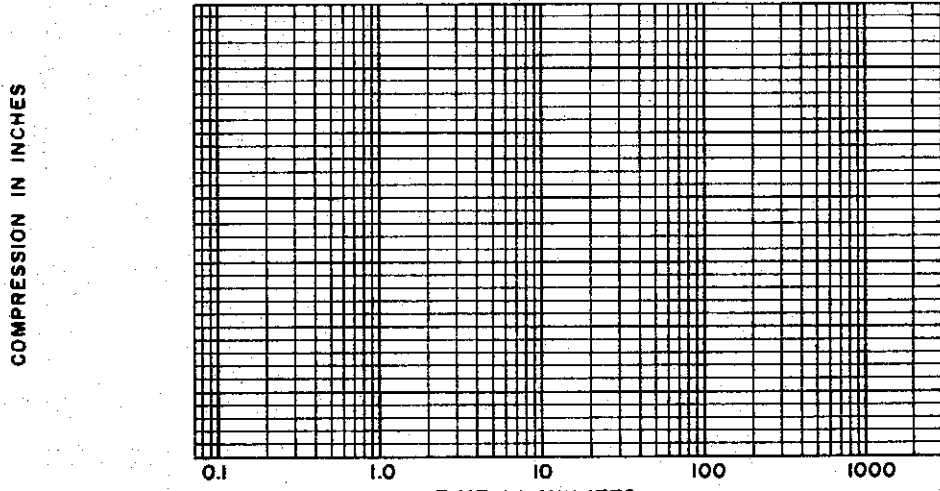
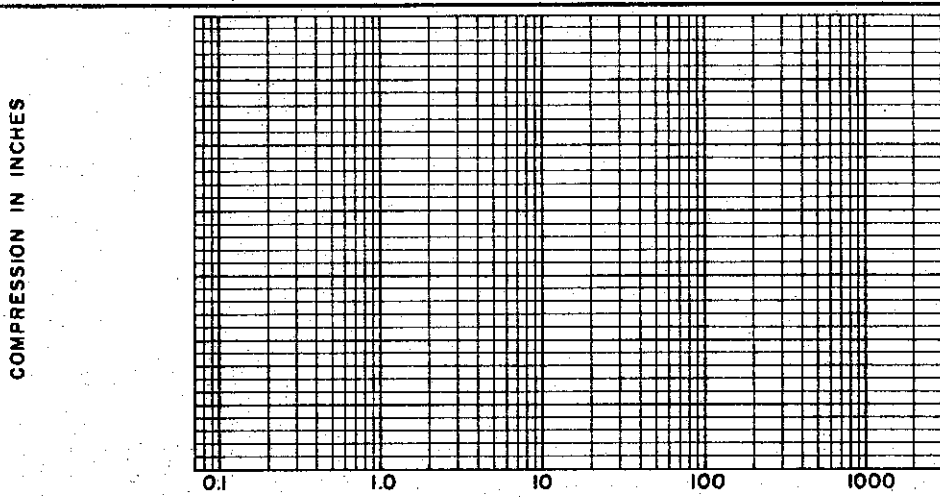
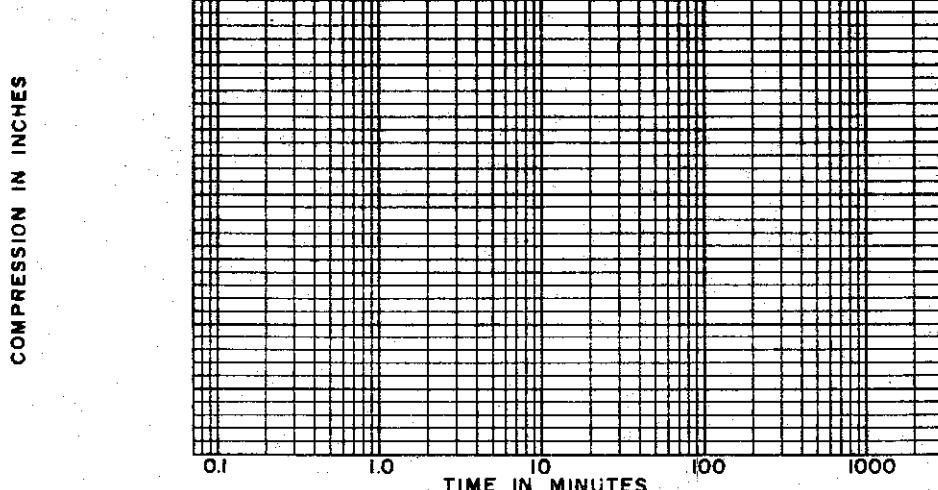
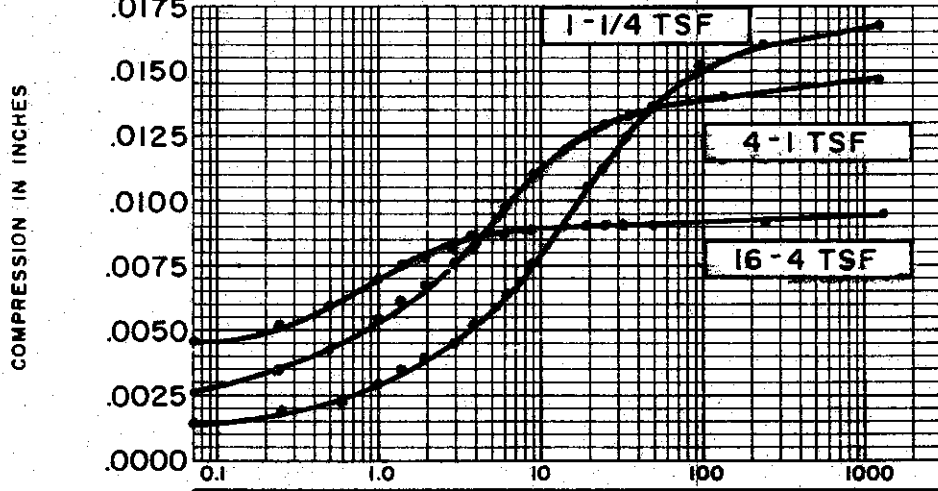
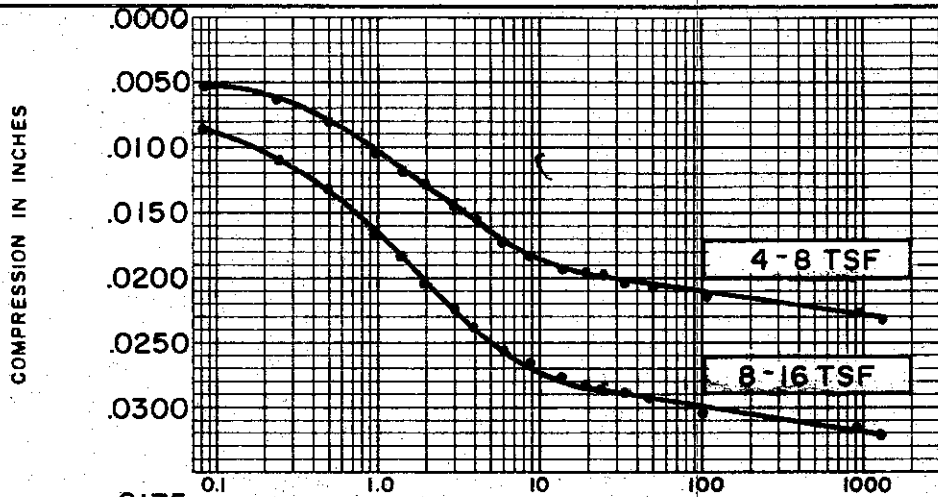
TEST DATA

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DI. METER 2.50"  
 INITIAL VOID RATIO 0.697

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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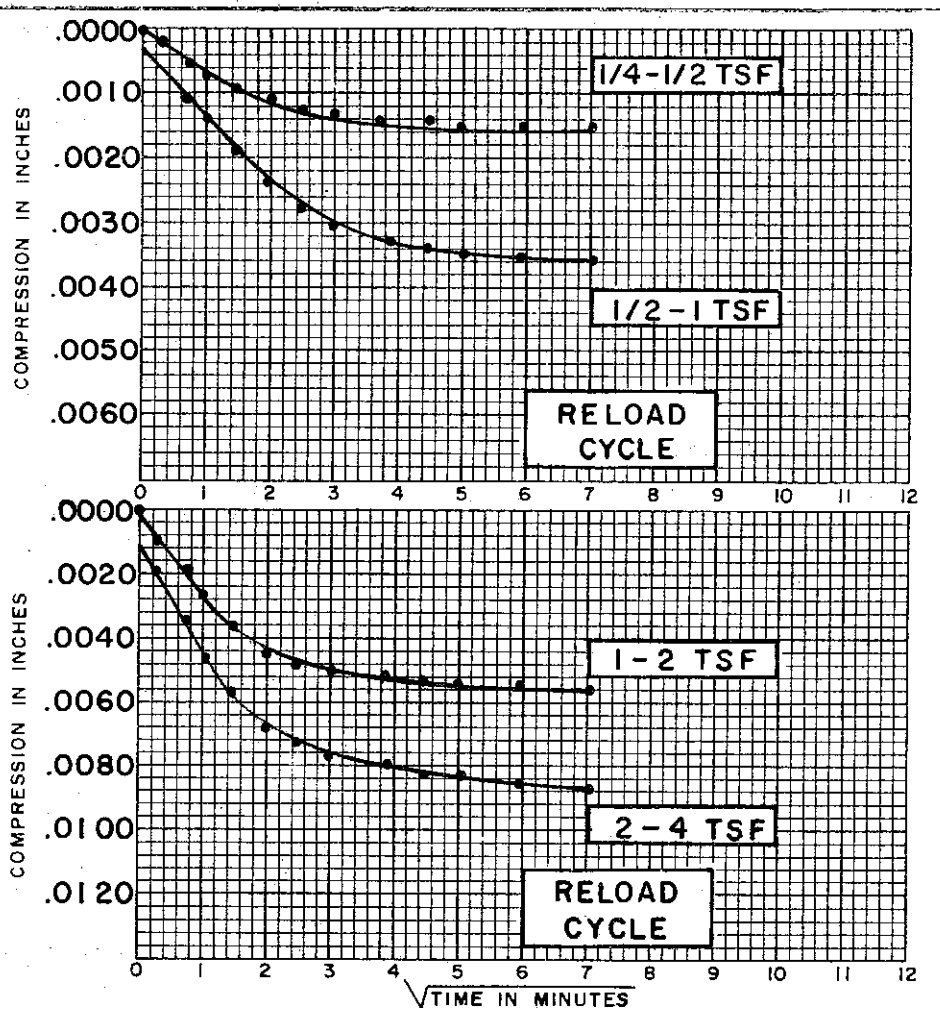
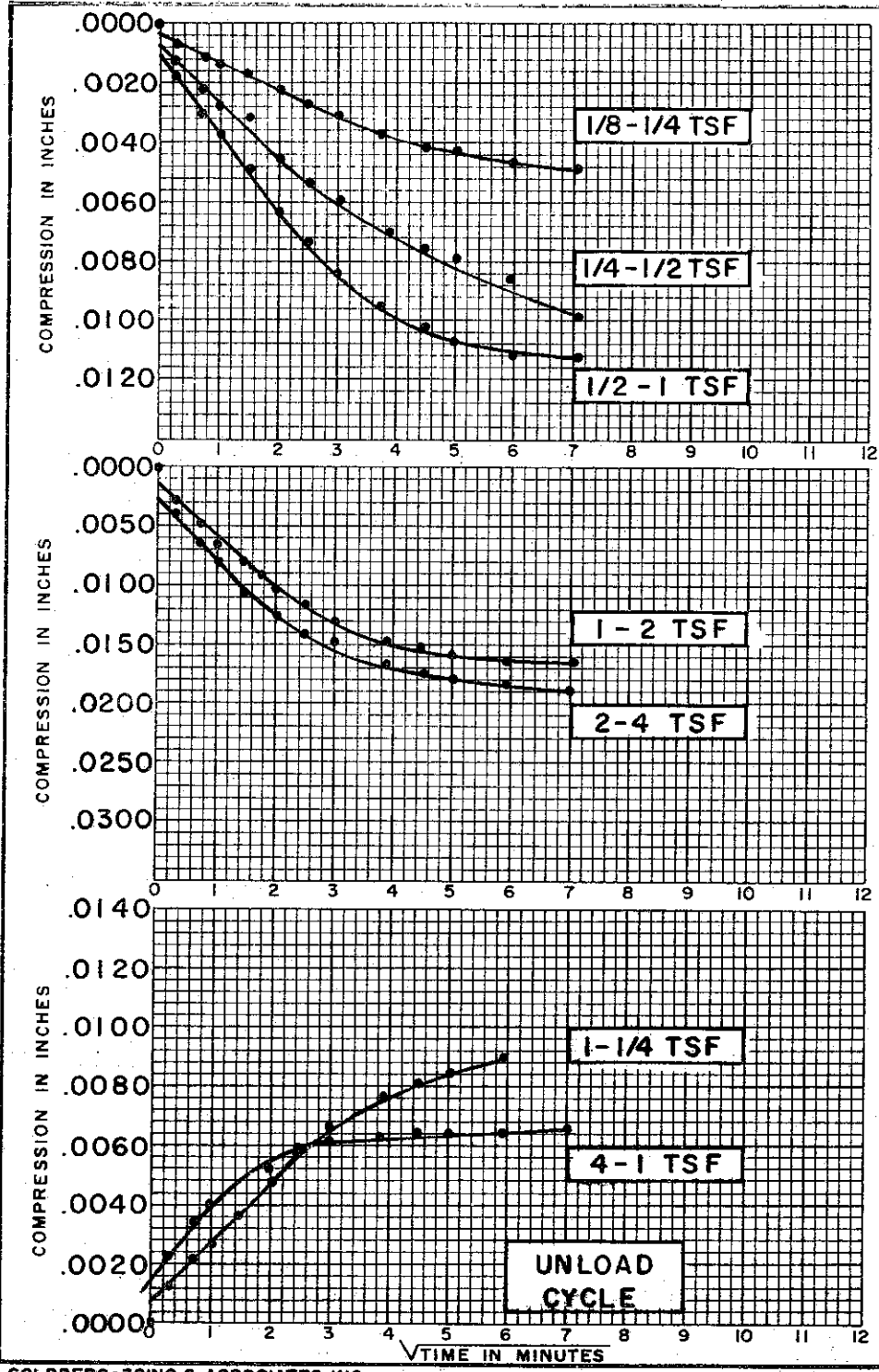


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	26.7%
FINAL WATER CONTENT	19.7%
BORING NO.	41
SAMPLE NO.	17
DEPTH	73.5

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.697

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



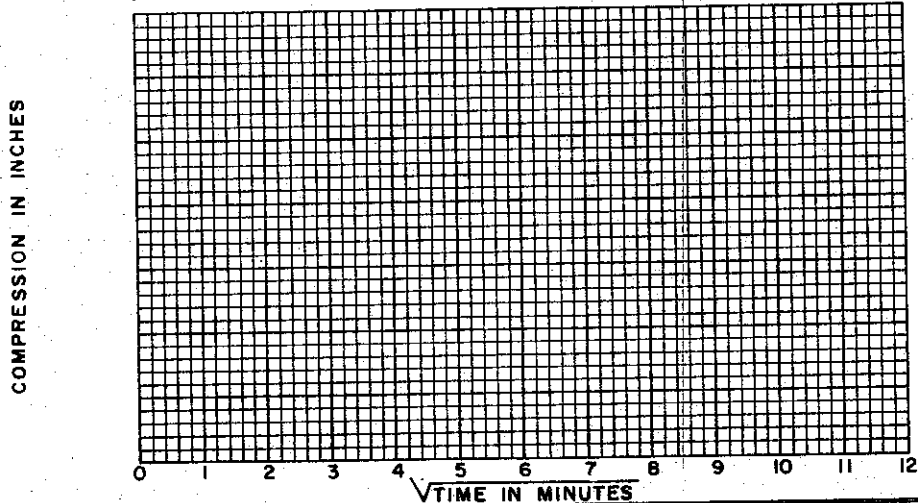
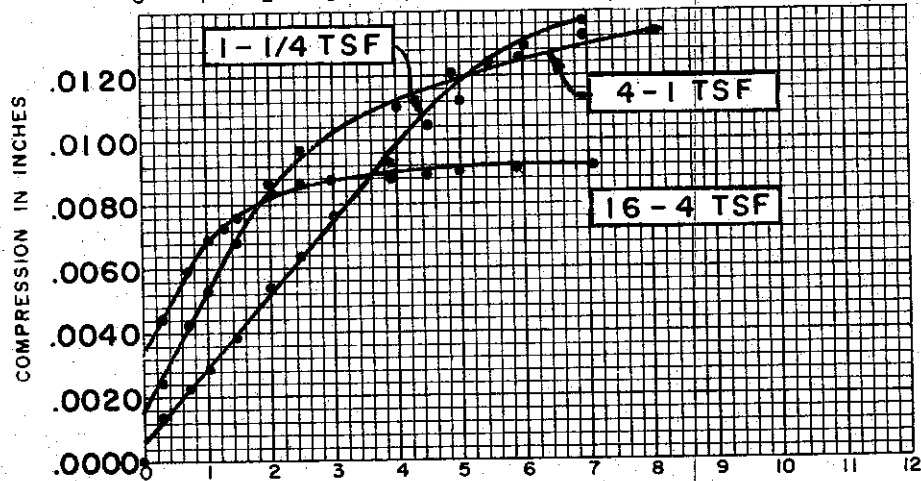
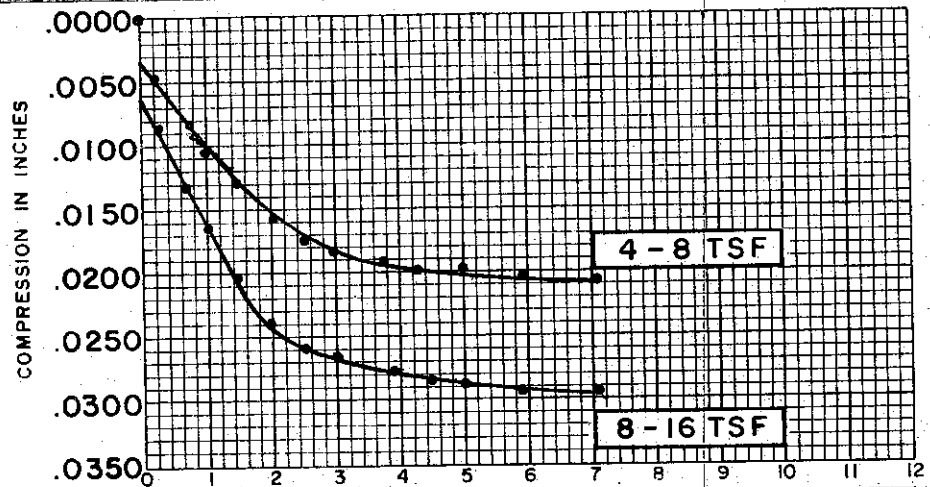


SOIL PROPERTIES	
SOIL DESCRIPTION: <u>SILTY CLAY, SANDY (CL)</u>	BORING NO. <u>41</u>
SPECIFIC GRAVITY <u>2.68</u>	SAMPLE NO. <u>17</u>
INITIAL WATER CONTENT <u>26.7%</u>	DEPTH <u>73.5</u>
FINAL WATER CONTENT <u>19.7%</u>	
TEST DATA	
INITIAL SAMPLE HEIGHT <u>0.80"</u>	
INITIAL SAMPLE DIAMETER <u>2.50"</u>	
INITIAL VOID RATIO <u>0.697</u>	

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

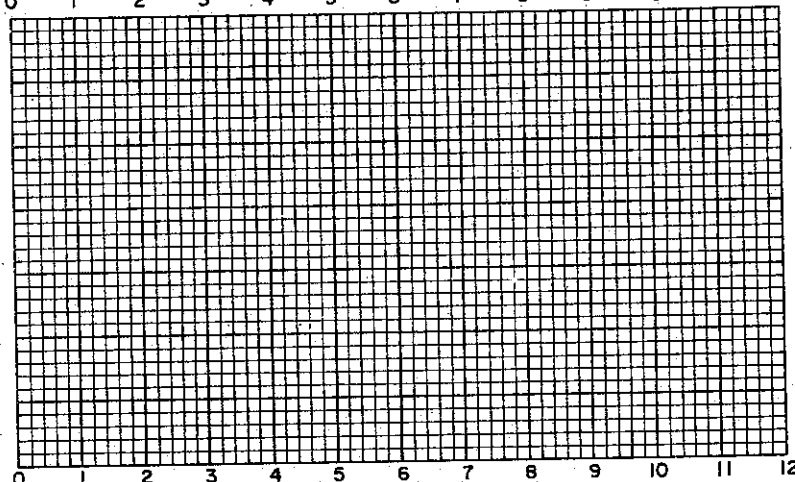
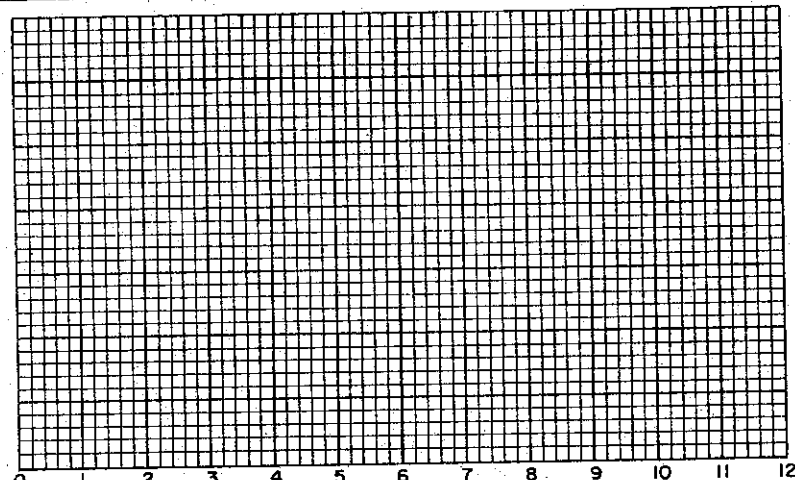
C-483

787-484



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 26.7 %  
 FINAL WATER CONTENT 19.7 %

BORING NO. 41  
 SAMPLE NO. 17  
 DEPTH 73.5

**TEST DATA**

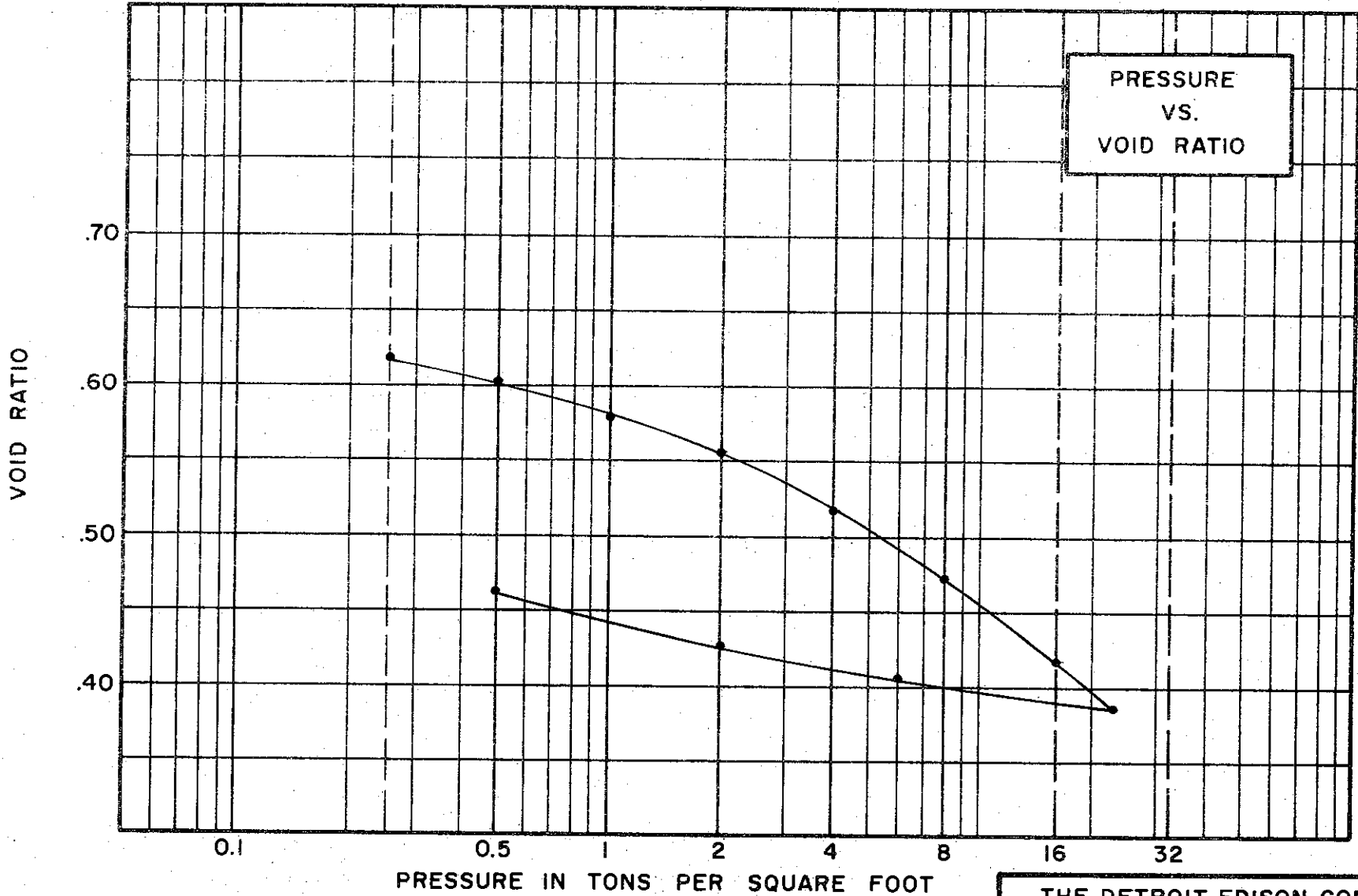
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.697

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 24.2% FINAL 19.4%  
ATTERBERG LIMITS:  
LIQUID LIMIT 29% PLASTIC LIMIT 19%

**TEST DATA**

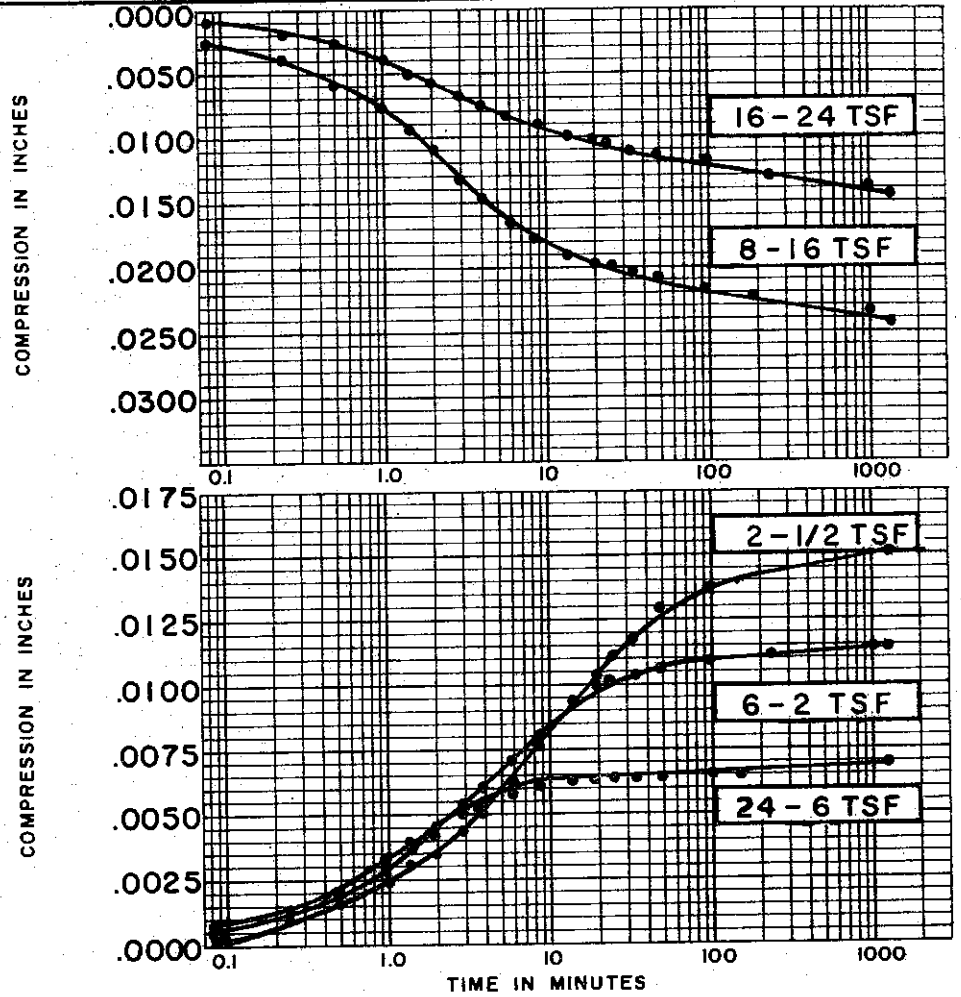
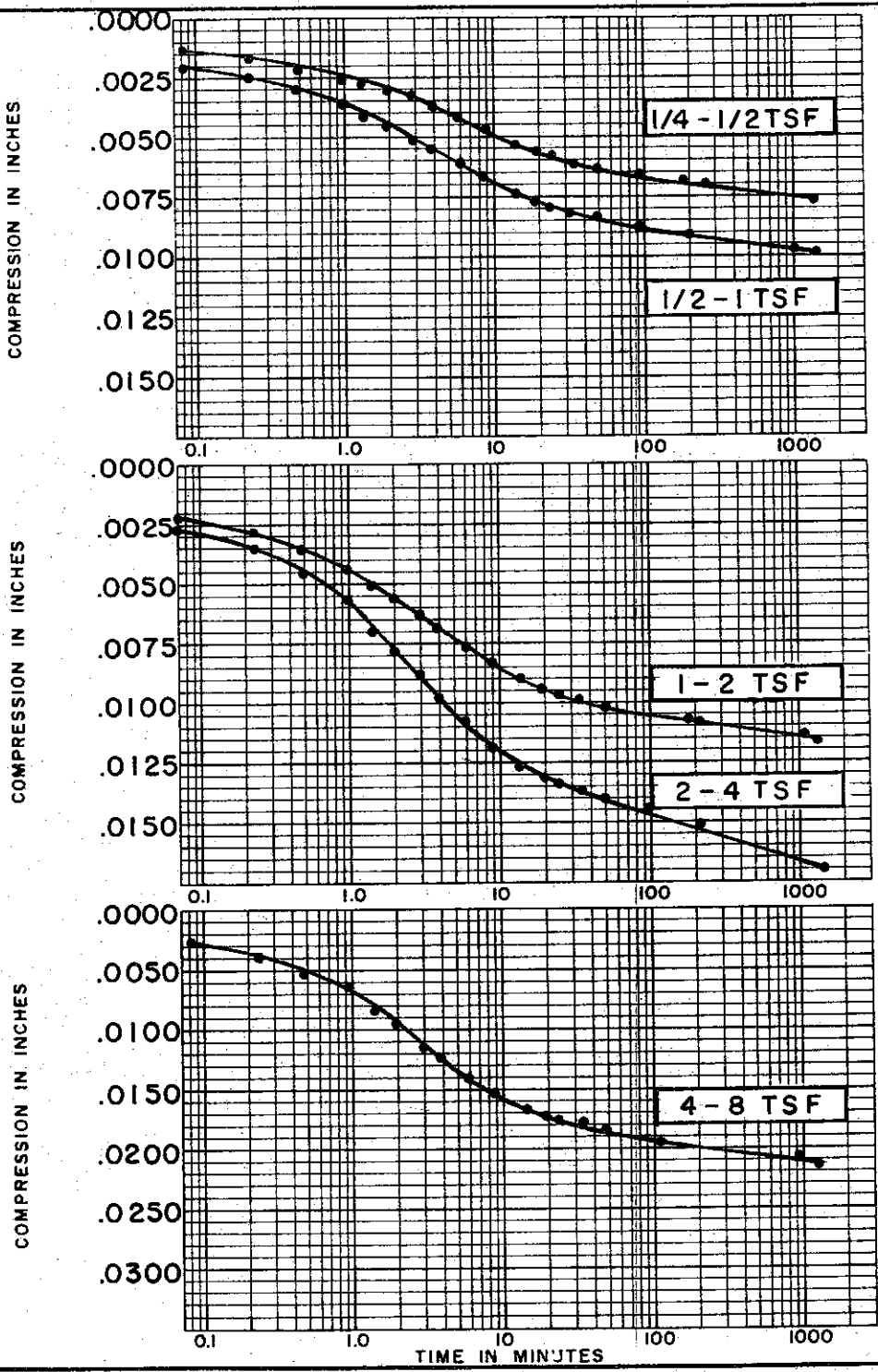
INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 41 TEST NO. C38.1  
SAMPLE NO. 25 DATE JAN. 1974  
DEPTH 113'

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

INITIAL WATER CONTENT 24.2 %

FINAL WATER CONTENT 19.4 %

BORING NO. 41

SAMPLE NO. 25

DEPTH 113'

**TEST DATA**

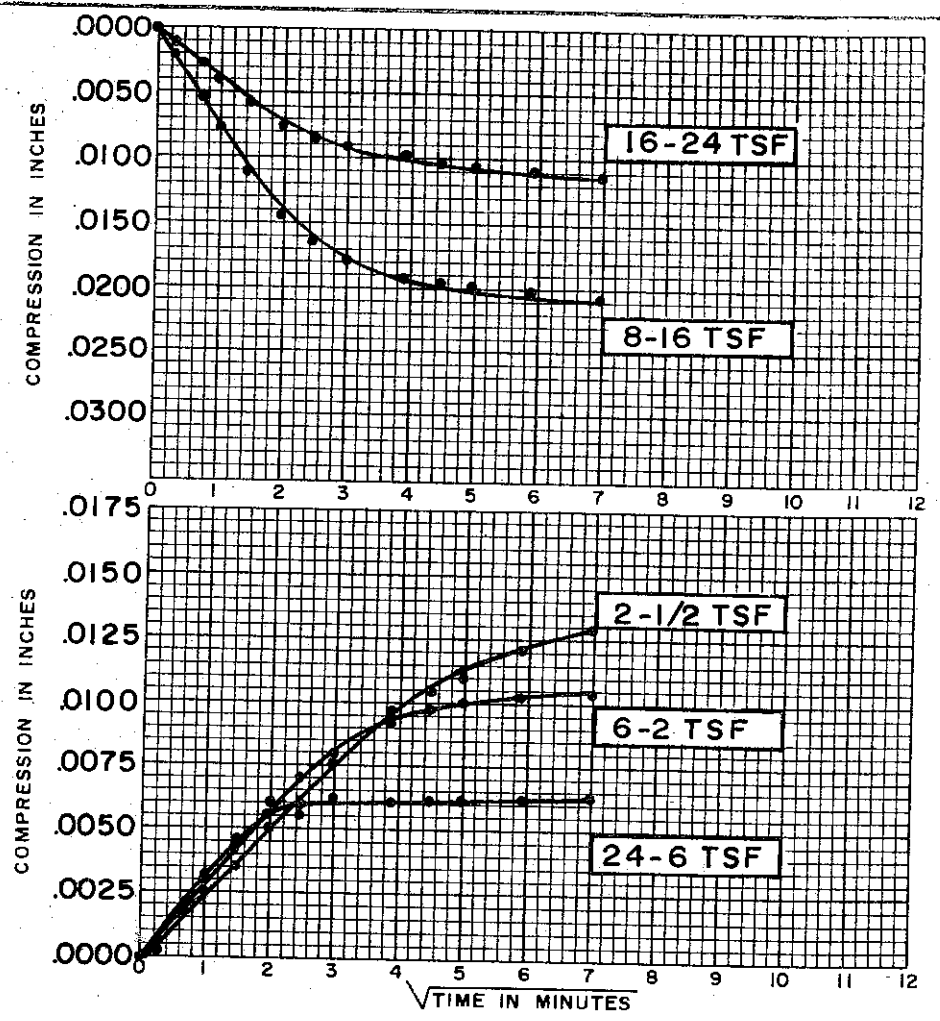
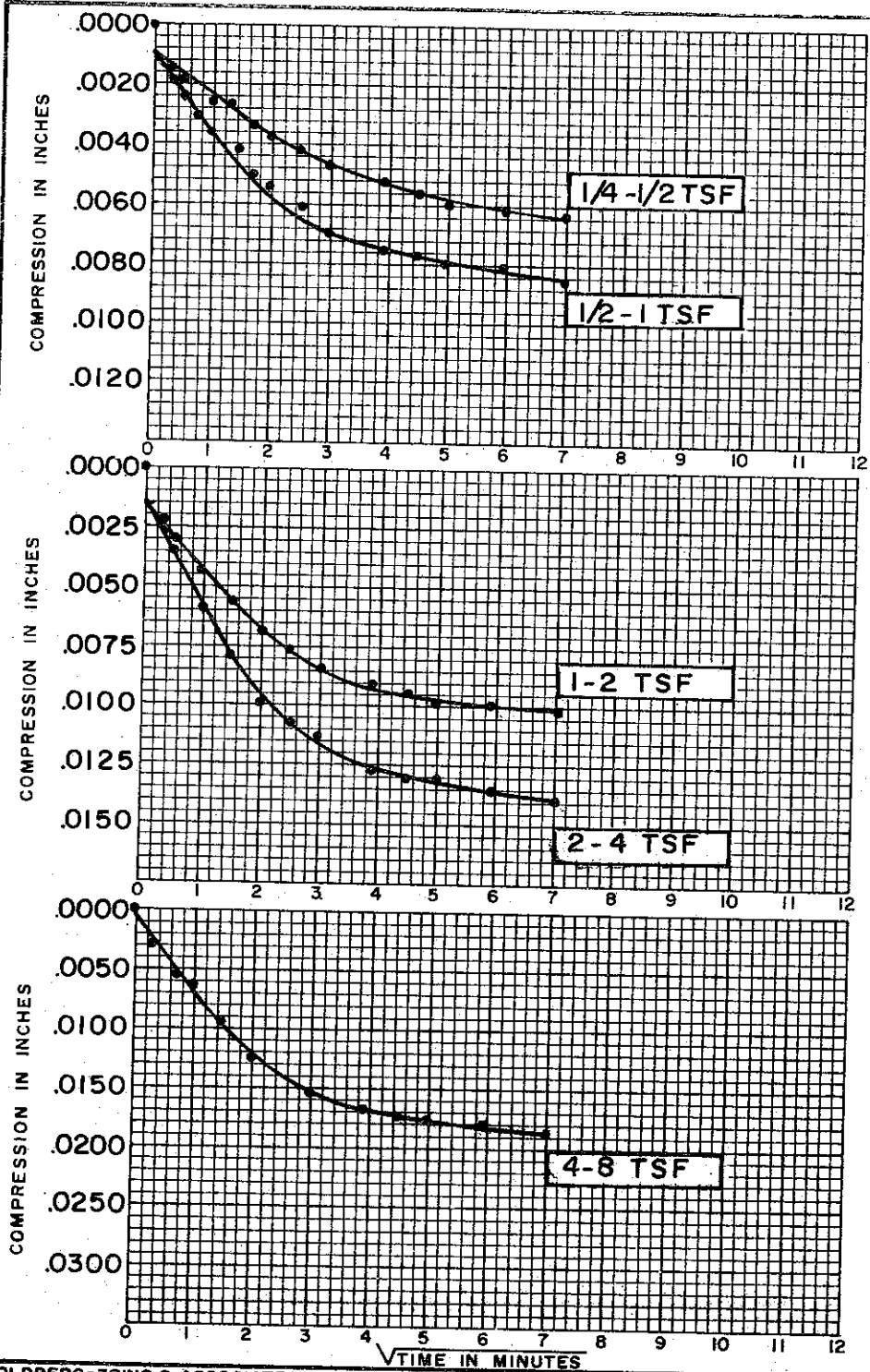
INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 24.2%  
 FINAL WATER CONTENT 19.4%

BORING NO. 41  
 SAMPLE NO. 25  
 DEPTH 113'

**TEST DATA**

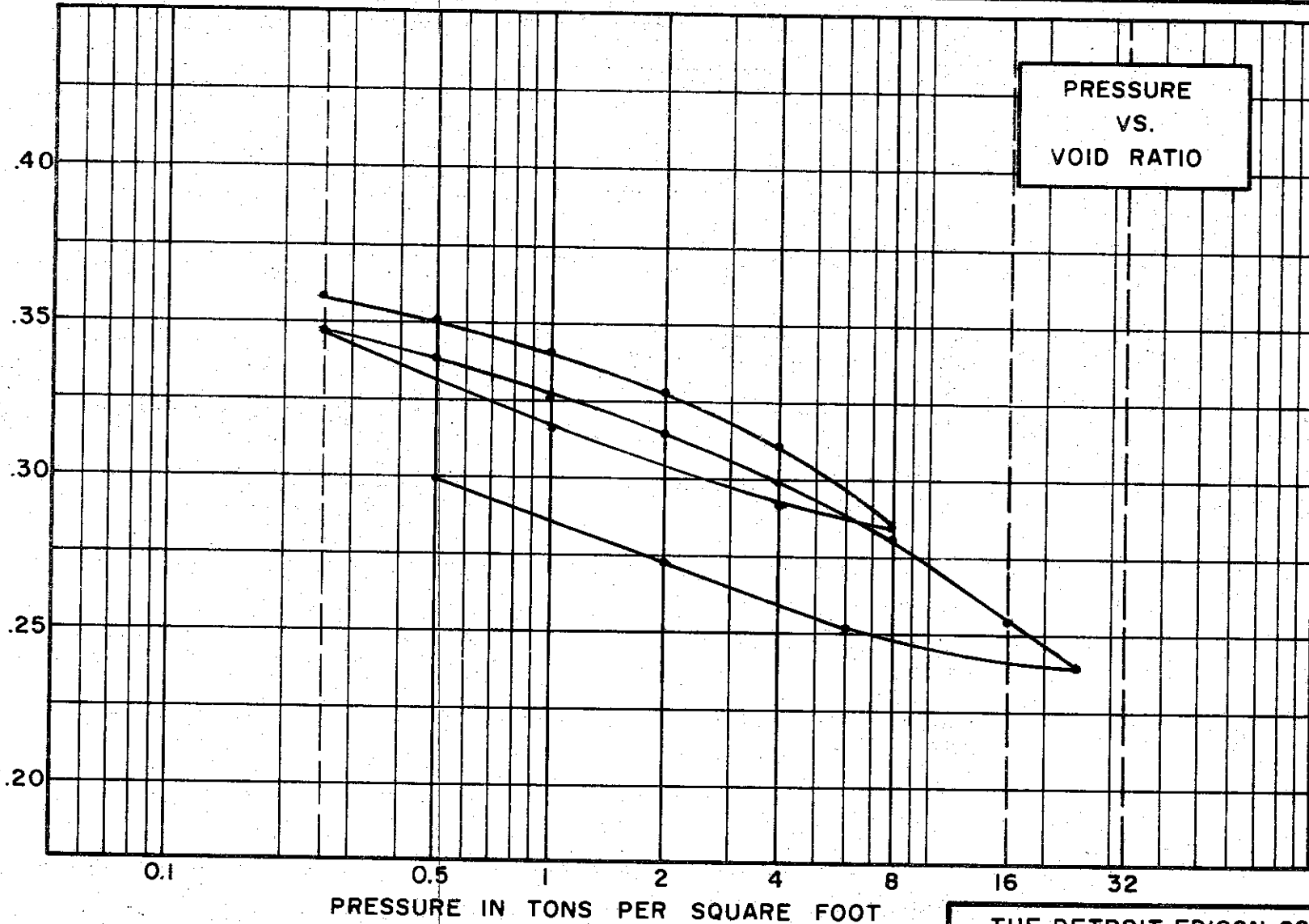
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

G-487

VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 WATER CONTENT, INITIAL 11.3% FINAL 12.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

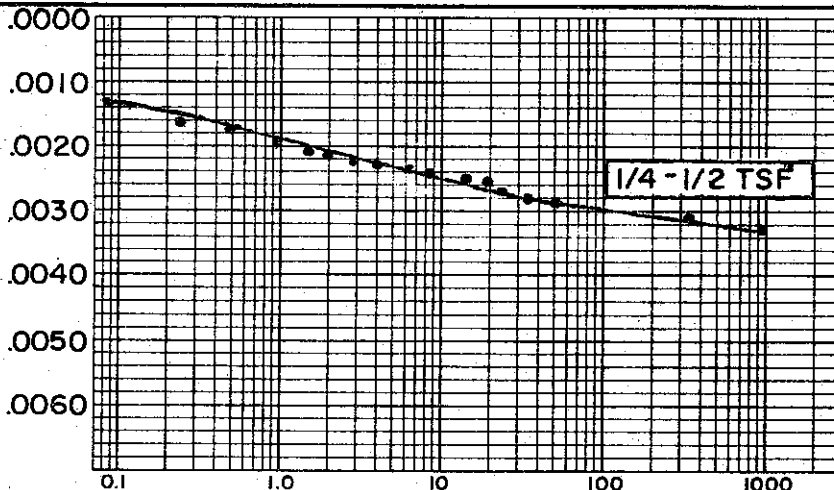
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.370

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

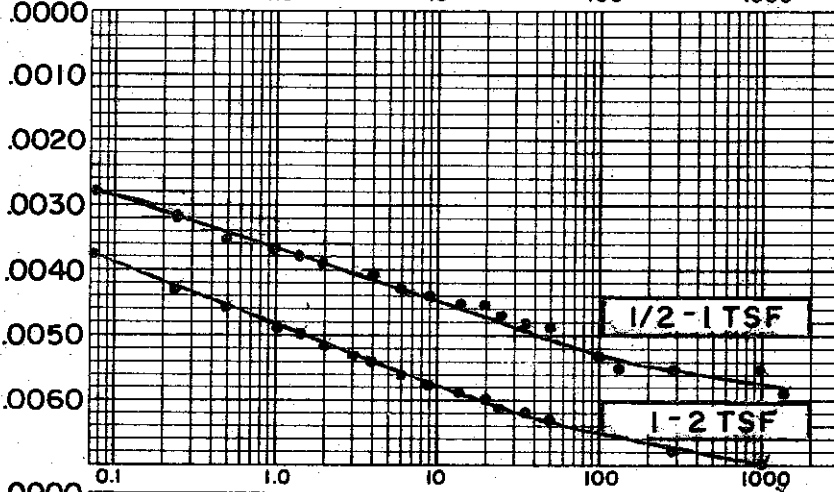
CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C4C.1  
 SAMPLE NO. 29 DATE FEB. 1974  
 DEPTH 130.8'

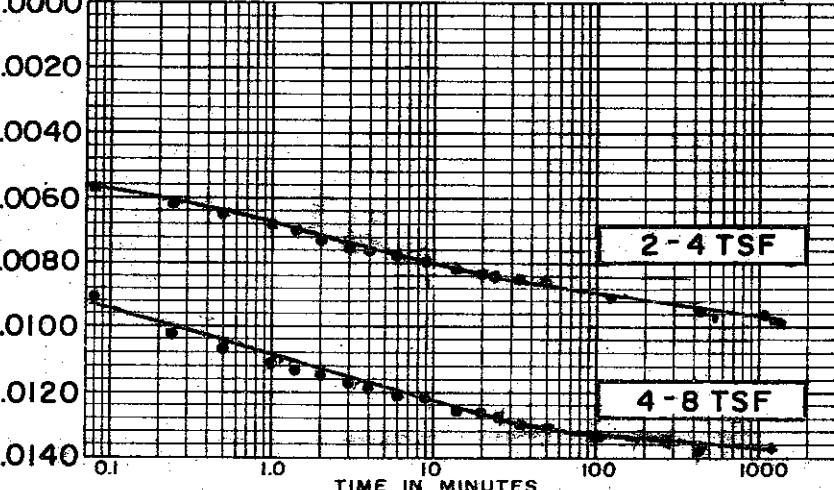
COMPRESSION IN INCHES



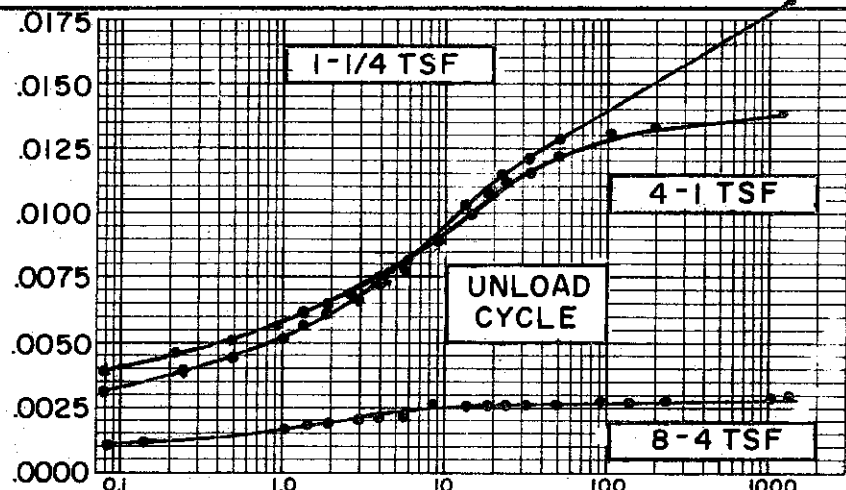
COMPRESSION IN INCHES



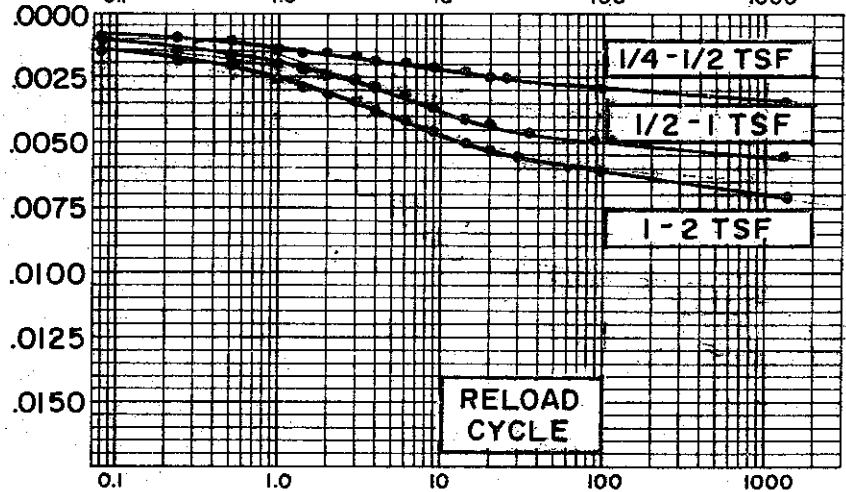
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



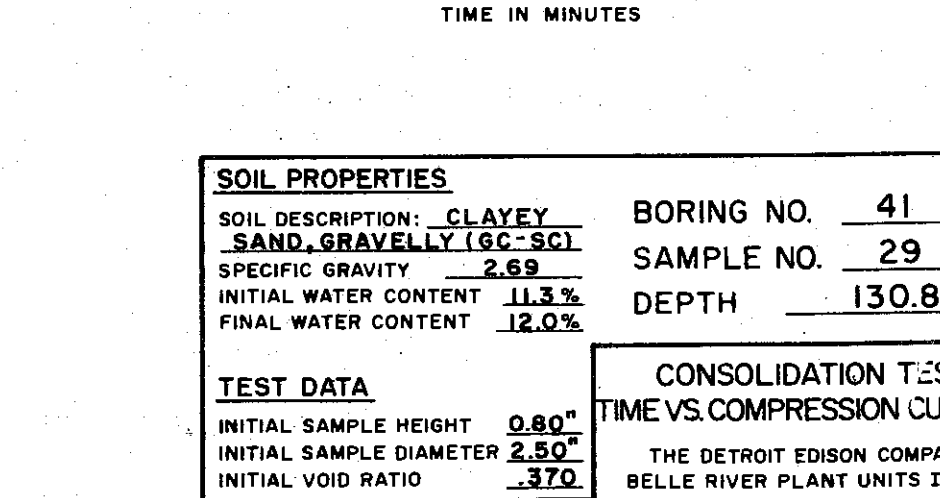
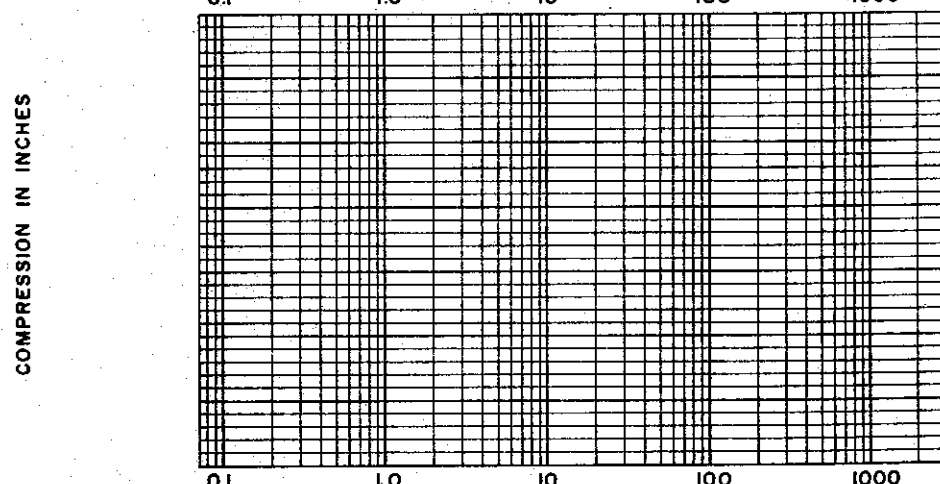
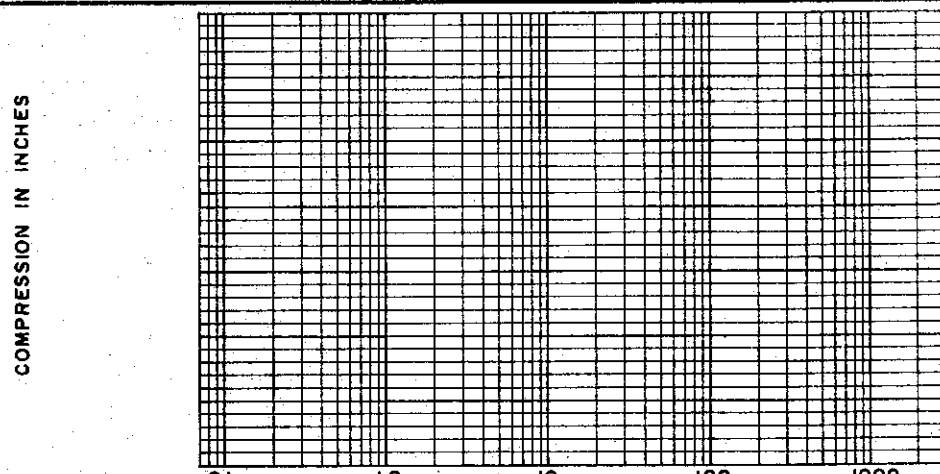
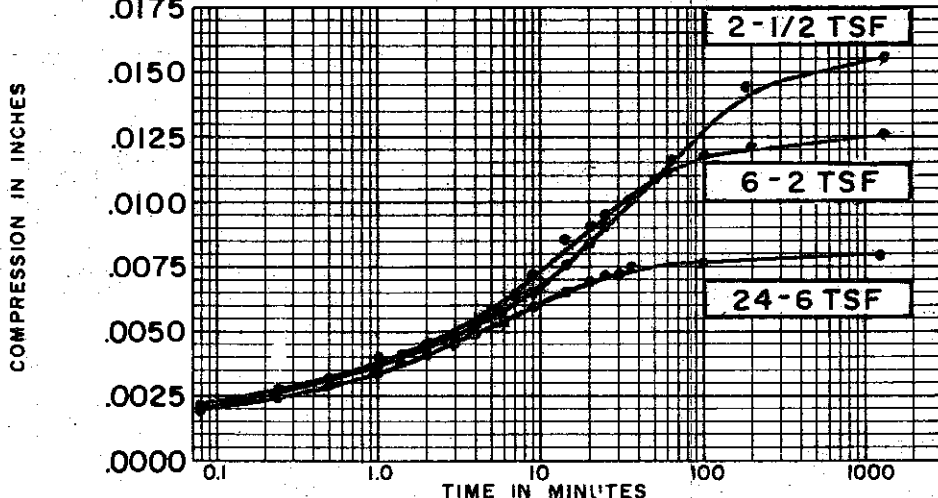
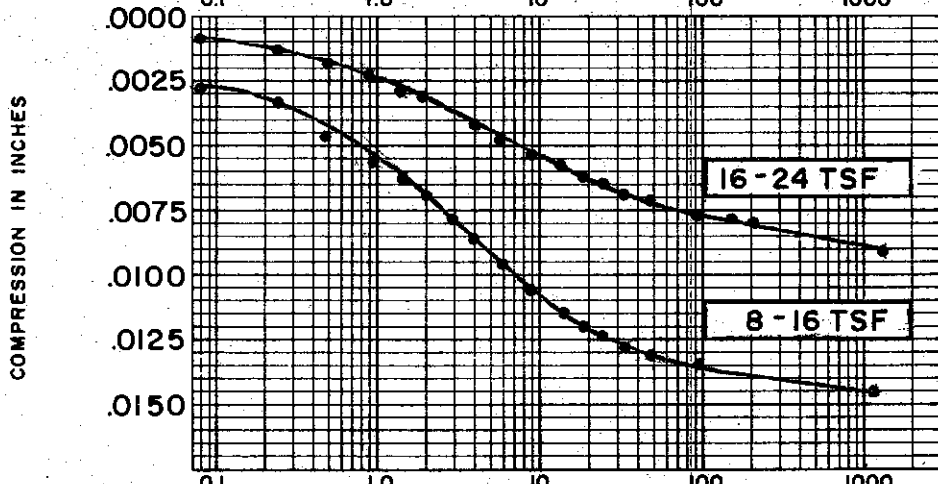
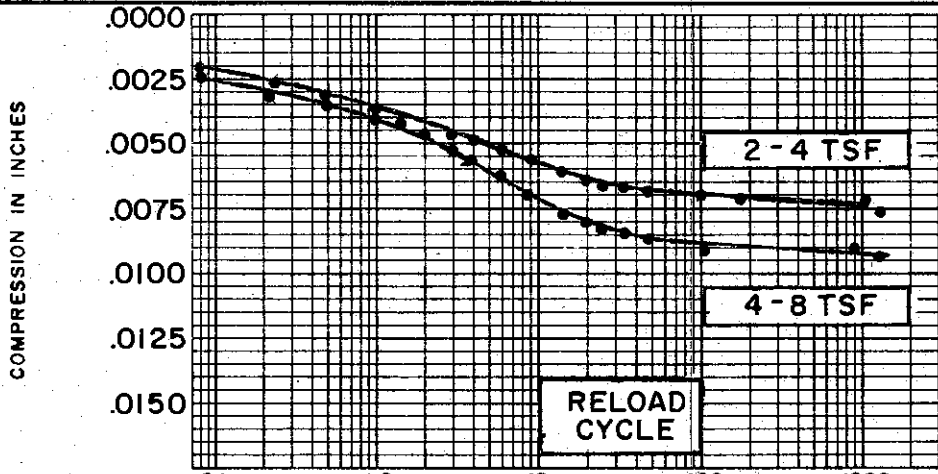
TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.3%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-489

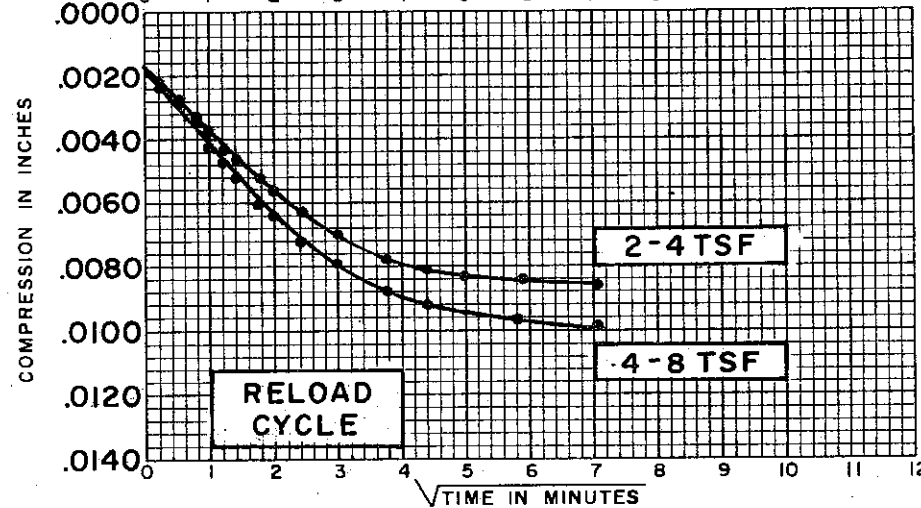
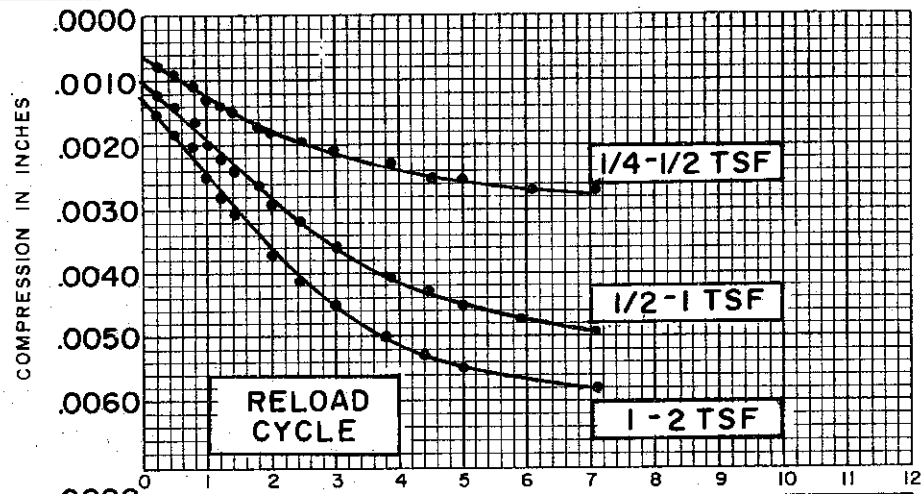
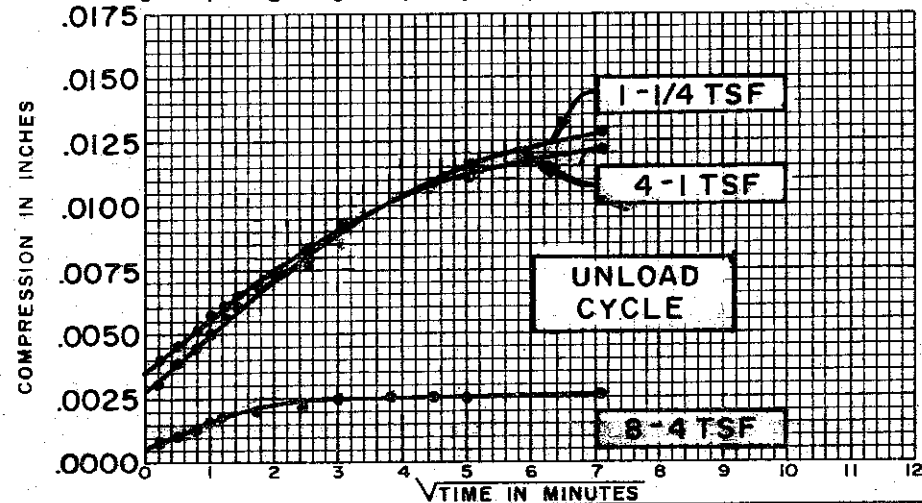
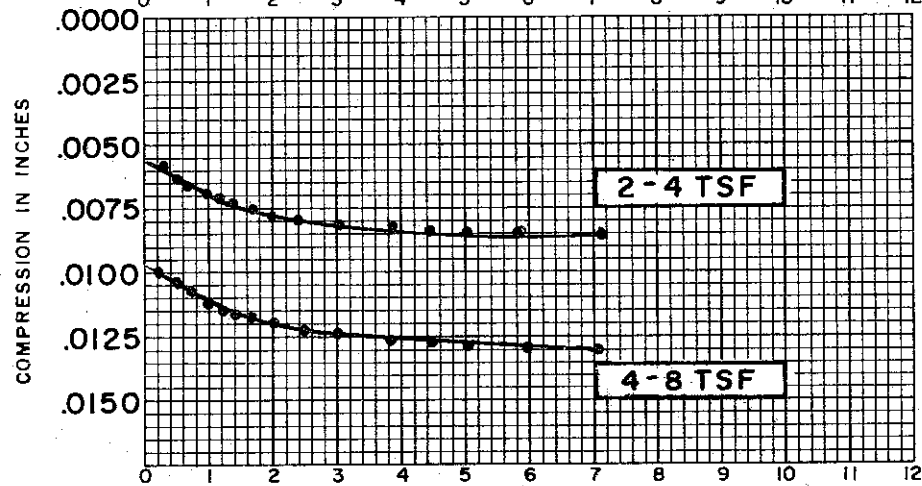
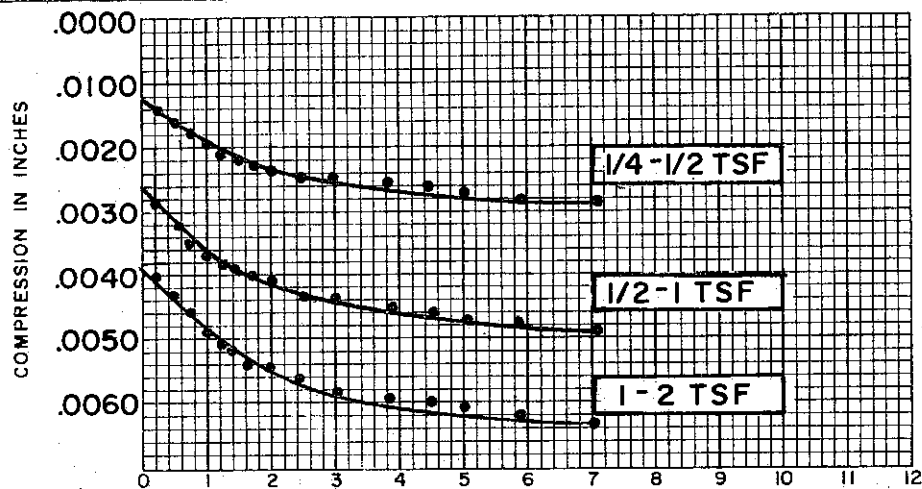


SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>CLAYEY SAND, GRAVELLY (GC-SC)</u>
SPECIFIC GRAVITY	<u>2.69</u>
INITIAL WATER CONTENT	<u>11.3%</u>
FINAL WATER CONTENT	<u>12.0%</u>
BORING NO.	<u>41</u>
SAMPLE NO.	<u>29</u>
DEPTH	<u>130.8'</u>

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>.370</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)  
 SPECIFIC GRAVITY 2.69  
 INITIAL WATER CONTENT 11.3%  
 FINAL WATER CONTENT 12.0%

BORING NO. 41  
 SAMPLE NO. 29  
 DEPTH 130.8'

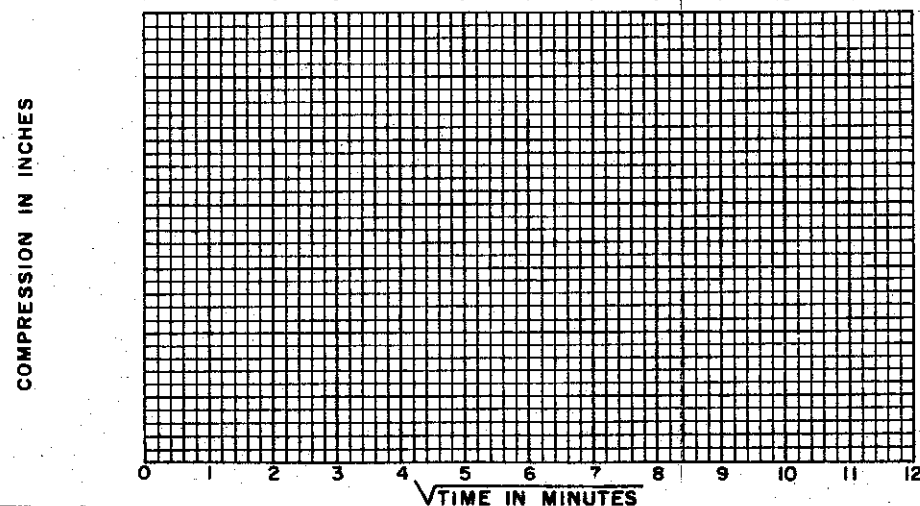
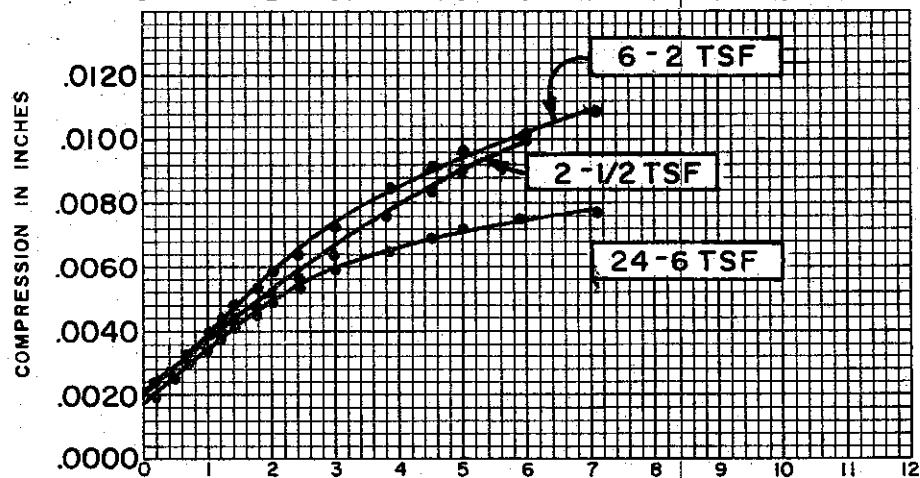
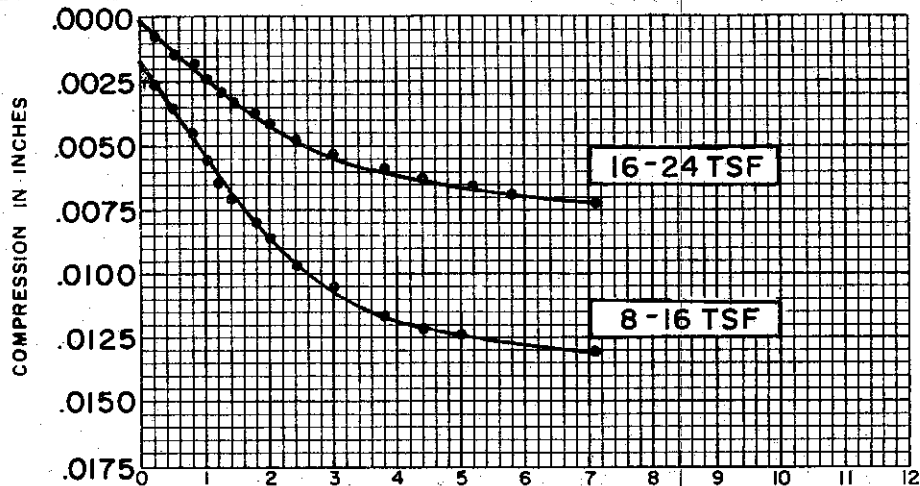
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO .370

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

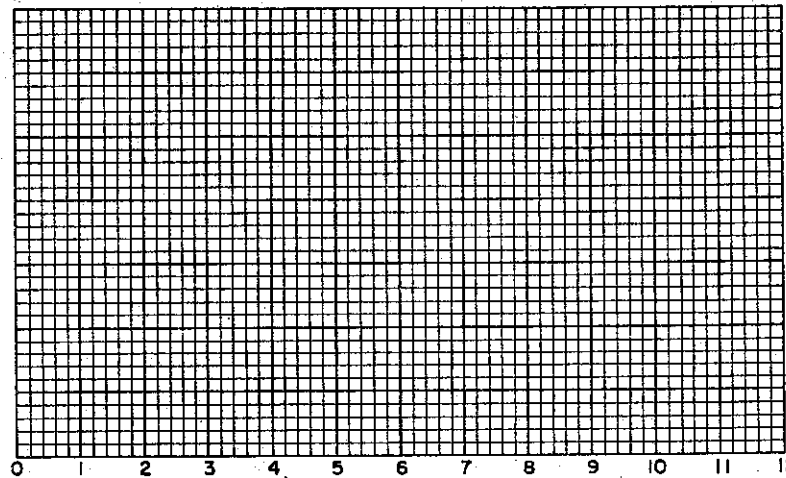
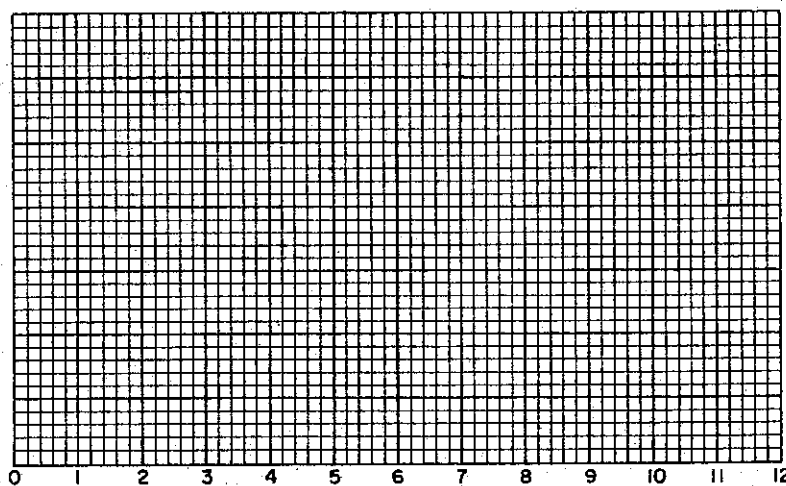
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-491



COMPRESSION IN INCHES

COMPRESSION IN INCHES

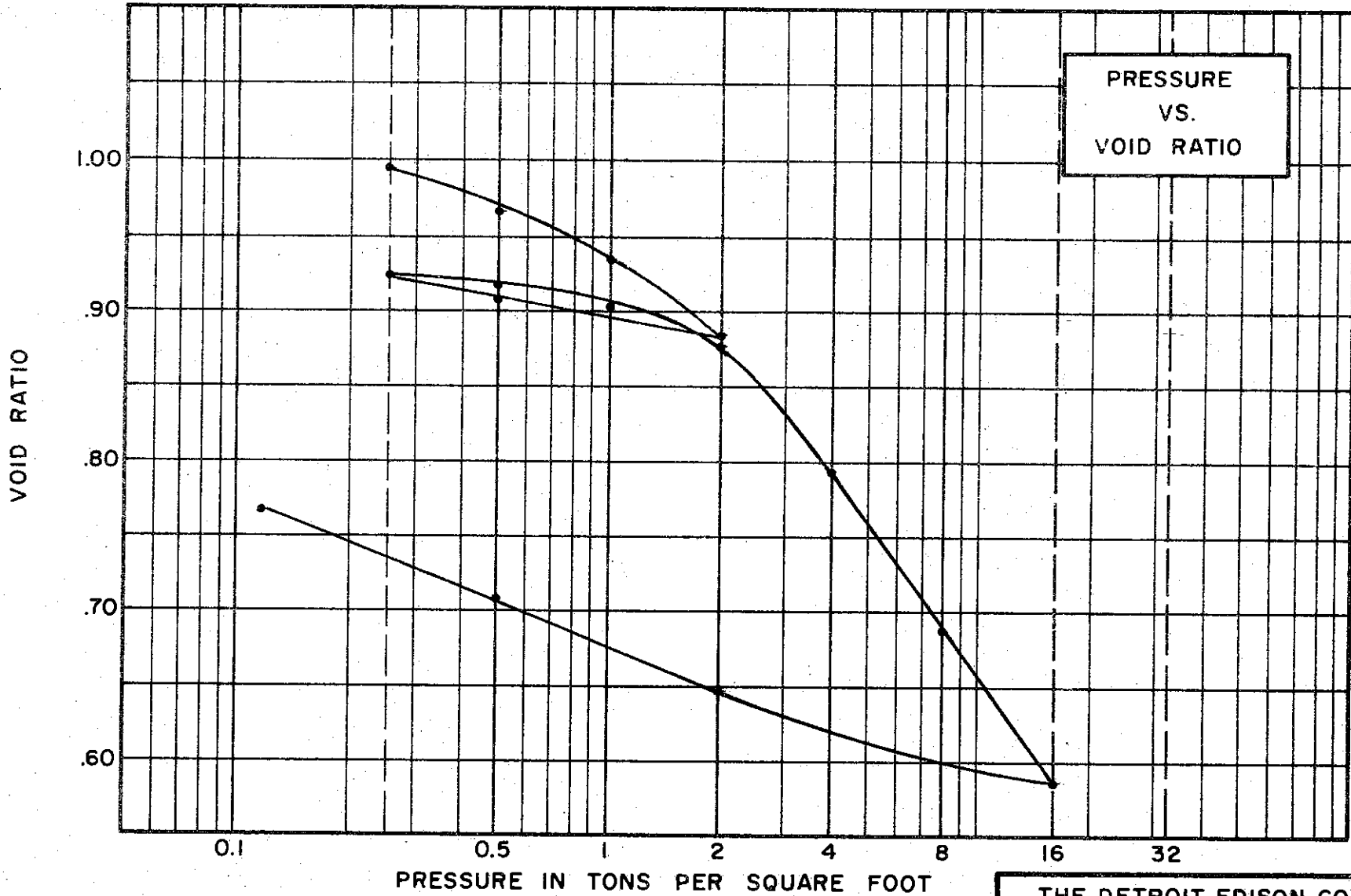


√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY	2.69
INITIAL WATER CONTENT	11.5%
FINAL WATER CONTENT	12.0%
BORING NO.	41
SAMPLE NO.	29
DEPTH	130.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	.370

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.8% FINAL 31.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 47% PLASTIC LIMIT 24%

**TEST DATA**

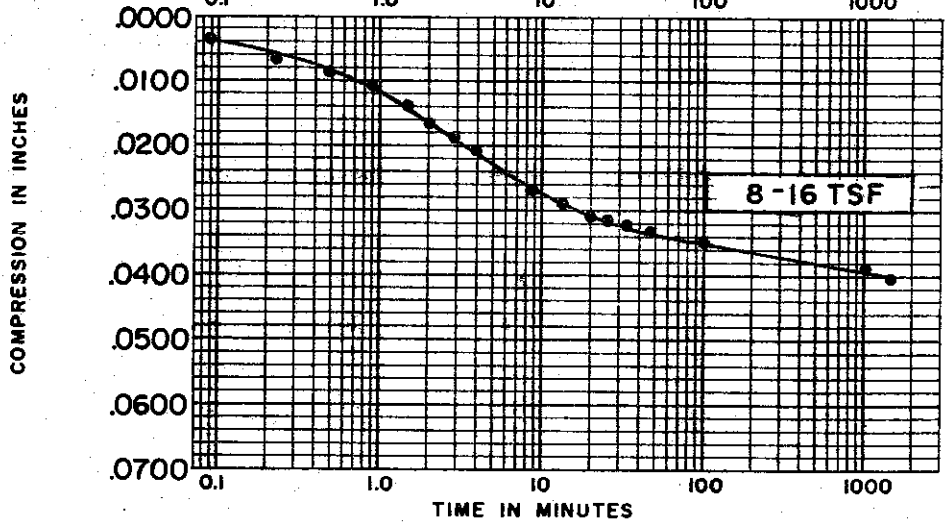
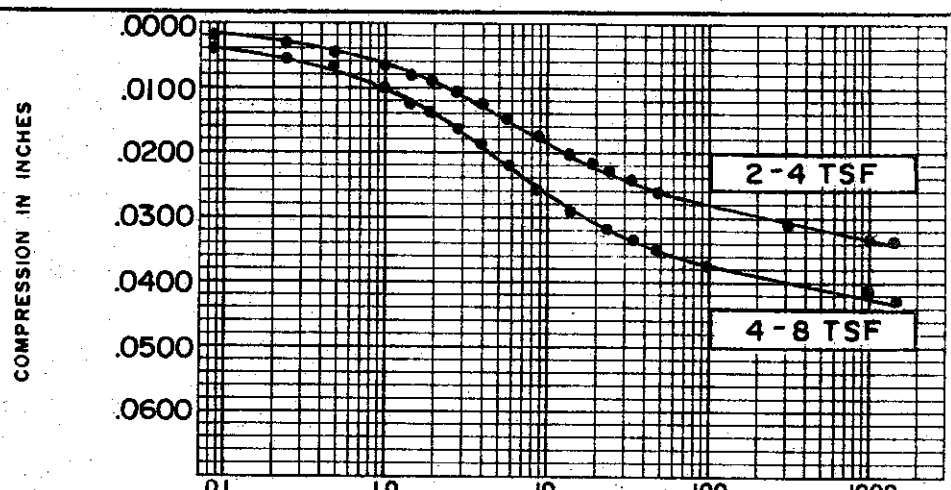
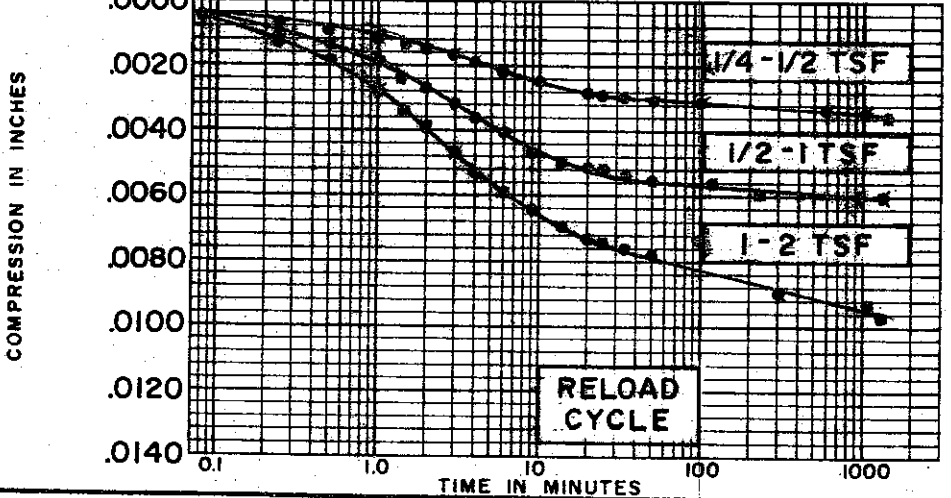
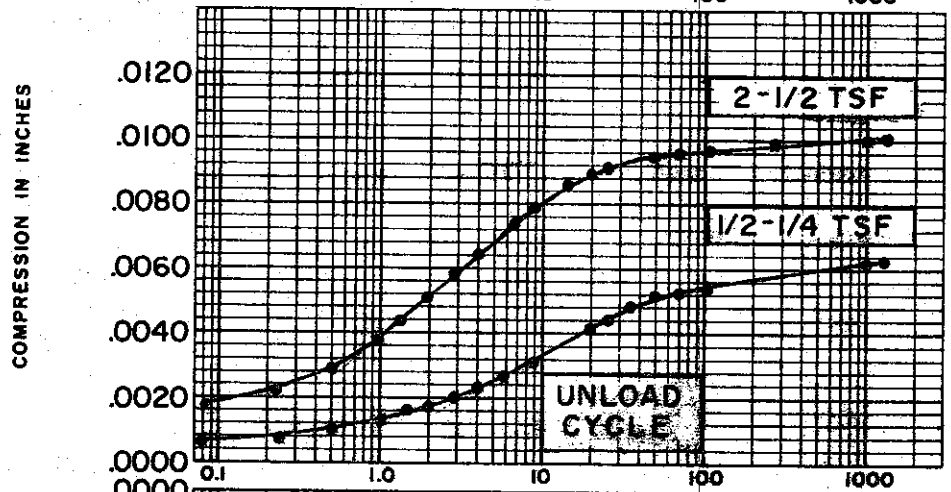
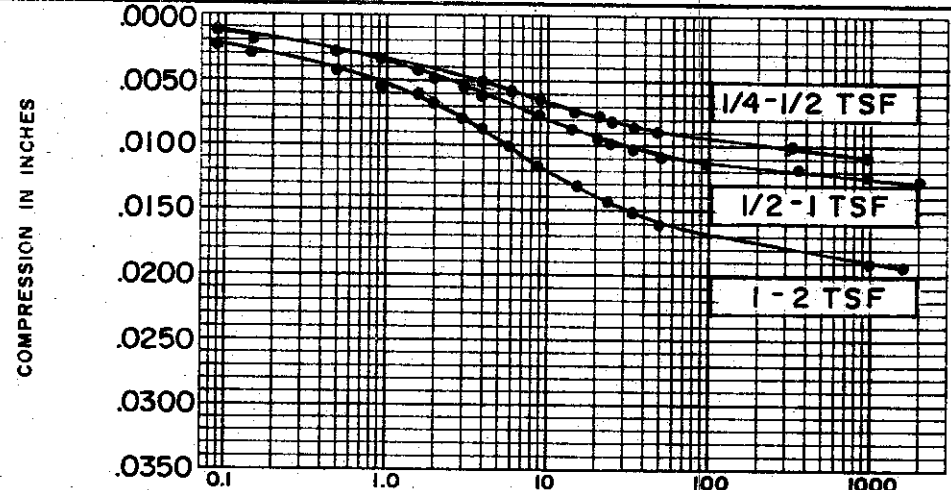
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 48 TEST NO. C202.1  
 SAMPLE NO. 10 DATE MARCH 74  
 DEPTH 39.2' TO 39.4'

C-493



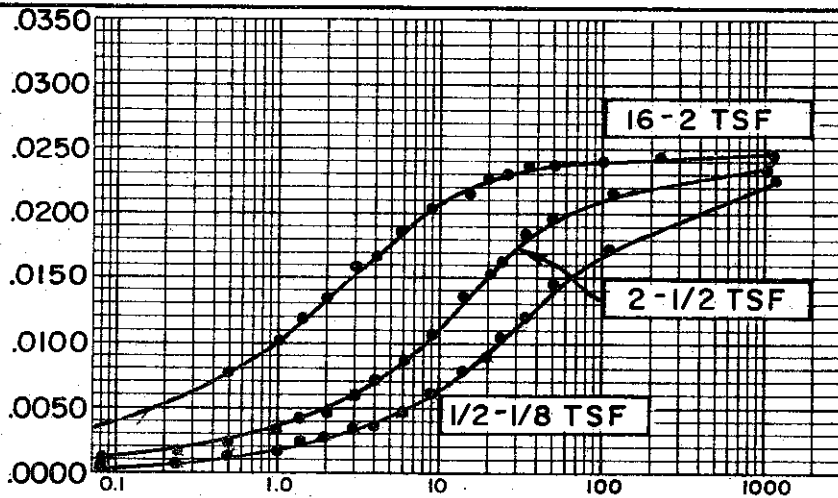
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	29.8%
FINAL WATER CONTENT	31.5%
BORING NO.	48
SAMPLE NO.	10
DEPTH	39.2' TO 39.4'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.027

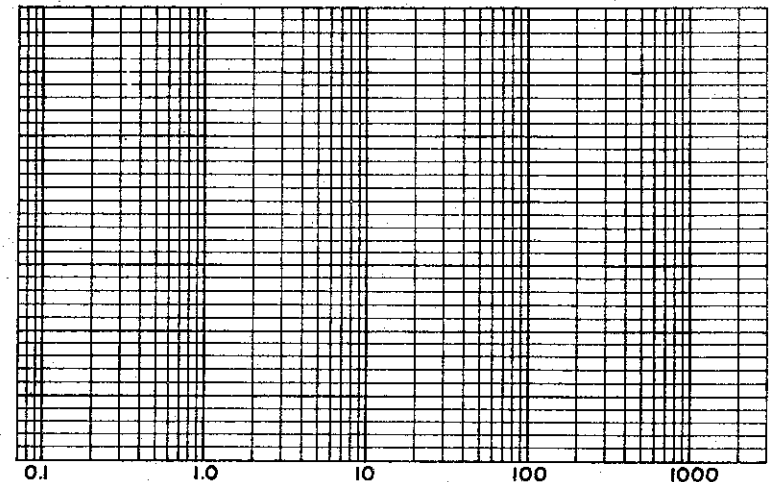
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-495

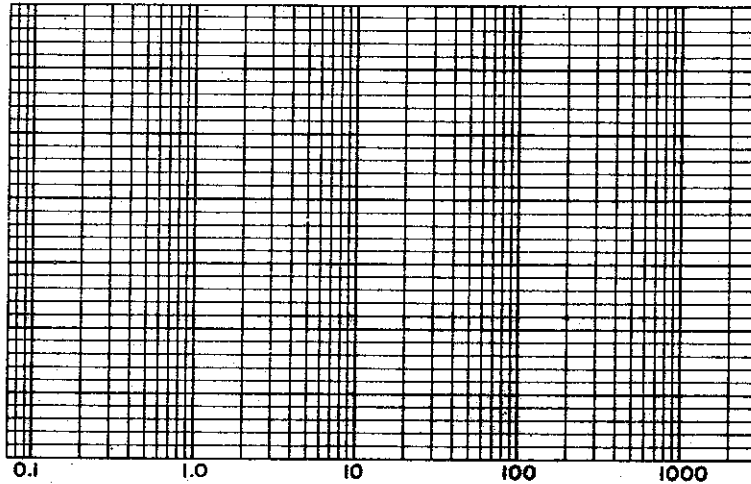
COMPRESSION IN INCHES



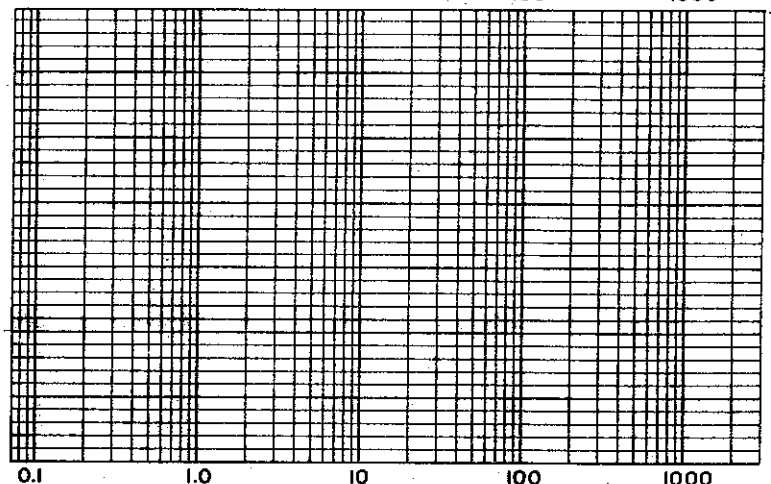
COMPRESSION IN INCHES



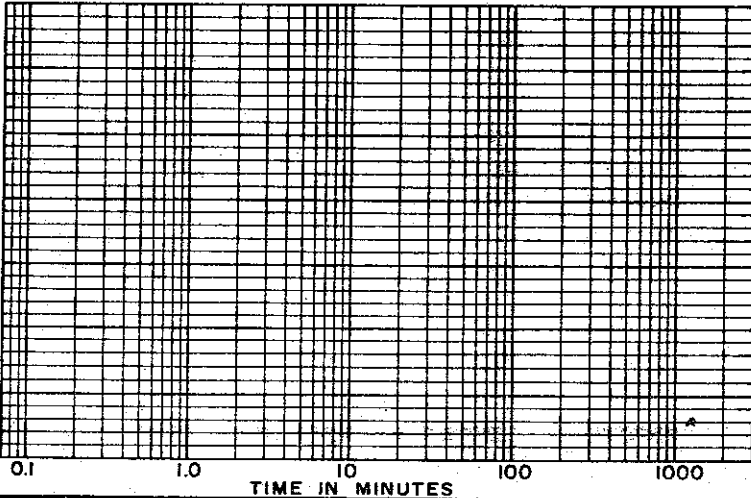
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.7'

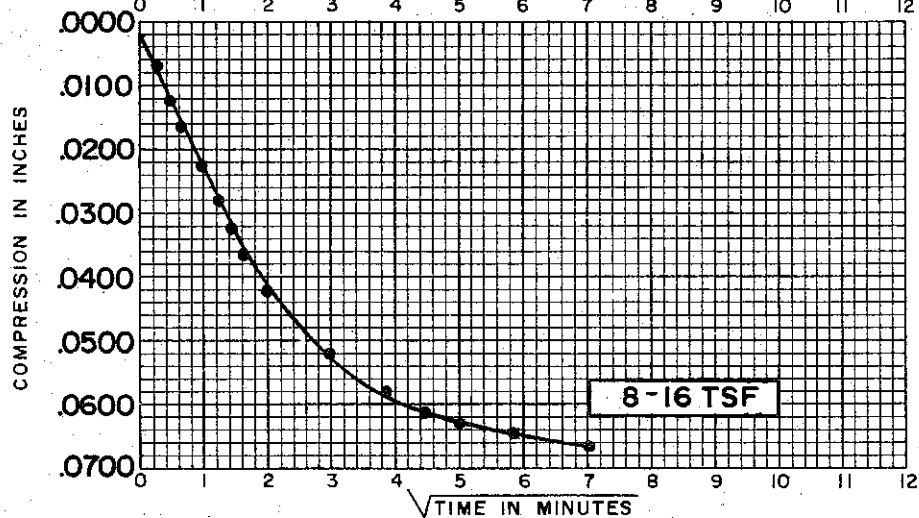
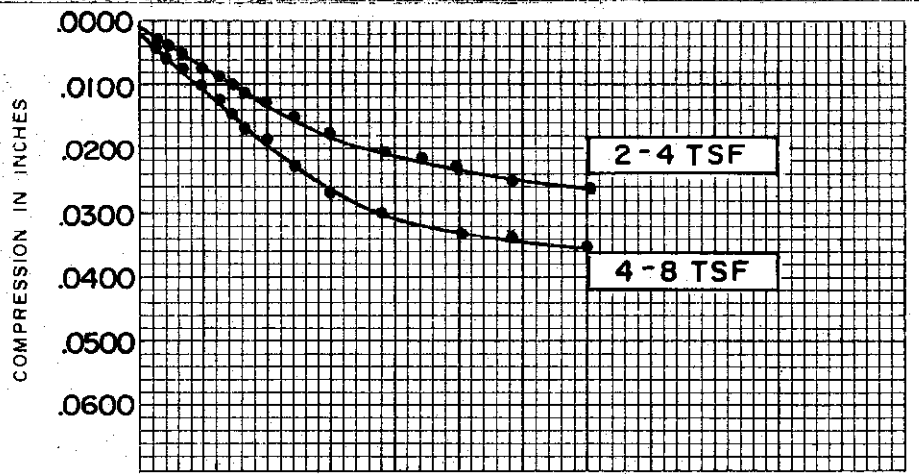
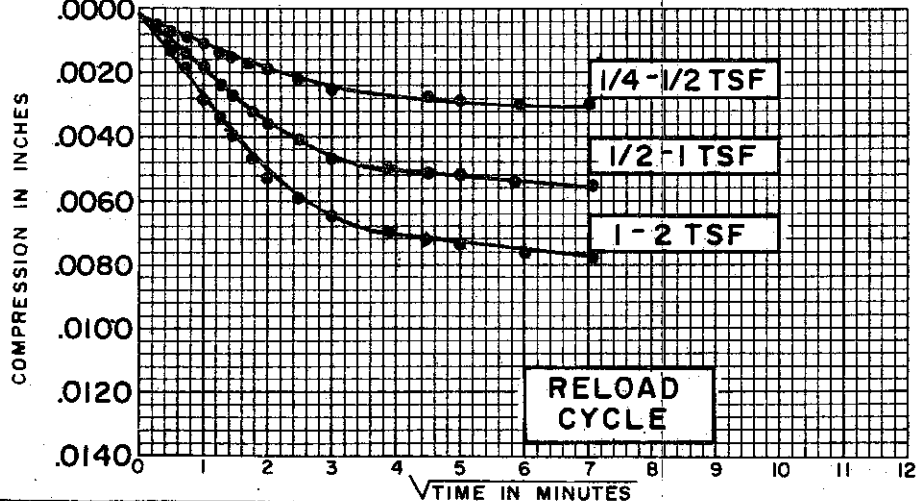
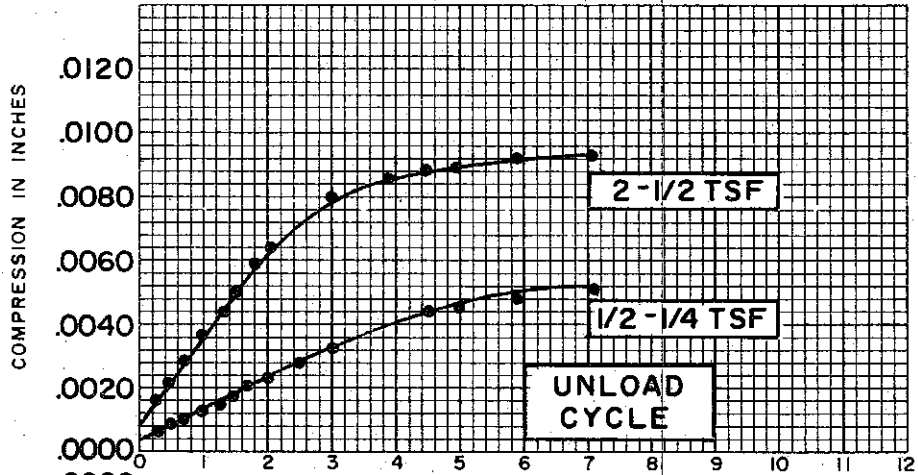
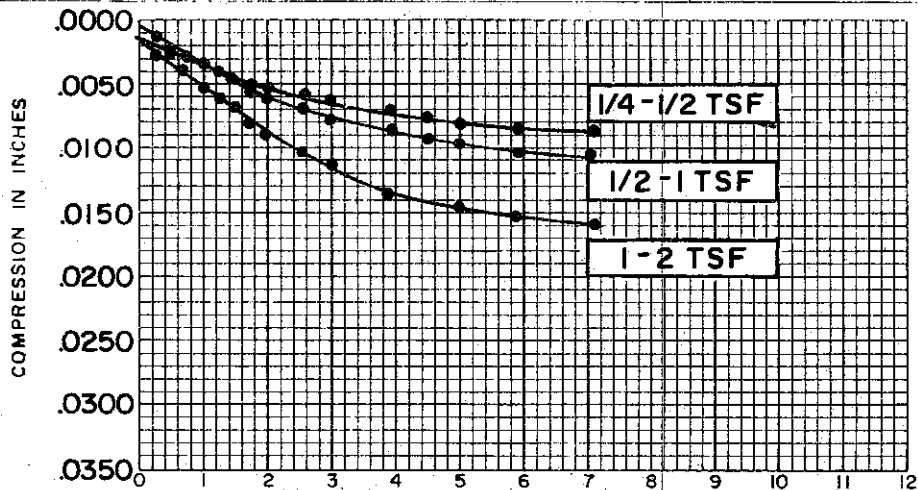
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.8%  
 FINAL WATER CONTENT 31.5%

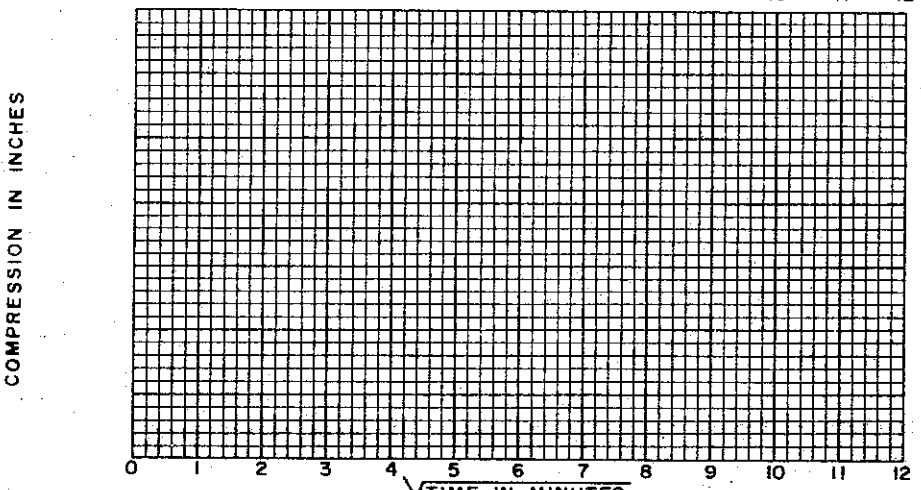
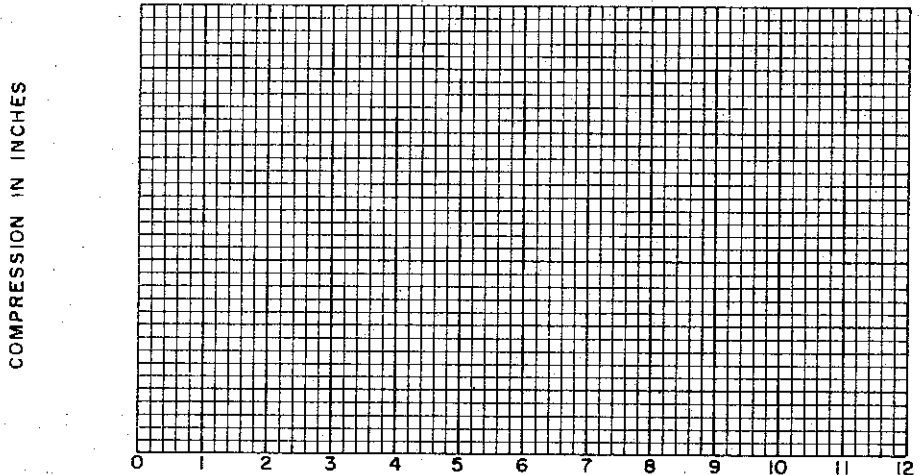
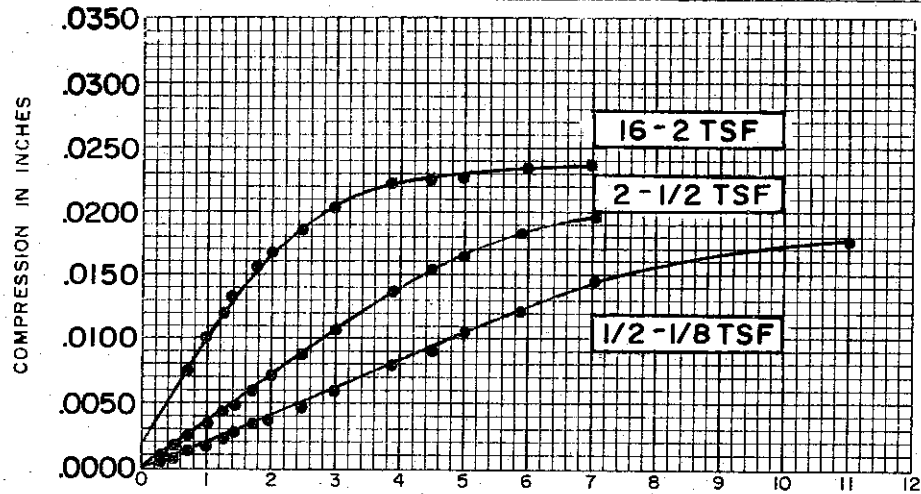
BORING NO. 48  
 SAMPLE NO. 10  
 DEPTH 39.2' TO 39.4'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.027

**CONSOLIDATION TEST TIME VS. COMPRESSION CURVES**

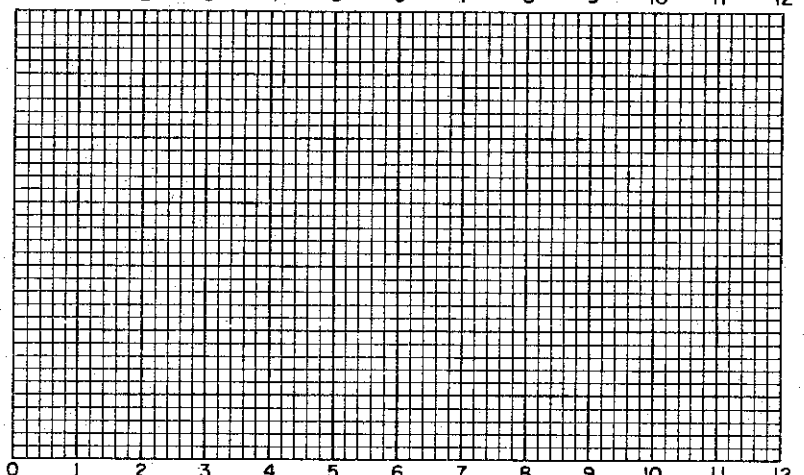
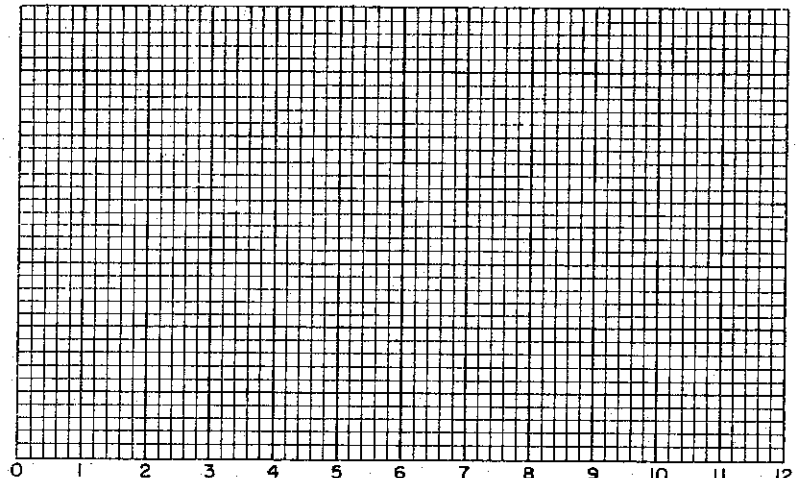
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

SOIL PROPERTIES	
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>
SPECIFIC GRAVITY	<u>2.73</u>
INITIAL WATER CONTENT	<u>38.8%</u>
FINAL WATER CONTENT	<u>31.5%</u>
BORING NO.	<u>48</u>
SAMPLE NO.	<u>10</u>
DEPTH	<u>39.2' TO 39.4'</u>

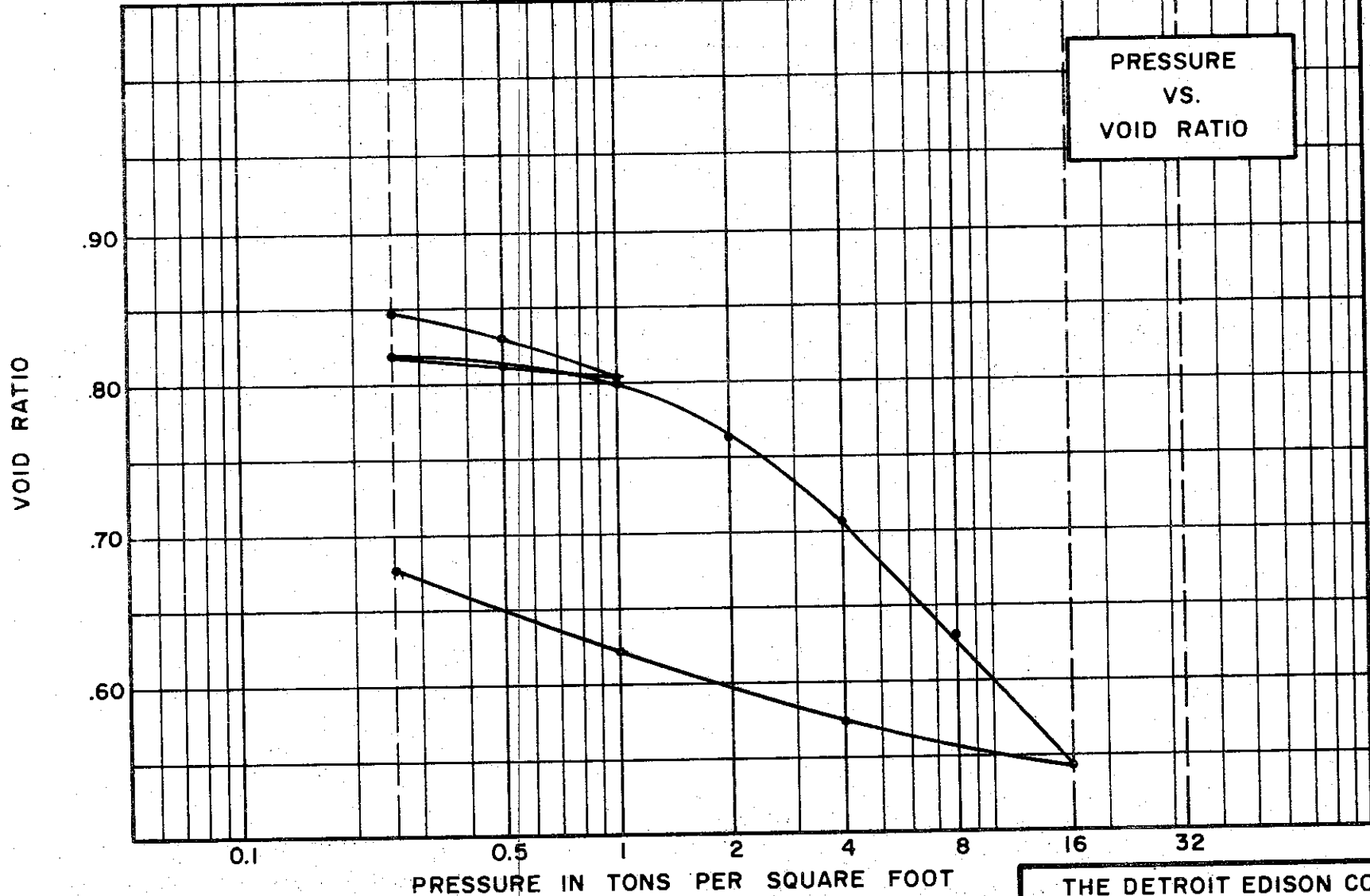
TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>1.027</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-497

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 33.3% FINAL 28.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 47% PLASTIC LIMIT 23%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.863

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

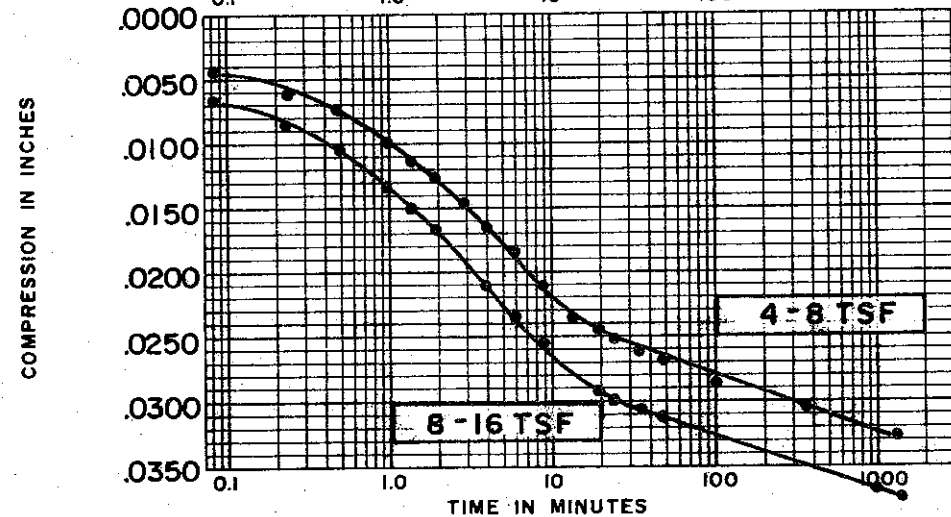
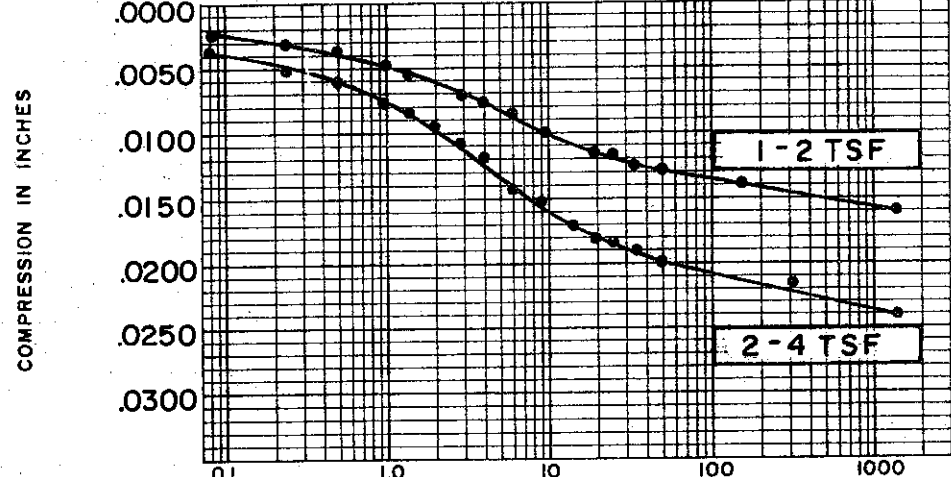
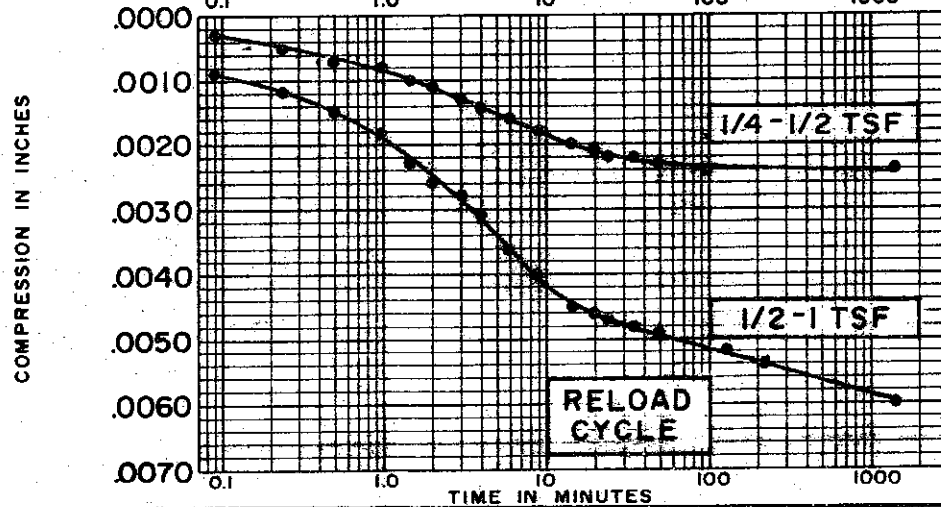
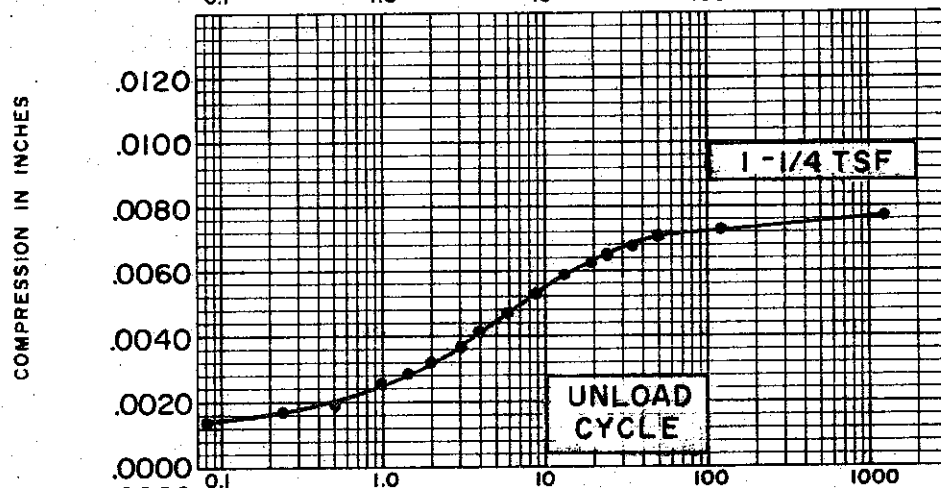
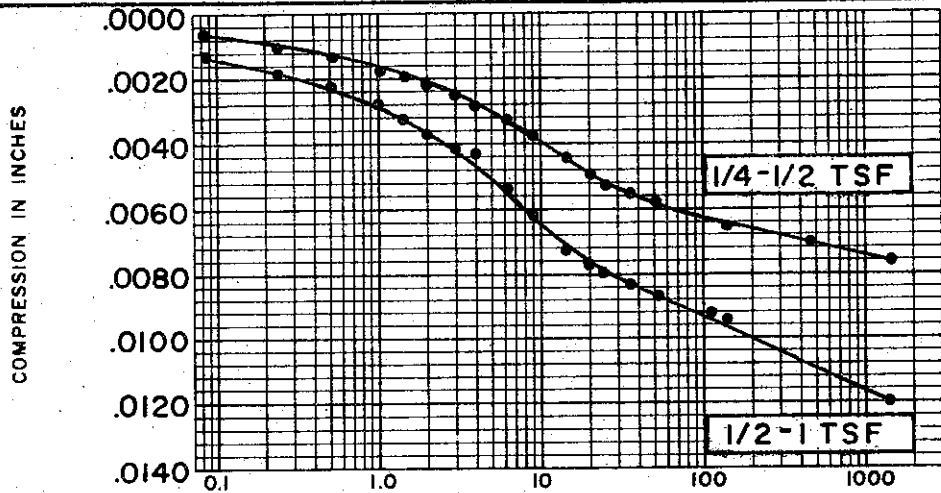
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 49 TEST NO. C133.1

SAMPLE NO. 3 DATE FEB. 1974

DEPTH 13.7' TO 14.0'





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

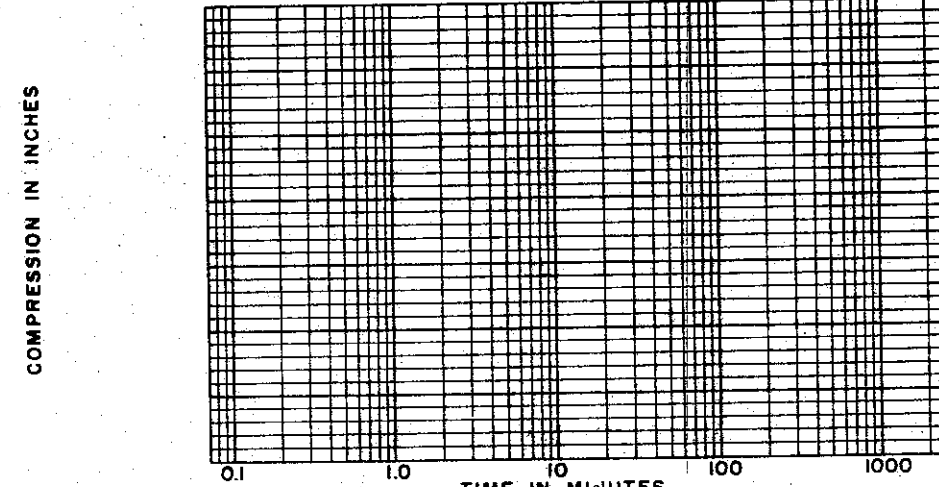
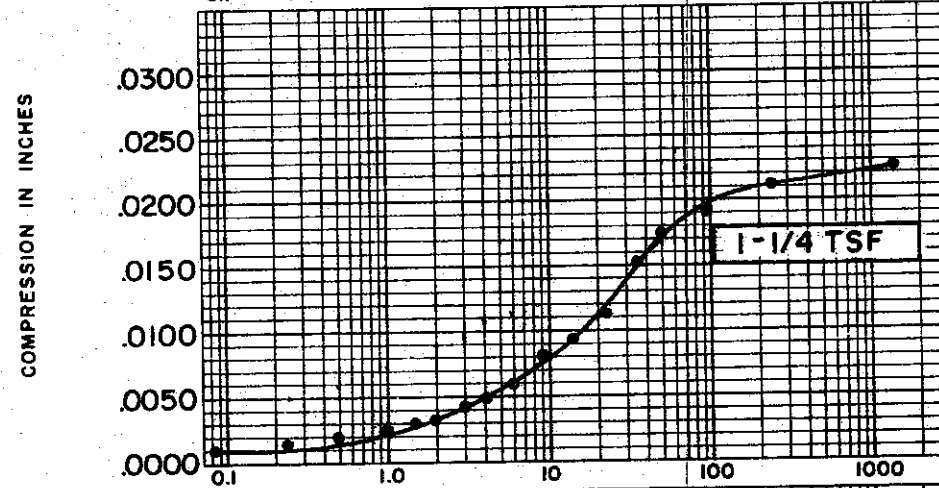
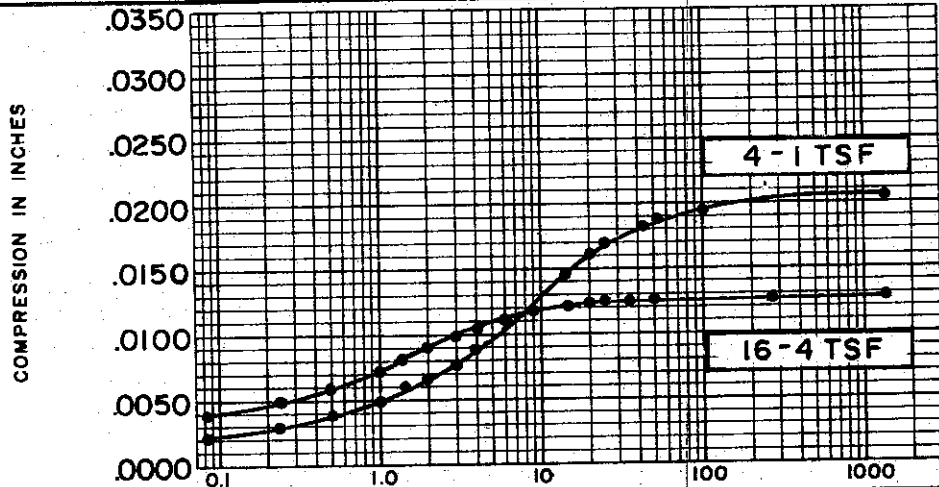
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

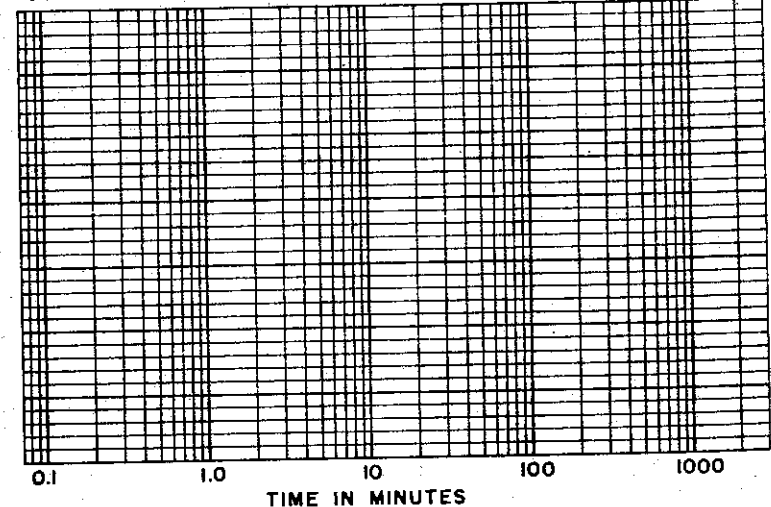
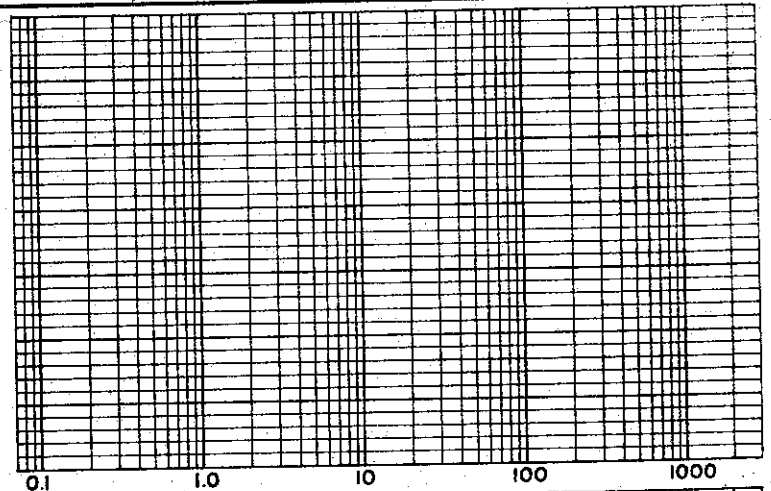
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-499



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

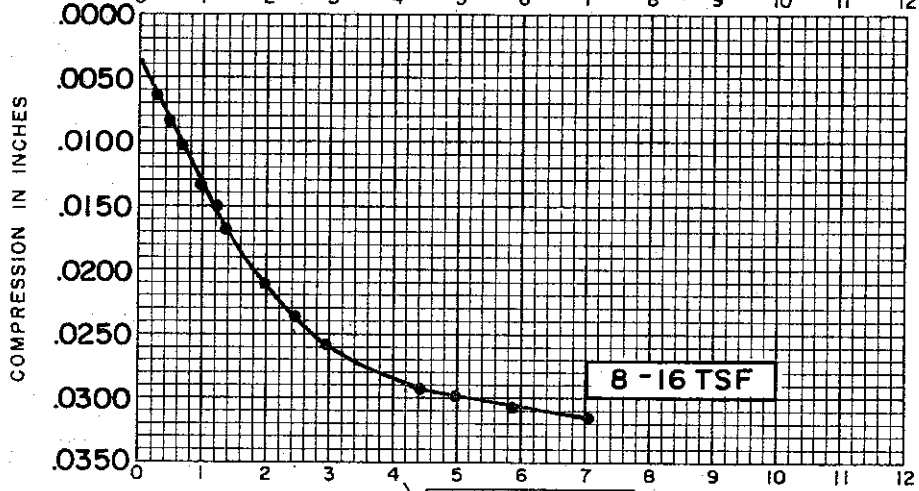
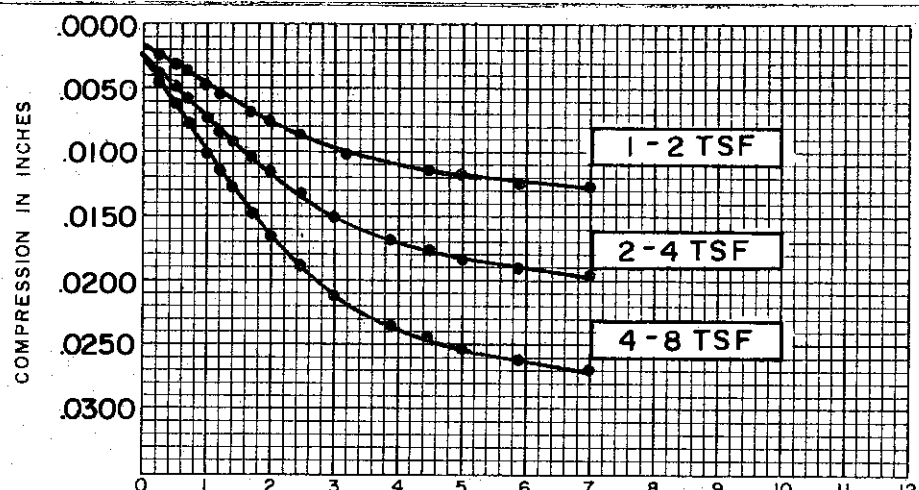
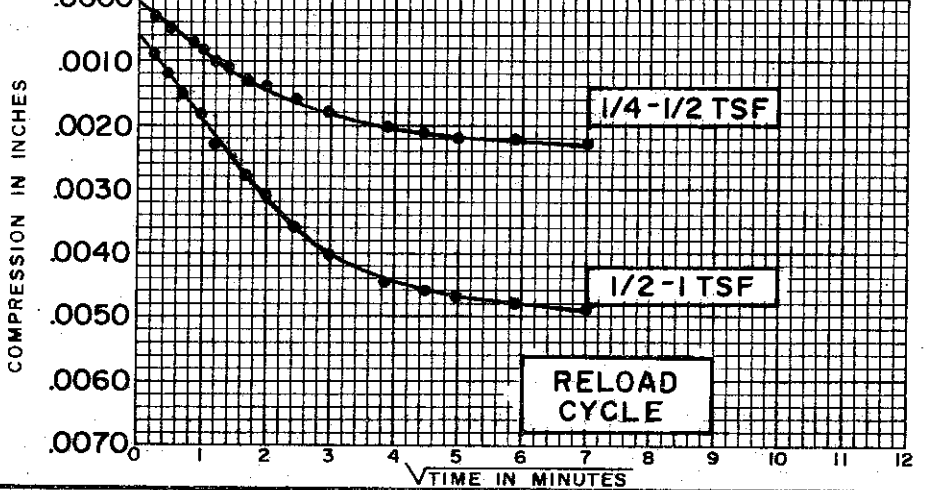
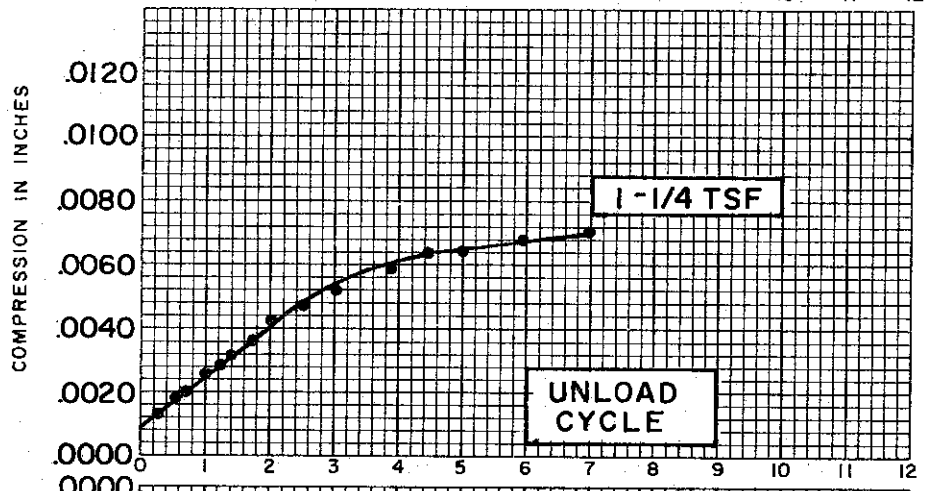
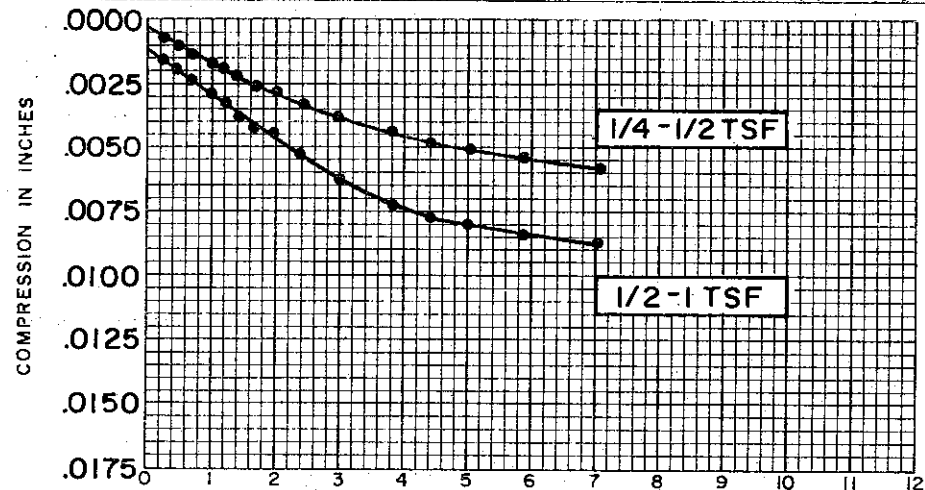
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.80"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-501

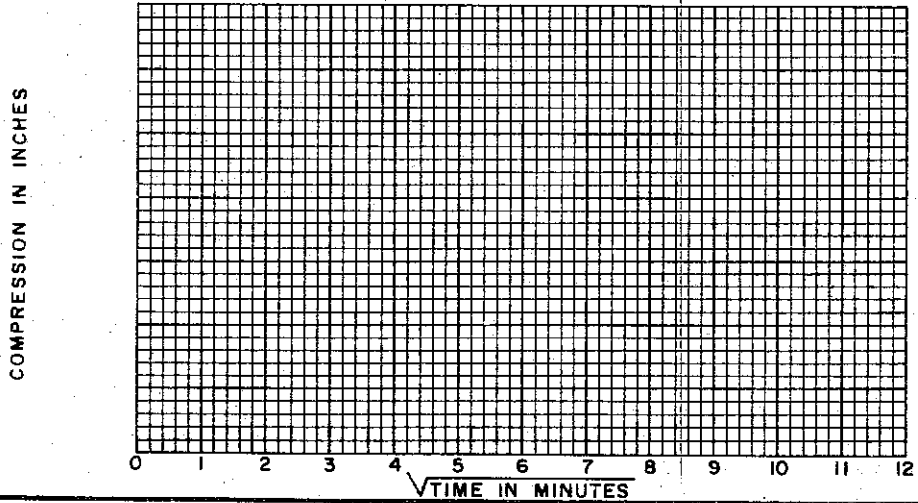
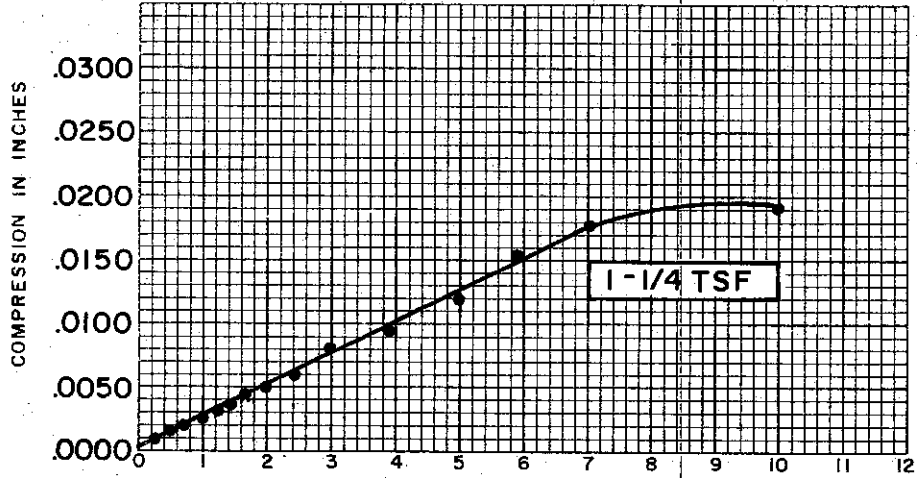
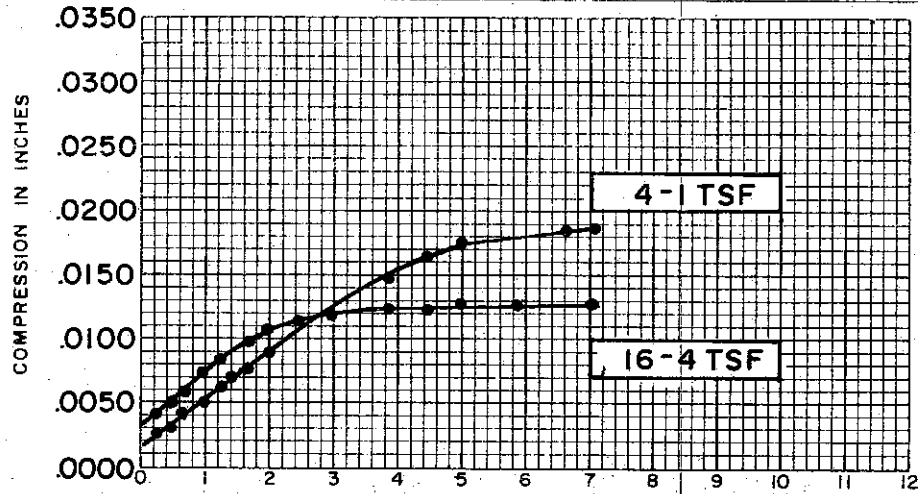


SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL-CH)</u>	SAMPLE NO. <u>3</u>
SPECIFIC GRAVITY	<u>2.72</u>	DEPTH <u>13.7' TO 14.0'</u>
INITIAL WATER CONTENT	<u>33.3%</u>	
FINAL WATER CONTENT	<u>28.5%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.60"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.863</u>

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

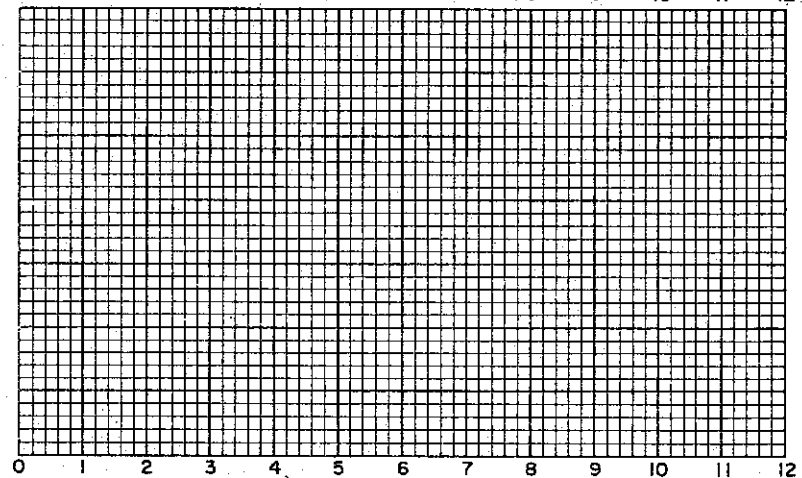
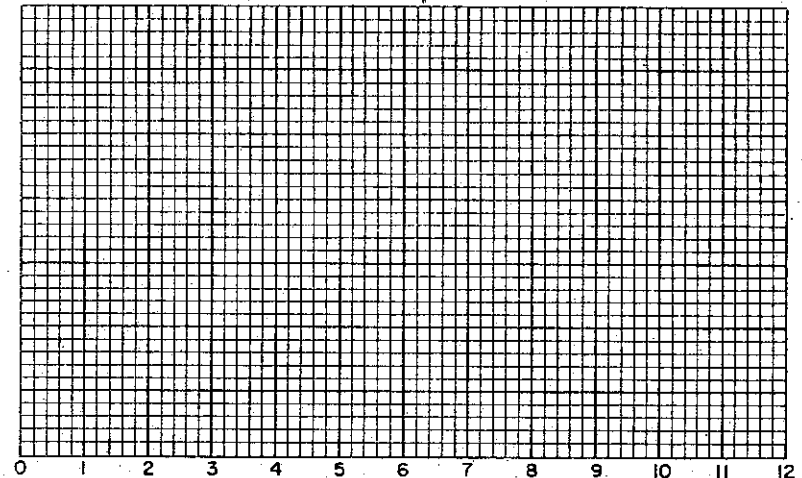
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 33.3%  
 FINAL WATER CONTENT 28.5%

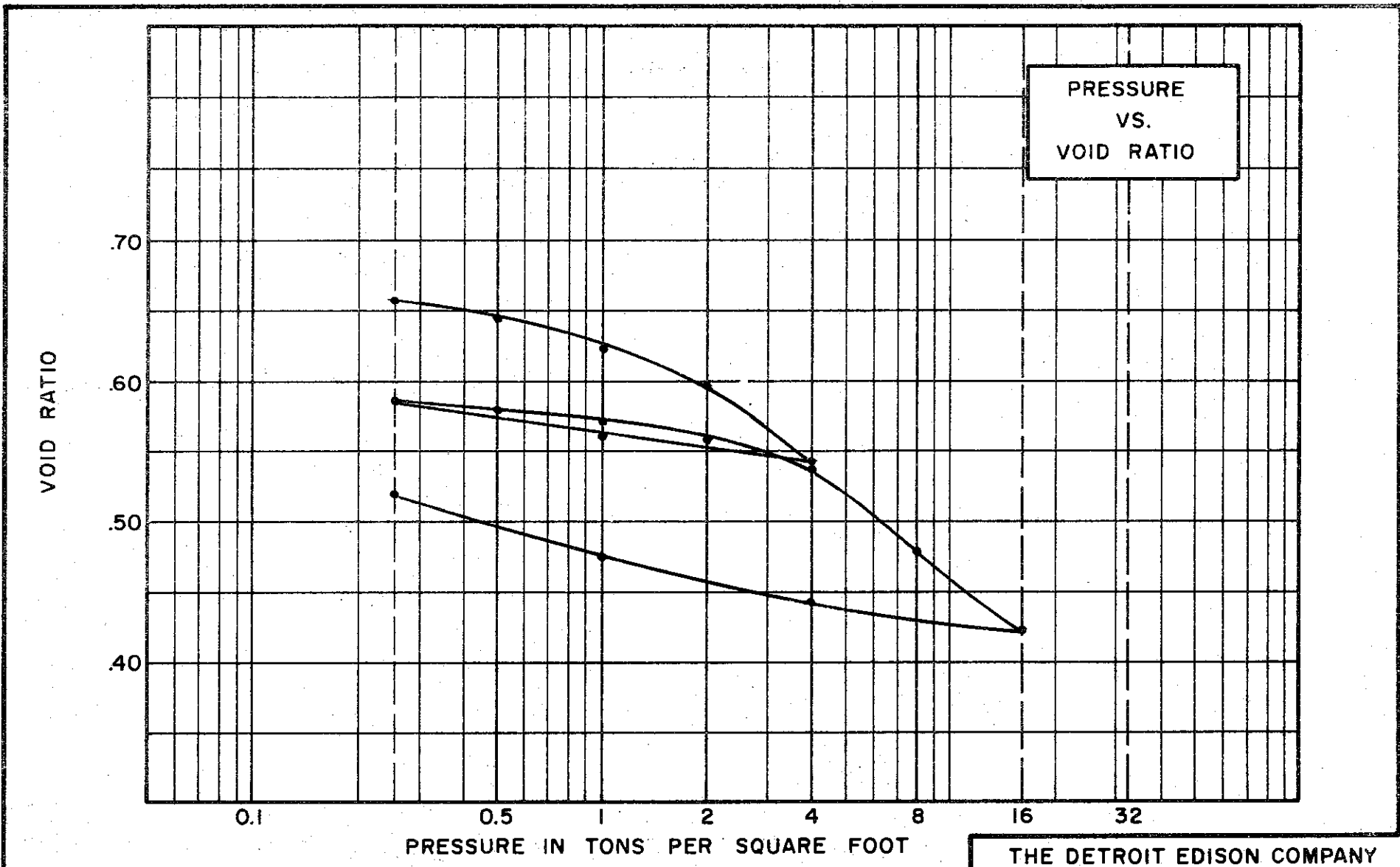
BORING NO. 49  
 SAMPLE NO. 3  
 DEPTH 13.7' TO 14.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.863

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 28.6% FINAL 24.4%

ATTERBERG LIMITS:  
 LIQUID LIMIT 37% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.701

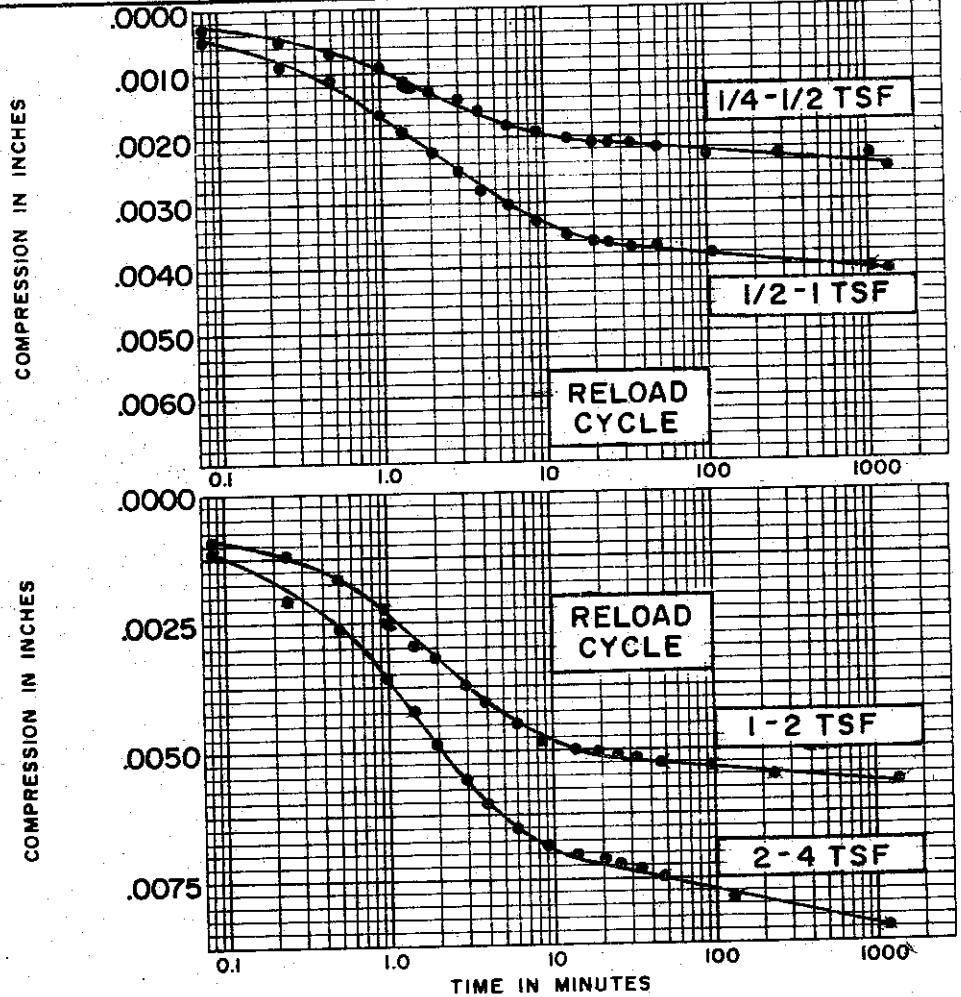
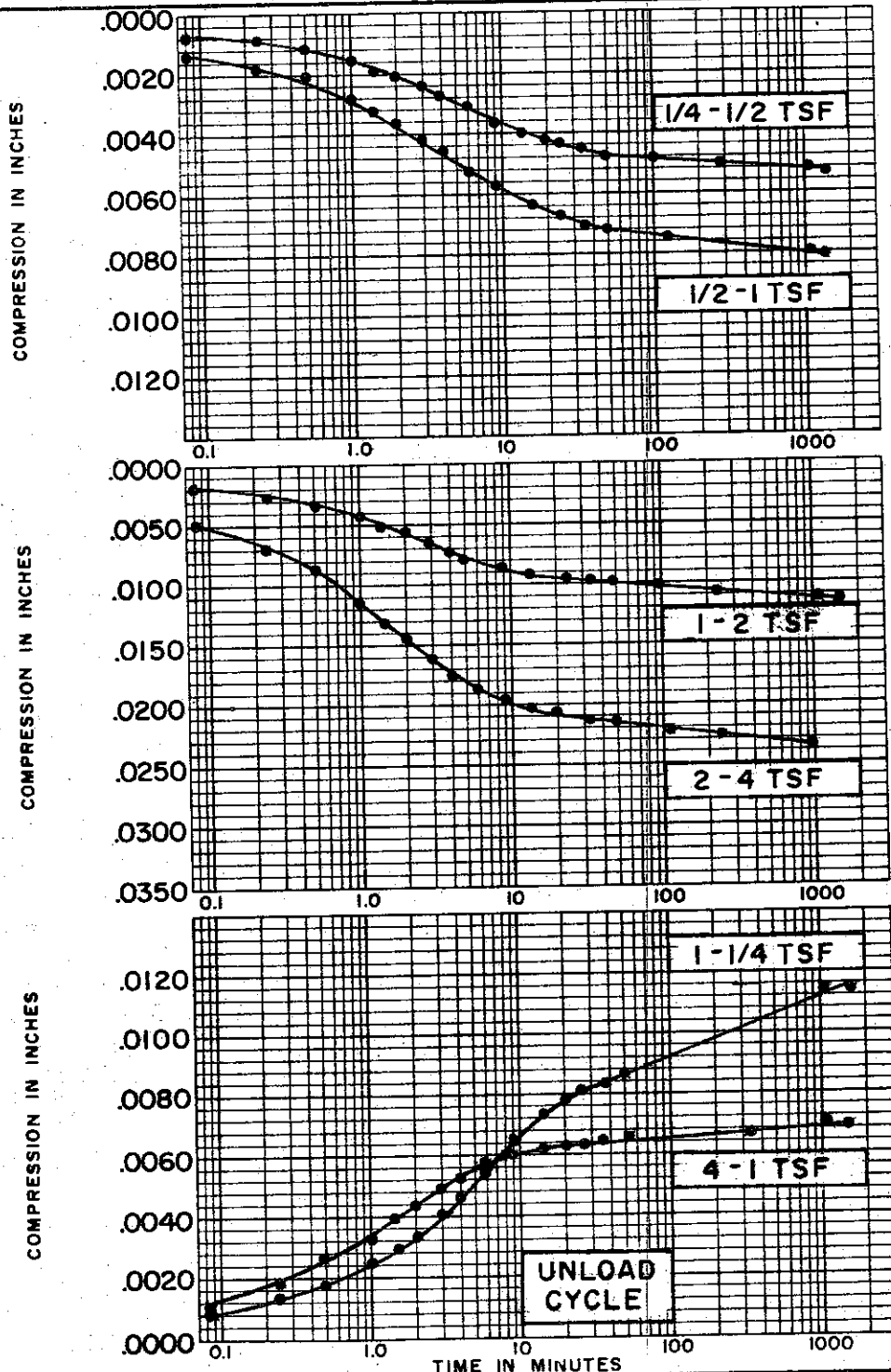
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 49 TEST NO. C141.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 93.8' TO 94.0'

C-503

C-504



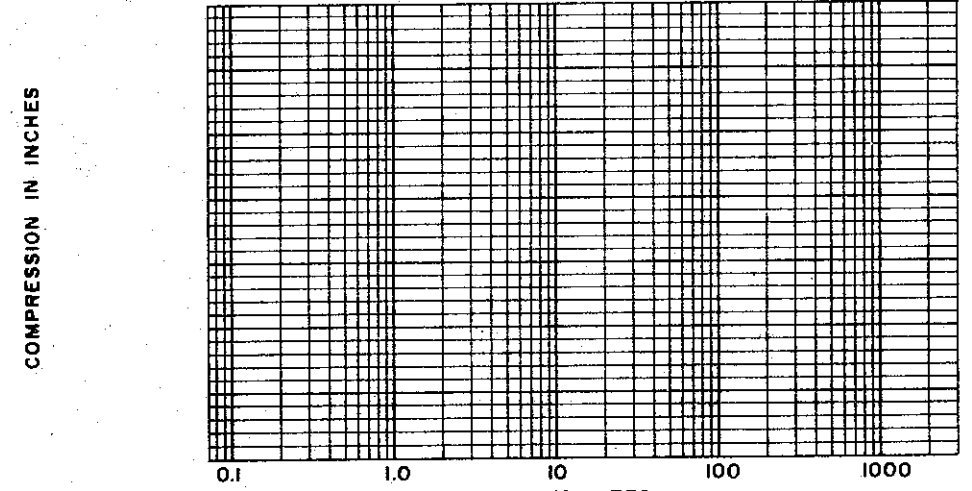
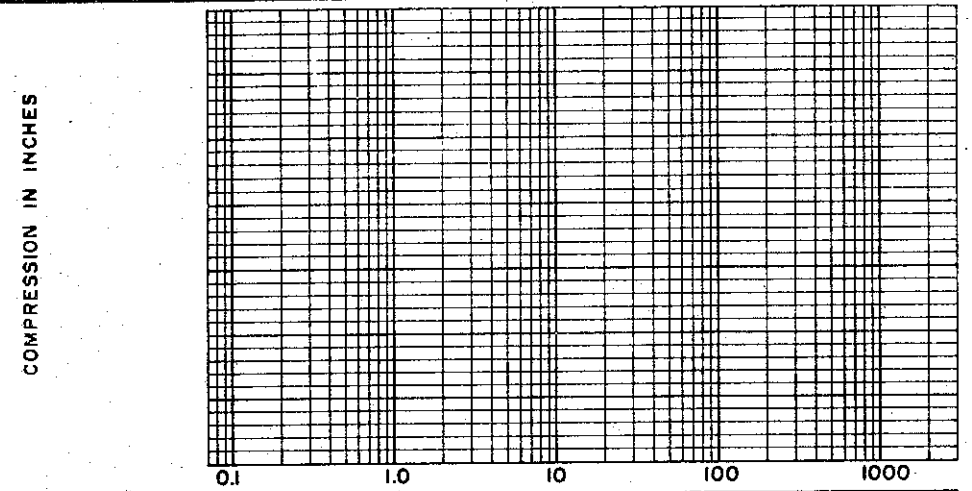
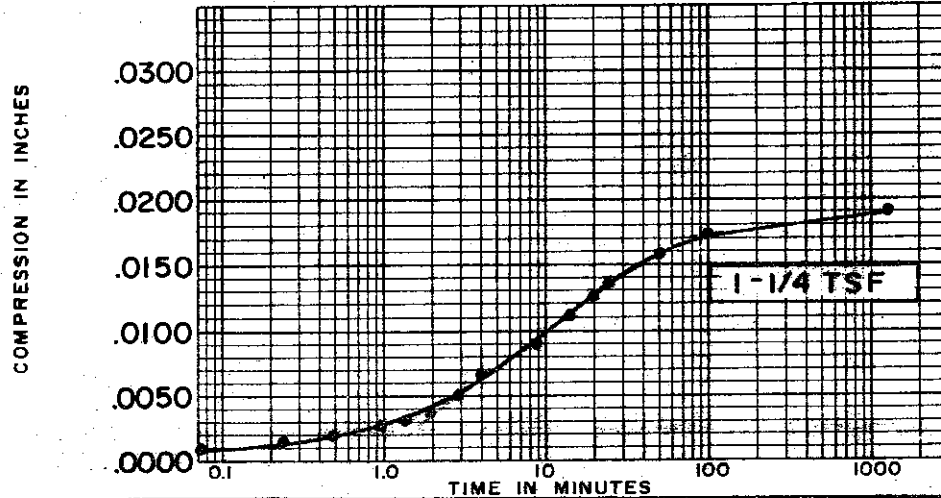
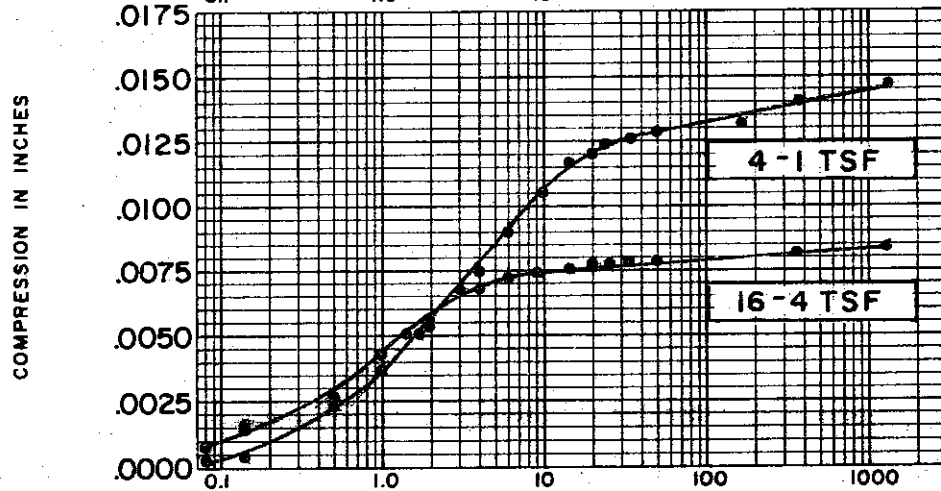
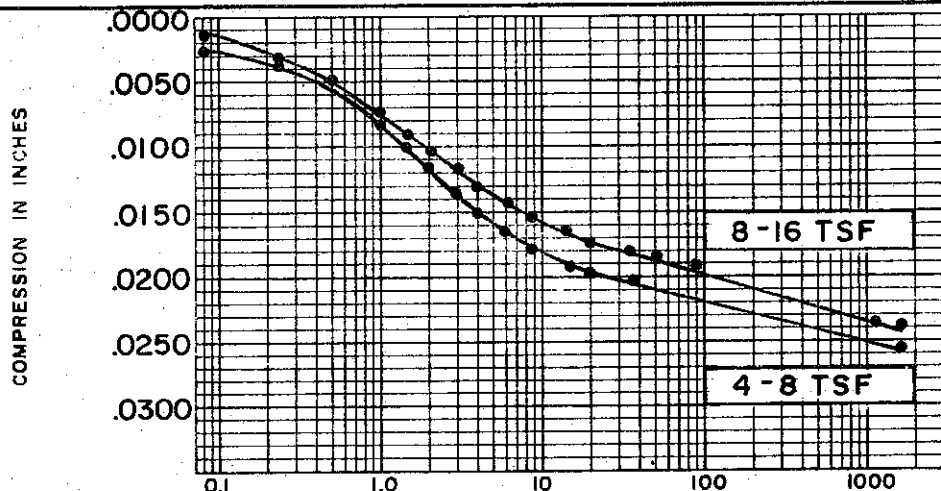
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.68
INITIAL WATER CONTENT	28.6%
FINAL WATER CONTENT	24.4%
TEST DATA	
INITIAL SAMPLE HEIGHT	0.75" <sup>u</sup>
INITIAL SAMPLE DIAMETER	2.50" <sup>u</sup>
INITIAL VOID RATIO	0.701

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

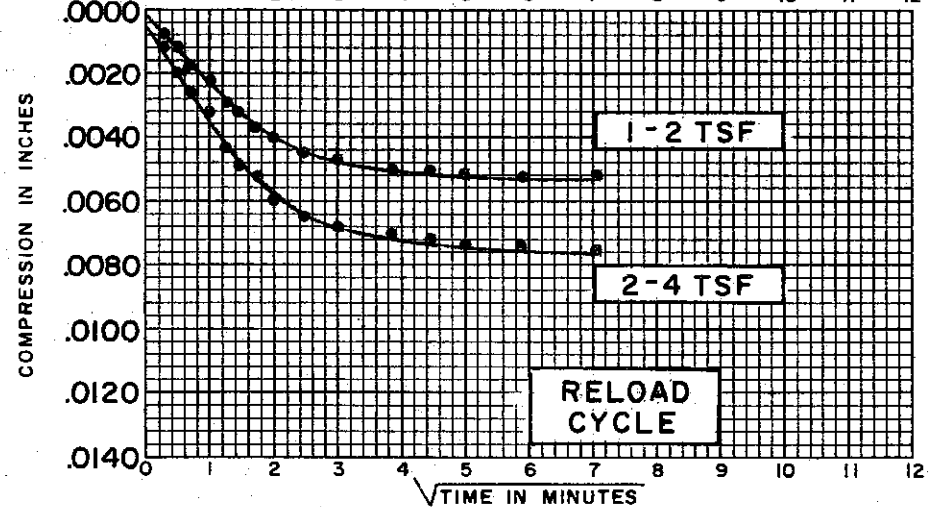
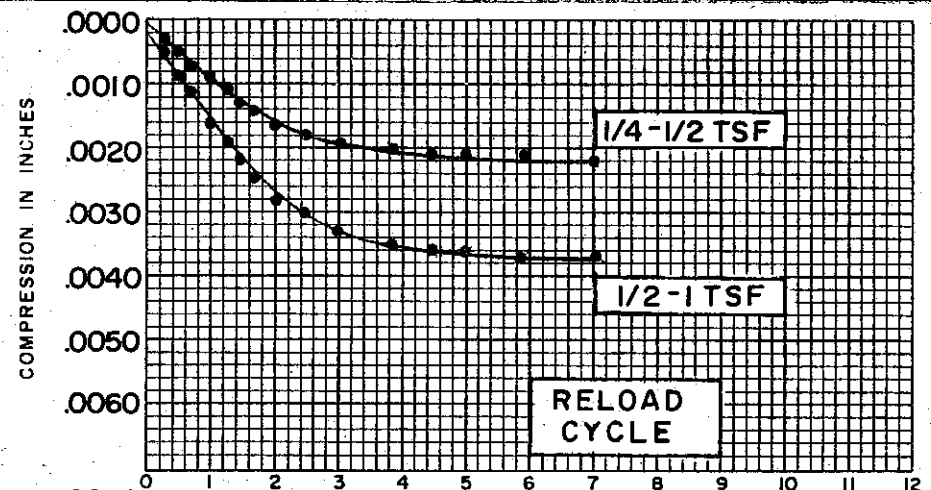
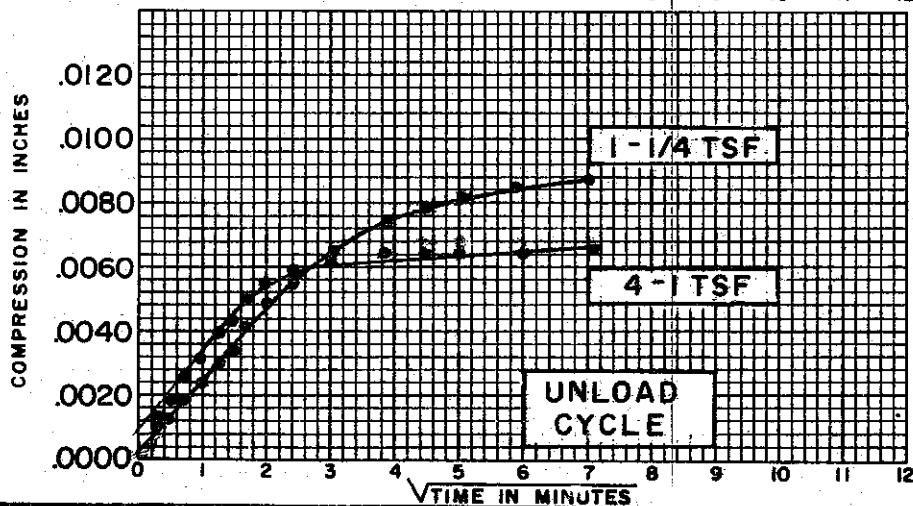
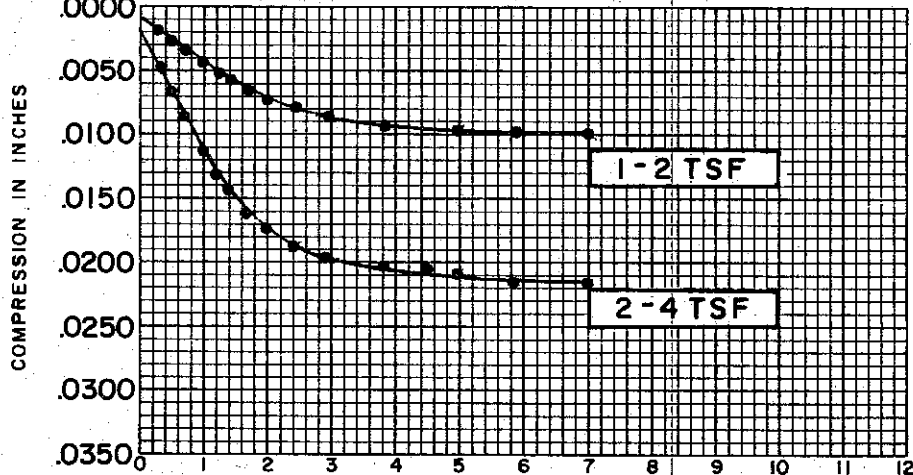
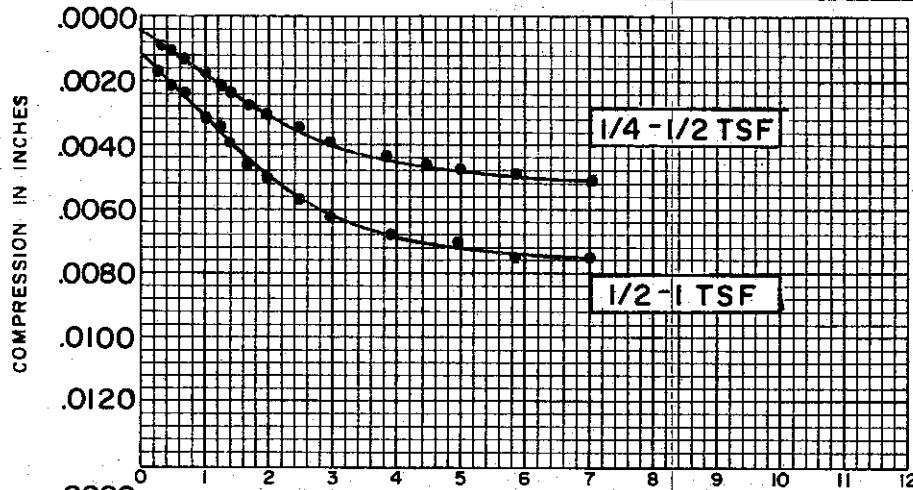
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-505



SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY <u>2.68</u>	INITIAL WATER CONTENT <u>28.6%</u>	DEPTH <u>93.8' TO 94.0'</u>
TEST DATA		CONSOLIDATION TEST
INITIAL SAMPLE HEIGHT <u>0.75"</u>	INITIAL SAMPLE DIAMETER <u>2.50"</u>	TIME VS. COMPRESSION CURVE
INITIAL VOID RATIO <u>0.701</u>		THE DETROIT EDISON COMPANY
		BELLE RIVER PLANT UNITS I & II



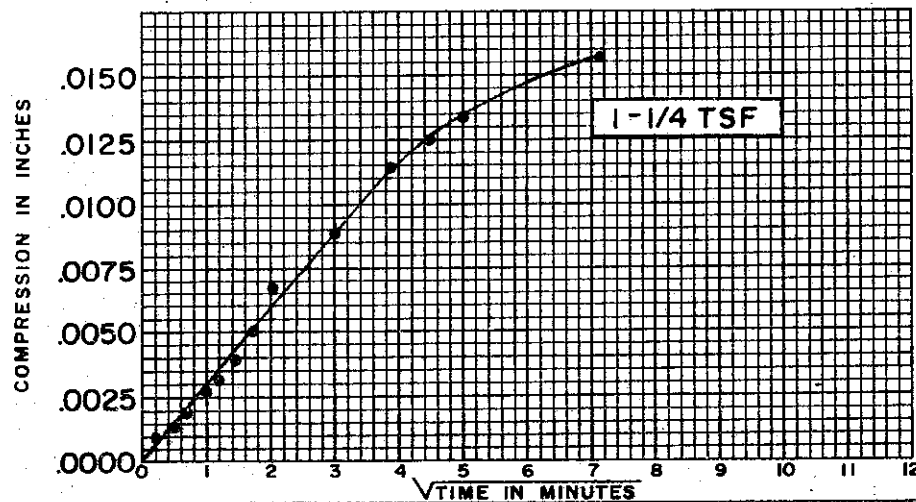
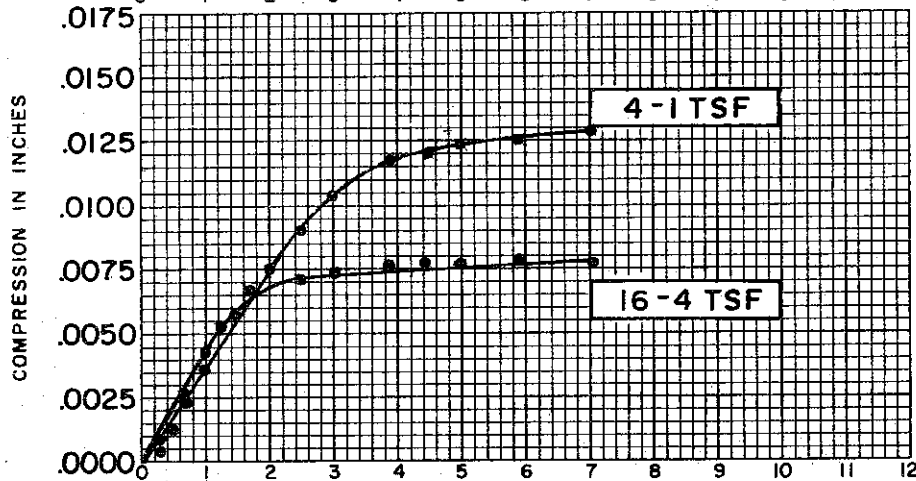
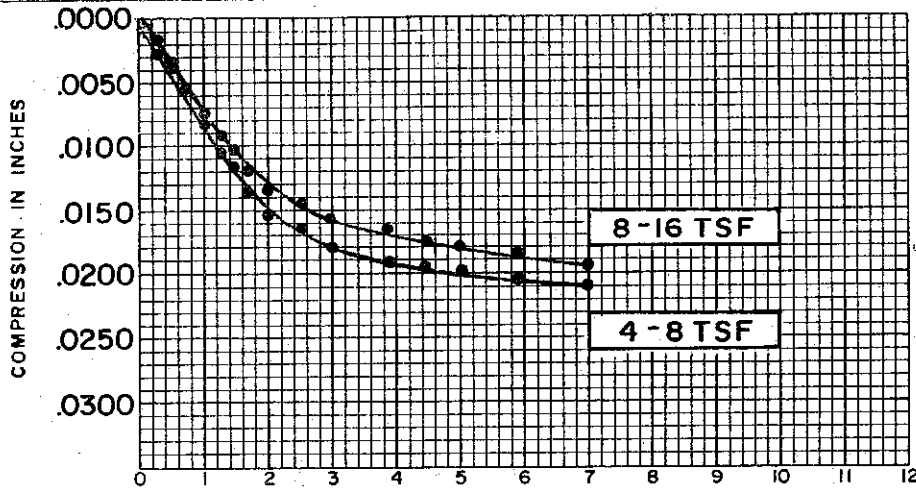
SOIL PROPERTIES		BORING NO. <u>49</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>11</u>
SPECIFIC GRAVITY	<u>2.68</u>	DEPTH <u>93.8' TO 94.0'</u>
INITIAL WATER CONTENT	<u>28.6%</u>	
FINAL WATER CONTENT	<u>24.4%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.75"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.701</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

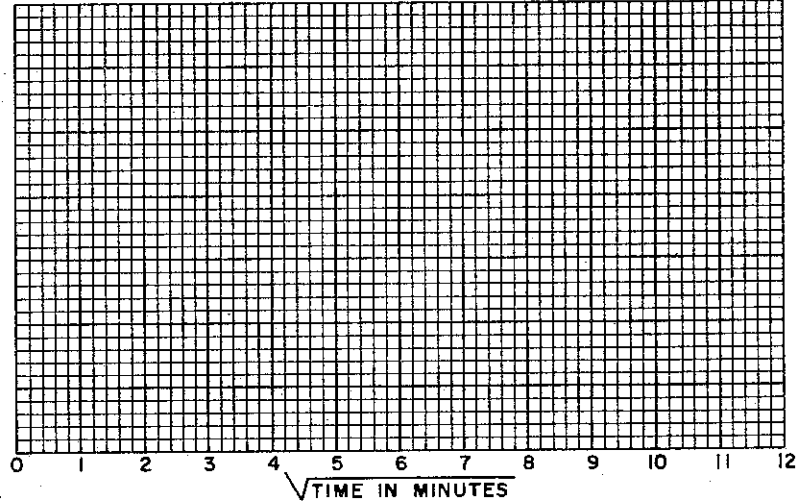
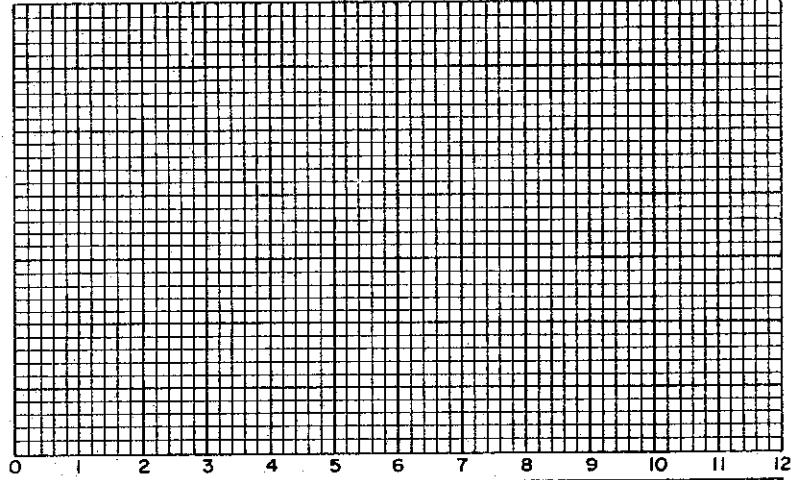
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.68  
 INITIAL WATER CONTENT 28.6%  
 FINAL WATER CONTENT 24.4%

BORING NO. 49  
 SAMPLE NO. 11  
 DEPTH 93.8' TO 94.0'

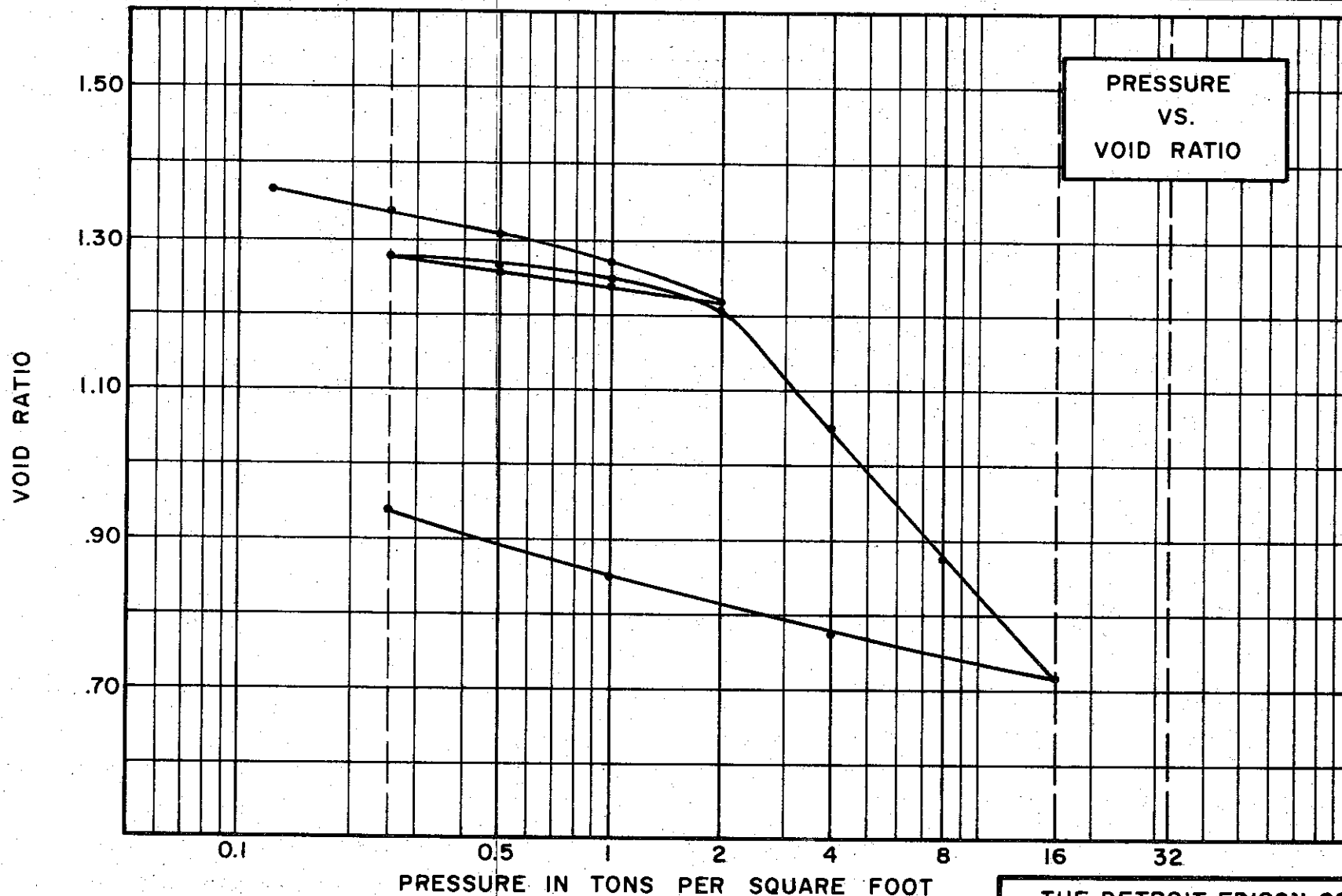
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.701

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-507



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 51.6% FINAL 39.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

**TEST DATA**

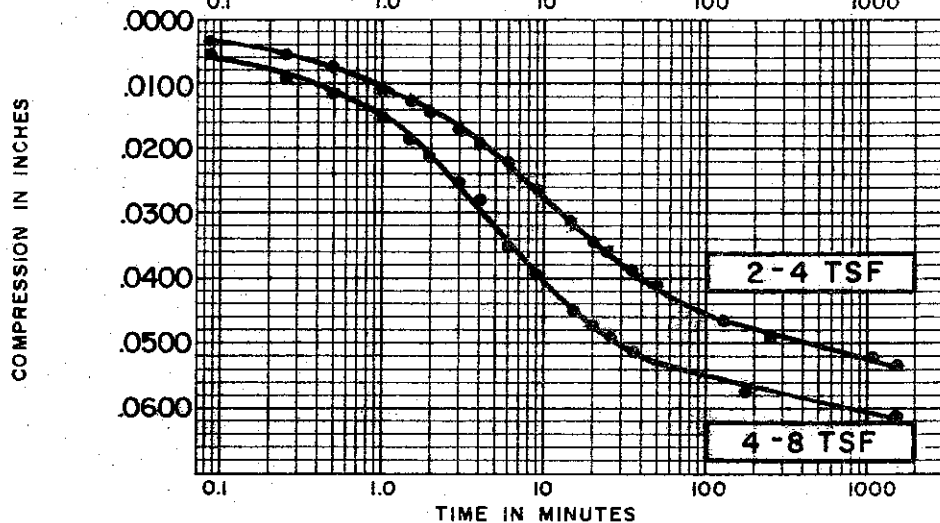
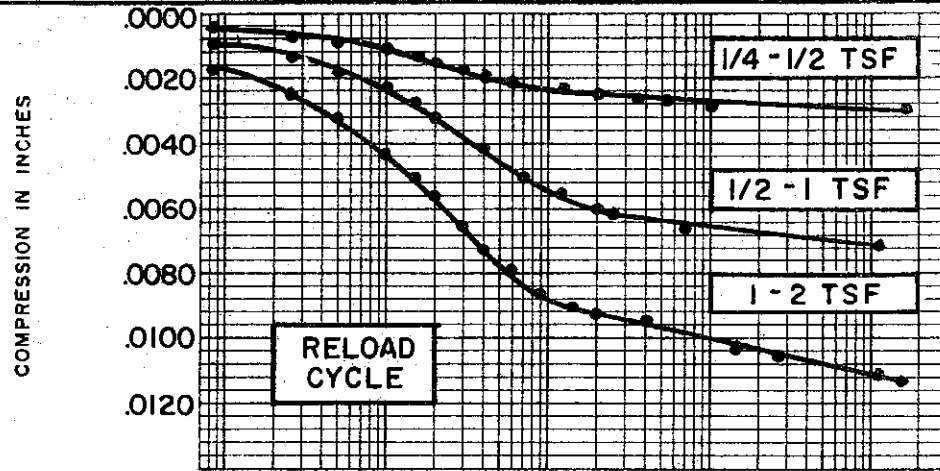
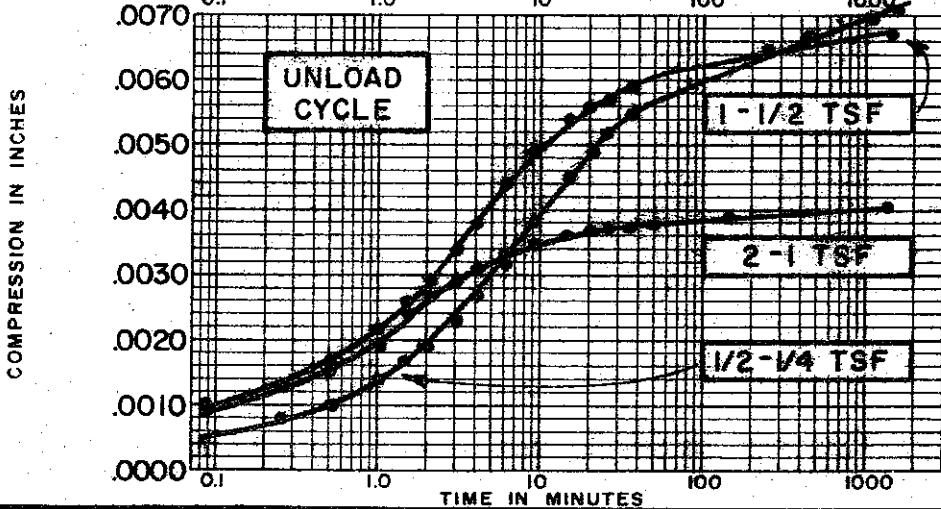
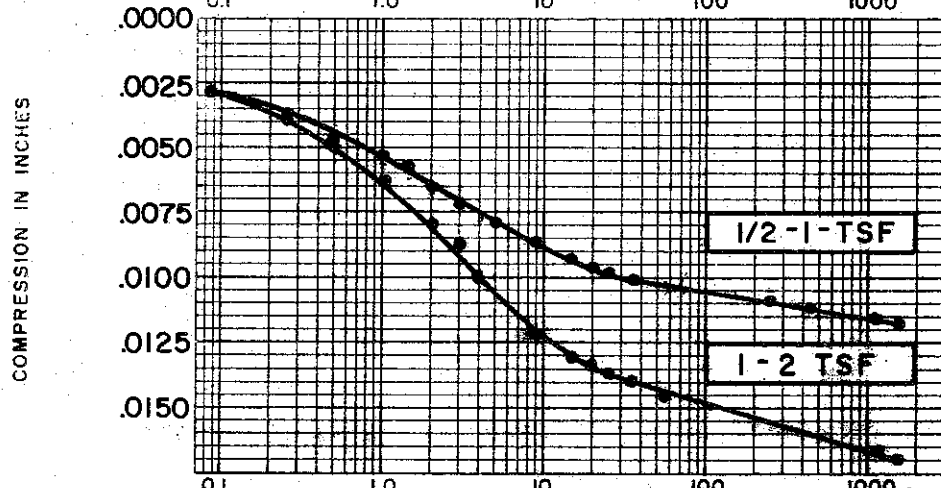
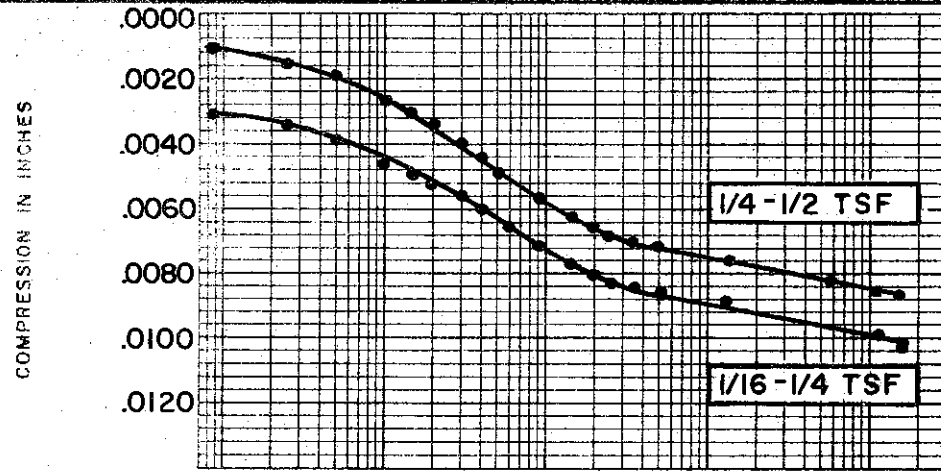
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 50 TEST NO. C86.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 38.5' TO 38.9'

C-509



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5' - 38.9'

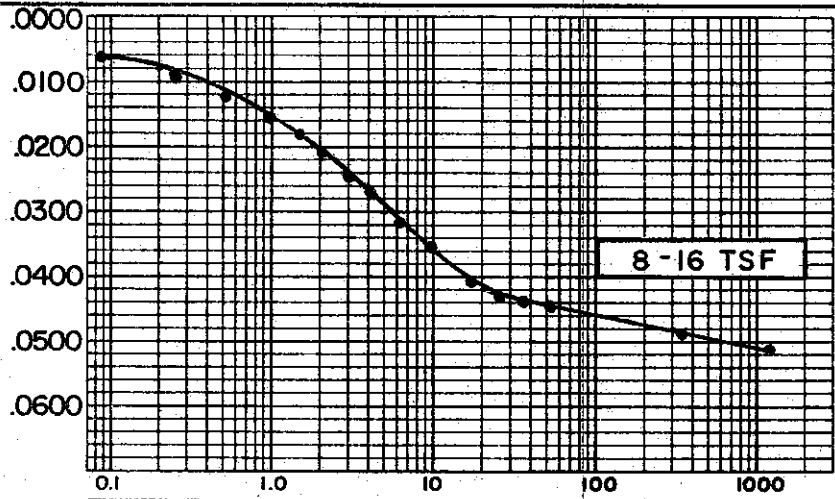
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE D. AMETER 2.50"  
 INITIAL VOID RATIO 1.383

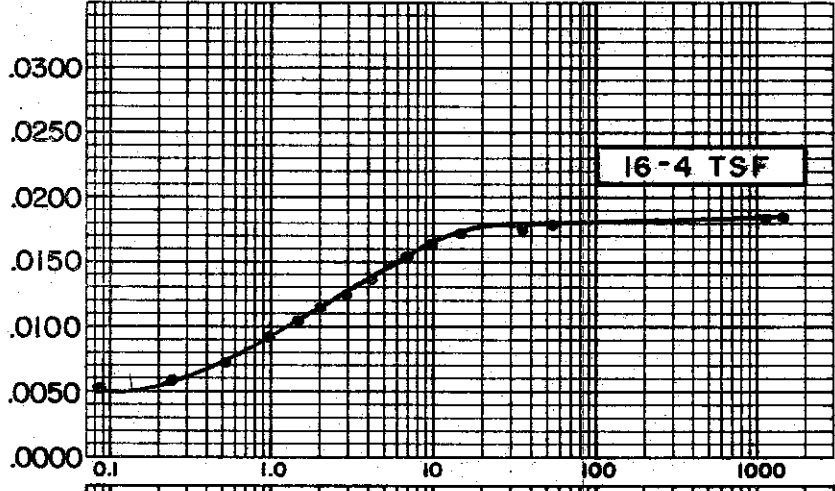
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

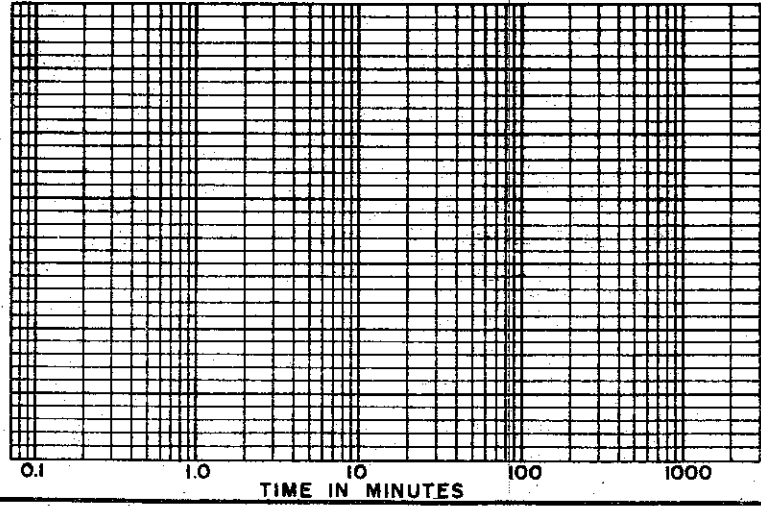
COMPRESSION IN INCHES



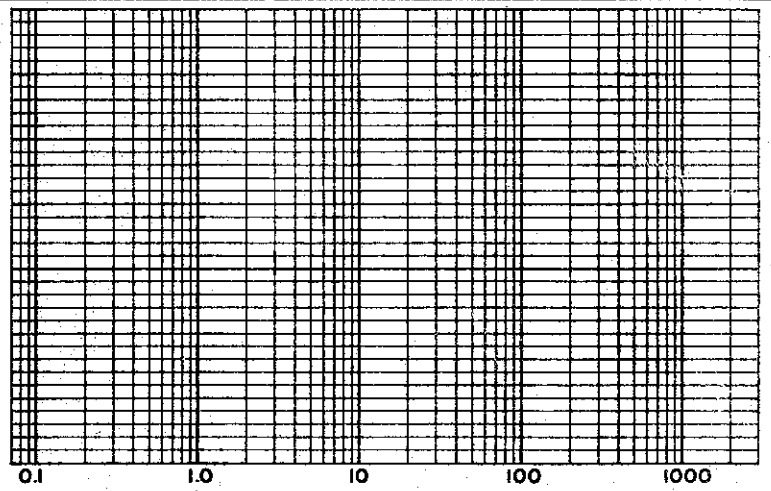
COMPRESSION IN INCHES



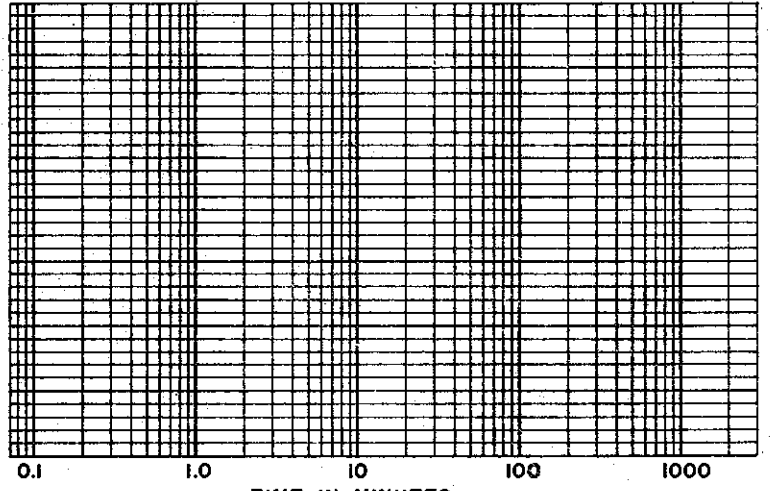
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

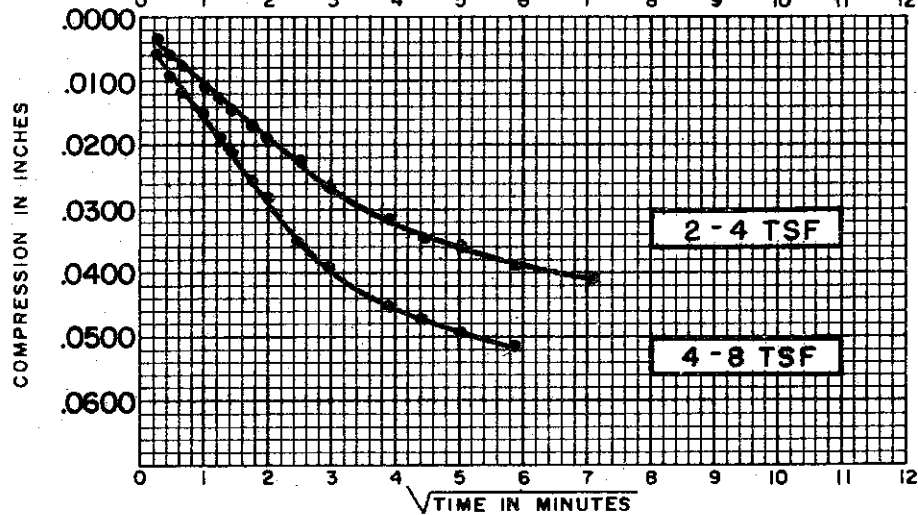
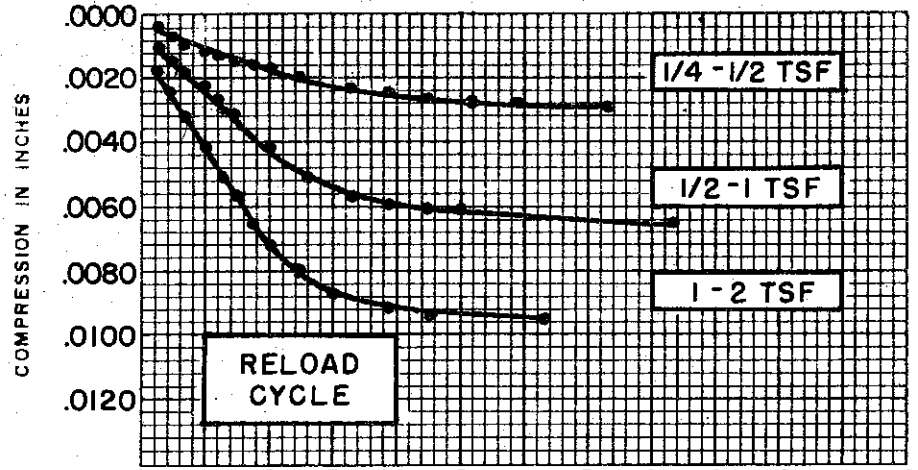
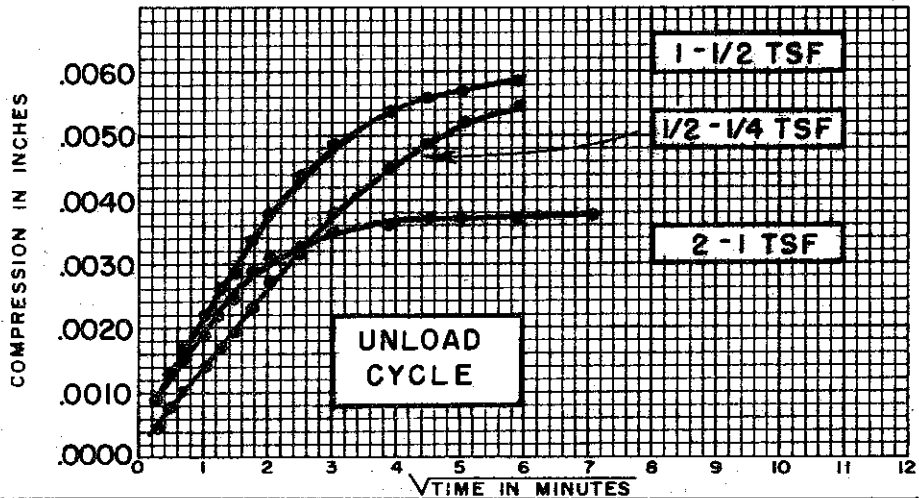
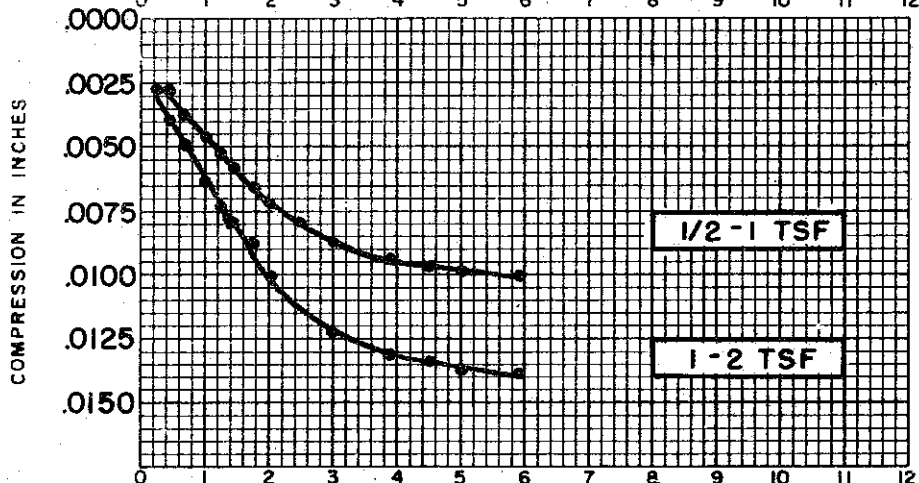
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-511



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 51.6 %  
 FINAL WATER CONTENT 39.9 %

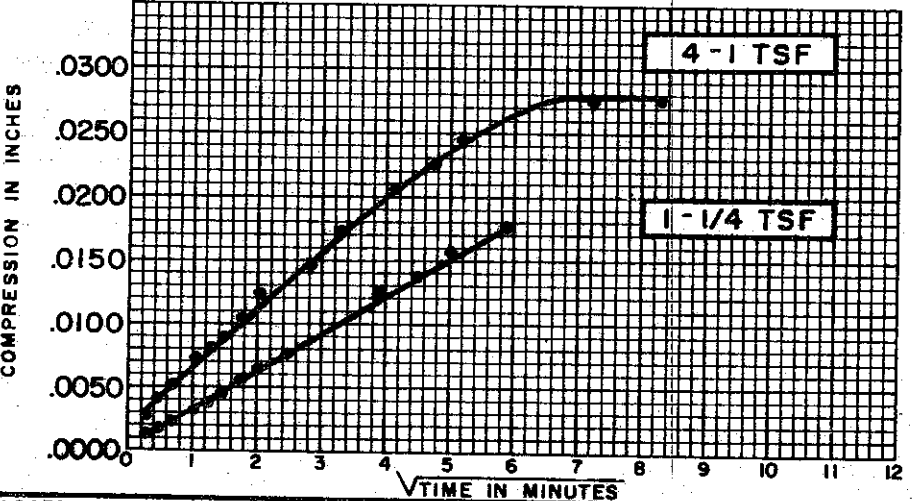
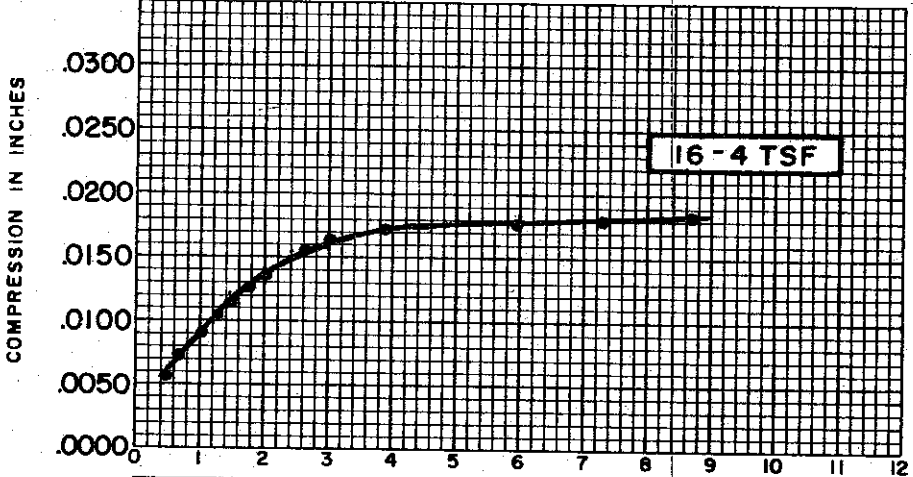
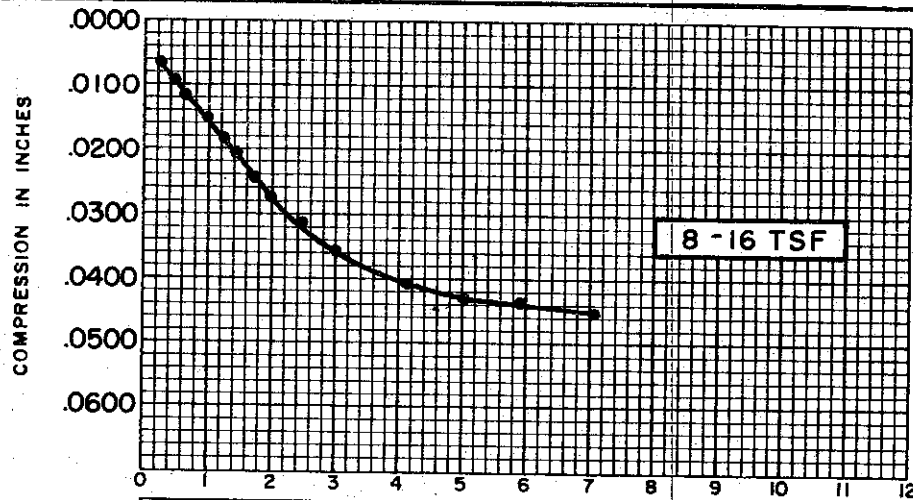
BORING NO. 50  
 SAMPLE NO. 8  
 DEPTH 38.5'-38.9'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.383

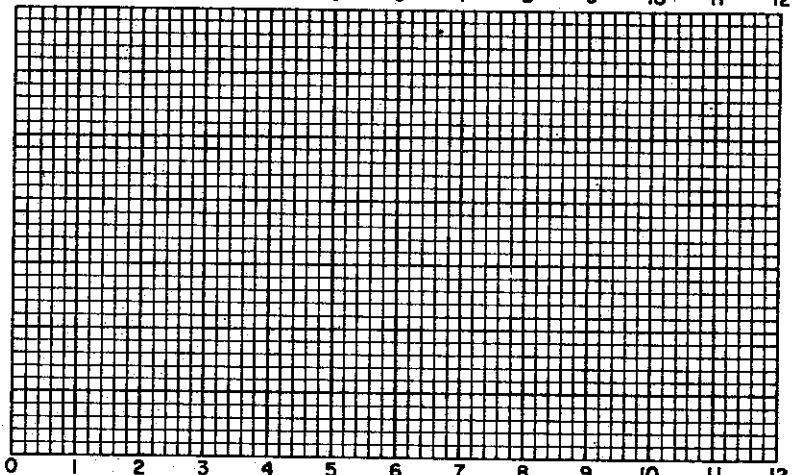
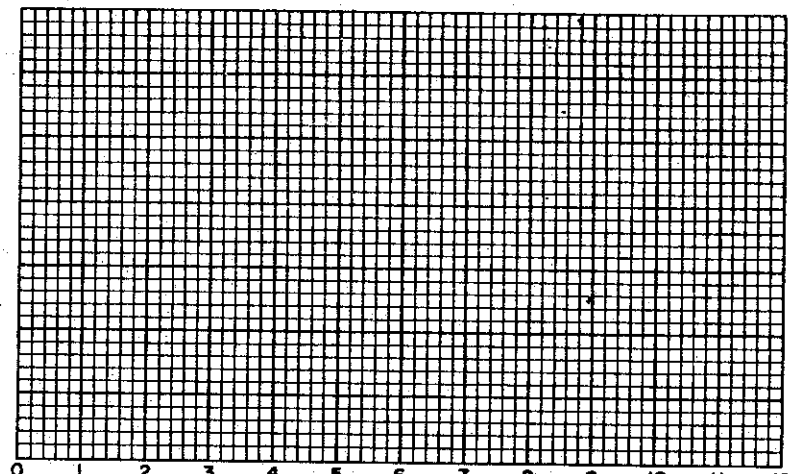
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

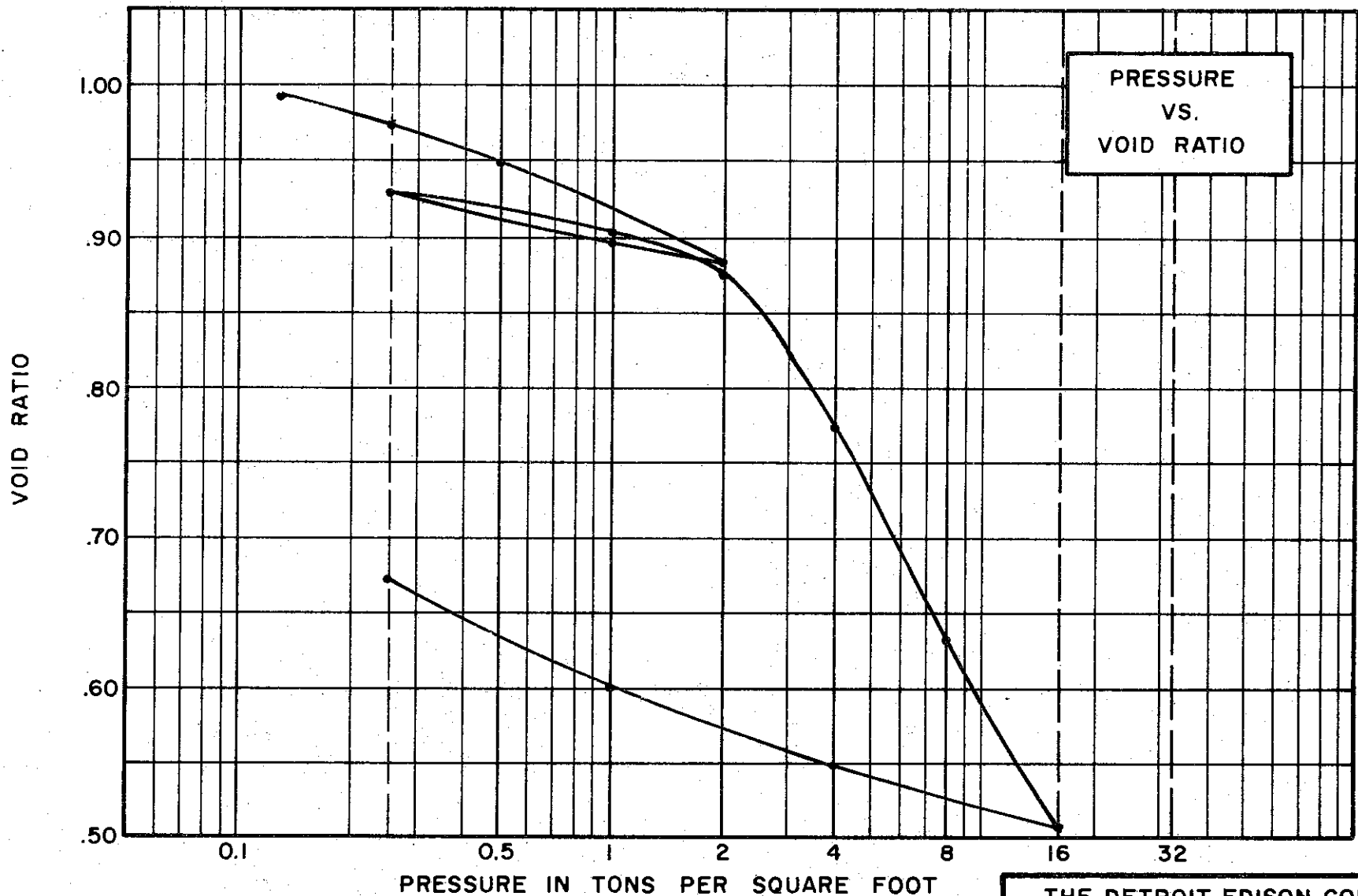
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CH)
SPECIFIC GRAVITY	2.75
INITIAL WATER CONTENT	51.6 %
FINAL WATER CONTENT	39.9 %
BORING NO.	50
SAMPLE NO.	8
DEPTH	38.5'-38.9'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.383

CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

PRESSURE  
VS.  
VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 40.5% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

**TEST DATA**

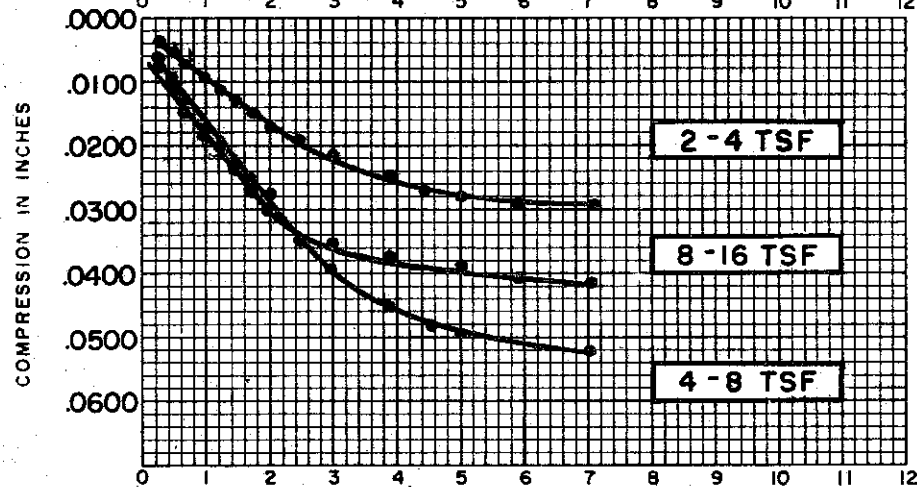
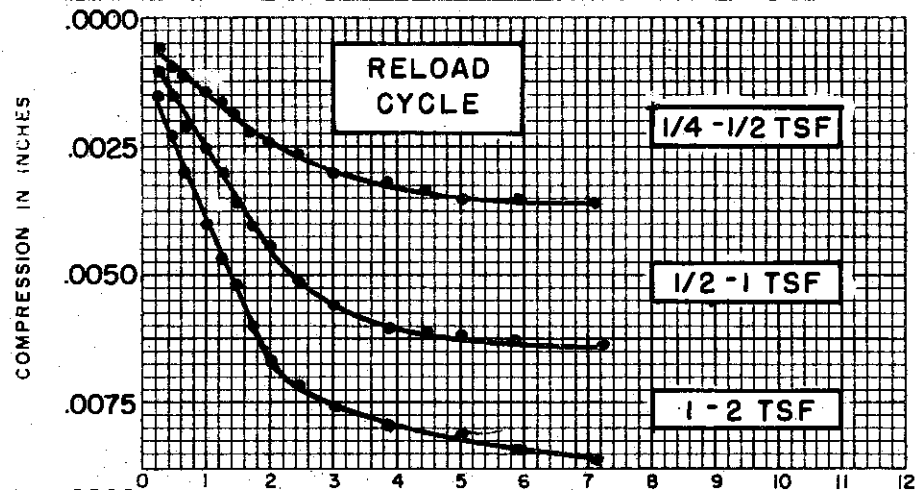
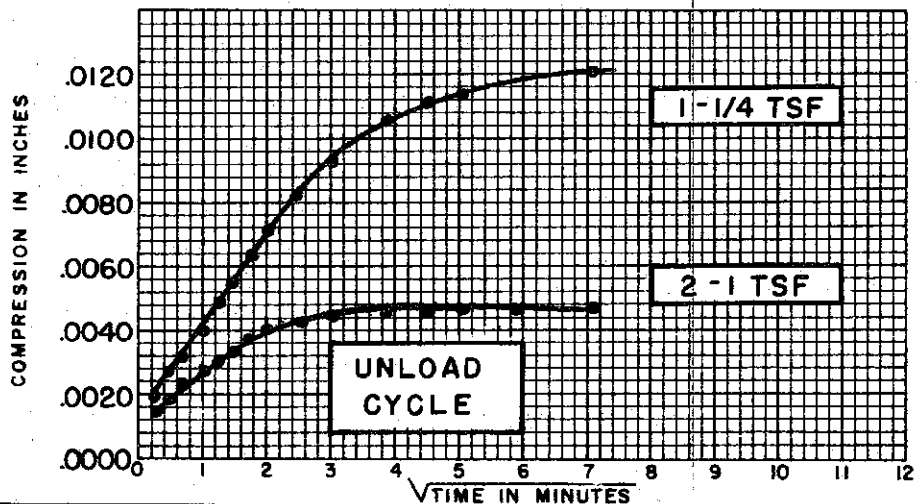
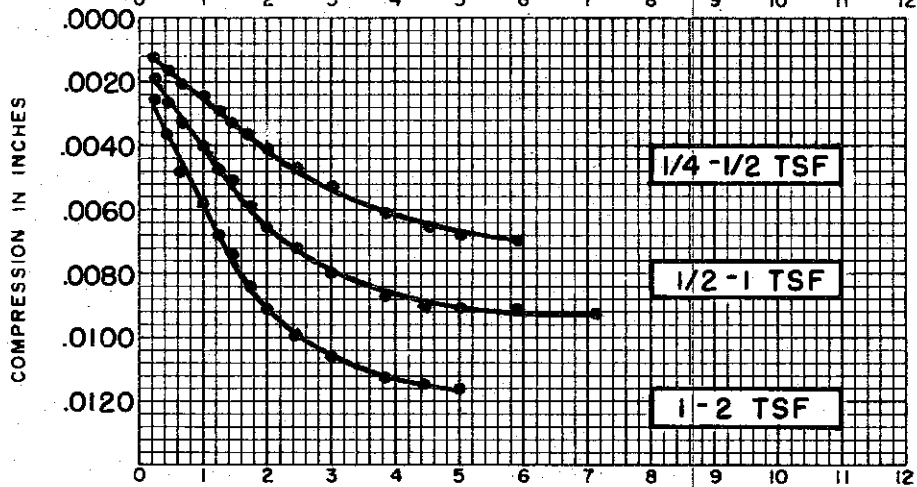
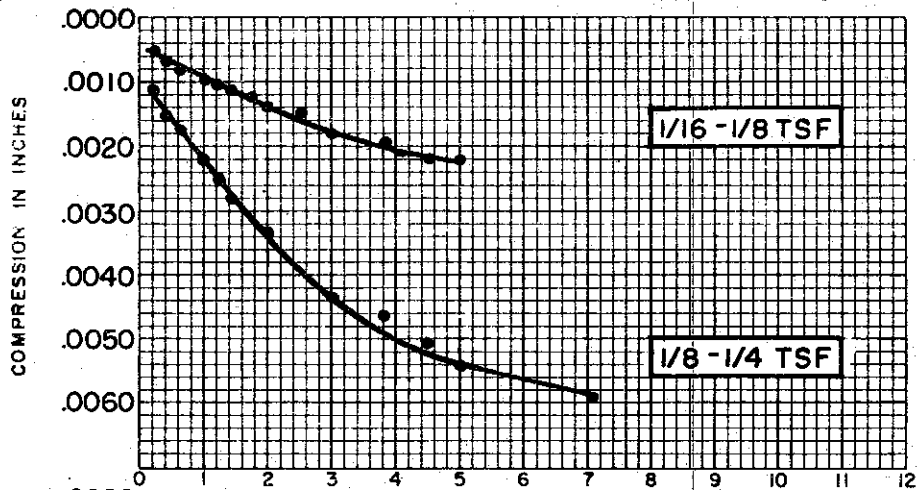
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 52 TEST NO. C109.1  
 SAMPLE NO. 4 DATE JULY 1974  
 DEPTH 29.9' TO 30.2'

C-513



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

**TEST DATA**

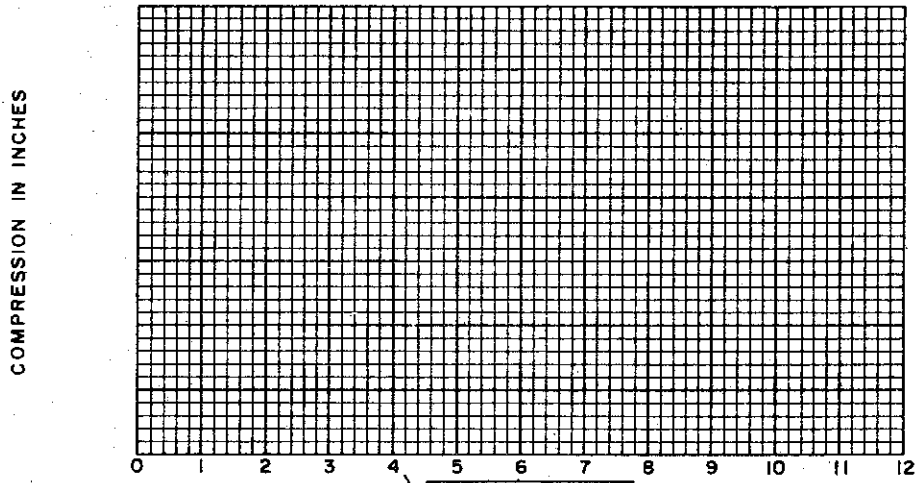
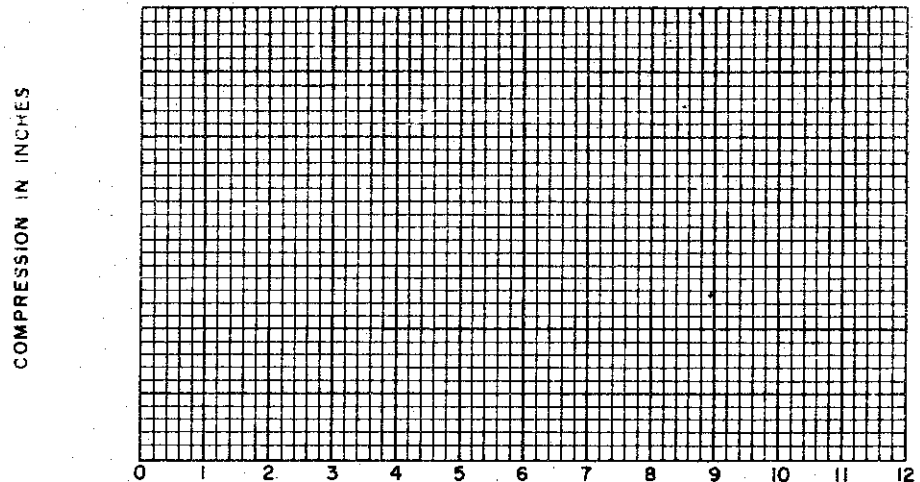
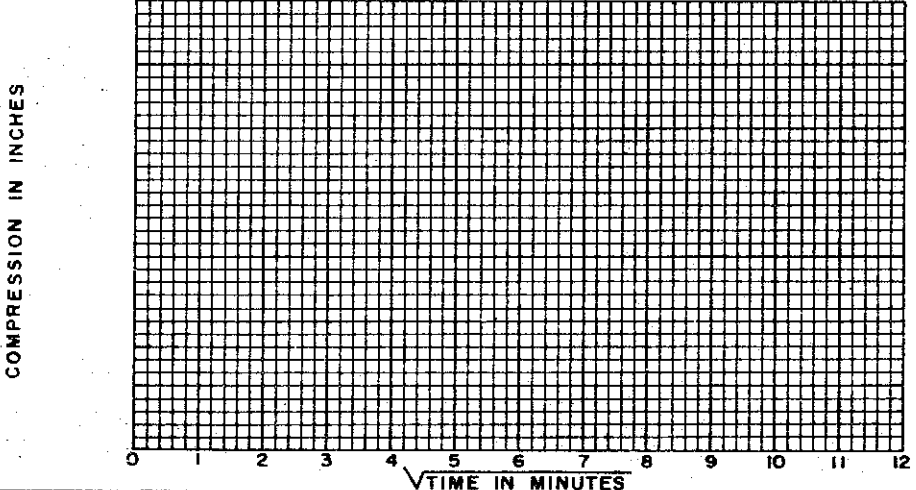
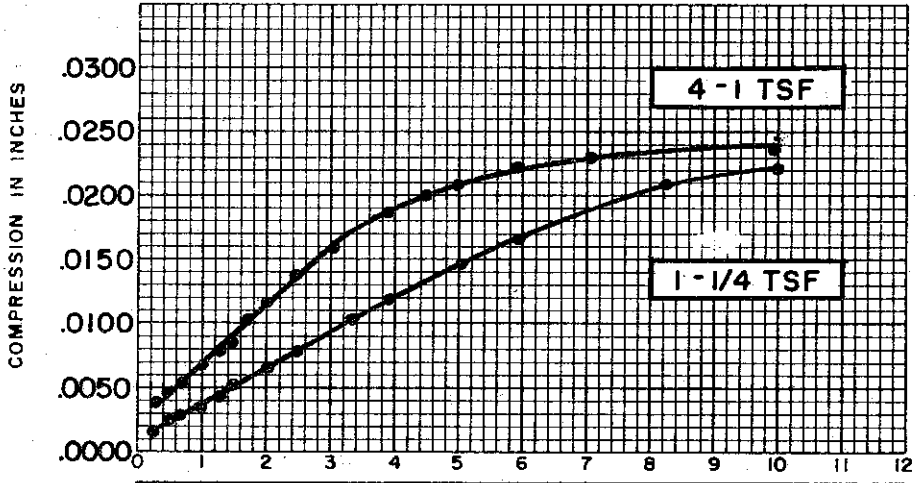
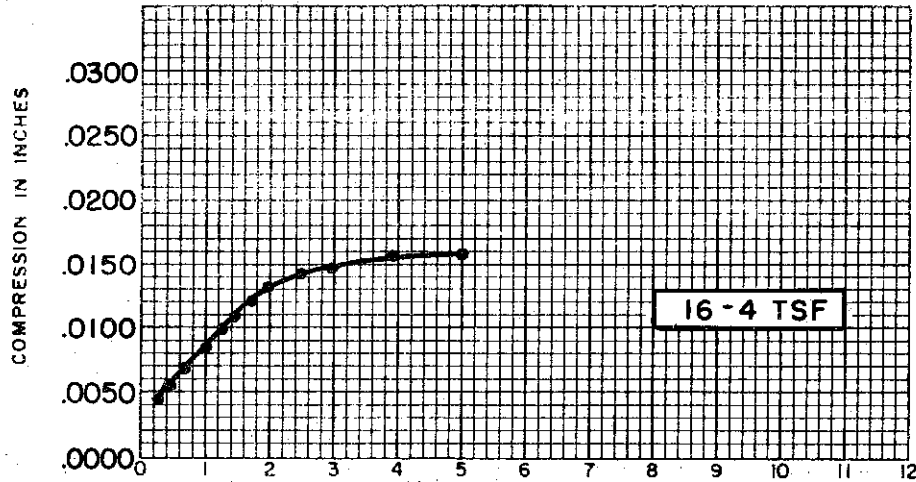
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



C-515

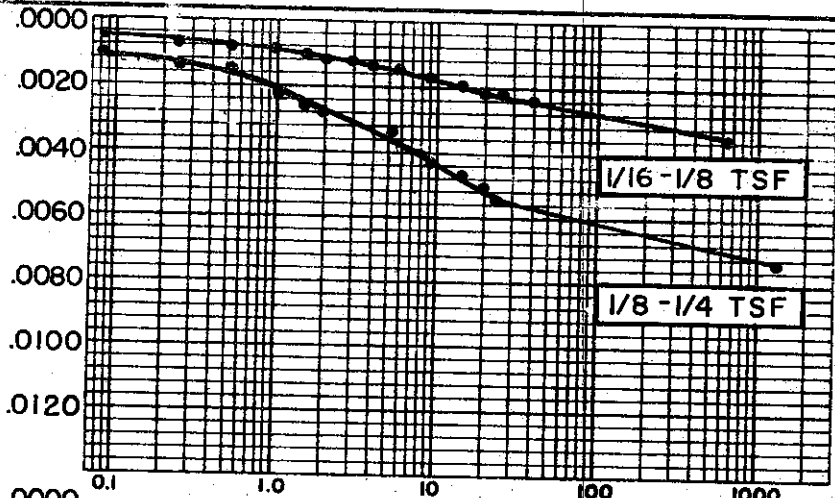


SOIL PROPERTIES		BORING NO.	52
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	4
SPECIFIC GRAVITY	2.70	DEPTH	29.9'-30.2'
INITIAL WATER CONTENT	40.5 %		
FINAL WATER CONTENT	28.9 %		

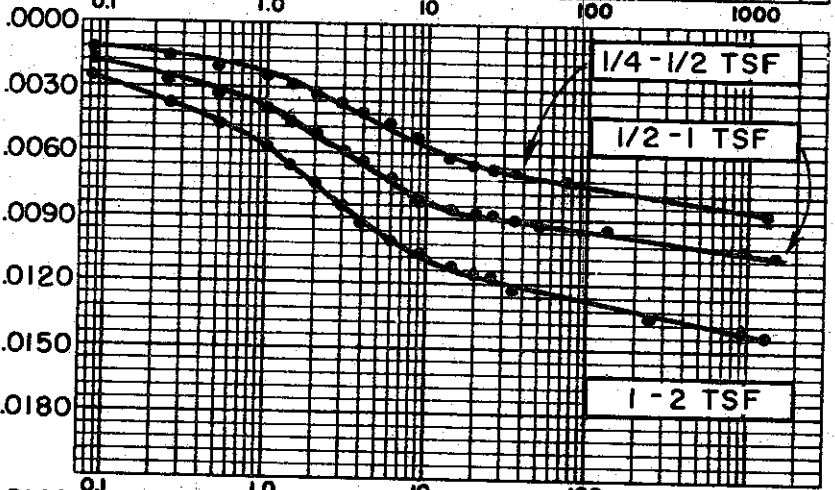
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.013

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

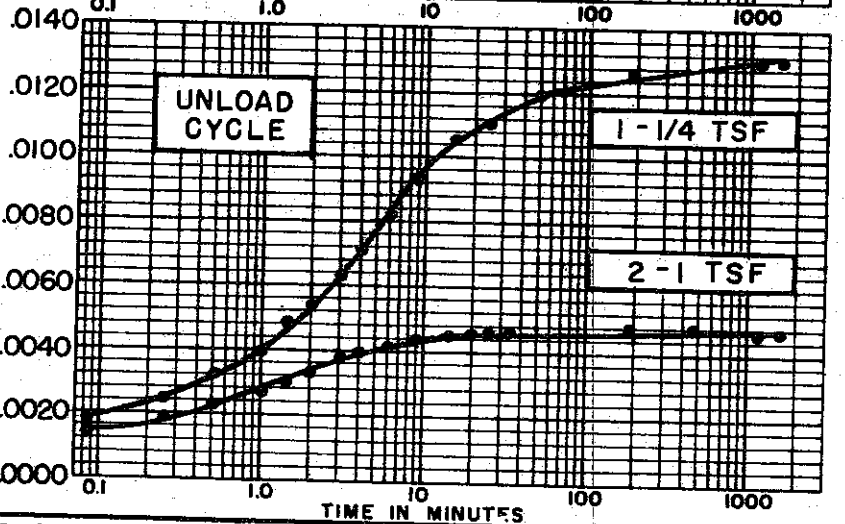
COMPRESSION IN INCHES



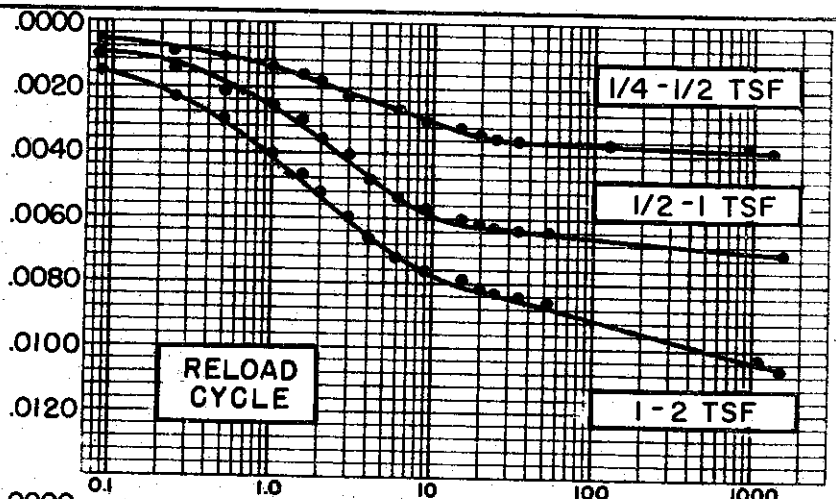
COMPRESSION IN INCHES



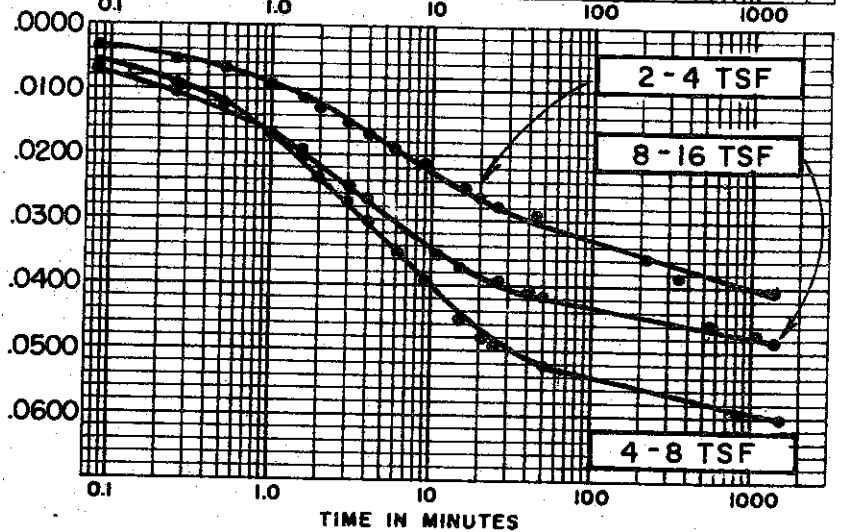
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 40.5 %  
FINAL WATER CONTENT 28.9 %

BORING NO. 52  
SAMPLE NO. 4  
DEPTH 29.9'-30.2'

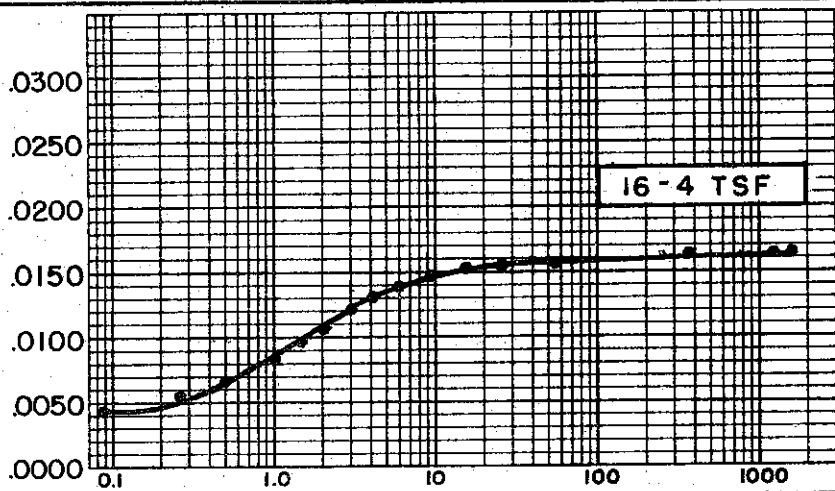
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 1.013

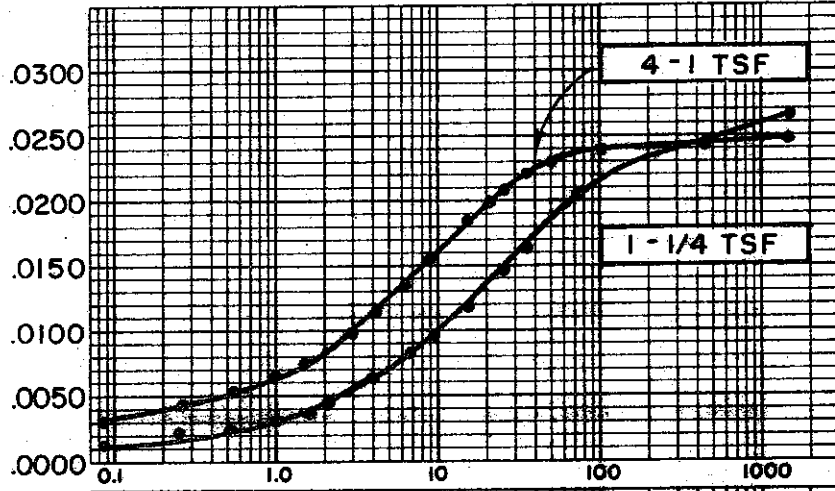
**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

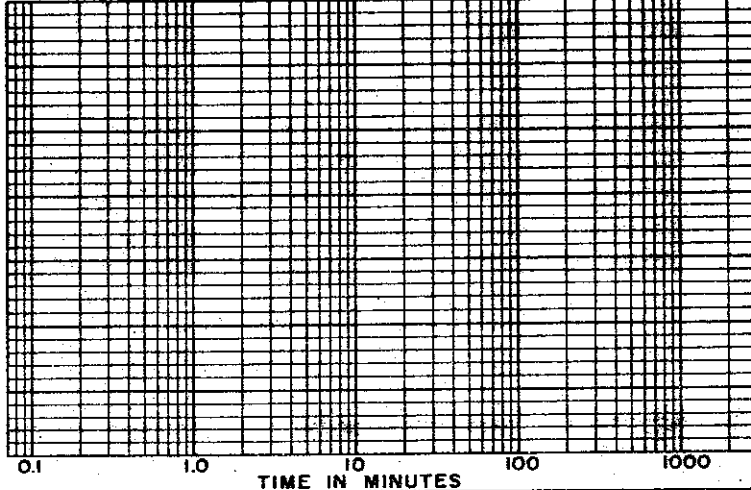
COMPRESSION IN INCHES



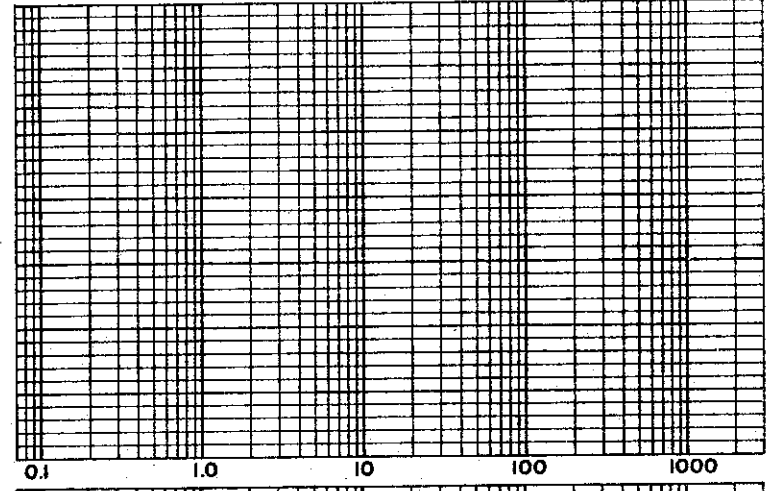
COMPRESSION IN INCHES



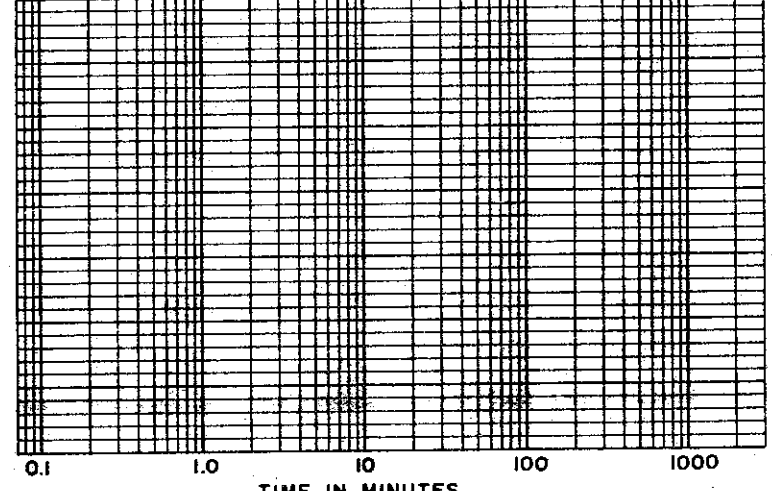
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 40.5 %  
 FINAL WATER CONTENT 28.9 %

BORING NO. 52  
 SAMPLE NO. 4  
 DEPTH 29.9'-30.2'

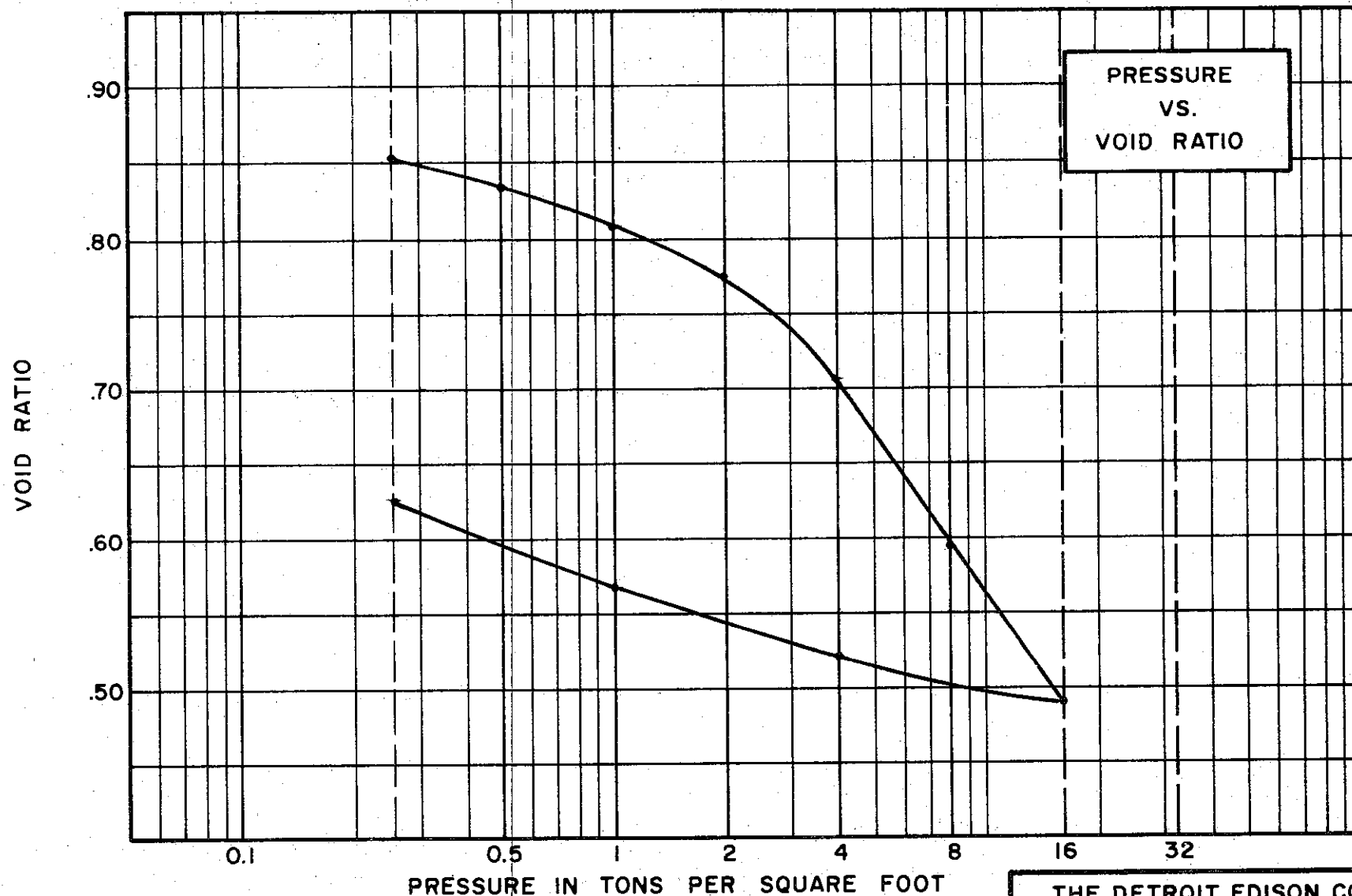
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 0.50"  
 INITIAL VOID RATIO 1.013

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-517

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY,  
SANDY (CL)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 30.9% FINAL 22.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

**TEST DATA**

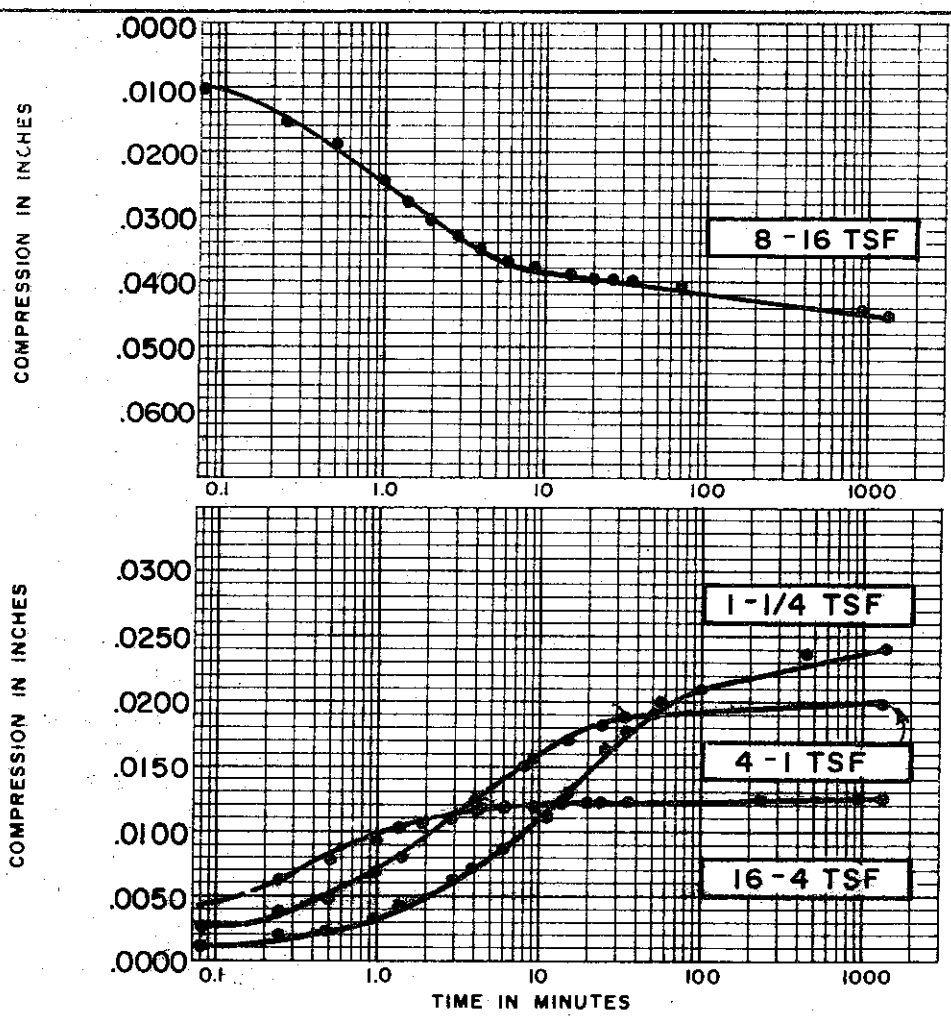
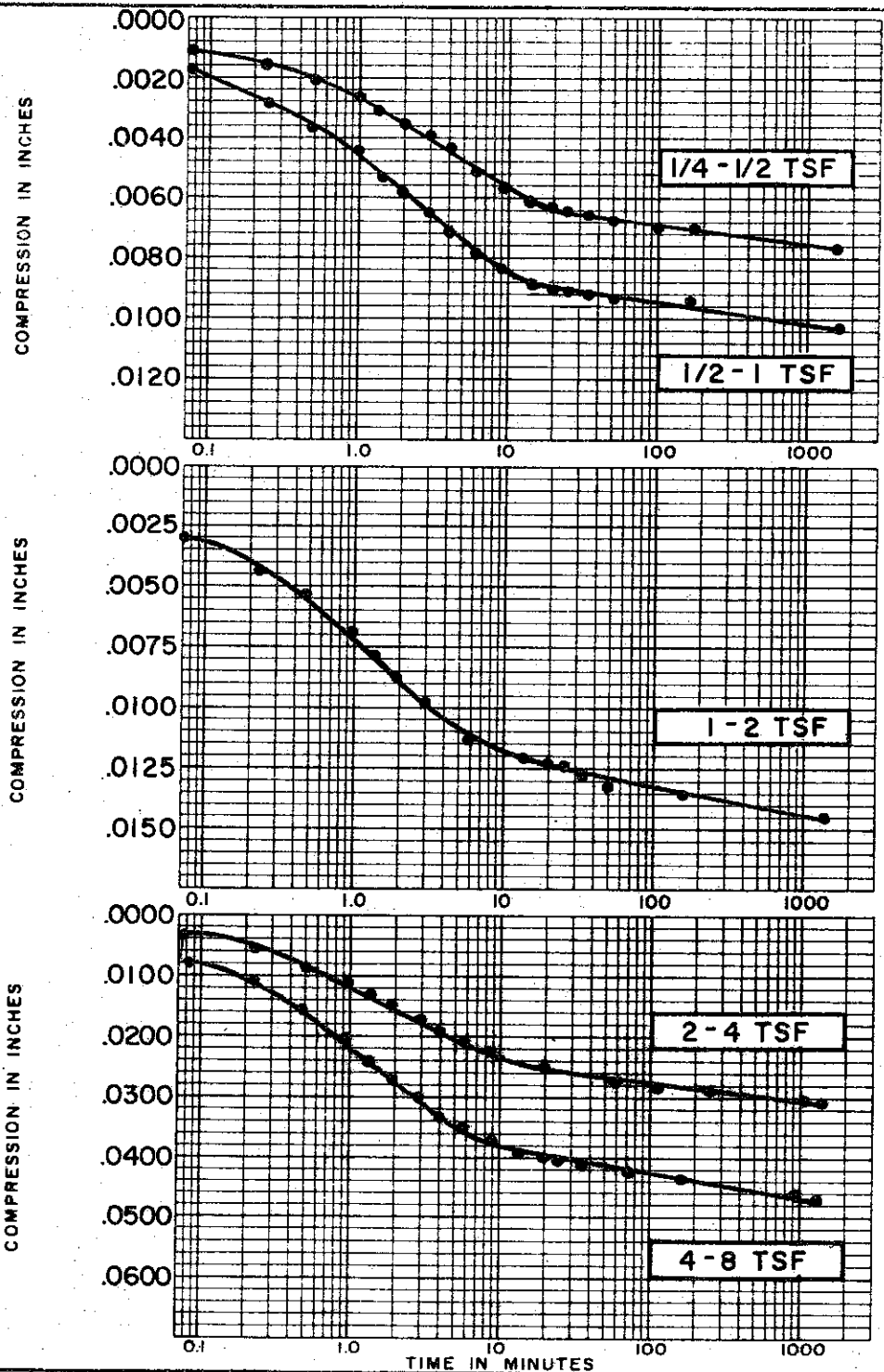
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.872

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

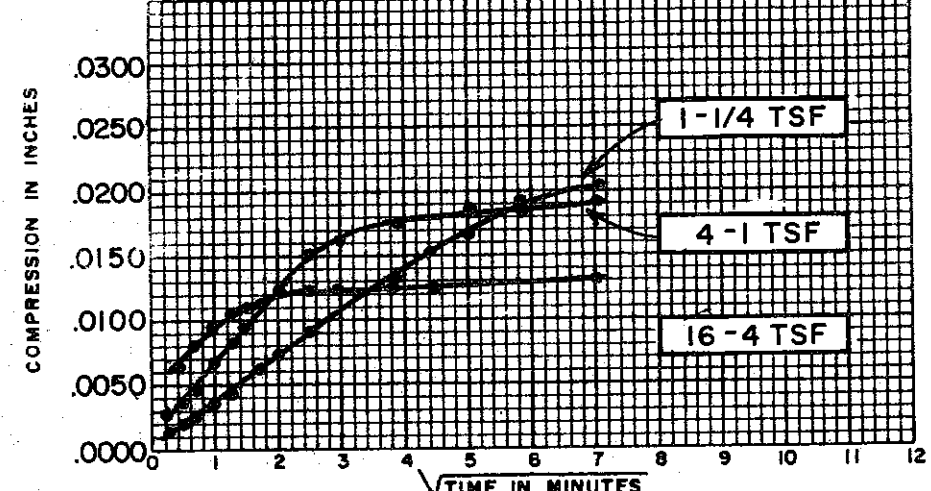
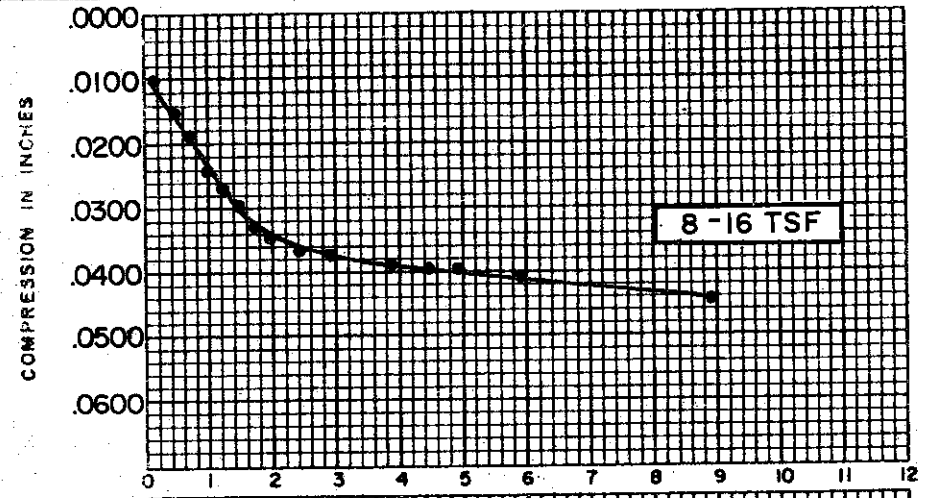
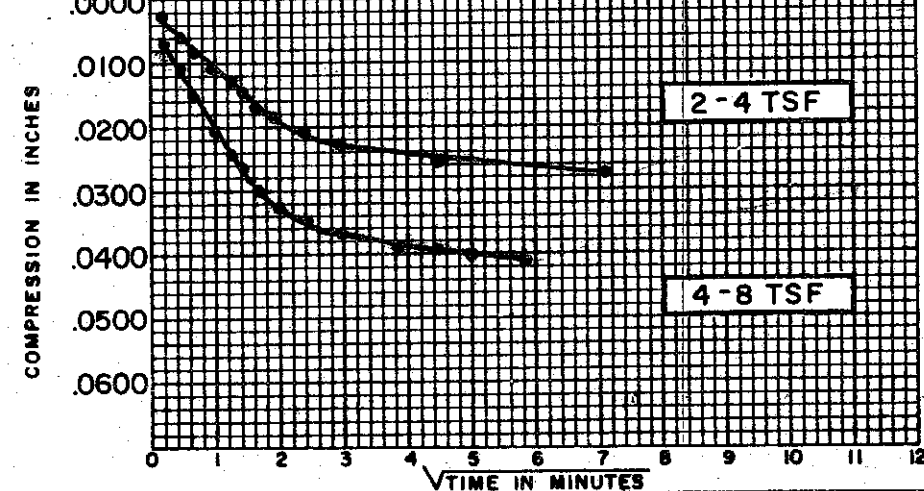
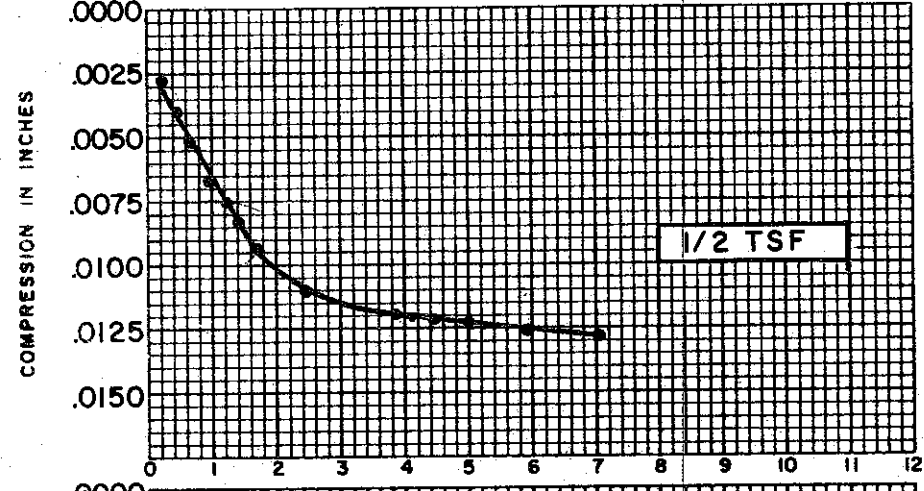
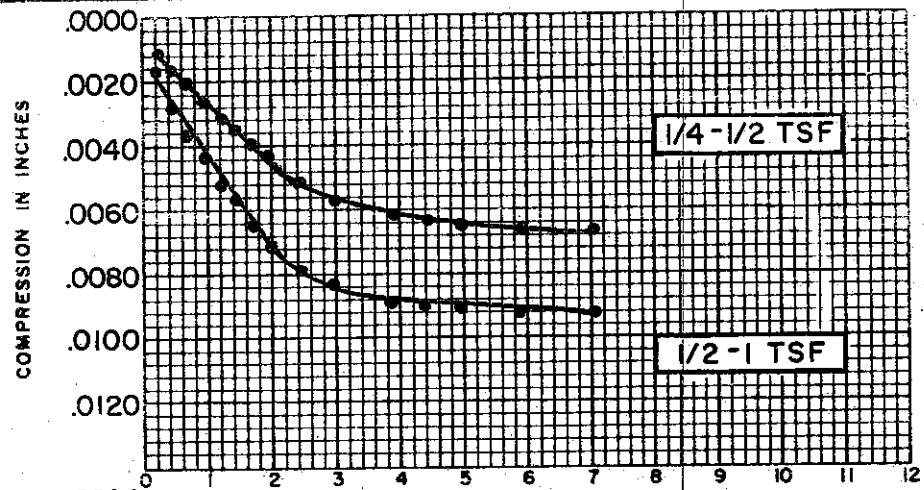
BORING NO. 53 TEST NO. C98.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 39.5' TO 39.8'

C-519



<b>SOIL PROPERTIES</b>		<b>BORING NO. 53</b>	
SOIL DESCRIPTION: <u>SILTY</u>		<b>SAMPLE NO. 5</b>	
<u>CLAY, SANDY (CL)</u>		<b>DEPTH 39.5' - 39.8'</b>	
SPECIFIC GRAVITY	<u>2.72</u>		
INITIAL WATER CONTENT	<u>30.9 %</u>		
FINAL WATER CONTENT	<u>22.7 %</u>		
<b>TEST DATA</b>			
INITIAL SAMPLE HEIGHT	<u>0.80"</u>		
INITIAL SAMPLE DIAMETER	<u>2.50"</u>		
INITIAL VOID RATIO	<u>0.872</u>		
		<b>CONSOLIDATION TEST</b>	
		<b>TIME VS. COMPRESSION CURVES</b>	
		THE DETROIT EDISON COMPANY	
		BELLE RIVER PLANT UNITS I & II	

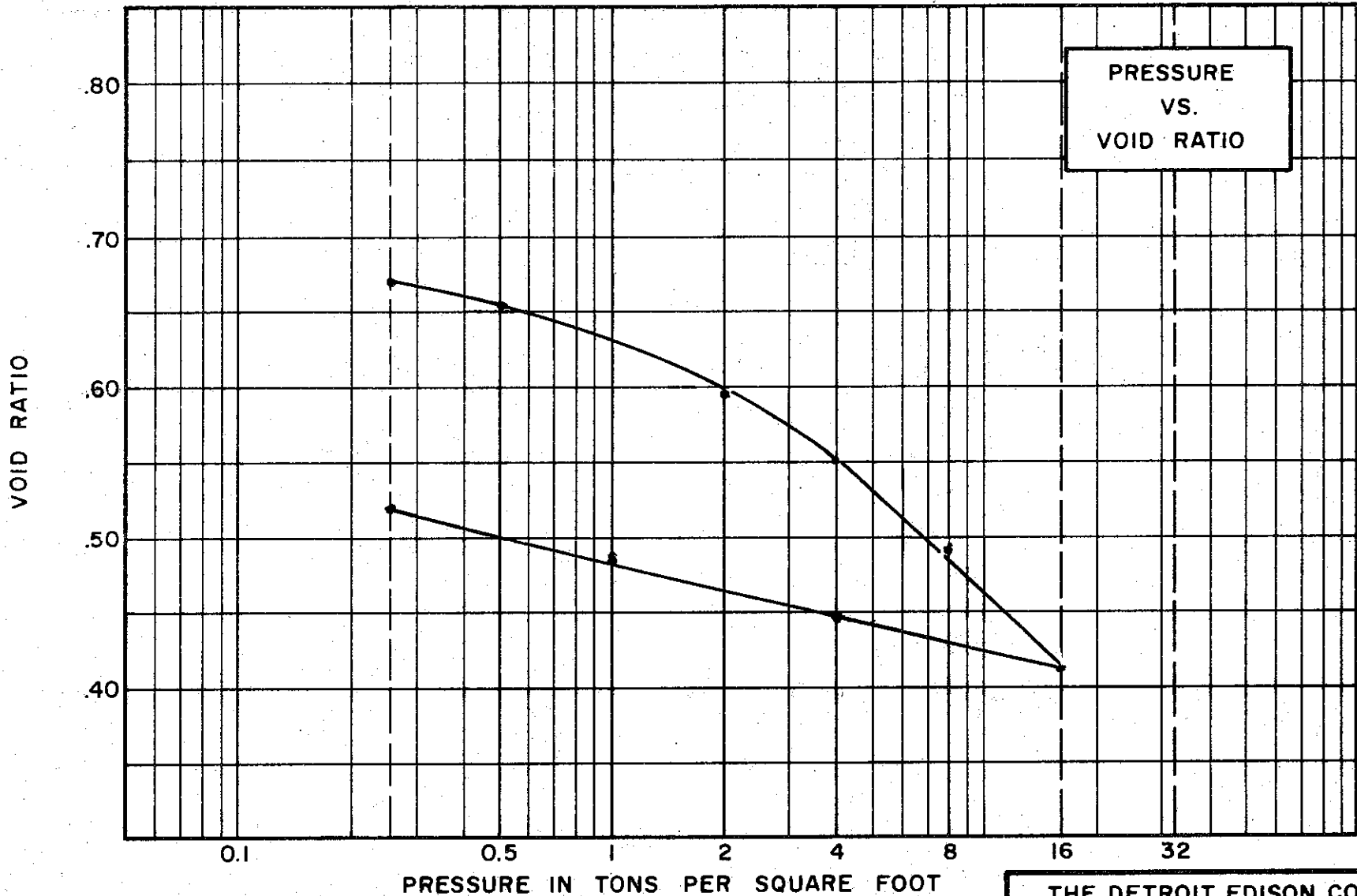
C-520



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	30.9%
FINAL WATER CONTENT	22.7%
BORING NO.	53
SAMPLE NO.	5
DEPTH	39.5'-39.8'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.872
CONSOLIDATION TEST	
TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

PRESSURE  
VS.  
VOID RATIO



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY  
(CL)  
SPECIFIC GRAVITY 2.71  
WATER CONTENT, INITIAL 26.0% FINAL 22.0%  
ATTERBERG LIMITS:  
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

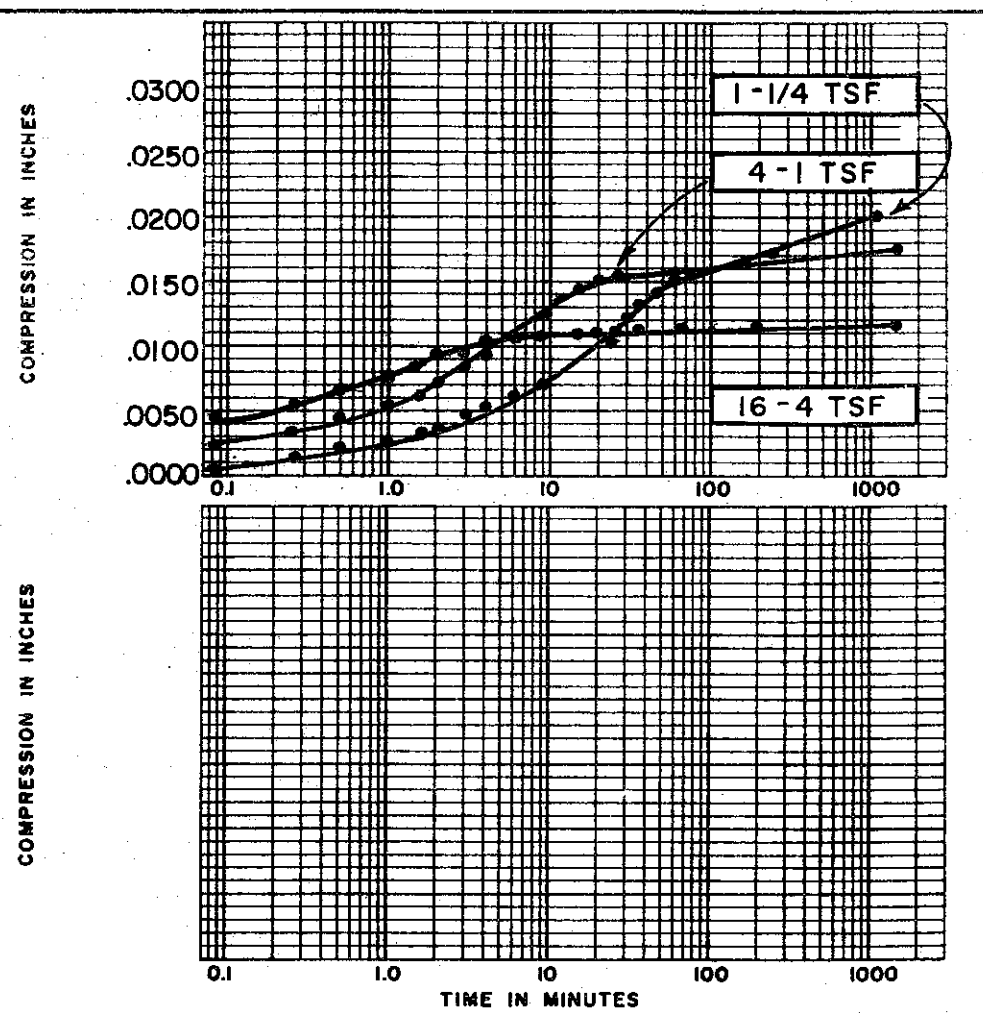
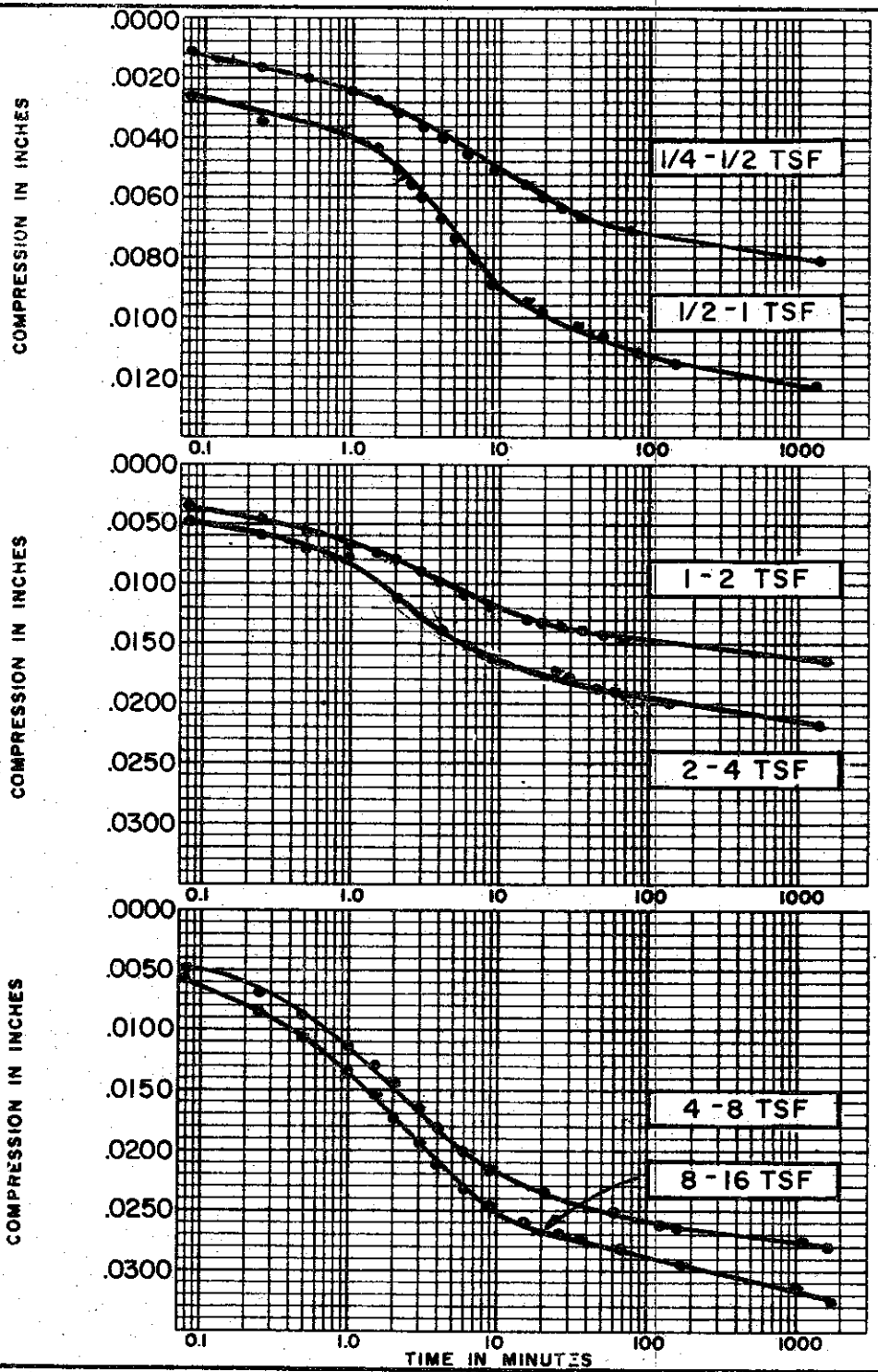
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.696

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

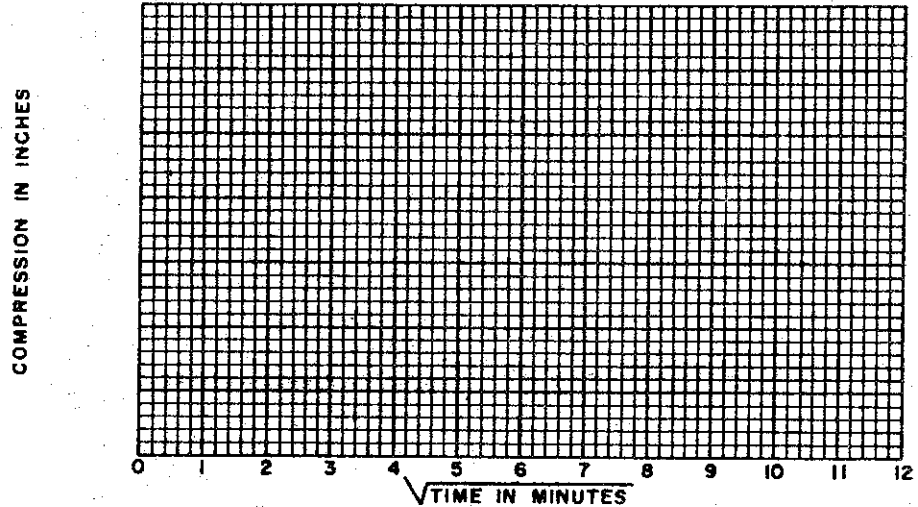
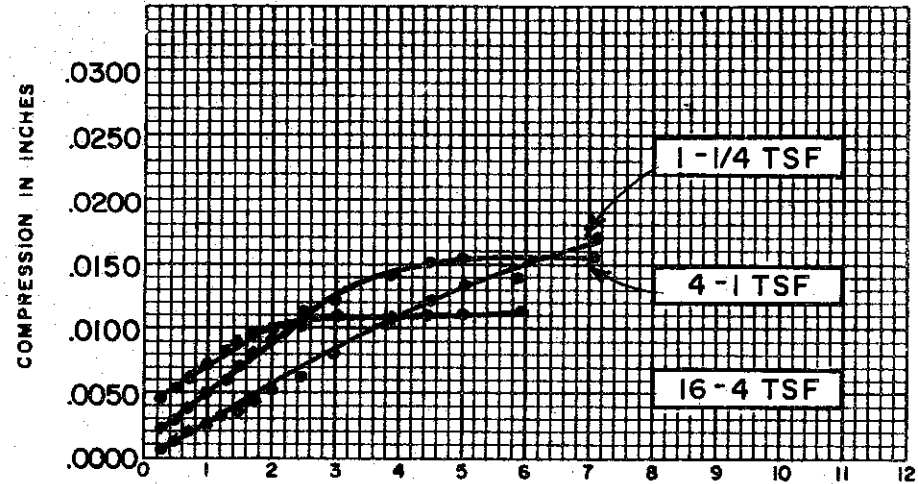
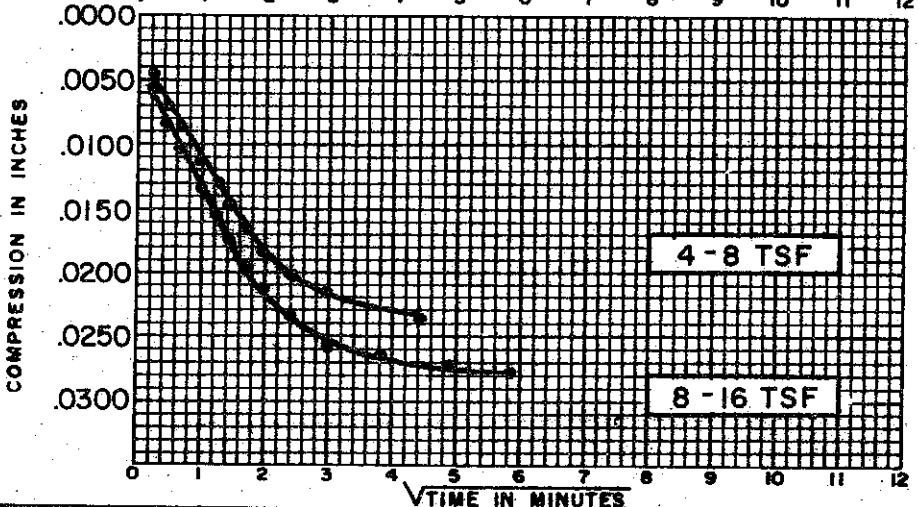
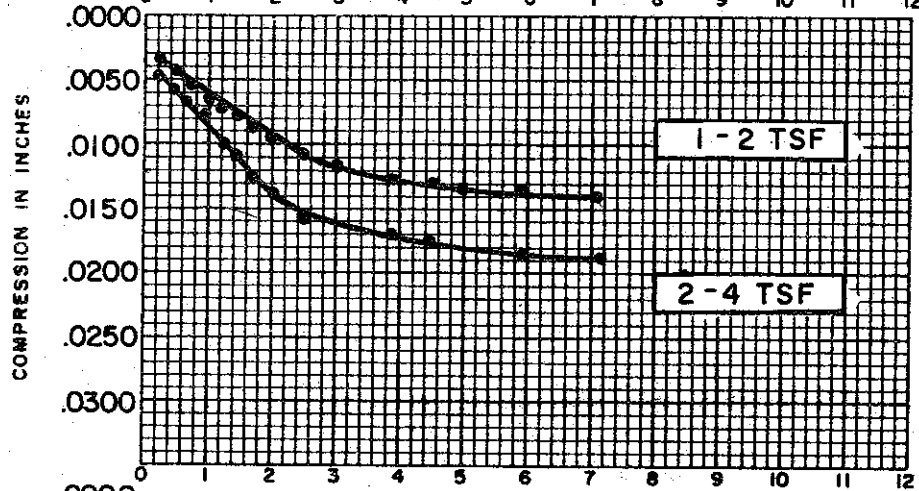
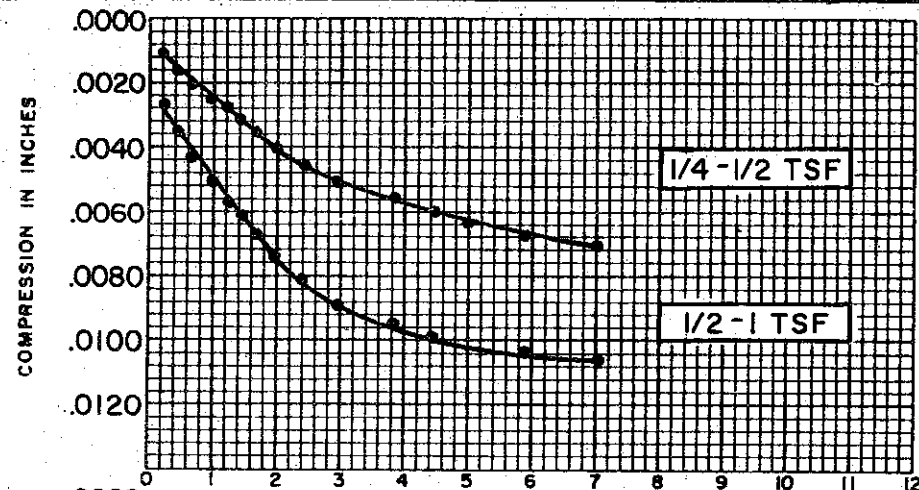
BORING NO. 54 TEST NO. C399.1  
SAMPLE NO. 6 DATE JULY 1974  
DEPTH 63.5' TO 63.8'

C-521



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	20.0 %
FINAL WATER CONTENT	22.0 %
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.696
BORING NO.	54
SAMPLE NO.	6
DEPTH	63.5' - 63.8'
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 26.0%  
 FINAL WATER CONTENT 22.0%

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5'-63.8'

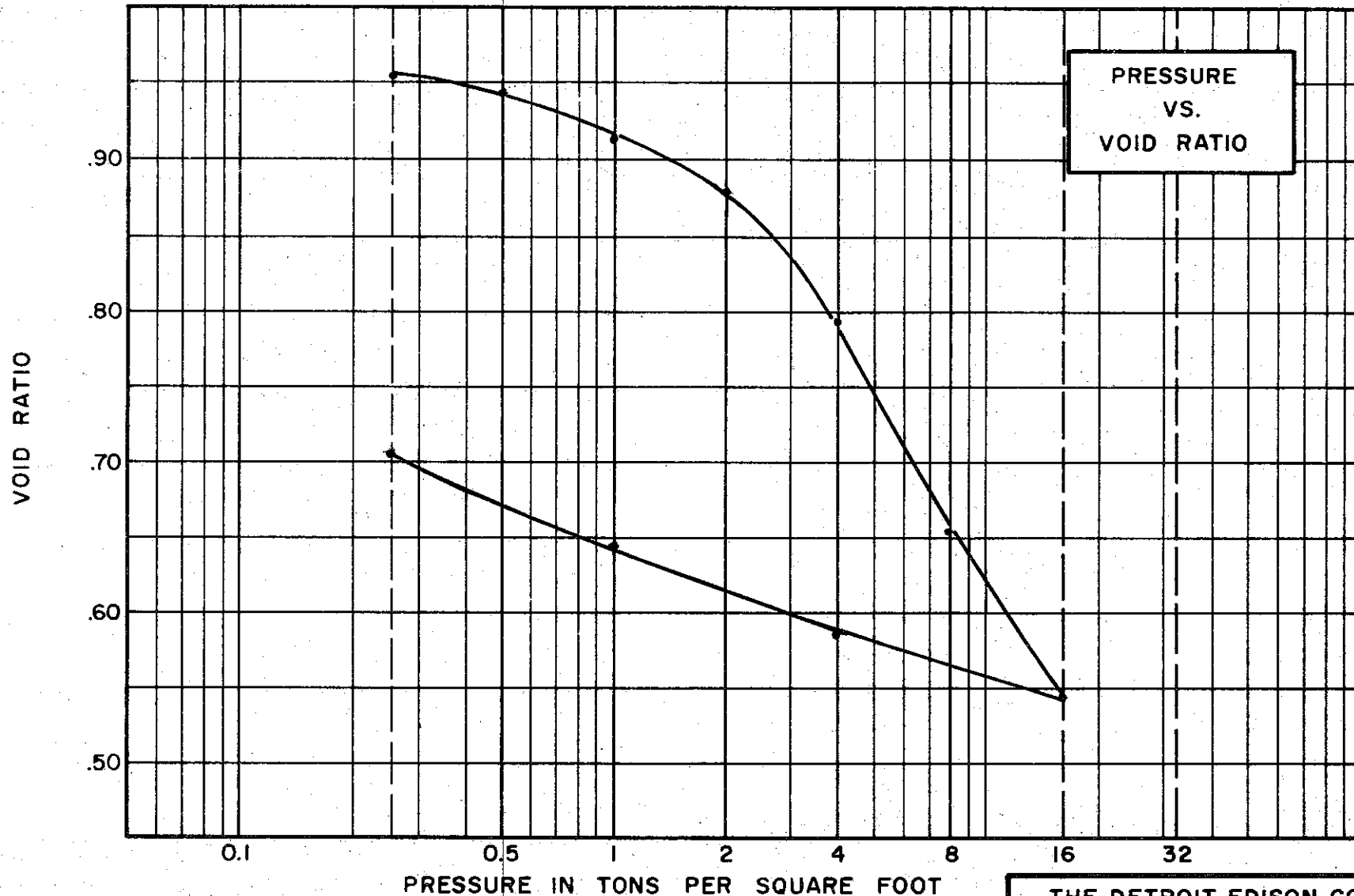
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.696

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-523



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 38.3% FINAL 30.6%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**

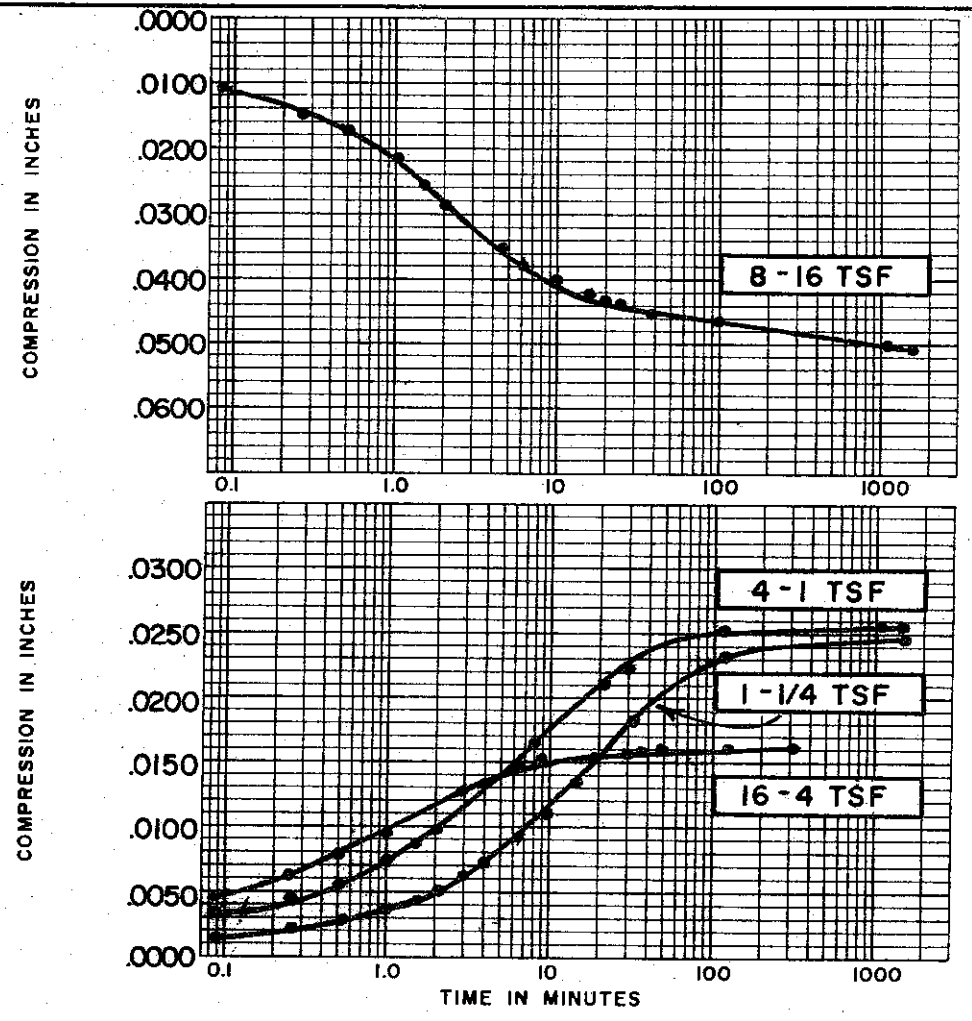
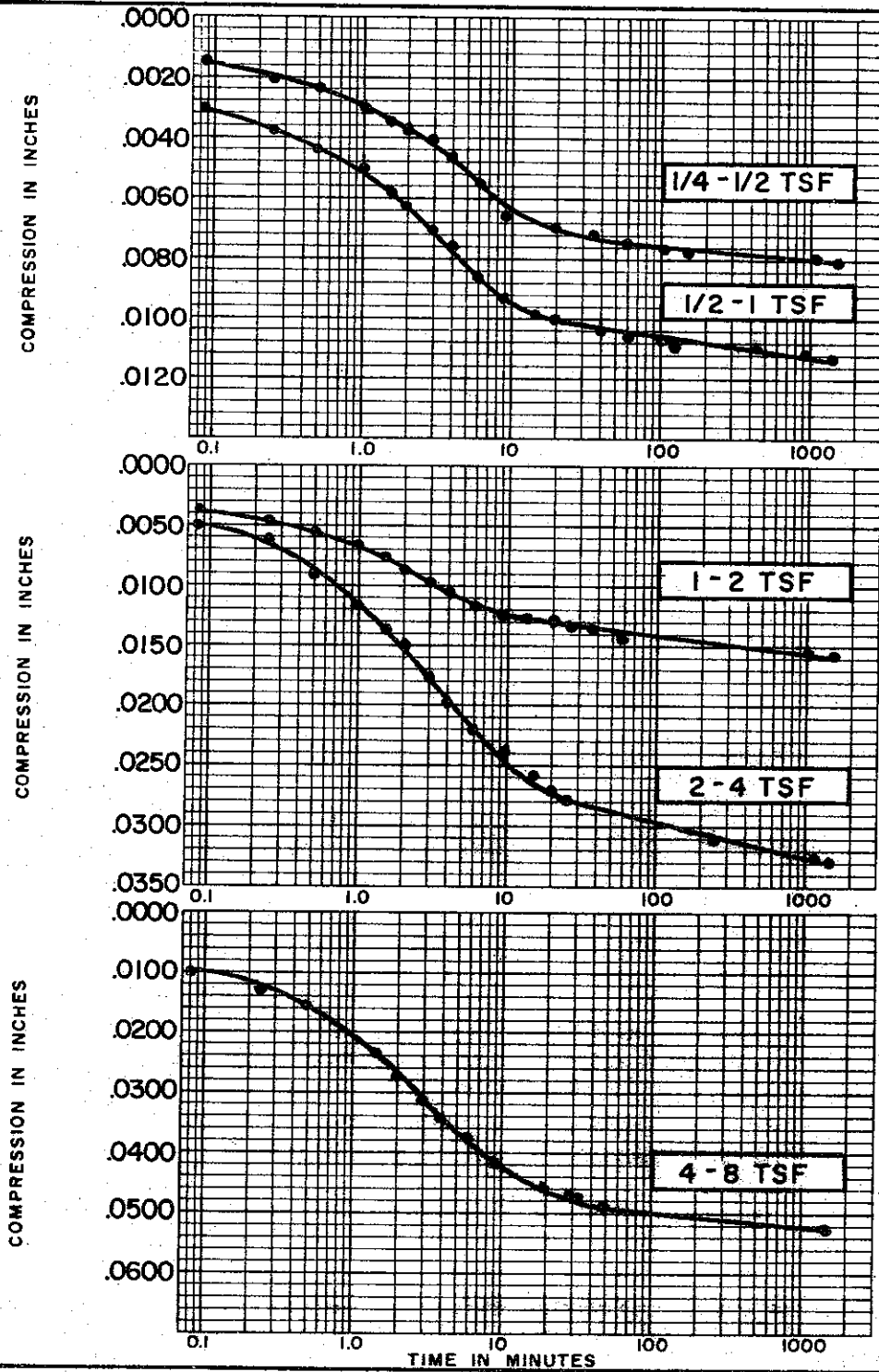
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

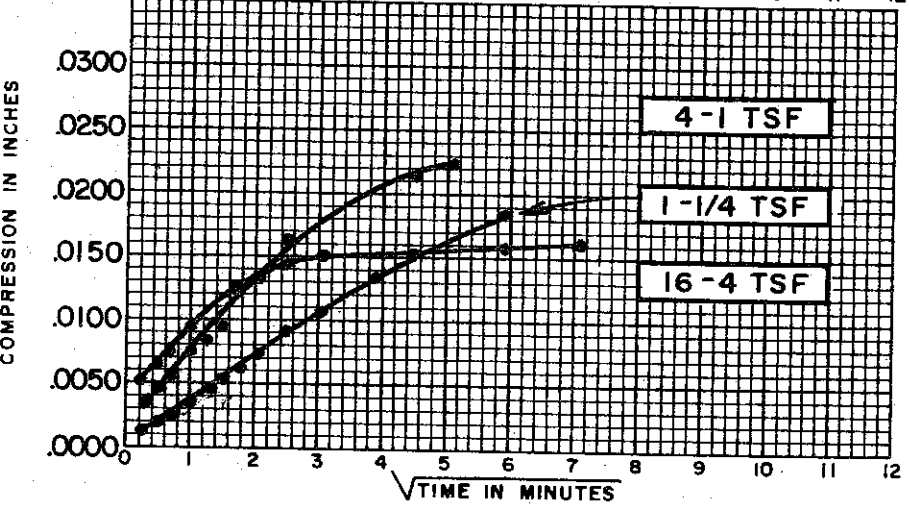
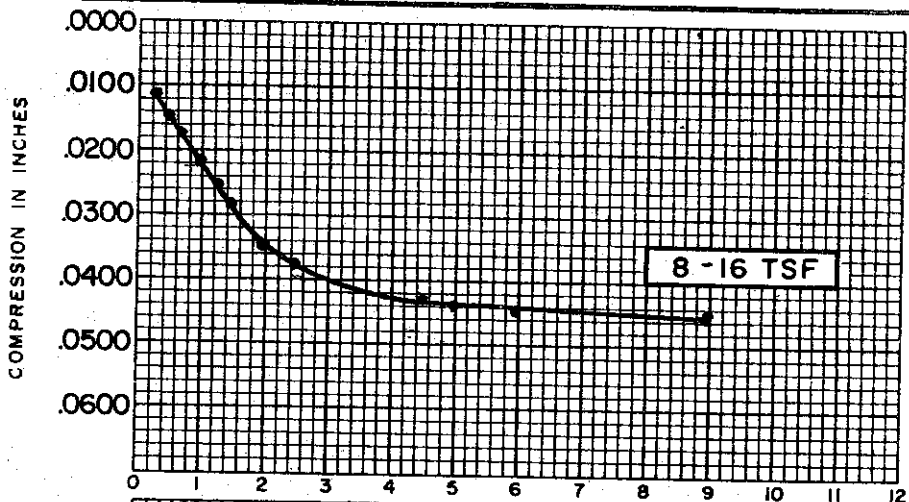
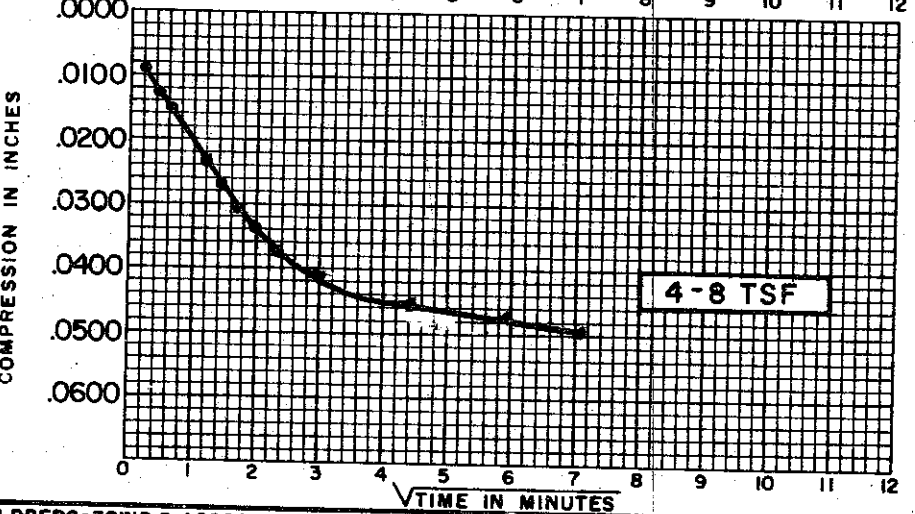
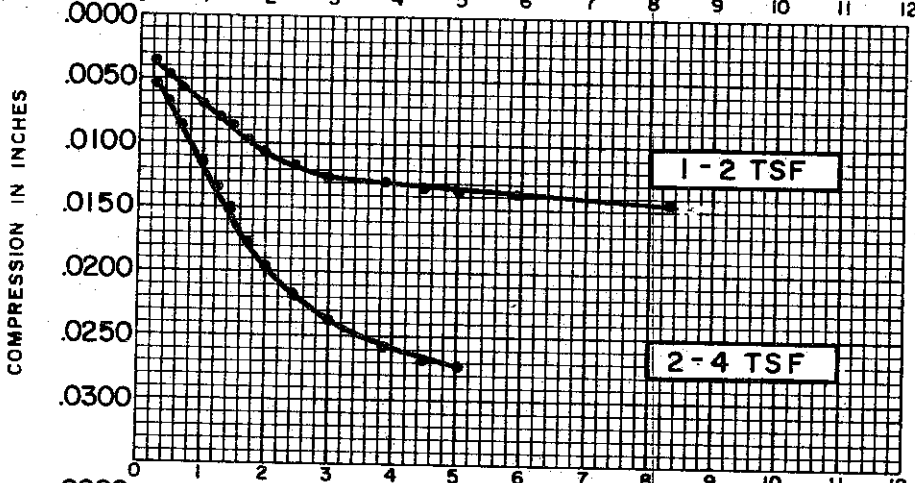
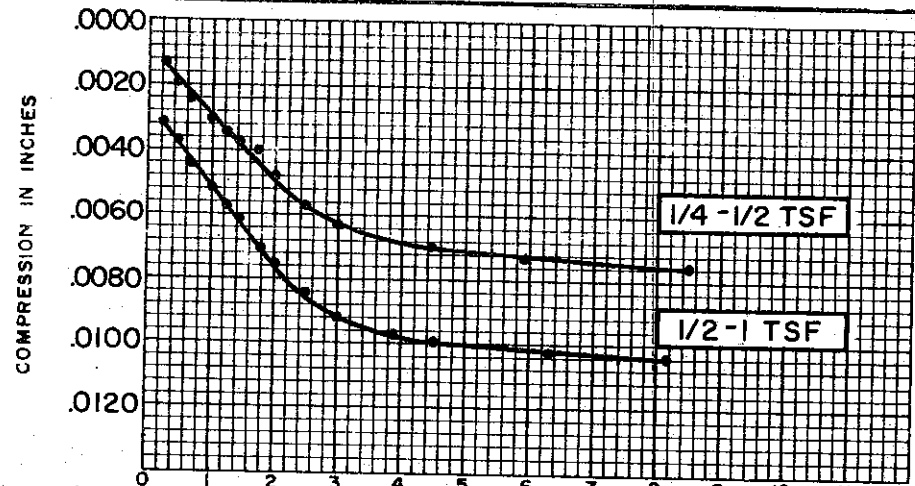
BORING NO. 54 TEST NO. C401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7' TO 74.0'

