April 10, 2023

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

RE: DTE Electric Company Comments on Proposed Decision: Proposed Denial of the CCR Part B Alternate Liner Demonstration Application, DTE Electric, Monroe, Fly Ash Basin, Monroe, Michigan
Docket ID: EPA-HQ-OLEM-2021-0283; Sent via Regulations.gov and email

Dear Ms. Lloyd:

The DTE Electric Company (DTE) respectfully submits these comments to Docket EPA-HQ-OLEM-2021-0283 in response to the U.S. Environmental Protection Agency (EPA) Proposed Denial of the CCR Part B Alternate Liner Demonstration Application for DTE Monroe Power Plant's Fly Ash Basin (Proposed Decision). DTE appreciates EPA's commitment to move the needle on the Part B applications but strongly believes that the Application should be approved based on the technical record and the attached comments. DTE has demonstrated through robust site characterization provided to the EPA and again provided in these comments, that the Fly Ash Basin complies with the requirements of the CCR rule, is not impacting groundwater within the uppermost aquifer, and has the necessary site characteristics to be eligible to perform an Alternate Liner Demonstration.

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

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

Sincerely,

Shawn Patterson

Shawn Patterson
Vice President – DTE Environmental Management and Safety

Enclosure

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

One Energy Plaza, Detroit, MI 48226-1221
dteenergy.com

DTE

April 10, 2023

COMMENTS OF DTE ELECTRIC COMPANY ON EPA'S PROPOSED DENIAL OF THE CCR PART B ALTERNATE LINER DEMONSTRATION APPLICATION, DTE ELECTRIC, MONROE POWER PLANT, FLY ASH BASIN, MONROE, MICHIGAN

Docket ID No. EPA-HQ-OLEM-2021-0283

I. Introduction

DTE Electric Company (DTE Electric or DTE) is providing this response and comments on the U.S. Environmental Protection Agency's (EPA or Agency) proposed denial of the CCR Part B Alternate Liner Demonstration Application for the DTE Electric Monroe Power Plant Fly Ash Basin, Monroe, Michigan (Proposed Decision), EPA Docket ID EPA-HQ-OLEM-2021-0283. This proposed denial comes more than two years after DTE's application for an Alternate Liner Demonstration for the Monroe Power Plant Fly Ash Basin Coal Combustion Residuals (CCR) Unit was submitted to the Agency on November 30, 2020 (Application).

DTE has carefully reviewed the Proposed Decision and it appears that EPA did not review all of the information available to them during the time of their review, most importantly the Preliminary Alternate Liner Demonstration (PALD) report[1] that was submitted to EPA on November 30, 2021. DTE has also identified many relevant facts about the facility that were not considered or were misinterpreted. Lastly, the Proposed Decision goes beyond the standards for review of an application contained in the rule and EPA's guidance by (i) dismissing the certification of the Qualified Professional Engineer which provides the basis for compliance with the regulations, and (ii) introducing review criteria that do not follow the prospective nature of the application.

The Monroe Power Plant Fly Ash Basin (MONPP FAB) is an existing surface impoundment underlain by a clay-rich, consistently present, glacially compacted geologic barrier that serves as a natural liner system. DTE submitted the Application under Part B[2] to pursue the

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[1] Geosyntec. 2021. Preliminary Alternative Liner Demonstration, Fly Ash Basin, Monroe Power Plant. Prepared for DTE Electric Company. November.

[2] *Hazardous and Solid Waste Management System: Disposal of CCR; A Holistic Approach to Closure Part B: Alternate Demonstration for Unlined Surface Impoundments* in the Federal Register (85 FR 72506) ("Part B final rule")

opportunity to demonstrate that the natural hydrogeological conditions unique to this site meet the alternative liner requirements set forth in the rule that would allow continued operation of the unit.

The Proposed Decision overlooks the significance of the conceptual site model and the unique hydrogeological setting present at the facility with an abundance of natural clay-rich soils. These soils have a geometric mean of 2.7×10^{-8} centimeters per second (cm/s) hydraulic conductivity based on the available dataset provided in the Application. EPA acknowledges in the Part B Preamble (at 72509), natural soils are capable of achieving the required effective hydraulic conductivities lower than 1×10^{-8} cm/s and/or on a case-by-case basis may exhibit an adequate thickness of low-conductivity soil that supports having somewhat higher soil conductivities throughout the soil column. This range of hydraulic conductivity of the glacially compacted natural clay liner system is well below the threshold to be considered for an ALD as presented in the Part B Preamble (at 72509) where EPA also states "Regardless, a conductivity of 1×10^{-7} cm/s for the lowermost soil component of the liner, whether in isolation or beneath a geomembrane component, remains the absolute floor for any unit to even be considered for an alternate liner demonstration." Yet, the EPA is proposing to deny the application on the basis of having hydraulic conductivities that are too high to meet the performance standards required by Part B.

The Proposed Decision also ignores the significant amount of site-specific characterization data provided in the PALD that further confirms the conceptual site model and demonstrates that the clay is laterally continuous and is at a minimum over 14 feet thick, and as much as 34 feet thick (a minimum of greater than 4.5 times the clay liner thickness modeled in the 2014 risk assessment[3]). Further, several data interpretations are taken out of context to speculate various instances of potential historic non-compliance which are used as reasons to deny the Application.

EPA also inappropriately dismissed the certification of the qualified professional engineer (QPE) in finding that certain elements of DTE's groundwater monitoring program do not meet the

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

requirements of the CCR rule[4], even though the facility's QPE certified compliance with the requirements of the CCR rule. The CCR rule does not permit EPA to summarily reject the compliance certifications of QPEs as part of the Agency's Part B reviews. The Agency has made clear, both in the preamble of the CCR rule and the plain language of the regulatory text, that a QPE certification under the CCR rule is the regulatory mechanism for demonstrating compliance with the applicable technical standards.

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

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

II. Background

DTE Energy is a diversified energy company, headquartered in Detroit, Michigan that is involved in the development and management of energy-related businesses and services nationwide. Our operating units include an electric utility (DTE Electric) and a natural gas utility (DTE Gas) which provide electric and/or gas services to residential, business and

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

industrial customers throughout Michigan. The DTE portfolio also includes non-utility energy businesses focused on industrial energy services, renewable natural gas, and energy marketing and trading.

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

The MONPP is a 3,066 MW (summer rated capacity) coal-fired power plant located in Monroe County. Monroe, which has four units in total, is the fourth largest coal-fired power plant in the United States and represents approximately 30% of the DTE Electric's generation energy mix.

The MONPP FAB consists of a 331-acre CCR surface impoundment, and a 79-acre dry CCR landfill on top of a portion of the impoundment. The FAB was constructed from 1973 to 1974 and the entire footprint (410-acres) has been utilized to store sluiced CCR and treat fly ash transport water to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) permit before discharging into Lake Erie. In July 2015, DTE received a permit to construct the Landfill in the north-western quadrant of the site and started receiving dry CCR prior to the effective date of the CCR rule. Both the Landfill and the FAB surface impoundment operate under the same Solid Waste Operating License issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Groundwater at the FAB has been monitored in accordance with EGLE approved monitoring plans since the mid-1990s.

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

A. History of Conceptual Site Model

The MONPP FAB was constructed in the mid-1970s. Over the past 50 years, DTE has performed many geologic studies and reviewed publicly available regional reports to characterize the site hydrogeological conditions, develop the conceptual site model, and support demonstrations that DTE has made to state regulators and now to the EPA, regarding the site-specific geology and the appropriateness of the groundwater monitoring program prepared consistent with applicable State and Federal regulations. In addition, DTE has had a groundwater monitoring system in place, and has performed groundwater monitoring at the MONPP FAB since the mid-1990s, well before the CCR rule was established, and monitoring data collected has showed continued compliance with applicable regulations and inform the Application and this response. Some noteworthy studies and key reports include:

- A regional study of the entire Monroe County done by Andrew Mazola and Titled "Geology for Environmental Planning in Monroe County". Information from this report was utilized by DTE to inform the development of the site conceptual model, and to support the development of the Application.
- A 1971 report by Soil and Foundation and Associates titled "Plum Creek Property Proposed Flyash Settling Basin" containing approximately 100 soil boring logs and fence diagrams. This report predated any solid waste regulation of ash disposal facilities by the State of Michigan. Information from this report was utilized by DTE to inform the development of the site conceptual model, and to support the development of the Application.
- A 1980 report by DTE titled "Hydrogeologic Report Monroe Ash Basin" summarizing the above two reports and providing additional data and interpretation. This report was required by the 1977 amendments to the Michigan Solid Waste Rules. Those rules

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

required an investigation of geology and a determination of whether groundwater monitoring was necessary. The 1980 report concluded that the presence of clay soils obviated the need for groundwater monitoring. Information from this report was utilized by DTE to inform the development of the site conceptual model, and to support the development of the Application.

- A 1995 report titled "Monroe Power Plant Effectiveness of Clay as a Natural Barrier On-site Ash Disposal Basin" and accompanying time of travel calculations that responded to additional changes to the Michigan Solid Waste Management Rules. The changes to the rules required another review of the 1980 determination that groundwater monitoring was not necessary. The 1995 Detroit Edison (now DTE) report and accompanying information that included information from the previous 1971 and 1980 reports requested a continued waiver of bedrock groundwater monitoring. This report was included in the Application.
- A 2018 report by TRC titled "Natural Clay Liner Equivalency Evaluation Report" that used information from regional geologic reports and existing site data to assess whether the natural soils below 6 CCR surface impoundments one of which was the FAB are performing equivalently to a composite liner using recognized and generally accepted good engineering practices. The report concluded that the natural clay liners at each of the evaluated sites are more protective than a single composite liner system and meet the RCRA protectiveness standard "does not pose a reasonable probability of adverse effects on health or the environment." This report was included in the Application.
- The 2021 PALD report by Geosyntec, prepared in accordance with § 257.71(d)(1)(ii), is the latest in a long series of demonstrations executed by DTE that concludes the natural clay liner present beneath the FAB is one of the several types of natural soil liners described by EPA in the Part B Preamble that is naturally protective, as it has undergone glacial compaction and achieves a sufficiently and consistently low hydraulic conductivity that effectively controls leachate within the FAB across the entire site. More than 100 additional boring locations were investigated as part of this demonstration, a rigorous laboratory study was implemented, lasting nearly two years, and a robust mathematical model developed in accordance with the requirements of the Part B rule that further reduces any uncertainty in the heterogeneity of the natural clay liner present at the site. The PALD is a substantially complete demonstration, but preliminary due to the long

time it takes to conduct the ASTM D7100 laboratory testing, which is due to the significantly low-conductivity nature of the clay that can take up to well over a year to reach the termination criteria. Consistent with previous investigations and studies performed at the site, the PALD concludes that the underlying natural clay liner is continuously present across the site and meets the protectiveness standard of RCRA Subtitle D, and more specifically there is no reasonable probability that water from the FAB will cause releases to groundwater that will exceed the groundwater protection standards (GWPS) at the waste boundary over the projected active life of the unit. DTE submitted the PALD to EPA on November 30, 2021, in accordance with § 257.71(d)(1)(ii), well in advance of the Proposed Decision, however, based on the Agency's comments, it does not appear that EPA reviewed the content of the demonstration. A copy of the PALD is included in this letter as Attachment A.

- The 2023 Final ALD prepared by Geosyntec. Since the submittal of the PALD, the analysis of the hydraulic conductivity compatibility samples required under § 257.71(d)(1)(ii)(B)(*2*) were terminated in December 2022 after running for almost two years due to the very low hydraulic conductivity of the samples. To that end, DTE is providing the updated final ALD as an attachment to this response, and summarizing to provide the additional technical details from the ALD. The results from the final ALD are also incorporated below in this response to further address the uncertainty and misunderstanding expressed by EPA in the Proposed Decision. A copy of the final ALD is included in Attachment B.
- Finally, in 2022/2023, DTE performed a supplemental aquifer characterization investigation to further characterize the site conditions and aquifer properties using a combination of groundwater geochemical, stable isotope, and radiogenic isotope analysis. This characterization also included an in-depth analysis of existing site data collected through 2022 from the MONPP FAB CCR unit. The "Additional Uppermost Aquifer Characterization Study" (Aquifer Characterization Study) performed by TRC that provides even more site-specific data that supports the conceptual site model for the site and further upholds the underlying premise that the aquifer remains unaffected by the FAB and has remained as such over the active life of the FAB. The Aquifer Characterization Study further substantiates site compliance and the efficacy of the Alternate Source Demonstration (January 20, 2020, submitted to EPA in the Application) and further demonstrates the protectiveness of the natural clay liner through a series of

in-depth geochemical and isotopic data analysis, including general chemistry, ionic speciation, mineral saturation, stable and radiogenic isotopes in combination with advanced statistical analysis that affirmatively demonstrates that the uppermost aquifer is not in communication with the CCR unit water, groundwater geochemistry in the uppermost aquifer is reflective of the geogenic natural environmental conditions, and is therefore unaffected by the MONPP FAB CCR unit. A copy of the Aquifer Characterization Study is included in Attachment C of this letter.

In summary, DTE has been monitoring the MONPP FAB for decades, and has amassed extensive subsurface data to evaluate the long-demonstrated effectiveness of clay underlying the MONPP FAB. The significant amount of site characterization data substantiates that the uppermost aquifer remains unaffected and demonstrates the protectiveness of the glacially compacted natural clay liner system.

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

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

III. Part B Purpose and Intent

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

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

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

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[6] Util. Solid Waste Activities Grp. V. EPA, 901 F.3d 414 (D.C. Cir. 2018)

probability of adverse effects to human health or the environment within the operational life of the CCR unit.

IV. Groundwater Has Not Been Impacted by the MONPP FAB

DTE is confident that the MONPP FAB groundwater monitoring program appropriately considers the site specific hydrogeologic conditions present at the site and accurately represents the quality of groundwater passing the downgradient boundary of the unit. The data provided to EPA in the Application met the requirements of the rule, and clearly show that the FAB groundwater monitoring program appropriately remains in detection monitoring. To align the groundwater monitoring program with the conceptual site model, the basis of the groundwater monitoring program hinges on the key premise that the uppermost aquifer has not been affected by operation of the FAB. This approach is substantiated with data that is further discussed in these comments.

DTE implemented an Aquifer Characterization Study (Attachment C) to further characterize the site conditions (including separation of the uppermost aquifer from the FAB) and aquifer properties using a combination of geochemical, stable isotope, and radiogenic isotope analysis, with additional in-depth analysis that provides even more site-specific data that supports the conceptual site model for the site and further upholds the underlying premise that the uppermost aquifer is not in communication with the FAB and remains unaffected and has remained as such over the active life of the FAB. The Aquifer Characterization Study further substantiates site compliance and the efficacy of the Alternate Source Demonstration (January 20, 2020) and further demonstrates the protectiveness of the natural clay liner.

The Aquifer Characterization Study demonstrates a distinct difference in chemical compositions between the groundwater underlying the unit, the pore water in contact with ash within the unit, and the surface water in the surrounding nearby surface water bodies. Fundamentally, groundwater chemistry is influenced by the various minerals and gases that are available to react with the water as it travels through the subsurface – through pores and fractures in rock or sediment. Their mere presence in groundwater does not indicate that a release from the CCR unit has occurred. The results of the Aquifer Characterization Study demonstrate with additional site-specific and quantifiable evidence that the uppermost aquifer has not been impacted by the operation of the FAB since operations began nearly 50 years ago, and that the source of the constituents observed in the uppermost aquifer are geogenic in nature.

The uppermost aquifer, as defined in 40 CFR §257.53, underlying the MONPP FAB consists of saturated limestone present beneath a thick contiguous glacially compacted natural clay liner system[7] that serves as a natural confining hydraulic barrier that isolates the underlying uppermost aquifer. At its deepest incised area, the FAB has a minimum of 14 feet of glacially compacted natural clay separating the bottom of the FAB from the uppermost aquifer. Near the north end of the FAB where the hydraulic gradient is steeper, the clay is at least 34 feet thick. The overlying low-permeability glacially compacted natural clay liner system that separates the FAB from the uppermost aquifer has a hydraulic conductivity of 3.3×10^{-9} cm/s to 1.0×10^{-8} centimeters per second (cm/s)[8] exceeding the requirements of the design criteria for the lower component of a composite liner. These hydrogeological characteristics align with the types of natural liners described in the Part B Preamble (at 72509) that EPA believes have the potential for facilities to successfully demonstrate that naturally compacted soil can be protective, one of which has undergone glacial compaction, “whereby stress from the weight and flow of the glacier compressed the naturally occurring soil”. The lateral continuity, thickness, and consistently low permeability of the glacially compacted natural clay liner system underlying the FAB make this facility well qualified for a Part B demonstration.

The PALD, the final ALD and the Aquifer Characterization Study provide additional detailed site information that further substantiates the conceptual site model at the site and the ASD, and further verifies that the FAB has not impacted groundwater. The FAB qualifies for an ALD Application approval because continued compliance with the groundwater requirements set forth in §§ 257.93 through 257.94 is demonstrated, and the basin remains in detection monitoring in accordance with the provisions under § 257.71(d)(1)(i)(B)(*2*), as discussed at length throughout this response.

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

[8] April 2023 final ALD page 3-3

V. The QPE's Certification was Wrongly Dismissed

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

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

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

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

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

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

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

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

In an attempt to preserve its right to file an ALD, DTE submitted an extension request on September 1, 2021, and an update to the extension request on September 1, 2022, under 40 C.F.R. § 257.71(d)(2)(ii)(A). EPA never responded to the extension requests, and therefore, the preliminary results of the demonstration were submitted to EPA on November 30, 2021, as required by 40 C.F.R. § 257.71(d)(2)(ii). In addition to fulfilling the requirements of the alternate liner demonstration under 40 C.F.R. § 257.71(d)(1)(ii), the PALD included important information to support DTE's application, but for reasons unknown to DTE, it was not considered in the Proposed Decision.

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

DTE is providing an update to the PALD (the final ALD) through this comment package as Attachment B to emphasize the relevancy of the comprehensive site characterization in the Agency's final decision-making. The final ALD includes updated analytical data from compatibility tests that were ran through December 2022 which were used to confirm that the model results in the PALD are accurate. The final ALD continues to demonstrate that there is no reasonable probability that water from the FAB will cause an exceedance of the groundwater protection standards outside of the basin.

VII. Active Life of the Fly Ash Basin

In order for the Monroe Power Plant to continue operation and provide electric service to Southeast Michigan, the FAB must continue to receive sluiced fly ash until such time that the four generating units at the power plant are converted to a dry fly ash handling system. Notwithstanding the exhaustive studies and data referenced herein demonstrating that the FAB has not impacted groundwater, DTE is diligently pursuing the implementation of the dry fly ash conversion with the last unit expected to complete the conversion in the fall of this year. Specifically, conversions are expected to occur in accordance with the following schedule: Unit 2 is complete, Unit 1 is underway, Unit 3 in Spring 2023, and Unit 4 Fall 2023. DTE is progressing through detailed engineering design for the Fly Ash basin closure, with dewatering pilot studies anticipated to begin this year progressing into full scale dewatering of the unit in 2024.

VIII. Demonstrated Compliance with the CCR rule

DTE has prepared the following discussion to further highlight the hydrogeological characteristics that make this facility uniquely qualified for a Part B demonstration. The information presented below demonstrates that compliance with the rule has been and continues to be met at the FAB and is meant to provide additional clarification to help resolve any misinterpretations or uncertainties expressed by the Agency in the Proposed Decision to deny the Application.

A. Documentation of Groundwater Monitoring Network Compliance

In the Proposed Decision, EPA stated that the information required under 40 C.F.R. § 257.71(d)(1)(i)(B)(*1*) is not included in the Application [Proposed Decision, p. 9]. The design and placement of the monitoring well network is well-documented in the Application and provides a narrative on pages 9 and 10 in the Application that speaks to the well network design along with supporting information and reports detailing the established monitoring well network in Appendix B. Additional supporting information regarding well locations, site geology (including the continuous presence of a glacially compacted natural clay liner system underlying the FAB), and groundwater flow potential are provided in Figures 2 through 10 of the Application. The information and narrative provided in the Application along with the QPE certification of the well network complies with 40 C.F.R. § 257.91 and demonstrates a thorough understanding of site hydrogeology and the potential for the impoundment to impact the groundwater flow.

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

- Map(s) of groundwater monitoring well locations in relation to the CCR unit(s) that depict the elevation of the potentiometric surface and the direction(s) of groundwater flow across the site;
    - — Provided in the Application Figures 6-10 Groundwater Potentiometric Surface Maps from September 2017 through September 2019, and additionally in the 2017 through 2019 Annual Groundwater Monitoring Reports in Application Appendix C, D, and E);
- Well construction diagrams and drilling logs for all groundwater monitoring wells;
    - — Provided in Application Appendix B – Groundwater Monitoring Systems Summary Report;
- Maps that characterize the direction of groundwater flow accounting for temporal variations;
    - — Provided in the Application Figures 6-10 Groundwater Potentiometric Surface Maps from September 2017 through September 2019, and additionally in the 2017 through 2019 Annual Groundwater Monitoring Reports in Application Appendix C, D, and E); and
- Any other data and analyses the owner or operator of the CCR surface impoundment relied upon when determining the design and location of the groundwater monitoring network.
    - — Several key historical reports relied upon to develop the monitoring network are included in the Application in Appendix K – Effectiveness of the Underlying Clay Soil as a Natural Barrier On-Site, Ash Disposal Basin, Monroe Power Plant Technical Report, Detroit Edison Design Engineering, 1995, and Appendix N – Historic Groundwater Artesian Conditions Documentation.

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

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

EPA states that “[t]he CCR regulations require development of a groundwater monitoring network that will identify the background level of contamination in the uppermost aquifer upgradient of a CCR unit, so that those levels can be compared with the contaminant levels in the wells downgradient of the CCR unit after the groundwater has flowed beneath it. *See* 2015 CCR rule preamble at 80 FR 21302, 21399-400.”[9] While it is well understood that the purpose of detection monitoring is to assess background groundwater quality and use it to compare to groundwater quality after it has passed beneath the CCR unit, we cannot corroborate EPA’s reference to the Preamble that implies all upgradient groundwater is contaminated and that the purpose of monitoring is to compare the difference in contamination levels in up- and downgradient wells. Although that may be the case in some instances where there are other sources impacting groundwater quality prior to

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[9] Proposed Decision, p. 11.

passing beneath the CCR unit, EPA's assumption that all groundwater being monitored is "contaminated" is overstated. In contrast, the EPA's Unified Guidance states that "[u]nits under detection monitoring are initially presumed not to be contributing a release to the groundwater unless demonstrated otherwise."[10]

From the onset of monitoring at the FAB, a myriad of data from historical site information, regional water quality, and more recent data collected as part of implementation of the CCR rule indicates that the uppermost aquifer beneath the FAB is unaffected by CCR operations. Therefore, the foundational premise of the detection monitoring program that the aquifer remains unaffected (i.e. the underlying clay is protective) has been met, and, as such, the well network is designed to detect a potential future release per 40 C.F.R § 257.91. There is no mechanism for groundwater in the upgradient wells to be affected by a release from the CCR unit through the clay. The upgradient/background monitoring wells are located approximately from 150 to over 600 feet on the upgradient edge of the CCR unit and are separated from the surface with over 37 feet of clay (reference boring logs/ALD for actual clay thickness on upgradient edge). It would require travel times that far exceed the timeframe in which the impoundment has been in service for CCR-affected water to get through the glacially compacted natural clay liner system as demonstrated in the Natural Clay Liner Equivalency Evaluation Report, DTE Electric and Consumers Energy Company Six Southeast Michigan Coal Combustion Residual Units, December 2018 (Liner Equivalency Report) (Application Appendix A), PALD (submitted to EPA November 30, 2021) (Attachment A of this response letter), and the Final ALD (Attachment B of this response letter).

Additionally, as detailed in Section 2.4 of the Application, the upgradient wells exhibit extraordinary upward vertical gradients as exhibited by their flowing artesian conditions. This condition occurs due to the confining nature of the clay that creates an impermeable barrier above the limestone aquifer and that groundwater is under extreme pressure because it cannot move into the clay. When this pressure is released (such as when a monitoring well is installed), it allows groundwater to rise to a "static head" level

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

also known as the potentiometric surface. For the FAB upgradient wells, these potentiometric surfaces have consistently been more than 10 feet above the ground surface, also referred to as flowing artesian wells. This indicates that groundwater is under a significant amount of pressure with strong vertical flow potential, indicating that, in addition to the clay barrier, forces in the aquifer would be acting against any potential vertical migration through the subsurface. Therefore, these “background” wells have not been affected and groundwater samples collected from them are representative of background conditions at that location. In addition, per 40 C.F.R. § 257.91, the monitoring well network was certified by a QPE and approved by the state regulatory agency. Further, the Aquifer Characterization Study (Attachment C of this response letter) provides additional data and lines of evidence substantiating that the uppermost aquifer is unaffected and that groundwater at all the monitoring wells are not in communication with the CCR in the FAB.

Specifically, the Aquifer Characterization Report substantiates the conceptual site model developed for the site at the early stages of the monitoring program, affirm that the uppermost aquifers remain unaffected by the facility, and further demonstrate that the FAB is not in hydraulic communication with the uppermost aquifer, with the following additional lines of evidence:

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

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

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

2. Groundwater Monitoring System Design is Adequate

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

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

The design of the monitoring system relies on professional judgement based on site specific technical information and defers to PE certification for approval. 40 C.F.R. § 257.91(f) requires "The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section." EPA's Preamble discussion states: "For the final rule, EPA has developed a groundwater monitoring program that is flexible and allows facilities to design a system that accounts for site specific conditions within specific parameters. The final rule establishes an overall performance standard that the system must meet, lays out the minimum requirements of an effective system, and requires the owner or operator to design a system that achieves that overall performance standard based on a full characterization of site conditions."[11] Nevertheless, working within these constraints the rule specifically allows the QPE to design a system that accounts for site conditions within the parameters of the minimum technical criteria, and EPA has added language to the regulation that expressly clarifies this.

The groundwater monitoring system consists of a total of seven monitoring wells evenly distributed along the FAB perimeter, including two upgradient wells (MW-16-04 and MW-16-05) that are representative of background hydraulically upgradient from the FAB, three downgradient wells (MW-16-01, MW-16-07, and MW-16-06), and two side gradient wells (MW-16-02 and MW-16-03). This distribution of wells allows groundwater quality to be monitored around the perimeter of the CCR unit, provides a comprehensive view of groundwater flow direction and rates across the footprint of the entire CCR unit, allows adequate collection of background data upgradient, downgradient, and side gradient of the CCR unit, and facilitates assessment of any spatial variability in groundwater geochemistry across the uppermost aquifer beneath the footprint of the unit. The seven monitoring wells located around the perimeter of the FAB have been selected to serve as both background and downgradient monitoring wells using intrawell statistical methods (discussed in more detail below in Section VIII.B.1.a) and provide increased protection by having downgradient monitoring wells distributed around the perimeter of the FAB (see Application at p. 14).

Aquifer characteristics are one of the key considerations in designing a monitoring system, such as hydraulic conductivity, hydraulic gradient, groundwater flow direction, aquifer heterogeneity, etc. As detailed in the Application (p. 5-7), the uppermost

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[11] Preamble at 21397-21398.

aquifer is situated within the laterally extensive limestone bedrock that is as thick as 350 feet in Monroe County[12] that is present beneath a thick, contiguous glacially compacted natural clay liner system that serves as a natural confining hydraulic barrier that isolates the underlying aquifer across the entire site (Application Figures 3-5). Additional data collected in the ALD confirmed the thickness of the clay ranges from 14 to 34 feet thick and the permeability run with compatibility testing for over two years ranges from 3.3×10^{-9} cm/s to 1.0×10^{-8} centimeters per second (cm/s).[13] Horizontal groundwater flow potential is consistently to the northeast (Application Figures 6-10) with strong vertical upward gradients (Application Section 2.4). The limestone aquifer represents a single hydrostratigraphic unit beneath the clay. Due to the strong upward gradients in combination with the laterally contiguous nature of the limestone, it is appropriate to place the monitoring wells within the uppermost portion of uppermost aquifer, beneath the clay, to ensure detection of any potential leakage from the CCR unit. The consistency observed in the groundwater flow direction since monitoring began in 2016 ensures that groundwater is constantly flowing in the direction of the three downgradient monitoring wells installed along the north perimeter of the FAB and confirms that these monitoring wells are appropriately placed to intercept groundwater flowing beneath the FAB.

The other key consideration in determining the placement of the monitoring well network are the physical and chemical characteristics of the potential contaminants of concern. The groundwater monitoring system is used to identify potential releases from the CCR unit by monitoring the Appendix III constituents (boron, calcium, chloride, fluoride, pH, sulfate and total dissolved solids [TDS]) (§ 257.94). The Appendix III constituents are known leading indicators of releases and were selected as primary indicators in detection monitoring due to, among other qualities, their elevated concentrations (typically) in the CCR material being managed and their generally high mobility and low reactivity in the environment.[14] These properties allow Appendix III constituents to travel readily through groundwater (transport is advection-dominated),

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[12] Reeves, H.W., Wright, KV and Nicholas, J.R., 2004, Hydrogeology and Simulation of Regional Ground-Water-Level Declines in Monroe County, Michigan, Water-Resources Investigations Report 03-4312, U.S. Department of the Interior, U.S. Geological Survey, Lansing, Michigan, p. 69

[13] April 2023 final ALD, p. 3-3

[14] Preamble at 21342.

remain detectible in the waste and groundwater, and provide early detection of potential leakage from the CCR unit being monitored. Based on these properties, Appendix III parameters can be expected to be fairly ubiquitous (not concentrated at a particular depth) and migrate throughout groundwater at approximately the rate of groundwater flow, therefore installation of the compliance wells in the downgradient direction of flow is appropriate. Groundwater is confined with hydraulic head levels above the top of the uppermost aquifer, demonstrating significant upward flow potential (free flowing artesian at natural ground surface over most of the FAB CCR unit), in addition, the Appendix III constituents are readily going to move with groundwater, and groundwater hydraulic gradients have demonstrated that horizontal flow potential is consistently toward the north-northeast, therefore, screening at the depth of first saturation in the uppermost aquifer (immediately beneath the overlying clay) is appropriate, along with the three wells appropriately positioned in the downgradient direction, which is ideal for early detection of groundwater influenced by potential leakage from the FAB.

Based on these two key considerations, the groundwater monitoring system clearly meets the performance standard of § 257.91(a) and accomplishes EPA's stated objective in the Proposed Decision, p. 11, that says "[t]he objective of a groundwater monitoring system is to intercept groundwater to determine whether it has been contaminated by the CCR unit being monitored."

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

B. The CCR Impoundment Properly Remains in Detection Monitoring

DTE's Application, in addition to all of the data available to EPA throughout their 2-year review period, successfully 1) documents that the groundwater monitoring system at the FAB meets all the requirements of 40 C.F.R. §§ 257.93 through 257.94, and 2) demonstrates that the FAB appropriately remains in detection monitoring.

1. Sampling and Analysis Program

Statistical analysis is a principal component of the CCR rule groundwater monitoring program. As summarized in EPA's Unified Guidance,[15] the fundamental goals of the CCR rule groundwater monitoring regulations are fairly straightforward. Regulated parties are to accurately characterize existing groundwater quality at their facility, assess whether a CCR release has occurred and, if so, determine whether measured levels meet the compliance standards. Using accepted statistical testing methods, evaluation of groundwater quality should have a high probability of leading to correct decisions about a facility's regulatory status. Essentially, this is accomplished through the framework provided in the CCR rule under with § 257.93 and § 257.94 that requires groundwater compliance monitoring be statistically compared to background groundwater quality through implementation of the detection monitoring program.

The following section provides additional discussion and clarification of information related to the statistical analysis program performed in accordance with § 257.93 in response to EPA's comments in the Proposed Decision (p. 18-36) that focus on that statistical methods portion of the sampling and analysis program under § 257.93(f) and (g). It should be clarified that DTE is only relying upon and justifying one monitoring system, serving both the Fly Ash Basin and the Vertical Extension Landfill, rather than the two monitoring systems referred to by EPA in the Proposed Decision on p. 18.

a. Reliance on Intrawell Comparisons

There are two general approaches, referred to as interwell and intrawell, that are used to perform data comparisons to background as presented in the EPA Unified Guidance and in the EPA Solid Waste Disposal Facility Criteria Technical Manual.[16] Interwell comparison methods compare background and compliance data collected from distinct spatial locations (upgradient versus downgradient). Whereas intrawell statistical limits compare historical background (collected from each individual well) to current data from a single location. There are certain conditions that should be considered when selecting which method is appropriate that include

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

[16] U.S. EPA 1993. Solid Waste Disposal Facility Criteria Technical Manual. Solid Waste and Emergency Response. EPA530-R-93-017. November.

site specific hydrological factors and groundwater data behaviors that may influence the power of the test.[17]

As discussed in the Application, due to the slow horizontal travel velocities (on the order of 70 feet/year), the presence of the underlying glacially compacted natural clay liner system (which result in excessive vertical travel times, that if groundwater were capable of migrating vertically through the clay would take over 130 years to reach the uppermost aquifer), the strong upward vertical flow potential of the uppermost aquifer, in addition to the spatial variability observed in the uppermost aquifer dataset, an intrawell statistical program has been selected to perform detection monitoring at all seven monitoring wells located around the perimeter of the CCR unit and comply with the requirements of 40 C.F.R. § 257.93. This selection is appropriate based on the site specific hydrogeological considerations and evidence of significant spatial variability across the monitoring well network attributed to natural conditions in the aquifer (i.e. the uppermost aquifer remains unaffected by CCR operations) that, consistent with the recommendations in the Unified Guidance[18], warrants the use of intrawell testing because it is a more powerful and appropriate method for detection monitoring under the site conditions that exist at the FAB CCR unit. Further discussion below provides additional detail on how the assumptions of interwell are not met and thus support intrawell as a more appropriate and powerful test for the FAB.

i. Groundwater Velocity

One of the assumptions in background-to-downgradient comparisons (i.e. interwell comparison) presented in the Unified Guidance, p. 6-29, is that "[g]roundwater flow should also move at a sufficient velocity beneath the site, so that the same groundwater observed at upgradient well locations is subsequently monitored at downgradient wells in the course of an evaluation period (*e.g.*, six months or a year). If groundwater flow is much slower, measurements from upgradient and downgradient wells may be more akin to samples from two separate aquifers. Extraneous factors may separately

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[17] Unified Guidance, p. 6-25 to 6-33.
[18] Unified Guidance, p. 8-1

influence the downgradient and background populations, confusing the determination of whether or not a release has occurred.”.

Specifically at the FAB, there is an over 4,000 ft horizontal distance between MW-16-05 (upgradient) and MW-16-01 (downgradient) perpendicular to the direction of groundwater flow (along the same assumed flow path). Conservatively assuming the groundwater horizontal seepage velocity of ~100 feet/year (data are provided in the Application and semiannually in the Annual reports). This results in about 40 years travel time from the upgradient to downgradient edge of the FAB. Even if a hypothetical groundwater velocity on the order of 10x higher than the average were assumed, groundwater flow would still be much slower than the 6-month evaluation period.

ii. Spatial Variability

The EPA’s Unified Guidance recommends the use of intrawell comparisons in situations where spatial variability is present – this is a reoccurring message that is reinforced in multiple chapters throughout the Unified Guidance, including an entire chapter dedicated to spatial variability and ways to identify it (see Chapter 13). For instance, on Unified Guidance p. 3-5, in reference to spatial variation across the well network, the Unified Guidance states: “If evident, the statistical approach would need to be modified so that distinct wells are treated as individual populations with statistical testing being conducted separately at each one (i.e., intrawell comparisons)”. The presence of significant spatial variability can invalidate the interwell method.

From the Unified Guidance Chapter 5 (p. 5-8), “If the spatial variation is ignored and data are pooled across wells with differing mean levels (and perhaps variances) to run an interwell parametric prediction limit or control chart test, the pooled standard deviation will tend to be substantially larger than expected. This will result in a higher critical limit for the test. Using pooled data with spatial variation will also tend to increase observed maximum values in background, leading to higher and less powerful non-parametric prediction limit tests. In either application, there will be a loss of statistical power for detecting concentration changes at individual compliance wells.

Compliance wells with naturally higher mean levels will also be more frequently determined to exceed the limit than expected, while real increases at compliance wells with naturally lower means will go undetected more often." This further demonstrates that significant spatial variability can reduce the power of the test by introducing higher variability in the background dataset and "exaggerating" the background limit.

EPA states (Proposed Decision p. 21) that "the Application does not consider the effect of the smaller background dataset that would result from reliance on downgradient compliance wells. When relying on upgradient wells to establish background concentrations, the data collected from each additional well can be pooled and used to increase the initial baseline sample size." However, EPA's comment does not consider the effect of using an incorrect statistical model for detection monitoring. The goal of detection monitoring is to correctly discern whether a release has occurred from the CCR unit. Having a statistical method with theoretically high power that ignores the hydrogeological facts of the unit is not going to achieve that goal. As discussed, multiple times throughout the Unified Guidance, spatial variability must be a consideration in determining an appropriate statistical test. In the case of the FAB, there is significant spatial variability in concentrations within the two upgradient monitoring wells. When pooled, this would result in a similar scenario as described above with the tests having lower statistical power. Although sample size of the background dataset is indeed a consideration, a larger background does lead to more power, there are recognized limitations in sample size during the onset of a detection monitoring program that can be resolved by updating background as described in and advocated for in the Unified Guidance [see Chapter 5].

Per the EPA's Unified Guidance, "the goal of groundwater analysis is not simply to identify significant concentration differences among monitoring wells at compliance point locations. It is also to determine why those differences exist."[19] Recognizing spatial variability and why it exists and assigning the appropriate statistical approach to account for the spatial variability is even

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[19] Unified Guidance, p. 13-2.

more important than ensuring that normality assumptions are met. In order to apply intrawell analysis, the aquifer must remain unaffected by releases from the CCR unit. The Unified Guidance recognizes that the determination of whether an observed pattern of spatial variation is natural and not synthetic requires expert judgment and knowledge concerning site hydrogeology and geochemistry to provide more definitive answers.[20] As detailed in the Application, DTE has performed that analysis and has determined that the aquifer is unaffected by the operation of the CCR unit using multiple lines of evidence. DTE has further studied the uppermost aquifer and has provided additional geochemical, stable isotopic, and radiogenic data that further confirm the uppermost aquifer is unaffected by CCR operations at the FAB.

Further analysis of the spatial variability is also provided herein to further demonstrate that the assumptions of interwell are invalidated due to the spatial variability across the well network, and between the two upgradient background wells. Thus, the use of intrawell methods is more appropriate and provides a more powerful statistical approach. Spatial variability was assessed on the dataset collected from all seven monitoring wells between August 2016 and April 2022 using box plots and analysis of variance (ANOVA) tests as recommended by the Unified Guidance (see Chapter 13). The results of the ANOVA test show significant variance is observed for boron, calcium, chloride, fluoride, sulfate and TDS across the entire well network. This is not unexpected. According to the Unified Guidance, indicator parameters are more likely to exhibit spatial variation.[21]

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

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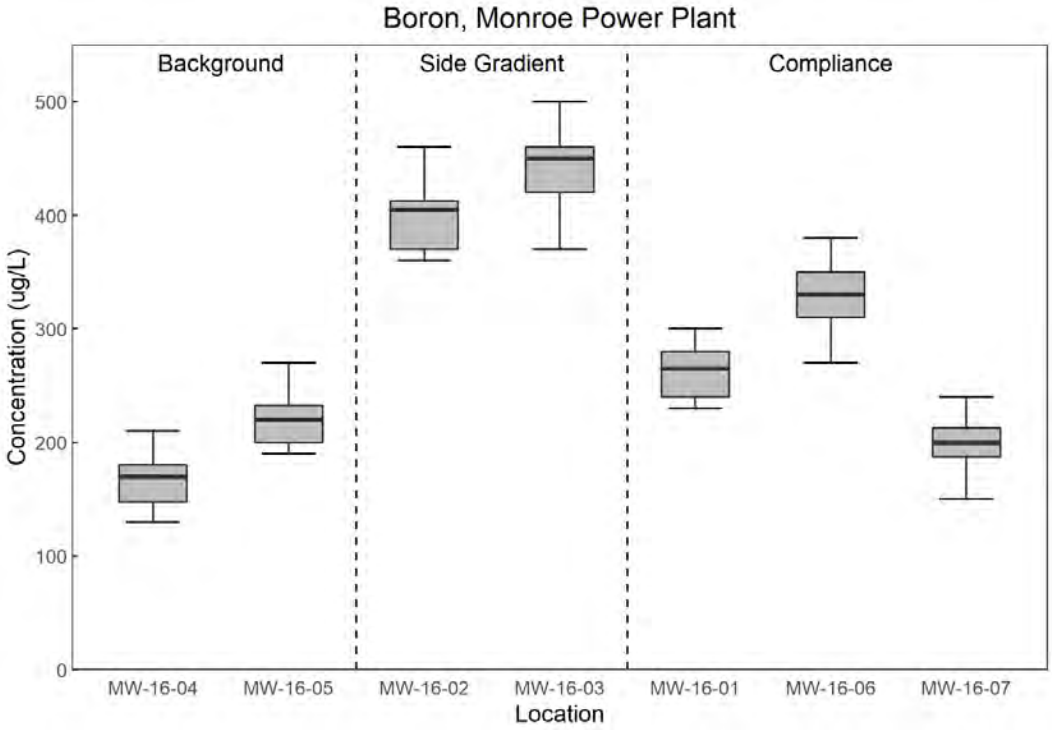
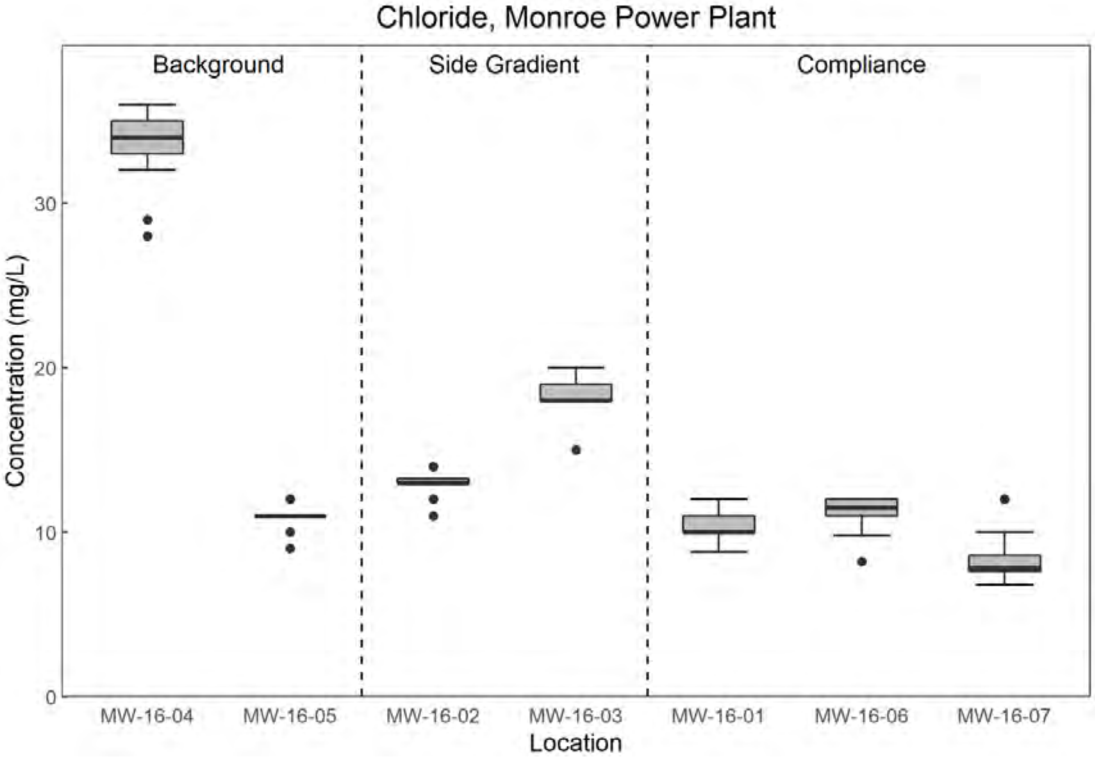
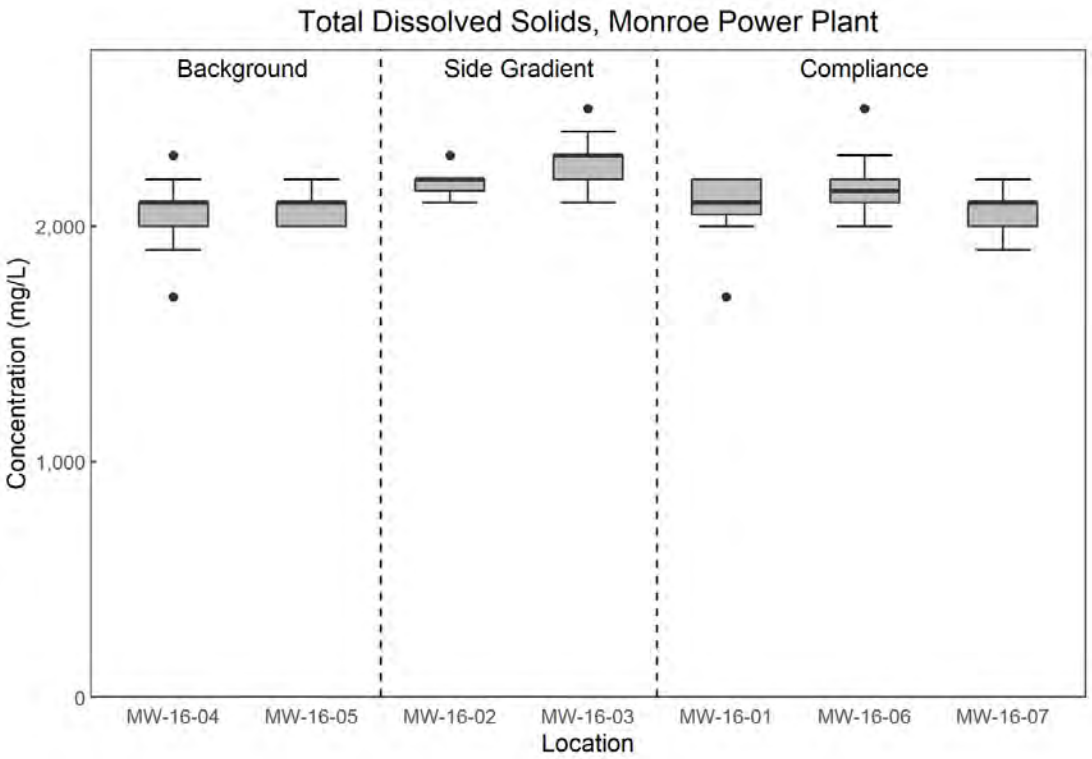
[20] Unified Guidance, p. 13-2.
[21] Unified Guidance, p. 6-31.

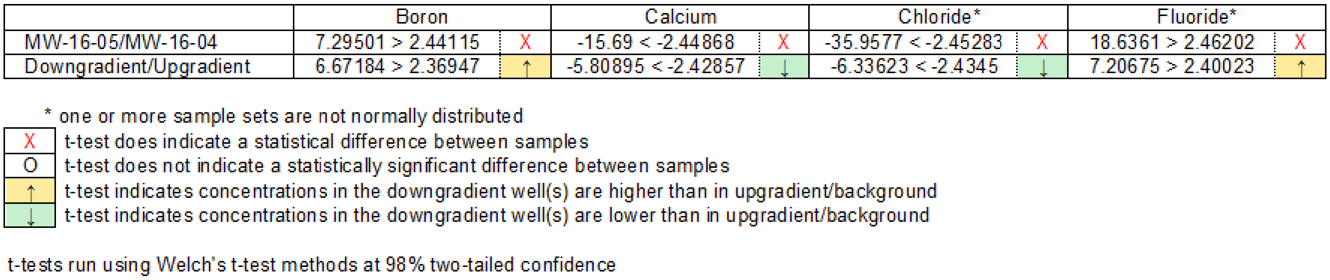

Boron, Monroe Power Plant
Background
Side Gradient
Compliance
Concentration (ug/L)
0
100
200
300
400
500
MW-16-04
MW-16-05
MW-16-02
MW-16-03
MW-16-01
MW-16-06
MW-16-07
Location


Chloride, Monroe Power Plant
Background
Side Gradient
Compliance
Concentration (mg/L)
0
10
20
30
MW-16-04
MW-16-05
MW-16-02
MW-16-03
MW-16-01
MW-16-06
MW-16-07
Location



As shown in the box plots, some of the concentrations in the background wells (i.e. chloride at MW-16-04) are much higher compared to the downgradient wells. That even when pooled, would result in a significantly higher concentration in the upgradient wells compared to the downgradient wells, lowering the sensitivity of the test and reducing the efficiency in detecting an increase in the downgradient wells.

Data populations were also compared using t-tests between the two upgradient wells (MW-16-04 and MW-16-05) to assess spatial variation between the two background wells for each of the Appendix III constituents. The results show evidence of significant difference between the two data populations within the background wells for boron, calcium, chloride, and fluoride as shown in the table below. To further compare the upgradient and downgradient data populations, t-tests were also used to compare the pooled upgradient wells (MW-16-04 and MW-16-05) and the pooled downgradient wells (MW-16-01, MW-16-06, and MW-16-07). This resulted in significant differences between the upgradient and downgradient populations for boron and fluoride. Looking at the concentrations, the upgradient wells have higher concentrations of calcium and chloride, and lower concentrations of boron and fluoride when compared to the downgradient wells.



	Boron		Calcium		Chloride*		Fluoride*	
MW-16-05/MW-16-04	7.29501 > 2.44115	X	-15.69 < -2.44868	X	-35.9577 < -2.45283	X	18.6361 > 2.46202	X
Downgradient/Upgradient	6.67184 > 2.36947	↑	-5.80895 < -2.42857	↓	-6.33623 < -2.4345	↓	7.20675 > 2.40023	↑

* one or more sample sets are not normally distributed

X	t-test does indicate a statistical difference between samples
O	t-test does not indicate a statistically significant difference between samples
↑	t-test indicates concentrations in the downgradient well(s) are higher than in upgradient/background
↓	t-test indicates concentrations in the downgradient well(s) are lower than in upgradient/background

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

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

b. Use of Appropriate Statistical Distributions

The CCR rule provides a framework for groundwater monitoring and defines the conditions under which statistical testing takes place. Specific statistical methods are identified in the CCR rule, just as they are in the RCRA regulations, but their application is not described in any detail. In order to implement a statistical analysis program, professionals must rely upon mathematical models and calculations, but just as importantly, professional experience and qualified decision-making to navigate the complexities of applying statistics to groundwater data. The CCR rule itself accounts for this by requiring QPE certification as the regulatory mechanism for demonstrating compliance with of the statistical method under § 257.93(f)(6).

Because a statistical model is at best an approximation of reality, all statistical tests and procedures require certain assumptions for the methods to be used correctly and for the results to be properly interpreted.[22] There are generally two types of statistical tests used in groundwater monitoring programs, parametric and non-parametric tests. Both of these statistical tests rely on the construction of a binary hypothesis test. The power of a binary hypothesis test is the probability that the test correctly rejects the null hypothesis when a specific alternative hypothesis is true. This probability represents the chances of a true positive detection conditioned on the actual existence of an effect. As a result, as the power of a test increases, the probability of wrongly failing to reject the null hypothesis (i.e. false negative) decreases.

Of these two statistical methods, parametric tests offer more statistical power and are preferred over non-parametric tests. However, most parametric test methods make a critical assumption that the underlying data follow a normal distribution, and if that underlying assumption is violated, it can impact the validity or accuracy of the test.[23] For this reason, it is important to check the normality of the dataset prior to selecting the appropriate statistical test. Non-parametric tests do not rely as heavily on the underlying data distribution; however, non-parametric tests require larger sample sizes than the parametric tests to ensure a similar level of statistical power.[24] So as long as the underlying distribution assumptions are met, parametric tests are preferred over non-parametric tests.

A statistical distribution is a mathematical model used to represent the shape and statistical characteristics of an unknown population (e.g., the concentrations of Appendix III constituents in groundwater upgradient of a CCR unit) that forms the basic building blocks of all statistical testing procedures.[25] A distribution in statistics is a function that shows the possible values for a variable and how often they occur. A normal distribution is typically bell-shaped. There are multiple techniques presented in both the EPA's Unified Guidance and EPA's ProUCL

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[22] Unified Guidance, p. 10-1.
[23] Unified Guidance, p. 17-9.
[24] Unified Guidance, p. 17-9.
[25] Unified Guidance, p. 3-2.

Technical Guide to assess data distributions and determine whether normality is observed in the dataset,[26] thus ensuring that the underlying assumption of normality are appropriately met under 40 C.F.R. § 257.93(g)(1). Despite there being many types of normality tests available, based on the information provided by the Agency, EPA's comments in the Proposed Decision rely solely on one particular normality test and exaggerate the effectiveness of the recommended Type I error rate for that specific normality test, which has no practical effect on compliance at the FAB.

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

EPA's selective references to the Unified Guidance are misleading. Using the multiple methods recommended by the EPA's Unified Guidance and allowable by §

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

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

EPA's comments in the Proposed Decision contradict the recommendations in EPA's Unified Guidance and the EPA's ProUCL Technical Guide by over emphasizing ways to identify non-normal distributions, rather than performing a more thorough assessment that the data population is normally distributed (i.e., the null hypothesis is met). Particularly when taking into consideration the pitfalls of using only a goodness-of-fit test and incorrectly assigning non-normality using the limited background dataset available for Appendix III constituents at the onset of the monitoring program. The Unified Guidance, page 18-6, states that "When normality cannot be justified, a non-parametric prediction limit should be considered instead. A non-parametric limit assumes only that all the data come from the same, unusually unknown, continuous population. Non-parametric prediction limits generally require a much larger number of background observations in order to provide the same level of confidence as a comparable parametric limit. Consequently, the Unified Guidance recommends that a parametric model be fit to the data ***if at all possible***."

The Unified Guidance contemplates exploration of different distribution models (i.e. mathematical transformations of the raw measurements) to exhaust all options to identify normality in the underlying dataset before assigning a non-normal distribution. The original values can be transformed into a set of numbers that behaves as if drawn from a normal distribution. The transformed values can then be utilized in and analyzed with a normal-theory test (i.e., a procedure that assumes the input data are normal).[27] This is clearly laid out in the Unified Guidance example of fitting distributions using a Shapiro-Wilk test.[28] The Shapiro-Wilk test can be used to test normality for datasets with fewer than 50 observations ($n \leq 50$). A significance level is selected to establish the critical point to compare against when running the statistical test for normality (i.e. assess whether the resulting test statistic is above or below the critical point based on the assigned significance level). The Unified Guidance generally recommends selecting a significance level of 0.01 for very small datasets ($n < 10$), 0.05 for moderately sized datasets ($10 \leq n < 20$), and 0.01 for larger data sets ($n \geq 20$).[29] When the Shapiro-Wilk statistic exceeds the critical point, normality can be accepted as a reasonable model for the underlying population. However, if the Shapiro-Wilk test rejects normality at that significance level, additional testing is recommended by the Unified Guidance to see if another distribution model provides a better fit.[30] If the Shapiro-Wilk test shows significant evidence of nonnormality (i.e. does not meet the critical point), then "the data should be transformed using logarithms or another transformation on the ladder of powers and re-checked using the Shapiro-Wilk test before proceeding with further statistical analysis."[31] Although it is recognized that in some cases a non-parametric limit is appropriate, as demonstrated in the Unified Guidance, it is a last resort due to its lack of power compared to parametric tests.

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[27] Unified Guidance, p. 3-8.

[28] Unified Guidance, p. 10-13 to 10-15.

[29] Unified Guidance, p. 10-14.

[30] Unified Guidance, p. 10-14.

[31] Unified Guidance, p. 10-14.

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

It is well understood that statistical power is limited by the sample size and that sample size is limited at the onset of any new monitoring program. This concept is also supported by the EPA's Unified Guidance that states, "very small individual well samples in the early stages of a monitoring program may make it difficult to utilize an intrawell method having both sufficient statistical power and meeting false positive design criteria."[32] This is correctable with the addition of new sample data which is incorporated into the background dataset periodically to improve statistical power of the test over time, which is exactly what DTE has done. The statistical power of the tests was improved by updating the background prediction limits once additional observations were available, in accordance with the recommendations in the Unified Guidance (see Chapter 5). This was completed for the FAB in December 2021 and presented in the 2021 Annual Groundwater Monitoring Report (available on DTE's CCR rule compliance data and information website[33]), subsequent to submittal of the Application. The number of samples comprising the background set for each well/constituent pair increased from 8 to 16, except for two that had 15 results after removal of outliers. Comparing the updated UPLs to the initial ones, 4 well/ constituent pairs moved from nonparametric to parametric, while 6 moved from parametric to nonparametric. While some of the updated prediction limit values changed, the magnitude of the changes were small.

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[32] Unified Guidance, p. 6-34.

[33] https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html

c. Effectiveness of Prediction Intervals

40 C.F.R. § 257.93(f) allows for the use of multiple statistical methods and defers to the QPE to ensure that the selected method meets the minimum performance standards of 40 C.F.R. § 257.93(g) to ensure contamination can be detected. Prediction intervals are calculated based on background samples and are thus frequently used for detection monitoring programs, which is based on comparisons to background water quality. Per the Unified Guidance, prediction intervals provide well established testing strategies for simultaneously controlling false positive rates while maintaining adequate power to detect contamination during detection monitoring, they offer flexibility to accommodate a wide variety of groundwater monitoring networks, and are generally easy to construct and straightforward to interpret.[34] Although the rule itself does not require a minimum nominal false positive rate as specified in 40 C.F.R. § 257.93(g)(2), prediction intervals combined with a retesting strategy can result in sufficiently low Type I error rates and the ability to detect real contamination. From a practical standpoint, prediction limits were selected for the FAB and have been demonstrated to adequately meet the performance standards in 40 C.F.R. § 257.93(g)(4) as discussed below.

Supporting analyses of the statistical calculations for the FAB program were provided to the Agency in the Application Appendix E (2017 Annual Groundwater Monitoring Report), which includes details on the statistical limit calculations at the onset of the monitoring program. DTE also provided the Groundwater Statistical Evaluation Plan for the FAB that provides an overview of the methods and steps used to guide these calculations (Application Appendix I). Since then, statistical updates have been performed in December 2021 and reported in the 2021 Annual Groundwater Monitoring Report (available to the Agency on DTE's CCR rule compliance data and information website[35] since early 2022). Additional detail is provided below to provide additional clarity and further justify the Type I error rate associated with the prediction intervals used at the FAB and demonstrate the effectiveness of the selected approach per 40 C.F.R. § 257.93(g)(4).

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[34] Unified Guidance, p. 18-1 to 19-35

[35] https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html

As discussed in Unified Guidance Chapters 18 and 19, the use of prediction limits requires management of the potential for high site-wide false positive rates (SWFPR), which can become very high in detection monitoring under the CCR rule with seven Appendix III parameters and at least three downgradient monitoring wells. The solution to managing the SWFPR (and the solution to §257.93(g)(4)) is to use a retesting strategy to control the SWFPR. This retesting procedure was contemplated from the onset of DTE's monitoring program as outlined in the Groundwater Statistical Evaluation Plan (Application Appendix I) and implemented as described throughout the annual groundwater reports since 2017 (Application Appendix C, D, and E, and DTE's CCR rule compliance data and information website[36]). For parametric prediction limits, k-multipliers are continuous statistical parameters that can be adjusted to match a desired false positive rate. As discussed by EPA in the Proposed Decision (p. 27), the Unified Guidance provides a set of tables that enable the estimation of the power provided by prediction limits with various resampling strategies. The series of tables were established with calculated k-multiplier values to meet a SWFPR of 10 percent, which exceeds the minimum of 5 percent established in §257.93(g)(2), under various testing scenarios (interwell or intrawell) with a given sample size and number of tests being run. Using the tables in Unified Guidance Appendix D.3 for intrawell prediction limits with a 1 of 2 resampling strategy, and semi-annual sampling with seven wells and seven constituents (interpolation between tables required), the initial prediction limits established with 8 sampling results fell marginally below the level having sufficient power compared to the EPA Reference Power Curve (ERPC) at 4 standard deviations (interpolated k-multiplier value 2.92).

A similar analysis using the 2021 updated prediction limits (15-16 observations) fell well within the region of the table exceeding the ERPC levels (interpolated value 2.26). Further, back-calculation of the k-multiplier from the ChemStat results in an even lower k-multiplier value. For example, using the dataset specific to sulfate in MW-16-06, the actual k-multiplier value is 2.0 for the initial 8 sampling events and 1.8 for the updated dataset using 16 samples. These lower k-multiplier values

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[36] https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html

are well within the range of values that meet the ERPC and demonstrate that the aforementioned interpolations are conservative estimates and that the real power is actually better than the interpolated k-multiplier values indicate. Thus, further demonstrating adequate statistical power is achieved to ensure adequate detection of potential contamination and shows that the prediction intervals are in compliance with §257.93(g)(4).

As discussed above, lower statistical power at the onset of monitoring is expected due to the relatively small sample size and is recognized by the Unified Guidance as a challenge at the early stages of the monitoring program. The initial prediction intervals were established with the minimum eight sampling results because, at the onset of the 2015 CCR Rule, hydrogeological characterization and monitoring networks needed to be established, with at least eight baseline samples from each well, within the first two years of implementing the 2015 CCR Rule. This tight timeline to implement the program (including initial site characterization, establishment of monitoring networks prior to even beginning to collect baseline samples) inherently limited the number of baseline datapoints that could be collected and remain temporally independent. DTE has performed the recommended steps set forth in the Unified Guidance to make these improvements as soon as an appropriate number of additional observations were available. DTE completed the updates in 2021 as documented in the 2021 Annual Groundwater Monitoring Report (available on DTE's CCR rule compliance data and information website[37]).

i. Outlier Testing

Outliers are data points in a dataset that are significantly different from other data points in the same dataset. In other words, they are values that are much higher or much lower than the rest of the data points in the dataset. Outliers can occur for a variety of reasons, such as errors in data collection, measurement errors, or unusual circumstances that are not representative of the normal behavior of the dataset. Outliers can have a significant impact on

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[37] https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html

the analysis of the dataset because they can skew the results or make it difficult to draw accurate conclusions. Therefore, it is important to identify and deal with outliers appropriately when analyzing a dataset. Typically, outliers are removed from a dataset that occurred due to errors or unusual circumstances that are unlikely to occur again. However, in some cases, outliers may be valid data points that represent important information, and in these cases, they should be retained in the analysis. Identification of outliers is key component of statistical testing to ensure that data are representative of groundwater conditions since the presence of even one extreme outlier may cause an otherwise recognizable distribution from being correctly identified.[38]

For the FAB program, outliers were tested as described in the Groundwater Statistical Evaluation Plan (Application Appendix I) (which align with the recommendations set forth in the Unified Guidance) and details for specific handling of outliers are included in the documentation of the actual statistical limit calculations provided in Application Appendix E. In 2017, there were no identified outliers given that there were none identified in the time-concentration plots as discussed in the Application on p. 320 and charts provided in the Application (p. 324-331). As stated in the Groundwater Statistical Evaluation Plan, data were reviewed graphically using tools such as time concentration trend plots, box and whisker plots and/or probability plots to illustrate and identify outliers, trends, or otherwise unusual observations at each monitoring location. This is accomplished prior to further in-depth review of the data sets to identify any obvious field or laboratory anomalies. Data points that are determined to be nonrepresentative will be ‘flagged’ for further detailed evaluation prior to removing from the background data or designating as an outlier. Further in-depth review would be a formal outlier test such as Dixon’s Outlier Test. Like many steps throughout the monitoring program, there is need for professional judgement in the decision-making process to determine which outliers should be removed.

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[38] Unified Guidance, p. 10-2.

In the Proposed Decision, EPA goes against its own guidance by using a statistical test to solely identify and remove outliers from the dataset. In the Unified Guidance, EPA clearly states “The Unified Guidance does not recommend that outliers be removed *solely* on a statistical basis.”[39] Per the Unified Guidance, a statistical determination of one or more statistical outliers does not indicate *why* the measurements are discrepant from the rest of the data set. The outlier tests can provide supportive information, but generally a reasonable rationale needs to be identified for removal of suspect outlier values (usually limited to background data). As such, EPA’s rationale for outlier removal in the Proposed Decision is flawed. In addition to not following the correct methods, EPA’s outlier comments are fraught with error as detailed below.

In the Proposed Decision (p. 29), EPA states, “Applying Dixon’s test with ProUCL v5.1, EPA identified an outlier in the reported intrawell background datasets with 99% confidence at MW-16-07 for total dissolved solids (2,200 mg/L). An additional outlier was identified with 95% confidence at MW-16-02 for pH (7.4 mg/L).” There are several missteps and errors in this statement.

- First, as discussed above, EPA is going against their own guidance by identifying outlier removal solely on a statistical basis. Formal testing for outliers should be done only if an observation seems particularly high or low compared to the rest of the dataset.[40]
- Second, EPA is flip-flopping various confidence levels, using both 99% and 95% to justify removal of outliers. The Unified Guidance cautions that removal of outliers should only take place under certain conditions, since a true elevated value may fit the pattern of a release or a change in historical background conditions.[41] By decreasing the confidence level to 95%, the chances of identifying a statistical outlier are also more likely. This is an example of how strictly sticking to a formal outlier test can end up

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[39] Unified Guidance, p. 12-1.
[40] Unified Guidance, p. 6-35.
[41] Unified Guidance, p. 6-35.

eliminating data points that are only marginally greater than the bulk of the data.

- Third, the TDS concentration of 2,200 milligrams per liter (mg/L) at MW-16-07 was collected on June 12, 2017. This data point is not an outlier. As shown on Table 2 of the 2017 Annual Groundwater Monitoring Report (Application p. 303), that datapoint is not "extreme" compared to the rest of the dataset. The eight background data points are shown on the table, while 2,200 mg/L represents the maximum within the dataset, 6 of the 8 samples had a TDS concentration of 2,100 mg/L, with the other data point of 2,000 mg/L. The 2,100 mg/L concentration met the data quality objectives of the program (Application p. 315-316) and falls within a reasonable range compared to the other background data points. Therefore, there is no reason to even formally test for outliers in this case.
- Fourth, EPA is selectively focusing on high data points as outliers and ignoring the low ones. This is evidenced by the fact that the highest TDS concentration (2,200 mg/L) and the lowest concentration (2,000 mg/L) at MW-16-07 are equally higher compared to the mean concentration of 2,100 mg/L (which is observed in the other 6 datapoints) by a marginal difference of 100 mg/L. Both are equally offset from the mean concentration, yet EPA only flagged the higher datapoint as an outlier.
- Fifth, the EPA-identified outlier for "MW-16-02 for pH (7.4 mg/L)" was collected on March 7, 2017. This data point is not an outlier. As shown on Table 2 of the 2017 Annual Groundwater Monitoring Report (Application p. 303) and the time-series plot of pH (Application p. 329) the datapoint is not "extreme" in comparison with the other data points. The time-series plot also shows how pH in groundwater across the well network on that sampling data was slightly higher than the rest of the background datapoints indicating that the datapoint is not anomalous solely to MW-16-02. Additionally, there is a duplicate sample shown on Table 2 collected on November 15, 2016 with a pH of 7.5 SU that further supports the 7.4 SU is representative of groundwater conditions. As such, there is no reason to

even formally test for outliers in this case. EPA also incorrectly identifies the units for pH as mg/L rather than SU.

Further, additional groundwater data collected through April 2021 was presented in the 2021 Annual Groundwater Monitoring Report (available to the Agency on DTE's CCR compliance data and information website[42]) and data were reassessed for outliers as part of the 2021 prediction limit update process. No outliers for TDS or pH were identified in the 2021 analysis, further confirming that the outliers identified by EPA in the Proposed Decision are not present in the dataset. However, two outliers for calcium were identified using the aforementioned screening process during the 2021 prediction limit update, which provides an example of how outliers are treated and documented throughout the program. The data presented in Appendix C of the 2021 Annual Groundwater Monitoring report demonstrates the step-wise approach and decision-making process used to assess suspected outliers through time-concentration graphs, probability plots, and formal outlier testing with Dixon's test, and further demonstrates that DTE is taking appropriate steps to develop effective prediction limits that meet the performance standard of 40 C.F.R. § 257.93(g)(4).

d. Alternate Source Demonstration is Adequate

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

Aside from being performed under a QPE direction and certification required by the rule, the ASD includes multiple lines of evidence that demonstrate the source is from something other than the CCR unit. Per the EPA's Unified Guidance, "the goal of groundwater analysis is not simply to identify significant concentration differences among monitoring wells at compliance point locations. It is also to

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[42] https://www.dteenergy.com/us/en/residential/community-and-news/environment/coal-combustion-residual-rule-compliance-data-and-information.html

determine why those differences exist."[43] Under RCRA (§258.54) and the CCR Rule (§257.94), the owner or operator may demonstrate that a source other than the [CCR unit] caused the statistically significant increase (SSI) over background levels for a constituent or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. These are often referred to as "alternate source demonstrations" or ASDs. These demonstrations have been an important consideration in solid waste groundwater monitoring programs since RCRA was enacted decades ago in order to identify SSIs due to factors unrelated to the unit being monitored. This is especially relevant given that all of the constituents being monitored under the CCR Rule are naturally present in the environment, and in particular, the Appendix III constituents, are very commonly present at detectable concentrations in groundwater.

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

DTE prepared an ASD for an initial SSI in January 2020 for TDS at a concentration of 2,300 mg/L, marginally above its respective prediction limit (PL) of 2,200 mg/L,

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[43] Unified Guidance. Chapter 13, p. 13-2.

at monitoring well MW-16-04. The ASD was included in the 2019 Annual Groundwater Monitoring Report and submitted to the EPA within the Application (Appendix C). The ASD concluded that the single TDS SSI was attributable to natural variability, largely relying on the isolated occurrence and small magnitude of the increase, the lack of hydraulic connection between the CCR unit and the uppermost aquifer, and the relatively short timeframe at the start of the monitoring program that did not account for long-term temporal changes (i.e. small background dataset available to calculate the prediction limits).

EPA is proposing (Proposed Decision p. 31) to find the information provided in the application insufficient to conclude that local subsurface geology would have prevented leakage from reaching groundwater within the operational life of the impoundment based on the theoretical groundwater flow rates used in the evaluation in addition to alleged inadequate data to demonstrate the continuity and consistency of the low permeability of the underlying clay, along with the irrelevance of the background timeline. The significant amount of data provided to EPA in the Application and the multiple site characterization studies demonstrate that the impervious glacially compacted natural clay liner system beneath the FAB is laterally continuous, substantially thick, and hydraulically separates the CCR unit from the uppermost aquifer. These details are further enumerated below in Section VIII.C of this letter and further support the conclusions of the ASD.

The flow rate calculations used to assess groundwater flow rates are appropriate and are recommended by EPA's RCRA draft Technical Guidance (1992) and EPA's Solid Waste Technical Guidance (1993), and are in-line with industry standards and the principles of hydrogeology. The average linear velocity of groundwater flow is derived from Darcy's Law and is a function of hydraulic conductivity, hydraulic gradient, and effective porosity. As detailed in the CCR Rule, "Darcy's Law for gravity flow through porous media is directly proportional to the hydraulic gradient. The use of Darcy's Law to calculate fluid flow through porous media is a well-established and generally accepted engineering methodology" (2015 CCR Rule Preamble p. 21372). The flow calculations presented in the ASD estimate that, due to the consistently low permeability of the clay and the considerable thickness of the clay, it would take over 300 years to travel through the clay, which is well over the 48 years of operation of the CCR unit. The addition of more data collected in the ALD confirms the continuity of the clay, and further refines the thickness of the clay to a range of 14 to 34 feet, with a geometric mean hydraulic conductivity of no more than 2.7 x 10^{-8} cm/s, resulting in vertical travel times of 130 years in fate and transport modeling presented in Section 4 of the PALD and final ALD (Attachments A and B), which is still well over the 48 years.

EPA is also proposing (Proposed Decision p. 32) to find that the absence of additional SSIs identified within the same or other monitoring wells is insufficient evidence to conclude that a potential release has not occurred. DTE acknowledges that the absence of additional SSIs identified within the same or other monitoring wells *on its own* is not a sufficient line of evidence to conclude that a potential release has not occurred in the FAB CCR unit. However, it is a line of evidence to consider in conjunction with other lines of evidence that a release has not occurred. In addition, boron (well known as a very conservative constituent that generally does not undergo retardation) would be expected to be the first constituent to be seen with a potential SSI in the monitoring well system and a potential boron SSI has not been identified to date.

Moreover, the timeframe over which the background dataset was collected is sufficient evidence, and highly relevant, to conclude that a potential release has not occurred given the timeframes allowed in the CCR rule. The original proposed CCR rule allowed one year, extended to two years, to perform site characterization, complete the monitoring system design, collect background samples, and develop a statistical analysis program. We agree with EPA that even two years is a very limited and ambitious timeframe to perform the necessary activities, especially for sites with deep wells and difficult drilling conditions. Discussed in the 2015 CCR Rule Preamble p. 21398: “After review of the comments received on this issue and careful reexamination of the actual requirements in the final rule, EPA agrees that a one-year timeframe is not feasible and has decided to extend the timeframes for completing installation of the system, including background monitoring, to two years.” Therefore, as required by the CCR rule, DTE performed the necessary activities to comply with the rule and began detection monitoring at the FAB CCR unit within a two-year period.

As discussed above in detail in Section VIII.B.1.c, the predictive power of the statistics is typically limited due to the relatively small background datasets available at the beginning stages of a monitoring program. The baseline dataset used to develop the initial prediction limits in 2017 were limited by the tight timeframe in which these programs had to be established and limited the number of independent samples that could be collected prior to initiating the detection monitoring program. It is well recognized that statistical power is limited by the sample size and that sample size is limited at the onset of any new monitoring program. The initial PLs were the statistical limits available at the time of the TDS SSI. As detailed above, the statistical power is able to be improved over time as more samples are collected. Additional monitoring since 2017 has resulted in additional background data being collected and utilized to update the PLs in 2021 that account for temporal variation in the dataset and improve the statistical power of the test.

Further, monitoring well MW-16-04 is located hydraulically upgradient from the FAB. Not only is it hydraulically separated from the CCR unit vertically, but it is on the upgradient edge of the waste boundary. As discussed above and in Section 2.4 of the Application, the upgradient wells exhibit extraordinary upward vertical gradients as exhibited by their flowing artesian conditions. For the FAB upgradient wells, these potentiometric surfaces have consistently been more than 10 feet above the ground surface. Therefore, DTE has presented adequate information to conclude that the ASD for the single SSI observed for TDS at the FAB CCR unit is adequate and has been further supported by the preponderance of evidence provided in the ALD (Attachment B) and the Aquifer Characterization Study (Attachment C). In addition, in six consecutive semiannual groundwater monitoring events since the 2019 SSI at MW-16-04, there have been no SSIs at the MONPP FAB CCR unit.

e. The Monitoring Status is Adequate

The data provided to EPA in the Application, and the additional clarifications in this letter and documentation provided in the ALD and Aquifer Characterization Study, continue to confirm that the clay is laterally continuous across the base of the FAB and the uppermost aquifer is hydraulically separated from the FAB, and that the aquifer remains unaffected. DTE has unequivocally demonstrated that the FAB remains in detection monitoring and that the presence of Appendix III parameters in groundwater in the uppermost aquifer are geogenic. It is also recognized and has been further explained above in Section VIII.B.1.a, that significant spatial variability is observed for most of the Appendix III parameters. The presence of these Appendix III constituents are attributable to variations in natural conditions that influence groundwater chemistry across the uppermost aquifer, which contributes to the variability in concentrations such as chloride and boron from well to well. The Unified Guidance is very clear that interwell methods are invalidated due to significant spatial variability, in addition to extremely slow horizontal groundwater flow rates that make it impossible to compare upgradient to downgradient concentrations for compliance. It has been demonstrated that the slight change observed for TDS (one constituent) at one hydraulically upgradient monitoring location that prompted the single ASD performed in January 2020 is not indicative of release to the uppermost aquifer. Therefore, the MONPP FAB remains appropriately in detection monitoring.

A significant amount of data is provided in the Application over the course of five sampling events from September 2017 through September 2019, in addition to another six events through 2022 available in the Annual Groundwater Monitoring Reports that consistently show groundwater flow constantly to the north-northeast that indicate monitoring well MW-16-03 is located side gradient to the FAB. Replacing local, site-specific static water level data with generalized descriptions of regional groundwater flow to make interpretations of downgradient well locations is pure speculation and goes against EPA's very own technical guidance that requires site specific, accurate water level measurements to make determinations on groundwater flow direction.[44] Groundwater flows from high potential to low potential, the head level data on the potentiometric surface maps provided for FAB show the lower head levels in the north-northeast direction, using the principles of hydrogeology groundwater is not flowing toward MW-16-03 from beneath the CCR unit. Regardless, MW-16-03 is routinely sampled as part of the detection monitoring program and statistical analysis is performed at that location that

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[44] USEPA 1993 Solid Waste Technical Manual p. 227.

continues to demonstrate that there is no influence to water quality from the CCR unit.

EPA presented a hypothetical and erroneous statistical analysis in the Proposed Decision (p. 35) that falsely claims SSIs for boron are present across the site. While EPA did not provide sufficient backup for DTE to perform a comprehensive review, it appears that EPA's hypothetical statistical analyses are not valid in the context of the site-specific hydrogeological conditions that are observed at the FAB. The details of these hydrogeological conditions and how they have shaped the monitoring network design and statistical analysis program are presented in detail in the Application and have been further clarified above throughout this letter.

C. The Unit Has Provided Documentation of the Necessary Soil Characteristics and Engineering Quality to Perform the Demonstration

The Application was prepared to meet the requirement of the Rule and was viewed as an application to get to the next step to perform the rigorous demonstration, assuming that, like a typical application process, there would be some back-and-forth communication and any questions EPA had from review of the application would be addressed through the demonstration. Several comments in the Proposed Decision refer to missing or inadequate information that prevented EPA from being able to make a determination (therefore used as a basis for denial). However, many of those items were part of step 2 of the Part B process (to be completed during the rigorous field testing in the demonstration) or were succinctly included in the application to satisfy EPA's request in the Part B Preamble to keep the applications concise.[45]

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

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[45] Preamble at 72514.

The FAB is a glacially compacted natural clay lined surface impoundment with an engineered component along the perimeter embankment. The embankment was constructed to meet engineering design criteria and has been heavily investigated and confirmed that it is of good quality and in line with accepted engineering practices with details on this included in Appendices H and L in the Application. To assess whether liner materials are suitable for use and construction of the liner is of good quality, data from the 1970s through 2020 were utilized to develop the conceptual site model for the FAB. The data and the conceptual site model provide multiple lines of evidence that the liner is of good quality and in line with proven and accepted engineering practices, such as the 1995 Detroit Edison Design Engineering report (included as Appendix K in the Application) that demonstrates that the gray clay-rich soil that the FAB is built directly on top of is consistently present beneath the bottom of the entire FAB with a thickness of greater than 14 feet and has a hydraulic conductivity generally ranging from 1.3×10^{-8} to 6.5×10^{-8} cm/s.

There was a single hydraulic conductivity test from the 1970s soil boring B8 collected from 41.5 feet that had a hydraulic conductivity of 1.9×10^{-7} cm/s as pointed out by EPA.[46] However, that depth is below the total thickness of clay-rich soil over much of the FAB as boring B8 had thicker clay-rich soil than most locations and it was the only sample run from below 36.5 feet. Further, seven additional soil samples were collected at five-foot intervals from 6.5 to 35.5 feet from the same B8 boring location and those seven additional samples had hydraulic conductivities ranging from 1.5×10^{-8} to 4.8×10^{-8} cm/s. This shows that there is not much heterogeneity in the upper portion of the clay beneath the FAB (i.e. the clay has a consistently lower hydraulic conductivity) and the highest hydraulic conductivity only occurs in the deeper clay, demonstrating the glacially compacted natural clay-liner system in this area is protective. Moreover, the additional detailed site characterization data presented in the ALD, further confirm that the 1.9×10^{-7} cm/s is not representative of the larger dataset. "The final rule requires that measurements of the variability of subsurface soil characteristics must be collected from around the perimeter of the impoundment to identify any regions of *substantially* higher hydraulic conductivity."[47] The hydraulic conductivity of 1.9×10^{-7} cm/s is not *substantially* higher, it is very close to the hydraulic conductivity of 1×10^{-7} cm/s of the two feet of compacted clay for an existing

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[46] Proposed Decision, p. 32.

[47] Preamble at 72519.

impoundment liner under the 2015 CCR rule[48], and is insignificant when considering the thickness of the clay and consistency of the lower hydraulic conductivity soils that make up the clay immediately beneath the FAB, and the depth and limited occurrence of the 1.9 x 10^{-7} cm/s conductivity soils.

Also, the 2016 clay-rich soil in samples collected by TRC (included in Appendix A of the Application) had a hydraulic conductivity ranging from 1.2 x 10^{-8} to 1.6 x 10^{-8} cm/s. The geometric mean of the aforementioned hydraulic conductivity data is 2.7 x 10^{-8} cm/s as presented in the December 2018 Clay Liner Equivalency Report that was included as Appendix A of the Application. While groundwater has the ability to move horizontally through higher permeability zones, it also has to pass vertically through the most restrictive low permeability material first. As discussed in more detail below, these higher permeable zones are not continuous and do not represent a consistent hydraulic conductivity that occurs continuously at any point through the entire 14-foot (or more) vertical profile between the bottom of the FAB and the uppermost aquifer. Rather, they represent a small portion of the overall range in heterogeneity observed within the clay at various points throughout the subsurface based on over 200 CPT/soil borings and 38 soil hydraulic conductivity tests. Clay layers are laterally continuous across the site. As such, it is appropriate in this instance to consider the effective hydraulic conductivity in terms of the entire profile (e.g. the geometric mean). The mere presence of a slightly higher hydraulic conductivity in a limited number of samples does not preclude the ability of the clay to be protective when considering the entire thickness and lithologic and hydrogeological characteristics of the entire vertical profile of the substrate beneath the FAB.

This is also supported by the EPA's discussion in the Part B Preamble where it states, "EPA agrees that it is possible for individual impoundments that are not lined with a composite liner or an alternative composite liner (as those terms are defined in the CCR regulations) to still be protective of human health and the environment. This is possible if the effective hydraulic conductivity of the engineered liner and/or naturally occurring soil is so low that, even if leachate migrates from the unit, the volume of leachate that can be released to the underlying aquifer over the active life of the impoundment is so small that these releases will not result in adverse effects at any point in the future"(Part B Preamble, p. 72508). In

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[48] 40 C.F.R. § 257.71 (a)(1)(i)

addition, the data presented in the application does not represent the final set of data to be used to make a Part B determination.

It has always been understood that field testing during the alternate liner demonstration will be collected in order to provide a higher density of lithologic and hydraulic conductivity data throughout the subsurface and allow more certainty on the heterogeneity and the effective hydraulic conductivity beneath the FAB. In fact, additional soil samples were collected that included additional clay-rich soil hydraulic conductivity analysis that were analyzed in accordance with the requirements of in 40 C.F.R. § 257.71(d) in December 2020 that was presented to the EPA within a preliminary ALD on November 30, 2021 (Attachment A in this letter). The additional clay-rich soil hydraulic conductivities from the samples collected in December 2020 and run with compatibility testing for two years ranged from 3.3 x 10^{-9} cm/s to 1.0 x 10^{-8} cm/s (similar to and lower than those measured in previous testing) (Attachment B). Additional details of the PALD (Attachment A), the final ALD (Attachment B) and the MONPP FAB CCR unit clay-rich soil properties are discussed below.

In the Part B preamble, EPA recognizes that natural clay-rich soils are capable of achieving the required effective hydraulic conductivities lower than 1 × 10^{-8} cm/s and/or on a case-by-case basis may exhibit an adequate thickness of low-conductivity soil that supports having somewhat higher soil conductivities throughout or in a portion of the soil column. As stated in the Part B preamble page 72509, "EPA identified risks slightly above the relevant risk criteria only for lithium, one of the most mobile CCR constituents. Based on these model results, an effective hydraulic conductivity of 1×10^{-8} cm/s would be sufficient to reduce identified risks to below levels of concern on a national scale. However, ***conditions present at individual facilities, such as the thickness of the low-conductivity soil*** or the presence of a geomembrane liner, ***might support somewhat higher soil conductivities on a case-by-case basis***." In the case of the MONPP FAB, the minimum clay thickness beneath the FAB is at least 14 feet and up to 34 feet of laterally contiguous clay, more than 4x the minimum design standard thickness of 3 feet for clay-lined units outlined in the 2015 CCR Rule.

A significant amount of data was collected on the physical properties of the soil before the FAB was constructed and more was collected later as part of the monitoring well network installation that was referenced and included in the Application as appendices (including the

Detroit Edison Design Engineering March 1995 Effectiveness of the Underlying Clay Soil as a Natural Barrier On-Site, the TRC October 2017 Groundwater Monitoring Systems Summary Reports, the TRC December 2018 Natural Clay Liner Equivalency Evaluation Report and the Geosyntec Consultants November 2020 Alternate Liner Demonstration Application Support for DTE Monroe Power Plant Fly Ash Basin Documentation of Source Material and Construction Quality). Significant additional data was collected on the physical properties of the soil and presented within the November 2021 preliminary ALD (Attachment A) that it appears EPA did not consider (the PALD was submitted to EPA more than a year before rendering the Proposed Decision). The PALD has been updated by Geosyntec to include additional hydraulic conductivity data from samples that were very slow in moving to termination criteria due to the low hydraulic conductivity and is attached in the final ALD, included in Attachment B of this comment package.

The November 2021 PALD and the final ALD concludes that the low permeability natural clay soils underlying the MONPP FAB are consistently present across the FAB with a thickness of at least 14 feet and have sufficiently low hydraulic conductivity based on laboratory testing performed in accordance with the requirements of 40 C.F.R. § 257.71(d) for two years. Data show that hydraulic conductivities ranging from 3.3 x 10^{-9} cm/s to 1.0 x 10^{-8}, more than sufficient to prevent groundwater contamination throughout the active life of the unit. This range of hydraulic conductivity of the glacially compacted natural clay liner system is well below the threshold to be considered for an ALD as presented in the Part B preamble page 72509 where EPA states “Regardless, a conductivity of 1 × 10^{-7} cm/s for the lowermost soil component of the liner, whether in isolation or beneath a geomembrane component, remains the absolute floor for any unit to even be considered for an alternate liner demonstration.”

Therefore, based on the above factors, the data collected at the MONPP FAB CCR unit has demonstrated the necessary soil characteristics and engineering quality to not only satisfy the requirements of the Application, but the preliminary and final ALD satisfy the requirements of the Part B Demonstration requirements of 40 C.F.R. § 257.71(d). On this basis, there is no reasonable probability that continued operation of the FAB surface impoundment will not result in detections of CCR constituents from the CCR unit above the GWPS in the uppermost aquifer.

In addition to the comprehensive information provided in the Application and summarized above, the following additional lines of evidence generated as part of completing the ALD supports that the FAB embankment and the glacially compacted natural clay liner system beneath the FAB exceed the minimum standards of the Part B rule, and the FAB was constructed with proven and accepted engineering practices.

1. Good Quality Liner Materials and Construction

The lithology beneath the FAB consists of atop the embankment downward: (1) lean clay, (2) sandy lean clay, (3) transitional unit, and (4) bedrock. The lean clay and sandy lean clay make up the two units that comprise the natural clay liner beneath the FAB. The lean clay is associated with the engineered embankment and the sandy lean clay is associated with the unit directly beneath the FAB.

Engineered Embankment

1. The “History of Construction Report” (Geosyntec, 2016) details the original 1970s construction and later slope improvements. The original construction required excavation of native clay soils and placement in lifts for the embankment and compacted to 95% of optimum dry density at +1 to -2% of optimum moisture content. This has been an engineering standard of practice for over 60 years.
2. The embankment and native lean clay soils immediately below the embankment consists of soils that are generally classified as lean clay with sand (i.e., percent retained above sieve #200 is ≤30%). In a few cases, it is classified as sandy lean clay (i.e., percent retained above sieve #200 is ≥30%). Hereafter the embankment is referred to as “lean clay”. It is approximately 40-ft thick down to an approximate elevation of 573 ft. This unit consists of mainly compacted stiff clay and minimal sand seams.
3. Additional soil borings and sampling and testing occurred post 1970s construction for the slope improvements (2010 through 2019) and for the ALD investigation in 2020.
4. The original embankment was improved by slope flattening that effectively made the embankment wider. The additional clay fill was installed under specifications based on the original construction with additional criteria. It was documented under a construction quality assurance program that included full time, independent,

inspection and testing. All of the data confirmed the good quality and consistency of the embankment soils.

Native Material Beneath the Embankment

This foundation unit (the glacially compacted natural clay liner system) is directly beneath the FAB. Thickness of this second unit ranged from 14 to 34 ft thick with an average thickness of 21 ft, increasing thickness from south to north. The sandy lean clay descriptor is consistent with ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System). Based on the long-term two years of clay-rich soil hydrology compatibility testing, the hydraulic conductivity values ranged between 3.3 x 10^{-9} cm/s and 1.0 x 10^{-8} cm/s for this unit. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report and are adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit. The final data from the ASTM D7100 testing indicated that clays within the liner will keep a consistent hydraulic conductivity value over time (as described in Section VIII.C below).

The third and fourth units identified in the conceptual site model are associated with the uppermost aquifer unit and not relevant to the liner composition. More information associated with the two liner units are provided in Section 2 of the ALD Report.

The following provides additional information that is also in the PALD and final ALD reports (Attachments A and B, respectively).

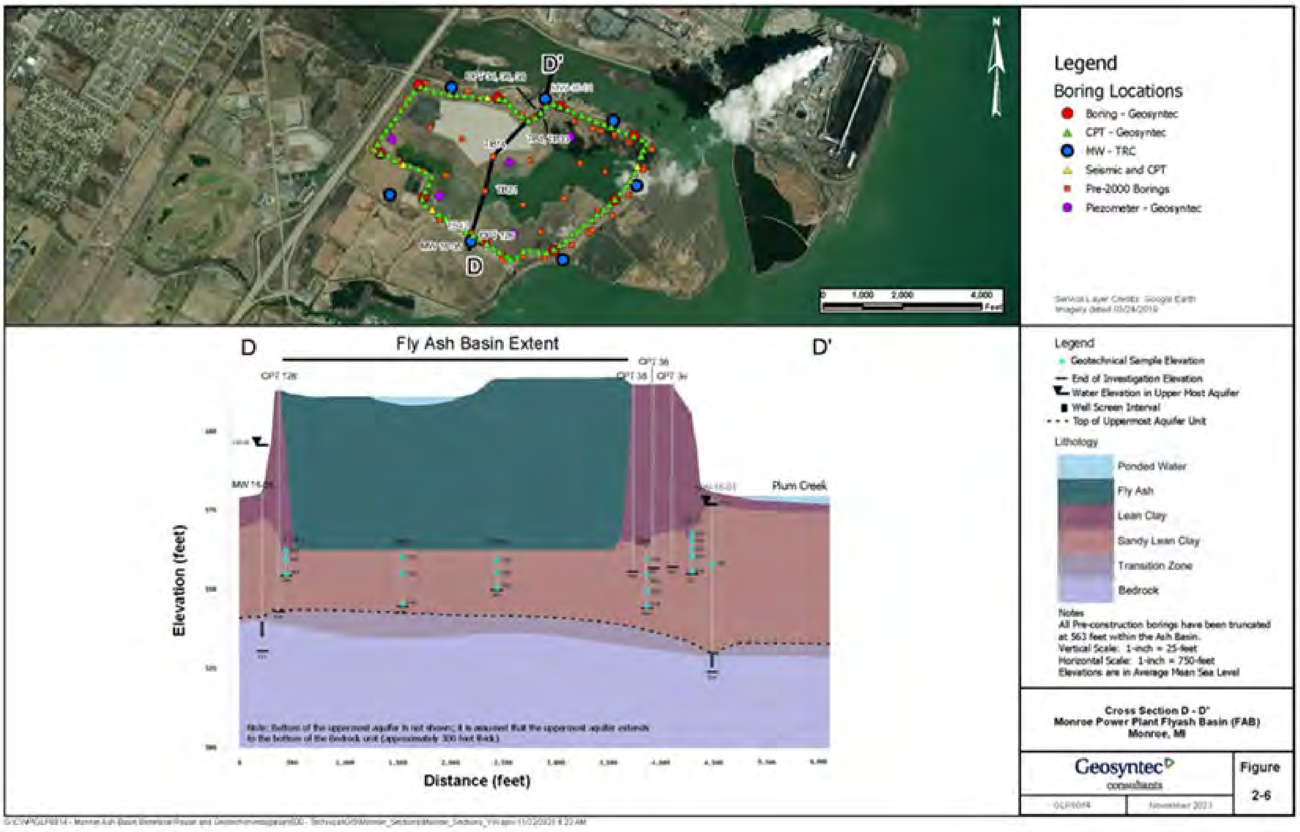
2. Detailed Site Characterization Data Affirms the Conceptual Site Model

From the 1970s through 2020, 129 borings, 95 CPTs, and 7 CCR monitoring wells were completed/installed within and around the FAB. Field and geotechnical laboratory testing, hydraulic conductivity testing, and soil descriptions were compiled from the many investigations as part of performing the ALD and summarized below (further descriptions are provided in the PALD and final ALD Reports (Attachments A and B, respectively):

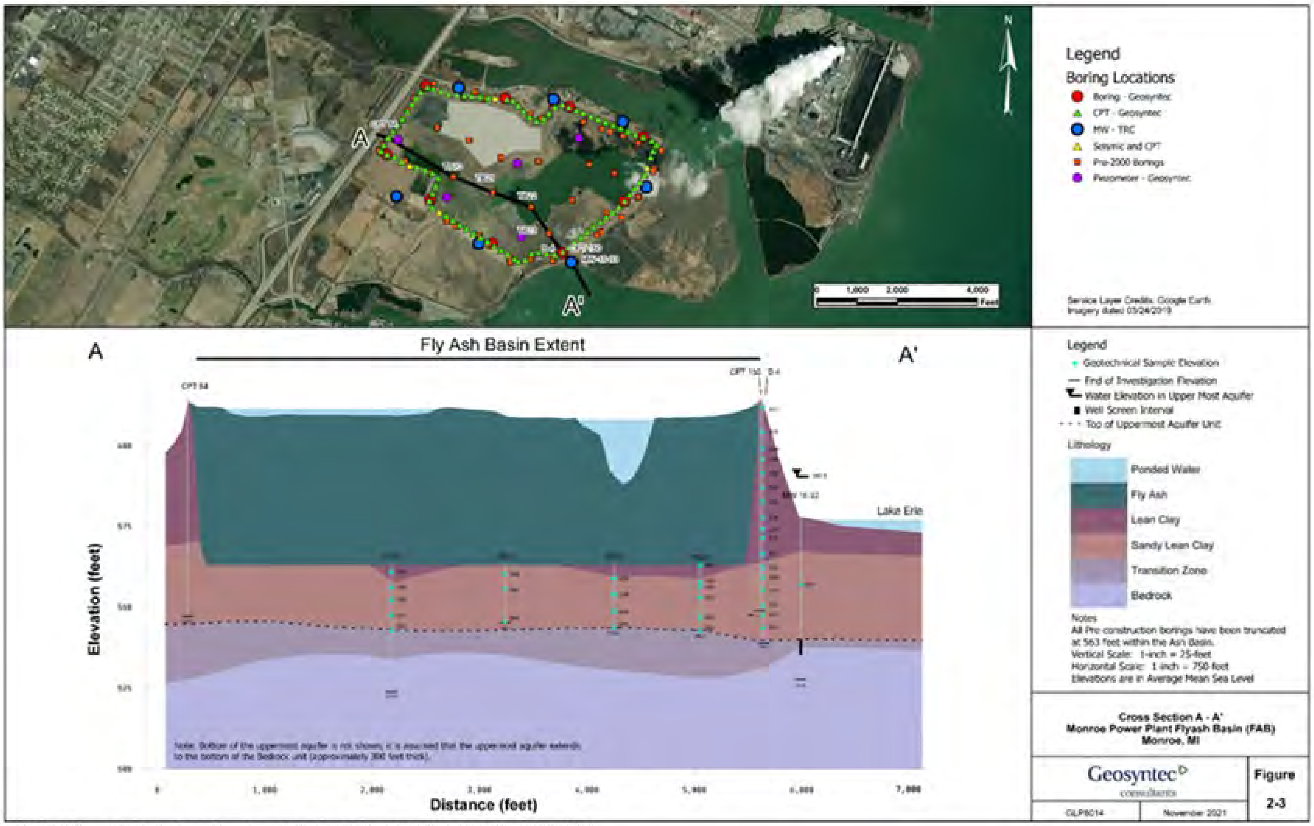
Field testing included pocket penetrometer tests on fine-grained soils, in situ hydraulic conductivity tests (slug tests) for the monitoring wells screened in the uppermost aquifer, and CPTs with pore pressure dissipation tests (PPDs). Geotechnical laboratory testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Laboratory test results are provided in the PALD and final ALD for the 1970s, 1990s, 2016, and 2020 laboratory studies, respectively.

Data from 127 pre-2020 soil boring logs/monitoring well logs, 95 CPTs (2020), and 9 sonic borings (2020) sample descriptions were reviewed and cataloged in a database for input to the three-dimensional (3D) environmental visualization system (EVS) model using Earth Volumetric Studio software.

The EVS model was used to visualize the significant amount of data (e.g. geology, geotechnical sample locations, monitoring well and well screen locations, and groundwater elevation surfaces) to visualize the extent of the basin embankment, fly ash, and ponded water along with the geology. Lithologic cross-sections were created from the EVS model and analyzed to determine the various changes in lithology across the site, visualize model inputs, and estimate thicknesses of geologic layers. The EVS



model including five cross section outputs is presented in the PALD and final ALD and confirms that the glacially compacted natural clay liner system is continuous across the FAB CCR unit ranging from 14 to 34 ft thick with an average thickness of 21 ft, increasing thickness from south to north as shown on cross sections included in the PALD and final ALD (Attachments A and B) below. Two representative cross sections from the PALD and final ALD are included below:



As part of the 2020 ALD testing program, natural clay liner hydraulic conductivity compatibility testing was performed in general accordance with "*Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions*", ASTM D7100 per the Part B preamble at 72523, using site-specific contact water. Hydraulic conductivity testing was performed on 16 soil samples using deionized water in accordance with "*Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter*", ASTM D5084, to establish baseline hydraulic conductivity measurements. Then, to further cauterize the range of hydraulic conductivities, eight of the samples exhibiting high and low hydraulic conductivity values were selected for compatibility testing in accordance with ASTM D7100 using site-specific water from the FAB (a.k.a. “contact water”). The testing was performed continuously by Excel Geotechnical Testing, Inc. located in Roswell, GA for two years for each of the samples. The final hydraulic conductivities ranged from between 3.3 x 10^{-9} cm/s and 1.0 x 10^{-8} cm/s. The longevity of the testing program was driven by the termination criteria of ASTM D7100 as fully described in the final ALD. Because of the consistency of the hydraulic conductivity results over the length of test duration (over two years), the testing demonstrated the lack of impact of contact water on the clay samples. All data associated with the hydraulic testing is summarized in detail in the PALD and final ALD Reports.

As detailed in the PALD and final ALD reports, in accordance with the demonstration requirements defined in 40 CFR § 257.71(d)(1)(ii), a fate and transport model analysis was performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the FAB exceeds the GWPS at the waste boundary throughout its active life. The active life was considered to be from 1975, when operations started at the FAB, to 2041, when the Vertical Extension Landfill atop the FAB is planned to be closed, which is 67 years. Additionally, as part of the sensitivity analysis for the fate and transport model, the model was run with a modeling period of 97 years to capture the post-closure care period. The results of the model predict COC concentrations that are very low such that there is no reasonable probability that water from the FAB will cause releases to groundwater throughout its active life and post closure period of 97 years that will exceed the groundwater protection standard at the solid waste boundary.

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

— The Embankment design criteria and construction records have been shown to meet this criterion by thousands of samples and analyses, construction documentation, and the conceptual site model.

— The wealth of information provided in the Application and the additional supplemental information provided herein on the glacially compacted natural clay liner system that demonstrate the performance of the soils underlying the FAB meet the Part B requirements.

— Extensive and lengthy compatibility testing of the clay embankment and underlying native clay materials demonstrate that the engineered clay embankment and glacially compacted natural clay liner system in the FAB will not degrade over time, further indicating its suitability as an alternate liner system.

The fate and transport modeling demonstrates that the water in the FAB is not expected to reach the uppermost aquifer below the FAB for at least 130 years, far beyond the active life of the FAB of 67 years and the post closure period of 30 years (97 years total). Therefore, there is no reasonable probability that continued operation of the surface impoundment will result in adverse effects to human health or the environment even using elevated (conservative) Darcy velocities/hydraulic conductivities. Therefore, the multiple lines of evidence demonstrate that the FAB has a liner that is of good quality and in line with proven and accepted engineering practices, as required by 40 C.F.R. § 257.71(d)(1)(i)(C). These data were presented in the Application and supplemented by the PALD Report (Attachment A) and are documented in the attached final ALD Report (Attachment B).

D. There is No Reasonable Risk of Additional Release Pathways Now or in the Future

There is no reasonable probability that a complete and direct transport pathway exists between the FAB and the nearby water bodies (i.e. Plum Creek and Lake Erie). Low hydraulic conductivity of the unsaturated soils (clay) with very slow horizontal travel times mitigate any potential risk for direct transport to Lake Erie or Plum Creek. The Application includes an assemblage of information such as soil hydraulic conductivity data, boring logs, cross-sections (included in Figures 3 through 5 and Appendices A, B, K, L and N of the Application) and in the November 30, 2021 preliminary ALD that EPA has had in their possession since November 2021 (Attachment A), in addition to the final ALD included in Attachment B, that show there is no highly transmissive soil between the impoundment and the nearby surface water bodies. Soil properties of the clay material included in the Application indicate travel times of more than 130-years through the clay to the uppermost aquifer. Horizontal travel times would be even longer through the clay due to the greater distance (on the order of 200+ feet at closest points) from Plum Creek and/or Lake Erie. In addition, as discussed further below, the information presented in the PALD and ALD (Attachments A and B) further supports the ability of the clay to prevent groundwater movement through the clay-rich unsaturated zone to Plum Creek or/or Lake Erie.

In addition to the comprehensive information provided in the Application, the following additional information clarifies how there is no potential for an overtopping flow release and there is no flowing water seepage through the perimeter embankment or below the embankment through the native clay soil that there could be a complete and direct transport pathway to the nearby surface water bodies that has not been identified through the high resolution site characterization investigations that have been performed to date.

The FAB is bounded by Dunbar Road and Plum Creek to the north and northeast, Interstate 75 to the west, a 200-acre peninsula into Lake Erie to the east, Lake Erie to the southeast, and a large open field and State recreation area to the south. At the closest points, the FAB is located 200 ft south of Plum Creek and approximately 250 ft northwest of Lake Erie.

The FAB embankment is constructed of low hydraulic conductivity clay as much as 46 ft above surrounding grade that was properly designed and constructed as detailed in Appendices F, H, and L of the Application. The EPA appears to imply that the above grade construction contributes to creating a potential transport pathway through the subsurface directly to surface water and therefore does not meet the CCR rule criterion. When considering the CCR Rule and the EPA’s comment, the pathway could be either through the embankment, the subsoils below the embankment above the uppermost aquifer, or through overtopping the embankment to surface water. These potential transport pathways do not exist at the FAB.

Operational controls and storage capacity avoid the potential for CCR and water from within the FAB to overtop the embankment. The lowest elevation of the FAB embankment crest is approximately elevation 613 ft, MSL. The FAB is operated using a gated discharge spillway so that the maximum elevation of the FAB water level is elevation 609 ft. Review of operating records for the annual inspections indicate the maximum operating surface water elevation of 609.0 ft is consistently met. Hydraulic modeling of the probable maximum flood (PMF) at the FAB indicated a peak water surface elevation of 612.0 ft, which leaves

1.0 ft of freeboard.[49] Consequently, the potential for a transport pathway over the embankment to surface water does not exist even under the most extreme PMF condition.

As thoroughly discussed above and in the information presented in the Application the embankment soils and those soils under the embankment are of sufficiently and consistently low hydraulic conductivity to preclude impacts to the uppermost aquifer. These same characteristics restrict seepage flow that could occur either through the embankment or underlying soils that could avoid mixing with groundwater in the uppermost aquifer.

No visible seepage was observed through the embankment during the slope improvements that were made from 2010 through 2019. The improvements included removal of all vegetation, stripping all topsoil, and inspecting the subgrade for wet spots/seepage over 80% of the perimeter face of the embankment. There was no visible evidence of wet spots/seepage on the embankment. Consequently, this transport pathway to surface water is not present through the embankment.

The soils under the embankment and above the uppermost aquifer have the same low hydraulic conductivity characteristics as the embankment. The potential transport pathway would be downward and then laterally through the native clay, through a longer pathway than through the embankment, to surface water. If there was no evidence of seepage through the embankment, there would be no seepage through the underlying soils to beyond the embankment to surface water.

It could be hypothesized that the transport pathway could be complete through flow laterally below the embankment and through the native clay to the surface water without exiting at the ground surface. However, as the groundwater model has demonstrated, the water in the FAB will not impact the uppermost aquifer located beneath at least 14 feet of glacially compacted natural clay liner within the operational life of the FAB (Attachments A and B), therefore, it would not impact surface water more than 200 ft away.

The lack of a geomembrane liner has no contributing factors to somehow allowing a transport pathway. As the groundwater model has demonstrated, even without a geomembrane, the water in the FAB will not impact the uppermost aquifer located beneath

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[49] Geosyntec, "Hydrologic and Hydraulic Capacity Assessment, Monroe Power Plant Ash Basin Facility, Monroe, MI", 2016

at least 14 feet of glacially compacted natural clay liner within the operational life and post closure period for the FAB (Attachments A and B), therefore, it would not impact surface water that is located at least 200 feet away.

Evaluation of all the information provided in the Application, the subsequent studies, and additional construction and operation information provided herein, the potential lateral transport pathways to surface water are highly unlikely to exist, and therefore it is unreasonable for EPA to deny the Application on grounds of a potential non-groundwater release pathway.

IX. Closing

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

ATTACHMENTS:

Attachment A

Geosyntec Consultants (Geosyntec). November 2021. Preliminary Alternative Liner Demonstration, Fly Ash Basin, Monroe Power Plant, Monroe, Michigan, Prepared for DTE Electric Company.

Attachment B

Geosyntec. April 2023. Alternative Liner Demonstration Fly Ash Basin Monroe Power Plant, Monroe, Michigan Prepared for DTE Electric Company.

Attachment C

TRC. April 2023. Additional Aquifer Characterization Report – Monroe Power Plant Fly Ash Basin CCR Unit, 7955 East Dunbar Road, Monroe, Michigan. Prepared for DTE Electric Company.

Attachment A

Preliminary Alternative Liner Demonstration

DTE

November 30, 2021

Sent via email

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

RE: Preliminary Alternate Liner Demonstration
DTE Electric Company Monroe Power Plant
Fly Ash Basin Coal Combustion Residuals Unit
7955 East Dunbar Road, Monroe, Michigan

Dear Administrator Regan:

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

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

DTE Electric appreciates EPA’s commitment to take this corrective action and believes it is both necessary and appropriate. Regardless of the Agency’s internal delays DTE Electric proceeded expeditiously with the hydrogeological site characterization and laboratory study as detailed in the September 1, 2021 extension request due to analytical limitations. The extension request detailed the compatibility laboratory testing program results as of late August 2021, and projected termination criteria to be met by November 2, 2023. EPA has not yet responded to the extension request.

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

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

Sincerely,

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

Enclosure

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

Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

PRELIMINARY ALTERNATIVE LINER DEMONSTRATION FLY ASH BASIN

MONROE POWER PLANT

Monroe, Michigan

Prepared by

Geosyntec consultants

engineers | scientists | innovators

2100 Commonwealth Avenue, Suite 100
Ann Arbor, Michigan 48105

GLP8014

November 2021

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1. INTRODUCTION

This report has been prepared to provide the Preliminary Alternate Liner Demonstration (ALD) of Monroe Fly Ash Basin (FAB) coal combustion residuals (CCR) unit in accordance with 40 CFR Part 257 as amended on November 20, 2020 (CCR Rule). **Figure 1-1** provides the site location.

The FAB is one of the two CCR units at the site, the other CCR unit is the Vertical Extension Landfill (Landfill) located at the northwest quadrant of FAB. DTE is planning to operate the Landfill through the end of 2040.

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

1.1 Background

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

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

DTE submitted an extension request due to "analytical limitation" under a separate cover, on September 1, 2021 [2]. The extension request detailed the compatibility testing program results as of late August 2021, and projected termination criteria to be met by November 2, 2023. The EPA has not yet responded to the extension request.

1.2 Purpose

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

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific water, and discussion of results.
- Section 4 – provides analysis approach, details, GWPS, and evaluation of results as to whether or not the FAB meets the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification by a qualified professional engineer.
- Section 7 – provides references.

1.4 Terms of Reference

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

2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

> *§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*
>
> *(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*
>
> *(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*
>
> *(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*
>
> *(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*
>
>> *(i) Samples are advanced to a depth less than the top of the groundwater table or 20 feet beneath the bottom of the nearest water body, whichever is greater, and/or*
>>
>> *(ii) Samples are spaced further apart than 200 feet around the impoundment perimeter;*
>
> *(5) A narrative description of site geological history; and*
>
> *(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*
>
>> *(i) The relative location of the impoundment with depth of ponded water noted;*
>>
>> *(ii) Monitoring wells with screening depth noted;*
>>
>> *(iii) Depiction of the location of other samples used in the development of the model;*

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

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

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

2.1 Introduction

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

2.2 Site Geology

The geology of Monroe County consists of primarily unconsolidated (soil) alluvium and glacial till deposits overlying bedrock. The unconsolidated material consists of shallow/surficial alluvium deposits (sand and gravel) on top of clay-rich glacial drift with some sporadic glaciofluvial deposits that range from not present to more than 150 ft thick, with an average thickness of about 50 ft [1].

In the area of the FAB CCR unit, clay-rich glacial drift directly overlays the bedrock and varies in thickness from 14- to 34-ft thick. There does not appear to be glaciolacustrine or glaciofluvial deposits as there are few sand and gravel lenses. It appears the drift was deposited directly from glacial events as there is a relatively consistent clay-rich glacial drift with minimal sands and gravels usually associated with a meltwater discharge. Bedrock in Monroe County is predominantly Devonian and Silurian-aged carbonates and includes the Antrim Shale, Traverse Group, Dundee Formation (limestone and some dolostone), Detroit River Group, Sylvania Sandstone, Bass Islands Group, and Salina Group. Monroe County's eastern boundary is Lake Erie, and in general, regional groundwater flow is to the east towards Lake Erie [1]. Much of the carbonate bedrock aquifer in Monroe County is confined and naturally artesian. Saturated bedrock of the Bass Islands Group is generally encountered from 37 to 53.5 ft below ground surface (ft-bgs). Groundwater flow in the carbonate bedrock aquifer in Monroe County is primarily through secondary porosity consisting of fractures often evident along bedding-plane partings [1].

2.2.1 Fly Ash Basin Site-Specific Geology

The FAB is located about one mile southwest of the Plant near Monroe, Michigan, and is bounded on the east by Lake Erie and the Plant discharge canal, on the west by Interstate Highway 75 (I-75), on the south by an agricultural field, and on the north by residential property and Plum Creek.

The FAB is encapsulated by an embankment that is up to 46 ft higher than the surrounding ground surface. The perimeter of the embankment crest defines the outer limits of the watershed, which is the plan area of rainfall. There is no outer watershed area that flows directly into the FAB.

During the ALD investigation in December 2020, 95 cone penetration tests (CPTs) and 9 soil borings were drilled along the top of the embankment to augment existing data. Based on the data from Geosyntec's 2020 investigation, the geology was relatively consistent with previous geologic interpretations that the underlying clay-rich soil had consistently low hydraulic conductivity values. Although the geology was consistent, the naming of the clay-rich soils has been changed as described below:

- The embankment was created with the upper 10-ft of clay-rich native soils and compacted to act as a barrier along the perimeter of the FAB CCR unit. The embankment material is described as a compacted lean clay.

- Directly underlying the embankment, the native soils consist of up to approximately 15-ft thick lean clay. Under the FAB (starting at approximate elevation 563 ft[1]) the geology consists of a 14 to 34 ft thickness of clay-rich soils identified as sandy lean clay. The sandy lean clay descriptor is consistent with ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) [3] and differs from previous soil descriptions.

- There is a transitional unit that also differs from previous soil descriptions and is identified as weathered bedrock and/or a mix of clay, sand and gravel. This unit is approximately 5 to 10 ft thick and directly underlays the sandy lean clay and sits atop the bedrock. This unit is wet and is considered the top of the uppermost aquifer unit which is the underlying fractured bedrock.

Further discussion of geologic descriptors of soil types is discussed in the conceptual site model (Section 2.6)

2.3 Uppermost Aquifer Field Testing and Hydrogeology

The uppermost aquifer unit begins at the top of the transition unit and originates in the underlying fractured bedrock. The aquifer within the bedrock exhibits artesian conditions. In 2016 TRC installed seven bedrock monitoring wells to the north, east, south and west of the FAB. All monitoring wells exhibit artesian conditions except MW-16-01. Monitoring well MW-16-01 is located within several hundred feet of several off-site domestic residential wells located to the

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[1] Elevations are referenced to National Geodetic Vertical Datum of 1929.

north along Dunbar Road adjacent to Plum Creek that likely lower the hydraulic head in the area of MW-16-01 [1]. Wells located hydraulically upgradient of the CCR unit include MW-16-03, MW-16-04 and MW-16-05 on the southwestern and southern part of the FAB. These wells exhibit artesian conditions, in which potentiometric elevations are significantly above the ground surface (generally 10 to 15 ft above ground surface). Downgradient monitoring wells MW-16-01, MW-16-05 and MW 16-06 range from slightly artesian to not artesian (MW-16-01).

The general flow lines within the uppermost aquifer at the site are to the northeast towards Plum Creek. The average hydraulic gradient to the northeast ranges from 0.002 to 0.0025 foot/foot along the eastern part of the FAB to 0.004 to 0.005 foot/foot in the center and northwestern part of the FAB, with an overall mean of 0.004 foot/foot.

In 2016, A hydraulic conductivity of approximately 1.5E-3 cm/s was measured at CCR monitoring well MW-16-01 using a single well hydraulic conductivity test. In 2021, TRC conducted slug tests at CCR monitoring wells MW-16-02 through MW-16-07 using a modified single well hydraulic conductivity test and hydraulic conductivity ranged from 1.0E-02 cm/s to 4.5E-03 cm/s. Test results are provided in **Appendix A**. The monitoring well construction details are presented in **Appendix B.**

2.4 Summary of Data Used for Site Characterization

Data from many investigations were used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included the 1970s, 1990s, and 2016 all of which are included in the initial ALD Application [1]. Data from Geosyntec's 2020 ALD Investigation were used to augment the previous data sets. In total, these investigations included 57 borings, 95 CPTs, and seven CCR monitoring wells. **Figure 2-1** provides investigation locations.

Boring logs for the initial design in the 1970s through the 1990s, 2016, and 2020 field investigations are provided in **Appendices C** through **F**, respectively. These investigations were conducted within the FAB (prior to excavation in the 1970s), and outside of the FAB embankment and an extensive investigation through the embankment conducted by Geosyntec in 2020 (as described in Section 2.5).

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and pore pressure dissipation tests (PPDs) at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices G** through **J** for the 1970s, 1990s, 2016, and 2020 laboratory studies, respectively.

It is Geosyntec's opinion that the combined data for the site are sufficient to capture the variability that may exist in soil conditions.

2.5 ALD-Specific Site Investigation Details

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the embankment and native soils.

The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to augment the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Extensive previous investigations from the initial design in the 1970s to the present are discussed in Section 2.4.

Investigations were conducted at 200-ft intervals at the top of the embankment from elevation 615 ft down to 75 ft bgs to an approximate elevation of 540 ft. The nearest surface water body is Plum Creek located north of the FAB; groundwater flows towards Plum Creek. The investigation extends down to 20 ft below the bottom of Plum Creek, which is at an approximate elevation of 562 ft.

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

2.5.1 Cone Penetrometer Tests

Ninety-five CPTs were completed atop the embankment in 200 ft intervals to characterize FAB embankment and native soils. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or down to approximately 75 ft bgs. Pore pressure dissipation (PPD) tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 70 dissipation tests were completed at CPTs advanced on top of the embankment; however, only six locations were used for calculating hydraulic conductivity because equilibrium pore pressure was not achieved due to the long wait-time associated with the fine-grained soils. Hydraulic conductivity values ranged between 1.66E-07 cm/s and 3.29E-08 cm/s. Results are summarized in **Table 2-2**. CPT logs are provided in **Appendix K1**, and PPD tests are provided in **Appendix K2**.

2.5.2 Sonic Drilling

In December 2020, nine soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples for characterization of native soils and the embankment. Soil samples were collected continuously in 2 to 10-foot sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS).

Shelby tubes were collected from the FAB embankment soils, and native soils at approximately 20-ft intervals from each of the sonic borings in accordance with ASTM D1587 [4]; for hard soil samples where Shelby tube sampling was not feasible, samples were collected with a Pitcher barrel sampler in accordance with ASTM D6519 [5]. The soil borings were advanced to depths of approximately 75 ft-bgs to characterize the embankment and native soils. Sonic drilling locations are provided in **Figure 2-1.** Boring logs are provided in **Appendix F**. Soil stratigraphy is discussed in Section 2.6.

2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. One hundred thirty-one soil samples were collected from nine borings for hydraulic conductivity testing from depths between 5 ft and 75 ft to capture soils conditions ranging from stiff to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 131 Moisture Content tests (ASTM D2216)
- 8 Specific Gravity tests (ASTM D854)
- 75 Grain Size Mechanical Sieve tests (ASTM D6913)
- 8 Grain Size Hydrometer tests (ASTM D7928)
- 75 Atterberg Limits tests (ASTM D4318)

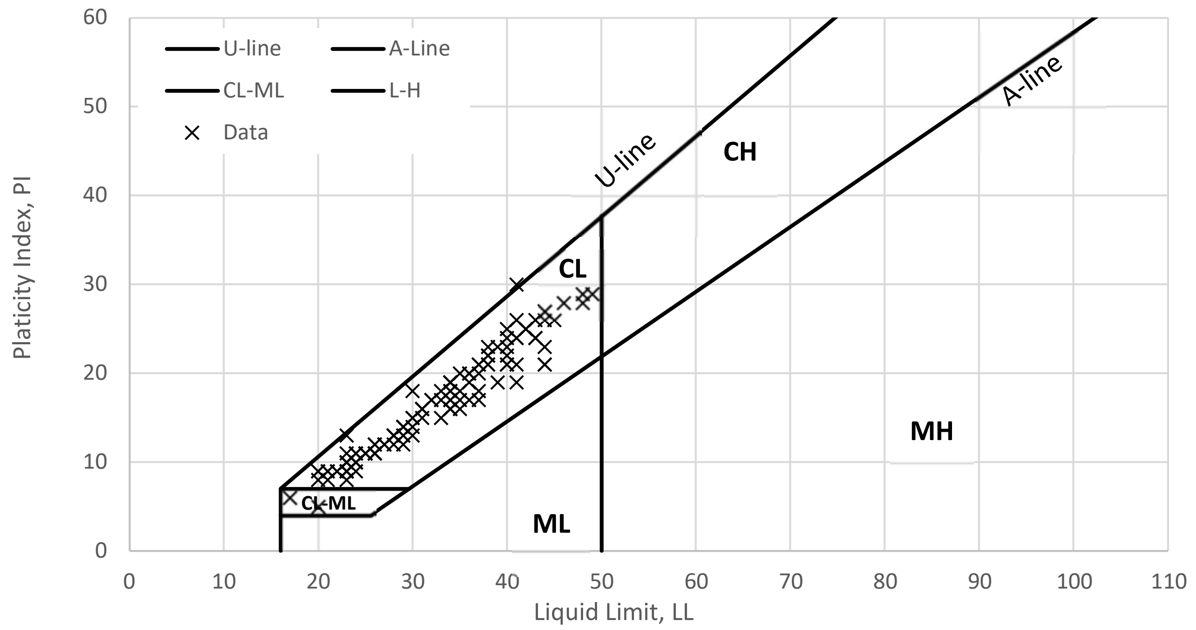
Note that these tests quantities are included in **Table 2-1**. Test results are provided in **Appendix J**.

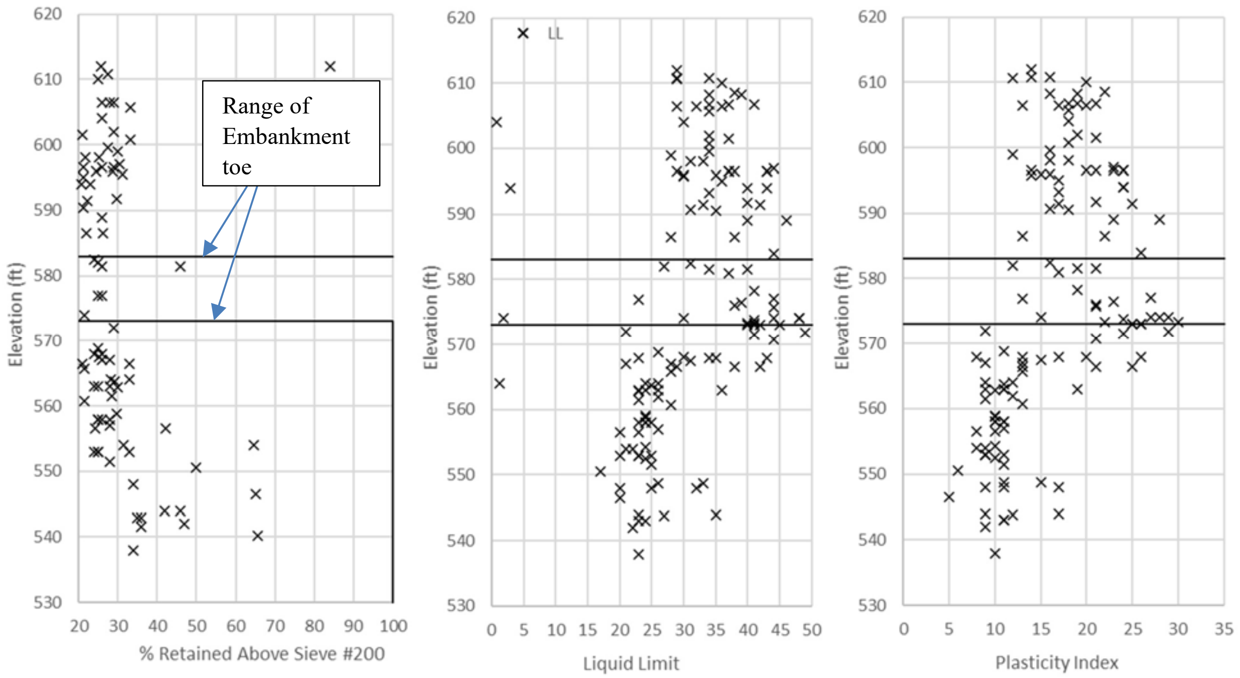
2.6 Conceptual Site Model

A comprehensive Conceptual Site Model (CSM) was developed from all the data and an EVS model was developed for the site. Based on the EVS model, the overall CSM of the Site lithology is relatively consistent with a low hydraulic conductivity clay-rich glacial deposits with non-interconnected sand seams. Within the FAB CCR unit, the uppermost aquifer includes the bedrock and overlying transition zone. The uppermost aquifer is assumed to extend from the top of the transitional unit to the base of the bedrock. Since it is a fractured bedrock aquifer, it is unknown the vertical extent of fractures, so it is assumed the entire bedrock beneath the FAB is fractured.