C-525



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	38.3 %
FINAL WATER CONTENT	30.6 %
BORING NO.	54
SAMPLE NO.	8
DEPTH	73.7' - 74.0'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.962

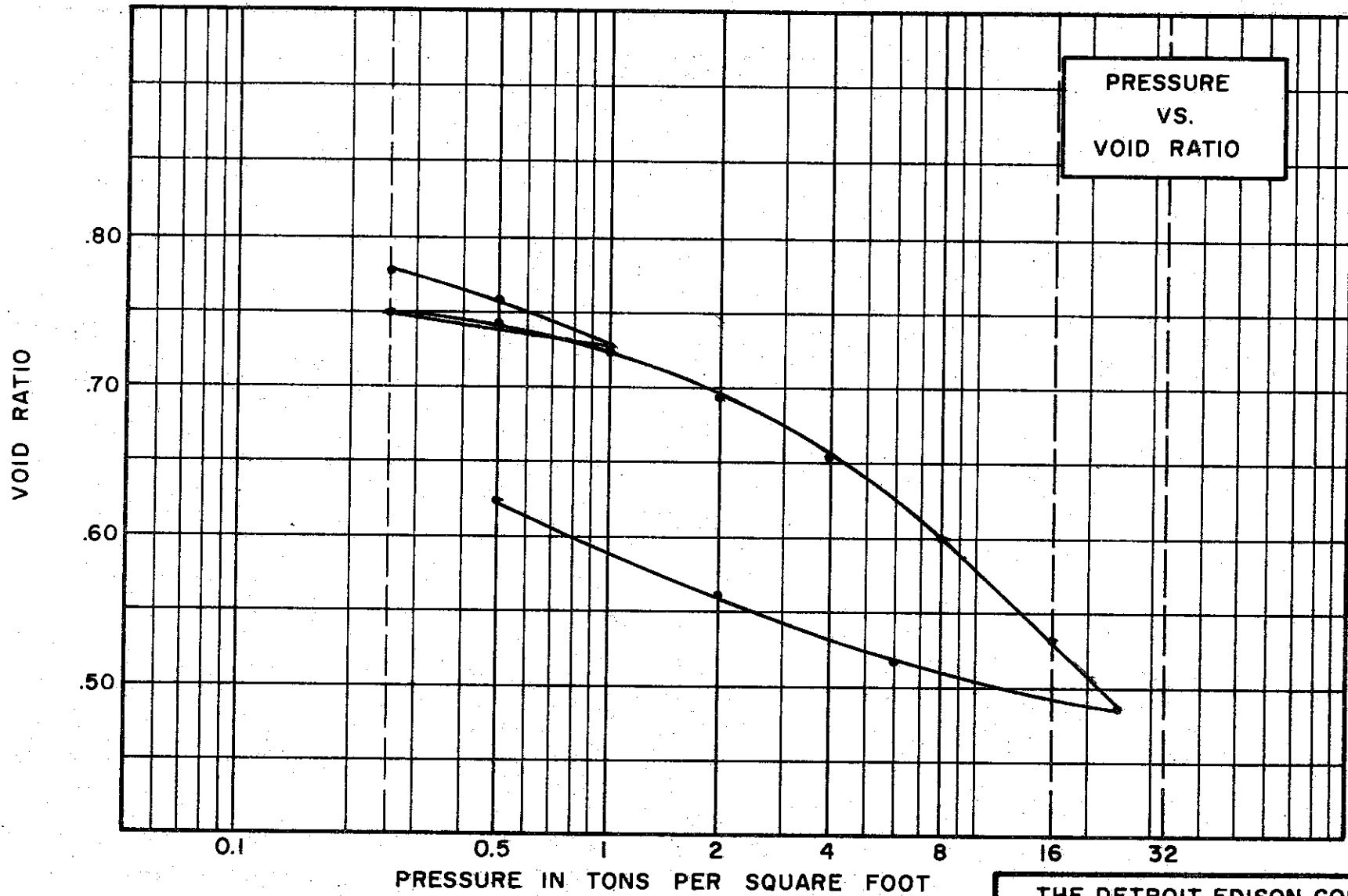
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 BORING NO. 54  
 SAMPLE NO. 8  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 38.3%  
 FINAL WATER CONTENT 30.6%  
 DEPTH 73.7'-74.0'

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.982

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



PRESSURE  
VS.  
VOID RATIO

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL-CH)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 30.0% FINAL 28.8%

ATTERBERG LIMITS:  
LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.787

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

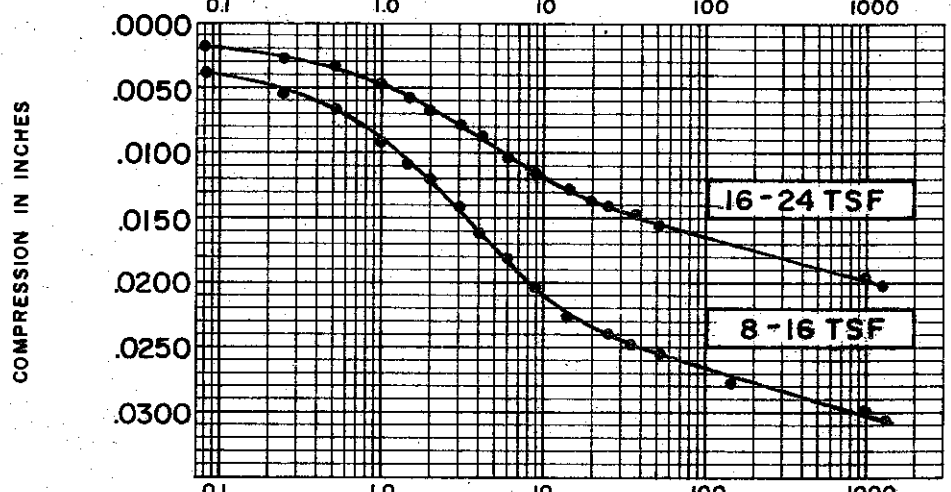
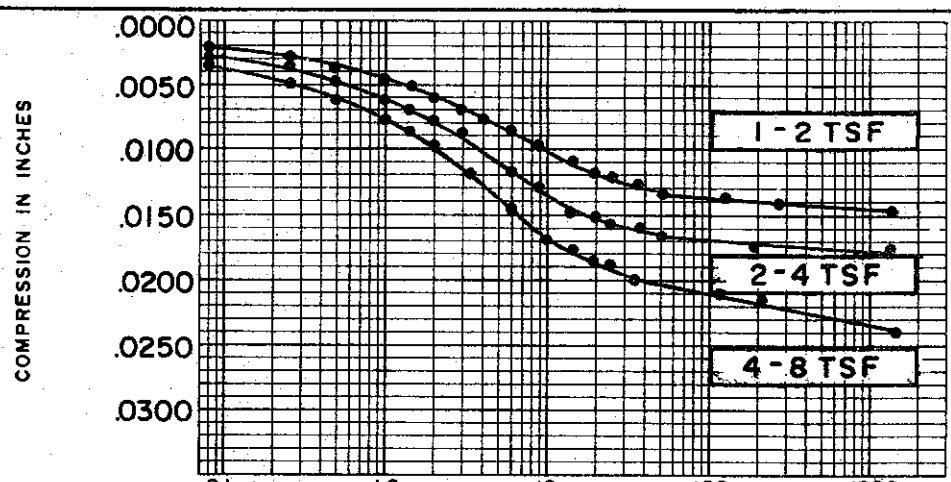
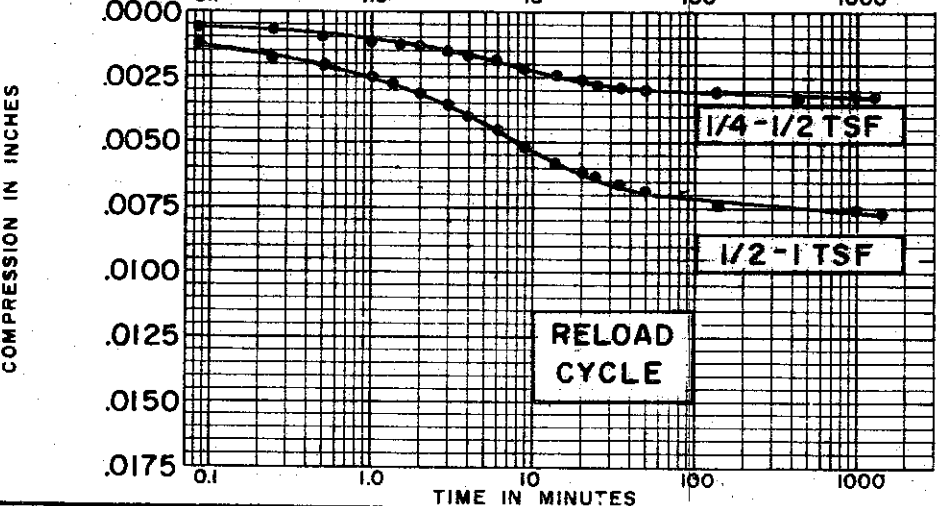
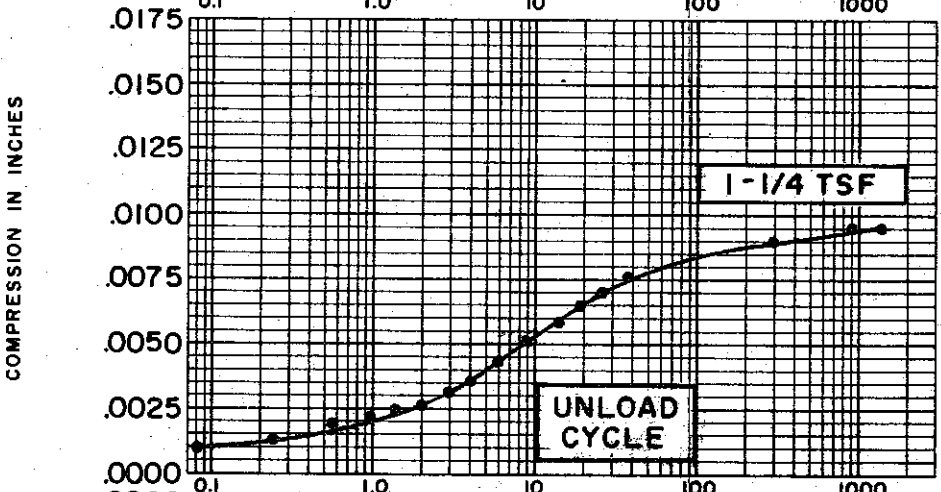
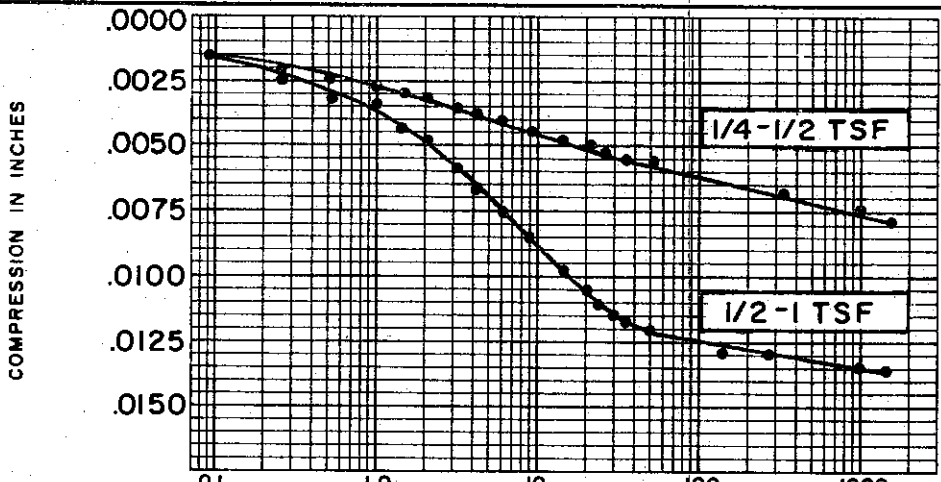
**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 60 TEST NO. C42.1

SAMPLE NO. 2 DATE FEB. 1974

DEPTH 9.8' TO 10.0'

C-527



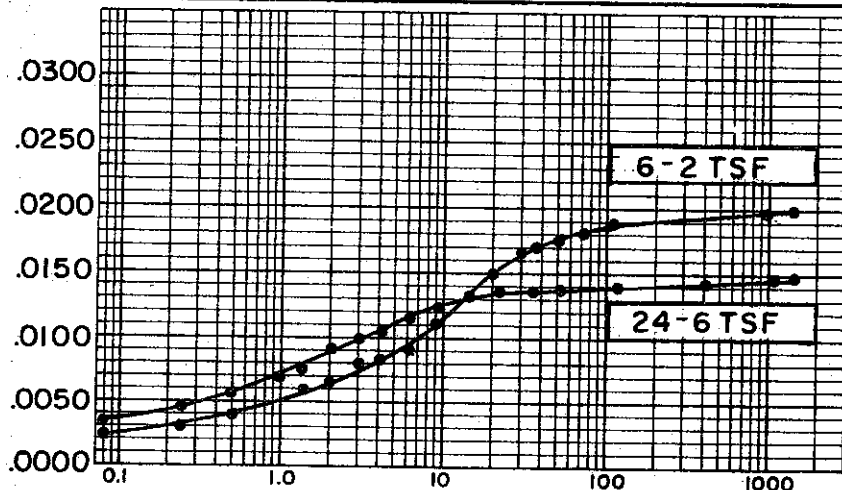
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	30.0%
FINAL WATER CONTENT	28.8%
BORING NO.	60
SAMPLE NO.	2
DEPTH	9.8' TO 10.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

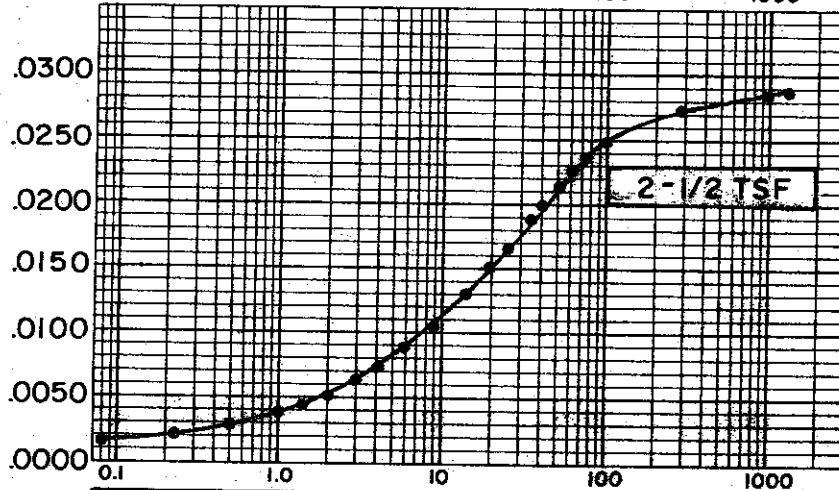
CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-529

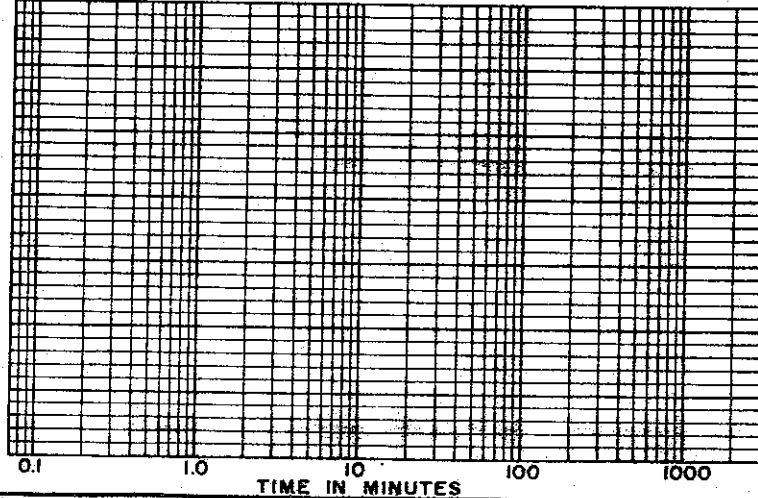
COMPRESSION IN INCHES



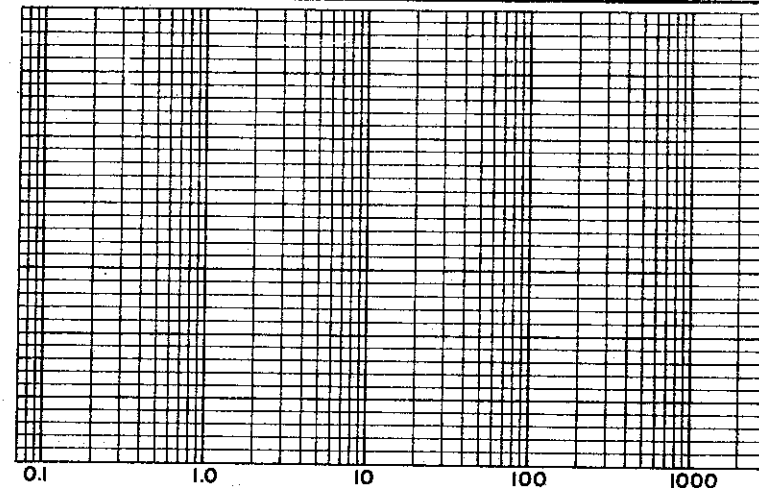
COMPRESSION IN INCHES



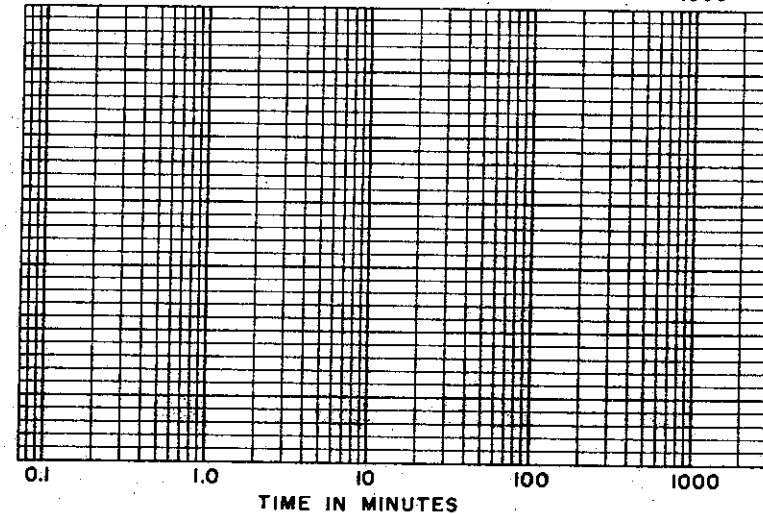
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CM)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

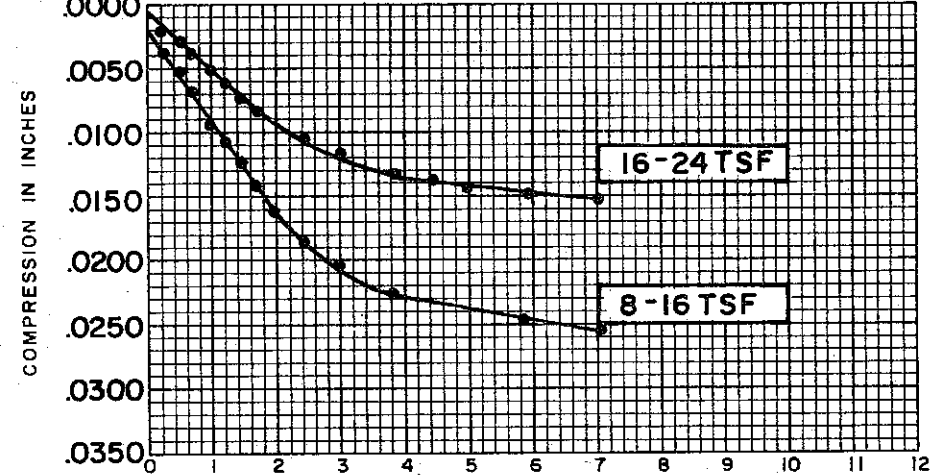
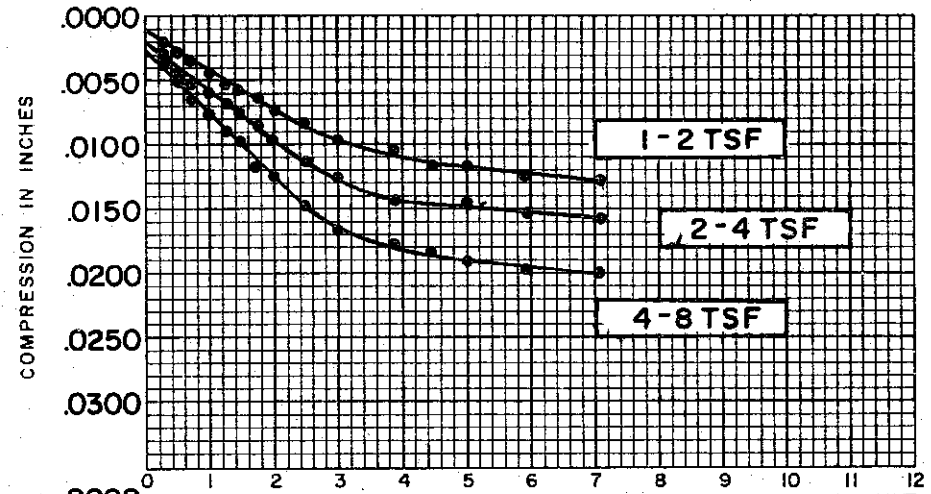
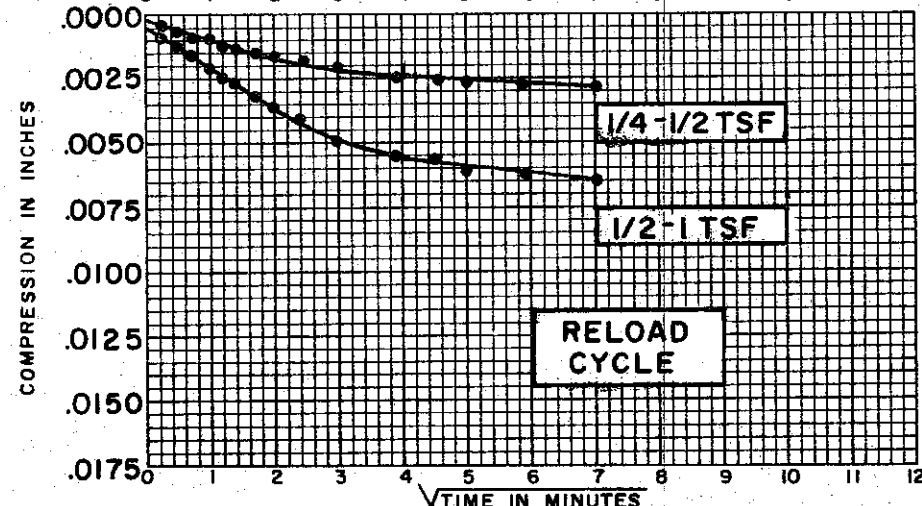
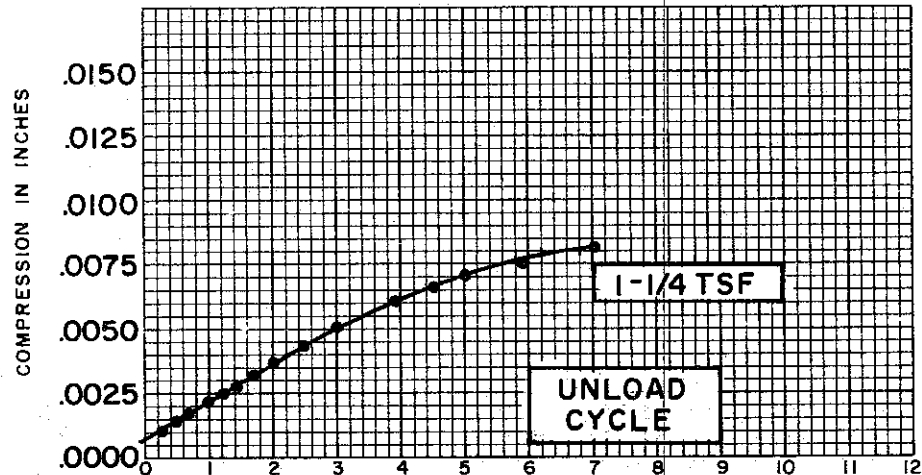
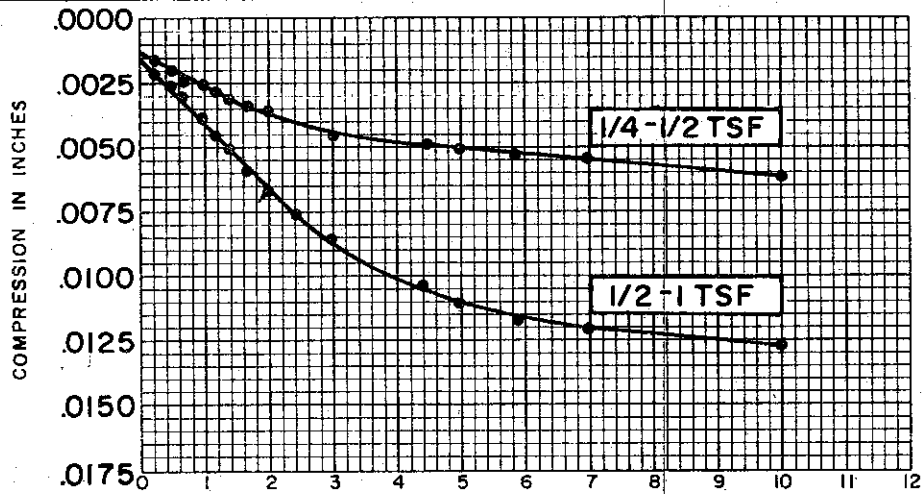
BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.60"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

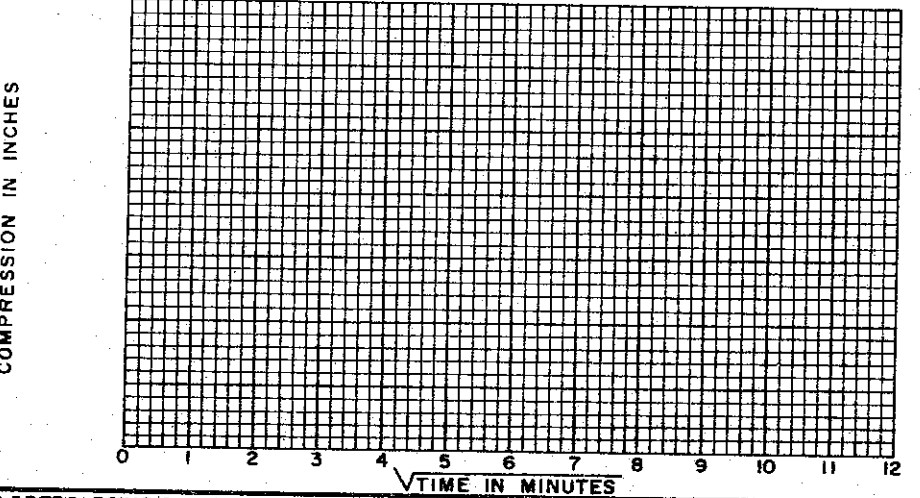
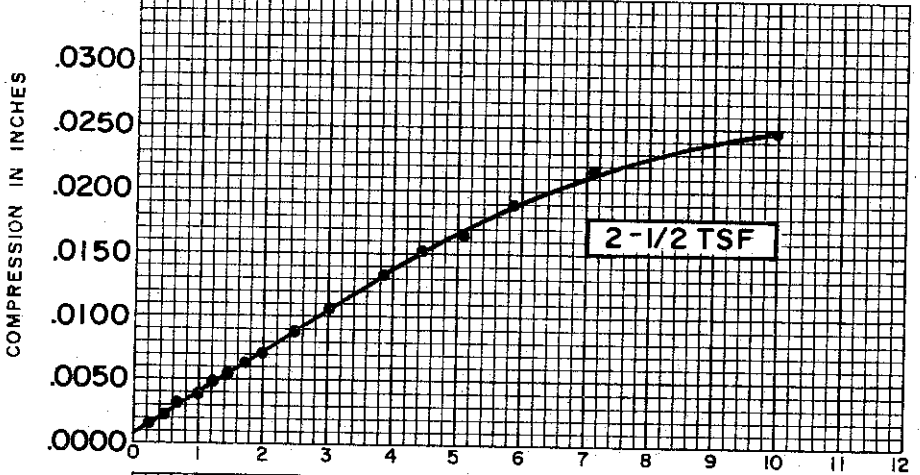
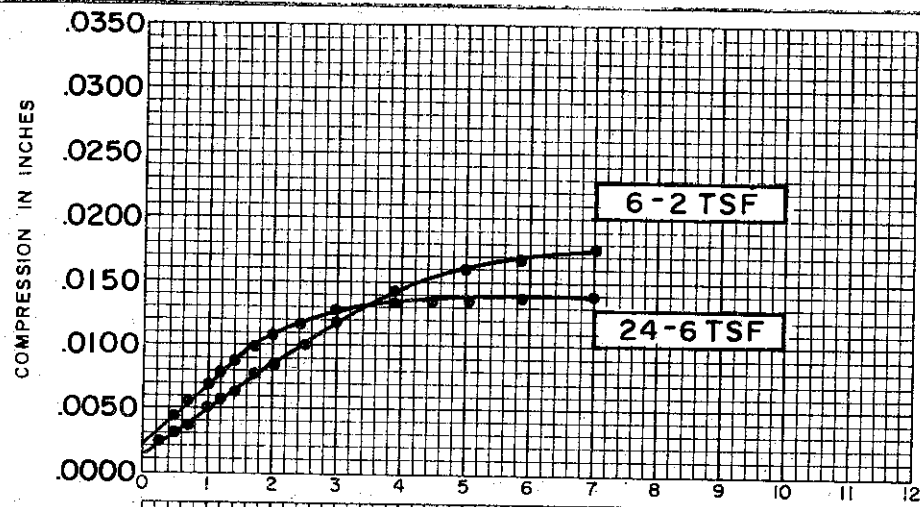


SOIL PROPERTIES		BORING NO.	60
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	2
SPECIFIC GRAVITY	2.71	DEPTH	9.8' TO 10.0'
INITIAL WATER CONTENT	30.0%		
FINAL WATER CONTENT	28.8%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.787

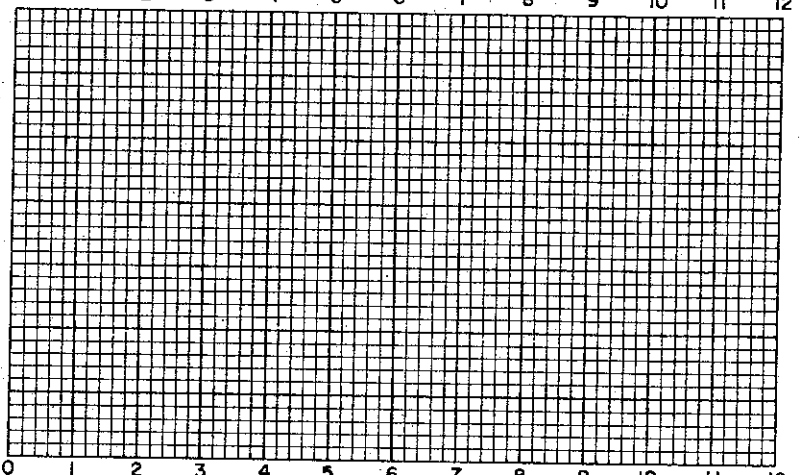
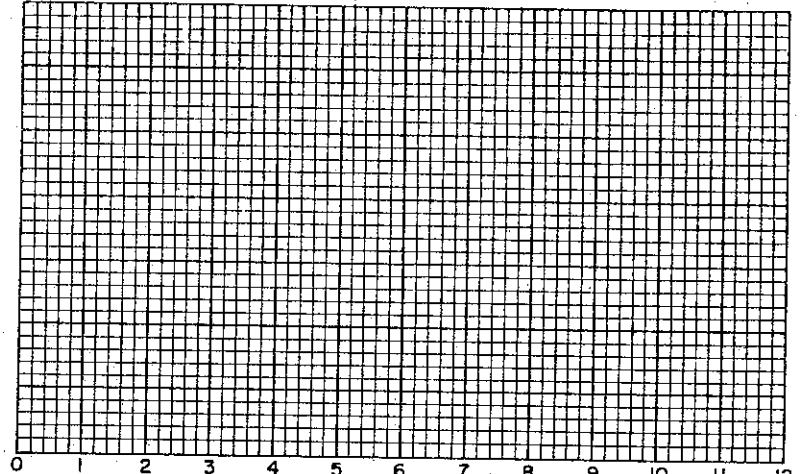
**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II





COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 30.0%  
 FINAL WATER CONTENT 28.8%

BORING NO. 60  
 SAMPLE NO. 2  
 DEPTH 9.8' TO 10.0'

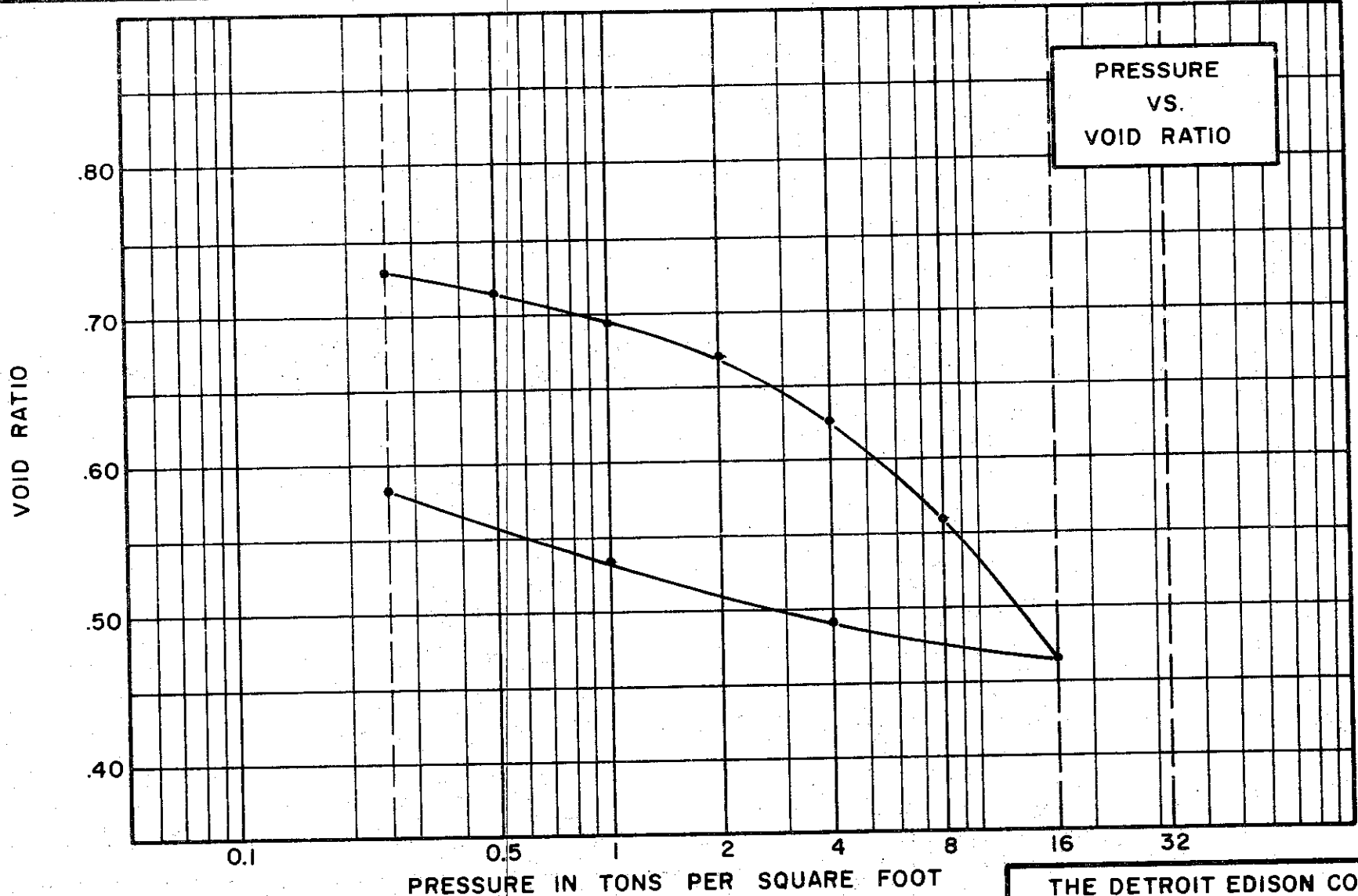
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.787

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-531



PRESSURE  
VS.  
VOID RATIO

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY  
(CL)  
SPECIFIC GRAVITY 2.73  
WATER CONTENT, INITIAL 27.9% FINAL 25.5%  
ATTERBERG LIMITS:  
LIQUID LIMIT 40% PLASTIC LIMIT 19%

TEST DATA

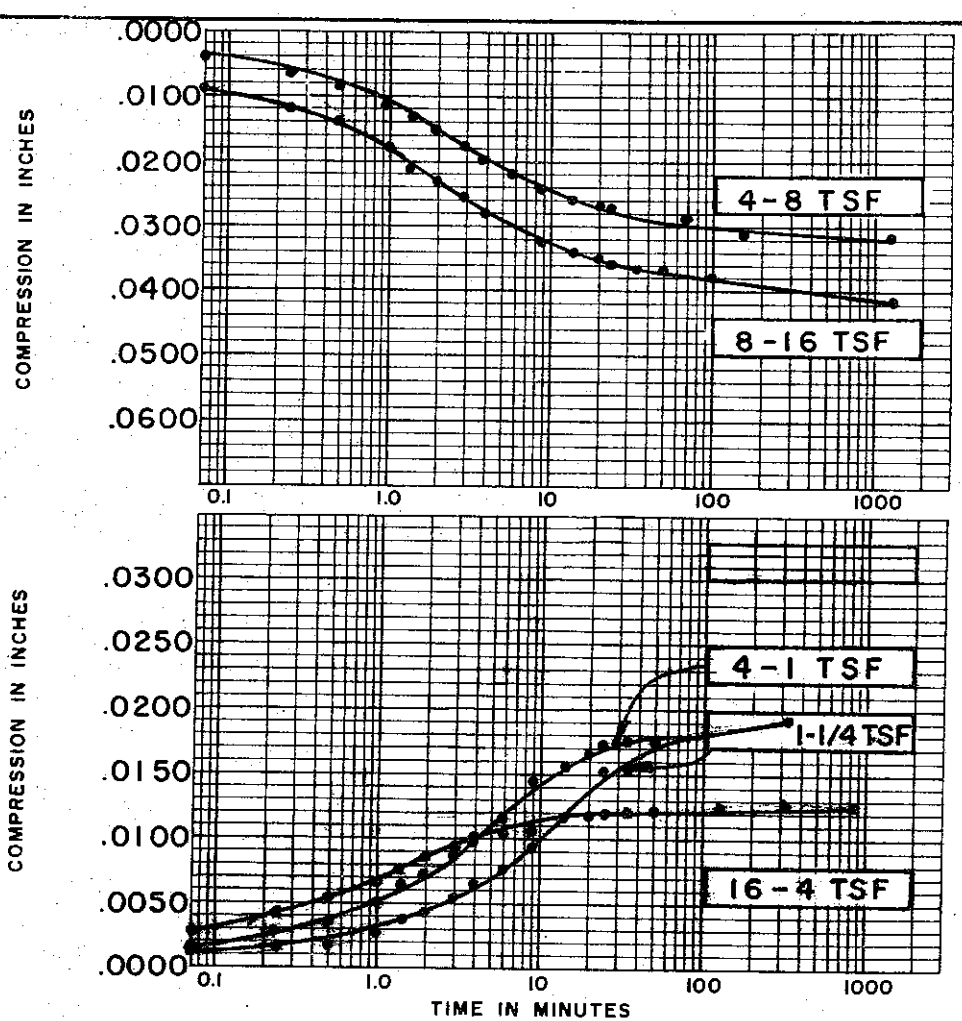
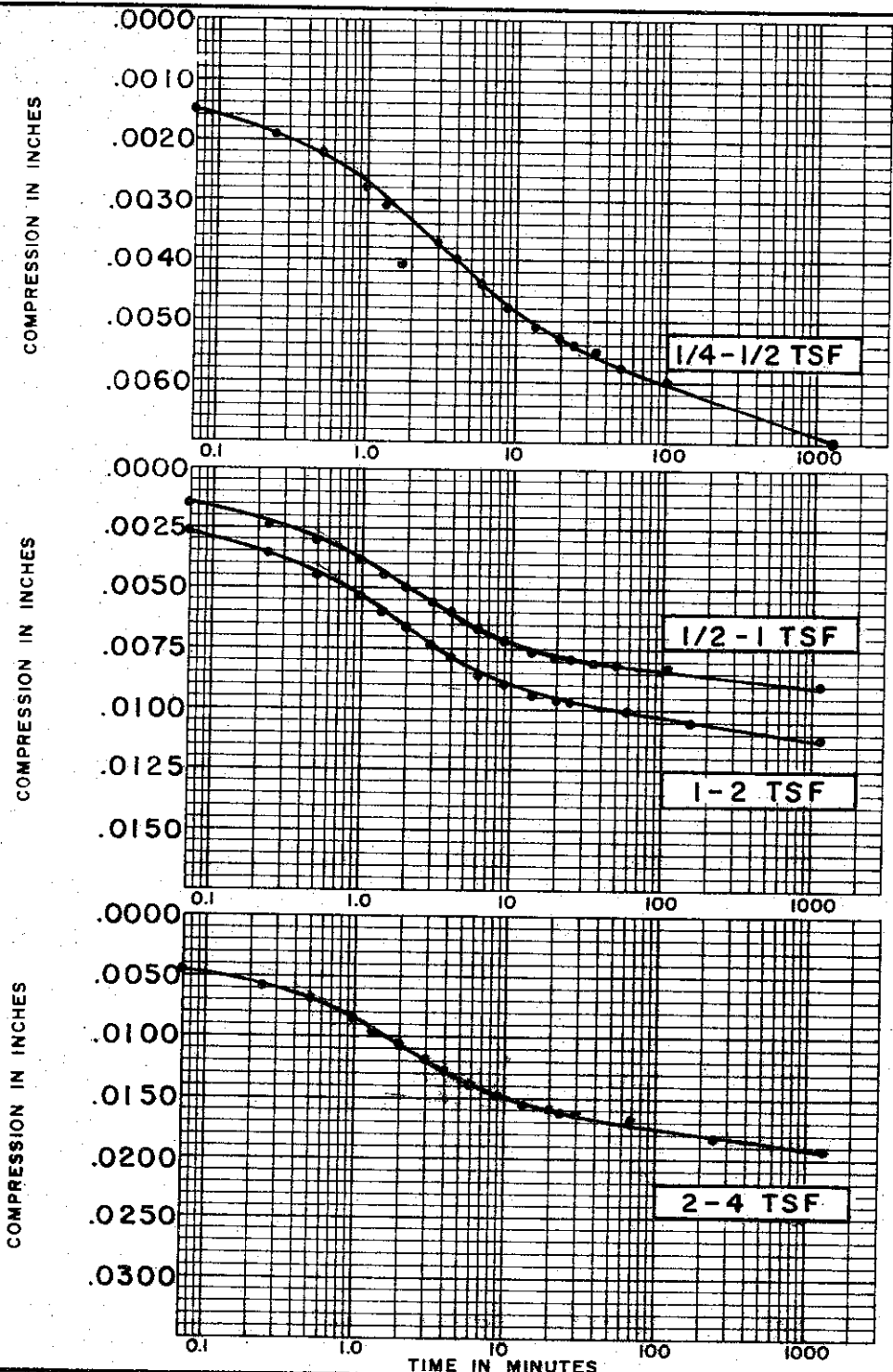
INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.744

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE

BORING NO. 60 TEST NO. C56.1  
SAMPLE NO. 16 DATE JAN. 1974  
DEPTH 85.5'

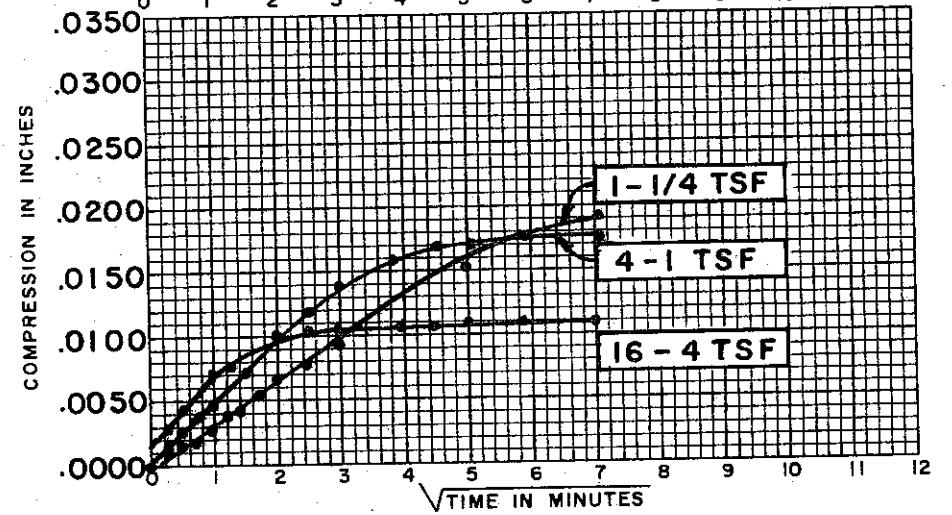
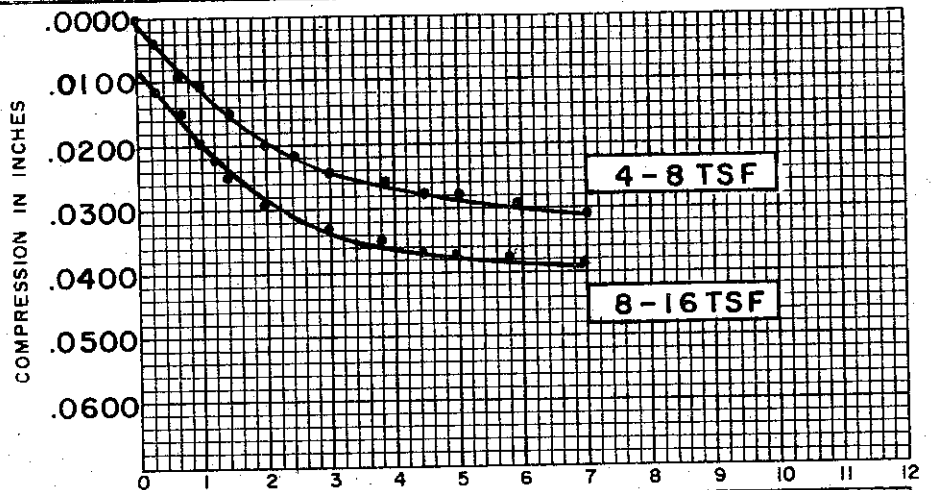
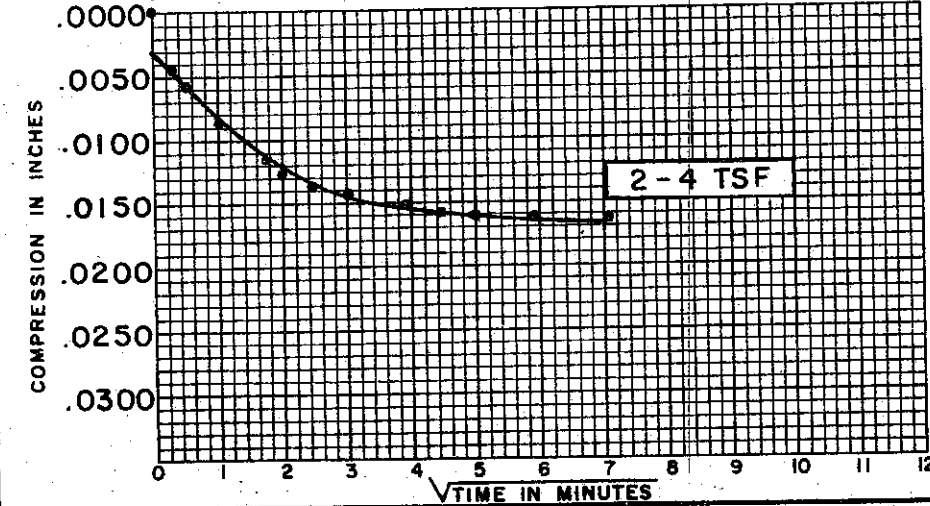
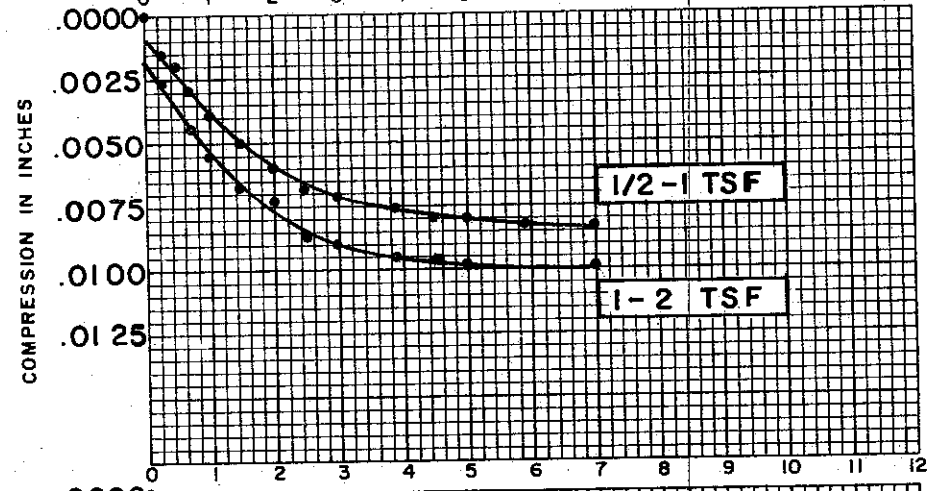
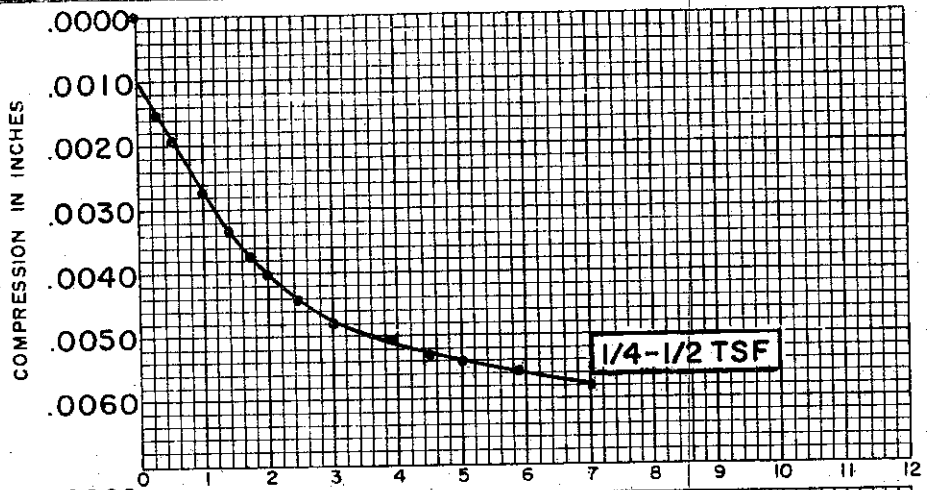
C-533



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	27.9 %
FINAL WATER CONTENT	25.5 %
BORING NO.	60
SAMPLE NO.	16
DEPTH	85.5'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.744

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 27.9 %  
 FINAL WATER CONTENT 25.5 %

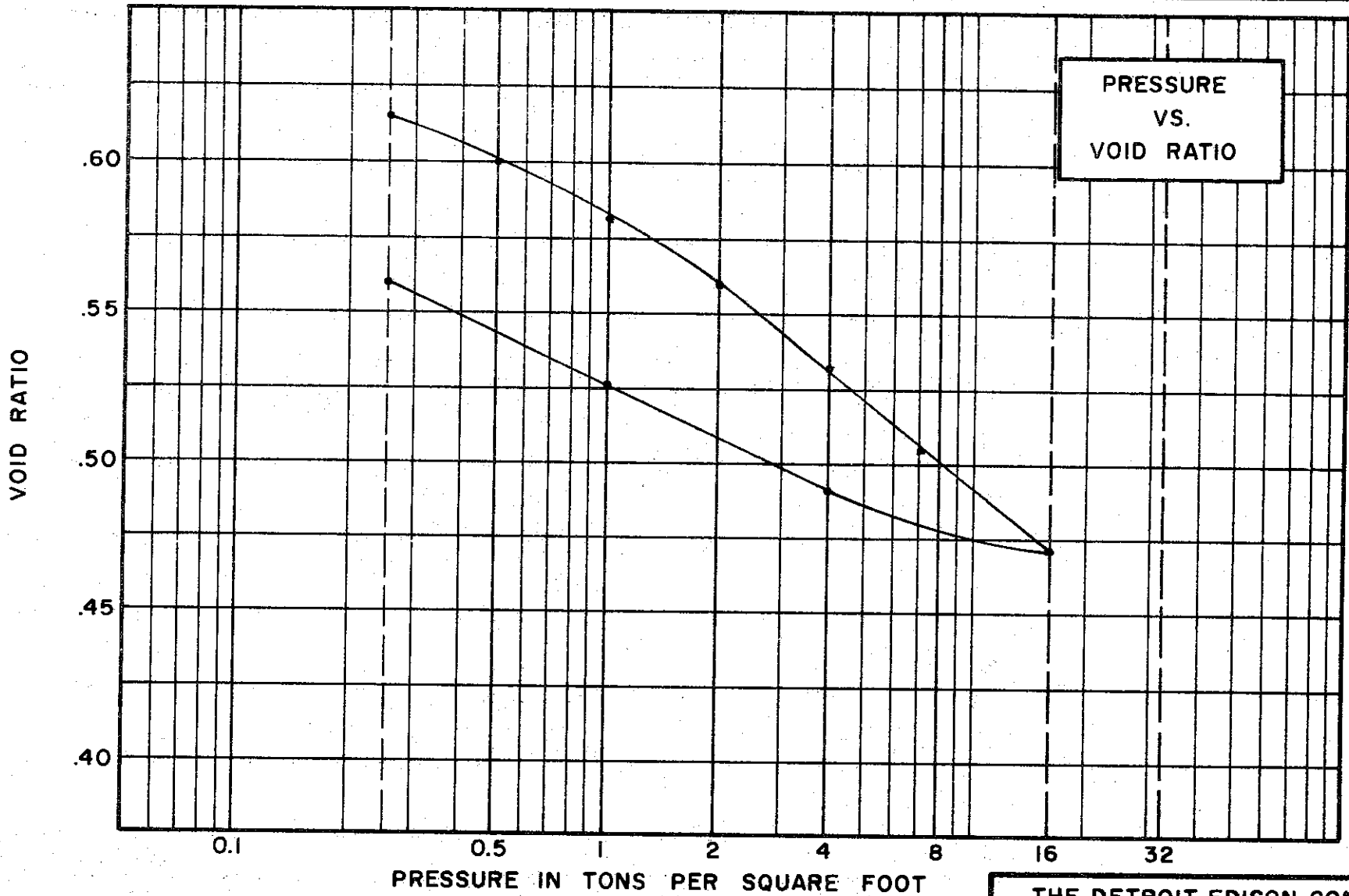
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.5'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.744

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 23.6% FINAL 23.4%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 53% PLASTIC LIMIT 24%

**TEST DATA**

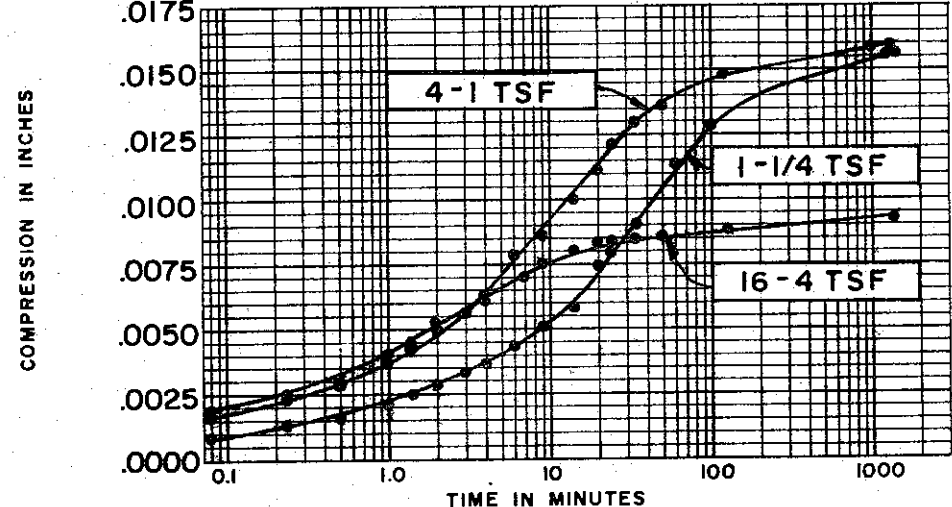
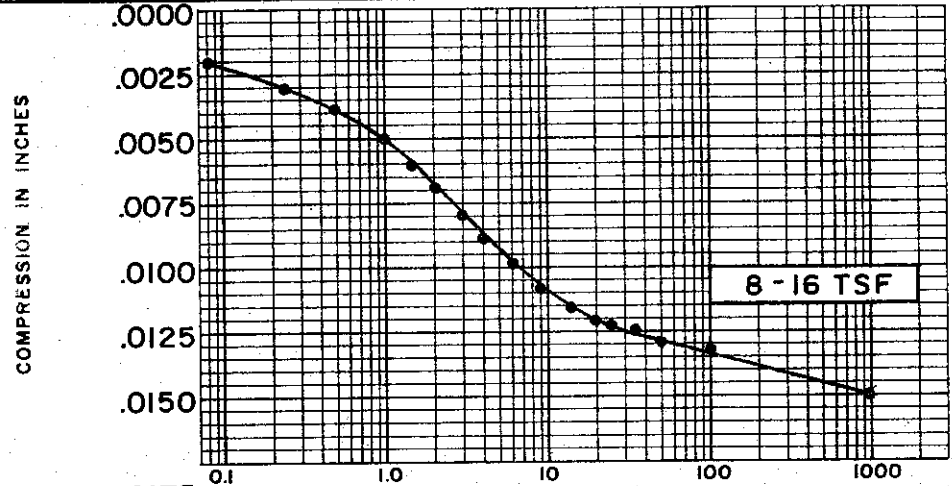
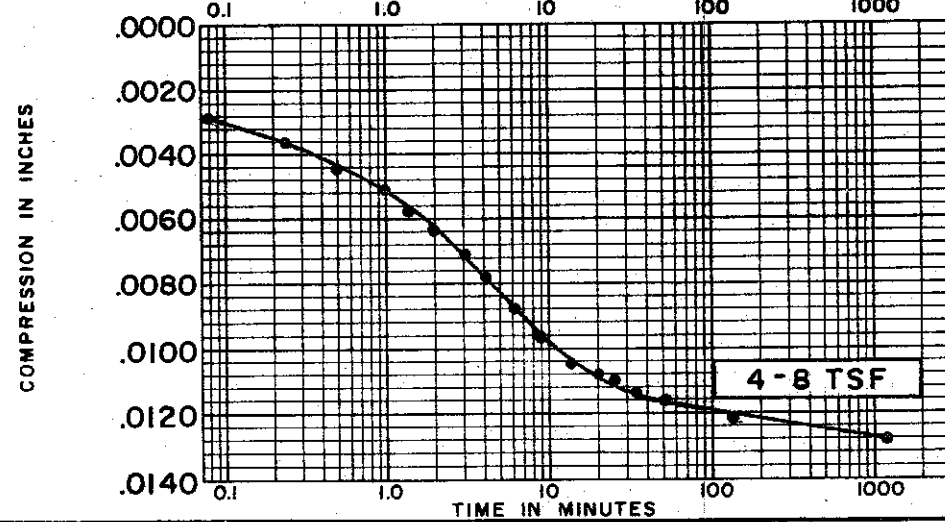
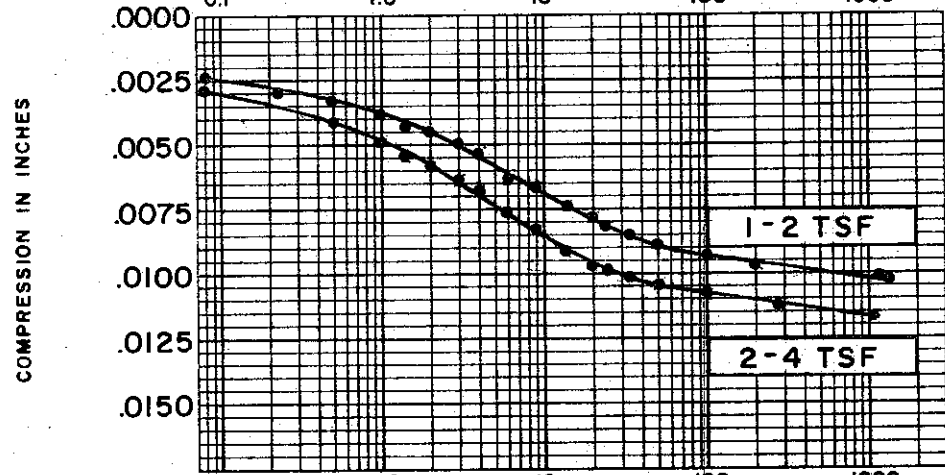
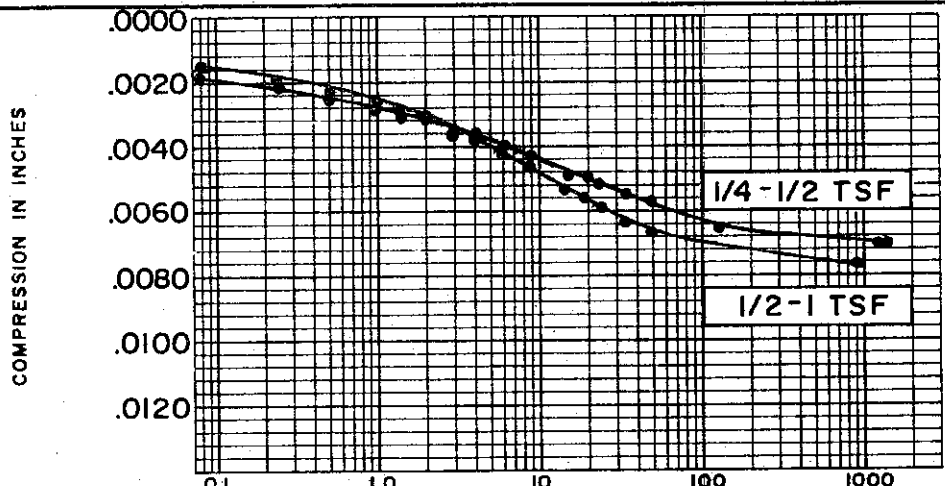
INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
 VOID RATIO VS. LOG PRESSURE

BORING NO. 105 TEST NO. C373.1  
 SAMPLE NO. 1 DATE APRIL 74  
 DEPTH 5.1' TO 5.4'

C-535



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 INITIAL WATER CONTENT 23.6%  
 FINAL WATER CONTENT 23.4%

BORING NO. 105  
 SAMPLE NO. 1  
 DEPTH 5.1' TO 5.4'

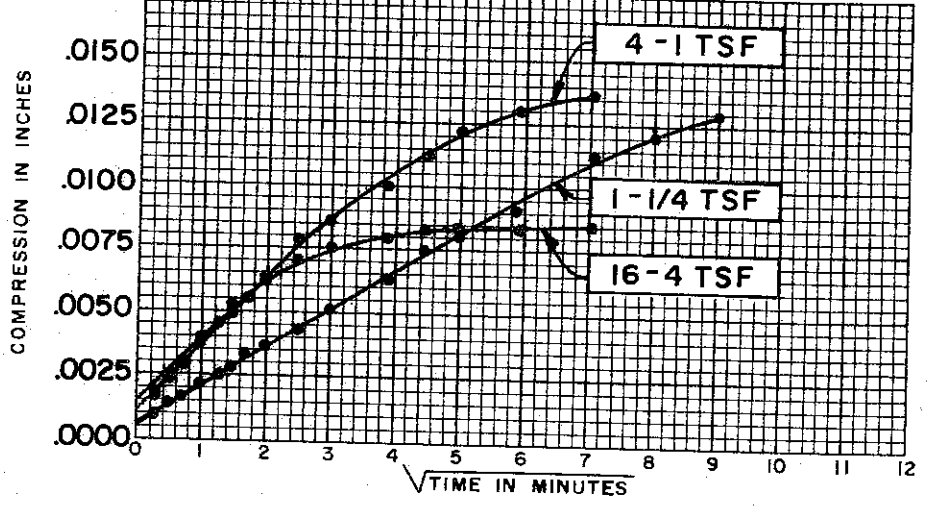
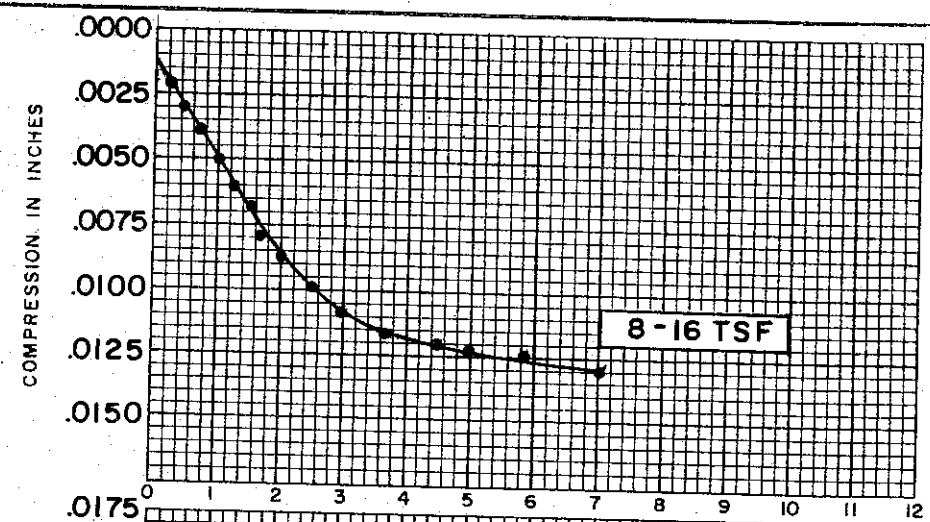
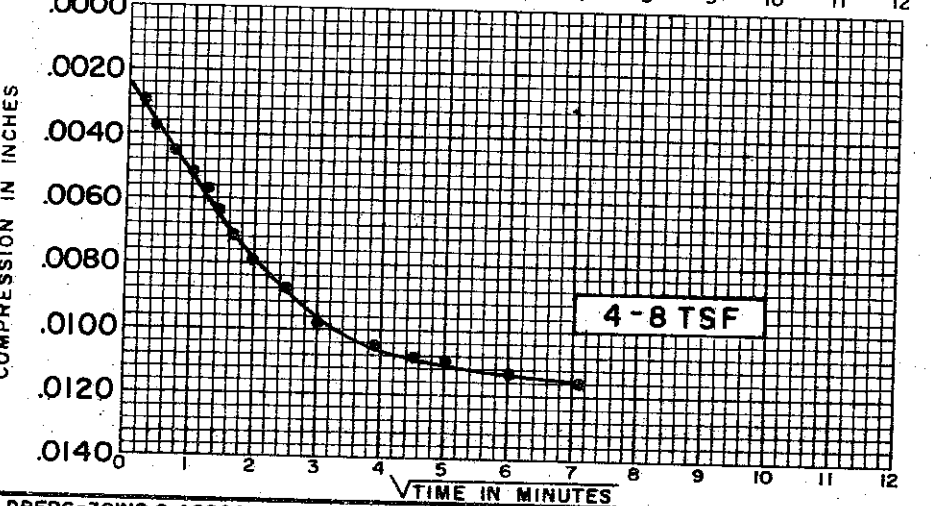
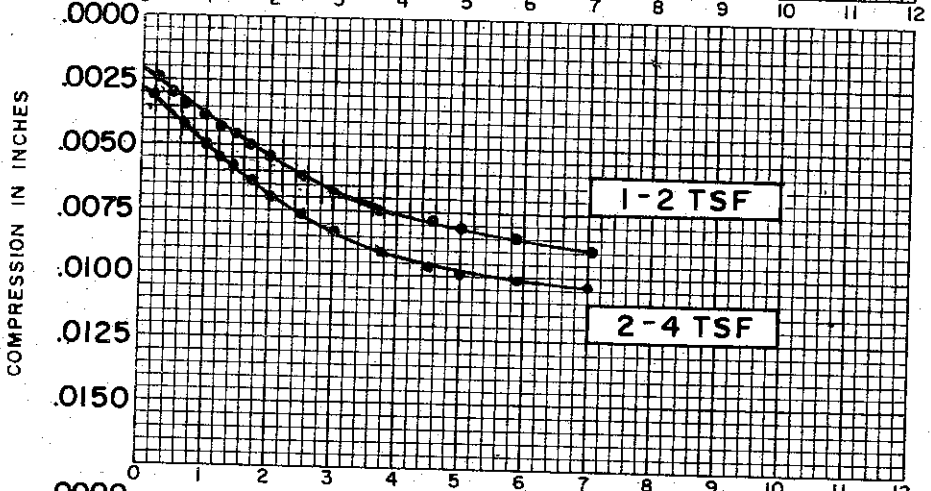
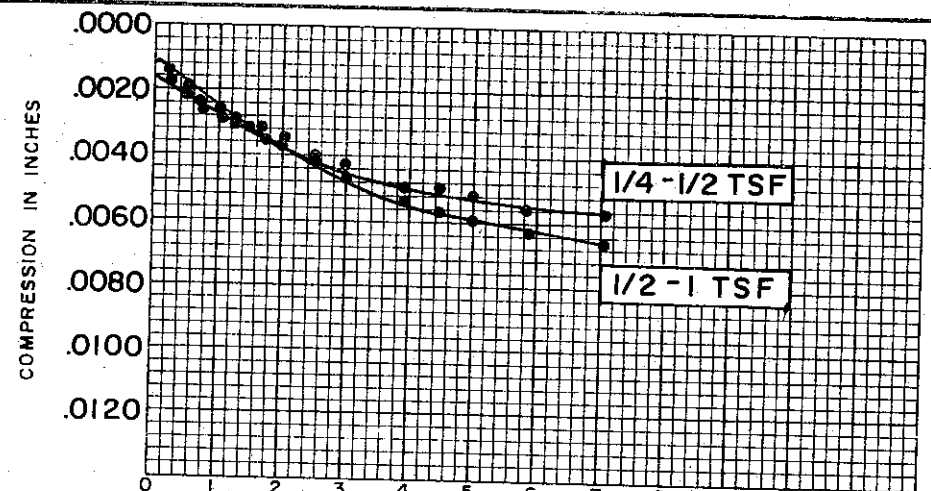
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.642

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

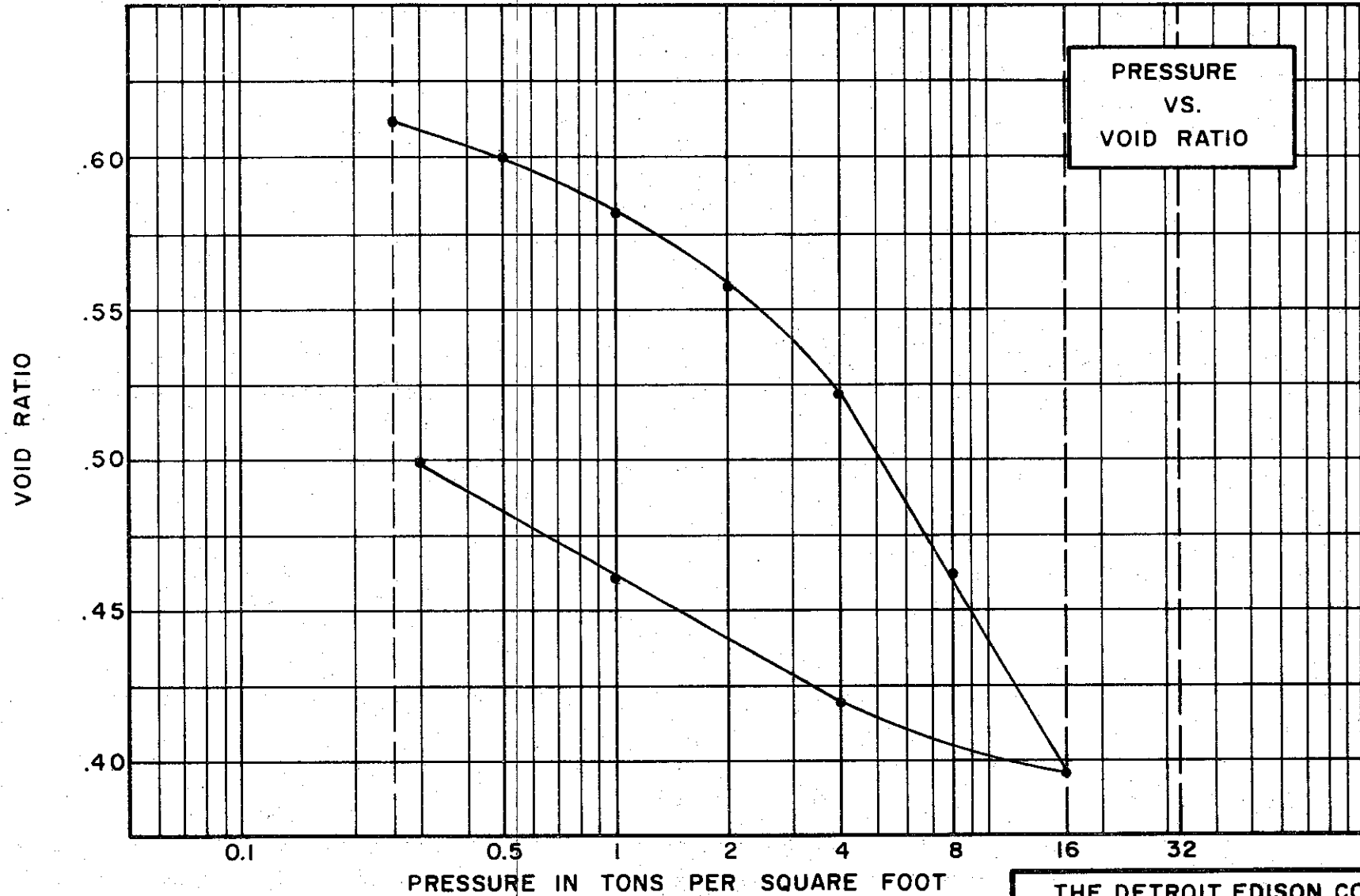
C-537



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)
SPECIFIC GRAVITY	2.72
INITIAL WATER CONTENT	23.6%
FINAL WATER CONTENT	23.4%
BORING NO.	105
SAMPLE NO.	1
DEPTH	5.1' TO 5.4'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.75"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.642

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 23.7%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.625

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

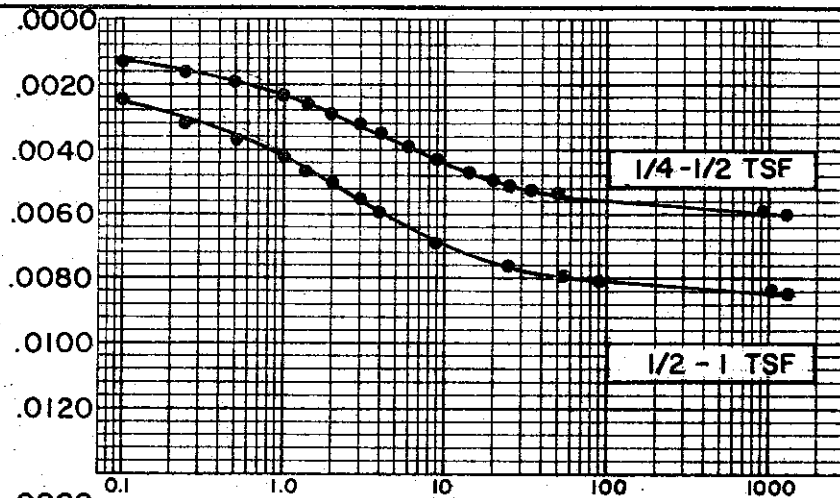
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 105 TEST NO. C380.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 70.9' TO 71.2'

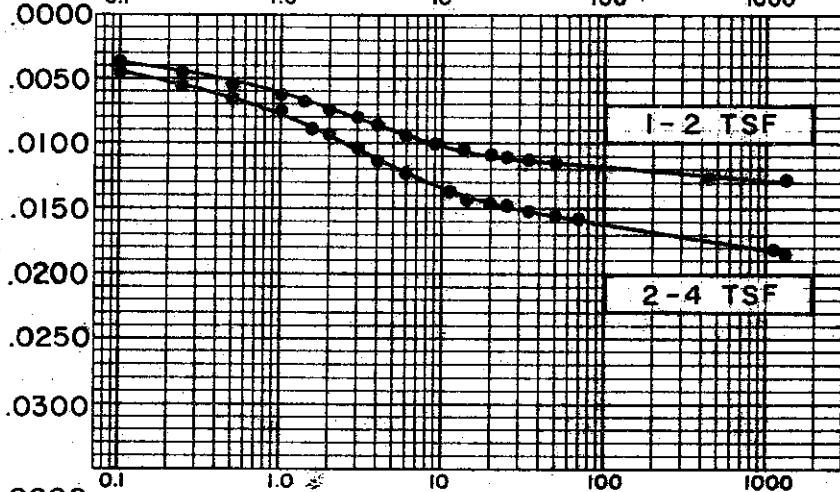


C-539

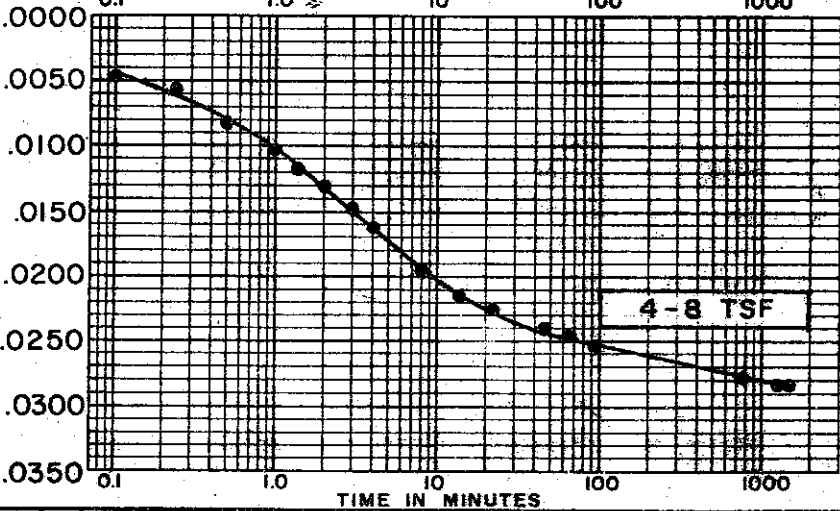
COMPRESSION IN INCHES



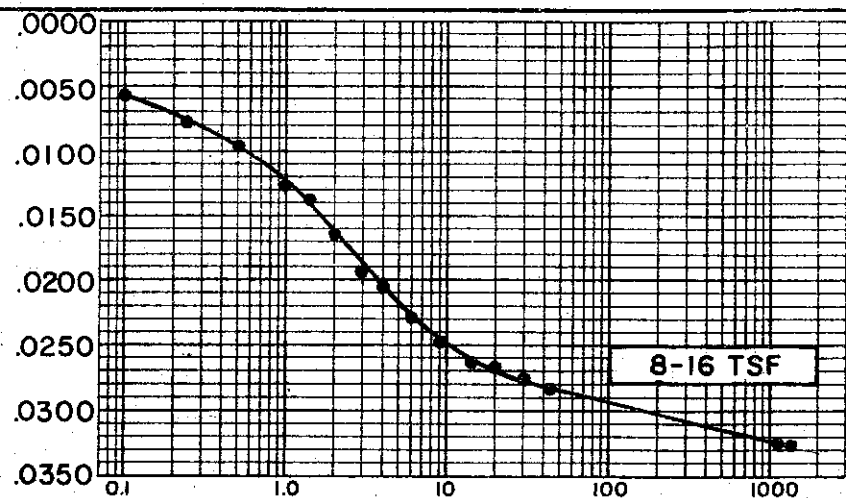
COMPRESSION IN INCHES



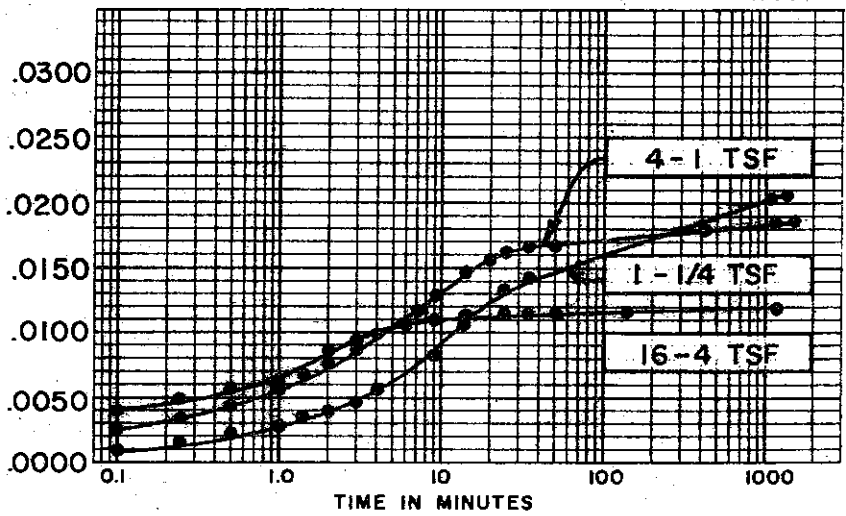
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.70  
INITIAL WATER CONTENT 23.7 %  
FINAL WATER CONTENT 22.5 %

BORING NO. 105  
SAMPLE NO. 8  
DEPTH 70.9' TO 71.2'

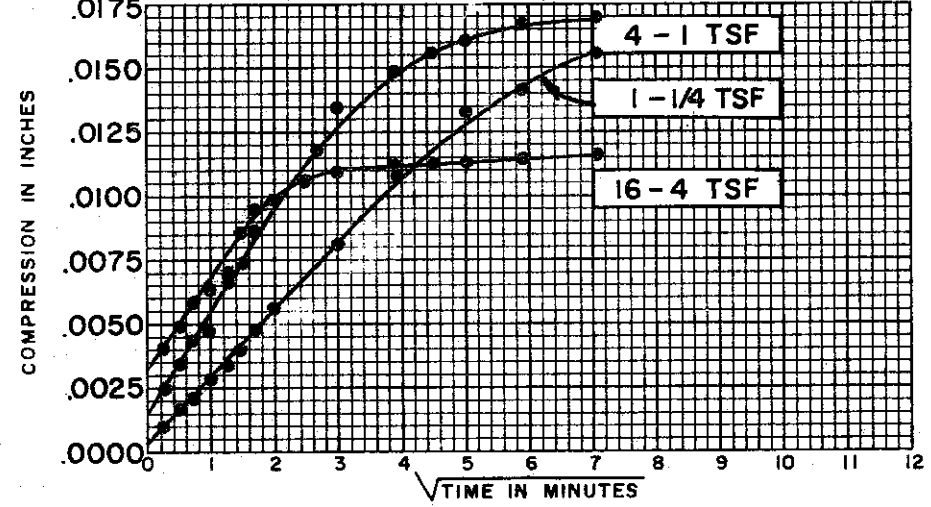
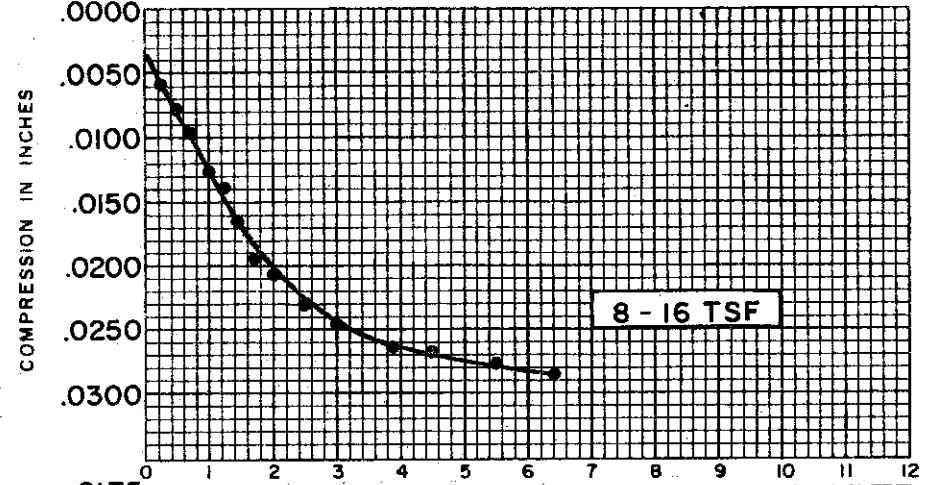
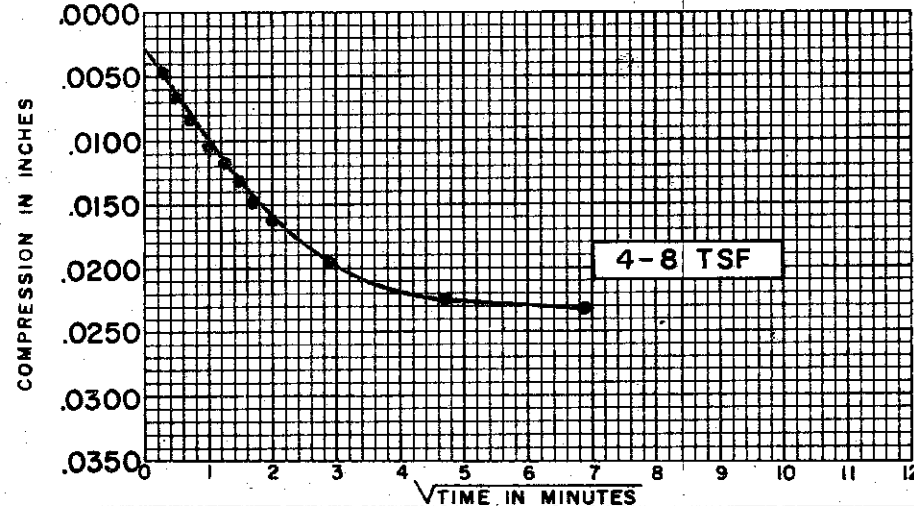
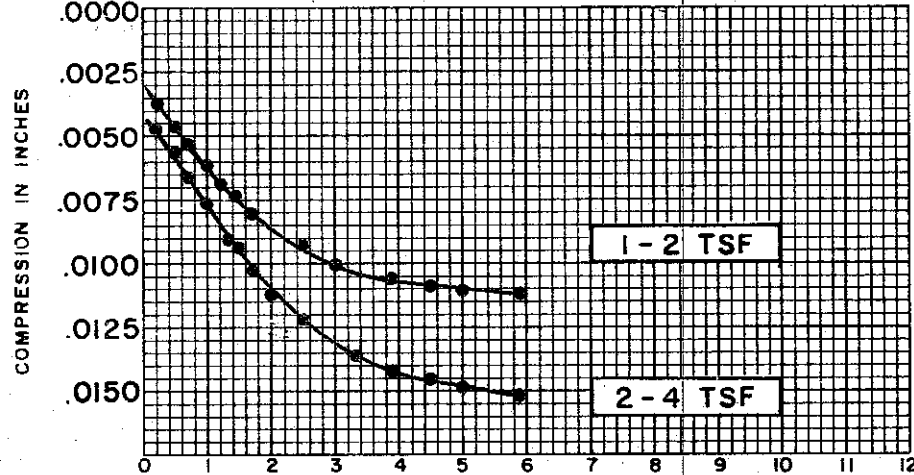
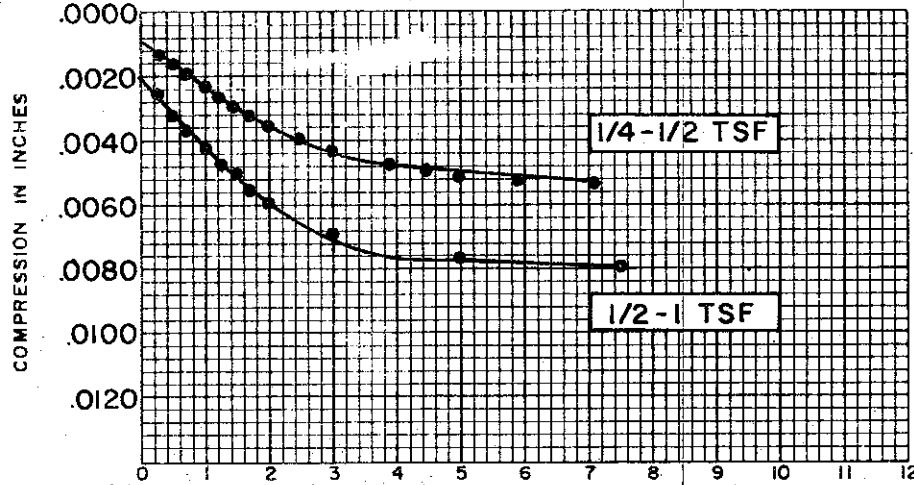
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.625

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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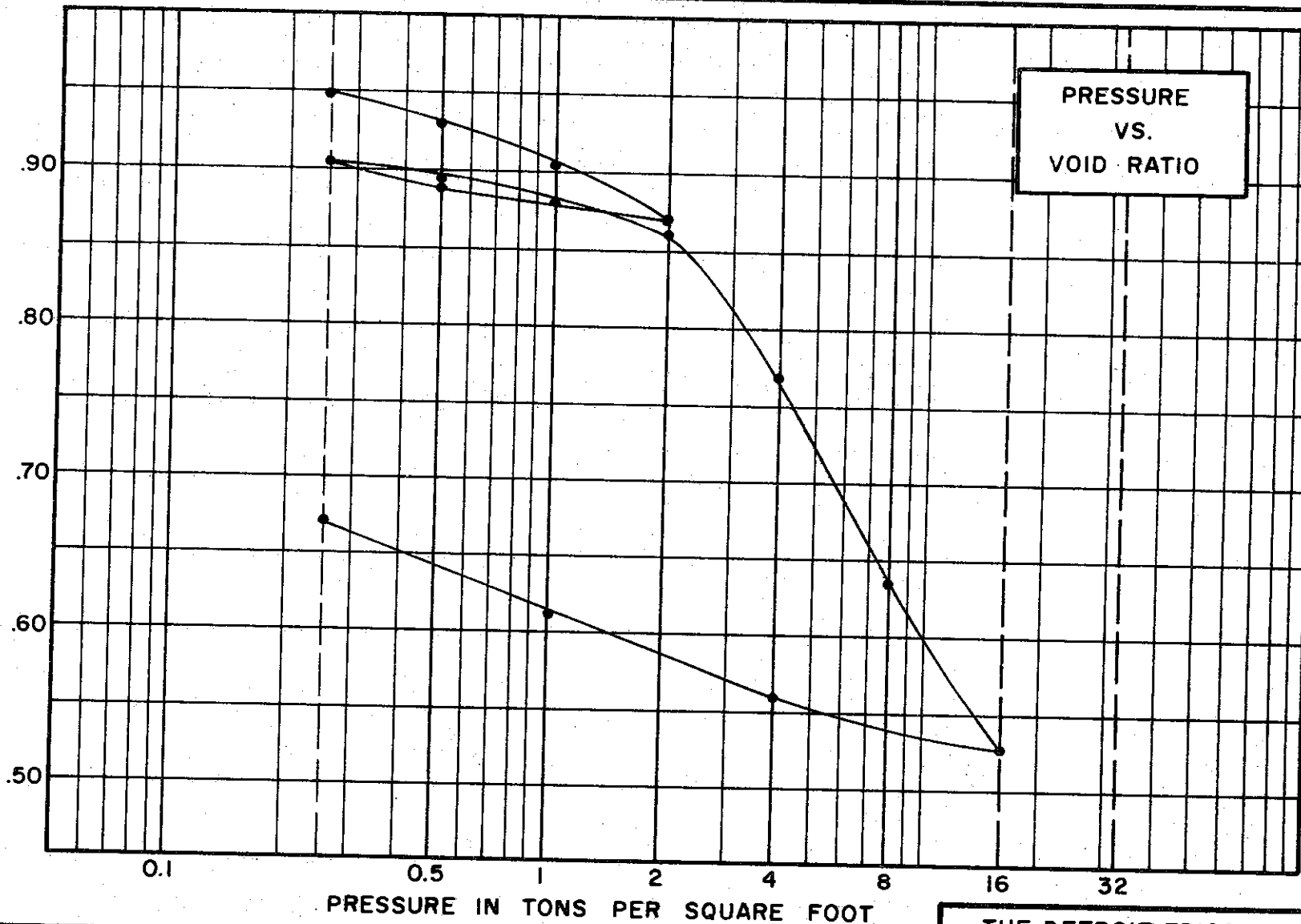


SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	23.7 %
FINAL WATER CONTENT	22.5 %
BORING NO.	105
SAMPLE NO.	8
DEPTH	70.9' TO 71.2'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.625

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

VOID RATIO



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 36.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

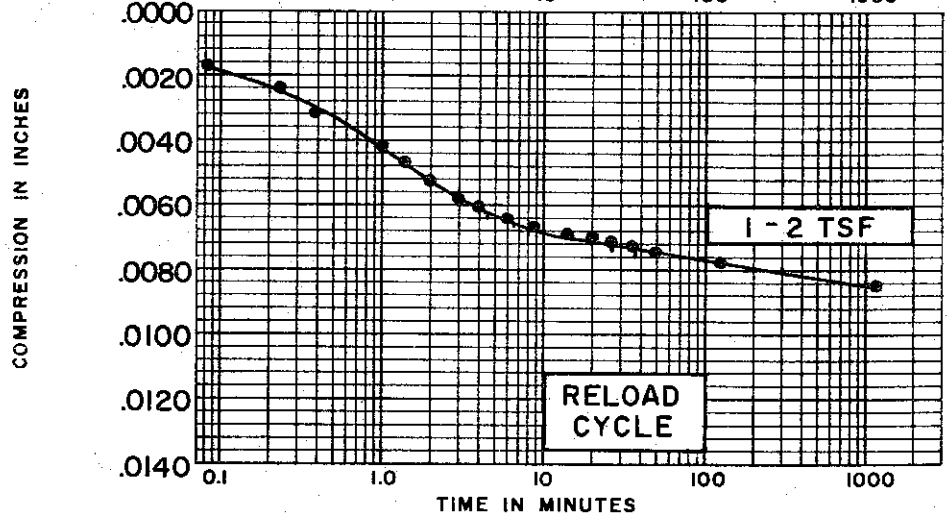
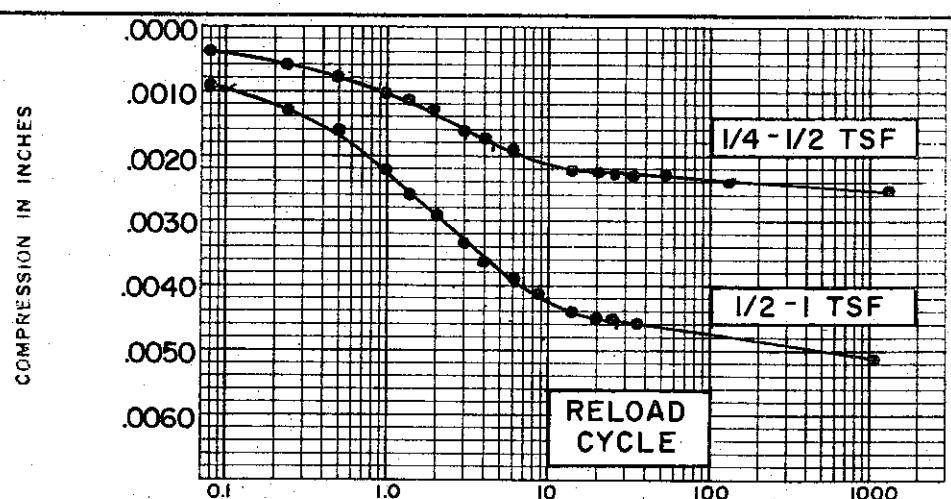
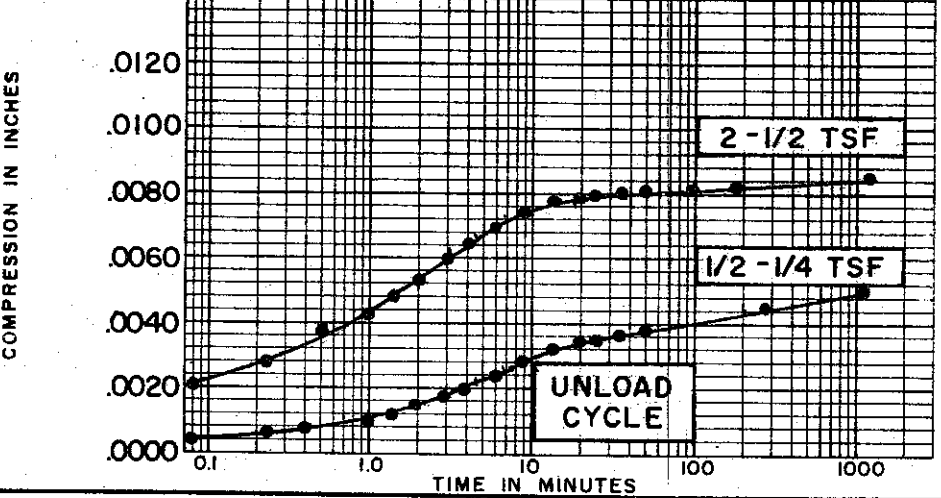
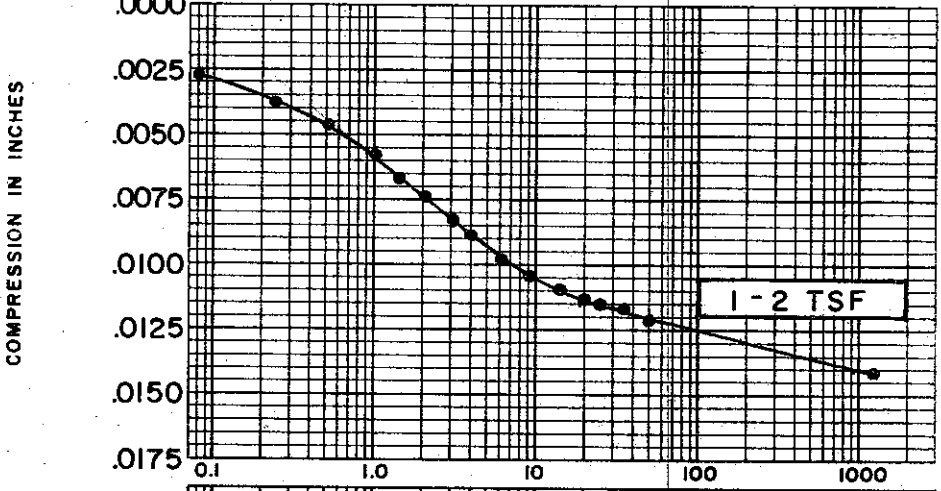
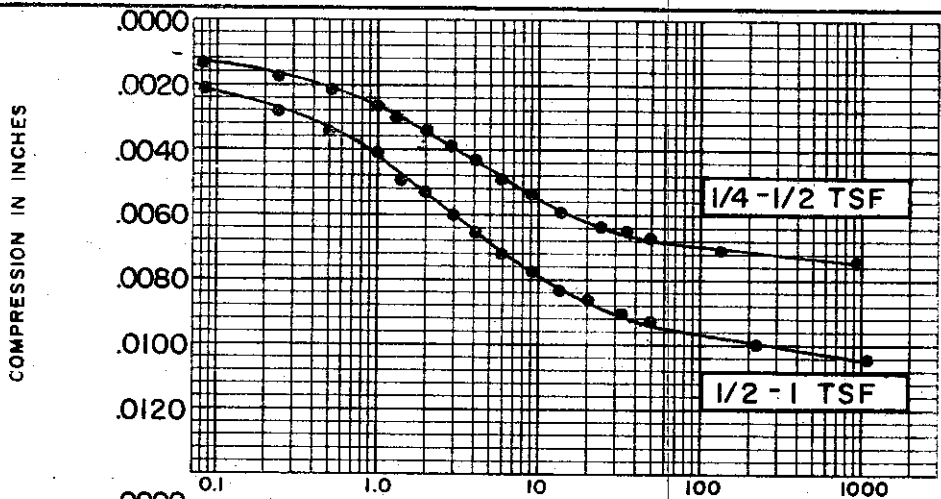
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 118 TEST NO. C256.1  
 SAMPLE NO. 5 DATE JULY 1974  
 DEPTH 38.6' TO 38.9'

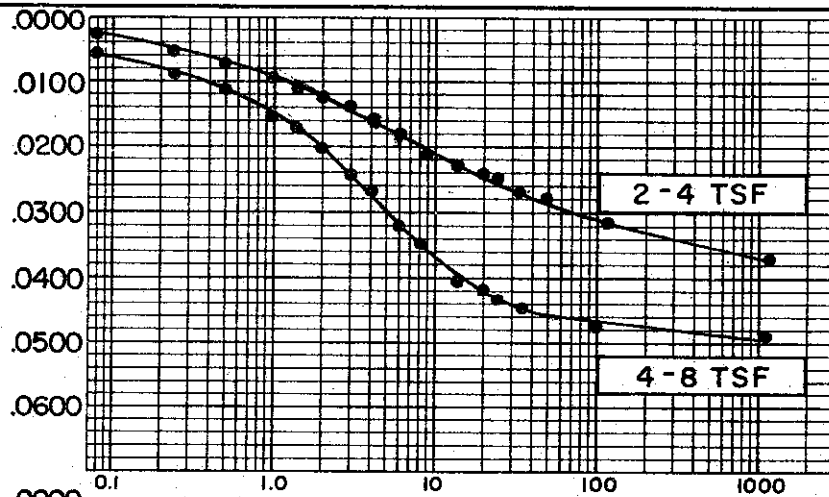
C-541

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS

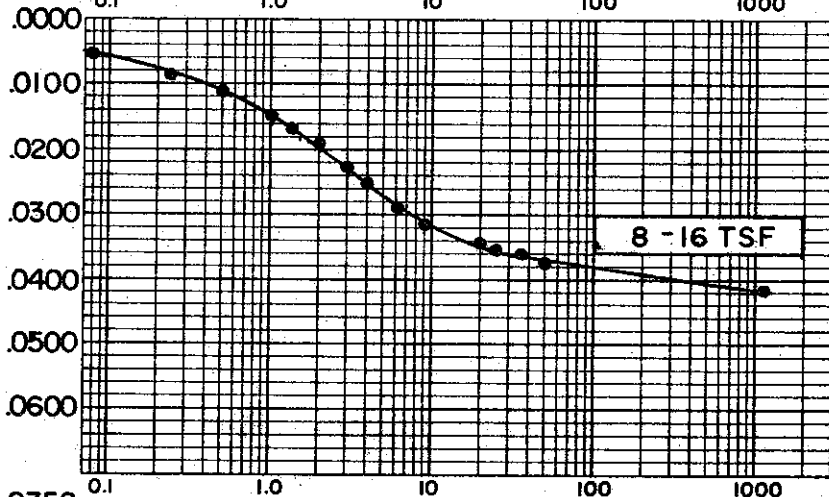


SOIL PROPERTIES		BORING NO.	118
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO.	5
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH	<u>38.6' TO 38.9'</u>
INITIAL WATER CONTENT	<u>36.9 %</u>		
FINAL WATER CONTENT	<u>    %    </u>		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	TIME VS. COMPRESSION CURVE	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	<u>0.969</u>	BELLE RIVER PLANT UNITS I & II	
		FILE 1255	

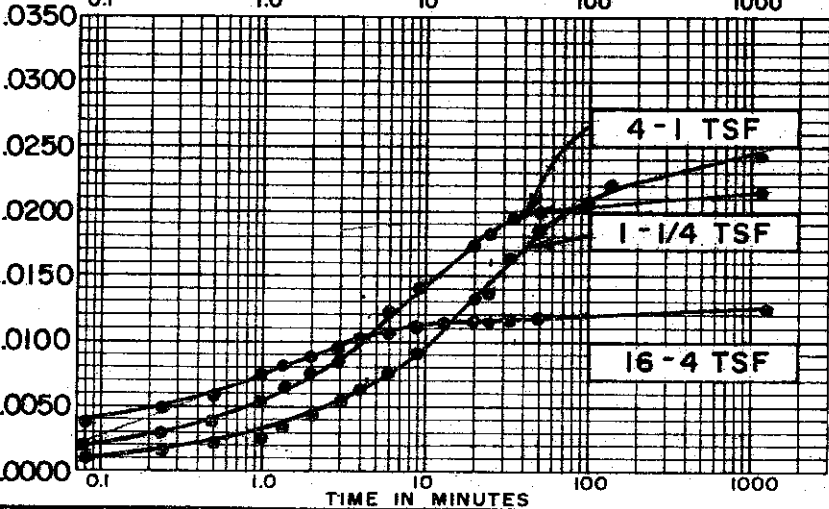
COMPRESSION IN INCHES



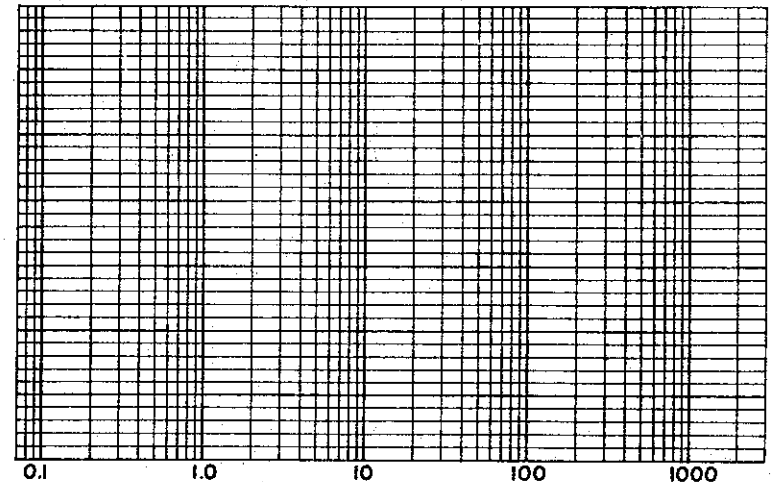
COMPRESSION IN INCHES



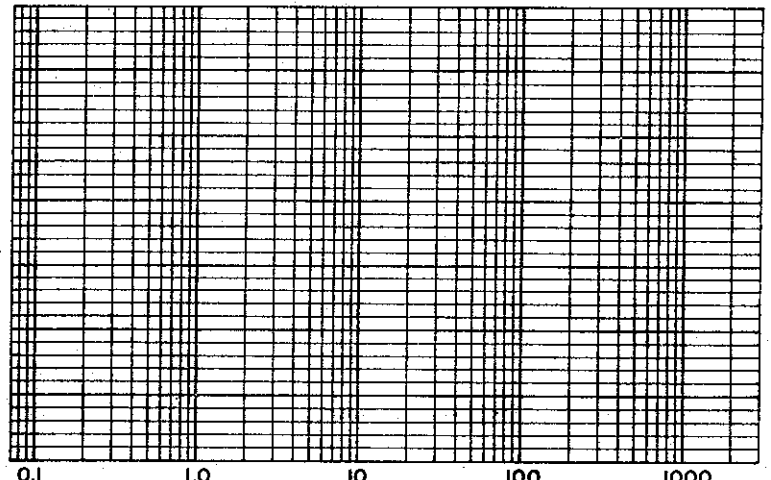
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT     %

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

**TEST DATA**

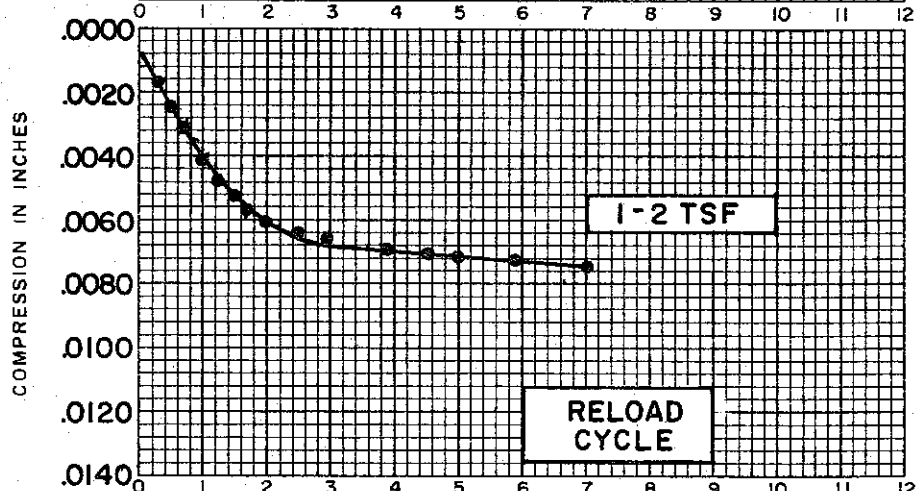
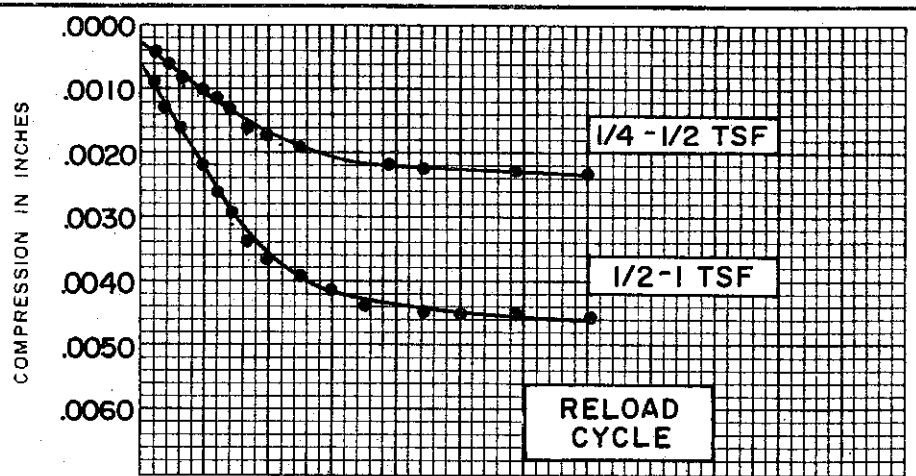
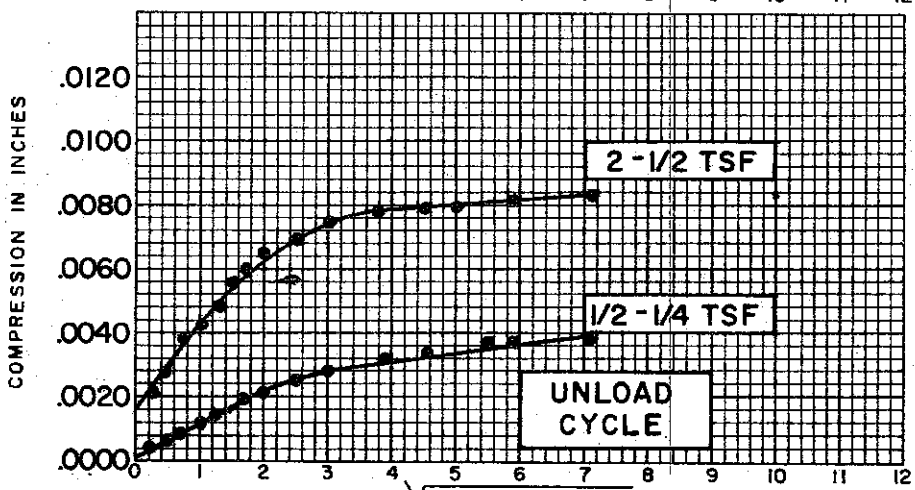
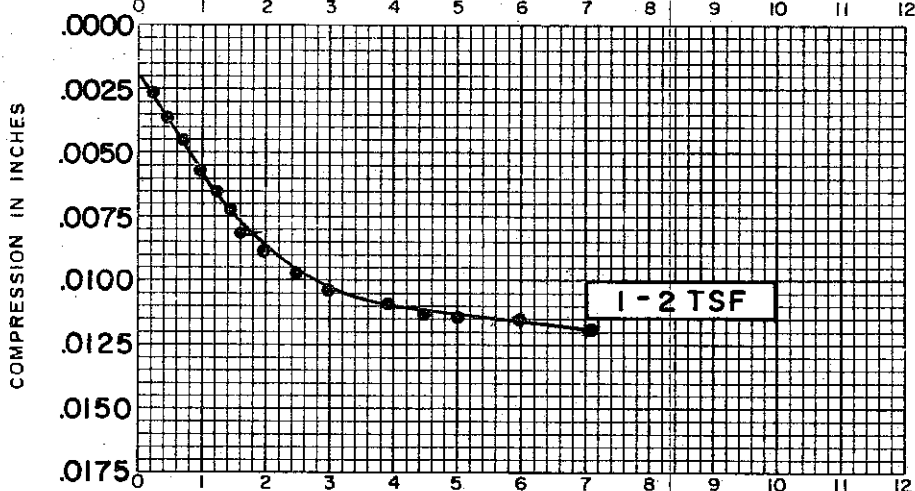
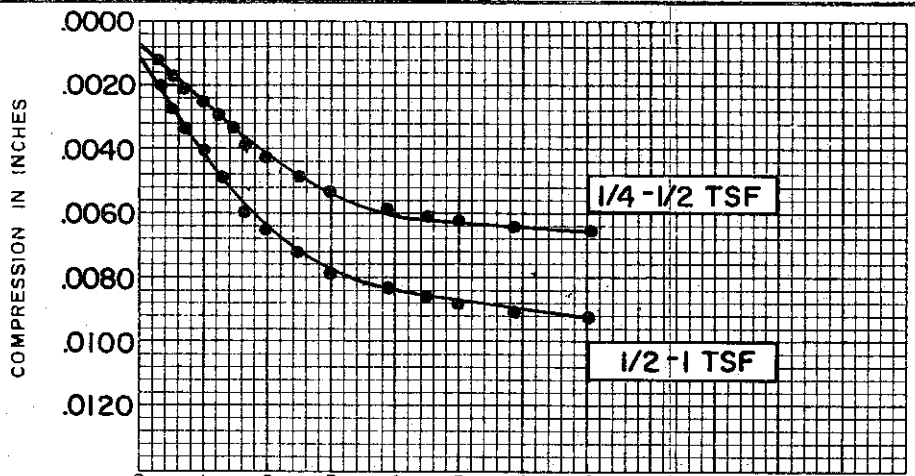
INITIAL SAMPLE HEIGHT 0.90"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255

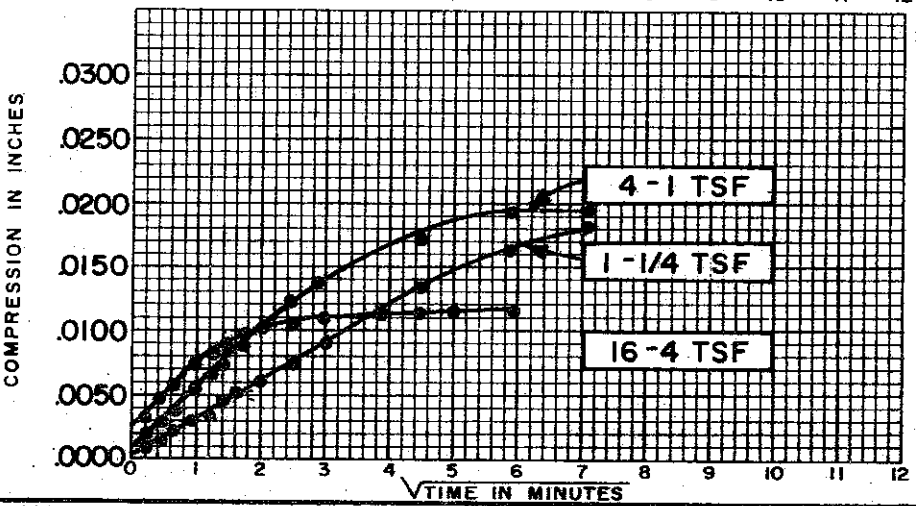
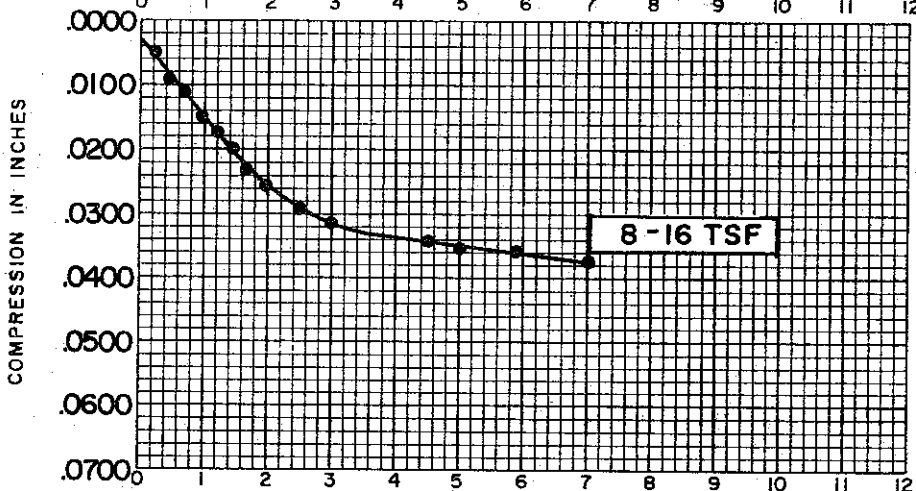
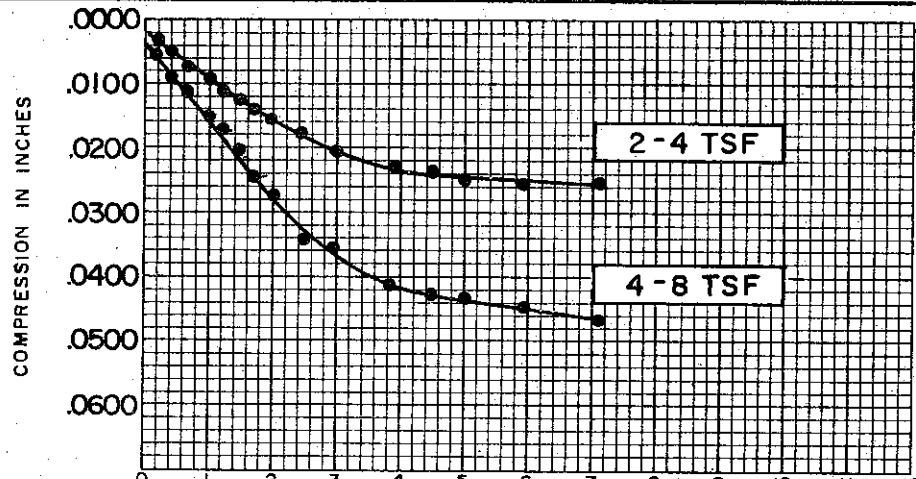
C-543



SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.70
INITIAL WATER CONTENT	36.9 %
FINAL WATER CONTENT	%
BORING NO.	118
SAMPLE NO.	5
DEPTH	38.6' TO 38.9'

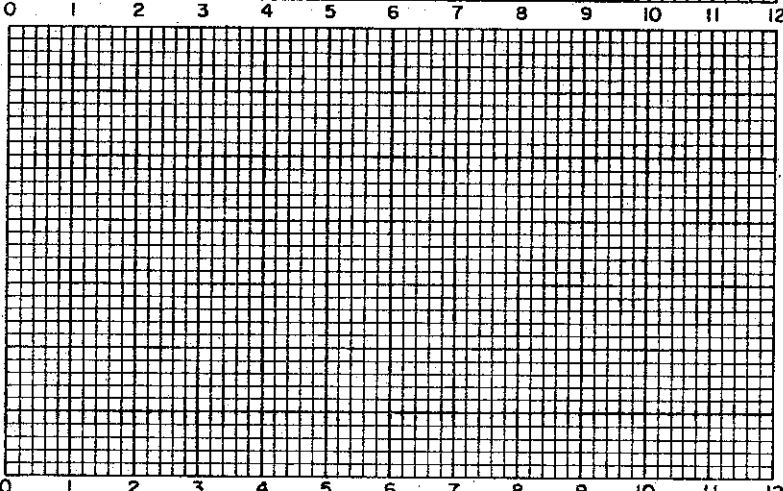
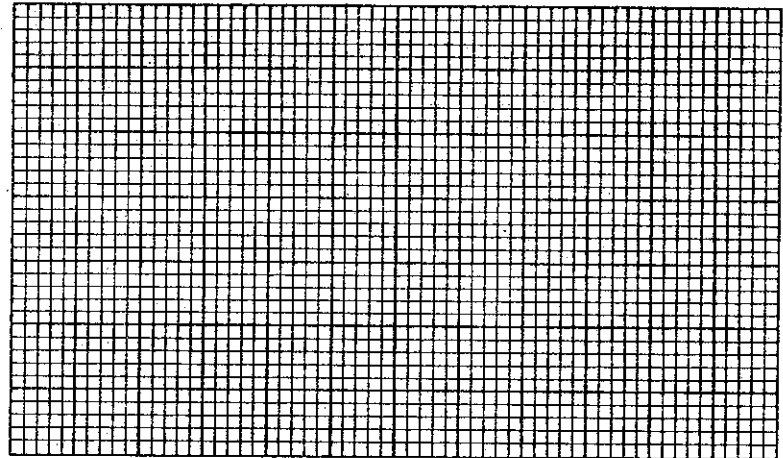
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.969

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



COMPRESSION IN INCHES

COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 36.9 %  
 FINAL WATER CONTENT       %

BORING NO. 118  
 SAMPLE NO. 5  
 DEPTH 38.6' TO 38.9'

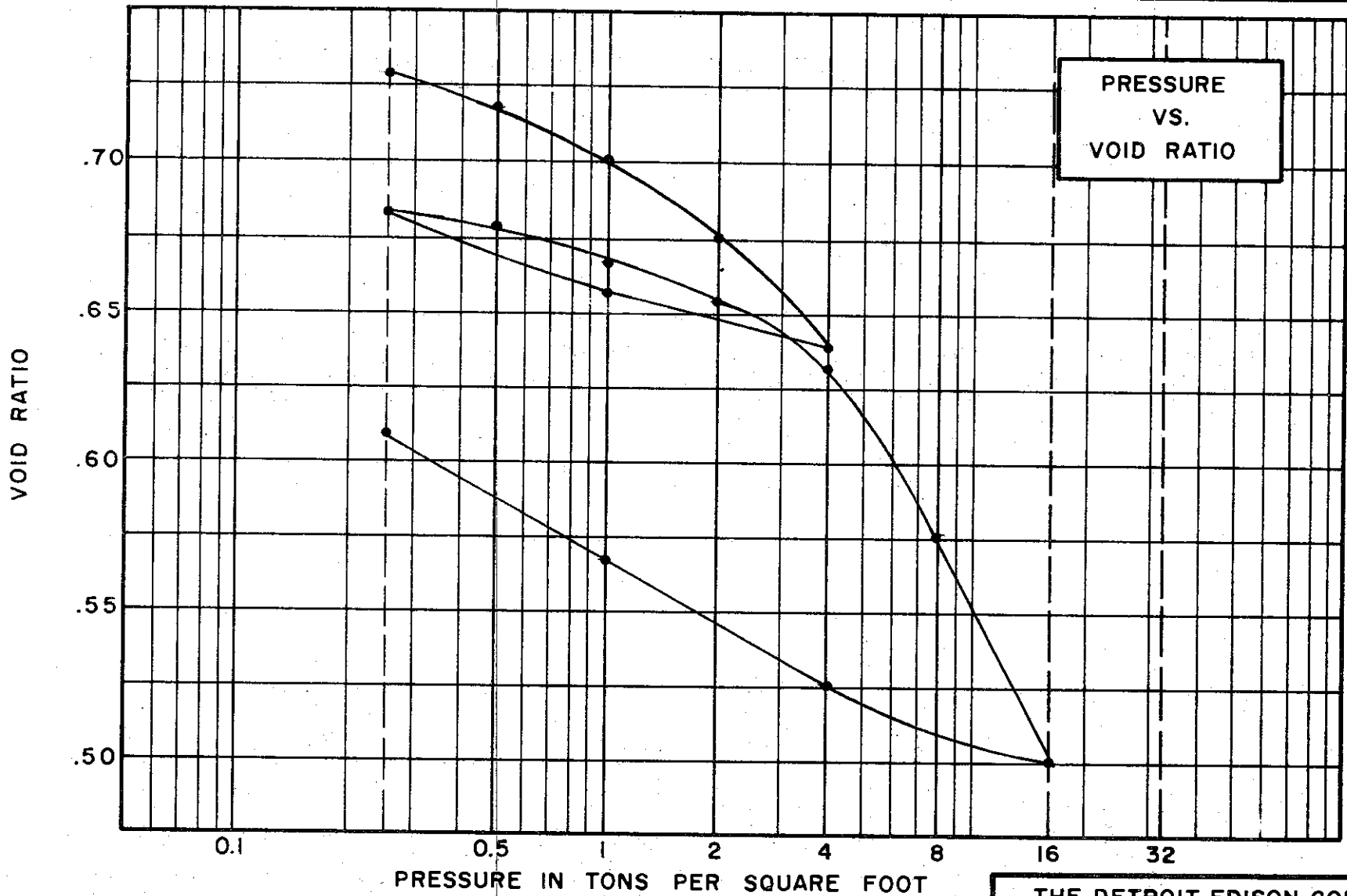
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.969

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

C-545



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 WATER CONTENT, INITIAL 27.8%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

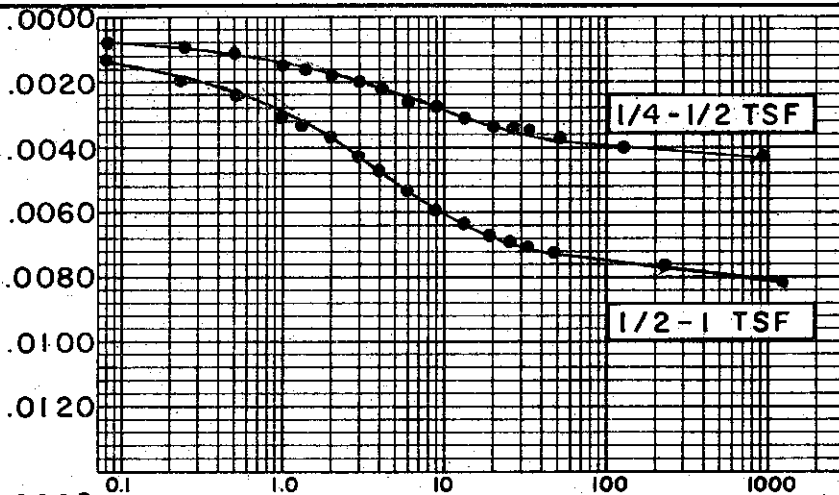
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

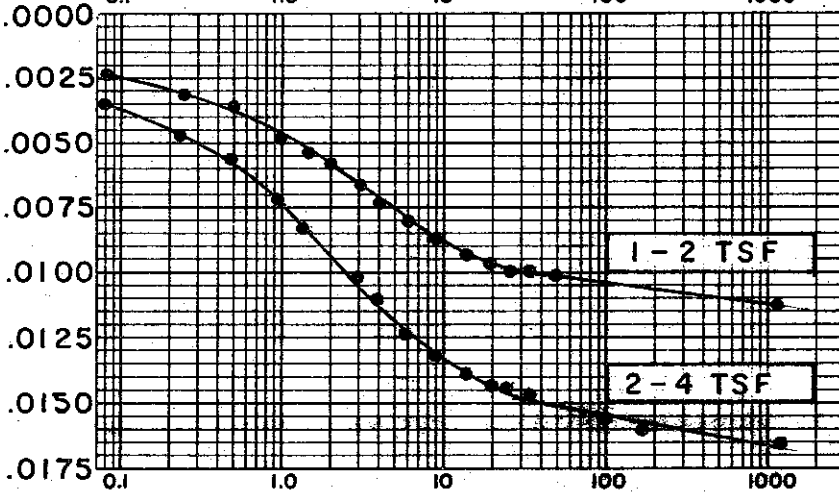
BORING NO. 118 TEST NO. C260.1  
 SAMPLE NO. 9 DATE JULY 1974  
 DEPTH 78.7' TO 79.0'



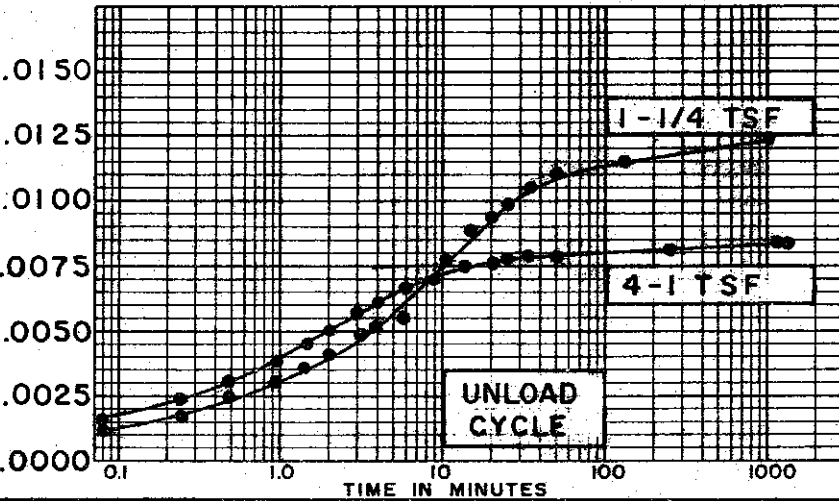
COMPRESSION IN INCHES



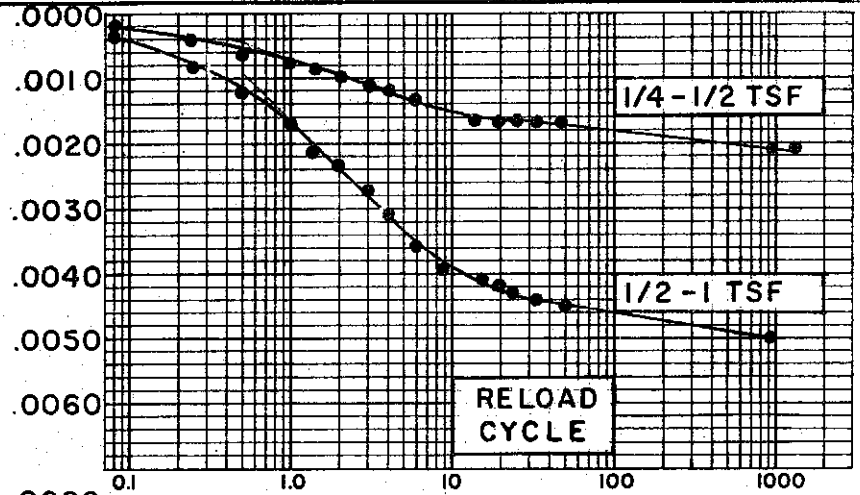
COMPRESSION IN INCHES



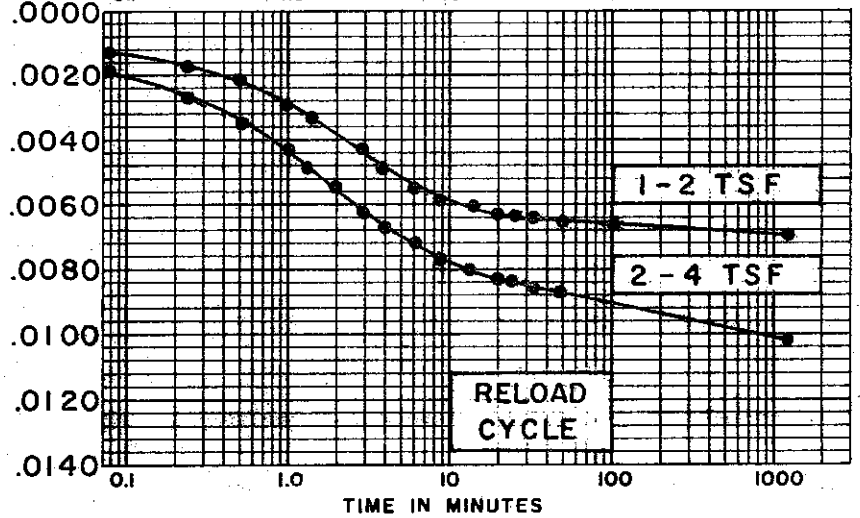
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

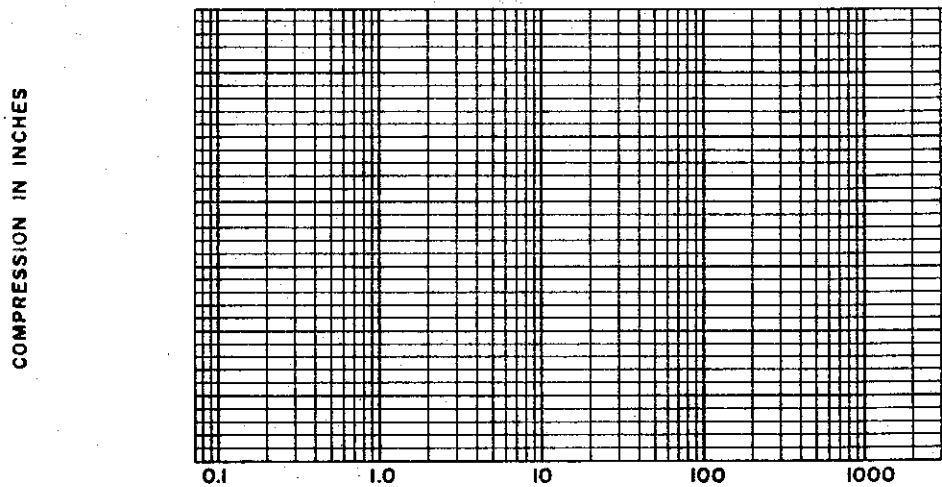
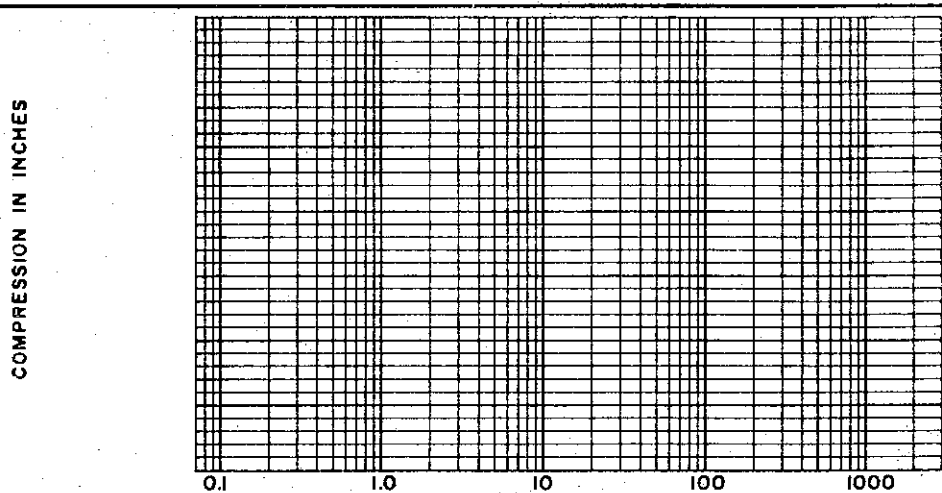
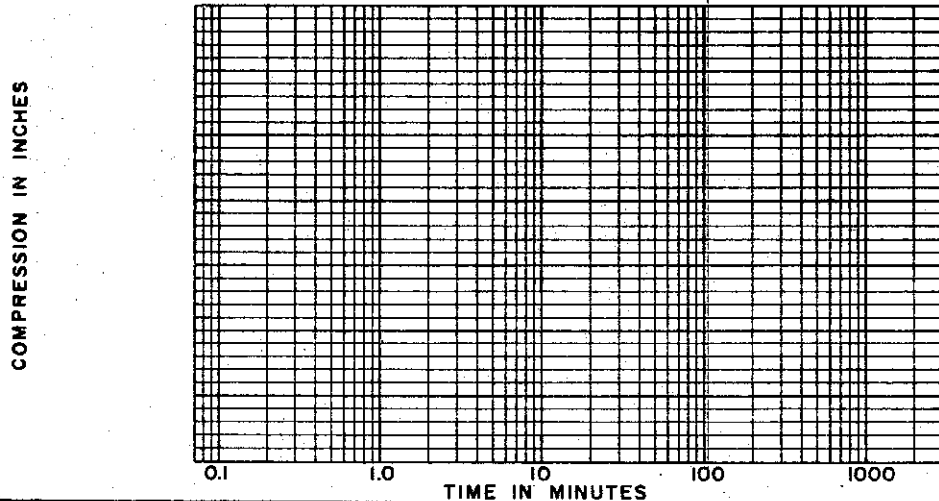
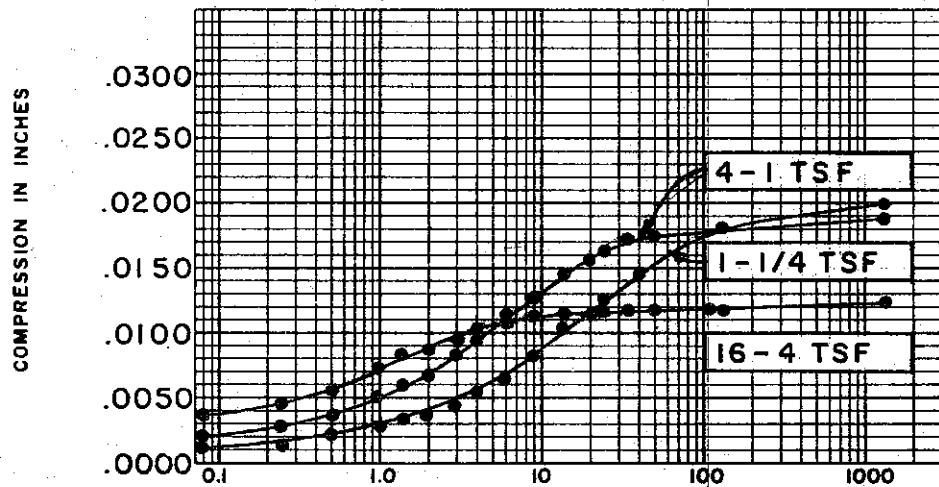
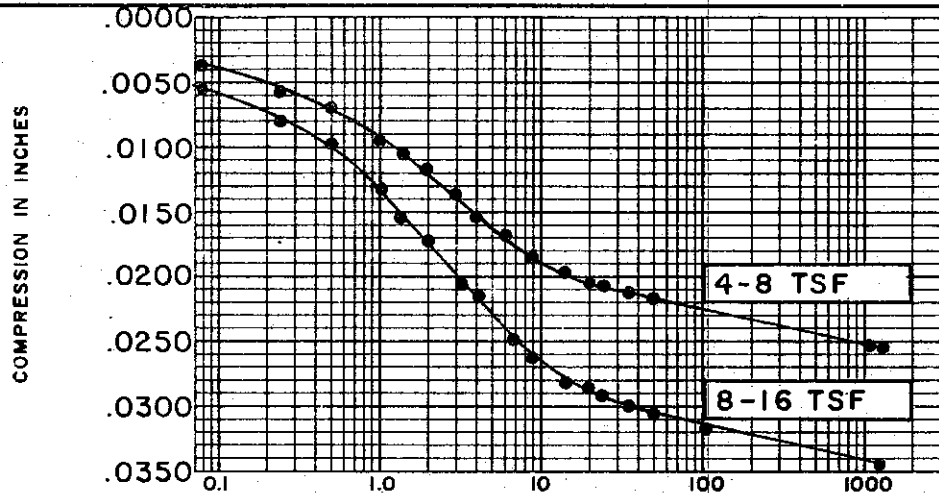
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

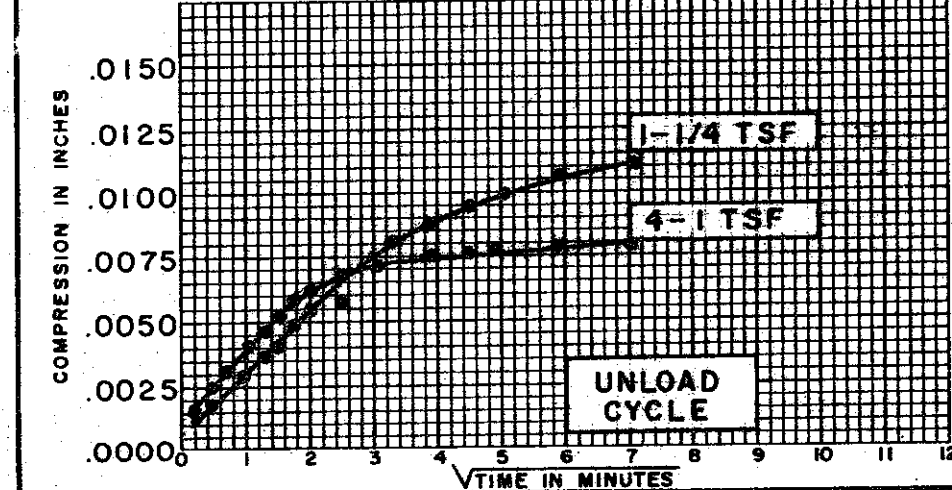
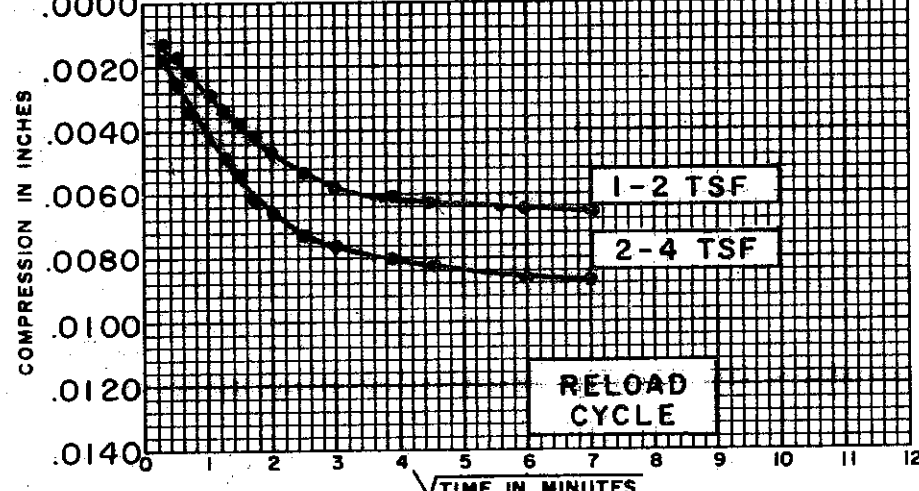
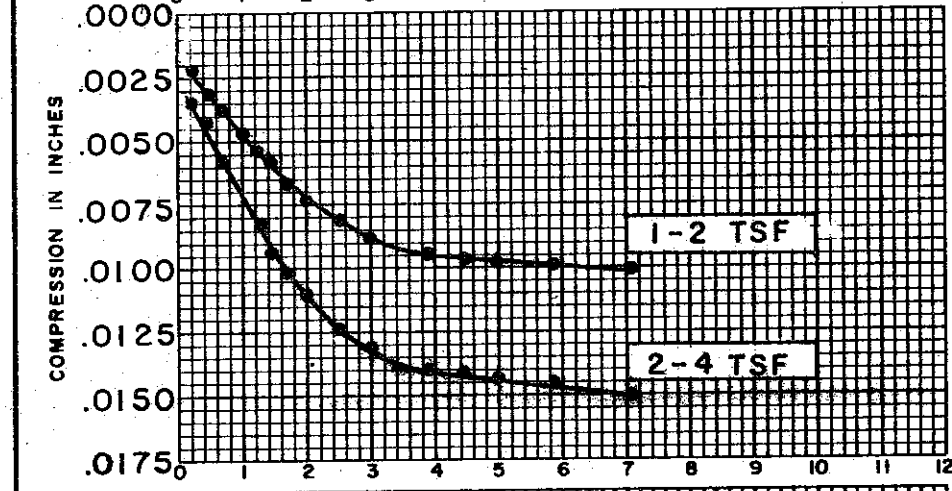
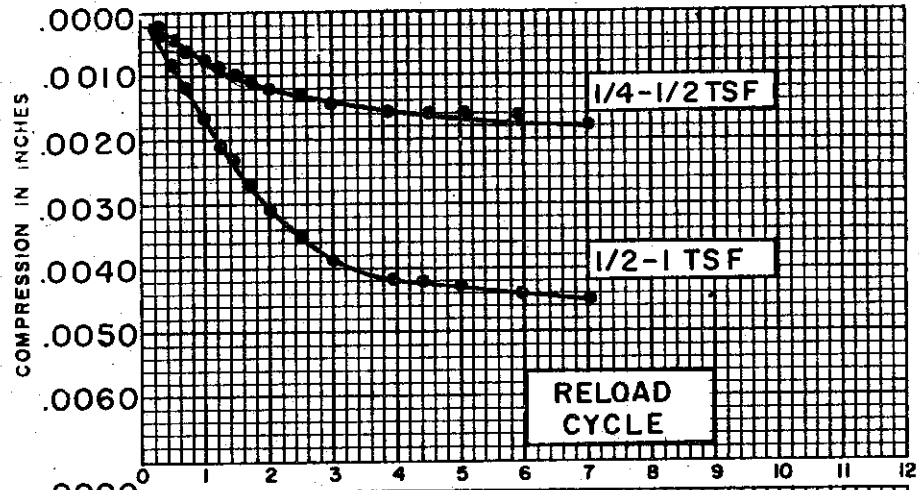
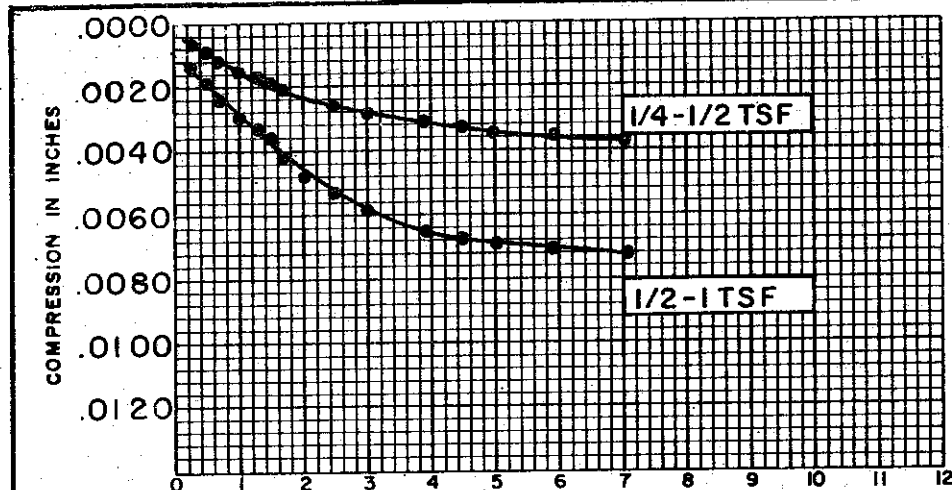
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

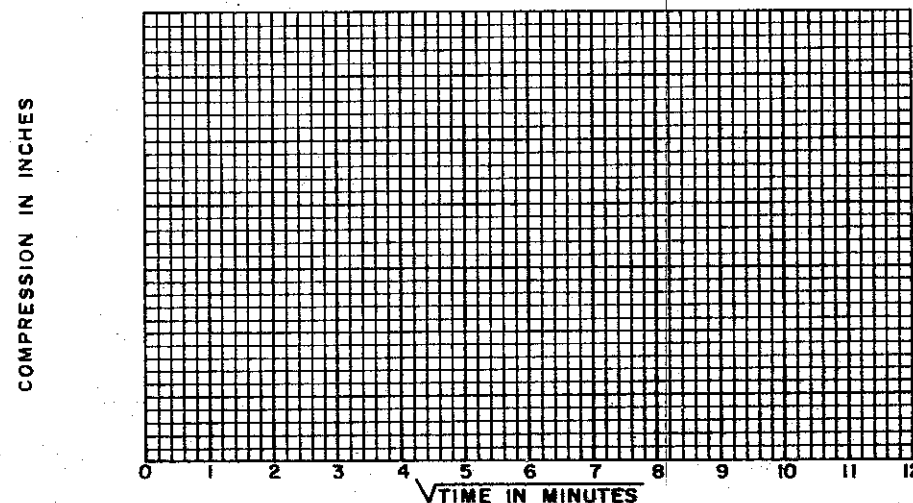
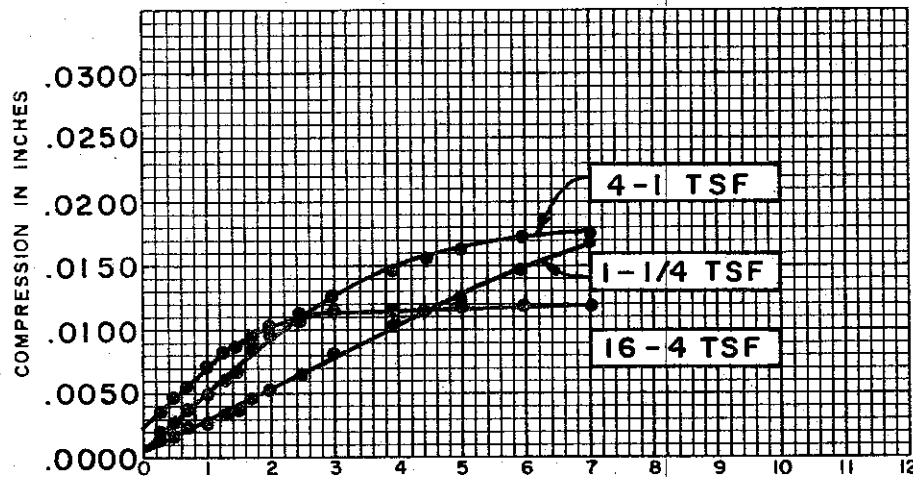
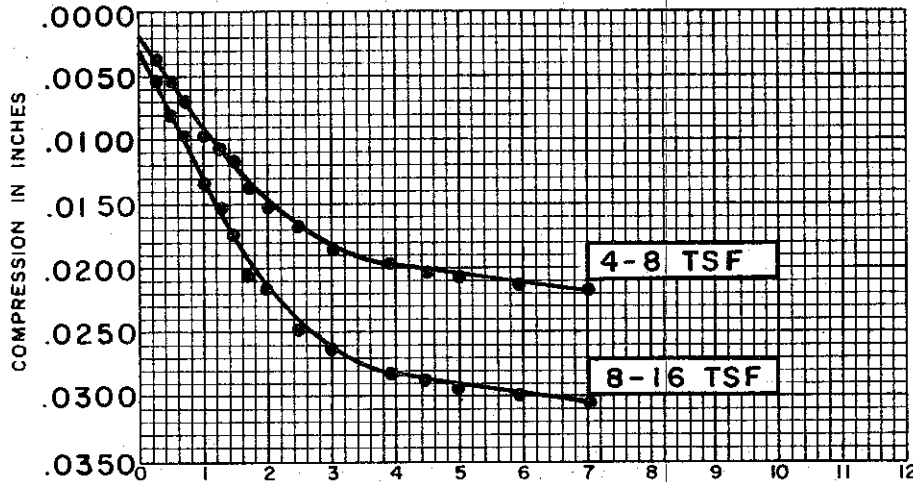


SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, (CE)</u>	SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.30"</u>	
INITIAL VOID RATIO	<u>0.741</u>	
CONSOLIDATION TEST		
TIME VS. COMPRESSION CURVES		
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II		



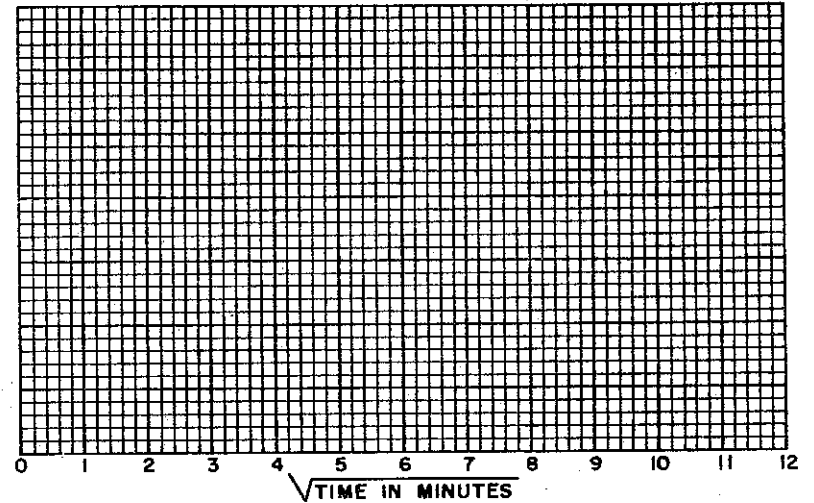
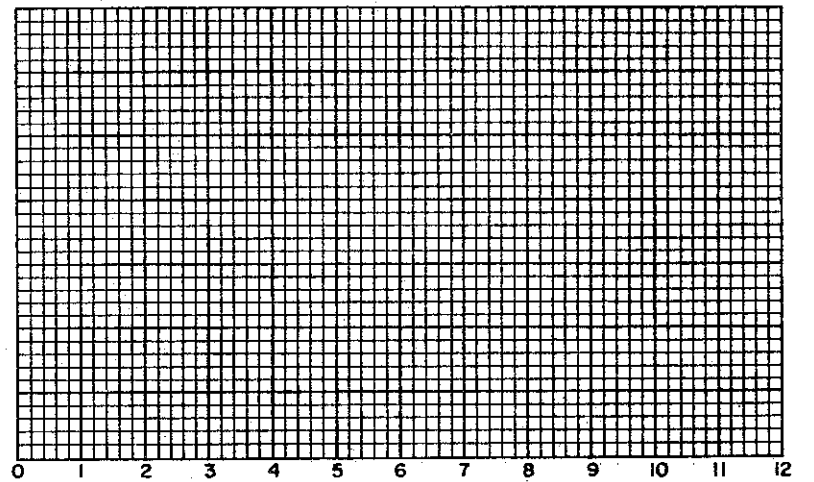
SOIL PROPERTIES		BORING NO. <u>118</u>
SOIL DESCRIPTION: <u>SILTY CLAY, (CL)</u>		SAMPLE NO. <u>9</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>78.7' TO 79.0'</u>
INITIAL WATER CONTENT	<u>27.8 %</u>	
FINAL WATER CONTENT	<u>25.6 %</u>	
TEST DATA		<b>CONSOLIDATION TEST</b> <b>TIME VS. COMPRESSION CURVES</b>  THE DETROIT EDISON COMPANY, BELLE RIVER PLANT UNITS I & II
INITIAL SAMPLE HEIGHT	<u>0.80"</u>	
INITIAL SAMPLE DIAMETER	<u>2.50"</u>	
INITIAL VOID RATIO	<u>0.741</u>	

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 27.8 %  
 FINAL WATER CONTENT 25.6 %

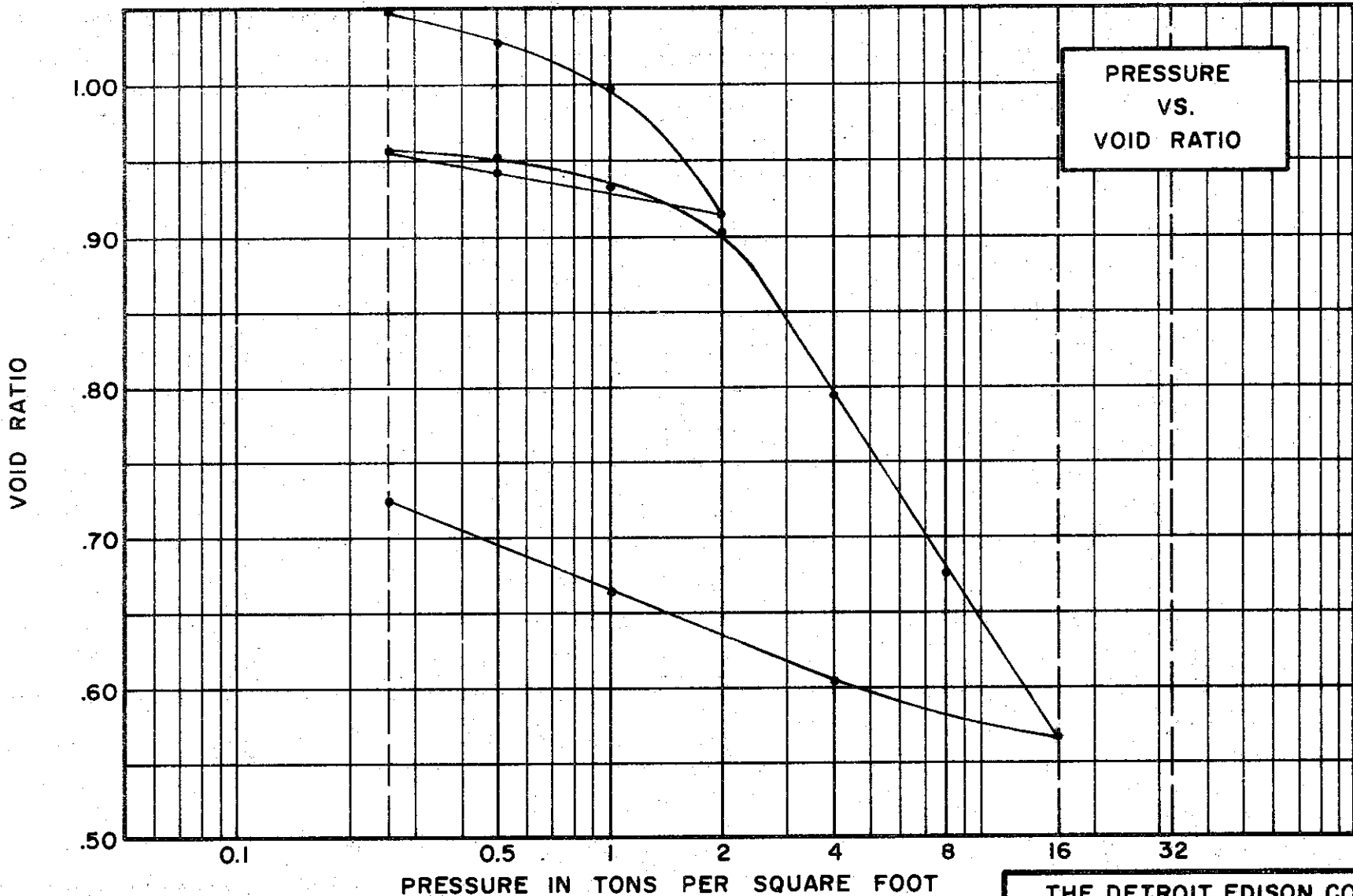
BORING NO. 118  
 SAMPLE NO. 9  
 DEPTH 78.7' TO 79.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.741

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 WATER CONTENT, INITIAL 40.2% FINAL 30.0%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 41% PLASTIC LIMIT 22%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

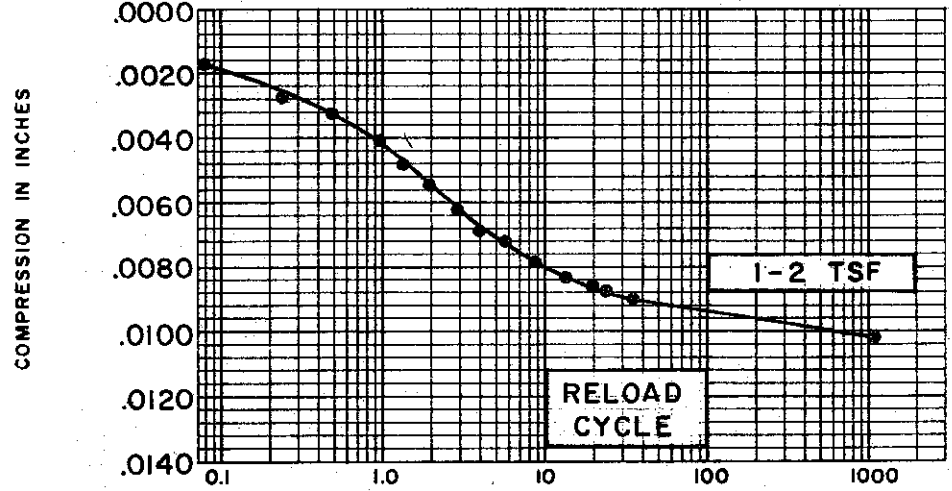
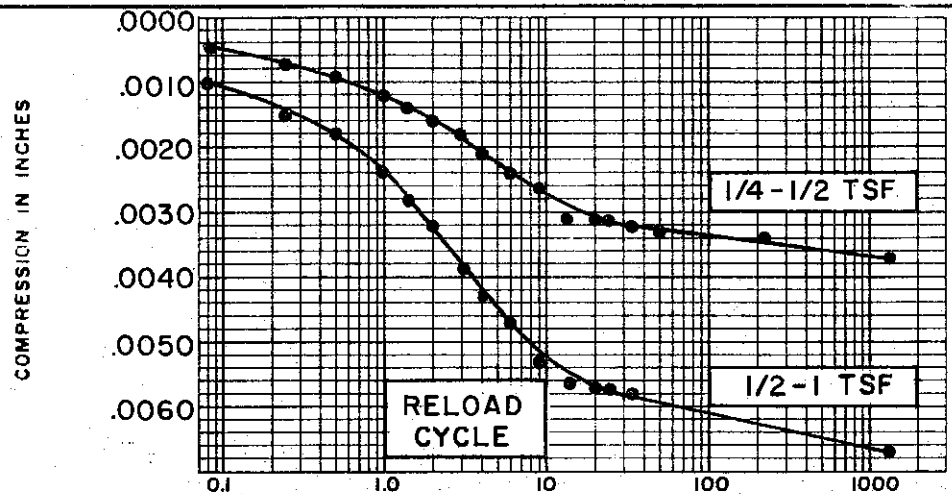
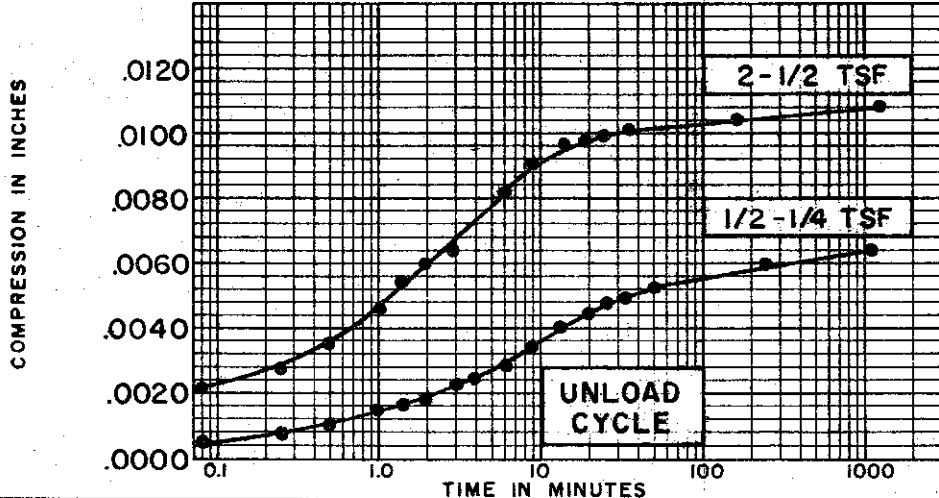
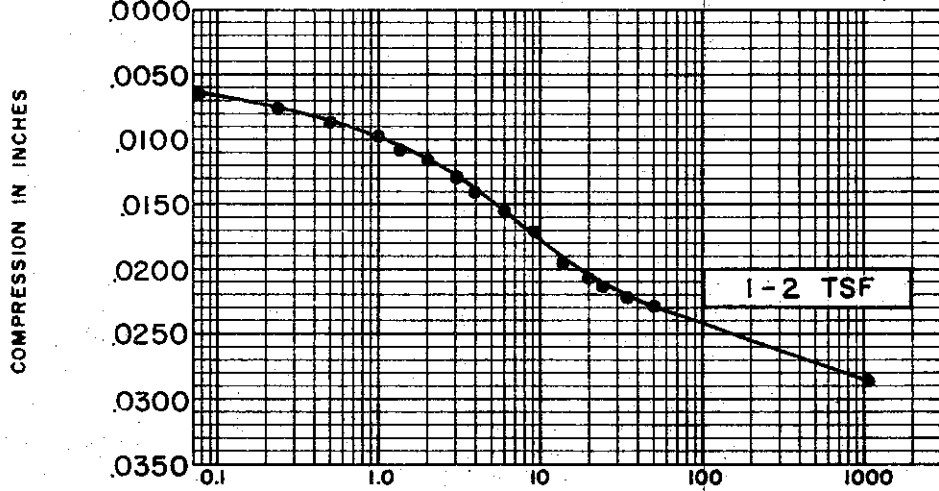
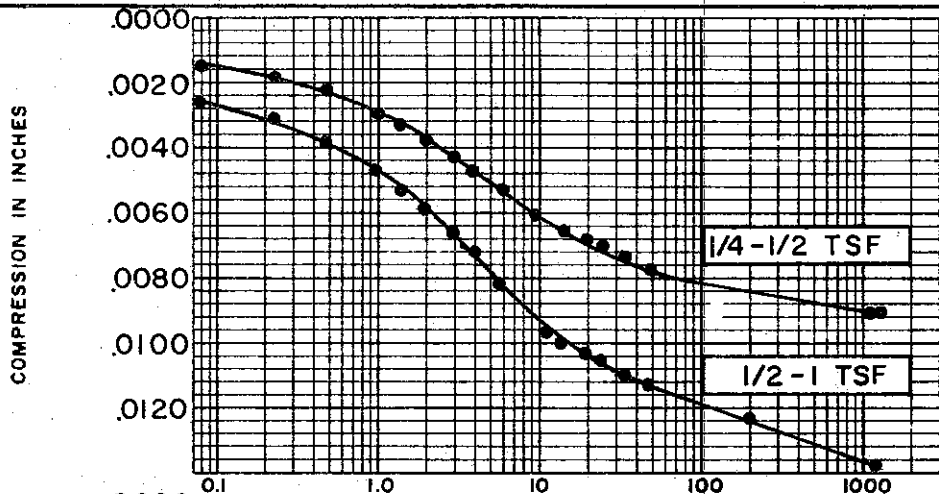
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST**  
**VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C389.1  
 SAMPLE NO. 9 DATE APRIL 74  
 DEPTH 39.1' TO 39.3'

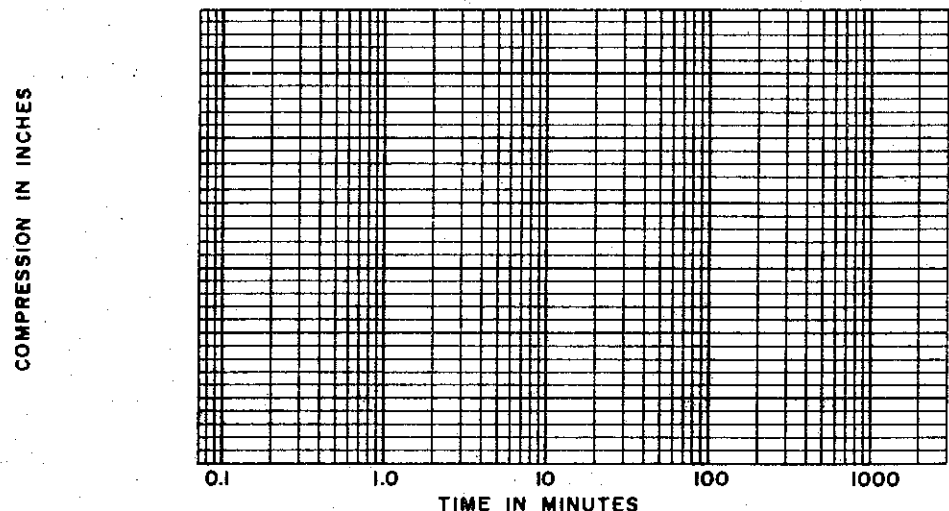
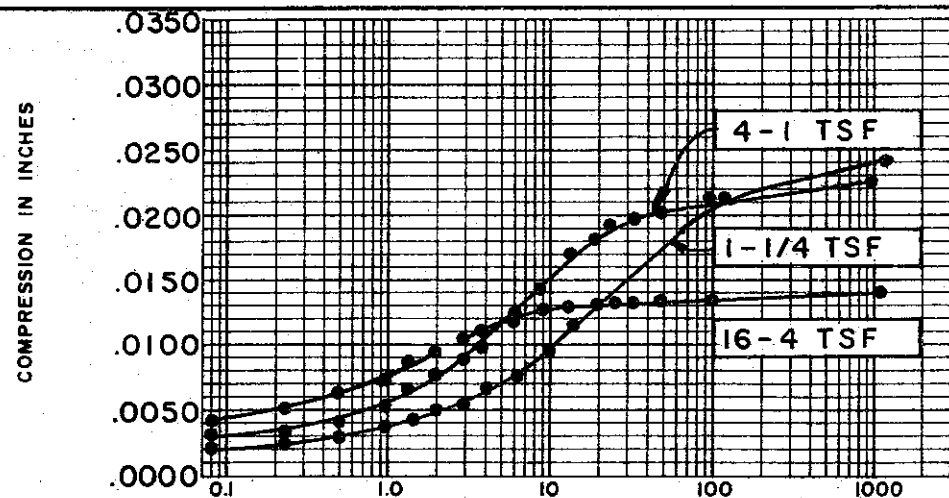
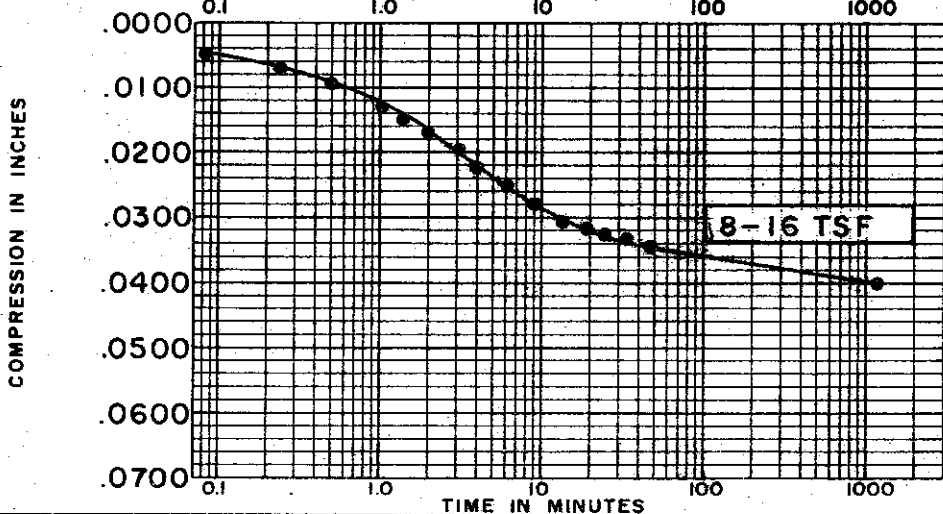
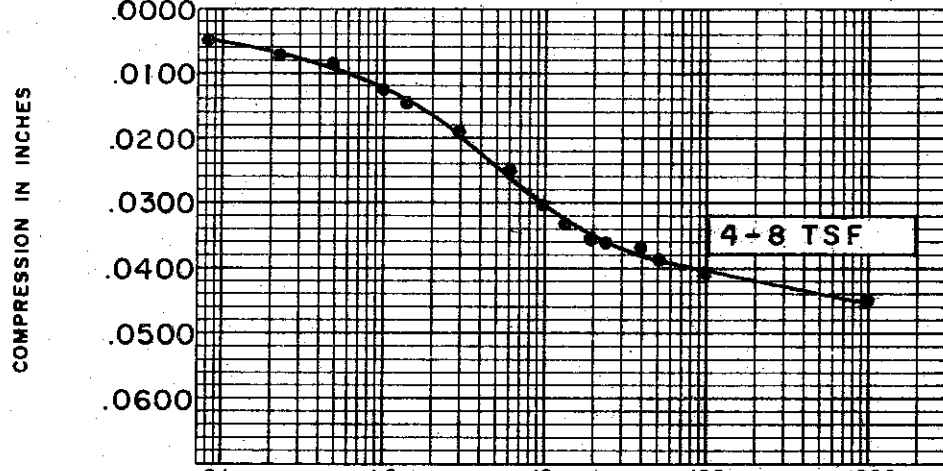
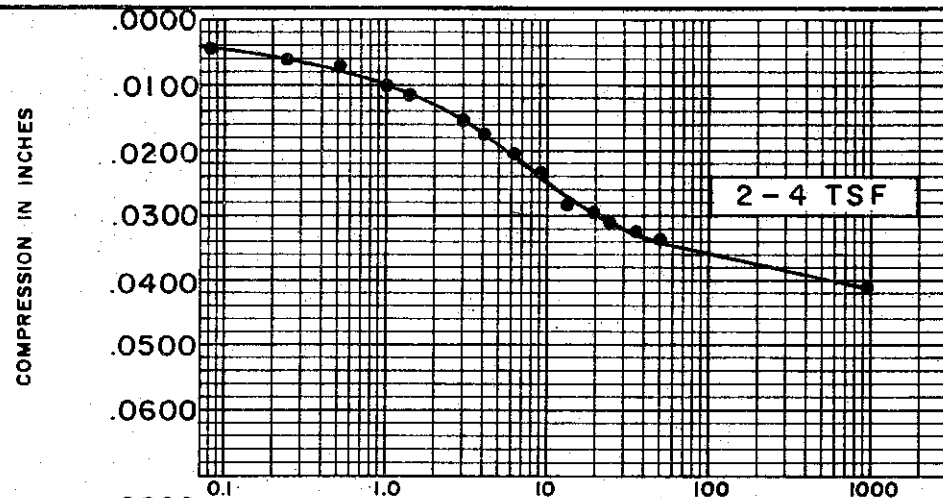
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GOLDBERG-ZOINO & ASSOCIATES, INC.  
 SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES		BORING NO. 129	
SOIL DESCRIPTION:	SILTY CLAY (CL)	SAMPLE NO.	9
SPECIFIC GRAVITY	2.73	DEPTH	39.1' TO 39.3'
INITIAL WATER CONTENT	40.2 %		
FINAL WATER CONTENT	30.0 %		
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT	0.80"	TIME VS. COMPRESSION CURVES	
INITIAL SAMPLE DIAMETER	2.50"	THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO	1.075	BELLE RIVER PLANT UNITS I & II	

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73  
 INITIAL WATER CONTENT 40.2 %  
 FINAL WATER CONTENT 30.0 %

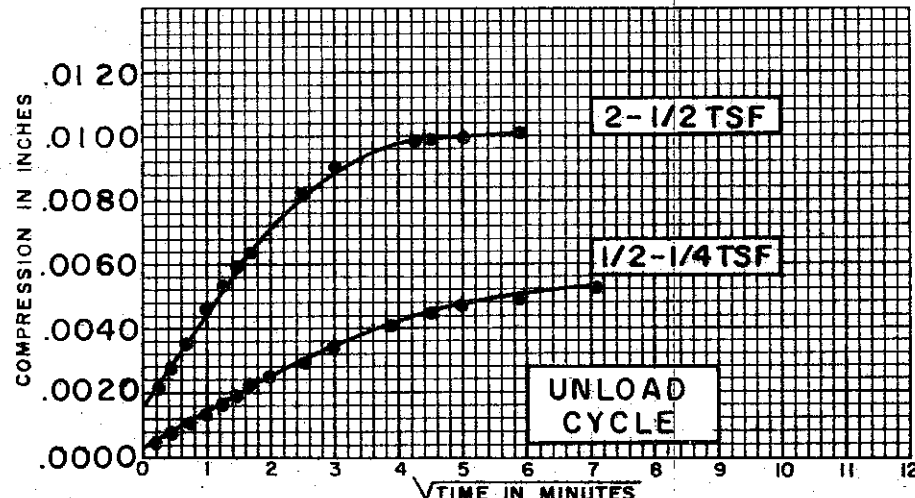
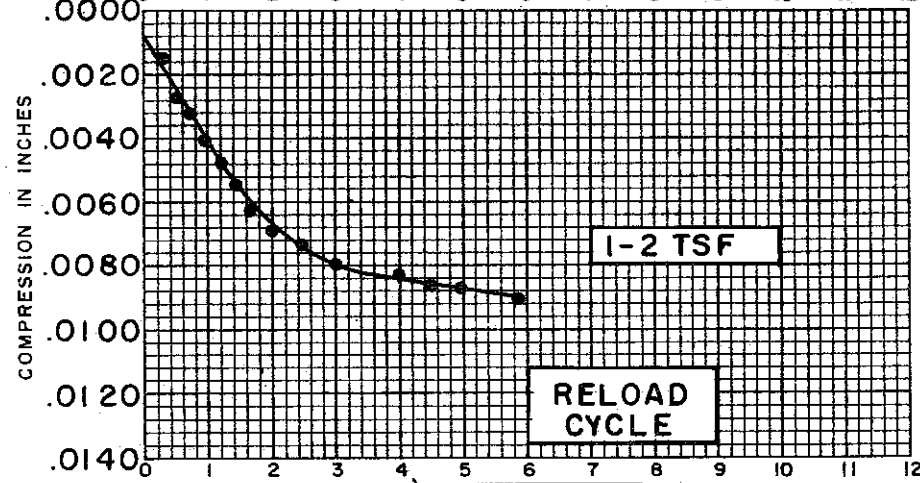
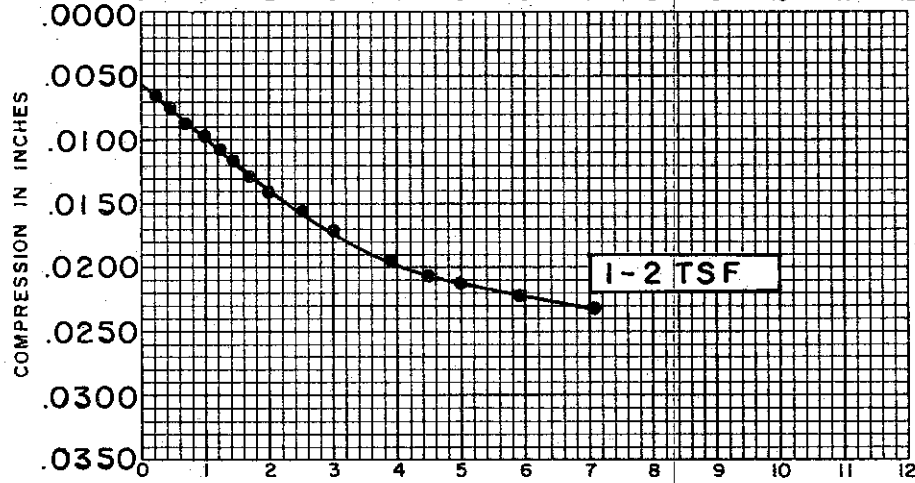
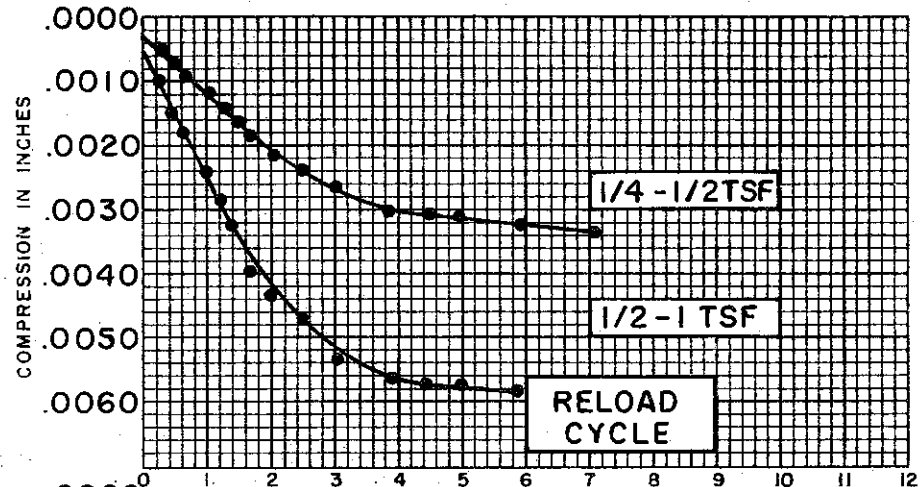
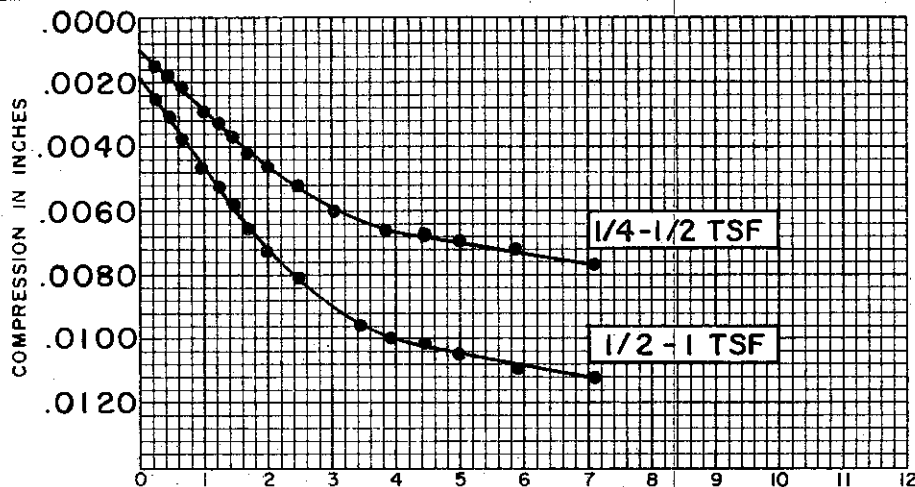
BORING NO. 129  
 SAMPLE NO. 9  
 DEPTH 39.1 TO 39.3'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.075

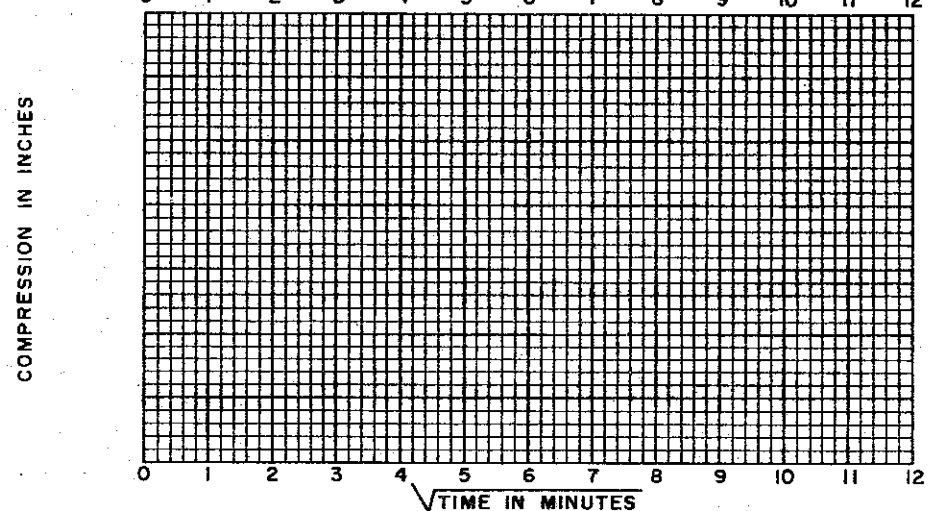
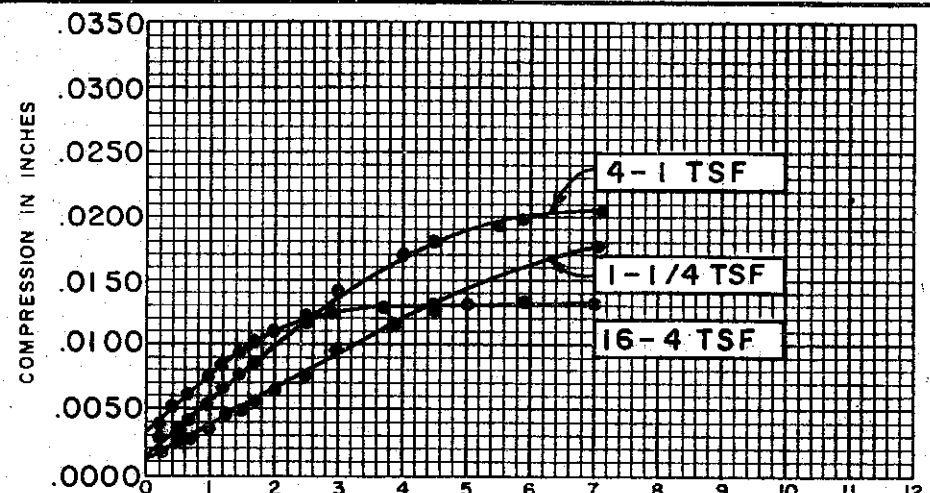
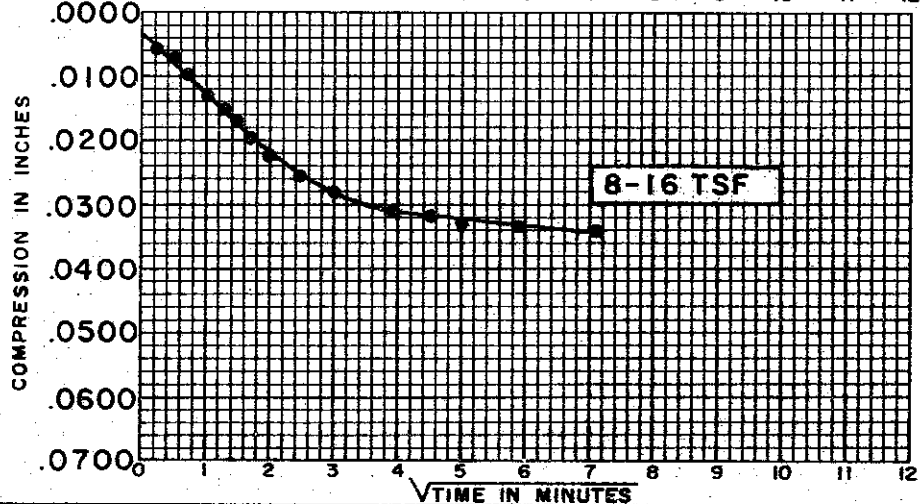
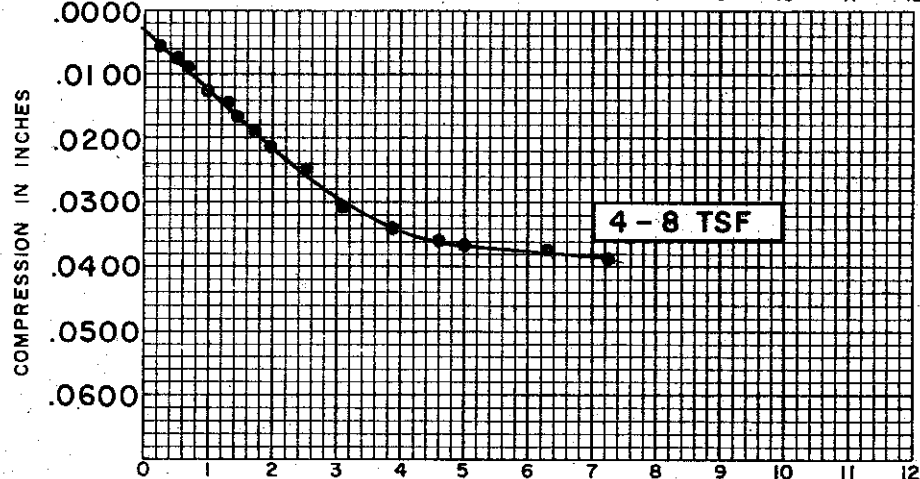
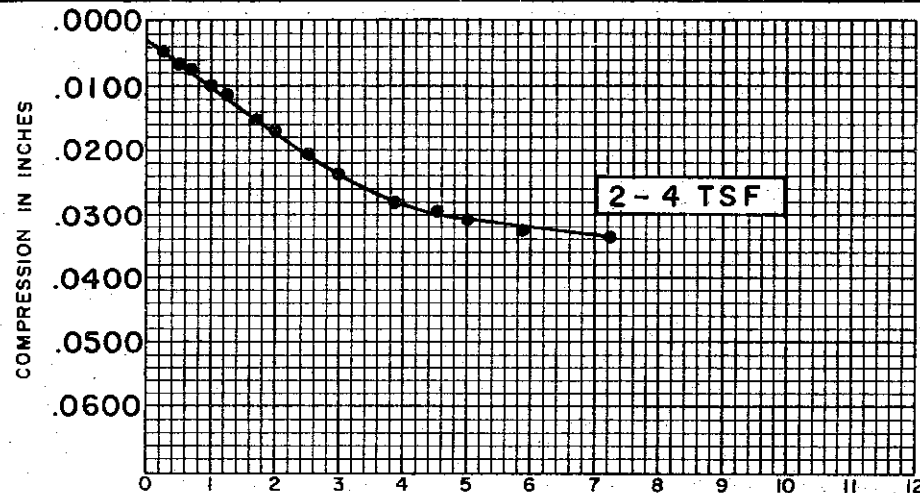
**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



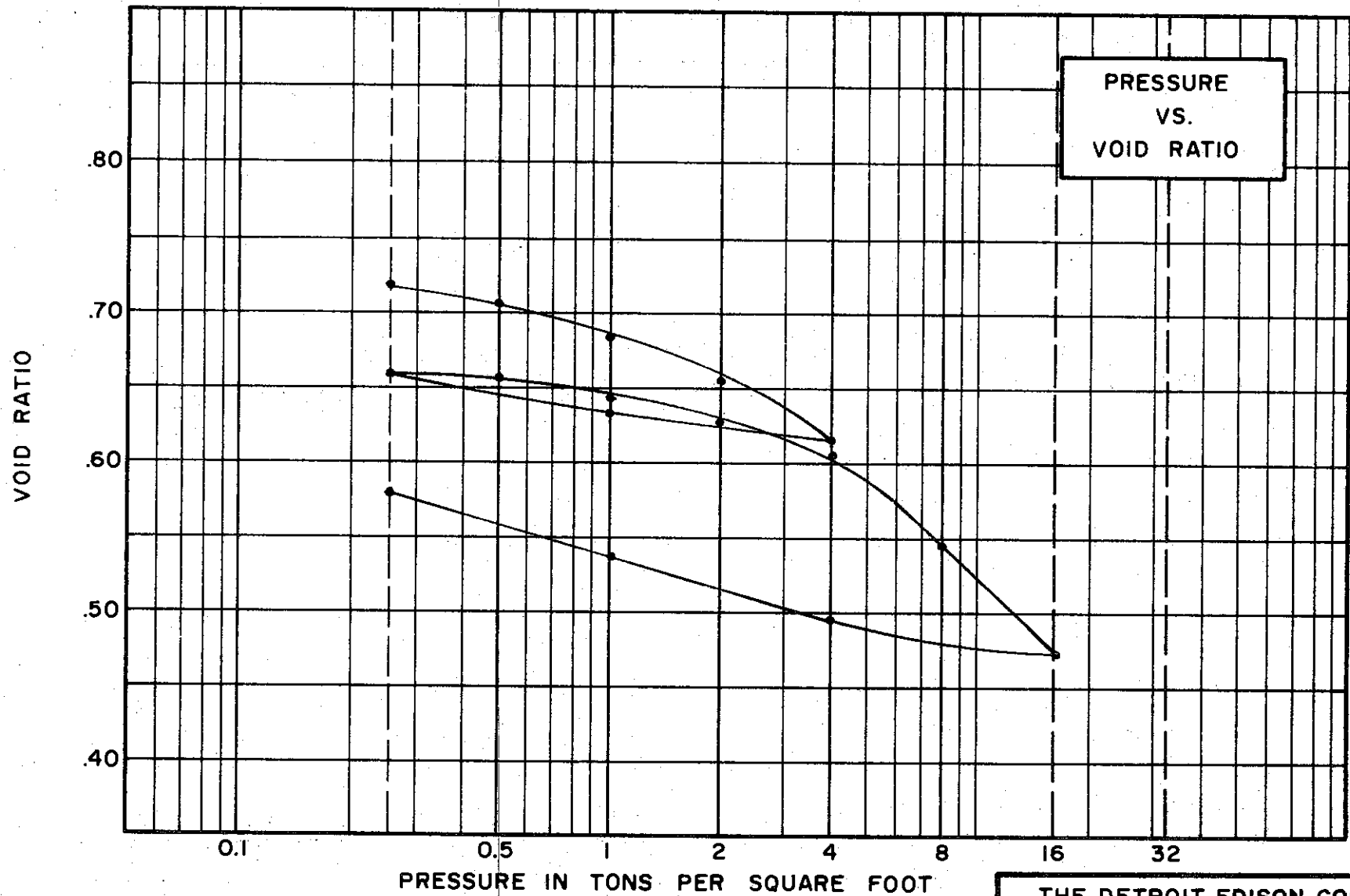
SOIL PROPERTIES		BORING NO. <u>129</u>	
SOIL DESCRIPTION: <u>SILTY CLAY (CL)</u>		SAMPLE NO. <u>9</u>	
SPECIFIC GRAVITY <u>2.73</u>		DEPTH <u>39.1' TO 39.3'</u>	
INITIAL WATER CONTENT <u>40.2 %</u>			
FINAL WATER CONTENT <u>30.0 %</u>			
TEST DATA		CONSOLIDATION TEST	
INITIAL SAMPLE HEIGHT <u>0.80"</u>		TIME VS. COMPRESSION CURVES	
INITIAL SAMPLE DIAMETER <u>2.50"</u>		THE DETROIT EDISON COMPANY	
INITIAL VOID RATIO <u>1.075</u>		BELLE RIVER PLANT UNITS I & II	





SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
INITIAL WATER CONTENT	40.2 %
FINAL WATER CONTENT	30.0 %
BORING NO.	129
SAMPLE NO.	9
DEPTH	39.1' TO 39.3'
TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	1.075
CONSOLIDATION TEST	
TIME VS. COMPRESSION CURVES	
THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II	

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY; SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 WATER CONTENT, INITIAL 28.0% FINAL 24.5%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**

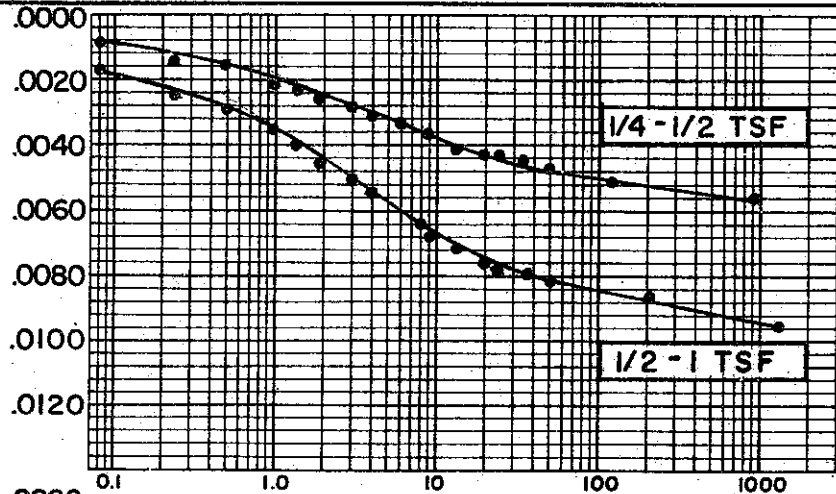
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.703

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

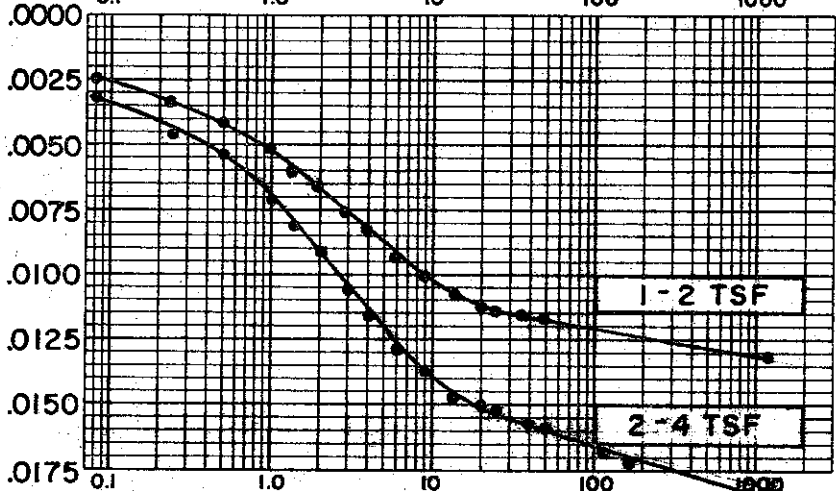
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 129 TEST NO. C395.1  
 SAMPLE NO. 21 DATE APRIL 74  
 DEPTH 103.7' TO 104.0'

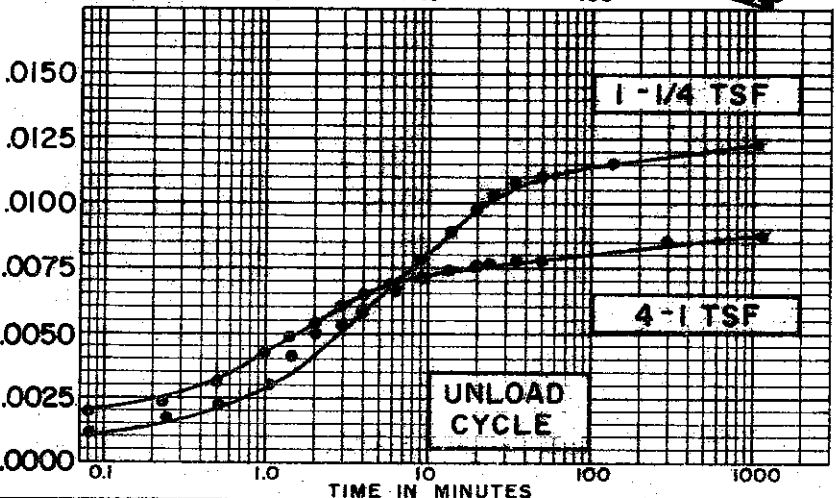
COMPRESSION IN INCHES



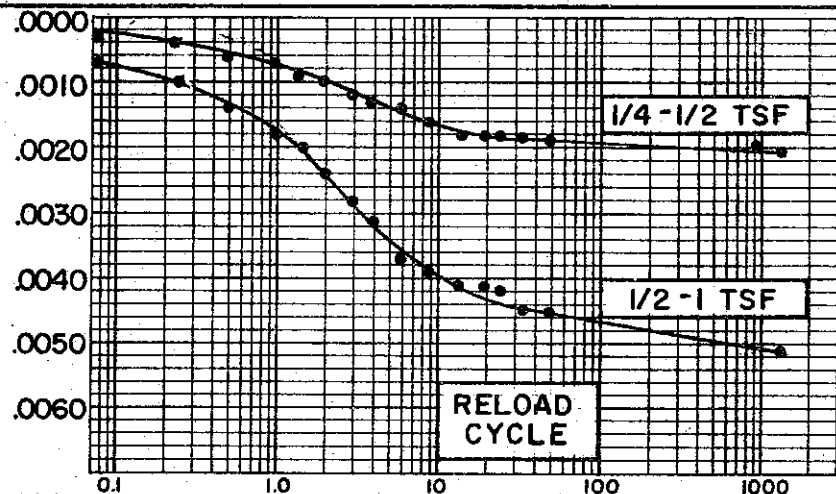
COMPRESSION IN INCHES



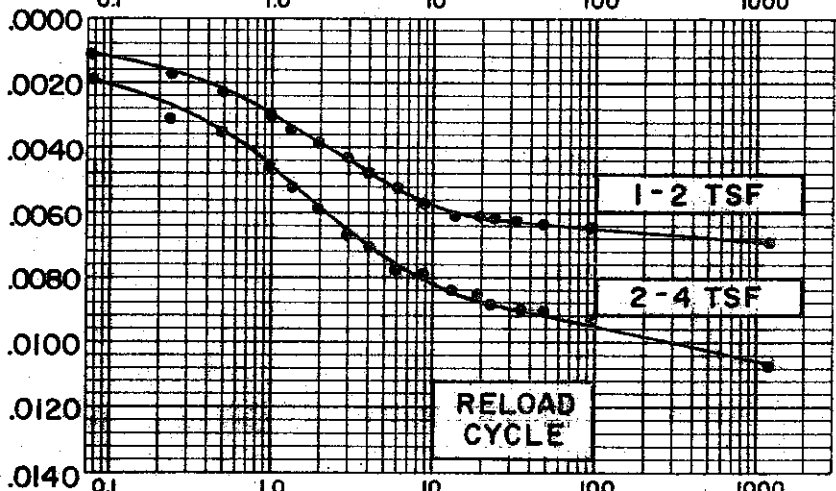
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71  
 INITIAL WATER CONTENT 28.0 %  
 FINAL WATER CONTENT 24.5 %

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7' TO 104.0'

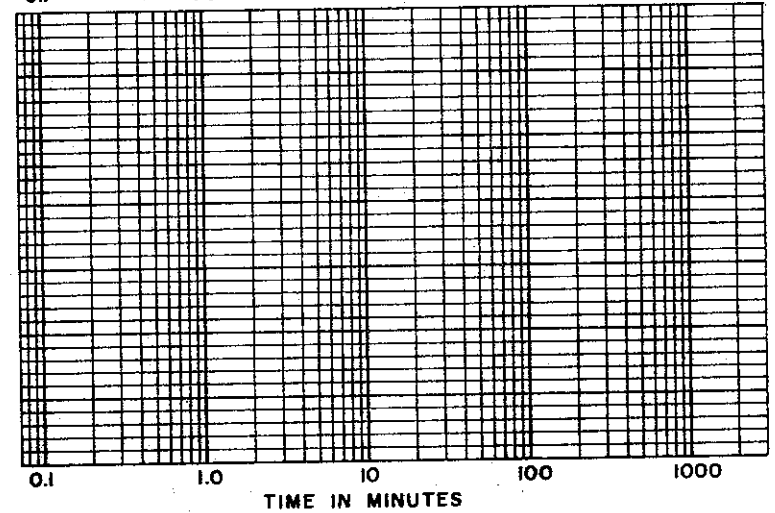
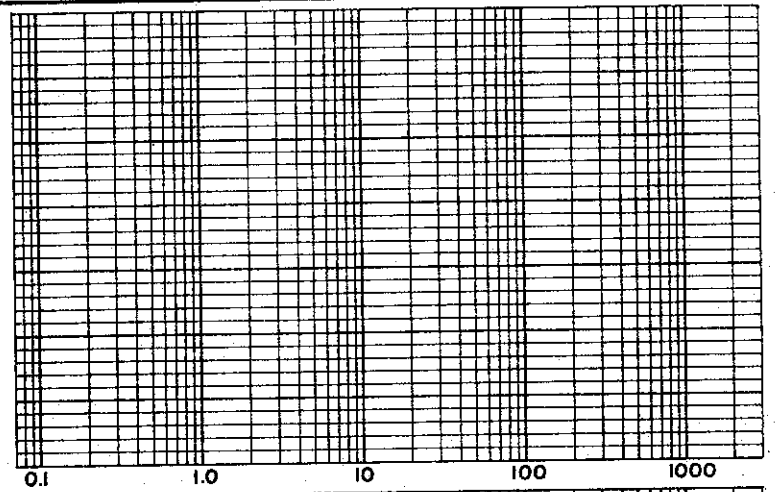
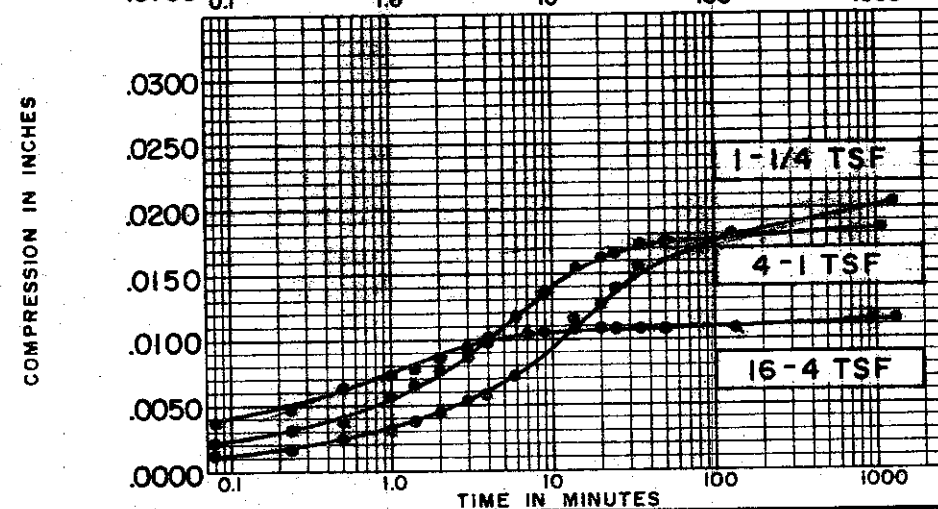
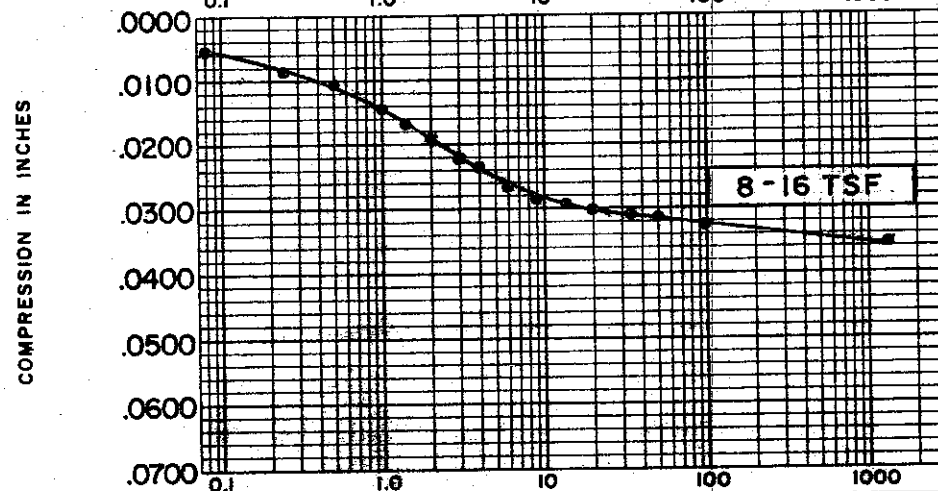
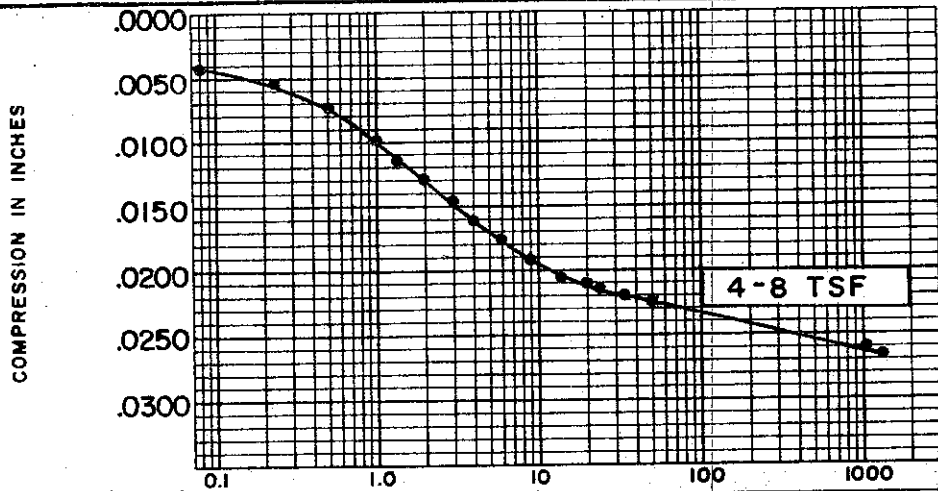
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVE.**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY, SANDY (CL)  
SPECIFIC GRAVITY 2.71  
INITIAL WATER CONTENT 28.0 %  
FINAL WATER CONTENT 24.5 %

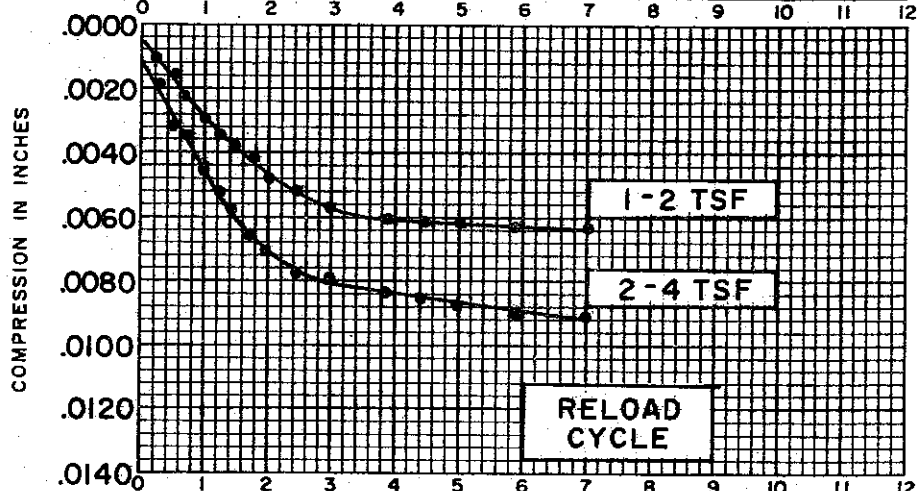
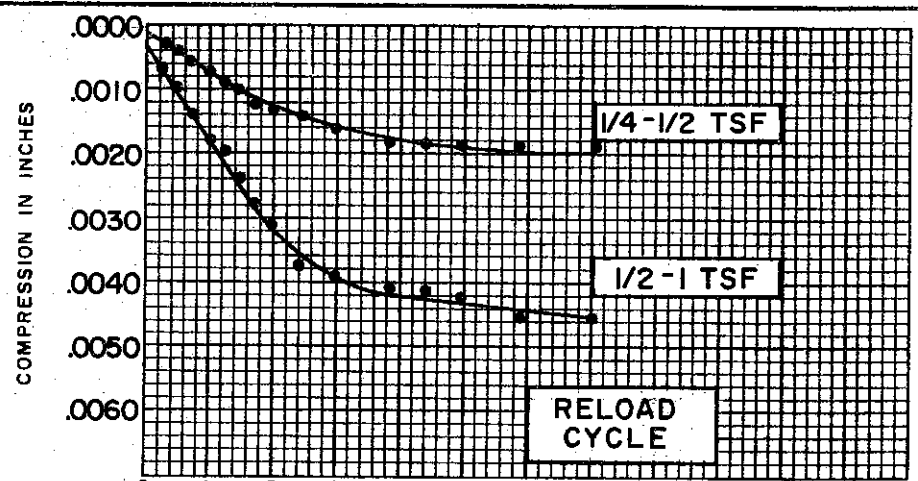
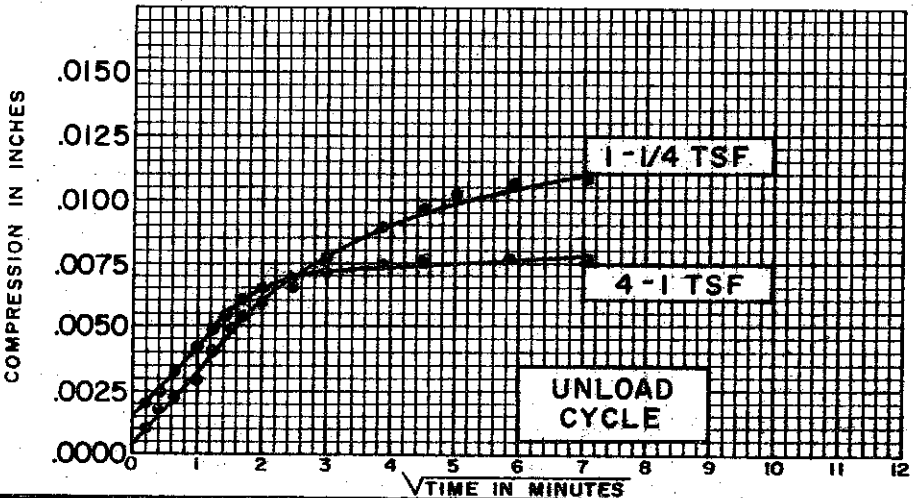
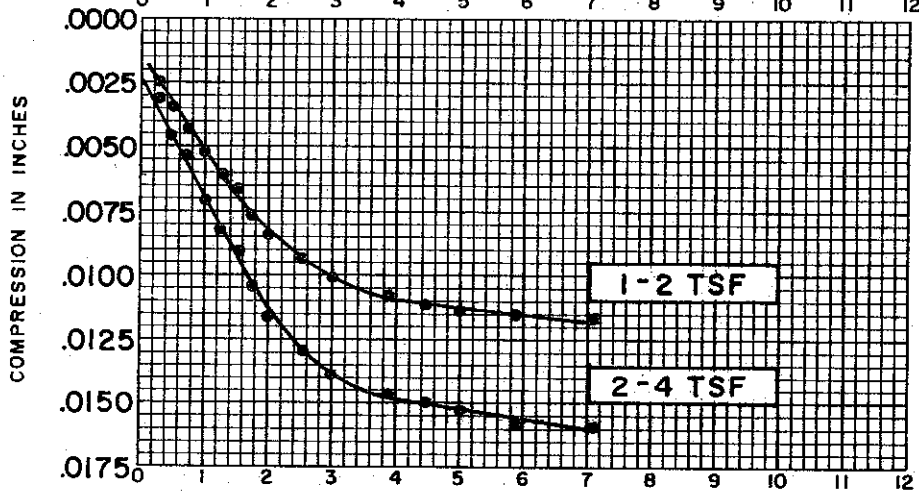
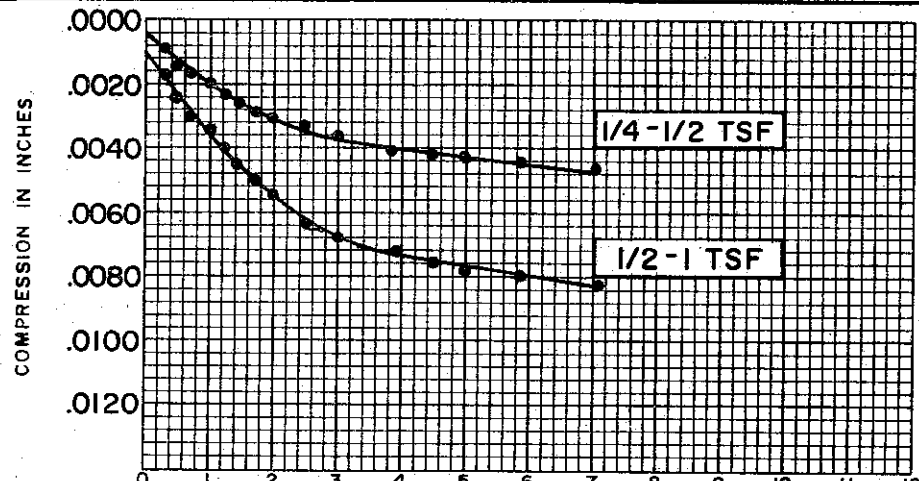
BORING NO. 129  
SAMPLE NO. 21  
DEPTH 103.7' TO 104.0'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO 0.730

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



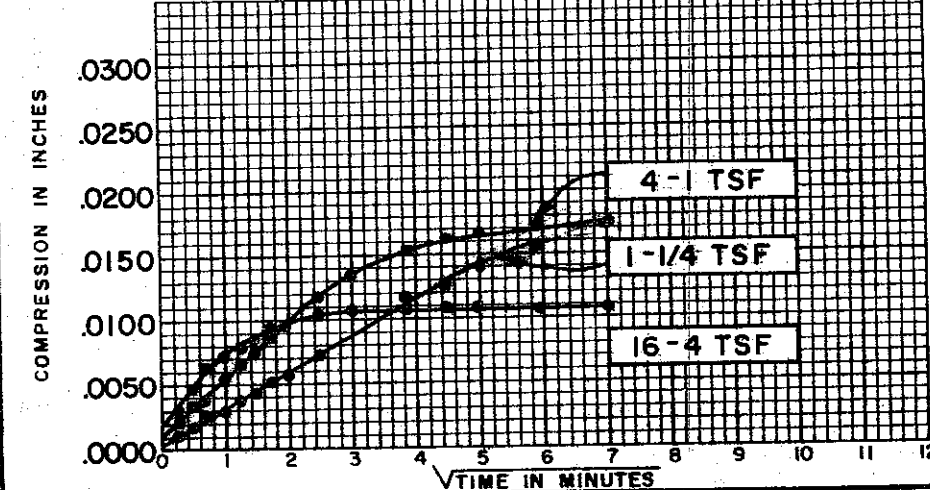
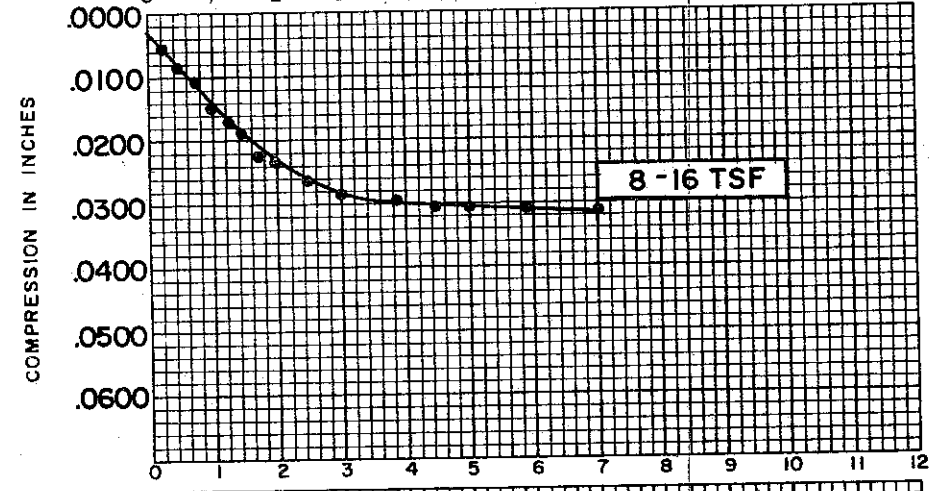
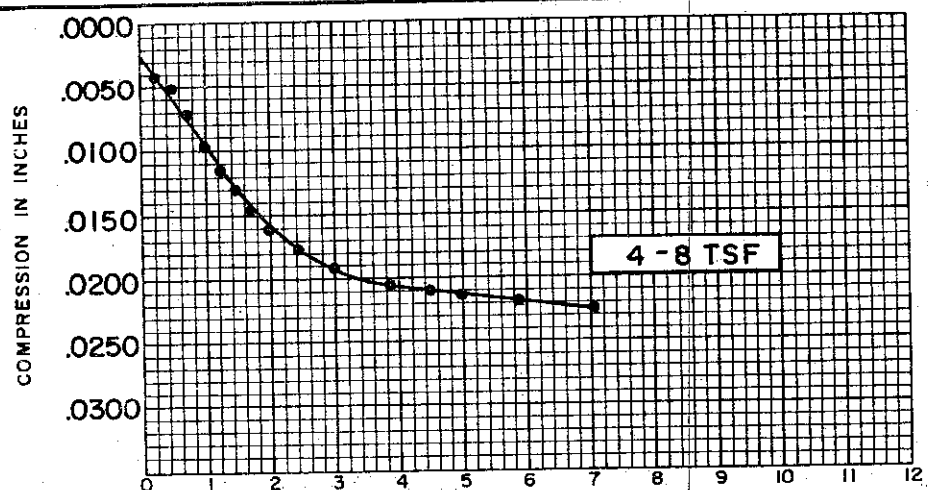
SOIL PROPERTIES	
SOIL DESCRIPTION:	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.71
INITIAL WATER CONTENT	28.0 %
FINAL WATER CONTENT	24.5 %
BORING NO.	129
SAMPLE NO.	21
DEPTH	103.7' TO 104.0'

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.730

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

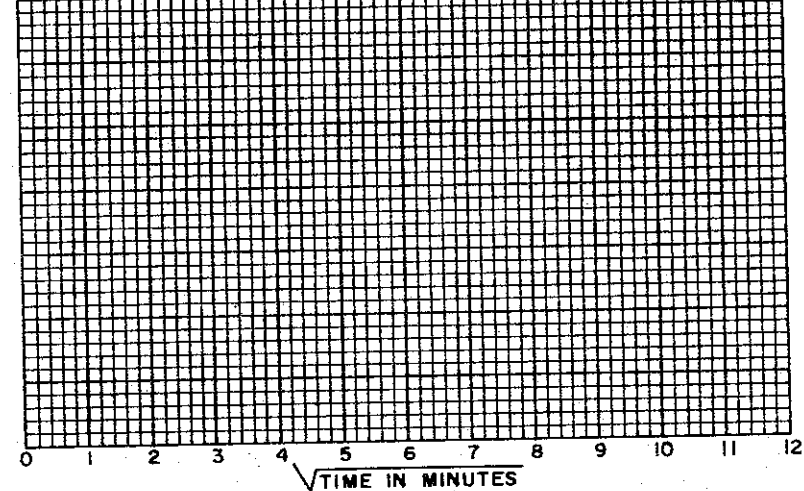
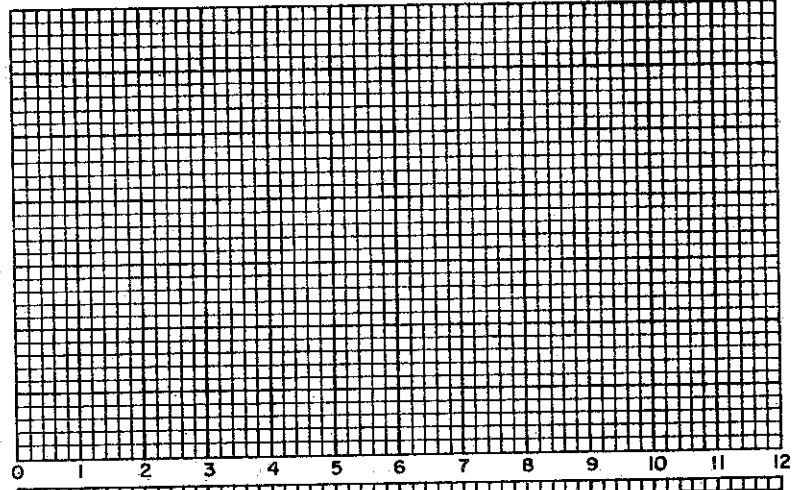
C-559

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COMPRESSION IN INCHES

COMPRESSION IN INCHES

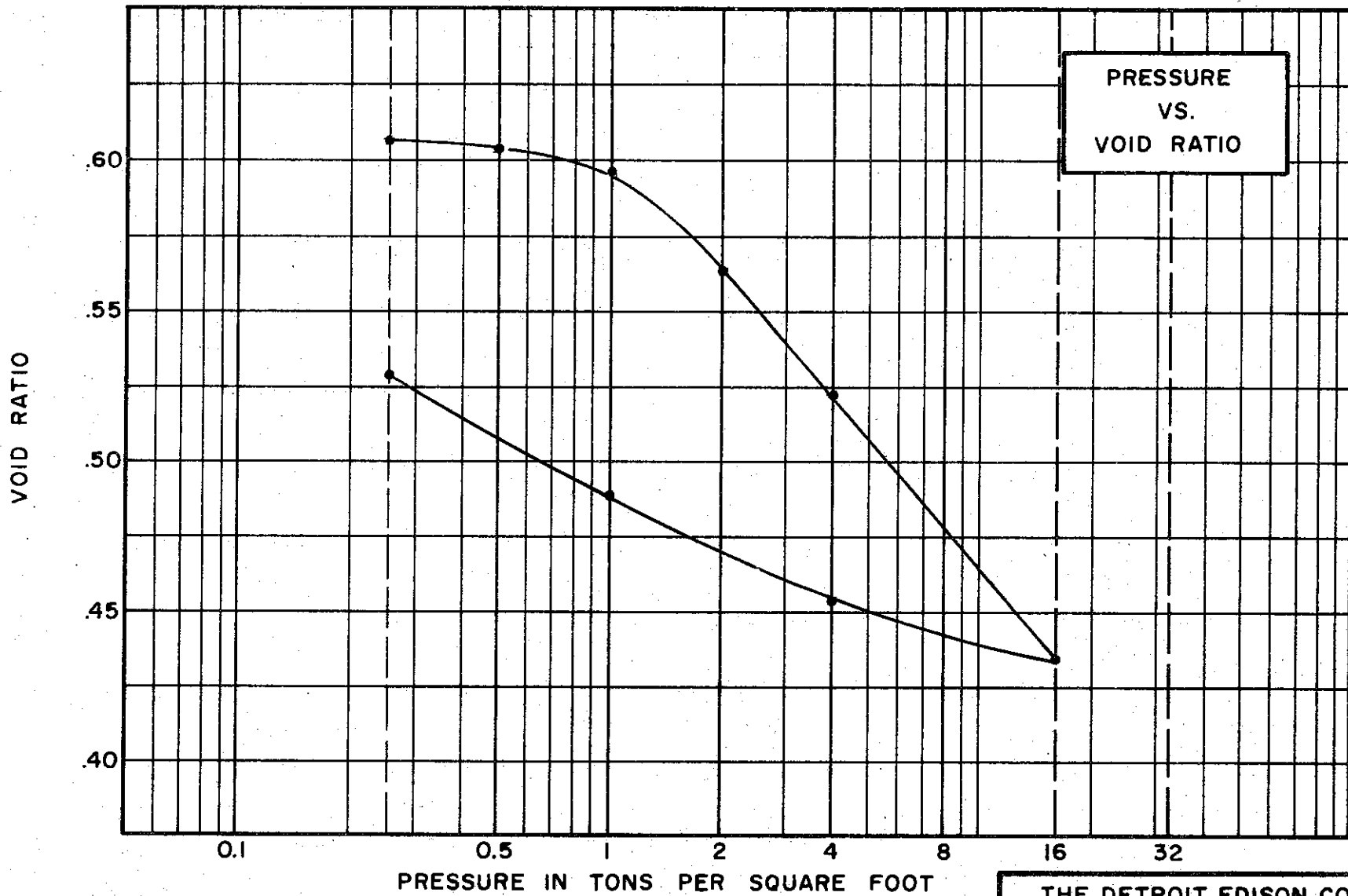


SOIL PROPERTIES		BORING NO. <u>129</u>
SOIL DESCRIPTION:	<u>SILTY CLAY, SANDY (CL)</u>	SAMPLE NO. <u>21</u>
SPECIFIC GRAVITY	<u>2.71</u>	DEPTH <u>103.7' TO 104.0'</u>
INITIAL WATER CONTENT	<u>28.0 %</u>	
FINAL WATER CONTENT	<u>24.5 %</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>0.730</u>

**CONSOLIDATION TEST**  
**TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 WATER CONTENT, INITIAL (17.3%) FINAL 21.3%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**

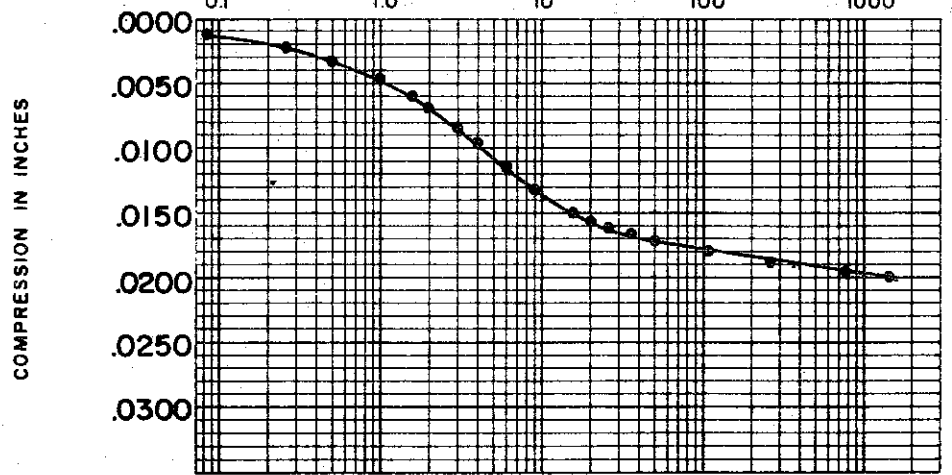
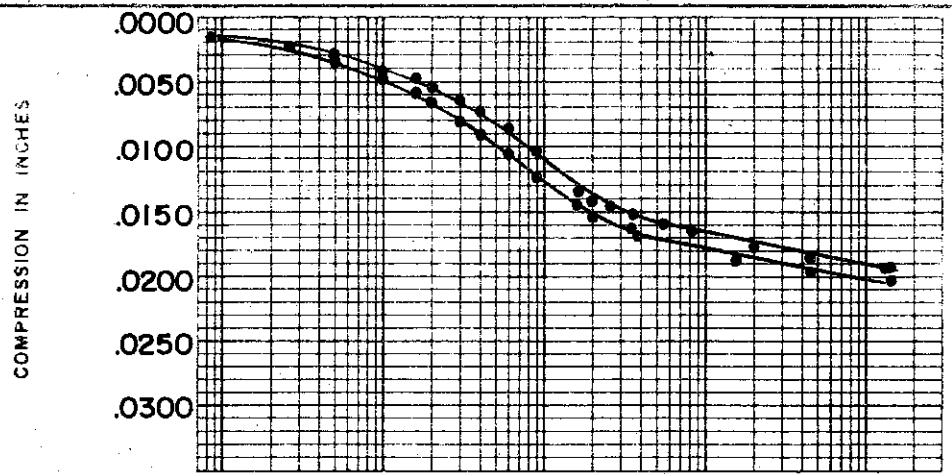
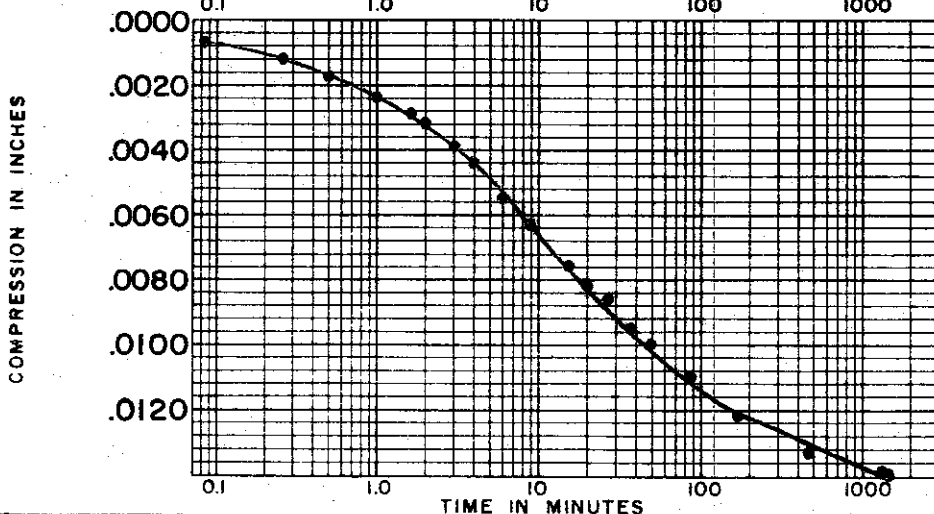
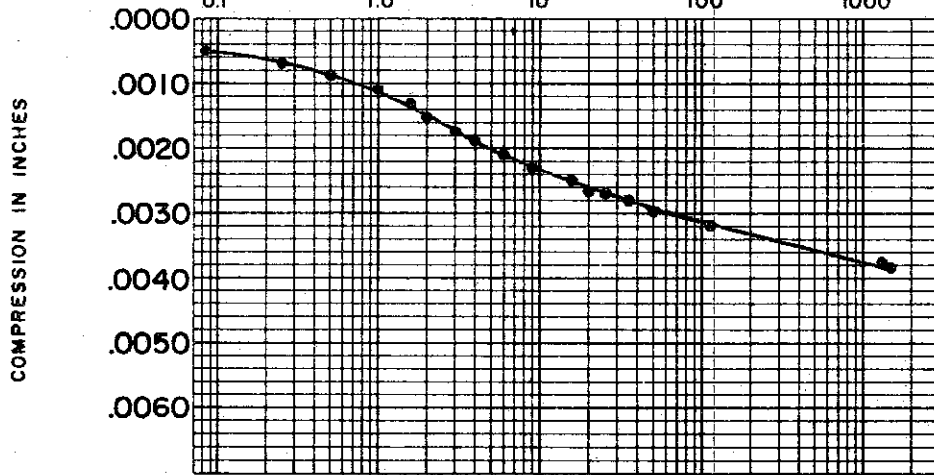
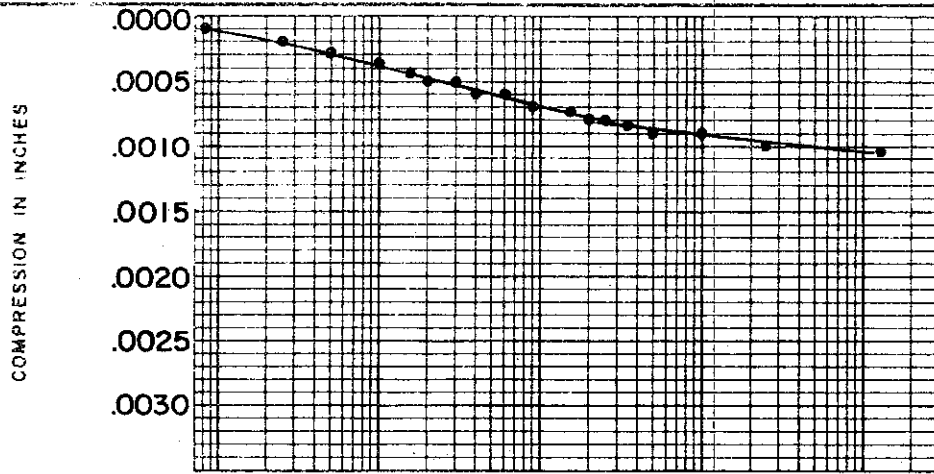
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.448"  
 INITIAL VOID RATIO (0.675)<sup>AS</sup> COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 136 TEST NO. C527.1  
 SAMPLE NO. ST6 DATE DEC. 1974  
 DEPTH 13.0' TO 14.6'

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**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

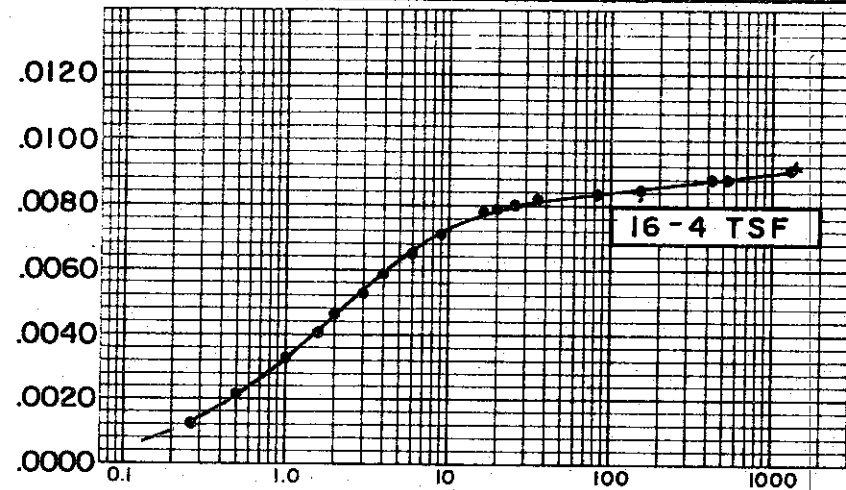
**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

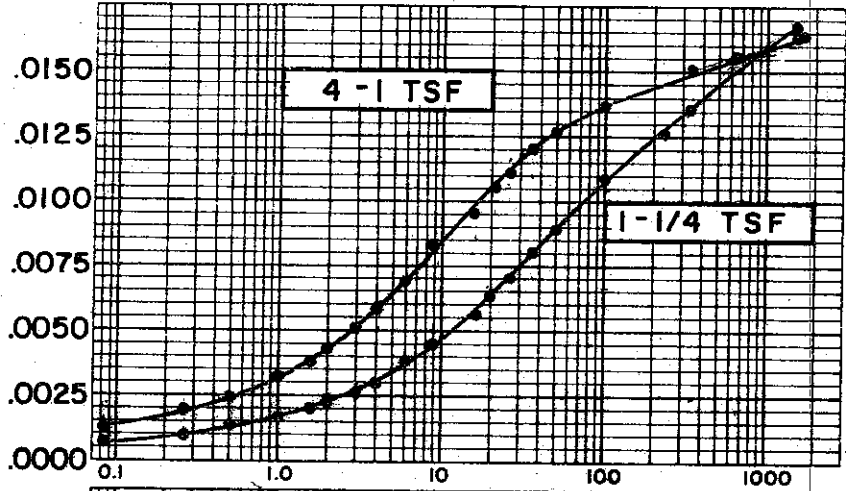


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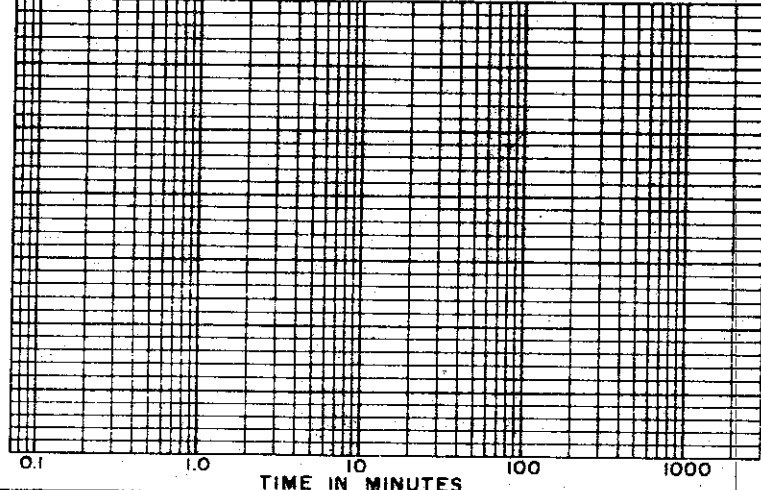
COMPRESSION IN INCHES



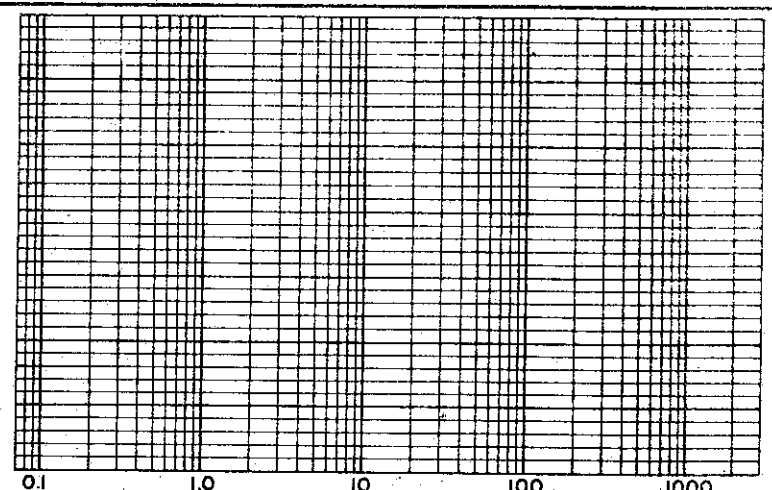
COMPRESSION IN INCHES



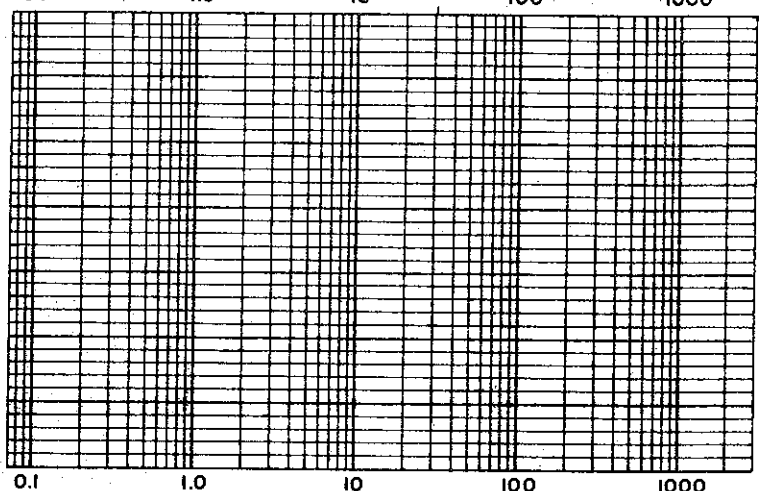
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 FINAL WATER CONTENT 21.3 %

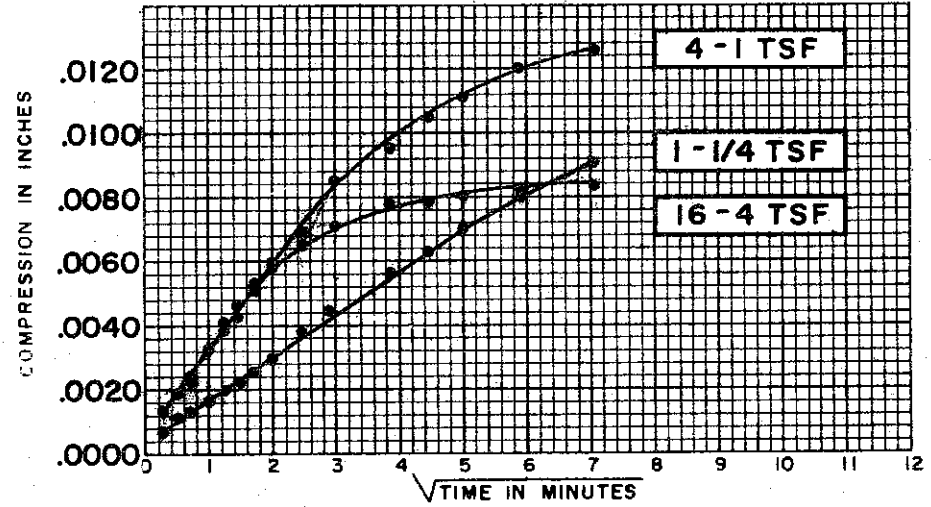
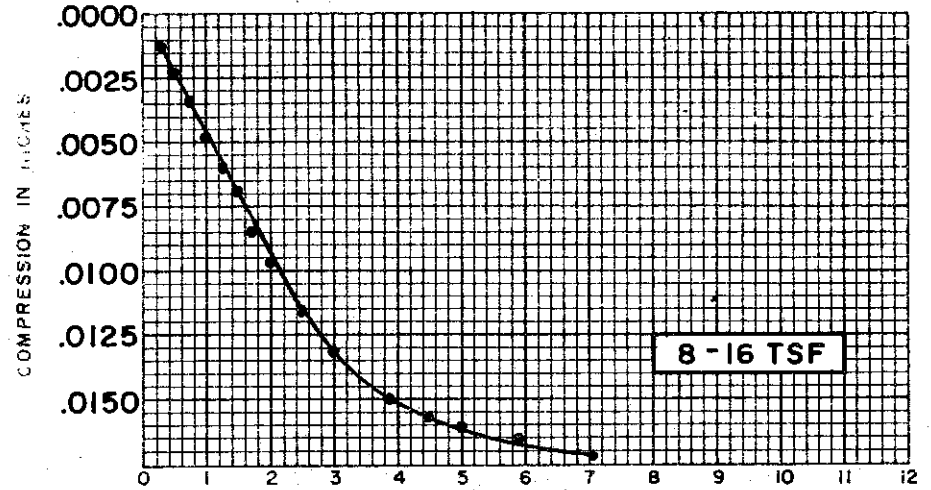
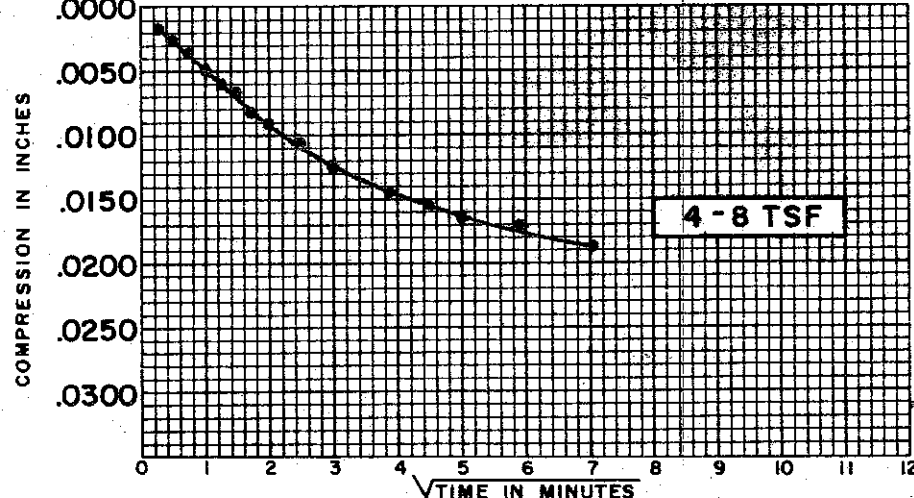
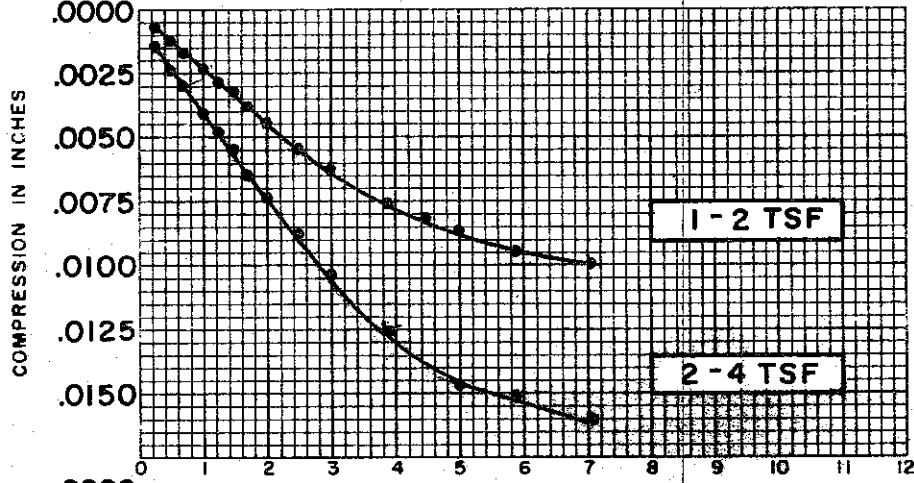
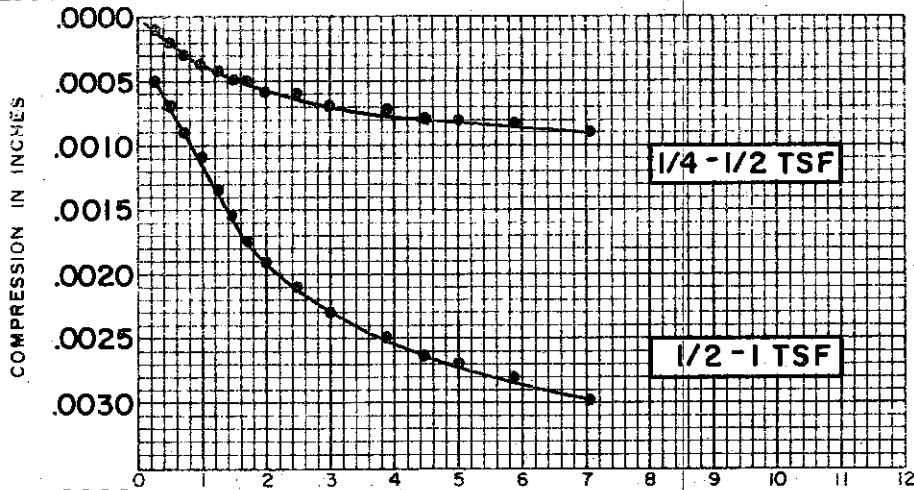
BORING NO. 136  
 SAMPLE NO. ST 6  
 DEPTH 13.0' TO 14.6'

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

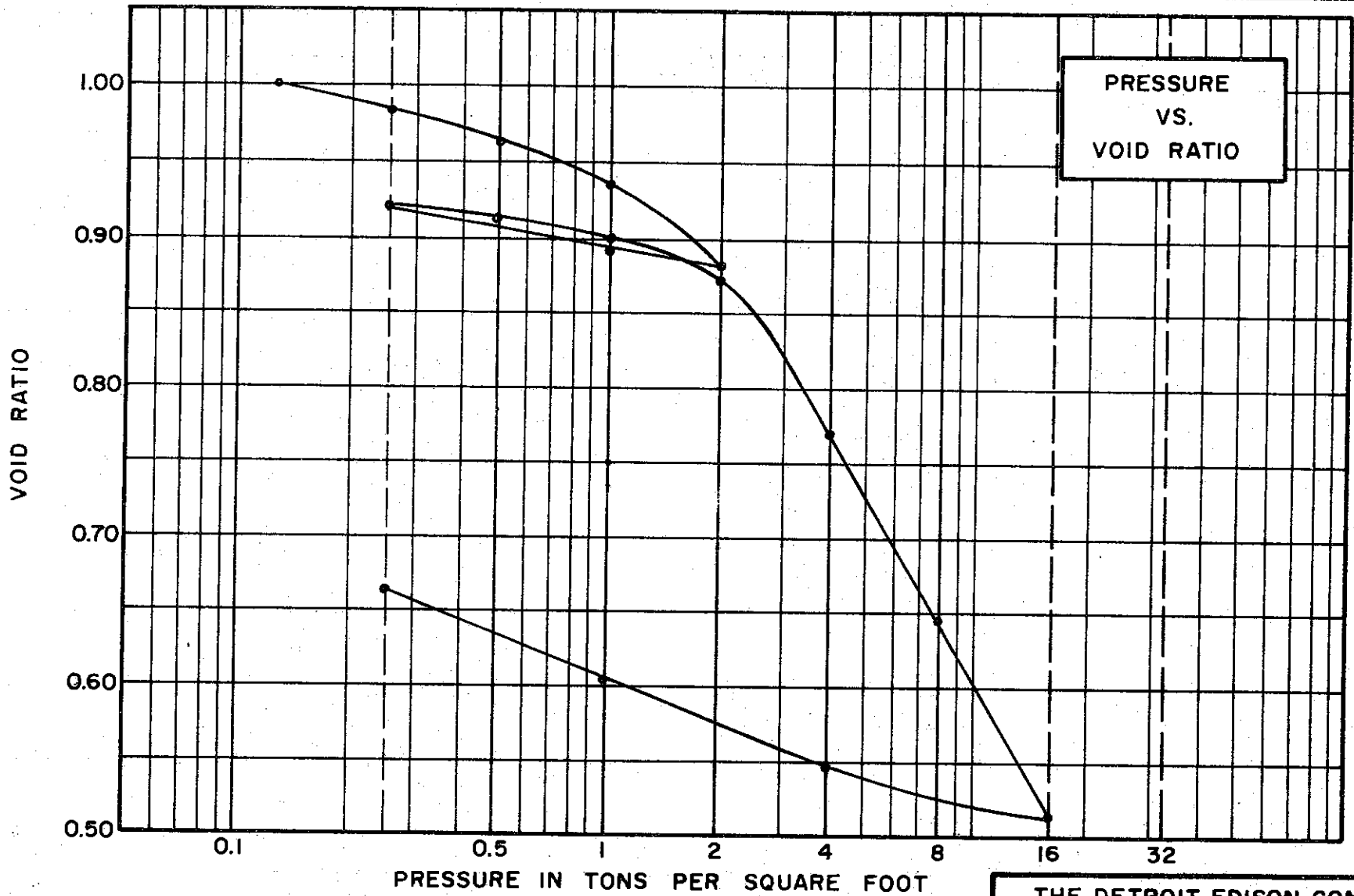
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**  
 SOIL DESCRIPTION: SILTY CLAY (CL)  
 BORING NO. 136  
 SAMPLE NO. ST 6  
 SPECIFIC GRAVITY 2.74  
 INITIAL WATER CONTENT (17.3) %  
 DEPTH 13.0' TO 14.6'  
 FINAL WATER CONTENT 21.3 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.675)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 FILE 1255



**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY  
CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.2% FINAL 30.5%

ATTERBERG LIMITS:  
LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.019

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

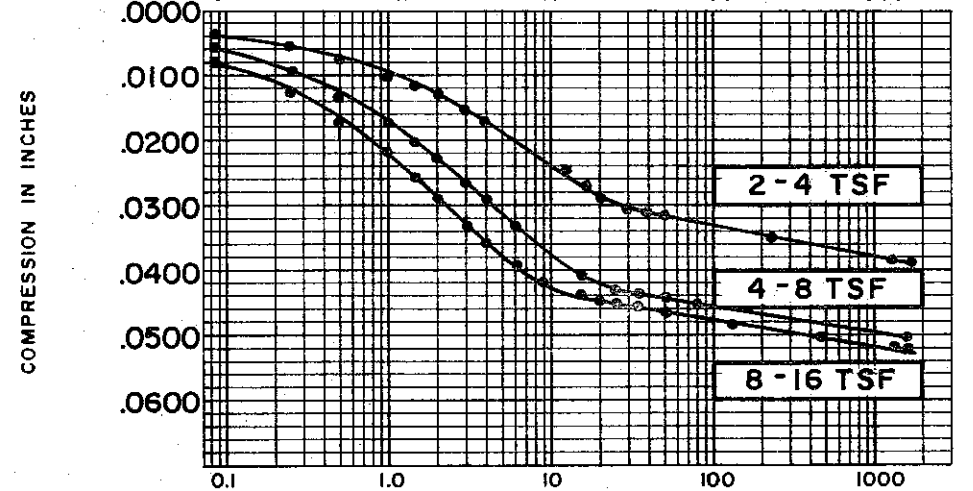
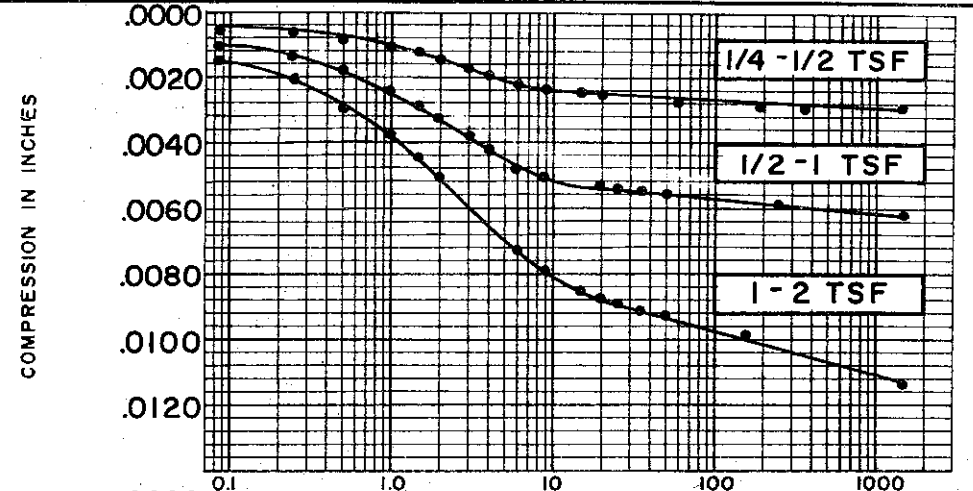
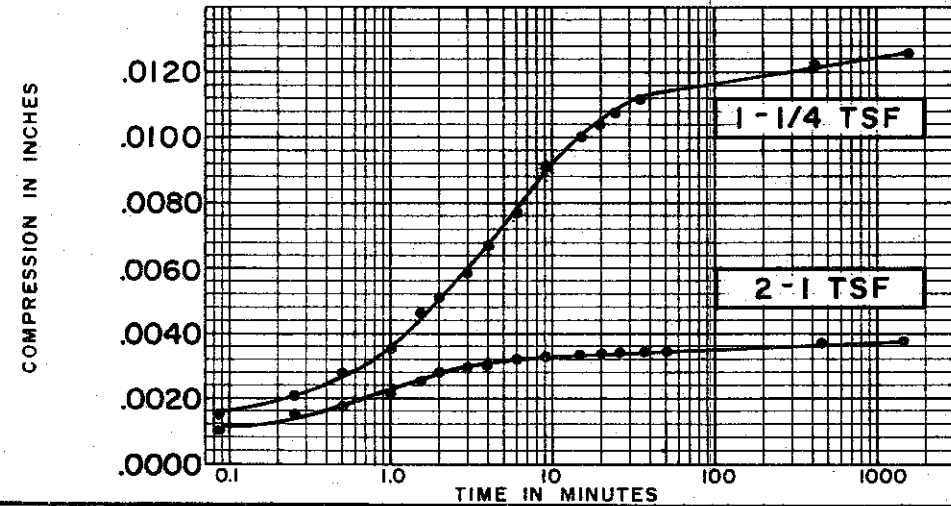
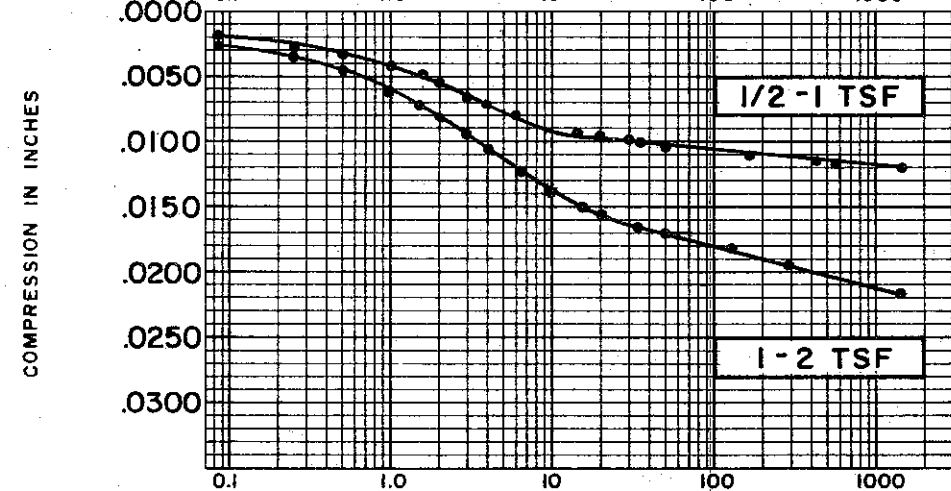
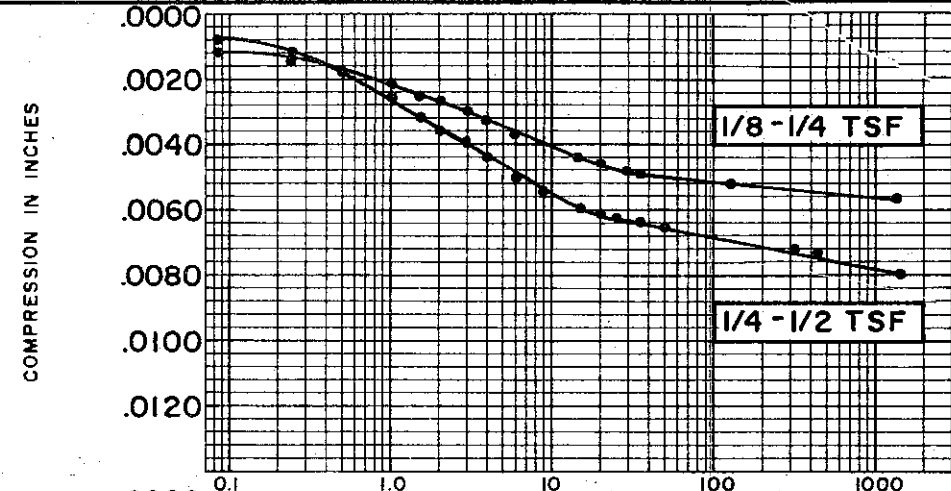
**CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE**

BORING NO. 142 TEST NO. C535.1

SAMPLE NO. 6 DATE NOV. 1974

DEPTH 20.1' TO 20.5'

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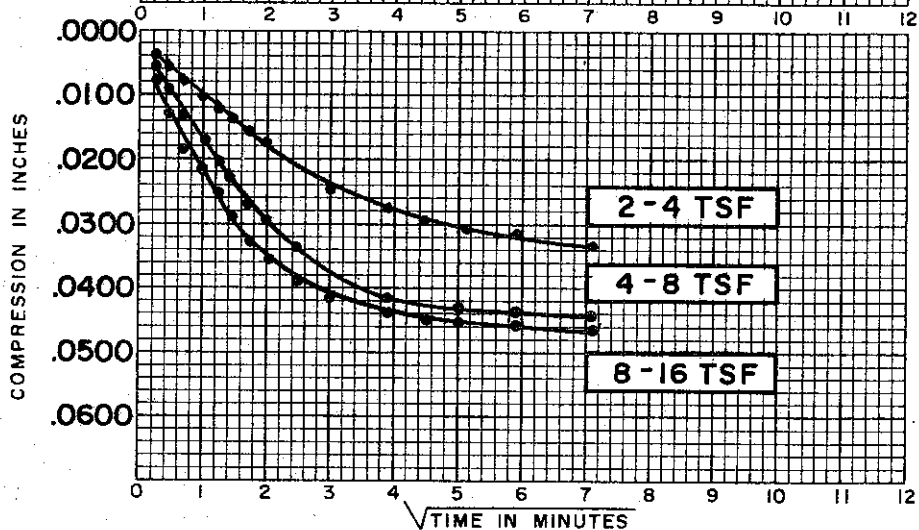
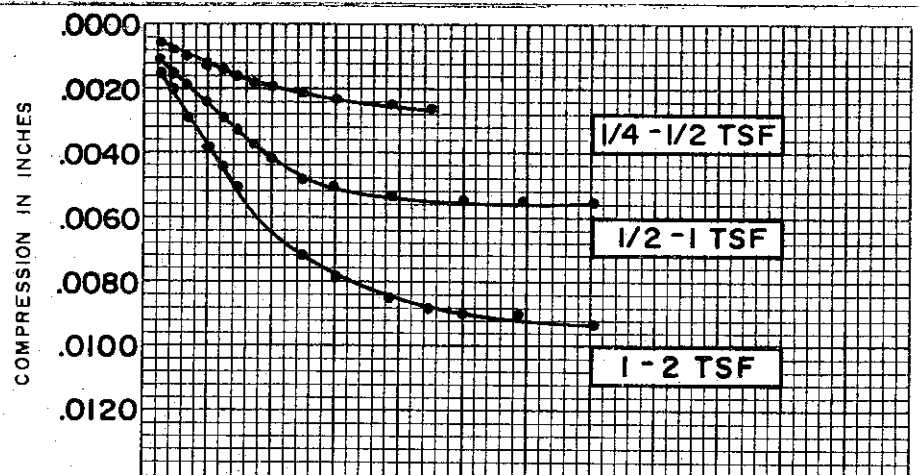
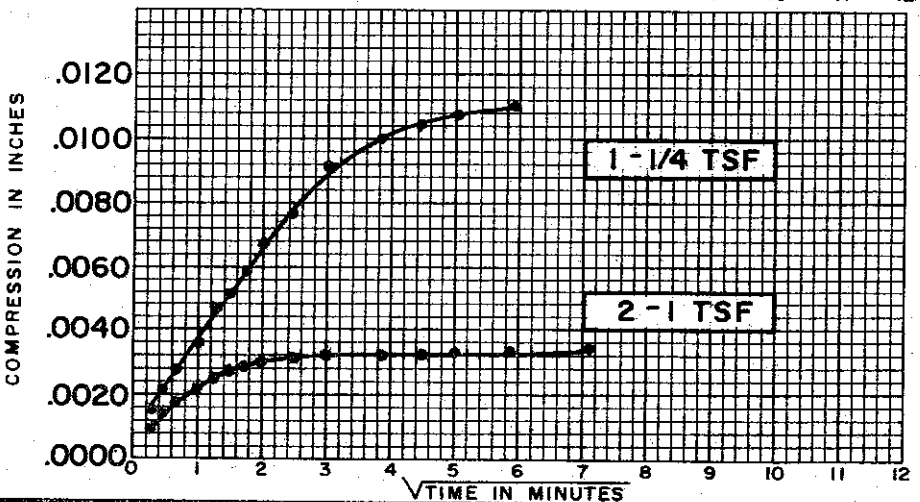
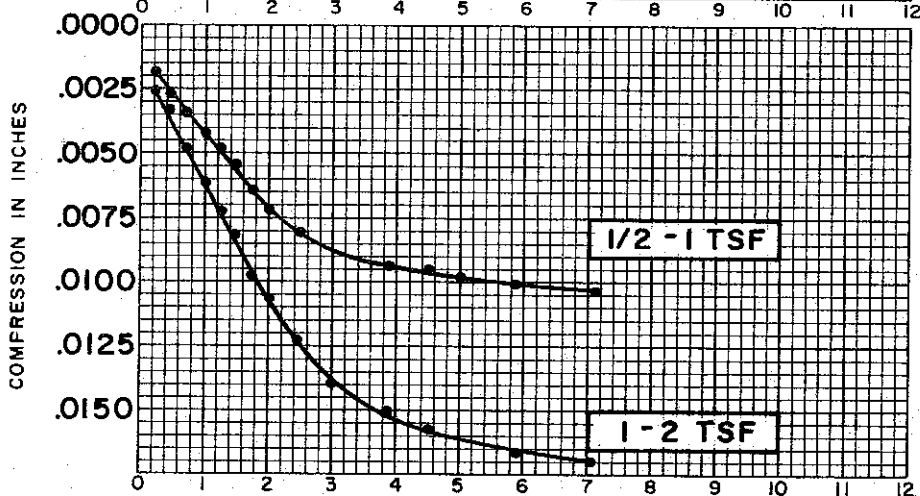
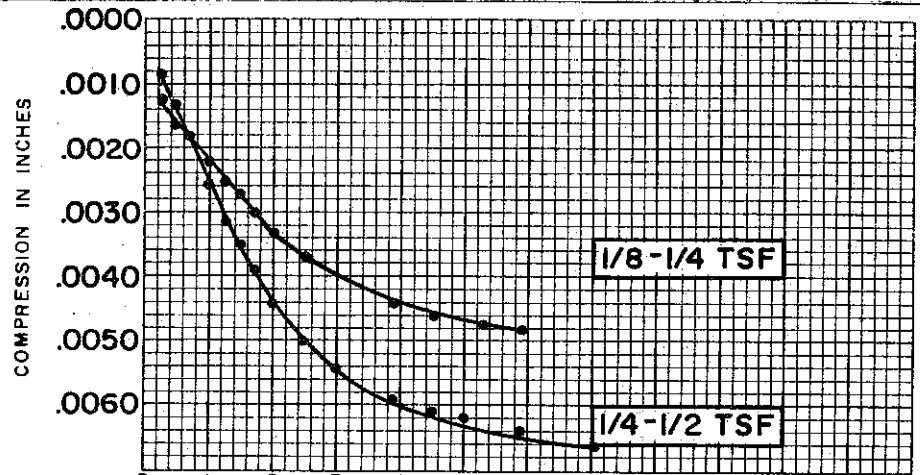


SOIL PROPERTIES		BORING NO. <u>142</u>
SOIL DESCRIPTION:	<u>SILTY CLAY (CL)</u>	SAMPLE NO. <u>6</u>
SPECIFIC GRAVITY	<u>2.70</u>	DEPTH <u>20.1' TO 20.5'</u>
INITIAL WATER CONTENT	<u>38.2%</u>	
FINAL WATER CONTENT	<u>30.5%</u>	

TEST DATA	
INITIAL SAMPLE HEIGHT	<u>0.80"</u>
INITIAL SAMPLE DIAMETER	<u>2.50"</u>
INITIAL VOID RATIO	<u>1.019</u>

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II



**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70  
 INITIAL WATER CONTENT 38.2 %  
 FINAL WATER CONTENT 30.5 %

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' TO 20.5'

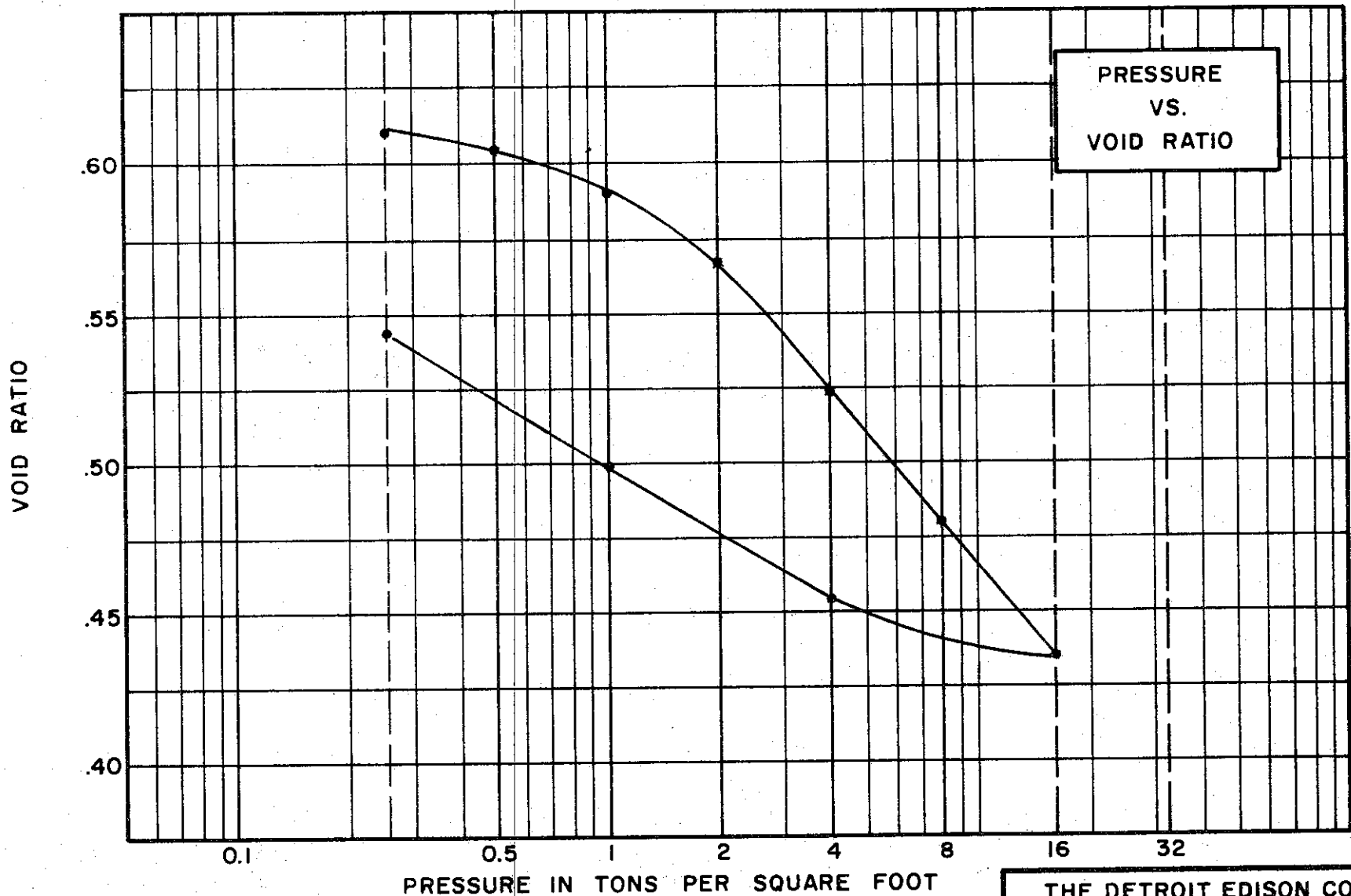
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 1.019

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 WATER CONTENT, INITIAL 5.9% FINAL 22.2%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 46% PLASTIC LIMIT 22%

**TEST DATA**

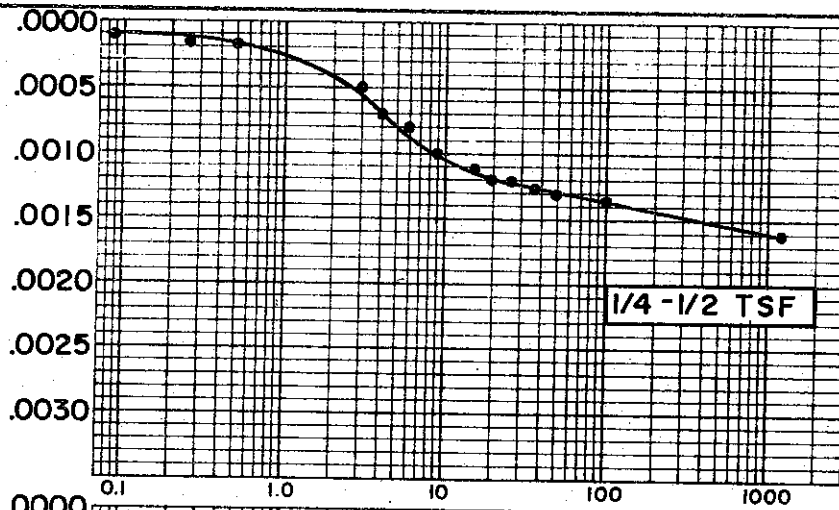
INITIAL SAMPLE HEIGHT 0.750"  
 INITIAL SAMPLE DIAMETER 2.500"  
 INITIAL HEIGHT OF SOIL SOLIDS 0.447"  
 INITIAL VOID RATIO (0.679) AS COMPACTED

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

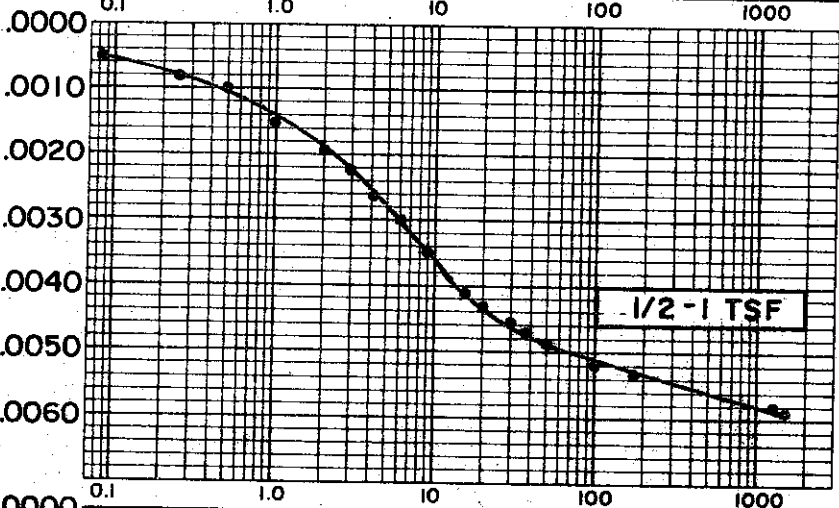
**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 146 TEST NO. C542.1  
 SAMPLE NO. 7 DATE DEC. 1974  
 DEPTH 14.0' TO 16.1'

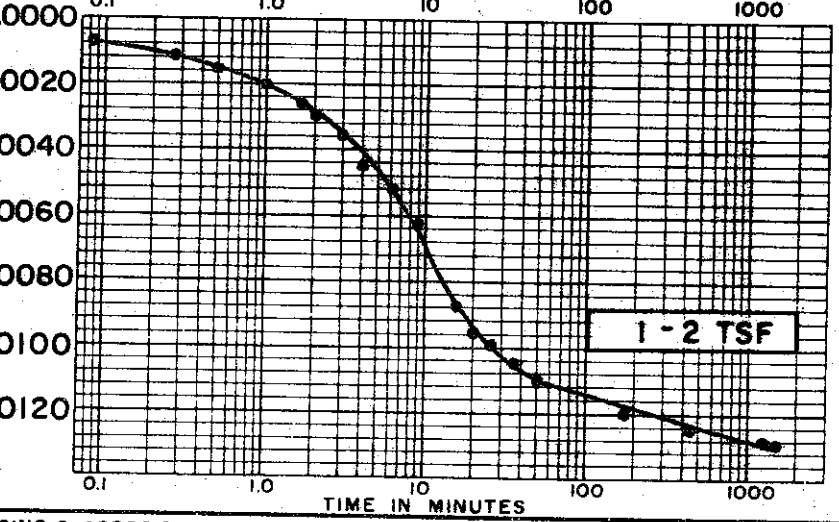
COMPRESSION IN INCHES



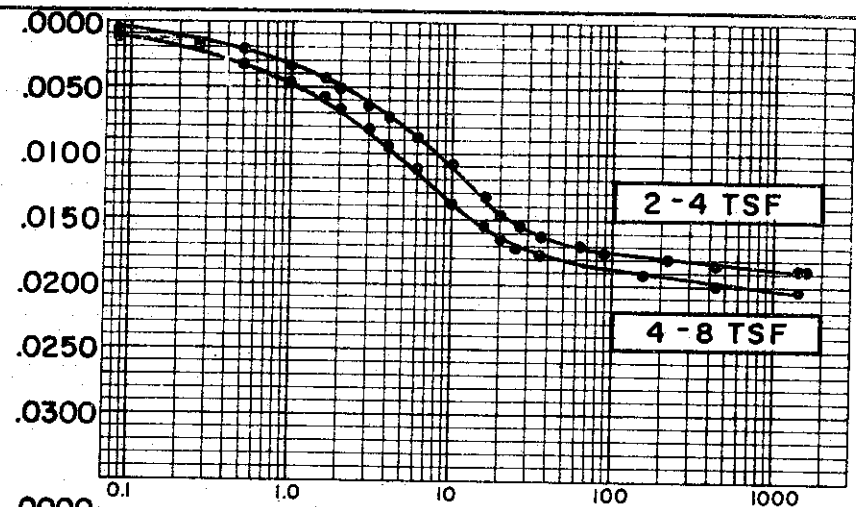
COMPRESSION IN INCHES



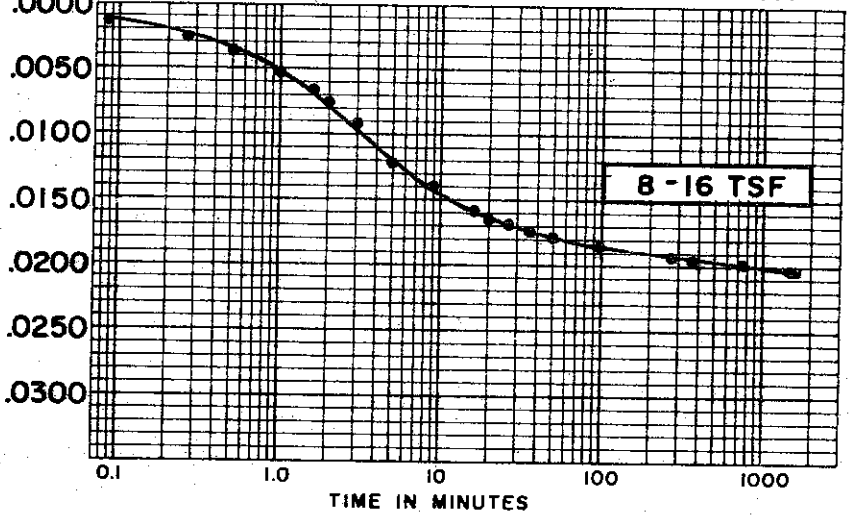
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9)%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

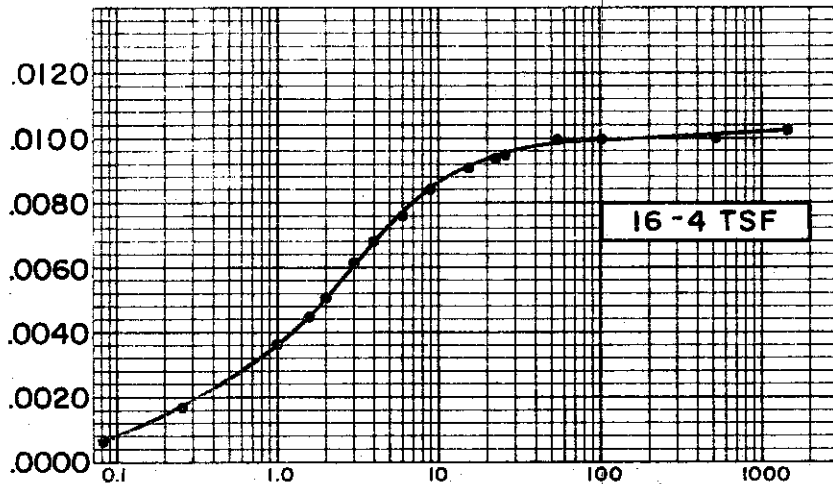
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

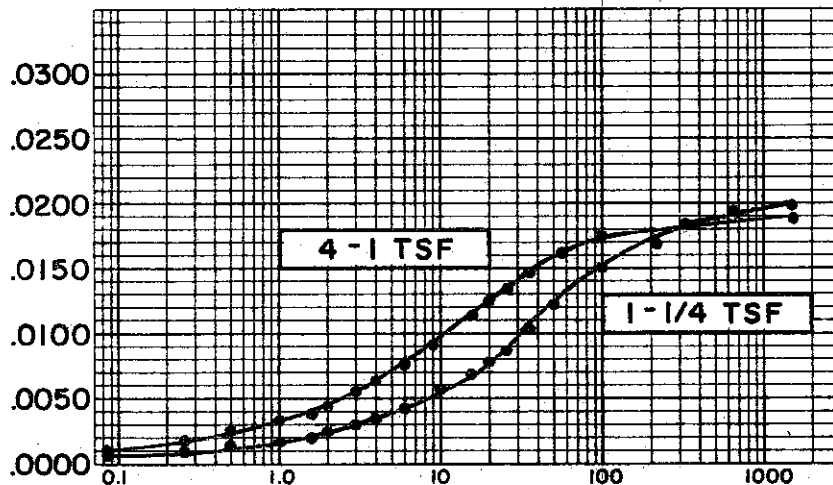
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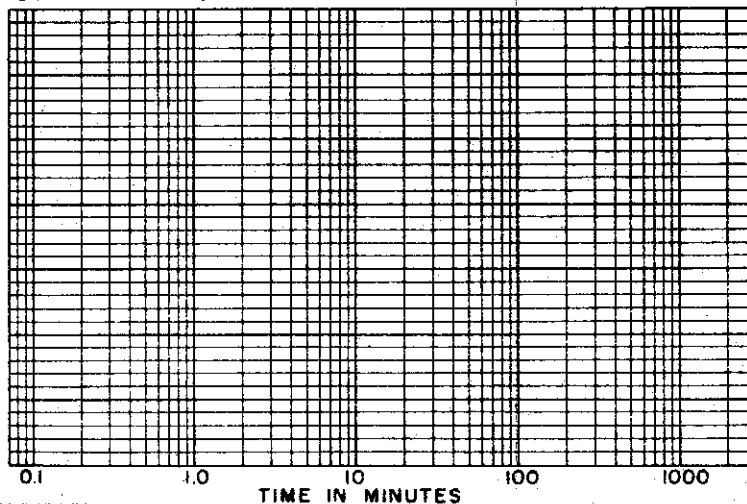
COMPRESSION IN INCHES



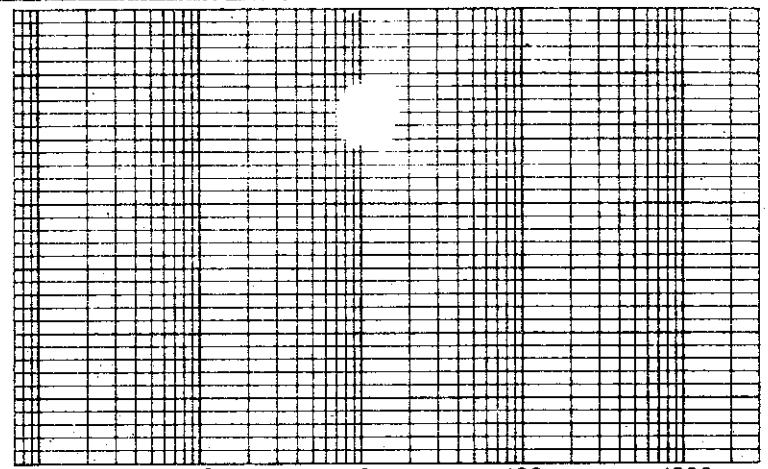
COMPRESSION IN INCHES



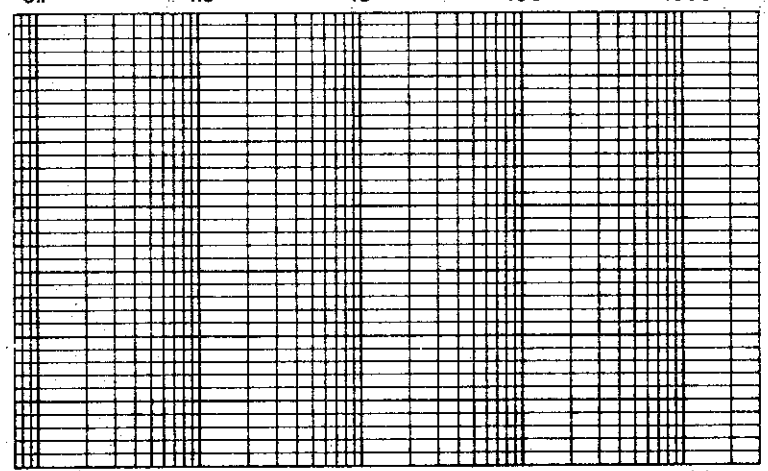
COMPRESSION IN INCHES



COMPRESSION IN INCHES



COMPRESSION IN INCHES



TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY  
CLAY (CL)  
SPECIFIC GRAVITY 2.75  
INITIAL WATER CONTENT (15.9)%  
FINAL WATER CONTENT 22.2%