Cross-sections (**Figures 2-2** through **2-7**) were created from the EVS model and analyzed to determine the various changes in lithology across the site. Upon review of the transects, the lithology beneath the FAB consists of (from atop the embankment:) (1) lean clay, (2) sandy lean clay, (3) transitional unit, and (4) bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]; however, the naming of the units has been updated. Previous soil descriptions identify the main clay unit underlying the FAB CCR unit as a "silty clay". However, upon review of geotechnical analysis (including Atterberg limits, moisture content, and grain size analysis) it is clear, that according to USCS descriptors, the soil is classified as a "sandy lean clay" as shown in the summary graph below which includes data from the 2020 investigation.

USCS Soil Classification of 2020 Geotechnical Data





A second discrepancy is the identification of the transitional unit that was included in the descriptors since there appears to be some variance directly atop the bedrock. The transitional unit was encountered below the sandy lean clay and atop the bedrock and mainly consists of weathered bedrock and clay mixed with gravel, sand and silt. The uppermost aquifer was identified as the top of the transitional unit; it includes the transitional unit and bedrock. The lithology directly underlying the FAB consist of the following:

- (1) Lean clay – This unit represents the compacted lean clay (i.e. embankment) and native lean clay soils immediately below the embankment; it consists of soils that are generally classified as lean clay with sand (i.e. percent retained above sieve #200 is ≤30%); in few cases, it is classified as sandy lean clay (i.e. percent retained above sieve #200 is ≥30%). Hereafter the embankment is referred to as lean clay which is approximately 40-ft thick to an approximate elevation of 573 ft. This unit consists of mainly compacted stiff clay and minimal sand seams. The embankment soils were sourced from the native lean clays.

- (2) Sandy lean clay – This unit is encountered directly beneath the FAB ranges from 14 to 34 ft thick with an average thickness of 21 ft, increasing thickness from south to north and consists of low plasticity clay. There were minimal observed sand lenses and they do not appear to be interconnected. Based on the CPT dissipation data, the hydraulic conductivity values ranged between 1.66E-07 cm/s and 3.29E-08 cm/s for native soils. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1] and are adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit.

- (3) Uppermost Aquifer Unit - The weathered bedrock and mixed clays with sand, silt and gravel is referred to as the transitional unit and it sits atop the bedrock. The uppermost aquifer unit begins at the top of the transition unit and originates in the underlying fractured bedrock. The aquifer within the bedrock exhibits artesian conditions. At its thinnest section, the FAB has approximately 14 ft of clay-rich soil separating the bottom of the FAB from the uppermost aquifer. It is assumed the uppermost aquifer unit extends from the top of the transitional unit to the base of the bedrock which can extend to approximately 300 ft bgs [6].

3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

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

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

3.1 Soil Sample and Site-Specific Water Details

3.1.1 Soil Samples for Hydraulic Conductivity Testing

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

3.1.2 Site-Specific Water Testing and Results

Site-specific water samples were collected from five open standpipe wells screened in CCR for geochemical analyses to assess the representative composition of an "aggressive" solution for use in the compatibility portion of the hydraulic conductivity testing. Samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific water samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All water samples were found to be basic, with pH values ranging from 9.73 to 11.8 SU. Total dissolved solids (TDS) concentrations ranged from 390 to 1600 mg/L, although four of the five samples were found to have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as "freshwater". Major ion compositions of these samples are illustrated on the Piper diagram in **Figure 3-1**. Three of the five samples suggest that the anion composition of the basin water is predominantly alkalinity, with variable contributions of sulfate. The cation composition is highly variable, with a range of calcium and monovalent cation (potassium and sodium) proportions and very little magnesium.

The analytical results are provided in **Appendix L** and tabulated in **Table 3-1**. Results were used to calculate the total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist's Workbench (GWB) v12.0.4. The GWB thermodynamic dataset 'thermo.com.V8.R6_.tdat' was used for the calculations to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of milligrams per liter (mg/L) and the ionic strength of each sample was calculated in units of molality (m). All samples contained similar ionic strength values (0.0124 m to 0.0311 m) with the exception of PZ-2, which contained an ionic strength of 0.0723 m. The PZ-2 sample is considered to be the more aggressive solution and was used for the compatibility testing as described in Section 3.2.

3.2 Hydraulic Conductivity Testing Procedure and Termination Criteria

Sixteen soil samples were tested for hydraulic conductivity, *k* using deionized water in accordance with ASTM D5084 [7] to establish a baseline *k* reading. Then, eight of the samples exhibiting high and low *k* values were selected for compatibility testing in accordance with ASTM D7100 [8] using site-specific water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and identified to be appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25. The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity measurements fall within ±25 % of the mean value for hydraulic conductivity, $k \geq$ 3E-8 cm/s or within ±50 % for $k <$ 1E-8 cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;

- At least two pore volumes (PV) of flow have passed through the sample; and

- pH and electrical conductivity of effluent are within 10% of that for the influent with no significant increasing or decreasing trends

3.3 Hydraulic Conductivity Test Results and Assessment

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

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

- PV of flow with time.

- hydraulic conductivity with time.

- hydraulic conductivity with PV;

- pH of inflow and outflow with time; and

- Electrical conductivity (EC) with time.

The progression of different parameters is provided from **Figure 3-2** through **3-41**.

Overall, the hydraulic conductivity, k value of samples range between 3.5E-09 and 1.4E-08 (cm/s). The amount of PV of flow that has passed through the samples ranges from 0.5 to 3.3. As of August 20, 2021, three of the samples have reached the 2 PV criterion. The remaining samples are projected to reach 2 PV between September 2021 and March 2023; this is based on linear extrapolations between the PV that has passed through the sample at known dates and assumes k stays essentially constant, which is the current case.

Overall, the PV of flow is progressing steadily towards the 2 PV criterion. Hydraulic conductivity values are generally stable and can be considered steady. pH values are provided in **Table 3-3.** In general, the average pH of inflow ranges from 12.7 to 12.8, and the average pH of outflow ranges from 8.3 to 8.6. The pH values of outflow are not within the 10 percent of inflow; they are projected to meet the termination criterion between July 2022 and November 2023. These dates are based on the convergence of linear extrapolations of the data.

EC values are provided in **Table 3-4.** In general, the average EC of inflow ranges from 4,523 to 4,840, and the average EC of outflow ranges from 1,126 to 2,060. The EC values of outflow are not within the 10 percent of inflow. Data is scattered such that the date for termination criteria is not predictable.

Table 3-5 summarizes if a sample has reached the termination criterion for PV, pH, EC, and the approximate projected date for reaching the termination criteria. As summarized in the table, samples have not reached all the termination criteria. The projected termination dates are based on the latest extrapolated date from PV and pH criteria. An accurate termination date cannot be predicted due to variation in EC.

The results do not include inflow vs outflow data. the inflow was maintained constant to provide a more stable hydraulic gradient across the sample, more accurate estimation of *k*, faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion would be reached by the same time the other criteria are reached.

4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

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

> *(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*
>
> *(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*
>
> *(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

4.1 Introduction

A fate and transport model analysis has been performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the FAB exceeds the GWPS at the waste boundary throughout its active life.

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

4.2 Groundwater Protection Standards

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

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

4.3 Consideration of Background Groundwater Concentrations

The background groundwater concentrations have been considered and are a factor when developing GWPS as discussed in the previous subsection (Section 4.2). At the FAB, naturally occurring background groundwater concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and peak groundwater background concentrations are further discussed in Section 4.6.1.

4.4 Leachate Quality Results

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

In addition to the site-specific leachate concentrations, 90th percentile concentrations from the 2014 EPA study [9] were considered in the analysis. This data is summarized in **Table 4-2**.

4.5 Fate and Transport Model

4.5.1 Analysis Model

A one-dimensional fate and transport model was performed to further understand the potential for contaminant transport from the FAB to the uppermost aquifer. The model was developed with a contaminant transport process through the sandy lean clay layer under the FAB. Contaminant transport processes are discussed in Section 4.5.2.1.

The modeling program POLLUTE [10] was selected for the one-dimensional fate and transport evaluation. The data input for POLLUTE acquires all the input parameters, performs calculations for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.4.2) to yield predicted concentrations at the various specified times and distances.

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

4.5.2 Proposed Mathematical and Associated Computer Model

4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the FAB for the modeled layer include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [11]:

$$\boldsymbol{Equation\ No.1}: \qquad n\frac{\delta c}{\delta t} = nD\frac{\delta^2 c}{\delta z^2} - V_\alpha\frac{\delta c}{\delta z} - \rho \mathrm{K}_d\frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

V_α = Darcy velocity in the vertical direction

K_d = distribution coefficient

ρ = dry density of soil

λ= decay constant of the contaminant species

t = time

POLLUTE assumes that the transport phenomena are governed by Equation No. 1

4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the leachate. The results from the model can thus be used as a prediction factor for estimating the future concentration of any COC in groundwater. Multiplying the output prediction factor by the initial leachate concentration returns the predicted groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

Equation No. 2: $PGC_t = PF_t * C_o$

Where:

PGC_t =predicted groundwater concentration after t years.

PF_t = prediction factored after t years, which is the output of the model.

C_o = established leachate concentration of the COC.

4.5.3 Fate and Transport Model Inputs

4.5.3.1 *Initial Leachate or Source Concentration*

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

4.5.3.2 *Number of Layers and Layer Thickness*

One layer was modeled at the site: the sandy lean clay layer. At the FAB, the sandy lean clay layer has an average thickness of 20.7 ft. The average thickness of the layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer and averaging the difference over the extent of the footprint of the FAB; model documentation for the average thickness can be found in **Appendix O**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The sandy lean clay layer was divided into 10 sublayers at the FAB.

4.5.3.3 *Modeling Period*

The model was run for an operating period of 67 years. This modeling period captures the amount of time elapsed from 1975, when operations started, to 2041, when the Landfill is planned to be closed.

4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters or they can be selected by the user. The default Talbot parameter were used in this demonstration [12].

4.5.3.5 *Boundary Conditions*

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

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

4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model. The Darcy velocity was calculated for the FAB using a vertical gradient and the vertical hydraulic conductivity of the sandy lean clay layer. The vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the elevation of the typical operation water level in the FAB. These parameters were chosen to produce a conservative value for the Darcy velocity. Darcy velocity value of 6.08E-3 m/year was calculated for the FAB as provided in **Appendix O**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing program for the vertical hydraulic conductivity of sandy lean clay.

4.5.3.7 *Hydrodynamic Dispersion Coefficient*

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

Equation No. 3: $$D = D^* + av$$

Where:

D = the hydrodynamic dispersion coefficient (m^2/year);

D* = the effective diffusion coefficient (m^2/year).

a = the dispersivity (m);

v = the groundwater seepage velocity (m/year).

For this demonstration, the coefficient of hydrodynamic dispersion value (D) of 0.19 m^2/year was input into the model. This value was based on the effective diffusion coefficient (D*) for chloride (0.19 m2/yr), as calculated by Rowe et al. [13]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest, this is a conservative constituent to model among the COC.

The second part of Equation 3, (av) is related to dispersion. Rowe et al. [9]. Discusses when the seepage velocity (6.08E-3 m/year) is low (i.e., clay soils), diffusion will control the parameter hydrodynamic dispersion (D) and dispersion is negligible.

4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data. An average of 24 percent porosity was estimated for the modeled sandy lean clay layer.

Based on empirical data provided by Sara (1994) [14], the laboratory porosity data was converted to effective porosities. An effective porosity value of 19 percent was used for the modeled sandy lean clay layer.

Density values from laboratory testing were also used to determine a suitable POLLUTE model input. The average density of 1,919 kg/m^3 (119.8 pcf) was obtained from the available data.

4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of containments in the modeled layers, while degradation simulates the breakdown of contaminants over time. Adsorption and degradation are assumed to be zero for the baseline model, which is conservative. Adsorption for Molybdenum was considered for the sensitivity analysis including; the minimum vertical flow path, extended time, increased Darcy velocity, the minimum effective porosity, and the high coefficient of hydrodynamic dispersion. For these sensitivity analyses, an adsorption coefficient of 0.0082 m3/kg was used based on [15]. More on sensitivity analyses are provided in Section 4.6.2.

4.6 Fate and Transport Analysis Results and Evaluation

4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. The baseline model calculated a PF_t of 6.97E-3. With both the C_o and

PF_t established, the PGC_t (i.e., predicted concentration) was calculated and compared to established GWPS for the FAB and presented in **Table 4-3**. As provided in the table, the predicted groundwater quality results, both for site-specific leachate and the 90th percentile concentrations from the 2014 EPA study [9] are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in 2016-2017 groundwater sampling events and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Table 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of FAB's active life.

The driving mechanism for the transport is chemical diffusion because the advective flow would take more than 130 years for a water molecule to travel from the bottom of FAB to the uppermost aquifer. **Appendix O** provides calculations for the time of travel.

The baseline model outputs for the FAB are included in **Appendix P**.

4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or PF_t, given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**. The resulting PF_t, from each sensitivity analysis was compared to a threshold prediction value, $PF_{threshold}$. The $PF_{threshold}$ value represents the PF_t at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the CCR unit; the threshold value is 1.06E-2 for the FAB. $PF_{threshold}$ is calculated using the Equation No. 4:

Equation No. 4:

$$PF_{threshold} = \min\left\{\frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \ldots, \frac{GWPS_i}{C_i}, \ldots, \frac{GWPS_n}{C_n}\right\}$$

Where:

$PF_{threshold}$ = Threshold Prediction Factor

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

C_i = Maximum porewater concentration of the COC 'i'

4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity. A Darcy velocity double the baseline value, which is 1.22E-02 m/year was used as input to the sensitivity analysis.

4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from testing completed by Rowe et al., 2004) [13], and thus a 25% increase and decrease are considered a satisfactory variation for sensitivity analysis.

4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results, which are 14 percent and 31 percent, respectively. Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results, which are 14 percent and 31 percent, respectively.

4.6.2.4 *Layer Thickness*

The isopach map was used to calculate the maximum and minimum thickness for the sandy lean clay layer (see **Appendix O**). Using the minimum and maximum thickness values as inputs, two additional models were run for FAB to evaluate model sensitivities to layer thickness; in each model, only the thickness variable was changed.

4.6.2.5 *Modeling Period*

The modeling period used was 67 years (the "baseline"). To further evaluate the impact of modeling runtime on the resultant PF_t, one model was run with a modeling period of 97 years to capture post-closure care time period.

4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. The resulting PF_t, from each sensitivity analysis was compared to a threshold prediction value, $PF_{threshold}$. As shown in **Table 4-5,** using more conservative model input parameters resulted in PF_t values ranging from 7.18E-50 to 1.96E-3, all of which are less than the threshold value. Thus, this sensitivity analysis demonstrates that the FAB is not predicted to impact groundwater quality based on conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix P**.

4.6.3 Reliability of Computer Model

The computer-based transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications (Talbot, 1979 [12]; Rowe, 1987 [16]; Rowe and Booker, 1987 [17]; Rowe, 1988 [11]; and Rowe and Booker, 1989 [18]) lend to the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

4.6.4 Degree of Conservativeness in Model Results

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

- The maximum measured leachate (i.e., porewater) concentration for each constituent was used for the fate and transport model prediction table;

- Constant leachate concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decreased leachate concentrations over time but to be conservative the model assumed constant leachate concentration over time;

- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays, which would retard or slow down the migration. The baseline model and about half of the sensitivity analyses, the model assumed no adsorption would occur over time;

- Degradation of leachate (input values) through the either biologic or chemical process was assumed not to occur during the modeling period. By assuming no degradation, the model overestimated the predicted groundwater quality over time; and

- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of FAB to the top of the uppermost aquifer; the analysis does not consider a 2-D flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

5. SUMMARY

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

Site-specific water was collected from different wells screened in CCR and tested to assess which had the more aggressive water. Water from PZ-2 was deemed to be more aggressive and used for compatibility testing to estimate the impacts on the hydraulic conductivity of soil samples. The testing program is still underway.

A comprehensive subsurface stratigraphy model was created using the augmented data set and processing it through the EVS. Following, Fate and Transport analysis was conducted with PZ-2 chemistry data to assess whether there is a reasonable probability that water from the FAB may result in releases to groundwater throughout its active life that will exceed the GWPS at the waste boundary.

The Fate and Transport analysis was conducted for the operating time period of 67 years ("baseline"), which captures the amount of time elapsed from 1975, when CCR unit operations started, to 2041, when the existing Landfill is planned to be closed.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than 130 years for a water molecule to travel from the bottom of FAB to the uppermost aquifer. Therefore, the analyses results indicate that, due to the low permeability nature of the in-situ unconsolidated materials, chemical diffusion is the dominant transport mechanism as opposed to advection or seepage flow. Consequently, the current hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow. It is highly unlikely that running the samples until they achieve termination criteria would change the outcome of this study, and therefore, the tests do not need to extend until November 2023.

In addition, the Fate and Transport analysis was augmented with a sensitivity analysis to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The analyses results show that there is no reasonable probability that water from the FAB will cause releases to groundwater that will exceed the GWPS at the waste boundary over the projected active life of the CCR unit.

6. CERTIFICATION

CCR Unit: DTE Electric Company; Monroe Power Plant, Fly Ash Basin (FAB)

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

Omer Bozok
Printed Name

November 30, 2021
Signature Date

6201062700 Michigan June 4, 2024
Registration Number State Expiration Date

OMER
BOZOK
ENGINEER
No.
6201062700

Affix Seal

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TABLES

Table 2-1 – Field and Lab Testing Summary

Test	Current ASTM	Number Used in Characterization
Pocket Penetrometer	WK27337	418
Slug Test	D4044	8
Grain Size Distribution	D6913	124
Atterberg Limits	D4318	136
Water Content	D2216	754
Unit Weight	D7263	352
Specific Gravity	D854	34
Hydraulic Conductivity	D5084/D7100	6/33
Cone Penetration Test	D3441	95

Table 2-2 – Dissipation Tests Results

CPT ID	Lithology Unit	Test Elevation (ft)	Hydraulic Conductivity (cm/s)
CPT20-028	Native	564.9	6.98E-07
CPT20-028	Native	559.9	2.77E-08
CPT20-048	Native	565.0	1.84E-07
CPT20-048	Native	559.9	2.41E-08
CPT20-130	Native	565.0	1.66E-07
CPT20-136	Native	549.1	3.29E-08

Table 3-1 – Ionic Strength of Filtered Pore Water

Sample ID	Units	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5
Alkalinity, Total (as CaCO3)	mg/L	460	1400	580	170	130
Antimony	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.0092
Arsenic	mg/L	0.0158	0.0129	0.0079	0.218	0.058
Barium	mg/L	4.6	1.2	2.8	0.189	0.207
Beryllium	mg/L	0.00222	0.00224	0.004	0.00244	0.004
Boron	mg/L	11	8.9	6.3	4.9	24
Cadmium	mg/L	0.00217	0.004	0.004	0.0022	0.00169
Calcium	mg/L	230	74	187	111	550
Chloride	mg/L	48	32	34	37	26
Chromium	mg/L	0.0067	0.0082	0.0066	0.0075	0.01
Cobalt	mg/L	0.00569	0.00268	0.0055	0.0059	0.00534
Fluoride	mg/L	3.6	23	1.2	0.83	0.4
Iron	mg/L	0.62	0.95	0.51	0.77	0.21
Lead	mg/L	0.0062	0.0072	0.00593	0.0073	0.01

Lithium	mg/L	0.034	0.0135	0.032	0.77	0.0106
Magnesium	mg/L	0.42	1.04	0.4	0.46	1.34
Manganese	mg/L	0.01	0.0101	0.01	0.0105	0.01
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	2.4	3.9	0.39	3.9	19.2
Potassium	mg/L	39	430	116	124	6.8
Selenium	mg/L	0.093	0.2	0.09	0.056	0.0193
Sodium	mg/L	78	1050	183	97	3.3
Sulfate	mg/L	11	67	27	140	530
Thallium	mg/L	0.01	0.00141	0.00057	0.00531	0.00048
Ionic Strength	**molal (m)**	**0.0135**	**0.0723**	**0.0203**	**0.0124**	**0.0311**

Notes:

U - Analyzed but not detected above the method detection limit. The method detection limit is shown.

Table 3-2 – Hydraulic Conductivity Test Results Summary

ID	Date	Days After Injection	Permeability (cm/s)	Pore Volumes Passed After Injection	Days to Target Pore Volume	Date of Target PV Reached
B2-ST-1 (20-22')	2/19/2021	0	5.9E-09	0.0000		
	8/20/2021	182	5.4E-09	1.0116	178	2/13/2022
B4-ST-2 (40-42')	2/26/2021	7	3.6E-09	0.0176		
	8/20/2021	182	3.5E-09	0.4894	560	3/3/2023
B4-ST-4 (70-72.5')	2/26/2021	7	1.4E-08	0.1220		
	8/20/2021	182	1.1E-08	2.7318	Complete	7/2/2021
B6-ST-1 (25-27')	2/19/2021	0	9.7E-09	0.0000		
	8/20/2021	182	7.6E-09	1.2755	103	12/1/2021
B6-ST-3 (55-57.5')	2/19/2021	0	1.2E-08	0.0000		
	8/20/2021	182	9.8E-09	1.8601	14	9/2/2021
B6-ST-4 (65-67.5')	2/26/2021	7	1.3E-08	0.1209		
	8/20/2021	182	1.0E-08	2.5584	Complete	7/12/2021
B9-ST-2 (40-42')	2/19/2021	0	1.1E-08	0.0000		
	8/20/2021	182	1.1E-08	1.8013	20	9/9/2021
B9-ST-3 (55-57')	3/19/2021	28	1.7E-08	0.5500		
	8/20/2021	182	1.4E-08	3.3033	Complete	6/10/2021

Table 3-3 – Summary of pH Results

Sample ID	Parameter	pH Inflow	pH Outflow	Is pH of outflow within termination boundaries?	Approximate Projected Termination Date
B2-ST-1 (20-22')	Min	12.3	8.2	No	11/2/2023
	Max	12.9	8.9		
	Average	12.7	8.5		
B4-ST-2 (40-42')	Min	12.4	8.2	No	3/29/2023
	Max	12.9	8.6		
	Average	12.7	8.5		
B5-ST-4 (70-72.5')	Min	12.3	8.0	No	5/4/2023
	Max	13.1	8.9		
	Average	12.7	8.6		
B6-ST-1 (25-27')	Min	12.4	8.2	No	12/5/2022
	Max	13.2	8.9		
	Average	12.8	8.5		
B6-ST-3 (55-57.5')	Min	12.4	8.0	No	7/28/2022
	Max	13.0	8.9		
	Average	12.7	8.5		
B6-ST-4(65.67.5')	Min	12.3	7.8	No	11/1/2022
	Max	13.0	8.7		
	Average	12.7	8.3		
B9-ST-2(40-42')	Min	12.3	7.9	No	10/10/2022
	Max	13.0	9.0		
	Average	12.7	8.6		
B9-ST-3(55-57')	Min	12.2	7.9	No	6/14/2023
	Max	13.2	9.0		
	Average	12.7	8.5		

Table 3-4 – Summary of Electrical Conductivity Results

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)	Is EC of outflow within termination boundaries?	Approximate Projected Termination Date
B2-ST-1 (20-22')	Min	4300	1434	No	N/A
	Max	4800	3000		
	Average	4553	2059		
B4-ST-2 (40-42')	Min	4840	1126	No	N/A
	Max	4840	1126		
	Average	4840	1126		
B5-ST-4 (70-72.5')	Min	4120	1082	No	N/A
	Max	5230	1534		
	Average	4650	1211		
B6-ST-1 (25-27')	Min	4370	1000	No	N/A
	Max	5040	1614		
	Average	4735	1384		
B6-ST-3 (55-57.5')	Min	4350	1128	No	N/A
	Max	4900	1683		
	Average	4730	1342		
B6-ST-4(65.67.5')	Min	3970	963	No	N/A
	Max	5090	1708		
	Average	4522	1201		
B9-ST-2(40-42')	Min	4380	1025	No	N/A
	Max	4940	1796		
	Average	4692	1232		
B9-ST-3(55-57')	Min	4230	885	No	N/A
	Max	5080	2430		
	Average	4811	1378		

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

	Termination Criterion Reached				
Sample ID	Pore Volumes Passed, PV	pH	Electrical Conductivity, EC	Approximate Projected Termination Date	Date Based On
B2-ST-1 (20-22')	No	No	No	11/2/2023	pH
B4-ST-2 (40-42')	No	No	No	3/29/2023	pH
B4-ST-4 (70-72.5')	Yes	No	No	5/15/2023	pH
B6-ST-1 (25-27')	No	No	No	12/5/2022	pH
B6-ST-3 (55-57.5')	No	No	No	7/28/2022	pH
B6-ST-4(65.67.5')	Yes	No	No	11/1/2022	pH
B9-ST-2(40-42')	No	No	No	10/10/2022	pH
B9-ST-3(55-57')	Yes	No	No	3/19/2023	pH

Table 4-1 – Groundwater Protection Standards

Constituents	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
				UTL	**GWPS**	**UTL**	**GWPS**	**UTL**	**GWPS**	**UTL**	**GWPS**	**UTL**	**GWPS**	**UTL**	**GWPS**	**UTL**	**GWPS**
Antimony	mg/L	MCL	6.0E-03	2.1E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**
Arsenic	mg/L	MCL	1.0E-02	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**
Barium	mg/L	MCL	2.0E+00	2.2E-02	**2.0E+00**	1.0E-02	**2.0E+00**	2.1E-02	**2.0E+00**	1.3E-02	**2.0E+00**	1.8E-02	**2.0E+00**	3.4E-02	**2.0E+00**	1.0E-02	**2.0E+00**
Beryllium	mg/L	MCL	4.0E-03	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**
Chromium	mg/L	MCL	1.0E-01	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	3.1E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**
Cobalt	mg/L	RSL	6.0E-03	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.6E-03	**6.0E-03**	1.0E-03	**6.0E-03**
Fluoride	mg/L	MCL	4.0E+00	1.8E+00	**4.0E+00**	1.8E+00	**4.0E+00**	1.7E+00	**4.0E+00**	1.1E+00	**4.0E+00**	1.7E+00	**4.0E+00**	1.8E+00	**4.0E+00**	1.8E+00	**4.0E+00**
Lead	mg/L	RSL	1.5E-02	1.0E-03	**1.5E-02**	1.0E-03	**1.5E-02**	2.5E-03	**1.5E-02**	1.0E-03	**1.5E-02**	1.0E-03	**1.5E-02**	1.1E-03	**1.5E-02**	1.0E-03	**1.5E-02**
Lithium	mg/L	Background or RSL	4.0E-02	9.2E-02	**9.2E-02**	1.2E-01	**1.2E-01**	1.3E-01	**1.3E-01**	2.3E-02	**4.0E-02**	5.0E-02	**5.0E-02**	1.0E-01	**1.0E-01**	4.3E-02	**4.3E-02**
Mercury	mg/L	MCL	2.0E-03	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**
Molybdenum	mg/L	RSL	1.0E-01	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**
Radium-226/228	pCi/L	MCL	5.0E+00	1.3E+00	**5.0E+00**	4.0E+00	**5.0E+00**	3.0E+00	**5.0E+00**	1.2E+00	**5.0E+00**	2.7E+00	**5.0E+00**	1.1E+00	**5.0E+00**	1.4E+00	**5.0E+00**
Selenium	mg/L	MCL	5.0E-02	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**
Thallium	mg/L	MCL	2.0E-03	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-2 –Baseline Fate and Transport Results

	Constituents	Units	Maximum Observed Concentration	90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer		Most Conservative GWPS	Outcome - Site (Pass/Fail)	Outcome - 90th Percentile (Pass/Fail)
						FAB	90th Percentile			
Appendix IV	Antimony*	mg/L	5.0E-03	4.0E-02	7.0E-03	3.5E-05	2.8E-04	6.0E-03	PASS	PASS
	Arsenic	mg/L	1.1E-01	7.8E-01	7.0E-03	7.7E-04	5.4E-03	1.0E-02	PASS	PASS
	Barium	mg/L	2.1E+00	2.1E-01	7.0E-03	1.5E-02	1.5E-03	2.0E+00	PASS	PASS
	Beryllium*	mg/L	2.0E-03	1.0E-03	7.0E-03	1.4E-05	7.0E-06	4.0E-03	PASS	PASS
	Cadmium*	mg/L	2.0E-03	6.0E-02	7.0E-03	1.4E-05	4.2E-04	5.0E-03	PASS	PASS
	Chromium	mg/L	7.8E-03	2.0E-01	7.0E-03	5.4E-05	1.4E-03	1.0E-01	PASS	PASS
	Cobalt	mg/L	2.6E-03	5.0E-02	7.0E-03	1.8E-05	3.5E-04	6.0E-03	PASS	PASS
	Fluoride	mg/L	2.4E+01	2.1E+01	7.0E-03	1.7E-01	1.5E-01	4.0E+00	PASS	PASS
	Lead	mg/L	5.3E-03	1.0E-01	7.0E-03	3.7E-05	7.0E-04	1.5E-02	PASS	PASS
	Lithium	mg/L	3.6E-01	4.5E-01	7.0E-03	2.5E-03	3.1E-03	4.0E-02	PASS	PASS
	Mercury*	mg/L	2.0E-04	7.0E-06	7.0E-03	1.4E-06	4.9E-08	2.0E-03	PASS	PASS
	Molybdenum	mg/L	9.4E+00	7.1E+00	7.0E-03	6.6E-02	4.9E-02	1.0E-01	PASS	PASS
	Combined Radium	pCi/L	1.9E+00	-	7.0E-03	1.3E-02	-	5.0E+00	PASS	NA
	Selenium	mg/L	8.5E-02	3.2E-01	7.0E-03	5.9E-04	2.2E-03	5.0E-02	PASS	PASS
	Thallium	mg/L	7.5E-04	3.0E-03	7.0E-03	5.2E-06	2.1E-05	2.0E-03	PASS	PASS

Notes:

* = Laboratory RL is used here; all analyses were below the RL.

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

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

Constituent	Unit	GWPS Selection	MW-16-01				
			Data				
			Maximum Observed Concentration (A)	**Maximum Predicted Concentration (B)**	**Combined Concentration (A+B)**	**GWPS**	**Pass/Fail**
Antimony	mg/L	MCL	2.1E-03	2.0E-06	2.1E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	2.3E-02	8.4E-04	2.4E-02	2.0	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	0.10	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.80	9.6E-03	1.81	4.0	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	7.8E-02	1.4E-04	7.8E-02	9.2E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	0.10	**Pass**
Radium-226/228	pCi/L	MCL	8.5E-04	7.6E-04	1.6E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

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

Constituent	Unit	GWPS Selection	MW-16-02				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	9.0E-03	8.4E-04	9.8E-03	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.71	4.00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	1.1E-01	1.4E-04	1.1E-01	1.2E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	3.3E-03	7.6E-04	4.1E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

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

Constituent	Unit	GWPS Selection	MW-16-03 Data: Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	2.1E-02	8.4E-04	2.2E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	3.1E-03	3.1E-06	3.1E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	2.5E-03	2.1E-06	2.5E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	1.2E-01	1.4E-04	1.2E-01	1.3E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	5.8E-04	7.6E-04	1.3E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

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

Constituent	Unit	GWPS Selection	MW-16-04				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	0	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	GWPS	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	6	MCL	1.1E-02	8.4E-04	1.2E-02	2.0E+00	**Pass**
Beryllium	10	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	2000	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	4	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	5	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	100	MCL	1.10	9.6E-03	1.1E+00	4.0E+00	**Pass**
Lead	6	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	4	RSL	2.1E-02	1.4E-04	2.1E-02	4.0E-02	**Pass**
Mercury	15	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	40	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	9.7E-04	7.6E-04	1.7E-03	5.0E-03	**Pass**
Selenium	100	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	5	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3 - MW-16-05
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-05				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	1.4E-02	8.4E-04	1.5E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	4.7E-02	1.4E-04	4.7E-02	5.0E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	2.3E-03	7.6E-04	3.0E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter
mg/L = milligrams per liter

Table 4-3 - MW-16-06
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-06				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.4E-02	8.4E-04	3.5E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.6E-03	1.0E-06	1.6E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.7E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.1E-03	2.1E-06	1.1E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	9.4E-02	1.4E-04	9.4E-02	1.0E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	9.2E-04	7.6E-04	1.7E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3 - MW-16-07
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-07 Data: Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	9.4E-03	8.4E-04	1.0E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.7E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	3.9E-02	1.4E-04	3.9E-02	4.3E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	1.1E-03	7.6E-04	1.9E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-4 – Sensitivity Analysis Model Inputs

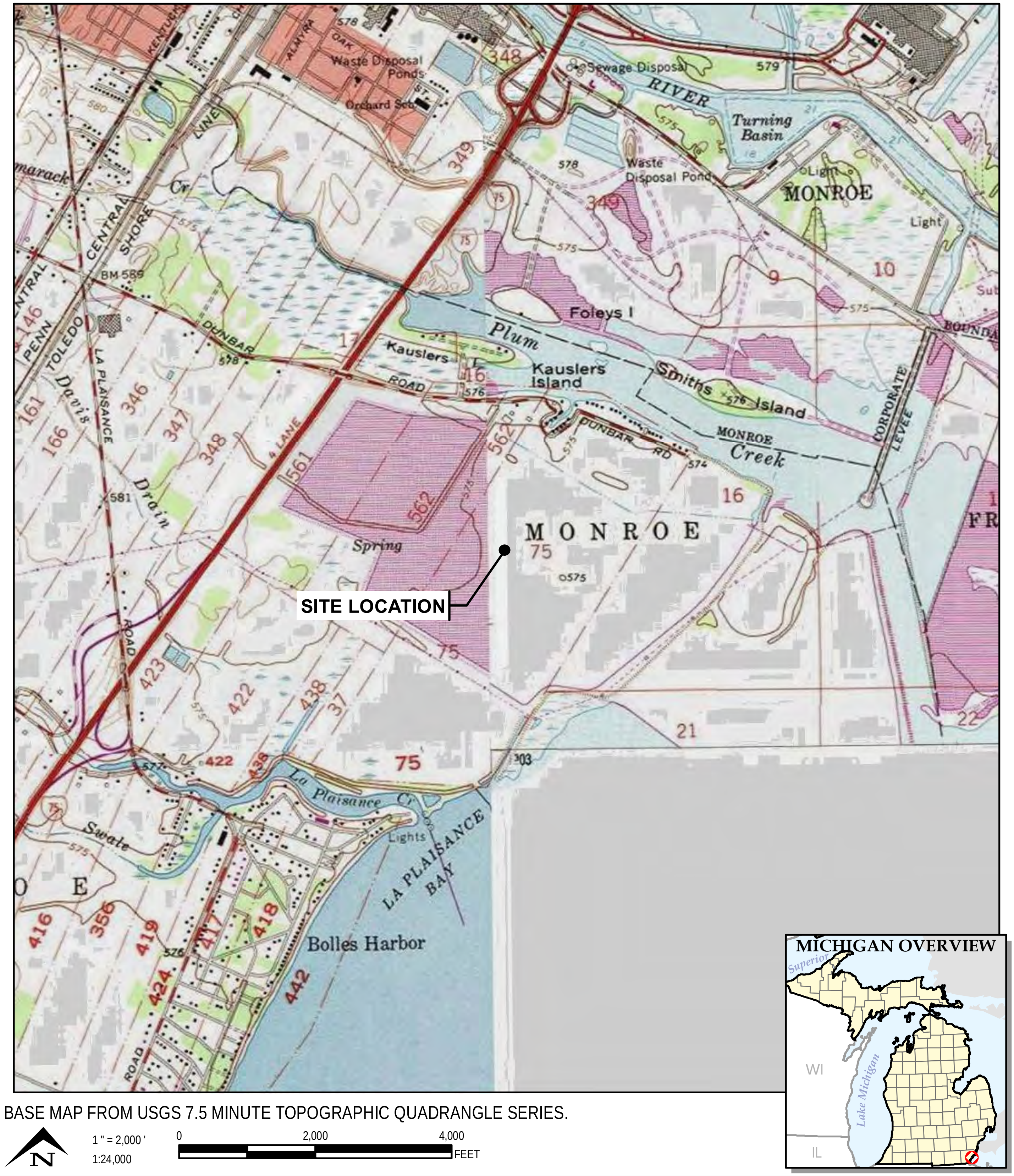
	Baseline	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**	**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**	**Baseline**	**Sensitivity Analysis**
Layer Properties	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr) Doubled	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)	Kd (m3/kg)	Kd Molybdenum (m3/kg)
Sandy Lean Clay	6.31	10.42	4.33	6.08E-03	1.22E-02	0.019	0.024	0.014	0.24	0.38	0.17	0.19	0.31	0.14	67	97	0	0.0082

Dv = Vertical Darcy Velocity

Table 4-5 – Sensitivity Analysis Results Prediction Factors

Monroe Ash Basin Sensitivity Analysis			
Model Name	**Description**	**Prediction Factor**	**Passing?***
Monroe_Baseline	Baseline model for the Bottom Ash Basins.	6.97E-03	YES
Monroe_ExtendedRun_Kd	Model runtime was extended from 67 years to 97 years; distribution coefficient applied for Molybdenum.	3.64E-46	YES
Monroe_DoubleDarcy_Kd	Darcy velocity value was doubled; distribution coefficient applied for Molybdenum.	4.97E-48**	YES
Monroe_CoHD_High_Kd	Coefficient of Hydrodynamic Dispersion was increased by 25%. Distribution coefficient applied for Molybdenum.	7.18E-50	YES
Monroe_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	1.96E-03	YES
Monroe_Porosity_High	Used the highest effective porosity; derived from data in project database.	1.47E-03	YES
Monroe_Porosity_Low_Kd	Used the lowest effective porosity; derived from data in project database. Distribution coefficient applied for Molybdenum.	3.09E-45**	YES
Monroe_Thick	Used thickest interval seen in project model; derived from project EVS model.	1.91E-07	YES
Monroe_Thin_Kd	Used thinnest interval seen in project model; distribution coefficient applied for Molybdenum.	1.60E-37	YES

* Indicates value less that $PF_{threshold}$, as discussed in Section 4.6.2.
** This sensitivity model run did not come to full convergence, because the prediction factor was below 10^{-50}. Therefore, the lowest calculated prediction factor was reported.



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

TRC - GIS

PROJECT:

DTE ELECTRIC COMPANY
MONROE POWER PLANT
FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

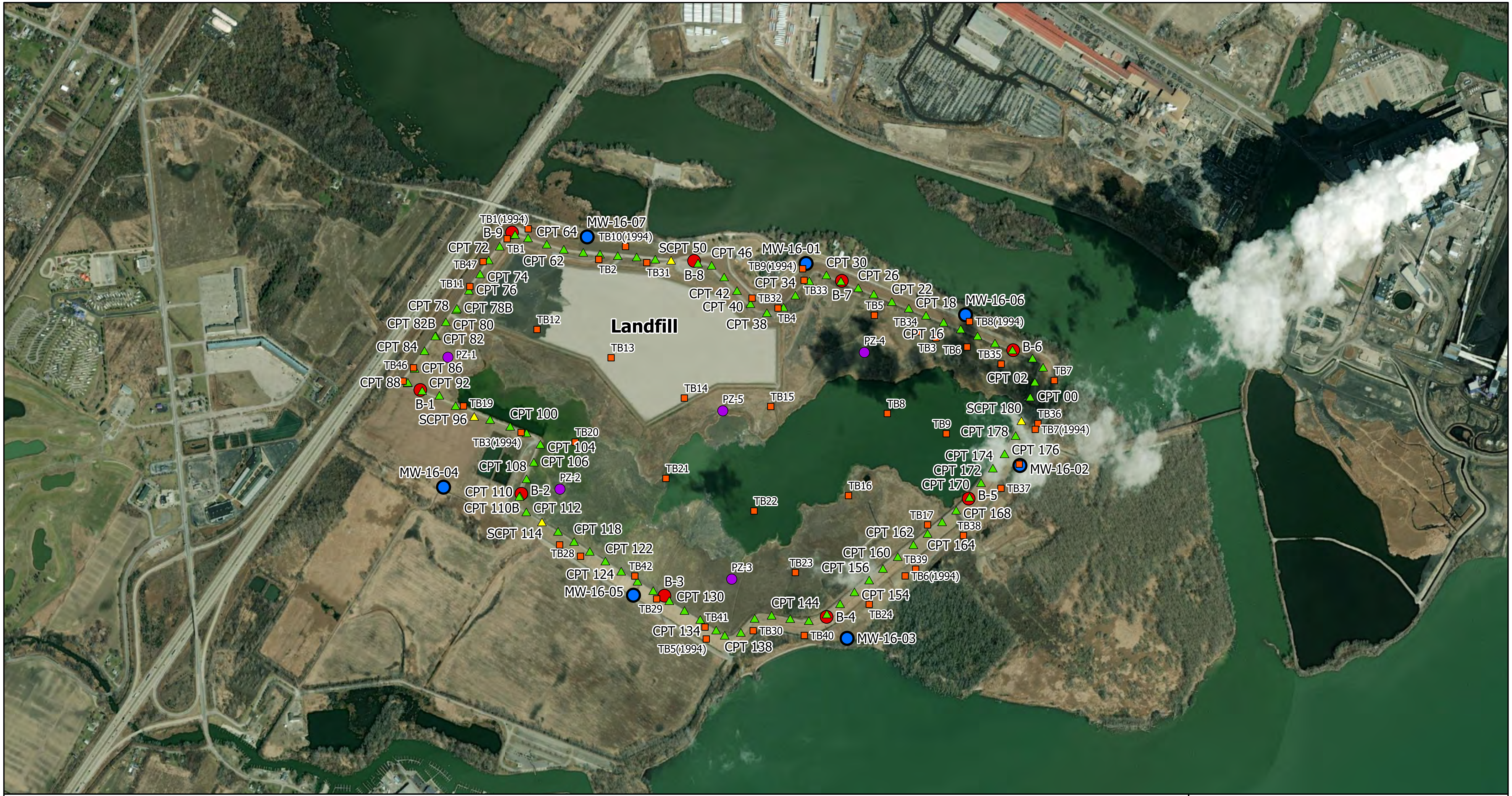
TITLE:

SITE LOCATION MAP

DRAWN BY:	S.MAJOR
CHECKED BY:	B. YELEN
APPROVED BY:	V. BUENING
DATE:	JANUARY 2020
PROJ. NO.:	320511.0001
FILE:	320511-0001-008SLM-MPP-Fig01.mxd

FIGURE 1

E:\DTE\CCR_Sites\2017_265996\320511-0001-008SLM-MPP-Fig01.mxd -- Saved By: MVAPHIADIS on 1/28/2020, 11:58:35 AM



Boring Locations

- ● Boring - Geosyntec
- ▲ CPT - Geosyntec
- ● MW - TRC
- ▲ Seismic and CPT
- ■ Pre-2000 Borings
- ● Piezometer - Geosyntec

Note: For clarity purposes, not all CPT IDs are provided.

0 500 1,000 2,000 3,000 4,000 Feet

N

Field Investigation Locations
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

Geosyntec consultants

Figure

2-1

GLP8014

November 2021

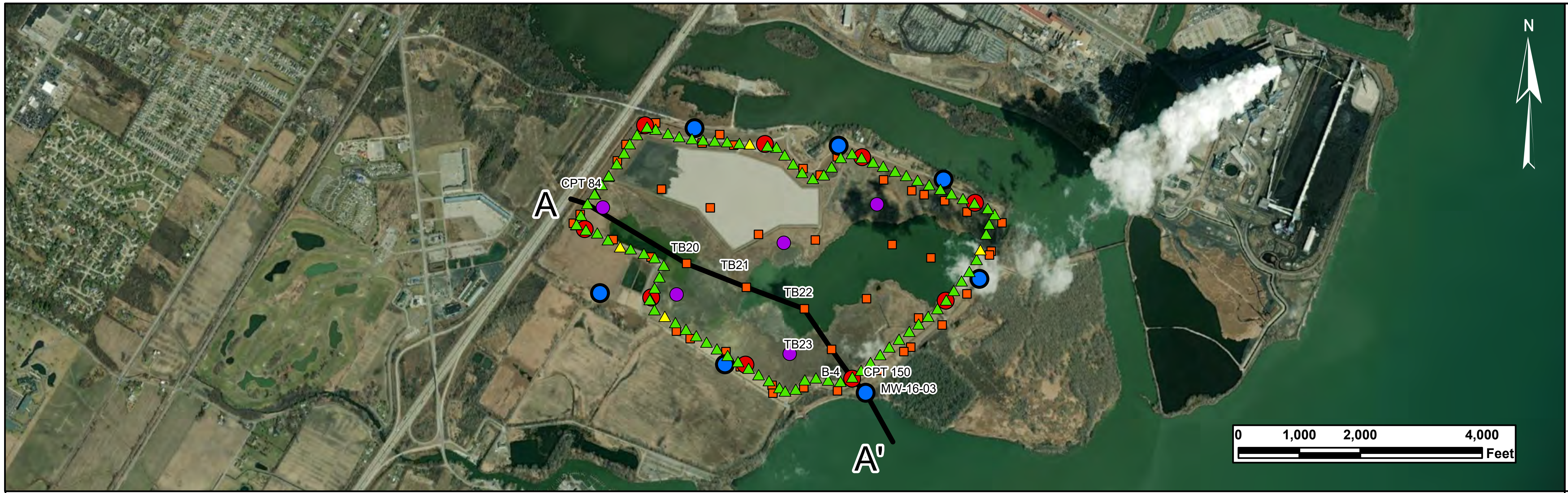
Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Boring - Pre-construction Borings
- 🟣 Piezometer - Geosyntec

Cross Section Locations
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

Geosyntec
consultants

GLP8014	November 2021	**Figure 2-2**

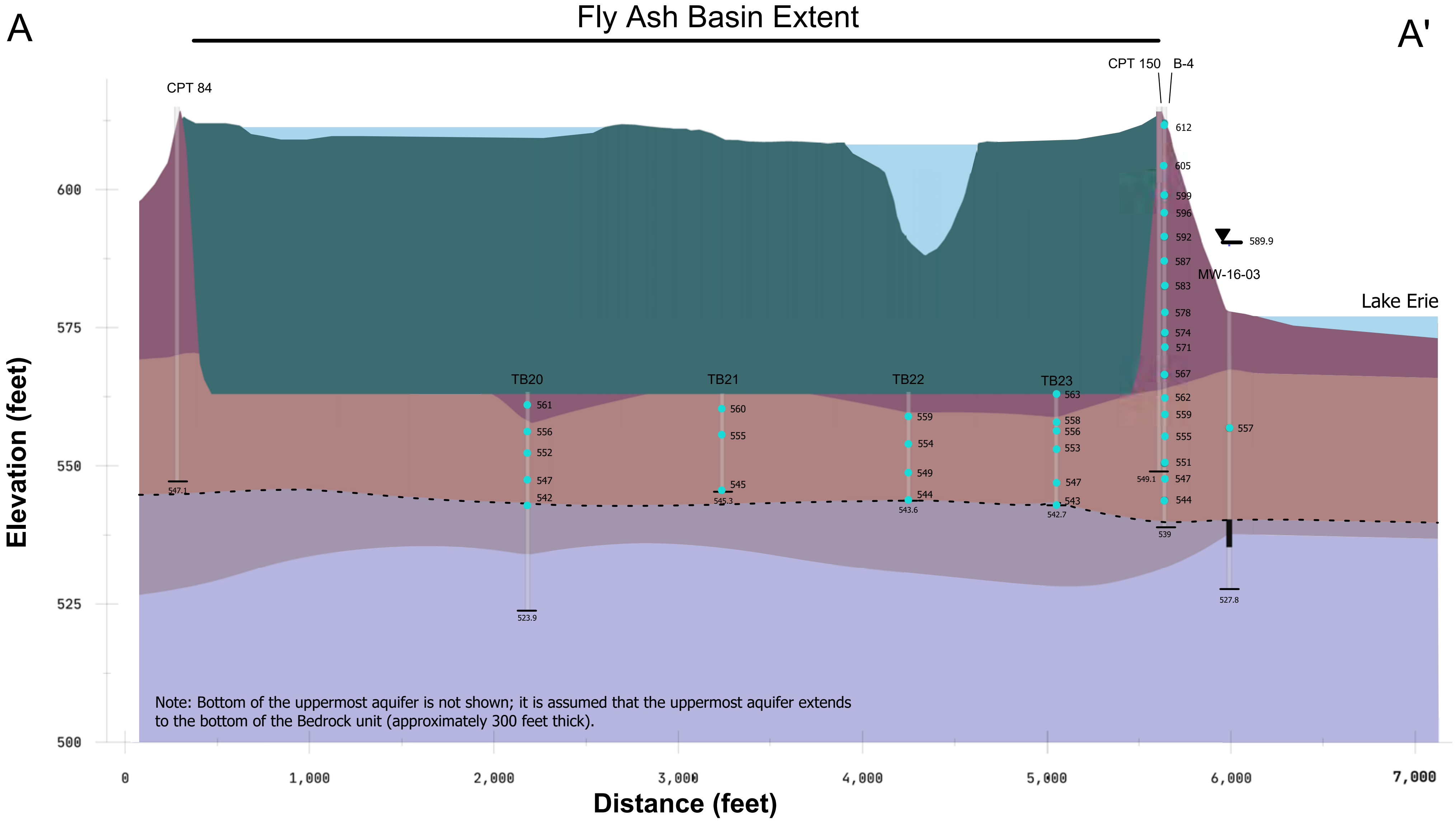


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- 🟦 Ponded Water
- ▨ Fly Ash
- ▨ Lean Clay
- ▨ Sandy Lean Clay
- ▨ Transition Zone
- ▨ Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section A - A'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

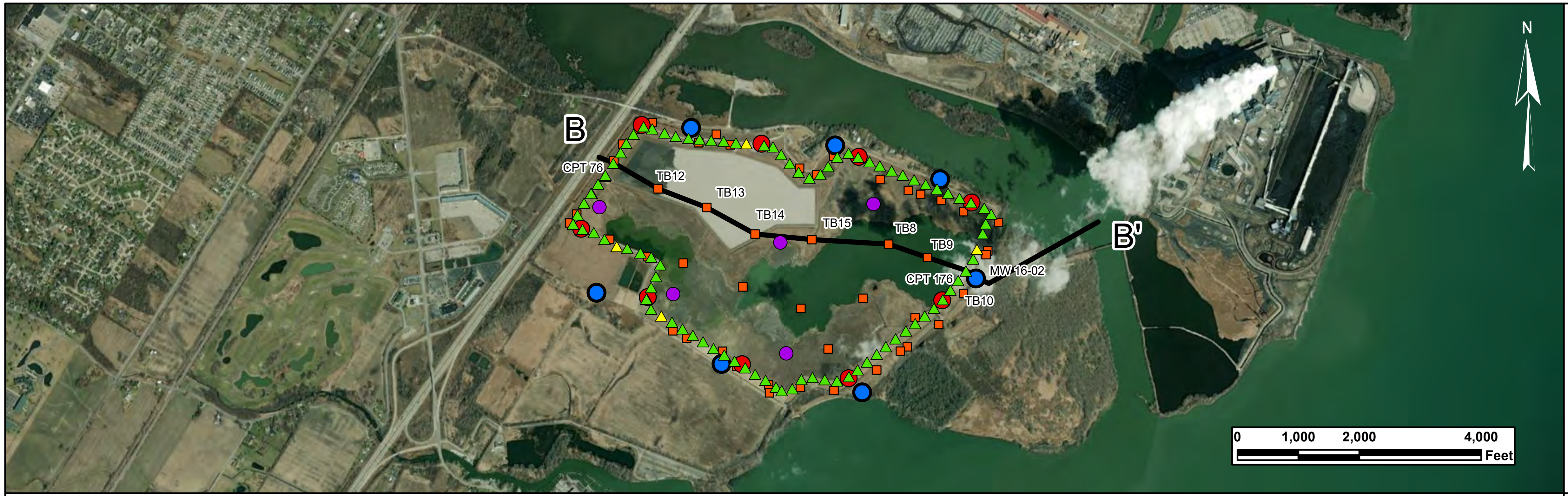
Geosyntec consultants

GLP8014 | November 2021

Figure

2-3

G:\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_YW.aprx 11/22/2021 1:37 PM

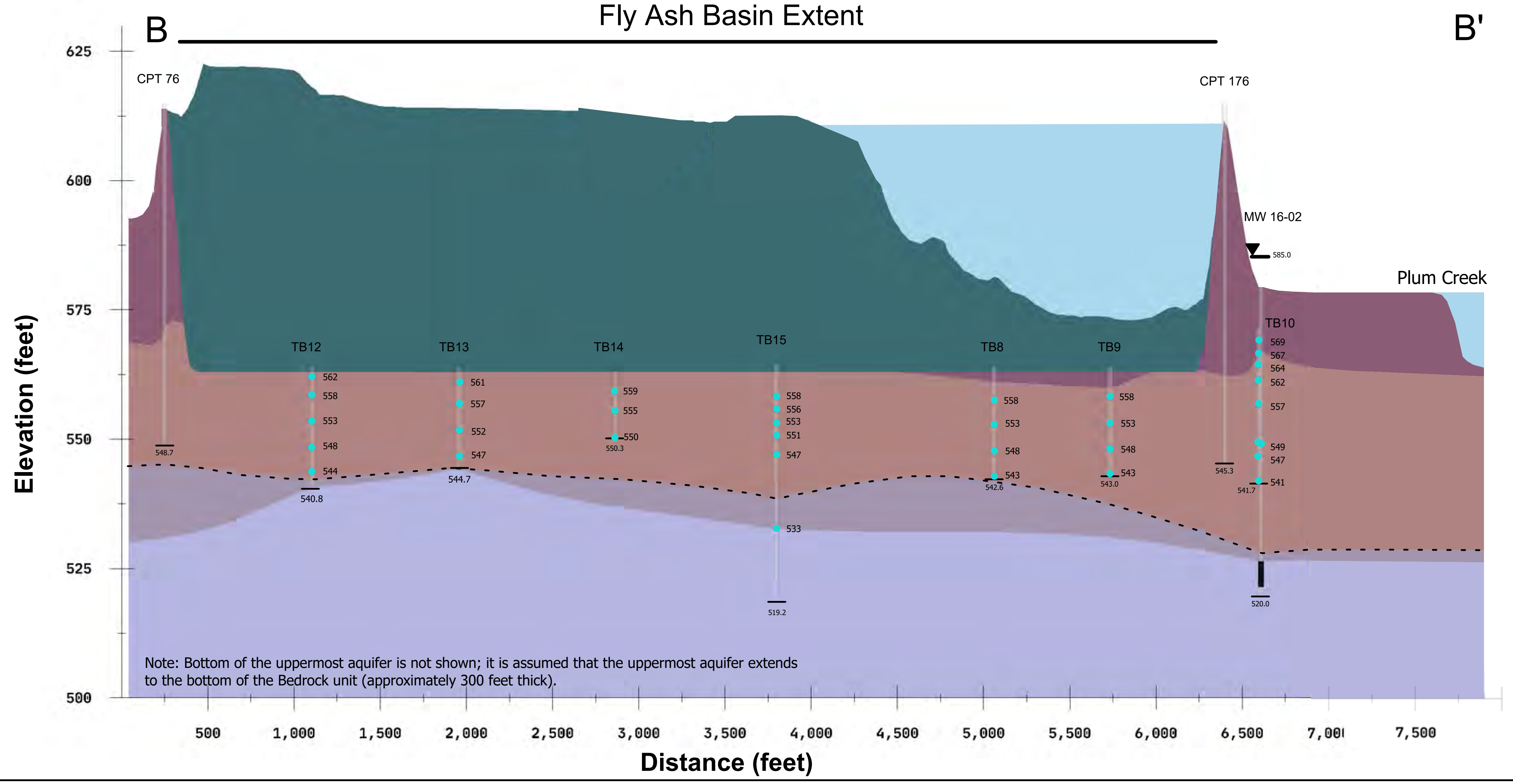


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- ▨ Ponded Water
- ▨ Fly Ash
- ▨ Lean Clay
- ▨ Sandy Lean Clay
- ▨ Transition Zone
- ▨ Bedrock

Notes

All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section B - B'
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

Geosyntec
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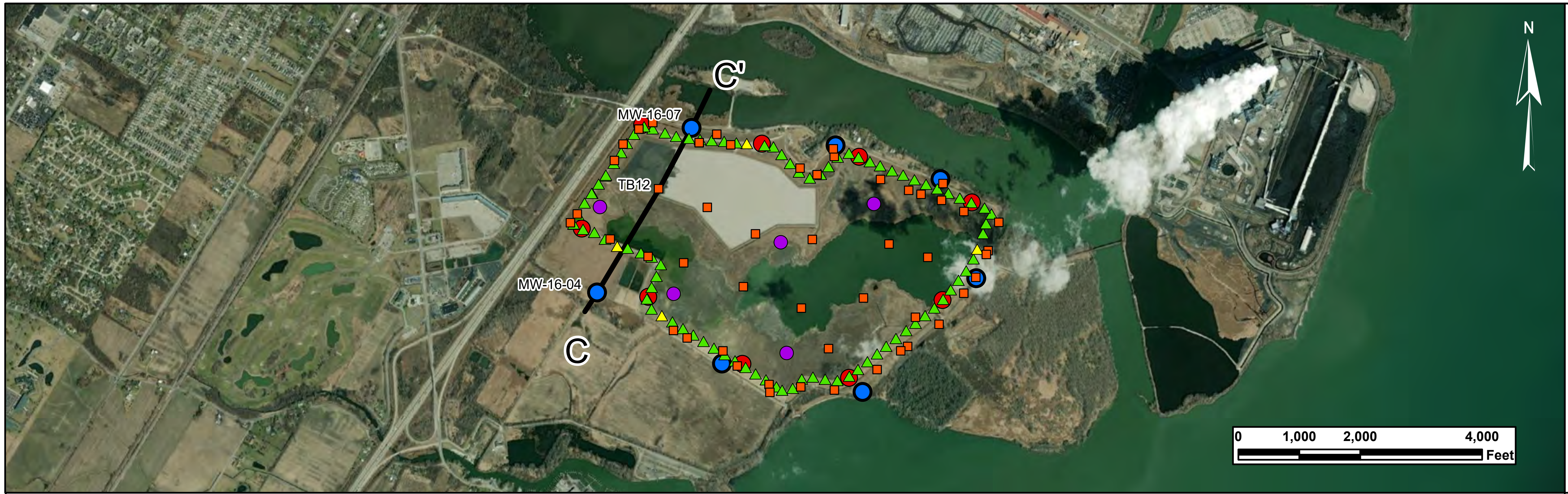
Figure

2-4

GLP8014

November 2021

G:\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_YW.aprx 11/22/2021 9:22 AM

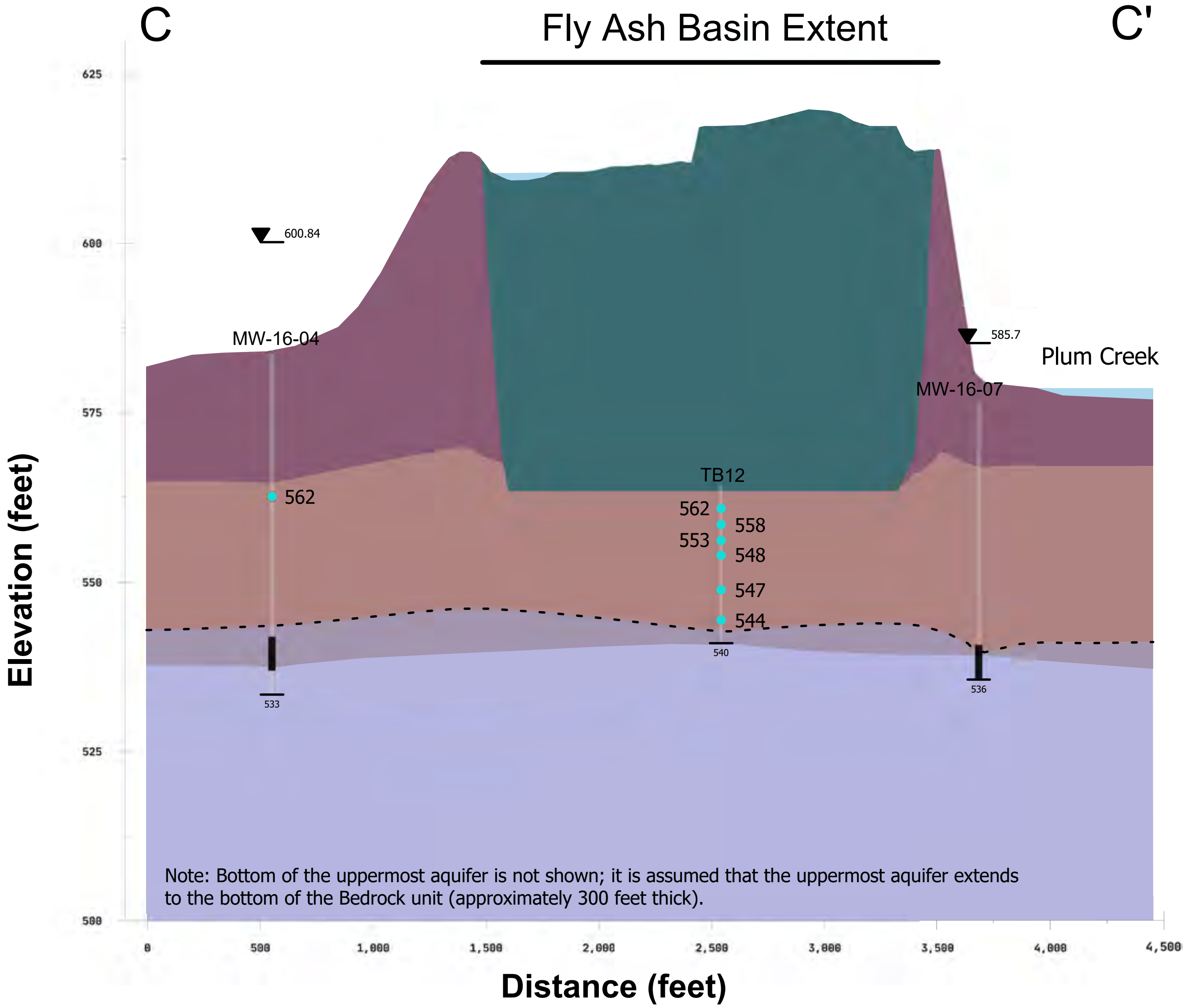


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- ■ Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- Ponded Water
- Fly Ash
- Lean Clay
- Sandy Lean Clay
- Transition Zone
- Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section C - C'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

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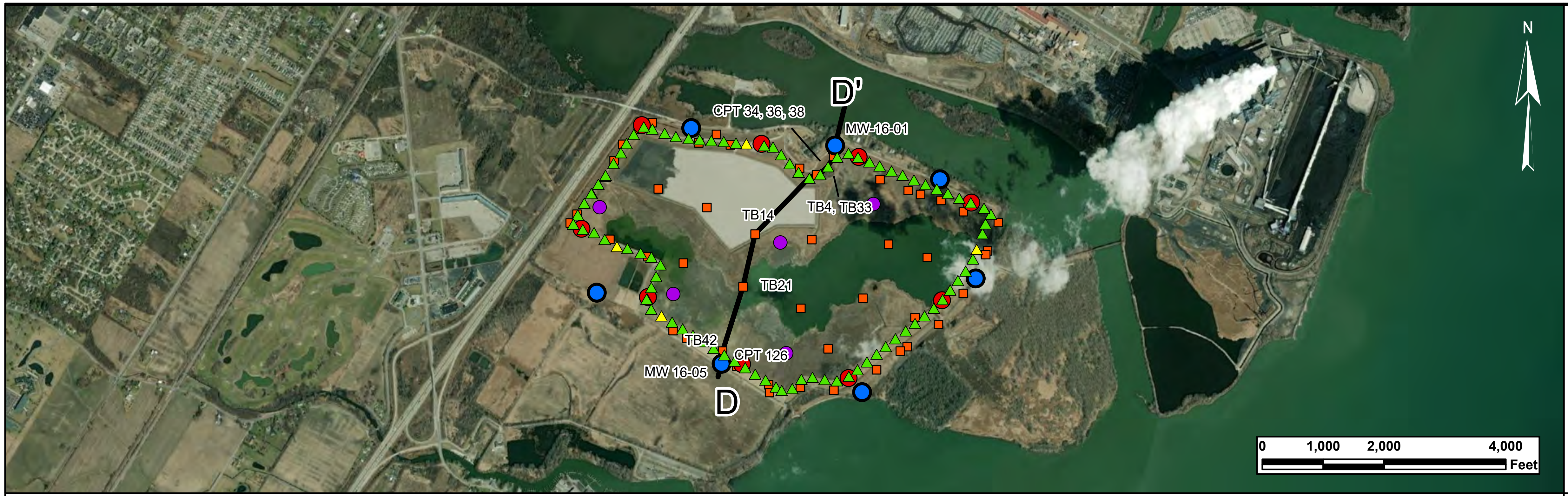
Figure

2-5

GLP8014

November 2021

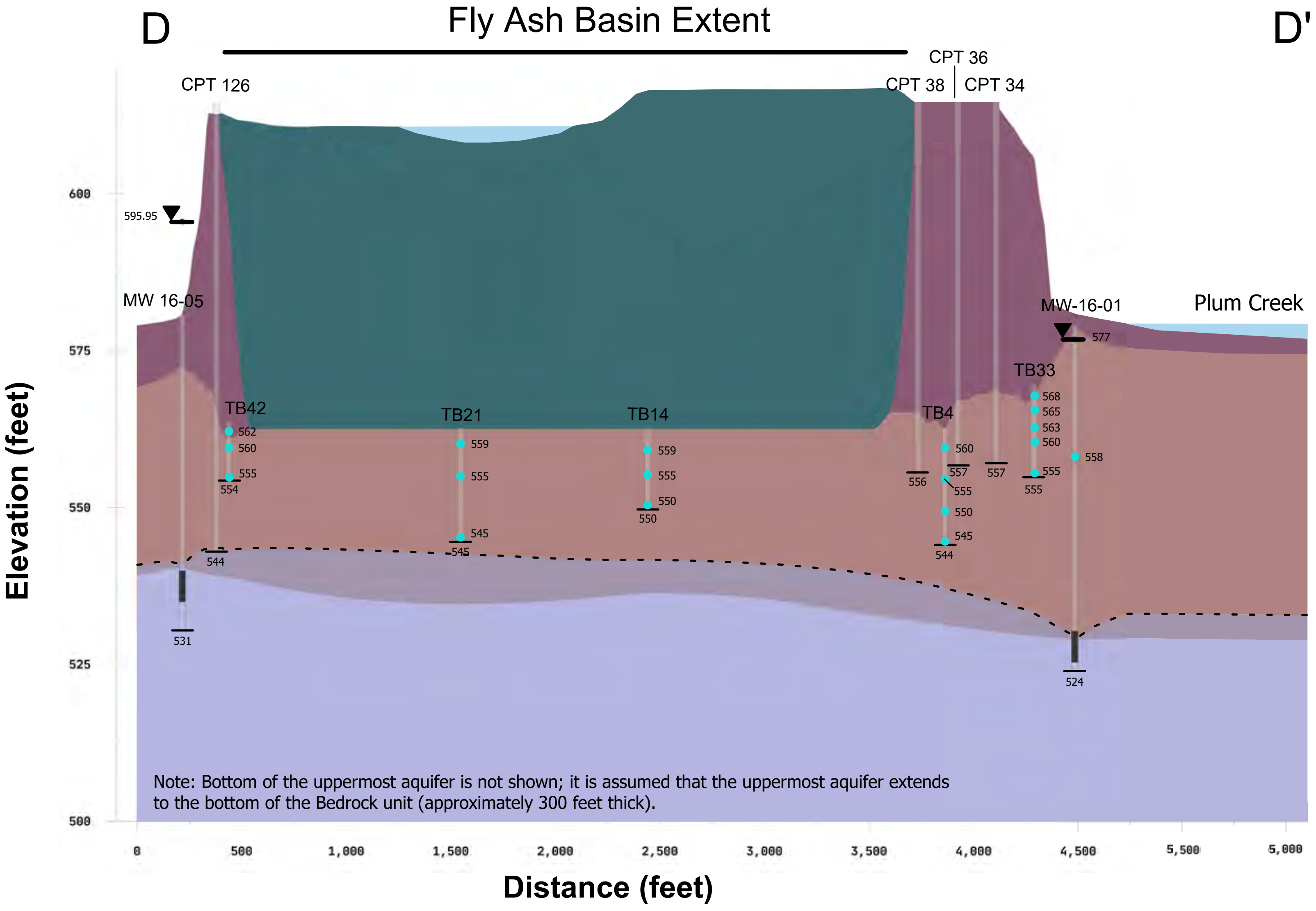


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- Ponded Water
- Fly Ash
- Lean Clay
- Sandy Lean Clay
- Transition Zone
- Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section D - D'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

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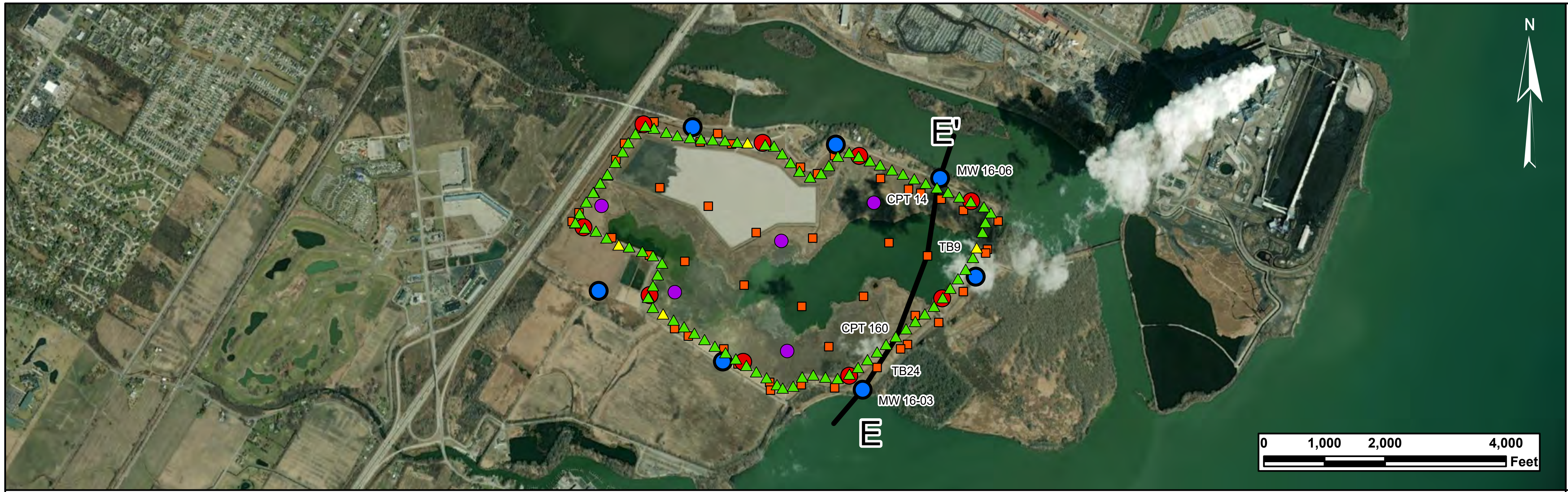
GLP8014	November 2021	**Figure** 2-6

G:\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_YW.aprx 11/22/2021 9:22 AM

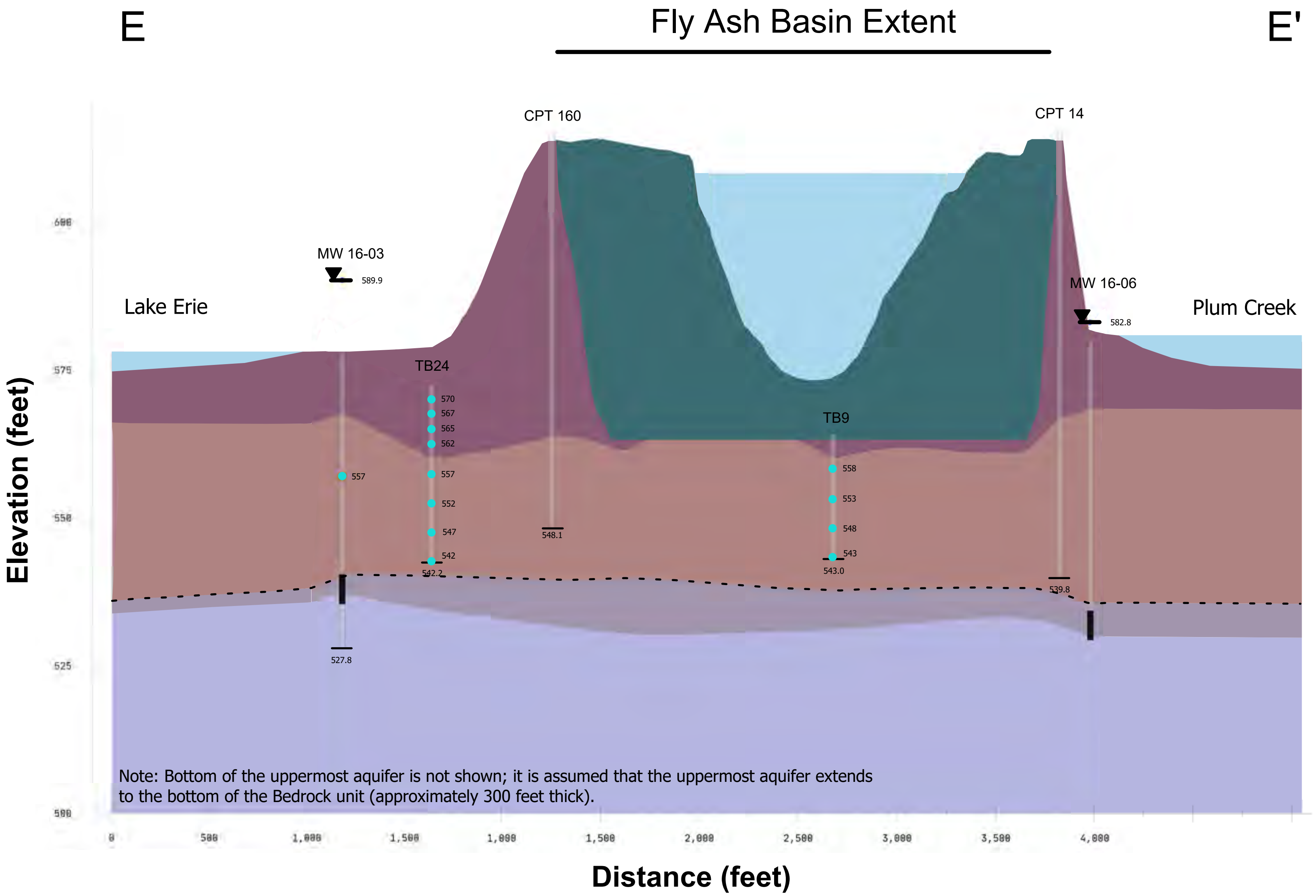


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- \- - - Top of Uppermost Aquifer Unit

Lithology

- ▨ Ponded Water
- ▨ Fly Ash
- ▨ Lean Clay
- ▨ Sandy Lean Clay
- ▨ Transition Zone
- ▨ Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section E - E'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

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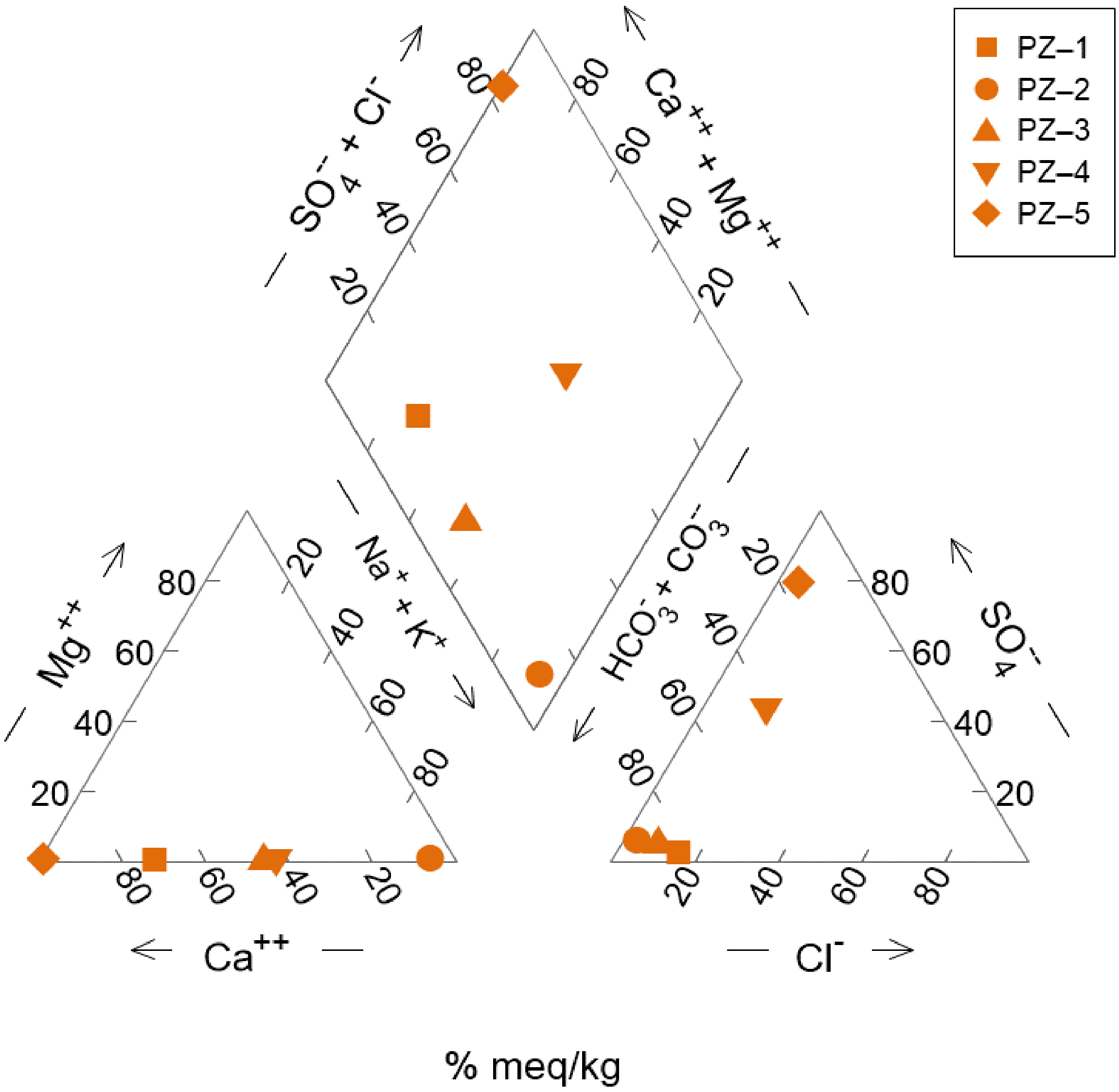
GLP8014	November 2021	**Figure** 2-7

G:\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_YW.aprx 11/19/2021 4:21 PM



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

Filtered Piezometer Sample Piper Diagram

Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

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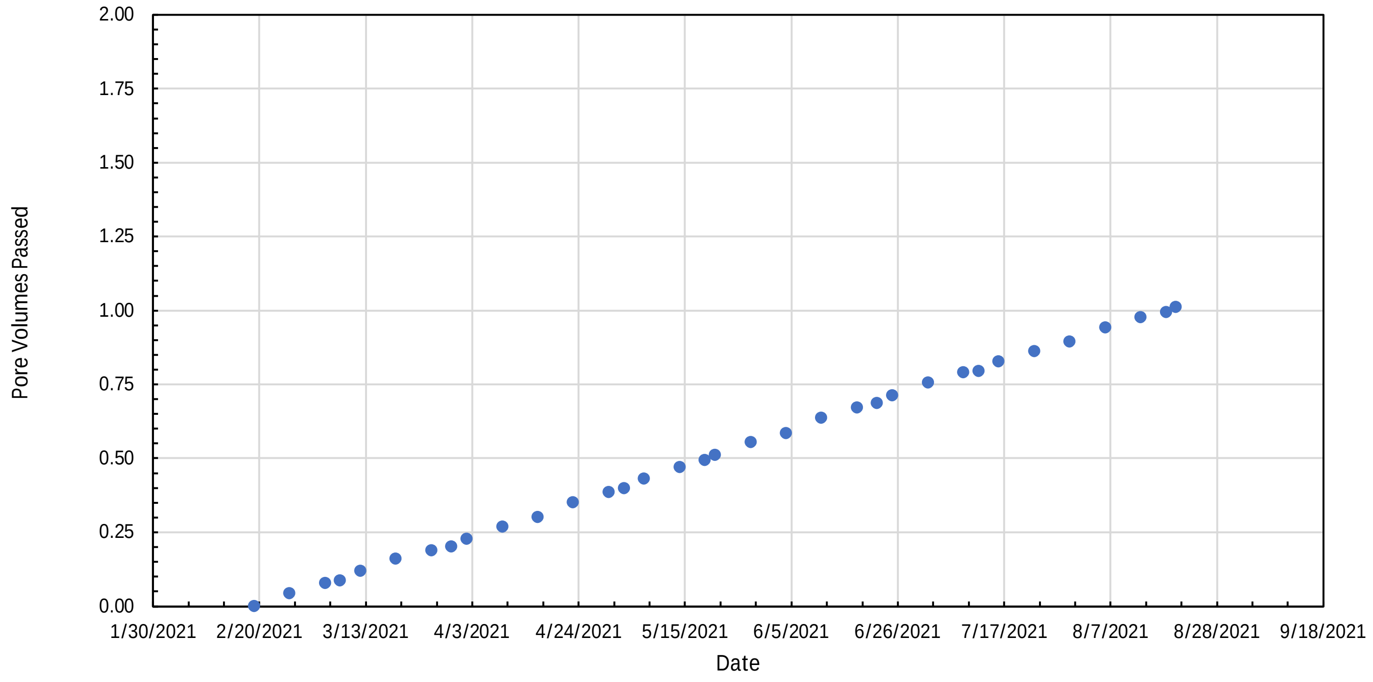
GLP8014	August 2021	**Figure 3-1**



B2-ST-1 (20-22 ft bgs) PV of Flow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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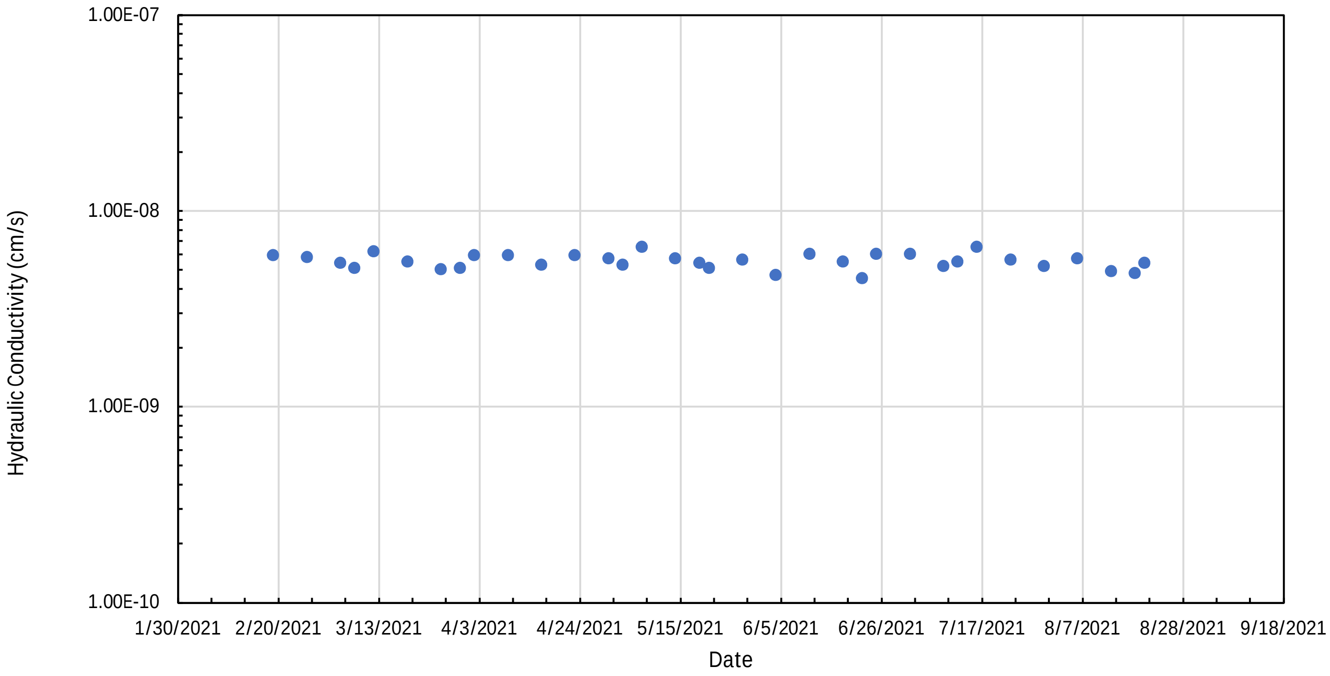
September 2021

Figure

3-2



B2-ST-1 (20-22 ft bgs) Hydraulic Conductivity with Time

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MONROE, MICHIGAN

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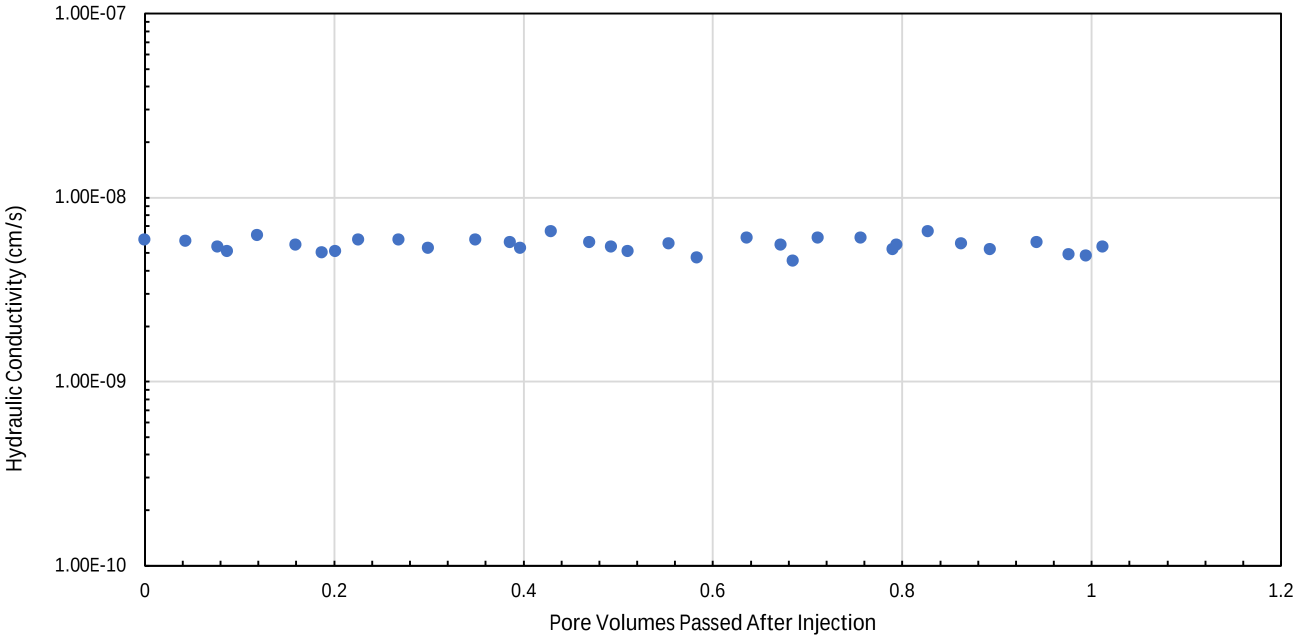
Figure

3-3



B2-ST-1 (20-22 ft bgs) Hydraulic Conductivity with PV
MONROE POWER PLANT MONROE, MICHIGAN

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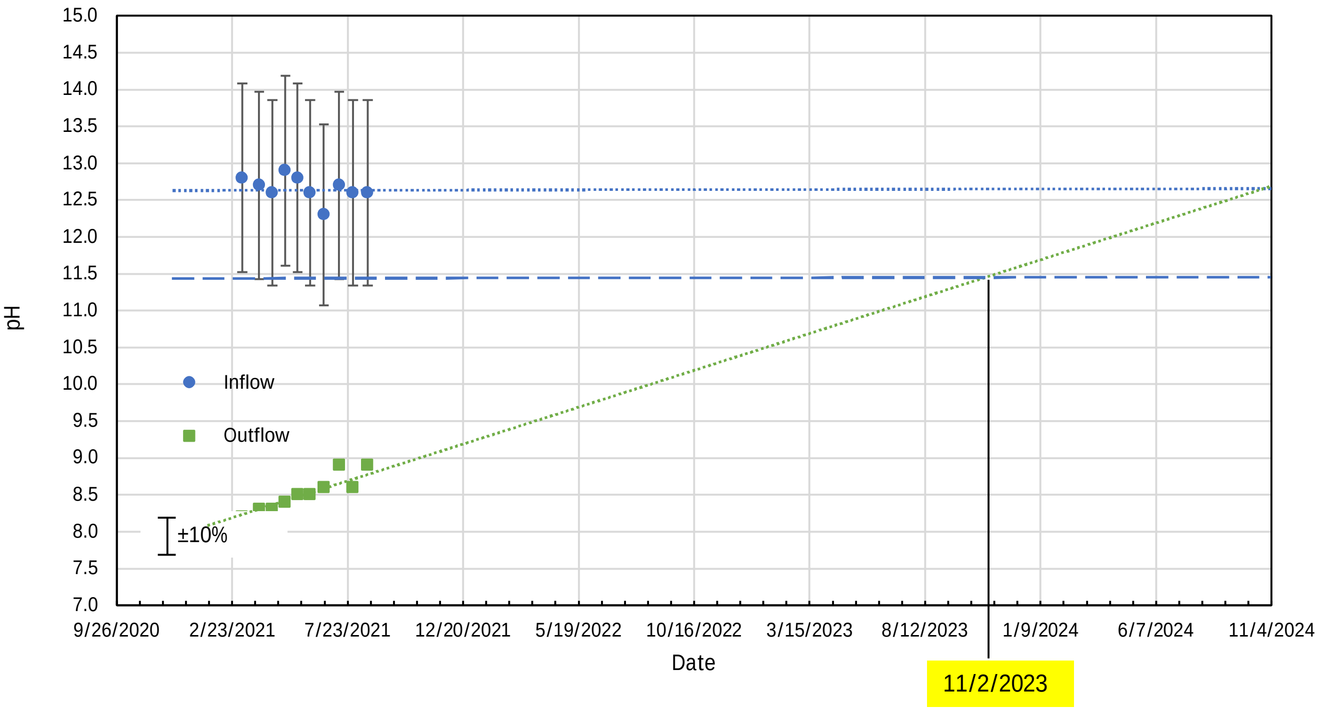
Figure 3-4



B2-ST-1 (20-22 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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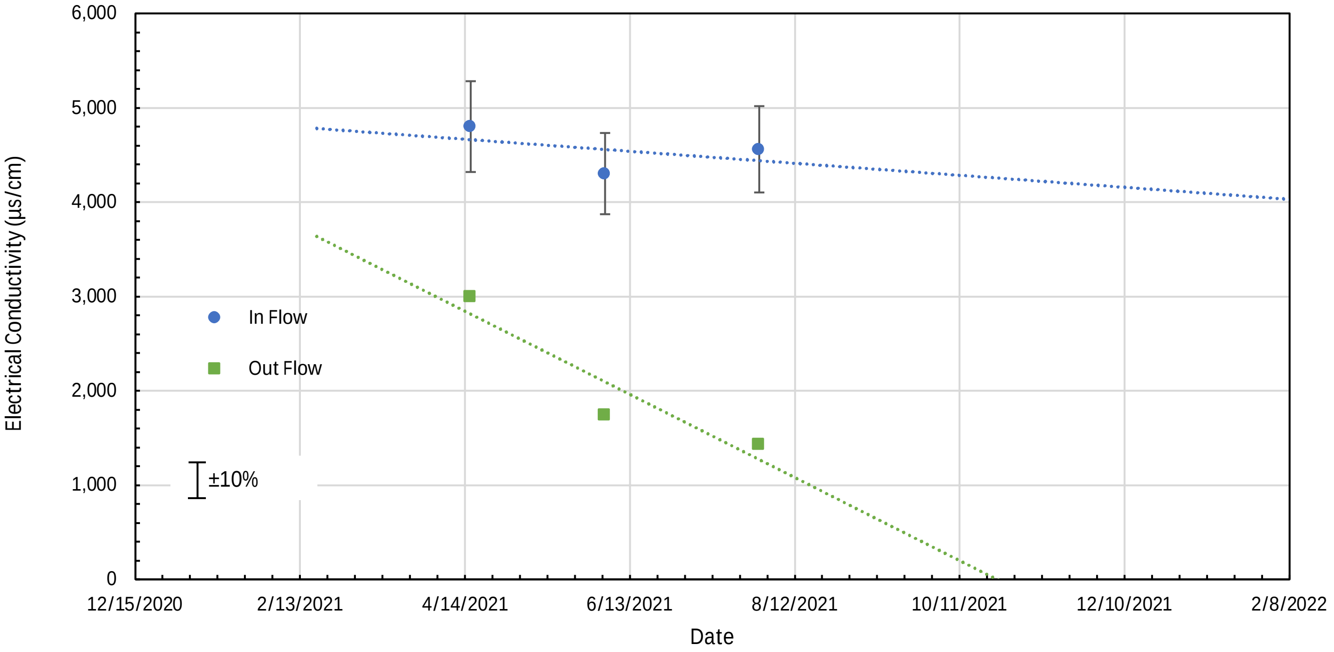
Figure 3-5



B2-ST-1 (20-22 ft bgs) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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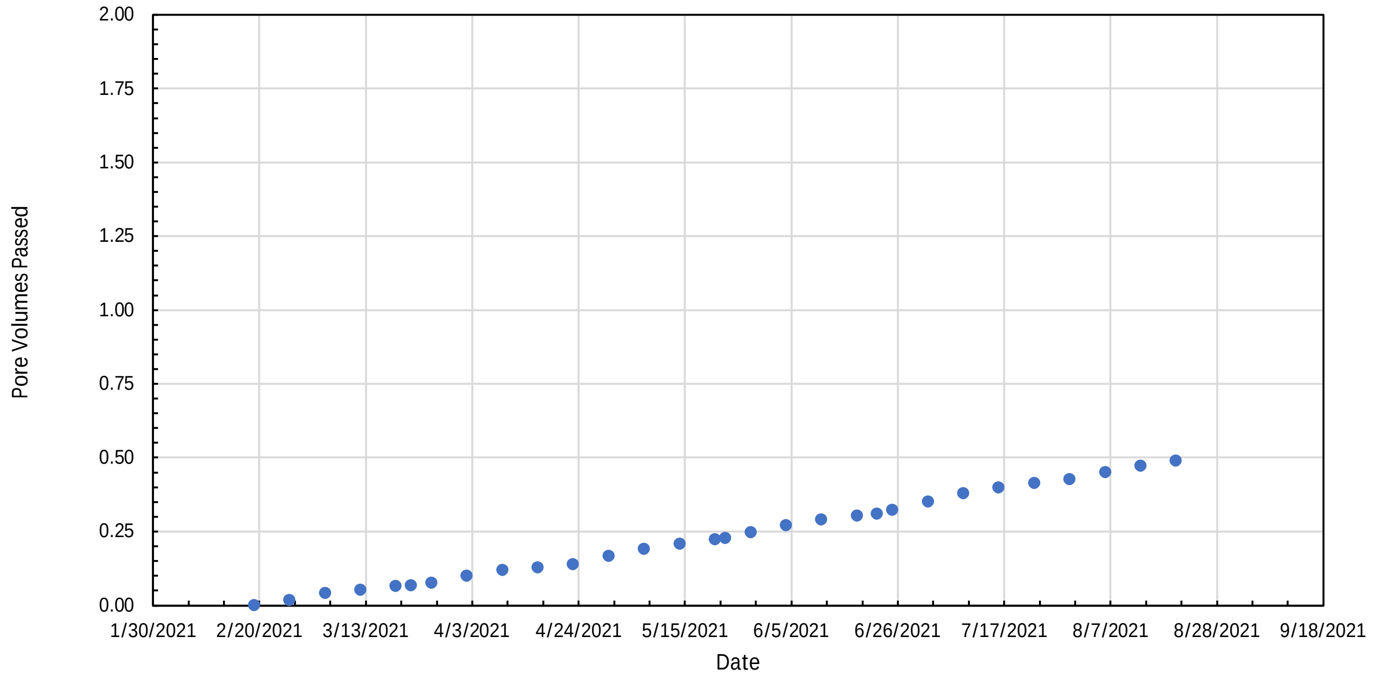
Ann Arbor, MI

September 2021

Figure

3-6



B4-ST-2 (40-42 ft bgs) PV of Flow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

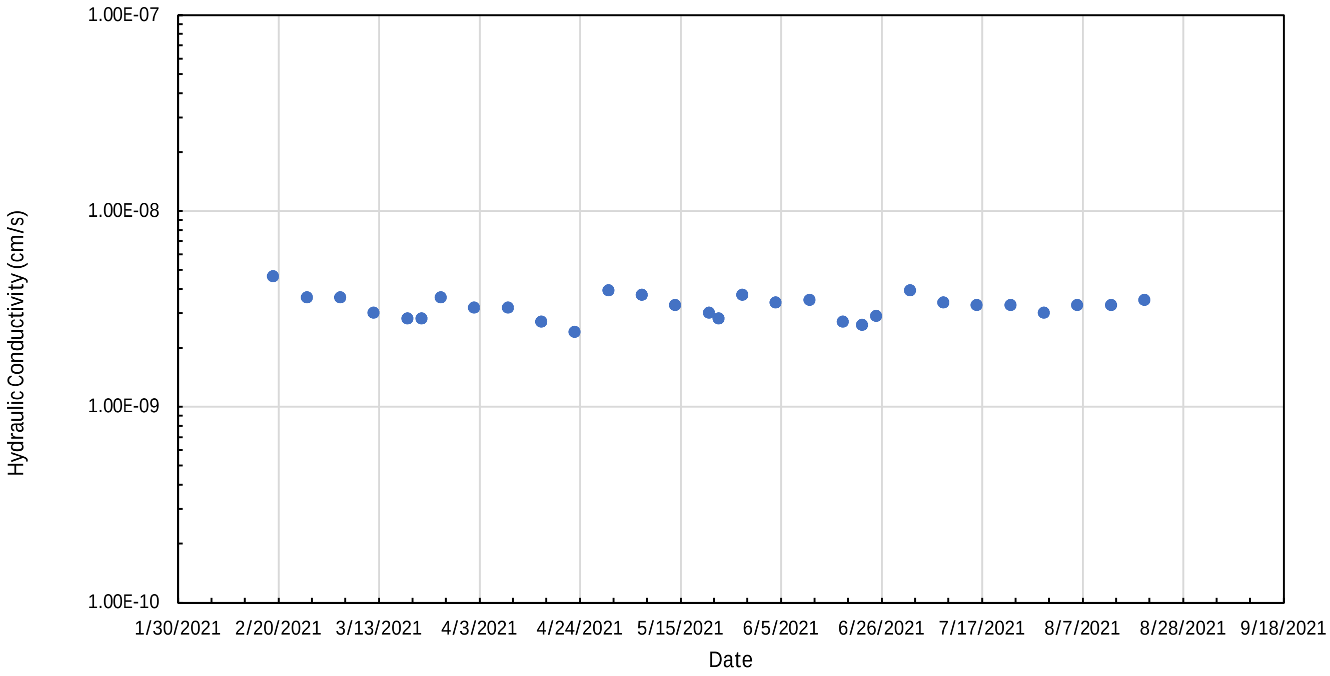
Geosyntec consultants

Ann Arbor, MI

September 2021

Figure

3-7



B4-ST-2 (40-42 ft bgs) Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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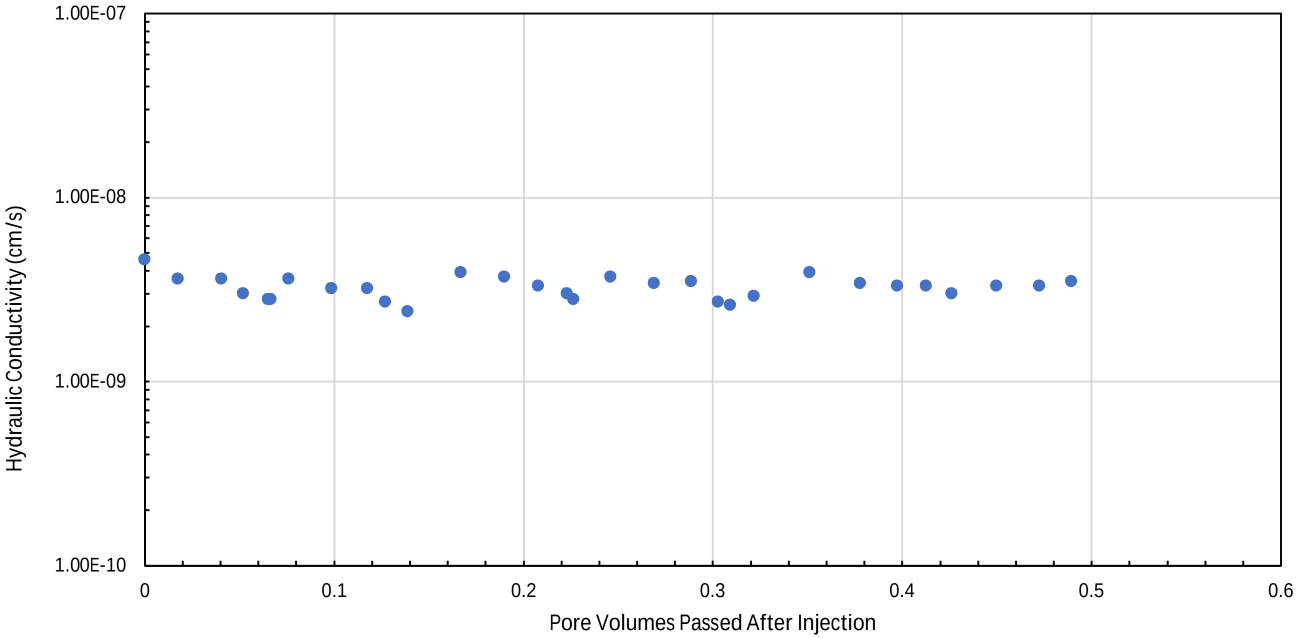
Figure

3-8



B4-ST-2 (40-42 ft bgs) Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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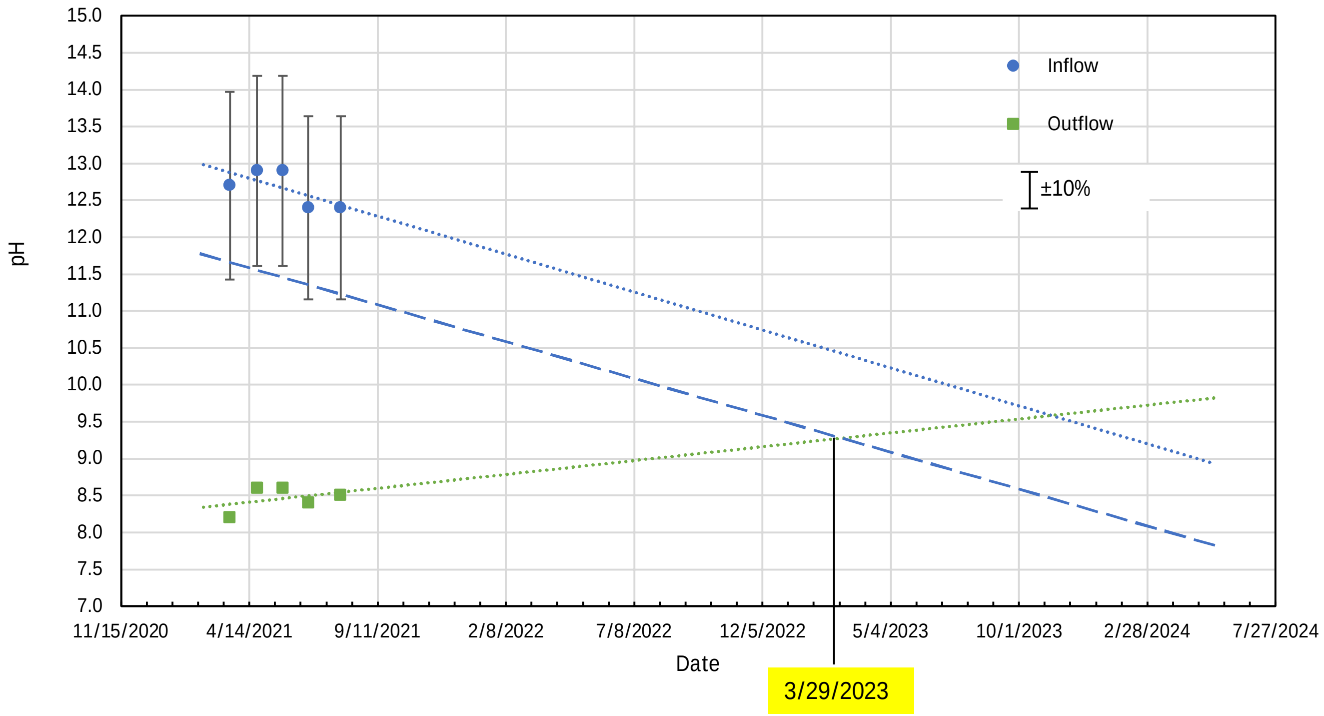
Figure

3-9



B4-ST-2 (40-42 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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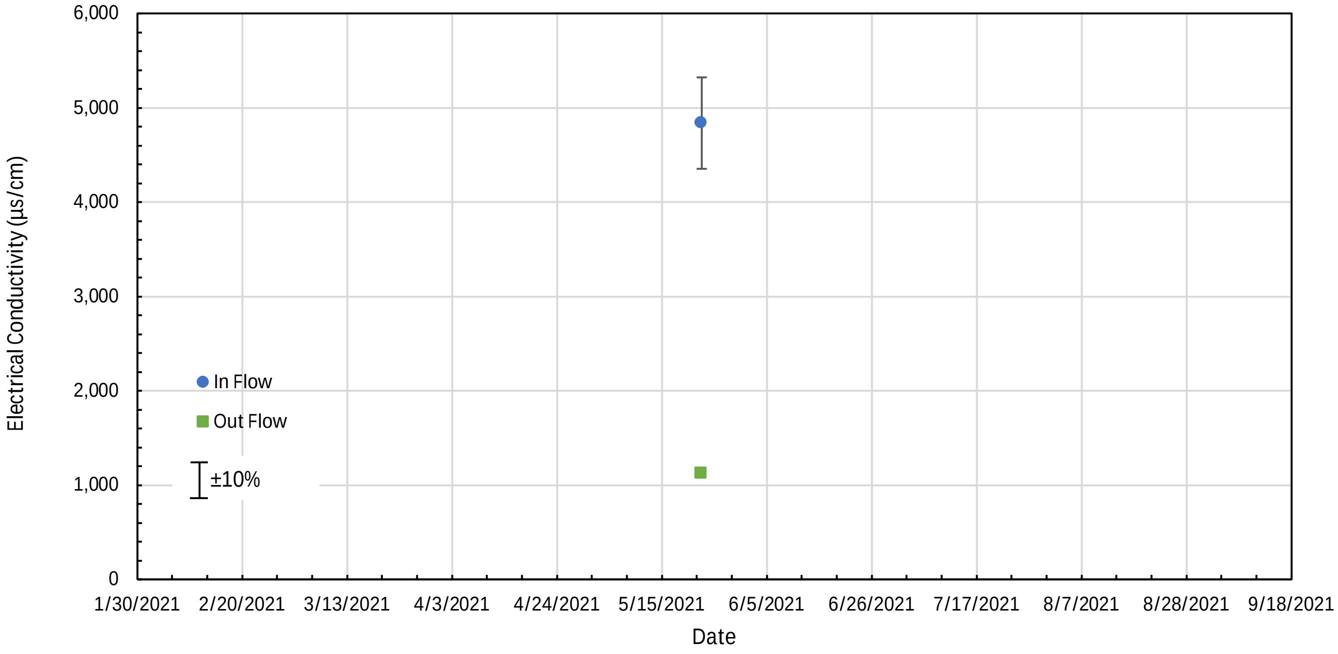
Figure 3-10



B4-ST-2 (40-42 ft bgs) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

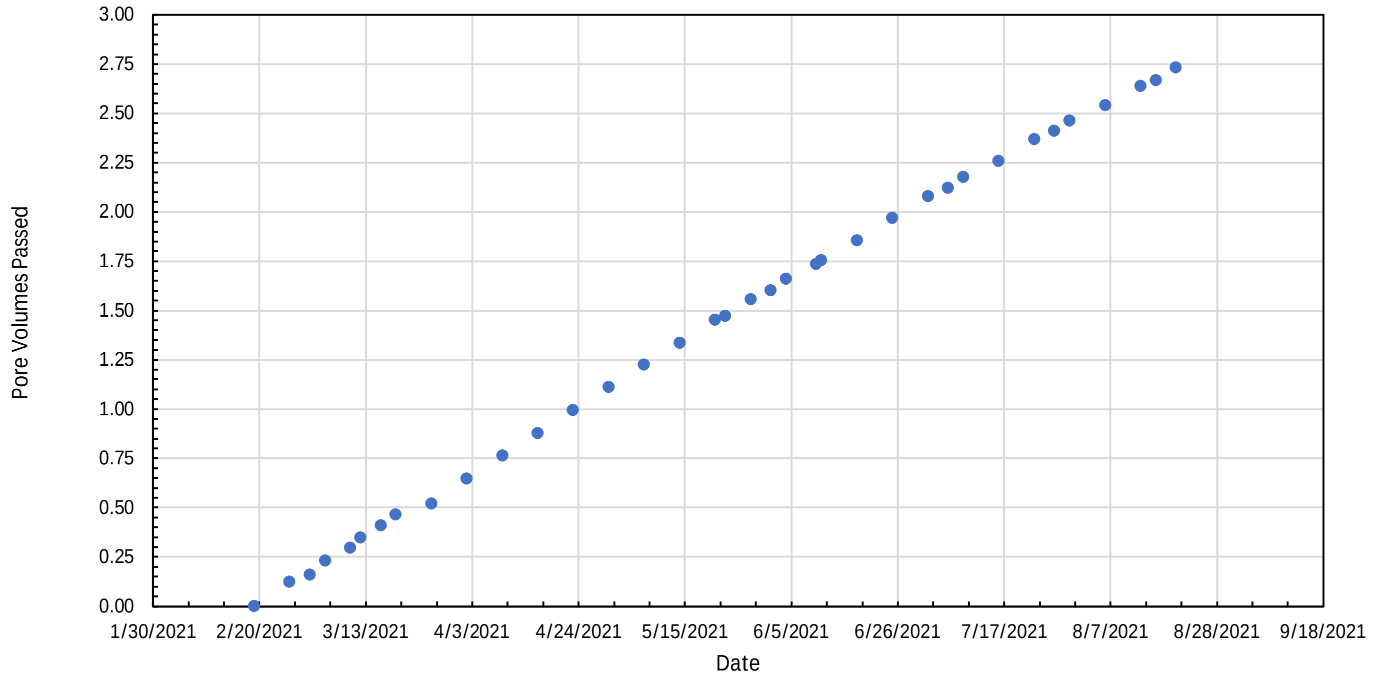
Geosyntec consultants

Ann Arbor, MI

September 2021

Figure

3-11



B4-ST-4 (70-72.5 ft bgs) PV of Flow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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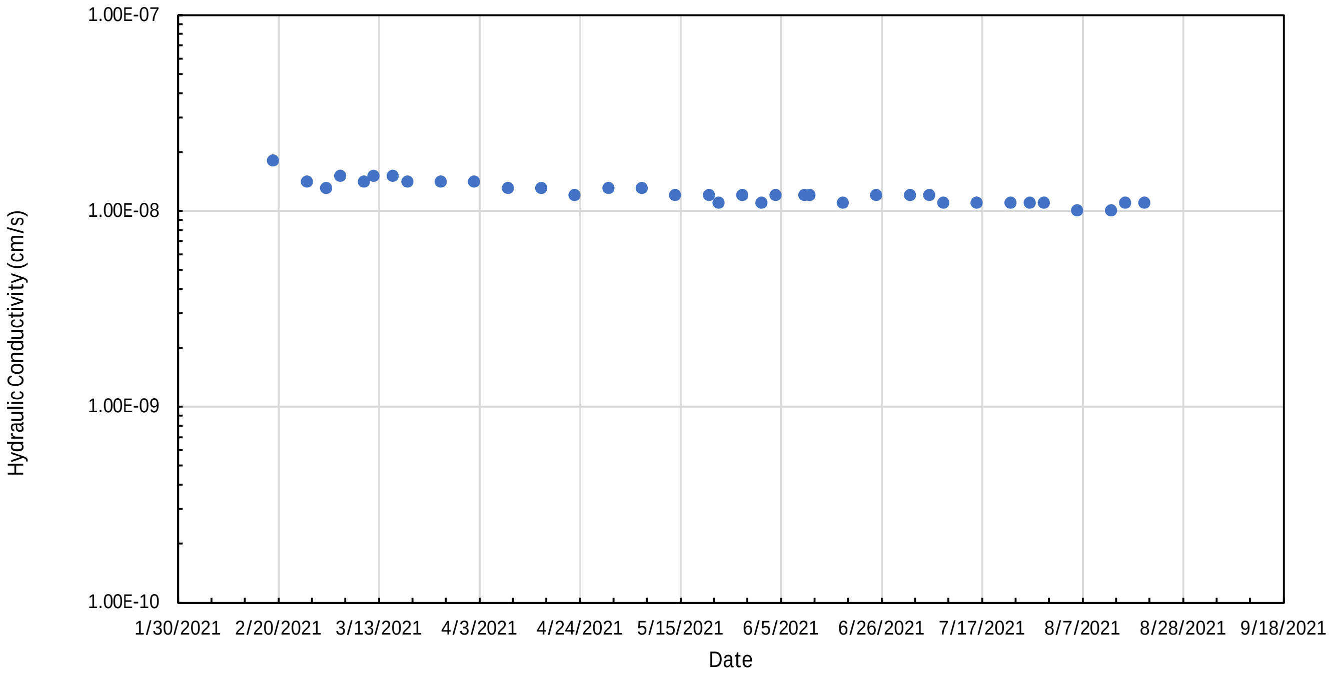
Figure

3-12



B4-ST-4 (70-72.5 ft bgs) Hydraulic Conductivity with Time

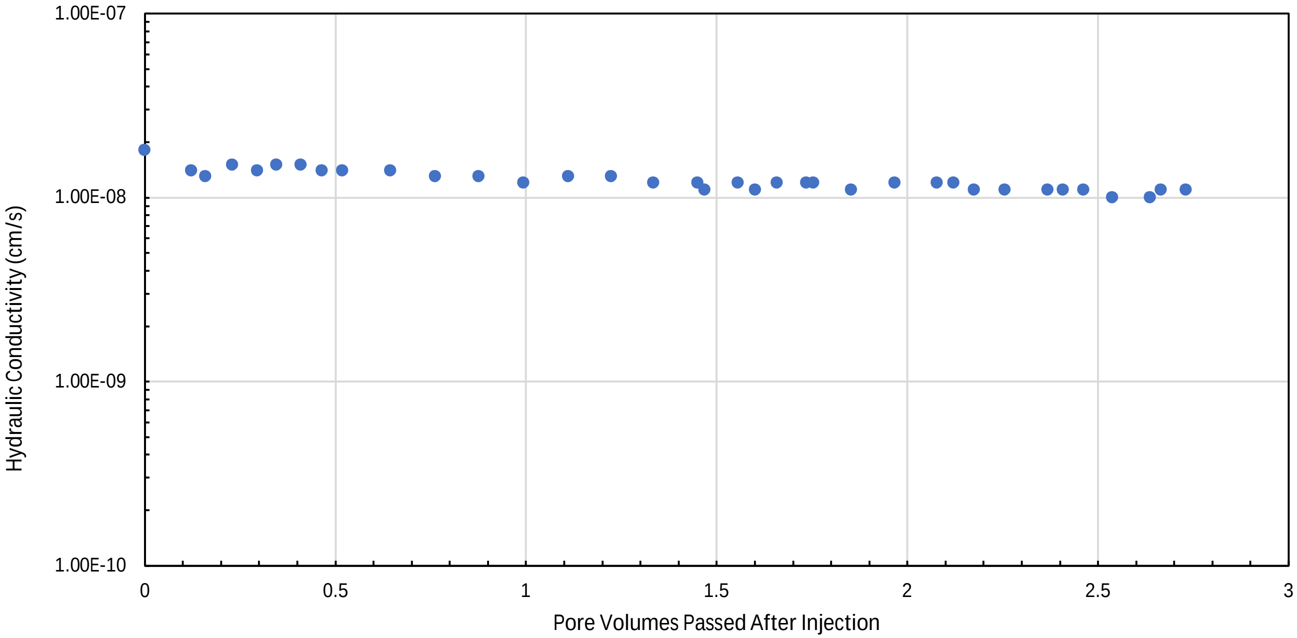
MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec
consultants

Ann Arbor, MI | September 2021

Figure

3-13



B4-ST-4 (70-72.5 ft bgs) Hydraulic Conductivity with PV

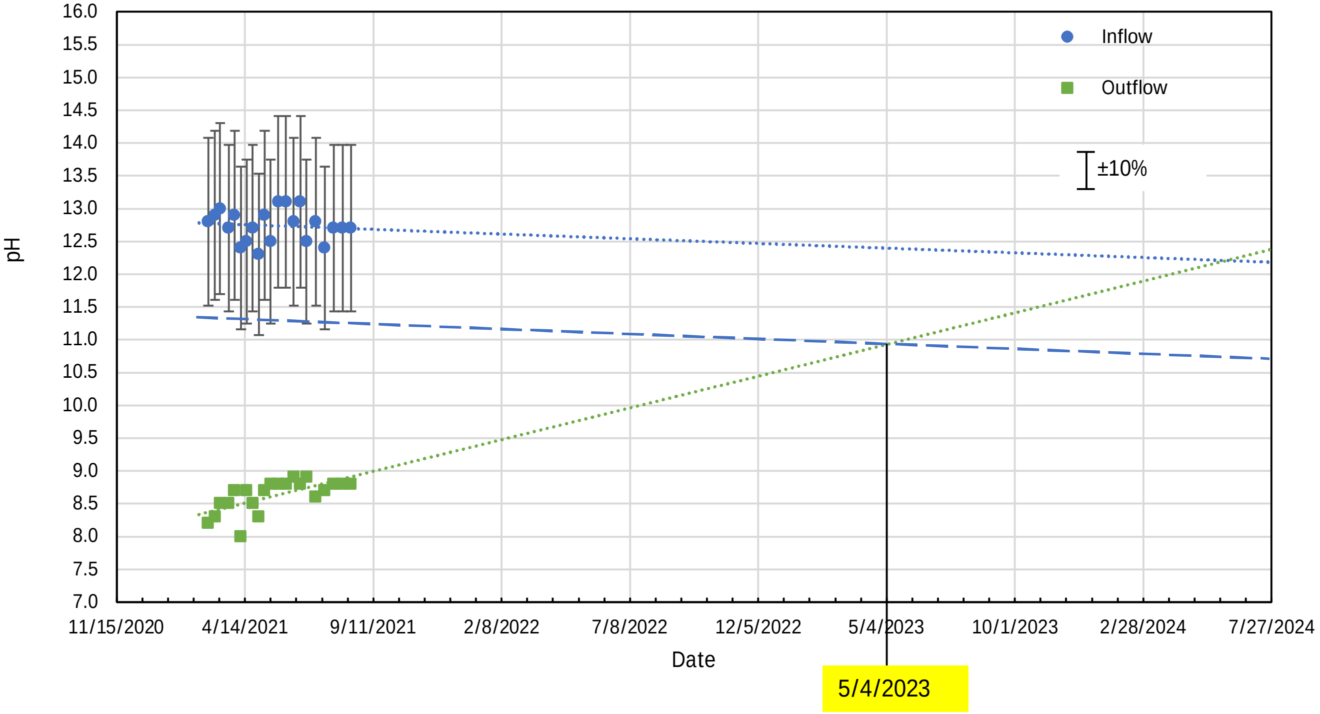
MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec
consultants

Ann Arbor, MI | September 2021

Figure

3-14



B4-ST-4 (70-72.5 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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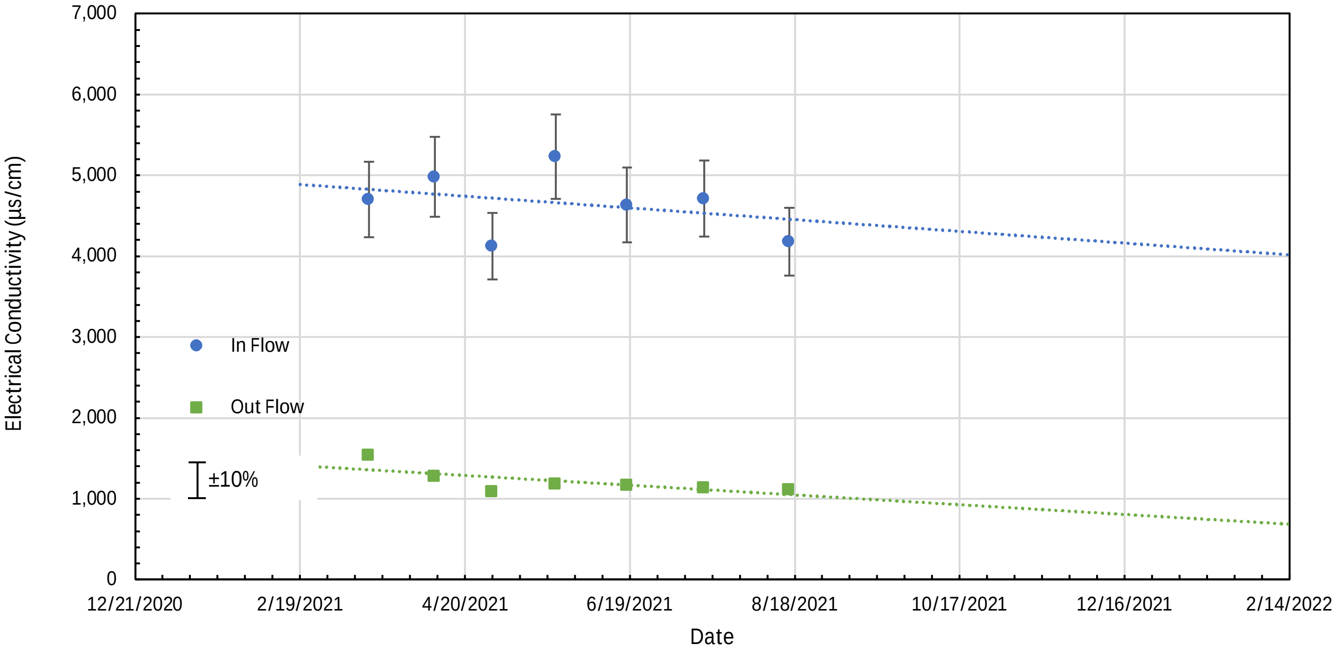
Ann Arbor, MI

September 2021

Figure

3-15



B4-ST-4 (70-72.5 ft bgs) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

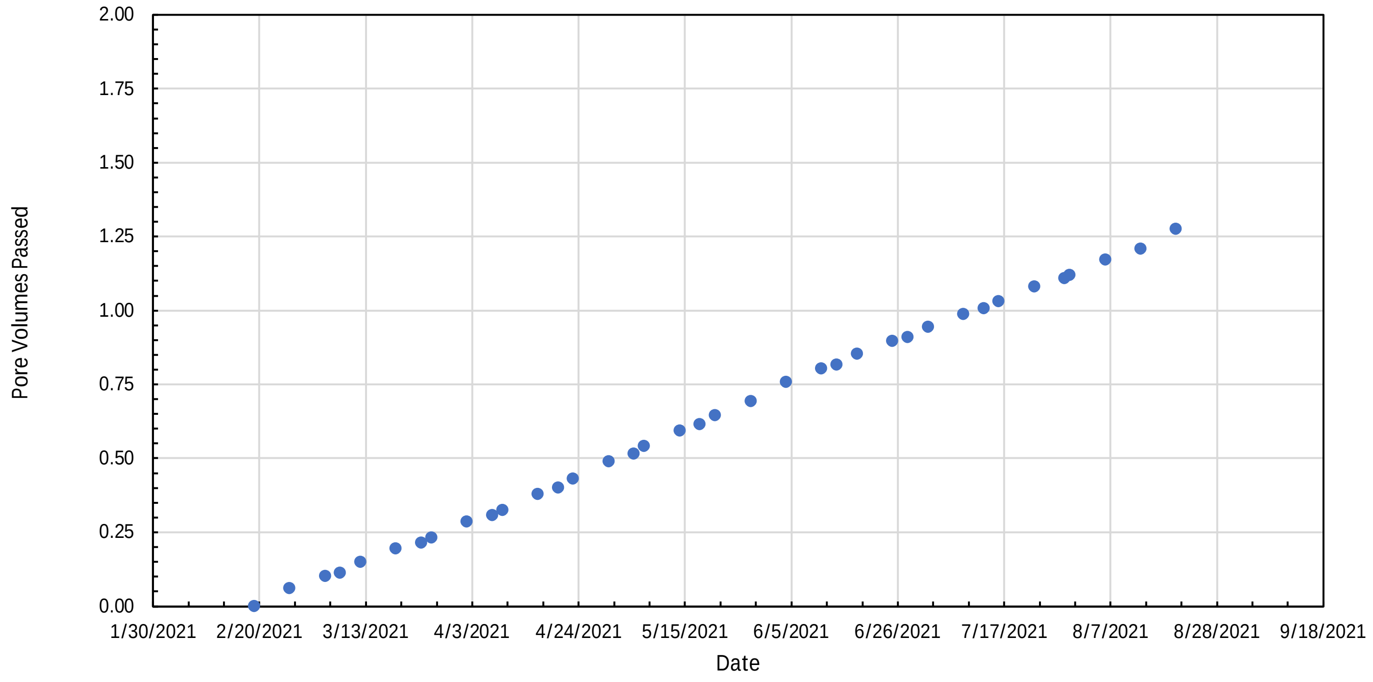
Geosyntec consultants

Ann Arbor, MI

September 2021

Figure

3-16



B6-ST-1 (25-27 ft bgs) PV of Flow with Time

MONROE POWER PLANT
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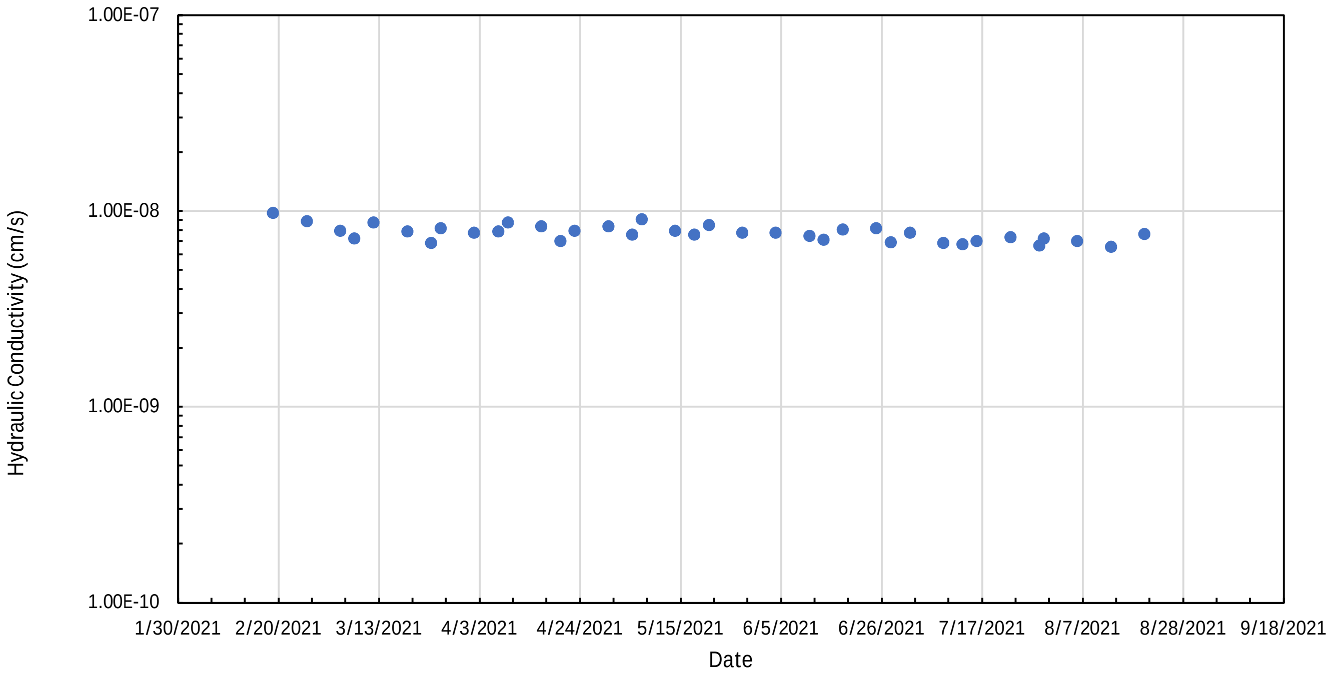
Figure

3-17



B6-ST-1 (25-27 ft bgs) Hydraulic Conductivity with Time

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MONROE, MICHIGAN

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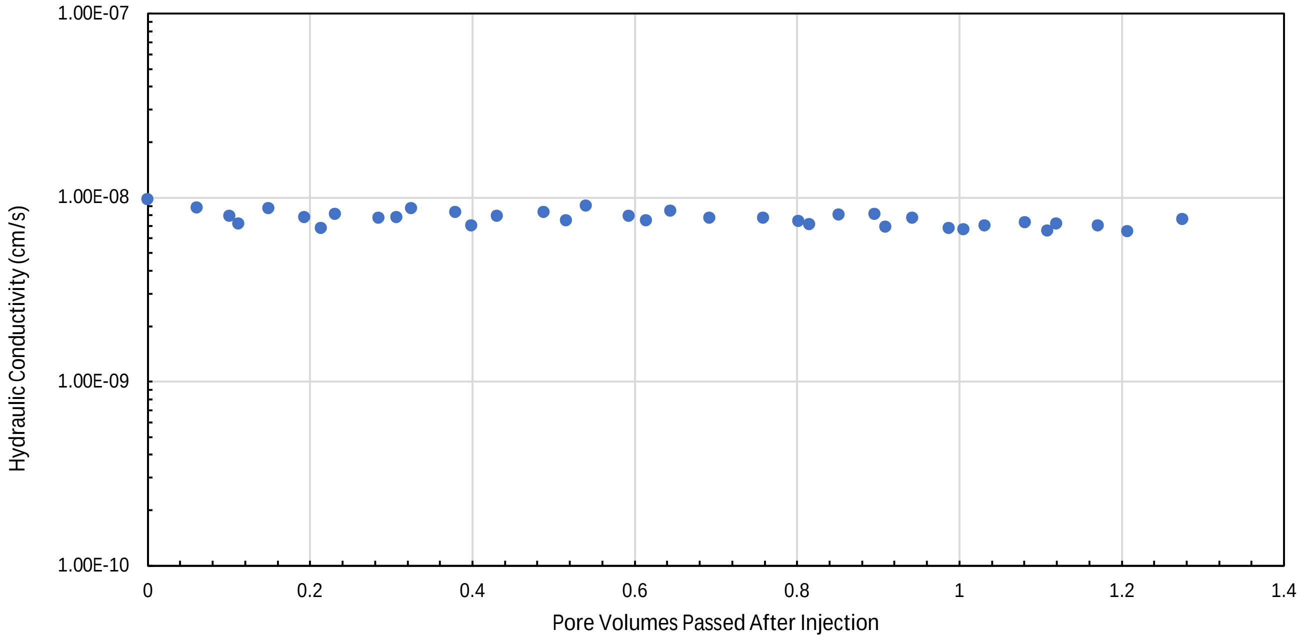
September 2021

Figure

3-18



B6-ST-1 (25-27 ft bgs) Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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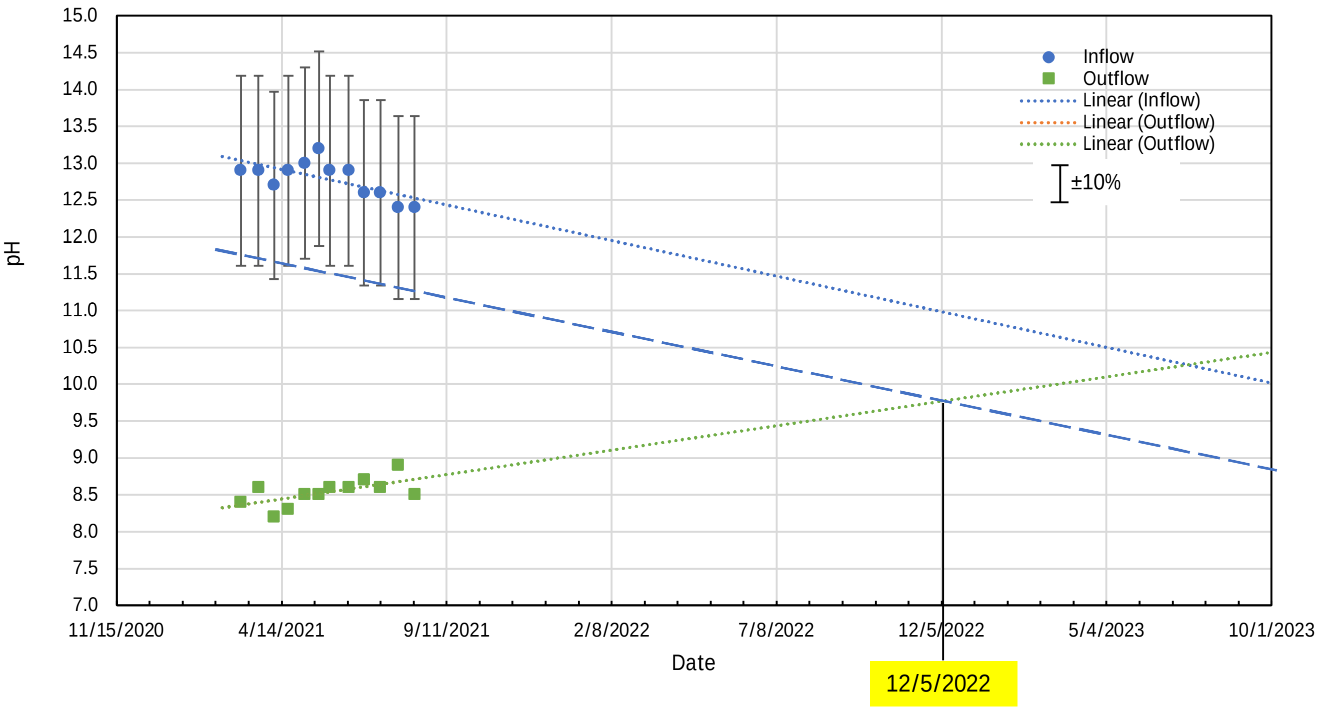
Figure

3-19



B6-ST-1 (25-27 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
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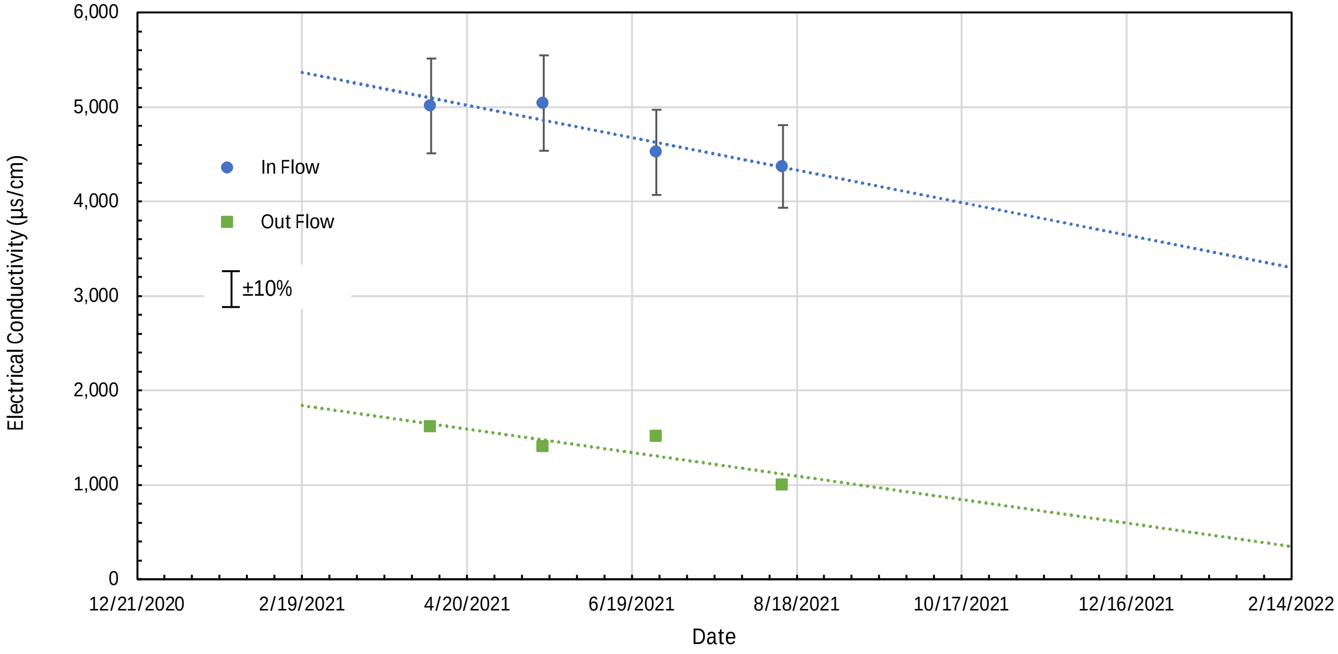
Figure

3-20



B6-ST-1 (25-27 ft bgs) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
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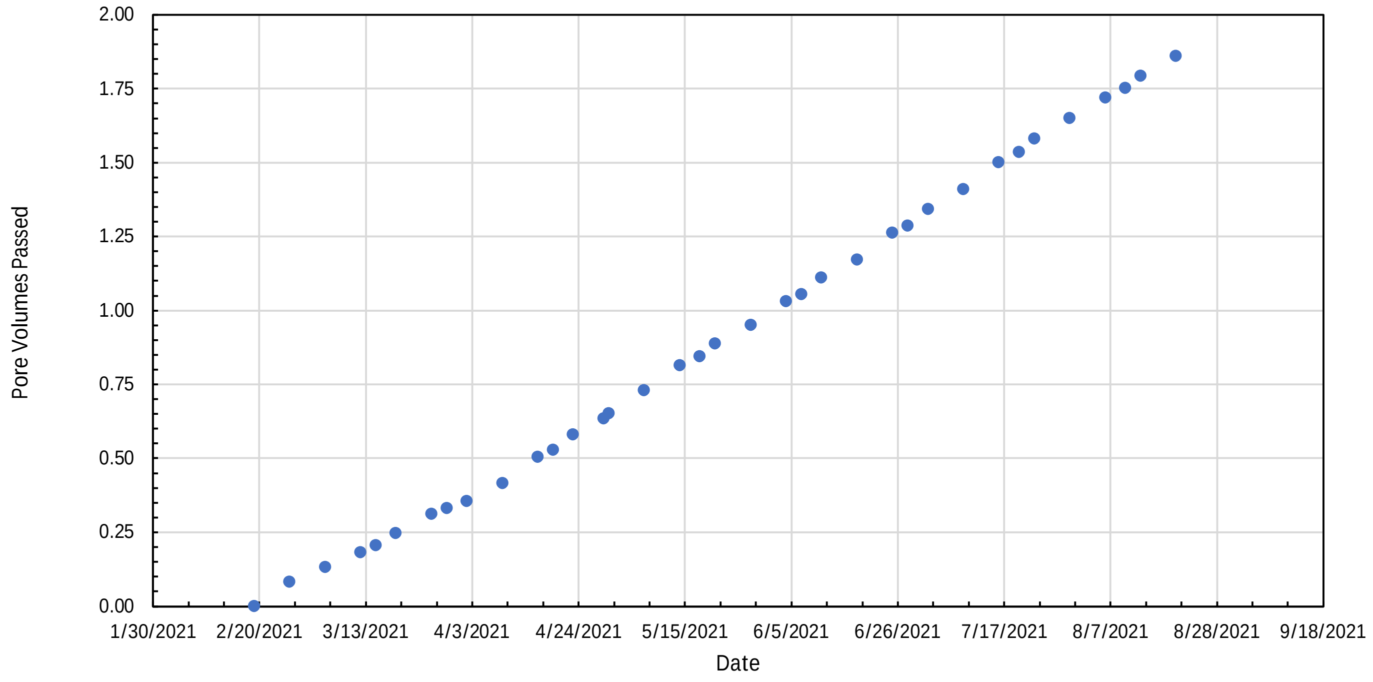
Figure

3-21



B6-ST-3 (55-57.5 ft bgs) PV of Flow with Time

MONROE POWER PLANT
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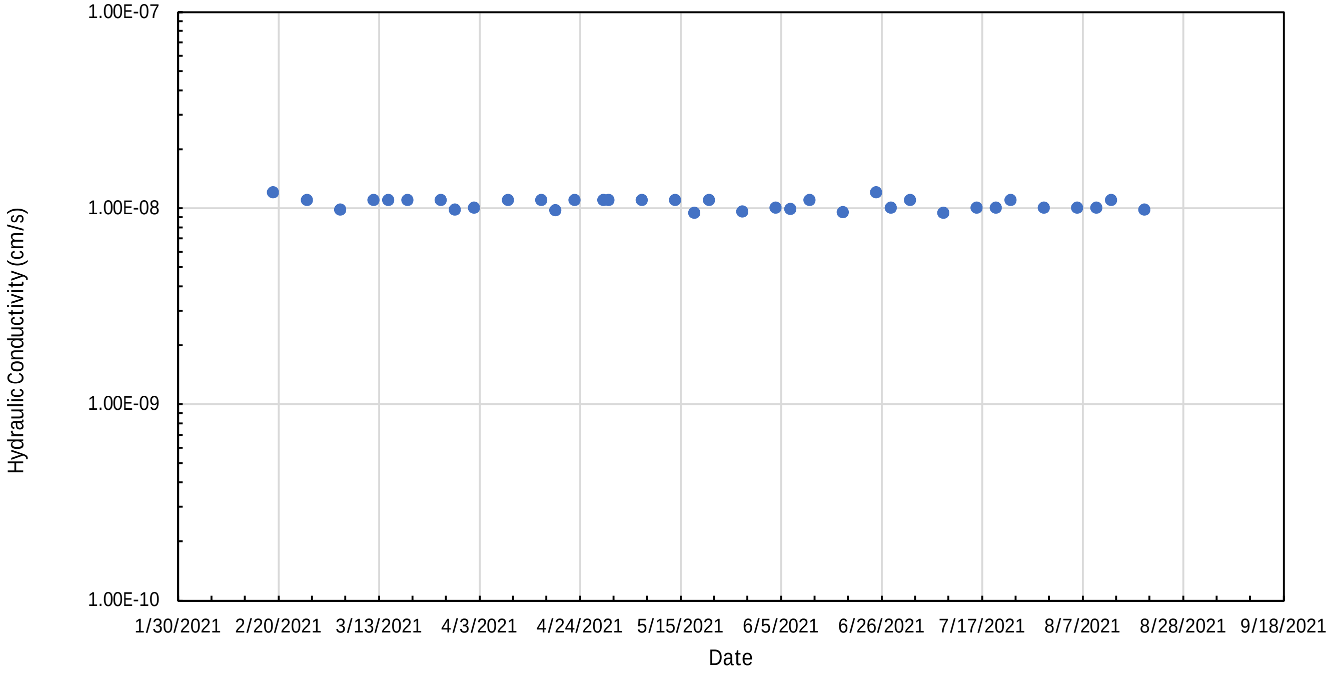
Figure

3-22



B6-ST-3 (55-57.5 ft bgs) Hydraulic Conductivity with Time

MONROE POWER PLANT
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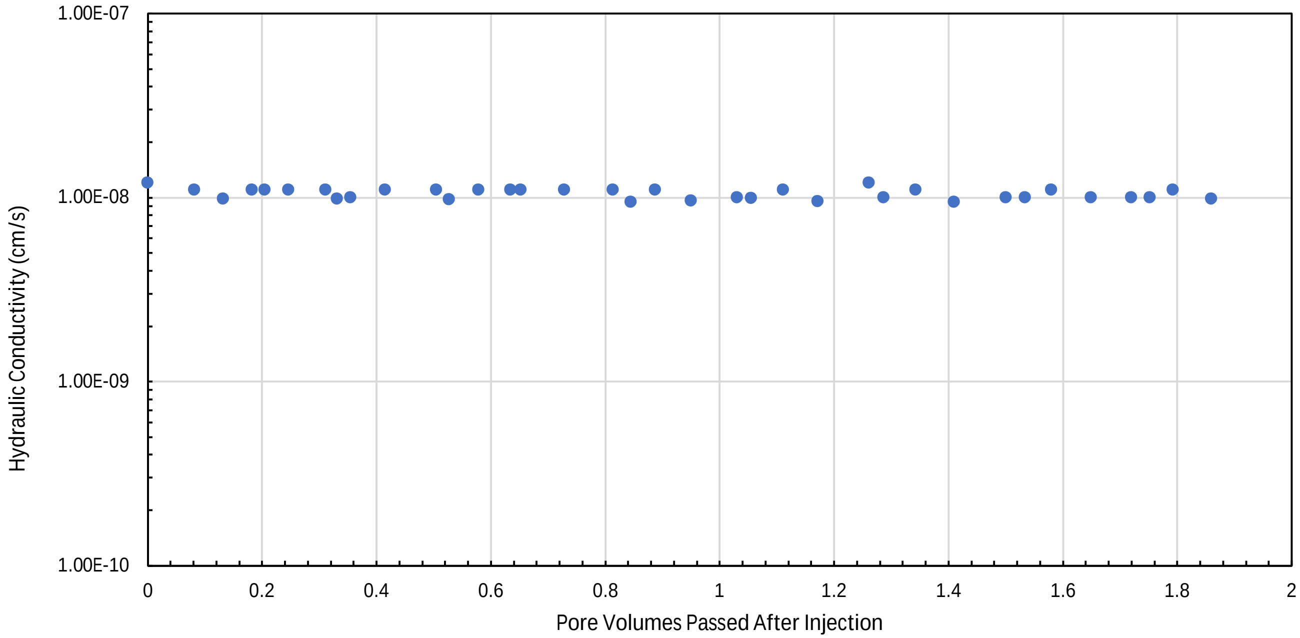
Figure

3-23



B6-ST-3 (55-57.5 ft bgs) Hydraulic Conductivity with PV

MONROE POWER PLANT
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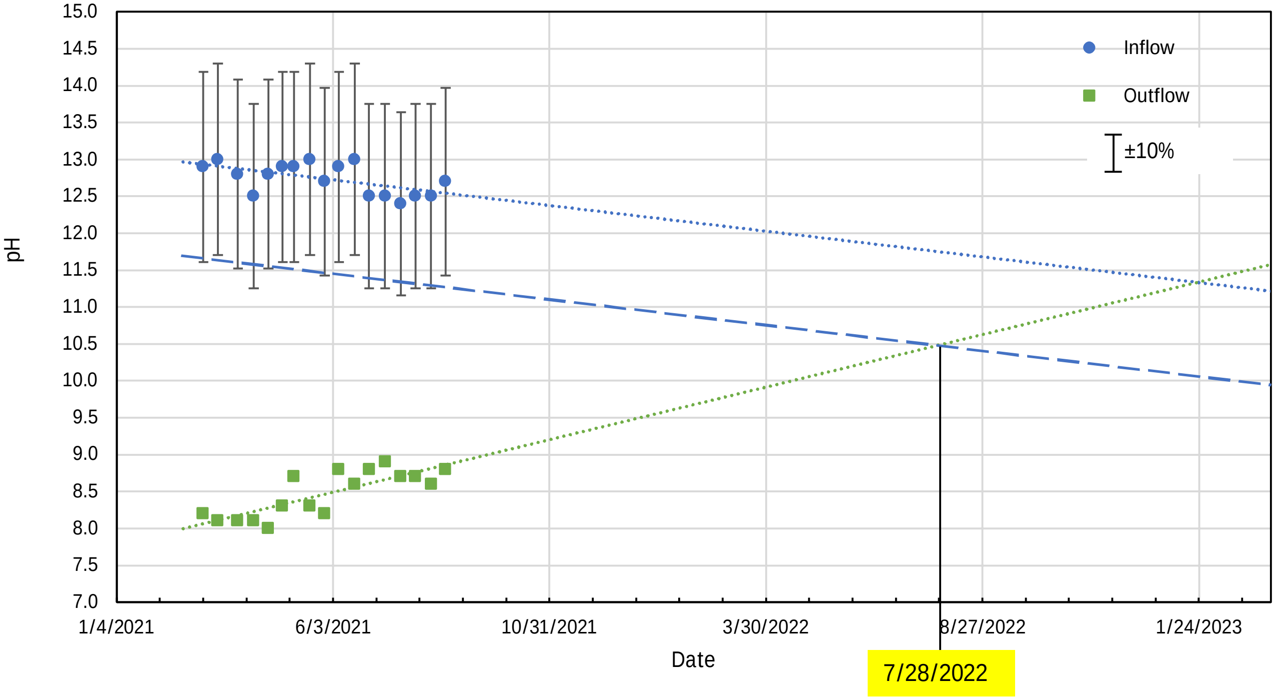
Figure

3-24



B6-ST-3 (55-57.5 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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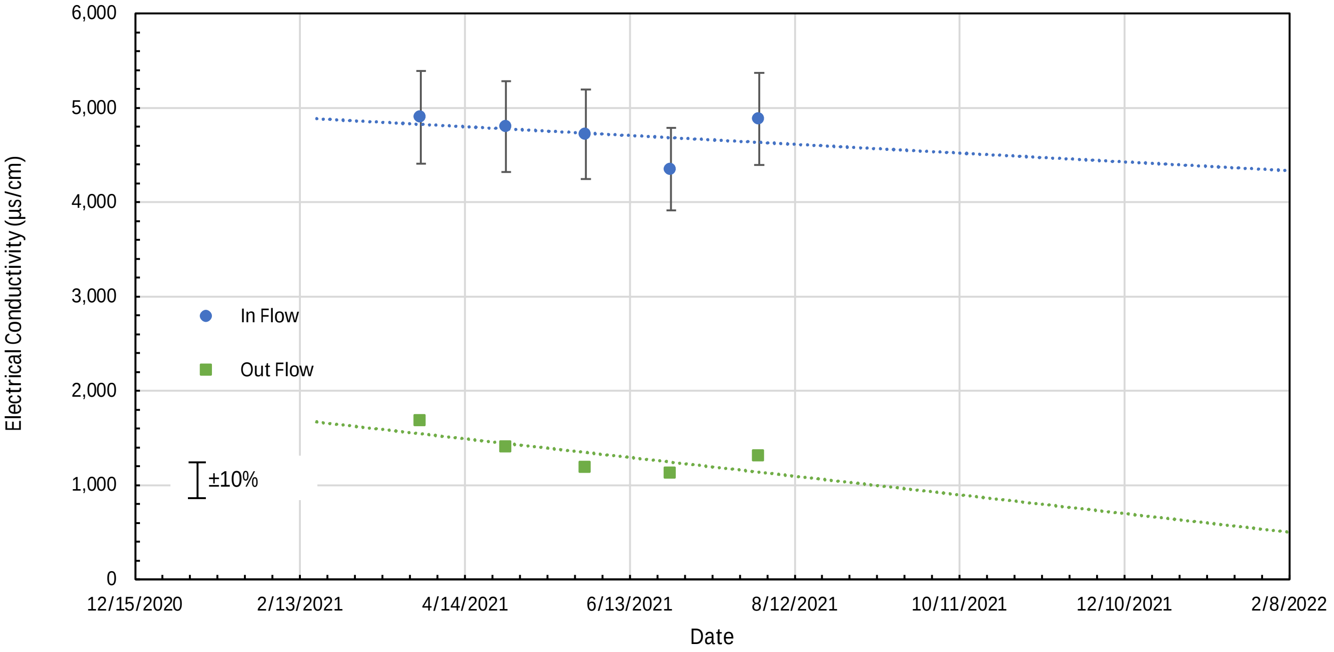
Figure

3-25



B6-ST-3 (55-57.5 ft bgs) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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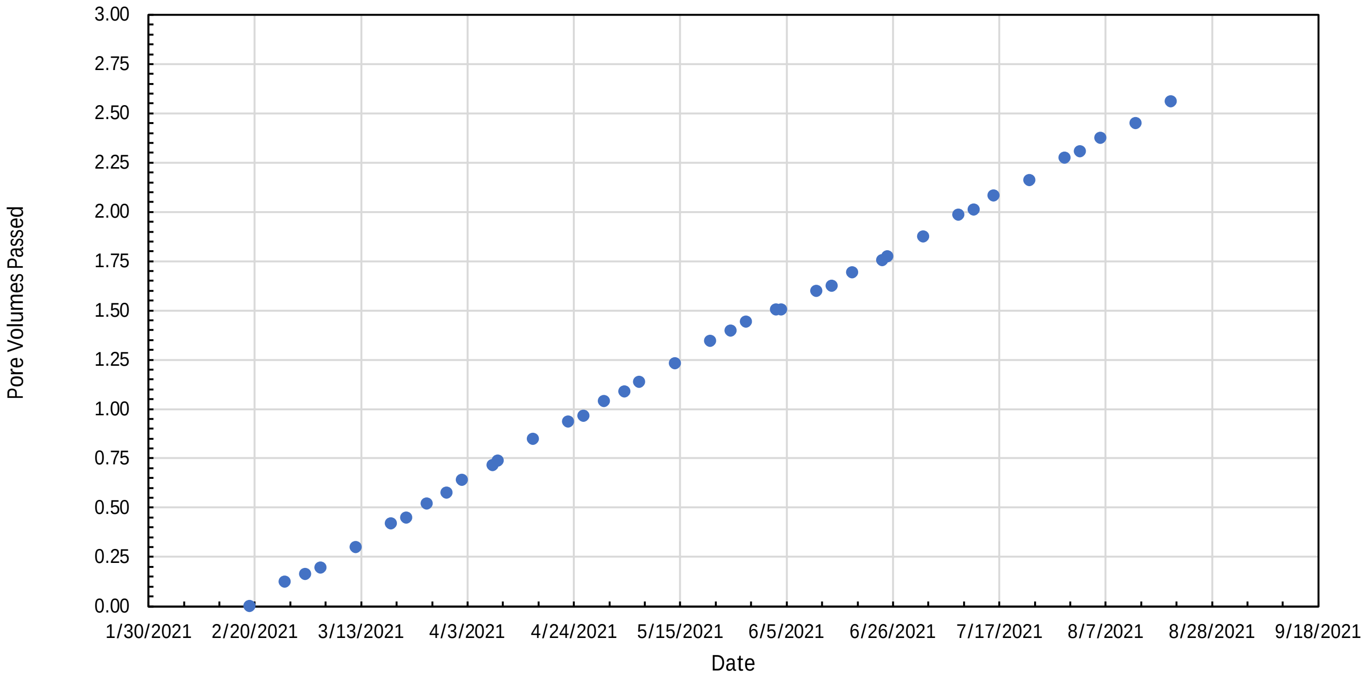
Figure

3-26



B6-ST-4 (65-67.5 ft bgs) PV of Flow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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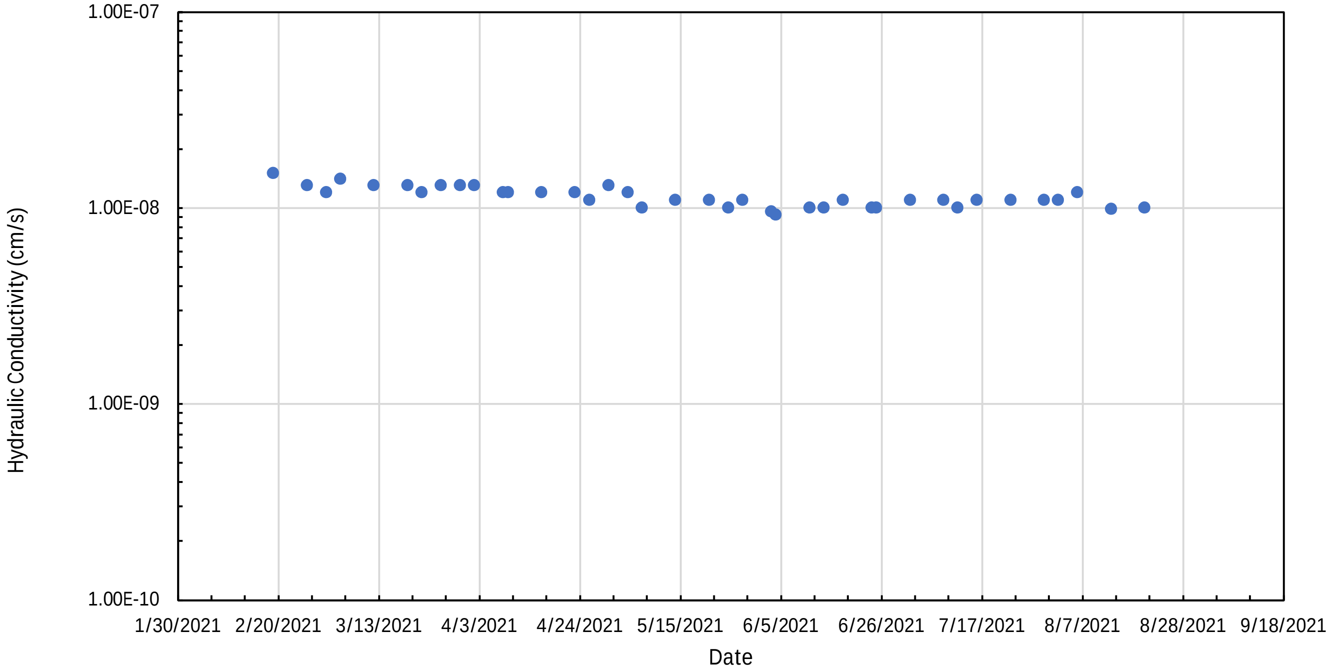
September 2021

Figure

3-27



B6-ST-4 (65-67.5 ft bgs) Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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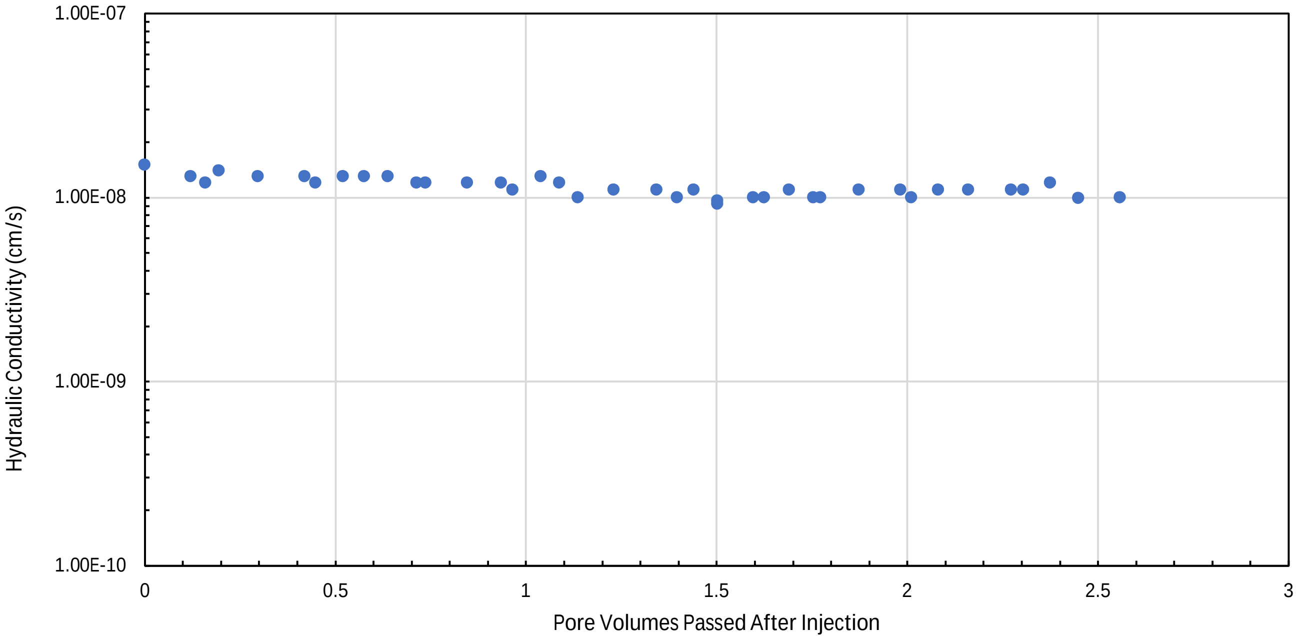
Figure

3-28



B6-ST-4 (65-67.5 ft bgs) Hydraulic Conductivity with PV

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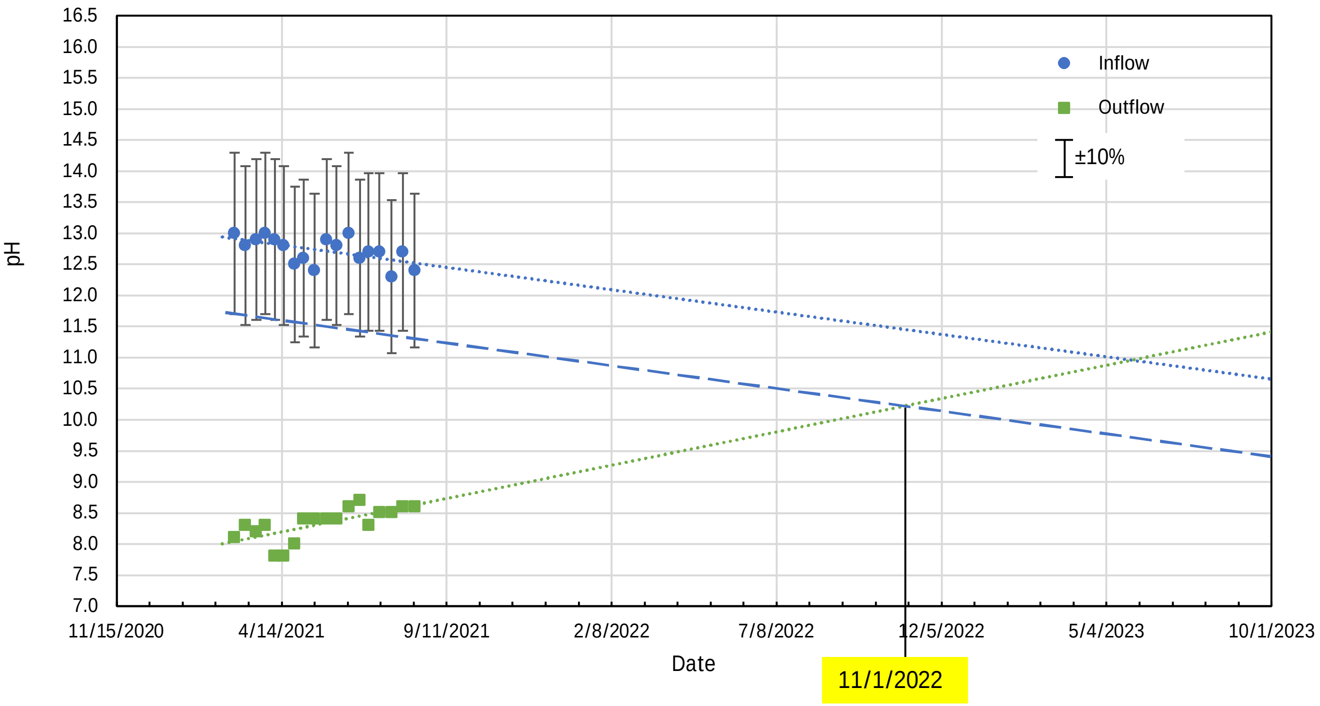
Figure 3-29



B6-ST-4 (65-67.5 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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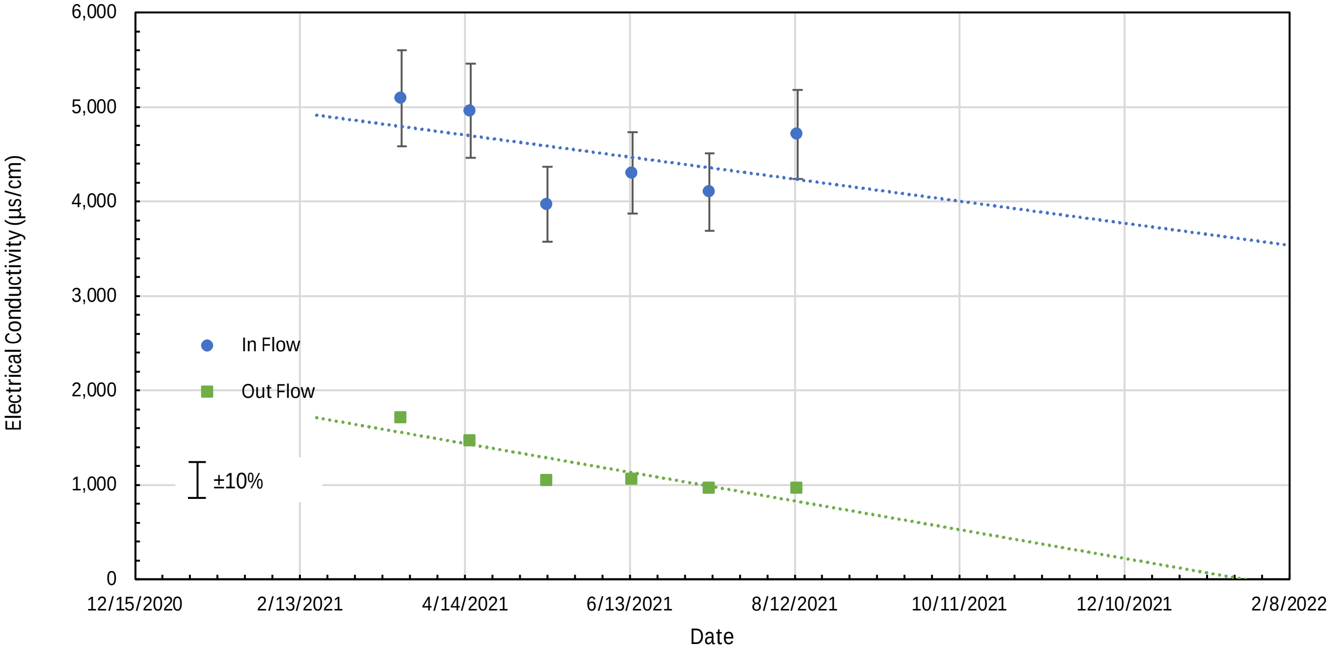
September 2021

Figure

3-30



B6-ST-4 (65-67.5 ft bgs) Electrical Conductivity (EC) with Time

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MONROE, MICHIGAN

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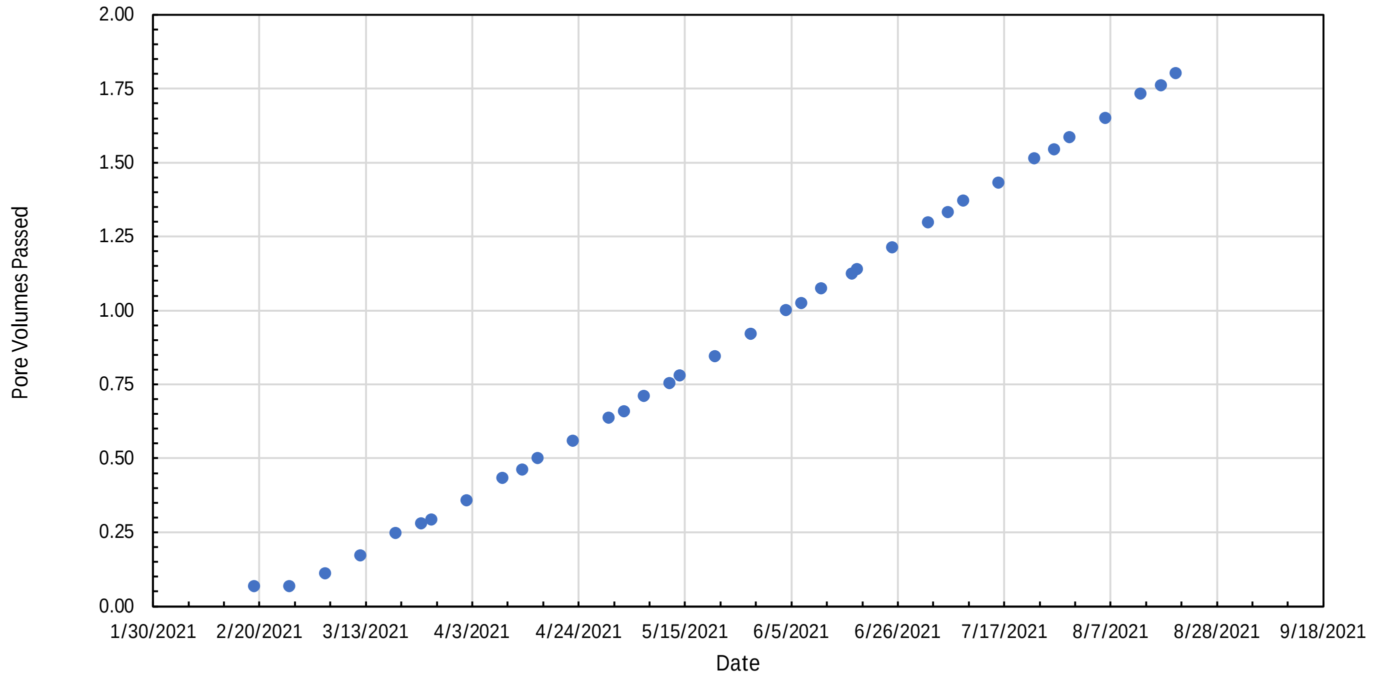
Figure

3-31



B9-ST-2 (40-42 ft bgs) PV of Flow with Time

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MONROE, MICHIGAN

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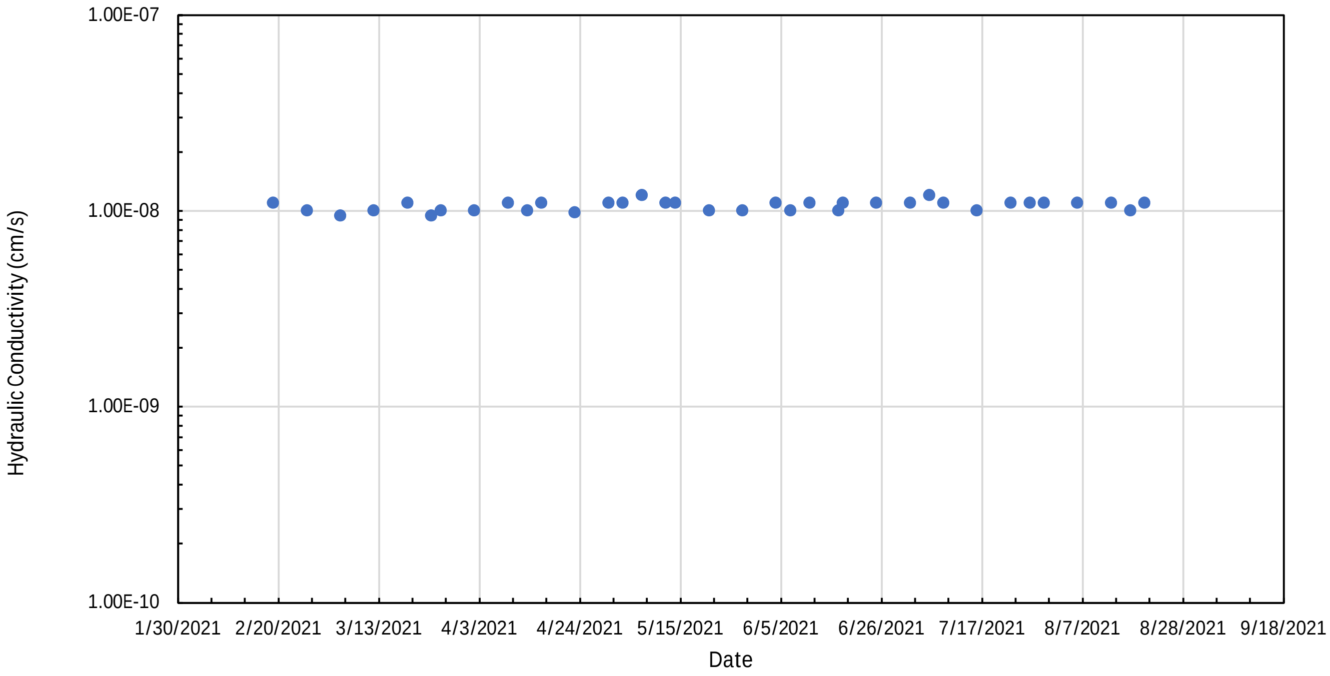
September 2021

Figure

3-32



B9-ST-2 (40-42 ft bgs) Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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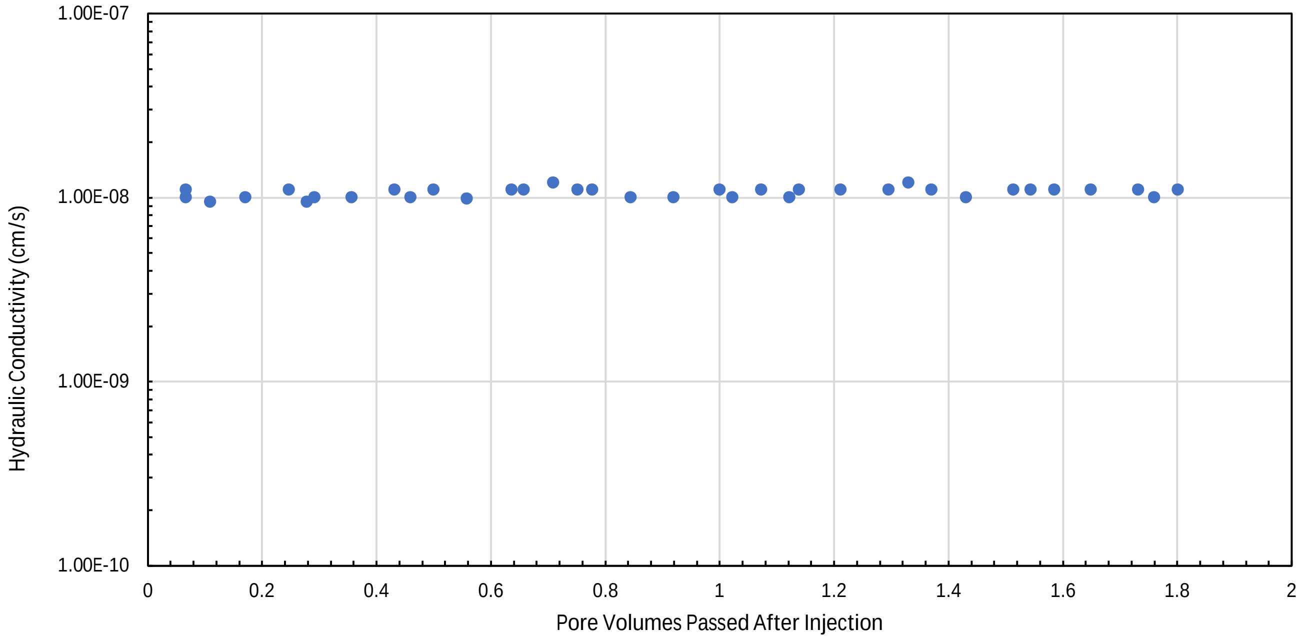
Ann Arbor, MI	September 2021	**Figure 3-33**



B9-ST-2 (40-42 ft bgs) Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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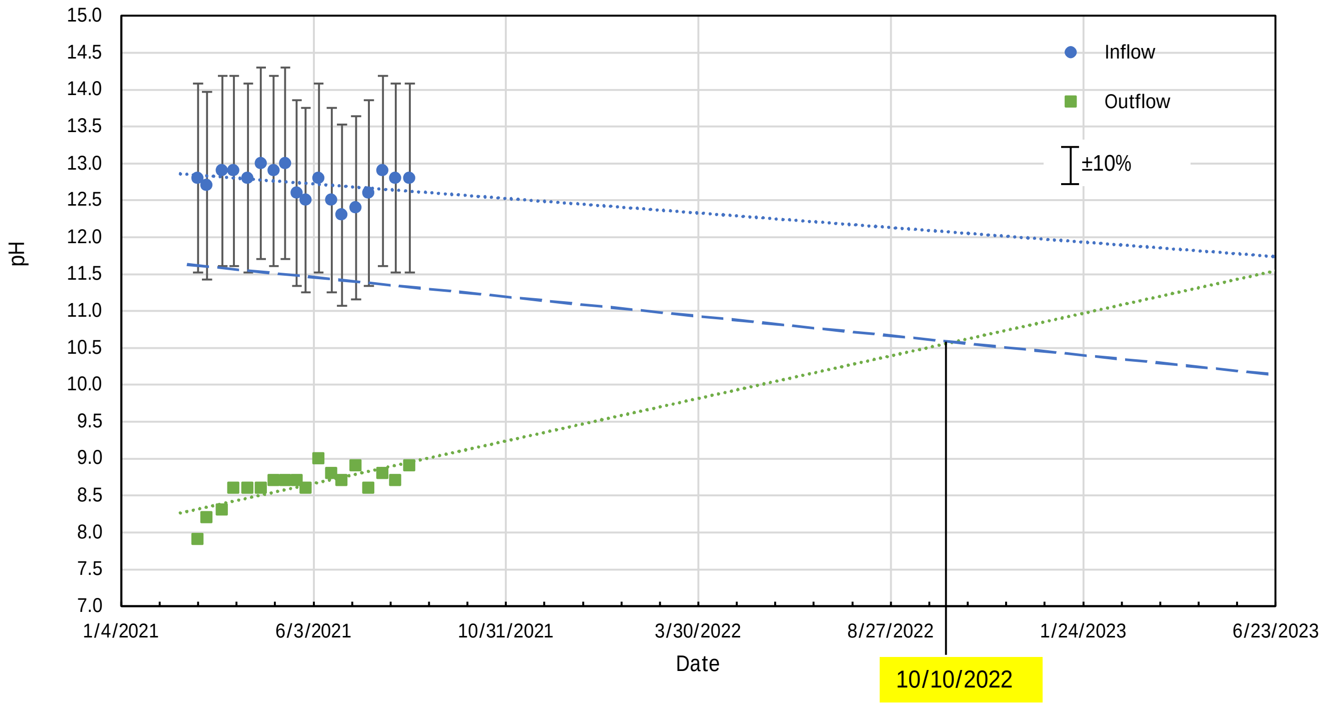
Figure

3-34



B9-ST-2 (40-42 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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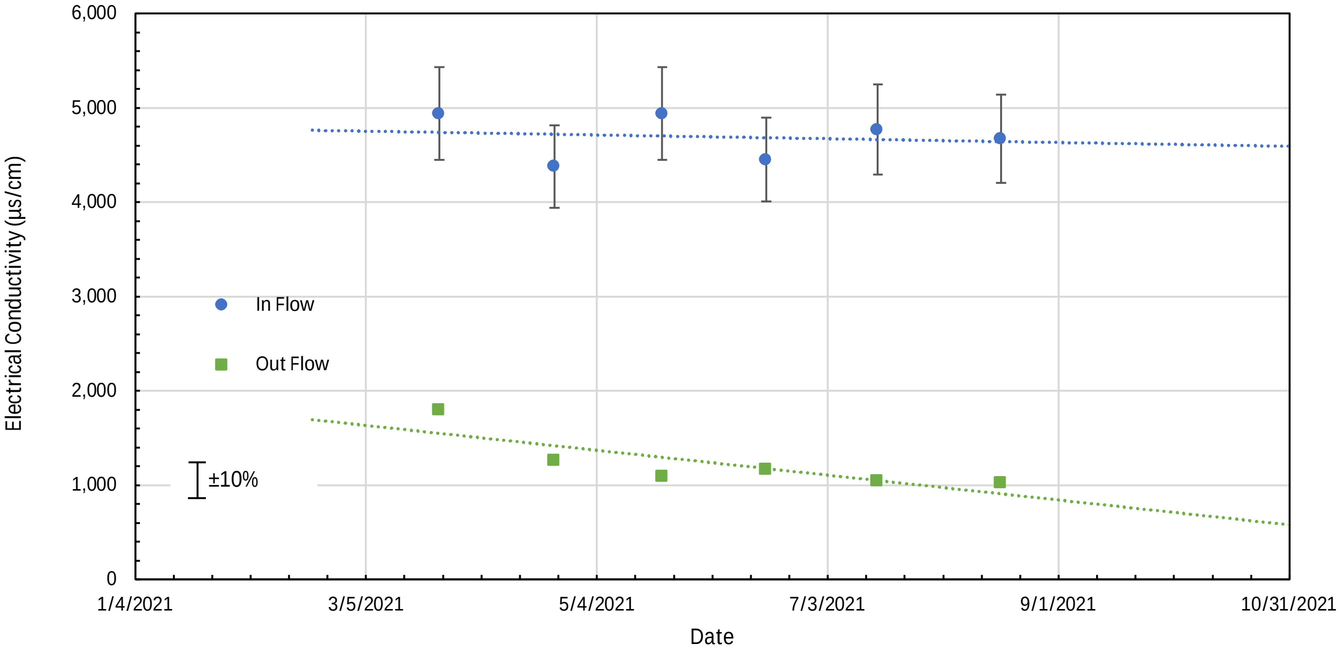
Figure

3-35



B9-ST-2 (40-42 ft bgs) Electrical Conductivity (EC) with Time

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MONROE, MICHIGAN

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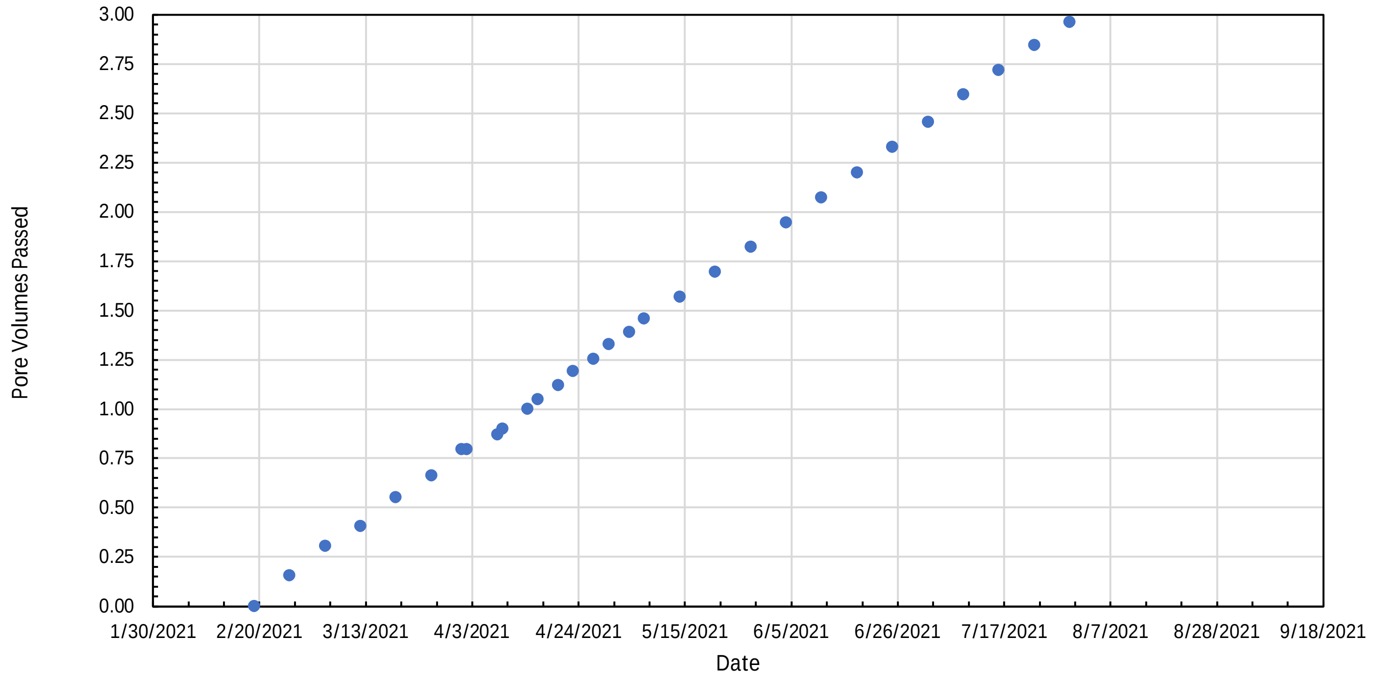
Figure

3-36



B9-ST-3 (55-57 ft bgs) PV of Flow with Time

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MONROE, MICHIGAN

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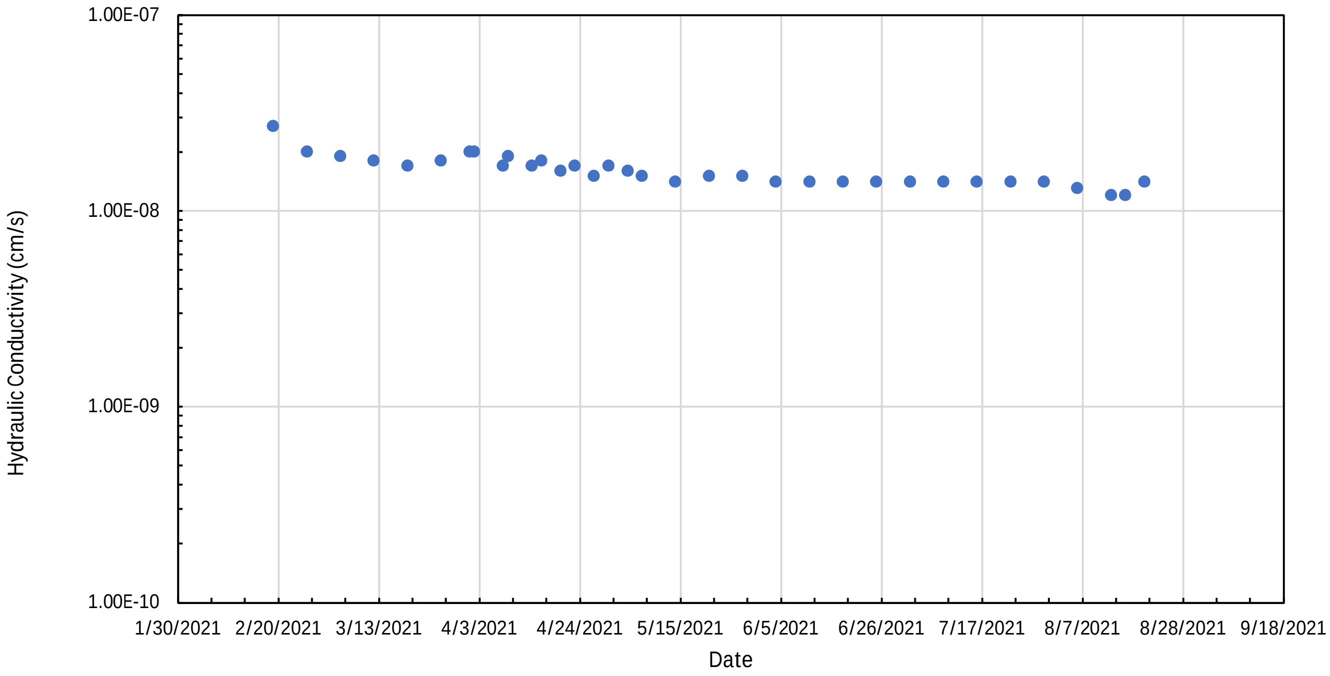
Figure

3-37



B9-ST-3 (55-57 ft bgs) Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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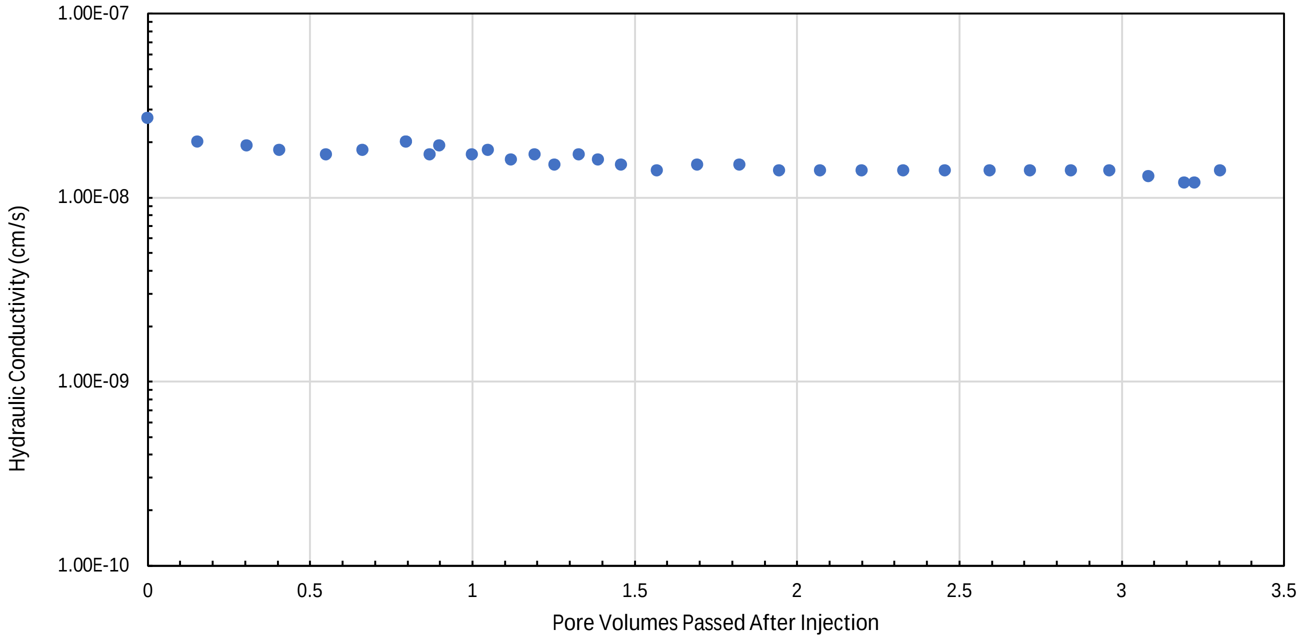
Ann Arbor, MI	September 2021

Figure

3-38



B9-ST-3 (55-57 ft bgs) Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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Figure

3-39

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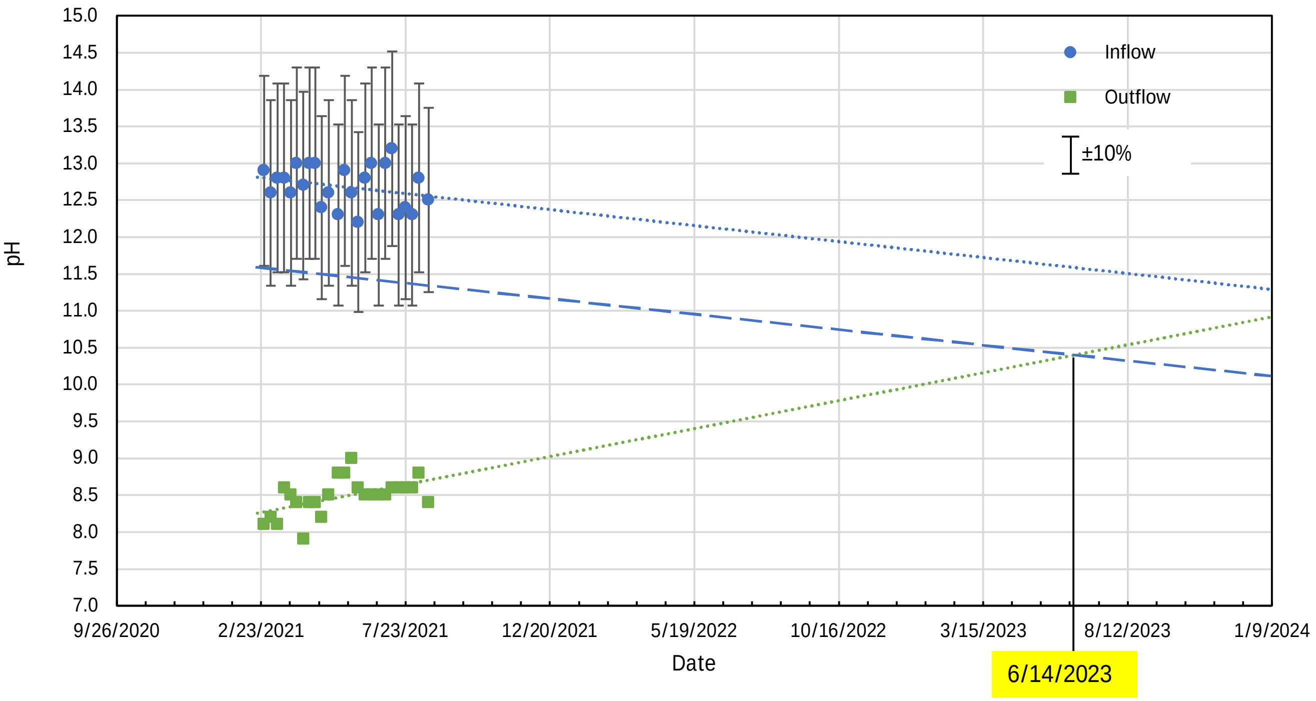

B9-ST-3 (55-57 ft bgs) pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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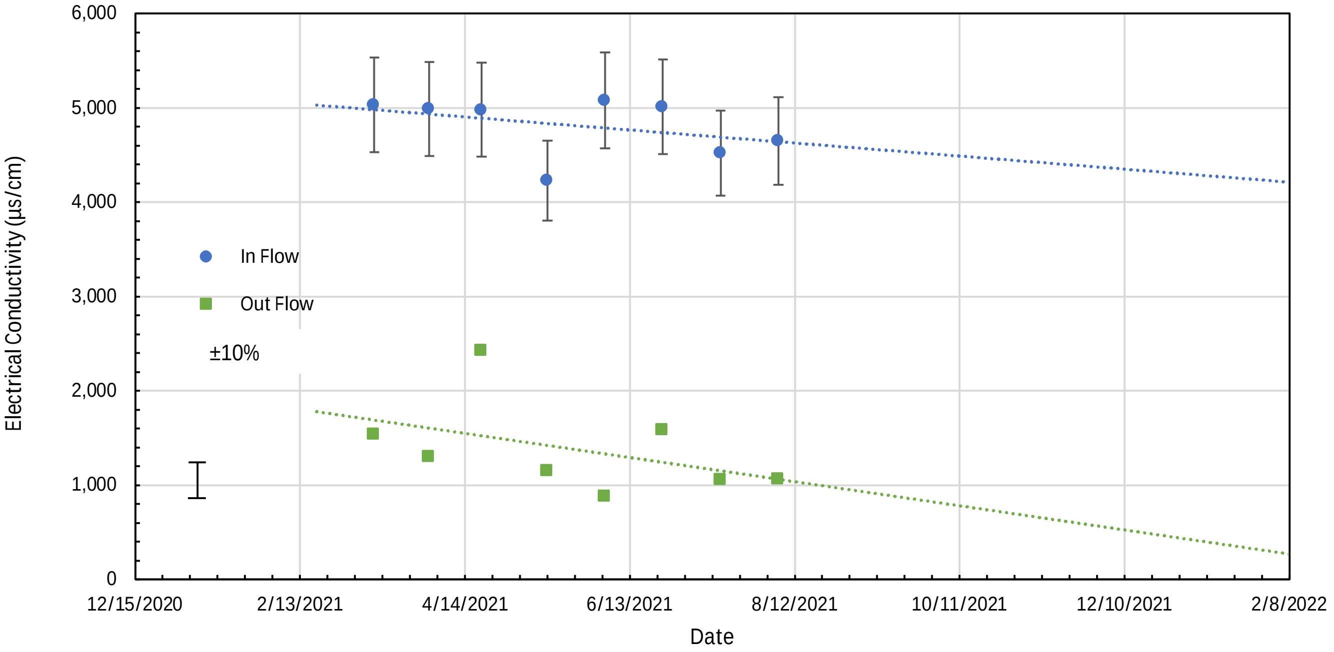
Figure

3-40



B9-ST-3 (55-57 ft bgs) Electrical Conductivity (EC) with Time

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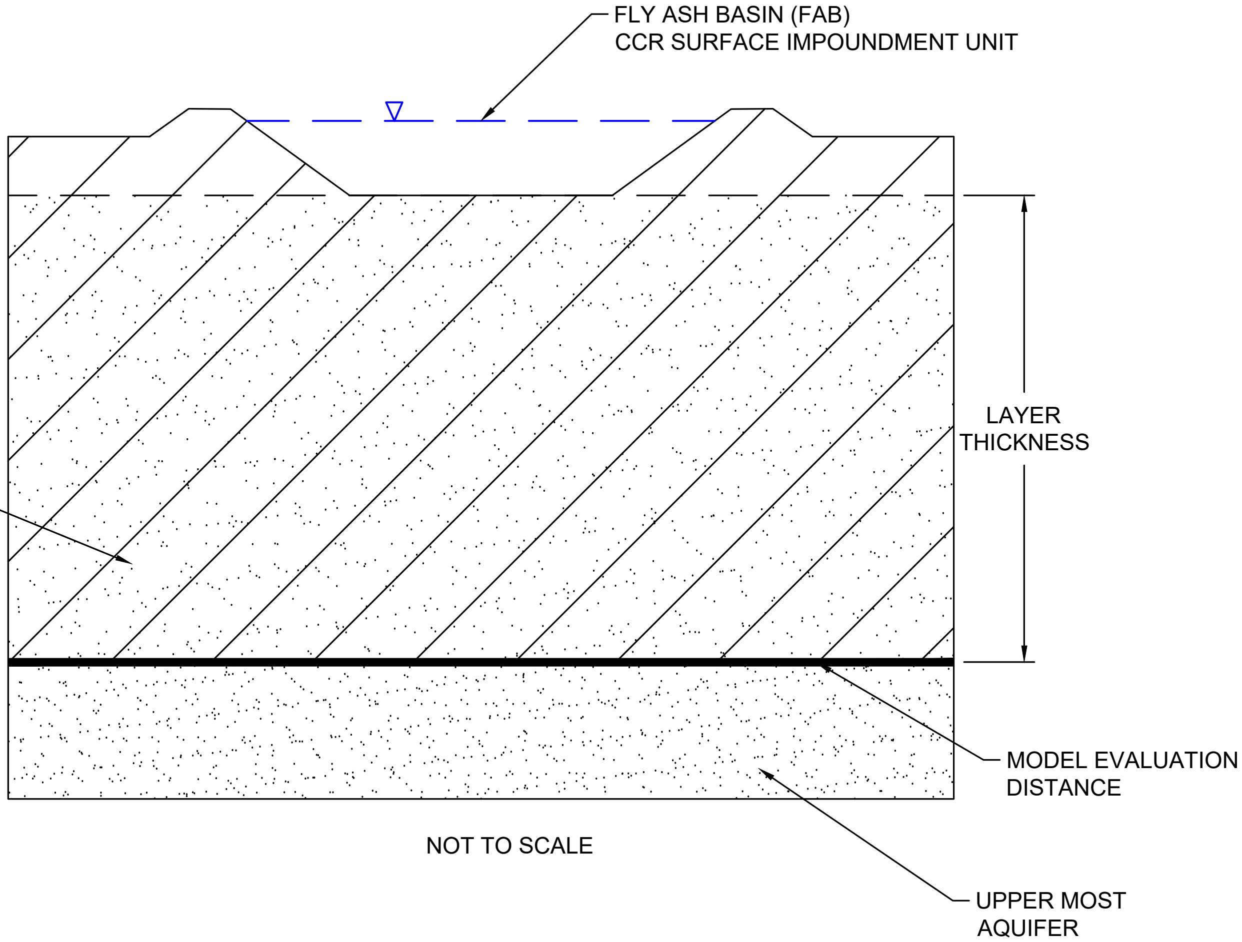
Figure

3-41

SANDY LEAN CLAY LAYER		
INPUT PARAMETER	**UNITS**	**VALUE**
DARCY VELOCITY	M/YR	1.91E-03
TOTAL THICKNESS	METERS	6.31
COEFFICIENT OF HYDODYNAMIC DISPERSION	M^2/a	0.019
EFFECTIVE POROSITY		0.58
DENSITY	KG/M3	1919
DISTRIBUTION COEFFICIENT	M^3/KG	0
DEGRADATION		0



LEGEND

▨ LEAN CLAY UNIT

▨ SANDY LEAN CLAY UNIT

░ UPPER MOST AQUIFER (TRANSITION ZONE)

FIGURE 4-1
FATE AND TRANSPORT
CONCEPTUAL MODEL
MONROE ALD - FAB

Geosyntec
consultants

PROJECT NO: GLP8014
OCTOBER 2021

FIGURE
4-1

O:\DWG\D\DTE\BELLE RIVER ALD\FT MODEL - FAB - Last Saved by: MKatelieva on 10/29/21

APPENDIX A – MONITORING WELL SLUG TEST RESULTS

2016 Slug Test Results

Hydraulic Conductivity Results

DTE Electric Company Monroe Power Plant Fly Ash Basin
Monroe, Michigan

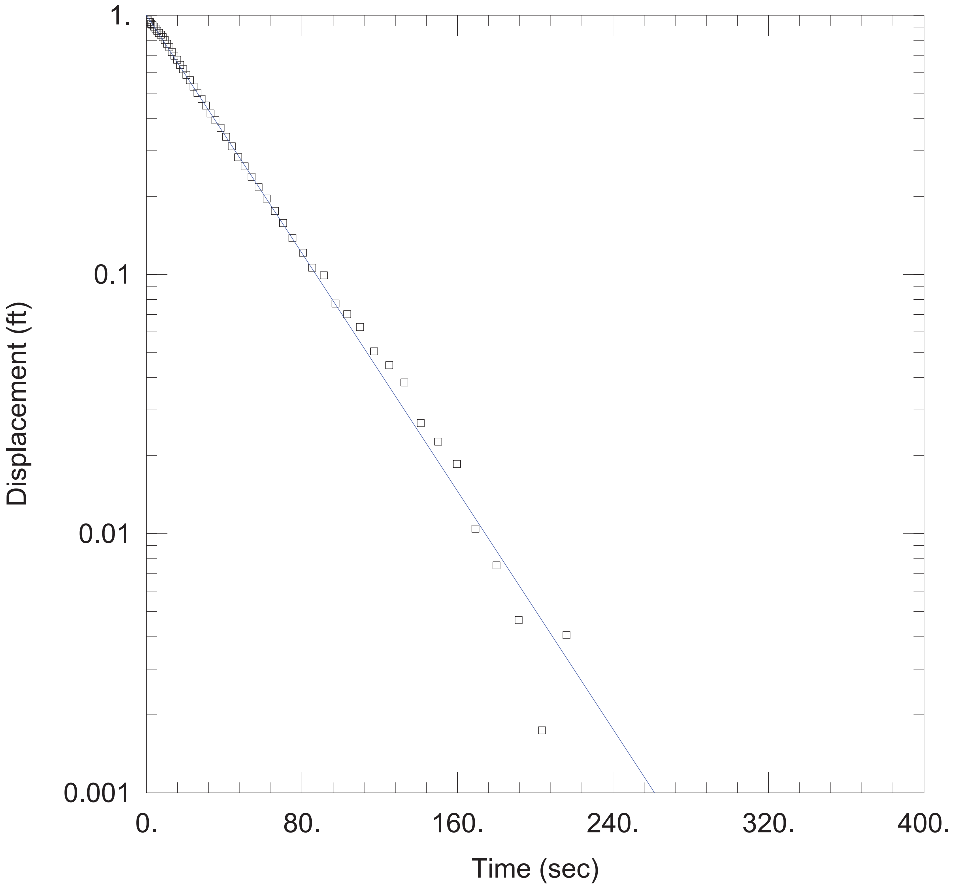
Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	**ft/day**
MW-16-01	3/1/2016	Falling Head	1.91E-03	5.403
		Rising Head	1.08E-03	3.053
		Average	**1.49E-03**	**4.228**

Conversion:

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

Notes:

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



FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-01 IN.aqt
Date: 11/27/17 Time: 14:21:09

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE MFAB CCR
Project: 231828.0001.0000
Location: Monroe, MI
Test Well: MW-16-01
Test Date: 3/2/16

AQUIFER DATA

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

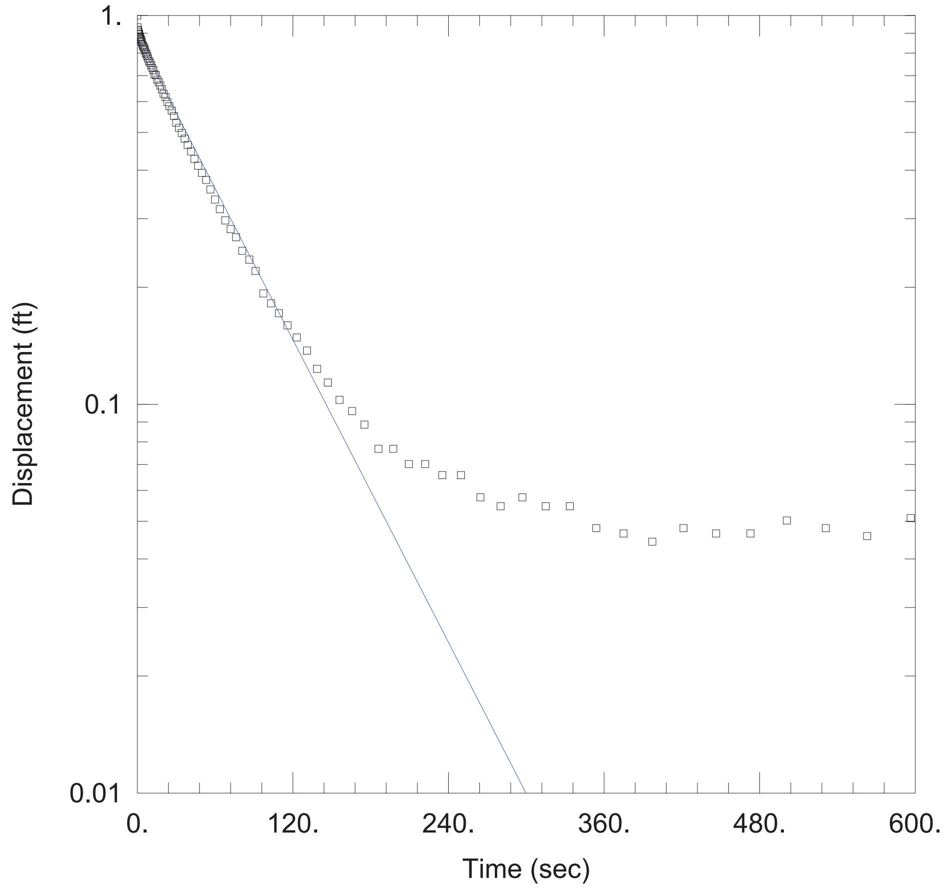
WELL DATA (MW-16-01)

Initial Displacement: 1.724 ft
Static Water Column Height: 48.77 ft
Total Well Penetration Depth: 53.21 ft
Screen Length: 5. ft
Casing Radius: 0.08333 ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001906 cm/sec
y0 = 1.725 ft



RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01 OUT.aqt
Date: 11/27/17 Time: 14:23:00

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE MFAB CCR
Project: 231828.0001.0000
Location: Monroe, MI
Test Well: MW-16-01
Test Date: 3/2/16

AQUIFER DATA

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

WELL DATA (MW-16-01)

Initial Displacement: 1.354 ft
Static Water Column Height: 48.77 ft
Total Well Penetration Depth: 53.21 ft
Screen Length: 5. ft
Casing Radius: 0.08333 ft
Well Radius: 0.08333 ft

SOLUTION

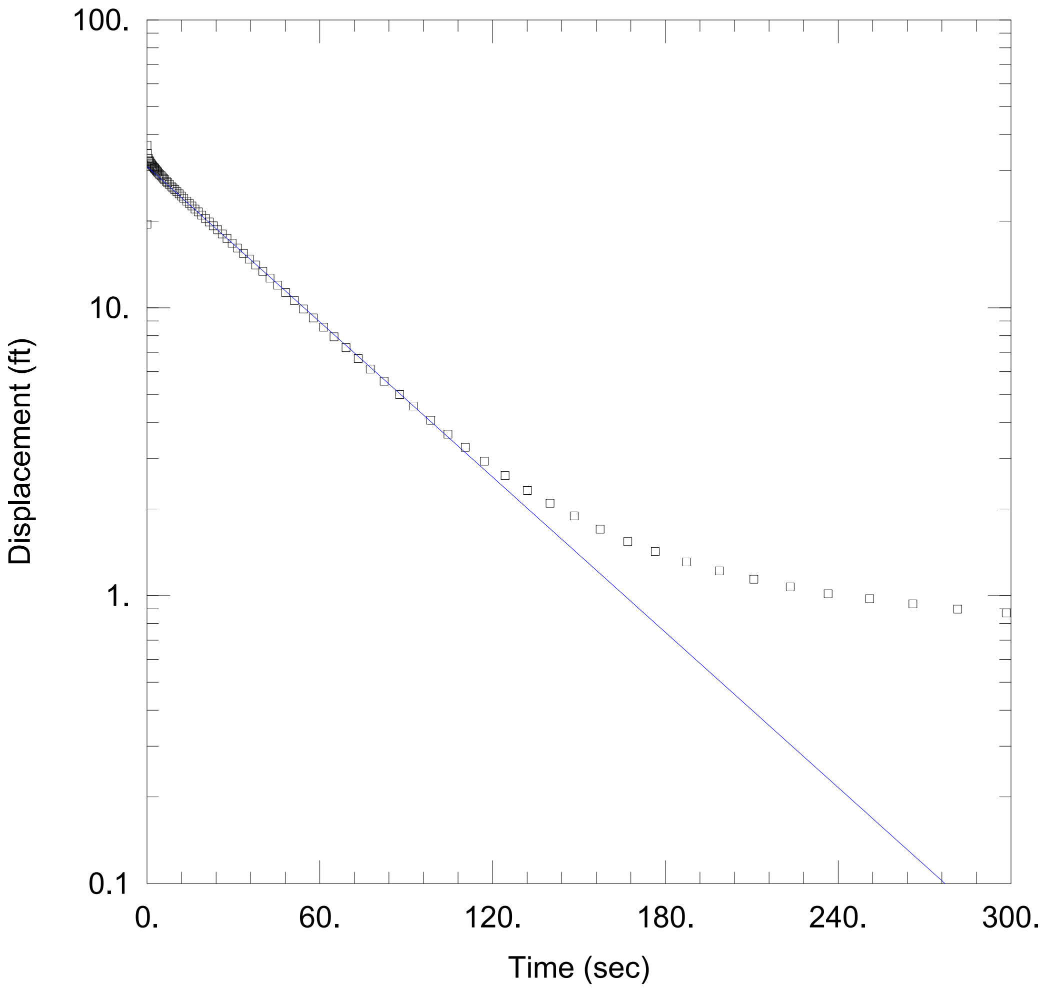
Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.001077 cm/sec
y0 = 1.191 ft

2021 Slug Test Results

2021 Hydraulic Conductivity Results Summary
DTE Electric Company Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill
7955 East Dunbar Road, Monroe, Michigan

Slug Test	WC (ft)	K (cm/s)	K (ft/d)	Comment/K Geometric mean (cm/s)	K Geometric Mean (ft/d)
MW-16-02 Test 1	63	NA	NA	Not a good match, use tests 2 and 3	NA
MW-16-02 Test 2	63	2.5E-03	7.0	2.6E-03	7.4
MW-16-02 Test 3	63	2.7E-03	7.8		
MW-16-03 Test 1	55	4.3E-03	12.2	4.5E-03	12.9
MW-16-03 Test 2	55	4.4E-03	12.5		
MW-16-03 Test 3	55	4.9E-03	14.0		
MW-16-04 Test 1	63	3.9E-02	110.9	3.5E-02	99.6
MW-16-04 Test 2	63	3.4E-02	95.5		
MW-16-04 Test 3	63	3.3E-02	93.3		
MW-16-05 Test 1	60	9.9E-03	28.1	1.0E-02	28.4
MW-16-05 Test 2	60	1.0E-02	28.5		
MW-16-05 Test 3	60	1.0E-02	28.7		
MW-16-06 Test 1	53	3.8E-03	10.7	3.3E-03	9.5
MW-16-06 Test 2	53	3.4E-03	9.5		
MW-16-06 Test 3	53	2.9E-03	8.3		
MW-16-07 Test 1	50	3.5E-03	9.9	4.1E-03	11.7
MW-16-07 Test 2	50	4.4E-03	12.5		
MW-16-07 Test 3	50	4.5E-03	12.9		

K = Hydraulic Conductivity
NA = Not applicable
WC = water column height in well
A pneumatic air slug was utilized to complete slug tests in these artesian free flowing wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 1.aqt
Date: 10/29/21 Time: 13:27:14

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

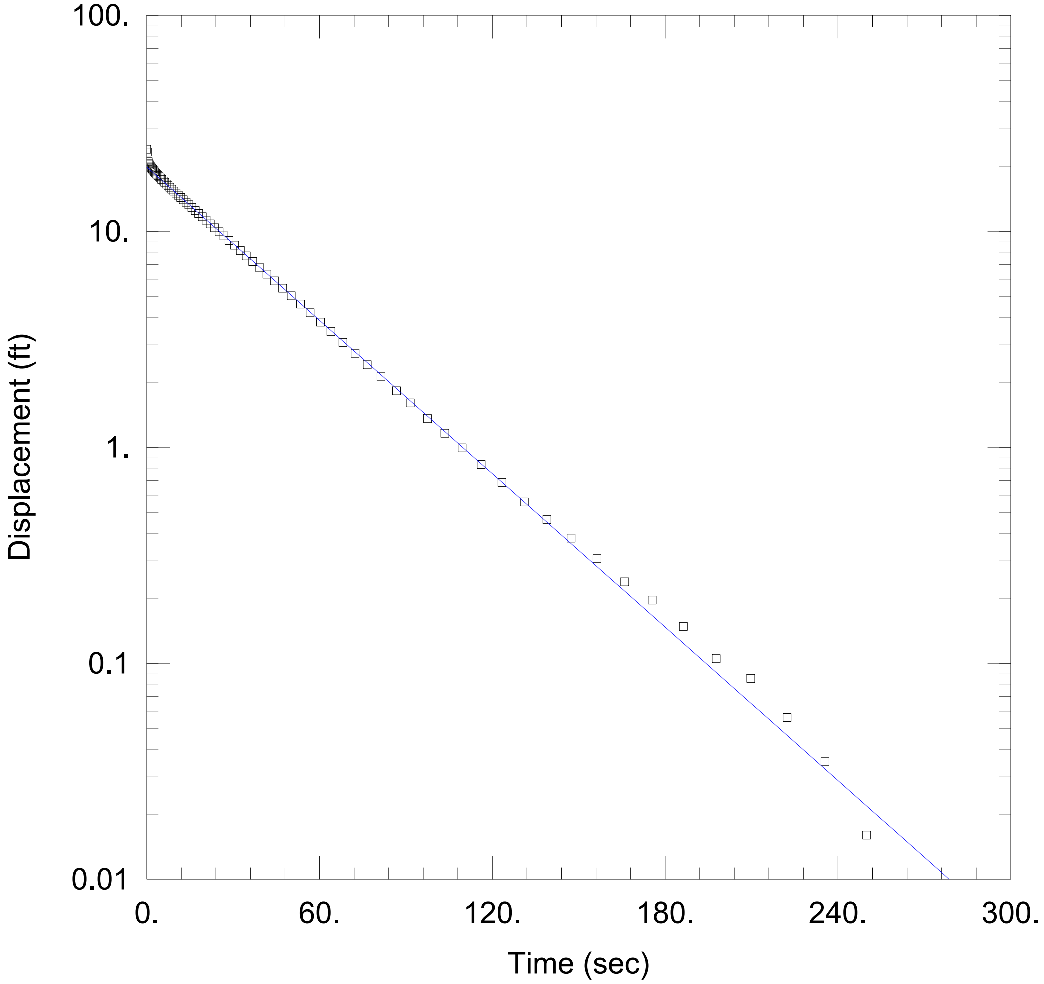
WELL DATA (MW-16-02)

Initial Displacement: 19.52 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 63. ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.001862 cm/sec
y0 = 30.93 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 2.aqt
Date: 10/29/21 Time: 13:30:29

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

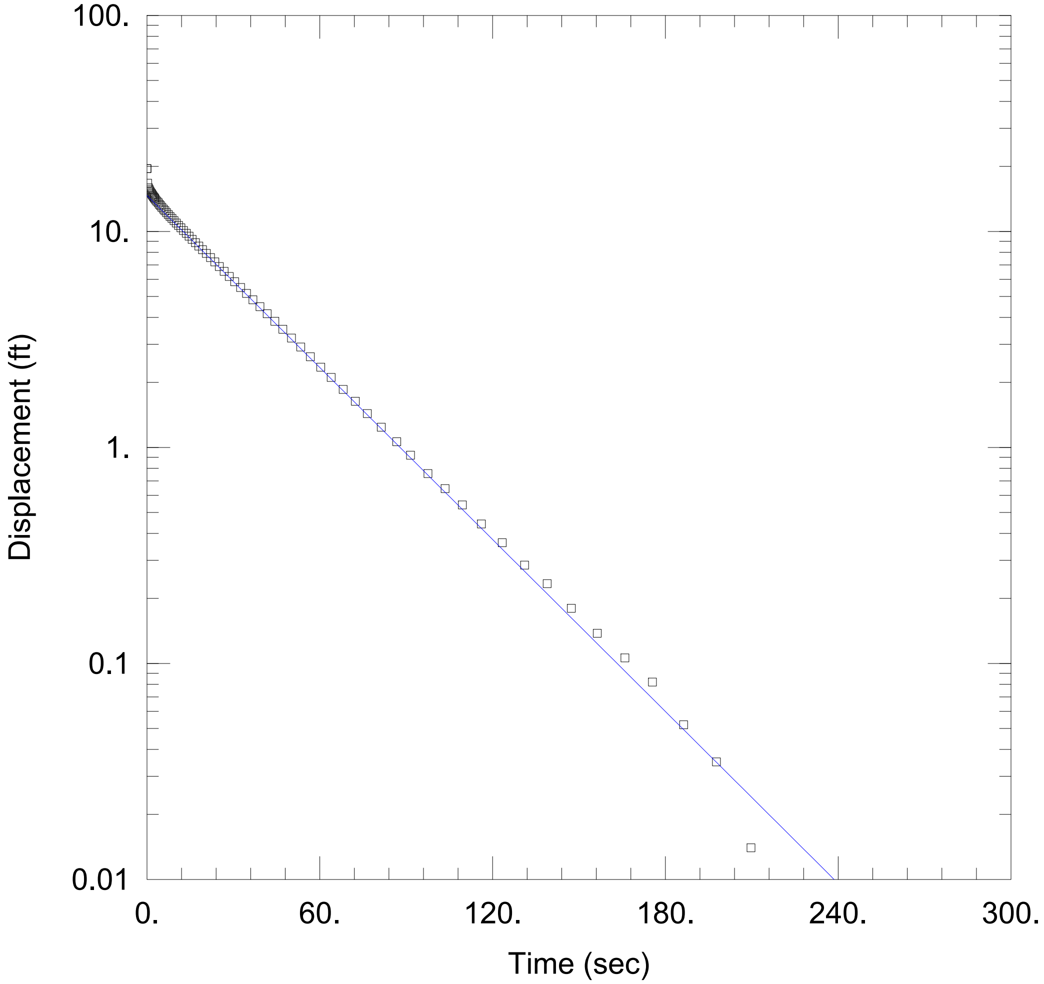
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-02)

Initial Displacement: 23.98 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.002452 cm/sec
y0 = 19.83 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 3.aqt
Date: 10/29/21 Time: 13:29:03

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

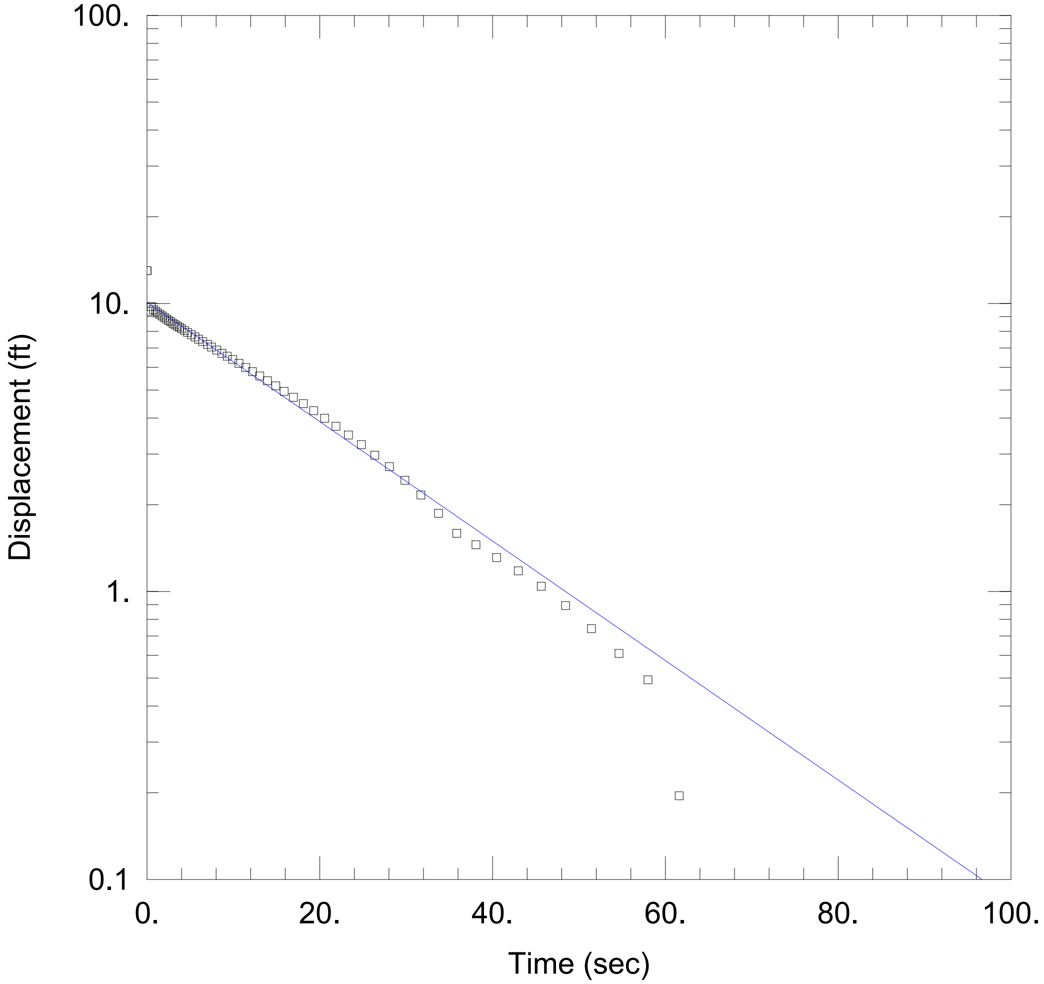
WELL DATA (MW-16-02)

Initial Displacement: 19.52 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.002749 cm/sec
y0 = 14.65 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 1.aqt
Date: 10/29/21 Time: 13:34:12

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

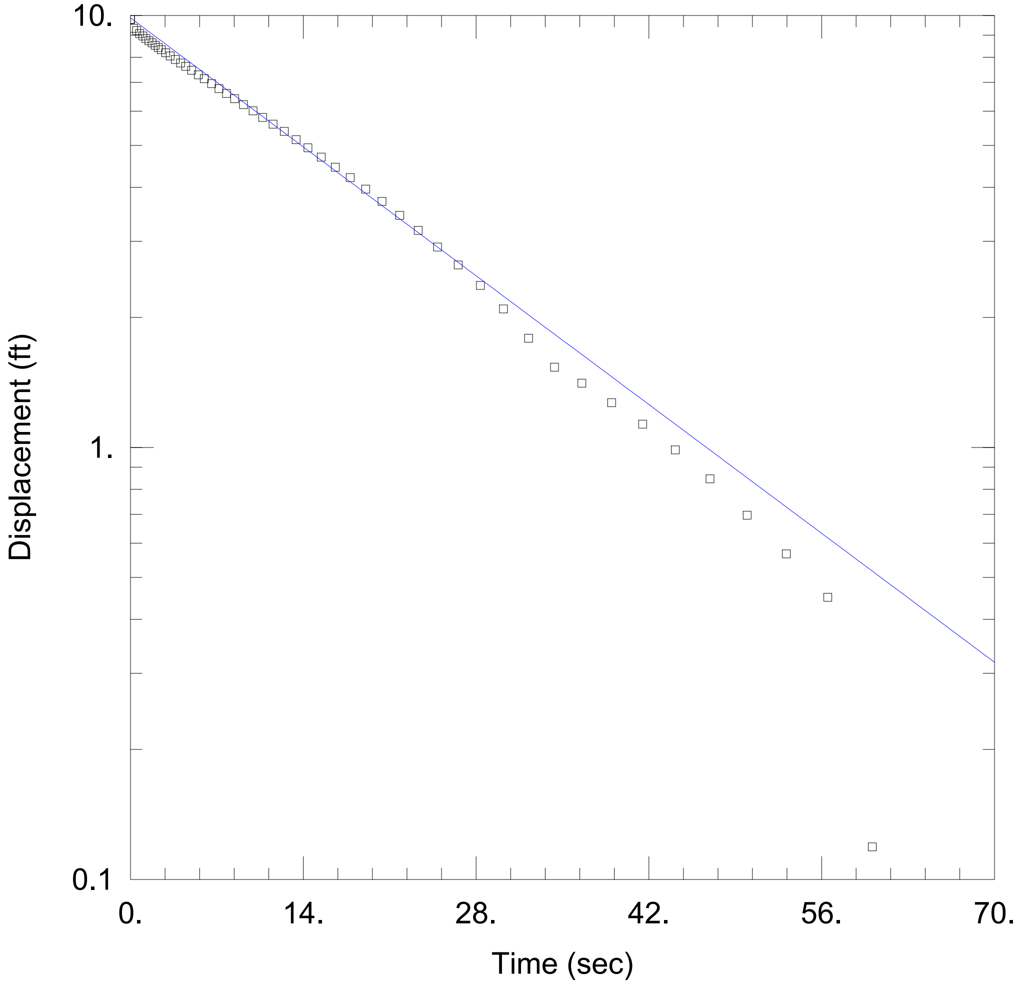
WELL DATA (MW-16-03)

Initial Displacement: 12.99 ft
Static Water Column Height: 55. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004296 cm/sec
y0 = 10.1 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 2.aqt
Date: 10/29/21 Time: 13:36:40

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

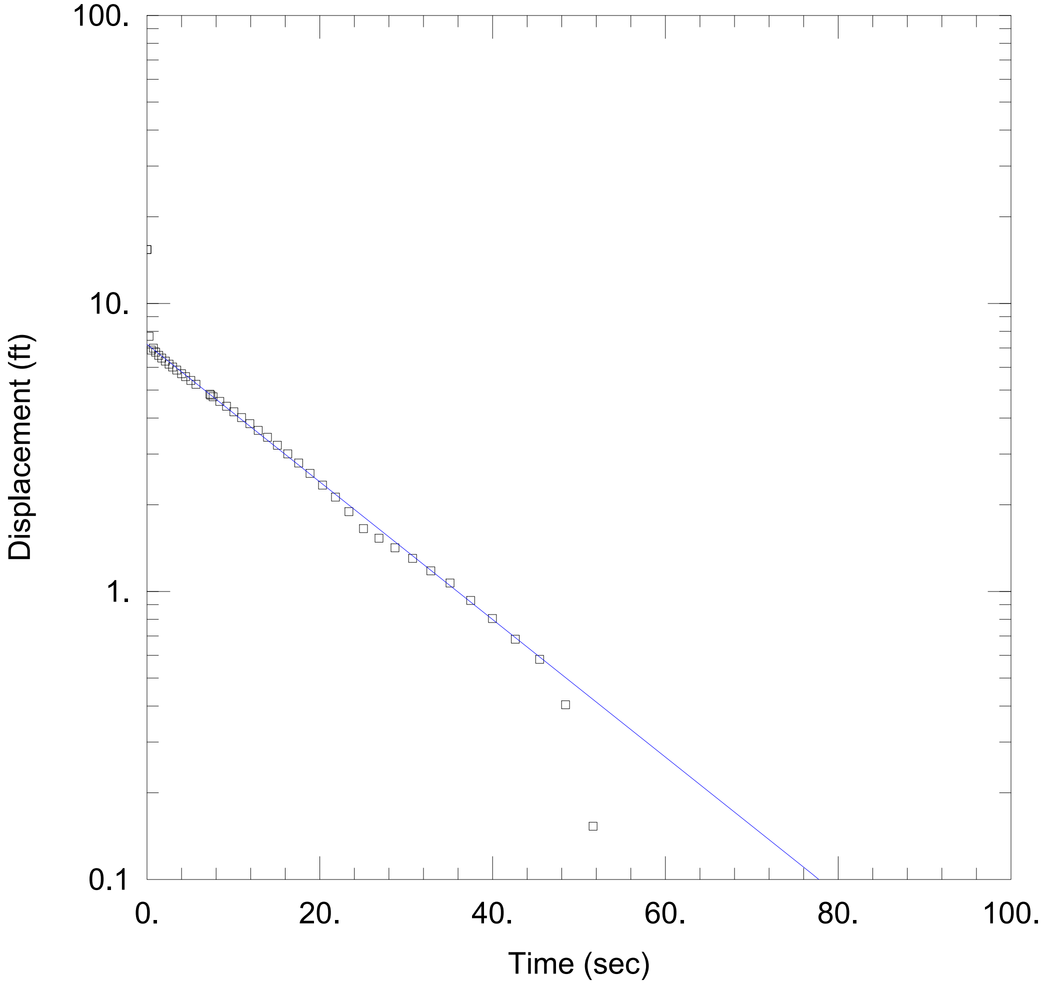
WELL DATA (MW-16-03)

Initial Displacement: 9.789 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 55. ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004413 cm/sec
y0 = 9.867 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 3.aqt
Date: 10/29/21 Time: 13:38:09

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

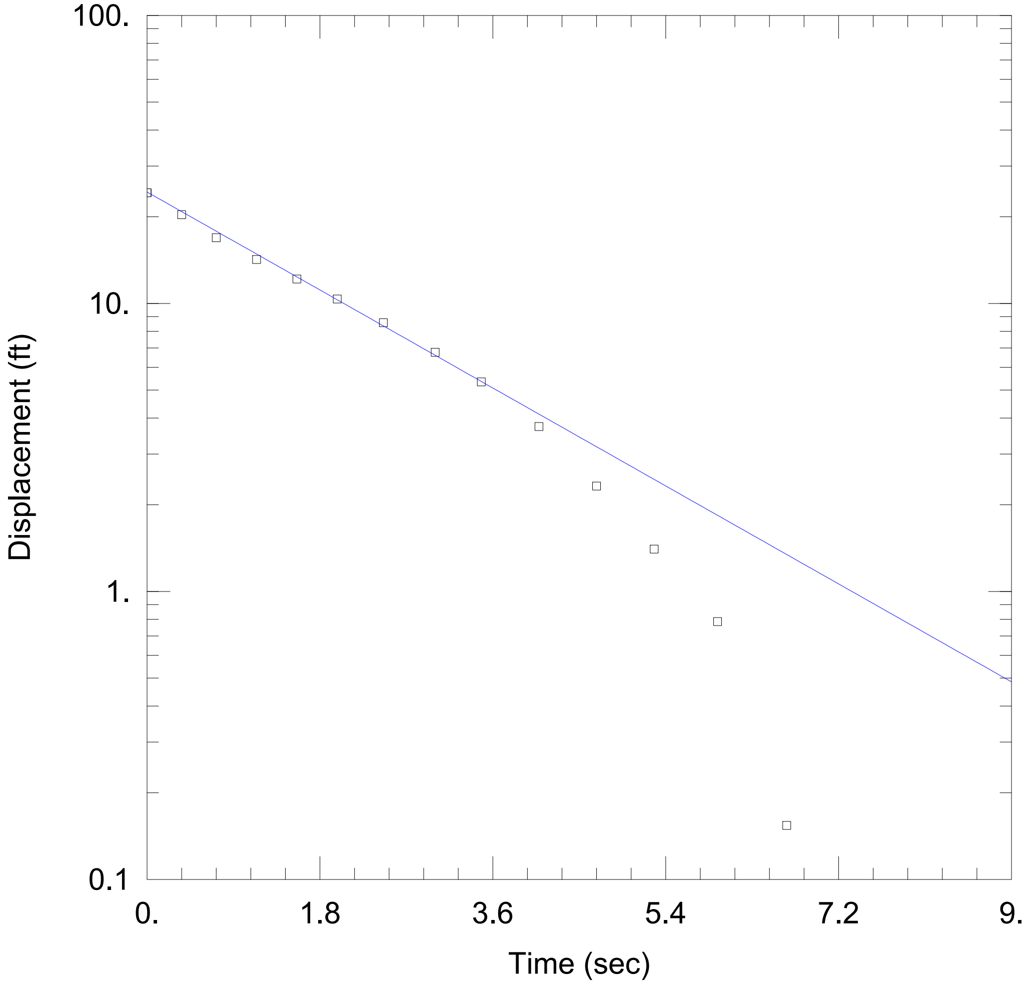
WELL DATA (MW-16-03)

Initial Displacement: 15.37 ft
Static Water Column Height: 55. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004948 cm/sec
y0 = 7.209 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 1.aqt
Date: 10/29/21 Time: 14:05:30

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

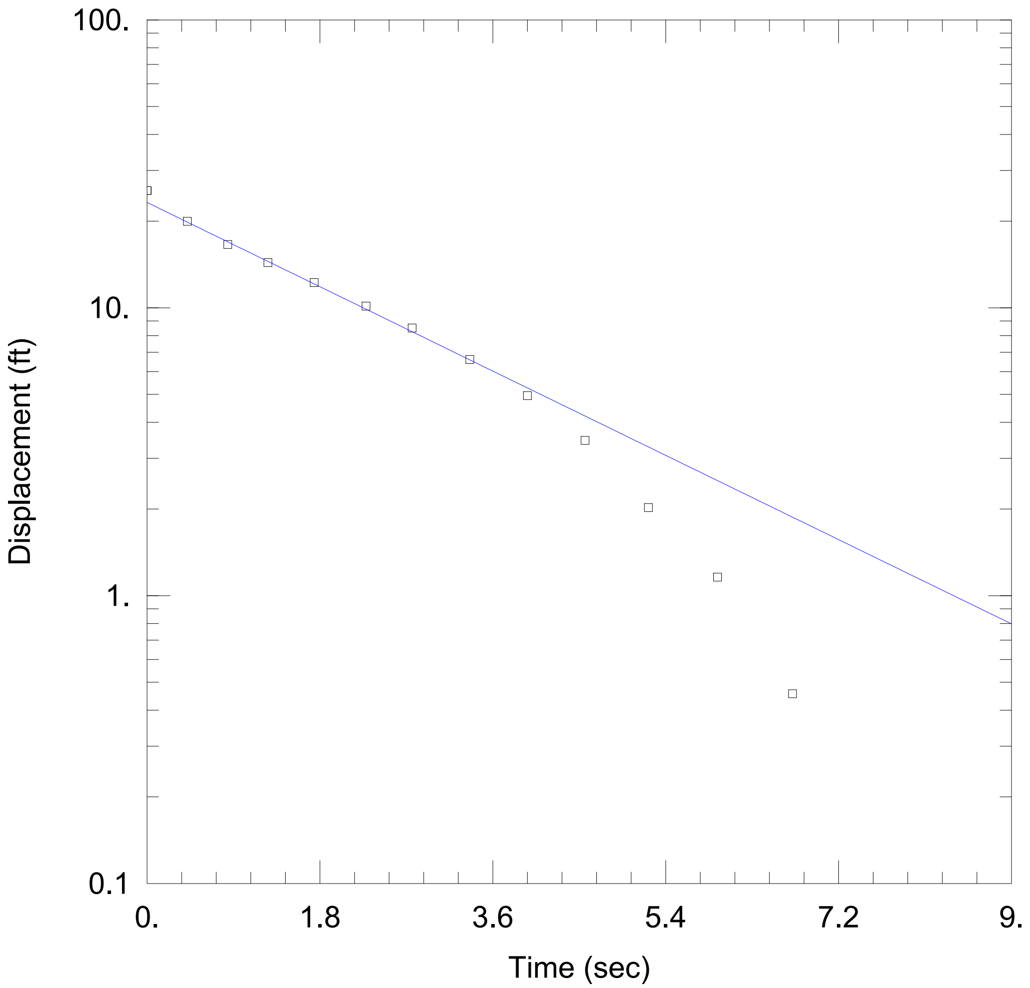
WELL DATA (MW-16-04)

Initial Displacement: 24.21 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03914 cm/sec
y0 = 24.37 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 2.aqt
Date: 10/29/21 Time: 14:07:50

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

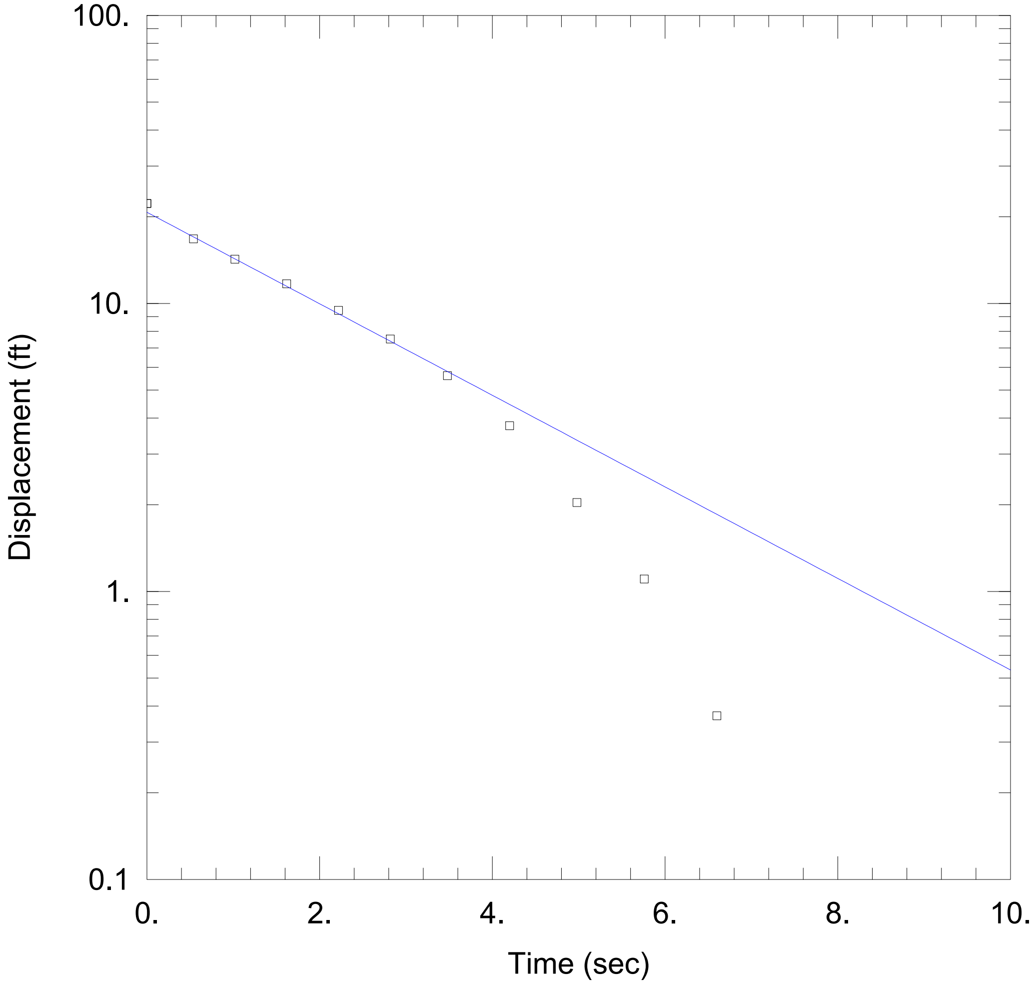
WELL DATA (MW-16-04)

Initial Displacement: 25.52 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03369 cm/sec
y0 = 23.21 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 3.aqt
Date: 10/29/21 Time: 14:11:31

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

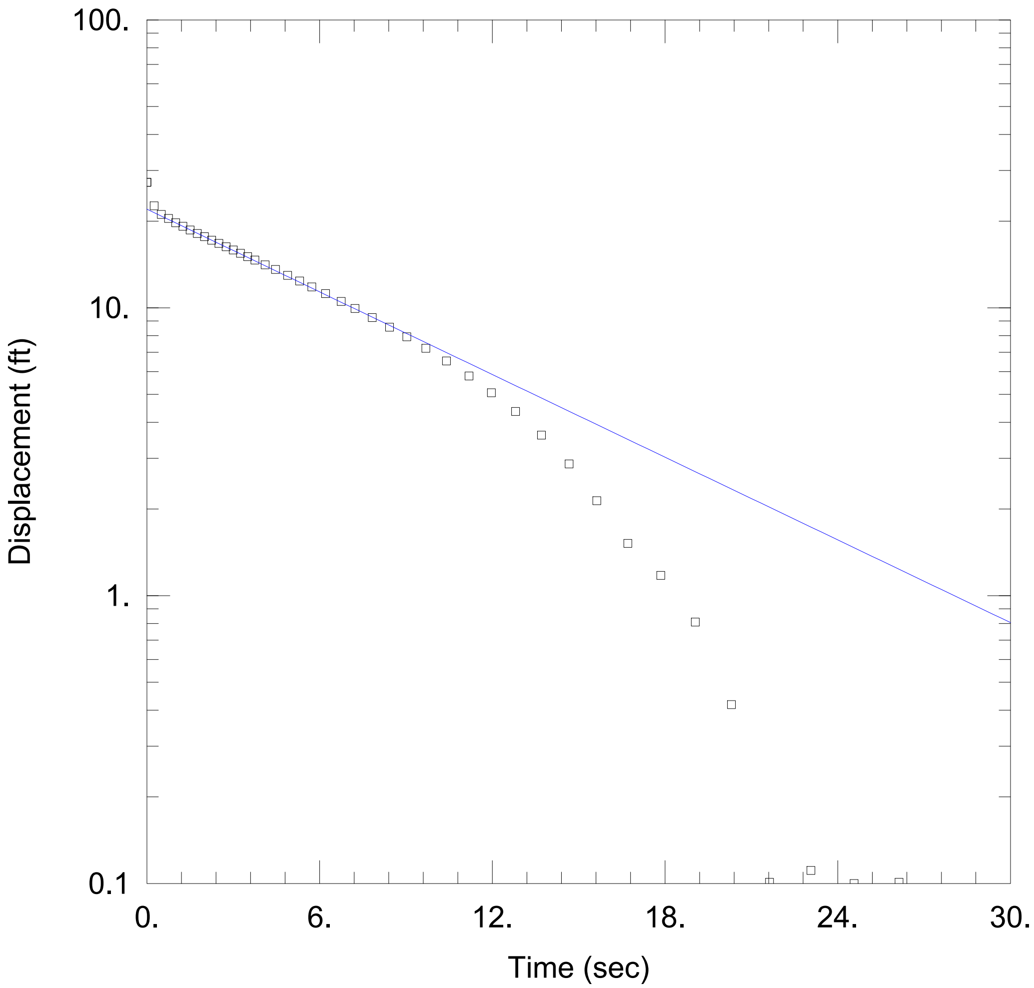
WELL DATA (MW-16-04)

Initial Displacement: 22.22 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03291 cm/sec
y0 = 20.73 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 1.aqt
Date: 10/29/21 Time: 14:16:43

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

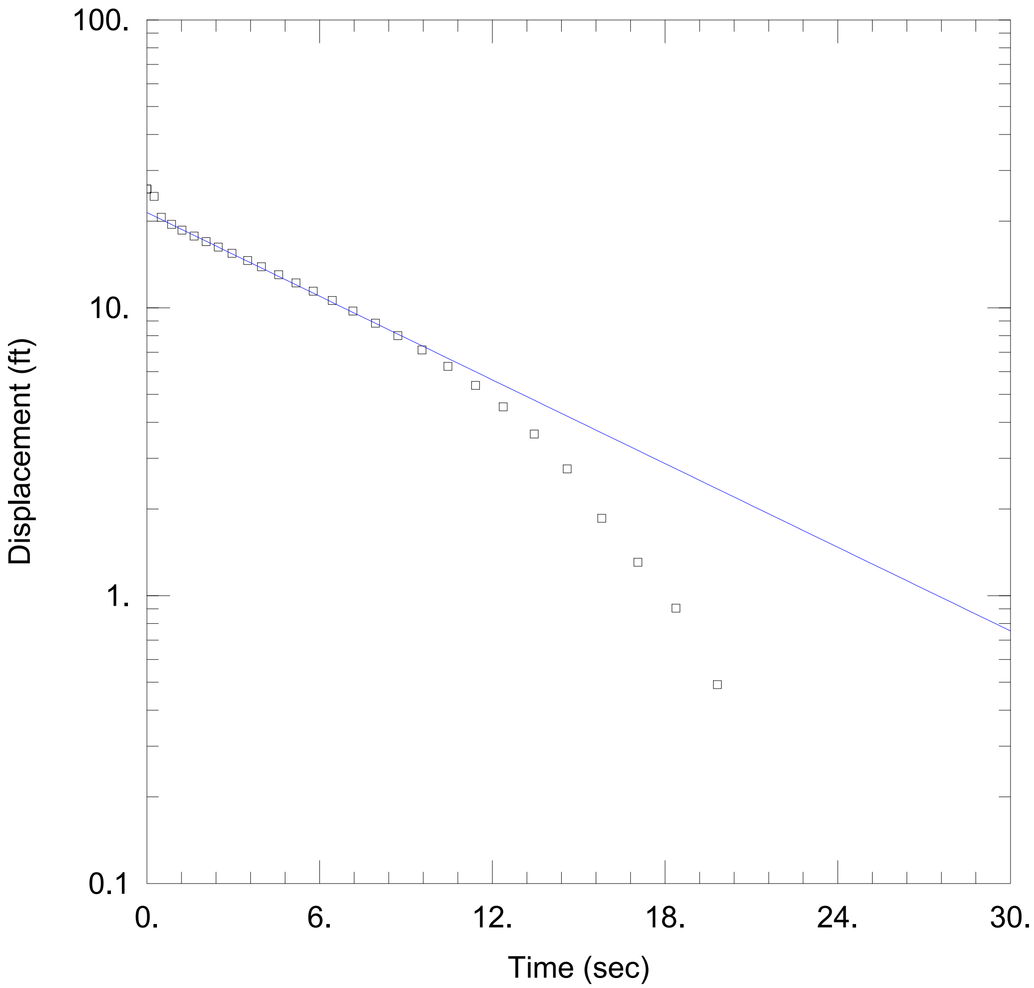
WELL DATA (MW-16-05)