BORING NO. 146  
SAMPLE NO. ST 7  
DEPTH 14.0' TO 16.1'

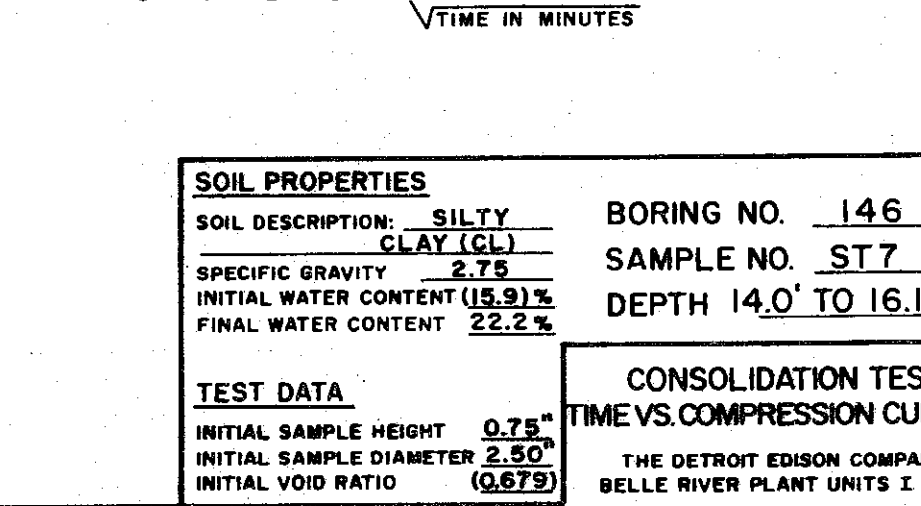
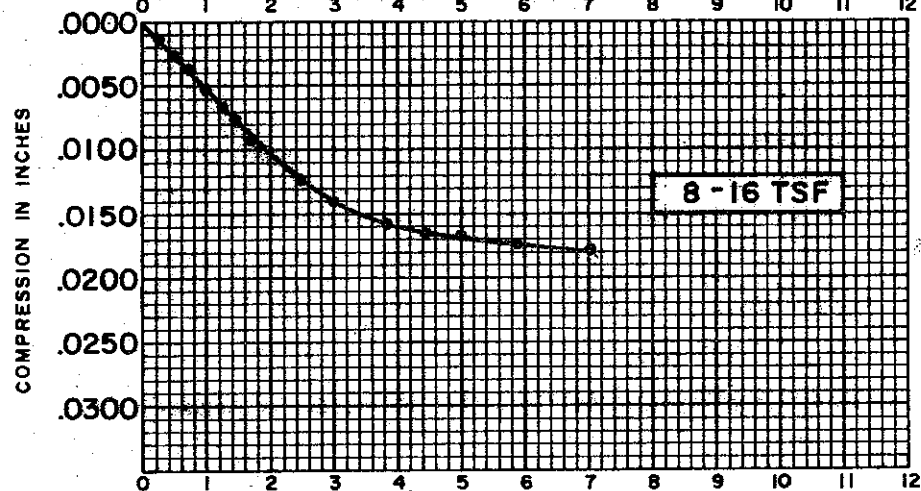
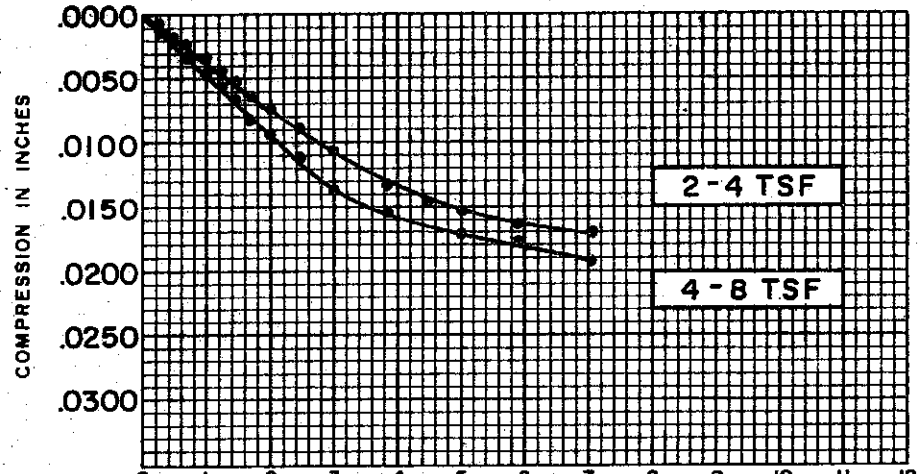
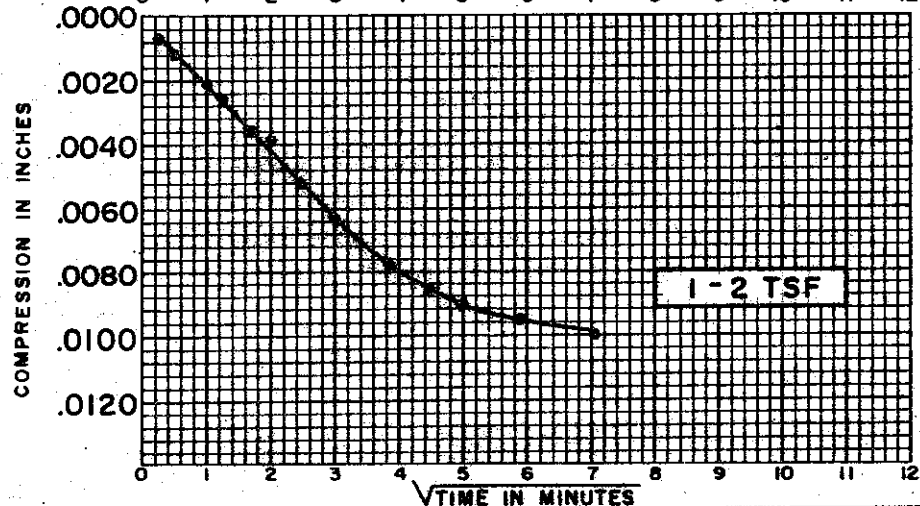
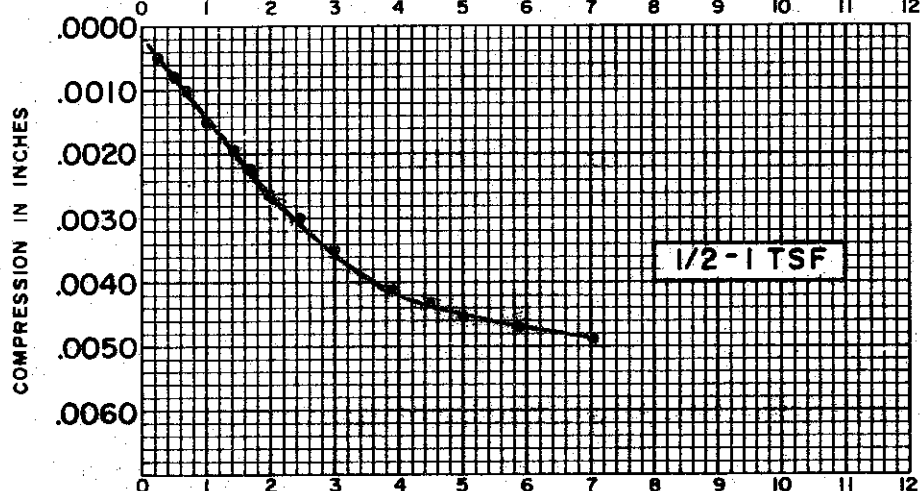
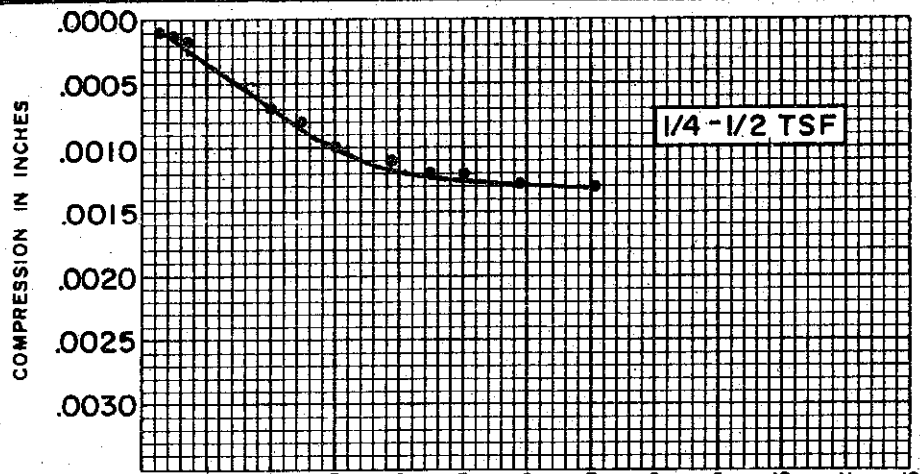
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
INITIAL SAMPLE DIAMETER 2.50"  
INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II





**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT (15.9) %  
 FINAL WATER CONTENT 22.2 %

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

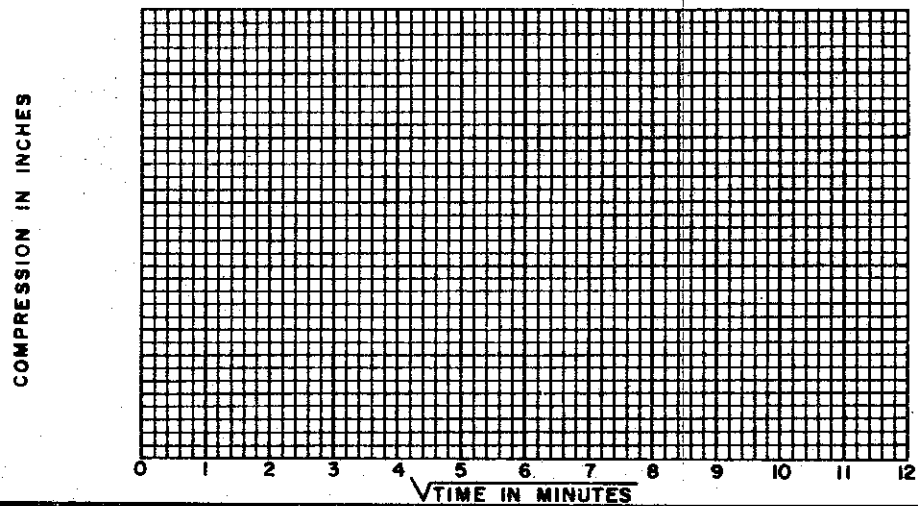
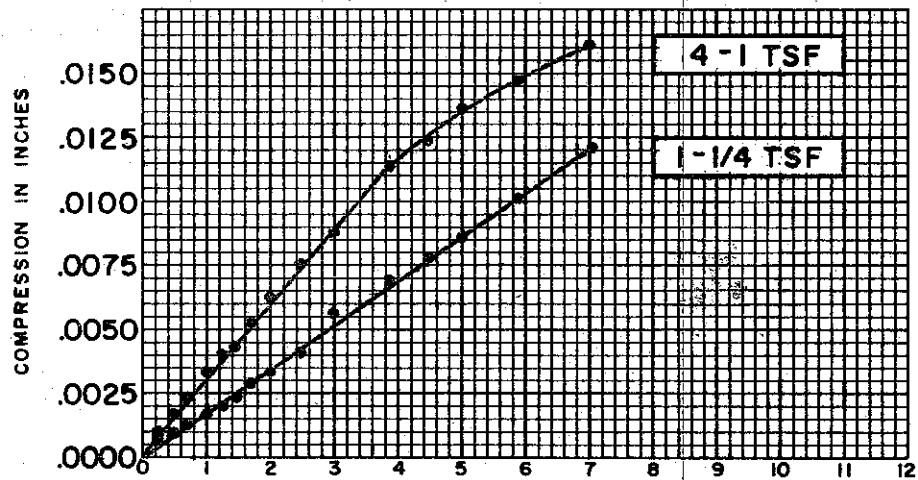
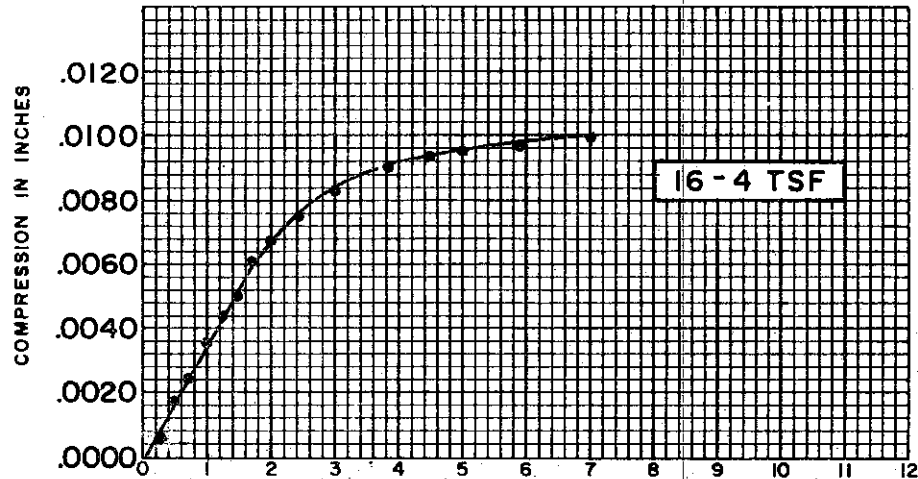
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

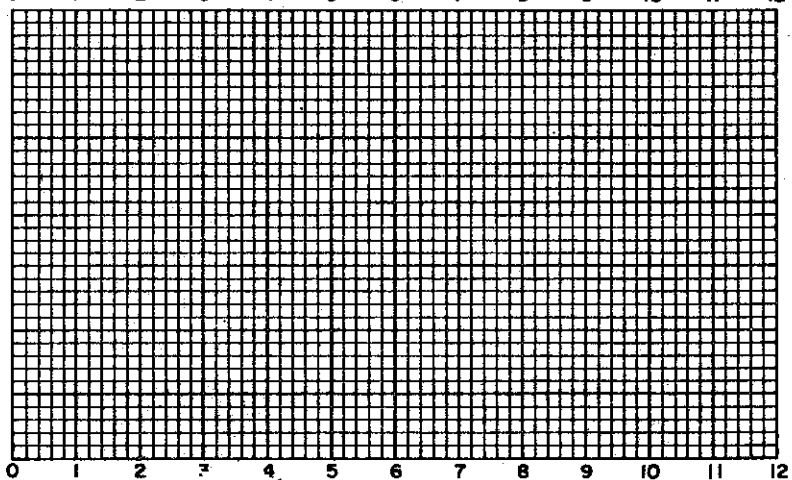
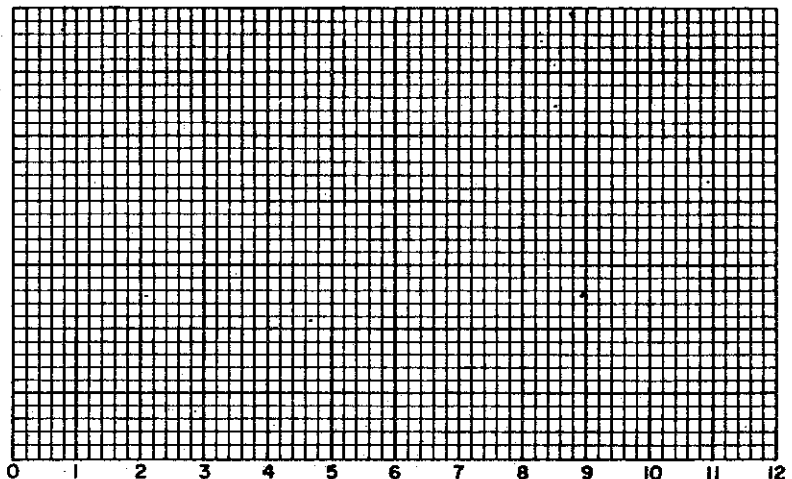
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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COMPRESSION IN INCHES

COMPRESSION IN INCHES



√TIME IN MINUTES

**SOIL PROPERTIES**

SOIL DESCRIPTION: SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.75  
 INITIAL WATER CONTENT 15.9%  
 FINAL WATER CONTENT 22.2%

BORING NO. 146  
 SAMPLE NO. ST 7  
 DEPTH 14.0' TO 16.1'

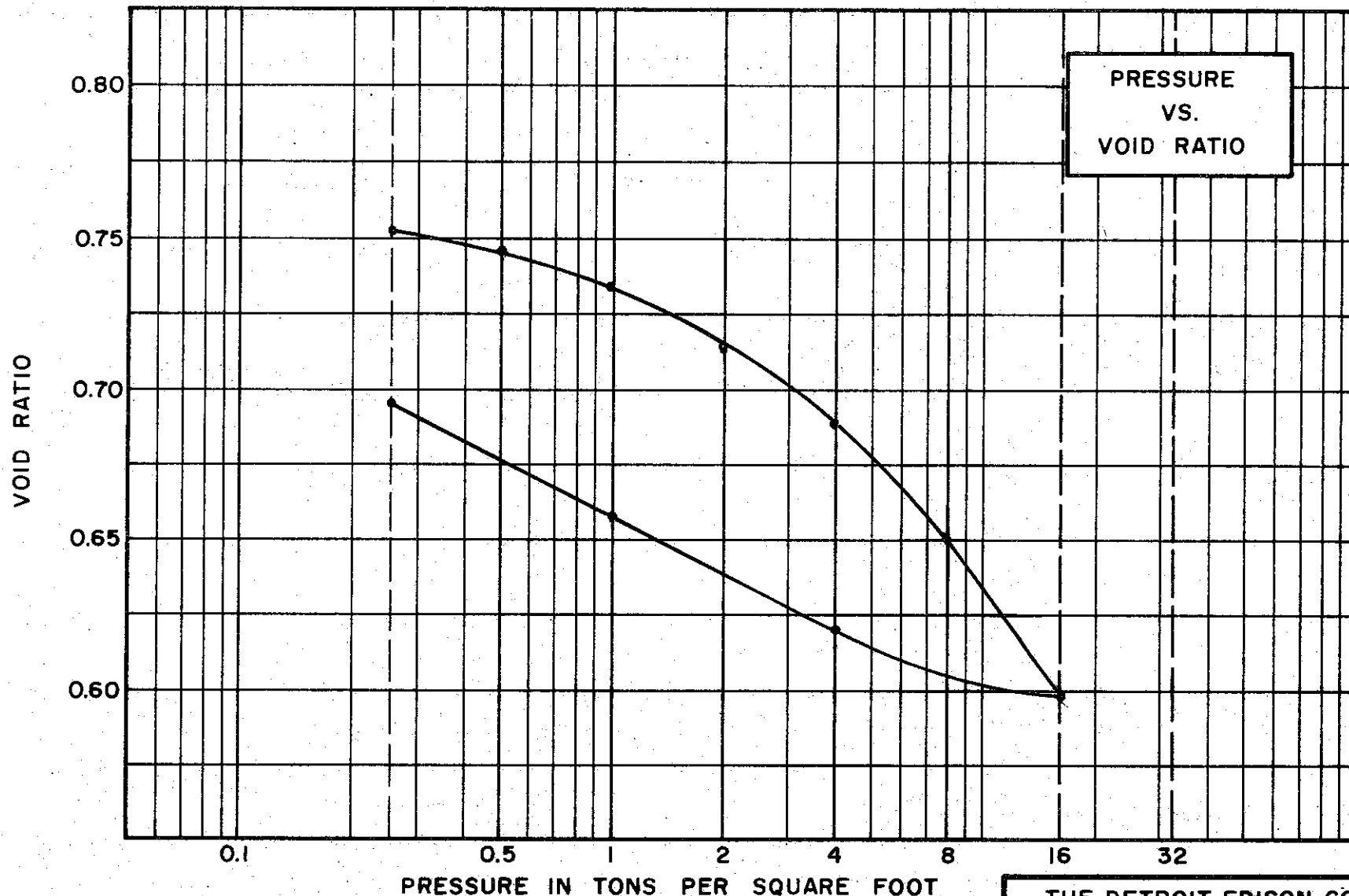
**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO (0.679)

**CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

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**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL-CH)  
 SPECIFIC GRAVITY 2.72  
 WATER CONTENT, INITIAL 29.1% FINAL 28.9%  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

**TEST DATA**

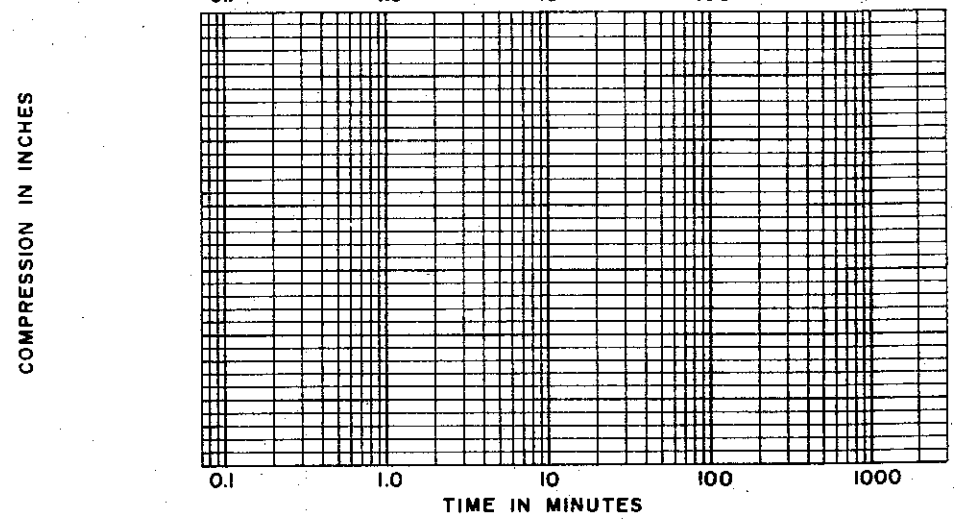
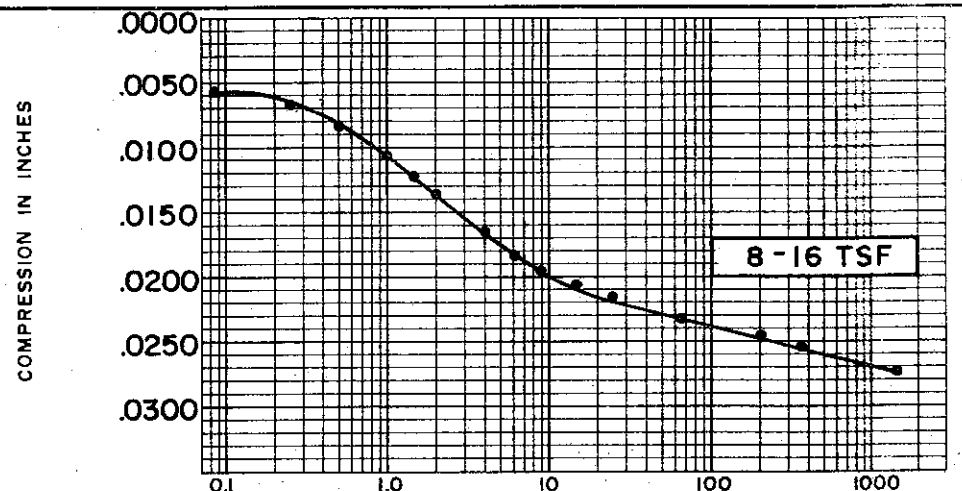
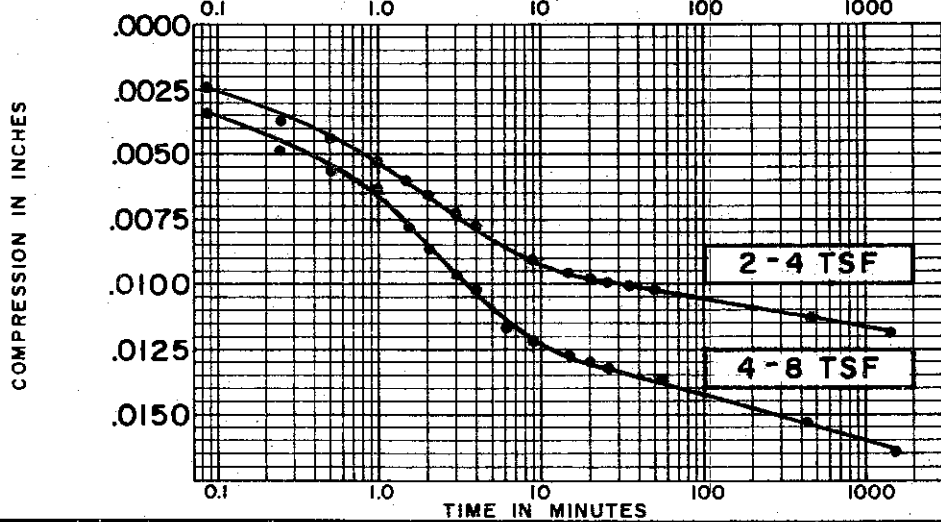
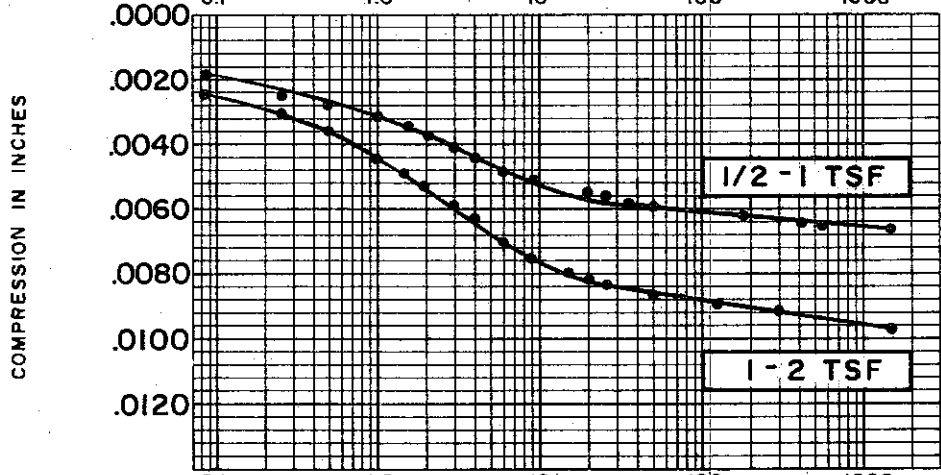
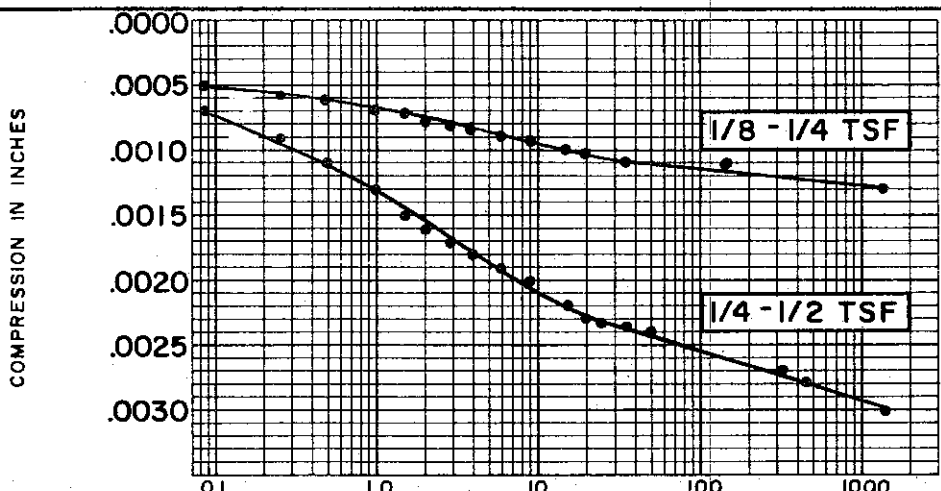
INITIAL SAMPLE HEIGHT 0.80"  
 INITIAL SAMPLE DIAMETER 2.50"  
 INITIAL VOID RATIO 0.757

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

**CONSOLIDATION TEST  
 VOID RATIO VS. LOG PRESSURE**

BORING NO. 185 TEST NO. C552.1  
 SAMPLE NO. 3 DATE NOV. 1974  
 DEPTH 7.9' TO 8.1'

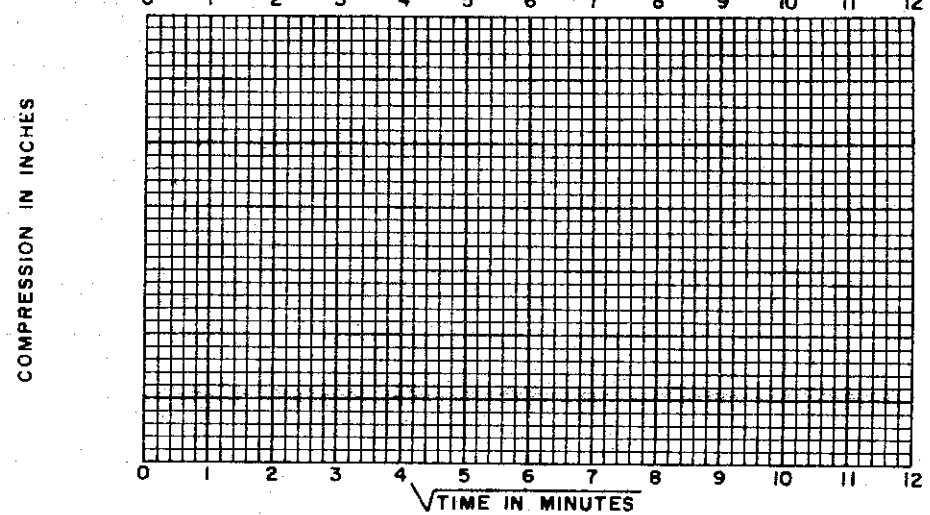
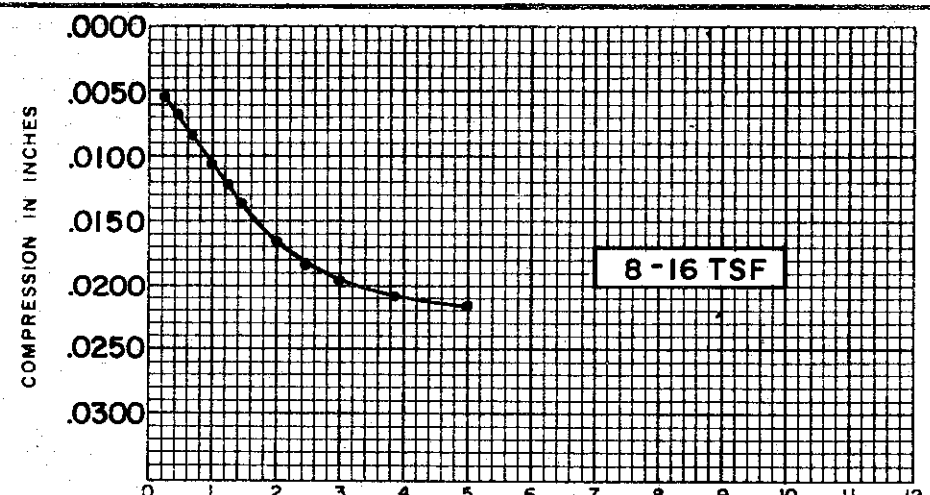
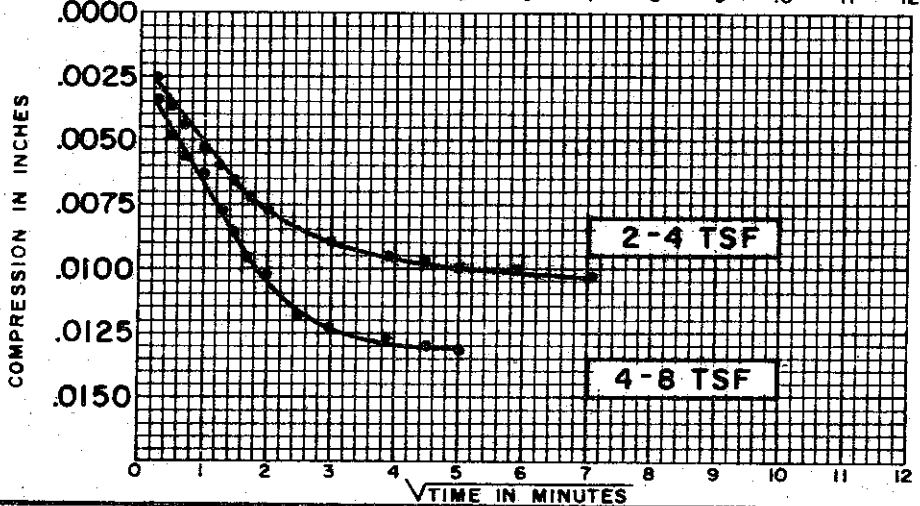
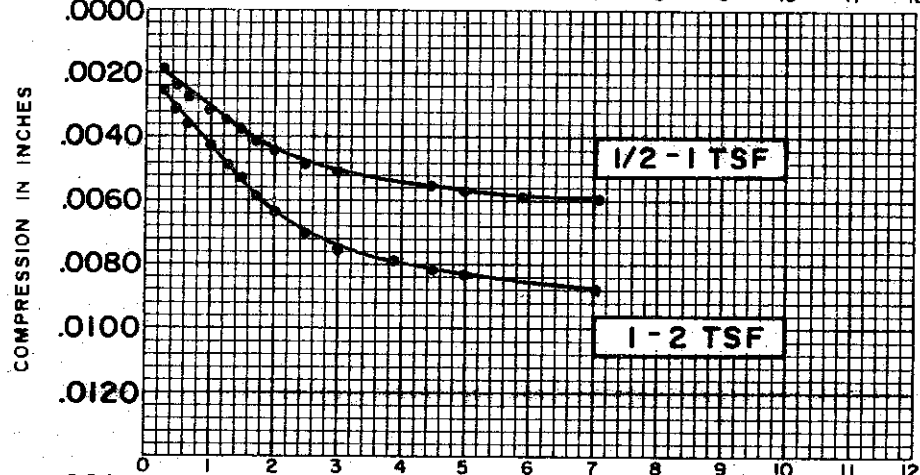
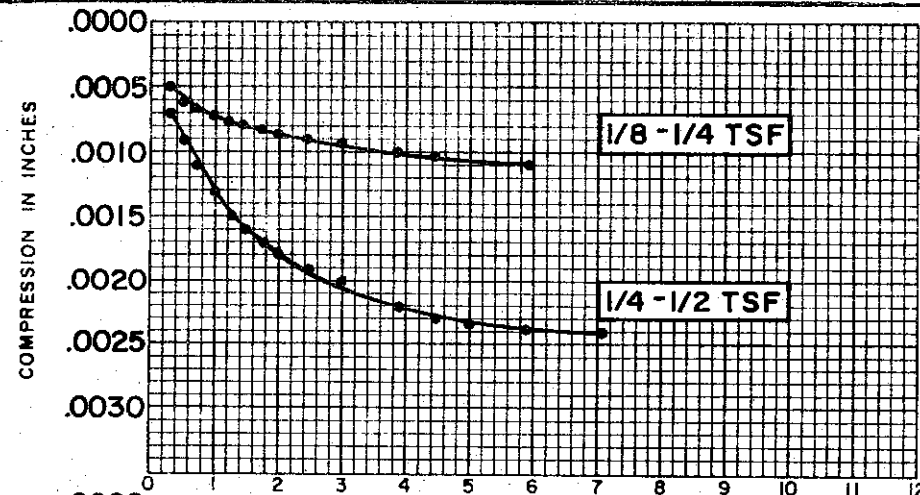
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SOIL PROPERTIES		BORING NO.	185
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	3
SPECIFIC GRAVITY	2.72	DEPTH	7.9' TO 8.1'
INITIAL WATER CONTENT	29.1 %		
FINAL WATER CONTENT	28.9 %		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.757

CONSOLIDATION TEST  
 TIME VS. COMPRESSION CURVES  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



SOIL PROPERTIES		BORING NO.	185
SOIL DESCRIPTION:	SILTY CLAY (CL-CH)	SAMPLE NO.	3
SPECIFIC GRAVITY	2.72	DEPTH	7.9' TO 8.1'
INITIAL WATER CONTENT	29.1%		
FINAL WATER CONTENT	28.9%		

TEST DATA	
INITIAL SAMPLE HEIGHT	0.80"
INITIAL SAMPLE DIAMETER	2.50"
INITIAL VOID RATIO	0.757

**CONSOLIDATION TEST  
TIME VS. COMPRESSION CURVES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-575

9-576

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	738	.11	.0012	300	.07	.0007
1/2 - 1	612	.13	.0014	180	.10	.0011
1 - 2	540	.14	.0015	138	.13	.0014
2 - 4	378	.19	.0020	78	.21	.0023
4 - 8	468	.15	.0016	108	.15	.0016
8 - 16	378	.17	.0018	108	.19	.0015
16 - 4	174	.36	.0039	60	.24	.0026
4 - 1	1164	.06	.0006	240	.07	.0007
1 - 1/4	3024	.02	.0002	900	.02	.0002

BORING NO. 38  
 SAMPLE NO. 4  
 DEPTH 14.6' to 14.7'  
 TEST NO. C18.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .770 C<sub>c</sub> .19

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/8 - 1/4	960	.08	.0009	---	---	----
1/4 - 1/2	612	.12	.0013	180	.10	.0011
1/2 - 1	468	.16	.0017	156	.11	.0012
1 - 2	378	.19	.0020	120	.13	.0014
2 - 4	288	.22	.0024	90	.17	.0018
4 - 1	135	.46	.0050	54	.27	.0029
1 - 1/4	912	.07	.0008	216	.07	.0007
1/4 - 1/2	264	.25	.0027	102	.15	.0016
1/2 - 1	438	.15	.0016	84	.18	.0019
1 - 2	173	.37	.0040	48	.31	.0033
2 - 4	135	.46	.0050	36	.40	.0043
4 - 8	216	.27	.0029	48	.28	.0030
8 - 16	192	.27	.0029	42	.29	.0031
16 - 4	138	.36	.0039	33	.34	.0037
4 - 1	576	.09	.0010	150	.08	.0009
1 - 1/4	1380	.04	.0004	450	.03	.0003

BORING NO. 38  
 SAMPLE NO. 16  
 DEPTH 74.0' to 74.1'  
 TEST NO. C24.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CH)  
 INITIAL WATER CONTENT 36.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO .935 C<sub>c</sub> .33

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	168	.11	.0012
1/2 - 1	408	.20	.0021	180	.10	.0011
1 - 1/4	1164	.07	.0007	312	.06	.0006
1/4 - 1/2	438	.18	.0019	120	.15	.0016
1/2 - 1	822	.09	.0010	180	.10	.0011
1 - 2	378	.20	.0022	132	.13	.0014
2 - 4	408	.18	.0019	120	.14	.0015
4 - 8	408	.17	.0018	102	.16	.0017
8 - 16	540	.11	.0012	120	.13	.0014
24 - 6	138	.42	.0046	45	.31	.0033
6 - 1/2	1218	.06	.0006	450	.04	.0004

BORING NO. 41  
SAMPLE NO. 5  
DEPTH 10.8' to 11.0'  
TEST NO. C29.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 29.5 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 23 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.799 C<sub>c</sub> 0.23

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	614	.12	.0013	240	.07	.0008
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	614	.11	.0012	225	.07	.0008
2 - 4	778	.08	.0009	210	.07	.0007
4 - 8	614	.09	.0010	162	.08	.0009
8 - 16	406	.12	.0013	96	.12	.0013
16 - 4	194	.24	.0026	54	.20	.0022
4 - 1	1110	.05	.0005	240	.05	.0005
1 - 1/4	3024	.02	.0002	720	.02	.0002

BORING NO. 41  
SAMPLE NO. 7  
DEPTH 21.0' to 21.1'  
TEST NO. C30.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL-CH)  
INITIAL WATER CONTENT 38.1 %  
ATTERBERG LIMITS  
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 1.055 C<sub>c</sub> 0.34

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

C-577

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	1500	.05	.0005	420	.04	.0004	DEPTH <u>53.0' to 53.2'</u>
1/2 - 1	1056	.06	.0006	300	.05	.0005	TEST NO. <u>C33.1</u>
1 - 2	738	.08	.0009	240	.06	.0006	<b>SOIL PROPERTIES</b>
2 - 4	696	.07	.0008	228	.06	.0006	SOIL DESCRIPTION: _____
4 - 8	540	.09	.0010	150	.07	.0008	<u>Silty CLAY (CL-CH)</u>
8 - 16	504	.08	.0009	108	.09	.0010	INITIAL WATER CONTENT <u>46.5 %</u>
24 - 6	378	.10	.0011	90	.10	.0011	ATTERBERG LIMITS
6 - 2	912	.05	.0005	192	.05	.0005	LIQUID LIMIT <u>52 %</u> PLASTIC LIMIT <u>25 %</u>
2 - 1/2	1500	.03	.0003	480	.02	.0002	<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.75 IN 1.905 CM.</u>
							INITIAL VOID RATIO <u>1.235</u> C <sub>c</sub> <u>0.35</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>41</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/8 - 1/4	1500	.06	.0006	360	.05	.0005	DEPTH <u>73.3'</u>
1/4 - 1/2	696	.11	.0012	240	.07	.0008	TEST NO. <u>C35.1</u>
1/2 - 1	696	.10	.0011	180	.09	.0010	<b>SOIL PROPERTIES</b>
1 - 2	468	.15	.0016	168	.10	.0011	SOIL DESCRIPTION: <u>Silty</u>
2 - 4	318	.21	.0023	120	.13	.0014	<u>CLAY, sandy (CL)</u>
4 - 1	240	.27	.0029	45	.33	.0036	INITIAL WATER CONTENT <u>26.7 %</u>
1 - 1/4	1008	.07	.0007	228	.07	.0007	ATTERBERG LIMITS
1/4 - 1/2	264	.26	.0028	60	.26	.0028	LIQUID LIMIT <u>25 %</u> PLASTIC LIMIT <u>15 %</u>
1/2 - 1	504	.13	.0014	102	.15	.0016	<b>TEST DATA</b>
1 - 2	174	.38	.0041	78	.20	.0021	INITIAL SAMPLE HEIGHT <u>0.80 IN 2.03 CM.</u>
2 - 4	216	.30	.0032	54	.28	.0030	INITIAL VOID RATIO <u>.697</u> C <sub>c</sub> <u>0.21</u>
4 - 8	348	.18	.0019	96	.15	.0016	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>
8 - 16	348	.17	.0018	72	.19	.0020	
16 - 4	138	.40	.0043	36	.35	.0038	
4 - 1	438	.13	.0014	54	.24	.0026	
1 - 1/4	2382	.03	.0003	660	.02	.0002	



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.13	.0014	210	.07	.0008
1/2 - 1	408	.17	.0018	132	.12	.0013
1 - 2	378	.18	.0019	114	.13	.0014
2 - 4	408	.16	.0017	108	.13	.0014
4 - 8	408	.15	.0016	114	.12	.0013
8 - 16	408	.14	.0015	96	.13	.0014
24 - 6	216	.24	.0026	54	.22	.0024
6 - 2	822	.07	.0007	168	.07	.0008
2 - 1/2	1686	.04	.0004	348	.04	.0004

BORING NO. 41  
SAMPLE NO. 25  
DEPTH 113'  
TEST NO. C38.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, sandy (CL)  
INITIAL WATER CONTENT 24.2 %  
ATTERBERG LIMITS  
LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.642 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	240	.33	.0036	108	.17	.0018
1/2 - 1	216	.36	.0039	120	.15	.0016
1 - 2	318	.24	.0026	90	.20	.0021
2 - 4	240	.32	.0034	108	.16	.0017
4 - 8	240	.31	.0033	108	.16	.0017
8 - 4	174	.41	.0044	54	.31	.0033
4 - 1	780	.09	.0010	276	.07	.0007
1 - 1/4	1380	.06	.0006	276	.07	.0007
1/4 - 1/2	348	.22	.0024	150	.12	.0013
1/2 - 1	540	.14	.0015	174	.10	.0011
1 - 2	780	.09	.0010	150	.11	.0012
2 - 4	654	.11	.0012	108	.16	.0017
4 - 8	468	.15	.0016	150	.16	.0012
8 - 16	378	.19	.0020	120	.13	.0014
24 - 6	540	.12	.0013	150	.10	.0011
6 - 2	960	.07	.0008	540	.03	.0003
2 - 1/2	1272	.06	.0006	960	.02	.0002

BORING NO. 41  
SAMPLE NO. 29  
DEPTH 130.9' to 131.1'  
TEST NO. C40.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Clayey SAND, gravelly (GC-SC)  
INITIAL WATER CONTENT 11.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.370 C<sub>c</sub> 0.09

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>48</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	438	.18	.0019	180	.10	.0011	DEPTH <u>39.2' to 39.4'</u>
1/2 - 1	540	.14	.0015	210	.08	.0009	TEST NO. <u>C202.1</u>
1 - 2	654	.11	.0012	156	.10	.0011	<b>SOIL PROPERTIES</b>
2 - 1/2	504	.13	.0014	114	.14	.0015	
1/2 - 1/4	1500	.05	.0005	390	.05	.0005	<u>Silty CLAY (CL-CH)</u>
1/4 - 1/2	576	.13	.0014	138	.12	.0013	INITIAL WATER CONTENT <u>38.8 %</u>
1/2 - 1	468	.15	.0016	138	.12	.0013	ATTERBERG LIMITS
1 - 2	504	.14	.0015	108	.15	.0016	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>24 %</u>
2 - 4	696	.09	.0010	300	.05	.0005	<b>TEST DATA</b>
4 - 8	654	.09	.0010	174	.08	.0009	
8 - 16	504	.10	.0011	144	.08	.0009	INITIAL VOID RATIO <u>1.027</u> C <sub>c</sub> <u>0.33</u>
16 - 2	438	.12	.0013	108	.11	.0012	
2 - 1/2	2232	.03	.0003	540	.11	.0002	
1/2 - 1/8	4440	.01	.0001	1020	.01	.0001	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>49</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	470	.17	.0018	240	.07	.0008	DEPTH <u>13.7' to 14.0'</u>
1/2 - 1	540	.14	.0015	162	.11	.0012	TEST NO. <u>C133.1</u>
1 - 1/4	738	.10	.0011	210	.08	.0009	<b>SOIL PROPERTIES</b>
1/4 - 1/2	264	.29	.0031	126	.14	.0015	
1/2 - 1	540	.14	.0015	120	.15	.0016	<u>Silty CLAY (CL-CH)</u>
1 - 2	540	.14	.0015	156	.11	.0012	INITIAL WATER CONTENT <u>33.3 %</u>
2 - 4	540	.13	.0014	156	.10	.0011	ATTERBERG LIMITS
4 - 8	504	.13	.0014	126	.12	.0013	LIQUID LIMIT <u>47 %</u> PLASTIC LIMIT <u>23 %</u>
8 - 16	318	.19	.0020	108	.13	.0014	<b>TEST DATA</b>
16 - 4	318	.18	.0019	66	.20	.0021	
4 - 1	1320	.05	.0005	330	.05	.0005	INITIAL VOID RATIO <u>0.863</u> C <sub>c</sub> <u>0.26</u>
1 - 1/4	4620	.01	.0001	1140	.01	.0001	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							SOIL PROPERTIES SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							TEST DATA INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 49 SAMPLE NO. _____ 11 DEPTH _____ 93.8' to 94.0' TEST NO. _____ C141.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	504	.13	.0014	174	.09	.0010	SOIL PROPERTIES SOIL DESCRIPTION: _____ Silty CLAY (CL)
1/2 - 1	504	.13	.0014	132	.11	.0012	INITIAL WATER CONTENT <u>28.6</u> %
1 - 2	348	.19	.0020	96	.16	.0017	ATTERBERG LIMITS
2 - 4	192	.32	.0034	57	.25	.0027	LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>22</u> %
4 - 1	264	.22	.0024	48	.29	.0031	TEST DATA
1 - 1/4	780	.07	.0008	168	.08	.0009	INITIAL SAMPLE HEIGHT <u>0.75</u> IN <u>1.905</u> CM.
1/4 - 1/2	288	.22	.0023	66	.22	.0023	INITIAL VOID RATIO <u>0.701</u> C <sub>c</sub> <u>0.20</u>
1/2 - 1	318	.20	.0021	84	.17	.0018	CONSOLIDATION TEST SUMMARY OF c <sub>v</sub> VALUES
1 - 2	264	.23	.0025	84	.17	.0018	THE DETROIT EDISON COMPANY
2 - 4	240	.25	.0027	60	.23	.0025	BELLE RIVER PLANT UNITS I & II
4 - 8	264	.22	.0023	72	.19	.0020	
8 - 16	264	.20	.0021	60	.21	.0022	
16 - 4	156	.33	.0035	39	.30	.0032	
4 - 1	738	.07	.0008	120	.10	.0011	
1 - 1/4	2016	.03	.0003	420	.03	.0003	

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____  INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ %  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/16 - 1/4	438	.18	.0019	174	.10	.0011
1/4 - 1/2	540	.14	.0015	138	.13	.0014
1/2 - 1	438	.18	.0019	84	.20	.0022
1 - 2	438	.17	.0018	84	.20	.0022
2 - 1	264	.27	.0029	60	.28	.0030
1 - 1/2	576	.13	.0014	156	.11	.0012
1/2 - 1/4	1272	.06	.0006	240	.07	.0008
1/4 - 1/2	240	.31	.0033	60	.29	.0031
1/2 - 1	468	.16	.0017	120	.14	.0015
1 - 2	408	.18	.0019	60	.28	.0030
2 - 4	960	.07	.0007	360	.05	.0005
4 - 8	698	.08	.0009	240	.06	.0006
8 - 16	612	.07	.0008	156	.07	.0007
16 - 4	288	.15	.0016	90	.11	.0012
4 - 1	2538	.02	.0002			
1 - 1/4	4338	.01	.0001			

BORING NO. _____ 50
SAMPLE NO. _____ 8
DEPTH _____ 38.5 - 38.9
TEST NO. _____ C86.1
<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ Silty CLAY (CH)  INITIAL WATER CONTENT <u>51.6</u> % ATTERBERG LIMITS LIQUID LIMIT <u>55</u> % PLASTIC LIMIT <u>23</u> %  <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.383</u> C <sub>c</sub> <u>0.55</u>

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<b>SOIL PROPERTIES</b>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTEBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/16 - 1/8	378	.21	.0023	150	.12	.0013	DEPTH _____
1/8 - 1/4	690	.11	.0012	210	.08	.0009	TEST NO. _____
1/4 - 1/2	576	.13	.0014	168	.10	.0011	<b>SOIL PROPERTIES</b>
1/2 - 1	378	.20	.0021	90	.20	.0021	SOIL DESCRIPTION: _____
1 - 2	288	.25	.0027	72	.24	.0026	Silty CLAY (CL-CH)
2 - 1	288	.25	.0027	51	.33	.0035	INITIAL WATER CONTENT <u>40.5</u> %
1 - 1/4	780	.09	.0010	144	.12	.0013	ATTEBERG LIMITS
1/4 - 1/2	348	.21	.0023	114	.15	.0016	LIQUID LIMIT <u>49</u> % PLASTIC LIMIT <u>20</u> %
1/2 - 1	504	.15	.0016	108	.16	.0017	<b>TEST DATA</b>
1 - 2	378	.19	.0020	60	.28	.0030	INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
2 - 4	648	.10	.0011	156	.10	.0011	INITIAL VOID RATIO <u>1.013</u> C <sub>c</sub> <u>0.45</u>
4 - 8	540	.11	.0012	156	.08	.0009	
8 - 16	624	.07	.0008	120	.09	.0010	
16 - 4	318	.15	.0016	84	.13	.0014	
4 - 1	1164	.05	.0005	312	.04	.0004	
1 - 1/4	3744	.02	.0002	840	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	504	.16	.0017	72	.25	.0027
1/2 - 1	438	.18	.0019	114	.16	.0017
1 - 2	288	.26	.0028	43	.40	.0043
2 - 4	240	.29	.0031	60	.27	.0029
4 - 8	264	.24	.0026	45	.33	.0035
8 - 16	240	.23	.0025	36	.35	.0038
16 - 4	138	.38	.0041	18	.68	.0073
4 - 1	654	.08	.0009	144	.09	.0010
1 - 1/4	2616	.02	.0002	600	.02	.0002

BORING NO. 53

SAMPLE NO. 5

DEPTH 39.5'-39.8'

TEST NO. C98.1

**SOIL PROPERTIES**

SOIL DESCRIPTION: Silty CLAY, Sandy (CL)

INITIAL WATER CONTENT 30.9%

ATTERBERG LIMITS

LIQUID LIMIT 39% PLASTIC LIMIT 20%

**TEST DATA**

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO .872 C<sub>c</sub> 0.35

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_

SAMPLE NO. \_\_\_\_\_

DEPTH \_\_\_\_\_

TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**

SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_%

ATTERBERG LIMITS

LIQUID LIMIT \_\_\_\_\_% PLASTIC LIMIT \_\_\_\_\_%

**TEST DATA**

INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.

INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>54</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	216	.08	.0009	DEPTH <u>63.5' - 63.8'</u>
1/2 - 1	438	.18	.0019	216	.08	.0009	TEST NO. <u>C399.1</u>
1 - 2	540	.14	.0015	132	.13	.0014	<b>SOIL PROPERTIES</b>
2 - 4	438	.16	.0017	114	.14	.0015	SOIL DESCRIPTION: _____
4 - 8	408	.16	.0017	84	.18	.0019	<u>Silty CLAY, sandy (CL)</u>
8 - 16	348	.18	.0019	84	.17	.0018	INITIAL WATER CONTENT <u>26.0</u> %
16 - 4	348	.17	.0018	27			ATTERBERG LIMITS
4 - 1	1008	.06	.0006	144	.10	.0011	LIQUID LIMIT <u>36</u> % PLASTIC LIMIT <u>18</u> %
1 - 1/4	2304	.03	.0003	540	.03	.0003	<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.
							INITIAL VOID RATIO <u>0.696</u> C <sub>c</sub> <u>0.24</u>

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<b>SOIL PROPERTIES</b>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTERBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<b>TEST DATA</b>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	540	.15	.0016	156	.12	.0013
1/2 - 1	540	.14	.0015	102	.18	.0019
1 - 2	408	.19	.0020	96	.18	.0019
2 - 4	348	.20	.0022	108	.15	.0016
4 - 8	438	.14	.0015	120	.12	.0013
8 - 16	318	.17	.0018	96	.13	.0014
16 - 4	216	.23	.0025	45	.26	.0028
4 - 1	576	.09	.0010	240	.06	.0006
1 - 1/4	2160	.03	.0003	570	.03	.0003

BORING NO. 54  
 SAMPLE NO. 8  
 DEPTH 73.7' - 74.0'  
 TEST NO. C401.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 INITIAL WATER CONTENT 38.3 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.982 C<sub>c</sub> 0.41

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	348	.23	.0025	114	.16	.0017	DEPTH <u>9.8' to 10.0'</u>
1/2 - 1	654	.12	.0013	216	.08	.0009	TEST NO. <u>C42.1</u>
1 - 1/4	1560	.05	.0005	330	.06	.0006	<b>SOIL PROPERTIES</b>
1/4 - 1/2	318	.24	.0026	180	.10	.0011	
1/2 - 1	774	.10	.0011	270	.07	.0007	<u>Silty CLAY (CL-CH)</u>
1 - 2	468	.16	.0017	180	.09	.0010	INITIAL WATER CONTENT <u>30.0%</u>
2 - 4	576	.12	.0013	168	.10	.0011	ATTERBERG LIMITS
4 - 8	540	.12	.0013	156	.10	.0011	LIQUID LIMIT <u>53%</u> PLASTIC LIMIT <u>26%</u>
8 - 16	318	.20	.0021	132	.11	.0012	<b>TEST DATA</b>
24 - 6	318	.18	.0019	72	.19	.0020	
6 - 2	1218	.05	.0005	420	.04	.0004	INITIAL VOID RATIO <u>0.787</u> C <sub>c</sub> <u>0.23</u>
2 - 1/2	3378	.02	.0002	960	.02	.0002	

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. <u>60</u>
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	240	.33	.0035	90	.20	.0022	DEPTH <u>85.2' to 85.4'</u>
1/2 - 1	240	.33	.0035	78	.23	.0025	TEST NO. <u>C56.1</u>
1 - 2	192	.39	.0042	54	.33	.0035	<b>SOIL PROPERTIES</b>
2 - 4	264	.28	.0030	72	.23	.0025	
4 - 8	264	.26	.0028	84	.19	.0020	<u>Silty CLAY (CL)</u>
8 - 16	348	.18	.0019	84	.17	.0018	INITIAL WATER CONTENT <u>27.9%</u>
16 - 4	156	.37	.0040	51	.26	.0028	ATTERBERG LIMITS
4 - 1	864	.07	.0008	210	.07	.0007	LIQUID LIMIT <u>40%</u> PLASTIC LIMIT <u>19%</u>
1 - 1/4	2400	.03	.0003	450	.04	.0004	<b>TEST DATA</b>
							INITIAL VOID RATIO <u>0.744</u> C <sub>c</sub> <u>0.27</u>

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							INITIAL WATER CONTENT _____ %			
							ATTERBERG LIMITS			
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.			
							INITIAL VOID RATIO _____ C <sub>c</sub> _____			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	408	.20	.0021	138	.14	.0014	105	8	70.9 - 71.2	C380.1
1/2 - 1	318	.24	.0026	96	.19	.0020				
1 - 2	318	.24	.0026	102	.17	.0018				
2 - 4	408	.18	.0019	90	.19	.0020				
4 - 8	438	.16	.0017	114	.14	.0015				
8 - 16	318	.20	.0021	96	.15	.0016				
16 - 4	318	.20	.0021	72	.20	.0021				
4 - 1	774	.08	.0008	180	.09	.0009				
1 - 1/4	2454	.03	.0003	480	.03	.0003				
							<b>SOIL PROPERTIES</b>			
							SOIL DESCRIPTION: _____			
							Silty CLAY (CL)			
							INITIAL WATER CONTENT <u>23.7</u> %			
							ATTERBERG LIMITS			
							LIQUID LIMIT <u>37</u> % PLASTIC LIMIT <u>19</u> %			
							<b>TEST DATA</b>			
							INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM.			
							INITIAL VOID RATIO <u>0.625</u> C <sub>c</sub> <u>0.21</u>			
							<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b> THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II			

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							DEPTH _____
							TEST NO. _____
							<u>SOIL PROPERTIES</u>
							SOIL DESCRIPTION: _____
							INITIAL WATER CONTENT _____ %
							ATTERBERG LIMITS
							LIQUID LIMIT _____ % PLASTIC LIMIT _____ %
							<u>TEST DATA</u>
							INITIAL SAMPLE HEIGHT _____ IN _____ CM.
							INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
1/4 - 1/2	540	.15	.0016	156	.13	.0013	DEPTH 38.9' - 39.3'
1/2 - 1	378	.21	.0022	108	.17	.0018	TEST NO. _____ C256.1
1 - 2	264	.28	.0030	84	.21	.0022	<u>SOIL PROPERTIES</u>
2 - 1/2	264	.28	.0030	72	.24	.0026	SOIL DESCRIPTION: _____
1/2 - 1/4	468	.16	.0017	132	.13	.0014	Silty CLAY (CL)
1/4 - 1/2	240	.31	.0034	78	.22	.0024	INITIAL WATER CONTENT 36.9 %
1/2 - 1	318	.24	.0025	72	.24	.0026	ATTERBERG LIMITS
1 - 2	174	.42	.0045	45	.38	.0041	LIQUID LIMIT 41 % PLASTIC LIMIT 22 %
2 - 4	576	.12	.0013	192	.09	.0009	<u>TEST DATA</u>
4 - 8	654	.10	.0010	138	.11	.0011	INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
8 - 16	378	.14	.0014	102	.12	.0013	INITIAL VOID RATIO 0.969 C <sub>c</sub> 0.39
16 - 4	102	.51	.0053	42	.28	.0030	
4 - 1	816	.07	.0007	240	.05	.0005	
1 - 1/4	2856	.02	.0002	780	.02	.0002	

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_

INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ 118	SAMPLE NO. _____ 9	DEPTH _____ 78.7' - 79.0'	TEST NO. _____ C260.1
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				
1/4 - 1/2	540	.15	.0016	186	.11	.0011				
1/2 - 1	540	.15	.0016	138	.13	.0014				
1 - 2	378	.20	.0022	114	.16	.0017				
2 - 4	348	.21	.0023	96	.18	.0019				
4 - 1	318	.22	.0025	72	.23	.0025				
1 - 1/4	1008	.08	.0008	288	.06	.0006				
1/4 - 1/2	240	.31	.0034	78	.22	.0024				
1/2 - 1	288	.26	.0028	84	.21	.0022				
1 - 2	408	.19	.0020	108	.16	.0017				
2 - 4	264	.28	.0030	66	.25	.0027				
4 - 8	264	.26	.0028	90	.18	.0019				
8 - 16	348	.20	.0022	96	.17	.0017				
16 - 4	216	.28	.0031	48	.30	.0032				
4 - 1	738	.09	.0009	228	.07	.0007				
1 - 1/4	3198	.02	.0002	630	.03	.0003				

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
Silty CLAY (CL)

INITIAL WATER CONTENT 27.8%  
ATTERBERG LIMITS  
LIQUID LIMIT 42% PLASTIC LIMIT 23%

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
INITIAL VOID RATIO 0.741 C<sub>c</sub> 0.24

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							<b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ INITIAL WATER CONTENT _____ % ATTERBERG LIMITS LIQUID LIMIT _____ % PLASTIC LIMIT _____ % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT _____ IN _____ CM. INITIAL VOID RATIO _____ C <sub>c</sub> _____

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____ SAMPLE NO. _____ DEPTH _____ TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	
							BORING NO. _____ 129 SAMPLE NO. _____ 9 DEPTH _____ 39.1' - 39.3' TEST NO. _____ C389 <b>SOIL PROPERTIES</b> SOIL DESCRIPTION: _____ <u>Silty CLAY (CL)</u> INITIAL WATER CONTENT <u>40.2</u> % ATTERBERG LIMITS LIQUID LIMIT <u>41</u> % PLASTIC LIMIT <u>22</u> % <b>TEST DATA</b> INITIAL SAMPLE HEIGHT <u>0.80</u> IN <u>2.03</u> CM. INITIAL VOID RATIO <u>1.083</u> C <sub>c</sub> <u>0.39</u>
1/4 - 1/2	540	.14	.0015	180	.11	.0011	<b>CONSOLIDATION TEST SUMMARY OF c<sub>v</sub> VALUES</b>  THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II
1/2 - 1	468	.16	.0017	156	.12	.0012	
1 - 2	780	.10	.0010	216	.08	.0008	
2 - 1/2	438	.16	.0017	96	.17	.0018	
1/2 - 1/4	1110	.07	.0007	270	.07	.0007	
1/4 - 1/2	540	.13	.0014	144	.12	.0012	
1/2 - 1	318	.22	.0024	102	.16	.0017	
1 - 2	264	.26	.0028	78	.20	.0022	
2 - 4	738	.09	.0009	186	.08	.0008	
4 - 8	738	.08	.0008	168	.08	.0008	
8 - 16	540	.10	.0010	132	.09	.0009	
16 - 4	288	.17	.0018	72	.15	.0016	
4 - 1	1056	.05	.0005	264	.05	.0005	
1 - 1/4	2779	.02	.0002	840	.01	.0001	

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD			BORING NO. _____	SAMPLE NO. _____	DEPTH _____	TEST NO. _____
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.				

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	348	.22	.0024	108	.17	.0018
1/2 - 1	378	.20	.0022	120	.15	.0016
1 - 2	318	.23	.0026	96	.19	.0020
2 - 4	438	.17	.0018	96	.18	.0019
4 - 1	288	.24	.0027	51	.32	.0035
1 - 1/4	540	.14	.0015	192	.09	.0009
1/4 - 1/2	288	.26	.0028	78	.22	.0024
1/2 - 1	432	.17	.0018	96	.22	.0024
1 - 2	240	.30	.0033	72	.23	.0025
2 - 4	240	.29	.0032	60	.28	.0030
4 - 8	438	.16	.0016	90	.18	.0019
8 - 16	288	.21	.0023	78	.19	.0020
16 - 4	120	.48	.0053	30	.47	.0050
4 - 1	780	.09	.0009	186	.08	.0008
1 - 1/4	2265	.02	.0002	480	.03	.0003

BORING NO. 129  
 SAMPLE NO. 21  
 DEPTH 103.7 - 104.0  
 TEST NO. C395.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY, Sandy (CL)  
 INITIAL WATER CONTENT 28.0 %  
 ATTERBERG LIMITS  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.730 C<sub>c</sub> .23

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4 - 1/2	135		.0052	72		.0023
1/2 - 1	317		.0022	102		.0016
1 - 2	1009		.0007	348		.0005
2 - 4	913		.0007	270		.0006
4 - 8	738		.0008	216		.0007
8 - 16	778		.0007	180		.0007
16 - 4	346		.0016	66		.0020
4 - 1	960		.0006	330		.0004
1 - 1/4	4338		.0001	1440		.0001

BORING NO. 136  
SAMPLE NO. ST6  
DEPTH 13.0' to 16.0'  
TEST NO. C527.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 17.3 %  
ATTERBERG LIMITS  
LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 3.28 IN 8.33 CM.  
INITIAL VOID RATIO (0.675) C<sub>c</sub> 0.15

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/4-1/2	378	.21	.0022	84	.21	.0023
1/2-1	504	.15	.0016	114	.17	.0017
1 - 2	576	.14	.0014	150	.12	.0012
2 - 1	812	.09	.0009	180	.10	.0010
1 - 1/4	72	1.0	.0105	36	.50	.0050
1/4-1/2	288	.25	.0027	108	.17	.0017
1/2-1	345	.21	.0022	108	.17	.0017
1 - 2	318	.23	.0024	102	.17	.0017
2 - 4	696	.10	.0010	186	.09	.0009
4 - 8	378	.17	.0017	108	.13	.0013
8 - 16	290	.19	.0020	72	.17	.0017

BORING NO. 142  
 SAMPLE NO. 6  
 DEPTH 20.1' to 20.5'  
 TEST NO. C535.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL)  
 \_\_\_\_\_  
 INITIAL WATER CONTENT 38.2%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 45% PLASTIC LIMIT 22%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 1.019 C<sub>c</sub> 0.41

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II



APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.
1/2 - 1	540	.12	.0013	228	.07	.0007
1 - 2	1440	.05	.0005	408	.04	.0004
2 - 4	1272	.05	.0005	306	.05	.0005
4 - 8	612	.09	.0010	216	.07	.0007
8 - 16	540	.10	.0011	150	.08	.0009
16 - 4	438	.12	.0013	96	.13	.0014
4 - 1	1752	.03	.0003	450	.03	.0003
1 - 1/4				1560	.01	.0001

BORING NO. 146  
SAMPLE NO. 7  
DEPTH 14.0' to 16.0'  
TEST NO. C542.1

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
SILTY CLAY (CL)  
INITIAL WATER CONTENT 15.9 %  
ATTERBERG LIMITS  
LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

**TEST DATA**  
INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.  
INITIAL VOID RATIO 0.679 C<sub>c</sub> 0.14

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day	c <sub>v</sub> cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
SAMPLE NO. \_\_\_\_\_  
DEPTH \_\_\_\_\_  
TEST NO. \_\_\_\_\_

**SOIL PROPERTIES**  
SOIL DESCRIPTION: \_\_\_\_\_  
INITIAL WATER CONTENT \_\_\_\_\_ %  
ATTERBERG LIMITS  
LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
SUMMARY OF c<sub>v</sub> VALUES**  
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II

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APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.
1/4-1/2	194	.43	.0045	72	.26	.0028
1/2- 1	317	.25	.0027	96	.20	.0021
1 - 2	378	.21	.0022	96	.19	.0020
2 - 4	345	.23	.0024	72	.24	.0026
4 - 8	378	.19	.0020	84	.21	.0022
8-16	324	.20	.0021	108	.16	.0016

BORING NO. 185  
 SAMPLE NO. 3  
 DEPTH 7.9' to 8.1'  
 TEST NO. C552.1

**SOIL PROPERTIES**  
 SOIL DESCRIPTION: Silty CLAY (CL-CH)  
 INITIAL WATER CONTENT 29.1%  
 ATTERBERG LIMITS  
 LIQUID LIMIT 50% PLASTIC LIMIT 23%

**TEST DATA**  
 INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.  
 INITIAL VOID RATIO 0.757 C<sub>c</sub> 0.18

APPLIED PRESSURE in tons/ft. <sup>2</sup>	SQUARE ROOT FITTING METHOD			LOG FITTING METHOD		
	t <sub>90</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.	t <sub>50</sub> in sec.	ft. <sup>2</sup> /day c <sub>v</sub>	cm. <sup>2</sup> /sec.

BORING NO. \_\_\_\_\_  
 SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TEST NO. \_\_\_\_\_

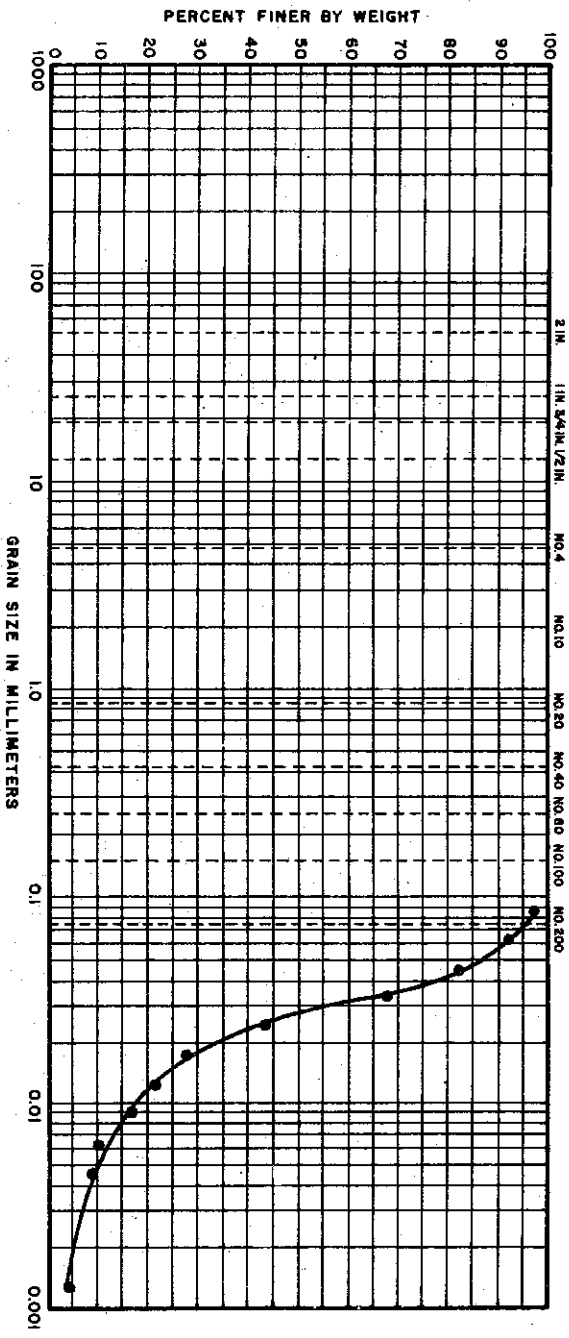
**SOIL PROPERTIES**  
 SOIL DESCRIPTION: \_\_\_\_\_  
 INITIAL WATER CONTENT \_\_\_\_\_ %  
 ATTERBERG LIMITS  
 LIQUID LIMIT \_\_\_\_\_ % PLASTIC LIMIT \_\_\_\_\_ %

**TEST DATA**  
 INITIAL SAMPLE HEIGHT \_\_\_\_\_ IN \_\_\_\_\_ CM.  
 INITIAL VOID RATIO \_\_\_\_\_ C<sub>c</sub> \_\_\_\_\_

**CONSOLIDATION TEST  
 SUMMARY OF c<sub>v</sub> VALUES**  
 THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

### GRAIN SIZE DISTRIBUTION

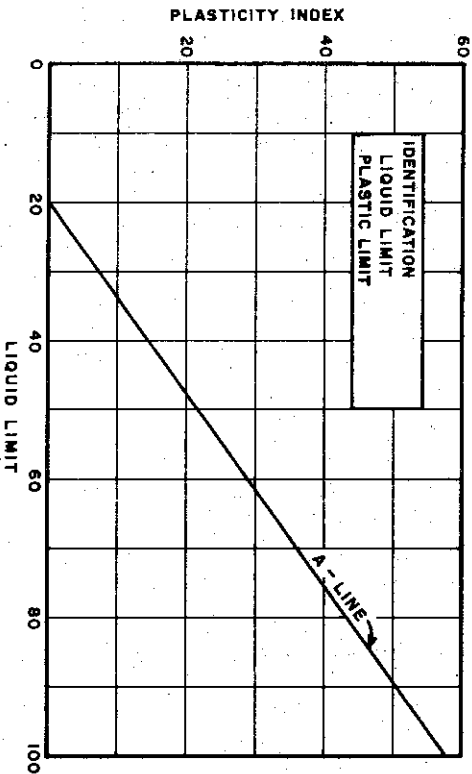
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)

EXPLORATION: BORING 7

SAMPLE : SS28

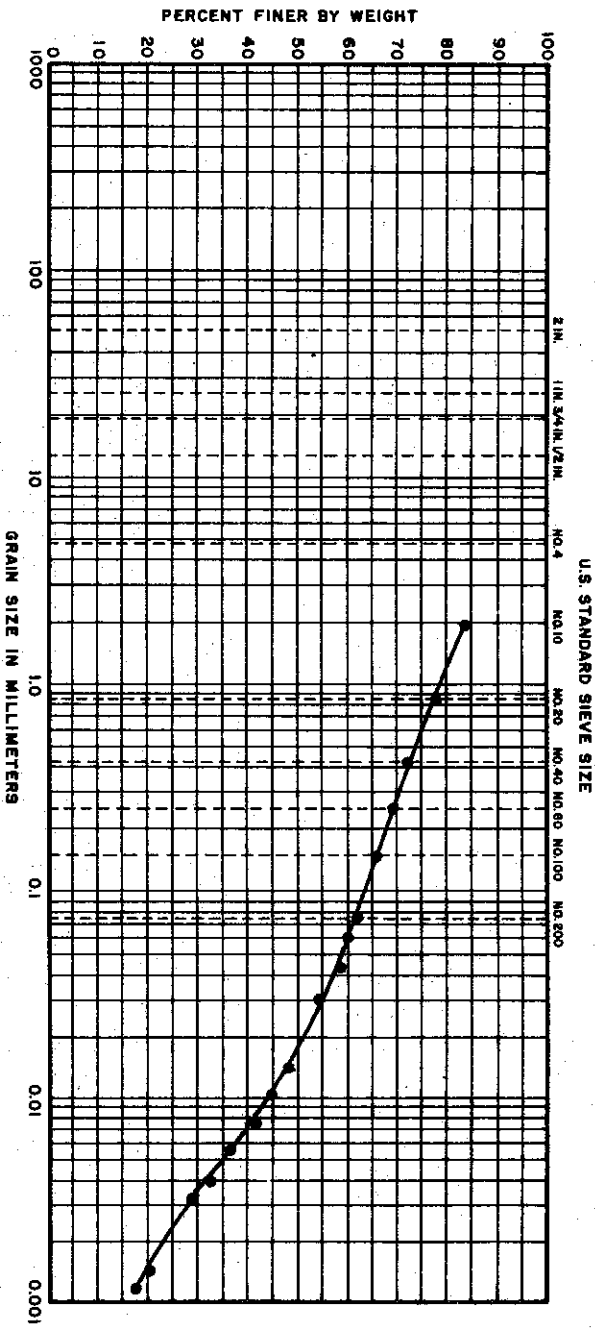
DEPTH : 129.6' TO 131.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

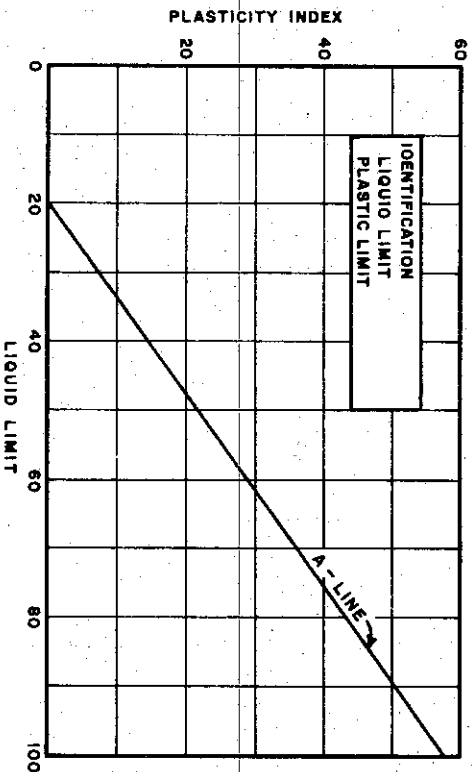
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 7  
 SAMPLE : S630  
 DEPTH : 136.8' TO 140.3'  
 SPECIFIC GRAVITY : USED 2.70

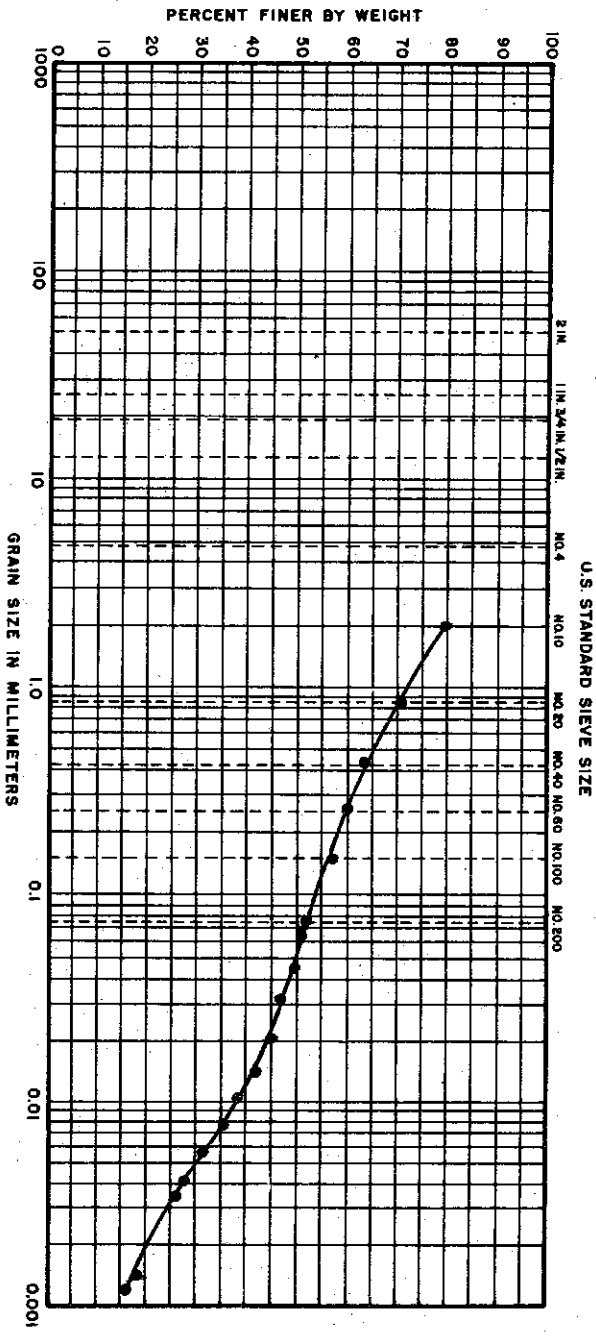
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255

DATE JAN. 74

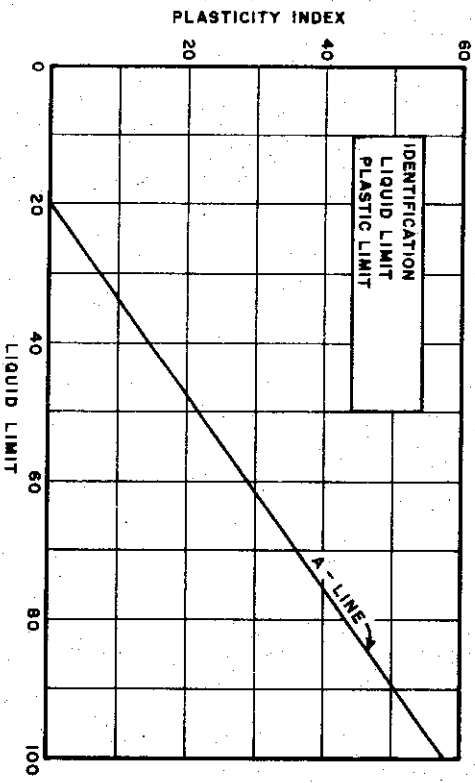
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



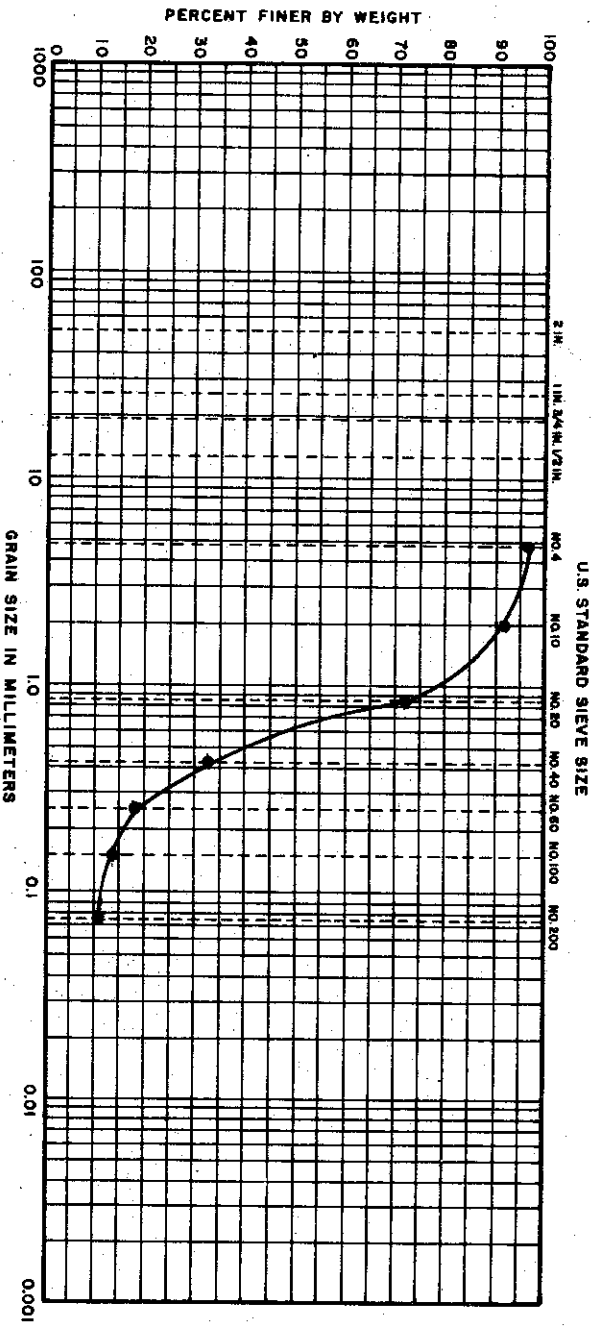
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)  
 EXPLORATION: BORING 10  
 SAMPLE : SS30  
 DEPTH : 141'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

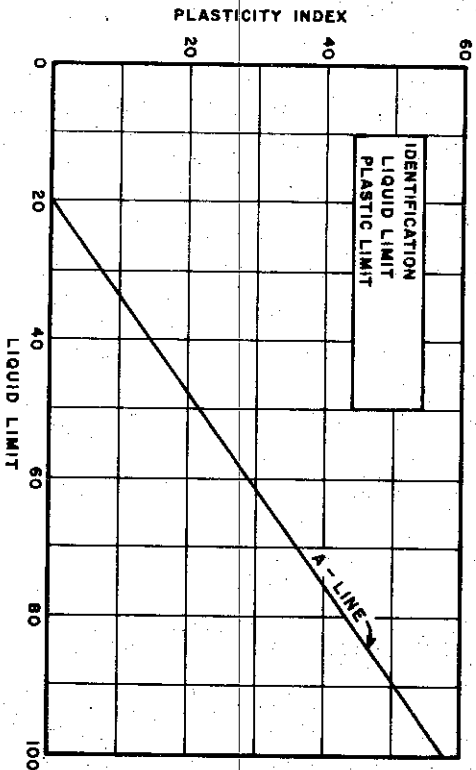
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

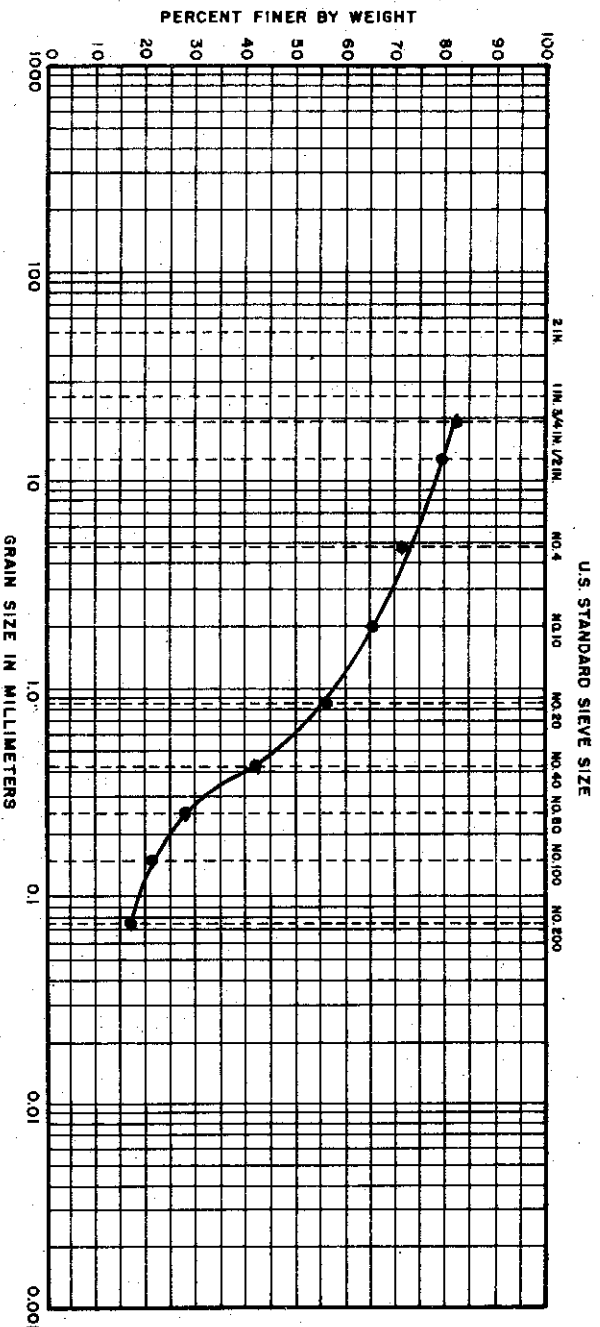
IDENTIFICATION : SILTY SAND (SM-SW)  
 EXPLORATION: BORING 18  
 SAMPLE : 11  
 DEPTH : 103.5' TO 105.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-600

FILE NO. 1255 DATE JULY 1974

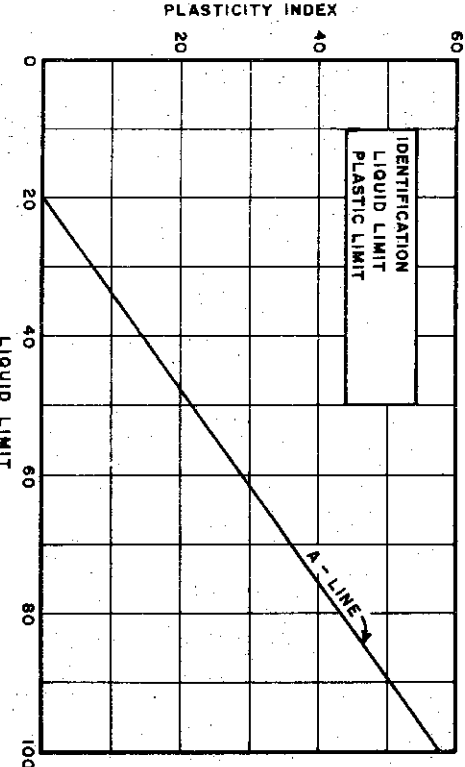
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

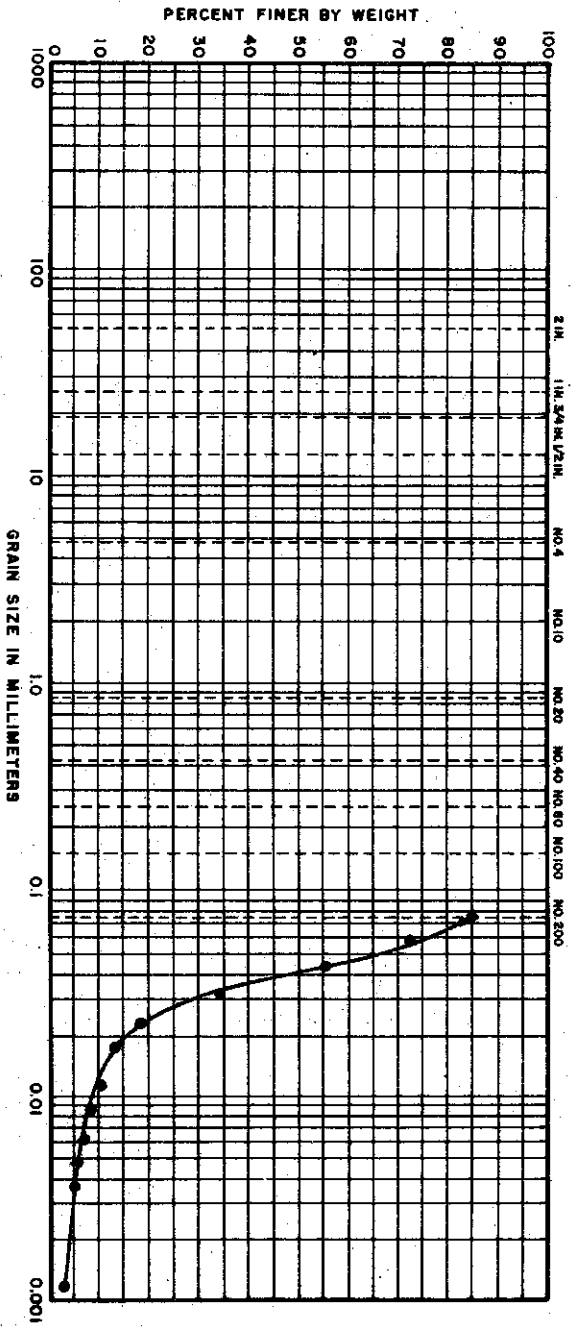
IDENTIFICATION : SILTY SAND, GRAVELLY (SM)  
 EXPLORATION : BORING 18  
 SAMPLE : 16  
 DEPTH : 139.6' TO 141.0'  
 SPECIFIC GRAVITY : USED 2.70

### THE DETROIT EDISON COMPANY BELLE RIVER PLANT UNITS I & II SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

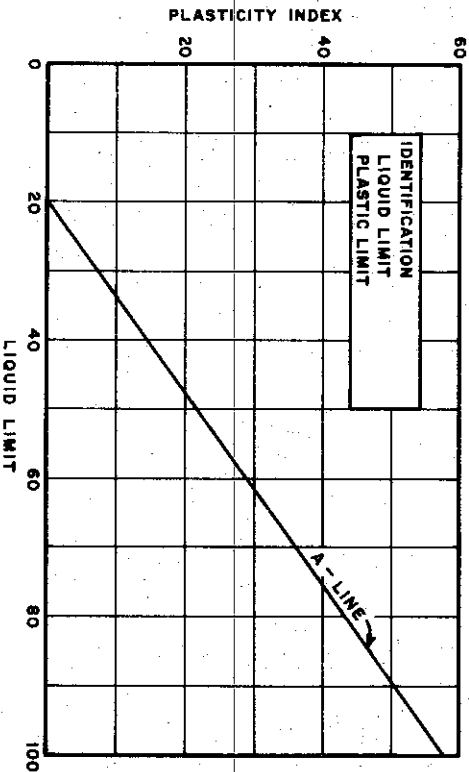
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)  
 EXPLORATION: BORING 22  
 SAMPLE : SS29  
 DEPTH : 133.5' TO 135.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

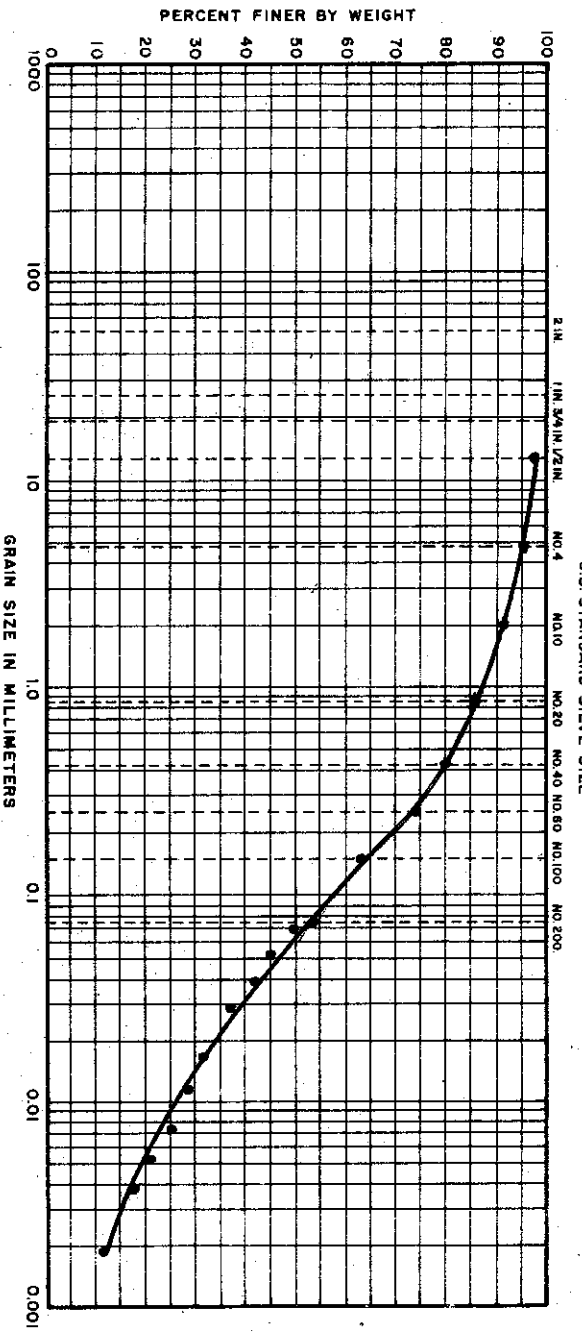
C-602

FILE NO. 1255

DATE JAN. 74



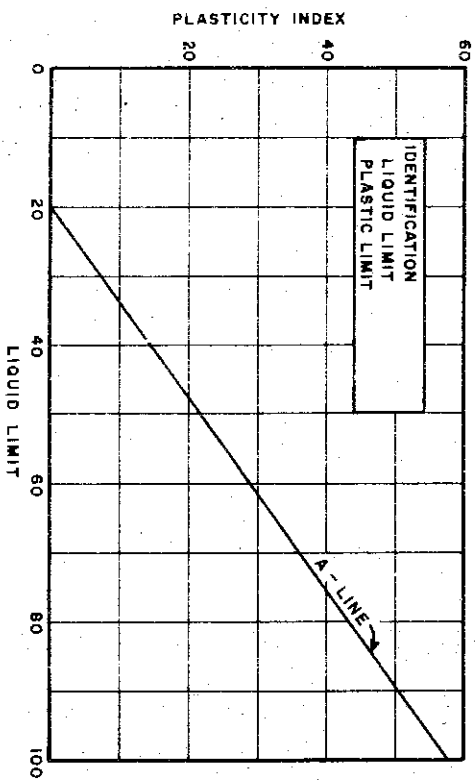
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



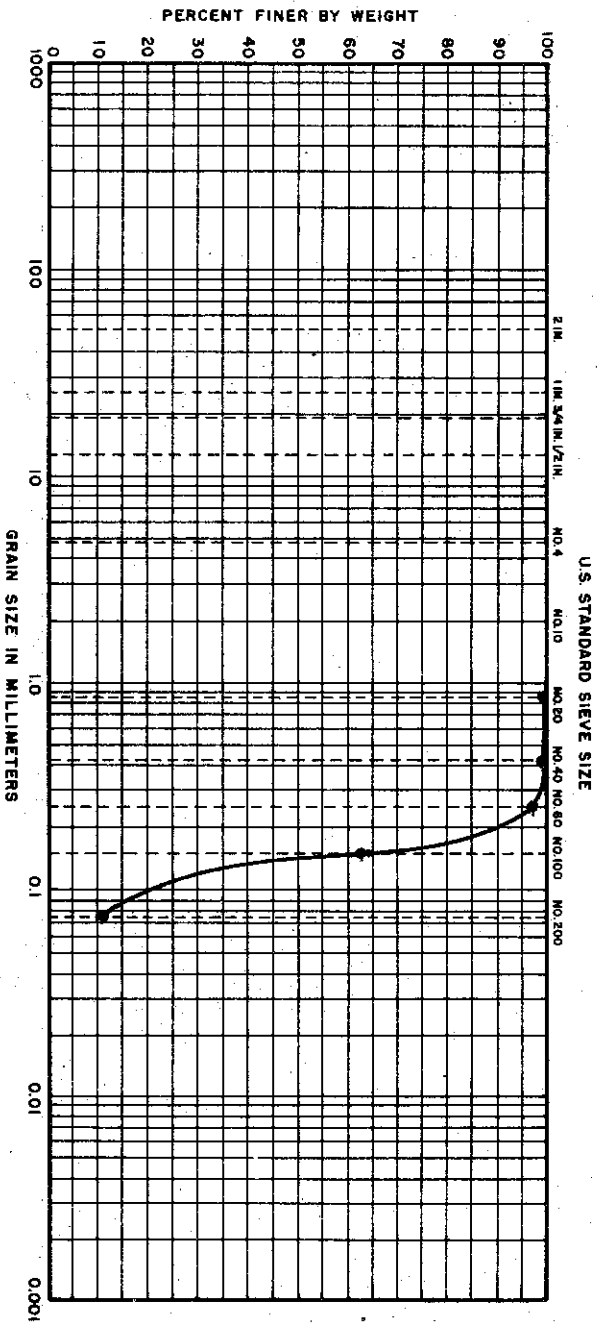
### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)  
 EXPLORATION: BORING 27  
 SAMPLE : SS17  
 DEPTH : 68.5' TO 70.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

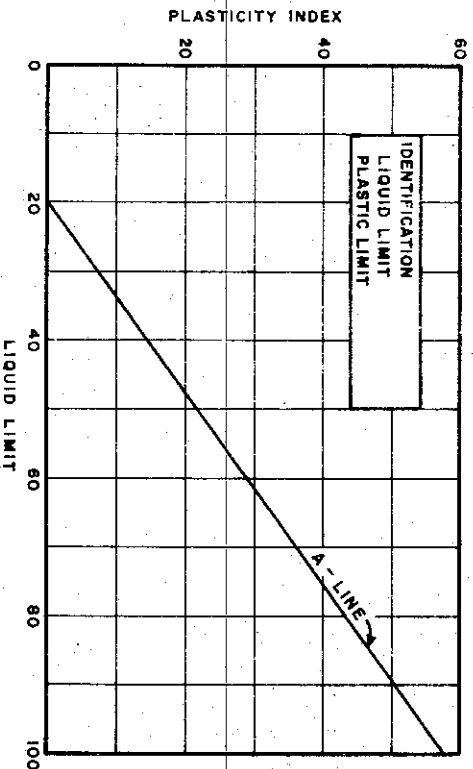
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

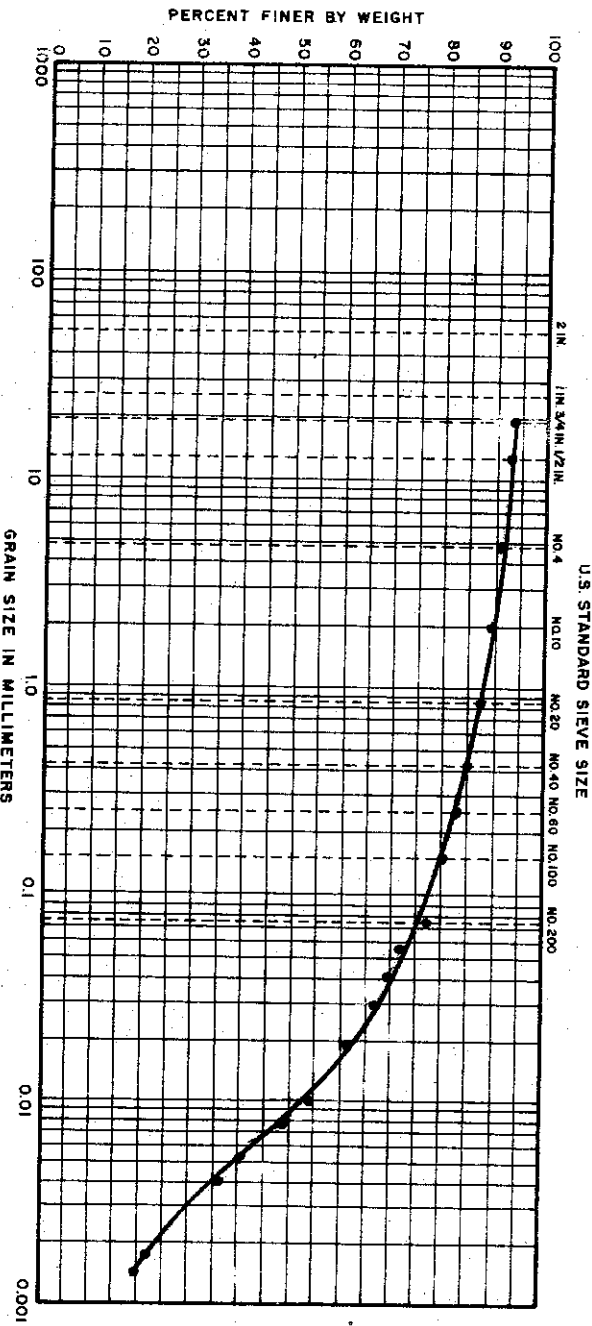
IDENTIFICATION : SILTY FINE SAND (SM-SP)  
 EXPLORATION: BORING 27  
 SAMPLE : 26  
 DEPTH : 113.6' TO 114.4'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-604

FILE NO. 1255 DATE JULY 1974

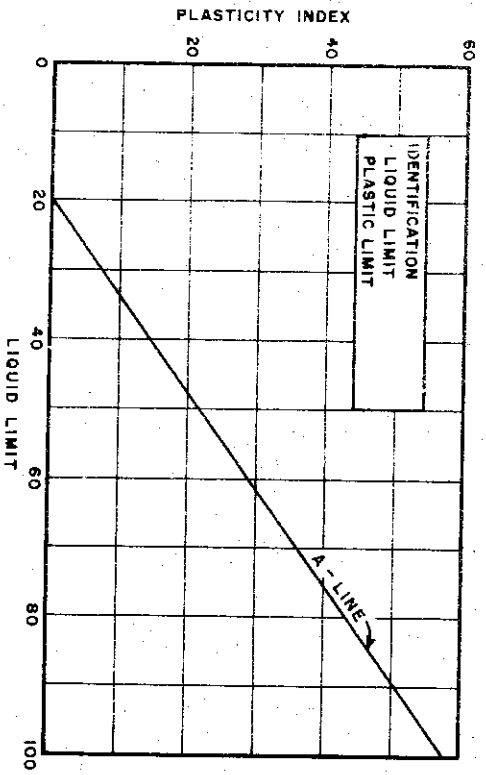
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

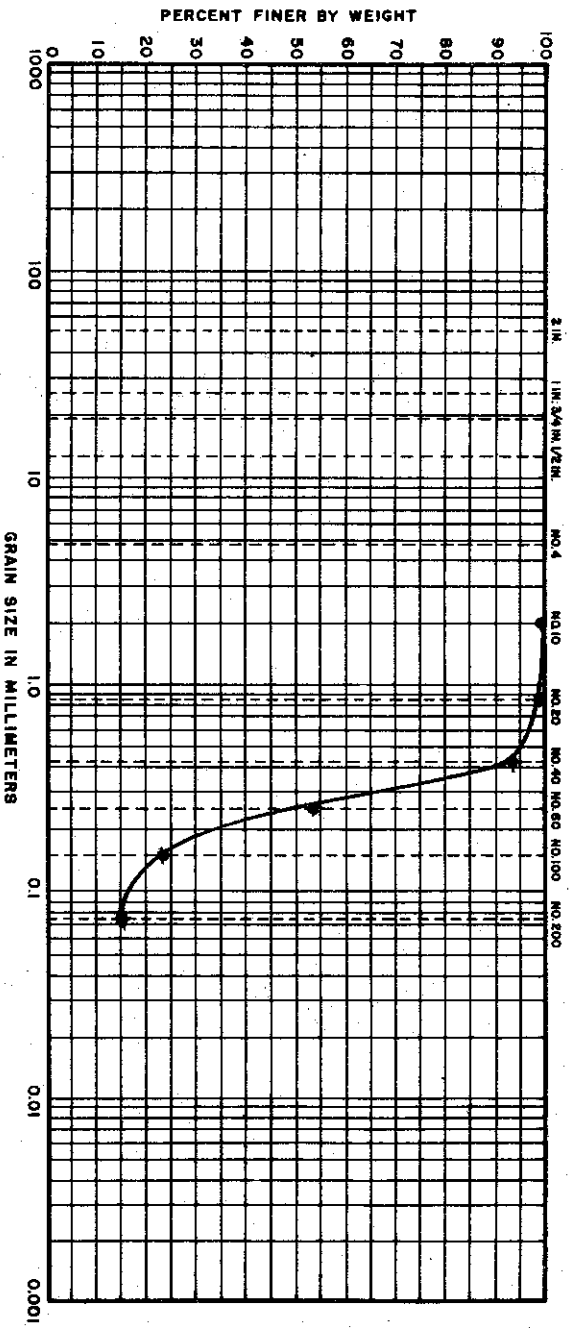
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 30  
 SAMPLE: SS15  
 DEPTH: 68.5' TO 70.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

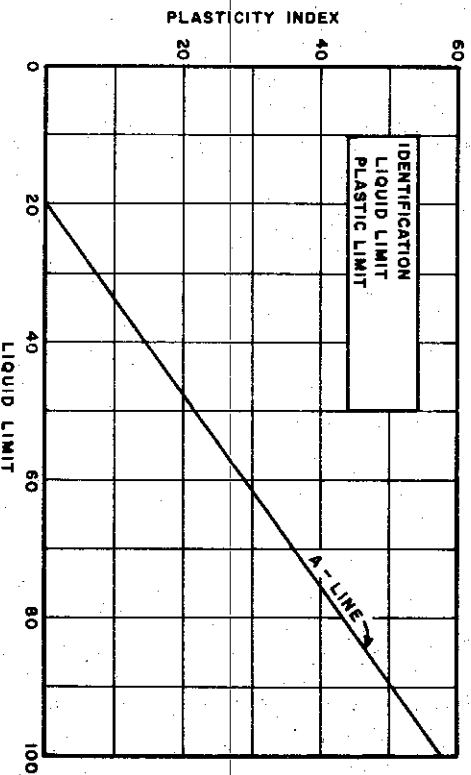
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 21  
 DEPTH : 98.5' TO 100.0'  
 SPECIFIC GRAVITY: USED 2.70

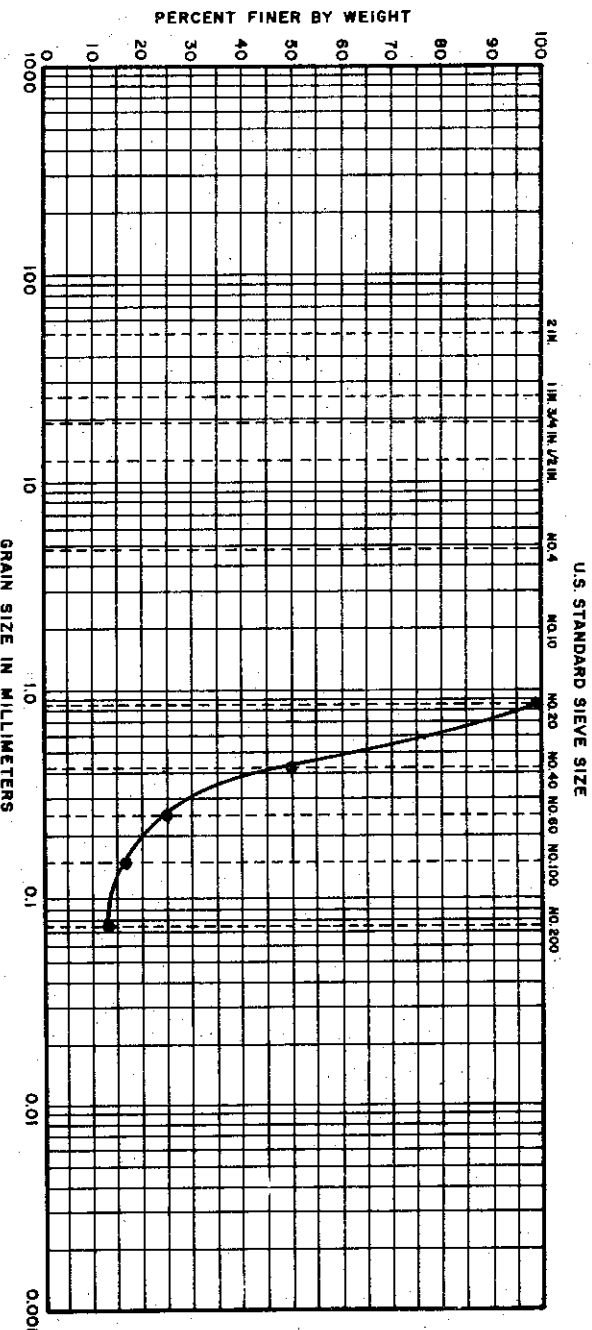
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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GOLDBERG - ZOINO & ASSOCIATES  
 CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255 DATE JULY 1974

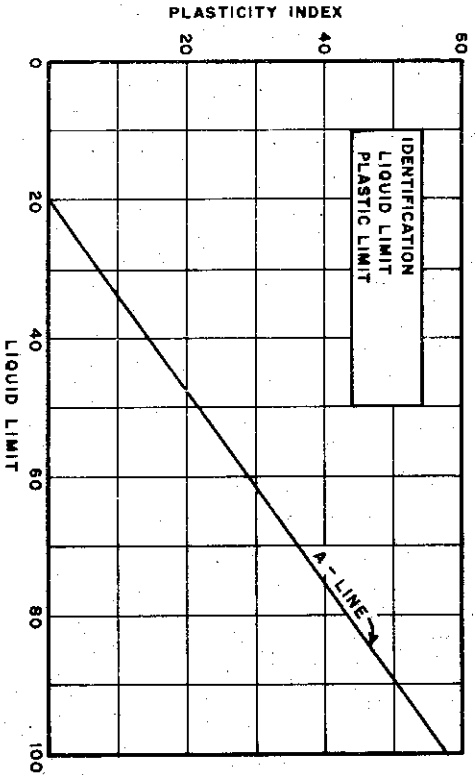
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

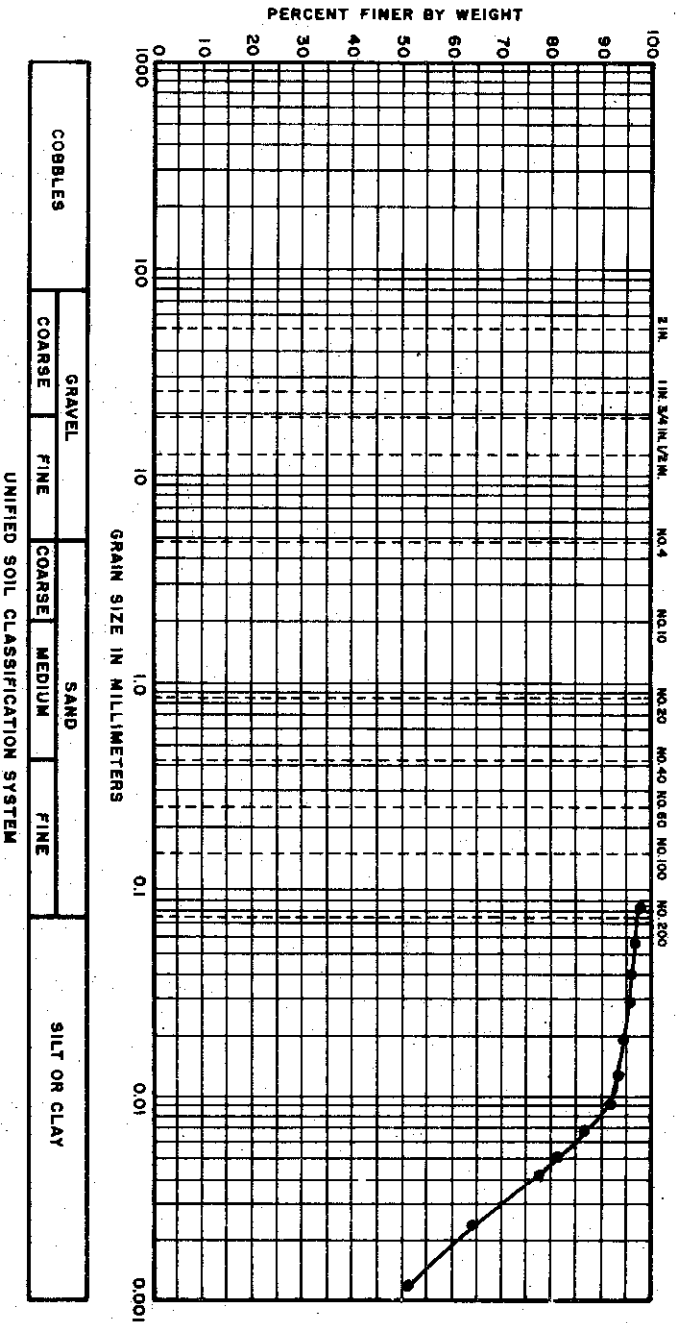
IDENTIFICATION : SILTY SAND (SM)  
 EXPLORATION: BORING 30  
 SAMPLE : 25  
 DEPTH : 118.5' TO 120.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

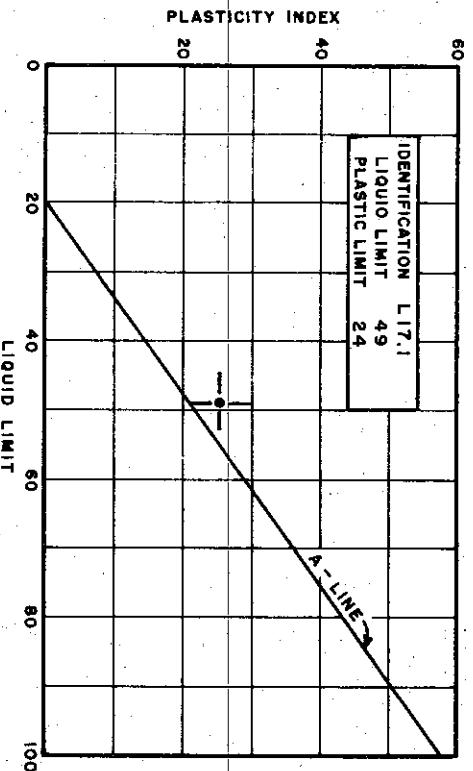
FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

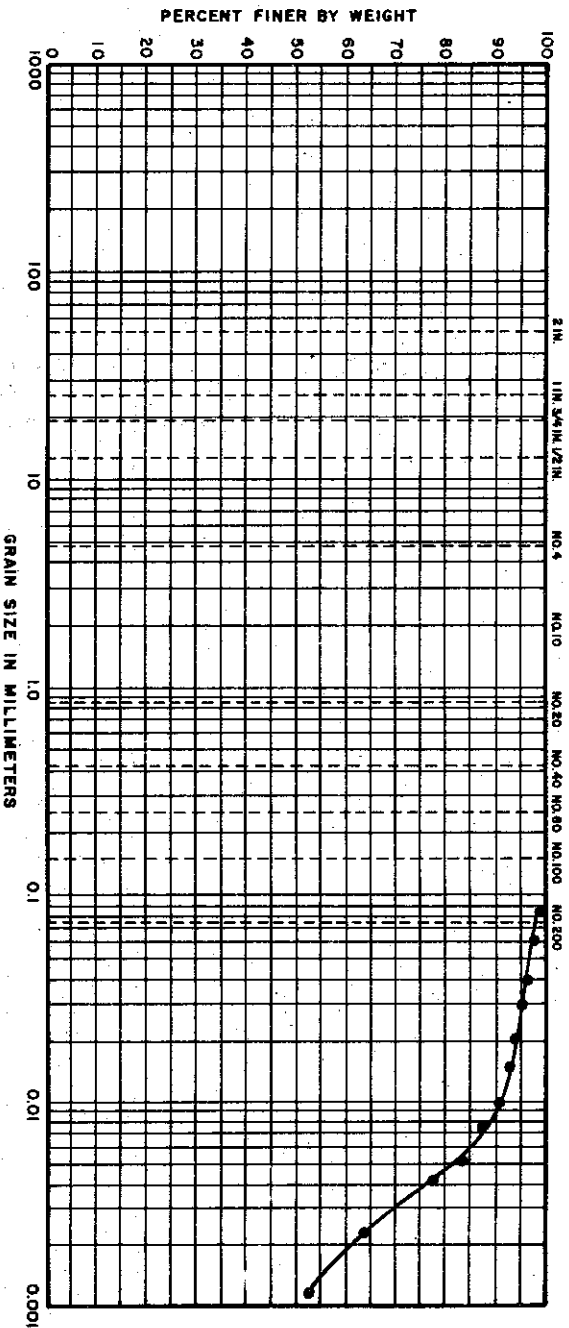
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 3B  
 SAMPLE : 5  
 DEPTH : 8.7' TO 9.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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### GRAIN SIZE DISTRIBUTION

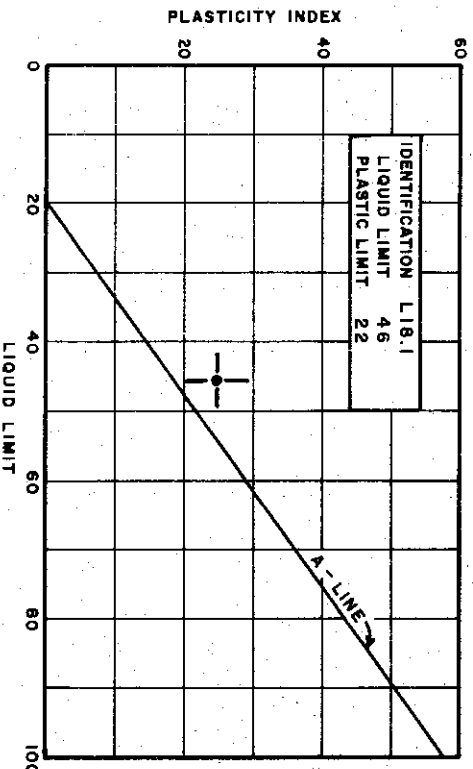
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)

EXPLORATION: BORING 3B

SAMPLE : 4

DEPTH : 14.3' TO 14.6'

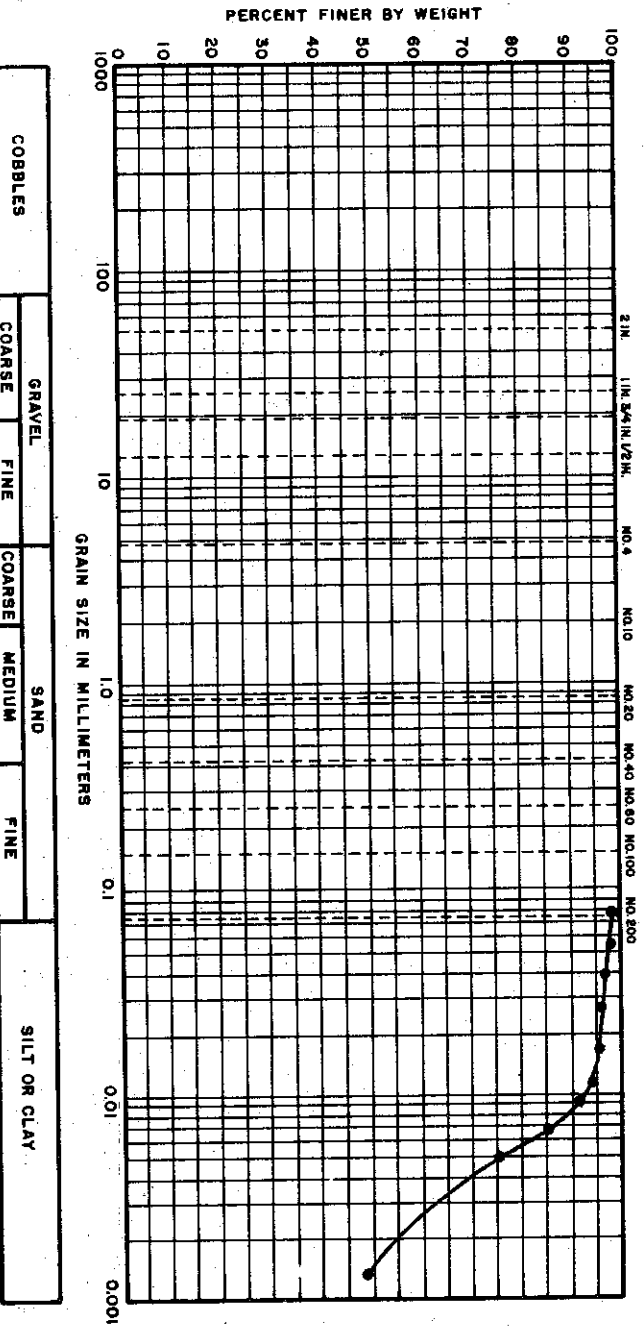
SPECIFIC GRAVITY = 2.71

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

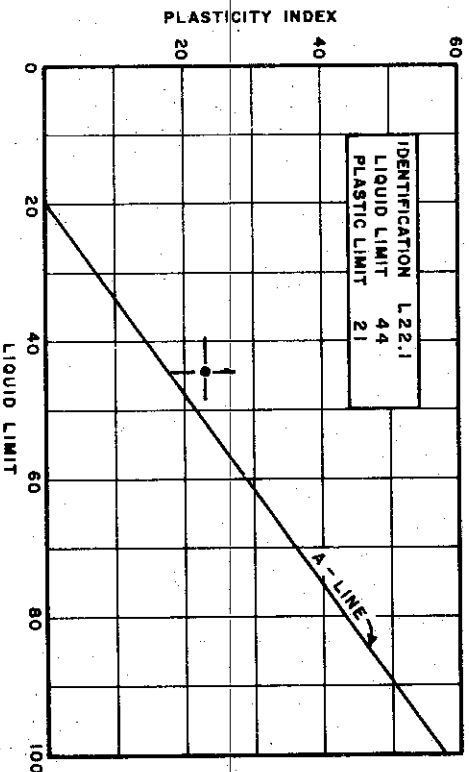
# GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



# PLASTICITY CHART

(COHESIVE SOIL ONLY)



## MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
EXPLORATION: BORING 38  
SAMPLE : 12  
DEPTH : 54.1' TO 54.5'  
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

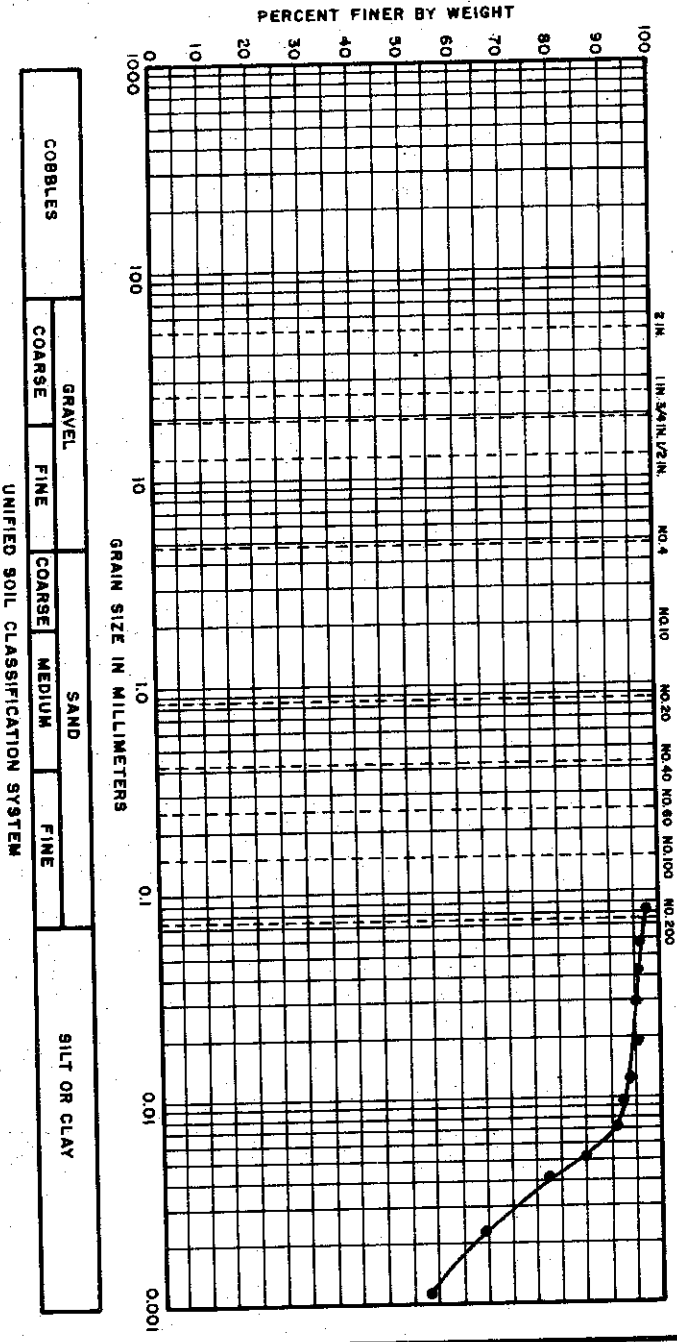
C-610

FILE NO. 1255  
DATE JAN 74



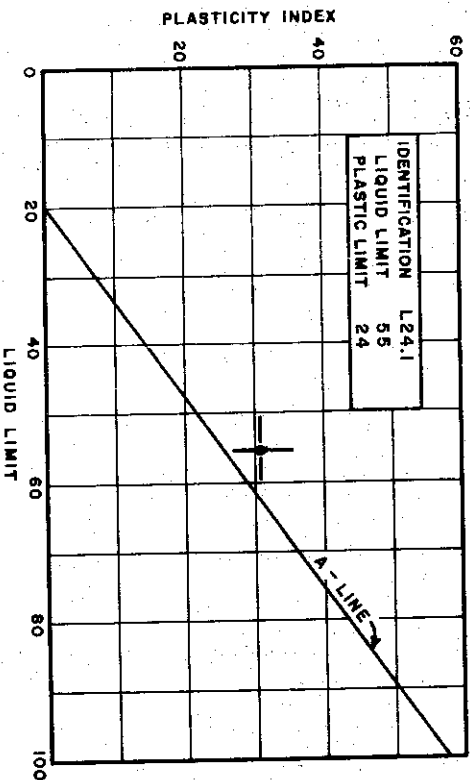
# GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



# PLASTICITY CHART

(COHESIVE SOIL ONLY)



# MATERIAL SOURCE

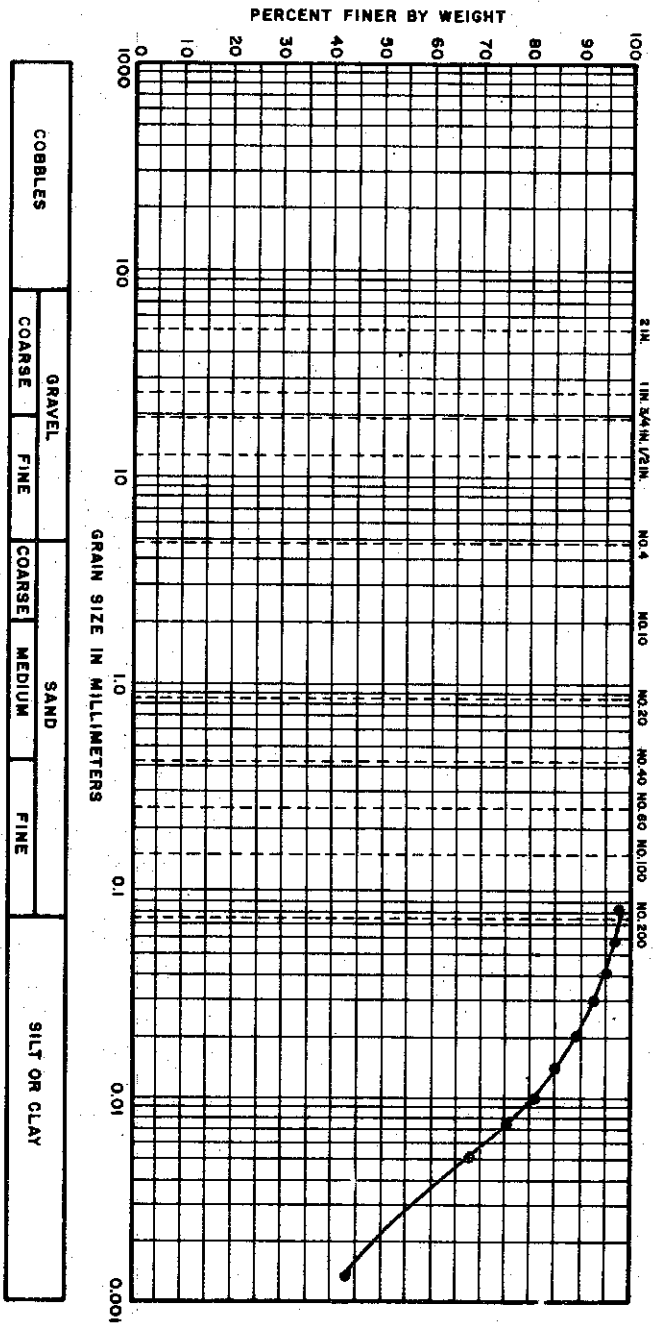
IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 38  
 SAMPLE : 16  
 DEPTH : 74.0' TO 74.1'  
 SPECIFIC GRAVITY = 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

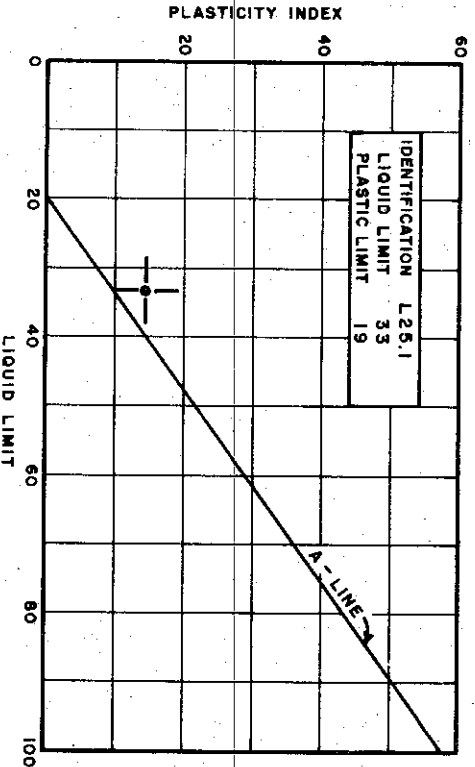
FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 38  
 SAMPLE : 18  
 DEPTH : 84.6' TO 84.9'  
 SPECIFIC GRAVITY : USED 2.70

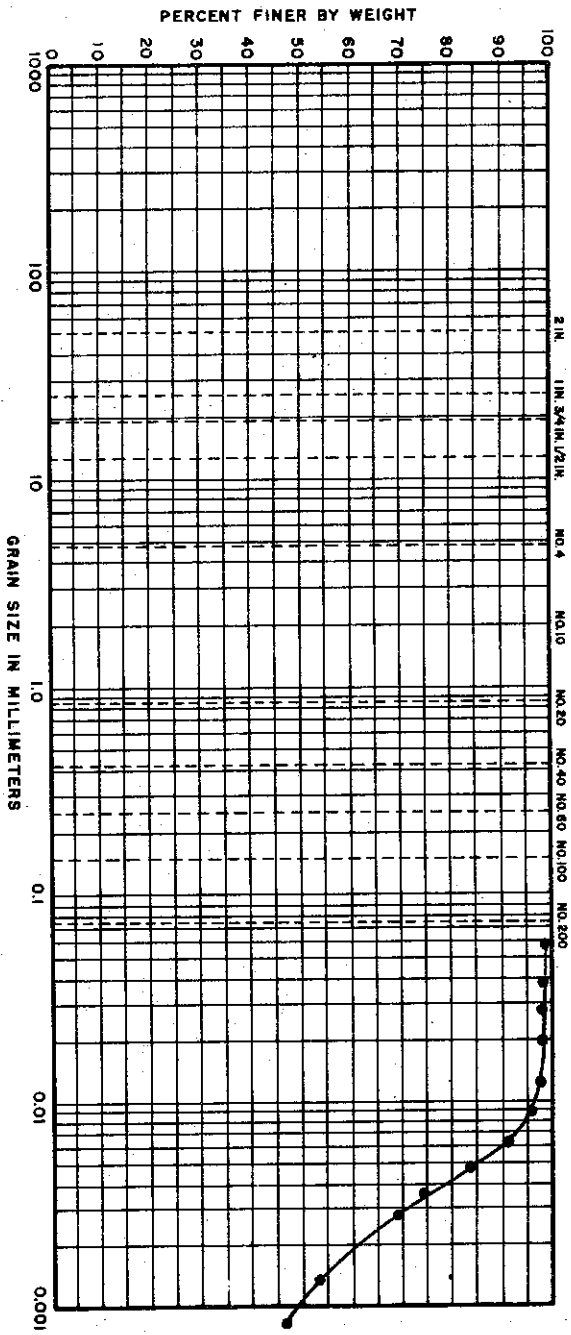
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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FILE NO. 1255 DATE JAN. 74

# GRAIN SIZE DISTRIBUTION

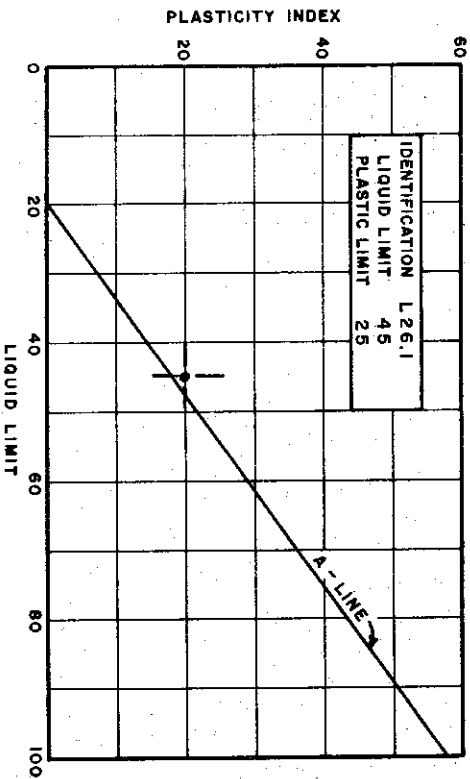
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION	L 26.1
LIQUID LIMIT	45
PLASTIC LIMIT	25

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 38

SAMPLE : 24

DEPTH : 114.2' TO 114.5'

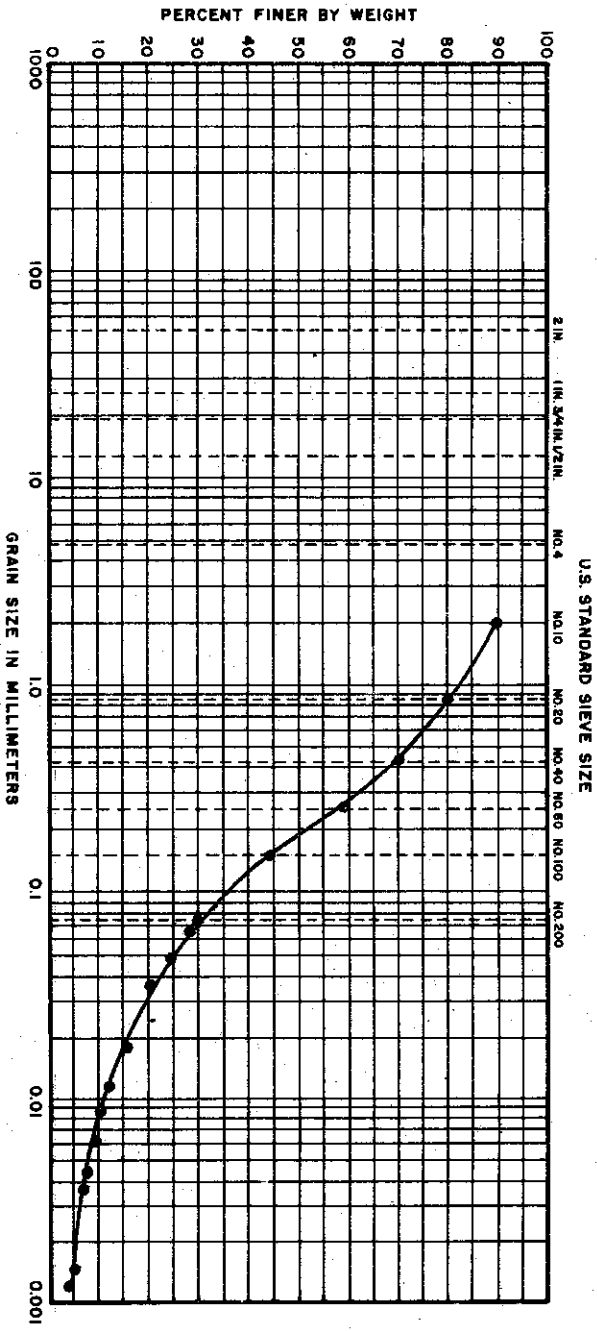
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255

DATE JAN. 74

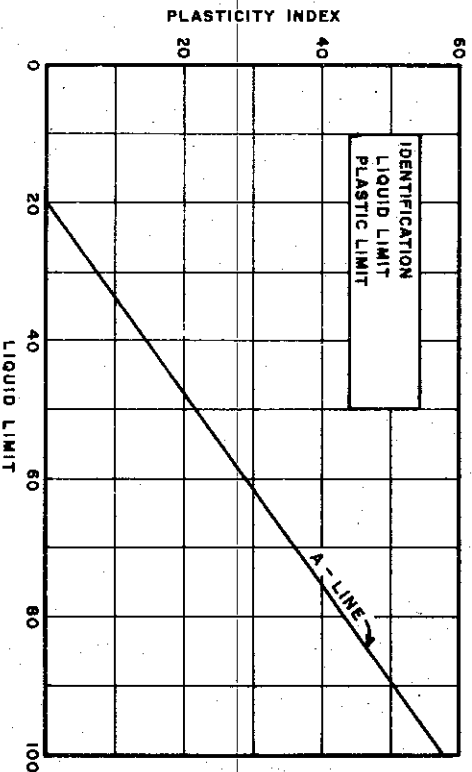
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

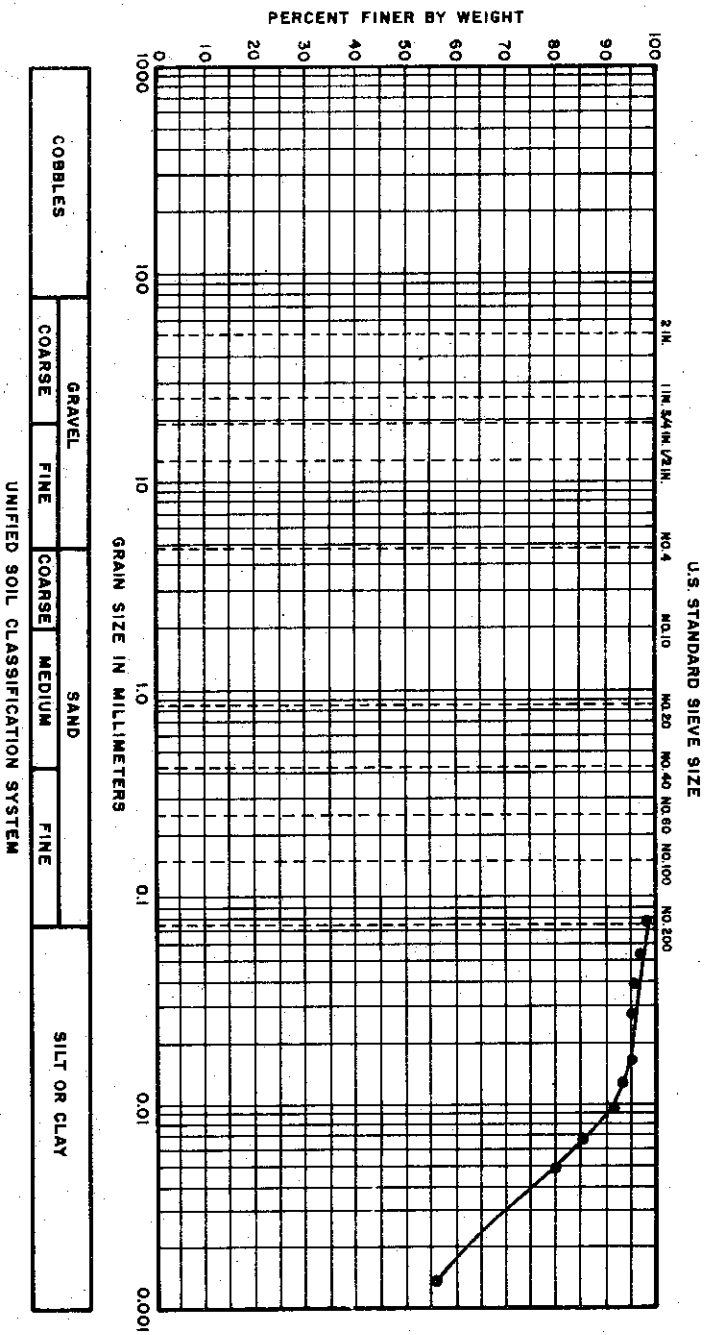
IDENTIFICATION: SILTY SAND (SM)  
 EXPLORATION: BORING 38  
 SAMPLE : SS30  
 DEPTH : 138.5' TO 140.0'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

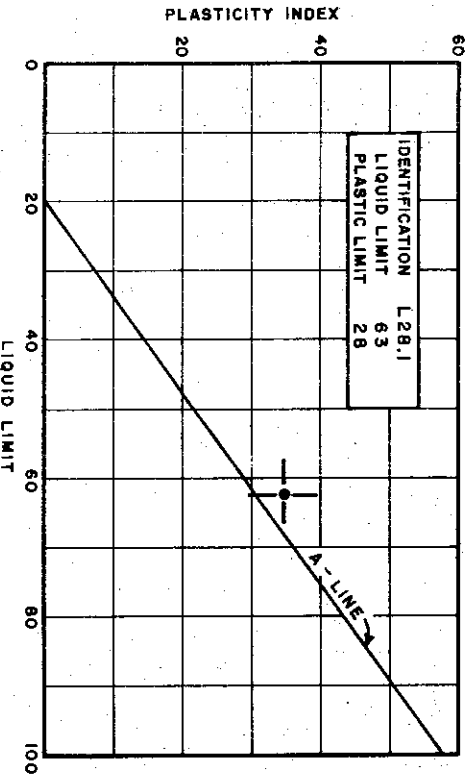
C-614

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



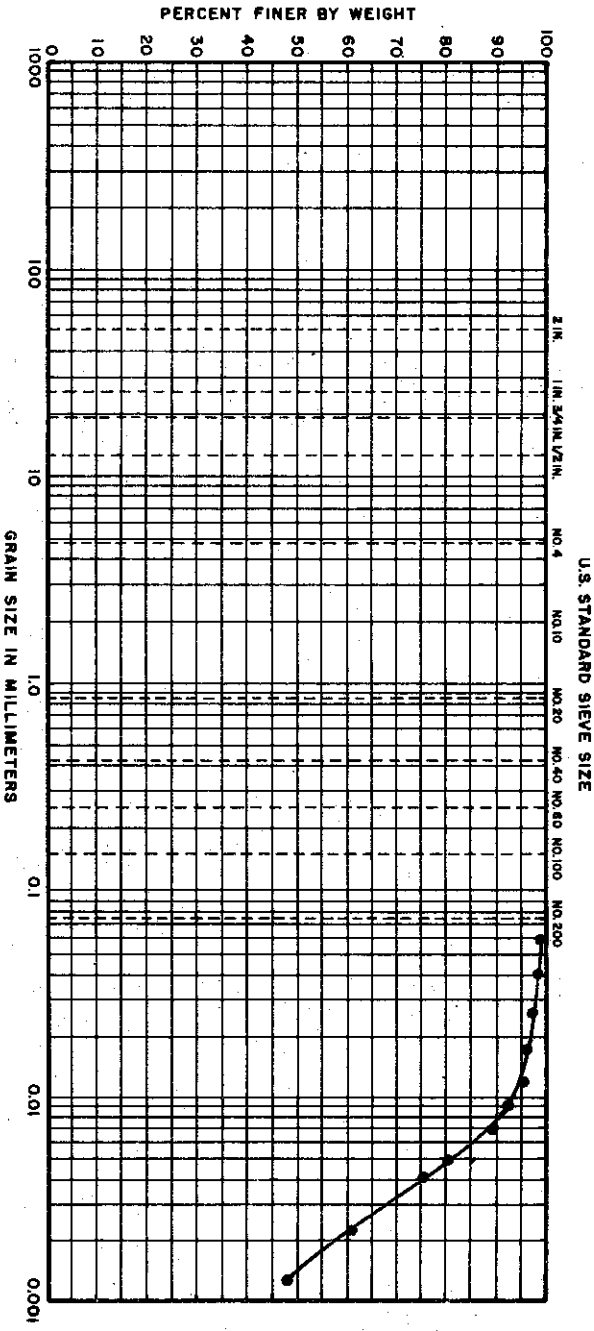
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CH)  
 EXPLORATION: BORING 41  
 SAMPLE : 2  
 DEPTH : 4.5' TO 4.8'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

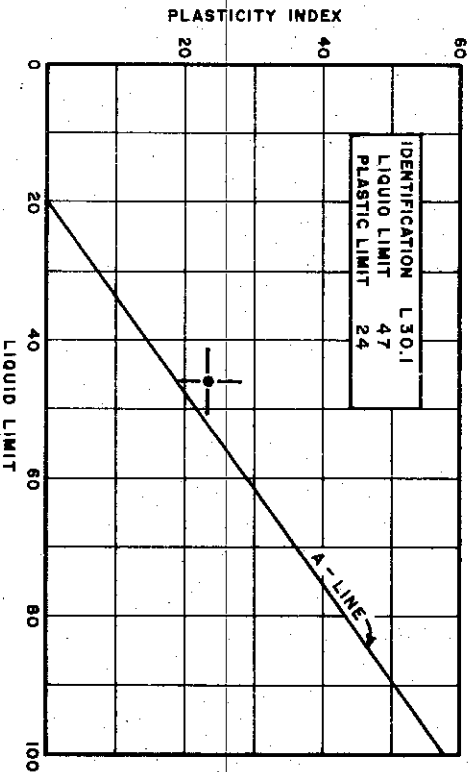
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION	L 30.1
LIQUID LIMIT	47
PLASTIC LIMIT	24

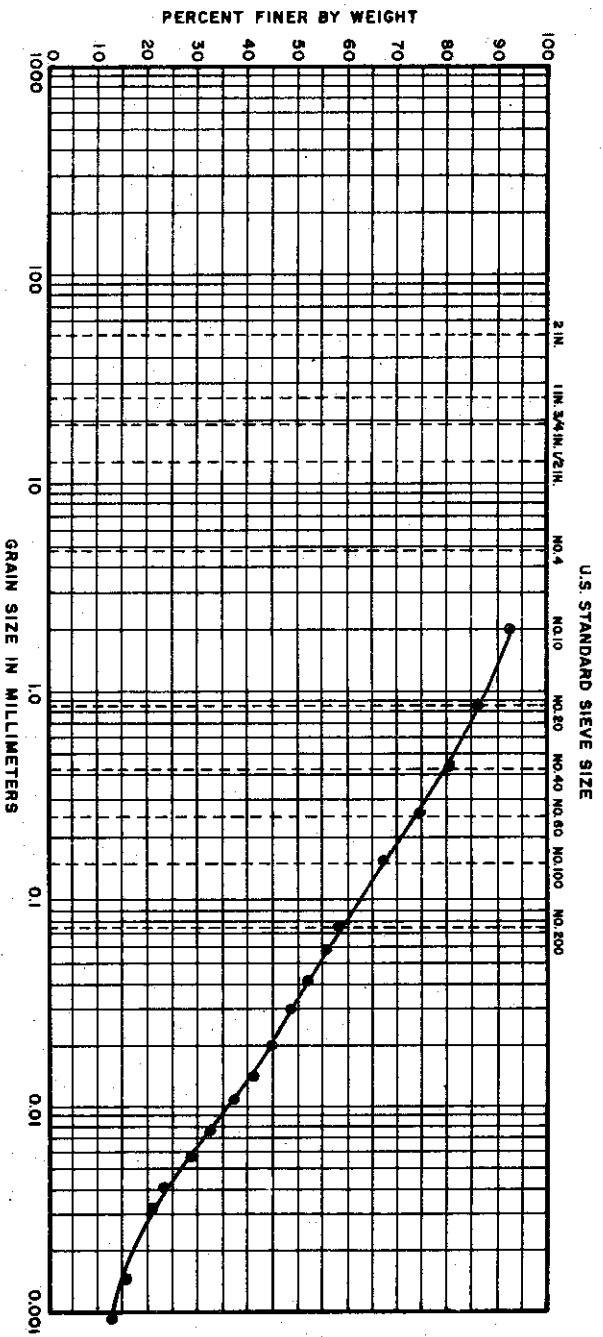
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 41  
 SAMPLE : 7  
 DEPTH : 20.6' TO 21.0'  
 SPECIFIC GRAVITY = 2.66

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

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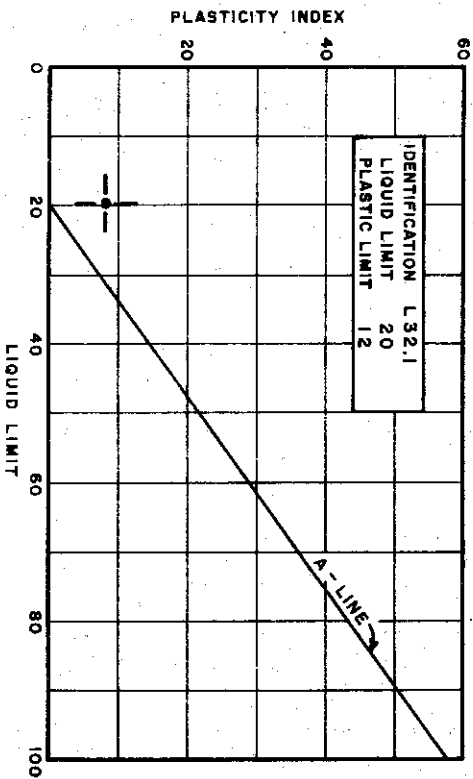
**GRAIN SIZE DISTRIBUTION**



COBBLES	GRAVEL		SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

**PLASTICITY CHART**  
(COHESIVE SOIL ONLY)



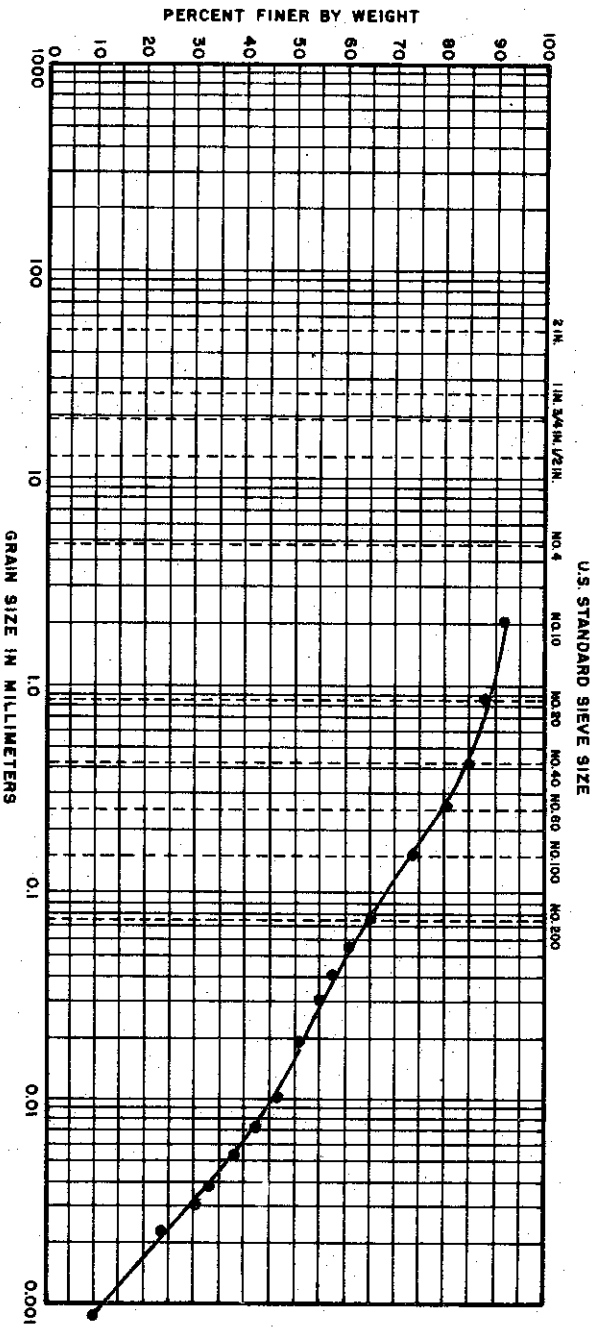
**MATERIAL SOURCE**

IDENTIFICATION : CLAYEY SAND (SC)  
 EXPLORATION : BORING 41  
 SAMPLE : II  
 DEPTH : 40.7' TO 41.0'  
 SPECIFIC GRAVITY : USED 2.70

**THE DETROIT EDISON COMPANY**  
**BELLE RIVER PLANT UNITS I & II**  
**SOIL CLASSIFICATION TESTS**

FILE NO. 1255 DATE JAN. 74

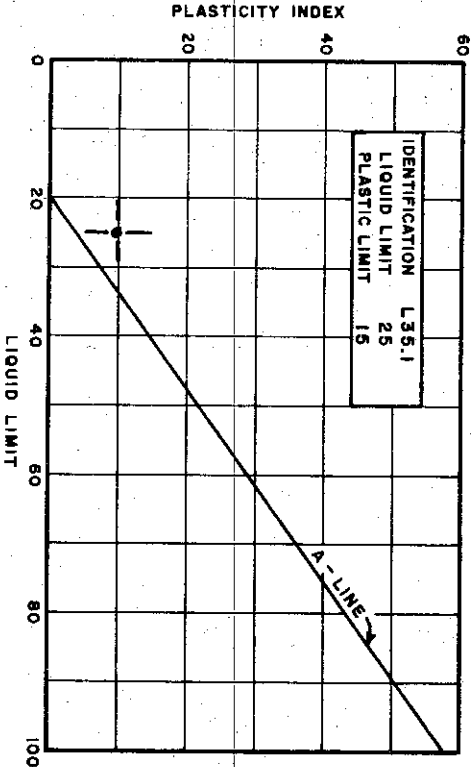
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL				SAND			
	COARSE	FINE	COARSE	MEDIUM	FINE	MEDIUM	FINE	SILT OR CLAY

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY; ZONES OF SAND (CL-SC)  
 EXPLORATION: BORING 41  
 SAMPLE : 17  
 DEPTH : 72.9' TO 73.2'  
 SPECIFIC GRAVITY = 2.68

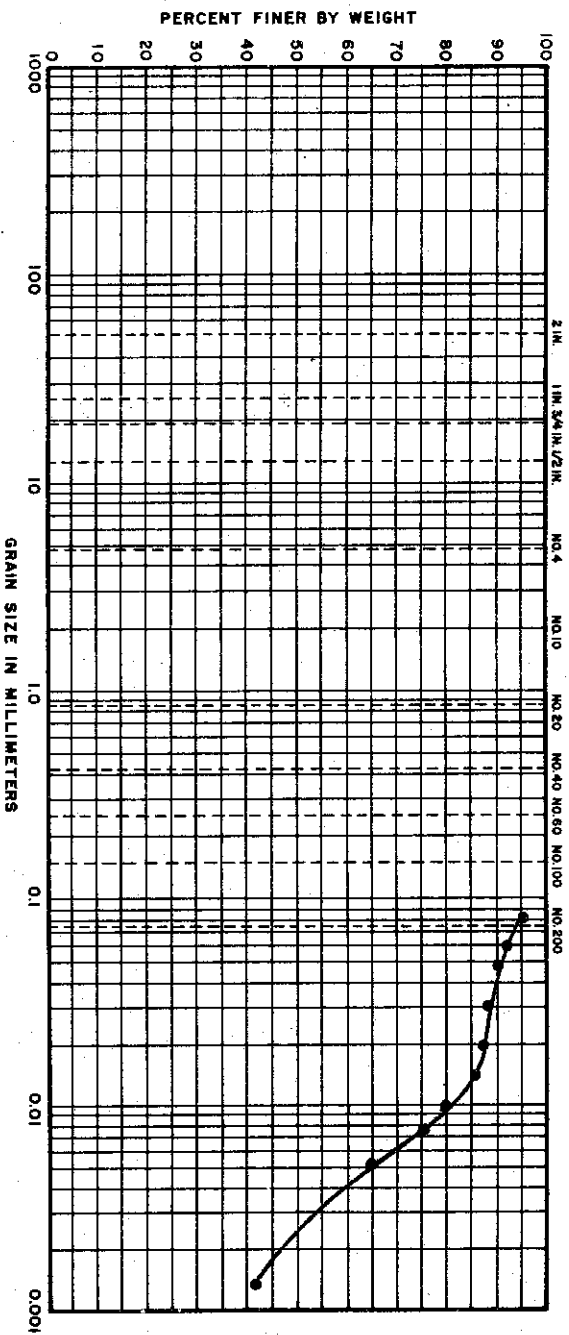
**THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS**

C-618



### GRAIN SIZE DISTRIBUTION

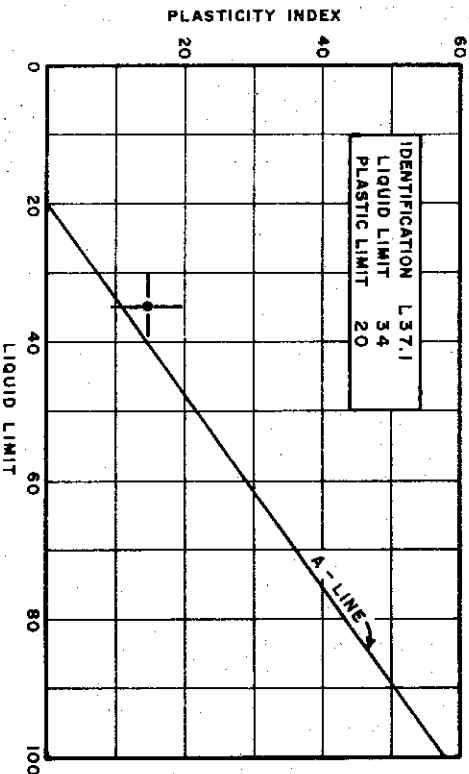
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L 37.1  
LIQUID LIMIT 34  
PLASTIC LIMIT 20

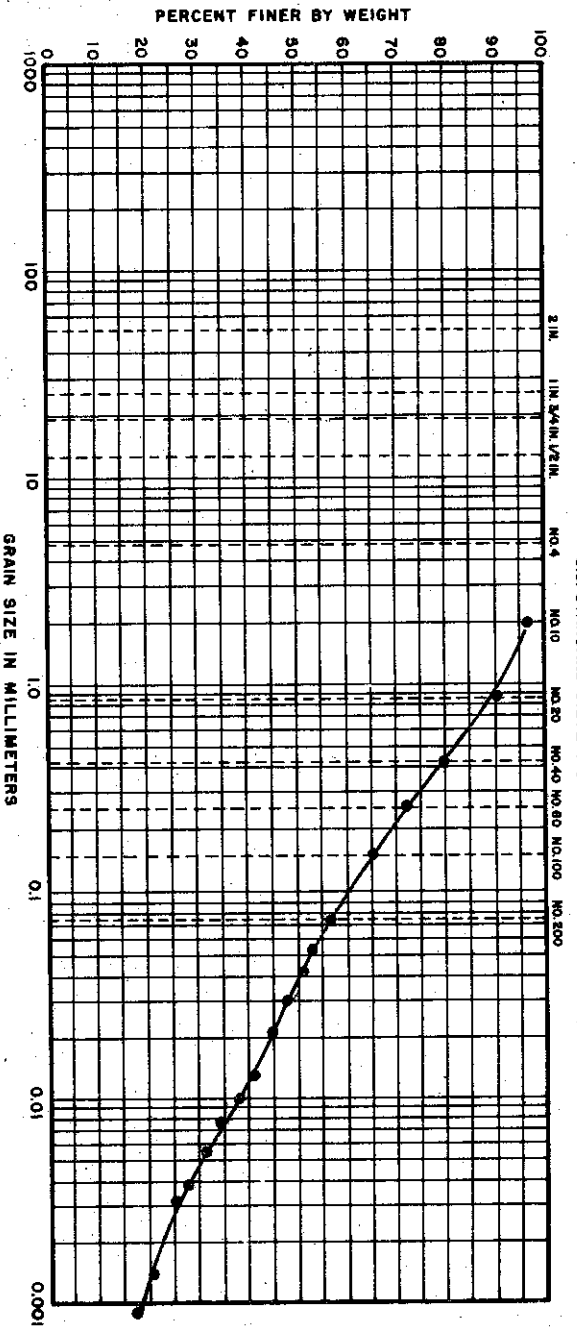
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
EXPLORATION: BORING 41  
SAMPLE : 23  
DEPTH : 101.9' TO 102.2'  
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

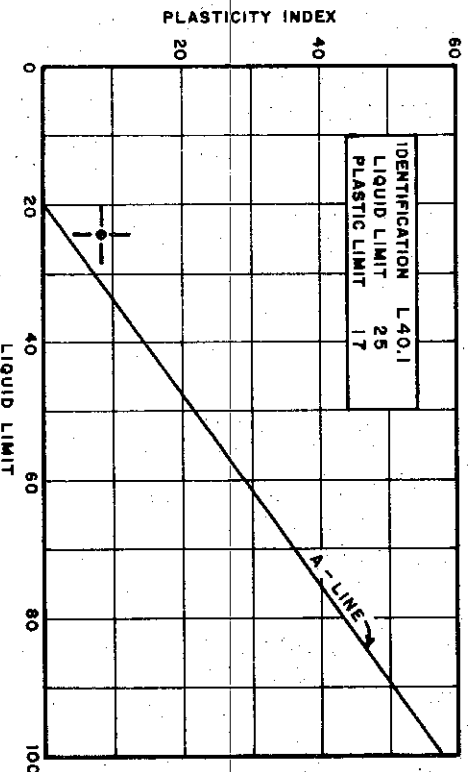
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (GC-SC)  
 EXPLORATION: BORING 41  
 SAMPLE : 29  
 DEPTH : 130.7' TO 130.9'  
 SPECIFIC GRAVITY = 2.69

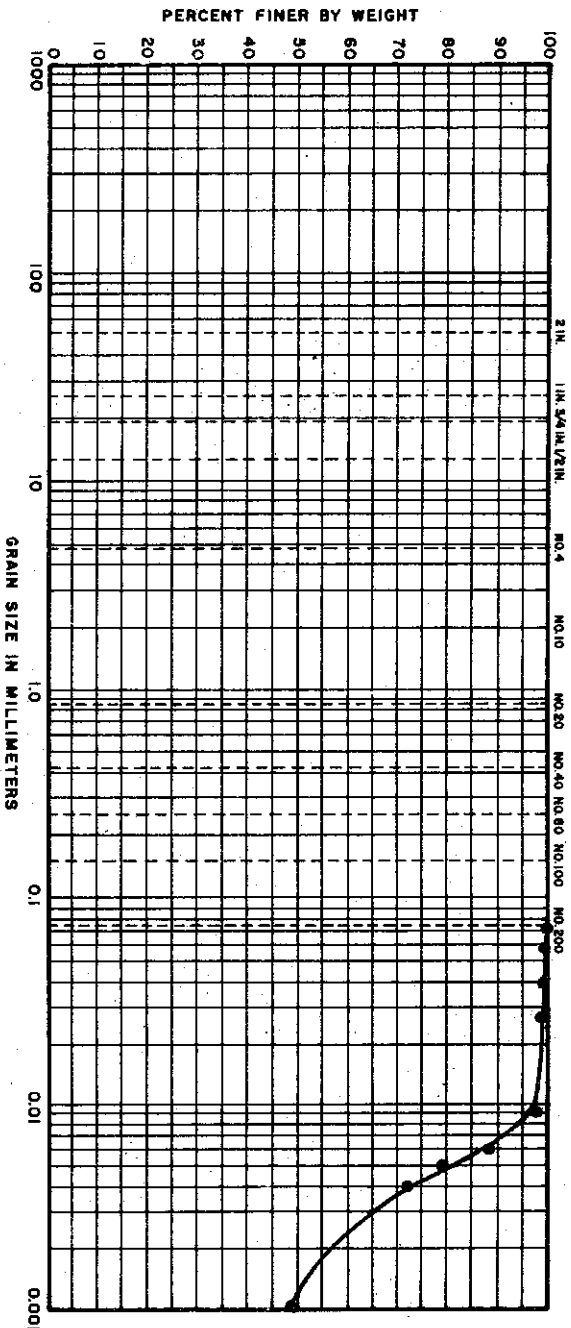
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-620

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

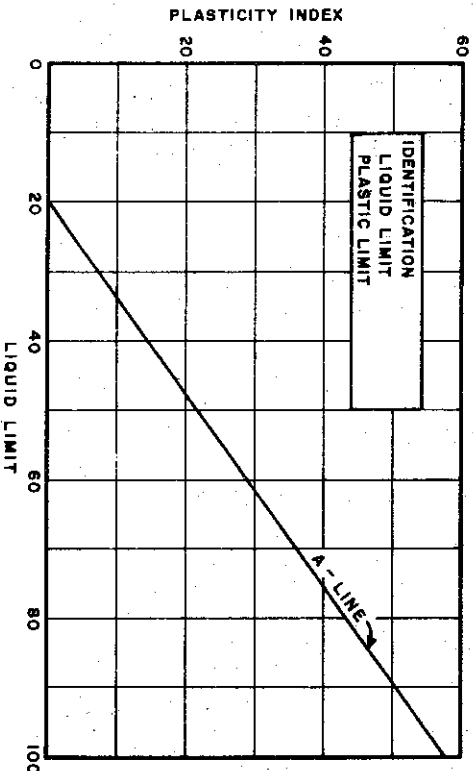
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



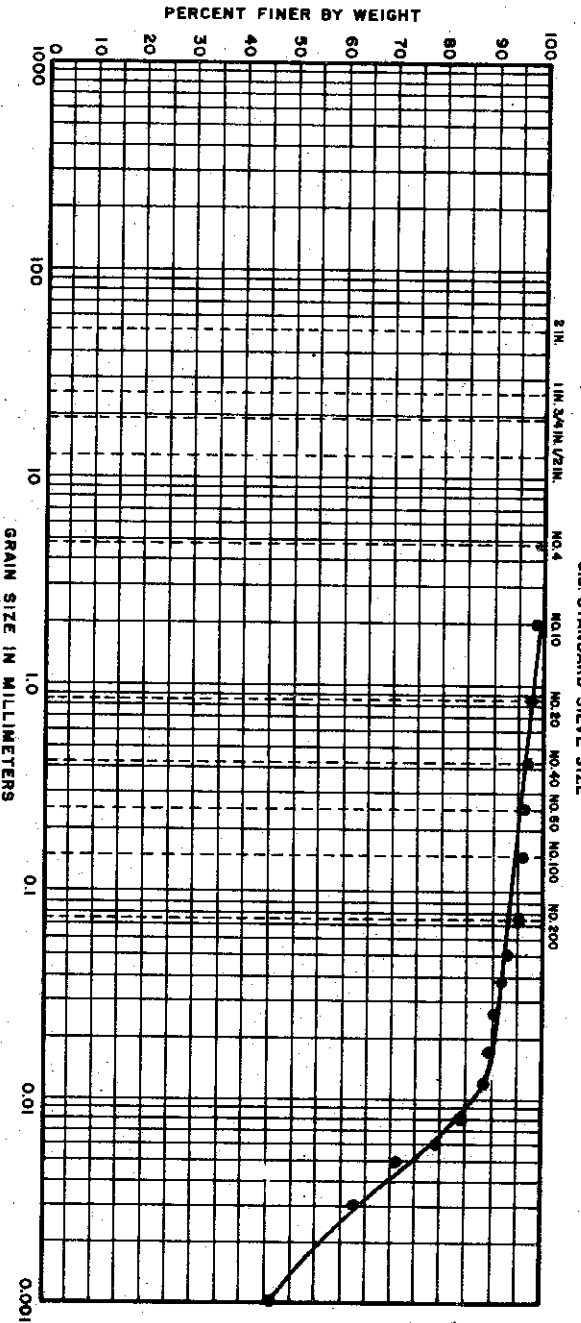
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 48  
 SAMPLE : 4  
 DEPTH : 8' - 10'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

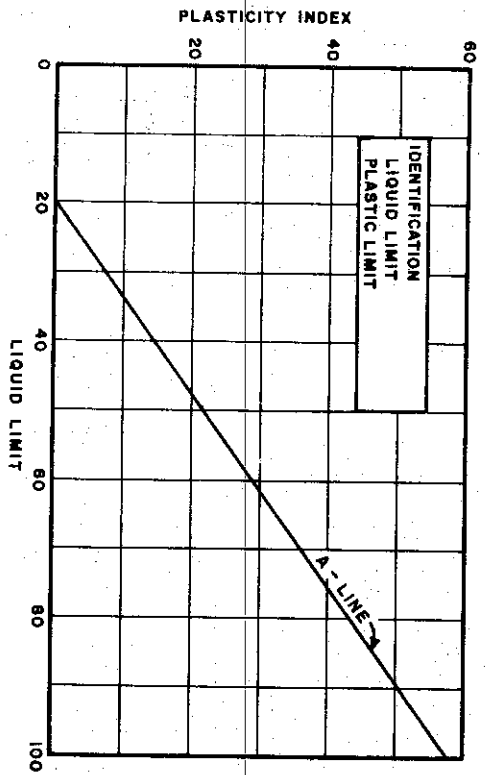
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 48  
 SAMPLE : 26  
 DEPTH : 118' - 120.6'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

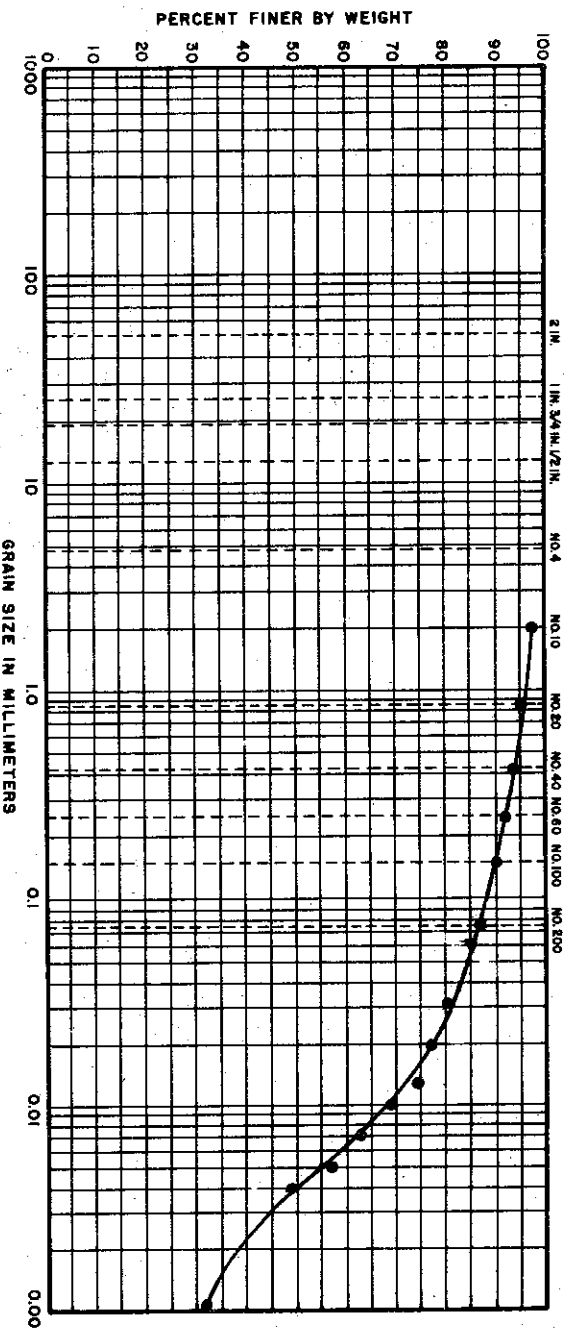
C-622

FILE NO. 1255

DATE MARCH 74

### GRAIN SIZE DISTRIBUTION

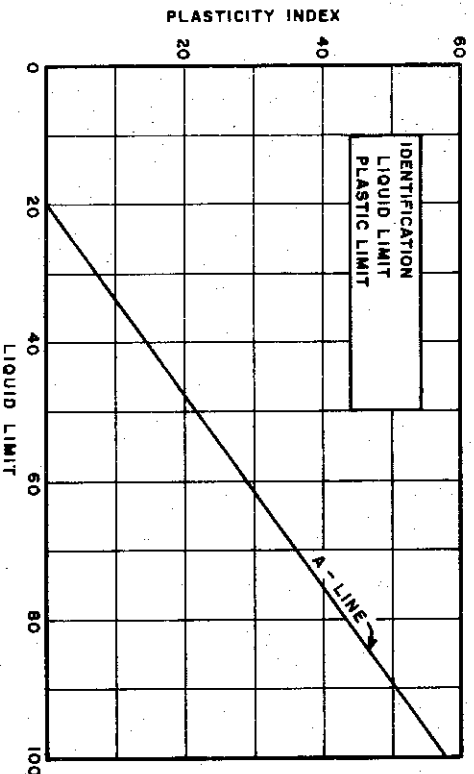
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

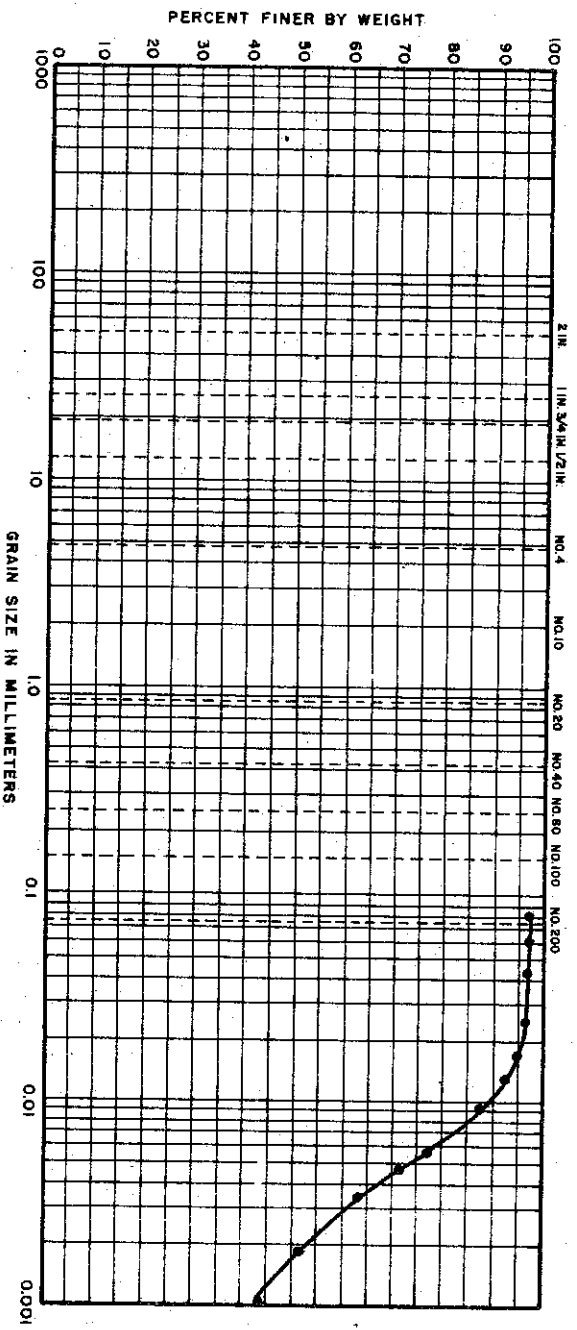
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 49  
 SAMPLE: 7  
 DEPTH: 53' - 55'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

# GRAIN SIZE DISTRIBUTION

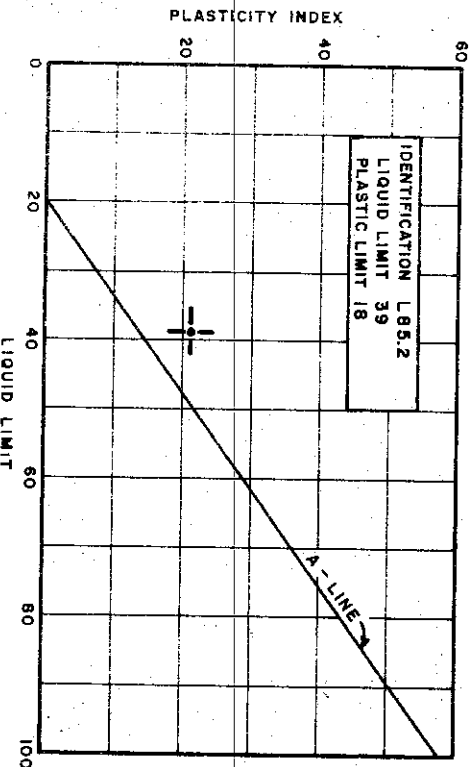
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

# PLASTICITY CHART (COHESIVE SOIL ONLY)



# MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 6  
 DEPTH: 28.3' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

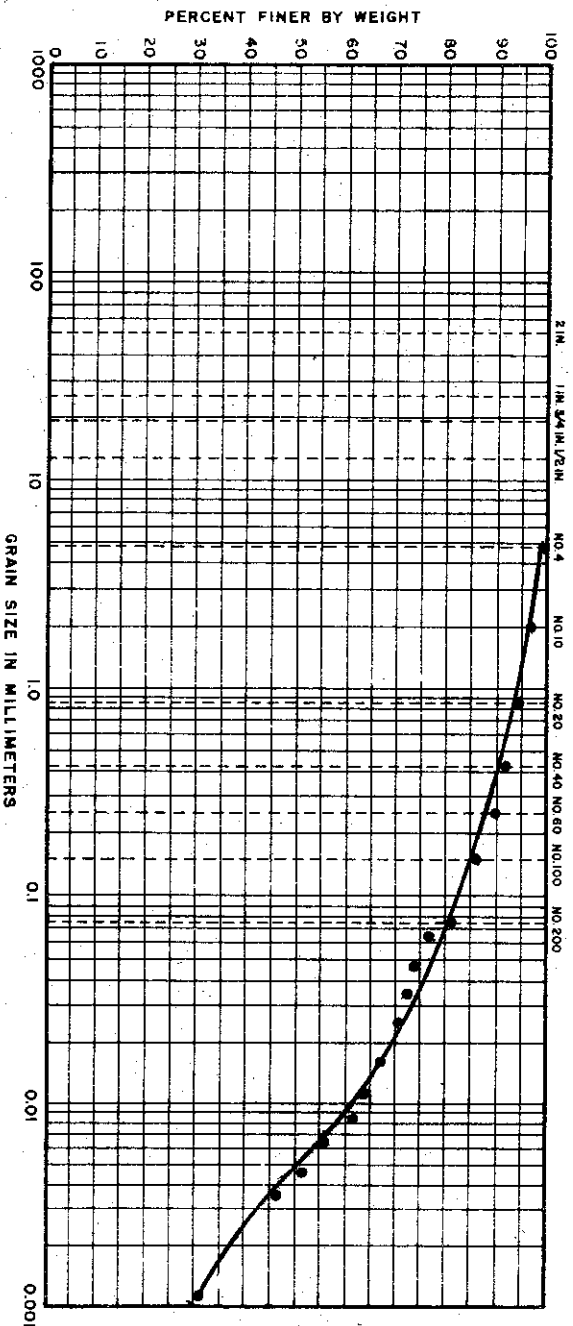
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-624

FILE NO. 1255  
 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION

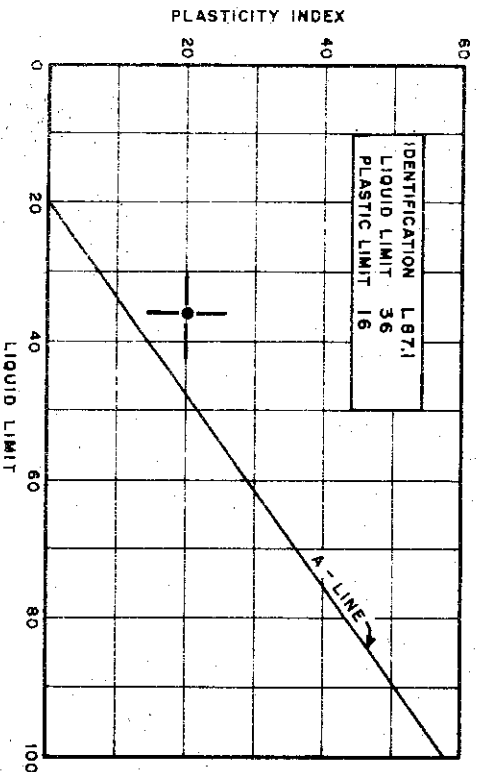
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

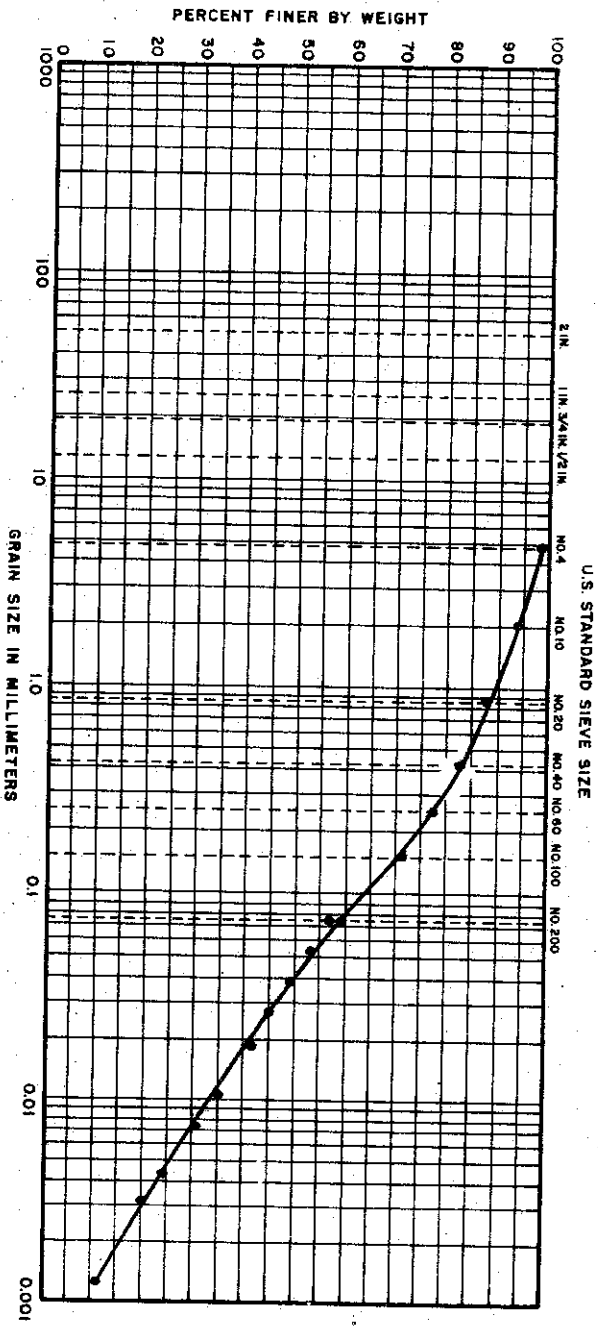


### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 50  
 SAMPLE: 10  
 DEPTH: 48.6' TO 48.8'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

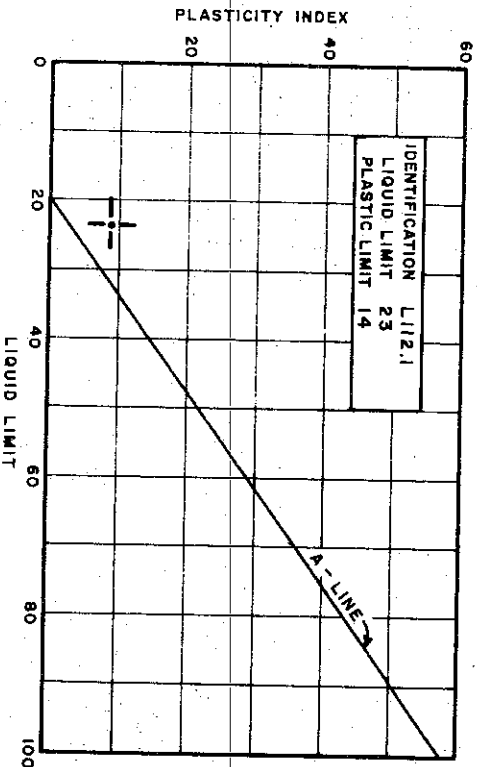
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

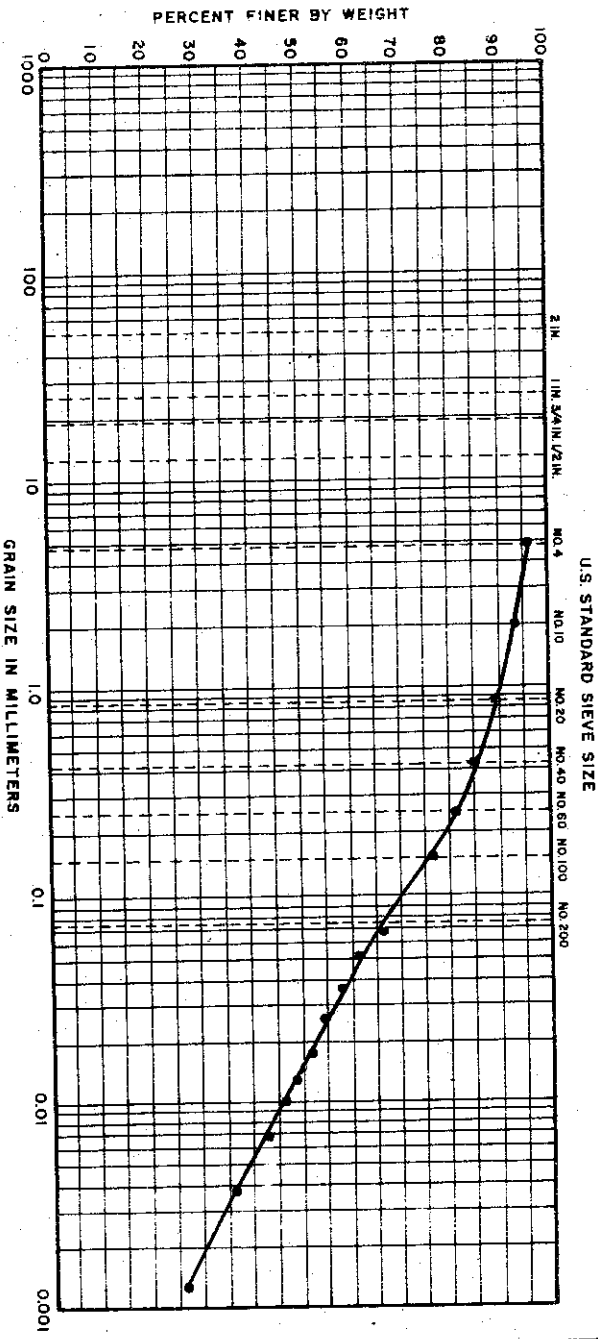
IDENTIFICATION : SILTY CLAY, SANDY (CL.)  
 EXPLORATION: BORING 52  
 SAMPLE : 7  
 DEPTH : 58.6' TO 58.9'  
 SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-626



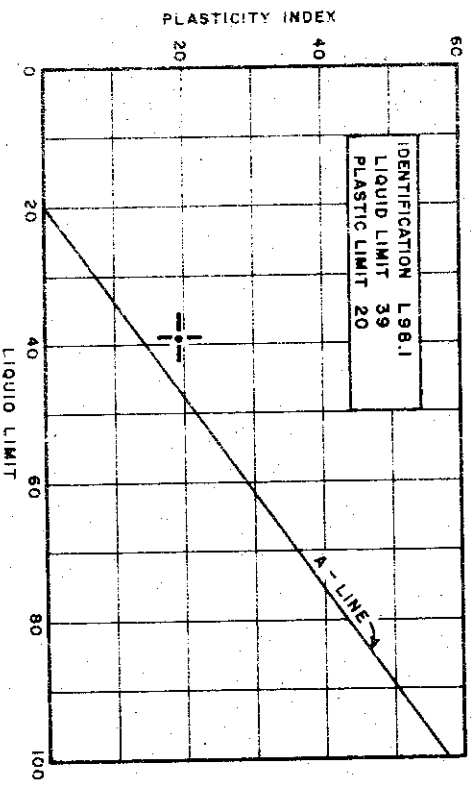
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND				SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

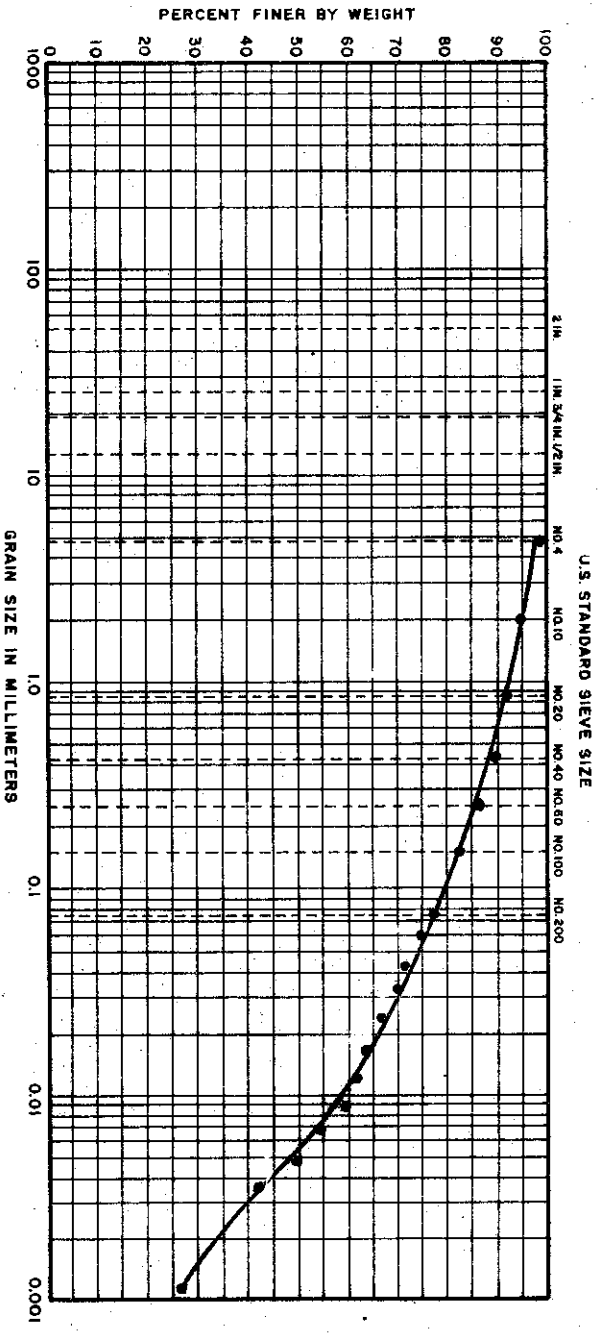


### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING: 53  
 SAMPLE: 5  
 DEPTH: 39.8' TO 39.8'  
 SPECIFIC GRAVITY: 2.72

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

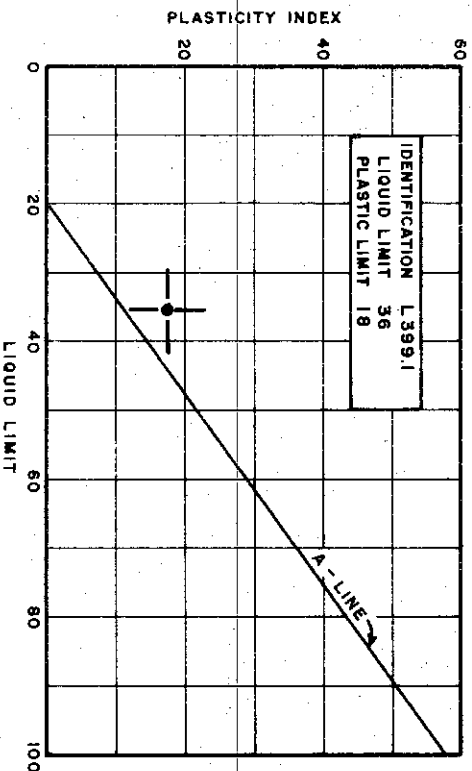
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

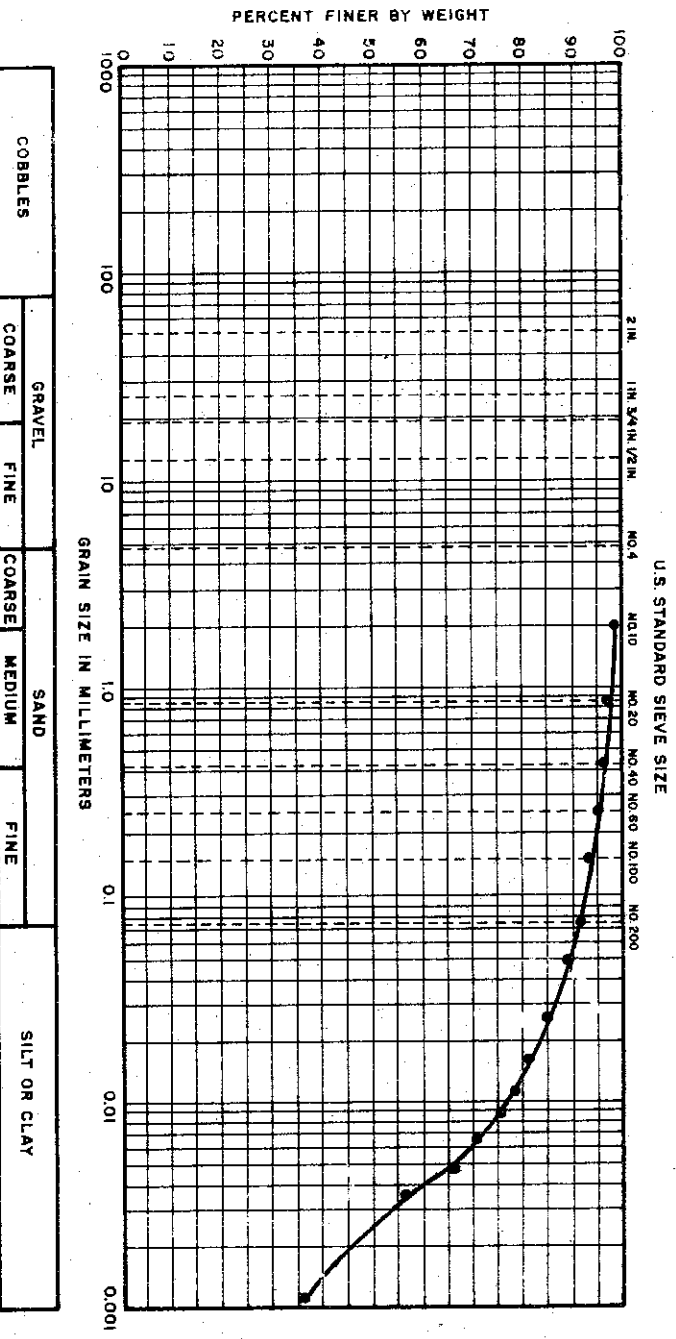
IDENTIFICATION: SILTY CLAY, SANDY (CL)  
 EXPLORATION: BORING 54  
 SAMPLE: 6  
 DEPTH: 63.5' TO 63.8'  
 SPECIFIC GRAVITY: 2.71

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

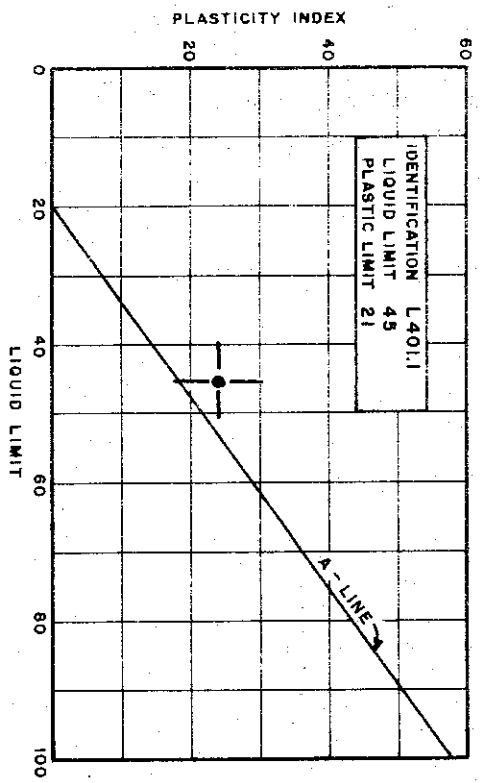
C-628

FILE NO. 1255 DATE JULY 1974

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

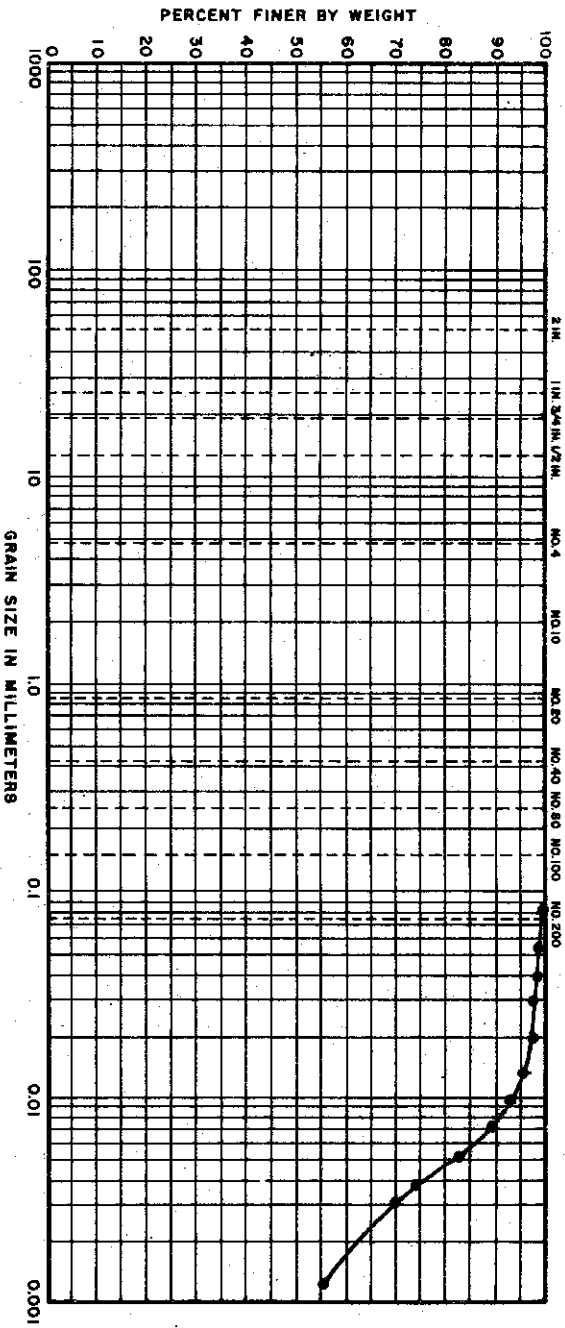
IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 54  
 SAMPLE: 8  
 DEPTH: 73.7' TO 74.0'  
 SPECIFIC GRAVITY: 2.73

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

# GRAIN SIZE DISTRIBUTION

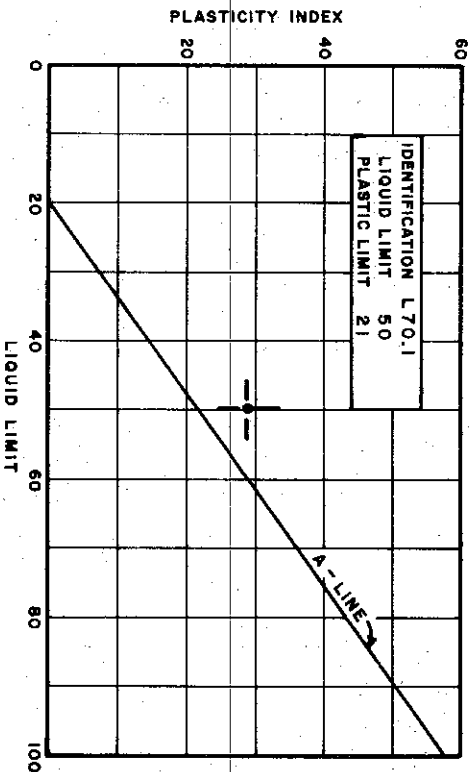
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND		SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

# PLASTICITY CHART (COHESIVE SOIL ONLY)



## MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL - CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS1  
 DEPTH : 5.0' TO 6.5'  
 SPECIFIC GRAVITY : USED 2.70

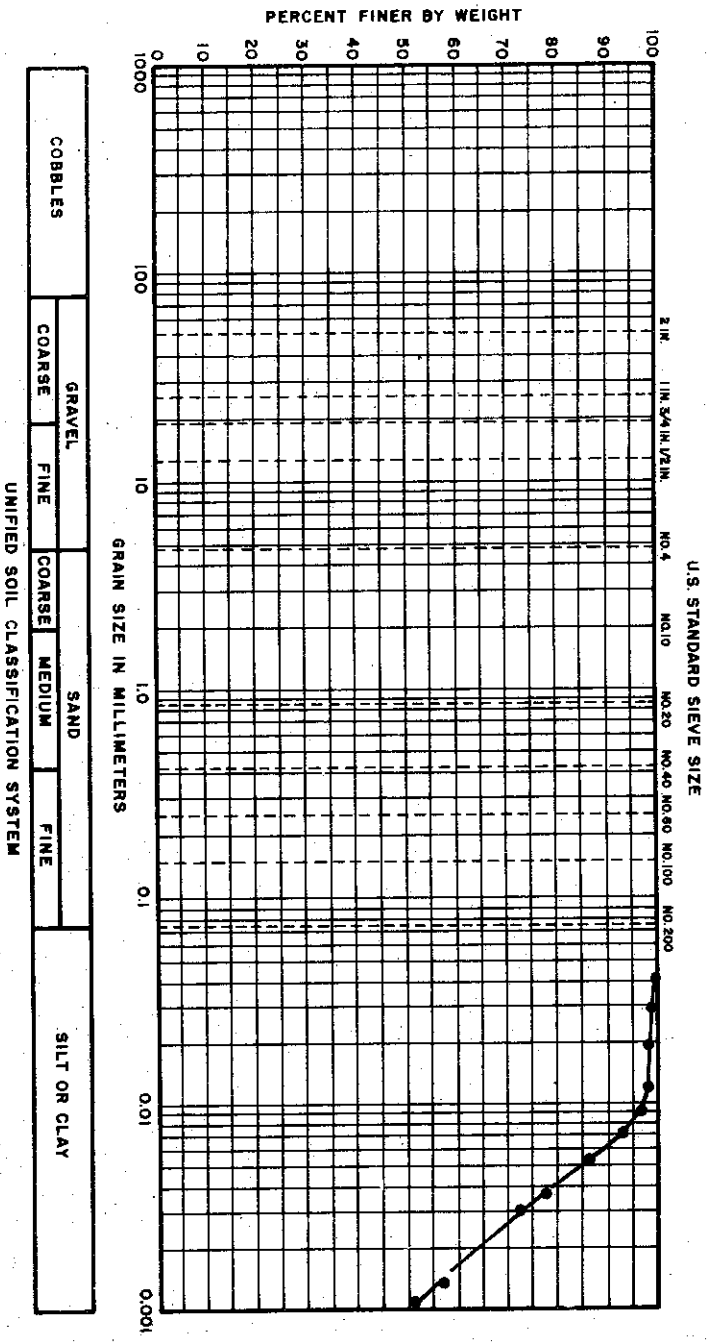
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-630

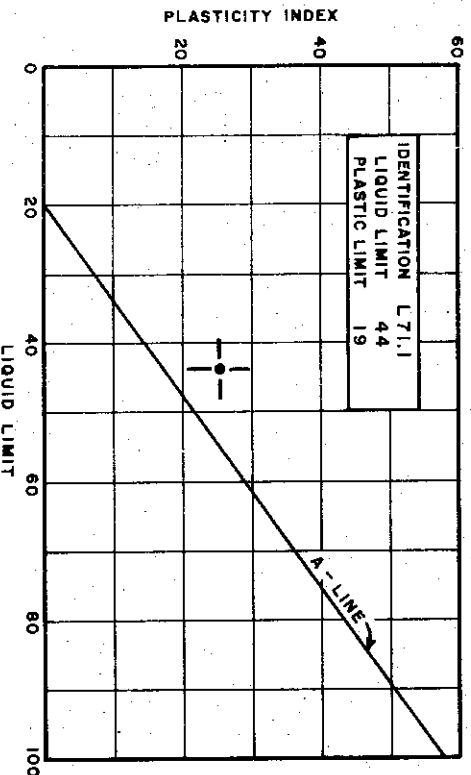
FILE NO. 1255

DATE JAN. 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)

EXPLORATION: BORING 60

SAMPLE : SS2

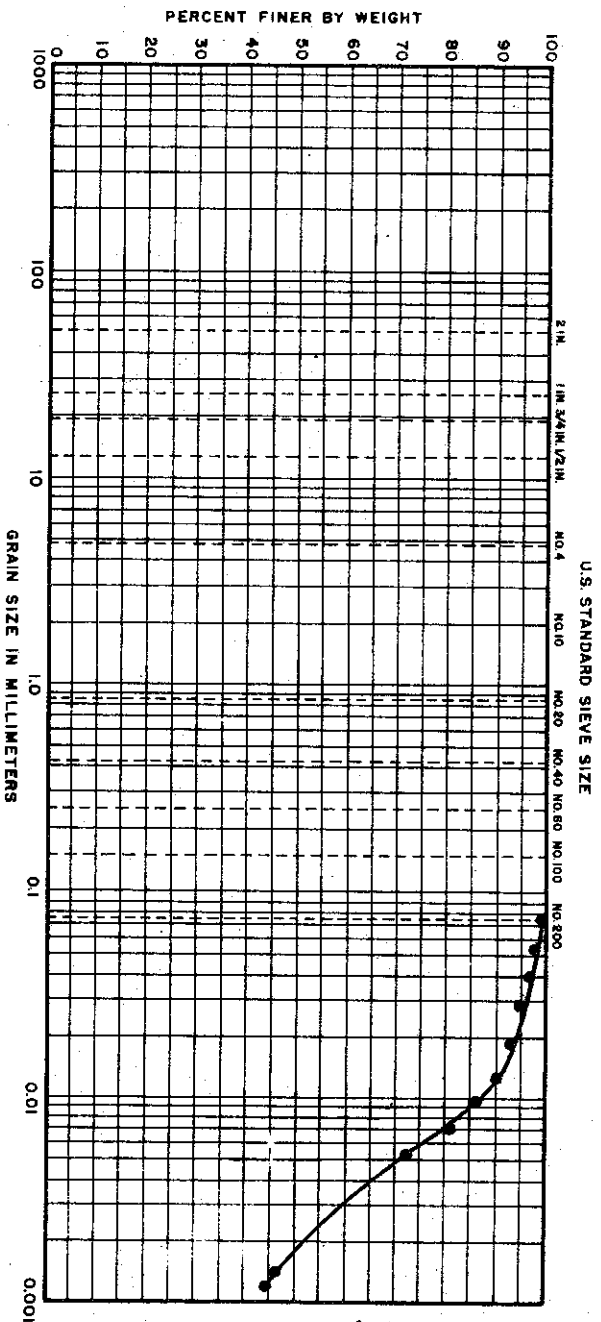
DEPTH : 10' TO 12.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

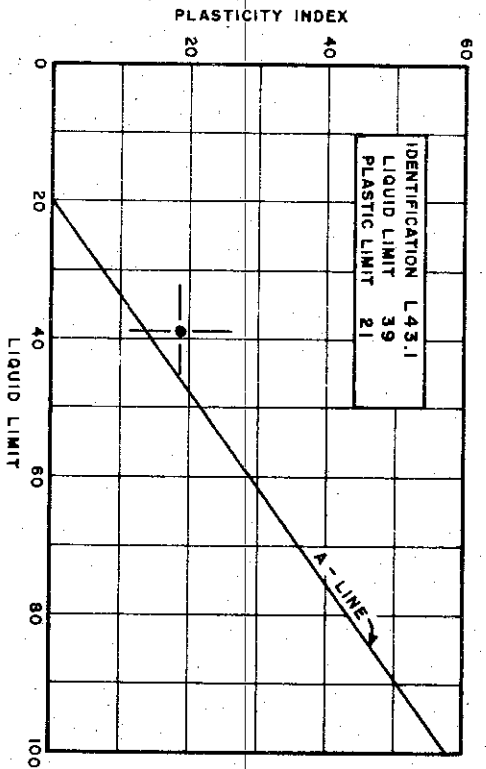
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE: 3  
 DEPTH: 18.1' TO 18.3'  
 SPECIFIC GRAVITY ASSUMED 2.70

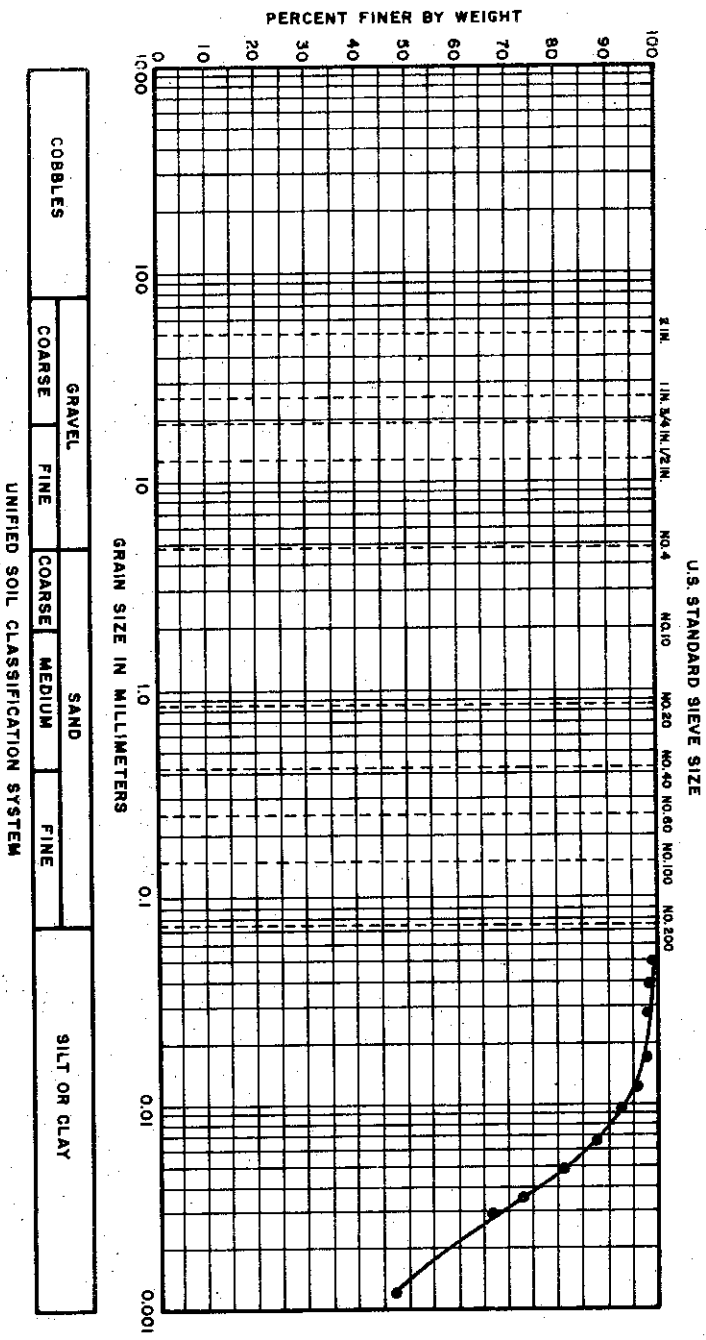
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-632

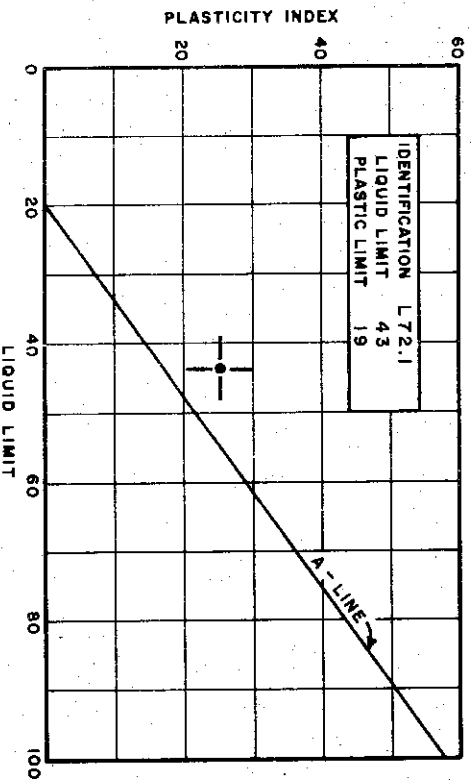
FILE NO. 1255

DATE MARCH 74

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

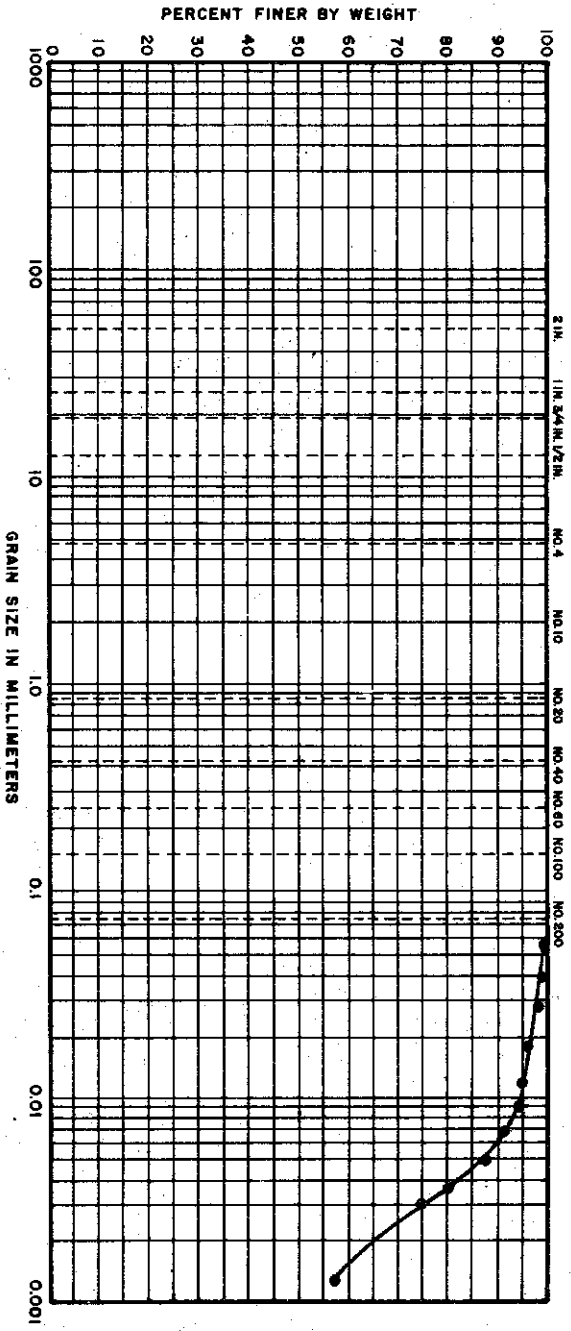
IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 553  
 DEPTH : 19' TO 20.5'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

### GRAIN SIZE DISTRIBUTION

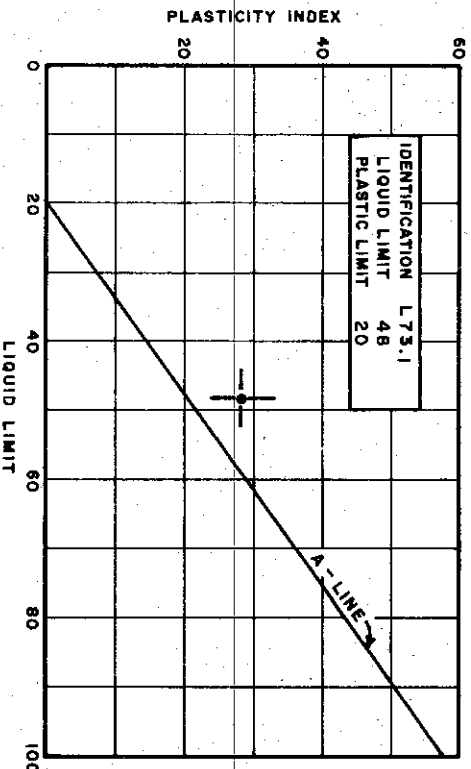
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 60  
 SAMPLE : SS 5  
 DEPTH : 27' TO 28.5'  
 SPECIFIC GRAVITY: USED 2.70

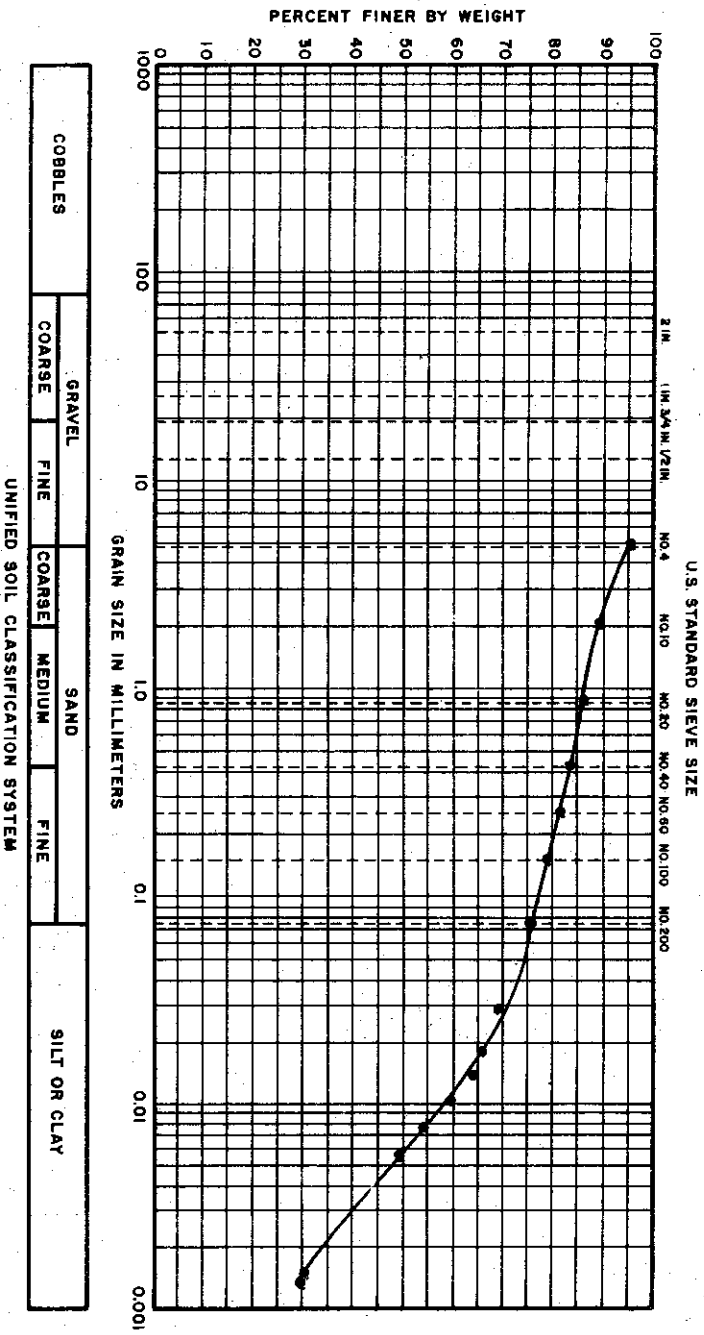
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-634

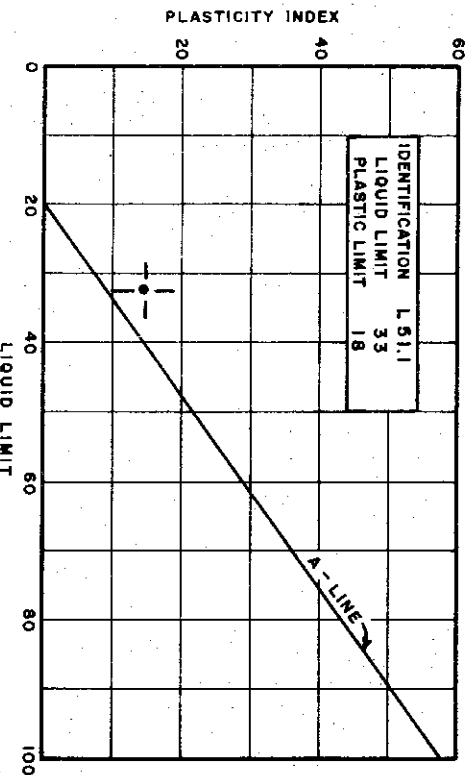
FILE NO. 1255 DATE JAN. 74



### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



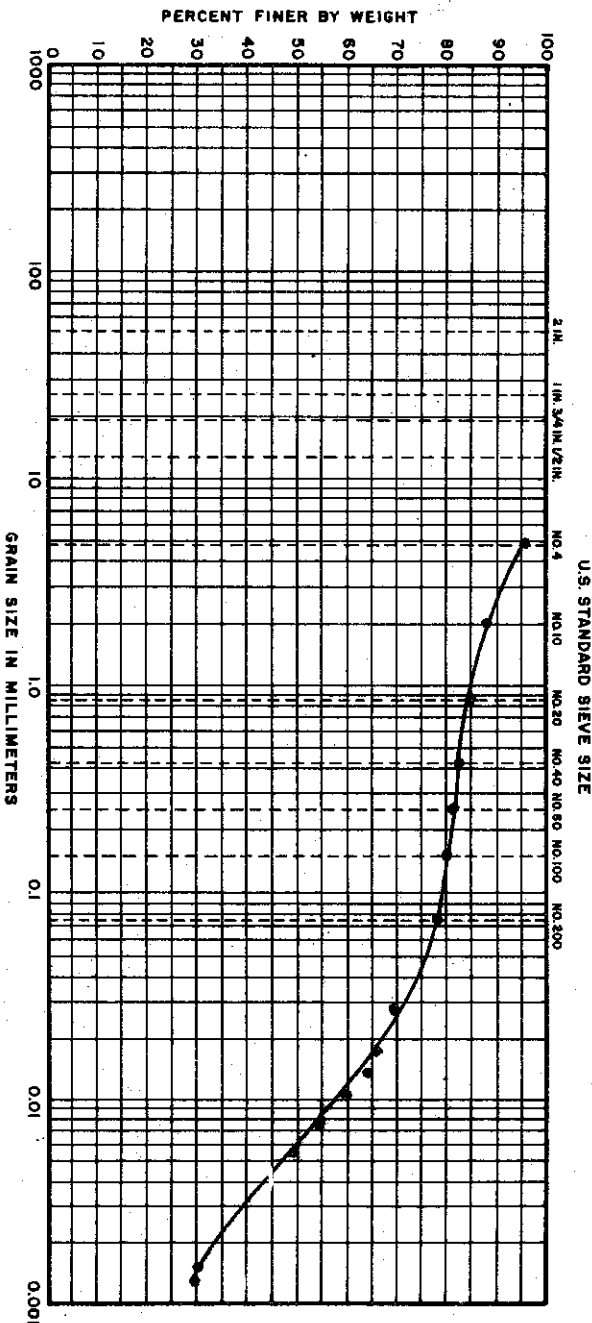
### MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 11  
 DEPTH : 56.1' TO 56.4'  
 SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255  
 DATE MARCH 74

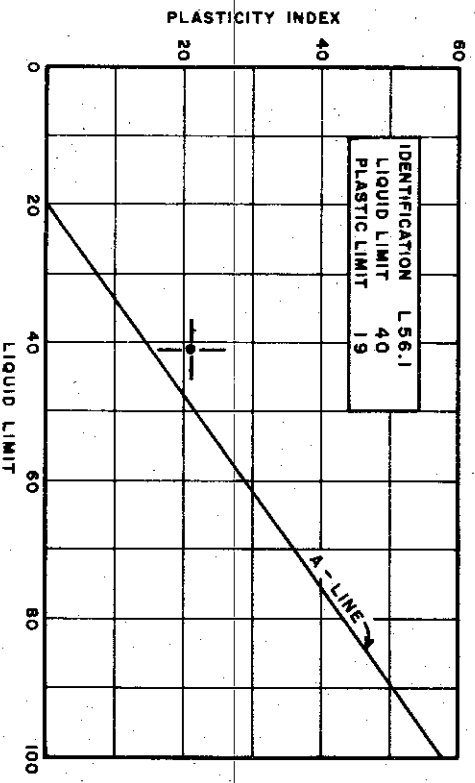
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 60  
 SAMPLE : 16  
 DEPTH : 85.6' TO 86.1'  
 SPECIFIC GRAVITY 2.73

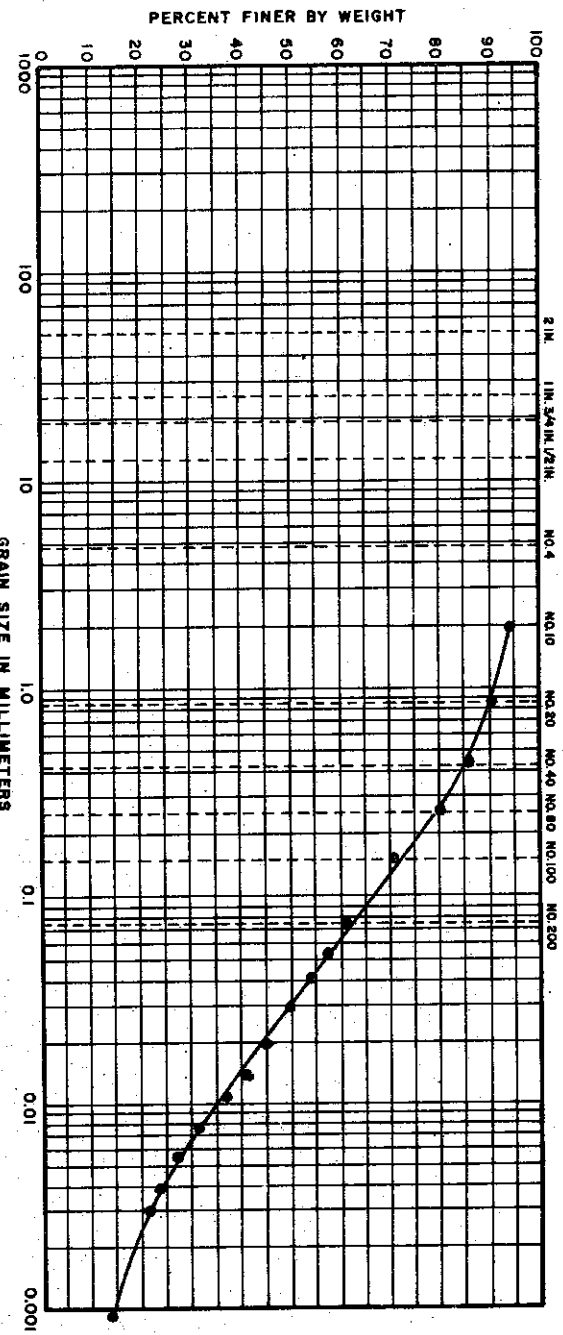
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-636

FILE NO. 1255 DATE MARCH 74

### GRAIN SIZE DISTRIBUTION

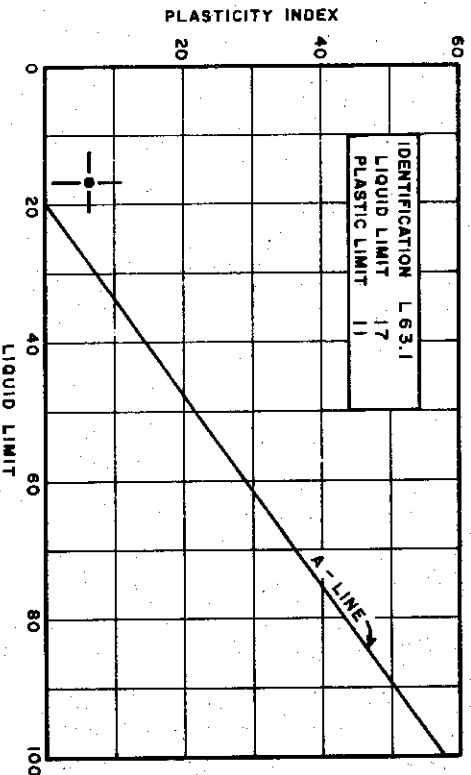
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION L 63.1  
LIQUID LIMIT 17  
PLASTIC LIMIT 11

### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)

EXPLORATION: BORING 60

SAMPLE : 23

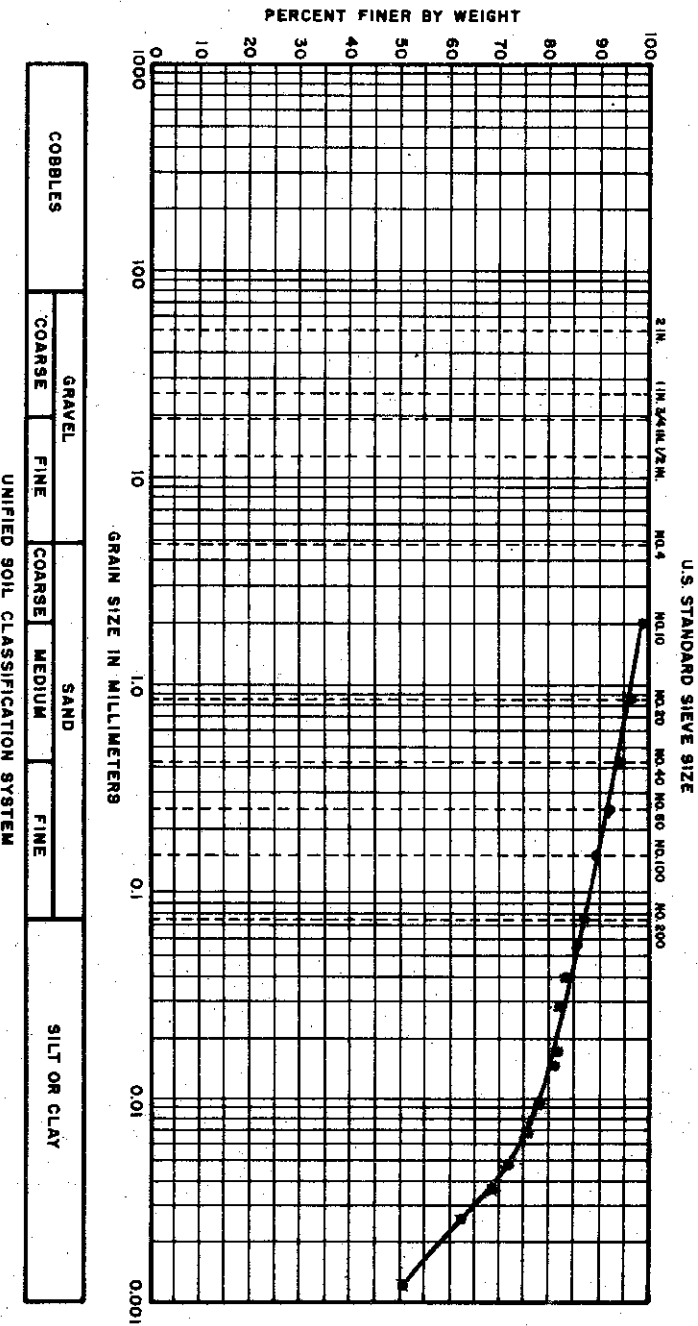
DEPTH : 119.5' TO 119.9'

SPECIFIC GRAVITY : USED 2.70

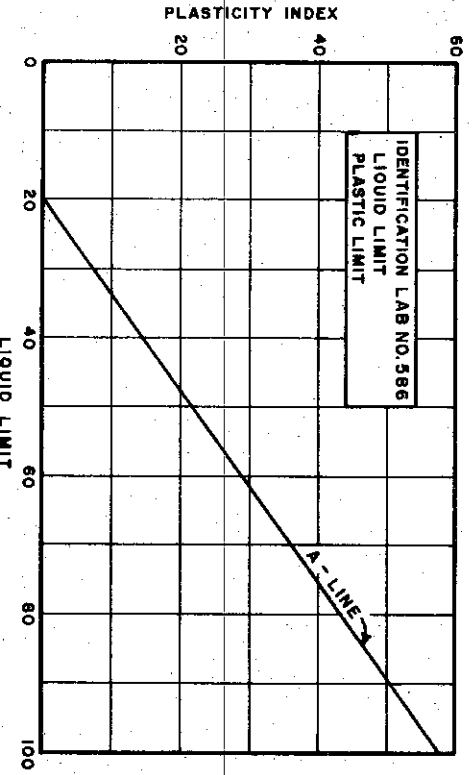
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

# GRAIN SIZE DISTRIBUTION



## PLASTICITY CHART (COHESIVE SOIL ONLY)



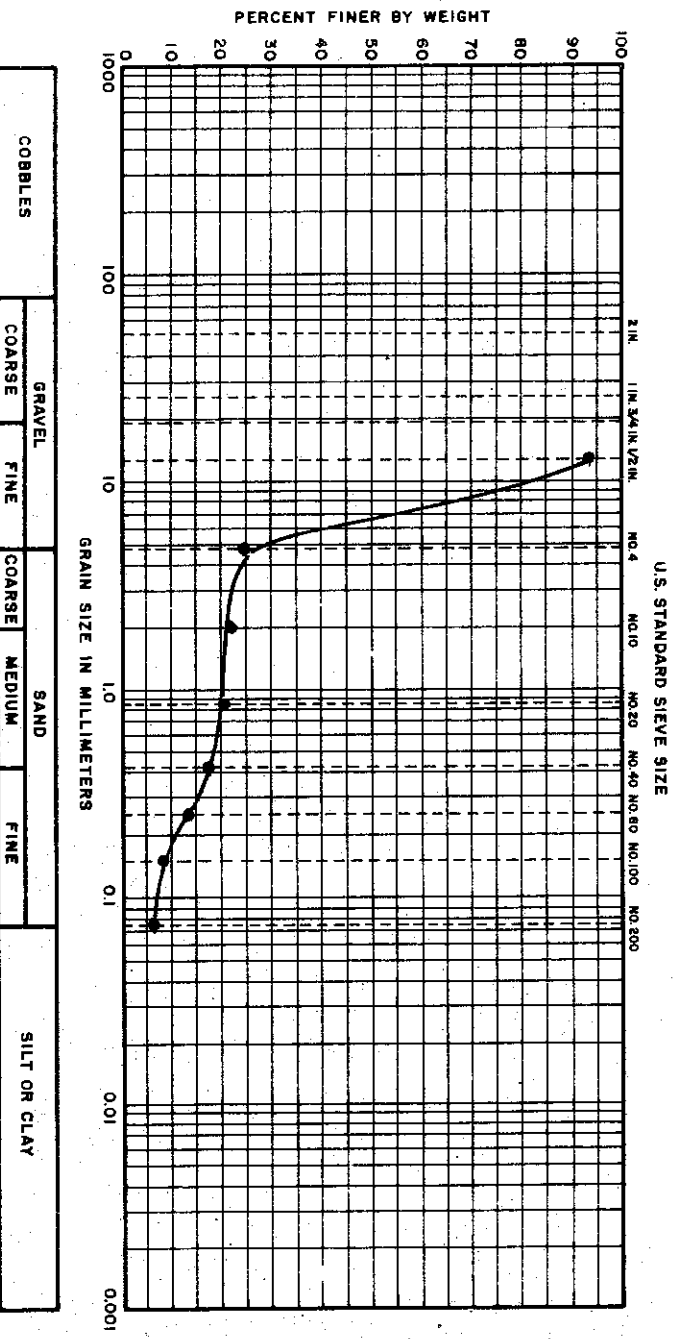
### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)  
EXPLORATION: BORING 137  
SAMPLE : SS1  
DEPTH : 1.5' TO 3.0'  
SPECIFIC GRAVITY : USED 2.70

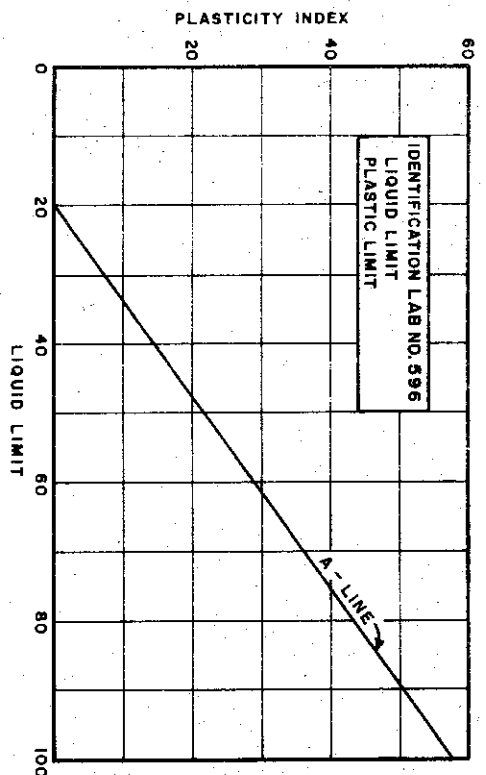
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-638

### GRAIN SIZE DISTRIBUTION



PLASTICITY CHART  
(COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : GRAVEL (GP)  
EXPLORATION: BORING 139  
SAMPLE : SS22  
DEPTH : 99.5' TO 101.0'

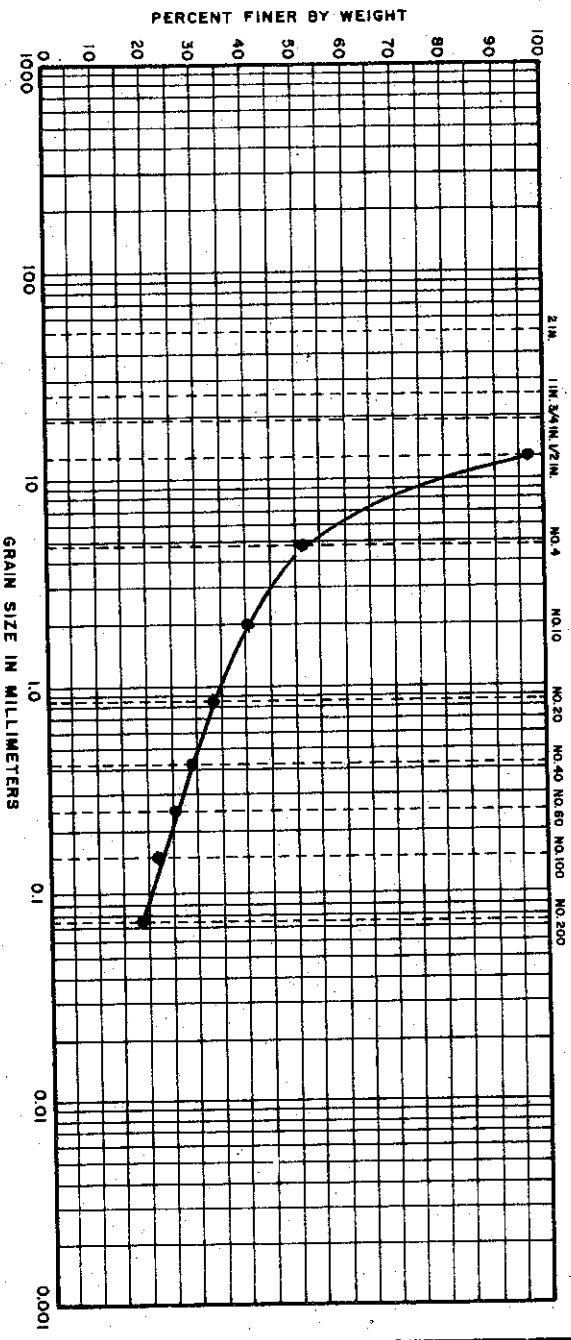
SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

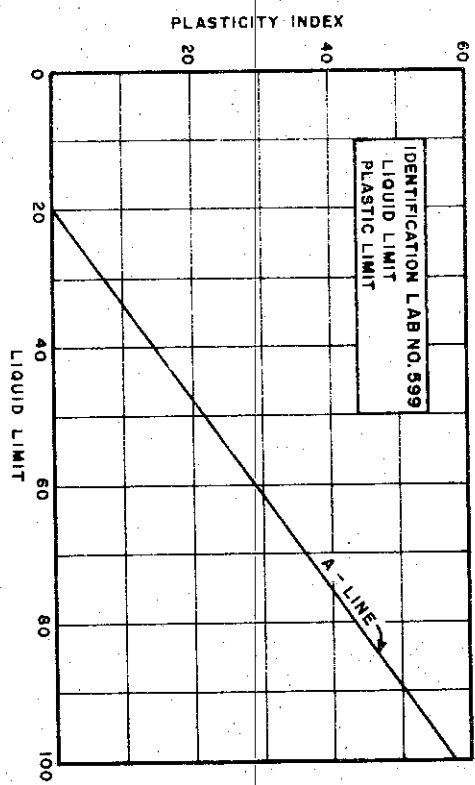
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



IDENTIFICATION LAB NO. 599  
LIQUID LIMIT  
PLASTIC LIMIT

### MATERIAL SOURCE

IDENTIFICATION : SANDY GRAVEL (GM)  
EXPLORATION: BORING 141  
SAMPLE : SS21  
DEPTH : 114.6' TO 116.0'  
SPECIFIC GRAVITY

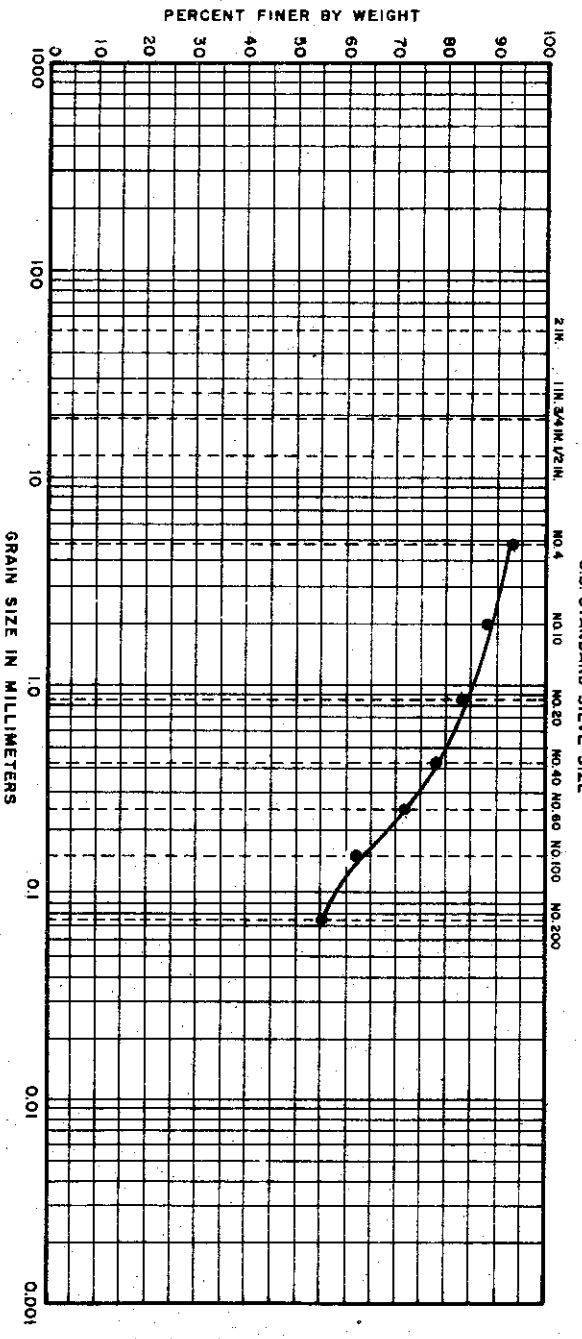
THE DETROIT EDISON COMPANY  
BELLE RIVER PLANT UNITS I & II  
SOIL CLASSIFICATION TESTS

C-640

FILE NO. 1255

DATE NOV. 1974

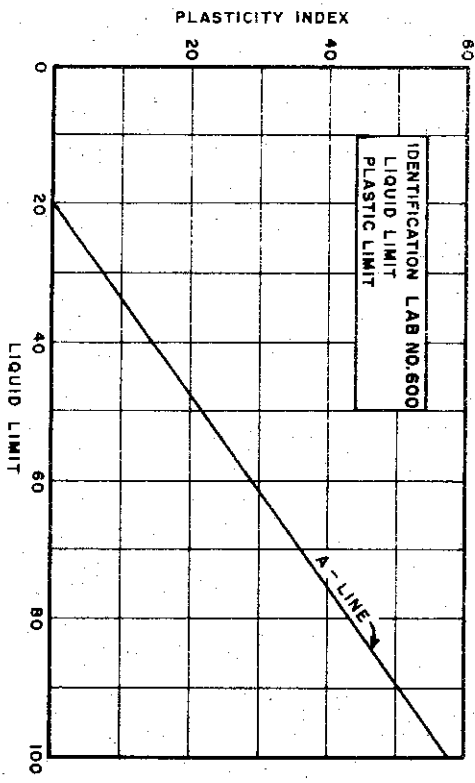
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

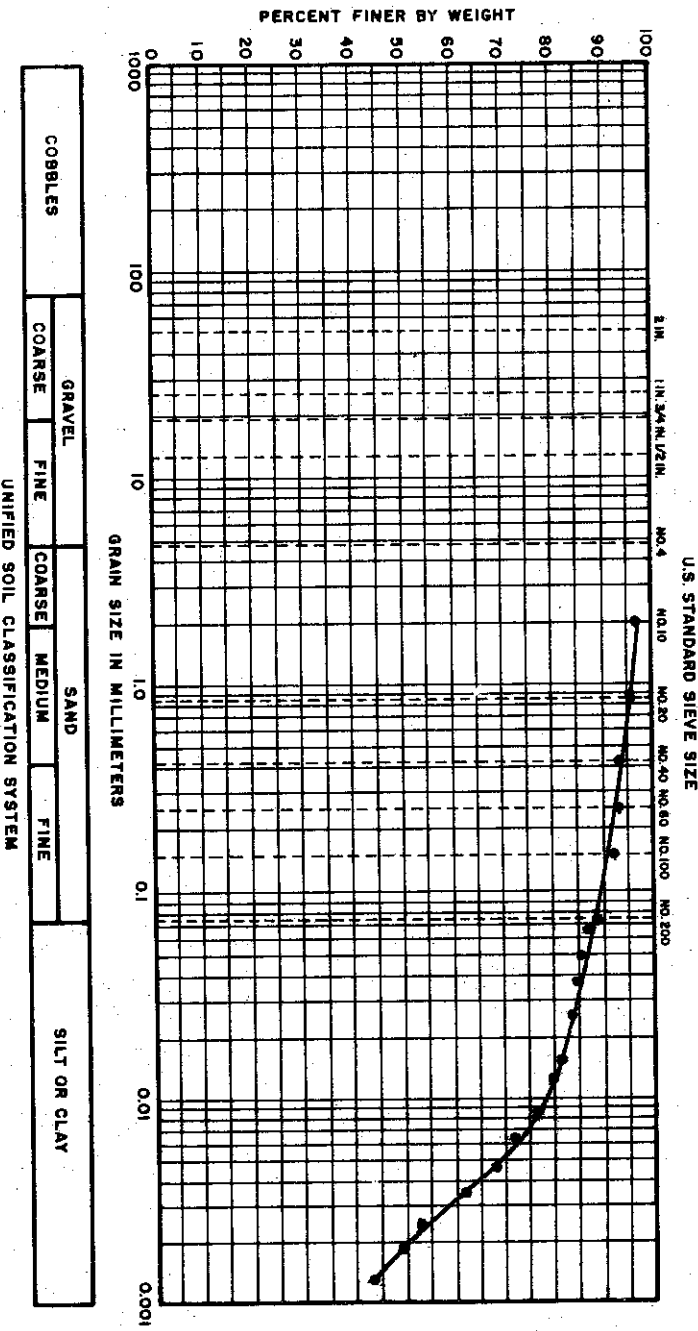


### MATERIAL SOURCE

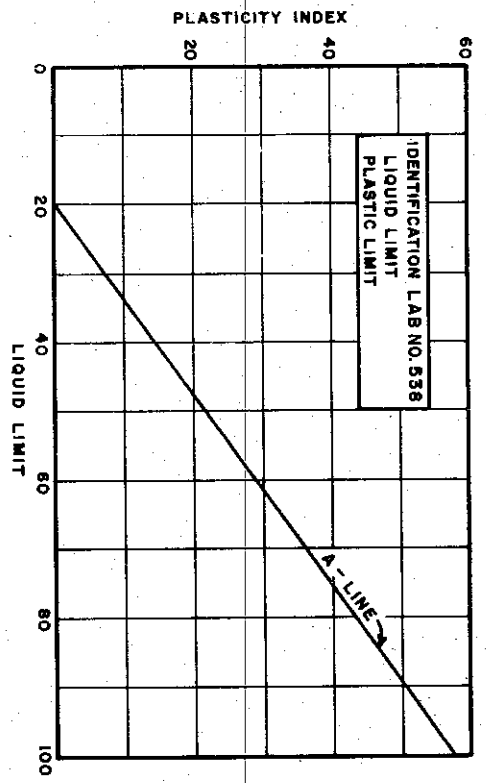
IDENTIFICATION: SANDY CLAY (SM-SC)  
 EXPLORATION: BORING 141  
 SAMPLE: SS27  
 DEPTH: 144.5' TO 146.0'  
 SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

### GRAIN SIZE DISTRIBUTION



### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)  
 EXPLORATION: BORING 144  
 SAMPLE : 6  
 DEPTH : 13.8' TO 14.1'  
 SPECIFIC GRAVITY : USED 2.70

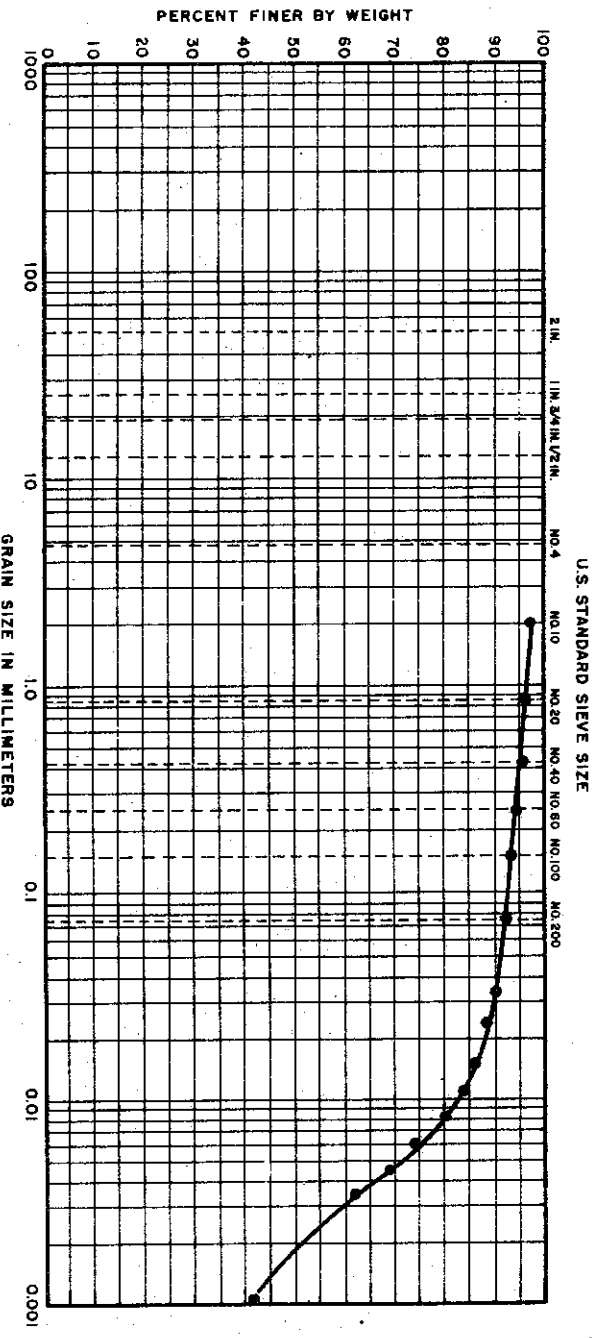
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

C-642

FILE NO. 1255 DATE NOV. 1974



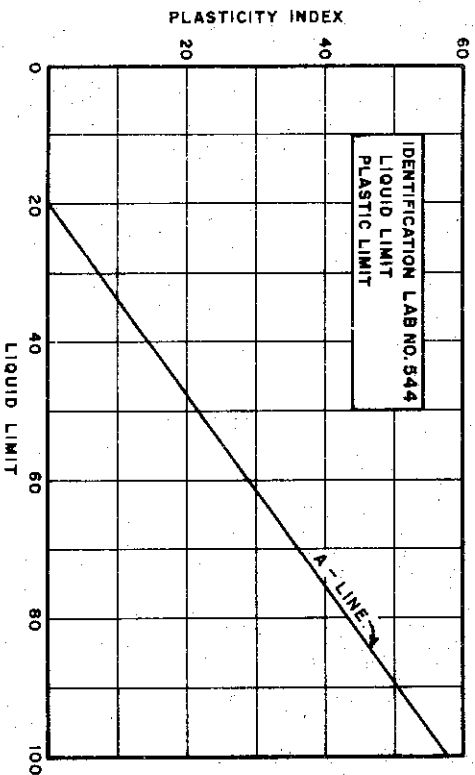
### GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)



### MATERIAL SOURCE

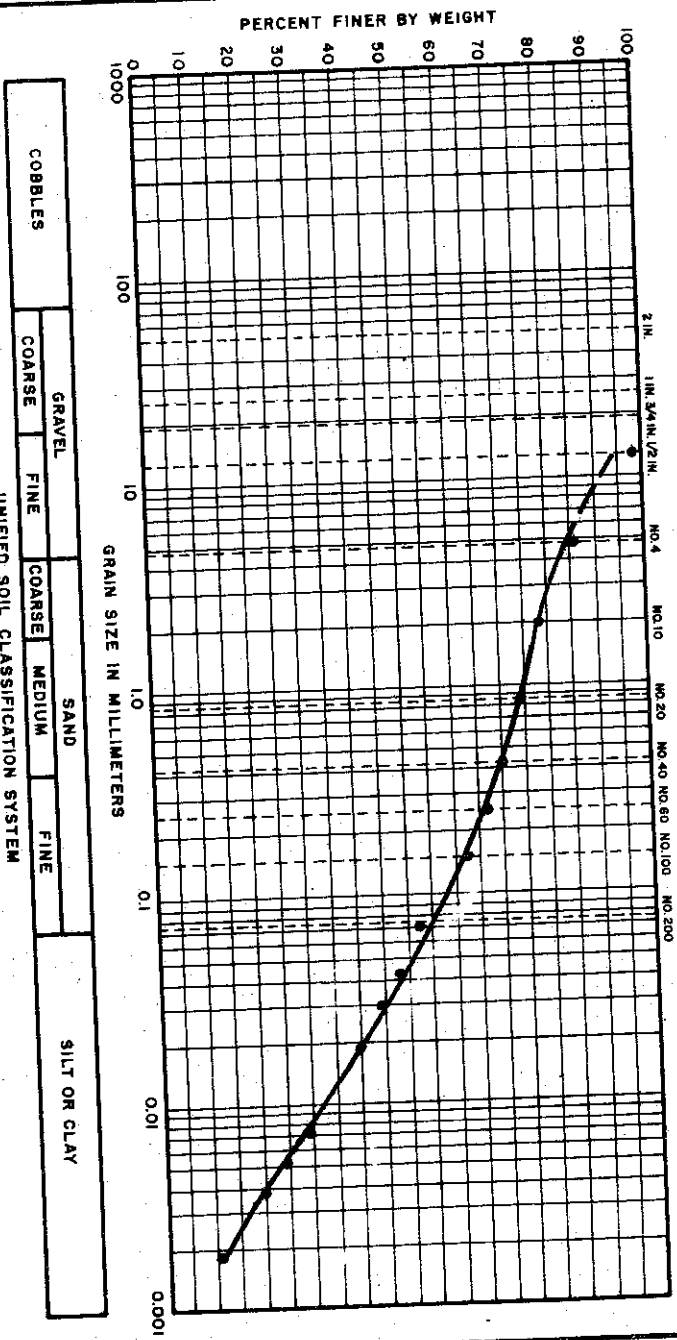
IDENTIFICATION : SILTY CLAY (CL-CH)  
 EXPLORATION: BORING 151A  
 SAMPLE : 2  
 DEPTH : 7.7' TO 8.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

### GRAIN SIZE DISTRIBUTION

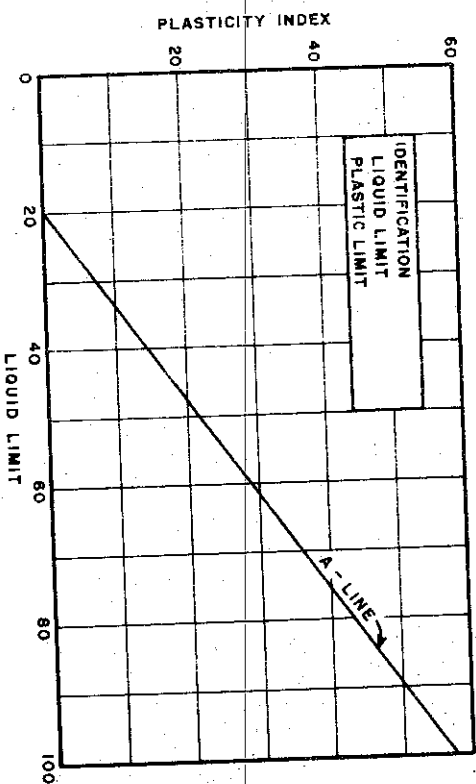
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

### PLASTICITY CHART (COHESIVE SOIL ONLY)

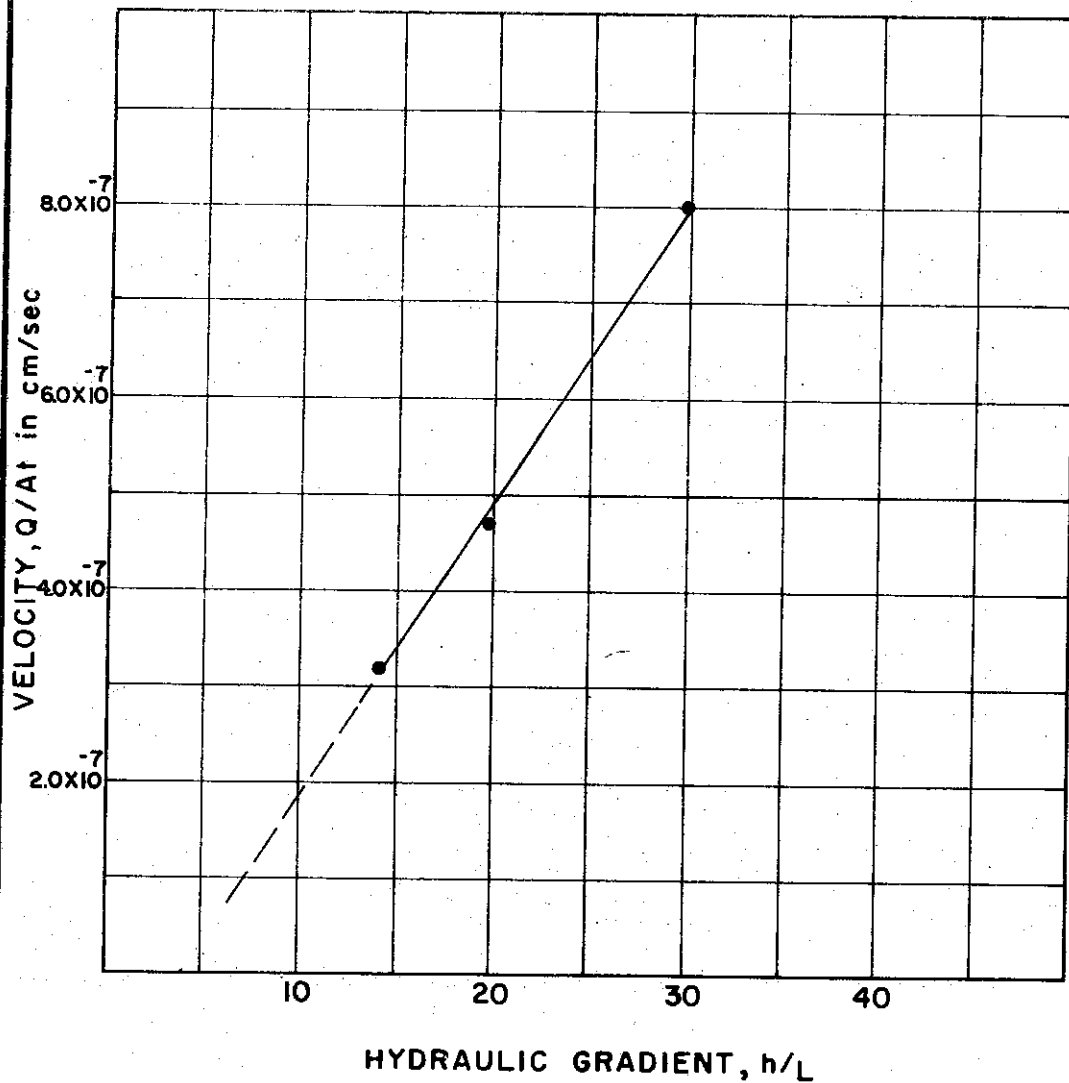


### MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-MI)  
 EXPLORATION: BORING 187  
 SAMPLE : SS14  
 DEPTH : 59.5' TO 60.0'  
 SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.875

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 84 pcf  
 INITIAL WATER CONTENT 37.2 % INITIAL VOID RATIO 1.002  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 18 %

### TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
				1.50	1.50	1.50
CONSOLIDATION PRESSURE $\frac{kg}{cm^2}$	$\bar{\sigma}$		1.50	1.50	1.50	1.50
BACK PRESSURE TOP $\frac{kg}{cm^2}$	$u_{top}$			2.841	2.854	2.876
BACK PRESSURE BOTTOM $\frac{kg}{cm^2}$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.39	2.39	2.39	2.39
HYDRAULIC GRADIENT	i			14.72	20.6	29.44
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.94	4.00	6.85
TIME OF DISCHARGE sec	t			190,800	266,400	270,000
PERMEABILITY $cm/sec$	k			$2.18 \times 10^{-8}$	$2.30 \times 10^{-8}$	$2.72 \times 10^{-8}$

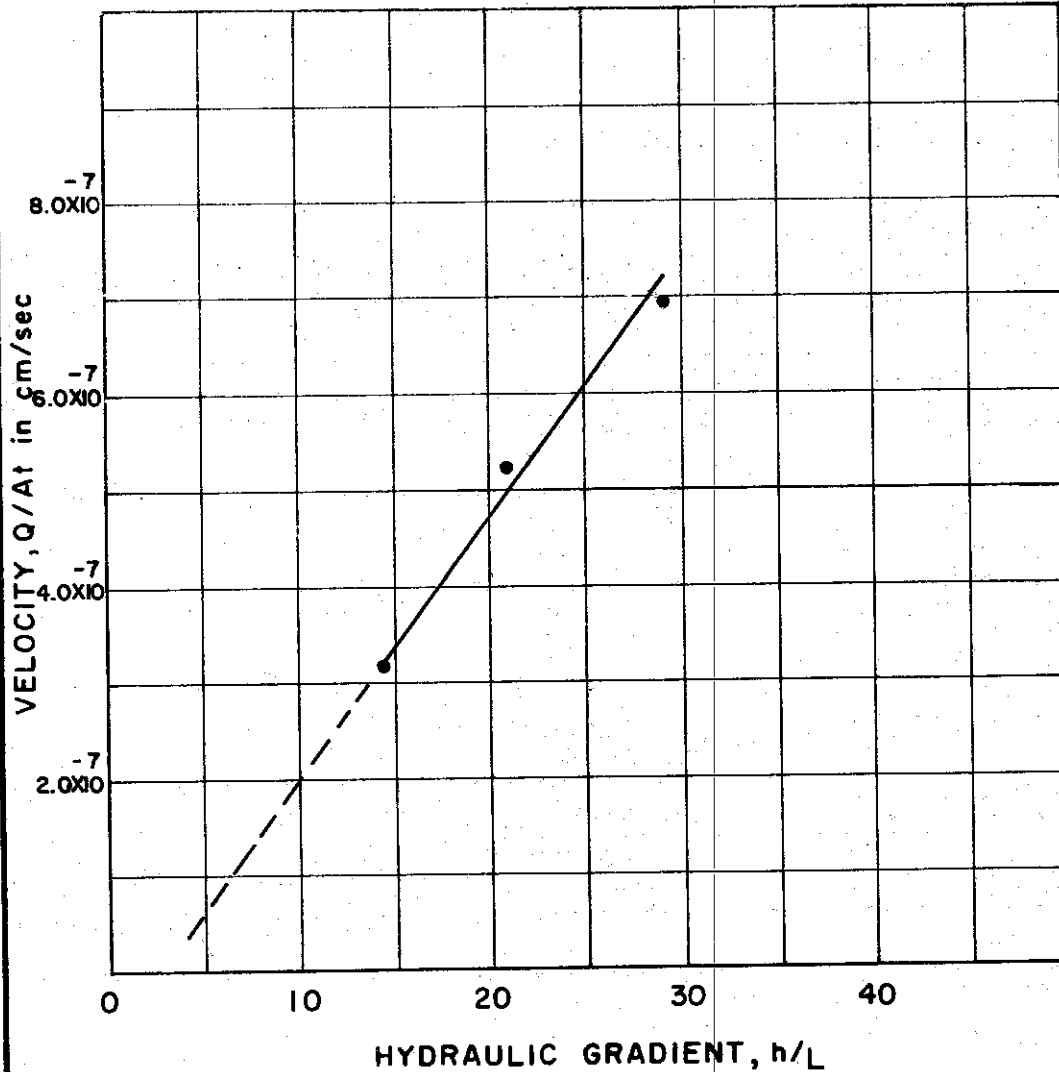
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50  
 SAMPLE NO. 6  
 DEPTH 28.3' TO 28.5'

TEST NO. k 85.1  
 DATE JULY 74

FILE 1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.645

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 97 pcf  
 INITIAL WATER CONTENT 26.9 % INITIAL VOID RATIO 0.730  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 16 %

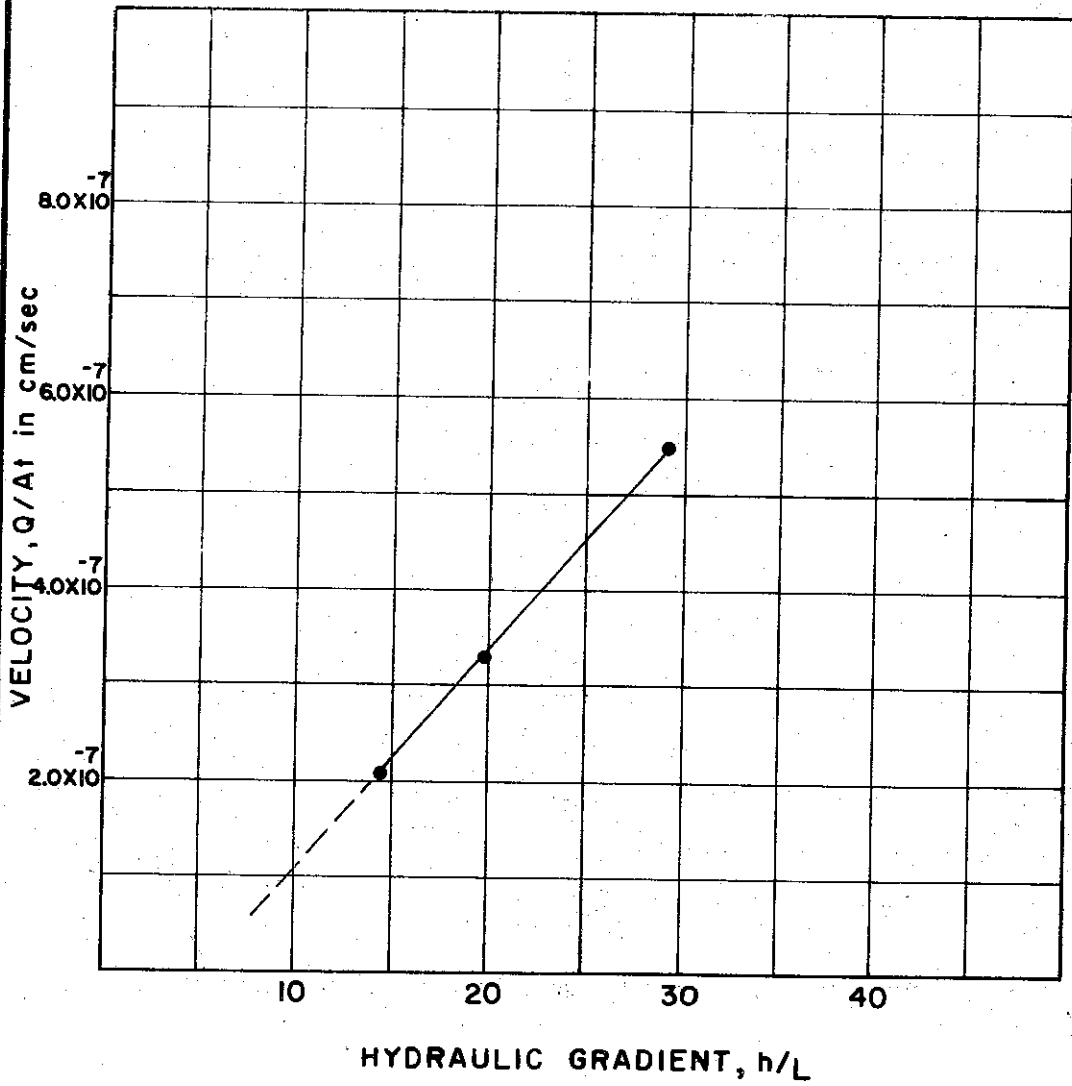
**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_1$ kg/cm <sup>2</sup>			2.00	2.00	2.00	2.00
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.847	2.862	2.883
BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT i				14.52	20.31	29.00
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.94	1.38	1.66
TIME OF DISCHARGE sec. t				93,600	82,800	75,600
PERMEABILITY cm/sec k				<sup>-8</sup> 2.18x10	<sup>-8</sup> 2.58x10	<sup>-8</sup> 2.39x10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 50  
 SAMPLE NO. 10  
 DEPTH 48.6 TO 48.8

TEST NO. K 87.1  
 DATE JULY 1974



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.374

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 119 pcf  
 INITIAL WATER CONTENT 15.1 % INITIAL VOID RATIO 0.411  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 23 % PLASTIC LIMIT 14 %

**TEST DATA**

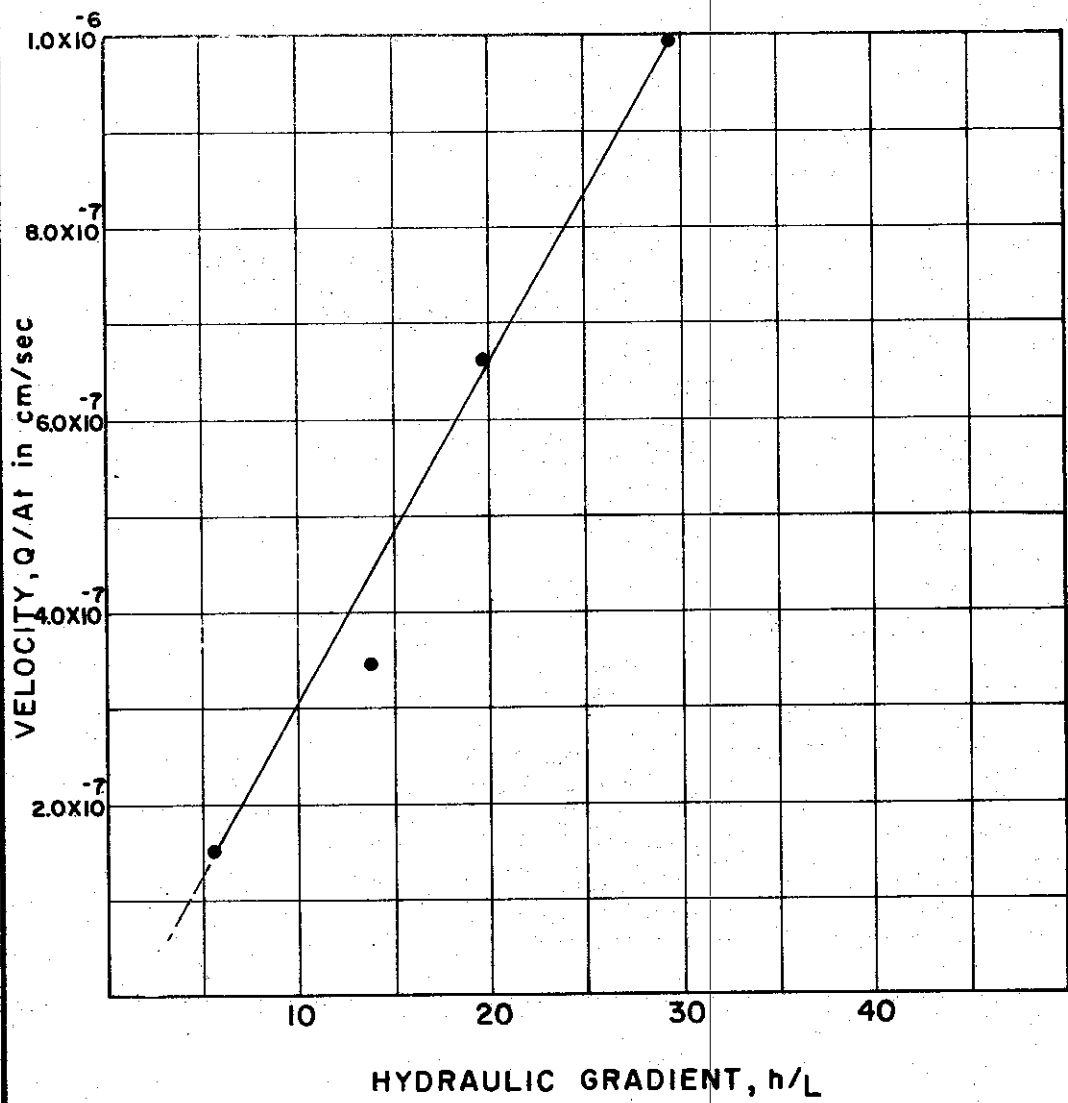
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\text{kg/cm}^2$	$\bar{\sigma}$		2.30	2.30	2.30	2.30
BACK PRESSURE TOP $\text{kg/cm}^2$	$u_{top}$			2.841	2.854	2.876
BOTTOM $\text{kg/cm}^2$	$u_{bot}$			2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.47	2.47	2.47	2.47
HYDRAULIC GRADIENT	i			14.20	19.87	28.40
SAMPLE AREA $\text{cm}^2$	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $\text{cm}^3$	Q			1.26	3.38	3.40
TIME OF DISCHARGE sec	t			190,800	320,400	198,000
PERMEABILITY $\text{cm/sec}$	k			$1.46 \times 10^{-8}$	$1.68 \times 10^{-8}$	$1.91 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 52  
 SAMPLE NO. 7  
 DEPTH 58.6' TO 58.9'

TEST NO. k112.1  
 DATE JULY 74

C-647



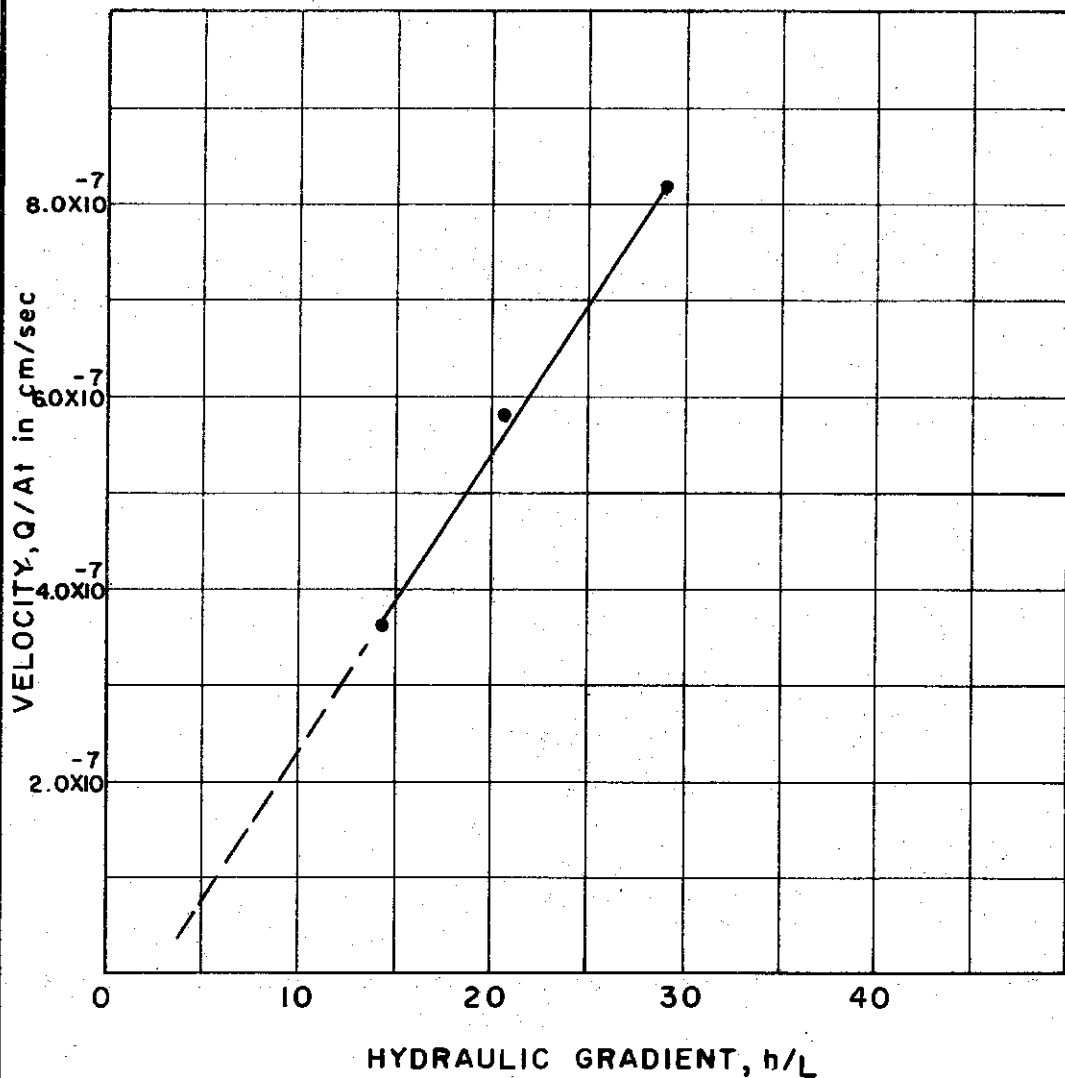
REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.685

SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY	2.72
DRY UNIT WEIGHT	104 pcf
INITIAL WATER CONTENT	30.2 %
INITIAL VOID RATIO	0.732
ATTERBERG LIMITS:	
LIQUID LIMIT	39 %
PLASTIC LIMIT	20 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_{cm}^2$	$\bar{\sigma}$		1.74	1.74	1.74	1.74	1.74
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.810	2.841	2.854	2.876
BOTTOM $kg/cm^2$	$u_{bot}$			2.806	2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			14.06	35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.49	2.49	2.49	2.49	2.49
HYDRAULIC GRADIENT	i			5.64	14.11	19.75	28.22
SAMPLE AREA $cm^2$	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $cm^3$	Q			1.22	2.30	5.89	8.50
TIME OF DISCHARGE $sec$	t			248,400	212,400	277,200	270,000
PERMEABILITY $cm/sec$	k			$2.75 \times 10^{-8}$	$2.42 \times 10^{-8}$	$3.40 \times 10^{-8}$	$3.52 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 53 TEST NO. k 98.1  
 SAMPLE NO. 5 DATE JULY 74  
 DEPTH 39.5' TO 39.8'



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE=0.641

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)  
 SPECIFIC GRAVITY 2.71 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2 % INITIAL VOID RATIO 0.724  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.40	2.40	2.40	2.40
BACK PRESSURE TOP $u_{top}$ BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.847	2.862	2.883
DIFFERENTIAL HEAD cm.	h			35.15	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.420	2.420	2.420	2.420
HYDRAULIC GRADIENT	i			14.52	20.33	29.0
SAMPLE AREA cm <sup>2</sup>	A	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED $Q$ cm <sup>3</sup>	Q			1.08	1.52	1.76
TIME OF DISCHARGE sec	t			93,800	82,800	75,600
PERMEABILITY cm/sec	k			-8 2.52X10	-8 2.85X10	-8 2.53X10

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

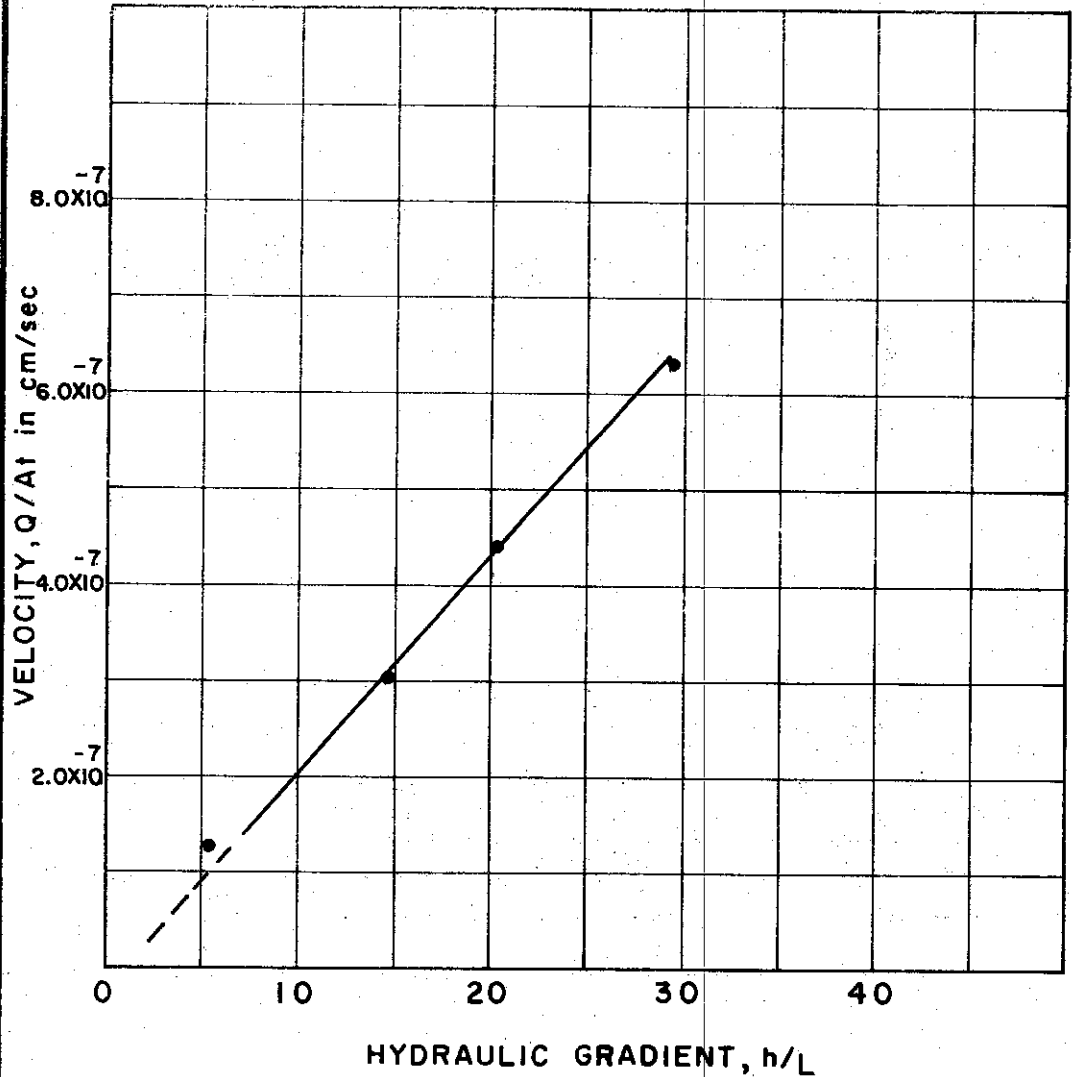
## PERMEABILITY TEST VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 54  
 SAMPLE NO. 6  
 DEPTH 63.5' TO 63.8'

TEST NO. K 399.1  
 DATE JULY 1974

FILE 1255

C-650



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.72

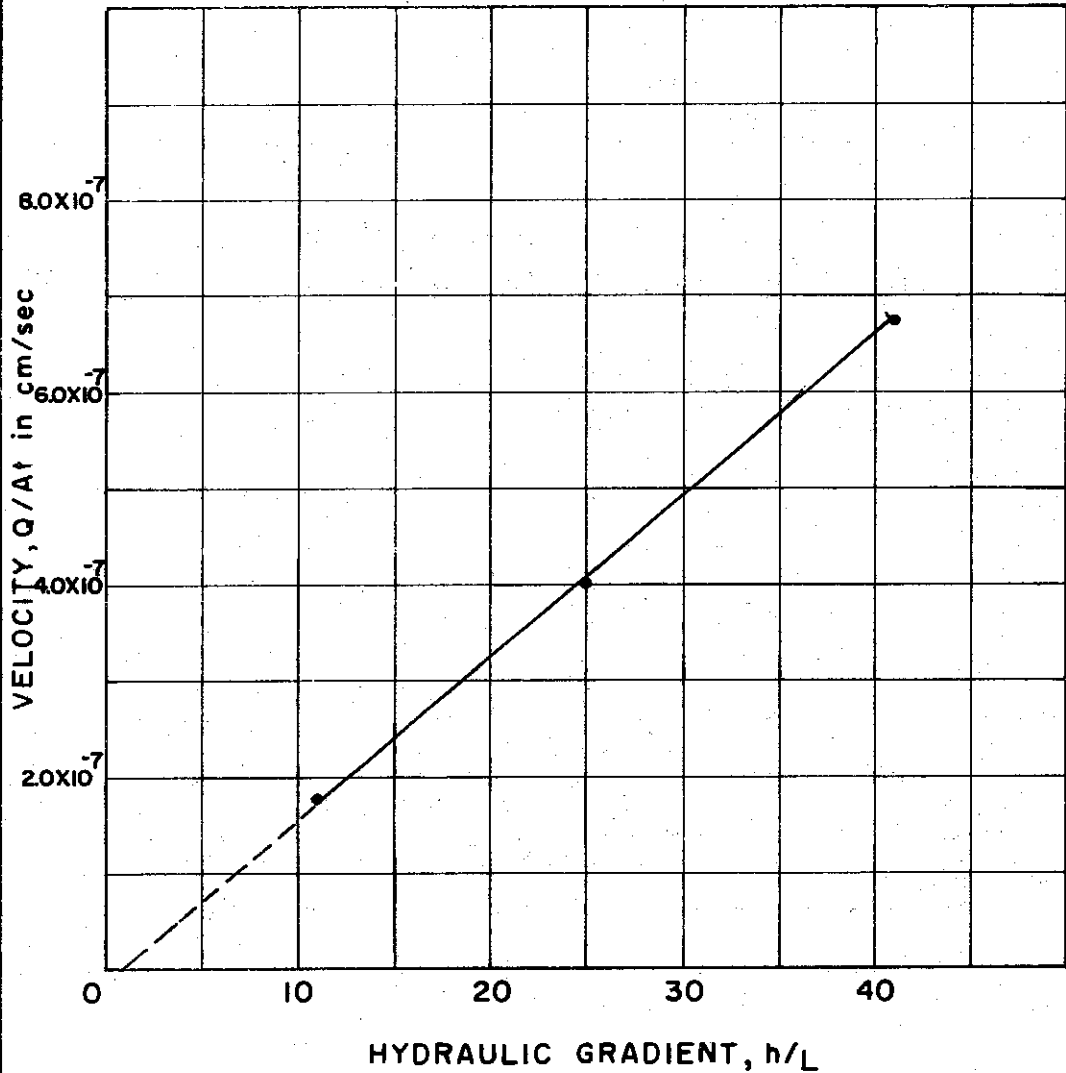
SOIL PROPERTIES	
SOIL DESCRIPTION	SILTY CLAY (CL)
SPECIFIC GRAVITY	2.73
DRY UNIT WEIGHT	90 pcf
INITIAL WATER CONTENT	31.6 %
INITIAL VOID RATIO	0.851
ATTERBERG LIMITS:	
LIQUID LIMIT	45 %
PLASTIC LIMIT	21 %

TEST DATA							
	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.71	2.71	2.71	2.71	2.71
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2826	2847	2862	2883
BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2812	2812	2812	2812
DIFFERENTIAL HEAD cm. h				14.06	35.15	49.21	70.31
SAMPLE LENGTH cm. L		2.540	2.376	2.376	2.376	2.376	2.376
HYDRAULIC GRADIENT i				5.92	14.80	20.71	29.50
SAMPLE AREA cm <sup>2</sup> A		31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm <sup>3</sup> Q				0.48	0.88	1.10	1.39
TIME OF DISCHARGE sec. t				108,000	90,000	79,200	75,600
PERMEABILITY cm/sec k				2.37x10 <sup>-8</sup>	2.09x10 <sup>-8</sup>	2.18x10 <sup>-8</sup>	2.00x10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 54 TEST NO. K 401.1  
 SAMPLE NO. 8 DATE JULY 1974  
 DEPTH 73.7 TO 74.0'





REMARKS:

C-651

**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 103 pcf  
 INITIAL WATER CONTENT 26.1 % INITIAL VOID RATIO 0.707  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

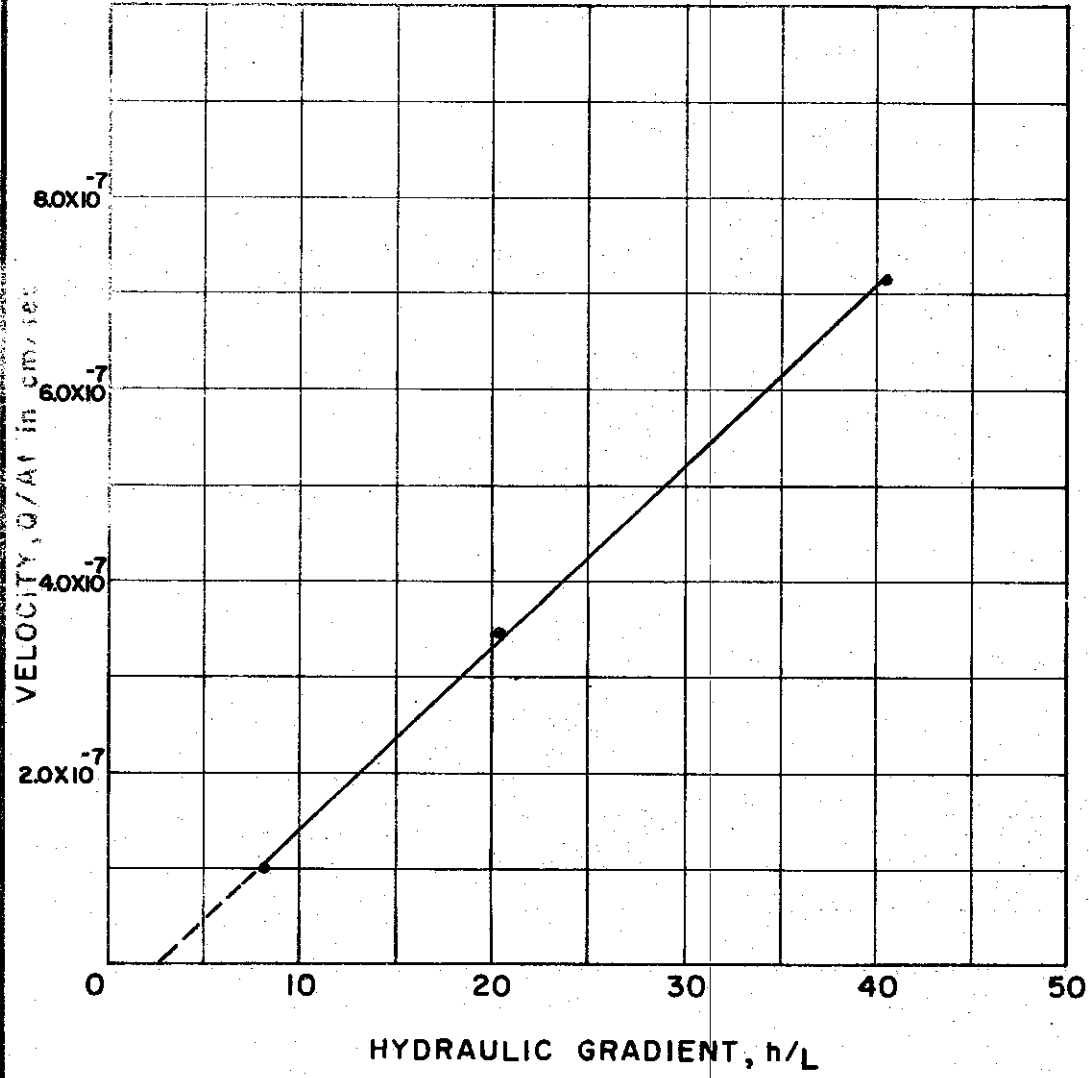
**TEST DATA**

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			1.05	1.05	1.05	1.05
BACK PRESSURE TOP $u_{top}$ kg/cm <sup>2</sup>				2.488	2.521	2.565
BACK PRESSURE BOTTOM $u_{bot}$ kg/cm <sup>2</sup>				2.460	2.460	2.460
DIFFERENTIAL HEAD cm.	h			27.7	63.0	103.8
SAMPLE LENGTH cm.	L	6.48	6.40	6.40	6.40	6.40
HYDRAULIC GRADIENT	i			11.0	25.0	41.2
SAMPLE AREA cm <sup>2</sup>	A	11.37	11.37	11.37	11.37	11.37
WATER DISCHARGED cm <sup>3</sup>	Q			.13	.29	.58
TIME OF DISCHARGE sec	t			72,000	72,000	86,000
PERMEABILITY cm/sec	k			1.60 x 10 <sup>-8</sup>	1.61 x 10 <sup>-8</sup>	1.63 x 10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

BORING NO. 60 TEST NO. k43.1  
 SAMPLE NO. 3 DATE MARCH 74  
 DEPTH 18.1' TO 18.3'

C-652



REMARKS:

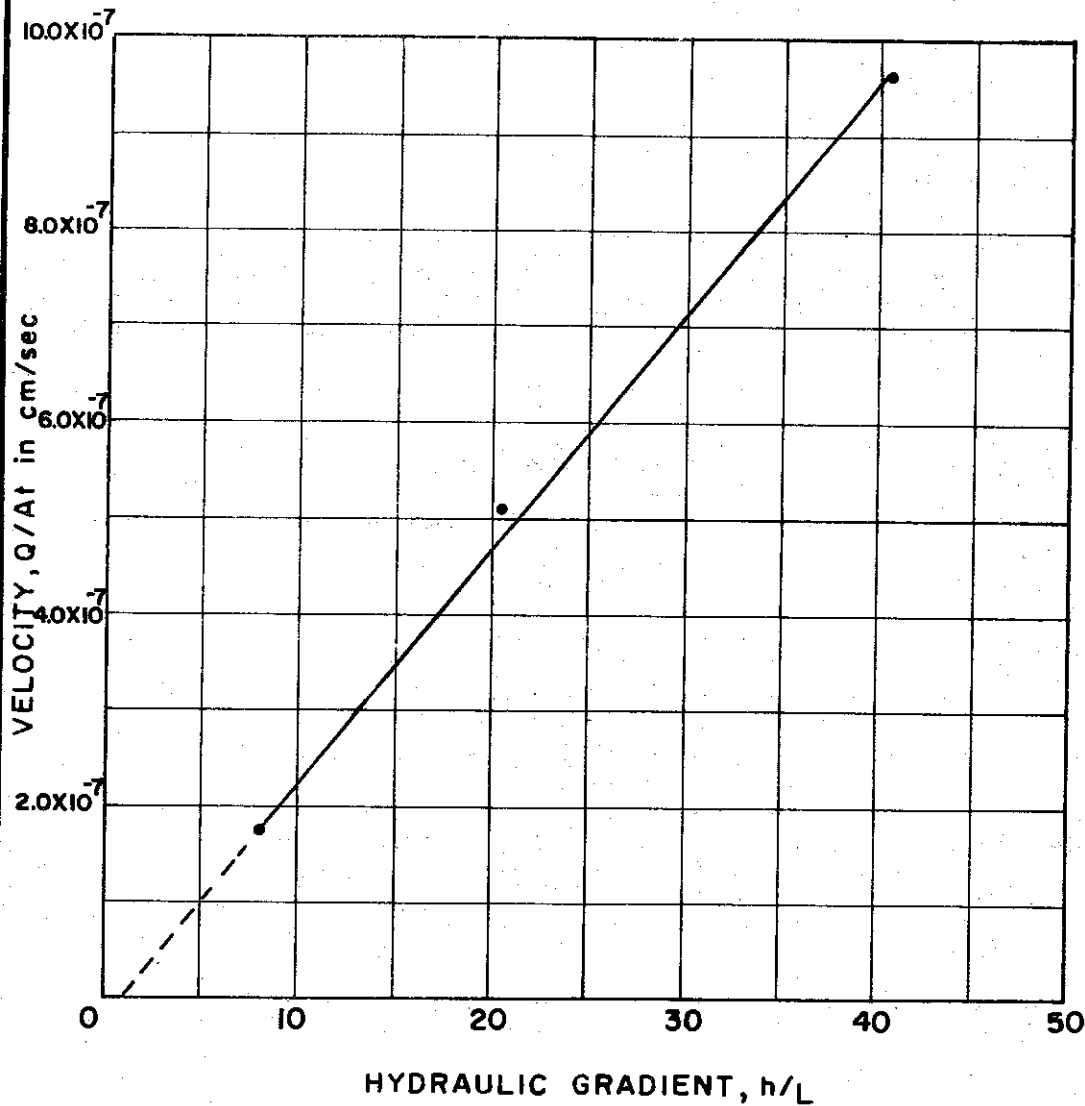
**SOIL PROPERTIES**

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 98 pcf  
 INITIAL WATER CONTENT 27.2% INITIAL VOID RATIO 1.30  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 33 % PLASTIC LIMIT 18 %

**TEST DATA**

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $\sigma_c$ kg/cm <sup>2</sup>			2.20	2.20	2.20	2.20
BACK PRESSURE TOP kg/cm <sup>2</sup> $u_{top}$				2.826	2.847	2.882
BACK PRESSURE BOTTOM kg/cm <sup>2</sup> $u_{bot}$				2.812	2.812	2.812
DIFFERENTIAL HEAD cm. h				14.06	35.16	70.30
SAMPLE LENGTH cm. L		1.90	1.73	1.73	1.73	1.73
HYDRAULIC GRADIENT i				8.13	20.32	40.63
SAMPLE AREA cm <sup>2</sup> A		31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED cm <sup>3</sup> Q				.21	.66	.23
TIME OF DISCHARGE sec. t				66,600	59,400	10,200
PERMEABILITY cm/sec k				1.25x10 <sup>-8</sup>	1.75x10 <sup>-8</sup>	1.76x10 <sup>-8</sup>

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**  
 BORING NO. 60 TEST NO. k51.1  
 SAMPLE NO. 11 DATE MARCH 74  
 DEPTH 56.1' TO 56.4'



REMARKS:

### SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)  
 SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 96 pcf  
 INITIAL WATER CONTENT 29.1 % INITIAL VOID RATIO .753  
 ATTERBERG LIMITS:  
 LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

### TEST DATA

	S Y M	INITIAL	CONSOL STAGE	PERMEABILITY STAGES		
CONSOLIDATION PRESSURE $kg/cm^2$	$\sigma$		3.00	3.00	3.00	3.00
BACK PRESSURE TOP $kg/cm^2$	$u_{top}$			2.836	2.847	2.882
BOTTOM $kg/cm^2$	$u_{bot}$			2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	$h$			14.06	35.16	70.30
SAMPLE LENGTH cm.	$L$	1.90	1.74	1.74	1.74	1.74
HYDRAULIC GRADIENT	$i$			8.08	20.20	40.40
SAMPLE AREA $cm^2$	$A$	31.70	31.70	31.70	31.70	31.70
WATER DISCHARGED $cm^3$	$Q$			.34	.97	.31
TIME OF DISCHARGE $sec$	$t$			63,000	59,400	10,200
PERMEABILITY $cm/sec$	$k$			$2.10 \times 10^{-8}$	$2.55 \times 10^{-8}$	$2.37 \times 10^{-8}$

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
**PERMEABILITY TEST**  
**VELOCITY VS. HYDRAULIC GRADIENT**

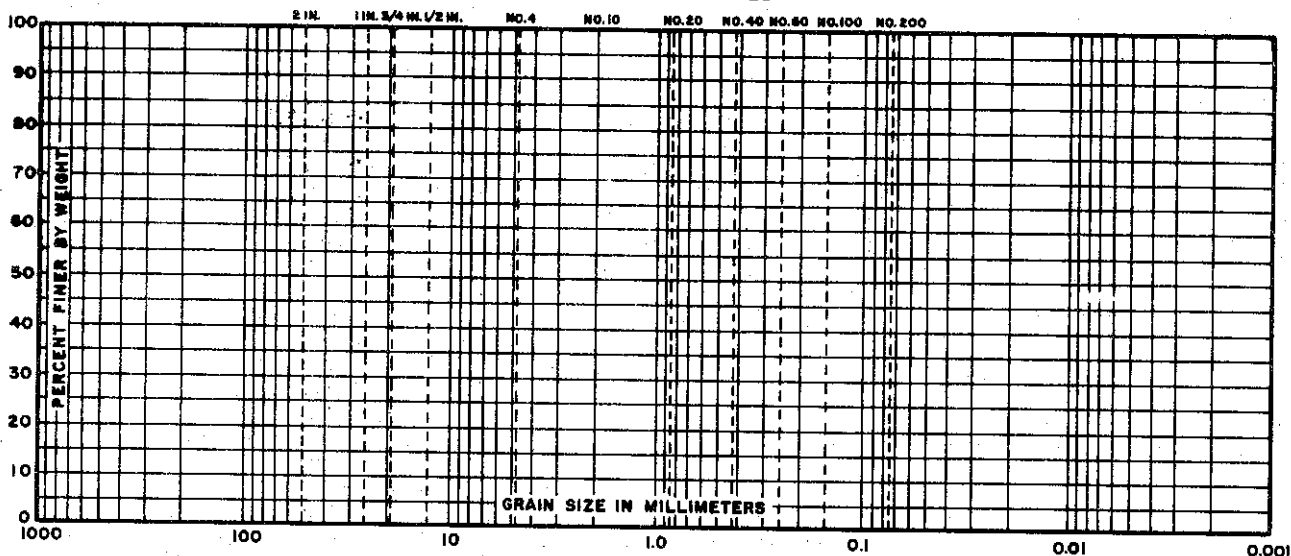
BORING NO. 60  
 SAMPLE NO. 16  
 DEPTH 85.6' TO 86.1'

TEST NO. k 56.1  
 DATE MARCH 74

FILE 1255

# GRAIN SIZE DISTRIBUTION

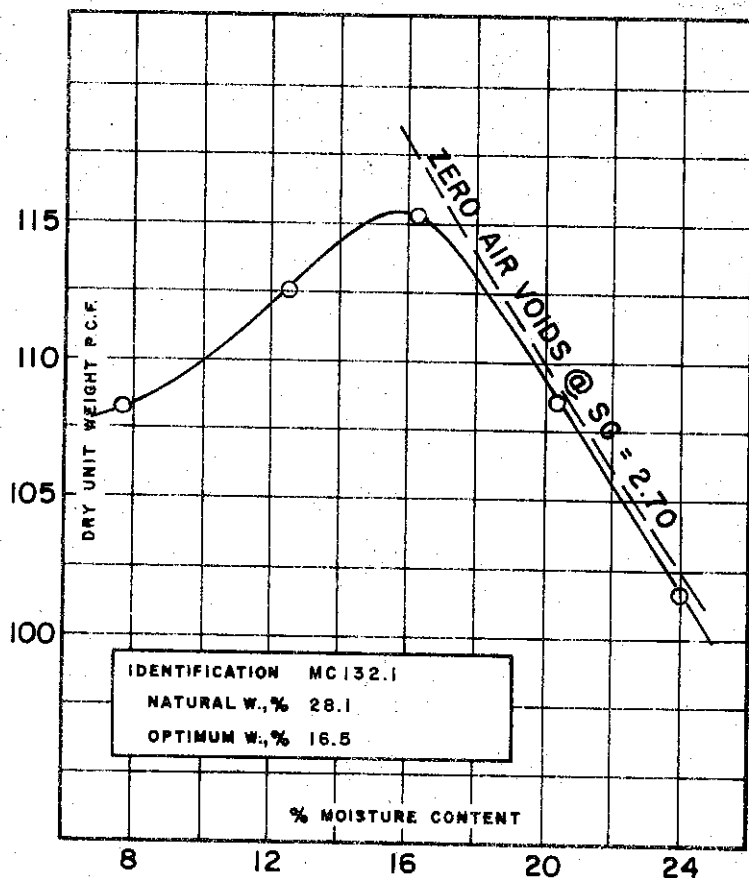
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 50  
 PLASTIC LIMIT 17

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 49  
 SAMPLE 2  
 DEPTH 6.0' TO 8.1'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

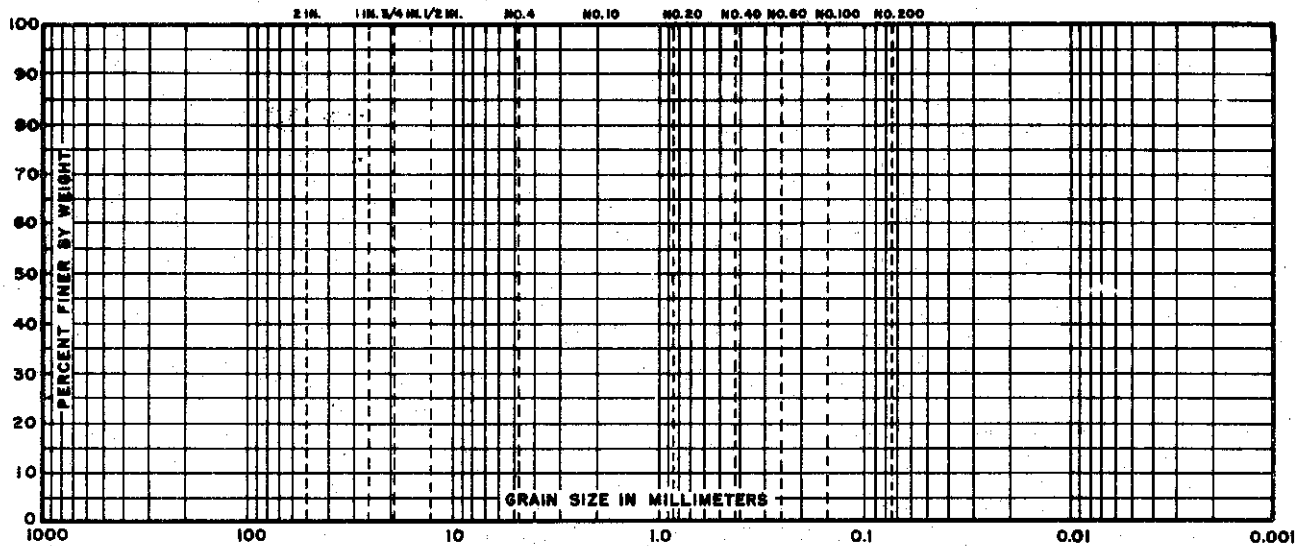
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II

## COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE MARCH 74

# GRAIN SIZE DISTRIBUTION

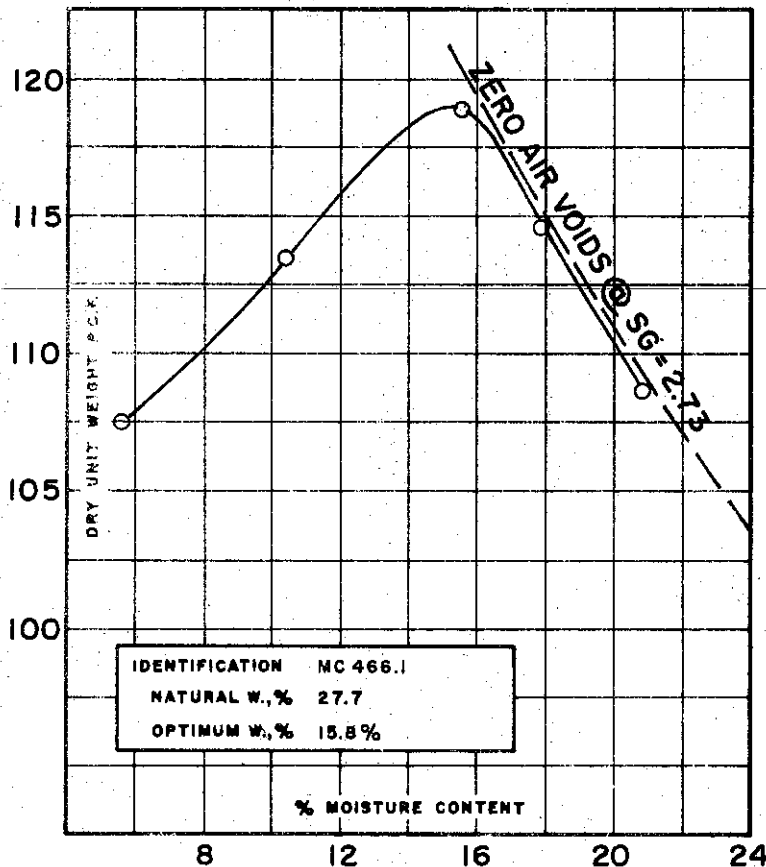
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION	MC 466.1
NATURAL W, %	27.7
OPTIMUM W, %	15.8%

## ATTERBERG LIMITS

IDENTIFICATION SEE DATA FOR  
 LIQUID LIMIT INDIVIDUAL  
 PLASTIC LIMIT SAMPLES

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 101, 105, 127, 128, 180 & 183  
 SAMPLE COMBINED SAMPLES  
 DEPTH 2.0' TO 10.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.584", MOLD DIAM. 4.000"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

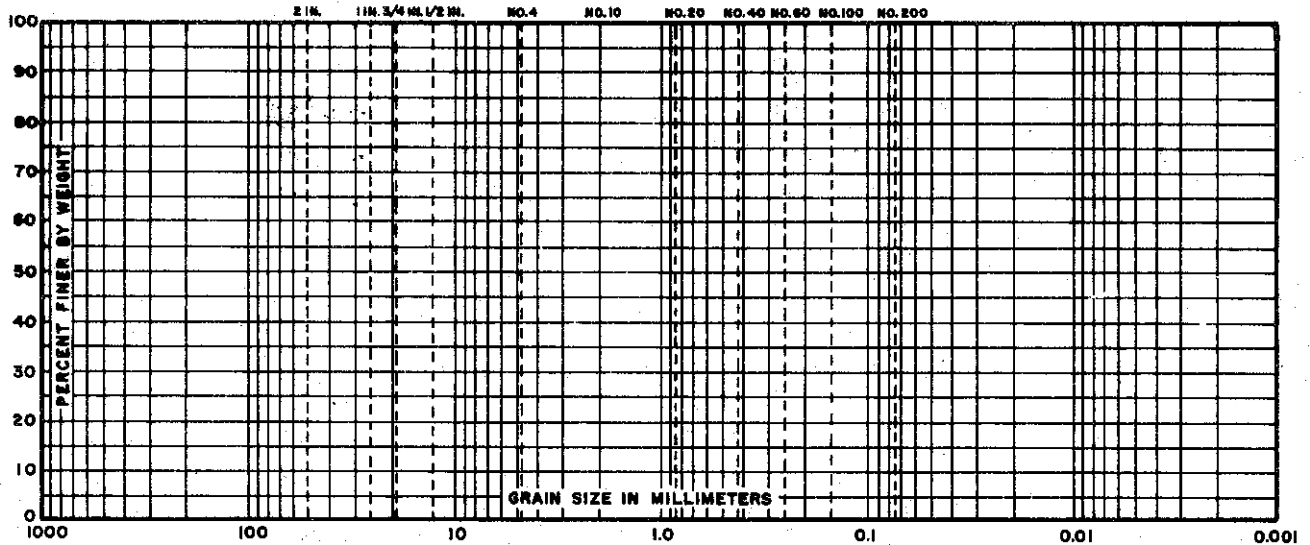
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

C-656

FILE NO. 1255 DATE APRIL 74

# GRAIN SIZE DISTRIBUTION

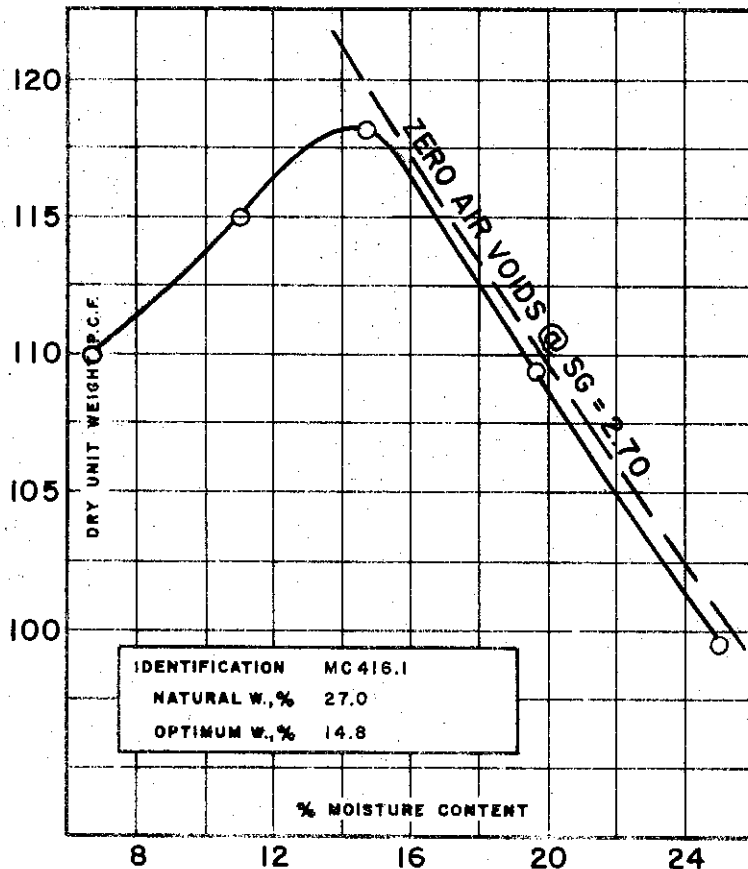
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION SILTY CLAY (CL-CH)  
 LIQUID LIMIT 49  
 PLASTIC LIMIT 22

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CL-CH)  
 EXPLORATION BORING 127  
 SAMPLE 3  
 DEPTH 5.6' TO 7.0'

## COMPACTION METHOD

ASTM TEST 01557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.56", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

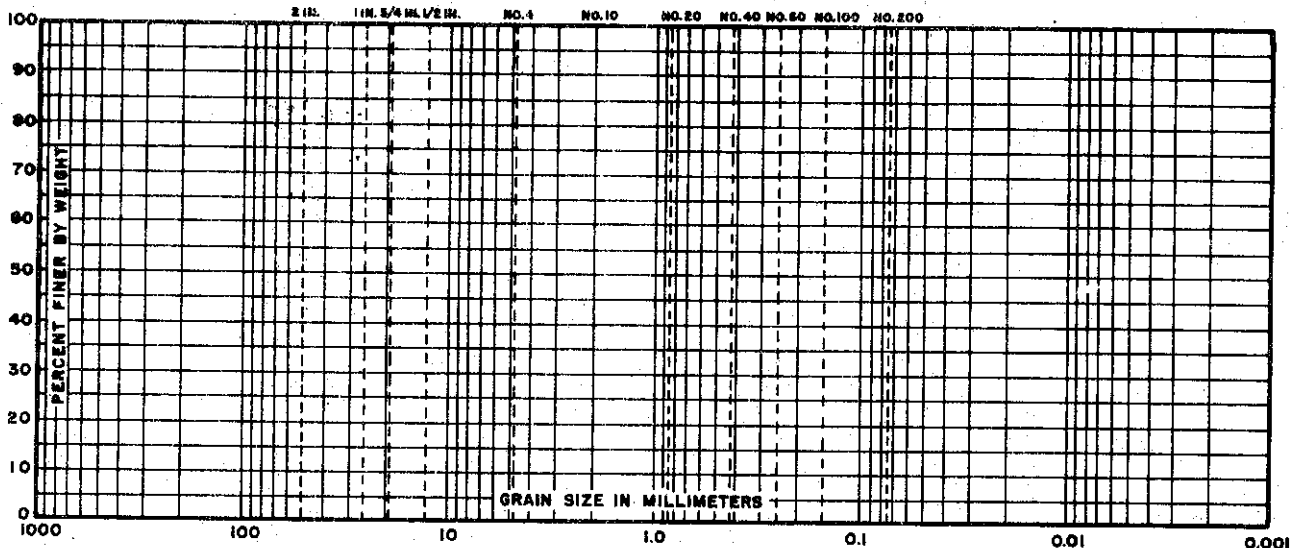
## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE JULY 74

# GRAIN SIZE DISTRIBUTION

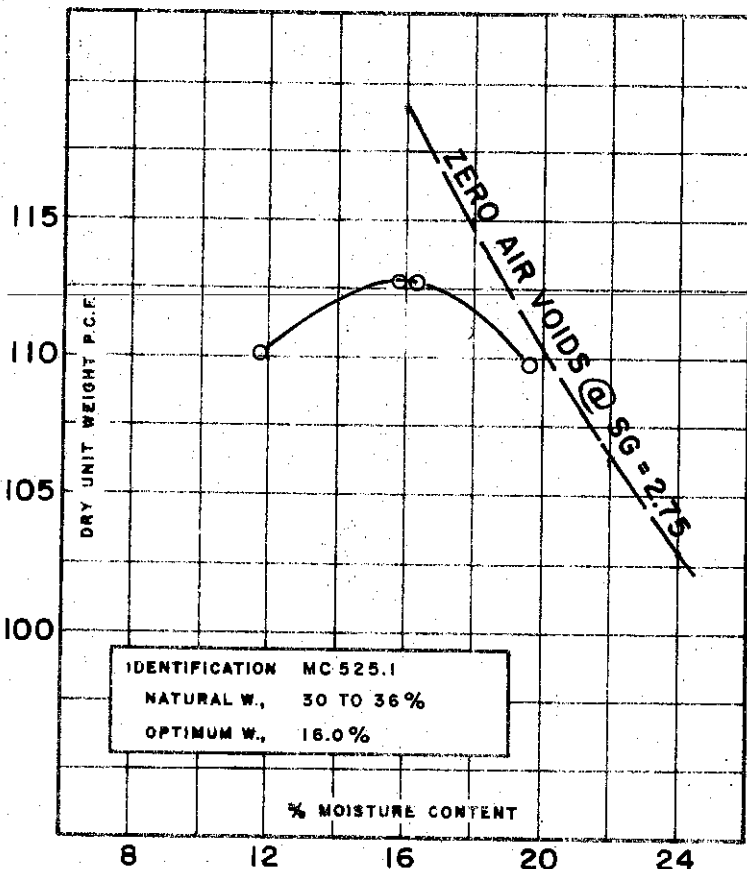
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 525.1  
 NATURAL W., 30 TO 36%  
 OPTIMUM W., 16.0%

## ATTERBERG LIMITS

IDENTIFICATION  
 LIQUID LIMIT  
 PLASTIC LIMIT

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 136  
 SAMPLE 2  
 DEPTH 3:0' TO 5:0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

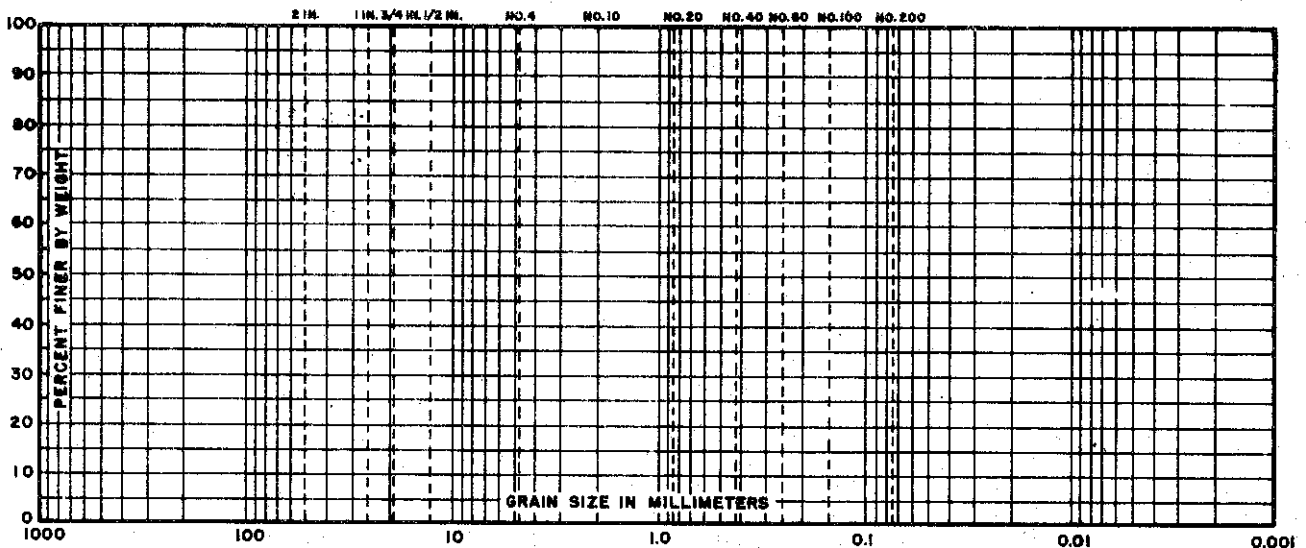
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

C-658

FILE NO. 1255 DATE NOV. 74

# GRAIN SIZE DISTRIBUTION

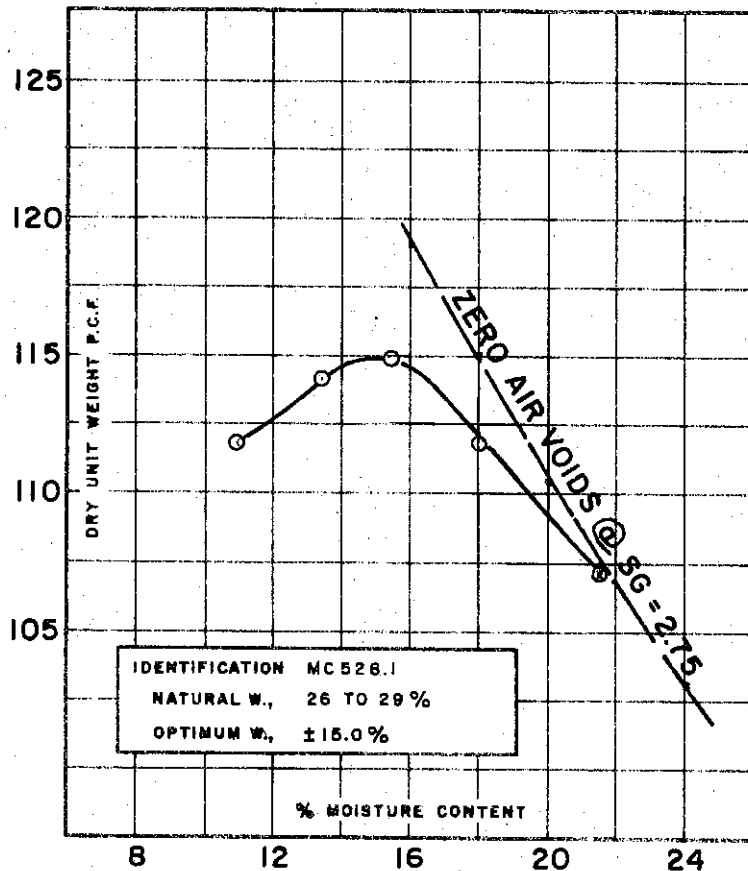
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 528.1  
 LIQUID LIMIT 56  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 141  
 SAMPLE 1  
 DEPTH 3.0' TO 5.0'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C.  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

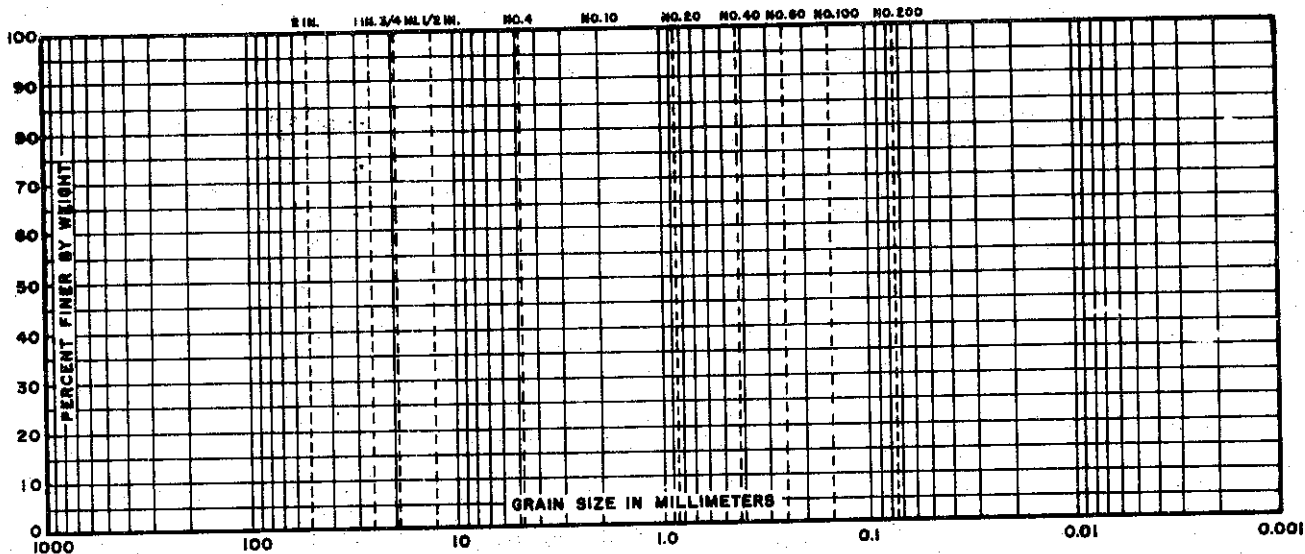
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE NOV. 74



# GRAIN SIZE DISTRIBUTION

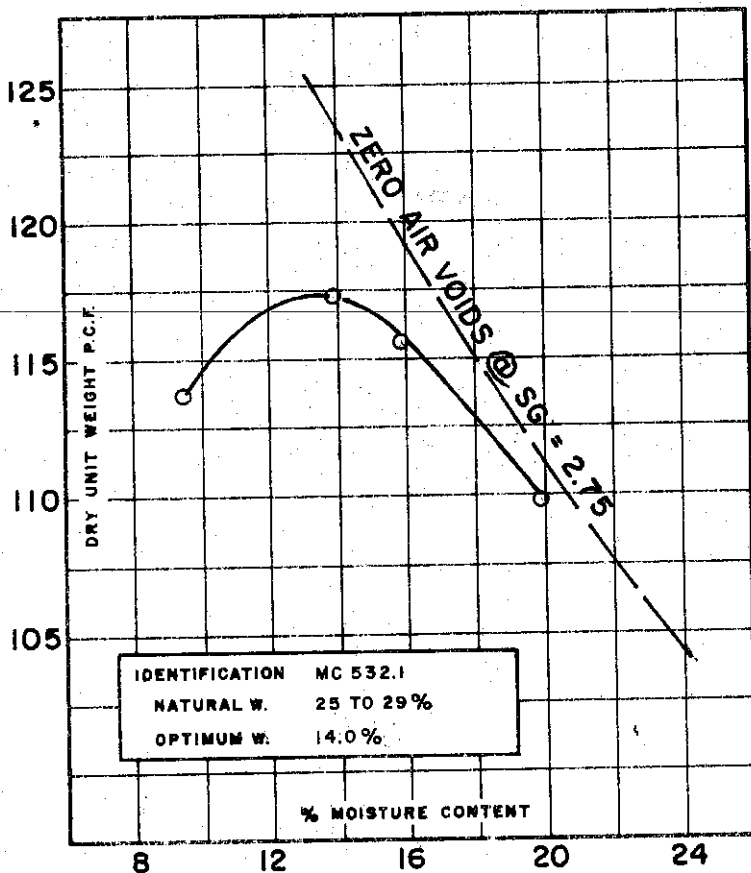
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



## ATTERBERG LIMITS

IDENTIFICATION L 532.1  
 LIQUID LIMIT 54  
 PLASTIC LIMIT 23

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)  
 EXPLORATION BORING 142  
 SAMPLE 1  
 DEPTH 3.0' TO 5.5'

## COMPACTION METHOD

ASTM TEST D1557 - METHOD C  
 AASHTO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

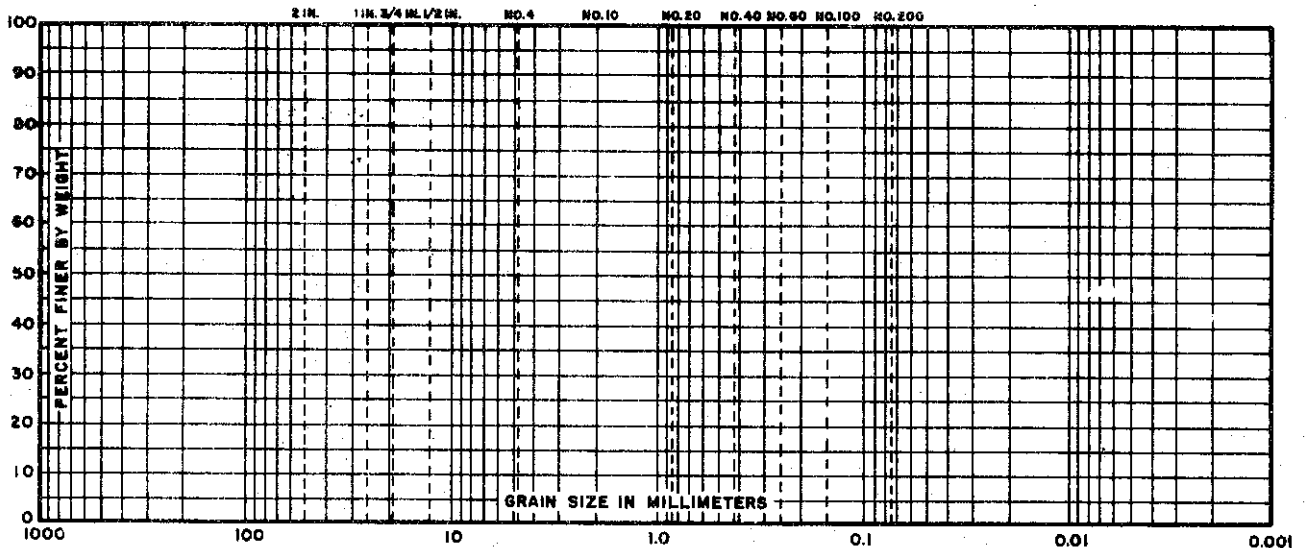
THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

C-660

# GRAIN SIZE DISTRIBUTION

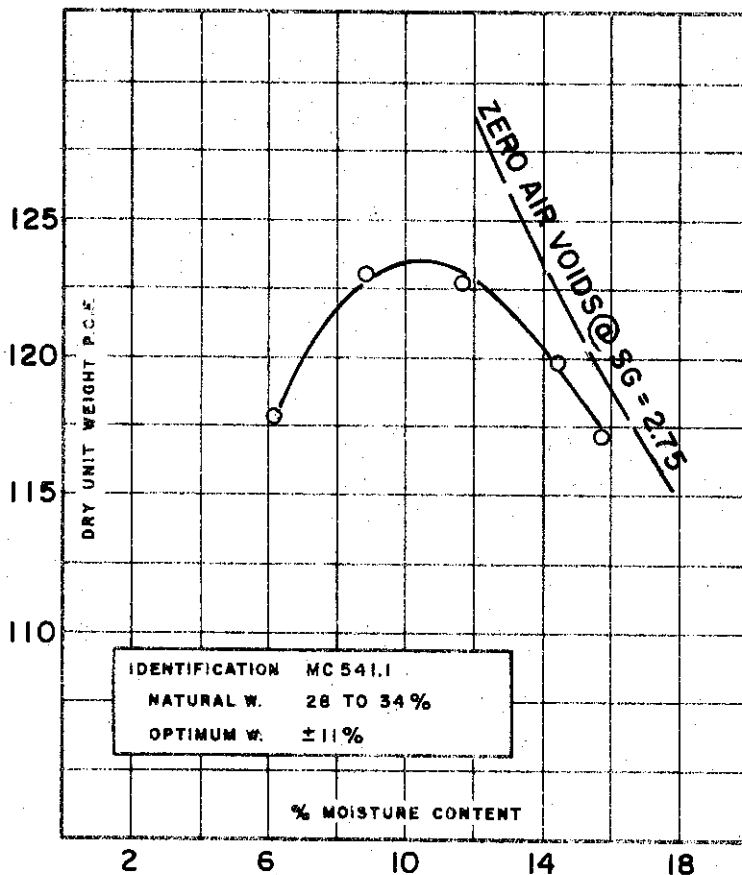
U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

## COMPACTION



IDENTIFICATION MC 541.1  
 NATURAL W. 28 TO 34%  
 OPTIMUM W. ±11%

## ATTERBERG LIMITS

IDENTIFICATION L 541.1  
 LIQUID LIMIT 38  
 PLASTIC LIMIT 19

## MATERIAL SOURCE

IDENTIFICATION SILTY CLAY, SANDY (CL)  
 EXPLORATION BORING 146  
 SAMPLE 5  
 DEPTH 10.0' TO 12.0'

## COMPACTION METHOD

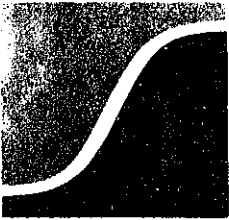
ASTM TEST D1557 - METHOD C  
 AASHO TEST  
 MOLD HEIGHT 4.58", MOLD DIAM. 4.00"  
 NO. LAYERS 5, BLOWS/LAYER 25,  
 HAMMER WT. 10 LBS, DROP HT. 18"

## NOTES:

THE DETROIT EDISON COMPANY  
 BELLE RIVER PLANT UNITS I & II  
 COMPACTION - GRADATION  
 TESTS

FILE NO. 1255 DATE APRIL 74

## Appendix D



U.W. STOLL AND ASSOCIATES soil mechanics and foundation consultants  
111 WEST KINGSLEY STREET ANN ARBOR, MICHIGAN 48103 (313) 994-5055

ULRICH W. STOLL  
GARRETT EVANS  
IN-KUIN KIM

September 8, 1975

Mr. Sherif Afifi  
Bechtel Power Corporation  
P. O. Box 1000  
777 East Eisenhower Parkway  
Ann Arbor, Michigan 48106

SUBJECT: Soil Testing  
Hopper Investigation  
Belle River Coal Handling  
Detroit Edison Company  
Technical Specification, 10539-3-C-13  
REFERENCE: Purchase Order No. AA2184

Dear Sir:

Enclosed herewith is the summary of laboratory testing conducted on soil samples received from the subject site, as authorized by the referenced purchase order. The laboratory testing was performed in accordance with your technical specification 10539-3-C-13 and included the following tests:

	<u>Pages</u>
30 Visual Classification and In-Situ Moistures	B-1, B-2, B-9
10 Atterberg Limits	B-3, B-4, B-5
30 Unconfined Compression	B-6 through B-28
2 In-Situ Moisture and Density	B-6, B-8
5 Mechanical Analysis	B-29, B-30

We appreciate the opportunity of serving you and trust that this work has been performed to your satisfaction.

Very truly yours,

U. W. STOLL AND ASSOCIATES

In-Kuin Kim, P.E.

IKK/jb

Enclosures

U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-1	23.2	GRAY-BROWN MOTTLED CLAY
	S-2	25.6	BROWN LAYERED CLAY
	S-3	38.6	GRAY CLAY WITH DRILL WASH
	S-4	35.9	GRAY CLAY WITH DRILL WASH
	S-5	39.6	GRAY CLAY WITH DRILL WASH
	S-6	43.1	GRAY CLAY WITH DRILL WASH
	S-7	39.4	GRAY CLAY
	S-8	32.5	GRAY CLAY
	S-9	34.6	GRAY CLAY
	S-10	37.1	GRAY CLAY
	S-11	33.4	GRAY CLAY
	S-12	30.7	GRAY CLAY WITH DRILL WASH
	S-13	28.7	GRAY CLAY WITH TRACE OF DRILL WASH
	S-14	27.2	GRAY CLAY WITH TRACE OF DRILL WASH
	S-15	27.1	GRAY CLAY
	S-16	24.2	GRAY CLAY
	S-17	24.0	GRAY CLAY
	S-18	24.8	GRAY CLAY
	S-19	26.8	GRAY CLAY WITH TRACE OF DRILL WASH
	S-20	25.4	GRAY CLAY
	S-21	25.9	GRAY CLAY
	S-22	27.8	GRAY CLAY
	S-23	26.7	GRAY CLAY
	S-24	25.9	GRAY CLAY
	S-25	32.2	GRAY CLAY

U. W. STILL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT: NATURAL MOISTURES OF  
BOTTLE SAMPLES

<u>BORING NUMBER</u>	<u>SAMPLE NUMBER</u>	<u>MOISTURE CONTENT (%)</u>	<u>VISUAL CLASSIFICATION</u>
B-191	S-26	40.6	GRAY CLAY
	S-27	25.7	WET CLAYEY SILT
	S-28	12.6	SANDY SILT
	S-29	10.2	DECOMPOSED SHALE



**U. W. STOLL and ASSOCIATES**  
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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: LABORATORY TEST DATA SUMMARY

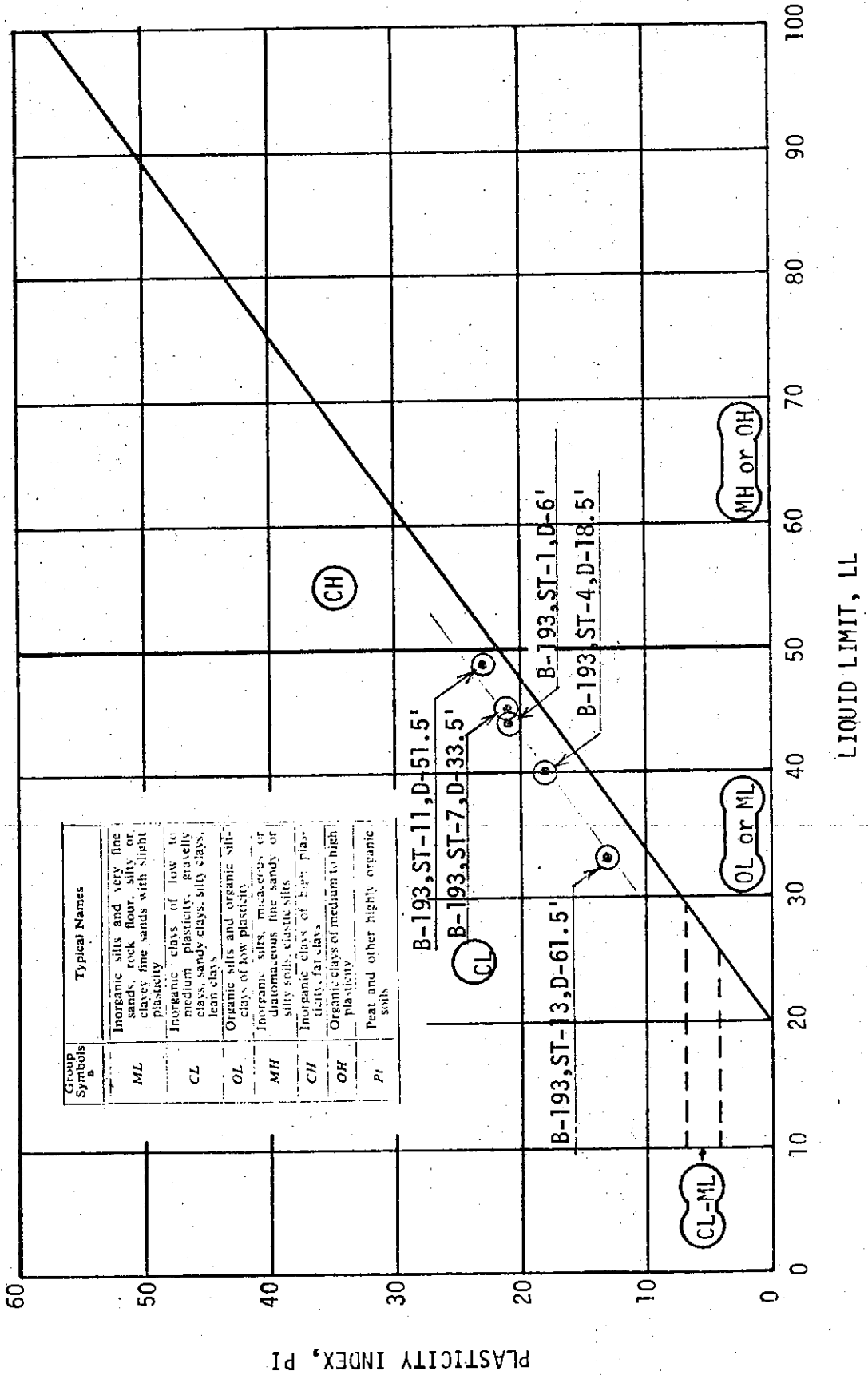
BORING NO.	SAMPLE NO.	DEPTH OF SAMPLE (FT.)	MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION (% OF TEST SAMPLE)							ATTERBERG LIMITS			STRENGTH TESTS			
			NATURAL MOISTURE (% OF DRY WTS.)	NATURAL DRY DENSITY (LBS/CU.FT.)	COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	TYPE OF TEST	MAX. PRINCIPAL STRESS (KG/SQ.CM.)	MIN. PRINCIPAL STRESS (KG/SQ.CM.)	AXIAL STRAIN AT FAILURE (%)
B-193	ST-1	6	13.4	103.6										UNCONF.				4200
	ST-4	18.5	36.3	85.5										UNCONF.				870
	ST-7	33.5	42.6	80.5										UNCONF.				690
	ST-11	51.5	27.5	95.5										UNCONF.				680
	ST-13	61.5	25.7	99.3										UNCONF.				1190
	ST-15	72.5	22.2	103.6										UNCONF.				1690
	ST-16	77.0	26.9	95.5										UNCONF.				500
	ST-16	78.0	26.3	96.1										UNCONF.				1560
	ST-19	98.0	23.6	99.3										UNCONF.				590
B-192	ST-1	20.0	31.9	88.7										UNCONF.				460
	ST-4	35.0	33.1	88.0										UNCONF.				710
	ST-6	45.0	39.2	78.7										UNCONF.				630
	ST-7	52.0	34.5	87.4										UNCONF.				660



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 CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75  
 SUBJECT: PLASTICITY CHART





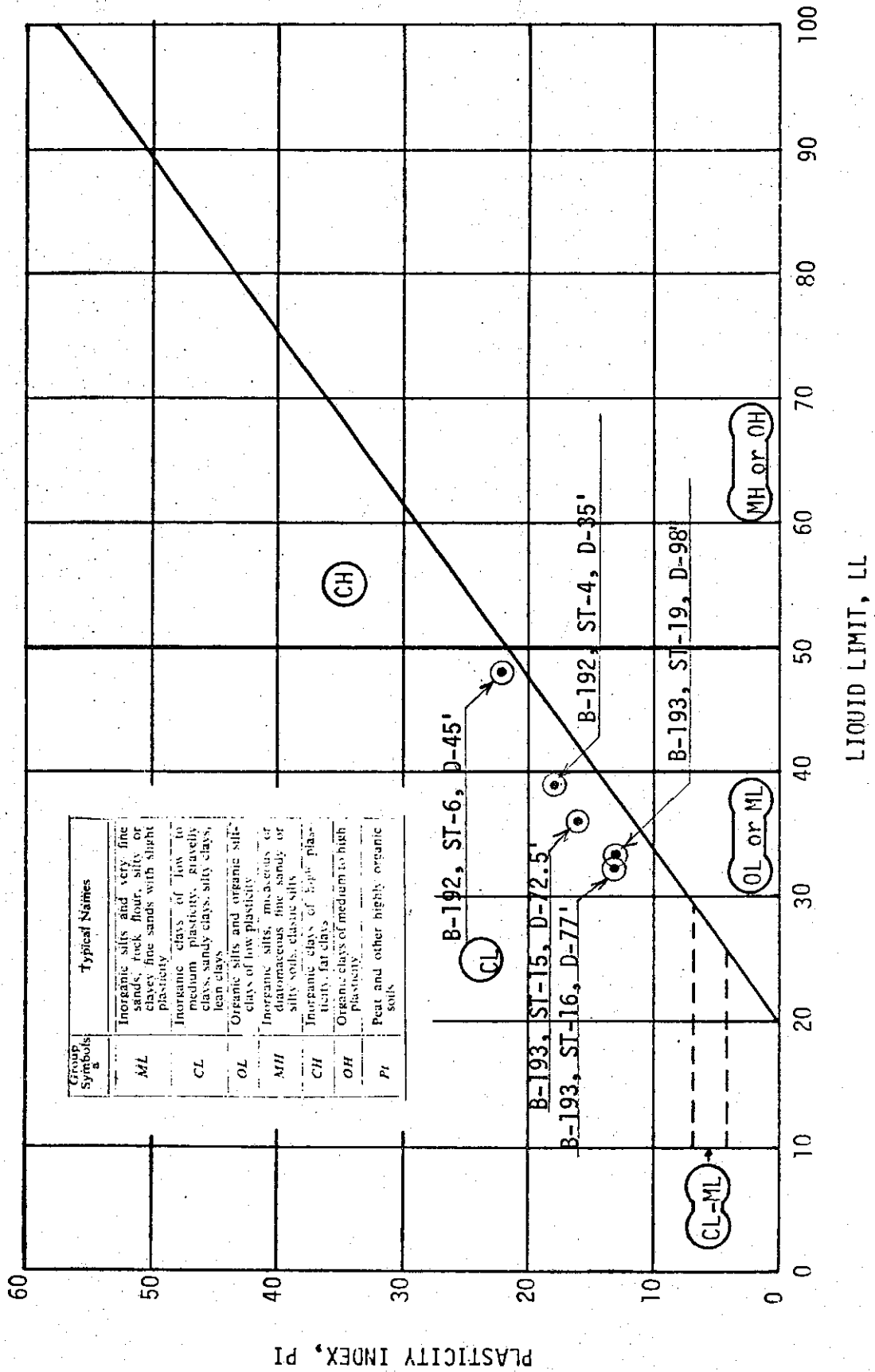


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CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR STRENGTH		NATURAL MOISTURE	
		PENETRATION BLOW	DEPTH				UNDIST	REMOLED	DRY DENS	(MG/CU.M)
B-193	6.0	PUSHED	\$	STIFF BROWN SILT CLAY WITH PEBBLE QU=4.5 TSF	UNCF 72.0	5%	201.0	13.4%	1.66	
ST-1	-6.0									
B-193	10.0	PUSHED		BROWN MOTTLED CLAY WITH PEBBLE SAMPLING DISTURBED QU=1.75TSF	NONE 72.5			30.0%	1.49	
ST-2	-10.0									
B-193	12.8	PUSHED		SOFT GRAY, CLAY WITH SEAM OF SILTY DARK GRAY SANDY CLAY, TV=.57TSF	UNCF 72.5	4%	61.3	32.6%	1.44	
ST-3	-12.8									
B-193	18.5	PUSHED		TAN GRAY SOFT SILTY CLAY (LACUSTRINE) TV=.32TSF	UNCF 72.5	3%	41.8	36.3%	1.37	
ST-4	-18.5									
B-193	23.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.29TSF	UNCF 72.5	2%	39.3	32.8%	1.38	
ST-5	-23.5									
B-193	28.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.27TSF	UNCF 72.0	2%	29.6	41.4%	1.32	
ST-6	-28.5									
B-193	33.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.27TSF	UNCF 72.1	3%	32.9	42.6%	1.29	
ST-7	-33.5									

UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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FIELD DATA			LABORATORY DATA				
BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW DEPTH	LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST ----- REMOLD (KN/SQ.M)	NATURAL MOISTURE ----- DRY DENS (MG/CU.M)
B-193	38.5	PUSHED	TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.37TSF	UNCF	3%	42.9	38.4%
ST-8	-38.5		72.9			1.33	
B-193	41.5	PUSHED	TAN GRAY SOFT LACUSTRINE CLAY TV=0.35TSF	UNCF	2%	31.6	40.6%
ST-9	-41.5		72.3			1.30	
B-193	46.5	PUSHED	REDDISH-GRAY SOFT CLAY (LACUSTRINE) TV=0.35TSF	UNCF	2%	40.4	46.5%
ST-10	-46.5		72.2			1.21	
B-193	51.5	PUSHED	SOFT GRAY MOTTLED LACUSTRINE CLAY TV=.29TSF	UNCF	6%	32.4	27.5%
ST-11	-51.5		72.3			1.53	
B-193	56.5	PUSHED	SOFT GRAY PEBBLY SANDY CLAY TV=.41TSF	UNCF	16%	41.1	20.6%
ST-12	-56.5		72.3			1.52	
B-193	61.5	PUSHED	PLASTIC GRAY SILTY CLAY WITH PEBBLES TV=.5 TSF	UNCF	16%	56.9	25.7%
ST-13	-61.5		72.5			1.59	

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SUBJECT:

F I E L D      D A T A      L A B O R A T O R Y      D A T A

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
						STRENGTH UNDIST	MOISTURE
						REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-193	66.0		FIRM GRAY SILTY CLAY	UNCF		78.9	22.3%
ST-14	-66.0	PUSHED	WITH PEBBLES TV= 0.63 TSF	72.3	20%		1.67
B-193	72.5		GRAY SILTY CLAY	UNCF		80.8	22.2%
ST-15	-72.5	PUSHED	WITH PEBBLES TV=.67-.78 TSF	72.4	14%		1.66
B-193	77.0		FIRM V. SILTY GRAY CLAY	UNCF		24.1	26.9%
ST-16	-77.0	PUSHED	SAND SEAMS TV=.65 TSF	72.9	5%		1.53
B-193	78.0		GRAY SILTY CLAY	UNCF		74.9	26.3%
ST-16	-78.0	PUSHED	WITH PEBBLES TV= .77 TSF	72.1	4%		1.54
B-193	82.0		GRAY SILTY CLAY	UNCF		70.8	20.4%
ST-17	-82.0	PUSHED	WITH PEBBLES TV= .85 TSF	72.2	14%		1.72
B-193	93.5		GRAY SILTY CLAY	NONE			25.5%
ST-18	-93.5	PUSHED	WITH PEBBLES DRILL WASH	71.1			1.62

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M. PENETRATION BLOW DEPTH	LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR STRENGTH		NATURAL
						UNDIST	REMOLD	MOISTURE
						(KN/SQ.M)	(MG/CU.M)	DRY DENS
B-193	98.0		GRAY SILTY CLAY WITH SOME PEBBLES & MOTTLE	UNCF	20%	28.0		23.6%
ST-19	-98.0	PUSHED	TV=.45 TSF	72.4				1.59
B-193, ST-20		PUSHED	GRAY SILTY CLAY WITH PEBBLES & DRILL WASH	NO TEST				31.1%
B-193	112.0		SOFT GRAY SILTY CLAY WITH PEBBLES	UNCF	20%	19.1		28.5%
ST-21	-112.0	PUSHED	TV=0.22 TSF	72.7				1.47
B-193, ST-22		}	NO TESTS DUE TO DRILL WASH					
B-193, ST-23								

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BY: IKK  
SUBJECT:

DATE: 8/75

FIELD DATA                      LABORATORY DATA

BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ----- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD	DRY DENS
							(KN/SQ.M)	(MG/CU.M)
B-192	20.0			GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.27 TSF	UNCF	8%	22.1	31.9%
ST-1	-20.0	PUSHED			72.7			1.42
B-192	25.0			GRAYISH BROWN SOFT PLASTIC LACUSTRINE CLAY TV=.27 TSF	UNCF	4%	27.8	35.6%
ST-2	-25.0	PUSHED			72.2			1.37
B-192	30.0			GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.25 TSF	UNCF	3%	27.7	41.8%
ST-3	-30.0	PUSHED			72.3			1.28
B-192	35.0			GRAYISH BROWN SOFT PLASTIC CLAY(LACUSTRINE) TV=.28 TSF	UNCF	2%	34.2	33.1%
ST-4	-35.0	PUSHED			72.5			1.41
B-192	40.0			GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.28 TSF	UNCF	2%	40.5	36.4%
ST-5	-40.0	PUSHED			72.4			1.31
B-192	45.0			BROWNISH GRAY PLASTIC LACUSTRI CLAY (MOTTLED) TV=.32 TSF	UNCF	1%	30.2	39.2%
ST-6	-45.0	PUSHED			72.3			1.26
B-192	52.0			FIRM GRAY SILTY CLAY WITH PEBBLES TV= 0.26 TSF	UNCF	4%	31.4	34.5%
ST-7	-52.0	PUSHED			72.3			1.40

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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F I E L D      D A T A                      L A B O R A T O R Y      D A T A

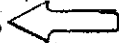
BORING ----- SAMPLE	DEPTH ----- ELEV	A.S.T.M.		LABORATORY DESCRIPTION	TEST ---- DIAM (MM)	STRAIN	SHEAR	NATURAL
		PENETRATION	BLOW DEPTH				UNDIST	MOISTURE
							REMOLD (KN/SQ.M)	DRY DENS (MG/CU.M)
B-192	55.0			SOFT GRAY SILTY CLAY	UNCF		36.8	27.8%
		PUSHED				10%		
ST-8	-55.0			WITH PEBBLES TV=0.40 TSF	72.5			1.54
B-192	80.0			SOFT GRAY SILTY CLAY WITH	UNCF		84.5	26.6%
		PUSHED		FINE SAND LAYERS		7%		
ST-11	-80.0			TV=.52 TSF	72.5			1.55
B-192	60.0			PLASTIC GRAY SILTY CLAY	UNCF		46.0	26.5%
		PUSHED				16%		
ST-9	-60.0			WITH PEBBLES TV=0.50 TSF	72.5			1.57
B-192	70.0			FIRM GRAY SILTY CLAY	UNCF		85.2	24.3%
		PUSHED				20%		
ST-10	-70.0			WITH PEBBLES TV=0.82 TSF	72.3			1.64

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SUBJECT:

SAMPLE IDENTIFICATION:		B-193, ST-1, D-6	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.50	.0	.00	119.33
2.00	5.0	.33	1064.92
2.50	11.0	.66	2192.85
3.00	16.5	.98	3219.35
3.50	21.0	1.31	4051.68
4.00	25.0	1.64	4785.06
4.50	28.5	1.97	5420.41
5.00	31.8	2.29	6014.33
5.50	35.0	2.62	6585.65
6.00	37.5	2.95	7024.04
6.50	39.8	3.28	7422.60
7.00	41.8	3.60	7763.41
7.50	43.5	3.93	8047.02
8.00	44.9	4.26	8274.00
8.50	45.6	4.59	8372.46
9.00	45.9	4.91	8397.85
9.50	45.9	5.24	8368.92
10.00	44.0	5.57	7999.41
10.50	39.0	5.90	7078.55



SAMPLE IDENTIFICATION:		B-193, ST-3, D-12.8	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	117.69
1.50	113.0	.35	595.39
2.00	222.0	.71	1052.83
2.50	332.0	1.06	1511.20
3.00	422.0	1.41	1882.54
3.50	485.0	1.77	2138.56
4.00	527.0	2.12	2305.42
4.50	558.0	2.48	2425.46
5.00	578.0	2.83	2499.18
5.50	590.0	3.18	2539.42
6.00	597.5	3.54	2560.86
6.50	600.0	3.89	2561.68
6.80	600.0	4.10	2556.02
7.00	599.0	4.24	2548.19
7.50	596.0	4.60	2526.63
8.00	593.0	4.95	2505.15



SAMPLE IDENTIFICATION:		B-193, ST-4, D-18.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
6.50	.0	.00	117.69
7.00	87.0	.33	485.48
7.50	160.0	.67	791.74
8.00	230.0	1.00	1083.33
8.50	290.0	1.34	1331.04
9.00	336.0	1.67	1518.59
9.50	366.0	2.00	1638.26
10.00	385.0	2.34	1711.47
10.50	395.0	2.67	1746.94
11.00	396.5	3.01	1747.13
11.50	388.0	3.34	1706.22
12.00	364.0	3.67	1600.15



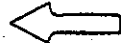


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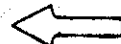
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SAMPLE IDENTIFICATION;		B-193, ST-5, D-23.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.50	.0	.00	117.69
5.00	80.0	.33	455.87
5.50	175.0	.66	855.09
6.00	272.0	.99	1260.05
6.50	337.0	1.32	1528.21
7.00	363.0	1.65	1631.69
7.30	366.0	1.85	1640.91
7.50	355.0	1.98	1592.92
8.00	323.0	2.31	1454.83
8.50	310.0	2.64	1396.17



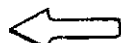
SAMPLE IDENTIFICATION;		B-193, ST-6, D-28.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.33
1.00	124.0	.64	649.00
1.50	200.0	.96	970.96
2.00	250.0	1.28	1180.32
2.50	264.0	1.60	1235.80
3.00	265.0	1.92	1236.00
4.00	260.0	2.56	1206.94
5.00	250.0	3.21	1157.33
6.00	244.0	3.85	1124.83



SAMPLE IDENTIFICATION;		B-193, ST-7, D-33.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
2.00	.0	.00	119.00
3.00	89.0	.65	497.86
4.00	177.0	1.30	867.51
5.00	260.0	1.95	1211.21
6.00	300.5	2.60	1372.55
7.00	290.0	3.25	1319.78
8.00	272.0	3.90	1236.66
9.00	262.0	4.55	1187.32



SAMPLE IDENTIFICATION;		B-193, ST-8, D-38.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
1.50	85.0	.35	471.73
2.00	138.0	.70	691.11
2.50	198.0	1.04	938.03
3.00	267.0	1.39	1220.47
3.50	331.0	1.74	1480.26
4.00	376.0	2.09	1660.05
4.50	400.0	2.44	1752.48
5.00	411.0	2.79	1791.13
5.50	412.5	3.13	1790.82
6.00	408.0	3.48	1766.14
6.50	390.0	3.83	1723.42



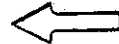
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SAMPLE IDENTIFICATION:		B-193, ST-9, D-41.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	91.0	.32	505.25
1.00	151.0	.64	758.14
1.25	179.0	.81	875.50
1.50	203.0	.97	975.56
1.75	224.0	1.13	1062.62
2.00	244.0	1.29	1145.18
2.50	272.0	1.61	1259.07
3.00	288.0	1.93	1321.94
3.50	288.0	2.26	1317.60
3.80	286.0	2.45	1306.66
4.30	281.0	2.77	1281.59
4.50	278.0	2.90	1267.45
5.00	270.0	3.22	1230.19



SAMPLE IDENTIFICATION:		B-193, ST-10, D-46.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.25	69.0	.16	413.41
.50	116.0	.33	613.30
.75	160.0	.49	799.74
1.00	205.0	.66	989.82
1.25	245.0	.82	1158.03
1.50	285.0	.99	1325.68
2.00	349.0	1.32	1591.68
2.50	373.0	1.64	1687.44
3.00	358.0	1.97	1618.84
4.00	325.0	2.63	1470.41



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SAMPLE IDENTIFICATION;		B-193, ST-11, D-51.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	118.35
1.25	38.0	.17	280.13
1.50	60.0	.33	373.29
2.00	100.0	.66	541.71
2.50	138.0	.99	700.54
3.00	176.0	1.32	858.31
3.50	205.0	1.65	977.21
4.00	232.0	1.98	1086.93
4.50	252.0	2.31	1166.68
5.00	266.0	2.64	1220.93
5.50	277.0	2.97	1262.36
6.00	284.5	3.30	1289.03
6.50	290.5	3.63	1309.31
7.00	295.0	3.96	1323.28
7.50	299.0	4.29	1335.07
8.00	302.0	4.62	1342.68
8.50	303.5	4.95	1344.12
9.00	306.0	5.28	1349.56
9.50	307.5	5.61	1350.90
10.00	309.0	5.94	1352.20
10.50	309.5	6.27	1349.45
11.00	310.2	6.61	1347.49
11.50	310.9	6.94	1345.50
12.00	311.3	7.27	1342.31
12.50	311.6	7.60	1338.72
13.00	311.7	7.93	1334.32
13.50	311.7	8.26	1329.54
14.50	310.5	8.92	1315.30
15.00	310.0	9.25	1308.59



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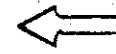
BY: IKK      DATE: 8/75  
SUBJECT:

SAMPLE IDENTIFICATION;  
DIAL GAGE      LOAD GAGE

B-193,ST-12,D-56.5

STRAIN      STRESS  
%      (PSF)

.00	.0	.00	118.35
.25	44.0	.16	305.71
.50	63.0	.33	386.06
.75	81.0	.49	461.89
1.00	96.0	.66	524.75
1.75	135.0	1.15	686.75
2.00	150.0	1.32	748.81
2.50	177.0	1.64	859.69
3.00	204.0	1.97	969.82
3.50	227.0	2.30	1062.51
4.00	249.0	2.63	1150.39
4.50	268.0	2.96	1225.22
5.00	284.0	3.29	1287.14
6.00	309.0	3.95	1380.91
7.00	329.0	4.61	1452.91
8.00	345.0	5.26	1507.61
9.00	358.5	5.92	1551.37
10.00	369.5	6.58	1584.40
11.00	379.0	7.24	1610.86
12.00	387.5	7.89	1632.87
13.00	395.0	8.55	1650.49
14.00	401.5	9.21	1663.81
16.00	413.0	10.53	1683.63
17.00	418.0	11.18	1690.21
18.00	422.5	11.84	1694.63
19.00	428.0	12.50	1702.53
20.00	432.5	13.16	1706.41
21.00	437.0	13.82	1710.04
22.00	441.0	14.47	1711.60
24.00	449.5	15.79	1715.82
25.00	453.5	16.45	1716.69
27.00	461.0	17.76	1715.99
28.00	465.0	18.42	1716.19
29.00	468.0	19.08	1712.72
30.40	471.5	20.00	1705.18

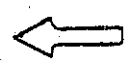


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BY: IKK                      DATE: 8/75  
 SUBJECT:

SAMPLE IDENTIFICATION;		B-193, ST-13, D-61.5	
DIAL GAGE	LOAD GAGE	STRAIN	STRESS
		%	(PSF)
1.00	.0	.00	117.69
1.50	76.0	.33	438.93
2.00	113.0	.67	593.53
2.50	48.0	1.00	318.30
3.00	182.0	1.33	878.63
3.50	218.0	1.66	1025.99
4.00	255.0	2.00	1176.49
4.50	292.0	2.33	1325.94
5.00	323.0	2.66	1449.55
5.50	353.0	2.99	1568.17
6.00	378.0	3.33	1665.41
6.50	398.0	3.66	1741.49
7.00	414.0	3.99	1800.71
7.50	429.0	4.32	1855.40
8.00	443.0	4.66	1905.63
8.50	456.0	4.99	1951.42
9.00	467.5	5.32	1990.82
9.50	478.0	5.66	2025.89
10.00	487.0	5.99	2054.67
10.50	496.0	6.32	2083.20
11.00	504.5	6.65	2109.50
12.00	520.0	7.32	2155.46
13.00	534.0	7.98	2194.68
14.00	547.0	8.65	2229.24
15.00	558.0	9.31	2255.36
16.00	569.0	9.98	2280.86
17.00	579.5	10.65	2303.84
18.00	588.5	11.31	2320.58
19.00	597.0	11.98	2334.94
20.00	604.5	12.64	2345.11
21.00	612.0	13.31	2354.86
22.00	619.0	13.97	2362.35
23.00	626.5	14.64	2371.27
24.00	633.0	15.30	2376.16
25.00	639.0	15.97	2378.90
26.00	644.0	16.63	2377.77
27.00	648.5	17.30	2374.59
28.00	653.0	17.96	2371.16
29.00	657.0	18.63	2365.75
30.00	660.5	19.29	2358.40
31.06	664.0	20.00	2349.68



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BY: IKK  
 SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION;		B-193, ST-14, D-66	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	105.0	.68	562.77
2.00	205.0	1.37	980.01
3.00	300.0	2.05	1370.48
4.00	382.0	2.74	1701.42
5.00	446.0	3.42	1953.33
6.00	495.0	4.11	2140.09
7.00	535.0	4.79	2287.40
8.00	570.0	5.48	2412.19
9.00	598.0	6.16	2506.89
10.00	625.0	6.85	2595.98
11.00	651.0	7.53	2679.54
12.00	675.0	8.22	2753.74
13.00	697.0	8.90	2818.76
14.00	717.0	9.59	2874.77
15.00	736.0	10.27	2925.78
16.00	755.0	10.96	2975.68
17.00	773.0	11.64	3020.69
18.00	788.0	12.33	3053.42
19.00	804.0	13.01	2088.99
20.00	818.0	13.70	3116.25
21.00	834.0	14.38	3150.01
22.00	848.0	15.07	3175.58
23.00	861.0	15.75	3196.73
24.00	875.0	16.44	3220.69
25.00	887.0	17.12	3236.75
26.00	900.0	17.81	3255.62
27.00	911.0	18.49	3266.77
28.00	923.0	19.18	3280.73
29.00	935.0	19.86	3293.99
29.20	937.0	20.00	3295.19
30.00	947.0	20.55	3306.54
31.00	958.0	21.23	3315.03



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BY: IKK      DATE: 8/75  
SUBJECT:

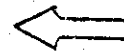
SAMPLE IDENTIFICATION:		B-193, ST-15, D-72.5	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	80.0	.62	455.81
2.00	130.0	1.24	663.23
3.00	180.0	1.86	868.02
4.00	230.0	2.47	1070.18
5.00	290.0	3.09	1310.96
6.00	355.0	3.71	1569.09
7.00	418.0	4.33	1815.64
8.00	476.0	4.95	2038.64
9.00	529.0	5.57	2238.48
11.00	620.0	6.80	2570.27
12.00	659.0	7.42	2706.94
13.00	692.0	8.04	2818.07
14.00	722.0	8.66	2915.80
15.00	751.0	9.28	3008.08
16.00	776.0	9.89	3083.49
17.00	798.0	10.51	3146.15
18.00	818.0	11.13	3200.08
19.00	838.0	11.75	3252.97
20.00	857.0	12.37	3301.06
22.00	890.0	13.61	3375.86
24.00	902.5	14.84	3372.86
26.00	880.0	16.08	3243.47
28.00	850.0	17.32	3090.05



SAMPLE IDENTIFICATION:		B-193, ST-16, D-77	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
1.00	.0	.00	116.41
2.00	88.0	.61	483.01
3.00	145.0	1.22	716.51
4.00	187.0	1.83	885.24
5.00	210.0	2.44	973.98
7.00	217.0	3.66	990.13
8.00	222.0	4.27	1003.96
10.00	226.0	5.49	1007.05
11.00	225.0	6.10	996.61



SAMPLE IDENTIFICATION:		B-193, ST-16, D-78	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	119.00
1.00	250.0	.53	1186.01
2.00	420.0	1.06	1901.79
3.00	535.0	1.59	2377.45
4.00	610.0	2.12	2679.78
5.00	663.0	2.66	2886.75
6.00	698.0	3.19	3016.48
7.00	722.0	3.72	3099.14
8.00	733.0	4.25	3127.27



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SAMPLE IDENTIFICATION:		B-193, ST-17, D-82	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.00	.0	.00	118.67
4.50	105.0	.28	566.65
5.00	138.0	.56	705.57
6.00	192.0	1.11	930.26
7.00	242.0	1.67	1135.54
8.00	289.0	2.22	1325.88
9.00	333.0	2.78	1501.50
10.00	374.0	3.33	1662.61
11.00	412.0	3.89	1809.42
12.00	447.0	4.44	1942.15
13.00	481.0	5.00	2069.15
14.00	510.0	5.56	2174.32
15.00	538.0	6.11	2274.08
16.00	565.0	6.67	2368.52
17.00	590.0	7.22	2453.73
18.00	611.0	7.78	2521.95
19.00	634.0	8.33	2597.03
20.00	655.0	8.89	2663.21
22.00	692.0	10.00	2773.30
24.00	724.0	11.11	2860.85
26.00	751.0	12.22	2926.56
28.00	768.0	13.33	2952.59
30.00	780.0	14.44	2958.69
32.00	786.0	15.56	2941.96
34.00	789.5	16.67	2915.74
35.00	793.0	17.22	2908.70
36.00	796.0	17.78	2899.74



B-193, ST-1B NO STRENGTH TEST DUE TO DRILL WASH



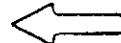
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DATE: 8/75

SAMPLE IDENTIFICATION:		B-193, ST-19, D-98	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	23.0	.66	214.53
2.00	49.0	1.32	322.35
3.00	68.0	1.97	399.51
4.00	85.0	2.63	467.31
5.00	98.0	3.29	517.68
6.00	112.0	3.95	571.41
7.00	124.0	4.61	616.24
8.00	136.0	5.26	660.40
9.00	147.0	5.92	699.87
10.00	158.0	6.58	738.73
11.00	169.0	7.24	776.98
12.00	179.0	7.89	810.68
13.00	188.0	8.55	839.94
14.00	198.0	9.21	872.55
15.00	207.0	9.87	900.77
16.00	215.0	10.53	924.67
17.00	224.0	11.18	951.90
18.00	233.0	11.84	978.64
19.00	241.0	12.50	1001.14
20.00	250.0	13.16	1026.89
21.00	257.0	13.82	1044.80
22.00	265.0	14.47	1065.95
23.00	272.0	15.13	1083.05
24.00	279.0	15.79	1099.75
25.00	285.0	16.45	1112.51
26.00	292.0	17.11	1128.45
27.00	297.0	17.76	1137.00
28.00	302.0	18.42	1145.27
29.00	307.0	19.08	1153.27
30.00	311.5	19.74	1159.27
30.40	316.0	20.00	1170.80



B-193, ST-20 No STRENGTH TEST DUE TO DRILL WASH  
(W<sub>m</sub> = 31.1%)

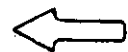
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SAMPLE IDENTIFICATION:		B-193, ST-21, D-112	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
1.00	10.0	.65	158.23
2.00	28.0	1.31	232.21
3.00	45.0	1.96	301.05
4.00	58.0	2.62	352.50
5.00	70.0	3.27	399.15
6.00	80.0	3.92	437.02
7.00	90.0	4.58	474.34
8.00	98.0	5.23	503.10
9.00	105.0	5.89	527.45
10.00	112.0	6.54	551.41
11.00	119.0	7.19	574.98
12.00	126.0	7.85	598.17
13.00	132.0	8.50	617.11
14.00	138.0	9.16	635.71
15.00	144.0	9.81	653.99
16.00	148.0	10.46	664.37
17.00	153.0	11.12	678.28
18.00	158.0	11.77	691.92
19.00	163.0	12.43	705.28
20.00	168.0	13.08	718.37
21.00	172.0	13.73	727.53
22.00	177.0	14.39	740.09
23.00	180.0	15.04	745.20
24.00	185.0	15.70	757.26
25.00	188.0	16.35	761.99
26.00	192.0	17.00	770.05
27.00	195.0	17.66	774.41
28.00	198.0	18.31	778.61
29.00	202.0	18.97	786.06
30.00	205.0	19.62	789.90
31.00	210.0	20.27	800.31
32.00	212.0	20.93	800.42
30.60	208.0	20.01	796.18



B-193 ST-22 } NO TEST DUE TO DRILL WASH  
B-193 ST-23 }

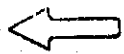
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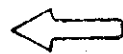
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DATE: 8/75

SAMPLE IDENTIFICATION:		B-192, ST-1, D-20	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
.40	11.5	.26	165.17
.80	20.0	.52	200.45
1.20	28.0	.79	233.44
1.60	35.0	1.05	262.07
2.00	42.0	1.31	290.55
2.40	50.0	1.57	323.03
2.80	57.0	1.83	351.18
3.20	65.0	2.10	383.32
3.60	73.0	2.36	415.28
4.00	81.0	2.62	447.07
4.40	90.0	2.88	482.77
4.80	99.0	3.14	518.28
5.20	108.0	3.41	553.59
5.60	118.0	3.67	592.77
6.80	147.0	4.45	704.94
7.20	157.0	4.72	743.24
7.60	166.0	4.98	777.31
8.00	174.0	5.24	807.18
8.40	181.0	5.50	832.88
8.80	187.0	5.76	854.45
9.20	192.0	6.02	871.92
9.60	197.0	6.29	889.27
10.00	200.0	6.55	898.63
10.40	203.0	6.81	907.91
10.80	206.0	7.07	917.13
11.20	208.0	7.33	922.38
11.60	209.0	7.60	923.67
12.00	210.0	7.86	924.94



SAMPLE IDENTIFICATION:		B-192, ST-2, D-25	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.50	27.0	.33	233.50
1.00	51.0	.66	334.80
1.50	78.0	.99	448.15
2.00	105.0	1.32	560.73
2.50	135.0	1.65	685.17
3.00	165.0	1.98	808.78
3.50	192.0	2.31	918.98
4.00	213.0	2.64	1003.41
4.50	229.0	2.97	1066.48
5.00	242.0	3.30	1116.67
5.50	250.0	3.63	1145.87
6.00	255.0	3.96	1162.51
6.50	256.0	4.29	1162.61
7.00	251.0	4.62	1138.18



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SAMPLE IDENTIFICATION:		B-192, ST-3, D-30	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	45.0	.32	309.47
1.00	83.0	.65	469.65
1.50	118.0	.97	616.10
2.00	157.0	1.30	778.43
2.50	193.0	1.62	927.07
3.00	222.0	1.95	1045.42
3.50	241.0	2.27	1121.23
4.00	250.0	2.60	1154.93
4.30	251.0	2.79	1156.77
4.50	250.0	2.92	1151.08
5.00	247.0	3.25	1134.84



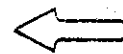
SAMPLE IDENTIFICATION:		B-192, ST-4, D-35	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	136.0	.65	690.61
2.00	275.0	1.31	1268.54
2.80	315.0	1.83	1428.53
4.00	254.0	2.62	1164.87



SAMPLE IDENTIFICATION:		B-192, ST-5, D-40	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
.50	86.0	.33	482.60
1.00	147.0	.66	739.02
1.50	205.0	.99	981.08
2.00	263.0	1.32	1221.51
2.50	313.0	1.65	1426.81
3.00	354.0	1.98	1593.15
3.50	377.0	2.31	1683.47
3.70	379.5	2.44	1691.58
4.10	372.0	2.70	1655.94
4.50	336.0	2.97	1502.71
5.00	310.0	3.30	1390.55



SAMPLE IDENTIFICATION:		B-192, ST-6, D-45	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.50	111.0	.33	590.33
1.00	194.0	.66	940.43
1.50	249.0	.99	1169.84
2.00	272.0	1.31	1262.87
2.15	272.0	1.41	1261.61
2.50	266.0	1.64	1233.47
3.00	254.0	1.97	1179.12
3.50	247.0	2.30	1145.97



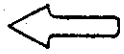
U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
SUBJECT:

DATE: 8/75

SAMPLE IDENTIFICATION;		B-192, ST-7, D-52	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	100.0	.71	541.43
2.00	170.0	1.42	832.16
3.00	224.0	2.14	1051.79
4.00	262.0	2.85	1201.77
5.00	285.0	3.56	1287.67
6.00	293.0	4.27	1310.87
7.00	270.0	4.98	1207.81

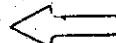


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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
JOB LOCATION: BELLE RIVER, MICHIGAN  
CLIENT: BECHTEL POWER CORPORATION

BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION;		B-192, ST-8, D-55	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	103.0	.62	551.62
2.00	165.0	1.23	808.20
3.00	132.0	1.85	665.62
4.00	195.0	2.47	922.33
5.00	247.0	3.09	1130.48
6.00	282.0	3.70	1266.39
7.00	305.0	4.32	1351.71
8.00	322.0	4.94	1411.61
9.00	334.0	5.56	1450.56
11.00	352.0	6.79	1502.84
12.00	358.0	7.41	1516.48
13.00	363.0	8.02	1525.90
14.00	367.5	8.64	1533.11
15.00	370.0	9.26	1532.38
16.00	373.5	9.88	1535.35
18.00	379.0	11.11	1535.08
19.00	381.0	11.73	1531.92
20.00	382.0	12.35	1524.93
21.00	383.0	12.96	1517.88
22.00	384.0	13.58	1510.79
23.00	384.0	14.20	1500.00
24.00	383.5	14.81	1487.40
25.00	381.0	15.43	1467.64



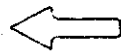
SAMPLE IDENTIFICATION;		B-192, ST-9, D-60	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	70.0	.63	412.31
2.00	130.0	1.26	661.26
3.00	185.0	1.89	886.18
4.00	235.0	2.52	1087.46
5.00	280.0	3.14	1265.51
6.00	317.0	3.77	1408.47
7.00	347.0	4.40	1521.04
8.00	371.0	5.03	1607.81
9.00	389.0	5.66	1669.27
10.00	404.0	6.29	1717.83
11.00	417.0	6.92	1757.68
12.00	429.0	7.55	1792.91
13.00	439.0	8.18	1819.70
14.00	447.0	8.81	1838.22
16.00	463.0	10.06	1873.96
17.00	471.0	10.69	1891.20
18.00	476.0	11.32	1896.70
19.00	482.0	11.95	1905.68
20.00	488.0	12.58	1914.34
21.00	493.0	13.21	1919.00
D-28 22.00	497.0	13.84	1919.73

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BY: IKK      DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

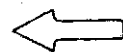
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
24.00	505.0	15.09	1920.54
25.00	509.0	15.72	1920.63
26.00	512.0	16.35	1916.95
27.00	516.0	16.98	1916.64
28.00	519.0	17.61	1912.62
29.00	523.0	18.24	1911.90
30.00	525.0	18.87	1904.09
31.80	530.5	20.00	1896.20



SAMPLE IDENTIFICATION:

B-192, ST-10, D-70

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	30.0	.16	246.05
.50	60.0	.31	373.36
.75	90.0	.47	500.27
1.00	117.0	.62	614.05
1.50	164.0	.93	810.94
2.00	209.0	1.24	998.14
2.50	252.0	1.55	1175.75
3.00	295.0	1.86	1352.21
3.50	336.0	2.17	1519.18
4.00	377.0	2.48	1685.06
4.50	417.0	2.80	1845.71
5.00	450.0	3.11	1976.33
5.50	482.0	3.42	2101.96
6.00	512.0	3.73	2218.52
6.50	537.0	4.04	2313.79
7.00	560.0	4.35	2400.23
7.50	582.0	4.66	2482.00
8.00	603.0	4.97	2559.12
9.00	639.0	5.59	2687.51
10.00	672.0	6.21	2801.97
11.00	702.0	6.83	2902.75
12.00	727.0	7.45	2982.19
13.00	751.0	8.07	3056.37
14.00	773.0	8.70	3121.48
15.00	792.0	9.32	3173.81
16.00	810.0	9.94	3221.29
17.00	827.0	10.56	3263.99
18.00	844.0	11.18	3305.79
19.00	859.0	11.80	3339.16
20.00	874.0	12.42	3371.74
22.00	900.0	13.66	3419.75
24.00	926.0	14.91	3465.01
26.00	949.0	16.15	3496.77
28.00	971.0	17.39	3522.56
30.00	992.0	18.63	3542.54
32.20	1014.0	20.00	3558.20
34.00	1037.0	21.12	3585.93



U. W. STOLL AND ASSOCIATES  
soil mechanics and foundation consultants

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BY: IKK DATE: 8/75  
SUBJECT: STRESS-STRAIN RELATIONS

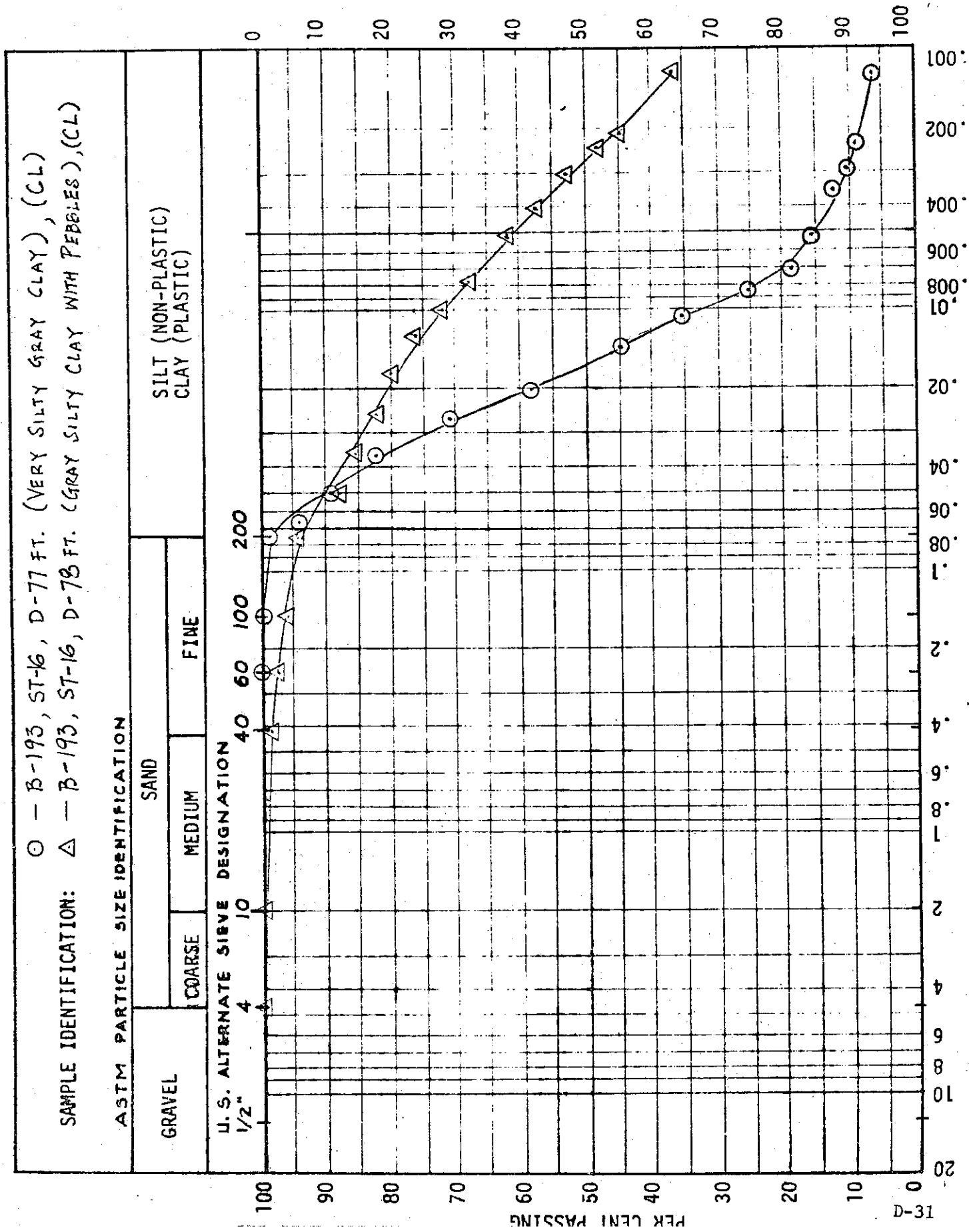
SAMPLE IDENTIFICATION;		B-192, ST-11, D-80	
DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
.25	42.0	.16	295.57
.50	92.0	.31	506.76
.75	137.0	.47	696.15
1.00	177.0	.62	863.86
1.25	216.0	.78	1026.83
1.50	253.0	.93	1180.87
1.75	288.0	1.09	1326.02
2.00	324.0	1.24	1474.90
2.25	360.0	1.40	1623.31
2.50	395.0	1.55	1767.07
3.00	460.0	1.86	2032.36
3.50	522.0	2.17	2283.48
4.00	578.0	2.48	2508.12
4.50	622.0	2.79	2681.75
5.00	664.0	3.10	2846.00
5.50	696.0	3.41	2968.13
6.00	726.0	3.72	3081.24
6.50	752.0	4.03	3177.26
7.00	774.0	4.34	3256.35
7.50	795.0	4.65	3330.81
8.00	810.0	4.96	3380.51
8.50	826.0	5.27	3433.83
9.00	838.0	5.58	3470.69
9.50	848.0	5.89	3499.25
10.00	856.0	6.20	3519.58
11.00	864.5	6.82	3529.93
11.50	850.0	7.13	3461.00
12.00	820.0	7.44	3331.54
12.50	795.0	7.75	3222.46





JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK  
 DATE: 9/75  
 SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



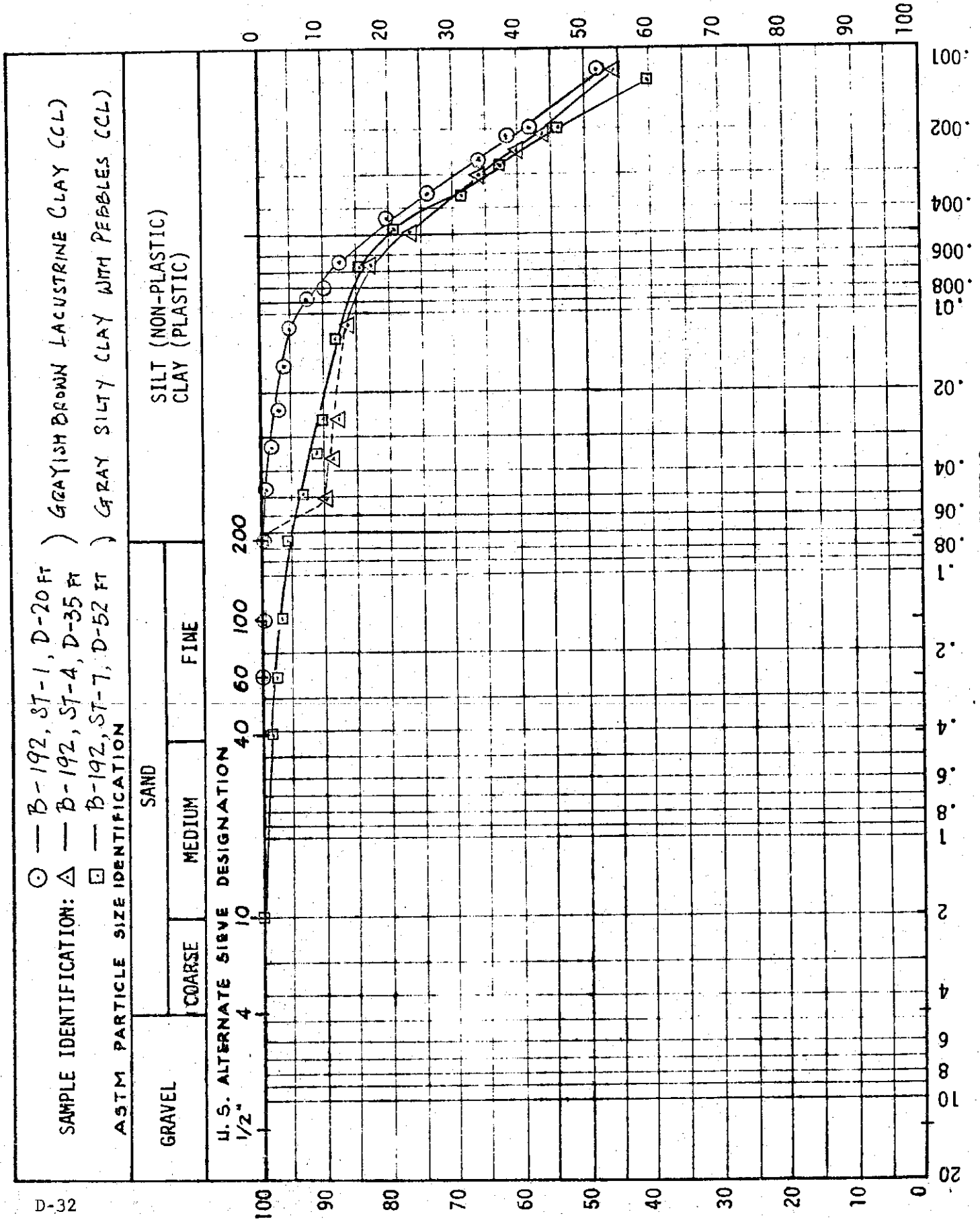
**U. W. STOLL AND ASSOCIATES**  
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER  
 JOB LOCATION: BELLE RIVER, MICHIGAN  
 CLIENT: BECHTEL POWER CORPORATION

BY: IKK

DATE: 9/75

SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



**APPENDIX G – 2016 LABORATORY TEST  
RESULTS**

TRC Environmental Corporation													QC:	JPH				
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH				
Project Name: DTE - BRPP BAB and DB						Cell #:						8						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-01, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray lean clay						Average Kv =						2.9E-08 cm/s						
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.87		2.87		Permeant: Water												
Sample Ht. (in)		3.02		3.02		Permeant Specific Gravity: 1.00												
Tare & Wet (g)		775.10		649.20		Sample Specific Gravity: 2.70 Est.												
Tare & Dry (g)		562.60		471.50		Confining Pressure (psi): 100.0												
Tare (g)		88.86		88.64		Burette Diameter (in): 0.250												
Sample Wt. (g)		563.65		560.56		Burette Zero (cm): 100.0												
Moisture (%)		44.9		46.4		Maximum Gradient: 7.0												
Wet Density (pcf)		109.9		109.5		Average Gradient: 6.5												
Dry Density (pcf)		75.9		74.8		Max. Effect. Stress (psi): 5.7												
Saturation (%)		99.2		100.0		Min. Effect. Stress (psi): 4.3												
						Ave. Effect. Stress (psi): 4.8												
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1	
1	2016	3	15	8	10.00	0.0	95	95	55.40		3.45		102.60					
2	2016	3	15	11	15.00	11100	23.0	95	95	56.10	0.70	4.05	0.60	101.30	1.30	-36.8	4.7E-08	
3	2016	3	15	14	16.00	10860	23.0	95	95	57.00	0.90	4.75	0.70	100.60	0.70	0.0	3.6E-08	
4	2016	3	15	18	15.00	14340	23.0	95	95	57.75	0.75	5.55	0.80	99.75	0.85	-3.0	3.3E-08	
5	2016	3	16	4	55.00	38400	22.0	95	95	59.30	1.55	7.65	2.10	97.50	2.25	-3.4	3.4E-08	
6	2016	3	16	8	38.00	13380	23.0	95	95	59.80	0.50	8.35	0.70	96.80	0.70	0.0	3.2E-08	
7	2016	3	16	11	56.00	11880	23.0	95	95	60.35	0.55	9.05	0.70	96.30	0.50	16.7	3.1E-08	
8	2016	3	16	15	1.00	11100	23.0	95	95	60.40	0.05	9.60	0.55	95.70	0.60	-4.3	3.2E-08	
9	2016	3	17	5	14.00	51180	22.0	95	95	61.30	0.90	12.10	2.50	93.20	2.50	0.0	3.2E-08	
10	2016	3	17	8	17.00	10980	24.0	95	95	62.05	0.75	12.65	0.55	92.75	0.45	10.0	3.0E-08	
11	2016	3	17	12	19.00	14520	23.0	95	95	62.15	0.10	13.25	0.60	92.05	0.70	-7.7	3.0E-08	
12	2016	3	17	17	49.00	19800	23.0	95	95	62.60	0.45	14.15	0.90	91.30	0.75	9.1	2.9E-08	
13	2016	3	18	5	23.00	41640	22.0	95	95	63.15	0.55	16.00	1.85	89.40	1.90	-1.3	3.3E-08	
14	2016	3	18	8	58.00	12900	24.0	95	95	63.60	0.45	16.55	0.55	88.90	0.50	4.8	3.0E-08	
15	2016	3	18	12	55.00	14220	23.0	95	95	63.80	0.20	17.10	0.55	88.30	0.60	-4.3	3.0E-08	
16	2016	3	18	16	30.00	12900	23.0	95	95	64.10	0.30	17.65	0.55	87.90	0.40	15.8	2.8E-08	
17	2016	3	21	4	58.00	217680	22.0	95	95	67.20	3.10	25.35	7.70	80.20	7.70	0.0	3.1E-08	
18	2016	3	21	8	1.00	10980	24.0	95	95	67.60	0.40	25.70	0.35	79.85	0.35	0.0	3.1E-08	
19	2016	3	21	12	10.00	14940	23.0	95	95	67.60	0.00	26.15	0.45	79.40	0.45	0.0	3.0E-08	
20	2016	3	21	15	12.00	10920	23.0	95	95	67.70	0.10	26.40	0.25	79.15	0.25	0.0	2.3E-08	1
21	2016	3	21	19	36.00	15840	23.0	95	95	68.30	0.60	26.90	0.50	78.70	0.45	5.3	3.1E-08	1
22	2016	3	21	21	31.00	6900	23.0	95	95	68.10	-0.20	27.10	0.20	78.50	0.20	0.0	3.0E-08	1
23	2016	3	22	5	52.00	30060	25.0	95	95	68.90	0.80	28.05	0.95	77.65	0.85	5.6	3.1E-08	1
24	2016	3	22	10	31.00	16740	23.0	95	95	68.85	-0.05	28.45	0.40	77.20	0.45	-5.9	2.8E-08	1
25	2016	3	22	15	59.00	19680	24.0	95	95	69.40	0.55	29.00	0.55	76.70	0.50	4.8	2.9E-08	1
26	2016	3	22	22	32.00	23580	24.0	95	95	69.80	0.40	29.55	0.55	76.10	0.60	-4.3	2.7E-08	1
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.			2.9E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.					

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						9					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: MW-16-05, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.7E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.84		Permeant: Water											
Sample Ht. (in)		3.25		3.20		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		536.11		691.40		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		403.90		517.10		Confining Pressure (psi): 100.0											
Tare (g)		93.83		91.24		Burette Diameter (in): 0.250											
Sample Wt. (g)		610.40		600.16		Burette Zero (cm): 100.0											
Moisture (%)		42.6		40.9		Maximum Gradient: 7.3											
Wet Density (pcf)		110.6		112.8		Average Gradient: 6.9											
Dry Density (pcf)		77.5		80.0		Max. Effect. Stress (psi): 6.1											
Saturation (%)		98.2		100.0		Min. Effect. Stress (psi): 4.6											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	25.20		1.95		101.75				
2	2016	3	15	11	15.00	0.0	95	95	27.70		1.80		99.60				
3	2016	3	15	14	17.00	10920	23.0	95	95	29.40	1.70	2.00	0.20	98.65	0.95	-65.2	3.2E-08
4	2016	3	15	18	16.00	14340	23.0	95	95	30.65	1.25	2.40	0.40	97.60	1.05	-44.8	3.1E-08
5	2016	3	16	4	56.00	38400	22.0	95	95	32.20	1.55	3.85	1.45	95.40	2.20	-20.5	3.1E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	32.40	0.20	4.40	0.55	94.85	0.55	0.0	2.6E-08
7	2016	3	16	11	57.00	11880	23.0	95	95	33.85	1.45	4.95	0.55	94.40	0.45	10.0	2.7E-08
8	2016	3	16	15	2.00	11100	23.0	95	95	34.00	0.15	5.35	0.40	93.90	0.50	-11.1	2.7E-08
9	2016	3	17	5	15.00	51180	22.0	95	95	35.20	1.20	7.35	2.00	91.80	2.10	-2.4	2.8E-08
10	2016	3	17	8	17.00	10920	24.0	95	95	35.80	0.60	7.80	0.45	91.45	0.35	12.5	2.5E-08
11	2016	3	17	12	20.00	14580	23.0	95	95	35.90	0.10	8.30	0.50	89.85	1.60	-52.4	5.1E-08
12	2016	3	17	17	50.00	19800	23.0	95	95	36.40	0.50	9.10	0.80	89.25	0.60	14.3	2.6E-08
13	2016	3	18	5	23.00	41580	22.0	95	95	37.00	0.60	10.65	1.55	88.60	0.65	40.9	2.0E-08
14	2016	3	18	8	58.00	12900	24.0	95	95	37.50	0.50	11.15	0.50	88.15	0.45	5.3	2.7E-08
15	2016	3	18	12	55.00	14220	23.0	95	95	37.70	0.20	11.65	0.50	87.60	0.55	-4.8	2.8E-08
16	2016	3	18	16	31.00	12960	23.0	95	95	38.00	0.30	12.10	0.45	87.20	0.40	5.9	2.5E-08
17	2016	3	21	4	59.00	217680	22.0	95	95	41.00	3.00	19.25	7.15	79.85	7.35	-1.4	3.0E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	41.40	0.40	19.55	0.30	79.60	0.25	9.1	2.4E-08
19	2016	3	21	12	10.00	14880	23.0	95	95	41.40	0.00	19.95	0.40	79.15	0.45	-5.9	2.8E-08
20	2016	3	21	15	13.00	10980	23.0	95	95	41.60	0.20	20.25	0.30	78.85	0.30	0.0	2.7E-08
21	2016	3	21	19	37.00	15840	23.0	95	95	42.00	0.40	20.80	0.55	78.55	0.30	29.4	2.7E-08
22	2016	3	21	21	32.00	6900	23.0	95	95	41.80	-0.20	20.90	0.10	78.30	0.25	-42.9	2.6E-08
23	2016	3	22	5	53.00	30060	25.0	95	95	42.75	0.95	21.75	0.85	77.55	0.75	6.3	2.6E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	42.75	0.00	22.20	0.45	77.10	0.45	0.0	2.8E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	43.25	0.50	22.75	0.55	76.65	0.45	10.0	2.7E-08
26	2016	3	22	22	33.00	23580	24.0	95	95	43.60	0.35	23.35	0.60	76.10	0.55	4.3	2.6E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.7E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				

TRC Environmental Corporation													QC:	JPH				
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH				
Project Name: DTE - BRPP BAB and DB						Cell #:						9						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray sandy lean clay, with gravel						Average Kv =						2.9E-08 cm/s						
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.86		2.83		Permeant: Water												
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity: 1.00												
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity: 2.68 Est.												
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi): 100.0												
Tare (g)		92.18		89.22		Burette Diameter (in): 0.250												
Sample Wt. (g)		666.40		648.58		Burette Zero (cm): 100.0												
Moisture (%)		42.2		40.1														
Wet Density (pcf)		112.9		112.9														
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi): 6.2												
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi): 4.5												
						Ave. Effect. Stress (psi): 5.0												
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1	
1	2016	4	21	11	16.00	0.0	95	95	16.80		2.50		102.25					
2	2016	4	21	20	32.00	33360	27.0	95	95	27.60	10.80	1.25	-1.25	96.40	5.85	-154.3	4.1E-08	
3	2016	4	22	9	22.00	46200	24.0	95	95	32.50	4.90	2.40	1.15	93.40	3.00	-44.6	3.0E-08	
4	2016	4	22	12	18.00	10560	24.0	95	95	33.50	1.00	2.85	0.45	92.90	0.50	-5.3	3.1E-08	
5	2016	4	22	18	33.00	22500	25.0	95	95	35.05	1.55	3.80	0.95	91.95	0.95	0.0	2.9E-08	
6	2016	4	25	11	30.00	233820	23.0	95	95	44.30	9.25	12.75	8.95	83.10	8.85	0.6	3.1E-08	
7	2016	4	25	17	41.00	22260	24.0	95	95	45.35	1.05	13.50	0.75	82.40	0.70	3.4	2.9E-08	
8	2016	4	25	20	39.00	10680	24.0	95	95	45.30	-0.05	13.80	0.30	82.00	0.40	-14.3	3.0E-08	
9	2016	4	25	23	15.00	9360	24.0	95	95	45.35	0.05	14.10	0.30	81.70	0.30	0.0	3.0E-08	
10	2016	4	26	4	59.00	20640	25.0	95	95	46.00	0.65	14.75	0.65	81.00	0.70	-3.7	3.0E-08	
11	2016	4	26	8	19.00	12000	24.0	95	95	45.95	-0.05	15.10	0.35	80.60	0.40	-6.7	3.0E-08	
12	2016	4	26	13	18.00	17940	24.0	95	95	46.40	0.45	15.70	0.60	80.10	0.50	9.1	3.0E-08	
13	2016	4	27	4	57.00	56340	23.0	95	95	47.60	1.20	17.40	1.70	78.60	1.50	6.2	2.9E-08	
14	2016	4	27	12	47.00	28200	23.0	95	95	47.95	0.35	18.20	0.80	77.90	0.70	6.7	2.8E-08	
15	2016	4	27	15	8.00	8460	23.0	95	95	47.90	-0.05	18.45	0.25	77.65	0.25	0.0	3.2E-08	
16	2016	4	28	5	1.00	49980	22.0	95	95	48.80	0.90	19.80	1.35	76.35	1.30	1.9	3.0E-08	
17	2016	4	28	8	5.00	11040	24.0	95	95	49.40	0.60	20.15	0.35	76.15	0.20	27.3	2.8E-08	
18	2016	4	28	14	56.00	24660	23.0	95	95	49.60	0.20	20.75	0.60	75.55	0.60	0.0	2.8E-08	
19	2016	4	28	20	48.00	21120	23.0	95	95	49.90	0.30	21.30	0.55	75.10	0.45	10.0	2.8E-08	
20	2016	4	29	5	31.00	31380	26.0	95	95	51.05	1.15	22.10	0.80	74.35	0.75	3.2	2.8E-08	
21	2016	4	29	10	27.00	17760	23.0	95	95	50.90	-0.15	22.50	0.40	73.90	0.45	-5.9	3.0E-08	
22	2016	4	29	14	41.00	15240	23.0	95	95	51.25	0.35	22.90	0.40	73.60	0.30	14.3	2.9E-08	
23	2016	4	29	18	0.00	11940	23.0	95	95	51.55	0.30	23.20	0.30	73.40	0.20	20.0	2.7E-08	
24	2016	5	1	16	23.00	166980	22.0	95	95	54.25	2.70	26.95	3.75	70.05	3.35	5.6	3.0E-08	
25	2016	5	2	4	58.00	45300	23.0	95	95	55.05	0.80	27.85	0.90	69.25	0.80	5.9	2.9E-08	
26	2016	5	2	8	4.00	11160	23.0	95	95	55.30	0.25	28.10	0.25	69.05	0.20	11.1	3.1E-08	
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.					
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.					

TRC Environmental Corporation												QC:	JPH					
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)												QA:	JPH					
Project Name: DTE - BRPP BAB and DB						Cell #:						9						
Project #: 231828.0003.0000						USCS Description:						N/A						
Sample Name: MW-16-07, 50-52'						USCS Classification:						N/A						
Visual Descript: Gray sandy lean clay, with gravel																		
Sample Type: Undisturbed		Initial Values		Final Values														
Sample Dia. (in)		2.86		2.83		Permeant:						Water						
Sample Ht. (in)		3.50		3.48		Permeant Specific Gravity:						1.00						
Tare & Wet (g)		512.00		737.80		Sample Specific Gravity:						2.68 Est.						
Tare & Dry (g)		387.40		552.10		Confining Pressure (psi):						100.0						
Tare (g)		92.18		89.22		Burette Diameter (in):						0.250						
Sample Wt. (g)		666.40		648.58		Burette Zero (cm):						100.0						
Moisture (%)		42.2		40.1		Maximum Gradient:						3.8						
Wet Density (pcf)		112.9		112.9		Average Gradient:						3.6						
Dry Density (pcf)		79.4		80.6		Max. Effect. Stress (psi):						5.2						
Saturation (%)		102.4		100.0		Min. Effect. Stress (psi):						4.6						
						Ave. Effect. Stress (psi):						4.9						
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi)		Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1	
1	2016	5	2	8	4.00	0.0	95	95	55.30		28.10		69.05					
2	2016	5	2	13	15.00	18660	23.0	95	95	55.65	0.35	28.50	0.40	68.80	0.25	23.1	2.8E-08	
3	2016	5	2	20	45.00	27000	26.0	95	95	56.30	0.65	29.00	0.50	68.35	0.45	5.3	2.6E-08	
4	2016	5	3	4	50.00	29100	23.0	95	95	56.00	-0.30	29.50	0.50	67.75	0.60	-9.1	3.1E-08	
5	2016	5	3	8	0.00	11400	25.0	95	95	56.35	0.35	29.70	0.20	67.60	0.15	14.3	2.5E-08	
6	2016	5	3	11	10.00	11400	23.0	95	95	56.30	-0.05	29.90	0.20	67.35	0.25	-11.1	3.4E-08	
7	2016	5	3	14	12.00	10920	23.0	95	95	56.40	0.10	30.15	0.25	67.25	0.10	42.9	2.8E-08	
8	2016	5	3	19	36.00	19440	24.0	95	95	57.20	0.80	30.55	0.40	67.05	0.20	33.3	2.6E-08	
9	2016	5	4	5	24.00	35280	23.0	95	95	57.60	0.40	31.15	0.60	66.50	0.55	4.3	2.9E-08	
10	2016	5	4	9	48.00	15840	23.0	95	95	57.60	0.00	31.40	0.25	66.25	0.25	0.0	2.9E-08	
11	2016	5	4	14	50.00	18120	23.0	95	95	57.70	0.10	31.70	0.30	66.00	0.25	9.1	2.8E-08	
12	2016	5	4	20	0.00	18600	25.0	95	95	58.25	0.55	32.10	0.40	65.80	0.20	33.3	2.9E-08	
13	2016	5	5	5	24.00	33840	24.0	95	95	58.35	0.10	32.60	0.50	65.30	0.50	0.0	2.8E-08	1
14	2016	5	5	10	25.00	18060	24.0	95	95	58.60	0.25	32.90	0.30	65.10	0.20	20.0	2.7E-08	1
15	2016	5	5	14	42.00	15420	24.0	95	95	58.90	0.30	33.20	0.30	64.85	0.25	9.1	3.5E-08	1
16	2016	5	6	4	52.00	51000	23.0	95	95	59.50	0.60	34.00	0.80	64.25	0.60	14.3	2.8E-08	1
17	2016	5	6	9	32.00	16800	23.0	95	95	59.70	0.20	34.25	0.25	64.05	0.20	11.1	2.9E-08	1
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
**A zero in this column starts a series of measurements.												*Average Kv for those rows with a 1 in the Ave. column.				2.9E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)												***Kv adjusted for temperature.						

TRC Environmental Corporation													QC:	JPH			
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)													QA:	JPH			
Project Name: DTE - BRPP BAB and DB						Cell #:						10					
Project #: 231828.0003.0000						USCS Description:						N/A					
Sample Name: SB-16-01, 50-52'						USCS Classification:						N/A					
Visual Descript: Gray lean clay						Average Kv =						2.1E-08 cm/s					
Sample Type: Undisturbed		Initial Values		Final Values													
Sample Dia. (in)		2.87		2.82		Permeant: Water											
Sample Ht. (in)		2.88		2.86		Permeant Specific Gravity: 1.00											
Tare & Wet (g)		534.46		607.60		Sample Specific Gravity: 2.70 Est.											
Tare & Dry (g)		400.40		448.80		Confining Pressure (psi): 100.0											
Tare (g)		98.45		86.36		Burette Diameter (in): 0.250											
Sample Wt. (g)		532.36		521.24		Burette Zero (cm): 100.0											
Moisture (%)		44.4		43.8		Maximum Gradient: 8.9											
Wet Density (pcf)		109.0		111.0		Average Gradient: 8.4											
Dry Density (pcf)		75.5		77.2		Max. Effect. Stress (psi): 6.1											
Saturation (%)		97.4		100.0		Min. Effect. Stress (psi): 4.5											
						Ave. Effect. Stress (psi): 5.1											
Yr.	Mo.	Day	Hr.	Min.	Run Time (s)	Temp C***	Pressure (psi) Bot	Pressure (psi) Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0.1
1	2016	3	15	8	11.00	0.0	95	95	24.00		1.65		102.30				
2	2016	3	15	11	16.00	0.0	95	95	27.35		1.15		99.70				
3	2016	3	15	14	17.00	0.0	95	95	29.50		1.15		98.60				
4	2016	3	15	18	17.00	14400	23.0	95	95	30.90	1.40	1.35	0.20	97.50	1.10	-69.2	2.5E-08
5	2016	3	16	4	56.00	38340	22.0	95	95	34.75	3.85	2.00	0.65	95.00	2.50	-58.7	2.4E-08
6	2016	3	16	8	39.00	13380	23.0	95	95	35.00	0.25	2.50	0.50	94.55	0.45	5.3	2.0E-08
7	2016	3	16	11	58.00	11940	23.0	95	95	35.45	0.45	3.00	0.50	94.10	0.45	5.3	2.3E-08
8	2016	3	16	15	3.00	11100	23.0	95	95	35.80	0.35	3.35	0.35	93.60	0.50	-17.6	2.2E-08
9	2016	3	17	5	15.00	51120	22.0	95	95	38.75	2.95	4.55	1.20	91.10	2.50	-35.1	2.2E-08
10	2016	3	17	8	18.00	10980	24.0	95	95	38.25	-0.50	5.25	0.70	90.95	0.15	64.7	2.3E-08
11	2016	3	17	12	21.00	14580	23.0	95	95	38.60	0.35	5.65	0.40	90.35	0.60	-20.0	2.1E-08
12	2016	3	17	17	51.00	19800	23.0	95	95	38.50	-0.10	6.45	0.80	89.85	0.50	23.1	2.1E-08
13	2016	3	18	5	24.00	41580	22.0	95	95	40.80	2.30	7.40	0.95	87.95	1.90	-33.3	2.3E-08
14	2016	3	18	8	59.00	12900	24.0	95	95	40.40	-0.40	8.05	0.65	87.70	0.25	44.4	2.3E-08
15	2016	3	18	12	56.00	14220	23.0	95	95	40.70	0.30	8.40	0.35	87.25	0.45	-12.5	1.9E-08
16	2016	3	18	16	32.00	12960	23.0	95	95	40.70	0.00	8.95	0.55	86.90	0.35	22.2	2.4E-08
17	2016	3	21	4	59.00	217620	22.0	95	95	45.25	4.55	15.10	6.15	80.30	6.60	-3.5	2.2E-08
18	2016	3	21	8	2.00	10980	24.0	95	95	45.25	0.00	15.50	0.40	80.10	0.20	33.3	2.2E-08
19	2016	3	21	12	11.00	14940	23.0	95	95	45.40	0.15	15.90	0.40	79.65	0.45	-5.9	2.4E-08
20	2016	3	21	15	13.00	10920	23.0	95	95	45.70	0.30	16.10	0.20	79.35	0.30	-20.0	1.9E-08
21	2016	3	21	19	38.00	15900	23.0	95	95	45.70	0.00	16.65	0.55	79.10	0.25	37.5	2.1E-08
22	2016	3	21	21	33.00	6900	23.0	95	95	46.10	0.40	16.70	0.05	78.80	0.30	-71.4	2.2E-08
23	2016	3	22	5	53.00	30000	25.0	95	95	47.20	1.10	17.35	0.65	78.00	0.80	-10.3	2.0E-08
24	2016	3	22	10	32.00	16740	23.0	95	95	47.10	-0.10	17.80	0.45	77.60	0.40	5.9	2.2E-08
25	2016	3	22	16	0.00	19680	24.0	95	95	47.40	0.30	18.35	0.55	77.15	0.45	10.0	2.2E-08
26	2016	3	22	22	34.00	23640	24.0	95	95	47.10	-0.30	19.10	0.75	76.80	0.35	36.4	2.1E-08
**A zero in this column starts a series of measurements.													*Average Kv for those rows with a 1 in the Ave. column.		2.1E-08 cm/s		
(Termination determined by stable Kv and low flow differential.)													***Kv adjusted for temperature.				



**APPENDIX H – 2020 LABORATORY TEST  
RESULTS**



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

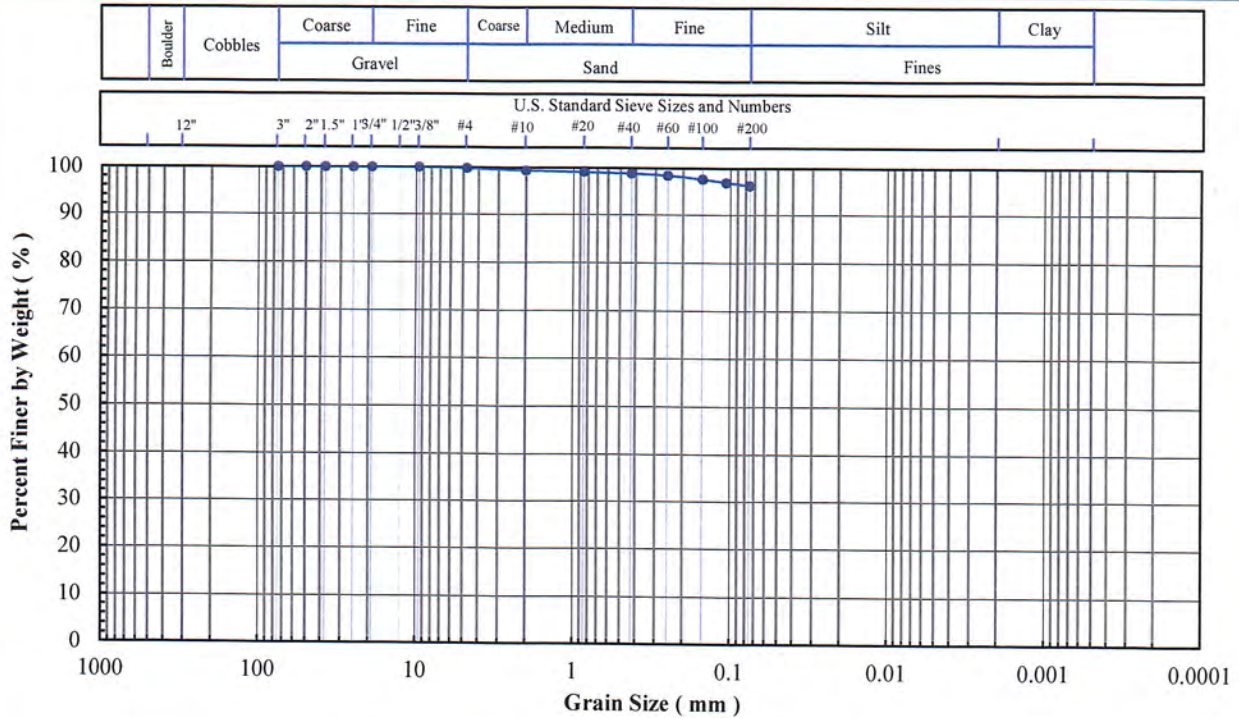
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-1 (3')  
Lab Sample No: 20L186

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

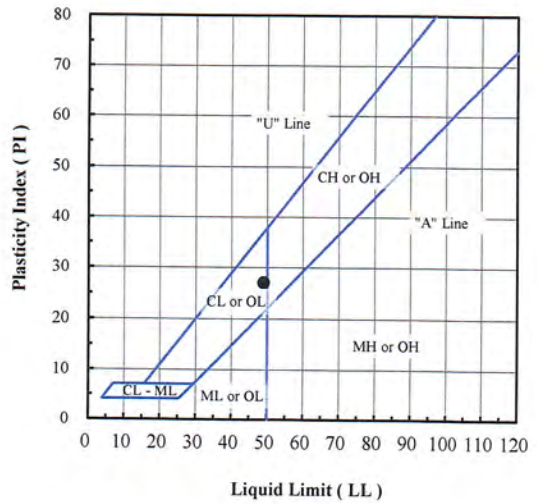


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	99.0
#40	0.425	98.7
#60	0.250	98.3
#100	0.150	97.5
#140	0.106	96.8
#200	0.075	96.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	3.7
Fines (%):	96.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-1 (3')	20L186	22.6	96.1	49	22	27	CL - Lean clay

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

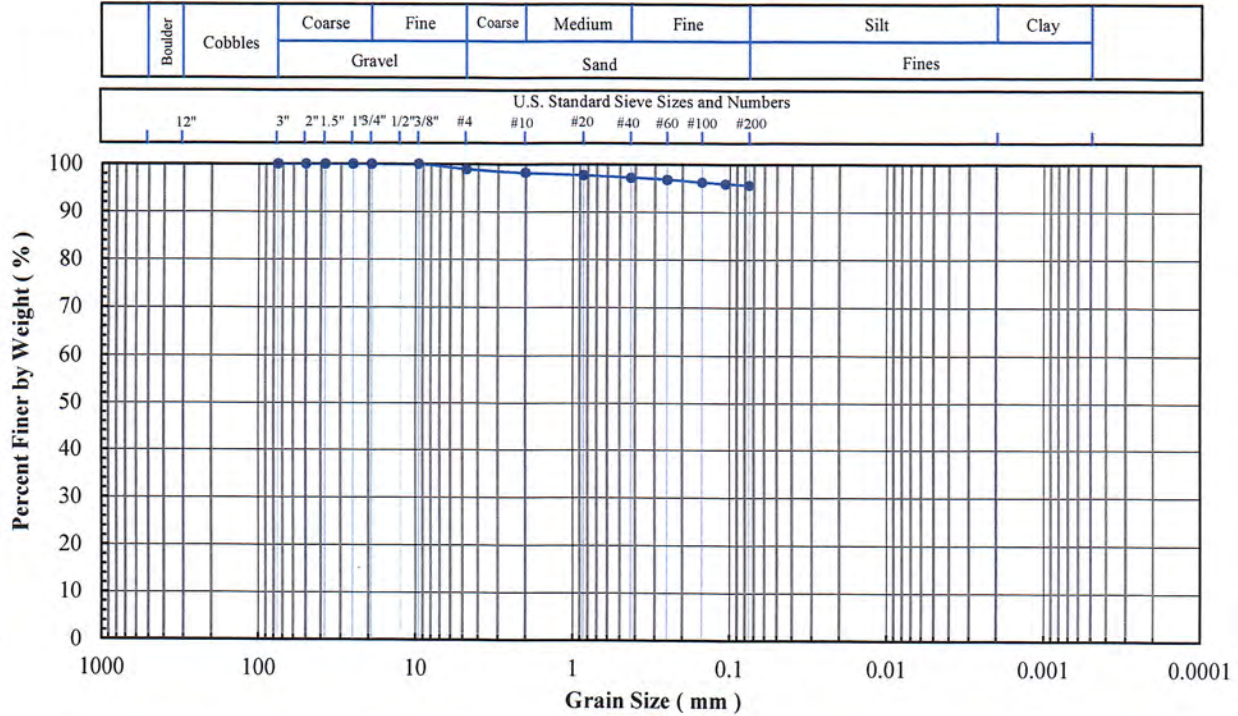
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B1-6 (25')  
Lab Sample No: 20L191

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

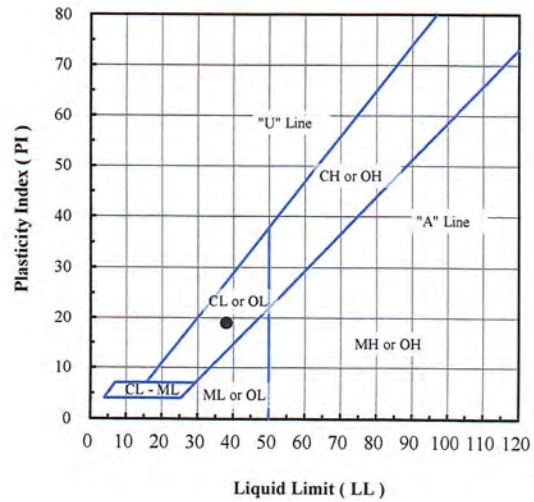


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	98.2
#20	0.850	97.7
#40	0.425	97.2
#60	0.250	96.8
#100	0.150	96.2
#140	0.106	95.9
#200	0.075	95.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	3.3
Fines (%):	95.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-6 (25')	20L191	35.5	95.6	38	19	19	CL - Lean clay

Note(s):

01-26-2021  
A.A. NSR



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

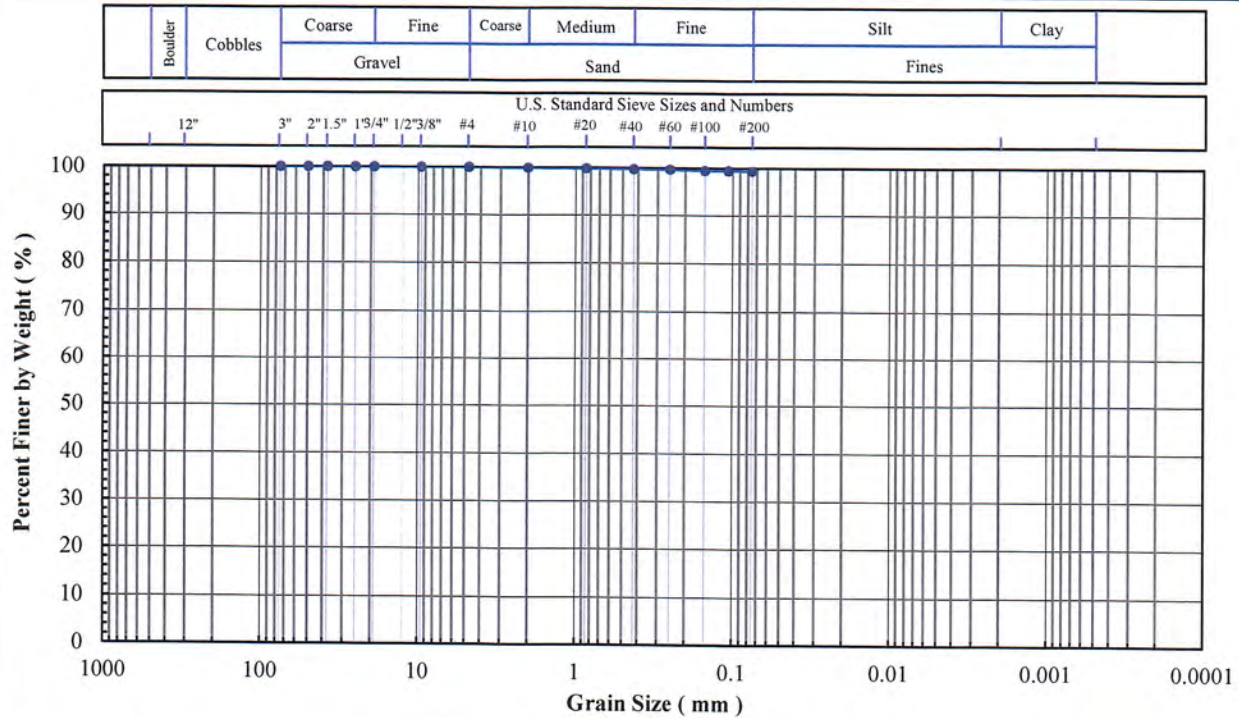
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-9 (48')  
 Lab Sample No: 20L194

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

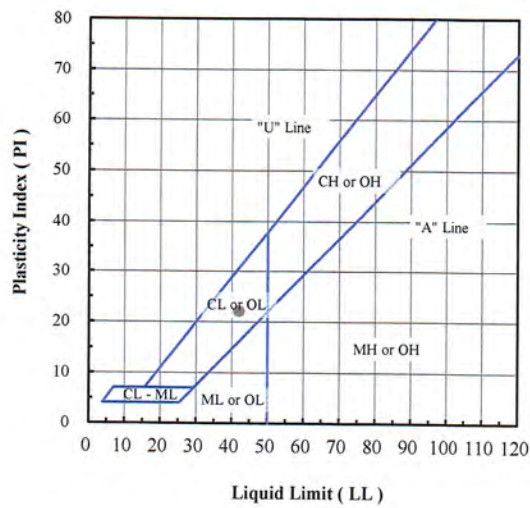


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.6
#100	0.150	99.4
#140	0.106	99.4
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-9 (48')	20L194	39.5	99.3	42	20	22	CL - Lean clay

Note(s):

*01-21-2021  
AA, NSR*



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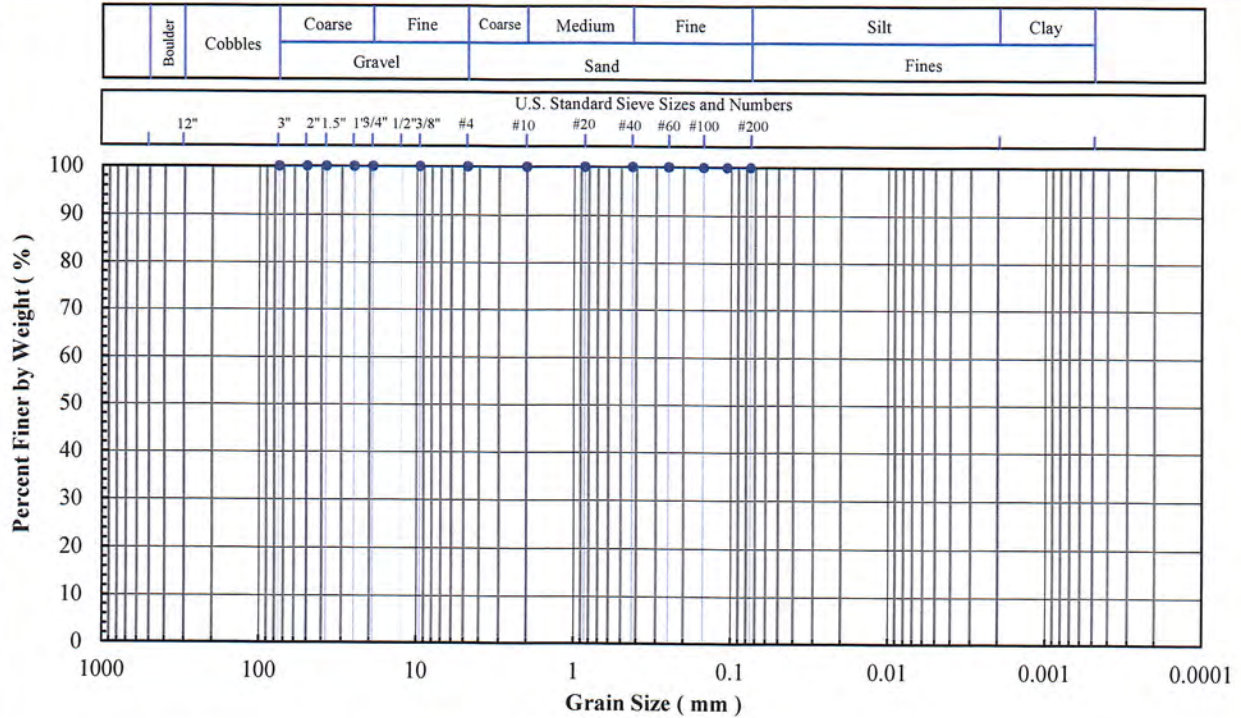
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B1-11 (59')  
Lab Sample No: 20L196

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

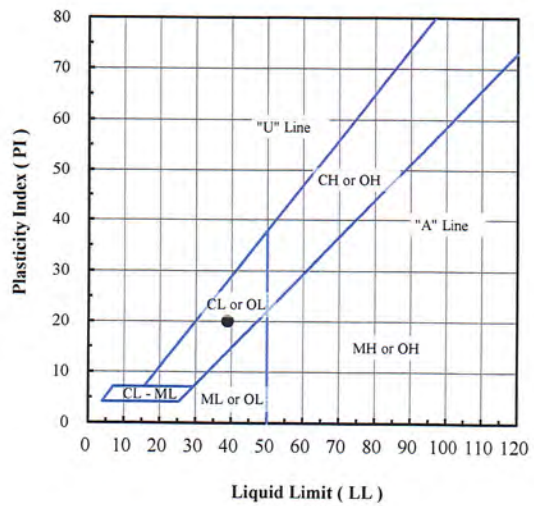


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	100.0
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-11 (59')	20L196	36.8	99.9	39	19	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, NSR



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953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

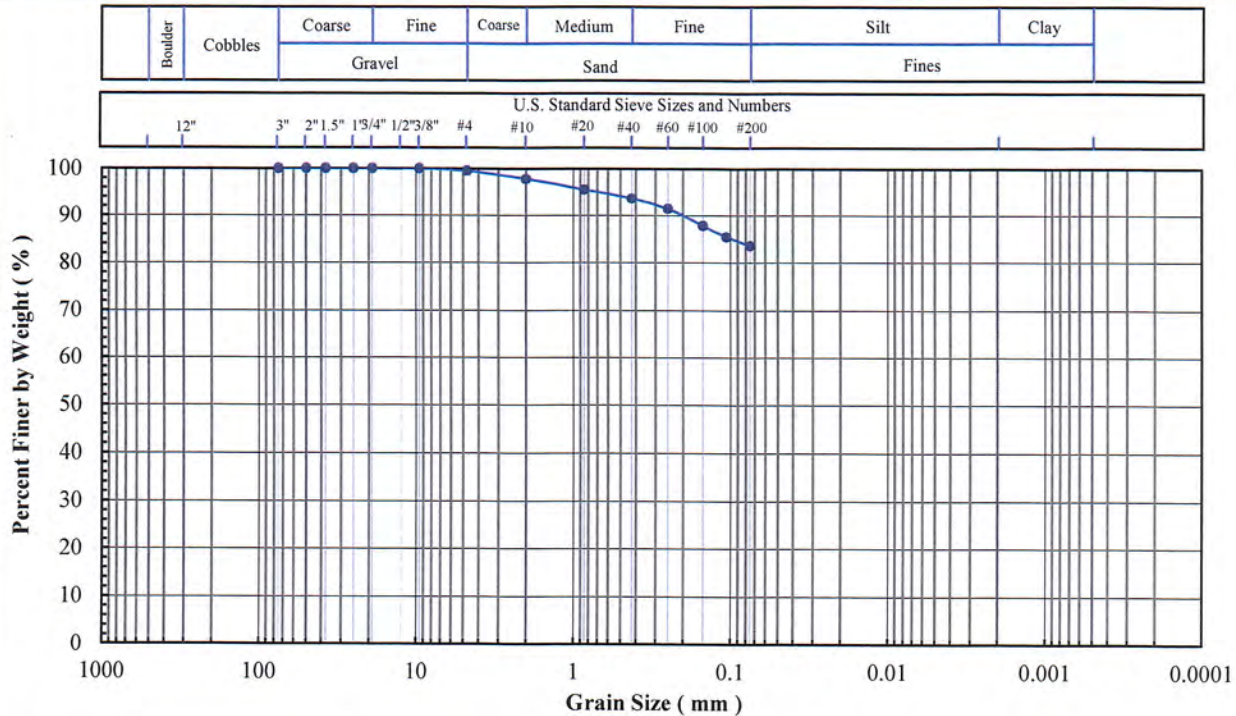
Client Sample ID: B1-14 (80')

Lab Sample No: 20L199

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

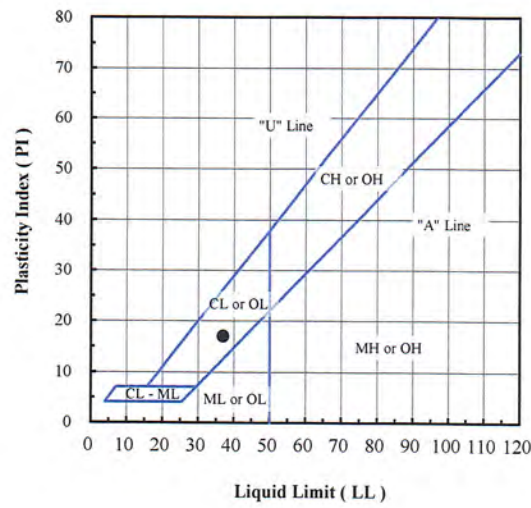


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.8
#20	0.850	95.5
#40	0.425	93.6
#60	0.250	91.4
#100	0.150	87.8
#140	0.106	85.4
#200	0.075	83.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	16.0
Fines (%):	83.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-14 (80')	20L199	24.6	83.5	37	20	17	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA, NSR



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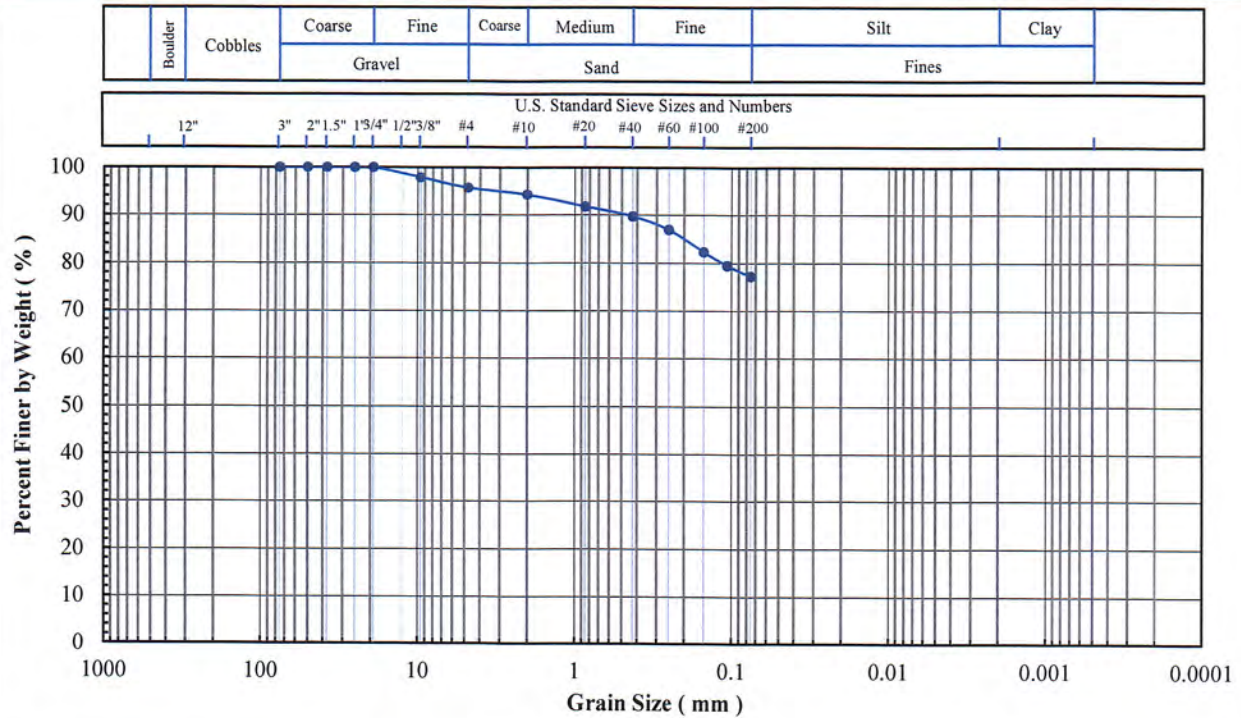
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
Project No: PN1017  
Client Sample ID: B1-16 (85')  
Lab Sample No: 20L201

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

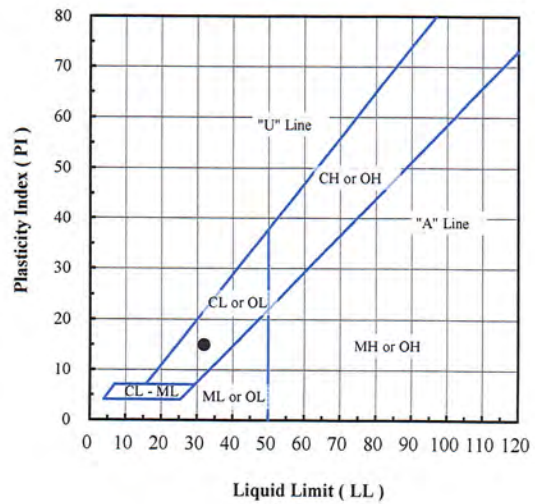


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	96
#10	2.00	94
#20	0.850	92
#40	0.425	90
#60	0.250	87
#100	0.150	82
#140	0.106	79
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	19
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-16 (85')	20L201	19.5	77	32	17	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
AA1NSR



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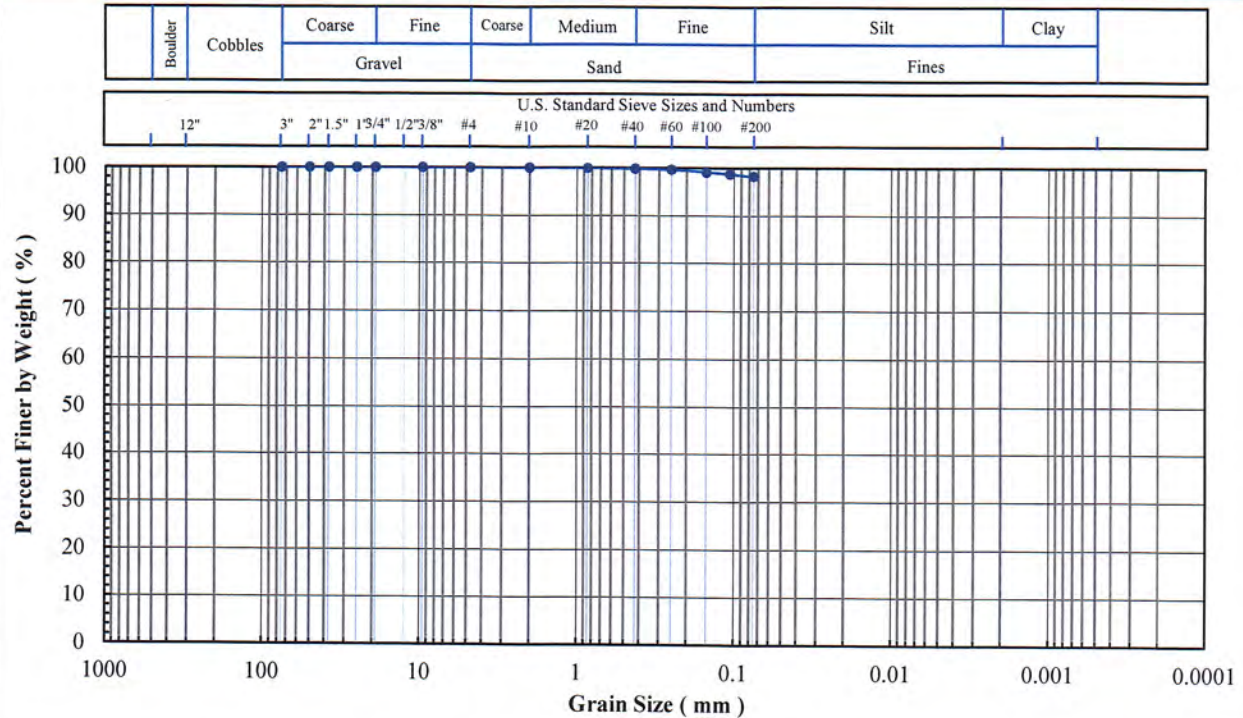
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, [www.excelgeotesting.com](http://www.excelgeotesting.com)

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B1-ST-1 (7-9)  
 Lab Sample No: 20L143

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

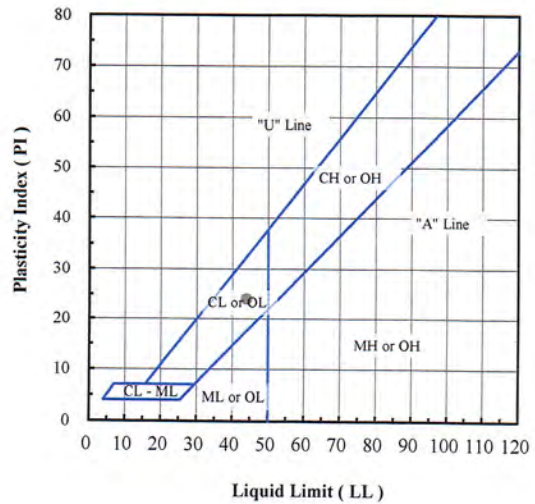


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	99.1
#140	0.106	98.7
#200	0.075	98.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	1.8
Fines (%):	98.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-1 (7-9)	20L143	22.7	98.2	44	20	24	CL - Lean clay

Note(s):

*02-01-2021  
 A.A. NSR*





**Excel Geotechnical Testing, Inc.**  
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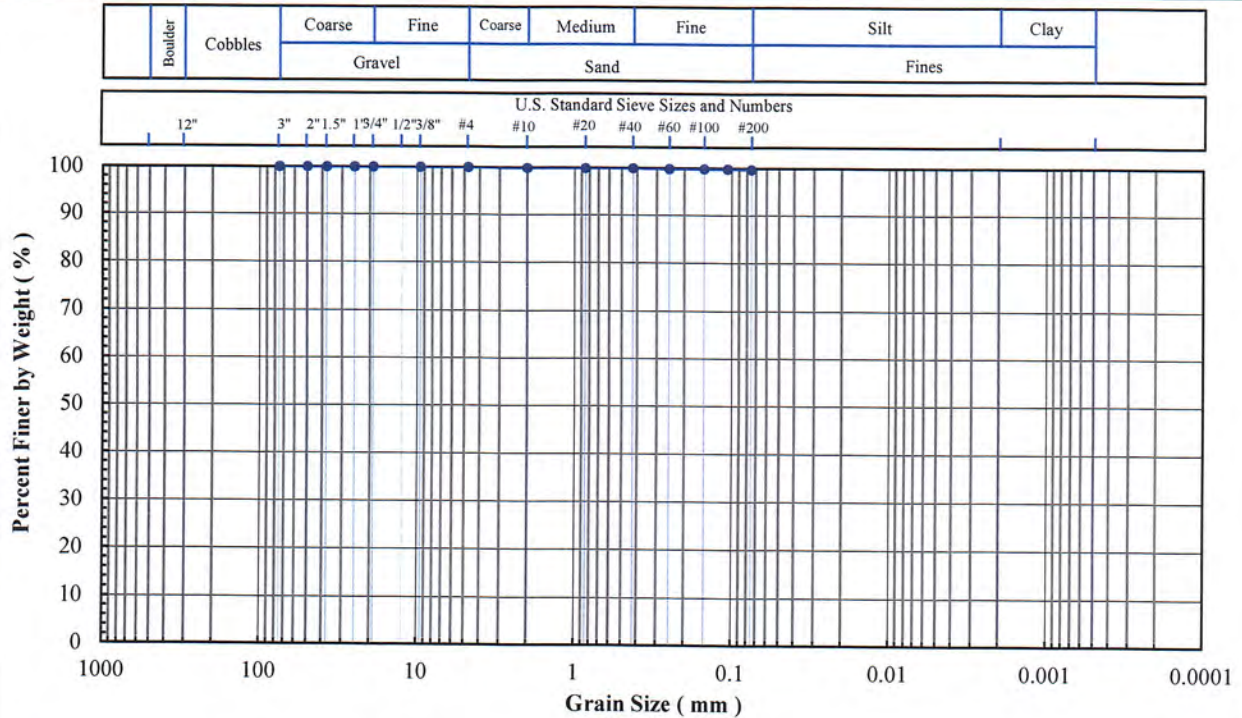
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B1-ST-3 (36-38')  
**Lab Sample No:** 20L145

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

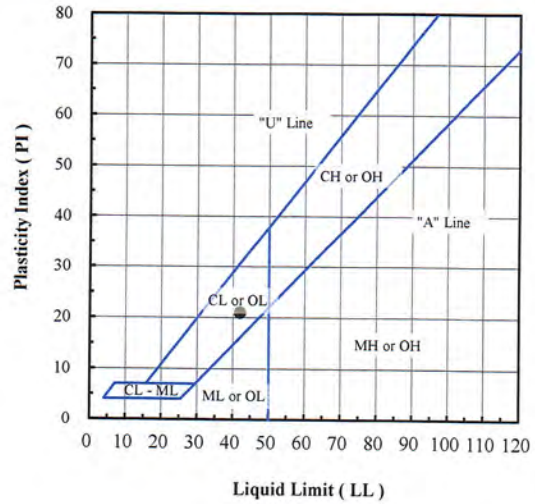


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.9
#40	0.425	99.9
#60	0.250	99.8
#100	0.150	99.8
#140	0.106	99.8
#200	0.075	99.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.3
Fines (%):	99.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
-------------------	--

Carbon. Content (%):	
----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (36-38')	20L145	35.2	99.7	42	21	21	CL - Lean clay

Note(s):

02-01-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

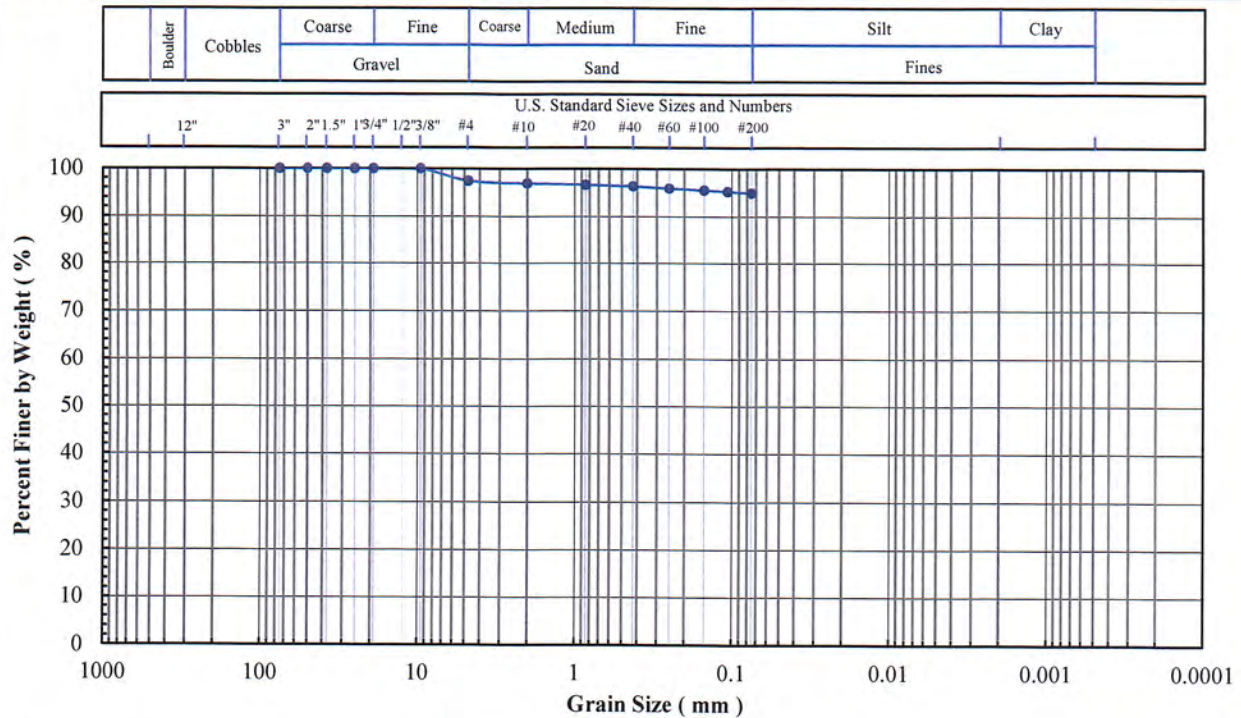
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-2 (5')  
Lab Sample No: 20L205

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

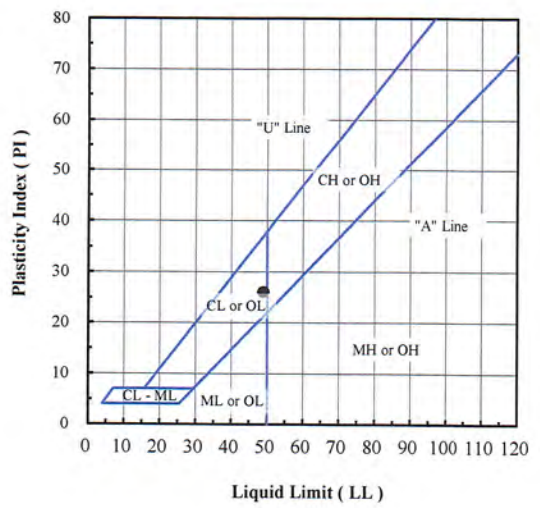


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	96.9
#20	0.850	96.6
#40	0.425	96.3
#60	0.250	95.9
#100	0.150	95.5
#140	0.106	95.2
#200	0.075	94.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	2.5
Fines (%):	94.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-2 (5')	20L205	26.9	94.9	49	23	26	CL - Lean clay

Note(s):

01-25-2021  
AA1/NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

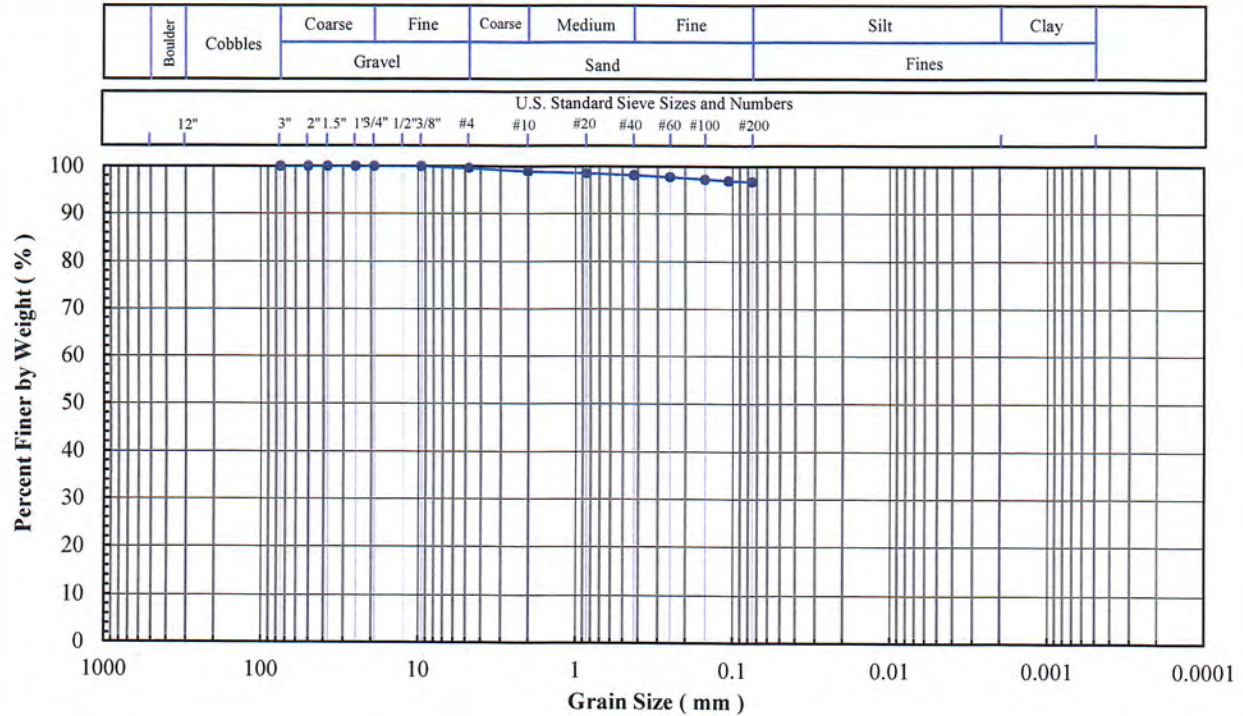
Client Sample ID: B2-5 (18')

Lab Sample No: 20L208

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

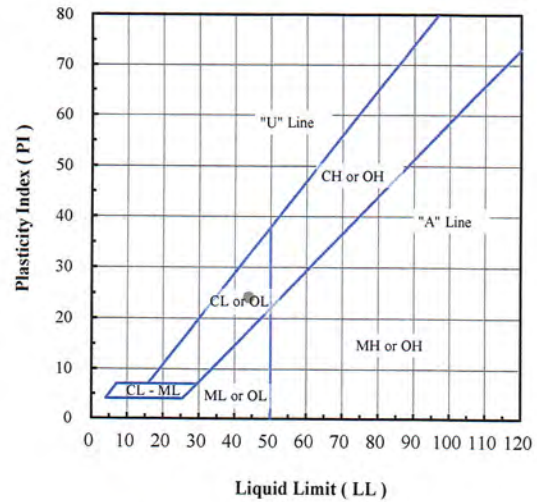


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	98.5
#40	0.425	98.1
#60	0.250	97.7
#100	0.150	97.2
#140	0.106	96.9
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	2.9
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-5 (18')	20L208	36.3	96.7	44	20	24	CL - Lean Clay

Note(s):

01-25-2021  
 AA, N5R



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

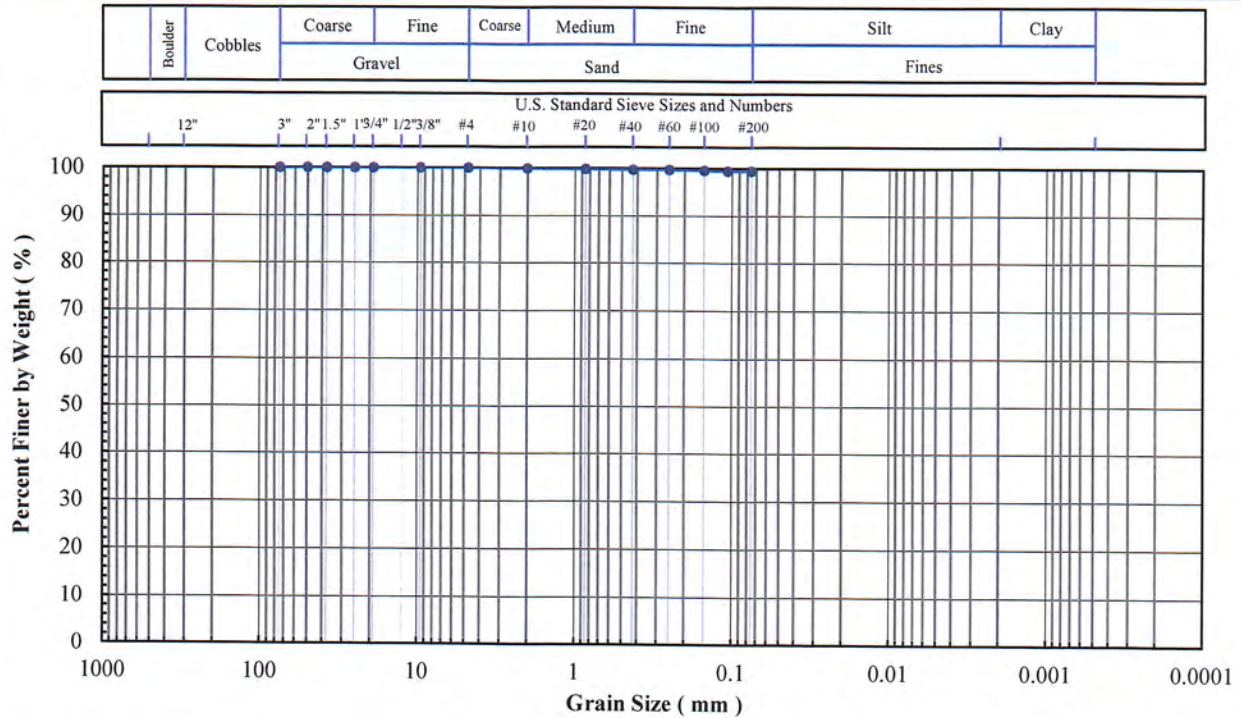
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B2-8 (40')  
Lab Sample No: 20L211

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

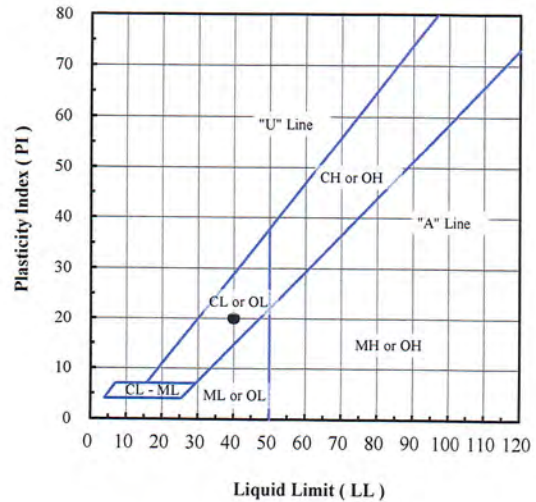


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.5
#140	0.106	99.4
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-8 (40')	20L211	37.5	99.4	40	20	20	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

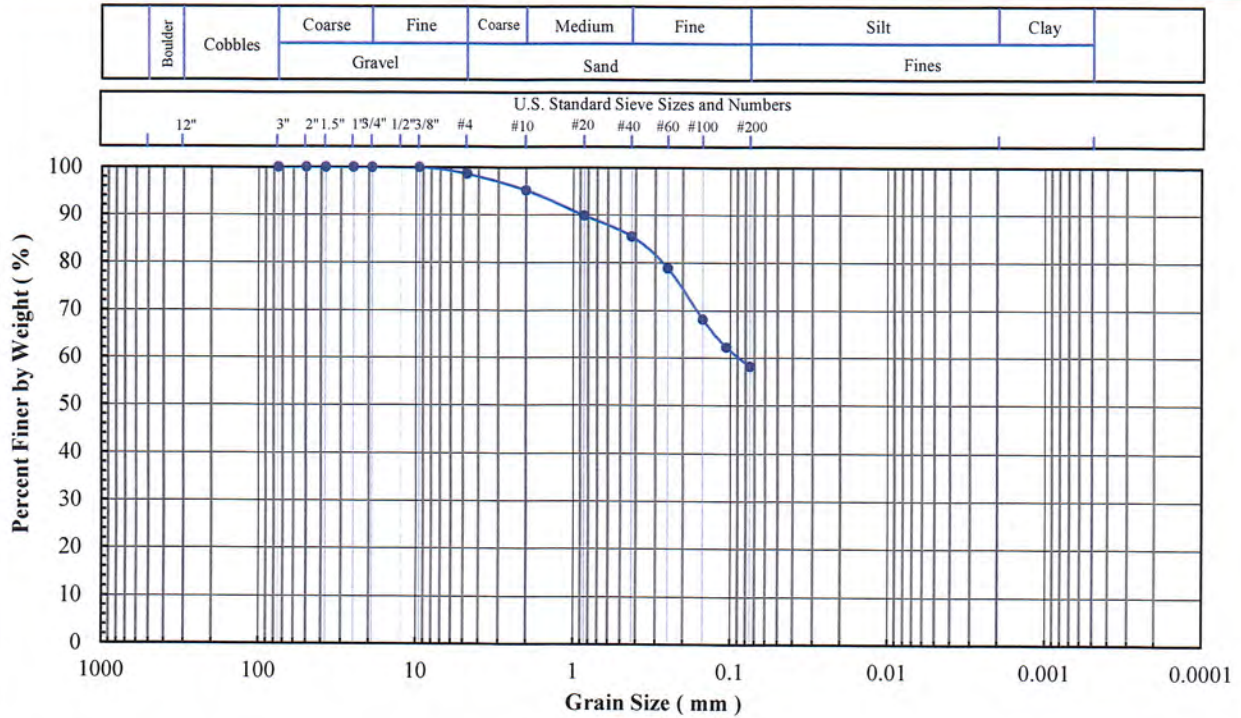
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

**Project Name:** Belle River ALD Support  
**Project No:** PN1017  
**Client Sample ID:** B2-12 (60')  
**Lab Sample No:** 20L215

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

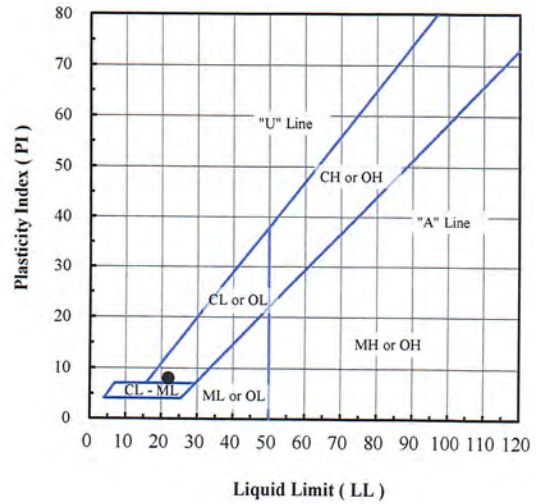


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	95.1
#20	0.850	89.8
#40	0.425	85.4
#60	0.250	78.8
#100	0.150	68.1
#140	0.106	62.2
#200	0.075	58.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	40.5
Fines (%):	58.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-12 (60')	20L215	17.4	58.1	22	14	8	CL - Sandy lean clay

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

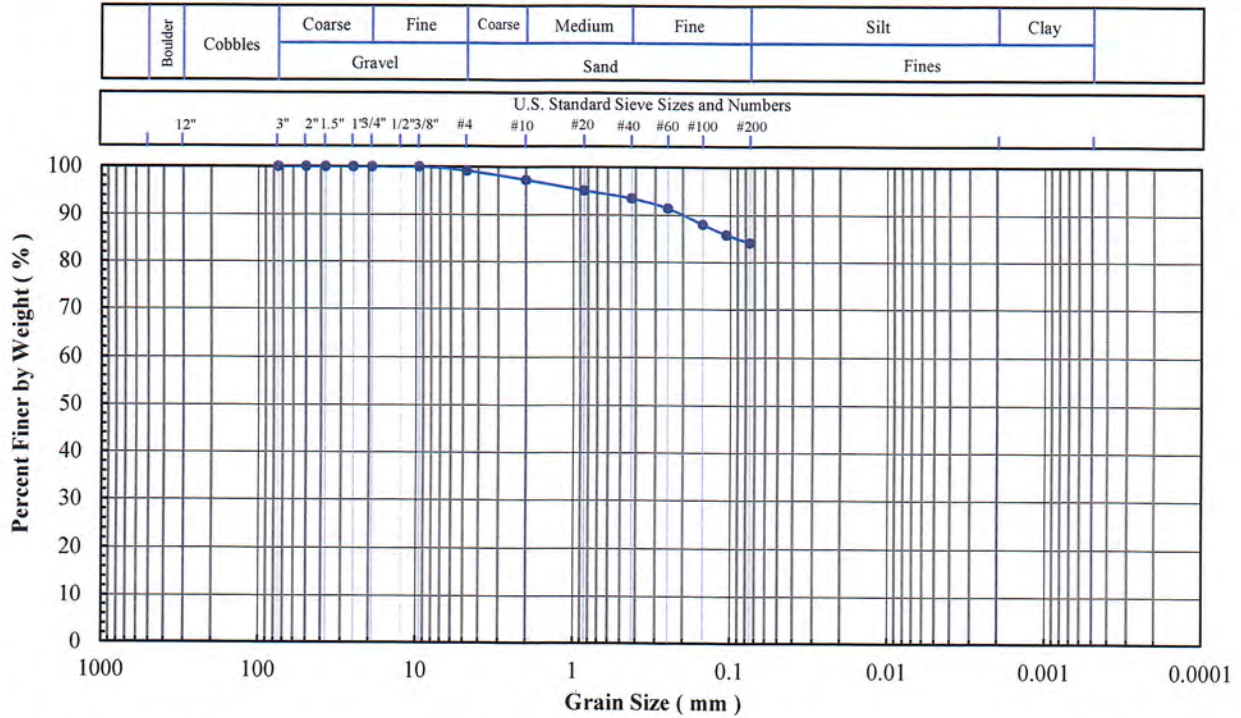
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-16 (80')  
 Lab Sample No: 20L219

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

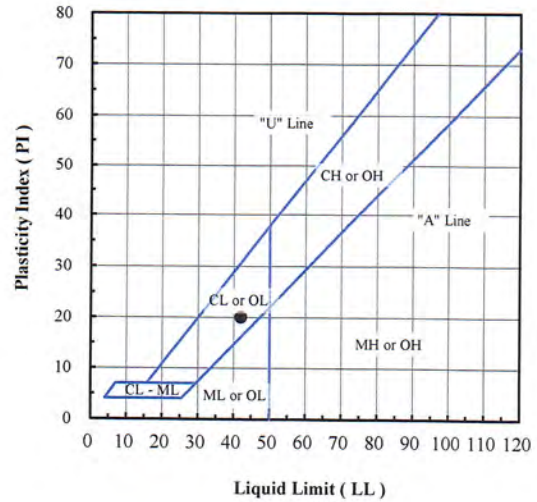


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	95.1
#40	0.425	93.5
#60	0.250	91.4
#100	0.150	88.0
#140	0.106	85.8
#200	0.075	84.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	15.1
Fines (%):	84.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-16 (80')	20L219	25.2	84.1	42	22	20	CL - Lean clay with sand

Note(s):

01-25-2021  
 AA1 NSR



**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

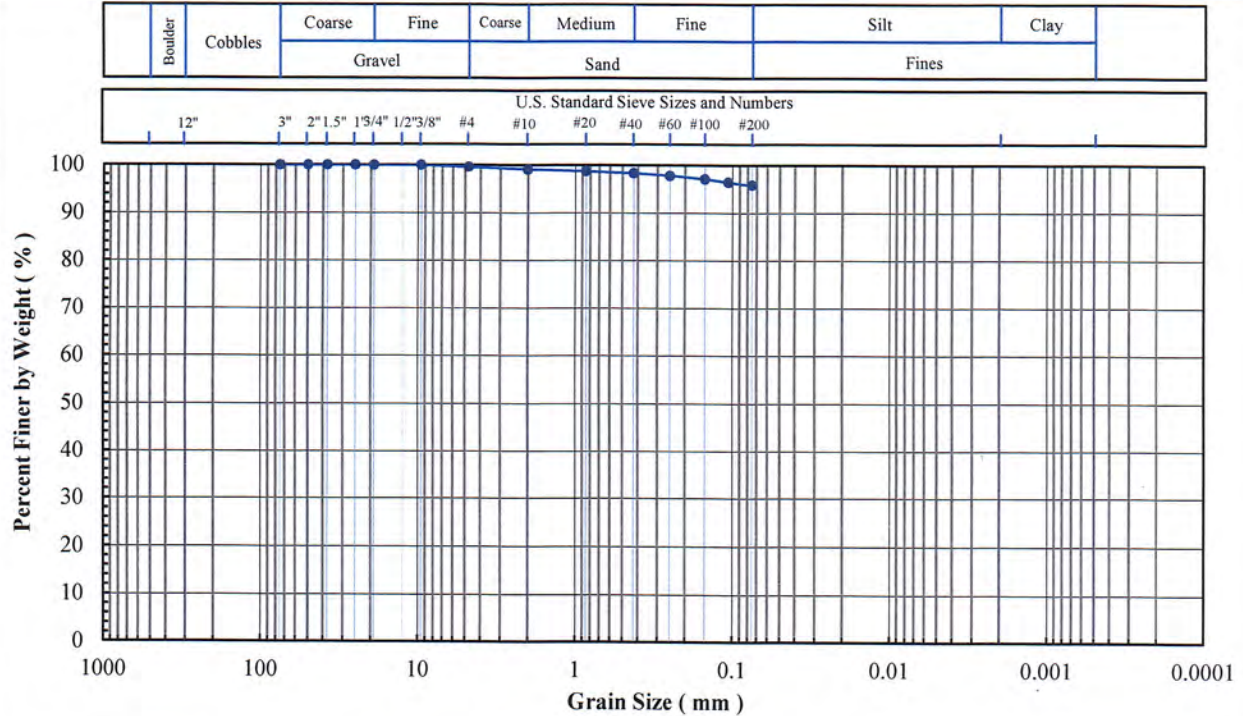
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B2-ST-1 (1-3')  
 Lab Sample No: 20L149

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

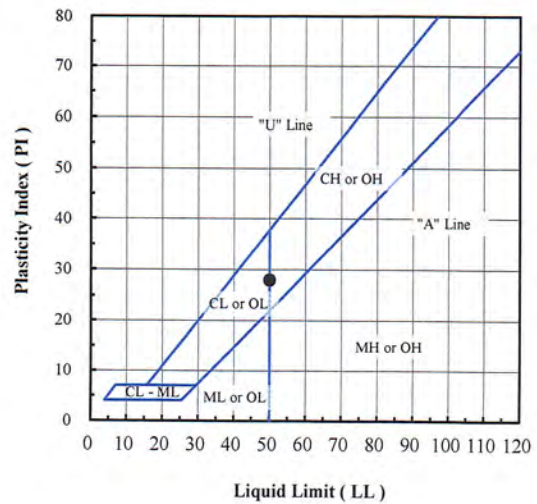


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	99.1
#20	0.850	98.7
#40	0.425	98.3
#60	0.250	97.8
#100	0.150	97.1
#140	0.106	96.4
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	3.8
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
-----------------------	--

Org. Content (%):	
-------------------	--

Carbon. Content (%):	
----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-ST-1 (1-3')	20L149	23.0	95.8	50	22	28	CL - Lean clay

Note(s):

02-01-2021  
 AA1NSA



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

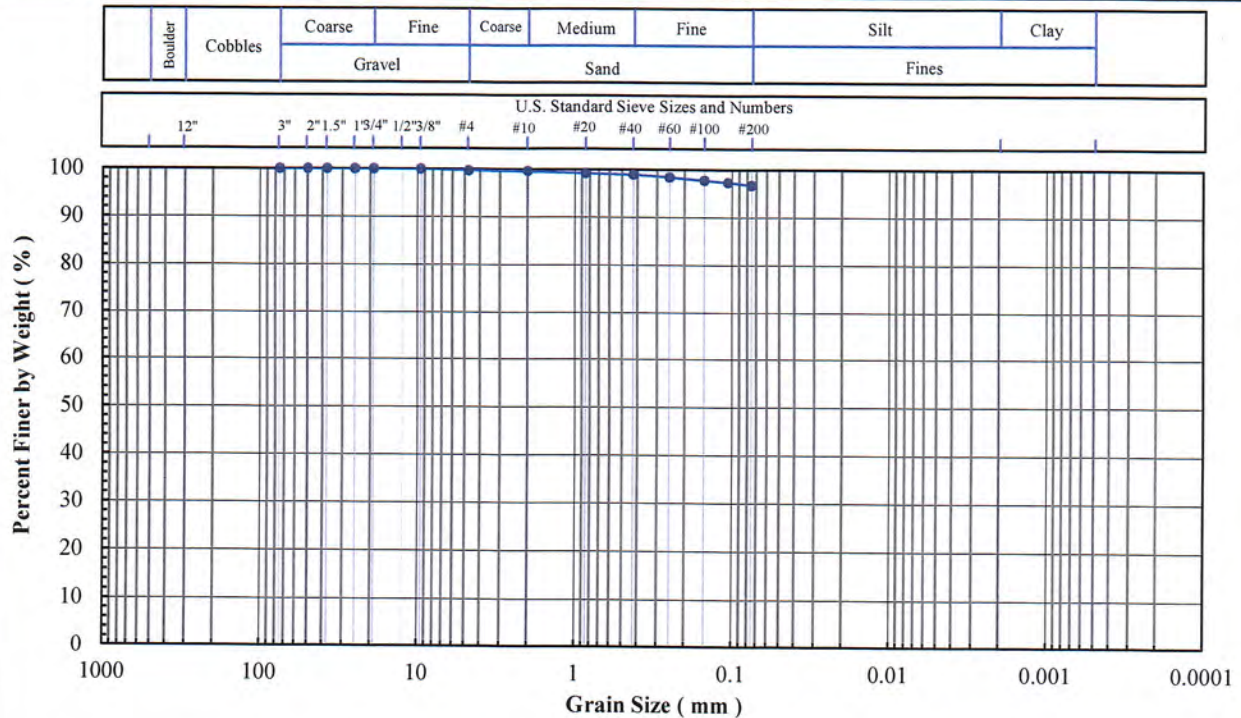
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-2 (5')  
 Lab Sample No: 20L224

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

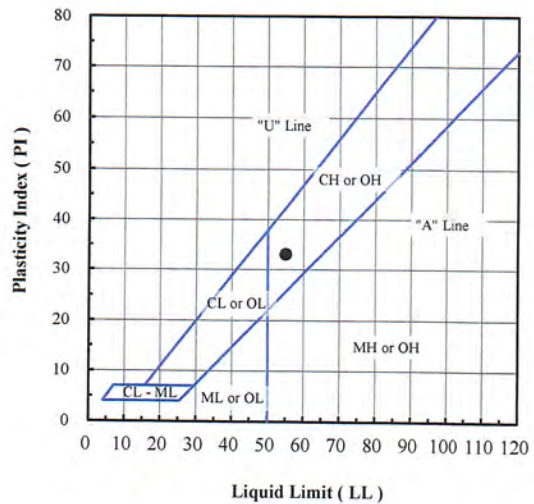


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.6
#20	0.850	99.2
#40	0.425	98.9
#60	0.250	98.4
#100	0.150	97.7
#140	0.106	97.3
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	3.0
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-2 (5')	20L224	24.1	96.7	55	22	33	CH - Fat clay

Note(s):

*01-25-2021  
 A.A. NSR*





**Excel Geotechnical Testing, Inc.**  
 "Excellence in Testing"

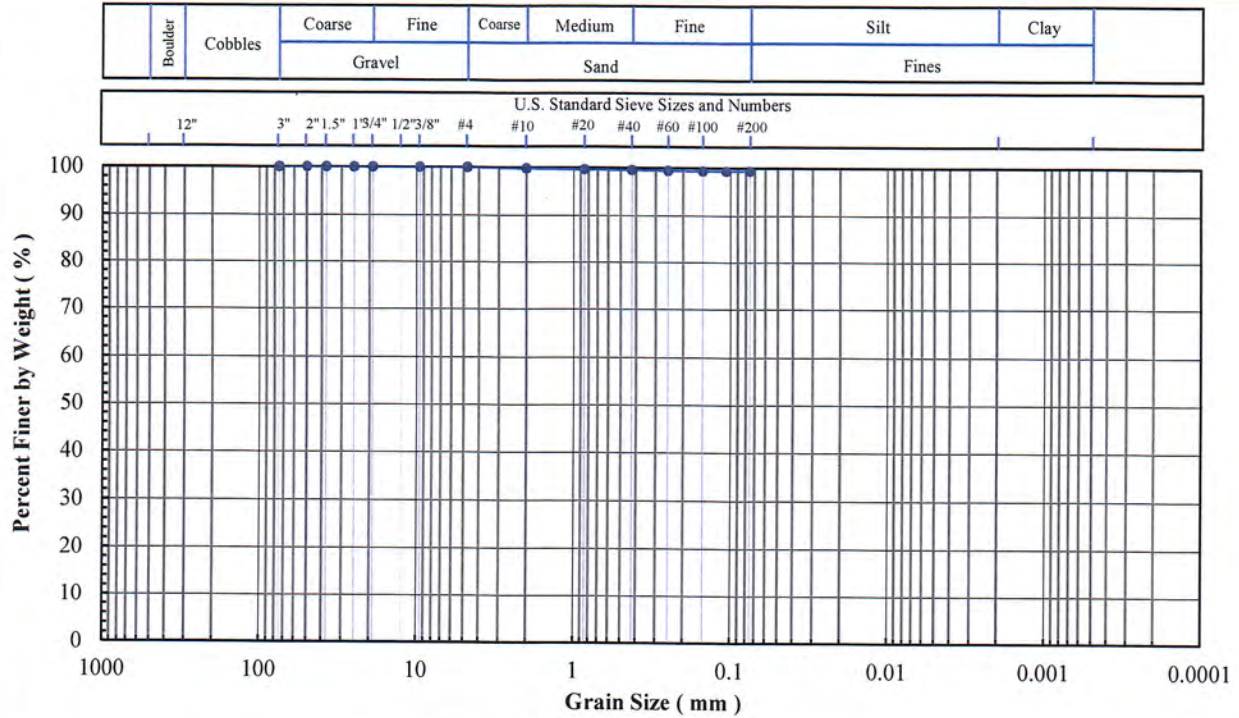
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-6 (25')  
 Lab Sample No: 20L228

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

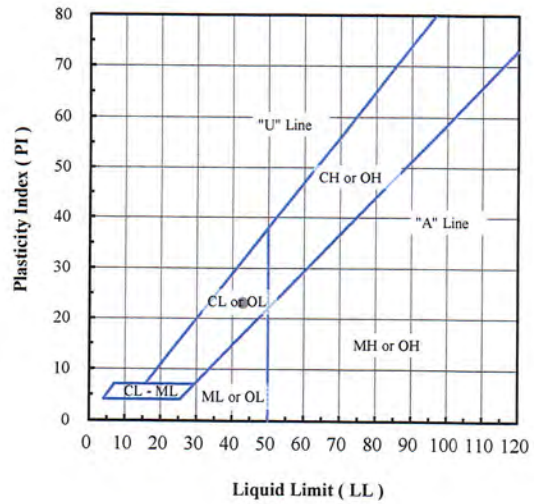


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.6
#40	0.425	99.5
#60	0.250	99.4
#100	0.150	99.3
#140	0.106	99.3
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (25')	20L228	37.7	99.3	43	20	23	CL - Lean clay

Note(s):

01-25-2021  
 AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

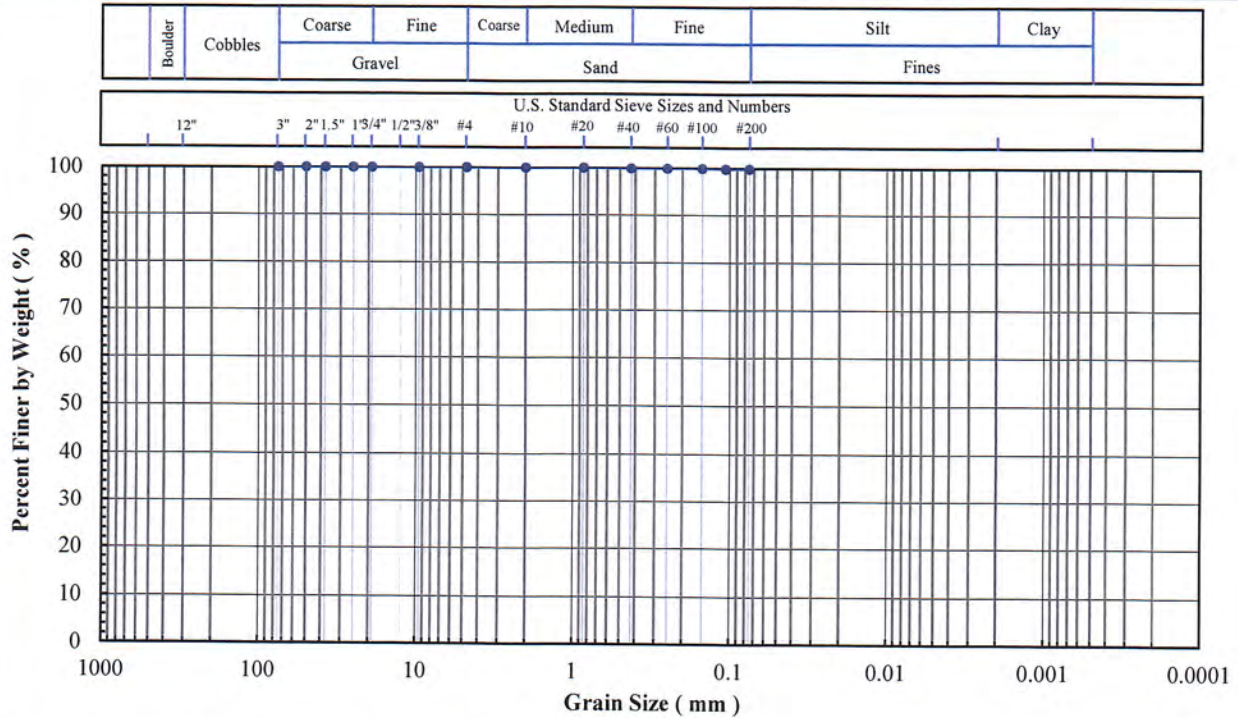
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-10 (45')  
Lab Sample No: 20L232

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

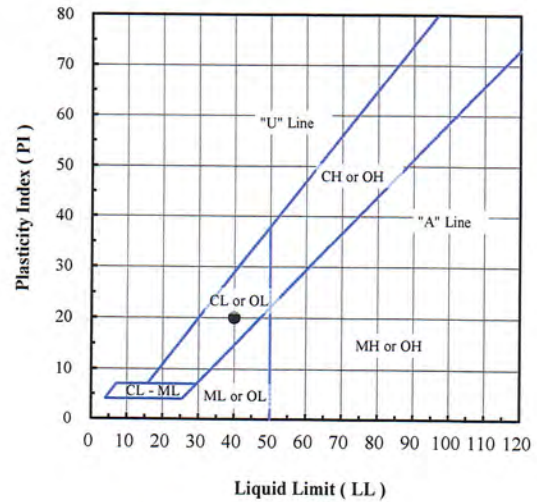


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.8
#200	0.075	99.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.2
Fines (%):	99.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-10 (45')	20L232	36.5	99.8	40	20	20	CL - Lean clay

Note(s):

*01-25-2021  
AA, NSK*



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

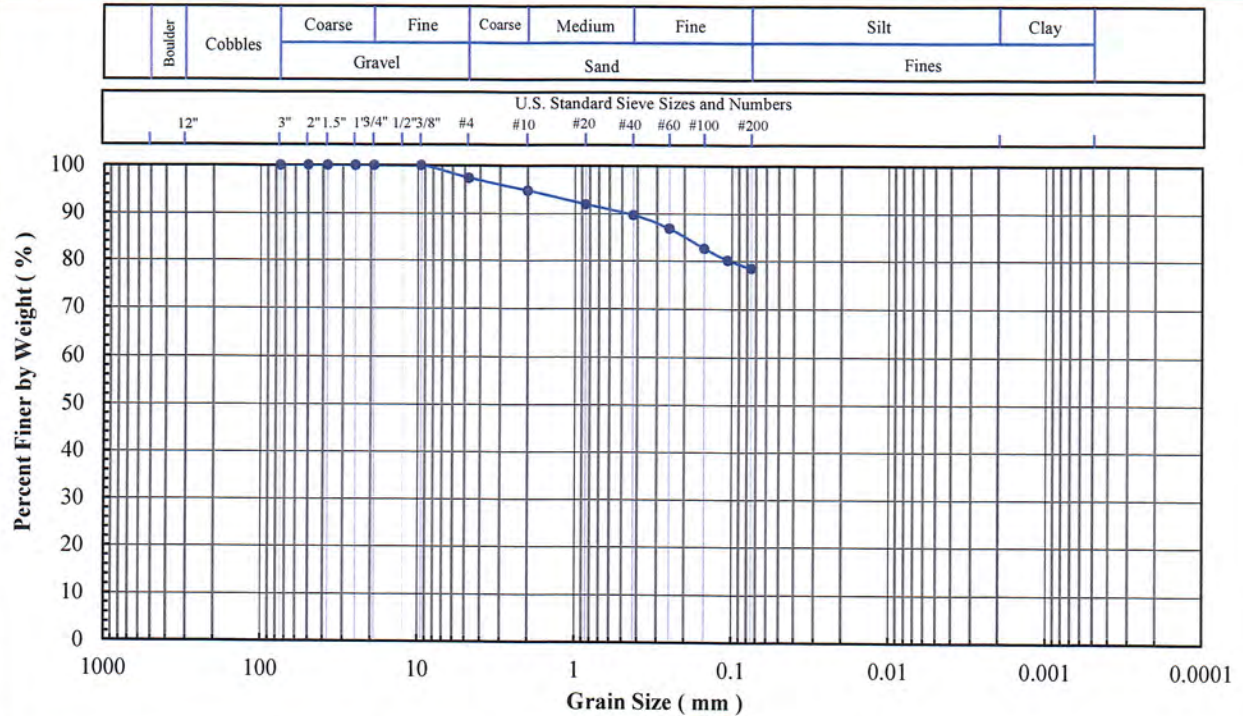
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B3-18 (85')  
Lab Sample No: 20L240

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

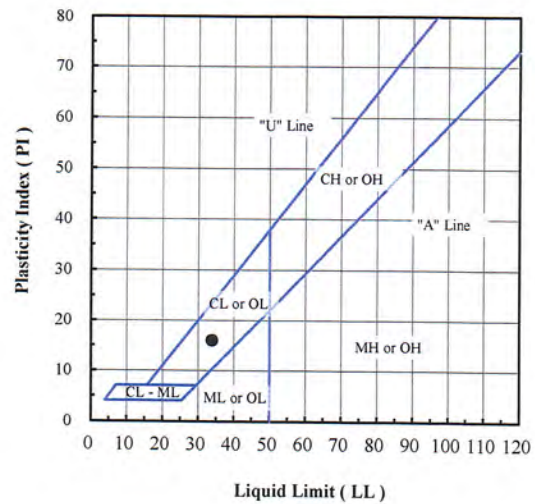


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	94.8
#20	0.850	91.9
#40	0.425	89.7
#60	0.250	86.8
#100	0.150	82.6
#140	0.106	80.1
#200	0.075	78.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	19.0
Fines (%):	78.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-18 (85')	20L240	21.9	78.4	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA1159



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

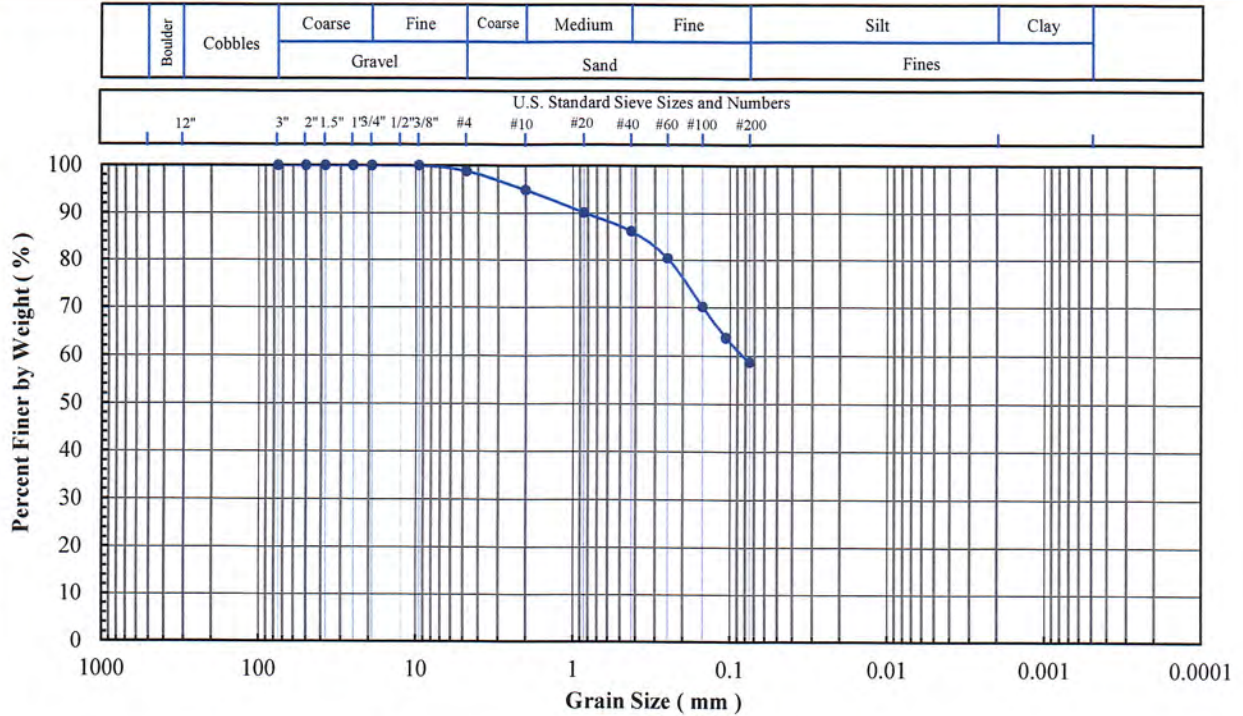
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Bell River ALD Support  
 Project No: PN1017  
 Client Sample ID: B3-14 (67')  
 Lab Sample No: 20L236

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318,  
 D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont.,  
 Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

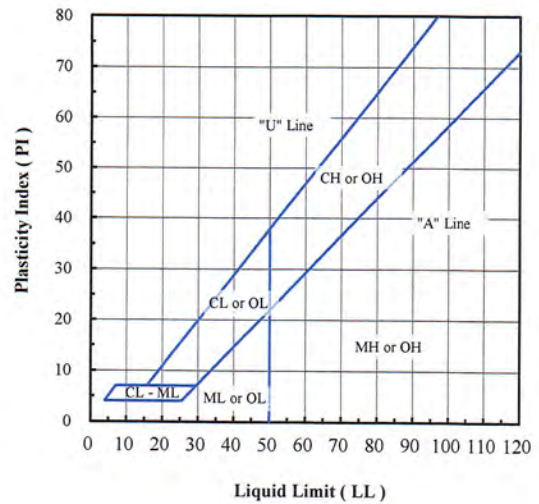


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	94.9
#20	0.850	90.1
#40	0.425	86.2
#60	0.250	80.4
#100	0.150	70.1
#140	0.106	63.7
#200	0.075	58.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	40.2
Fines (%):	58.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-14 (67')	20L236	15.2	58.6				

Note(s):

02-03-2021  
 AA, NSF



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

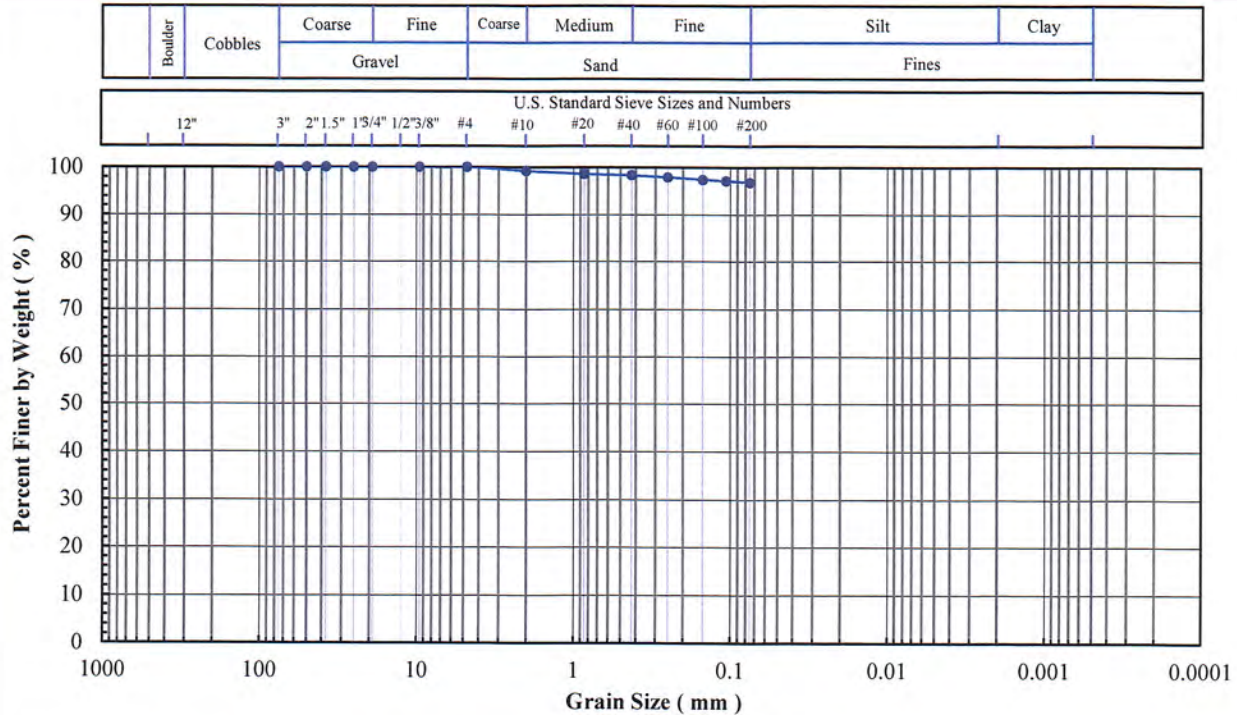
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-1 (10')  
Lab Sample No: 20L243

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

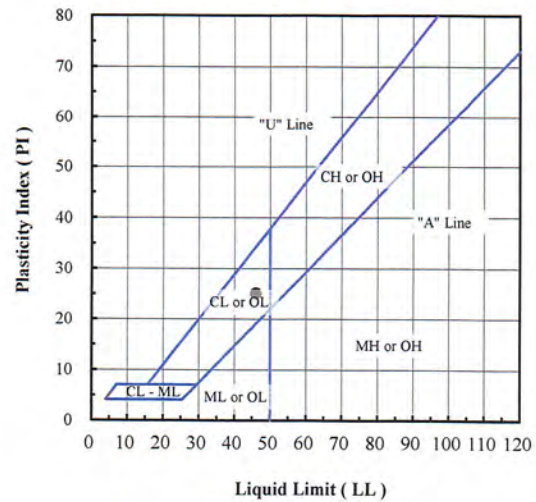


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.2
#20	0.850	98.6
#40	0.425	98.3
#60	0.250	97.9
#100	0.150	97.4
#140	0.106	97.1
#200	0.075	96.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	3.2
Fines (%):	96.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (10')	20L243	25.6	96.8	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support

Project No: PN1017

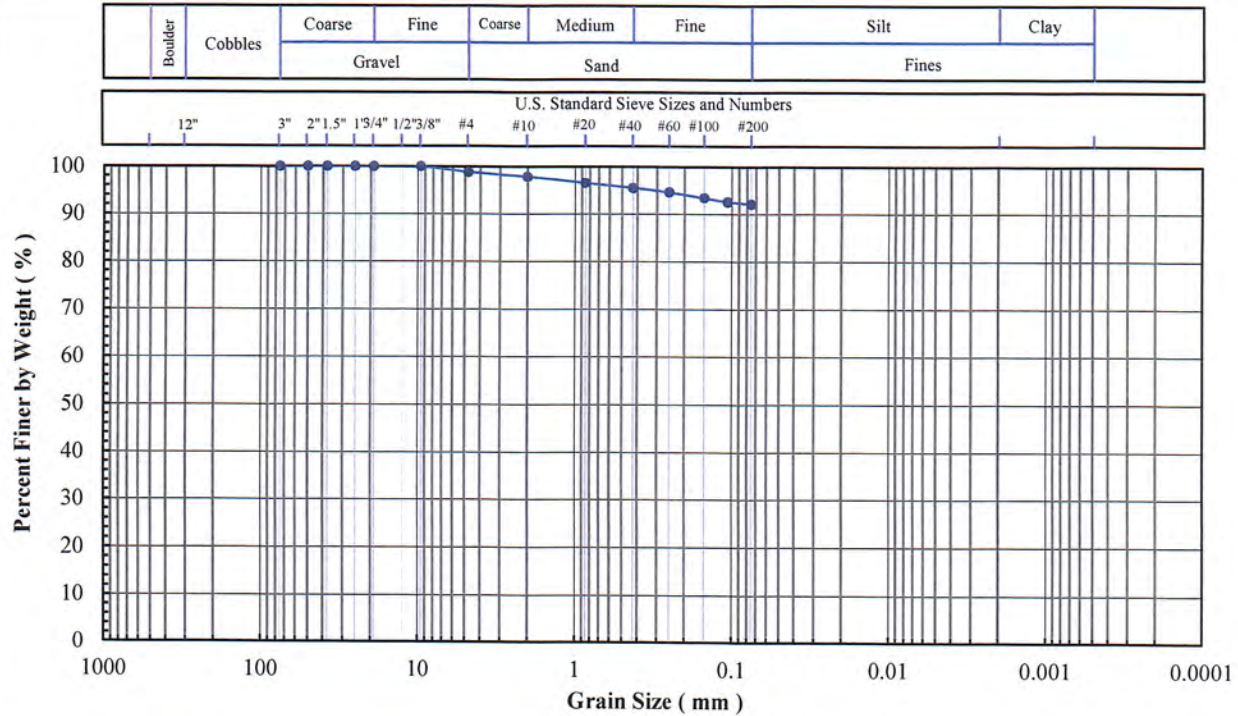
Client Sample ID: B4-7 (34')

Lab Sample No: 20L249

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

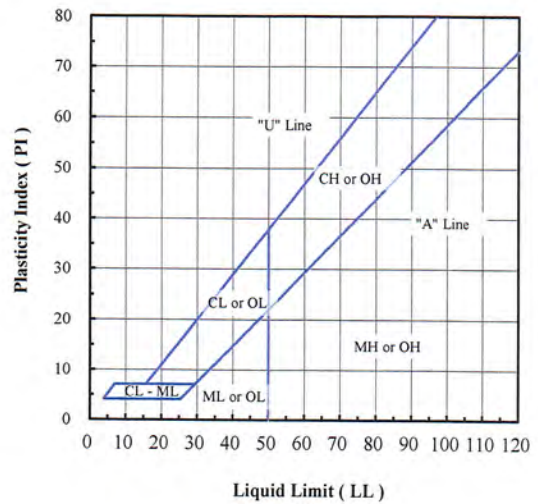


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.8
#20	0.850	96.4
#40	0.425	95.4
#60	0.250	94.5
#100	0.150	93.3
#140	0.106	92.5
#200	0.075	92.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	6.8
Fines (%):	92.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-7 (34')	20L249	33.9	92.0				

Note(s):

01-25-2021  
AA1 MSR



**Excel Geotechnical Testing, Inc.**  
*"Excellence in Testing"*

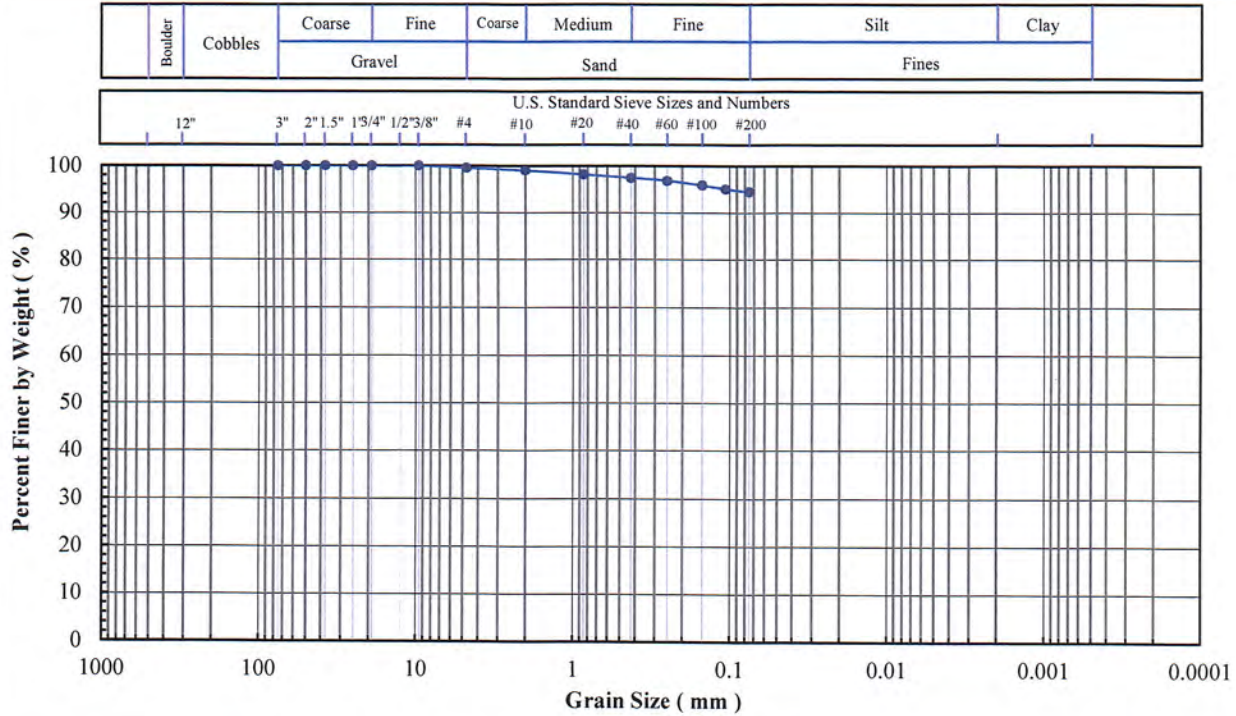
953 Forrest Street, Roswell, Georgia 30075  
 Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
 Project No: PN1017  
 Client Sample ID: B4-12 (55')  
 Lab Sample No: 20L254

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

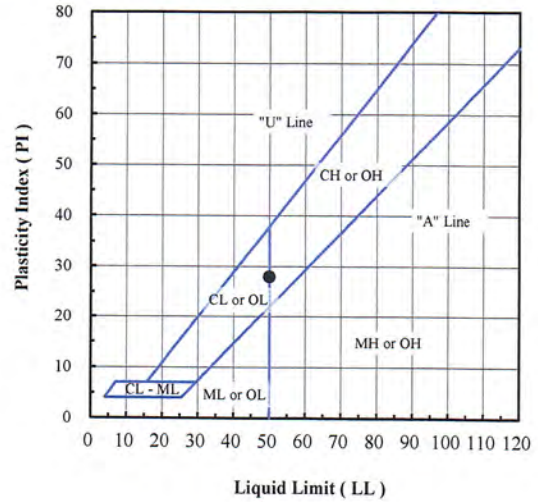


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	97.4
#60	0.250	96.8
#100	0.150	95.8
#140	0.106	95.0
#200	0.075	94.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	5.1
Fines (%):	94.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (55')	20L254	41.4	94.4	50	22	28	CH - Fat clay

Note(s):

01-25-2021  
 AA1NSR



**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

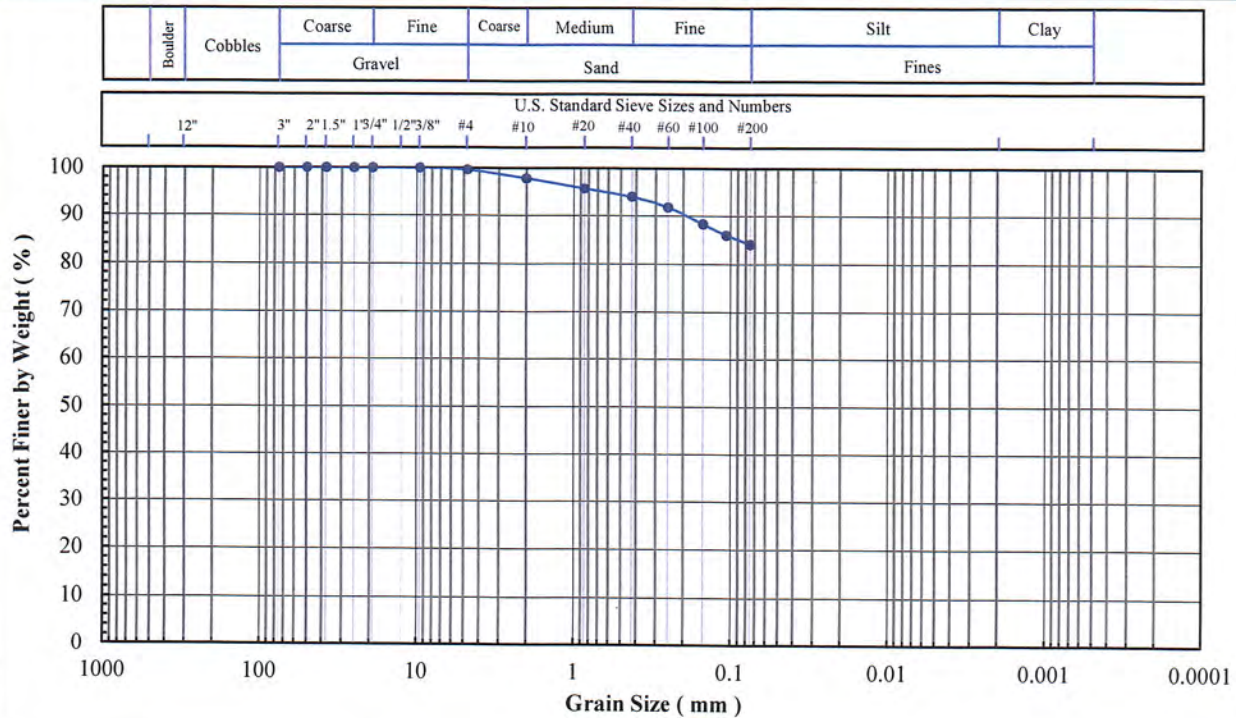
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-16 (75')  
Lab Sample No: 20L258

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

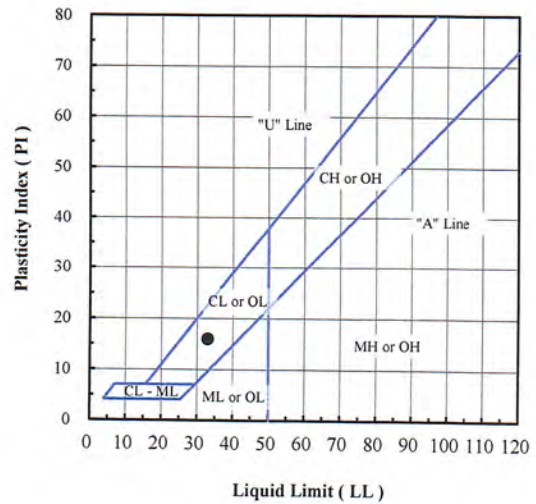


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	97.8
#20	0.850	95.6
#40	0.425	93.9
#60	0.250	91.7
#100	0.150	88.2
#140	0.106	85.9
#200	0.075	84.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	15.6
Fines (%):	84.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-16 (75')	20L258	24.0	84.0	33	17	16	CL - Lean clay with sand

Note(s):

01-25-2021  
AA, NJSR





**Excel Geotechnical Testing, Inc.**  
"Excellence in Testing"

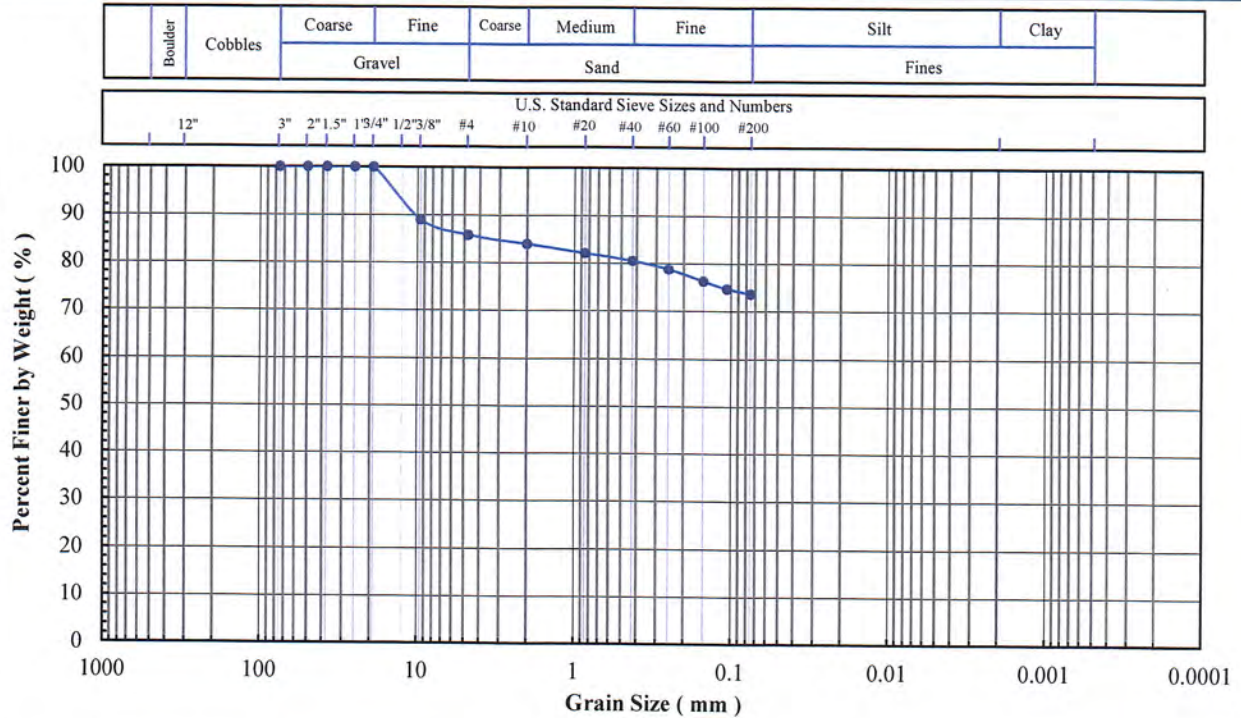
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B4-20 (95')  
Lab Sample No: 20L262

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

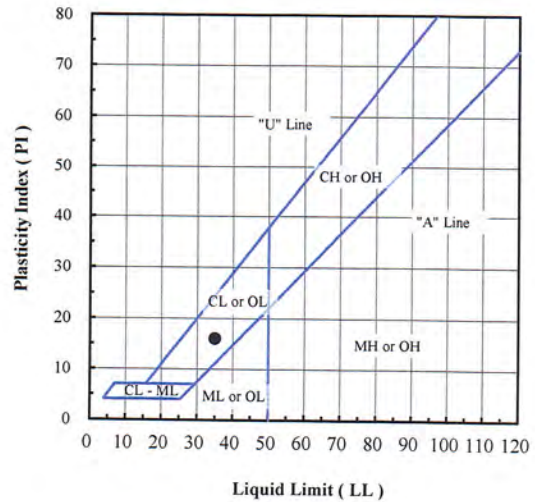


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	89
#4	4.75	86
#10	2.00	84
#20	0.850	82
#40	0.425	81
#60	0.250	79
#100	0.150	76
#140	0.106	75
#200	0.075	74

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	14
Sand (%):	12
Fines (%):	74
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-20 (95')	20L262	21.7	74	35	19	16	CL - Lean clay with gravel

Note(s): Sieve specimen was undersized.

01-25-2021  
AA1 NSR



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Project Name: Belle River ALD Support

Project No: PN1017

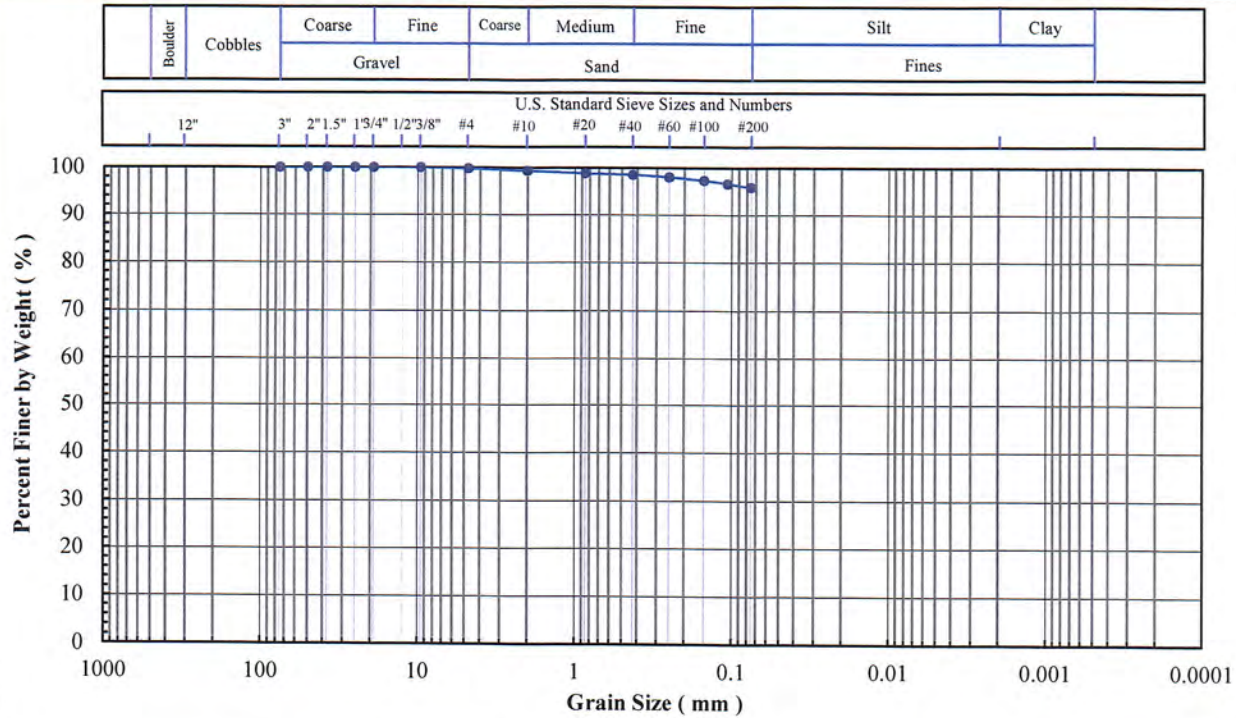
Client Sample ID: B5-1 (7')

Lab Sample No: 20L263

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

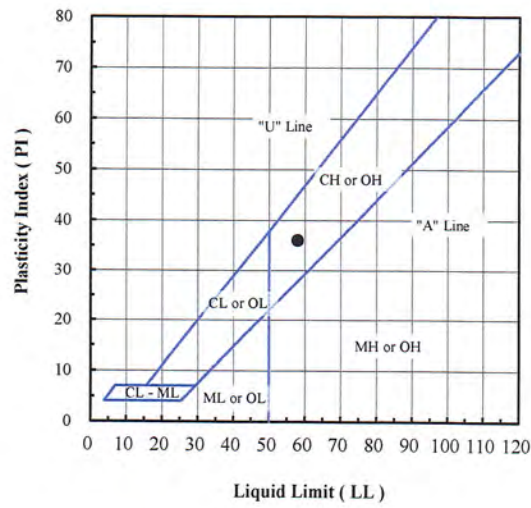


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	98.8
#40	0.425	98.5
#60	0.250	98.0
#100	0.150	97.3
#140	0.106	96.6
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	4.0
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-1 (7')	20L263	35.7	95.8	58	22	36	CH - Fat clay

Note(s):

01-25-2021  
 AA, NSR



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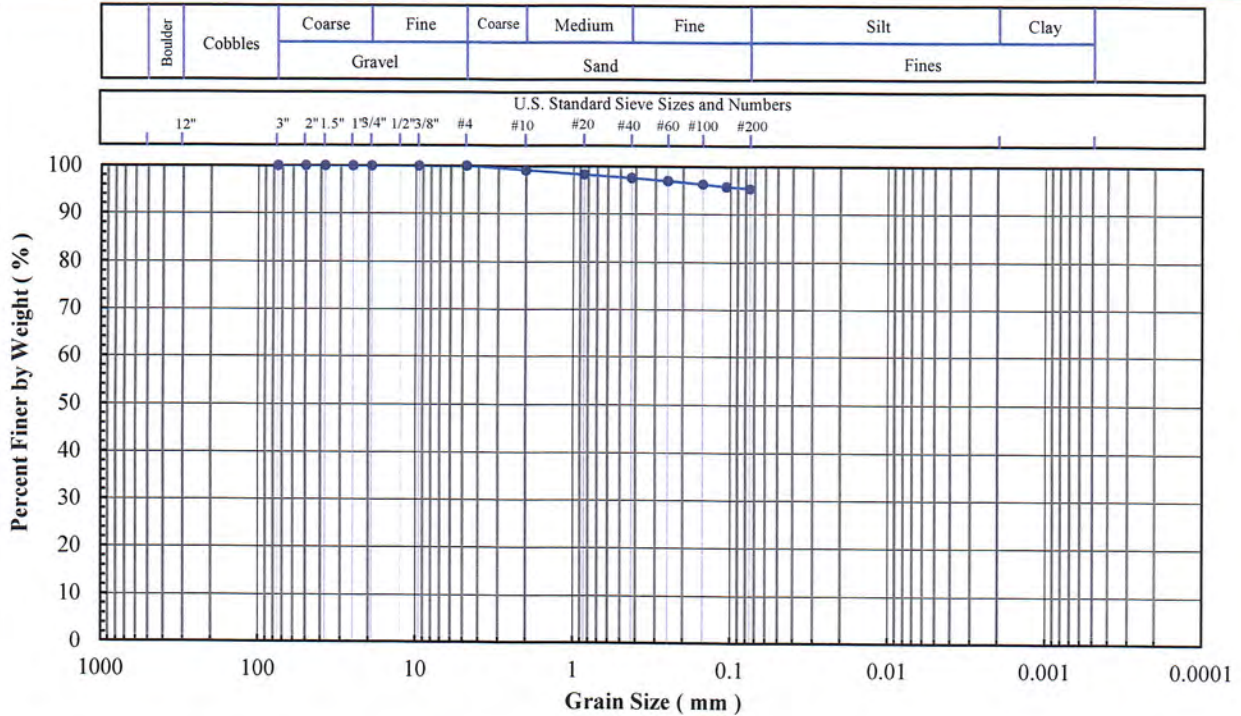
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-4 (29')  
Lab Sample No: 20L266

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

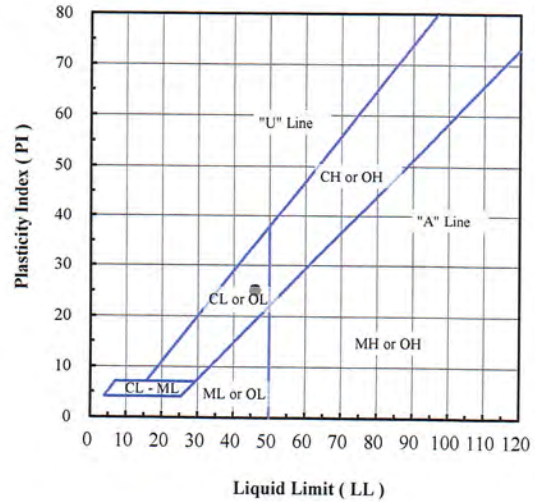


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.1
#20	0.850	98.2
#40	0.425	97.5
#60	0.250	96.9
#100	0.150	96.2
#140	0.106	95.7
#200	0.075	95.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	4.7
Fines (%):	95.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-4 (29')	20L266	39.1	95.3	46	21	25	CL - Lean clay

Note(s):

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

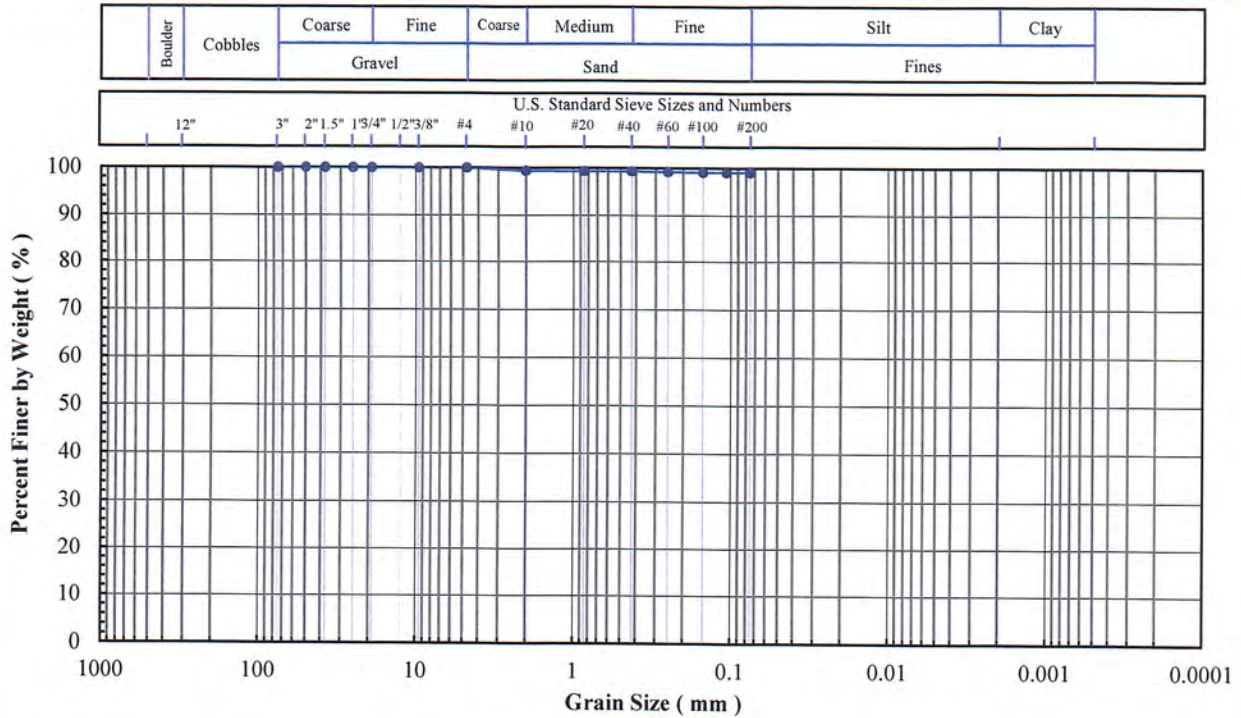
Client Sample ID: B5-9 (52')

Lab Sample No: 20L271

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

## SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

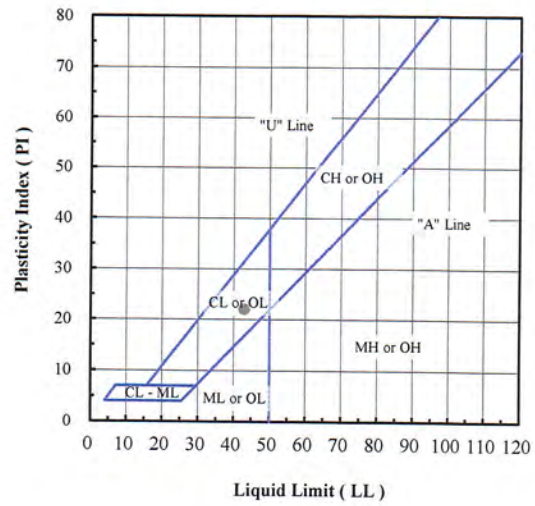


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.4
#20	0.850	99.3
#40	0.425	99.3
#60	0.250	99.2
#100	0.150	99.1
#140	0.106	99.1
#200	0.075	99.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.9
Fines (%):	99.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Org. Content (%):	
-------------------	--

Carbon. Content (%):	
----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-9 (52')	20L271	40.2	99.1	43	21	22	CL - Lean clay

Note(s):

01-25-2021  
AAI, MSR



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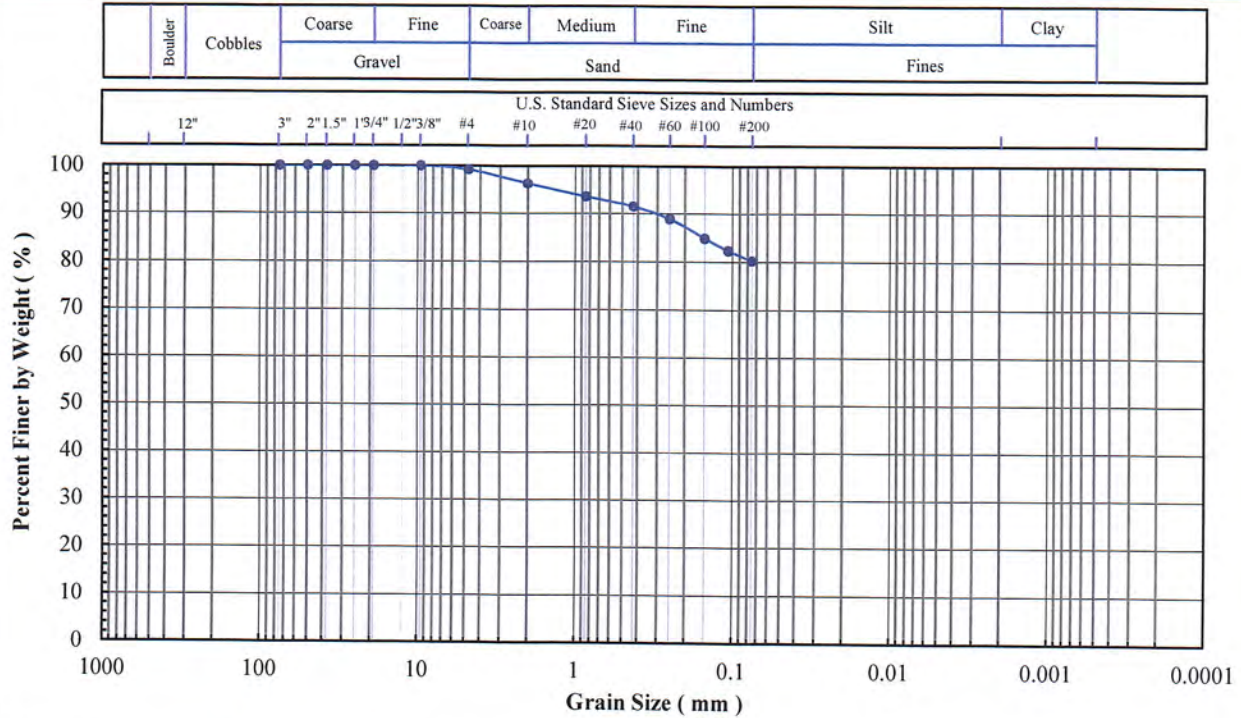
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B5-13 (72')  
Lab Sample No: 20L275

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

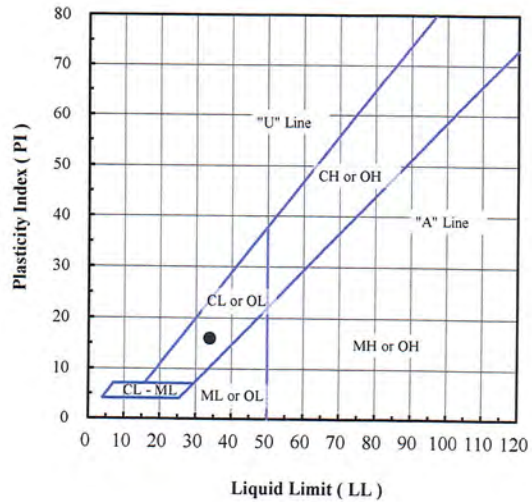


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	93.5
#40	0.425	91.4
#60	0.250	88.8
#100	0.150	84.8
#140	0.106	82.3
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	19.0
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-13 (72')	20L275	27.1	80.2	34	18	16	CL - Lean clay with sand

Note(s):

*01-25-2021  
AA1, NSR*



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Project Name: Belle River ALD Support

Project No: PN1017

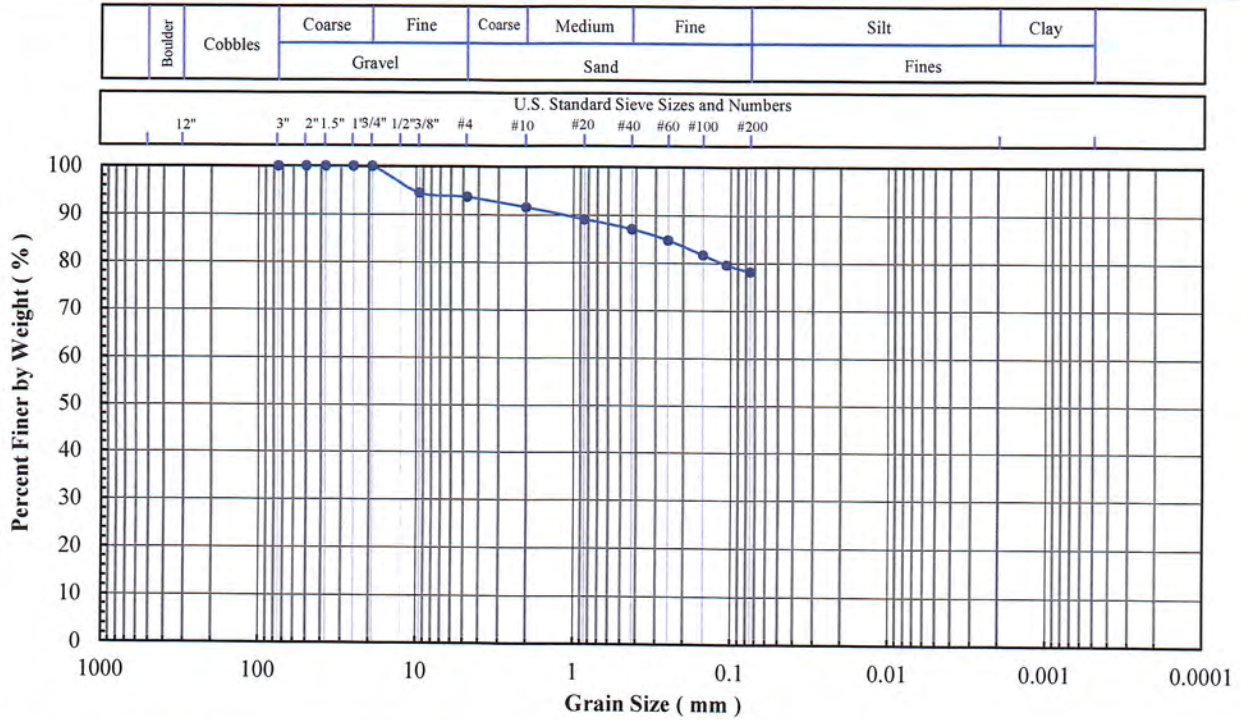
Client Sample ID: B5-17 (92')

Lab Sample No: 20L279

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

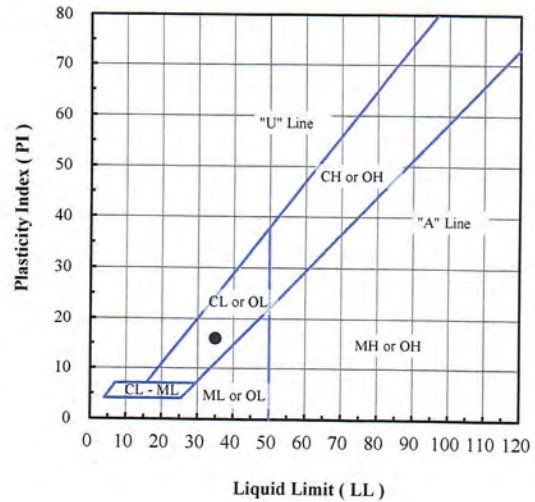


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	92
#20	0.850	89
#40	0.425	87
#60	0.250	85
#100	0.150	82
#140	0.106	80
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	16
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-17 (92')	20L279	22.0	78	35	19	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-25-2021  
AA, MSR



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Project Name: Belle River ALD Support

Project No: PN1017

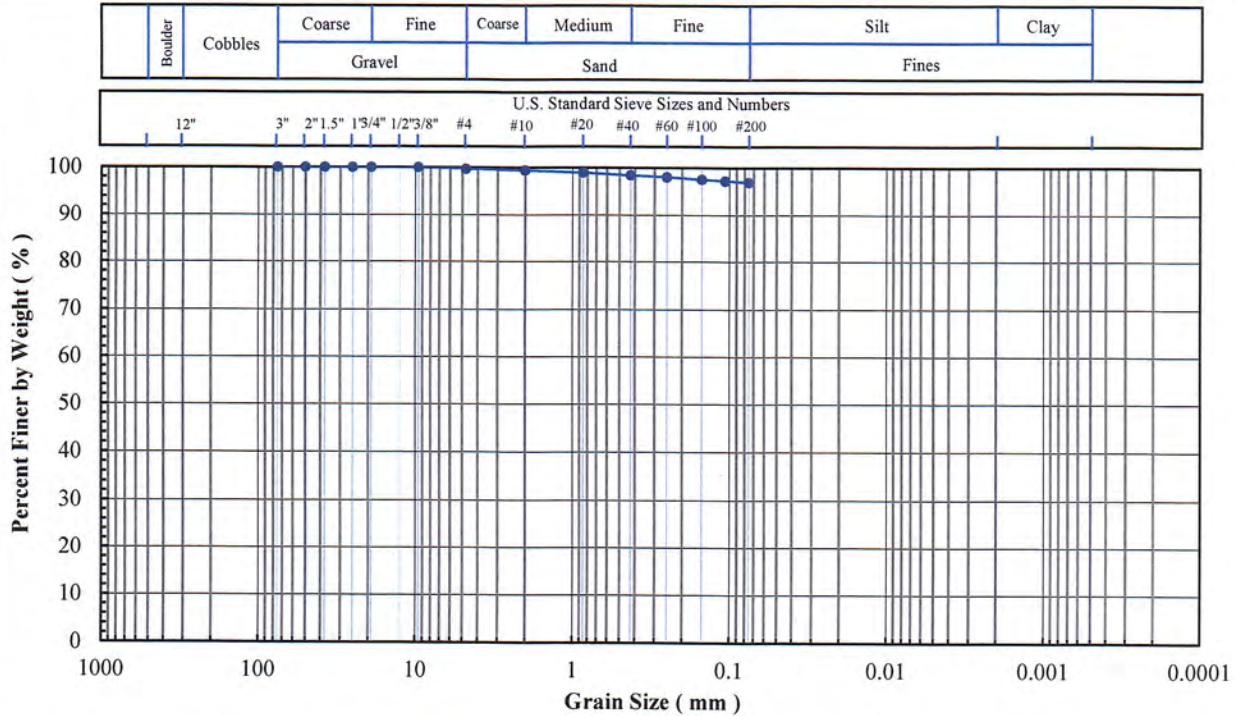
Client Sample ID: B6-3 (15')

Lab Sample No: 20L284

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

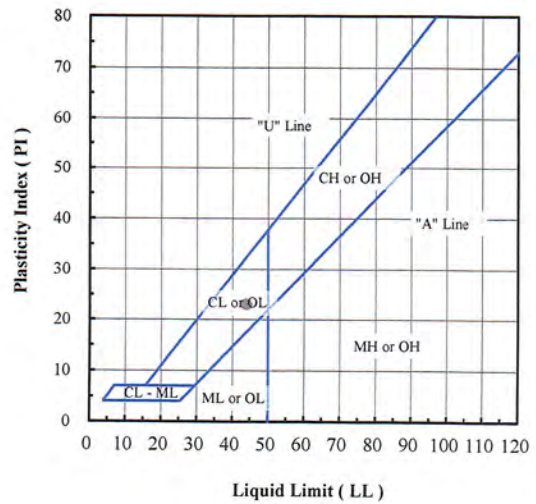


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.4
#20	0.850	98.9
#40	0.425	98.4
#60	0.250	98.0
#100	0.150	97.5
#140	0.106	97.2
#200	0.075	96.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	2.8
Fines (%):	96.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-3 (15')	20L284	36.7	96.9	44	21	23	CL - Lean clay

Note(s):

*01-26-2021  
AA, NSR*



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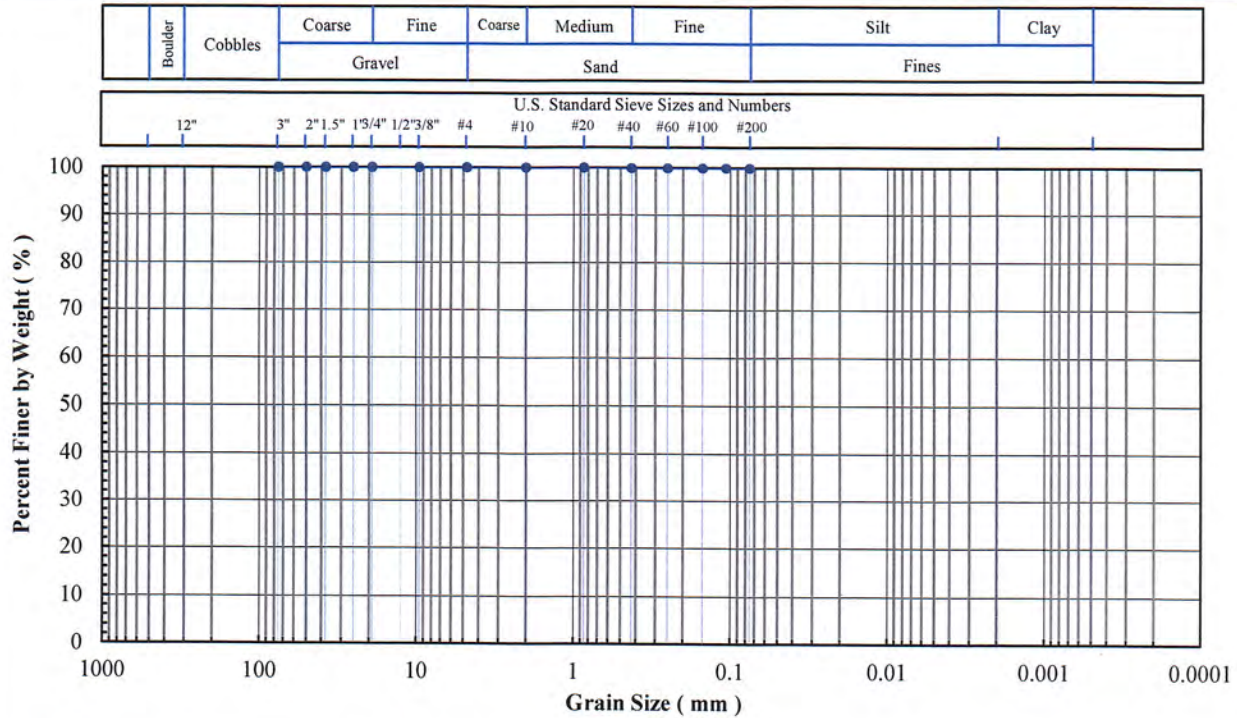
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-7 (35')  
Lab Sample No: 20L288

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

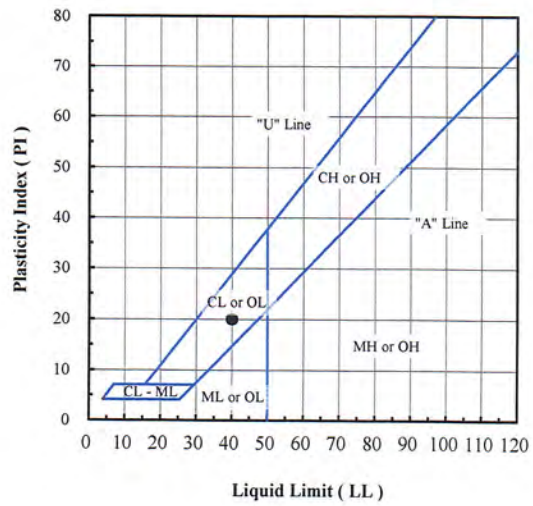


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (35')	20L288	37.8	99.9	40	20	20	CL - Lean clay

Note(s):

*01-26-2021  
AAI/NSR*





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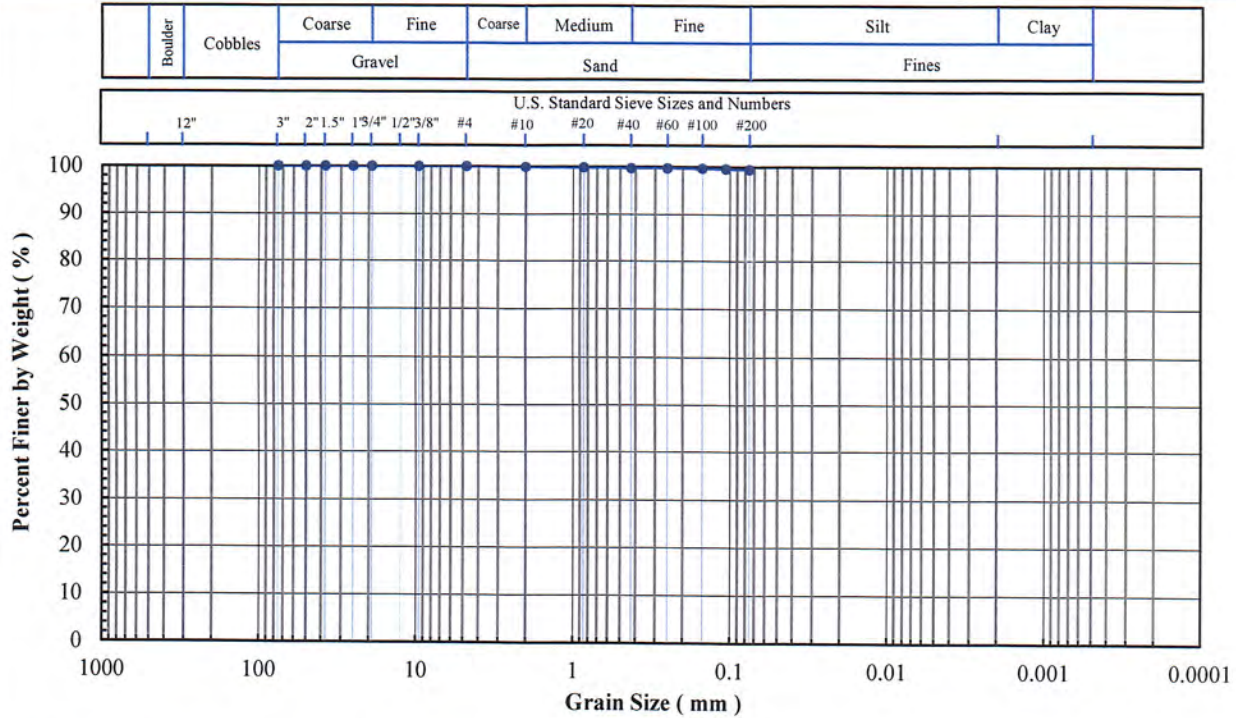
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-11 (55')  
Lab Sample No: 20L292

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

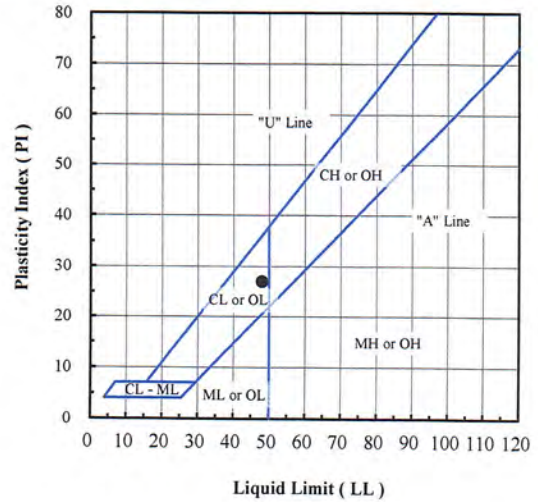


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.6
#140	0.106	99.5
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-11 (55')	20L292	38.7	99.4	48	21	27	CL - Lean Clay

Note(s):

01-26-2021  
AA, NSR



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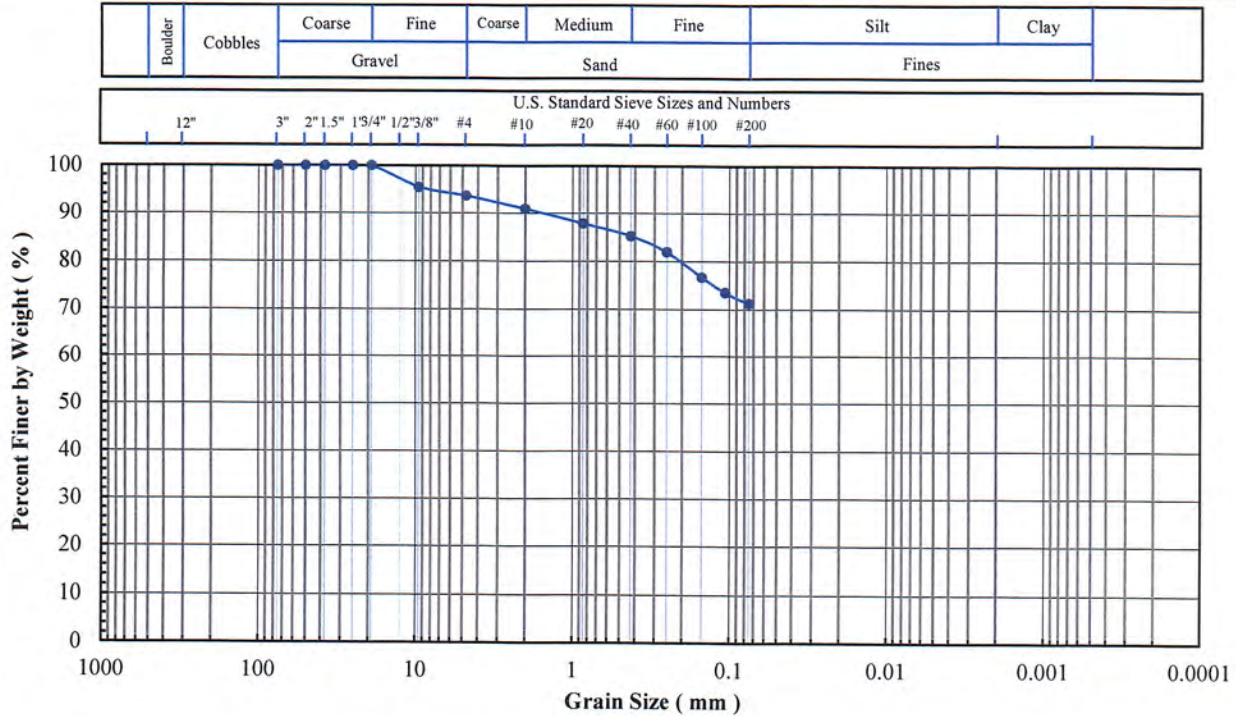
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-15 (75')  
Lab Sample No: 20L296

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

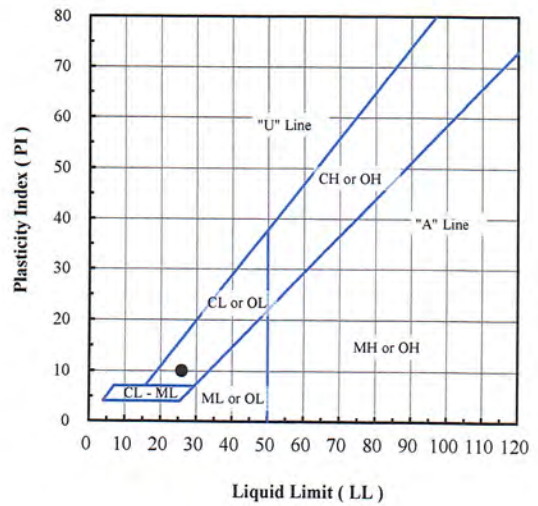


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	91
#20	0.850	88
#40	0.425	85
#60	0.250	82
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	23
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-15 (75')	20L296	20.5	71	26	16	10	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021  
AA, MSR



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"Excellence in Testing"

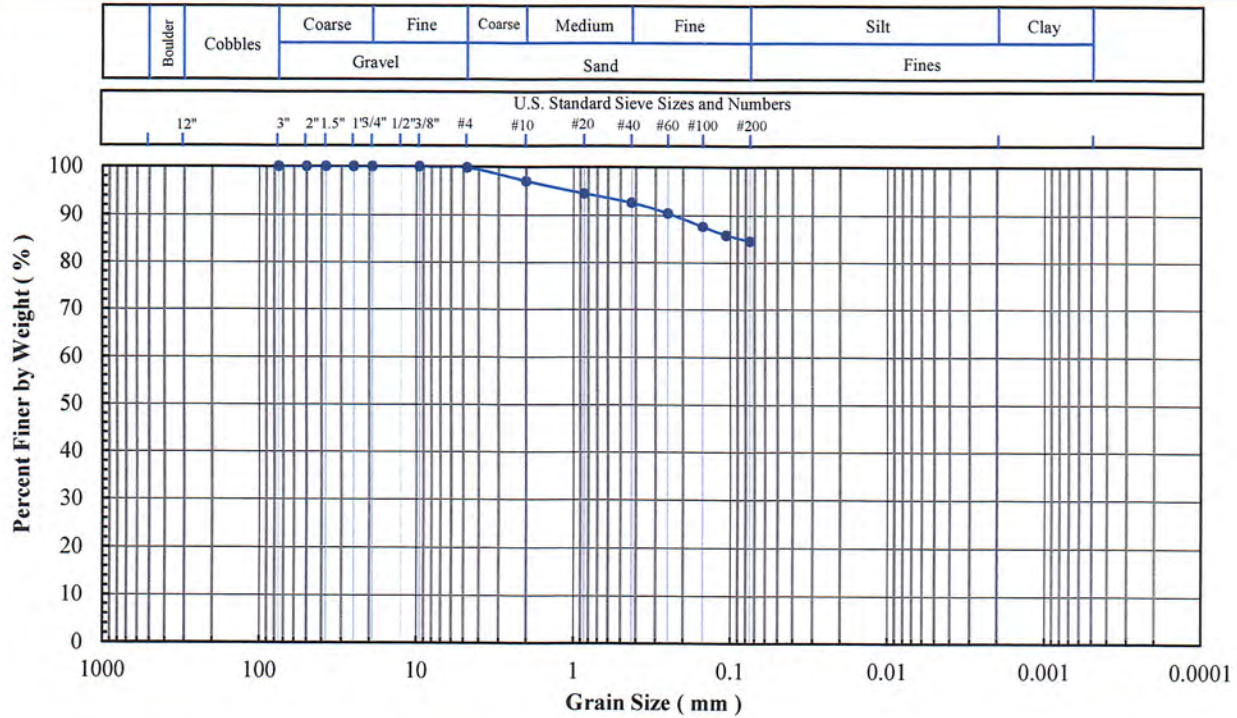
953 Forrest Street, Roswell, Georgia 30075  
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Belle River ALD Support  
Project No: PN1017  
Client Sample ID: B6-19 (95')  
Lab Sample No: 20L300

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

**SOIL INDEX PROPERTIES**

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

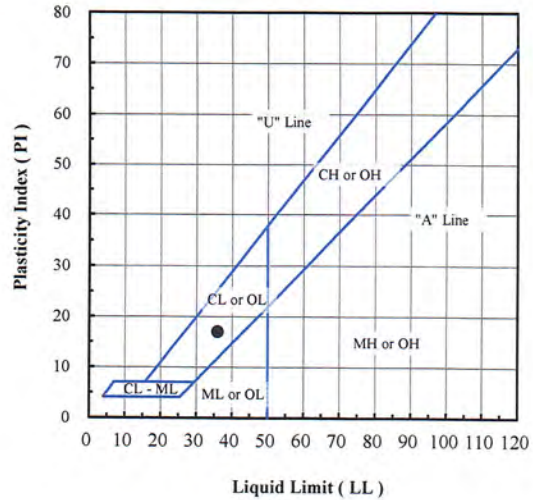


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	97.0
#20	0.850	94.5
#40	0.425	92.6
#60	0.250	90.4
#100	0.150	87.6
#140	0.106	85.8
#200	0.075	84.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	15.2
Fines (%):	84.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-19 (95')	20L300	26.5	84.6	36	19	17	CL - Lean clay with sand

Note(s):

*01-26-2021  
AAI, NSR*



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## FLEXIBLE WALL PERMEABILITY TEST <sup>(1)</sup> ASTM D5084

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B1-ST-3 (36-38')
<b>Lab Sample Number:</b>	20L145
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.43	7.37	89.5	35.0	53.0	50.0	3.0	DDW	12	2.2E-8
	3.47	7.04	97.4	27.6	63.00	50.0	13.0	DDW	10	2.7E-9

### Notes:

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-21-2021  
APK, NSR



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-2 (7-9')
<b>Lab Sample Number:</b>	20L150
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	1/26/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.54	7.22	98.2	26.8	53.0	50.0	3.0	DDW	12	2.1E-8
	3.54	7.20	98.8	26.4	54.00	50.0	4.0	DDW	12	2.0E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B2-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L155
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.24	110.9	20.3	53.0	50.0	3.0	DDW	3	3.3E-8
	3.50	7.16	114.2	18.5	77.00	50.0	27.0	DDW	6	2.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

\* Deviations:

Laboratory temperature at 22±3 °C.

*7-21-2021  
APK, NSR*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B3-ST-1 (1-3')
<b>Lab Sample Number:</b>	20L156
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/8/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.17	111.4	19.1	53.0	50.0	3.0	DDW	8	9.6E-9
	3.62	7.29	104.7	22.7						

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B4-ST-4 (67-69')
<b>Lab Sample Number:</b>	20L165
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.23	129.8	11.6	53.0	50.0	3.0	DDW	5	2.8E-8
	3.55	7.21	129.5	11.1	69.00	50.0	19.0	DDW	10	1.8E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, ASB*





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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B5-ST-2 (27-29')
<b>Lab Sample Number:</b>	20L169
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/15/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.34	85.9	36.8	53.0	50.0	3.0	DDW	9	3.4E-8
	3.48	7.02	93.4	30.7	60.00	50.0	10.0	DDW	4	2.1E-8

**Notes:**

- Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
- Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
- Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 APK, ASB*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-4 (47-49')
<b>Lab Sample Number:</b>	20L177
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity  ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.49	7.32	86.6	38.3	53.0	50.0	3.0	DDW	5	2.5E-8
	3.45	7.16	93.3	29.6	65.00	50.0	15.0	DDW	10	1.8E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 AFK, NSB*



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**FLEXIBLE WALL PERMEABILITY TEST** <sup>(1)</sup>  
**ASTM D5084**

<b>Project Name:</b>	Belle River ALD Support
<b>Project Number:</b>	PN1017
<b>Client Name:</b>	Geosyntec Consultants
<b>Site Sample ID:</b>	B6-ST-7 (97-99')
<b>Lab Sample Number:</b>	20L180
<b>Material Type:</b>	Soil
<b>Specified Value (cm/sec):</b>	NA
<b>Date Test Started:</b>	2/17/2021

Specimen Type ( See Note2 ) ( - )	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ( cm/s )
	Specimen Final Conditions				Cell Press. ( psi )	Back Press. ( psi )	Consolid. Press. ( psi )	Permeant Liquid <sup>(3)</sup> ( - )	Average Gradient ( - )	
	Spec. Length ( cm )	Spec. Diameter ( cm )	Dry Unit Weight ( pcf )	Moisture Content ( % )						
ST	3.53	7.29	104.1	23.5	53.0	50.0	3.0	DDW	4	2.4E-8
	3.51	7.18	108.3	21.0	76.00	50.0	26.0	DDW	9	1.2E-8

**Notes:**

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

*7-21-2021  
 HPK, MSK*



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# LAST PAGE

**Test Applicability and Limitations:**

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

**Storage Policy:**

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of \$1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of \$1.30 per sample per day will be applied after the initial 3 months storage.