Initial Displacement: 27.27 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.009917 cm/sec
y0 = 22.01 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 2.aqt
Date: 10/29/21 Time: 14:18:42

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

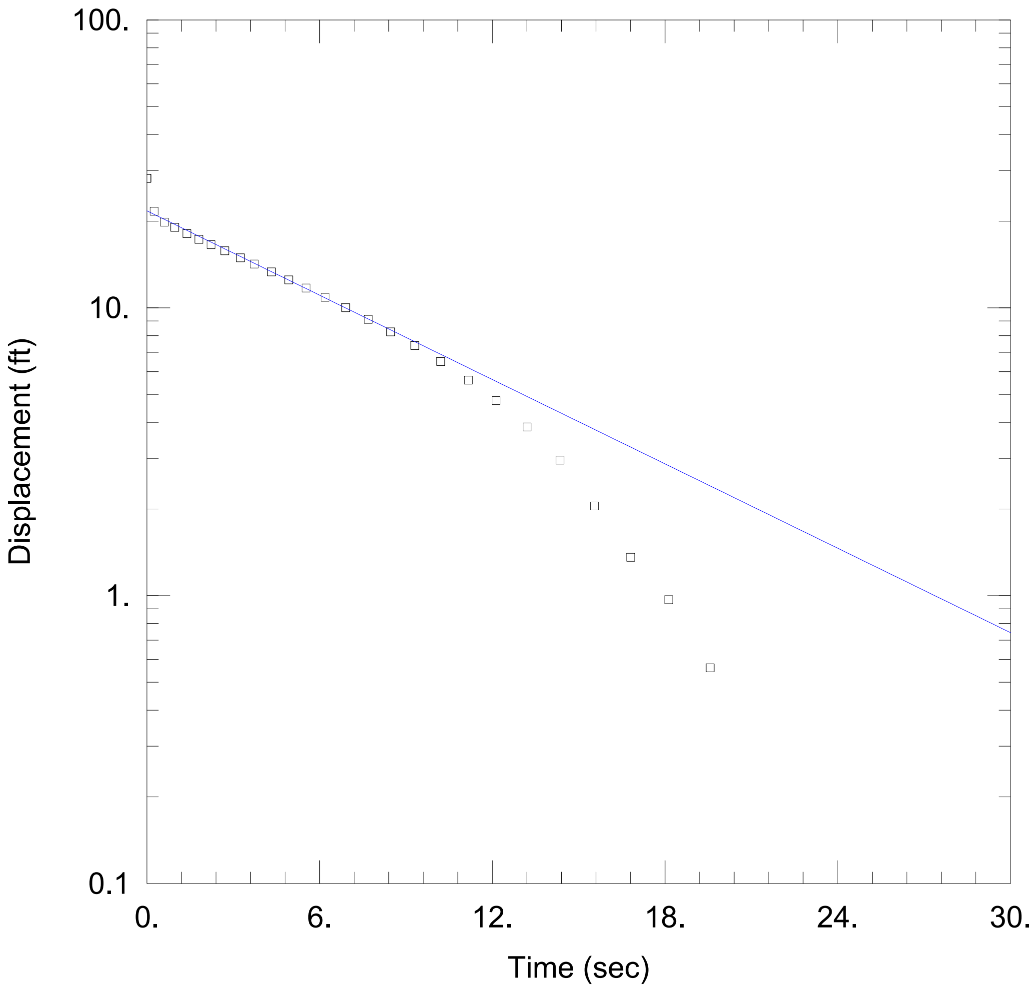
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-05)

Initial Displacement: 25.85 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.01004 cm/sec
y0 = 21.42 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 3.aqt
Date: 10/29/21 Time: 14:20:26

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

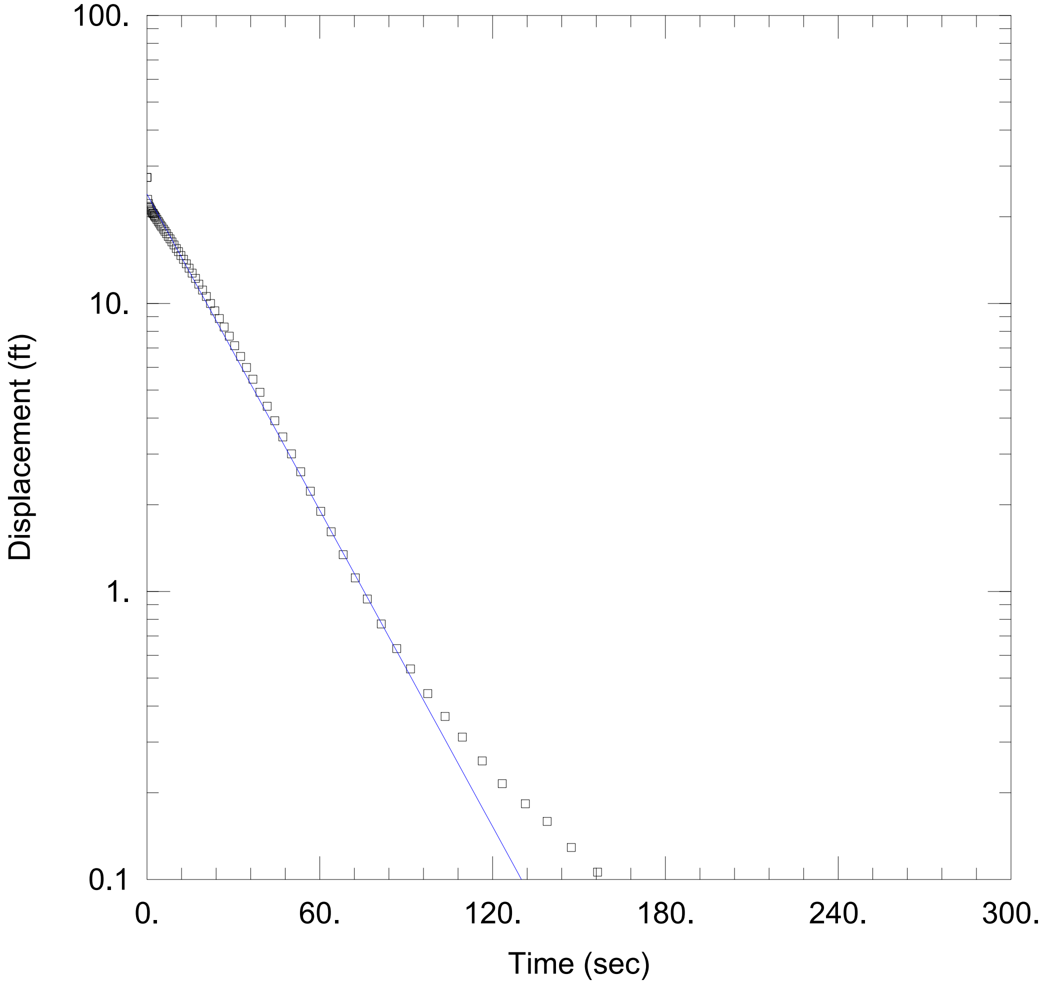
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-05)

Initial Displacement: 28.15 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.01012 cm/sec
y0 = 21.72 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 1.aqt
Date: 10/29/21 Time: 14:25:42

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

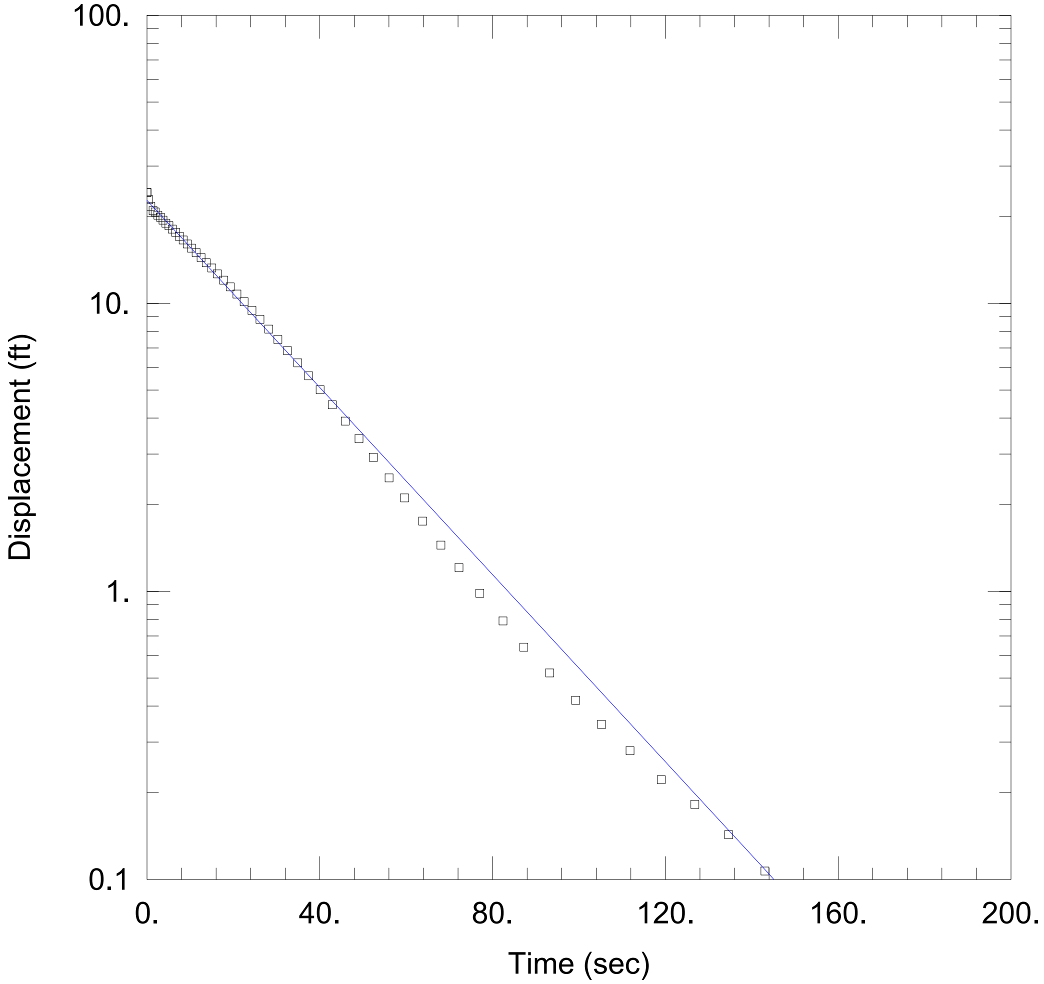
WELL DATA (MW-16-06)

Initial Displacement: 27.37 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003791 cm/sec
y0 = 23.95 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 2.aqt
Date: 10/29/21 Time: 14:27:18

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

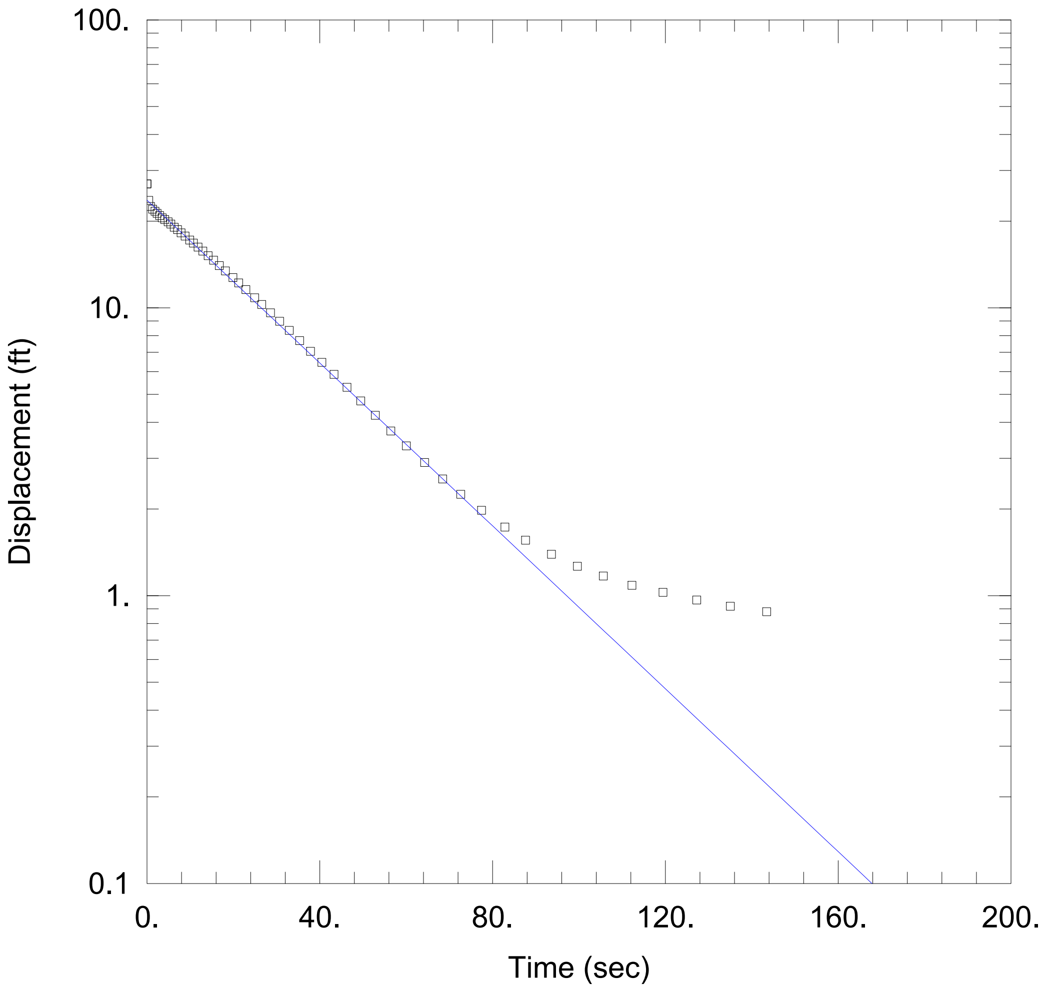
WELL DATA (MW-16-06)

Initial Displacement: 24.27 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003365 cm/sec
y0 = 22.8 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 3.aqt
Date: 10/29/21 Time: 14:29:09

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

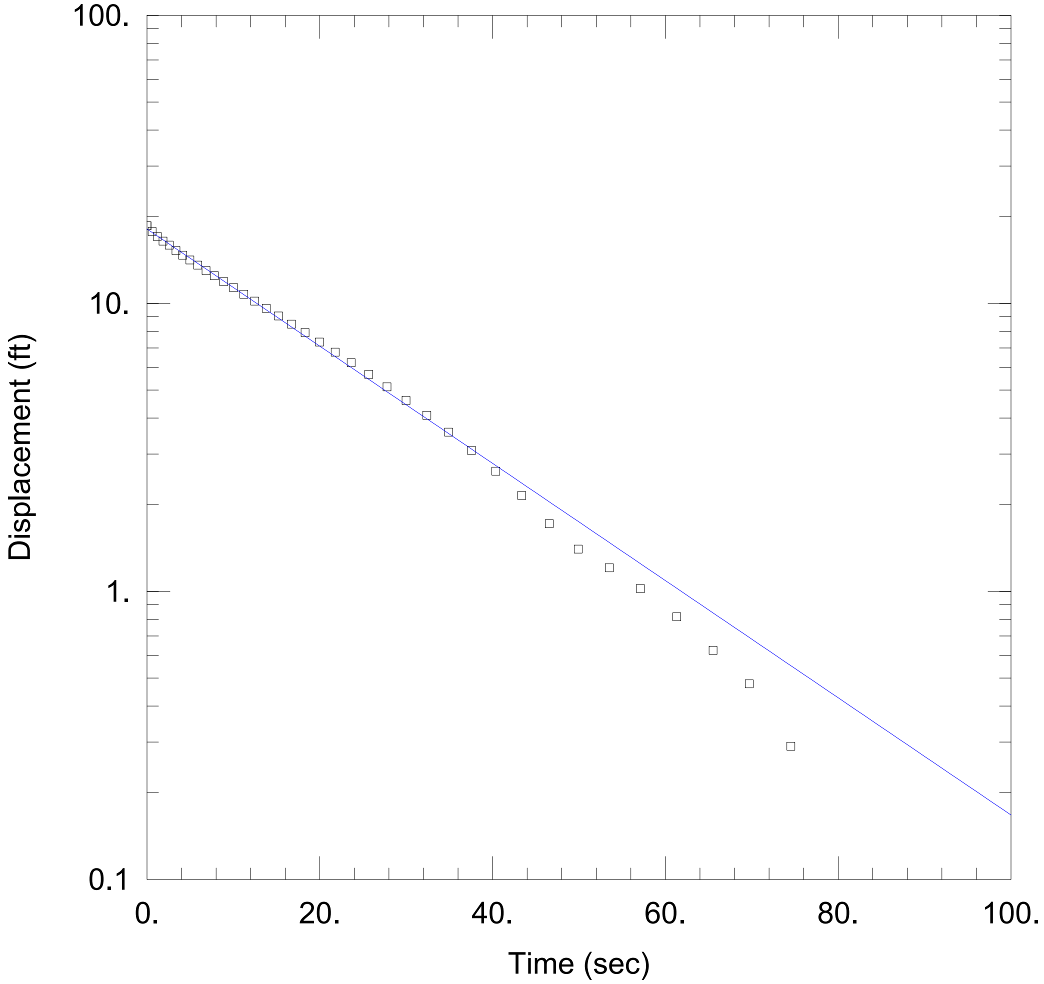
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 26.94 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.00293 cm/sec
y0 = 23.65 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 1.aqt
Date: 10/29/21 Time: 14:33:05

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

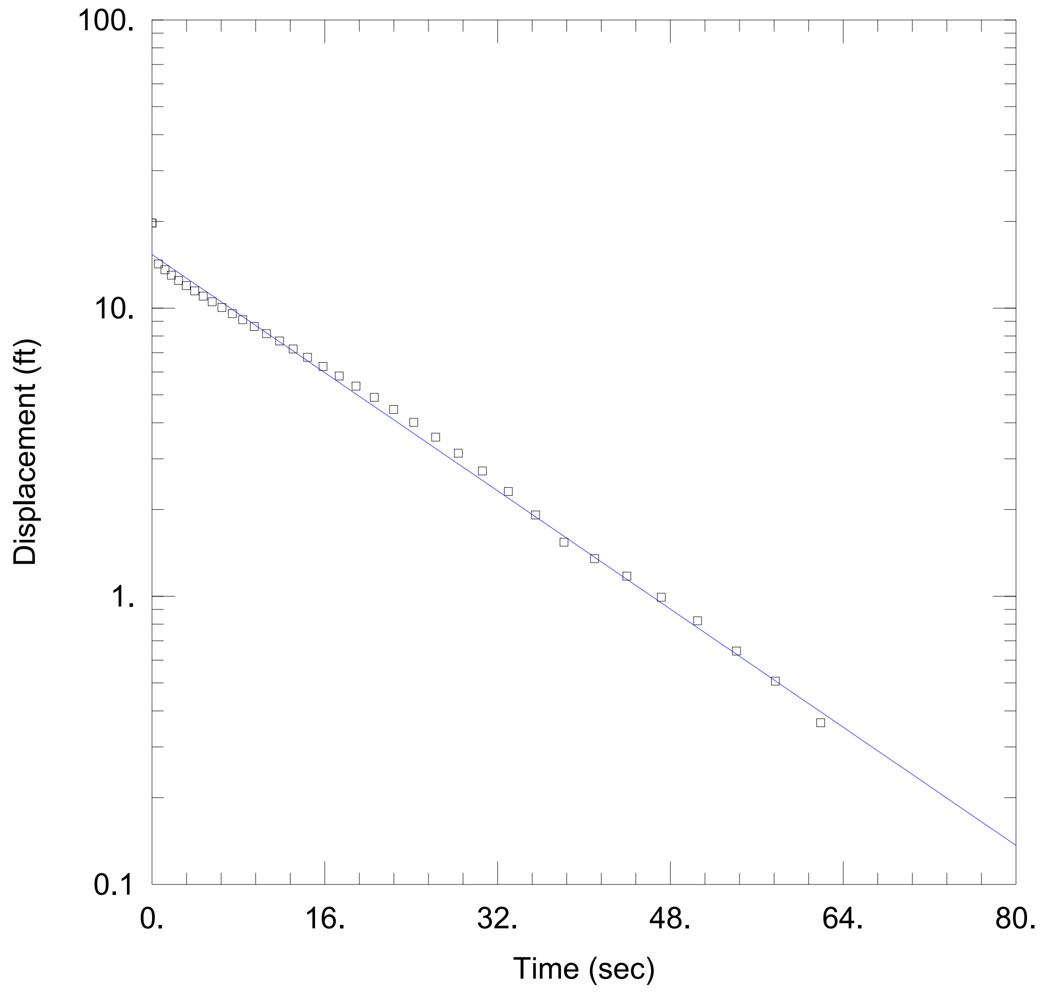
WELL DATA (MW-16-07)

Initial Displacement: 18.61 ft
Static Water Column Height: 50. ft
Total Well Penetration Depth: 18.5 ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003492 cm/sec
y0 = 18.14 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 2.aqt
Date: 10/29/21
Time: 14:36:35

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

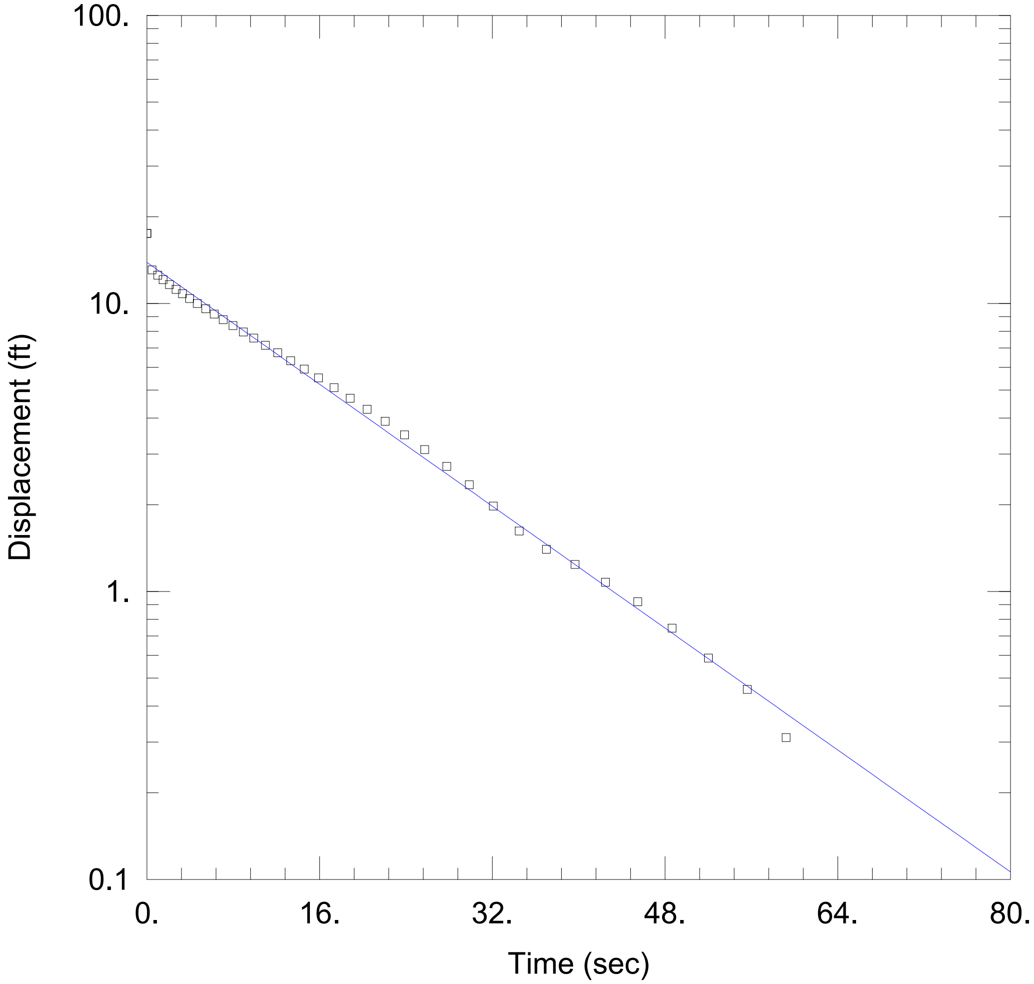
WELL DATA (MW-16-07)

Initial Displacement: 19.73 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.0861 ft
Static Water Column Height: 50. ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004398 cm/sec
y0 = 15.34 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 3.aqt
Date: 10/29/21 Time: 14:34:43

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-07)

Initial Displacement: 17.51 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.0861 ft
Static Water Column Height: 50. ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

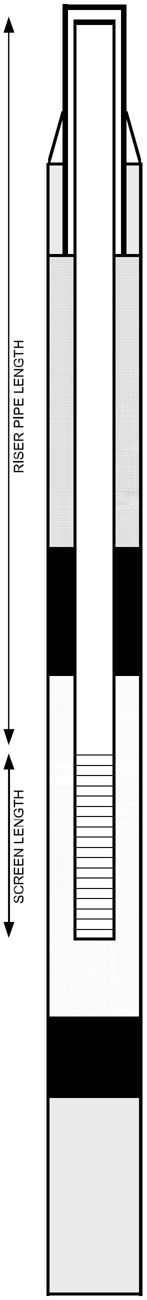
Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004539 cm/sec
y0 = 13.88 ft

APPENDIX B – MONITORING WELL CONSTRUCTION DIAGRAMS

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-01**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/17/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.74	2.8	TOP OF CASING
578.91	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: GROUT SLURRY
		GROUT/BACKFILL METHOD: TREMIE
50.8		
	39.5	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	44.0	BENTONITE SEAL
530.9	48.0	TOP OF SCREEN
5.0		
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
525.9	53.0	BOTTOM OF SCREEN
	53.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
523.91	55.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 55 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 50 MINUTES

WATER REMOVED: 100 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	57.30	T/PVC	2/19/2016	11:00
SWL BEFORE DEVELOPING:	4.69	T/PVC	2/19/2016	10:00
SWL AFTER DEVELOPING:	4.80	T/PVC	3/17/2016	8:45
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

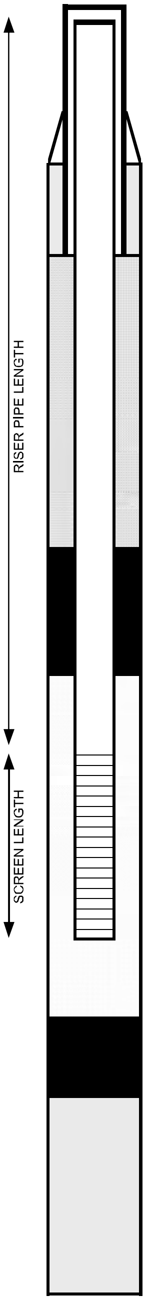
LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-02**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/18/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.81	2.4	TOP OF CASING
579.44	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD: TREMIE
55.4		
	40.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	44.0	BENTONITE SEAL
526.4	53.0	TOP OF SCREEN
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
5.0		
521.4	58.0	BOTTOM OF SCREEN
	60.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
519.44	60.0	HOLE BOTTOM



NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 60 FT.
IN. FROM ___ TO ___ FT.

SURF. CASING DIAMETER: ___ IN. FROM ___ TO ___ FT.
___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 2,880 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY TO CLOUDY

COLOR BEFORE: LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	61.03	T/PVC	3/17/2016	9:30
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	2.42	ATOC	3/17/2016	9:30
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

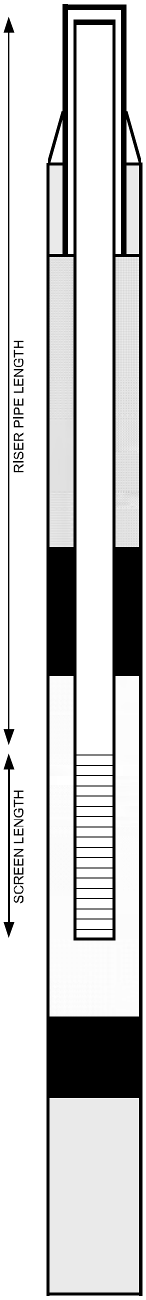
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-03**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/16/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
579.95	2.7	TOP OF CASING
577.29	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
39.7		GROUT/BACKFILL METHOD: TREMIE
	28.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	32.0	BENTONITE SEAL
540.3	37.0	TOP OF SCREEN
5.0		FILTER PACK MATERIAL: PEA STONE
535.3	42.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
527.29	50.0	HOLE BOTTOM

NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 16 HOURS
WATER REMOVED: 7,200 GALLONS
WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID
COLOR BEFORE: DARK GRAY
CLARITY AFTER: CLEAR
COLOR AFTER: NONE

ODOR (IF PRESENT): SULFUR

WATER LEVEL SUMMARY

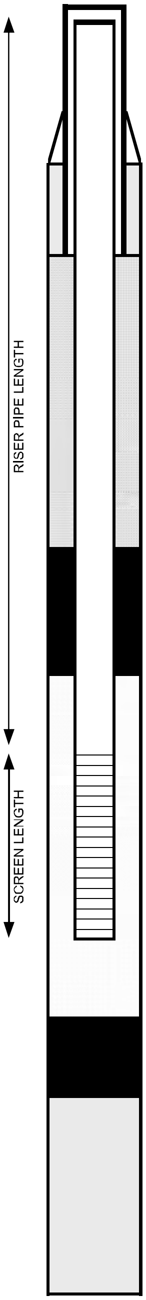
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	44.65	T/PVC	3/17/2016	9:25
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	11.20	ATOC	3/17/2016	9:25
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO
LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-04**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/15/2016	INSTALLED BY: C. Scieszka	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
585.54	2.9	TOP OF CASING
582.64	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD: TREMIE
43.9		
	32.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	36.0	BENTONITE SEAL
541.6	41.0	TOP OF SCREEN
		FILTER PACK MATERIAL: PEA STONE
5.0		
536.6	46.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
532.64	50.0	HOLE BOTTOM

NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
___ IN. FROM ___ TO ___ FT.

SURF. CASING DIAMETER: ___ IN. FROM ___ TO ___ FT.
___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 16 HOURS

WATER REMOVED: 28,900 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): SULFUR

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	49.45	T/PVC	3/17/2016	10:15
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	16.50	ATOC	3/17/2016	10:15
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

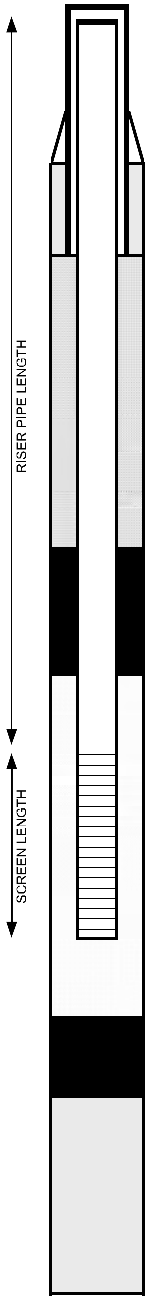
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-05**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/13/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
583.25	2.7	TOP OF CASING
580.51	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL CEMENT/GROUT SLURRY
42.7		GROUT/BACKFILL METHOD TREMIE
	33.0	GROUT
		BENTONITE SEAL MATERIAL PELLETS
	35.0	BENTONITE SEAL
540.5	40.0	TOP OF SCREEN
5.0		FILTER PACK MATERIAL PEA STONE
535.5	45.0	BOTTOM OF SCREEN
	45.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL PEA STONE
530.51	50.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 12 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: VERY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): VERY SLIGHT TO NONE SULFUR

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	14.00	ATOC	5/5/2016	12:47
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

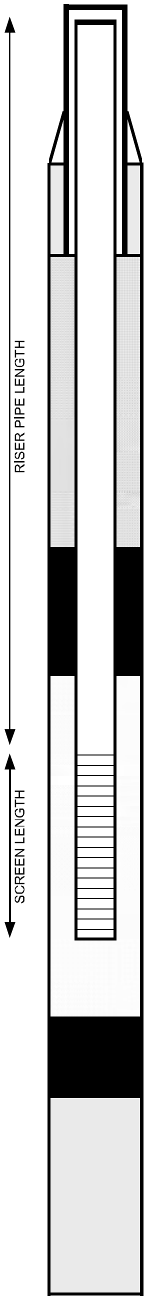
LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-06**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/13/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.94	2.7	TOP OF CASING
579.20	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
47.7		
	38.0	GROUT
	40.0	BENTONITE SEAL
534.20	45.0	TOP OF SCREEN
5.0		
529.20	50.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
529.20	50.0	HOLE BOTTOM



GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY

GROUT/BACKFILL METHOD: TREMIE

BENTONITE SEAL MATERIAL: PELLETS

FILTER PACK MATERIAL: PEA STONE

BACKFILL MATERIAL: NA

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 240-250 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: SLIGHTLY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	0.75	ATOC	5/5/2016	9:30
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

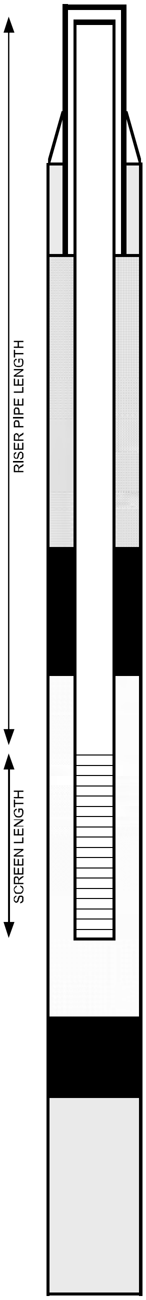
PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-07**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/14/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
578.40	3.0	TOP OF CASING
575.41	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD TREMIE
38.0		
	27.0	GROUT
		BENTONITE SEAL MATERIAL PELLETS
	30.0	BENTONITE SEAL
540.4	35.0	TOP OF SCREEN
		FILTER PACK MATERIAL PEA STONE
5.0		
535.4	40.0	BOTTOM OF SCREEN
	40.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL NA
535.41	40.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 40 FT.
IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 240 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: SLIGHTLY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	–	T/PVC	–	–
DTB AFTER DEVELOPING:	–	T/PVC	–	–
SWL BEFORE DEVELOPING:	–	T/PVC	–	–
SWL AFTER DEVELOPING:	8.80	ATOC	5/5/2016	10:44
OTHER SWL:	.	T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

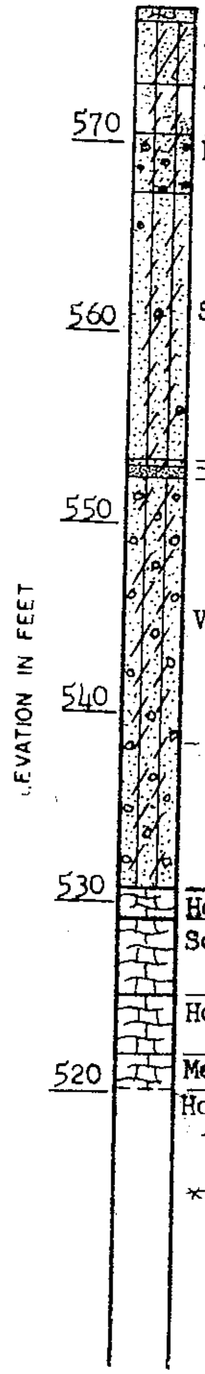
LOCK KEY NUMBER: 3120

REVISED 11/2013

APPENDIX C - 1970’s BORING LOGS

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 577.0 Ft. (IGLD Datum)



TOPSOIL; Soft Dk.Brn.SEMI-ORG.SILTY CLAY. 9"
V.Stiff Brown & Gray VERY SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 4'0"
V.Stiff Brown & Gray SILTY CLAY, w/Sand Pockets, Traces of Gravel. 6'6"
Hard Mottled Brown F. SANDY SILTY CLAY, w/Some Gravel. 9'6"

Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel. 23'6"

Hd.Gr.SILTY CLAY, w/Some Sand & Grav. 23'11"
Compact Gray FINE SAND. Moist. 24'3"

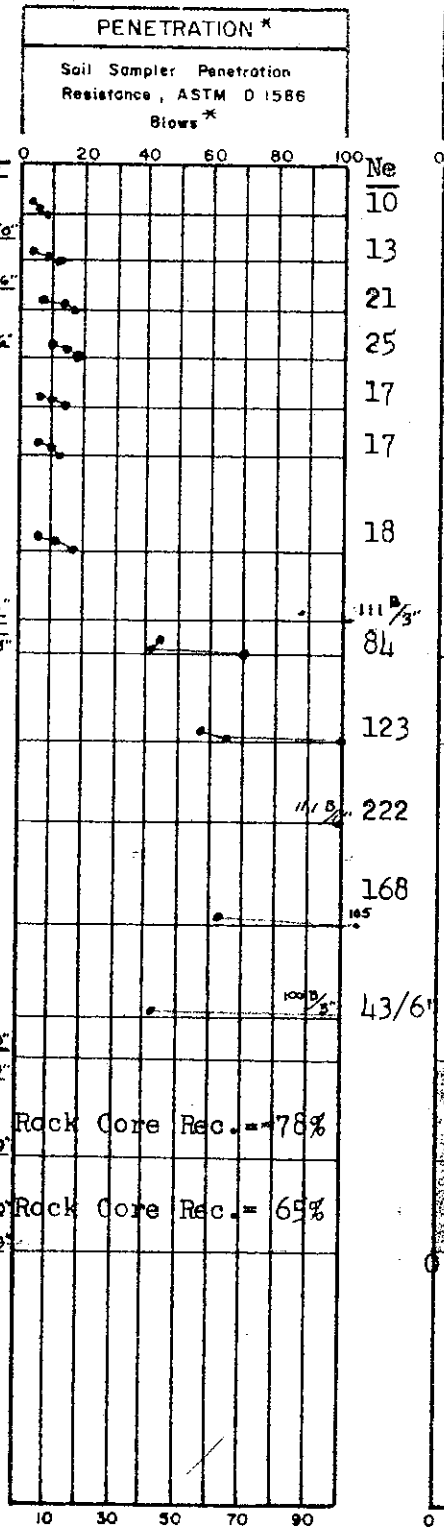
V. Hard Gray V.F. SANDY SILTY CLAY, Very Gravelly in Some Zones, Generally Gravelly, w/Rock Fragments. (GLACIAL TILL).
*

Top of Rock, EL. 531.0 46'0"
Hd.Lt.Gray Broken LIMESTONE BRECCIA. 47'9"
Soft Light Gray to Brown V.Fragmented LIMESTONE, w/Seams of Hard Limestone. 51'9"
Hd.Lt.Gr.to Brn.Mod.Fragmented DOLOMITIC LIMESTONE, w/ZoneMed.Hard Shale. 55'0"
Med.Hard.Gr.Mod.Fragmented LIMESTONE. 56'9"

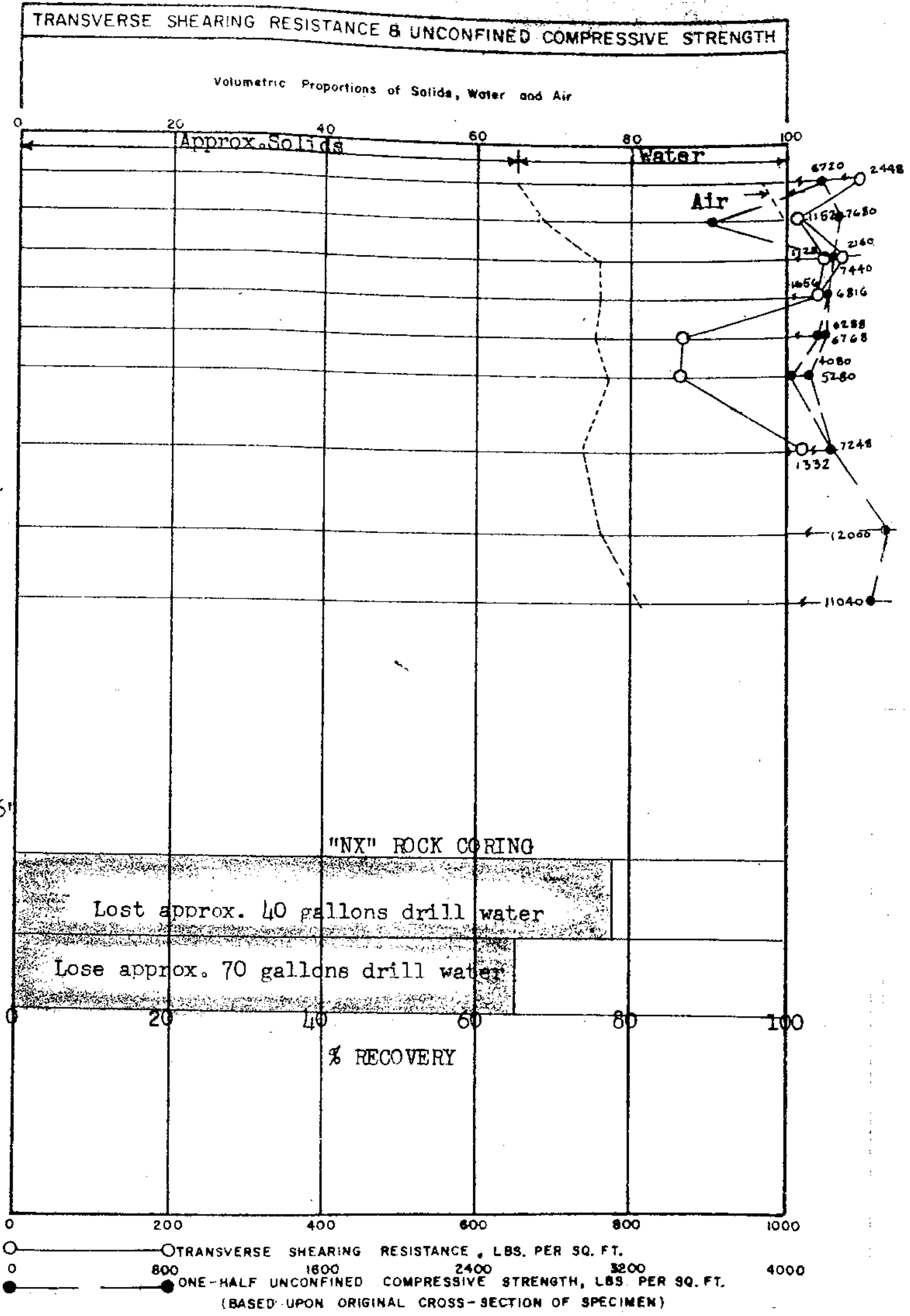
Hole dry augered to d=34';
46' 9" of 3-inch casing used after auger.

* Encountered artesian water; See Note
Hole grouted w/2 bags cement;
no water flow during final inspection on Sept. 9, 1970

PENETRATION *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	574.5	V.Stiff	17.8	109.4
LS-2	5.0	572.0	V.Stiff	17.4	114.2
LS-3	7.5	569.5	Hard	12.1	[illegible]
LS-4	10.0	567.0	Hard	12.0	127.8
LS-5	12.5	564.5	Stiff	11.9	136.7
LS-6	15.0	562.0	Stiff	12.3	129.4
LS-7	20.0	557.0	Hard	12.4	123.7
BS-8	23.8	553.2	Hard		
LS-8	25.3	551.7	V.Hard	11.4	127.9
LS-9	30.0	547.0	V.Hard	8.3	136.5
BS-11	34.0	543.0	V.Hard		
BS-12	39.5	537.5	V.Hard		
BS-13	44.3	532.7	V.Hard		
	46.8	530.2			
Core Run No.1	51.8	525.2			
No.2	56.8	520.2			

MON 169

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-4350; W-1100
TOTAL DEPTH: 56'9"

BORING STARTED: July 15, 1970
BORING COMPLETED: July 16, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: B.Singleton
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 46'9" feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.
ROCK CORE [illegible]: NX (2 1/8")

NOTE: Artesian water encountered at d=38'6" (El. 538.5); head rose to 1'10" above ground.
Upon completion, w/46'9" casing in place, artesian water was flowing 1'10" above ground at 15 gpm, with strong sulphur odor.
Artesian head was 6 ft. above ground 2 hrs. after completion, and static.

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 1 TB1

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

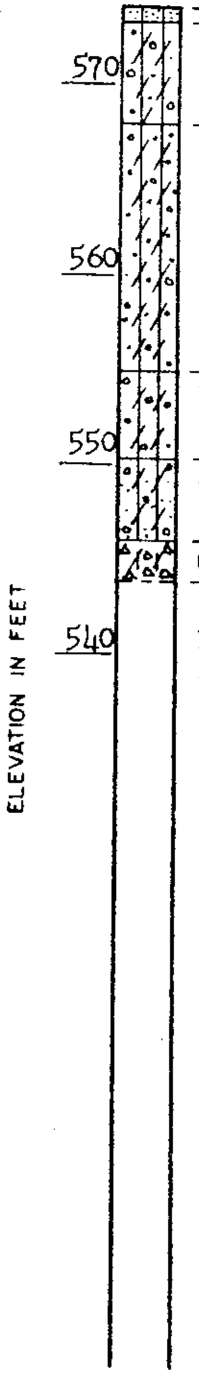
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

SFA FORM

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.1 Ft. (IGLD Datum)



TOPSOIL; Dark SANDY CLAY. Damp. 10½"

Medium Brown SILTY CLAY, w/Trace Coarse Sand & Gravel. Damp. 6'0"

Hard Mottled Brown SILTY CLAY, w/Some Coarse Sand & Fine Gravel. 19'0"

V.Stiff to Hard Gray SILTY CLAY, w/Some Fine Gravel. (GLACIAL TILL) 23'6"

Hard Gray SILTY CLAY, (GLACIAL TILL) w/Some Coarse Sand & Gravel. 27'9"

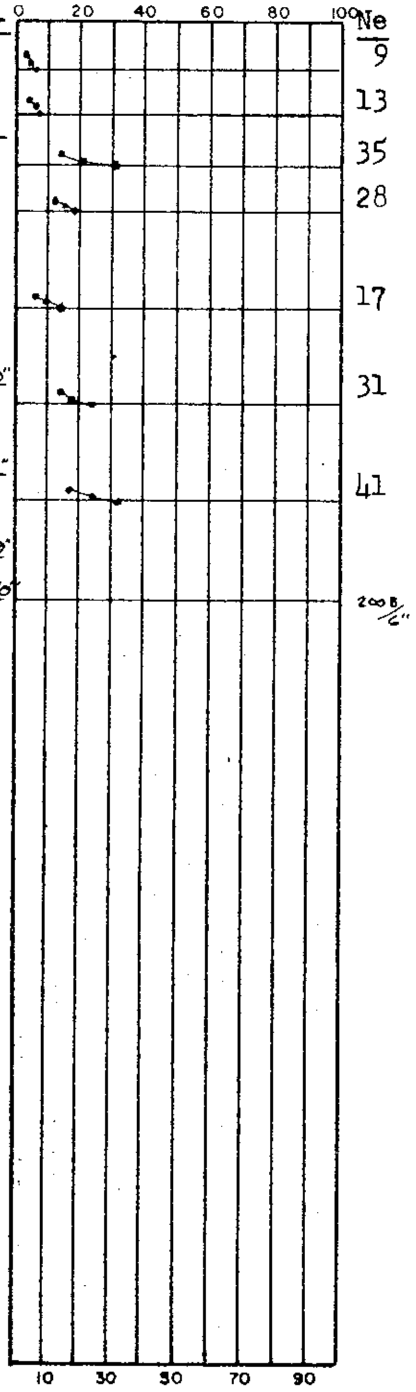
Gr. LIMESTONE CHIPS, w/Some Silt & Clay. 30'0"

* Hole dry augered to full depth.
5'0" of 4-in. casing used.
Hole grouted with 3 bags cement.

* Encountered artesian water at flow of 0.3 gpm.
Static artesian head reached at 1'2" above ground surface, and remained static for one hour.
No water flow during final inspection on Sept. 9, 1970

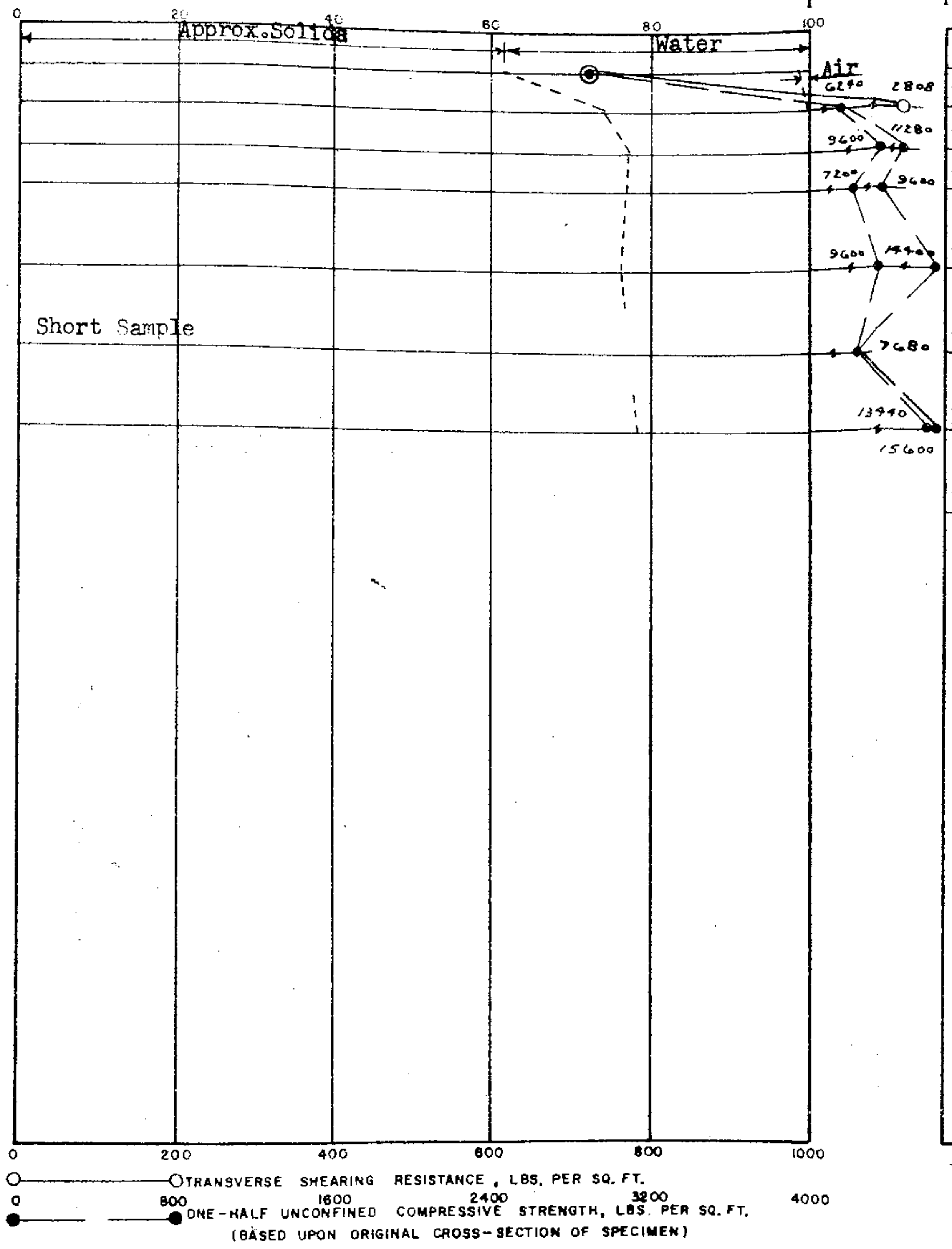
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sample used through LS-7;
2.00" O.D. Heavy wall sampler used for BS-8

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f
LS-1	2.5	571.6	Firm to Stiff	22.1	104.1
LS-2	5.0	569.1	Hard	13.0	124.8
LS-3	7.5	566.6	V.Hard	10.8	128.9
LS-4	10.0	564.1	Hard to V.Hard	11.4	128.2
LS-5	15.0	559.1	V.Hard	10.9	127.4
LS-6	20.0	554.1	Hard	11.3	--
LS-7	25.0	549.1	V.Hard	10.7	130.6
BS-8	30.0	544.1	Limestone Fragments		
			MDN	170	

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-4500; W-100
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: J.Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 5'0" feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SFA FORM E-7

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 2 TB2

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.9 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Description	Depth
	TOPSOIL; Brn. SEMI-ORGANIC F. SANDY SILT.	1'6"
570	V. Stiff to Hard Mtld. Brown SILTY CLAY, w/Some Sand, Little Gravel. (Partially Fill?)	6'0"
	V. Stiff to Hard Brown & Gray SILTY CLAY, w/Little Sand, Sl. Trace of Gravel.	15'3"
560	V. Hard Gray (w/Some Brown to d=15'0") SILTY CLAY, w/Traces of Sand & Gravel.	25'0"
550	V. Hard Dark Gray F. SANDY SILTY CLAY, Gravelly, w/Many Rock Fragments. (GLACIAL TILL.)	
540	* TOP OF ROCK	37'0"
	Hard Lt. Brn. Med. Fragmented DOLOMITIC LIMESTONE. Fractures close.	39'9"
	Hd. Lt. Gr.-Brn. V. Fragmented LIMESTONE. Fracts close from El. 535.45 to El. 534.10	42'0"
530	Soft Gray Weathered SHALE, w/Med. Hd. Zone from El. 533.90 to El. 532.30	47'1"
520		

37'0" NX casing used.

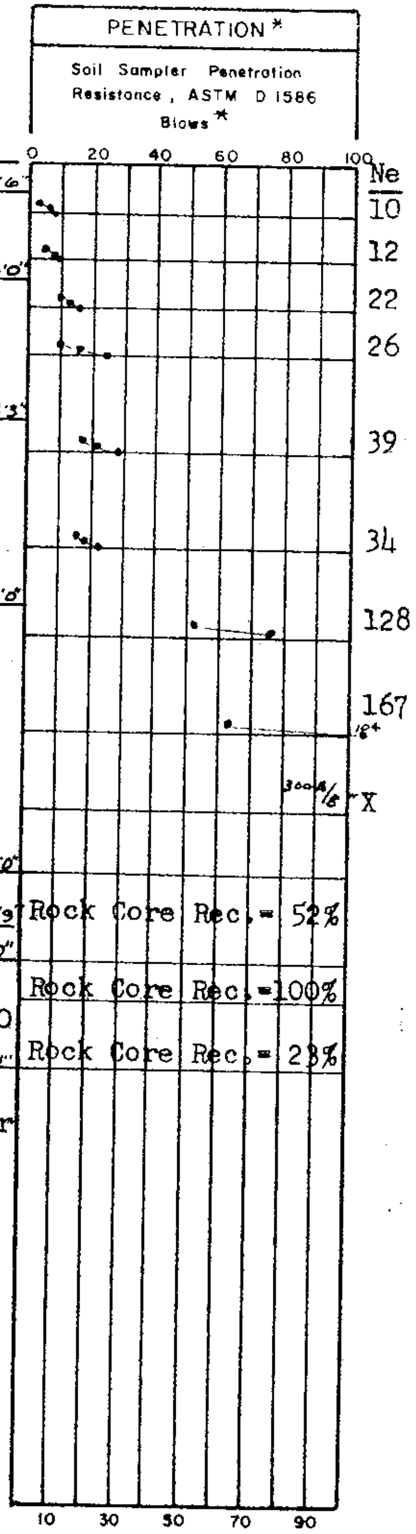
* Encountered ground water; water level after 30-min. and 60-min. remained steady at d=8'3" (El. 567.6).

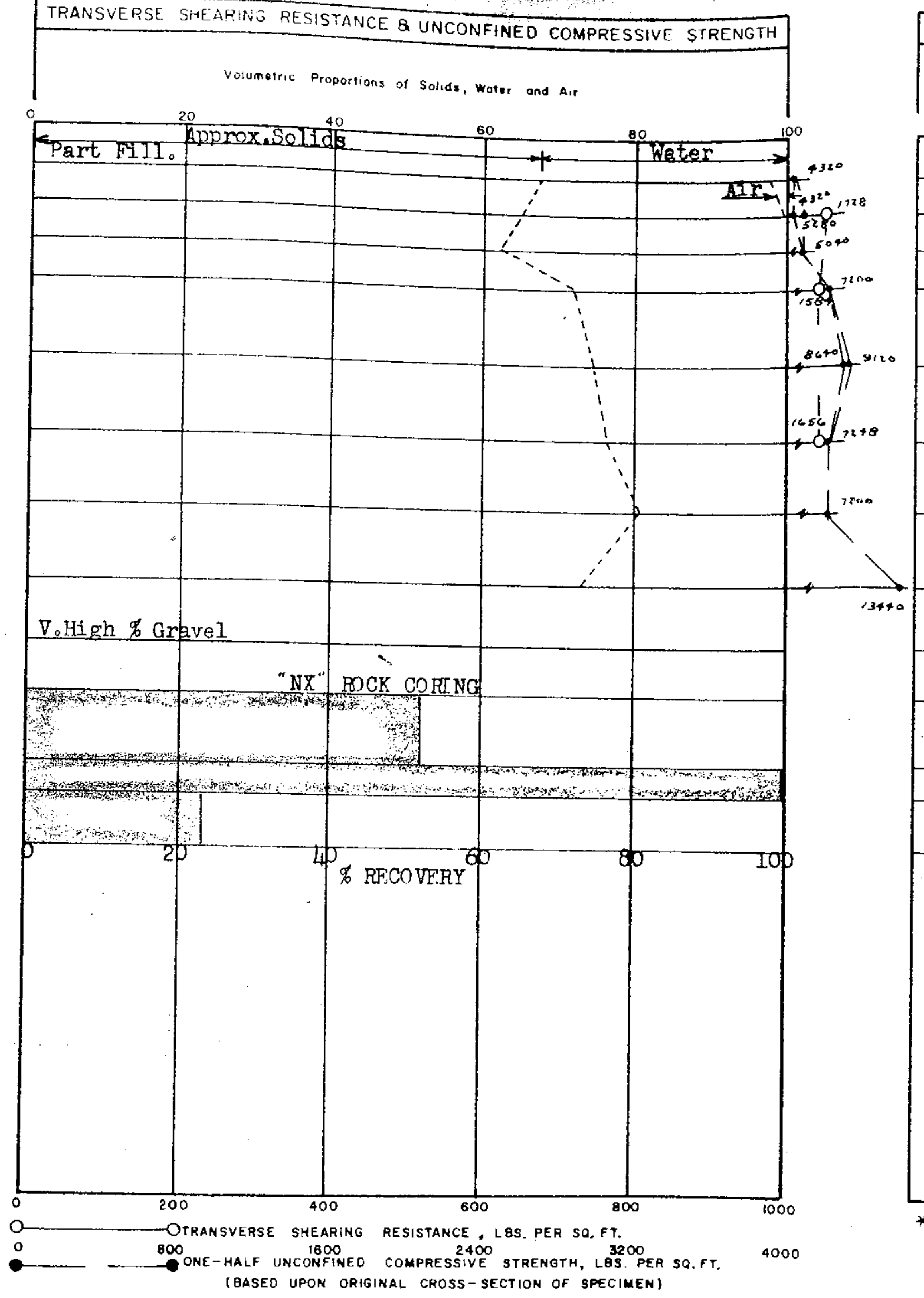
Upon completion of coring, water level rose to d=1'2" (El. 574.7), but dropped to d=8'3" (El. 567.6) during grouting.

Hole grouted with cement in rock phase and bentonite in soil phase.

No water flow during final inspection on Sept. 9, 1970

See Test Boring Location Plan





** 1.75" O.D. Michigan Liner Sampler used through LS-4; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field So No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	573.4	Part Fill; V. Stiff	16.6	113.5
LS-2	5.0	570.9	V. Stiff to Hard	21.2	108.9
LS-3	7.5	568.4	V. Stiff	23.4	104.5
LS-4	10.0	565.9	Hard	15.4	119.7
LS-5	15.0	560.9	V. Hard	12.2	125.8
LS-6	20.0	555.9	V. Hard	11.8	128.3
LS-7	24.5	551.4	V. Hard	8.1	136.6
LS-8	29.5	546.4	V. Hard	13.5	123.8
LS-9	33.5	542.4	V. Hard	8.4	--
	37.0	538.9			
Core Run No. 1	41.5	535.4			
No. 2	43.6	532.3			
No. 3	47.1	528.8			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 171.

LOCATION: N-4800; E-900
TOTAL DEPTH: 47'1"

BORING STARTED: July 23, 1970
BORING COMPLETED: July 24, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 37'0" feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall.

ROCK CORE DIAMETER: NX (2⅛") Ne = Evaluated Blows/Foot.

SFA FORM 7

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 3 TB3

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 573.2 Ft. (IGLD Datum.

ELEVATION IN FEET

Elevation	Description	Depth	Ne
	TOPSOIL; Dark SANDY CLAY. Damp.	7"	
570	Plastic to Firm Brn.& Gr.Mtld.SILTY CLAY, w/Trace Very Fine Sand. Damp.	5'6"	7 13
	V.Stiff Brown w/Gray Mottling SILTY CLAY, w/Trace of Very Fine Sand. Moist.	8'6"	27
560	V.Stiff Brown w/Gray SILTY CLAY, w/Trace Very Fine Sand & Few Pebbles. Damp.	14'0"	29
	Firm Grav SILTY CLAY, w/Some Fine Sand. Damp.	18'9"	16
550	Compact Gray VERY FINE SAND, w/Some Silt. Damp.	23'0"	50
	Hard Gray SILTY CLAY, w/Trace Very Fine Sand & Gravel. Damp. * (GLACIAL TILL)	30'0"	47 59
540			

* Ground water encountered

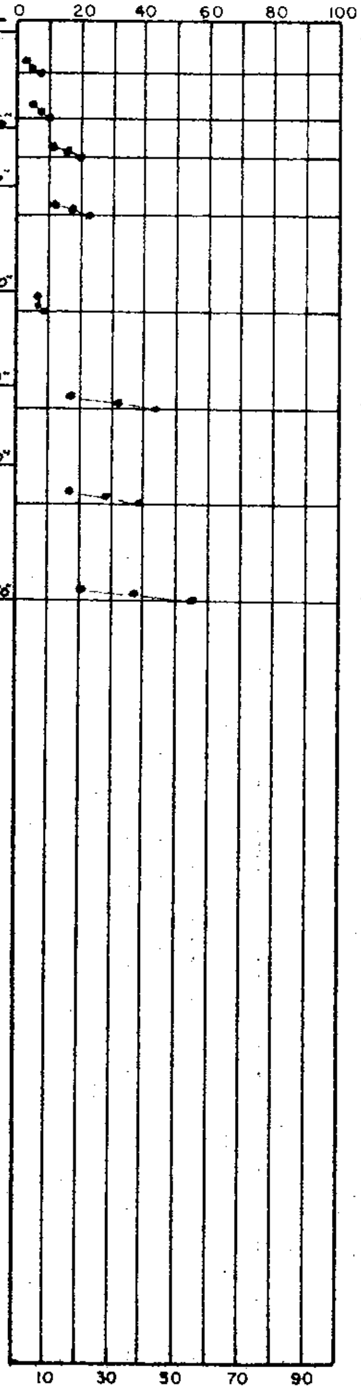
Water level in 1 hr. at El.562.9

Hole grouted with 3 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970

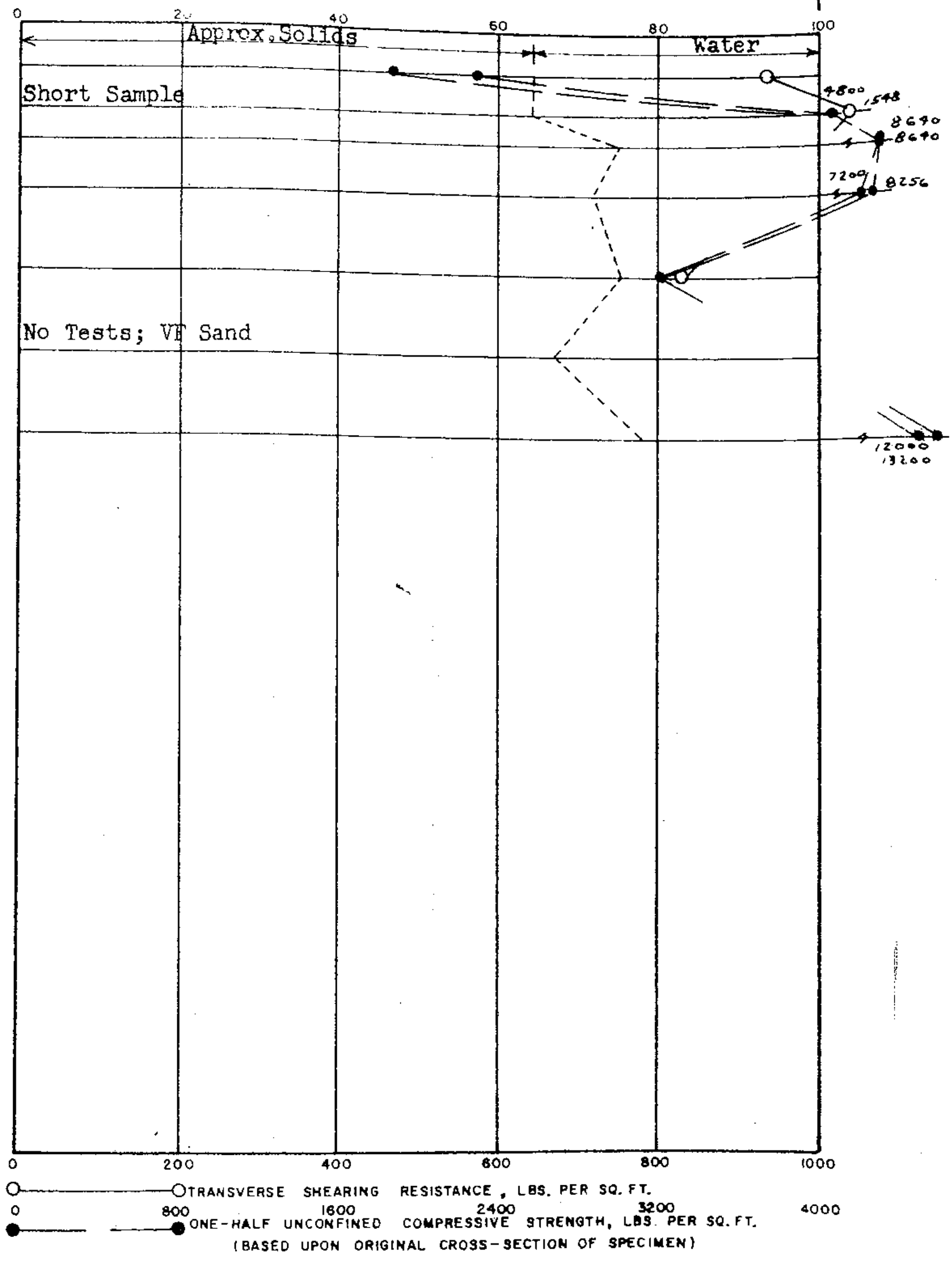
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-4; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	570.7	Plastic to Firm	21.3	107.6
LS-2	5.0	568.2	Hard	20.7	108.0
LS-3	7.0	566.2	V.Hard	12.4	126.1
LS-4	10.0	563.2	Hard to V.Hard	13.8	121.3
LS-5	15.0	558.2	Firm to Stiff	12.3	126.6
LS-6	20.0	553.2	Compact VF Sand	17.5	111.6
LS-7	25.0	548.2	V.Hard	10.7	131.2
BS-8	30.0	543.2	Limestone Fragments W/Slt&Cly		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 172

See Test Boring Location Plan

LOCATION: N-4700; E-1900

TOTAL DEPTH: 30'0"

BORING STARTED: August 5, 1970

BORING COMPLETED: August 5, 1970

INSPECTOR: J.O.Wanzeck (S&FA)

DRILLER: J. Corbin

CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 4 TB4

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

SFA FORM -7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.9 Ft. (IGLD Datum)

ELEVATION IN FEET

570 TOPSOIL; Dk. Brn. SEMI-ORGANIC SANDY CLAY.

Firm to Stiff Brown & Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 6'0"

*Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 9'0"

560 Very Stiff to Hard Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. (GLACIAL TILL?)

550

22'6"

Very Hard Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL) 32'0"

540 Hard to Very Hard Dk. Gr. F. SANDY SILTY CLAY, Gravelly, w/Many Rock Fragments. (GLACIAL TILL)

TOP OF ROCK:

530 Refusal w/Gear Bit; Set NX casing. 43'6"

Med. Hd. Lt. Brown Fragmented LIMESTONE, w/Few Shale partings & Zone Dolomitic Limestone. Fractures moderately close.

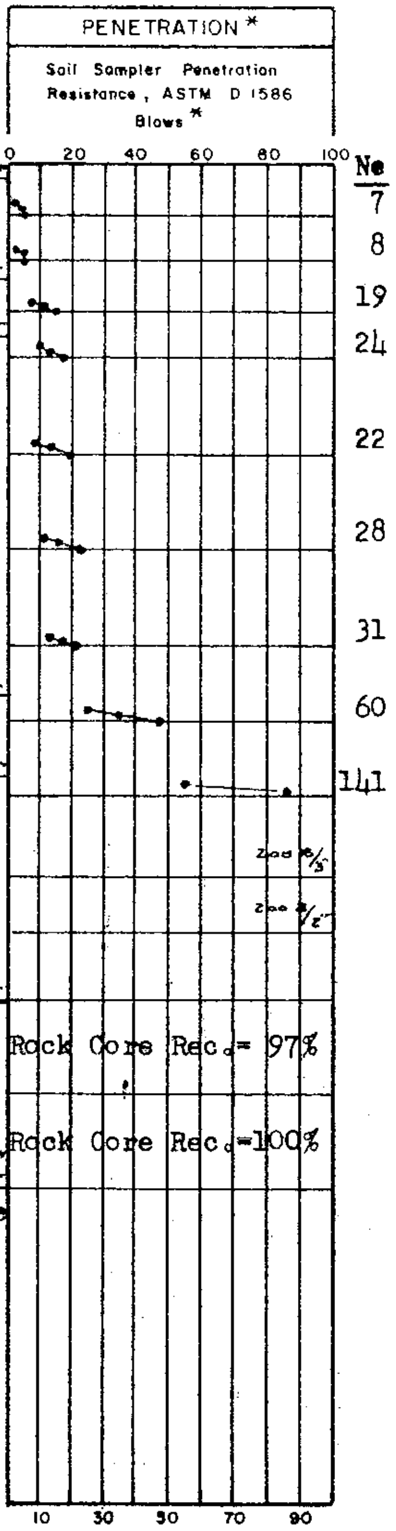
520 Soft Dark Gray SHALE. 53'0" 53'6"

* Encountered ground water; water level rose to Elev. 568.2 in 1-hour; drove 10' of 4" casing.

10' of 4"in. casing & 43'6" NX casing used.

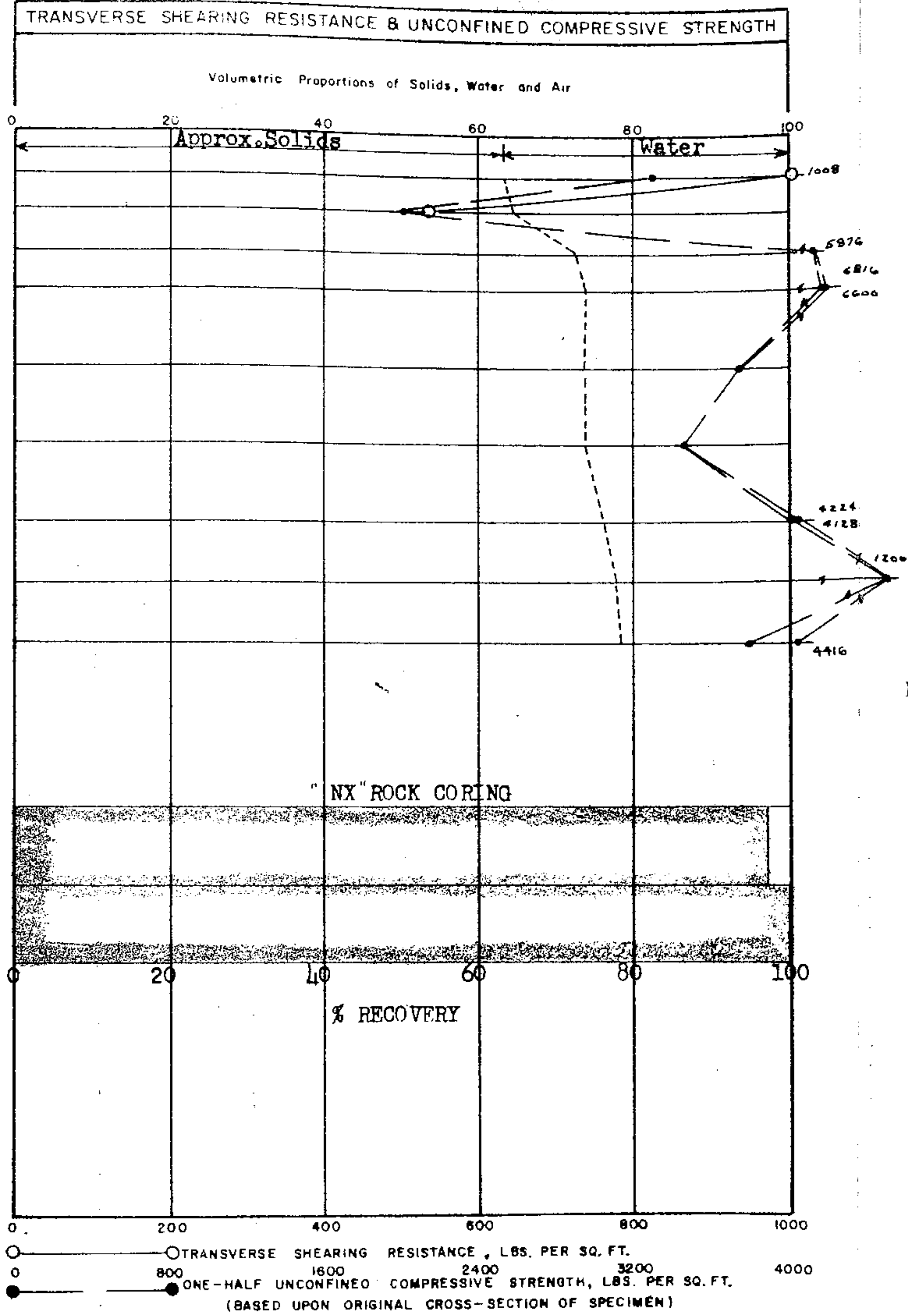
510 NOTE: No artesian flow encountered in rock; hole grouted immediately upon completion w/3 bags of cement. No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan



Rock Core Rec.= 97%

Rock Core Rec.=100%



** 1.75" O.D. Michigan Liner Sampler used through LS-7; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	[illegible]
LS-1	2.5	570.4	Stiff	21.8	106.5
LS-2	5.0	567.9	Firm	20.6	105.5
LS-3	7.5	565.4	Hard	13.9	122.5
LS-4	10.0	562.9	Hard	13.0	124.1
LS-5	15.0	557.9	Hard	13.3	123.9
LS-6	20.0	552.9	V. Stiff	12.4	124.1
LS-7	25.0	547.9	V. Stiff	10.3	128.4
LS-8	29.0	543.9	V. Hard	9.5	-
LS-9	33.0	539.9	Hard	10.4	132.6
No Recovery	37.3	535.6			
No Rec.	40.2	532.7			
	43.5	529.4			
Core Run No. 1	48.5	524.4			
No. 2	53.5	519.4			

* Laboratory consistency based upon visual examination of sample independent of field evaluation and strength determined by laboratory test.

LOCATION: N-5000; E-2900
TOTAL DEPTH: 53'6"

BORING STARTED: July 31, 1970
BORING COMPLETED: Aug. 3, 1970

INSPECTOR: J.O. Wanzeck (S&FA)
DRILLER: D.T. Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ____ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NX (2⅛")

SFA FORM E-7

MON 173

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 5 TB5

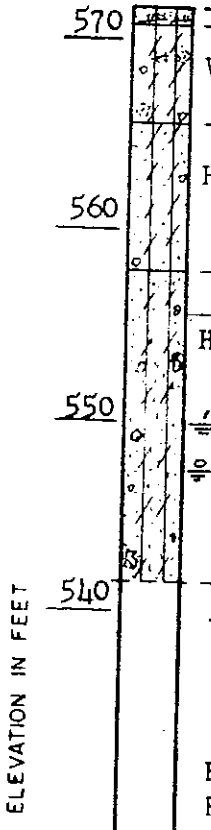
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR:
DATE: 10-20-70
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.9 Ft. (IGLD Datum)



TOPSOIL: Bk.Brn.SEMI-ORGANIC SANDY CLAY. 9"

V.Stiff to Hard Brown & Gray SILTY CLAY, w/Few Sand Pockets, Traces of Gravel. 6.0'

Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 15'8"

Hard to V. Hard Gray F. SANDY SILTY CLAY, w/Some Coarse Sand, Gravel & Rock Fragments. (GLACIAL TILL) 30.0'

* Encountered ground water, ground water at El.547.8 upon completion, rose to El.555.9 and seeped out; dropped to El.550.1 in 1-hr.

Hole dry augered; no casing used.
Hole grouted w/2 bags of cement & 1 bag of bentonite; no water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-5100; E-3900
TOTAL DEPTH: 30'0"

BORING STARTED: August 11, 1970
BORING COMPLETED: August 11, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

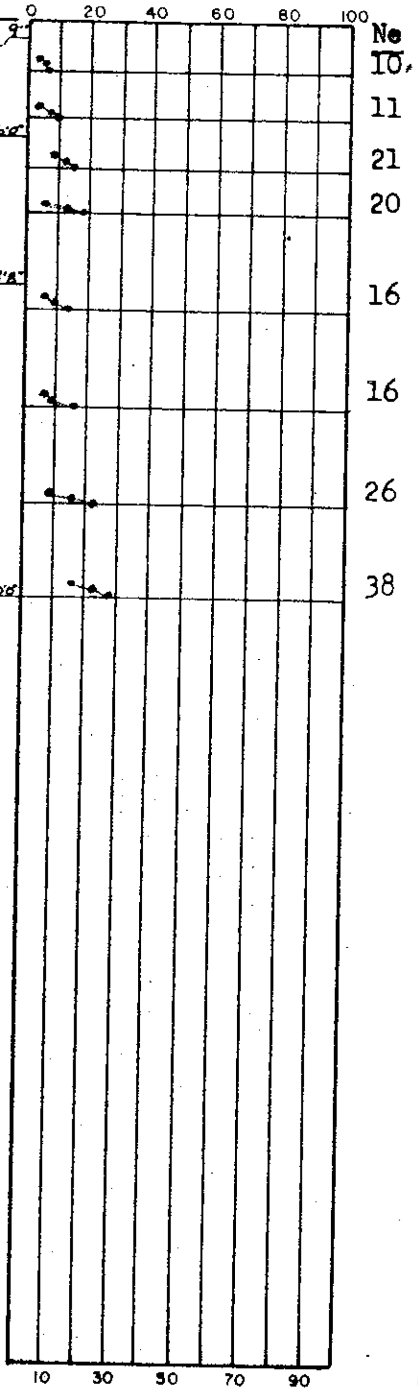
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

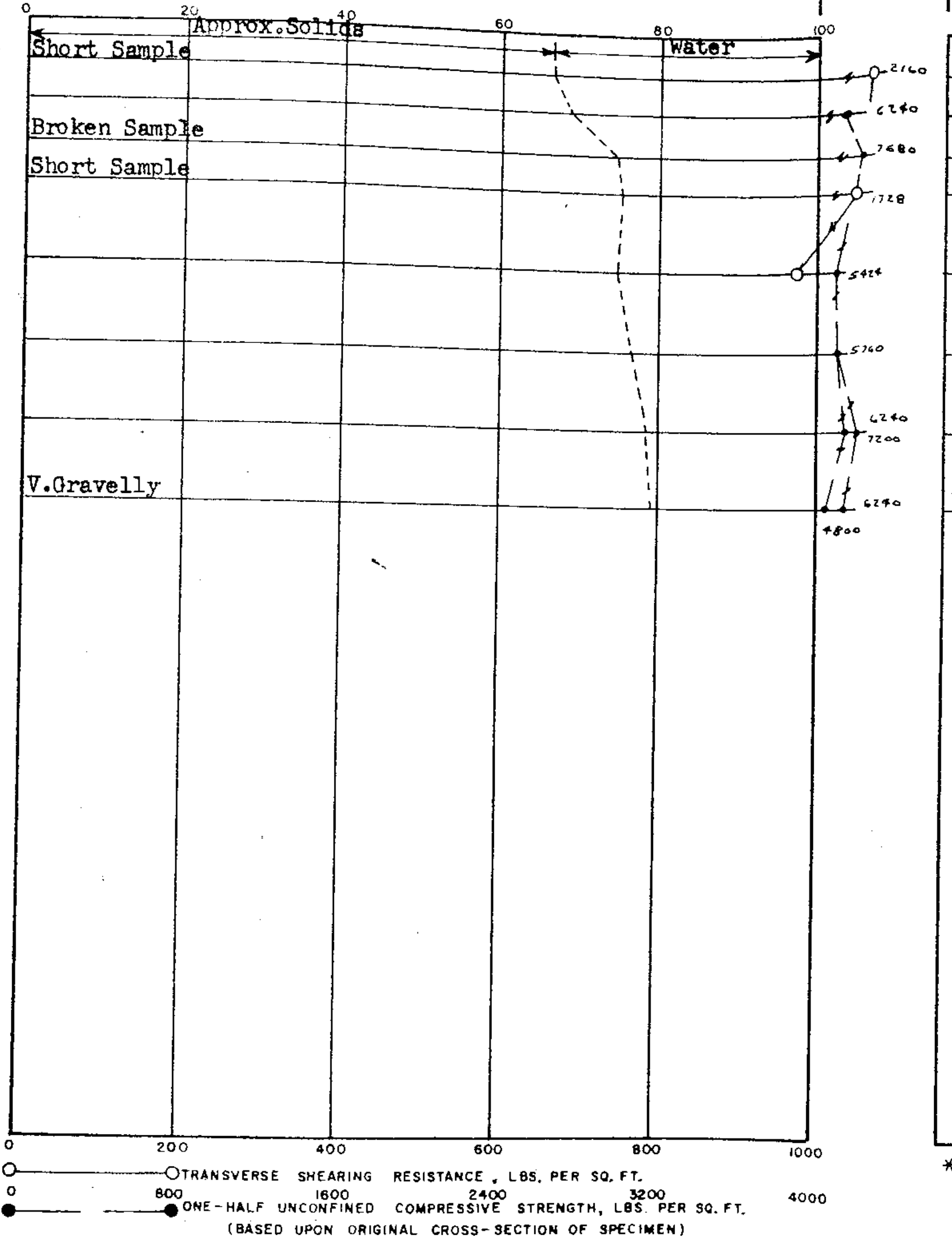
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	569.4	V.Stiff to Hard	19.1	112.2
LS-2	5.0	566.9	V.Stiff	16.0	116.3
LS-3	7.5	564.4	Hard	13.0	125.6
LS-4	10.0	561.9	Hard	12.4	126.6
LS-5	15.0	556.9	Hard	11.9	126.2
LS-6	20.0	551.9	Hard	11.0	128.4
LS-7	25.0	546.9	V.Hard	10.6	132.0
LS-8	30.0	541.9	Hard	9.8	132.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 174

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 6 TB6

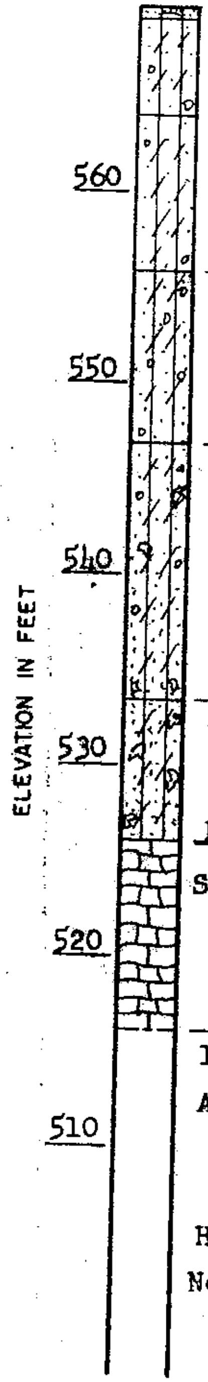
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 10-26-70 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 569.9 Ft. (IGLD Datum)



TOPSOIL;Dk.Brn.SEMI-ORG.V.SANDY CLAY. 1'6"

Stiff Brown & Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 5'6"

Stiff to V. Stiff Mtld. Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 13'6"

V.Stiff Gray SILTY CLAY, w/Some Sand & Gravel. (GLACIAL TILL?) 23'6"

V. Hard Gray FINE SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL) 36'0"

V.Hard Dark Gray FINE SANDY SILTY CLAY, w/Many Rock Fragments.(GLACIAL TILL)

TOP OF ROCK:
Refusal w/Gear Bit; Set NX casing 43'4"

Soft to Medium Hard Lt.Brn.V.Fragmented DOLOMITIC LIMESTONE & LIMESTONE. Fractures Close to Mod. Close. 53'4"

10' of 4-in.casing set with hole at d=29 ft.

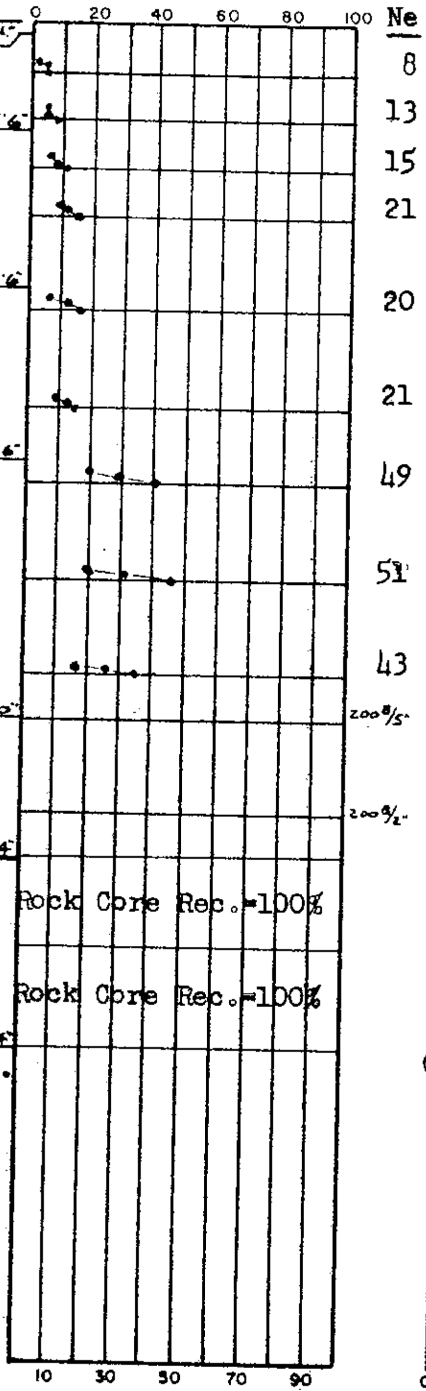
Artesian water noted upon completion of rock coring, w/flow of 50 gpm; static head established at 4.2 ft. above ground surface (El.574.1)

Hole was grouted w/3bags of cement.

No water flow during final inspection on Sept. 9, 1970.

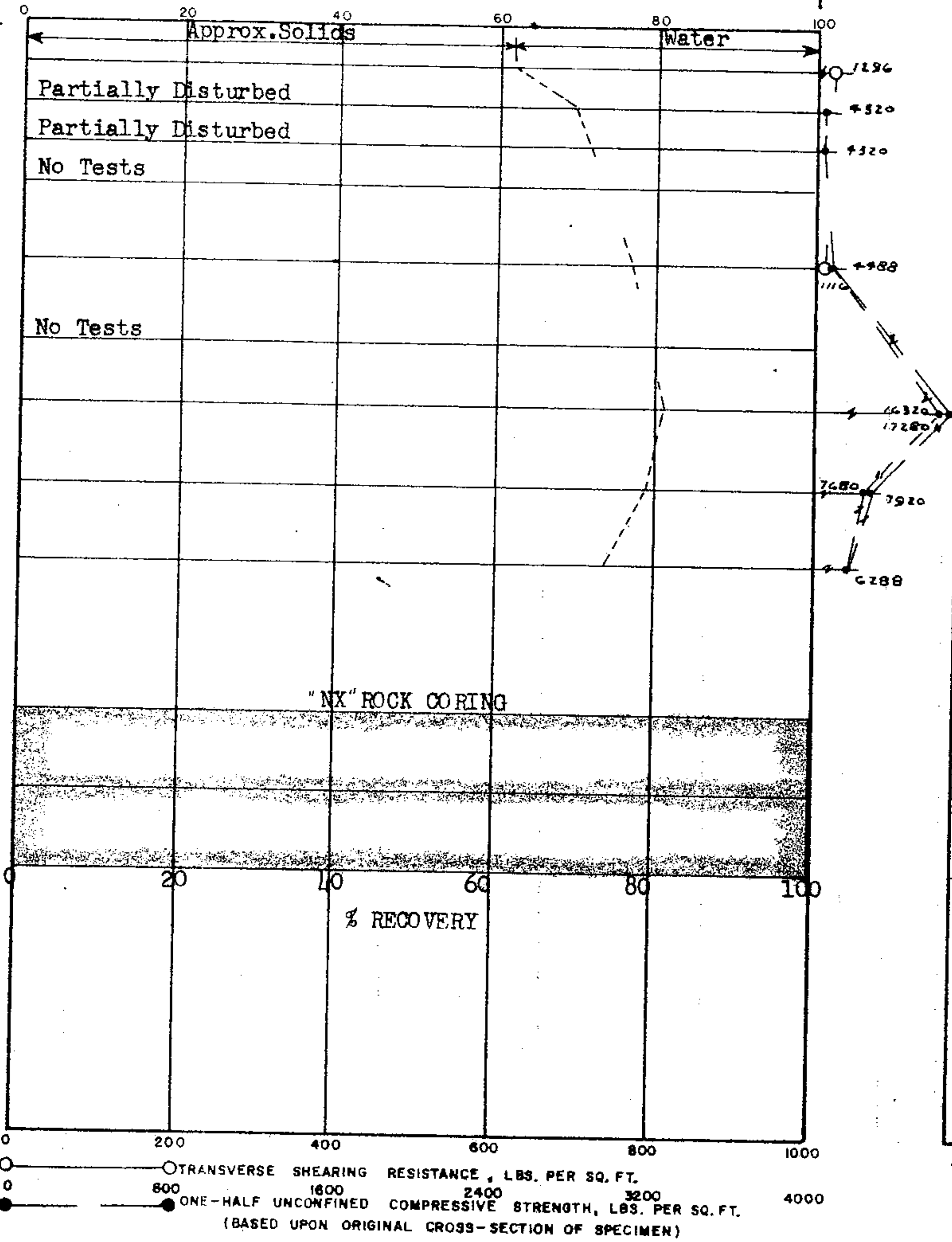
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-6; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev, Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	567.4	V.Stiff	22.9	104.4
LS-2	5.0	564.9	Stiff	16.2	117.1
LS-3	7.5	562.4	Stiff	14.8	120.2
LS-4	10.0	559.9	V.Stiff	--	--
LS-5	15.0	554.9	V.Stiff	11.3	129.4
LS-6	20.0	549.9	V.Stiff	--	--
LS-7	24.0	545.9	V.Hard	8.8	136.5
LS-8	29.0	540.9	V.Hard	9.6	132.9
LS-9	34.0	535.9	Hard	12.7	123.9
BS-10	36.3	533.6	Rock Frags		
BS-11	41.2	528.7	Rock Frags w/Hd.Clay		
	43.3	526.6			
Core Run No.1	48.3	521.6			
No.2	53.3	516.6			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan N-5100; E-4900
TOTAL DEPTH: 53'4"

BORING STARTED: August 4, 1970
BORING COMPLETED: August 5, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NX (2-1/8")

MON 175

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 7 TB7

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

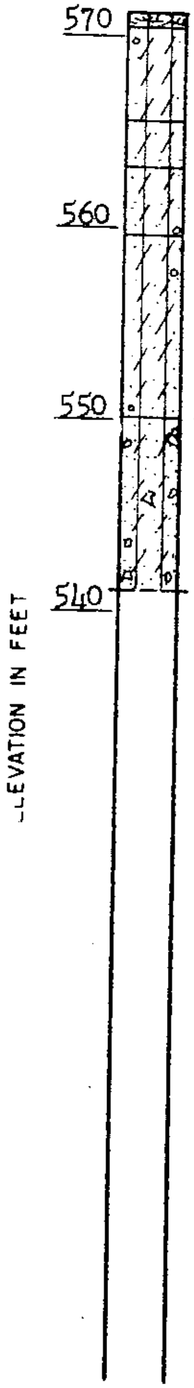
APPR: GAO
DATE: 10-20-70
JOB NO. 128-A

SFA FORM 1-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 571.1 Ft. (IGLD Datum)



TOPSOIL; Dk. Brn. SEMI-ORG. F. SANDY CLAY. 8"

Medium Mtld. Brown SILTY CLAY,
w/Trace of Sand, Slight Traces Gravel. 5'6"

Firm Mtld. Brown SILTY CLAY,
w/Traces of Sand. 8'0"

V. Stiff Brown SILTY CLAY,
w/Some Sand, Traces of Gravel. 11'6"

Firm to Stiff Gray SILTY CLAY,
w/Some Sand, Traces of Gravel. 21'0"

V. Stiff to Hard Dk. Gr. FINE SANDY SILTY CLAY
w/Some Gravel & Rock Fragments.
(GLACIAL TILL) 30'0"

Hole dry augered, dry upon completion.

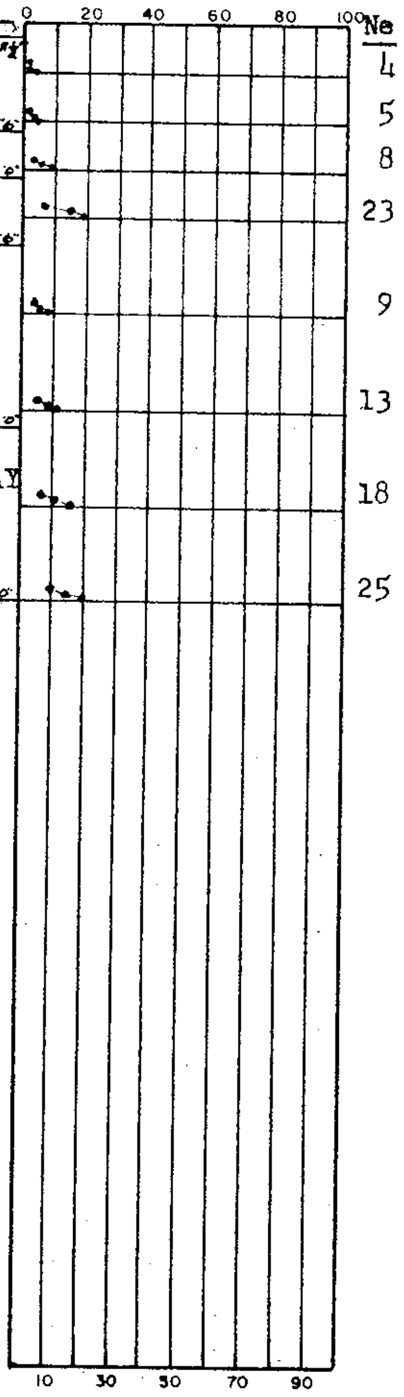
Hole grouted w/1 bag cement & 1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

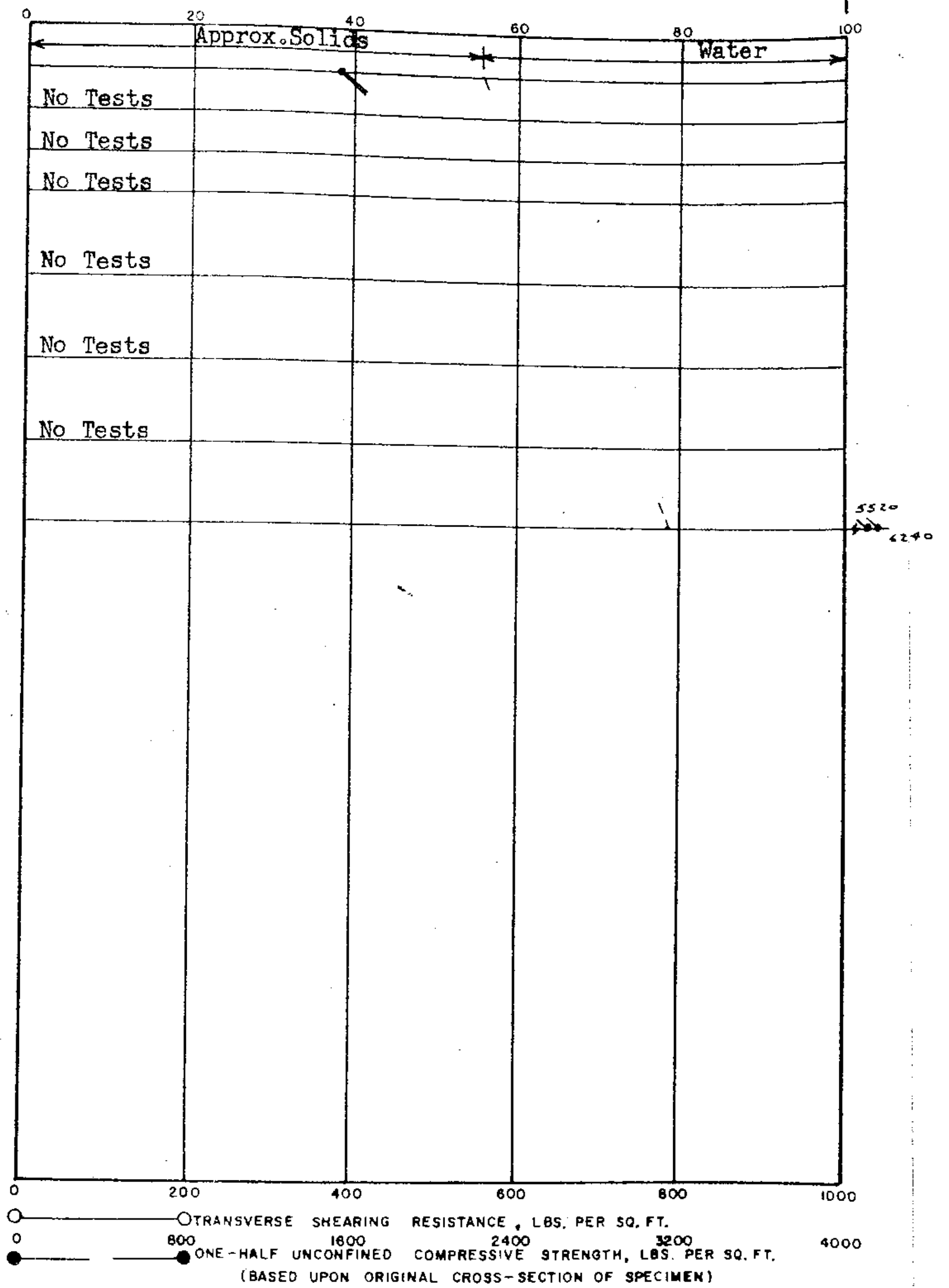
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.6	Medium	29.4	93.0
LS-2	5.0	566.1	Medium	--	--
LS-3	7.5	563.6	Firm	--	--
LS-4	10.0	561.1	V.Stiff	--	--
LS-5	15.0	556.1	Firm	--	--
LS-6	20.0	551.1	V.Stiff	--	--
LS-7	25.0	546.1	V.Stiff	--	--
LS-8	30.0	541.1	Hard	10.2	131.8

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-4100; E-3400
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: B.W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ____ inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NONE

MON 176

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 8 TB 8

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 10-20-70
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.5 Ft. (IGLD Datum)

ELEVATION IN FEET

Elev.	Description	Depth
570	TOPSOIL; Dk. Brn. SEMI-ORG. F. SANDY CLAY.	10"
	Firm to Stiff Brown & Gray SILTY CLAY, w/Some Sand, Traces of Gravel.	8'6"
560	Stiff Brown SILTY CLAY, w/Little Sand, Few Sand Pockets, Traces of Gravel.	13'3"
550	Stiff Gray SILTY CLAY, w/Some Sand, Few Sand Partings, Little to Some Gravel.	23'8"
540	Hard to V. Hard Dk. Gr. F. SANDY SILTY CLAY, * w/Some Gravel & Rock Fragments. (GLACIAL TILL)	30'0"

Hole dry augered.

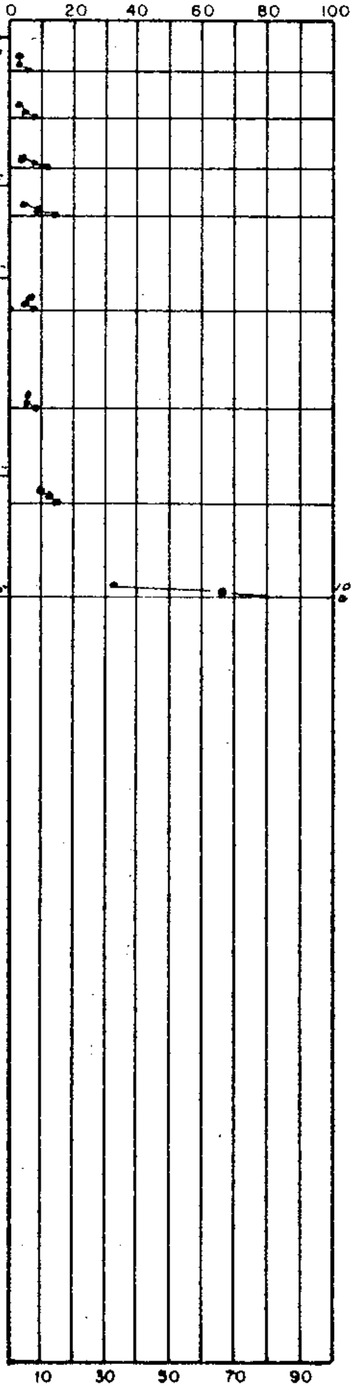
* Encountered ground water (slight).

Hole grouted w/2 bags of cement.

No Water flow during final inspection on Sept. 9, 1970.

PENETRATION *

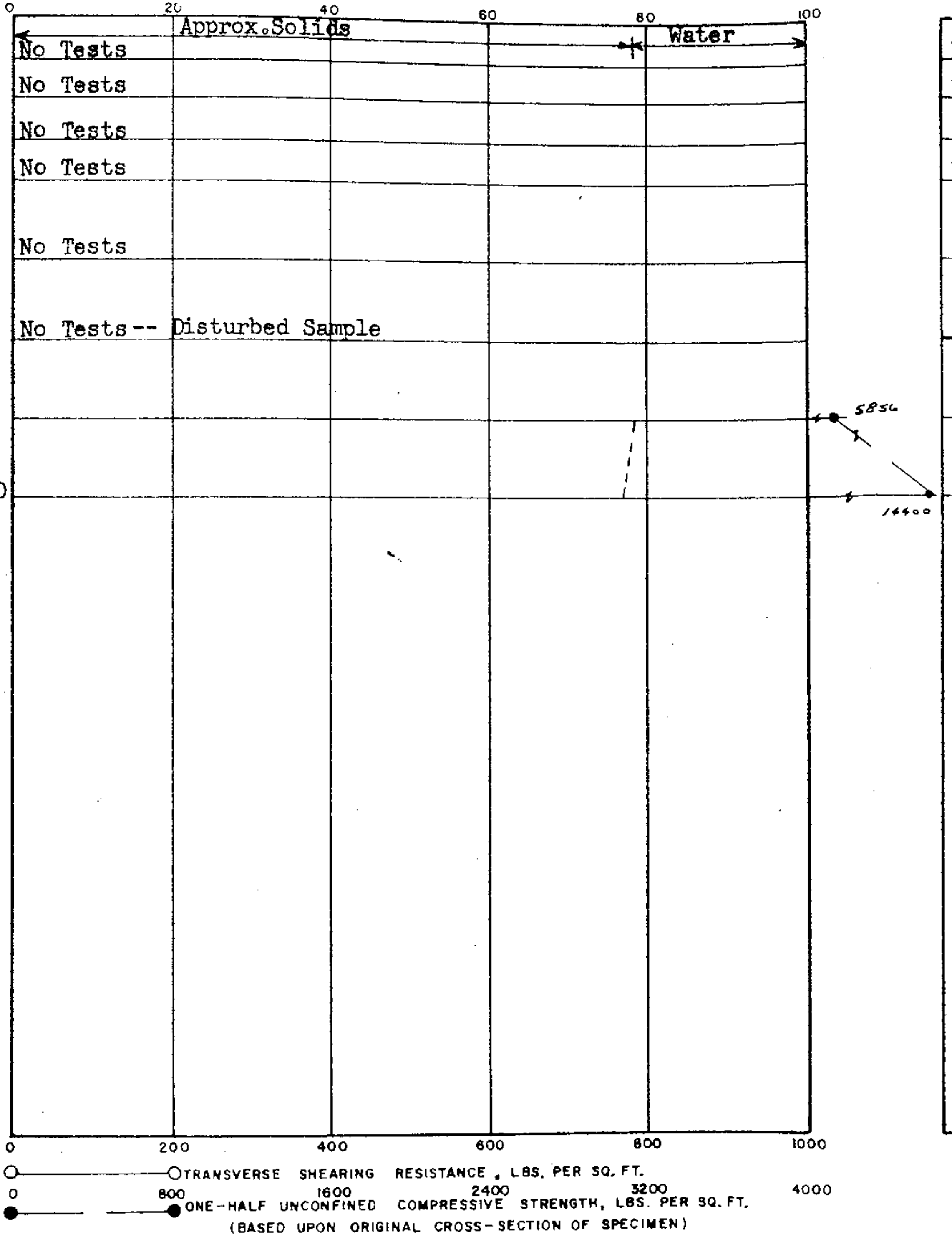
Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



Ne
6
8
12
14
13
12
22
100

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	569.0	Firm	--	--
LS-2	5.0	566.5	Firm	--	--
LS-3	7.5	564.0	Stiff	--	--
LS-4	10.0	561.5	Stiff	--	--
LS-5	15.0	556.5	Stiff	--	--
LS-6	20.0	551.5	Stiff	--	--
LS-7	25.0	546.5	Hard	9.9	132.9
LS-8	30.0	541.5	V. Hard	9.8	130.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-4100; E-4150
TOTAL DEPTH: 30'0"

BORING STARTED: August 12, 1970
BORING COMPLETED: August 12, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: D.T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NONE

** 1.75" O.D. Michigan Liner Sampler used through LS-7; 2.00" O.D. Heavy wall sampler used below.

MON 177

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 9 TB 9

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

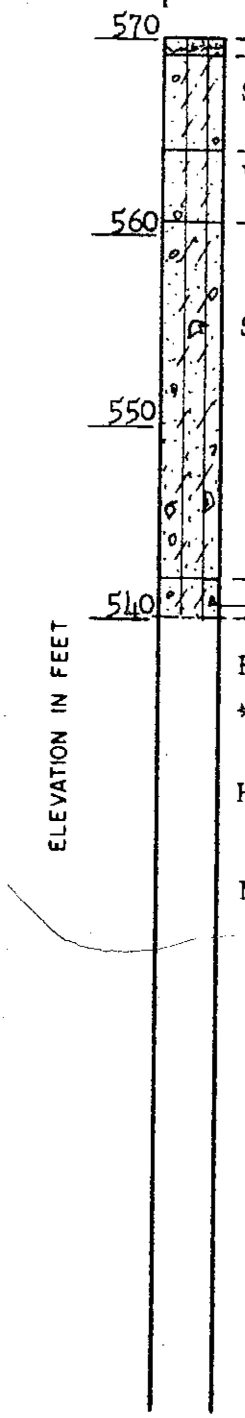
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

SFA FORM L-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.2 Ft. (IGLD Datum)



TOPSOIL; Dk.Brn.SEMI-ORG.F.SANDYCLAY. 1'

Stiff to V.Stiff Brown & Gray SILTY CLAY, w/Some Sand, Traces of Gravel. 5'0"

V.Stiff Brown SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 9'5"

Stiff to Hard Gray FINE SANDY SILTY CLAY, w/Some Gravel & Few Rock Fragments. (GLACIAL TILL, in lower elevation) 28'0"

* V.Hard Dk.Gray F.SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL) 30'0"

Hole dry augered.

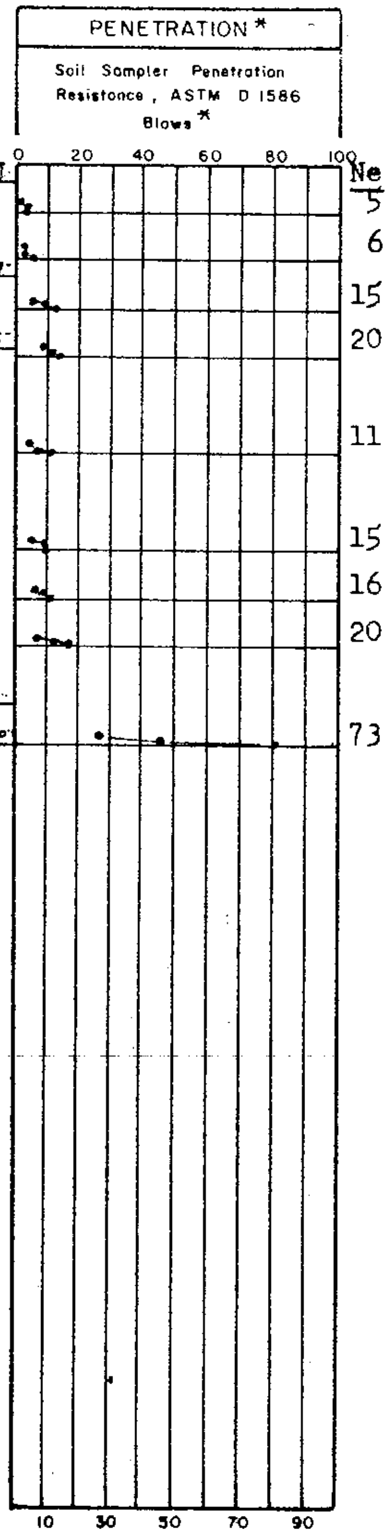
* Encountered ground water; water level rose 3" in 1 hour.

Hole grouted w/1 bag cement & 2 bags bentonite.

No water flow during final inspection on Sept. 9, 1970.

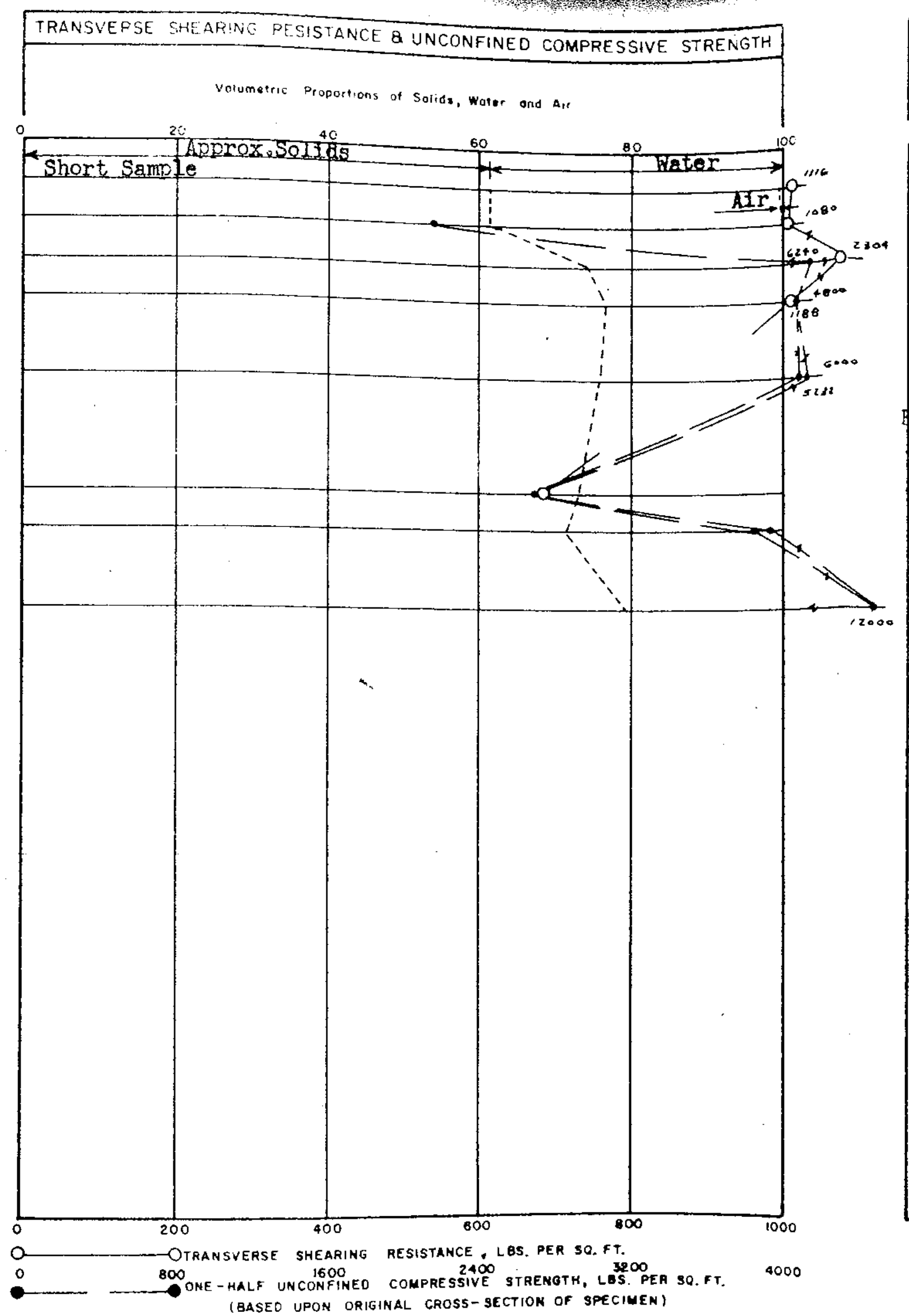
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
●——— ———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT.
(BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	567.7	V.Stiff	22.9	103.4
LS-2	5.0	565.2	Stiff to V.Stiff	23.7	103.8
LS-3	7.5	562.7	V.Stiff to Hard	13.4	124.8
LS-4	10.0	560.2	V.Stiff	12.1	127.2
LS-5	15.0	555.2	Hard	12.3	126.5
No Recovery	20.0	550.2			
LS-6	22.5	547.7	Firm to Stiff	14.1	123.1
LS-7	25.0	545.2	Stiff	12.6	120.8
LS-8	30.0	540.2	V.Hard	9.5	134.7

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-4100; E-4800
TOTAL DEPTH: 30'0"

BORING STARTED: August 12, 1970
BORING COMPLETED: August 12, 1970

INSPECTOR: B.W.Behrman (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SFA FORM E-7

MON 178

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 10 TB10

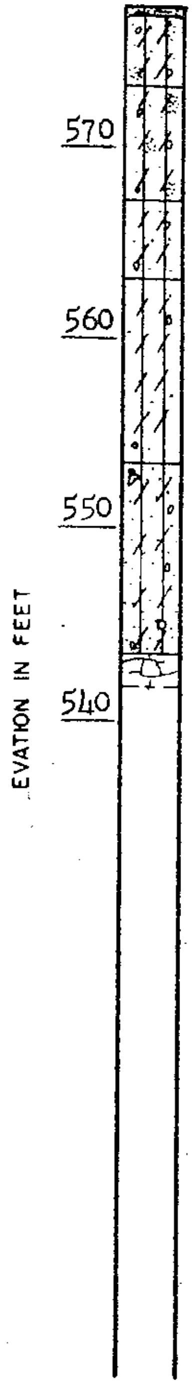
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 577.3 Ft. (IGLD Datum)



Depth	Description
9"	Medium Dark Brown SANDY TOPSOIL.
4'0"	V.Stiff Mtld. Brown & Gray SILTY CLAY, w/Sand Pockets & Tr.Gravel.
10'0"	Stiff to V.Stiff Mottled Brown SILTY CLAY, w/Some Sand & Gravel, Few Sand Pockets.
14'0"	Stiff Gray (w/Some Brown) SILTY CLAY, w/Some Sand, Traces of Gravel.
23'6"	Stiff to V.Stiff Light Gray SILTY CLAY, w/Little Sand, Traces of Fine Gravel.
33'6"	Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)
35'2"	* Lt.Gray Broken DOLOMITE.(Roller bit used)

Hole dry-augered to d=15'
Used 18'6" of 3" casing.

* Encountered ground water;
artesian flow; initial = 4 gpm,
after 30 minutes = 4.1 gpm

Artesian head = El.589.5 at completion;
= El.590.4 after 2 hours.

Hole grouted w/3bags of cement & 1 bag dry concrete.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-3600; W-1350
TOTAL DEPTH: 35'2"

BORING STARTED: July 17, 1970
BORING COMPLETED: July 17, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

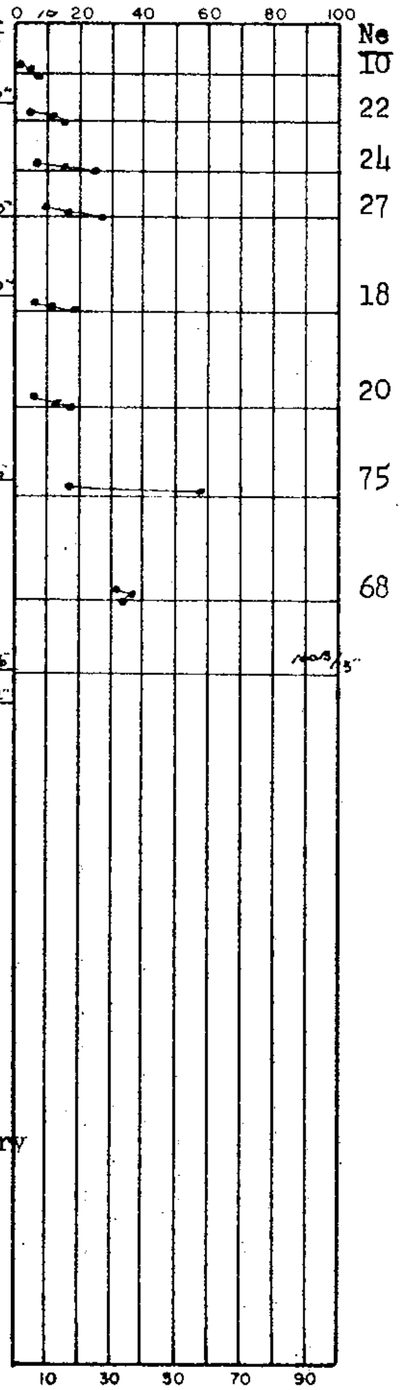
WATER LEVEL in hole at indicated number of hours after completion of boring; 18.5 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: None

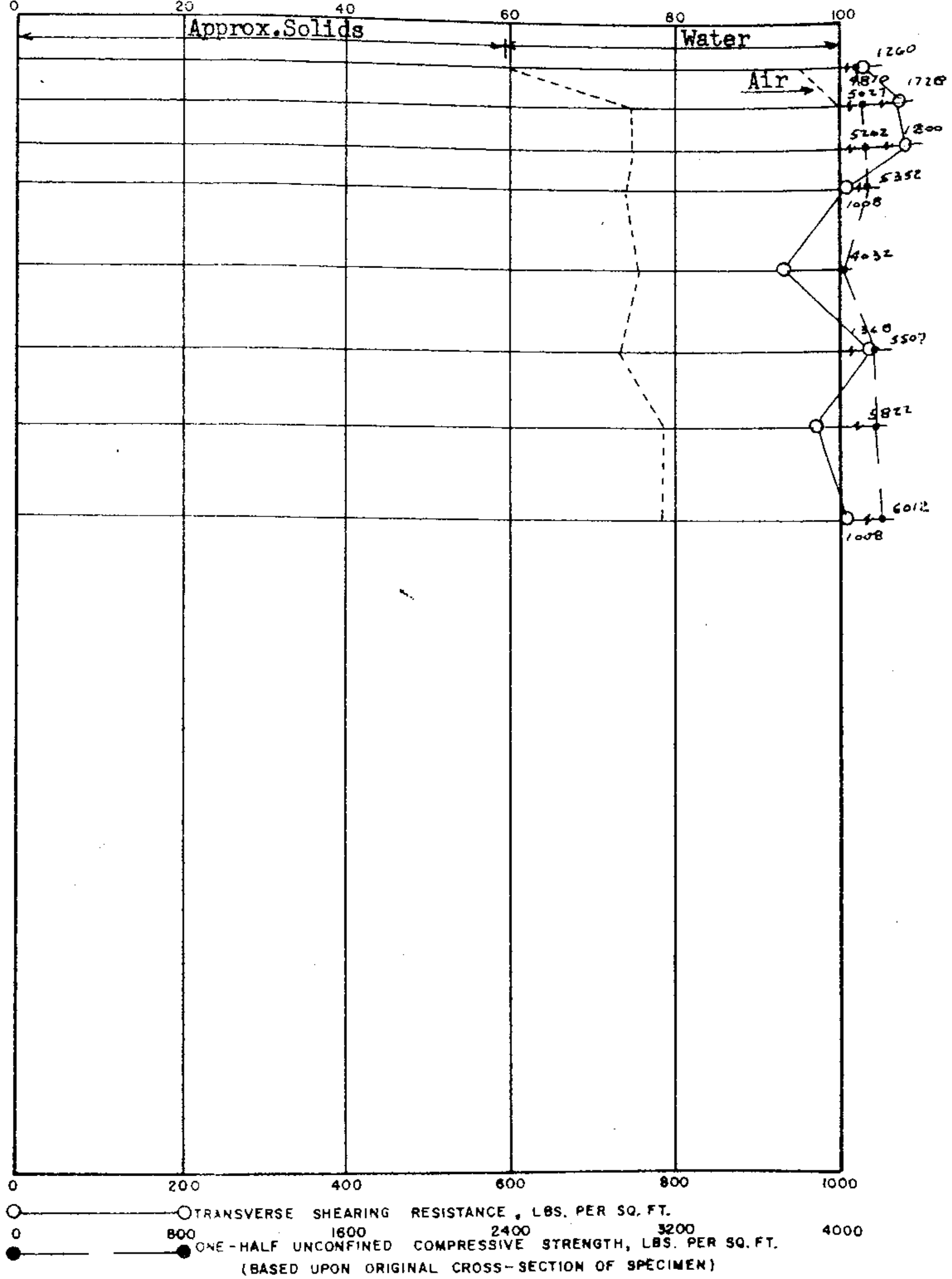
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f
LS-1	2.5	574.8	V.Stiff	22.0	100.8
LS-2	5.0	572.3	V.Stiff	12.5	125.9
LS-3	7.5	569.8	V.Stiff	12.5	126.0
LS-4	10.0	567.3	V.Stiff	13.5	124.1
LS-5	15.0	562.3	Stiff	12.2	127.2
LS-6	20.0	557.3	Hard	12.4	123.1
LS-7	24.5	552.8	Hard	11.2	132.4
LS-8	30.0	547.3	Hard	10.4	132.7
No Recovery	33.8	543.5			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 179

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 11 TB 11

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

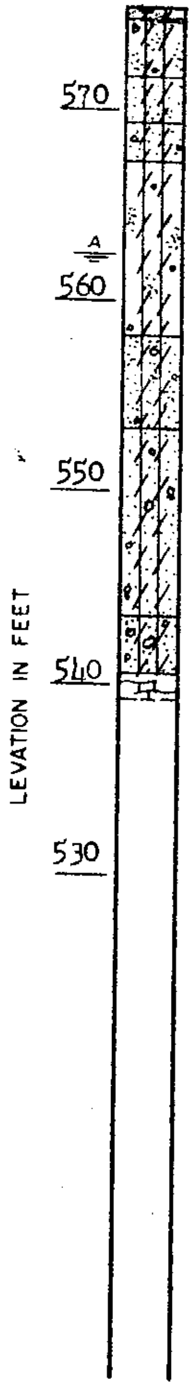
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-[illegible]

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.3 Ft. (IGLD Datum)



TOPSOIL: Medium Dk. Brn/Gray SILTY CLAY. 3/4'

Hard Brown w/Gray, SILTY CLAY, w/Sand Pockets, Traces of Gravel. 3'6"

V. Stiff Mottled Brown SILTY CLAY, w/Traces of Sand. 6'0"

Hard Mottled Brown SILTY CLAY, w/Little Sand, Traces of Gravel. 8'0"

Hard Gray, w/Some Brown streaks, SILTY CLAY w/Few Sand Pockets, Traces of Gravel. 17'0"

Hard Gray SILTY CLAY, w/Some Sand (frequently in pockets), and Traces of Gravel. 21'9"

V. Hard Gray SILTY CLAY, w/Some Sand & Fine Gravel, Few Rock Fragments. (GLACIAL TILL) 31'6"

Hard Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Frags. GLACIAL TILL. 34'6"

Gray Broken DOLOMITE/LIMESTONE. 36'0"

8' of NX casing, 10' of 4" casing used.

* Encountered artesian ground water; initial flow= 15 gpm; after 30-min. flow= 14 gpm.

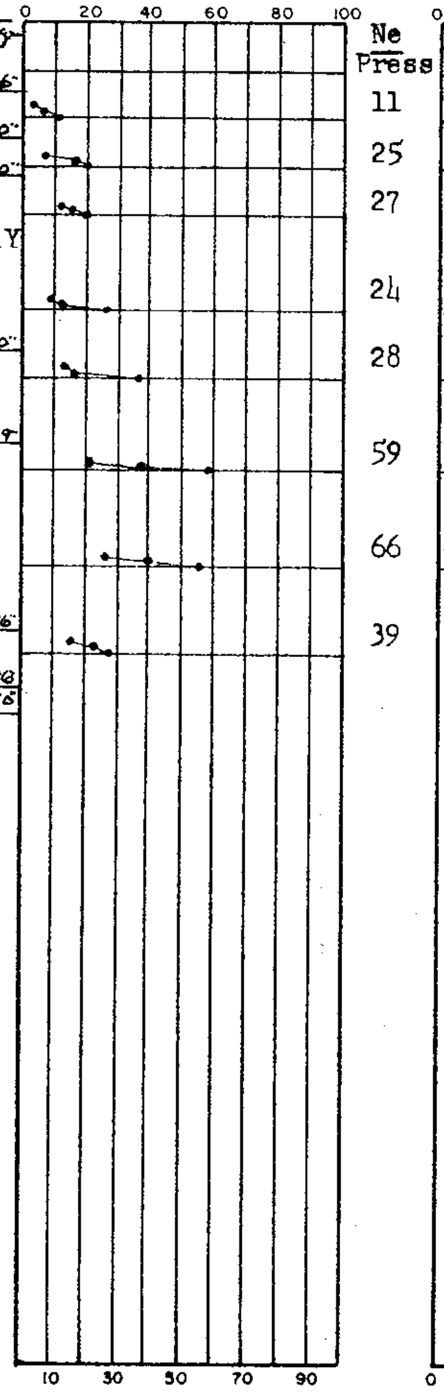
Static head established at d=12'7" (El. 562.7)

Hole grouted w/4 bags of cement.

No water flow during final inspection on Sept. 9, 1970.

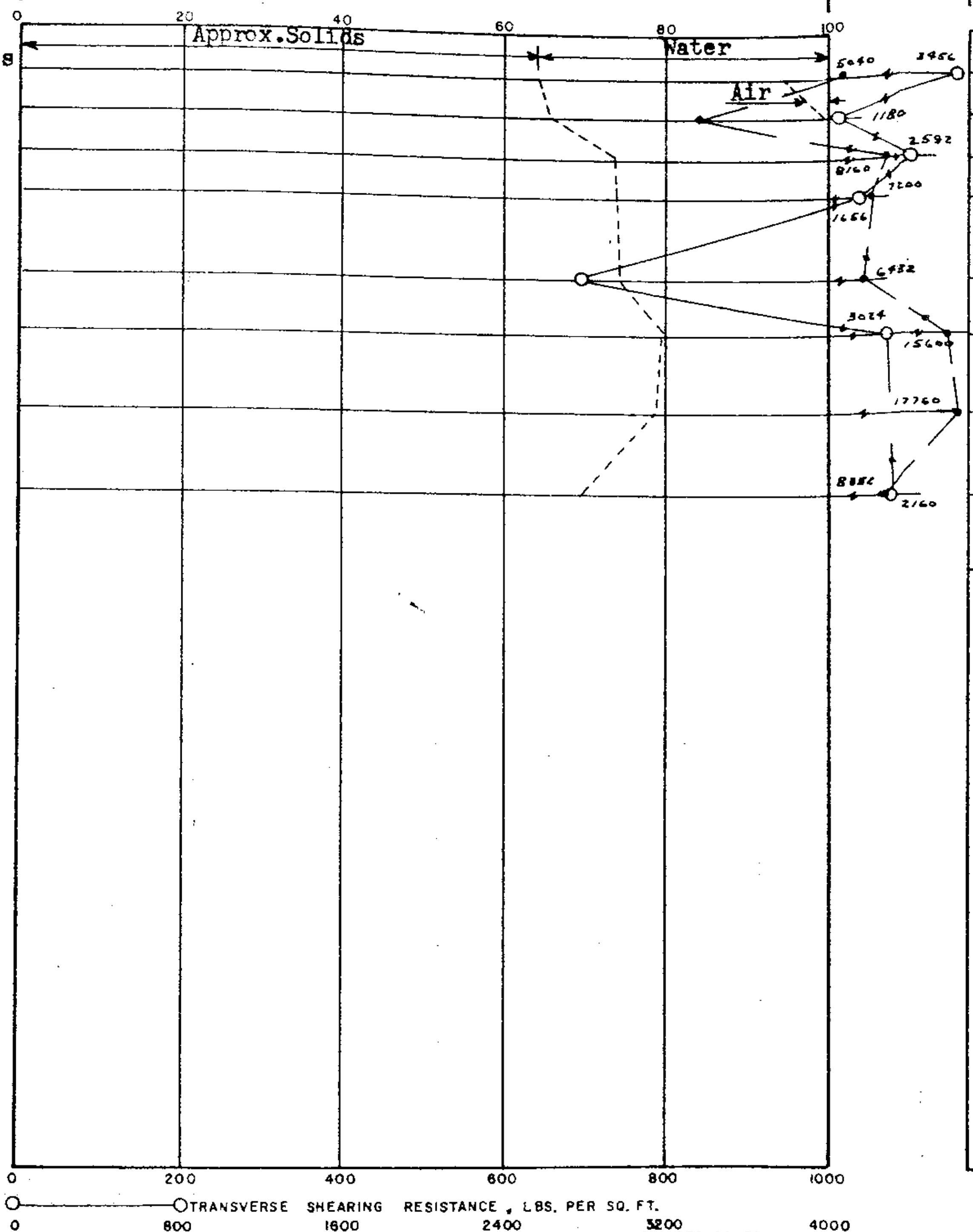
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-5; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	572.8	Hard	17.5	108.6
LS-2	5.0	570.3	V.Stiff	17.3	110.3
LS-3	7.5	567.8	Hard	12.7	123.8
LS-4	10.0	565.3	Hard	12.4	124.5
LS-5	15.0	560.3	Stiff to Hard	12.1	126.0
LS-6	18.5	556.8	Hard	8.7	133.3
LS-7	23.3	552.0	V.Hard	10.2	132.2
LS-8	28.3	547.0	V.Hard	16.0	116.7
BS-9	33.0	542.3	V.Compact Clayey Silt		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan N-3600; W-600
TOTAL DEPTH: 36'0"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

INSPECTOR: J. C. Vanzeck (S&FA)
DRILLER: J. Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

MON 180

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 12 TB 12

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

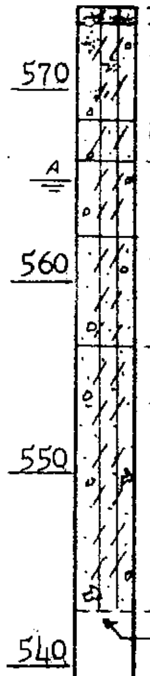
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-70 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.2 Ft. (IGLD Datum)

ELEVATION IN FEET



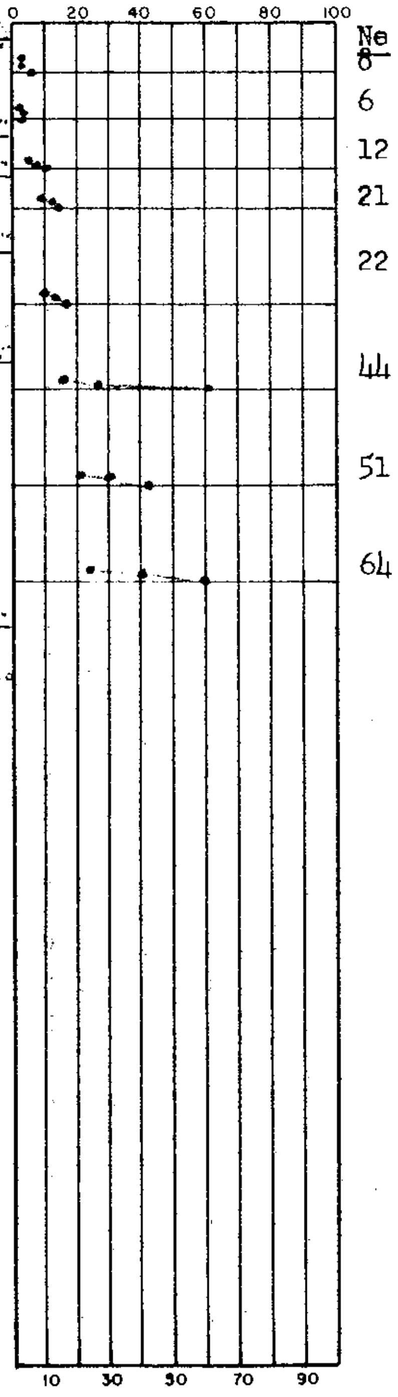
Depth	Description
11"	TOPSOIL; Dk. Brn.-Gr. SEMI-ORG. SILTY CLAY.
6'0"	Firm to Stiff Brown & Gray SILTY CLAY, w/Some Sand Pockets, Traces of Gravel.
8'0"	Stiff Light Brown SILTY CLAY, w/Some Sand, Traces of Gravel.
12'0"	V.Stiff Light Brown SILTY CLAY, w/Traces of Gravel.
17'6"	V.Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel.
31'4"	V.Hard Gray SILTY CLAY, w/Some Sand, Some Fine Gravel, & Rock Fragments. GLACIAL TILL. *

Refusal.
10' of 4-in. casing, 7' of NX casing used.
* Ground water encountered (Artesian); flow varied from 15 to 17 gpm.; static head 8'9" (El. 865.4).

Hole grouted upon completion w/8 bags cement; no flow as of Sept. 9, 1970 final inspection.

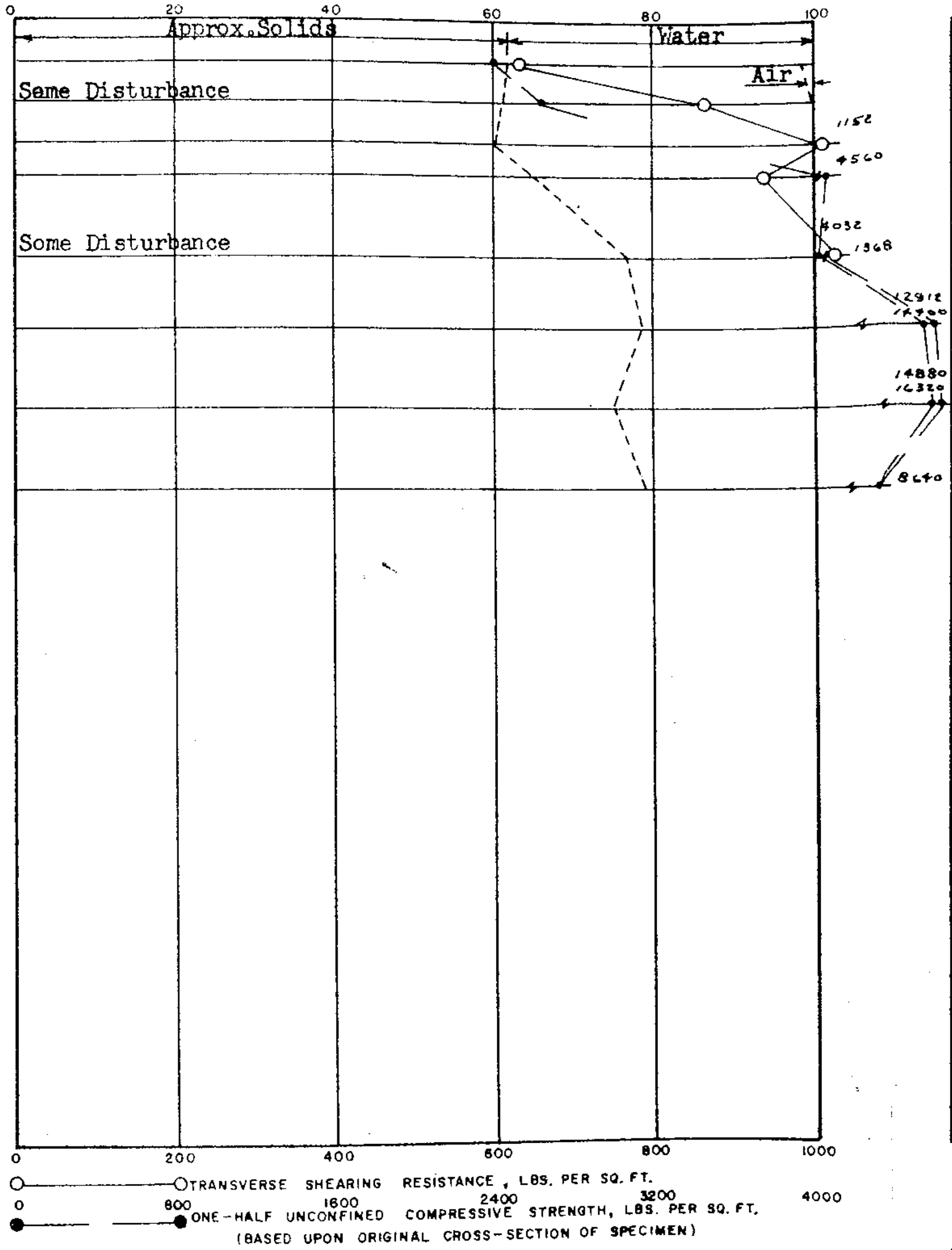
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-4;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	571.7	Firm	22.1	103.1
LS-2	5.0	569.2	Firm to Stiff	25.1	102.0
LS-3	7.5	566.7	Stiff	23.0	101.3
LS-4	9.5	564.7	V.Stiff	20.8	109.0
LS-5	14.5	559.7	V.Stiff	12.0	128.6
LS-6	19.0	555.2	V.Hard	12.1	132.6
LS-7	24.0	550.2	V.Hard	11.2	127.4
LS-8	29.0	545.2	V.Hard	8.9	133.9

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-3600; E-400
TOTAL DEPTH: 31'4"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; _____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

MON 181

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 13 TB 13

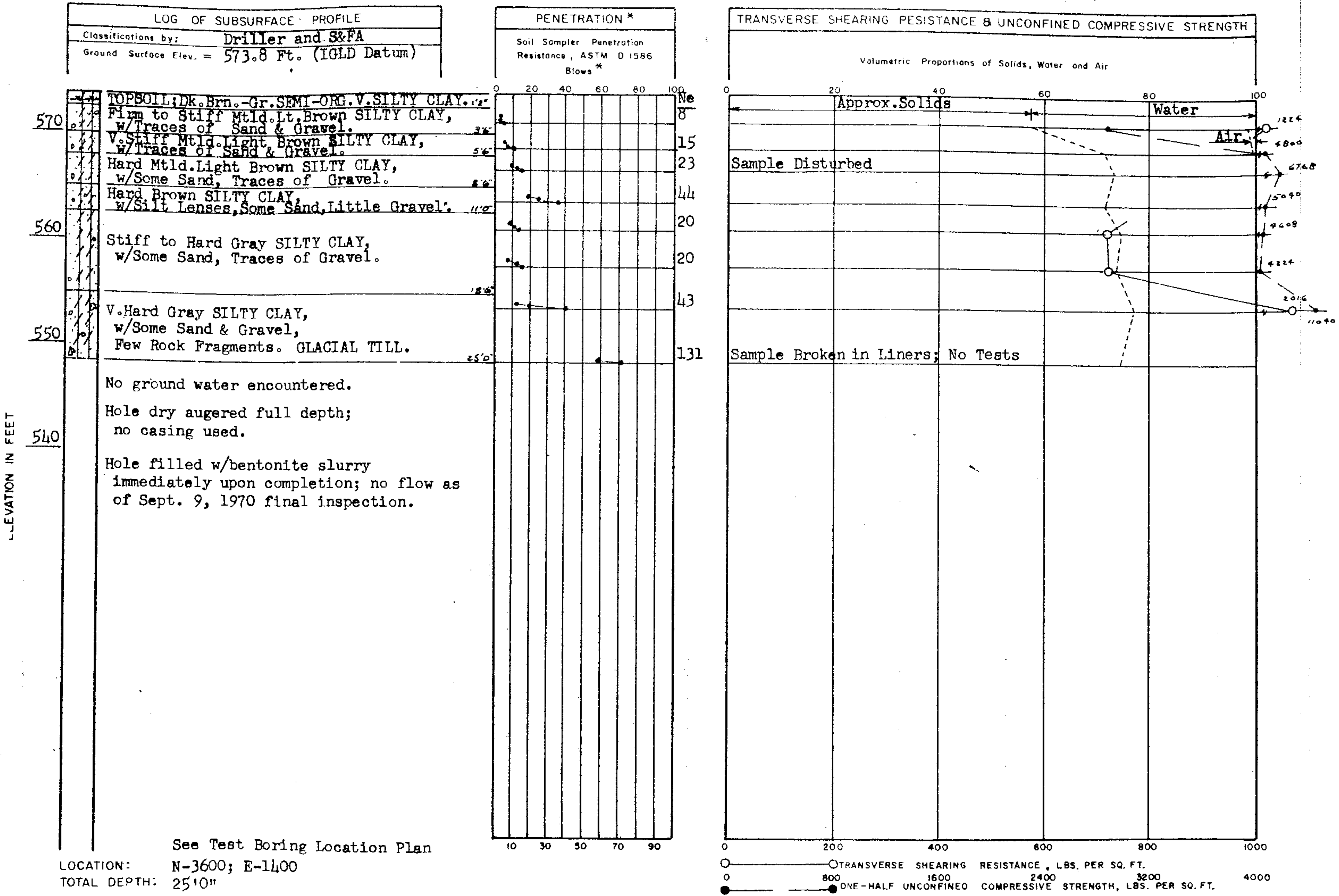
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAS DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.8 Ft. (IGLD Datum)



TOPSOIL; Dk.Brn.-Gr.SEMI-ORG.V.SILTY CLAY.

Firm to Stiff Mtld.Lt.Brown SILTY CLAY, w/Traces of Sand & Gravel.

V.Stiff Mtld.Light Brown SILTY CLAY, w/Traces of Sand & Gravel.

Hard Mtld.Light Brown SILTY CLAY, w/Some Sand, Traces of Gravel.

Hard Brown SILTY CLAY, w/Silt Lenses, Some Sand, Little Gravel.

Stiff to Hard Gray SILTY CLAY, w/Some Sand, Traces of Gravel.

V.Hard Gray SILTY CLAY, w/Some Sand & Gravel, Few Rock Fragments. GLACIAL TILL.

No ground water encountered.

Hole dry augered full depth; no casing used.

Hole filled w/bentonite slurry immediately upon completion; no flow as of Sept. 9, 1970 final inspection.

Sample Disturbed

Sample Broken in Liners; No Tests

○——○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

0 800 1600 2400 3200 4000

●——● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-3; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	571.3	Firm to Stiff	25.9	97.7
LS-2	5.0	568.8	V.Stiff	14.8	120.6
LS-3	7.0	566.8	Hard	13.6	123.2
LS-4	10.0	563.8	Hard	14.1	120.9
LS-5	12.5	561.3	Stiff to Hard	11.1	126.5
LS-6	16.0	557.8	Stiff to Hard	12.2	123.2
LS-7	20.0	553.8	V.Hard	9.4	128.0
LS-8	25.0	548.8	V.Hard	8.8	125.8

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-3600; E-1400
TOTAL DEPTH: 25'0"

BORING STARTED: July 22, 1970
BORING COMPLETED: July 22, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

≡ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: None

MON 182

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 14 TB 14

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA
DATE: 6-7-71
JOB NO. 128-A

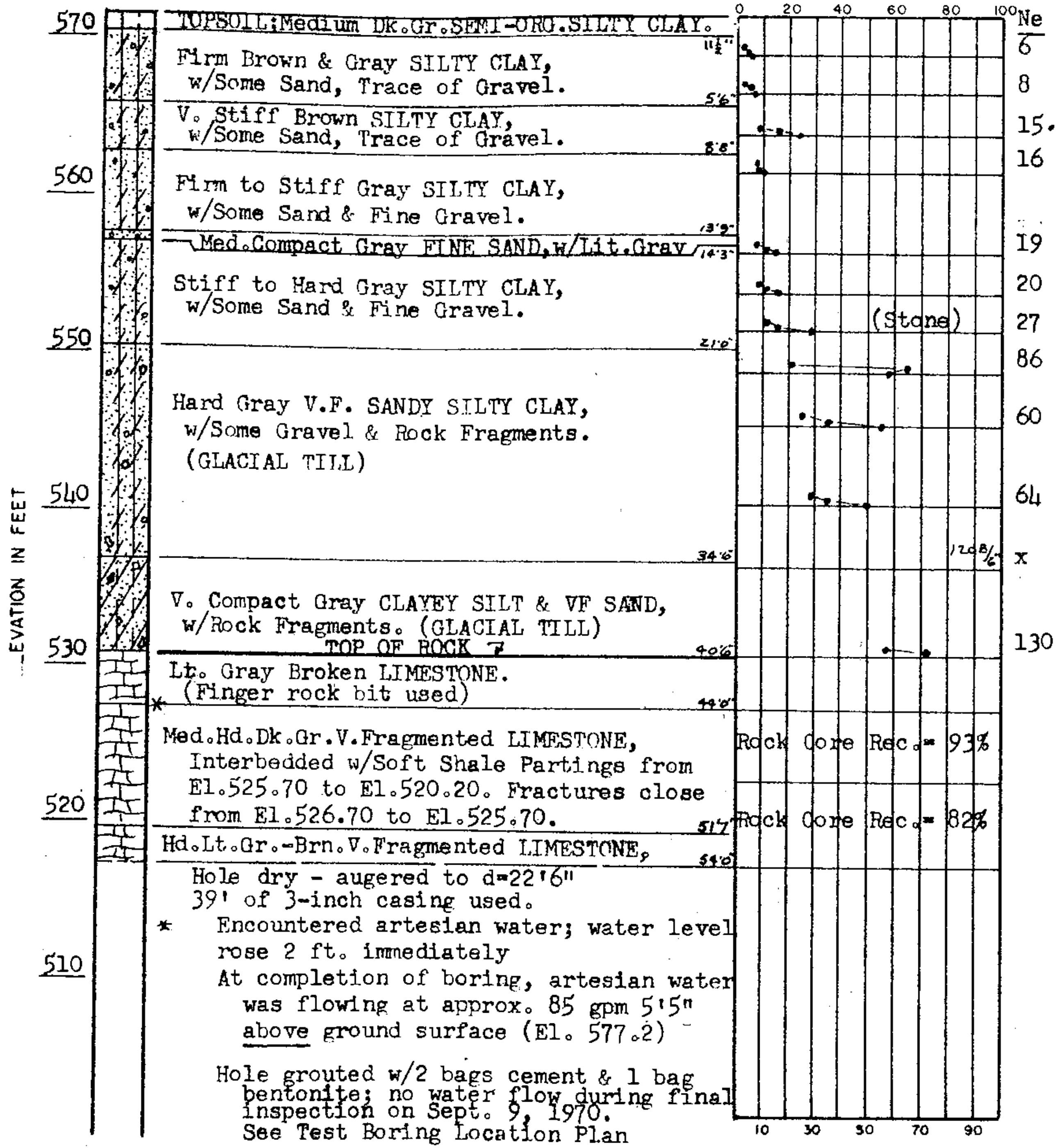
SFA FORM S-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.7 Ft. (IGLD Datum)

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TOPSOIL: Medium Dk.Gr.SEMI-ORG.SILTY CLAY.

Firm Brown & Gray SILTY CLAY, w/Some Sand, Trace of Gravel.

V. Stiff Brown SILTY CLAY, w/Some Sand, Trace of Gravel.

Firm to Stiff Gray SILTY CLAY, w/Some Sand & Fine Gravel.

Med.Compact Gray FINE SAND, w/Lit.Grav.

Stiff to Hard Gray SILTY CLAY, w/Some Sand & Fine Gravel.

Hard Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)

V. Compact Gray CLAYEY SILT & VF SAND, w/Rock Fragments. (GLACIAL TILL)

TOP OF ROCK

Lt. Gray Broken LIMESTONE. (Finger rock bit used)

Med.Hd.Dk.Gr.V.Fragmented LIMESTONE, Interbedded w/Soft Shale Partings from El.525.70 to El.520.20. Fractures close from El.526.70 to El.525.70. — Rock Core Rec.= 93%

Hd.Lt.Gr.-Brn.V.Fragmented LIMESTONE, — Rock Core Rec.= 82%

Hole dry - augered to d=22'6"
39' of 3-inch casing used.
* Encountered artesian water; water level rose 2 ft. immediately
At completion of boring, artesian water was flowing at approx. 85 gpm 5'5" above ground surface (El. 577.2)

Hole grouted w/2 bags cement & 1 bag bentonite; no water flow during final inspection on Sept. 9, 1970.
See Test Boring Location Plan

LOCATION: N-3600; E-2400
TOTAL DEPTH: 54'0"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

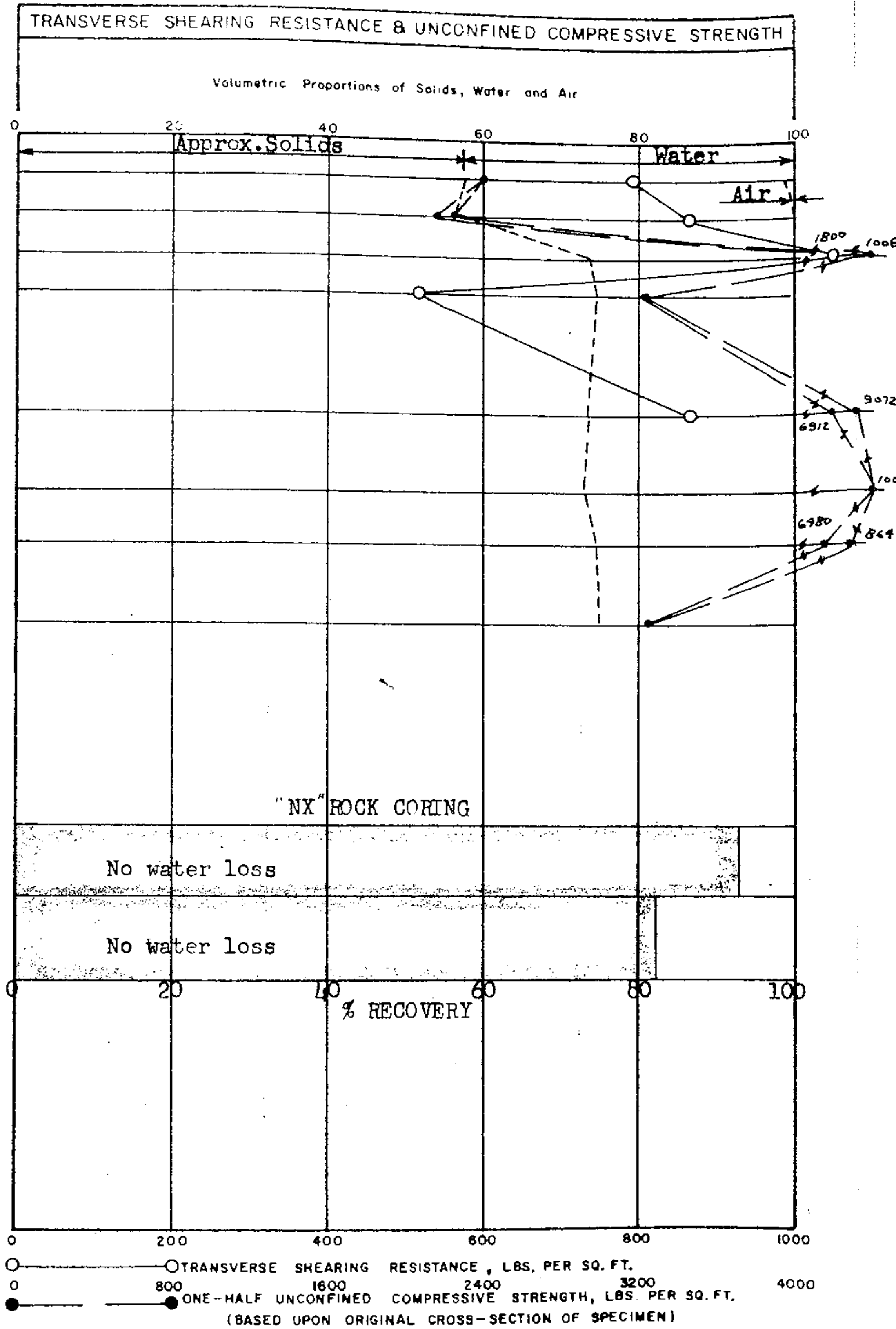
INSPECTOR: B. W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [✓ 6] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: NX (2⅛")

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



** 1.75" O.D. Michigan Liner Sampler used through LS-5;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.2	Firm	26.3	97.5
LS-2	5.0	566.7	Firm to Stiff	28.9	95.8
LS-3	7.5	564.2	Hard	13.1	124.3
LS-4	10.0	561.7	Firm	12.3	124.8
No Recovery	15.0	556.7			
LS-5	17.5	554.2	Stiff to Hard	12.4	123.2
BS-6	20.0	551.7	Compact Clayey Sd.		
LS-6	22.5	549.2	V.Hard	9.2	123.0
LS-7	26.0	545.7	Hard	10.9	126.1
LS-8	31.0	540.7	Stiff	11.2	127.0
BS-10	35.0	536.7	Hard Silty Clay		
BS-11	40.5	531.2	V.Compact Silt		
	44.0	527.7			
Core Run No.1	48.5	523.2			
No.2	54.0	517.7			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 183

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 15 TB 15

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.6 Ft. (IGLD Datum)

Elev.	Description	Depth
570	TOPSOIL:Med.Dk.Gr. SEMI-ORG. SANDY CLAY	10½"
	Medium to Firm Brown & Gray V.SILTY CLAY, w/Traces of Sand, Gravel & Organic.	7'0"
560	Stiff Brown V.SILTY CLAY, w/Little Sand, Tr. Gravel & Rock Frags.	9'4"
550	Firm to Stiff Gray V. SILTY CLAY, w/Little Sand, Tr. Gravel & Rk. Frags (GLACIAL TILL)	24'0"
	Hard Dark Gray V. CLAYEY SILT & VF SAND, w/Traces of C. Sand & Rock Frags. (GLACIAL TILL)	28'11"
540	* V.Hd. Dk.Gr. CLAYEY SILT.(GLACIAL TILL)	30'0"

* Encountered Ground Water (V.slight)

Hole dry augered.

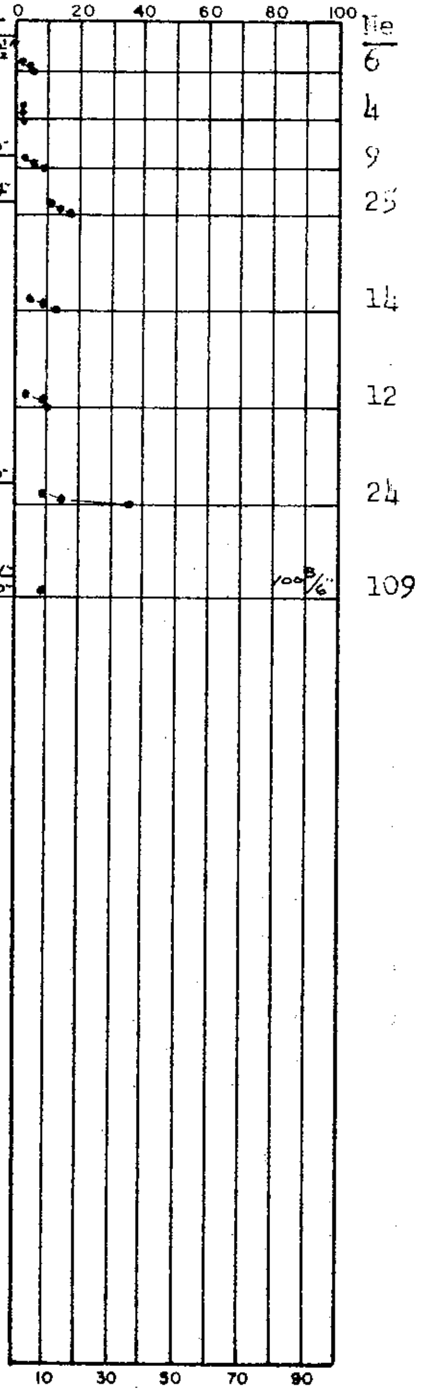
Hole grouted w/2 bags of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

ELEVATION IN FEET

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



Ne	TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH
6	Not Tested
4	Not Tested
9	Not Tested
25	Not Tested
14	Not Tested
12	Not Tested; Broken in Liner
24	Not Tested
109	

Volumetric Proportions of Solids, Water and Air: 0, 20, 40, 60, 80, 100 — No Tests

0, 200, 400, 600, 800, 1000 ○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
0, 800, 1600, 2400, 3200, 4000 ●——●ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.1	Firm	--	--
LS-2	5.0	565.6	Medium	--	--
LS-3	7.5	563.1	Firm to Stiff	--	--
BS-4	9.1	561.5	Hard	--	--
LS-4	10.0	560.6	Hard		
LS-5	15.0	555.6	Stiff	--	--
LS-6	20.0	550.6	Stiff	--	--
LS-7	25.0	545.6	Hard	--	--
BS-7	30.0	540.6	V.Hard		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3100; E-3400
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: M. M. Dragecivic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

MON 184

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 16 TB 16

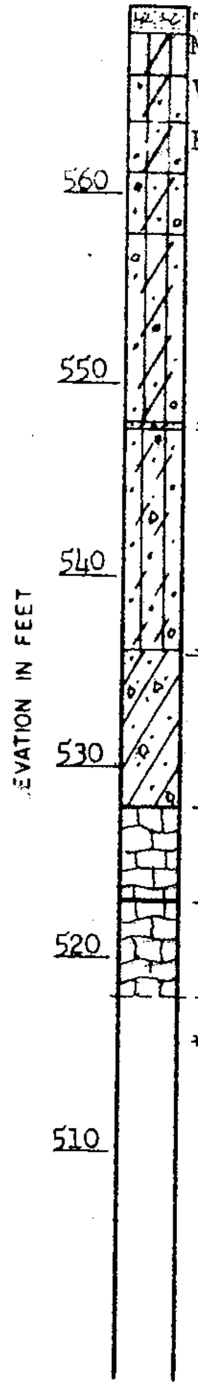
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-2-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 569.8 Ft. (IGLD Datum)



- TOPSOIL: Soft Blk. SEMI-ORG. SANDY CLAY. 1'6"
- Medium Dk. Gray & Brown V.SILTY CLAY, w/Some Organic Matter 3'6"
- V.Soft Brown & Gray VERY SILTY CLAY, w/Traces of Sand. 6'0"
- Firm Brown & Gray VERY SILTY CLAY, w/Traces of Sand. 8'6"
- V.Stiff Mtld. Brown VERY SILTY CLAY, w/Some Sand, Traces of Gravel. 11'9"
- Firm to Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel. 21'6"
- ROCK FRAGMENTS, w/SILT & F. SAND 22'0"
- Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Traces of Gravel & Rock Fragments. (GLACIAL TILL) 33'4"
- * V. Compact Dk. Gray SILT & VF SAND, Mixed w/Rock Fragments

TOP OF ROCK, EL.528.3 41'6"

- Hard Lt. Brown to Gray DOLOMITIC LIMESTONE; Generally Solid, but V. Fragmented, El.526.8 to El. 526.3. Seven-inch clay layer, El.525.
- Hard Lt. Gray Thinly Bedded LIMESTONE & DOLOMITIC LIMESTONE, w/Few Shale Partings. Moderately Fractured. 51'6"

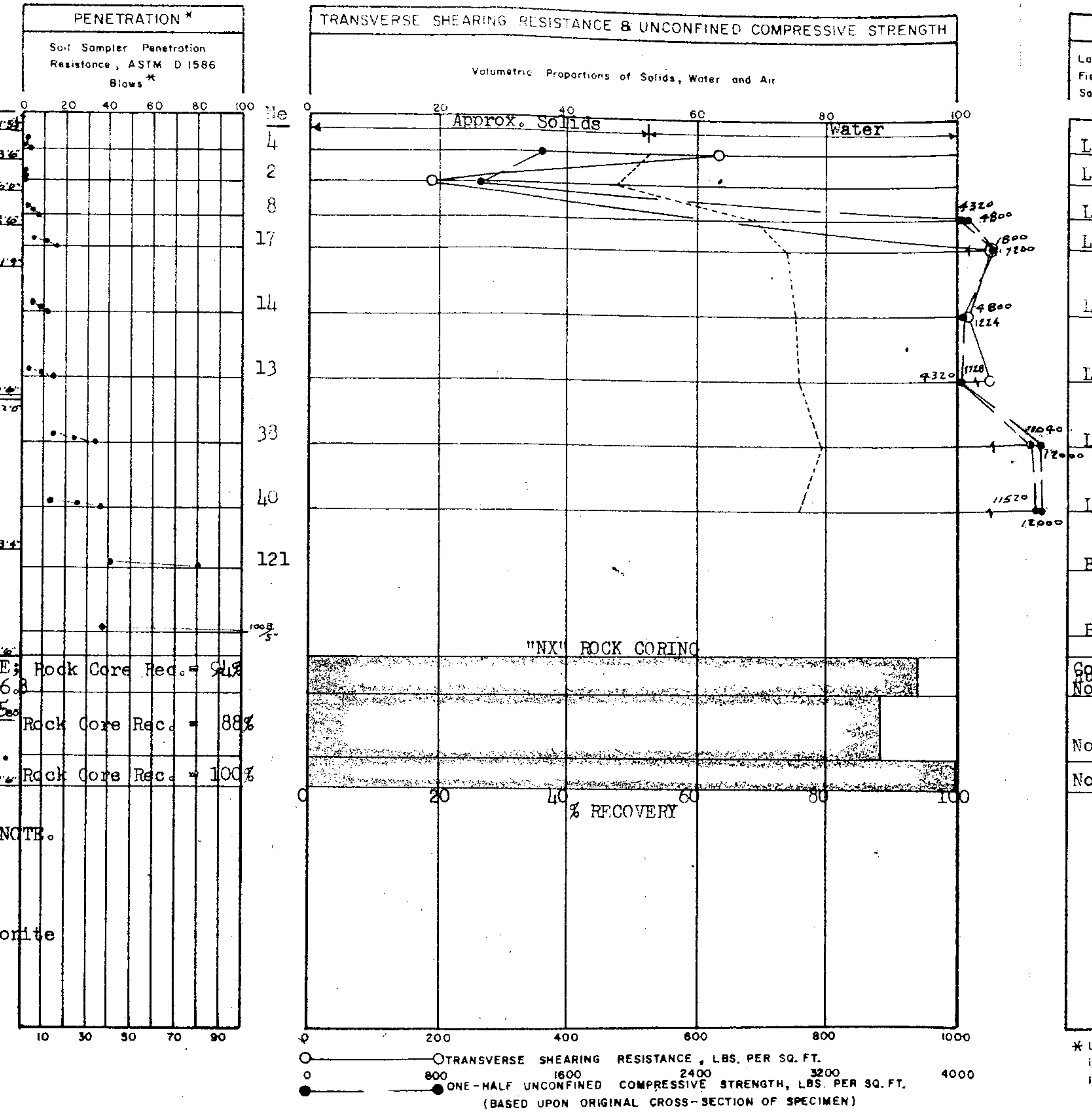
* Encountered artesian water; level rose to 1'10" above ground (El.571.6) See NOTE.

3-inch casing set to d= 41'6"

Hole grouted w/5 bags of cement, 1 bag of dry concrete, & 1 bag of bentonite

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan



** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6;
2.00" O.D. Heavy Wall Sampler used for all below LS-6.

NOTE: Artesian water flowed at rate of 2.5 gpm after first core run, with casing 1'8" above ground (El. 571.5)
Artesian water flowed at rate of 5.0 gpm after completion of boring, with casing 1'8" above ground (El. 571.5)

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	567.3	Soft-Med. Topsoil	33.3	88.2
LS-2	5.0	564.8	V. Soft	32.9	89.0
LS-3	7.5	562.3	Firm	17.3	115.2
LS-4	10.0	559.8	V.Stiff	13.5	123.5
LS-5	15.0	554.8	Stiff	12.0	125.4
LS-6	20.0	549.8	Firm to Stiff	12.7	126.7
LS-7	25.0	544.8	Hard	10.1	132.6
LS-8	30.0	539.8	Hard	12.3	128.7
BS-8	34.5	535.3	Limestone Fragments		
BS-9	39.5	530.3	Weathered Shale		
	41.5	528.3			
Core Run No.1	44.3	525.5			
No.2	49.3	520.5			
No.3	51.5	518.3			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 185

LOCATION: N-3100; E-4328
TOTAL DEPTH: 51'6"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 11, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole of indicated number of hours after completion of boring; 41.5 feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: NXC (2⅛")

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 17 TB 17

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.6 Ft. (IGLD Datum)

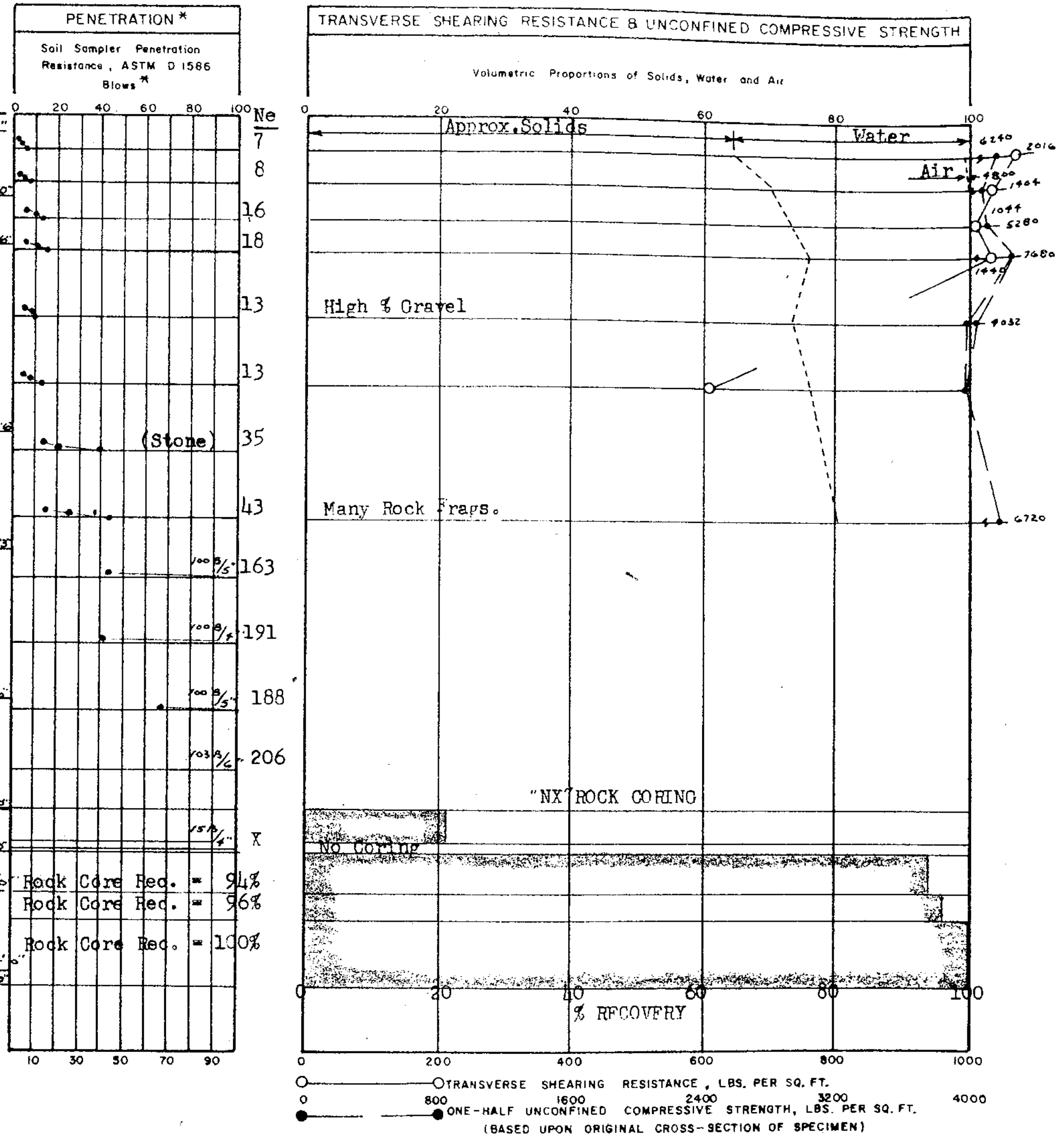
ELEVATION IN FEET

Elevation	Depth	Description
	1'0"	TOPSOIL;Brn.-Gr.SEMI-ORGANIC SILTY CLAY.
570	6'0"	Stiff to Hard Mtld. Brown SILTY CLAY, w/Some Fine Sand, Traces of Gravel.
	9'6"	V.Stiff Brown SILTY CLAY, w/Some Sand, Traces of Gravel.
560	23'6"	V. Stiff Gray SILTY CLAY, w/Some Sand, Some Fine Gravel.
550	33'3"	Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel, Few Rock Fragments. (GLACIAL TILL) —*
540	43'6"	V. Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL)
530	51'0"	V.Compact Dark Gr. CLAYEY SILT & VF SAND, w/Many Rock Fragments. (GLACIAL TILL) TOP OF ROCK, EL. 524.7
520	55'6"	Soft Light Gray Broken LIMESTONE, w/Seams Gray Shale.
	58'0"	Soft Lt. Gr.-Brn. Fragmented LIMESTONE. Fractures Close.
	64'0"	Med.Hard Light Gray Solid LIMESTONE, w/Zones Dolomitic Limestone & Some Shale Seams.
510	65'0"	Mod.Fractured LIMESTONE BRECCIA.

54'10" 3-inch casing used.

* Encountered artesian water; see NOTE

See Test Boring Location Plan



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight pcf
LS-1	2.5	573.1	Hard	20.1	108.8
LS-2	5.0	570.6	V.Stiff	16.0	117.6
LS-3	7.5	568.1	V.Stiff	13.8	122.8
LS-4	10.0	565.6	Hard	11.8	127.8
LS-5	15.0	560.6	V.Stiff	12.8	123.5
LS-6	20.0	555.6	Firm to V.Stiff	12.3	127.6
BS-7	25.0	550.6	Hard		
LS-7	30.0	545.6	Hard	9.2	136.3
BS-9	34.5	541.1	V.Hard		
BS-10	39.3	536.3	Rock Fragments		
BS-11	44.4	531.2	Rock Fragments w/Silt&Clay		
BS-12	49.0	526.6	Rock Fragments		
	51.9	524.7			
Core Run No1	54.1	521.5			
	55.0	520.6			
No.2	58.0	517.6			
No.3	60.0	515.6			
No.4	65.0	510.6			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-2600; W-1600
TOTAL DEPTH: 65'0"

BORING STARTED: July 28, 1970
BORING COMPLETED: July 29, 1970

INSPECTOR: J.O.Wanzeck& B.W.Behrman(S&FA)
DRILLER: B.Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne-Evaluated Blows/Foot

ROCK CORE DIAMETER: NX (2 1/8")

** 1.75" O.D. Michigan Liner Sampler used through LS-6; 2.00" O.D. Heavy wall sampler used below

NOTE: Artesian water encountered at d=32'3"(El.543.3), flowed over casing at 1'8" above ground surface at 33 gpm; drove casing to d=39'(El.536.6), water flowed at rate of 37.5 gpm 3 ft. above ground surface. With casing extended above ground static head was reached in 20 minutes at 15'10" above ground (El.591.4). With casing extended to d=51'(El.524.6), overnite static head was 19'2" above ground surface (El.594.8), flow was approx.37 gpm when upper casing was removed.

At completion of boring artesian water flowed at rate of 75 gpm with casing 1'8" above ground surface. Casing capped overnite; extended to 20'8" above ground surface (El.606.3) at rate of approx. 100 gpm.

<u>Extreme difficulty experienced in grouting hole and stopping artesian flow</u>; used 28 bags of cement, 7 bags of dry-mix concrete & 1 bag of bentonite during period of 16 hours to stop flow.

MON 186

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 18 TB 18

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO 128-A

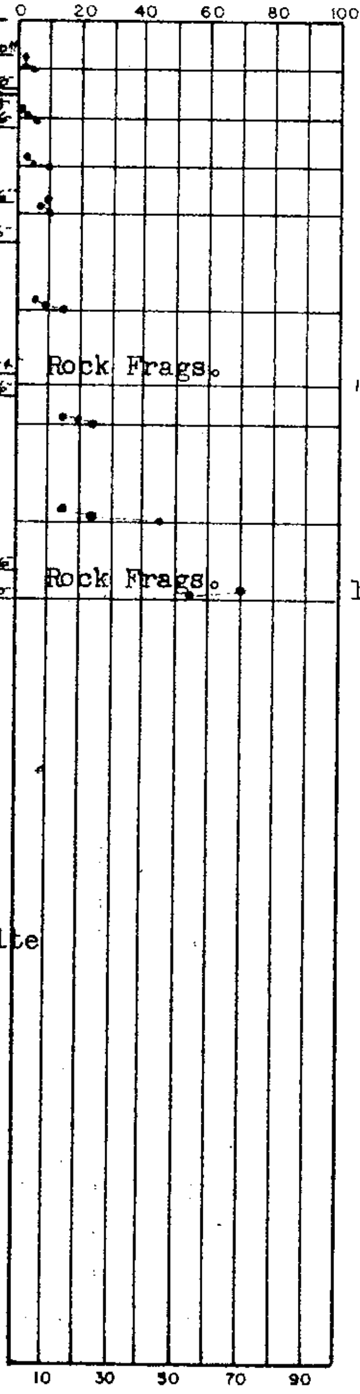
LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.2 Ft. (IGLD Datum)

ELEVATION IN FEET	LOG OF SUBSURFACE PROFILE	Depth	Ne	TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH
	TOPSOIL; Soft Dk.Brn. SEMI-ORG. SANDY SILT.	1'0"		Approx. Solids ⟷ Water
570	Soft Mtld. Brn. TOPSOIL Mixed w/CLAYEY SILT.	3'0"	4	Not Tested
	Loose Brown FINE SAND.	3'5"		
	Soft Mtld. Brown V. SILTY CLAY	5'6"	4	Not Tested
	Medium Brown V. SILTY CLAY, w, Sand Partings		8	Not Tested
	Firm to Stiff Brn. & Gray V. SILTY CLAY, w/Traces of Sand & Gravel.	9'6" 11'6"	18	Transition Zone; Not Tested
560	Firm to Stiff Gray SILTY CLAY, w/ Traces of Sand.		15	Not Tested
	ROCK FRAGMENTS, w/SILT & F. SAND	18'6" 19'6"	Rock Frags. 100/3"	
550	Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)		35	Not Tested
			38	6624 7680
	* ROCK FRAGMENTS, w/SILT & F. SAND.	28'6" 30'0"	Rock Frags. 125	
540				

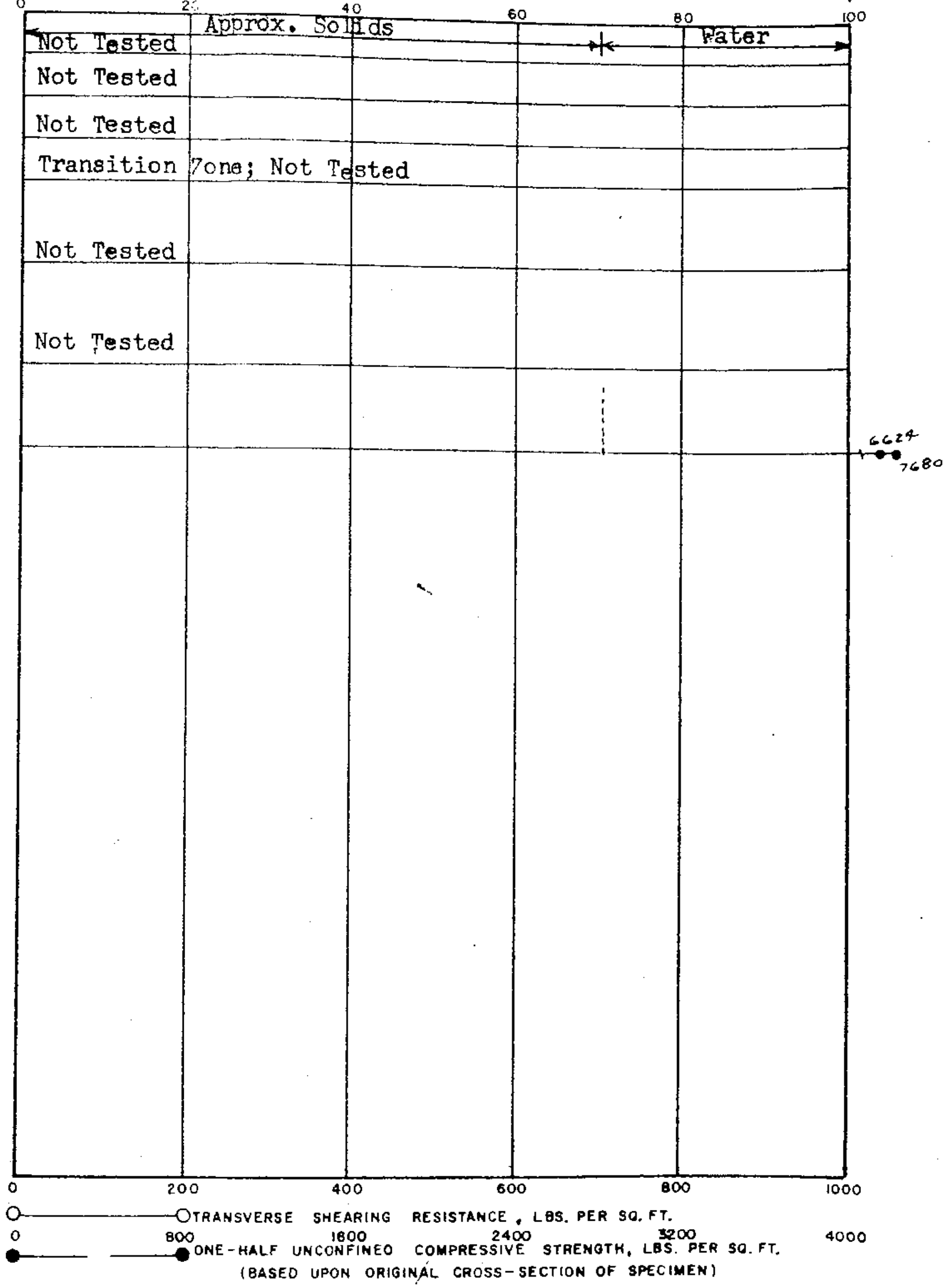
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



* Encountered artesian water; water flowed at rate of 4 gpm with casing 1'9" above ground (El. 576.0) Static condition established at 9'3" above ground (El. 583.5)

Hole dry augered.

Hole grouted w/3 bags of cement, 1 bag of dry concrete & 1 bag of bentonite

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-2600; W-600
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling Inc.

WATER LEVEL in hole of indicated number of hours after completion of boring; _____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

**1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-5; 2.00" O.D. Heavy Wall Sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight pcf
LS-1	2.5	571.7	Soft Topsoil	--	--
LS-2	5.0	569.2	Soft	--	--
LS-3	7.5	566.7	Medium	--	--
LS-4	10.0	564.2	Firm to Stiff	--	--
LS-5	15.0	559.2	Stiff		
BS-6	18.7	555.5	Loose Silt& Rock Frags.		
LS-6	20.0	553.2	Hard	--	--
LS-7	25.0	548.2	Hard	15.8	118.4
No Recovery	30.0	544.2			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 187

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 19 TB 19

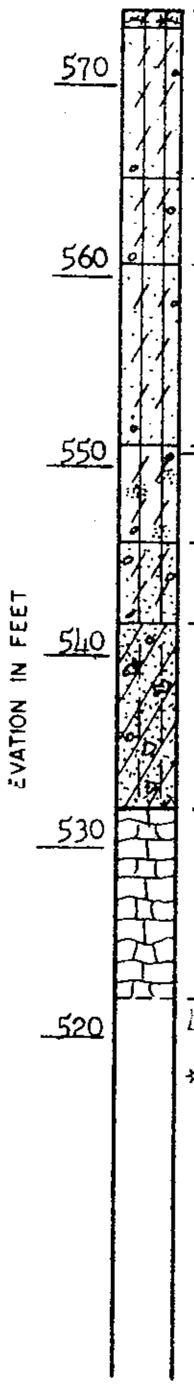
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.9 Ft. (IGLD Datum)



~~TOPSOIL;Dk.Gray SEMI-ORGANIC SILTY CLAY.~~ 10"

Firm to V.Stiff Brown & Gray SILTY CLAY, w/Few Silt Lenses, Little Sand, Traces of Fine Gravel. 8'6"

V.Stiff to Hard Brown & Gray SILTY CLAY, w/Little Sand, Traces of Gravel. 13'0"

Hard Gray SILTY CLAY, w/Some Fine Sand, Sl.Tr.Gravel. 22'6"

* Hard Gray SILTY CLAY, w/Sand Pockets, Traces of Gravel. (GLACIAL TILL) 27'6"

V.Hard Dk. Gray VF SANDY SILTY CLAY, w/Some Gravel. (GLACIAL TILL) 32'0"

V.Compact Dark Gray CLAYEY SILT & VF SAND, w/Some Gravel & Many Rock Fragments.

(GLACIAL TILL)

TOP OF ROCK, EL. 532.4 41'6"

Med.Hd.Lt.Gr.-Brn.Mod.to V.Fragmented LIMESTONE, w/Soft Shale Layer from El.528.20 to El.527.40. Fracture moderately close from El.527.30 to El.522.40. 51'6"

41'6" NX casing used.

* Encountered artesian water; water level rose immediately to d=18'6" (El.555.4), and remained static for 30 minutes.

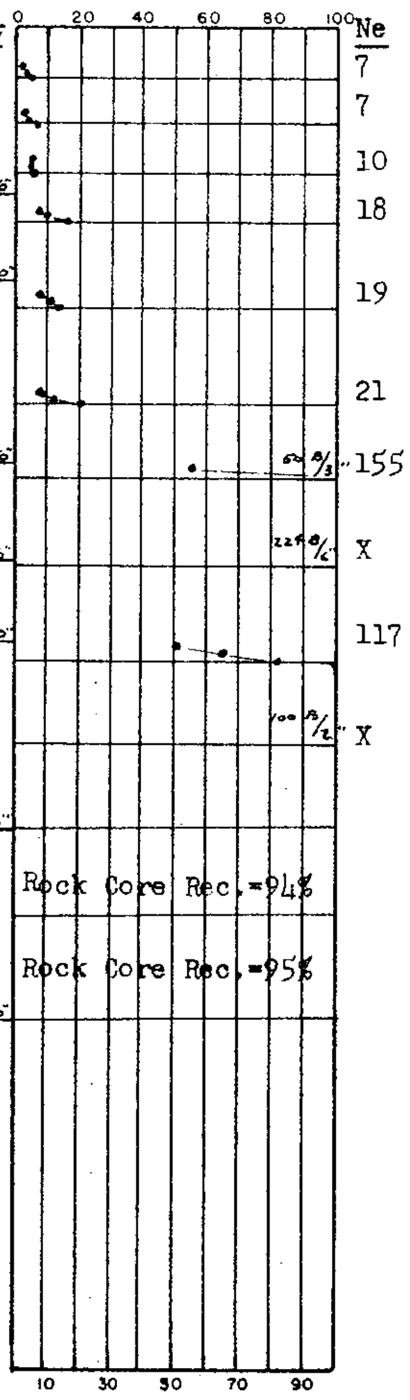
With 41'6" casing in artesian water rose to h=13'1" (El.587.0), at measured flow of 1 gpm. Level was static for 1-hr.

Hole was grouted with 7 bags cement. No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

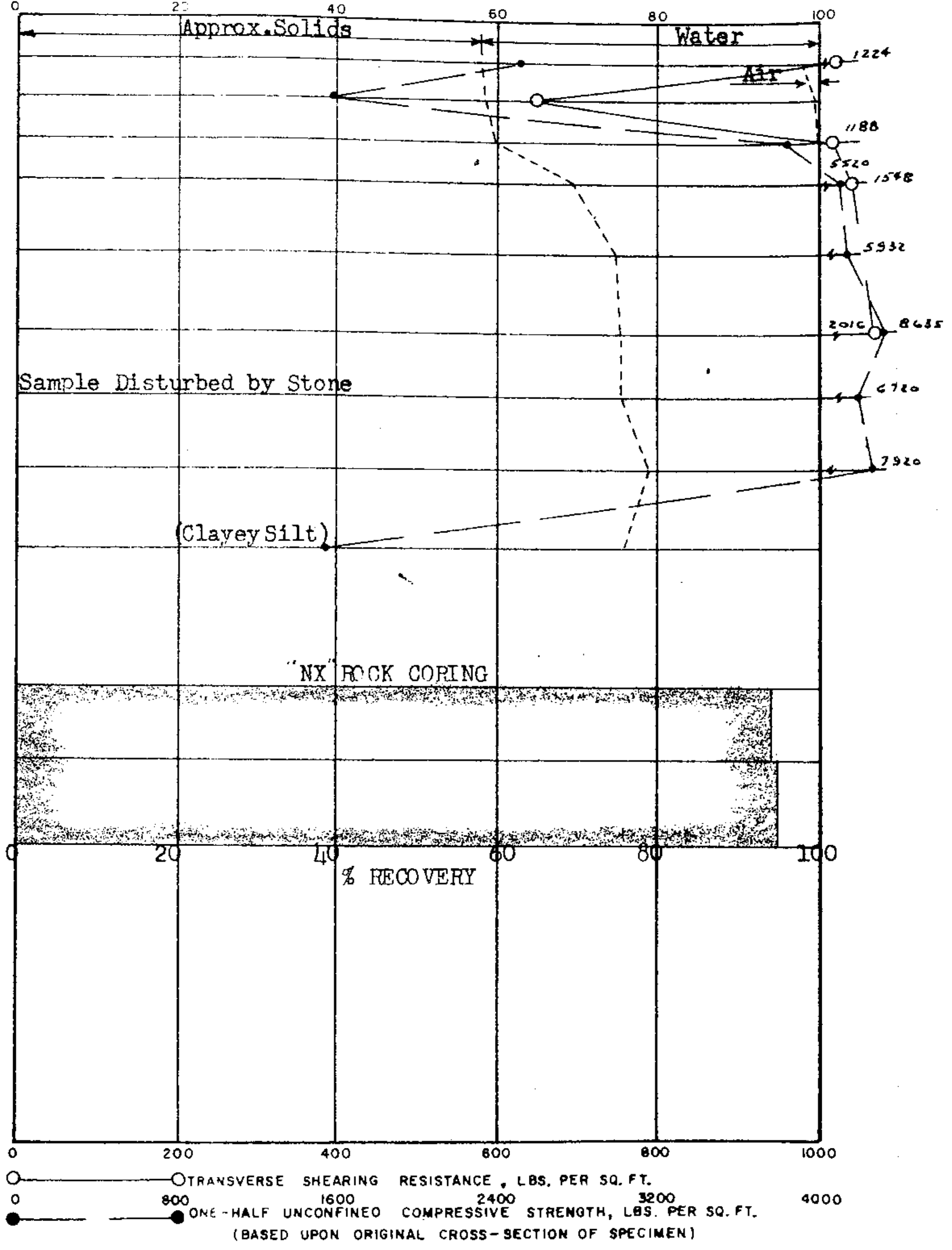
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-6; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	571.4	Variable: Firm-Hard	25.5	97.5
LS-2	5.0	568.9	Firm to Stiff	26.0	98.5
LS-3	7.5	566.4	V.Stiff	24.5	100.9
LS-4	10.0	563.9	V.Stiff to Hard	16.4	116.9
LS-5	14.5	559.4	Hard	12.3	125.3
LS-6	19.5	554.4	V.Hard	11.9	126.5
LS-7	23.3	550.6	Hard, w/ Sd.Pockets	10.4	127.0
LS-8	28.0	545.9	V.Hard	9.4	133.6
LS-9	33.0	540.9	V.Compact Silt	12.9	126.1
BS-10	37.2	536.7	Rock Frags w/Silt&Clay		
	41.5	532.4			
Core Run No.1	46.0	527.9			
No.2	51.5	522.4			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-2600; E-400
TOTAL DEPTH: 51'6"

BORING STARTED: July 27, 1970
BORING COMPLETED: July 28, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 41.5 feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: NX ($2\frac{1}{8}$)

SFA FORM E-7

MON 108

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 20 TB 20

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO.128-A

[illegible] by: Driller and S&FA
[illegible] Surface Elev.: 573.6 Ft. (IGLD Datum)

Elevation	Depth	Soil description
		TOPSOIL; Med. Dk. Gr. SEMI-ORG. V.SDY. CLAY
570		Firm to Stiff Brown & Gray V.SILTY CLAY, w/Traces of Sand & Gravel.
	5.9	V.Stiff Brown VERY SILTY CLAY, w/Traces of Sand & Gravel.
	9.5	
560		V.Stiff to Hard Dk. Gray SILTY CLAY, w/Some Sand & Gravel, Few Rock Frags. (GLACIAL TILL?)
550	23.0	V.Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments (GLACIAL TILL)
	30.0	
540		

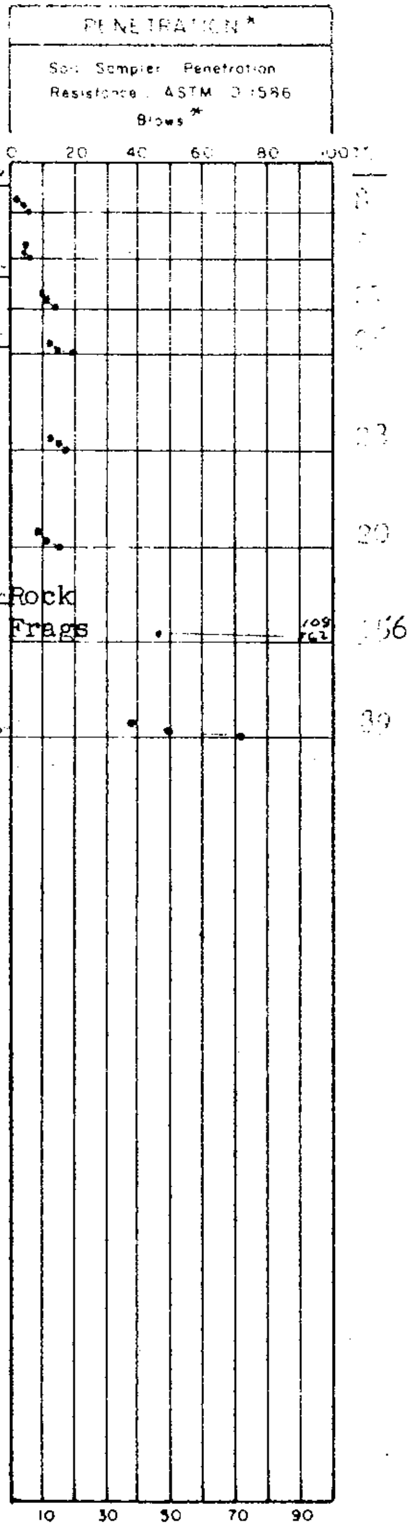
Hole dry augered.

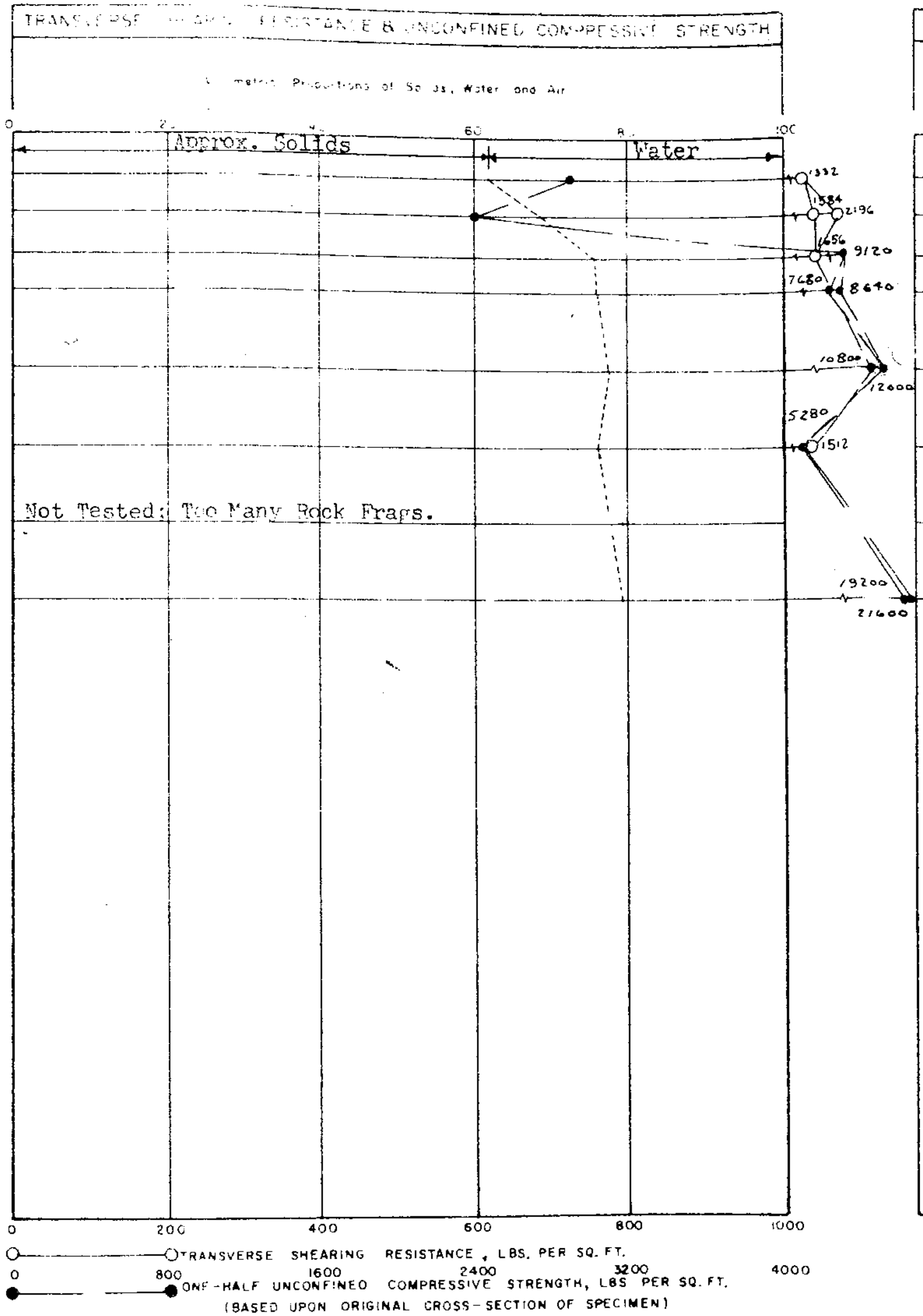
No ground water encountered.

Hole grouted w/2 bags of cement.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan





** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6; 2.00" O.D. Heavy wall sampler used for LS-7 and LS-8.

Lab & Field Sa. No.	Sample Depth Feet	Sample Elev. Feet	Laboratory Consistency*	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	571.1	Variable; Firm-Stiff	21.6	106.3
LS-2	5.0	568.6	Variable; Firm-Stiff	17.8	114.2
LS-3	[illegible]	566.1	V.Stiff	12.6	126.6
LS-4	10.0	562.6	V.Stiff	11.9	127.0
LS-5	15.0	558.6	Hard	11.4	130.1
LS-6	20.0	553.6	V.Stiff	12.8	127.1
LS-7	25.0	548.6	V.Hard	--	--
LS-8	30.0	543.6	V.Hard	10.0	134.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 189

LOCATION: N-2600; E-1100
TOTAL DEPTH: 30'0"

BORING STARTED: August 13, 1970
BORING COMPLETED: August 13, 1970

INSPECTOR: J. O. Wangeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Allo Drilling, Inc.
WATER LEVEL in hole of indicated number of hours after completion of boring; 0 feet of casing in place.
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 21 TB 21

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-2-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.1 Ft. (IGLD Datum)

ELEVATION IN FEET	Description	Depth
570	TOPSOIL:Med.Dk.Gr.SEMI-ORGSDY.SILCLAY	0"
	Med. to Firm Brown (w/Some Gray) SILTY CLAY, w/Little Sand, Traces of Gravel.	5'6"
560	Stiff to V.Stiff Brown V. SILTY CLAY, w/Some Sand, Traces of Gravel & Decomposed Rock Fragments.	14'0"
550	V.Stiff to Hard Dk. Gr. V.F. SDY. SILTY CLAY w/Some Gravel & Rock Fragments. (GLACIAL TILL)	29'3"
540	V.Hard Dk.Gr. VF SDY. SILTY CLAY w/Many Rock Fragments	30'0"

Hole dry augered.

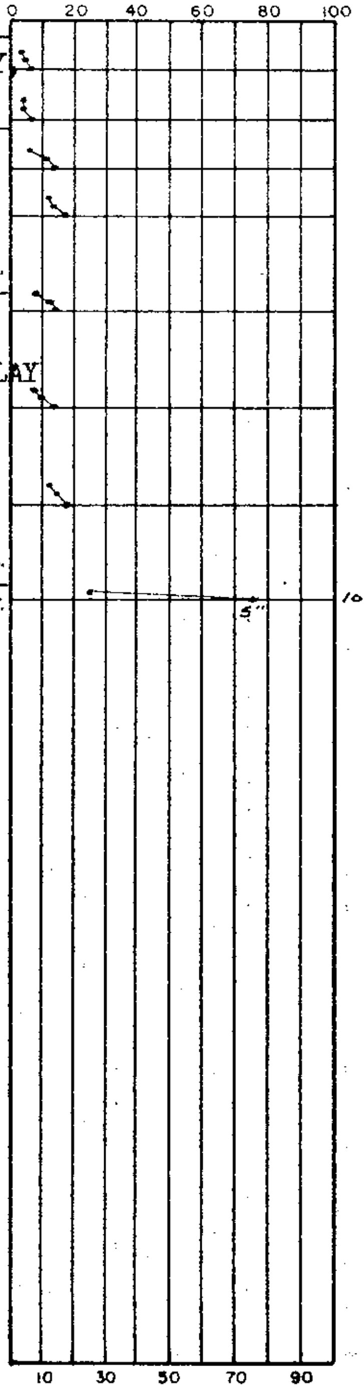
No ground water encountered.

Hole grouted w/3 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

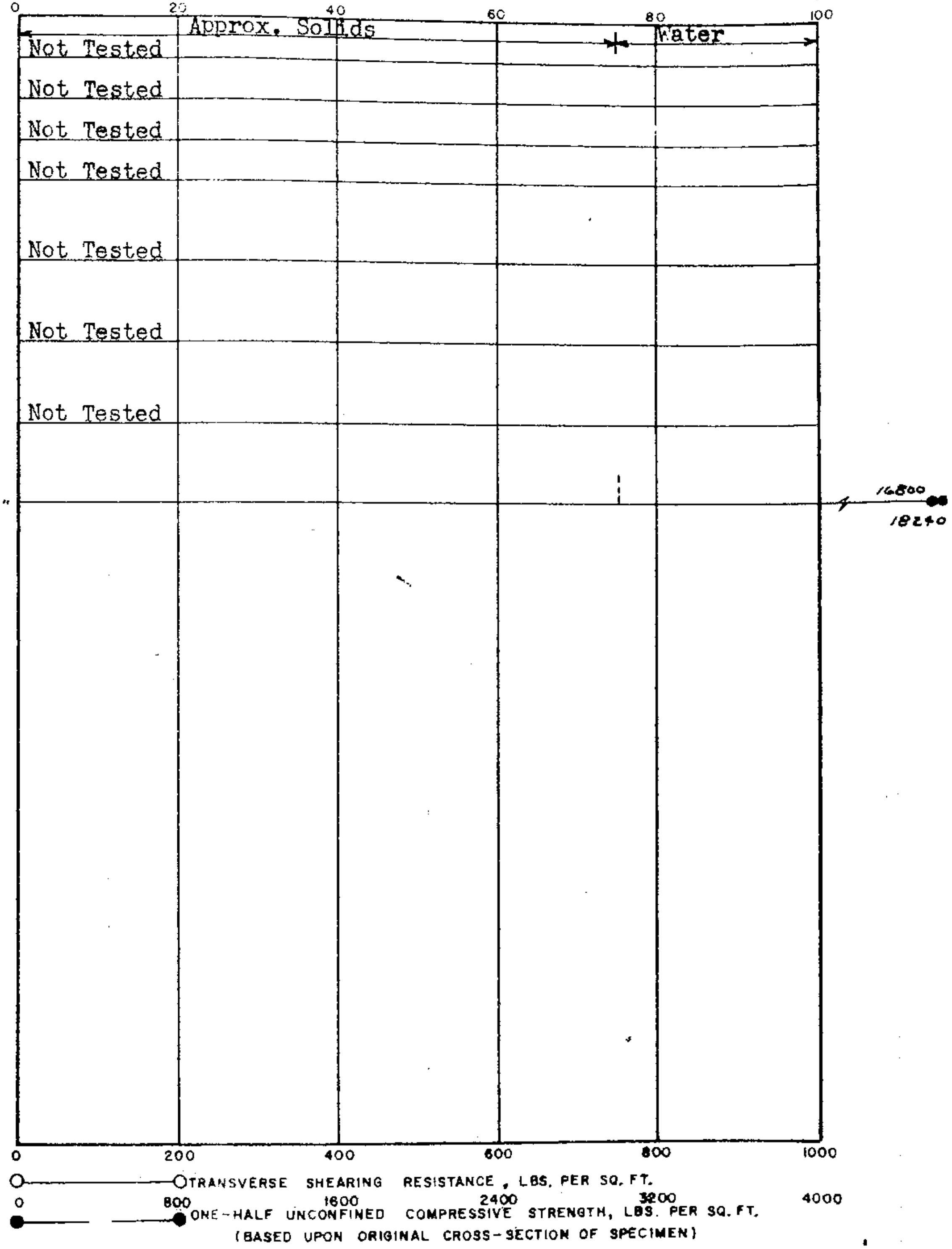
Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



Ne	TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH
9	Not Tested
8	Not Tested
17	Not Tested
24	Not Tested
20	Not Tested
18	Not Tested
25	Not Tested
100 B/11"	

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○——○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●——● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used thru LS-7;
2.00" O.D. Heavy wall sampler used for LS-8.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.6	Medium to Firm	--	--
LS-2	5.0	567.1	Medium to Firm	--	--
LS-3	7.5	564.6	Stiff	--	--
LS-4	10.0	562.1	V. Stiff	--	--
LS-5	15.0	557.1	V. Stiff	--	--
LS-6	20.0	552.1	V. Stiff	--	--
LS-7	25.0	547.1	Hard	--	--
LS-8	30.0	542.1	V. Hard	12.1	127.5

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-2600; E-2400
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SFA FORM 8-7

MON 190

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 22 TB 22

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

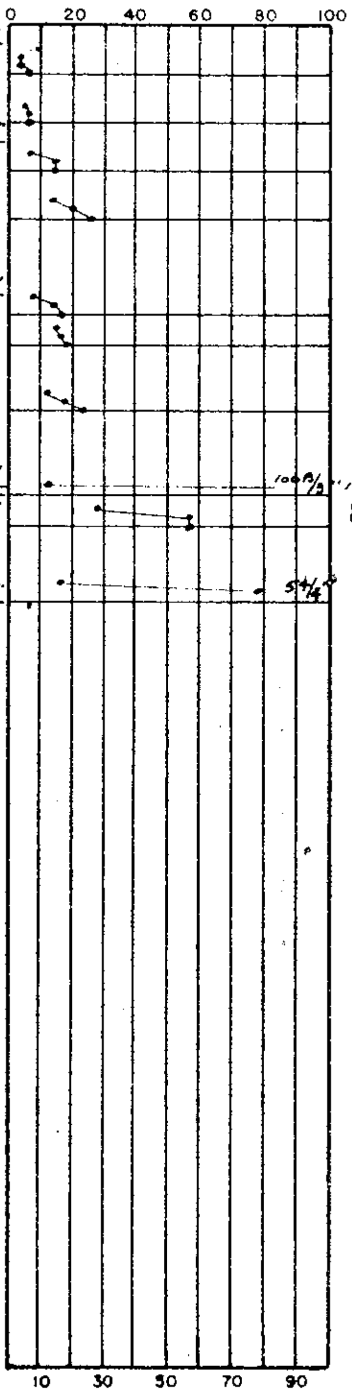
LOG OF SUBSURFACE PROFILE

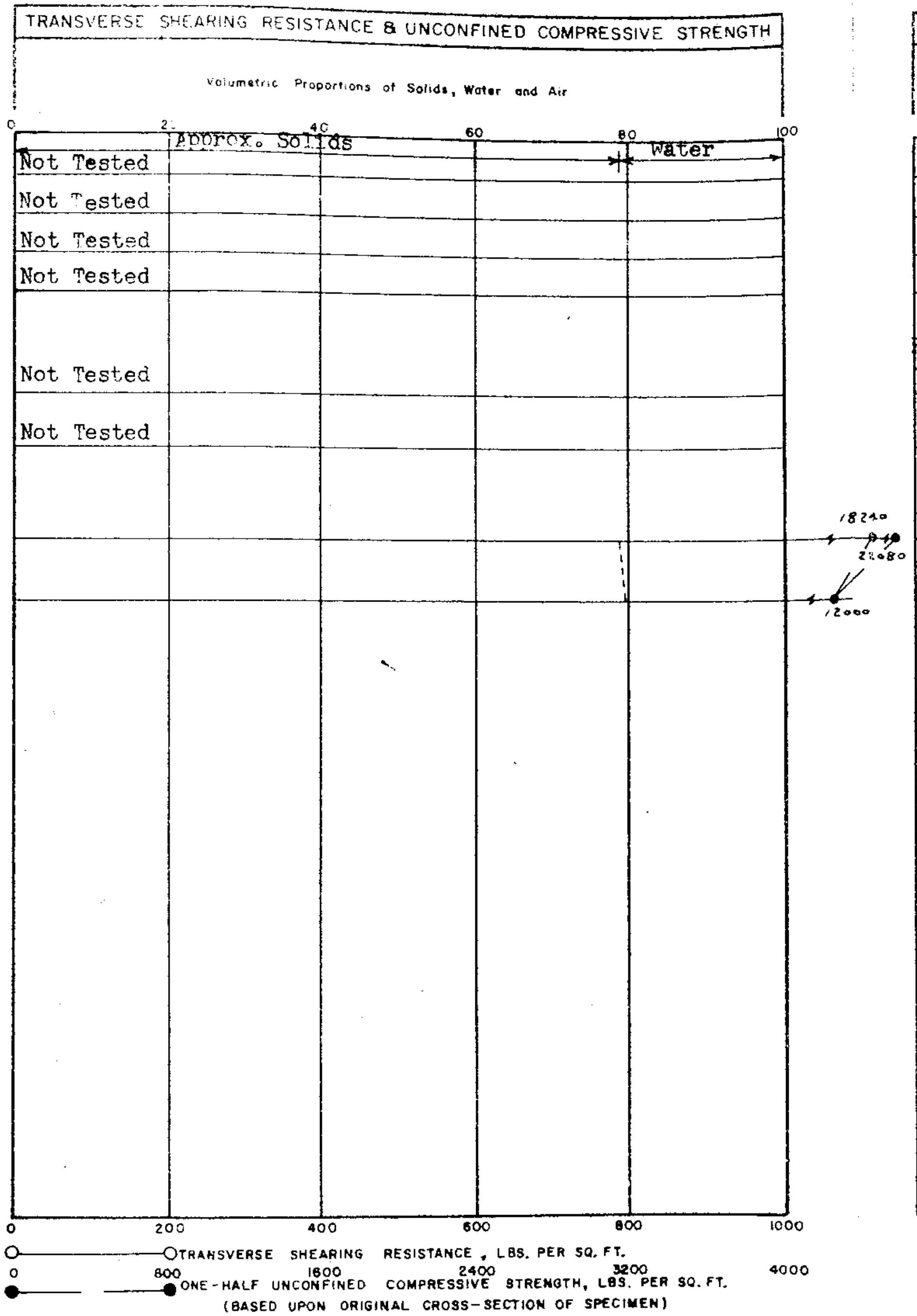
Classifications by: Driller and S&FA

Ground Surface Elev. = 571.2 Ft. (IGLD Datum)

ELEVATION IN FEET

Elev.	Description	Depth	Ne	Transverse Shearing Resistance & Unconfined Compressive Strength
570	TOPSOIL;Dk.Brn.SEMI-ORG.SDY.SLY.CLAY	0'6"		
	Med. to Firm Mtld. Brown V. SILTY CLAY, w/Little Sand & Gravel. Traces Organic.	6'0"	8 11	Not Tested Not Tested
560	Firm to Stiff Brown, w/Gray Streaks, VERY SILTY CLAY. w/Some Sand, Traces Gravel & Rk. Frags.	14'0"	21 23	Not Tested Not Tested
550	Stiff Gray VERY SILTY CLAY, w/Some Sand, Gravel & Rock Frags (GLACIAL TILL?)	24'0"	22 32 29	Not Tested Not Tested
	* ROCK FRAGMENTS or BOULDER	24'5"	100 8/3	
540	V. Hard Dk.Gray VF SANDY SILTY CLAY, w/Some Gravel, Many Rock Frags. (GLACIAL TILL)	30'0"	86 95	18240 21680 12000





T.B.-23;

~~Hole dry augered~~

* Encountered ground water; rose 16" to El. 548.9 in 1 hour.

Hole grouted w/2 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970

T.B.-23A:

Hole offset 3-ft. from TB-23.

Hole augered w/o sampling to d=24'5"

No ground water encountered, dry upon completion.

Hole grouted w/3 bags of bentonite and 1 bag of cement.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-2100; E-3150

TOTAL DEPTH: 30'0"

BORING STARTED: August 7, 1970

BORING COMPLETED: August 10,1970

INSPECTOR: M.M. Dragicevic (S&FA)

DRILLER: D.T. Corbin

CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

SFA FORM E-7

SOIL SAMPLE DATA

Lab & Field So. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	568.7	Medium to Firm	--	--
LS-2	5.0	566.2	Firm	--	--
LS-3	7.5	563.7	Firm to Stiff	--	--
LS-4	10.0	561.2	Firm to Stiff	--	--
No Recovery	15.0	556.2			
LS-5	16.5	554.7	Stiff	--	--
LS-6	20.0	551.2	Stiff	--	--
BS-7	24.3	546.9	V.Stiff		
LS-7	26.0	545.2	V.Hard	9.3	133.0
LS-8	30.0	541.2	V.Hard	7.7	136.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 191

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 23 & 23A

PLUM CREEK PROPERTY TB 23
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 5-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 570.8 Ft. (IGLD Datum)

Elevation	Depth	Description
570		TOPSOIL;Med.Dk.Gray SEMI-ORG.SDY.SILTY CLAY
		Med. to Firm Brown & Gray V.SILTY CLAY, w/Traces of Sand & Gravel. *
	7'0"	V.Stiff to Hard Brown & Gray V.SILTY CLAY, w/Some Sand, Traces of Gravel & Rk.Frags.
560	13'0"	V.Stiff Dk.Gray V. SILTY CLAY, w/Some Sand, Little Gravel & Few Rock Frags. (GLACIAL TILL?)
550	24'0"	V.Hard Dk. Gray VF SANDY SILTY CLAY, w/Traces of Gravel, Many Rock Frags. (GLACIAL TILL)
540	30'0"	

Hole dry augered.

* Encountered ground water; rose 3'0" in 1 hour to El. 568.0.

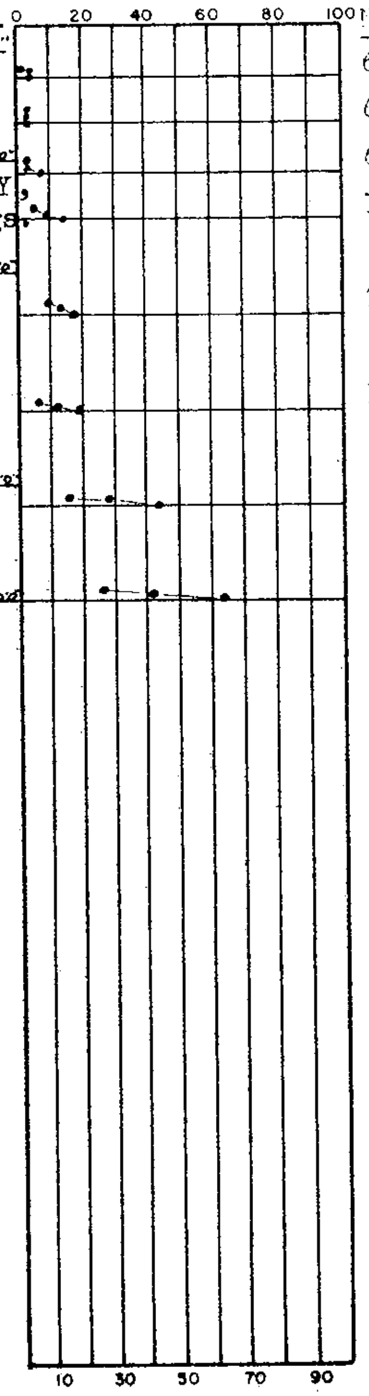
Hole grouted w/2 bags of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

ELEVATION IN FEET

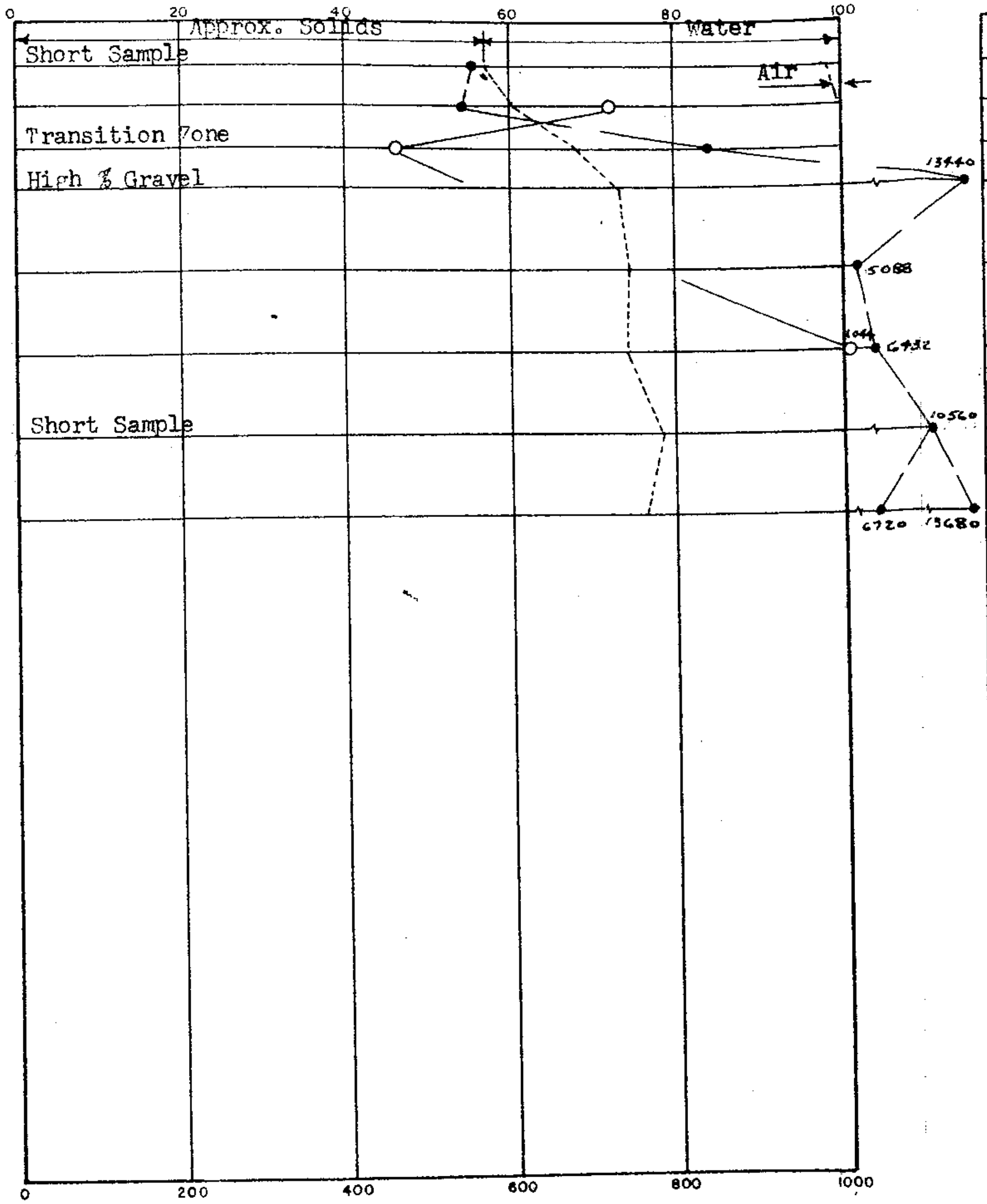
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT. 0, 800, 1600, 2400, 3200, 4000

●——●ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT.

(BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	568.3	Medium	27.0	96.3
LS-2	5.0	565.8	Medium to Firm	25.4	101.3
LS-3	7.5	563.3	Medium to Firm	18.2	113.4
LS-4	10.0	560.8	Hard	11.7	123.1
LS-5	15.0	555.3	V. Stiff	12.5	126.0
LS-6	20.0	550.8	Stiff	12.7	125.8
LS-7	25.0	545.8	V. Hard	9.8	132.0
LS-8	30.0	540.8	Hard to V. Hard	11.0	129.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 192

See Test Boring Location Plan

LOCATION: N-2100; E-3900
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: J. G. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 24 TB 24

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

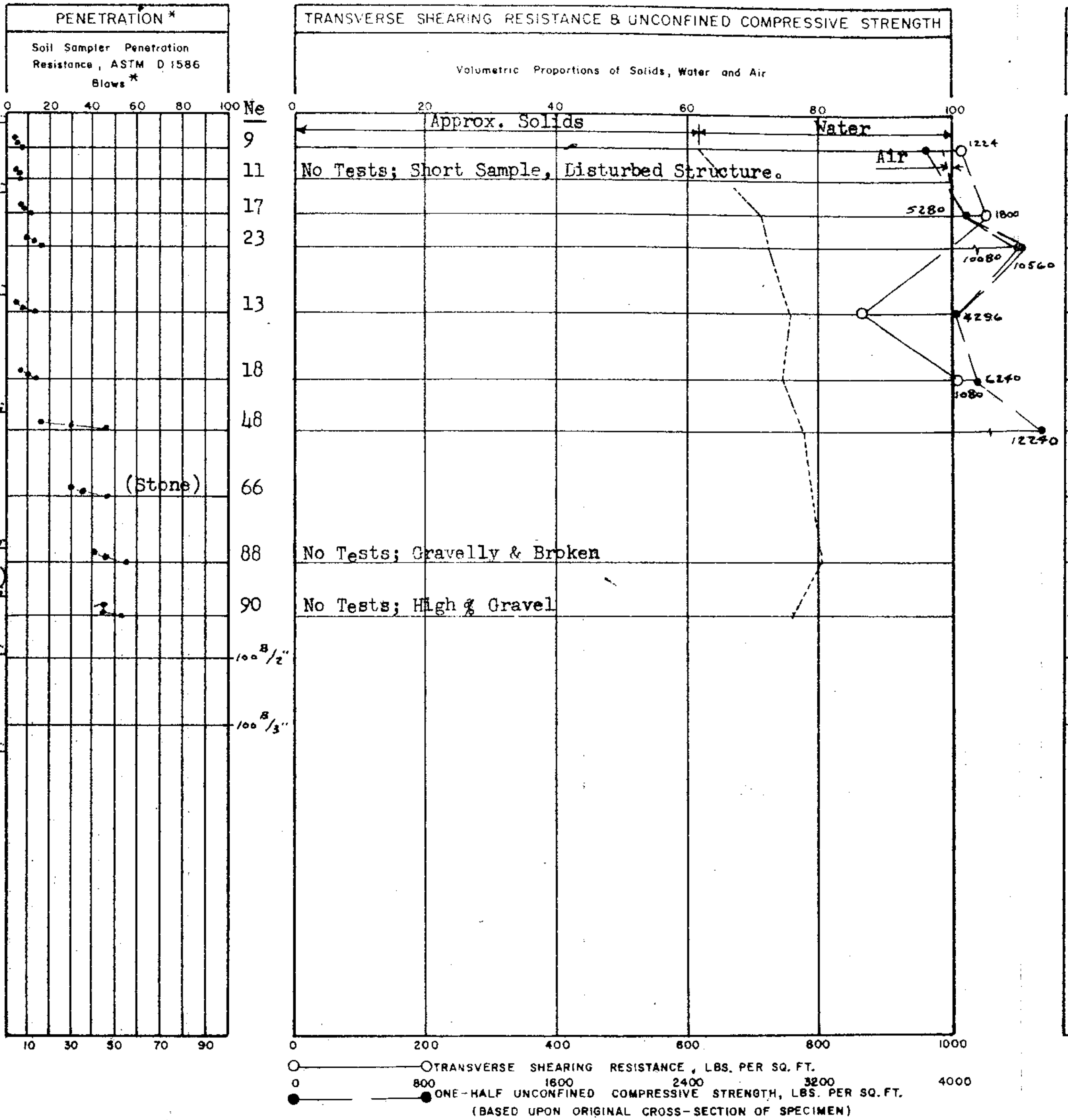
Classifications by: Driller and S&FA
Ground Surface Elev. = 573.3 Ft. (IGLD Datum)

ELEVATION IN FEET

TOPSOIL; Med.Dk.Gr.SEMI-ORG.V.SDY.CLAY.
570 Firm to Stiff Mtld. Brown V.SILTY CLAY, w/Traces of Sand & Organic Matter. 6.0'
V.Stiff to Hard Brown (w/Some Gray) VERY SILTY CLAY, w/Few Silt Lenses, Little Sand, Traces of Gravel. 13.5'
560
Firm to Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel.
550 22.5'
V.Hard Dk.Gray VF SANDY SILTY CLAY, w/Little Gravel, Many Rock Frags., Few Cobbles. (GLACIAL TILL)
540 33.0'
V.Hard Dk.Gray VF SANDY SILTY CLAY, V.Gravelly, Many Rock Frags.(GLACIAL TILL) 36.5'
*V.Hard Dk.Gray VERY SANDY SILTY CLAY, w/Seams of Sand, Some Gravel&Rk. Frags. (GLACIAL TILL) 41.0'
530 V.Hard Dk.Gray VERY SANDY SILTY CLAY, Mixed w/Gravel & Many Rock Frags. (GLACIAL TILL)
REFUSAL ON GEAR BIT * 48.5'

520 10' of 4-inch, 45' of NX casing used. Hole advanced by roller type gear bit; wrench dropped in hole, and rock coring was prevented.

See Test Boring Location Plan



Lab & Field Sa. No.	Sample Depth, Feet	S E F		ter ntent by ..y Wt	Dry Unit Weight p.c.f.
LS-1	2.5	570.8	Firm to Stiff	21.9	104.5
LS-2	5.0	568.3	Firm to Stiff	21.3	--
LS-3	7.5	565.8	V.Stiff to Hard	14.8	119.8
LS-4	10.0	563.3	V.Hard	13.6	122.8
LS-5	15.0	558.3	Firm to Stiff	12.7	126.7
LS-6	20.0	553.3	Firm to Stiff	12.1	126.0
LS-7	24.0	549.3	V. Hard	10.4	130.0
BS-8	29.0	544.3	V. Hard		
LS-8	34.0	539.3	V. Hard	10.6	135.6
LS-9	38.0	535.3	V. Hard	12.0	127.6
BS-11	41.2	532.1	V. Hard		
No Rec.	46.3	527.0			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-1450; E-900
TOTAL DEPTH: 48'5"

BORING STARTED: July 29, 1970
BORING COMPLETED: July 30, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 45 feet of casing in place. Artesian
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6; 2.00" O.D. Heavy Wall Sampler used below.

* Encountered artesian water at d=37'6" (El.535.8); flow remained steady at 3 gpm for 1 hour; eased off.
Encountered artesian water at d=48'5" (El.524.9); flow of approx. 29 gpm reached static head at El. 591.6 and remained steady for 1 hour.
Hole grouted w/6 bags of cement and 1 bag of bentonite.
No water flow during final inspection on Sept. 9, 1970.

MON 196

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 28 TB 28

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

S&FA FORM S-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.3 Ft. (IGLD Datum)

ELEVATION IN FEET	Description	Depth
	TOPSOIL; Med.Dk.Gr.SEMI-ORG.SDY.SLY.CLAY.	9"
570	Medium to Stiff Brown & Gray SILTY CLAY, w/Little Sand, Traces of Roots.	6'0"
560	Stiff to Hard Mtld. Brown SILTY CLAY, w/Little Sand, Traces of Gravel.	14'3"
550	Medium to Stiff Gray SILTY CLAY w/Some F. Sand, Some Gravel. — *	23'6"
	V.Hard Mtld. Dk.Gray VF SANDY SILTY CLAY, w/Some Gravel & Rook Fragments. (GLACIAL TILL)	30'0"
540		

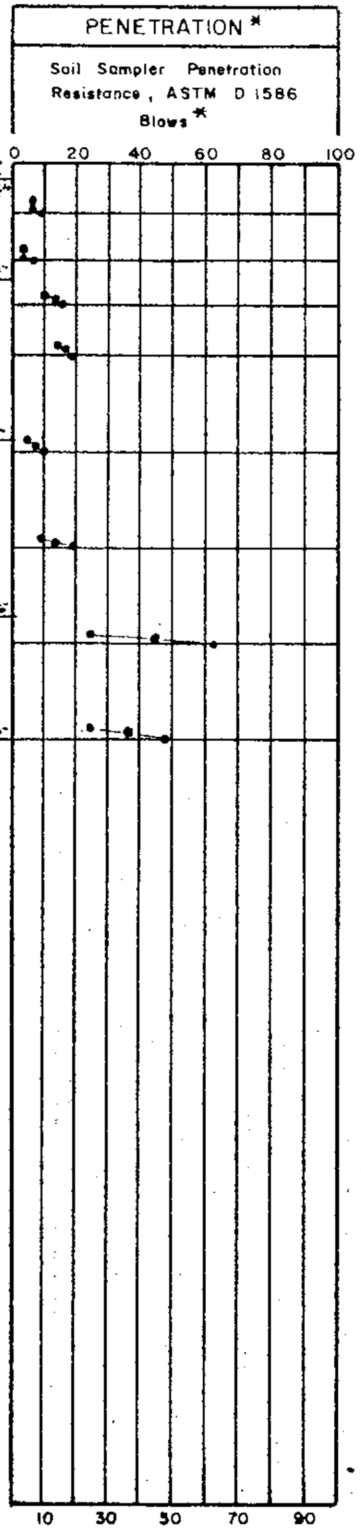
Hole dry augered.

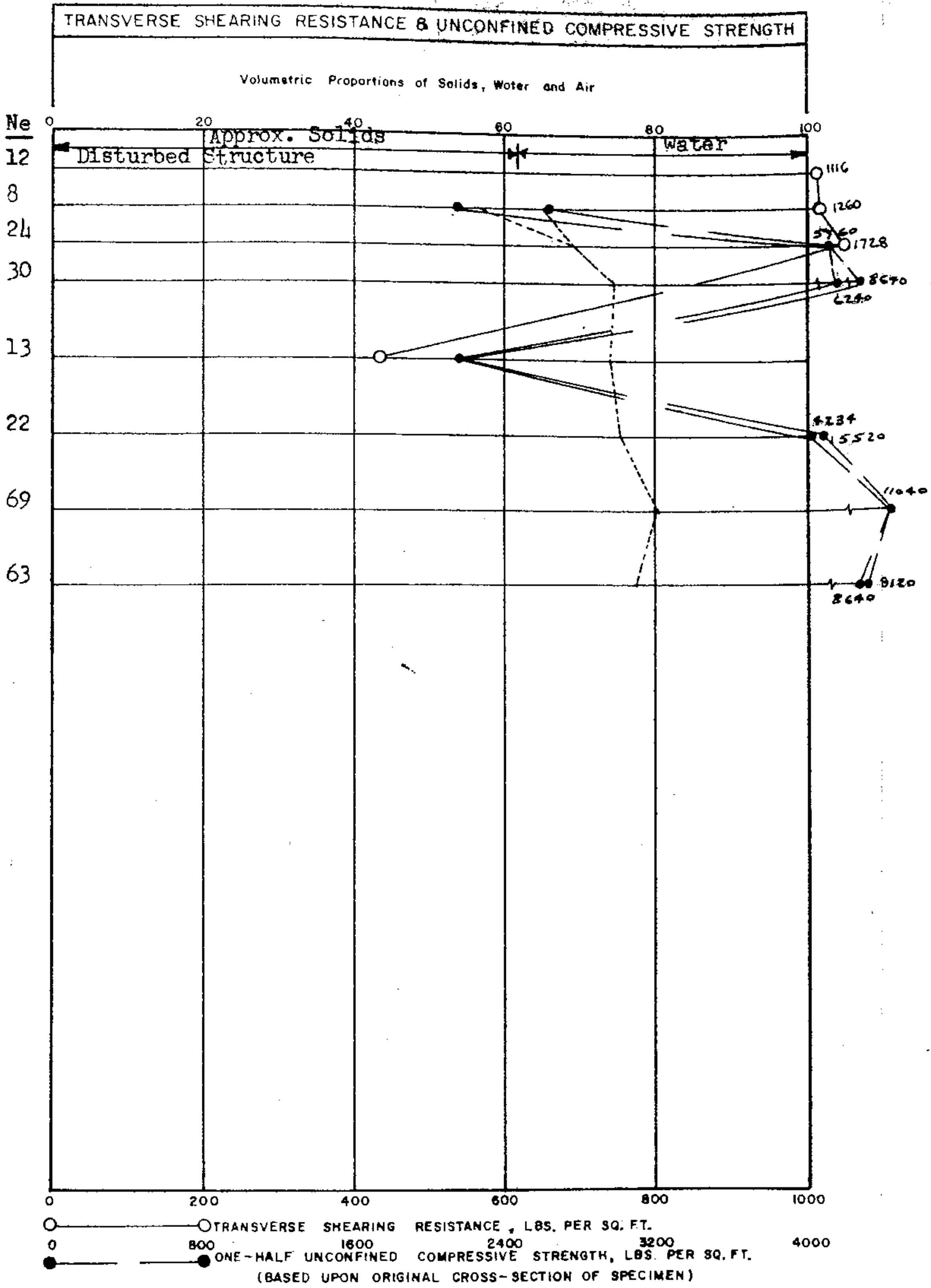
* Encountered ground water.

Hole grouted w/3 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan





Lab & Field Sa. No.	Sample Depth, Feet	Feet		Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.8	Stiff	18.6	--
LS-2	5.0	567.3	Stiff — Medium —	20.7 27.9	110.4 95.2
LS-3	7.5	564.8	V.Stiff	15.4	117.7
LS-4	10.0	562.3	Stiff to Hard	13.1	125.6
LS-5	15.0	557.3	Medium	12.9	124.7
LS-6	20.0	552.3	Firm to Stiff	12.7	126.6
LS-7	25.0	547.3	V. Hard	9.0	135.5
LS-8	30.0	542.3	V. Hard	10.3	131.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-1300; E-1900
TOTAL DEPTH: 30'0"

BORING STARTED: August 7, 1970
BORING COMPLETED: August 7, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.
* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

MON 197

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 29 TB 29

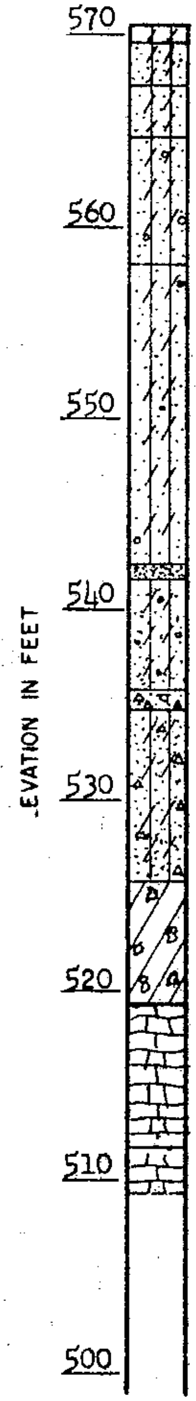
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.5 Ft. (IGLD Datum)



TOPSOIL:Dk.Brn.SEMI-ORGANIC V.SILTY CLAY. 10"

Firm Brown & Gray SILTY CLAY, w/Some Sand, Traces of Gravel. 3'0"

Medium Brown & Gray SILTY CLAY, w/Little Sand. 5'8"

Stiff to Hard Mtld. Brown SILTY CLAY, w/Some Sand & Fine Gravel. 12'3"

Firm to Stiff & Hard (Varies) Gray SILTY CLAY, w/Some Sand & Fine Gravel. 28'0"

Med.Comp.Gr.FINE SAND,w/Little Gravel. 28'9"

Firm to Stiff Gray SILTY CLAY, w/Some Sand & Gravel. (GLACIAL TILL?) 34'6"

ROCK FRAGMENTS. 35'6"

V.Hard Dk.Gray F. SANDY SILTY CLAY, w/Some F.Gravel,Many Rock Fragments. (GLACIAL TILL.)

——* 44'6"

V.Compact Gray SILT & ROCK FRAGMENTS. Wet. (GLACIAL TILL.) TOP OF ROCK 51'0"

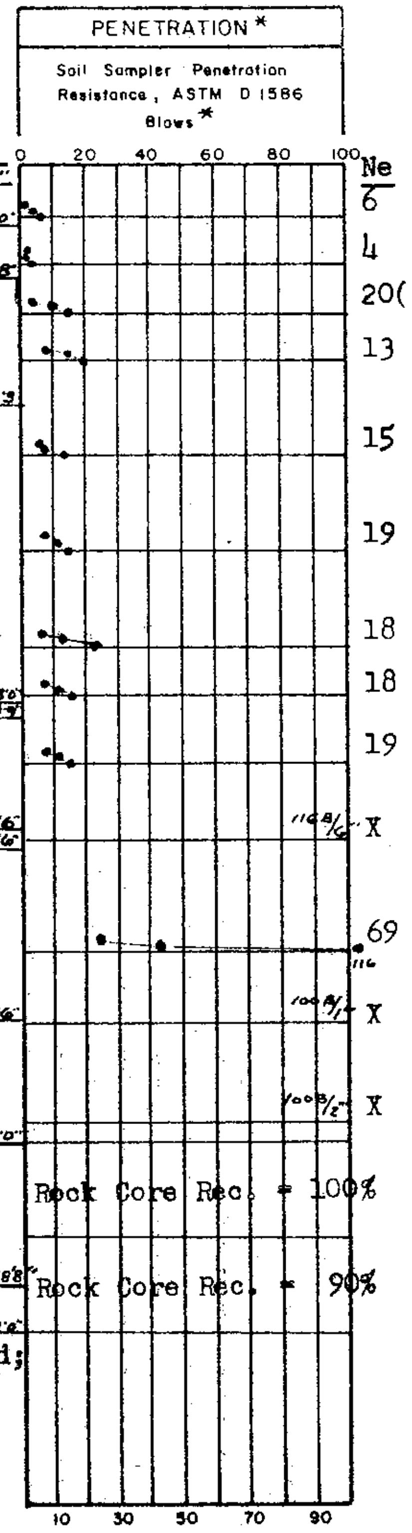
Med. Hard Light Gr.-Brn.Solid LIMESTONE, w/Some Thin Fragmented Zones. 58'8"

Med. Hard Lt. Brown Solid LIMESTONE. 61'0"

* Artesian flow w/sulphur odor encountered; hole cased to d=35'6"; head 2'2" above ground surface.
Cased to d=44'6", and artesian flow continued at rate of 4 gpm,w/head 7'6" above ground surface. See other info in rock coring.

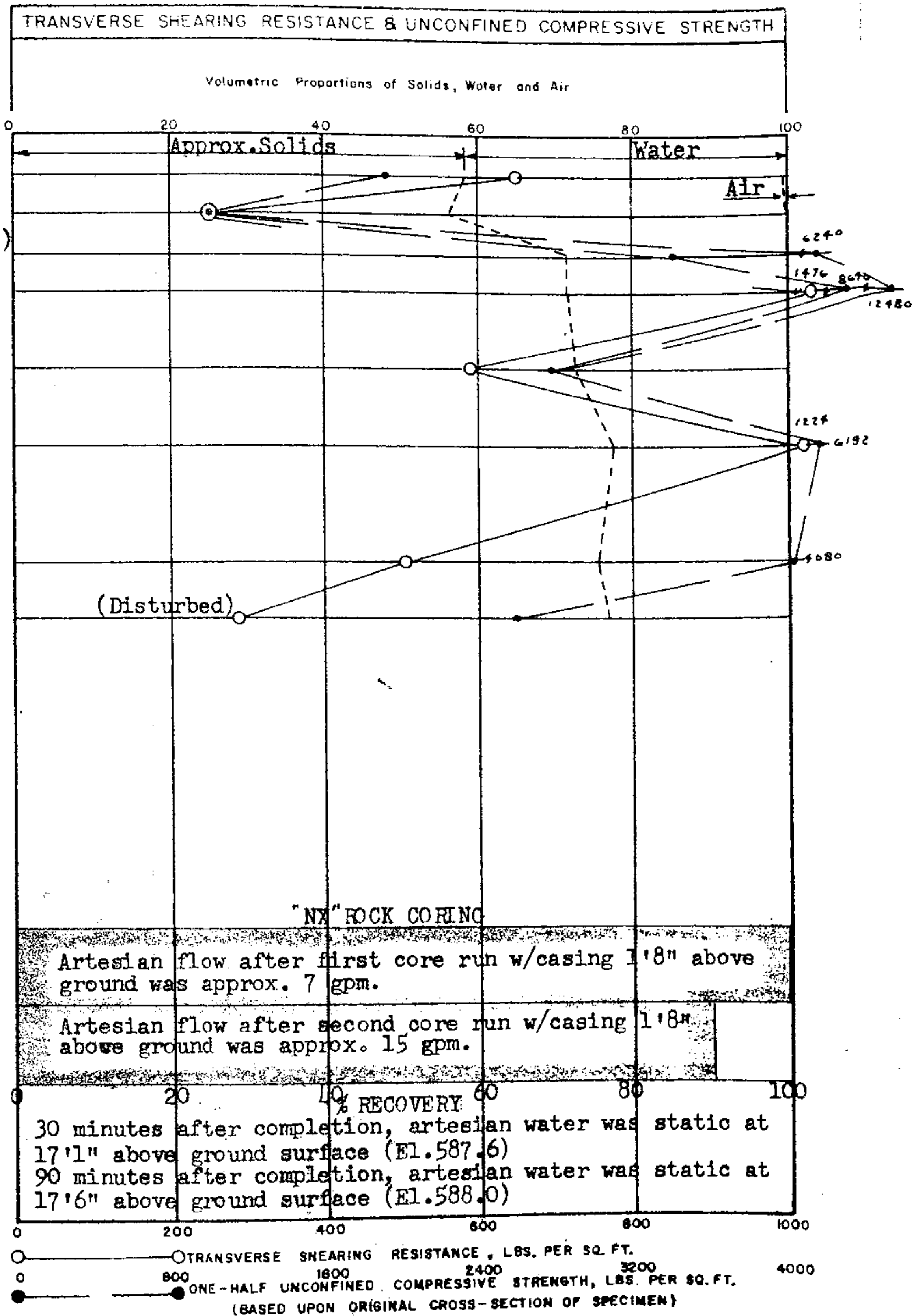
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



"NX" ROCK CORING

Artesian flow after first core run w/casing 1'8" above ground was approx. 7 gpm.

Artesian flow after second core run w/casing 1'8" above ground was approx. 15 gpm.

30 minutes after completion, artesian water was static at 17'1" above ground surface (El.587.6)
90 minutes after completion, artesian water was static at 17'6" above ground surface (El.588.0)

** 1.75" O.D. Michigan Liner Sampler used through LS-4; 2.00" O.D. Heavy wall sampler used below.

NOTE: <u>Extreme difficulty was experienced in stopping artesian water flow</u>. During a total grouting period of 14 hours, 10 bags of cement, 4 bags of dry-mix concrete and 1 bag of bentonite were used.

S

Lab & Field Sa. No	Sample Depth, Feet	S E Feet		er ntent by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.0	Firm	26.4	98.0
LS-2	5.0	565.5	Medium	29.1	95.0
LS-3	7.5	563.0	Stiff to V.Stiff	14.0	120.3
LS-4	10.0	560.5	Hard	13.9	120.5
LS-5	15.0	555.5	Firm	13.5	122.4
LS-6	20.0	550.5	V.Stiff to Hard	12.2	130.0
No Rec.	25.0	545.5			
LS-7	27.5	543.0	Firm to Stiff	11.4	127.0
LS-8	31.0	539.5	Firm to Stiff	11.9	129.6
BS-9	35.0	535.5	V.Hard V. Silty Clay		
BS-10	41.0	529.5	V.Hard V. Silty Clay		
No Rec.	44.6	525.9			
No Rec.	49.7	520.8			
	51.0	519.5			
Core Run No.1	56.0	514.5			
No.2	61.0	509.5			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 198

LOCATION: See Test Boring Location Plan
N-1350; E-2900
TOTAL DEPTH: 61'0"

BORING STARTED: July 22, 1970
BORING COMPLETED: July 24, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (2) inches, using 140 lb weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: NX (2⅛")

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 30 TB 30

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.0 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Description	Depth
	Loose Yellow SAND.	3"
	TOPSOIL, MOSS & PEAT	1'6"
570	Medium to Firm Mtld. Brown & Gray V.SILTY CLAY, W/Trace Fine Sand.	5'6"
	V.Stiff Brown VERY SILTY CLAY, w/Tr. Sand, Little Gravel, Tr.Organic	8'6"
	V.Stiff tc Hard Brown SILTY CLAY, w/Some Sand, Little Gravel.	11'6"
560	Hard Mtld. Gray SILTY CLAY, w/Some Sand, Little Gravel, Many Rock Fragments.	15'8"
	V.Hard Dk.Gray VF SANDY SILTY CLAY, w/Some Sand & Gravel, Many Rock Frags. (GLACIAL TILL)	20'0"
550		

Hole dry augered.

No ground water encountered.