## **APPENDIX I1 – CPT LOGS**



GeoSyntec

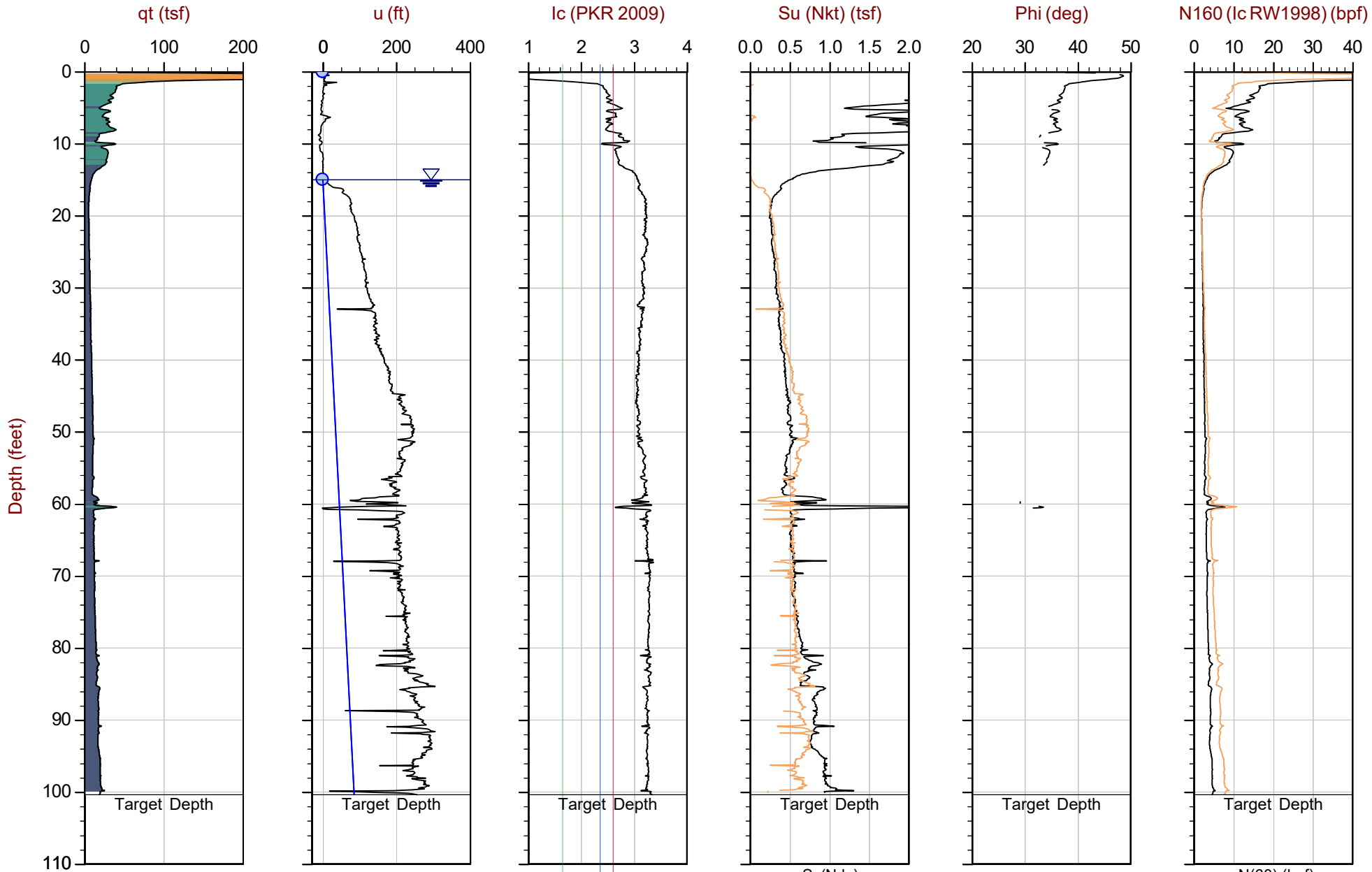
Job No: 20-61-21681

Date: 2020-12-10 14:55

Site: DTE Belle River Power Plant

Sounding: CPT20-01

Cone: 551:T1500F15U500



Max Depth: 30.600 m / 100.39 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP01.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470985ft E: 13625925ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

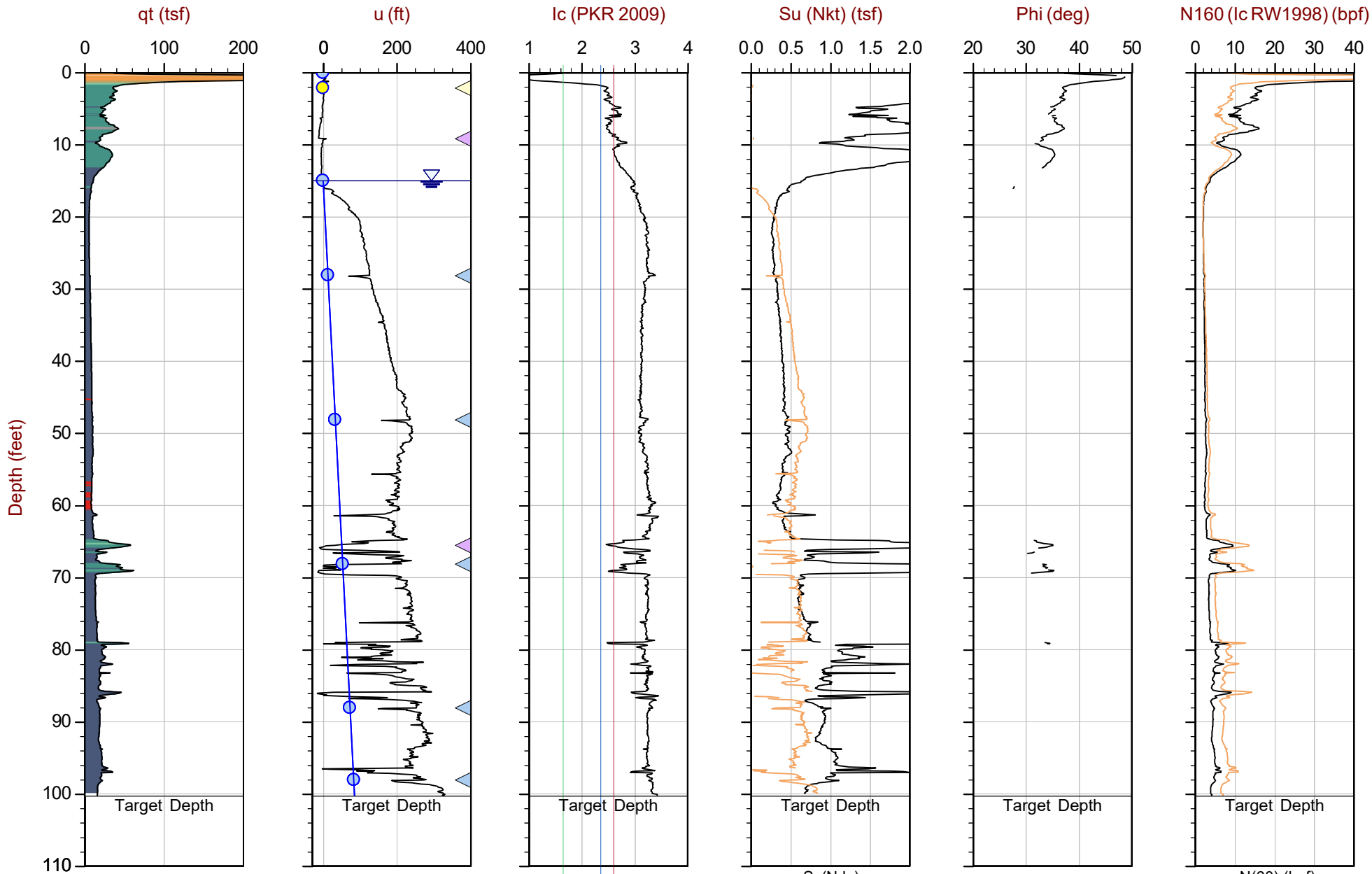
Job No: 20-61-21681

Date: 2020-12-11 08:28

Site: DTE Belle River Power Plant

Sounding: CPT20-01B

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP01B.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470980ft E: 13625906ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

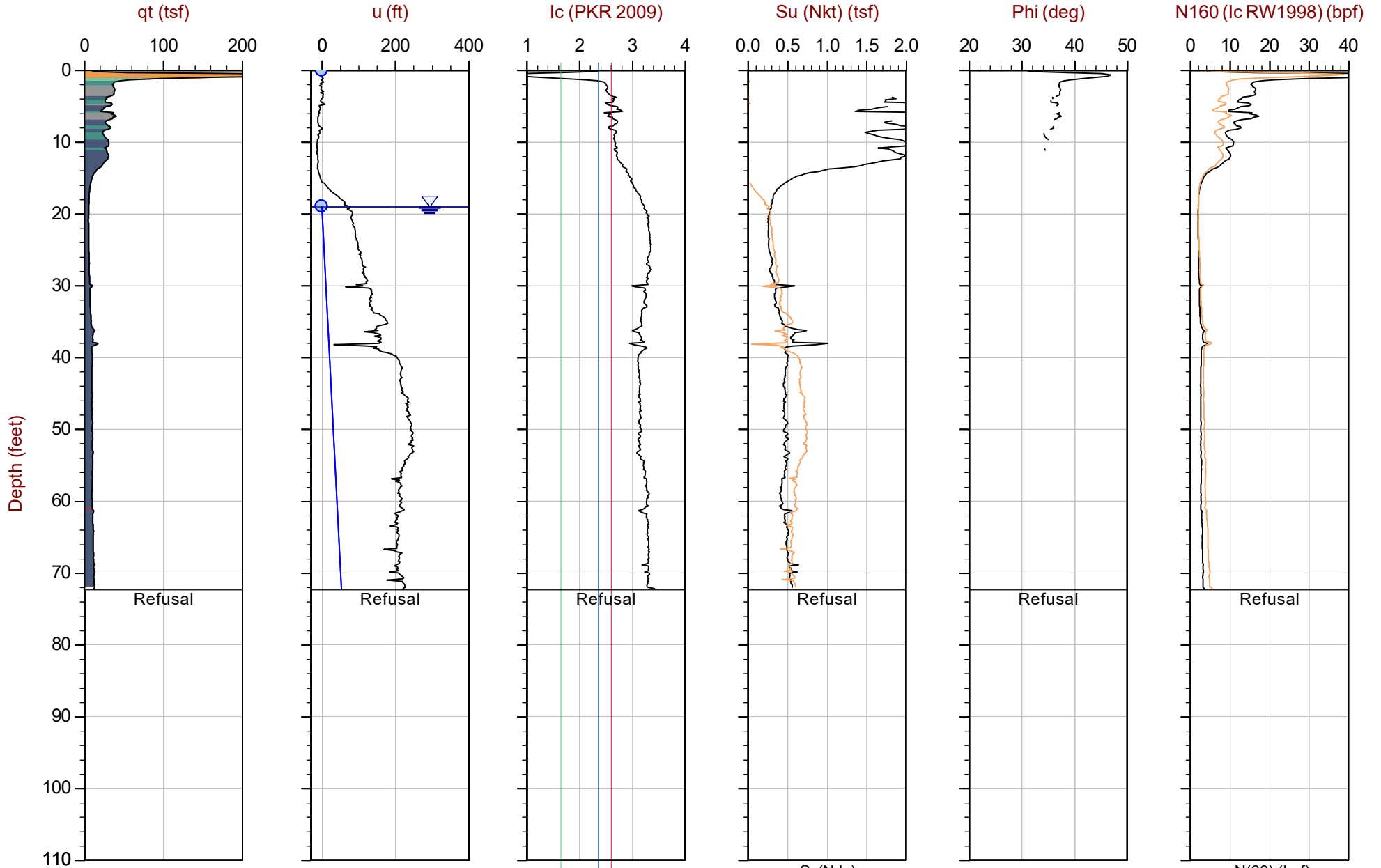
Job No: 20-61-21681

Date: 2020-12-09 12:28

Site: DTE Belle River Power Plant

Sounding: CPT20-02

Cone: 513:T1500F15U500



Max Depth: 22.050 m / 72.34 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP02.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470997ft E: 13626119ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

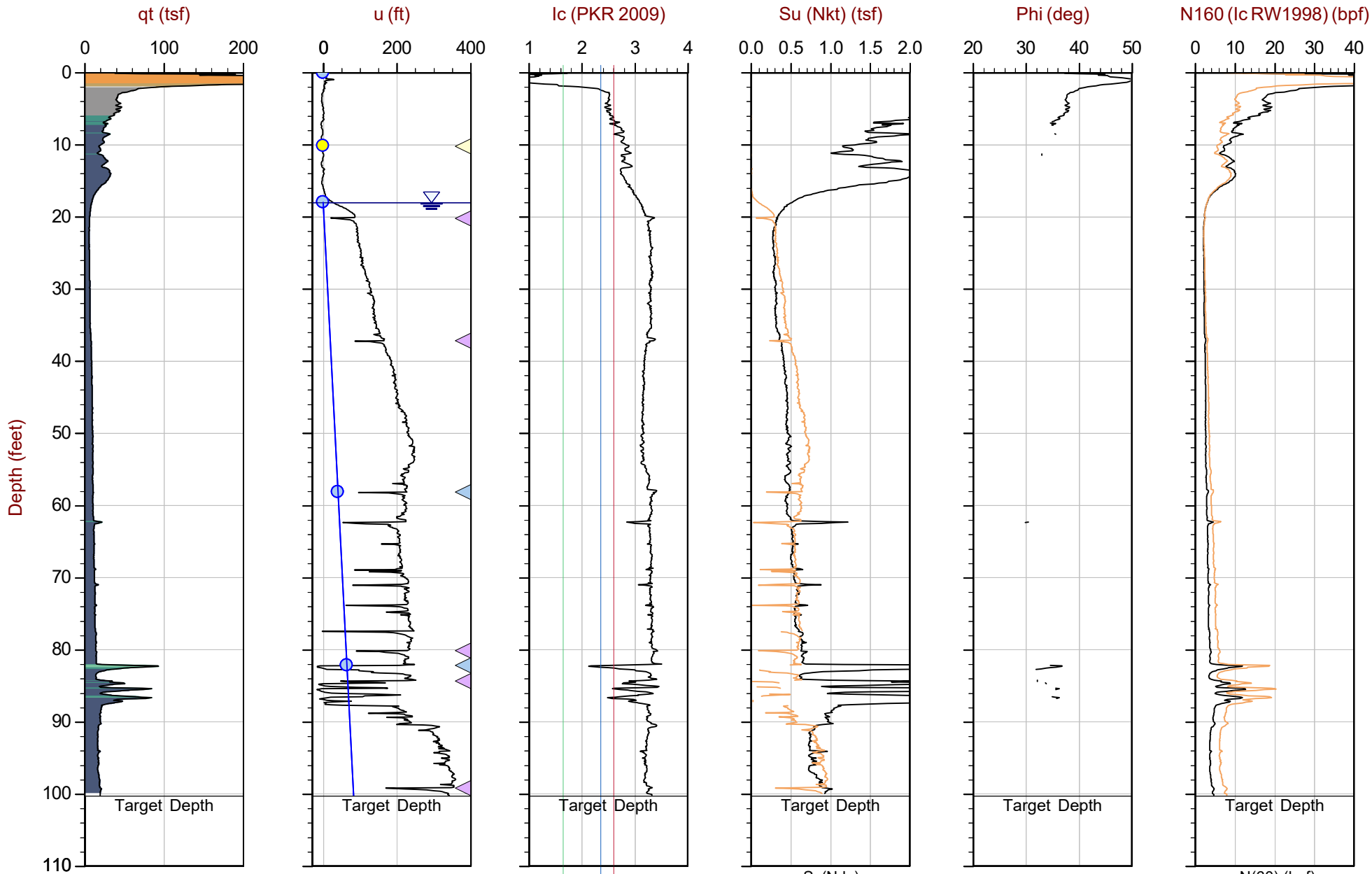
Job No: 20-61-21681

Date: 2020-12-09 14:00

Site: DTE Belle River Power Plant

Sounding: CPT20-03

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP03.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471039ft E: 13626171ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

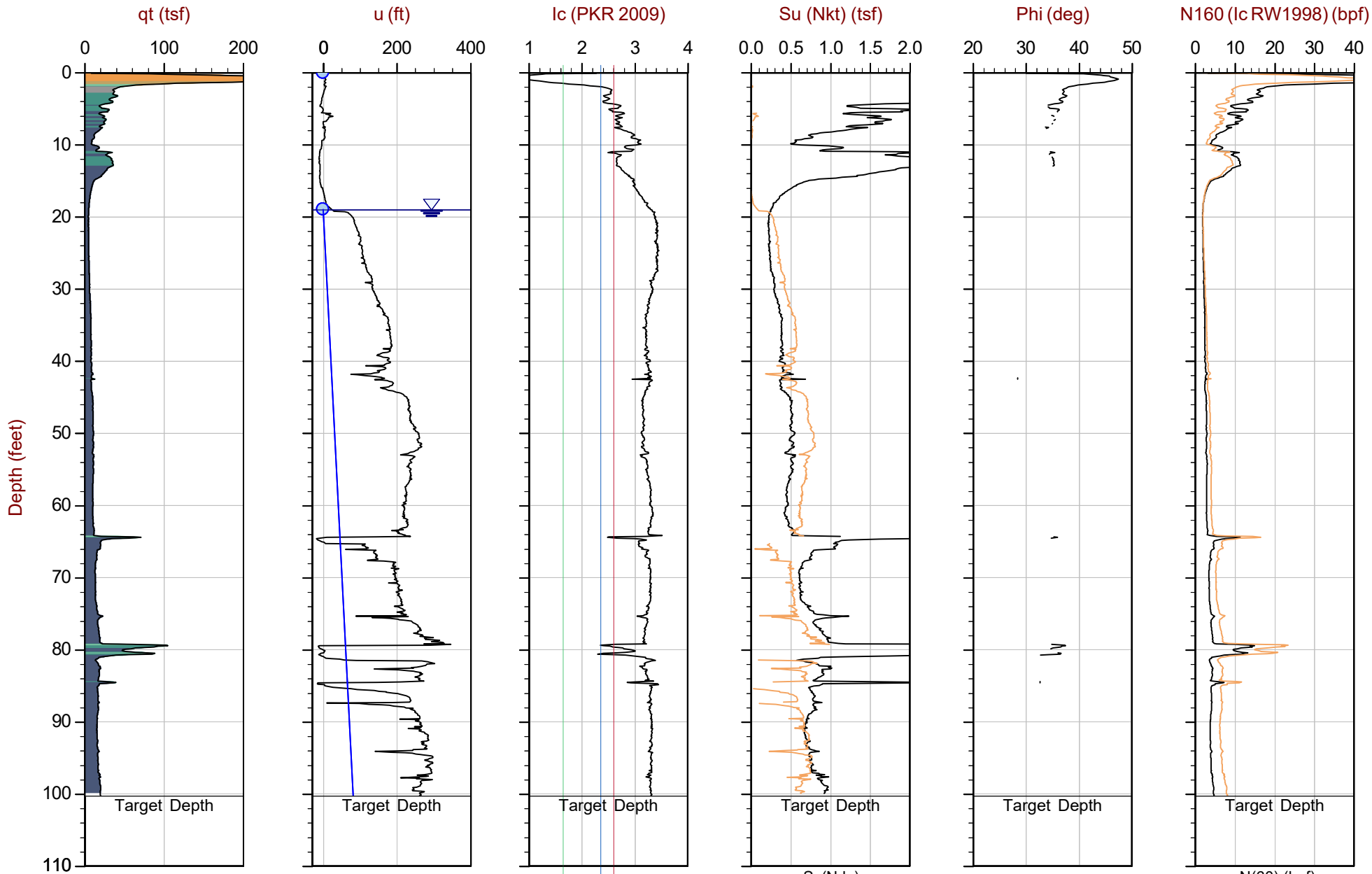
Job No: 20-61-21681

Date: 2020-12-09 11:05

Site: DTE Belle River Power Plant

Sounding: CPT20-04

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP04.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471237ft E: 13626152ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

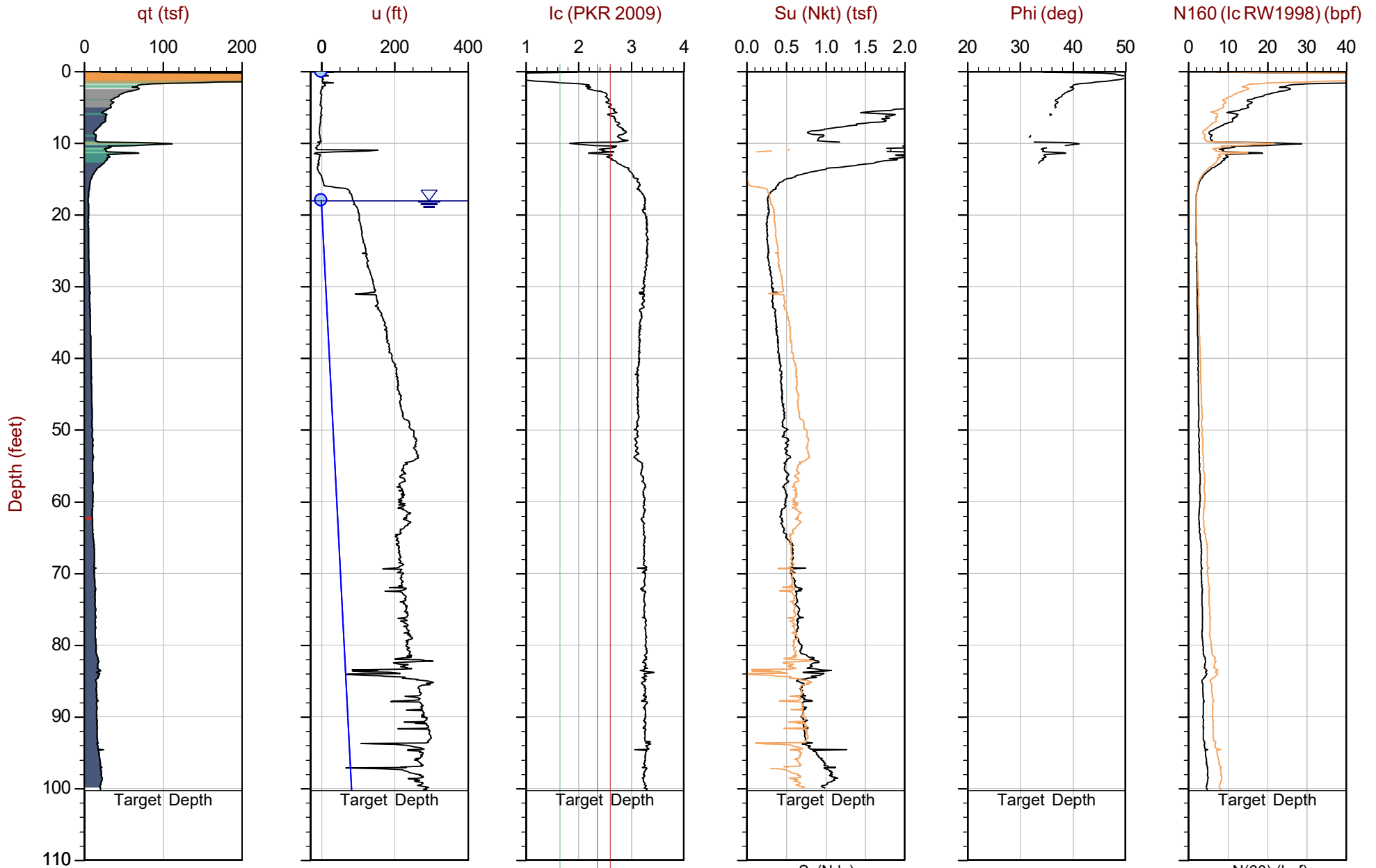
Job No: 20-61-21681

Date: 2020-12-09 12:02

Site: DTE Belle River Power Plant

Sounding: CPT20-05

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP05.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471243ft E: 13625954ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line

— N(60) (bpf)



GeoSyntec

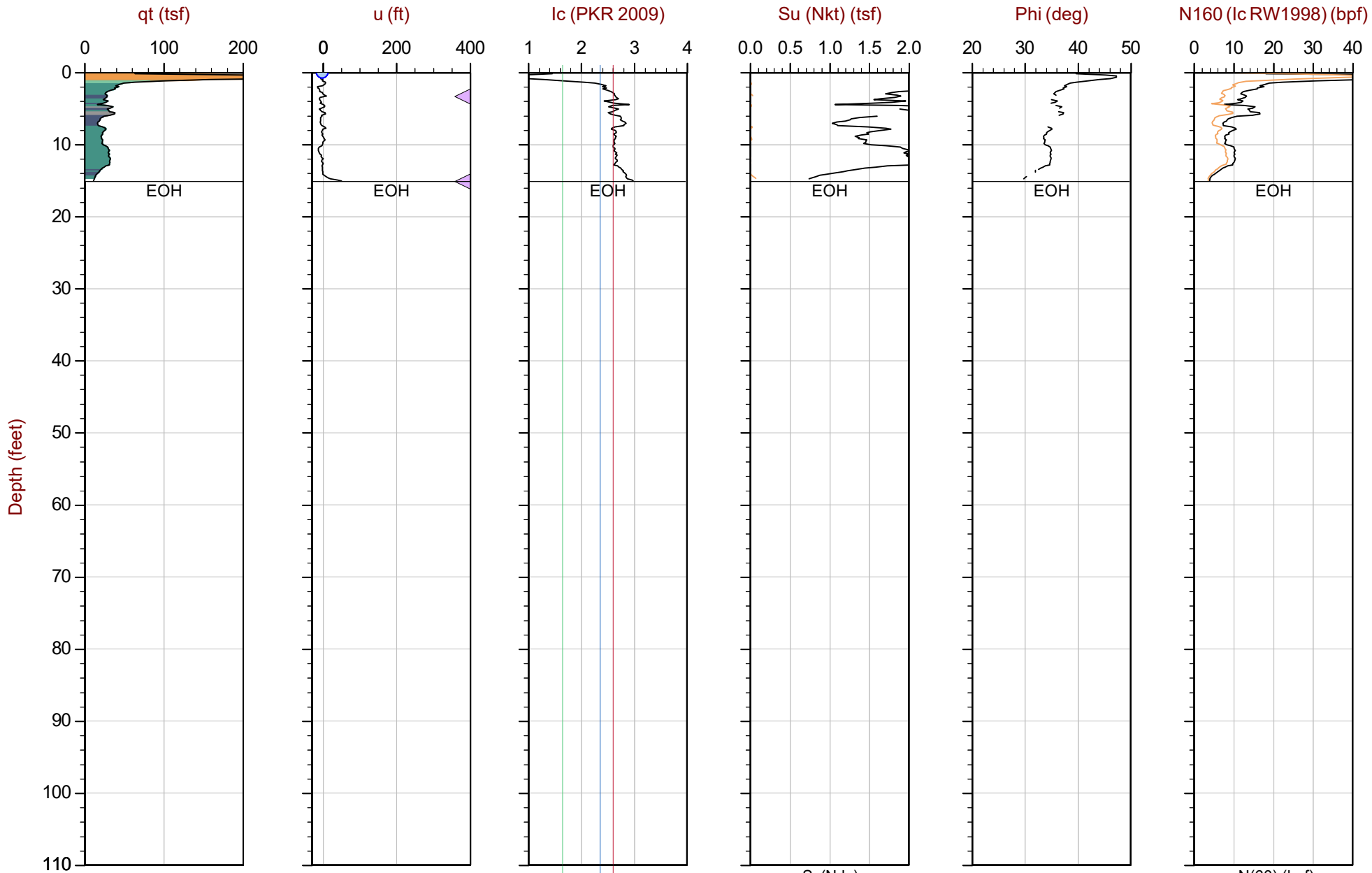
Job No: 20-61-21681

Date: 2020-12-09 13:54

Site: DTE Belle River Power Plant

Sounding: CPT20-06

Cone: 513:T1500F15U500



Max Depth: 4.600 m / 15.09 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471221ft E: 13625753ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

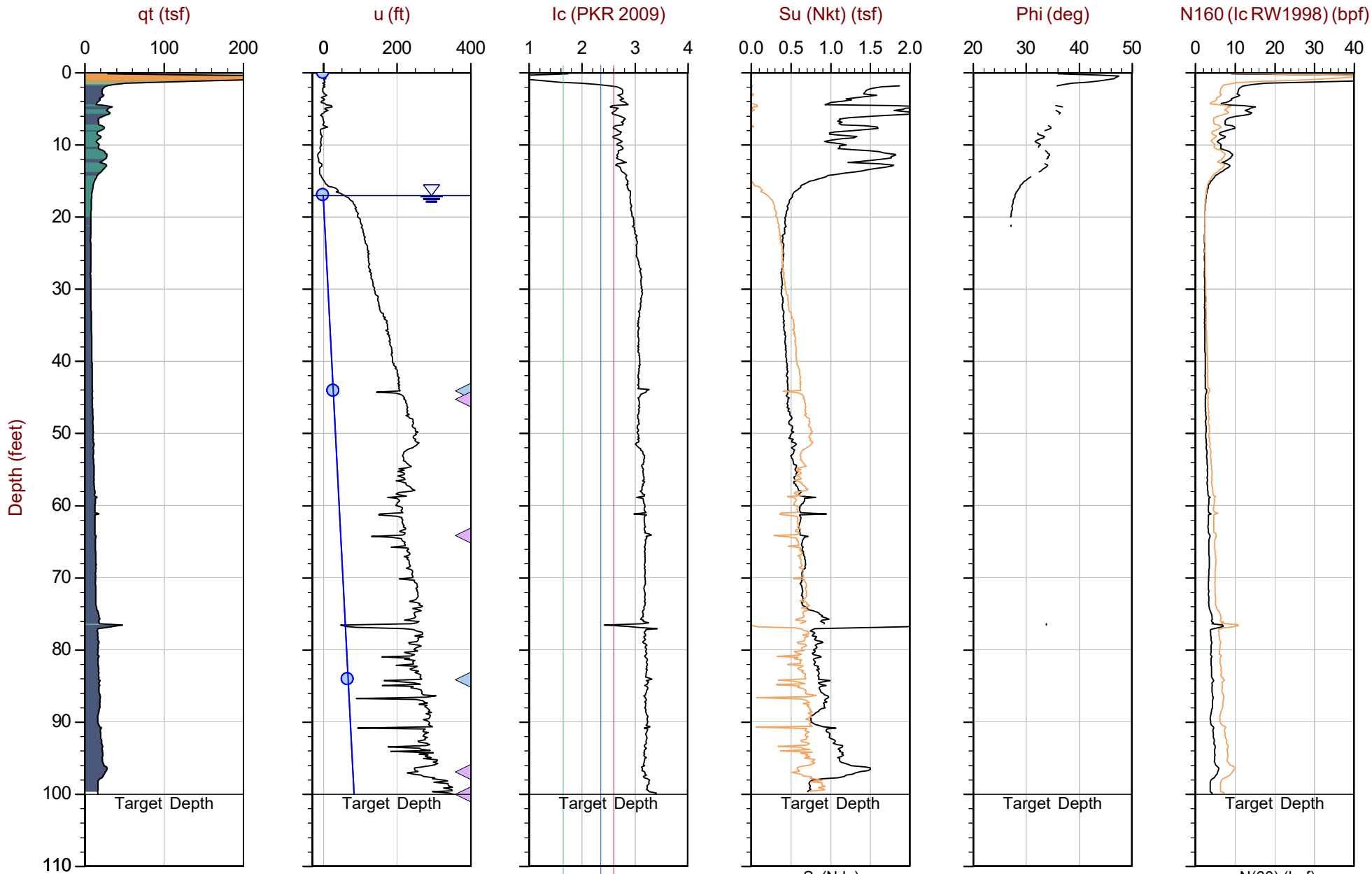
Job No: 20-61-21681

Date: 2020-12-10 08:43

Site: DTE Belle River Power Plant

Sounding: CPT20-06B

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP06B.COR

Unit Wt: SBTQtn (PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471216ft E: 13625742ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

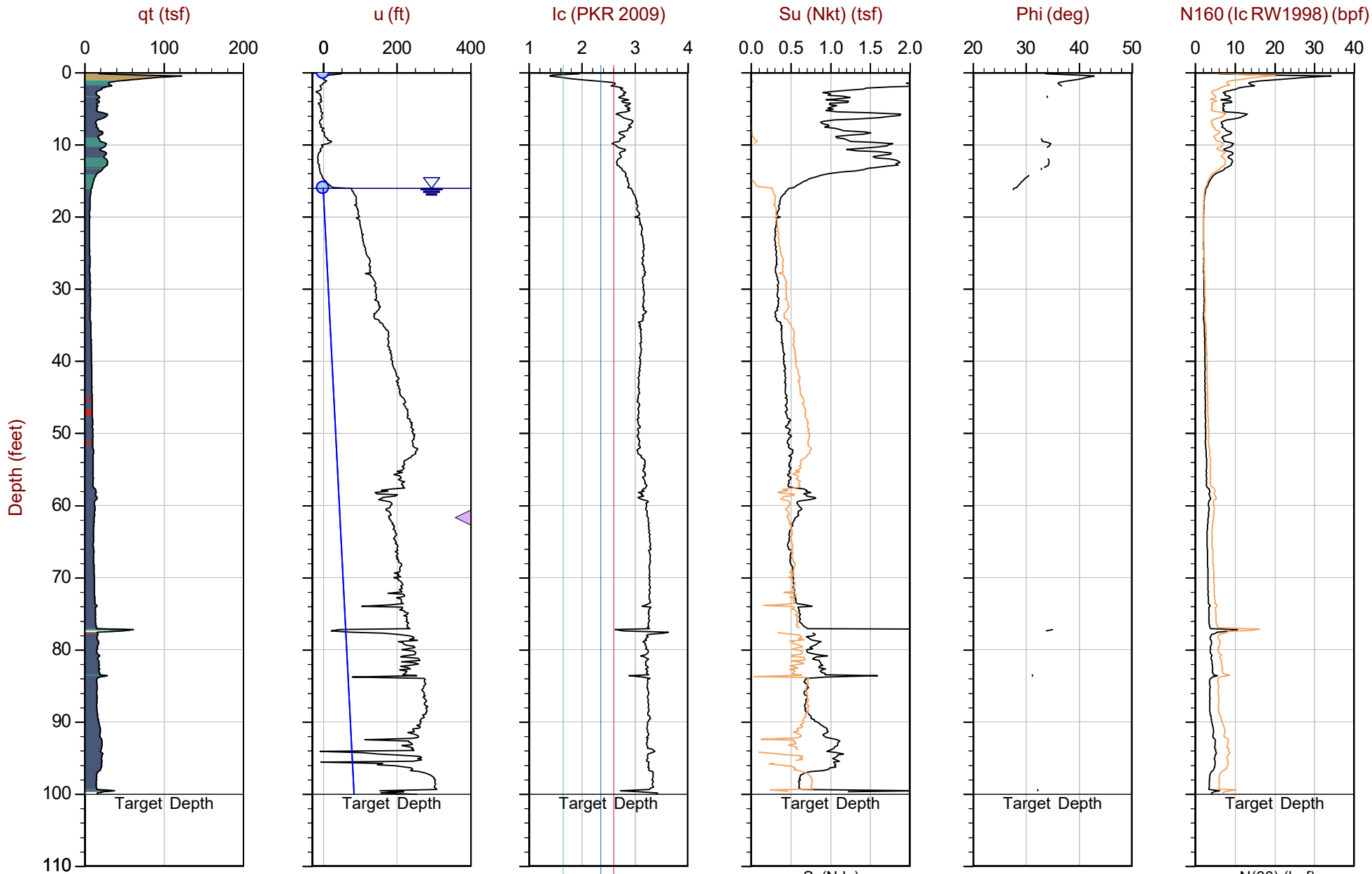
Job No: 20-61-21681

Date: 2020-12-09 11:04

Site: DTE Belle River Power Plant

Sounding: CPT20-07

Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP07.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 471015ft E: 13625752ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

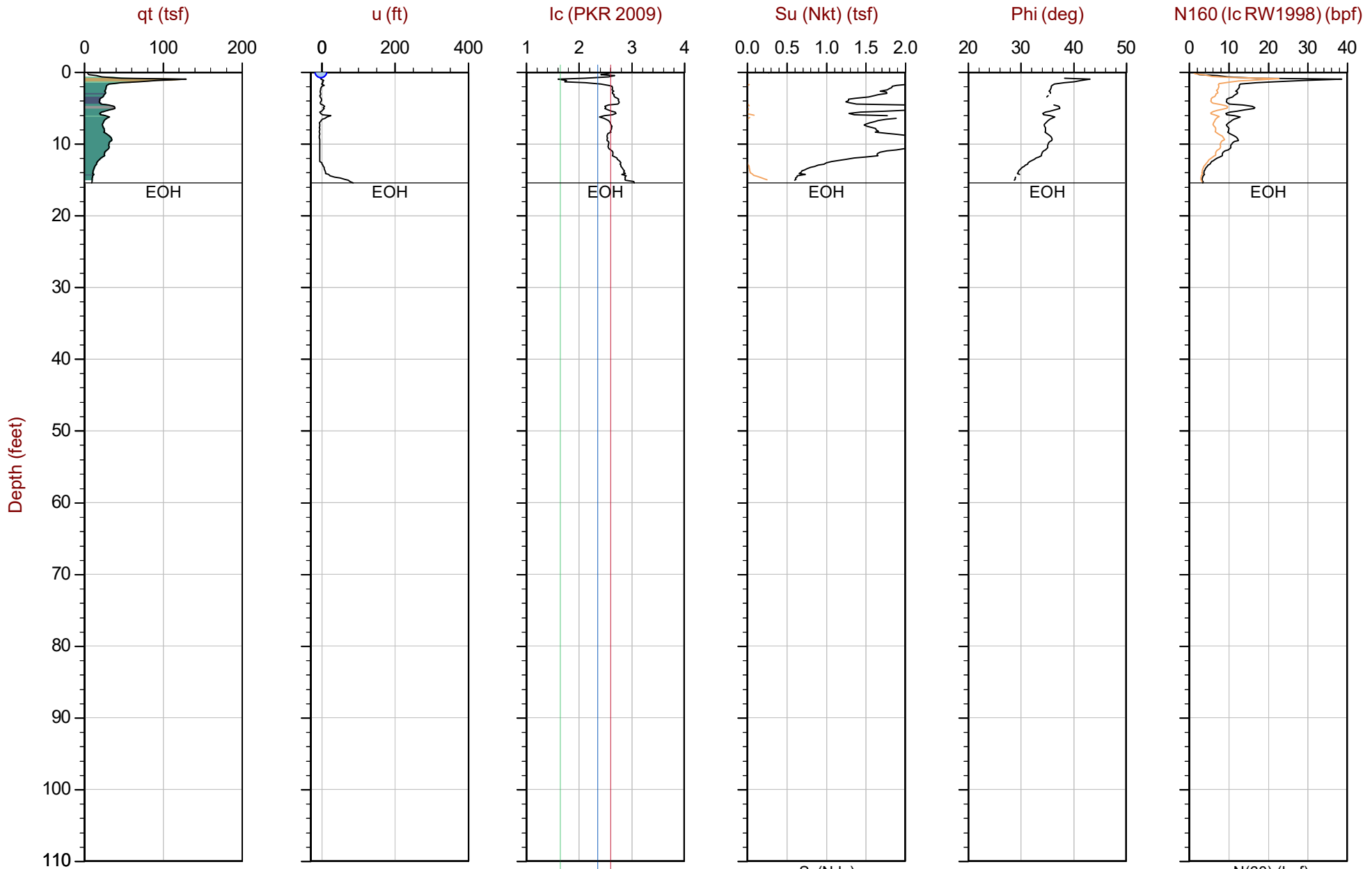
Job No: 20-61-21681

Date: 2020-12-11 12:09

Site: DTE Belle River Power Plant

Sounding: CPT20-08

Cone: 568:T1500F15U500



Max Depth: 4.700 m / 15.42 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470392ft E: 13626398ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

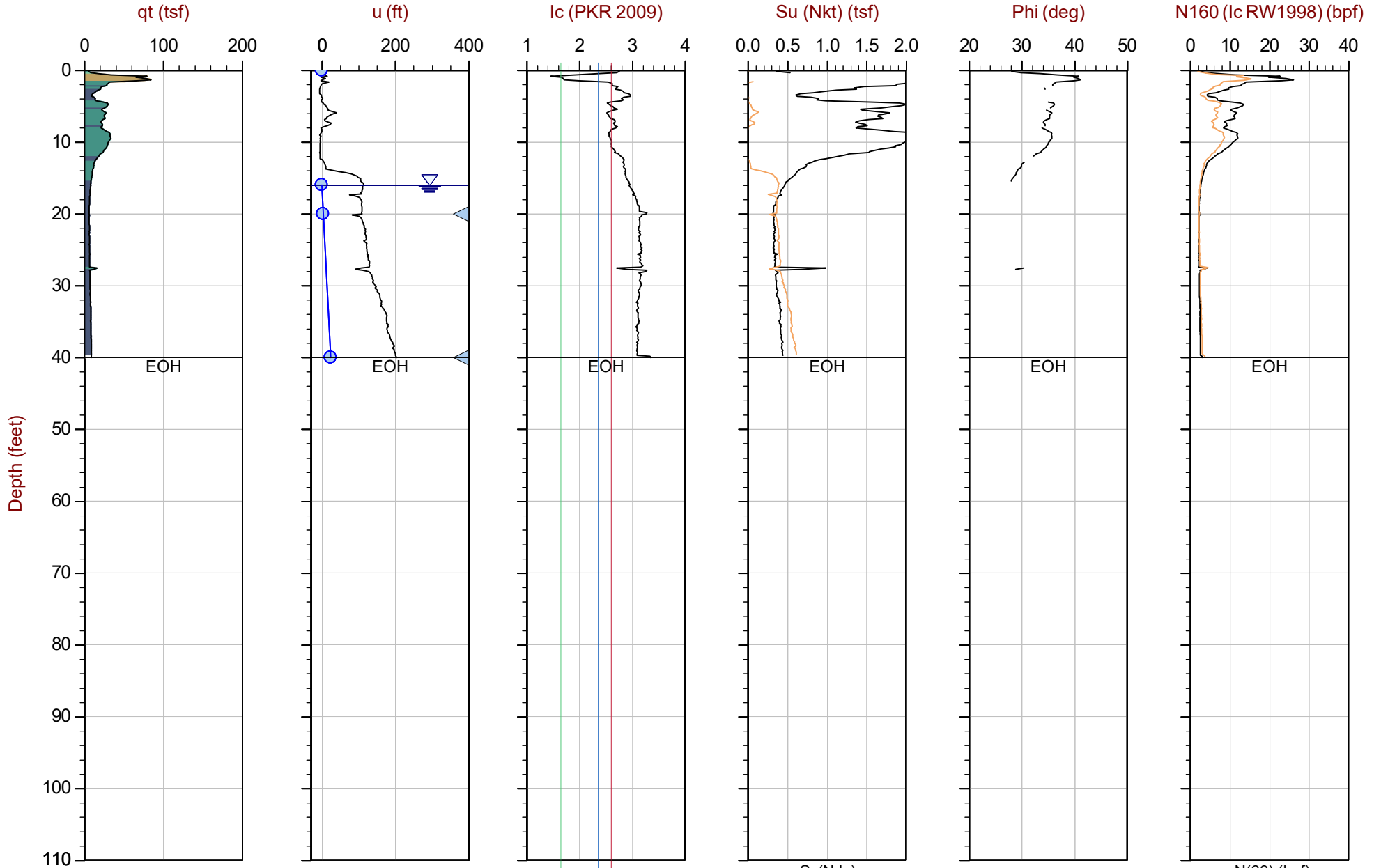
Job No: 20-61-21681

Date: 2020-12-11 12:35

Site: DTE Belle River Power Plant

Sounding: CPT20-08B

Cone: 568:T1500F15U500



Max Depth: 12.200 m / 40.03 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470382ft E: 13626396ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line





GeoSyntec

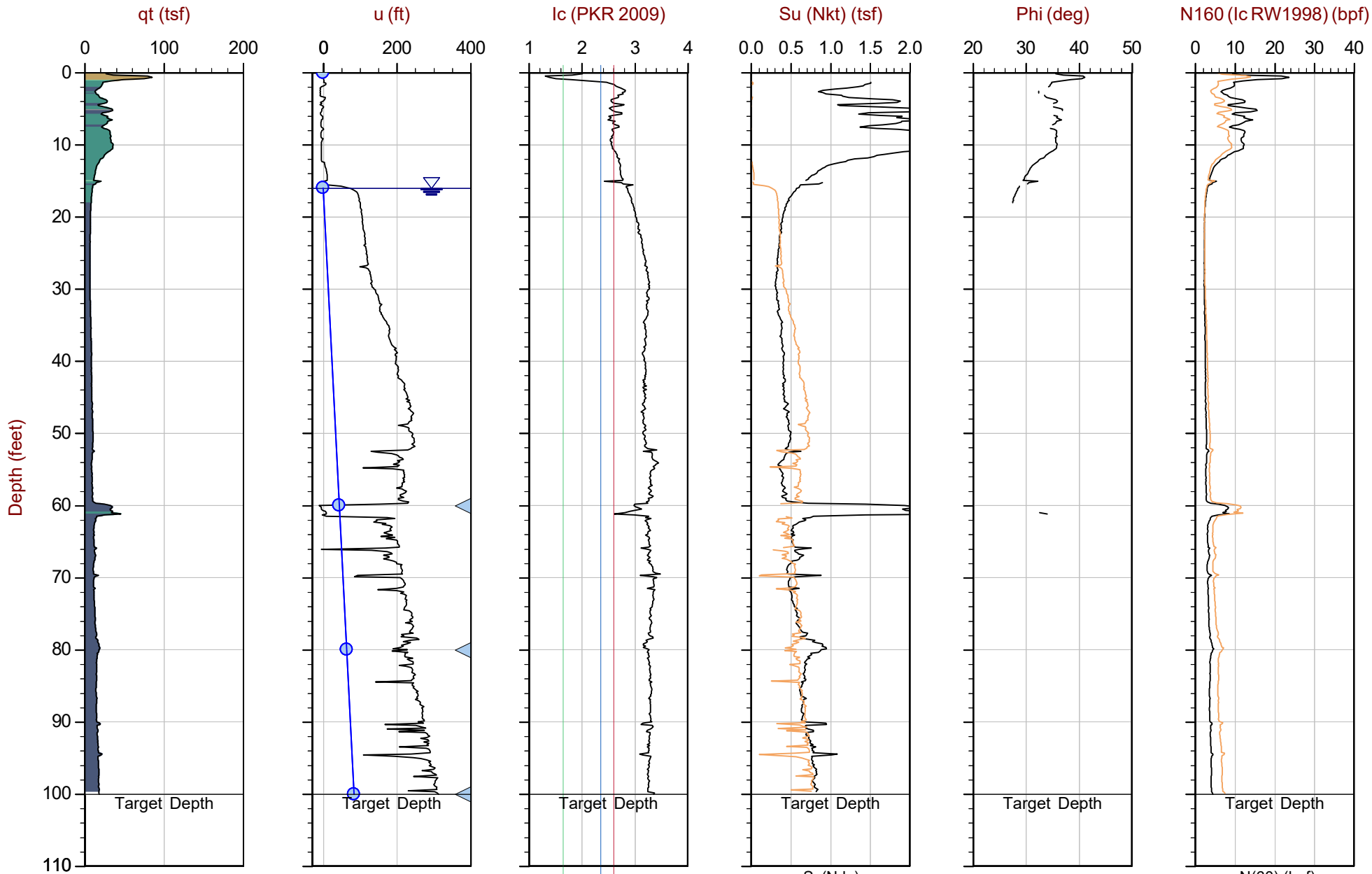
Job No: 20-61-21681

Date: 2020-12-15 08:41

Site: DTE Belle River Power Plant

Sounding: CPT20-08C

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP08C.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470384ft E: 13626391ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

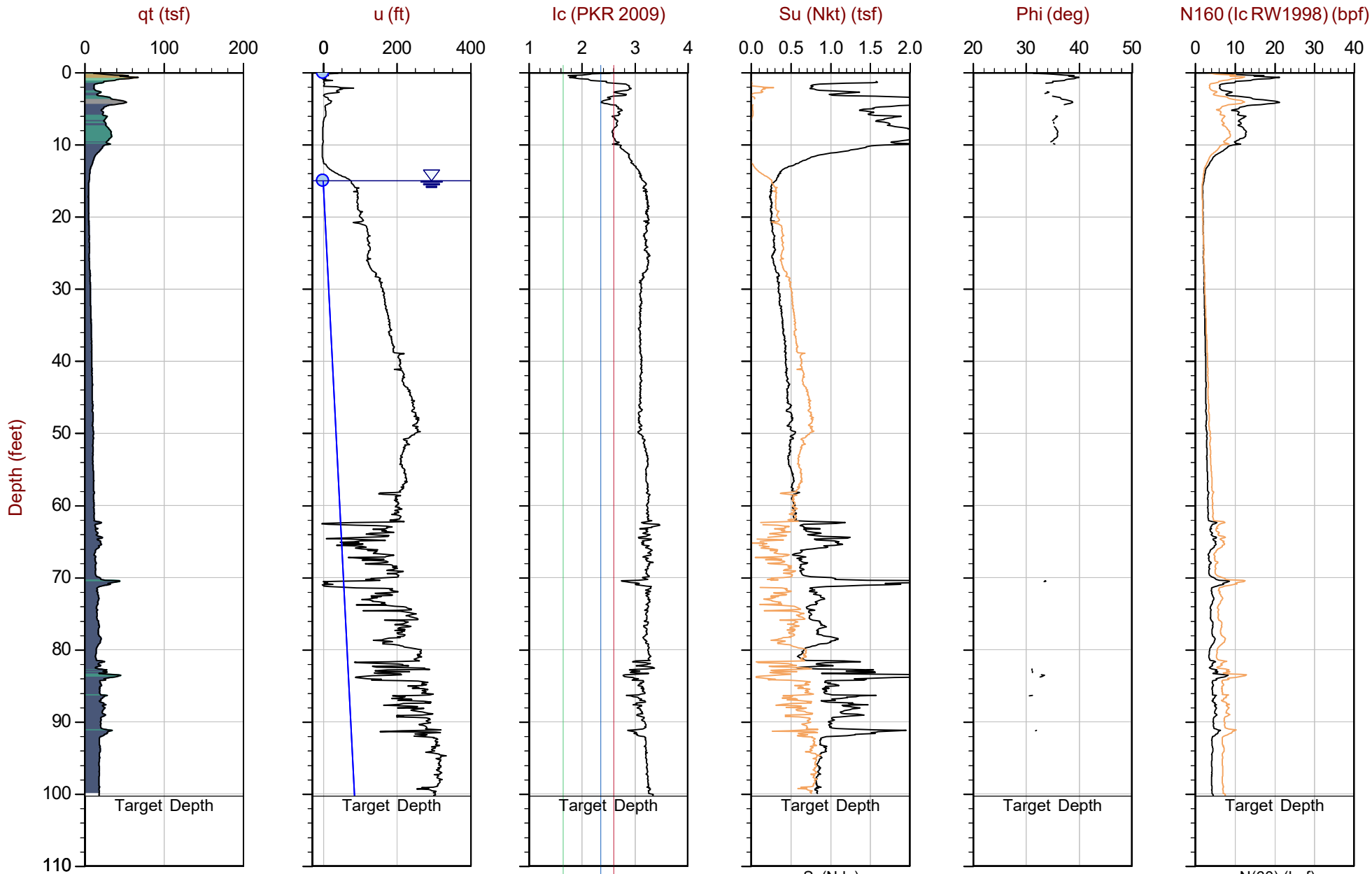
Job No: 20-61-21681

Date: 2020-12-16 11:02

Site: DTE Belle River Power Plant

Sounding: CPT20-10.1

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP10.1.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469861 ft E: 13626732 ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

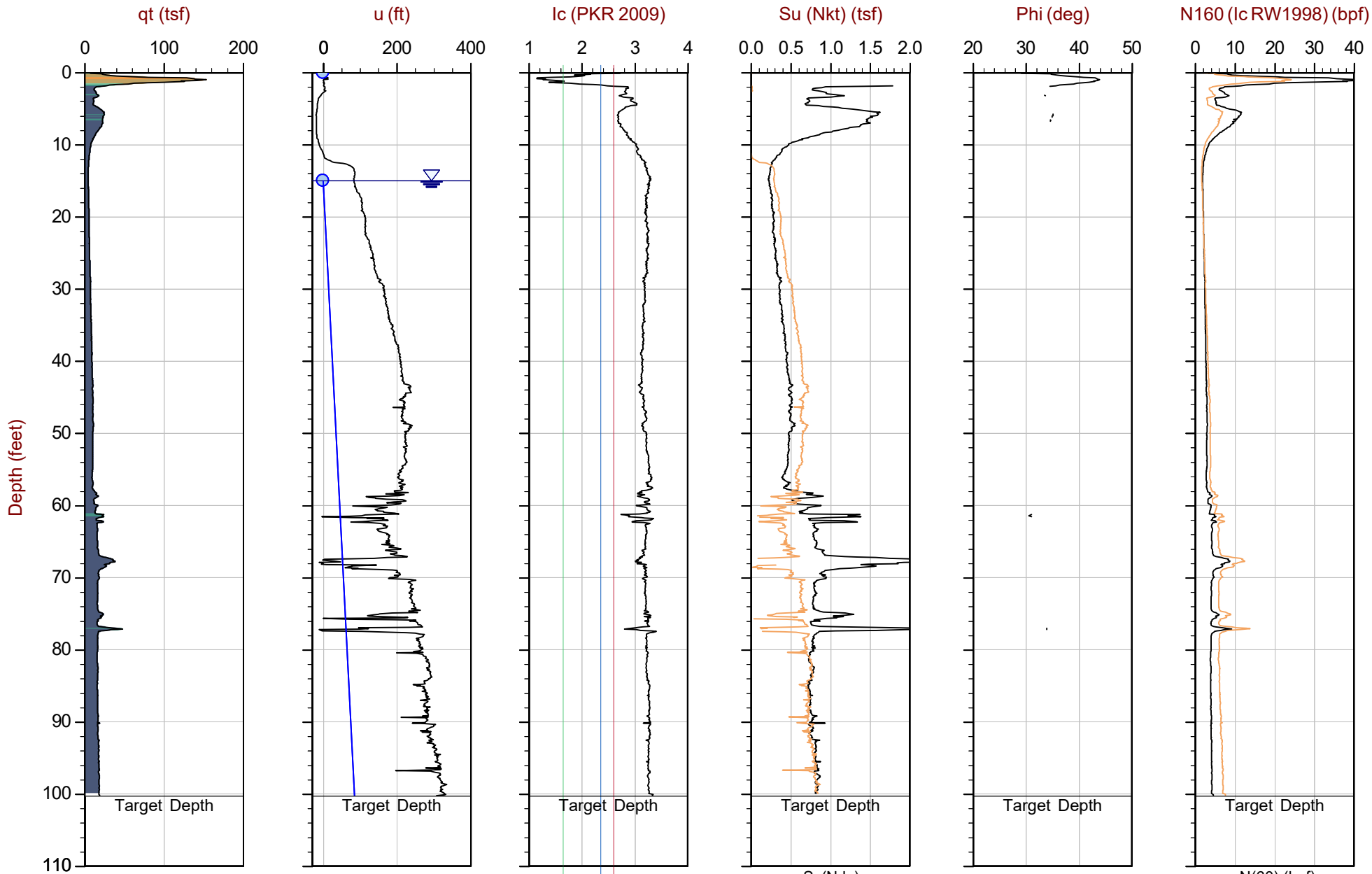
Job No: 20-61-21681

Date: 2020-12-16 11:53

Site: DTE Belle River Power Plant

Sounding: CPT20-10A

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP10A.COR

Unit Wt: SBTQtn(PKR2009)

Su Nkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469934ft E: 13626592ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

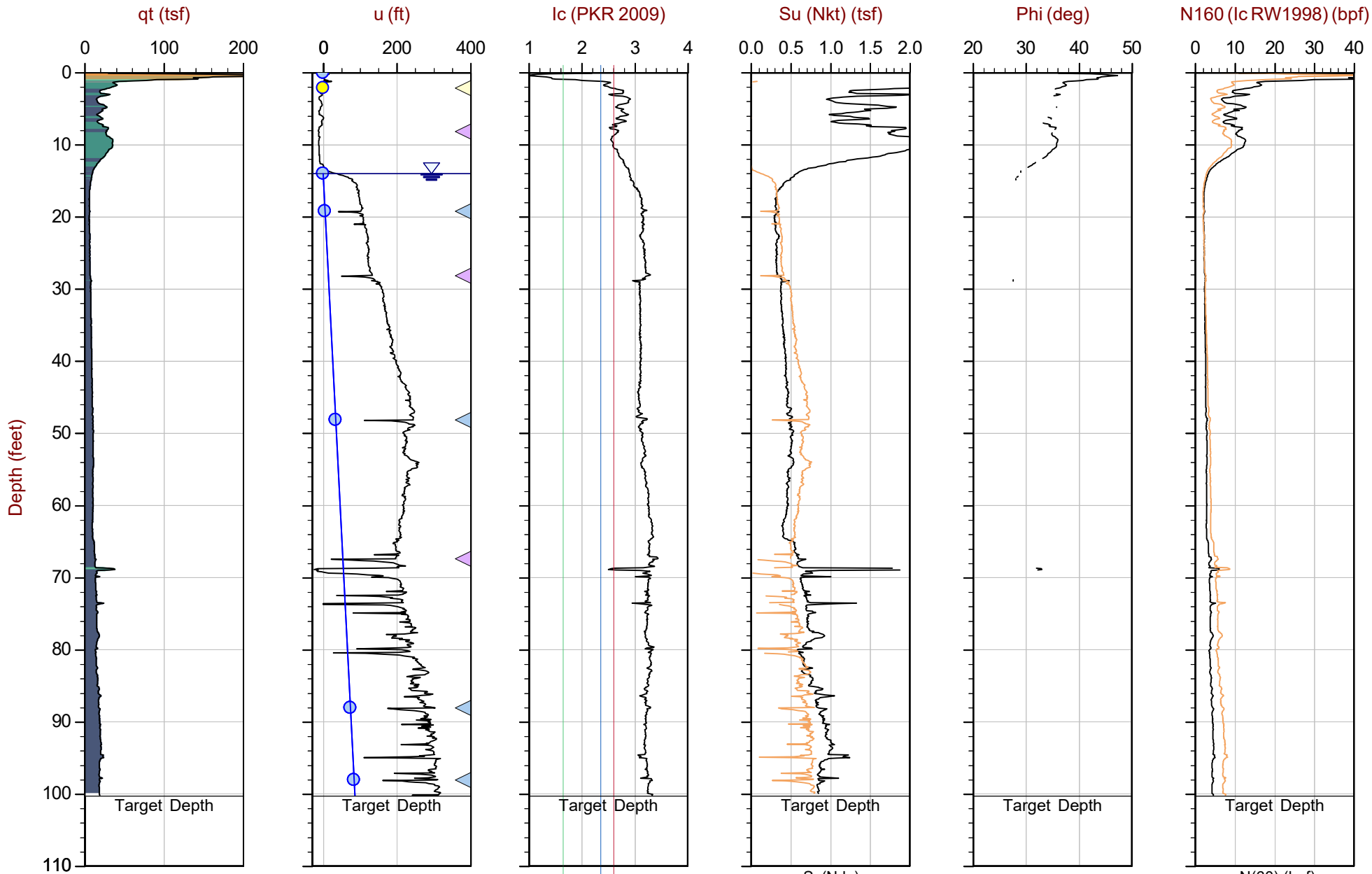
Job No: 20-61-21681

Date: 2020-12-15 11:07

Site: DTE Belle River Power Plant

Sounding: CPT20-11

Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ○ Assumed Ueq

File: 20-61-21681\_CP11.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

△ Dissipation, Ueq achieved

▽ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 469979ft E: 13626765ft

Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

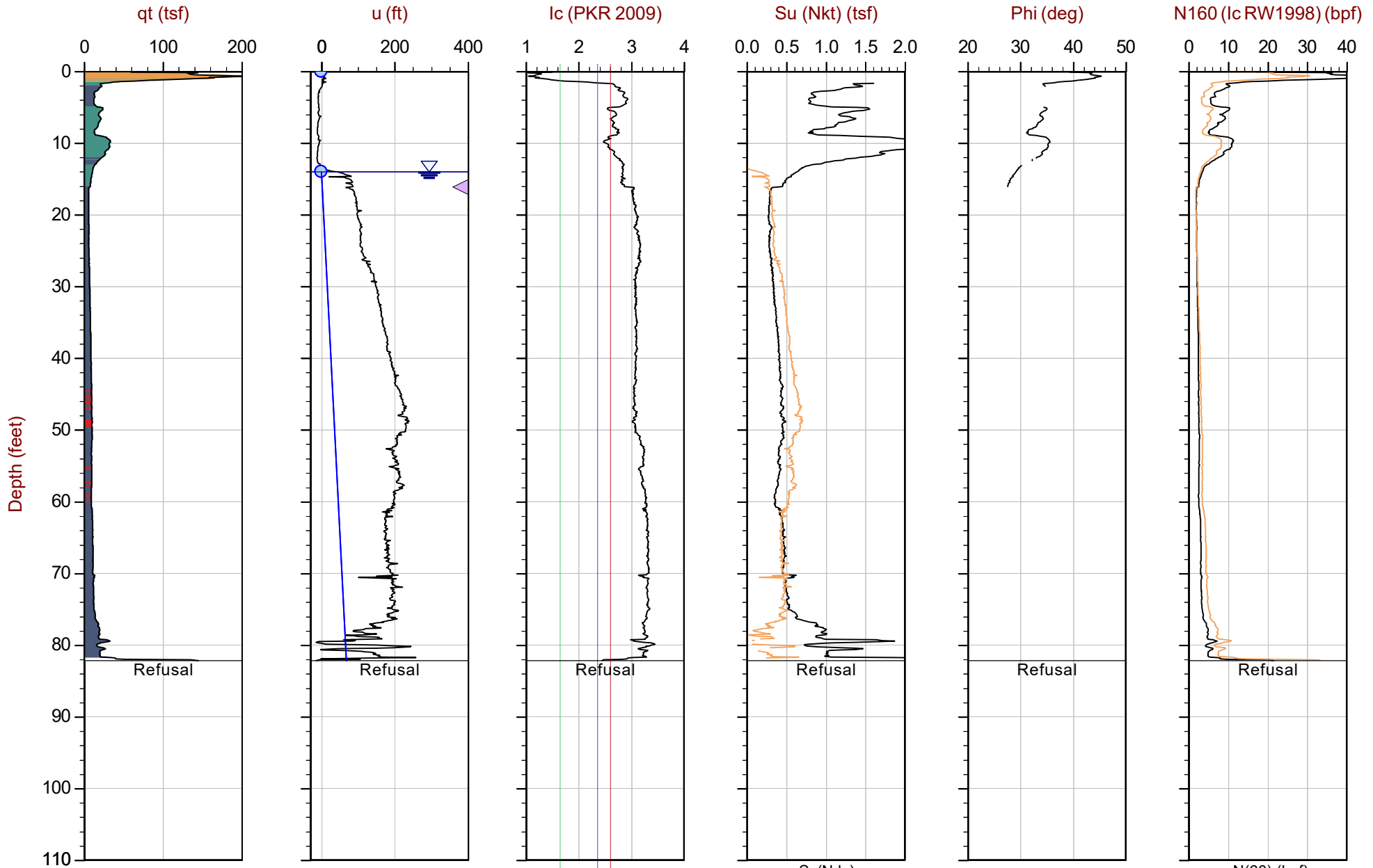
Job No: 20-61-21681

Date: 2020-12-15 08:44

Site: DTE Belle River Power Plant

Sounding: CPT20-12

Cone: 551:T1500F15U500



Max Depth: 25.050 m / 82.18 ft

Depth Inc: 0.025 m / 0.082 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP12.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470292ft E: 13626802ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

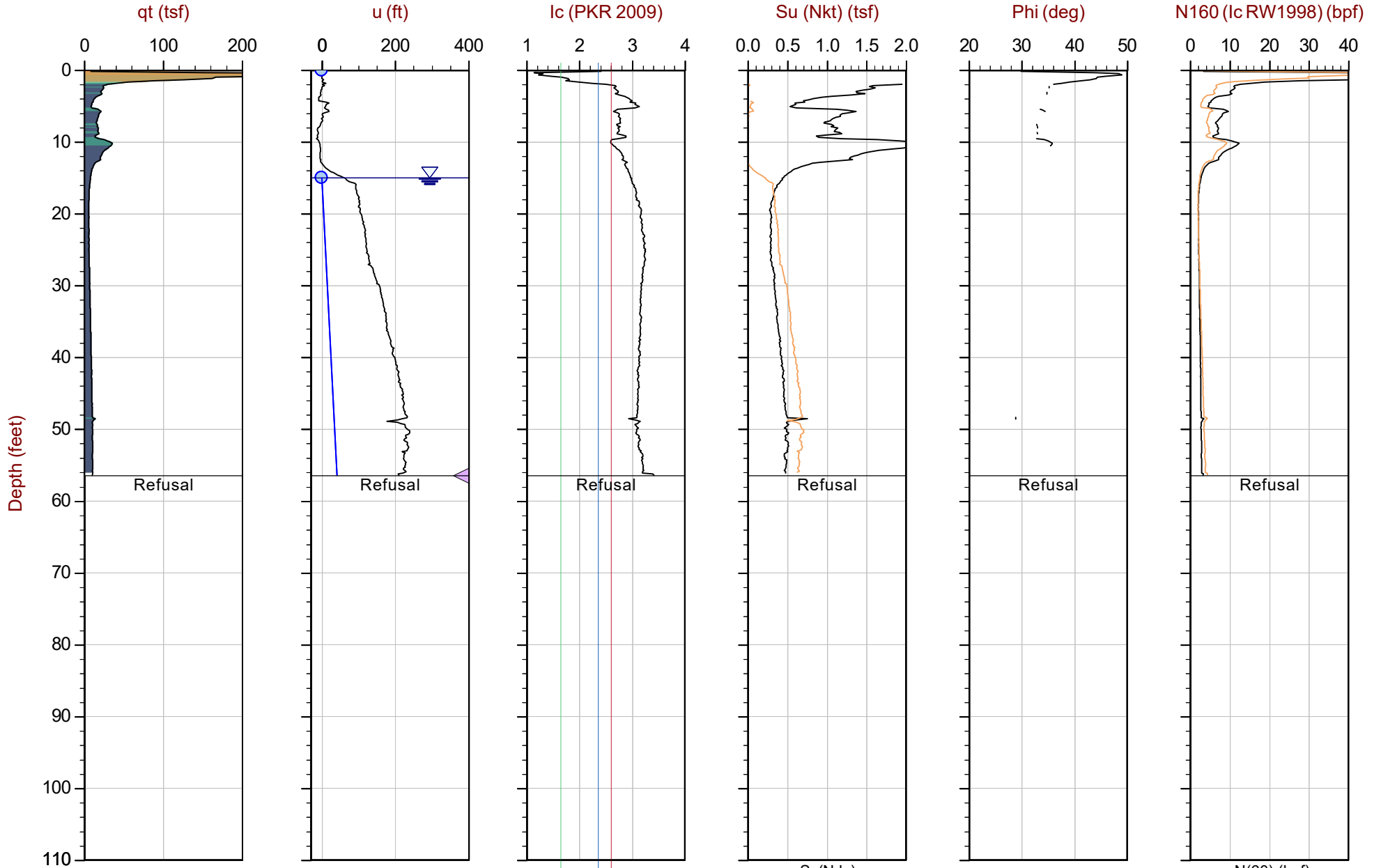
Job No: 20-61-21681

Date: 2020-12-10 15:00

Site: DTE Belle River Power Plant

Sounding: CPT20-13

Cone: 513:T1500F15U500



Max Depth: 17.200 m / 56.43 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◁ Dissipation, Ueq achieved

◁ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470478ft E: 13626800ft

Sheet No: 1 of 1

◁ Dissipation, Ueq assumed

— Hydrostatic Line



GeoSyntec

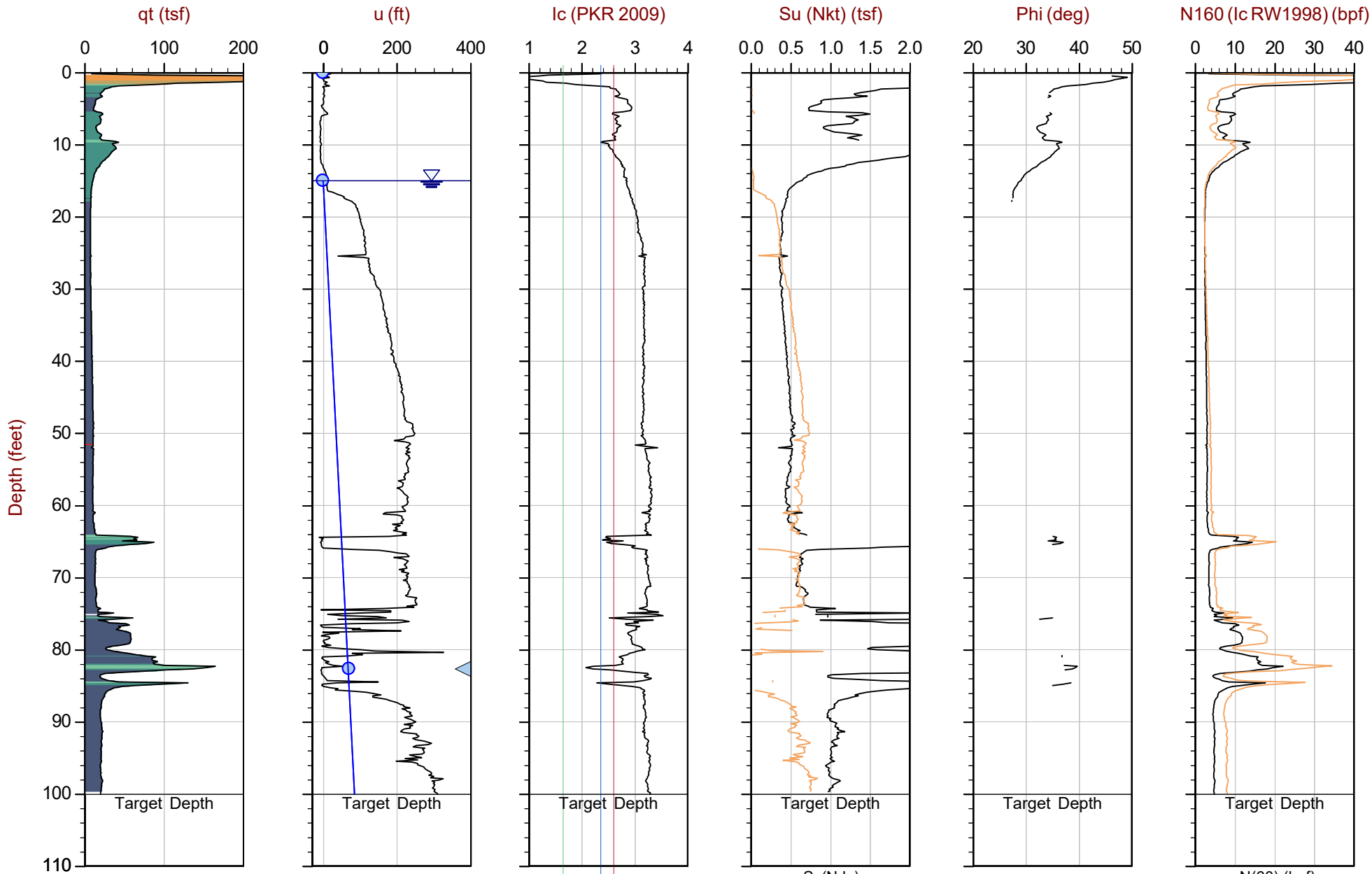
Job No: 20-61-21681

Date: 2020-12-11 09:09

Site: DTE Belle River Power Plant

Sounding: CPT20-13B

Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: EveryPoint

Overplot Item: ● Ueq ● Assumed Ueq

File: 20-61-21681\_CP13B.COR

Unit Wt: SBTQtn(PKR2009)

SuNkt/Ndu: 15.0 / 9.0

◀ Dissipation, Ueq achieved

◀ Dissipation, Ueq not achieved

SBT: Robertson, 2009 and 2010

Coords: Michigan State Plane South N: 470491ft E: 13626793ft

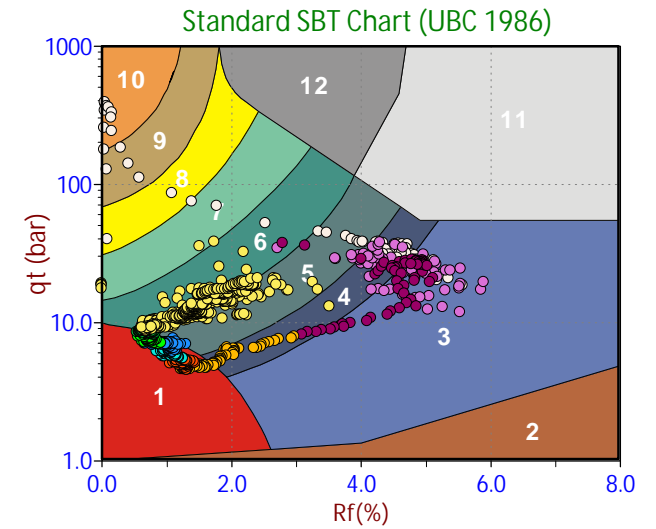
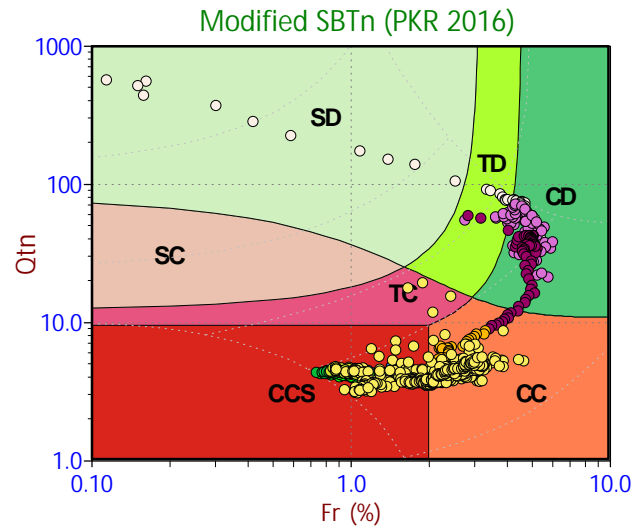
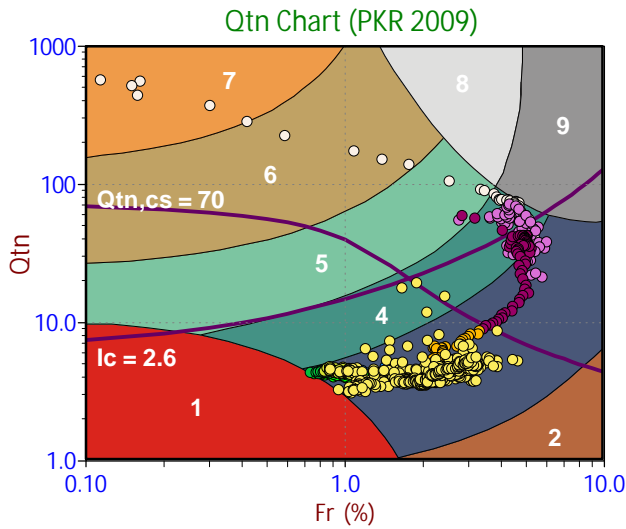
Sheet No: 1 of 1

◀ Dissipation, Ueq assumed

— Hydrostatic Line

## Soil Behavior Type (SBT) Scatter Plots





Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

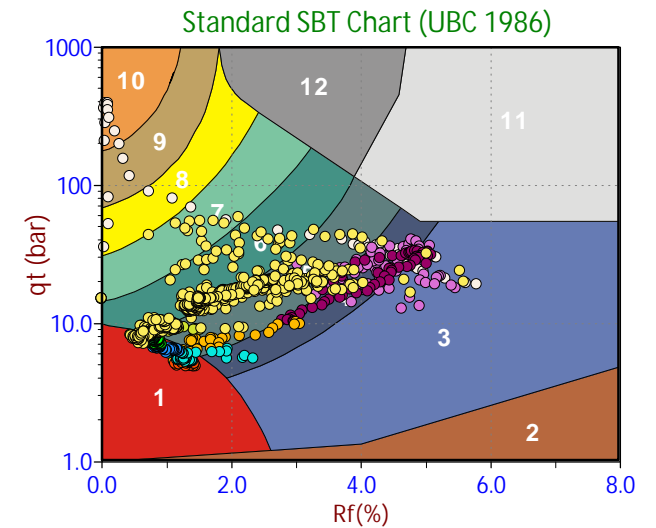
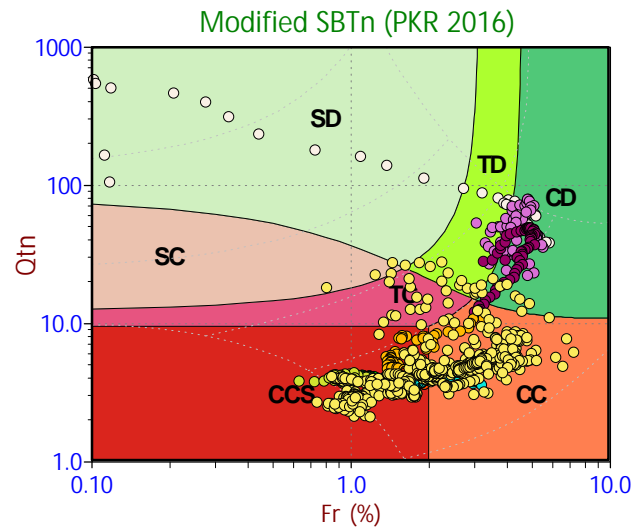
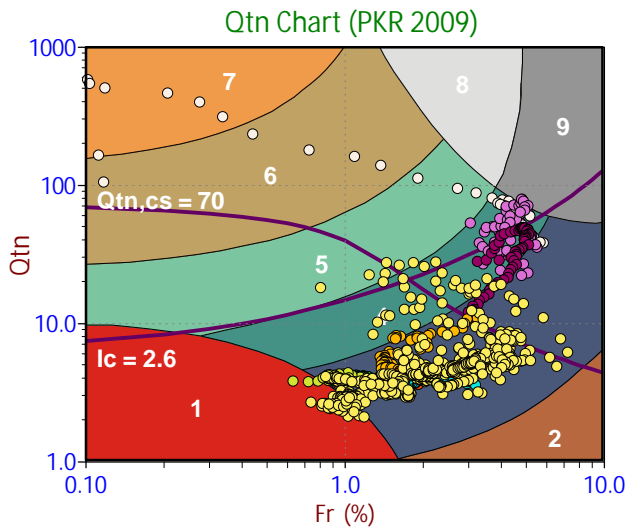
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

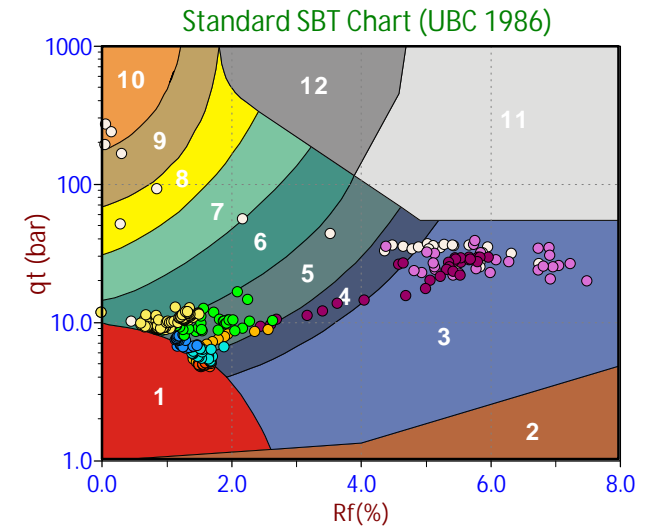
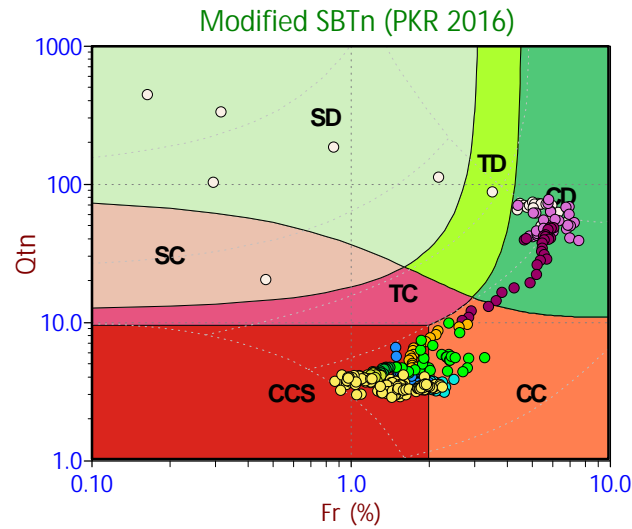
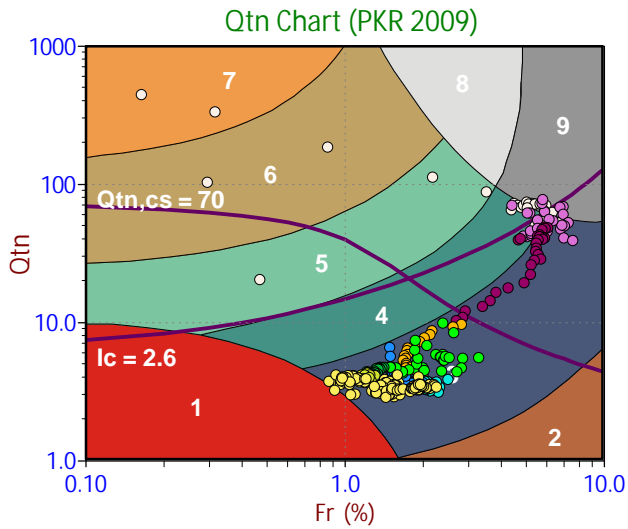
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
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- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

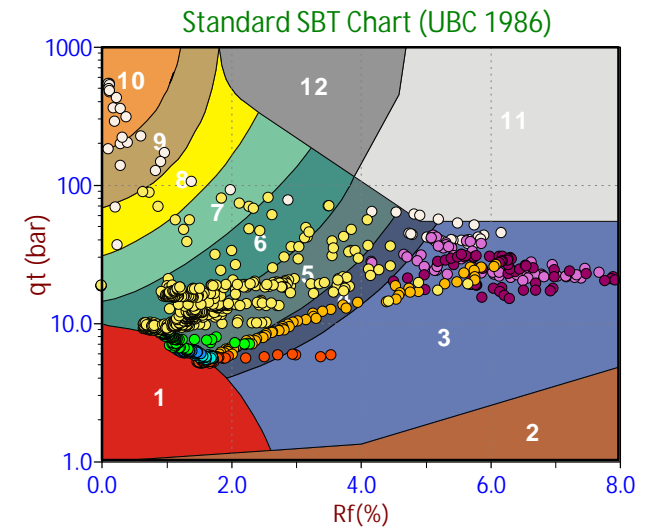
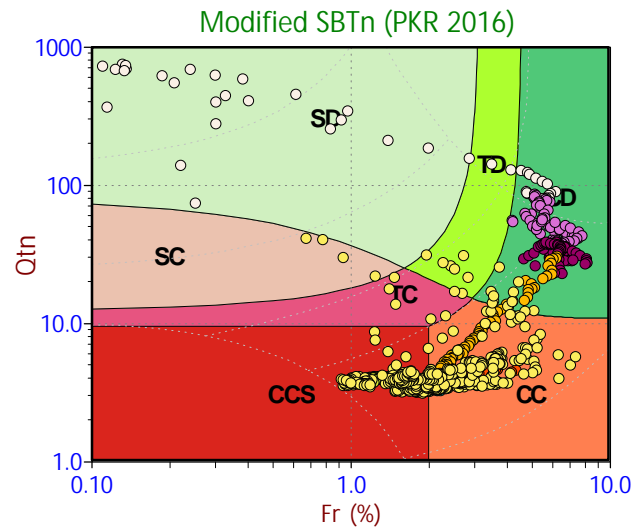
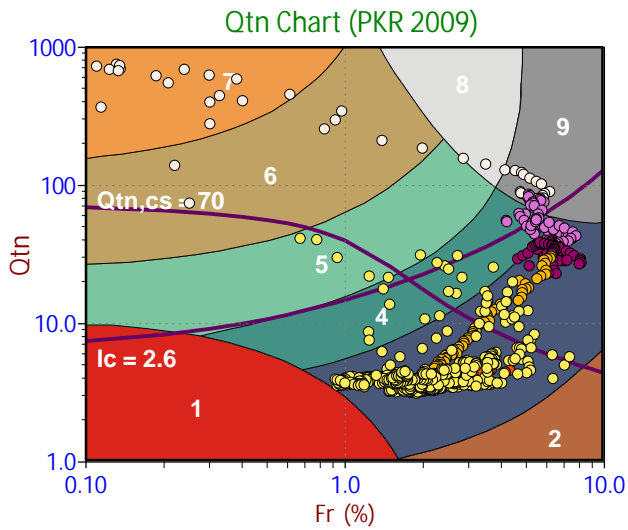
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

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- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
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Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

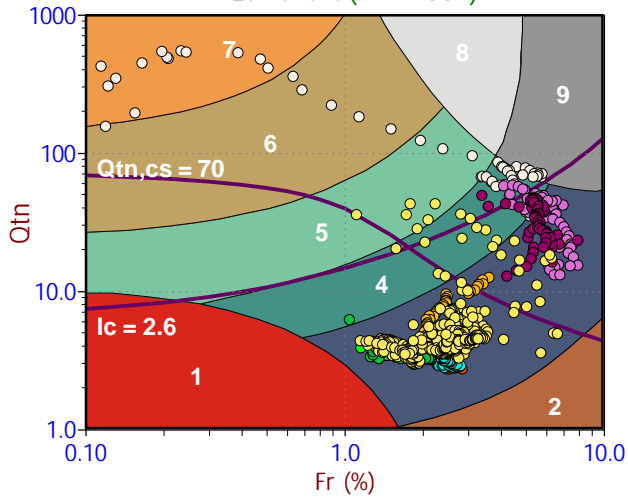
Legend

- CCS (Cont. sensitive clay like)
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- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

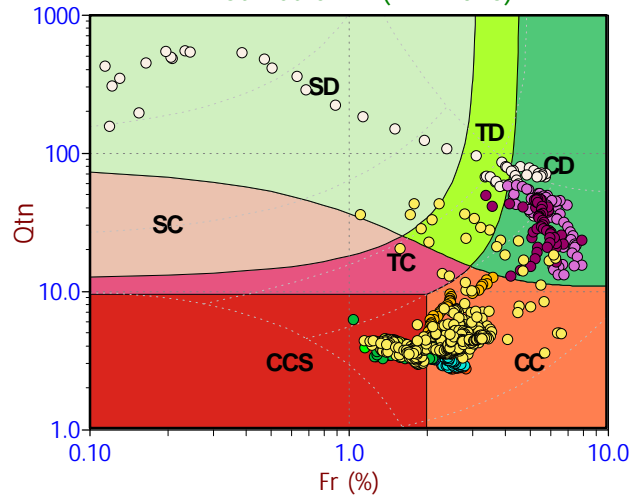
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

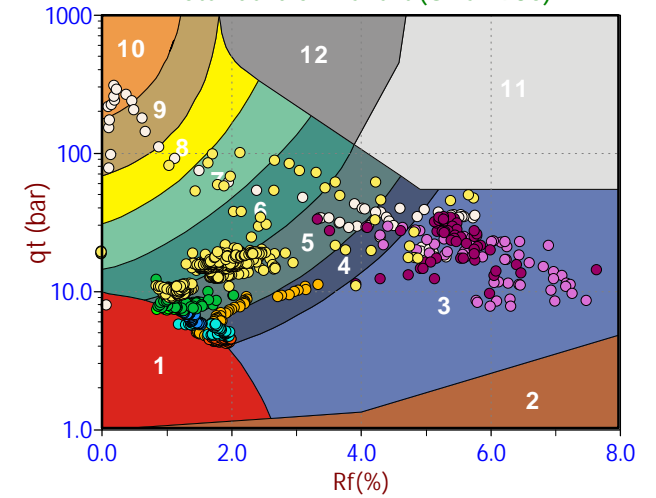
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

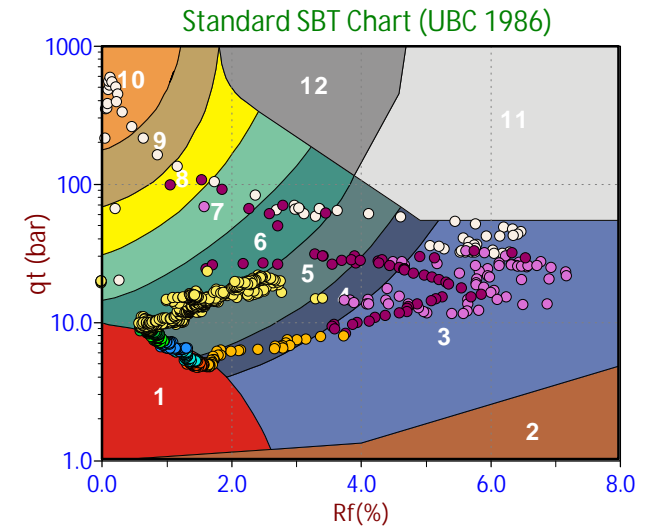
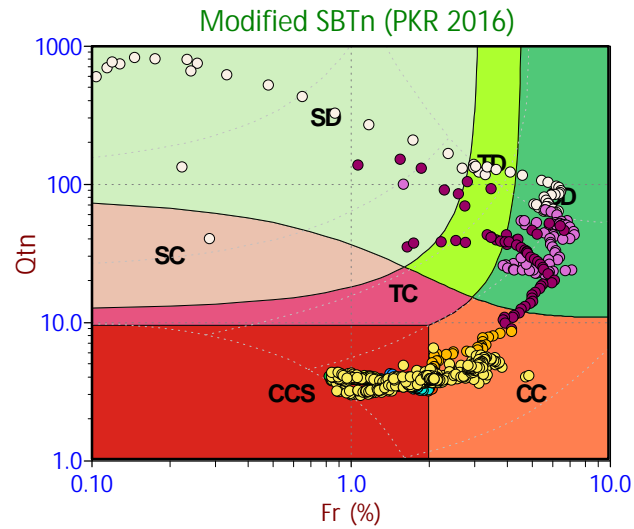
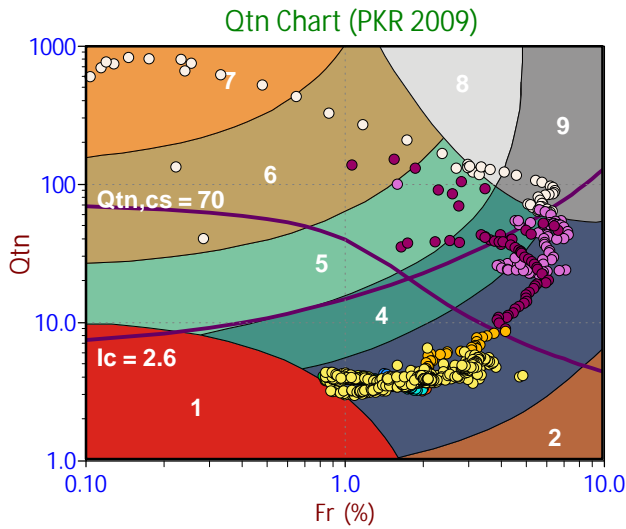
- Sensitive, Fine Grained
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- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

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Legend

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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

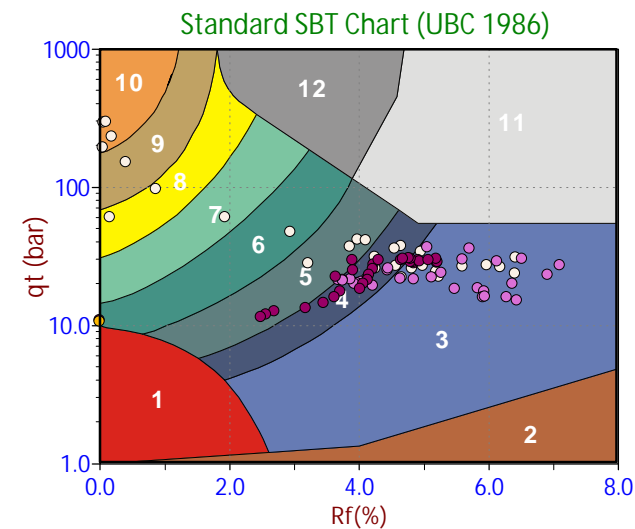
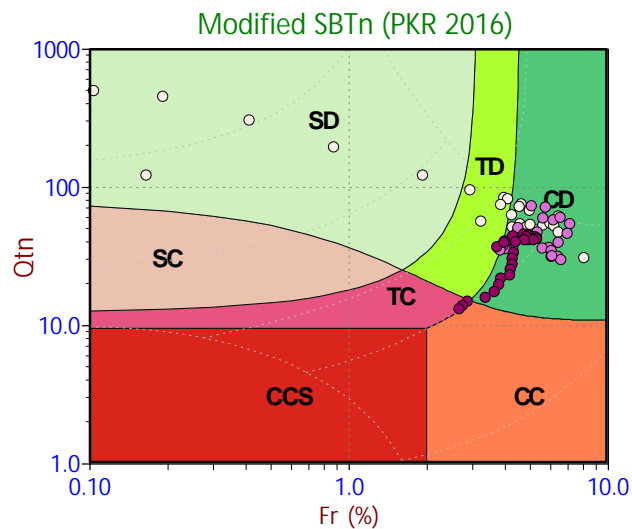
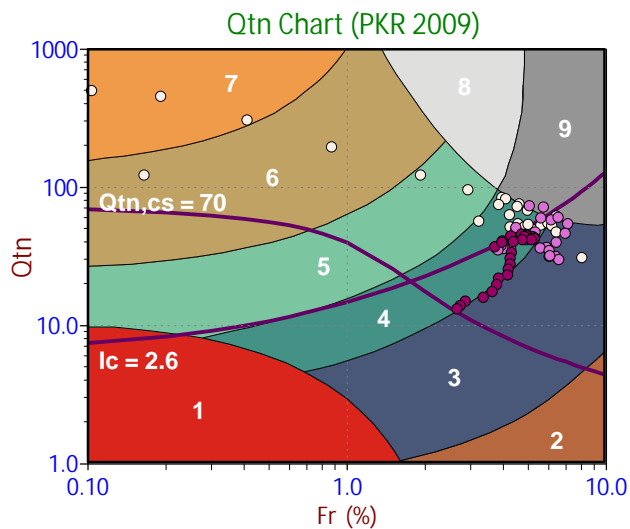
- Sensitive, Fine Grained
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Legend

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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

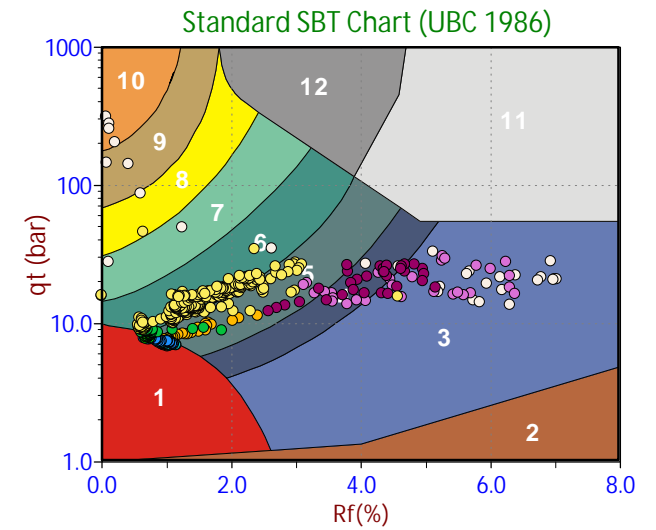
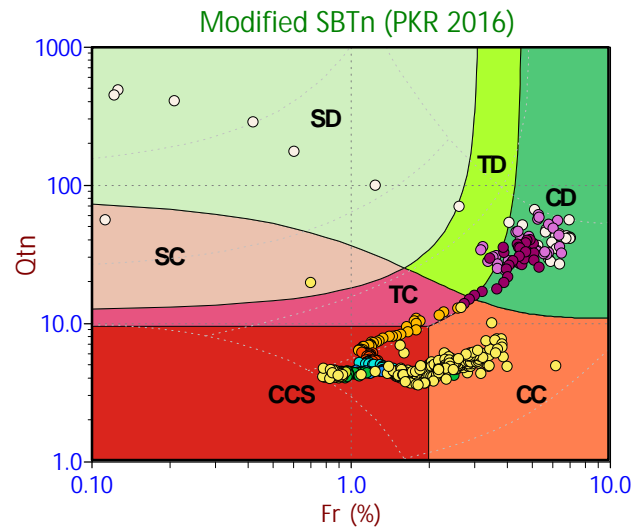
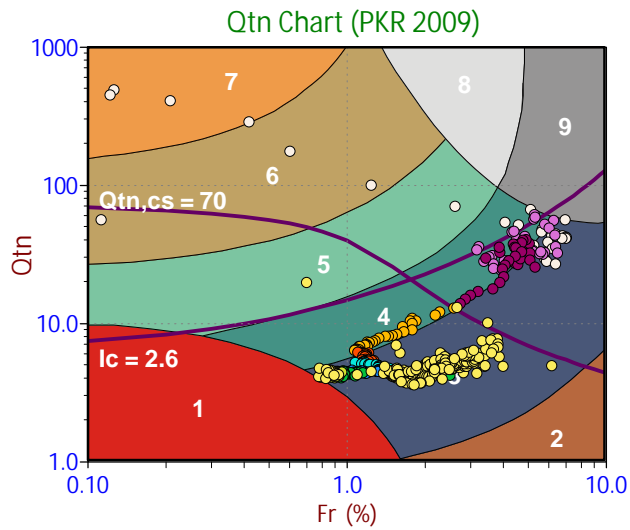
- Sensitive, Fine Grained
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- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
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Legend

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- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
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- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

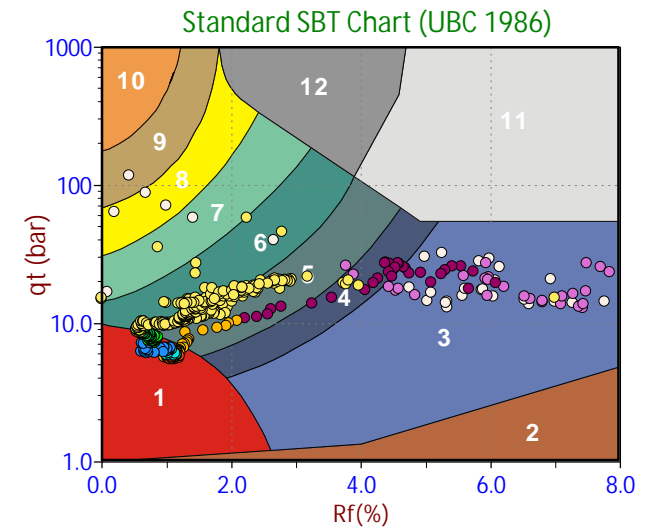
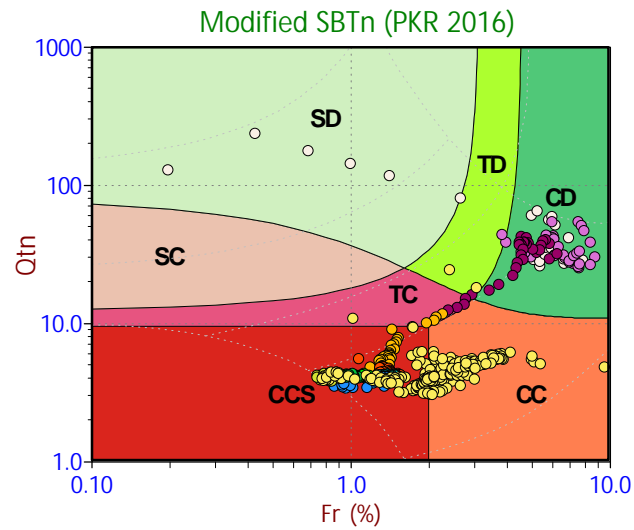
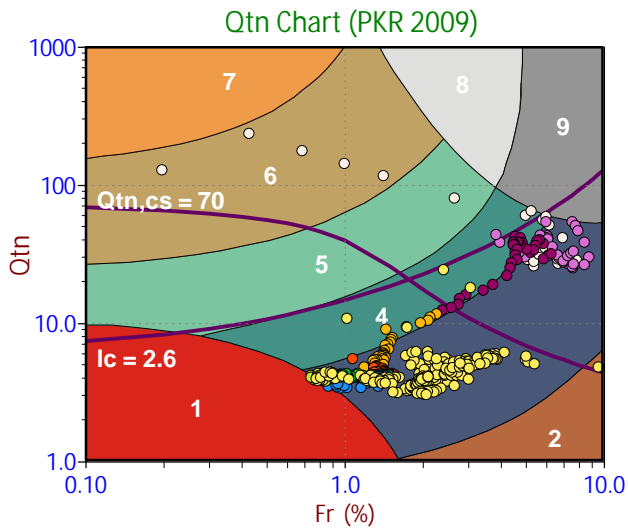
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
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- Silty Sand/Sand
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- Cemented Sand





**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

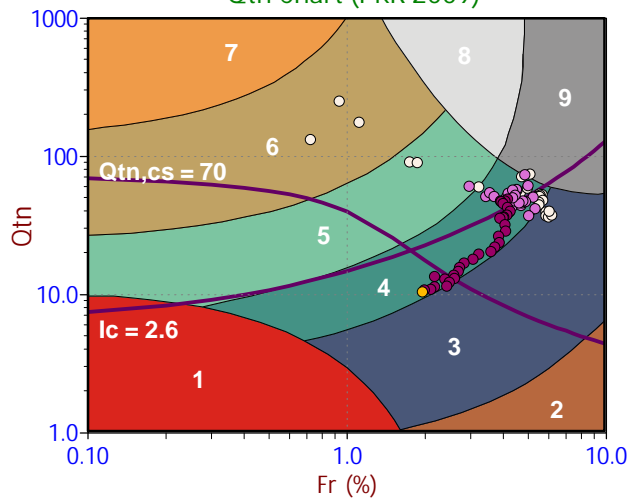
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

**Legend**

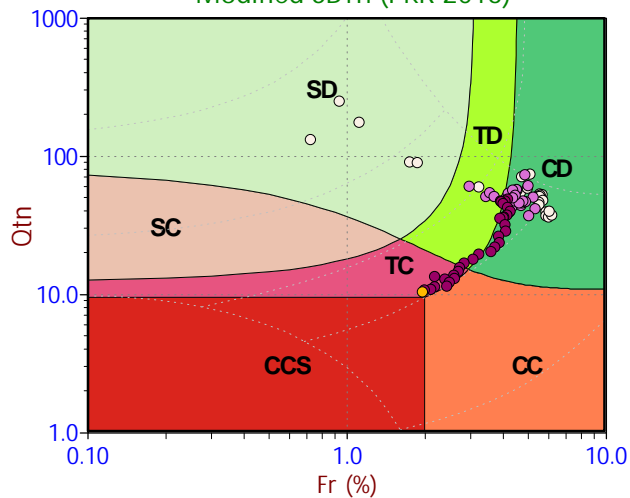
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



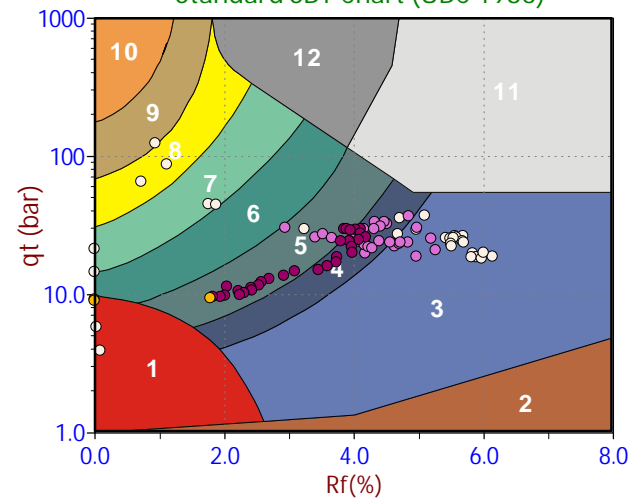
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

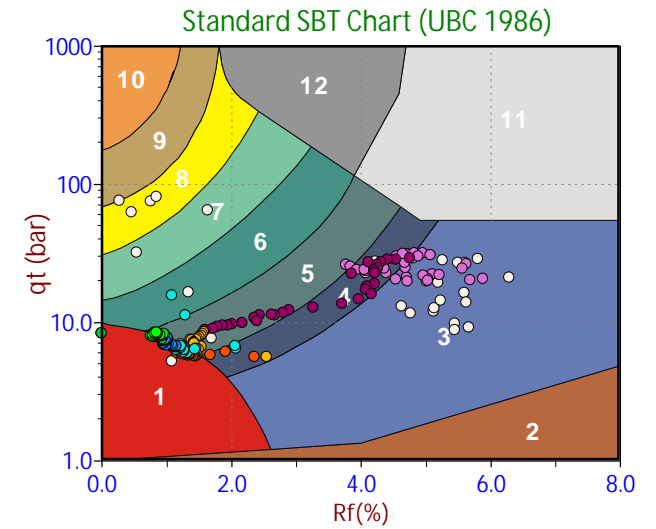
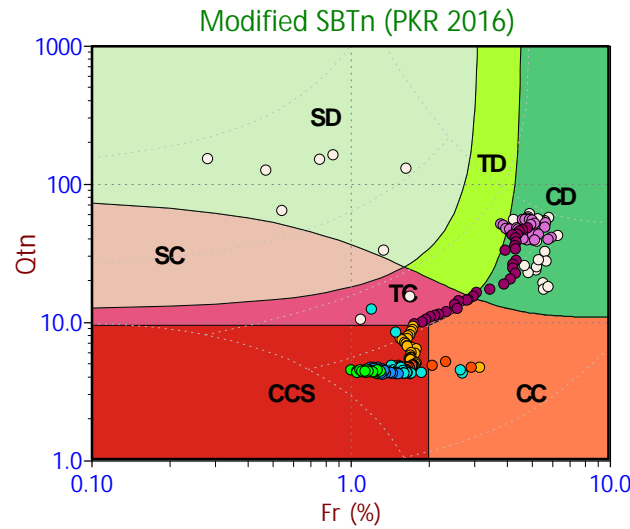
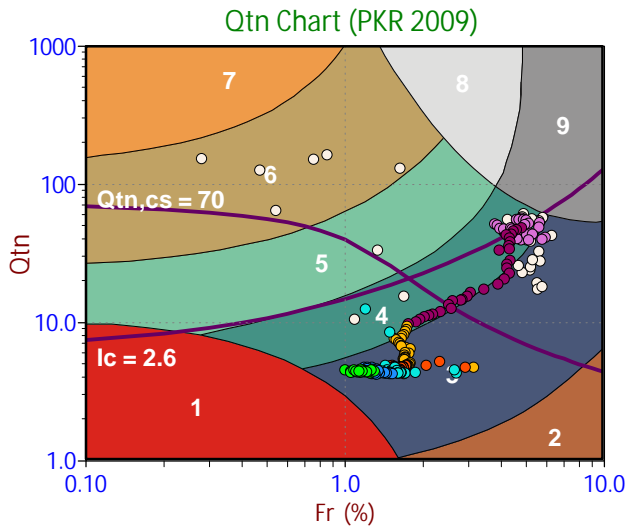
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

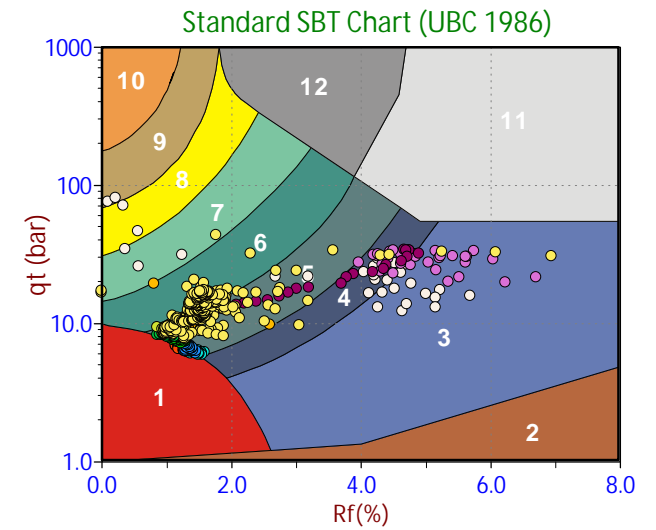
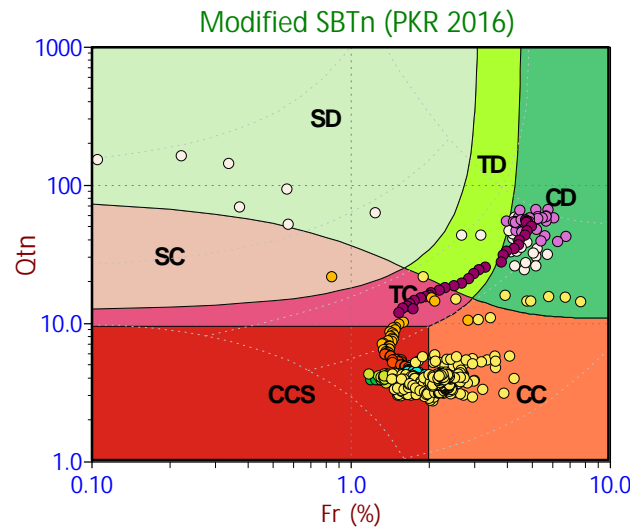
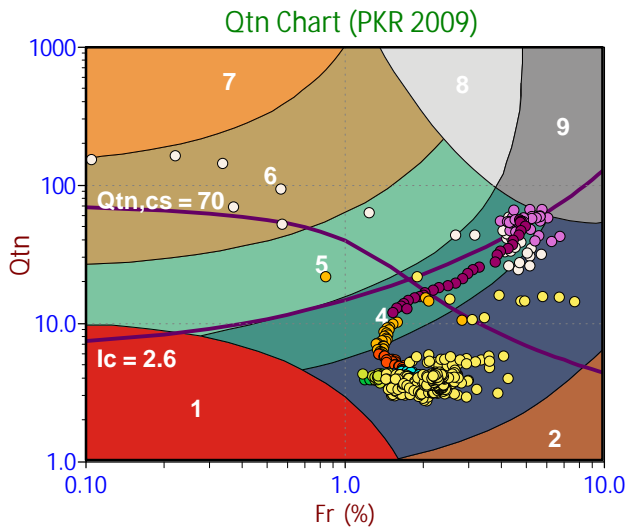
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

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- CC (Cont. clay like)
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- SC (Cont. sand like)
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- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
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- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
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- Cemented Sand



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

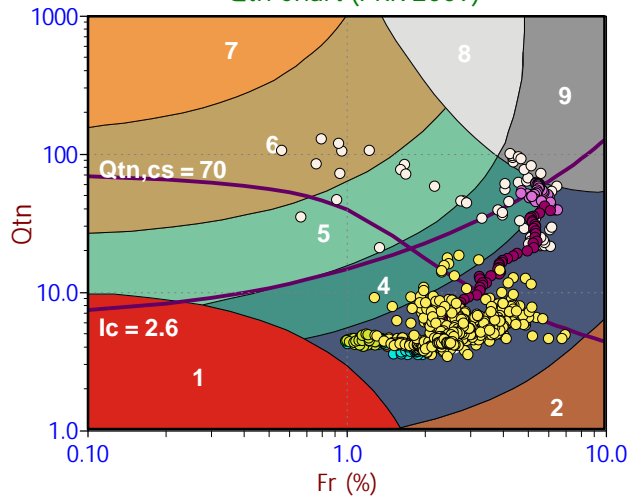
#### Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

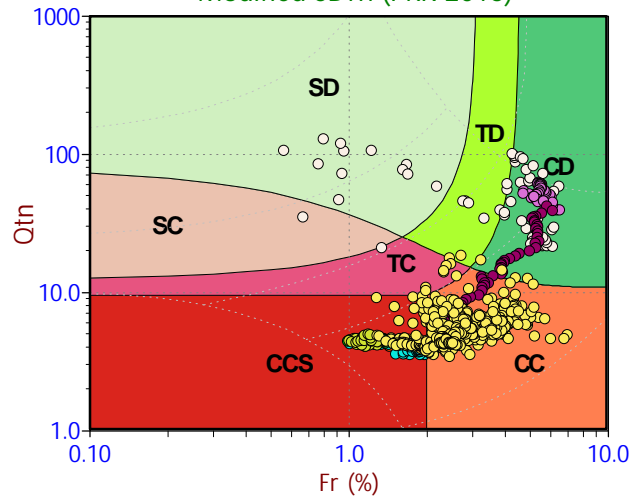
#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

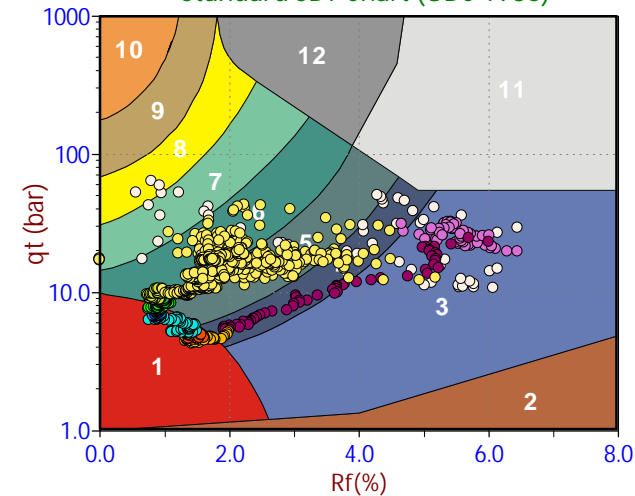
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

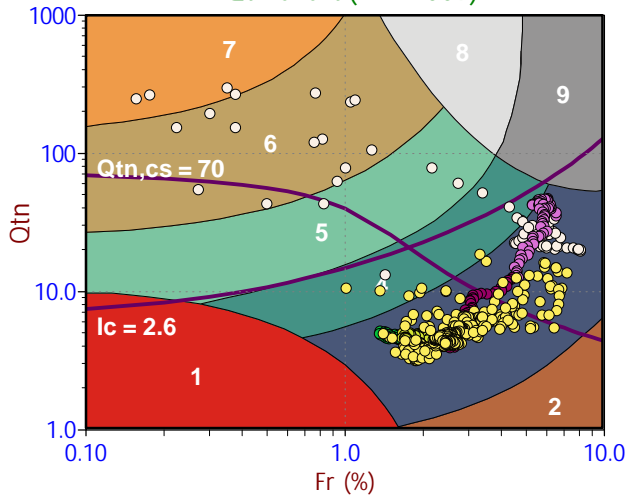
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

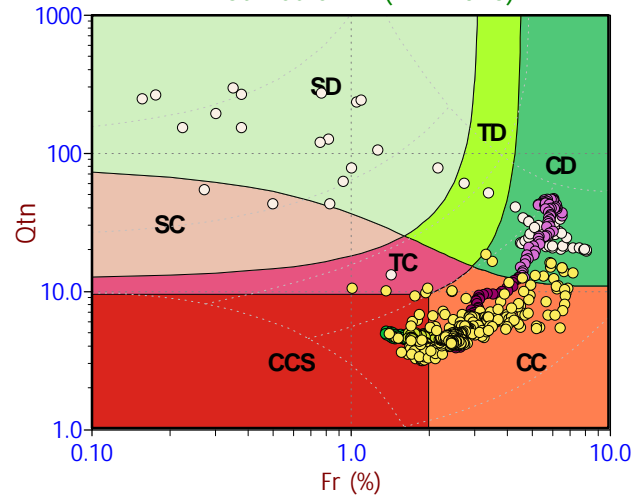
Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

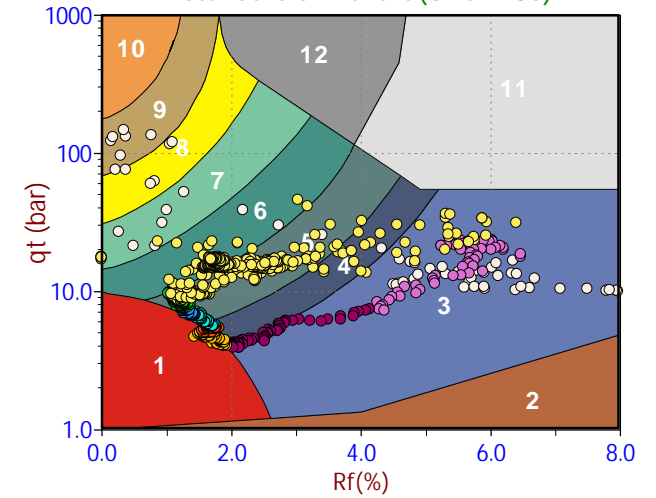
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

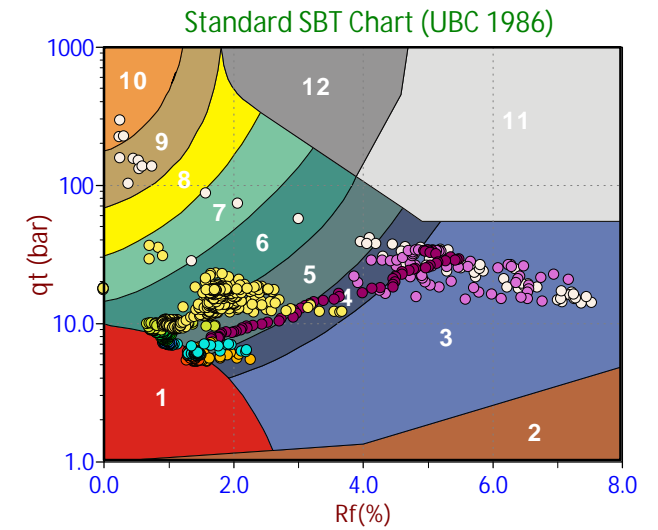
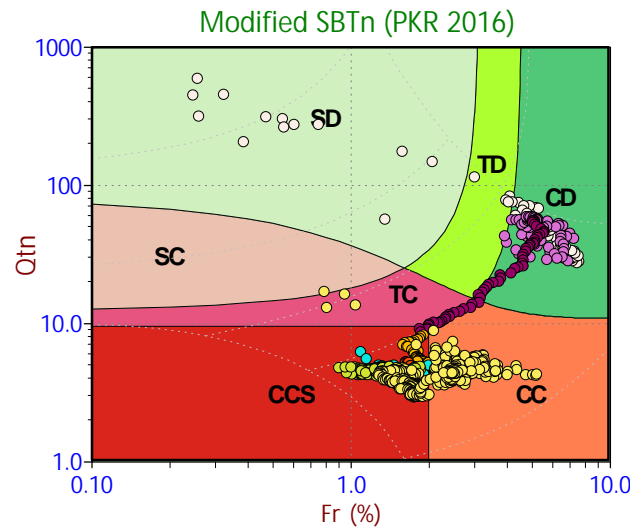
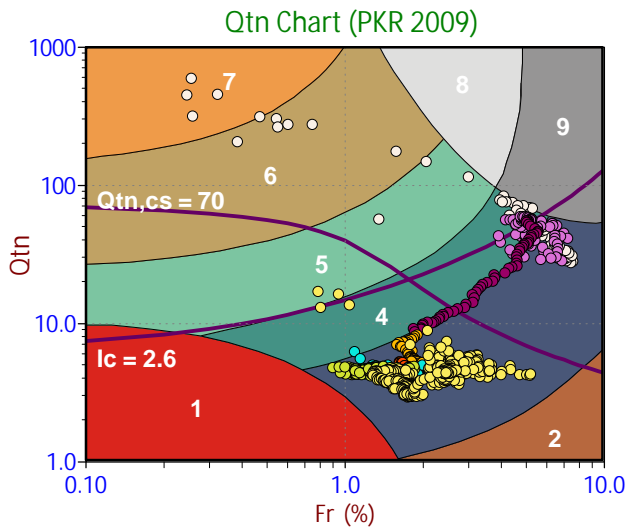
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
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- Sands
- Gravelly Sand to Sand
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Legend

- CCS (Cont. sensitive clay like)
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Legend

- Sensitive Fines
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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

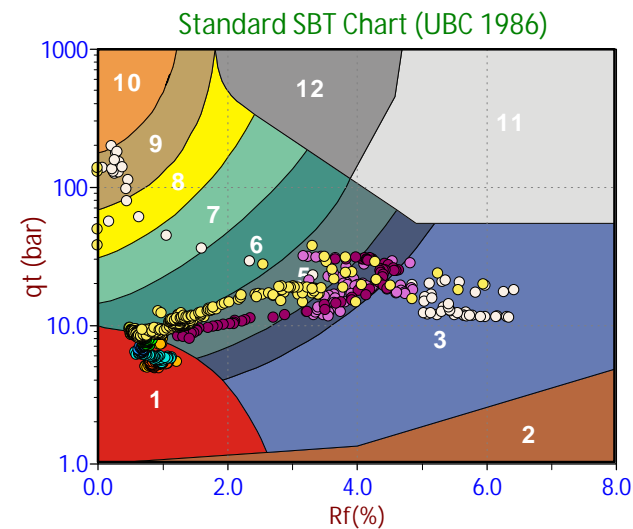
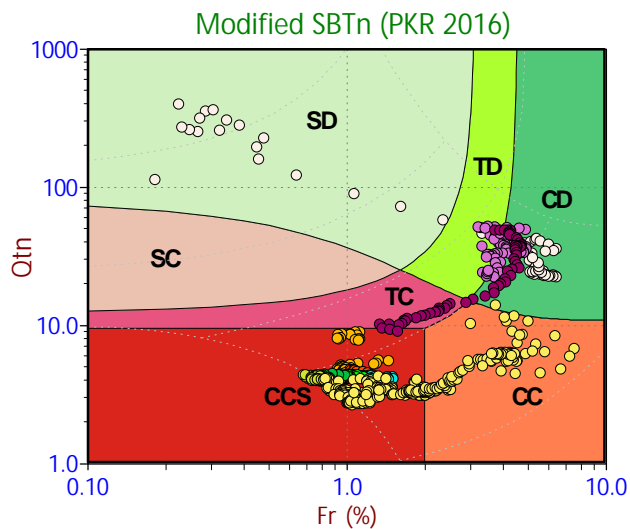
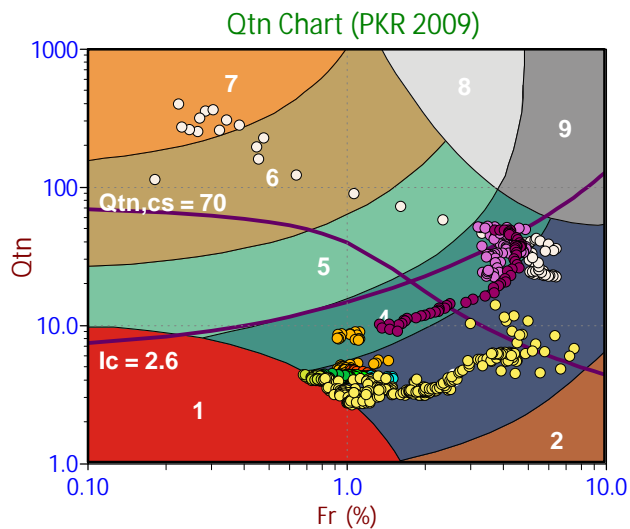
- Sensitive, Fine Grained
- Organic Soils
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Legend

- Sensitive Fines
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- >20.0 to 25.0 ft
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- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
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- Sand Mixtures
- Sands
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- Very Stiff Fine Grained

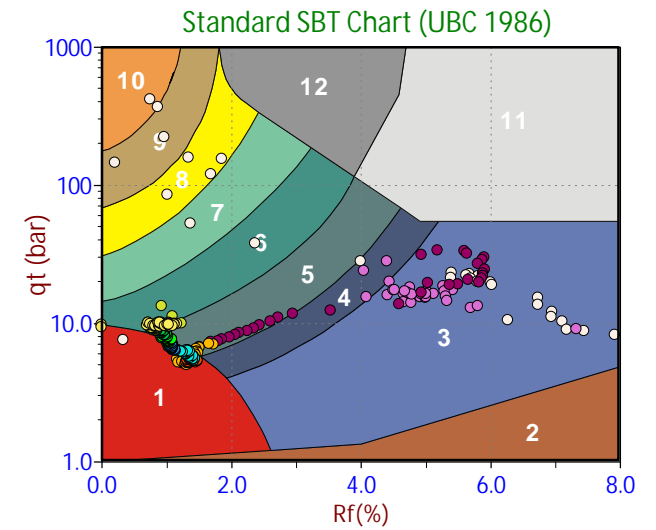
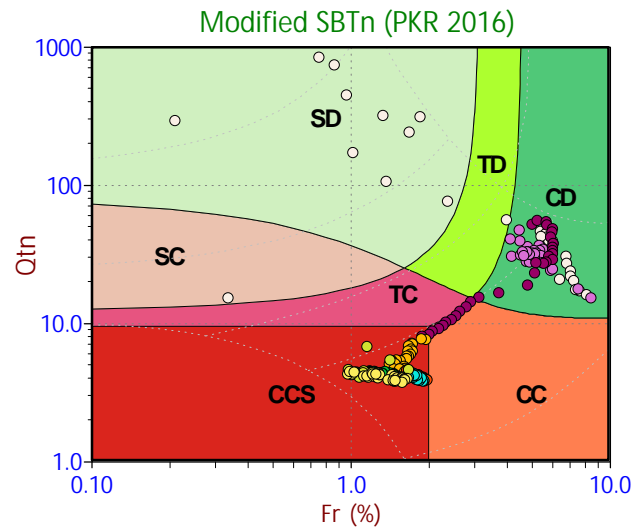
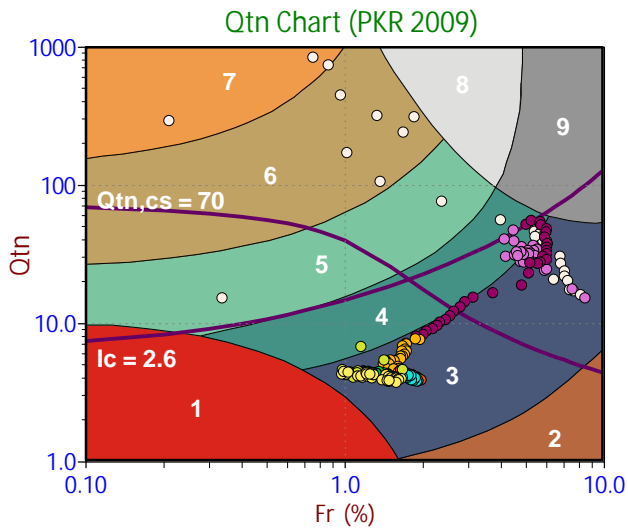
Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
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Legend

- Sensitive Fines
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#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

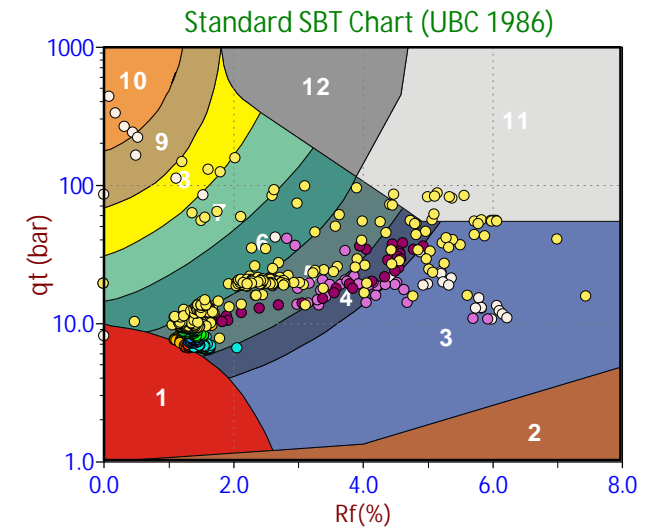
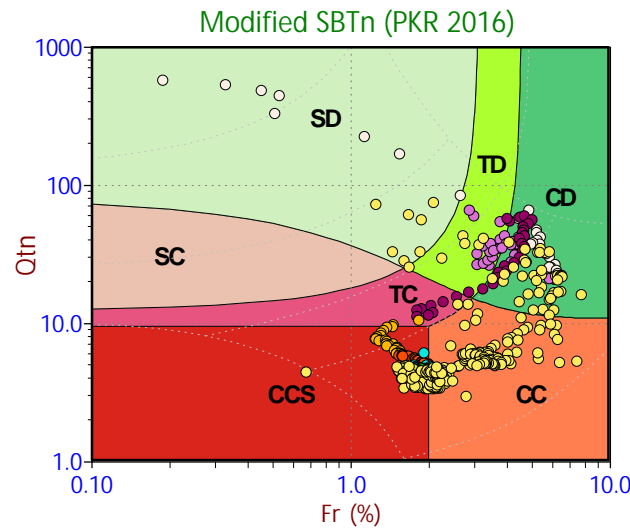
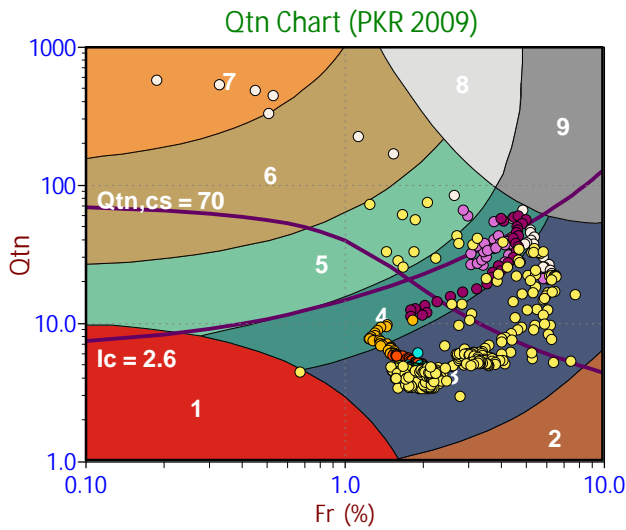
- Sensitive, Fine Grained
- Organic Soils
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- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- CCS (Cont. sensitive clay like)
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- SC (Cont. sand like)
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- TD (Dil. transitional)
- SD (Dil. sand like)

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
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- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
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Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
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- Sand
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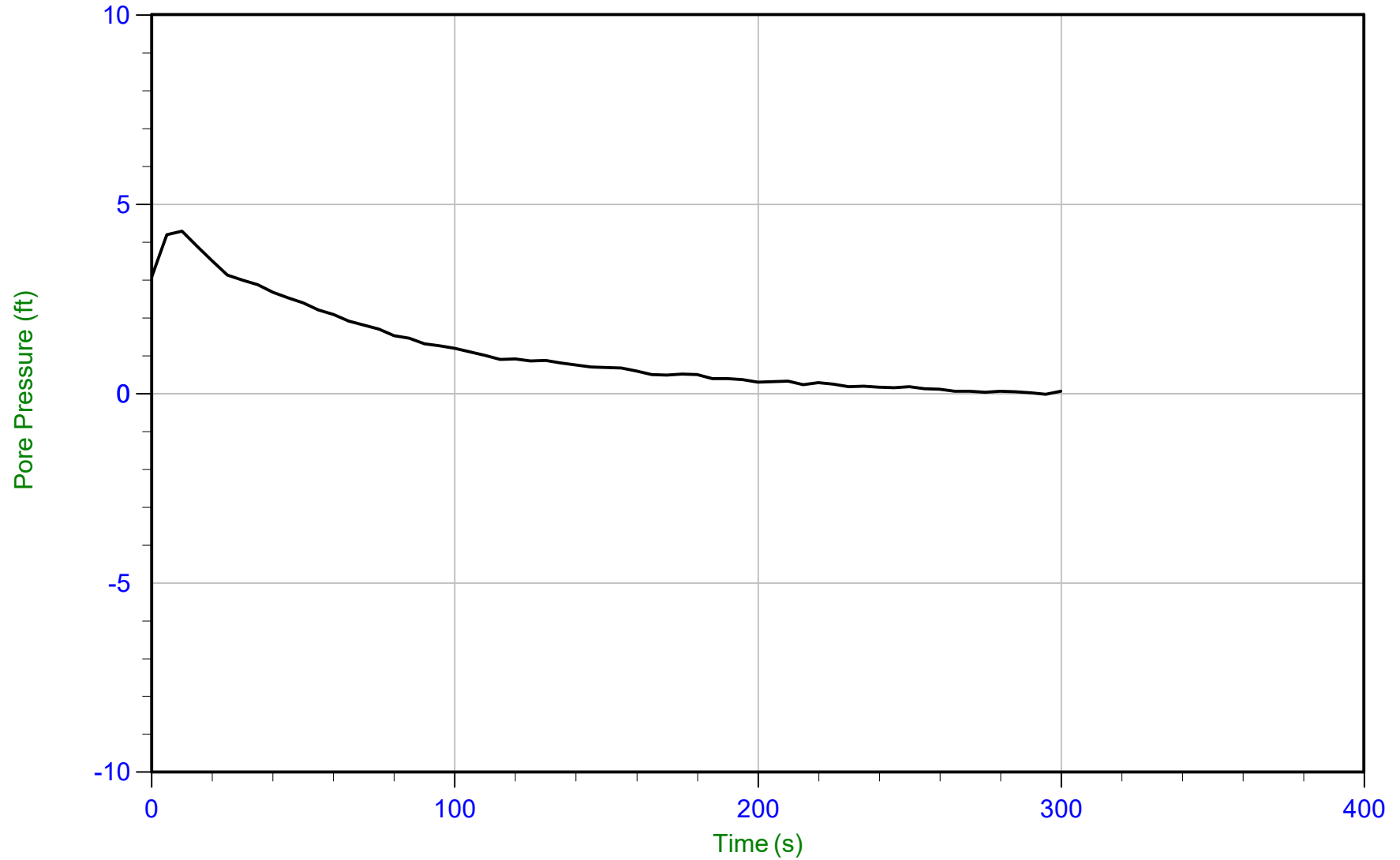
## **APPENDIX I2 – PPD TEST RESULTS**



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 300.0 s

u Min: -0.0 ft  
u Max: 4.3 ft  
u Final: 0.1 ft

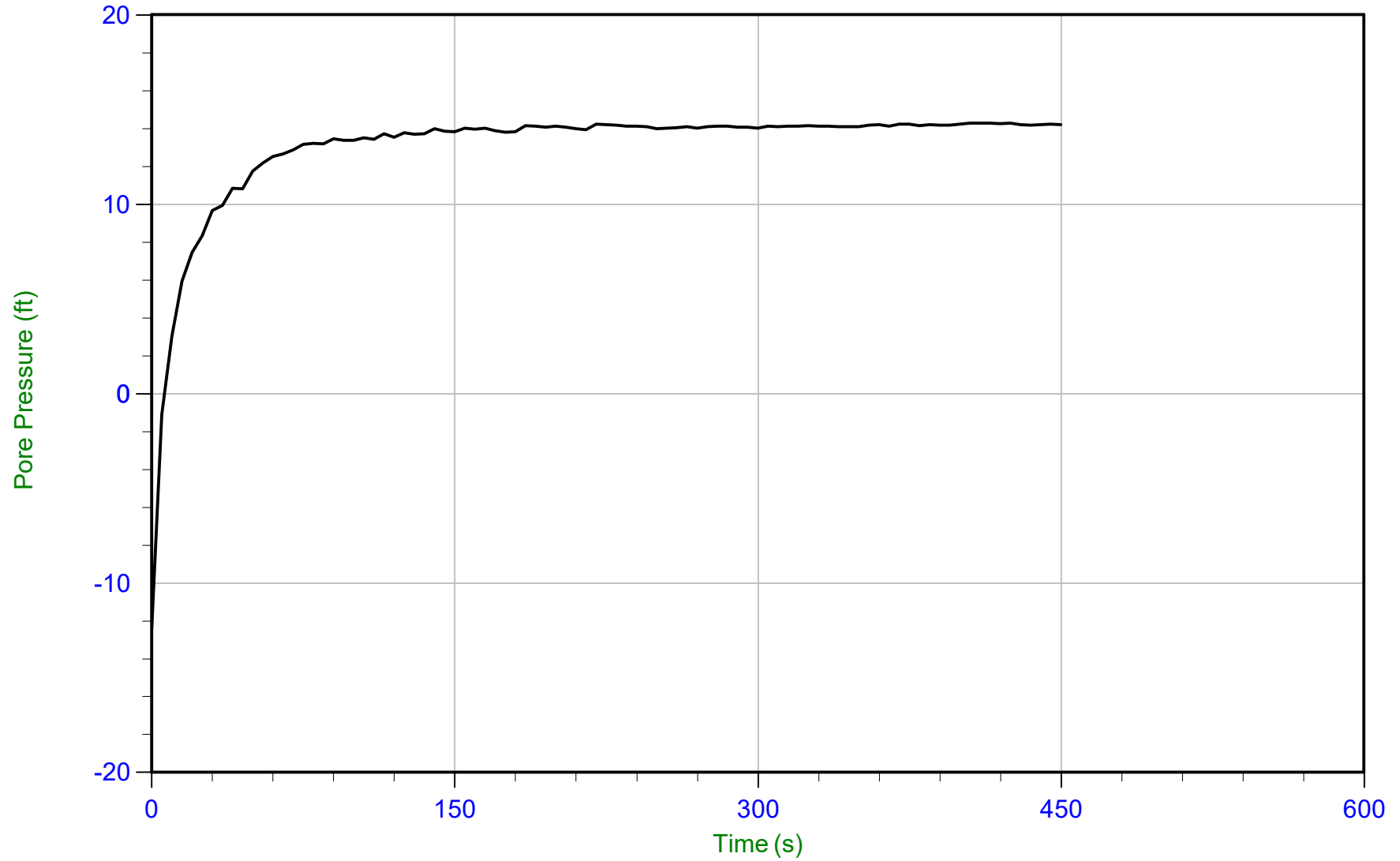
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 2.775 m / 9.104 ft  
Duration: 450.0 s

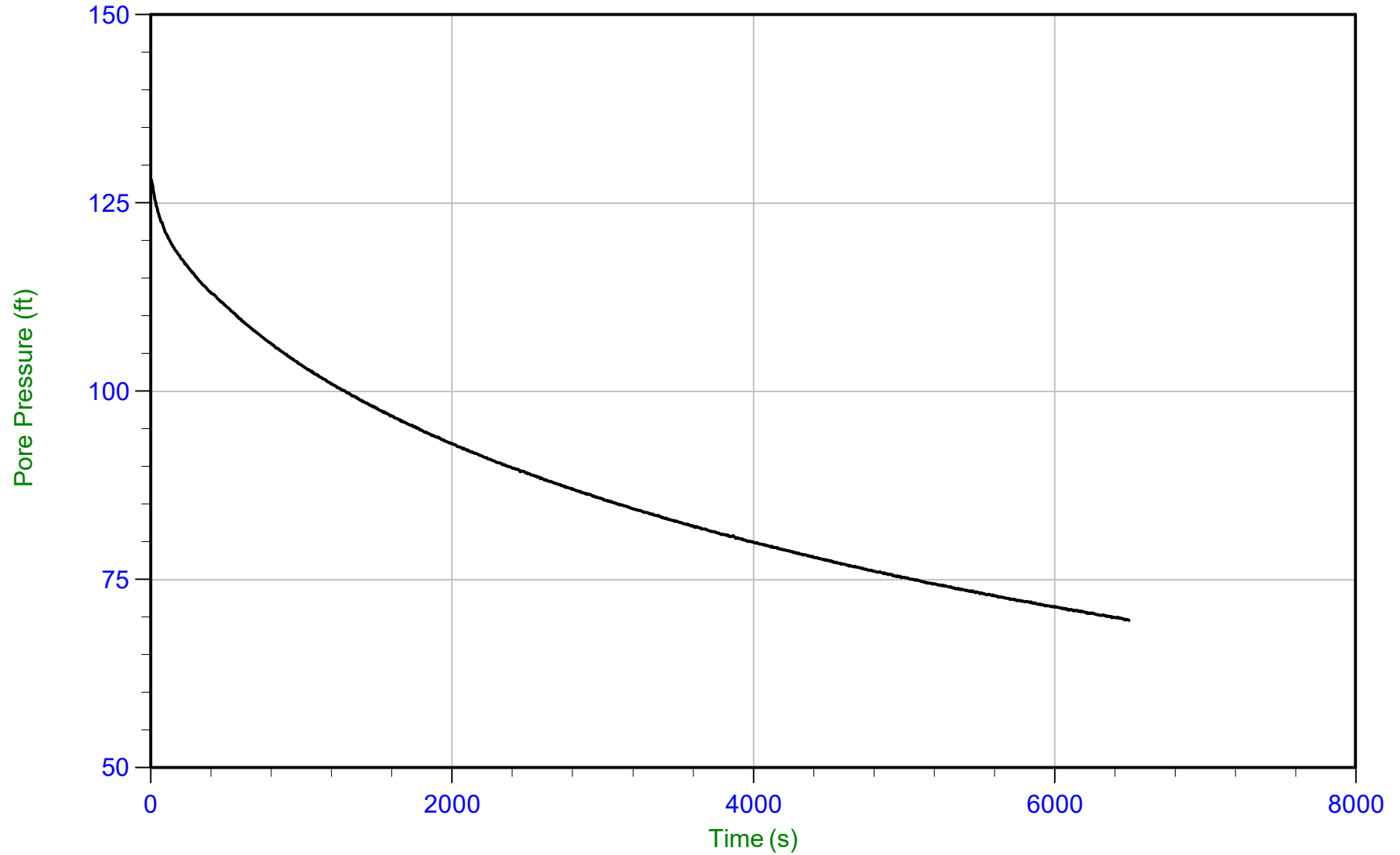
u Min: -12.5 ft  
u Max: 14.3 ft  
u Final: 14.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 6500.0 s

u Min: 69.6 ft  
u Max: 128.1 ft  
u Final: 69.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 13.1 ft  
U(50): 70.62 ft

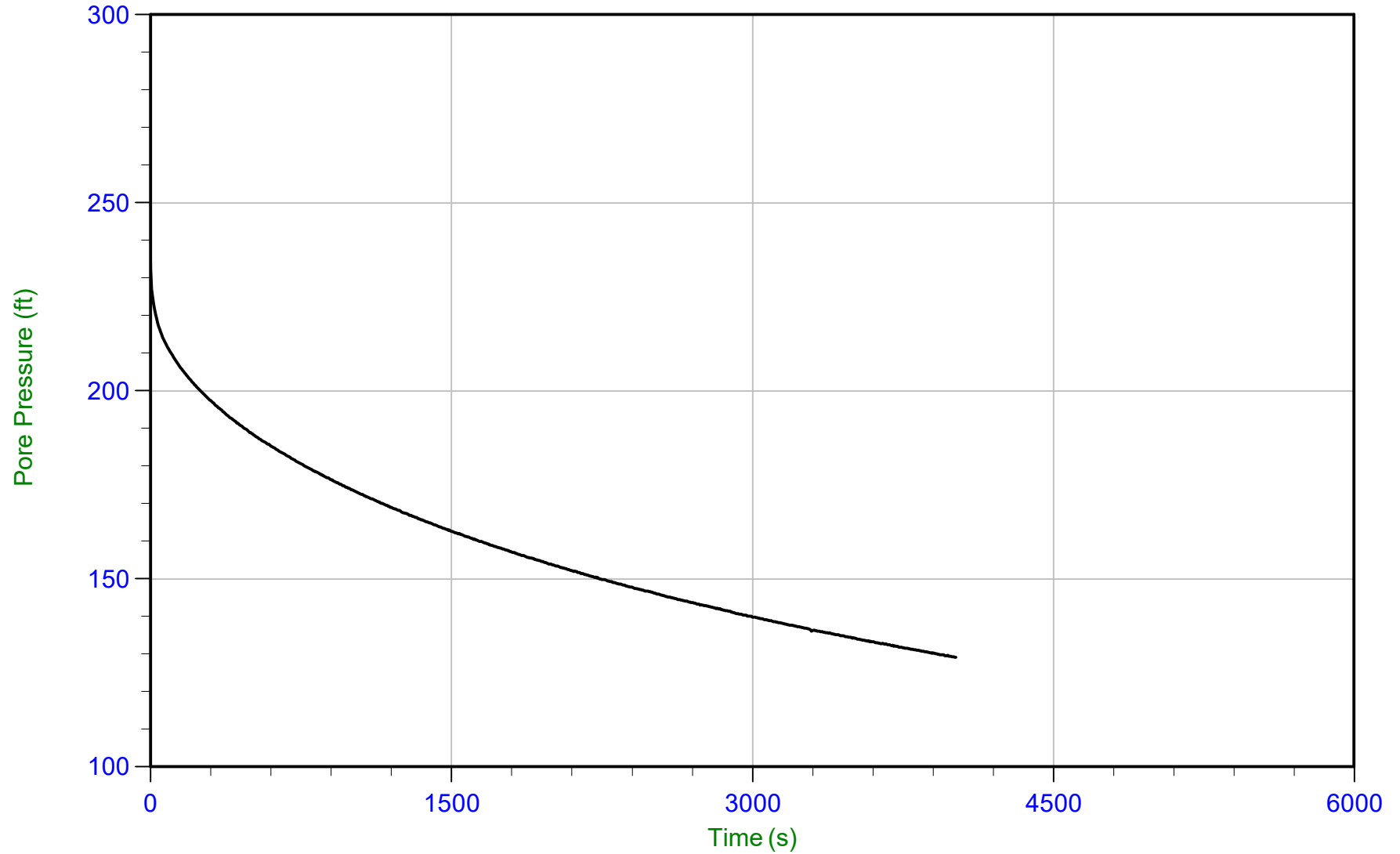
T(50): 6203.4 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 4015.0 s

u Min: 129.2 ft  
u Max: 234.0 ft  
u Final: 129.2 ft

WT: 4.572 m / 15.000 ft  
Ueq: 33.1 ft  
U(50): 133.60 ft

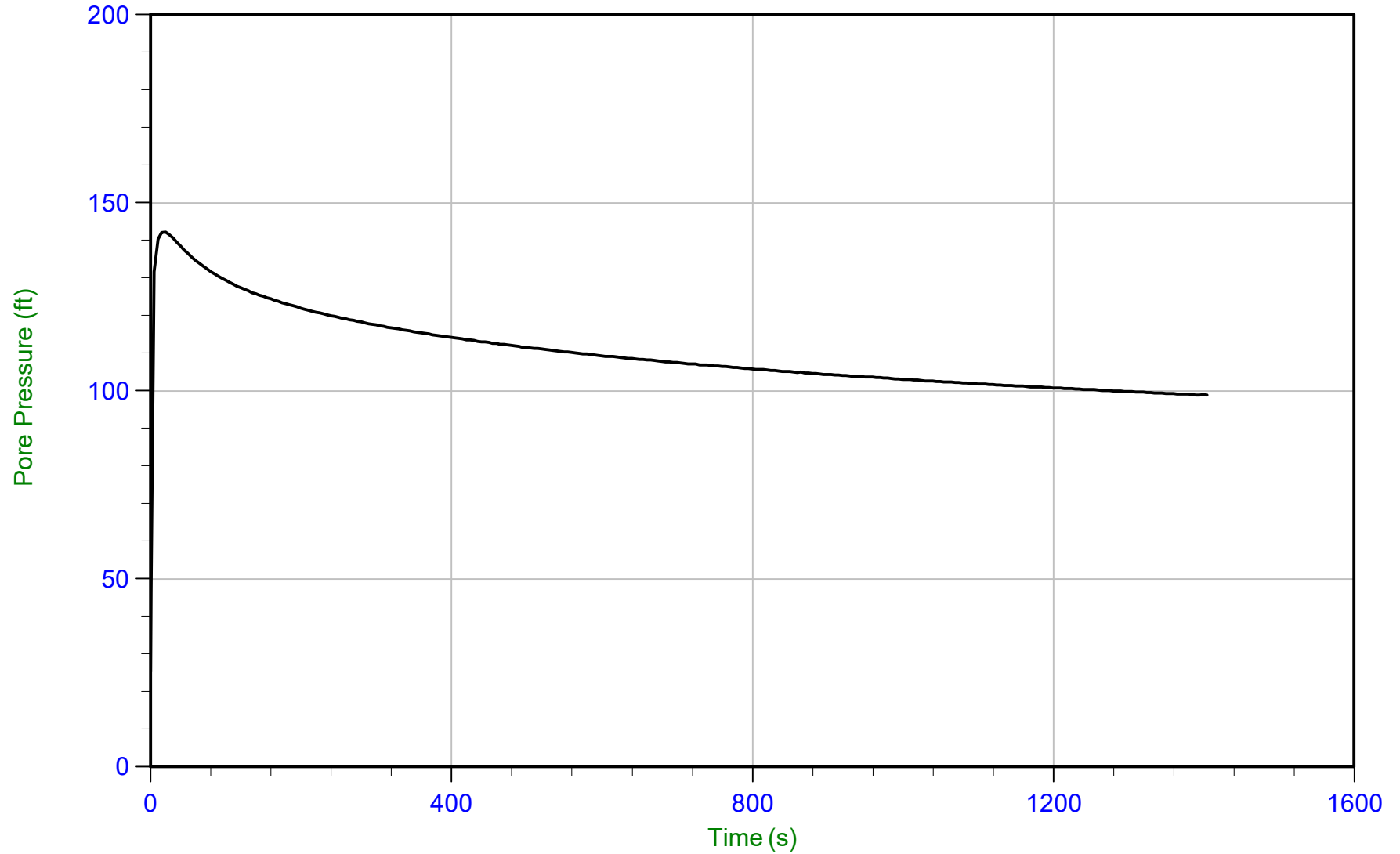
T(50): 3564.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 19.975 m / 65.534 ft  
Duration: 1405.0 s

u Min: 25.2 ft  
u Max: 142.2 ft  
u Final: 98.9 ft

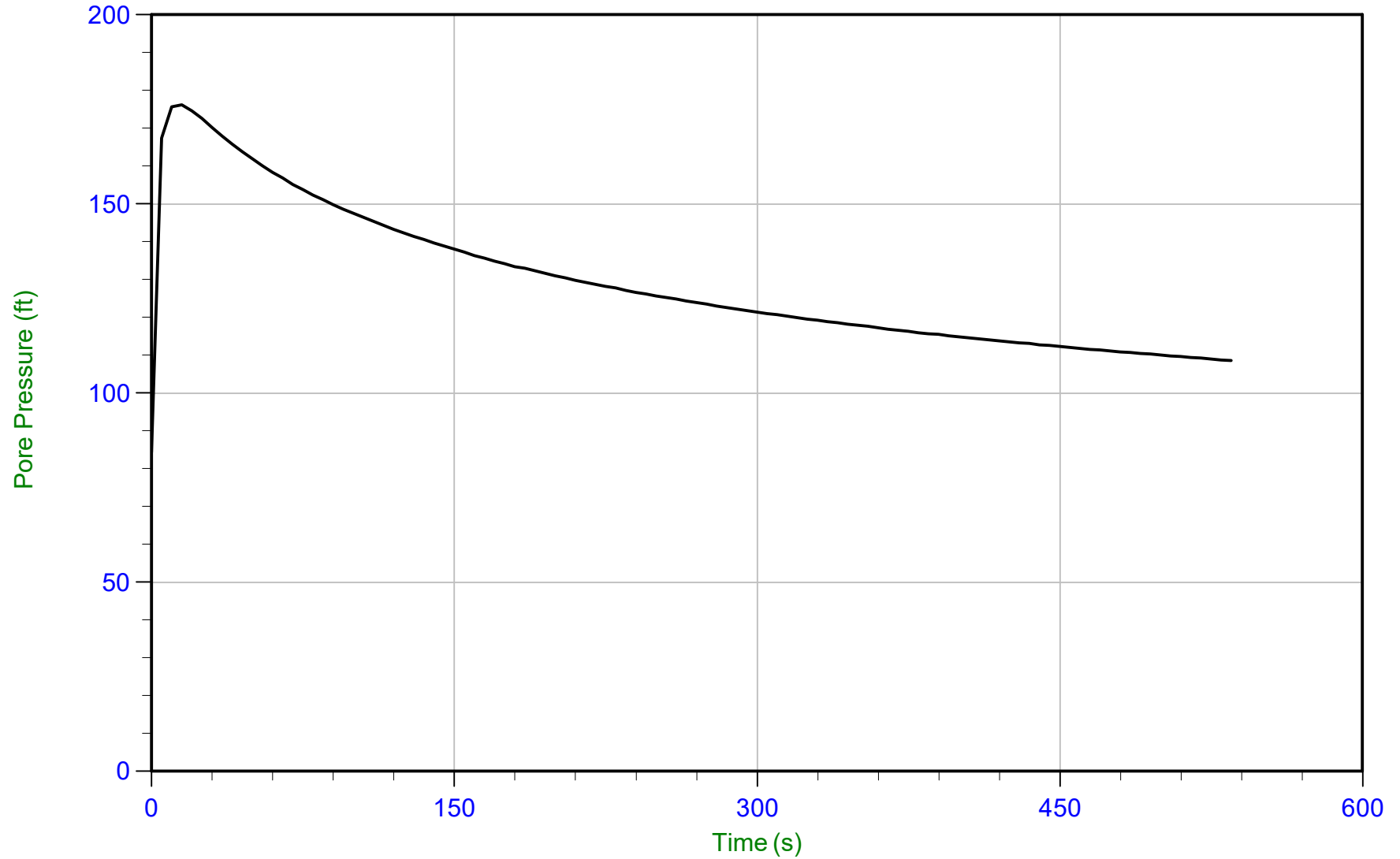




Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 20.775 m / 68.159 ft  
Duration: 535.0 s

u Min: 84.4 ft  
u Max: 176.2 ft  
u Final: 108.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 53.2 ft  
U(50): 114.66 ft

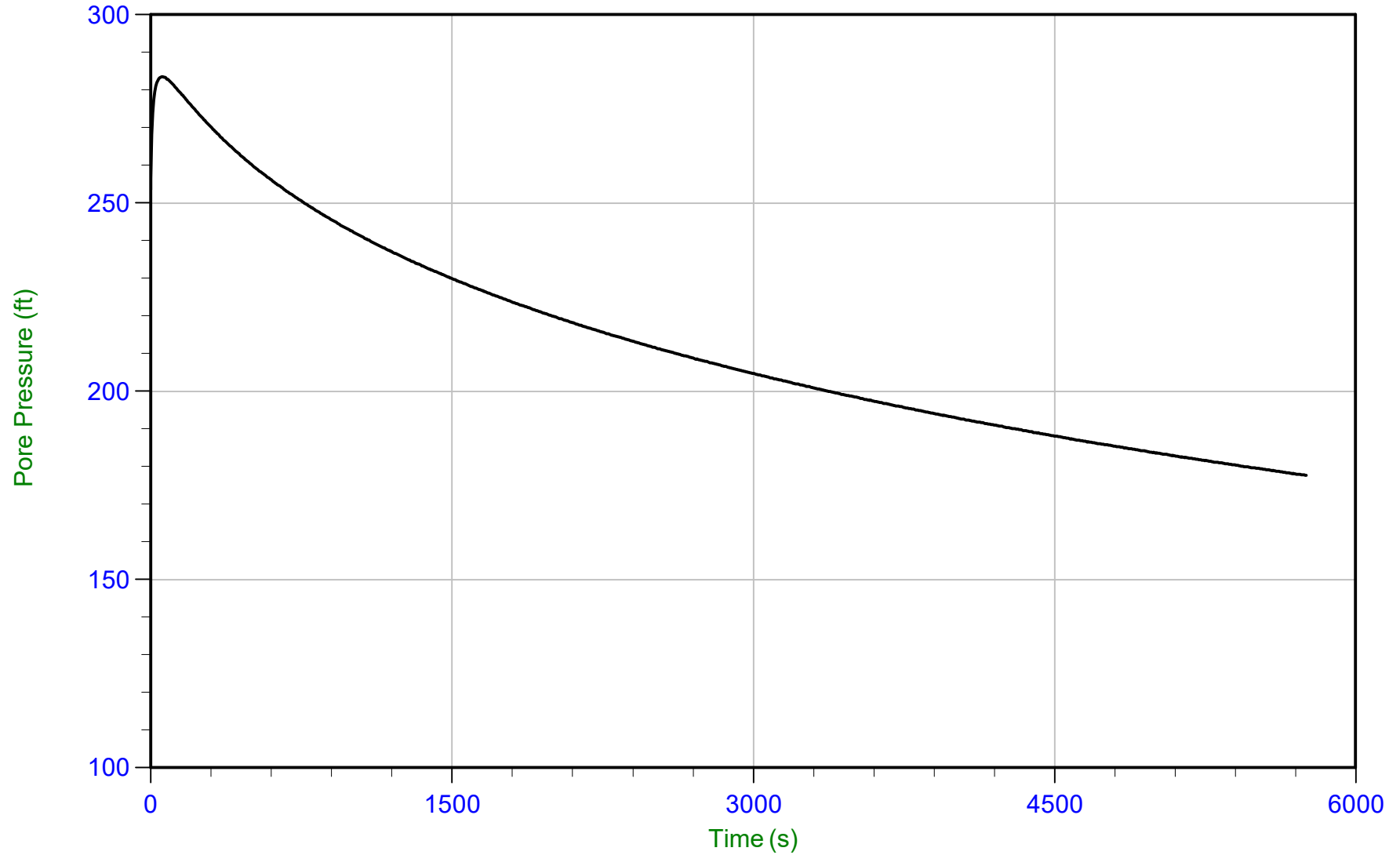
T(50): 389.0 s  
lr: 100  
Ch: 1.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 5755.0 s

u Min: 177.6 ft  
u Max: 283.6 ft  
u Final: 177.6 ft

WT: 4.572 m / 15.000 ft  
Ueq: 73.1 ft  
U(50): 178.34 ft

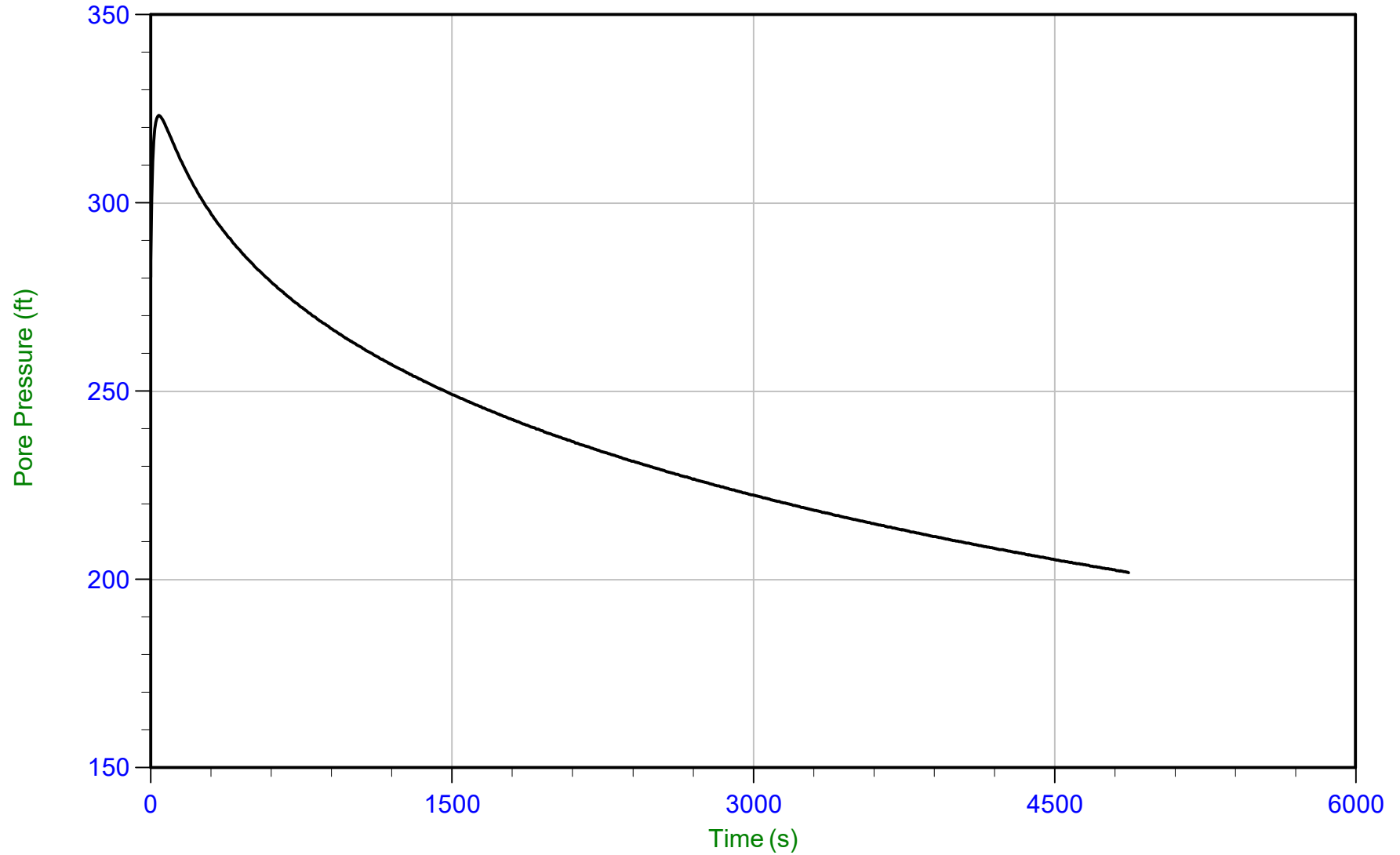
T(50): 5600.8 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 08:28  
Site: DTE Belle River Power Plant

Sounding: CPT20-01B  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP01B.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4870.0 s

u Min: 201.9 ft  
u Max: 323.3 ft  
u Final: 201.9 ft

WT: 4.572 m / 15.000 ft  
Ueq: 83.1 ft  
U(50): 203.21 ft

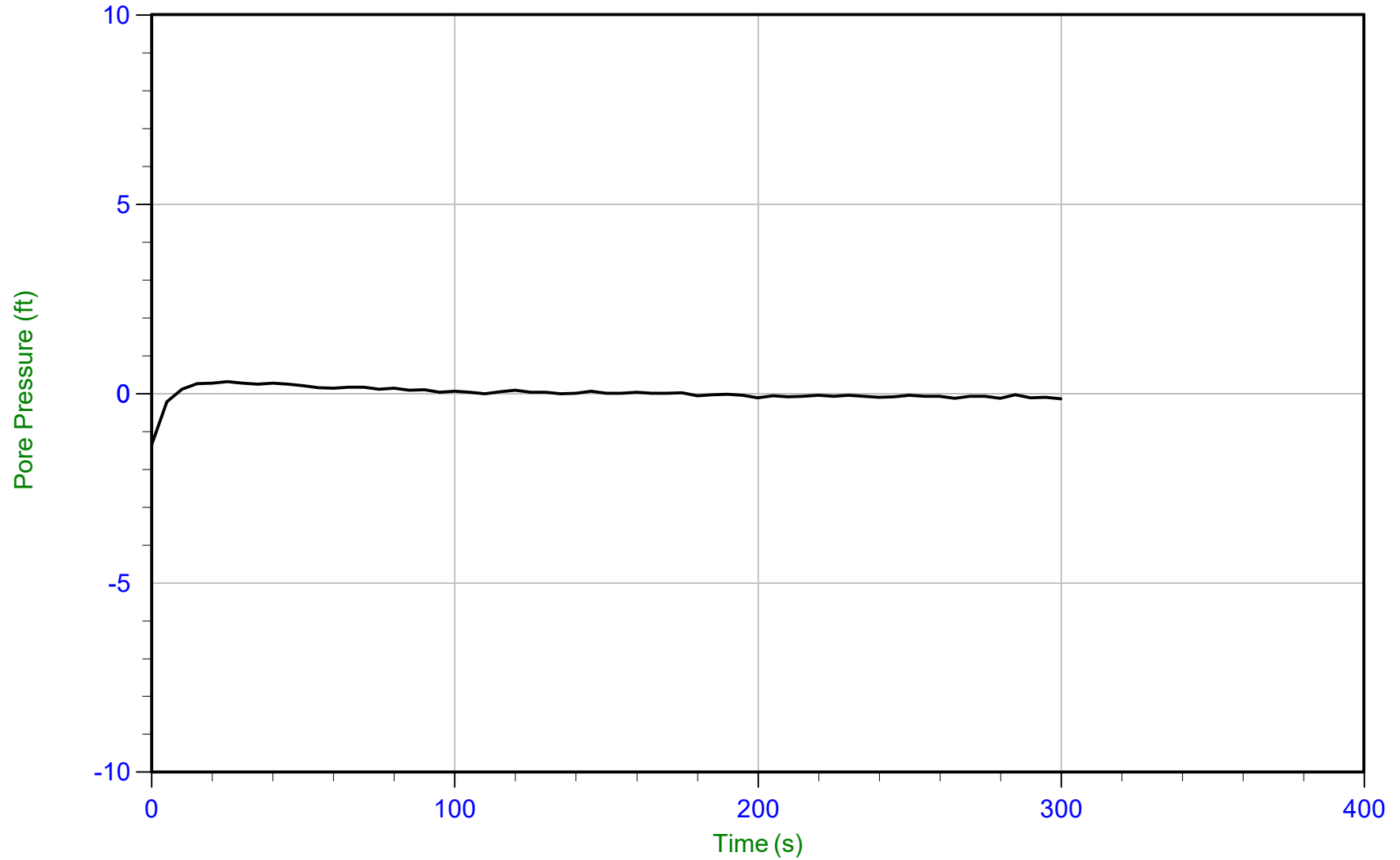
T(50): 4686.3 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 3.100 m / 10.170 ft  
Duration: 300.0 s

u Min: -1.4 ft  
u Max: 0.3 ft  
u Final: -0.1 ft

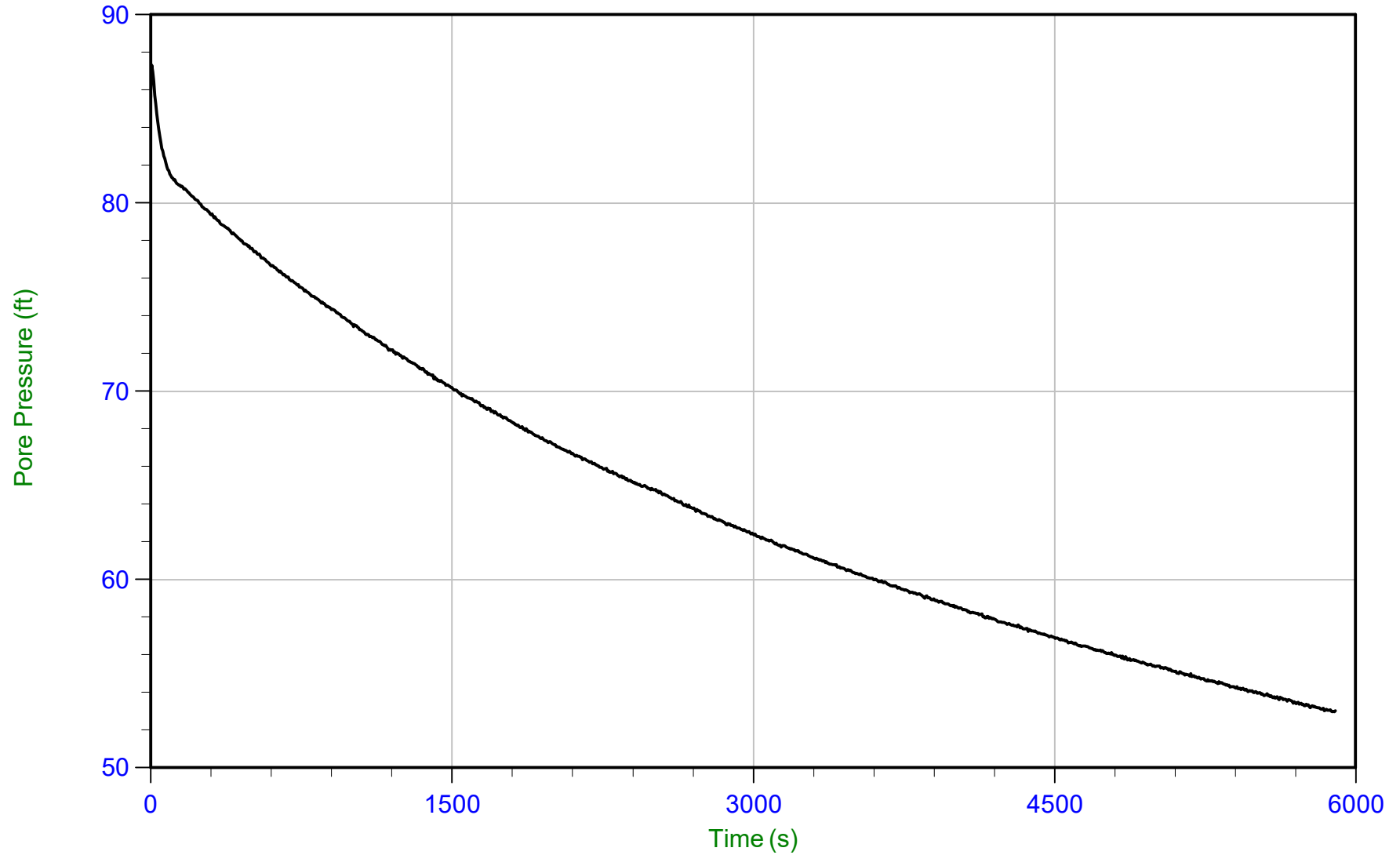
WT: 3.100 m / 10.170 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 6.150 m / 20.177 ft  
Duration: 5900.0 s

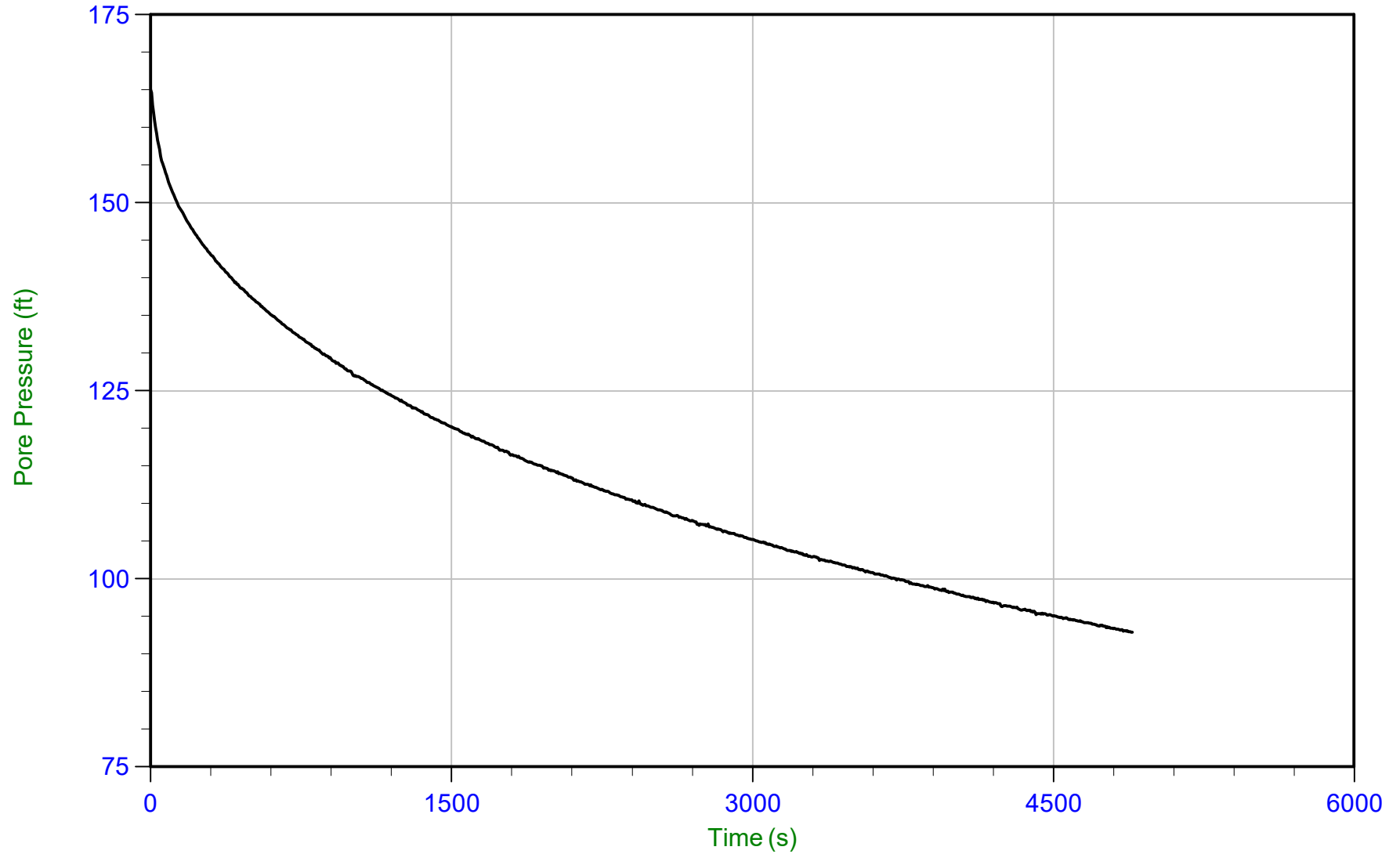
u Min: 53.0 ft  
u Max: 87.3 ft  
u Final: 53.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 11.325 m / 37.155 ft  
Duration: 4895.0 s

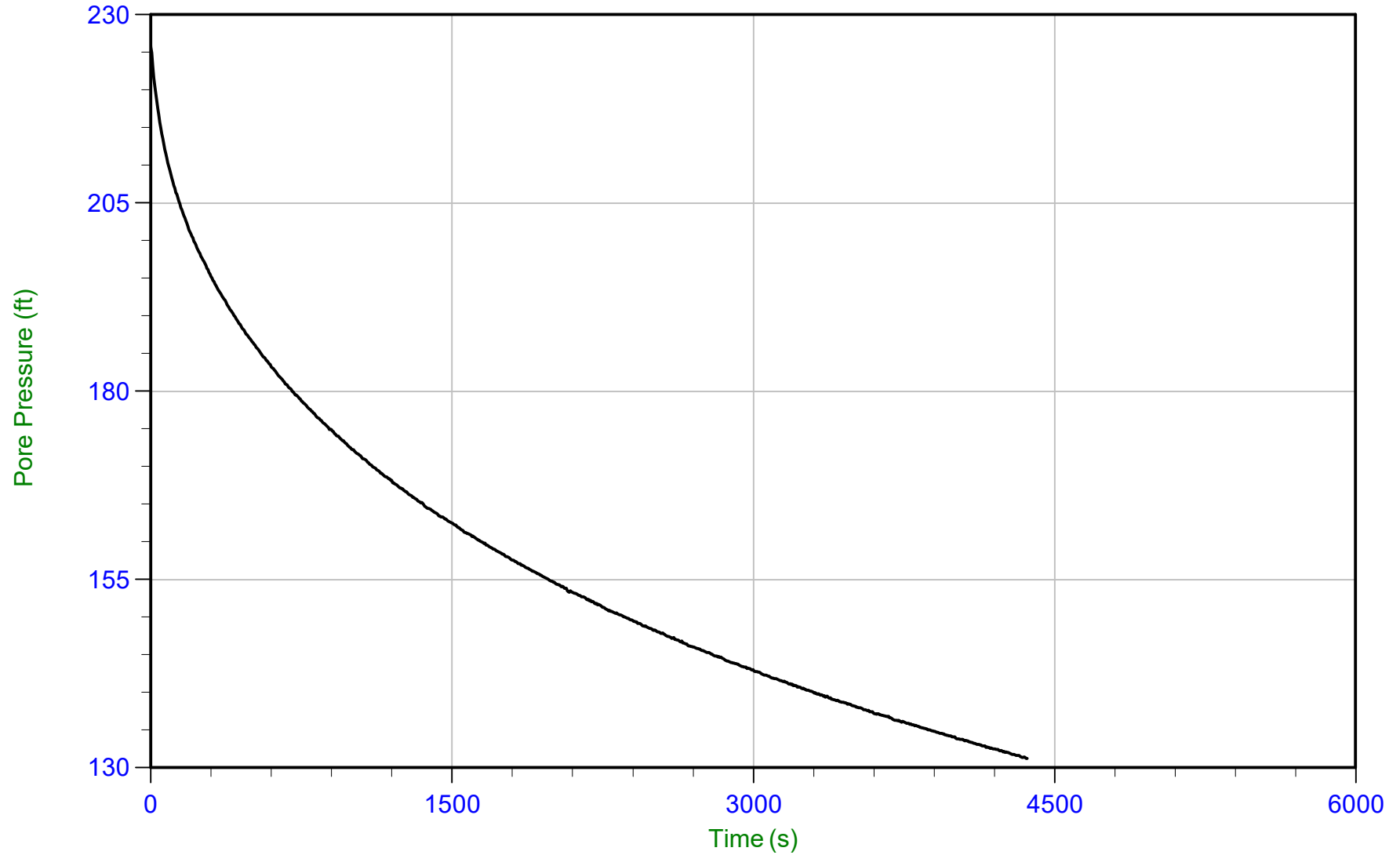
u Min: 92.9 ft  
u Max: 165.1 ft  
u Final: 92.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 17.725 m / 58.152 ft  
Duration: 4365.0 s

u Min: 131.3 ft  
u Max: 225.8 ft  
u Final: 131.3 ft

WT: 5.486 m / 17.998 ft  
Ueq: 40.2 ft  
U(50): 133.00 ft

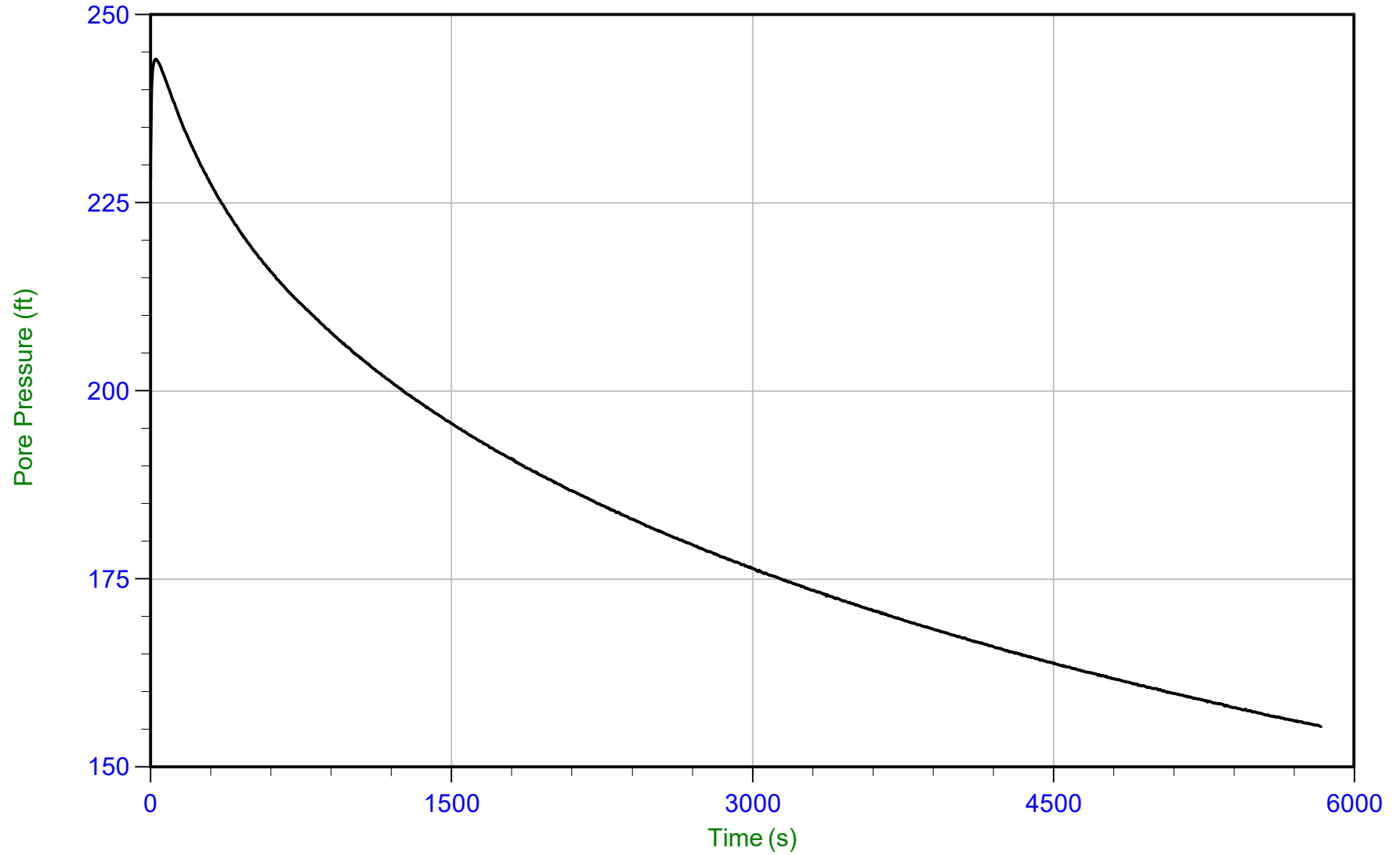
T(50): 4136.3 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 24.425 m / 80.134 ft  
Duration: 5835.0 s

u Min: 155.4 ft  
u Max: 244.1 ft  
u Final: 155.4 ft

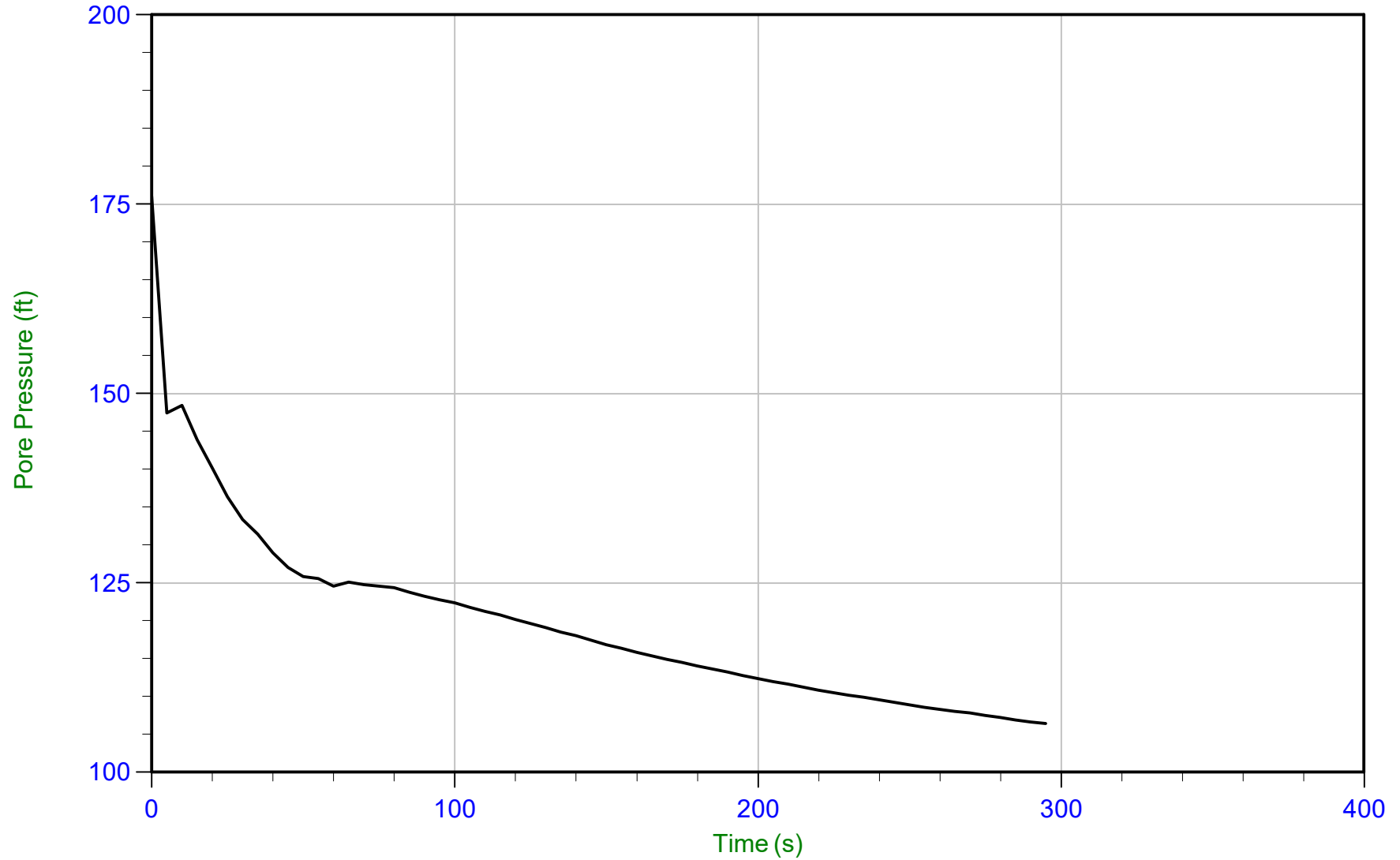




Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.050 m / 82.184 ft  
Duration: 295.0 s

u Min: 106.4 ft  
u Max: 176.0 ft  
u Final: 106.4 ft

WT: 5.486 m / 17.998 ft  
Ueq: 64.2 ft  
U(50): 120.10 ft

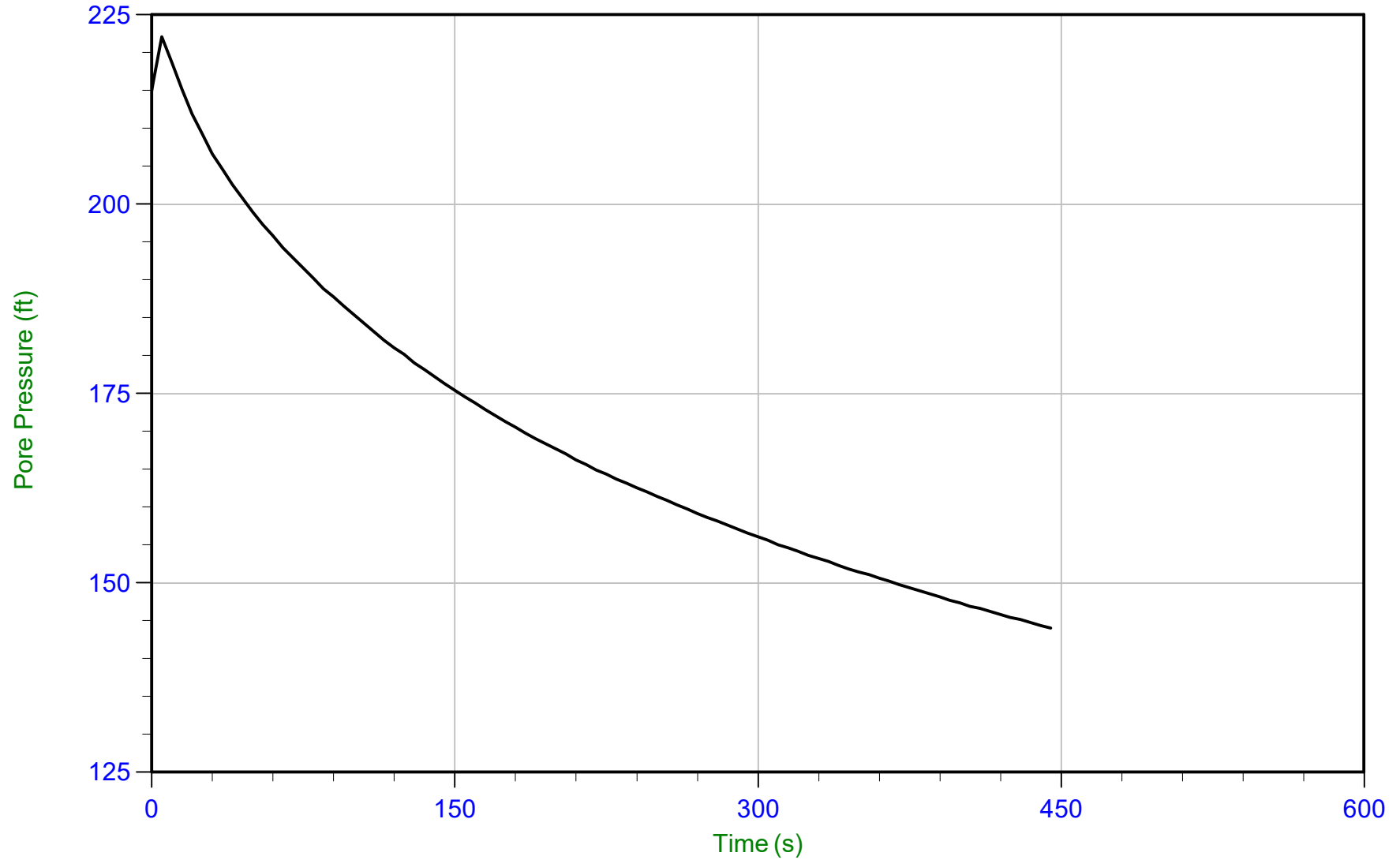
T(50): 120.6 s  
lr: 100  
Ch: 5.8 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 25.700 m / 84.317 ft  
Duration: 445.0 s

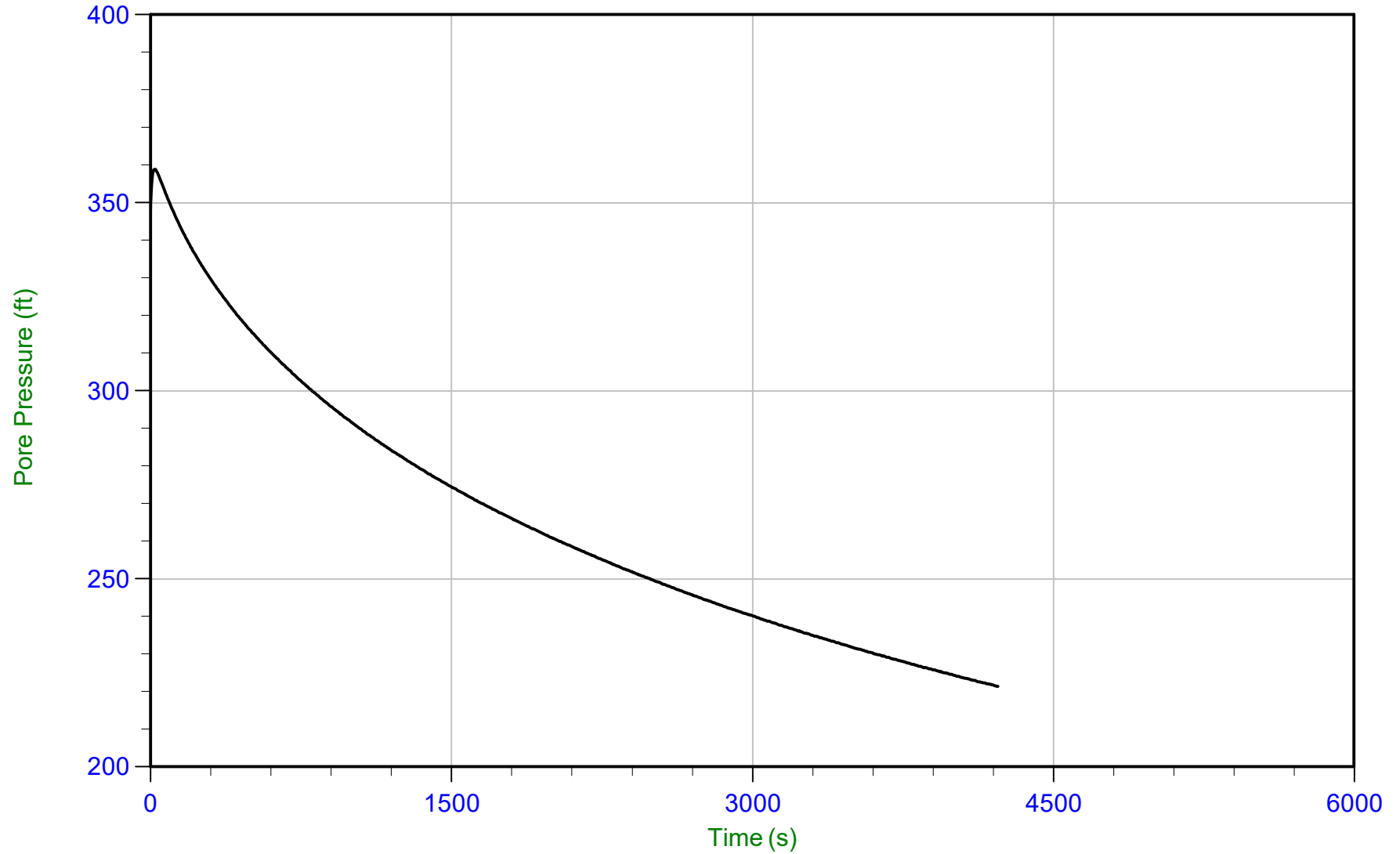
u Min: 144.0 ft  
u Max: 222.1 ft  
u Final: 144.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 14:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-03  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP03.PPF  
Depth: 30.225 m / 99.162 ft  
Duration: 4225.0 s

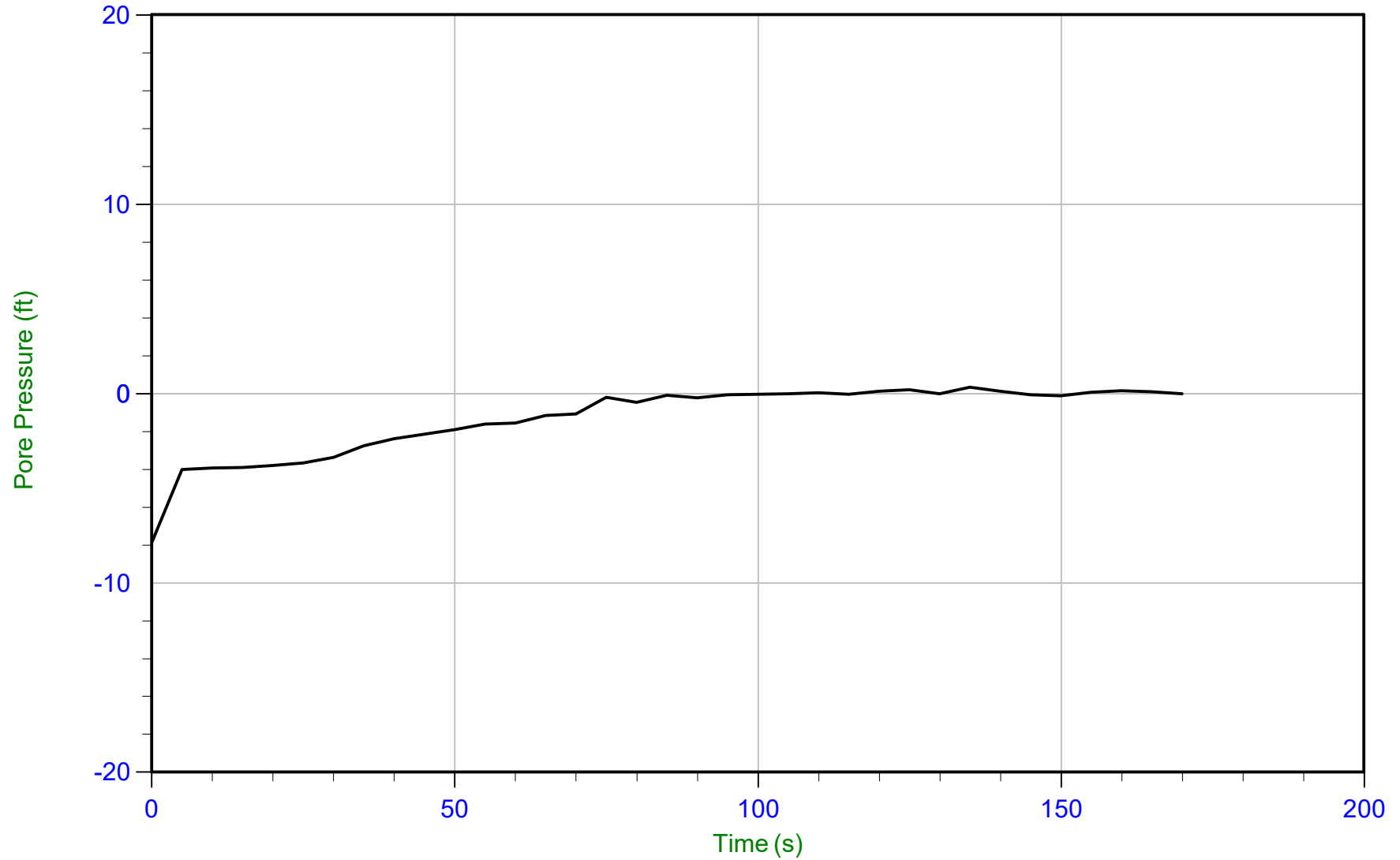
u Min: 221.4 ft  
u Max: 358.9 ft  
u Final: 221.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 0.650 m / 2.133 ft  
Duration: 170.0 s

u Min: -7.9 ft  
u Max: 0.3 ft  
u Final: -0.0 ft

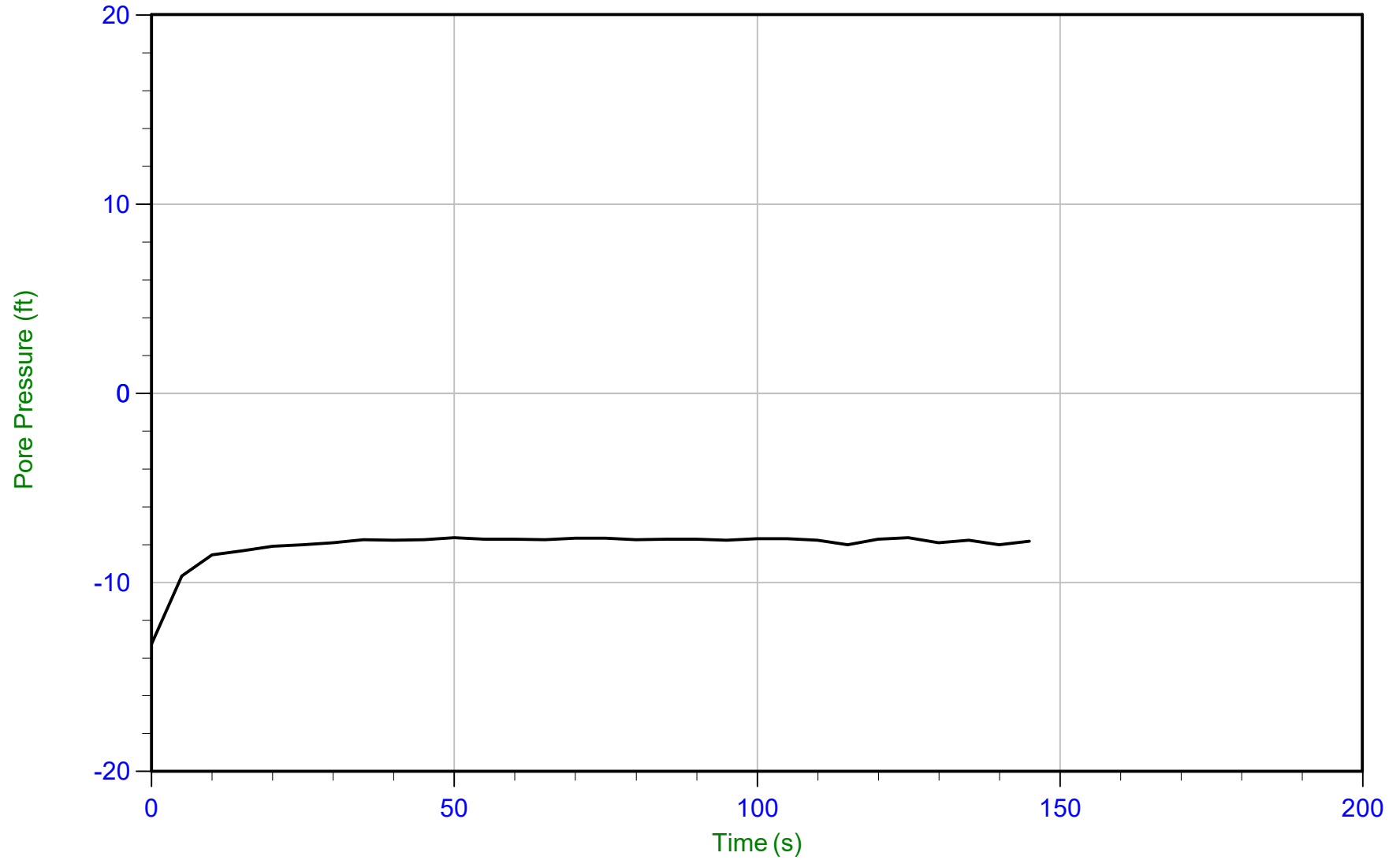
WT: 0.650 m / 2.133 ft  
Ueq: 0.0 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 2.475 m / 8.120 ft  
Duration: 145.0 s

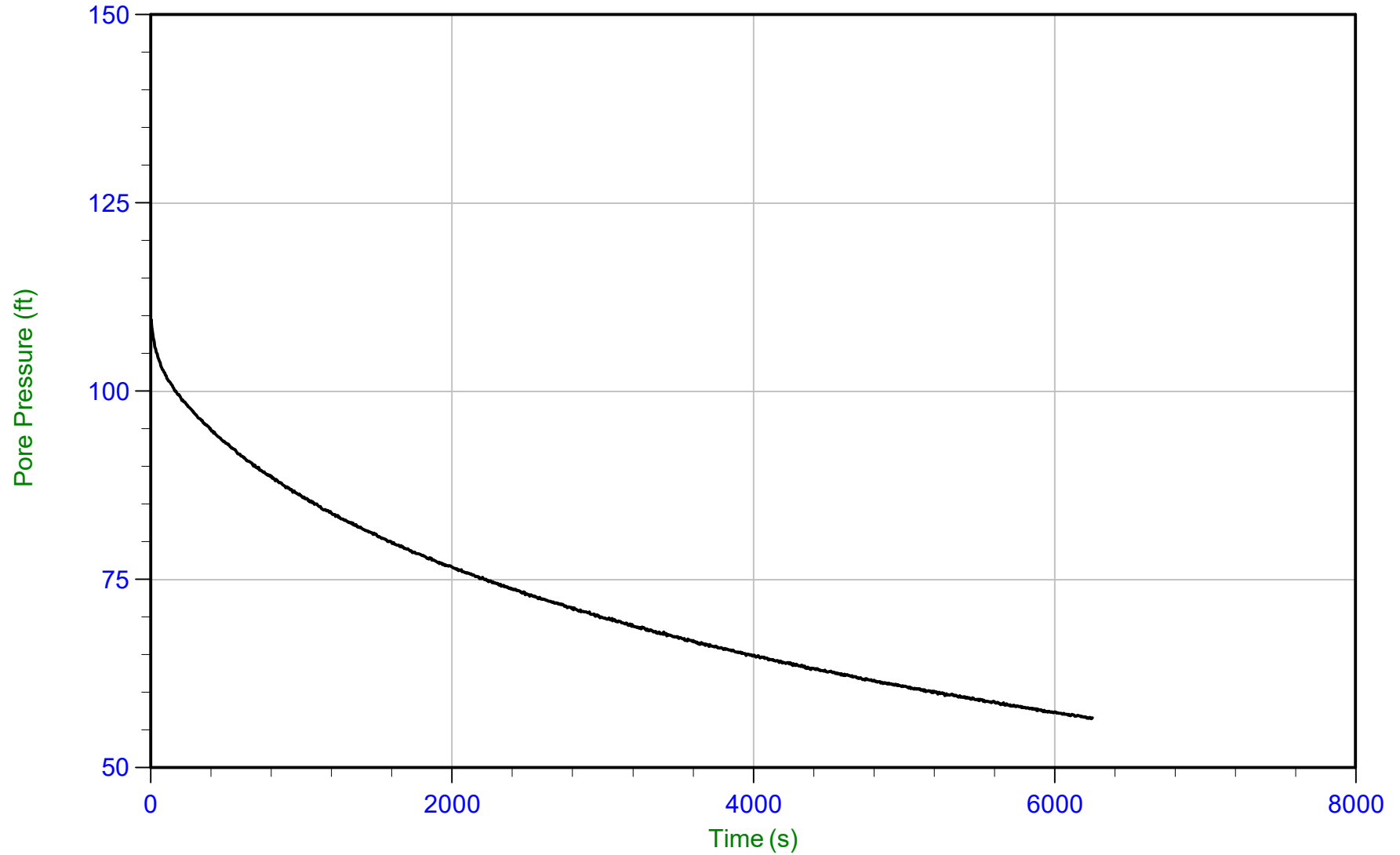
u Min: -13.3 ft  
u Max: -7.6 ft  
u Final: -7.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 5.850 m / 19.193 ft  
Duration: 6255.0 s

u Min: 56.5 ft  
u Max: 109.5 ft  
u Final: 56.6 ft

WT: 4.267 m / 13.999 ft  
Ueq: 5.2 ft  
U(50): 57.33 ft

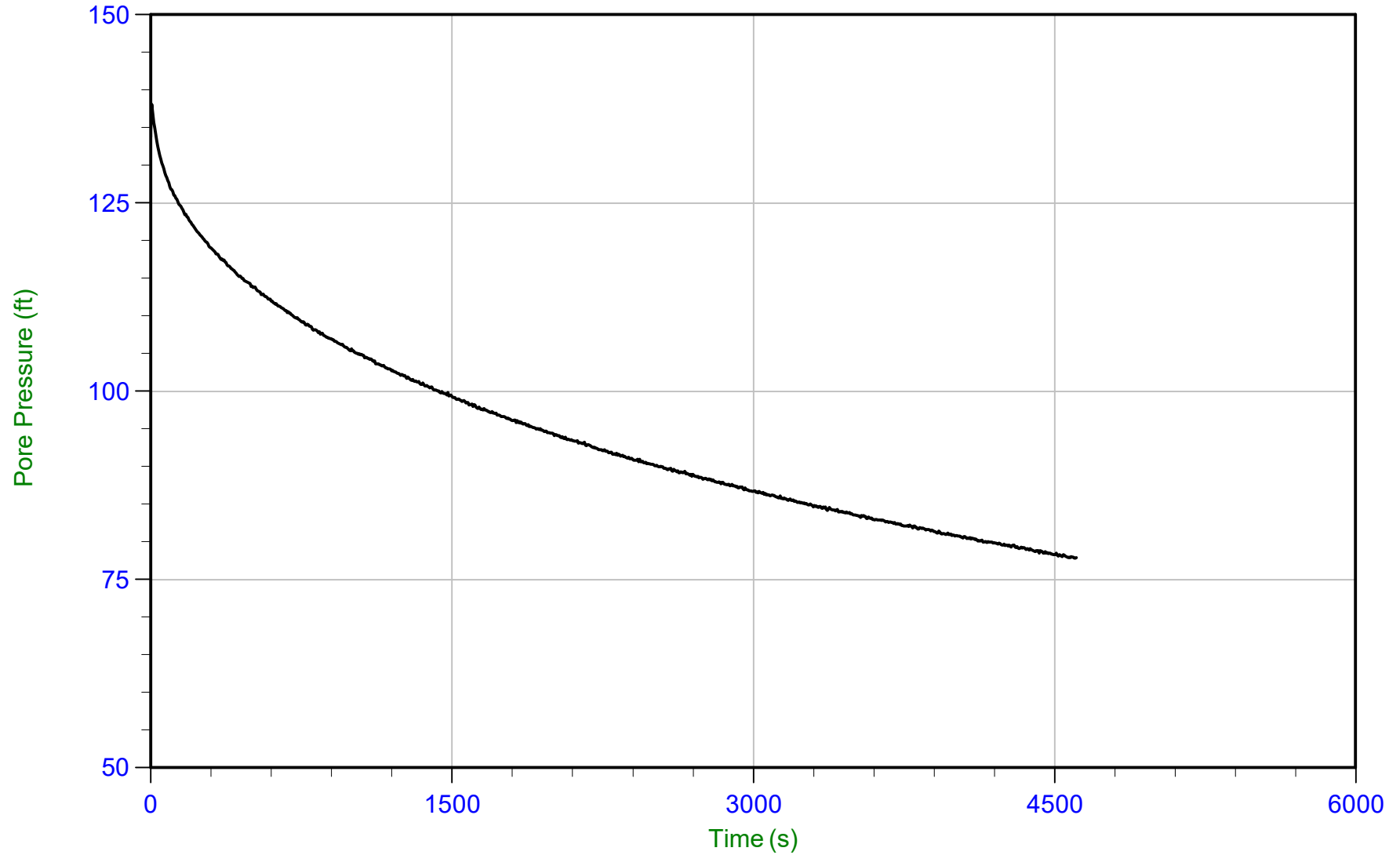
T(50): 5985.9 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 8.575 m / 28.133 ft  
Duration: 4610.0 s

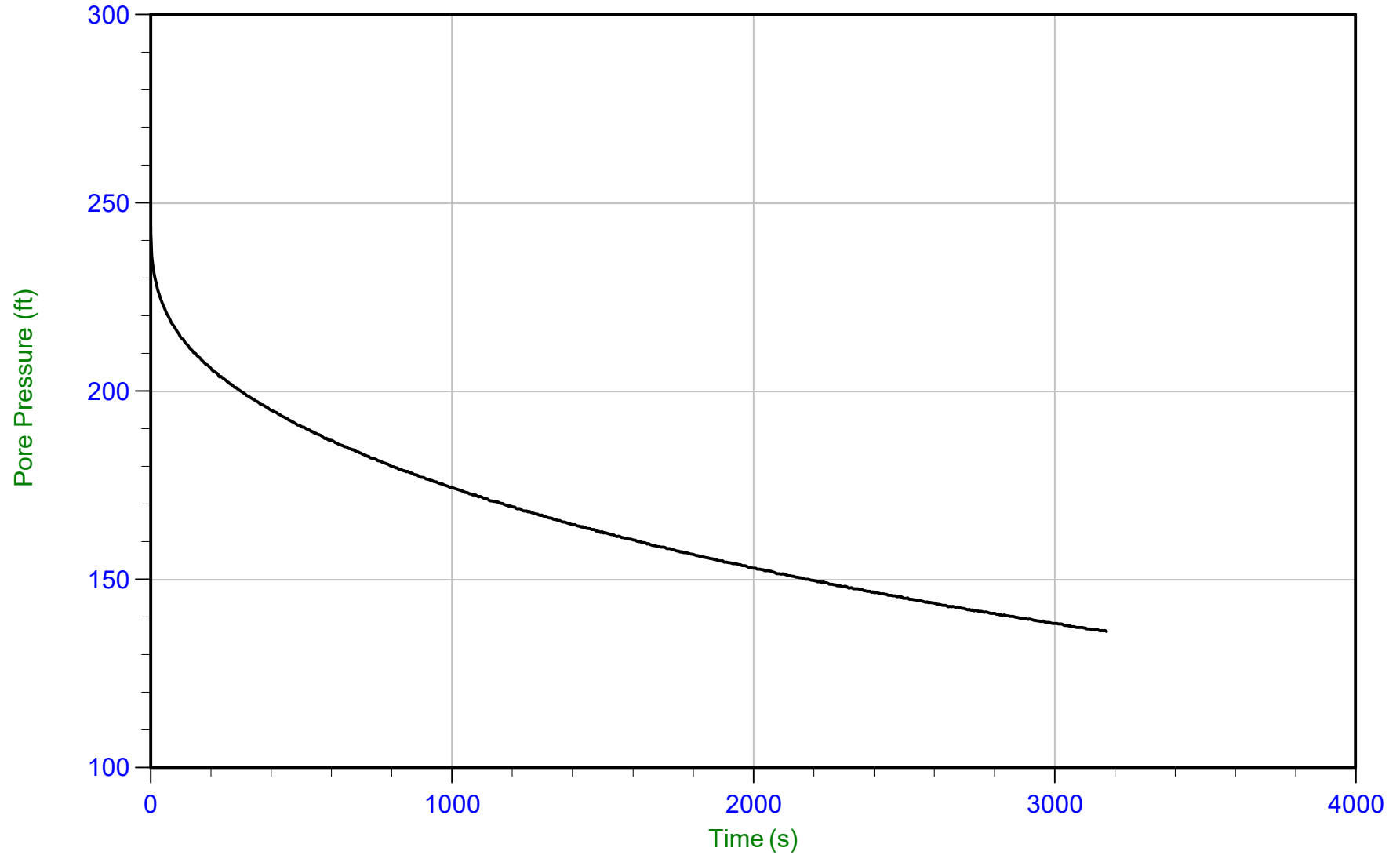
u Min: 77.8 ft  
u Max: 138.1 ft  
u Final: 77.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 14.675 m / 48.146 ft  
Duration: 3175.0 s

u Min: 136.1 ft  
u Max: 243.7 ft  
u Final: 136.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 34.1 ft  
U(50): 138.91 ft

T(50): 2952.5 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min

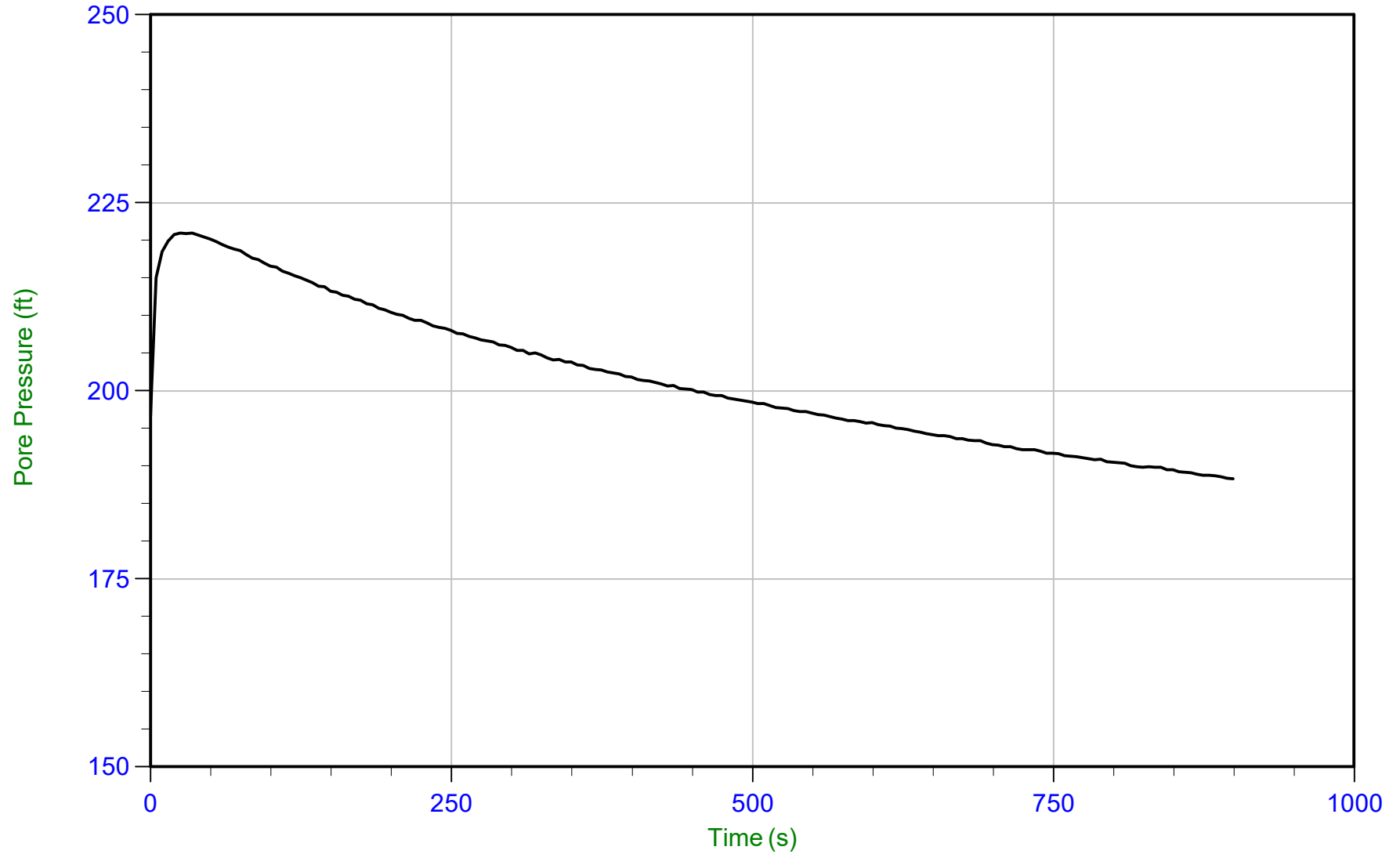




Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 20.550 m / 67.420 ft  
Duration: 900.0 s

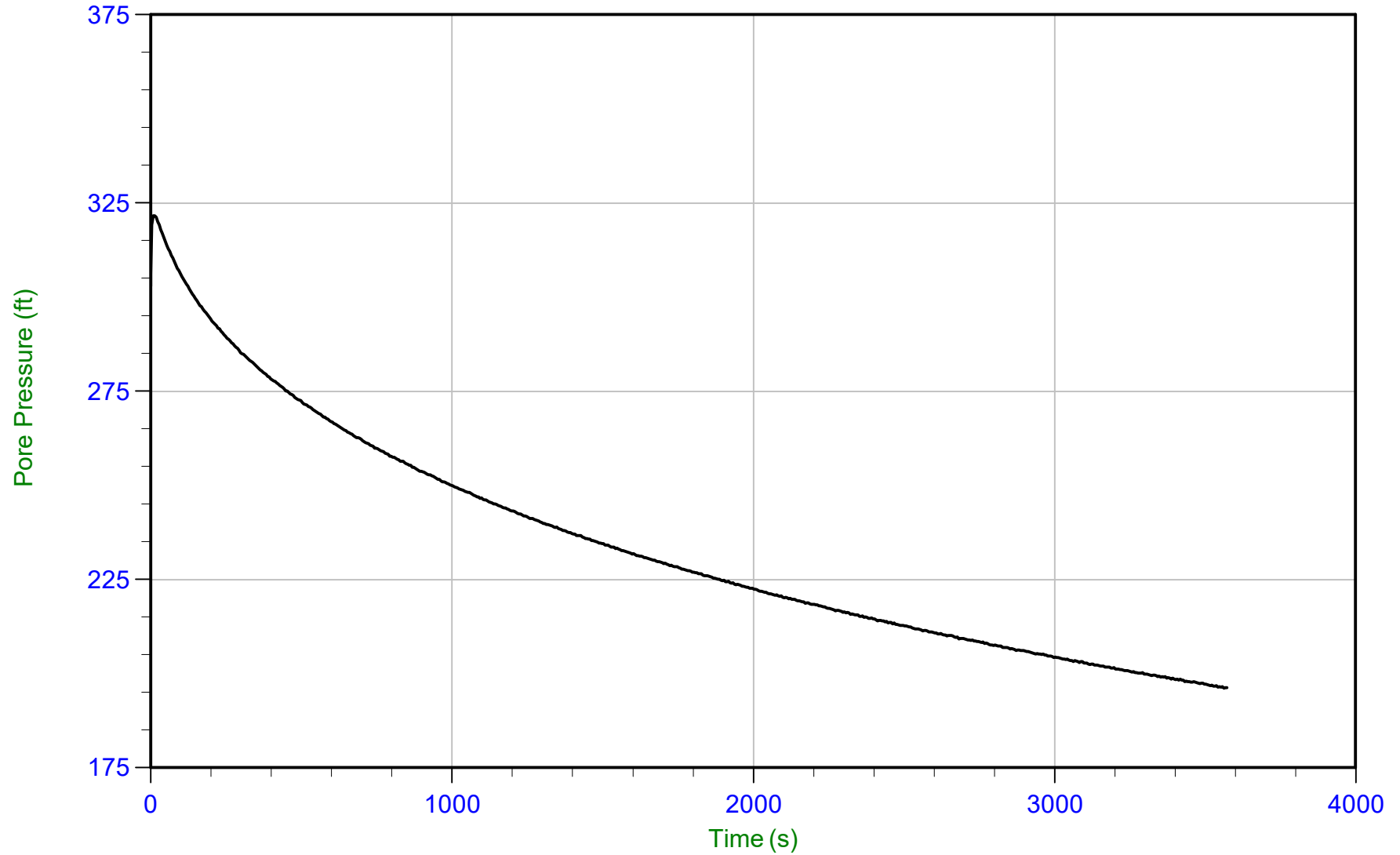
u Min: 188.3 ft  
u Max: 221.0 ft  
u Final: 188.3 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 26.850 m / 88.089 ft  
Duration: 3575.0 s

u Min: 196.1 ft  
u Max: 321.7 ft  
u Final: 196.3 ft

WT: 4.267 m / 13.999 ft  
Ueq: 74.1 ft  
U(50): 197.88 ft

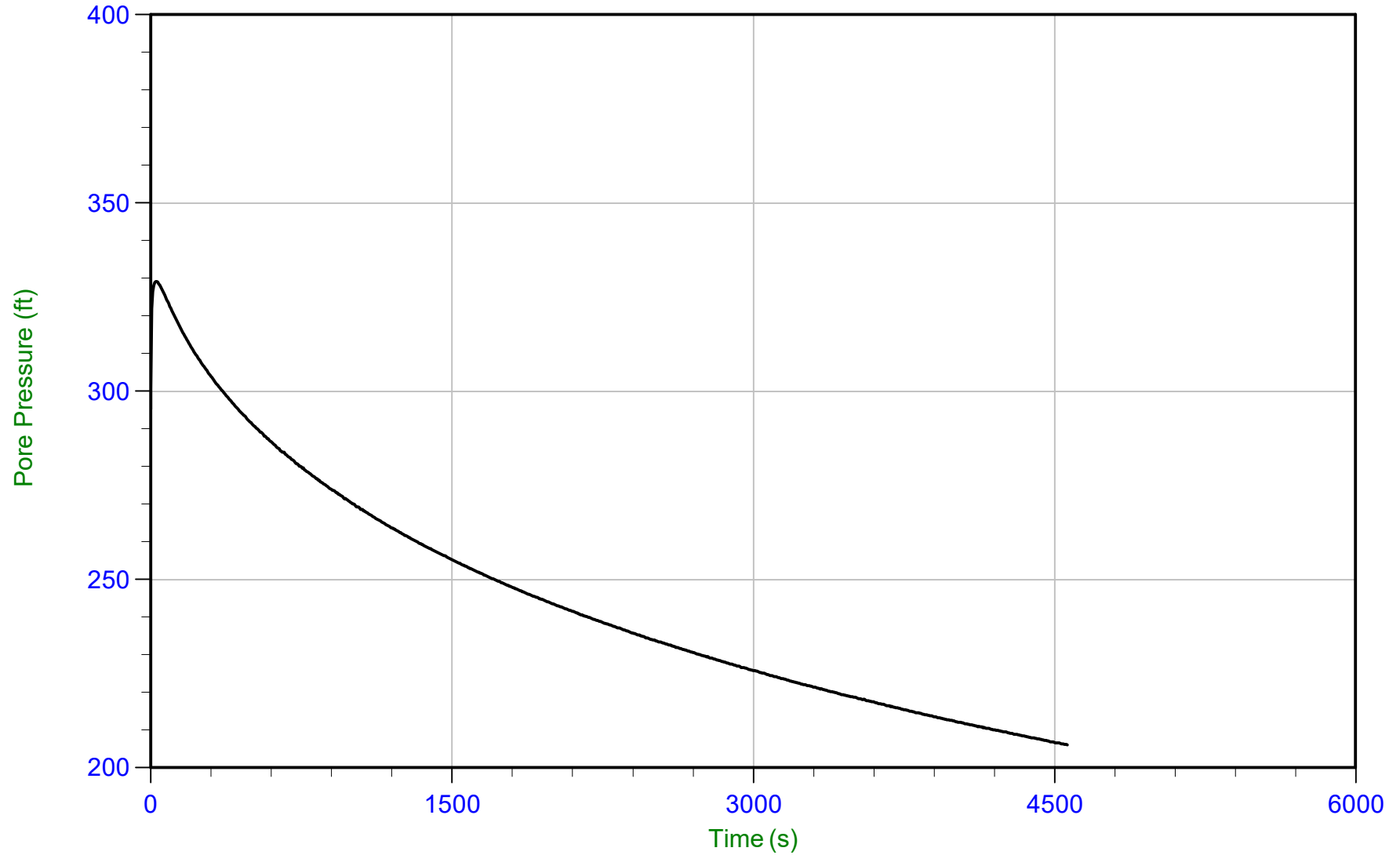
T(50): 3435.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 11:07  
Site: DTE Belle River Power Plant

Sounding: CPT20-11  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP11.PPF  
Depth: 29.900 m / 98.096 ft  
Duration: 4565.0 s

u Min: 206.1 ft  
u Max: 329.2 ft  
u Final: 206.1 ft

WT: 4.267 m / 13.999 ft  
Ueq: 84.1 ft  
U(50): 206.63 ft

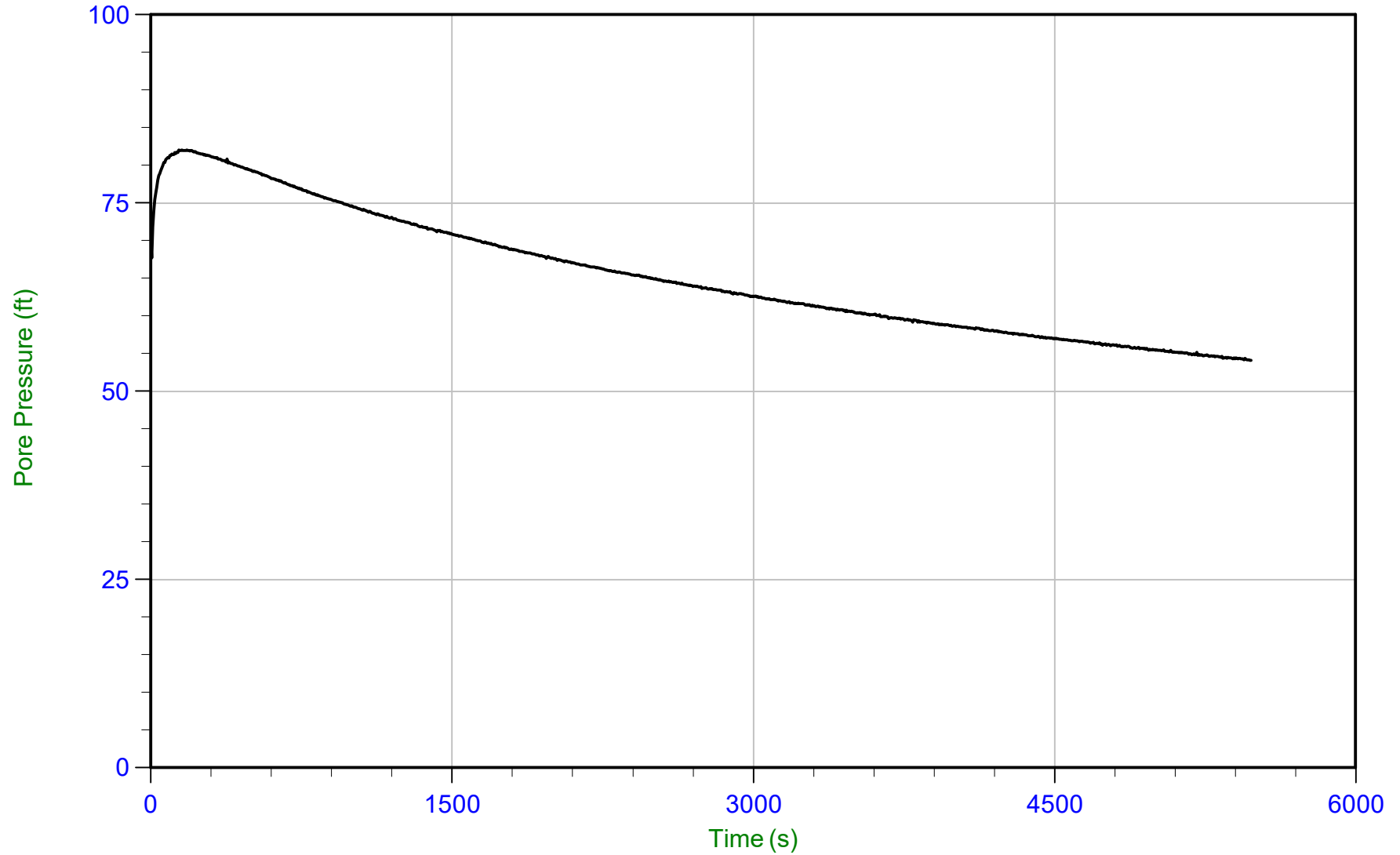
T(50): 4484.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:44  
Site: DTE Belle River Power Plant

Sounding: CPT20-12  
Cone: 551:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP12.PPF  
Depth: 4.900 m / 16.076 ft  
Duration: 5480.0 s

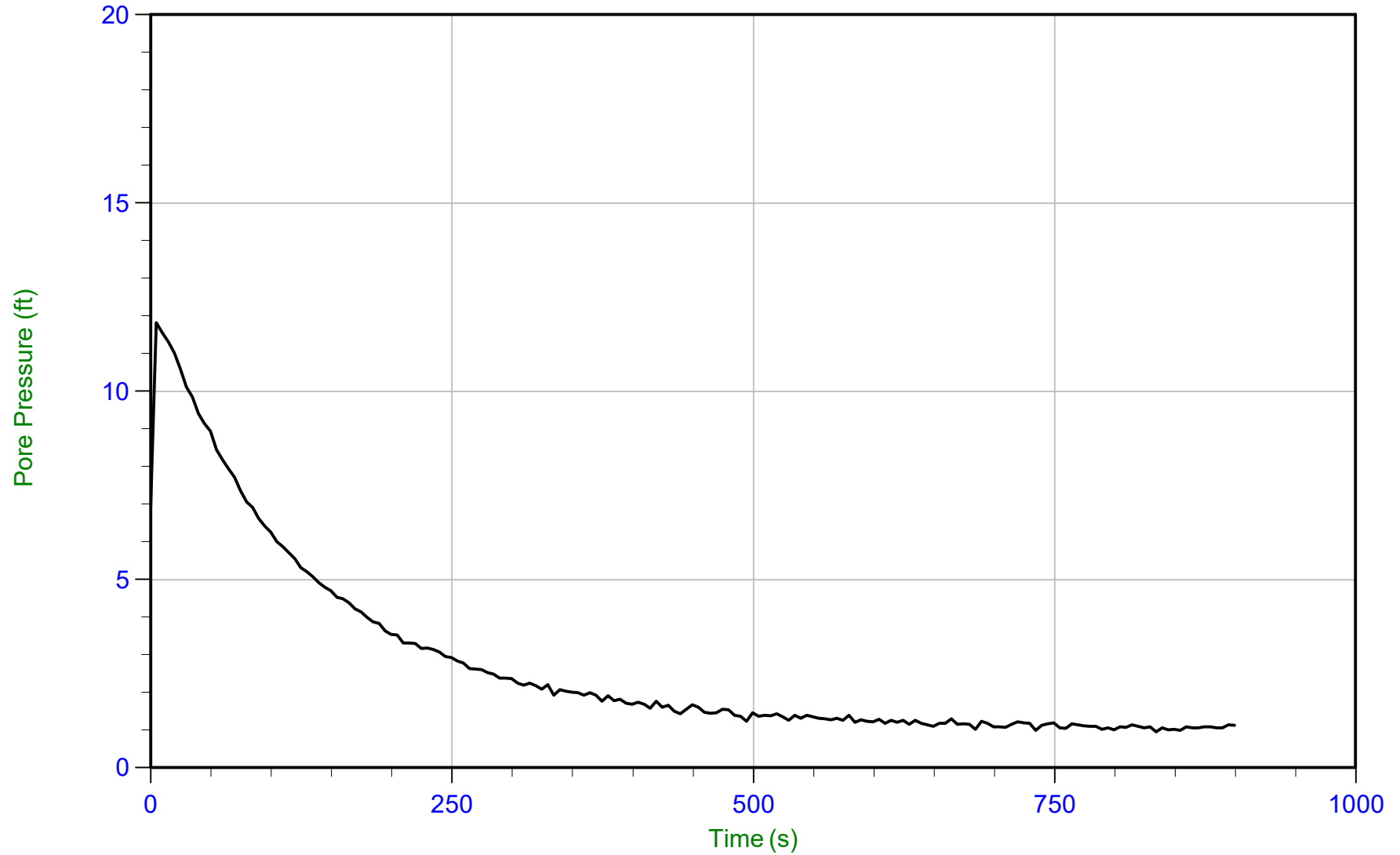
u Min: 54.1 ft  
u Max: 82.0 ft  
u Final: 54.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 1.000 m / 3.281 ft  
Duration: 900.0 s

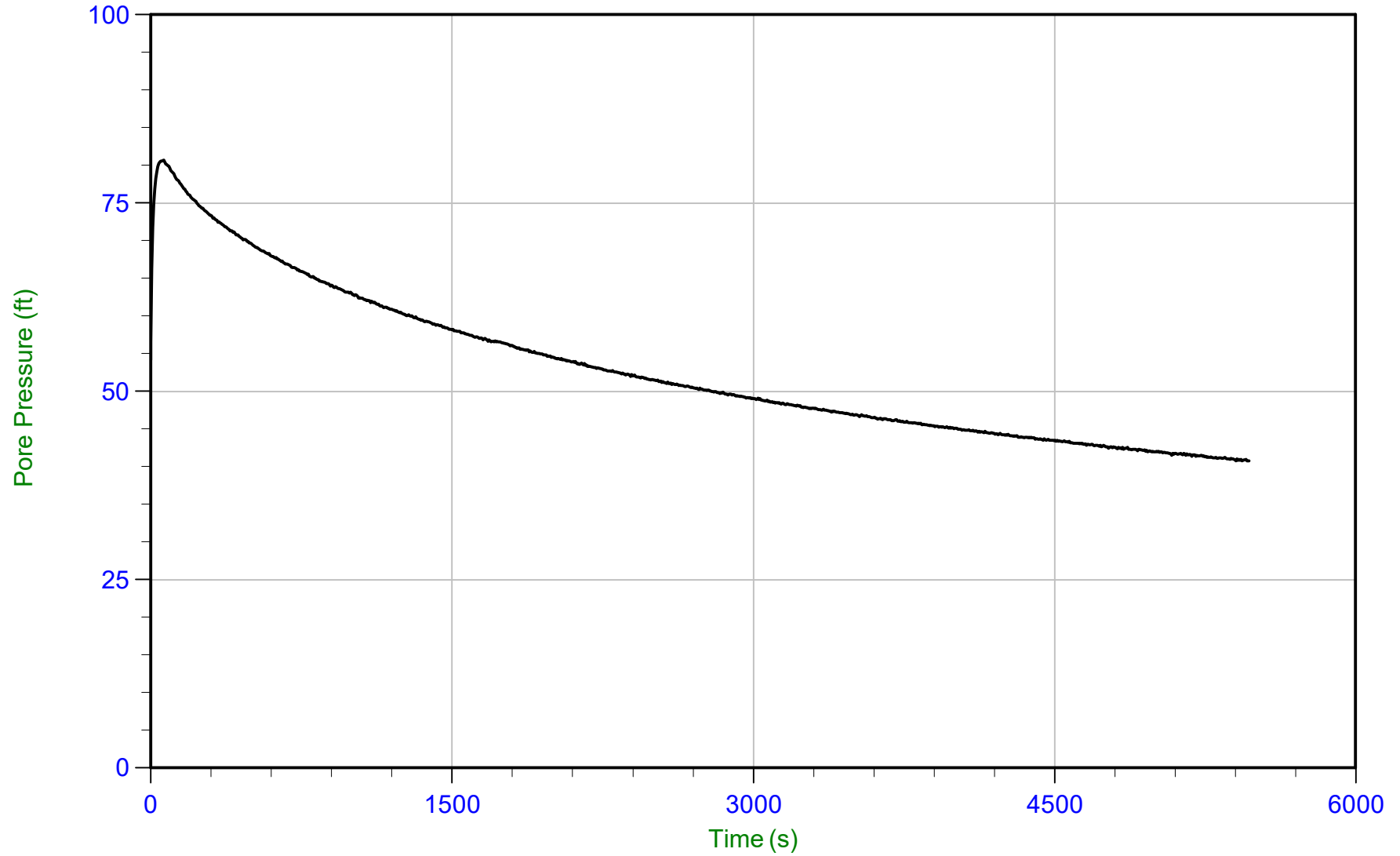
u Min: 1.0 ft  
u Max: 11.8 ft  
u Final: 1.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 13:54  
Site: DTE Belle River Power Plant

Sounding: CPT20-06  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06.PPF  
Depth: 4.600 m / 15.092 ft  
Duration: 5470.0 s

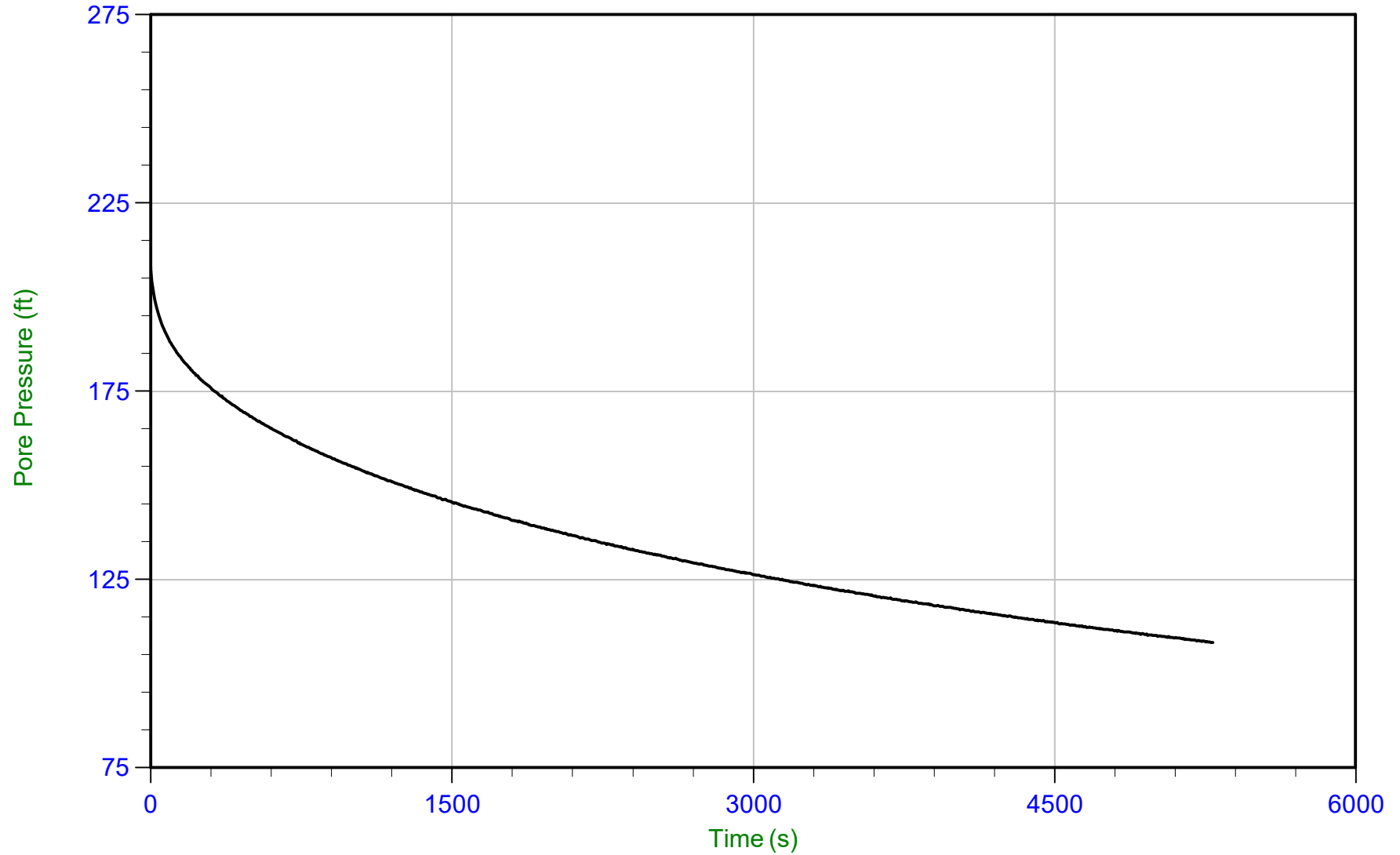
u Min: 40.7 ft  
u Max: 80.7 ft  
u Final: 40.8 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.450 m / 44.127 ft  
Duration: 5290.0 s

u Min: 108.2 ft  
u Max: 208.0 ft  
u Final: 108.3 ft

WT: 5.182 m / 17.000 ft  
Ueq: 27.1 ft  
U(50): 117.58 ft

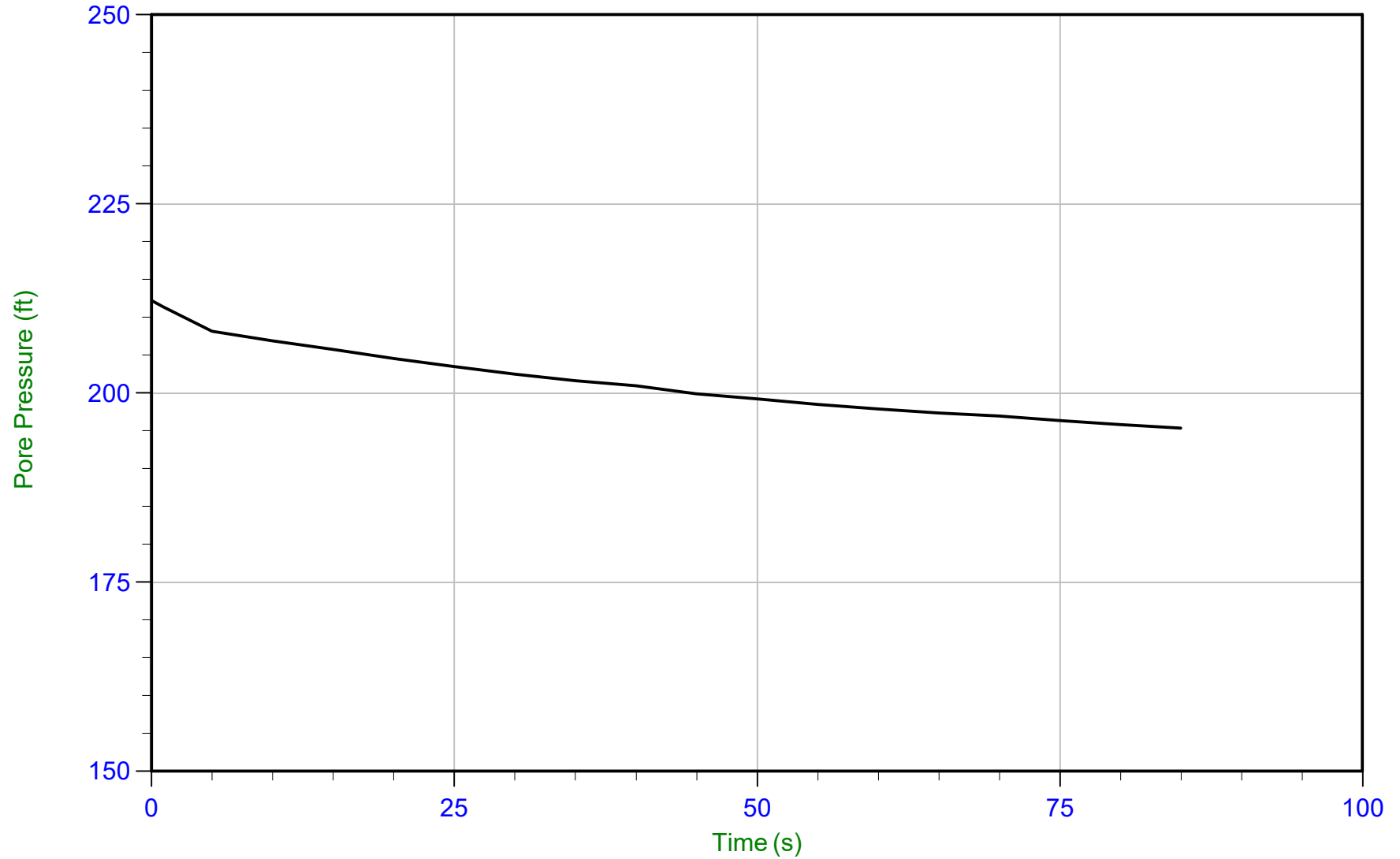
T(50): 3964.4 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 13.800 m / 45.275 ft  
Duration: 85.0 s

u Min: 195.3 ft  
u Max: 212.2 ft  
u Final: 195.3 ft

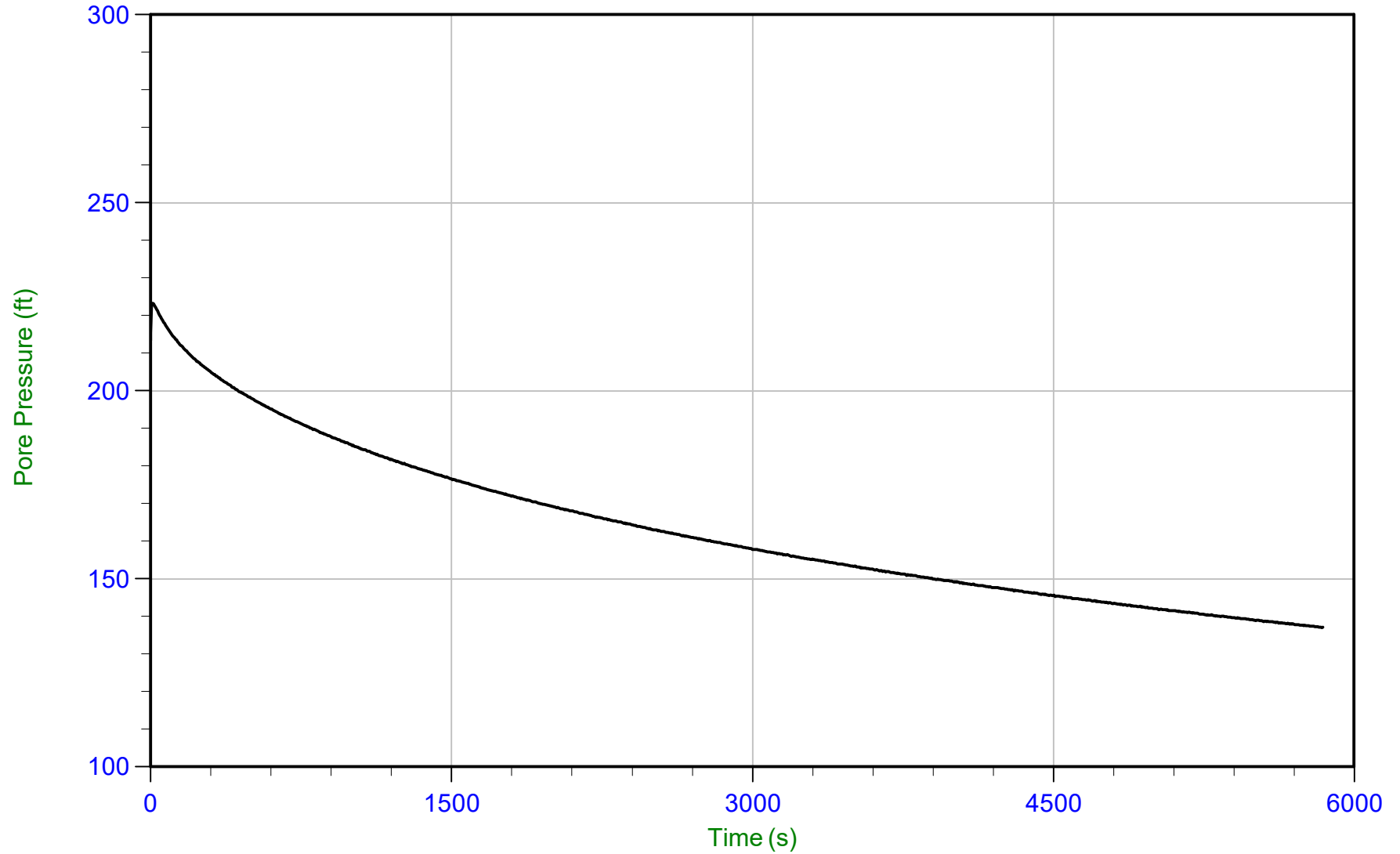




Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 19.550 m / 64.140 ft  
Duration: 5845.0 s

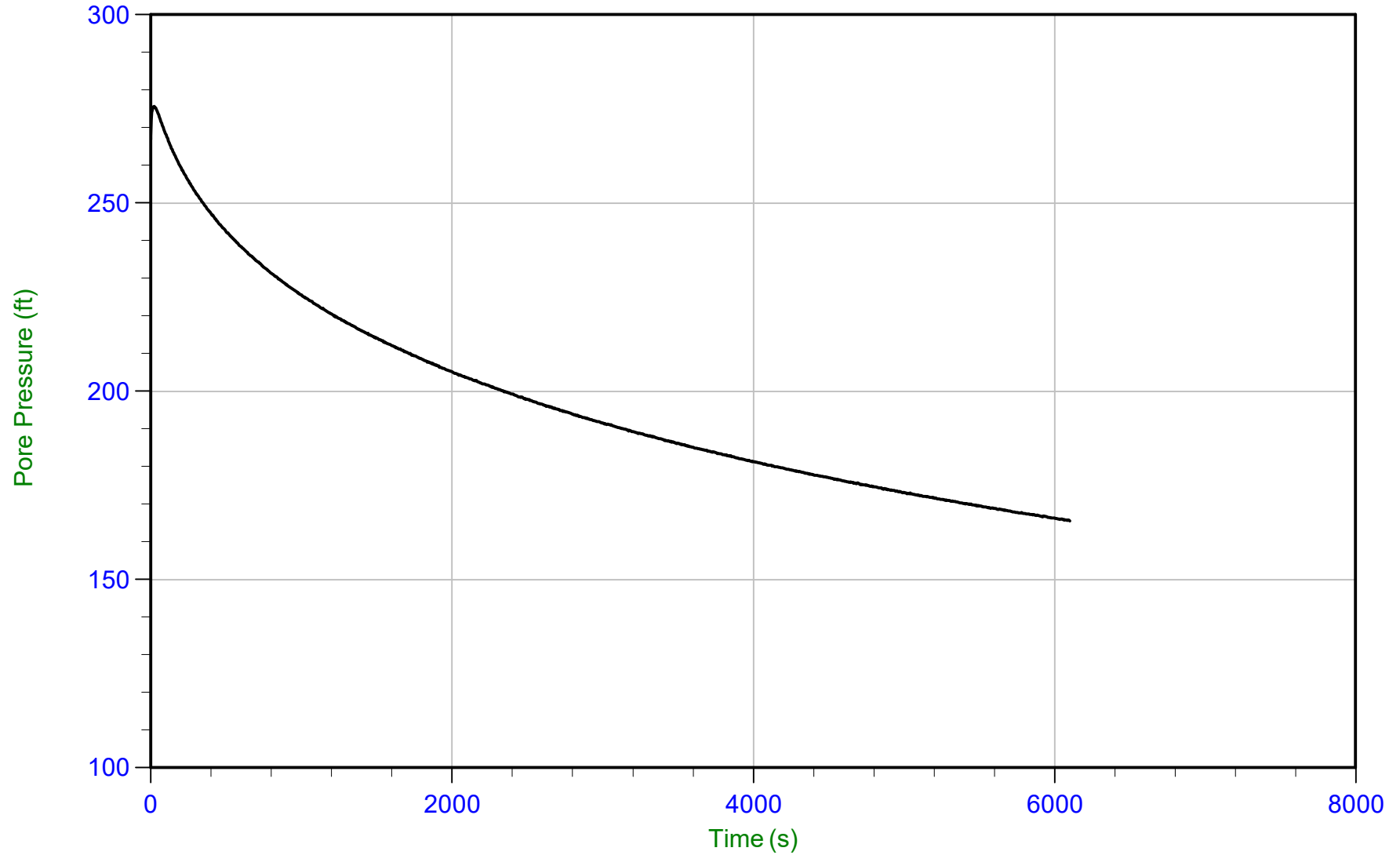
u Min: 137.0 ft  
u Max: 223.2 ft  
u Final: 137.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 25.650 m / 84.153 ft  
Duration: 6105.0 s

u Min: 165.5 ft  
u Max: 275.6 ft  
u Final: 165.5 ft

WT: 5.182 m / 17.000 ft  
Ueq: 67.2 ft  
U(50): 171.39 ft

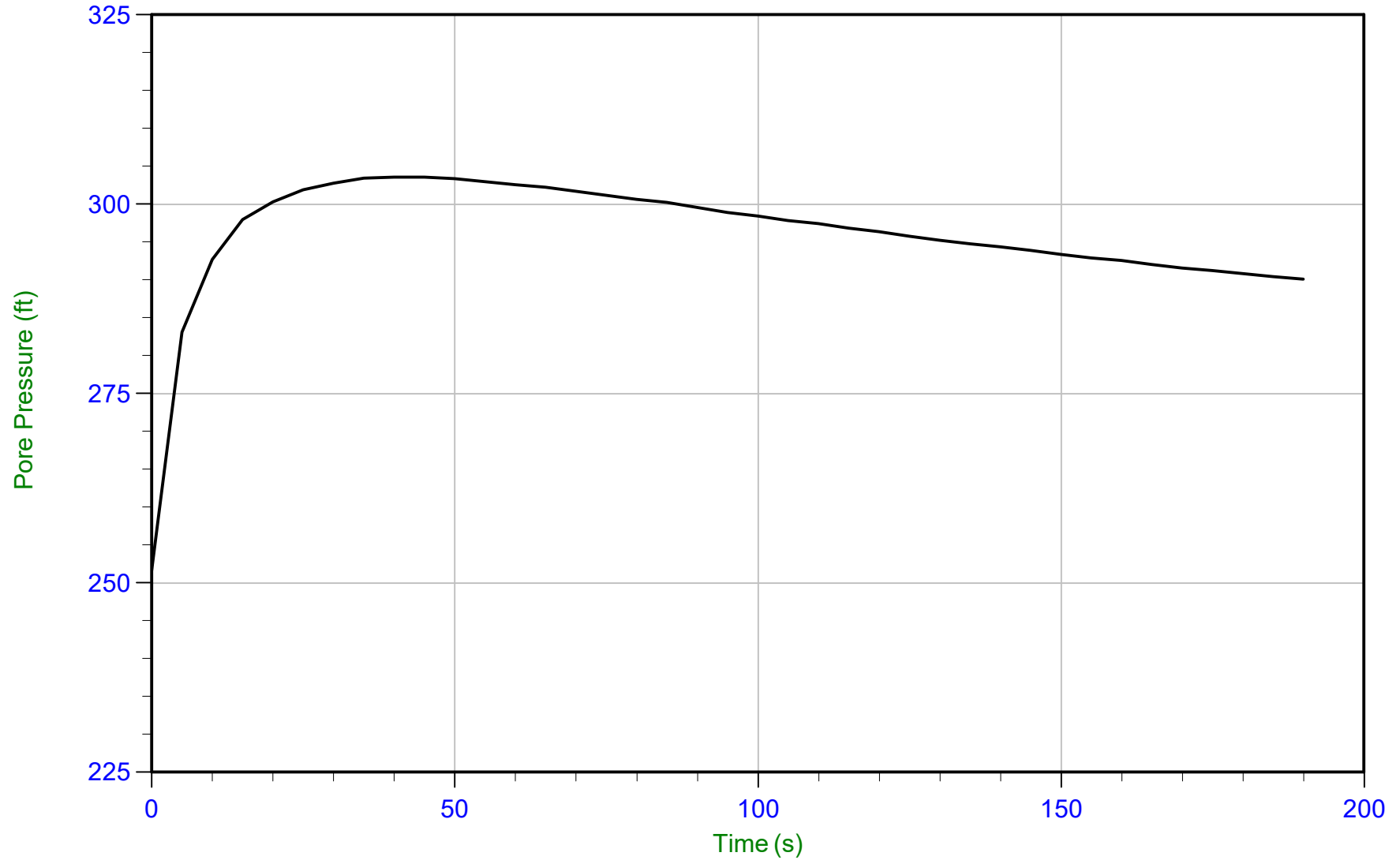
T(50): 5203.0 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 29.550 m / 96.948 ft  
Duration: 190.0 s

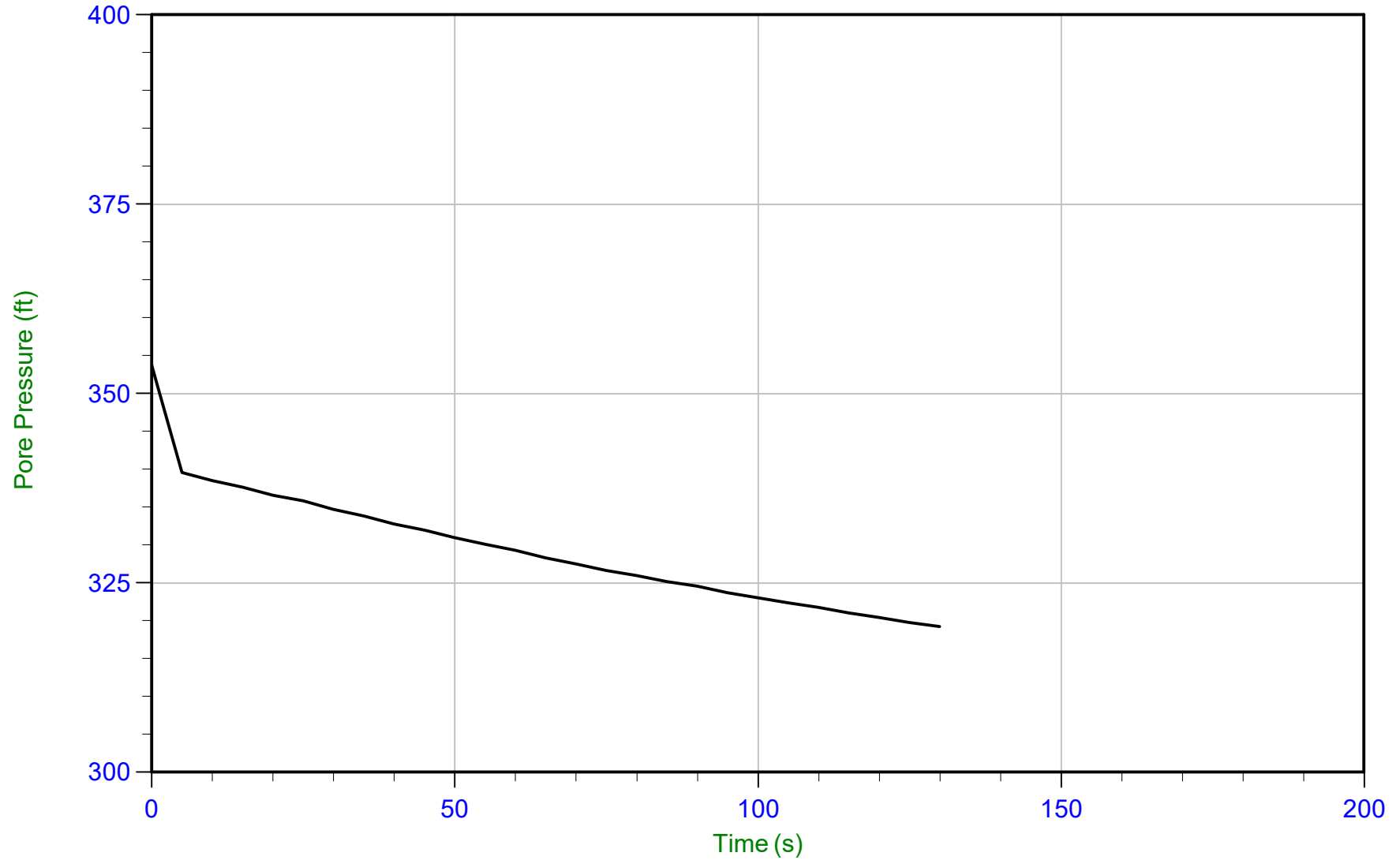
u Min: 251.6 ft  
u Max: 303.6 ft  
u Final: 290.1 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 08:43  
Site: DTE Belle River Power Plant

Sounding: CPT20-06B  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP06B.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 130.0 s

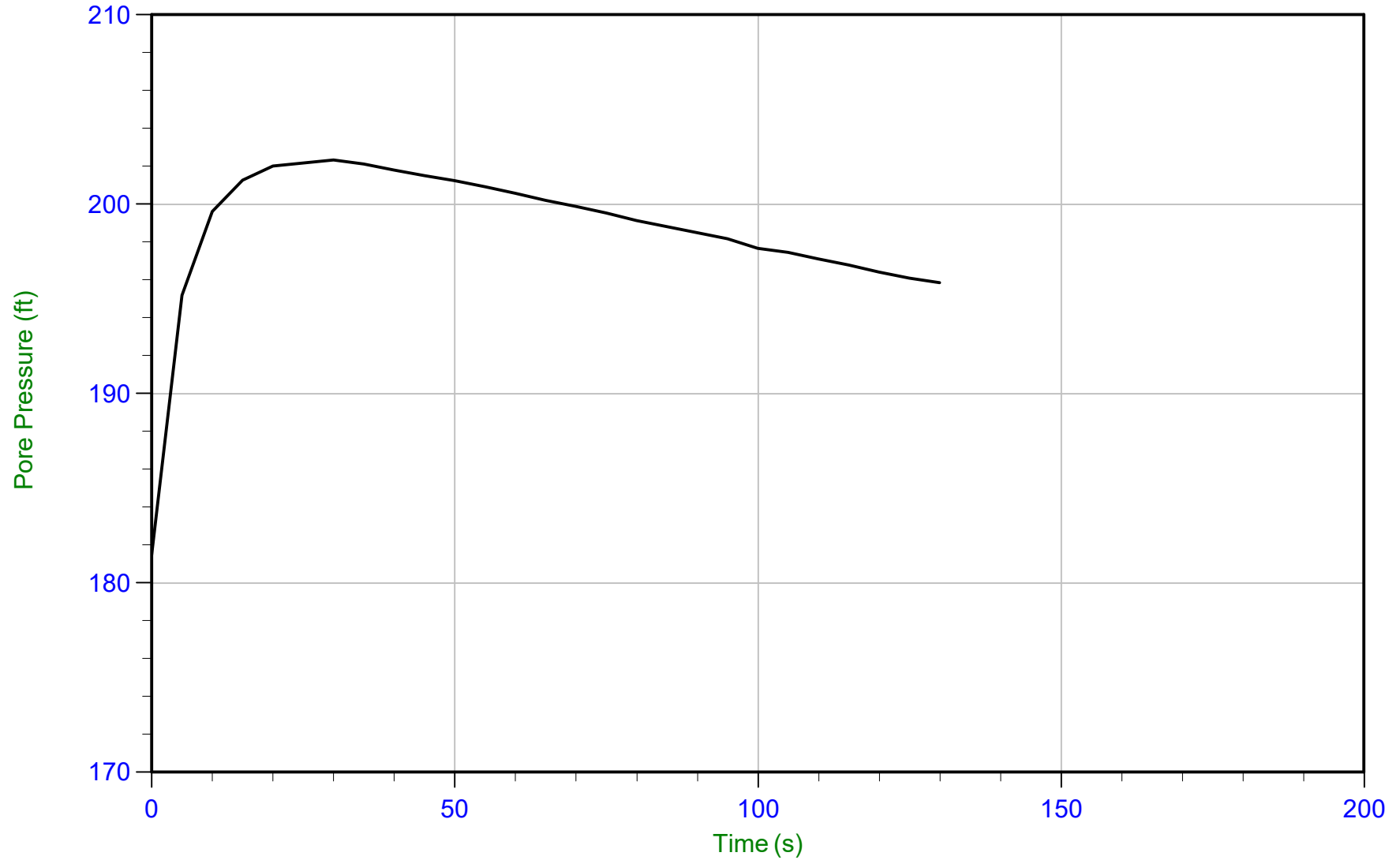
u Min: 319.2 ft  
u Max: 353.7 ft  
u Final: 319.2 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/09/2020 11:04  
Site: DTE Belle River Power Plant

Sounding: CPT20-07  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP07.PPF  
Depth: 18.800 m / 61.679 ft  
Duration: 130.0 s

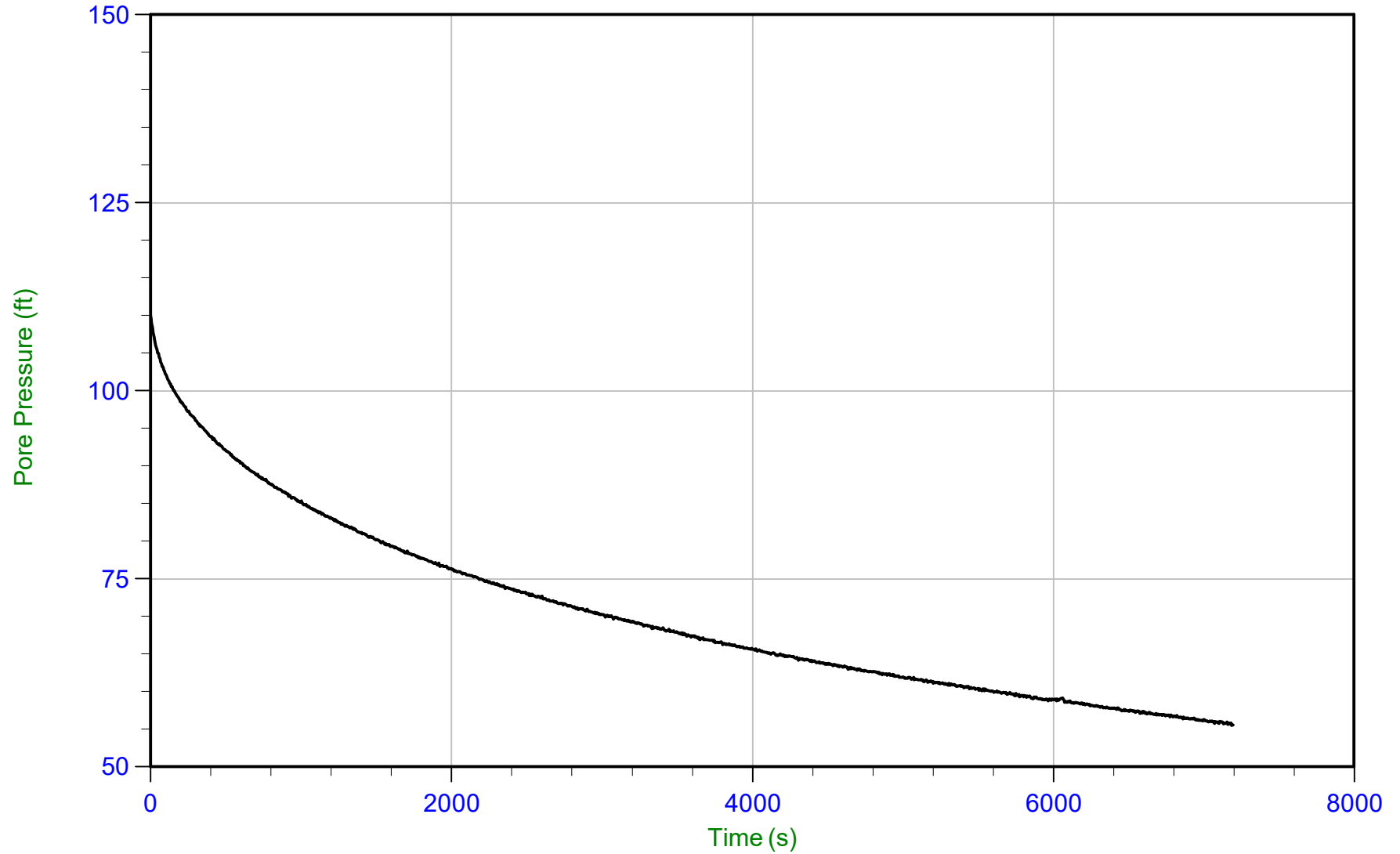
u Min: 181.5 ft  
u Max: 202.3 ft  
u Final: 195.9 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 6.100 m / 20.013 ft  
Duration: 7200.0 s

u Min: 55.5 ft  
u Max: 110.1 ft  
u Final: 55.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 4.0 ft  
U(50): 57.04 ft

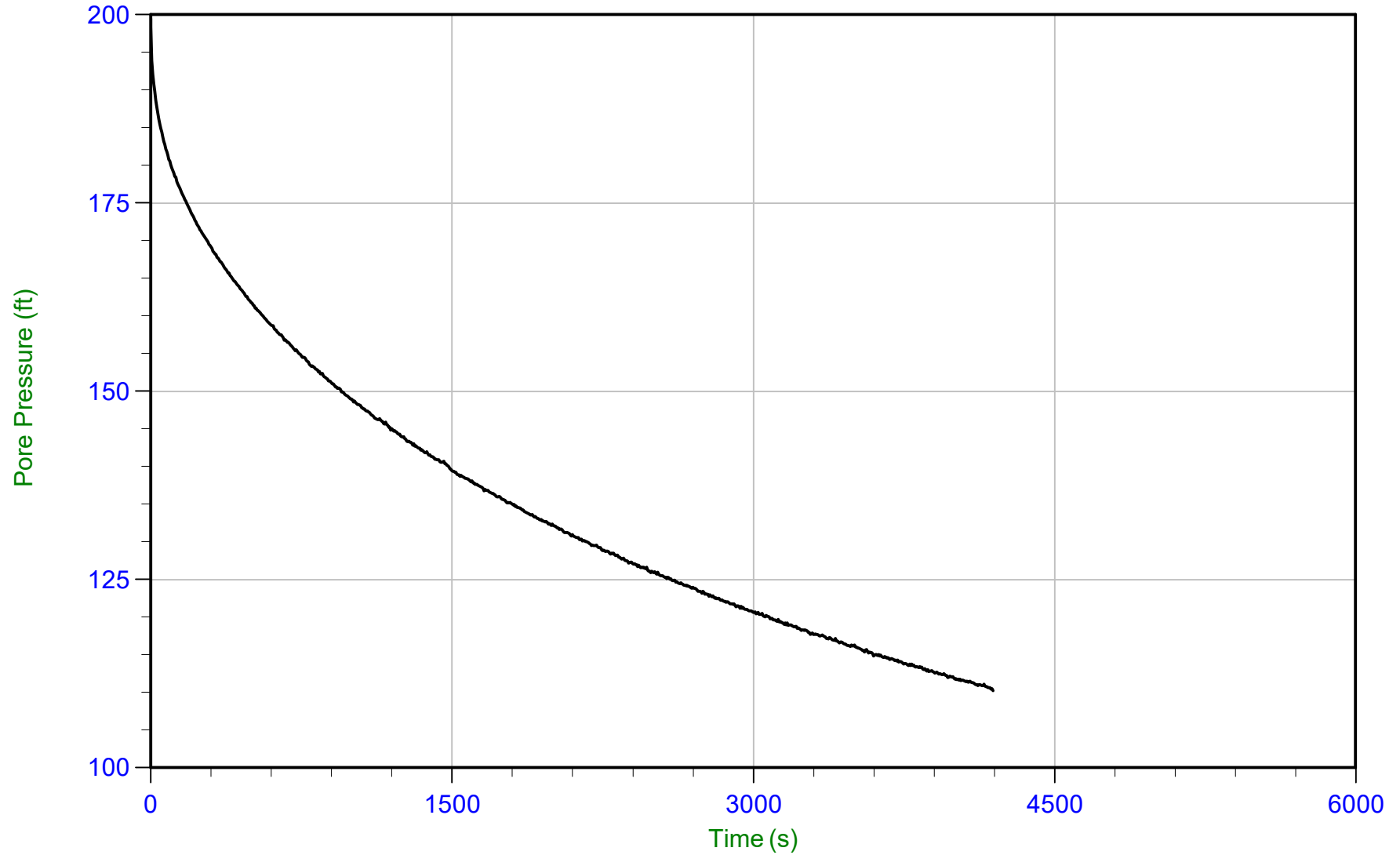
T(50): 6624.7 s  
lr: 100  
Ch: 0.1 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 12:35  
Site: DTE Belle River Power Plant

Sounding: CPT20-08B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08B.PPF  
Depth: 12.200 m / 40.026 ft  
Duration: 4195.0 s

u Min: 110.2 ft  
u Max: 199.5 ft  
u Final: 110.2 ft

WT: 4.877 m / 16.000 ft  
Ueq: 24.0 ft  
U(50): 111.76 ft

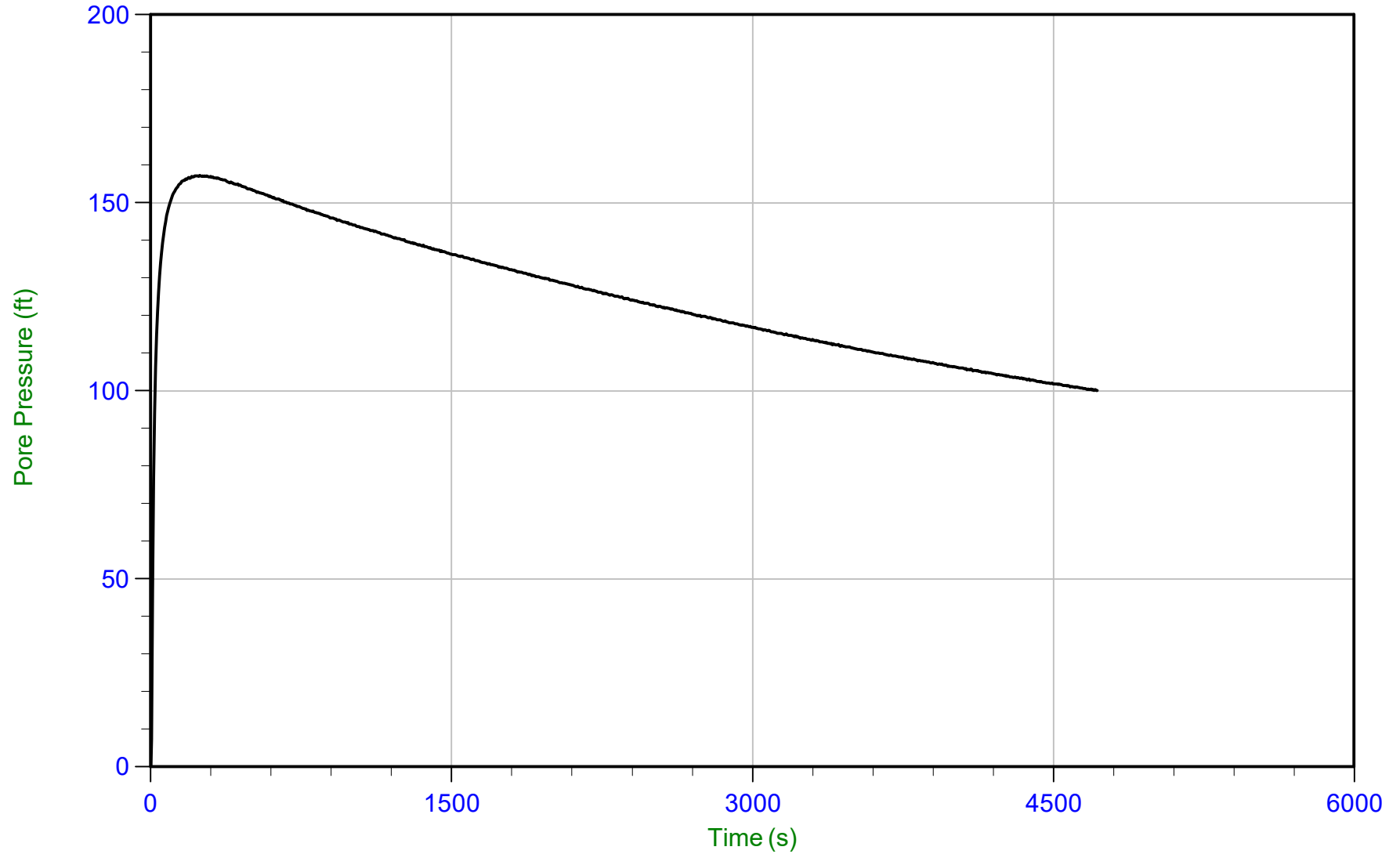
T(50): 4004.2 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 18.300 m / 60.039 ft  
Duration: 4720.0 s

u Min: -7.2 ft  
u Max: 157.2 ft  
u Final: 100.1 ft

WT: 4.877 m / 16.000 ft  
Ueq: 44.0 ft  
U(50): 100.63 ft

T(50): 4406.0 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min

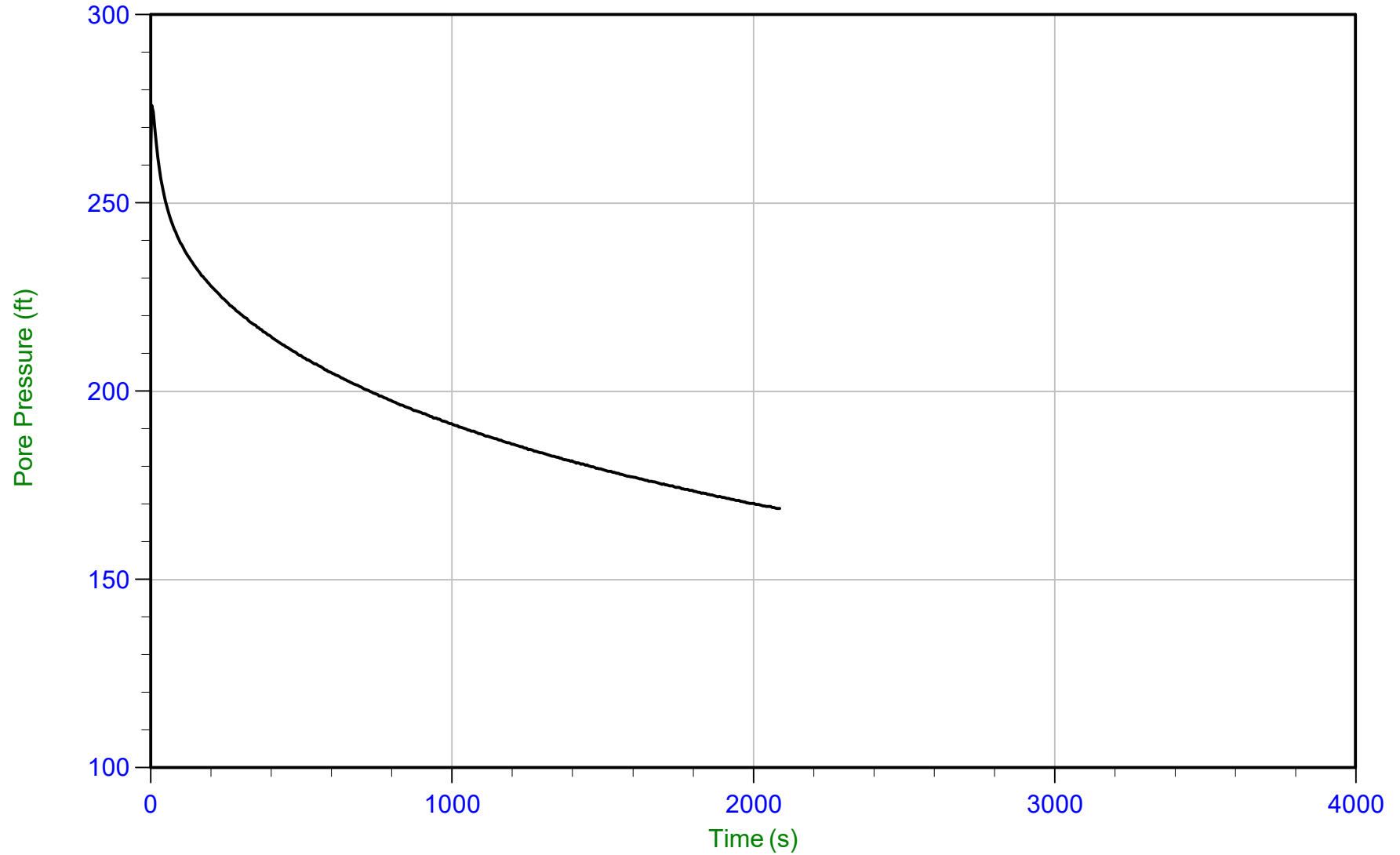




Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 24.400 m / 80.052 ft  
Duration: 2090.0 s

u Min: 168.8 ft  
u Max: 276.0 ft  
u Final: 168.8 ft

WT: 4.877 m / 16.000 ft  
Ueq: 64.1 ft  
U(50): 170.02 ft

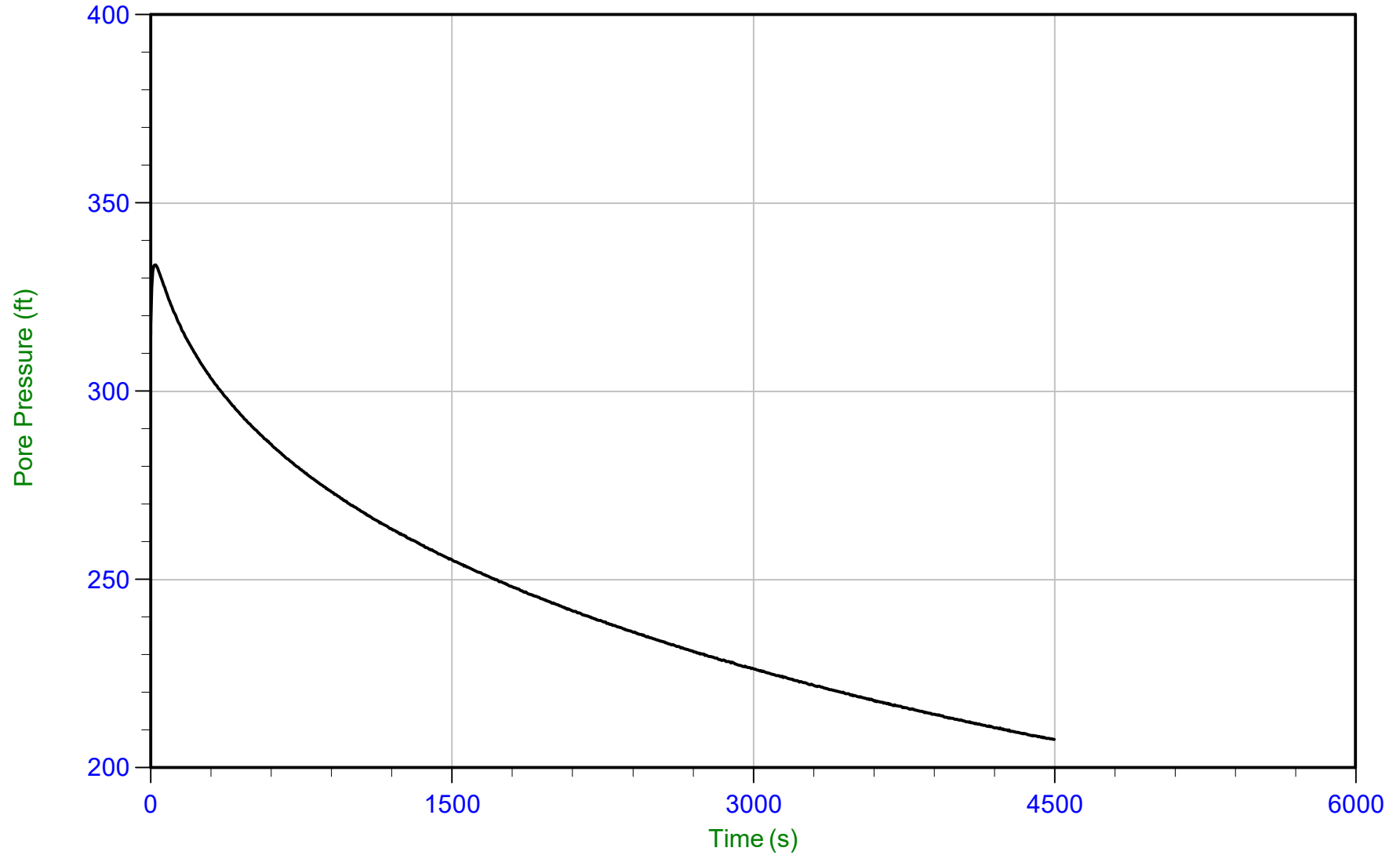
T(50): 2003.9 s  
lr: 100  
Ch: 0.4 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/15/2020 08:41  
Site: DTE Belle River Power Plant

Sounding: CPT20-08C  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP08C.PPF  
Depth: 30.500 m / 100.064 ft  
Duration: 4500.0 s

u Min: 207.5 ft  
u Max: 333.6 ft  
u Final: 207.5 ft

WT: 4.877 m / 16.000 ft  
Ueq: 84.1 ft  
U(50): 208.83 ft

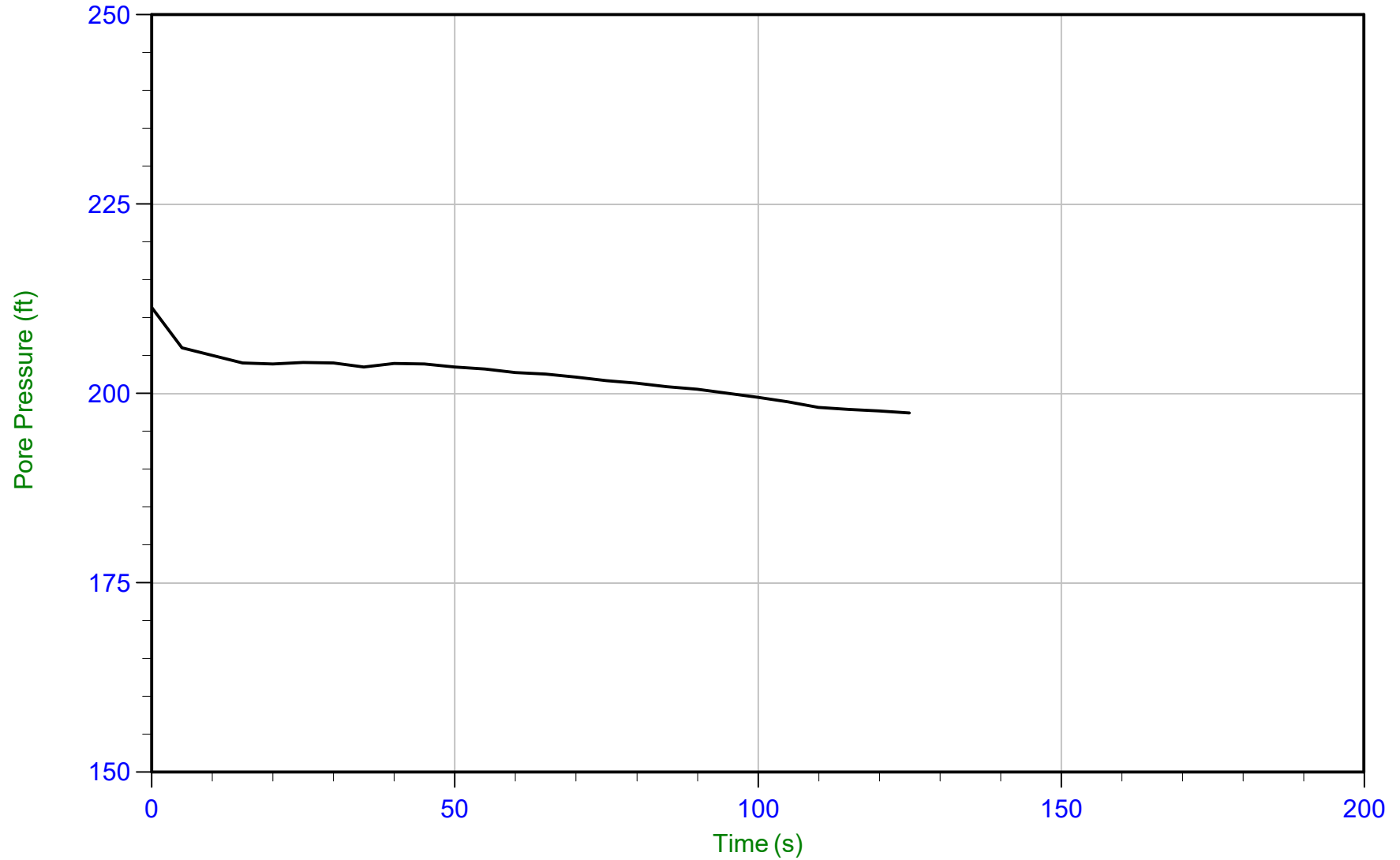
T(50): 4346.6 s  
lr: 100  
Ch: 0.2 cm<sup>2</sup>/min



Geosyntec

Job No: 20-61-21681  
Date: 12/10/2020 15:00  
Site: DTE Belle River Power Plant

Sounding: CPT20-13  
Cone: 513:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13.PPF  
Depth: 17.200 m / 56.430 ft  
Duration: 125.0 s

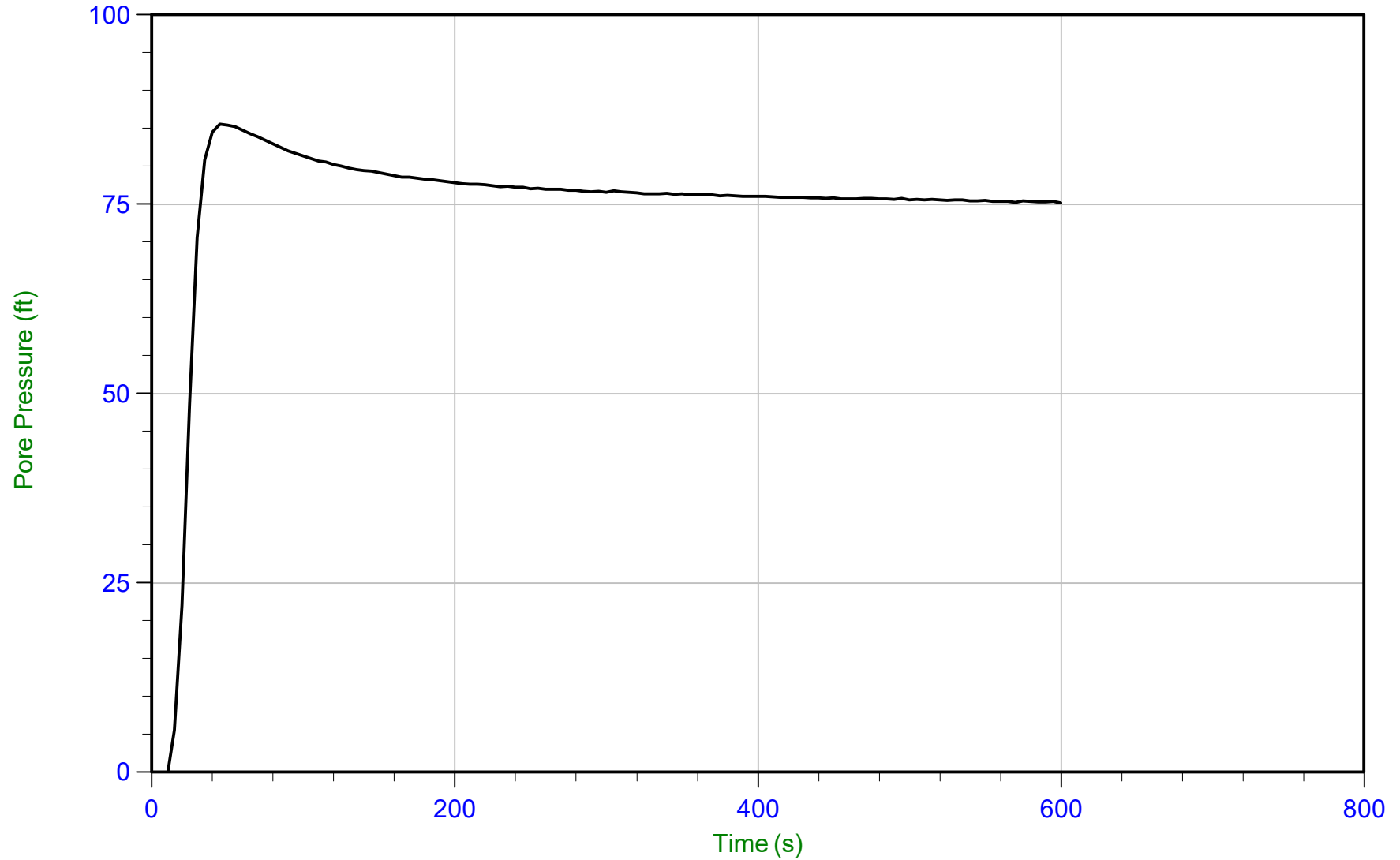
u Min: 197.4 ft  
u Max: 211.4 ft  
u Final: 197.4 ft



Geosyntec

Job No: 20-61-21681  
Date: 12/11/2020 09:09  
Site: DTE Belle River Power Plant

Sounding: CPT20-13B  
Cone: 568:T1500F15U500 Area=15 cm<sup>2</sup>



Trace Summary:

Filename: 20-61-21681\_CP13B.PPF  
Depth: 25.200 m / 82.676 ft  
Duration: 600.0 s

u Min: -3.9 ft  
u Max: 85.6 ft  
u Final: 75.2 ft

WT: 3.962 m / 13.000 ft  
Ueq: 69.7 ft  
U(50): 77.63 ft

T(50): 171.6 s  
lr: 100  
Ch: 4.1 cm<sup>2</sup>/min

**APPENDIX J – CHEMISTRY ANALYSIS OF SITE-SPECIFIC WATER**



05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

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<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

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**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.



<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>9.9</b>		<b>1.0</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Fluoride</b>	<b>0.22</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Sulfate</b>	<b>140</b>		<b>8.0</b>	<b>mg/L</b>	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.43</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>330</b>		<b>50</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>43</b>		<b>20</b>	<b>mg/L</b>	20	12/30/2020 06:55 PM
<b>Fluoride</b>	<b>0.44</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:49 PM
<b>Sulfate</b>	<b>1,200</b>		<b>100</b>	<b>mg/L</b>	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.32</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>2,100</b>		<b>300</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0				
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0				
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0				
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0				
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0				
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0				
Calcium	63.88	0.50	10	53.04	108	75-125	0			O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0				
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0				
Iron	8.964	0.080	10	0.02083	89.4	75-125	0				
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0				
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0				
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0				
Potassium	12.35	0.20	10	2.605	97.4	75-125	0				
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0				
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0				

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0				
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0				
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0				
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0				
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0				
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0				
Calcium	34.88	0.50	10	25.15	97.2	75-125	0				
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0				
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0				
Iron	9.488	0.080	10	0.143	93.5	75-125	0				
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0				
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0				
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0				
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0				
Potassium	12.88	0.20	10	3.03	98.5	75-125	0				
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0				
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS		Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO

MS				Sample ID: 20121813-10DMS		Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO

MSD				Sample ID: 20121813-01DMSD		Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20	
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20	
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20	
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20	
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20	
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20	
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20	
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20	
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20	
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20	
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20	
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20	
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20	
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20	
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MSD		Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 09:37 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043032</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD		Sample ID: <b>20121813-01DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 05:22 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201231A</b>			SeqNo: <b>7046544</b>		Prep Date: <b>12/30/2020</b>		DF: <b>10</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD		Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 05:41 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201231A</b>			SeqNo: <b>7046556</b>		Prep Date: <b>12/30/2020</b>		DF: <b>10</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>	Sample ID: <b>MBLK-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021476</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

<b>LCS</b>	Sample ID: <b>LCS-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021475</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

<b>DUP</b>	Sample ID: <b>20121752-03B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID: <b>DB</b>	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021469</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>		SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.





# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information			Project Information				Parameter/Method Request for Analysis										
Purchase Order		Project Name	DTE Belle River		A	Metals											
Work Order		Project Number	GLP 8017		B	pH, Anions, TDS, Alkalinity											
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants		C												
Send Report To	Michael Coram	Invoice Attn.	Michael Coram		D												
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.		E												
	Suite 100		Suite 100		F												
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105		G												
Phone	734-794-1547	Phone	734-794-1547		H												
Fax	734-332-8063	Fax	734-332-8063		I												
e-Mail Address					J												
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

Sampler(s): Please Print & Sign <i>Mike Coram</i>		Shipment Method: Carrier <i>FedEx</i>		Turnaround Time: (Business Days) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____				Results Due Date:	
Relinquished by: <i>[Signature]</i>	Date: 12/17	Time: 3:00	Received by:	Date:	Time:	Notes: <b>Separate Report</b>			
Relinquished by: <i>Fedex</i>	Date: 12/18/20	Time: 10:00	Received by (Laboratory): <i>[Signature]</i>	Date:	Time:	ALS Cooler ID:	Cooler Temp: 5.8°C	QC Package: (Check Box Below)	
Logged by (Laboratory): <i>MTG</i>	Date: 12/18/20	Time: 13:46	Checked by (Laboratory): <i>[Signature]</i>					<input checked="" type="checkbox"/> Level II: Standard QC	<input type="checkbox"/> Level III: Raw Data
								<input type="checkbox"/> TRRP LRC	<input type="checkbox"/> TRRP Level IV
								<input type="checkbox"/> Level IV: SW846 Methods/CLP like	
								<input type="checkbox"/> Other: _____	

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752**

Received by: **MJG**

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 5.8/5.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 12/18/2020 1:47:53 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

**Client Project Name:** DTE - Belle River

**Client Project Number:** GLP-8017

**Client PO Number:**

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00



Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

Parameter/Method Request for Analysis  
Radium 226 and 228 combined

ALS Project Manager: Mike Coram

<b>Purchase Order</b>	<b>Project Name</b>	<b>Project Information</b>
<b>Work Order</b>	<b>Project Number</b>	<b>Parameter/Method Request for Analysis</b>
<b>Company Name</b>	<b>Bill To Company</b>	A Radium 226 and 228 combined
<b>Send Report To</b>	<b>Invoice Attn</b>	B <i>Report Separate</i>
<b>Address</b>	<b>Address</b>	
<b>City/State/Zip</b>	<b>City/State/Zip</b>	
<b>Phone</b>	<b>Phone</b>	
<b>Fax</b>	<b>Fax</b>	
<b>e-Mail Address</b>	<b>e-Mail Address</b>	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-F	12/16	3:00	SW	2	2	X										
2	BAB-W	12/16	2:00	SW	2	2	X										
3	DB	12/16	4:00	SW	2	2	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

**Sampler(s) Please Print & Sign**  
Mike Coram

**Shipment Method**  
Fed Ex

**Required Turnaround Time: (Check Box)**  
 Std. 10 WK. Days  
 5 WK. Days  
 2 WK. Days  
 24 Hour

**Results Due Date:**

**Relinquished by:** [Signature] **Date:** 12/17 **Time:** 3:00

**Received by (Laboratory):** [Signature] **Date:** **Time:**

**Relinquished by:** [Signature] **Date:** **Time:**

**Checked by (Laboratory):** **Date:** **Time:**

**Preservative Key:** 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

**QC Package: (Check One Box Below)**  
 Level III Std. CC  
 Level III Std. CC/Pres. Data  
 Level IV SW/826-CLP  
 Other

**TRPP Check List**  
 TRPP Level I  
 TRPP Level II  
 TRPP Level III  
 TRPP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20



ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWT: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-455 RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECEIVING**  
**225 COMMERCE DR**

12-1  
3.2

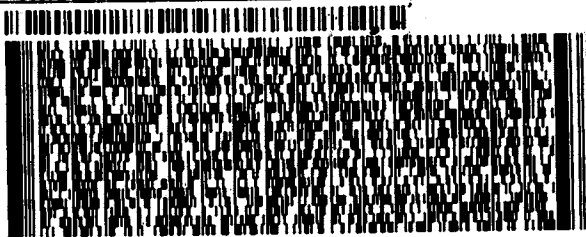
**FORT COLLINS CO 80524**

(616) 682-5201

REF:

INU:

DEPT:



**FedEx**  
Express



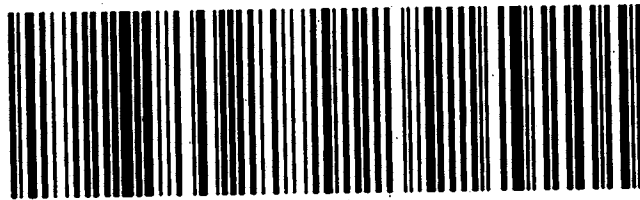
14107-10002027

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	45		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C

ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012397-1	2012397-2	2012397-3
-----------	-----------	-----------

Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3

**APPENDIX K – ALD HYDRAULIC  
CONDUCTIVITY TEST RESULTS**





**Excel Geotechnical Testing, Inc.**  
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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	3/15/2021	0	1.2E-08	0.0000	-	-	-	-	
						3/22/2021	7	9.3E-09	0.0417	-	-	-	-	
						3/29/2021	14	7.3E-09	0.0681	8.3	8.4	-	-	
						4/05/2021	21	7.0E-09	0.1077	-	-	-	-	
						4/12/2021	28	7.1E-09	0.1345	-	-	-	-	
						4/14/2021	30	6.9E-09	0.1408	8.2	8.5	-	-	
						4/19/2021	35	7.8E-09	0.1725	-	-	-	-	
						4/26/2021	42	6.4E-09	0.2022	-	-	-	-	
						4/27/2021	43	6.9E-09	0.2059	8.2	8.4	656	1614	
						5/3/2021	49	7.7E-09	0.2434	-	-	-	-	
						5/04/2021	50	7.8E-09	0.2487	-	-	-	-	
						5/07/2021	53	7.7E-09	0.2619	-	-	-	-	
						5/10/2021	56	6.9E-09	0.2728	8.3	8.2	-	-	
						5/14/2021	60	8.1E-09	0.2987	-	-	-	-	
						5/21/2021	67	7.2E-09	0.3323	-	-	-	-	
						5/24/2021	70	6.9E-09	0.3423	8.5	8.6	-	-	
						5/28/2021	74	8.1E-09	0.3684	-	-	-	-	
						6/04/2021	81	7.0E-09	0.4006	8.4	8.6	660	1411	
6/11/2021	88	7.6E-09	0.4404	-	-	-	-							
6/17/2021	94	6.5E-09	0.4634	8.3	8.2	-	-							
6/18/2021	95	7.3E-09	0.4729	-	-	-	-							
6/25/2021	102	7.6E-09	0.5139	-	-	-	-							
7/01/2021	108	6.4E-09	0.5375	8.5	8.2	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	7/02/2021	109	7.6E-09	0.5460	-	-	-	-	
						7/09/2021	116	7.0E-09	0.5870	-	-	-	-	
						7/16/2021	123	6.9E-09	0.6139	8.5	8.2	656	1230	
						7/23/2021	130	7.6E-09	0.6560	-	-	-	-	
						7/30/2021	137	7.0E-09	0.6827	8.6	8.5	-	-	
						8/06/2021	144	6.9E-09	0.7216	-	-	-	-	
						8/13/2021	151	6.8E-09	0.7489	8.5	8.1	-	-	
						8/20/2021	158	8.2E-09	0.7906	-	-	-	-	
						8/27/2021	165	6.0E-09	0.8165	-	-	-	-	
						8/30/2021	168	7.4E-09	0.8265	8.3	8.3	653	1141	
						9/03/2021	172	7.2E-09	0.8517	-	-	-	-	
						9/10/2021	179	6.5E-09	0.8827	-	-	-	-	
						9/14/2021	183	5.8E-09	0.8948	8.1	8.3	-	-	
						9/17/2021	186	6.9E-09	0.9131	-	-	-	-	
						9/24/2021	193	6.6E-09	0.9453	-	-	-	-	
						10/01/2021	200	5.7E-09	0.9663	-	-	-	-	
						10/04/2021	203	5.8E-09	0.9733	8.4	8.4	-	-	
						10/08/2021	207	7.2E-09	0.9990	-	-	-	-	
10/15/2021	214	6.3E-09	1.0291	-	-	-	-							
10/22/2021	221	5.5E-09	1.0485	8.2	8.3	622	1200							
10/29/2021	228	6.8E-09	1.0886	-	-	-	-							
11/05/2021	235	8.1E-09	1.1118	-	-	-	-							
11/12/2021	242	8.2E-09	1.1185	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	11/19/2021	249	7.7E-09	1.1187	-	-	-	-	
						11/21/2021	251	8.0E-09	1.1178	8.0	8.3	-	-	
						11/26/2021	256	8.1E-09	1.1372	-	-	-	-	
						12/03/2021	263	7.9E-09	1.1516	-	-	-	-	
						12/10/2021	270	6.7E-09	1.1553	-	-	-	-	
						12/17/2021	277	7.5E-09	1.1541	-	-	-	-	
						12/21/2021	281	6.2E-09	1.1606	8.8	8.6	-	-	
						12/24/2021	284	6.7E-09	1.1782	-	-	-	-	
						12/31/2021	291	6.5E-09	1.2109	-	-	-	-	
						1/7/2022	298	5.7E-09	1.2333	8.8	8.8	719	1274	
						1/14/2022	305	6.3E-09	1.2688	-	-	-	-	
						1/21/2022	312	5.8E-09	1.2956	-	-	-	-	
						1/26/2022	317	4.9E-09	1.3070	8.0	8.2	-	-	
						1/28/2022	319	5.3E-09	1.3176	-	-	-	-	
						2/4/2022	326	6.0E-09	1.3494	-	-	-	-	
						2/11/2022	333	5.2E-09	1.3714	8.7	8.7	1091	-	
						2/18/2022	340	6.4E-09	1.4082	-	-	-	-	
						2/25/2022	347	6.3E-09	1.4346	8.9	9.0	964	1310	
						3/4/2022	354	6.8E-09	1.4730	-	-	-	-	
3/11/2022	361	6.7E-09	1.5008	-	-	-	-							
3/14/2022	364	6.8E-09	1.5103	8.4	9.0	1220	-							
3/18/2022	368	6.9E-09	1.5337	-	-	-	-							
3/25/2022	375	6.8E-09	1.5649	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	3/29/2022	379	6.4E-09	1.5786	9.1	9.1	1210	-	
						4/1/2022	382	7.2E-09	1.5978	-	-	-	-	
						4/8/2022	389	6.6E-09	1.6302	-	-	-	-	
						4/15/2022	396	6.1E-09	1.6525	8.3	8.3	1236	1256	
						4/22/2022	403	6.6E-09	1.6942	-	-	-	-	
						4/29/2022	410	6.3E-09	1.7236	-	-	-	-	
						5/2/2022	413	7.0E-09	1.7342	8.2	8.3	1257	-	
						5/6/2022	417	7.6E-09	1.7604	-	-	-	-	
						5/13/2022	424	7.1E-09	1.7937	-	-	-	-	
						5/17/2022	428	6.8E-09	1.8081	7.8	8.2	1252	-	
						5/20/2022	431	7.1E-09	1.8278	-	-	-	-	
						5/27/2022	438	7.1E-09	1.8623	-	-	-	-	
						6/1/2022	443	6.3E-09	1.8792	8.1	8.4	1254	-	
						6/3/2022	445	6.8E-09	1.8931	-	-	-	-	
						6/10/2022	452	7.0E-09	1.9301	-	-	-	-	
						6/16/2022	458	6.6E-09	1.9533	8.0	8.3	1294	-	
						6/17/2022	459	7.0E-09	1.9605	-	-	-	-	
						6/24/2022	466	7.1E-09	1.9994	-	-	-	-	
7/1/2022	473	7.0E-09	2.0260	8.3	8.3	1315	-							
7/8/2022	480	7.3E-09	2.0702	-	-	-	-							
7/15/2022	487	6.7E-09	2.0976	-	-	-	-							
7/18/2022	490	6.5E-09	2.1068	8.2	8.3	1257	1377							
7/22/2022	494	7.7E-09	2.1330	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9')	20L143	26.7	98.1	28.7	96.6	7/29/2022	501	7.1E-09	2.1668	-	-	-	-	
						8/3/2022	506	6.3E-09	2.1828	8.1	8.3	1253	-	
						8/5/2022	508	7.3E-09	2.1974	-	-	-	-	
						8/12/2022	515	7.5E-09	2.2351	-	-	-	-	
						8/18/2022	521	6.3E-09	2.2562	9.1	8.3	1315	-	
						8/19/2022	522	6.6E-09	2.2629	-	-	-	-	
						8/26/2022	529	7.1E-09	2.3023	-	-	-	-	
						8/31/2022	534	6.7E-09	2.3224	7.9	8.2	1256	1233	
						9/2/2022	536	7.4E-09	2.3356	-	-	-	-	
						9/9/2022	543	6.8E-09	2.3720	-	-	-	-	
						9/15/2022	549	6.7E-09	2.3940	8.5	8.6	1309	-	
						9/16/2022	550	7.0E-09	2.4009	-	-	-	-	
						9/23/2022	557	7.0E-09	2.4393	-	-	-	-	
						9/30/2022	564	6.5E-09	2.4657	8.7	8.6	1253	-	
						10/7/2022	571	7.1E-09	2.5058	-	-	-	-	
						10/14/2022	578	7.0E-09	2.5343	8.5	8.3	1209	1197	
						10/21/2022	585	6.6E-09	2.5730	-	-	-	-	
						10/28/2022	592	6.3E-09	2.6010	-	-	-	-	
10/31/2022	595	5.9E-09	2.6098	8.5	8.3	1209	1197							
11/4/2022	599	7.3E-09	2.6346	-	-	-	-							
11/11/2022	606	6.9E-09	2.6681	-	-	-	-							
11/18/2022	613	6.1E-09	2.6945	-	-	-	-							
11/25/2022	620	6.0E-09	2.7244	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B1-ST-1 (7-9)	20L143	26.7	98.1	28.7	96.6	12/2/2022	627	5.0E-09	2.7459	-	-	-	-	
						12/5/2022	630	5.0E-09	2.7534	8.5	8.5	1242	1200	
						12/9/2022	634	6.5E-09	2.7749	-	-	-	-	
						12/16/2022	641	5.1E-09	2.8008	-	-	-	-	
						12/23/2022	648	4.4E-09	2.8182	-	-	-	-	
						12/31/2022	656	4.9E-09	2.8525	-	-	-	-	

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	3/15/2021	0	1.8E-08		-	-	-	-	
						3/22/2021	7	1.6E-08	0.0846	8.5	8.1	-	-	
						3/29/2021	14	1.3E-08	0.1548	-	-	-	-	
						3/30/2021	15	1.3E-08	0.1595	8.5	8.3	-	-	
						4/05/2021	21	1.4E-08	0.2036	-	-	-	-	
						4/09/2021	25	1.3E-08	0.2270	8.0	8.1	782	3050	
						4/12/2021	28	1.4E-08	0.2608	-	-	-	-	
						4/16/2021	32	1.3E-08	0.2939	8.2	8.5	-	-	
						4/19/2021	35	1.3E-08	0.3273	-	-	-	-	
						4/26/2021	42	1.1E-08	0.3737	8.0	7.9	-	-	
						5/03/2021	49	1.3E-08	0.4429	8.2	8.5	560	2300	
						5/07/2021	53	1.3E-08	0.4826	-	-	-	-	
						5/12/2021	58	1.2E-08	0.5197	8.1	8.3	-	-	
						5/14/2021	60	1.3E-08	0.5444	-	-	-	-	
						5/21/2021	67	1.2E-08	0.6038	8.3	8.1	-	-	
						5/28/2021	74	1.2E-08	0.6683	8.4	8.2	621	1790	
						6/04/2021	81	1.2E-08	0.7309	-	-	-	-	
						6/11/2021	88	1.2E-08	0.7967	-	-	-	-	
6/14/2021	91	1.1E-08	0.8129	8.3	8.2	-	-							
6/18/2021	95	1.2E-08	0.8553	-	-	-	-							
6/22/2021	99	1.1E-08	0.8823	8.3	8.1	595	1982							
6/25/2021	102	1.3E-08	0.9169	-	-	-	-							
7/01/2021	108	1.1E-08	0.9601	8.5	8.5	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	7/02/2021	109	1.1E-08	0.9719	-	-	-	-	
						7/09/2021	116	1.1E-08	1.0337	8.8	8.4	-	-	
						7/16/2021	123	1.2E-08	1.0975	8.7	8.1	657	1988	
						7/23/2021	130	1.2E-08	1.1654	8.3	8.4	-	-	
						7/30/2021	137	1.2E-08	1.2287	-	-	-	-	
						8/02/2021	140	1.1E-08	1.2452	8.7	8.1	-	-	
						8/06/2021	144	1.2E-08	1.2857	-	-	-	-	
						8/13/2021	151	1.1E-08	1.3313	8.2	8.1	652	1764	
						8/20/2021	158	1.2E-08	1.3978	-	-	-	-	
						8/23/2021	161	1.1E-08	1.4132	8.1	8.3	-	-	
						8/27/2021	165	1.2E-08	1.4535	-	-	-	-	
						8/31/2021	169	1.2E-08	1.4815	8.4	8.2	-	-	
						9/03/2021	172	1.2E-08	1.5143	-	-	-	-	
						9/08/2021	177	1.1E-08	1.5516	8.1	8.0	596	1523	
						9/10/2021	179	1.1E-08	1.5740	-	-	-	-	
						9/17/2021	186	9.8E-09	1.6213	-	-	-	-	
						9/20/2021	189	1.0E-08	1.6353	8.2	8.3	-	-	
						9/24/2021	193	1.2E-08	1.6763	-	-	-	-	
10/01/2021	200	9.0E-09	1.7155	8.3	8.3	-	-							
10/08/2021	207	1.1E-08	1.7778	-	-	-	-							
10/12/2021	211	1.2E-08	1.7970	8.3	8.4	585	1524							
10/15/2021	214	1.1E-08	1.8259	-	-	-	-							
10/22/2021	221	9.4E-09	1.8672	8.5	8.3	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR





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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	10/29/2021	228	1.1E-08	1.9280	-	-	-	-	
						11/01/2021	231	1.1E-08	1.9439	8.1	8.1	-	-	
						11/05/2021	235	1.2E-08	1.9864	-	-	-	-	
						11/12/2021	242	9.3E-09	2.0274	8.2	8.2	591	1510	
						11/19/2021	249	1.2E-08	2.0850	-	-	-	-	
						11/24/2021	254	9.8E-09	2.1108	8.2	8.1	-	-	
						11/26/2021	256	1.1E-08	2.1339	-	-	-	-	
						12/03/2021	263	1.0E-08	2.1827	-	-	-	-	
						12/08/2021	268	9.4E-09	2.2043	8.3	8.1	-	-	
						12/10/2021	270	9.9E-09	2.2227	-	-	-	-	
						12/14/2021	274	1.1E-08	2.2543	8.1	7.9	653	1120	
						12/17/2021	277	1.1E-08	2.2847	-	-	-	-	
						12/21/2021	281	1.1E-08	2.3157	8.5	8.3	-	-	
						12/24/2021	284	1.1E-08	2.3456	-	-	-	-	
						12/30/2021	290	1.1E-08	2.3880	8.3	8.2	-	-	
						12/31/2021	291	1.1E-08	2.3996	-	-	-	-	
						01/07/2022	298	1.0E-08	2.4543	8.7	8.2	609	1010	
						01/14/2022	305	1.1E-08	2.5129	-	-	-	-	
						1/18/2022	309	9.6E-09	2.5343	8.0	8.1	-	-	
						1/21/2022	312	1.0E-08	2.5652	-	-	-	-	
1/28/2022	319	9.0E-09	2.6069	8.3	8.5	-	-							
2/4/2022	326	1.0E-08	2.6650	-	-	-	-							
2/7/2022	329	9.8E-09	2.6820	8.5	8.7	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	2/11/2022	333	1.0E-08	2.7173	-	-	-	-	
						2/17/2022	339	9.8E-09	2.7561	8.5	8.8	1213	-	
						2/18/2022	340	1.0E-08	2.7674	-	-	-	-	
						2/25/2022	347	1.1E-08	2.8240	8.9	9.1	1224	856	
						3/4/2022	354	1.1E-08	2.8832	-	-	-	-	
						3/7/2022	357	1.1E-08	2.9016	8.7	8.6	1226	-	
						3/11/2022	361	1.1E-08	2.9381	-	-	-	-	
						3/17/2022	367	9.7E-09	2.9759	8.9	8.8	1198	-	
						3/18/2022	368	1.0E-08	2.9860	-	-	-	-	
						3/25/2022	375	1.2E-08	3.0436	-	-	-	-	
						3/28/2022	378	1.1E-08	3.0694	8.3	8.5	1229	903	
						4/1/2022	382	1.1E-08	3.0983	-	-	-	-	
						4/7/2022	388	1.0E-08	3.1386	8.6	8.5	1238	-	
						4/8/2022	389	1.1E-08	3.1494	-	-	-	-	
						4/16/2022	397	1.1E-08	3.2061	7.8	8.0	1261	-	
						4/22/2022	403	9.9E-09	3.2603	-	-	-	-	
						4/27/2022	408	9.8E-09	3.2895	7.9	8.0	1237	972	
						4/29/2022	410	1.0E-08	3.3101	-	-	-	-	
						5/6/2022	417	1.1E-08	3.3638	-	-	-	-	
						5/7/2022	418	1.1E-08	3.3704	7.9	8.0	1345	-	
5/13/2022	424	1.1E-08	3.4264	-	-	-	-							
5/17/2022	428	1.1E-08	3.4517	7.8	8.0	1267	-							
5/20/2022	431	1.1E-08	3.4836	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	5/26/2022	437	1.1E-08	3.5267	8.1	8.3	1262	942	
						5/27/2022	438	1.1E-08	3.5385	-	-	-	-	
						6/3/2022	445	1.1E-08	3.5964	-	-	-	-	
						6/6/2022	448	1.1E-08	3.6124	8.0	8.2	1304	-	
						6/10/2022	452	1.1E-08	3.6501	-	-	-	-	
						6/16/2022	458	1.1E-08	3.6906	7.9	8.0	1281	-	
						6/17/2022	459	1.1E-08	3.7017	-	-	-	-	
						6/24/2022	466	1.1E-08	3.7603	-	-	-	-	
						6/27/2022	469	9.9E-09	3.7753	8.2	8.3	1253	945	
						7/1/2022	473	1.2E-08	3.8170	-	-	-	-	
						7/6/2022	478	1.2E-08	3.8543	8.1	8.1	1245	-	
						7/8/2022	480	1.2E-08	3.8776	-	-	-	-	
						7/15/2022	487	1.1E-08	3.9311	8.0	8.0	1250	-	
						7/22/2022	494	1.2E-08	3.9951	-	-	-	-	
						7/25/2022	497	1.2E-08	4.0130	8.2	8.3	1191	1046	
						7/29/2022	501	1.2E-08	4.0552	-	-	-	-	
						8/3/2022	506	1.1E-08	4.0903	8.0	8.1	1259	-	
						8/5/2022	508	1.2E-08	4.1136	-	-	-	-	
8/12/2022	515	1.1E-08	4.1683	8.0	8.1	1271	-							
8/19/2022	522	1.1E-08	4.2329	-	-	-	-							
8/22/2022	525	1.1E-08	4.2503	8.1	8.2	1246	1109							
8/26/2022	529	1.2E-08	4.2918	-	-	-	-							
8/31/2022	534	1.1E-08	4.3273	8.2	8.2	1248	-							

3-29-2023  
Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	9/2/2022	536	1.1E-08	4.3504	-	-	-	-	
						9/9/2022	543	1.1E-08	4.4039	8.5	8.4	1290	-	
						9/16/2022	550	1.2E-08	4.4677	-	-	-	-	
						9/20/2022	554	1.1E-08	4.4846	8.2	8.3	1264	1136	
						9/23/2022	557	1.2E-08	4.5256	-	-	-	-	
						9/28/2022	562	1.1E-08	4.5602	8.4	8.4	1140	-	
						9/30/2022	564	1.1E-08	4.5827	-	-	-	-	
						10/7/2022	571	1.1E-08	4.6360	8.0	8.1	1240	-	
						10/14/2022	578	1.1E-08	4.7000	8.3	8.3	1200	1101	
						10/21/2022	585	1.1E-08	4.7606	-	-	-	-	
						10/24/2022	588	1.1E-08	4.7785	8.4	8.2	1253	-	
						10/28/2022	592	1.1E-08	4.8193	-	-	-	-	
						11/3/2022	598	1.1E-08	4.8590	8.3	8.3	1207	-	
						11/4/2022	599	1.1E-08	4.8705	-	-	-	-	
						11/11/2022	606	1.1E-08	4.9299	8.5	8.4	1224	926	
						11/18/2022	613	9.7E-09	4.9876	-	-	-	-	
						11/23/2022	618	8.3E-09	5.0109	8.5	8.7	-	-	
						11/25/2022	620	9.8E-09	5.0305	-	-	-	-	
12/2/2022	627	8.9E-09	5.0759	-	-	-	-							
12/5/2022	630	8.8E-09	5.0894	8.4	8.5	1257	-							
12/9/2022	634	1.0E-08	5.1250	-	-	-	-							
12/16/2022	641	7.9E-09	5.1618	8.4	8.5	1190	894							
12/23/2022	648	8.8E-09	5.2138	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

2-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-1 (1-3)	20L149	20.4	105.7	26.0	101.6	12/31/2022	656	8.7E-09	5.2624	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	3/15/2021	0	2.4E-08	0.0000	-	-	-	-	
						3/22/2021	7	1.9E-08	0.0762	8.2	8.0	-	-	
						3/29/2021	14	2.0E-08	0.1547	8.2	8.1	-	-	
						4/05/2021	21	1.8E-08	0.2164	8.1	8.2	523	1271	
						4/12/2021	28	2.0E-08	0.2904	-	-	-	-	
						4/13/2021	29	2.0E-08	0.2961	8.3	8.3	-	-	
						4/19/2021	35	2.0E-08	0.3672	8.2	8.1	-	-	
						4/26/2021	42	1.9E-08	0.4413	8.1	8.0	578	1313	
						4/30/2021	46	2.1E-08	0.4969	8.4	8.1	-	-	
						5/05/2021	51	2.1E-08	0.5617	8.4	8.2	-	-	
						5/07/2021	53	2.0E-08	0.5909	-	-	-	-	
						5/10/2021	56	1.9E-08	0.6224	8.3	8.0	607	1081	
						5/14/2021	60	2.1E-08	0.6759	-	-	-	-	
						5/19/2021	65	2.0E-08	0.7406	8.0	8.2	-	-	
						5/21/2021	67	2.1E-08	0.7738	-	-	-	-	
						5/24/2021	70	2.1E-08	0.8050	8.2	8.2	666	1197	
						5/28/2021	74	2.1E-08	0.8595	8.3	8.1	-	-	
						6/02/2021	79	2.0E-08	0.9233	8.2	8.2	-	-	
6/04/2021	81	2.1E-08	0.9549	-	-	-	-							
6/07/2021	84	2.1E-08	0.9865	8.6	8.3	598	1074							
6/11/2021	88	2.2E-08	1.0419	8.4	8.1	-	-							
6/16/2021	93	2.1E-08	1.1071	8.4	8.0	-	-							
6/18/2021	95	2.1E-08	1.1396	-	-	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	6/21/2021	98	2.0E-08	1.1710	8.4	8.2	665	944	
						6/25/2021	102	2.2E-08	1.2298	-	-	-	-	
						6/29/2021	106	2.1E-08	1.2848	8.6	8.4	-	-	
						7/02/2021	109	1.9E-08	1.3242	8.6	8.1	618	1000	
						7/07/2021	114	2.0E-08	1.3932	8.1	8.1	-	-	
						7/09/2021	116	1.9E-08	1.4223	-	-	-	-	
						7/13/2021	120	2.0E-08	1.4630	8.3	8.4	-	-	
						7/16/2021	123	2.1E-08	1.5068	-	-	-	-	
						7/19/2021	126	2.0E-08	1.5349	8.2	8.4	612	974	
						7/23/2021	130	2.1E-08	1.5898	8.2	8.1	-	-	
						7/29/2021	136	2.0E-08	1.6629	8.2	8.1	-	-	
						7/30/2021	137	2.1E-08	1.6798	-	-	-	-	
						8/04/2021	142	1.8E-08	1.7315	8.3	8.2	610	933	
						8/06/2021	144	1.8E-08	1.7593	-	-	-	-	
						8/10/2021	148	2.0E-08	1.8002	8.2	8.1	-	-	
						8/13/2021	151	2.1E-08	1.8459	-	-	-	-	
						8/16/2021	154	2.1E-08	1.8754	8.3	8.1	-	-	
						8/20/2021	158	2.2E-08	1.9341	-	-	-	-	
						8/23/2021	161	1.9E-08	1.9568	8.1	8.3	582	857	
8/27/2021	165	2.1E-08	2.0127	-	-	-	-							
8/30/2021	168	2.1E-08	2.0365	8.5	8.3	-	-							
9/03/2021	172	2.0E-08	2.0908	8.7	8.2	-	-							
9/08/2021	177	2.1E-08	2.1424	8.2	8.1	622	844							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	9/10/2021	179	2.1E-08	2.1734	-	-	-	-	
						9/13/2021	182	1.9E-08	2.2019	8.2	8.2	-	-	
						9/17/2021	186	2.0E-08	2.2564	-	-	-	-	
						9/20/2021	189	1.9E-08	2.2802	8.2	8.3	-	-	
						9/24/2021	193	2.1E-08	2.3353	8.2	8.2	597	879	
						10/01/2021	200	1.7E-08	2.4097	8.4	8.4	-	-	
						10/07/2021	206	2.0E-08	2.4809	8.3	8.2	-	-	
						10/08/2021	207	1.9E-08	2.4941	-	-	-	-	
						10/14/2021	213	1.8E-08	2.5518	8.4	8.4	589	818	
						10/15/2021	214	1.8E-08	2.5654	-	-	-	-	
						10/22/2021	221	1.7E-08	2.6261	8.7	8.5	-	-	
						10/27/2021	226	2.0E-08	2.6889	8.6	8.4	-	-	
						10/29/2021	228	2.0E-08	2.7223	-	-	-	-	
						11/01/2021	231	2.1E-08	2.7543	8.1	8.1	610	831	
						11/05/2021	235	2.1E-08	2.8085	-	-	-	-	
						11/09/2021	239	1.8E-08	2.8361	8.8	8.5	-	-	
						11/12/2021	242	1.9E-08	2.8770	-	-	-	-	
						11/16/2021	246	1.8E-08	2.9080	8.8	8.3	-	-	
11/19/2021	249	2.2E-08	2.9551	-	-	-	-							
11/23/2021	253	2.2E-08	2.9935	8.8	8.3	661	783							
11/26/2021	256	2.2E-08	3.0400	-	-	-	-							
11/30/2021	260	1.9E-08	3.0726	8.8	8.3	-	-							
12/03/2021	263	2.1E-08	3.1182	-	-	-	-							

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Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	12/06/2021	266	2.0E-08	3.1463	8.3	8.1	-	-	
						12/10/2021	270	1.9E-08	3.1951	8.4	8.1	671	741	
						12/14/2021	274	1.9E-08	3.2281	7.8	8.0	-	-	
						12/17/2021	277	2.0E-08	3.2715	-	-	-	-	
						12/20/2021	280	2.1E-08	3.3014	8.3	8.1	-	-	
						12/24/2021	284	2.0E-08	3.3522	8.6	8.1	645	721	
						12/30/2021	290	2.0E-08	3.4220	8.6	8.4	-	-	
						12/31/2021	291	2.0E-08	3.4396	-	-	-	-	
						01/04/2022	295	2.0E-08	3.4863	8.1	8.0	-	-	
						01/07/2022	298	1.9E-08	3.5276	-	-	-	-	
						1/10/2022	301	1.7E-08	3.5536	8.2	8.0	649	720	
						1/14/2022	305	2.0E-08	3.6060	8.4	8.0	-	-	
						1/19/2022	310	1.9E-08	3.6684	8.5	8.1	-	-	
						1/21/2022	312	2.0E-08	3.7025	-	-	-	-	
						1/26/2022	317	1.8E-08	3.7442	8.3	8.4	1149	760	
						1/28/2022	319	1.8E-08	3.7723	-	-	-	-	
						2/1/2022	323	1.8E-08	3.8105	8.5	8.4	-	-	
						2/4/2022	326	1.9E-08	3.8526	-	-	-	-	
2/7/2022	329	1.9E-08	3.8801	8.7	8.5	-	-							
2/11/2022	333	1.9E-08	3.9313	-	-	-	-							
2/14/2022	336	1.8E-08	3.9571	8.8	8.2	1191	770							
2/18/2022	340	2.0E-08	4.0110	8.5	8.4	-	-							
2/23/2022	345	2.0E-08	4.0726	8.8	8.4	1180	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	2/25/2022	347	2.0E-08	4.1040	-	-	-	-	
						2/28/2022	350	2.0E-08	4.1370	8.9	8.7	1200	765	
						3/4/2022	354	2.1E-08	4.1917	-	-	-	-	
						3/7/2022	357	2.2E-08	4.2179	8.6	8.7	-	-	
						3/11/2022	361	2.1E-08	4.2733	-	-	-	-	
						3/14/2022	364	1.9E-08	4.2968	8.5	8.6	-	-	
						3/18/2022	368	2.0E-08	4.3514	-	-	-	-	
						3/21/2022	371	1.8E-08	4.3743	8.8	8.8	1211	800	
						3/25/2022	375	2.2E-08	4.4317	8.9	8.2	1230	-	
						3/30/2022	380	2.1E-08	4.4978	8.2	8.6	1220	-	
						4/1/2022	382	2.1E-08	4.5292	-	-	-	-	
						4/4/2022	385	2.1E-08	4.5628	8.1	8.6	1225	836	
						4/8/2022	389	2.1E-08	4.6180	-	-	-	-	
						4/9/2022	390	2.1E-08	4.6287	8.2	8.7	1222	-	
						4/14/2022	395	2.1E-08	4.6911	7.9	8.0	1278	-	
						4/15/2022	396	2.0E-08	4.7047	-	-	-	-	
						4/20/2022	401	1.8E-08	4.7578	7.8	7.9	1210		
						4/22/2022	403	1.9E-08	4.7842	-	-	-	-	
4/27/2022	408	1.9E-08	4.8344	7.9	8.0	1214	-							
4/29/2022	410	1.9E-08	4.8652	-	-	-	-							
5/2/2022	413	2.0E-08	4.8997	7.9	8.0	1220	-							
5/6/2022	417	2.1E-08	4.9558	-	-	-	-							
5/7/2022	418	2.1E-08	4.9674	7.8	7.8	1236	873							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	5/12/2022	423	2.1E-08	5.0318	7.7	7.9	1196	-	
						5/13/2022	424	2.1E-08	5.0504	-	-	-	-	
						5/17/2022	428	2.2E-08	5.1006	7.8	8.0	1239		
						5/20/2022	431	2.1E-08	5.1460	-	-	-	-	
						5/23/2022	434	2.1E-08	5.1748	7.9	8.3	1247	956	
						5/27/2022	438	2.2E-08	5.2328	-	-	-	-	
						5/28/2022	439	2.1E-08	5.2441	7.8	7.8	-	-	
						6/3/2022	445	2.1E-08	5.3162	8.0	8.1	1289	-	
						6/8/2022	450	2.1E-08	5.3852	8.0	8.1	1270	1536	
						6/10/2022	452	2.2E-08	5.4180	-	-	-	-	
						6/13/2022	455	2.2E-08	5.4529	8.2	8.3	1277	-	
						6/17/2022	459	2.2E-08	5.5106	8.1	8.1	1264	-	
						6/22/2022	464	2.1E-08	5.5783	7.9	8.1	1250	1771	
						6/24/2022	466	2.1E-08	5.6113	-	-	-	-	
						6/27/2022	469	2.1E-08	5.6448	8.4	8.3	1199	-	
						7/1/2022	473	2.2E-08	5.7032	-	-	-	-	
						7/5/2022	477	2.3E-08	5.7361	8.2	8.2	1276	-	
						7/8/2022	480	2.1E-08	5.7838	-	-	-	-	
7/11/2022	483	2.1E-08	5.8123	8.1	8.2	1271	1013							
7/15/2022	487	2.2E-08	5.8711	-	-	-	-							
7/18/2022	490	2.1E-08	5.8961	8.1	8.3	1251	-							
7/22/2022	494	2.3E-08	5.9550	-	-	-	-							
7/27/2022	499	2.2E-08	6.0271	8.5	8.6	1152	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	7/29/2022	501	2.2E-08	6.0446	8.0	8.2	1164	977	
						8/2/2022	505	2.2E-08	6.0952	7.9	8.2	1261	-	
						8/5/2022	508	2.2E-08	6.1437	-	-	-	-	
						8/8/2022	511	2.1E-08	6.1722	8.4	8.3	1264	-	
						8/12/2022	515	2.1E-08	6.2321	-	-	-	-	
						8/15/2022	518	2.2E-08	6.2569	8.9	8.4	1221	2090	
						8/19/2022	522	2.2E-08	6.3160	8.3	8.6	-	-	
						8/24/2022	527	2.1E-08	6.3850	7.9	8.1	1224	-	
						8/26/2022	529	2.2E-08	6.4180	-	-	-	-	
						8/29/2022	532	2.2E-08	6.4531	8.2	8.2	1244	1244	
						9/2/2022	536	2.2E-08	6.5122	8.3	8.3	1253	-	
						9/7/2022	541	2.1E-08	6.5807	8.1	8.1	1250	-	
						9/9/2022	543	2.1E-08	6.6150	-	-	-	-	
						9/12/2022	546	2.1E-08	6.6491	8.0	8.1	1168	1783	
						9/16/2022	550	2.2E-08	6.7092	8.6	8.5	1283	-	
						9/21/2022	555	2.1E-08	6.7757	8.5	8.6	1191	-	
						9/23/2022	557	2.1E-08	6.8100	-	-	-	-	
						9/26/2022	560	2.2E-08	6.8445	8.4	8.2	1239	1059	
9/30/2022	564	2.2E-08	6.9031	8.2	8.2	1196	-							
10/7/2022	571	2.1E-08	7.0035	-	-	-	-							
10/10/2022	574	2.1E-08	7.0365	8.9	8.3	1213	1045							
10/14/2022	578	2.2E-08	7.0950	8.2	8.1	1207	-							
10/19/2022	583	2.0E-08	7.1600	8.4	8.3	1201	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B2-ST-4 (47-49')	20L152	36.6	84.2	39.0	83.2	10/21/2022	585	1.9E-08	7.1910	-	-	-	-	
						10/24/2022	588	2.1E-08	7.2276	8.2	8.1	1190	-	
						10/28/2022	592	2.1E-08	7.2259	8.6	8.3	1231	-	
						11/2/2022	597	2.1E-08	7.3513	7.9	8.1	1312	-	
						11/4/2022	599	2.2E-08	7.3849	-	-	-	-	
						11/7/2022	602	2.2E-08	7.4202	8.3	8.2	1218	997	
						11/11/2022	606	2.2E-08	7.4791	8.1	8.3	-	-	
						11/18/2022	613	1.9E-08	7.5493	8.2	8.4	1215	-	
						11/23/2022	618	1.7E-08	7.5999	8.6	8.7	1193	1011	
						11/25/2022	620	1.9E-08	7.6286	-	-	-	-	
						12/2/2022	627	1.8E-08	7.7056	-	-	-	-	
						12/3/2022	628	1.7E-08	7.7151	8.8	8.8	-	-	
						12/5/2022	630	1.7E-08	7.7292	8.6	8.6	1194	-	
						12/9/2022	634	1.9E-08	7.7785	-	-	-	-	
						12/13/2022	638	1.7E-08	7.8139	8.6	8.9	1238	1043	
						12/16/2022	641	1.8E-08	7.8475	-	-	-	-	
12/20/2022	645	1.6E-08	7.8684	9.4	9.0	1290	-							
12/23/2022	648	1.8E-08	7.9165	-	-	-	-							
12/31/2022	656	1.6E-08	7.9960	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	3/15/2021	0	2.2E-08	0.0000	-	-	-	-	
						3/22/2021	7	2.0E-08	0.1144	8.5	8.2	-	-	
						3/29/2021	14	1.9E-08	0.2120	8.1	8.2	-	-	
						4/05/2021	21	1.7E-08	0.3126	8.2	8.2	633	1118	
						4/12/2021	28	1.9E-08	0.4132	-	-	-	-	
						4/13/2021	29	1.9E-08	0.4221	8.3	8.1	-	-	
						4/19/2021	35	1.9E-08	0.5181	8.2	8.1	-	-	
						4/26/2021	42	1.7E-08	0.6197	8.4	8.0	648	1027	
						5/03/2021	49	1.9E-08	0.7283	8.5	8.1	-	-	
						5/10/2021	56	1.8E-08	0.8335	8.1	7.8	-	-	
						5/14/2021	60	1.9E-08	0.9042	8.5	8.1	719	980	
						5/20/2021	66	1.8E-08	1.0021	8.6	8.4	-	-	
						5/21/2021	67	1.8E-08	1.0259	-	-	-	-	
						5/25/2021	71	1.9E-08	1.0878	8.1	8.1	-	-	
						5/28/2021	74	1.9E-08	1.1473	8.3	8.2	611	1024	
						6/04/2021	81	1.8E-08	1.2549	8.6	8.0	-	-	
						6/10/2021	87	1.9E-08	1.3556	8.8	8.6	-	-	
						6/11/2021	88	1.9E-08	1.3775	-	-	-	-	
6/16/2021	93	1.8E-08	1.4522	8.5	8.1	699	927							
6/18/2021	95	1.8E-08	1.4956	-	-	-	-							
6/22/2021	99	1.8E-08	1.5517	8.2	7.9	-	-							
6/25/2021	102	2.0E-08	1.6200	-	-	-	-							
6/28/2021	105	1.9E-08	1.6642	8.3	8.6	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	7/02/2021	109	2.0E-08	1.7456	8.2	7.8	-	-	
						7/08/2021	115	1.8E-08	1.8481	8.2	8.2	735	816	
						7/09/2021	116	1.8E-08	1.8697	-	-	-	-	
						7/14/2021	121	1.9E-08	1.9475	8.3	8.1	-	-	
						7/16/2021	123	1.8E-08	1.9823	-	-	-	-	
						7/20/2021	127	1.9E-08	2.0134	8.2	8.2	-	-	
						7/23/2021	130	1.9E-08	2.0741	-	-	-	-	
						7/27/2021	134	1.8E-08	2.1274	8.7	8.2	681	862	
						7/30/2021	137	1.8E-08	2.1826	-	-	-	-	
						8/03/2021	141	1.6E-08	2.2278	8.4	8.3	-	-	
						8/06/2021	144	1.6E-08	2.2787	-	-	-	-	
						8/10/2021	148	1.7E-08	2.3263	8.1	8.1	-	-	
						8/13/2021	151	1.8E-08	2.3830	-	-	-	-	
						8/16/2021	154	1.9E-08	2.4223	8.1	8.1	714	817	
						8/20/2021	158	1.8E-08	2.4934	-	-	-	-	
						8/23/2021	161	1.6E-08	2.5242	8.1	8.1	-	-	
						8/27/2021	165	1.8E-08	2.5950	-	-	-	-	
						8/30/2021	168	1.9E-08	2.6279	8.1	8.2	-	-	
9/03/2021	172	1.8E-08	2.6980	8.4	8.1	647	811							
9/09/2021	178	1.7E-08	2.7929	8.1	8.0	-	-							
9/10/2021	179	1.7E-08	2.8139	-	-	-	-							
9/14/2021	183	1.8E-08	2.8731	8.0	7.9	-	-							
9/17/2021	186	1.7E-08	2.9252	-	-	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	9/21/2021	190	1.8E-08	2.9740	8.3	8.1	600	792	
						9/24/2021	193	1.8E-08	3.0317	-	-	-	-	
						9/28/2021	197	1.6E-08	3.0759	8.1	8.0	-	-	
						10/01/2021	200	1.6E-08	3.1277	-	-	-	-	
						10/05/2021	204	1.8E-08	3.1790	8.2	8.1	-	-	
						10/08/2021	207	1.8E-08	3.2357	-	-	-	-	
						10/12/2021	211	1.7E-08	3.2808	8.1	8.0	580	777	
						10/15/2021	214	1.8E-08	3.3342	-	-	-	-	
						10/19/2021	218	1.4E-08	3.3741	8.1	8.2	-	-	
						10/22/2021	221	1.6E-08	3.4245	-	-	-	-	
						10/26/2021	225	1.7E-08	3.4754	8.5	8.2	-	-	
						10/29/2021	228	1.8E-08	3.5315	-	-	-	-	
						11/01/2021	231	1.9E-08	3.5702	8.1	8.0	669	672	
						11/05/2021	235	1.9E-08	3.6440	-	-	-	-	
						11/09/2021	239	1.6E-08	3.6822	8.0	8.0	-	-	
						11/12/2021	242	1.7E-08	3.7371	-	-	-	-	
						11/16/2021	246	1.6E-08	3.7819	8.2	8.1	-	-	
						11/19/2021	249	2.1E-08	3.8441	-	-	-	-	
						11/24/2021	254	2.0E-08	3.9063	8.5	8.2	601	800	
						11/26/2021	256	2.1E-08	3.9536	-	-	-	-	
12/02/2021	262	1.7E-08	4.0228	8.1	8.2	-	-							
12/03/2021	263	1.7E-08	4.0475	-	-	-	-							
12/08/2021	268	1.8E-08	4.1201	8.1	7.9	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	12/10/2021	270	1.8E-08	4.1674	-	-	-	-	
						12/14/2021	274	1.8E-08	4.2369	7.9	7.7	579	758	
						12/17/2021	277	1.8E-08	4.2936	-	-	-	-	
						12/20/2021	280	1.8E-08	4.3333	8.3	7.9	-	-	
						12/24/2021	284	1.8E-08	4.4010	-	-	-	-	
						12/28/2021	288	1.8E-08	4.4449	8.8	8.5	-	-	
						12/31/2021	291	1.9E-08	4.5034	-	-	-	-	
						01/04/2022	295	1.8E-08	4.5510	8.1	7.8	652	786	
						01/07/2022	298	1.8E-08	4.6086	-	-	-	-	
						1/10/2022	301	1.7E-08	4.6449	8.4	7.9	-	-	
						01/14/2022	305	1.8E-08	4.7178	-	-	-	-	
						1/18/2022	309	1.6E-08	4.7602	8.0	7.9	-	-	
						1/21/2022	312	1.8E-08	4.8233	-	-	-	-	
						1/24/2022	315	1.8E-08	4.8581	8.2	7.9	1051	790	
						1/28/2022	319	1.8E-08	4.9267	-	-	-	-	
						1/31/2022	322	1.6E-08	5.0304	8.2	8.3	-	-	
						2/7/2022	329	1.7E-08	5.0640	8.4	8.2	-	-	
						2/11/2022	333	1.7E-08	5.1323	-	-	-	-	
						2/14/2022	336	1.7E-08	5.1676	8.5	8.5	1183	849	
						2/18/2022	340	1.9E-08	5.2408	8.5	8.0	-	-	
2/23/2022	345	1.9E-08	5.3296	8.5	8.5	-	-							
2/25/2022	347	1.9E-08	5.3705	-	-	-	-							
2/28/2022	350	1.9E-08	5.4168	8.5	8.5	1177	729							

3-29-2023  
Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	3/4/2022	354	1.9E-08	5.4927	-	-	-	-	
						3/7/2022	357	2.0E-08	5.5306	8.6	8.5	-	-	
						3/11/2022	361	2.0E-08	5.6092	-	-	-	-	
						3/14/2022	364	1.8E-08	5.6440	8.5	8.8	-	-	
						3/18/2022	368	1.9E-08	5.7181	-	-	-	-	
						3/21/2022	371	1.7E-08	5.7507	8.1	8.4	1150	783	
						3/25/2022	375	2.1E-08	5.8285	9.1	8.9	1230	-	
						3/31/2022	381	2.0E-08	5.9182	8.6	7.9	1208	-	
						4/1/2022	382	2.1E-08	5.9426	-	-	-	-	
						4/5/2022	386	1.9E-08	6.0087	8.2	8.6	1274	741	
						4/8/2022	389	2.0E-08	6.0719	-	-	-	-	
						4/11/2022	392	1.8E-08	6.1097	7.5	7.6	1249	-	
						4/16/2022	397	2.0E-08	6.2036	7.7	8.1	1223	-	
						4/22/2022	403	1.7E-08	6.2945	-	-	-	-	
						4/23/2022	404	1.8E-08	6.3079	7.9	7.9	1261	972	
						4/29/2022	410	1.9E-08	6.4110	8.3	8.0	1241	-	
						5/5/2022	416	1.9E-08	6.5156	8.2	8.1	1294	-	
						5/6/2022	417	2.0E-08	6.5409	-	-	-	-	
5/11/2022	422	1.9E-08	6.6190	7.9	8.0	1247	925							
5/13/2022	424	2.0E-08	6.6666	-	-	-	-							
5/16/2022	427	2.1E-08	6.7160	8.0	8.1	1284	-							
5/20/2022	431	2.0E-08	6.7928	-	-	-	-							
5/23/2022	434	1.9E-08	6.8273	7.9	8.1	1290	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	5/27/2022	438	2.1E-08	6.9063	-	-	-	-	
						5/28/2022	439	2.0E-08	6.9218	7.9	8.0	1250	-	
						6/3/2022	445	2.0E-08	7.0243	8.1	8.1	1241	-	
						6/8/2022	450	2.1E-08	7.1197	8.4	8.1	1247	-	
						6/10/2022	452	2.1E-08	7.1652	-	-	-	-	
						6/13/2022	455	2.1E-08	7.2155	8.2	8.2	1249	813	
						6/17/2022	459	2.1E-08	7.2969	-	-	-	-	
						6/20/2022	462	2.0E-08	7.3329	8.2	8.1	1287	-	
						6/24/2022	466	2.1E-08	7.4128	-	-	-	-	
						6/27/2022	469	1.9E-08	7.4476	8.2	8.3	1210	-	
						7/1/2022	473	2.1E-08	7.5290	-	-	-	-	
						7/5/2022	477	2.2E-08	7.5766	8.2	8.5	1183	1104	
						7/8/2022	480	2.1E-08	7.6424	-	-	-	-	
						7/11/2022	483	2.0E-08	7.6827	8.2	8.2	1250	-	
						7/15/2022	487	2.2E-08	7.7647	-	-	-	-	
						7/18/2022	490	2.0E-08	7.8010	8.1	8.2	1152	-	
						7/22/2022	494	2.2E-08	7.8825	-	-	-	-	
						7/25/2022	497	2.0E-08	7.9184	8.0	8.1	1118	834	
						7/28/2022	500	2.1E-08	7.9828	8.3	8.2	1191	-	
						7/29/2022	501	2.1E-08	8.0033	-	-	-	-	
8/2/2022	505	2.1E-08	8.0774	7.9	8.1	1249	-							
8/5/2022	508	2.1E-08	8.1445	-	-	-	-							
8/8/2022	511	2.0E-08	8.1856	8.2	8.3	1203	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79')	20L160	20.5	106.6	19.5	111.0	8/12/2022	515	2.2E-08	8.2683	-	-	-	-	
						8/15/2022	518	2.0E-08	8.3036	8.2	8.1	1224	-	
						8/19/2022	522	2.1E-08	8.3839	8.4	8.3	1178	-	
						8/24/2022	527	2.1E-08	8.4790	8.1	8.2	1231	801	
						8/26/2022	529	2.1E-08	8.5254	-	-	-	-	
						8/29/2022	532	2.1E-08	8.5751	8.1	8.3	1242	-	
						9/2/2022	536	2.2E-08	8.6559	8.1	8.3	1237	-	
						9/7/2022	541	2.0E-08	8.7501	8.1	8.2	1218	922	
						9/9/2022	543	2.0E-08	8.7965	-	-	-	-	
						9/12/2022	546	2.1E-08	8.8447	8.1	8.2	1194	-	
						9/16/2022	550	2.1E-08	8.9270	8.2	8.2	1179	-	
						9/22/2022	556	1.9E-08	9.0316	7.9	8.0	1238	1133	
						9/23/2022	557	2.0E-08	9.0584	-	-	-	-	
						9/27/2022	561	2.1E-08	9.1280	8.1	8.1	1224	-	
						9/30/2022	564	2.1E-08	9.1938	-	-	-	-	
						10/3/2022	567	2.0E-08	9.2344	8.4	8.3	1212	-	
						10/7/2022	571	2.1E-08	9.3149	8.2	8.2	1195	982	
						10/12/2022	576	1.9E-08	9.4067	8.8	8.3	1250	-	
10/14/2022	578	2.1E-08	9.4537	-	-	-	-							
10/18/2022	582	1.9E-08	9.5122	8.5	8.2	1191	-							
10/21/2022	585	1.9E-08	9.5717	-	-	-	-							
10/24/2022	588	2.0E-08	9.6153	8.6	8.3	1186	870							
10/28/2022	592	2.0E-08	9.6949	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B3-ST-5 (77-79)	20L160	20.5	106.6	19.5	111.0	10/31/2022	595	2.0E-08	9.7324	8.0	8.1	1236	-	
						11/4/2022	599	2.1E-08	9.8135	-	-	-	-	
						11/7/2022	602	2.0E-08	9.8507	8.2	8.3	1195	-	
						11/11/2022	606	2.1E-08	9.9319	8.1	8.3	1331	907	
						11/18/2022	613	1.7E-08	10.0270	8.3	8.4	1397	-	
						11/25/2022	620	1.6E-08	10.1139	-	-	-	-	
						11/30/2022	625	1.6E-08	10.1911	8.6	8.8	1256	-	
						12/1/2022	626	1.6E-08	10.2008	8.5	8.6	1161	931	
						12/2/2022	627	1.5E-08	10.2170	-	-	-	-	
						12/8/2022	633	1.4E-08	10.2911	8.3	8.5	1376	-	
						12/9/2022	634	1.5E-08	10.3122	-	-	-	-	
						12/16/2022	641	1.5E-08	10.4070	8.6	8.7	1213	-	
						12/22/2022	647	1.3E-08	10.4771	8.6	8.6	1273	955	
						12/23/2022	648	1.5E-08	10.4994	-	-	-	-	
12/31/2022	656	1.6E-08	10.6189	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	3/15/2021	0	2.7E-08	0.0000	-	-	-	-	
						3/19/2021	4	3.0E-08	0.0694	8.6	8.4	-	-	
						3/22/2021	7	2.9E-08	0.1236	-	-	-	-	
						3/24/2021	9	3.0E-08	0.1481	8.7	8.2	-	-	
						3/29/2021	14	2.5E-08	0.2201	8.4	8.3	565	910	
						4/02/2021	18	2.3E-08	0.2835	8.5	8.1	-	-	
						4/05/2021	21	2.3E-08	0.3313	-	-	-	-	
						4/07/2021	23	2.4E-08	0.3526	7.9	8.0	-	-	
						4/12/2021	28	2.6E-08	0.4258	-	-	-	-	
						4/13/2021	29	2.5E-08	0.4337	7.7	8.0	661	930	
						4/19/2021	35	2.4E-08	0.5144	8.0	8.0	-	-	
						4/23/2021	39	2.5E-08	0.5782	8.5	8.7	-	-	
						4/26/2021	42	2.5E-08	0.6278	-	-	-	-	
						4/27/2021	43	2.5E-08	0.6412	8.1	8.0	586	823	
						5/03/2021	49	2.6E-08	0.7411	8.4	8.1	-	-	
						5/07/2021	53	2.7E-08	0.8047	8.7	8.1	-	-	
						5/12/2021	58	2.5E-08	0.8788	8.3	8.1	518	788	
						5/14/2021	60	2.6E-08	0.9138	-	-	-	-	
5/17/2021	63	2.5E-08	0.9507	8.2	8.2	-	-							
5/21/2021	67	2.6E-08	1.0152	7.7	7.8	-	-							
5/25/2021	71	2.6E-08	1.0790	7.8	7.8	584	746							
5/28/2021	74	2.7E-08	1.1324	7.8	8.0	-	-							
6/01/2021	78	2.7E-08	1.1968	7.9	7.9	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	6/04/2021	81	2.6E-08	1.2483	8.0	7.9	586	778	
						6/08/2021	85	2.6E-08	1.3136	8.1	8.2	-	-	
						6/11/2021	88	2.6E-08	1.3669	8.2	8.1	-	-	
						6/15/2021	92	2.6E-08	1.4316	8.2	8.2	597	730	
						6/18/2021	95	2.6E-08	1.4863	8.1	8.2	-	-	
						6/23/2021	100	2.5E-08	1.5629	8.4	8.3	-	-	
						6/25/2021	102	2.7E-08	1.6056	-	-	-	-	
						6/28/2021	105	2.6E-08	1.6453	8.5	8.3	650	774	
						7/02/2021	109	2.7E-08	1.7123	8.2	7.8	-	-	
						7/06/2021	113	2.7E-08	1.7795	8.3	8.4	-	-	
						7/09/2021	116	2.5E-08	1.8314	8.5	8.1	710	830	
						7/14/2021	121	2.6E-08	1.9130	8.3	8.2	-	-	
						7/16/2021	123	2.8E-08	1.9569	-	-	-	-	
						7/19/2021	126	2.7E-08	1.9941	8.3	8.2	-	-	
						7/23/2021	130	2.6E-08	2.0575	8.4	8.2	651	734	
						7/28/2021	135	2.6E-08	2.1330	8.2	8.2	-	-	
						7/30/2021	137	2.6E-08	2.1727	-	-	-	-	
						8/03/2021	141	2.3E-08	2.2186	8.3	8.2	-	-	
8/06/2021	144	2.4E-08	2.2681	-	-	-	-							
8/09/2021	147	2.5E-08	2.3002	8.3	8.2	651	749							
8/13/2021	151	2.7E-08	2.3653	8.1	8.1	-	-							
8/17/2021	155	2.8E-08	2.4344	8.3	8.3	-	-							
8/20/2021	158	2.7E-08	2.4869	8.3	8.2	611	671							

3-29-2023  
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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	8/25/2021	163	2.5E-08	2.5687	8.0	8.0	-	-	
						8/27/2021	165	2.5E-08	2.6071	-	-	-	-	
						8/30/2021	168	2.7E-08	2.6423	7.9	8.0	-	-	
						9/03/2021	172	2.5E-08	2.7066	8.1	8.1	571	696	
						9/07/2021	176	2.7E-08	2.7704	8.2	8.2	-	-	
						9/10/2021	179	2.6E-08	2.8255	8.4	8.2	-	-	
						9/14/2021	183	2.5E-08	2.8889	8.0	8.0	631	651	
						9/17/2021	186	2.4E-08	2.9386	-	-	-	-	
						9/20/2021	189	2.5E-08	2.9693	8.1	8.2	-	-	
						9/24/2021	193	2.6E-08	3.0364	8.0	8.0	-	-	
						9/28/2021	197	2.5E-08	3.0976	8.1	8.2	571	632	
						10/01/2021	200	2.4E-08	3.1463	-	-	-	-	
						10/07/2021	206	2.6E-08	3.2321	8.2	8.1	-	-	
						10/08/2021	207	2.6E-08	3.2511	-	-	-	-	
						10/12/2021	211	2.4E-08	3.3017	8.1	8.1	568	659	
						10/15/2021	214	2.4E-08	3.3497	-	-	-	-	
						10/18/2021	217	2.1E-08	3.3766	8.4	8.2	-	-	
						10/22/2021	221	2.4E-08	3.4364	-	-	-	-	
10/26/2021	225	2.6E-08	3.5019	8.2	8.1	527	653							
10/29/2021	228	2.5E-08	3.5514	-	-	-	-							
11/01/2021	231	2.5E-08	3.5824	8.2	8.2	-	-							
11/05/2021	235	2.5E-08	3.6451	8.4	8.3	-	-							
11/09/2021	239	2.4E-08	3.7083	8.5	8.2	667	662							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.





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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	11/12/2021	242	2.4E-08	3.7578	-	-	-	-	
						11/16/2021	246	2.2E-08	3.7928	8.4	8.2	-	-	
						11/19/2021	249	2.7E-08	3.8436	-	-	-	-	
						11/21/2021	251	2.6E-08	3.8675	8.5	8.2	-	-	
						11/26/2021	256	2.5E-08	3.9386	-	-	-	-	
						11/30/2021	260	2.3E-08	3.9661	8.4	8.2	669	665	
						12/03/2021	263	2.5E-08	4.0184	-	-	-	-	
						12/07/2021	267	2.4E-08	4.0560	8.6	8.4	-	-	
						12/10/2021	270	2.4E-08	4.0703	-	-	-	-	
						12/14/2021	274	2.3E-08	4.1083	8.7	8.2	-	-	
						12/17/2021	277	2.5E-08	4.1600	-	-	-	-	
						12/20/2021	280	2.5E-08	4.1905	8.2	8.0	580	688	
						12/24/2021	284	2.5E-08	4.2524	-	-	-	-	
						12/28/2021	288	2.4E-08	4.2850	8.2	8.1	-	-	
						12/31/2021	291	2.5E-08	4.3382	-	-	-	-	
						01/03/2022	294	2.5E-08	4.3687	8.9	8.5	-	-	
						01/07/2022	298	2.5E-08	4.4328	8.3	7.8	645	689	
						1/12/2022	303	2.5E-08	4.5079	8.7	8.8	-	-	
1/14/2022	305	2.5E-08	4.5459	-	-	-	-							
1/18/2022	309	2.5E-08	4.5933	8.1	8.0	-	-							
1/22/2022	313	2.5E-08	4.6599	7.7	8.0	1072	668							
1/28/2022	319	2.4E-08	4.7378	7.9	7.9	-	-							
2/2/2022	324	2.3E-08	4.8125	9.0	8.6	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	2/4/2022	326	2.4E-08	4.8490	-	-	-	-	
						2/7/2022	329	2.4E-08	4.8863	8.4	8.5	1148	672	
						2/11/2022	333	2.3E-08	4.9476	8.6	8.6	-	-	
						2/16/2022	338	2.4E-08	5.0232	8.2	8.3	-	-	
						2/18/2022	340	2.5E-08	5.0614	-	-	-	-	
						2/21/2022	343	2.5E-08	5.0994	8.3	8.6	1167	696	
						2/25/2022	347	2.6E-08	5.1632	8.9	8.6	-	-	
						3/3/2022	353	2.5E-08	5.2479	8.4	8.5	-	-	
						3/4/2022	354	2.5E-08	5.2686	-	-	-	-	
						3/7/2022	357	2.8E-08	5.3156	8.6	8.7	1167	697	
						3/11/2022	361	2.7E-08	5.3830	8.8	8.6	-	-	
						3/16/2022	366	2.4E-08	5.4466	8.8	8.8	-	-	
						3/18/2022	368	2.6E-08	5.4857	-	-	-	-	
						3/21/2022	371	2.4E-08	5.5222	8.8	8.6	1174	726	
						3/25/2022	375	2.8E-08	5.5901	8.7	8.8	-	-	
						3/29/2022	379	2.6E-08	5.6584	8.6	8.8	-	-	
						4/1/2022	382	2.7E-08	5.7124	8.2	8.7	1196	811	
						4/5/2022	386	2.6E-08	5.7786	7.9	8.6	1232	-	
4/8/2022	389	2.7E-08	5.8324	-	-	-	-							
4/9/2022	390	2.7E-08	5.8467	7.9	8.3	1228	-							
4/14/2022	395	2.6E-08	5.9226	8.1	8.2	1228	923							
4/15/2022	396	2.6E-08	5.9412	-	-	-	-							
4/20/2022	401	2.2E-08	6.0010	7.7	7.7	1246	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	4/22/2022	403	2.0E-08	6.0228	-	-	-	-	
						4/27/2022	408	2.2E-08	6.0866	7.9	7.8	1228	-	
						4/29/2022	410	2.3E-08	6.1250	-	-	-	-	
						5/2/2022	413	2.6E-08	6.1651	7.8	8.0	1186	874	
						5/6/2022	417	2.7E-08	6.2322	8.0	8.0	1254	-	
						5/11/2022	422	2.6E-08	6.3207	7.9	8.0	1226	-	
						5/13/2022	424	2.6E-08	6.3694	-	-	-	-	
						5/17/2022	428	2.6E-08	6.4304	7.8	7.9	1214	871	
						5/20/2022	431	2.6E-08	6.4855	-	-	-	-	
						5/23/2022	434	2.5E-08	6.5173	8.1	8.1	1228	-	
						5/27/2022	438	2.8E-08	6.5863	7.9	8.0	1239	-	
						5/31/2022	442	2.6E-08	6.6531	8.0	8.0	1246	-	
						6/3/2022	445	2.7E-08	6.7084	-	-	-	-	
						6/4/2022	446	2.7E-08	6.7244	7.9	7.9	1282	-	
						6/9/2022	451	2.5E-08	6.7984	7.9	8.0	1228	-	
						6/10/2022	452	2.6E-08	6.8198	-	-	-	-	
						6/13/2022	455	2.8E-08	6.8685	8.3	8.2	1212	1296	
						6/17/2022	459	2.8E-08	6.9374	7.9	8.1	1251	-	
						6/21/2022	463	2.8E-08	7.0059	7.9	8.1	1259	-	
						6/24/2022	466	2.7E-08	7.0614	-	-	-	-	
6/27/2022	469	2.5E-08	7.0921	8.1	8.2	1229	1237							
7/1/2022	473	2.8E-08	7.1605	8.1	8.2	1222	-							
7/5/2022	477	3.0E-08	7.2337	8.0	8.2	1215	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	7/8/2022	480	2.8E-08	7.2913	-	-	-	-	
						7/11/2022	483	2.6E-08	7.3233	8.1	8.2	1203	938	
						7/15/2022	487	2.8E-08	7.3925	8.3	8.3	1242	-	
						7/19/2022	491	2.8E-08	7.4631	8.0	8.0	1228	-	
						7/22/2022	494	2.8E-08	7.5214	-	-	-	-	
						7/25/2022	497	2.8E-08	7.5536	8.1	8.2	1176	1521	
						7/28/2022	500	2.7E-08	7.6087	8.1	8.2	1187	-	
						7/29/2022	501	2.8E-08	7.6296	-	-	-	-	
						8/1/2022	504	2.8E-08	7.6770	8.2	8.3	1266	-	
						8/5/2022	508	2.8E-08	7.7479	7.9	8.0	1174	1637	
						8/9/2022	512	2.7E-08	7.8162	8.3	8.5	1245	-	
						8/12/2022	515	2.8E-08	7.8744	-	-	-	-	
						8/15/2022	518	2.7E-08	7.9059	8.1	8.2	1223	-	
						8/19/2022	522	2.7E-08	7.9746	8.2	8.3	1230	987	
						8/23/2022	526	2.8E-08	8.0433	8.1	8.2	1213	-	
						8/26/2022	529	2.7E-08	8.0997	8.3	8.3	1276	-	
						8/30/2022	533	2.8E-08	8.1695	7.9	8.0	1192	1371	
						9/2/2022	536	2.8E-08	8.2265	8.1	8.1	1228	-	
9/6/2022	540	2.7E-08	8.2946	8.3	8.3	1275	-							
9/9/2022	543	2.7E-08	8.3511	8.3	8.4	1208	977							
9/13/2022	547	2.4E-08	8.4179	8.1	8.2	1218	-							
9/16/2022	550	2.7E-08	8.4749	8.2	8.2	1204	-							
9/20/2022	554	2.6E-08	8.5417	8.3	8.3	1222	1156							

3-29-2023  
Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B4-ST-3 (47-49')	20L164	42.1	80.7	38.8	84.3	9/23/2022	557	2.6E-08	8.5957	-	-	-	-	
						9/26/2022	560	2.7E-08	8.6288	8.2	8.1	1201	-	
						9/30/2022	564	2.7E-08	8.6993	8.3	8.2	1118	-	
						10/5/2022	569	2.6E-08	8.7768	8.2	8.2	1143	973	
						10/7/2022	571	2.6E-08	8.8152	-	-	-	-	
						10/14/2022	578	2.7E-08	8.9223	-	-	-	-	
						10/19/2022	583	2.4E-08	8.9966	8.2	8.3	1172	1000	
						10/21/2022	585	2.4E-08	9.0314	-	-	-	-	
						10/28/2022	592	2.4E-08	9.1356	-	-	-	-	
						11/1/2022	596	2.5E-08	9.2011	8.4	8.4	1214	1062	
						11/4/2022	599	2.6E-08	9.2557	-	-	-	-	
						11/11/2022	606	2.6E-08	9.3554	-	-	-	-	
						11/18/2022	613	2.2E-08	9.4592	8.0	8.1	1283	1042	
						11/25/2022	620	2.3E-08	9.5448	-	-	-	-	
						12/2/2022	627	2.1E-08	9.6363	-	-	-	-	
						12/9/2022	634	2.2E-08	9.7330	-	-	-	-	
						12/13/2022	638	2.1E-08	9.7763	-	-	-	-	
12/16/2022	641	2.1E-08	9.8143	-	-	-	-							
12/20/2022	645	1.9E-08	9.8368	8.5	8.5	1243	1090							
12/23/2022	648	2.1E-08	9.8920	-	-	-	-							
12/31/2022	656	2.1E-08	10.0045	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 1)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	3/15/2021	0	1.7E-08	0.0000	-	-	-	-	
						3/22/2021	7	1.6E-08	0.0979	8.4	8.0	-	-	
						3/29/2021	14	1.4E-08	0.1870	-	-	-	-	
						3/30/2021	15	1.4E-08	0.1939	8.4	8.3	-	-	
						4/02/2021	18	1.5E-08	0.2308	8.5	8.4	605	2010	
						4/05/2021	21	1.6E-08	0.2786	-	-	-	-	
						4/09/2021	25	1.5E-08	0.3212	7.9	8.0	-	-	
						4/12/2021	28	1.6E-08	0.3695	-	-	-	-	
						4/16/2021	32	1.5E-08	0.4124	8.6	8.5	-	-	
						4/19/2021	35	1.6E-08	0.4650	-	-	-	-	
						4/23/2021	39	1.3E-08	0.5034	8.5	8.3	676	1372	
						4/26/2021	42	1.1E-08	0.5235	-	-	-	-	
						5/05/2021	51	7.7E-09	0.5955	8.5	8.2	-	-	
						5/07/2021	53	1.2E-08	0.6300	-	-	-	-	
						5/12/2021	58	1.5E-08	0.6886	8.5	8.3	-	-	
						5/14/2021	60	1.6E-08	0.7225	-	-	-	-	
						5/18/2021	64	1.6E-08	0.7744	8.3	8.2	697	1569	
						5/21/2021	67	1.4E-08	0.8261	-	-	-	-	
5/24/2021	70	1.3E-08	0.8612	8.4	8.3	-	-							
5/28/2021	74	1.8E-08	0.9284	8.5	8.1	-	-							
6/04/2021	81	1.5E-08	1.0236	8.3	8.2	760	1192							
6/11/2021	88	1.6E-08	1.1178	8.2	8.5	-	-							
6/18/2021	95	1.5E-08	1.2151	8.1	8.4	-	-							

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR



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**Test Results Summary (Page 2)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	6/24/2021	101	1.6E-08	1.3021	8.6	8.0	679	1067	
						6/25/2021	102	1.6E-08	1.3213	-	-	-	-	
						6/29/2021	106	1.6E-08	1.3805	8.3	8.0	-	-	
						7/02/2021	109	1.6E-08	1.4321	-	-	-	-	
						7/06/2021	113	1.6E-08	1.4840	8.6	8.1	-	-	
						7/09/2021	116	1.5E-08	1.5320	-	-	-	-	
						7/13/2021	120	1.5E-08	1.5750	8.3	8.3	598	1134	
						7/16/2021	123	1.6E-08	1.6254	-	-	-	-	
						7/21/2021	128	1.4E-08	1.6776	8.2	8.1	-	-	
						7/23/2021	130	1.5E-08	1.7109	-	-	-	-	
						7/28/2021	135	1.5E-08	1.7692	8.1	8.1	-	-	
						7/30/2021	137	1.3E-08	1.7980	-	-	-	-	
						8/06/2021	144	1.3E-08	1.8751	8.6	8.4	733	1040	
						8/13/2021	151	1.4E-08	1.9154	8.1	8.1	-	-	
						8/20/2021	158	1.4E-08	2.0174	8.2	8.1	-	-	
						8/26/2021	164	1.4E-08	2.1000	8.5	8.1	695	1100	
						8/27/2021	165	1.4E-08	2.1204	-	-	-	-	
						9/01/2021	170	1.5E-08	2.1843	8.1	8.2	-	-	
9/03/2021	172	1.4E-08	2.2170	-	-	-	-							
9/08/2021	177	1.4E-08	2.2738	8.1	8.1	-	-							
9/10/2021	179	1.4E-08	2.3071	-	-	-	-							
9/14/2021	183	1.4E-08	2.3527	8.2	8.1	569	832							
9/17/2021	186	1.4E-08	2.3959	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 3)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	9/21/2021	190	1.5E-08	2.4412	8.1	8.1	-	-	
						9/24/2021	193	1.5E-08	2.4917	-	-	-	-	
						9/28/2021	197	1.4E-08	2.5334	8.2	8.1	-	-	
						10/01/2021	200	1.4E-08	2.5769	-	-	-	-	
						10/05/2021	204	1.5E-08	2.6225	8.1	8.1	555	771	
						10/08/2021	207	1.5E-08	2.6685	-	-	-	-	
						10/14/2021	213	1.3E-08	2.7240	8.0	8.1	-	-	
						10/15/2021	214	1.4E-08	2.7402	-	-	-	-	
						10/22/2021	221	1.2E-08	2.8132	8.5	8.1	-	-	
						10/28/2021	227	1.4E-08	2.8936	8.0	8.0	578	725	
						10/29/2021	228	1.4E-08	2.9101	-	-	-	-	
						11/04/2021	234	1.4E-08	2.9821	8.2	8.1	-	-	
						11/05/2021	235	1.4E-08	2.9999	-	-	-	-	
						11/12/2021	242	1.2E-08	3.0737	8.3	8.3	-	-	
						11/19/2021	249	1.5E-08	3.1592	8.5	8.4	625	720	
						11/26/2021	256	1.1E-08	3.2346	-	-	-	-	
						12/02/2021	262	9.3E-09	3.2661	8.4	8.2	-	-	
						12/03/2021	263	1.1E-08	3.2826	-	-	-	-	
						12/08/2021	268	1.4E-08	3.3435	8.6	8.1	-	-	
						12/10/2021	270	1.3E-08	3.3706	-	-	-	-	
12/14/2021	274	1.4E-08	3.4204	8.0	8.0	626	655							
12/17/2021	277	1.4E-08	3.4663	-	-	-	-							
1/0/1900	280	1.5E-08	3.5011	8.1	8.0	-	-							

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

3-29-2023  
 Approved By: NSR





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**Test Results Summary (Page 4)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	12/24/2021	284	1.4E-08	3.5588	-	-	-	-	
						12/28/2021	288	1.4E-08	3.5990	8.3	8.1	-	-	
						12/31/2021	291	1.5E-08	3.6488	-	-	-	-	
						1/3/2022	294	1.5E-08	3.6845	8.3	8.2	623	693	
						1/7/2022	298	1.4E-08	3.7440	-	-	-	-	
						1/11/2022	302	1.3E-08	3.7812	8.9	8.6	-	-	
						1/14/2022	305	1.5E-08	3.8292	-	-	-	-	
						1/18/2022	309	1.4E-08	3.8721	8.9	8.2	-	-	
						1/21/2022	312	1.4E-08	3.9238	-	-	-	-	
						1/26/2022	317	1.3E-08	3.9709	8.0	8.1	1120	720	
						2/2/2022	324	1.3E-08	4.0573	8.6	8.5	-	-	
						2/4/2022	326	1.4E-08	4.0895	-	-	-	-	
						2/9/2022	331	1.3E-08	4.1462	8.2	8.4	1149	-	
						2/11/2022	333	1.3E-08	4.1762	-	-	-	-	
						2/16/2022	338	1.3E-08	4.2338	8.1	8.7	1192	715	
						2/18/2022	340	1.4E-08	4.2678	-	-	-	-	
						2/23/2022	345	1.4E-08	4.3260	8.7	8.3	-	-	
						2/25/2022	347	1.4E-08	4.3599	-	-	-	-	
						3/3/2022	353	1.3E-08	4.4259	8.3	8.4	-	-	
						3/4/2022	354	1.4E-08	4.4428	-	-	-	-	
3/10/2022	360	1.5E-08	4.5205	8.8	9.1	1204	690							
3/11/2022	361	1.5E-08	4.5388	-	-	-	-							
1/0/1900	368	1.3E-08	4.6205	8.5	9.2	1186	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 5)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	3/25/2022	375	1.5E-08	4.7141	7.6	8.4	-	-	
						4/1/2022	382	1.4E-08	4.8069	7.8	8.1	1223	685	
						4/8/2022	389	1.4E-08	4.9002	8.1	8.4	1227	-	
						4/15/2022	396	1.5E-08	4.9936	8.0	8.2	1242	-	
						4/22/2022	403	1.3E-08	5.0797	-	-	-	-	
						4/24/2022	405	1.3E-08	5.0977	7.7	7.9	1224	731	
						4/29/2022	410	1.4E-08	5.1686	-	-	-	-	
						5/2/2022	413	1.4E-08	5.1974	7.9	7.7	1206	-	
						5/6/2022	417	1.5E-08	5.2595	-	-	-	-	
						5/9/2022	420	1.4E-08	5.2913	8.0	8.0	1218	-	
						5/13/2022	424	1.6E-08	5.3559	-	-	-	-	
						5/16/2022	427	1.5E-08	5.3892	7.9	8.0	1246	754	
						5/20/2022	431	1.5E-08	5.4522	-	-	-	-	
						5/23/2022	434	1.4E-08	5.4840	7.9	8.0	1260	-	
						5/27/2022	438	1.5E-08	5.5468	-	-	-	-	
						5/31/2022	442	1.3E-08	5.5849	7.8	7.9	1244	-	
						6/3/2022	445	1.4E-08	5.6347	-	-	-	-	
						6/7/2022	449	1.4E-08	5.6785	7.9	8.1	1250	-	
6/10/2022	452	1.5E-08	5.7287	-	-	-	-							
6/14/2022	456	1.5E-08	5.7743	8.3	8.2	1286	-							
6/17/2022	459	1.6E-08	5.8244	-	-	-	-							
6/21/2022	463	1.4E-08	5.8685	7.9	8.1	1213	-							
1/0/1900	466	1.5E-08	5.9184	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 6)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	6/29/2022	471	1.4E-08	5.9709	8.2	8.2	1231	782	
						7/1/2022	473	1.5E-08	6.0063	-	-	-	-	
						7/6/2022	478	1.5E-08	6.0694	7.9	8.1	1241	-	
						7/8/2022	480	1.5E-08	6.1057	-	-	-	-	
						7/13/2022	485	1.4E-08	6.1651	8.0	8.1	1271	-	
						7/15/2022	487	1.4E-08	6.1651	-	-	-	-	
						7/22/2022	494	1.6E-08	6.3104	-	-	-	-	
						7/27/2022	499	1.4E-08	6.3650	8.9	8.2	1178	1219	
						7/29/2022	501	1.5E-08	6.4016	-	-	-	-	
						8/3/2022	506	1.4E-08	6.4599	8.0	8.1	1218	-	
						8/5/2022	508	1.5E-08	6.4953	-	-	-	-	
						8/10/2022	513	1.4E-08	6.5550	8.3	8.2	1291	-	
						8/12/2022	515	1.5E-08	6.5901	-	-	-	-	
						8/16/2022	519	1.5E-08	6.6409	7.8	7.9	1215	1021	
						8/19/2022	522	1.5E-08	6.6928	-	-	-	-	
						8/23/2022	526	1.4E-08	6.7393	8.0	8.1	1199	-	
						8/26/2022	529	1.5E-08	6.7931	-	-	-	-	
						8/30/2022	533	1.4E-08	6.8354	8.0	8.1	1246	-	
9/1/2022	535	1.5E-08	6.8882	-	-	-	-							
9/6/2022	540	1.4E-08	6.9314	8.4	8.2	1198	768							
9/9/2022	543	1.4E-08	6.9801	-	-	-	-							
9/12/2022	546	1.4E-08	7.0155	8.0	8.1	1112	-							
9/16/2022	550	1.5E-08	7.0797	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



**Excel Geotechnical Testing, Inc.**  
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**Test Results Summary (Page 7)**

**Compatibility Test Results**

Project Name: Belle River ALD Support

Project No.: PN1017

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	9/19/2022	553	1.4E-08	7.1115	8.3	8.2	1213	-	
						9/23/2022	557	1.6E-08	7.1767	-	-	-	-	
						9/26/2022	560	1.5E-08	7.2082	8.2	8.2	1210	777	
						9/30/2022	564	1.5E-08	7.2718	-	-	-	-	
						10/3/2022	567	1.4E-08	7.3024	8.3	8.2	1218	-	
						10/7/2022	571	1.5E-08	7.3643	-	-	-	-	
						10/11/2022	575	1.3E-08	7.4012	8.8	8.3	1210	-	
						10/14/2022	578	1.4E-08	7.4510	-	-	-	-	
						10/19/2022	583	1.3E-08	7.5011	8.4	8.3	1200	755	
						10/21/2022	585	1.3E-08	7.5309	-	-	-	-	
						10/27/2022	591	1.3E-08	7.5975	8.6	8.4	1250	-	
						10/28/2022	592	1.3E-08	7.6149	-	-	-	-	
						11/3/2022	598	1.3E-08	7.6878	8.4	8.2	1193	-	
						11/4/2022	599	1.4E-08	7.7056	-	-	-	-	
						11/11/2022	606	1.4E-08	7.7986	8.0	8.0	1210	777	
						11/18/2022	613	1.1E-08	7.8742	8.4	8.3	1248	-	
						11/25/2022	620	1.3E-08	7.9526	-	-	-	-	
						11/30/2022	625	1.3E-08	8.0135	8.4	8.8	1203	-	
12/2/2022	627	1.2E-08	8.0318	-	-	-	-							
12/5/2022	630	1.2E-08	8.0552	8.5	8.5	1155	804							
12/9/2022	634	1.3E-08	8.1093	-	-	-	-							
12/13/2022	638	1.1E-08	8.1426	8.5	8.7	1204	-							
12/16/2022	641	1.2E-08	8.1834	-	-	-	-							

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.



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**Test Results Summary (Page 8)**

**Compatibility Test Results**

**Project Name: Belle River ALD Support**

**Project No.: PN1017**

Site ID	Lab No.	Test Information												Remarks	
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity			
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow		
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89')	20L172	21.6	107.5	20.1	110.9	12/22/2022	647	9.4E-09	8.2299	8.7	8.4	1244	-		
						12/23/2022	648	1.0E-08	8.2456	-	-	-	-		
						12/31/2022	656	9.7E-09	8.3209	-	-	-	-		

3-29-2023  
 Approved By: NSR

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

**APPENDIX L – GROUNDWATER PROTECTION  
STANDARD CALCULATIONS**

## Technical Memorandum

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**Date:** November 24, 2021

**To:** Chris Scieszka, DTE Electric Company

**From:** Vince Buening, TRC  
Sarah Holmstrom, TRC  
Kristin Lowery, TRC

**Project No.:** 413591.0003.0000 Phase 1 Task 1

**Subject:** Groundwater Protection Standard Calculation – DTE Electric Company, Belle River Power Plant Bottom Ash Basins

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DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Belle River Power Plant (BRPP) Bottom Ash Basins (BABs) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule<sup>1</sup> (“Part B”) that allows a facility to prepare demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the BRPP BABs remain in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)<sup>2</sup>, the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the BRPP BABs CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the BRPP BABs from August 2016 through September 2017, as part of

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<sup>1</sup> On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

<sup>2</sup> As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

## Technical Memorandum

initiating the detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to September 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the BRPP BABs were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Per the Stats Plan, the BRPP BABs CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL. The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for BRPP BABs includes MW-16-01, MW-16-02, MW-16-03, MW-16-04, and MW-16-09. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of nondetects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

### Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum



## Technical Memorandum

included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. Data collected at MW-16-09 on 7/24/2017 were found to be anomalous due to high turbidity in the sample. Monitoring well MW-16-09 was resampled on 7/25/2017 with acceptable turbidity; therefore, the 7/24/2017 data was rejected and replaced with the 7/25/2017 data. The remaining data were found to be complete and usable for the purposes of the CCR monitoring program.

### Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix IV parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

### Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

As noted above, data collected at MW-16-09 on 7/24/2017 was found to be anomalous due to high turbidity in the sample. Therefore, these data were removed from the background data set and replaced with acceptable data from 7/25/2017. Outlier removal from the background data set is summarized in Table 1.

### Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 2.

### Tolerance Limits

Table 2 presents the calculated UTLs for the background/baseline data sets. As discussed above, the BRPP BABs CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For non-normal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

## Technical Memorandum

### Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 3.

### Attachments

Table 1 – Summary of Outlier Evaluation

Table 2 – Summary of Descriptive Statistics and Tolerance Limit Calculations

Table 3 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

# Technical Memorandum

## Tables

**Table 1**  
 Summary of Outlier Evaluation  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Antimony	ug/L	MW-16-09	7/24/2017	< 2.0	High turbidity in sample; results replaced by 7/25/2017 sample
Arsenic	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Barium	ug/L	MW-16-09	7/24/2017	310	High turbidity in sample; results replaced by 7/25/2017 sample
Beryllium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Cadmium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Chromium	ug/L	MW-16-09	7/24/2017	18	High turbidity in sample; results replaced by 7/25/2017 sample
Cobalt	ug/L	MW-16-09	7/24/2017	6.3	High turbidity in sample; results replaced by 7/25/2017 sample
Fluoride	mg/L	MW-16-09	7/24/2017	1.6	High turbidity in sample; results replaced by 7/25/2017 sample
Lead	ug/L	MW-16-09	7/24/2017	5	High turbidity in sample; results replaced by 7/25/2017 sample
Lithium	ug/L	MW-16-09	7/24/2017	57	High turbidity in sample; results replaced by 7/25/2017 sample
Mercury	ug/L	MW-16-09	7/24/2017	< 0.20	High turbidity in sample; results replaced by 7/25/2017 sample
Molybdenum	ug/L	MW-16-09	7/24/2017	66	High turbidity in sample; results replaced by 7/25/2017 sample
Radium-226/228	pCi/L	MW-16-09	7/24/2017	1.67	High turbidity in sample; results replaced by 7/25/2017 sample
Selenium	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Thallium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample

**Notes:**

ug/L = micrograms per liter

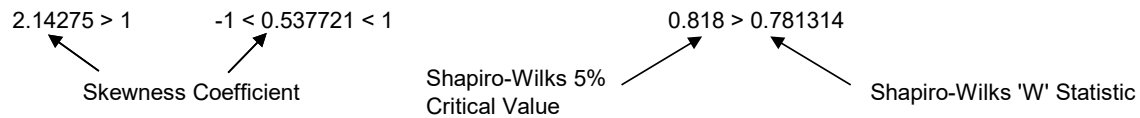
mg/L = milligrams per liter

pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Antimony (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	2.0
MW-16-02		100% Non-Detect			N	PQL	2.0
MW-16-03		100% Non-Detect			N	PQL	2.0
MW-16-04		100% Non-Detect			N	PQL	2.0
MW-16-09		100% Non-Detect			Y	PQL	2.0
<b>Arsenic (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	5.0
MW-16-02		100% Non-Detect			N	PQL	5.0
MW-16-03		100% Non-Detect			N	PQL	5.0
MW-16-04		> 50% Non-Detect			N	Non-Parametric	7.0
MW-16-09		> 50% Non-Detect			Y	Non-Parametric	7.2
<b>Barium (ug/L)</b>							
MW-16-01	1 < 1.93433	1 < 1.85565	0.829 > 0.647993	0.829 > 0.665248	N	Non-Parametric	300
MW-16-02	1 < 1.09096	1 < 1.04324	0.829 > 0.778715	0.829 > 0.789832	N	Non-Parametric	330
MW-16-03	-1.40422 < -1	-1.4678 < -1	0.818 > 0.800797	0.818 > 0.787552	N	Non-Parametric	310
MW-16-04	1 < 1.50819	1 < 1.41108	0.829 > 0.737494	0.829 > 0.756518	N	Non-Parametric	440
MW-16-09	-1 < -0.562075 < 1	--	--	--	Y	Parametric	330
<b>Beryllium (ug/L)</b>							
MW-16-01		> 50% Non-Detect			N	Non-Parametric	2.8
MW-16-02		> 50% Non-Detect			N	Non-Parametric	2.8
MW-16-03		100% Non-Detect			N	PQL	1.0
MW-16-04		> 50% Non-Detect			N	Non-Parametric	1.0
MW-16-09		100% Non-Detect			Y	PQL	1.0

**Notes:**

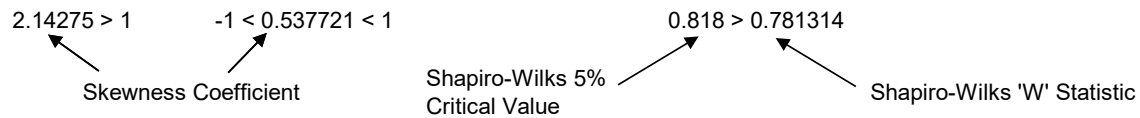


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Cadmium (ug/L)</b>							
MW-16-01			100% Non-Detect		N	PQL	1.0
MW-16-02			100% Non-Detect		N	PQL	1.0
MW-16-03			100% Non-Detect		N	PQL	1.0
MW-16-04			100% Non-Detect		N	PQL	1.0
MW-16-09			100% Non-Detect		Y	PQL	1.0
<b>Chromium (ug/L)</b>							
MW-16-01			> 50% Non-Detect		N	Non-Parametric	13
MW-16-02			> 50% Non-Detect		N	Non-Parametric	19
MW-16-03			100% Non-Detect		N	PQL	2.0
MW-16-04	1 < 1.19014	1 < 1.01083	0.829 > 0.703824	0.829 > 0.772663	N	Non-Parametric	27
MW-16-09	-1 < -0.0757045 < 1	--	--	--	Y	Parametric	25
<b>Cobalt (ug/L)</b>							
MW-16-01			> 50% Non-Detect		N	Non-Parametric	3.6
MW-16-02			> 50% Non-Detect		N	Non-Parametric	3.9
MW-16-03			100% Non-Detect		N	PQL	1.0
MW-16-04	1 < 1.05578	-1 < 0.709812 < 1	--	--	N	Parametric	13
MW-16-09	-1 < 0.577785 < 1	--	--	--	Y	Parametric	7.7
<b>Fluoride (mg/L)</b>							
MW-16-01	-1 < -0.926404 < 1	--	--	--	N	Parametric	2.0
MW-16-02	-1 < -0.531685 < 1	--	--	--	N	Parametric	1.4
MW-16-03	-1 < -0.534079 < 1	--	--	--	N	Parametric	2.0
MW-16-04	-1 < -0.959228 < 1	--	--	--	N	Parametric	1.9
MW-16-09	-1 < -0.838747 < 1	--	--	--	Y	Parametric	1.8

**Notes:**

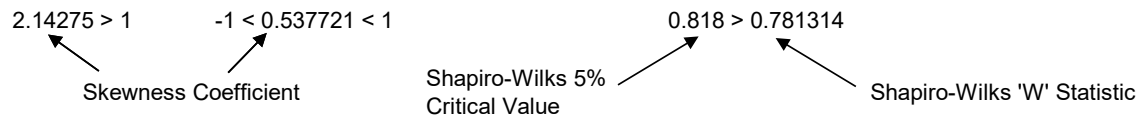


PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Lead (ug/L)</b>							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	3.5
MW-16-02	> 50% Non-Detect				N	Non-Parametric	2.9
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	1 < 1.03004	-1 < 0.630363 < 1	--	--	N	Parametric	12
MW-16-09	-1 < 0.692648 < 1	--	--	--	Y	Parametric	6.9
<b>Lithium (ug/L)</b>							
MW-16-01	1 < 1.09646	-1 < -0.656345 < 1	--	--	N	Parametric	42
MW-16-02	1 < 1.83731	1 < 1.66952	0.829 > 0.693604	0.829 > 0.735502	N	Non-Parametric	19
MW-16-03	-1 < -0.163822 < 1	--	--	--	N	Parametric	24
MW-16-04	1 < 1.69658	1 < 1.51405	0.829 > 0.748153	0.829 > 0.790765	N	Non-Parametric	37
MW-16-09	-1 < 0.201671 < 1	--	--	--	Y	Parametric	65
<b>Mercury (ug/L)</b>							
MW-16-01	100% Non-Detect				N	PQL	0.20
MW-16-02	100% Non-Detect				N	PQL	0.20
MW-16-03	100% Non-Detect				N	PQL	0.20
MW-16-04	100% Non-Detect				N	PQL	0.20
MW-16-09	100% Non-Detect				Y	PQL	0.20
<b>Molybdenum (ug/L)</b>							
MW-16-01	-1 < 0.522804 < 1	--	--	--	N	Parametric	96
MW-16-02	1 < 2.33768	1 < 2.23139	0.829 > 0.55159	0.829 > 0.606275	N	Non-Parametric	65
MW-16-03	-1 < -0.738383 < 1	--	--	--	N	Parametric	110
MW-16-04	-1 < 0.881343 < 1	--	--	--	N	Parametric	120
MW-16-09	-1 < -0.202509 < 1	--	--	--	Y	Parametric	69

**Notes:**

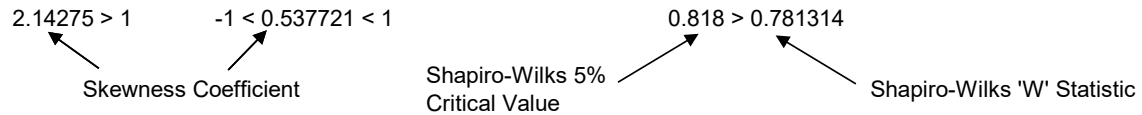


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 pCi/L = picocuries per liter

**Table 2**  
 Summary of Descriptive Statistics and Tolerance Limit Calculations  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
<b>Radium 226/228 (pCi/L)</b>							
MW-16-01	-1 < 0.444198 < 1	--	--	--	N	Parametric	2.36
MW-16-02	1 < 1.14403	-1 < 0.68333 < 1	--	--	N	Parametric	3.63
MW-16-03	1 < 1.45519	-1 < 0.909563 < 1	--	--	N	Parametric	4.87
MW-16-04	-1 < 0.379575 < 1	--	--	--	N	Parametric	3.49
MW-16-09	-1 < 0.00907827 < 1	--	--	--	Y	Parametric	4.14
<b>Selenium (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	5.0
MW-16-02		100% Non-Detect			N	PQL	5.0
MW-16-03		100% Non-Detect			N	PQL	5.0
MW-16-04		100% Non-Detect			N	PQL	5.0
MW-16-09		100% Non-Detect			Y	PQL	5.0
<b>Thallium (ug/L)</b>							
MW-16-01		100% Non-Detect			N	PQL	1.0
MW-16-02		100% Non-Detect			N	PQL	1.0
MW-16-03		100% Non-Detect			N	PQL	1.0
MW-16-04		100% Non-Detect			N	PQL	1.0
MW-16-09		100% Non-Detect			Y	PQL	1.0

**Notes:**



PQL = Practical Quantitation Limit  
 ug/L = micrograms per liter  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter



**Table 3**  
 Summary of Groundwater Protection Standards  
 DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>	2.0	<b>6.0</b>
Arsenic	ug/L	MCL	10	5.0	<b>10</b>	5.0	<b>10</b>	5.0	<b>10</b>	7.0	<b>10</b>	7.2	<b>10</b>
Barium	ug/L	MCL	2,000	300	<b>2,000</b>	330	<b>2,000</b>	310	<b>2,000</b>	440	<b>2,000</b>	330	<b>2,000</b>
Beryllium	ug/L	MCL	4	2.8	<b>4.0</b>	2.8	<b>4.0</b>	1.0	<b>4.0</b>	1.0	<b>4.0</b>	1.0	<b>4.0</b>
Cadmium	ug/L	MCL	5	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>	1.0	<b>5.0</b>
Chromium	ug/L	MCL	100	13	<b>100</b>	19	<b>100</b>	2.0	<b>100</b>	27	<b>100</b>	25	<b>100</b>
Cobalt	ug/L	Background or RSL	6	3.6	<b>6.0</b>	3.9	<b>6.0</b>	1.0	<b>6.0</b>	13	<b>13</b>	7.7	<b>7.7</b>
Fluoride	mg/L	MCL	4	2.0	<b>4.0</b>	1.4	<b>4.0</b>	2.0	<b>4.0</b>	1.9	<b>4.0</b>	1.8	<b>4.0</b>
Lead	ug/L	RSL	15	3.5	<b>15</b>	2.9	<b>15</b>	1.0	<b>15</b>	12	<b>15</b>	6.9	<b>15</b>
Lithium	ug/L	Background or RSL	40	42	<b>42</b>	19	<b>40</b>	24	<b>40</b>	37	<b>40</b>	65	<b>65</b>
Mercury	ug/L	MCL	2	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>	0.20	<b>2.0</b>
Molybdenum	ug/L	Background or RSL	100	96	<b>100</b>	65	<b>100</b>	110	<b>110</b>	120	<b>120</b>	69	<b>100</b>
Radium-226/228	pCi/L	MCL	5	2.36	<b>5.00</b>	3.63	<b>5.00</b>	4.87	<b>5.00</b>	3.49	<b>5.00</b>	4.14	<b>5.00</b>
Selenium	ug/L	MCL	50	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>	5.0	<b>50</b>
Thallium	ug/L	MCL	2	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>	1.0	<b>2.0</b>

**Notes:**

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

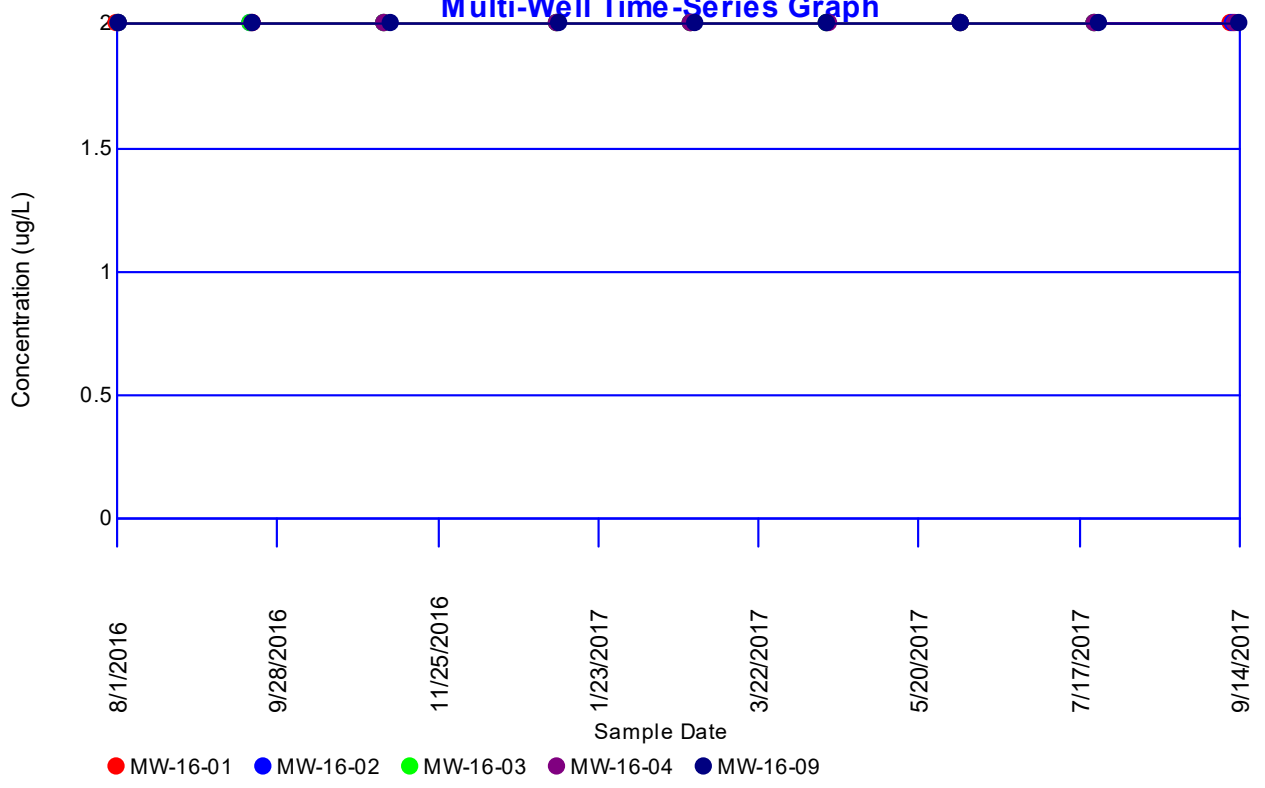
pCi/L = picocuries per liter

## Technical Memorandum

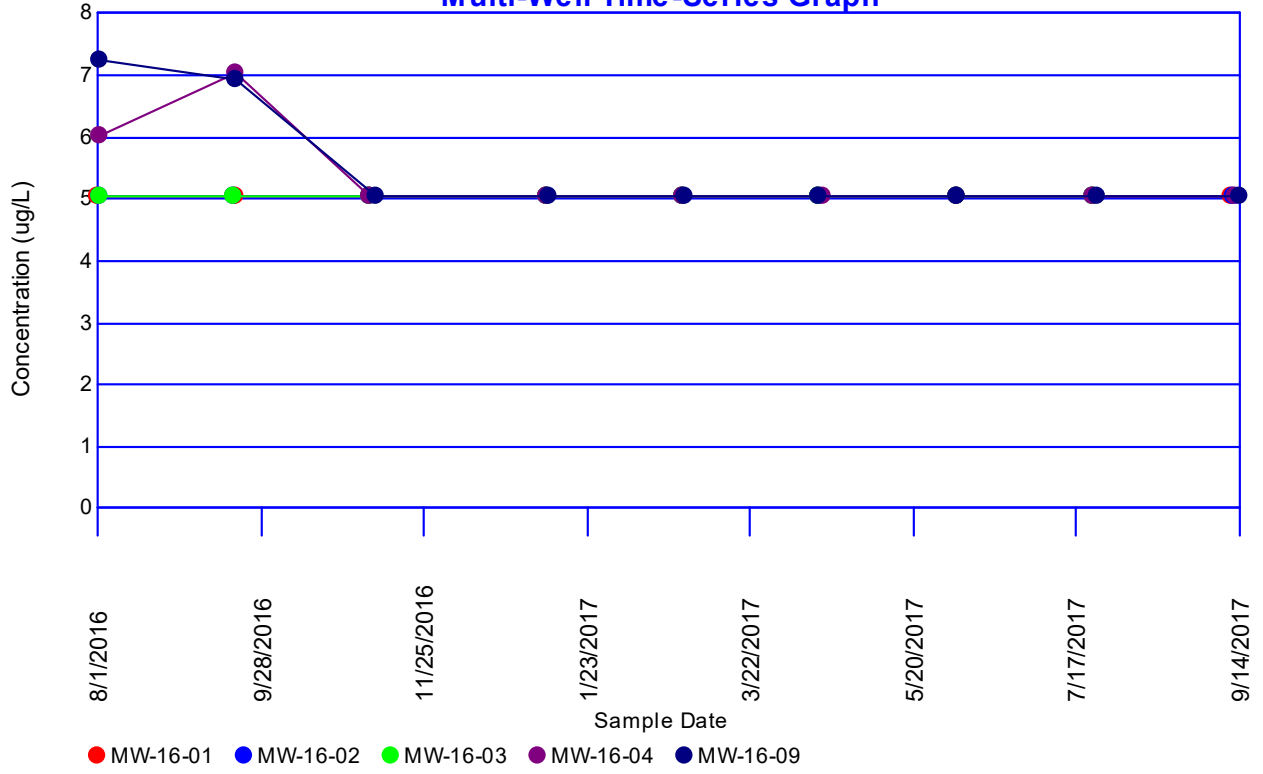
# Attachment A ChemStat™ Outputs

# Antimony

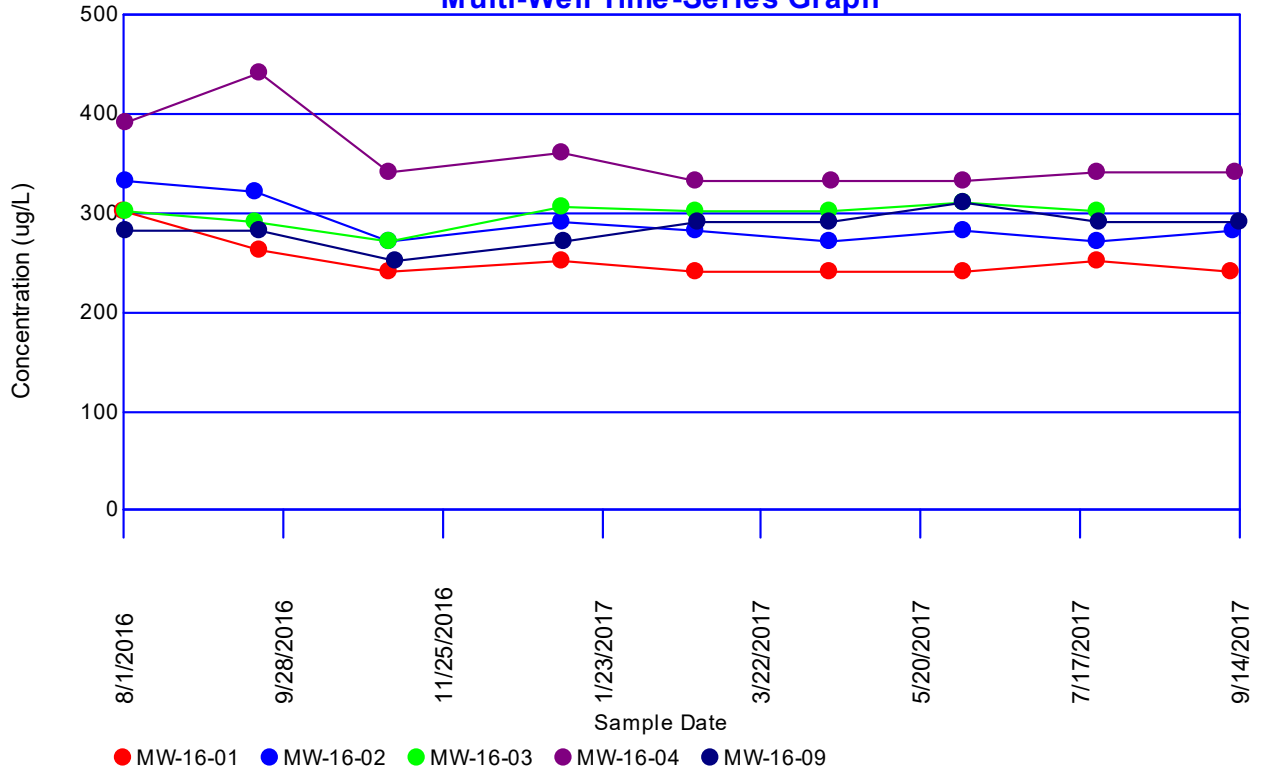
## Multi-Well Time-Series Graph



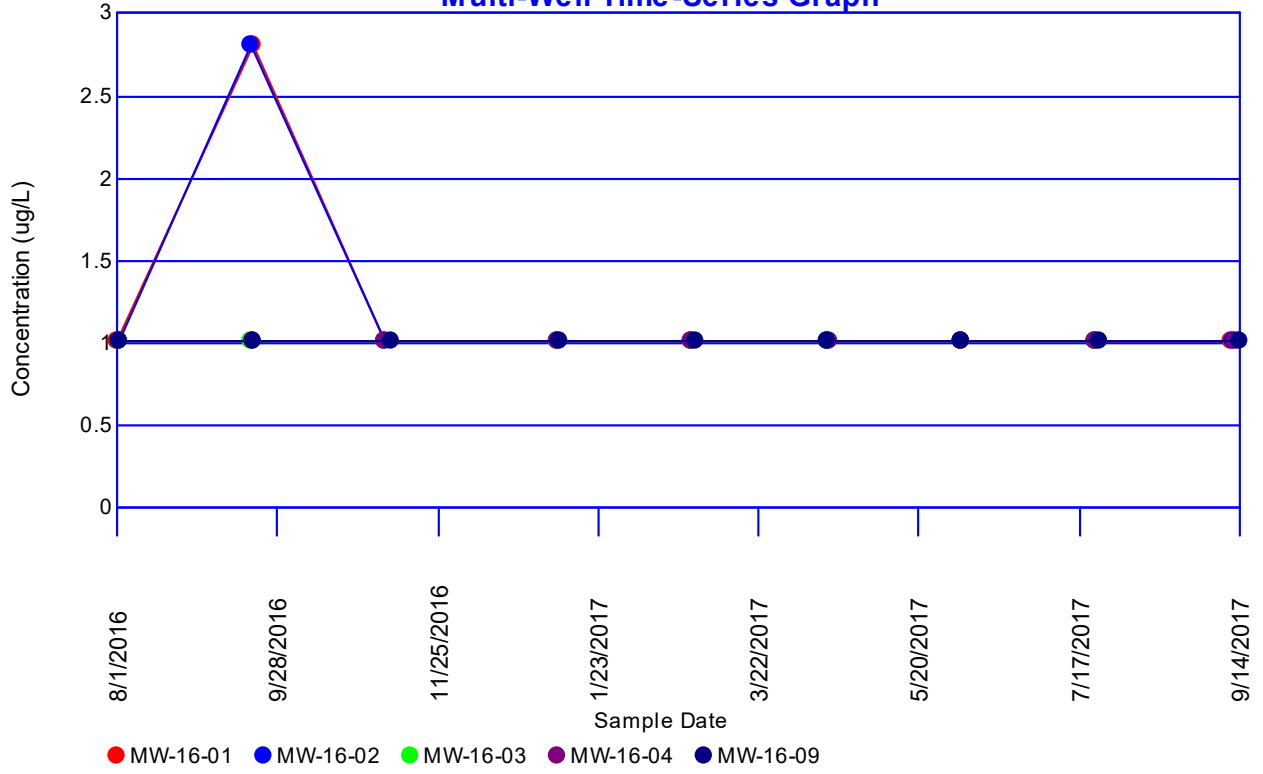
# Arsenic Multi-Well Time-Series Graph



# Barium Multi-Well Time-Series Graph

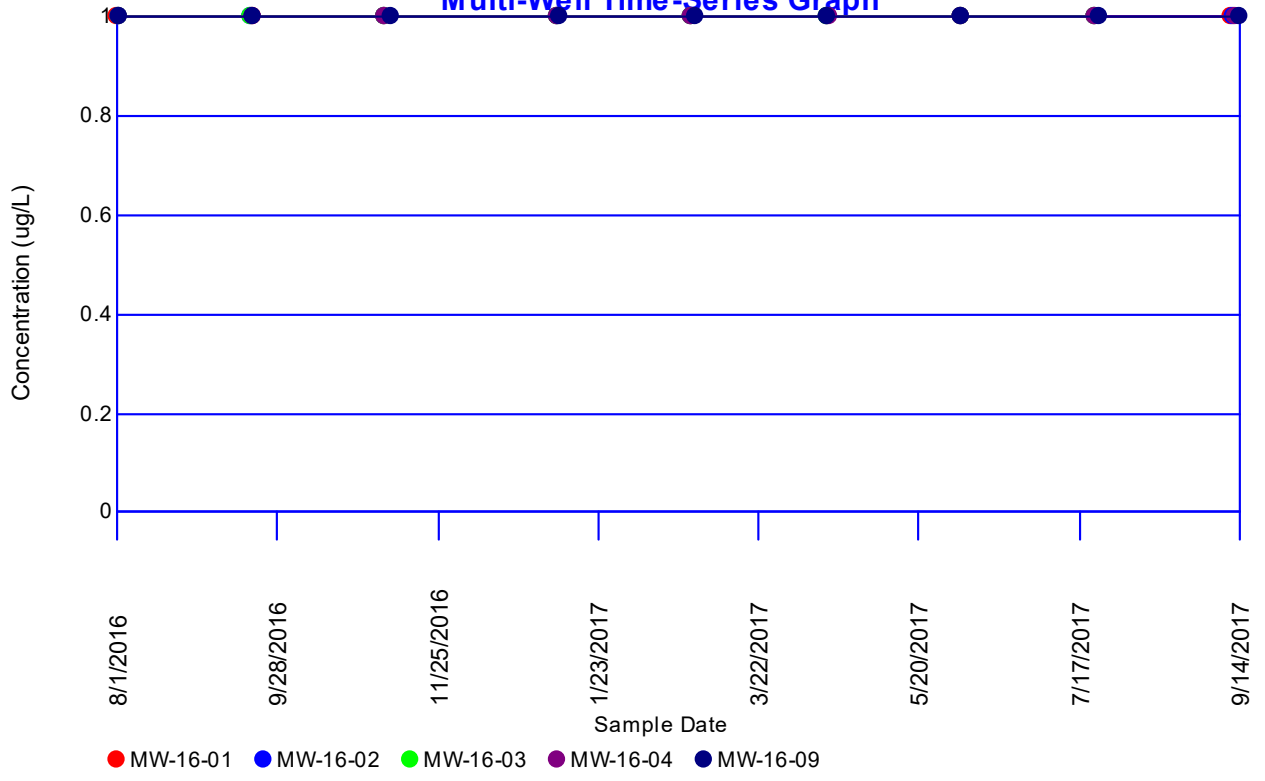


# Beryllium Multi-Well Time-Series Graph

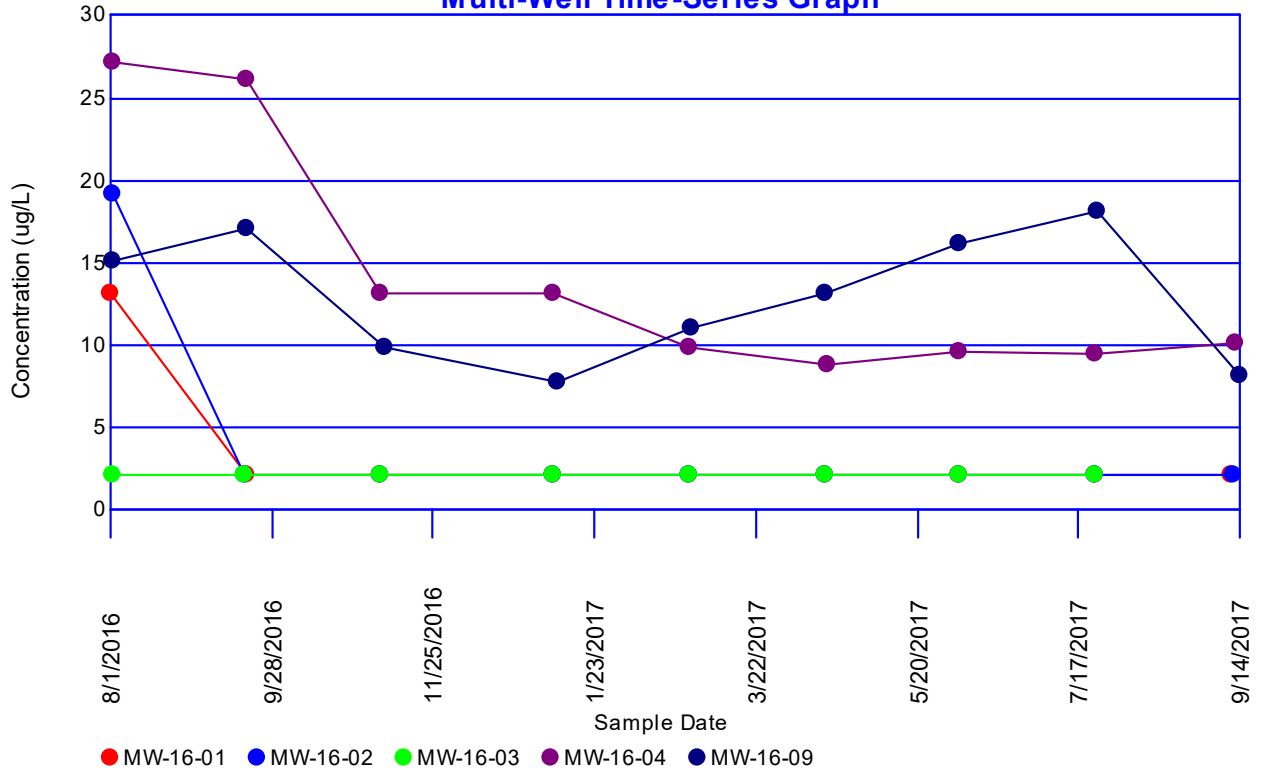


# Cadmium

## Multi-Well Time-Series Graph



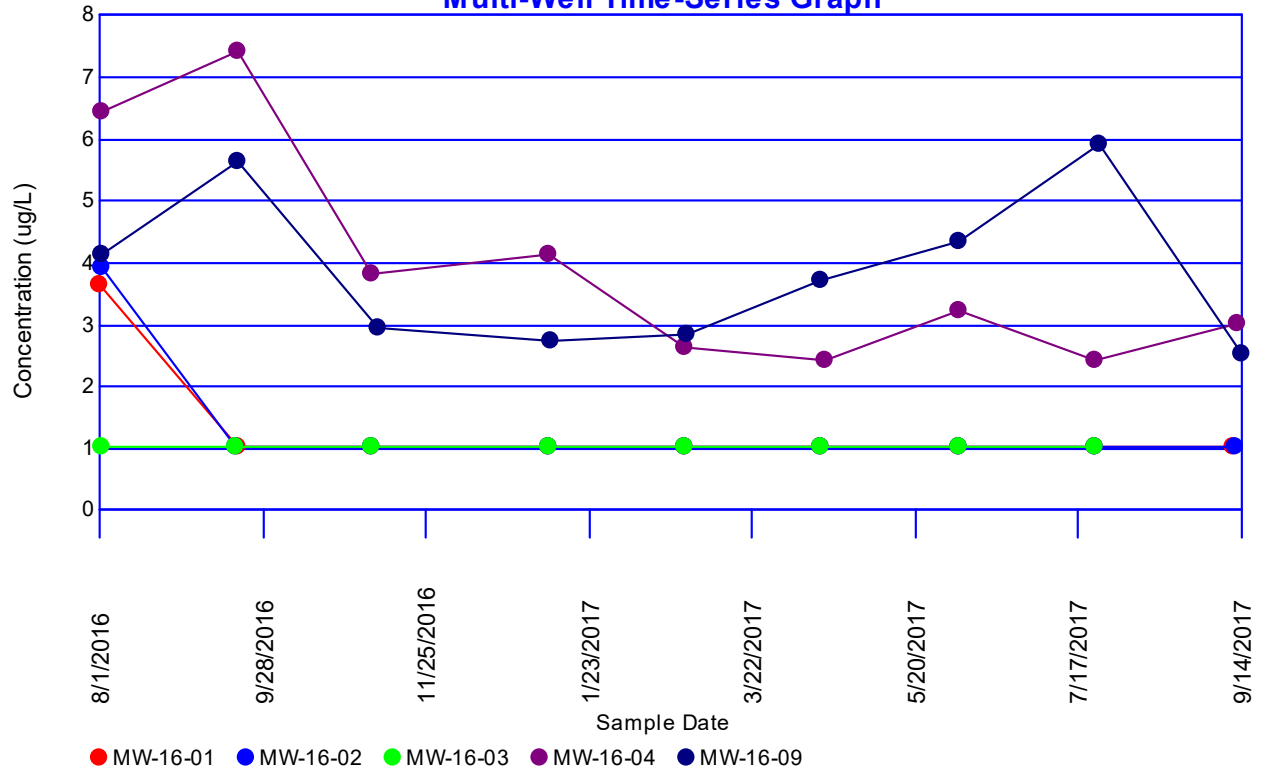
# Chromium Multi-Well Time-Series Graph



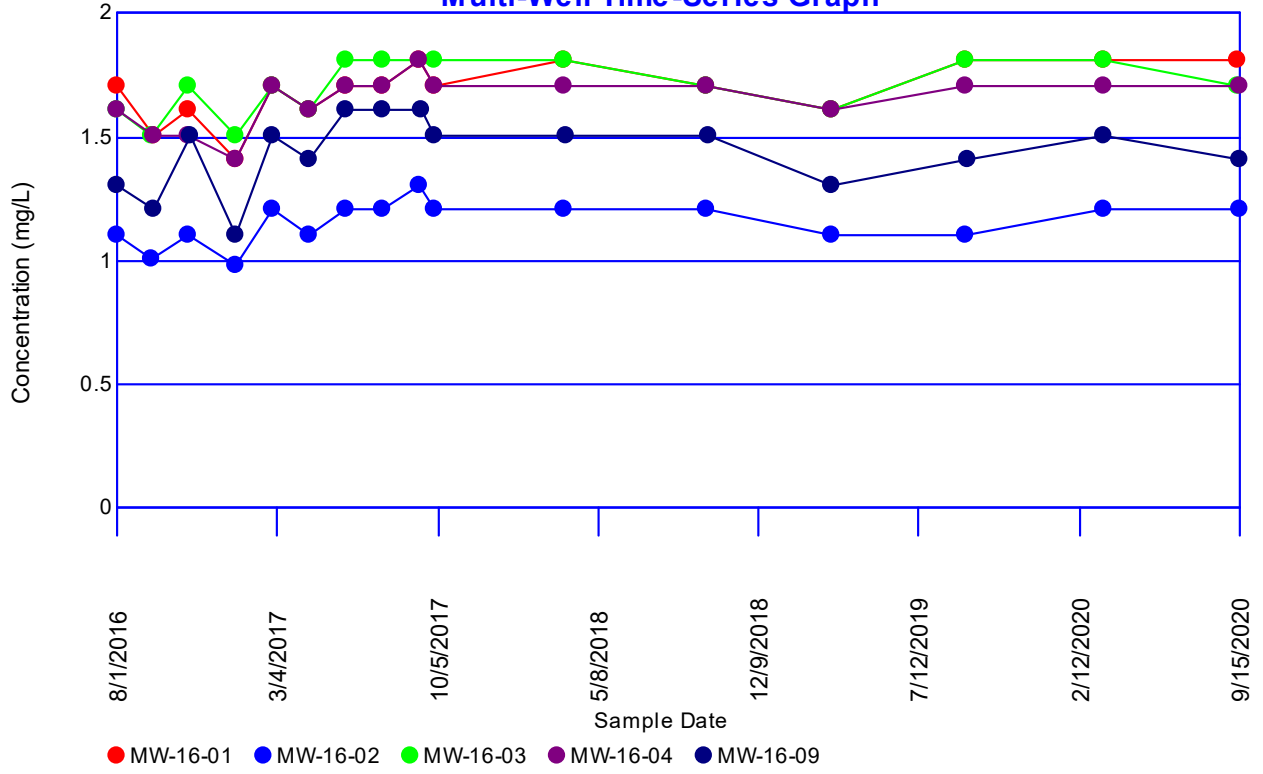


# Cobalt

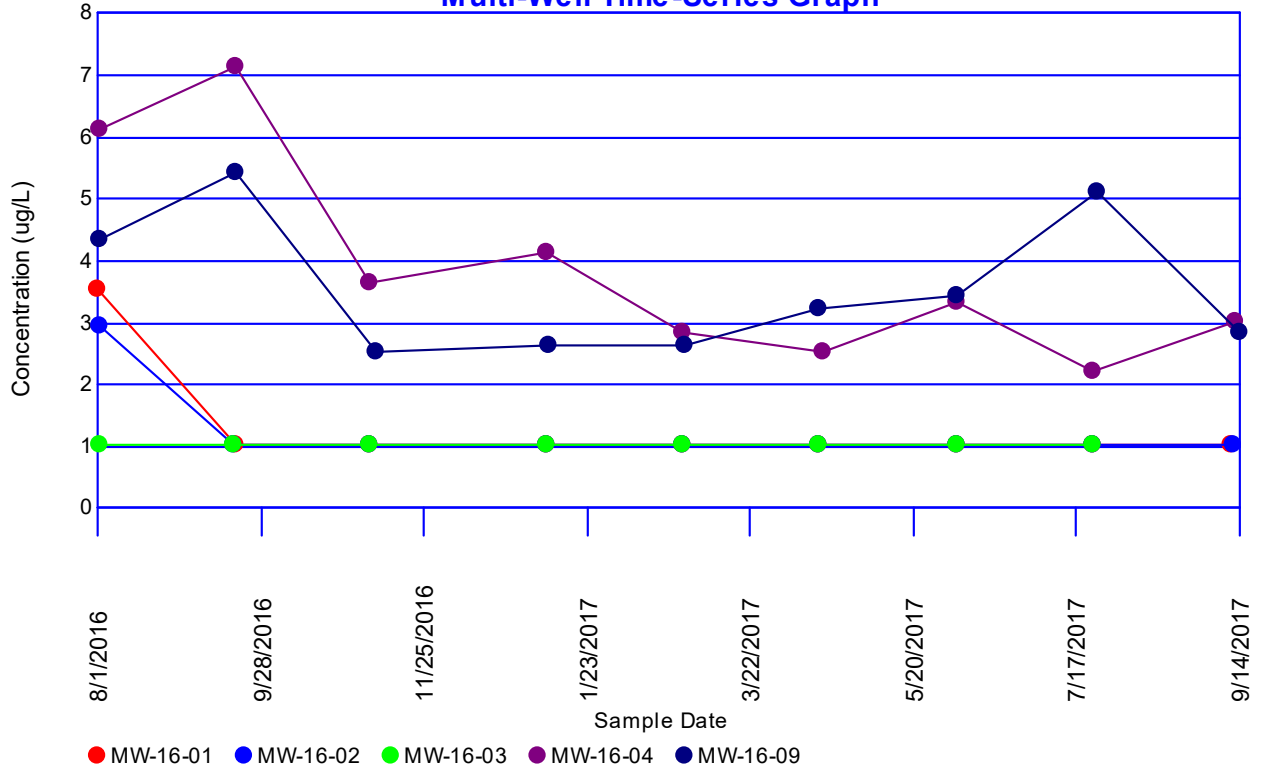
## Multi-Well Time-Series Graph



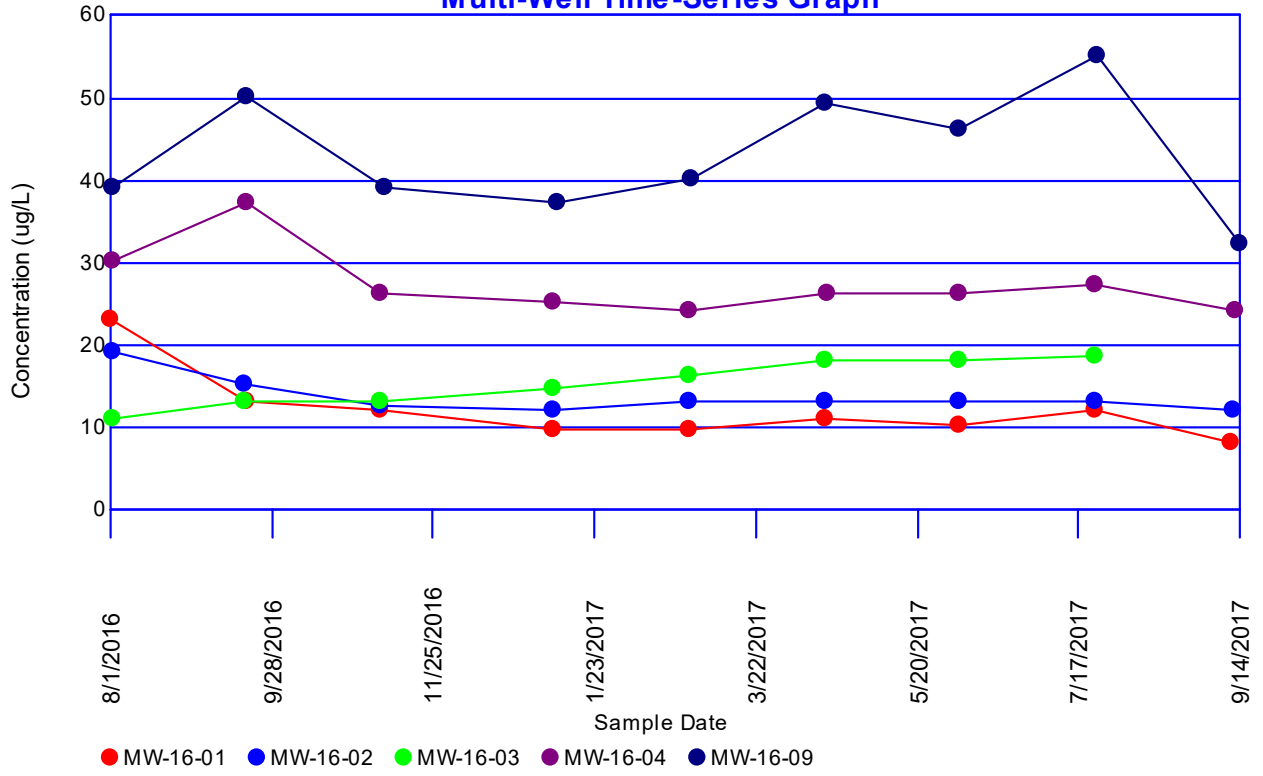
# Fluoride Multi-Well Time-Series Graph



# Lead Multi-Well Time-Series Graph

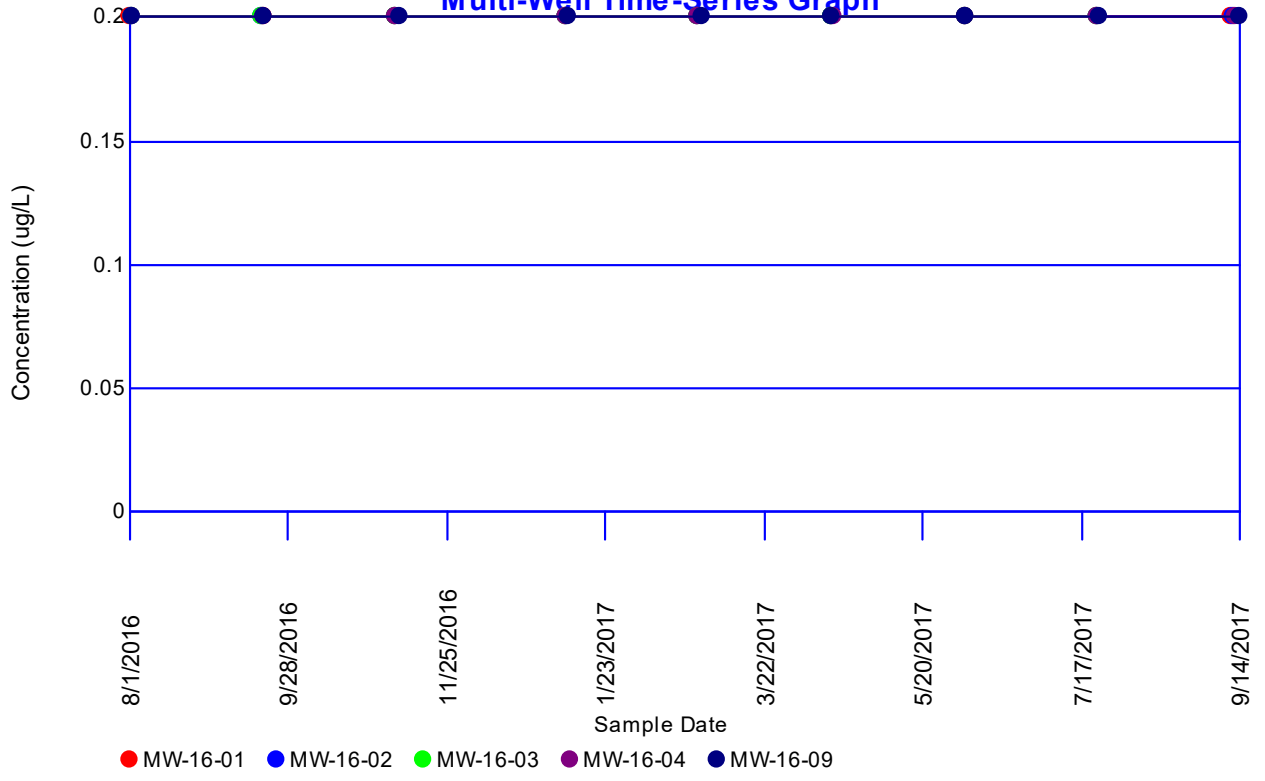


# Lithium Multi-Well Time-Series Graph

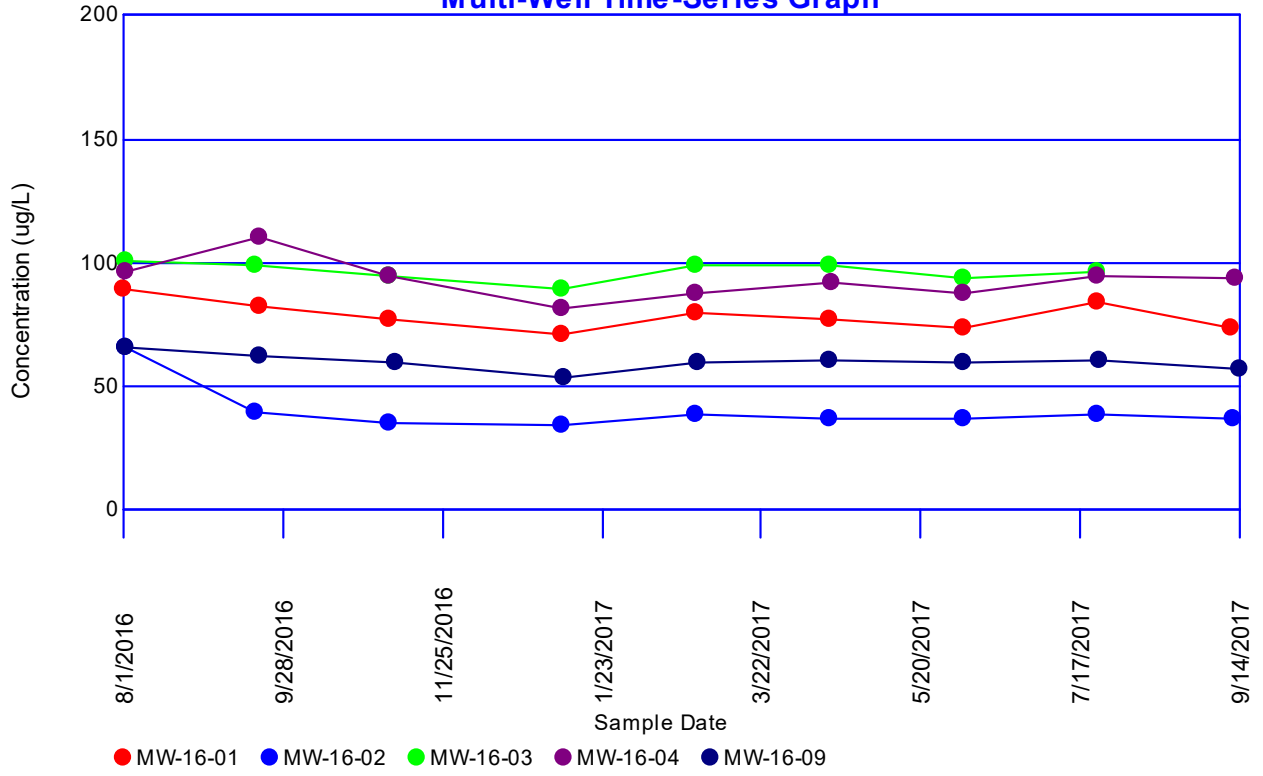


# Mercury

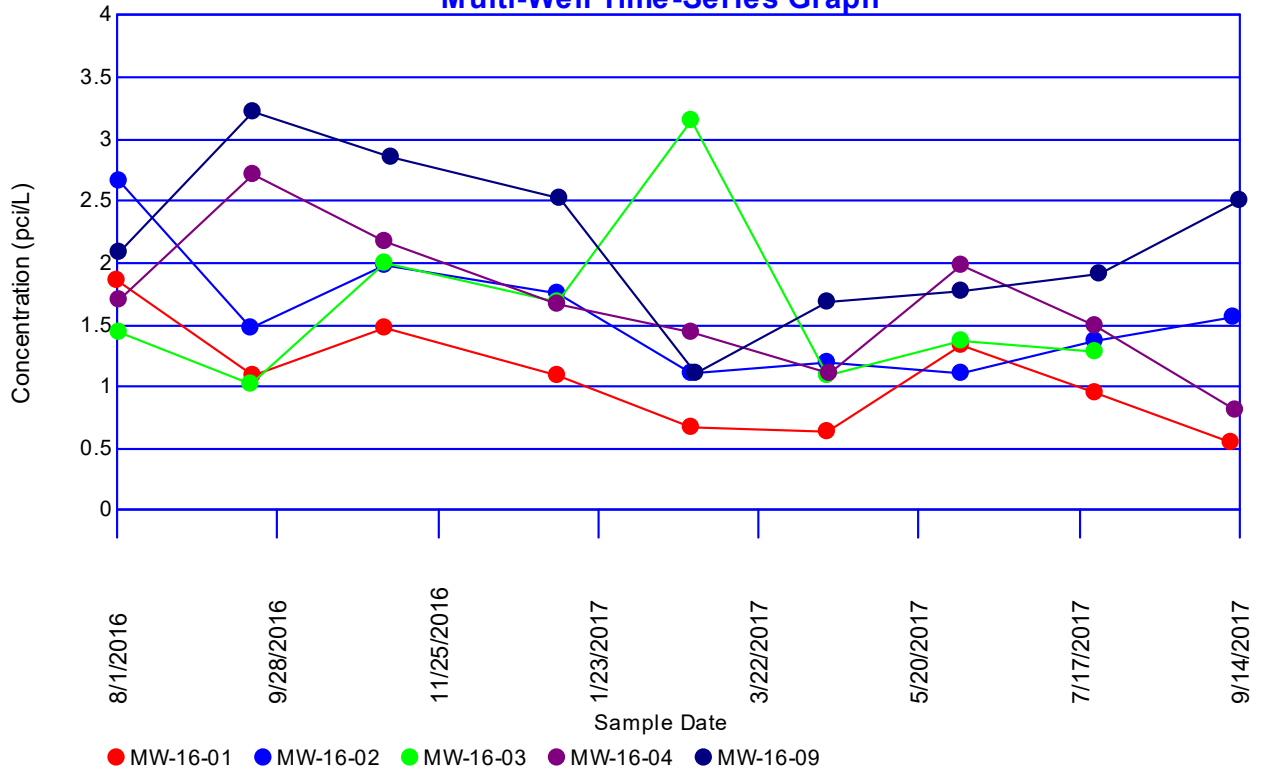
## Multi-Well Time-Series Graph



# Molybdenum Multi-Well Time-Series Graph

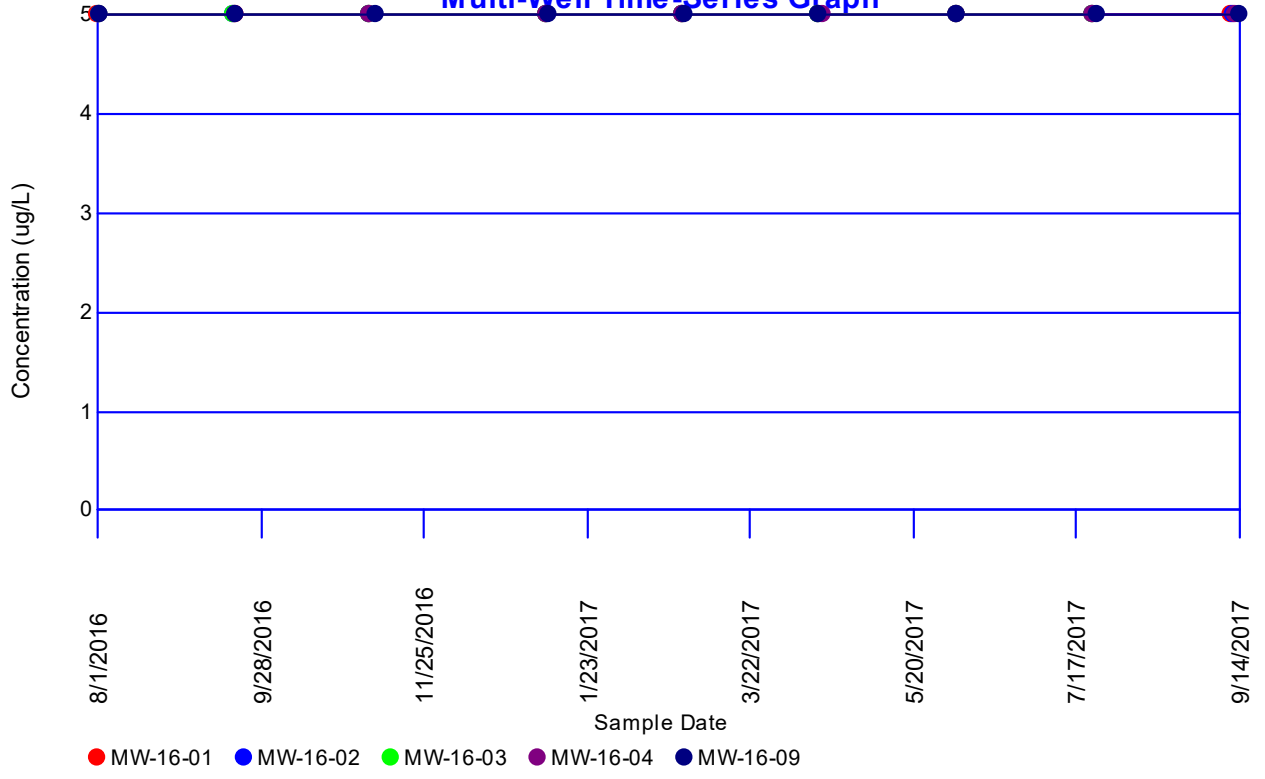


# Radium-226/228 Multi-Well Time-Series Graph



# Selenium

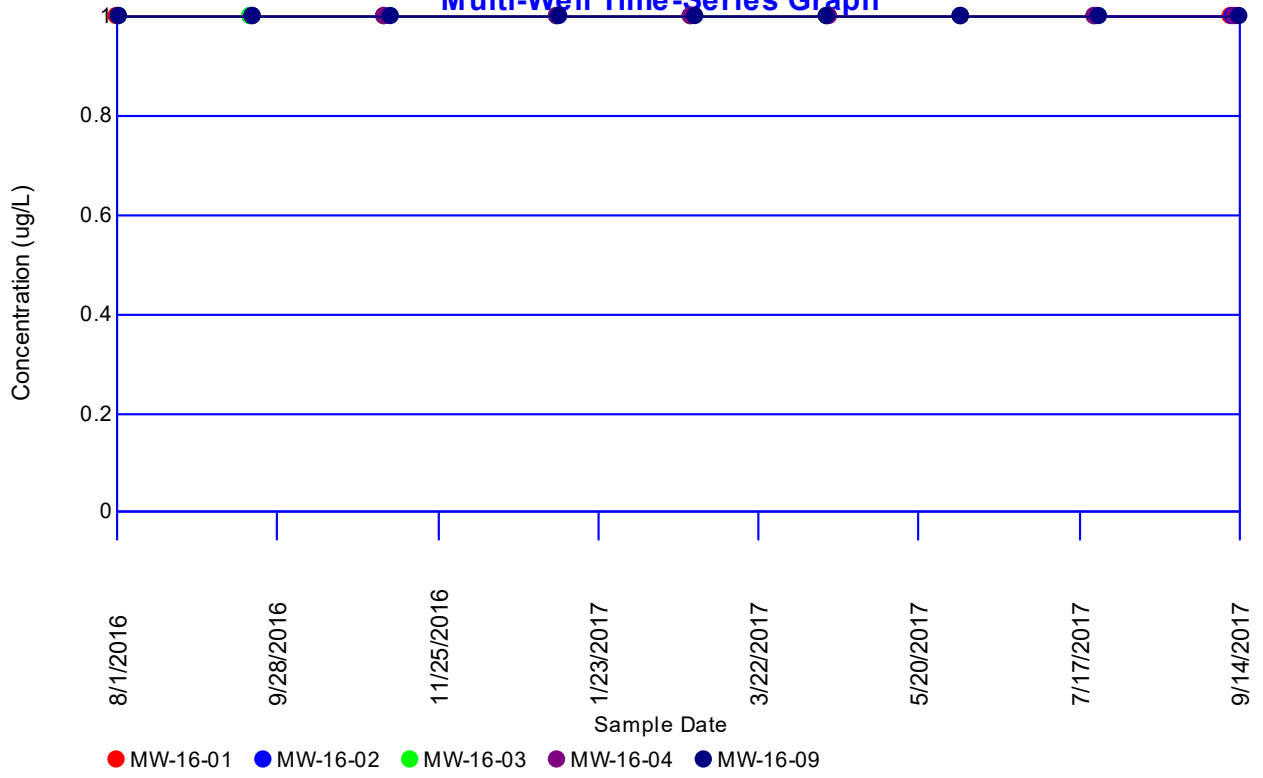
## Multi-Well Time-Series Graph





# Thallium

## Multi-Well Time-Series Graph



## Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

---

Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

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MW-16-01	9	9 (100%)	8/1/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U

---

MW-16-02	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U

---

MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U

---

MW-16-04	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/18/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/13/2017	ND<2 U	ND<2 U

---

MW-16-09	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/9/2016	ND<2 U	ND<2 U
			1/10/2017	ND<2 U	ND<2 U
			2/28/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/25/2017	ND<2 U	ND<2 U
			9/14/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U

---

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 40

Percent Non-Detects: 90.9091%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
MW-16-04	9	7 (77.7778%)	8/2/2016	6	6
			9/20/2016	7	7
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/18/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/13/2017	ND<5 U	ND<5 U
MW-16-09	9	7 (77.7778%)	8/2/2016	7.2	7.2
			9/20/2016	6.9	6.9
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
------	-------	----	------	-------	----------

---

MW-16-01	9	0 (0%)	8/1/2016	300	300
			9/20/2016	260	260
			11/7/2016	240	240
			1/9/2017	250	250
			2/27/2017	240	240
			4/17/2017	240	240
			6/5/2017	240	240
			7/24/2017	250	250
			9/11/2017	240	240

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MW-16-02	9	0 (0%)	8/2/2016	330	330
			9/19/2016	320	320
			11/7/2016 ~	270	270
			1/9/2017	290	290
			2/27/2017	280	280
			4/17/2017	270	270
			6/5/2017	280	280
			7/24/2017	270	270
			9/12/2017	280	280

---

MW-16-03	8	0 (0%)	8/2/2016	300	300
			9/19/2016 ~	290	290
			11/7/2016	270	270
			1/9/2017 ~	305	305
			2/27/2017 ~	300	300
			4/17/2017 ~	300	300
			6/5/2017	310	310
			7/24/2017 ~	300	300

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MW-16-04	9	0 (0%)	8/2/2016	390	390
			9/20/2016	440	440
			11/7/2016	340	340
			1/9/2017	360	360
			2/27/2017	330	330
			4/18/2017	330	330
			6/5/2017	330	330
			7/24/2017	340	340
			9/13/2017	340	340

---

MW-16-09	9	0 (0%)	8/2/2016	280	280
			9/20/2016	280	280
			11/9/2016	250	250
			1/10/2017	270	270
			2/28/2017	290	290
			4/17/2017	290	290
			6/5/2017	310	310
			7/25/2017	290	290
			9/14/2017	290	290
			7/24/2017	310	310

---

There are 0 unused locations

---

<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 41

Percent Non-Detects: 93.1818%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	2.8	2.8
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	2.8	2.8
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U^	ND<1 U^
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	1	1
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U^	ND<1 U^
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			<b>7/24/2017</b>	<b>ND&lt;1 U</b>	<b>ND&lt;1 U</b>



There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
			MW-16-04	9	9 (100%)
9/20/2016	ND<1 U	ND<1 U			
11/7/2016	ND<1 U	ND<1 U			
1/9/2017	ND<1 U	ND<1 U			
2/27/2017	ND<1 U	ND<1 U			
4/18/2017	ND<1 U	ND<1 U			
6/5/2017	ND<1 U	ND<1 U			
7/24/2017	ND<1 U	ND<1 U			
9/13/2017	ND<1 U	ND<1 U			
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	13	13
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U
MW-16-02	9	8 (88.8889%)	8/2/2016	19	19
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U
MW-16-04	9	0 (0%)	8/2/2016	27	27
			9/20/2016	26	26
			11/7/2016	13	13
			1/9/2017	13	13
			2/27/2017	9.8	9.8
			4/18/2017	8.7	8.7
			6/5/2017	9.5	9.5
			7/24/2017	9.4	9.4
			9/13/2017	10	10
MW-16-09	9	0 (0%)	8/2/2016	15	15
			9/20/2016	17	17
			11/9/2016	9.8	9.8
			1/10/2017	7.6	7.6
			2/28/2017	11	11
			4/17/2017	13	13
			6/5/2017	16	16
			7/25/2017	18	18
			9/14/2017	8	8
			<b>7/24/2017</b>	<b>18</b>	<b>18</b>

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	3.6	3.6
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	3.9	3.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	0 (0%)	8/2/2016	6.4	6.4
			9/20/2016	7.4	7.4
			11/7/2016	3.8	3.8
			1/9/2017	4.1	4.1
			2/27/2017	2.6	2.6
			4/18/2017	2.4	2.4
			6/5/2017	3.2	3.2
			7/24/2017	2.4	2.4
			9/13/2017	3	3
MW-16-09	9	0 (0%)	8/2/2016	4.1	4.1
			9/20/2016	5.6	5.6
			11/9/2016	2.9	2.9
			1/10/2017	2.7	2.7
			2/28/2017	2.8	2.8
			4/17/2017	3.7	3.7
			6/5/2017	4.3	4.3
			7/25/2017	5.9	5.9
			9/14/2017	2.5	2.5
			7/24/2017	<b>6.3</b>	<b>6.3</b>

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 79

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	16	0 (0%)	8/1/2016	1.7	1.7
			9/20/2016	1.5	1.5
			11/7/2016	1.6	1.6
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/17/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/11/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.8	1.8
			10/1/2018	1.7	1.7
			3/18/2019 ~	1.6	1.6
			9/16/2019 ~	1.8	1.8
			3/17/2020 ~	1.8	1.8
			9/14/2020 ~	1.8	1.8

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MW-16-02	16	0 (0%)	8/2/2016	1.1	1.1
			9/19/2016	1	1
			11/7/2016 ~	1.1	1.1
			1/9/2017	0.97	0.97
			2/27/2017	1.2	1.2
			4/17/2017	1.1	1.1
			6/5/2017	1.2	1.2
			7/24/2017	1.2	1.2
			9/12/2017	1.3	1.3
			10/2/2017	1.2	1.2
			3/26/2018	1.2	1.2
			10/1/2018	1.2	1.2
			3/18/2019	1.1	1.1
			9/16/2019	1.1	1.1
			3/17/2020	1.2	1.2
9/15/2020	1.2	1.2			

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MW-16-03	15	0 (0%)	8/2/2016	1.6	1.6
			9/19/2016 ~	1.5	1.5
			11/7/2016	1.7	1.7
			1/9/2017 ~	1.5	1.5
			2/27/2017 ~	1.7	1.7
			4/17/2017 ~	1.6	1.6
			6/5/2017	1.8	1.8
			7/24/2017 ~	1.8	1.8
			10/2/2017	1.8	1.8
			3/26/2018	1.8	1.8
			10/1/2018 ~	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.8	1.8
			3/17/2020	1.8	1.8
			9/14/2020	1.7	1.7

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MW-16-04	16	0 (0%)	8/2/2016	1.6	1.6
			9/20/2016	1.5	1.5
			11/7/2016	1.5	1.5
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/18/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/13/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.7	1.7
			10/1/2018	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.7	1.7
			3/17/2020	1.7	1.7
			9/15/2020	1.7	1.7

MW-16-09	16	0 (0%)	8/2/2016	1.3	1.3
			9/20/2016	1.2	1.2
			11/9/2016	1.5	1.5
			1/10/2017	1.1	1.1
			2/28/2017	1.5	1.5
			4/17/2017	1.4	1.4
			6/5/2017	1.6	1.6
			7/25/2017	1.6	1.6
			9/14/2017	1.6	1.6
			10/3/2017 ~	1.5	1.5
			3/27/2018	1.5	1.5
			10/4/2018	1.5	1.5
			3/20/2019	1.3	1.3
			9/17/2019	1.4	1.4
			3/19/2020	1.5	1.5
			9/15/2020	1.4	1.4
			<b>7/24/2017</b>	<b>1.6</b>	<b>1.6</b>

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original
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## Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 24

Percent Non-Detects: 54.5455%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	3.5	3.5
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	2.9	2.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	0 (0%)	8/2/2016	6.1	6.1
			9/20/2016	7.1	7.1
			11/7/2016	3.6	3.6
			1/9/2017	4.1	4.1
			2/27/2017	2.8	2.8
			4/18/2017	2.5	2.5
			6/5/2017	3.3	3.3
			7/24/2017	2.2	2.2
			9/13/2017	3	3
MW-16-09	9	0 (0%)	8/2/2016	4.3	4.3
			9/20/2016	5.4	5.4
			11/9/2016	2.5	2.5
			1/10/2017	2.6	2.6
			2/28/2017	2.6	2.6
			4/17/2017	3.2	3.2
			6/5/2017	3.4	3.4
			7/25/2017	5.1	5.1
			9/14/2017	2.8	2.8
			<b>7/24/2017</b>	<b>5</b>	<b>5</b>

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 1

Percent Non-Detects: 2.27273%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	1 (11.1111%)	8/1/2016	23	23
			9/20/2016	13	13
			11/7/2016	12	12
			1/9/2017	9.5	9.5
			2/27/2017	9.6	9.6
			4/17/2017	11	11
			6/5/2017	10	10
			7/24/2017	12	12
			9/11/2017	ND<8 U	ND<8 U

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MW-16-02	9	0 (0%)	8/2/2016	19	19
			9/19/2016	15	15
			11/7/2016 ~	12.5	12.5
			1/9/2017	12	12
			2/27/2017	13	13
			4/17/2017	13	13
			6/5/2017	13	13
			7/24/2017	13	13
			9/12/2017	12	12

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MW-16-03	8	0 (0%)	8/2/2016	11	11
			9/19/2016 ~	13	13
			11/7/2016	13	13
			1/9/2017 ~	14.5	14.5
			2/27/2017 ~	16	16
			4/17/2017 ~	18	18
			6/5/2017	18	18
			7/24/2017 ~	18.5	18.5

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MW-16-04	9	0 (0%)	8/2/2016	30	30
			9/20/2016	37	37
			11/7/2016	26	26
			1/9/2017	25	25
			2/27/2017	24	24
			4/18/2017	26	26
			6/5/2017	26	26
			7/24/2017	27	27
			9/13/2017	24	24

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MW-16-09	9	0 (0%)	8/2/2016	39	39
			9/20/2016	50	50
			11/9/2016	39	39
			1/10/2017	37	37
			2/28/2017	40	40
			4/17/2017	49	49
			6/5/2017	46	46
			7/25/2017	55	55
			9/14/2017	32	32
			7/24/2017	57	57

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There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/11/2017	ND<0.2 U	ND<0.2 U
MW-16-02	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016	ND<0.2 U	ND<0.2 U
			11/7/2016 ~	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/12/2017	ND<0.2 U	ND<0.2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016 ~	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017 ~	ND<0.2 U	ND<0.2 U
			2/27/2017 ~	ND<0.2 U	ND<0.2 U
			4/17/2017 ~	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017 ~	ND<0.2 U	ND<0.2 U
			MW-16-04	9	9 (100%)
9/20/2016	ND<0.2 U	ND<0.2 U			
11/7/2016	ND<0.2 U	ND<0.2 U			
1/9/2017	ND<0.2 U	ND<0.2 U			
2/27/2017	ND<0.2 U	ND<0.2 U			
4/18/2017	ND<0.2 U	ND<0.2 U			
6/5/2017	ND<0.2 U	ND<0.2 U			
7/24/2017	ND<0.2 U	ND<0.2 U			
9/13/2017	ND<0.2 U	ND<0.2 U			
MW-16-09	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/9/2016	ND<0.2 U	ND<0.2 U
			1/10/2017	ND<0.2 U	ND<0.2 U
			2/28/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/25/2017	ND<0.2 U	ND<0.2 U
			9/14/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

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Loc.	Meas.	ND	Date	Conc.	Original
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There are 5 compliance locations

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Loc.	Meas.	ND	Date	Conc.	Original
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MW-16-01	9	0 (0%)	8/1/2016	89	89
			9/20/2016	82	82
			11/7/2016	76	76
			1/9/2017	70	70
			2/27/2017	79	79
			4/17/2017	76	76
			6/5/2017	73	73
			7/24/2017	83	83
			9/11/2017	73	73

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MW-16-02	9	0 (0%)	8/2/2016	65	65
			9/19/2016	39	39
			11/7/2016 ~	34.5	34.5
			1/9/2017	34	34
			2/27/2017	38	38
			4/17/2017	36	36
			6/5/2017	36	36
			7/24/2017	38	38
			9/12/2017	36	36

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MW-16-03	8	0 (0%)	8/2/2016	100	100
			9/19/2016 ~	98.5	98.5
			11/7/2016	94	94
			1/9/2017 ~	89	89
			2/27/2017 ~	98.5	98.5
			4/17/2017 ~	98	98
			6/5/2017	93	93
			7/24/2017 ~	96	96

---

MW-16-04	9	0 (0%)	8/2/2016	96	96
			9/20/2016	110	110
			11/7/2016	94	94
			1/9/2017	81	81
			2/27/2017	87	87
			4/18/2017	91	91
			6/5/2017	87	87
			7/24/2017	94	94
			9/13/2017	93	93

---

MW-16-09	9	0 (0%)	8/2/2016	65	65
			9/20/2016	62	62
			11/9/2016	59	59
			1/10/2017	53	53
			2/28/2017	59	59
			4/17/2017	60	60
			6/5/2017	59	59
			7/25/2017	60	60
			9/14/2017	56	56
			7/24/2017	66	66

---



There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 1

Percent Non-Detects: 2.27273%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	1.84	1.84
			9/20/2016	1.07	1.07
			11/7/2016	1.46	1.46
			1/9/2017	1.08	1.08
			2/27/2017	0.656	0.656
			4/17/2017	0.619	0.619
			6/5/2017	1.32	1.32
			7/24/2017	0.942	0.942
			9/11/2017	0.536	0.536
MW-16-02	9	0 (0%)	8/2/2016	2.65	2.65
			9/19/2016	1.46	1.46
			11/7/2016 ~	1.96	1.96
			1/9/2017	1.73	1.73
			2/27/2017	1.1	1.1
			4/17/2017	1.18	1.18
			6/5/2017	1.1	1.1
			7/24/2017	1.35	1.35
			9/12/2017	1.55	1.55
MW-16-03	8	0 (0%)	8/2/2016	1.43	1.43
			9/19/2016 ~	1.008	1.008
			11/7/2016	1.98	1.98
			1/9/2017 ~	1.66	1.66
			2/27/2017 ~	3.1365	3.1365
			4/17/2017 ~	1.074	1.074
			6/5/2017	1.36	1.36
			7/24/2017 ~	1.26	1.26
MW-16-04	9	1 (11.1111%)	8/2/2016	1.69	1.69
			9/20/2016	2.7	2.7
			11/7/2016	2.16	2.16
			1/9/2017	ND<1.65 U	ND<1.65 U
			2/27/2017	1.43	1.43
			4/18/2017	1.09	1.09
			6/5/2017	1.97	1.97
			7/24/2017	1.47	1.47
			9/13/2017	0.802	0.802
MW-16-09	9	0 (0%)	8/2/2016	2.07	2.07
			9/20/2016	3.2	3.2
			11/9/2016	2.83	2.83
			1/10/2017	2.51	2.51
			2/28/2017	1.1	1.1
			4/17/2017	1.67	1.67
			6/5/2017	1.75	1.75
			7/25/2017	1.9	1.9
			9/14/2017	2.49	2.49
			7/24/2017	1.67	1.67

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
			MW-16-04	9	9 (100%)
9/20/2016	ND<5 U	ND<5 U			
11/7/2016	ND<5 U	ND<5 U			
1/9/2017	ND<5 U	ND<5 U			
2/27/2017	ND<5 U	ND<5 U			
4/18/2017	ND<5 U	ND<5 U			
6/5/2017	ND<5 U	ND<5 U			
7/24/2017	ND<5 U	ND<5 U			
9/13/2017	ND<5 U	ND<5 U			
MW-16-09	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44

Total Non-Detect: 44

Percent Non-Detects: 100%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original
There are 5 compliance locations					
Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
9/13/2017	ND<1 U	ND<1 U			
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U

There are 0 unused locations

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<b>Loc.</b>	<b>Meas.</b>	<b>ND</b>	<b>Date</b>	<b>Conc.</b>	<b>Original</b>
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## Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	251.111	19.6497	1.93433
MW-16-02	9	287.778	22.2361	1.09096
MW-16-03	8	296.875	12.2292	-1.40422
MW-16-04	9	355.556	37.1184	1.50819
MW-16-09	9	283.333	16.5831	-0.562075

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	294.886	41.3084	1.14494



## Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	5.5234	0.0733807	1.85565
MW-16-02	9	5.65966	0.0745478	1.04324
MW-16-03	8	5.69254	0.0424051	-1.4678
MW-16-04	9	5.86924	0.0978708	1.41108
MW-16-09	9	5.64506	0.0596884	-0.725993

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	5.67765	0.133294	0.658393

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	240	300	60	0.5888	35.328
2	240	260	20	0.3244	6.488
3	240	250	10	0.1976	1.976
4	240	250	10	0.0947	0.947
5	240	240	0		
6	250	240	-10		
7	250	240	-10		
8	260	240	-20		
9	300	240	-60		

---

Sum of b values = 44.739

Sample Standard Deviation = 19.6497

W Statistic = 0.647993

**5% Critical value of 0.829 exceeds 0.647993**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.647993**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.48064	5.70378	0.223144	0.5888	0.131387
2	5.48064	5.56068	0.0800427	0.3244	0.0259659
3	5.48064	5.52146	0.040822	0.1976	0.00806643
4	5.48064	5.52146	0.040822	0.0947	0.00386584
5	5.48064	5.48064	0		
6	5.52146	5.48064	-0.040822		
7	5.52146	5.48064	-0.040822		
8	5.56068	5.48064	-0.0800427		
9	5.70378	5.48064	-0.223144		

---

Sum of b values = 0.169285

Sample Standard Deviation = 0.0733807

W Statistic = 0.665248

**5% Critical value of 0.829 exceeds 0.665248**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.665248**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	270	330	60	0.5888	35.328
2	270	320	50	0.3244	16.22
3	270	290	20	0.1976	3.952
4	280	280	0	0.0947	0
5	280	280	0		
6	280	280	0		
7	290	270	-20		
8	320	270	-50		
9	330	270	-60		

---

Sum of b values = 55.5

Sample Standard Deviation = 22.2361

W Statistic = 0.778715

**5% Critical value of 0.829 exceeds 0.778715**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.778715  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.79909	0.200671	0.5888	0.118155
2	5.59842	5.76832	0.169899	0.3244	0.0551152
3	5.59842	5.66988	0.071459	0.1976	0.0141203
4	5.63479	5.63479	0	0.0947	0
5	5.63479	5.63479	0		
6	5.63479	5.63479	0		
7	5.66988	5.59842	-0.071459		
8	5.76832	5.59842	-0.169899		
9	5.79909	5.59842	-0.200671		

---

Sum of b values = 0.18739

Sample Standard Deviation = 0.0745478

W Statistic = 0.789832

**5% Critical value of 0.829 exceeds 0.789832**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.789832  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	270	310	40	0.6052	24.208
2	290	305	15	0.3164	4.746
3	300	300	0	0.1743	0
4	300	300	0	0.0561	0
5	300	300	0		
6	300	300	0		
7	305	290	-15		
8	310	270	-40		

---

Sum of b values = 28.954

Sample Standard Deviation = 12.2292

W Statistic = 0.800797

**5% Critical value of 0.818 exceeds 0.800797**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.800797

Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.73657	0.13815	0.6052	0.0836086
2	5.66988	5.72031	0.0504309	0.3164	0.0159563
3	5.70378	5.70378	0	0.1743	0
4	5.70378	5.70378	0	0.0561	0
5	5.70378	5.70378	0		
6	5.70378	5.70378	0		
7	5.72031	5.66988	-0.0504309		
8	5.73657	5.59842	-0.13815		

---

Sum of b values = 0.0995649

Sample Standard Deviation = 0.0424051

W Statistic = 0.787552

**5% Critical value of 0.818 exceeds 0.787552**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.749 is less than 0.787552  
Data is normally distributed at 99% level of significance

## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	330	440	110	0.5888	64.768
2	330	390	60	0.3244	19.464
3	330	360	30	0.1976	5.928
4	340	340	0	0.0947	0
5	340	340	0		
6	340	340	0		
7	360	330	-30		
8	390	330	-60		
9	440	330	-110		

---

Sum of b values = 90.16

Sample Standard Deviation = 37.1184

W Statistic = 0.737494

**5% Critical value of 0.829 exceeds 0.737494**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.737494**  
**Evidence of non-normality at 99% level of significance**



## Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	5.79909	6.08677	0.287682	0.5888	0.169387
2	5.79909	5.96615	0.167054	0.3244	0.0541923
3	5.79909	5.8861	0.0870114	0.1976	0.0171934
4	5.82895	5.82895	0	0.0947	0
5	5.82895	5.82895	0		
6	5.82895	5.82895	0		
7	5.8861	5.79909	-0.0870114		
8	5.96615	5.79909	-0.167054		
9	6.08677	5.79909	-0.287682		

---

Sum of b values = 0.240773

Sample Standard Deviation = 0.0978708

W Statistic = 0.756518

**5% Critical value of 0.829 exceeds 0.756518**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.756518**  
**Evidence of non-normality at 99% level of significance**

## Skewness Coefficient

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.33333	4	2.47487
MW-16-02	9	3	6	2.47487
MW-16-03	8	1	0	Div 0
MW-16-04	9	14.0444	7.22947	1.19014
MW-16-09	9	12.8222	3.90697	-0.0757045

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	6.76818	7.36676	1.12792

## Skewness Coefficient

Parameter: Chromium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.284994	0.854983	2.47487
MW-16-02	9	0.32716	0.98148	2.47487
MW-16-03	8	0	0	Div 0
MW-16-04	9	2.54712	0.436647	1.01083
MW-16-09	9	2.50634	0.324454	-0.313661

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.15888	1.30696	0.421281

## Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	8.7	27	18.3	0.5888	10.775
2	9.4	26	16.6	0.3244	5.38504
3	9.5	13	3.5	0.1976	0.6916
4	9.8	13	3.2	0.0947	0.30304
5	10	10	0		
6	13	9.8	-3.2		
7	13	9.5	-3.5		
8	26	9.4	-16.6		
9	27	8.7	-18.3		

---

Sum of b values = 17.1547

Sample Standard Deviation = 7.22947

W Statistic = 0.703824

**5% Critical value of 0.829 exceeds 0.703824**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.703824**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.16332	3.29584	1.13251	0.5888	0.666824
2	2.24071	3.2581	1.01739	0.3244	0.33004
3	2.25129	2.56495	0.313658	0.1976	0.0619787
4	2.28238	2.56495	0.282567	0.0947	0.0267591
5	2.30259	2.30259	0		
6	2.56495	2.28238	-0.282567		
7	2.56495	2.25129	-0.313658		
8	3.2581	2.24071	-1.01739		
9	3.29584	2.16332	-1.13251		

---

Sum of b values = 1.0856

Sample Standard Deviation = 0.436647

W Statistic = 0.772663

**5% Critical value of 0.829 exceeds 0.772663**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.772663  
Data is normally distributed at 99% level of significance

## Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.844444	1.03333	2.47487
MW-16-02	9	0.877778	1.13333	2.47487
MW-16-03	8	0.5	0	Div 0
MW-16-04	9	3.92222	1.80401	1.05578
MW-16-09	9	3.83333	1.25996	0.577785

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.02955	1.94321	1.08691

## Skewness Coefficient

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.473805	0.658027	2.47487
MW-16-02	9	-0.464911	0.684708	2.47487
MW-16-03	8	-0.693147	0	Div 0
MW-16-04	9	1.28578	0.411047	0.709812
MW-16-09	9	1.29773	0.318513	0.309567

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.210406	1.02611	0.46083

## Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	16	1.68125	0.116726	-0.926404
MW-16-02	16	1.14812	0.085574	-0.531685
MW-16-03	15	1.69333	0.109978	-0.534079
MW-16-04	16	1.64375	0.103078	-0.959228
MW-16-09	16	1.43125	0.14477	-0.838747

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
79	1.51734	0.237701	-0.645165



## Skewness Coefficient

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.833333	1	2.47487
MW-16-02	9	0.766667	0.8	2.47487
MW-16-03	8	0.5	0	Div 0
MW-16-04	9	3.85556	1.67415	1.03004
MW-16-09	9	3.54444	1.11816	0.692648

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.93182	1.81554	1.10528

## Skewness Coefficient

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.476935	0.648637	2.47487
MW-16-02	9	-0.49783	0.585953	2.47487
MW-16-03	8	-0.693147	0	Div 0
MW-16-04	9	1.27636	0.392994	0.630363
MW-16-09	9	1.22423	0.298626	0.509869

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.186074	0.997788	0.459565

## Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	11.5667	5.01647	1.09646
MW-16-02	9	13.6111	2.20479	1.83731
MW-16-03	8	15.25	2.80306	-0.163822
MW-16-04	9	27.2222	4.08588	1.69658
MW-16-09	9	43	7.38241	0.201671

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	22.2864	12.8073	0.945088

## Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.36334	0.453983	-0.656345
MW-16-02	9	2.60087	0.144581	<b>1.66952</b>
MW-16-03	8	2.70913	0.190083	-0.33224
MW-16-04	9	3.29525	0.13616	<b>1.51405</b>
MW-16-09	9	3.74805	0.172324	-0.0300527

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.94865	0.568928	-0.0332975

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	12	19	7	0.5888	4.1216
2	12	15	3	0.3244	0.9732
3	12.5	13	0.5	0.1976	0.0988
4	13	13	0	0.0947	0
5	13	13	0		
6	13	13	0		
7	13	12.5	-0.5		
8	15	12	-3		
9	19	12	-7		

---

Sum of b values = 5.1936

Sample Standard Deviation = 2.20479

W Statistic = 0.693604

**5% Critical value of 0.829 exceeds 0.693604**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.693604**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	2.48491	2.94444	0.459532	0.5888	0.270573
2	2.48491	2.70805	0.223144	0.3244	0.0723878
3	2.52573	2.56495	0.0392207	0.1976	0.00775001
4	2.56495	2.56495	0	0.0947	0
5	2.56495	2.56495	0		
6	2.56495	2.56495	0		
7	2.56495	2.52573	-0.0392207		
8	2.70805	2.48491	-0.223144		
9	2.94444	2.48491	-0.459532		

---

Sum of b values = 0.35071

Sample Standard Deviation = 0.144581

W Statistic = 0.735502

**5% Critical value of 0.829 exceeds 0.735502**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.735502**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	24	37	13	0.5888	7.6544
2	24	30	6	0.3244	1.9464
3	25	27	2	0.1976	0.3952
4	26	26	0	0.0947	0
5	26	26	0		
6	26	26	0		
7	27	25	-2		
8	30	24	-6		
9	37	24	-13		

---

Sum of b values = 9.996

Sample Standard Deviation = 4.08588

W Statistic = 0.748153

**5% Critical value of 0.829 exceeds 0.748153**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.748153**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.17805	3.61092	0.432864	0.5888	0.25487
2	3.17805	3.4012	0.223144	0.3244	0.0723878
3	3.21888	3.29584	0.076961	0.1976	0.0152075
4	3.2581	3.2581	0	0.0947	0
5	3.2581	3.2581	0		
6	3.2581	3.2581	0		
7	3.29584	3.21888	-0.076961		
8	3.4012	3.17805	-0.223144		
9	3.61092	3.17805	-0.432864		

---

Sum of b values = 0.342466

Sample Standard Deviation = 0.13616

W Statistic = 0.790765

**5% Critical value of 0.829 exceeds 0.790765**  
**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.764 is less than 0.790765  
Data is normally distributed at 99% level of significance



## Skewness Coefficient

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	77.8889	5.9675	0.522804
MW-16-02	9	39.6111	9.66236	<b>2.33768</b>
MW-16-03	8	95.875	3.6718	-0.738383
MW-16-04	9	92.5556	8.04846	0.881343
MW-16-09	9	59.2222	3.38296	-0.202509

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	72.5114	22.2618	-0.385541

## Skewness Coefficient

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data  
Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	4.35272	0.0755176	0.407973
MW-16-02	9	3.659	0.198488	<b>2.23139</b>
MW-16-03	8	4.56239	0.0388519	-0.787655
MW-16-04	9	4.52457	0.0846274	0.636649
MW-16-09	9	4.07983	0.0576437	-0.358962

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	4.22828	0.354139	-0.782091

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	34	65	31	0.5888	18.2528
2	34.5	39	4.5	0.3244	1.4598
3	36	38	2	0.1976	0.3952
4	36	38	2	0.0947	0.1894
5	36	36	0		
6	38	36	-2		
7	38	36	-2		
8	39	34.5	-4.5		
9	65	34	-31		

---

Sum of b values = 20.2972

Sample Standard Deviation = 9.66236

W Statistic = 0.55159

**5% Critical value of 0.829 exceeds 0.55159**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.55159**  
**Evidence of non-normality at 99% level of significance**

## Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

<b>i</b>	<b>x(i)</b>	<b>x(n-i+1)</b>	<b>x(n-1+1)-x(i)</b>	<b>a(n-i+1)</b>	<b>b(i)</b>
1	3.52636	4.17439	0.648027	0.5888	0.381558
2	3.54096	3.66356	0.122602	0.3244	0.0397722
3	3.58352	3.63759	0.0540672	0.1976	0.0106837
4	3.58352	3.63759	0.0540672	0.0947	0.00512017
5	3.58352	3.58352	0		
6	3.63759	3.58352	-0.0540672		
7	3.63759	3.58352	-0.0540672		
8	3.66356	3.54096	-0.122602		
9	4.17439	3.52636	-0.648027		

---

Sum of b values = 0.437134

Sample Standard Deviation = 0.198488

W Statistic = 0.606275

**5% Critical value of 0.829 exceeds 0.606275**  
**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.764 exceeds 0.606275**  
**Evidence of non-normality at 99% level of significance**

## Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	1.05811	0.430503	0.444198
MW-16-02	9	1.56444	0.499828	1.14403
MW-16-03	8	1.61356	0.690404	1.45519
MW-16-04	9	1.57078	0.632875	0.379575
MW-16-09	9	2.16889	0.648911	0.00907827

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.59474	0.664125	0.701046

## Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data

Skewness < -1 indicates negatively skewed data

---

### Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.0193514	0.418258	-0.0790602
MW-16-02	9	0.407617	0.291247	0.68333
MW-16-03	8	0.413581	0.367002	0.909563
MW-16-04	9	0.375802	0.420285	-0.16482
MW-16-09	9	0.730349	0.324062	-0.577924

---

### All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.380873	0.42673	-0.220691

# Non-Parametric Tolerance Interval

MW-16-01

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 300

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-01

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.8

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-01

**Parameter: Chromium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 13

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval

MW-16-01

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.6

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.68125

Background standard deviation = 0.116726

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.97575

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-01

**Parameter: Lead**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.5

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-01

**Parameter: Lithium**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.36334

Background standard deviation = 0.453983

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.73936

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 77.8889

Background standard deviation = 5.9675

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 95.9764

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Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.05811

Background standard deviation = 0.430503

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.36297

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-02

**Parameter: Barium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 330

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval MW-16-02

Parameter: **Beryllium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.8

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval MW-16-02

**Parameter: Chromium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 19

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Non-Parametric Tolerance Interval MW-16-02

**Parameter: Cobalt**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 3.9

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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# Parametric Tolerance Interval Analysis MW-16-02

**Parameter: Fluoride**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.14812

Background standard deviation = 0.085574

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.36403

---

Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-02

**Parameter: Lead**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 2.9

Minimum Coverage = 71.7%

Average Coverage = 90%

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<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
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## Non-Parametric Tolerance Interval

MW-16-02

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 19

Minimum Coverage = 71.7%

Average Coverage = 90%

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Location	Date	Value	Significant
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# Non-Parametric Tolerance Interval

# MW-16-02

**Parameter: Molybdenum**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 65

Minimum Coverage = 71.7%

Average Coverage = 90%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 0.407617

Background standard deviation = 0.291247

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 1.29039

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Non-Parametric Tolerance Interval

# MW-16-03

**Parameter: Barium**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

Total Percent Non-Detects = 0%

Background measurements (n) = 8

Maximum Background Concentration = 310

Minimum Coverage = 68.8%

Average Coverage = 88.8889%

---

<b>Location</b>	<b>Date</b>	<b>Value</b>	<b>Significant</b>
-----------------	-------------	--------------	--------------------

# Parametric Tolerance Interval Analysis MW-16-03

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15

Background mean = 1.69333

Background standard deviation = 0.109978

One-sided normal tolerance factor (K) at 95% confidence = 2.566

Upper tolerance limit = 1.97554

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 15.25

Background standard deviation = 2.80306

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 24.1862

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 95.875

Background standard deviation = 3.6718

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 107.581

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8

Background mean = 0.413581

Background standard deviation = 0.367002

One-sided normal tolerance factor (K) at 95% confidence = 3.188

Upper tolerance limit = 1.58358

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval MW-16-04

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 7

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval MW-16-04

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 440

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval MW-16-04

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%

Background measurements (n) = 9

Maximum Background Concentration = 1

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Non-Parametric Tolerance Interval MW-16-04

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 27

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Cobalt**

**Natural Logarithm Transformation**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.28578

Background standard deviation = 0.411047

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.53166

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Fluoride**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.64375

Background standard deviation = 0.103078

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.90381

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.27636

Background standard deviation = 0.392994

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 2.46752

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-04

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%

Background measurements (n) = 9

Maximum Background Concentration = 37

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Molybdenum**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 92.5556

Background standard deviation = 8.04846

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 116.95

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-04

**Parameter: Radium-226/228**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 1.57078

Background standard deviation = 0.632875

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 3.48902

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Non-Parametric Tolerance Interval

MW-16-09

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%

Background measurements (n) = 9

Maximum Background Concentration = 7.2

Minimum Coverage = 71.7%

Average Coverage = 90%

---

Location	Date	Value	Significant
----------	------	-------	-------------



# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Barium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 283.333

Background standard deviation = 16.5831

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 333.597

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 12.8222

Background standard deviation = 3.90697

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 24.6643

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Cobalt**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.83333

Background standard deviation = 1.25996

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 7.65227

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Fluoride**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16

Background mean = 1.43125

Background standard deviation = 0.14477

One-sided normal tolerance factor (K) at 95% confidence = 2.523

Upper tolerance limit = 1.7965

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Lead**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 3.54444

Background standard deviation = 1.11816

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 6.93358

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Lithium**

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 43

Background standard deviation = 7.38241

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 65.3761

---

Location	Date	Value	Significant
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# Parametric Tolerance Interval Analysis MW-16-09

**Parameter: Molybdenum**

**Original Data (Not Transformed)**

**Non-Detects Replaced with 1/2 DL**

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 59.2222

Background standard deviation = 3.38296

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 69.476

---

Location	Date	Value	Significant
----------	------	-------	-------------

# Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

## USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9

Background mean = 2.16889

Background standard deviation = 0.648911

One-sided normal tolerance factor (K) at 95% confidence = 3.031

Upper tolerance limit = 4.13574

---

Location	Date	Value	Significant
----------	------	-------	-------------



**APPENDIX M – FATE AND TRANSPORT  
MODEL INPUTS**

# Calculation Package

**COMPUTATION COVER SHEET**

Client:   DTE   Project:   BRPP ALD   Project/  
Proposal No.:   GLP8017    
Task No.

Title of Computations   Vertical Darcy Velocity and Travel Time Calculations  

Computations by: Signature   *Nick Williams*   11/17/2021  
Printed Name   Nick Williams   Date  
Title   Senior Staff Professional  

Assumptions and Procedures Checked by: Signature   *Jesse Varsho*   11/17/2021  
Printed Name   Jesse Varsho   Date  
(peer reviewer) Title \_\_\_\_\_

Computations Checked by: Signature   *Isaiah Vaught*   11/17/2021  
Printed Name   Isaiah Vaught   Date  
Title \_\_\_\_\_

Computations backchecked by: Signature   *Nick Williams*   11/17/2021  
(originator) Printed Name   Nick Williams   Date  
Title \_\_\_\_\_

Approved by: Signature   *Omer Bozok*   11/24/2021  
(pm or designate) Printed Name   Omer Bozok   Date  
Title \_\_\_\_\_

Approval notes: \_\_\_\_\_

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

## TABLE OF CONTENTS

1. PURPOSE.....	3
2. ASSUMPTIONS.....	3
3. SOLUTION .....	3
4. TRAVEL TIME SOLUTION.....	4

## 1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Belle River Power Plant Bottom Ash Basins (BAB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the BABs to the Uppermost Aquifer.

## 2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

## 3. SOLUTION

The Darcy velocity ( $q$ ) through the model lithologies or layers is expressed in m/year =

$$= K(i) = K \left( \frac{H_1 - H_2}{l_1 - l_2} \right)$$

Where,

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$H_1 - H_2$  = difference in hydraulic head between the BAB water level and the upper most aquifer potentiometric surface

$l_1 - l_2$  = distance in direction of flow

Thus:

$K$  = Geomean of Clay with Sand hydraulic conductivity value (data provided in Attachment 1) =  $2.15 \times 10^{-8}$  cm/s

$H_1$  = Total head at the bottom of BAB = 590 ft

$H_2$  = Average water level elevation from monitoring wells (data provided in Attachment 2) =  $574.28^1$  ft

$l_1$  = Bottom of ash pond = 580 ft

$l_2$  = Average elevation of well screen midpoints =  $470.98^1$  ft

$q$  = **Darcy velocity in m/year (= cm/s \* 315360) =  $1.02 \times 10^{-3}$  m/year**

<sup>1</sup> Value is an average taken from all monitoring wells

#### 4. TRAVEL TIME SOLUTION

Travel time ( $T$ ) through the model lithology is expressed in years =

$$T = t / \left( \frac{K * i}{n} \right)$$

Where:

$t$  = minimum model thickness

$K$  = vertical hydraulic conductivity (laboratory measured)

$i$  = vertical gradient

$n$  = effective porosity

Thus:

$t$  = Minimum model thickness per EVS model = 26.21 m

$K$  = Hydraulic conductivity =  $2.15 \times 10^{-8}$  cm/s

$i$  = Calculated using variables in Section 3 = 0.15

$n$  = Average of porosity data from Clay with Sand layer, converted to effective porosity using Sara (1994) = 0.34

$T$  = **Travel time in years (= s / 31536000) = 8,762 years**

**Note:** Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of BAB to top of uppermost aquifer.

# Attachment 1

Location ID	Layer	Elevation (ft)	Vertical Hydraulic Conductivity, $k_v$ (cm/s)		Vertical Hydraulic Conductivity, $k_v$ (cm/s)		
			DDW	Site Water	Clay	Clay with Sand	Dike
B1-ST-3 (36-38)	Clay	555.8	2.20E-08		2.20E-08		
	Clay	555.8	2.60E-09		2.60E-09		
B2-ST-2 (7-9)	Dike	584.0	2.10E-08				2.10E-08
	Dike	584.0	1.90E-08				1.90E-08
B2-ST-7 (97-99)	Clay with Sand	494.0	3.30E-08			3.30E-08	
	Clay with Sand	494.0	2.00E-08			2.00E-08	
B3-ST-1 (1-3)	Dike	590.0	9.50E-09				9.50E-09
B4-ST-4 (67-69)	Clay with Sand	518.0	2.80E-08			2.80E-08	
	Clay with Sand	518.0	1.80E-08			1.80E-08	
B5-ST-2 (27-29)	Clay	563.3	3.40E-08		3.40E-08		
	Clay	563.3	2.30E-08		2.30E-08		
B6-ST-4 (47-49)	Clay	541.3	2.50E-08		2.50E-08		
	Clay	541.3	1.80E-08		1.80E-08		
B6-ST-7 (97-99)	Clay with Sand	491.3	2.40E-08			2.40E-08	
	Clay with Sand	491.3	1.20E-08			1.20E-08	
B1-ST-1 (7-9)	Dike	584.8		8.20E-09			8.20E-09
B2-ST-1 (1-3)	Dike	590.0		1.20E-08			1.20E-08
B2-ST-4 (47-49)	Clay	544.0		2.20E-08	2.20E-08		
B3-ST-5 (77-79)	Clay with Sand	514.0		1.90E-08		1.90E-08	
B4-ST-3 (47-49)	Clay	538.0		2.80E-08	2.80E-08		
B5-ST-5 (87-89)	Clay with Sand	503.3		1.50E-08		1.50E-08	
MW-16-01	Clay with Sand	537.2	2.90E-08			2.90E-08	
MW-16-05	Clay with Sand	537.3	2.70E-08			2.70E-08	
MW-16-07	Clay	538.9	2.90E-08		2.90E-08		
MW-16-02	Sand	491.7					
MW-16-03	Sand	453.7					
MW-16-06	Sand	452.5					
MW-16-08	Sand	453.8					
MW-16-09	Sand	449.9					
MW-16-10	Sand	441.8					
MW-16-11A	Sand	450.0					
SB-16-01	Clay	537.7	2.10E-08		2.10E-08		
<b>Statistical Parameter</b>					<b>Clay</b>	<b>Clay with Sand</b>	<b>Dike</b>
<b>Mean</b>					2.25E-08	2.25E-08	1.39E-08
<b>GeoMean</b>					<b>1.94E-08</b>	<b>2.15E-08</b>	<b>1.30E-08</b>
<b>Maximum</b>					3.40E-08	3.30E-08	2.10E-08
<b>Minimum</b>					2.60E-09	1.20E-08	8.20E-09
<b>Count</b>					10	10	5
<b>Standard Deviation</b>					8.37E-09	6.75E-09	5.74E-09



## Attachment 2

Table 1

Summary of Groundwater Elevation Data – March and September 2020  
 Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program  
 China Township, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
Date Installed	3/17/2016		3/15/2016		6/1/2016		3/8/2016		6/2/2016	
TOC Elevation	590.06		588.94		590.66		590.51		590.80	
Geologic Unit of Screened Interval	Sand		Sand		Silty Sand		Sand		Sand	
Screened Interval Elevation	496.3 to 491.3		494.3 to 489.3		456.0 to 451.0		468.5 to 463.5		452.3 to 447.3	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
03/17/2020	15.83	574.23	13.28	575.66	16.13	574.53	16.48	574.03	16.31	574.49
09/14/2020	16.16	573.90	13.58	575.36	16.46	574.20	16.83	573.68	16.60	574.20

**Notes:**

Elevations are reported in feet relative to the North American Vertical Datum of 1988.  
 ft BTOC - feet Below top of casing.

Well ID	MW-06-01	MW-06-02	MW-06-03	MW-06-04	MW-16-09
Screen Mid Point Elevation, $I_2$ (ft)	493.8	491.8	453.5	466	449.8
Aquifer Water Level, $H_2$ (ft)	573.9	575.4	574.2	573.7	574.2
Total Head Difference, $H_1 - H_2$ (ft)	16.1	14.6	15.8	16.3	15.8
Flow Distance, $I_1 - I_2$ (ft)	86.2	88.2	126.5	114	130.2
Gradient, $i$	0.19	0.17	0.12	0.14	0.12

Pond Water Elevation, $H_1$ (ft)	590
Elevation of Pond Outflow, $I_1$ (ft)	580

Average Gradient	0.15
------------------	------

# POLLUTE Model Inputs

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Dist. Coeff.	Dry Density (kg/m3)
BAB	Clay	1.02E-03	2.03E-03	12.01	13.99	11.03	25	1.94E-08	0.019	0.02375	0.01425	0.37	0.45	0.28	0	1509.084
	Clay with Sand	1.02E-03	2.03E-03	19.29	23.62	15.18	40	2.15E-08	0.019	0.02375	0.01425	0.34	0.45	0.20	0	1509.084

## Notes:

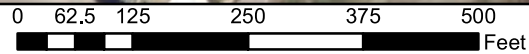
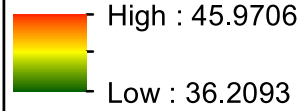
1. Kv = vertical hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table M-1
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. Kv of Clay with Sand selected for the calculation of the Darcy velocity as the higher and thus more conservative value of the two layers; POLLUTE only allows one input for Darcy velocity
4. CoHD = Coefficient of Hydrodynamic Dispersion
5. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994

## Model Thickness



**BAB Clay Thickness (ft)**

**Value**



**Bottom Ash Basin  
Clay Thickness**

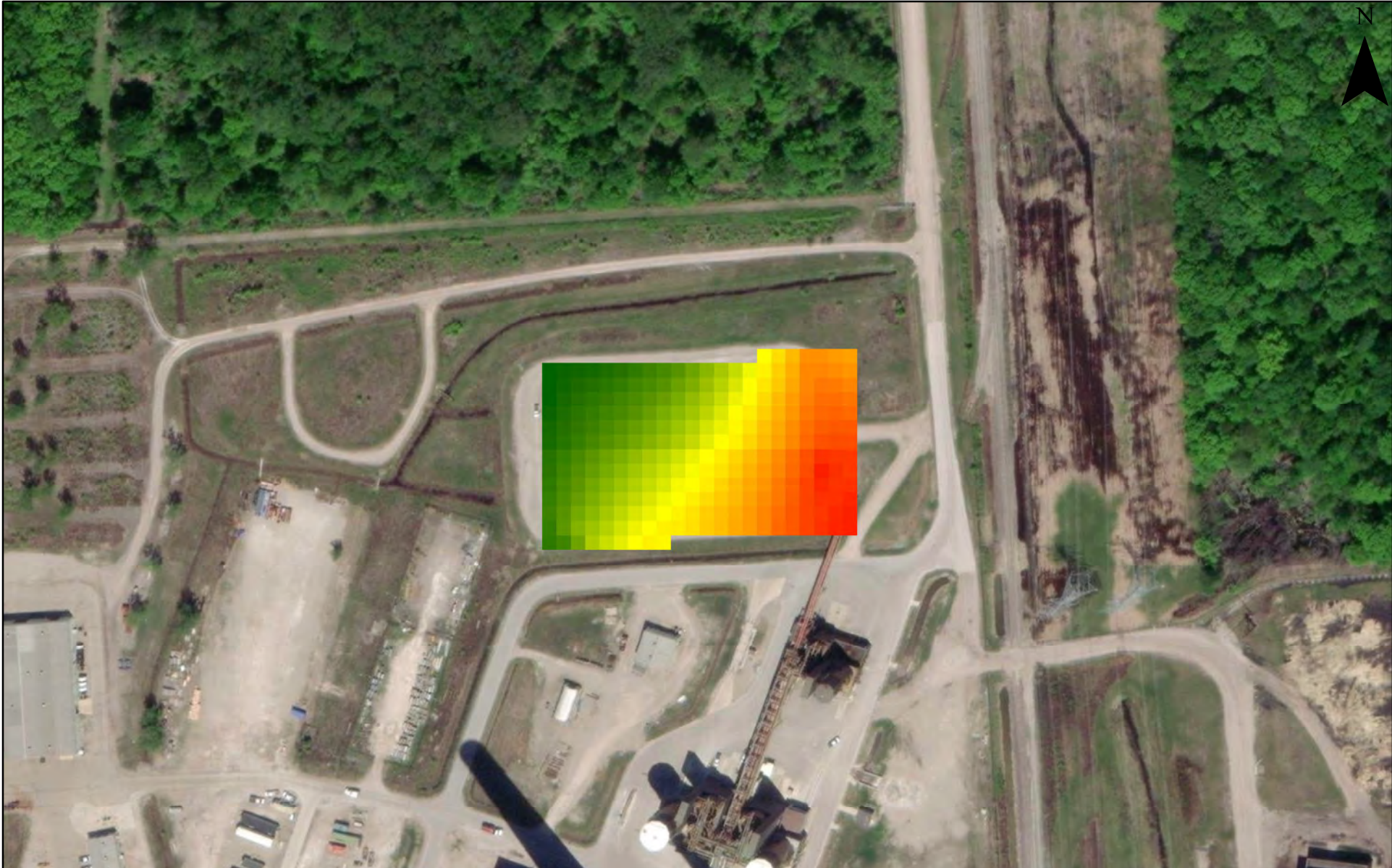


8/9/2021

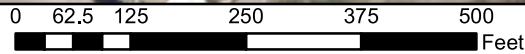
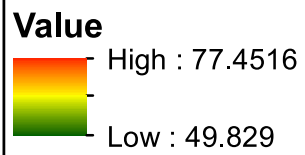
Chicago, IL

**Figure**

**M-1**



**BAB Clay with Sand Thickness**



**Bottom Ash Basin  
Clay with Sand Thickness**



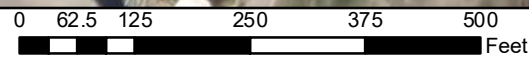
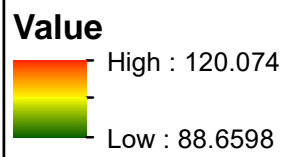
8/9/2021

Chicago, IL

**Figure  
M-2**



**Model Interval Thickness**

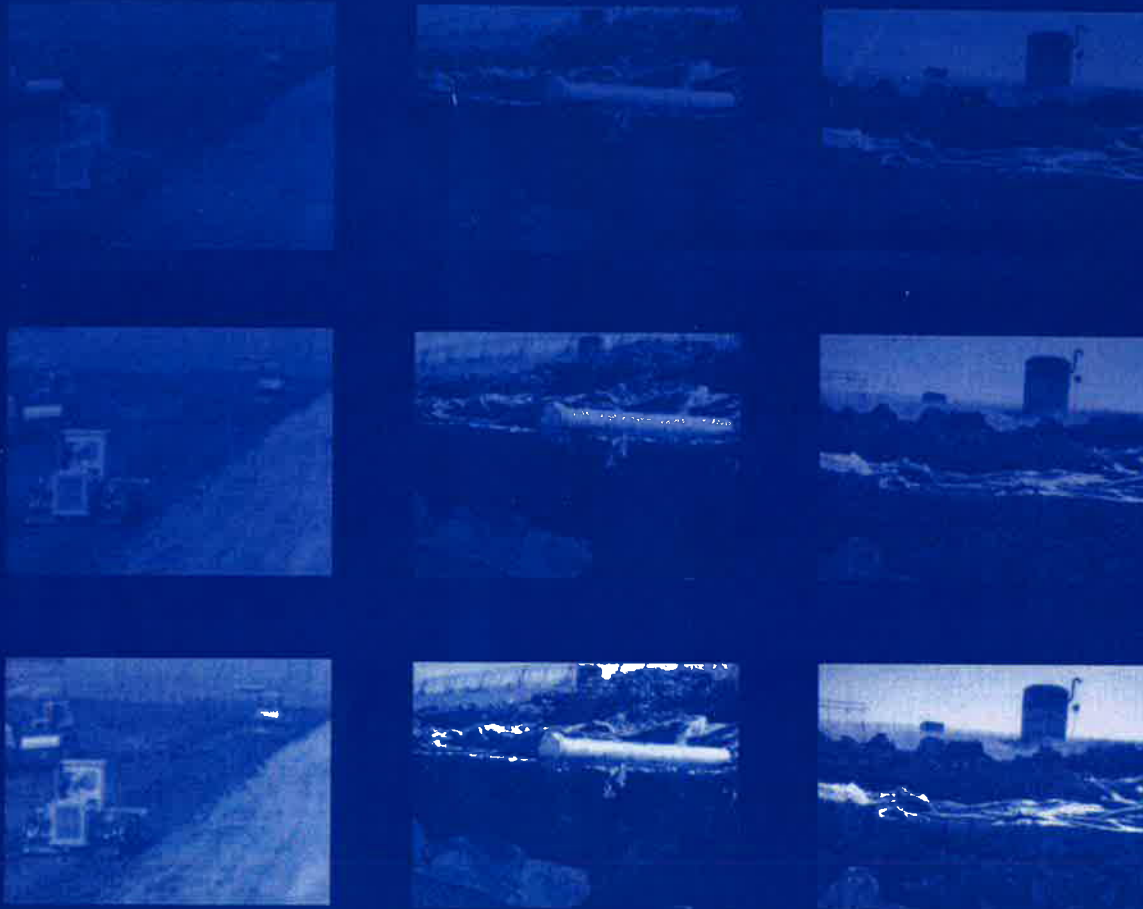


<b>Bottom Ash Basins Model Interval Thickness</b>		<b>Figure M-3</b>
11/11/2021	Chicago, IL	



## Reference Material

 **CRC Press**  
Taylor & Francis Group  
A CHAPMAN & HALL BOOK



# BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES

2ND EDITION

R. Kerry Rowe, Robert M. Quigley,  
Richard W.I. Brachman & John R. Booker

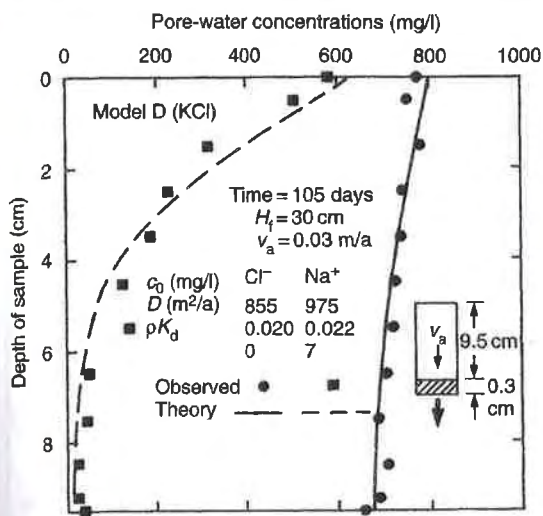


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe et al., 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some con-

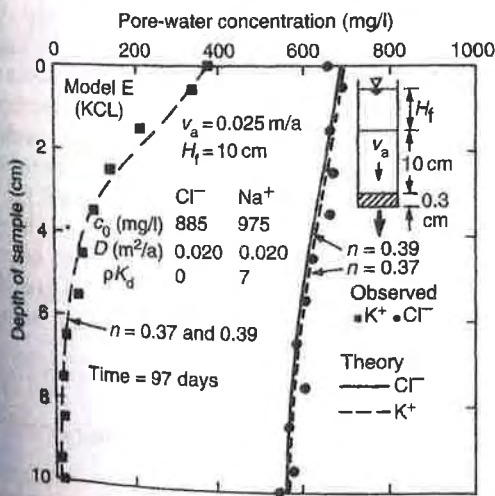


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe et al., 1988).

fidence in the parameters  $D$  and  $\rho K_d$  for the clay and source fluids examined.

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient,  $D$ , for chloride was deduced for each model and ranged between 0.018 and 0.02 m<sup>2</sup>/a with an average value of 0.019 m<sup>2</sup>/a. This small variation in  $D$  does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m<sup>2</sup>/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters  $D$  and  $K_d$ . Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

### 8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection-diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

# SITE ASSESSMENT and REMEDIATION Handbook **Second Edition**

**Martin N. Sara**



 **LEWIS PUBLISHERS**

**Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils**

Texture Class	Sample Size	Total	Residual	Effective
		Porosity ( $\phi$ ) cm <sup>3</sup> /cm <sup>3</sup>	Saturation ( $\phi_r$ ) cm <sup>3</sup> /cm <sup>3</sup>	Porosity ( $\phi_c$ ) cm <sup>3</sup> /cm <sup>3</sup>
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 (0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 (0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value

Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.

**APPENDIX N – FATE AND TRANSPORT  
MODEL OUTPUTS**

# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## BAB Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.248E+01	2.078E-45
1.296E+01	2.050E-47
1.345E+01	4.107E-49
1.393E+01	1.173E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00



	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.248E+01	4.063E-32
	1.296E+01	4.214E-33
	1.345E+01	3.967E-34
	1.393E+01	3.349E-35
	1.441E+01	2.524E-36
	1.489E+01	1.693E-37
	1.538E+01	1.006E-38
	1.586E+01	5.275E-40
	1.634E+01	2.433E-41
	1.682E+01	9.869E-43
	1.730E+01	3.565E-44
	1.779E+01	1.217E-45
	1.827E+01	4.720E-47
	1.875E+01	2.657E-48
	1.923E+01	2.038E-49
	1.972E+01	1.680E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.203E-41 8.647E-43 5.763E-44 3.677E-45 2.449E-46 1.979E-47 2.100E-48 2.648E-49 3.480E-50 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 1.884E-21 2.319E-22 2.563E-23 2.535E-24 2.237E-25 1.762E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.255E-27 8.656E-29 7.250E-30 9.792E-31 1.880E-31 3.915E-32 7.956E-33 1.541E-33 2.829E-34 4.915E-35 8.068E-36 1.250E-36 1.825E-37 2.506E-38 3.236E-39 3.920E-40 4.452E-41 4.741E-42 4.745E-43 4.507E-44 4.172E-45 4.001E-46 4.394E-47 5.936E-48 9.487E-49 1.631E-49 2.821E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
	1.345E+01	1.382E-20
	1.393E+01	2.335E-21
	1.441E+01	3.635E-22
	1.489E+01	5.194E-23
	1.538E+01	6.795E-24
	1.586E+01	8.122E-25
	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32
	2.020E+01	1.846E-32
	2.068E+01	4.362E-33
	2.116E+01	9.891E-34
	2.165E+01	2.147E-34
	2.213E+01	4.459E-35
	2.261E+01	8.846E-36
	2.309E+01	1.676E-36
	2.357E+01	3.027E-37
	2.406E+01	5.209E-38
	2.454E+01	8.531E-39
	2.502E+01	1.329E-39
	2.550E+01	1.966E-40
	2.599E+01	2.761E-41
	2.647E+01	3.685E-42
	2.695E+01	4.684E-43
	2.743E+01	5.716E-44
	2.791E+01	6.827E-45
	2.840E+01	8.322E-46
	2.888E+01	1.110E-46
	2.936E+01	1.731E-47
	2.984E+01	3.169E-48
	3.033E+01	6.406E-49
	3.081E+01	1.340E-49
	3.129E+01	2.793E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.248E+01	1.217E-17
1.296E+01	3.249E-18
1.345E+01	8.170E-19
1.393E+01	1.931E-19
1.441E+01	4.282E-20
1.489E+01	8.893E-21
1.538E+01	1.727E-21
1.586E+01	3.127E-22
1.634E+01	5.273E-23
1.682E+01	8.262E-24
1.730E+01	1.201E-24
1.779E+01	1.616E-25
1.827E+01	2.017E-26
1.875E+01	2.354E-27
1.923E+01	2.655E-28
1.972E+01	3.184E-29
2.020E+01	4.867E-30
2.068E+01	1.044E-30
2.116E+01	2.756E-31
2.165E+01	7.703E-32
2.213E+01	2.135E-32
2.261E+01	5.747E-33
2.309E+01	1.495E-33
2.357E+01	3.753E-34
2.406E+01	9.078E-35
2.454E+01	2.115E-35
2.502E+01	4.742E-36
2.550E+01	1.022E-36
2.599E+01	2.118E-37
2.647E+01	4.214E-38
2.695E+01	8.043E-39
2.743E+01	1.472E-39
2.791E+01	2.581E-40
2.840E+01	4.333E-41
2.888E+01	6.971E-42
2.936E+01	1.076E-42
2.984E+01	1.601E-43
3.033E+01	2.320E-44
3.081E+01	3.353E-45
3.129E+01	5.038E-46

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
1.056E+01  
1.104E+01  
1.152E+01  
1.200E+01  
1.248E+01  
1.296E+01  
1.345E+01  
1.393E+01  
1.441E+01  
1.489E+01  
1.538E+01  
1.586E+01  
1.634E+01  
1.682E+01  
1.730E+01  
1.779E+01  
1.827E+01  
1.875E+01  
1.923E+01  
1.972E+01  
2.020E+01  
2.068E+01  
2.116E+01  
2.165E+01  
2.213E+01  
2.261E+01  
2.309E+01  
2.357E+01  
2.406E+01  
2.454E+01  
2.502E+01  
2.550E+01  
2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

4.337E-01  
2.346E-01  
1.100E-01  
4.443E-02  
1.538E-02  
4.547E-03  
1.145E-03  
2.451E-04  
4.452E-05  
6.852E-06  
8.927E-07  
9.837E-08  
9.162E-09  
7.219E-10  
4.860E-11  
3.069E-12  
3.171E-13  
9.445E-14  
4.044E-14  
1.740E-14  
7.194E-15  
2.849E-15  
1.083E-15  
4.061E-16  
1.399E-16  
4.591E-17  
1.434E-17  
4.262E-18  
1.203E-18  
3.220E-19  
8.164E-20  
1.958E-20  
4.437E-21  
9.480E-22  
1.907E-22  
3.606E-23  
6.400E-24  
1.065E-24  
1.658E-25  
2.421E-26  
3.336E-27  
4.437E-28  
6.086E-29  
9.850E-30  
2.127E-30  
5.837E-31  
1.773E-31  
5.466E-32  
1.658E-32  
4.894E-33  
1.402E-33  
3.896E-34  
1.049E-34  
2.733E-35  
6.891E-36  
1.681E-36  
3.962E-37

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.023E-38 1.984E-38 4.207E-39 8.605E-40 1.696E-40 3.222E-41 5.901E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 8.607E-16 3.284E-16 1.202E-16 4.218E-17 1.417E-17 4.558E-18 1.401E-18 4.113E-19 1.151E-19 3.072E-20 7.798E-21 1.881E-21 4.308E-22 9.352E-23 1.922E-23 3.734E-24 6.852E-25 1.187E-25 1.945E-26 3.034E-27 4.604E-28 7.193E-29 1.293E-29



	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.983E-30 8.642E-31 2.804E-31 9.357E-32 3.096E-32 1.003E-32 3.170E-33 9.752E-34 2.919E-34 8.498E-35 2.405E-35 6.611E-36 1.765E-36 4.574E-37 1.150E-37 2.804E-38 6.625E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 3.512E-15 1.503E-15 6.206E-16 2.471E-16 9.480E-17 3.502E-17 1.245E-17 4.254E-18 1.397E-18 4.400E-19 1.329E-19 3.847E-20 1.066E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.821E-21 7.133E-22 1.720E-22 3.954E-23 8.648E-24 1.798E-24 3.554E-25 6.675E-26 1.195E-26 2.055E-27 3.479E-28 6.139E-29 1.249E-29 3.187E-30 9.940E-31 3.436E-31 1.223E-31 4.333E-32 1.508E-32 5.136E-33 1.709E-33 5.549E-34 1.758E-34 5.433E-35 1.637E-35 4.806E-36 1.375E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.326E-13 1.981E-13 8.651E-14 4.354E-14 2.233E-14 1.078E-14 5.051E-15 2.293E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.008E-15 4.292E-16 1.768E-16 7.039E-17 2.709E-17 1.006E-17 3.609E-18 1.248E-18 4.159E-19 1.334E-19 4.118E-20 1.222E-20 3.481E-21 9.514E-22 2.493E-22 6.255E-23 1.502E-23 3.446E-24 7.553E-25 1.581E-25 3.165E-26 6.081E-27 1.135E-27 2.120E-28 4.221E-29 9.821E-30 2.819E-30 9.560E-31 3.517E-31 1.323E-31 4.953E-32 1.825E-32 6.596E-33 2.334E-33 8.084E-34 2.739E-34 9.072E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09

9.120E+00	5.449E-10
9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.016E-13
1.104E+01	2.215E-13
1.152E+01	9.850E-14
1.200E+01	5.229E-14
1.248E+01	2.697E-14
1.296E+01	1.359E-14
1.345E+01	6.658E-15
1.393E+01	3.172E-15
1.441E+01	1.468E-15
1.489E+01	6.598E-16
1.538E+01	2.878E-16
1.586E+01	1.218E-16
1.634E+01	5.000E-17
1.682E+01	1.988E-17
1.730E+01	7.659E-18
1.779E+01	2.856E-18
1.827E+01	1.030E-18
1.875E+01	3.591E-19
1.923E+01	1.209E-19
1.972E+01	3.932E-20
2.020E+01	1.233E-20
2.068E+01	3.727E-21
2.116E+01	1.085E-21
2.165E+01	3.039E-22
2.213E+01	8.185E-23
2.261E+01	2.118E-23
2.309E+01	5.260E-24
2.357E+01	1.253E-24
2.406E+01	2.864E-25
2.454E+01	6.279E-26
2.502E+01	1.324E-26
2.550E+01	2.703E-27
2.599E+01	5.438E-28
2.647E+01	1.120E-28
2.695E+01	2.536E-29
2.743E+01	6.808E-30
2.791E+01	2.205E-30
2.840E+01	8.115E-31
2.888E+01	3.161E-31
2.936E+01	1.247E-31
2.984E+01	4.888E-32
3.033E+01	1.887E-32
3.081E+01	7.156E-33
3.129E+01	2.662E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB\_ExtendedRun

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.248E+01	2.078E-45
1.296E+01	2.050E-47
1.345E+01	4.107E-49
1.393E+01	1.173E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40
	2.020E+01	1.203E-41
	2.068E+01	8.647E-43
	2.116E+01	5.763E-44
	2.165E+01	3.677E-45
	2.213E+01	2.449E-46
	2.261E+01	1.979E-47
	2.309E+01	2.100E-48
	2.357E+01	2.648E-49
	2.406E+01	3.480E-50
	2.454E+01	0.000E+00



	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16
	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
	1.345E+01	1.382E-20
	1.393E+01	2.335E-21
	1.441E+01	3.635E-22
	1.489E+01	5.194E-23
	1.538E+01	6.795E-24
	1.586E+01	8.122E-25
	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.846E-32 4.362E-33 9.891E-34 2.147E-34 4.459E-35 8.846E-36 1.676E-36 3.027E-37 5.209E-38 8.531E-39 1.329E-39 1.966E-40 2.761E-41 3.685E-42 4.684E-43 5.716E-44 6.827E-45 8.322E-46 1.110E-46 1.731E-47 3.169E-48 6.406E-49 1.340E-49 2.793E-50
35	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 7.006E-01 4.337E-01 2.346E-01 1.100E-01 4.443E-02 1.538E-02 4.547E-03 1.145E-03 2.451E-04 4.452E-05 6.852E-06 8.927E-07 9.837E-08 9.162E-09 7.219E-10 4.860E-11 3.069E-12 3.171E-13 9.445E-14 4.044E-14 1.740E-14 7.194E-15 2.849E-15 1.083E-15 4.061E-16 1.399E-16 4.591E-17 1.434E-17 4.262E-18 1.203E-18 3.220E-19

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	8.164E-20 1.958E-20 4.437E-21 9.480E-22 1.907E-22 3.606E-23 6.400E-24 1.065E-24 1.658E-25 2.421E-26 3.336E-27 4.437E-28 6.086E-29 9.850E-30 2.127E-30 5.837E-31 1.773E-31 5.466E-32 1.658E-32 4.894E-33 1.402E-33 3.896E-34 1.049E-34 2.733E-35 6.891E-36 1.681E-36 3.962E-37 9.023E-38 1.984E-38 4.207E-39 8.605E-40 1.696E-40 3.222E-41 5.901E-42
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13

	1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.256E-14 3.501E-14 1.670E-14 7.925E-15 3.512E-15 1.503E-15 6.206E-16 2.471E-16 9.480E-17 3.502E-17 1.245E-17 4.254E-18 1.397E-18 4.400E-19 1.329E-19 3.847E-20 1.066E-20 2.821E-21 7.133E-22 1.720E-22 3.954E-23 8.648E-24 1.798E-24 3.554E-25 6.675E-26 1.195E-26 2.055E-27 3.479E-28 6.139E-29 1.249E-29 3.187E-30 9.940E-31 3.436E-31 1.223E-31 4.333E-32 1.508E-32 5.136E-33 1.709E-33 5.549E-34 1.758E-34 5.433E-35 1.637E-35 4.806E-36 1.375E-36
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04

5.760E+00	1.023E-04
6.240E+00	2.483E-05
6.720E+00	5.421E-06
7.200E+00	1.065E-06
7.680E+00	1.879E-07
8.160E+00	2.981E-08
8.640E+00	4.249E-09
9.120E+00	5.449E-10
9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.016E-13
1.104E+01	2.215E-13
1.152E+01	9.850E-14
1.200E+01	5.229E-14
1.248E+01	2.697E-14
1.296E+01	1.359E-14
1.345E+01	6.658E-15
1.393E+01	3.172E-15
1.441E+01	1.468E-15
1.489E+01	6.598E-16
1.538E+01	2.878E-16
1.586E+01	1.218E-16
1.634E+01	5.000E-17
1.682E+01	1.988E-17
1.730E+01	7.659E-18
1.779E+01	2.856E-18
1.827E+01	1.030E-18
1.875E+01	3.591E-19
1.923E+01	1.209E-19
1.972E+01	3.932E-20
2.020E+01	1.233E-20
2.068E+01	3.727E-21
2.116E+01	1.085E-21
2.165E+01	3.039E-22
2.213E+01	8.185E-23
2.261E+01	2.118E-23
2.309E+01	5.260E-24
2.357E+01	1.253E-24
2.406E+01	2.864E-25
2.454E+01	6.279E-26
2.502E+01	1.324E-26
2.550E+01	2.703E-27
2.599E+01	5.438E-28
2.647E+01	1.120E-28
2.695E+01	2.536E-29
2.743E+01	6.808E-30
2.791E+01	2.205E-30
2.840E+01	8.115E-31
2.888E+01	3.161E-31
2.936E+01	1.247E-31
2.984E+01	4.888E-32
3.033E+01	1.887E-32
3.081E+01	7.156E-33
3.129E+01	2.662E-33

9.600E-01  
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2.880E+00  
3.360E+00  
3.840E+00  
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2.152E-01  
1.336E-01  
7.805E-02  
4.283E-02  
2.205E-02  
1.064E-02  
4.813E-03  
2.037E-03  
8.062E-04  
2.984E-04  
1.032E-04  
3.337E-05  
1.007E-05  
2.839E-06  
7.470E-07  
1.834E-07  
4.203E-08  
8.987E-09  
1.794E-09  
3.350E-10  
6.126E-11  
1.037E-11  
1.895E-12  
4.859E-13  
2.040E-13  
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4.148E-15  
2.255E-15  
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1.626E-16  
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3.877E-17  
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8.518E-18  
3.868E-18  
1.719E-18  
7.476E-19  
3.180E-19  
1.322E-19  
5.373E-20  
2.133E-20  
8.269E-21  
3.129E-21  
1.155E-21  
4.160E-22  
1.461E-22  
4.996E-23

	2.840E+01	1.665E-23
	2.888E+01	5.401E-24
	2.936E+01	1.706E-24
	2.984E+01	5.243E-25
	3.033E+01	1.569E-25
	3.081E+01	4.573E-26
	3.129E+01	1.302E-26

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB Darcy

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00203$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.899E-01
	9.600E-01	3.170E-02
	1.440E+00	1.173E-03
	1.920E+00	1.395E-05



2.400E+00	5.182E-08
2.880E+00	5.999E-11
3.360E+00	1.314E-13
3.840E+00	1.263E-14
4.320E+00	1.064E-15
4.800E+00	6.514E-17
5.280E+00	2.848E-18
5.760E+00	8.699E-20
6.240E+00	1.812E-21
6.720E+00	2.503E-23
7.200E+00	2.229E-25
7.680E+00	1.279E-27
8.160E+00	7.406E-30
8.640E+00	1.881E-31
9.120E+00	8.046E-33
9.600E+00	2.907E-34
1.008E+01	8.446E-36
1.056E+01	1.951E-37
1.104E+01	3.543E-39
1.152E+01	5.008E-41
1.200E+01	5.723E-43
1.248E+01	5.059E-45
1.296E+01	5.171E-47
1.345E+01	1.074E-48
1.393E+01	3.182E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.667E-01
	9.600E-01	1.368E-01
	1.440E+00	2.392E-02
	1.920E+00	2.422E-03
	2.400E+00	1.393E-04
	2.880E+00	4.505E-06
	3.360E+00	8.123E-08
	3.840E+00	8.141E-10
	4.320E+00	4.946E-12
	4.800E+00	1.302E-13
	5.280E+00	2.603E-14
	5.760E+00	5.001E-15
	6.240E+00	8.235E-16
	6.720E+00	1.154E-16
	7.200E+00	1.368E-17
	7.680E+00	1.362E-18
	8.160E+00	1.129E-19
	8.640E+00	7.730E-21
	9.120E+00	4.326E-22
	9.600E+00	1.960E-23
	1.008E+01	7.110E-25
	1.056E+01	2.058E-26
	1.104E+01	4.950E-28
	1.152E+01	1.367E-29
	1.200E+01	9.120E-31
	1.248E+01	9.788E-32
	1.296E+01	1.054E-32
	1.345E+01	1.030E-33
	1.393E+01	9.032E-35
	1.441E+01	7.071E-36
	1.489E+01	4.924E-37
	1.538E+01	3.039E-38
	1.586E+01	1.655E-39
	1.634E+01	7.928E-41
	1.682E+01	3.340E-42
	1.730E+01	1.252E-43
	1.779E+01	4.434E-45
	1.827E+01	1.780E-46
	1.875E+01	1.037E-47
	1.923E+01	8.241E-49
	1.972E+01	7.051E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.613E-01
	9.600E-01	2.330E-01
	1.440E+00	6.923E-02
	1.920E+00	1.443E-02
	2.400E+00	2.080E-03
	2.880E+00	2.056E-04
	3.360E+00	1.385E-05
	3.840E+00	6.325E-07
	4.320E+00	1.954E-08
	4.800E+00	4.085E-10
	5.280E+00	6.240E-12
	5.760E+00	2.330E-13
	6.240E+00	5.558E-14
	6.720E+00	1.544E-14
	7.200E+00	3.900E-15
	7.680E+00	8.876E-16
	8.160E+00	1.814E-16
	8.640E+00	3.318E-17
	9.120E+00	5.408E-18
	9.600E+00	7.826E-19
	1.008E+01	1.001E-19
	1.056E+01	1.125E-20
	1.104E+01	1.106E-21
	1.152E+01	9.464E-23
	1.200E+01	7.294E-24
	1.248E+01	4.610E-25
	1.296E+01	2.503E-26
	1.345E+01	1.199E-27
	1.393E+01	5.909E-29
	1.441E+01	4.600E-30
	1.489E+01	6.445E-31
	1.538E+01	1.082E-31
	1.586E+01	1.772E-32
	1.634E+01	2.722E-33
	1.682E+01	3.890E-34
	1.730E+01	5.160E-35
	1.779E+01	6.341E-36
	1.827E+01	7.203E-37
	1.875E+01	7.548E-38
	1.923E+01	7.281E-39
	1.972E+01	6.450E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.243E-41 3.914E-42 2.708E-43 1.792E-44 1.236E-45 1.032E-46 1.132E-47 1.479E-48 2.017E-49 2.688E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.220E-01 3.097E-01 1.207E-01 3.624E-02 8.296E-03 1.437E-03 1.873E-04 1.830E-05 1.337E-06 7.288E-08 2.960E-09 9.038E-11 2.454E-12 2.092E-13 6.417E-14 2.148E-14 6.709E-15 1.939E-15 5.176E-16 1.273E-16 2.878E-17 5.965E-18 1.131E-18 1.955E-19 3.197E-20 4.532E-21 5.791E-22 6.648E-23 6.829E-24 6.259E-25 5.118E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.783E-27 2.704E-28 2.336E-29 3.250E-30 6.459E-31 1.395E-31 2.945E-32 5.923E-33 1.129E-33 2.038E-34 3.474E-35 5.590E-36 8.475E-37 1.209E-37 1.621E-38 2.040E-39 2.407E-40 2.662E-41 2.767E-42 2.728E-43 2.618E-44 2.598E-45 2.946E-46 4.109E-47 6.794E-48 1.211E-48 2.174E-49 3.811E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.650E-01 3.710E-01 1.707E-01 6.399E-02 1.936E-02 4.702E-03 9.118E-04 1.407E-04 1.724E-05 1.674E-06 1.286E-07 7.805E-09 3.753E-10 1.488E-11 7.609E-13 1.541E-13 5.784E-14 2.173E-14 7.705E-15 2.568E-15 8.033E-16

	1.056E+01	2.354E-16
	1.104E+01	6.455E-17
	1.152E+01	1.656E-17
	1.200E+01	4.109E-18
	1.248E+01	9.107E-19
	1.296E+01	1.872E-19
	1.345E+01	3.561E-20
	1.393E+01	6.251E-21
	1.441E+01	1.010E-21
	1.489E+01	1.499E-22
	1.538E+01	2.037E-23
	1.586E+01	2.529E-24
	1.634E+01	2.864E-25
	1.682E+01	2.965E-26
	1.730E+01	2.856E-27
	1.779E+01	2.735E-28
	1.827E+01	3.124E-29
	1.875E+01	5.263E-30
	1.923E+01	1.214E-30
	1.972E+01	3.094E-31
	2.020E+01	7.855E-32
	2.068E+01	1.927E-32
	2.116E+01	4.539E-33
	2.165E+01	1.023E-33
	2.213E+01	2.207E-34
	2.261E+01	4.548E-35
	2.309E+01	8.947E-36
	2.357E+01	1.679E-36
	2.406E+01	3.000E-37
	2.454E+01	5.105E-38
	2.502E+01	8.257E-39
	2.550E+01	1.269E-39
	2.599E+01	1.852E-40
	2.647E+01	2.567E-41
	2.695E+01	3.388E-42
	2.743E+01	4.290E-43
	2.791E+01	5.313E-44
	2.840E+01	6.703E-45
	2.888E+01	9.228E-46
	2.936E+01	1.484E-46
	2.984E+01	2.806E-47
	3.033E+01	5.872E-48
	3.081E+01	1.274E-48
	3.129E+01	2.757E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.974E-01
	9.600E-01	4.209E-01
	1.440E+00	2.168E-01
	1.920E+00	9.438E-02
	2.400E+00	3.445E-02
	2.880E+00	1.049E-02
	3.360E+00	2.653E-03
	3.840E+00	5.557E-04
	4.320E+00	9.615E-05
	4.800E+00	1.372E-05
	5.280E+00	1.613E-06

5.760E+00	1.559E-07
6.240E+00	1.239E-08
6.720E+00	8.099E-10
7.200E+00	4.430E-11
7.680E+00	2.413E-12
8.160E+00	3.099E-13
8.640E+00	1.102E-13
9.120E+00	4.621E-14
9.600E+00	1.874E-14
1.008E+01	7.231E-15
1.056E+01	2.649E-15
1.104E+01	9.205E-16
1.152E+01	3.039E-16
1.200E+01	9.825E-17
1.248E+01	2.890E-17
1.296E+01	8.014E-18
1.345E+01	2.093E-18
1.393E+01	5.136E-19
1.441E+01	1.183E-19
1.489E+01	2.551E-20
1.538E+01	5.143E-21
1.586E+01	9.675E-22
1.634E+01	1.694E-22
1.682E+01	2.757E-23
1.730E+01	4.161E-24
1.779E+01	5.817E-25
1.827E+01	7.539E-26
1.875E+01	9.134E-27
1.923E+01	1.067E-27
1.972E+01	1.322E-28
2.020E+01	2.076E-29
2.068E+01	4.582E-30
2.116E+01	1.251E-30
2.165E+01	3.628E-31
2.213E+01	1.044E-31
2.261E+01	2.919E-32
2.309E+01	7.887E-33
2.357E+01	2.056E-33
2.406E+01	5.165E-34
2.454E+01	1.250E-34
2.502E+01	2.910E-35
2.550E+01	6.518E-36
2.599E+01	1.403E-36
2.647E+01	2.899E-37
2.695E+01	5.747E-38
2.743E+01	1.092E-38
2.791E+01	1.990E-39
2.840E+01	3.470E-40
2.888E+01	5.799E-41
2.936E+01	9.295E-42
2.984E+01	1.436E-42
3.033E+01	2.158E-43
3.081E+01	3.230E-44
3.129E+01	5.017E-45

9.600E-01	4.624E-01
1.440E+00	2.586E-01
1.920E+00	1.254E-01
2.400E+00	5.238E-02
2.880E+00	1.876E-02
3.360E+00	5.738E-03
3.840E+00	1.495E-03
4.320E+00	3.312E-04
4.800E+00	6.226E-05
5.280E+00	9.918E-06
5.760E+00	1.337E-06
6.240E+00	1.525E-07
6.720E+00	1.470E-08
7.200E+00	1.199E-09
7.680E+00	8.351E-11
8.160E+00	5.441E-12
8.640E+00	5.737E-13
9.120E+00	1.751E-13
9.600E+00	7.746E-14
1.008E+01	3.448E-14
1.056E+01	1.476E-14
1.104E+01	6.048E-15
1.152E+01	2.380E-15
1.200E+01	9.237E-16
1.248E+01	3.303E-16
1.296E+01	1.125E-16
1.345E+01	3.651E-17
1.393E+01	1.126E-17
1.441E+01	3.301E-18
1.489E+01	9.176E-19
1.538E+01	2.416E-19
1.586E+01	6.019E-20
1.634E+01	1.416E-20
1.682E+01	3.143E-21
1.730E+01	6.567E-22
1.779E+01	1.290E-22
1.827E+01	2.377E-23
1.875E+01	4.107E-24
1.923E+01	6.644E-25
1.972E+01	1.007E-25
2.020E+01	1.441E-26
2.068E+01	1.987E-27
2.116E+01	2.815E-28
2.165E+01	4.682E-29
2.213E+01	1.038E-29
2.261E+01	2.939E-30
2.309E+01	9.246E-31
2.357E+01	2.959E-31
2.406E+01	9.317E-32
2.454E+01	2.857E-32
2.502E+01	8.502E-33
2.550E+01	2.453E-33
2.599E+01	6.858E-34
2.647E+01	1.856E-34
2.695E+01	4.862E-35
2.743E+01	1.232E-35
2.791E+01	3.017E-36



	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.136E-37 1.630E-37 3.590E-38 7.628E-39 1.562E-39 3.082E-40 5.863E-41
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.440E-01 4.975E-01 2.962E-01 1.559E-01 7.209E-02 2.917E-02 1.030E-02 3.163E-03 8.434E-04 1.950E-04 3.901E-05 6.753E-06 1.010E-06 1.305E-07 1.455E-08 1.401E-09 1.174E-10 9.096E-12 9.416E-13 2.497E-13 1.121E-13 5.331E-14 2.466E-14 1.104E-14 4.898E-15 2.020E-15 8.002E-16 3.041E-16 1.108E-16 3.866E-17 1.291E-17 4.121E-18 1.256E-18 3.652E-19 1.012E-19 2.667E-20 6.684E-21 1.590E-21 3.584E-22 7.651E-23 1.544E-23 2.943E-24 5.295E-25 9.008E-26 1.458E-26 2.293E-27 3.700E-28 6.834E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.617E-29 4.823E-30 1.619E-30 5.606E-31 1.926E-31 6.481E-32 2.127E-32 6.796E-33 2.113E-33 6.389E-34 1.878E-34 5.363E-35 1.487E-35 4.004E-36 1.046E-36 2.648E-37 6.501E-38
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.614E-01 5.277E-01 3.301E-01 1.852E-01 9.278E-02 4.131E-02 1.631E-02 5.692E-03 1.754E-03 4.762E-04 1.138E-04 2.393E-05 4.420E-06 7.171E-07 1.021E-07 1.275E-08 1.399E-09 1.356E-10 1.219E-11 1.339E-12 3.286E-13 1.473E-13 7.351E-14 3.628E-14 1.782E-14 8.196E-15 3.641E-15 1.561E-15 6.451E-16 2.570E-16 9.857E-17 3.638E-17 1.291E-17 4.401E-18 1.440E-18 4.518E-19 1.358E-19 3.906E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.074E-20 2.821E-21 7.066E-22 1.687E-22 3.832E-23 8.278E-24 1.699E-24 3.314E-25 6.159E-26 1.099E-26 1.927E-27 3.507E-28 7.318E-29 1.914E-29 6.144E-30 2.197E-30 8.112E-31 2.983E-31 1.078E-31 3.814E-32 1.318E-32 4.445E-33 1.463E-33 4.696E-34 1.470E-34 4.482E-35 1.332E-35
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.762E-01 5.539E-01 3.607E-01 2.132E-01 1.139E-01 5.476E-02 2.364E-02 9.143E-03 3.163E-03 9.770E-04 2.693E-04 6.613E-05 1.446E-05 2.816E-06 4.876E-07 7.507E-08 1.027E-08 1.251E-09 1.365E-10 1.391E-11 1.669E-12 4.032E-13 1.809E-13 9.410E-14 4.991E-14 2.502E-14 1.217E-14 5.733E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.617E-15 1.156E-15 4.944E-16 2.044E-16 8.168E-17 3.152E-17 1.174E-17 4.214E-18 1.458E-18 4.859E-19 1.558E-19 4.799E-20 1.420E-20 4.032E-21 1.097E-21 2.860E-22 7.131E-23 1.700E-23 3.870E-24 8.415E-25 1.749E-25 3.488E-26 6.750E-27 1.304E-27 2.672E-28 6.367E-29 1.873E-29 6.539E-30 2.489E-30 9.711E-31 3.774E-31 1.444E-31 5.421E-32 1.993E-32 7.168E-33 2.522E-33 8.679E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.890E-01 5.770E-01 3.885E-01 2.397E-01 1.350E-01 6.913E-02 3.212E-02 1.351E-02 5.140E-03 1.765E-03 5.465E-04 1.525E-04 3.829E-05 8.654E-06 1.759E-06 3.213E-07 5.276E-08 7.783E-09

9.120E+00	1.033E-09
9.600E+00	1.242E-10
1.008E+01	1.410E-11
1.056E+01	1.866E-12
1.104E+01	4.650E-13
1.152E+01	2.121E-13
1.200E+01	1.163E-13
1.248E+01	6.223E-14
1.296E+01	3.253E-14
1.345E+01	1.655E-14
1.393E+01	8.183E-15
1.441E+01	3.931E-15
1.489E+01	1.834E-15
1.538E+01	8.309E-16
1.586E+01	3.651E-16
1.634E+01	1.556E-16
1.682E+01	6.425E-17
1.730E+01	2.570E-17
1.779E+01	9.949E-18
1.827E+01	3.726E-18
1.875E+01	1.349E-18
1.923E+01	4.719E-19
1.972E+01	1.593E-19
2.020E+01	5.190E-20
2.068E+01	1.629E-20
2.116E+01	4.927E-21
2.165E+01	1.433E-21
2.213E+01	4.010E-22
2.261E+01	1.078E-22
2.309E+01	2.781E-23
2.357E+01	6.882E-24
2.406E+01	1.634E-24
2.454E+01	3.720E-25
2.502E+01	8.142E-26
2.550E+01	1.725E-26
2.599E+01	3.592E-27
2.647E+01	7.637E-28
2.695E+01	1.774E-28
2.743E+01	4.871E-29
2.791E+01	1.617E-29
2.840E+01	6.137E-30
2.888E+01	2.475E-30
2.936E+01	1.013E-30
2.984E+01	4.121E-31
3.033E+01	1.652E-31
3.081E+01	6.509E-32
3.129E+01	2.515E-32

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB CoHD High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.02375 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.02375 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	3.338E-01
	9.600E-01	5.164E-02
	1.440E+00	3.400E-03
	1.920E+00	9.115E-05

2.400E+00	9.708E-07
2.880E+00	4.053E-09
3.360E+00	6.926E-12
3.840E+00	6.577E-14
4.320E+00	8.320E-15
4.800E+00	8.803E-16
5.280E+00	7.224E-17
5.760E+00	4.538E-18
6.240E+00	2.150E-19
6.720E+00	7.558E-21
7.200E+00	1.934E-22
7.680E+00	3.527E-24
8.160E+00	4.501E-26
8.640E+00	4.087E-28
9.120E+00	4.009E-30
9.600E+00	1.369E-31
1.008E+01	7.950E-33
1.056E+01	4.144E-34
1.104E+01	1.821E-35
1.152E+01	6.687E-37
1.200E+01	2.121E-38
1.248E+01	5.230E-40
1.296E+01	1.051E-41
1.345E+01	1.722E-43
1.393E+01	2.411E-45
1.441E+01	3.679E-47
1.489E+01	9.715E-49
1.538E+01	3.893E-50
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00



	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.997E-01
	9.600E-01	1.729E-01
	1.440E+00	3.985E-02
	1.920E+00	5.964E-03
	2.400E+00	5.711E-04
	2.880E+00	3.462E-05
	3.360E+00	1.320E-06
	3.840E+00	3.151E-08
	4.320E+00	4.703E-10
	4.800E+00	4.698E-12
	5.280E+00	1.268E-13
	5.760E+00	2.655E-14
	6.240E+00	6.112E-15
	6.720E+00	1.249E-15
	7.200E+00	2.249E-16
	7.680E+00	3.552E-17
	8.160E+00	4.899E-18
	8.640E+00	5.867E-19
	9.120E+00	6.067E-20
	9.600E+00	5.382E-21
	1.008E+01	4.067E-22
	1.056E+01	2.600E-23
	1.104E+01	1.395E-24
	1.152E+01	6.249E-26
	1.200E+01	2.446E-27
	1.248E+01	8.159E-29
	1.296E+01	3.510E-30
	1.345E+01	3.160E-31
	1.393E+01	4.157E-32
	1.441E+01	5.497E-33
	1.489E+01	6.749E-34
	1.538E+01	7.602E-35
	1.586E+01	7.830E-36
	1.634E+01	7.355E-37
	1.682E+01	6.283E-38
	1.730E+01	4.867E-39
	1.779E+01	3.410E-40
	1.827E+01	2.155E-41
	1.875E+01	1.229E-42
	1.923E+01	6.370E-44
	1.972E+01	3.102E-45
	2.020E+01	1.571E-46
	2.068E+01	1.002E-47
	2.116E+01	8.801E-49
	2.165E+01	9.189E-50
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.854E-01
	9.600E-01	2.699E-01
	1.440E+00	9.561E-02
	1.920E+00	2.561E-02
	2.400E+00	5.127E-03
	2.880E+00	7.616E-04
	3.360E+00	8.346E-05
	3.840E+00	6.721E-06
	4.320E+00	3.966E-07
	4.800E+00	1.711E-08
	5.280E+00	5.399E-10
	5.760E+00	1.283E-11
	6.240E+00	3.836E-13
	6.720E+00	6.447E-14
	7.200E+00	2.010E-14
	7.680E+00	6.005E-15
	8.160E+00	1.655E-15
	8.640E+00	4.196E-16
	9.120E+00	9.755E-17
	9.600E+00	2.075E-17
	1.008E+01	4.027E-18
	1.056E+01	7.111E-19
	1.104E+01	1.139E-19
	1.152E+01	1.649E-20
	1.200E+01	2.238E-21
	1.248E+01	2.595E-22
	1.296E+01	2.685E-23
	1.345E+01	2.469E-24
	1.393E+01	2.011E-25
	1.441E+01	1.450E-26
	1.489E+01	9.391E-28
	1.538E+01	5.897E-29
	1.586E+01	4.633E-30
	1.634E+01	6.093E-31
	1.682E+01	1.123E-31
	1.730E+01	2.202E-32
	1.779E+01	4.173E-33
	1.827E+01	7.498E-34
	1.875E+01	1.272E-34
	1.923E+01	2.033E-35
	1.972E+01	3.058E-36

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.322E-37 5.730E-38 7.115E-39 8.263E-40 8.963E-41 9.074E-42 8.583E-43 7.635E-44 6.513E-45 5.607E-46 5.374E-47 6.342E-48 9.145E-49 1.458E-49 2.364E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.396E-01 3.430E-01 1.516E-01 5.455E-02 1.585E-02 3.693E-03 6.872E-04 1.018E-04 1.197E-05 1.115E-06 8.214E-08 4.784E-09 2.208E-10 8.406E-12 4.163E-13 8.183E-14 2.952E-14 1.064E-14 3.621E-15 1.158E-15 3.474E-16 9.769E-17 2.570E-17 6.322E-18 1.505E-18 3.188E-19 6.263E-20 1.138E-20 1.910E-21 2.950E-22 4.183E-23

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.432E-24 6.442E-25 6.971E-26 6.899E-27 6.356E-28 5.837E-29 6.430E-30 1.046E-30 2.317E-31 5.653E-32 1.372E-32 3.217E-33 7.239E-34 1.560E-34 3.214E-35 6.328E-36 1.189E-36 2.132E-37 3.641E-38 5.919E-39 9.147E-40 1.343E-40 1.872E-41 2.480E-42 3.128E-43 3.788E-44 4.491E-45 5.435E-46 7.199E-47 1.115E-47 2.028E-48 4.069E-49 8.449E-50 1.748E-50
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.778E-01 3.996E-01 2.024E-01 8.716E-02 3.172E-02 9.700E-03 2.483E-03 5.306E-04 9.442E-05 1.397E-05 1.715E-06 1.746E-07 1.473E-08 1.029E-09 6.011E-11 3.191E-12 2.774E-13 7.725E-14 3.135E-14 1.266E-14 4.884E-15

	1.056E+01	1.794E-15
	1.104E+01	6.266E-16
	1.152E+01	2.085E-16
	1.200E+01	6.811E-17
	1.248E+01	2.024E-17
	1.296E+01	5.686E-18
	1.345E+01	1.509E-18
	1.393E+01	3.777E-19
	1.441E+01	8.901E-20
	1.489E+01	1.972E-20
	1.538E+01	4.099E-21
	1.586E+01	7.982E-22
	1.634E+01	1.453E-22
	1.682E+01	2.468E-23
	1.730E+01	3.905E-24
	1.779E+01	5.745E-25
	1.827E+01	7.851E-26
	1.875E+01	9.990E-27
	1.923E+01	1.197E-27
	1.972E+01	1.403E-28
	2.020E+01	1.790E-29
	2.068E+01	2.963E-30
	2.116E+01	6.749E-31
	2.165E+01	1.840E-31
	2.213E+01	5.246E-32
	2.261E+01	1.479E-32
	2.309E+01	4.057E-33
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	2.454E+01	6.825E-35
	2.502E+01	1.629E-35
	2.550E+01	3.746E-36
	2.599E+01	8.299E-37
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	2.791E+01	1.355E-39
	2.840E+01	2.462E-40
	2.888E+01	4.293E-41
	2.936E+01	7.183E-42
	2.984E+01	1.154E-42
	3.033E+01	1.788E-43
	3.081E+01	2.691E-44
	3.129E+01	4.007E-45
30	0.000E+00	1.000E+00
	4.800E-01	7.066E-01
	9.600E-01	4.449E-01
	1.440E+00	2.472E-01
	1.920E+00	1.203E-01
	2.400E+00	5.092E-02
	2.880E+00	1.869E-02
	3.360E+00	5.922E-03
	3.840E+00	1.617E-03
	4.320E+00	3.794E-04
	4.800E+00	7.640E-05
	5.280E+00	1.319E-05

5.760E+00	1.950E-06
6.240E+00	2.465E-07
6.720E+00	2.665E-08
7.200E+00	2.463E-09
7.680E+00	1.952E-10
8.160E+00	1.360E-11
8.640E+00	1.019E-12
9.120E+00	1.683E-13
9.600E+00	6.369E-14
1.008E+01	2.830E-14
1.056E+01	1.234E-14
1.104E+01	5.181E-15
1.152E+01	2.096E-15
1.200E+01	8.385E-16
1.248E+01	3.094E-16
1.296E+01	1.093E-16
1.345E+01	3.688E-17
1.393E+01	1.189E-17
1.441E+01	3.658E-18
1.489E+01	1.072E-18
1.538E+01	2.993E-19
1.586E+01	7.941E-20
1.634E+01	2.001E-20
1.682E+01	4.782E-21
1.730E+01	1.082E-21
1.779E+01	2.315E-22
1.827E+01	4.679E-23
1.875E+01	8.914E-24
1.923E+01	1.599E-24
1.972E+01	2.699E-25
2.020E+01	4.284E-26
2.068E+01	6.420E-27
2.116E+01	9.192E-28
2.165E+01	1.305E-28
2.213E+01	2.009E-29
2.261E+01	3.847E-30
2.309E+01	9.682E-31
2.357E+01	2.900E-31
2.406E+01	9.214E-32
2.454E+01	2.930E-32
2.502E+01	9.138E-33
2.550E+01	2.776E-33
2.599E+01	8.202E-34
2.647E+01	2.353E-34
2.695E+01	6.556E-35
2.743E+01	1.772E-35
2.791E+01	4.644E-36
2.840E+01	1.180E-36
2.888E+01	2.904E-37
2.936E+01	6.921E-38
2.984E+01	1.596E-38
3.033E+01	3.560E-39
3.081E+01	7.675E-40
3.129E+01	1.599E-40

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
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4.252E-28  
7.107E-29  
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3.085E-30  
8.975E-31  
2.980E-31  
1.034E-31  
3.590E-32  
1.226E-32  
4.098E-33  
1.337E-33

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.257E-34 1.321E-34 3.998E-35 1.178E-35 3.383E-36 9.453E-37 2.570E-37
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.477E-01 5.133E-01 3.214E-01 1.826E-01 9.365E-02 4.324E-02 1.792E-02 6.654E-03 2.209E-03 6.550E-04 1.732E-04 4.083E-05 8.570E-06 1.601E-06 2.660E-07 3.929E-08 5.160E-09 6.029E-10 6.312E-11 6.189E-12 7.218E-13 1.710E-13 7.421E-14 3.710E-14 1.889E-14 9.055E-15 4.210E-15 1.897E-15 8.277E-16 3.496E-16 1.429E-16 5.648E-17 2.157E-17 7.954E-18 2.831E-18 9.714E-19 3.212E-19 1.023E-19 3.133E-20 9.223E-21 2.608E-21 7.074E-22 1.839E-22 4.580E-23 1.091E-23 2.485E-24 5.405E-25 1.123E-25



	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.230E-26 4.253E-27 7.880E-28 1.462E-28 2.891E-29 6.687E-30 1.908E-30 6.428E-31 2.348E-31 8.767E-32 3.257E-32 1.191E-32 4.272E-33 1.500E-33 5.156E-34 1.733E-34 5.698E-35
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.630E-01 5.400E-01 3.523E-01 2.109E-01 1.154E-01 5.759E-02 2.612E-02 1.075E-02 4.008E-03 1.352E-03 4.124E-04 1.136E-04 2.823E-05 6.328E-06 1.279E-06 2.329E-07 3.820E-08 5.644E-09 7.516E-10 9.065E-11 1.019E-11 1.242E-12 2.549E-13 1.026E-13 5.365E-14 2.780E-14 1.412E-14 6.983E-15 3.360E-15 1.572E-15 7.149E-16 3.158E-16 1.355E-16 5.639E-17 2.277E-17 8.912E-18 3.380E-18 1.241E-18

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.410E-19 1.515E-19 5.033E-20 1.614E-20 4.994E-21 1.490E-21 4.284E-22 1.186E-22 3.156E-23 8.077E-24 1.985E-24 4.685E-25 1.061E-25 2.310E-26 4.850E-27 9.922E-28 2.025E-28 4.329E-29 1.047E-29 3.040E-30 1.045E-30 3.964E-31 1.561E-31 6.177E-32 2.419E-32 9.324E-33 3.530E-33
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.761E-01 5.630E-01 3.799E-01 2.373E-01 1.369E-01 7.266E-02 3.542E-02 1.584E-02 6.480E-03 2.425E-03 8.289E-04 2.586E-04 7.360E-05 1.910E-05 4.514E-06 9.718E-07 1.905E-07 3.399E-08 5.519E-09 8.163E-10 1.104E-10 1.395E-11 1.835E-12 3.569E-13 1.361E-13 6.921E-14 3.720E-14 1.977E-14

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.027E-14 5.210E-15 2.577E-15 1.243E-15 5.838E-16 2.672E-16 1.191E-16 5.167E-17 2.181E-17 8.949E-18 3.569E-18 1.383E-18 5.202E-19 1.899E-19 6.721E-20 2.306E-20 7.662E-21 2.464E-21 7.667E-22 2.306E-22 6.700E-23 1.879E-23 5.084E-24 1.326E-24 3.335E-25 8.084E-26 1.892E-26 4.289E-27 9.516E-28 2.111E-28 4.893E-29 1.265E-29 3.849E-30 1.372E-30 5.406E-31 2.226E-31 9.257E-32
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.874E-01 5.833E-01 4.046E-01 2.619E-01 1.577E-01 8.811E-02 4.559E-02 2.181E-02 9.633E-03 3.924E-03 1.473E-03 5.089E-04 1.618E-04 4.732E-05 1.272E-05 3.140E-06 7.121E-07 1.483E-07

9.120E+00	2.835E-08
9.600E+00	4.975E-09
1.008E+01	8.020E-10
1.056E+01	1.192E-10
1.104E+01	1.664E-11
1.152E+01	2.378E-12
1.200E+01	4.763E-13
1.248E+01	1.661E-13
1.296E+01	8.416E-14
1.345E+01	4.648E-14
1.393E+01	2.562E-14
1.441E+01	1.386E-14
1.489E+01	7.335E-15
1.538E+01	3.796E-15
1.586E+01	1.919E-15
1.634E+01	9.484E-16
1.682E+01	4.577E-16
1.730E+01	2.156E-16
1.779E+01	9.914E-17
1.827E+01	4.447E-17
1.875E+01	1.945E-17
1.923E+01	8.296E-18
1.972E+01	3.447E-18
2.020E+01	1.395E-18
2.068E+01	5.495E-19
2.116E+01	2.106E-19
2.165E+01	7.850E-20
2.213E+01	2.844E-20
2.261E+01	1.001E-20
2.309E+01	3.421E-21
2.357E+01	1.135E-21
2.406E+01	3.649E-22
2.454E+01	1.138E-22
2.502E+01	3.435E-23
2.550E+01	1.004E-23
2.599E+01	2.840E-24
2.647E+01	7.769E-25
2.695E+01	2.055E-25
2.743E+01	5.262E-26
2.791E+01	1.305E-26
2.840E+01	3.153E-27
2.888E+01	7.494E-28
2.936E+01	1.793E-28
2.984E+01	4.499E-29
3.033E+01	1.256E-29
3.081E+01	4.079E-30
3.129E+01	1.528E-30

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB CoHD Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.01425 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.01425 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.131E-01
	9.600E-01	1.205E-02
	1.440E+00	1.567E-04
	1.920E+00	4.396E-07

2.400E+00	2.590E-10
2.880E+00	1.363E-13
3.360E+00	8.267E-15
3.840E+00	4.334E-16
4.320E+00	1.477E-17
4.800E+00	3.176E-19
5.280E+00	4.163E-21
5.760E+00	3.191E-23
6.240E+00	1.370E-25
6.720E+00	3.310E-28
7.200E+00	1.168E-30
7.680E+00	2.505E-32
8.160E+00	5.805E-34
8.640E+00	1.017E-35
9.120E+00	1.315E-37
9.600E+00	1.236E-39
1.008E+01	8.309E-42
1.056E+01	4.014E-44
1.104E+01	1.686E-46
1.152E+01	1.365E-48
1.200E+01	2.308E-50
1.248E+01	0.000E+00
1.296E+01	0.000E+00
1.345E+01	0.000E+00
1.393E+01	0.000E+00
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	3.859E-01
	9.600E-01	7.908E-02
	1.440E+00	8.025E-03
	1.920E+00	3.879E-04
	2.400E+00	8.739E-06
	2.880E+00	9.056E-08
	3.360E+00	4.292E-10
	3.840E+00	1.174E-12
	4.320E+00	5.004E-14
	4.800E+00	7.766E-15
	5.280E+00	1.001E-15
	5.760E+00	1.044E-16
	6.240E+00	8.714E-18
	6.720E+00	5.762E-19
	7.200E+00	2.980E-20
	7.680E+00	1.189E-21
	8.160E+00	3.603E-23
	8.640E+00	8.164E-25
	9.120E+00	1.369E-26
	9.600E+00	1.793E-28
	1.008E+01	3.152E-30
	1.056E+01	1.699E-31
	1.104E+01	1.295E-32
	1.152E+01	8.982E-34
	1.200E+01	5.637E-35
	1.248E+01	2.896E-36
	1.296E+01	1.273E-37
	1.345E+01	4.757E-39
	1.393E+01	1.503E-40
	1.441E+01	3.997E-42
	1.489E+01	9.025E-44
	1.538E+01	1.845E-45
	1.586E+01	4.392E-47
	1.634E+01	1.716E-48
	1.682E+01	9.340E-50
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00



	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	4.845E-01
	9.600E-01	1.557E-01
	1.440E+00	3.172E-02
	1.920E+00	3.990E-03
	2.400E+00	3.046E-04
	2.880E+00	1.397E-05
	3.360E+00	3.817E-07
	3.840E+00	6.194E-09
	4.320E+00	6.011E-11
	4.800E+00	5.503E-13
	5.280E+00	5.673E-14
	5.760E+00	1.266E-14
	6.240E+00	2.519E-15
	6.720E+00	4.361E-16
	7.200E+00	6.535E-17
	7.680E+00	8.432E-18
	8.160E+00	9.309E-19
	8.640E+00	8.734E-20
	9.120E+00	6.912E-21
	9.600E+00	4.578E-22
	1.008E+01	2.515E-23
	1.056E+01	1.137E-24
	1.104E+01	4.199E-26
	1.152E+01	1.286E-27
	1.200E+01	3.924E-29
	1.248E+01	1.898E-30
	1.296E+01	1.950E-31
	1.345E+01	2.398E-32
	1.393E+01	2.786E-33
	1.441E+01	2.950E-34
	1.489E+01	2.832E-35
	1.538E+01	2.457E-36
	1.586E+01	1.920E-37
	1.634E+01	1.346E-38
	1.682E+01	8.449E-40
	1.730E+01	4.730E-41
	1.779E+01	2.362E-42
	1.827E+01	1.061E-43
	1.875E+01	4.462E-45
	1.923E+01	1.998E-46
	1.972E+01	1.190E-47

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.916E-49 9.499E-50 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 5.493E-01 2.230E-01 6.479E-02 1.320E-02 1.861E-03 1.798E-04 1.183E-05 5.283E-07 1.595E-08 3.260E-10 4.871E-12 1.789E-13 4.181E-14 1.135E-14 2.803E-15 6.235E-16 1.245E-16 2.226E-17 3.546E-18 5.015E-19 6.267E-20 6.886E-21 6.617E-22 5.532E-23 4.167E-24 2.568E-25 1.360E-26 6.358E-28 3.063E-29 2.338E-30 3.204E-31

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.248E-32 8.386E-33 1.256E-33 1.750E-34 2.264E-35 2.714E-36 3.006E-37 3.072E-38 2.890E-39 2.497E-40 1.979E-41 1.441E-42 9.725E-44 6.282E-45 4.234E-46 3.460E-47 3.715E-48 4.741E-49 6.309E-50 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 5.960E-01 2.797E-01 1.009E-01 2.754E-02 5.616E-03 8.498E-04 9.486E-05 7.782E-06 4.678E-07 2.056E-08 6.609E-10 1.600E-11 4.860E-13 8.295E-14 2.633E-14 8.017E-15 2.251E-15 5.813E-16 1.377E-16 2.984E-17 5.900E-18

	1.056E+01	1.061E-18
	1.104E+01	1.731E-19
	1.152E+01	2.554E-20
	1.200E+01	3.532E-21
	1.248E+01	4.179E-22
	1.296E+01	4.413E-23
	1.345E+01	4.142E-24
	1.393E+01	3.442E-25
	1.441E+01	2.533E-26
	1.489E+01	1.674E-27
	1.538E+01	1.072E-28
	1.586E+01	8.572E-30
	1.634E+01	1.147E-30
	1.682E+01	2.156E-31
	1.730E+01	4.311E-32
	1.779E+01	8.339E-33
	1.827E+01	1.529E-33
	1.875E+01	2.647E-34
	1.923E+01	4.319E-35
	1.972E+01	6.630E-36
	2.020E+01	9.563E-37
	2.068E+01	1.294E-37
	2.116E+01	1.640E-38
	2.165E+01	1.944E-39
	2.213E+01	2.152E-40
	2.261E+01	2.223E-41
	2.309E+01	2.146E-42
	2.357E+01	1.948E-43
	2.406E+01	1.695E-44
	2.454E+01	1.488E-45
	2.502E+01	1.453E-46
	2.550E+01	1.745E-47
	2.599E+01	2.564E-48
	2.647E+01	4.169E-49
	2.695E+01	6.898E-50
	2.743E+01	1.116E-50
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.315E-01
	9.600E-01	3.276E-01
	1.440E+00	1.369E-01
	1.920E+00	4.544E-02
	2.400E+00	1.187E-02
	2.880E+00	2.425E-03
	3.360E+00	3.852E-04
	3.840E+00	4.743E-05
	4.320E+00	4.514E-06
	4.800E+00	3.314E-07
	5.280E+00	1.874E-08

5.760E+00	8.163E-10
6.240E+00	2.792E-11
6.720E+00	9.915E-13
7.200E+00	1.306E-13
7.680E+00	4.394E-14
8.160E+00	1.533E-14
8.640E+00	5.021E-15
9.120E+00	1.535E-15
9.600E+00	4.375E-16
1.008E+01	1.160E-16
1.056E+01	2.853E-17
1.104E+01	6.501E-18
1.152E+01	1.371E-18
1.200E+01	2.771E-19
1.248E+01	4.928E-20
1.296E+01	8.029E-21
1.345E+01	1.195E-21
1.393E+01	1.621E-22
1.441E+01	1.995E-23
1.489E+01	2.224E-24
1.538E+01	2.238E-25
1.586E+01	2.037E-26
1.634E+01	1.700E-27
1.682E+01	1.387E-28
1.730E+01	1.343E-29
1.779E+01	1.983E-30
1.827E+01	4.131E-31
1.875E+01	9.526E-32
1.923E+01	2.173E-32
1.972E+01	4.763E-33
2.020E+01	9.964E-34
2.068E+01	1.986E-34
2.116E+01	3.765E-35
2.165E+01	6.784E-36
2.213E+01	1.160E-36
2.261E+01	1.882E-37
2.309E+01	2.891E-38
2.357E+01	4.200E-39
2.406E+01	5.766E-40
2.454E+01	7.473E-41
2.502E+01	9.148E-42
2.550E+01	1.060E-42
2.599E+01	1.171E-43
2.647E+01	1.261E-44
2.695E+01	1.385E-45
2.743E+01	1.684E-46
2.791E+01	2.444E-47
2.840E+01	4.209E-48
2.888E+01	7.979E-49
2.936E+01	1.553E-49
2.984E+01	2.986E-50
3.033E+01	0.000E+00
3.081E+01	0.000E+00
3.129E+01	0.000E+00

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
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1.248E+01  
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1.393E+01  
1.441E+01  
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1.586E+01  
1.634E+01  
1.682E+01  
1.730E+01  
1.779E+01  
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2.309E+01  
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2.502E+01  
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2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

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2.043E-02  
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2.439E-06  
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7.593E-10  
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2.912E-16  
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3.279E-22  
4.876E-23  
6.663E-24  
8.350E-25  
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1.012E-26  
1.003E-27  
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1.976E-33  
4.529E-34  
9.954E-35  
2.095E-35  
4.219E-36  
8.123E-37  
1.494E-37  
2.621E-38  
4.385E-39  
6.986E-40  
1.060E-40  
1.530E-41  
2.107E-42  
2.779E-43

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.559E-44 4.552E-45 6.138E-46 9.363E-47 1.678E-47 3.422E-48 7.443E-49
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 6.830E-01 4.034E-01 2.033E-01 8.653E-02 3.089E-02 9.194E-03 2.273E-03 4.654E-04 7.873E-05 1.098E-05 1.262E-06 1.192E-07 9.259E-09 5.917E-10 3.164E-11 1.691E-12 2.145E-13 7.485E-14 3.069E-14 1.217E-14 4.588E-15 1.643E-15 5.579E-16 1.800E-16 5.689E-17 1.632E-17 4.415E-18 1.124E-18 2.691E-19 6.043E-20 1.271E-20 2.500E-21 4.585E-22 7.831E-23 1.243E-23 1.829E-24 2.493E-25 3.151E-26 3.725E-27 4.252E-28 5.157E-29 7.962E-30 1.725E-30 4.608E-31 1.304E-31 3.660E-32 9.980E-33 2.630E-33

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.686E-34 1.638E-34 3.865E-35 8.776E-36 1.917E-36 4.022E-37 8.104E-38 1.567E-38 2.904E-39 5.157E-40 8.771E-41 1.429E-41 2.234E-42 3.366E-43 4.939E-44 7.223E-45 1.098E-45
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.024E-01 4.340E-01 2.331E-01 1.079E-01 4.278E-02 1.445E-02 4.142E-03 1.005E-03 2.060E-04 3.560E-05 5.181E-06 6.341E-07 6.523E-08 5.637E-09 4.099E-10 2.558E-11 1.640E-12 2.339E-13 8.492E-14 3.674E-14 1.551E-14 6.271E-15 2.423E-15 8.963E-16 3.267E-16 1.091E-16 3.467E-17 1.046E-17 2.994E-18 8.118E-19 2.082E-19 5.044E-20 1.153E-20 2.480E-21 5.017E-22 9.522E-23 1.693E-23 2.816E-24



	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	4.377E-25 6.356E-26 8.667E-27 1.130E-27 1.486E-28 2.240E-29 4.483E-30 1.177E-30 3.507E-31 1.072E-31 3.226E-32 9.452E-33 2.685E-33 7.389E-34 1.967E-34 5.066E-35 1.261E-35 3.031E-36 7.035E-37 1.575E-37 3.400E-38 7.071E-39 1.416E-39 2.729E-40 5.062E-41 9.041E-42 1.558E-42
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.190E-01 4.609E-01 2.607E-01 1.292E-01 5.570E-02 2.082E-02 6.720E-03 1.869E-03 4.467E-04 9.164E-05 1.612E-05 2.427E-06 3.126E-07 3.443E-08 3.241E-09 2.616E-10 1.856E-11 1.413E-12 2.363E-13 9.087E-14 4.112E-14 1.827E-14 7.811E-15 3.219E-15 1.312E-15 4.940E-16 1.780E-16 6.132E-17

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.018E-17 6.333E-18 1.895E-18 5.396E-19 1.461E-19 3.758E-20 9.164E-21 2.116E-21 4.622E-22 9.532E-23 1.854E-23 3.394E-24 5.845E-25 9.471E-26 1.448E-26 2.115E-27 3.060E-28 4.793E-29 9.325E-30 2.386E-30 7.279E-31 2.358E-31 7.653E-32 2.436E-32 7.552E-33 2.277E-33 6.668E-34 1.896E-34 5.229E-35 1.399E-35 3.628E-36 9.113E-37 2.217E-37 5.217E-38 1.188E-38 2.613E-39 5.557E-40
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.334E-01 4.848E-01 2.863E-01 1.499E-01 6.931E-02 2.815E-02 1.002E-02 3.114E-03 8.444E-04 1.994E-04 4.094E-05 7.303E-06 1.131E-06 1.520E-07 1.770E-08 1.789E-09 1.574E-10 1.249E-11

9.120E+00	1.129E-12
9.600E+00	2.265E-13
1.008E+01	9.312E-14
1.056E+01	4.385E-14
1.104E+01	2.032E-14
1.152E+01	9.138E-15
1.200E+01	4.074E-15
1.248E+01	1.689E-15
1.296E+01	6.736E-16
1.345E+01	2.581E-16
1.393E+01	9.496E-17
1.441E+01	3.352E-17
1.489E+01	1.134E-17
1.538E+01	3.675E-18
1.586E+01	1.139E-18
1.634E+01	3.375E-19
1.682E+01	9.547E-20
1.730E+01	2.575E-20
1.779E+01	6.617E-21
1.827E+01	1.618E-21
1.875E+01	3.757E-22
1.923E+01	8.282E-23
1.972E+01	1.730E-23
2.020E+01	3.422E-24
2.068E+01	6.401E-25
2.116E+01	1.133E-25
2.165E+01	1.901E-26
2.213E+01	3.055E-27
2.261E+01	4.832E-28
2.309E+01	8.055E-29
2.357E+01	1.590E-29
2.406E+01	4.035E-30
2.454E+01	1.249E-30
2.502E+01	4.222E-31
2.550E+01	1.452E-31
2.599E+01	4.935E-32
2.647E+01	1.642E-32
2.695E+01	5.330E-33
2.743E+01	1.686E-33
2.791E+01	5.191E-34
2.840E+01	1.556E-34
2.888E+01	4.536E-35
2.936E+01	1.286E-35
2.984E+01	3.545E-36
3.033E+01	9.491E-37
3.081E+01	2.467E-37
3.129E+01	6.226E-38

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# POLLUTEv7

Version 7.13

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## BAB ClayPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.786E-01
	9.600E-01	2.926E-02
	1.440E+00	1.040E-03
	1.920E+00	1.187E-05

2.400E+00	4.235E-08
2.880E+00	4.707E-11
3.360E+00	9.937E-14
3.840E+00	9.178E-15
4.320E+00	7.423E-16
4.800E+00	4.365E-17
5.280E+00	1.832E-18
5.760E+00	5.373E-20
6.240E+00	1.074E-21
6.720E+00	1.425E-23
7.200E+00	1.218E-25
7.680E+00	6.713E-28
8.160E+00	3.740E-30
8.640E+00	9.150E-32
9.120E+00	3.757E-33
9.600E+00	1.303E-34
1.008E+01	3.635E-36
1.056E+01	8.061E-38
1.104E+01	1.405E-39
1.152E+01	1.907E-41
1.200E+01	2.287E-43
1.248E+01	1.948E-45
1.296E+01	1.921E-47
1.345E+01	3.851E-49
1.393E+01	1.100E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.487E-01
	9.600E-01	1.264E-01
	1.440E+00	2.123E-02
	1.920E+00	2.064E-03
	2.400E+00	1.140E-04
	2.880E+00	3.540E-06
	3.360E+00	6.129E-08
	3.840E+00	5.898E-10
	4.320E+00	3.444E-12
	4.800E+00	8.769E-14
	5.280E+00	1.686E-14
	5.760E+00	3.109E-15
	6.240E+00	4.915E-16
	6.720E+00	6.615E-17
	7.200E+00	7.529E-18
	7.680E+00	7.195E-19
	8.160E+00	5.727E-20
	8.640E+00	3.763E-21
	9.120E+00	2.022E-22
	9.600E+00	8.792E-24
	1.008E+01	3.062E-25
	1.056E+01	8.509E-27
	1.104E+01	1.966E-28
	1.152E+01	5.237E-30
	1.200E+01	3.684E-31
	1.248E+01	3.813E-32
	1.296E+01	3.954E-33
	1.345E+01	3.722E-34
	1.393E+01	3.141E-35
	1.441E+01	2.368E-36
	1.489E+01	1.588E-37
	1.538E+01	9.434E-39
	1.586E+01	4.947E-40
	1.634E+01	2.282E-41
	1.682E+01	9.255E-43
	1.730E+01	3.343E-44
	1.779E+01	1.141E-45
	1.827E+01	4.427E-47
	1.875E+01	2.493E-48
	1.923E+01	1.912E-49
	1.972E+01	1.576E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.400E-01
	9.600E-01	2.154E-01
	1.440E+00	6.150E-02
	1.920E+00	1.231E-02
	2.400E+00	1.705E-03
	2.880E+00	1.618E-04
	3.360E+00	1.046E-05
	3.840E+00	4.589E-07
	4.320E+00	1.361E-08
	4.800E+00	2.733E-10
	5.280E+00	4.013E-12
	5.760E+00	1.453E-13
	6.240E+00	3.338E-14
	6.720E+00	8.906E-15
	7.200E+00	2.160E-15
	7.680E+00	4.720E-16
	8.160E+00	9.261E-17
	8.640E+00	1.626E-17
	9.120E+00	2.545E-18
	9.600E+00	3.535E-19
	1.008E+01	4.340E-20
	1.056E+01	4.684E-21
	1.104E+01	4.421E-22
	1.152E+01	3.632E-23
	1.200E+01	2.936E-24
	1.248E+01	1.786E-25
	1.296E+01	9.342E-27
	1.345E+01	4.313E-28
	1.393E+01	2.054E-29
	1.441E+01	1.551E-30
	1.489E+01	2.102E-31
	1.538E+01	3.401E-32
	1.586E+01	5.366E-33
	1.634E+01	7.934E-34
	1.682E+01	1.092E-34
	1.730E+01	1.394E-35
	1.779E+01	1.650E-36
	1.827E+01	1.804E-37
	1.875E+01	1.820E-38
	1.923E+01	1.690E-39
	1.972E+01	1.442E-40



	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.128E-41 8.111E-43 5.406E-44 3.449E-45 2.298E-46 1.857E-47 1.971E-48 2.485E-49 3.266E-50 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 5.985E-01 2.866E-01 1.073E-01 3.096E-02 6.807E-03 1.132E-03 1.417E-04 1.330E-05 9.329E-07 4.882E-08 1.904E-09 5.584E-11 1.461E-12 1.210E-13 3.575E-14 1.150E-14 3.447E-15 9.567E-16 2.452E-16 5.789E-17 1.256E-17 2.500E-18 4.550E-19 7.567E-20 1.296E-20 1.768E-21 2.176E-22 2.405E-23 2.378E-24 2.099E-25 1.652E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.177E-27 8.120E-29 6.804E-30 9.195E-31 1.766E-31 3.676E-32 7.472E-33 1.447E-33 2.656E-34 4.614E-35 7.574E-36 1.173E-36 1.713E-37 2.352E-38 3.037E-39 3.678E-40 4.178E-41 4.448E-42 4.452E-43 4.229E-44 3.914E-45 3.754E-46 4.124E-47 5.573E-48 8.907E-49 1.531E-49 2.648E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.401E-01 3.435E-01 1.519E-01 5.471E-02 1.591E-02 3.710E-03 6.909E-04 1.024E-04 1.205E-05 1.123E-06 8.284E-08 4.829E-09 2.230E-10 8.496E-12 4.211E-13 8.283E-14 2.990E-14 1.079E-14 3.673E-15 1.175E-15 3.530E-16

	1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.933E-17 2.615E-17 6.467E-18 1.677E-18 3.578E-19 7.082E-20 1.297E-20 2.192E-21 3.412E-22 4.874E-23 6.377E-24 7.621E-25 8.309E-26 8.285E-27 7.691E-28 7.115E-29 7.894E-30 1.293E-30 2.886E-31 7.093E-32 1.734E-32 4.098E-33 9.290E-34 2.017E-34 4.187E-35 8.307E-36 1.573E-36 2.842E-37 4.890E-38 8.009E-39 1.247E-39 1.845E-40 2.592E-41 3.459E-42 4.396E-43 5.364E-44 6.407E-45 7.811E-46 1.042E-46 1.626E-47 2.976E-48 6.016E-49 1.259E-49 2.623E-50
30	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00	1.000E+00 6.716E-01 3.899E-01 1.931E-01 8.077E-02 2.833E-02 8.285E-03 2.013E-03 4.048E-04 6.728E-05 9.220E-06 1.040E-06

5.760E+00	9.658E-08
6.240E+00	7.369E-09
6.720E+00	4.627E-10
7.200E+00	2.431E-11
7.680E+00	1.279E-12
8.160E+00	1.602E-13
8.640E+00	5.502E-14
9.120E+00	2.216E-14
9.600E+00	8.632E-15
1.008E+01	3.198E-15
1.056E+01	1.125E-15
1.104E+01	3.755E-16
1.152E+01	1.199E-16
1.200E+01	4.036E-17
1.248E+01	1.143E-17
1.296E+01	3.053E-18
1.345E+01	7.675E-19
1.393E+01	1.814E-19
1.441E+01	4.021E-20
1.489E+01	8.351E-21
1.538E+01	1.621E-21
1.586E+01	2.936E-22
1.634E+01	4.950E-23
1.682E+01	7.755E-24
1.730E+01	1.127E-24
1.779E+01	1.516E-25
1.827E+01	1.893E-26
1.875E+01	2.209E-27
1.923E+01	2.491E-28
1.972E+01	2.989E-29
2.020E+01	4.572E-30
2.068E+01	9.807E-31
2.116E+01	2.590E-31
2.165E+01	7.239E-32
2.213E+01	2.006E-32
2.261E+01	5.400E-33
2.309E+01	1.405E-33
2.357E+01	3.526E-34
2.406E+01	8.528E-35
2.454E+01	1.987E-35
2.502E+01	4.454E-36
2.550E+01	9.601E-37
2.599E+01	1.989E-37
2.647E+01	3.957E-38
2.695E+01	7.552E-39
2.743E+01	1.382E-39
2.791E+01	2.423E-40
2.840E+01	4.068E-41
2.888E+01	6.544E-42
2.936E+01	1.010E-42
2.984E+01	1.503E-43
3.033E+01	2.178E-44
3.081E+01	3.147E-45
3.129E+01	4.730E-46

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
7.200E+00  
7.680E+00  
8.160E+00  
8.640E+00  
9.120E+00  
9.600E+00  
1.008E+01  
1.056E+01  
1.104E+01  
1.152E+01  
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1.393E+01  
1.441E+01  
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1.586E+01  
1.634E+01  
1.682E+01  
1.730E+01  
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2.454E+01  
2.502E+01  
2.550E+01  
2.599E+01  
2.647E+01  
2.695E+01  
2.743E+01  
2.791E+01

4.286E-01  
2.305E-01  
1.074E-01  
4.311E-02  
1.483E-02  
4.359E-03  
1.091E-03  
2.321E-04  
4.189E-05  
6.408E-06  
8.297E-07  
9.086E-08  
8.410E-09  
6.586E-10  
4.407E-11  
2.767E-12  
2.845E-13  
8.432E-14  
3.589E-14  
1.534E-14  
6.306E-15  
2.485E-15  
9.481E-16  
3.819E-16  
1.315E-16  
4.316E-17  
1.348E-17  
4.006E-18  
1.130E-18  
3.025E-19  
7.670E-20  
1.839E-20  
4.167E-21  
8.902E-22  
1.791E-22  
3.386E-23  
6.009E-24  
9.994E-25  
1.556E-25  
2.272E-26  
3.131E-27  
4.165E-28  
5.714E-29  
9.252E-30  
1.999E-30  
5.487E-31  
1.666E-31  
5.139E-32  
1.558E-32  
4.600E-33  
1.318E-33  
3.661E-34  
9.852E-35  
2.567E-35  
6.474E-36  
1.579E-36  
3.722E-37

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	8.475E-38 1.863E-38 3.951E-39 8.081E-40 1.593E-40 3.026E-41 5.541E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.168E-01 4.613E-01 2.642E-01 1.336E-01 5.940E-02 2.310E-02 7.832E-03 2.310E-03 5.917E-04 1.313E-04 2.524E-05 4.196E-06 6.026E-07 7.475E-08 8.004E-09 7.402E-10 5.960E-11 4.445E-12 4.480E-13 1.159E-13 5.018E-14 2.293E-14 1.021E-14 4.443E-15 2.038E-15 8.097E-16 3.089E-16 1.130E-16 3.966E-17 1.333E-17 4.285E-18 1.317E-18 3.865E-19 1.082E-19 2.886E-20 7.325E-21 1.767E-21 4.047E-22 8.783E-23 1.805E-23 3.506E-24 6.433E-25 1.114E-25 1.826E-26 2.848E-27 4.322E-28 6.754E-29 1.215E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.804E-30 8.126E-31 2.636E-31 8.798E-32 2.911E-32 9.432E-33 2.980E-33 9.167E-34 2.744E-34 7.987E-35 2.260E-35 6.212E-36 1.659E-36 4.298E-37 1.080E-37 2.634E-38 6.223E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.337E-01 4.895E-01 2.946E-01 1.590E-01 7.652E-02 3.274E-02 1.242E-02 4.163E-03 1.232E-03 3.213E-04 7.375E-05 1.489E-05 2.641E-06 4.114E-07 5.625E-08 6.748E-09 7.108E-10 6.619E-11 5.726E-12 6.120E-13 1.470E-13 6.371E-14 3.064E-14 1.474E-14 7.461E-15 3.306E-15 1.415E-15 5.840E-16 2.325E-16 8.918E-17 3.294E-17 1.171E-17 4.000E-18 1.313E-18 4.136E-19 1.249E-19 3.616E-20 1.001E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.651E-21 6.701E-22 1.616E-22 3.714E-23 8.121E-24 1.689E-24 3.337E-25 6.268E-26 1.122E-26 1.929E-27 3.267E-28 5.766E-29 1.173E-29 2.996E-30 9.348E-31 3.232E-31 1.150E-31 4.075E-32 1.418E-32 4.829E-33 1.607E-33 5.217E-34 1.653E-34 5.107E-35 1.539E-35 4.517E-36 1.292E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.482E-01 5.141E-01 3.221E-01 1.831E-01 9.400E-02 4.344E-02 1.802E-02 6.695E-03 2.224E-03 6.600E-04 1.747E-04 4.120E-05 8.655E-06 1.618E-06 2.690E-07 3.977E-08 5.227E-09 6.113E-10 6.404E-11 6.284E-12 7.335E-13 1.740E-13 7.584E-14 3.858E-14 2.103E-14 1.016E-14 4.757E-15 2.159E-15



	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	9.491E-16 4.039E-16 1.663E-16 6.622E-17 2.548E-17 9.467E-18 3.394E-18 1.174E-18 3.910E-19 1.254E-19 3.871E-20 1.148E-20 3.271E-21 8.940E-22 2.342E-22 5.876E-23 1.411E-23 3.237E-24 7.094E-25 1.485E-25 2.972E-26 5.710E-27 1.066E-27 1.991E-28 3.966E-29 9.232E-30 2.651E-30 8.994E-31 3.309E-31 1.245E-31 4.659E-32 1.717E-32 6.204E-33 2.195E-33 7.602E-34 2.575E-34 8.530E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.607E-01 5.357E-01 3.472E-01 2.060E-01 1.115E-01 5.489E-02 2.451E-02 9.907E-03 3.620E-03 1.194E-03 3.550E-04 9.512E-05 2.294E-05 4.979E-06 9.718E-07 1.705E-07 2.688E-08 3.808E-09

9.120E+00	4.852E-10
9.600E+00	5.604E-11
1.008E+01	6.131E-12
1.056E+01	7.900E-13
1.104E+01	1.942E-13
1.152E+01	8.750E-14
1.200E+01	4.929E-14
1.248E+01	2.542E-14
1.296E+01	1.280E-14
1.345E+01	6.272E-15
1.393E+01	2.987E-15
1.441E+01	1.382E-15
1.489E+01	6.212E-16
1.538E+01	2.709E-16
1.586E+01	1.147E-16
1.634E+01	4.705E-17
1.682E+01	1.871E-17
1.730E+01	7.205E-18
1.779E+01	2.686E-18
1.827E+01	9.686E-19
1.875E+01	3.377E-19
1.923E+01	1.137E-19
1.972E+01	3.696E-20
2.020E+01	1.159E-20
2.068E+01	3.503E-21
2.116E+01	1.020E-21
2.165E+01	2.856E-22
2.213E+01	7.690E-23
2.261E+01	1.990E-23
2.309E+01	4.941E-24
2.357E+01	1.177E-24
2.406E+01	2.690E-25
2.454E+01	5.897E-26
2.502E+01	1.243E-26
2.550E+01	2.539E-27
2.599E+01	5.107E-28
2.647E+01	1.053E-28
2.695E+01	2.383E-29
2.743E+01	6.402E-30
2.791E+01	2.074E-30
2.840E+01	7.636E-31
2.888E+01	2.974E-31
2.936E+01	1.174E-31
2.984E+01	4.599E-32
3.033E+01	1.775E-32
3.081E+01	6.732E-33
3.129E+01	2.504E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB ClayPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.27	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.839E-01
	9.600E-01	3.038E-02
	1.440E+00	1.101E-03
	1.920E+00	1.281E-05

2.400E+00	4.657E-08
2.880E+00	5.275E-11
3.360E+00	1.133E-13
3.840E+00	1.067E-14
4.320E+00	8.793E-16
4.800E+00	5.270E-17
5.280E+00	2.255E-18
5.760E+00	6.740E-20
6.240E+00	1.374E-21
6.720E+00	1.857E-23
7.200E+00	1.619E-25
7.680E+00	9.091E-28
8.160E+00	5.158E-30
8.640E+00	1.285E-31
9.120E+00	5.377E-33
9.600E+00	1.901E-34
1.008E+01	5.406E-36
1.056E+01	1.222E-37
1.104E+01	2.172E-39
1.152E+01	3.003E-41
1.200E+01	2.853E-43
1.248E+01	2.430E-45
1.296E+01	2.395E-47
1.345E+01	4.798E-49
1.393E+01	1.370E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.571E-01
	9.600E-01	1.312E-01
	1.440E+00	2.246E-02
	1.920E+00	2.225E-03
	2.400E+00	1.253E-04
	2.880E+00	3.965E-06
	3.360E+00	6.997E-08
	3.840E+00	6.864E-10
	4.320E+00	4.083E-12
	4.800E+00	1.057E-13
	5.280E+00	2.070E-14
	5.760E+00	3.891E-15
	6.240E+00	6.271E-16
	6.720E+00	8.601E-17
	7.200E+00	9.979E-18
	7.680E+00	9.720E-19
	8.160E+00	7.886E-20
	8.640E+00	5.282E-21
	9.120E+00	2.893E-22
	9.600E+00	1.282E-23
	1.008E+01	4.553E-25
	1.056E+01	1.290E-26
	1.104E+01	3.036E-28
	1.152E+01	8.218E-30
	1.200E+01	4.578E-31
	1.248E+01	4.737E-32
	1.296E+01	4.913E-33
	1.345E+01	4.627E-34
	1.393E+01	3.907E-35
	1.441E+01	2.945E-36
	1.489E+01	1.976E-37
	1.538E+01	1.174E-38
	1.586E+01	6.158E-40
	1.634E+01	2.841E-41
	1.682E+01	1.153E-42
	1.730E+01	4.163E-44
	1.779E+01	1.421E-45
	1.827E+01	5.510E-47
	1.875E+01	3.100E-48
	1.923E+01	2.377E-49
	1.972E+01	1.960E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.500E-01
	9.600E-01	2.235E-01
	1.440E+00	6.504E-02
	1.920E+00	1.327E-02
	2.400E+00	1.872E-03
	2.880E+00	1.811E-04
	3.360E+00	1.194E-05
	3.840E+00	5.337E-07
	4.320E+00	1.614E-08
	4.800E+00	3.302E-10
	5.280E+00	4.940E-12
	5.760E+00	1.816E-13
	6.240E+00	4.249E-14
	6.720E+00	1.155E-14
	7.200E+00	2.856E-15
	7.680E+00	6.361E-16
	8.160E+00	1.272E-16
	8.640E+00	2.277E-17
	9.120E+00	3.632E-18
	9.600E+00	5.143E-19
	1.008E+01	6.435E-20
	1.056E+01	7.080E-21
	1.104E+01	6.813E-22
	1.152E+01	5.699E-23
	1.200E+01	3.653E-24
	1.248E+01	2.223E-25
	1.296E+01	1.163E-26
	1.345E+01	5.370E-28
	1.393E+01	2.554E-29
	1.441E+01	1.926E-30
	1.489E+01	2.607E-31
	1.538E+01	4.218E-32
	1.586E+01	6.657E-33
	1.634E+01	9.846E-34
	1.682E+01	1.355E-34
	1.730E+01	1.731E-35
	1.779E+01	2.049E-36
	1.827E+01	2.242E-37
	1.875E+01	2.262E-38
	1.923E+01	2.101E-39
	1.972E+01	1.793E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.403E-41 1.009E-42 6.725E-44 4.291E-45 2.857E-46 2.307E-47 2.447E-48 3.085E-49 4.054E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.096E-01 2.973E-01 1.135E-01 3.335E-02 7.473E-03 1.267E-03 1.616E-04 1.546E-05 1.105E-06 5.896E-08 2.344E-09 7.005E-11 1.865E-12 1.568E-13 4.717E-14 1.546E-14 4.724E-15 1.336E-15 3.491E-16 8.401E-17 1.859E-17 3.770E-18 6.992E-19 1.180E-19 1.608E-20 2.196E-21 2.703E-22 2.988E-23 2.956E-24 2.610E-25 2.055E-26



	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.464E-27 1.010E-28 8.446E-30 1.139E-30 2.186E-31 4.553E-32 9.256E-33 1.793E-33 3.293E-34 5.722E-35 9.395E-36 1.456E-36 2.125E-37 2.920E-38 3.771E-39 4.569E-40 5.190E-41 5.527E-42 5.533E-43 5.256E-44 4.864E-45 4.663E-46 5.119E-47 6.911E-48 1.104E-48 1.898E-49 3.283E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.518E-01 3.563E-01 1.606E-01 5.892E-02 1.746E-02 4.149E-03 7.876E-04 1.190E-04 1.427E-05 1.356E-06 1.019E-07 6.054E-09 2.849E-10 1.106E-11 5.569E-13 1.112E-13 4.089E-14 1.503E-14 5.217E-15 1.702E-15 5.209E-16

	1.056E+01	1.494E-16
	1.104E+01	4.008E-17
	1.152E+01	9.990E-18
	1.200E+01	2.076E-18
	1.248E+01	4.433E-19
	1.296E+01	8.777E-20
	1.345E+01	1.608E-20
	1.393E+01	2.719E-21
	1.441E+01	4.233E-22
	1.489E+01	6.051E-23
	1.538E+01	7.919E-24
	1.586E+01	9.467E-25
	1.634E+01	1.032E-25
	1.682E+01	1.030E-26
	1.730E+01	9.559E-28
	1.779E+01	8.838E-29
	1.827E+01	9.788E-30
	1.875E+01	1.601E-30
	1.923E+01	3.569E-31
	1.972E+01	8.773E-32
	2.020E+01	2.146E-32
	2.068E+01	5.071E-33
	2.116E+01	1.150E-33
	2.165E+01	2.497E-34
	2.213E+01	5.186E-35
	2.261E+01	1.029E-35
	2.309E+01	1.950E-36
	2.357E+01	3.523E-37
	2.406E+01	6.064E-38
	2.454E+01	9.934E-39
	2.502E+01	1.547E-39
	2.550E+01	2.290E-40
	2.599E+01	3.217E-41
	2.647E+01	4.294E-42
	2.695E+01	5.459E-43
	2.743E+01	6.661E-44
	2.791E+01	7.955E-45
	2.840E+01	9.695E-46
	2.888E+01	1.292E-46
	2.936E+01	2.014E-47
	2.984E+01	3.686E-48
	3.033E+01	7.449E-49
	3.081E+01	1.559E-49
	3.129E+01	3.248E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.838E-01
	9.600E-01	4.044E-01
	1.440E+00	2.040E-01
	1.920E+00	8.696E-02
	2.400E+00	3.108E-02
	2.880E+00	9.263E-03
	3.360E+00	2.293E-03
	3.840E+00	4.701E-04
	4.320E+00	7.963E-05
	4.800E+00	1.112E-05
	5.280E+00	1.279E-06

5.760E+00	1.210E-07
6.240E+00	9.412E-09
6.720E+00	6.023E-10
7.200E+00	3.225E-11
7.680E+00	1.725E-12
8.160E+00	2.190E-13
8.640E+00	7.652E-14
9.120E+00	3.141E-14
9.600E+00	1.247E-14
1.008E+01	4.708E-15
1.056E+01	1.688E-15
1.104E+01	5.735E-16
1.152E+01	1.831E-16
1.200E+01	4.985E-17
1.248E+01	1.413E-17
1.296E+01	3.775E-18
1.345E+01	9.496E-19
1.393E+01	2.245E-19
1.441E+01	4.980E-20
1.489E+01	1.035E-20
1.538E+01	2.009E-21
1.586E+01	3.640E-22
1.634E+01	6.140E-23
1.682E+01	9.623E-24
1.730E+01	1.399E-24
1.779E+01	1.883E-25
1.827E+01	2.350E-26
1.875E+01	2.744E-27
1.923E+01	3.094E-28
1.972E+01	3.707E-29
2.020E+01	5.659E-30
2.068E+01	1.212E-30
2.116E+01	3.199E-31
2.165E+01	8.943E-32
2.213E+01	2.479E-32
2.261E+01	6.675E-33
2.309E+01	1.737E-33
2.357E+01	4.361E-34
2.406E+01	1.055E-34
2.454E+01	2.459E-35
2.502E+01	5.513E-36
2.550E+01	1.189E-36
2.599E+01	2.464E-37
2.647E+01	4.902E-38
2.695E+01	9.359E-39
2.743E+01	1.713E-39
2.791E+01	3.004E-40
2.840E+01	5.045E-41
2.888E+01	8.118E-42
2.936E+01	1.253E-42
2.984E+01	1.864E-43
3.033E+01	2.702E-44
3.081E+01	3.904E-45
3.129E+01	5.865E-46

9.600E-01	4.444E-01
1.440E+00	2.434E-01
1.920E+00	1.156E-01
2.400E+00	4.728E-02
2.880E+00	1.658E-02
3.360E+00	4.964E-03
3.840E+00	1.266E-03
4.320E+00	2.745E-04
4.800E+00	5.051E-05
5.280E+00	7.874E-06
5.760E+00	1.039E-06
6.240E+00	1.160E-07
6.720E+00	1.094E-08
7.200E+00	8.733E-10
7.680E+00	5.955E-11
8.160E+00	3.806E-12
8.640E+00	3.966E-13
9.120E+00	1.193E-13
9.600E+00	5.173E-14
1.008E+01	2.254E-14
1.056E+01	9.438E-15
1.104E+01	3.779E-15
1.152E+01	1.432E-15
1.200E+01	4.707E-16
1.248E+01	1.622E-16
1.296E+01	5.325E-17
1.345E+01	1.665E-17
1.393E+01	4.948E-18
1.441E+01	1.397E-18
1.489E+01	3.740E-19
1.538E+01	9.488E-20
1.586E+01	2.276E-20
1.634E+01	5.159E-21
1.682E+01	1.103E-21
1.730E+01	2.219E-22
1.779E+01	4.197E-23
1.827E+01	7.451E-24
1.875E+01	1.240E-24
1.923E+01	1.931E-25
1.972E+01	2.820E-26
2.020E+01	3.886E-27
2.068E+01	5.169E-28
2.116E+01	7.085E-29
2.165E+01	1.145E-29
2.213E+01	2.469E-30
2.261E+01	6.771E-31
2.309E+01	2.056E-31
2.357E+01	6.342E-32
2.406E+01	1.924E-32
2.454E+01	5.680E-33
2.502E+01	1.628E-33
2.550E+01	4.524E-34
2.599E+01	1.218E-34
2.647E+01	3.174E-35
2.695E+01	8.007E-36
2.743E+01	1.953E-36
2.791E+01	4.606E-37

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.049E-37 2.307E-38 4.893E-39 1.001E-39 1.973E-40 3.750E-41 6.868E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.297E-01 4.783E-01 2.790E-01 1.438E-01 6.511E-02 2.580E-02 8.916E-03 2.680E-03 6.996E-04 1.583E-04 3.100E-05 5.252E-06 7.689E-07 9.721E-08 1.061E-08 1.000E-09 8.205E-11 6.231E-12 6.368E-13 1.670E-13 7.356E-14 3.422E-14 1.545E-14 6.631E-15 2.506E-15 9.963E-16 3.803E-16 1.393E-16 4.889E-17 1.644E-17 5.288E-18 1.626E-18 4.774E-19 1.337E-19 3.568E-20 9.061E-21 2.187E-21 5.009E-22 1.088E-22 2.236E-23 4.345E-24 7.975E-25 1.382E-25 2.265E-26 3.533E-27 5.360E-28 8.369E-29 1.503E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.462E-30 1.002E-30 3.250E-31 1.085E-31 3.590E-32 1.164E-32 3.677E-33 1.132E-33 3.388E-34 9.864E-35 2.792E-35 7.677E-36 2.050E-36 5.314E-37 1.336E-37 3.259E-38 7.701E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.469E-01 5.074E-01 3.110E-01 1.710E-01 8.385E-02 3.656E-02 1.413E-02 4.828E-03 1.456E-03 3.870E-04 9.054E-05 1.863E-05 3.368E-06 5.347E-07 7.452E-08 9.111E-09 9.781E-10 9.283E-11 8.177E-12 8.865E-13 2.155E-13 9.484E-14 4.613E-14 2.175E-14 9.154E-15 4.059E-15 1.738E-15 7.180E-16 2.860E-16 1.098E-16 4.057E-17 1.443E-17 4.932E-18 1.620E-18 5.105E-19 1.543E-19 4.467E-20 1.238E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.278E-21 8.289E-22 2.000E-22 4.597E-23 1.006E-23 2.092E-24 4.135E-25 7.769E-26 1.391E-26 2.392E-27 4.048E-28 7.139E-29 1.450E-29 3.695E-30 1.152E-30 3.981E-31 1.417E-31 5.020E-32 1.748E-32 5.954E-33 1.981E-33 6.435E-34 2.039E-34 6.303E-35 1.899E-35 5.578E-36 1.596E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.615E-01 5.328E-01 3.400E-01 1.969E-01 1.030E-01 4.849E-02 2.049E-02 7.760E-03 2.628E-03 7.946E-04 2.143E-04 5.153E-05 1.103E-05 2.102E-06 3.562E-07 5.367E-08 7.190E-09 8.569E-10 9.149E-11 9.141E-12 1.082E-12 2.590E-13 1.136E-13 5.632E-14 2.575E-14 1.244E-14 5.832E-15 2.649E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.165E-15 4.963E-16 2.045E-16 8.147E-17 3.136E-17 1.166E-17 4.182E-18 1.447E-18 4.823E-19 1.548E-19 4.779E-20 1.418E-20 4.041E-21 1.105E-21 2.896E-22 7.269E-23 1.745E-23 4.006E-24 8.784E-25 1.839E-25 3.682E-26 7.075E-27 1.321E-27 2.466E-28 4.905E-29 1.139E-29 3.266E-30 1.107E-30 4.071E-31 1.532E-31 5.735E-32 2.114E-32 7.641E-33 2.705E-33 9.369E-34 3.175E-34 1.052E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.742E-01 5.551E-01 3.664E-01 2.215E-01 1.221E-01 6.125E-02 2.787E-02 1.148E-02 4.274E-03 1.437E-03 4.354E-04 1.189E-04 2.923E-05 6.465E-06 1.286E-06 2.300E-07 3.695E-08 5.335E-09



9.120E+00	6.929E-10
9.600E+00	8.156E-11
1.008E+01	9.082E-12
1.056E+01	1.185E-12
1.104E+01	2.912E-13
1.152E+01	1.268E-13
1.200E+01	6.022E-14
1.248E+01	3.108E-14
1.296E+01	1.566E-14
1.345E+01	7.681E-15
1.393E+01	3.661E-15
1.441E+01	1.695E-15
1.489E+01	7.623E-16
1.538E+01	3.327E-16
1.586E+01	1.409E-16
1.634E+01	5.784E-17
1.682E+01	2.301E-17
1.730E+01	8.868E-18
1.779E+01	3.308E-18
1.827E+01	1.193E-18
1.875E+01	4.162E-19
1.923E+01	1.402E-19
1.972E+01	4.560E-20
2.020E+01	1.431E-20
2.068E+01	4.325E-21
2.116E+01	1.259E-21
2.165E+01	3.529E-22
2.213E+01	9.507E-23
2.261E+01	2.460E-23
2.309E+01	6.113E-24
2.357E+01	1.457E-24
2.406E+01	3.330E-25
2.454E+01	7.302E-26
2.502E+01	1.540E-26
2.550E+01	3.144E-27
2.599E+01	6.323E-28
2.647E+01	1.302E-28
2.695E+01	2.943E-29
2.743E+01	7.890E-30
2.791E+01	2.552E-30
2.840E+01	9.388E-31
2.888E+01	3.657E-31
2.936E+01	1.443E-31
2.984E+01	5.656E-32
3.033E+01	2.184E-32
3.081E+01	8.285E-33
3.129E+01	3.083E-33

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB SandPoro High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.45	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05
	2.400E+00	4.368E-08

2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.139E-43
1.248E+01	1.806E-45
1.296E+01	1.766E-47
1.345E+01	3.509E-49
1.393E+01	0.000E+00
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00
2.984E+01	0.000E+00

	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.057E-30
	1.200E+01	3.442E-31
	1.248E+01	3.531E-32
	1.296E+01	3.631E-33
	1.345E+01	3.389E-34
	1.393E+01	2.837E-35
	1.441E+01	2.120E-36
	1.489E+01	1.410E-37
	1.538E+01	8.304E-39
	1.586E+01	4.318E-40
	1.634E+01	1.975E-41
	1.682E+01	7.941E-43
	1.730E+01	2.844E-44
	1.779E+01	9.624E-46
	1.827E+01	3.702E-47
	1.875E+01	2.067E-48
	1.923E+01	1.572E-49
	1.972E+01	1.285E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00

	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.202E-23
	1.200E+01	2.744E-24
	1.248E+01	1.655E-25
	1.296E+01	8.583E-27
	1.345E+01	3.929E-28
	1.393E+01	1.855E-29
	1.441E+01	1.389E-30
	1.489E+01	1.865E-31
	1.538E+01	2.992E-32
	1.586E+01	4.681E-33
	1.634E+01	6.863E-34
	1.682E+01	9.364E-35
	1.730E+01	1.186E-35
	1.779E+01	1.391E-36
	1.827E+01	1.509E-37
	1.875E+01	1.509E-38
	1.923E+01	1.390E-39
	1.972E+01	1.175E-40
	2.020E+01	9.118E-42

	2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.499E-43 4.295E-44 2.717E-45 1.794E-46 1.438E-47 1.514E-48 1.892E-49 2.466E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.232E-19 8.719E-20 1.210E-20 1.638E-21 1.998E-22 2.190E-23 2.148E-24 1.879E-25 1.467E-26 1.036E-27

	1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.086E-29 5.886E-30 7.886E-31 1.501E-31 3.100E-32 6.247E-33 1.200E-33 2.184E-34 3.761E-35 6.121E-36 9.401E-37 1.361E-37 1.853E-38 2.372E-39 2.849E-40 3.208E-41 3.387E-42 3.361E-43 3.165E-44 2.904E-45 2.762E-46 3.009E-47 4.033E-48 6.392E-49 1.090E-49 1.868E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16 1.135E-16



	1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.005E-17 7.402E-18 1.565E-18 3.312E-19 6.501E-20 1.181E-20 1.979E-21 3.053E-22 4.326E-23 5.612E-24 6.650E-25 7.189E-26 7.108E-27 6.542E-28 6.001E-29 6.600E-30 1.072E-30 2.372E-31 5.781E-32 1.402E-32 3.284E-33 7.382E-34 1.589E-34 3.271E-35 6.435E-36 1.208E-36 2.164E-37 3.692E-38 5.996E-39 9.257E-40 1.358E-40 1.891E-41 2.502E-42 3.153E-43 3.815E-44 4.518E-45 5.462E-46 7.226E-47 1.118E-47 2.030E-48 4.070E-49 8.443E-50 1.744E-50
30	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00	1.000E+00 6.756E-01 3.946E-01 1.966E-01 8.274E-02 2.920E-02 8.592E-03 2.100E-03 4.250E-04 7.107E-05 9.800E-06 1.113E-06 1.039E-07

6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.307E-16
1.152E+01	1.361E-16
1.200E+01	3.765E-17
1.248E+01	1.057E-17
1.296E+01	2.801E-18
1.345E+01	6.983E-19
1.393E+01	1.636E-19
1.441E+01	3.598E-20
1.489E+01	7.409E-21
1.538E+01	1.426E-21
1.586E+01	2.561E-22
1.634E+01	4.282E-23
1.682E+01	6.652E-24
1.730E+01	9.583E-25
1.779E+01	1.279E-25
1.827E+01	1.582E-26
1.875E+01	1.832E-27
1.923E+01	2.048E-28
1.972E+01	2.436E-29
2.020E+01	3.695E-30
2.068E+01	7.860E-31
2.116E+01	2.058E-31
2.165E+01	5.705E-32
2.213E+01	1.567E-32
2.261E+01	4.184E-33
2.309E+01	1.079E-33
2.357E+01	2.686E-34
2.406E+01	6.441E-35
2.454E+01	1.488E-35
2.502E+01	3.307E-36
2.550E+01	7.069E-37
2.599E+01	1.452E-37
2.647E+01	2.864E-38
2.695E+01	5.420E-39
2.743E+01	9.832E-40
2.791E+01	1.709E-40
2.840E+01	2.846E-41
2.888E+01	4.539E-42
2.936E+01	6.946E-43
2.984E+01	1.024E-43
3.033E+01	1.472E-44
3.081E+01	2.109E-45
3.129E+01	3.144E-46

0.000E+00	1.000E+00
4.800E-01	7.006E-01
9.600E-01	4.337E-01

1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.192E-15
1.104E+01	2.844E-15
1.152E+01	1.067E-15
1.200E+01	3.560E-16
1.248E+01	1.216E-16
1.296E+01	3.957E-17
1.345E+01	1.226E-17
1.393E+01	3.612E-18
1.441E+01	1.011E-18
1.489E+01	2.683E-19
1.538E+01	6.746E-20
1.586E+01	1.604E-20
1.634E+01	3.604E-21
1.682E+01	7.634E-22
1.730E+01	1.523E-22
1.779E+01	2.855E-23
1.827E+01	5.024E-24
1.875E+01	8.285E-25
1.923E+01	1.279E-25
1.972E+01	1.852E-26
2.020E+01	2.530E-27
2.068E+01	3.337E-28
2.116E+01	4.540E-29
2.165E+01	7.290E-30
2.213E+01	1.562E-30
2.261E+01	4.252E-31
2.309E+01	1.281E-31
2.357E+01	3.915E-32
2.406E+01	1.177E-32
2.454E+01	3.446E-33
2.502E+01	9.790E-34
2.550E+01	2.697E-34
2.599E+01	7.195E-35
2.647E+01	1.859E-35
2.695E+01	4.648E-36
2.743E+01	1.124E-36
2.791E+01	2.627E-37
2.840E+01	5.931E-38

	2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.293E-38 2.718E-39 5.512E-40 1.077E-40 2.029E-41 3.684E-42
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.686E-14 2.612E-14 1.165E-14 4.955E-15 1.899E-15 7.482E-16 2.831E-16 1.028E-16 3.575E-17 1.191E-17 3.799E-18 1.158E-18 3.370E-19 9.356E-20 2.475E-20 6.228E-21 1.490E-21 3.383E-22 7.281E-23 1.483E-23 2.858E-24 5.199E-25 8.931E-26 1.451E-26 2.244E-27 3.376E-28 5.232E-29 9.334E-30 2.137E-30

	2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	6.141E-31 1.976E-31 6.538E-32 2.145E-32 6.892E-33 2.159E-33 6.585E-34 1.954E-34 5.641E-35 1.582E-35 4.313E-36 1.142E-36 2.934E-37 7.312E-38 1.767E-38 4.140E-39
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.250E-14 3.485E-14 1.630E-14 6.948E-15 3.054E-15 1.296E-15 5.306E-16 2.095E-16 7.970E-17 2.920E-17 1.029E-17 3.487E-18 1.135E-18 3.546E-19 1.062E-19 3.048E-20 8.370E-21 2.197E-21

	1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.508E-22 1.317E-22 3.001E-23 6.508E-24 1.342E-24 2.629E-25 4.896E-26 8.688E-27 1.482E-27 2.488E-28 4.355E-29 8.790E-30 2.226E-30 6.890E-31 2.363E-31 8.339E-32 2.929E-32 1.011E-32 3.413E-33 1.126E-33 3.624E-34 1.138E-34 3.488E-35 1.042E-35 3.033E-36 8.600E-37
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.325E-13 1.979E-13 8.597E-14 4.230E-14 1.957E-14 9.376E-15 4.355E-15 1.961E-15 8.550E-16

	1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.609E-16 1.474E-16 5.820E-17 2.221E-17 8.182E-18 2.909E-18 9.976E-19 3.296E-19 1.048E-19 3.209E-20 9.438E-21 2.666E-21 7.225E-22 1.877E-22 4.670E-23 1.111E-23 2.529E-24 5.495E-25 1.141E-25 2.263E-26 4.312E-27 7.980E-28 1.479E-28 2.921E-29 6.745E-30 1.922E-30 6.466E-31 2.359E-31 8.801E-32 3.266E-32 1.193E-32 4.276E-33 1.500E-33 5.152E-34 1.730E-34 5.682E-35
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09 5.449E-10

9.600E+00	6.332E-11
1.008E+01	6.967E-12
1.056E+01	9.009E-13
1.104E+01	2.201E-13
1.152E+01	9.540E-14
1.200E+01	4.585E-14
1.248E+01	2.345E-14
1.296E+01	1.172E-14
1.345E+01	5.694E-15
1.393E+01	2.690E-15
1.441E+01	1.235E-15
1.489E+01	5.503E-16
1.538E+01	2.381E-16
1.586E+01	9.991E-17
1.634E+01	4.066E-17
1.682E+01	1.603E-17
1.730E+01	6.124E-18
1.779E+01	2.264E-18
1.827E+01	8.096E-19
1.875E+01	2.799E-19
1.923E+01	9.346E-20
1.972E+01	3.013E-20
2.020E+01	9.368E-21
2.068E+01	2.807E-21
2.116E+01	8.103E-22
2.165E+01	2.250E-22
2.213E+01	6.009E-23
2.261E+01	1.542E-23
2.309E+01	3.796E-24
2.357E+01	8.968E-25
2.406E+01	2.032E-25
2.454E+01	4.416E-26
2.502E+01	9.232E-27
2.550E+01	1.869E-27
2.599E+01	3.729E-28
2.647E+01	7.621E-29
2.695E+01	1.712E-29
2.743E+01	4.562E-30
2.791E+01	1.466E-30
2.840E+01	5.355E-31
2.888E+01	2.069E-31
2.936E+01	8.094E-32
2.984E+01	3.145E-32
3.033E+01	1.204E-32
3.081E+01	4.526E-33
3.129E+01	1.670E-33

### NOTICE

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obtained with this program for any specific case.