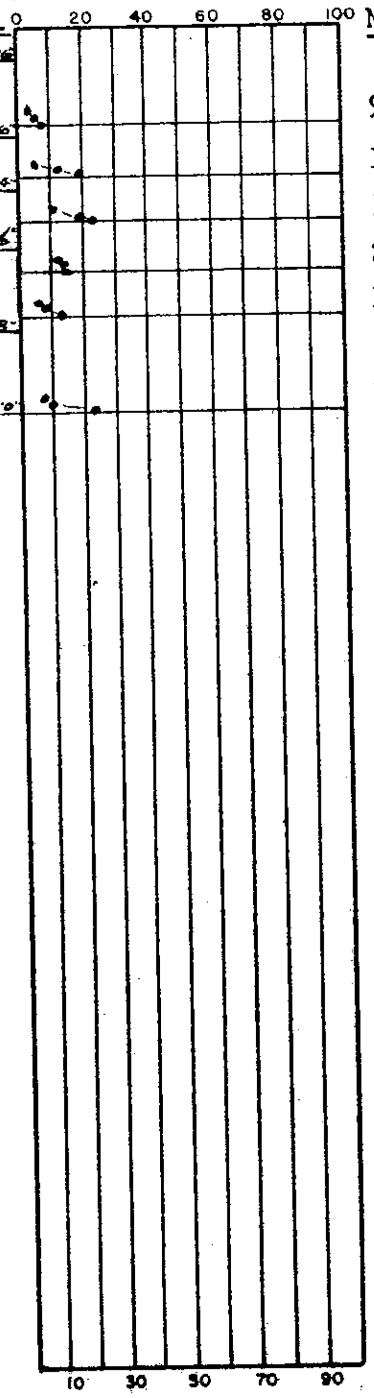
Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

PENETRATION *

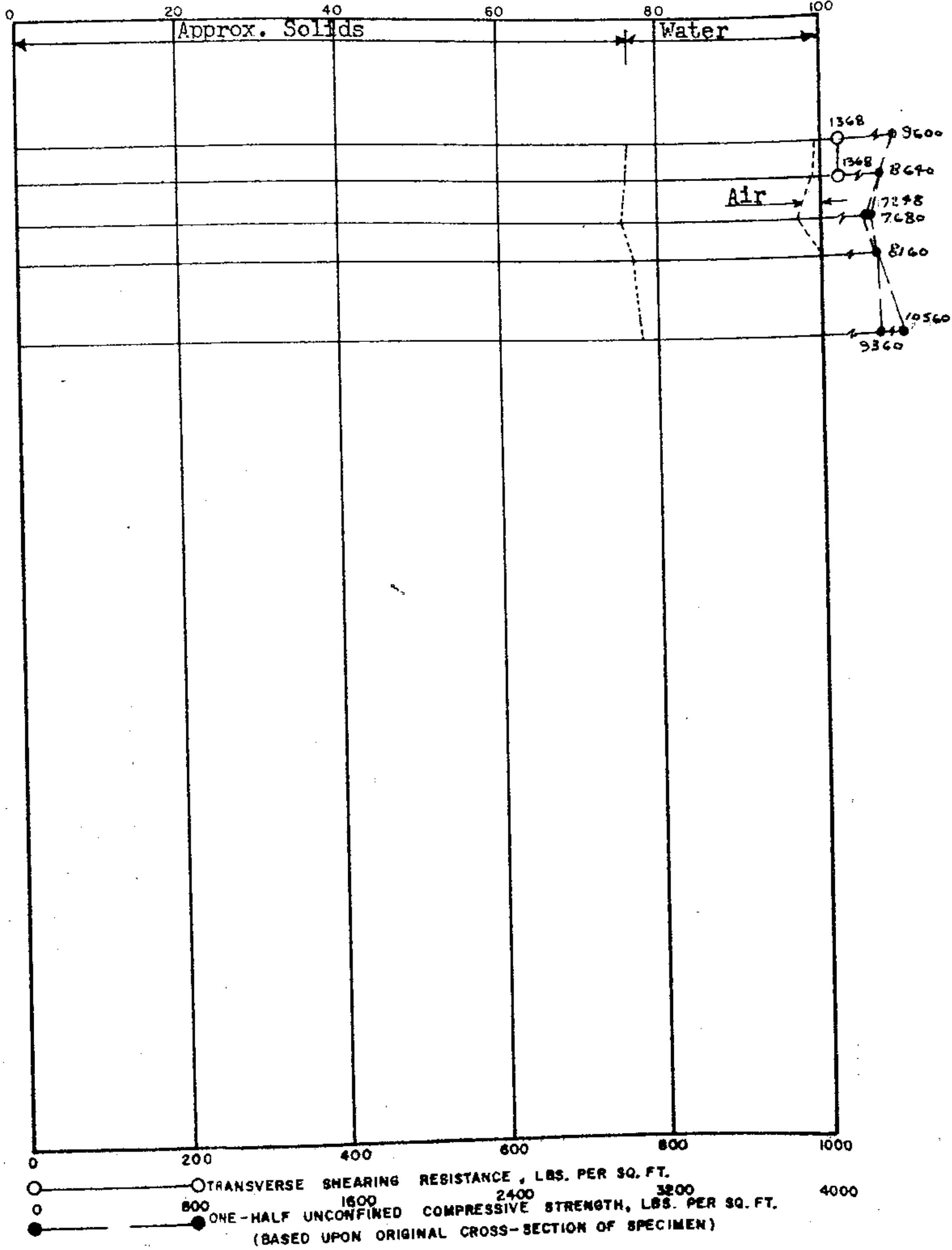
Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



Ne
9
17
30
25
17
18

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	569.0			
LS-1	7.5	566.5		11.7	128.0
LS-2	10.0	564.0		11.7	127.1
LS-3	12.5	561.5		10.8	126.5
LS-4	15.0	559.0		11.4	128.3
LS-5	20.0	554.0		10.3	132.1

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 199

LOCATION: N-4650; E-400
TOTAL DEPTH: 20'0"

BORING STARTED: August 25, 1970
BORING COMPLETED: August 25, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: R. E. Budzeika
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 31 TB 31

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GMO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. ≈ 573.1 Ft. (IGLD Datum)

ELEVATION IN FEET

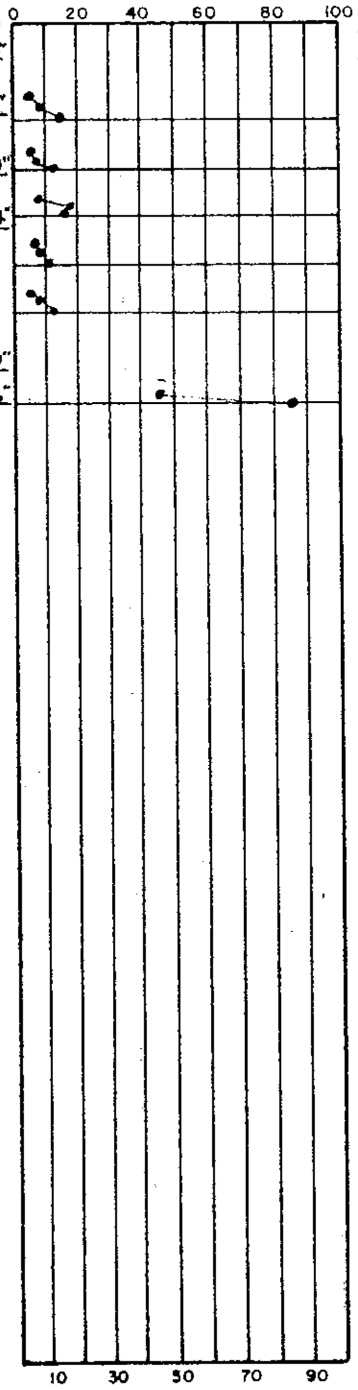
	TOPSOIL;Med.Dk.Gr. SEMI-ORG.CLAYEY SILT.	1'6"		
570	Loose Brown FINE TO MEDIUM SAND.	4'6"	15	
	V.Stiff Mtld. Brown VERY SILTY CLAY, w/Little Sand, Traces of Gravel.	7'9"	13	Broken in Liner
	Hard Mtld. Brown SILTY CLAY, w/Some Fine Sand.	10'4"	25	Not Tested
560	24		15	Not Tested
	V.Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel.	17'10"	13	Not Tested
	V.Hard Dk.Gr. V. CLAYEY SILTY SAND. (GLACIAL TILL)	19'6"	134	Not Tested
550	Hole dry augered; dry at completion.			

Hole grouted w/1 bag of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

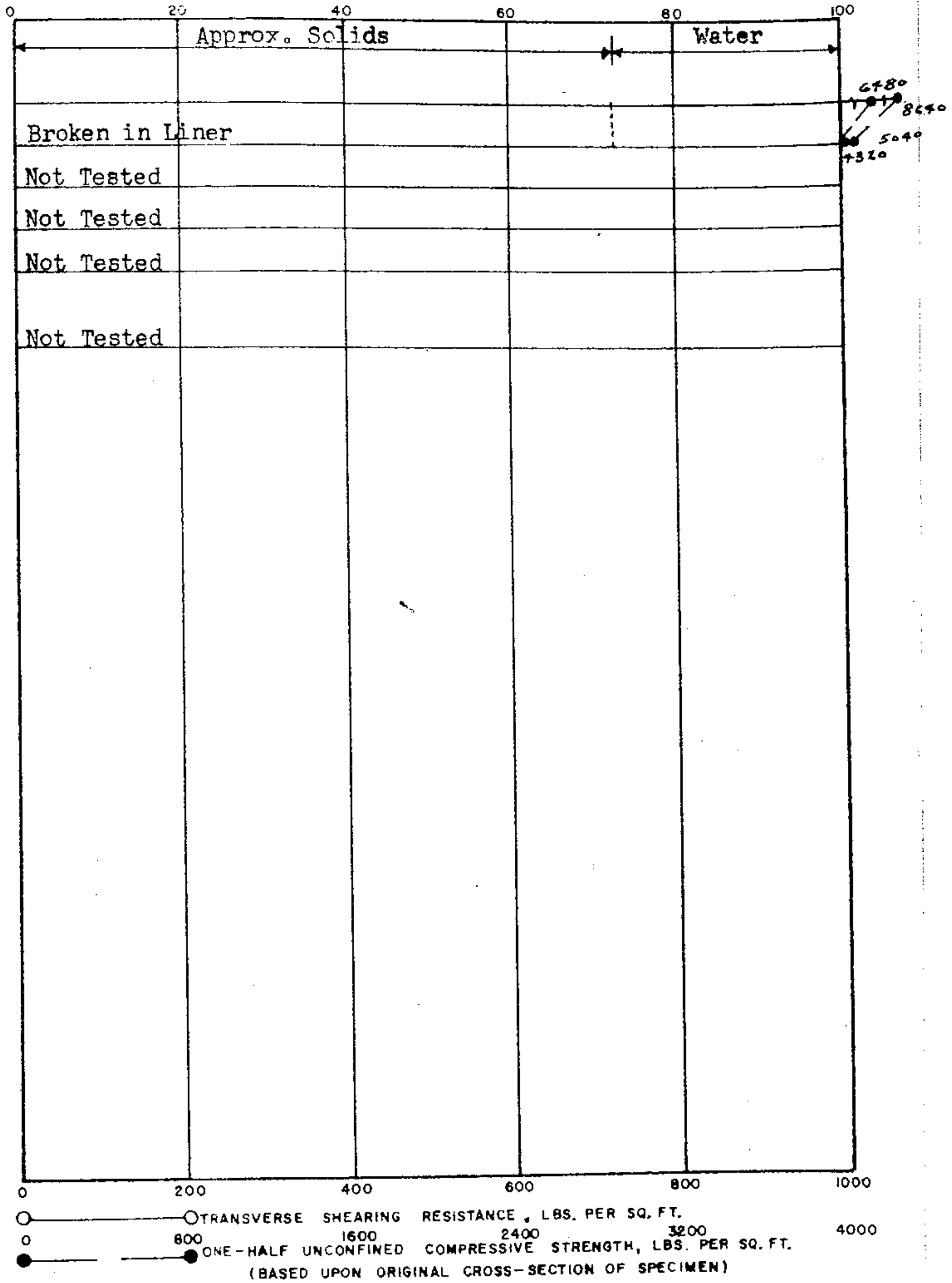
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-5; 2.00" O.D. Heavy wall sampler used for LS-6.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	5.0	568.1	Stiff to Hard	14.3	121.3
LS-2	7.5	565.6	V. Stiff	14.2	121.9
LS-3	10.0	563.1	Hard	--	--
LS-4	12.5	560.6	V. Stiff	--	--
LS-5	15.0	558.1	Stiff	--	--
LS-6	19.5	553.6	V. Hard	--	--

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-4700; E-1600
TOTAL DEPTH: 19'6"

BORING STARTED: September 2, 1970
BORING COMPLETED: September 3, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R.E. Budzeika
CONTRACTOR: Able Drilling, Inc.
≡ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑫ inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

MON 200

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 32 TB 32

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 573.9 Ft. (IGLD Datum)

ELEVATION IN FEET

Elev.	Description	Depth
	TOPSOIL; Med.Dk.Brn.V.CLAYEY SILT over 8" Yellow FINE SAND.	1'4"
570	Medium Brown VERY SILTY CLAY, w/Some Fine Sand, Traces Gravel.	6'4"
	V.Stiff Brown (w/Red Pockets), VERY SILTY CLAY, w/Some Sand, Traces Gravel.	10'9"
560	V.Stiff Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL?)	
554.8 ft	ROCK FRAGMENTS Mixed w/SILTY CLAY & SAND	19.1'
	Compact Dk.Gray FINE SAND, Mixed w/V.Hard Dk.Gr. VF SDY.SILTY CLAY (GLACIAL TILL)	20'0"
550		

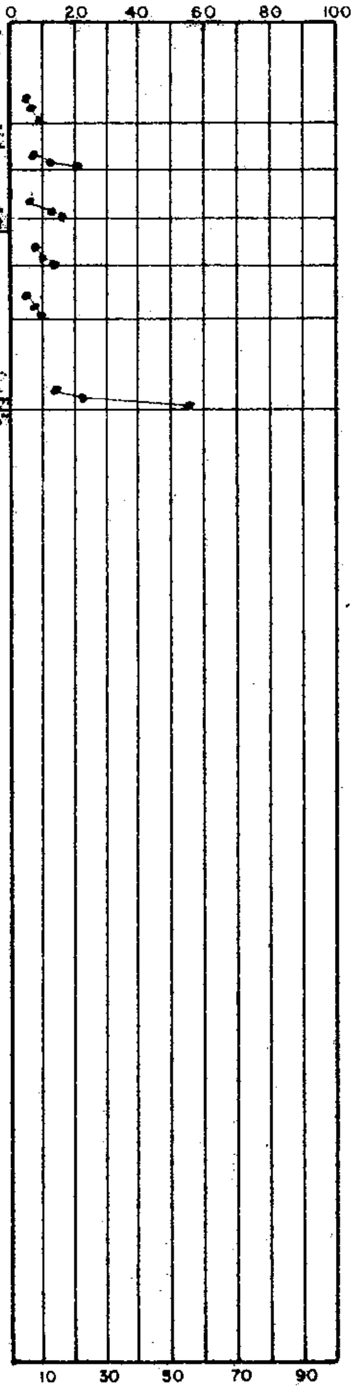
Hole dry augered, dry at completion.

Hole grouted w/1 bag of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

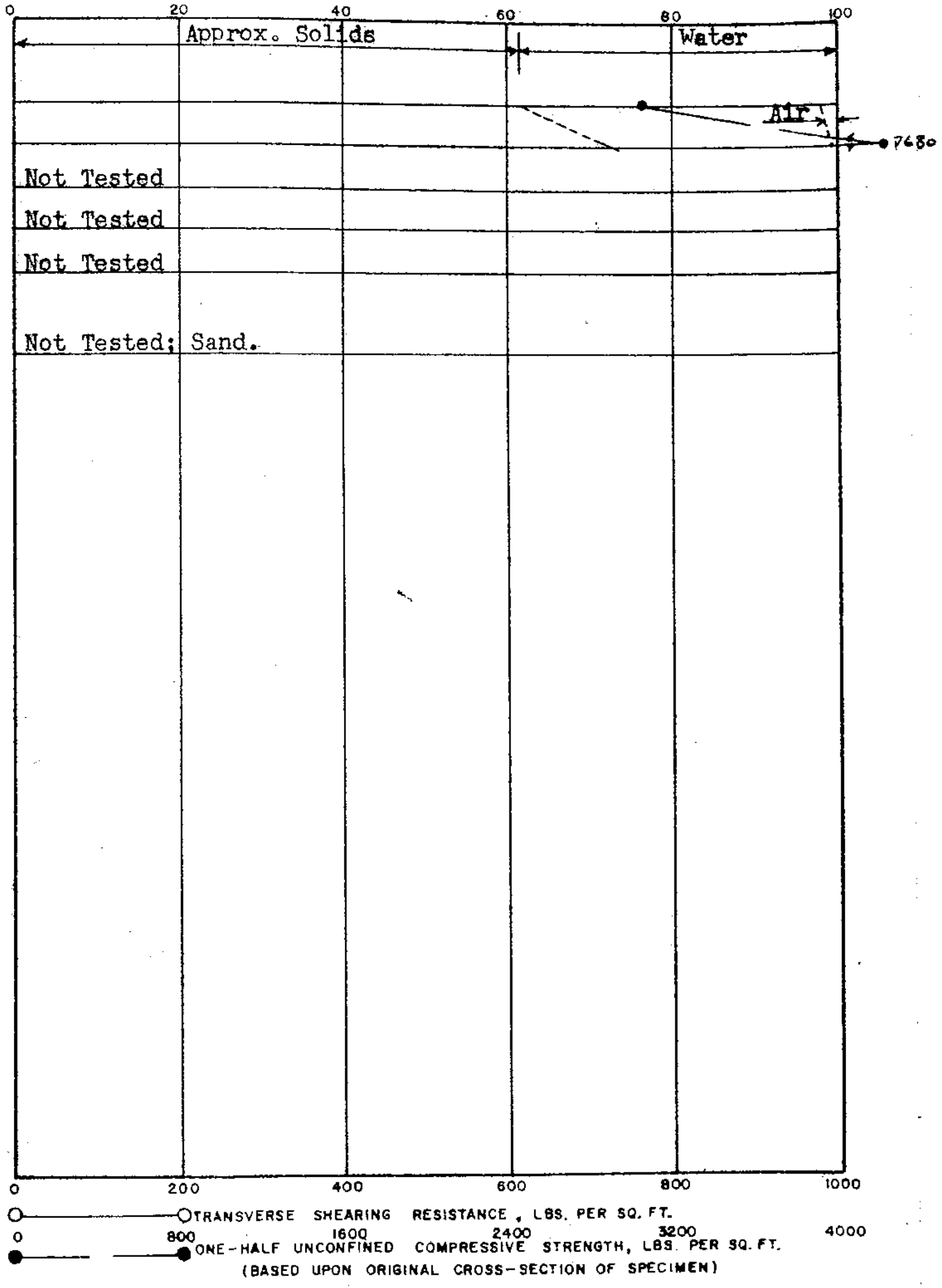
Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



Ne	TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH
11	
21	
19	Not Tested
18	Not Tested
12	Not Tested
35	Not Tested; Sand.

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	5.0	568.9	Medium	21.7	103.3
LS-2	7.5	566.4	V. Stiff	13.2	123.2
LS-3	10.0	563.9	V. Stiff	--	--
LS-4	12.5	561.4	V. Stiff	--	--
LS-5	15.0	558.9	Firm to Stiff	--	--
LS-6	20.0	553.9	Compact Fine Sand	--	--

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 201

See Test Boring Location Plan
LOCATION: N-5050; E-2100
TOTAL DEPTH: 20'0"

BORING STARTED: September 2, 1970
BORING COMPLETED: September 2, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 33 TB33

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

SFA FORM 7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.9 Ft. (IGLD Datum)

VATION IN FEET

Elevation	Description	Depth
	~~TOPSOIL;Dk.Brn.SEMI-ORG.F.SANDY CLAY.~~	10"
570	Firm to V. Stiff Mtld.Brown SILTY CLAY, w/Some Sand,Traces Rock Fragments.	5'9"
	V.Stiff Brown SILTY CLAY, w/Little Sand, Traces of Gravel.	8'4"
	Hard Brown SILTY CLAY, w/Little Sand,Traces of Gravel.	10'6"
560	Stiff Gray SILTY CLAY, w/Some Sand & Gravel.	12'6"
	Stiff to Very Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel, * Many Small Rock Fragments. (GLACIAL TILL)	
550		25'0"
540		

Hole dry augered.

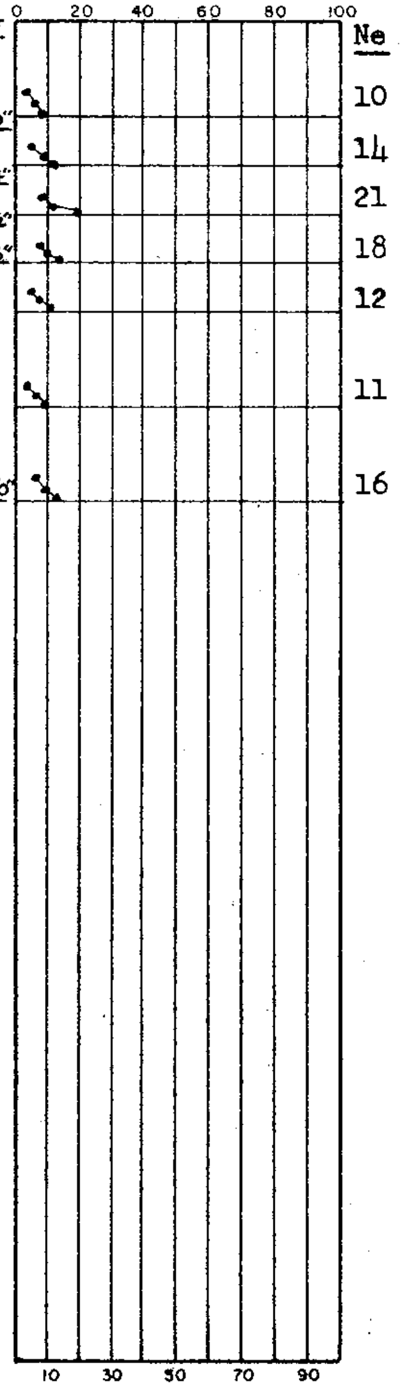
* Encountered ground water (v.slight).

Hole dry at completion of drilling; grouted w/1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

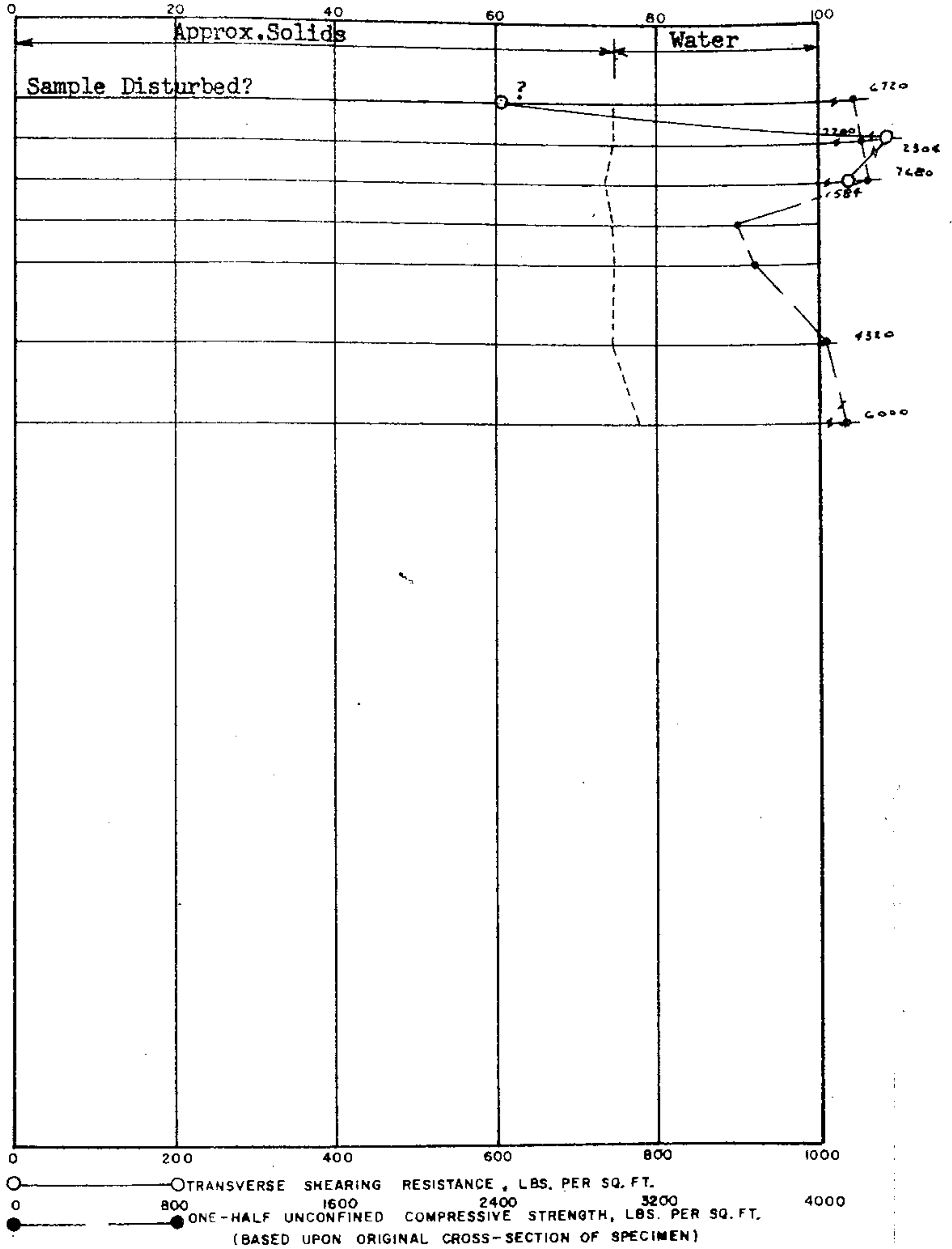
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev, Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	5.0	567.9	Firm to V.Stiff	13.6	125.8
LS-2	7.5	565.4	V.Stiff to Hard	13.0	125.6
LS-3	10.0	562.9	Hard	13.3	124.1
LS-4	12.5	560.4	Stiff	12.3	125.9
LS-5	15.0	557.9	Stiff	12.6	125.7
LS-6	20.0	552.9	Stiff	13.4	126.2
LS-7	25.0	547.9	V.Stiff	11.3	131.7

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-5100; E-3400
TOTAL DEPTH: 25'0"

BORING STARTED: September 2, 1970
BORING COMPLETED: September 2, 1970

INSPECTOR: M.M.Dragicevic (S&FA)
DRILLER: R.E.Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

MON 202

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 34 TB 34

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.6 Ft. (IGLD Datum)

ELEVATION IN FEET

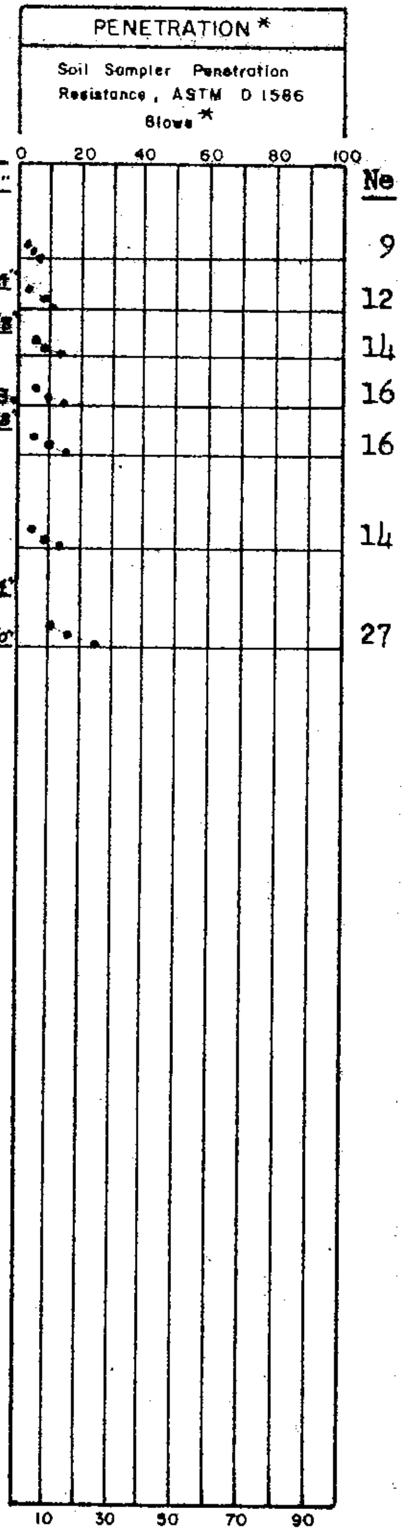
Elev.	Description	Depth
570	TOPSOIL: Dk. Brn. SEMI-ORG. V. SANDY CLAY.	1'1"
	Firm Brown & Gray SILTY CLAY, w/Little Sand, Traces of Fine Gravel.	6'4"
	Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel.	8'8"
560	V.Stiff to Hard Brown SILTY CLAY, w/Little Sand, Traces Gravel & Rock Frags.	13'8"
550	V.Stiff to Hard Gray F.SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)	22'4"
	V.Hard Dark Gray FINE SANDY SILTY CLAY, V.Gravelly, w/Many Rock Fragments.	25'0"
540		

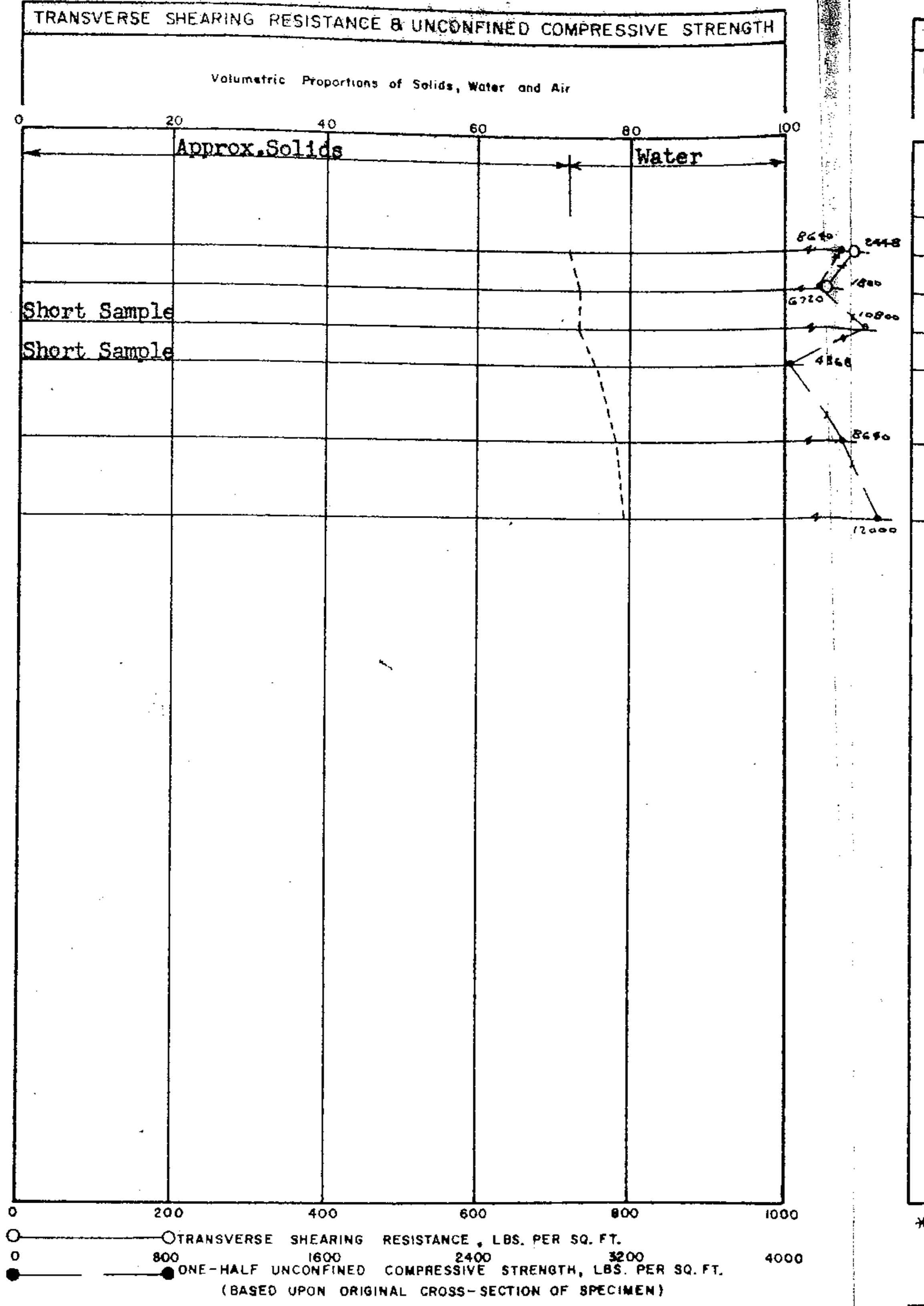
Hole dry augered; dry upon completion.

Hole grouted w/1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan





** 1.75" O.D. Michigan Liner Sampler used in all Liner Samples
2.00" O.D. Heavy wall Sampler used in BS-1 only.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.6	Firm		
LS-1	7.5	564.1	Hard	14.1	122.2
LS-2	10.0	561.6	V.Stiff to Hard	13.5	124.3
LS-3	12.5	559.1	Hard	13.5	122.1
LS-4	15.0	556.6	V.Stiff	12.3	125.7
LS-5	20.0	551.6	Hard	10.1	132.3
LS-6	25.0	546.6	V.Hard	9.6	134.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 203

LOCATION: N-5050; E-4400
TOTAL DEPTH: 25'0"

BORING STARTED: Sept. 1, 1970
BORING COMPLETED: Sept. 1, 1970

INSPECTOR: M.N.Dragicevic (S&FA)
DRILLER: R.E.Budzeika
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; _____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ___ inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 35 TB 35

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.7 Ft. (IGLD Datum)

ELEVATION IN FEET: 570, 560, 550, 540

TOPSOIL; Dk. Brn. SEMI-ORG. F. SANDY CLAY. 11"

Medium Brown & Gray SILTY CLAY, w/Traces of Sand & Fine Gravel. 6'6"

V. Stiff Mtld. Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 8'4"

V. Stiff Brown SILTY CLAY, w/Traces of Sand & Gravel. 10'8"

Hard Gray & Brown SILTY CLAY, w/Some Sand, Gravelly (GLACIAL TILL?) 13'6"

V. Stiff Gray FINE SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL) 23'11"

24

Refusal; Boulder or Rock

Hole dry augered; dry upon completion.

Hole grouted w/1 bag cement & 1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-4600; E-4900
TOTAL DEPTH: 23'11"

BORING STARTED: September 1, 1970
BORING COMPLETED: September 1, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R.E. Budzeika
CONTRACTOR: Able Drilling, Inc.

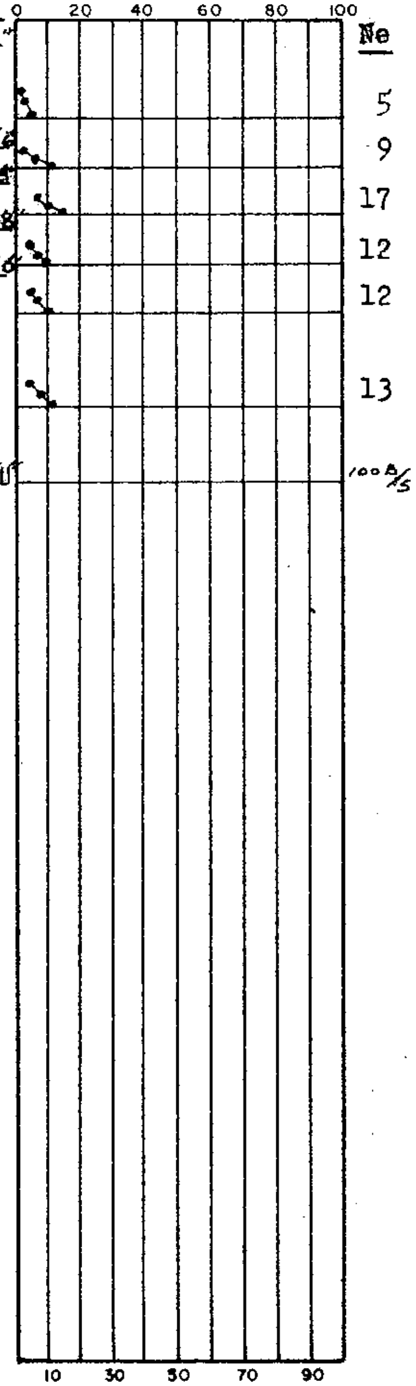
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

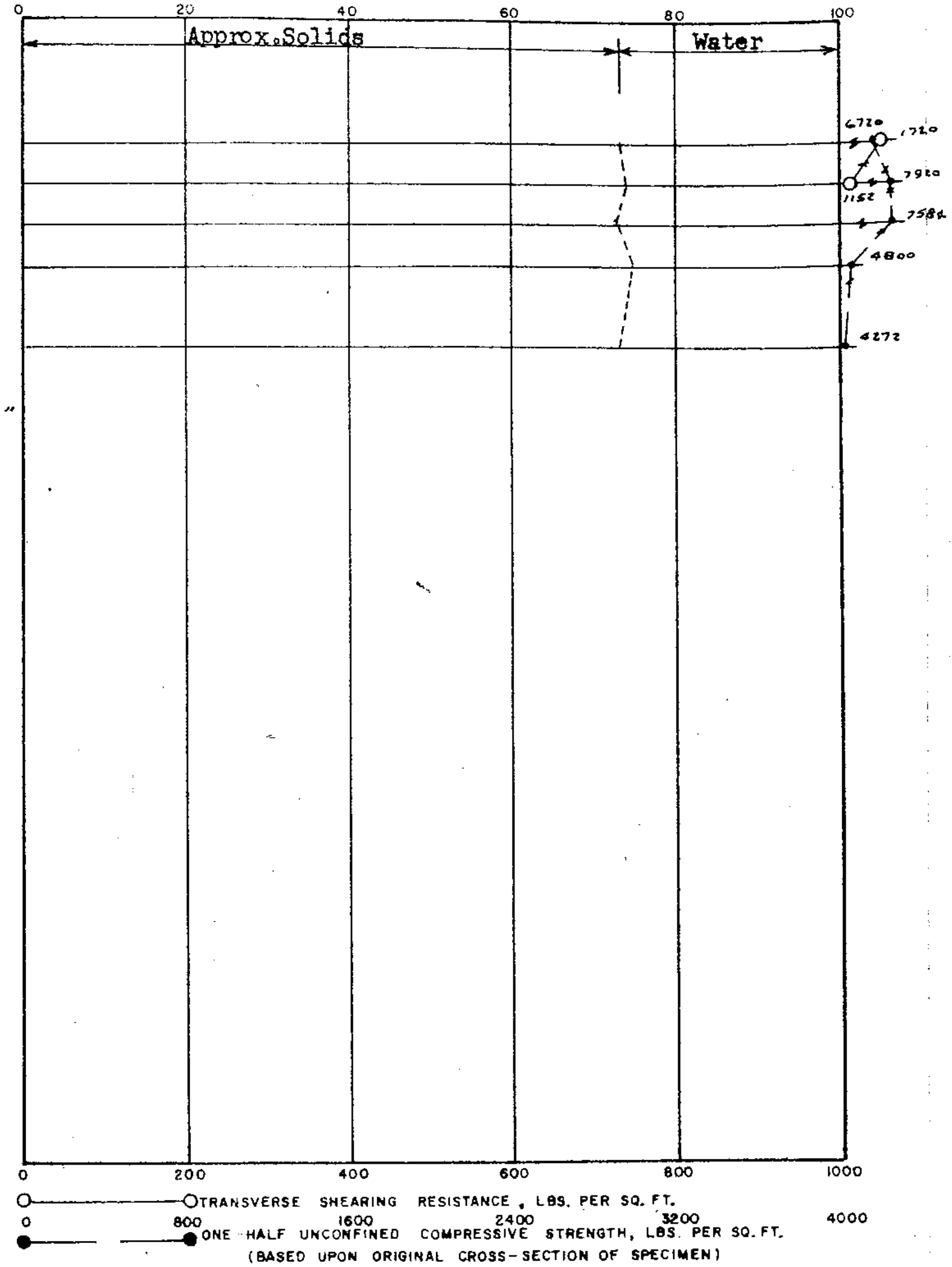
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used in all Liner Samples; 2.00" O.D. Heavy wall sampler used in BS-1 & BS-7 only.

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.7	Medium		
LS-1	7.5	563.2	V.Stiff	13.6	123.6
LS-2	10.0	560.7	V.Stiff to Hard	13.9	124.7
LS-3	12.5	558.2	Hard	13.9	122.1
LS-4	15.0	555.7	V.Stiff	12.2	127.1
LS-5	20.0	550.7	V.Stiff	13.2	123.5
BS-7	23.9	546.8	Rock Fragments		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 204

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 36 TB 36

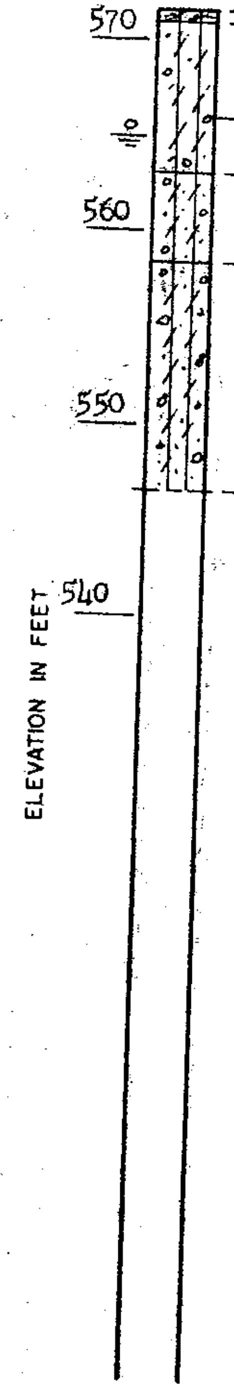
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAG | DATE: 10-20-70 | JOB NO. 128-X

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 571.3 Ft. (IGLD Datum)



TOPSOIL: Loose Dk. Brn. SEMI-ORG. V. SILTY CLAY — 7"

Soft Brown & Gray SILTY CLAY, w/Some Fine Sand & Gravel. — 8'6"

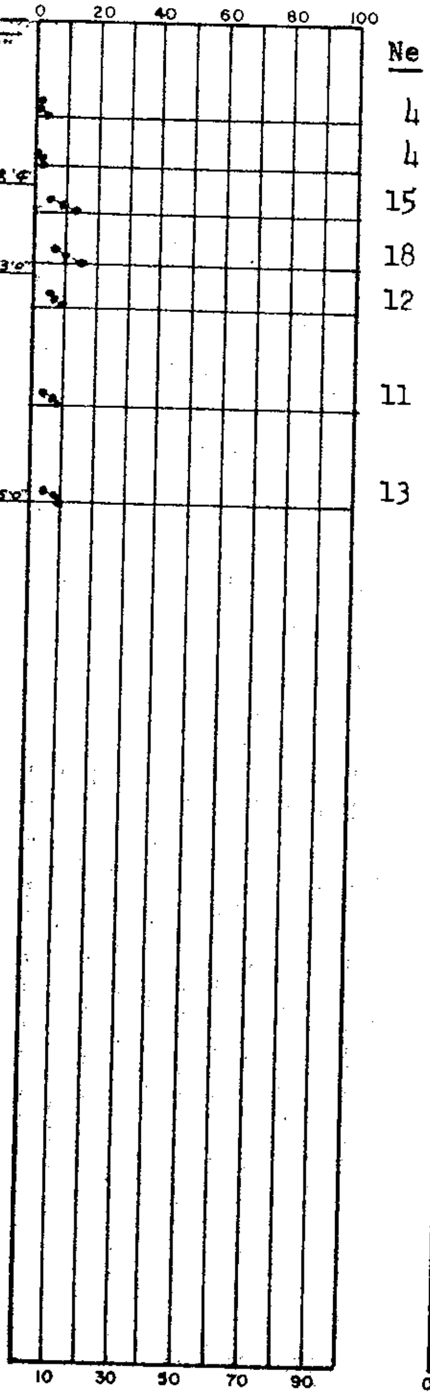
Stiff to V. Stiff Brown SILTY CLAY, w/Some Fine Sand & Gravel. — 13'0"

Firm to V. Stiff Gray SILTY CLAY, w/Some Sand, Gravel & Rock Frags. (GLACIAL TILL?) — 25'0"

Hole Dry augered full depth.
*Ground water encountered.
Water level in hole after sampling at d=10' was at d=5'6" (El. 565.8)
Water level upon completion was at d=6'6" (El. 564.8).
Hole grouted w/1 bag of bentonite.
No water flow during final inspection on Sept. 9, 1970

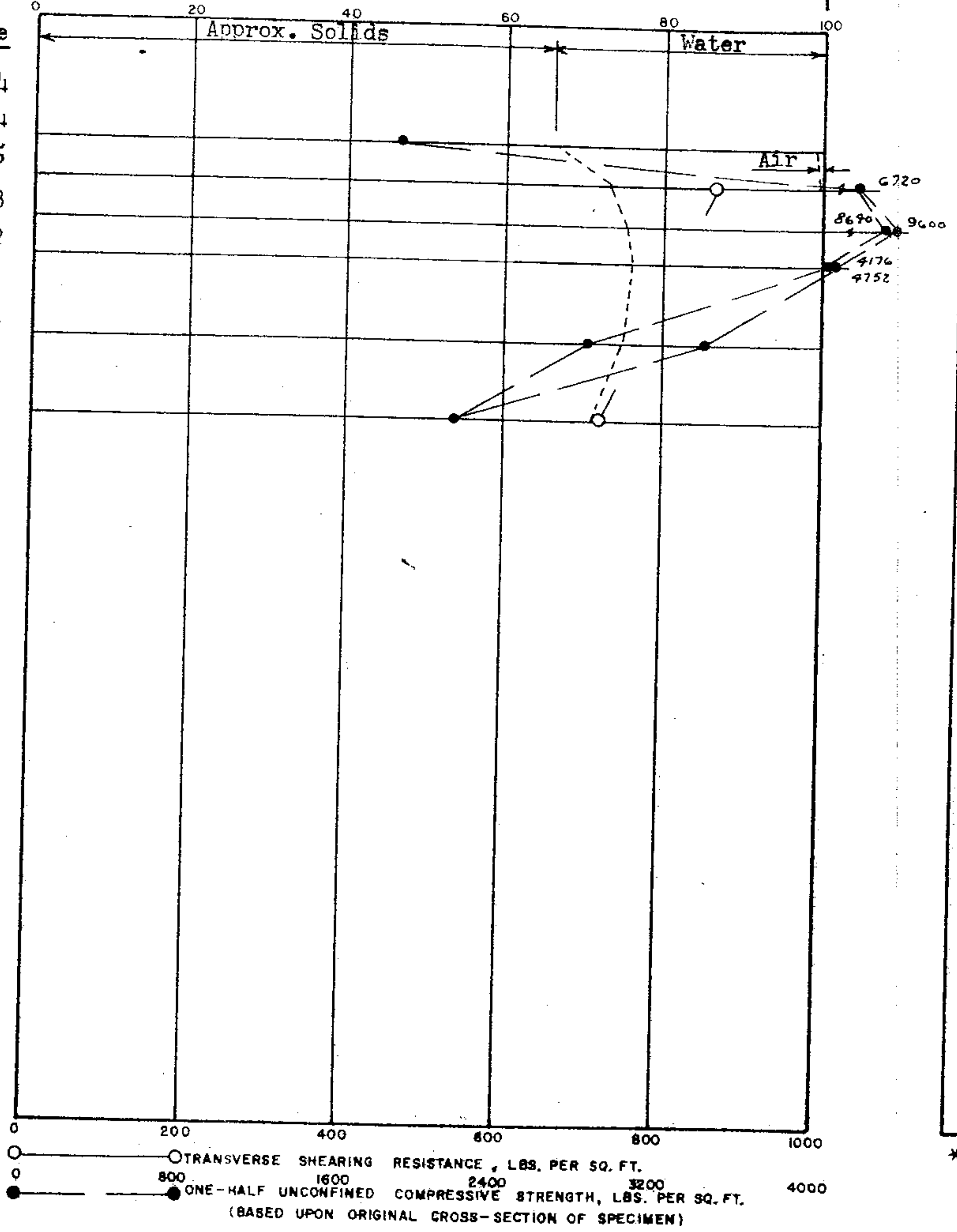
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT.
(BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.3	Soft		
LS-1	7.5	563.8	Soft to Medium	18.7	111.2
LS-2	10.0	561.3	Stiff to V. Stiff	14.1	122.8
LS-3	12.5	558.8	Hard	12.5	125.4
LS-4	15.0	556.3	V. Stiff	12.8	126.8
LS-5	20.0	551.3	Firm to Stiff	13.1	125.3
LS-6	25.0	546.3	Firm to Stiff	14.7	121.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan
N-3750; E-4800
TOTAL DEPTH: 25'0"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 28, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for all LS samples; 2.00" O.D. Heavy wall sampler used for BS-1.

MON 205

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 37 TB 3

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: [illegible] | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 570.5 Ft. (IGLD Datum)

VATION IN FEET

570 0	TOPSOIL;Med.Dk.Gr. SEMI-ORG.CLAYEY SILT.	1'8"
48	Soft to Med. Brown (w/Some Gray) SILT, w/Some Fine Sand & Clay.	5'8"
	Med to Firm Brown & Gray SILTY CLAY, w/Few Sand Partings.	8'4"
560	Firm Brown VERY SILTY CLAY, w/Some Sand, Little Gravel.	10'6"
	Firm Mottled Gray SILTY CLAY, w/Some Sand, Little Gravel.	13'6"
	Firm to Stiff Gray VERY SILTY CLAY, w/Little Sand, Traces of Gravel.	16'6"
550	Firm to Stiff Dk. Gr. VF SDY. SILTY CLAY, w/Little Gravel, Scme Rock Frags. (GLACIAL TILL)	27'4"
540		

Hole dry augered; ground water seepage encountered between d=1'8" & d= 5'8".

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-3200; E-4600
TOTAL DEPTH: 27'4"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 31, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

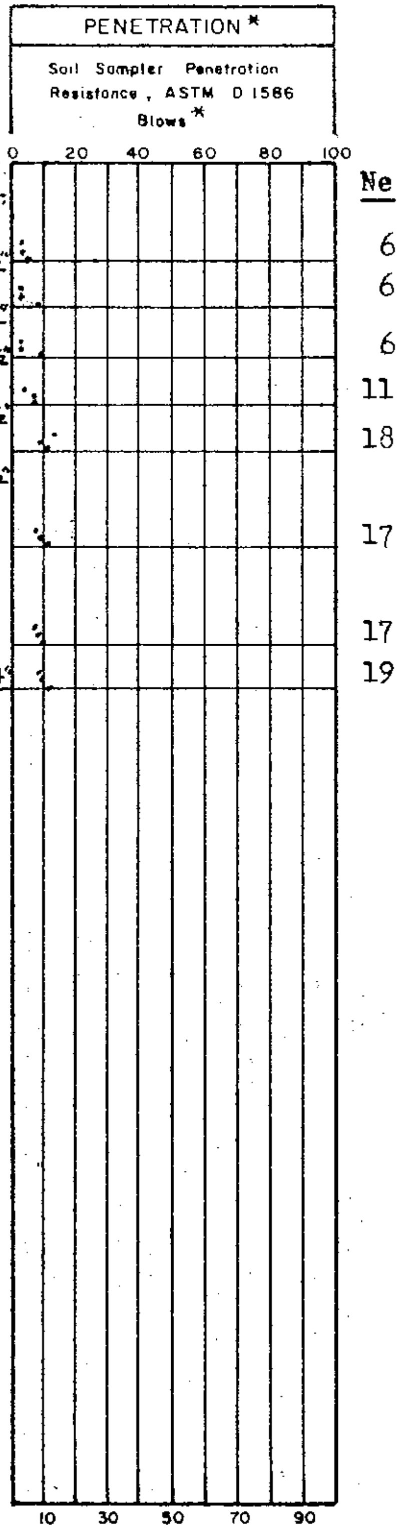
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

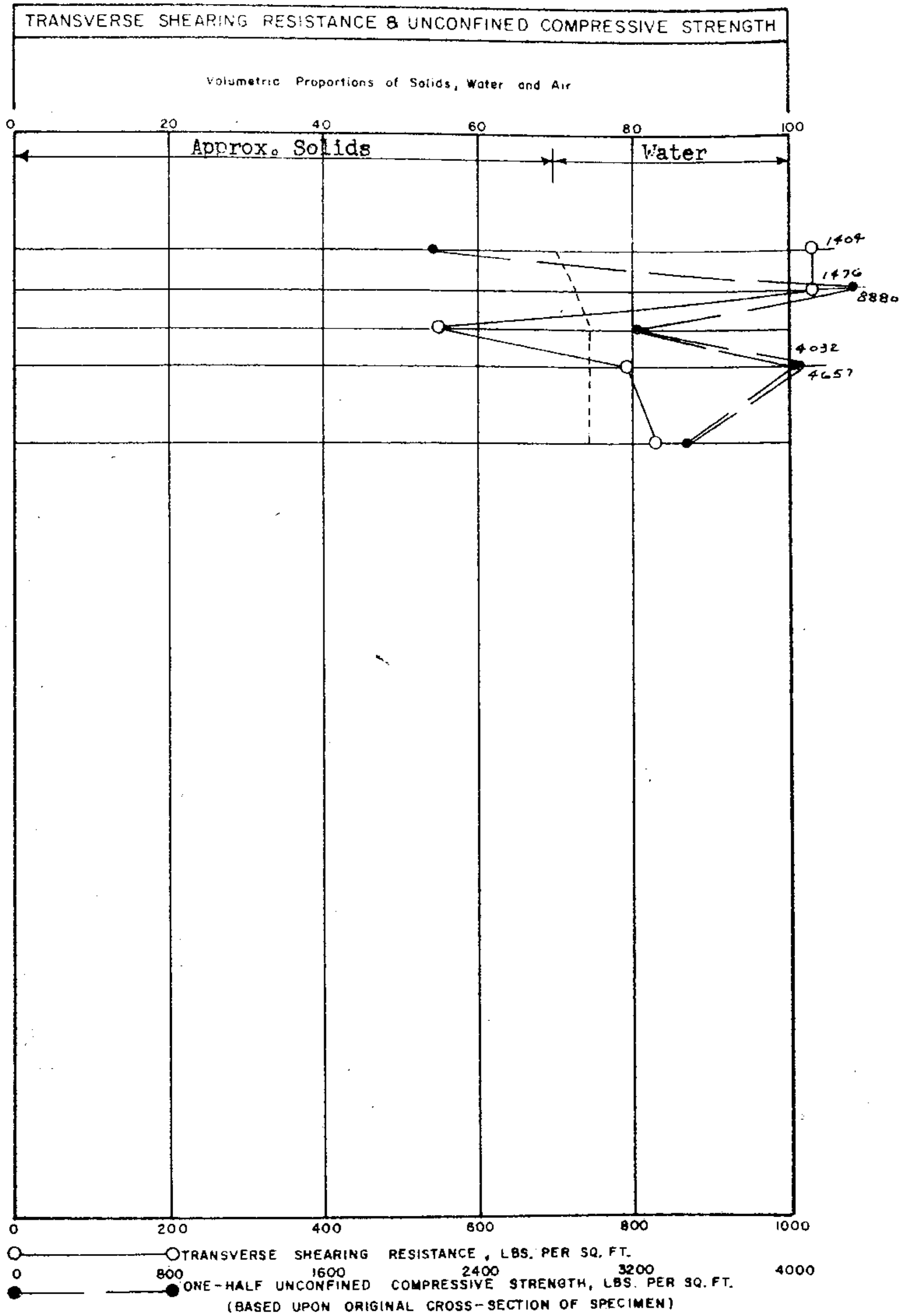
SFA
ORM
E-7

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



** 1.75" O.D. Michigan Liner Sampler used for LS samples;
2.00" O.D. Heavy wall sampler used for BS-1 & No Recovery samples.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.5	Soft to Medium		
LS-1	7.5	563.0	Firm to Stiff	16.4	117.6
LS-2	10.0	560.5	Firm to V Stiff	13.9	122.2
LS-3	12.5	558.0	Firm	13.1	125.6
LS-4	15.0	555.5	Firm to Stiff	12.6	126.9
LS-5	20.0	550.5	Firm to Stiff	13.1	125.0
No Rec.	25.0	545.5			
No Rec.	27.3	543.2			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 206

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 38 TB 38

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 5-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 570.2 Ft. (IGLD Datum)

Elevation	Description	Depth
570	TOPSOIL; Med. Dk. Brn. SEMI-ORG. CLAYEY SILT.	11"
84	Medium to Firm Brn & Gr. V.SILTY CLAY, w/Traces of Fine Sand.	5'4"
	Stiff Brown (w/Some Red) V.SILTY CLAY, w/Silt Partings, Traces Sd.&Grav.	7'8"
560	Stiff Gray (w/Some Red) V.SILTY CLAY, w/Some Fine Sand, Little Gravel.	10'6"
	Stiff Brown & Gray SILTY CLAY, w/Traces of Sand & Gravel.	13'4"
	V.Stiff Gray SILTY CLAY, w/Some Sd.&Grav., Few Rk.Frags.	16'4"
550	Firm to Stiff Gray SILTY CLAY, w/Some Sand & Traces of Gravel.	21'6"

Refusal; Boulder or Bedrock? (could not penetrate)

Hole dry augered, no ground water encountered.

Hole grouted w/1 bag of bentonite.

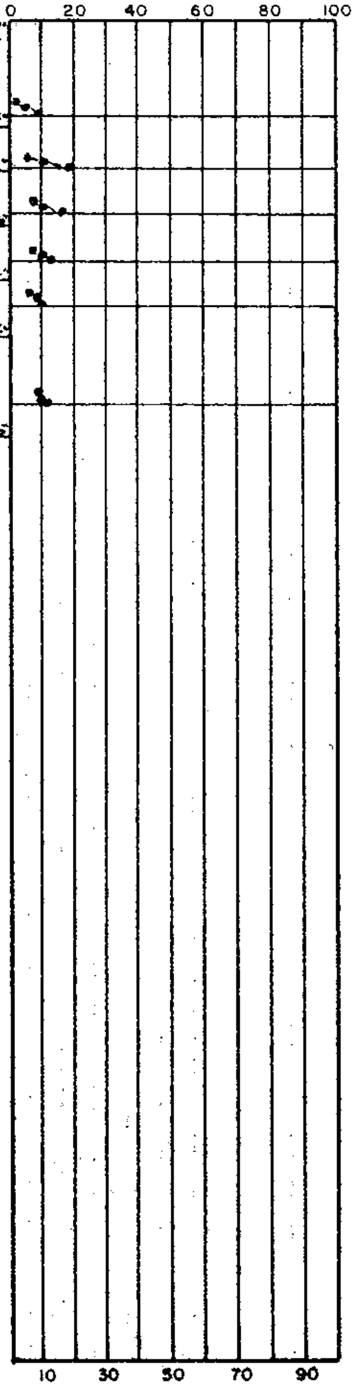
No water flow during final inspection on Sept. 9, 1970.

540

ELEVATION IN FEET

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



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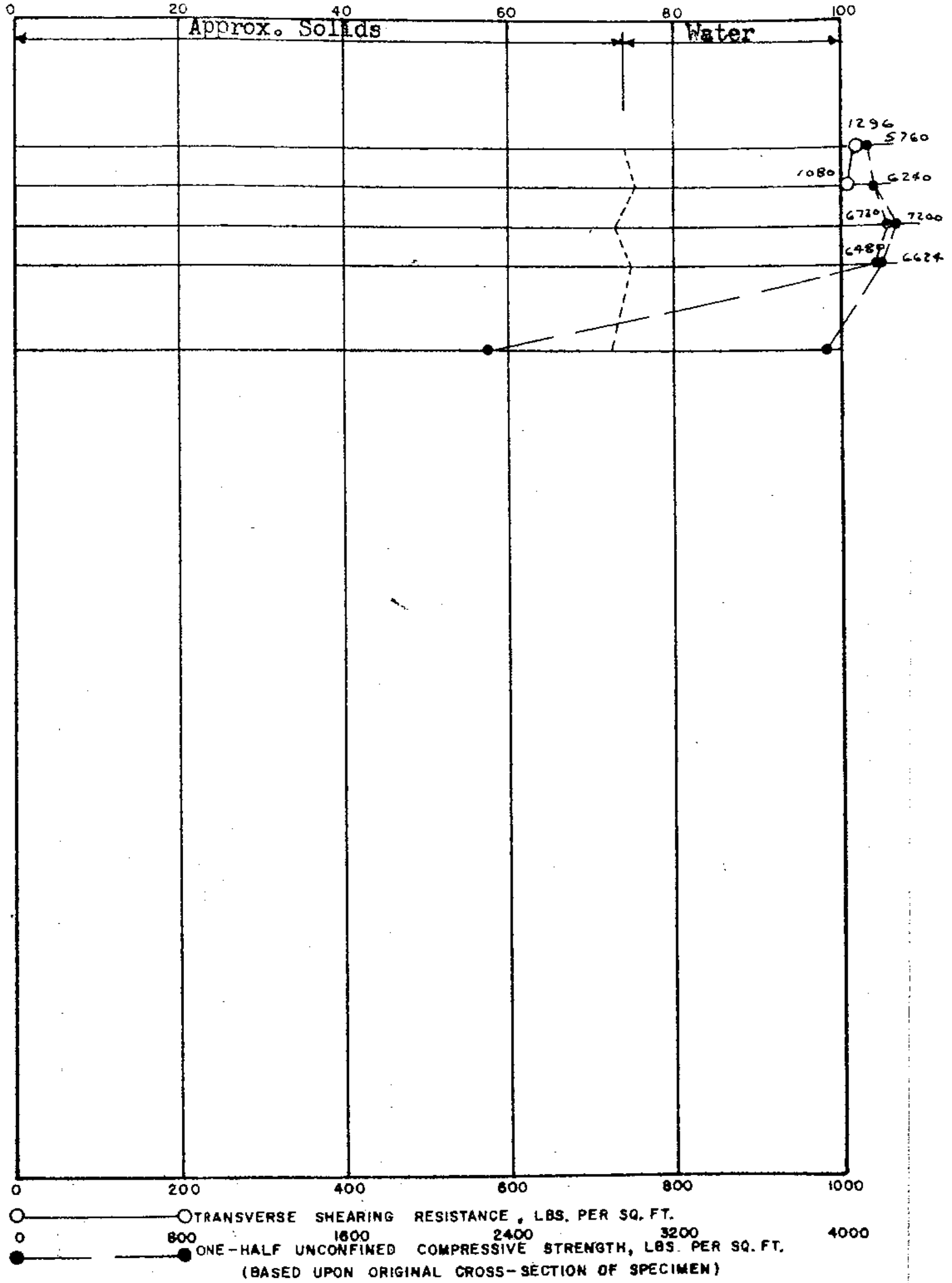
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used for all LS samples; 2.00" O.D. Heavy wall sampler used for BS-1

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.2	Medium		
LS-1	7.5	562.7	V. Stiff	13.5	122.7
LS-2	10.0	560.2	V. Stiff	12.0	126.9
LS-3	12.5	557.7	Hard	13.7	122.8
LS-4	15.0	555.2	Hard	12.0	126.2
LS-5	20.0	550.2	Firm to Stiff	13.4	122.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 207

See Test Boring Location Plan
LOCATION: N-2600; E-4300
TOTAL DEPTH: 21'6"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 28, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 39 TB39

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAP
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA

Ground Surface Elev. = 570.2 Ft. (IGLD Datum)

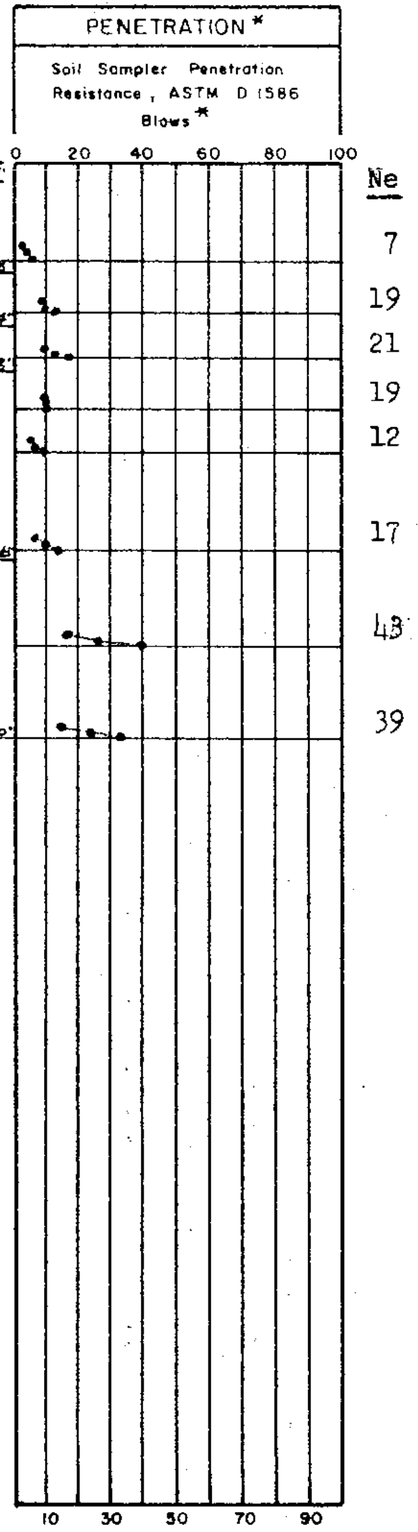
570	TOPSOIL;Med.Dk.Brn.SFMI-ORG.V.SLY.CLAY	10"
	Medium Brown & Gray VERY SILTY CLAY, w/Some Fine Sand, Traces of Gravel.	5'8"
	V.Stiff Mtld.Brown VERY SILTY CLAY, w/Some Fine Sand, Traces of Gravel.	8'4"
560	Hard Brown SILTY CLAY, w/Some Fine Sand, Traces of Gravel.	10'8"
550	Stiff to Hard Gray (w/Traces of Brown) VF SANDY SILTY CLAY, w/Traces of Gravel & Rock Frags. (GLACIAL TILL)	20'6"
540	V.Hard Dk.Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)	30'0"

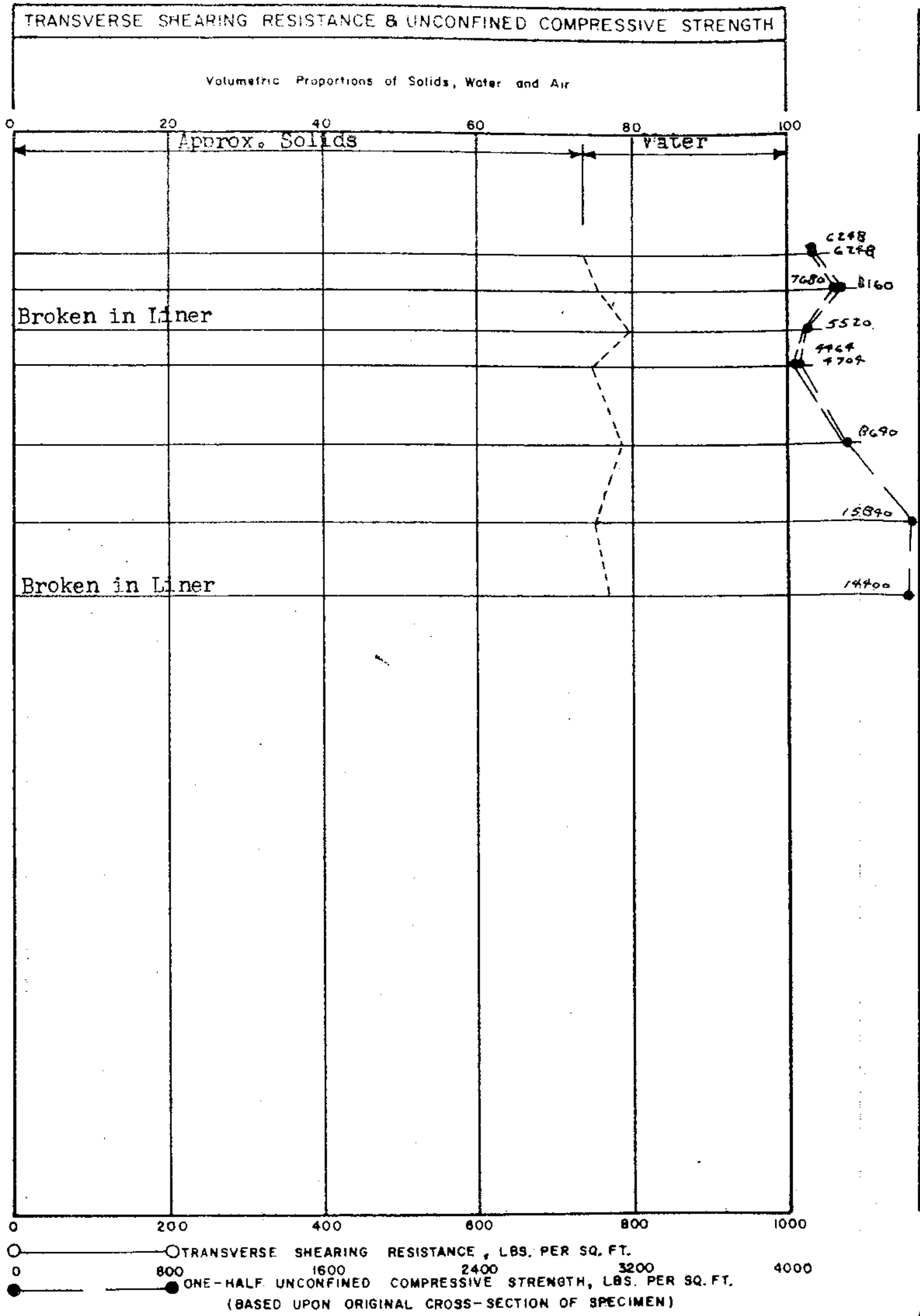
VATION IN FEET

Hole dry augered; no ground water encountered.

Hole grouted w/2 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970.





SOIL

Lab & Field Sa. No	Sample Depth, Feet	Samp Elev Feet			Dry Unit Weight p.c.f
BS-1	5.0	565.2	Medium		
LS-1	7.5	562.7	V. Stiff to Hard	13.6	123.8
LS-2	10.0	560.2	Hard	12.8	126.6
LS-3	12.5	557.7	V. Stiff	11.1	132.8
LS-4	15.0	555.2	Stiff	12.8	125.6
LS-5	20.0	550.2	Hard	9.9	132.2
LS-6	25.0	545.2	V. Hard	11.5	127.5
LS-7	30.0	540.2	V. Hard	11.2	130.3

See Test Boring Location Plan

LOCATION: N-1500; E-3400

TOTAL DEPTH: 30'0"

BORING STARTED: August 27, 1970

BORING COMPLETED: August 27, 1970

INSPECTOR: M.M. Dragicevic (S&FA)

DRILLER: R. Pudzeika

CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler inches; using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6;
2.00" O.D. Heavy wall sampler used for BS-1 & LS-7.

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 208

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 40 TB 40

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 571.6 Ft. (IGLD Datum)

570 TOPSOIL; Med. Dk. Brn. SEMI-ORG. V. SILTY CLAY 11"
Soft to Med. Brown & Gray SILTY CLAY, w/Little Sand. 5'6"
Med. to Firm Mtld. Brown V. SILTY CLAY, w/Traces of Sand & Gravel. 8'6"
560 Hard Brown to Gray SILTY CLAY, w/Traces of Fine Sand & Gravel. 10'6"
Firm Gray VF SANDY SILTY CLAY, w/Little Gravel & Few Rock Frags. (GLACIAL TILL) 15'6"
550 Stiff to Hard Dk. Gray VF SDY. SILTY CLAY, w/Little Gravel & Some Rock Frags. (GLACIAL TILL) 25'0"

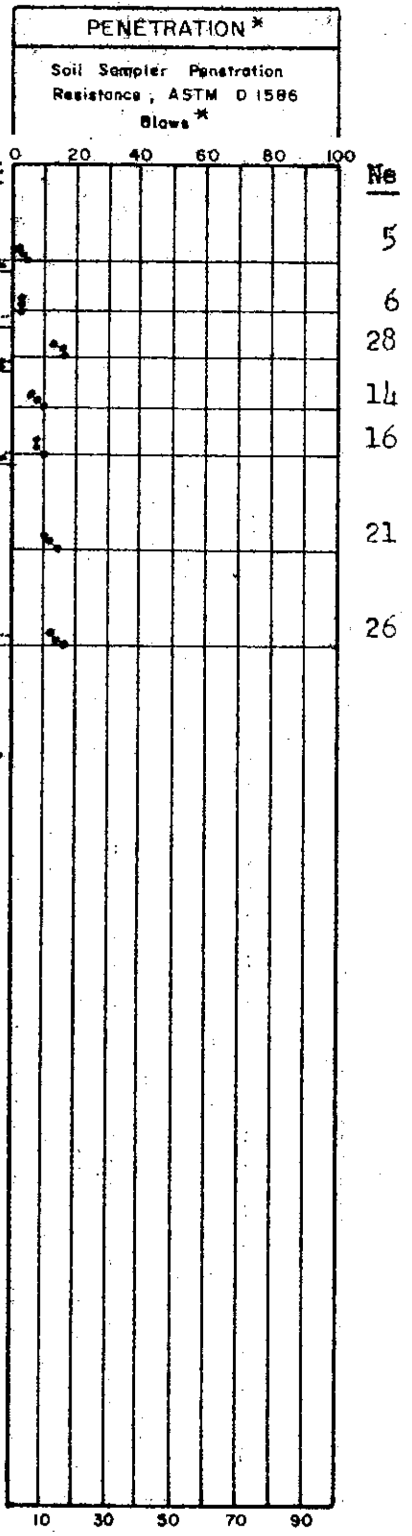
* Encountered ground water w/hole at d=8'6"; drilling stopped for 16 hours and ground water rose 2 ft. to El. 568.6.

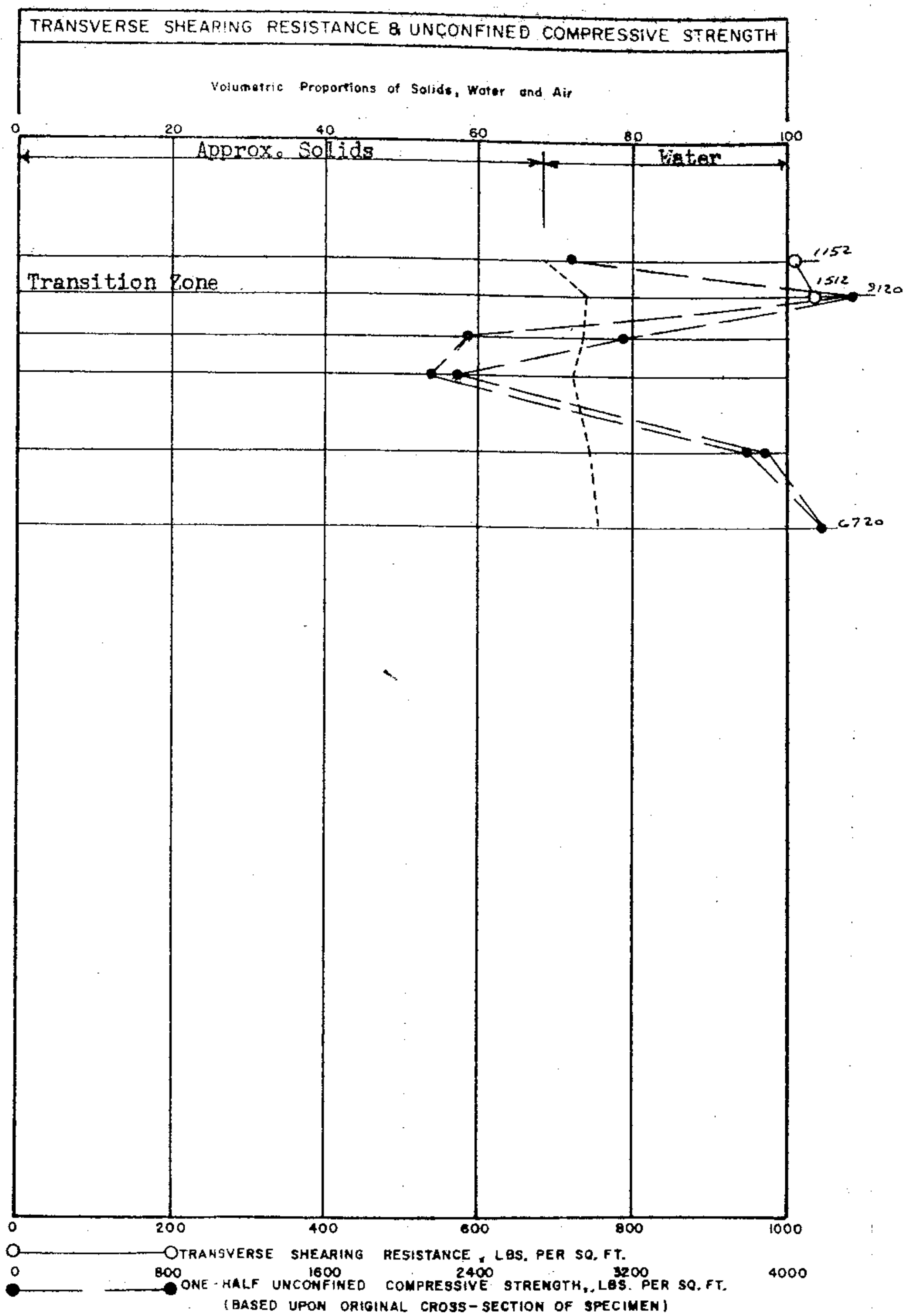
540

Hole continued by dry augering.

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.





** 1.75" O.D. Michigan Liner Sampler used for all LS samples; 2.00" O.D. Heavy wall sampler used for BS-1.

Lab & Field Sa. No	Sa Dep Fee			Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.6	Medium		
LS-1	7.5	564.1	Firm to Stiff	17.5	115.2
LS-2	10.0	561.6	Hard	13.2	124.5
LS-3	12.5	559.1	Firm	12.9	123.2
LS-4	15.0	556.6	Firm	13.7	121.5
LS-5	20.0	551.6	Stiff	12.3	125.7
LS-6	25.0	546.6	V. Stiff to Hard	12.1	128.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 209

See Test Boring Location Plan
LOCATION: N-1300; E-2400
TOTAL DEPTH: 25'0"

BORING STARTED: August 26, 1970
BORING COMPLETED: August 27, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 41 TB 41

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 573.2Ft. (IGLD Datum)

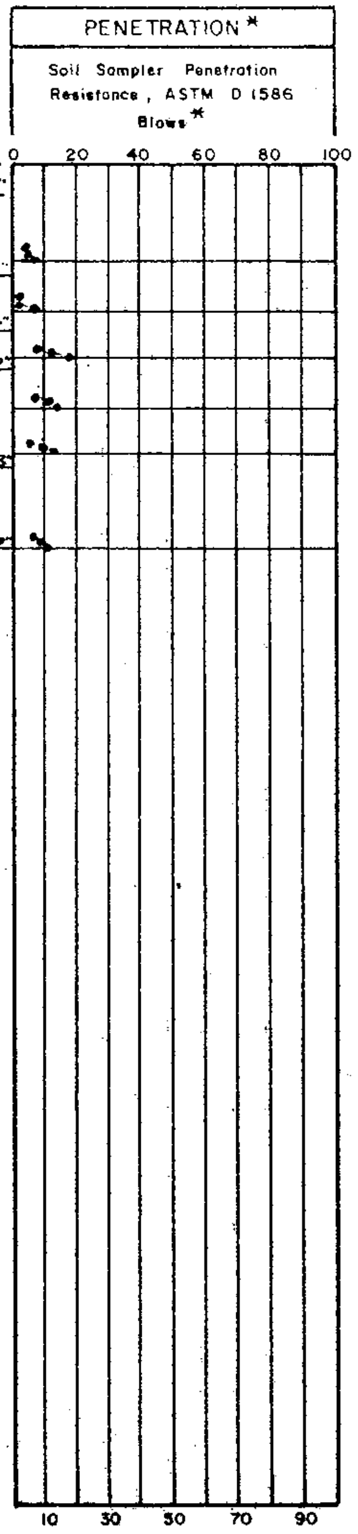
EVATION IN FEET

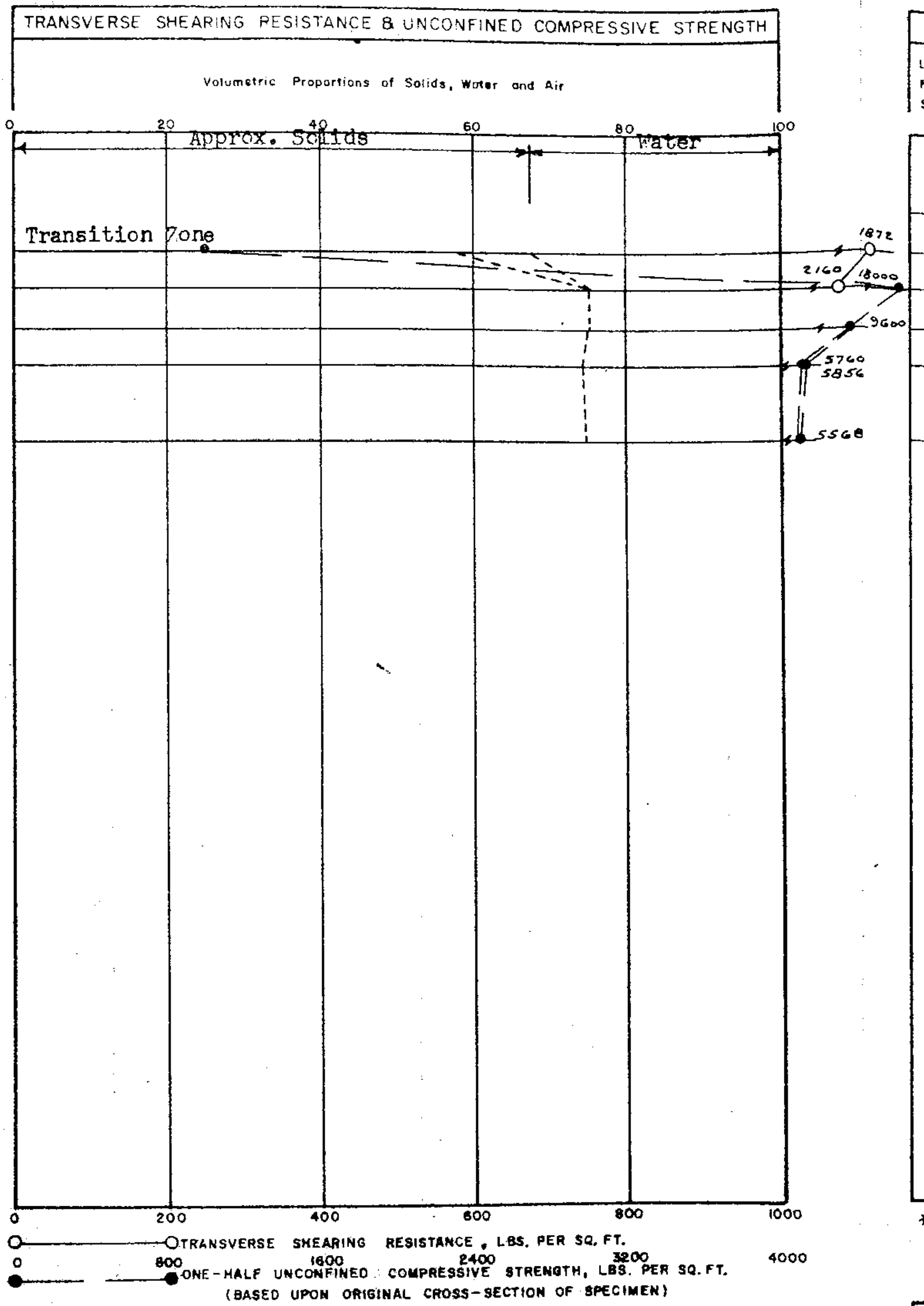
	TOPSOIL;Med.Dk.Brn.SEMI-ORG.CLAYEY SILT.	1'5"	Ne
570	Firm Brown CLAYEY SILT, w/Pockets of Fine Sand.	5'8"	9
	Soft to Hard (Varies) Brown & Gray V.SILTY CLAY, w/Some Sand & Gravel.	8'6"	4
	Hard Brown SILTY CLAY, w/Tr. Sd.&Gravel	10'6"	20
560	V.Stiff to Hard Brown (w/Some Gray) SILTY CLAY, w/Traces Sand & Gravel.	15'8"	20 15
½ ¼	V.Stiff to Hard Dk.Gray VF SDY.SILTY CLAY, w/Little Gravel, Few Rock Frags. (GLACIAL TILL)	20'0"	16
550			

Hole dry augered; no ground water encountered.

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on September 9, 1970.





** 1.75" O.D. Michigan Liner Sampler used for all LS samples;
2.00" O.D. Heavy wall sampler used for BS-1

SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	568.2	Firm		
LS-1	7.5	565.7	Soft — Hard —	27.6 17.6	96.9 114.5
LS-2	10.0	563.2	Hard	12.9	125.8
LS-3	12.5	560.7	Hard	13.1	125.9
LS-4	15.0	558.2	V. Stiff to Hard	13.3	124.1
LS-5	20.0	553.2	V. Stiff to Hard	12.4	125.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-1500; E-1400
TOTAL DEPTH: 20'0"

BORING STARTED: August 26, 1970
BORING COMPLETED: August 26, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

MON 210

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 42 TB 42

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: G4 | DATE: 9-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA

Ground Surface Elev. = 576.4 Ft. (IGLD Datum)

Med.Dk.Brn. SEMI-ORG. V.SILTY CLAY.

Firm Reddish-Brown (w/Some Gray) VERY SILTY CLAY, w/Some Sand. 5'6"

570

V.Stiff to V.Hard Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 10'0"

Stiff to V.Hard (Varies) Gray (w/Some Brn.) SILTY CLAY, w/Few Sand Partings, Tr.Grav. 12'6"

V.Stiff Gray SILTY CLAY, w/Some Sand, Little Gravel. (GLACIAL TILL?) 16'6"

560

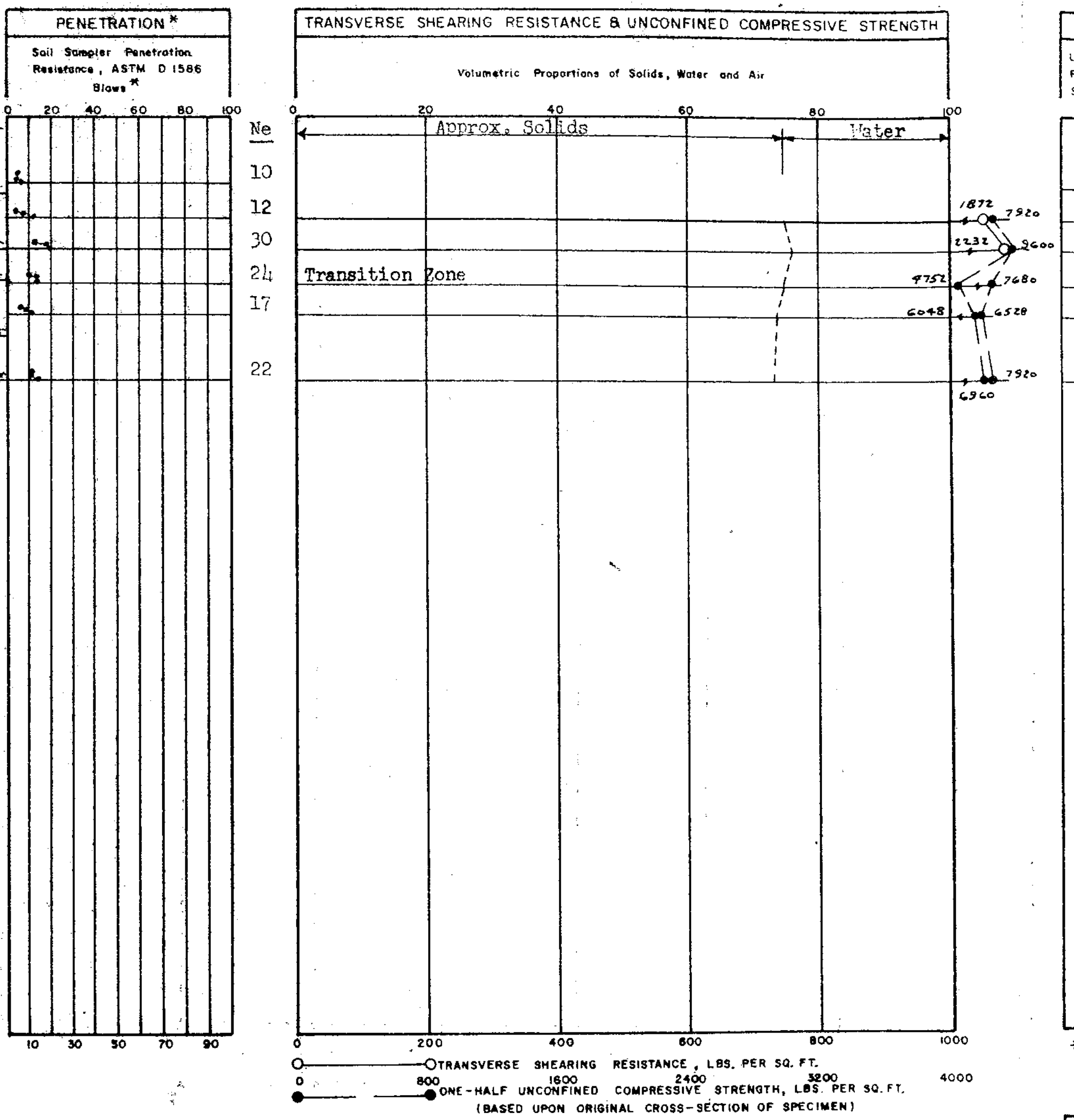
Hard Dk.Gray VF SDY. SILTY CLAY, w/Some Grav. & Rk. Frags. (GLACIAL TILL) 20'0"

Hole dry augered; no ground water encountered.

550

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.



** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-4; 2.00" O.D. Heavy wall sampler used for BS-1 and LS-5.

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	571.4	Firm		
LS-1	7.5	568.9	V. Stiff to Hard	13.8	124.6
LS-2	10.0	566.4	V. Hard	12.5	126.9
LS-3	12.5	563.9	Stiff to V. Hard	12.2	125.1
LS-4	15.0	561.4	V. Stiff	12.6	124.1
LS-5	20.0	556.4	Hard	13.4	124.2

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-3100; W-1400

TOTAL DEPTH: 20'0"

BORING STARTED: August 24, 1970

BORING COMPLETED: August 24, 1970

INSPECTOR: M.M. Dragicevic (S&FA)

DRILLER: R.E. Budzeika

CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 18 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: None

MON 214

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 46 TB46

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO

DATE: 6-7-71

JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA

Ground Surface Elev. = 577.4 Ft. (IGLD Datum)

EVATION IN FEET

TOPSOIL; Soft Dk.Brn.SEMI-ORG.V.SILTY CLAY.

Hard Lt.Brown & Gray CLAYEY SILT,
w/Little Sand.

6'6"

570

V.Hard Brown VERY SILTY CLAY,
w/Traces of Sand & Gravel.

10'8"

Hard Gr.(w/Some Brn.) VF SDY. SILTY CLAY,
w/Traces Grav.&Rk.Frags.(GLACIAL TILL?)

13'0"

Hard Dk.Gray VF SDY.SILTY CLAY,
w/Little Gravel. Few Rock Fragments.
(GLACIAL TILL)

560

20'0"

Hole dry augered; no ground water
encountered.

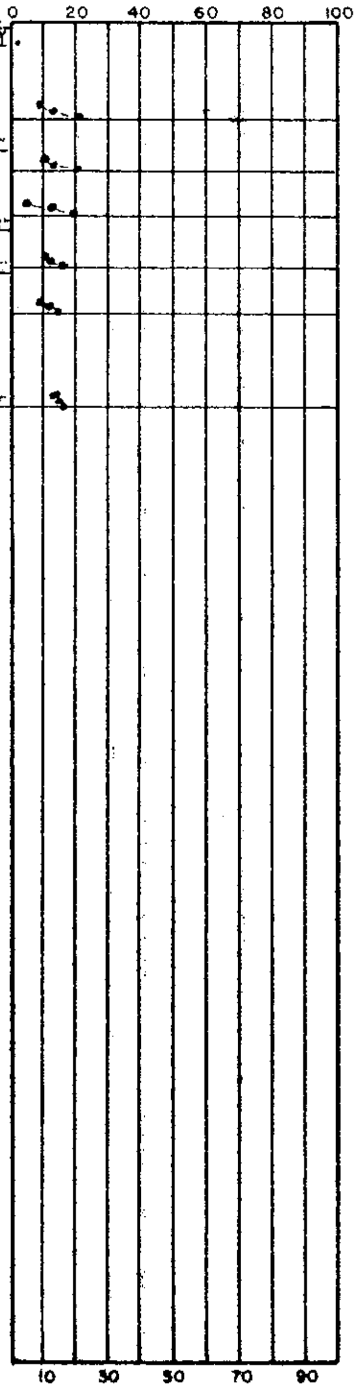
550

Hole grouted w/1 bag of bentonite.

No water flow during final inspection
on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration
Resistance, ASTM D 1586
Blows *



Ne
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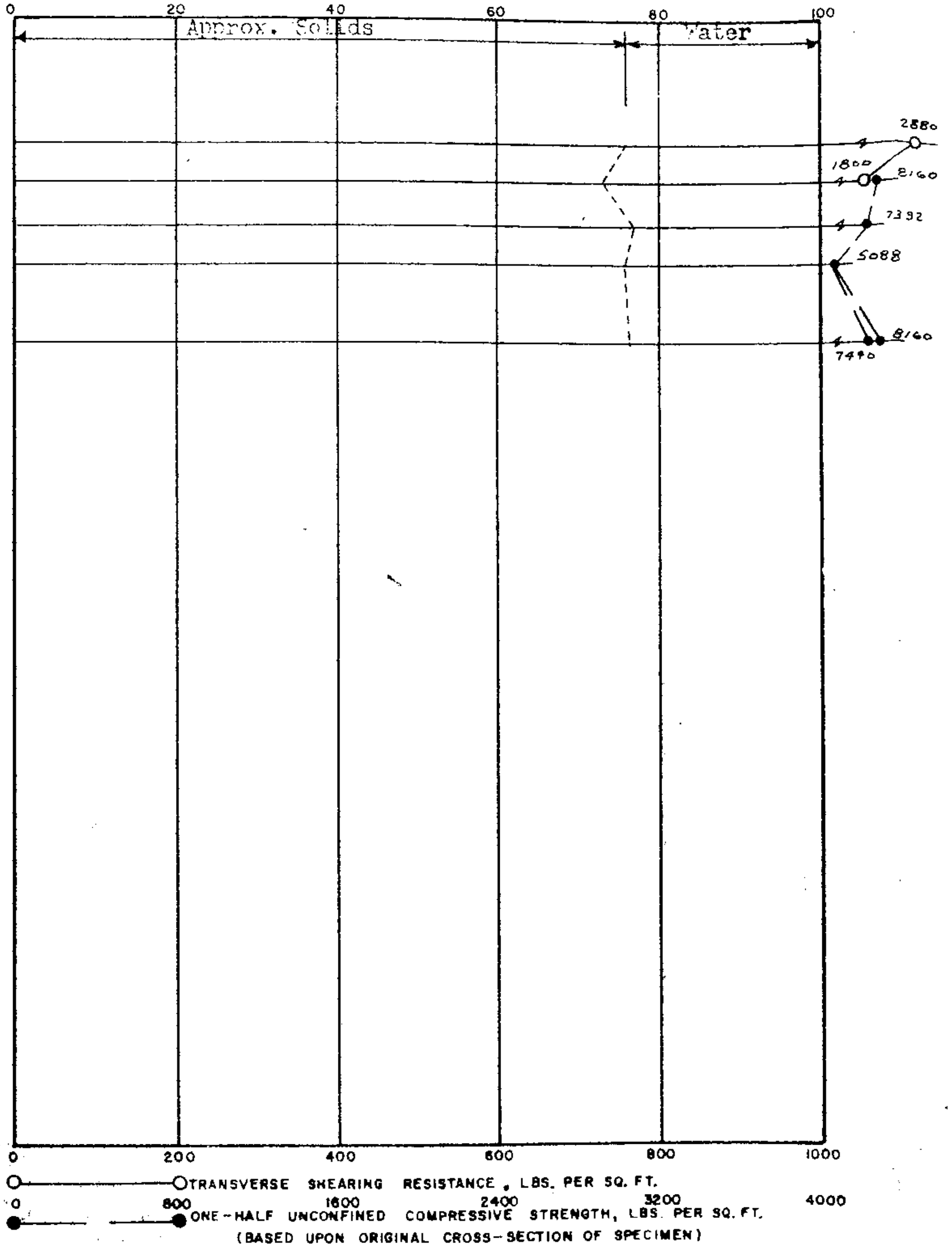
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
BS-1	5.0	572.4	Hard		
LS-1	7.5	569.9	V. Hard	12.3	127.6
LS-2	10.0	567.4	Hard	13.3	122.8
LS-3	12.5	564.9	Hard	11.5	128.5
LS-4	15.0	562.4	V. Stiff	12.5	126.0
LS-5	20.0	557.4	Hard	11.6	127.2

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 215

LOCATION: See Test Boring Location Plan
N-3950; W-1200

TOTAL DEPTH: 20'0"

BORING STARTED: August 24, 1970

BORING COMPLETED: August 24, 1970

INSPECTOR: M.M. Dragicevic (S&FA)

DRILLER: R.T. Budzeika

CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 18 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 17 TB47

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

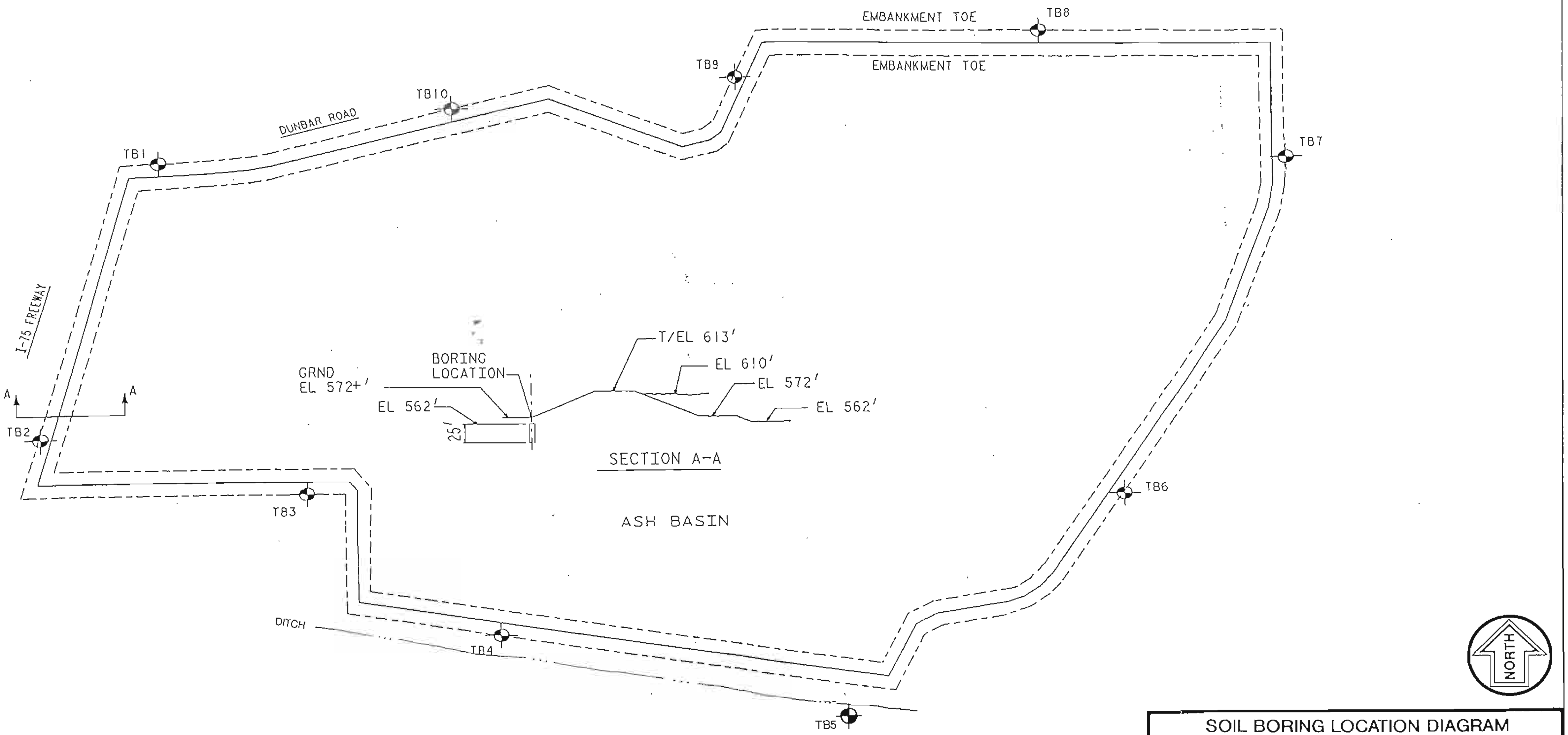
THE DETROIT EDISON COMPANY

APPR: GAA

DATE: 4-7-71

JOB NO. 123-A

APPENDIX D – 1990's BORING LOGS



NOTE:

THE SOIL BORING ELEVATIONS AND LOCATIONS WERE DETERMINED BY DETROIT EDISON.

TO THE BEST OF OUR KNOWLEDGE, THE BORINGS SHOWN ON THIS PLAN ARE AT THEIR APPROXIMATE LOCATIONS.

SOIL BORING LOCATION DIAGRAM
VERIFICATION OF SOIL BARRIER
MONROE, MICHIGAN

sme
soil and materials
engineers, inc

BAY CITY
KALAMAZOO
LANSING
PLYMOUTH
TOLEDO

Date 11-9-94
Drawn By ARR
Scale NTS
Job PG 22087

soil and materials engineers, inc.

MON 844

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/12/94
JOB NUMBER: PG22087

BORING TB1
SHEET: 1

DRILLER: JH RIG: 26

ELEVATION (FEET)

SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 577

SAMPLE TYPE, NUMBER & INTERVAL

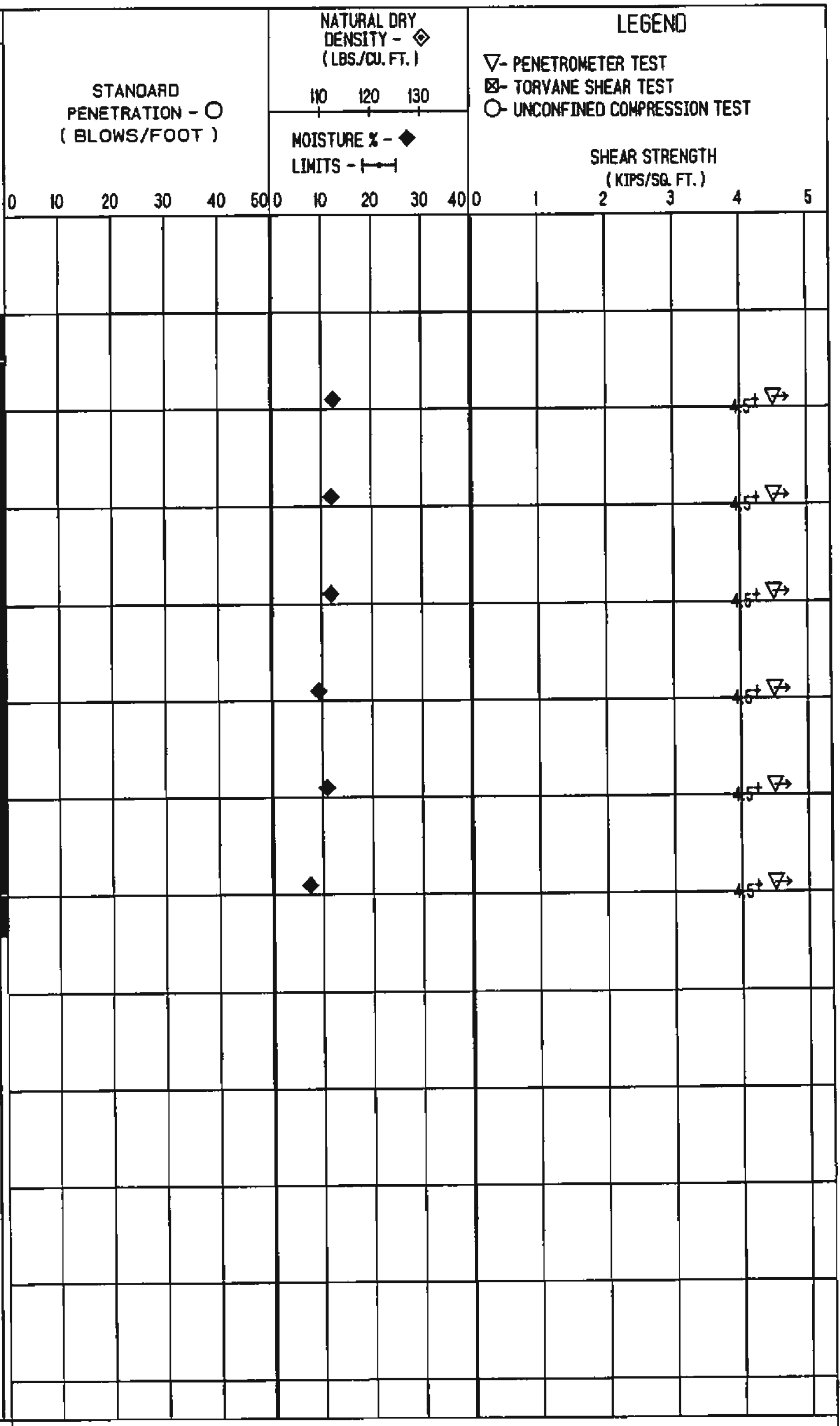
ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE, NUMBER & INTERVAL
575	Silty Clay Fill-Trace Sand, Gravel and Topsoil-Brown-Hard (CL-Fill)	CS1 CS2
570 565	Silty Clay-Some Sand-Trace Gravel-with Occasional Silt & Sand Seams & Layers-Mottled Brown-Hard (CL)	CS3 CS4 CS5 CS6
⇟560	Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)	CS7 CS8
555 550 545	Silty Clay-Trace Sand & Gravel-with Fine Sand Layer from 24 to 25 feet-Gray-Hard (CL)	CS9 CS10 CS11 CS12
	Driller reported 1.5 feet of layered Shale & Limestone	CS13

540

Notes:

1. Soil boring location 4519.60 North and -1114.24 East.
2. End of boring at 24 feet (elevation 543 feet).
3. Groundwater was not observed after completion of the drilling operations.

535 530 525 520



WATER LEVEL OBSERVATIONS

⇟ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

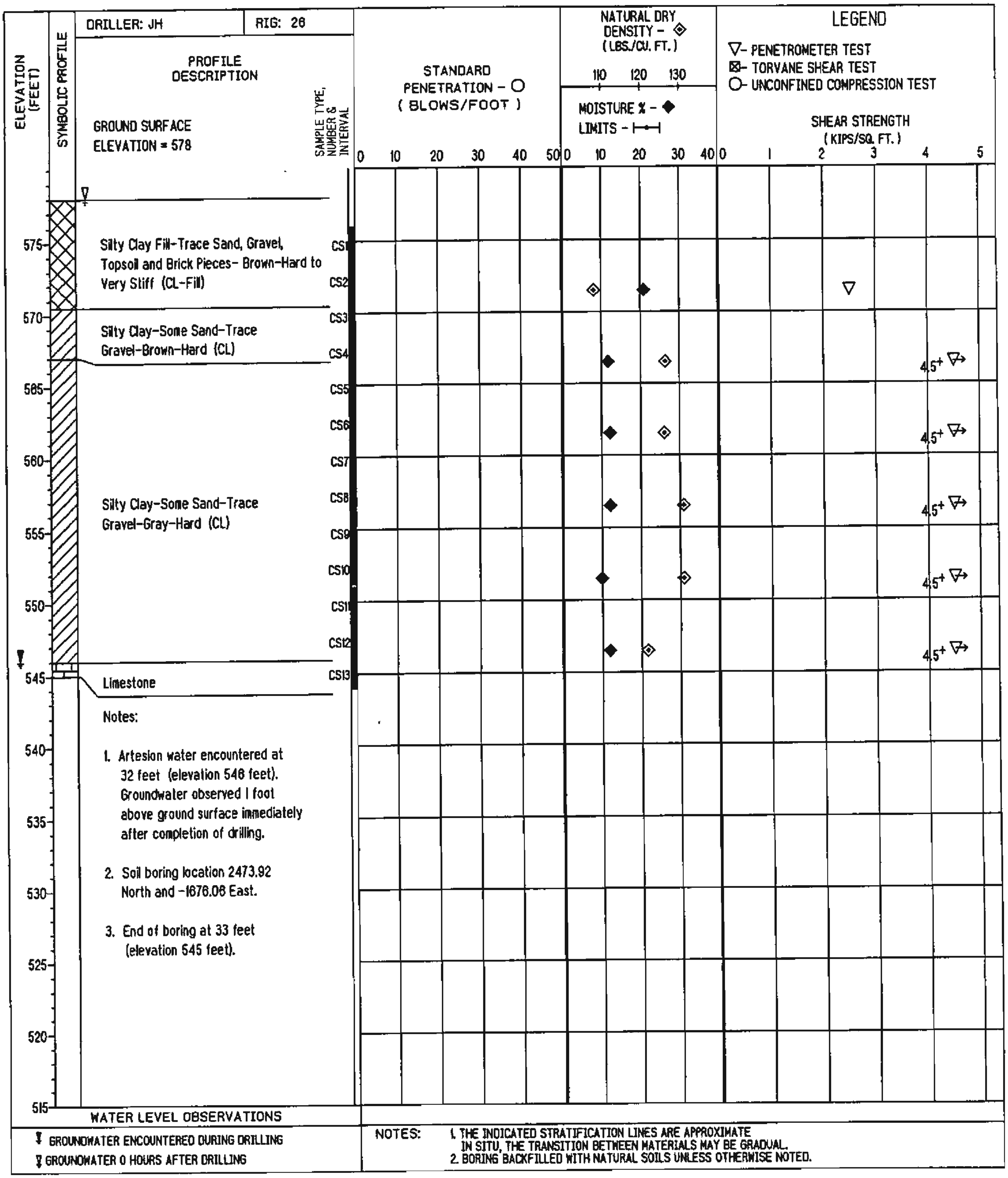
MON 845

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/20/94
JOB NUMBER: PG22087

BORING TB2
SHEET: 1

DRILLER: JH RIG: 26



GROUND SURFACE ELEVATION = 578

Silty Clay Fill–Trace Sand, Gravel, Topsoil and Brick Pieces– Brown–Hard to Very Stiff (CL–Fill)

Silty Clay–Some Sand–Trace Gravel–Brown–Hard (CL)

Silty Clay–Some Sand–Trace Gravel–Gray–Hard (CL)

Limestone

Notes:

1. Artesion water encountered at 32 feet (elevation 546 feet). Groundwater observed 1 foot above ground surface immediately after completion of drilling.

2. Soil boring location 2473.92 North and –1676.06 East.

3. End of boring at 33 feet (elevation 545 feet).

WATER LEVEL OBSERVATIONS

Ŧ GROUNDWATER ENCOUNTERED DURING DRILLING
Ṿ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

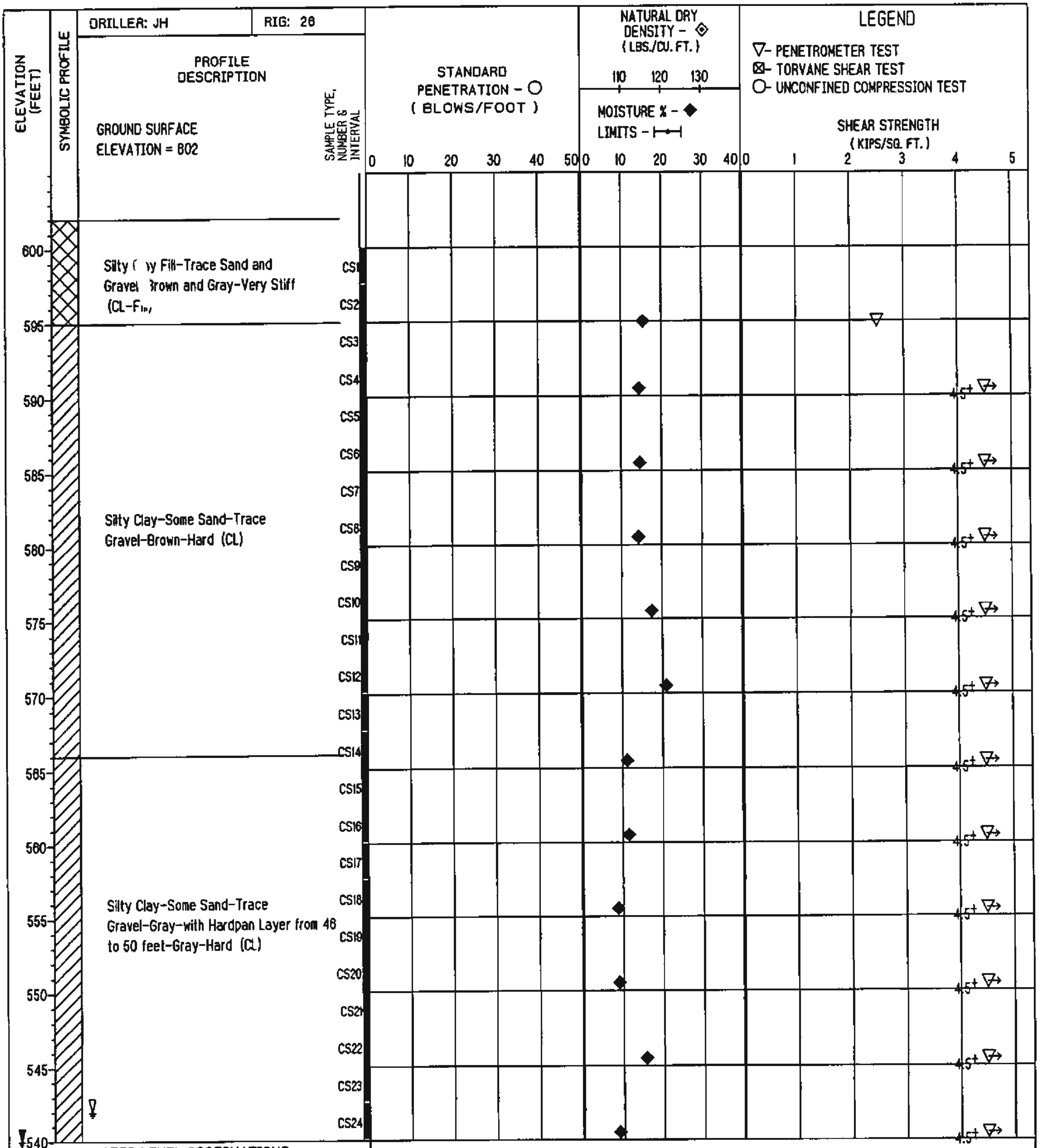
soil and materials engineers, inc.

MON 846

JOB NAME:	VERIFICATION OF SOIL BARRIER	A/E:		BORING TB3
JOB LOCATION:	MONROE, MICHIGAN	BY: SDN	DATE: 9/19/94	
OWNER:	DETROIT EDISON	JOB NUMBER:	PG22087	SHEET: 1

DRILLER: JH

RIG: 26



LEGEND

▽– PENETROMETER TEST

⊠– TORVANE SHEAR TEST

○– UNCONFINED COMPRESSION TEST

GROUND SURFACE ELEVATION = 602

Silty Clay Fill-Trace Sand and Gravel-Brown and Gray-Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-with Hardpan Layer from 48 to 50 feet-Gray-Hard (CL)

WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:

1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/19/94
JOB NUMBER: PG22087

BORING TB3
SHEET: 2

DRILLER: JH RIG: 26

ELEVATION (FEET)
SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 602

SAMPLE TYPE, NUMBER & INTERVAL

STANDARD PENETRATION – ○ (BLOWS/FOOT)
0 10 20 30 40 50

NATURAL DRY DENSITY – ◈ (LBS./CU. FT.)
110 120 130

MOISTURE % – ◆
LIMITS – ├─●─┤
0 10 20 30 40

LEGEND
▽– PENETROMETER TEST
☒– TORVANE SHEAR TEST
○– UNCONFINED COMPRESSION TEST

SHEAR STRENGTH (KIPS/SQ. FT.)
0 1 2 3 4 5

Elevation	Profile Description	Sample
	Weathered Limestone	CS25
535	Notes:	
	1. Soil boring location 2441.20 North and -291.12 East.	
530	2. End of boring at 63 feet (elevation 539 feet).	
525		
520		
515		
510		
505		
500		
495		
490		
485		
480		
475		

WATER LEVEL OBSERVATIONS

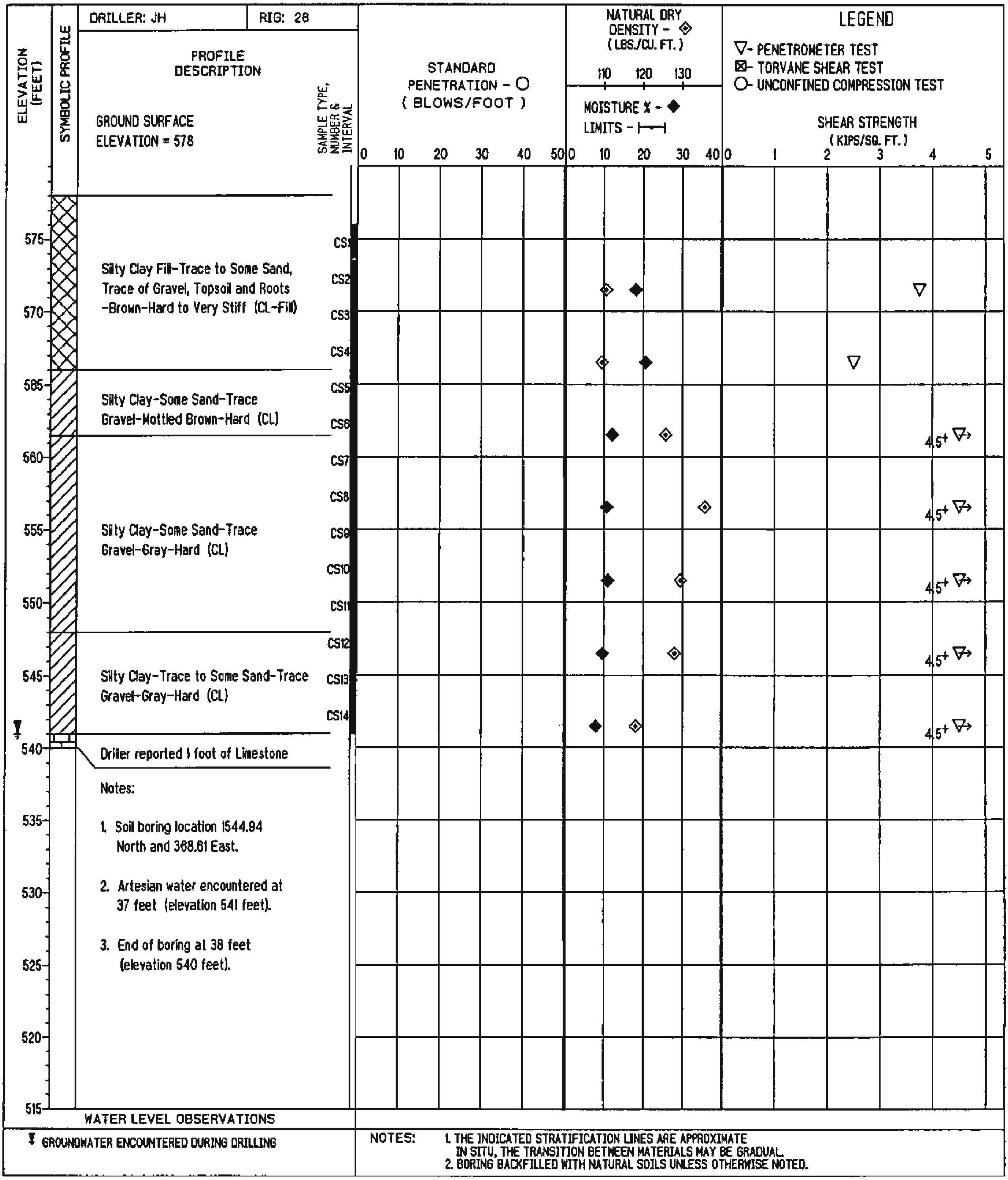
▼ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 847

JOB NAME:	VERIFICATION OF SOIL BARRIER	A/E:			
JOB LOCATION:	MONROE, MICHIGAN	BY: SDN	DATE: 9/16/94		BORING TB4
OWNER:	DETROIT EDISON	JOB NUMBER:	PG22087		SHEET: 1



Silty Clay Fill-Trace to Some Sand, Trace of Gravel, Topsoil and Roots -Brown-Hard to Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Mottled Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)

Silty Clay-Trace to Some Sand-Trace Gravel-Gray-Hard (CL)

Driller reported 1 foot of Limestone

Notes:

1. Soil boring location 1544.94 North and 368.61 East.
2. Artesian water encountered at 37 feet (elevation 541 feet).
3. End of boring at 38 feet (elevation 540 feet).