# POLLUTEv7

Version 7.13

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## BAB SandPoro Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.20	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	3.094E-43
1.248E+01	2.714E-45
1.296E+01	2.757E-47
1.345E+01	5.691E-49
1.393E+01	1.674E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.538E+01	0.000E+00
1.586E+01	0.000E+00
1.634E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.779E+01	0.000E+00
1.827E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.972E+01	0.000E+00
2.020E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.165E+01	0.000E+00
2.213E+01	0.000E+00
2.261E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.406E+01	0.000E+00
2.454E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.599E+01	0.000E+00
2.647E+01	0.000E+00
2.695E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.840E+01	0.000E+00
2.888E+01	0.000E+00
2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.072E-30
	1.200E+01	4.978E-31
	1.248E+01	5.304E-32
	1.296E+01	5.665E-33
	1.345E+01	5.493E-34
	1.393E+01	4.776E-35
	1.441E+01	3.708E-36
	1.489E+01	2.562E-37
	1.538E+01	1.568E-38
	1.586E+01	8.470E-40
	1.634E+01	4.025E-41
	1.682E+01	1.682E-42
	1.730E+01	6.258E-44
	1.779E+01	2.200E-45
	1.827E+01	8.783E-47
	1.875E+01	5.088E-48
	1.923E+01	4.018E-49
	1.972E+01	3.411E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.209E-23
	1.200E+01	3.969E-24
	1.248E+01	2.487E-25
	1.296E+01	1.340E-26
	1.345E+01	6.371E-28
	1.393E+01	3.123E-29
	1.441E+01	2.426E-30
	1.489E+01	3.383E-31
	1.538E+01	5.634E-32
	1.586E+01	9.156E-33
	1.634E+01	1.394E-33
	1.682E+01	1.976E-34
	1.730E+01	2.600E-35
	1.779E+01	3.169E-36
	1.827E+01	3.571E-37
	1.875E+01	3.712E-38
	1.923E+01	3.551E-39
	1.972E+01	3.121E-40

	2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	2.516E-41 1.863E-42 1.279E-43 8.406E-45 5.761E-46 4.786E-47 5.224E-48 6.779E-49 9.175E-50 1.213E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.788E-20 1.750E-20 2.460E-21 3.117E-22 3.548E-23 3.615E-24 3.286E-25 2.665E-26

	1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.955E-27 1.389E-28 1.196E-29 1.661E-30 3.281E-31 7.035E-32 1.473E-32 2.937E-33 5.555E-34 9.940E-35 1.681E-35 2.682E-36 4.033E-37 5.708E-38 7.591E-39 9.475E-40 1.109E-40 1.216E-41 1.254E-42 1.227E-43 1.169E-44 1.154E-45 1.302E-46 1.807E-47 2.971E-48 5.258E-49 9.366E-50 1.629E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.007E-17
	1.152E+01	7.542E-18
	1.200E+01	2.263E-18
	1.248E+01	4.973E-19
	1.296E+01	1.014E-19
	1.345E+01	1.912E-20
	1.393E+01	3.328E-21
	1.441E+01	5.333E-22
	1.489E+01	7.849E-23
	1.538E+01	1.058E-23
	1.586E+01	1.302E-24
	1.634E+01	1.462E-25
	1.682E+01	1.502E-26
	1.730E+01	1.436E-27
	1.779E+01	1.367E-28
	1.827E+01	1.558E-29
	1.875E+01	2.620E-30
	1.923E+01	6.011E-31
	1.972E+01	1.521E-31
	2.020E+01	3.830E-32
	2.068E+01	9.322E-33
	2.116E+01	2.177E-33
	2.165E+01	4.868E-34
	2.213E+01	1.041E-34
	2.261E+01	2.128E-35
	2.309E+01	4.152E-36
	2.357E+01	7.727E-37
	2.406E+01	1.370E-37
	2.454E+01	2.312E-38
	2.502E+01	3.709E-39
	2.550E+01	5.654E-40
	2.599E+01	8.183E-41
	2.647E+01	1.125E-41
	2.695E+01	1.473E-42
	2.743E+01	1.852E-43
	2.791E+01	2.277E-44
	2.840E+01	2.855E-45
	2.888E+01	3.911E-46
	2.936E+01	6.265E-47
	2.984E+01	1.178E-47
	3.033E+01	2.450E-48
	3.081E+01	5.278E-49
	3.129E+01	1.133E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06



5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.318E-16
1.152E+01	1.405E-16
1.200E+01	5.443E-17
1.248E+01	1.587E-17
1.296E+01	4.364E-18
1.345E+01	1.130E-18
1.393E+01	2.749E-19
1.441E+01	6.277E-20
1.489E+01	1.342E-20
1.538E+01	2.684E-21
1.586E+01	5.007E-22
1.634E+01	8.695E-23
1.682E+01	1.403E-23
1.730E+01	2.100E-24
1.779E+01	2.912E-25
1.827E+01	3.743E-26
1.875E+01	4.500E-27
1.923E+01	5.224E-28
1.972E+01	6.442E-29
2.020E+01	1.011E-29
2.068E+01	2.225E-30
2.116E+01	6.042E-31
2.165E+01	1.739E-31
2.213E+01	4.962E-32
2.261E+01	1.376E-32
2.309E+01	3.688E-33
2.357E+01	9.534E-34
2.406E+01	2.376E-34
2.454E+01	5.701E-35
2.502E+01	1.317E-35
2.550E+01	2.925E-36
2.599E+01	6.243E-37
2.647E+01	1.279E-37
2.695E+01	2.516E-38
2.743E+01	4.744E-39
2.791E+01	8.569E-40
2.840E+01	1.483E-40
2.888E+01	2.457E-41
2.936E+01	3.908E-42
2.984E+01	5.988E-43
3.033E+01	8.937E-44
3.081E+01	1.329E-44
3.129E+01	2.052E-45

9.600E-01  
1.440E+00  
1.920E+00  
2.400E+00  
2.880E+00  
3.360E+00  
3.840E+00  
4.320E+00  
4.800E+00  
5.280E+00  
5.760E+00  
6.240E+00  
6.720E+00  
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7.680E+00  
8.160E+00  
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2.743E+01  
2.791E+01

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4.452E-05  
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9.837E-08  
9.162E-09  
7.219E-10  
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3.069E-12  
3.171E-13  
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7.197E-15  
2.860E-15  
1.118E-15  
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3.330E-22  
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4.940E-30  
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1.382E-31  
4.316E-32  
1.312E-32  
3.874E-33  
1.109E-33  
3.073E-34  
8.251E-35  
2.144E-35  
5.386E-36  
1.308E-36

	2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	3.069E-37 6.952E-38 1.519E-38 3.201E-39 6.502E-40 1.273E-40 2.401E-41
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.616E-14 1.176E-14 5.269E-15 2.745E-15 1.122E-15 4.406E-16 1.660E-16 5.995E-17 2.074E-17 6.865E-18 2.173E-18 6.566E-19 1.893E-19 5.200E-20 1.359E-20 3.378E-21 7.966E-22 1.781E-22 3.770E-23 7.545E-24 1.426E-24 2.545E-25 4.295E-26 6.900E-27 1.078E-27 1.731E-28 3.192E-29

	2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	7.545E-30 2.244E-30 7.486E-31 2.572E-31 8.765E-32 2.925E-32 9.520E-33 3.017E-33 9.302E-34 2.790E-34 8.132E-35 2.303E-35 6.335E-36 1.692E-36 4.382E-37 1.101E-37 2.679E-38
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01 1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.667E-13 7.269E-14 3.536E-14 1.758E-14 1.004E-14 4.578E-15 2.016E-15 8.564E-16 3.509E-16 1.386E-16 5.269E-17 1.928E-17 6.783E-18 2.292E-18 7.437E-19 2.313E-19 6.895E-20 1.966E-20

	1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	5.362E-21 1.396E-21 3.469E-22 8.210E-23 1.850E-23 3.963E-24 8.067E-25 1.561E-25 2.877E-26 5.095E-27 8.876E-28 1.609E-28 3.354E-29 8.766E-30 2.806E-30 9.974E-31 3.654E-31 1.333E-31 4.779E-32 1.676E-32 5.745E-33 1.922E-33 6.273E-34 1.997E-34 6.198E-35 1.875E-35 5.525E-36
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.248E+01 1.296E+01 1.345E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.328E-13 1.986E-13 8.768E-14 4.623E-14 2.828E-14 1.405E-14 6.770E-15 3.162E-15

	1.393E+01 1.441E+01 1.489E+01 1.538E+01 1.586E+01 1.634E+01 1.682E+01 1.730E+01 1.779E+01 1.827E+01 1.875E+01 1.923E+01 1.972E+01 2.020E+01 2.068E+01 2.116E+01 2.165E+01 2.213E+01 2.261E+01 2.309E+01 2.357E+01 2.406E+01 2.454E+01 2.502E+01 2.550E+01 2.599E+01 2.647E+01 2.695E+01 2.743E+01 2.791E+01 2.840E+01 2.888E+01 2.936E+01 2.984E+01 3.033E+01 3.081E+01 3.129E+01	1.431E-15 6.267E-16 2.656E-16 1.089E-16 4.312E-17 1.650E-17 6.090E-18 2.168E-18 7.439E-19 2.458E-19 7.811E-20 2.386E-20 7.002E-21 1.971E-21 5.320E-22 1.375E-22 3.400E-23 8.037E-24 1.815E-24 3.913E-25 8.068E-26 1.596E-26 3.067E-27 5.892E-28 1.204E-28 2.867E-29 8.427E-30 2.933E-30 1.109E-30 4.296E-31 1.656E-31 6.285E-32 2.339E-32 8.529E-33 3.043E-33 1.062E-33 3.624E-34
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.968E-12
	1.056E+01	9.031E-13
	1.104E+01	2.247E-13
	1.152E+01	1.052E-13
	1.200E+01	6.623E-14
	1.248E+01	3.513E-14
	1.296E+01	1.820E-14
	1.345E+01	9.176E-15
	1.393E+01	4.497E-15
	1.441E+01	2.141E-15
	1.489E+01	9.904E-16
	1.538E+01	4.447E-16
	1.586E+01	1.937E-16
	1.634E+01	8.182E-17
	1.682E+01	3.350E-17
	1.730E+01	1.328E-17
	1.779E+01	5.099E-18
	1.827E+01	1.893E-18
	1.875E+01	6.797E-19
	1.923E+01	2.357E-19
	1.972E+01	7.892E-20
	2.020E+01	2.549E-20
	2.068E+01	7.935E-21
	2.116E+01	2.379E-21
	2.165E+01	6.864E-22
	2.213E+01	1.904E-22
	2.261E+01	5.075E-23
	2.309E+01	1.298E-23
	2.357E+01	3.187E-24
	2.406E+01	7.502E-25
	2.454E+01	1.694E-25
	2.502E+01	3.680E-26
	2.550E+01	7.735E-27
	2.599E+01	1.601E-27
	2.647E+01	3.388E-28
	2.695E+01	7.856E-29
	2.743E+01	2.157E-29
	2.791E+01	7.154E-30
	2.840E+01	2.703E-30
	2.888E+01	1.083E-30
	2.936E+01	4.399E-31
	2.984E+01	1.775E-31
	3.033E+01	7.059E-32
	3.081E+01	2.758E-32
	3.129E+01	1.057E-32

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# POLLUTEv7

Version 7.13

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## BAB ClayThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	13.99 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	35	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.596E-01	2.074E-01
	1.119E+00	1.110E-02
	1.679E+00	1.326E-04
	2.238E+00	3.313E-07

2.798E+00	1.687E-10
3.358E+00	1.053E-13
3.917E+00	6.573E-15
4.477E+00	3.228E-16
5.036E+00	1.020E-17
5.596E+00	2.009E-19
6.156E+00	2.381E-21
6.715E+00	1.625E-23
7.275E+00	6.112E-26
7.834E+00	1.312E-28
8.394E+00	5.687E-31
8.954E+00	1.289E-32
9.513E+00	2.746E-34
1.007E+01	4.370E-36
1.063E+01	5.094E-38
1.119E+01	4.272E-40
1.175E+01	2.540E-42
1.231E+01	1.092E-44
1.287E+01	4.584E-47
1.343E+01	4.416E-49
1.399E+01	0.000E+00
1.454E+01	0.000E+00
1.509E+01	0.000E+00
1.564E+01	0.000E+00
1.619E+01	0.000E+00
1.675E+01	0.000E+00
1.730E+01	0.000E+00
1.785E+01	0.000E+00
1.840E+01	0.000E+00
1.895E+01	0.000E+00
1.950E+01	0.000E+00
2.005E+01	0.000E+00
2.060E+01	0.000E+00
2.115E+01	0.000E+00
2.171E+01	0.000E+00
2.226E+01	0.000E+00
2.281E+01	0.000E+00
2.336E+01	0.000E+00
2.391E+01	0.000E+00
2.446E+01	0.000E+00
2.501E+01	0.000E+00
2.556E+01	0.000E+00
2.612E+01	0.000E+00
2.667E+01	0.000E+00
2.722E+01	0.000E+00
2.777E+01	0.000E+00
2.832E+01	0.000E+00
2.887E+01	0.000E+00
2.942E+01	0.000E+00
2.997E+01	0.000E+00
3.052E+01	0.000E+00
3.108E+01	0.000E+00
3.163E+01	0.000E+00
3.218E+01	0.000E+00
3.273E+01	0.000E+00
3.328E+01	0.000E+00

0.000E+00	1.000E+00
5.596E-01	3.789E-01
1.119E+00	7.525E-02
1.679E+00	7.293E-03
2.238E+00	3.316E-04
2.798E+00	6.919E-06
3.358E+00	6.539E-08
3.917E+00	2.785E-10
4.477E+00	7.419E-13
5.036E+00	4.038E-14
5.596E+00	6.048E-15
6.156E+00	7.436E-16
6.715E+00	7.356E-17
7.275E+00	5.796E-18
7.834E+00	3.595E-19
8.394E+00	1.732E-20
8.954E+00	6.394E-22
9.513E+00	1.779E-23
1.007E+01	3.669E-25
1.063E+01	5.574E-27
1.119E+01	6.856E-29
1.175E+01	1.410E-30
1.231E+01	8.584E-32
1.287E+01	6.288E-33
1.343E+01	4.094E-34
1.399E+01	2.400E-35
1.454E+01	1.218E-36
1.509E+01	5.299E-38
1.564E+01	1.964E-39
1.619E+01	6.169E-41
1.675E+01	1.637E-42
1.730E+01	3.719E-44
1.785E+01	7.865E-46
1.840E+01	2.059E-47
1.895E+01	8.904E-49
1.950E+01	5.044E-50
2.005E+01	0.000E+00
2.060E+01	0.000E+00
2.115E+01	0.000E+00
2.171E+01	0.000E+00
2.226E+01	0.000E+00
2.281E+01	0.000E+00
2.336E+01	0.000E+00
2.391E+01	0.000E+00
2.446E+01	0.000E+00
2.501E+01	0.000E+00
2.556E+01	0.000E+00
2.612E+01	0.000E+00
2.667E+01	0.000E+00
2.722E+01	0.000E+00
2.777E+01	0.000E+00
2.832E+01	0.000E+00
2.887E+01	0.000E+00
2.942E+01	0.000E+00
2.997E+01	0.000E+00
3.052E+01	0.000E+00
3.108E+01	0.000E+00

	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.596E-01	4.773E-01
	1.119E+00	1.498E-01
	1.679E+00	2.953E-02
	2.238E+00	3.558E-03
	2.798E+00	2.576E-04
	3.358E+00	1.108E-05
	3.917E+00	2.813E-07
	4.477E+00	4.196E-09
	5.036E+00	3.721E-11
	5.596E+00	3.645E-13
	6.156E+00	4.527E-14
	6.715E+00	9.827E-15
	7.275E+00	1.881E-15
	7.834E+00	3.124E-16
	8.394E+00	4.474E-17
	8.954E+00	5.495E-18
	9.513E+00	5.752E-19
	1.007E+01	5.095E-20
	1.063E+01	3.789E-21
	1.119E+01	2.346E-22
	1.175E+01	1.199E-23
	1.231E+01	5.010E-25
	1.287E+01	1.706E-26
	1.343E+01	4.859E-28
	1.399E+01	1.504E-29
	1.454E+01	9.140E-31
	1.509E+01	1.040E-31
	1.564E+01	1.293E-32
	1.619E+01	1.498E-33
	1.675E+01	1.583E-34
	1.730E+01	1.518E-35
	1.785E+01	1.318E-36
	1.840E+01	1.032E-37
	1.895E+01	7.267E-39
	1.950E+01	4.586E-40
	2.005E+01	2.588E-41
	2.060E+01	1.306E-42
	2.115E+01	5.952E-44
	2.171E+01	2.565E-45
	2.226E+01	1.197E-46
	2.281E+01	7.519E-48
	2.336E+01	6.496E-49
	2.391E+01	6.348E-50
	2.446E+01	0.000E+00
	2.501E+01	0.000E+00
	2.556E+01	0.000E+00
	2.612E+01	0.000E+00
	2.667E+01	0.000E+00
	2.722E+01	0.000E+00
	2.777E+01	0.000E+00
	2.832E+01	0.000E+00

	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.596E-01	5.421E-01
	1.119E+00	2.158E-01
	1.679E+00	6.106E-02
	2.238E+00	1.203E-02
	2.798E+00	1.626E-03
	3.358E+00	1.495E-04
	3.917E+00	9.299E-06
	4.477E+00	3.892E-07
	5.036E+00	1.093E-08
	5.596E+00	2.064E-10
	6.156E+00	2.927E-12
	6.715E+00	1.337E-13
	7.275E+00	3.293E-14
	7.834E+00	8.683E-15
	8.394E+00	2.071E-15
	8.954E+00	4.441E-16
	9.513E+00	8.528E-17
	1.007E+01	1.461E-17
	1.063E+01	2.225E-18
	1.119E+01	2.999E-19
	1.175E+01	3.558E-20
	1.231E+01	3.700E-21
	1.287E+01	3.352E-22
	1.343E+01	2.631E-23
	1.399E+01	1.853E-24
	1.454E+01	1.127E-25
	1.509E+01	5.915E-27
	1.564E+01	2.793E-28
	1.619E+01	1.452E-29
	1.675E+01	1.288E-30
	1.730E+01	1.905E-31
	1.785E+01	3.168E-32
	1.840E+01	5.076E-33
	1.895E+01	7.618E-34
	1.950E+01	1.065E-34
	2.005E+01	1.384E-35
	2.060E+01	1.668E-36
	2.115E+01	1.860E-37
	2.171E+01	1.917E-38
	2.226E+01	1.821E-39
	2.281E+01	1.592E-40
	2.336E+01	1.278E-41
	2.391E+01	9.450E-43
	2.446E+01	6.493E-44
	2.501E+01	4.283E-45
	2.556E+01	2.959E-46

	2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.478E-47 2.712E-48 3.513E-49 4.741E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01	1.000E+00 5.888E-01 2.717E-01 9.583E-02 2.541E-02 5.007E-03 7.274E-04 7.749E-05 6.029E-06 3.416E-07 1.406E-08 4.210E-10 9.567E-12 3.244E-13 6.495E-14 2.034E-14 6.012E-15 1.635E-15 4.082E-16 9.326E-17 1.945E-17 3.694E-18 6.365E-19 9.920E-20 1.394E-20 1.831E-21 2.144E-22 2.242E-23 2.087E-24 1.725E-25 1.266E-26 8.420E-28 5.583E-29 4.893E-30 7.155E-31 1.388E-31 2.799E-32 5.436E-33 1.001E-33 1.743E-34 2.861E-35 4.425E-36

	2.336E+01	6.438E-37
	2.391E+01	8.798E-38
	2.446E+01	1.128E-38
	2.501E+01	1.353E-39
	2.556E+01	1.519E-40
	2.612E+01	1.593E-41
	2.667E+01	1.564E-42
	2.722E+01	1.445E-43
	2.777E+01	1.281E-44
	2.832E+01	1.144E-45
	2.887E+01	1.132E-46
	2.942E+01	1.368E-47
	2.997E+01	2.021E-48
	3.052E+01	3.315E-49
	3.108E+01	5.554E-50
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.596E-01	6.244E-01
	1.119E+00	3.189E-01
	1.679E+00	1.306E-01
	2.238E+00	4.230E-02
	2.798E+00	1.073E-02
	3.358E+00	2.116E-03
	3.917E+00	3.229E-04
	4.477E+00	3.800E-05
	5.036E+00	3.439E-06
	5.596E+00	2.388E-07
	6.156E+00	1.271E-08
	6.715E+00	5.187E-10
	7.275E+00	1.668E-11
	7.834E+00	6.215E-13
	8.394E+00	9.993E-14
	8.954E+00	3.402E-14
	9.513E+00	1.157E-14
	1.007E+01	3.683E-15
	1.063E+01	1.093E-15
	1.119E+01	3.016E-16
	1.175E+01	7.728E-17
	1.231E+01	1.835E-17
	1.287E+01	4.026E-18
	1.343E+01	8.160E-19
	1.399E+01	1.582E-19
	1.454E+01	2.787E-20
	1.509E+01	4.506E-21
	1.564E+01	6.663E-22
	1.619E+01	8.985E-23
	1.675E+01	1.102E-23
	1.730E+01	1.224E-24
	1.785E+01	1.231E-25
	1.840E+01	1.123E-26
	1.895E+01	9.463E-28
	1.950E+01	7.936E-29
	2.005E+01	8.177E-30

	2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	1.293E-30 2.780E-31 6.476E-32 1.485E-32 3.273E-33 6.888E-34 1.382E-34 2.641E-35 4.801E-36 8.292E-37 1.360E-37 2.113E-38 3.111E-39 4.332E-40 5.702E-41 7.096E-42 8.367E-43 9.415E-44 1.031E-44 1.147E-45 1.400E-46 2.023E-47 3.476E-48 6.616E-49
35	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01	1.000E+00 6.528E-01 3.592E-01 1.639E-01 6.132E-02 1.864E-02 4.577E-03 9.036E-04 1.430E-04 1.808E-05 1.825E-06 1.467E-07 9.390E-09 4.787E-10 1.990E-11 8.944E-13 1.325E-13 4.698E-14 1.762E-14 6.273E-15 2.103E-15 6.635E-16 1.966E-16 5.461E-17 1.423E-17 3.597E-18 8.374E-19 1.818E-19 3.676E-20 6.904E-21 1.202E-21 1.934E-22



	1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.872E-23 3.924E-24 4.924E-25 5.672E-26 6.026E-27 6.045E-28 6.204E-29 7.879E-30 1.457E-30 3.508E-31 9.122E-32 2.354E-32 5.882E-33 1.414E-33 3.265E-34 7.232E-35 1.536E-35 3.123E-36 6.077E-37 1.131E-37 2.009E-38 3.406E-39 5.508E-40 8.486E-41 1.246E-41 1.745E-42 2.344E-43 3.051E-44 3.952E-45
40	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01	1.000E+00 6.760E-01 3.940E-01 1.953E-01 8.144E-02 2.838E-02 8.217E-03 1.969E-03 3.890E-04 6.327E-05 8.453E-06 9.264E-07 8.319E-08 6.117E-09 3.689E-10 1.870E-11 1.021E-12 1.567E-13 5.753E-14 2.319E-14 8.972E-15 3.297E-15 1.149E-15 3.792E-16 1.187E-16 3.638E-17 1.036E-17

	1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	2.784E-18 7.049E-19 1.679E-19 3.757E-20 7.879E-21 1.546E-21 2.835E-22 4.844E-23 7.698E-24 1.136E-24 1.556E-25 1.979E-26 2.362E-27 2.740E-28 3.416E-29 5.474E-30 1.220E-30 3.302E-31 9.410E-32 2.656E-32 7.285E-33 1.932E-33 4.948E-34 1.222E-34 2.909E-35 6.671E-36 1.472E-36 3.124E-37 6.372E-38 1.248E-38 2.346E-39 4.229E-40 7.308E-41 1.211E-41
45	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00 9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01	1.000E+00 6.955E-01 4.243E-01 2.244E-01 1.020E-01 3.953E-02 1.302E-02 3.626E-03 8.521E-04 1.685E-04 2.801E-05 3.907E-06 4.567E-07 4.472E-08 3.666E-09 2.522E-10 1.499E-11 9.883E-13 1.692E-13 6.491E-14 2.768E-14 1.143E-14

	1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	4.507E-15 1.697E-15 6.112E-16 2.167E-16 7.188E-17 2.269E-17 6.809E-18 1.940E-18 5.238E-19 1.339E-19 3.238E-20 7.391E-21 1.590E-21 3.218E-22 6.120E-23 1.092E-23 1.823E-24 2.849E-25 4.167E-26 5.734E-27 7.567E-28 1.014E-28 1.567E-29 3.213E-30 8.552E-31 2.568E-31 7.889E-32 2.388E-32 7.041E-33 2.014E-33 5.583E-34 1.499E-34 3.894E-35 9.786E-36 2.377E-36 5.579E-37 1.264E-37 2.764E-38 5.826E-39
50	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00 6.715E+00 7.275E+00 7.834E+00 8.394E+00 8.954E+00	1.000E+00 7.122E-01 4.510E-01 2.514E-01 1.224E-01 5.171E-02 1.888E-02 5.935E-03 1.602E-03 3.707E-04 7.339E-05 1.241E-05 1.792E-06 2.207E-07 2.317E-08 2.073E-09 1.587E-10

	9.513E+00 1.007E+01 1.063E+01 1.119E+01 1.175E+01 1.231E+01 1.287E+01 1.343E+01 1.399E+01 1.454E+01 1.509E+01 1.564E+01 1.619E+01 1.675E+01 1.730E+01 1.785E+01 1.840E+01 1.895E+01 1.950E+01 2.005E+01 2.060E+01 2.115E+01 2.171E+01 2.226E+01 2.281E+01 2.336E+01 2.391E+01 2.446E+01 2.501E+01 2.556E+01 2.612E+01 2.667E+01 2.722E+01 2.777E+01 2.832E+01 2.887E+01 2.942E+01 2.997E+01 3.052E+01 3.108E+01 3.163E+01 3.218E+01 3.273E+01 3.328E+01	1.078E-11 8.563E-13 1.706E-13 6.908E-14 3.086E-14 1.342E-14 5.604E-15 2.254E-15 8.956E-16 3.349E-16 1.199E-16 4.110E-17 1.346E-17 4.208E-18 1.255E-18 3.565E-19 9.639E-20 2.477E-20 6.041E-21 1.397E-21 3.056E-22 6.322E-23 1.234E-23 2.271E-24 3.937E-25 6.429E-26 9.922E-27 1.466E-27 2.152E-28 3.431E-29 6.790E-30 1.756E-30 5.392E-31 1.756E-31 5.726E-32 1.833E-32 5.720E-33 1.737E-33 5.125E-34 1.469E-34 4.089E-35 1.104E-35 2.894E-36 7.350E-37
55	0.000E+00 5.596E-01 1.119E+00 1.679E+00 2.238E+00 2.798E+00 3.358E+00 3.917E+00 4.477E+00 5.036E+00 5.596E+00 6.156E+00	1.000E+00 7.266E-01 4.748E-01 2.765E-01 1.424E-01 6.459E-02 2.567E-02 8.910E-03 2.695E-03 7.091E-04 1.620E-04 3.209E-05

6.715E+00	5.507E-06
7.275E+00	8.182E-07
7.834E+00	1.052E-07
8.394E+00	1.169E-08
8.954E+00	1.124E-09
9.513E+00	9.404E-11
1.007E+01	7.200E-12
1.063E+01	6.928E-13
1.119E+01	1.641E-13
1.175E+01	7.044E-14
1.231E+01	3.275E-14
1.287E+01	1.486E-14
1.343E+01	6.534E-15
1.399E+01	2.847E-15
1.454E+01	1.173E-15
1.509E+01	4.647E-16
1.564E+01	1.771E-16
1.619E+01	6.485E-17
1.675E+01	2.280E-17
1.730E+01	7.687E-18
1.785E+01	2.484E-18
1.840E+01	7.686E-19
1.895E+01	2.274E-19
1.950E+01	6.431E-20
2.005E+01	1.735E-20
2.060E+01	4.465E-21
2.115E+01	1.094E-21
2.171E+01	2.548E-22
2.226E+01	5.639E-23
2.281E+01	1.184E-23
2.336E+01	2.355E-24
2.391E+01	4.438E-25
2.446E+01	7.918E-26
2.501E+01	1.342E-26
2.556E+01	2.180E-27
2.612E+01	3.493E-28
2.667E+01	5.902E-29
2.722E+01	1.178E-29
2.777E+01	3.009E-30
2.832E+01	9.348E-31
2.887E+01	3.170E-31
2.942E+01	1.095E-31
2.997E+01	3.742E-32
3.052E+01	1.253E-32
3.108E+01	4.093E-33
3.163E+01	1.304E-33
3.218E+01	4.046E-34
3.273E+01	1.223E-34
3.328E+01	3.598E-35

#### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB ClayThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	11.03 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	19.29 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.412E-01	3.215E-01
	8.824E-01	4.575E-02
	1.324E+00	2.633E-03
	1.765E+00	5.850E-05

2.206E+00	4.895E-07
2.647E+00	1.521E-09
3.088E+00	2.003E-12
3.530E+00	4.222E-14
3.971E+00	5.016E-15
4.412E+00	4.678E-16
4.853E+00	3.324E-17
5.294E+00	1.773E-18
5.736E+00	6.980E-20
6.177E+00	1.991E-21
6.618E+00	4.028E-23
7.059E+00	5.650E-25
7.500E+00	5.417E-27
7.942E+00	3.994E-29
8.383E+00	6.190E-31
8.824E+00	3.037E-32
9.265E+00	1.564E-33
9.706E+00	6.804E-35
1.015E+01	2.455E-36
1.059E+01	7.290E-38
1.103E+01	1.840E-39
1.151E+01	2.481E-41
1.199E+01	2.590E-43
1.248E+01	2.208E-45
1.296E+01	2.166E-47
1.344E+01	4.307E-49
1.392E+01	1.229E-50
1.441E+01	0.000E+00
1.489E+01	0.000E+00
1.537E+01	0.000E+00
1.585E+01	0.000E+00
1.633E+01	0.000E+00
1.682E+01	0.000E+00
1.730E+01	0.000E+00
1.778E+01	0.000E+00
1.826E+01	0.000E+00
1.875E+01	0.000E+00
1.923E+01	0.000E+00
1.971E+01	0.000E+00
2.019E+01	0.000E+00
2.068E+01	0.000E+00
2.116E+01	0.000E+00
2.164E+01	0.000E+00
2.212E+01	0.000E+00
2.260E+01	0.000E+00
2.309E+01	0.000E+00
2.357E+01	0.000E+00
2.405E+01	0.000E+00
2.453E+01	0.000E+00
2.502E+01	0.000E+00
2.550E+01	0.000E+00
2.598E+01	0.000E+00
2.646E+01	0.000E+00
2.694E+01	0.000E+00
2.743E+01	0.000E+00
2.791E+01	0.000E+00
2.839E+01	0.000E+00



	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.412E-01	4.894E-01
	8.824E-01	1.623E-01
	1.324E+00	3.496E-02
	1.765E+00	4.767E-03
	2.206E+00	4.050E-04
	2.647E+00	2.121E-05
	3.088E+00	6.802E-07
	3.530E+00	1.329E-08
	3.971E+00	1.585E-10
	4.412E+00	1.392E-12
	4.853E+00	7.583E-14
	5.294E+00	1.717E-14
	5.736E+00	3.657E-15
	6.177E+00	6.840E-16
	6.618E+00	1.117E-16
	7.059E+00	1.586E-17
	7.500E+00	1.946E-18
	7.942E+00	2.051E-19
	8.383E+00	1.846E-20
	8.824E+00	1.407E-21
	9.265E+00	9.019E-23
	9.706E+00	4.821E-24
	1.015E+01	2.134E-25
	1.059E+01	7.805E-27
	1.103E+01	2.554E-28
	1.151E+01	6.681E-30
	1.199E+01	4.060E-31
	1.248E+01	4.193E-32
	1.296E+01	4.353E-33
	1.344E+01	4.103E-34
	1.392E+01	3.468E-35
	1.441E+01	2.618E-36
	1.489E+01	1.758E-37
	1.537E+01	1.046E-38
	1.585E+01	5.493E-40
	1.633E+01	2.537E-41
	1.682E+01	1.031E-42
	1.730E+01	3.727E-44
	1.778E+01	1.272E-45
	1.826E+01	4.919E-47
	1.875E+01	2.757E-48
	1.923E+01	2.110E-49
	1.971E+01	1.740E-50
	2.019E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.164E+01	0.000E+00
	2.212E+01	0.000E+00
	2.260E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00

	2.405E+01	0.000E+00
	2.453E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.598E+01	0.000E+00
	2.646E+01	0.000E+00
	2.694E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.839E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.412E-01	5.768E-01
	8.824E-01	2.583E-01
	1.324E+00	8.750E-02
	1.765E+00	2.204E-02
	2.206E+00	4.077E-03
	2.647E+00	5.499E-04
	3.088E+00	5.374E-05
	3.530E+00	3.791E-06
	3.971E+00	1.925E-07
	4.412E+00	7.018E-09
	4.853E+00	1.842E-10
	5.294E+00	3.785E-12
	5.736E+00	1.736E-13
	6.177E+00	4.277E-14
	6.618E+00	1.291E-14
	7.059E+00	3.616E-15
	7.500E+00	9.282E-16
	7.942E+00	2.178E-16
	8.383E+00	4.658E-17
	8.824E+00	9.057E-18
	9.265E+00	1.596E-18
	9.706E+00	2.540E-19
	1.015E+01	3.637E-20
	1.059E+01	4.672E-21
	1.103E+01	5.578E-22
	1.151E+01	4.581E-23
	1.199E+01	3.249E-24
	1.248E+01	1.980E-25
	1.296E+01	1.037E-26
	1.344E+01	4.794E-28
	1.392E+01	2.277E-29
	1.441E+01	1.706E-30
	1.489E+01	2.301E-31
	1.537E+01	3.721E-32
	1.585E+01	5.875E-33
	1.633E+01	8.695E-34
	1.682E+01	1.198E-34
	1.730E+01	1.531E-35
	1.778E+01	1.813E-36
	1.826E+01	1.985E-37
	1.875E+01	2.005E-38

	1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.863E-39 1.591E-40 1.246E-41 8.970E-43 5.983E-44 3.817E-45 2.539E-46 2.046E-47 2.165E-48 2.727E-49 3.583E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01	1.000E+00 6.323E-01 3.317E-01 1.418E-01 4.872E-02 1.335E-02 2.895E-03 4.948E-04 6.640E-05 6.981E-06 5.736E-07 3.679E-08 1.840E-09 7.234E-11 2.501E-12 1.884E-13 5.423E-14 1.945E-14 6.652E-15 2.134E-15 6.406E-16 1.797E-16 4.699E-17 1.144E-17 2.592E-18 5.655E-19 9.405E-20 1.420E-20 1.941E-21 2.391E-22 2.646E-23 2.620E-24

	1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	2.316E-25 1.826E-26 1.302E-27 8.974E-29 7.485E-30 1.005E-30 1.926E-31 4.010E-32 8.154E-33 1.580E-33 2.903E-34 5.046E-35 8.289E-36 1.285E-36 1.877E-37 2.580E-38 3.334E-39 4.041E-40 4.594E-41 4.895E-42 4.903E-43 4.659E-44 4.312E-45 4.132E-46 4.528E-47 6.103E-48 9.741E-49 1.674E-49 2.895E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00	1.000E+00 6.715E-01 3.890E-01 1.918E-01 7.964E-02 2.766E-02 7.991E-03 1.912E-03 3.778E-04 6.151E-05 8.236E-06 9.055E-07 8.166E-08 6.037E-09 3.664E-10 1.866E-11 1.001E-12 1.444E-13 5.192E-14 2.082E-14 8.030E-15 2.943E-15

	9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.023E-15 3.369E-16 1.053E-16 3.222E-17 7.951E-18 1.827E-18 3.904E-19 7.734E-20 1.418E-20 2.399E-21 3.737E-22 5.345E-23 7.001E-24 8.376E-25 9.142E-26 9.126E-27 8.477E-28 7.835E-29 8.657E-30 1.411E-30 3.141E-31 7.718E-32 1.888E-32 4.463E-33 1.012E-33 2.199E-34 4.568E-35 9.068E-36 1.719E-36 3.106E-37 5.348E-38 8.765E-39 1.366E-39 2.022E-40 2.842E-41 3.795E-42 4.827E-43 5.892E-44 7.037E-45 8.573E-46 1.142E-46 1.777E-47 3.248E-48 6.561E-49
30	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00	1.000E+00 7.010E-01 4.350E-01 2.364E-01 1.116E-01 4.545E-02 1.591E-02 4.769E-03 1.220E-03 2.661E-04 4.935E-05 7.774E-06

5.294E+00	1.039E-06
5.736E+00	1.178E-07
6.177E+00	1.131E-08
6.618E+00	9.212E-10
7.059E+00	6.408E-11
7.500E+00	4.090E-12
7.942E+00	3.816E-13
8.383E+00	1.024E-13
8.824E+00	4.337E-14
9.265E+00	1.880E-14
9.706E+00	7.856E-15
1.015E+01	3.146E-15
1.059E+01	1.211E-15
1.103E+01	4.597E-16
1.151E+01	1.460E-16
1.199E+01	4.382E-17
1.248E+01	1.242E-17
1.296E+01	3.320E-18
1.344E+01	8.353E-19
1.392E+01	1.976E-19
1.441E+01	4.384E-20
1.489E+01	9.113E-21
1.537E+01	1.771E-21
1.585E+01	3.209E-22
1.633E+01	5.417E-23
1.682E+01	8.494E-24
1.730E+01	1.235E-24
1.778E+01	1.664E-25
1.826E+01	2.079E-26
1.875E+01	2.428E-27
1.923E+01	2.738E-28
1.971E+01	3.279E-29
2.019E+01	4.993E-30
2.068E+01	1.067E-30
2.116E+01	2.813E-31
2.164E+01	7.863E-32
2.212E+01	2.179E-32
2.260E+01	5.870E-33
2.309E+01	1.528E-33
2.357E+01	3.837E-34
2.405E+01	9.285E-35
2.453E+01	2.164E-35
2.502E+01	4.854E-36
2.550E+01	1.047E-36
2.598E+01	2.170E-37
2.646E+01	4.319E-38
2.694E+01	8.248E-39
2.743E+01	1.510E-39
2.791E+01	2.649E-40
2.839E+01	4.451E-41
2.887E+01	7.163E-42
2.936E+01	1.106E-42
2.984E+01	1.646E-43
3.032E+01	2.387E-44

8.824E-01  
1.324E+00  
1.765E+00  
2.206E+00  
2.647E+00  
3.088E+00  
3.530E+00  
3.971E+00  
4.412E+00  
4.853E+00  
5.294E+00  
5.736E+00  
6.177E+00  
6.618E+00  
7.059E+00  
7.500E+00  
7.942E+00  
8.383E+00  
8.824E+00  
9.265E+00  
9.706E+00  
1.015E+01  
1.059E+01  
1.103E+01  
1.151E+01  
1.199E+01  
1.248E+01  
1.296E+01  
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1.633E+01  
1.682E+01  
1.730E+01  
1.778E+01  
1.826E+01  
1.875E+01  
1.923E+01  
1.971E+01  
2.019E+01  
2.068E+01  
2.116E+01  
2.164E+01  
2.212E+01  
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2.309E+01  
2.357E+01  
2.405E+01  
2.453E+01  
2.502E+01  
2.550E+01  
2.598E+01  
2.646E+01  
2.694E+01

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4.993E-33  
1.431E-33  
3.978E-34  
1.071E-34  
2.792E-35  
7.044E-36

	2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	1.719E-36 4.053E-37 9.234E-38 2.031E-38 4.309E-39 8.817E-40 1.739E-40
40	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01	1.000E+00 7.432E-01 5.047E-01 3.109E-01 1.727E-01 8.609E-02 3.839E-02 1.527E-02 5.405E-03 1.700E-03 4.741E-04 1.172E-04 2.563E-05 4.961E-06 8.486E-07 1.283E-07 1.712E-08 2.019E-09 2.108E-10 1.987E-11 1.909E-12 3.014E-13 1.067E-13 5.108E-14 2.514E-14 1.237E-14 5.322E-15 2.202E-15 8.752E-16 3.341E-16 1.223E-16 4.295E-17 1.444E-17 4.647E-18 1.429E-18 4.197E-19 1.176E-19 3.138E-20 7.971E-21 1.924E-21 4.409E-22 9.578E-23 1.969E-23 3.829E-24 7.031E-25 1.219E-25 1.998E-26 3.118E-27 4.733E-28



	2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	7.388E-29 1.325E-29 3.047E-30 8.810E-31 2.856E-31 9.532E-32 3.155E-32 1.023E-32 3.232E-33 9.946E-34 2.978E-34 8.672E-35 2.455E-35 6.751E-36 1.803E-36 4.674E-37 1.176E-37
45	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01 1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01	1.000E+00 7.590E-01 5.319E-01 3.420E-01 2.008E-01 1.072E-01 5.185E-02 2.268E-02 8.947E-03 3.180E-03 1.017E-03 2.920E-04 7.530E-05 1.742E-05 3.613E-06 6.716E-07 1.118E-07 1.667E-08 2.225E-09 2.665E-10 2.905E-11 3.119E-12 4.640E-13 1.457E-13 7.010E-14 3.699E-14 1.753E-14 8.045E-15 3.567E-15 1.527E-15 6.308E-16 2.513E-16 9.644E-17 3.564E-17 1.268E-17 4.334E-18 1.423E-18 4.487E-19 1.356E-19

	1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	3.927E-20 1.088E-20 2.883E-21 7.292E-22 1.760E-22 4.046E-23 8.855E-24 1.843E-24 3.644E-25 6.847E-26 1.226E-26 2.110E-27 3.571E-28 6.297E-29 1.278E-29 3.252E-30 1.013E-30 3.498E-31 1.245E-31 4.411E-32 1.536E-32 5.232E-33 1.741E-33 5.655E-34 1.792E-34 5.540E-35 1.670E-35
50	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00 8.383E+00 8.824E+00 9.265E+00 9.706E+00 1.015E+01 1.059E+01 1.103E+01 1.151E+01 1.199E+01 1.248E+01	1.000E+00 7.724E-01 5.555E-01 3.699E-01 2.271E-01 1.281E-01 6.616E-02 3.122E-02 1.344E-02 5.270E-03 1.879E-03 6.089E-04 1.791E-04 4.781E-05 1.157E-05 2.537E-06 5.041E-07 9.069E-08 1.477E-08 2.179E-09 2.915E-10 3.578E-11 4.280E-12 6.459E-13 1.882E-13 9.133E-14 4.559E-14 2.264E-14 1.094E-14

	1.296E+01 1.344E+01 1.392E+01 1.441E+01 1.489E+01 1.537E+01 1.585E+01 1.633E+01 1.682E+01 1.730E+01 1.778E+01 1.826E+01 1.875E+01 1.923E+01 1.971E+01 2.019E+01 2.068E+01 2.116E+01 2.164E+01 2.212E+01 2.260E+01 2.309E+01 2.357E+01 2.405E+01 2.453E+01 2.502E+01 2.550E+01 2.598E+01 2.646E+01 2.694E+01 2.743E+01 2.791E+01 2.839E+01 2.887E+01 2.936E+01 2.984E+01 3.032E+01	5.126E-15 2.328E-15 1.024E-15 4.361E-16 1.797E-16 7.157E-17 2.755E-17 1.024E-17 3.674E-18 1.271E-18 4.238E-19 1.360E-19 4.200E-20 1.247E-20 3.553E-21 9.717E-22 2.547E-22 6.395E-23 1.536E-23 3.526E-24 7.734E-25 1.620E-25 3.244E-26 6.235E-27 1.164E-27 2.174E-28 4.323E-29 1.003E-29 2.874E-30 9.731E-31 3.578E-31 1.346E-31 5.039E-32 1.857E-32 6.714E-33 2.377E-33 8.233E-34
55	0.000E+00 4.412E-01 8.824E-01 1.324E+00 1.765E+00 2.206E+00 2.647E+00 3.088E+00 3.530E+00 3.971E+00 4.412E+00 4.853E+00 5.294E+00 5.736E+00 6.177E+00 6.618E+00 7.059E+00 7.500E+00 7.942E+00	1.000E+00 7.840E-01 5.762E-01 3.951E-01 2.517E-01 1.485E-01 8.097E-02 4.069E-02 1.881E-02 7.994E-03 3.118E-03 1.115E-03 3.653E-04 1.096E-04 3.009E-05 7.557E-06 1.735E-06 3.641E-07 6.982E-08

8.383E+00	1.223E-08
8.824E+00	1.958E-09
9.265E+00	2.869E-10
9.706E+00	3.888E-11
1.015E+01	5.127E-12
1.059E+01	8.143E-13
1.103E+01	2.354E-13
1.151E+01	1.030E-13
1.199E+01	5.299E-14
1.248E+01	2.734E-14
1.296E+01	1.378E-14
1.344E+01	6.753E-15
1.392E+01	3.218E-15
1.441E+01	1.490E-15
1.489E+01	6.699E-16
1.537E+01	2.924E-16
1.585E+01	1.238E-16
1.633E+01	5.082E-17
1.682E+01	2.022E-17
1.730E+01	7.791E-18
1.778E+01	2.906E-18
1.826E+01	1.048E-18
1.875E+01	3.657E-19
1.923E+01	1.232E-19
1.971E+01	4.007E-20
2.019E+01	1.257E-20
2.068E+01	3.802E-21
2.116E+01	1.107E-21
2.164E+01	3.103E-22
2.212E+01	8.361E-23
2.260E+01	2.164E-23
2.309E+01	5.378E-24
2.357E+01	1.282E-24
2.405E+01	2.931E-25
2.453E+01	6.429E-26
2.502E+01	1.356E-26
2.550E+01	2.770E-27
2.598E+01	5.572E-28
2.646E+01	1.147E-28
2.694E+01	2.593E-29
2.743E+01	6.944E-30
2.791E+01	2.245E-30
2.839E+01	8.253E-31
2.887E+01	3.214E-31
2.936E+01	1.268E-31
2.984E+01	4.970E-32
3.032E+01	1.919E-32

### NOTICE

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# POLLUTEv7

Version 7.13

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GAEA Technologies Ltd., R.K. Rowe and J.R. Booker

## BAB SandThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	23.62 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.259E+01	7.107E-46
1.318E+01	3.241E-48
1.377E+01	3.736E-50
1.436E+01	0.000E+00
1.495E+01	0.000E+00
1.554E+01	0.000E+00
1.613E+01	0.000E+00
1.672E+01	0.000E+00
1.731E+01	0.000E+00
1.791E+01	0.000E+00
1.850E+01	0.000E+00
1.909E+01	0.000E+00
1.968E+01	0.000E+00
2.027E+01	0.000E+00
2.086E+01	0.000E+00
2.145E+01	0.000E+00
2.204E+01	0.000E+00
2.263E+01	0.000E+00
2.322E+01	0.000E+00
2.381E+01	0.000E+00
2.440E+01	0.000E+00
2.499E+01	0.000E+00
2.558E+01	0.000E+00
2.617E+01	0.000E+00
2.676E+01	0.000E+00
2.735E+01	0.000E+00
2.794E+01	0.000E+00
2.853E+01	0.000E+00
2.912E+01	0.000E+00
2.971E+01	0.000E+00
3.031E+01	0.000E+00
3.090E+01	0.000E+00
3.149E+01	0.000E+00
3.208E+01	0.000E+00
3.267E+01	0.000E+00
3.326E+01	0.000E+00

	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.259E+01	2.459E-32
	1.318E+01	1.478E-33
	1.377E+01	7.600E-35
	1.436E+01	3.305E-36
	1.495E+01	1.206E-37
	1.554E+01	3.670E-39
	1.613E+01	9.243E-41
	1.672E+01	1.919E-42
	1.731E+01	3.330E-44
	1.791E+01	5.372E-46
	1.850E+01	1.161E-47
	1.909E+01	4.401E-49
	1.968E+01	2.063E-50
	2.027E+01	0.000E+00
	2.086E+01	0.000E+00
	2.145E+01	0.000E+00
	2.204E+01	0.000E+00
	2.263E+01	0.000E+00
	2.322E+01	0.000E+00
	2.381E+01	0.000E+00
	2.440E+01	0.000E+00
	2.499E+01	0.000E+00
	2.558E+01	0.000E+00
	2.617E+01	0.000E+00
	2.676E+01	0.000E+00
	2.735E+01	0.000E+00



	2.794E+01	0.000E+00
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.259E+01	9.949E-26
	1.318E+01	2.533E-27
	1.377E+01	5.772E-29
	1.436E+01	2.084E-30
	1.495E+01	1.787E-31
	1.554E+01	1.921E-32
	1.613E+01	1.935E-33
	1.672E+01	1.755E-34
	1.731E+01	1.424E-35
	1.791E+01	1.031E-36
	1.850E+01	6.623E-38
	1.909E+01	3.765E-39
	1.968E+01	1.886E-40
	2.027E+01	8.306E-42
	2.086E+01	3.225E-43
	2.145E+01	1.133E-44

	2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.993E-46 1.798E-47 1.201E-48 9.812E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 1.188E-21 8.744E-23 5.464E-24 2.882E-25 1.281E-26 4.947E-28

	1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01 2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	2.004E-29 1.417E-30 1.821E-31 2.661E-32 3.707E-33 4.783E-34 5.685E-35 6.207E-36 6.211E-37 5.681E-38 4.738E-39 3.594E-40 2.475E-41 1.548E-42 8.878E-44 4.830E-45 2.759E-46 1.974E-47 1.907E-48 2.173E-49 2.534E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.259E+01	2.667E-19
	1.318E+01	3.555E-20
	1.377E+01	4.211E-21
	1.436E+01	4.412E-22
	1.495E+01	4.069E-23
	1.554E+01	3.287E-24
	1.613E+01	2.316E-25
	1.672E+01	1.424E-26
	1.731E+01	7.810E-28
	1.791E+01	4.310E-29
	1.850E+01	3.416E-30
	1.909E+01	4.775E-31
	1.968E+01	8.465E-32
	2.027E+01	1.507E-32
	2.086E+01	2.543E-33
	2.145E+01	4.029E-34
	2.204E+01	5.975E-35
	2.263E+01	8.278E-36
	2.322E+01	1.070E-36
	2.381E+01	1.287E-37
	2.440E+01	1.439E-38
	2.499E+01	1.492E-39
	2.558E+01	1.433E-40
	2.617E+01	1.274E-41
	2.676E+01	1.049E-42
	2.735E+01	8.085E-44
	2.794E+01	6.002E-45
	2.853E+01	4.627E-46
	2.912E+01	4.213E-47
	2.971E+01	4.915E-48
	3.031E+01	6.838E-49
	3.090E+01	1.007E-49
	3.149E+01	1.466E-50
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.259E+01	9.092E-18
1.318E+01	1.762E-18
1.377E+01	3.114E-19
1.436E+01	5.009E-20
1.495E+01	7.304E-21
1.554E+01	9.623E-22
1.613E+01	1.141E-22
1.672E+01	1.214E-23
1.731E+01	1.154E-24
1.791E+01	9.778E-26
1.850E+01	7.416E-27
1.909E+01	5.180E-28
1.968E+01	3.764E-29
2.027E+01	3.832E-30
2.086E+01	6.311E-31
2.145E+01	1.295E-31
2.204E+01	2.708E-32
2.263E+01	5.446E-33
2.322E+01	1.040E-33
2.381E+01	1.883E-34
2.440E+01	3.221E-35
2.499E+01	5.206E-36
2.558E+01	7.934E-37
2.617E+01	1.139E-37
2.676E+01	1.538E-38
2.735E+01	1.950E-39
2.794E+01	2.319E-40
2.853E+01	2.585E-41
2.912E+01	2.704E-42
2.971E+01	2.666E-43
3.031E+01	2.514E-44
3.090E+01	2.359E-45
3.149E+01	2.386E-46
3.208E+01	2.876E-47
3.267E+01	4.253E-48
3.326E+01	7.150E-49
3.385E+01	1.250E-49
3.444E+01	2.164E-50
3.503E+01	0.000E+00
3.562E+01	0.000E+00

9.600E-01	4.337E-01
1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.194E-15
1.104E+01	2.849E-15
1.152E+01	1.083E-15
1.200E+01	4.061E-16
1.259E+01	1.094E-16
1.318E+01	2.740E-17
1.377E+01	6.371E-18
1.436E+01	1.372E-18
1.495E+01	2.730E-19
1.554E+01	5.008E-20
1.613E+01	8.445E-21
1.672E+01	1.306E-21
1.731E+01	1.845E-22
1.791E+01	2.376E-23
1.850E+01	2.781E-24
1.909E+01	2.952E-25
1.968E+01	2.841E-26
2.027E+01	2.505E-27
2.086E+01	2.121E-28
2.145E+01	2.010E-29
2.204E+01	2.759E-30
2.263E+01	5.556E-31
2.322E+01	1.299E-31
2.381E+01	3.058E-32
2.440E+01	6.959E-33
2.499E+01	1.516E-33
2.558E+01	3.153E-34
2.617E+01	6.253E-35
2.676E+01	1.181E-35
2.735E+01	2.123E-36
2.794E+01	3.626E-37
2.853E+01	5.880E-38
2.912E+01	9.042E-39
2.971E+01	1.317E-39
3.031E+01	1.816E-40
3.090E+01	2.368E-41
3.149E+01	2.925E-42

	3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.435E-43 3.880E-44 4.339E-45 5.095E-46 6.822E-47 1.094E-47 2.023E-48
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01 1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01 2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 6.958E-16 2.102E-16 5.966E-17 1.588E-17 3.955E-18 9.208E-19 1.999E-19 4.040E-20 7.581E-21 1.318E-21 2.118E-22 3.139E-23 4.279E-24 5.356E-25 6.150E-26 6.513E-27 6.515E-28 6.686E-29 8.541E-30 1.592E-30 3.848E-31 1.001E-31 2.582E-32

	2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	6.442E-33 1.546E-33 3.564E-34 7.878E-35 1.669E-35 3.386E-36 6.570E-37 1.219E-37 2.158E-38 3.647E-39 5.875E-40 9.015E-41 1.318E-41 1.839E-42 2.459E-43 3.192E-44 4.133E-45
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01 1.436E+01 1.495E+01 1.554E+01 1.613E+01 1.672E+01 1.731E+01 1.791E+01 1.850E+01 1.909E+01 1.968E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 2.912E-15 1.015E-15 3.351E-16 1.047E-16 3.092E-17 8.617E-18 2.263E-18 5.590E-19 1.297E-19 2.822E-20 5.745E-21 1.092E-21 1.937E-22



	2.027E+01 2.086E+01 2.145E+01 2.204E+01 2.263E+01 2.322E+01 2.381E+01 2.440E+01 2.499E+01 2.558E+01 2.617E+01 2.676E+01 2.735E+01 2.794E+01 2.853E+01 2.912E+01 2.971E+01 3.031E+01 3.090E+01 3.149E+01 3.208E+01 3.267E+01 3.326E+01 3.385E+01 3.444E+01 3.503E+01 3.562E+01	3.193E-23 4.888E-24 6.935E-25 9.115E-26 1.113E-26 1.284E-27 1.473E-28 1.929E-29 3.444E-30 8.324E-31 2.301E-31 6.494E-32 1.795E-32 4.808E-33 1.243E-33 3.099E-34 7.443E-35 1.721E-35 3.830E-36 8.192E-37 1.683E-37 3.320E-38 6.281E-39 1.139E-39 1.978E-40 3.292E-41 5.249E-42
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.259E+01 1.318E+01 1.377E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.326E-13 1.981E-13 8.651E-14 4.354E-14 2.233E-14 9.120E-15 3.557E-15 1.323E-15

	1.436E+01	4.690E-16
	1.495E+01	1.582E-16
	1.554E+01	5.074E-17
	1.613E+01	1.545E-17
	1.672E+01	4.463E-18
	1.731E+01	1.221E-18
	1.791E+01	3.160E-19
	1.850E+01	7.724E-20
	1.909E+01	1.780E-20
	1.968E+01	3.864E-21
	2.027E+01	7.881E-22
	2.086E+01	1.508E-22
	2.145E+01	2.704E-23
	2.204E+01	4.533E-24
	2.263E+01	7.097E-25
	2.322E+01	1.037E-25
	2.381E+01	1.418E-26
	2.440E+01	1.838E-27
	2.499E+01	2.349E-28
	2.558E+01	3.286E-29
	2.617E+01	5.910E-30
	2.676E+01	1.434E-30
	2.735E+01	4.132E-31
	2.794E+01	1.247E-31
	2.853E+01	3.733E-32
	2.912E+01	1.089E-32
	2.971E+01	3.084E-33
	3.031E+01	8.451E-34
	3.090E+01	2.241E-34
	3.149E+01	5.746E-35
	3.208E+01	1.424E-35
	3.267E+01	3.406E-36
	3.326E+01	7.864E-37
	3.385E+01	1.751E-37
	3.444E+01	3.758E-38
	3.503E+01	7.769E-39
	3.562E+01	1.546E-39
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.259E+01	2.318E-14
	1.318E+01	9.898E-15
	1.377E+01	4.054E-15
	1.436E+01	1.590E-15
	1.495E+01	5.971E-16
	1.554E+01	2.144E-16
	1.613E+01	7.352E-17
	1.672E+01	2.407E-17
	1.731E+01	7.511E-18
	1.791E+01	2.232E-18
	1.850E+01	6.309E-19
	1.909E+01	1.694E-19
	1.968E+01	4.317E-20
	2.027E+01	1.042E-20
	2.086E+01	2.380E-21
	2.145E+01	5.135E-22
	2.204E+01	1.045E-22
	2.263E+01	2.003E-23
	2.322E+01	3.612E-24
	2.381E+01	6.118E-25
	2.440E+01	9.734E-26
	2.499E+01	1.459E-26
	2.558E+01	2.083E-27
	2.617E+01	2.932E-28
	2.676E+01	4.441E-29
	2.735E+01	8.330E-30
	2.794E+01	2.069E-30
	2.853E+01	6.181E-31
	2.912E+01	1.968E-31
	2.971E+01	6.278E-32
	3.031E+01	1.964E-32
	3.090E+01	5.980E-33
	3.149E+01	1.770E-33
	3.208E+01	5.083E-34
	3.267E+01	1.416E-34
	3.326E+01	3.827E-35
	3.385E+01	1.002E-35
	3.444E+01	2.542E-36
	3.503E+01	6.240E-37
	3.562E+01	1.482E-37

### NOTICE

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# POLLUTEv7

Version 7.13

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## BAB SandThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS  $V_a = 0.00102$  m/year

### Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distribution Coefficient	Dry Density
Clay	12 m	25	0.019 m <sup>2</sup> /a	0.37	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>
Clay with Sand	15.17 m	40	0.019 m <sup>2</sup> /a	0.34	0 m <sup>3</sup> /kg	1510 kg/m <sup>3</sup>

### Boundary Conditions

#### Constant Concentration

Source Concentration = 1 mg/L

#### Infinite Thickness Bottom Boundary

### Laplace Transform Parameters

TAU = 7   N = 20   SIG = 0   RNU = 2

### Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

2.400E+00	4.368E-08
2.880E+00	4.885E-11
3.360E+00	1.037E-13
3.840E+00	9.638E-15
4.320E+00	7.843E-16
4.800E+00	4.641E-17
5.280E+00	1.960E-18
5.760E+00	5.783E-20
6.240E+00	1.164E-21
6.720E+00	1.553E-23
7.200E+00	1.336E-25
7.680E+00	7.408E-28
8.160E+00	4.152E-30
8.640E+00	1.022E-31
9.120E+00	4.221E-33
9.600E+00	1.474E-34
1.008E+01	4.135E-36
1.056E+01	9.227E-38
1.104E+01	1.619E-39
1.152E+01	2.210E-41
1.200E+01	2.440E-43
1.238E+01	5.794E-45
1.276E+01	1.384E-46
1.314E+01	4.621E-48
1.352E+01	2.432E-49
1.390E+01	1.493E-50
1.428E+01	0.000E+00
1.465E+01	0.000E+00
1.503E+01	0.000E+00
1.541E+01	0.000E+00
1.579E+01	0.000E+00
1.617E+01	0.000E+00
1.655E+01	0.000E+00
1.693E+01	0.000E+00
1.731E+01	0.000E+00
1.769E+01	0.000E+00
1.807E+01	0.000E+00
1.845E+01	0.000E+00
1.883E+01	0.000E+00
1.921E+01	0.000E+00
1.959E+01	0.000E+00
1.996E+01	0.000E+00
2.034E+01	0.000E+00
2.072E+01	0.000E+00
2.110E+01	0.000E+00
2.148E+01	0.000E+00
2.186E+01	0.000E+00
2.224E+01	0.000E+00
2.262E+01	0.000E+00
2.300E+01	0.000E+00
2.338E+01	0.000E+00
2.376E+01	0.000E+00
2.414E+01	0.000E+00
2.452E+01	0.000E+00
2.489E+01	0.000E+00
2.527E+01	0.000E+00
2.565E+01	0.000E+00

	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.238E+01	6.542E-32
	1.276E+01	1.121E-32
	1.314E+01	1.825E-33
	1.352E+01	2.787E-34
	1.390E+01	3.975E-35
	1.428E+01	5.288E-36
	1.465E+01	6.547E-37
	1.503E+01	7.532E-38
	1.541E+01	8.034E-39
	1.579E+01	7.931E-40
	1.617E+01	7.234E-41
	1.655E+01	6.090E-42
	1.693E+01	4.742E-43
	1.731E+01	3.448E-44
	1.769E+01	2.417E-45
	1.807E+01	1.771E-46
	1.845E+01	1.553E-47
	1.883E+01	1.758E-48
	1.921E+01	2.357E-49
	1.959E+01	3.315E-50
	1.996E+01	0.000E+00
	2.034E+01	0.000E+00
	2.072E+01	0.000E+00
	2.110E+01	0.000E+00
	2.148E+01	0.000E+00
	2.186E+01	0.000E+00

	2.224E+01	0.000E+00
	2.262E+01	0.000E+00
	2.300E+01	0.000E+00
	2.338E+01	0.000E+00
	2.376E+01	0.000E+00
	2.414E+01	0.000E+00
	2.452E+01	0.000E+00
	2.489E+01	0.000E+00
	2.527E+01	0.000E+00
	2.565E+01	0.000E+00
	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.238E+01	3.508E-25
	1.276E+01	3.577E-26
	1.314E+01	3.336E-27
	1.352E+01	2.925E-28
	1.390E+01	2.669E-29
	1.428E+01	3.187E-30
	1.465E+01	5.746E-31
	1.503E+01	1.312E-31
	1.541E+01	3.144E-32
	1.579E+01	7.371E-33
	1.617E+01	1.662E-33
	1.655E+01	3.585E-34
	1.693E+01	7.392E-35
	1.731E+01	1.455E-35
	1.769E+01	2.733E-36
	1.807E+01	4.889E-37



	1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	8.326E-38 1.348E-38 2.073E-39 3.025E-40 4.186E-41 5.491E-42 6.840E-43 8.135E-44 9.371E-45 1.081E-45 1.331E-46 1.889E-47 3.186E-48 6.089E-49 1.227E-49 2.484E-50 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
20	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01	1.000E+00 6.021E-01 2.900E-01 1.093E-01 3.172E-02 7.017E-03 1.174E-03 1.479E-04 1.397E-05 9.858E-07 5.191E-08 2.037E-09 6.011E-11 1.582E-12 1.317E-13 3.914E-14 1.266E-14 3.820E-15 1.067E-15 2.751E-16 6.535E-17 1.427E-17 2.858E-18 5.233E-19 8.741E-20 1.381E-20 2.908E-21 5.748E-22 1.064E-22 1.843E-23 2.977E-24 4.483E-25

	1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	6.287E-26 8.233E-27 1.019E-27 1.239E-28 1.650E-29 2.838E-30 6.647E-31 1.851E-31 5.392E-32 1.555E-32 4.367E-33 1.188E-33 3.127E-34 7.951E-35 1.953E-35 4.629E-36 1.058E-36 2.333E-37 4.952E-38 1.012E-38 1.989E-39 3.758E-40 6.822E-41 1.190E-41 1.996E-42 3.225E-43 5.053E-44 7.777E-45 1.207E-45 1.974E-46 3.581E-47 7.412E-48 1.715E-48 4.228E-49
25	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01	1.000E+00 6.439E-01 3.476E-01 1.547E-01 5.605E-02 1.640E-02 3.847E-03 7.210E-04 1.075E-04 1.273E-05 1.194E-06 8.861E-08 5.197E-09 2.415E-10 9.257E-12 4.612E-13 9.118E-14 3.312E-14 1.202E-14 4.118E-15 1.326E-15 4.007E-16

	1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	1.135E-16 3.005E-17 7.447E-18 1.785E-18 5.333E-19 1.521E-19 4.137E-20 1.072E-20 2.642E-21 6.189E-22 1.376E-22 2.898E-23 5.780E-24 1.090E-24 1.941E-25 3.267E-26 5.218E-27 8.006E-28 1.223E-28 2.025E-29 4.106E-30 1.075E-30 3.337E-31 1.103E-31 3.669E-32 1.200E-32 3.837E-33 1.195E-33 3.625E-34 1.070E-34 3.070E-35 8.565E-36 2.322E-36 6.114E-37 1.563E-37 3.875E-38 9.319E-39 2.173E-39 4.907E-40 1.073E-40 2.274E-41 4.668E-42 9.294E-43 1.800E-43
30	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00	1.000E+00 6.756E-01 3.946E-01 1.966E-01 8.274E-02 2.920E-02 8.592E-03 2.100E-03 4.250E-04 7.107E-05 9.800E-06 1.113E-06

5.760E+00	1.039E-07
6.240E+00	7.979E-09
6.720E+00	5.041E-10
7.200E+00	2.665E-11
7.680E+00	1.409E-12
8.160E+00	1.774E-13
8.640E+00	6.128E-14
9.120E+00	2.484E-14
9.600E+00	9.733E-15
1.008E+01	3.628E-15
1.056E+01	1.284E-15
1.104E+01	4.311E-16
1.152E+01	1.375E-16
1.200E+01	4.295E-17
1.238E+01	1.600E-17
1.276E+01	5.753E-18
1.314E+01	1.993E-18
1.352E+01	6.648E-19
1.390E+01	2.134E-19
1.428E+01	6.586E-20
1.465E+01	1.953E-20
1.503E+01	5.555E-21
1.541E+01	1.516E-21
1.579E+01	3.960E-22
1.617E+01	9.903E-23
1.655E+01	2.367E-23
1.693E+01	5.405E-24
1.731E+01	1.177E-24
1.769E+01	2.446E-25
1.807E+01	4.849E-26
1.845E+01	9.190E-27
1.883E+01	1.678E-27
1.921E+01	3.012E-28
1.959E+01	5.577E-29
1.996E+01	1.161E-29
2.034E+01	2.962E-30
2.072E+01	9.236E-31
2.110E+01	3.241E-31
2.148E+01	1.186E-31
2.186E+01	4.353E-32
2.224E+01	1.576E-32
2.262E+01	5.599E-33
2.300E+01	1.947E-33
2.338E+01	6.621E-34
2.376E+01	2.201E-34
2.414E+01	7.153E-35
2.452E+01	2.271E-35
2.489E+01	7.040E-36
2.527E+01	2.131E-36
2.565E+01	6.292E-37
2.603E+01	1.813E-37
2.641E+01	5.093E-38
2.679E+01	1.395E-38
2.717E+01	3.723E-39

9.600E-01	4.337E-01
1.440E+00	2.346E-01
1.920E+00	1.100E-01
2.400E+00	4.443E-02
2.880E+00	1.538E-02
3.360E+00	4.547E-03
3.840E+00	1.145E-03
4.320E+00	2.451E-04
4.800E+00	4.452E-05
5.280E+00	6.852E-06
5.760E+00	8.927E-07
6.240E+00	9.837E-08
6.720E+00	9.162E-09
7.200E+00	7.219E-10
7.680E+00	4.860E-11
8.160E+00	3.069E-12
8.640E+00	3.171E-13
9.120E+00	9.445E-14
9.600E+00	4.044E-14
1.008E+01	1.740E-14
1.056E+01	7.194E-15
1.104E+01	2.849E-15
1.152E+01	1.083E-15
1.200E+01	4.061E-16
1.238E+01	1.763E-16
1.276E+01	7.433E-17
1.314E+01	3.040E-17
1.352E+01	1.206E-17
1.390E+01	4.636E-18
1.428E+01	1.726E-18
1.465E+01	6.224E-19
1.503E+01	2.171E-19
1.541E+01	7.321E-20
1.579E+01	2.385E-20
1.617E+01	7.503E-21
1.655E+01	2.277E-21
1.693E+01	6.660E-22
1.731E+01	1.877E-22
1.769E+01	5.089E-23
1.807E+01	1.327E-23
1.845E+01	3.326E-24
1.883E+01	8.007E-25
1.921E+01	1.850E-25
1.959E+01	4.108E-26
1.996E+01	8.783E-27
2.034E+01	1.820E-27
2.072E+01	3.719E-28
2.110E+01	7.773E-29
2.148E+01	1.776E-29
2.186E+01	4.783E-30
2.224E+01	1.548E-30
2.262E+01	5.698E-31
2.300E+01	2.227E-31
2.338E+01	8.837E-32
2.376E+01	3.488E-32
2.414E+01	1.357E-32
2.452E+01	5.194E-33

	2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	1.951E-33 7.190E-34 2.599E-34 9.211E-35 3.200E-35 1.089E-35 3.633E-36
40	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01	1.000E+00 7.210E-01 4.668E-01 2.689E-01 1.369E-01 6.120E-02 2.395E-02 8.170E-03 2.425E-03 6.249E-04 1.396E-04 2.699E-05 4.514E-06 6.524E-07 8.142E-08 8.772E-09 8.163E-10 6.612E-11 4.961E-12 5.024E-13 1.306E-13 5.687E-14 2.613E-14 1.168E-14 5.054E-15 2.166E-15 1.052E-15 4.981E-16 2.300E-16 1.035E-16 4.535E-17 1.935E-17 8.038E-18 3.248E-18 1.276E-18 4.871E-19 1.806E-19 6.503E-20 2.271E-20 7.691E-21 2.524E-21 8.021E-22 2.467E-22 7.339E-23 2.110E-23 5.860E-24 1.571E-24 4.066E-25 1.015E-25

	2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	2.450E-26 5.728E-27 1.308E-27 2.969E-28 6.941E-29 1.773E-29 5.250E-30 1.827E-30 7.140E-31 2.957E-31 1.247E-31 5.249E-32 2.186E-32 8.978E-33 3.629E-33 1.443E-33 5.641E-34
45	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01 1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01	1.000E+00 7.380E-01 4.953E-01 2.999E-01 1.628E-01 7.884E-02 3.394E-02 1.295E-02 4.369E-03 1.301E-03 3.413E-04 7.884E-05 1.602E-05 2.859E-06 4.481E-07 6.164E-08 7.440E-09 7.886E-10 7.389E-11 6.430E-12 6.905E-13 1.666E-13 7.256E-14 3.501E-14 1.670E-14 7.925E-15 4.191E-15 2.169E-15 1.098E-15 5.439E-16 2.633E-16 1.246E-16 5.761E-17 2.601E-17 1.147E-17 4.934E-18 2.071E-18 8.474E-19 3.380E-19

	1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	1.314E-19 4.971E-20 1.831E-20 6.559E-21 2.285E-21 7.736E-22 2.544E-22 8.120E-23 2.515E-23 7.551E-24 2.198E-24 6.199E-25 1.694E-25 4.487E-26 1.154E-26 2.897E-27 7.168E-28 1.786E-28 4.658E-29 1.342E-29 4.454E-30 1.697E-30 7.096E-31 3.106E-31 1.379E-31 6.110E-32 2.682E-32
50	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00 9.120E+00 9.600E+00 1.008E+01 1.056E+01 1.104E+01 1.152E+01 1.200E+01 1.238E+01 1.276E+01 1.314E+01	1.000E+00 7.526E-01 5.201E-01 3.279E-01 1.875E-01 9.685E-02 4.502E-02 1.879E-02 7.025E-03 2.349E-03 7.012E-04 1.867E-04 4.432E-05 9.366E-06 1.762E-06 2.947E-07 4.385E-08 5.798E-09 6.822E-10 7.192E-11 7.099E-12 8.326E-13 1.981E-13 8.651E-14 4.354E-14 2.233E-14 1.263E-14 7.010E-15 3.817E-15



	1.352E+01 1.390E+01 1.428E+01 1.465E+01 1.503E+01 1.541E+01 1.579E+01 1.617E+01 1.655E+01 1.693E+01 1.731E+01 1.769E+01 1.807E+01 1.845E+01 1.883E+01 1.921E+01 1.959E+01 1.996E+01 2.034E+01 2.072E+01 2.110E+01 2.148E+01 2.186E+01 2.224E+01 2.262E+01 2.300E+01 2.338E+01 2.376E+01 2.414E+01 2.452E+01 2.489E+01 2.527E+01 2.565E+01 2.603E+01 2.641E+01 2.679E+01 2.717E+01	2.038E-15 1.067E-15 5.476E-16 2.754E-16 1.356E-16 6.543E-17 3.090E-17 1.428E-17 6.458E-18 2.856E-18 1.235E-18 5.218E-19 2.154E-19 8.685E-20 3.418E-20 1.312E-20 4.915E-21 1.795E-21 6.385E-22 2.212E-22 7.463E-23 2.450E-23 7.822E-24 2.428E-24 7.327E-25 2.149E-25 6.128E-26 1.701E-26 4.614E-27 1.231E-27 3.280E-28 8.970E-29 2.627E-29 8.616E-30 3.226E-30 1.348E-30 6.021E-31
55	0.000E+00 4.800E-01 9.600E-01 1.440E+00 1.920E+00 2.400E+00 2.880E+00 3.360E+00 3.840E+00 4.320E+00 4.800E+00 5.280E+00 5.760E+00 6.240E+00 6.720E+00 7.200E+00 7.680E+00 8.160E+00 8.640E+00	1.000E+00 7.651E-01 5.420E-01 3.533E-01 2.110E-01 1.149E-01 5.689E-02 2.556E-02 1.039E-02 3.821E-03 1.268E-03 3.794E-04 1.023E-04 2.483E-05 5.421E-06 1.065E-06 1.879E-07 2.981E-08 4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.238E+01	3.112E-14
	1.276E+01	1.827E-14
	1.314E+01	1.055E-14
	1.352E+01	5.987E-15
	1.390E+01	3.338E-15
	1.428E+01	1.829E-15
	1.465E+01	9.839E-16
	1.503E+01	5.197E-16
	1.541E+01	2.695E-16
	1.579E+01	1.372E-16
	1.617E+01	6.849E-17
	1.655E+01	3.355E-17
	1.693E+01	1.611E-17
	1.731E+01	7.587E-18
	1.769E+01	3.501E-18
	1.807E+01	1.583E-18
	1.845E+01	7.009E-19
	1.883E+01	3.039E-19
	1.921E+01	1.290E-19
	1.959E+01	5.354E-20
	1.996E+01	2.174E-20
	2.034E+01	8.633E-21
	2.072E+01	3.350E-21
	2.110E+01	1.270E-21
	2.148E+01	4.702E-22
	2.186E+01	1.699E-22
	2.224E+01	5.993E-23
	2.262E+01	2.061E-23
	2.300E+01	6.913E-24
	2.338E+01	2.260E-24
	2.376E+01	7.199E-25
	2.414E+01	2.235E-25
	2.452E+01	6.762E-26
	2.489E+01	1.997E-26
	2.527E+01	5.772E-27
	2.565E+01	1.642E-27
	2.603E+01	4.653E-28
	2.641E+01	1.342E-28
	2.679E+01	4.075E-29
	2.717E+01	1.357E-29

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**Attachment C**  
**Additional Aquifer Characterization**  
**Reports**



# Additional Uppermost Aquifer Characterization Study

**Belle River Power Plant Bottom Ash  
Basins CCR Unit, 4505 King Road,  
China Township, Michigan**

April 2023

A handwritten signature in blue ink that reads "Clint Miller".

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Clint Miller, PhD., PG  
Senior Project Geochemist

A handwritten signature in blue ink that reads "Vincent E. Buening".

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Vincent E. Buening, C.P.G.  
Senior Project Manager

**Prepared For:**

DTE Electric Company

**Prepared By:**

TRC  
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Ann Arbor, MI 48108

A handwritten signature in blue ink that reads "Alexander Eklund".

---

Alexander Eklund  
Data Scientist

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## 1.0 Introduction

### 1.1 Purpose and Objectives

The objective of this report is to document TRC's Additional Aquifer Characterization Study performed at the Belle River Power Plant Bottom Ash Basins CCR unit (BRPP BABs CCR unit) (hereinafter "the CCR unit"), which is located at the Belle River Power Plant, China Township, Michigan. This study was performed to determine if additional data, collected in December 2022, provide further lines of evidence to substantiate that groundwater in the uppermost aquifer is unimpacted by CCR operations. This additional uppermost aquifer characterization study is complementary to the preliminary alternative liner demonstration (ALD) prepared in accordance with 40 CFR §257.71 (d) that was submitted to the United States Environmental Protection Agency (EPA) on November 30, 2021 (Geosyntec, November 2021), and the previous studies (TRC, 2017, Bechtel, 1976) performed to establish the groundwater monitoring program developed pursuant to 40 CFR §257.91.

Previous studies performed at the site including the ALD have demonstrated and verified that the site is underlain by a thick laterally-continuous clay-rich deposit which meets the requirements of an alternate liner per 40 CFR §257.71 (d). The site characterization and groundwater data collected to-date from the CCR unit indicate that the natural underlying clay hydraulically separates the CCR unit from the uppermost aquifer and that groundwater quality is not affected by the CCR unit or any associated management activities. The data and analysis presented within the preliminary ALD further confirms the pre-existing site conceptual model, and through rigorous field testing and site-specific flow and transport modeling demonstrates the effectiveness of the clay. The preliminary ALD demonstrates that there is no reasonable probability that water from the CCR unit will result in a release to the uppermost aquifer throughout the CCR unit's active life, nor will data exceed the groundwater protection standard at the waste boundaries over the projected active life and post closure period of the CCR unit.

This additional characterization study included the collection of additional groundwater samples during December 2022, along with further analyses of existing data to further characterize the uppermost aquifer. Water samples were collected from the CCR unit groundwater monitoring well network, the BABs water, and a surface water sample was collected from the St. Clair River. Laboratory analysis performed during December 2022 included additional geochemical indicators, stable isotopes, and radiometric isotopes. Stable isotopes do not decay, but preferentially fractionate under physical, chemical and or environmental conditions. Radiometric isotopes are unstable and do decay; decay is at a constant rate, and therefore can be useful for age-dating different water sources. Additionally, data collected as part of monitoring under the state program (2020 to 2022) and the federal CCR program (2015-2022) were used as described and presented within this report.

In summary, the data collected in this assessment confirms that the uppermost aquifer is not in communication with the CCR unit water; groundwater geochemistry in the uppermost aquifer is reflective of the geogenic natural environmental conditions and is therefore unaffected by the CCR unit. Each of the multiple lines of evidence presented in this report independently supports this conclusion as discussed below.



## 1.2 Site Overview and Operational History

The BRPP is located in Section 13, Township 4 North, Range 16 East, at 4505 King Road, China Township in St. Clair County, Michigan (Figure 1). The BRPP was constructed in the early 1980s with plant operations beginning in 1984. Prior to Detroit Edison Company's operations commencing in the 1980s, the BRPP property was generally wooded and farmland. The property has been used continuously as a coal fired power plant since Detroit Edison Company (now DTE Electric) began power plant operations at BRPP in 1984 and is generally constructed over a natural clay-rich soil base. The BABs have been in use by the BRPP since it began operation and have collected CCR bottom ash that is periodically cleaned out and either sold for beneficial reuse or disposed of at the Range Road Landfill (RRLF).

The BRPP BABs are two adjacent physical sedimentation basins that are slightly raised CCR surface impoundments referred to as the North and South BABs, located north of the BRPP. These are considered one CCR unit. The BABs receive sluiced bottom ash and other process flow water from the power plant. Discharge water from each BAB flows over an outlet weir that gravity flows to a site storm water conveyance network of ditches and pipes, then flows into the diversion basin (DB) CCR unit, which is monitored as a separate CCR unit in accordance with the CCR Rule.

The DB is an incised CCR surface impoundment located east of the BRPP. Water flows into the DB from the North and South BABs through a network of pipes and ditches. The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit.

## 1.3 Geology/Hydrogeology

The geologic and hydrogeologic conditions at the CCR unit have been extensively studied and these studies (including TRC, 2017, Bechtel, 1976 and Geosyntec 2020), provide specific details on the hydrogeology and geology in the region, and at the BRPP. A brief discussion is provided below.

The CCR unit is located approximately one mile west of the St. Clair River. The CCR unit is underlain by more than 100 feet of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 140 to 150 feet below ground surface (bgs). In general, the CCR unit is initially underlain by at least 90 to as much as 130 feet of laterally extensive low hydraulic conductivity silty clay-rich deposits (TRC, 2017 and Geosyntec, 2021). The depth to the top of the confined sand-rich uppermost aquifer encountered immediately beneath the silty clay-rich deposits varies up to 46 feet within the monitoring well network and rapidly thins to the south and east of the BABs and pinches out (i.e., no longer present) to the southeast in the vicinity of SB-16-01 (Figure 2). Consequently, the uppermost aquifer is not laterally contiguous across the entire BRPP BABs CCR unit, and not present beneath the southeastern corner of the BABs. Monitoring wells MW-16-01 through MW-16-04 and MW-16-09 are all screened in the top of the sand-rich uppermost aquifer that is up to approximately 50 feet thick where it is present and underlain by the Bedford Shale.

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The variability in the depth to the uppermost aquifer is a consequence of the heterogeneity of the glacial deposits and is driven by the lateral discontinuity of the sand outwash within the encapsulating fine-grained, silty clay till that is at least 82 feet thick that confines the uppermost aquifer beneath the BABs CCR unit. This is supported by the artesian conditions observed in the uppermost aquifer where the groundwater potentiometric surface elevation is well above the bottom of the overlying confining clay unit. There is a lack of interconnection and/or lack of significant vertical variation between the uppermost aquifer sand unit(s) encountered across the CCR unit as demonstrated by the extensive amount of time (months) it took for water levels in monitoring well MW-16-02 to reach equilibrium after well construction and development (TRC, 2017).

Given the horizontally expansive clay with substantial vertical thickness that isolates the uppermost aquifer from the CCR unit, the heterogeneity of the glacial deposits (with the top of the uppermost aquifer elevation across the BABs, where present varying up to 46 feet vertically), the no flow boundary where no sand or gravel is present in the southeastern portion of the CCR unit area, and the apparent lack of hydraulic interconnectedness of the uppermost aquifer encountered at the BABs in some areas, it is not appropriate to infer horizontal flow direction or gradients across the CCR unit (TRC, January 2023) (Figure 4).

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## 2.0 Additional Data Collection

The additional groundwater, basin water and surface water sample collection was performed from December 14 to 16, 2022 to provide data to further characterize the uppermost aquifer at the CCR unit. These samples were collected in general accordance with the *CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin (QAPP)* (TRC, July 2016; revised March and August 2017).

### 2.1 Groundwater Sample Collection

Groundwater samples were collected from the five wells within the CCR unit uppermost aquifer monitoring well network (MW-16-01 through MW-16-04 and MW-16-09) (Figure 2).

### 2.2 Bottom Ash Basin Water Sample Collection

A water sample was collected from the North BAB (North BAB) (Figure 2). A water sample could not be collected from the South BAB as it was dry in December 2022.

### 2.3 Surface Water Sample Collection

A surface water sample (SC-01) was collected from the St. Clair River from the approximate location shown on Figure 3.

### 2.4 Laboratory Analysis

The aforementioned samples were submitted to the laboratories listed below for analysis of the following parameters to support the additional aquifer characterization:

- Eurofins Environment Testing for analysis of calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO<sub>4</sub>), chloride (Cl), HCO<sub>3</sub> and alkalinity (bicarbonate (HCO<sub>3</sub>), carbonate (CO<sub>3</sub>) and total alkalinity), boron (B), lithium (Li) and strontium (Sr);
- ALS Scandinavia for analysis of  $\delta^{11}\text{B}$ ,  $\delta^{87}\text{Sr}$  and  $\delta^7\text{Li}$ ;
- Waterloo Environmental Isotope Laboratory for analysis of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ ; and
- Miami Tritium Laboratory for analysis of tritium.

Note: the  $\delta$  notation is explained in Section 3. The December 2022 water data are summarized in Tables 1 through 3 and the December 2022 laboratory data for these water samples are provided in Appendix A.

## 3.0 Geochemical and Isotopic Data Analysis

### 3.1 Geochemistry

In order to provide a comprehensive evaluation of the data collected in December 2022, all of the existing Appendix III and Appendix IV data from groundwater samples collected from 2016 through 2022, as provided in the 2017 to 2022 Annual Reports (TRC, January 2018 through January 2023) were also included in the evaluation. These parameters included boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228 combined. Additionally, concentrations of magnesium, potassium, sodium, strontium, and total organic carbon (TOC), as well as field measured parameters including oxidation-reduction potential (ORP), dissolved oxygen (DO), specific conductivity (SC), temperature, and turbidity were analyzed/measured and utilized in this evaluation. The December 2022 field data are summarized in Table 1, and data for samples collected from the CCR unit water (2020 to 2022) and groundwater data collected from the uppermost aquifer monitoring wells (December 2022) are summarized in Table 2.

Analyte concentrations were compared to their historical values to verify consistency with past data (when possible). Samples collected from the BABs water were compared to groundwater samples collected from the uppermost aquifer (MW-16-01 to MW-16-04 and MW-16-09). In addition, a surface water sample for analysis was collected from the St. Clair River (SC-01). The purpose of the St. Clair River sample was to provide analytical data independent of either the CCR unit water or the uppermost aquifer groundwater. This data serves to augment the conceptual site model (CSM) by providing background information of other water types in the area, particularly the source of some of the stable isotopes.

#### 3.1.1 General Chemistry

Data show that the December 2022 sampling results are consistent with historical data, and the results were within typical ranges of previously analyzed samples. The uppermost aquifer groundwater, North BAB CCR unit water, and St. Clair River sample geochemistries are broadly differentiated from each other in virtually every analysis. Figure 5 provides a Piper Diagram which plots the concentrations into groups or facies commonly recognized for comparison of major ions. The St. Clair River surface water sample plots in the calcium-bicarbonate while the uppermost aquifer groundwater is tightly packed in the sodium-chloride group. The CCR unit water falls into the mixed-sodium-sulfate facies and is distinctively different from the uppermost aquifer groundwater.

Sulfate concentrations within the uppermost aquifer groundwater ranged from below the laboratory reporting limit (RL) of 1.0 milligrams per liter (mg/L) to 16 mg/L, and the St. Clair River sample was 15 mg/L. The CCR unit water sulfate concentration was 150 mg/L (Figure 6). Chloride concentrations in the uppermost aquifer groundwater ranged from 350 mg/L to 930 mg/L, while the St. Clair River concentration was 9.6 mg/L, and the CCR unit was 8.2 mg/L. Bicarbonate concentrations in the uppermost aquifer groundwater ranged from 150 mg/L to 200 mg/L, but the CCR unit water concentration was only 50 mg/L. Conversely, the carbonate ion concentration in the uppermost aquifer groundwater and the St. Clair River sample was below

the laboratory reporting limit of 5 mg/L, but the CCR unit concentration was 47 mg/L. Fluoride concentrations in the uppermost aquifer groundwater ranged from 1.2 mg/L to 1.8 mg/L, but the CCR unit water concentration was only 0.09 mg/L.

Sodium concentrations in the uppermost aquifer groundwater ranged from 190 mg/L to 580 mg/L, and the CCR unit water concentration was 49 mg/L. The CCR unit potassium concentration (3.2 mg/L) was higher than the uppermost aquifer groundwater (average 2.9 mg/L). Similarly, the lithium concentration in the CCR unit water (0.026 mg/L) was approximately 25% higher than the uppermost aquifer groundwater (average 0.020 mg/L). Calcium was, on average more concentrated in the CCR unit water (49 mg/L) than in the uppermost aquifer groundwater (average 41 mg/L), and magnesium was more concentrated in the uppermost aquifer groundwater (average 13.1 mg/L) than in the CCR unit water (8.2 mg/L). Barium concentrations in the uppermost aquifer groundwater ranged from 0.22 mg/L to 0.32 mg/L, and concentrations in the CCR unit (Figure 7). Boron concentration in the uppermost aquifer groundwater (average 1.1 mg/L) was, on average six times higher than the CCR unit water (0.19 mg/L).

Groundwater in the uppermost aquifer was close to neutral (pH 7.6 to 7.9 standard units (SUs) while the CCR unit water was alkaline (pH 9.3 SU), and the uppermost aquifer ORP was negative (-177 to -73 millivolts [mV]) while the CCR unit water ORP was only -4.5 mV. Table 4 below provides a summary of the data, which is discussed more fully in Section 3.1.2.

**Table 4 - Summary of Water Chemistry Results**

Parameter	Units	Aquifer Avg	CCR unit	St. Clair River
Na <sup>+</sup> + K <sup>+</sup> + Li <sup>+</sup>	mg/L	347	52	7
Ca <sup>2+</sup> + Mg <sup>2+</sup> + Ba <sup>2+</sup>	mg/L	55	58	33
B <sup>3+</sup>	mg/L	1.1	0.2	<0.1
HCO <sub>3</sub> <sup>-</sup> + CO <sub>3</sub> <sup>2-</sup> + SO <sub>4</sub> <sup>2-</sup> + Cl <sup>-</sup> + F <sup>-</sup>	mg/L	729	255	106
pH	SU	7.8	9.3	8.3
Eh	mV	-121	-4.5	5.9

### 3.1.2 Ionic Speciation and Mineral Saturation

Using the measured data, the dominant dissolved species of each measured element was determined. Typically, the basis species were also the dominant ionic form. Due to the pH difference between the uppermost aquifer groundwater and the CCR unit water, dominant species were shifted because of the large quantity of hydroxide ions in the CCR unit water (e.g., bicarbonate to carbonate and boric acid to borate). The dominant calcium and magnesium species were Ca<sup>2+</sup> and Mg<sup>2+</sup> in the uppermost aquifer groundwater and St. Clair River, but additional masses of CaCO<sub>3</sub> and MgCO<sub>3</sub> in the CCR unit water. Similarly, boron was primarily B(OH)<sub>3</sub> in the uppermost aquifer groundwater and St. Clair River, but B(OH)<sub>4</sub><sup>-</sup> contributed mass in the CCR unit water. SO<sub>4</sub><sup>-</sup>, Cl<sup>-</sup>, and F<sup>-</sup> were the dominant anions in all groups. HCO<sub>3</sub><sup>-</sup> was the primary species in the uppermost aquifer groundwater, but the CCR unit water had equal

contribution of  $\text{CO}_3^{2-}$  due to the pH.

Geochemical parameters for the CCR unit water and the uppermost aquifer groundwater were calculated from the measured data using Geochemist's Workbench® (GW). The average of the chemical parameters for each water are presented below in Table 5.

**Table 5 - Calculated Average Geochemical Parameters**

Parameter	Units	CCR Unit Water	Uppermost Aquifer Average
f O <sub>2</sub> (g)	fugacity	1.756E-51	5.889E-64
pe	pe	-0.08	-2.15
Eh (O <sub>2</sub> (aq)/H <sub>2</sub> O)	Volts	-0.005	-0.121
Ionic strength	molal	0.008	0.019
Chlorinity	molal	0.001	0.016
Hardness	Micrograms/Kilogram (as CaCO <sub>3</sub> )	156	158
Hardness (carbonate)	Micrograms/Kilogram (as CaCO <sub>3</sub> )	86	123
Hardness (non-carbonate)	Micrograms/Kilogram (as CaCO <sub>3</sub> )	71	35
Carbonate alkalinity	Micrograms/Kilogram (as CaCO <sub>3</sub> )	86	131
Charge imbalance	equivalents/Liter	0.0002	-0.0002
Charge imbalance error	percentage	2.48	-0.05

Fugacity is a thermodynamic parameter that can be used to differentiate water masses based on their geochemical properties. Fugacity is a measure of the escaping tendency of a gas or volatile substance from a liquid or solid phase, and it is commonly used to describe the behavior of gases and other volatile substances in aqueous environments. A very low fugacity, as observed in each of these waters, means that a gas or volatile substance is not readily escaping from a liquid or solid phase. Both pe and Eh can be used to describe water masses based on their oxidative or reducing potential. The pe and Eh values correspond to slightly reducing conditions, meaning although both waters are near 0, they have a slight tendency to donate electrons to other species. In other words, there is a small excess of electron donors (such as ferrous iron) compared to electron acceptors (such as oxygen) in the system.

Ionic strength is a measure of the concentration of charged ions (e.g., Na<sup>+</sup>, Cl<sup>-</sup>, Mg<sup>2+</sup>, etc.) in a solution. Chlorinity is a measure of the concentration of chloride ions (Cl<sup>-</sup>) in a solution and is often used as a proxy for salinity. The CCR unit water and the uppermost aquifer groundwater

differ significantly in their ionic strength and chlorinity values. The CCR water has a lower chlorinity and a higher ionic strength compared to the uppermost aquifer groundwater, which has a higher chlorinity and a lower ionic strength. The higher ionic strength of the CCR water indicates that there is a higher concentration of ions in the water, which could be due to the presence of dissolved salts, acids, or bases, or other dissolved ionic species.

Carbonate and non-carbonate hardness are two measures of water hardness that can be used to differentiate water masses based on their composition. Carbonate hardness, also known as temporary hardness, is caused by the presence of dissolved bicarbonate and carbonate ions in the water. These ions are derived from the dissolution of calcium and magnesium carbonates in the rock formations through which the water has passed. Non-carbonate hardness, also known as permanent hardness, is caused by the presence of dissolved calcium and magnesium ions in the water that are not associated with carbonate or bicarbonate ions. This type of hardness is typically caused by the dissolution of calcium and magnesium sulfates or chlorides in the water. The differences in carbonate and noncarbonate hardness between the CCR unit water and uppermost aquifer groundwater are significant. The CCR water has a lower carbonate hardness and a higher noncarbonate hardness compared to the uppermost aquifer.

Mineral saturation indices of 102 mineral phases were also calculated using GW.  $\log(Q/K)$  mineral saturation data is typically used to determine the saturation state of minerals. Q represents the activity of a particular mineral species, while K represents the equilibrium constant for the mineral reaction in question. The logarithm of the ratio of Q to K is taken to calculate  $\log(Q/K)$ , which provides an indication of the saturation state of the mineral. If  $\log(Q/K)$  is positive, it indicates that the mineral is oversaturated and may precipitate out of solution. If  $\log(Q/K)$  is negative, it indicates that the mineral is undersaturated and may dissolve into solution. If  $\log(Q/K)$  is zero, it indicates that the mineral is in a state of equilibrium. The saturation results are provided in Table 6.

Based on the calculations presented in Table 6, the St. Clair River sample was undersaturated with respect to all minerals except witherite ( $\text{BaCO}_3$ ) and several oxides. The CCR unit water was oversaturated with respect to the following minerals:

- Carbonates
  - Calcite/Aragonite –  $\text{CaCO}_3$
  - Dolomite –  $\text{CaMg}(\text{CO}_3)_2$
  - Strontianite –  $\text{SrCO}_3$
  - Witherite –  $\text{BaCO}_3$
- Sulfates
  - Barite –  $\text{BaSO}_4$
- Oxides
  - Ferrite-Ca/Mg –  $\text{Ca}(\text{FeO}_2)_2/\text{MgFe}_2\text{O}_4$
  - Goethite –  $\alpha\text{-FeO}(\text{OH})$
  - Hematite –  $\text{Fe}_2\text{O}_3$

Additionally, alstonite ( $\text{BaCa}(\text{CO}_3)_2$ ), barytocalcite ( $\text{BaCa}(\text{CO}_3)_2$ ), magnesite ( $\text{MgCO}_3$ ), monohydrocalcite ( $\text{CaCO}_3 \cdot \text{H}_2\text{O}$ ), and celestite ( $\text{SrSO}_4$ ), were near equilibrium in the CCR unit water. The uppermost aquifer groundwater was only over saturated with respect to the following minerals:

- Carbonates
  - Dolomite –  $\text{CaMg}(\text{CO}_3)_2$
  - Strontianite –  $\text{SrCO}_3$
  - Witherite –  $\text{BaCO}_3$
- Oxides
  - Ferrite-Ca/Mg –  $\text{Ca}(\text{FeO}_2)_2/\text{MgFe}_2\text{O}_4$
  - Goethite –  $\alpha\text{-FeO}(\text{OH})$
  - Hematite –  $\text{Fe}_2\text{O}_3$

Additionally, calcite and aragonite ( $\text{CaCO}_3$ ), magnesite ( $\text{MgCO}_3$ ), monohydrocalcite ( $\text{CaCO}_3 \cdot \text{H}_2\text{O}$ ), and barite ( $\text{BaSO}_4$ ) were near equilibrium. In general, minerals with boron, chloride, fluoride, lithium, potassium, and sodium were undersaturated and minerals with calcium and magnesium were oversaturated in both waters. Oxides were oversaturated or near equilibrium in all samples. Carbonates were oversaturated in the CCR unit water, and near equilibrium in the uppermost aquifer groundwater. Sulfate minerals were oversaturated in the CCR unit water but were undersaturated in the uppermost aquifer groundwater. This is also presented in Figure 6, which provides the concentration of calcium plus magnesium as a function of concentration of dissolved sulfate.

Based on these results calcium, magnesium, strontium, and dissolved inorganic carbon (DIC) may be precipitating out of the uppermost aquifer groundwater, however this effect is likely minor given the saturation indices. Sulfate is expected to dissolve out of the uppermost aquifer material into the groundwater due to the substantial combined undersaturation of sulfate minerals (-4.8 average).

Although the carbonates are oversaturated in the CCR unit water, they may not be precipitating due to the pH. In alkaline conditions, carbonates can dissolve due to the formation of bicarbonate ions in solution. Note that calcium plus magnesium concentration as a function of the concentration of dissolved bicarbonate is provided in Figure 10 (discussed below).

### 3.2 Stable Isotopes

While concentration, speciation, and saturation data provide useful geochemical information to characterize water types, and can be particularly useful to determine if one body of water is in hydraulic connection with another, stable isotope analyses can provide unique “signatures” to differentiate and source waters. In order to build on the information presented above in Section 3.1, several isotopic evaluations were performed. For this study, lithium, boron strontium, hydrogen and oxygen isotopic data were used to determine the sources of various analytes and to build a CSM of the hydrogeologic and geochemical conditions. The stable isotope water data collected in December 2022 is summarized in Table 3.



Isotopes are commonly expressed with the delta notation ( $\delta$ ). The delta notation is a common way to express the relative abundance of isotopes in a sample, relative to a standard reference material. It is used to express the differences in the isotopic composition of a sample relative to the reference material, in parts per thousand (per mil or ‰). The delta notation is defined as:

$$\delta = \left( \frac{R_{Sample}}{R_{Standard}} - 1 \right) 1,000$$

Where R is typically the rare isotope abundance divided by the abundant isotope abundance.

### 3.2.1 Lithium ( $\delta^7\text{Li}$ ) and Boron ( $\delta^{11}\text{B}$ )

Lithium ( $\delta^7\text{Li}$ ) and boron ( $\delta^{11}\text{B}$ ) isotopes can be used to distinguish CCR water from background because the isotopic composition of lithium and boron in CCR is typically distinct from the composition in natural sources, such as rocks and sediments. The isotopic composition of lithium and boron in CCR is different from that of in natural sources because coal has a unique isotopic signature due to its geological origins and the processes involved in its formation.

The isotopic composition of lithium can change during coal formation due to several factors, including the geological origins of the coal, the depositional environment, and the processes involved in coal formation (Owen, 2015). Lithium has two stable isotopes, lithium-6 and lithium-7, and their relative abundance can be expressed as the delta value ( $\delta^7\text{Li}$ ) relative to a standard reference material (LSVEC NIST 8545 RM). The  $\delta^7\text{Li}$  value can be used to track changes in the isotopic composition of lithium during coal formation (Teichert, 2022). The  $\delta^7\text{Li}$  value of coal generally increases with increasing rank, or maturity, of the coal. This is because as coal is buried and subjected to increasing pressure and temperature, it undergoes a process called devolatilization, in which the volatile components of the coal, including lithium, are released. The released lithium preferentially enriches the remaining coal in the lighter isotope, lithium-6, leading to an enrichment in the  $\delta^7\text{Li}$  value in the coal. The exact extent to which the  $\delta^7\text{Li}$  value changes during coal formation can also depend on other factors, such as the depositional environment and the source of the organic matter that forms the coal. For example, coal formed from organic matter derived from plants that preferentially take up lithium-6 during growth may have a higher  $\delta^7\text{Li}$  value than coal formed from marine organisms that have a higher  $\delta^7\text{Li}$  value (Schlesinger, 2021).

Boron is a trace element that can be found in coal in varying amounts. The isotopic composition of boron in coal can change during coal formation, but the specifics of this process depend on several factors, including the source of boron, the depositional environment, and the conditions during coalification (Williams, 2004). In general, boron is derived from several sources during coal formation, including volcanic activity, seawater, and groundwater. Boron has two stable isotopes, boron-10 and boron-11, and their relative abundance can be expressed as the delta value ( $\delta^{11}\text{B}$ ) relative to a standard reference material (NIST SRM 951 RM). The isotopic composition of boron in these sources can vary, with different isotopic ratios of boron-10 to boron-11. During coal formation, boron can be incorporated into organic matter or minerals in the coal, and the isotopic composition of boron can be affected by processes such as adsorption, diffusion, and precipitation. For example, boron may be adsorbed onto clay minerals or organic matter in the coal, leading to a shift in the isotopic composition of boron towards the

composition of the adsorbent (Williams, 2004). The depositional environment can also play a role in determining the isotopic composition of boron in coal. In marine environments, boron may be more enriched in boron-11 due to the fractionation of boron isotopes during seawater evaporation (Xiao, 2007). In freshwater environments, boron isotopes may be more fractionated due to differences in boron uptake by plants (Xiao, 2022).

For these reasons, the  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values in water can provide information about the source and transport of CCR and CCR affected water. The unique isotopic composition of lithium and boron in CCRs can be used as a tracer. Therefore, this additional uppermost aquifer characterization utilized the measurement of  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. In order to make this effort even more robust, a surface water sample was collected from the nearby St. Clair River upstream from the CCR unit (Figure 3) in order to determine their  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values.

The  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  of the CCR unit water was -0.13 per mil (‰) and -0.81 ‰, respectively, and the uppermost aquifer groundwater ranged from 28.75 to 31.21 ‰ and 39.26 to 43.49 ‰, respectively. As observed in Figure 8, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups. The St. Clair surface water sample plots in a distinct region at 20.8 ‰ and -4.82 ‰, respectively. The distinct CCR water, uppermost aquifer groundwater, and St. Clair River sample isotopic compositions are echoed in the distinctive concentration profiles in Figure 8. The CCR unit water lithium and boron isotopic compositions fall within ranges commonly observed of fractionated CCR material (Davidson, 1993; Spivak-Birndorf, 2006; Harkness 2015; Teichert, 2022). The  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values of the uppermost aquifer groundwater samples and the surface water sample from St. Clair River are compositionally distinct from the CCR values (Ruhl, 2014; Owen, 2015) and fall within ranges commonly observed in the natural environment (Gonfiantini, 2006).

### 3.2.2 Strontium ( $^{87}\text{Sr}/^{86}\text{Sr}$ )

Similar to lithium and boron, the isotopic composition of strontium can be used to identify coal combustion residuals because coal and the minerals associated with it have a distinct strontium isotope signature that is different from other geologic materials (Brandt, 2018). During the coal combustion process, the strontium isotopic composition of the coal and any associated minerals is altered. CRR, including fly ash and bottom ash, can therefore be identified by analyzing their strontium isotopic composition and comparing it to the strontium isotopic composition of nearby liquids and solids that have not been affected by coal combustion (Hurst, 1981). The isotopic composition of strontium can be determined as a ratio of two of the stable isotopes, Sr-86, Sr-87, expressed as the ratio  $^{87}\text{Sr}/^{86}\text{Sr}$  relative to a standard reference material (NIST SRM 987).

Strontium is a trace element that occurs naturally in coal-forming environments, and its isotopic composition can be affected by the source of the sedimentary materials, as well as by diagenetic processes. During coal formation, organic matter is buried and subjected to heat and pressure, which causes it to transform into coal. This process can lead to the release of fluids from the sedimentary rocks surrounding the coal seam, which can affect the isotopic composition of strontium in the coal (Spivak-Birndorf, 2012). In particular, the fluids may contain different concentrations of strontium isotopes compared to the original sedimentary rocks, which

can lead to changes in the isotopic composition of strontium in the coal.

In addition, strontium can be incorporated into the organic matter itself during coal formation, which can also alter its isotopic composition. The extent to which strontium is incorporated into the organic matter is dependent on several factors, including the original concentration of strontium in the sedimentary materials and the conditions during coal formation. The isotopic composition of strontium in coal can be influenced by both the source materials and the processes that occur during coal formation (Korte, 2003). This makes it a useful tool for determining if CCR impacted waters are in hydraulic connection with natural water.

Therefore, this additional uppermost aquifer characterization utilized the measurement of  $^{87}\text{Sr}/^{86}\text{Sr}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the groundwater. Surface water collected from the nearby St. Clair River (Figure 3) in order to determine their  $^{87}\text{Sr}/^{86}\text{Sr}$  values.

The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of the CCR unit water was 0.708901 while the uppermost aquifer groundwater ranged from 0.709290 to 0.709517. The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the CCR unit water was approximately 0.0002 lower than the uppermost aquifer groundwater, which although seeming small, amounts to more than two times the internal range of all uppermost aquifer groundwater sample results. The St. Clair River sample strontium ratio was 0.709999, which is isotopically distinct from the other two groundwater groups. As observed in Figure 9, the CCR unit water, uppermost aquifer groundwater, and St. Clair surface water sample plot in three separate regions. The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the CCR unit water is within published ranges of CCR leachate (Ruhl, 2014; Wang, 2020), and the uppermost aquifer groundwater samples and St. Clair River sample composition fit with values observed in natural waters (Shahand, 2009).

### **3.2.3 Hydrogen ( $\delta^2\text{H}$ ) and Oxygen ( $\delta^{18}\text{O}$ )**

Hydrogen and oxygen isotopes are commonly used in environmental studies to trace the sources and fate of water molecules. The use of hydrogen and oxygen isotopes in water can provide valuable insights into the impacts of CCRs on water quality. In the case of CCR impacts in water, hydrogen and oxygen isotopes can be used to determine the source of water in ponds and if those molecules have migrated to natural waters (Liu, 2006). The isotopic composition of water molecules within these CCR water bodies can be compared to the isotopic composition of nearby uncontaminated water bodies. The isotopic composition of hydrogen and oxygen in water molecules is expressed as  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ , respectively, and is measured in ‰ relative to a standard (Vienna Standard Mean Ocean Water [VMOW]). The isotopic signature of CCRs can vary depending on the source of coal, combustion conditions, and post-combustion processing (Huang, 2017).

Additionally, precipitation can have a significant effect on hydrogen and oxygen isotopes in groundwater. This is because the isotopic composition of precipitation varies in different regions (global and local meteoric water lines) due to variations in temperature, altitude, and atmospheric circulation patterns (Jouzel, 1984). When precipitation falls to the ground, it can either infiltrate into the soil and recharge the groundwater, or it can run off and enter streams or ponds. In the case of infiltration, the isotopic composition of the precipitation is generally preserved as it moves through the soil and into the groundwater. This means that the  $\delta^2\text{H}$  and

$\delta^{18}\text{O}$  values of the groundwater will be similar to those of the precipitation that recharged it. The degree to which precipitation affects the isotopic composition of groundwater can vary depending on factors such as the depth and age of the groundwater, the nature of the subsurface materials, and the rate of recharge. Therefore,  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values in groundwater can be used to trace the origin and movement of water in aquifers and to identify if CCR has impacted water.

For these reasons this additional uppermost aquifer characterization utilized the measurement of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. Surface water was collected from the nearby St. Clair River where shown on Figure 3 in order to determine their  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions.

The  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions of the CCR unit water were -54.32 ‰ and -7.44 ‰, respectively, and the uppermost aquifer groundwater compositions ranged from -112.02 to -102.29 ‰ and -15.80 to -14.67 ‰, respectively. The uppermost aquifer groundwater samples all plot above the global meteoric water line<sup>1</sup>, and the CCR unit water sample and the St. Clair River sample plot below the line (Craig, 1961). The St. Clair River sample and the CCR unit sample  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions were essentially equal (percent difference of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  were 1.14% and 1.12%, respectively). The CCR unit water  $\delta^2\text{H}$ , on was 50.84 ‰ heavier than the uppermost aquifer groundwater average, and the  $\delta^{18}\text{O}$  was 7.59 ‰ more positive. As observed in Figure 10, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups. The differences between the  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  CCR water and the uppermost aquifer groundwater are more than 5 times and 7 times, respectively greater than the total range of uppermost aquifer groundwater compositions.

### 3.3 Age Dating with Tritium Isotopes

The use of the isotope tritium to age date water is a well-established science and it has been successfully used to age date water sources for decades (Schlosser, 1988). Tritium ( $^3\text{H}$ ) is a radioactive isotope of hydrogen, that decays at a constant rate to Helium-3 ( $^3\text{He}^*$ ) with a half-life of about 12.3 years. It is a naturally occurring radioactive isotope, but also can be produced by human activities such as nuclear weapons testing. Tritium can be used to determine the age of groundwater because it can serve as a tracer of the time since the water was last in contact with the atmosphere (Telloli, 2022). Tritium is introduced into the atmosphere through nuclear weapons testing and naturally occurring cosmic radiation. It then becomes incorporated into precipitation and infiltrates into the ground, where it is taken up by plants or recharges groundwater. There are no subsurface reactions that generate tritium. Because tritium has a relatively short half-life, its concentration in precipitation, surface water and groundwater can be used to determine the age of the water (Dove, 2021).

When groundwater is recharged by precipitation that contains tritium, the concentration of tritium in the groundwater will be proportional to the age of the water since it was last in contact with the atmosphere. For example, if the concentration of tritium in the groundwater is high, it

<sup>1</sup> The global meteoric water line describes the global annual average relationship between hydrogen and oxygen isotope ratios (deuterium and oxygen 18) in natural meteoric waters. It is widely used to track water masses in environmental geochemistry and hydrogeology (Craig, 1961).

indicates that the water was recharged relatively recently, whereas if the concentration of tritium is low or undetectable, it indicates that the water is older. This information is important for understanding the hydrology of aquifers and for managing and protecting groundwater resources.

The groundwater age can be estimated using the concentration of tritium in the water and the known rate of decay of tritium. The basic equation for calculating tritium age is:

$$Age = \ln\left(\frac{A/A_0}{\lambda}\right)$$

Where A is the measured tritium in the water sample in tritium units (TU),  $A_0$  is the tritium concentration in precipitation, and  $\lambda$  is the decay constant which is 0.693 divided by the half-life of 12.3 years. The tritium age calculated from this equation represents the time since the water was last in contact with the atmosphere. However, it is important to note that the tritium age reflects the time since the water entered the subsurface but may not necessarily reflect the time since the water was first recharged into the aquifer. This is because the water may have spent some time in the unsaturated zone (i.e., the soil and rock above the water table) before entering the aquifer, and this time is not accounted for in the tritium age calculation.

This additional uppermost aquifer characterization utilized tritium to determine if water from the CCR unit was impacting the uppermost aquifer groundwater. This was accomplished by collecting a water sample from within the CCR unit water, uppermost aquifer groundwater samples, and a surface water sample from nearby St. Clair River upgradient of the unit. The tritium water data collected in December 2022 is summarized in Table 3. The St. Clair River and CCR unit water measured tritium values were 23.9 and 26.4 TU while the while the uppermost aquifer groundwater ranged from less than the detection limit of 0.1 TU to 0.18 TU. Using the equation above, either the St. Clair River sample or the CCR unit water can be used to represent  $A_0$ . Therefore, age estimates are calculated using both values. Using the CCR water as  $A_0$ , the water in the St. Clair River would be 2.5 years old, MW-16-09 would be approximately 90 years old, and the remaining aquifer samples would be greater than 100 years old (Figure 11). Using the St. Clair River sample as  $A_0$  yields similar results (MW-16-09 at 85 years old and the remaining aquifer samples are greater than 98 years old). If a significant amount of CCR-impacted water were entering the groundwater, we should see an impact on the tritium concentration. Therefore, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

It is important to note that diffusion may affect tritium concentrations. Diffusion can affect tritium values in groundwater by altering the concentration gradient of tritium in the subsurface. Diffusion is the process by which molecules move from areas of high concentration to areas of low concentration due to random thermal motion. In the subsurface, diffusion can cause tritium to move from areas of higher concentration to areas of lower concentration, resulting in a decrease in tritium concentration over time. In groundwater systems, tritium is introduced into the subsurface through infiltration of tritium-containing precipitation. The tritium concentration in

the groundwater is initially highest near the recharge zone and decreases as the water flows through the subsurface. As the tritium moves through the subsurface, it can be affected by diffusion, which can cause it to move from areas of higher concentration to areas of lower concentration.

The rate of diffusion of tritium in groundwater is therefore primarily dependent on the hydraulic conductivity of the subsurface materials and the concentration gradient of tritium. It is important to consider the effects of diffusion when interpreting tritium data in groundwater studies, as it can impact the accuracy of age estimates and the interpretation of the hydrogeological processes in the subsurface.

The control of diffusion in a groundwater system can be demonstrated by calculating the Peclet number. The Peclet number is a dimensionless number that describes the relative importance of advection and diffusion in a fluid system. In groundwater, the Peclet number can be calculated using the following equation:

$$Pe = \frac{(Lv)}{D}$$

where  $Pe$  is the Peclet number,  $L$  is the characteristic length scale of the system (e.g. the distance between the source and the monitoring well),  $v$  is the groundwater velocity, and  $D$  is the molecular diffusion coefficient. A Peclet number greater than 1 indicates that advection is dominant, while a Peclet number less than 1 indicates that diffusion is dominant. Given the distance (100 ft) to the monitoring wells and a seepage velocity of 3 ft/year, at standard temperature and pressure the Peclet number for tritium is greater than 10. Therefore, diffusion can be ruled out as an influence on the downgradient tritium age.

## 4.0 Statistical Analysis

TRC performed statistical evaluations of the data collected as part of this study to evaluate additional lines of evidence to support aquifer characterization. In order to compare the different water groups (CCR unit vs uppermost aquifer groundwater) to each other in a holistic manner, principal component analysis (PCA) and linear discriminant analysis (LDA) were selected as appropriate data analysis tools. PCA and LDA are statistical techniques that are used for large data sets containing a high number of dimensions/features per observation allowing for visualization of multidimensional data. PCA is a well-established statistical method for evaluating data and has been around for over 100 years. Likewise, LDA analysis is a statistical method that has been used to evaluate large data sets since the 1930s. Geochemists and groundwater statisticians use these tools because they are effective to evaluate large data sets that are typical for sites that have numerous wells and numerous parameters tested, which result in potentially large data dimensionality.

The data used for this analysis consisted of the data collected from the uppermost aquifer monitoring well network from August 2016 through December 2022 and bottom ash basin water samples from December 2020 through December 2022. Based on the recommendations from the Electric Power Research Institute (EPRI) New Technique in Alternative Source Demonstrations (EPRI, October 2022) guidance and the minimum requirements of LDA, only Appendix III analytes (boron, calcium, chloride, fluoride, sulfate, pH, and total dissolved solids (TDS)) were retained for analysis. Furthermore, it was found that TDS was not consistently reported in all the CCR unit water data and was removed from the analyte suite leaving boron, calcium, chloride, fluoride, sulfate, and pH. Due to the limited number of diversion basin and bottom ash basin samples and the minimum requirements of LDA, the diversion basin and bottom ash basin samples were combined to form a diversion basin and bottom ash basin group for the linear discriminant analysis. Non-detects were multiplied by 0.5 as this has been found to produce the most accurate results for PCA (Farnham et al, 2002).

### 4.1 Principal Component Analysis

The goal of principal component analysis is to reduce the dimensionality of the data while preserving the variation contained within the dataset. To reduce the dimensionality, the data is linearly transformed from  $n$  dimensions to  $n$  linearly transformed dimensions or principal components (PCs). These resulting PCs are ordered in terms of which components contain the most variation of the original dataset from PC1 having the most variation to PC $n$  having the least variation. The amount of variation each PC contains can be found in the eigenvalue of the PC, with higher eigenvalues corresponding to a higher percentage of the original dataset variation explained. These eigenvalues can be plotted to compare PCs to each other on what's known as a scree plot. Typically, the first two PCs are retained for further analysis, but any PCs with eigenvalues near or above 1 can be beneficial for analysis. The results of the PCA are commonly presented on a plot that contains both the loading scores of the PCs and the original data points projected using the PCs in what is known as a biplot. The loading scores indicate how much each analyte affects the corresponding PC and the projected points can be used to find clusters of similar data within the original dataset.

Figure 12, called a Scree plot, shows the eigenvalues for the six PCs created from the original data. PC1 and PC2 are above 1 and are therefore retained for further analysis. Figure 13 (Biplot) contains two sets of data, the blue arrows centered around the origin represent the loading scores for the PCs and the colored points represented the projected data. As can be seen in the percentages provided for each axis, PC1 contains 40.91% of the variation of the original dataset, meaning that most of the variation of the data can be seen in the horizontal axis. PC2 contains 28.79% of the variation of the original dataset. Together PC1 and PC2 account for 69.71% of the variation of the original data, showing that the data has been reduced from six dimensions to two dimensions while only losing 30.29% of the variation. There is no established criteria for how much variation is required to be explained by the PCs but at least 70% is a common target which the first two PCs are close to (Jolliffe and Cadima 2016).

Because the data are standardized before PCA is performed, the loading scores are multiplied to the standardized score of each analyte. As can be seen by the arrows in Figure 13 (Biplot), fluoride points almost directly left, meaning that higher than average concentrations of fluoride in a sample would project that sample further to the left on the biplot. Conversely, if a sample has lower than average concentrations of fluoride it would be projected more to the right. From the loading scores we can see that PC1 is strongly influenced by fluoride, chloride, boron, and pH and weakly influenced by calcium, sulfate. PC2 is strongly influenced by calcium and sulfate and weakly influenced by chloride, boron, fluoride, and pH. The standardized data points are projected using the loading scores and are displayed as the color-coded points on the biplot. 95% confidence intervals were calculated to observe possible separation between the groups. As can be seen on the graph, most of the uppermost aquifer groundwater samples fall close to the origin and within the 95% confidence interval with a few outliers. The CCR unit water samples are also located around the origin and the confidence interval encompasses a similar area to the uppermost aquifer groundwater. While this graph does not show the uppermost aquifer groundwater and BABs CCR unit water samples are neatly separated, it does not conclusively show that they are inseparable. Because PCA attempts to preserve the most amount of variation within the data, it is not attempting to separate the groups from each other and can choose a projection which may not separate the groups but does preserve the most variation.

## 4.2 Linear Discriminant Analysis

In addition to PCA, linear discriminant analysis (LDA) was performed to demonstrate separation between the groups. LDA is similar to PCA in that it performs dimensionality reduction on the data, however, instead of preserving the most amount of variation of the dataset, it attempts to separate the provided groups and then predicts the group membership of each data point. Because LDA is a classification method, we can directly measure the separability of the groups based on the performance of the model. There is an additional requirement of LDA in which each group must have at least as many samples as there are analytes used in the model. Since there are only five samples from the bottom ash basin, four samples from the nearby diversion basin, were added to the bottom ash basin dataset to ensure complete coverage of the six analytes.



Figure 14 (LDA Origin) shows the eigenvalues, canonical coefficients which are analogous to loading scores in PCA, the prediction matrix, and the error rate of the LDA. Because LDA is attempting to separate the groups from each other the percentage of variance shown in the eigenvalues table is the variance between the different groups and not the total variance of the dataset. The canonical variables, which are analogous to PCs, are able to explain all of the variation between groups in just one variable instead of the six variables PCA produced. Similar to PCA, when we observe the standardized canonical coefficients table, we can see that the canonical variable is strongly influenced by chloride and fluoride while only being weakly influenced by boron, calcium, and sulfate; it is insignificantly influenced by pH. The classification count table shows the predicted classification of each point in the columns while the actual classification are the rows. Where the predicted class column intersects the matching actual class row represents the correct classification, where the prediction class column doesn't match the actual class row represents a misclassification. The LDA model only classified the points into the correct classes, demonstrating that the groups are separate from each other, this can also be seen in the error rate table within Figure 14 (LDA Origin) that the total error rate is 0%.

Figure 15, called an LDA Histogram, visually represents where each point is projected to using CV1. The rows represent the true classification of the data within them while the colors represent the model's prediction. As can be seen, the model perfectly separated the groups showing that the groups are distinct from each other. Additionally, an analysis of variance (ANOVA) was performed on the projected data to demonstrate a statistically significant difference between the three groups, the output of this analysis is presented in Figure 16 (LDA ANOVA). As can be seen in the figure, at the  $p = 0.05$  level, the population means of the uppermost aquifer groundwater and the BABs and DB CCR units water are significantly different.

## 5.0 Findings and Conclusions

The data analyzed in this assessment demonstrate that the CCR unit water is not in hydraulic communication with the uppermost aquifer and therefore has not impacted the uppermost aquifer groundwater. Each of the individual analytes provides a line of evidence in support of this conclusion.

### 5.1 Geochemistry

The geochemistry data provides three distinct lines of evidence that the uppermost aquifer and the CCR unit are not in communication. The first is the distribution of mass or concentration of individual analytes in the three water groups (uppermost aquifer groundwater, St. Clair River upgradient surface water, and CCR unit water). The second is the geochemical condition of each water group, and the third is calculated environmental conditions calculated from the first two lines of evidence. From a simple perspective it can be seen that the concentrations of individual analytes in the CCR unit water are very different than within the uppermost aquifer groundwater. These differences are not minor. For example, sulfate is 15 times more concentrated in the CCR unit water than the concentration in the uppermost aquifer groundwater. The differences are very apparent in the Piper diagram.

When two water masses become hydraulically connected, they tend to become more like each other chemically and physically. For example, the uppermost aquifer groundwater has more than 67 times more chloride and 16 times more fluoride than the CCR unit water. The chloride and fluoride are not coming from the CCR unit. They are naturally in the uppermost aquifer groundwater.

Geochemical conditions in the CCR unit water are very different from the uppermost aquifer groundwater. The pH of the CCR unit water is approximately 9 SU, but the uppermost aquifer groundwater is only 7.8 SU. This means that there are approximately 17 times as many hydroxide ions in the CCR unit water than in the underlying groundwater. Similarly, the ORP of the uppermost aquifer groundwater is significantly higher than the uppermost aquifer groundwater.

The third line of geochemical evidence adds weight to the first two. The minerals which are undersaturated in the uppermost aquifer groundwater have component elements which are higher downgradient, and conversely the minerals which are oversaturated have component elements which are lower downgradient. Therefore, these geochemical calculations represent the natural conditions in the uppermost aquifer groundwater quite well. Therefore, the water geochemistry demonstrates that the uppermost aquifer groundwater and the CCR unit water are not in communication, the existing concentrations of Appendix III and IV analytes in groundwater are geogenic and the uppermost aquifer has not been affected.

### 5.2 Stable Isotopes

Similar to the multiple lines of evidence described in the preceding section, the stable isotope results reinforce the conclusions described above. The stable isotope analyses provide five distinct lines of evidence ( $\delta^7\text{Li}$ ,  $\delta^{11}\text{B}$ ,  $^{87}\text{Sr}/^{86}\text{Sr}$ ,  $\delta^2\text{H}$ , and  $\delta^{18}\text{O}$ ) which unequivocally show that the lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater does not

come from nor is it in communication with the CCR unit water. Not only do the compositions of each of these species fall within well-known natural ranges in the uppermost aquifer groundwater, but each is also statistically different than the corresponding composition in the CCR unit water at 95% confidence intervals. Therefore, the stable isotopes demonstrate that the uppermost aquifer groundwater and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

### **5.3 Age Dating with Tritium Isotopes**

Each of the previously discussed lines of evidence develops different aspects of the CSM and by themselves conclusively show that the CCR unit water is not in communication with the uppermost aquifer and the uppermost aquifer groundwater has not been affected. The tritium data, likewise, reinforces the concept that the uppermost aquifer groundwater is not in communication with the CCR unit. Tritium has a half-life of 12.3 years, and the reporting limit is 0.1 TU. Therefore, groundwater ages up to 95 years in age from recharge should be observable. Based on the results presented within Section 3.3, groundwater within all of the BABs monitoring wells was recharged at least 85 years ago (the BABs entered service 39 years ago). If a significant amount of CCR-impacted water were entering the groundwater, we should see an impact on the tritium concentration. Therefore, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

### **5.4 Statistical Analysis**

Principal component analysis was performed on bottom ash basin samples for App III analytes to compare the uppermost aquifer groundwater to the CCR unit water in a holistic manner. The results of the PCA were inconclusive in separating the CCR unit water from the uppermost aquifer groundwater and additional analysis was required.

Linear discriminant analysis was performed to further investigate if the CCR unit water from the uppermost aquifer groundwater are in communication with each other. Linear discriminant analysis is similar to PCA in that they are both dimensionality reduction techniques, but LDA attempts to separate the groups while PCA simply attempts to preserve the variance within the dataset. The model created by the LDA had perfect accuracy and was able to completely separate the groups from each other with a large distance between them. To further provide evidence that the separation is strong, an ANOVA was performed on the data transformed by the LDA. Analysis of variance compares groups of data to each other to determine if it is statistically probable for the data to be from the same population or different populations. The results of the ANOVA showed that at the 95% confidence level, the units are distinct from each other demonstrating that the uppermost aquifer groundwater, and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

### **5.5 Final Assessment**

In conclusion, the data collected in this assessment confirms that the uppermost aquifer is not in hydraulic communication with the CCR unit water. This conclusion is supported by each of the multiple lines of evidence presented in this report:

- 
- The geochemical composition of the uppermost aquifer groundwater is statistically distinct from the CCR unit water;
  - The source of lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater is from upgradient groundwater and, as demonstrated by the stable isotope data is distinct from the CCR unit water; and
  - Age dating with tritium validates that the uppermost aquifer groundwater is not hydraulically connected to the CCR unit.

These multiple lines of evidence come together in an additive fashion to further validate the CSM established in the ALD and previous studies, which holds that the contiguous glacially compacted natural clay-rich soil natural liner system serves as a natural confining hydraulic barrier isolating the underlying uppermost aquifer from the CCR unit and the uppermost aquifer groundwater is unaffected by the CCR unit water.

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## 6.0 References

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## Tables



**Table 1**  
 Summary of Field Data – December 2022  
 Belle River Power Plant Bottom Ash Basins CCR Unit  
 China Township, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (deg C)	Turbidity (NTU)
<b>Bottom Ash Basins Monitoring Wells/Uppermost Aquifer</b>							
MW-16-01	12/14/2022	1.31	-110.6	7.8	1,371	9.9	1.54
MW-16-02	12/14/2022	1.28	-72.6	7.6	1,085	10.2	1.85
MW-16-03	12/14/2022	1.23	-128.9	7.9	1,615	10.7	0.91
MW-16-04	12/15/2022	1.15	-176.9	7.8	1,498	11.5	10.6
MW-16-09	12/16/2022	1.37	-117.2	7.8	2,527	9.8	46.9
<b>Bottom Ash Basins Water</b>							
North BAB	12/14/2022	10.21	-4.5	9.3	411	10.5	3.68
<b>Surface Water/St. Clair River</b>							
SC-01	12/16/2022	12.01	5.9	8.3	149	4.5	5.57

**Notes:**

- mg/L -Milligrams per Liter.
- mV - Millivolts.
- SU - Standard Units.
- umhos/cm - Micromhos per centimeter.
- °C - Degrees Celsius.
- NTU - Nephelometric Turbidity Unit

**Table 2**  
 Summary of Analytical Results – December 2020 to December 2022  
 Belle River Power Plant Bottom Ash Basin CCR Unit  
 China Township, Michigan

Constituent:		Alkalinity, bicarbonate	Alkalinity, carbonate	Alkalinity, total	Barium	Boron	Calcium	Chloride	Fluoride	Lithium	Magnesium	Molybdenum	Potassium	Sodium	Strontium	Sulfate	Total Organic Carbon
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Location	Sample Date																
<b>Bottom Ash Basins Monitoring Wells/Uppermost Aquifer</b>																	
MW-16-01	12/14/2022	<b>170</b>	< 5	<b>170</b>	<b>0.22 F1</b>	<b>1.0</b>	<b>42</b>	<b>450</b>	<b>1.8</b>	<b>0.015</b>	<b>14</b>	<b>0.071</b>	<b>2.7</b>	<b>300</b>	<b>1.2</b>	<b>9.0</b>	0.79 J
MW-16-02	12/14/2022	<b>150</b>	< 5	<b>150</b>	<b>0.25</b>	<b>1.1</b>	<b>54</b>	<b>350</b>	<b>1.2</b>	<b>0.015</b>	<b>16</b>	<b>0.025</b>	<b>3.4</b>	<b>190</b>	<b>1.5</b>	<b>9.1</b>	0.72 J
MW-16-03	12/14/2022	<b>160</b>	< 5	<b>160</b>	<b>0.32</b>	<b>0.99</b>	<b>34</b>	<b>550</b>	<b>1.8</b>	<b>0.020</b>	<b>11</b>	<b>0.087</b>	<b>2.8</b>	<b>350</b>	<b>0.96</b>	< 1	0.73 J
MW-16-04	12/15/2022	<b>160</b>	< 5	<b>160</b>	<b>0.29</b>	<b>1.0</b>	<b>46</b>	<b>470</b>	<b>1.8</b>	<b>0.019</b>	<b>15</b>	<b>0.068</b>	<b>3.0</b>	<b>300</b>	<b>1.2</b>	<b>16</b>	0.75 J
MW-16-09	12/16/2022	<b>200</b>	< 5	<b>200</b>	<b>0.22</b>	<b>1.4</b>	<b>31</b>	<b>930</b>	<b>1.5</b>	<b>0.025</b>	<b>9.6</b>	<b>0.035</b>	<b>2.7</b>	<b>580</b>	<b>0.84</b>	<b>13</b>	<b>2.5</b>
<b>Bottom Ash Basins Water</b>																	
NORTH BAB	1/29/2021	<b>88</b>	< 10	<b>88</b>	<b>0.48</b>	<b>0.17</b>	<b>42</b>	<b>9.0</b>	<b>0.26</b>	<b>0.017</b>	<b>8.1</b>	<b>0.018</b>	<b>3.0</b>	<b>28</b>	--	<b>100</b>	--
	12/14/2022	<b>50</b>	<b>47</b>	<b>97</b>	<b>0.27</b>	<b>0.19</b>	<b>49</b>	<b>8.2</b>	<b>0.099</b>	<b>0.026</b>	<b>8.2</b>	<b>0.023</b>	<b>3.2</b>	<b>49</b>	<b>2.0</b>	<b>150</b>	<b>1.1</b>
SOUTH BAB	1/29/2021	<b>46</b>	<b>14</b>	<b>60</b>	<b>0.42</b>	<b>0.41</b>	<b>29</b>	<b>9.6</b>	<b>0.52</b>	< 0.01	<b>7.4</b>	<b>0.024</b>	<b>3.8</b>	<b>44</b>	--	<b>110</b>	--
BAB-E <sup>(1)</sup>	12/16/2020	<b>71</b>	<b>20</b>	<b>91</b>	<b>0.21</b>	<b>0.26</b>	<b>39</b>	<b>8.6</b>	<b>0.25</b>	<b>0.014</b>	<b>7.9</b>	<b>0.024</b>	<b>3.0</b>	<b>29</b>	--	<b>94</b>	--
BAB-W <sup>(2)</sup>	12/16/2020	<b>83</b>	< 10	<b>89</b>	<b>0.30</b>	<b>0.21</b>	<b>54</b>	<b>9.9</b>	<b>0.22</b>	<b>0.013</b>	<b>10</b>	<b>0.016</b>	<b>3.4</b>	<b>33</b>	--	<b>140</b>	--
<b>Surface Water/St. Clair River</b>																	
SC-01	12/16/2022	<b>81</b>	< 5	<b>81</b>	<b>0.013</b>	< 0.1	<b>25</b>	<b>9.6</b>	<b>0.08</b>	< 0.008	<b>7.6</b>	< 0.005	<b>1.1</b>	<b>5.9</b>	<b>0.086</b>	<b>15</b>	<b>1.9</b>

**Notes:**

mg/L = milligram per liter, -- = not analyzed.

**Bold** font denotes concentrations detected above laboratory reporting limits.

J = estimated value. Concentration above the laboratory method detection limit but below the reporting limit.

F1 = MS and/or MSD recovery exceeds control limits

(1) = same location as NORTH BAB, (2) = same location as SOUTH BAB

**Table 3**  
 Summary of Stable Isotope and Tritium Results – December 2022  
 Belle River Power Plant Bottom Ash Basins CCR Unit  
 China Township, Michigan

Constituent:		$\delta^{87}\text{Sr}$	$\delta^{11}\text{B}$	$\delta^7\text{Li}$	$\delta^2\text{H}$	$\delta^{18}\text{O}$	Tritium
Units:		‰	‰	‰	‰	‰	TU
Sample Location	Sample Date						
<b>Bottom Ash Basins Monitoring Wells/Uppermost Aquifer</b>							
MW-16-01	12/14/2022	<b>0.709290</b>	<b>39.26</b>	<b>31.21</b>	<b>-103.940542</b>	<b>-14.96447</b>	<0.1
MW-16-02	12/14/2022	<b>0.709517</b>	<b>39.32</b>	<b>30.67</b>	<b>-104.862778</b>	<b>-15.035052</b>	<0.1
MW-16-03	12/14/2022	<b>0.709430</b>	<b>39.49</b>	<b>29.15</b>	<b>-102.293772</b>	<b>-14.683754</b>	<0.1
MW-16-04	12/15/2022	<b>0.709343</b>	<b>40.63</b>	<b>28.75</b>	<b>-102.675451</b>	<b>-14.665324</b>	<0.1
MW-16-09	12/16/2022	<b>0.709459</b>	<b>43.49</b>	<b>29.89</b>	<b>-112.022478</b>	<b>-15.80079</b>	<b>0.18</b>
<b>Bottom Ash Basins Water</b>							
North BAB	12/14/2022	<b>0.708901</b>	<b>-0.81</b>	<b>-0.13</b>	<b>-54.318947</b>	<b>-7.441738</b>	<b>26.4</b>
<b>Surface Water/St. Clair River</b>							
SC-01	12/16/2022	<b>0.709999</b>	<b>-4.82</b>	<b>20.80</b>	<b>-53.700517</b>	<b>-7.358694</b>	<b>23.9</b>

Notes:

‰ = per mil

TU = Tritium Units

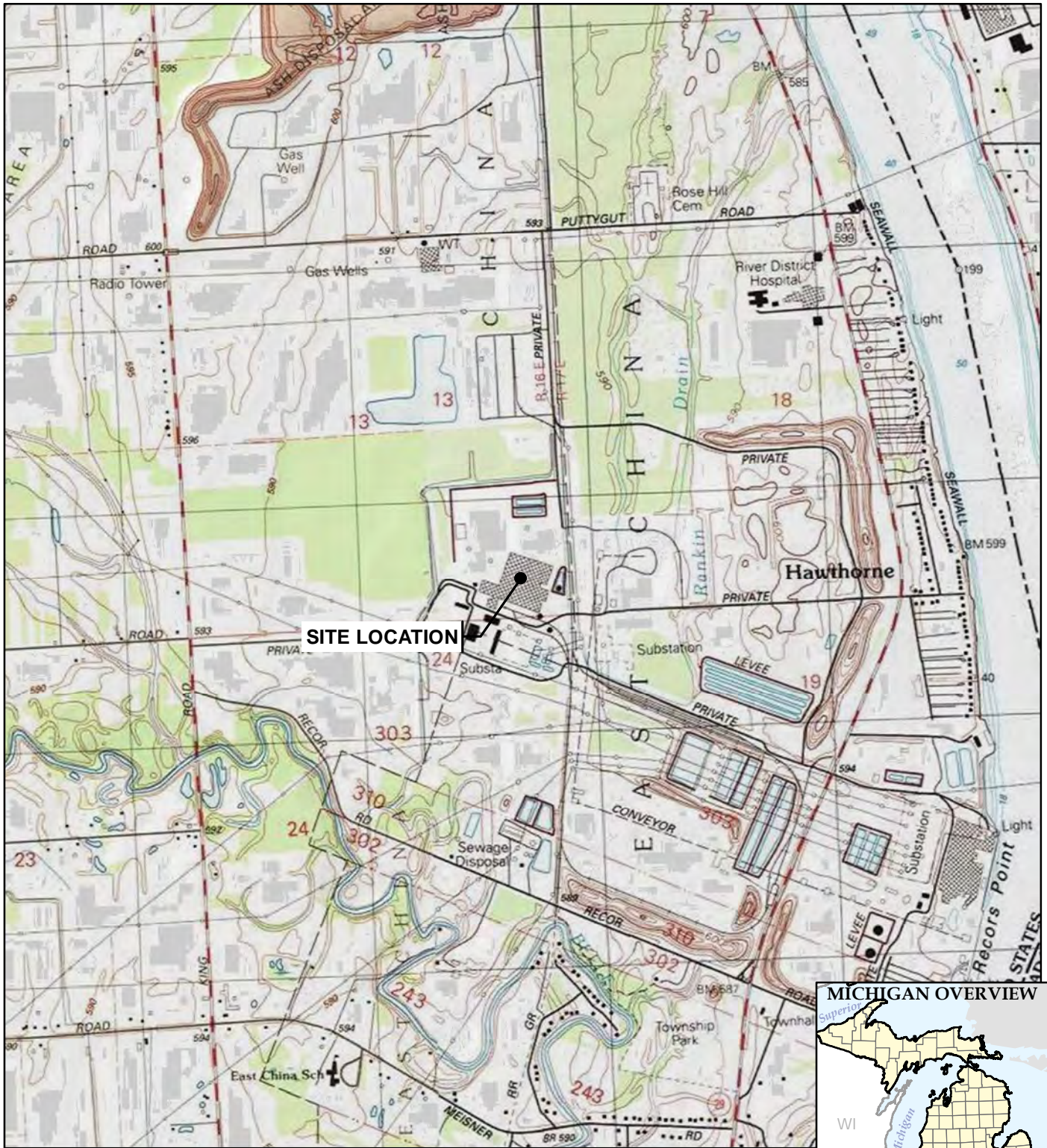
**Bold font** denotes concentrations detected above laboratory reporting limits.

**Table 6**  
 Summary Calculated Mineral Saturation – December 2022  
 Belle River Power Plant – RCRA CCR Monitoring Program  
 China Township, Michigan

Sample Location	Unit	MW-16-01	MW-16-02	MW-16-03	MW-16-04	MW-16-09	North BAB	SC-01	N BAB MW Avg
Alstonite (BaCa(CO <sub>3</sub> ) <sub>2</sub> )	log Q/K	-1.45	-1.53	-1.46	-1.41	-3.87	-1.28	-3.70	-1.94
Anhydrite (CaSO <sub>4</sub> )	log Q/K	-3.40	-3.25	-4.45	-3.11	-3.48	-2.00	-3.17	-3.54
Antarctite (CaCl <sub>2</sub> ·6H <sub>2</sub> O)	log Q/K	-11.18	-11.26	-11.12	-11.12	-10.77	-14.53	-14.52	-11.09
Aragonite (CaCO <sub>3</sub> )	log Q/K	0.05	0.03	-0.08	0.03	-1.24	0.16	-0.59	-0.24
Arcanite (K <sub>2</sub> SO <sub>4</sub> )	log Q/K	-10.80	-10.58	-11.74	-10.49	-10.71	-9.34	-11.05	-10.86
Artinite (Mg <sub>2</sub> (OH) <sub>2</sub> ·3H <sub>2</sub> O)	log Q/K	-6.69	-6.85	-6.85	-6.68	-10.30	-6.62	-8.28	-7.47
Ba(OH) <sub>2</sub> ·8H <sub>2</sub> O	log Q/K	-15.06	-15.16	-14.84	-14.97	-17.22	-14.54	-16.76	-15.45
BaCl <sub>2</sub> (c)	log Q/K	-12.28	-12.42	-11.96	-12.13	-11.73	-15.68	-16.70	-12.10
BaCl <sub>2</sub> ·2H <sub>2</sub> O	log Q/K	-9.98	-10.12	-9.68	-9.86	-9.43	-13.39	-14.30	-9.81
BaCl <sub>2</sub> ·H <sub>2</sub> O	log Q/K	-10.73	-10.86	-10.41	-10.59	-10.18	-14.12	-15.09	-10.55
BaF <sub>2</sub> (c)	log Q/K	-8.41	-8.68	-8.27	-8.31	-8.64	-10.84	-12.14	-8.46
BaO(c)	log Q/K	-40.34	-40.41	-40.02	-40.05	-42.51	-39.75	-42.76	-40.67
Barite (BaSO <sub>4</sub> )	log Q/K	-0.08	0.00	-0.90	0.25	-0.01	1.25	-0.72	-0.15
Barytocalcite (BaCa(CO <sub>3</sub> ) <sub>2</sub> )	log Q/K	-1.61	-1.69	-1.62	-1.57	-4.03	-1.44	-3.86	-2.10
BaS(c)	log Q/K	-165.10	-164.80	-165.30	-163.60	-165.10	-165.20	-171.10	-164.78
Bassanite (CaSO <sub>4</sub> ·1/2H <sub>2</sub> O)	log Q/K	-4.03	-3.88	-5.08	-3.74	-4.11	-2.63	-3.81	-4.17
Bischofite (MgCl <sub>2</sub> ·6H <sub>2</sub> O)	log Q/K	-12.04	-12.17	-11.97	-11.96	-11.64	-15.68	-15.52	-11.96
Bloedite (Bloedite)	log Q/K	-13.69	-13.97	-15.58	-13.18	-13.12	-12.85	-16.48	-13.91
Borax (Na <sub>2</sub> H <sub>20</sub> B <sub>4</sub> O <sub>17</sub> )	log Q/K	-20.14	-20.52	-19.76	-20.13	-21.05	-24.14	-28.18	-20.32
Boric acid (H <sub>3</sub> BO <sub>3</sub> )	log Q/K	-5.02	-4.97	-4.96	-4.99	-4.86	-5.74	-6.10	-4.96
Brucite (Mg(OH) <sub>2</sub> )	log Q/K	-4.94	-5.03	-4.95	-4.89	-7.25	-4.66	-5.84	-5.41
Burkeite (Na <sub>6</sub> (CO <sub>3</sub> )(SO <sub>4</sub> ) <sub>2</sub> )	log Q/K	-23.66	-24.96	-25.27	-23.35	-22.88	-25.74	-33.11	-24.02
Ca(OH) <sub>2</sub> (c)	log Q/K	-11.01	-11.04	-11.00	-10.93	-13.31	-10.41	-11.90	-11.46
Ca <sub>2</sub> Cl <sub>2</sub> (OH) <sub>2</sub> ·H <sub>2</sub> O	log Q/K	-21.50	-21.62	-21.45	-21.40	-23.39	-24.26	-25.61	-21.87
Ca <sub>4</sub> Cl <sub>2</sub> (OH) <sub>6</sub> ·13H <sub>2</sub> O	log Q/K	-37.53	-37.78	-37.63	-37.60	-44.01	-39.23	-42.36	-38.91
CaCl <sub>2</sub> ·2H <sub>2</sub> O	log Q/K	-15.64	-15.71	-15.54	-15.52	-15.23	-18.96	-19.15	-15.53
CaCl <sub>2</sub> ·4H <sub>2</sub> O	log Q/K	-12.11	-12.19	-12.03	-12.03	-11.70	-15.45	-15.50	-12.01
CaCl <sub>2</sub> ·H <sub>2</sub> O	log Q/K	-15.84	-15.91	-15.75	-15.72	-15.44	-19.16	-19.38	-15.73
Calcite (CaCO <sub>3</sub> )	log Q/K	0.21	0.20	0.09	0.20	-1.07	0.32	-0.42	-0.07
Carnallite (KMgCl <sub>3</sub> ·6(H <sub>2</sub> O))	log Q/K	-17.91	-18.04	-17.75	-17.79	-17.22	-23.19	-23.29	-17.74
CaSO <sub>4</sub> ·1/2H <sub>2</sub> O(beta)	log Q/K	-4.22	-4.07	-5.27	-3.92	-4.30	-2.82	-4.00	-4.36
Celestite (SrSO <sub>4</sub> )	log Q/K	-2.94	-2.81	-4.00	-2.70	-3.03	-1.40	-3.59	-3.09
Chloromagnesite (MgCl <sub>2</sub> )	log Q/K	-30.83	-30.93	-30.69	-30.61	-30.44	-34.42	-34.81	-30.70
Colemanite (Ca <sub>2</sub> B <sub>6</sub> O <sub>11</sub> ·5H <sub>2</sub> O)	log Q/K	-27.62	-27.42	-27.35	-27.43	-31.25	-30.82	-35.51	-28.21
Dolomite (CaMg(CO <sub>3</sub> ) <sub>2</sub> )	log Q/K	1.01	0.93	0.75	0.98	-1.57	0.92	-0.36	0.42
Dolomite-dis (CaMg(CO <sub>3</sub> ) <sub>2</sub> )	log Q/K	-0.65	-0.72	-0.90	-0.67	-3.23	-0.73	-2.06	-1.23
Dolomite-ord (CaMg(CO <sub>3</sub> ) <sub>2</sub> )	log Q/K	1.01	0.93	0.75	0.98	-1.57	0.92	-0.36	0.42
Epsomite (MgSO <sub>4</sub> ·7H <sub>2</sub> O)	log Q/K	-5.86	-5.77	-6.93	-5.60	-5.96	-4.78	-5.63	-6.02
Fe(OH) <sub>3</sub> (ppd)	log Q/K	2.56	2.65	2.46	2.56	3.61	1.52	2.70	2.77
Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> (c)	log Q/K	-47.51	-46.71	-50.66	-46.43	-38.78	-47.02	-45.35	-46.02
FeF <sub>3</sub> (c)	log Q/K	-8.83	-9.00	-9.03	-8.77	-4.90	-14.29	-11.87	-8.11
Ferrite-2-Ca (Ca <sub>2</sub> Fe <sub>2</sub> O <sub>5</sub> )	log Q/K	-19.27	-19.15	-19.45	-19.07	-21.79	-20.16	-20.98	-19.75
Ferrite-Ca (Ca(FeO) <sub>2</sub> )	log Q/K	5.16	5.30	4.94	5.21	4.95	3.65	4.63	5.11
Ferrite-Mg (MgFe <sub>2</sub> O <sub>4</sub> )	log Q/K	5.22	5.31	5.00	5.28	5.00	3.41	4.57	5.16
Fluorite (CaF <sub>2</sub> )	log Q/K	-0.24	-0.46	-0.35	-0.23	-0.61	-2.63	-2.89	-0.38
Gaylussite (Na <sub>2</sub> Ca(CO <sub>3</sub> ) <sub>2</sub> ·5H <sub>2</sub> O)	log Q/K	-6.53	-7.10	-6.63	-6.76	-8.35	-8.01	-10.50	-7.07
Goethite (α-FeO(OH))	log Q/K	7.12	7.21	7.01	7.10	8.17	6.07	7.33	7.32
Graphite (C)	log Q/K	-77.98	-77.85	-77.81	-77.47	-77.02	-79.15	-80.55	-77.63
Gypsum (CaSO <sub>4</sub> ·2H <sub>2</sub> O)	log Q/K	-3.07	-2.93	-4.13	-2.79	-3.15	-1.68	-2.79	-3.21
Halite (NaCl)	log Q/K	-5.44	-5.74	-5.29	-5.43	-4.87	-7.94	-8.73	-5.36
Hematite (Fe <sub>2</sub> O <sub>3</sub> )	log Q/K	15.16	15.33	14.93	15.12	17.25	13.05	15.54	15.56
Hexahydrate (MgSO <sub>4</sub> ·6H <sub>2</sub> O)	log Q/K	-6.20	-6.12	-7.27	-5.93	-6.30	-5.12	-6.01	-6.36
Huntite (Mg <sub>3</sub> Ca(CO <sub>3</sub> ) <sub>4</sub> )	log Q/K	-4.42	-4.62	-4.92	-4.44	-9.60	-4.89	-7.41	-5.60
Hydroboracite (CaMgB <sub>6</sub> O <sub>8</sub> (OH) <sub>6</sub> ·3H <sub>2</sub> O)	log Q/K	-24.04	-23.95	-23.93	-24.16	-27.66	-27.66	-30.94	-24.75
Hydromagnesite (Mg <sub>5</sub> (CO <sub>3</sub> ) <sub>4</sub> (OH) <sub>2</sub> ·4H <sub>2</sub> O)	log Q/K	-14.04	-14.38	-14.55	-14.01	-21.54	-14.54	-18.02	-15.70
Hydrophilite (CaCl <sub>2</sub> )	log Q/K	-19.69	-19.75	-19.58	-19.54	-19.28	-23.00	-23.32	-19.57
Jarosite-K (KFe <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub> )	log Q/K	-5.11	-4.44	-7.41	-4.49	1.39	-6.25	-3.65	-4.01
Jarosite-Na (NaFe <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub> )	log Q/K	-5.05	-4.72	-7.40	-4.68	1.74	-7.13	-4.23	-4.02
K <sub>2</sub> CO <sub>3</sub> ·3/2H <sub>2</sub> O	log Q/K	-16.14	-16.08	-16.17	-16.17	-17.25	-15.97	-17.16	-16.36
K <sub>8</sub> H <sub>4</sub> (CO <sub>3</sub> ) <sub>6</sub> ·3H <sub>2</sub> O	log Q/K	-58.65	-58.37	-59.01	-58.89	-61.07	-58.94	-62.46	-59.20
Kainite (KMg(SO <sub>4</sub> )Cl·3H <sub>2</sub> O)	log Q/K	-13.90	-13.81	-14.87	-13.56	-13.71	-14.45	-15.72	-13.97
Kalinite (KHCO <sub>3</sub> )	log Q/K	-6.64	-6.60	-6.72	-6.69	-6.69	-6.80	-7.08	-6.67
Kieserite (MgSO <sub>4</sub> ·H <sub>2</sub> O)	log Q/K	-8.10	-8.01	-9.14	-7.78	-8.20	-7.00	-8.07	-8.25
KMgCl <sub>3</sub>	log Q/K	-36.19	-36.30	-35.96	-35.94	-35.51	-41.43	-42.06	-35.98
KMgCl <sub>3</sub> ·2H <sub>2</sub> O	log Q/K	-28.36	-28.49	-28.17	-28.17	-27.69	-33.62	-34.04	-28.18
KNaCO <sub>3</sub> ·6H <sub>2</sub> O	log Q/K	-9.81	-10.07	-9.84	-9.98	-10.63	-10.54	-11.82	-10.07
Leonhardite (MgSO <sub>4</sub> ·4H <sub>2</sub> O)	log Q/K	-7.12	-7.02	-8.17	-6.82	-7.21	-6.03	-6.99	-7.27
Lime (CaO)	log Q/K	-21.73	-21.75	-21.70	-21.59	-24.04	-21.11	-22.86	-22.16
Magnesite (MgCO <sub>3</sub> )	log Q/K	-0.93	-0.99	-1.05	-0.93	-2.23	-1.12	-1.70	-1.23
Mercallite (KHSO <sub>4</sub> )	log Q/K	-14.72	-14.51	-15.70	-14.43	-13.56	-13.57	-14.37	-14.58
Mg <sub>2</sub> Cl(OH) <sub>3</sub> ·4H <sub>2</sub> O	log Q/K	-11.62	-11.84	-11.66	-11.61	-14.89	-13.07	-14.35	-12.32
MgCl <sub>2</sub> ·2H <sub>2</sub> O	log Q/K	-21.10	-21.22	-20.99	-20.94	-20.71	-24.72	-24.84	-20.99
MgCl <sub>2</sub> ·4H <sub>2</sub> O	log Q/K	-15.22	-15.35	-15.14	-15.11	-14.83	-18.86	-18.80	-15.13
MgCl <sub>2</sub> ·H <sub>2</sub> O	log Q/K	-24.70	-24.82	-24.58	-24.52	-24.31	-28.31	-28.54	-24.59
MgF <sub>2</sub> (c)	log Q/K	-3.59	-3.86	-3.70	-3.56	-3.98	-6.28	-6.43	-3.74
MgOHCl	log Q/K	-14.56	-14.66	-14.50	-14.44	-15.52	-16.22	-16.94	-14.74
MgSO <sub>4</sub> (c)	log Q/K	-13.59	-13.49	-14.61	-13.24	-13.69	-12.48	-13.69	-13.72
MHSH(Mg1.5)	log Q/K	-11.78	-11.72	-12.82	-11.42	-13.03	-10.54	-12.25	-12.15
Mirabilite (Na <sub>2</sub> SO <sub>4</sub> ·10H <sub>2</sub> O)	log Q/K	-6.40	-6.79	-7.26	-6.23	-5.74	-6.67	-9.14	-6.48
Misenite (K <sub>8</sub> H <sub>8</sub> (SO <sub>4</sub> ) <sub>7</sub> )	log Q/K	-97.94	-96.50	-104.80	-95.98	-90.94	-89.64	-95.91	-97.23
Molybdenite (FeCl <sub>3</sub> )	log Q/K	-36.52	-36.45	-36.39	-36.26	-31.43	-43.37	-41.01	-35.41
Monohydrocalcite (CaCO <sub>3</sub> ·H <sub>2</sub> O)	log Q/K	-0.75	-0.77	-0.88	-0.77	-2.04	-0.64	-1.38	-1.04
Na <sub>3</sub> H(SO <sub>4</sub> ) <sub>2</sub>	log Q/K	-20.96	-21.44	-22.74	-20.51	-18.86	-20.94	-24.83	-20.90
NaFeO <sub>2</sub> (c)	log Q/K	-7.15	-7.33	-7.13	-7.11	-6.89	-8.71	-9.17	-7.12
Nesquehonite (MgCO <sub>3</sub> ·3H <sub>2</sub> O)	log Q/K	-4.05	-4.11	-4.16	-4.03	-5.35	-4.23	-4.91	-4.34
Pentahydrate (MgSO <sub>4</sub> ·5H <sub>2</sub> O)	log Q/K	-6.53	-6.44	-7.59	-6.26	-6.62	-5.44	-6.33	-6.69
Pirssonite (Na <sub>2</sub> Ca(CO <sub>3</sub> ) <sub>2</sub> ·2(H <sub>2</sub> O))	log Q/K	-7.27	-7.83	-7.34	-7.44	-9.09	-8.73	-11.45	-7.79
Portlandite (Ca(OH) <sub>2</sub> )	log Q/K	-11.01	-11.04	-11.00	-10.93	-13.31	-10.41	-11.90	-11.46
Sr(OH) <sub>2</sub> (c)	log Q/K	-17.03	-17.08	-17.02	-16.98	-19.35	-16.29	-18.93	-17.49
SrCl <sub>2</sub> (c)	log Q/K	-16.60	-16.69	-16.51	-16.52	-16.20	-19.78	-21.06	-16.50
SrCl <sub>2</sub> ·2H <sub>2</sub> O	log Q/K	-11.62	-11.71	-11.54	-11.58	-11.22	-14.81	-15.95	-11.53
SrCl <sub>2</sub> ·6H <sub>2</sub> O	log Q/K	-9.41	-9.51	-9.35	-9.40	-9.01	-12.61	-13.62	-9.33
SrCl <sub>2</sub> ·H <sub>2</sub> O	log Q/K	-13.23	-13.32	-13.15	-13.18	-12.84	-16.43	-17.62	-13.14
SrF <sub>2</sub> (c)	log Q/K	-4.64	-4.88	-4.75	-4.66	-5.03	-6.88	-8.27	-4.79
SrO(c)	log Q/K	-32.45	-32.48	-32.39	-32.30	-34.77	-31.67	-34.67	-32.88
SrS(c)	log Q/K	-165.40	-165.00	-165.90	-164.00	-165.60	-165.20	-171.40	-165.18
Strontianite (SrCO <sub>3</sub> )	log Q/K	1.35	1.32	1.21	1.27	0.06	1.60	-0.14	1.05
Sulfur-Rhomb (S)	log Q/K	-112.60	-112.20	-113.20	-111.50	-110.40	-112.80	-115.40	-111.98
Sylvite (KCl)	log Q/K	-6.96	-6.96	-6.87	-6.92	-6.67	-8.60	-8.89	-6.88
Tachyhydrite (CaMg <sub>2</sub> Cl <sub>6</sub> ·12H <sub>2</sub> O)	log Q/K	-40.06	-40.39	-39.83	-39.78	-38.86	-50.67	-50.56	-39.78
Thenardite (Na <sub>2</sub> SO <sub>4</sub> )	log Q/K	-7.95	-8.32	-8.77	-7.71	-7.29	-8.20	-10.93	-8.01
Witherite (BaCO <sub>3</sub> )	log Q/K	2.52	2.44	2.62	2.54	1.38	2.56	1.00	2.30

Notes:  
 Positive values are oversaturated and may precipitate out of solution  
 Negative values are undersaturated and may dissolve into solution

## Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.



1540 Eisenhower Place  
Ann Arbor, MI 48108-3284  
Phone: 734.971.7080  
www.trccompanies.com

PROJECT:

**DTE ELECTRIC COMPANY  
BELLE RIVER POWER PLANT  
4505 KING ROAD  
CHINA TOWNSHIP, MICHIGAN**

TITLE:

**SITE LOCATION MAP**

DRAWN BY:

A. FOJTIK

CHECKED BY:

J. KRENZ

APPROVED BY:

V. BUENING

DATE:

JANUARY 2023

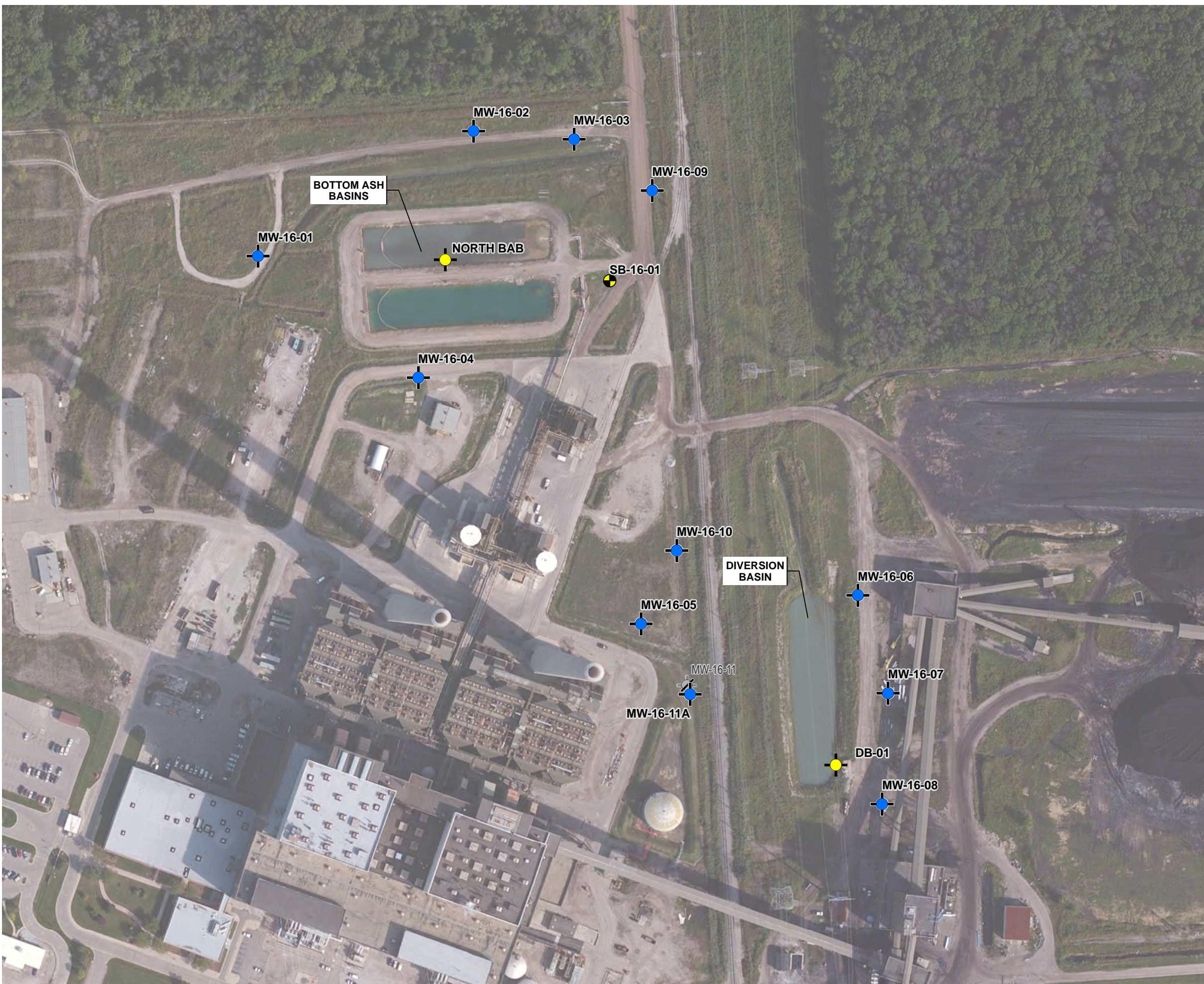
PROJ. NO.:

461816.0003





FILE:

461816-0003\_001.mxd

**FIGURE 1**

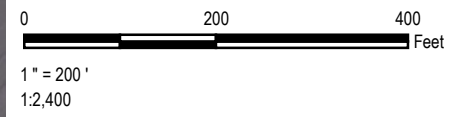



**LEGEND**

-  SOIL BORING
-  SURFACE WATER SAMPLE POINT
-  MONITORING WELL
-  DECOMMISSIONED MONITORING WELL

**NOTES**

1. BASE MAP IMAGERY FROM ESRI WORLD IMAGERY, (08/13/2021).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.



PROJECT:		<b>DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN</b>	
TITLE: <b>SITE PLAN</b>			
DRAWN BY:	A. ADAIR	PROJ NO.:	522172.0000
CHECKED BY:	J. KRENZ	<b>FIGURE 2</b>	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		
		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com	
FILE NO.:	522172-0003_002.mxd		

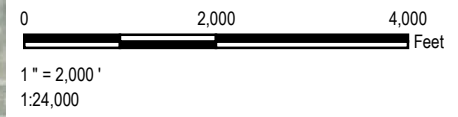


**LEGEND**

 SURFACE WATER SAMPLE POINT

**NOTES**

1. BASE MAP IMAGERY FROM ESRI WORLD IMAGERY, (08/13/2021).
2. SURFACE WATER SAMPLE LOCATION IS APPROXIMATE.



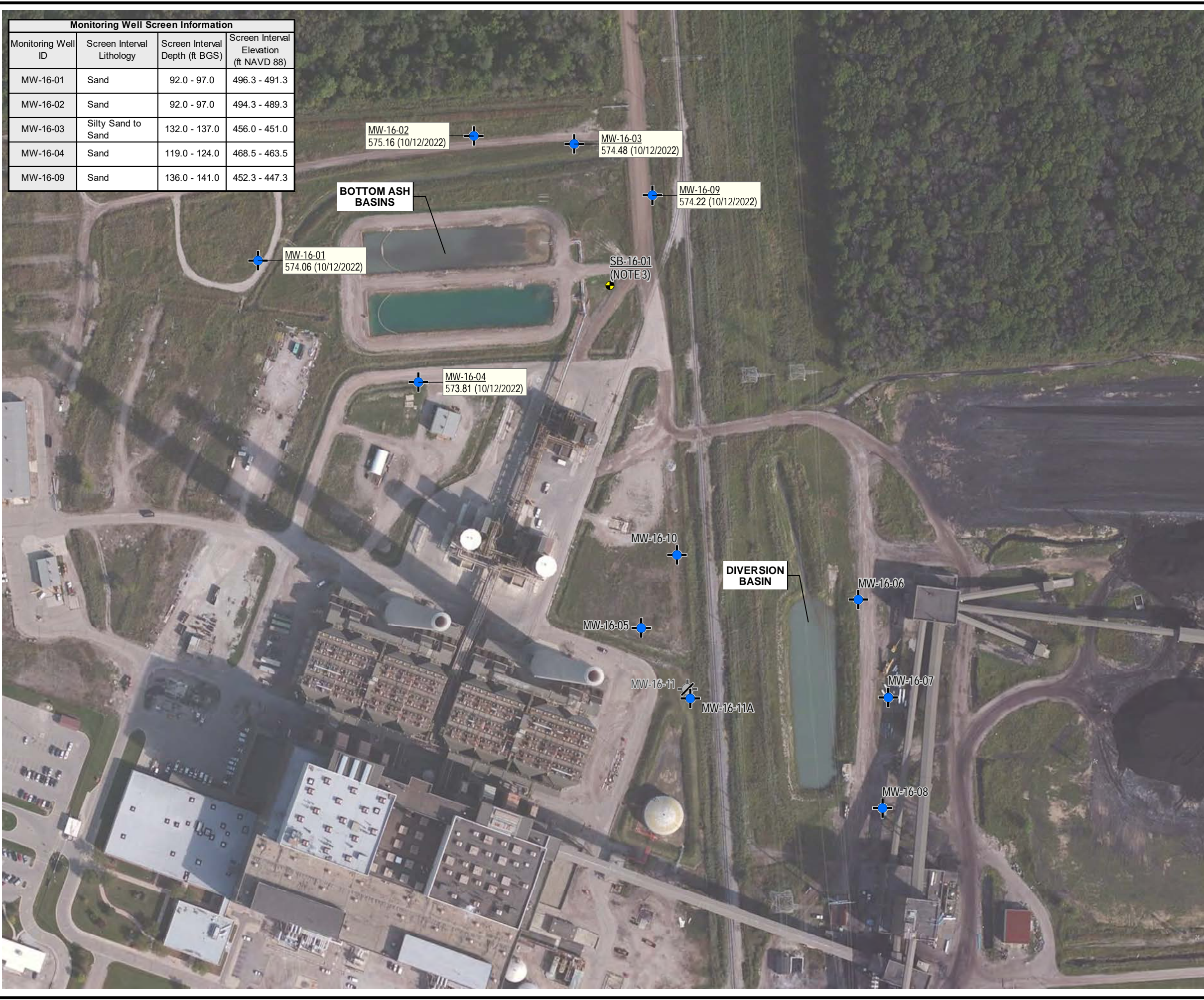
PROJECT:	DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN	
TITLE:	OFFSITE SURFACE WATER SAMPLE LOCATION	
DRAWN BY:	A. ADAIR	PROJ NO.: 522171.0000
CHECKED BY:	J. KRENZ	<b>FIGURE 3</b>
APPROVED BY:	V. BUENING	
DATE:	JANUARY 2023	



1540 Eisenhower Place  
Ann Arbor, MI 48108-3284  
Phone: 734.971.7080  
www.trccompanies.com



Monitoring Well Screen Information			
Monitoring Well ID	Screen Interval Lithology	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft NAVD 88)
MW-16-01	Sand	92.0 - 97.0	496.3 - 491.3
MW-16-02	Sand	92.0 - 97.0	494.3 - 489.3
MW-16-03	Silty Sand to Sand	132.0 - 137.0	456.0 - 451.0
MW-16-04	Sand	119.0 - 124.0	468.5 - 463.5
MW-16-09	Sand	136.0 - 141.0	452.3 - 447.3



**LEGEND**

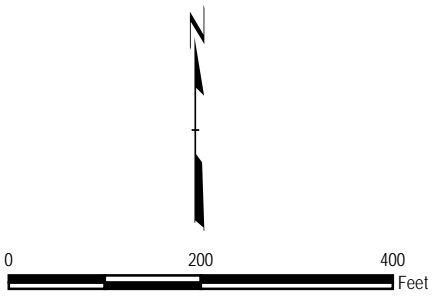
- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

MW ID  
GROUNDWATER ELEVATION (DATE)

FT BGS  
FEET BELOW GROUND SURFACE  
FT NAVD 88  
ELEVATION RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988

**NOTES**

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, (3/23/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.
3. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.

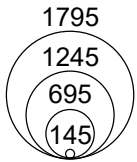


1" = 200'  
1:2,400

PROJECT:		<b>DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT BOTTOM ASH BASIN 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN</b>	
TITLE:		<b>BOTTOM ASH BASINS GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY OCTOBER 2022</b>	
DRAWN BY:	A. FOJTIK	PROJ NO.:	413591.0003
CHECKED BY:	J. KRENZ	<b>FIGURE 4</b>	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		



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Phone: 734.971.7080  
www.trccompanies.com



Total Dissolved Solids (TDS)

- North BAB
- MW-16-01
- ▲ MW-16-02
- ▼ MW-16-03
- ◆ MW-16-04
- ◆ MW-16-09
- ★ SC-01

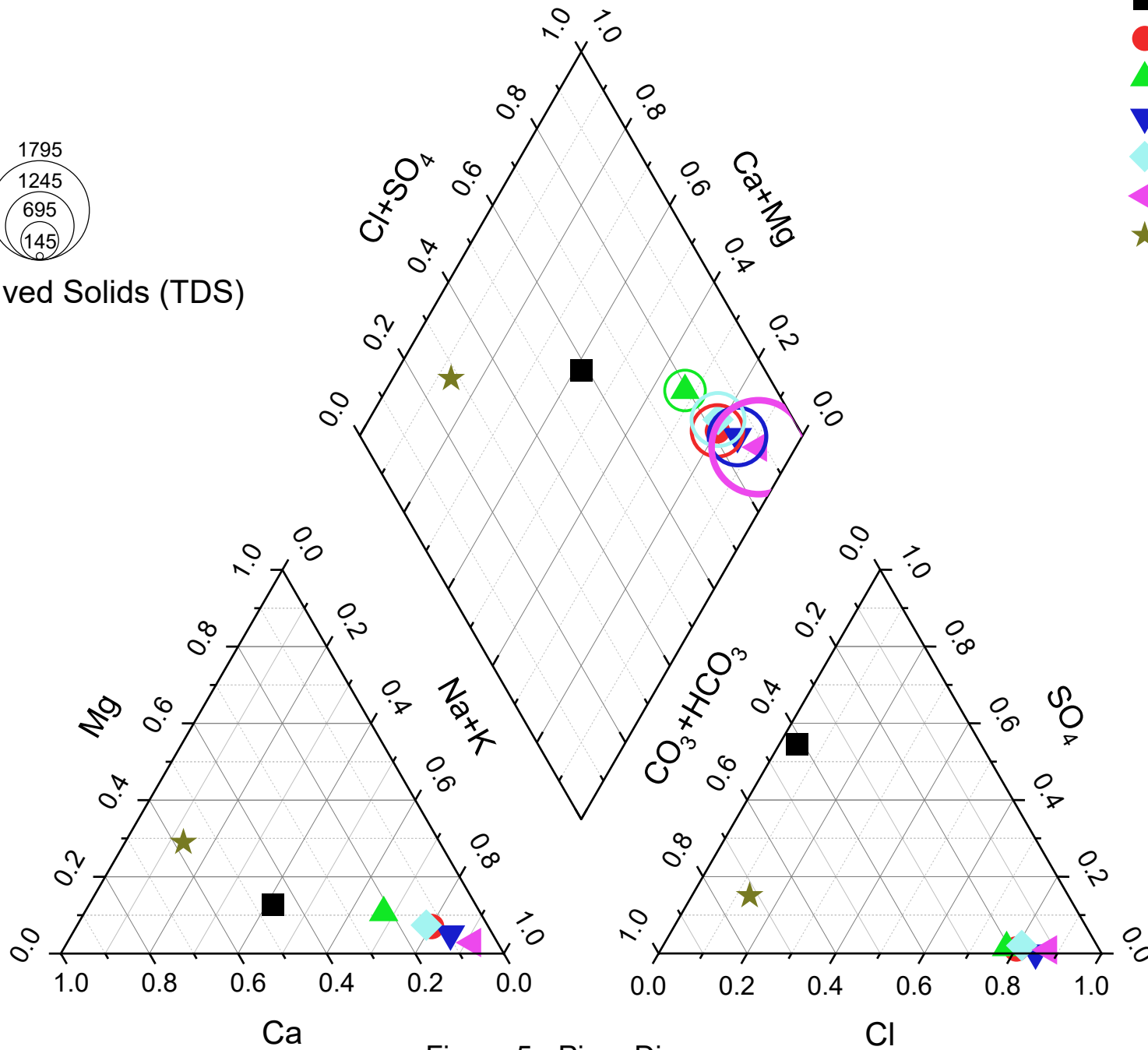
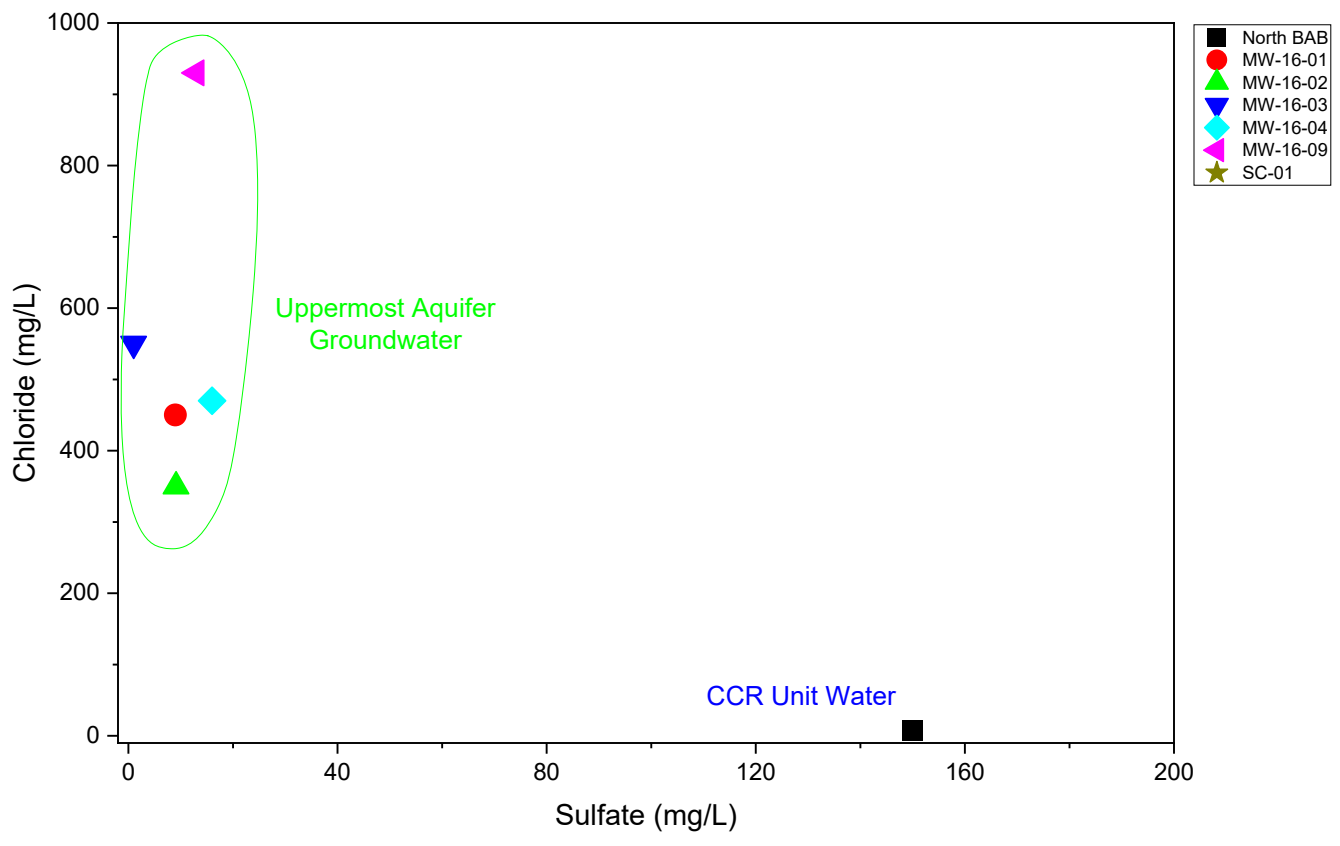
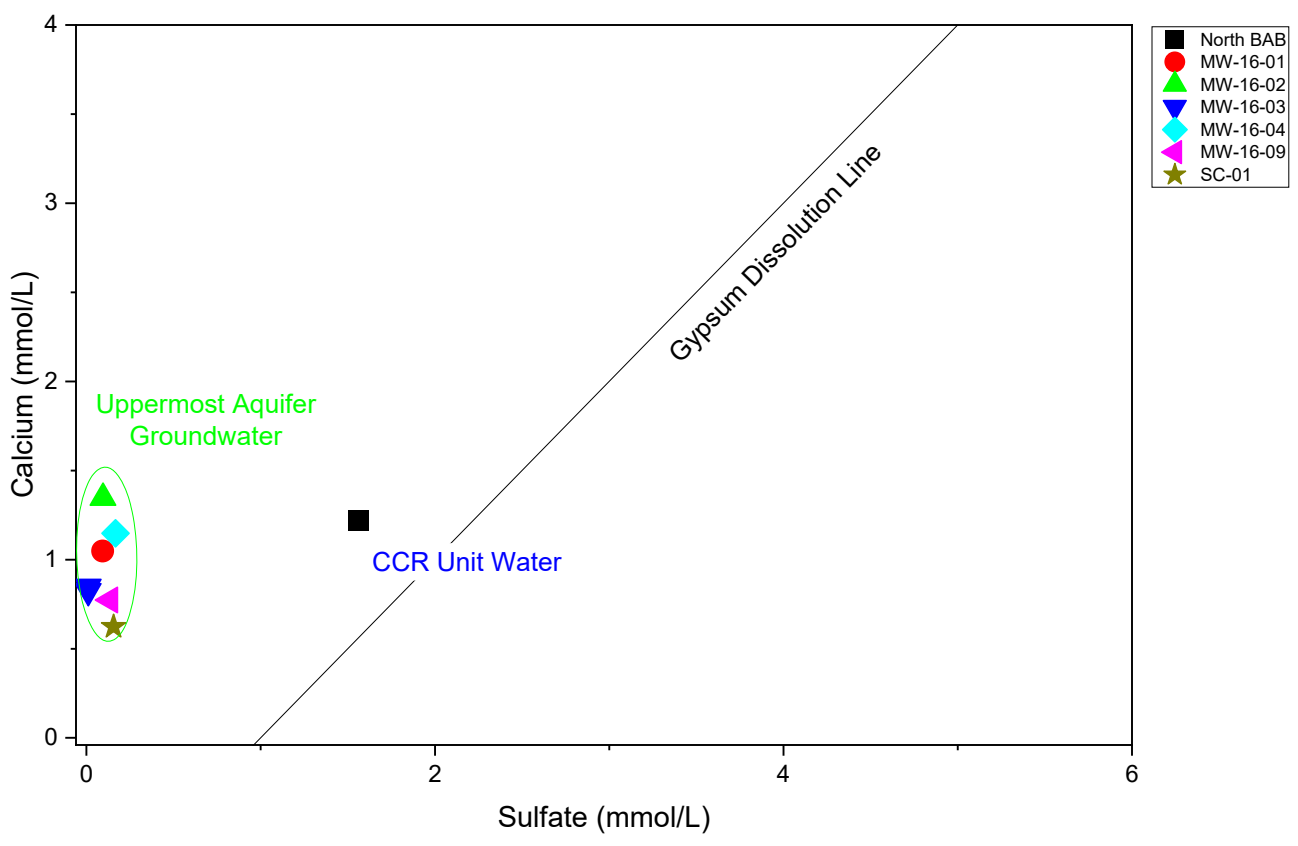
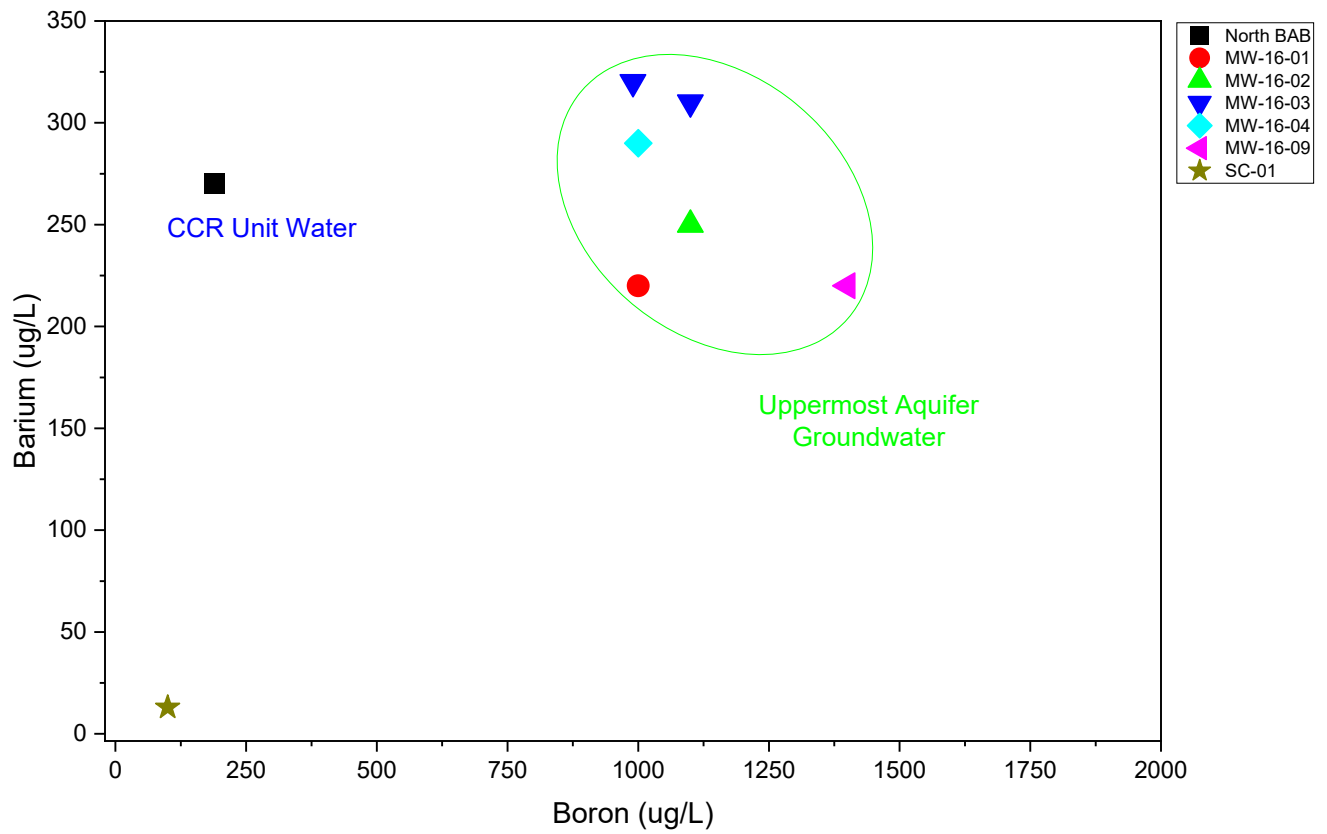
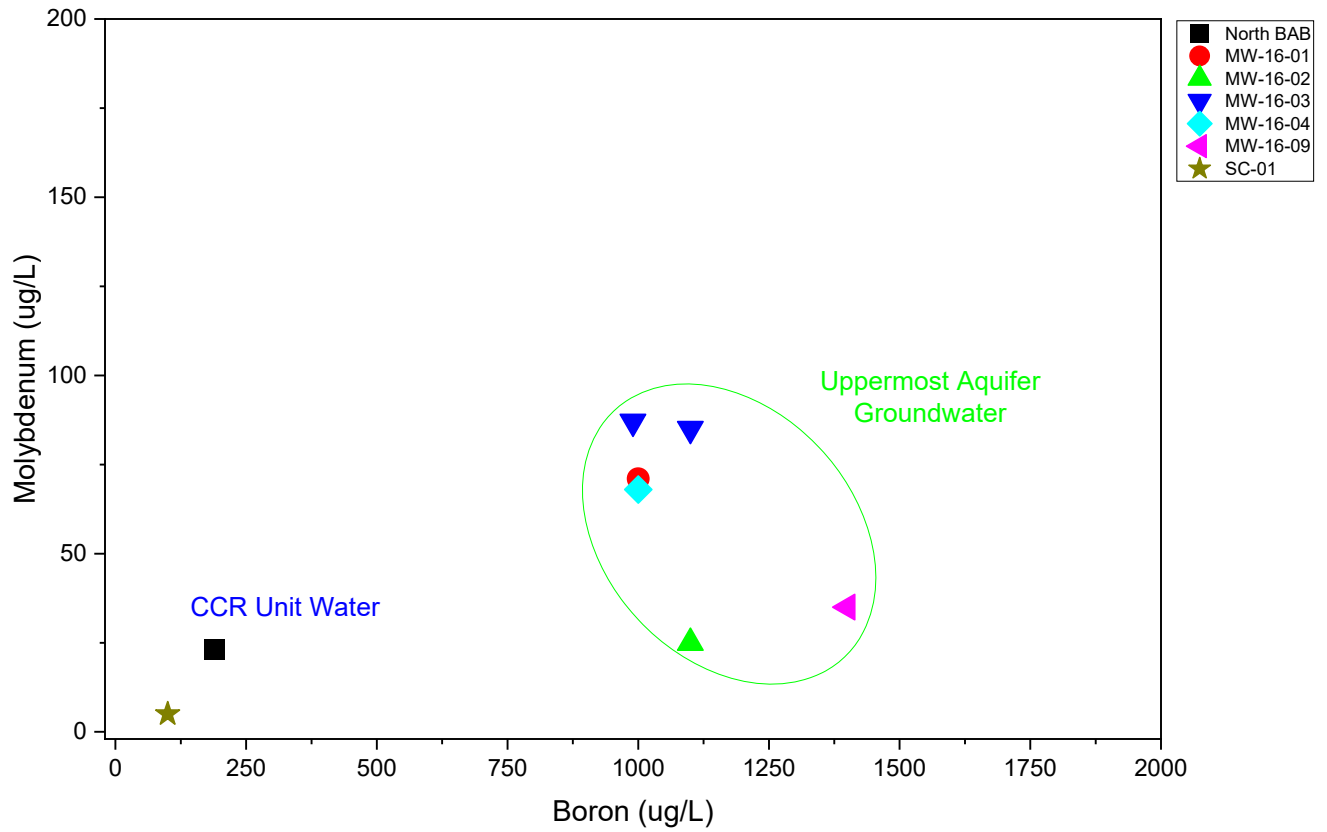


Figure 5 - Piper Diagram  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan

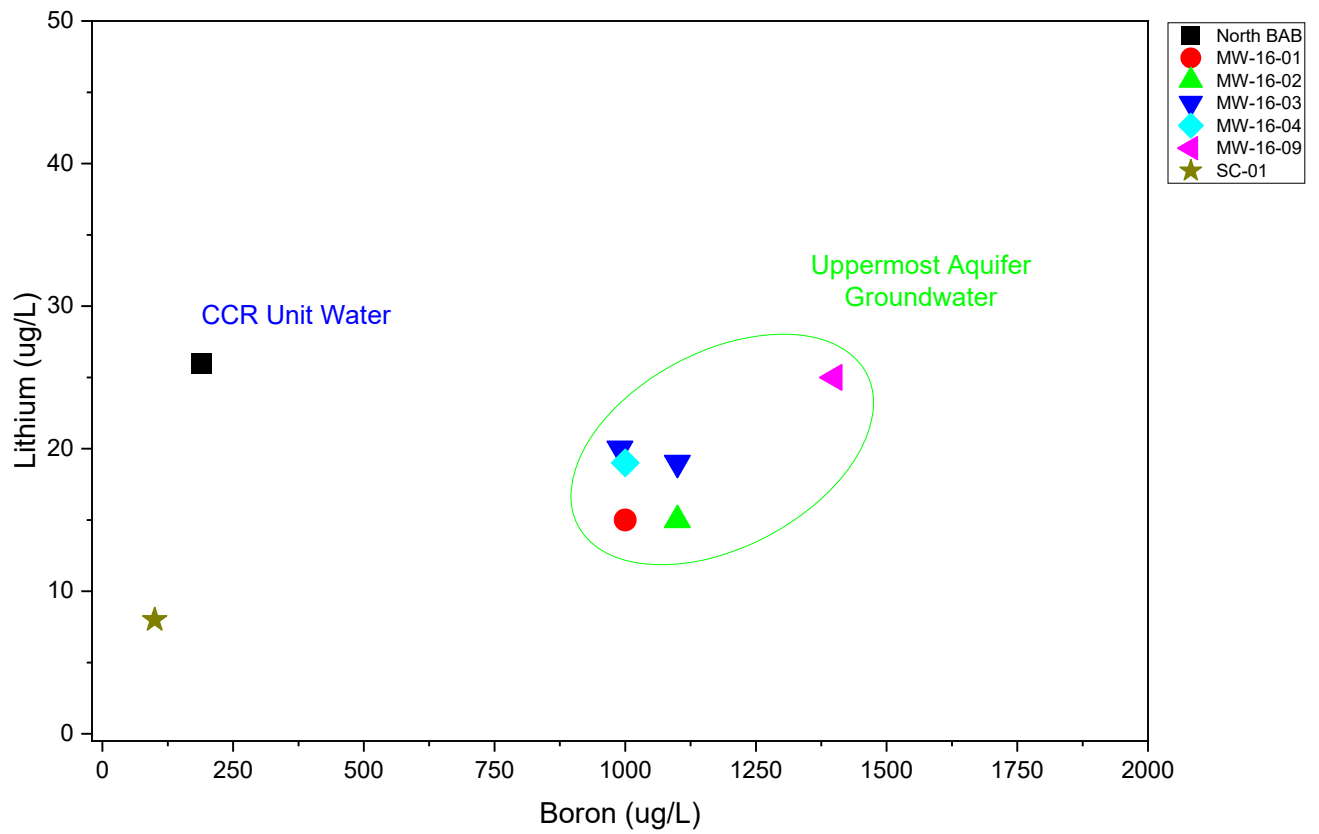
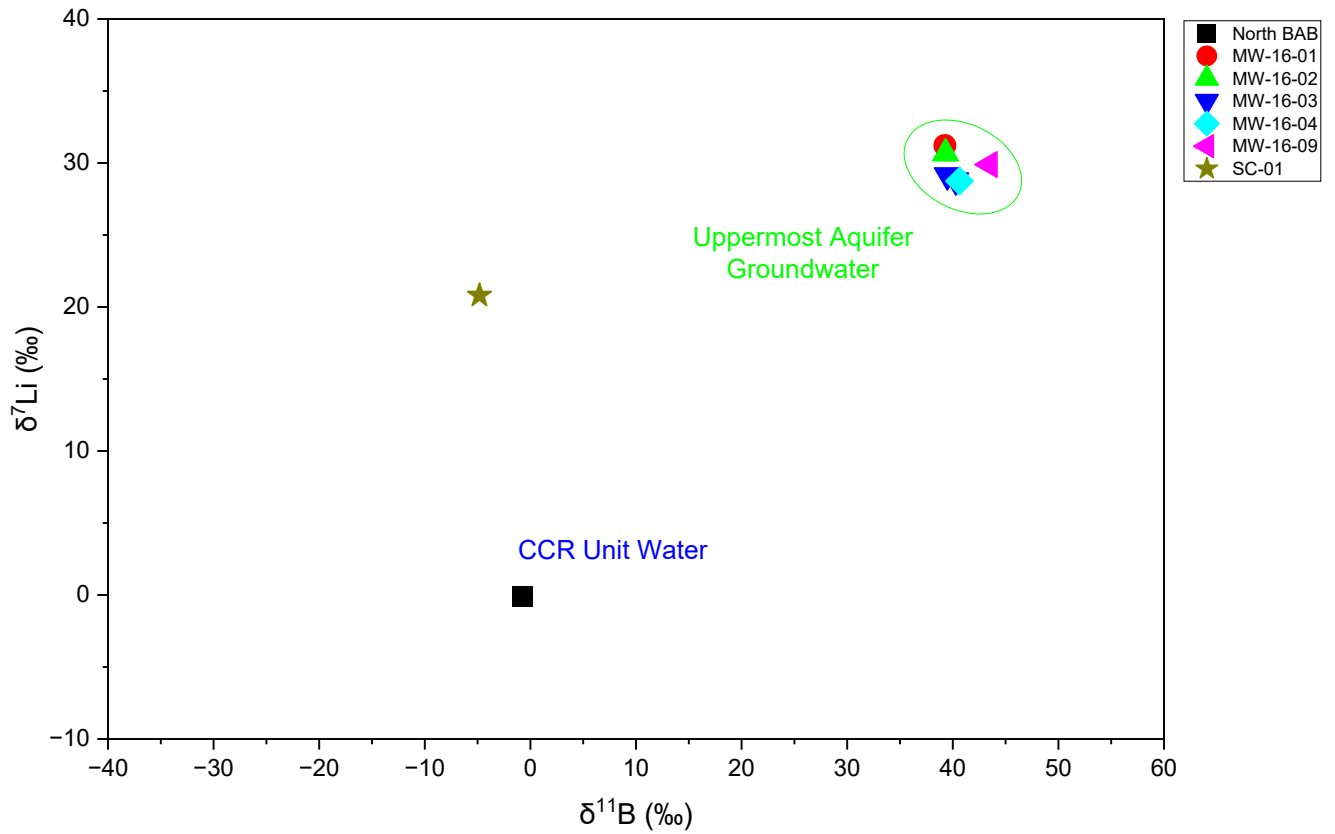
**Figure 6**  
 Summary of Calcium and Sulfate Saturation with Chloride and Sulfate Concentrations  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



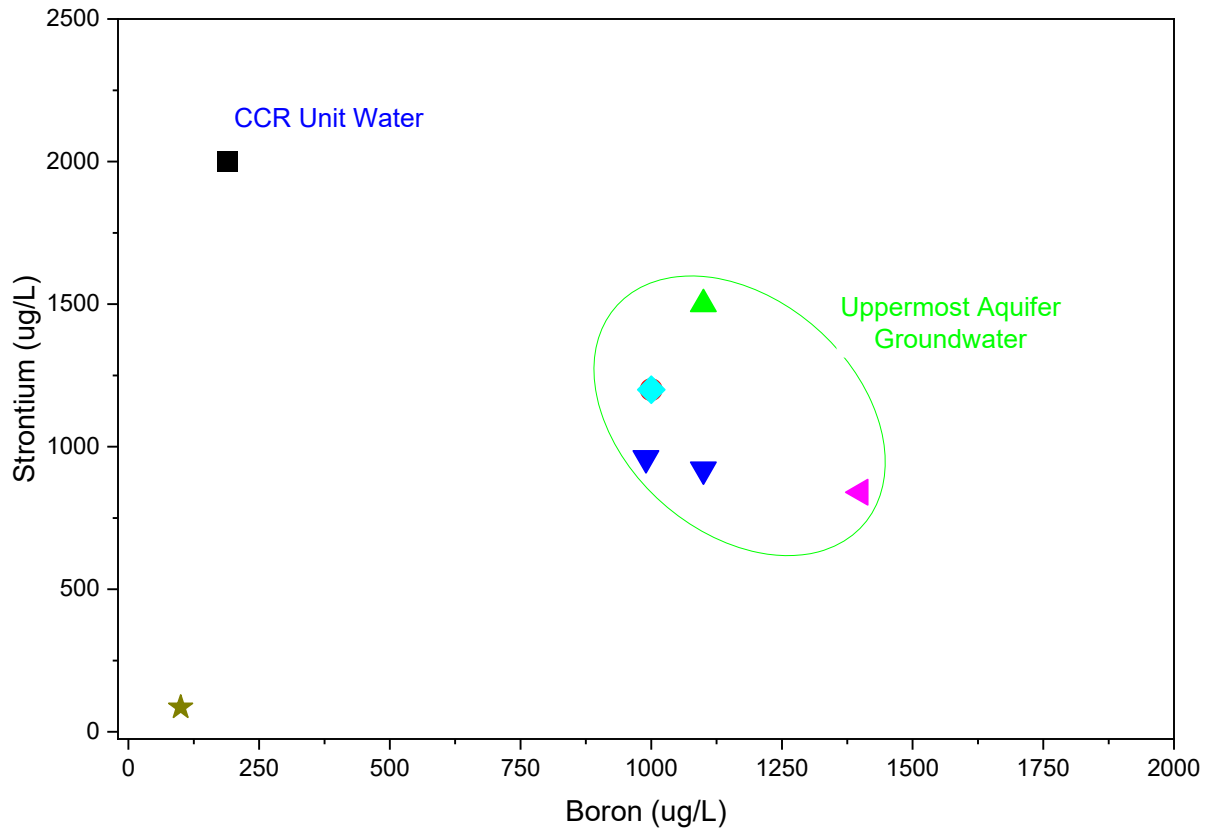
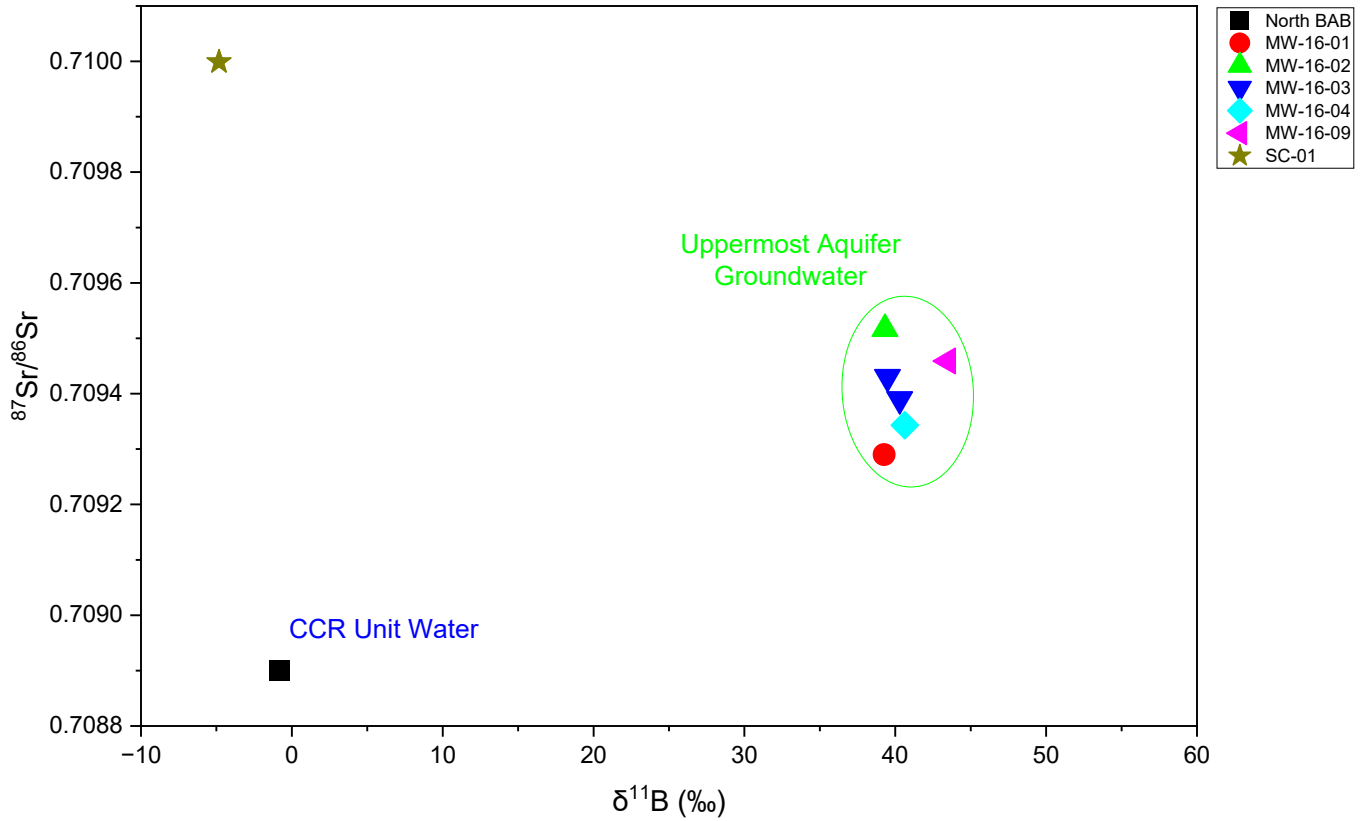
**Figure 7**  
Molybdenum and Barium with Boron Concentrations  
Belle River Power Plant  
4505 King Rd, China Township, Michigan



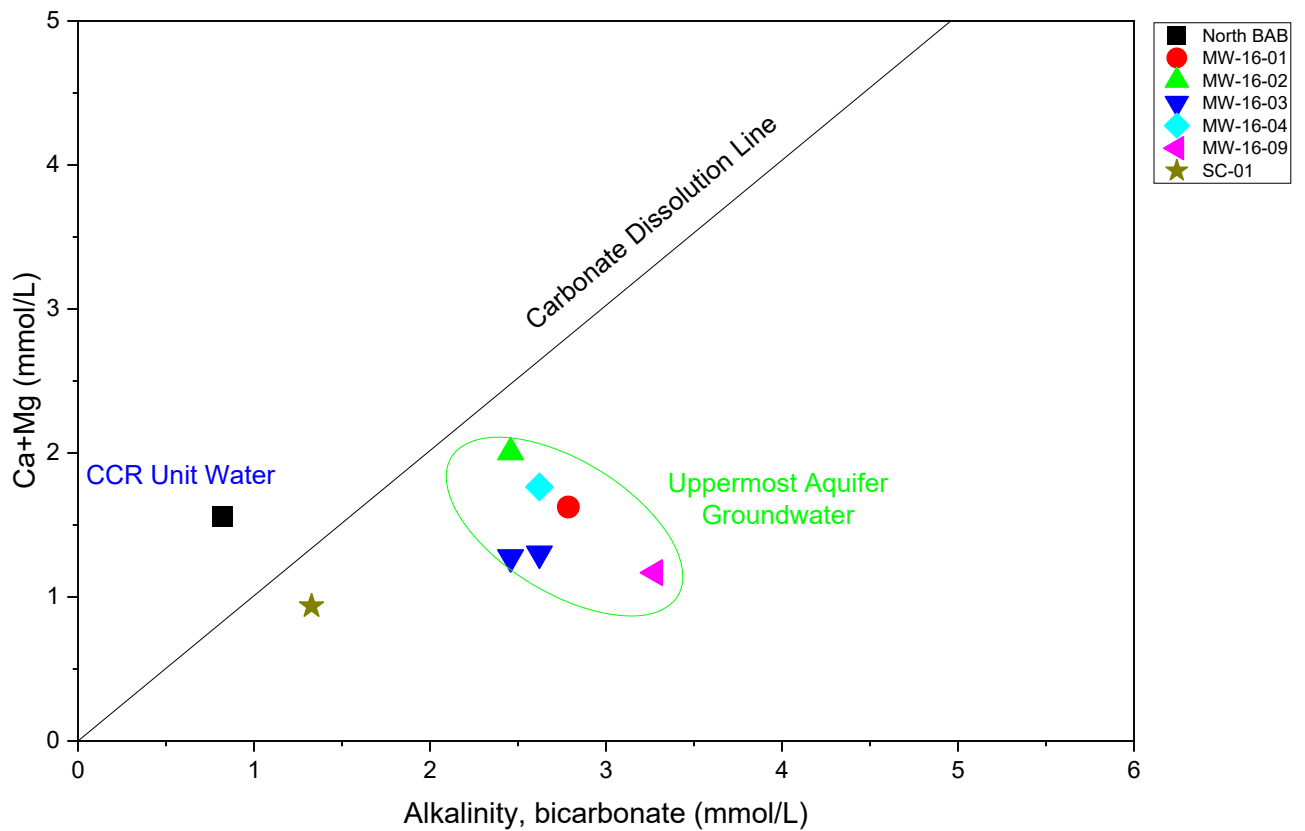
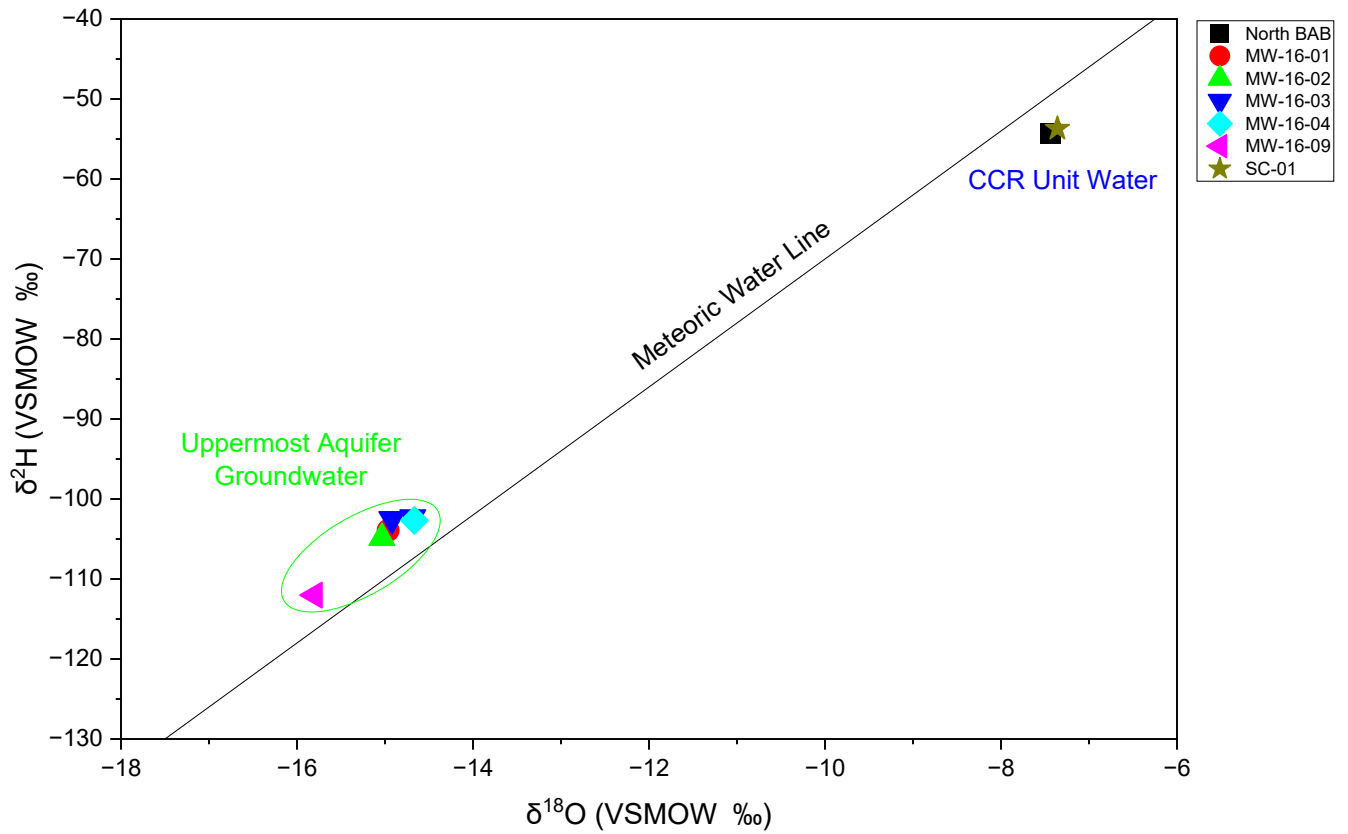
**Figure 8**  
 Lithium and Boron Isotopic Compositions and Concentrations  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



**Figure 9**  
**Strontium and Boron Isotopic Compositions and Concentrations**  
**Belle River Power Plant**  
**4505 King Rd, China Township, Michigan**



**Figure 10**  
 Hydrogen and Oxygen Isotopic Compositions and Carbonate Saturation  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



**Figure 11**  
Tritium Data and Age Model  
Belle River Power Plant  
4505 King Rd, China Township, Michigan

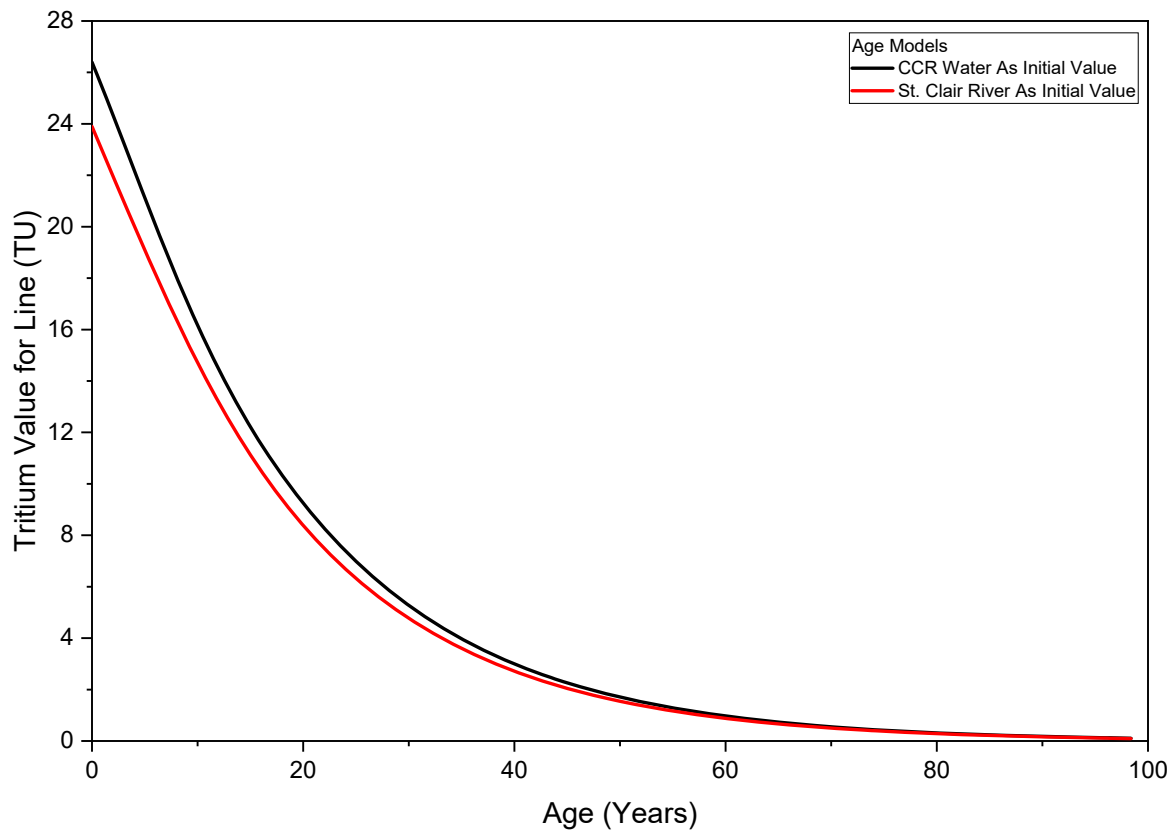
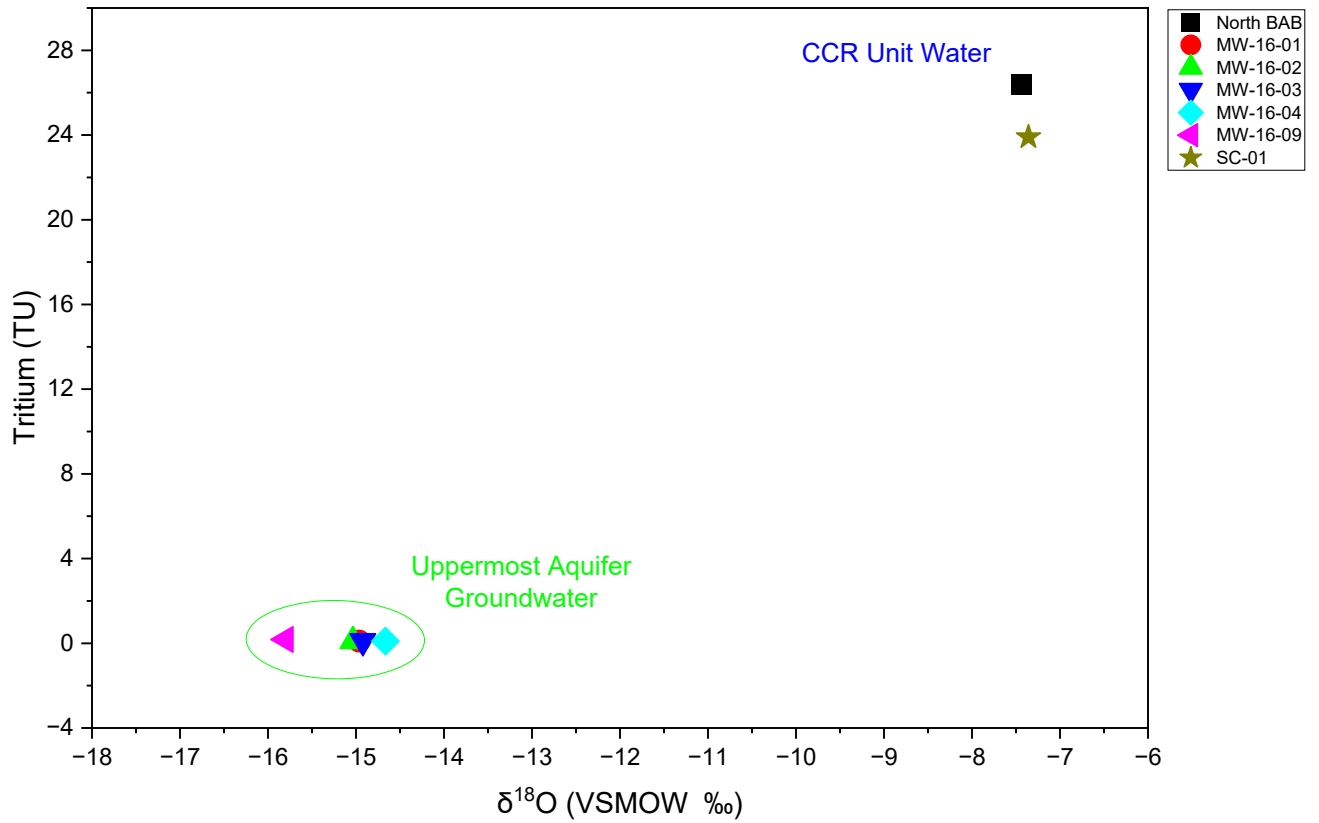




Figure 12 - Scree Plot  
Belle River Power Plant Bottom Ash Basin CCR Unit  
4505 King Road, China Township, Michigan

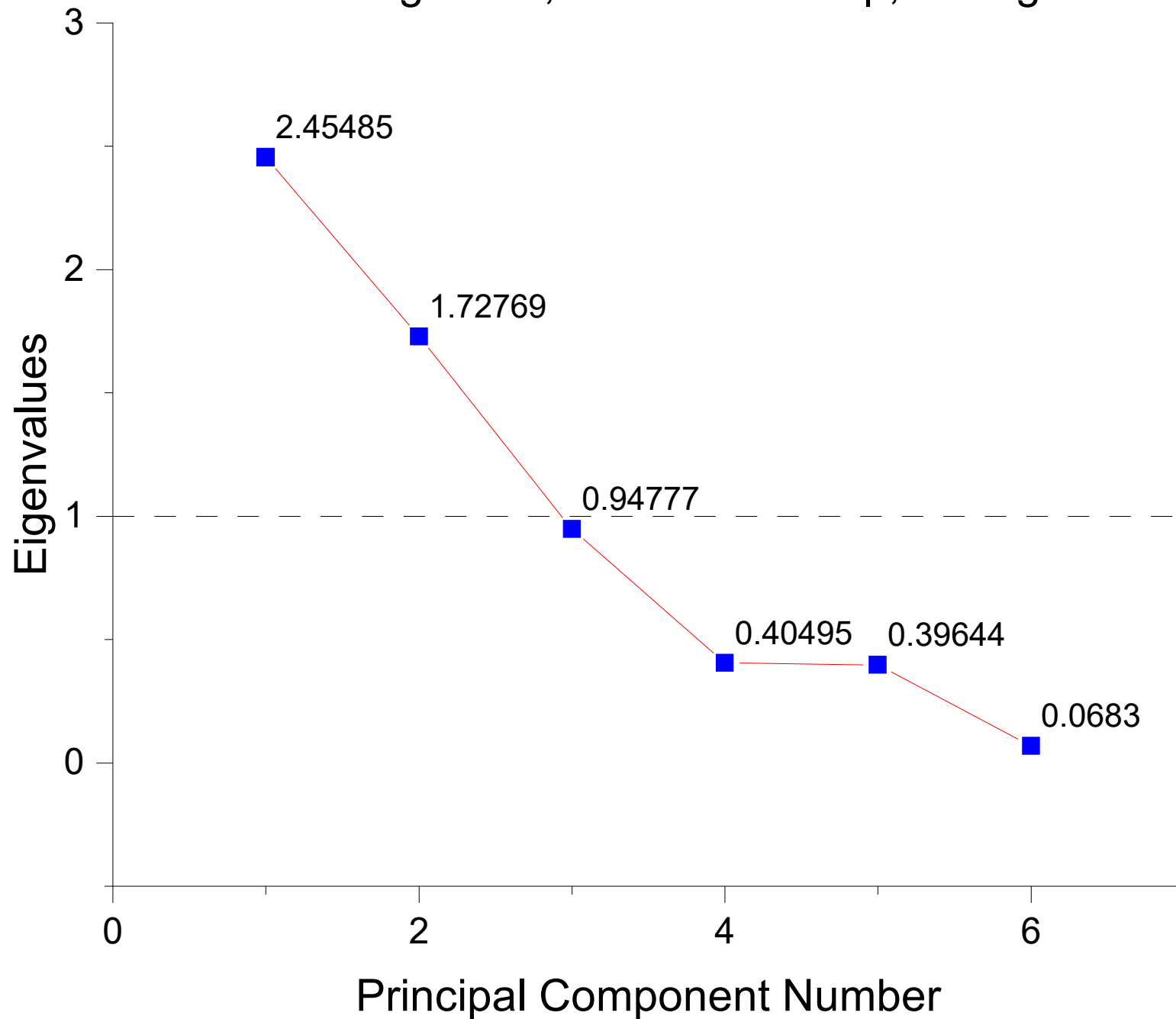
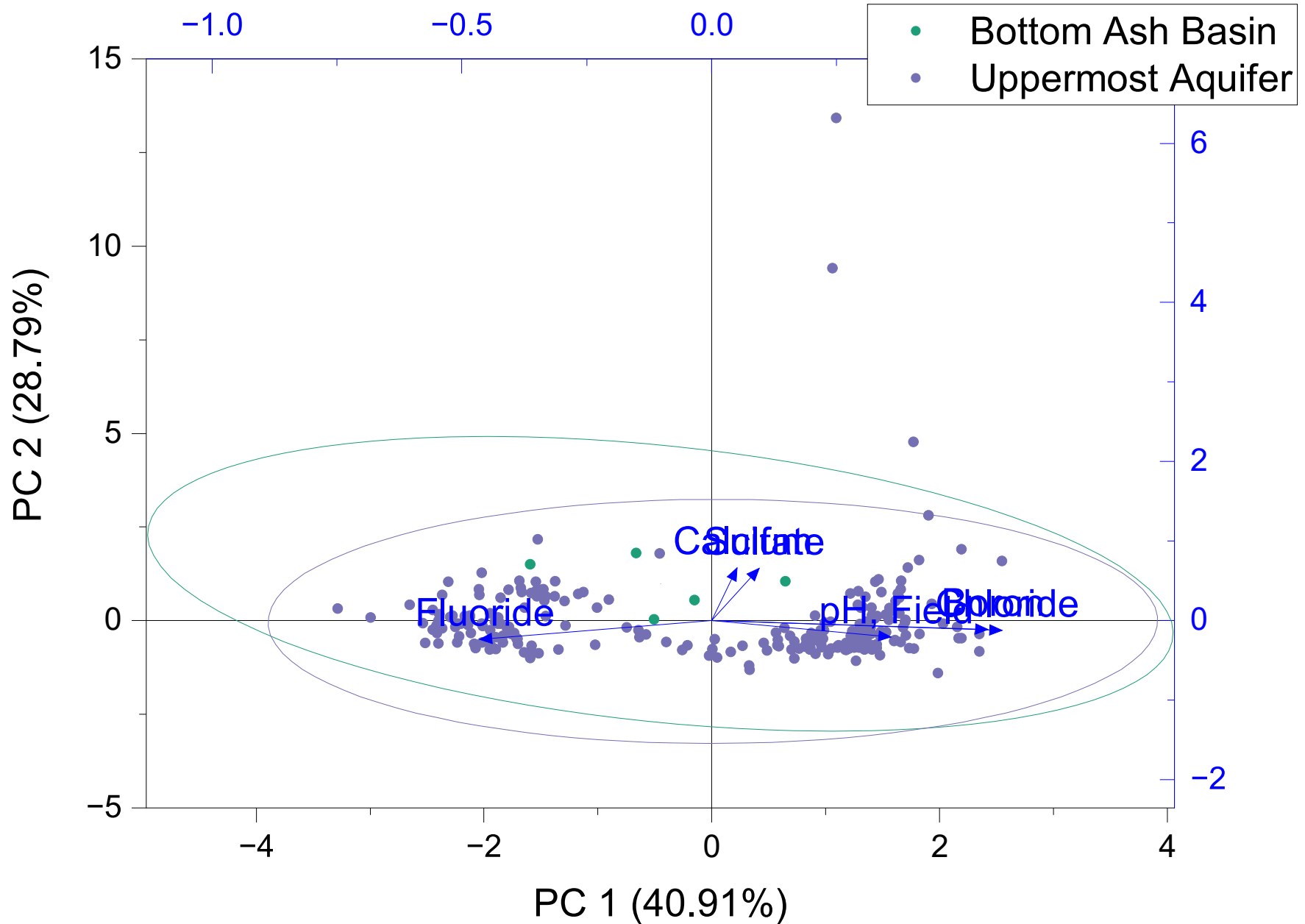


Figure 13 - Biplot  
Belle River Power Plant Bottom Ash Basin CCR Unit  
4505 King Road, China Township, Michigan



# Figure 14 - BRPP LDA Origin

Discriminant Analysis (3/24/2023 15:04:1

## Canonical Discriminant Analysis

### Eigenvalues

	Eigenvalue	Percentage of Variance	Cumulative	Canonical Correlation
1	1.23366	100.00%	100.00%	0.74317

### Standardized Canonical Coefficients

	Canonical Variable 1
Boron	-0.22198
Calcium	0.34127
Chloride	1.19871
Fluoride	1.11313
pH, Field	-2.95507E-7
Sulfate	-0.3104

## Classification Summary for Training Data

### Classification Count

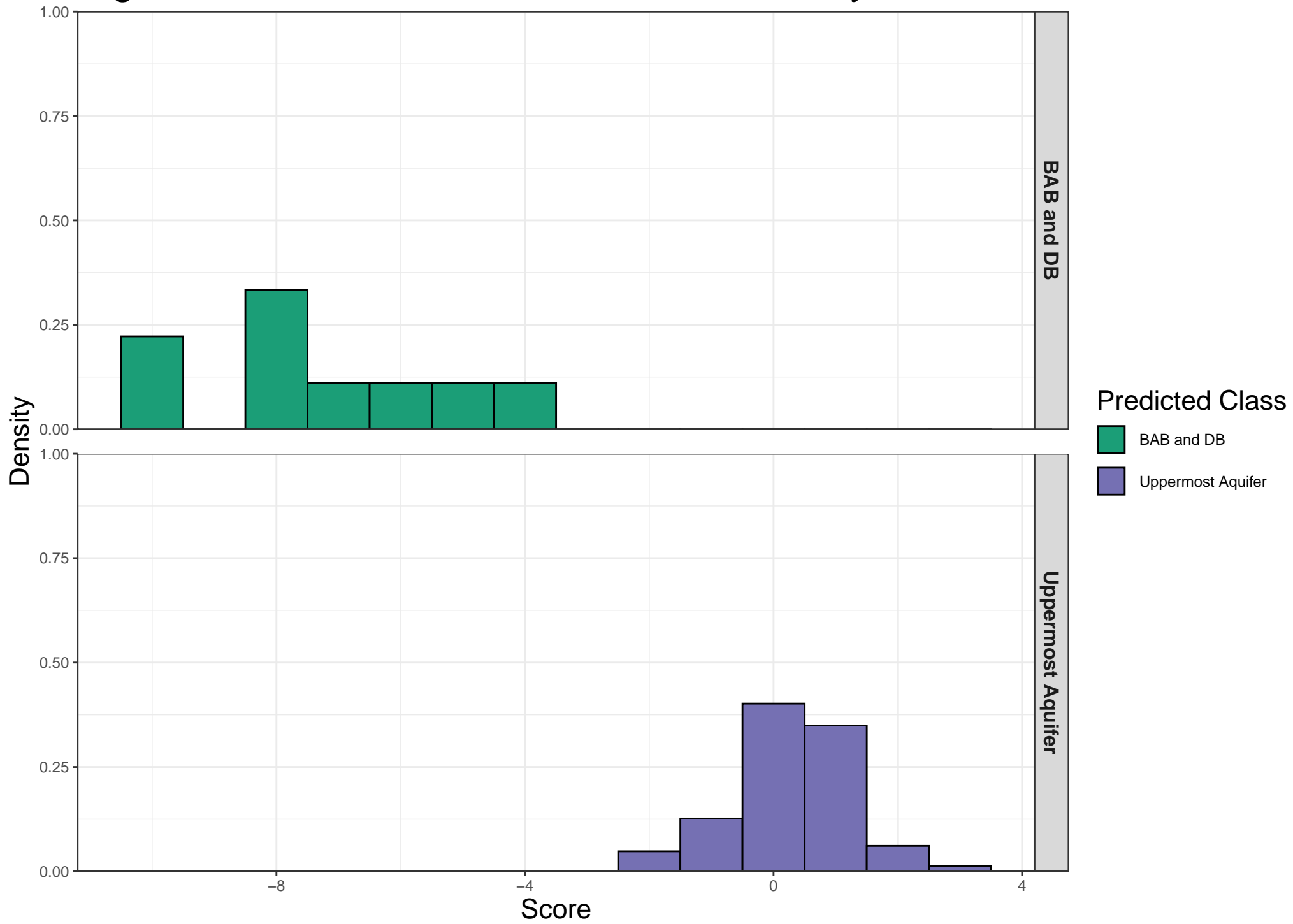
	Predicted Group		
	BAB and DB	Uppermost Aquifer	Total
BAB and DB	9 100.00%	0 0.00%	9 100.00%
Uppermost Aquifer	0 0.00%	229 100.00%	229 100.00%
Total	9 3.78%	229 96.22%	238 100.00%

### Error Rate

	BAB and DB	Uppermost Aquifer	Total
Prior	0.5	0.5	
Rate	0.00%	0.00%	0.00%

Error rate for classification of training data is 0.00%.

# Figure 15 – Belle River Power Plant Density of LDA Scores



## Figure 16 - BRPP LDA ANOVA

ANOVAOneWay (3/24/2023 15:07:06)

### Descriptive Statistics

	N Analysis	N Missing	Mean	Standard Deviation	SE of Mean
BAB and DB	9	0	-5.57907	1.75276	0.58425
Uppermost Aquifer	229	0	0.21926	0.96296	0.06363

### One Way ANOVA

#### Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	291.14412	291.14412	291.14412	<0.0001
Error	236	236	1		
Total	237	527.14412			

Null Hypothesis: The means of all levels are equal.

Alternative Hypothesis: The means of one or more levels are different.

At the 0.05 level, the population means are significantly different.

# Appendix A

## December 2022 Laboratory Data

# ALS Environmental



05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER



**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

---

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

---

**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>9.9</b>		<b>1.0</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Fluoride</b>	<b>0.22</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:30 PM
<b>Sulfate</b>	<b>140</b>		<b>8.0</b>	<b>mg/L</b>	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.43</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>330</b>		<b>50</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>43</b>		<b>20</b>	<b>mg/L</b>	20	12/30/2020 06:55 PM
<b>Fluoride</b>	<b>0.44</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:49 PM
<b>Sulfate</b>	<b>1,200</b>		<b>100</b>	<b>mg/L</b>	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.32</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>2,100</b>		<b>300</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0				
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0				
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0				
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0				
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0				
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0				
Calcium	63.88	0.50	10	53.04	108	75-125	0			O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0				
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0				
Iron	8.964	0.080	10	0.02083	89.4	75-125	0				
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0				
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0				
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0				
Potassium	12.35	0.20	10	2.605	97.4	75-125	0				
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0				
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0				

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0				
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0				
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0				
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0				
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0				
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0				
Calcium	34.88	0.50	10	25.15	97.2	75-125	0				
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0				
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0				
Iron	9.488	0.080	10	0.143	93.5	75-125	0				
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0				
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0				
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0				
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0				
Potassium	12.88	0.20	10	3.03	98.5	75-125	0				
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0				
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO	

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO	

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20		
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20		
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20		
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20		
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20		
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20		
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O	
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20		
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20		
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20		
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20		
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20		
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O	
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20		
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20		
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20		
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O	
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MSD		Sample ID: 20121813-10DMSD				Units: mg/L		Analysis Date: 12/30/2020 09:37 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043032		Prep Date: 12/30/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD		Sample ID: 20121813-01DMSD				Units: mg/L		Analysis Date: 12/31/2020 05:22 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046544		Prep Date: 12/30/2020		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD		Sample ID: 20121813-10DMSD				Units: mg/L		Analysis Date: 12/31/2020 05:41 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046556		Prep Date: 12/30/2020		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

MBLK		Sample ID: <b>MBLK-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021476</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids ND 30

LCS		Sample ID: <b>LCS-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021475</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

DUP		Sample ID: <b>20121752-03B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID: <b>DB</b>		Run ID: <b>TDS_201223B</b>		SeqNo: <b>7021469</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>		
Client ID:		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>		
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information			Project Information				Parameter/Method Request for Analysis										
Purchase Order		Project Name	DTE Belle River		A	Metals											
Work Order		Project Number	GLP 8017		B	pH, Anions, TDS, Alkalinity											
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants		C												
Send Report To	Michael Coram	Invoice Attn.	Michael Coram		D												
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.		E												
	Suite 100		Suite 100		F												
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105		G												
Phone	734-794-1547	Phone	734-794-1547		H												
Fax	734-332-8063	Fax	734-332-8063		I												
e-Mail Address					J												
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
Sampler(s): Please Print & Sign <i>Mike Coram</i>		Shipment Method: Carrier <i>FedEx</i>		Turnaround Time: (Business Days) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____				Results Due Date:									
Relinquished by: <i>[Signature]</i>	Date: 12/17	Time: 3:00	Received by:		Date:	Time:	Notes: <b>Separate Report</b>										
Relinquished by: <i>Fedex</i>	Date: 12/18/20	Time: 10:00	Received by (Laboratory): <i>[Signature]</i>		Date:	Time:	ALS Cooler ID	Cooler Temp	QC Package: (Check Box Below)								
Logged by (Laboratory): <i>MTG</i>	Date: 12/18/20	Time: 13:46	Checked by (Laboratory): <i>[Signature]</i>					5.8°C	<input type="checkbox"/> TRRP LRC		<input type="checkbox"/> TRRP Level IV						
								PA23	<input type="checkbox"/> Level IV: SW846 Methods/CLP like		<input type="checkbox"/> Other: _____						

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752**

Received by: **MJG**

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 5.8/5.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 12/18/2020 1:47:53 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

**Client Project Name:** DTE - Belle River

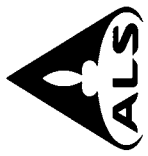
**Client Project Number:** GLP-8017

**Client PO Number:**

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00





Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

Parameter/Method Request for Analysis  
Radium 226 and 228 combined

ALS Project Manager: *Report Separate*

<b>Purchase Order</b>	<b>Project Name</b>	<b>Project Information</b>
<b>Work Order</b>	<i>DTE - Belle River</i>	
<b>Company Name</b>	<b>Project Number</b>	
<b>Send Report To</b>	<i>GRP - 8017</i>	
<b>Address</b>	<b>Bill To Company</b>	
<b>City/State/Zip</b>	<b>Invoice Attn</b>	
<b>Phone</b>	<b>Address</b>	
<b>Fax</b>	<b>City/State/Zip</b>	
<b>e-Mail Address</b>	<b>Phone</b>	
	<b>Fax</b>	
	<b>e-Mail Address</b>	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	<i>BAB - F</i>	<i>12/16</i>	<i>3:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
2	<i>BAB - W</i>	<i>12/16</i>	<i>2:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
3	<i>DB</i>	<i>12/16</i>	<i>4:00</i>	<i>SW</i>	<i>2</i>	<i>2</i>	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

**Sampler(s) Please Print & Sign**  
*Mike Coram - Cor*

**Shipment Method**  
*Fed Ex*

**Required Turnaround Time: (Check Box)**  
 5 WK Days  
 Std. 10 WK Days  
 2 WK Days  
 24 Hour

**Results Due Date:**

**Relinquished by:** *MC* **Date:** *12/17* **Time:** *3:00*

**Received by (Laboratory):** *MC* **Date:** *12/17* **Time:** *3:00*

**Checked by (Laboratory):**

**QC Package: (Check One Box Below)**  
 Level III Std. CC  
 Level III Std. CC/Pres. Data  
 Level IV SW/826-CLP  
 Other

**Preservative Key:** 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20

ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWTG: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-355 RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECIEVING**  
**225 COMMERCÉ DR**

12-1  
3.2

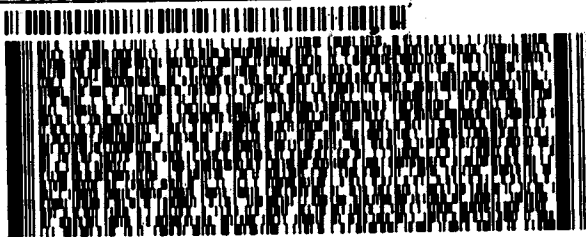
**FORT COLLINS CO 80524**

(616) 582-5201

REF:

INU:

DEPT:



**FedEx**  
Express



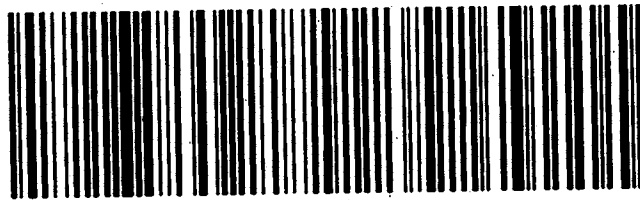
14107-100020207

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**



**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	45		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C

ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012397-1	2012397-2	2012397-3
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Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3



11-Feb-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **21020218**

Dear Michael,

ALS Environmental received 3 samples on 03-Feb-2021 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 24.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental ALS

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 21020218

**Work Order Sample Summary**

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
21020218-01	BAB-North	Groundwater		1/29/2021 12:35	2/3/2021 09:00	<input type="checkbox"/>
21020218-02	BAB-South	Groundwater		1/29/2021 12:15	2/3/2021 09:00	<input type="checkbox"/>
21020218-03	DB	Groundwater		1/29/2021 13:20	2/3/2021 09:00	<input type="checkbox"/>

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 21020218

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**Case Narrative**

Samples for the above noted Work Order were received on 02/03/2021. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R309524, Method SW9040C, Sample BAB-North (21020218-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample BAB-South (21020218-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample DB (21020218-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

Client: Geosyntec Consultants  
 Project: DTE- Belle River (GLP-8017)  
 Sample ID: BAB-North  
 Collection Date: 1/29/2021 12:35 PM

Work Order: 21020218  
 Lab ID: 21020218-01  
 Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:39 PM
<b>MERCURY BY CVAA (DISSOLVED)</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:41 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 2/9/21 15:19	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
<b>Barium</b>	<b>0.48</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:26 PM
<b>Boron</b>	<b>0.17</b>		<b>0.020</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:26 PM
<b>Calcium</b>	<b>42</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
Iron	ND		0.080	mg/L	1	2/9/2021 05:26 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
<b>Lithium</b>	<b>0.017</b>		<b>0.010</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
<b>Magnesium</b>	<b>8.1</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Manganese	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
<b>Molybdenum</b>	<b>0.018</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/10/2021 08:12 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
<b>Sodium</b>	<b>28</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:26 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:26 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>		Prep: FILTER 2/9/21 09:47	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
<b>Barium</b>	<b>0.46</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:30 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	2/10/2021 07:41 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:30 PM
<b>Calcium</b>	<b>41</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:30 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
<b>Lithium</b>	<b>0.017</b>		<b>0.010</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
<b>Magnesium</b>	<b>7.8</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 11-Feb-2021

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-North  
**Collection Date:** 1/29/2021 12:35 PM

**Work Order:** 21020218  
**Lab ID:** 21020218-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
<b>Molybdenum</b>	<b>0.017</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
<b>Potassium</b>	<b>2.9</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
<b>Sodium</b>	<b>27</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:30 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:30 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>88</b>		<b>10</b>	<b>mg/L</b>	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
<b>Alkalinity, Total (as CaCO3)</b>	<b>88</b>		<b>10</b>	<b>mg/L</b>	1	2/9/2021 12:49 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>9.0</b>		<b>1.0</b>	<b>mg/L</b>	1	2/5/2021 08:18 PM
<b>Fluoride</b>	<b>0.26</b>		<b>0.10</b>	<b>mg/L</b>	1	2/5/2021 08:18 PM
<b>Sulfate</b>	<b>100</b>		<b>10</b>	<b>mg/L</b>	10	2/5/2021 08:37 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>7.87</b>	H	<b>0.10</b>	<b>s.u.</b>	1	2/9/2021 12:49 PM
<b>Temperature</b>	<b>20.3</b>	H	<b>0.10</b>	<b>°C</b>	1	2/9/2021 12:49 PM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 2/7/21 15:44	Analyst: <b>ERW</b>
<b>Total Dissolved Solids</b>	<b>200</b>		<b>50</b>	<b>mg/L</b>	1	2/9/2021 02:45 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 11-Feb-2021

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-South  
**Collection Date:** 1/29/2021 12:15 PM

**Work Order:** 21020218  
**Lab ID:** 21020218-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:48 PM
<b>MERCURY BY CVAA (DISSOLVED)</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:50 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 2/9/21 15:19	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
<b>Barium</b>	<b>0.42</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:31 PM
<b>Boron</b>	<b>0.41</b>		<b>0.020</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:31 PM
<b>Calcium</b>	<b>29</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
<b>Iron</b>	<b>0.97</b>		<b>0.080</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 05:31 PM
<b>Magnesium</b>	<b>7.4</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
<b>Manganese</b>	<b>0.0095</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/10/2021 08:13 PM
<b>Potassium</b>	<b>3.8</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
<b>Sodium</b>	<b>44</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:31 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:31 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>		Prep: FILTER 2/9/21 09:47	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
<b>Barium</b>	<b>0.16</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:32 PM
<b>Boron</b>	<b>0.42</b>		<b>0.020</b>	<b>mg/L</b>	1	2/10/2021 07:42 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:32 PM
<b>Calcium</b>	<b>25</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:32 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 04:32 PM
<b>Magnesium</b>	<b>6.4</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group, USA

Date: 11-Feb-2021

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-South  
**Collection Date:** 1/29/2021 12:15 PM

**Work Order:** 21020218  
**Lab ID:** 21020218-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
<b>Molybdenum</b>	<b>0.022</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM
<b>Potassium</b>	<b>3.7</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
<b>Sodium</b>	<b>42</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:32 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:32 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	<b>46</b>		<b>10</b>	<b>mg/L</b>	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	<b>14</b>		<b>10</b>	<b>mg/L</b>	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	<b>60</b>		<b>10</b>	<b>mg/L</b>	1	2/9/2021 12:49 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	<b>9.6</b>		<b>1.0</b>	<b>mg/L</b>	1	2/5/2021 08:56 PM
Fluoride	<b>0.52</b>		<b>0.10</b>	<b>mg/L</b>	1	2/5/2021 08:56 PM
Sulfate	<b>110</b>		<b>8.0</b>	<b>mg/L</b>	8	2/5/2021 09:16 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	<b>8.71</b>	H	<b>0.10</b>	<b>s.u.</b>	1	2/9/2021 12:49 PM
Temperature	<b>19.5</b>	H	<b>0.10</b>	<b>°C</b>	1	2/9/2021 12:49 PM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 2/7/21 15:44	Analyst: <b>ERW</b>
Total Dissolved Solids	<b>220</b>		<b>50</b>	<b>mg/L</b>	1	2/9/2021 02:45 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 1/29/2021 01:20 PM

**Work Order:** 21020218  
**Lab ID:** 21020218-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:52 PM
<b>MERCURY BY CVAA (DISSOLVED)</b>			<b>SW7470A</b>		Prep: SW7470 2/8/21 13:14	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:53 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 2/9/21 15:19	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
<b>Barium</b>	<b>0.35</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:33 PM
<b>Boron</b>	<b>0.68</b>		<b>0.20</b>	<b>mg/L</b>	10	2/10/2021 08:15 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:33 PM
<b>Calcium</b>	<b>41</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
<b>Chromium</b>	<b>0.0056</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
<b>Iron</b>	<b>0.26</b>		<b>0.080</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
<b>Lithium</b>	<b>0.016</b>		<b>0.010</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
<b>Magnesium</b>	<b>9.0</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
<b>Manganese</b>	<b>0.0097</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
<b>Molybdenum</b>	<b>0.029</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
<b>Potassium</b>	<b>3.9</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
<b>Sodium</b>	<b>58</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 05:33 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:33 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>		Prep: FILTER 2/9/21 09:47	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
<b>Barium</b>	<b>0.24</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:34 PM
<b>Boron</b>	<b>0.61</b>		<b>0.020</b>	<b>mg/L</b>	1	2/10/2021 07:44 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:34 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:34 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
<b>Lithium</b>	<b>0.015</b>		<b>0.010</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
<b>Magnesium</b>	<b>8.5</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 11-Feb-2021

Client: Geosyntec Consultants  
 Project: DTE- Belle River (GLP-8017)  
 Sample ID: DB  
 Collection Date: 1/29/2021 01:20 PM

Work Order: 21020218  
 Lab ID: 21020218-03  
 Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
<b>Molybdenum</b>	<b>0.029</b>		<b>0.0050</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
<b>Potassium</b>	<b>3.7</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
Selenium	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
<b>Sodium</b>	<b>57</b>		<b>0.20</b>	<b>mg/L</b>	1	2/9/2021 04:34 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:34 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	69		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	35		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3)	18		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	100		10	mg/L	1	2/9/2021 12:49 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	14		1.0	mg/L	1	2/5/2021 09:35 PM
Fluoride	0.31		0.10	mg/L	1	2/5/2021 09:35 PM
Sulfate	130		8.0	mg/L	8	2/5/2021 09:54 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	9.01	H	0.10	s.u.	1	2/9/2021 12:49 PM
Temperature	19.7	H	0.10	°C	1	2/9/2021 12:49 PM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 2/7/21 15:44	Analyst: <b>ERW</b>
Total Dissolved Solids	300		50	mg/L	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 21020218  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **171771** Instrument ID **HG4** Method: **SW7470A**

MBLK		Sample ID: <b>MBLK-171771-171771</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/8/2021 01:27 PM</b>			
Client ID:		Run ID: <b>HG4_210208A</b>				SeqNo: <b>7127171</b>		Prep Date: <b>2/8/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	ND	0.00020									

LCS		Sample ID: <b>LCS-171771-171771</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/8/2021 02:50 PM</b>			
Client ID:		Run ID: <b>HG4_210208A</b>				SeqNo: <b>7127218</b>		Prep Date: <b>2/8/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.001785	0.00020	0.002	0	89.2	80-120	0				

MS		Sample ID: <b>21020251-02AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/8/2021 02:11 PM</b>			
Client ID:		Run ID: <b>HG4_210208A</b>				SeqNo: <b>7127196</b>		Prep Date: <b>2/8/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.01995	0.0020	0.02	0.00075	96	75-125	0				

MSD		Sample ID: <b>21020251-02AMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/8/2021 02:13 PM</b>			
Client ID:		Run ID: <b>HG4_210208A</b>				SeqNo: <b>7127197</b>		Prep Date: <b>2/8/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Mercury	0.0198	0.0020	0.02	0.00075	95.2	75-125	0.01995	0.755	20		

The following samples were analyzed in this batch:

21020218-01A	21020218-01C	21020218-02A
21020218-02C	21020218-03A	21020218-03C

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171827 Instrument ID ICPMS3 Method: SW6020B (Dissolve)

MBLK		Sample ID: MBLK-171827-171827				Units: mg/L		Analysis Date: 2/9/2021 04:21 PM		
Client ID:		Run ID: ICPMS3_210209A			SeqNo: 7131167		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

MBLK		Sample ID: MBLK-171827-171827				Units: mg/L		Analysis Date: 2/10/2021 07:33 PM		
Client ID:		Run ID: ICPMS3_210210B			SeqNo: 7133898		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	ND	0.020								

LCS		Sample ID: LCS-171827-171827				Units: mg/L		Analysis Date: 2/9/2021 04:22 PM		
Client ID:		Run ID: ICPMS3_210209A			SeqNo: 7131168		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0857	0.0050	0.1	0	85.7	80-120	0			
Arsenic	0.08929	0.0050	0.1	0	89.3	80-120	0			
Chromium	0.08766	0.0050	0.1	0	87.7	80-120	0			
Cobalt	0.0894	0.0050	0.1	0	89.4	80-120	0			
Iron	9.019	0.080	10	0	90.2	80-120	0			
Magnesium	9.509	0.20	10	0	95.1	80-120	0			
Potassium	9.46	0.20	10	0	94.6	80-120	0			
Selenium	0.09002	0.0050	0.1	0	90	80-120	0			
Sodium	9.507	0.20	10	0	95.1	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171827 Instrument ID ICPMS3 Method: SW6020B (Dissolve)

LCS				Sample ID: LCS-171827-171827			Units: mg/L		Analysis Date: 2/10/2021 07:34 PM		
Client ID:		Run ID: ICPMS3_210210B			SeqNo: 7133899		Prep Date: 2/9/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Barium	0.09386	0.0050	0.1	0	93.9	80-120	0				
Beryllium	0.09556	0.0020	0.1	0	95.6	80-120	0				
Boron	0.451	0.020	0.5	0	90.2	80-120	0				
Cadmium	0.1006	0.0020	0.1	0	101	80-120	0				
Calcium	9.733	0.50	10	0	97.3	80-120	0				
Lead	0.0935	0.0050	0.1	0	93.5	80-120	0				
Lithium	0.09548	0.010	0.1	0	95.5	80-120	0				
Manganese	0.09292	0.0050	0.1	0	92.9	80-120	0				
Molybdenum	0.09283	0.0050	0.1	0	92.8	80-120	0				
Thallium	0.09105	0.0050	0.1	0	91	80-120	0				

MS				Sample ID: 21020221-05CMS			Units: mg/L		Analysis Date: 2/9/2021 04:43 PM		
Client ID:		Run ID: ICPMS3_210209A			SeqNo: 7131181		Prep Date: 2/9/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1073	0.0050	0.1	0.004695	103	75-125	0				
Arsenic	0.1256	0.0050	0.1	0.02734	98.3	75-125	0				
Barium	0.1975	0.0050	0.1	0.09727	100	75-125	0				
Beryllium	0.102	0.0020	0.1	0.000004	102	75-125	0				
Cadmium	0.1033	0.0020	0.1	0.000858	102	75-125	0				
Chromium	0.09276	0.0050	0.1	-0.000101	92.9	75-125	0				
Cobalt	0.0935	0.0050	0.1	0.000074	93.4	75-125	0				
Iron	9.544	0.080	10	-0.000258	95.4	75-125	0				
Lead	0.09906	0.0050	0.1	-0.000002	99.1	75-125	0				
Lithium	0.1067	0.010	0.1	0.005053	102	75-125	0				
Magnesium	10.65	0.20	10	0.6432	100	75-125	0				
Manganese	0.09753	0.0050	0.1	0.000013	97.5	75-125	0				
Potassium	13.46	0.20	10	3.327	101	75-125	0				
Selenium	0.1159	0.0050	0.1	0.008307	108	75-125	0				
Sodium	11.55	0.20	10	1.711	98.4	75-125	0				
Thallium	0.09602	0.0050	0.1	0.00022	95.8	75-125	0				

MS				Sample ID: 21020221-05CMS			Units: mg/L		Analysis Date: 2/10/2021 07:59 PM		
Client ID:		Run ID: ICPMS3_210210B			SeqNo: 7133914		Prep Date: 2/9/2021		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Boron	11.73	0.20	0.5	11.63	19.6	75-125	0			SO	
Calcium	259.6	5.0	10	267.5	-78.8	75-125	0			SO	
Molybdenum	8.941	0.050	0.1	9.43	-489	75-125	0			SO	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171827 Instrument ID ICPMS3 Method: SW6020B (Dissolve)

MSD		Sample ID: 21020221-05CMSD				Units: mg/L		Analysis Date: 2/9/2021 04:45 PM		
Client ID:		Run ID: ICPMS3_210209A			SeqNo: 7131182		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1081	0.0050	0.1	0.004695	103	75-125	0.1073	0.729	20	
Arsenic	0.1257	0.0050	0.1	0.02734	98.4	75-125	0.1256	0.0827	20	
Barium	0.1991	0.0050	0.1	0.09727	102	75-125	0.1975	0.83	20	
Beryllium	0.1025	0.0020	0.1	0.000004	102	75-125	0.102	0.478	20	
Cadmium	0.1032	0.0020	0.1	0.000858	102	75-125	0.1033	0.0814	20	
Calcium	253.8	0.50	10	245.8	80.1	75-125	251.3	0.993	20	EO
Chromium	0.09319	0.0050	0.1	-0.000101	93.3	75-125	0.09276	0.457	20	
Cobalt	0.093	0.0050	0.1	0.000074	92.9	75-125	0.0935	0.533	20	
Iron	9.524	0.080	10	-0.000258	95.2	75-125	9.544	0.211	20	
Lead	0.09986	0.0050	0.1	-0.000002	99.9	75-125	0.09906	0.802	20	
Lithium	0.1074	0.010	0.1	0.005053	102	75-125	0.1067	0.669	20	
Magnesium	10.69	0.20	10	0.6432	100	75-125	10.65	0.396	20	
Manganese	0.09729	0.0050	0.1	0.000013	97.3	75-125	0.09753	0.248	20	
Potassium	13.49	0.20	10	3.327	102	75-125	13.46	0.238	20	
Selenium	0.1103	0.0050	0.1	0.008307	102	75-125	0.1159	5	20	
Sodium	11.5	0.20	10	1.711	97.9	75-125	11.55	0.459	20	
Thallium	0.09707	0.0050	0.1	0.00022	96.9	75-125	0.09602	1.09	20	

MSD		Sample ID: 21020221-05CMSD				Units: mg/L		Analysis Date: 2/10/2021 08:00 PM		
Client ID:		Run ID: ICPMS3_210210B			SeqNo: 7133915		Prep Date: 2/9/2021		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	11.81	0.20	0.5	11.63	35.2	75-125	11.73	0.664	20	SO
Calcium	266.8	5.0	10	267.5	-6.95	75-125	259.6	2.73	20	SO
Molybdenum	9.188	0.050	0.1	9.43	-242	75-125	8.941	2.73	20	SO

The following samples were analyzed in this batch: 21020218-01C 21020218-02C 21020218-03C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171837 Instrument ID ICPMS3 Method: SW6020B

MBLK		Sample ID: MBLK-171837-171837				Units: mg/L		Analysis Date: 2/9/2021 05:20 PM			
Client ID:		Run ID: ICPMS3_210209A				SeqNo: 7131221		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	ND	0.0050									
Arsenic	ND	0.0050									
Barium	ND	0.0050									
Beryllium	ND	0.0020									
Cadmium	ND	0.0020									
Calcium	ND	0.50									
Chromium	ND	0.0050									
Cobalt	ND	0.0050									
Iron	ND	0.080									
Lead	ND	0.0050									
Lithium	ND	0.010									
Magnesium	ND	0.20									
Manganese	ND	0.0050									
Potassium	ND	0.20									
Selenium	ND	0.0050									
Sodium	ND	0.20									
Thallium	ND	0.0050									

MBLK		Sample ID: MBLK-171837-171837				Units: mg/L		Analysis Date: 2/10/2021 08:10 PM			
Client ID:		Run ID: ICPMS3_210210B				SeqNo: 7133921		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Boron	ND	0.020									
Molybdenum	ND	0.0050									

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171837 Instrument ID ICPMS3 Method: SW6020B

LCS		Sample ID: LCS-171837-171837				Units: mg/L		Analysis Date: 2/9/2021 05:21 PM		
Client ID:		Run ID: ICPMS3_210209A			SeqNo: 7131223		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0943	0.0050	0.1	0	94.3	80-120	0			
Arsenic	0.1004	0.0050	0.1	0	100	80-120	0			
Barium	0.09716	0.0050	0.1	0	97.2	80-120	0			
Beryllium	0.09892	0.0020	0.1	0	98.9	80-120	0			
Boron	0.4506	0.020	0.5	0	90.1	80-120	0			
Cadmium	0.1018	0.0020	0.1	0	102	80-120	0			
Calcium	9.911	0.50	10	0	99.1	80-120	0			
Chromium	0.1011	0.0050	0.1	0	101	80-120	0			
Cobalt	0.1005	0.0050	0.1	0	101	80-120	0			
Iron	10	0.080	10	0	100	80-120	0			
Lead	0.09736	0.0050	0.1	0	97.4	80-120	0			
Lithium	0.09537	0.010	0.1	0	95.4	80-120	0			
Magnesium	10.02	0.20	10	0	100	80-120	0			
Manganese	0.09892	0.0050	0.1	0	98.9	80-120	0			
Molybdenum	0.09561	0.0050	0.1	0	95.6	80-120	0			
Potassium	9.937	0.20	10	0	99.4	80-120	0			
Selenium	0.101	0.0050	0.1	0	101	80-120	0			
Sodium	9.964	0.20	10	0	99.6	80-120	0			
Thallium	0.09287	0.0050	0.1	0	92.9	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Geosyntec Consultants  
**Work Order:** 21020218  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **171837**      Instrument ID **ICPMS3**      Method: **SW6020B**

MS		Sample ID: <b>21020218-01AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/9/2021 05:28 PM</b>		
Client ID: <b>BAB-North</b>		Run ID: <b>ICPMS3_210209A</b>			SeqNo: <b>7131231</b>		Prep Date: <b>2/9/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09531	0.0050	0.1	0.000535	94.8	75-125	0			
Arsenic	0.106	0.0050	0.1	0.004913	101	75-125	0			
Barium	0.5807	0.0050	0.1	0.4786	102	75-125	0			O
Beryllium	0.1008	0.0020	0.1	0.000005	101	75-125	0			
Boron	0.6679	0.020	0.5	0.1696	99.7	75-125	0			
Cadmium	0.09992	0.0020	0.1	0.000028	99.9	75-125	0			
Calcium	50.88	0.50	10	41.71	91.7	75-125	0			O
Chromium	0.1048	0.0050	0.1	0.004783	100	75-125	0			
Cobalt	0.1001	0.0050	0.1	0.000044	100	75-125	0			
Iron	9.992	0.080	10	0.03947	99.5	75-125	0			
Lead	0.09806	0.0050	0.1	0.000997	97.1	75-125	0			
Lithium	0.1171	0.010	0.1	0.0174	99.7	75-125	0			
Magnesium	17.93	0.20	10	8.149	97.8	75-125	0			
Manganese	0.09893	0.0050	0.1	0.00235	96.6	75-125	0			
Molybdenum	0.1154	0.0050	0.1	0.01656	98.8	75-125	0			
Potassium	12.76	0.20	10	3.009	97.6	75-125	0			
Selenium	0.09775	0.0050	0.1	0.000816	96.9	75-125	0			
Sodium	37.41	0.20	10	28.03	93.8	75-125	0			
Thallium	0.0931	0.0050	0.1	0.000099	93	75-125	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171837 Instrument ID ICPMS3 Method: SW6020B

MSD		Sample ID: 21020218-01AMSD				Units: mg/L		Analysis Date: 2/9/2021 05:29 PM		
Client ID: BAB-North		Run ID: ICPMS3_210209A			SeqNo: 7131233		Prep Date: 2/9/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09562	0.0050	0.1	0.000535	95.1	75-125	0.09531	0.325	20	
Arsenic	0.1066	0.0050	0.1	0.004913	102	75-125	0.106	0.583	20	
Barium	0.5787	0.0050	0.1	0.4786	100	75-125	0.5807	0.339	20	O
Beryllium	0.09986	0.0020	0.1	0.000005	99.9	75-125	0.1008	0.892	20	
Boron	0.6702	0.020	0.5	0.1696	100	75-125	0.6679	0.348	20	
Cadmium	0.1001	0.0020	0.1	0.000028	100	75-125	0.09992	0.211	20	
Calcium	51.01	0.50	10	41.71	93	75-125	50.88	0.261	20	O
Chromium	0.1046	0.0050	0.1	0.004783	99.8	75-125	0.1048	0.244	20	
Cobalt	0.1003	0.0050	0.1	0.000044	100	75-125	0.1001	0.188	20	
Iron	10.02	0.080	10	0.03947	99.8	75-125	9.992	0.277	20	
Lead	0.09843	0.0050	0.1	0.000997	97.4	75-125	0.09806	0.379	20	
Lithium	0.1162	0.010	0.1	0.0174	98.8	75-125	0.1171	0.735	20	
Magnesium	17.71	0.20	10	8.149	95.7	75-125	17.93	1.2	20	
Manganese	0.09947	0.0050	0.1	0.00235	97.1	75-125	0.09893	0.552	20	
Molybdenum	0.1174	0.0050	0.1	0.01656	101	75-125	0.1154	1.73	20	
Potassium	12.83	0.20	10	3.009	98.2	75-125	12.76	0.546	20	
Selenium	0.09486	0.0050	0.1	0.000816	94	75-125	0.09775	2.99	20	
Sodium	37.4	0.20	10	28.03	93.8	75-125	37.41	0.0176	20	
Thallium	0.09346	0.0050	0.1	0.000099	93.4	75-125	0.0931	0.388	20	

The following samples were analyzed in this batch:

21020218-01A	21020218-02A	21020218-03A
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 171610 Instrument ID TDS Method: A2540 C-11

MBLK		Sample ID: MBLK-171610-171610				Units: mg/L		Analysis Date: 2/9/2021 02:45 PM		
Client ID:		Run ID: TDS_210209A		SeqNo: 7130209		Prep Date: 2/7/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

LCS		Sample ID: LCS-171610-171610				Units: mg/L		Analysis Date: 2/9/2021 02:45 PM		
Client ID:		Run ID: TDS_210209A		SeqNo: 7130208		Prep Date: 2/7/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 464 30 495 0 93.7 85-109 0

DUP		Sample ID: 21020092-13A DUP				Units: mg/L		Analysis Date: 2/9/2021 02:45 PM		
Client ID:		Run ID: TDS_210209A		SeqNo: 7130187		Prep Date: 2/7/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 1520 300 0 0 0 0-0 1500 1.32 10

DUP		Sample ID: 21020221-01B DUP				Units: mg/L		Analysis Date: 2/9/2021 02:45 PM		
Client ID:		Run ID: TDS_210209A		SeqNo: 7130203		Prep Date: 2/7/2021		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 600 100 0 0 0 0-0 593.3 1.12 10 H

The following samples were analyzed in this batch: 21020218-01B 21020218-02B 21020218-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R309401** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R309401</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/5/2021 02:50 PM</b>			
Client ID:		Run ID: <b>IC3_210205A</b>				SeqNo: <b>7124881</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R309401</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/5/2021 03:10 PM</b>			
Client ID:		Run ID: <b>IC3_210205A</b>				SeqNo: <b>7124882</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.483	1.0	10	0	94.8	88-110	0				
Fluoride	1.989	0.10	2	0	99.5	82-116	0				
Sulfate	9.754	1.0	10	0	97.5	90-110	0				

MS		Sample ID: <b>21020375-03A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/5/2021 05:24 PM</b>			
Client ID:		Run ID: <b>IC3_210205A</b>				SeqNo: <b>7124889</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	761.2	40	400	366.7	98.6	88-110	0				
Sulfate	399	40	400	22.67	94.1	90-110	0				

MSD		Sample ID: <b>21020375-03A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/5/2021 05:44 PM</b>			
Client ID:		Run ID: <b>IC3_210205A</b>				SeqNo: <b>7124890</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	761.5	40	400	366.7	98.7	88-110	761.2	0.0436	20		
Sulfate	397.8	40	400	22.67	93.8	90-110	399	0.305	20		

The following samples were analyzed in this batch: 21020218-01B 21020218-02B 21020218-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R309522** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R309522-R309522</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209A</b>				SeqNo: <b>7129322</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R309522-R309522</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209A</b>				SeqNo: <b>7129323</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	894.2	10	925	0	96.7	88-110	0			
Alkalinity, Total (as CaCO3)	965.4	10	1000	0	96.5	89-103	0			

DUP		Sample ID: <b>21020218-01B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID: <b>BAB-North</b>		Run ID: <b>TITRATOR 1_210209A</b>				SeqNo: <b>7129326</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	83.06	10	0	0	0	0-0	87.95	5.72	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Hydroxide (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Phenolphthalein (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Total (as CaCO3)	83.06	10	0	0	0	0-0	87.95	5.72	10	

DUP		Sample ID: <b>21020353-01H DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209A</b>				SeqNo: <b>7129337</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	767.6	10	0	0	0	0-0	778.2	1.37	10	

The following samples were analyzed in this batch: | 21020218-01B | 21020218-02B | 21020218-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21020218  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R309524** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R309524-R309524</b>				Units: <b>s.u.</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209B</b>				SeqNo: <b>7129346</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS		Sample ID: <b>LCS-R309524-R309524</b>				Units: <b>s.u.</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209B</b>				SeqNo: <b>7129349</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP		Sample ID: <b>21020240-01A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_210209B</b>				SeqNo: <b>7129348</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.63	0.10	0	0	0	0-0	7.87	3.1	5	H
Temperature	20.95	0.10	0	0	0	0-0	21.12	0.808		H

DUP		Sample ID: <b>21020218-01B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>2/9/2021 12:49 PM</b>		
Client ID: <b>BAB-North</b>		Run ID: <b>TITRATOR 1_210209B</b>				SeqNo: <b>7129351</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.85	0.10	0	0	0	0-0	7.87	0.254	5	H
Temperature	20.03	0.10	0	0	0		20.3	1.34		H

The following samples were analyzed in this batch: 

21020218-01B	21020218-02B	21020218-03B
--------------	--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Fort Collins, CO  
+1 970 490 1511

Everett, WA  
+1 425 356 2600

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Houston, TX  
+1 281 530 5656

Spring City, PA  
+1 610 948 4903

South Charleston, WV  
+1 304 356 3168

Middletown, PA  
+1 717 944 5541

Salt Lake City, UT  
+1 801 266 7700

York, PA  
+1 717 505 5280

Page \_\_\_\_ of \_\_\_\_

COC ID: 235261

21020218

ALS Project Manager: \_\_\_\_\_ ALS Work Order #: 34024

Customer Information		Project Information		Parameter/Method Request for Analysis												
Purchase Order		Project Name	DTE Belle River	A	pH, TDS, Alkalinity											
Work Order		Project Number	GIP-8017	B	Anions - Cl, F, SO4											
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	Metals (Total)											
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	Metals (Dissolved) Lab Filtered											
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.	E												
	Suite 100		Suite 100	F												
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G												
Phone	(734) 794-1547	Phone	(734) 794-1547	H												
Fax	(734) 332-8063	Fax	(734) 332-8063	I												
e-Mail Address		e-Mail Address		J												

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB - North	1/29	12:35	GW	2	3	X	X	X	X							
2	BAB - South	1/29	12:35	↓	↓	↓	X	X	X	X							
3	DB	1/29	13:20	↓	↓	↓	X	X	X	X							
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign <i>Mike Coram</i>		Shipment Method Fed Ex		Required Turnaround Time: (Check Box) <input type="checkbox"/> Std 10 WK Days <input type="checkbox"/> 5 WK Days <input type="checkbox"/> Other <input type="checkbox"/> 2 WK Days <input type="checkbox"/> 24 Hour				Results Due Date:			
Relinquished by: <i>[Signature]</i>	Date: 2/1	Time: 1400	Received by:		Notes: DISS METALS → 1al Filter						
Relinquished by: Fedex	Date: 2/3/20	Time: 9:00	Received by (Laboratory):		Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)				
Logged by (Laboratory): MS6	Date: 2/3/20	Time: 14:15	Checked by (Laboratory):			0.8°C	<input type="checkbox"/> Level II Std QC	<input type="checkbox"/> TRRP CheckList			
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035						TAL	<input type="checkbox"/> Level III Std QC/Raw Data	<input type="checkbox"/> TRRP Level IV			
						pH 7.4	<input type="checkbox"/> Level IV SW846/CLP				
							<input type="checkbox"/> Other				

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **03-Feb-21 09:00**

Work Order: **21020218**

Received by: **MJG**

Checklist completed by Matthew Gaylord 03-Feb-21  
eSignature Date

Reviewed by: Chad Whelton 03-Feb-21  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 0.8/0.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 2/3/2021 2:16:54 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

# **Eurofins Environmental Testing**



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Mr. Vincent Buening  
TRC Environmental Corporation.  
1540 Eisenhower Place  
Ann Arbor, Michigan 48108-7080

Generated 1/4/2023 7:30:32 PM

## JOB DESCRIPTION

CCR DTE Belle River Power-Aquifer

## JOB NUMBER

240-178276-1

# Eurofins Canton

## Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

## Authorization



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1/4/2023 7:30:32 PM

Authorized for release by  
Kris Brooks, Project Manager II  
[Kris.Brooks@et.eurofinsus.com](mailto:Kris.Brooks@et.eurofinsus.com)  
(330)966-9790



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# Definitions/Glossary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

### General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
⊞	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

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**Job ID: 240-178276-1**

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**Laboratory: Eurofins Canton**

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**Narrative**

**Job Narrative  
240-178276-1**

**Receipt**

The samples were received on 12/20/2022 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C

**Metals**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

**General Chemistry**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

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# Method Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

#### Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396



# Sample Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178276-1	NORTH BAB	Water	12/14/22 15:28	12/20/22 10:00
240-178276-2	DB-01	Water	12/16/22 14:40	12/20/22 10:00
240-178276-3	SC-01	Water	12/16/22 15:49	12/20/22 10:00
240-178276-4	DUP-01	Water	12/14/22 00:00	12/20/22 10:00

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# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: NORTH BAB

## Lab Sample ID: 240-178276-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	190		100	57	ug/L	1		6010B	Total Recoverable
Barium	270		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	49000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	8200		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3200		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	23		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	2000		10	10	ug/L	1		6020	Total Recoverable
Sodium	49000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	26		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	97		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	50		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	47		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	8.2		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.099		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	150		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.1		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: DB-01

## Lab Sample ID: 240-178276-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	7300		100	57	ug/L	1		6010B	Total Recoverable
Barium	290		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	110000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	15000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	13000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	240		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	2300		10	10	ug/L	1		6020	Total Recoverable
Sodium	460000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	83		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	120		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	27		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	46		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.26		0.050	0.050	mg/L	1		9056A	Total/NA

This Detection Summary does not include radiochemical test results.

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# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: DB-01 (Continued)

## Lab Sample ID: 240-178276-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	1100		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	3.7		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: SC-01

## Lab Sample ID: 240-178276-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	13		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	25000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	7600		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	1100		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	86		10	10	ug/L	1		6020	Total Recoverable
Sodium	5900		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	81		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	81		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	9.6		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.080		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	15		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.9		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: DUP-01

## Lab Sample ID: 240-178276-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1100		100	57	ug/L	1		6010B	Total Recoverable
Barium	310		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	33000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	85		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	920		10	10	ug/L	1		6020	Total Recoverable
Sodium	340000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	19		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01 (Continued)**

**Lab Sample ID: 240-178276-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	550		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.69	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: NORTH BAB**

**Lab Sample ID: 240-178276-1**

Date Collected: 12/14/22 15:28

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	190		100	57	ug/L		12/27/22 12:00	12/28/22 15:18	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	270		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:01	1
Calcium	49000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Magnesium	8200		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Potassium	3200		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Molybdenum	23		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:01	1
Strontium	2000		10	10	ug/L		12/27/22 12:00	12/28/22 16:01	1
Sodium	49000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Lithium	26		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:01	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	97		5.0	2.6	mg/L			12/21/22 22:20	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	50		5.0	2.6	mg/L			12/21/22 22:20	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	47		5.0	2.6	mg/L			12/21/22 22:20	1
Chloride (SW846 9056A)	8.2		1.0	1.0	mg/L			12/31/22 21:00	1
Fluoride (SW846 9056A)	0.099		0.050	0.050	mg/L			12/31/22 21:00	1
Sulfate (SW846 9056A)	150		1.0	1.0	mg/L			12/31/22 21:00	1
Total Organic Carbon (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 1 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 2 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 3 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 4 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DB-01**

**Lab Sample ID: 240-178276-2**

Date Collected: 12/16/22 14:40

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	7300		100	57	ug/L		12/27/22 12:00	12/28/22 15:22	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	290		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:12	1
Calcium	110000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Magnesium	15000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Potassium	13000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Molybdenum	240		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:12	1
Strontium	2300		10	10	ug/L		12/27/22 12:00	12/28/22 16:12	1
Sodium	460000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Lithium	83		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:12	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:24	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	120		5.0	2.6	mg/L			12/21/22 22:24	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	27		5.0	2.6	mg/L			12/21/22 22:24	1
Chloride (SW846 9056A)	46		1.0	1.0	mg/L			12/31/22 21:21	1
Fluoride (SW846 9056A)	0.26		0.050	0.050	mg/L			12/31/22 21:21	1
Sulfate (SW846 9056A)	1100		10	10	mg/L			12/31/22 21:43	10
Total Organic Carbon (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 1 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 2 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 3 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 4 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: SC-01**

**Lab Sample ID: 240-178276-3**

Date Collected: 12/16/22 15:49

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/27/22 12:00	12/28/22 15:26	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	13		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:14	1
Calcium	25000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Magnesium	7600		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Potassium	1100		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:14	1
Strontium	86		10	10	ug/L		12/27/22 12:00	12/28/22 16:14	1
Sodium	5900		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Lithium	8.0	U	8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:14	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	81		5.0	2.6	mg/L			12/21/22 22:28	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	81		5.0	2.6	mg/L			12/21/22 22:28	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:28	1
Chloride (SW846 9056A)	9.6		1.0	1.0	mg/L			12/31/22 22:05	1
Fluoride (SW846 9056A)	0.080		0.050	0.050	mg/L			12/31/22 22:05	1
Sulfate (SW846 9056A)	15		1.0	1.0	mg/L			12/31/22 22:05	1
Total Organic Carbon (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 1 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 2 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 3 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 4 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01**  
 Date Collected: 12/14/22 00:00  
 Date Received: 12/20/22 10:00

**Lab Sample ID: 240-178276-4**  
 Matrix: Water

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1100		100	57	ug/L		12/27/22 12:00	12/28/22 15:31	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	310		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:17	1
Calcium	33000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Magnesium	11000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Potassium	2700		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Molybdenum	85		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:17	1
Strontium	920		10	10	ug/L		12/27/22 12:00	12/28/22 16:17	1
Sodium	340000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Lithium	19		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:17	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:32	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:32	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:32	1
Chloride (SW846 9056A)	550		10	10	mg/L			12/31/22 22:48	10
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			12/31/22 22:27	1
Sulfate (SW846 9056A)	1.0	U	1.0	1.0	mg/L			12/31/22 22:27	1
Total Organic Carbon (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 1 (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 2 (SW846 9060A)	0.69	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 3 (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 4 (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 09:12	1



# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-557192/1-A  
Matrix: Water  
Analysis Batch: 557398

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/27/22 12:00	12/28/22 14:02	1

Lab Sample ID: LCS 240-557192/2-A  
Matrix: Water  
Analysis Batch: 557398

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000	1010		ug/L		101	80 - 120

## Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 240-557192/1-A  
Matrix: Water  
Analysis Batch: 557451

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 15:42	1
Calcium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Magnesium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Potassium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 15:42	1
Strontium	10	U	10	10	ug/L		12/27/22 12:00	12/28/22 15:42	1
Sodium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Lithium	8.0	U	8.0	8.0	ug/L		12/27/22 12:00	12/28/22 15:42	1

Lab Sample ID: LCS 240-557192/3-A  
Matrix: Water  
Analysis Batch: 557451

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	938		ug/L		94	80 - 120
Calcium	25000	24500		ug/L		98	80 - 120
Magnesium	25000	24500		ug/L		98	80 - 120
Potassium	25000	24500		ug/L		98	80 - 120
Molybdenum	500	465		ug/L		93	80 - 120
Strontium	500	469		ug/L		94	80 - 120
Sodium	25000	24500		ug/L		98	80 - 120
Lithium	500	483		ug/L		97	80 - 120

## Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: MB 240-557050/30  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 2320B-1997 - Alkalinity, Total (Continued)

Lab Sample ID: MB 240-557050/4  
 Matrix: Water  
 Analysis Batch: 557050

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1

Lab Sample ID: LCS 240-557050/29  
 Matrix: Water  
 Analysis Batch: 557050

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557649/3  
 Matrix: Water  
 Analysis Batch: 557649

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	1.0	U	1.0	1.0	mg/L			12/31/22 07:59	1
Fluoride	0.050	U	0.050	0.050	mg/L			12/31/22 07:59	1
Sulfate	1.0	U	1.0	1.0	mg/L			12/31/22 07:59	1

Lab Sample ID: LCS 240-557649/4  
 Matrix: Water  
 Analysis Batch: 557649

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	2.50	2.65		mg/L		106	90 - 110
Sulfate	50.0	50.3		mg/L		101	90 - 110

## Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557515/34  
 Matrix: Water  
 Analysis Batch: 557515

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/29/22 06:09	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/29/22 06:09	1

Lab Sample ID: MB 240-557515/4  
 Matrix: Water  
 Analysis Batch: 557515

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 9060A - Organic Carbon, Total (TOC) (Continued)

**Lab Sample ID: LCS 240-557515/35**  
**Matrix: Water**  
**Analysis Batch: 557515**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115
TOC Result 1	18.3	18.3		mg/L		100	85 - 115

**Lab Sample ID: LCS 240-557515/5**  
**Matrix: Water**  
**Analysis Batch: 557515**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115
TOC Result 1	18.3	18.3		mg/L		100	85 - 115

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Metals

### Prep Batch: 557192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	3005A	
240-178276-2	DB-01	Total Recoverable	Water	3005A	
240-178276-3	SC-01	Total Recoverable	Water	3005A	
240-178276-4	DUP-01	Total Recoverable	Water	3005A	
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-557192/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-557192/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

### Analysis Batch: 557398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	6010B	557192
240-178276-2	DB-01	Total Recoverable	Water	6010B	557192
240-178276-3	SC-01	Total Recoverable	Water	6010B	557192
240-178276-4	DUP-01	Total Recoverable	Water	6010B	557192
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	6010B	557192
LCS 240-557192/2-A	Lab Control Sample	Total Recoverable	Water	6010B	557192

### Analysis Batch: 557451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	6020	557192
240-178276-2	DB-01	Total Recoverable	Water	6020	557192
240-178276-3	SC-01	Total Recoverable	Water	6020	557192
240-178276-4	DUP-01	Total Recoverable	Water	6020	557192
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	6020	557192
LCS 240-557192/3-A	Lab Control Sample	Total Recoverable	Water	6020	557192

## General Chemistry

### Analysis Batch: 557050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	2320B-1997	
240-178276-2	DB-01	Total/NA	Water	2320B-1997	
240-178276-3	SC-01	Total/NA	Water	2320B-1997	
240-178276-4	DUP-01	Total/NA	Water	2320B-1997	
MB 240-557050/30	Method Blank	Total/NA	Water	2320B-1997	
MB 240-557050/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-557050/29	Lab Control Sample	Total/NA	Water	2320B-1997	

### Analysis Batch: 557515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	9060A	
240-178276-2	DB-01	Total/NA	Water	9060A	
240-178276-3	SC-01	Total/NA	Water	9060A	
240-178276-4	DUP-01	Total/NA	Water	9060A	
MB 240-557515/34	Method Blank	Total/NA	Water	9060A	
MB 240-557515/4	Method Blank	Total/NA	Water	9060A	
LCS 240-557515/35	Lab Control Sample	Total/NA	Water	9060A	
LCS 240-557515/5	Lab Control Sample	Total/NA	Water	9060A	

# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## General Chemistry

### Analysis Batch: 557649

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	9056A	
240-178276-2	DB-01	Total/NA	Water	9056A	
240-178276-2	DB-01	Total/NA	Water	9056A	
240-178276-3	SC-01	Total/NA	Water	9056A	
240-178276-4	DUP-01	Total/NA	Water	9056A	
240-178276-4	DUP-01	Total/NA	Water	9056A	
MB 240-557649/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557649/4	Lab Control Sample	Total/NA	Water	9056A	

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: NORTH BAB

Lab Sample ID: 240-178276-1

Date Collected: 12/14/22 15:28

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:18
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:01
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:20
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 21:00
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 07:07

## Client Sample ID: DB-01

Lab Sample ID: 240-178276-2

Date Collected: 12/16/22 14:40

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:22
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:12
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:24
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 21:21
Total/NA	Analysis	9056A		10	557649	JMB	EET CAN	12/31/22 21:43
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 08:01

## Client Sample ID: SC-01

Lab Sample ID: 240-178276-3

Date Collected: 12/16/22 15:49

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:26
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:14
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:28
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 22:05
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 08:37

## Client Sample ID: DUP-01

Lab Sample ID: 240-178276-4

Date Collected: 12/14/22 00:00

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:31
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:17

# Lab Chronicle

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01**  
**Date Collected: 12/14/22 00:00**  
**Date Received: 12/20/22 10:00**

**Lab Sample ID: 240-178276-4**  
**Matrix: Water**

<u>Prep Type</u>	<u>Batch Type</u>	<u>Batch Method</u>	<u>Run</u>	<u>Dilution Factor</u>	<u>Batch Number</u>	<u>Analyst</u>	<u>Lab</u>	<u>Prepared or Analyzed</u>
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:32
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 22:27
Total/NA	Analysis	9056A		10	557649	JMB	EET CAN	12/31/22 22:48
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 09:12

**Laboratory References:**

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

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# Accreditation/Certification Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22





**Eurofins - Canton Sample Receipt Form/Narrative**  
**Barberton Facility**

Login # : 178276

Client TBC Site Name \_\_\_\_\_

Cooler unpacked by:

Cooler Received on 12-20-22 Opened on 12-20-22

Chamuk

FedEx: 1<sup>st</sup> Grd  UPS  FAS  Clipper  Client Drop Off  Eurofins Courier  Other \_\_\_\_\_

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

Eurofins Cooler # 52 Foam Box  Client Cooler  Box  Other \_\_\_\_\_

Packing material used: Bubble Wrap  Foam  Plastic Bag  None  Other \_\_\_\_\_

COOLANT: Wet Ice  Blue Ice  Dry Ice  Water  None

1. Cooler temperature upon receipt  See Multiple Cooler Form
- IR GUN # IR-13 (CF **-0.2** °C) Observed Cooler Temp. 3.2 °C Corrected Cooler Temp. 3.0 °C
- IR GUN # IR-16 (CF **-0.1** °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
- IR GUN # IR-17 (CF **-0.3** °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity \_\_\_\_\_  Yes  No
- Were the seals on the outside of the cooler(s) signed & dated?  Yes  No NA
- Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?  Yes  No
- Were tamper/custody seals intact and uncompromised?  Yes  No NA

**Tests that are not checked for pH by Receiving:**

VOAs  
Oil and Grease  
TOC

3. Shippers' packing slip attached to the cooler(s)?  Yes  No
4. Did custody papers accompany the sample(s)?  Yes  No
5. Were the custody papers relinquished & signed in the appropriate place?  Yes  No
6. Was/were the person(s) who collected the samples clearly identified on the COC?  Yes  No
7. Did all bottles arrive in good condition (Unbroken)?  Yes  No
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?  Yes  No
9. For each sample, does the COC specify preservatives  (Y/N), # of containers  (Y/N), and sample type of grab/comp  (Y/N)?
10. Were correct bottle(s) used for the test(s) indicated?  Yes  No
11. Sufficient quantity received to perform indicated analyses?  Yes  No
12. Are these work share samples and all listed on the COC?  Yes  No
- If yes, Questions 13-17 have been checked at the originating laboratory.
13. Were all preserved sample(s) at the correct pH upon receipt?  Yes  No NA pH Strip Lot# **HC291590**
14. Were VOAs on the COC?  Yes  No
15. Were air bubbles >6 mm in any VOA vials?  Yes  No NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_  Yes  No
17. Was a LL Hg or Me Hg trip blank present?  Yes  No

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other \_\_\_\_\_

Concerning \_\_\_\_\_

**18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES**  additional next page

Samples processed by: \_\_\_\_\_

**19. SAMPLE CONDITION**

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.

Sample(s) \_\_\_\_\_ were received in a broken container.

Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

**20. SAMPLE PRESERVATION**

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.

Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Mr. Vincent Buening  
TRC Environmental Corporation.  
1540 Eisenhower Place  
Ann Arbor, Michigan 48108-7080

Generated 1/5/2023 7:14:50 PM

## JOB DESCRIPTION

CCR DTE Belle River Power - Aquifer

## JOB NUMBER

240-178297-1

# Eurofins Canton

## Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

## Authorization



Generated  
1/5/2023 7:14:50 PM

Authorized for release by  
Kris Brooks, Project Manager II  
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(330)966-9790



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# Definitions/Glossary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
U	Indicates the analyte was analyzed for but not detected.

### General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

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**Job ID: 240-178297-1**

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**Laboratory: Eurofins Canton**

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**Narrative**

**Job Narrative**  
**240-178297-1**

**Receipt**

The samples were received on 12/20/2022 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C

**Metals**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

**General Chemistry**

Method 9056A\_28D: The following samples were diluted due to the nature of the sample matrix: MW-16-08 (240-178297-8), MW-16-11A (240-178297-11) and (240-178344-J-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.



# Method Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

#### Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396



# Sample Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178297-1	MW-16-01	Water	12/14/22 10:33	12/20/22 10:00
240-178297-2	MW-16-02	Water	12/14/22 12:13	12/20/22 10:00
240-178297-3	MW-16-03	Water	12/14/22 13:46	12/20/22 10:00
240-178297-4	MW-16-04	Water	12/15/22 13:34	12/20/22 10:00
240-178297-5	MW-16-05	Water	12/15/22 09:24	12/20/22 10:00
240-178297-6	MW-16-06	Water	12/15/22 10:55	12/20/22 10:00
240-178297-7	MW-16-07	Water	12/15/22 12:28	12/20/22 10:00
240-178297-8	MW-16-08	Water	12/16/22 12:33	12/20/22 10:00
240-178297-9	MW-16-09	Water	12/16/22 13:34	12/20/22 10:00
240-178297-10	MW-16-10	Water	12/16/22 09:20	12/20/22 10:00
240-178297-11	MW-16-11A	Water	12/16/22 11:05	12/20/22 10:00

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# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-01

## Lab Sample ID: 240-178297-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1000		100	57	ug/L	1		6010B	Total Recoverable
Barium	220	F1	5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	42000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	14000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	71		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	300000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	15		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	450		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	9.0		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.77	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.80	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-02

## Lab Sample ID: 240-178297-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1100		100	57	ug/L	1		6010B	Total Recoverable
Barium	250		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	54000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	16000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3400		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	25		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1500		10	10	ug/L	1		6020	Total Recoverable
Sodium	190000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	15		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	350		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.2		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	9.1		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-02 (Continued)

## Lab Sample ID: 240-178297-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 1	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-03

## Lab Sample ID: 240-178297-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	990		100	57	ug/L	1		6010B	Total Recoverable
Barium	320		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	34000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2800		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	87		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	960		10	10	ug/L	1		6020	Total Recoverable
Sodium	350000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	20		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	550		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-04

## Lab Sample ID: 240-178297-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1000		100	57	ug/L	1		6010B	Total Recoverable
Barium	290		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	46000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	15000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	68		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	300000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-04 (Continued)

## Lab Sample ID: 240-178297-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	19		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	470		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	16		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.75	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.77	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.76	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-05

## Lab Sample ID: 240-178297-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1600		100	57	ug/L	1		6010B	Total Recoverable
Barium	240		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	33000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4100		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	810		10	10	ug/L	1		6020	Total Recoverable
Sodium	870000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	47		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1400		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	6.1		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.8		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-06

## Lab Sample ID: 240-178297-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	250		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	38000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-06 (Continued)

## Lab Sample ID: 240-178297-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4300		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	14		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1000		10	10	ug/L	1		6020	Total Recoverable
Sodium	960000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	45		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	180		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	180		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1600		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	4.4		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.67	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-07

## Lab Sample ID: 240-178297-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	220		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	35000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	7.4		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	1100000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	53		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	230		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	230		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1700		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	30		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	4.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	5.0		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-08

## Lab Sample ID: 240-178297-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	300		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	40000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	13000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	16		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	1100000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	57		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1800		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.61	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.64	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-09

## Lab Sample ID: 240-178297-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1400		100	57	ug/L	1		6010B	Total Recoverable
Barium	220		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	31000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	9600		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	35		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	840		10	10	ug/L	1		6020	Total Recoverable
Sodium	580000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	25		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	200		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	200		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	930		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.5		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	13		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.5		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-09 (Continued)

## Lab Sample ID: 240-178297-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 2	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	2.5		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-10

## Lab Sample ID: 240-178297-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1900		100	57	ug/L	1		6010B	Total Recoverable
Barium	67		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	26000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	9000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4600		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	540		10	10	ug/L	1		6020	Total Recoverable
Sodium	980000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	67		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	210		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	210		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1500		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	60		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.53	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.52	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.53	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.54	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.54	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-11A

## Lab Sample ID: 240-178297-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	270		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	38000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4800		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	12		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1000		10	10	ug/L	1		6020	Total Recoverable
Sodium	1000000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-11A (Continued)**

**Lab Sample ID: 240-178297-11**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	57		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1700		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.1		0.10	0.10	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.51	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.



# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-01**

**Lab Sample ID: 240-178297-1**

Date Collected: 12/14/22 10:33

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1000		100	57	ug/L		12/21/22 12:00	12/23/22 03:28	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220	F1	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:09	1
Calcium	42000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Magnesium	14000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Potassium	2700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Molybdenum	71		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:09	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:09	1
Sodium	300000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Lithium	15		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:09	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:26	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:26	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:26	1
Chloride (SW846 9056A)	450		5.0	5.0	mg/L			01/03/23 16:27	5
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 16:05	1
Sulfate (SW846 9056A)	9.0		1.0	1.0	mg/L			01/03/23 16:05	1
Total Organic Carbon (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 1 (SW846 9060A)	0.77	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 2 (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 3 (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 4 (SW846 9060A)	0.80	J	1.0	0.35	mg/L			12/29/22 14:35	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-02**

**Lab Sample ID: 240-178297-2**

Date Collected: 12/14/22 12:13

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1100		100	57	ug/L		12/21/22 12:00	12/23/22 03:44	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	250		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:21	1
Calcium	54000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Magnesium	16000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Potassium	3400		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Molybdenum	25		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:21	1
Strontium	1500		10	10	ug/L		12/21/22 12:00	12/22/22 16:21	1
Sodium	190000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Lithium	15		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:21	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 21:30	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 21:30	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:30	1
Chloride (SW846 9056A)	350		5.0	5.0	mg/L			01/03/23 17:53	5
Fluoride (SW846 9056A)	1.2		0.050	0.050	mg/L			01/03/23 16:48	1
Sulfate (SW846 9056A)	9.1		1.0	1.0	mg/L			01/03/23 16:48	1
Total Organic Carbon (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 1 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 2 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 3 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 4 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 15:10	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-03**

**Lab Sample ID: 240-178297-3**

Date Collected: 12/14/22 13:46

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	990		100	57	ug/L		12/21/22 12:00	12/23/22 03:49	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	320		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:24	1
Calcium	34000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Potassium	2800		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Molybdenum	87		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:24	1
Strontium	960		10	10	ug/L		12/21/22 12:00	12/22/22 16:24	1
Sodium	350000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Lithium	20		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:24	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:35	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:35	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:35	1
Chloride (SW846 9056A)	550		10	10	mg/L			01/03/23 18:37	10
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 18:15	1
Sulfate (SW846 9056A)	1.0	U	1.0	1.0	mg/L			01/03/23 18:15	1
Total Organic Carbon (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 1 (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 2 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 3 (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 4 (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 15:45	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-04**

**Lab Sample ID: 240-178297-4**

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1000		100	57	ug/L		12/21/22 12:00	12/23/22 03:53	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	290		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:26	1
Calcium	46000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Magnesium	15000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Potassium	3000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Molybdenum	68		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:26	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:26	1
Sodium	300000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Lithium	19		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:26	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:39	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:39	1
Chloride (SW846 9056A)	470		5.0	5.0	mg/L			01/03/23 19:20	5
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 18:59	1
Sulfate (SW846 9056A)	16		1.0	1.0	mg/L			01/03/23 18:59	1
Total Organic Carbon (SW846 9060A)	0.75	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 1 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 2 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 3 (SW846 9060A)	0.77	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 4 (SW846 9060A)	0.76	J	1.0	0.35	mg/L			12/29/22 16:20	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-05**

**Lab Sample ID: 240-178297-5**

Date Collected: 12/15/22 09:24

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1600		100	57	ug/L		12/21/22 12:00	12/23/22 04:06	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	240		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:34	1
Calcium	33000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Potassium	4100		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Molybdenum	11		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:34	1
Strontium	810		10	10	ug/L		12/21/22 12:00	12/22/22 16:34	1
Sodium	870000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Lithium	47		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:34	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	190		5.0	2.6	mg/L			12/21/22 21:43	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	190		5.0	2.6	mg/L			12/21/22 21:43	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:43	1
Chloride (SW846 9056A)	1400		20	20	mg/L			01/03/23 20:04	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 19:42	2
Sulfate (SW846 9056A)	6.1		2.0	2.0	mg/L			01/03/23 19:42	2
Total Organic Carbon (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 1 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 2 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 3 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 4 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-06**

**Lab Sample ID: 240-178297-6**

Date Collected: 12/15/22 10:55

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:10	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	250		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:36	1
Calcium	38000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Magnesium	12000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Potassium	4300		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Molybdenum	14		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:36	1
Strontium	1000		10	10	ug/L		12/21/22 12:00	12/22/22 16:36	1
Sodium	960000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Lithium	45		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:36	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	180		5.0	2.6	mg/L			12/21/22 21:47	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	180		5.0	2.6	mg/L			12/21/22 21:47	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:47	1
Chloride (SW846 9056A)	1600		20	20	mg/L			01/03/23 20:47	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 20:25	2
Sulfate (SW846 9056A)	4.4		2.0	2.0	mg/L			01/03/23 20:25	2
Total Organic Carbon (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 1 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 2 (SW846 9060A)	0.67	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 3 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 4 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-07**

**Lab Sample ID: 240-178297-7**

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:14	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:39	1
Calcium	35000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Potassium	4700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Molybdenum	7.4		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:39	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:39	1
Sodium	1100000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Lithium	53		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:39	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	230		5.0	2.6	mg/L			12/21/22 21:52	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	230		5.0	2.6	mg/L			12/21/22 21:52	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:52	1
Chloride (SW846 9056A)	1700		20	20	mg/L			01/03/23 22:14	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 21:09	2
Sulfate (SW846 9056A)	30		2.0	2.0	mg/L			01/03/23 21:09	2
Total Organic Carbon (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 1 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 2 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 3 (SW846 9060A)	4.9		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 4 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-08**

**Lab Sample ID: 240-178297-8**

Date Collected: 12/16/22 12:33

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:19	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	300		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:41	1
Calcium	40000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Magnesium	13000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Potassium	4700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Molybdenum	16		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:41	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:41	1
Sodium	1100000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Lithium	57		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:41	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:58	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:58	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:58	1
Chloride (SW846 9056A)	1800		20	20	mg/L			01/03/23 22:57	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 22:35	2
Sulfate (SW846 9056A)	2.0	U	2.0	2.0	mg/L			01/03/23 22:35	2
Total Organic Carbon (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 1 (SW846 9060A)	0.61	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 2 (SW846 9060A)	0.64	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 3 (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 4 (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1



# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-09**

**Lab Sample ID: 240-178297-9**

Date Collected: 12/16/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1400		100	57	ug/L		12/21/22 12:00	12/23/22 04:23	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:44	1
Calcium	31000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Magnesium	9600		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Potassium	2700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Molybdenum	35		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:44	1
Strontium	840		10	10	ug/L		12/21/22 12:00	12/22/22 16:44	1
Sodium	580000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Lithium	25		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:44	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	200		5.0	2.6	mg/L			12/21/22 22:07	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	200		5.0	2.6	mg/L			12/21/22 22:07	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:07	1
Chloride (SW846 9056A)	930		10	10	mg/L			01/03/23 23:40	10
Fluoride (SW846 9056A)	1.5		0.050	0.050	mg/L			01/03/23 23:19	1
Sulfate (SW846 9056A)	13		1.0	1.0	mg/L			01/03/23 23:19	1
Total Organic Carbon (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 1 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 2 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 3 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 4 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-10**

**Lab Sample ID: 240-178297-10**

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1900		100	57	ug/L		12/21/22 12:00	12/23/22 04:28	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	67		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:46	1
Calcium	26000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Magnesium	9000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Potassium	4600		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Molybdenum	11		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:46	1
Strontium	540		10	10	ug/L		12/21/22 12:00	12/22/22 16:46	1
Sodium	980000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Lithium	67		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:46	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	210		5.0	2.6	mg/L			12/21/22 22:11	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	210		5.0	2.6	mg/L			12/21/22 22:11	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:11	1
Chloride (SW846 9056A)	1500		20	20	mg/L			01/04/23 00:24	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/04/23 00:02	2
Sulfate (SW846 9056A)	60		2.0	2.0	mg/L			01/04/23 00:02	2
Total Organic Carbon (SW846 9060A)	0.53	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 1 (SW846 9060A)	0.52	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 2 (SW846 9060A)	0.53	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 3 (SW846 9060A)	0.54	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 4 (SW846 9060A)	0.54	J	1.0	0.35	mg/L			12/29/22 20:14	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-11A**

**Lab Sample ID: 240-178297-11**

Date Collected: 12/16/22 11:05

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:32	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	270		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:49	1
Calcium	38000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Magnesium	12000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Potassium	4800		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Molybdenum	12		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:49	1
Strontium	1000		10	10	ug/L		12/21/22 12:00	12/22/22 16:49	1
Sodium	1000000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Lithium	57		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:49	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 22:16	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 22:16	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:16	1
Chloride (SW846 9056A)	1700		20	20	mg/L			01/04/23 01:07	20
Fluoride (SW846 9056A)	1.1		0.10	0.10	mg/L			01/04/23 00:46	2
Sulfate (SW846 9056A)	2.0	U	2.0	2.0	mg/L			01/04/23 00:46	2
Total Organic Carbon (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 1 (SW846 9060A)	0.51	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 2 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 3 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 4 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1

# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 6010B - Metals (ICP)

**Lab Sample ID: MB 240-556847/1-A**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/21/22 12:00	12/23/22 03:19	1

**Lab Sample ID: LCS 240-556847/2-A**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000	979		ug/L		98	80 - 120

**Lab Sample ID: 240-178297-1 MS**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000		1000	2030		ug/L		100	75 - 125

**Lab Sample ID: 240-178297-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Boron	1000		1000	1970		ug/L		94	75 - 125	3	20

## Method: 6020 - Metals (ICP/MS)

**Lab Sample ID: MB 240-556847/1-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Calcium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Magnesium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Potassium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Strontium	10	U	10	10	ug/L		12/21/22 12:00	12/22/22 16:05	1
Sodium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Lithium	8.0	U	8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:05	1

**Lab Sample ID: LCS 240-556847/3-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	1010		ug/L		101	80 - 120
Calcium	25000	24200		ug/L		97	80 - 120
Magnesium	25000	23700		ug/L		95	80 - 120
Potassium	25000	24300		ug/L		97	80 - 120
Molybdenum	500	458		ug/L		92	80 - 120
Strontium	500	470		ug/L		94	80 - 120

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 6020 - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 240-556847/3-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Sodium	25000	23900		ug/L		95	80 - 120
Lithium	500	482		ug/L		96	80 - 120

**Lab Sample ID: 240-178297-1 MS**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	220	F1	1000	1560	F1	ug/L		134	75 - 125
Calcium	42000		25000	63200		ug/L		84	75 - 125
Magnesium	14000		25000	37500		ug/L		94	75 - 125
Potassium	2700		25000	26800		ug/L		96	75 - 125
Molybdenum	71		500	582		ug/L		102	75 - 125
Strontium	1200		500	1620		ug/L		86	75 - 125
Sodium	300000		25000	315000	4	ug/L		48	75 - 125
Lithium	15		500	514		ug/L		100	75 - 125

**Lab Sample ID: 240-178297-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Barium	220	F1	1000	1550	F1	ug/L		133	75 - 125	0	20
Calcium	42000		25000	62900		ug/L		83	75 - 125	0	20
Magnesium	14000		25000	36700		ug/L		91	75 - 125	2	20
Potassium	2700		25000	26500		ug/L		95	75 - 125	1	20
Molybdenum	71		500	569		ug/L		100	75 - 125	2	20
Strontium	1200		500	1620		ug/L		85	75 - 125	0	20
Sodium	300000		25000	313000	4	ug/L		40	75 - 125	1	20
Lithium	15		500	502		ug/L		97	75 - 125	2	20

## Method: 2320B-1997 - Alkalinity, Total

**Lab Sample ID: MB 240-557050/30**  
**Matrix: Water**  
**Analysis Batch: 557050**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1

**Lab Sample ID: MB 240-557050/4**  
**Matrix: Water**  
**Analysis Batch: 557050**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: LCS 240-557050/29  
 Matrix: Water  
 Analysis Batch: 557050

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity	146	140		mg/L		96	86 - 123

Lab Sample ID: 240-178297-8 DU  
 Matrix: Water  
 Analysis Batch: 557050

Client Sample ID: MW-16-08  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	170		165		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	170		165		mg/L		2	20
Carbonate Alkalinity as CaCO3	5.0	U	5.0	U	mg/L		NC	20

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557809/3  
 Matrix: Water  
 Analysis Batch: 557809

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	1.0	mg/L			01/03/23 13:33	1
Fluoride	0.050	U	0.050	0.050	mg/L			01/03/23 13:33	1
Sulfate	1.0	U	1.0	1.0	mg/L			01/03/23 13:33	1

Lab Sample ID: LCS 240-557809/4  
 Matrix: Water  
 Analysis Batch: 557809

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	49.2		mg/L		98	90 - 110
Fluoride	2.50	2.61		mg/L		104	90 - 110
Sulfate	50.0	50.6		mg/L		101	90 - 110

## Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557788/3  
 Matrix: Water  
 Analysis Batch: 557788

Client Sample ID: Method Blank  
 Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1

Lab Sample ID: LCS 240-557788/4  
 Matrix: Water  
 Analysis Batch: 557788

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.0		mg/L		98	85 - 115
TOC Result 1	18.3	18.0		mg/L		98	85 - 115

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Metals

### Prep Batch: 556847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	3005A	
240-178297-2	MW-16-02	Total Recoverable	Water	3005A	
240-178297-3	MW-16-03	Total Recoverable	Water	3005A	
240-178297-4	MW-16-04	Total Recoverable	Water	3005A	
240-178297-5	MW-16-05	Total Recoverable	Water	3005A	
240-178297-6	MW-16-06	Total Recoverable	Water	3005A	
240-178297-7	MW-16-07	Total Recoverable	Water	3005A	
240-178297-8	MW-16-08	Total Recoverable	Water	3005A	
240-178297-9	MW-16-09	Total Recoverable	Water	3005A	
240-178297-10	MW-16-10	Total Recoverable	Water	3005A	
240-178297-11	MW-16-11A	Total Recoverable	Water	3005A	
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-178297-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	3005A	

### Analysis Batch: 557096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	6010B	556847
240-178297-2	MW-16-02	Total Recoverable	Water	6010B	556847
240-178297-3	MW-16-03	Total Recoverable	Water	6010B	556847
240-178297-4	MW-16-04	Total Recoverable	Water	6010B	556847
240-178297-5	MW-16-05	Total Recoverable	Water	6010B	556847
240-178297-6	MW-16-06	Total Recoverable	Water	6010B	556847
240-178297-7	MW-16-07	Total Recoverable	Water	6010B	556847
240-178297-8	MW-16-08	Total Recoverable	Water	6010B	556847
240-178297-9	MW-16-09	Total Recoverable	Water	6010B	556847
240-178297-10	MW-16-10	Total Recoverable	Water	6010B	556847
240-178297-11	MW-16-11A	Total Recoverable	Water	6010B	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6010B	556847
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	6010B	556847
240-178297-1 MS	MW-16-01	Total Recoverable	Water	6010B	556847
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	6010B	556847

### Analysis Batch: 557119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	6020	556847
240-178297-2	MW-16-02	Total Recoverable	Water	6020	556847
240-178297-3	MW-16-03	Total Recoverable	Water	6020	556847
240-178297-4	MW-16-04	Total Recoverable	Water	6020	556847
240-178297-5	MW-16-05	Total Recoverable	Water	6020	556847
240-178297-6	MW-16-06	Total Recoverable	Water	6020	556847
240-178297-7	MW-16-07	Total Recoverable	Water	6020	556847
240-178297-8	MW-16-08	Total Recoverable	Water	6020	556847
240-178297-9	MW-16-09	Total Recoverable	Water	6020	556847
240-178297-10	MW-16-10	Total Recoverable	Water	6020	556847
240-178297-11	MW-16-11A	Total Recoverable	Water	6020	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6020	556847

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Metals (Continued)

### Analysis Batch: 557119 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	6020	556847
240-178297-1 MS	MW-16-01	Total Recoverable	Water	6020	556847
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	6020	556847

## General Chemistry

### Analysis Batch: 557050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	2320B-1997	
240-178297-2	MW-16-02	Total/NA	Water	2320B-1997	
240-178297-3	MW-16-03	Total/NA	Water	2320B-1997	
240-178297-4	MW-16-04	Total/NA	Water	2320B-1997	
240-178297-5	MW-16-05	Total/NA	Water	2320B-1997	
240-178297-6	MW-16-06	Total/NA	Water	2320B-1997	
240-178297-7	MW-16-07	Total/NA	Water	2320B-1997	
240-178297-8	MW-16-08	Total/NA	Water	2320B-1997	
240-178297-9	MW-16-09	Total/NA	Water	2320B-1997	
240-178297-10	MW-16-10	Total/NA	Water	2320B-1997	
240-178297-11	MW-16-11A	Total/NA	Water	2320B-1997	
MB 240-557050/30	Method Blank	Total/NA	Water	2320B-1997	
MB 240-557050/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-557050/29	Lab Control Sample	Total/NA	Water	2320B-1997	
240-178297-8 DU	MW-16-08	Total/NA	Water	2320B-1997	

### Analysis Batch: 557788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	9060A	
240-178297-2	MW-16-02	Total/NA	Water	9060A	
240-178297-3	MW-16-03	Total/NA	Water	9060A	
240-178297-4	MW-16-04	Total/NA	Water	9060A	
240-178297-5	MW-16-05	Total/NA	Water	9060A	
240-178297-6	MW-16-06	Total/NA	Water	9060A	
240-178297-7	MW-16-07	Total/NA	Water	9060A	
240-178297-8	MW-16-08	Total/NA	Water	9060A	
240-178297-9	MW-16-09	Total/NA	Water	9060A	
240-178297-10	MW-16-10	Total/NA	Water	9060A	
240-178297-11	MW-16-11A	Total/NA	Water	9060A	
MB 240-557788/3	Method Blank	Total/NA	Water	9060A	
LCS 240-557788/4	Lab Control Sample	Total/NA	Water	9060A	

### Analysis Batch: 557809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	9056A	
240-178297-1	MW-16-01	Total/NA	Water	9056A	
240-178297-2	MW-16-02	Total/NA	Water	9056A	
240-178297-2	MW-16-02	Total/NA	Water	9056A	
240-178297-3	MW-16-03	Total/NA	Water	9056A	
240-178297-3	MW-16-03	Total/NA	Water	9056A	
240-178297-4	MW-16-04	Total/NA	Water	9056A	
240-178297-4	MW-16-04	Total/NA	Water	9056A	
240-178297-5	MW-16-05	Total/NA	Water	9056A	

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## General Chemistry (Continued)

### Analysis Batch: 557809 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-5	MW-16-05	Total/NA	Water	9056A	
240-178297-6	MW-16-06	Total/NA	Water	9056A	
240-178297-6	MW-16-06	Total/NA	Water	9056A	
240-178297-7	MW-16-07	Total/NA	Water	9056A	
240-178297-7	MW-16-07	Total/NA	Water	9056A	
240-178297-8	MW-16-08	Total/NA	Water	9056A	
240-178297-8	MW-16-08	Total/NA	Water	9056A	
240-178297-9	MW-16-09	Total/NA	Water	9056A	
240-178297-9	MW-16-09	Total/NA	Water	9056A	
240-178297-10	MW-16-10	Total/NA	Water	9056A	
240-178297-10	MW-16-10	Total/NA	Water	9056A	
240-178297-11	MW-16-11A	Total/NA	Water	9056A	
240-178297-11	MW-16-11A	Total/NA	Water	9056A	
MB 240-557809/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557809/4	Lab Control Sample	Total/NA	Water	9056A	

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-01

## Lab Sample ID: 240-178297-1

Date Collected: 12/14/22 10:33

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:28
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:09
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:26
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 16:05
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 16:27
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 14:35

## Client Sample ID: MW-16-02

## Lab Sample ID: 240-178297-2

Date Collected: 12/14/22 12:13

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:44
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:21
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:30
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 16:48
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 17:53
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 15:10

## Client Sample ID: MW-16-03

## Lab Sample ID: 240-178297-3

Date Collected: 12/14/22 13:46

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:49
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:24
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:35
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 18:15
Total/NA	Analysis	9056A		10	557809	JMB	EET CAN	01/03/23 18:37
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 15:45

## Client Sample ID: MW-16-04

## Lab Sample ID: 240-178297-4

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:53

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-04

## Lab Sample ID: 240-178297-4

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:26
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:39
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 18:59
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 19:20
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 16:20

## Client Sample ID: MW-16-05

## Lab Sample ID: 240-178297-5

Date Collected: 12/15/22 09:24

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:06
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:34
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:43
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 19:42
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 20:04
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 16:56

## Client Sample ID: MW-16-06

## Lab Sample ID: 240-178297-6

Date Collected: 12/15/22 10:55

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:10
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:36
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:47
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 20:25
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 20:47
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 17:32

## Client Sample ID: MW-16-07

## Lab Sample ID: 240-178297-7

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:14
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:39

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-07

## Lab Sample ID: 240-178297-7

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:52
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 21:09
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 22:14
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 18:08

## Client Sample ID: MW-16-08

## Lab Sample ID: 240-178297-8

Date Collected: 12/16/22 12:33

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:19
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:41
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:58
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 22:35
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 22:57
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 18:45

## Client Sample ID: MW-16-09

## Lab Sample ID: 240-178297-9

Date Collected: 12/16/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:23
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:44
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:07
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 23:19
Total/NA	Analysis	9056A		10	557809	JMB	EET CAN	01/03/23 23:40
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 19:39

## Client Sample ID: MW-16-10

## Lab Sample ID: 240-178297-10

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:28
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:46
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:11
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/04/23 00:02

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-10**

**Lab Sample ID: 240-178297-10**

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/04/23 00:24
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 20:14

**Client Sample ID: MW-16-11A**

**Lab Sample ID: 240-178297-11**

Date Collected: 12/16/22 11:05

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:32
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:49
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:16
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/04/23 00:46
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/04/23 01:07
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 20:49

**Laboratory References:**

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

# Accreditation/Certification Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22 *
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

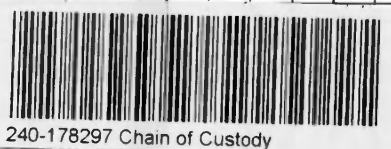


**Chain of Custody Record**



3.2/3.0

<b>Client Information</b>		Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-102238-37085.4
Client Contact: Jacob Krenz		E-Mail: Kris.Brooks@et.eurofins.com	State of Origin:	Page: Page 4 of 7
Company: TRC Environmental Corporation.		PWSID:	Job #:	
Address: 1540 Eisenhower Place		Analysis Requested		
City: Ann Arbor		Due Date Requested:		
State, Zip: MI, 48108-7080		TAT Requested (days):		
Phone: 313-971-7080(Tel) 313-971-9022(Fax)		Compliance Project: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Email: JKrenz@trccompanies.com		FO #: <del>179074-2022</del> 193 523		
Project Name: CCR DTE Belle River Power-Aquifer		WO #: <del>379029-0003P512</del>		
Site: Michigan		Project #: 24012488		
SSOW#:		SSOW#:		
<b>Sample Identification</b>	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=wastebill, BT=Basic Anal)
MW-16-01	12-14-22	10:33	G	Water
MW-16-02	12-14-22	13:13	G	Water
MW-16-03	12-14-22	13:46	G	Water
MW-16-04	12-15-22	13:34	G	Water
MW-16-05	12-15-22	09:24	G	Water
MW-16-06	12-15-22	10:55	G	Water
MW-16-07	12-15-22	12:28	G	Water
MW-16-08	12-16-22	12:33	G	Water
MW-16-09	12-16-22	13:34	G	Water
MW-16-10	12-16-22	09:20	G	Water
MW-16-11a	12-16-22	11:05	G	Water
Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 2320B - Carb. Bicar & Total Alkalinity <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 9056A_28D - Chloride, Sulfate <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 6020 - (MOD) Metals - Ca, Mg, Na, K, Ba, No, B, Sr, Li, <b>TOC</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Total Number of Containers: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Special Instructions/Note:				
Possible Hazard Identification <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested: I, II, III, IV, Other (specify)				
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months				
Special Instructions/QC Requirements:				
Empty Kit Relinquished by: _____ Date: _____				
Relinquished by: _____ Date: 12-14-22 / 0850 Company: TRC				
Relinquished by: TRC Storage Vendor & Party _____ Date: 12/17/22 / 1039 Company: _____				
Relinquished by: _____ Date: 12/19/22 / 1400 Company: ECF				
Custody Seal(s) Contact: _____ Custody Seal No.: _____				
Cooler Temperature(s) °C and Other Remarks: _____				



Barberton Facility

Client TBC Site Name \_\_\_\_\_

Cooler unpacked by:

Chamick

Cooler Received on 12-20-22 Opened on 12-20-22

FedEx: 1<sup>st</sup> Grd  UPS  FAS  Clipper  Client Drop Off  Eurofins Courier  Other

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

Eurofins Cooler # 52C Foam Box  Client Cooler  Box  Other \_\_\_\_\_

Packing material used: Bubble Wrap  Foam  Plastic Bag  None  Other \_\_\_\_\_

COOLANT: Wet Ice  Blue Ice  Dry Ice  Water  None

- 1. Cooler temperature upon receipt  See Multiple Cooler Form
  - IR GUN # IR-13 (CF -0.2 °C) Observed Cooler Temp. 3.2 °C Corrected Cooler Temp. 3.0 °C
  - IR GUN # IR-16 (CF -0.1 °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
  - IR GUN # IR-17 (CF -0.3 °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C

- 2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity \_\_\_\_\_ Yes No
  - Were the seals on the outside of the cooler(s) signed & dated? Yes  No  NA
  - Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes  No  NA
  - Were tamper/custody seals intact and uncompromised? Yes  No  NA
- 3. Shippers' packing slip attached to the cooler(s)? Yes  No
- 4. Did custody papers accompany the sample(s)? Yes  No
- 5. Were the custody papers relinquished & signed in the appropriate place? Yes  No
- 6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes  No
- 7. Did all bottles arrive in good condition (Unbroken)? Yes  No
- 8. Could all bottle labels (ID/Date/Time) be reconciled with the COC? Yes  No
- 9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)? Yes  No
- 10. Were correct bottle(s) used for the test(s) indicated? Yes  No
- 11. Sufficient quantity received to perform indicated analyses? Yes  No
- 12. Are these work share samples and all listed on the COC? Yes  No
- If yes, Questions 13-17 have been checked at the originating laboratory.
- 13. Were all preserved sample(s) at the correct pH upon receipt? Yes  No  NA  pH Strip Lot# HC291590
- 14. Were VOAs on the COC? Yes  No
- 15. Were air bubbles >6 mm in any VOA vials?  Larger than this. Yes  No  NA
- 16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_ Yes  No
- 17. Was a LL Hg or Me Hg trip blank present? Yes  No

Tests that are not checked for pH by Receiving:

VOAs  
Oil and Grease  
TOC

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other \_\_\_\_\_

Concerning \_\_\_\_\_

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES  additional next page

Samples processed by: \_\_\_\_\_

19. SAMPLE CONDITION

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.

Sample(s) \_\_\_\_\_ were received in a broken container.

Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.

Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



Temperature readings: \_\_\_\_\_

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container</u>		<u>Preservative</u>	
			<u>pH</u>	<u>Temp</u>	<u>Added (mls)</u>	<u>Lot #</u>
MW-16-01	240-178297-D-1	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-02	240-178297-D-2	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-03	240-178297-D-3	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-04	240-178297-D-4	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-05	240-178297-D-5	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-06	240-178297-D-6	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-07	240-178297-D-7	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-08	240-178297-D-8	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-09	240-178297-D-9	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-10	240-178297-D-10	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-11A	240-178297-D-11	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____

# ALS Scandinavia

# ANALYSIS REPORT



Issued by: ALS Scandinavia Luleå, Aurorum 10, SE-977 75 LULEÅ, Sweden  
Client: TRC  
Date of receipt: 2022-12-22  
Date of analysis: 2023-01-12  
Order number(our): LE2216210  
Your reference: Vincent Buening  
Our reference: Ilia Rodushkin

Lab number(our)	Sample name	$\delta^{11}\text{B}$ , ‰	2SD, ‰	$\delta^7\text{Li}$ , ‰	2SD, ‰	$^{87}\text{Sr}/^{86}\text{Sr}$	2 SD
LE2216210-001	MW-16-01	39.26	0.65	31.21	0.72	0.709290	0.000029
LE2216210-002	MW-16-02	39.32	0.84	30.67	0.77	0.709517	0.000016
LE2216210-003	MW-16-03	39.49	0.56	29.15	0.82	0.709430	0.000065
LE2216210-004	MW-16-04	40.63	0.62	28.75	0.92	0.709343	0.000012
LE2216210-005	MW-16-05	45.84	0.62	27.83	0.73	0.709407	0.000008
LE2216210-006	MW-16-06	46.46	0.60	31.52	0.78	0.709327	0.000026
LE2216210-007	MW-16-07	45.94	0.85	28.44	0.73	0.709541	0.000013
LE2216210-008	MW-16-08	46.31	0.65	23.69	0.79	0.709581	0.000016
LE2216210-009	MW-16-09	43.49	0.71	29.89	1.04	0.709459	0.000030
LE2216210-009	MW-16-09, r.2	44.18	0.67	30.51	0.88	0.709448	0.000039
LE2216210-010	MW-16-10	46.72	0.79	21.88	0.67	0.709502	0.000020
LE2216210-011	MW-16-11A	46.11	0.64	22.89	0.74	0.709443	0.000040
LE2216210-012	North BAB	-0.81	0.78	-0.13	0.66	0.708901	0.000014
LE2216210-013	DB-01	-5.01	0.63	11.48	0.63	0.709354	0.000008
LE2216210-014	SC-01	-4.82	0.62	20.80	0.65	0.709999	0.000013
LE2216210-014	SC-01, r.2	-5.07	0.68	21.14	0.71	0.710000	0.000009
LE2216210-015	DUP-01	40.29	0.68	28.79	0.84	0.709390	0.000024

## Comments

The analysis is carried out by MC-ICP-MS (NEPTUNE Plus) using internal standardization and external calibration with bracketing isotope SRMs  
Analysis is carried out after ion exchange separation  
Li delta value calculated against LSVEC NIST 8545 RM  
Boron delta values calculated to NIST SRM 951 RM  
SD calculated from two independent consecutive measurements

Signature

Ilia Rodushkin

Associate Professor

LABORATORY MANAGER

ALS Scandinavia AB

# Waterloo EIL

#	Sample	Date	Lab#	$\delta^{18}\text{O}$	Result	Repeat	$\delta^2\text{H}$	Result	Repeat		pH
				H <sub>2</sub> O	VSMOW	$\pm 0.2\text{‰}$	H <sub>2</sub> O	VSMOW	$\pm 0.8\text{‰}$		
1	MW-16-01	2022-12-14	495331	X	-14.96	-15.02	X	-103.94	-104.60	250ml	7.75
2	MW-16-02	2022-12-14	495332	X	-15.04		X	-104.86		250ml	7.57
3	MW-16-03	2022-12-14	495333	X	-14.68		X	-102.29		250ml	7.92
4	MW-16-04	2022-12-15	495334	X	-14.67		X	-102.68		250ml	7.84
5	MW-16-05	2022-12-15	495335	X	-16.73	-16.61	X	-118.71	-118.73	250ml	8.05
6	MW-16-06	2022-12-15	495336	X	-16.61		X	-118.39		250ml	8.12
7	MW-16-07	2022-12-15	495337	X	-16.39		X	-116.78		250ml	7.98
8	MW-16-08	2022-12-16	495338	X	-16.35		X	-116.98		250ml	8.12
9	MW-16-09	2022-12-16	495339	X	-15.80		X	-112.02		250ml	7.76
10	MW-16-10	2022-12-16	495340	X	-16.42	-16.43	X	-116.12	-116.35	250ml	8.08
11	MW-16-11A	2022-12-16	495341	X	-16.75		X	-118.91		250ml	8.08
12	North BAB	2022-12-14	495342	X	-7.44		X	-54.32		250ml	9.28
13	DB-01	2022-12-16	495343	X	-7.06		X	-53.02		250ml	8.9
14	SC-01	2022-12-16	495344	X	-7.36		X	-53.70		250ml	8.33
15	DUP-01	2022-12-14	495345	X	-14.92	-14.92	X	-102.52	-101.84	250ml	7.92

Client: Buening/TRC

ISO# 2022714

Environmental Isotope Lab

Location: C2

2023-01-06

Project: BRPP BABs DB

15 for 18O, 2H

2 of 2

EC	AZD
uS/cm	
1,371	
1,085	
1,615	
1,498	
3,497	
4,022	
4,492	
4,622	
2,527	
3,853	
4,198	
411	
1,827	
149	
1,615	

# Miami Tritium Laboratory



March 13, 2023

TRITIUM LABORATORY

Data Release #23-013  
Job # 4256

TRC Companies  
TRITIUM SAMPLES

---

Dr. James D. Happell  
Associate Research Professor

Distribution:  
Vince Buening  
1540 Eisenhower Place  
Ann Arbor, MI 48108  
vbuening@trccompanies.com



Tritium Scale New Half-life

Tritium concentrations are normally expressed in TU, where 1 TU indicates a T/H abundance ratio of  $10^{-18}$ . The values refer to the tritium scale recommended by U.S. National Institute of Science and Technology (NIST, formerly NBS), and International Atomic Energy Agency (IAEA). The TU-numbers are based on the NIST tritium water standard #4926E. Age corrections and conversions are made using the recommended half-life of **12.32 years**, i.e., a decay rate of  $\lambda = 5.626\% \text{ year}^{-1}$ . In this scale, 1 TU is equivalent to 7.151 dpm/kg H<sub>2</sub>O, or 3.222 pCi/kg H<sub>2</sub>O, (equivalent to pCi/L in freshwater) or 0.1192 Bq/kg H<sub>2</sub>O (Bq = disint/sec). We can also express tritium concentrations in pCi/L upon client request.

Tritium concentrations in TU or pCi/L are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used.

The stated errors, eTU or err, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Very low tritium values

In some cases, negative tritium values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU or pCi/L. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU or pCi/L should be used.

Additional information

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling", and our Web-site [www.rsmas.miami.edu/groups/tritium](http://www.rsmas.miami.edu/groups/tritium).

Tritium efficiencies and background values are somewhat different in each of the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2.4 TU. The background is typically 0.3 cpm, known to about  $\pm 0.02$  cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

Client: TRC COMPANIES  
Recvd : 22/12/21  
Job# : 4256  
Final : 23/03/09

Purchase Order: 193682  
Contact: Vince Buening 734-904-3302  
1540 Eisenhower Place  
Ann Arbor, MI 48108  
vbuening@trccompanies.com  
BRPP BABs & DB

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
MW-16-01		4256.01	221214	1000	275	0.02	0.09
MW-16-02		4256.02	221214	1000	275	0.03	0.09
MW-16-03		4256.03	221214	1000	275	0.00	0.09
MW-16-04		4256.04	221215	1000	275	-0.12	0.09
MW-16-05		4256.05	221215	1000	275	0.11	0.09
MW-16-06		4256.06	221215	1000	275	-0.01	0.09
MW-16-07		4256.07	221215	1000	275	0.37	0.09
MW-16-08		4256.08	221216	1000	275	0.03	0.09
MW-16-09		4256.09	221216	1000	275	0.18	0.09
MW-16-10		4256.10	221216	1000	275	0.27	0.09
MW-16-11A		4256.11	221216	1000	275	0.05	0.09
NORTH BAB		4256.12	221214	1000	275	26.4	0.9
DB-01		4256.13	221216	1000	275	22.4	0.7
SC-01		4256.14	221216	1000	275	23.9	0.8
DUP-01		4256.15	221214	1000	275	0.05*	0.09

\* Average of duplicate runs



# Additional Uppermost Aquifer Characterization Study

**Belle River Power Plant Diversion  
Basin CCR Unit, 4505 King Road,  
China Township, Michigan**

April 2023

A handwritten signature in blue ink that reads "Clint Miller".

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Clint Miller, PhD., PG.  
Senior Project Geochemist

A handwritten signature in blue ink that reads "Vincent E. Buening".

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Vincent Buening, C.P.G.  
Senior Project Manager

**Prepared For:**

DTE Electric Company

**Prepared By:**

TRC  
1540 Eisenhower Pl.  
Ann Arbor, MI 48108

A handwritten signature in blue ink that reads "Alexander Eklund".

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Alexander Eklund  
Data Scientist

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## 1.0 Introduction

### 1.1 Purpose and Objectives

The objective of this report is to document TRC's Additional Aquifer Characterization Study performed at the Belle River Power Plant Diversion Basin CCR unit (BRPP DB CCR unit) (hereinafter "the CCR unit"), which is located at the Belle River Power Plant, China Township, Michigan. This study was performed to determine if additional data, collected in December 2022, provide further lines of evidence to substantiate that groundwater in the uppermost aquifer remains unimpacted by CCR operations. This additional uppermost aquifer characterization study is complementary to the preliminary alternative liner demonstration (ALD) prepared in accordance with 40 CFR §257.71 (d) that was submitted to the United States Environmental Protection Agency (EPA) on November 30, 2021 (Geosyntec, November 2021), and the previous studies (TRC, 2017, Bechtel, 1976) performed to establish the groundwater monitoring program developed pursuant to 40 CFR §257.91.

Previous studies performed at the site including the ALD have demonstrated and verified that the site is underlain by a thick laterally- continuous clay-rich deposit which meets the requirements of an alternate liner per 40 CFR §257.71 (d). The site characterization and groundwater data collected to-date from the CCR unit indicate that the natural underlying clay hydraulically separates the CCR unit from the uppermost aquifer and that groundwater quality is not affected by the CCR unit or any associated management activities. The data and analysis presented within the preliminary ALD further confirms the pre-existing site conceptual model, and through rigorous field testing and site-specific flow and transport modeling demonstrates the effectiveness of the clay. The preliminary ALD demonstrates that there is no reasonable probability that water from the CCR unit will result in a release to the uppermost aquifer throughout the CCR units active life, nor will data exceed the groundwater protection standard at the waste boundaries over the projected active life and post closure of the CCR unit.

This additional characterization study included the collection of additional groundwater samples during December 2022, along with further analyses of existing data to further characterize the uppermost aquifer. Water samples were collected from the CCR unit groundwater monitoring well network, the DB water, and a surface water sample was collected from the St. Clair River. Laboratory analysis performed during December 2022 included additional geochemical indicators, stable isotopes, and radiometric isotopes. Stable isotopes do not decay, but preferentially fractionate under physical, chemical and or environmental conditions. Radiometric isotopes are unstable and do decay; decay is at a constant rate, and therefore can be useful for age-dating different water sources. Additionally, data collected as part of monitoring under the state program (2020 to 2022) and the federal CCR program (2015-2022) were used as described and presented within this report.

In summary, the data collected in this assessment confirms that the uppermost aquifer is not in communication with the CCR unit water, groundwater geochemistry in the uppermost aquifer is reflective of the geogenic natural environmental conditions and is therefore unaffected by the CCR unit. Each of the multiple lines of evidence presented in this report independently supports this conclusion as discussed below.

## 1.2 Site Overview and Operational History

The BRPP is located in Section 13, Township 4 North, Range 16 East, at 4505 King Road, China Township in St. Clair County, Michigan (Figure 1). The BRPP was constructed in the early 1980s with plant operations beginning in 1984. Prior to Detroit Edison Company's operations commencing in the 1980s, the BRPP property was generally wooded and farmland. The property has been used continuously as a coal fired power plant since Detroit Edison Company (now DTE Electric) began power plant operations at BRPP in 1984 and is generally constructed over a natural clay-rich soil base. The DB has been in use by the BRPP since it began operation and has collected CCR bottom ash that is periodically cleaned out and either sold for beneficial reuse or disposed of at the Range Road Landfill (RRLF).

The DB is an incised CCR surface impoundment located east of the BRPP. Water flows into the DB from the North and South BABs through a network of pipes and ditches. The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit.

## 1.3 Geology/Hydrogeology

The geologic and hydrogeologic conditions at the CCR unit have been extensively studied and these studies (including TRC, 2017, Bechtel, 1976 and Geosyntec 2020), provide specific details on the hydrogeology and geology in the region, and at the BRPP. A brief discussion is provided below.

The BRPP DB CCR unit is located approximately one mile west of the St. Clair River. The BRPP DB CCR unit is underlain by more than 130 feet of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 135 to 145 feet below ground surface (bgs). In general, the BRPP DB is underlain by 115 to 130 feet of laterally extensive low hydraulic conductivity silty clay-rich deposits (TRC, 2017 and Geosyntec, 2021). The silty clay-rich till was then underlain by two to seven feet of silt between the till and the underlying shale bedrock (not an aquifer) confining unit. Groundwater was encountered within this silt at the shale bedrock interface representing a confined uppermost aquifer underlying the BRPP DB CCR unit and monitoring wells MW-16-05 through MW-16-08, MW-16-10 and MW-16-11A are screened within this uppermost aquifer. Within the uppermost aquifer the groundwater is artesian with the potentiometric surface elevation being well above the bottom of the overlying confining clay unit.

The average hydraulic gradient throughout the BRPP DB within the uppermost aquifer during both of the 2022 semiannual events (TRC, January 2023) is estimated at approximately 0.003 feet/feet, resulting in an estimated average groundwater flow velocity of approximately 0.001 feet/day or 0.4 feet/year to the west-northwest using the average hydraulic conductivity of 0.13 ft/day (TRC, 2017 and Geosyntec, 2021) and an assumed effective porosity of 0.4 (TRC, January 2023) (Figure 4).

---

## 2.0 Additional Data Collection

The additional groundwater, basin water and surface water sample collection was performed from December 14 to 16, 2022 in to provide data to support additional characterization of the uppermost aquifer at the CCR unit. These samples were collected in general accordance with the *CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin (QAPP)* (TRC, July 2016; revised March and August 2017).

### 2.1 Groundwater Sample Collection

Groundwater samples were collected from the six wells within the CCR unit uppermost aquifer monitoring well network (MW-16-05 through MW-16-08, MW-16-10 and MW-11A) (Figure 2).

### 2.2 Diversion Basin Water Sample Collection

A water sample was collected from the Diversion Basin (DB) (Figure 2).

### 2.3 Surface Water Sample Collection

A surface water sample (SC-01) was collected from the St. Clair River from the approximate location shown on Figure 3.

### 2.4 Laboratory Analysis

The aforementioned samples were submitted to the laboratories listed below for analysis of the following parameters to support the additional aquifer characterization:

- Eurofins Environment Testing for analysis of calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO<sub>4</sub>), chloride (Cl), HCO<sub>3</sub> and alkalinity (bicarbonate (HCO<sub>3</sub>), carbonate (CO<sub>3</sub>) and total alkalinity), boron (B), lithium (Li) and strontium (Sr);
- ALS Scandinavia for analysis of  $\delta^{11}\text{B}$ ,  $\delta^{87}\text{Sr}$  and  $\delta^7\text{Li}$ ;
- Waterloo Environmental Isotope Laboratory for analysis of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ ; and
- Miami Tritium Laboratory for analysis of tritium.

Note: the  $\delta$  notation is explained in Section 3. The December 2022 water data are summarized in Tables 1 through 3 and the December 2022 laboratory data for these water samples are provided in Appendix A.



## 3.0 Geochemical and Isotopic Data Analysis

### 3.1 Geochemistry

In order to provide a comprehensive evaluation of the data collected in December 2022, all of the existing Appendix III and Appendix IV data from groundwater samples collected from 2016 through 2022, as provided in the 2017 to 2022 Annual Reports (TRC, January 2018 through January 2023) were also included in the evaluation. These parameters included boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228 combined. Additionally, concentrations of magnesium, potassium, sodium, strontium, and total organic carbon (TOC), as well as field measured parameters including oxidation-reduction potential (ORP), dissolved oxygen (DO), specific conductivity (SC), temperature, and turbidity were analyzed/measured and utilized in this evaluation. The December 2022 field data are summarized in Table 1, and data for samples collected from the CCR unit water (2020 to 2022) and groundwater data collected from the uppermost aquifer monitoring wells (December 2022) are summarized in Table 2.

Analyte concentrations were compared to their historical values to verify consistency with past data (when possible). Samples collected from the DBs water were compared to groundwater samples collected from the uppermost aquifer (MW-16-5, MW-16-6, MW-16-7, MW-16-8, MW-16-10, and MW-16-11A). In addition, a surface water sample for analysis was collected from the St. Clair River (SC-01). The purpose of the St. Clair River sample was to provide analytical data independent of either the CCR unit water or the uppermost aquifer groundwater. This data serves to augment the conceptual site model (CSM) by providing background information of other water types in the area, particularly the source of some of the stable isotopes.

#### 3.1.1 General Chemistry

Data show that the December 2022 sampling results are consistent with historical data, and the results were within typical ranges of previously analyzed samples. The uppermost aquifer groundwater, DB unit water, and St. Clair River sample geochemistries are broadly differentiated from each other in virtually every analysis. Figure 5 provides a Piper Diagram which plots the concentrations into groups or facies commonly recognized for comparison of major ions. The St. Clair River surface water sample plots in the calcium-bicarbonate while the uppermost aquifer groundwater is tightly packed in the sodium-chloride group. The CCR unit water falls into the sodium sulfate facies and is distinctively different from the uppermost aquifer groundwater.

Sulfate concentrations within the uppermost aquifer groundwater ranged from below the laboratory reporting limit (RL) of 2.0 milligrams per liter (mg/L) to 60 mg/L, and the St. Clair River sample was 15 mg/L. The CCR unit water sulfate concentration was 1,100 mg/L (Figure 6). Chloride concentrations in the uppermost aquifer groundwater ranged from 1,400 mg/L to 1,800 mg/L, while the St. Clair River concentration was 9.6 mg/L, and the CCR unit water was only 46 mg/L. Bicarbonate concentrations in the uppermost aquifer groundwater ranged from 170 mg/L to 230 mg/L, but the CCR unit water concentration was only 120 mg/L. Conversely, the carbonate ion concentration in the uppermost aquifer groundwater and the St. Clair River

sample was below the laboratory RL of 5 mg/L, but the CCR unit water concentration was 27 mg/L. Fluoride concentrations in the uppermost aquifer groundwater ranged from 1.1 mg/L to 1.2 mg/L, but the CCR unit water concentration was only 0.26 mg/L.

Sodium concentrations in the uppermost aquifer groundwater ranged from 870 mg/L to 1,100 mg/L, and the CCR unit water concentration was 460 mg/L. The CCR unit water potassium concentration (13 mg/L) was higher than the uppermost aquifer groundwater (average 4.5 mg/L). Similarly, the lithium concentration in the CCR unit water (0.083 mg/L) was approximately 42% higher than the uppermost aquifer groundwater (0.054 mg/L). Calcium, magnesium, and barium were, on average 103%, 31%, and 27% more concentrated in the CCR unit water (110 mg/L, 15 mg/L and 0.29 mg/L mg/L, respectively) than in the uppermost aquifer groundwater (35 mg/L, 11 mg/L, and 0.22 mg/L, respectively); Figure 7). Boron concentration in the CCR unit water (7.3 mg/L) was, on average four times higher than uppermost aquifer groundwater (1.8 mg/L).

Groundwater in the uppermost aquifer was slightly alkaline (pH 8.1 standard units (SU)), while the CCR unit water was more alkaline (pH 8.9 SU) and the uppermost aquifer groundwater ORP was negative (-219 to -64 millivolts [mV]) while the CCR unit water ORP was only -13 mV. Table 4 below provides a summary of the data, which is discussed more fully in Section 3.1.2.

**Table 4 - Summary of Water Chemistry Results**

Parameter	Units	Aquifer Avg	CCR unit	St. Clair River
Na <sup>+</sup> + K <sup>+</sup> + Li <sup>+</sup>	mg/L	1,006	473	7
Ca <sup>2+</sup> + Mg <sup>2+</sup> + Ba <sup>2+</sup>	mg/L	46.6	125.3	33
B <sup>3+</sup>	mg/L	1.8	7.3	<0.1
HCO <sub>3</sub> <sup>-</sup> + CO <sub>3</sub> <sup>2-</sup> + SO <sub>4</sub> <sup>2-</sup> + Cl <sup>-</sup> + F <sup>-</sup>	mg/L	1,832	1,293	106
pH	SU	8.1	8.9	8.3
Eh	mV	-137	-13	5.9

### 3.1.2 Ionic Speciation and Mineral Saturation

Using the measured data, the dominant dissolved species of each measured element was determined. Typically, the basis species were also the dominant ionic form. Due to the pH difference between the uppermost aquifer groundwater and the CCR unit water, dominant species were shifted because of the larger quantity of hydroxide ions in the CCR unit water (e.g., bicarbonate to carbonate and boric acid to borate). The dominant calcium and magnesium species were Ca<sup>2+</sup> and Mg<sup>2+</sup> in the uppermost aquifer groundwater and St. Clair River, but additional masses of CaCO<sub>3</sub> and MgCO<sub>3</sub> in the CCR unit water. SO<sub>4</sub><sup>-</sup>, Cl<sup>-</sup>, and F<sup>-</sup> were the dominant anions in all groups. HCO<sub>3</sub><sup>-</sup> was the primary species in the uppermost aquifer groundwater, but the CCR unit water had equal contribution of CO<sub>3</sub><sup>2-</sup> due to the pH.

Geochemical parameters for the CCR unit water and the uppermost aquifer groundwater were calculated from the measured data using Geochemist's Workbench® (GW). The average of the chemical parameters for each water are presented below in Table 5.

**Table 5 - Calculated Average Geochemical Parameters**

Parameter	Units	CCR Unit Water	Uppermost Aquifer Average
f O <sub>2</sub> (g)	fugacity	1.12E-54	3.65E-61
pe	pe	-0.22	-2.43
Ionic strength	molal	0.036	0.049
Chlorinity	molal	0.001	0.046
Hardness	Micrograms/Kilogram (as CaCO <sub>3</sub> )	336	134
Hardness (carbonate)	Micrograms/Kilogram (as CaCO <sub>3</sub> )	127	130
Hardness (non-carbonate)	Micrograms/Kilogram (as CaCO <sub>3</sub> )	209	4
Carbonate alkalinity	Micrograms/Kilogram (as CaCO <sub>3</sub> )	127	155
Charge imbalance	equivalents/kg	0.0003	-0.0027
Charge imbalance error	percentage	0.59	-0.03
Eh (O <sub>2</sub> (aq)/H <sub>2</sub> O)	Volts	-0.013	-0.137

Fugacity is a thermodynamic parameter that can be used to differentiate water masses based on their geochemical properties. Fugacity is a measure of the escaping tendency of a gas or volatile substance from a liquid or solid phase, and it is commonly used to describe the behavior of gases and other volatile substances in aqueous environments. A very low fugacity, as observed in each of these waters, means that a gas or volatile substance is not readily escaping from a liquid or solid phase. Both pe and Eh can be used to describe water masses based on their oxidative or reducing potential. The pe and Eh values correspond to slightly reducing conditions, meaning although both waters are near 0, they have a slight tendency to donate electrons to other species. In other words, there is a small excess of electron donors (such as ferrous iron) compared to electron acceptors (such as oxygen) in the system.

Ionic strength is a measure of the concentration of charged ions (e.g., Na<sup>+</sup>, Cl<sup>-</sup>, Mg<sup>2+</sup>, etc.) in a solution. Chlorinity is a measure of the concentration of chloride ions (Cl<sup>-</sup>) in a solution and is often used as a proxy for salinity. The CCR unit water and uppermost aquifer groundwater differ significantly in their ionic strength and chlorinity values. The CCR water has a lower chlorinity and a higher ionic strength compared to the uppermost aquifer groundwater, which has a higher

chlorinity and a lower ionic strength. The higher ionic strength of the CCR water indicates that there is a higher concentration of ions in the water, which could be due to the presence of dissolved salts, acids, or bases, or other dissolved ionic species.

Carbonate and non-carbonate hardness are two measures of water hardness that can be used to differentiate water masses based on their composition. Carbonate hardness, also known as temporary hardness, is caused by the presence of dissolved bicarbonate and carbonate ions in the water. These ions are derived from the dissolution of calcium and magnesium carbonates in the rock formations through which the water has passed. Non-carbonate hardness, also known as permanent hardness, is caused by the presence of dissolved calcium and magnesium ions in the water that are not associated with carbonate or bicarbonate ions. This type of hardness is typically caused by the dissolution of calcium and magnesium sulfates or chlorides in the water. The differences in carbonate and noncarbonate hardness between the CCR unit water and the uppermost aquifer groundwater are significant. The CCR water is significantly harder than the uppermost aquifer groundwater. Additionally, the CCR unit water has a much higher noncarbonate hardness. The CCR water has a lower carbonate hardness and a higher noncarbonate hardness compared to the uppermost aquifer groundwater.

Mineral saturation indices of 102 mineral phases were also calculated using GW. Log(Q/K) mineral saturation data is typically used to determine the saturation state of minerals. Q represents the activity of a particular mineral species, while K represents the equilibrium constant for the mineral reaction in question. The logarithm of the ratio of Q to K is taken to calculate log(Q/K), which provides an indication of the saturation state of the mineral. If log(Q/K) is positive, it indicates that the mineral is oversaturated and may precipitate out of solution. If log(Q/K) is negative, it indicates that the mineral is undersaturated and may dissolve into solution. If log(Q/K) is zero, it indicates that the mineral is in a state of equilibrium. The saturation results are provided in Table 6.

Based on the calculations presented in Table 6, the St. Clair River sample was undersaturated with respect to all minerals except witherite ( $\text{BaCO}_3$ ) and several oxides. The CCR unit water was oversaturated with respect to the following minerals:

- Carbonates
  - Calcite –  $\text{CaCO}_3$
  - Dolomite –  $\text{CaMg}(\text{CO}_3)_2$
  - Strontianite –  $\text{SrCO}_3$
  - Witherite –  $\text{BaCO}_3$
- Sulfates
  - Barite –  $\text{BaSO}_4$
  - Jarosite-K/Na –  $\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6/\text{NaFe}_3(\text{SO}_4)_2(\text{OH})_6$
- Oxides
  - Ferrite-Ca/Mg –  $\text{Ca}(\text{FeO}_2)_2/\text{MgFe}_2\text{O}_4$
  - Goethite –  $\alpha\text{-FeO}(\text{OH})$

- Hematite –  $\text{Fe}_2\text{O}_3$

Additionally, anhydrite ( $\text{CaSO}_4$ ), aragonite ( $\text{CaCO}_3$ ), celestite ( $\text{SrSO}_4$ ), gypsum ( $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ ), magnesite ( $\text{MgCO}_3$ ), and monohydrocalcite ( $\text{CaCO}_3 \cdot \text{H}_2\text{O}$ ) were near equilibrium in the CCR unit water. The uppermost aquifer groundwater was only over saturated with respect to the following minerals:

- Carbonates
  - Dolomite –  $\text{CaMg}(\text{CO}_3)_2$
  - Strontianite –  $\text{SrCO}_3$
  - Witherite –  $\text{BaCO}_3$
- Oxides
  - Ferrite-Ca/Mg –  $\text{Ca}(\text{FeO}_2)_2/\text{MgFe}_2\text{O}_4$
  - Goethite –  $\alpha\text{-FeO}(\text{OH})$
  - Hematite –  $\text{Fe}_2\text{O}_3$

Additionally, calcite and aragonite ( $\text{CaCO}_3$ ), barite ( $\text{BaSO}_4$ ), fluorite ( $\text{CaF}_2$ ), magnesite ( $\text{MgCO}_3$ ), and monohydrocalcite ( $\text{CaCO}_3 \cdot \text{H}_2\text{O}$ ) were near equilibrium. In general, minerals with boron, chloride, fluoride, lithium, potassium, and sodium were undersaturated and minerals with calcium and magnesium were oversaturated in both waters. Oxides were oversaturated or near equilibrium in all samples. Carbonates were oversaturated in the CCR unit water, and near equilibrium in the uppermost aquifer groundwater. Sulfate minerals were oversaturated in the CCR unit water but were undersaturated in the uppermost aquifer groundwater. This is also presented in Figure 6, which provides the concentration of calcium plus magnesium as a function of concentration of dissolved sulfate.

Based on these results calcium, magnesium, strontium, and dissolved inorganic carbon (DIC) may be precipitating out of the uppermost aquifer groundwater, however this effect is likely minor given the saturation indices. Sulfate is expected to dissolve out of the uppermost aquifer material into the groundwater due to the substantial combined undersaturation of sulfate minerals (-3.7 average).

Although the carbonates are oversaturated in the CCR unit water, they may not be precipitating due to the pH. In alkaline conditions, carbonates can dissolve due to the formation of bicarbonate ions in solution. Note that calcium plus magnesium concentration as a function of the concentration of dissolved bicarbonate is provided in Figure 10 (discussed below).

### 3.2 Stable Isotopes

While concentration, speciation, and saturation data provide useful geochemical information to characterize water types, and can be particularly useful to determine if one body of water is in hydraulic connection with another, stable isotope analyses can provide unique “signatures” to differentiate and source waters. In order to build on the information presented above in Section 3.1, several isotopic evaluations were performed. For this study, lithium, boron strontium, hydrogen and oxygen isotopic data were used to determine the sources of various analytes and

to build a CSM of the hydrogeologic and geochemical conditions. The stable isotope water data collected in December 2022 is summarized in Table 3.

Isotopes are commonly expressed with the delta notation ( $\delta$ ). The delta notation is a common way to express the relative abundance of isotopes in a sample, relative to a standard reference material. It is used to express the differences in the isotopic composition of a sample relative to the reference material, in parts per thousand (per mil or ‰). The delta notation is defined as:

$$\delta = \left( \frac{R_{Sample}}{R_{Standard}} - 1 \right) 1,000$$

Where R is typically the rare isotope abundance divided by the abundant isotope abundance.

### **3.2.1 Lithium ( $\delta^7\text{Li}$ ) and Boron ( $\delta^{11}\text{B}$ )**

Lithium ( $\delta^7\text{Li}$ ) and boron ( $\delta^{11}\text{B}$ ) isotopes can be used to distinguish CCR water from background because the isotopic composition of lithium and boron in CCR is typically distinct from the composition in natural sources, such as rocks and sediments. The isotopic composition of lithium and boron in CCR is different from that of in natural sources because coal has a unique isotopic signature due to its geological origins and the processes involved in its formation.

The isotopic composition of lithium can change during coal formation due to several factors, including the geological origins of the coal, the depositional environment, and the processes involved in coal formation (Owen, 2015). Lithium has two stable isotopes, lithium-6 and lithium-7, and their relative abundance can be expressed as the delta value ( $\delta^7\text{Li}$ ) relative to a standard reference material (LSVEC NIST 8545 RM). The  $\delta^7\text{Li}$  value can be used to track changes in the isotopic composition of lithium during coal formation (Teichert, 2022). The  $\delta^7\text{Li}$  value of coal generally increases with increasing rank, or maturity, of the coal. This is because as coal is buried and subjected to increasing pressure and temperature, it undergoes a process called devolatilization, in which the volatile components of the coal, including lithium, are released. The released lithium preferentially enriches the remaining coal in the lighter isotope, lithium-6, leading to an enrichment in the  $\delta^7\text{Li}$  value in the coal. The exact extent to which the  $\delta^7\text{Li}$  value changes during coal formation can also depend on other factors, such as the depositional environment and the source of the organic matter that forms the coal. For example, coal formed from organic matter derived from plants that preferentially take up lithium-6 during growth may have a higher  $\delta^7\text{Li}$  value than coal formed from marine organisms that have a higher  $\delta^7\text{Li}$  value (Schlesinger, 2021).

Boron is a trace element that can be found in coal in varying amounts. The isotopic composition of boron in coal can change during coal formation, but the specifics of this process depend on several factors, including the source of boron, the depositional environment, and the conditions during coalification (Williams, 2004). In general, boron is derived from several sources during coal formation, including volcanic activity, seawater, and groundwater. Boron has two stable isotopes, boron-10 and boron-11, and their relative abundance can be expressed as the delta value ( $\delta^{11}\text{B}$ ) relative to a standard reference material (NIST SRM 951 RM). The isotopic composition of boron in these sources can vary, with different isotopic ratios of boron-10 to boron-11. During coal formation, boron can be incorporated into organic matter or minerals in

the coal, and the isotopic composition of boron can be affected by processes such as adsorption, diffusion, and precipitation. For example, boron may be adsorbed onto clay minerals or organic matter in the coal, leading to a shift in the isotopic composition of boron towards the composition of the adsorbent (Williams, 2004). The depositional environment can also play a role in determining the isotopic composition of boron in coal. In marine environments, boron may be more enriched in boron-11 due to the fractionation of boron isotopes during seawater evaporation (Xiao, 2007). In freshwater environments, boron isotopes may be more fractionated due to differences in boron uptake by plants (Xiao, 2022).

For these reasons, the  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values in water can provide information about the source and transport of CCR and CCR affected water. The unique isotopic composition of lithium and boron in CCRs can be used as a tracer. Therefore, this additional uppermost aquifer characterization utilized the measurement of  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. In order to make this effort even more robust, a surface water sample was collected from the nearby St. Clair River upstream from the CCR unit (Figure 3) in order to determine their  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values.

The  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  of the CCR unit water was 11.48 per mil (‰) and -5.01 ‰, respectively, and the uppermost aquifer groundwater ranged from 21.88 to 31.52 ‰ and 45.84 to 46.72 ‰, respectively. As observed in Figure 8, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups. The St. Clair surface water sample plots in a distinct region at 20.8 ‰ and -4.82 ‰, respectively. The distinct CCR water, uppermost aquifer groundwater, and St. Clair River sample isotopic compositions are echoed in the distinctive concentration profiles in Figure 8. The CCR unit water lithium and boron isotopic compositions fall within ranges commonly observed of fractionated CCR material (Davidson, 1993; Spivak-Birndorf, 2006; Harkness 2015; Teichert, 2022). The  $\delta^7\text{Li}$  and  $\delta^{11}\text{B}$  values of the uppermost aquifer groundwater samples and the surface water sample from St. Clair River are compositionally distinct from the CCR values (Ruhl, 2014; Owen, 2015) and fall within ranges commonly observed in the natural environment (Gonfiantini, 2006).

### 3.2.2 Strontium ( $^{87}\text{Sr}/^{86}\text{Sr}$ )

Similar to lithium and boron, the isotopic composition of strontium can be used to identify coal combustion residuals because coal and the minerals associated with it have a distinct strontium isotope signature that is different from other geologic materials (Brandt, 2018). During the coal combustion process, the strontium isotopic composition of the coal and any associated minerals is altered. CRR, including fly ash and bottom ash, can therefore be identified by analyzing their strontium isotopic composition and comparing it to the strontium isotopic composition of nearby liquids and solids that have not been affected by coal combustion (Hurst, 1981). The isotopic composition of strontium can be determined as a ratio of two of the stable isotopes, Sr-86, Sr-87, expressed as the ratio  $^{87}\text{Sr}/^{86}\text{Sr}$  relative to a standard reference material (NIST SRM 987).

Strontium is a trace element that occurs naturally in coal-forming environments, and its isotopic composition can be affected by the source of the sedimentary materials, as well as by diagenetic processes. During coal formation, organic matter is buried and subjected to heat and pressure, which causes it to transform into coal. This process can lead to the release of fluids

from the sedimentary rocks surrounding the coal seam, which can affect the isotopic composition of strontium in the coal (Spivak-Birndorf, 2012). In particular, the fluids may contain different concentrations of strontium isotopes compared to the original sedimentary rocks, which can lead to changes in the isotopic composition of strontium in the coal.

In addition, strontium can be incorporated into the organic matter itself during coal formation, which can also alter its isotopic composition. The extent to which strontium is incorporated into the organic matter is dependent on several factors, including the original concentration of strontium in the sedimentary materials and the conditions during coal formation. The isotopic composition of strontium in coal can be influenced by both the source materials and the processes that occur during coal formation (Korte, 2003). This makes it a useful tool for determining if CCR impacted waters are in hydraulic connection with natural water.

Therefore, this additional uppermost aquifer characterization utilized the measurement of  $^{87}\text{Sr}/^{86}\text{Sr}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the groundwater. Surface water collected from the nearby St. Clair River (Figure 3) in order to determine their  $^{87}\text{Sr}/^{86}\text{Sr}$  values.

The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of the CCR unit water was 0.709354 while the uppermost aquifer groundwater ranged from 0.709327 to 0.709581. The St. Clair River sample strontium ratio was 0.709999, which is isotopically distinct from the other two groundwater groups. As observed in Figure 9, the CCR unit water, uppermost aquifer groundwater, and St. Clair surface water sample plot in three separate regions. The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the CCR unit water is within published ranges of CCR leachate (Ruhl, 2014; Wang, 2020), and the uppermost aquifer groundwater samples and St. Clair River sample composition fit with values observed in natural waters (Shahand, 2009).

### **3.2.3 Hydrogen ( $\delta^2\text{H}$ ) and Oxygen ( $\delta^{18}\text{O}$ )**

Hydrogen and oxygen isotopes are commonly used in environmental studies to trace the sources and fate of water molecules. The use of hydrogen and oxygen isotopes in water can provide valuable insights into the impacts of CCRs on water quality. In the case of CCR impacts in water, hydrogen and oxygen isotopes can be used to determine the source of water in ponds and if those molecules have migrated to natural waters (Liu, 2006). The isotopic composition of water molecules within these CCR water bodies can be compared to the isotopic composition of nearby uncontaminated water bodies. The isotopic composition of hydrogen and oxygen in water molecules is expressed as  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ , respectively, and is measured in ‰ relative to a standard (Vienna Standard Mean Ocean Water [VMOW]). The isotopic signature of CCRs can vary depending on the source of coal, combustion conditions, and post-combustion processing (Huang, 2017).

Additionally, precipitation can have a significant effect on hydrogen and oxygen isotopes in groundwater. This is because the isotopic composition of precipitation varies in different regions (global and local meteoric water lines) due to variations in temperature, altitude, and atmospheric circulation patterns (Jouzel, 1984). When precipitation falls to the ground, it can either infiltrate into the soil and recharge the groundwater, or it can run off and enter streams or ponds. In the case of infiltration, the isotopic composition of the precipitation is generally



preserved as it moves through the soil and into the groundwater. This means that the  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values of the groundwater will be similar to those of the precipitation that recharged it. The degree to which precipitation affects the isotopic composition of groundwater can vary depending on factors such as the depth and age of the groundwater, the nature of the subsurface materials, and the rate of recharge. Therefore,  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values in groundwater can be used to trace the origin and movement of water in aquifers and to identify if CCR has impacted water.

For these reasons this additional uppermost aquifer characterization utilized the measurement of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. Surface water was collected from the nearby St. Clair River where shown on Figure 3 in order to determine their  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions.

The  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions of the CCR unit water were  $-53.01\text{‰}$  and  $-7.06\text{‰}$ , respectively, and the uppermost aquifer groundwater compositions ranged from  $-118.91$  to  $-116.12\text{‰}$  and  $-16.75$  to  $-16.35\text{‰}$ , respectively. The uppermost aquifer groundwater samples all plot above the global meteoric water line, and the CCR unit water sample and the St. Clair River sample plot below the line (Craig, 1961). The St. Clair River sample and the CCR unit sample  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  compositions were essentially equal (percent difference of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  were 1.28% and 4.20%, respectively). The CCR unit water  $\delta^2\text{H}$ , on was 64.63 ‰ heavier than the uppermost aquifer groundwater average, and the  $\delta^{18}\text{O}$  was 9.49 ‰ heavier. As observed in Figure 10, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups. The differences between the  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  CCR water and the uppermost aquifer groundwater are more than 23 times and 24 times, respectively greater than the total range of uppermost aquifer groundwater compositions.

### 3.3 Age Dating with Tritium Isotopes

The use of the isotope tritium to age date water is a well-established science and it has been successfully used to age date water sources for decades (Schlosser, 1988). Tritium ( $^3\text{H}$ ) is a radioactive isotope of hydrogen, that decays at a constant rate to Helium-3 ( $^3\text{He}^*$ ) with a half-life of about 12.3 years. It is a naturally occurring radioactive isotope, but also can be produced by human activities such as nuclear weapons testing. Tritium can be used to determine the age of groundwater because it can serve as a tracer of the time since the water was last in contact with the atmosphere (Telloli, 2022). Tritium is introduced into the atmosphere through nuclear weapons testing and naturally occurring cosmic radiation. It then becomes incorporated into precipitation and infiltrates into the ground, where it is taken up by plants or recharges groundwater. There are no subsurface reactions that generate tritium. Because tritium has a relatively short half-life, its concentration in precipitation, surface water and groundwater can be used to determine the age of the water (Dove, 2021).

When groundwater is recharged by precipitation that contains tritium, the concentration of tritium in the groundwater will be proportional to the age of the water since it was last in contact with the atmosphere. For example, if the concentration of tritium in the groundwater is high, it indicates that the water was recharged relatively recently, whereas if the concentration of tritium is low or undetectable, it indicates that the water is older. This information is important for

understanding the hydrology of aquifers and for managing and protecting groundwater resources.

The groundwater age can be estimated using the concentration of tritium in the water and the known rate of decay of tritium. The basic equation for calculating tritium age is:

$$Age = \ln\left(\frac{A/A_0}{\lambda}\right)$$

Where A is the measured tritium in the water sample in tritium units (TU),  $A_0$  is the tritium concentration in precipitation, and  $\lambda$  is the decay constant which is 0.693 divided by the half-life of 12.3 years. The tritium age calculated from this equation represents the time since the water was last in contact with the atmosphere. However, it is important to note that the tritium age reflects the time since the water entered the subsurface but may not necessarily reflect the time since the water was first recharged into the aquifer. This is because the water may have spent some time in the unsaturated zone (i.e., the soil and rock above the water table) before entering the aquifer, and this time is not accounted for in the tritium age calculation.

This additional uppermost aquifer characterization utilized tritium to determine if water from the CCR unit was impacting the uppermost aquifer groundwater. This was accomplished by collecting a water sample from within the CCR unit water, uppermost aquifer groundwater samples, and a surface water sample from nearby St. Clair River upgradient of the unit. The tritium water data collected in December 2022 is summarized in Table 3. The St. Clair River and CCR unit measured tritium values were 23.9 and 22.4 TU while the while the uppermost aquifer groundwater ranged from less than the detection limit of 0.1 TU to 0.37 TU.

Using the equation above, either the St. Clair River sample or the CCR unit water can be used to represent  $A_0$ . Therefore, age estimates are calculated using both values. Using the St. Clair water as  $A_0$ , the water in the CCR unit would be 1.2 years old, MW-16-07 would be approximately 74 years old, MW-16-10 would be 80 years old, and MW-16-05 would be 95 years old, and the remaining uppermost aquifer groundwater samples would be greater than 97 years old (Figure 11). Using the St. Clair River sample as  $A_0$  yields similar results with MW-16-07 would be approximately 73 years old, MW-16-10 would be 78 years old, and MW-16-05 would be 94 years old, and the remaining uppermost aquifer groundwater samples would be greater than 96 years old. If a significant amount of CCR-impacted water were entering the groundwater, we should see an impact on the tritium concentration. Therefore, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

It is important to note that diffusion may affect tritium concentrations. Diffusion can affect tritium values in groundwater by altering the concentration gradient of tritium in the subsurface. Diffusion is the process by which molecules move from areas of high concentration to areas of low concentration due to random thermal motion. In the subsurface, diffusion can cause tritium to move from areas of higher concentration to areas of lower concentration, resulting in a decrease in tritium concentration over time. In groundwater systems, tritium is introduced into

the subsurface through infiltration of tritium-containing precipitation. The tritium concentration in the groundwater is initially highest near the recharge zone and decreases as the water flows through the subsurface. As the tritium moves through the subsurface, it can be affected by diffusion, which can cause it to move from areas of higher concentration to areas of lower concentration.

The rate of diffusion of tritium in groundwater is therefore primarily dependent on the hydraulic conductivity of the subsurface materials and the concentration gradient of tritium. It is important to consider the effects of diffusion when interpreting tritium data in groundwater studies, as it can impact the accuracy of age estimates and the interpretation of the hydrogeological processes in the subsurface.

The control of diffusion in a groundwater system can be demonstrated by calculating the Peclet number. The Peclet number is a dimensionless number that describes the relative importance of advection and diffusion in a fluid system. In groundwater, the Peclet number can be calculated using the following equation:

$$Pe = \frac{(Lv)}{D}$$

where  $Pe$  is the Peclet number,  $L$  is the characteristic length scale of the system (e.g., the distance between the source and the monitoring well),  $v$  is the groundwater velocity, and  $D$  is the molecular diffusion coefficient. A Peclet number greater than 1 indicates that advection is dominant, while a Peclet number less than 1 indicates that diffusion is dominant. Given the distance (40 ft) to the monitoring wells and a seepage velocity of 0.6 ft/year, at standard temperature and pressure the Peclet number for tritium is greater than 10. Therefore, diffusion can be initially ruled out as an influence on the downgradient tritium age.

## 4.0 Statistical Analysis

TRC performed statistical evaluations of the data collected as part of this study to evaluate additional lines of evidence to support aquifer characterization. In order to compare the different water groups (CCR unit vs uppermost aquifer groundwater) to each other in a holistic manner, principal component analysis (PCA) and linear discriminant analysis (LDA) were selected as appropriate data analysis tools. PCA and LDA are statistical techniques that are used for large data sets containing a high number of dimensions/features per observation allowing for visualization of multidimensional data. PCA is a well-established statistical method for evaluating data and has been around for over 100 years. Likewise, LDA analysis is a statistical method that has been used to evaluate large data sets since the 1930s. Geochemists and groundwater statisticians use these tools because they are effective to evaluate large data sets that are typical for sites that have numerous wells and numerous parameters tested, which result in potentially large data dimensionality.

The data used for this analysis consisted of the data collected from the uppermost aquifer monitoring well network from August 2016 through December 2022 and diversion basin water samples from December 2020 through December 2022. Based on the recommendations from the Electric Power Research Institute (EPRI) New Technique in Alternative Source Demonstrations (EPRI, October 2022) guidance and the minimum requirements of LDA, only Appendix III analytes (boron, calcium, chloride, fluoride, sulfate, pH, and total dissolved solids (TDS)) were retained for analysis. Furthermore, it was found that TDS was not consistently reported in all the CCR unit water data and was removed from the analyte suite leaving boron, calcium, chloride, fluoride, sulfate, and pH. Due to the limited number of diversion basin and bottom ash basin samples and the minimum requirements of LDA, the diversion basin and bottom ash basin samples were combined to form a diversion basin and bottom ash basin group for the linear discriminant analysis. Non-detects were multiplied by 0.5 as this has been found to produce the most accurate results for PCA (Farnham et al, 2002).

### 4.1 Principal Component Analysis

The goal of principal component analysis is to reduce the dimensionality of the data while preserving the variation contained within the dataset. To reduce the dimensionality, the data is linearly transformed from  $n$  dimensions to  $n$  linearly transformed dimensions or principal components (PCs). These resulting PCs are ordered in terms of which components contain the most variation of the original dataset from PC1 having the most variation to PC $n$  having the least variation. The amount of variation each PC contains can be found in the eigenvalue of the PC, with higher eigenvalues corresponding to a higher percentage of the original dataset variation explained. These eigenvalues can be plotted to compare PCs to each other on what's known as a scree plot. Typically, the first two PCs are retained for further analysis, but any PCs with eigenvalues near or above 1 can be beneficial for analysis. The results of the PCA are commonly presented on a plot that contains both the loading scores of the PCs and the original data points projected using the PCs in what is known as a biplot. The loading scores indicate how much each analyte affects the corresponding PC and the projected points can be used to find clusters of similar data within the original dataset.

Figure 12, called a Scree plot, shows the eigenvalues for the six PCs created from the original data. PC1 and PC2 are above 1 and are therefore retained for further analysis. Figure 13 contains two sets of data, the blue arrows centered around the origin represent the loading scores for the PCs and the colored points represented the projected data. As can be seen in the percentages provided for each axis, PC1 contains 44.69% of the variation of the original dataset, meaning that most of the variation of the data can be seen in the horizontal axis. PC2 contains 27.67% of the variation of the original dataset. Together PC1 and PC2 account for 72.36% of the variation of the original data, showing that the data has been reduced from six dimensions to two dimensions while only losing 27.64% of the variation. There is no established criteria for how much variation should be explained by the PCs but at least 70% is a common target which the first two PCs meet (Jolliffe and Cadima 2016).

Because the data are standardized before PCA is performed, these loadings are applied to the standardized score of each analyte. As can be seen on by the arrows in Figure 13, fluoride points almost directly left, meaning that higher than average concentrations of fluoride in a sample would project that sample further to the left on the biplot. Conversely, if a sample has lower than average concentrations of fluoride it would be projected more to the right. From the loading scores we can see that PC1 is strongly influenced by fluoride and boron and moderately influenced by calcium, sulfate, chloride, and pH. PC2 is moderately influenced by calcium, sulfate, chloride, and pH and is not significantly influenced by fluoride and boron. The standardized data points are projected using the loading scores and are displayed as the color-coded points on the biplot. 95% confidence intervals were calculated to observe possible separation between the groups. As can be seen on the graph, most of the uppermost aquifer groundwater samples fall close to the origin and within the 95% confidence interval with a few outliers. The CCR unit samples are more sporadically located around the graph and the confidence interval encompasses all the samples. While this graph does not show the uppermost aquifer groundwater and DB CCR unit water samples are neatly separated, it does not conclusively show that they are inseparable. Because PCA attempts to preserve the most amount of variation within the data, it is not attempting to separate the groups from each other and may choose a projection which does not separate the groups but does preserve the most variation.

## 4.2 Linear Discriminant Analysis

In addition to PCA, linear discriminant analysis (LDA) was performed to demonstrate separation between the groups. LDA is similar to PCA in that it performs dimensionality reduction on the data, however, instead of preserving the most amount of variation of the dataset, it attempts to separate the provided groups and then predicts the group membership of each data point. Because LDA is a classification method, we can directly measure the separability of the groups based on the performance of the model. There is an additional requirement of LDA in which each group must have at least as many samples as there are analytes used in the model. Since there are only five samples from the bottom ash basin, four samples from the nearby diversion basin, were added to the bottom ash basin dataset to ensure complete coverage of the six analytes.

Figure 14 (LAD Origin) shows the eigenvalues, canonical coefficients which are analogous to loading scores in PCA, the prediction matrix, and the error rate of the LDA. Because LDA is attempting to separate the groups from each other the percentage of variance shown in the eigenvalues table is the variance between the different groups and not the total variance of the dataset. The canonical variables, which are analogous to PCs, are able to explain all of the variation between groups in just one variable instead of the six variables PCA produced. Similar to PCA, when we observe the standardized canonical coefficients table, we can see that the canonical variable is strongly influenced by chloride and fluoride while only being weakly influenced by boron, calcium, and sulfate; it is insignificantly influenced by pH. The classification count table shows the predicted classification of each point in the columns while the actual classification are the rows. Where the predicted class column intersects the matching actual class row represents the correct classification, where the prediction class column doesn't match the actual class row represents a misclassification. The LDA model only classified the points into the correct classes, demonstrating that the groups are separate from each other, this can also be seen in the error rate table within Figure 14 that the total error rate is 0%.

Figure 15, called an LAD Histogram, visually represents where each point is projected to using CV1. The rows represent the true classification of the data within them while the colors represent the model's prediction. As can be seen, the model perfectly separated the groups showing that the groups are distinct from each other. Additionally, an analysis of variance (ANOVA) was performed on the projected data to demonstrate a statistically significant difference between the two groups, the output of this analysis is presented in Figure 16. As can be seen in the figure, at the  $p = 0.05$  level, the population means of the uppermost aquifer groundwater and the BABs and DB CCR units' water are significantly different.

## 5.0 Findings and Conclusions

The data analyzed in this assessment demonstrate that the CCR unit water is not in hydraulic communication with the uppermost aquifer and therefore has not impacted the uppermost aquifer groundwater. Each of the individual analytes provides a line of evidence in support of this conclusion.

### 5.1 Geochemistry

The geochemistry data provides four distinct lines of evidence that the uppermost aquifer and the CCR unit are not in communication. The first is the distribution of mass or concentration of individual analytes in the three water groups (uppermost aquifer groundwater, St. Clair River upgradient surface water, and CCR unit water). The second is the geochemical condition of each water group, the third is calculated environmental conditions calculated from the first two lines of evidence, and the fourth is the lack of statistically significant increases (SSIs) as cited in numerous previous reports. From a simple perspective it can be seen that the concentrations of individual analytes in the CCR unit water are very different than within the uppermost aquifer groundwater. These differences are not minor. For example, sulfate is 63 times more concentrated in the CCR unit water than the concentration in the uppermost aquifer groundwater, and molybdenum is 20 times more concentrated in the CCR water. When two water masses become hydraulically connected, they tend to become more like each other chemically and physically. The dissolved species discussed in this report are naturally in the uppermost aquifer groundwater.

Geochemical conditions in the CCR unit water are very different from the uppermost aquifer groundwater. The pH of the CCR unit water is approximately 8.9 SU, but the uppermost aquifer groundwater is only 8.1 SU. This means that there are many more hydroxide ions in the CCR water than the uppermost aquifer. If the CCR unit water and uppermost aquifer groundwater were connected, the pH would be much closer. Similarly, the ORP of the CCR unit water is significantly higher than the uppermost aquifer groundwater.

The third line of geochemical evidence adds weight to the first two. The minerals which are undersaturated in the uppermost aquifer groundwater have component elements which are higher downgradient, and conversely the minerals which are oversaturated have component elements which are lower downgradient. Therefore, these geochemical calculations represent the natural conditions in the uppermost aquifer groundwater quite well. Therefore, the water geochemistry demonstrates that the uppermost aquifer groundwater and the CCR unit water are not in communication, the existing concentrations of Appendix III and IV analytes in groundwater are geogenic and the uppermost aquifer has not been affected.

The fourth line of evidence, the lack of SSIs shows that the uppermost aquifer groundwater is not receiving inputs from the CCR unit water.

### 5.2 Stable Isotopes

Similar to the multiple lines of evidence described in the preceding section, the stable isotope results reinforce the conclusions described above. The stable isotope analyses provide five distinct lines of evidence ( $\delta^7\text{Li}$ ,  $\delta^{11}\text{B}$ ,  $^{87}\text{Sr}/^{86}\text{Sr}$ ,  $\delta^2\text{H}$ , and  $\delta^{18}\text{O}$ ) which unequivocally show that the

lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater does not come from nor is it in communication with the CCR unit water. Not only do the compositions of each of these species fall within well-known natural ranges in the uppermost aquifer groundwater, but each is also statistically different than the corresponding composition in the CCR unit water at 95% confidence intervals. Therefore, the stable isotopes demonstrate that the uppermost aquifer groundwater and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

### **5.3 Age Dating with Tritium Isotopes**

Each of the previously discussed lines of evidence develops different aspects of the CSM and by themselves conclusively show that the CCR unit water is not in communication with the uppermost aquifer groundwater and the uppermost aquifer has not been affected. The tritium data, likewise, reinforces the concept that the uppermost aquifer groundwater is not in communication with the CCR unit. Therefore, the tritium analysis provides another line of evidence that the uppermost aquifer groundwater and the CCR unit water are not in communication and the uppermost aquifer has not been affected. Tritium has a half-life of 12.3 years, and the reporting limit is 0.1 TU. Therefore, groundwater ages up to 95 years in age from recharge should be observable. Based on the results presented within Section 3.3, groundwater within all of the DB CCR unit monitoring wells was recharged at least 73 years ago (the DB entered service 39 years ago). If a significant amount of CCR-impacted water were entering the groundwater, we should see an impact on the tritium concentration. Therefore, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

### **5.4 Statistical Analysis**

Principal component analysis was performed on bottom ash basin samples for App III analytes to compare the uppermost aquifer groundwater to the CCR unit water in a holistic manner. The results of the PCA were inconclusive in separating the CCR unit water from the uppermost aquifer groundwater and additional analysis was required.

Linear discriminant analysis was performed to further investigate if the CCR unit water and the uppermost aquifer groundwater are in communication with each other. Linear discriminant analysis is similar to PCA in that they are both dimensionality reduction techniques, but LDA attempts to separate the groups while PCA simply attempts to preserve the variance within the dataset. The model created by the LDA had perfect accuracy and was able to completely separate the groups from each other with a large distance between them. To further provide evidence that the separation is strong, an ANOVA was performed on the data transformed by the LDA. Analysis of variance compares groups of data to each other to determine if it is statistically probable for the data to be from the same population or different populations. The results of the ANOVA showed that at the 95% confidence level, the units are distinct from each other demonstrating that the uppermost aquifer groundwater, and the CCR unit water are not in communication and the uppermost aquifer has not been affected.



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## 5.5 Final Assessment

In conclusion, the data collected in this assessment confirms that the uppermost aquifer is not in hydraulic communication with the CCR unit water. This conclusion is supported by each of the multiple lines of evidence presented in this report:

- The geochemical composition of the uppermost aquifer groundwater is statistically distinct from the CCR unit water;
- The source of lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater is from upgradient groundwater and, as demonstrated by the stable isotope data is distinct from the CCR unit water; and
- Age dating with tritium validates that the uppermost aquifer groundwater is not hydraulically connected to the CCR unit water.

These multiple lines of evidence come together in an additive fashion to further validate the CSM established in the ALD and previous studies, which holds that the contiguous glacially compacted natural clay-rich soil natural liner system serves as a natural confining hydraulic barrier isolating the underlying uppermost aquifer from the CCR unit and the uppermost aquifer groundwater is unaffected by the CCR unit water.

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## 6.0 References

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# Tables

**Table 1**  
 Summary of Field Data – December 2022  
 Belle River Power Plant Diversion Basin CCR Unit  
 China Township, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (deg C)	Turbidity (NTU)
<b>Diversion Basin Monitoring Wells/Uppermost Aquifer</b>							
MW-16-05	12/15/2022	1.45	-219.2	8.1	3,497	10.0	12.3
MW-16-06	12/15/2022	1.32	-195.4	8.1	4,022	10.3	1.54
MW-16-07	12/15/2022	1.27	-203.8	8.0	4,492	10.7	25.3
MW-16-08	12/16/2022	1.20	-71.2	8.1	4,622	10.1	52.1
MW-16-10	12/16/2022	1.70	-65.5	8.1	3,853	10.1	35.6
MW-16-11A	12/16/2022	1.42	-64.3	8.1	4,198	9.5	5.85
<b>Diversion Basin Water</b>							
DB-01	12/16/2022	11.10	-12.5	8.9	1,827	7.1	5.91
<b>Surface Water/St. Clair River</b>							
SC-01	12/16/2022	12.01	5.9	8.3	149	4.5	5.57

**Notes:**

- mg/L - Milligrams per Liter.
- mV - Millivolts.
- SU - Standard Units.
- umhos/cm - Micromhos per centimeter.
- °C - Degrees Celsius.
- NTU - Nephelometric Turbidity Unit

**Table 2**  
 Summary of Analytical Results – December 2020 to December 2022  
 Belle River Power Plant Diversion Basin CCR Unit  
 China Township, Michigan

Constituent:		Alkalinity, bicarbonate	Alkalinity, carbonate	Alkalinity, total	Barium	Boron	Calcium	Chloride	Fluoride	Lithium	Magnesium	Molybdenum	Potassium	Sodium	Strontium	Sulfate	Total Organic Carbon
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Location	Sample Date																
<b>Diversion Basin Monitoring Wells/Uppermost Aquifer</b>																	
MW-16-05	12/15/2022	<b>190</b>	< 5	<b>190</b>	<b>0.24</b>	<b>1.6</b>	<b>33</b>	<b>1,400</b>	<b>1.2</b>	<b>0.047</b>	<b>11</b>	<b>0.011</b>	<b>4.1</b>	<b>870</b>	<b>0.81</b>	<b>6.1</b>	<b>1.8</b>
MW-16-06	12/15/2022	<b>180</b>	< 5	<b>180</b>	<b>0.25</b>	<b>1.8</b>	<b>38</b>	<b>1,600</b>	<b>1.2</b>	<b>0.045</b>	<b>12</b>	<b>0.014</b>	<b>4.3</b>	<b>960</b>	<b>1.0</b>	<b>4.4</b>	0.68 J
MW-16-07	12/15/2022	<b>230</b>	< 5	<b>230</b>	<b>0.22</b>	<b>1.8</b>	<b>35</b>	<b>1,700</b>	<b>1.2</b>	<b>0.053</b>	<b>11</b>	<b>0.0074</b>	<b>4.7</b>	<b>1,100</b>	<b>1.2</b>	<b>30</b>	<b>5.0</b>
MW-16-08	12/16/2022	<b>170</b>	< 5	<b>170</b>	<b>0.30</b>	<b>1.8</b>	<b>40</b>	<b>1,800</b>	<b>1.2</b>	<b>0.057</b>	<b>13</b>	<b>0.016</b>	<b>4.7</b>	<b>1,100</b>	<b>1.2</b>	< 2	0.62 J
MW-16-10	12/16/2022	<b>210</b>	< 5	<b>210</b>	<b>0.067</b>	<b>1.9</b>	<b>26</b>	<b>1,500</b>	<b>1.2</b>	<b>0.067</b>	<b>9.0</b>	<b>0.011</b>	<b>4.6</b>	<b>980</b>	<b>0.54</b>	<b>60</b>	0.53 J
MW-16-11A	12/16/2022	<b>170</b>	< 5	<b>170</b>	<b>0.27</b>	<b>1.8</b>	<b>38</b>	<b>1,700</b>	<b>1.1</b>	<b>0.057</b>	<b>12</b>	<b>0.012</b>	<b>4.8</b>	<b>1,000</b>	<b>1.0</b>	< 2	0.49 J
<b>Diversion Basin Water</b>																	
DB	12/16/2020	<b>140</b>	< 10	<b>140</b>	<b>0.19</b>	<b>6.0</b>	<b>110</b>	<b>43</b>	<b>0.44</b>	<b>0.061</b>	<b>18</b>	<b>0.30</b>	<b>13</b>	<b>510</b>	--	<b>1,200</b>	--
	1/29/2021	<b>69</b>	<b>35</b>	<b>100</b>	<b>0.35</b>	<b>0.68</b>	<b>41</b>	<b>14</b>	<b>0.31</b>	<b>0.016</b>	<b>9.0</b>	<b>0.029</b>	<b>3.9</b>	<b>58</b>	--	<b>130</b>	--
	10/8/2021	<b>85</b>	<b>32</b>	<b>120</b>	<b>1.2</b>	<b>1.1</b>	<b>86</b>	<b>15</b>	<b>1.2</b>	<b>0.038</b>	<b>17</b>	<b>0.053</b>	<b>7.1</b>	<b>170</b>	--	<b>410</b>	--
DB-01 <sup>(1)</sup>	12/16/2022	<b>120</b>	<b>27</b>	<b>150</b>	<b>0.29</b>	<b>7.3</b>	<b>110</b>	<b>46</b>	<b>0.26</b>	<b>0.083</b>	<b>15</b>	<b>0.24</b>	<b>13</b>	<b>460</b>	<b>2.3</b>	<b>1,100</b>	<b>3.7</b>
<b>Surface Water/St. Clair River</b>																	
SC-01	12/16/2022	<b>81</b>	< 5	<b>81</b>	<b>0.013</b>	< 0.1	<b>25</b>	<b>9.6</b>	<b>0.08</b>	< 0.008	<b>7.6</b>	< 0.005	<b>1.1</b>	<b>5.9</b>	<b>0.086</b>	<b>15</b>	<b>1.9</b>

**Notes:**

mg/L = milligram per liter, -- = not analyzed.

**Bold font** denotes concentrations detected above laboratory reporting limits.

J = estimated value. Concentration above the laboratory method detection limit but below the reporting limit.

F1 = MS and/or MSD recovery exceeds control limits

(1) same location as DB

**Table 3**  
 Summary of Stable Isotope and Tritium Results – December 2022  
 Belle River Power Plant Diversion Basin CCR Unit  
 China Township, Michigan

Constituent:		$\delta^{87}\text{Sr}$	$\delta^{11}\text{B}$	$\delta^7\text{Li}$	$\delta^2\text{H}$	$\delta^{18}\text{O}$	Tritium
Units:		‰	‰	‰	‰	‰	TU
Sample Location	Sample Date						
<b>Diversion Basin Monitoring Wells/Uppermost Aquifer</b>							
MW-16-05	12/15/2022	<b>0.709407</b>	<b>45.84</b>	<b>27.83</b>	<b>-118.709774</b>	<b>-16.730833</b>	<b>0.11</b>
MW-16-06	12/15/2022	<b>0.709327</b>	<b>46.46</b>	<b>31.52</b>	<b>-118.385583</b>	<b>-16.61386</b>	< 0.1
MW-16-07	12/15/2022	<b>0.709541</b>	<b>45.94</b>	<b>28.44</b>	<b>-116.781592</b>	<b>-16.388755</b>	<b>0.37</b>
MW-16-08	12/16/2022	<b>0.709581</b>	<b>46.31</b>	<b>23.69</b>	<b>-116.975338</b>	<b>-16.350531</b>	< 0.1
MW-16-10	12/16/2022	<b>0.709502</b>	<b>46.72</b>	<b>21.88</b>	<b>-116.1181</b>	<b>-16.423863</b>	<b>0.27</b>
MW-16-11A	12/16/2022	<b>0.709443</b>	<b>46.11</b>	<b>22.89</b>	<b>-118.914906</b>	<b>-16.74763</b>	< 0.1
<b>Diversion Basin Water</b>							
DB-01	12/16/2022	<b>0.709354</b>	<b>-5.01</b>	<b>11.48</b>	<b>-53.016172</b>	<b>-7.056188</b>	<b>22.4</b>
<b>Surface Water/St. Clair River</b>							
SC-01	12/16/2022	<b>0.709999</b>	<b>-4.82</b>	<b>20.80</b>	<b>-53.700517</b>	<b>-7.358694</b>	<b>23.9</b>

Notes:

‰ = per mil

TU = Tritium Units

**Bold font** denotes concentrations detected above laboratory reporting limits.

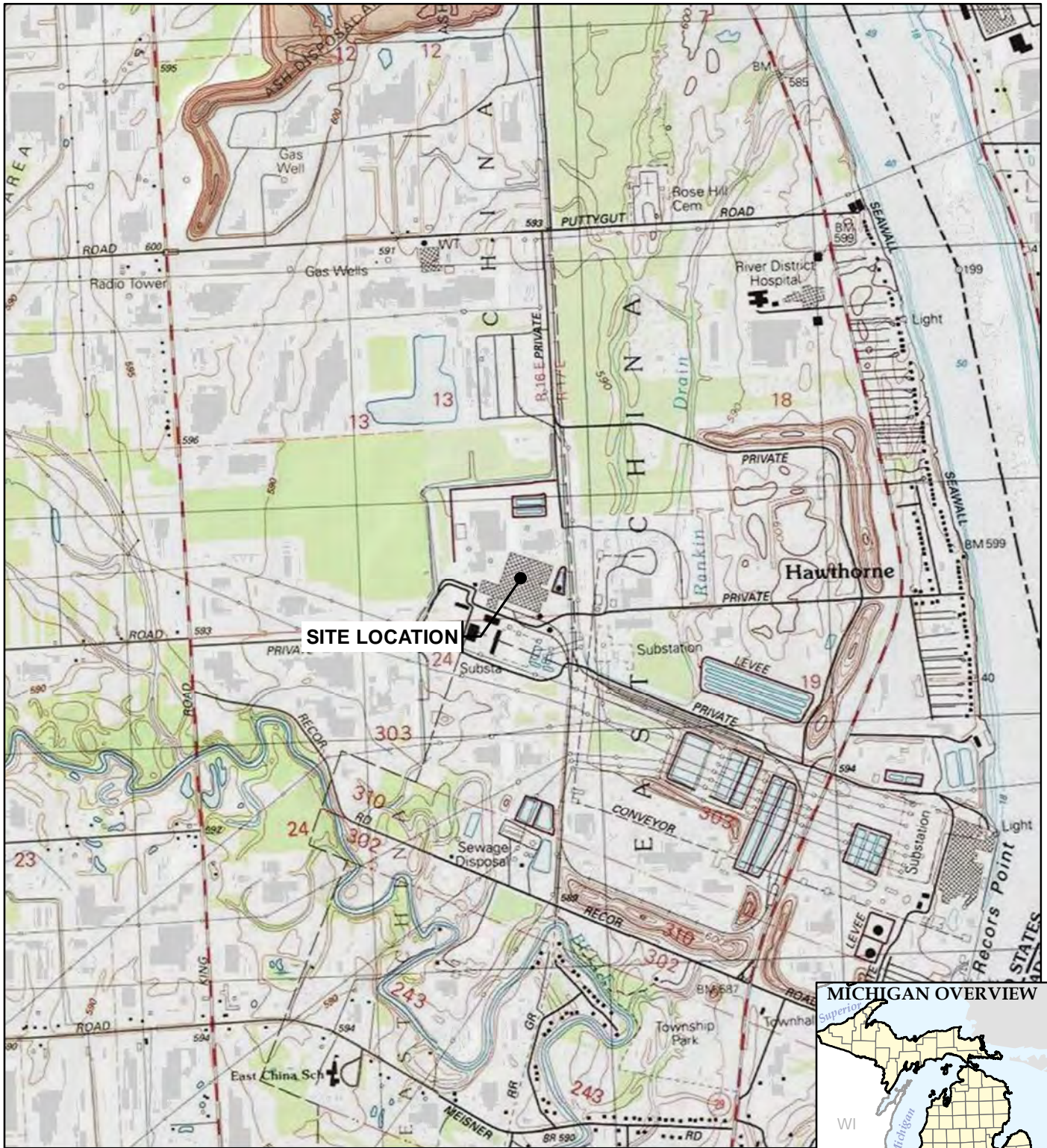


**Table 6**  
**Summary Calculated Mineral Saturation – December 2022**  
**Belle River Power Plant – RCRA CCR Monitoring Program**  
**China Township, Michigan**

Sample Location	Unit	DB-01	MW-16-05	MW-16-06	MW-16-07	MW-16-08	MW-16-10	MW-16-11A	SC-01	DB MW Avg
Alstonite (BaCa(CO3)2)	log Q/K	-2.09	-1.57	-1.58	-2.40	-2.06	-2.37	-2.40	-3.70	-2.06
Anhydrite (CaSO4)	log Q/K	-1.21	-3.88	-3.99	-3.22	-4.35	-3.02	-4.35	-3.17	-3.80
Antarctite (CaCl2·6H2O)	log Q/K	-12.98	-10.47	-10.32	-10.33	-10.22	-10.54	-10.27	-14.52	-10.36
Aragonite (CaCO3)	log Q/K	-0.05	-0.10	-0.08	-0.48	-0.35	-0.27	-0.51	-0.59	-0.30
Arcanite (K2SO4)	log Q/K	-7.44	-10.75	-10.88	-10.00	-11.17	-9.68	-11.13	-11.05	-10.60
Artinite (Mg2(OH)2·3H2O)	log Q/K	-7.89	-6.87	-6.83	-8.14	-7.55	-7.28	-8.07	-8.28	-7.46
Ba(OH)2·8H2O	log Q/K	-15.81	-15.00	-14.99	-15.93	-15.41	-15.75	-15.75	-16.76	-15.47
BaCl2(c)	log Q/K	-14.59	-11.40	-11.29	-11.31	-11.13	-11.93	-11.21	-16.70	-11.38
BaCl2·2H2O	log Q/K	-12.23	-9.10	-8.99	-9.03	-8.83	-9.64	-8.90	-14.30	-9.08
BaCl2·H2O	log Q/K	-13.00	-9.85	-9.73	-9.77	-9.57	-10.38	-9.65	-15.09	-9.82
BaF2(c)	log Q/K	-10.38	-8.86	-8.86	-8.95	-8.81	-9.45	-8.91	-12.14	-8.97
BaO(c)	log Q/K	-41.46	-40.27	-40.22	-41.11	-40.66	-41.00	-41.08	-42.76	-40.72
Barite (BaSO4)	log Q/K	1.72	-0.40	-0.56	0.18	-0.85	0.00	-0.86	-0.72	-0.41
Barytocalcite (BaCa(CO3)2)	log Q/K	-2.25	-1.73	-1.74	-2.57	-2.22	-2.53	-2.56	-3.86	-2.22
BaS(c)	log Q/K	-166.90	-165.40	-165.30	-164.30	-165.70	-165.10	-166.20	-171.10	-165.33
Bassanite (CaSO4·1/2H2O)	log Q/K	-1.84	-4.51	-4.62	-3.85	-4.98	-3.65	-4.99	-3.81	-4.43
Bischofite (MgCl2·6H2O)	log Q/K	-14.25	-11.29	-11.15	-11.15	-11.03	-11.34	-11.11	-15.52	-11.18
Bloedite (Bloedite)	log Q/K	-9.53	-13.52	-13.74	-12.04	-14.32	-11.57	-14.40	-16.48	-13.27
Borax (Na2H20B4O17)	log Q/K	-16.89	-18.34	-18.04	-18.73	-18.38	-18.09	-18.76	-28.18	-18.39
Boric acid (H3BO3)	log Q/K	-4.19	-4.81	-4.76	-4.74	-4.75	-4.73	-4.76	-6.10	-4.76
Brucite (Mg(OH)2)	log Q/K	-5.67	-5.00	-4.96	-5.87	-5.43	-5.27	-5.78	-5.84	-5.38
Burkeite (Na6(CO3)(SO4)2)	log Q/K	-18.79	-21.49	-21.63	-20.03	-22.28	-19.29	-22.59	-33.11	-21.22
Ca(OH)2(c)	log Q/K	-11.40	-11.11	-11.04	-11.95	-11.53	-11.39	-11.87	-11.90	-11.48
Ca2Cl2(OH)2·H2O	log Q/K	-23.63	-20.89	-20.68	-21.60	-21.06	-21.24	-21.44	-25.61	-21.15
Ca4Cl2(OH)6·13H2O	log Q/K	-39.89	-37.15	-36.87	-39.68	-38.18	-38.08	-39.13	-42.36	-38.18
CaCl2·2H2O	log Q/K	-17.53	-14.92	-14.76	-14.75	-14.66	-14.99	-14.73	-19.15	-14.80
CaCl2·4H2O	log Q/K	-13.94	-11.39	-11.24	-11.24	-11.14	-11.46	-11.20	-15.50	-11.28
CaCl2·H2O	log Q/K	-17.75	-15.12	-14.96	-14.95	-14.87	-15.19	-14.94	-19.38	-15.01
Calcite (CaCO3)	log Q/K	0.12	0.07	0.09	-0.31	-0.18	-0.10	-0.35	-0.42	-0.13
Carnallite (KMgCl3·6(H2O))	log Q/K	-20.44	-16.53	-16.33	-16.28	-16.13	-16.51	-16.21	-23.29	-16.33
CaSO4·1/2H2O(beta)	log Q/K	-2.03	-4.70	-4.81	-4.04	-5.17	-3.84	-5.17	-4.00	-4.62
Celestite (SrSO4)	log Q/K	-0.86	-3.46	-3.54	-2.66	-3.84	-2.67	-3.89	-3.59	-3.34
Chloromagnesite (MgCl2)	log Q/K	-33.30	-30.07	-29.90	-29.87	-29.80	-30.11	-29.93	-34.81	-29.95
Colemanite (Ca2B6O11·5H2O)	log Q/K	-23.25	-26.60	-26.15	-27.87	-27.07	-26.68	-27.75	-35.51	-27.02
Dolomite (CaMg(CO3)2)	log Q/K	0.42	0.75	0.78	-0.02	0.25	0.44	-0.09	-0.36	0.35
Dolomite-dis (CaMg(CO3)2)	log Q/K	-1.26	-0.90	-0.88	-1.67	-1.41	-1.22	-1.75	-2.06	-1.31
Dolomite-ord (CaMg(CO3)2)	log Q/K	0.42	0.75	0.78	-0.02	0.25	0.44	-0.09	-0.36	0.35
Epsomite (MgSO4·7H2O)	log Q/K	-4.01	-6.31	-6.45	-5.68	-6.78	-5.44	-6.79	-5.63	-6.24
Fe(OH)3(ppd)	log Q/K	2.80	2.44	2.39	3.13	2.78	2.65	2.96	2.70	2.73
Fe2(SO4)3(c)	log Q/K	-40.06	-48.86	-49.42	-42.80	-48.30	-45.00	-47.09	-45.35	-46.91
FeF3(c)	log Q/K	-10.50	-9.71	-9.79	-7.74	-8.69	-9.27	-8.16	-11.87	-8.89
Ferrite-2-Ca (Ca2Fe2O5)	log Q/K	-19.68	-19.71	-19.67	-19.99	-19.87	-19.84	-20.21	-20.98	-19.88
Ferrite-Ca (Ca(FeO2)2)	log Q/K	5.29	4.82	4.77	5.34	5.07	4.96	5.10	4.63	5.01
Ferrite-Mg (MgFe2O4)	log Q/K	4.95	4.92	4.86	5.43	5.17	5.08	5.18	4.57	5.11
Fluorite (CaF2)	log Q/K	-1.71	-0.86	-0.83	-0.89	-0.82	-0.99	-0.90	-2.89	-0.88
Gaylussite (Na2Ca(CO3)2·5H2O)	log Q/K	-6.33	-5.74	-5.70	-6.38	-6.11	-5.86	-6.44	-10.50	-6.04
Goethite (α-FeO(OH))	log Q/K	7.39	7.00	6.95	7.68	7.34	7.21	7.53	7.33	7.28
Graphite (C)	log Q/K	-79.58	-78.04	-77.94	-77.29	-77.75	-77.96	-77.85	-80.55	-77.81
Gypsum (CaSO4·2H2O)	log Q/K	-0.85	-3.55	-3.67	-2.90	-4.02	-2.70	-4.02	-2.79	-3.48
Halite (NaCl)	log Q/K	-6.29	-4.54	-4.44	-4.37	-4.34	-4.46	-4.40	-8.73	-4.43
Hematite (Fe2O3)	log Q/K	15.69	14.92	14.80	16.28	15.59	15.34	15.96	15.54	15.48
Hexahydrate (MgSO4·6H2O)	log Q/K	-4.37	-6.65	-6.79	-6.02	-7.12	-5.78	-7.14	-6.01	-6.58
Huntite (Mg3Ca(CO3)4)	log Q/K	-6.07	-4.90	-4.86	-6.44	-5.90	-5.50	-6.62	-7.41	-5.70
Hydroboracite (CaMgB6O8(OH)6·3H2O)	log Q/K	-19.49	-23.00	-22.63	-24.42	-23.08	-23.08	-23.08	-30.94	-23.45
Hydromagnesite (Mg5(CO3)4(OH)2·4H2O)	log Q/K	-16.80	-14.54	-14.48	-16.97	-15.97	-15.38	-17.05	-18.02	-15.73
Hydrophilite (CaCl2)	log Q/K	-21.64	-18.96	-18.80	-18.78	-18.70	-19.03	-18.79	-23.32	-18.84
Jarosite-K (KFe3(SO4)2(OH)6)	log Q/K	0.89	-6.01	-6.47	-1.26	-5.27	-3.12	-4.25	-3.65	-4.40
Jarosite-Na (NaFe3(SO4)2(OH)6)	log Q/K	0.80	-5.68	-6.16	-0.98	-4.92	-2.81	-3.87	-4.23	-4.07
K2CO3·3/2H2O	log Q/K	-15.03	-15.76	-15.76	-16.06	-15.96	-15.71	-16.06	-17.16	-15.89
K8H4(CO3)6·3H2O	log Q/K	-53.74	-57.22	-57.33	-57.48	-57.70	-56.81	-57.76	-62.46	-57.38
Kainite (KMg(SO4)Cl·3H2O)	log Q/K	-12.44	-13.73	-13.79	-12.96	-14.05	-12.78	-14.07	-15.72	-13.56
Kalinite (KHCO3)	log Q/K	-5.97	-6.47	-6.50	-6.39	-6.49	-6.39	-6.46	-7.08	-6.45
Kieserite (MgSO4·H2O)	log Q/K	-6.35	-8.55	-8.67	-7.89	-9.01	-7.67	-9.05	-8.07	-8.47
KMgCl3	log Q/K	-38.97	-34.81	-34.58	-34.49	-34.39	-34.78	-34.52	-42.06	-34.60
KMgCl3·2H2O	log Q/K	-31.05	-26.99	-26.77	-26.70	-26.58	-26.96	-26.68	-34.04	-26.78
KNaCO3·6H2O	log Q/K	-9.02	-9.16	-9.16	-9.46	-9.33	-9.12	-9.44	-11.82	-9.28
Leonhardtite (MgSO4·4H2O)	log Q/K	-5.32	-7.56	-7.69	-6.92	-8.03	-6.69	-8.06	-6.99	-7.49
Lime (CaO)	log Q/K	-22.24	-21.83	-21.75	-22.64	-22.25	-22.10	-22.61	-22.86	-22.20
Magnesite (MgCO3)	log Q/K	-1.44	-1.04	-1.03	-1.43	-1.29	-1.18	-1.47	-1.70	-1.24
Mercallite (KHSO4)	log Q/K	-11.79	-14.88	-15.03	-13.75	-15.11	-13.78	-14.93	-14.37	-14.58
Mg2Cl(OH)3·4H2O	log Q/K	-13.64	-11.35	-11.24	-12.63	-11.86	-11.77	-12.39	-14.35	-11.87
MgCl2·2H2O	log Q/K	-23.45	-20.34	-20.19	-20.17	-20.08	-20.39	-20.19	-24.84	-20.23
MgCl2·4H2O	log Q/K	-17.49	-14.47	-14.32	-14.32	-14.21	-14.51	-14.30	-18.80	-14.36
MgCl2·H2O	log Q/K	-27.10	-23.94	-23.79	-23.76	-23.68	-23.99	-23.80	-28.54	-23.83
MgF2(c)	log Q/K	-5.50	-4.17	-4.15	-4.20	-4.14	-4.28	-4.24	-6.43	-4.20
MgOHCl	log Q/K	-16.13	-14.21	-14.11	-14.55	-14.29	-14.36	-14.52	-16.94	-14.34
MgSO4(c)	log Q/K	-11.91	-14.04	-14.15	-13.36	-14.50	-13.15	-14.55	-13.69	-13.96
MHSH(Mg1.5)	log Q/K	-10.42	-12.26	-12.35	-12.02	-12.93	-11.50	-13.14	-12.25	-12.37
Mirabilite (Na2SO4·10H2O)	log Q/K	-3.95	-5.80	-5.89	-4.98	-6.13	-4.72	-6.17	-9.14	-5.61
Misenite (K8H8(SO4)7)	log Q/K	-76.96	-98.90	-99.94	-91.36	-100.70	-91.19	-99.55	-95.91	-96.94
Molysite (FeCl3)	log Q/K	-38.90	-35.40	-35.27	-33.11	-34.03	-34.86	-33.53	-41.01	-34.37
Monohydrocalcite (CaCO3·H2O)	log Q/K	-0.85	-0.90	-0.88	-1.28	-1.15	-1.07	-1.31	-1.38	-1.10
Na3H(SO4)2	log Q/K	-16.16	-20.24	-20.45	-18.22	-20.76	-18.05	-20.68	-24.83	-19.73
NaFeO2(c)	log Q/K	-7.09	-6.77	-6.77	-6.39	-6.57	-6.59	-6.60	-9.17	-6.62
Nesquehonite (MgCO3·3H2O)	log Q/K	-4.60	-4.16	-4.15	-4.54	-4.41	-4.30	-4.60	-4.91	-4.36
Pentahydrate (MgSO4·5(H2O))	log Q/K	-4.69	-6.98	-7.11	-6.34	-7.45	-6.10	-7.46	-6.33	-6.90
Pirssonite (Na2Ca(CO3)2·2(H2O))	log Q/K	-7.18	-6.47	-6.42	-7.08	-6.84	-6.59	-7.19	-11.45	-6.77
Portlandite (Ca(OH)2)	log Q/K	-11.40	-11.11	-11.04	-11.95	-11.53	-11.39	-11.87	-11.90	-11.48
Sr(OH)2(c)	log Q/K	-17.60	-17.17	-17.07	-17.86	-17.50	-17.52	-17.90	-18.93	-17.50
SrCl2(c)	log Q/K	-18.64	-15.92	-15.72	-15.60	-15.57	-16.06	-15.70	-21.06	-15.76
SrCl2·2H2O	log Q/K	-13.59	-10.94	-10.75	-10.64	-10.59	-11.08	-10.71	-15.95	-10.79
SrCl2·6H2O	log Q/K	-11.32	-8.73	-8.55	-8.45	-8.39	-8.88	-8.49	-13.62	-8.58
SrCl2·H2O	log Q/K	-15.24	-12.56	-12.36	-12.25	-12.21	-12.70	-12.33	-17.62	-12.40
SrF2(c)	log Q/K	-6.28	-5.30	-5.23	-5.18	-5.17	-5.50	-5.31	-8.27	-5.28
SrO(c)	log Q/K	-33.18	-32.58	-32.46	-33.22	-32.90	-32.93	-33.34	-34.67	-32.91
SrS(c)	log Q/K	-166.90	-165.90	-165.70	-164.60	-166.10	-165.20	-166.70	-171.40	-165.70
Strontianite (SrCO3)	log Q/K	1.15	1.17	1.21	0.92	1.01	0.93	0.80	-0.14	1.01
Sulfur-Rhmb (S)	log Q/K	-112.70	-113.00	-113.00	-111.10	-112.90	-111.90	-112.90	-115.40	-112.47
Sylvite (KCl)	log Q/K	-7.29	-6.34	-6.27	-6.22	-6.19	-6.27	-6.19	-8.89	-6.24
Tachyhydrite (CaMg2Cl6·12H2O)	log Q/K	-46.39	-37.84	-37.40	-37.39	-37.07	-38.00	-37.30	-50.56	-37.50
Thenardite (Na2SO4)	log Q/K	-5.62	-7.33	-7.42	-6.49	-7.67	-6.26	-7.73	-10.93	-7.15
Witherite (BaCO3)	log Q/K	2.02	2.54	2.51	2.07	2.30	1.90	2.13	1.00	2.24

Notes:  
Positive values are oversaturated and may precipitate out of solution  
Negative values are undersaturated and may dissolve into solution

# Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.



1540 Eisenhower Place  
Ann Arbor, MI 48108-3284  
Phone: 734.971.7080  
www.trccompanies.com

PROJECT:

**DTE ELECTRIC COMPANY  
BELLE RIVER POWER PLANT  
4505 KING ROAD  
CHINA TOWNSHIP, MICHIGAN**

TITLE:

**SITE LOCATION MAP**

DRAWN BY:

A. FOJTIK

CHECKED BY:

J. KRENZ

APPROVED BY:

V. BUENING

DATE:

JANUARY 2023

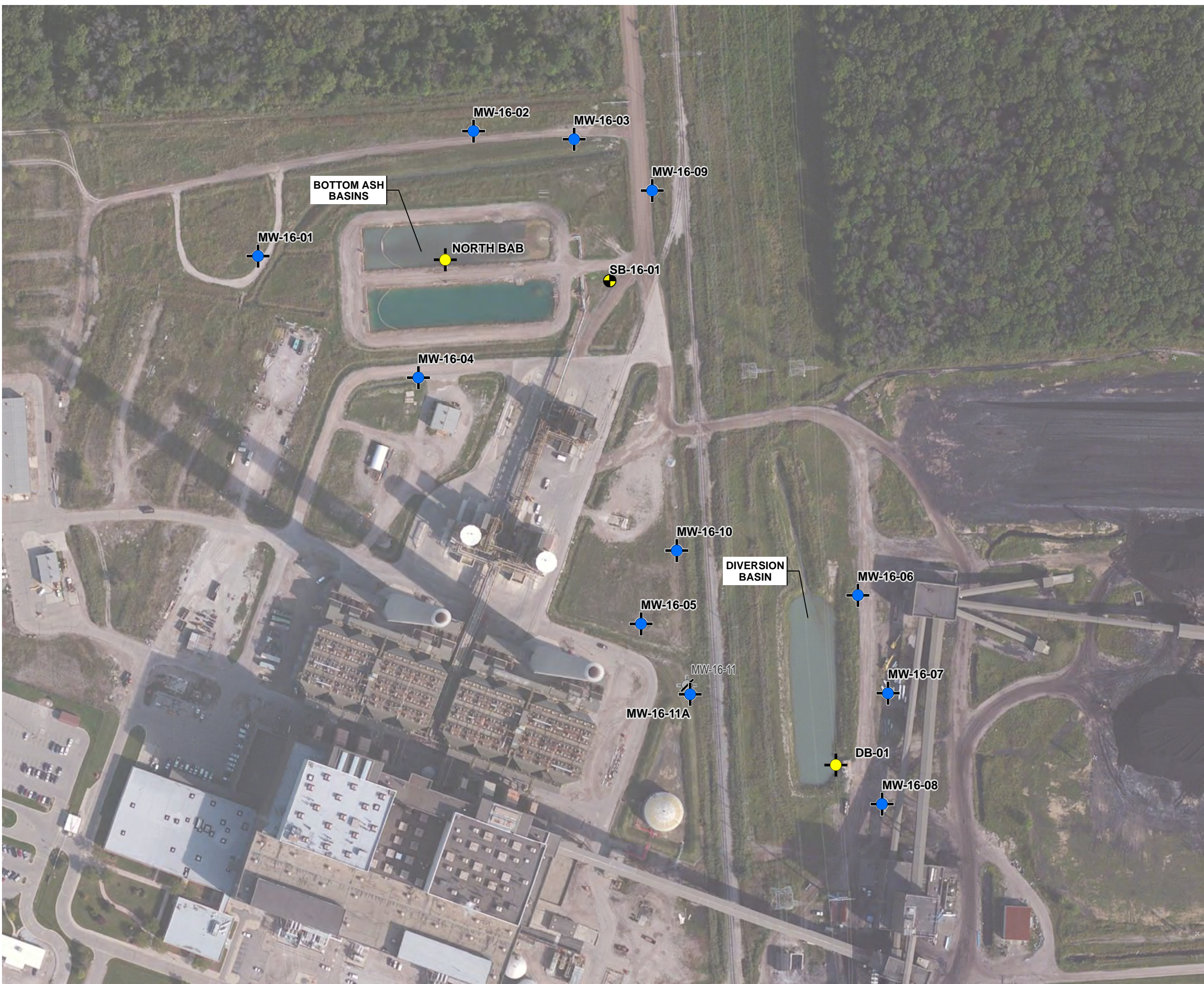
PROJ. NO.:

461816.0003





FILE:

461816-0003\_001.mxd

**FIGURE 1**

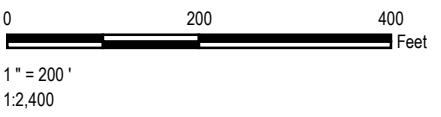


**LEGEND**

-  SOIL BORING
-  SURFACE WATER SAMPLE POINT
-  MONITORING WELL
-  DECOMMISSIONED MONITORING WELL

**NOTES**

1. BASE MAP IMAGERY FROM ESRI WORLD IMAGERY, (08/13/2021).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.



PROJECT:		DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN	
TITLE: <b>SITE PLAN</b>			
DRAWN BY:	A. ADAIR	PROJ. NO.:	522172.0000
CHECKED BY:	J. KRENZ	<b>FIGURE 2</b>	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		



1540 Eisenhower Place  
Ann Arbor, MI 48108-3284  
Phone: 734.971.7080  
www.trccompanies.com

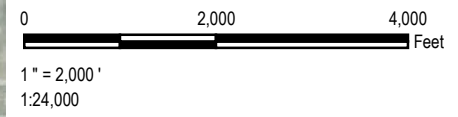



**LEGEND**

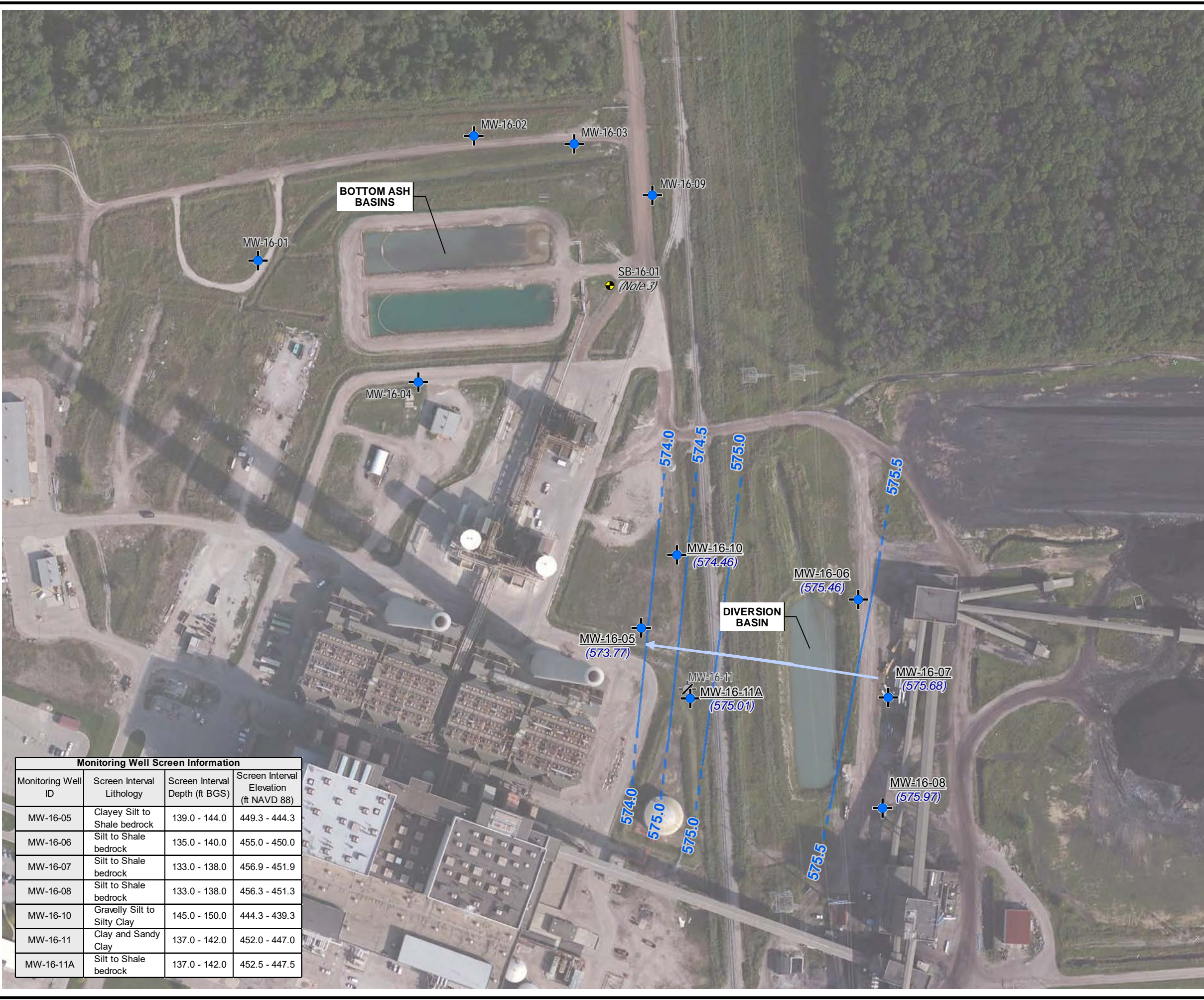
 SURFACE WATER SAMPLE POINT

**NOTES**

1. BASE MAP IMAGERY FROM ESRI WORLD IMAGERY, (08/13/2021).
2. SURFACE WATER SAMPLE LOCATION IS APPROXIMATE.



PROJECT:		<b>DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN</b>	
TITLE:		<b>OFFSITE SURFACE WATER SAMPLE LOCATION</b>	
DRAWN BY:	A. ADAIR	PROJ NO.:	522171.0000
CHECKED BY:	J. KRENZ	<b>FIGURE 3</b>	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		
		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com	
FILE NO.:	522172-0003_003.mxd		

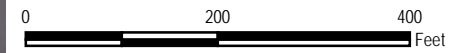


**LEGEND**

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- (575.47) GROUNDWATER ELEVATION (FT NAVD 88)
- (NU) NOT USED AS IS ANOMALOUS ELEVATION
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

**NOTES**

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, AND JUNE 2016 BY BMJ ENGINEERS AND SURVEYORS, INC.
3. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.



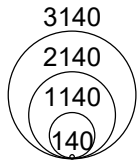
1" = 200'  
1:2,400

Monitoring Well Screen Information			
Monitoring Well ID	Screen Interval Lithology	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft NAVD 88)
MW-16-05	Clayey Silt to Shale bedrock	139.0 - 144.0	449.3 - 444.3
MW-16-06	Silt to Shale bedrock	135.0 - 140.0	455.0 - 450.0
MW-16-07	Silt to Shale bedrock	133.0 - 138.0	456.9 - 451.9
MW-16-08	Silt to Shale bedrock	133.0 - 138.0	456.3 - 451.3
MW-16-10	Gravelly Silt to Silty Clay	145.0 - 150.0	444.3 - 439.3
MW-16-11	Clay and Sandy Clay	137.0 - 142.0	452.0 - 447.0
MW-16-11A	Silt to Shale bedrock	137.0 - 142.0	452.5 - 447.5

PROJECT:		<b>DTE ELECTRIC COMPANY BELLE RIVER POWER PLANT DIVERSION BASIN 4505 KING ROAD CHINA TOWNSHIP, MICHIGAN</b>	
TITLE:		<b>DIVERSION BASIN GROUNDWATER POTENTIOMETRIC SURFACE MAP OCTOBER 2022</b>	
DRAWN BY:	A. FOJTIK	PROJ NO.:	461816.0003
CHECKED BY:	J. KRENZ	<b>FIGURE 4</b>	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		



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Ann Arbor, MI 48108-3284  
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Total Dissolved Solids (TDS)

- DB-01
- MW-16-05
- ▲ MW-16-06
- ▼ MW-16-07
- ◆ MW-16-08
- ◆ MW-16-10
- ▲ MW-16-11A
- ★ SC-01

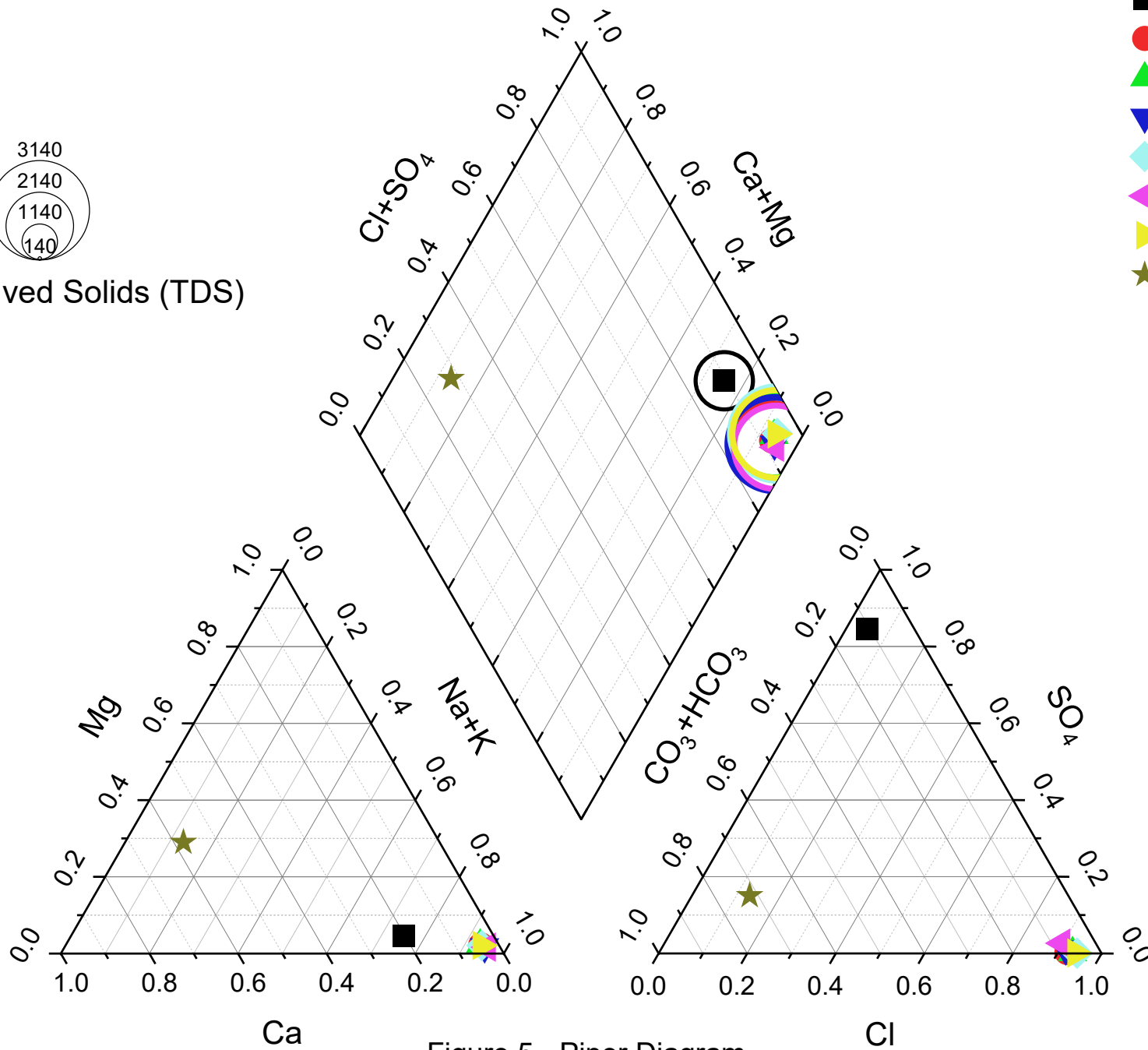
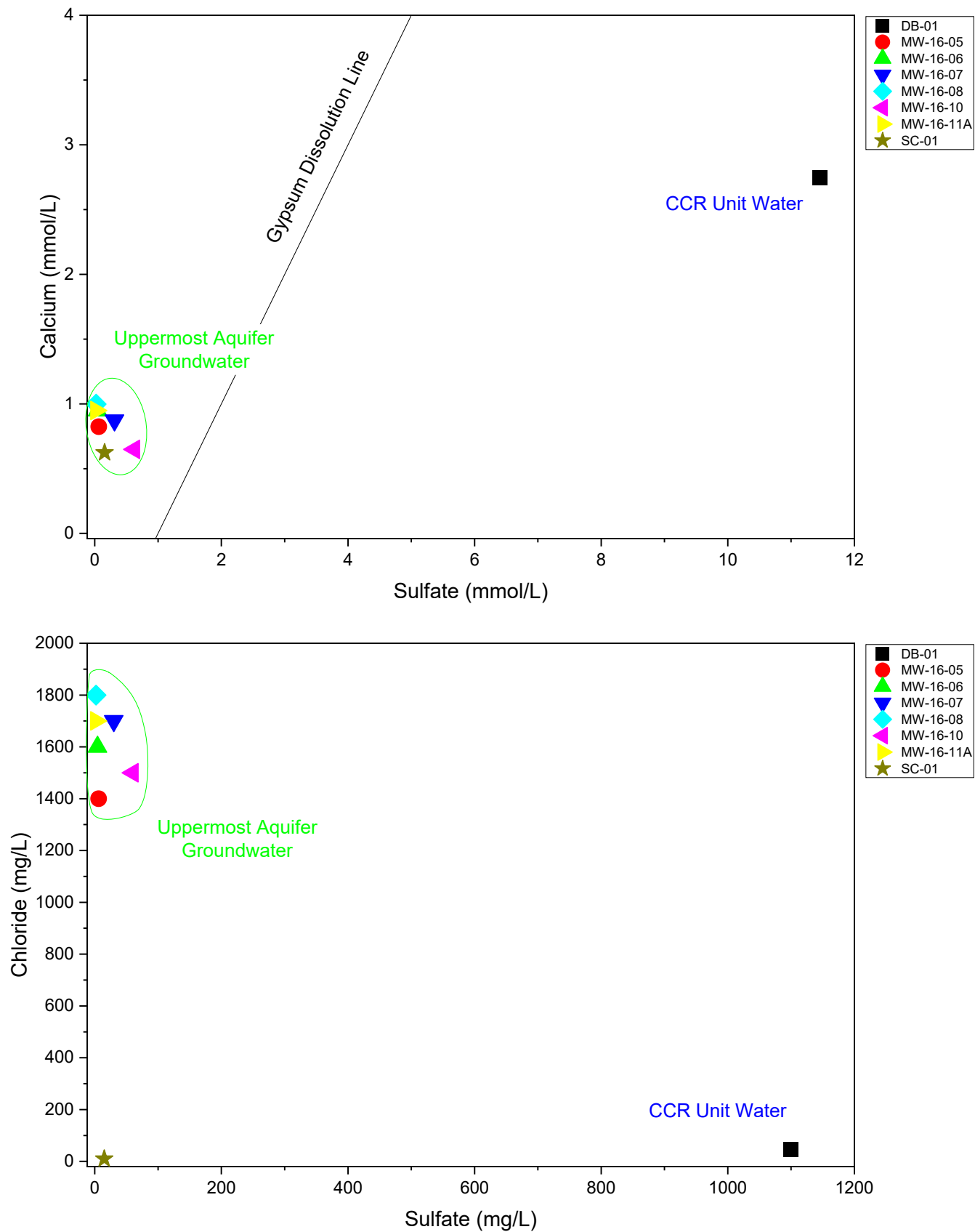


Figure 5 - Piper Diagram  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan

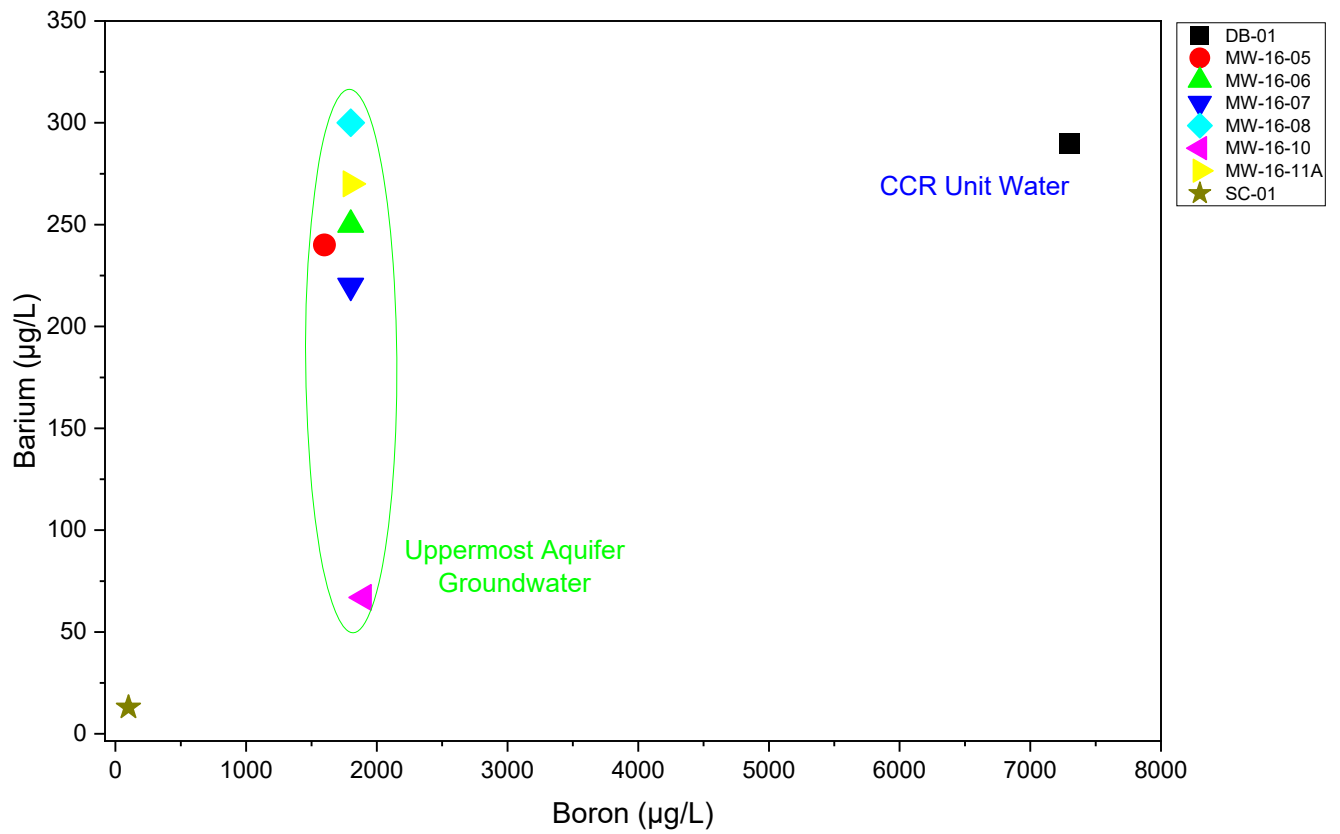
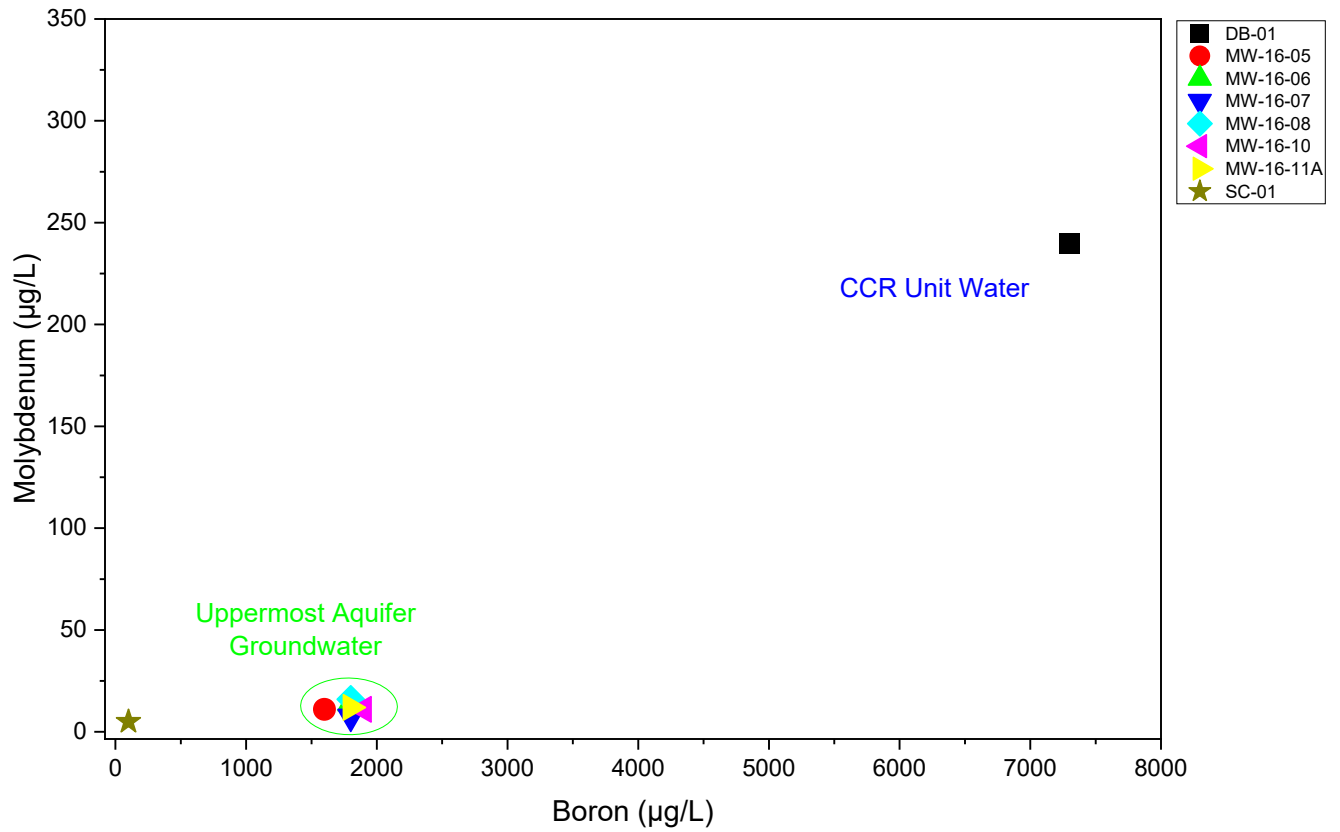
**Figure 6**

Summary of Calcium and Sulfate Saturation with Chloride and Sulfate Concentrations  
Belle River Power Plant  
4505 King Rd, China Township, Michigan

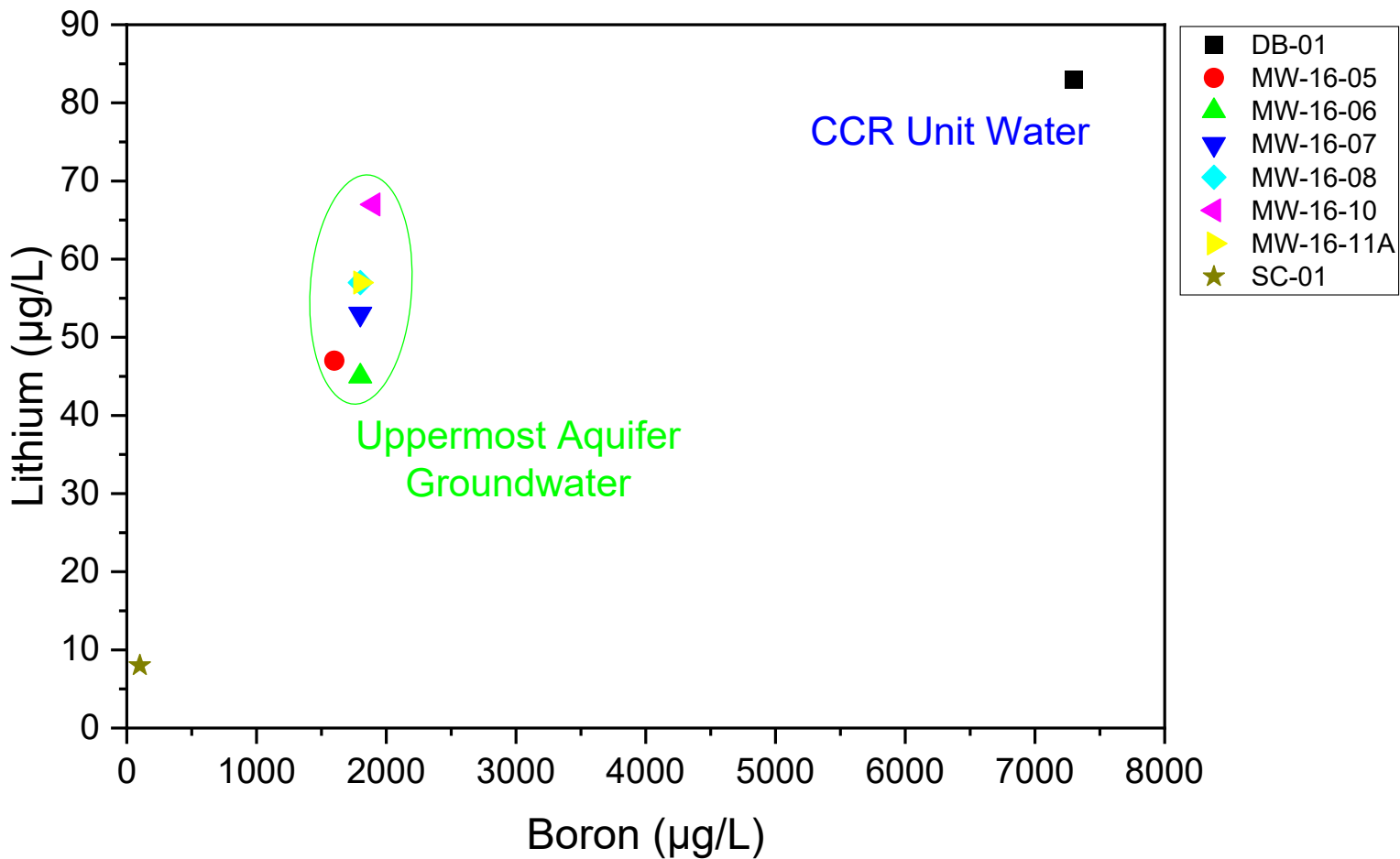
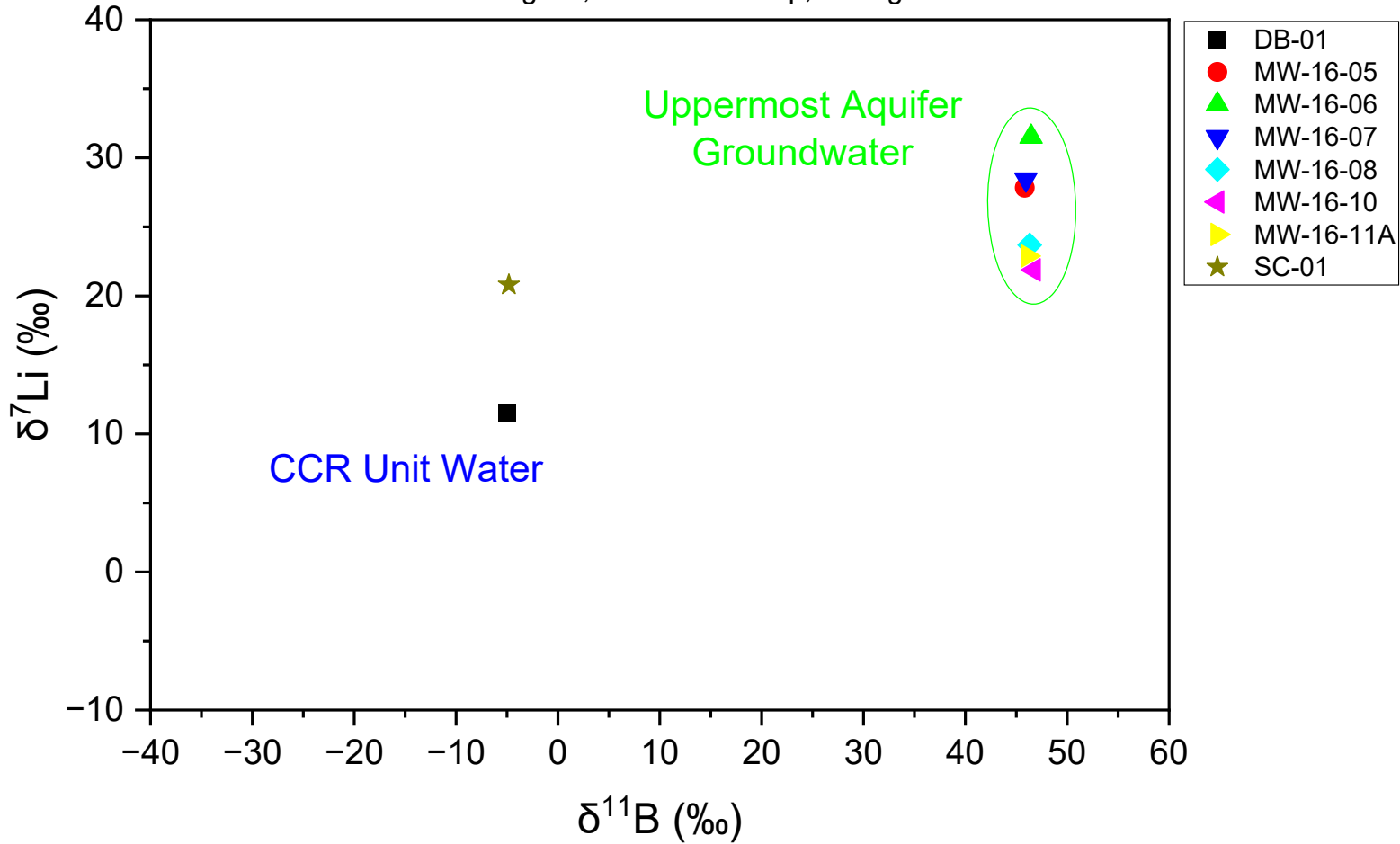




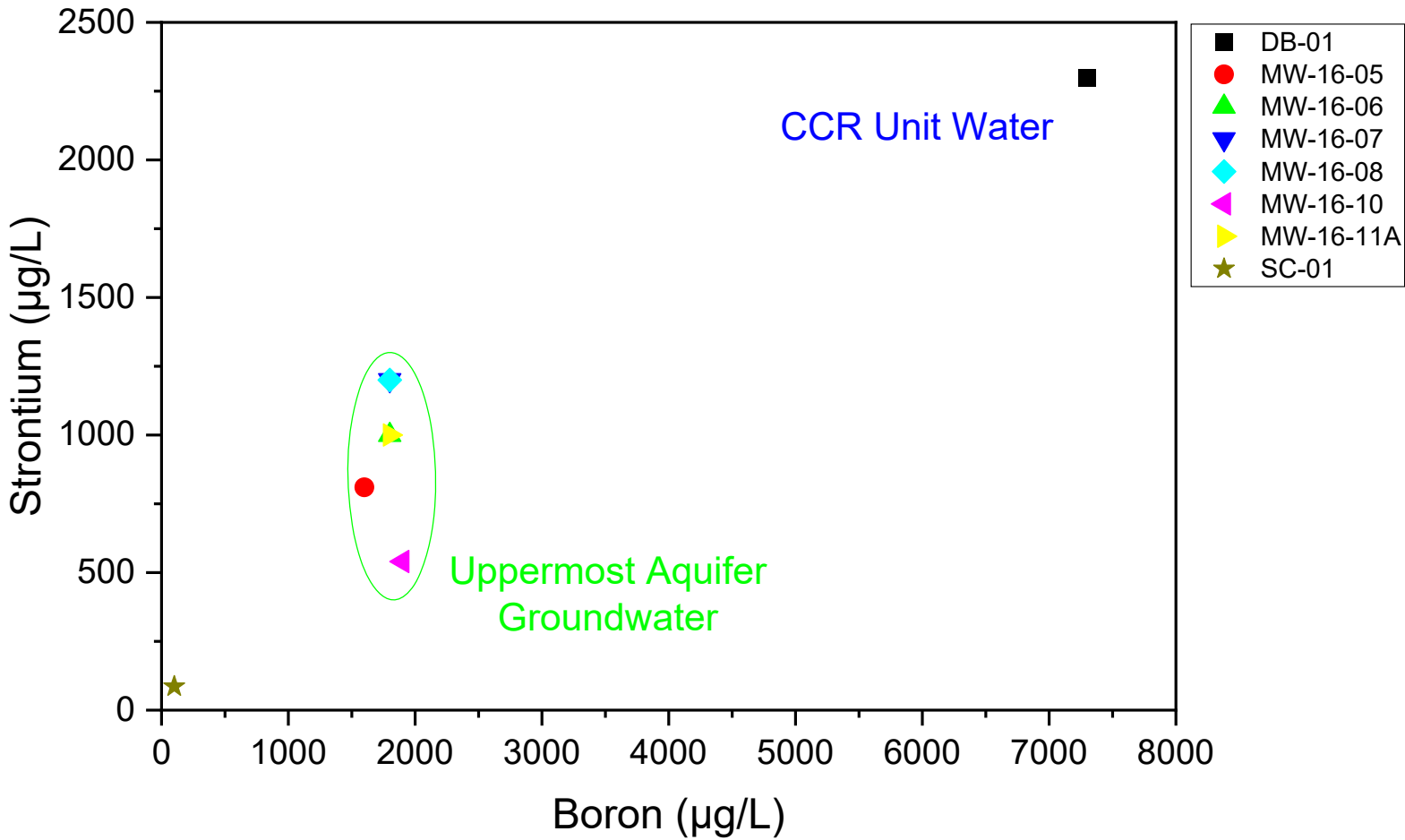
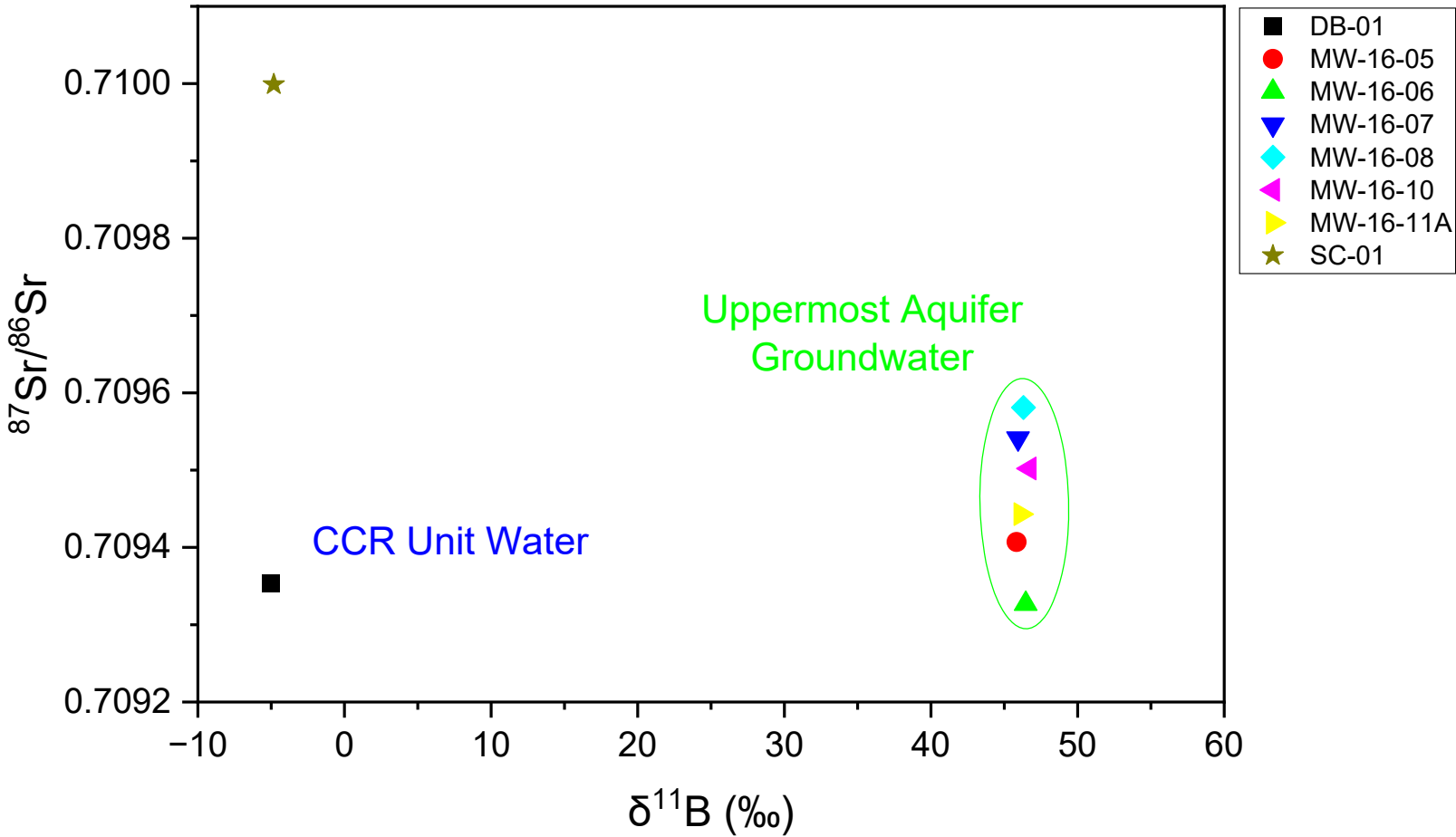
**Figure 7**  
**Molybdenum and Barium with Boron Concentrations**  
**Belle River Power Plant**  
**4505 King Rd, China Township, Michigan**



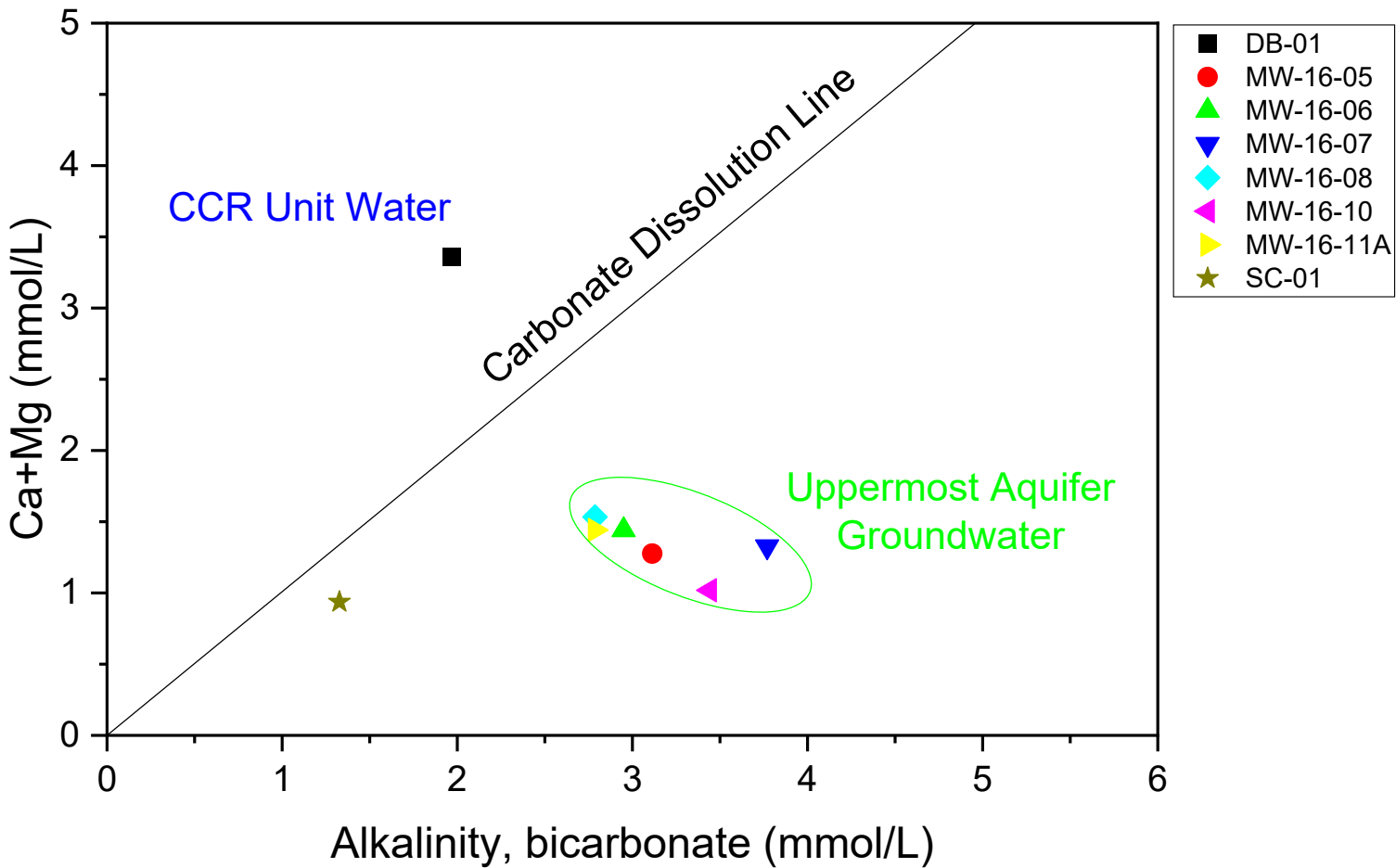
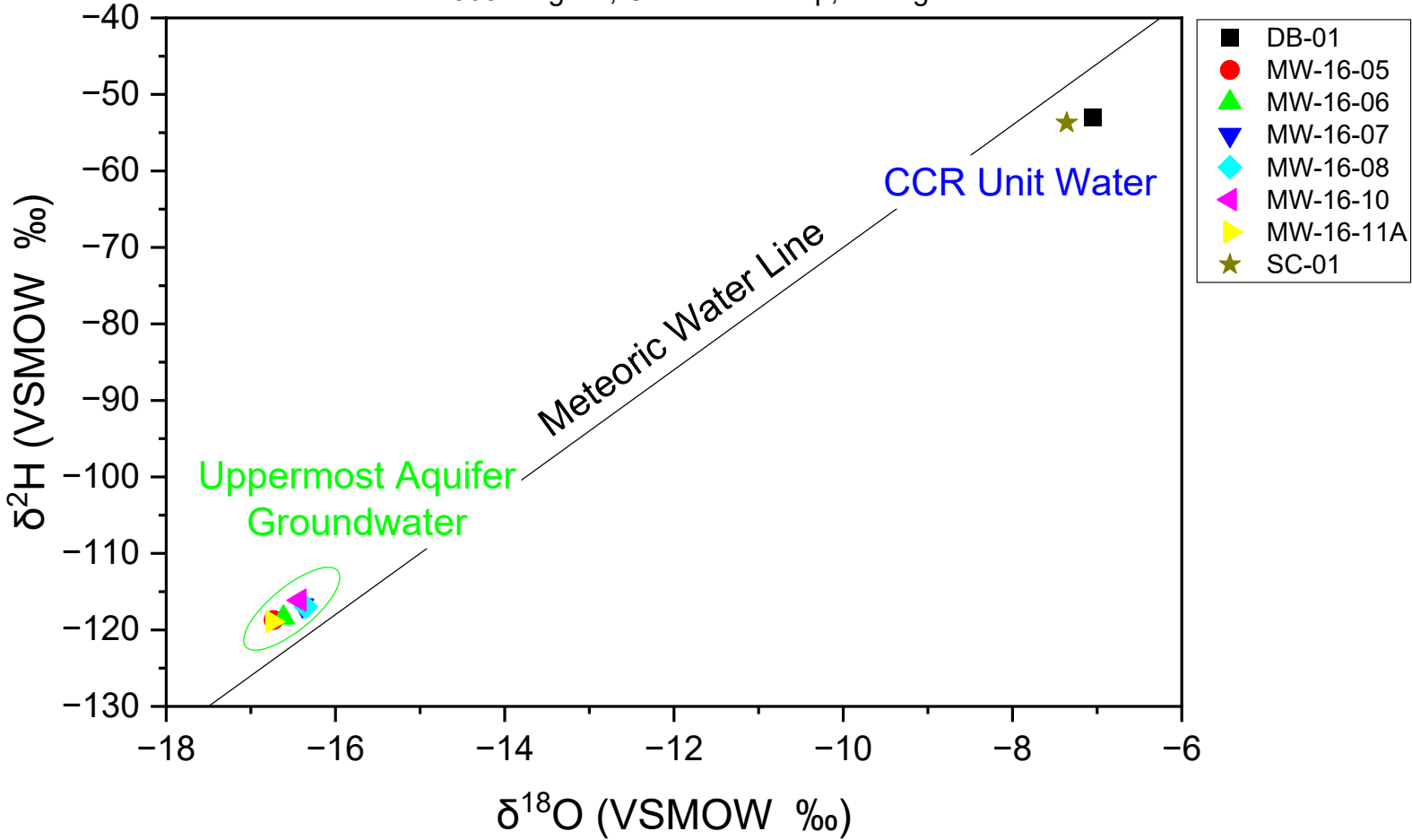
**Figure 8**  
 Summary of Lithium and Boron Isotopic and Concentration Results  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



**Figure 9**  
 Summary of Strontium and Boron Isotopic Concentration Results  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



**Figure 10**  
 Hydrogen and Oxygen Isotopic Compositions and Carbonate Solubility  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan



**Figure 11**  
 Tritium Data and Age Model  
 Belle River Power Plant  
 4505 King Rd, China Township, Michigan

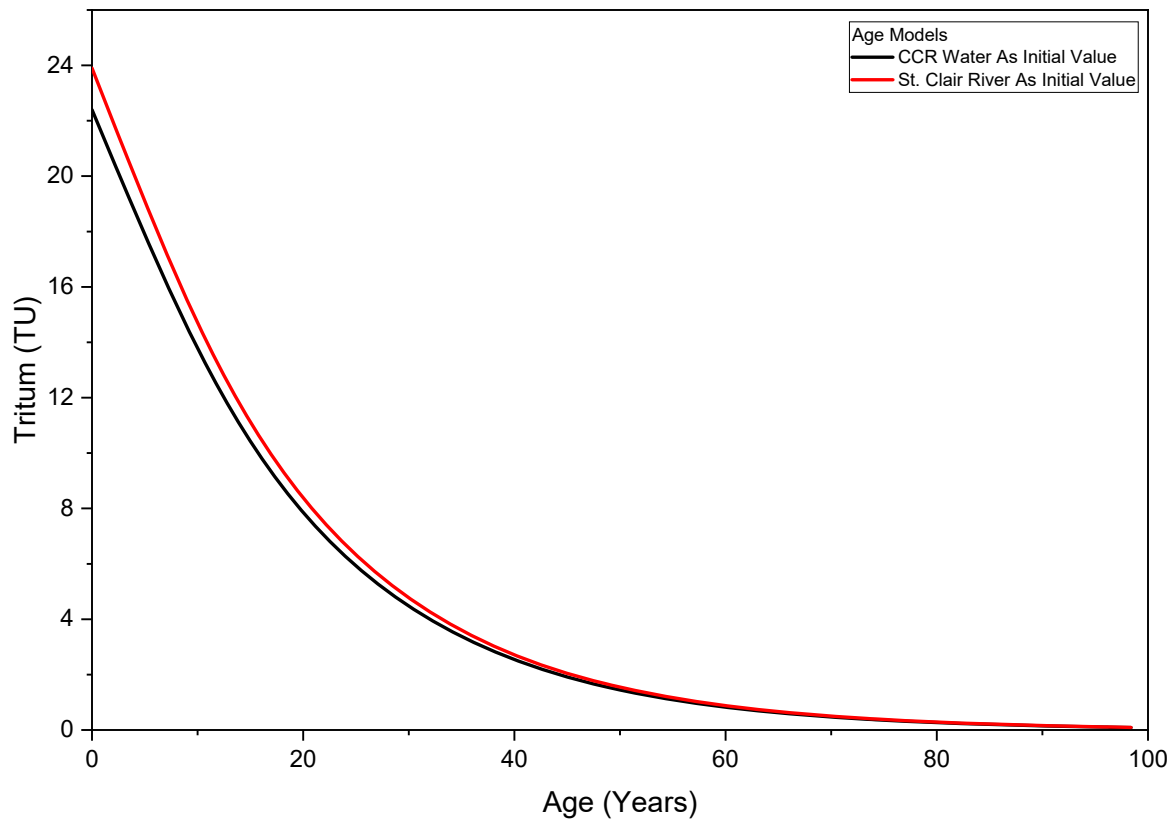
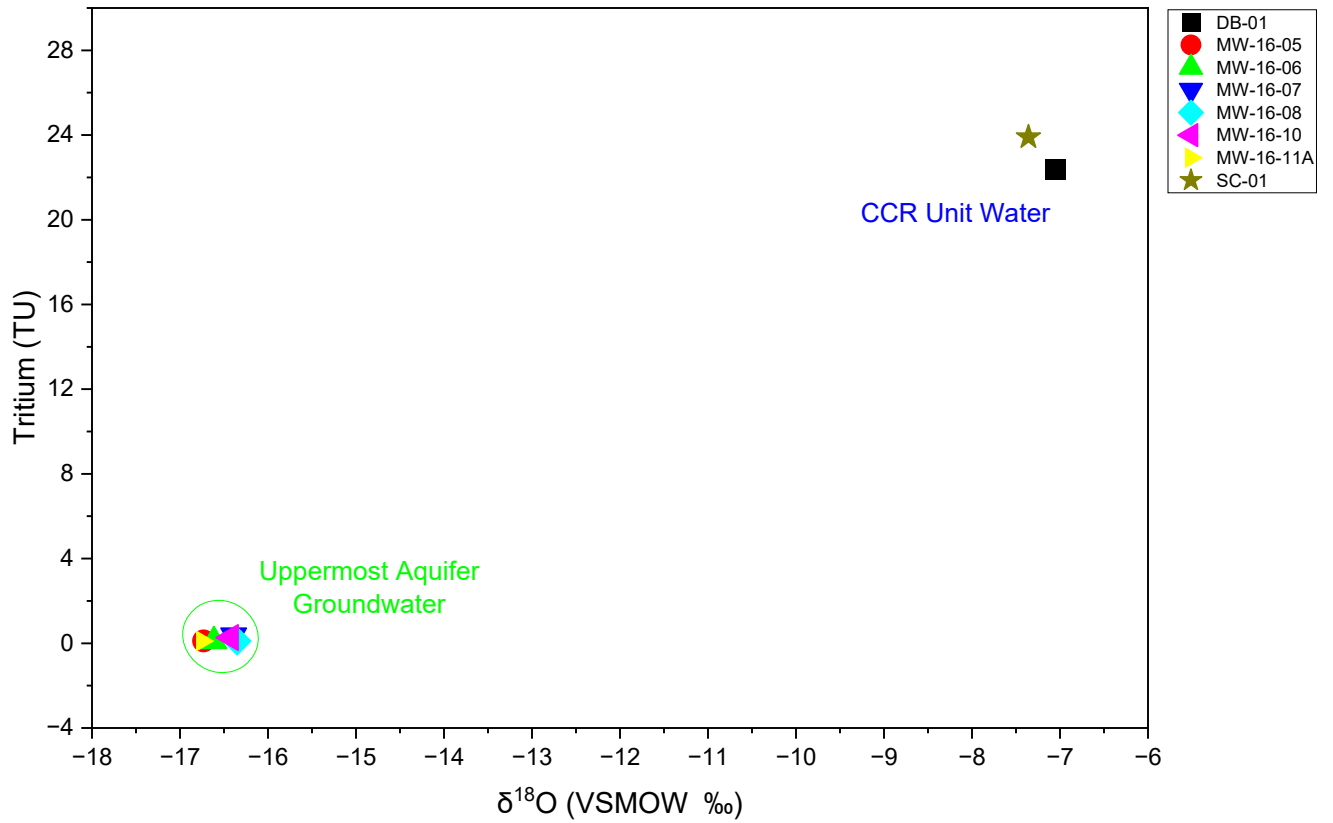


Figure 12 - Scree Plot  
Belle River Power Plant Diversion Basin CCR Unit  
4505 King Road, China Township, Michigan

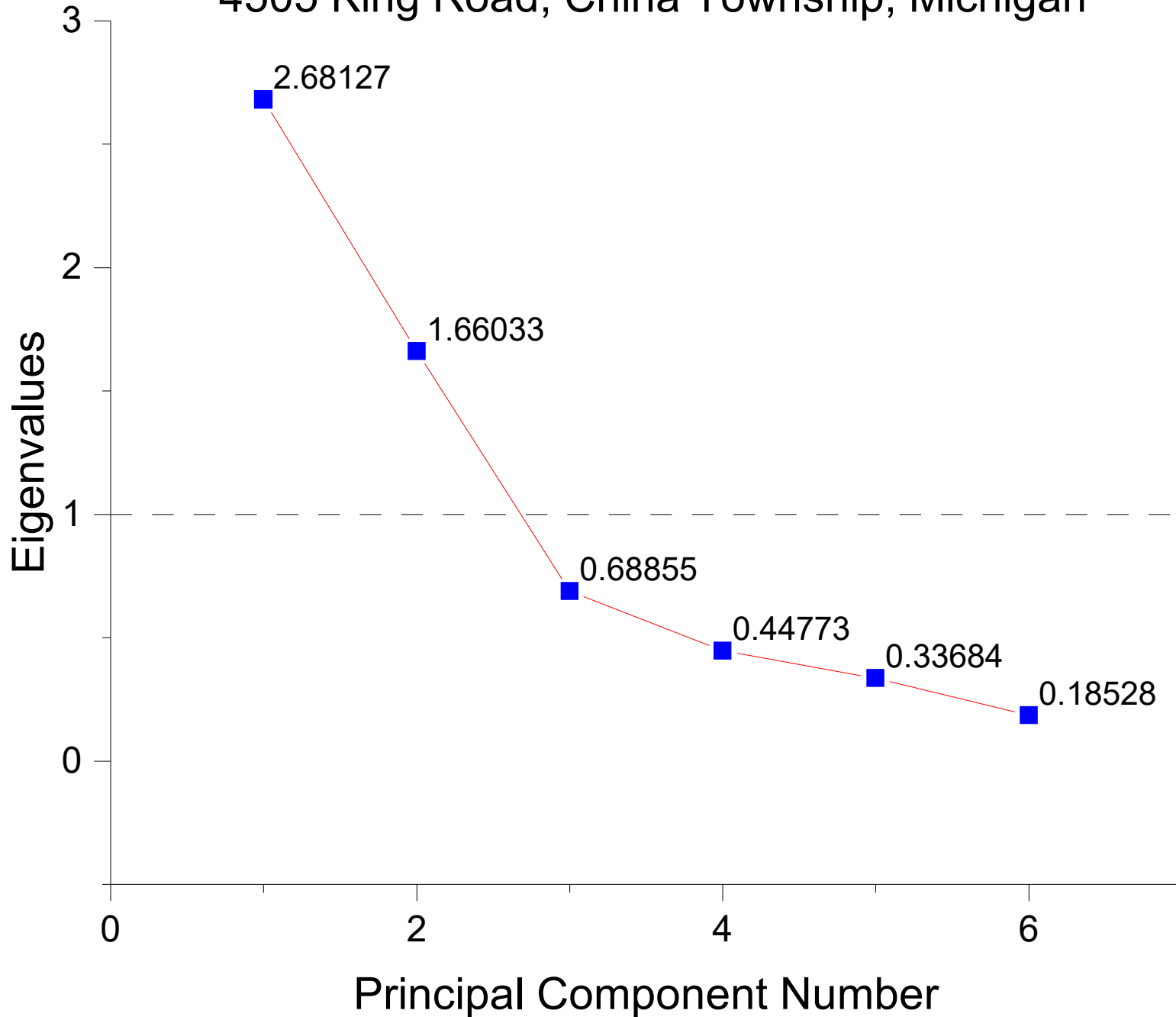
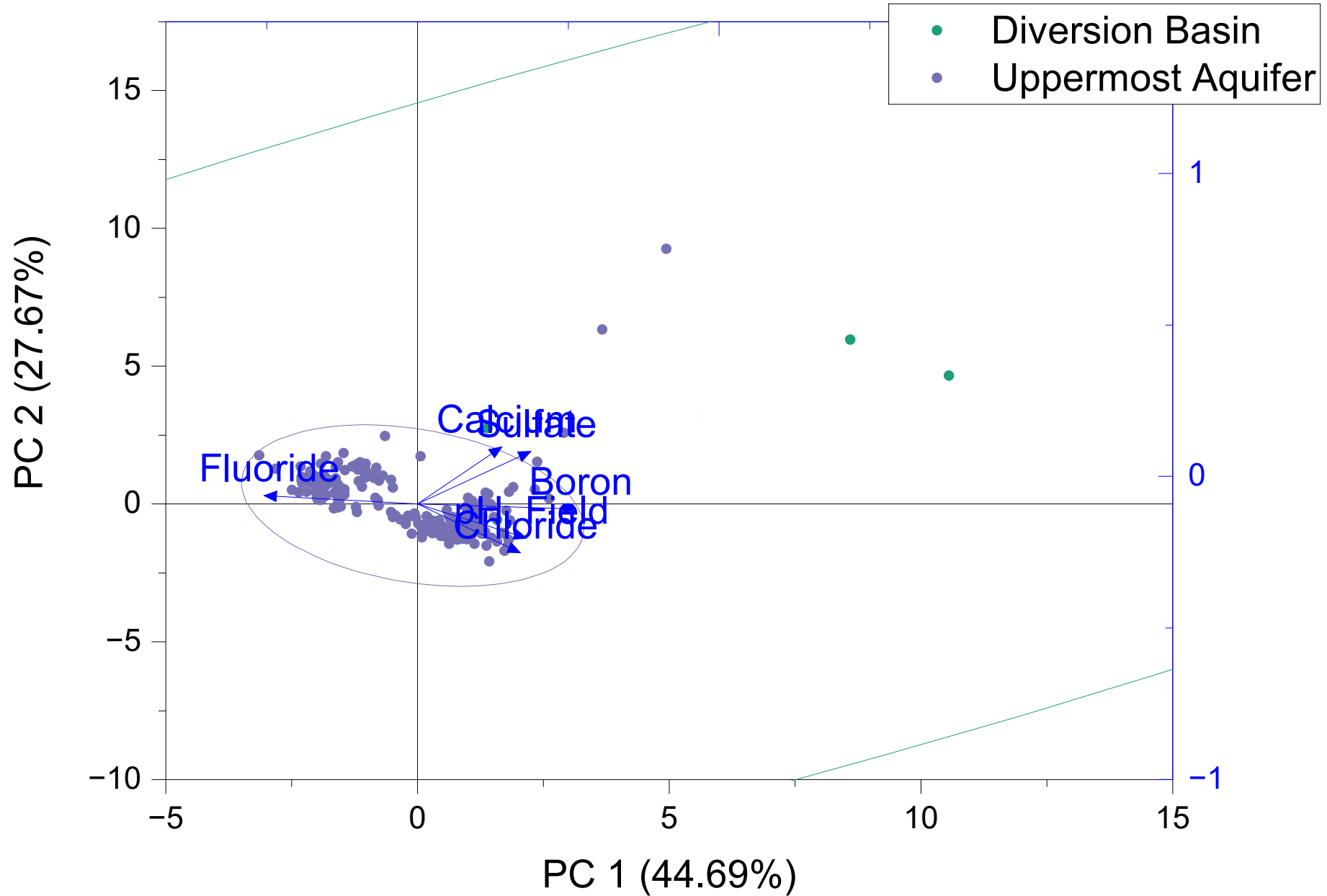


Figure 13 - Biplot  
Belle River Power Plant Diversion Basin CCR Unit  
4505 King Road, China Township, Michigan



# Figure 14. - BRPP LDA Origin

Discriminant Analysis (3/24/2023 15:04:1

## Canonical Discriminant Analysis

### Eigenvalues

	Eigenvalue	Percentage of Variance	Cumulative	Canonical Correlation
1	1.23366	100.00%	100.00%	0.74317

### Standardized Canonical Coefficients

	Canonical Variable 1
Boron	-0.22198
Calcium	0.34127
Chloride	1.19871
Fluoride	1.11313
pH, Field	-2.95507E-7
Sulfate	-0.3104

## Classification Summary for Training Data

### Classification Count

	Predicted Group		
	BAB and DB	Uppermost Aquifer	Total
BAB and DB	9 100.00%	0 0.00%	9 100.00%
Uppermost Aquifer	0 0.00%	229 100.00%	229 100.00%
Total	9 3.78%	229 96.22%	238 100.00%

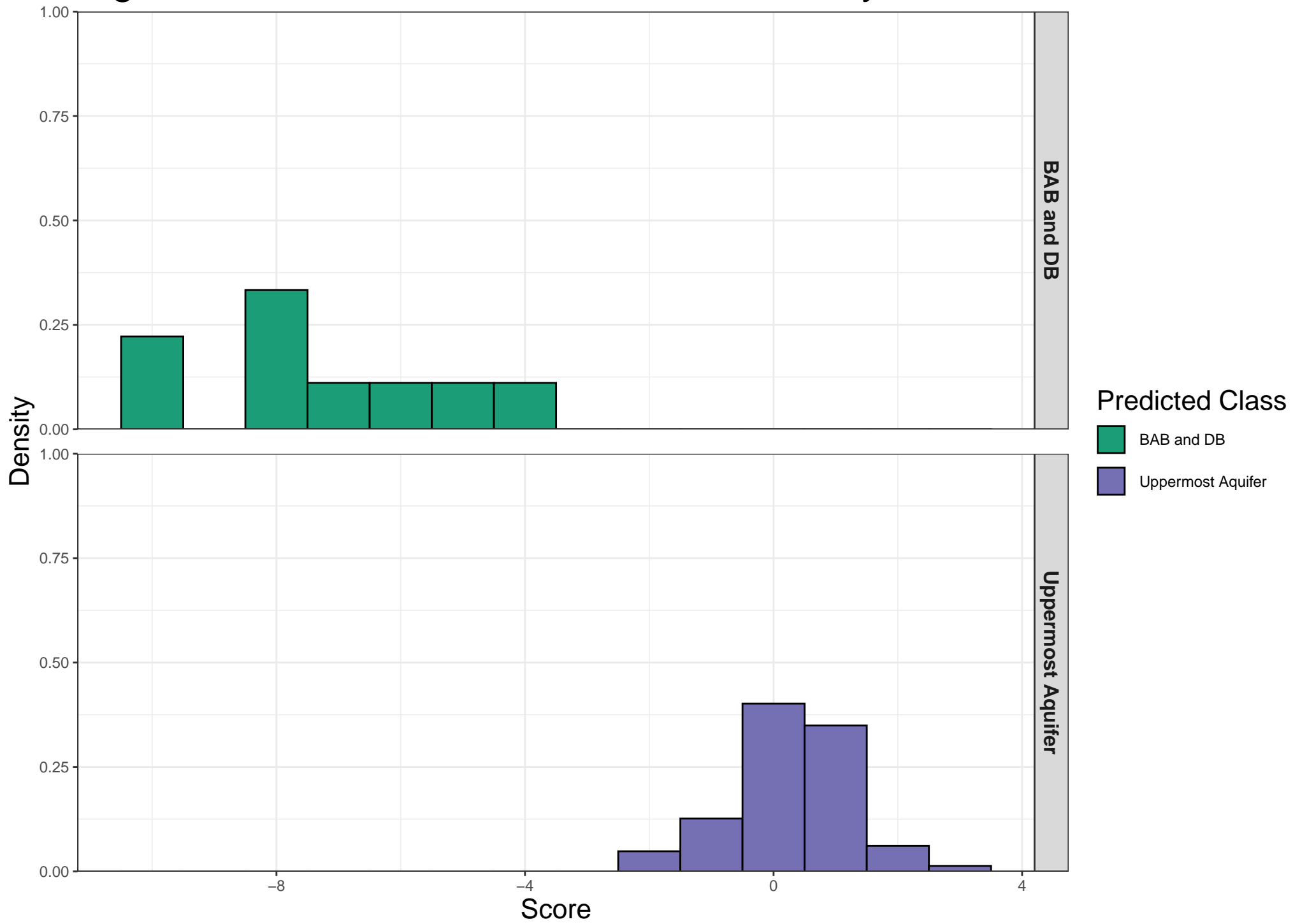
### Error Rate

	BAB and DB	Uppermost Aquifer	Total
Prior	0.5	0.5	
Rate	0.00%	0.00%	0.00%

Error rate for classification of training data is 0.00%.



# Figure 15. – Belle River Power Plant Density of LDA Scores



## Figure 16. - BRPP LDA ANOVA

ANOVAOneWay (3/24/2023 15:07:06)

### Descriptive Statistics

	N Analysis	N Missing	Mean	Standard Deviation	SE of Mean
BAB and DB	9	0	-5.57907	1.75276	0.58425
Uppermost Aquifer	229	0	0.21926	0.96296	0.06363

### One Way ANOVA

#### Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	291.14412	291.14412	291.14412	<0.0001
Error	236	236	1		
Total	237	527.14412			

Null Hypothesis: The means of all levels are equal.

Alternative Hypothesis: The means of one or more levels are different.

At the 0.05 level, the population means are significantly different.

# Appendix A

## December 2022 Laboratory Data

# ALS Environmental



05-Jan-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)**

Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental ALS

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**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	<input type="checkbox"/>
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	<input type="checkbox"/>

---

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Work Order:** 20121752

---

**Case Narrative**

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units



**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-E  
**Collection Date:** 12/16/2020 03:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Boron</b>	<b>0.26</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
<b>Calcium</b>	<b>39</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Lithium</b>	<b>0.014</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Magnesium</b>	<b>7.9</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Molybdenum</b>	<b>0.024</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
<b>Potassium</b>	<b>3.0</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>Sodium</b>	<b>29</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
Alkalinity, Bicarbonate (as CaCO3)	71		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	20		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	10		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	91		10	mg/L	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
Chloride	8.6		1.0	mg/L	1	12/30/2020 07:11 PM
Fluoride	0.25		0.10	mg/L	1	12/30/2020 07:11 PM
Sulfate	94		8.0	mg/L	8	12/31/2020 02:59 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.84	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.8	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
Total Dissolved Solids	240		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** BAB-W  
**Collection Date:** 12/16/2020 02:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-02  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>			
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>			
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Barium</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Boron</b>	<b>0.21</b>		<b>0.020</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
<b>Calcium</b>	<b>54</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Iron</b>	<b>0.28</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Lithium</b>	<b>0.013</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Magnesium</b>	<b>10</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Manganese</b>	<b>0.0078</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Molybdenum</b>	<b>0.016</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
<b>Potassium</b>	<b>3.4</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>Sodium</b>	<b>33</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>83</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>89</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			
Chloride	9.9		1.0	mg/L	1	12/30/2020 07:30 PM
Fluoride	0.22		0.10	mg/L	1	12/30/2020 07:30 PM
Sulfate	140		8.0	mg/L	8	12/30/2020 06:36 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			
pH (laboratory)	8.43	H	0.100	s.u.	1	12/29/2020 11:55 AM
Temperature	20.7	H	0.100	°C	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>			
Total Dissolved Solids	330		50	mg/L	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 05-Jan-21

**Client:** Geosyntec Consultants  
**Project:** DTE- Belle River (GLP-8017)  
**Sample ID:** DB  
**Collection Date:** 12/16/2020 04:00 PM

**Work Order:** 20121752  
**Lab ID:** 20121752-03  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVA</b>			<b>SW7470A</b>		Prep: SW7470 12/30/20 13:08	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3005A 12/30/20 15:00	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Arsenic</b>	<b>0.0057</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Barium</b>	<b>0.19</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Boron</b>	<b>6.0</b>		<b>0.20</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
<b>Calcium</b>	<b>110</b>		<b>0.50</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Iron</b>	<b>0.35</b>		<b>0.080</b>	<b>mg/L</b>	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>Lithium</b>	<b>0.061</b>		<b>0.010</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Magnesium</b>	<b>18</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Manganese</b>	<b>0.068</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Molybdenum</b>	<b>0.30</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Potassium</b>	<b>13</b>		<b>0.20</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Selenium</b>	<b>0.0087</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/30/2020 09:09 PM
<b>Sodium</b>	<b>510</b>		<b>2.0</b>	<b>mg/L</b>	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>QTN</b>
<b>Alkalinity, Bicarbonate (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
<b>Alkalinity, Total (as CaCO3)</b>	<b>140</b>		<b>10</b>	<b>mg/L</b>	1	12/29/2020 11:55 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>43</b>		<b>20</b>	<b>mg/L</b>	20	12/30/2020 06:55 PM
<b>Fluoride</b>	<b>0.44</b>		<b>0.10</b>	<b>mg/L</b>	1	12/30/2020 07:49 PM
<b>Sulfate</b>	<b>1,200</b>		<b>100</b>	<b>mg/L</b>	100	12/31/2020 03:21 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>8.32</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/29/2020 11:55 AM
<b>Temperature</b>	<b>20.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/29/2020 11:55 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 12/22/20 11:40	Analyst: <b>AJS</b>
<b>Total Dissolved Solids</b>	<b>2,100</b>		<b>300</b>	<b>mg/L</b>	1	12/23/2020 02:50 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

**QC BATCH REPORT**

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>	Sample ID: <b>MBLK-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:14 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040771</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>	Sample ID: <b>LCS-170071-170071</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:16 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040772</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0 104 80-120 0

<b>MS</b>	Sample ID: <b>20121813-10DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:55 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040812</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00219 0.00020 0.002 0.000003 109 75-125 0

<b>MSD</b>	Sample ID: <b>20121813-10DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201230A</b>			SeqNo: <b>7040815</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0.000003 106 75-125 0.00219 3.48 20

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

**Client:** Geosyntec Consultants  
**Work Order:** 20121752  
**Project:** DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083**      Instrument ID **ICPMS4**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:51 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>		SeqNo: <b>7043005</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS		Sample ID: <b>LCS-170083-170083</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 08:52 PM</b>		
Client ID:		Run ID: <b>ICPMS4_201230A</b>			SeqNo: <b>7043006</b>		Prep Date: <b>12/30/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/30/2020 09:13 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043018		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0				
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0				
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0				
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0				
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0				
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0				
Calcium	63.88	0.50	10	53.04	108	75-125	0			O	
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0				
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0				
Iron	8.964	0.080	10	0.02083	89.4	75-125	0				
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0				
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0				
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O	
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0				
Potassium	12.35	0.20	10	2.605	97.4	75-125	0				
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0				
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O	
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0				

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/30/2020 09:35 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043031		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0				
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0				
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0				
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0				
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0				
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0				
Calcium	34.88	0.50	10	25.15	97.2	75-125	0				
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0				
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0				
Iron	9.488	0.080	10	0.143	93.5	75-125	0				
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0				
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0				
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0				
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0				
Potassium	12.88	0.20	10	3.03	98.5	75-125	0				
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0				
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O	
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MS				Sample ID: 20121813-01DMS			Units: mg/L		Analysis Date: 12/31/2020 05:20 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046543		Prep Date: 12/30/2020		DF: 10			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO	

MS				Sample ID: 20121813-10DMS			Units: mg/L		Analysis Date: 12/31/2020 05:39 PM		
Client ID:		Run ID: ICPMS4_201231A		SeqNo: 7046555		Prep Date: 12/30/2020		DF: 10			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO	

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:15 PM		
Client ID:		Run ID: ICPMS4_201230A		SeqNo: 7043019		Prep Date: 12/30/2020		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20		
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20		
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20		
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20		
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20		
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20		
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O	
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20		
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20		
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20		
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20		
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20		
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O	
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20		
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20		
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20		
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O	
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: 170083 Instrument ID ICPMS4 Method: SW6020B

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/30/2020 09:37 PM		
Client ID:		Run ID: ICPMS4_201230A			SeqNo: 7043032		Prep Date: 12/30/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20		
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20		
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20		
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20		
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20		
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20		
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20		
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20		
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20		
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20		
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20		
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20		
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20		
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20		
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20		
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20		
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O	
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20		

MSD				Sample ID: 20121813-01DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:22 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046544		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO	

MSD				Sample ID: 20121813-10DMSD			Units: mg/L		Analysis Date: 12/31/2020 05:41 PM		
Client ID:		Run ID: ICPMS4_201231A			SeqNo: 7046556		Prep Date: 12/30/2020		DF: 10		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO	

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>	Sample ID: <b>MBLK-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021476</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

<b>LCS</b>	Sample ID: <b>LCS-169727-169727</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID:	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021475</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 476 30 495 0 96.2 85-109 0

<b>DUP</b>	Sample ID: <b>20121752-03B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/23/2020 02:50 PM</b>			
Client ID: <b>DB</b>	Run ID: <b>TDS_201223B</b>			SeqNo: <b>7021469</b>		Prep Date: <b>12/22/2020</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 1940 300 0 0 0 0-0 2100 7.92 10

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033262</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R306910-R306910</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033263</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP		Sample ID: <b>20121803-01E DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033273</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033276</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201229A</b>				SeqNo: <b>7033278</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033301</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

LCS		Sample ID: <b>LCS-R306912-R306912</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033308</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 3.99 0.10 4 0 99.8 92-108 0

DUP		Sample ID: <b>20122120-08C DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033305</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 8.05 0.10 0 0 0 0-0 7.99 0.748 5 H

Temperature 20.95 0.10 0 0 0 0-0 20.76 0.911 H

DUP		Sample ID: <b>20121990-05A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/29/2020 11:55 AM</b>			
Client ID:		Run ID: <b>TITRATOR 1_201229B</b>				SeqNo: <b>7033315</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

pH (laboratory) 7.51 0.10 0 0 0 0-0 7.56 0.664 5 H

Temperature 20.63 0.10 0 0 0 0 19.96 3.3 H

The following samples were analyzed in this batch:

20121752-01B	20121752-02B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 04:56 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043048</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Fluoride	ND	0.10									

LCS		Sample ID: <b>LCS-R307142</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 05:15 PM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043049</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.321	1.0	10	0	93.2	88-110	0				
Fluoride	2.135	0.10	2	0	107	82-116	0				

MS		Sample ID: <b>20122223-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043070</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	405	40	400	28.42	94.1	88-110	0				
Fluoride	84.26	4.0	80	0	105	82-116	0				

MSD		Sample ID: <b>20122223-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 12:19 AM</b>			
Client ID:		Run ID: <b>IC3_201230A</b>				SeqNo: <b>7043071</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20		
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20		

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 01:43 PM</b>			
Client ID:		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043217</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	ND	1.0									
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307145</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 02:39 PM</b>			
Client ID:		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043218</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.353	1.0	10	0	93.5	88-110	0				
Sulfate	9.647	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20121752-03B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:14 PM</b>			
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043233</b>		Prep Date:		DF: <b>20</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	228.2	20	200	42.57	92.8	88-110	0				
Sulfate	1470	20	200	1251	109	90-110	0			EO	

MSD		Sample ID: <b>20121752-03B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/30/2020 07:34 PM</b>			
Client ID: <b>DB</b>		Run ID: <b>IC4_201230A</b>				SeqNo: <b>7043234</b>		Prep Date:		DF: <b>20</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20		
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO	

The following samples were analyzed in this batch: 

20121752-01B	20121752-02B	20121752-03B
--------------	--------------	--------------

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 20121752  
 Project: DTE- Belle River (GLP-8017)

# QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 01:42 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047811</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	ND	1.0									

LCS		Sample ID: <b>LCS-R307276</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 02:01 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047812</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	9.654	1.0	10	0	96.5	90-110	0				

MS		Sample ID: <b>20122530-06A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:35 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047826</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	424.4	40	400	43.11	95.3	90-110	0				

MSD		Sample ID: <b>20122530-06A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/31/2020 06:54 PM</b>			
Client ID:		Run ID: <b>IC3_201231A</b>				SeqNo: <b>7047827</b>		Prep Date:		DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20		

The following samples were analyzed in this batch:

20121752-01B	20121752-03B
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.



# Chain of Custody Form

Page 1 of 1

ALS Environmental  
 3352 128th Avenue  
 Holland, Michigan 49424  
 (Tel) 616.399.6070  
 (Fax) 616.399.6185

20121752

Customer Information			Project Information				Parameter/Method Request for Analysis										
Purchase Order		Project Name	DTE Belle River		A	Metals											
Work Order		Project Number	GLP 8017		B	pH, Anions, TDS, Alkalinity											
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants		C												
Send Report To	Michael Coram	Invoice Attn.	Michael Coram		D												
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.		E												
	Suite 100		Suite 100		F												
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105		G												
Phone	734-794-1547	Phone	734-794-1547		H												
Fax	734-332-8063	Fax	734-332-8063		I												
e-Mail Address					J												
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

<b>Sampler(s): Please Print &amp; Sign</b> Mike Coram <i>[Signature]</i>		<b>Shipment Method:</b> Carrier <i>FedEx</i>		<b>Turnaround Time: (Business Days)</b> <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____				<b>Results Due Date:</b> _____			
<b>Relinquished by:</b> <i>[Signature]</i>		<b>Date:</b> 12/17	<b>Time:</b> 3:00	<b>Received by:</b> <i>[Signature]</i>		<b>Date:</b> _____	<b>Time:</b> _____	<b>Notes:</b> Separate Report			
<b>Relinquished by:</b> Fedex		<b>Date:</b> 12/18/20	<b>Time:</b> 10:00	<b>Received by (Laboratory):</b> <i>[Signature]</i>		<b>Date:</b> _____	<b>Time:</b> _____	<b>ALS Cooler ID</b> _____	<b>Cooler Temp</b> 5.8°C	<b>QC Package: (Check Box Below)</b> <input checked="" type="checkbox"/> Level II: Standard QC <input type="checkbox"/> Level III: Raw Data <input type="checkbox"/> TRRP LRC <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV: SW846 Methods/CLP like <input type="checkbox"/> Other: _____	
<b>Logged by (Laboratory):</b> MITG		<b>Date:</b> 12/18/20	<b>Time:</b> 13:46	<b>Checked by (Laboratory):</b> <i>[Signature]</i>		<b>Date:</b> _____	<b>Time:</b> _____	<b>ALS Cooler ID</b> PA23	<b>Cooler Temp</b> _____	<b>QC Package: (Check Box Below)</b> <input type="checkbox"/> TRRP LRC <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV: SW846 Methods/CLP like <input type="checkbox"/> Other: _____	



Sample Receipt Checklist

Client Name: GEOSYNTEC - AA

Date/Time Received: 18-Dec-20 10:00

Work Order: 20121752

Received by: MJG

Checklist completed by Matthew Gaylord 18-Dec-20  
eSignature Date

Reviewed by: Chad Whelton 18-Dec-20  
eSignature Date

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition? Yes  No  Not Present

Custody seals intact on shipping container/cooler? Yes  No  Not Present

Custody seals intact on sample bottles? Yes  No  Not Present

Chain of custody present? Yes  No

Chain of custody signed when relinquished and received? Yes  No

Chain of custody agrees with sample labels? Yes  No

Samples in proper container/bottle? Yes  No

Sample containers intact? Yes  No

Sufficient sample volume for indicated test? Yes  No

All samples received within holding time? Yes  No

Container/Temp Blank temperature in compliance? Yes  No

Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s): 5.8/5.8C IR1

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 12/18/2020 1:47:53 PM

Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

-----

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



Tuesday, January 19, 2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd. Suite 100  
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397  
Project Name: DTE - Belle River  
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2012397

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All remaining acceptance criteria were met.

### **Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a "Y2" flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012397

**Client Name:** Geosyntec Consultants

**Client Project Name:** DTE - Belle River

**Client Project Number:** GLP-8017

**Client PO Number:**

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00



Cincinnati, OH  
+1 513 733 5336  
Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511  
Holland, MI  
+1 616 399 6070

Houston, TX  
+1 281 530 5656  
Middletown, PA  
+1 717 944 5541  
Spring City, PA  
+1 610 948 4903  
Salt Lake City, UT  
+1 801 266 7700  
South Charleston, WV  
+1 304 356 3168  
York, PA  
+1 717 505 5280

Chain of Custody Form  
Page 1 of 1  
COC ID: 230240  
ALS Work Order #: 33730

ALS Project Manager: Radium 226 and 228 combined

Customer Information		Project Information	
Purchase Order	Project Name	A	Radium 226 and 228 combined
Work Order	Project Number	B	
Company Name	Bill To Company	C	
Send Report To	Invoice Attn	D	
Address	Address	E	
City/State/Zip	City/State/Zip	F	
Phone	Phone	G	
Fax	Fax	H	
e-Mail Address	e-Mail Address	I	
		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16	3:00	SW	2	2	X										
2	BAB-W	12/16	2:00	SW	2	2	X										
3	DB	12/16	4:00	SW	2	2	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram - Cor

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box)  
 Std. 10 WK. Days  
 5 WK. Days  
 24 Hour

Results Due Date:

Relinquished By: [Signature] Date: 12/17 Time: 3:00

Received by (Laboratory): [Signature] Date: Time:

Relinquished by: [Signature] Date: Time:

Checked by (Laboratory): [Signature] Date: Time:

QC Package: (Check One Box Below)  
 Level III Std. CC  
 Level III Std. CC/Pres. Data  
 Level IV SW/826-CLP  
 Other

TRPP Check List  
 TRPP Level I  
 TRPP Level II  
 TRPP Level III  
 TRPP Level IV

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client Name/ID:

Geosyntec MI

Workorder No:

2012397

Project Manager:

Initials:

RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on <b>shipping</b> containers intact?	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on <b>sample</b> containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input checked="" type="checkbox"/> #5	<input type="checkbox"/> Rad Only	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

N/A  YES  NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted?  YES  N/A

Contact Name

Date:

Project Manager Signature / Date:

*RGA* 12/21/20

ORIGIN ID:DEDA (248) 390-5748  
MIKE CORAM

SUITE 100  
2100 COMMONWEALTH BLVD STE 100  
ANN ARBOR, MI 48105  
UNITED STATES US

SHIP DATE: 17DEC20  
ACTWTG: 56.90 LB  
CAD: 6997566/SSFO2121  
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 159297-455 RHD8 Exp 11/21

TO **ALS FT. COLLINS**  
**ATTN: SAMPLE RECEIVING**  
**225 COMMERCÉ DR**

12-1  
3.2

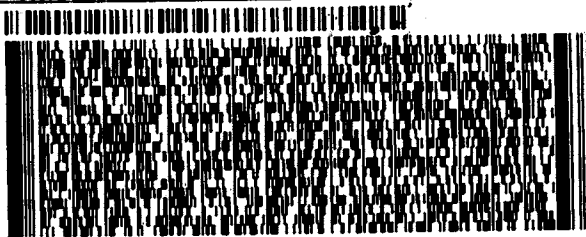
**FORT COLLINS CO 80524**

(616) 682-5201

REF:

INU:

DEPT:



**FedEx**  
Express



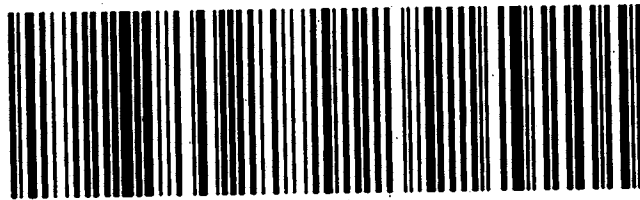
14107-10002027

TRK# 7816 0264 9731  
0201

**FRI - 18 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**NA FTCA**

**DSR**  
**80524**  
**CO-US DEN**





**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-E  
**Legal Location:**  
**Collection Date:** 12/16/2020 15:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	
<b>Ra-226</b>	0.57 (+/- 0.35)	Y1	0.41	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	101	Y1	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	
<b>COMBINED RADIUM (226+228)</b>	1.49 (+/- 0)		0.78	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	0.92 (+/- 0.45)		0.78	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	99.2		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** BAB-W  
**Legal Location:**  
**Collection Date:** 12/16/2020 14:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
<b>Ra-226</b>	1.78 (+/- 0.66)	Y2	0.3	pCi/l	NA	1/12/2021 11:32
<i>Carr: BARIUM</i>	132	Y2	40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
<b>COMBINED RADIUM (226+228)</b>	1.78 (+/- 0)		1.32	pCi/l	NA	1/15/2021 07:48
<b>Ra-228</b>	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
<i>Carr: BARIUM</i>	57		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: 1/4/2021	PrepBy: TRB
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	95		40-110	%REC	DL = NA	1/12/2021 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: 1/11/2021	PrepBy: RGS
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	45		40-110	%REC	DL = NA	1/15/2021 07:48

**Client:** Geosyntec Consultants  
**Project:** GLP-8017 DTE - Belle River  
**Sample ID:** DB  
**Legal Location:**  
**Collection Date:** 12/16/2020 16:00

**Date:** 19-Jan-21  
**Work Order:** 2012397  
**Lab ID:** 2012397-3  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers**

**Radiochemistry:**

- "Report Limit" is the MDC
- U or ND - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- W - DER is greater than Warning Limit of 1.42
- \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- G - Sample density differs by more than 15% of LCS density.
- D - DER is greater than Control Limit
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

- B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
- U or ND - Indicates that the compound was analyzed for but not detected.
- E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
- M - Duplicate injection precision was not met.
- N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
- Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
- \* - Duplicate analysis (relative percent difference) not within control limits.
- S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

- U or ND - Indicates that the compound was analyzed for but not detected.
- B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
- E - Analyte concentration exceeds the upper level of the calibration range.
- J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
- A - A tentatively identified compound is a suspected aldol-condensation product.
- X - The analyte was diluted below an accurate quantitation level.
- \* - The spike recovery is equal to or outside the control criteria used.
- + - The relative percent difference (RPD) equals or exceeds the control criteria.
- G - A pattern resembling gasoline was detected in this sample.
- D - A pattern resembling diesel was detected in this sample.
- M - A pattern resembling motor oil was detected in this sample.
- C - A pattern resembling crude oil was detected in this sample.
- 4 - A pattern resembling JP-4 was detected in this sample.
- 5 - A pattern resembling JP-5 was detected in this sample.
- H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
- L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
- Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
  - gasoline
  - JP-8
  - diesel
  - mineral spirits
  - motor oil
  - Stoddard solvent
  - bunker C

ALS -- Fort Collins

Date: 1/19/2021 1:00:4

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 2012397

Project: GLP-8017 DTE - Belle River

Batch ID: RE210104-1-3

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB		Sample ID: RE210104-1			Units: pCi/l		Analysis Date: 1/12/2021 12:16				
Client ID:		Run ID: RE210104-1A			Prep Date: 1/4/2021		DF: NA				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012397-1	2012397-2	2012397-3
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Client: Geosyntec Consultants  
 Work Order: 2012397  
 Project: GLP-8017 DTE - Belle River

# QC BATCH REPORT

Batch ID: RA210111-1-5 Instrument ID: GASPROP Method: Radium-228 Analysis by GFPC

LCS		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB		Sample ID: RA210111-1		Units: ug			Analysis Date: 1/15/2021 07:48				
Client ID:		Run ID: RA210111-1A			Prep Date: 1/11/2021			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1      2012397-2      2012397-3



25-Oct-2021

Michael Coram  
Geosyntec Consultants  
2100 Commonwealth Blvd.  
Suite 100  
Ann Arbor, MI 48105

Re: **GLP8017**

Work Order: **21101019**

Dear Michael,

ALS Environmental received 2 samples on 12-Oct-2021 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 18.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton", is written over a light blue horizontal line.

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

### Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

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**Client:** Geosyntec Consultants  
**Project:** GLP8017  
**Work Order:** 21101019

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
21101019-01	DB-1-20211008	Liquid		10/8/2021 12:00	10/12/2021 10:00	<input type="checkbox"/>
21101019-02	DB-2-20211008	Liquid		10/8/2021 12:00	10/12/2021 10:00	<input type="checkbox"/>



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**Client:** Geosyntec Consultants  
**Project:** GLP8017  
**Work Order:** 21101019

---

**Case Narrative**

Samples for the above noted Work Order were received on 10/12/2021. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

Batch R329582, Method SW9040C, Sample DB-2-20211008 (21101019-02A): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R329231, Method SW9056A, Sample 21101019-02A MS: The MS recovery was below the lower control limit. However, the MSD recovery and the RPD between the MS and MSD were within control limits. No qualification is required for this analyte: Sulfate.

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

**ALS Group, USA**

Date: 25-Oct-2021

**Client:** Geosyntec Consultants

**Project:** GLP8017

**Sample ID:** DB-1-20211008

**Collection Date:** 10/8/2021 12:00 PM

**Work Order:** 21101019

**Lab ID:** 21101019-01

**Matrix:** LIQUID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 10/20/21 12:36	Analyst: <b>EJC</b>
Mercury	ND		0.00020	mg/L	1	10/20/2021 02:07 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3015A 10/21/21 13:54	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	10/21/2021 06:21 PM
<b>Arsenic</b>	<b>0.0074</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Barium</b>	<b>1.2</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
Beryllium	ND		0.0020	mg/L	1	10/21/2021 06:21 PM
<b>Boron</b>	<b>1.1</b>		<b>0.020</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
Cadmium	ND		0.0020	mg/L	1	10/21/2021 06:21 PM
<b>Calcium</b>	<b>86</b>		<b>0.50</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Chromium</b>	<b>0.012</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
Cobalt	ND		0.0050	mg/L	1	10/21/2021 06:21 PM
<b>Iron</b>	<b>3.6</b>		<b>0.080</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
Lead	ND		0.0050	mg/L	1	10/21/2021 06:21 PM
<b>Lithium</b>	<b>0.038</b>		<b>0.010</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Magnesium</b>	<b>17</b>		<b>0.20</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Manganese</b>	<b>0.078</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Molybdenum</b>	<b>0.053</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Potassium</b>	<b>7.1</b>		<b>0.20</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Selenium</b>	<b>0.0088</b>		<b>0.0050</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
<b>Sodium</b>	<b>170</b>		<b>0.20</b>	<b>mg/L</b>	1	10/21/2021 06:21 PM
Thallium	ND		0.0050	mg/L	1	10/21/2021 06:21 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA**

Date: 25-Oct-2021

**Client:** Geosyntec Consultants

**Project:** GLP8017

**Work Order:** 21101019

**Sample ID:** DB-2-20211008

**Lab ID:** 21101019-02

**Collection Date:** 10/8/2021 12:00 PM

**Matrix:** LIQUID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>ALKALINITY</b>			<b>A2320 B-11</b>			Analyst: <b>MP</b>
Alkalinity, Bicarbonate (as CaCO3)	85		10	mg/L	1	10/17/2021 08:56 AM
Alkalinity, Carbonate (as CaCO3)	32		10	mg/L	1	10/17/2021 08:56 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	10/17/2021 08:56 AM
Alkalinity, Phenolphthalein (as CaCO3)	16		10	mg/L	1	10/17/2021 08:56 AM
Alkalinity, Total (as CaCO3)	120		10	mg/L	1	10/17/2021 08:56 AM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>QTN</b>
Chloride	15		1.0	mg/L	1	10/15/2021 02:48 PM
Fluoride	1.2		0.10	mg/L	1	10/15/2021 02:48 PM
Sulfate	410		100	mg/L	100	10/18/2021 10:17 PM
<b>PH (LABORATORY)</b>			<b>SW9040C</b>			Analyst: <b>KNC</b>
pH (laboratory)	8.54	H	0.10	s.u.	1	10/22/2021 07:40 AM
Temperature	19.5	H	0.10	°C	1	10/22/2021 07:40 AM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 10/13/21 19:13	Analyst: <b>SRN</b>
Total Dissolved Solids	780		50	mg/L	1	10/16/2021 12:24 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Geosyntec Consultants  
**Work Order:** 21101019  
**Project:** GLP8017

**QC BATCH REPORT**

Batch ID: **185786** Instrument ID **HG4** Method: **SW7470A**

MBLK		Sample ID: <b>MBLK-185786-185786</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/20/2021 02:04 PM</b>		
Client ID:		Run ID: <b>HG4_211020A</b>		SeqNo: <b>7857537</b>		Prep Date: <b>10/20/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS		Sample ID: <b>LCS-185786-185786</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/20/2021 02:06 PM</b>		
Client ID:		Run ID: <b>HG4_211020A</b>		SeqNo: <b>7857538</b>		Prep Date: <b>10/20/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00216	0.00020	0.002	0	108	80-120	0			

MS		Sample ID: <b>21101357-03AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/20/2021 02:18 PM</b>		
Client ID:		Run ID: <b>HG4_211020A</b>		SeqNo: <b>7857545</b>		Prep Date: <b>10/20/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.02115	0.0020	0.02	0.000855	101	75-125	0			

MSD		Sample ID: <b>21101357-03AMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/20/2021 02:20 PM</b>		
Client ID:		Run ID: <b>HG4_211020A</b>		SeqNo: <b>7857546</b>		Prep Date: <b>10/20/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0216	0.0020	0.02	0.000855	104	75-125	0.02115	2.11	20	

The following samples were analyzed in this batch: 21101019-01A

**Client:** Geosyntec Consultants  
**Work Order:** 21101019  
**Project:** GLP8017

# QC BATCH REPORT

Batch ID: **185871**      Instrument ID **ICPMS3**      Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-185871-185871</b>			Units: <b>mg/L</b>		Analysis Date: <b>10/21/2021 06:18 PM</b>			
Client ID:		Run ID: <b>ICPMS3_211021A</b>			SeqNo: <b>7861718</b>		Prep Date: <b>10/21/2021</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: 185871 Instrument ID ICPMS3 Method: SW6020B

LCS		Sample ID: LCS-185871-185871				Units: mg/L		Analysis Date: 10/21/2021 06:19 PM		
Client ID:		Run ID: ICPMS3_211021A			SeqNo: 7861719		Prep Date: 10/21/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.093	0.0050	0.1	0	93	80-120	0			
Arsenic	0.09654	0.0050	0.1	0	96.5	80-120	0			
Barium	0.09588	0.0050	0.1	0	95.9	80-120	0			
Beryllium	0.09096	0.0020	0.1	0	91	80-120	0			
Boron	0.4985	0.020	0.5	0	99.7	80-120	0			
Cadmium	0.0967	0.0020	0.1	0	96.7	80-120	0			
Calcium	9.653	0.50	10	0	96.5	80-120	0			
Chromium	0.1048	0.0050	0.1	0	105	80-120	0			
Cobalt	0.1052	0.0050	0.1	0	105	80-120	0			
Iron	9.984	0.080	10	0	99.8	80-120	0			
Lead	0.09388	0.0050	0.1	0	93.9	80-120	0			
Lithium	0.09055	0.010	0.1	0	90.5	80-120	0			
Magnesium	10.09	0.20	10	0	101	80-120	0			
Manganese	0.09165	0.0050	0.1	0	91.7	80-120	0			
Molybdenum	0.09399	0.0050	0.1	0	94	80-120	0			
Potassium	9.478	0.20	10	0	94.8	80-120	0			
Selenium	0.09082	0.0050	0.1	0	90.8	80-120	0			
Sodium	10.45	0.20	10	0	104	80-120	0			
Thallium	0.09321	0.0050	0.1	0	93.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: 185871 Instrument ID ICPMS3 Method: SW6020B

MS		Sample ID: 21101430-02BMS				Units: mg/L		Analysis Date: 10/21/2021 06:31 PM		
Client ID:		Run ID: ICPMS3_211021A			SeqNo: 7861726		Prep Date: 10/21/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09215	0.0050	0.1	0.0001683	92	75-125	0			
Arsenic	0.09743	0.0050	0.1	0.000671	96.8	75-125	0			
Barium	0.1779	0.0050	0.1	0.08391	94	75-125	0			
Beryllium	0.08899	0.0020	0.1	0.0000077	89	75-125	0			
Boron	0.5507	0.020	0.5	0.05884	98.4	75-125	0			
Cadmium	0.09414	0.0020	0.1	0.000044	94.1	75-125	0			
Calcium	113.1	0.50	10	107.8	52.2	75-125	0			SO
Chromium	0.1951	0.0050	0.1	0.08718	108	75-125	0			
Cobalt	0.1074	0.0050	0.1	0.005485	102	75-125	0			
Iron	10.13	0.080	10	0.3785	97.5	75-125	0			
Lead	0.09387	0.0050	0.1	0.0001749	93.7	75-125	0			
Lithium	0.0971	0.010	0.1	0.007191	89.9	75-125	0			
Magnesium	56.29	0.20	10	48.79	75.1	75-125	0			O
Manganese	0.2131	0.0050	0.1	0.1402	72.9	75-125	0			S
Molybdenum	0.09635	0.0050	0.1	0.003416	92.9	75-125	0			
Potassium	10.29	0.20	10	1.102	91.9	75-125	0			
Selenium	0.08959	0.0050	0.1	0.0001705	89.4	75-125	0			
Sodium	32.29	0.20	10	23.7	85.9	75-125	0			
Thallium	0.09394	0.0050	0.1	0.0000121	93.9	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: 185871 Instrument ID ICPMS3 Method: SW6020B

MSD		Sample ID: 21101430-02BMSD				Units: mg/L		Analysis Date: 10/21/2021 06:32 PM		
Client ID:		Run ID: ICPMS3_211021A			SeqNo: 7861727		Prep Date: 10/21/2021		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09093	0.0050	0.1	0.0001683	90.8	75-125	0.09215	1.34	20	
Arsenic	0.09672	0.0050	0.1	0.000671	96.1	75-125	0.09743	0.729	20	
Barium	0.1763	0.0050	0.1	0.08391	92.4	75-125	0.1779	0.899	20	
Beryllium	0.08933	0.0020	0.1	0.0000077	89.3	75-125	0.08899	0.375	20	
Boron	0.5532	0.020	0.5	0.05884	98.9	75-125	0.5507	0.452	20	
Cadmium	0.09308	0.0020	0.1	0.000044	93	75-125	0.09414	1.14	20	
Calcium	112.9	0.50	10	107.8	50.1	75-125	113.1	0.193	20	SO
Chromium	0.1804	0.0050	0.1	0.08718	93.2	75-125	0.1951	7.84	20	
Cobalt	0.1062	0.0050	0.1	0.005485	101	75-125	0.1074	1.11	20	
Iron	10.01	0.080	10	0.3785	96.3	75-125	10.13	1.13	20	
Lead	0.09321	0.0050	0.1	0.0001749	93	75-125	0.09387	0.709	20	
Lithium	0.09694	0.010	0.1	0.007191	89.8	75-125	0.0971	0.166	20	
Magnesium	56.79	0.20	10	48.79	80.1	75-125	56.29	0.887	20	O
Manganese	0.2148	0.0050	0.1	0.1402	74.6	75-125	0.2131	0.803	20	S
Molybdenum	0.09572	0.0050	0.1	0.003416	92.3	75-125	0.09635	0.662	20	
Potassium	10.39	0.20	10	1.102	92.9	75-125	10.29	0.939	20	
Selenium	0.08645	0.0050	0.1	0.0001705	86.3	75-125	0.08959	3.57	20	
Sodium	32.45	0.20	10	23.7	87.5	75-125	32.29	0.475	20	
Thallium	0.09319	0.0050	0.1	0.0000121	93.2	75-125	0.09394	0.797	20	

The following samples were analyzed in this batch: 21101019-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: **185462** Instrument ID **TDS** Method: **A2540 C-11**

MBLK		Sample ID: <b>MBLK-185462-185462</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/16/2021 12:24 PM</b>		
Client ID:		Run ID: <b>TDS_211016A</b>		SeqNo: <b>7845297</b>		Prep Date: <b>10/13/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

LCS		Sample ID: <b>LCS-185462-185462</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/16/2021 12:24 PM</b>		
Client ID:		Run ID: <b>TDS_211016A</b>		SeqNo: <b>7845296</b>		Prep Date: <b>10/13/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 480 30 495 0 97 85-109 0

DUP		Sample ID: <b>21101019-02A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/16/2021 12:24 PM</b>		
Client ID: <b>DB-2-20211008</b>		Run ID: <b>TDS_211016A</b>		SeqNo: <b>7845282</b>		Prep Date: <b>10/13/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 793.3 50 0 0 0 0-0 776.7 2.12 10

DUP		Sample ID: <b>21101020-01C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/16/2021 12:24 PM</b>		
Client ID:		Run ID: <b>TDS_211016A</b>		SeqNo: <b>7845284</b>		Prep Date: <b>10/13/2021</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 320 50 0 0 0 0-0 300 6.45 10 H

The following samples were analyzed in this batch: 21101019-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants

Work Order: 21101019

Project: GLP8017

# QC BATCH REPORT

Batch ID: **R329107**

Instrument ID **Titrator 1**

Method: **A2320 B-11**

MBLK		Sample ID: <b>MB-R329107-R329107</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/17/2021 08:56 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_211017A</b>			SeqNo: <b>7845556</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3)	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS		Sample ID: <b>LCS-R329107-R329107</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/17/2021 08:56 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_211017A</b>			SeqNo: <b>7845557</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	817.2	10	925	0	88.3	88-110	0			
Alkalinity, Total (as CaCO3)	910.8	10	1000	0	91.1	89-103	0			

DUP		Sample ID: <b>21101315-01C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/17/2021 08:56 AM</b>		
Client ID:		Run ID: <b>TITRATOR 1_211017A</b>			SeqNo: <b>7845562</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	227.3	10	0	0	0	0-0	233.3	2.61	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Hydroxide (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

The following samples were analyzed in this batch:

21101019-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: **R329139** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R329139</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/15/2021 11:38 AM</b>		
Client ID:		Run ID: <b>IC4_211015A</b>		SeqNo: <b>7846756</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								

LCS		Sample ID: <b>LCS-R329139</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/15/2021 12:31 PM</b>		
Client ID:		Run ID: <b>IC4_211015A</b>		SeqNo: <b>7846759</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	10.13	1.0	10	0	101	88-110	0			
Fluoride	2.067	0.10	2	0	103	82-116	0			

LCS		Sample ID: <b>LCS-R329139</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/15/2021 07:38 PM</b>		
Client ID:		Run ID: <b>IC4_211015A</b>		SeqNo: <b>7846787</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.998	1.0	10	0	100	88-110	0			
Fluoride	2.127	0.10	2	0	106	82-116	0			

MS		Sample ID: <b>21101315-01D MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/15/2021 01:17 PM</b>		
Client ID:		Run ID: <b>IC4_211015A</b>		SeqNo: <b>7846762</b>		Prep Date:		DF: <b>10</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	124.3	10	100	30.84	93.4	88-110	0			
Fluoride	20.17	1.0	20	0	101	82-116	0			

MSD		Sample ID: <b>21101315-01D MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/15/2021 01:32 PM</b>		
Client ID:		Run ID: <b>IC4_211015A</b>		SeqNo: <b>7846763</b>		Prep Date:		DF: <b>10</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	124.9	10	100	30.84	94	88-110	124.3	0.498	20	
Fluoride	20.27	1.0	20	0	101	82-116	20.17	0.485	20	

The following samples were analyzed in this batch: 21101019-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: **R329231** Instrument ID **IC4** Method: **SW9056A**

MBLK		Sample ID: <b>MBLK-R329231</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/18/2021 12:29 PM</b>			
Client ID:		Run ID: <b>IC4_211018A</b>				SeqNo: <b>7851332</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Sulfate ND 1.0

LCS		Sample ID: <b>LCS-R329231</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/18/2021 01:14 PM</b>			
Client ID:		Run ID: <b>IC4_211018A</b>				SeqNo: <b>7851335</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Sulfate 9.421 1.0 10 0 94.2 90-110 0

LCS		Sample ID: <b>LCS-R329231</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/18/2021 09:47 PM</b>			
Client ID:		Run ID: <b>IC4_211018A</b>				SeqNo: <b>7851361</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Sulfate 9.765 1.0 10 0 97.6 90-110 0

MS		Sample ID: <b>21101019-02A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/18/2021 10:32 PM</b>			
Client ID: <b>DB-2-20211008</b>		Run ID: <b>IC4_211018A</b>				SeqNo: <b>7851364</b>		Prep Date:		DF: <b>100</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Sulfate 1260 100 1000 411.5 84.9 90-110 0 S

MSD		Sample ID: <b>21101019-02A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/18/2021 10:47 PM</b>			
Client ID: <b>DB-2-20211008</b>		Run ID: <b>IC4_211018A</b>				SeqNo: <b>7851365</b>		Prep Date:		DF: <b>100</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	

Sulfate 1350 100 1000 411.5 93.9 90-110 1260 6.88 20

The following samples were analyzed in this batch: 21101019-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants  
 Work Order: 21101019  
 Project: GLP8017

# QC BATCH REPORT

Batch ID: **R329582** Instrument ID **WETCHEM** Method: **A4500-H B-11**

LCS		Sample ID: <b>LCS-R329582-R329582</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/22/2021 07:40 AM</b>			
Client ID:		Run ID: <b>WETCHEM_211022B</b>				SeqNo: <b>7863883</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
pH (laboratory)	4	0.10	4	0	100	92-108	0				

LCS		Sample ID: <b>LCS-R329582-R329582</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/22/2021 07:40 AM</b>			
Client ID:		Run ID: <b>WETCHEM_211022B</b>				SeqNo: <b>7863892</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
pH (laboratory)	4	0.10	4	0	100	92-108	0				

DUP		Sample ID: <b>21101803-02A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/22/2021 07:40 AM</b>			
Client ID:		Run ID: <b>WETCHEM_211022B</b>				SeqNo: <b>7863891</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
pH (laboratory)	7.19	0.10	0	0	0	0-0	7.19	0	5	H	
Temperature	19.7	0.10	0	0	0	0-0	19.7	0		H	

DUP		Sample ID: <b>21101019-02A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/22/2021 07:40 AM</b>			
Client ID: <b>DB-2-20211008</b>		Run ID: <b>WETCHEM_211022B</b>				SeqNo: <b>7863894</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
pH (laboratory)	8.54	0.10	0	0	0	0-0	8.54	0	5	H	
Temperature	19.4	0.10	0	0	0		19.5	0.514		H	

The following samples were analyzed in this batch:

21101019-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Fort Collins, CO  
+1 970 490 1511

# Chain of Custody Form

Houston, TX  
+1 281 530 5656

Spring City, PA  
+1 610 948 4903

South Charleston, WV  
+1 304 356 3168

Everett, WA  
+1 425 356 2600

Holland, MI  
+1 616 399 6070

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Middletown, PA  
+1 717 944 5541

Salt Lake City, UT  
+1 801 266 7700

York, PA  
+1 717 505 5280

COC ID: 053549

ALS Project Manager:

ALS Work Order #: 21101019

### Customer Information

### Project Information

### Parameter/Method Request for Analysis

Purchase Order		Project Name		A	Metals by ICP-MS
Work Order		Project Number	GLP8017	B	pH (Laboratory)
Company Name	Geosyntec Consultants	Bill To Company		C	Anions by Ion Chromatography
Send Report To	Mike Coram	Invoice Attn		D	Total dissolved solids
Address	2100 Commonwealth Blvd, STE 100 Ann Arbor, MI, 48105	Address		E	Alkalinity
City/State/Zip		City/State/Zip		F	
Phone	248 390 5748	Phone		G	
Fax		Fax		H	
e-Mail Address	Mcoram@geosyntec.com	e-Mail Address		I	
				J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	DB-1-20211008	10/09/2021	12:00	L		1	X										
2	DB-2-20211008	10/08/2021	12:00	L		1		X	X	X	X						
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign Will Blocher		Shipment Method Fed Ex		Turnaround Time in Business Days (BD) <input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD				Results Due Date:			
Relinquished by:	Date:	Time:	Received by:	Notes:							
Will Blocher	10/11/2021	16:30	Fed Ex								
Relinquished by:	Date:	Time:	Received by (Laboratory):	Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)					
Fed ex	10/12/21	1000	DFS	IR1	3.8°C	<input type="checkbox"/> Level II Std QC	<input type="checkbox"/> TRRP Checklist				
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):		pH30	<input type="checkbox"/> Level III Std QC/Raw Data	<input type="checkbox"/> TRRP Level IV				
DFS	10/12/21	1245				<input type="checkbox"/> Level IV SW846/CLP	<input type="checkbox"/> Other				
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035											

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **12-Oct-21 10:00**

Work Order: **21101019**

Received by: **DS**

Checklist completed by Diane Shaw 12-Oct-21  
eSignature Date

Reviewed by: Alex J. Csaszar 12-Oct-21  
eSignature Date

Matrices: Liquid

Carrier name: FedEx

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No
- Sample(s) received on ice? Yes  No

Temperature(s)/Thermometer(s):

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

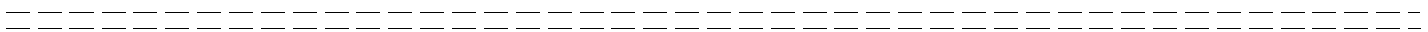
Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted

Water - pH acceptable upon receipt? Yes  No  N/A

pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:



Client Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_ Person Contacted: \_\_\_\_\_

Contacted By: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments:

CorrectiveAction:



# **Eurofins Environmental Testing**



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Mr. Vincent Buening  
TRC Environmental Corporation.  
1540 Eisenhower Place  
Ann Arbor, Michigan 48108-7080

Generated 1/4/2023 7:30:32 PM

## JOB DESCRIPTION

CCR DTE Belle River Power-Aquifer

## JOB NUMBER

240-178276-1

# Eurofins Canton

## Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

## Authorization



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1/4/2023 7:30:32 PM

Authorized for release by  
Kris Brooks, Project Manager II  
[Kris.Brooks@et.eurofinsus.com](mailto:Kris.Brooks@et.eurofinsus.com)  
(330)966-9790



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# Definitions/Glossary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

### General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
⊞	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

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**Job ID: 240-178276-1**

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**Laboratory: Eurofins Canton**

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**Narrative**

**Job Narrative  
240-178276-1**

**Receipt**

The samples were received on 12/20/2022 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C

**Metals**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

**General Chemistry**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

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# Method Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

#### Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

# Sample Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178276-1	NORTH BAB	Water	12/14/22 15:28	12/20/22 10:00
240-178276-2	DB-01	Water	12/16/22 14:40	12/20/22 10:00
240-178276-3	SC-01	Water	12/16/22 15:49	12/20/22 10:00
240-178276-4	DUP-01	Water	12/14/22 00:00	12/20/22 10:00

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# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: NORTH BAB

## Lab Sample ID: 240-178276-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	190		100	57	ug/L	1		6010B	Total Recoverable
Barium	270		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	49000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	8200		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3200		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	23		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	2000		10	10	ug/L	1		6020	Total Recoverable
Sodium	49000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	26		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	97		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	50		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	47		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	8.2		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.099		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	150		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.1		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: DB-01

## Lab Sample ID: 240-178276-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	7300		100	57	ug/L	1		6010B	Total Recoverable
Barium	290		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	110000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	15000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	13000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	240		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	2300		10	10	ug/L	1		6020	Total Recoverable
Sodium	460000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	83		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	120		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	27		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	46		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.26		0.050	0.050	mg/L	1		9056A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: DB-01 (Continued)

## Lab Sample ID: 240-178276-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	1100		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	3.7		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	3.7		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: SC-01

## Lab Sample ID: 240-178276-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	13		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	25000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	7600		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	1100		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	86		10	10	ug/L	1		6020	Total Recoverable
Sodium	5900		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	81		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	81		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	9.6		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.080		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	15		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.9		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: DUP-01

## Lab Sample ID: 240-178276-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1100		100	57	ug/L	1		6010B	Total Recoverable
Barium	310		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	33000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	85		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	920		10	10	ug/L	1		6020	Total Recoverable
Sodium	340000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	19		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01 (Continued)**

**Lab Sample ID: 240-178276-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	550		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.69	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.70	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: NORTH BAB**

**Lab Sample ID: 240-178276-1**

Date Collected: 12/14/22 15:28

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	190		100	57	ug/L		12/27/22 12:00	12/28/22 15:18	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	270		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:01	1
Calcium	49000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Magnesium	8200		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Potassium	3200		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Molybdenum	23		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:01	1
Strontium	2000		10	10	ug/L		12/27/22 12:00	12/28/22 16:01	1
Sodium	49000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:01	1
Lithium	26		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:01	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	97		5.0	2.6	mg/L			12/21/22 22:20	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	50		5.0	2.6	mg/L			12/21/22 22:20	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	47		5.0	2.6	mg/L			12/21/22 22:20	1
Chloride (SW846 9056A)	8.2		1.0	1.0	mg/L			12/31/22 21:00	1
Fluoride (SW846 9056A)	0.099		0.050	0.050	mg/L			12/31/22 21:00	1
Sulfate (SW846 9056A)	150		1.0	1.0	mg/L			12/31/22 21:00	1
Total Organic Carbon (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 1 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 2 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 3 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1
TOC Result 4 (SW846 9060A)	1.1		1.0	0.35	mg/L			12/29/22 07:07	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DB-01**

**Lab Sample ID: 240-178276-2**

Date Collected: 12/16/22 14:40

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	7300		100	57	ug/L		12/27/22 12:00	12/28/22 15:22	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	290		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:12	1
Calcium	110000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Magnesium	15000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Potassium	13000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Molybdenum	240		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:12	1
Strontium	2300		10	10	ug/L		12/27/22 12:00	12/28/22 16:12	1
Sodium	460000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:12	1
Lithium	83		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:12	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:24	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	120		5.0	2.6	mg/L			12/21/22 22:24	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	27		5.0	2.6	mg/L			12/21/22 22:24	1
Chloride (SW846 9056A)	46		1.0	1.0	mg/L			12/31/22 21:21	1
Fluoride (SW846 9056A)	0.26		0.050	0.050	mg/L			12/31/22 21:21	1
Sulfate (SW846 9056A)	1100		10	10	mg/L			12/31/22 21:43	10
Total Organic Carbon (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 1 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 2 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 3 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1
TOC Result 4 (SW846 9060A)	3.7		1.0	0.35	mg/L			12/29/22 08:01	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: SC-01**

**Lab Sample ID: 240-178276-3**

Date Collected: 12/16/22 15:49

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/27/22 12:00	12/28/22 15:26	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	13		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:14	1
Calcium	25000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Magnesium	7600		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Potassium	1100		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:14	1
Strontium	86		10	10	ug/L		12/27/22 12:00	12/28/22 16:14	1
Sodium	5900		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:14	1
Lithium	8.0	U	8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:14	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	81		5.0	2.6	mg/L			12/21/22 22:28	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	81		5.0	2.6	mg/L			12/21/22 22:28	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:28	1
Chloride (SW846 9056A)	9.6		1.0	1.0	mg/L			12/31/22 22:05	1
Fluoride (SW846 9056A)	0.080		0.050	0.050	mg/L			12/31/22 22:05	1
Sulfate (SW846 9056A)	15		1.0	1.0	mg/L			12/31/22 22:05	1
Total Organic Carbon (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 1 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 2 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 3 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1
TOC Result 4 (SW846 9060A)	1.9		1.0	0.35	mg/L			12/29/22 08:37	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01**

**Lab Sample ID: 240-178276-4**

Date Collected: 12/14/22 00:00

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1100		100	57	ug/L		12/27/22 12:00	12/28/22 15:31	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	310		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:17	1
Calcium	33000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Magnesium	11000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Potassium	2700		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Molybdenum	85		5.0	5.0	ug/L		12/27/22 12:00	12/28/22 16:17	1
Strontium	920		10	10	ug/L		12/27/22 12:00	12/28/22 16:17	1
Sodium	340000		1000	1000	ug/L		12/27/22 12:00	12/28/22 16:17	1
Lithium	19		8.0	8.0	ug/L		12/27/22 12:00	12/28/22 16:17	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:32	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 22:32	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:32	1
Chloride (SW846 9056A)	550		10	10	mg/L			12/31/22 22:48	10
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			12/31/22 22:27	1
Sulfate (SW846 9056A)	1.0	U	1.0	1.0	mg/L			12/31/22 22:27	1
Total Organic Carbon (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 1 (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 2 (SW846 9060A)	0.69	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 3 (SW846 9060A)	0.70	J	1.0	0.35	mg/L			12/29/22 09:12	1
TOC Result 4 (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 09:12	1

# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-557192/1-A  
Matrix: Water  
Analysis Batch: 557398

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/27/22 12:00	12/28/22 14:02	1

Lab Sample ID: LCS 240-557192/2-A  
Matrix: Water  
Analysis Batch: 557398

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000	1010		ug/L		101	80 - 120

## Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 240-557192/1-A  
Matrix: Water  
Analysis Batch: 557451

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 15:42	1
Calcium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Magnesium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Potassium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/27/22 12:00	12/28/22 15:42	1
Strontium	10	U	10	10	ug/L		12/27/22 12:00	12/28/22 15:42	1
Sodium	1000	U	1000	1000	ug/L		12/27/22 12:00	12/28/22 15:42	1
Lithium	8.0	U	8.0	8.0	ug/L		12/27/22 12:00	12/28/22 15:42	1

Lab Sample ID: LCS 240-557192/3-A  
Matrix: Water  
Analysis Batch: 557451

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 557192

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	938		ug/L		94	80 - 120
Calcium	25000	24500		ug/L		98	80 - 120
Magnesium	25000	24500		ug/L		98	80 - 120
Potassium	25000	24500		ug/L		98	80 - 120
Molybdenum	500	465		ug/L		93	80 - 120
Strontium	500	469		ug/L		94	80 - 120
Sodium	25000	24500		ug/L		98	80 - 120
Lithium	500	483		ug/L		97	80 - 120

## Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: MB 240-557050/30  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 2320B-1997 - Alkalinity, Total (Continued)

Lab Sample ID: MB 240-557050/4  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1

Lab Sample ID: LCS 240-557050/29  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557649/3  
Matrix: Water  
Analysis Batch: 557649

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	1.0	U	1.0	1.0	mg/L			12/31/22 07:59	1
Fluoride	0.050	U	0.050	0.050	mg/L			12/31/22 07:59	1
Sulfate	1.0	U	1.0	1.0	mg/L			12/31/22 07:59	1

Lab Sample ID: LCS 240-557649/4  
Matrix: Water  
Analysis Batch: 557649

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	2.50	2.65		mg/L		106	90 - 110
Sulfate	50.0	50.3		mg/L		101	90 - 110

## Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557515/34  
Matrix: Water  
Analysis Batch: 557515

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/29/22 06:09	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/29/22 06:09	1

Lab Sample ID: MB 240-557515/4  
Matrix: Water  
Analysis Batch: 557515

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Method: 9060A - Organic Carbon, Total (TOC) (Continued)

**Lab Sample ID: LCS 240-557515/35**  
**Matrix: Water**  
**Analysis Batch: 557515**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115
TOC Result 1	18.3	18.3		mg/L		100	85 - 115

**Lab Sample ID: LCS 240-557515/5**  
**Matrix: Water**  
**Analysis Batch: 557515**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115
TOC Result 1	18.3	18.3		mg/L		100	85 - 115

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Metals

### Prep Batch: 557192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	3005A	
240-178276-2	DB-01	Total Recoverable	Water	3005A	
240-178276-3	SC-01	Total Recoverable	Water	3005A	
240-178276-4	DUP-01	Total Recoverable	Water	3005A	
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-557192/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-557192/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

### Analysis Batch: 557398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	6010B	557192
240-178276-2	DB-01	Total Recoverable	Water	6010B	557192
240-178276-3	SC-01	Total Recoverable	Water	6010B	557192
240-178276-4	DUP-01	Total Recoverable	Water	6010B	557192
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	6010B	557192
LCS 240-557192/2-A	Lab Control Sample	Total Recoverable	Water	6010B	557192

### Analysis Batch: 557451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total Recoverable	Water	6020	557192
240-178276-2	DB-01	Total Recoverable	Water	6020	557192
240-178276-3	SC-01	Total Recoverable	Water	6020	557192
240-178276-4	DUP-01	Total Recoverable	Water	6020	557192
MB 240-557192/1-A	Method Blank	Total Recoverable	Water	6020	557192
LCS 240-557192/3-A	Lab Control Sample	Total Recoverable	Water	6020	557192

## General Chemistry

### Analysis Batch: 557050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	2320B-1997	
240-178276-2	DB-01	Total/NA	Water	2320B-1997	
240-178276-3	SC-01	Total/NA	Water	2320B-1997	
240-178276-4	DUP-01	Total/NA	Water	2320B-1997	
MB 240-557050/30	Method Blank	Total/NA	Water	2320B-1997	
MB 240-557050/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-557050/29	Lab Control Sample	Total/NA	Water	2320B-1997	

### Analysis Batch: 557515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	9060A	
240-178276-2	DB-01	Total/NA	Water	9060A	
240-178276-3	SC-01	Total/NA	Water	9060A	
240-178276-4	DUP-01	Total/NA	Water	9060A	
MB 240-557515/34	Method Blank	Total/NA	Water	9060A	
MB 240-557515/4	Method Blank	Total/NA	Water	9060A	
LCS 240-557515/35	Lab Control Sample	Total/NA	Water	9060A	
LCS 240-557515/5	Lab Control Sample	Total/NA	Water	9060A	

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## General Chemistry

### Analysis Batch: 557649

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178276-1	NORTH BAB	Total/NA	Water	9056A	
240-178276-2	DB-01	Total/NA	Water	9056A	
240-178276-2	DB-01	Total/NA	Water	9056A	
240-178276-3	SC-01	Total/NA	Water	9056A	
240-178276-4	DUP-01	Total/NA	Water	9056A	
240-178276-4	DUP-01	Total/NA	Water	9056A	
MB 240-557649/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557649/4	Lab Control Sample	Total/NA	Water	9056A	

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Client Sample ID: NORTH BAB

**Lab Sample ID: 240-178276-1**

**Date Collected: 12/14/22 15:28**

**Matrix: Water**

**Date Received: 12/20/22 10:00**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:18
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:01
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:20
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 21:00
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 07:07

## Client Sample ID: DB-01

**Lab Sample ID: 240-178276-2**

**Date Collected: 12/16/22 14:40**

**Matrix: Water**

**Date Received: 12/20/22 10:00**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:22
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:12
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:24
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 21:21
Total/NA	Analysis	9056A		10	557649	JMB	EET CAN	12/31/22 21:43
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 08:01

## Client Sample ID: SC-01

**Lab Sample ID: 240-178276-3**

**Date Collected: 12/16/22 15:49**

**Matrix: Water**

**Date Received: 12/20/22 10:00**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:26
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:14
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:28
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 22:05
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 08:37

## Client Sample ID: DUP-01

**Lab Sample ID: 240-178276-4**

**Date Collected: 12/14/22 00:00**

**Matrix: Water**

**Date Received: 12/20/22 10:00**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6010B		1	557398	RKT	EET CAN	12/28/22 15:31
Total Recoverable	Prep	3005A			557192	SHB	EET CAN	12/27/22 12:00
Total Recoverable	Analysis	6020		1	557451	DSH	EET CAN	12/28/22 16:17

# Lab Chronicle

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

**Client Sample ID: DUP-01**  
**Date Collected: 12/14/22 00:00**  
**Date Received: 12/20/22 10:00**

**Lab Sample ID: 240-178276-4**  
**Matrix: Water**

<u>Prep Type</u>	<u>Batch Type</u>	<u>Batch Method</u>	<u>Run</u>	<u>Dilution Factor</u>	<u>Batch Number</u>	<u>Analyst</u>	<u>Lab</u>	<u>Prepared or Analyzed</u>
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:32
Total/NA	Analysis	9056A		1	557649	JMB	EET CAN	12/31/22 22:27
Total/NA	Analysis	9056A		10	557649	JMB	EET CAN	12/31/22 22:48
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 09:12

**Laboratory References:**

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396



# Accreditation/Certification Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power-Aquifer

Job ID: 240-178276-1

## Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22

3.23.0

**Client Information**  
 Client Contact: Jacob Krenz  
 Company: TRC Environmental Corporation.  
 Address: 1540 Eisenhower Place  
 City: Ann Arbor  
 State, Zip: MI, 48108-7080  
 Phone: 313-971-7080 (Tel) 313-971-9022 (Fax)  
 Email: JKrenz@trccompanies.com  
 Project Name: CCR DTE Belle River Power-Aquifer  
 Site: Michigan

**Sampler:** S. Krenz  
**Phone:** 734-395-9804  
**Lab PM:** Brooks, Kris M  
**E-Mail:** Kris.Brooks@et.eurofins.com

**Carrier Tracking No(s):** 240-102238-37085.5  
**State of Origin:** Michigan  
**Page:** Page 5 of 7  
**Job #:**

**Analysis Requested**

Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Preservation Code	Matrix (Water, Soil, On-surface, BI-Tissue, A-Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056A_28D - Carb. Bicarb & Total Alkalinity	6020 (MOD) Metals - Ca, Mg, Na, K, Ba, Mo, Sr, Li, Pb, TCC	Total Number of Containers	Special Instructions/Note:
12-14-22	1538	G		Water	N	N	X	X	4	
12-16-22	1440	G		Water	N	N	X	X	4	
12-16-22	1544	G		Water	N	N	X	X	4	
12-14-22		G		Water	N	N	X	X	4	
				Water						
				Water						
				Water						
				Water						
				Water						
				Water						
				Water						

**Sample Identification**  
 North BAB  
 DB-01  
 SC-01  
 bup-01

**Barcode:** 240-178276 Chain of Custody

**Preservation Codes:**  
 A - HCl  
 B - NaOH  
 C - Zn Acetate  
 D - Nitric Acid  
 E - NaHSO4  
 F - MeOH  
 G - Amchlor  
 H - Ascorbic Acid  
 I - Ice  
 J - DI Water  
 K - EDTA  
 L - EDA  
 Other:

**Preservation Codes:**  
 M - Hexane  
 N - None  
 O - AsNaO2  
 P - Na2O4S  
 Q - Na2SO3  
 R - Na2SO4  
 S - H2SO4  
 T - TSP Dodecahydrate  
 U - Acetone  
 V - MCAA  
 W - pH 4-5  
 Y - Trizma  
 Z - other (specify)

**Possible Hazard Identification**  
 Non-Hazard  
 Flammable  
 Skin Irritant  
 Poison B  
 Unknown  
 Radiological

**Deliverable Requested:** I, II, III, IV, Other (specify)

**Empty Kit Relinquished by:**  
 Relinquished by: [Signature]  
 Relinquished by: [Signature]

**Custody Seals/Intact:**  
 Yes  
 No

**Special Instructions/Note:**  
 Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return To Client  
 Disposal By Lab  
 Archive For Months

**Special Instructions/QC Requirements:**

**Method of Shipment:**

**Date:**

**Received by:** TRC Storage  
 Date/Time: 12-14-22/0850  
 Company: TRC

**Received by:** [Signature]  
 Date/Time: 12/14/22 1044  
 Company: [Signature]

**Received by:** [Signature]  
 Date/Time: 12-20-22 10:00  
 Company: [Signature]

**Cooler Temperature(s):** C and Other Remarks



**Eurofins - Canton Sample Receipt Form/Narrative**  
**Barberton Facility**

Login # : 178276

Client TBC Site Name \_\_\_\_\_

Cooler unpacked by:

Cooler Received on 12-20-22 Opened on 12-20-22

Chamuk

FedEx: 1<sup>st</sup> Grd  UPS FAS Clipper Client Drop Off Eurofins Courier Other \_\_\_\_\_

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

Eurofins Cooler # 5C Foam Box Client Cooler Box Other \_\_\_\_\_

Packing material used: Bubble Wrap Foam Plastic Bag None Other \_\_\_\_\_


COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt  See Multiple Cooler Form
- IR GUN # IR-13 (CF **-0.2** °C) Observed Cooler Temp. 3.2 °C Corrected Cooler Temp. 3.0 °C
- IR GUN # IR-16 (CF **-0.1** °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
- IR GUN # IR-17 (CF **-0.3** °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity \_\_\_\_\_ Yes No
- Were the seals on the outside of the cooler(s) signed & dated? Yes No NA
- Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No
- Were tamper/custody seals intact and uncompromised? Yes No NA

**Tests that are not checked for pH by Receiving:**

VOAs  
Oil and Grease  
TOC

3. Shippers' packing slip attached to the cooler(s)? Yes No
4. Did custody papers accompany the sample(s)? Yes No
5. Were the custody papers relinquished & signed in the appropriate place? Yes No
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No
7. Did all bottles arrive in good condition (Unbroken)? Yes No
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC? Yes No
9. For each sample, does the COC specify preservatives  (Y/N), # of containers  (Y/N), and sample type of grab/comp  (Y/N)?
10. Were correct bottle(s) used for the test(s) indicated? Yes No
11. Sufficient quantity received to perform indicated analyses? Yes No
12. Are these work share samples and all listed on the COC? Yes  No
- If yes, Questions 13-17 have been checked at the originating laboratory.
13. Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# **HC291590**
14. Were VOAs on the COC? Yes No
15. Were air bubbles >6 mm in any VOA vials?  Yes  No NA  ← Larger than this.
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_ Yes  No
17. Was a LL Hg or Me Hg trip blank present? Yes  No

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other \_\_\_\_\_

Concerning \_\_\_\_\_

**18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES**  additional next page

Samples processed by: \_\_\_\_\_

**19. SAMPLE CONDITION**

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.

Sample(s) \_\_\_\_\_ were received in a broken container.

Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

**20. SAMPLE PRESERVATION**

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.

Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Mr. Vincent Buening  
TRC Environmental Corporation.  
1540 Eisenhower Place  
Ann Arbor, Michigan 48108-7080

Generated 1/5/2023 7:14:50 PM

## JOB DESCRIPTION

CCR DTE Belle River Power - Aquifer

## JOB NUMBER

240-178297-1

# Eurofins Canton

## Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

## Authorization



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Authorized for release by  
Kris Brooks, Project Manager II  
[Kris.Brooks@et.eurofinsus.com](mailto:Kris.Brooks@et.eurofinsus.com)  
(330)966-9790



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# Definitions/Glossary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
U	Indicates the analyte was analyzed for but not detected.

### General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

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**Job ID: 240-178297-1**

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**Laboratory: Eurofins Canton**

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**Narrative**

**Job Narrative  
240-178297-1**

**Receipt**

The samples were received on 12/20/2022 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C

**Metals**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

**General Chemistry**

Method 9056A\_28D: The following samples were diluted due to the nature of the sample matrix: MW-16-08 (240-178297-8), MW-16-11A (240-178297-11) and (240-178344-J-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.



# Method Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

#### Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

# Sample Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178297-1	MW-16-01	Water	12/14/22 10:33	12/20/22 10:00
240-178297-2	MW-16-02	Water	12/14/22 12:13	12/20/22 10:00
240-178297-3	MW-16-03	Water	12/14/22 13:46	12/20/22 10:00
240-178297-4	MW-16-04	Water	12/15/22 13:34	12/20/22 10:00
240-178297-5	MW-16-05	Water	12/15/22 09:24	12/20/22 10:00
240-178297-6	MW-16-06	Water	12/15/22 10:55	12/20/22 10:00
240-178297-7	MW-16-07	Water	12/15/22 12:28	12/20/22 10:00
240-178297-8	MW-16-08	Water	12/16/22 12:33	12/20/22 10:00
240-178297-9	MW-16-09	Water	12/16/22 13:34	12/20/22 10:00
240-178297-10	MW-16-10	Water	12/16/22 09:20	12/20/22 10:00
240-178297-11	MW-16-11A	Water	12/16/22 11:05	12/20/22 10:00

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13



# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-01

## Lab Sample ID: 240-178297-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1000		100	57	ug/L	1		6010B	Total Recoverable
Barium	220	F1	5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	42000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	14000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	71		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	300000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	15		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	450		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	9.0		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.77	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.79	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.80	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-02

## Lab Sample ID: 240-178297-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1100		100	57	ug/L	1		6010B	Total Recoverable
Barium	250		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	54000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	16000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3400		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	25		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1500		10	10	ug/L	1		6020	Total Recoverable
Sodium	190000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	15		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	150		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	350		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.2		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	9.1		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-02 (Continued)

## Lab Sample ID: 240-178297-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 1	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.71	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-03

## Lab Sample ID: 240-178297-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	990		100	57	ug/L	1		6010B	Total Recoverable
Barium	320		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	34000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2800		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	87		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	960		10	10	ug/L	1		6020	Total Recoverable
Sodium	350000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	20		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	550		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-04

## Lab Sample ID: 240-178297-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1000		100	57	ug/L	1		6010B	Total Recoverable
Barium	290		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	46000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	15000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	68		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	300000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-04 (Continued)

## Lab Sample ID: 240-178297-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	19		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	470		5.0	5.0	mg/L	5		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	16		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.75	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.74	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.77	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.76	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-05

## Lab Sample ID: 240-178297-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1600		100	57	ug/L	1		6010B	Total Recoverable
Barium	240		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	33000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4100		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	810		10	10	ug/L	1		6020	Total Recoverable
Sodium	870000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	47		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1400		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	6.1		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.8		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.8		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-06

## Lab Sample ID: 240-178297-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	250		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	38000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-06 (Continued)

## Lab Sample ID: 240-178297-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4300		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	14		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1000		10	10	ug/L	1		6020	Total Recoverable
Sodium	960000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	45		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	180		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	180		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1600		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	4.4		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.67	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.68	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-07

## Lab Sample ID: 240-178297-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	220		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	35000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	7.4		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	1100000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	53		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	230		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	230		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1700		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	30		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	5.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	4.9		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	5.0		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-08

## Lab Sample ID: 240-178297-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	300		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	40000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	13000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	16		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1200		10	10	ug/L	1		6020	Total Recoverable
Sodium	1100000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	57		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1800		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.61	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.64	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.62	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-09

## Lab Sample ID: 240-178297-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1400		100	57	ug/L	1		6010B	Total Recoverable
Barium	220		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	31000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	9600		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	35		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	840		10	10	ug/L	1		6020	Total Recoverable
Sodium	580000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	25		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	200		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	200		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	930		10	10	mg/L	10		9056A	Total/NA
Fluoride	1.5		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	13		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.5		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-09 (Continued)

## Lab Sample ID: 240-178297-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 2	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	2.5		1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-10

## Lab Sample ID: 240-178297-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1900		100	57	ug/L	1		6010B	Total Recoverable
Barium	67		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	26000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	9000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4600		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	540		10	10	ug/L	1		6020	Total Recoverable
Sodium	980000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	67		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	210		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	210		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1500		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.2		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	60		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.53	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.52	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.53	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.54	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.54	J	1.0	0.35	mg/L	1		9060A	Total/NA

## Client Sample ID: MW-16-11A

## Lab Sample ID: 240-178297-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1800		100	57	ug/L	1		6010B	Total Recoverable
Barium	270		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	38000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	4800		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	12		5.0	5.0	ug/L	1		6020	Total Recoverable
Strontium	1000		10	10	ug/L	1		6020	Total Recoverable
Sodium	1000000		1000	1000	ug/L	1		6020	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Detection Summary

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-11A (Continued)**

**Lab Sample ID: 240-178297-11**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	57		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	170		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	1700		20	20	mg/L	20		9056A	Total/NA
Fluoride	1.1		0.10	0.10	mg/L	2		9056A	Total/NA
Total Organic Carbon	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.51	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.49	J	1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Canton

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-01**

**Lab Sample ID: 240-178297-1**

Date Collected: 12/14/22 10:33

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1000		100	57	ug/L		12/21/22 12:00	12/23/22 03:28	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220	F1	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:09	1
Calcium	42000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Magnesium	14000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Potassium	2700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Molybdenum	71		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:09	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:09	1
Sodium	300000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:09	1
Lithium	15		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:09	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:26	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:26	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:26	1
Chloride (SW846 9056A)	450		5.0	5.0	mg/L			01/03/23 16:27	5
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 16:05	1
Sulfate (SW846 9056A)	9.0		1.0	1.0	mg/L			01/03/23 16:05	1
Total Organic Carbon (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 1 (SW846 9060A)	0.77	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 2 (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 3 (SW846 9060A)	0.79	J	1.0	0.35	mg/L			12/29/22 14:35	1
TOC Result 4 (SW846 9060A)	0.80	J	1.0	0.35	mg/L			12/29/22 14:35	1



# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-02**

**Lab Sample ID: 240-178297-2**

Date Collected: 12/14/22 12:13

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1100		100	57	ug/L		12/21/22 12:00	12/23/22 03:44	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	250		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:21	1
Calcium	54000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Magnesium	16000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Potassium	3400		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Molybdenum	25		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:21	1
Strontium	1500		10	10	ug/L		12/21/22 12:00	12/22/22 16:21	1
Sodium	190000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:21	1
Lithium	15		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:21	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 21:30	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	150		5.0	2.6	mg/L			12/21/22 21:30	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:30	1
Chloride (SW846 9056A)	350		5.0	5.0	mg/L			01/03/23 17:53	5
Fluoride (SW846 9056A)	1.2		0.050	0.050	mg/L			01/03/23 16:48	1
Sulfate (SW846 9056A)	9.1		1.0	1.0	mg/L			01/03/23 16:48	1
Total Organic Carbon (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 1 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 2 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 3 (SW846 9060A)	0.71	J	1.0	0.35	mg/L			12/29/22 15:10	1
TOC Result 4 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 15:10	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-03**

**Lab Sample ID: 240-178297-3**

Date Collected: 12/14/22 13:46

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	990		100	57	ug/L		12/21/22 12:00	12/23/22 03:49	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	320		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:24	1
Calcium	34000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Potassium	2800		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Molybdenum	87		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:24	1
Strontium	960		10	10	ug/L		12/21/22 12:00	12/22/22 16:24	1
Sodium	350000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:24	1
Lithium	20		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:24	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:35	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:35	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:35	1
Chloride (SW846 9056A)	550		10	10	mg/L			01/03/23 18:37	10
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 18:15	1
Sulfate (SW846 9056A)	1.0	U	1.0	1.0	mg/L			01/03/23 18:15	1
Total Organic Carbon (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 1 (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 2 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 3 (SW846 9060A)	0.73	J	1.0	0.35	mg/L			12/29/22 15:45	1
TOC Result 4 (SW846 9060A)	0.72	J	1.0	0.35	mg/L			12/29/22 15:45	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-04**

**Lab Sample ID: 240-178297-4**

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1000		100	57	ug/L		12/21/22 12:00	12/23/22 03:53	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	290		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:26	1
Calcium	46000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Magnesium	15000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Potassium	3000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Molybdenum	68		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:26	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:26	1
Sodium	300000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:26	1
Lithium	19		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:26	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:39	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	160		5.0	2.6	mg/L			12/21/22 21:39	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:39	1
Chloride (SW846 9056A)	470		5.0	5.0	mg/L			01/03/23 19:20	5
Fluoride (SW846 9056A)	1.8		0.050	0.050	mg/L			01/03/23 18:59	1
Sulfate (SW846 9056A)	16		1.0	1.0	mg/L			01/03/23 18:59	1
Total Organic Carbon (SW846 9060A)	0.75	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 1 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 2 (SW846 9060A)	0.74	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 3 (SW846 9060A)	0.77	J	1.0	0.35	mg/L			12/29/22 16:20	1
TOC Result 4 (SW846 9060A)	0.76	J	1.0	0.35	mg/L			12/29/22 16:20	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-05**

**Lab Sample ID: 240-178297-5**

Date Collected: 12/15/22 09:24

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1600		100	57	ug/L		12/21/22 12:00	12/23/22 04:06	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	240		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:34	1
Calcium	33000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Potassium	4100		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Molybdenum	11		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:34	1
Strontium	810		10	10	ug/L		12/21/22 12:00	12/22/22 16:34	1
Sodium	870000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:34	1
Lithium	47		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:34	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	190		5.0	2.6	mg/L			12/21/22 21:43	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	190		5.0	2.6	mg/L			12/21/22 21:43	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:43	1
Chloride (SW846 9056A)	1400		20	20	mg/L			01/03/23 20:04	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 19:42	2
Sulfate (SW846 9056A)	6.1		2.0	2.0	mg/L			01/03/23 19:42	2
Total Organic Carbon (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 1 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 2 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 3 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1
TOC Result 4 (SW846 9060A)	1.8		1.0	0.35	mg/L			12/29/22 16:56	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-06**

**Lab Sample ID: 240-178297-6**

Date Collected: 12/15/22 10:55

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:10	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	250		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:36	1
Calcium	38000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Magnesium	12000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Potassium	4300		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Molybdenum	14		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:36	1
Strontium	1000		10	10	ug/L		12/21/22 12:00	12/22/22 16:36	1
Sodium	960000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:36	1
Lithium	45		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:36	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	180		5.0	2.6	mg/L			12/21/22 21:47	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	180		5.0	2.6	mg/L			12/21/22 21:47	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:47	1
Chloride (SW846 9056A)	1600		20	20	mg/L			01/03/23 20:47	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 20:25	2
Sulfate (SW846 9056A)	4.4		2.0	2.0	mg/L			01/03/23 20:25	2
Total Organic Carbon (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 1 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 2 (SW846 9060A)	0.67	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 3 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1
TOC Result 4 (SW846 9060A)	0.68	J	1.0	0.35	mg/L			12/29/22 17:32	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-07**

**Lab Sample ID: 240-178297-7**

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:14	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:39	1
Calcium	35000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Magnesium	11000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Potassium	4700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Molybdenum	7.4		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:39	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:39	1
Sodium	1100000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:39	1
Lithium	53		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:39	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	230		5.0	2.6	mg/L			12/21/22 21:52	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	230		5.0	2.6	mg/L			12/21/22 21:52	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:52	1
Chloride (SW846 9056A)	1700		20	20	mg/L			01/03/23 22:14	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 21:09	2
Sulfate (SW846 9056A)	30		2.0	2.0	mg/L			01/03/23 21:09	2
Total Organic Carbon (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 1 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 2 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 3 (SW846 9060A)	4.9		1.0	0.35	mg/L			12/29/22 18:08	1
TOC Result 4 (SW846 9060A)	5.0		1.0	0.35	mg/L			12/29/22 18:08	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-08**

**Lab Sample ID: 240-178297-8**

Date Collected: 12/16/22 12:33

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:19	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	300		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:41	1
Calcium	40000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Magnesium	13000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Potassium	4700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Molybdenum	16		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:41	1
Strontium	1200		10	10	ug/L		12/21/22 12:00	12/22/22 16:41	1
Sodium	1100000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:41	1
Lithium	57		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:41	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:58	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 21:58	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 21:58	1
Chloride (SW846 9056A)	1800		20	20	mg/L			01/03/23 22:57	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/03/23 22:35	2
Sulfate (SW846 9056A)	2.0	U	2.0	2.0	mg/L			01/03/23 22:35	2
Total Organic Carbon (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 1 (SW846 9060A)	0.61	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 2 (SW846 9060A)	0.64	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 3 (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1
TOC Result 4 (SW846 9060A)	0.62	J	1.0	0.35	mg/L			12/29/22 18:45	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-09**

**Lab Sample ID: 240-178297-9**

Date Collected: 12/16/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1400		100	57	ug/L		12/21/22 12:00	12/23/22 04:23	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	220		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:44	1
Calcium	31000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Magnesium	9600		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Potassium	2700		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Molybdenum	35		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:44	1
Strontium	840		10	10	ug/L		12/21/22 12:00	12/22/22 16:44	1
Sodium	580000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:44	1
Lithium	25		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:44	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	200		5.0	2.6	mg/L			12/21/22 22:07	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	200		5.0	2.6	mg/L			12/21/22 22:07	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:07	1
Chloride (SW846 9056A)	930		10	10	mg/L			01/03/23 23:40	10
Fluoride (SW846 9056A)	1.5		0.050	0.050	mg/L			01/03/23 23:19	1
Sulfate (SW846 9056A)	13		1.0	1.0	mg/L			01/03/23 23:19	1
Total Organic Carbon (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 1 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 2 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 3 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1
TOC Result 4 (SW846 9060A)	2.5		1.0	0.35	mg/L			12/29/22 19:39	1



# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-10**

**Lab Sample ID: 240-178297-10**

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1900		100	57	ug/L		12/21/22 12:00	12/23/22 04:28	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	67		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:46	1
Calcium	26000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Magnesium	9000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Potassium	4600		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Molybdenum	11		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:46	1
Strontium	540		10	10	ug/L		12/21/22 12:00	12/22/22 16:46	1
Sodium	980000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:46	1
Lithium	67		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:46	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	210		5.0	2.6	mg/L			12/21/22 22:11	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	210		5.0	2.6	mg/L			12/21/22 22:11	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:11	1
Chloride (SW846 9056A)	1500		20	20	mg/L			01/04/23 00:24	20
Fluoride (SW846 9056A)	1.2		0.10	0.10	mg/L			01/04/23 00:02	2
Sulfate (SW846 9056A)	60		2.0	2.0	mg/L			01/04/23 00:02	2
Total Organic Carbon (SW846 9060A)	0.53	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 1 (SW846 9060A)	0.52	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 2 (SW846 9060A)	0.53	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 3 (SW846 9060A)	0.54	J	1.0	0.35	mg/L			12/29/22 20:14	1
TOC Result 4 (SW846 9060A)	0.54	J	1.0	0.35	mg/L			12/29/22 20:14	1

# Client Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-11A**

**Lab Sample ID: 240-178297-11**

Date Collected: 12/16/22 11:05

Matrix: Water

Date Received: 12/20/22 10:00

**Method: SW846 6010B - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1800		100	57	ug/L		12/21/22 12:00	12/23/22 04:32	1

**Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	270		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:49	1
Calcium	38000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Magnesium	12000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Potassium	4800		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Molybdenum	12		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:49	1
Strontium	1000		10	10	ug/L		12/21/22 12:00	12/22/22 16:49	1
Sodium	1000000		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:49	1
Lithium	57		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:49	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 22:16	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	170		5.0	2.6	mg/L			12/21/22 22:16	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 22:16	1
Chloride (SW846 9056A)	1700		20	20	mg/L			01/04/23 01:07	20
Fluoride (SW846 9056A)	1.1		0.10	0.10	mg/L			01/04/23 00:46	2
Sulfate (SW846 9056A)	2.0	U	2.0	2.0	mg/L			01/04/23 00:46	2
Total Organic Carbon (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 1 (SW846 9060A)	0.51	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 2 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 3 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1
TOC Result 4 (SW846 9060A)	0.49	J	1.0	0.35	mg/L			12/29/22 20:49	1

# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 6010B - Metals (ICP)

**Lab Sample ID: MB 240-556847/1-A**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/21/22 12:00	12/23/22 03:19	1

**Lab Sample ID: LCS 240-556847/2-A**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000	979		ug/L		98	80 - 120

**Lab Sample ID: 240-178297-1 MS**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000		1000	2030		ug/L		100	75 - 125

**Lab Sample ID: 240-178297-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 557096**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Boron	1000		1000	1970		ug/L		94	75 - 125	3	20

## Method: 6020 - Metals (ICP/MS)

**Lab Sample ID: MB 240-556847/1-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Calcium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Magnesium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Potassium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Strontium	10	U	10	10	ug/L		12/21/22 12:00	12/22/22 16:05	1
Sodium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Lithium	8.0	U	8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:05	1

**Lab Sample ID: LCS 240-556847/3-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	1010		ug/L		101	80 - 120
Calcium	25000	24200		ug/L		97	80 - 120
Magnesium	25000	23700		ug/L		95	80 - 120
Potassium	25000	24300		ug/L		97	80 - 120
Molybdenum	500	458		ug/L		92	80 - 120
Strontium	500	470		ug/L		94	80 - 120

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# QC Sample Results

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 6020 - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 240-556847/3-A**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Sodium	25000	23900		ug/L		95	80 - 120
Lithium	500	482		ug/L		96	80 - 120

**Lab Sample ID: 240-178297-1 MS**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	220	F1	1000	1560	F1	ug/L		134	75 - 125
Calcium	42000		25000	63200		ug/L		84	75 - 125
Magnesium	14000		25000	37500		ug/L		94	75 - 125
Potassium	2700		25000	26800		ug/L		96	75 - 125
Molybdenum	71		500	582		ug/L		102	75 - 125
Strontium	1200		500	1620		ug/L		86	75 - 125
Sodium	300000		25000	315000	4	ug/L		48	75 - 125
Lithium	15		500	514		ug/L		100	75 - 125

**Lab Sample ID: 240-178297-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 557119**

**Client Sample ID: MW-16-01**  
**Prep Type: Total Recoverable**  
**Prep Batch: 556847**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Barium	220	F1	1000	1550	F1	ug/L		133	75 - 125	0	20
Calcium	42000		25000	62900		ug/L		83	75 - 125	0	20
Magnesium	14000		25000	36700		ug/L		91	75 - 125	2	20
Potassium	2700		25000	26500		ug/L		95	75 - 125	1	20
Molybdenum	71		500	569		ug/L		100	75 - 125	2	20
Strontium	1200		500	1620		ug/L		85	75 - 125	0	20
Sodium	300000		25000	313000	4	ug/L		40	75 - 125	1	20
Lithium	15		500	502		ug/L		97	75 - 125	2	20

## Method: 2320B-1997 - Alkalinity, Total

**Lab Sample ID: MB 240-557050/30**  
**Matrix: Water**  
**Analysis Batch: 557050**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 20:50	1

**Lab Sample ID: MB 240-557050/4**  
**Matrix: Water**  
**Analysis Batch: 557050**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1

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# QC Sample Results

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: LCS 240-557050/29  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity	146	140		mg/L		96	86 - 123

Lab Sample ID: 240-178297-8 DU  
Matrix: Water  
Analysis Batch: 557050

Client Sample ID: MW-16-08  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	170		165		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	170		165		mg/L		2	20
Carbonate Alkalinity as CaCO3	5.0	U	5.0	U	mg/L		NC	20

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557809/3  
Matrix: Water  
Analysis Batch: 557809

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	1.0	mg/L			01/03/23 13:33	1
Fluoride	0.050	U	0.050	0.050	mg/L			01/03/23 13:33	1
Sulfate	1.0	U	1.0	1.0	mg/L			01/03/23 13:33	1

Lab Sample ID: LCS 240-557809/4  
Matrix: Water  
Analysis Batch: 557809

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	49.2		mg/L		98	90 - 110
Fluoride	2.50	2.61		mg/L		104	90 - 110
Sulfate	50.0	50.6		mg/L		101	90 - 110

## Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557788/3  
Matrix: Water  
Analysis Batch: 557788

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1

Lab Sample ID: LCS 240-557788/4  
Matrix: Water  
Analysis Batch: 557788

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.0		mg/L		98	85 - 115
TOC Result 1	18.3	18.0		mg/L		98	85 - 115

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Metals

### Prep Batch: 556847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	3005A	
240-178297-2	MW-16-02	Total Recoverable	Water	3005A	
240-178297-3	MW-16-03	Total Recoverable	Water	3005A	
240-178297-4	MW-16-04	Total Recoverable	Water	3005A	
240-178297-5	MW-16-05	Total Recoverable	Water	3005A	
240-178297-6	MW-16-06	Total Recoverable	Water	3005A	
240-178297-7	MW-16-07	Total Recoverable	Water	3005A	
240-178297-8	MW-16-08	Total Recoverable	Water	3005A	
240-178297-9	MW-16-09	Total Recoverable	Water	3005A	
240-178297-10	MW-16-10	Total Recoverable	Water	3005A	
240-178297-11	MW-16-11A	Total Recoverable	Water	3005A	
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-178297-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	3005A	
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	3005A	

### Analysis Batch: 557096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	6010B	556847
240-178297-2	MW-16-02	Total Recoverable	Water	6010B	556847
240-178297-3	MW-16-03	Total Recoverable	Water	6010B	556847
240-178297-4	MW-16-04	Total Recoverable	Water	6010B	556847
240-178297-5	MW-16-05	Total Recoverable	Water	6010B	556847
240-178297-6	MW-16-06	Total Recoverable	Water	6010B	556847
240-178297-7	MW-16-07	Total Recoverable	Water	6010B	556847
240-178297-8	MW-16-08	Total Recoverable	Water	6010B	556847
240-178297-9	MW-16-09	Total Recoverable	Water	6010B	556847
240-178297-10	MW-16-10	Total Recoverable	Water	6010B	556847
240-178297-11	MW-16-11A	Total Recoverable	Water	6010B	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6010B	556847
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	6010B	556847
240-178297-1 MS	MW-16-01	Total Recoverable	Water	6010B	556847
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	6010B	556847

### Analysis Batch: 557119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total Recoverable	Water	6020	556847
240-178297-2	MW-16-02	Total Recoverable	Water	6020	556847
240-178297-3	MW-16-03	Total Recoverable	Water	6020	556847
240-178297-4	MW-16-04	Total Recoverable	Water	6020	556847
240-178297-5	MW-16-05	Total Recoverable	Water	6020	556847
240-178297-6	MW-16-06	Total Recoverable	Water	6020	556847
240-178297-7	MW-16-07	Total Recoverable	Water	6020	556847
240-178297-8	MW-16-08	Total Recoverable	Water	6020	556847
240-178297-9	MW-16-09	Total Recoverable	Water	6020	556847
240-178297-10	MW-16-10	Total Recoverable	Water	6020	556847
240-178297-11	MW-16-11A	Total Recoverable	Water	6020	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6020	556847

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# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Metals (Continued)

### Analysis Batch: 557119 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	6020	556847
240-178297-1 MS	MW-16-01	Total Recoverable	Water	6020	556847
240-178297-1 MSD	MW-16-01	Total Recoverable	Water	6020	556847

## General Chemistry

### Analysis Batch: 557050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	2320B-1997	
240-178297-2	MW-16-02	Total/NA	Water	2320B-1997	
240-178297-3	MW-16-03	Total/NA	Water	2320B-1997	
240-178297-4	MW-16-04	Total/NA	Water	2320B-1997	
240-178297-5	MW-16-05	Total/NA	Water	2320B-1997	
240-178297-6	MW-16-06	Total/NA	Water	2320B-1997	
240-178297-7	MW-16-07	Total/NA	Water	2320B-1997	
240-178297-8	MW-16-08	Total/NA	Water	2320B-1997	
240-178297-9	MW-16-09	Total/NA	Water	2320B-1997	
240-178297-10	MW-16-10	Total/NA	Water	2320B-1997	
240-178297-11	MW-16-11A	Total/NA	Water	2320B-1997	
MB 240-557050/30	Method Blank	Total/NA	Water	2320B-1997	
MB 240-557050/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-557050/29	Lab Control Sample	Total/NA	Water	2320B-1997	
240-178297-8 DU	MW-16-08	Total/NA	Water	2320B-1997	

### Analysis Batch: 557788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	9060A	
240-178297-2	MW-16-02	Total/NA	Water	9060A	
240-178297-3	MW-16-03	Total/NA	Water	9060A	
240-178297-4	MW-16-04	Total/NA	Water	9060A	
240-178297-5	MW-16-05	Total/NA	Water	9060A	
240-178297-6	MW-16-06	Total/NA	Water	9060A	
240-178297-7	MW-16-07	Total/NA	Water	9060A	
240-178297-8	MW-16-08	Total/NA	Water	9060A	
240-178297-9	MW-16-09	Total/NA	Water	9060A	
240-178297-10	MW-16-10	Total/NA	Water	9060A	
240-178297-11	MW-16-11A	Total/NA	Water	9060A	
MB 240-557788/3	Method Blank	Total/NA	Water	9060A	
LCS 240-557788/4	Lab Control Sample	Total/NA	Water	9060A	

### Analysis Batch: 557809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-1	MW-16-01	Total/NA	Water	9056A	
240-178297-1	MW-16-01	Total/NA	Water	9056A	
240-178297-2	MW-16-02	Total/NA	Water	9056A	
240-178297-2	MW-16-02	Total/NA	Water	9056A	
240-178297-3	MW-16-03	Total/NA	Water	9056A	
240-178297-3	MW-16-03	Total/NA	Water	9056A	
240-178297-4	MW-16-04	Total/NA	Water	9056A	
240-178297-4	MW-16-04	Total/NA	Water	9056A	
240-178297-5	MW-16-05	Total/NA	Water	9056A	

# QC Association Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## General Chemistry (Continued)

### Analysis Batch: 557809 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178297-5	MW-16-05	Total/NA	Water	9056A	
240-178297-6	MW-16-06	Total/NA	Water	9056A	
240-178297-6	MW-16-06	Total/NA	Water	9056A	
240-178297-7	MW-16-07	Total/NA	Water	9056A	
240-178297-7	MW-16-07	Total/NA	Water	9056A	
240-178297-8	MW-16-08	Total/NA	Water	9056A	
240-178297-8	MW-16-08	Total/NA	Water	9056A	
240-178297-9	MW-16-09	Total/NA	Water	9056A	
240-178297-9	MW-16-09	Total/NA	Water	9056A	
240-178297-10	MW-16-10	Total/NA	Water	9056A	
240-178297-10	MW-16-10	Total/NA	Water	9056A	
240-178297-11	MW-16-11A	Total/NA	Water	9056A	
240-178297-11	MW-16-11A	Total/NA	Water	9056A	
MB 240-557809/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557809/4	Lab Control Sample	Total/NA	Water	9056A	



# Lab Chronicle

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-01

Lab Sample ID: 240-178297-1

Date Collected: 12/14/22 10:33

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:28
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:09
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:26
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 16:05
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 16:27
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 14:35

## Client Sample ID: MW-16-02

Lab Sample ID: 240-178297-2

Date Collected: 12/14/22 12:13

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:44
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:21
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:30
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 16:48
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 17:53
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 15:10

## Client Sample ID: MW-16-03

Lab Sample ID: 240-178297-3

Date Collected: 12/14/22 13:46

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:49
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:24
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:35
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 18:15
Total/NA	Analysis	9056A		10	557809	JMB	EET CAN	01/03/23 18:37
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 15:45

## Client Sample ID: MW-16-04

Lab Sample ID: 240-178297-4

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 03:53

# Lab Chronicle

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-04

Lab Sample ID: 240-178297-4

Date Collected: 12/15/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:26
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:39
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 18:59
Total/NA	Analysis	9056A		5	557809	JMB	EET CAN	01/03/23 19:20
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 16:20

## Client Sample ID: MW-16-05

Lab Sample ID: 240-178297-5

Date Collected: 12/15/22 09:24

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:06
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:34
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:43
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 19:42
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 20:04
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 16:56

## Client Sample ID: MW-16-06

Lab Sample ID: 240-178297-6

Date Collected: 12/15/22 10:55

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:10
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:36
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:47
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 20:25
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 20:47
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 17:32

## Client Sample ID: MW-16-07

Lab Sample ID: 240-178297-7

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:14
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:39

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Client Sample ID: MW-16-07

## Lab Sample ID: 240-178297-7

Date Collected: 12/15/22 12:28

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:52
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 21:09
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 22:14
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 18:08

## Client Sample ID: MW-16-08

## Lab Sample ID: 240-178297-8

Date Collected: 12/16/22 12:33

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:19
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:41
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 21:58
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/03/23 22:35
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/03/23 22:57
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 18:45

## Client Sample ID: MW-16-09

## Lab Sample ID: 240-178297-9

Date Collected: 12/16/22 13:34

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:23
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:44
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:07
Total/NA	Analysis	9056A		1	557809	JMB	EET CAN	01/03/23 23:19
Total/NA	Analysis	9056A		10	557809	JMB	EET CAN	01/03/23 23:40
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 19:39

## Client Sample ID: MW-16-10

## Lab Sample ID: 240-178297-10

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:28
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:46
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:11
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/04/23 00:02

Eurofins Canton

# Lab Chronicle

Client: TRC Environmental Corporation.  
 Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

**Client Sample ID: MW-16-10**

**Lab Sample ID: 240-178297-10**

Date Collected: 12/16/22 09:20

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/04/23 00:24
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 20:14

**Client Sample ID: MW-16-11A**

**Lab Sample ID: 240-178297-11**

Date Collected: 12/16/22 11:05

Matrix: Water

Date Received: 12/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:32
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:49
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 22:16
Total/NA	Analysis	9056A		2	557809	JMB	EET CAN	01/04/23 00:46
Total/NA	Analysis	9056A		20	557809	JMB	EET CAN	01/04/23 01:07
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 20:49

**Laboratory References:**

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

# Accreditation/Certification Summary

Client: TRC Environmental Corporation.  
Project/Site: CCR DTE Belle River Power - Aquifer

Job ID: 240-178297-1

## Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22 *
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

**Chain of Custody Record**



3.2/3.0

Client Information		Lab PM		Carrier Tracking No(s)		COC No:					
TRC Environmental Corporation.		Brooks, Kris M		240-102238-37085.4		240-102238-37085.4					
Address: 1540 Eisenhower Place		E-Mail: Kris.Brooks@et.eurofins.com		State of Origin:		Page: Page 4 of 7					
City: Ann Arbor		PWSID:		Job #:		Preservation Codes:					
State, Zip: MI, 48108-7080		Due Date Requested:		Analysis Requested		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 X - EDTA Y - Trizma Z - other (specify)					
Phone: 313-971-7080(Tel) 313-971-9022(Fax)		TAT Requested (days):		Perform MS/MSD (Yes or No)		Other:					
Email: JKrenz@trccompanies.com		Compliance Project: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Field Filtered Sample (Yes or No)		Total Number of Containers					
Project Name: CCR DTE Belle River Power-Aquifer		FO #: <del>179074-2022</del> 193 523		9056A_28D - Chloride, Sulfate		Special Instructions/Note:					
Site: Michigan		WO #: 379029 0003 P512		2320B - Carb. Bicarb & Total Alkalinity		4					
		Project #: 24012468		6020 - (MOD) Metals - Ca, Mg, Na, K, Ba, No, B, Sr, Li, TOC		4					
		SSOW#:		9056B_28D - Chloride, Sulfate		4					
Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Preservation Code	Matrix (W=water, S=solid, O=wastebill, BT=BIAS, AW=)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056A_28D - Chloride, Sulfate	2320B - Carb. Bicarb & Total Alkalinity	6020 - (MOD) Metals - Ca, Mg, Na, K, Ba, No, B, Sr, Li, TOC	Special Instructions/Note:
MW-16-01	12-14-22	1033	G		Water	N	N	X	X	X	
MW-16-02	12-14-22	1313	G		Water			X	X	X	
MW-16-03	12-14-22	1346	G		Water			X	X	X	
MW-16-04	12-15-22	1334	G		Water			X	X	X	
MW-16-05	12-15-22	0924	G		Water			X	X	X	
MW-16-06	12-15-22	1055	G		Water			X	X	X	
MW-16-07	12-15-22	1228	G		Water			X	X	X	
MW-16-08	12-16-22	1233	G		Water			X	X	X	
MW-16-09	12-16-22	1334	G		Water			X	X	X	
MW-16-10	12-16-22	0920	G		Water			X	X	X	
MW-16-11a	12-16-22	1105	G		Water			X	X	X	

240-178297 Chain of Custody

**Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)**  
 Return To Client  Disposal By Lab  Archive For \_\_\_\_\_ Months

**Special Instructions/QC Requirements:**

Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date: 12-14-22 / 0850 Company: TRC  
 Relinquished by: TRC Storage Vendor & Party Date: 12/17/22 / 1039 Company: TRC  
 Relinquished by: \_\_\_\_\_ Date: 12/19/22 / 1400 Company: ECF  
 Custody Seal No.: \_\_\_\_\_  
 Custody Seal Contact: \_\_\_\_\_  
 Cooler (Temperatures) °C and Other Remarks:

Barberton Facility

Client TBC Site Name \_\_\_\_\_

Cooler unpacked by:

Chamick

Cooler Received on 12-20-22 Opened on 12-20-22

FedEx: 1<sup>st</sup> Grd  UPS FAS Clipper Client Drop Off Eurofins Courier Other

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

Eurofins Cooler # 52 Foam Box Client Cooler Box Other \_\_\_\_\_

Packing material used: Bubble Wrap Foam Plastic Bag None Other \_\_\_\_\_

COOLANT: Wet Ice Blue Ice Dry Ice Water None

- 1. Cooler temperature upon receipt  See Multiple Cooler Form
  - IR GUN # IR-13 (CF -0.2 °C) Observed Cooler Temp. 3.2 °C Corrected Cooler Temp. 3.0 °C
  - IR GUN # IR-16 (CF -0.1 °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
  - IR GUN # IR-17 (CF -0.3 °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C


- 2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity \_\_\_\_\_ Yes No
  - Were the seals on the outside of the cooler(s) signed & dated?  Yes  No NA
  - Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes  No NA
  - Were tamper/custody seals intact and uncompromised?  Yes  No NA

Tests that are not checked for pH by Receiving:

VOAs  
Oil and Grease  
TOC

- 3. Shippers' packing slip attached to the cooler(s)?  Yes  No
- 4. Did custody papers accompany the sample(s)?  Yes  No
- 5. Were the custody papers relinquished & signed in the appropriate place?  Yes  No
- 6. Was/were the person(s) who collected the samples clearly identified on the COC?  Yes  No
- 7. Did all bottles arrive in good condition (Unbroken)?  Yes  No
- 8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?  Yes  No
- 9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?  Yes  No
- 10. Were correct bottle(s) used for the test(s) indicated?  Yes  No
- 11. Sufficient quantity received to perform indicated analyses?  Yes  No
- 12. Are these work share samples and all listed on the COC? Yes  No

If yes, Questions 13-17 have been checked at the originating laboratory.

- 13. Were all preserved sample(s) at the correct pH upon receipt?  Yes  No NA pH Strip Lot# HC291590
- 14. Were VOAs on the COC?  Yes  No
- 15. Were air bubbles >6 mm in any VOA vials?  Yes  No NA  Larger than this.
- 16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_ Yes  No
- 17. Was a LL Hg or Me Hg trip blank present? Yes  No

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other

Concerning \_\_\_\_\_

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES  additional next page

Samples processed by: \_\_\_\_\_

19. SAMPLE CONDITION

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.

Sample(s) \_\_\_\_\_ were received in a broken container.

Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.

Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_

Temperature readings: \_\_\_\_\_

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container</u>		<u>Preservative</u>	
			<u>pH</u>	<u>Temp</u>	<u>Added (mls)</u>	<u>Lot #</u>
MW-16-01	240-178297-D-1	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-02	240-178297-D-2	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-03	240-178297-D-3	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-04	240-178297-D-4	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-05	240-178297-D-5	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-06	240-178297-D-6	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-07	240-178297-D-7	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-08	240-178297-D-8	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-09	240-178297-D-9	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-10	240-178297-D-10	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____
MW-16-11A	240-178297-D-11	Plastic 500ml - with Nitric Acid	_____	_____	_____	_____



# ALS Scandinavia

# ANALYSIS REPORT



Issued by: ALS Scandinavia Luleå, Aurorum 10, SE-977 75 LULEÅ, Sweden  
Client: TRC  
Date of receipt: 2022-12-22  
Date of analysis: 2023-01-12  
Order number(our): LE2216210  
Your reference: Vincent Buening  
Our reference: Ilia Rodushkin

Lab number(our)	Sample name	$\delta^{11}\text{B}$ , ‰	2SD, ‰	$\delta^7\text{Li}$ , ‰	2SD, ‰	$^{87}\text{Sr}/^{86}\text{Sr}$	2 SD
LE2216210-001	MW-16-01	39.26	0.65	31.21	0.72	0.709290	0.000029
LE2216210-002	MW-16-02	39.32	0.84	30.67	0.77	0.709517	0.000016
LE2216210-003	MW-16-03	39.49	0.56	29.15	0.82	0.709430	0.000065
LE2216210-004	MW-16-04	40.63	0.62	28.75	0.92	0.709343	0.000012
LE2216210-005	MW-16-05	45.84	0.62	27.83	0.73	0.709407	0.000008
LE2216210-006	MW-16-06	46.46	0.60	31.52	0.78	0.709327	0.000026
LE2216210-007	MW-16-07	45.94	0.85	28.44	0.73	0.709541	0.000013
LE2216210-008	MW-16-08	46.31	0.65	23.69	0.79	0.709581	0.000016
LE2216210-009	MW-16-09	43.49	0.71	29.89	1.04	0.709459	0.000030
LE2216210-009	MW-16-09, r.2	44.18	0.67	30.51	0.88	0.709448	0.000039
LE2216210-010	MW-16-10	46.72	0.79	21.88	0.67	0.709502	0.000020
LE2216210-011	MW-16-11A	46.11	0.64	22.89	0.74	0.709443	0.000040
LE2216210-012	North BAB	-0.81	0.78	-0.13	0.66	0.708901	0.000014
LE2216210-013	DB-01	-5.01	0.63	11.48	0.63	0.709354	0.000008
LE2216210-014	SC-01	-4.82	0.62	20.80	0.65	0.709999	0.000013
LE2216210-014	SC-01, r.2	-5.07	0.68	21.14	0.71	0.710000	0.000009
LE2216210-015	DUP-01	40.29	0.68	28.79	0.84	0.709390	0.000024

## Comments

The analysis is carried out by MC-ICP-MS (NEPTUNE Plus) using internal standartization and external calibration with bracketing isotope SRMs  
Analysis is carried out after ion exchange separation  
Li delta value calculated against LSVEC NIST 8545 RM  
Boron delta values calculated to NIST SRM 951 RM  
SD calculated from two independent consequitive measurements

Signature

Ilia Rodushkin

Associate Professor

LABORATORY MANAGER

ALS Scandinavia AB

# Waterloo EIL

#	Sample	Date	Lab#	$\delta^{18}\text{O}$	Result	Repeat	$\delta^2\text{H}$	Result	Repeat		pH
				H <sub>2</sub> O	VSMOW	$\pm 0.2\text{‰}$	H <sub>2</sub> O	VSMOW	$\pm 0.8\text{‰}$		
1	MW-16-01	2022-12-14	495331	X	-14.96	-15.02	X	-103.94	-104.60	250ml	7.75
2	MW-16-02	2022-12-14	495332	X	-15.04		X	-104.86		250ml	7.57
3	MW-16-03	2022-12-14	495333	X	-14.68		X	-102.29		250ml	7.92
4	MW-16-04	2022-12-15	495334	X	-14.67		X	-102.68		250ml	7.84
5	MW-16-05	2022-12-15	495335	X	-16.73	-16.61	X	-118.71	-118.73	250ml	8.05
6	MW-16-06	2022-12-15	495336	X	-16.61		X	-118.39		250ml	8.12
7	MW-16-07	2022-12-15	495337	X	-16.39		X	-116.78		250ml	7.98
8	MW-16-08	2022-12-16	495338	X	-16.35		X	-116.98		250ml	8.12
9	MW-16-09	2022-12-16	495339	X	-15.80		X	-112.02		250ml	7.76
10	MW-16-10	2022-12-16	495340	X	-16.42	-16.43	X	-116.12	-116.35	250ml	8.08
11	MW-16-11A	2022-12-16	495341	X	-16.75		X	-118.91		250ml	8.08
12	North BAB	2022-12-14	495342	X	-7.44		X	-54.32		250ml	9.28
13	DB-01	2022-12-16	495343	X	-7.06		X	-53.02		250ml	8.9
14	SC-01	2022-12-16	495344	X	-7.36		X	-53.70		250ml	8.33
15	DUP-01	2022-12-14	495345	X	-14.92	-14.92	X	-102.52	-101.84	250ml	7.92

Client: Buening/TRC

ISO# 2022714

Environmental Isotope Lab

Location: C2

2023-01-06

Project: BRPP BABs DB

15 for 18O, 2H

2 of 2

EC	AZD
uS/cm	
1,371	
1,085	
1,615	
1,498	
3,497	
4,022	
4,492	
4,622	
2,527	
3,853	
4,198	
411	
1,827	
149	
1,615	

# Miami Tritium Laboratory



March 13, 2023

TRITIUM LABORATORY

Data Release #23-013  
Job # 4256

TRC Companies  
TRITIUM SAMPLES

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Associate Research Professor

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Tritium Scale New Half-life

Tritium concentrations are normally expressed in TU, where 1 TU indicates a T/H abundance ratio of  $10^{-18}$ . The values refer to the tritium scale recommended by U.S. National Institute of Science and Technology (NIST, formerly NBS), and International Atomic Energy Agency (IAEA). The TU-numbers are based on the NIST tritium water standard #4926E. Age corrections and conversions are made using the recommended half-life of **12.32 years**, i.e., a decay rate of  $\lambda = 5.626\% \text{ year}^{-1}$ . In this scale, 1 TU is equivalent to 7.151 dpm/kg H<sub>2</sub>O, or 3.222 pCi/kg H<sub>2</sub>O, (equivalent to pCi/L in freshwater) or 0.1192 Bq/kg H<sub>2</sub>O (Bq = disint/sec). We can also express tritium concentrations in pCi/L upon client request.

Tritium concentrations in TU or pCi/L are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used.

The stated errors, eTU or err, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Very low tritium values

In some cases, negative tritium values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU or pCi/L. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU or pCi/L should be used.

Additional information

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling", and our Web-site [www.rsmas.miami.edu/groups/tritium](http://www.rsmas.miami.edu/groups/tritium).

Tritium efficiencies and background values are somewhat different in each of the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2.4 TU. The background is typically 0.3 cpm, known to about  $\pm 0.02$  cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.



Client: TRC COMPANIES  
Recvd : 22/12/21  
Job# : 4256  
Final : 23/03/09

Purchase Order: 193682  
Contact: Vince Buening 734-904-3302  
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Ann Arbor, MI 48108  
vbuening@trccompanies.com  
BRPP BABs & DB

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
MW-16-01		4256.01	221214	1000	275	0.02	0.09
MW-16-02		4256.02	221214	1000	275	0.03	0.09
MW-16-03		4256.03	221214	1000	275	0.00	0.09
MW-16-04		4256.04	221215	1000	275	-0.12	0.09
MW-16-05		4256.05	221215	1000	275	0.11	0.09
MW-16-06		4256.06	221215	1000	275	-0.01	0.09
MW-16-07		4256.07	221215	1000	275	0.37	0.09
MW-16-08		4256.08	221216	1000	275	0.03	0.09
MW-16-09		4256.09	221216	1000	275	0.18	0.09
MW-16-10		4256.10	221216	1000	275	0.27	0.09
MW-16-11A		4256.11	221216	1000	275	0.05	0.09
NORTH BAB		4256.12	221214	1000	275	26.4	0.9
DB-01		4256.13	221216	1000	275	22.4	0.7
SC-01		4256.14	221216	1000	275	23.9	0.8
DUP-01		4256.15	221214	1000	275	0.05*	0.09

\* Average of duplicate runs