WATER LEVEL OBSERVATIONS

⊻ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 848

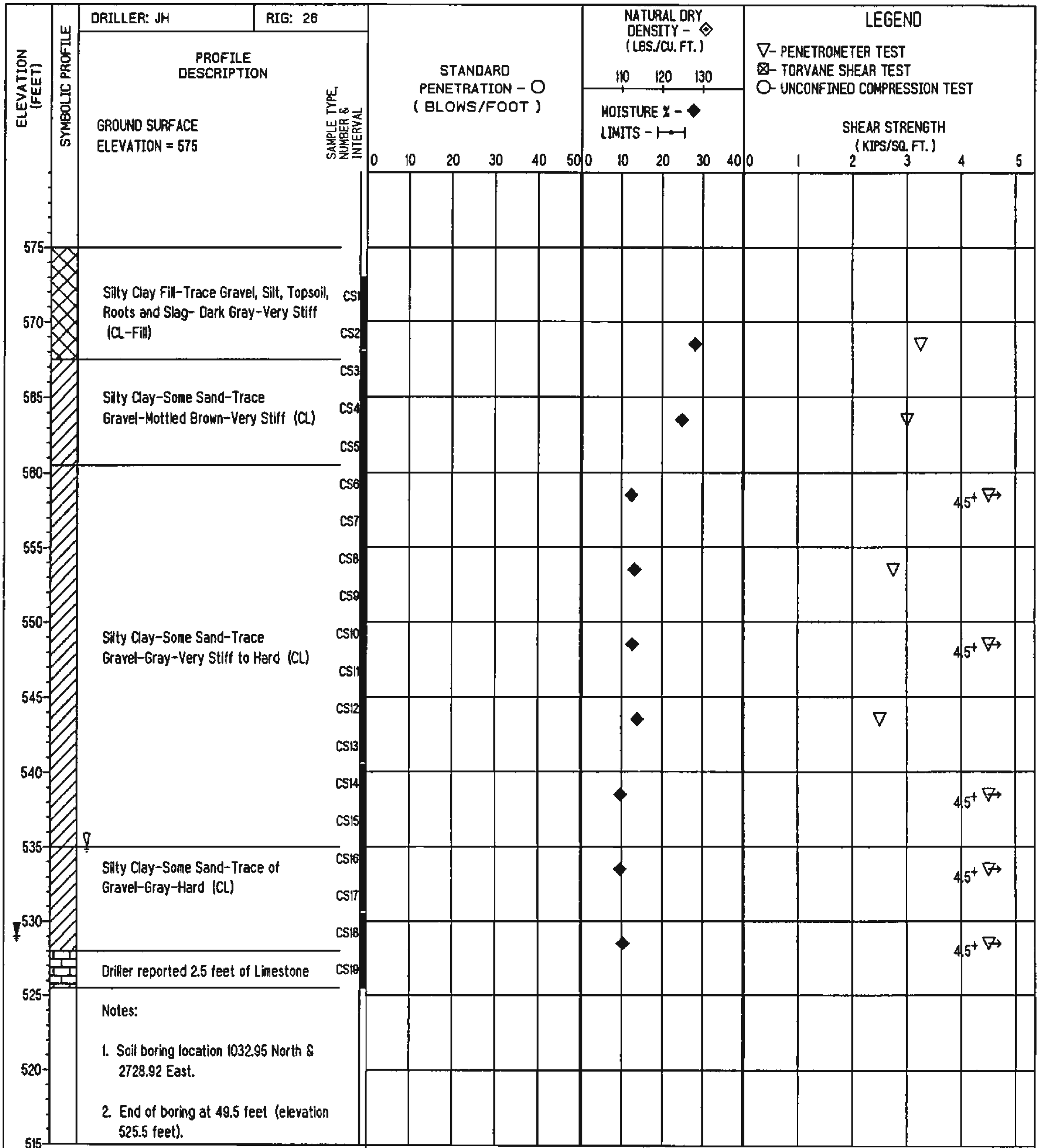
JOB NAME:	VERIFICATION OF SOIL BARRIER	A/E:	
JOB LOCATION:	MONROE, MICHIGAN	BY: SDN	DATE: 9/15/94
OWNER:	DETROIT EDISON	JOB NUMBER:	PG22087

BORING TB5

SHEET: 1

DRILLER: JH

RIG: 26



PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 575

Silty Clay Fill-Trace Gravel, Silt, Topsoil, Roots and Slag- Dark Gray-Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Mottled Brown-Very Stiff (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Very Stiff to Hard (CL)

Silty Clay-Some Sand-Trace of Gravel-Gray-Hard (CL)

Driller reported 2.5 feet of Limestone

Notes:

1. Soil boring location 1032.95 North & 2728.92 East.
2. End of boring at 49.5 feet (elevation 525.5 feet).

WATER LEVEL OBSERVATIONS

- ▼ GROUNDWATER ENCOUNTERED DURING DRILLING
- ▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

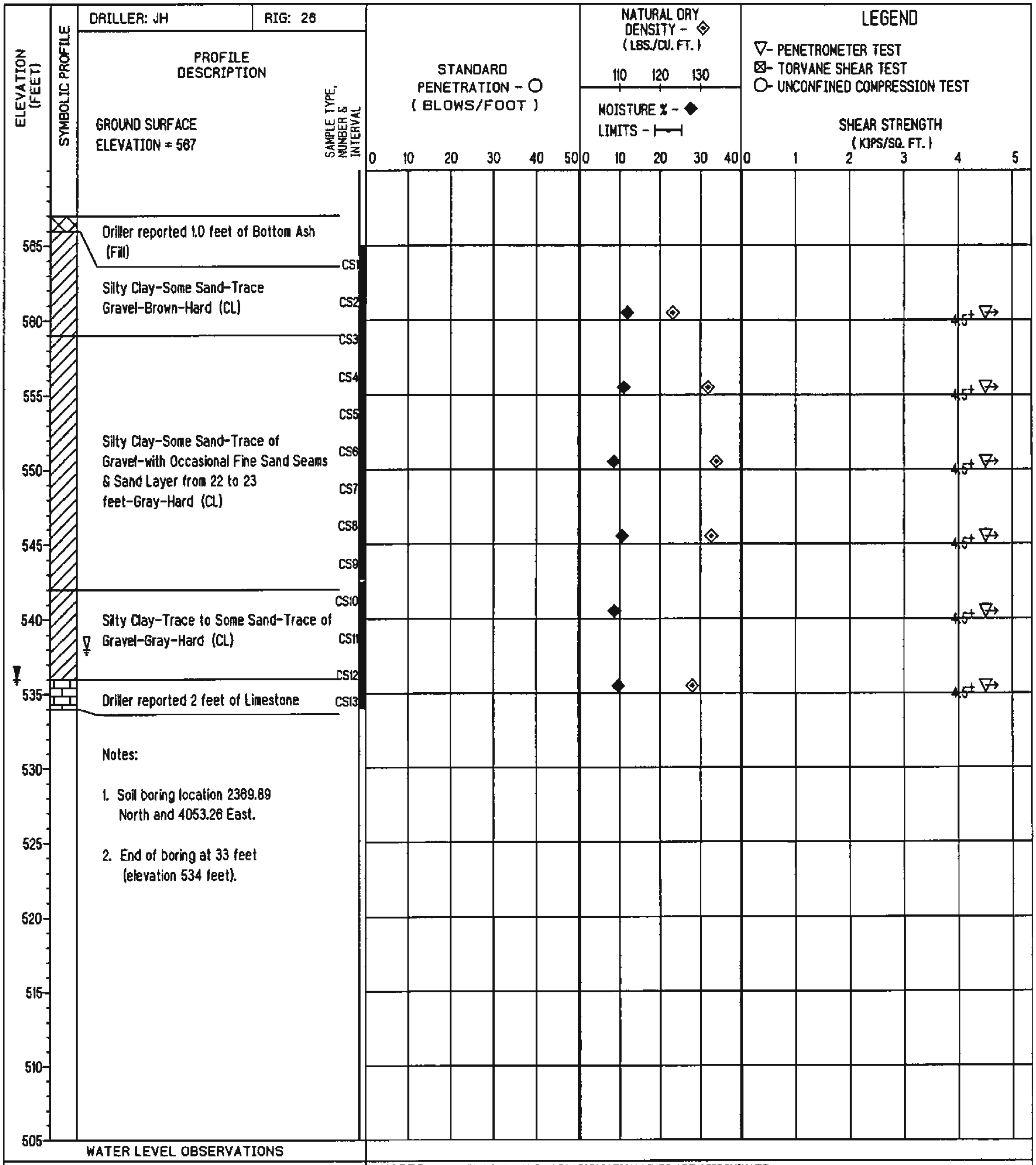
MON 849

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/14/94
JOB NUMBER: PG22087

BORING TB6
SHEET: 1

DRILLER: JH RIG: 26



PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 567

Driller reported 1.0 feet of Bottom Ash (Fill)

Silty Clay-Some Sand-Trace Gravel-Brown-Hard (CL)

Silty Clay-Some Sand-Trace of Gravel-with Occasional Fine Sand Seams & Sand Layer from 22 to 23 feet-Gray-Hard (CL)

Silty Clay-Trace to Some Sand-Trace of Gravel-Gray-Hard (CL)

Driller reported 2 feet of Limestone

Notes:

1. Soil boring location 2369.89 North and 4053.26 East.
2. End of boring at 33 feet (elevation 534 feet).

WATER LEVEL OBSERVATIONS

- ▼ GROUNDWATER ENCOUNTERED DURING DRILLING
- ▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 850

JOB NAME: VERIFICATION OF SOIL BARRIER

A/E:

JOB LOCATION: MONROE, MICHIGAN

BY: SDN **DATE:** 9/13/94

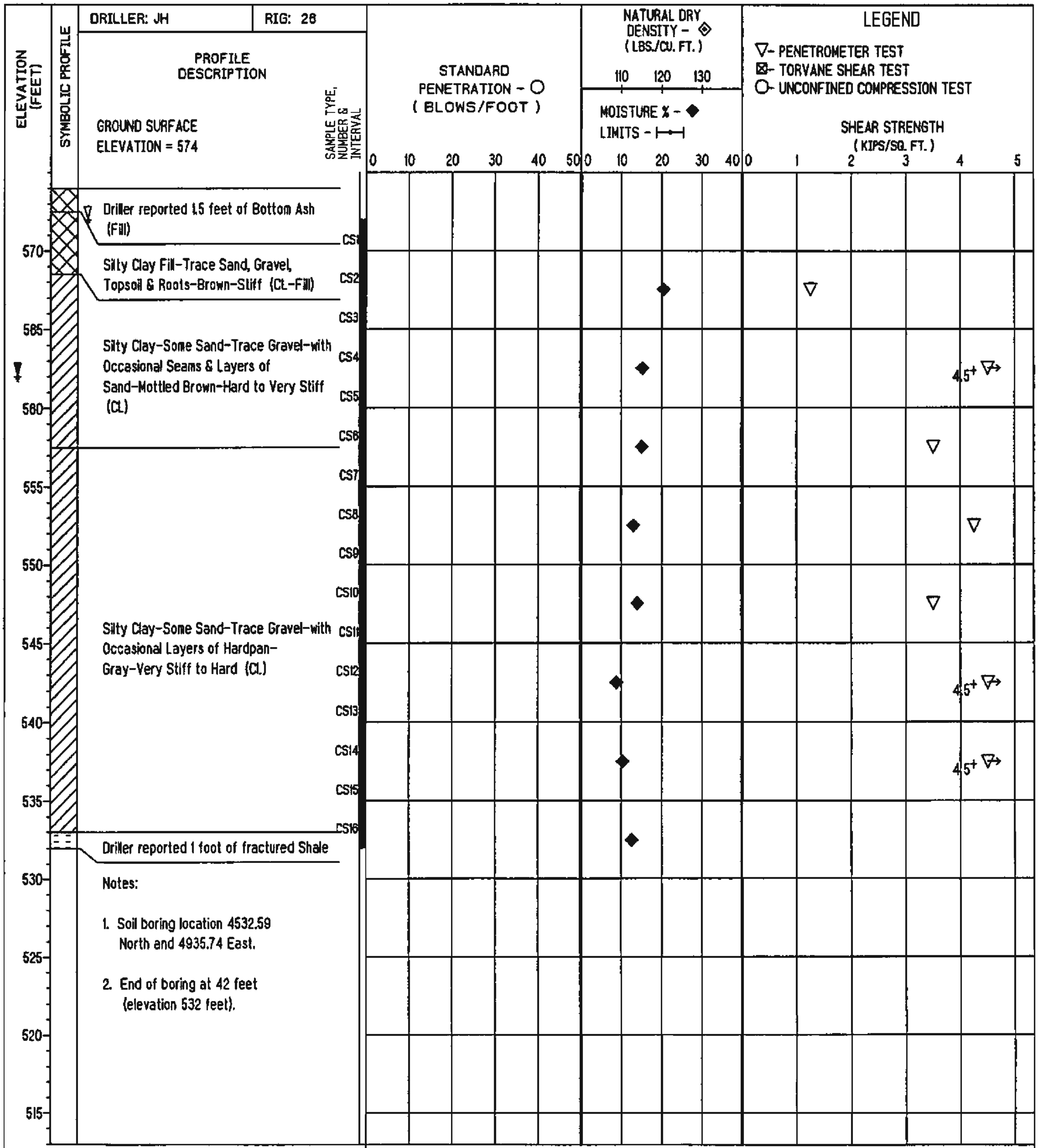
BORING TB7

OWNER: DETROIT EDISON

JOB NUMBER: PG22087

SHEET: 1

DRILLER: JH **RIG:** 28



GROUND SURFACE
ELEVATION = 574

Driller reported 1.5 feet of Bottom Ash (Fill)

Silty Clay Fill-Trace Sand, Gravel, Topsoil & Roots-Brown-Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-with Occasional Seams & Layers of Sand-Mottled Brown-Hard to Very Stiff (CL)

Silty Clay-Some Sand-Trace Gravel-with Occasional Layers of Hardpan-Gray-Very Stiff to Hard (CL)

Driller reported 1 foot of fractured Shale

Notes:

1. Soil boring location 4532.59 North and 4935.74 East.
2. End of boring at 42 feet (elevation 532 feet).

WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

▼ GROUNDWATER 24 HOURS AFTER DRILLING

NOTES:

1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

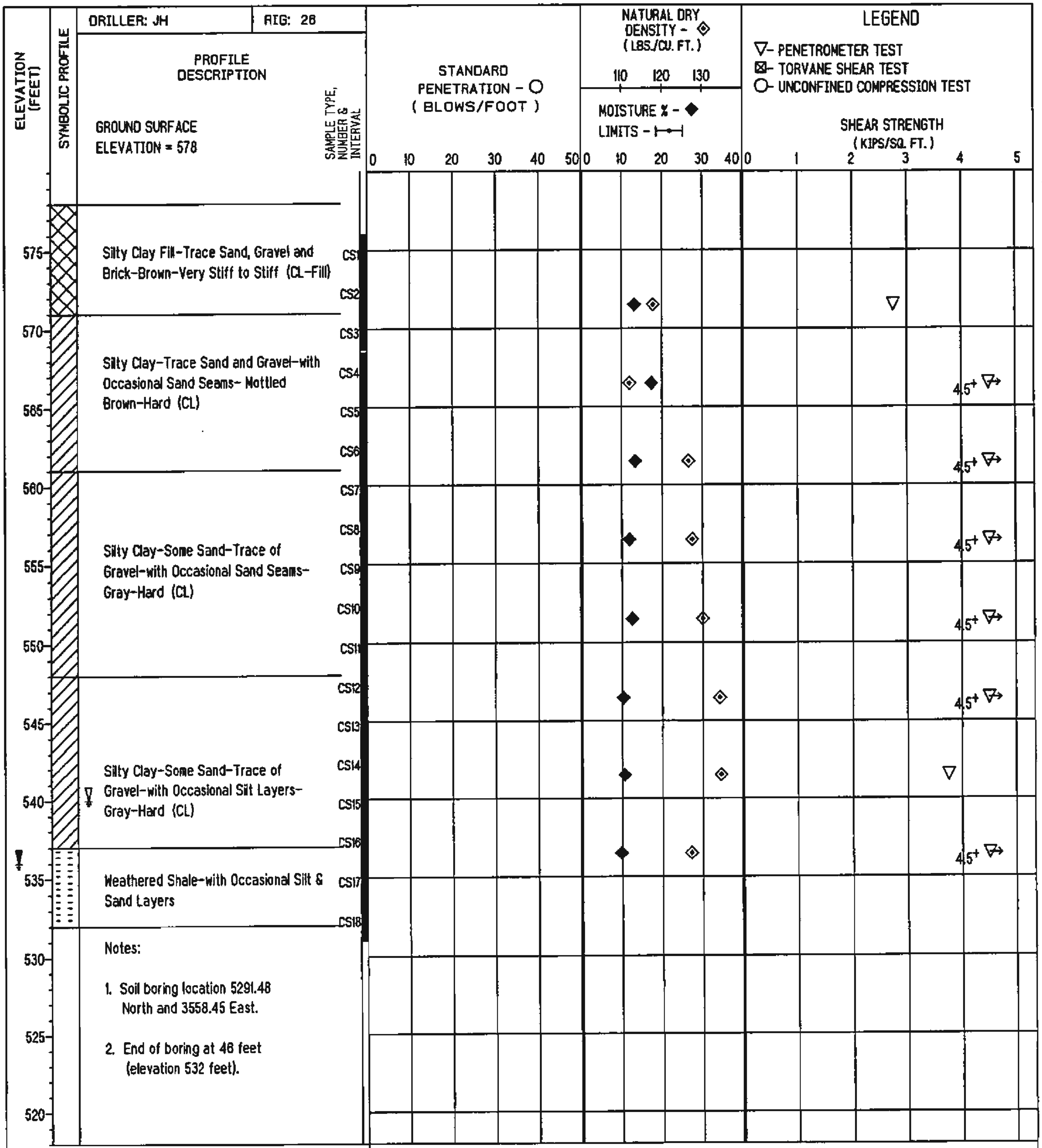
soil and materials engineers, inc.

MON 851

JOB NAME:	VERIFICATION OF SOIL BARRIER	A/E:	
JOB LOCATION:	MONROE, MICHIGAN	BY: LMJ/SDN	DATE: 9/13/94
OWNER:	DETROIT EDISON	JOB NUMBER: PG22087	

BORING TB8

SHEET: 1



GROUND SURFACE ELEVATION = 578

Silty Clay Fill–Trace Sand, Gravel and Brick–Brown–Very Stiff to Stiff (CL–Fill)

Silty Clay–Trace Sand and Gravel–with Occasional Sand Seams– Mottled Brown–Hard (CL)

Silty Clay–Some Sand–Trace of Gravel–with Occasional Sand Seams– Gray–Hard (CL)

Silty Clay–Some Sand–Trace of Gravel–with Occasional Silt Layers– Gray–Hard (CL)

Weathered Shale–with Occasional Silt & Sand Layers

Notes:

1. Soil boring location 5291.48 North and 3558.45 East.
2. End of boring at 46 feet (elevation 532 feet).

WATER LEVEL OBSERVATIONS

⍖ GROUNDWATER ENCOUNTERED DURING DRILLING

⍖ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 852

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/12/94
JOB NUMBER: PG22087

BORING TB9
SHEET: 1

DRILLER: JH RIG: 26

ELEVATION (FEET)

SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 579

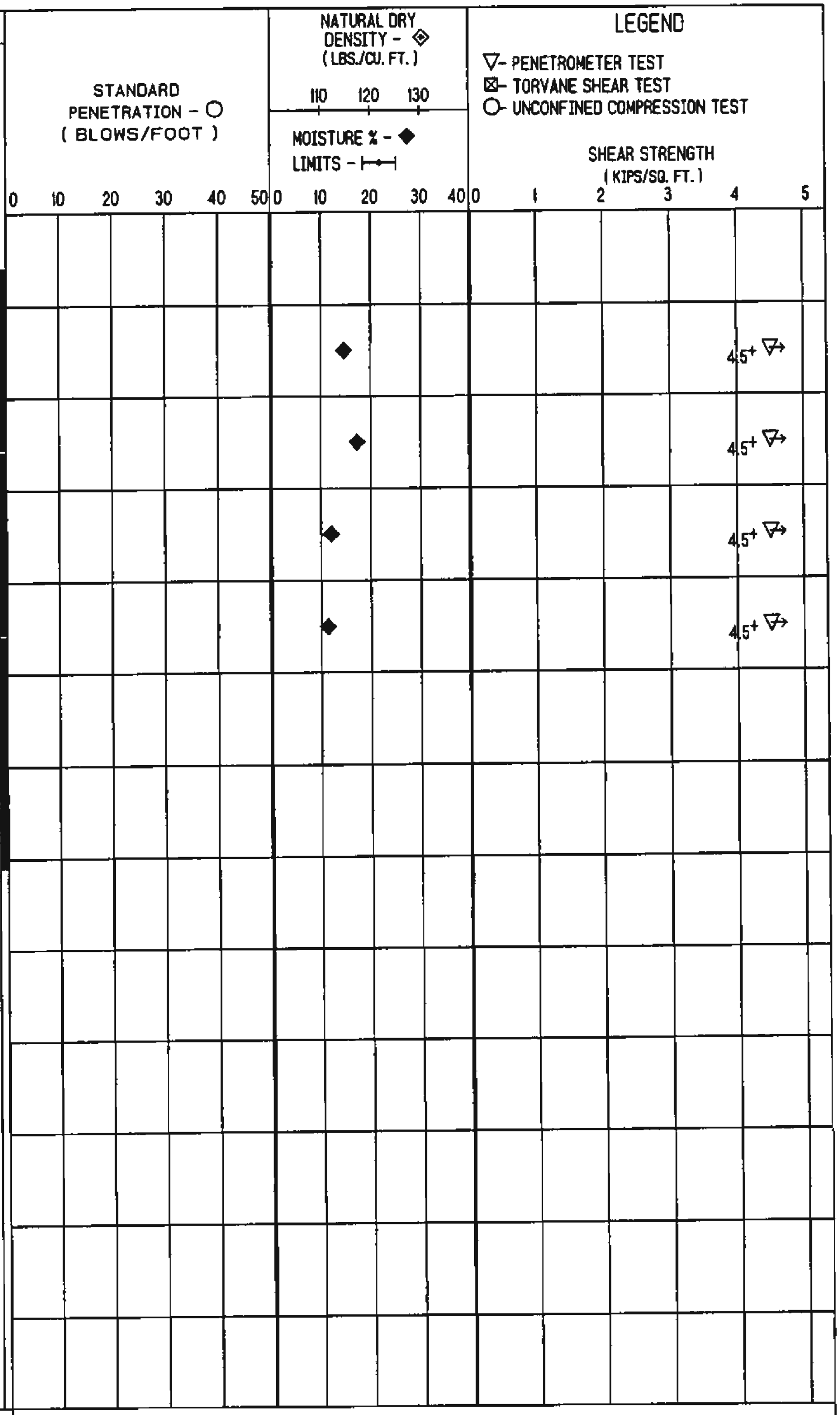
SAMPLE TYPE, NUMBER & INTERVAL

Elevation (feet)	Profile description	Samples
579–574.5	Silty Clay Fill-Trace Sand, Gravel, Topsoil, Roots and Brick Pieces-Brown-Very Stiff (CL-Fill)	CS1 CS2
574.5–562	Silty Clay-Some Sand-Trace Gravel-Brown-Hard (CL)	CS3 CS4 CS5 CS6
562–557	Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)	CS7 CS8
557–551	Fine Sand-Trace to Some Silt-Trace Gravel-with Occasional Clay Layers-Gray-Wet-Medium Dense (SP)	CS9 CS10 CS11
551–545	Driller reported 8 feet of Sandy Clay (Hardpan)-Trace to Some Gravel (CL)	CS12 CS13
545–543.5	Diller reported 1.5 feet of Shale and Limestone	

575 570 565 560 555 550 545 540 535 530 525 520 515

Notes:

1. Soil boring location 5004.06 North and 1977.59 East.
2. Installed PVC well at depth of 27 ft., (elevation 552 feet), backfilled with sand to 20 ft, placed 1 foot of bentonite & grouted to surface.
3. End of boring at 35.5 feet (elevation 543.5 feet).



WATER LEVEL OBSERVATIONS

- ▼ GROUNDWATER ENCOUNTERED DURING DRILLING
- ▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

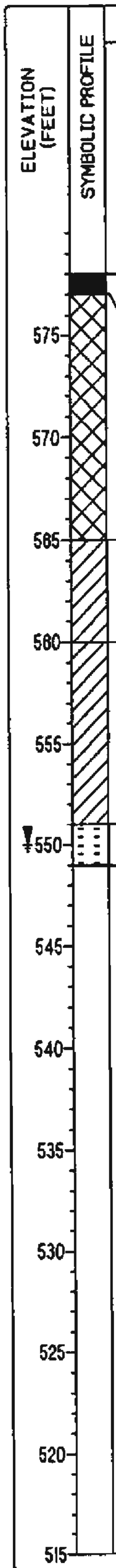
MON 853

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/9/94
JOB NUMBER: PG22087

BORING TB10
SHEET: 1

DRILLER: JH
RIG: 26



PROFILE DESCRIPTION

GROUND SURFACE
ELEVATION = 578

SAMPLE TYPE, NUMBER & INTERVAL

Driller reported 12 inches of Organic Topsoil-Black (Topsoil) — CS1

Silty Clay Fill-Trace to Some Sand, Trace of Gravel, Roots and Brick Pieces-Brown-Very Stiff to Stiff (CL-Fill) — CS2, CS3, CS4, CS5

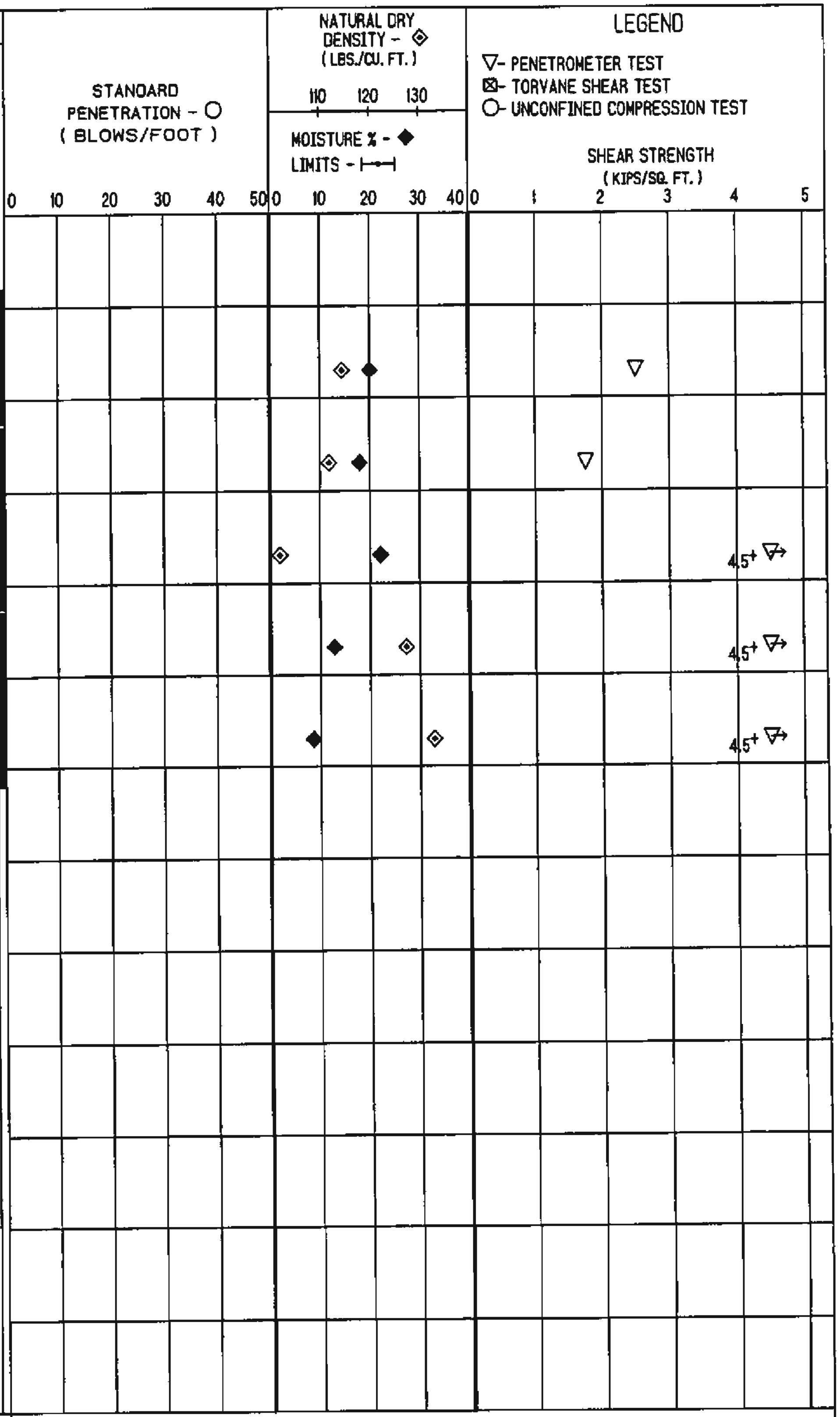
Silty Clay-Trace Sand & Gravel-Mottled Brown-Hard (CL) — CS6, CS7

Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL) — CS8, CS9, CS10

Weathered Shale — CS11

Notes:

1. Soil boring location 4875.58 North & 640.68 East.
2. End of boring at 29 feet (elevation 549 feet).



WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

APPENDIX E – 2016 BORING LOGS

LEGEND

- ✛ MONITORING WELLS
- APPROXIMATE BOUNDARY OF FLY ASH BASIN

NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN MARCH AND MAY 2016.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

DTE ELECTRIC COMPANY
MONROE POWER PLANT FLY ASH BASIN
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:

MONITORING NETWORK AND SITE PLAN

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0001
CHECKED BY:	C. SCIESZKA	**FIGURE 1**	
APPROVED BY:	V. BUENING		
DATE:	OCTOBER 2017		

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trcsolutions.com

FILE NO.: 265996-0001-000_Stat.mxd

Plot Date: 10/4/2017, 13:56:35 PM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0001-000_Stat.mxd

Coordinate System: NAD 1983 UTM Zone 17N (Meter)
Map Rotation: 0

TRC - GIS

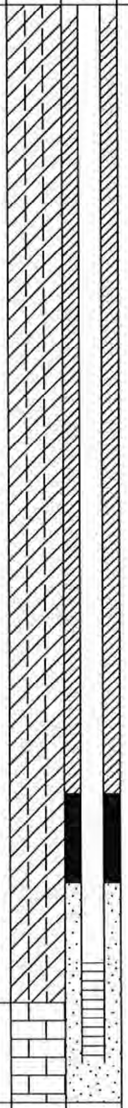
TRC

WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 2/17/16	Date Drilling Completed: 2/17/16	Project Number: 231828.0001.0000	
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 578.91	TOC Elevation (ft) 581.74	Total Depth (ft bgs) 60.0	Borehole Dia. (in) 6
Boring Location: SW of fly ash basin. N: 143121.86 E: 13394675.84		Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic	
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 08:45 ▼ Depth (ft bgs) 2.00		

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG / WELL DIAGRAM	COMMENTS
1 CS	65			▼ **SILTY CLAY** mostly clay, some silt, low plasticity, very dark gray (7.5YR 3/1), no odor, moist, medium stiff, high organic content, roots and grass. Change to no roots at 3.5 feet. Change to hard at 5.0 feet. Change to medium stiff at 5.5 feet. Change to trace to few gravel at 6.0 feet.			
2 CS	95		10	Change to medium plasticity, dark gray (10YR 4/1) mottled with yellowish brown (10YR 5/6), at 12.5 feet. Change to dark gray (10YR 4/1), very stiff at 17.5 feet.			
3 ST	60		20				
4 CS	100				CL-ML		
5 CS	100		30	Change to weathered limestone appearance, light gray (10YR 7/1), slight odor, stiff at 32.5 feet.			
6 CS	95		40	Change to not cohesive at 42.5 feet. Change to little silt, few coarse sand at 43.5 feet. Change to some silt, trace coarse sand at 45.0 feet. Grades to wet from 40 to 48 feet. Change to bedrock fragments encountered, wet at 48.0 feet.			
7 CS	100		50	**LIMESTONE** very weathered, light gray (10YR 7/1), moist, medium dense, similar to silt.			
				End of boring at 55.0 feet below ground surface.			

Signature: JReed

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734-971-7080
Fax 734-971-9022

TRC

WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 1 of 1

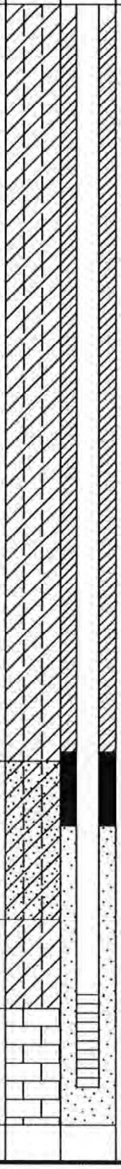
Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 2/18/16	Date Drilling Completed: 2/18/16	Project Number: 231828.0001.0000

Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 579.44	TOC Elevation (ft) 581.81	Total Depth (ft bgs) 55.0	Borehole Dia. (in) 6

Boring Location: S of fly ash basin. N: 140938.78 E: 13396986.03	Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith	Drilling Equipment: TerraSonic

Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 09:30 Depth (ft bgs) -4.82

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	90			**SILTY CLAY** mostly clay, some silt, trace to few sand, trace to few gravel, low plasticity, dark brown (10YR 3/3), no odor, moist, hard. Change to dry at 3.25 feet. Change to dark gray (10YR 4/1) at 5.0 feet.	CL-ML	Artesian well conditions present.
2 CS	95		10	Change to moist at 9.5 feet Change to very stiff at 10.5 feet. Change to dark gray (10YR 4/1), mottled with light reddish brown (5YR 6/3) at 12.0 feet.		
3 ST	65		20			
4 CS	100			Change to no mottling at 25.0 feet.		
5 ST	95		30			
6 CS	100					
7 CS	100		40	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine to coarse sand, low plasticity, dark gray (10YR 4/1), no odor, moist, very stiff. Change to light gray (10YR 7/1), slight odor at 42.5 feet.	CL-ML	
8 CS	100		50	**SILTY CLAY** mostly clay, some silt, few gravel, very low plasticity, light gray (10YR 7/1), slight odor, moist, hard. Change to dry, not cohesive at 51.5 feet.	CL-ML	
				LIMESTONE weathered, slight odor, saturated.		
			60	End of boring at 60.0 feet below ground surface.		



Signature: JReed

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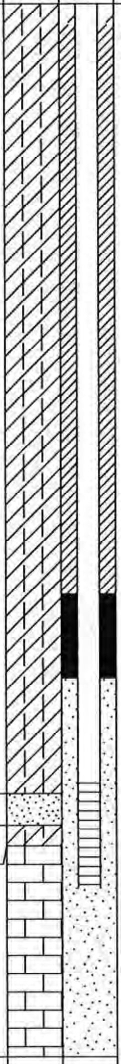
WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 2/16/16	Date Drilling Completed: 2/16/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 577.29	TOC Elevation (ft) 579.95	Total Depth (ft bgs) 50.0
				Borehole Dia. (in) 6
Boring Location: E of fly ash basin. N: 139040.68 E: 13395136.56		Personnel Logged By - Chris Scieszka Driller - Austin Goldsmith		Drilling Equipment: TerraSonic
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 09:25 Depth (ft bgs) -13.95	

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	70			**SILTY CLAY** mostly clay, some silt, low plasticity, very dark brown (10YR 2/2), no odor, moist, medium stiff (2.0 tsf), high organics, roots. Change to no roots, trace fine gravel at 2.5 feet. Change to wood fragments present at 8.0 feet.		Artesian well conditions present.
2 CS	60		10	Change to medium to high plasticity, dark gray (10YR 4/1), mottled with yellowish brown (10YR 5/6) and light reddish brown (5YR 6/3), no organics at 10.0 feet. Change to trace to few fine to coarse sand, trace to few fine gravel low plasticity, yellowish brown (10YR 5/4), at 12.0 feet. Change to dark gray (10YR 4/1), very stiff (3.0 tsf) at 17.0 feet.	CL-ML	
3 ST	100		20			
4 CS	100					
5 CS	100		30	Change to hard (>4.0 tsf) at 30.0 feet.		
				SAND mostly fine to coarse sand, trace to few silt, very dark gray (10YR 3/1), no odor, moist, loose.	SP	
				SILTY CLAY mostly clay, some silt, low plasticity, dark gray (10YR 4/1), no odor, moist, very stiff (3.0 tsf).	CL-ML	
6 CS	100		40	**LIMESTONE** light gray (10YR 7/1), slight odor, weathered, saturated. Change to very weathered, moist at 41.0 feet. Change to competent, dry.		
			50	End of boring at 50.0 feet below ground surface.		



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WELL CONSTRUCTION LOG

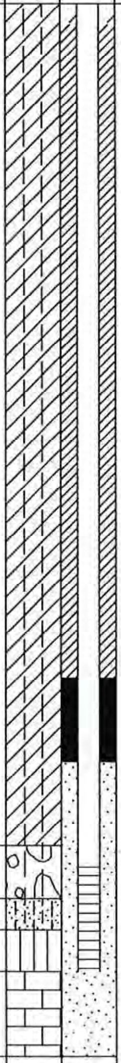
WELL NO. MW-16-04

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 2/15/16		Date Drilling Completed: 2/15/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 582.64	TOC Elevation (ft) 585.54	Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6
Boring Location: N of fly ash basin. N: 140704.67 E: 13390758.97		Personnel Logged By - Chris Scieszka Driller - Austin Goldsmith		Drilling Equipment: TerraSonic	
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time 3/17/16 10:15	Depth (ft bgs) Depth (ft bgs) -19.40	

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	20			**SILTY CLAY** mostly clay, little to some silt, trace to few fine to coarse sand, trace to few fine to coarse gravel, low plasticity, dark brown (10YR 3/3), no odor, dry, hard (>4.0 tsf).		Artesian well conditions present.
2 CS	100		10	Change to soft (0.5 tsf) at 10.0 feet. Change to very stiff (3 to 4 tsf) at 15.0 feet.		
3 ST	80		20	Change to dark gray (10YR 4/1) at 19.0 feet.	CL-ML	
4 CS	100			Change to very stiff to hard (3 to >4 tsf) at 22.0 feet.		
5 CS	100		30	Change to cobble present at 29.5 feet. Change to hard (>4.0 tsf) at 31.0 feet.		
6 CS	80		40	**SILTY GRAVEL** mostly fine to coarse gravel, little to some silt, few fine to coarse sand, gray (10YR 5/1), no odor, saturated, medium dense to dense.	GM	
				SILTY SAND mostly fine to medium sand, little to some silt, gray (10YR 5/1), no odor, moist to saturated, dense to very dense.	SM	
				SILT mostly silt, trace to few fine sand, no plasticity, dark grayish brown (10YR 4/2), no odor, dry, very dense.	ML	
			50	**LIMESTONE** gray (10YR 5/1) to dark gray (10 R 4/1), dry, competent but fractured.		
				End of boring at 50.0 feet below ground surface.		

GRAPHIC LOG / WELL DIAGRAM



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WELL CONSTRUCTION LOG

WELL NO. MW-16-05

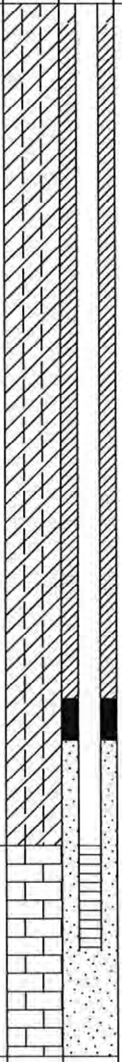
Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 4/12/16	Date Drilling Completed: 4/13/16	Project Number: 231828.0001.0000

Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 580.51	TOC Elevation (ft) 583.25	Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6

Boring Location: S edge of fly ash basin, along farm field edge. N: 139537.14 E: 13392810.51	Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith	Drilling Equipment: TerraSonic

Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 5/5/16 12:47 Depth (ft bgs) -16.70



SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	75			**SILTY CLAY** mostly clay, little to some silt, low plasticity, very dark brown (10YR 2/2), no odor, moist, medium stiff, organic material present, roots and grass. Change to few to little fine to coarse sand at 2.5 feet. Change to brown (10YR 5/3), very stiff, no organic material at 5.0 feet. Change to trace to few gravel, gray (10YR 5/1) at 7.5 feet.		Artesian well conditions present.
2 CS	100		10			
3 CS	100		20		CL-ML	
4 CS	100		30	Change to no to trace fine to medium sand, no gravel, dark gray (10YR 4/1), hard at 30 feet.		
5 CS	100		40	**LIMESTONE** weathered, light gray (10YR 7/1), slight odor, moist to dry. Change to competent at 46.5 feet.		
			50	End of boring at 50.0 feet below ground surface.		

SOIL BORING WELL CONSTRUCTION LOG 231828.0001.GPJ TRC_CORP.GDT 231828.0001.0000 5/16/16

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Fax 734-971-9022

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WELL CONSTRUCTION LOG

WELL NO. MW-16-06

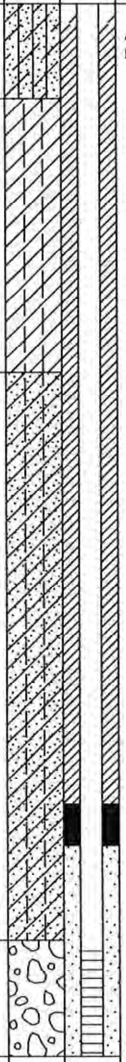
Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 4/13/16	Date Drilling Completed: 4/13/16	Project Number: 231828.0001.0000

Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 579.20	TOC Elevation (ft) 581.94	Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6

Boring Location: NE of fly ash basin, along the river's edge. N: 142566.72 E: 13396398.37	Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith	Drilling Equipment: TerraSonic

Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 5/5/16 09:30 Depth (ft bgs) -3.45



SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
				CLAYEY SILT WITH SAND mostly silt, few to little fine to coarse sand, few to little clay, black (10YR 2/1), no odor, moist, medium stiff, high organic content, roots and grass. Change to very dark gray (10YR 3/1) at 2.5 feet.	ML-CL	Artesian well conditions present.
1 CS	98			**SILTY CLAY** mostly clay, some silt, few to little fine to coarse sand, light yellowish brown (10YR 6/4), moist, medium stiff. Change to brown (10YR 5/3), very stiff to hard at 7.0 feet.	CL-ML	
			10	Change to dark gray (10YR 4/1), hard at 11.5 feet.		
2 CS	100			Change to no to trace sand at 15.0 feet.		
			20	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine to coarse sand, dark gray (10YR 4/1), moist, hard.	CL-ML	
3 CS	100					
			30			
4 CS	100					
			40			
5 CS	100			**GRAVEL AND COBBLES** large broken limestone boulders, and cobbles, saturated.	GP	
			50	End of boring at 50.0 feet below ground surface.		

Signature: Reed

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Fax 734-971-9022

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WELL CONSTRUCTION LOG

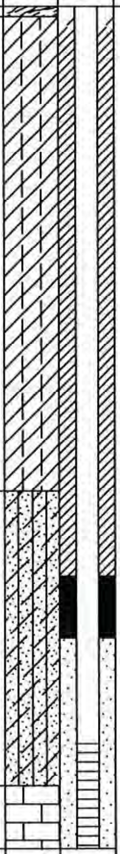
WELL NO. MW-16-07

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 4/14/16	Date Drilling Completed: 4/14/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 575.41	TOC Elevation (ft) 578.40	Total Depth (ft bgs) 40.0
				Borehole Dia. (in) 6
Boring Location: N of fly ash basin, S of E Dunbar Road, W of main gate. N: 143408.82 E: 13392311.01		Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 5/5/16 10:44 Depth (ft bgs)	

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	95		0	**TOPSOIL** **SILTY CLAY** mostly clay, some silt, few to little sand, brown (10YR 5/3) to gray (10YR 5/1), no odor, moist, medium stiff.		Artesian well conditions present.
2 CS	100		10	Change to dark gray (10YR 4/1) at 9.5 feet.	CL-ML	
3 CS	100		20	**SANDY SILT WITH CLAY** mostly silt, little sand, little clay, dark gray (10YR 4/1), moist, medium to very stiff. Change to little to some sand at 25.0 feet. Change to gray (GLEY1 5/N), crumbly at 28.5 feet.		
4 CS	100		30	Change to wet at 35.0 feet. **LIMESTONE** weathered, light gray (10YR 7/1), slight odor, wet. Change to saturated at 39.5 feet.	ML-CL	
			40	End of boring at 40.0 feet below ground surface.		
			50			

GRAPHIC LOG / WELL DIAGRAM



Signature: for J Reed

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APPENDIX F – 2020 BORING LOGS

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-1**

Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847	-83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615	○	6'/6'	B-1-1 (0-6')	GRAVEL (GP) - Gray gravel fill with coarse sand	>4.5, 1.5, 3.5, 1.0	Boring drilled through the crest of the embankment at Station 90+00
	▨			SILTY CLAY (CL) - Dark brown, slight reddish brown mottling, trace coarse and fine gravel, little sand, stiff to hard, moist		
610	▨					
	▨	10.5'/10'	B-1-2 (6-16')	Becomes grayish brown to brown	2.0, 4.0, 3.0, 4.0, 1.0, 3.5, 1.0	
605	▨			Becomes dark brown, more gravelly		
	▨			Becomes less gravelly		
600	▨					
	▨	4'/4'	B-1-3 (16-20')	Becomes medium stiff to very stiff	1.0, 1.0, 2.0, 0.5	
595	▨			Becomes light brown		
	▨	50%	B-1-ST-1 (20-22.5')		>4.5	
590	▨	6'/3.5'	B-1-4 (22.5-26')	Becomes dark brown, slight reddish brown mottling, some coarse gravel and sand, trace fine gravel, stiff to hard, moist	4.0, 1.5, 2.0	

Geosyntec consultants	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**		**Boring: B-1**
Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847 -83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
				Same as above, little sand		
585						
		9.5'/ 10'	B-1-5 (26-36')	Becomes more gravelly from 32' to 35'	2.0, 4.0, 4.5, 4.0, 1.5	
580						
		6'/4'	B-1-6 (36-40')		4.0, 4.5	
575				Becomes medium to dark brown, some sand, hard, moist		
		75%	B-1-ST-2 (40-42.5')		>4.5	
570		6'/3.5'	B-1-7 (42.5-46')	Becomes gray to dark gray, some brown mottling, some coarse gravel and sand, hard, moist to dry	>4.5	
				Same as above, few gravel		
565						
		11'/10'	B-1-8 (46-56')	Same as above, very stiff to hard	>4.5, 3.5, 2.5, 3.0, 2.5, 4.5, 4.0	
560						

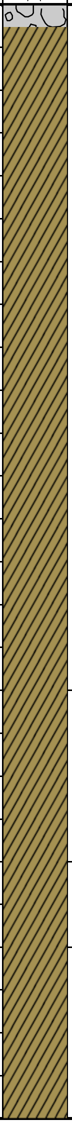
Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-1**

Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847	-83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	5.5'/ 4'	B-1-9 (56-60')	Same as above, very stiff	3.0, 2.0	
	▨	100%	B-1-ST-3 (60-62.5)	Become gray to dark gray, some brown mottling, some coarse gravel and sand, hard, moist to dry	4.5	
550	▨	5'/3.5'	B-1-10 (62.5-66')	Becomes dark gray, some coarse and fine gravel, some sand, very stiff to hard, moist	4.5, 4.5	
	▨	9'/10'	B-1-11 (66-76')		3.0	
545 540	▨			Same as above, beomces few gravel End of boring at 76'		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-2**

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816 -83.3816

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615		4'/6'	B-2-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with sand from 0" to 4" SILTY CLAY (CL) - Light brown silty clay, some sand, few coarse and fine gravel, stiff to hard, moist	>4.5, 2.5, 3.5, 2.5	Boring drilled through the crest of the embankment at Station 110+00
610						
		7'/10'	B-2-2 (6'-16')	Becomes few gravel, little sand, medium stiff to hard, moist Becomes more sandy from 6' to 8'	1.0, 2.5, 1.5, 4.5, 0.5, 0.5	
605						
600				Becomes more gravelly from 15' to 17'		
		3'/4'	B-2-3 (16'-20')		0.5, 0.5, 1.0	
595						
		75%	B-2-ST-2 (20'-22')		1.0	
		4'/4'	B-2-4 (22'-26')	Becomes sandier, few coarse and fine gravel, medium stiff to hard, moist Slight reddish-brown mottling from 24' to 25'	1.0, >4.5, 3.5	
590						

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-2

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816	-83.3816

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585	▨	8'/10'	B-2-5 (26'-36')	Same as above	2.0, 4.0, >4.5, 3.5, 1.5	
580	▨			Becomes dark brown, few reddish-brown mottling, coarse gravel, little sand, stiff to hard, moist		
575	▨	7'/10'	B-2-6 (36'-46')		1.5, 2.5, >4.5, 2.5, 2.5, 1.5	
570	▨			Becomes dark gray to brownish gray, few reddish-brown mottling, stiff to hard, moist		
565	▨	10'/10'	B-2-7 (46'-56')		1.5, 3.0, 1.5, 2.5, >4.5, 4.5	
560	▨					

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-2**

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816	-83.3816

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨			Becomes very stiff to hard		
555	▨	10'/10'	B-2-8 (56'-66')	Same as above, with white to light gray gravelly coarse sand, some coarse gravel from 59' to 60'	4.5, 2.5, >4.5, >4.5, >4.5	
550	▨					
	▨			Becomes medium gray, moist to wet, slight odor		
545	▨	10'/10'	B-2-9 (66'-76')	Becomes more gravelly	>4.5, >4.5, 2.5, 1.5, 3.0, 2.0, 4.0	
540	▨			*End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-3**

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785	-83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615				GRAVEL (GP) - Gray gravel fill with coarse sand 0" to 6"		Boring drilled through the crest of the embankment at Station 130+00
610		7'/10'	B-3-1 (0'-10')	SILTY CLAY (CL) - Medium brown with few reddish-brown mottling, trace gravel, little sand, medium stiff to hard, moist to dry	2.5, 3.0, 4.5, >4.5, 0.5	
605 600		3.5'/6'	B-3-2 (10'-16')	Same as above, with consistency from stiff to hard Becomes less sandy, more silty	4.0, 1.5, 2.0	
595 590		8'/10'	B-3-3 (16'-26')	Same as above, becomes dark brown with few reddish-brown mottling, trace gravel, stiff to hard, moist to dry Slight reddish-brown mottling from 24' to 25'	1.5, 2.5, 2.5, 4.5	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-3**

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785	-83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585 580	▨	9'/10'	B-3-4 (26'-36')	Same as above	3.0, 3.0, 4.0, >4.5	
575 570	▨	10'/10'	B-3-5 (36'-46')	Same as above, no gravel Becomes less sandy, more silty	4.0, 2.5, 3.5, 4.5, >4.5	
565 560	▨	10'/10'	B-3-6 (46'-56')	Some reddish-brown mottling, more gravelly Color changes gradually from brown to gray from 50 to 53'	>4.5, 3.5, 4.0, 3.5, 4.0, 3.0, 4.0, 3.0, 2.5	

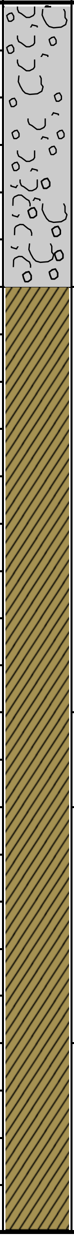
Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-3**

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785	-83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555 550	▨	10'/10'	B-3-7 (56'-66')	Becomes medium gray, trace gravel, little sand, moist Becomes more gravelly Trace white fine sand, becomes more gravelly Becomes dark gray, more gravelly, some medium to coarse sand, few clay, dry	3.0, 1.5, 0.5, 1.0, 1.5, <0.5	
545 540	▨	10'/10'	B-3-8 (66'-76')	Same as above *End of boring at 76'*	>4.5, >4.5, >4.5, >4.5	Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

	Client: DTE Energy **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-4**

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779	-83.3696



Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610		3.5'/6'	B-4-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0" to 6" Becomes light brown		Boring drilled through the crest of the embankment at Station 150+00
605		3'/9'	B-4-2 (6'-15')	SILTY CLAY (CL) - Light to medium brown, little coarse gravel, few fine gravel, few sand, stiff to very stiff, moist	1.5, 1.5, 1.5, 2.5	
600		83%	B-4-ST-1 (15'-17')	Becomes trace gravel, little sand	4.0	
595		3.5'/4'	B-4-3 (17'-21')	Becomes less gravelly; few reddish-brown mottling	1.5, 1.5, 4.0	
590		4'/5'	B-4-4 (21'-26')		1.5, 2.0, 3.0	

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779	-83.3696

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨	10'/14'	B-4-5 (26-30')	Same as above, with medium stiff to very stiff consistency	0.5, 3.5	
585	▨		B-4-6 (30'-35')	Becomes medium to dark brown, very stiff to hard, moist to dry	2.0, 2.0, 2.5, 3.5	
580	▨		B-4-7 (35'-40')	Same as above Becomes brownish-gray from 39.5' to 40'	>4.5, 3.5	
575	▨	96%	B-4-ST-2 (40'-42')		3.5	
	▨	3'/4'	B-4-8 (42'-46')	Same as above	4.5	
570	▨	11'/9'	B-4-9 (46'-51')	Becomes less gravelly	2.5, 4.5, 4.5	
565	▨		B-4-10 (51'-55')	Becomes dark gray, few brown mottling, some fine gravel, little coarse gravel, little sand, very stiff to hard, dry	3.5, >4.5, >4.5, 3.5	
560	▨	100%	B-4-ST-3 (55'-57.5')	Becomes trace gravel	> 4.5	

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779	-83.3696

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6/5.5'	B-4-11 (57.5'-63')		1.5, >4.5	
550	▨	3'/3'	B-4-12 (63'-66')	Becomes CL-ML, few gravel, some sand, stiff to hard, dry 3" dark gray sand seam at 65.5'	> 4.5	
	▨	6.5'/4'	B-4-13 (66'-70')	Becomes medium gray, little coarse black sand, few coarse and fine gravel, stiff to hard, moist	> 4.5, 2.5, 2.0	
545	▨	83%	B-4-ST-3 (70'-72.5')		4.0	
540	▨	6'/3.5'	B-4-14 (72.5-76)	Becomes sandy, wet at 72.5' to 73.5' *End of boring at 76'*	1.5, >4.5	Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-5**

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813 -83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615		4'/6'	B-5-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0' to 1'		Boring drilled through the crest of the embankment at Station 170+00
				SILTY CLAY - Medium to dark brown, little coarse gravel, few fine gravel, few sand, medium stiff to very stiff, moist	4.0, 4.0, 0.5, 2.0	
610		9.5'/10'	B-5-2 (6'-11')	Becomes trace gravel, little sand Trace reddish-brown mottling from 6' to 8'	1.5, 1.5, 2.5, 2.0, 1.0	
605			B-5-3 (11'-16')	Few gray silt 11' to 12'		
600		3'/5'	B-5-4 (16'-21')	Same as above, with medium stiff consistency Increasing gray silt from 17' to 22'	1.5, 1.5, 1.5	
595		2'/5'	B-5-5 (21'-26')	Becomes medium to dark brown, little coarse gravel, few fine gravel, few sand, very stiff, moist	3.5, 2.5	
590						

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813 -83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585	▨	8.5'/10'	B-5-6 (26'-31')	Becomes trace gravel, little sand Becomes dark brown, some coarse gravel, little fine gravel, little sand, very stiff to hard, moist to dry	4.5, 4.5, 4.5, >4.5, 3.5	
580			B-5-7 (31'-36')			
575		7'/6'	B-5-8 (36'-42')	Becomes trace gravel, few sand	2.5, 4.5, 2.5	
570		4'/4'	B-5-9 (42'-46')	Same as above	>4.5, 2.5	
565		11'/10'	B-5-10 (46'-51')	Becomes less gravelly	>4.5, 2.5, 3.0, 2.0, >4.5,	
560			B-5-11 (51'-56')	Becomes medium gray, very stiff to hard, moist to dry		

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813 -83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6'/5'	B-5-12 (56'-61')	Same as above	4.0, 2.5	
550	▨	5'/5'	B-5-13 (61'-66')	Becomes medium gray, stiff to very stiff Becomes less gravelly from 62' to 69'	3.5, 2.5	
	▨	2.5'/4'	B-5-14 (66'-70')	Same as above	1.5, 1.0, 2.0	
545		Attempted to collect Shelby Tube sample, no recovery				Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout
540	░	27%	B-5-ST-1 (73.5'-76')	SILTY SAND (SM), medium gray, trace gravel *End of boring at 76'*		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-6**	
Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857 -83.362

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615	⁘	6/6'	B-6-1 (0'-6')	GRAVEL (GP) - Medium gray gravel fill with coarse sand 0' to 1.5'		Boring drilled through the crest of the embankment at Station 8+00
610	▨			SILTY CLAY (CL) - Medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, stiff to very stiff, moist to dry	3.5, 2.0, 1.5	
605	▨	9.5'/10'	B-6-2 (6'-11')	Becomes trace gravel, little sand	2.5, 3.5, 3.0, 1.5, 2.0	
600	▨		B-6-3 (11'-16")	Pockets of few gray silty clay from 12' to 14'		
595	▨	4'/5'	B-6-4 (16'-21')	Same as above	2.0, 1.5	
590	▨	4'/4'	B-6-5 (21'-25')	Becomes medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, very stiff, moist to dry	2.5, 3.0	

Geosyntec consultants engineers | scientists | innovators	Client: DTE Energy Project: DTE Monroe Alternative Liner Demonstration Boring Logs Monroe Power Plant	Boring: B-6

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857 -83.362

Elevation (ft. amsl)	LITHOLOGY	RECOVERY	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
	▨	73%	B-6-ST-1 (25'-27')	Becomes less sandy	3.5	
585	▨	11'/9'	B-6-6 (27'-31')	Reddish-brown mottling becomes more abundant	4.0, 3.5, 1.5, 2.0, 4.0, 2.5	
580	▨		B-6-7 (31'-36')	Becomes few gravel, with pockets of gray silty clay		
575	▨	4'/4'	B-6-8 (36'-40')	Same as above, with very stiff to hard consistency Becomes less gravelly from 36' to 45'	>4.5, 4.5, 3.0, 2.5	
	▨	50%	B-6-ST-2 (40'-42.5')	Becomes trace gravel	>4.5	
570	▨	13.5'/12.5'	B-6-9 (42.5'-45')	Becomes medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, stiff to very stiff, moist to dry	3.0, 1.5	
565	▨		B-6-10 (45'-50')	Becomes dark brown, some gray mottling, trace gravel, little sand, very stiff to hard, moist to dry	3.0, 2.0, >4.5, >4.5, >4.5, 2.5	
560	▨		B-6-11 (50'-55')	Becomes medium gray, little coarse gravel, few fine gravel, few sand, very stiff to hard, moist to dry		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-6**

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857	-83.362

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨	100%	B-6-ST-3 (55'-57.5')	Becomes more sandy	>4.5	Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout
555		2.5'/ 2.5'	B-6-12 (57.5'-60')	Becomes dark gray, some coarse gravel, little fine gravel, little sand, hard, dry	>4.5	
550		5'/5'	B-6-13 (60'-65')	Becomes trace gravel	>4.5, >4.5, >4.5	
		100%	B-6-ST-4 (65'-67.5')		>4.5	
545		9'/7.5'	B-6-14 (67.5'-70')	Becomes less gravelly	>4.5	
540			B-6-15 (70'-76')	Becomes more gravelly Some coarse gray sand *End of boring at 76'*	>4.5, >4.5	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-7**

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878	-83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615	○	4'/6'	B-7-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0' to 1'		Boring drilled through the crest of the embankment at Station 28+00
	▨			SILTY CLAY (CL) - Medium to dark brown, few reddish-brown mottling, trace gravel, little sand, stiff to very stiff, moist to dry	3.5, 3.5, 2.0	
610	▨	8'/10'	B-7-2 (6'-11')	Becomes less gravelly and sandy Few gray silty clay from 7' to 20'	2.0, 1.5, 2.0, 2.5, 2.5, 3.5	
605	▨		B-7-3 (11'-16')	Same as above		
600	▨	4'/5'	B-7-4 (16'-21')	Same as above, with consistency from medium stiff to hard	2.0, 2.5, 4.5	
595	▨	4'/5'	B-7-5 (21'-26')	Becomes medium to dark brown, few reddish-brown mottling, stiff to very stiff, moist to dry	2.0, 1.5, 2.5	
590	▨					

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-7

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878	-83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585	▨	9.5'/10'	B-7-6 (26-31")	Few grayish-black silty clay from 26' to 28' Becomes dark brown, some gray silty clay interspersed, little reddish-brown mottling, very stiff to hard, moist	2.0, 2.5, >4.5, 4.5, >4.5, 4.5	
580	▨		B-7-7 (31'-36')			
575	▨	3'/5'	B-7-8 (36'-41')	Same as above	2.5, 4.5	
570	▨	3'/5'	B-7-9 (41'-46')	Same as above	>4.5, 3.5	
565	▨	9.5'/10'	B-7-10 (46'-51')	Becomes medium gray, moist to dry	4.0, 3.0, 3.0, >4.5	
560	▨		B-7-11 (51'-56')			

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-7**

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878 -83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	5.5'/5'	B-7-12 (56'-61')	Same as above, with hard consistency	4.0, 4.5, >4.5	
	▨	6'/4'	B-7-13 (61'-65')	Becomes more sandy beginning at 64'	2.5, 4.0	
550	▨	100%	B-7-ST-1 (65'-67.5')		>4.5	
545	▨	10.5'/ 8.5'	B-7-14 (67.5'-71')	Becomes medium to dark gray, hard, dry	>4.5, >4.5, >4.5	
540	▨		B-7-15 (71'-76')	Becomes more gravelly Becomes moist to wet *End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

	Client: DTE Energy **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-8**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884	-83.3747

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610		4'/6'	B-8-1 (0'-6')	GRAVEL (GP) - Light to medium gray gravel fill Becomes brown, clayey, and moist at 3' Becomes light gray, sandy at 4'		Boring drilled through the crest of the embankment at Station 48+00
605		7'/10'	B-8-2 (6'-11')	SILTY CLAY (CL) - Medium to dark brown, few gravel, little sand, very stiff to hard, moist	4.0, 3.5, 3.0, 2.5, >4.5	
600			B-8-3 (11'-16")	Same as above		
595		3.5'/5'	B-8-4 (16'-21')	Becomes trace gravel, stiff to very stiff consistency	3.0, 2.0, 3.0	
590		3.5'/5'	B-8-5 (21'-26')	Becomes medium to dark brown, stiff to very stiff Few gray silty clay from 23' to 26'	2.5, 2.0	

Geosyntec consultants engineers | scientists | innovators	Client: DTE Energy Project: DTE Monroe Alternative Liner Demonstration Boring Logs Monroe Power Plant	Boring: B-8

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884 -83.3747

Elevation (ft. amsl)	LITHOLOGY	RECOVERY	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
585	▨	7.5'/10'	B-8-6 (26-31")	Same as above	1.0, 3.5, 4.5	
580	▨		B-8-7 (31'-36')	Few gray silty clay at 32'		
575	▨	6.5'/5'	B-8-8 (36'-41')	Becomes dark brown with few gray silty clay, few reddish-brown mottling very stiff to hard, moist	3.5, >4.5	
570	▨	5'/5'	B-8-9 (41'-46')	Same as above	>4.5, >4.5, 3.5, 2.5	
565	▨	12'/10'	B-8-10 (46'-51')	Becomes more gravelly Becomes medium to dark gray, few gravel, some reddish-brown mottling, few black mottling, moist to dry	3.5, 3.5, 3.5, >4.5, >4.5	
560	▨		B-8-11 (51'-56')			

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-8**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884	-83.3747

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6'/5'	B-8-12 (56'-61')	Becomes more sandy	2.5, 4.0, 4.5, >4.5	
550	▨	6'/5'	B-8-13 (61'-66')	Becomes more gravelly and sandy at 65.5'	>4.5, >4.5, 2.5, 4.0	
545	▧	8.5'/10'	B-8-14 (66'-71')	CLAYEY GRAVEL (GC) - Light to dark gray some sand and clay, wet, slight odor		
540	▧		B-8-15 (71'-76')	Becomes sandier, dry, stronger odor *End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**		**Boring: B-9**
Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893 | -83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610	○	3.5'/6'	B-9-1 (0'-6')	GRAVEL - Light gray to light brown gravel fill with coarse sand from 0' to 6' Becomes sandy at 2'		Boring drilled through the crest of the embankment at Station 68+00
605	▨	9.5'/10'	B-9-2 (6'-11')	SILTY CLAY - Medium to dark brown, few coarse and fine gravel, few sand, very stiff to hard, moist	3.5, 2.5, 3.5, 4.5, 4.0	
600	▨		B-9-3 (11'-16")	Same as above		
595	▨	5'/5'	B-9-4 (16'-21')	Becomes trace gravel, little sand	3.5, 4.0	
	▨	4'/4'	B-9-5 (21'-25')	Becomes less gravelly from 25' to 32'	>4.5, >4.5, 4.0	

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-9

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893 -83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
590		100%	B-9-ST-1 (25'-27')	Becomes few sand	3.0	
		9.5'/9'	B-9-6 (27'-30')	Same as above, with very stiff to hard consistency	2.0, 3.0, >4.5, 4.0, 4.5	
585 580			B-9-7 (30'-36')	Pockets of gray silty clay from 33' to 36', becomes sandier		
		4'/4'	B-9-8 (36'-40')	Becomes brownish gray from 36' to 38'	1.5, 3.5, 3.5	
575		100%	B-9-ST-2 (40'-42')	Becomes more gravelly	4.5	
		6'/4'	B-9-9 (42'-46')	Few pinkish-red clay at 42' Becomes dark brown, few reddish-brown mottling, trace gravel, little sand, hard, moist	4.5, >4.5	
570		11.5'/9'	B-9-10 (46'-50')		>4.5, 3.5, 3.0, 4.5	
565			B-9-11 (50'-55')	Becomes medium to dark gray, some reddish-brown mottling, few coarse and fine gravel, few sand, very stiff to hard, moist		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-9**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893	-83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
560	▨	63%	B-9-ST-3 (55'-57')	Becomes sandier	4.0	
		6'/5'	B-9-12 (57'-60')	Becomes less sandy, hard consistency	4.0	
555		5'/5'	B-9-13 (60'-65')	Becomes more gravelly at 63' Becomes dark gray, sandy at 64.5'	>4.5, >4.5, 4.5	
550		33%	B-9-ST-4 (65'-67')	*End of boring at 67' (refusal)*		

APPENDIX G – 1970's LABORATORY TEST RESULTS

UNIFIED SOIL CLASSIFICATION

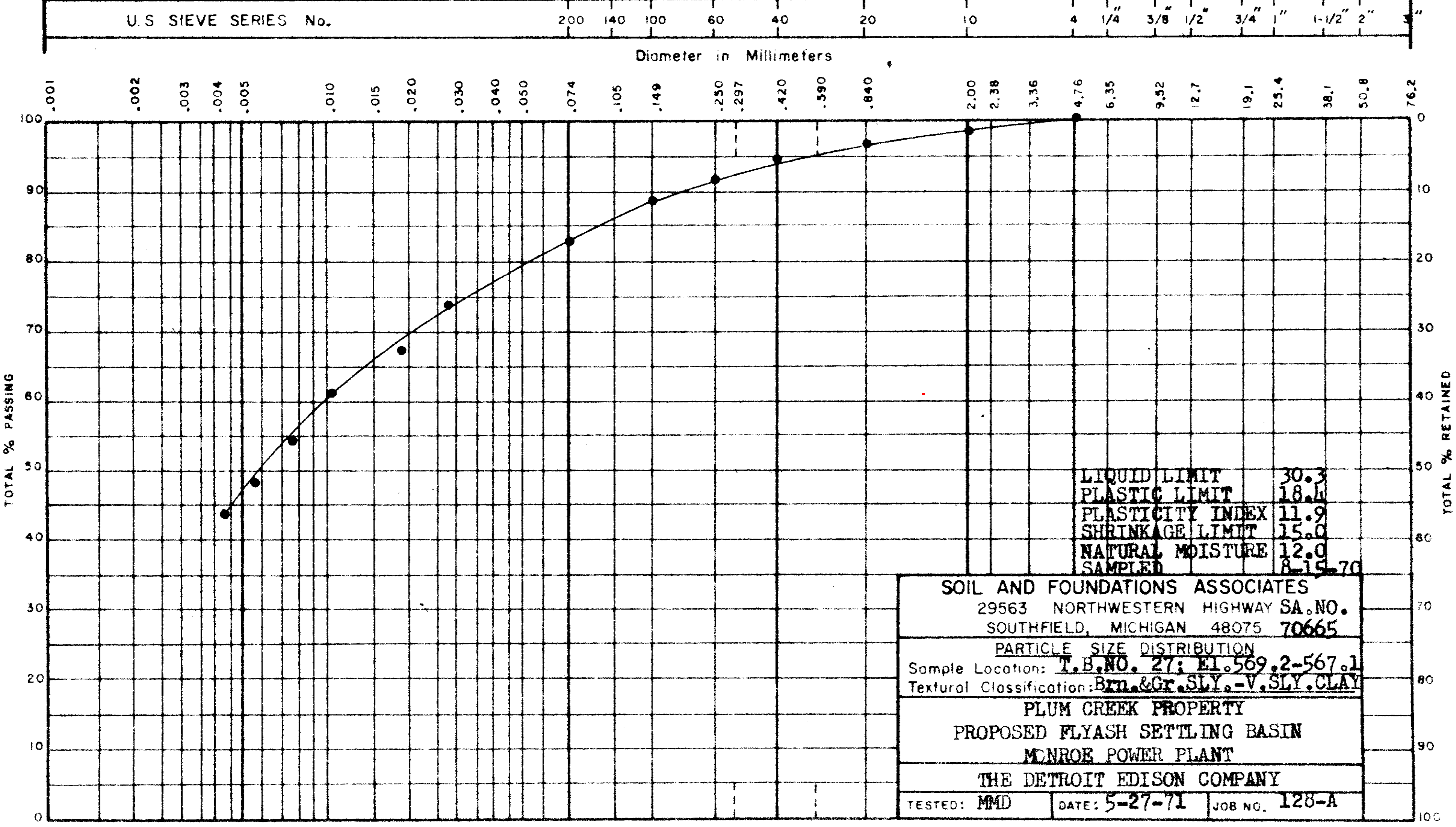
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 47 %	Silt 36 %	Fine Sand 11 %	Medium Sand 05 %	C. Sand 01 %	Gravel 00 %



LIQUID LIMIT	30.3
PLASTIC LIMIT	18.4
PLASTICITY INDEX	11.9
SHRINKAGE LIMIT	15.0
NATURAL MOISTURE	12.0
SAMPLED	8-15-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA.NO. 70665

PARTICLE SIZE DISTRIBUTION

Sample Location: T.B.NO. 27; El.569.2-567.1

Textural Classification: Brn.&Gr.SLY.-V.SLY.CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD	DATE: 5-27-71	JOB NO. 128-A

UNIFIED SOIL CLASSIFICATION

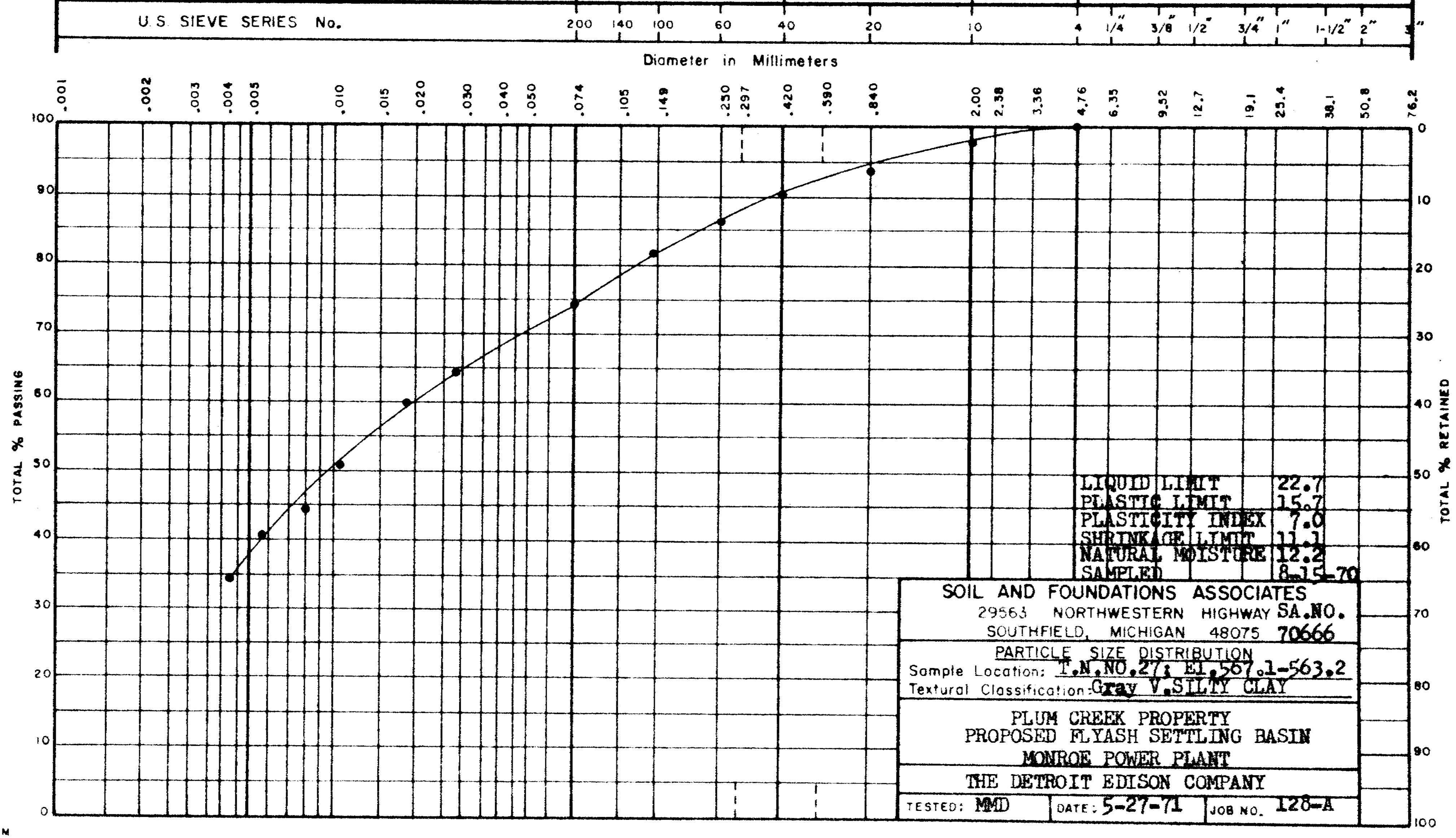
Clay & Silt ___ % | Fine Sand ___ % | Medium Sand ___ % | C. Sand ___ % | Fine Gravel ___ % | Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ % | Silt ___ % | Fine Sand ___ % | Coarse Sand ___ % | Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 % | Silt 36 % | Fine Sand 16 % | Medium Sand 08 % | C. Sand 02 % | Gravel 00 %



LIQUID LIMIT 22.7
PLASTIC LIMIT 15.7
PLASTICITY INDEX 7.0
SHRINKAGE LIMIT 11.1
NATURAL MOISTURE 12.2
SAMPLED 8-15-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA.NO. 70666

PARTICLE SIZE DISTRIBUTION
Sample Location: T.N.NO.27; El.567.1-563.2
Textural Classification: Gray V.SILTY CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD | DATE: 5-27-71 | JOB NO. 128-A

SFA FORM 6

UNIFIED SOIL CLASSIFICATION

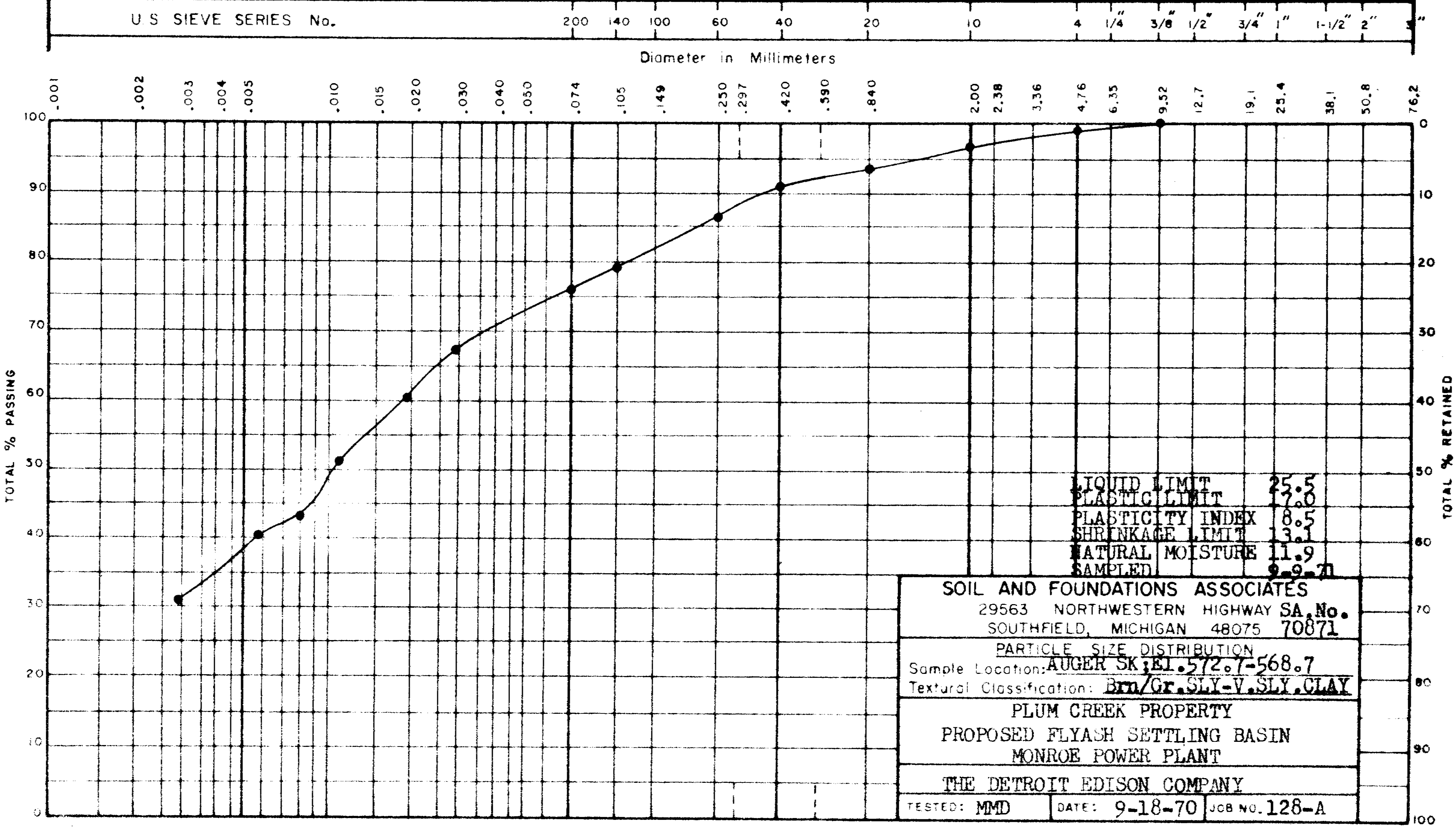
Clay & Silt ____%	Fine Sand ____%	Medium Sand ____%	C. Sand ____%	Fine Gravel ____%	Cse. Gravel ____%

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____%	Silt ____%	Fine Sand ____%	Coarse Sand ____%	Gravel ____%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 %	Silt 38 %	Fine Sand 15 %	Medium Sand 06 %	C. Sand 02 %	Gravel 01 %



LIQUID LIMIT 25.5
PLASTIC LIMIT 17.0
PLASTICITY INDEX 8.5
SHRINKAGE LIMIT 13.1
NATURAL MOISTURE 11.9
SAMPLED 9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. No. 70871

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SK; El. 572.7-568.7

Textural Classification: Brn/Gr. SLY-V. SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD	DATE: 9-18-70	JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

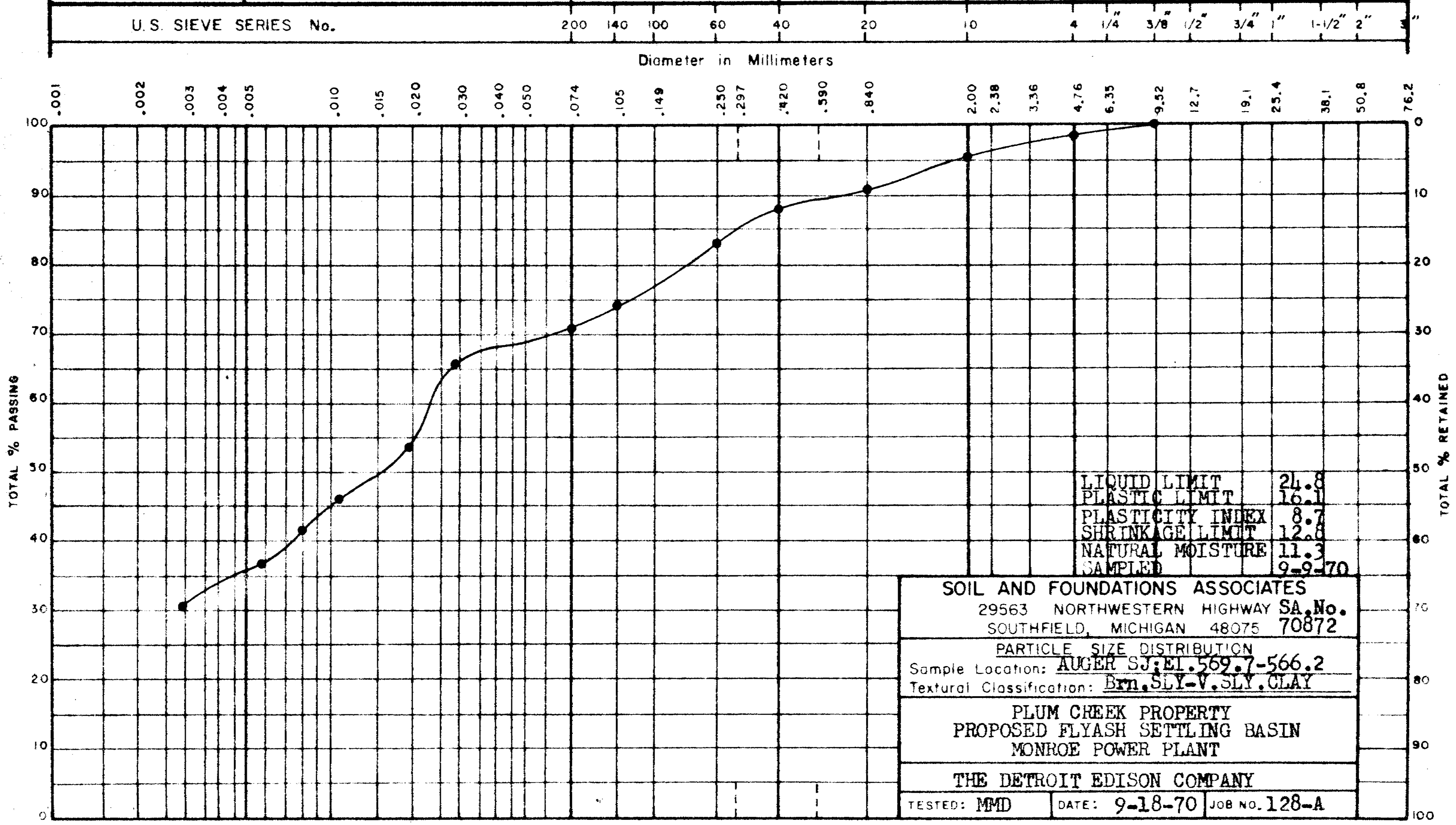
Clay & Silt ____ %	Fine Sand ____ %	Medium Sand ____ %	C. Sand __ %	Fine Gravel ____ %	Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ %	Silt ____ %	Fine Sand ____ %	Coarse Sand ____ %	Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 36 %	Silt 35 %	Fine Sand 17 %	Medium Sand 08 %	C. Sand 03 %	Gravel 01 %



LIQUID LIMIT	24.8
PLASTIC LIMIT	16.1
PLASTICITY INDEX	8.7
SHRINKAGE LIMIT	12.8
NATURAL MOISTURE	11.3
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA.No. 70872

PARTICLE SIZE DISTRIBUTION
Sample Location: AUGER SJ;El.569.7-566.2
Textural Classification: Brn.SLY-V.SLY.CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD DATE: 9-18-70 JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

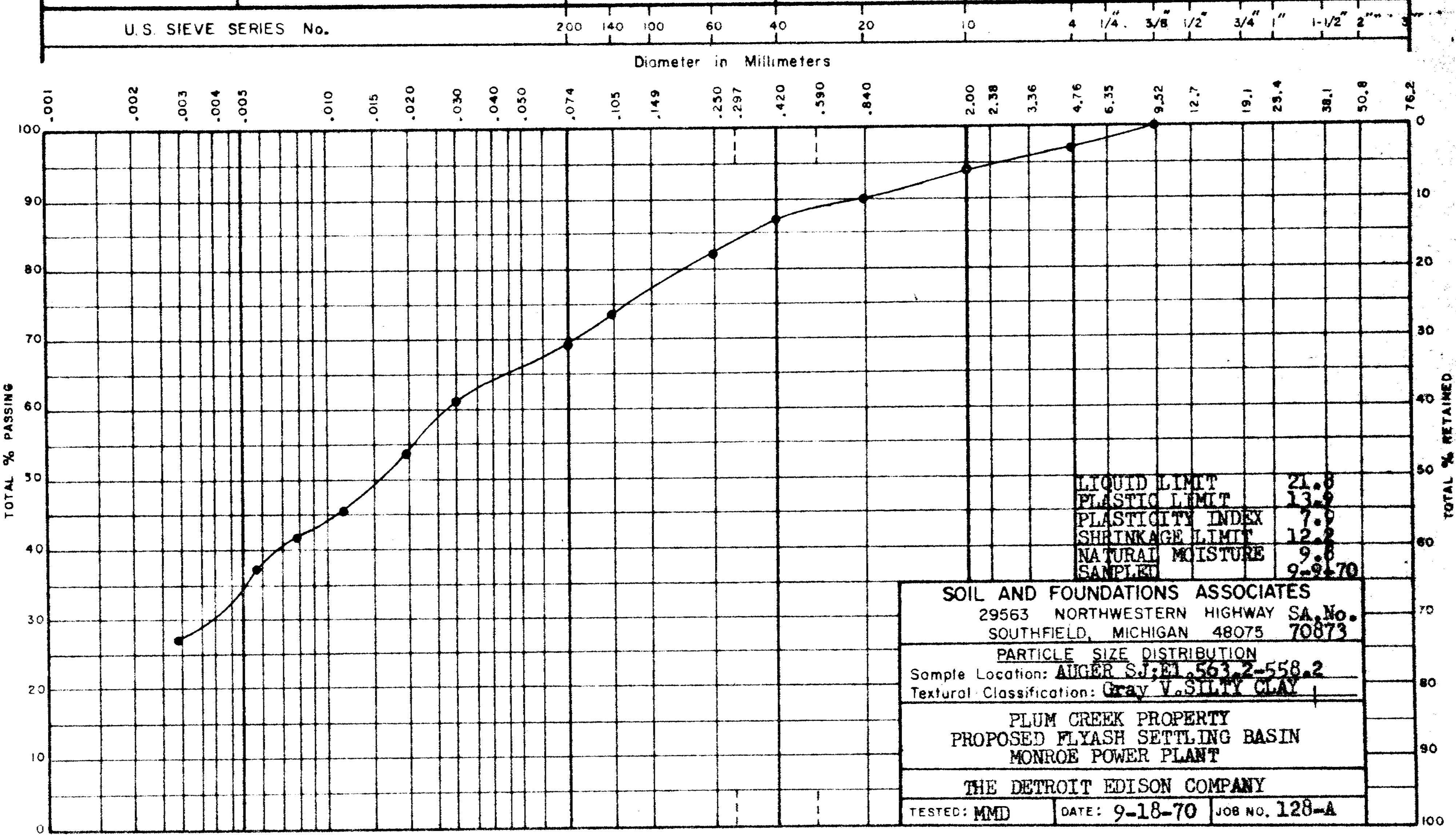
Clay & Silt ____ %	Fine Sand ____ %	Medium Sand ____ %	C. Sand ____ %	Fine Gravel ____ %	Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ %	Silt ____ %	Fine Sand ____ %	Coarse Sand ____ %	Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 34 %	Silt 35 %	Fine Sand 18 %	Medium Sand 07 %	C. Sand 03 %	Gravel 03 %



LIQUID LIMIT 21.8
PLASTIC LIMIT 13.9
PLASTICITY INDEX 7.9
SHRINKAGE LIMIT 12.2
NATURAL MOISTURE 9.6
SAMPLED 9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. No. 70873

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SJ;El.563.2-558.2

Textural Classification: Gray V.SILTY CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD DATE: 9-18-70 JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

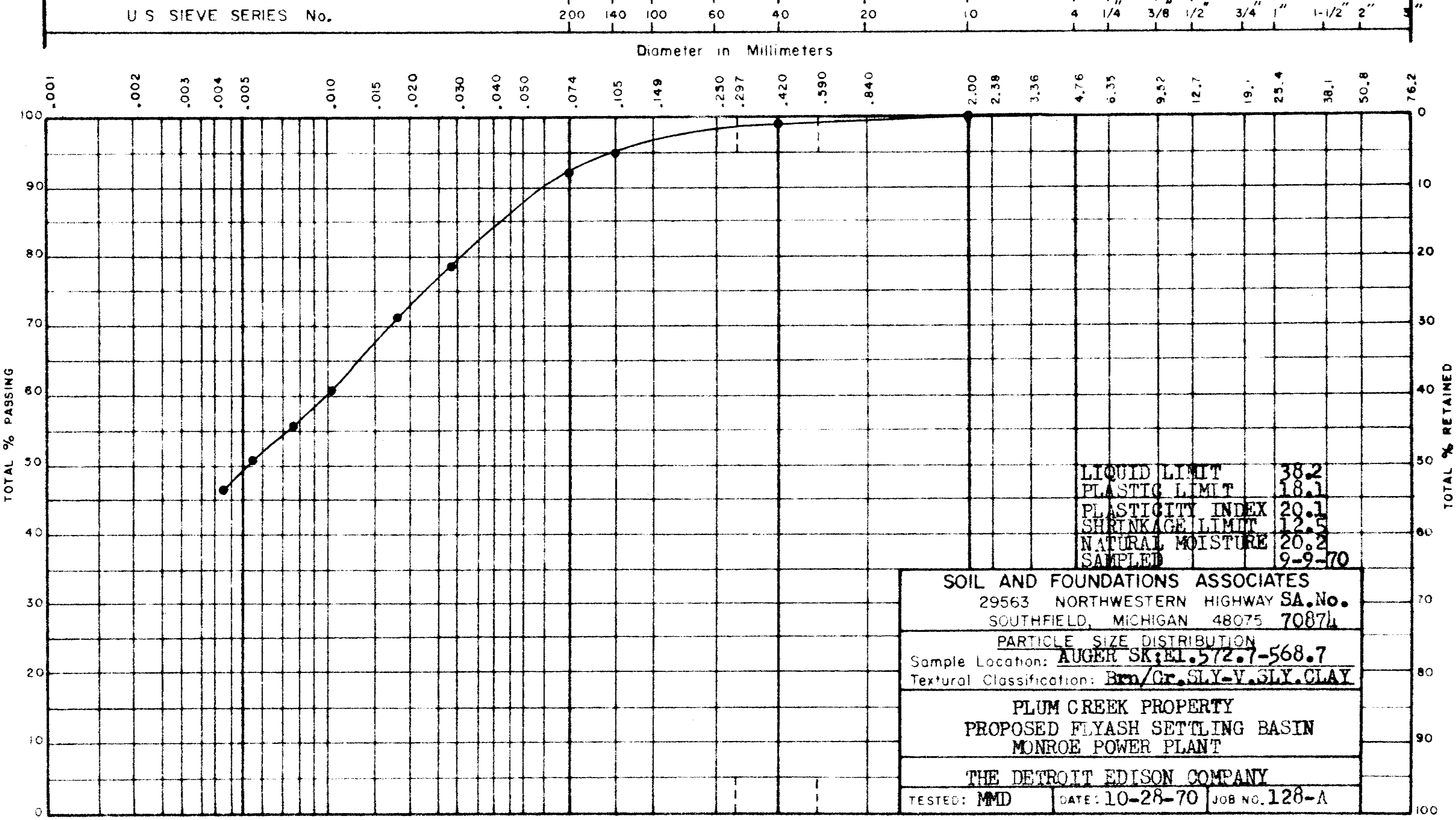
Clay & Silt ___%	Fine Sand ___%	Medium Sand ___%	C. Sand ___%	Fine Gravel ___%	Cse. Gravel ___%

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___%	Silt ___%	Fine Sand ___%	Coarse Sand ___%	Gravel ___%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 49 %	Silt 43 %	Fine Sand 07 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	38.2
PLASTIC LIMIT	18.1
PLASTICITY INDEX	20.1
SHRINKAGE LIMIT	12.5
NATURAL MOISTURE	20.2
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075
SA.No. 70874

PARTICLE SIZE DISTRIBUTION
Sample Location: AUGER SK;El.572.7-568.7
Textural Classification: Brn/Gr.SLY-V.SLY.CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD DATE: 10-28-70 JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

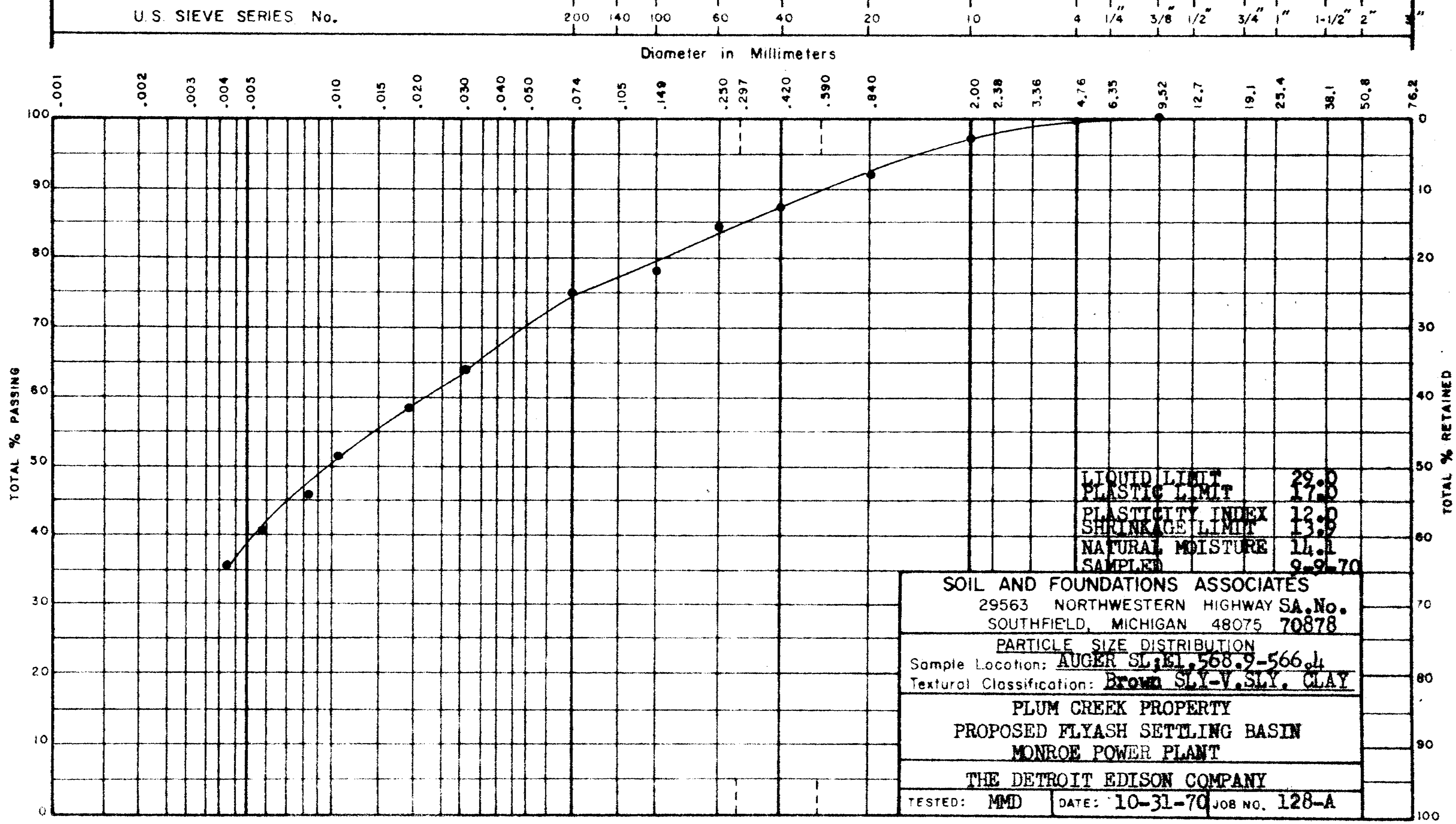
Clay & Silt ____ %	Fine Sand ____ %	Medium Sand ____ %	C. Sand ____ %	Fine Gravel ____ %	Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ %	Silt ____ %	Fine Sand ____ %	Coarse Sand ____ %	Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 %	Silt 37 %	Fine Sand 12 %	Medium Sand 10 %	C. Sand 02 %	Gravel 01 %



LIQUID LIMIT	29.0
PLASTIC LIMIT	17.0
PLASTICITY INDEX	12.0
SHRINKAGE LIMIT	13.9
NATURAL MOISTURE	14.1
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. No. 70878

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SL; El. 568.9-566.4

Textural Classification: Brown SLY-V.SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD	DATE: 10-31-70	JOB NO. 128-A

SFA
FORM
E-6

UNIFIED SOIL CLASSIFICATION

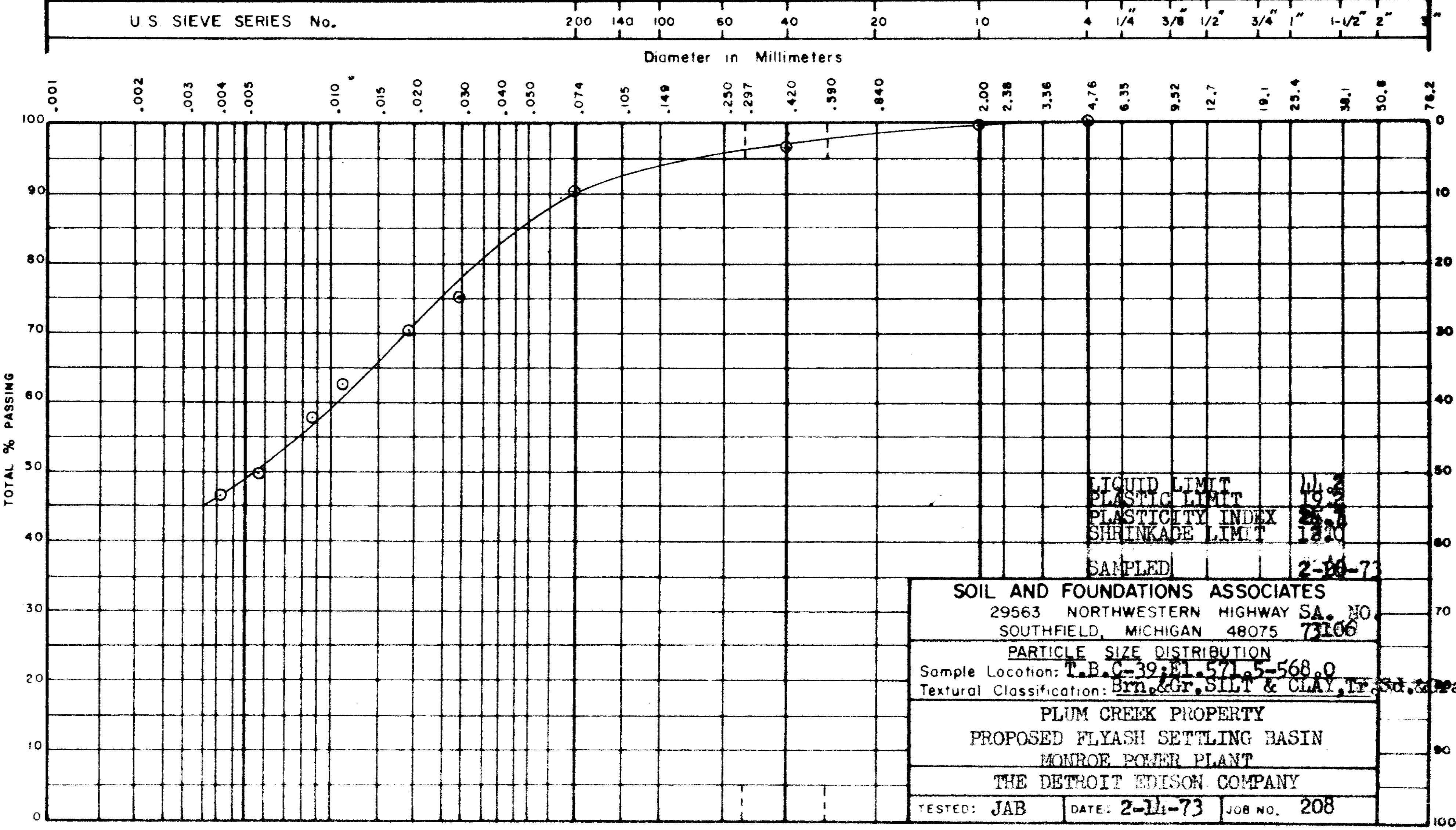
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 47 %	Silt 43 %	Fine Sand 07 %	Medium Sand 03 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT 44.2
PLASTIC LIMIT 19.2
PLASTICITY INDEX 25.0
SHRINKAGE LIMIT 12.0

SAMPLED 2-10-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. NO. 73106

PARTICLE SIZE DISTRIBUTION

Sample Location: T.B.C-39;El.571.5-568.0

Textural Classification: Brn.&Gr.SILT & CLAY,Tr.Sd.&Grav.

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: JAB   DATE: 2-14-73   JOB NO. 208

SFA
FORM
E-6

UNIFIED SOIL CLASSIFICATION

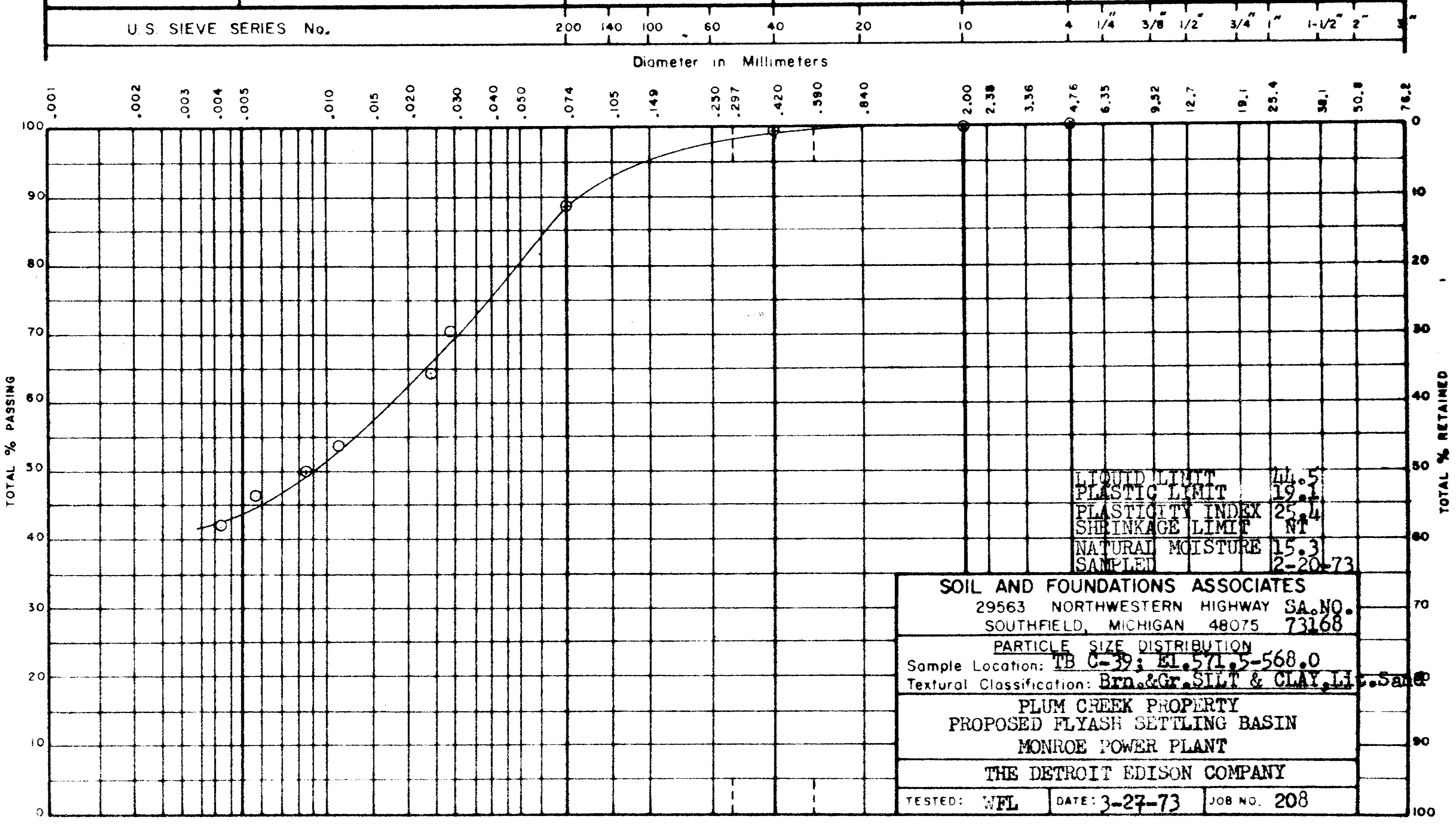
Clay & Silt ___%	Fine Sand ___%	Medium Sand ___%	C. Sand ___%	Fine Gravel ___%	Cse. Gravel

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___%	Silt ___%	Fine Sand ___%	Coarse Sand ___%	Gravel ___%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 44 %	Silt 44 %	Fine Sand 11 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	44.5
PLASTIC LIMIT	19.1
PLASTICITY INDEX	25.4
SHRINKAGE LIMIT	NT
NATURAL MOISTURE	15.3
SAMPLED	2-20-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. NO. 73168

PARTICLE SIZE DISTRIBUTION
Sample Location: TB C-39; El.571.5-568.0
Textural Classification: Brn.&Gr.SILT & CLAY,Lit.Sand

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: WFL DATE: 3-27-73 JOB NO. 208

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

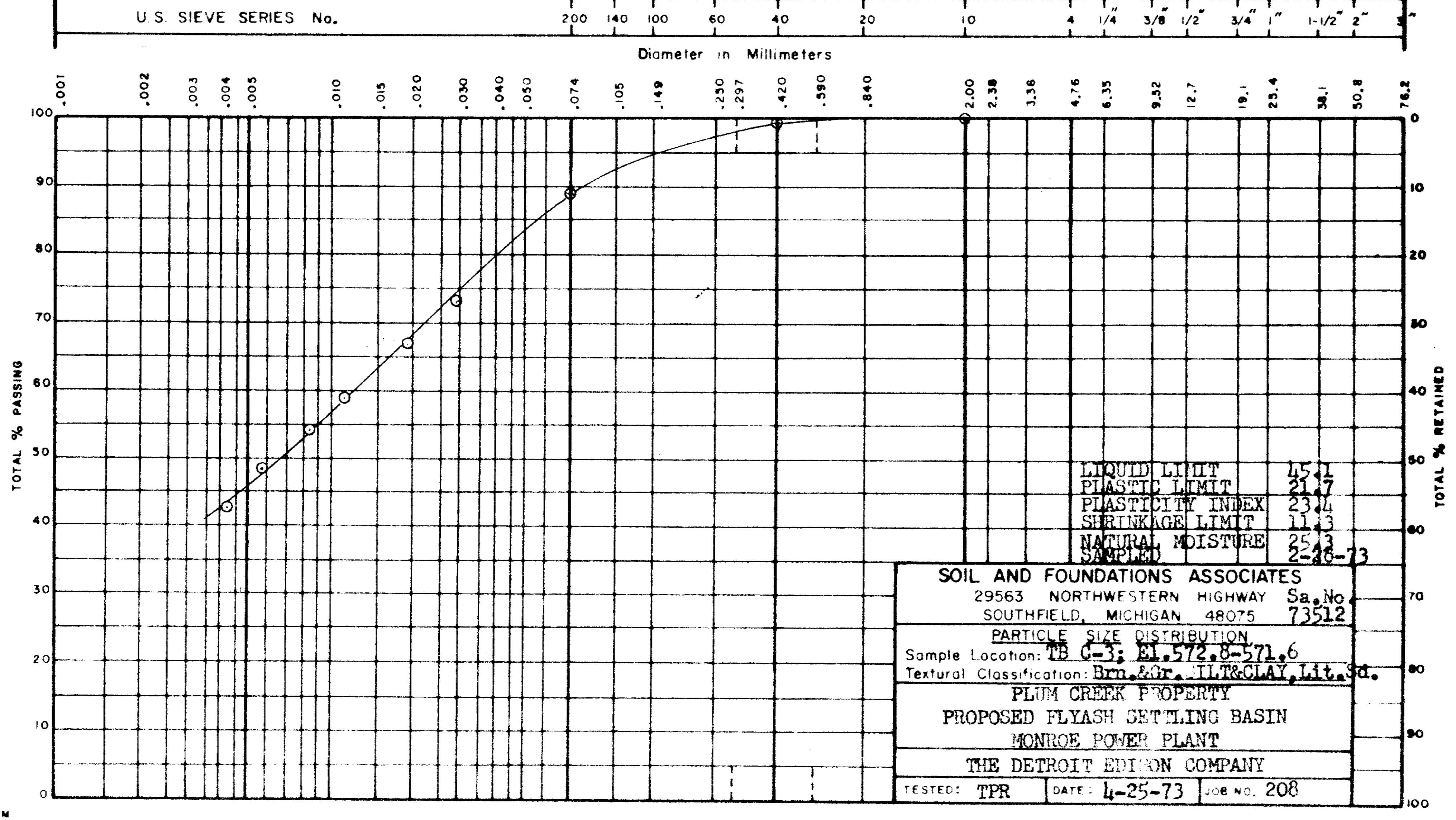
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 45 %	Silt 44 %	Fine Sand 10 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	45.1
PLASTIC LIMIT	21.7
PLASTICITY INDEX	23.4
SHRINKAGE LIMIT	11.3
NATURAL MOISTURE	25.3
SAMPLED	2-26-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

Sa. No. 73512

PARTICLE SIZE DISTRIBUTION

Sample Location: TB C-3; El. 572.8-571.6

Textural Classification: Brn. & Gr. SILT & CLAY, Lit. Sd.

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: TPR DATE: 4-25-73 JOB NO. 208

SFA FORM E-6

APPENDIX H – 1990’s LABORATORY TEST RESULTS

TABLE 1

LABORATORY TEST RESULTS

VERIFICATION OF NATURAL SOIL BARRIER - MONROE ASH BASIN

SME PROJECT NO. PG-22087

BORING NO.	SAMPLE NO.	DEPTH (feet)	CLASSIFICATION SYMBOL	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	SPECIFIC GRAVITY	VOID RATIO (calculated)	ATTERBERG LIMITS			PARTICLE SIZE DISTRIBUTION (%)						COEFFICIENT OF PERMEABILITY (cm/sec)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	
B2	CS2	6.5	CL	21	108	2.73	0.58	42	17	25	0	0	2	5	36	57	3.3E-08
B2	CS4	11.5	CL	12	126	2.68	0.33	23	15	8	0	0	8	18	39	35	5.8E-08
B2	CS6	16.5	CL	12	126	2.72	0.35	23	14	9	0	0	8	16	40	36	1.3E-08
B2	CS8	21.5	CL	12	127	2.72	0.34	24	13	11	0	0	8	17	38	37	1.5E-08
B2	CS10	26.5	CL	10	131	2.75	0.31	20	11	9	0	0	9	24	34	33	2.0E-08
B2	CS12	31.5	CL	12	122	2.73	0.40	32	15	17	0	0	5	9	39	47	2.0E-08
B4	CS2	6.5	CL	18	111	2.73	0.53	45	19	26	0	0	2	8	37	53	6.6E-08
B4	CS4	11.5	CL	21	109	2.73	0.56	43	17	26	0	0	3	11	36	50	2.1E-08
B4	CS6	16.5	CL	12	126	2.71	0.34	24	13	11	0	0	8	17	41	34	4.7E-08
B4	CS8	21.5	CL	11	136	2.70	0.24	23	13	10	0	0	8	18	37	37	2.1E-08
B4	CS10	26.5	CL	11	130	2.73	0.31	23	14	9	0	0	8	17	38	37	3.0E-08
B4	CS12	31.5	CL	10	128	2.71	0.32	25	14	11	0	0	4	11	44	41	1.8E-08
B4	CS14	36.5	CL	8	118	2.73	0.44	24	13	11	0	0	13	23	44	20	*
B6	CS2	6.5	CL	12	123	2.70	0.37	27	15	12	0	0	8	17	39	36	7.4E-08
B6	CS4	11.5	CL	11	132	2.72	0.29	23	13	10	0	0	8	17	39	36	1.8E-08
B6	CS6	16.5	CL	8	134	2.72	0.27	21	12	9	0	0	7	22	38	33	4.0E-08
B6	CS8	21.5	CL	11	133	2.75	0.29	21	12	9	0	0	7	21	37	35	6.5E-08
B6	CS10	26.5	CL	9	125	2.71	0.35	26	14	12	0	0	5	13	39	43	*
B6	CS12	31.5	CL	10	128	2.74	0.34	26	15	11	0	0	11	17	33	39	*
B8	CS2	6.5	CL	13	118	2.73	0.44	41	15	26	0	0	3	12	35	50	1.5E-08
B8	CS4	11.5	CL	17	112	2.73	0.52	34	17	17	0	0	7	17	38	38	2.2E-08
B8	CS6	16.5	CL	13	127	2.73	0.34	26	15	11	0	0	9	19	38	34	4.8E-08
B8	CS8	21.5	CL	12	129	2.74	0.33	24	14	10	0	0	8	17	40	35	1.6E-08
B8	CS10	26.5	CL	13	130	2.76	0.32	25	14	11	0	0	7	18	36	39	1.7E-08
B8	CS12	31.5	CL	10	134	2.73	0.27	20	11	9	0	0	10	24	41	25	4.7E-08
B8	CS14	36.5	CL	11	135	2.75	0.27	23	12	11	0	0	11	24	31	34	3.8E-08
B8	CS16	41.5	CL	10	127	2.78	0.37	23	13	10	0	0	15	19	46	20	1.9E-07

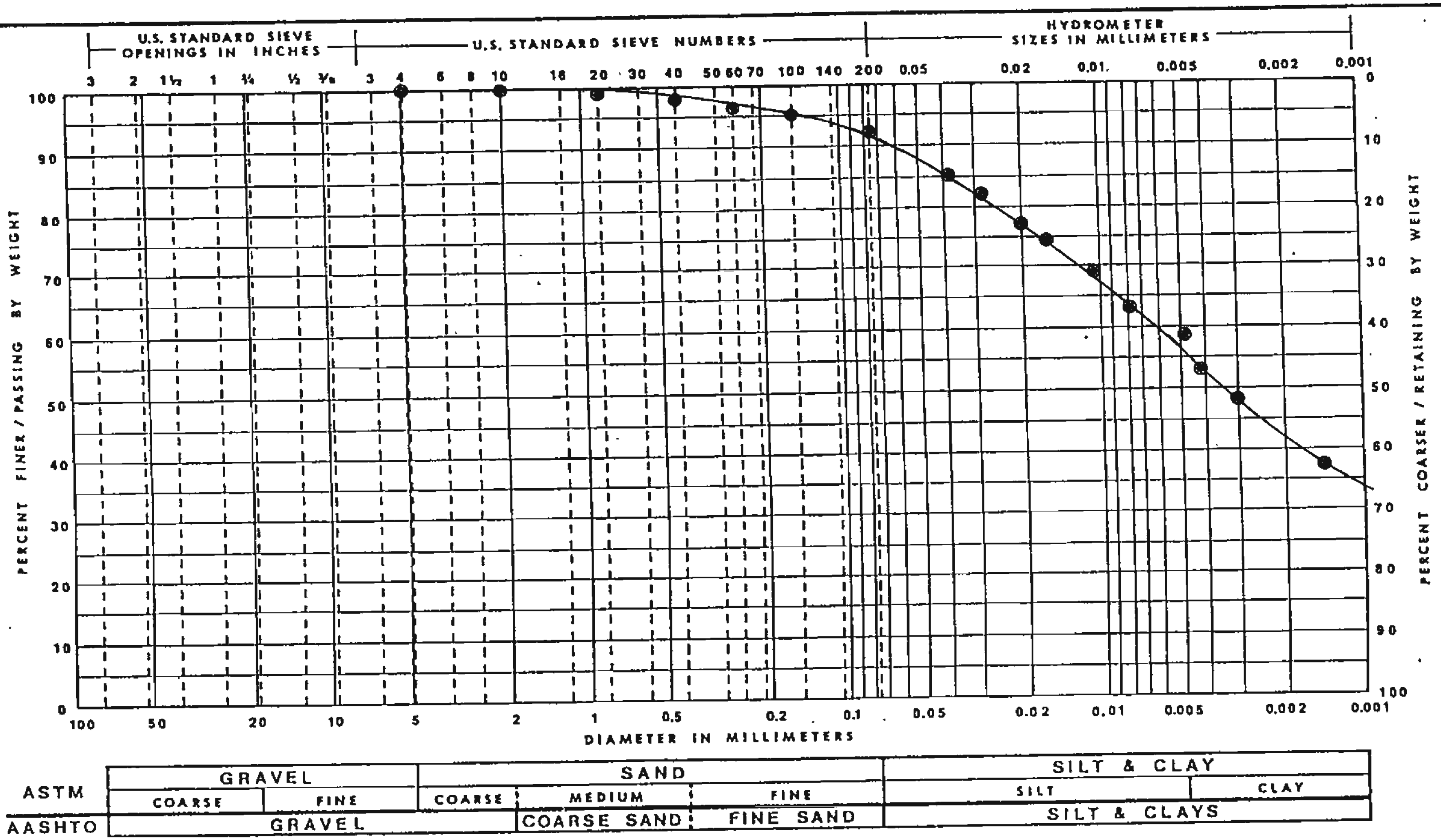
TABLE 1

LABORATORY TEST RESULTS
VERIFICATION OF NATURAL SOIL BARRIER - MONROE ASH BASIN
SME PROJECT NO. PG-22087

BORING NO.	SAMPLE NO.	DEPTH (feet)	CLASSIFICATION SYMBOL	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	SPECIFIC GRAVITY	VOID RATIO (calculated)	ATTERBERG LIMITS			PARTICLE SIZE DISTRIBUTION (%)						COEFFICIENT OF PERMEABILITY (cm/sec)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	
B10	CS2	6.5	CL	20	114	2.72	0.49	40	15	25	0	0	3	13	35	49	3.6E-08
B10	CS4	11.5	CL	18	112	2.75	0.53	35	15	20	0	0	2	9	39	50	1.2E-08
B10	CS6	16.5	CL	22	102 *	2.74	0.68	36	17	19	0	0	1	2	37	60	5.3E-08
B10	CS8	21.5	CL	13	127	2.71	0.33	25	14	11	0	0	8	17	37	38	3.7E-08
B10	CS10	26.5	CL	10	133	2.74	0.29	23	14	9	0	0	7	17	39	37	1.5E-08

NOTE:

* Sample too small or disturbed to run test.



CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS2	6.5	Silty Clay- Trace of Sand, Gravel, Topsoil & Brick Pieces- Brown (CL)	93	

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

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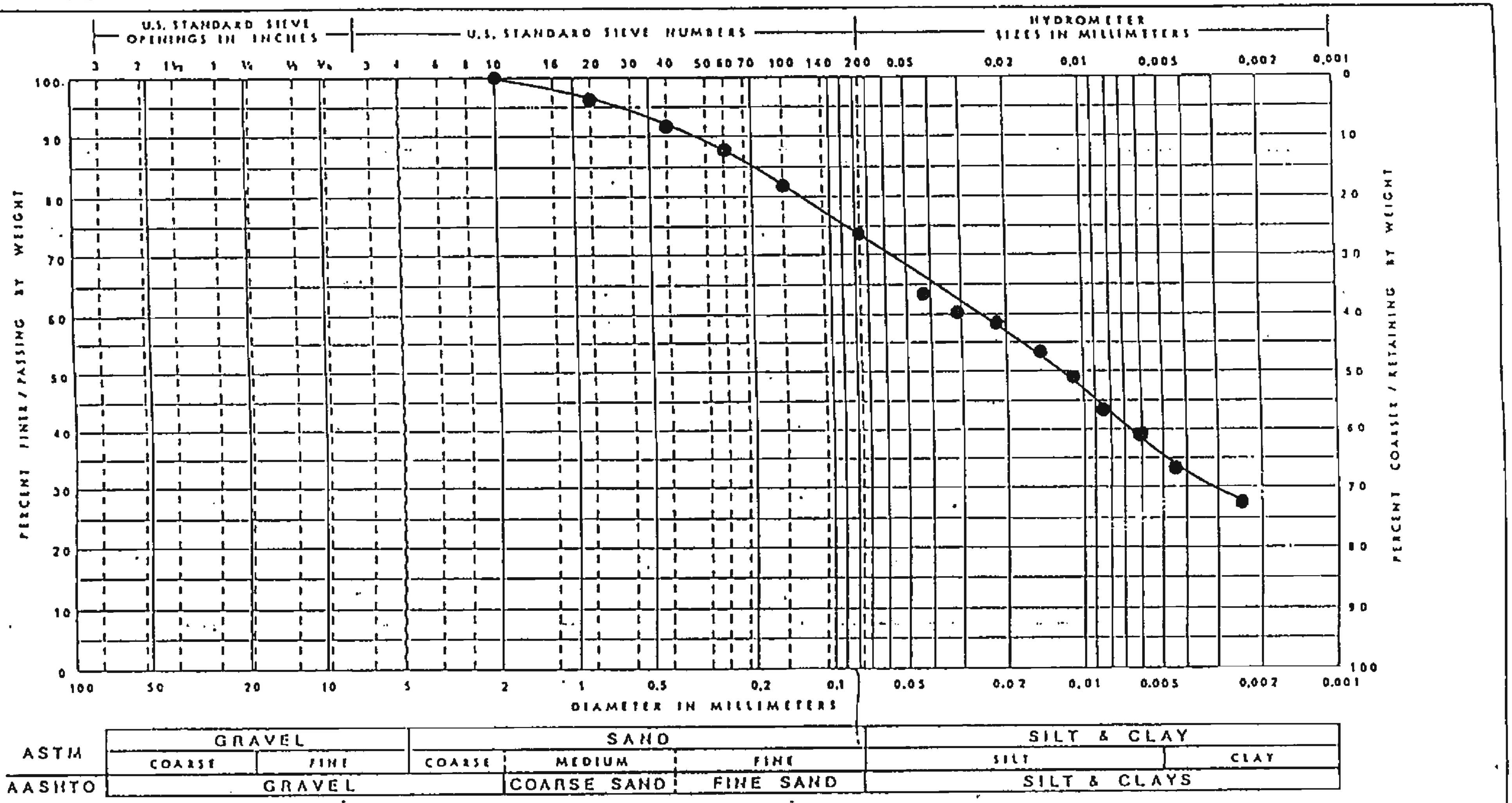

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS4	11.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	74	

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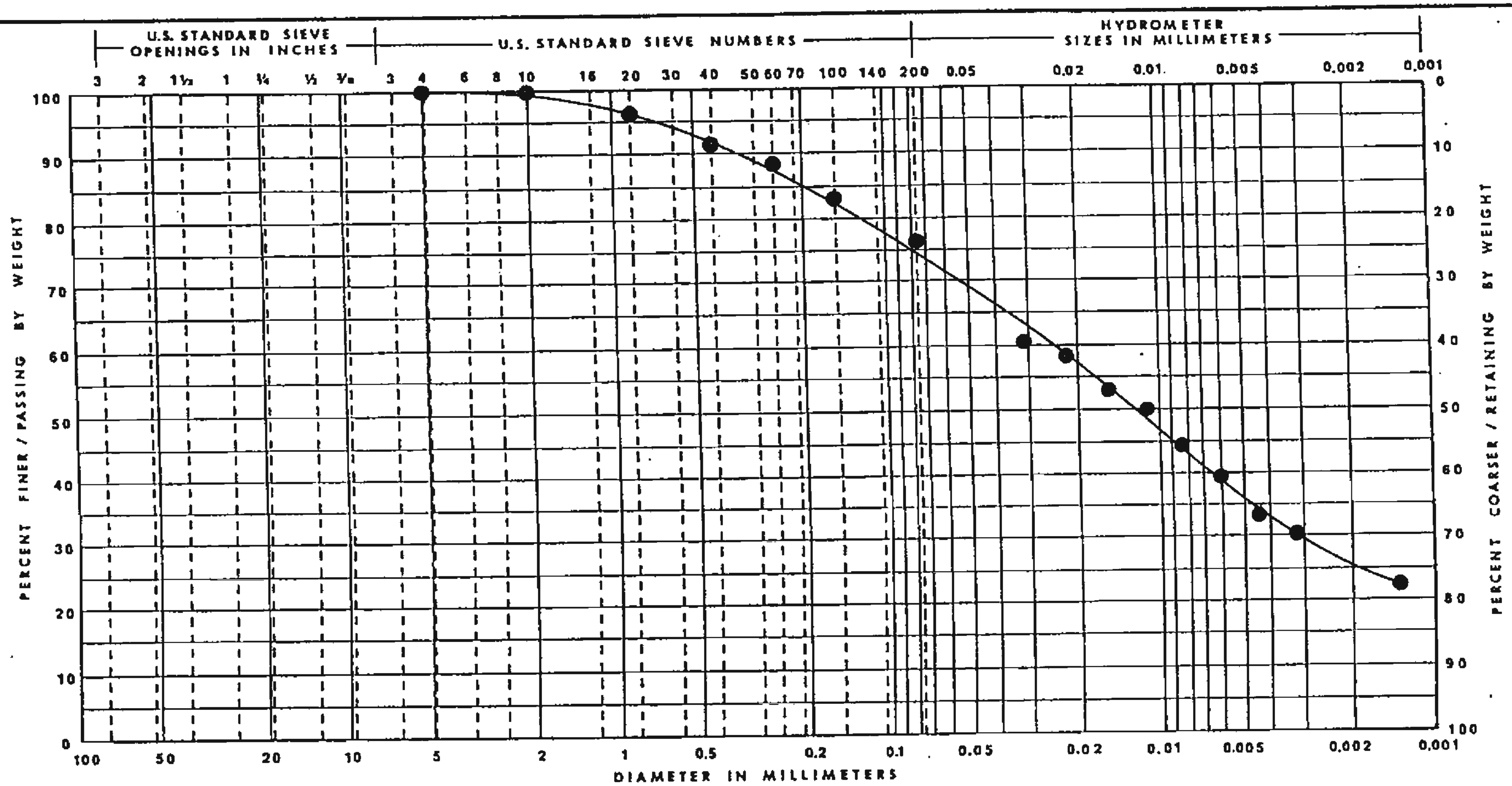

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS6	16.5	Silty Clay-Some Sand-Trace of	76	
				Gravel-Gray (CL)		

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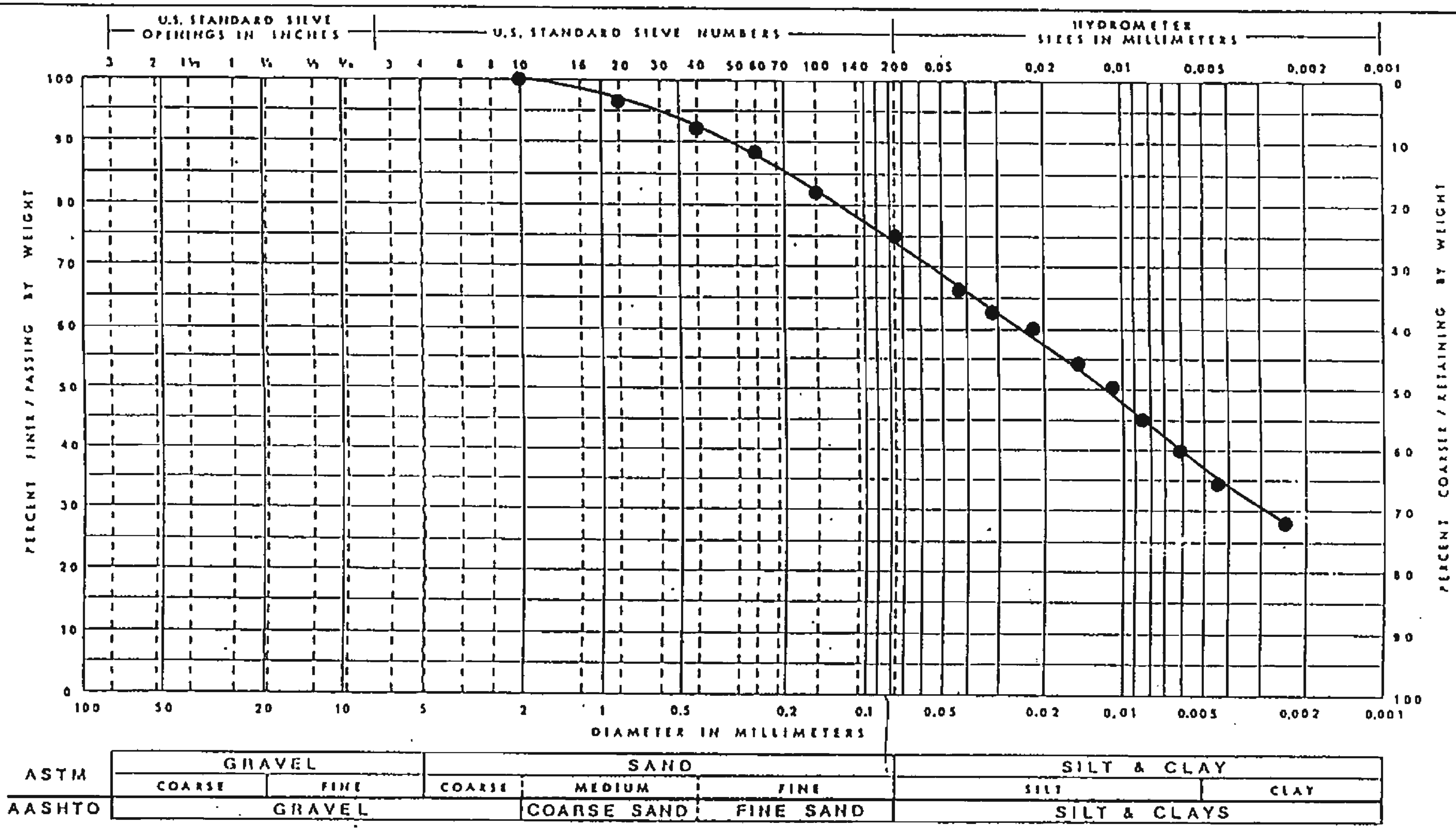

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B2	CS8	21.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	75	

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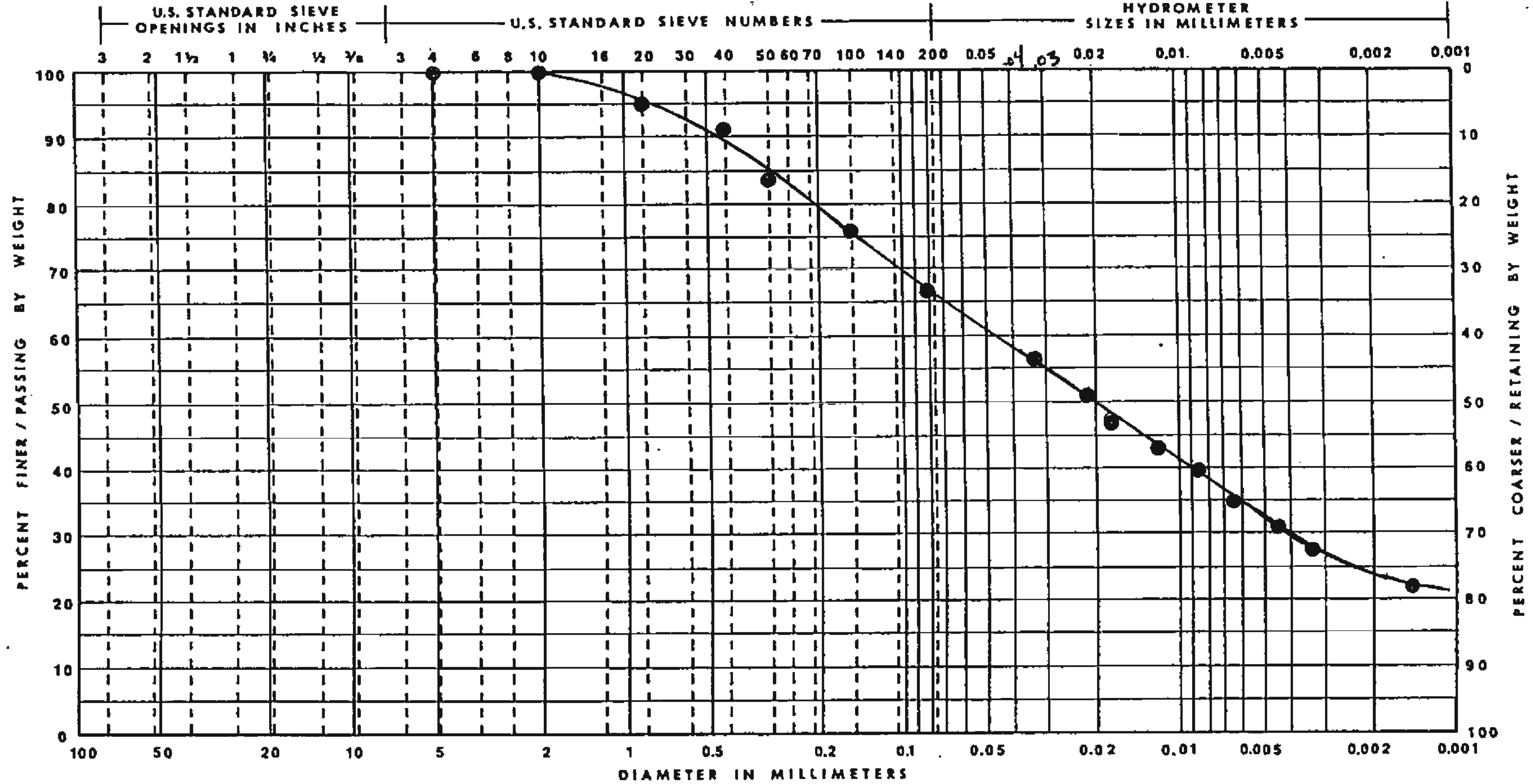

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS10	26.5	Silty Clay-Some Sand-Trace of	67	
				Gravel-Gray (CL)		

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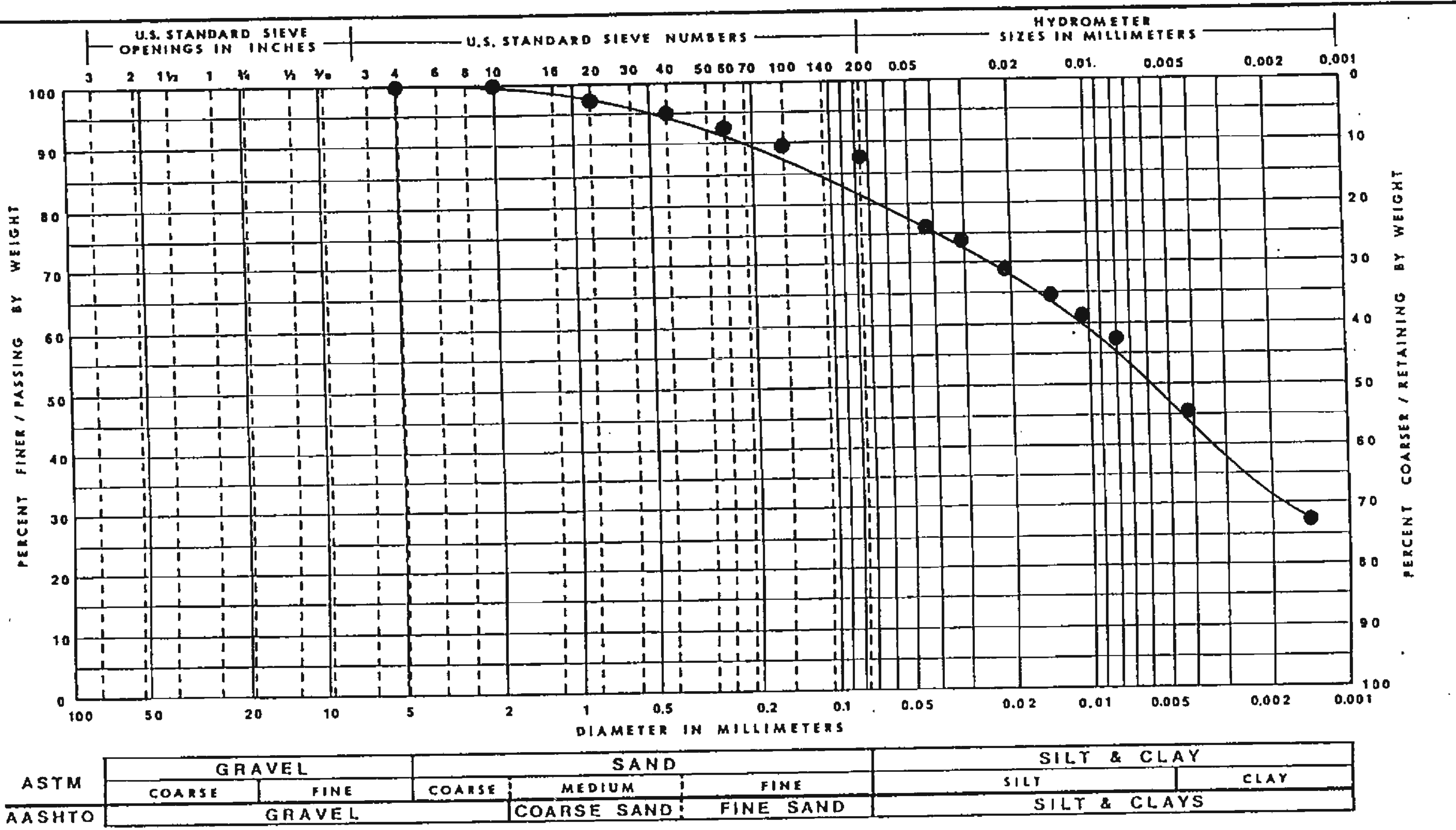

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS12	34.5	Silty Clay-Trace to Some Sand-Trace of Gravel-Gray (CL)	86	

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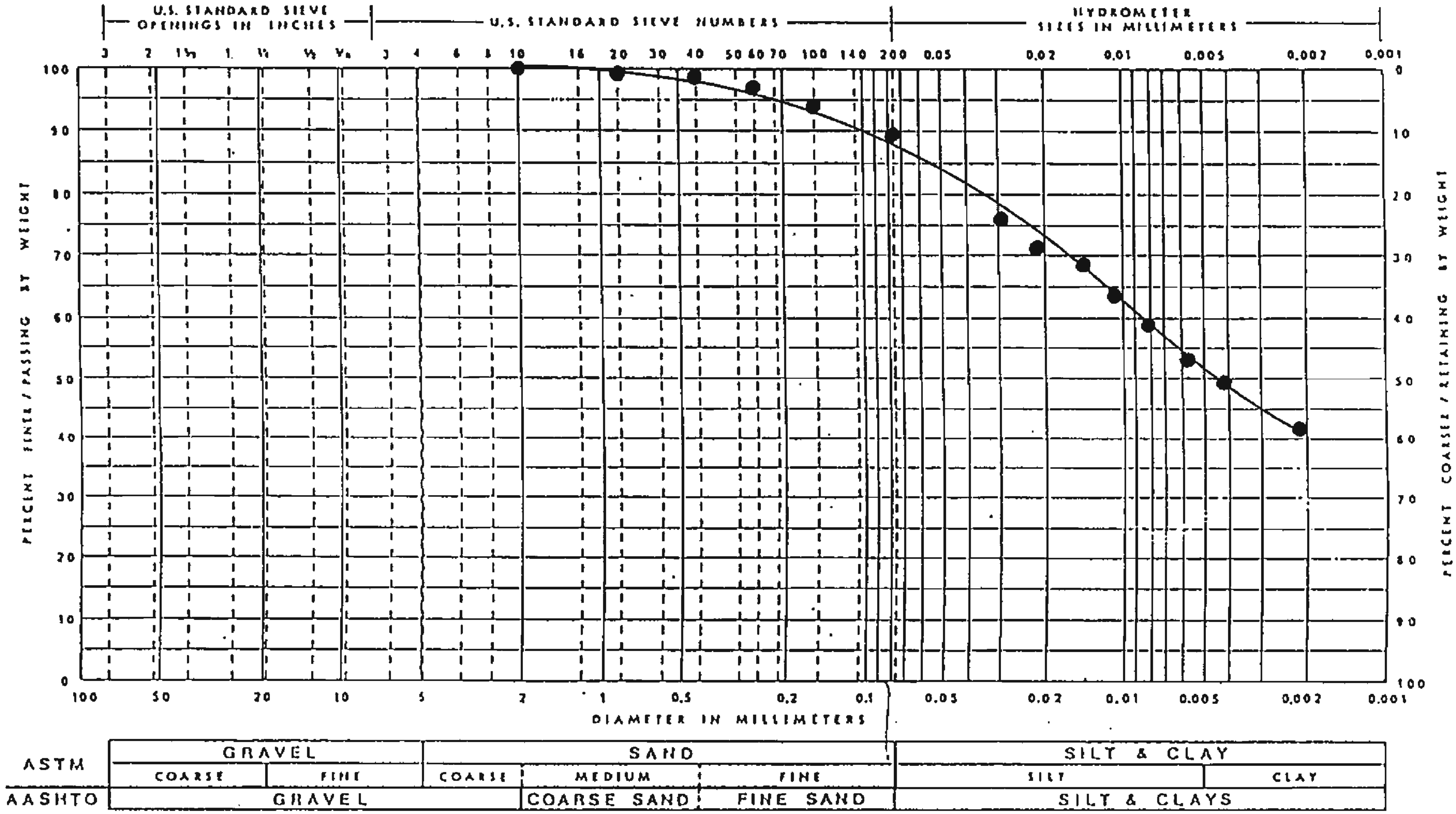

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B4	CS2	6.5	Silty Clay, Trace to Some Sand, Trace Gravel, Mottled Brown (CL)	90	

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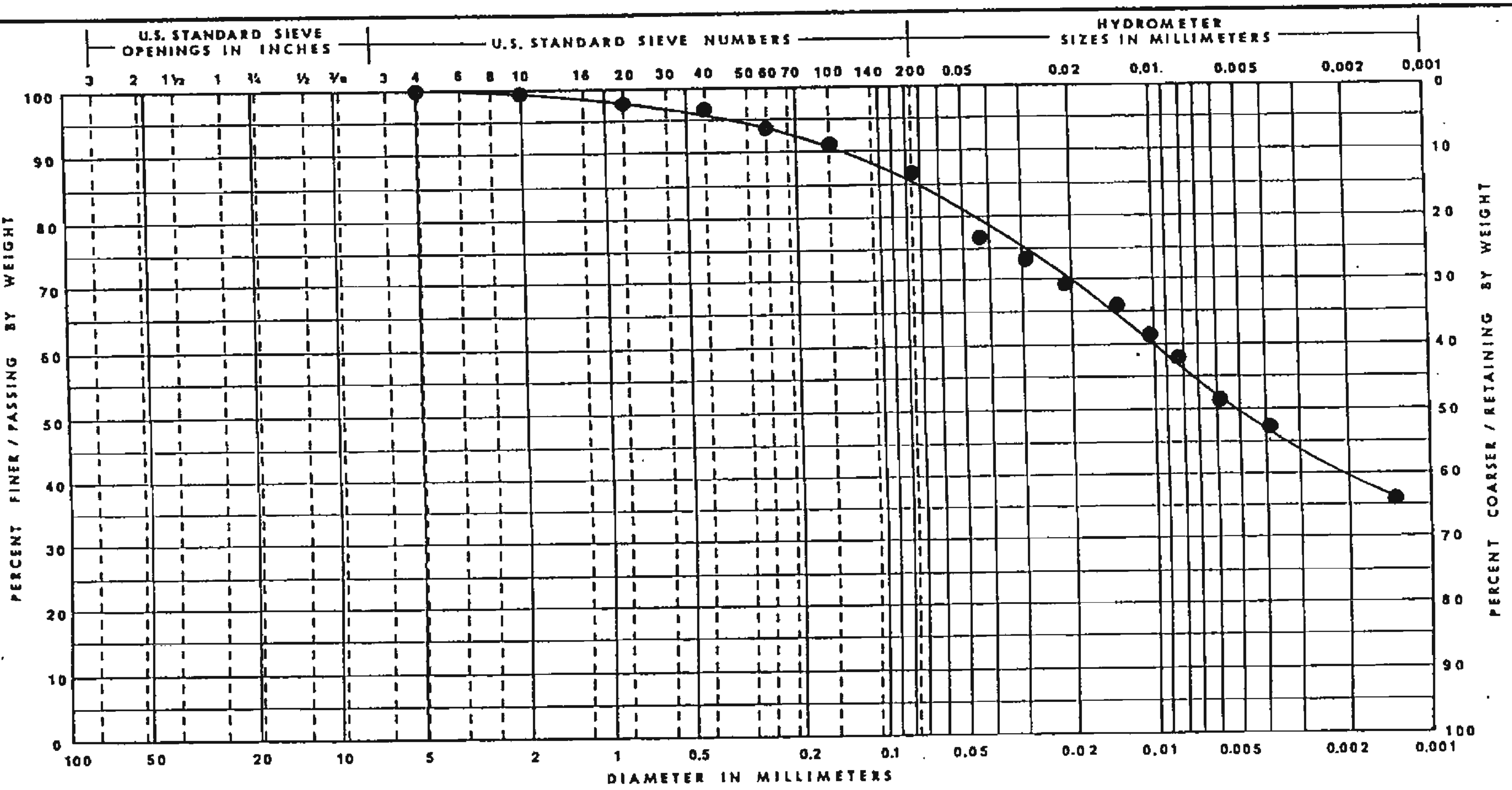

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS4	11.5	Silty Clay-Trace to Some Sand- Trace of Gravel, Topsoil & Roots-Brown (CL)	86	

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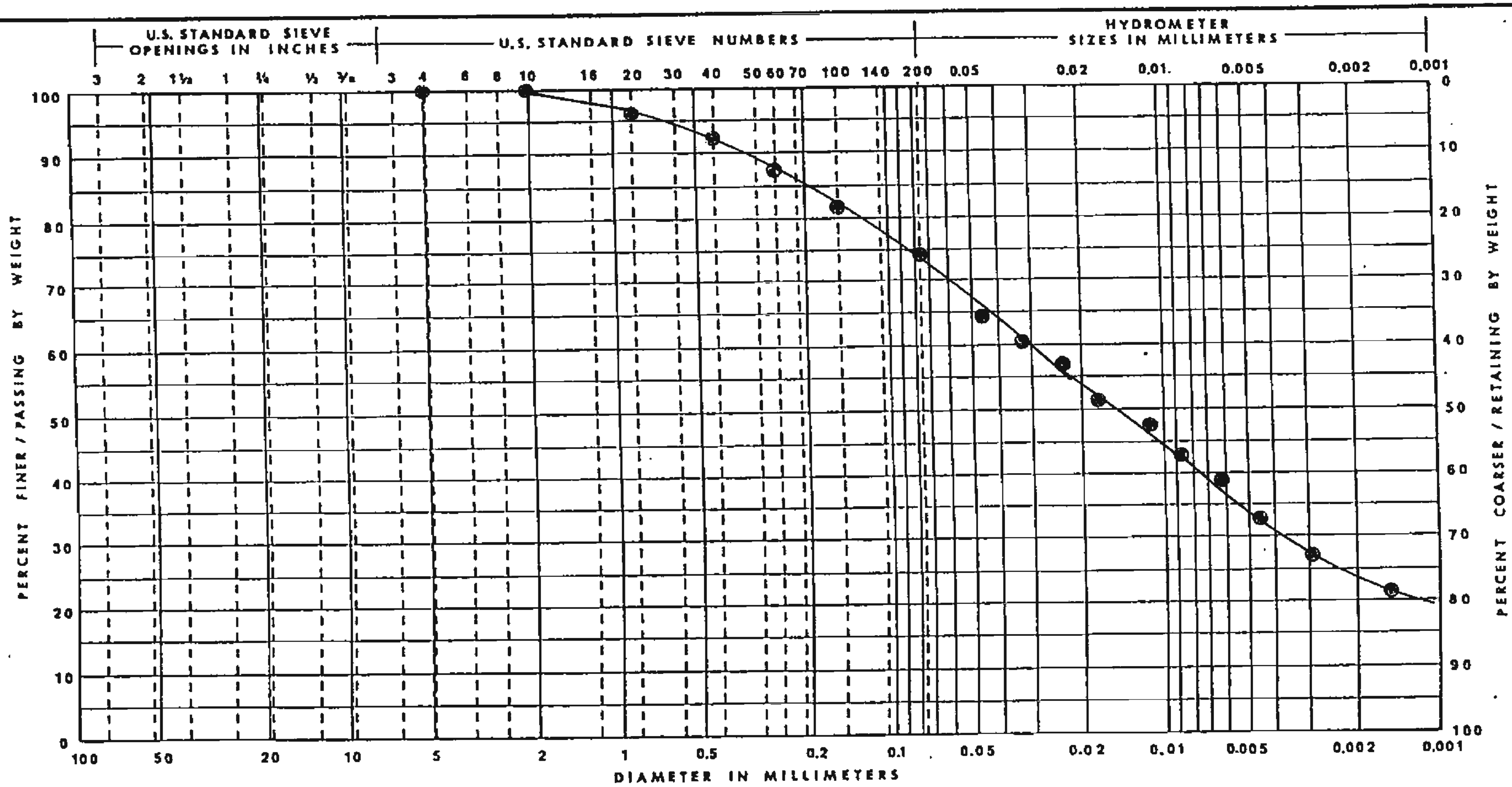

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS6	16.5	Silty Clay-Some Sand-Trace of Gravel-Mottled Brown (CL)	75	

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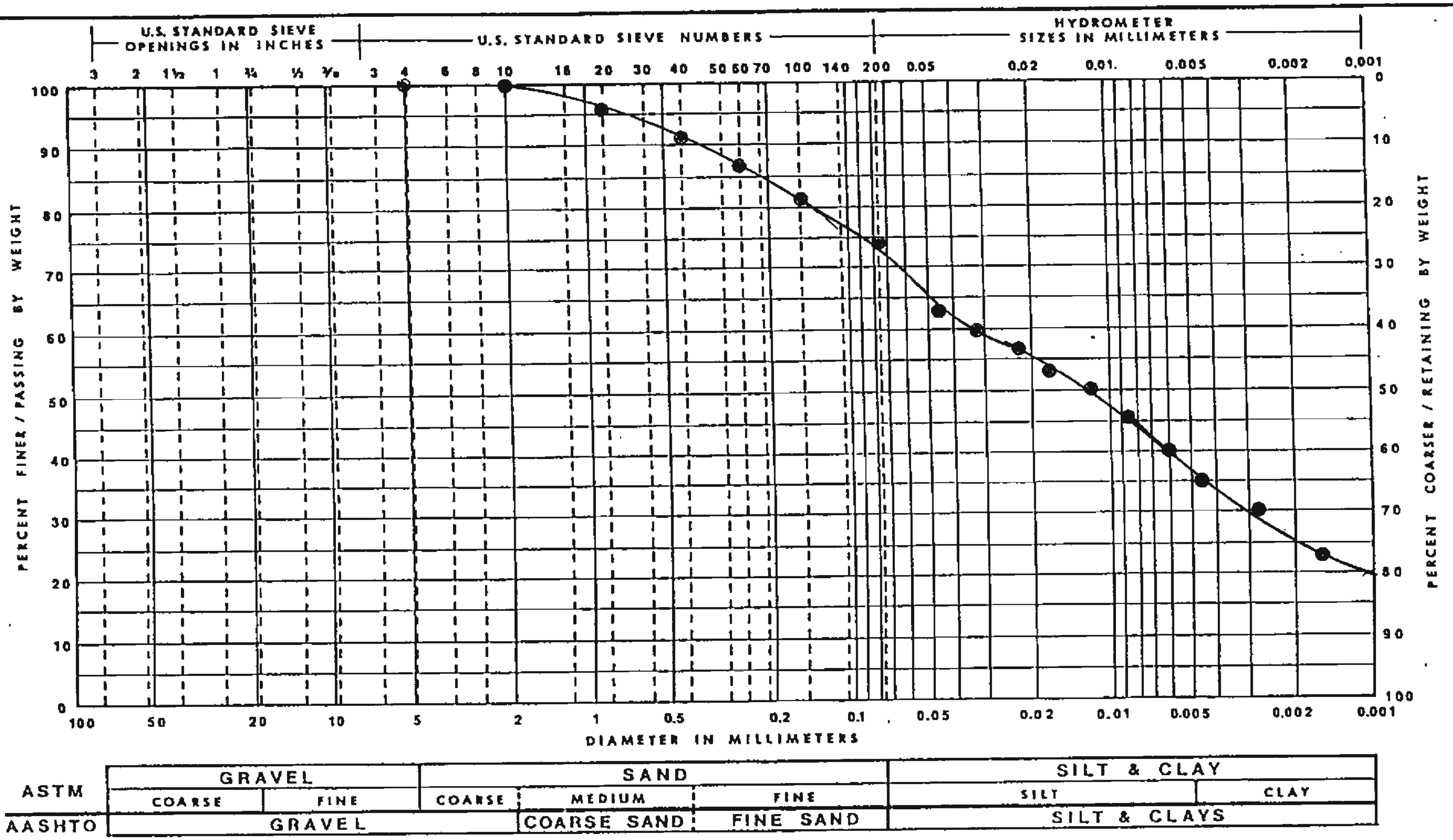

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS8	21.5	Silty Clay-Some Sand-Trace of	74	
				Gravel-Gray (CL)		

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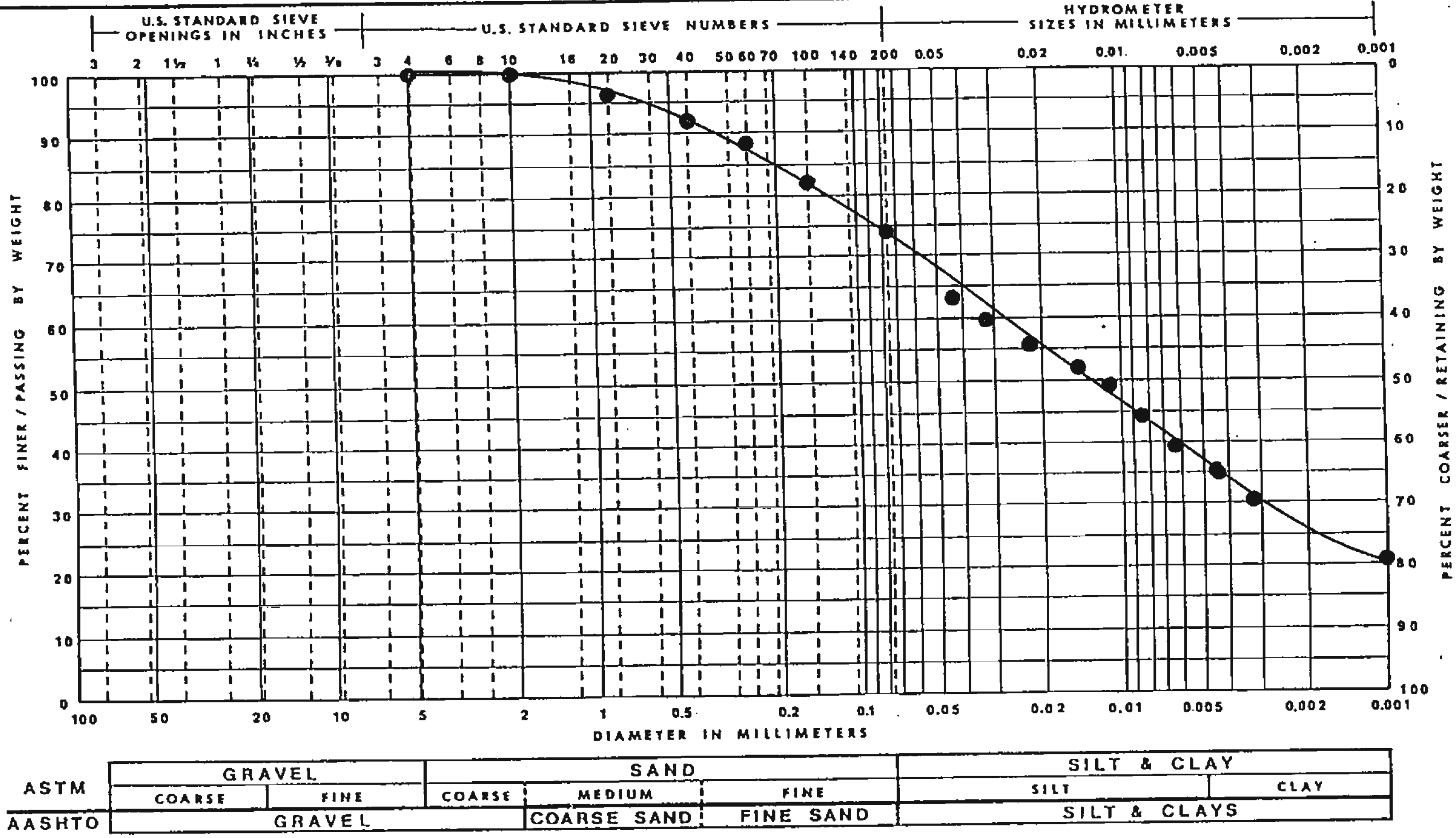

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS10	26.5	Silty Clay-Some Sand-Trace of	75	
				Gravel-Gray (CL)		

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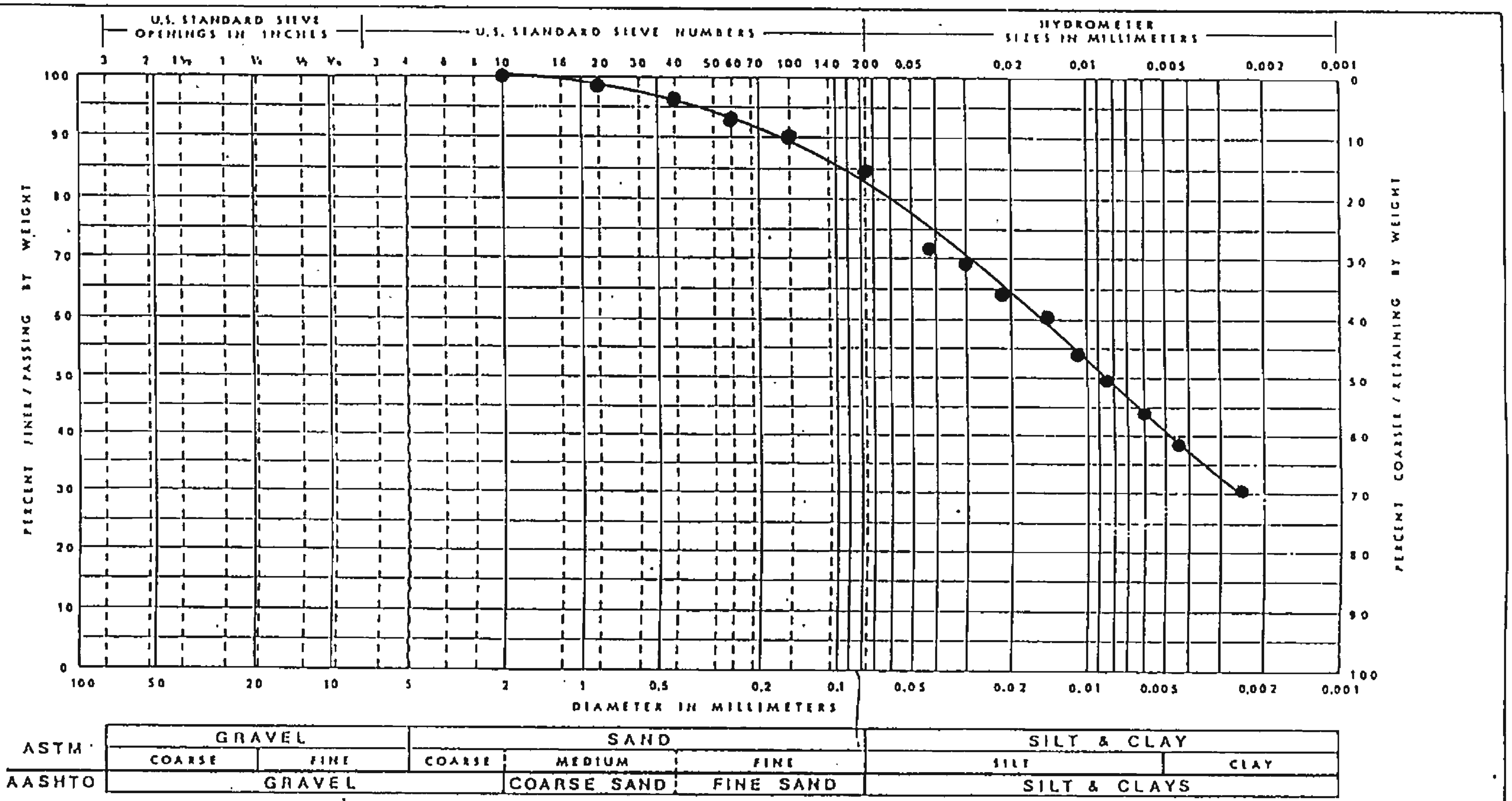

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS12	31.5	Silty Clay, Trace to Some Sand, Trace of Gravel, Gray (CL)	85	

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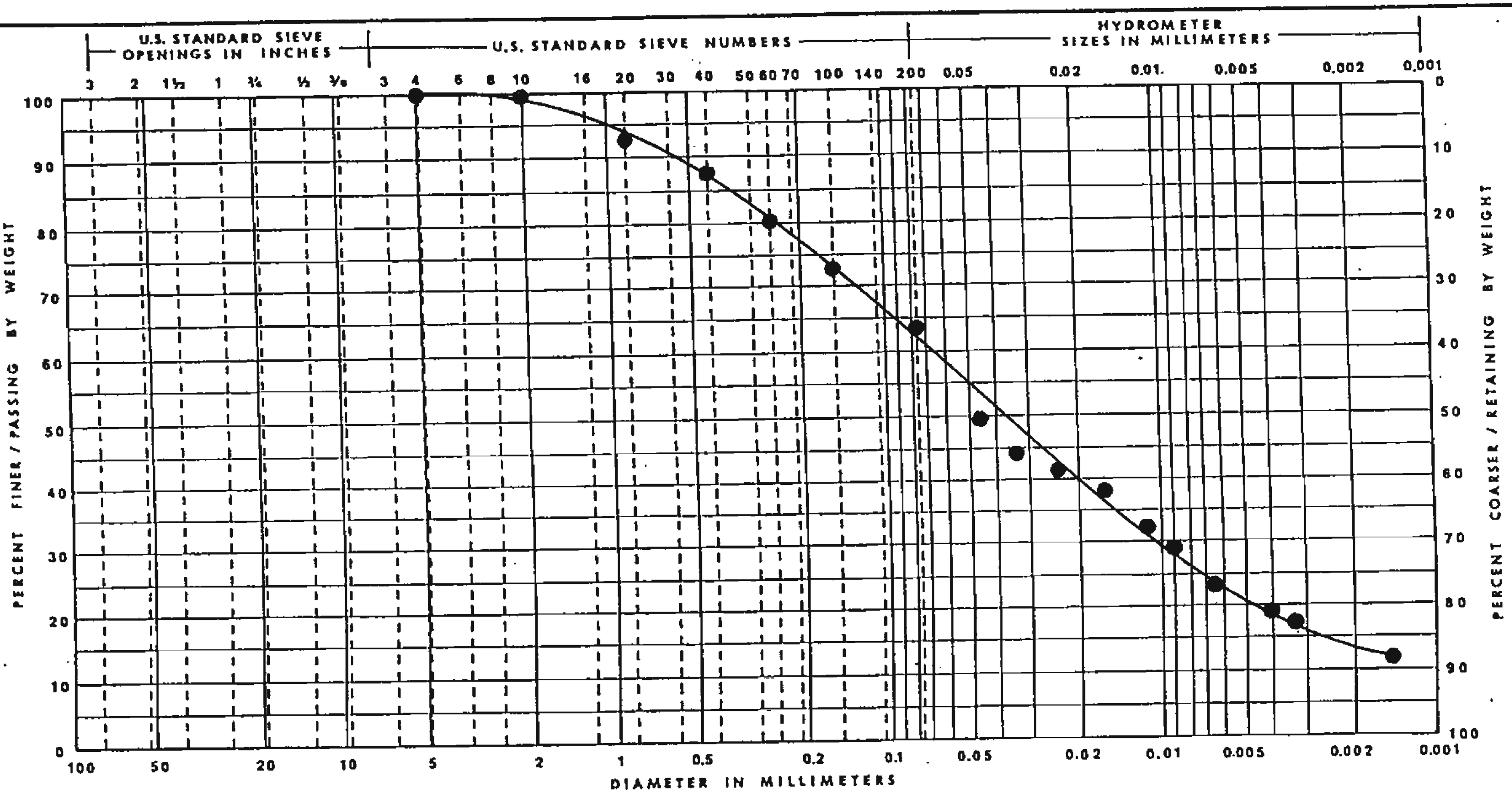

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS14	36.5	Limestone	64	

MONROE ASH BASIN
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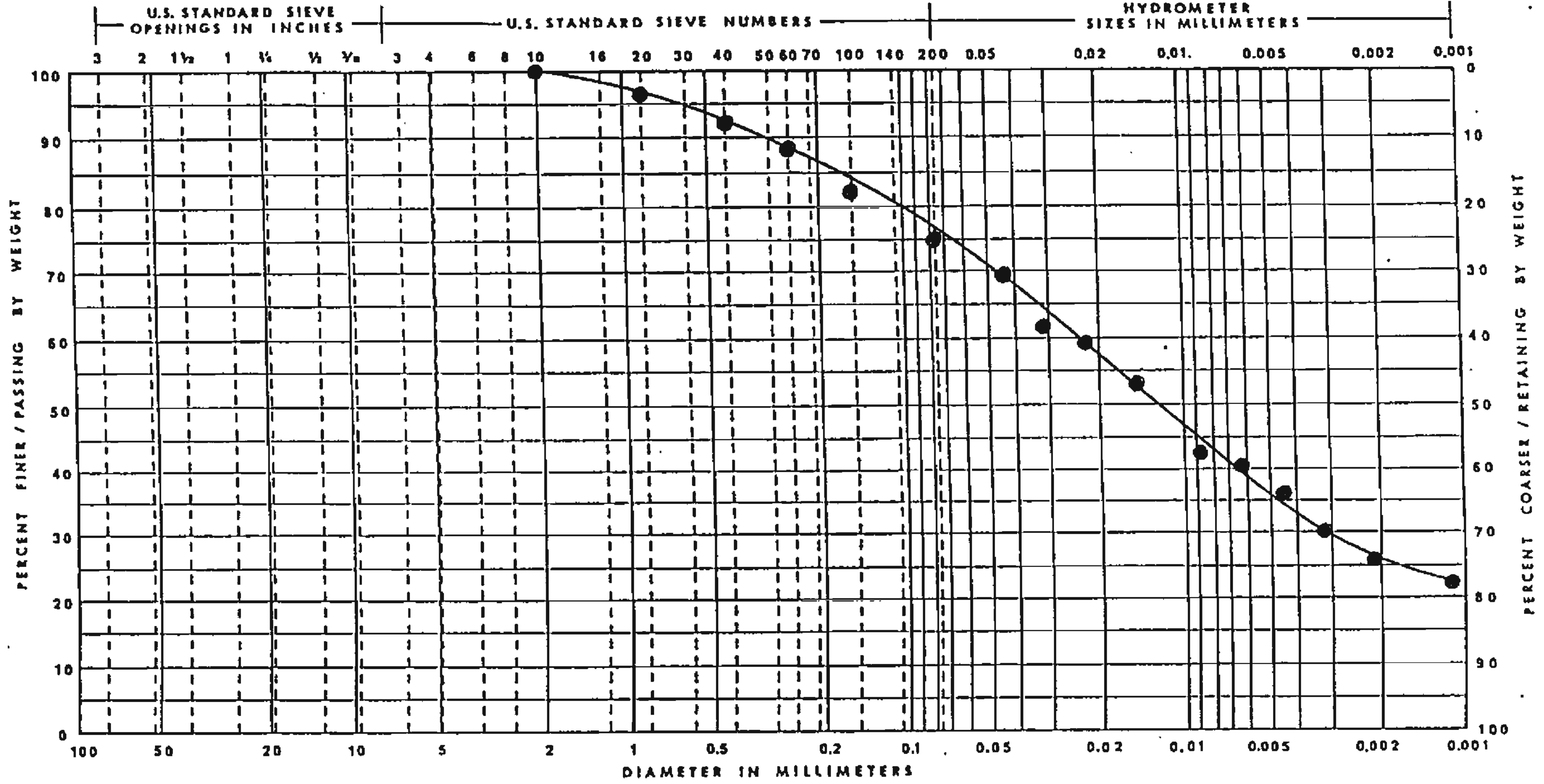

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS2	6.5	Silty Clay, Some Sand, Trace	75	
				of Gravel, Mottled Brown (CL)		

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

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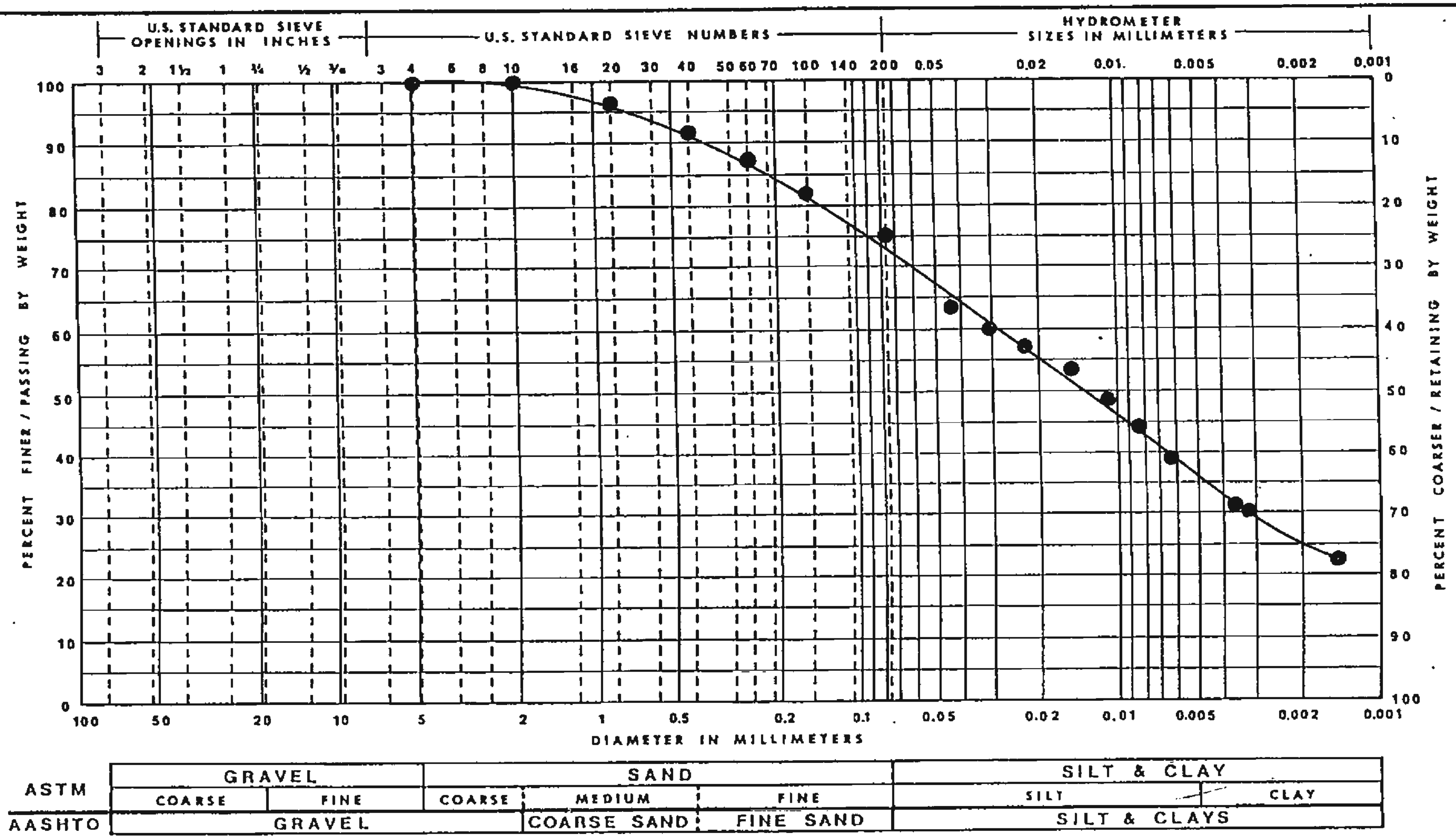

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS4	11.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	75	

MONROE ASH BASIN
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DETROIT, MICHIGAN

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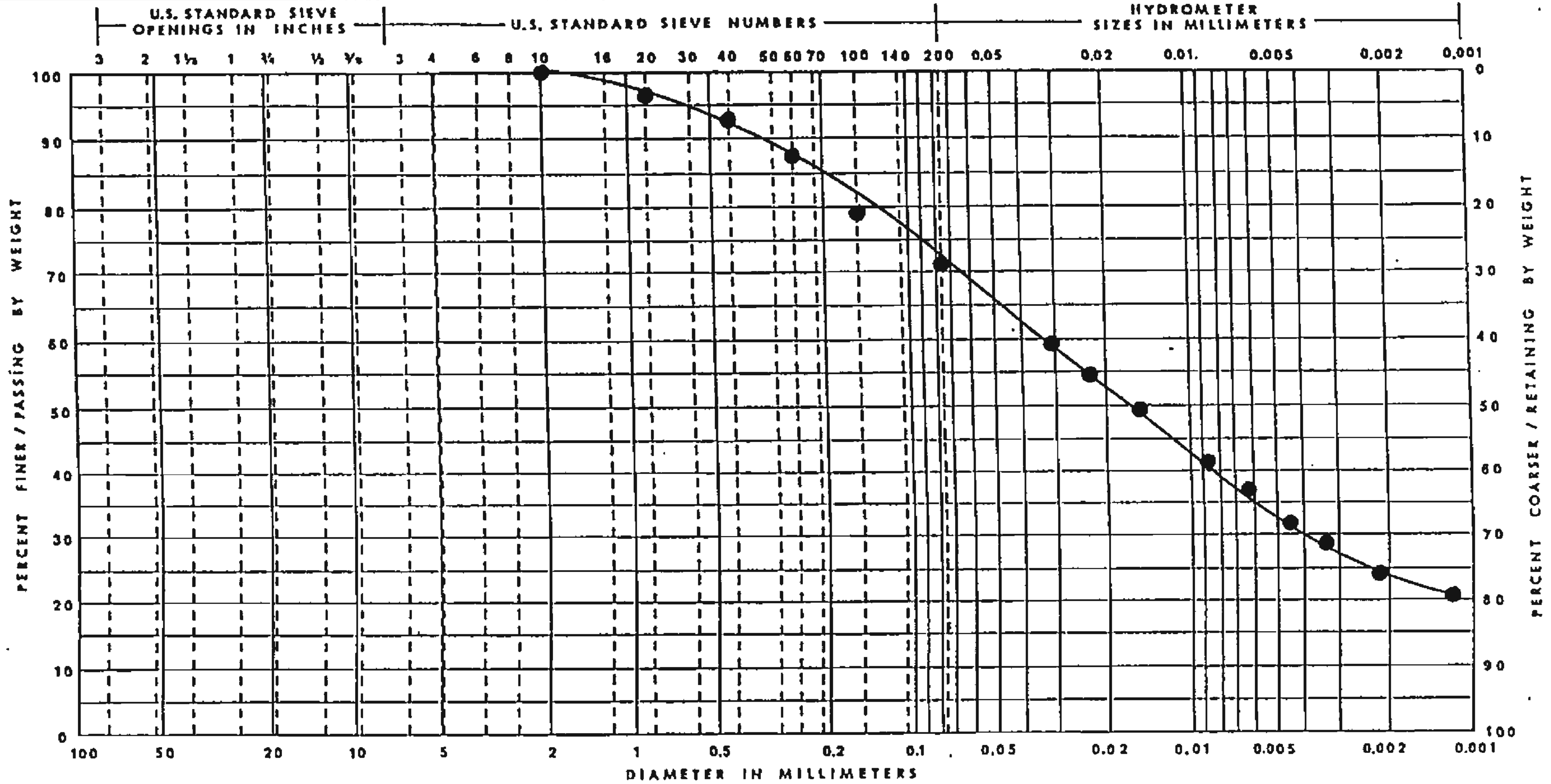

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS6	16.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	71	

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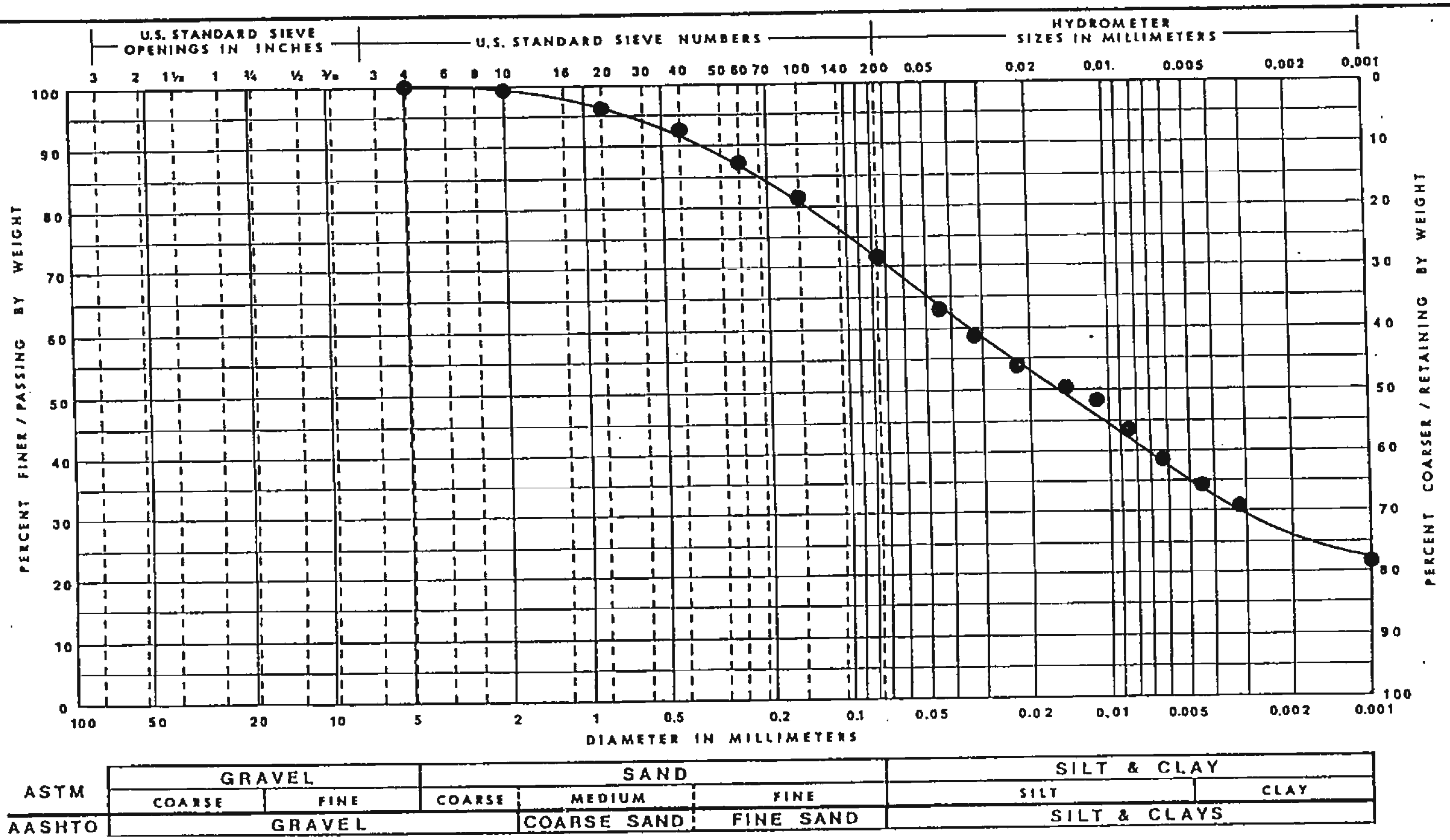

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS8	21.5	Silty Clay-Some Sand-Trace of	72	
				Gravel-Gray (CL)		

MONROE ASH BASIN
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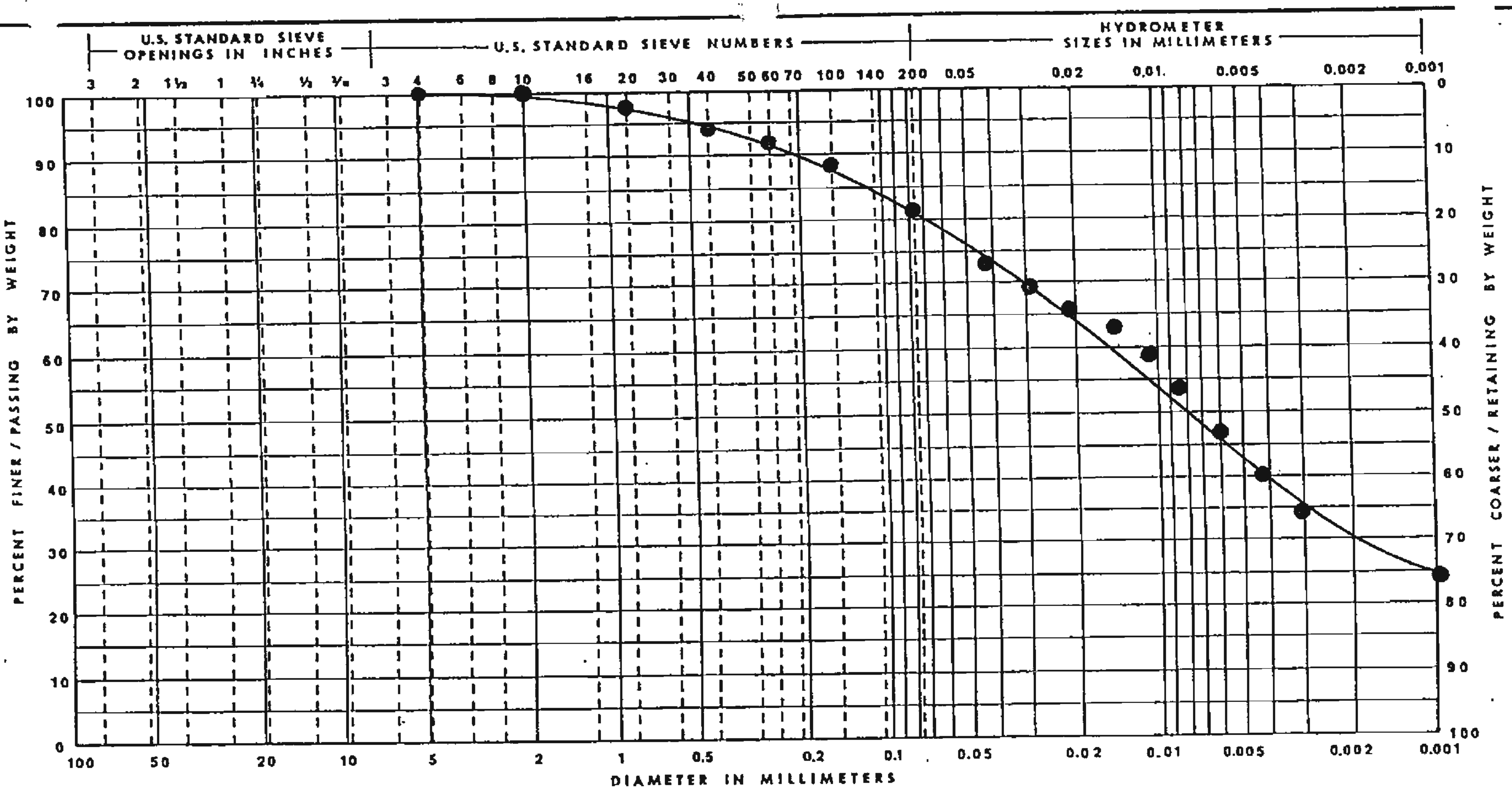

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS10	26.5	Silty Clay-Trace to Some Sand-	81	
				Trace of Gravel-Gray (CL)		

MONROE ASH BASIN
DETROIT EDISON
DETROIT, MICHIGAN

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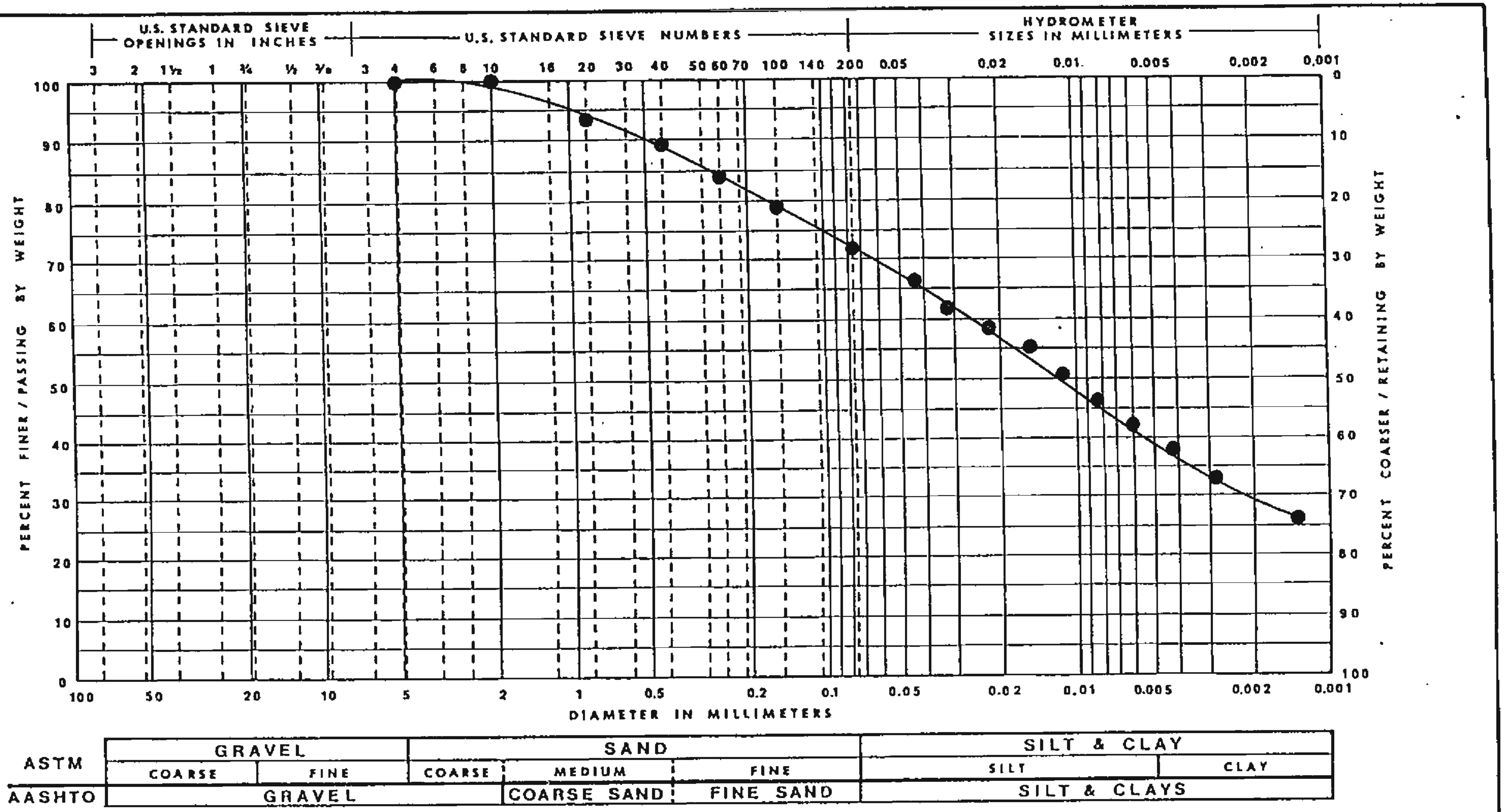

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS12	31.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	72	

MONROE ASH BASIN
DETROIT EDISON
DETROIT, MICHIGAN

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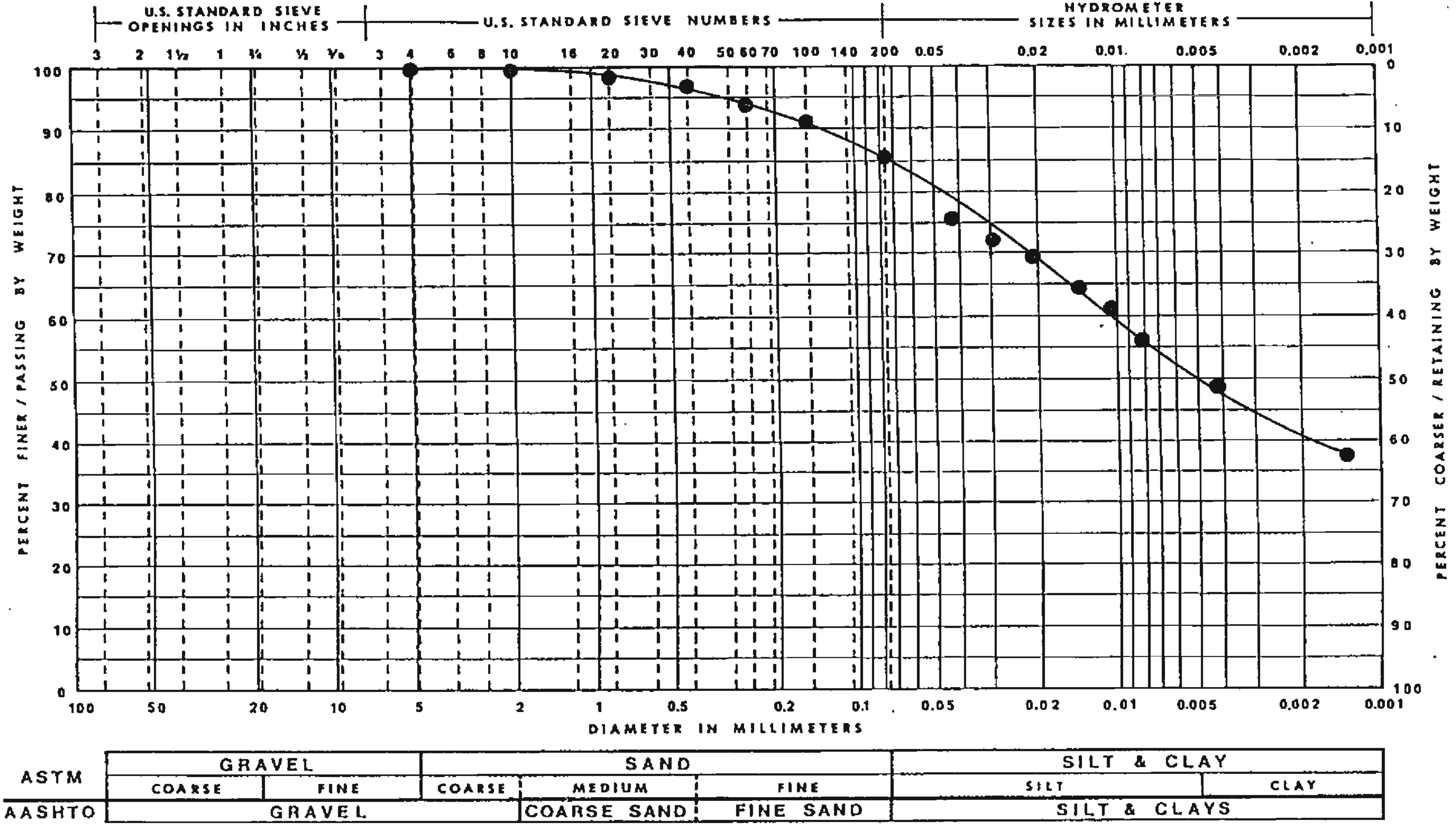

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS2	6.5	Silty Clay-Trace to Some Sand-	85	
				Trace of Gravel-Mottled Brown		
				(CL)		

MONROE ASH BASIN
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DETROIT, MICHIGAN

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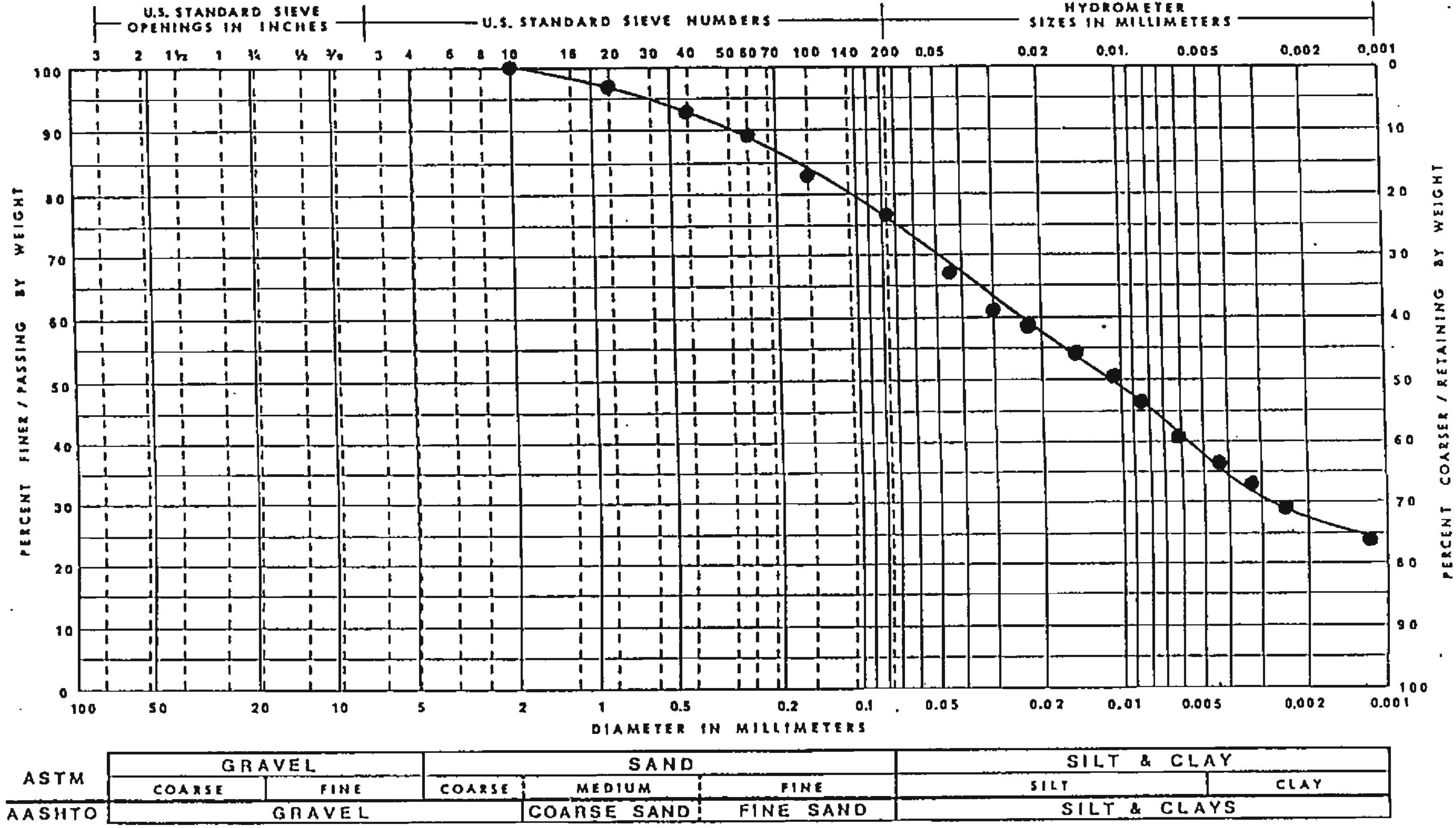

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS4	11.5	Silty Clay, Some Sand, Trace of Gravel, Mottled Brown (CL)	76	

MONROE ASH BASIN
DETROIT EDISION
MONROE, MICHIGAN

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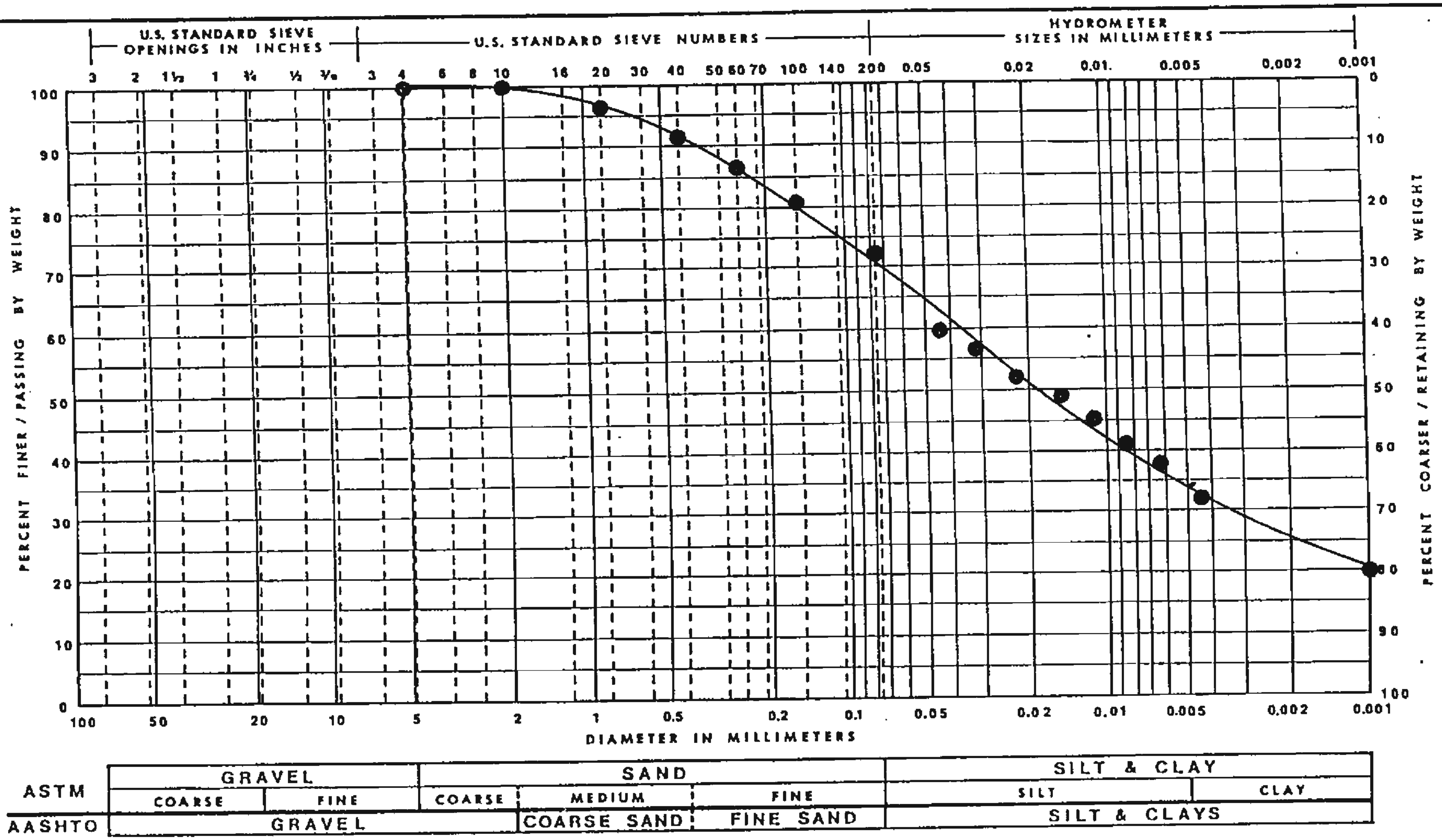

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS6	16.5	Silty Clay-Some Sand-Trace of Gravel-Mottled Brown (CL)	72	

MONROE ASH BASIN
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DETROIT, MICHIGAN

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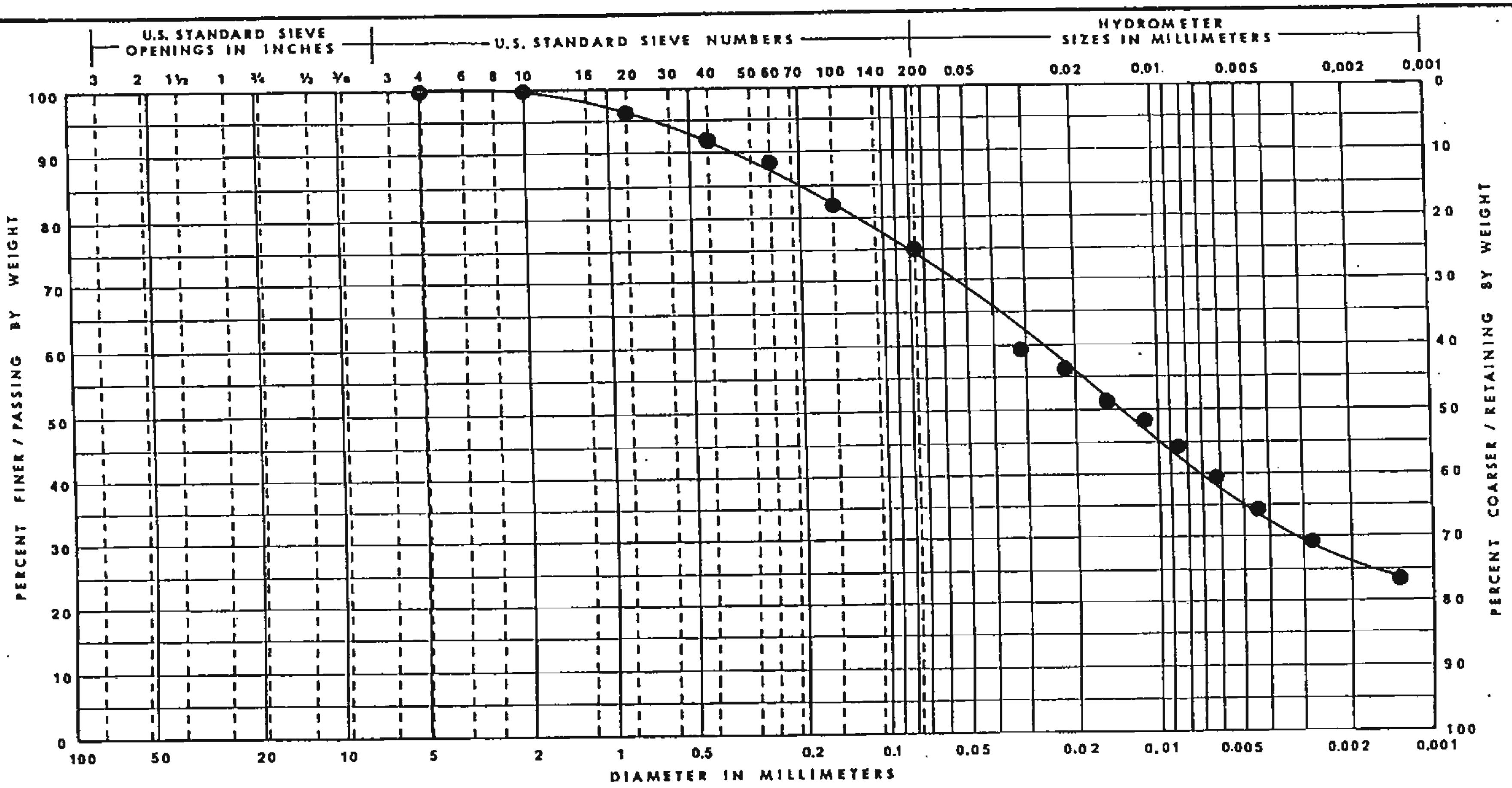

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS8	21.5	Silty Clay-Some Sand-Trace of	75	
				Gravel-Gray (CL)		

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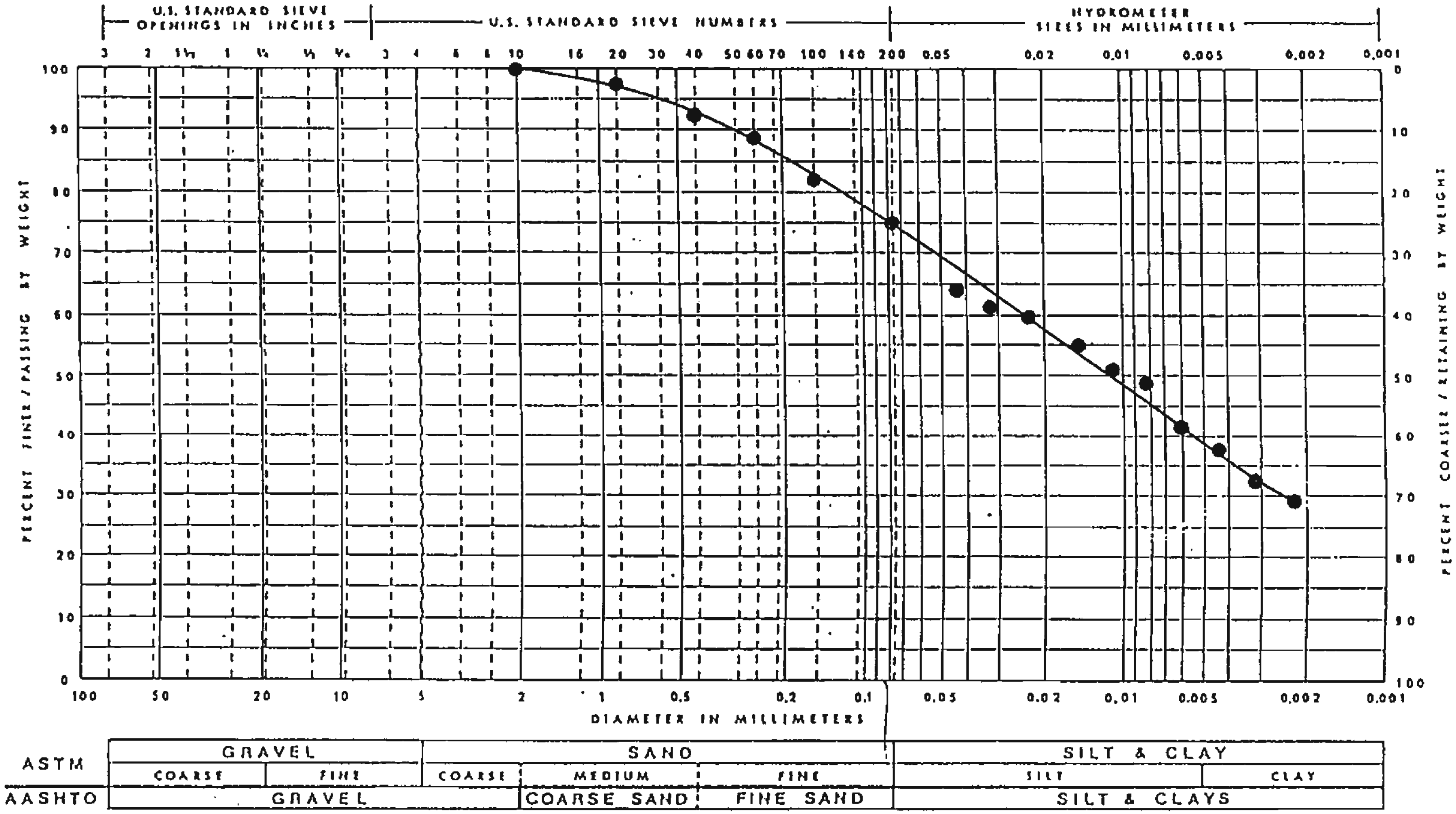

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B8	CS10	26.5	Silty Clay, Some Sand, Trace	75	
				of Gravel, Gray (CL)		

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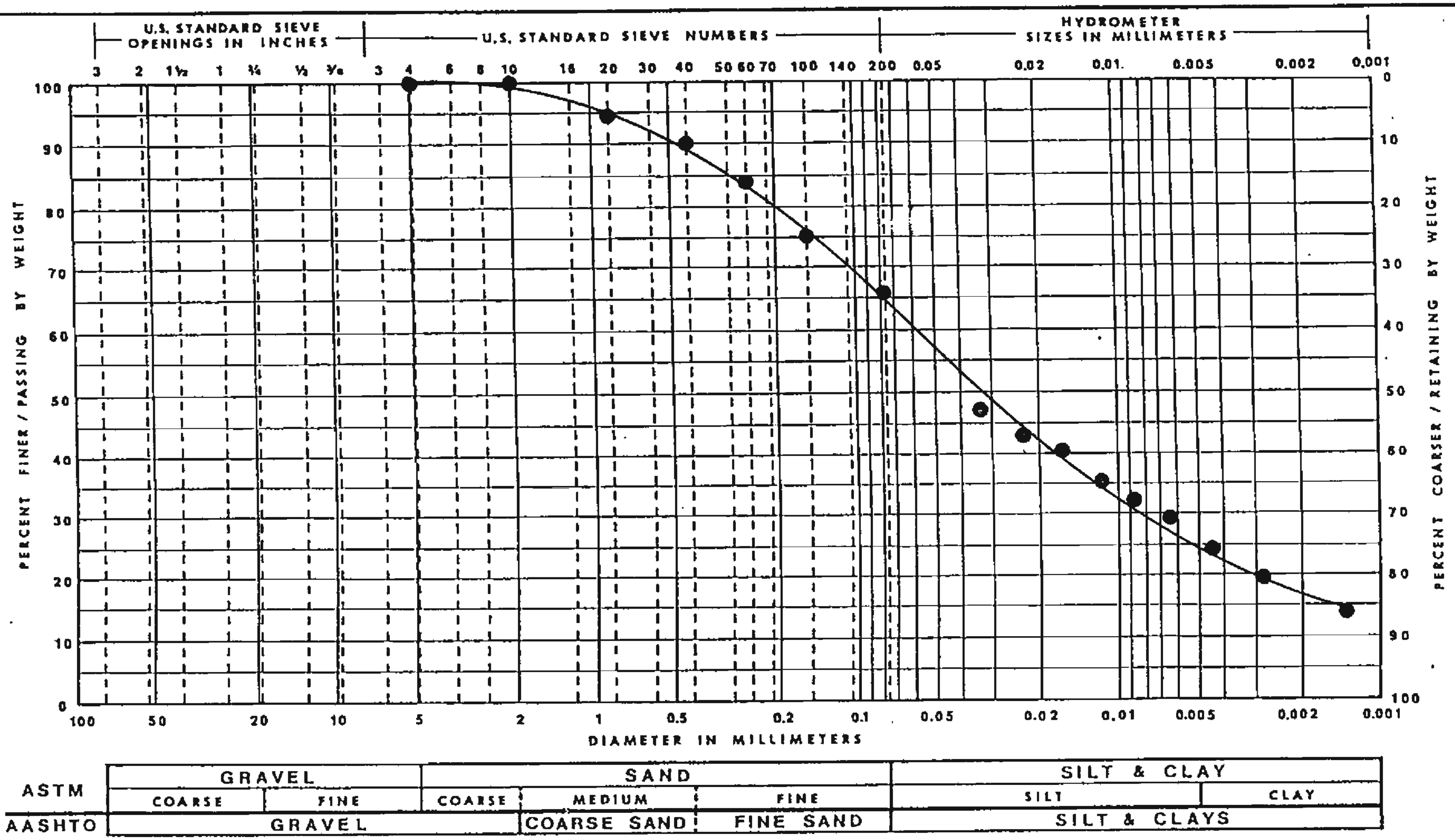

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS12	31.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	66	

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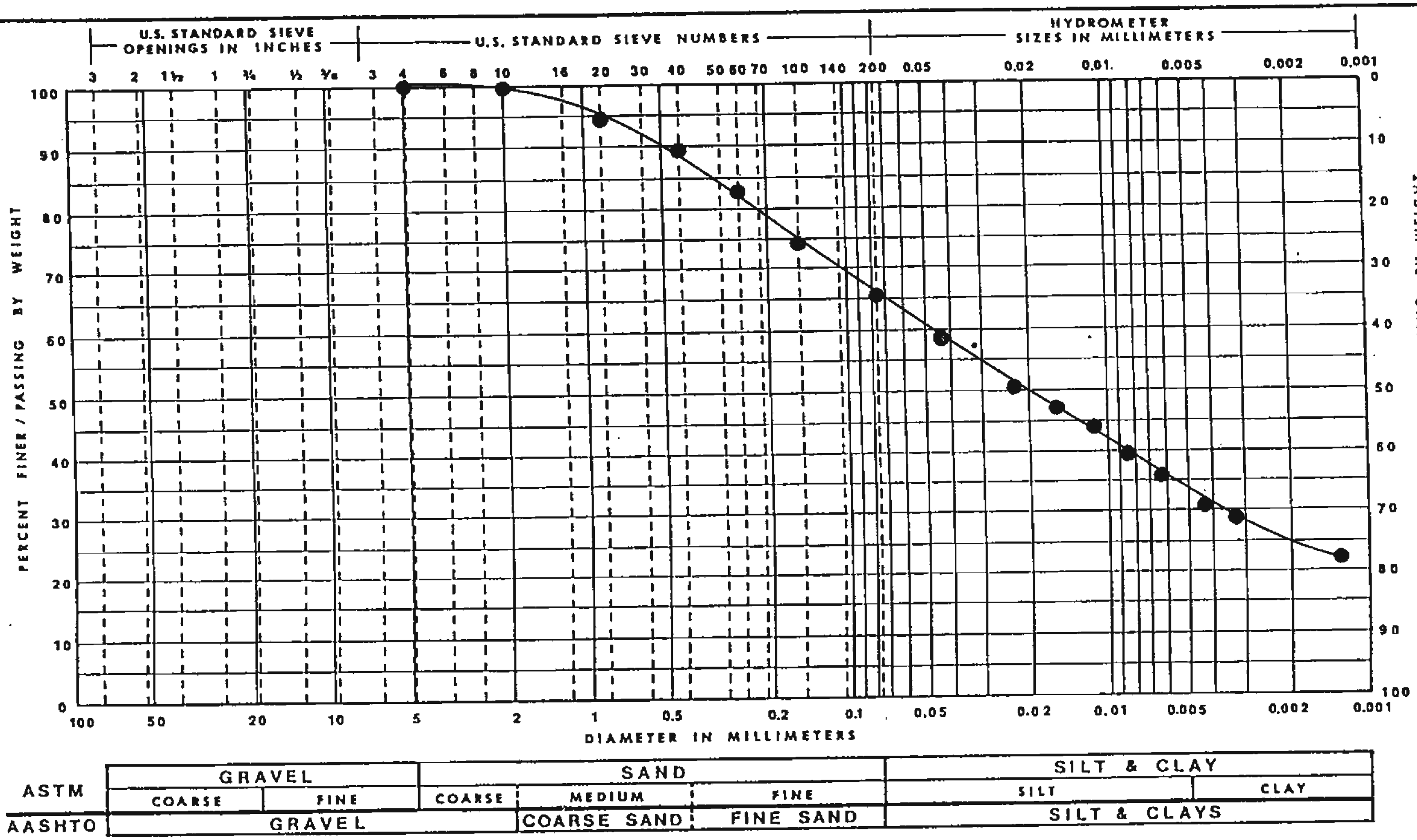

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS14	36.5	Silty Clay-Some Sand-Trace of	65	
				Gravel-Gray (CL)		

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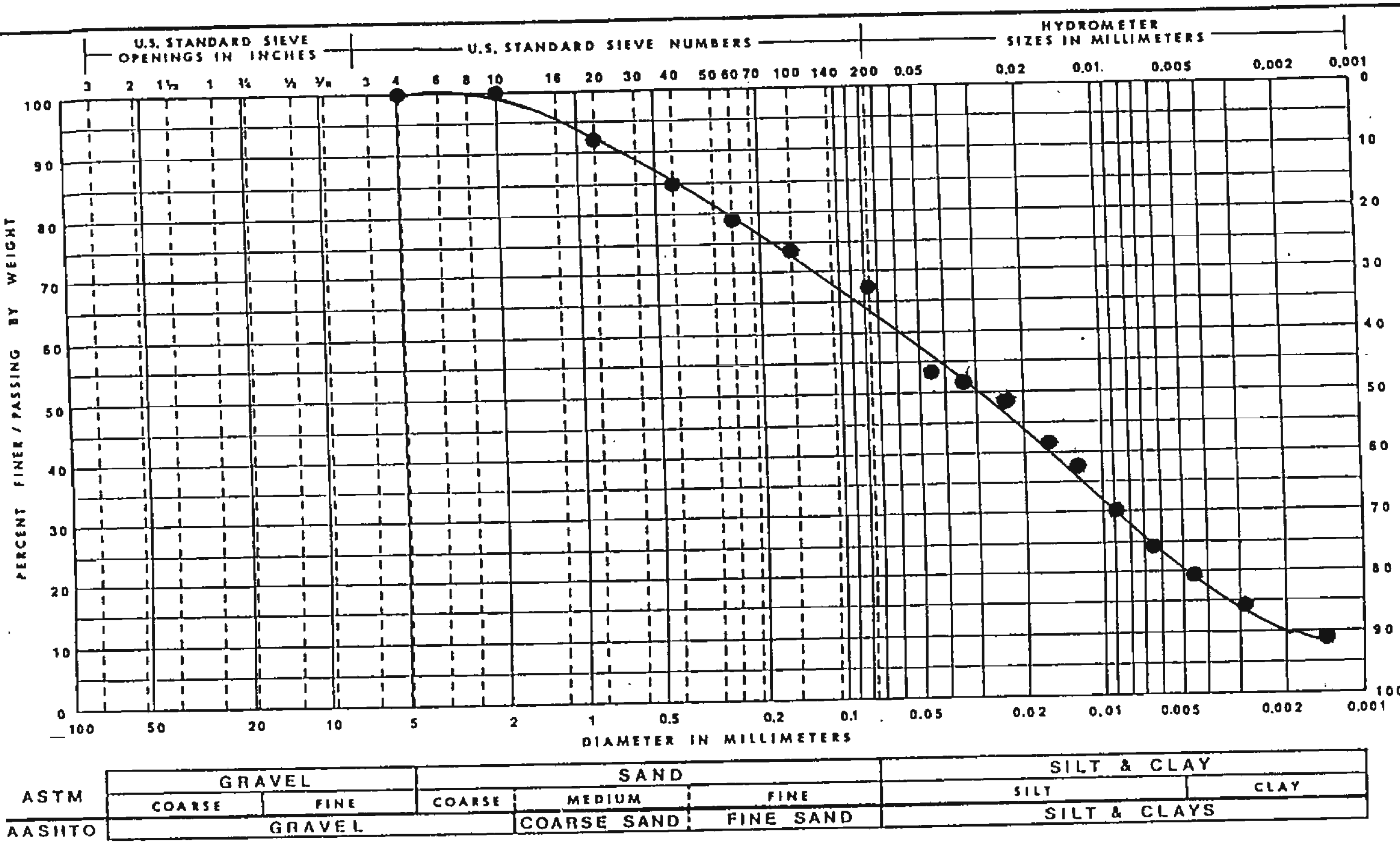

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS16	41.5	Clayey Silt-Some Sand-Trace of Gravel-Gray (CL)	66	

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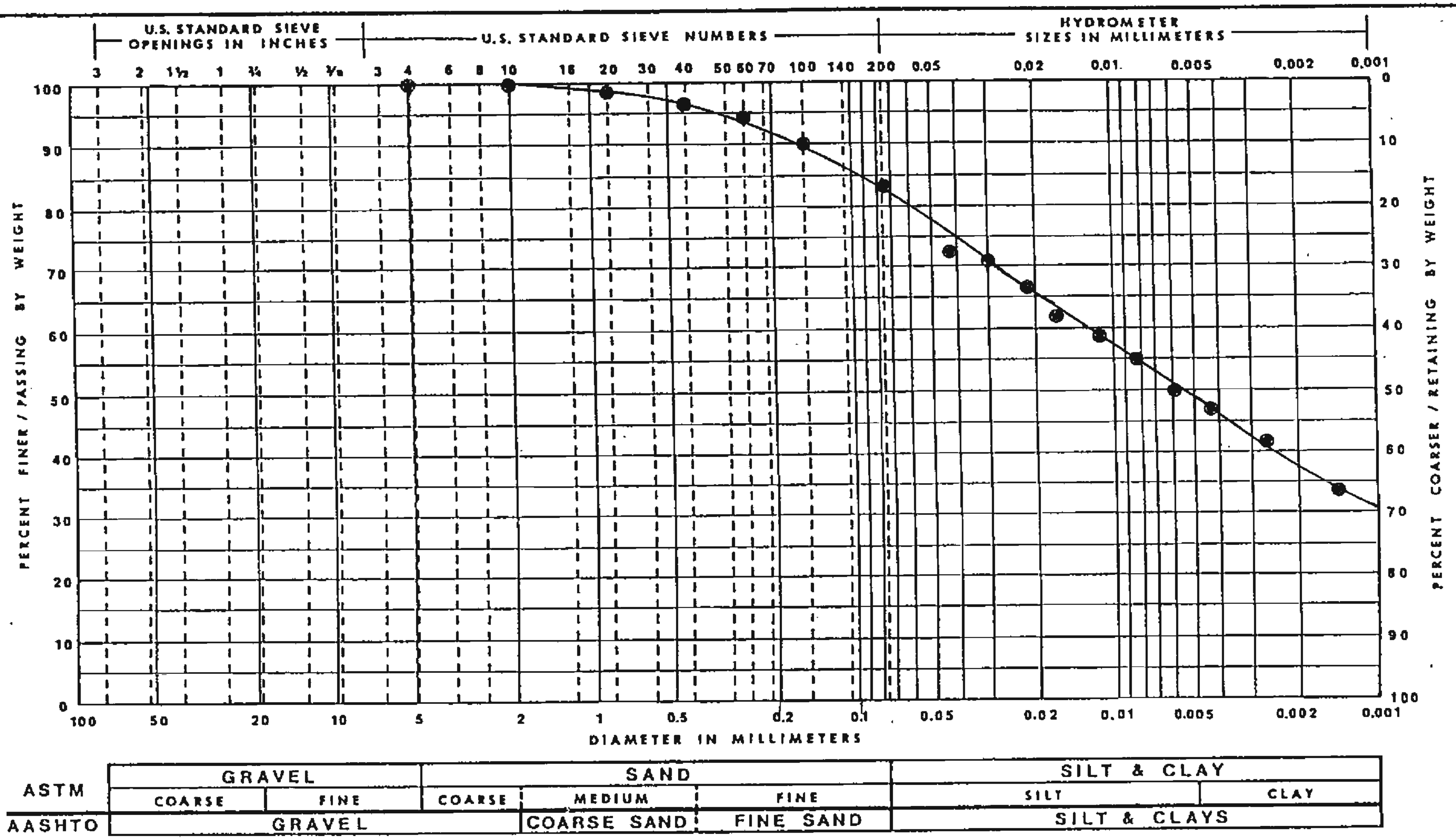

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS2	6.5	Silty Clay-Trace to Some Sand-Trace of Gravel, Roots & Brick Pieces-Brown (CL)	84	

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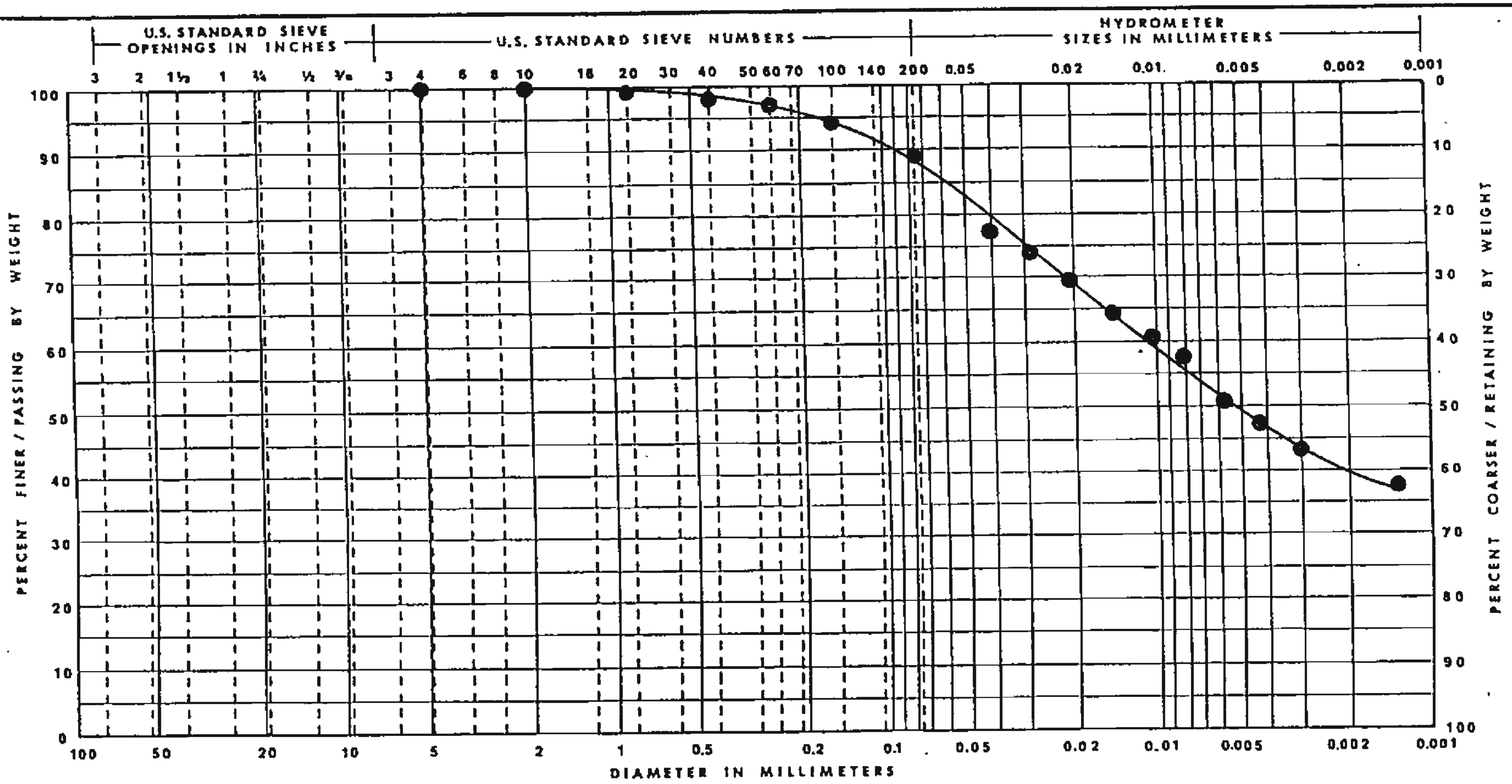

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS4	11.5	Silty Clay-Trace to Some Sand-	89	
				Trace of Gravel, Roots & Brick		
				Pieces-Brown (CL)		

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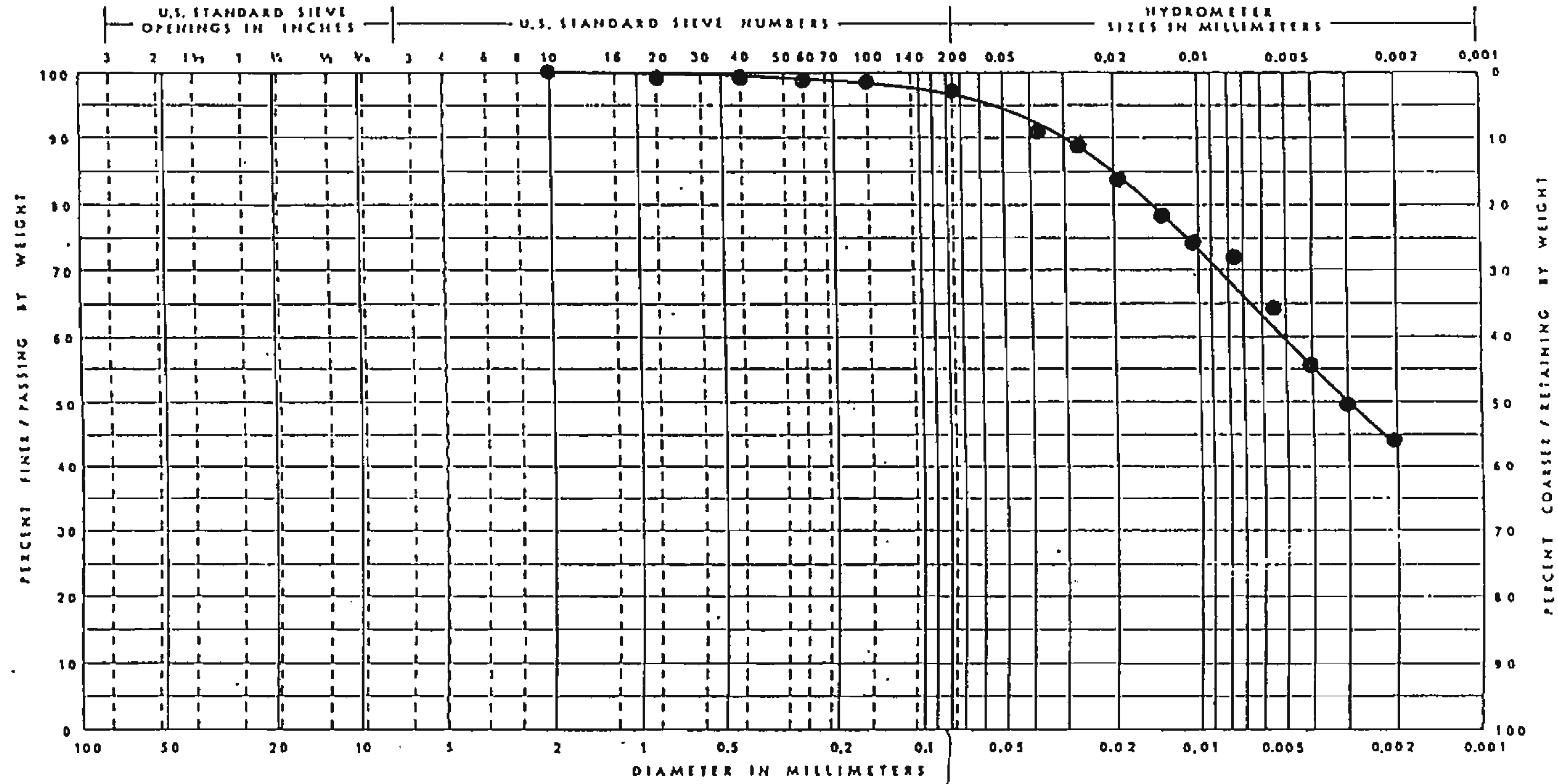

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B10	CS6	16.5	Silty Clay, Trace of Sand and Gravel, Mottled Brown (CL)	97	

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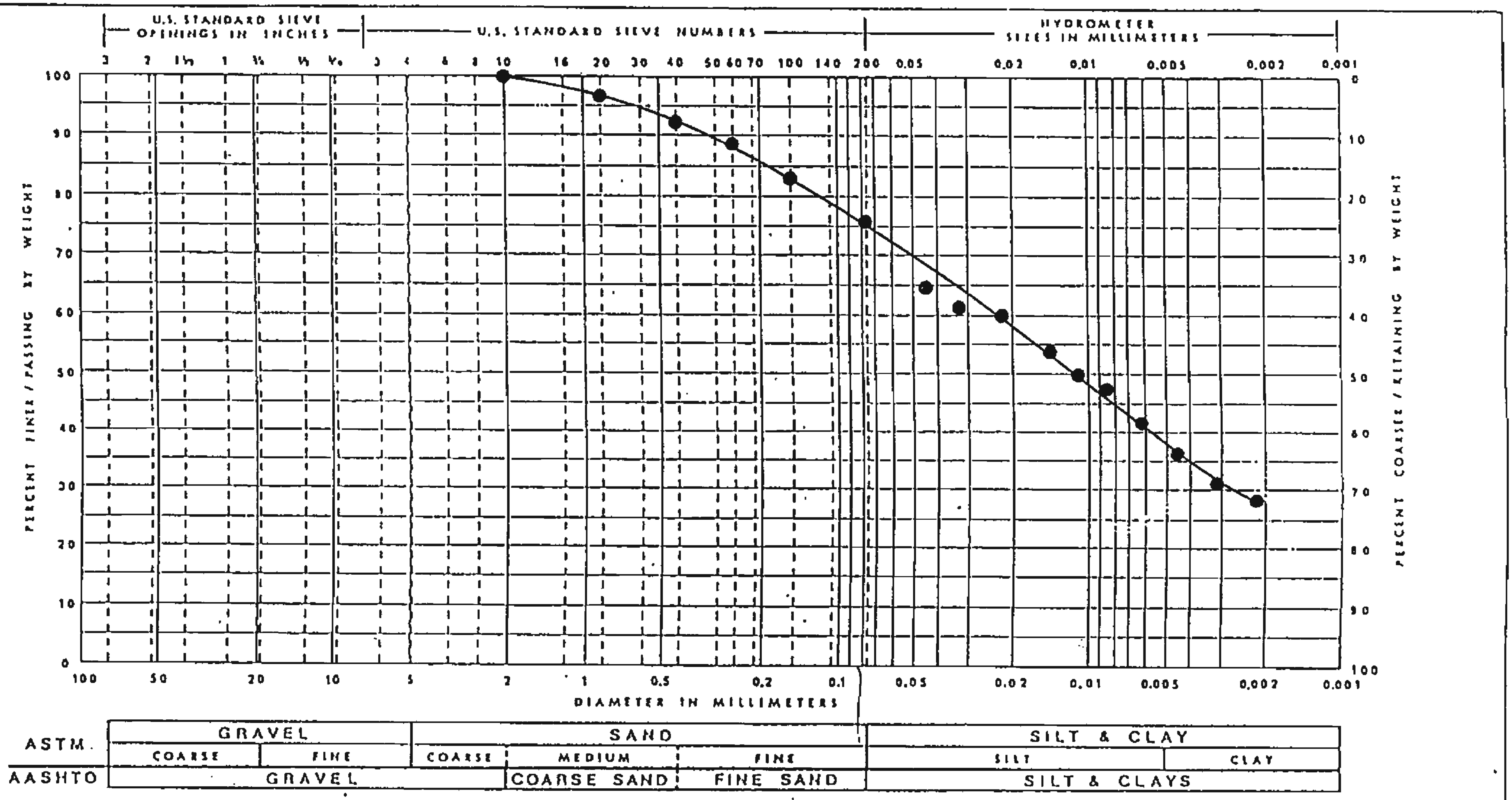

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS8	21.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	75	

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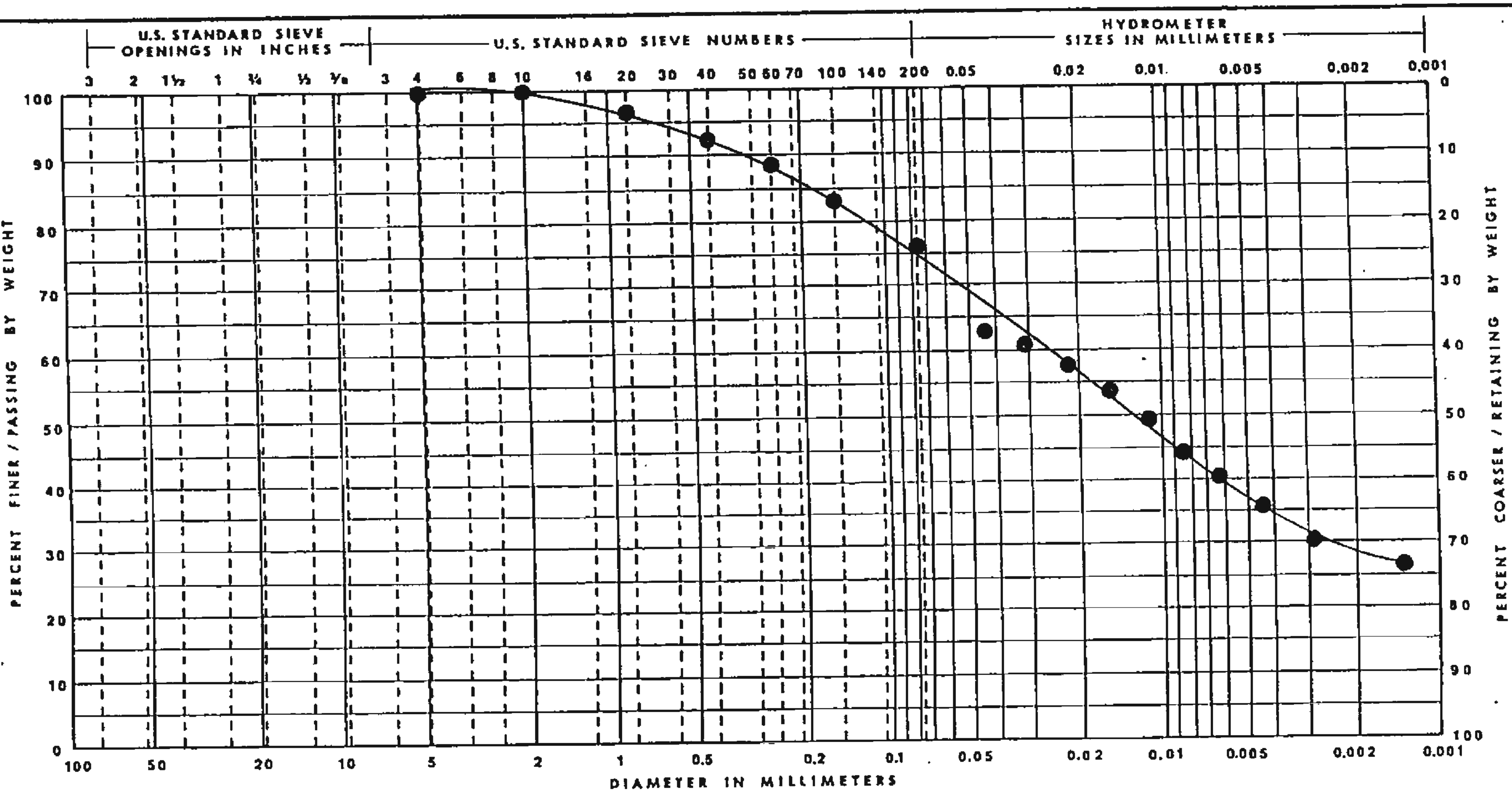

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS10	26.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	76	

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APPENDIX I – 2016 LABORATORY TEST RESULTS

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	8
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-01, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.6E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.87	Permeant:	Water	
Sample Ht. (in)	3.31	3.31	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	542.53	912.90	Sample Specific Gravity:	2.81	Est.
Tare & Dry (g)	495.80	821.70	Confining Pressure (psi):	100.0	
Tare (g)	90.23	91.36	Burette Diameter (in):	0.250	
Sample Wt. (g)	816.00	821.54	Burette Zero (cm):	100.0	

Moisture (%)	11.5	12.5	Maximum Gradient:	6.7
Wet Density (pcf)	145.1	146.0	Average Gradient:	6.5
Dry Density (pcf)	130.1	129.8	Max. Effect. Stress (psi):	5.8
Saturation (%)	92.9	100.0	Min. Effect. Stress (psi):	4.4
			Ave. Effect. Stress (psi):	4.9

Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
2016	3	2	5	6.00		0.0	95	95	45.70		2.90		102.20				
2016	3	2	9	13.00	14820	24.0	95	95	46.50	0.80	4.15	1.25	100.65	1.55	-10.7	5.6E-08	
2016	3	2	12	8.00	10500	22.0	95	95	46.70	0.20	4.95	0.80	99.85	0.80	0.0	4.8E-08	
2016	3	2	20	42.00	30840	22.0	95	95	48.30	1.60	7.20	2.25	97.85	2.00	5.9	4.5E-08	
2016	3	3	14	8.00	62760	23.0	95	95	50.95	2.65	10.90	3.70	94.55	3.30	5.7	3.8E-08	
2016	3	3	18	52.00	17040	24.0	95	95	51.50	0.55	11.80	0.90	93.80	0.75	9.1	3.4E-08	
2016	3	4	13	27.00	66900	22.0	95	95	53.20	1.70	14.70	2.90	91.15	2.65	4.5	3.2E-08	
2016	3	4	18	53.00	19560	22.0	95	95	53.80	0.60	15.45	0.75	90.45	0.70	3.4	3.0E-08	
2016	3	7	5	14.00	210060	22.0	95	95	58.95	5.15	21.05	5.60	85.35	5.10	4.7	2.2E-08	
2016	3	7	8	14.00	10800	23.0	95	95	59.30	0.35	21.30	0.25	85.15	0.20	11.1	1.9E-08	
2016	3	7	13	26.00	18720	22.0	95	95	59.75	0.45	21.65	0.35	84.80	0.35	0.0	1.8E-08	
2016	3	7	18	47.00	19260	21.0	95	95	60.50	0.75	22.05	0.40	84.55	0.25	23.1	1.7E-08	
2016	3	8	5	5.00	37080	25.0	95	95	61.50	1.00	22.75	0.70	83.85	0.70	0.0	1.7E-08	
2016	3	8	13	23.00	29880	22.0	95	95	62.20	0.70	23.30	0.55	83.30	0.55	0.0	1.8E-08	
2016	3	8	19	23.00	21600	22.0	95	95	63.10	0.90	23.70	0.40	83.10	0.20	33.3	1.4E-08	
2016	3	9	5	30.00	36420	24.0	95	95	63.80	0.70	24.30	0.60	82.40	0.70	-7.7	1.8E-08	
2016	3	9	11	14.00	20640	24.0	95	95	64.30	0.50	24.65	0.35	82.15	0.25	16.7	1.5E-08	
2016	3	9	20	22.00	32880	22.0	95	95	64.70	0.40	25.25	0.60	81.70	0.45	14.3	1.7E-08	
2016	3	10	4	59.00	31020	23.0	95	95	65.20	0.50	25.70	0.45	81.20	0.50	-5.3	1.6E-08	1
2016	3	10	8	24.00	12300	23.0	95	95	65.40	0.20	25.90	0.20	81.00	0.20	0.0	1.7E-08	1
2016	3	10	11	23.00	10740	23.0	95	95	65.40	0.00	26.05	0.15	80.85	0.15	0.0	1.5E-08	1
2016	3	10	20	45.00	33720	23.0	95	95	66.20	0.80	26.65	0.60	80.45	0.40	20.0	1.6E-08	1
2016	3	11	4	53.00	29280	22.0	95	95	66.20	0.00	27.05	0.40	79.95	0.50	-11.1	1.8E-08	1
2016	3	11	7	57.00	11040	24.0	95	95	66.60	0.40	27.20	0.15	79.80	0.15	0.0	1.5E-08	1

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 1.6E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	9
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-02, 30-32'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.3E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.86	Permeant:	Water	
Sample Ht. (in)	3.06	3.03	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	392.27	822.40	Sample Specific Gravity:	2.80	Est.
Tare & Dry (g)	353.20	733.00	Confining Pressure (psi):	100.0	
Tare (g)	89.98	90.41	Burette Diameter (in):	0.250	
Sample Wt. (g)	733.20	731.99	Burette Zero (cm):	100.0	

Moisture (%)	14.8	13.9	Maximum Gradient:	9.2
Wet Density (pcf)	141.0	143.2	Average Gradient:	9.0
Dry Density (pcf)	122.8	125.7	Max. Effect. Stress (psi):	5.7
Saturation (%)	98.2	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.8

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	2	5	7.00		0.0	95	95	55.10		2.10		101.90				
2	2016	3	2	9	14.00	14820	24.0	95	95	55.90	0.80	2.65	0.55	101.15	0.75	-15.4	2.4E-08	
3	2016	3	2	12	9.00	10500	22.0	95	95	56.20	0.30	2.95	0.30	100.75	0.40	-14.3	1.9E-08	
4	2016	3	2	20	43.00	30840	22.0	95	95	57.75	1.55	4.05	1.10	99.90	0.85	12.8	1.8E-08	
5	2016	3	3	14	9.00	62760	23.0	95	95	60.30	2.55	5.95	1.90	98.50	1.40	15.2	1.5E-08	
6	2016	3	3	18	53.00	17040	24.0	95	95	60.85	0.55	6.50	0.55	98.00	0.50	4.8	1.8E-08	
7	2016	3	4	13	28.00	66900	22.0	95	95	62.50	1.65	8.30	1.80	96.55	1.45	10.8	1.5E-08	
8	2016	3	4	18	54.00	19560	22.0	95	95	63.10	0.60	8.80	0.50	96.15	0.40	11.1	1.5E-08	
9	2016	3	7	5	15.00	210060	22.0	95	95	67.80	4.70	13.70	4.90	92.40	3.75	13.3	1.4E-08	
10	2016	3	7	8	14.00	10740	23.0	95	95	68.30	0.50	13.95	0.25	92.20	0.20	11.1	1.5E-08	
11	2016	3	7	13	26.00	18720	21.0	95	95	68.60	0.30	14.35	0.40	92.00	0.20	33.3	1.2E-08	
12	2016	3	7	18	48.00	19320	21.0	95	95	69.35	0.75	14.80	0.45	91.75	0.25	28.6	1.3E-08	
13	2016	3	8	5	5.00	37020	25.0	95	95	70.40	1.05	15.60	0.80	91.15	0.60	14.3	1.3E-08	
14	2016	3	8	13	48.00	31380	22.0	95	95	70.40	0.00	16.15	0.55	90.70	0.45	10.0	1.2E-08	
15	2016	3	8	19	24.00	20160	22.0	95	95	71.75	1.35	16.60	0.45	90.55	0.15	50.0	1.1E-08	
16	2016	3	9	5	31.00	36420	24.0	95	95	72.40	0.65	17.25	0.65	90.15	0.40	23.8	1.1E-08	
17	2016	3	9	11	15.00	20640	24.0	95	95	72.80	0.40	17.65	0.40	89.85	0.30	14.3	1.3E-08	
18	2016	3	9	20	23.00	32880	22.0	95	95	73.20	0.40	18.35	0.70	89.55	0.30	40.0	1.2E-08	
19	2016	3	10	4	59.00	30960	23.0	95	95	73.60	0.40	18.85	0.50	89.10	0.45	5.3	1.2E-08	1
20	2016	3	10	8	23.00	12240	23.0	95	95	73.80	0.20	19.10	0.25	88.90	0.20	11.1	1.4E-08	1
21	2016	3	10	11	23.00	10800	23.0	95	95	73.80	0.00	19.30	0.20	88.70	0.20	0.0	1.5E-08	1
22	2016	3	10	20	46.00	33780	23.0	95	95	74.50	0.70	20.00	0.70	88.45	0.25	47.4	1.1E-08	1
23	2016	3	11	4	54.00	29280	22.0	95	95	74.40	-0.10	20.45	0.45	87.85	0.60	-14.3	1.5E-08	1
24	2016	3	11	7	58.00	11040	24.0	95	95	74.80	0.40	20.70	0.25	87.75	0.10	42.9	1.3E-08	1
25																		
26																		

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 1.3E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	10
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-03, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.2E-08 cm/s

	Initial Values	Final Values		
Sample Type: Undisturbed				
Sample Dia. (in)	2.87	2.87	Permeant:	Water
Sample Ht. (in)	3.00	3.01	Permeant Specific Gravity:	1.00
Tare & Wet (g)	563.98	834.70	Sample Specific Gravity:	2.82 Est.
Tare & Dry (g)	512.90	750.80	Confining Pressure (psi):	100.0
Tare (g)	88.99	90.55	Burette Diameter (in):	0.250
Sample Wt. (g)	740.10	744.15	Burette Zero (cm):	100.0

Moisture (%)	12.0	12.7	Maximum Gradient:	9.8
Wet Density (pcf)	145.3	145.8	Average Gradient:	9.4
Dry Density (pcf)	129.7	129.4	Max. Effect. Stress (psi):	5.7
Saturation (%)	95.6	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.8

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	2	5	8.00		0.0	95	95	50.70		2.00		101.60				
2	2016	3	2	9	14.00	14760	24.0	95	95	50.40	-0.30	2.65	0.65	100.90	0.70	-3.7	2.4E-08	
3	2016	3	2	12	9.00	10500	22.0	95	95	51.00	0.60	2.95	0.30	100.50	0.40	-14.3	1.9E-08	
4	2016	3	2	20	44.00	30900	22.0	95	95	52.65	1.65	3.85	0.90	99.75	0.75	9.1	1.5E-08	
5	2016	3	3	14	10.00	62760	23.0	95	95	55.10	2.45	5.50	1.65	98.30	1.45	6.5	1.4E-08	
6	2016	3	3	18	54.00	17040	24.0	95	95	55.30	0.20	6.00	0.50	97.90	0.40	11.1	1.5E-08	
7	2016	3	4	13	29.00	66900	22.0	95	95	57.20	1.90	7.55	1.55	96.50	1.40	5.1	1.3E-08	
8	2016	3	4	18	55.00	19560	22.0	95	95	57.70	0.50	8.00	0.45	96.00	0.50	-5.3	1.5E-08	
9	2016	3	7	5	15.00	210000	22.0	95	95	63.25	5.55	12.30	4.30	92.10	3.90	4.9	1.3E-08	
10	2016	3	7	8	15.00	10800	23.0	95	95	63.40	0.15	12.60	0.30	91.90	0.20	20.0	1.6E-08	
11	2016	3	7	13	27.00	18720	21.0	95	95	63.80	0.40	12.85	0.25	91.60	0.30	-9.1	1.1E-08	
12	2016	3	7	18	49.00	19320	21.0	95	95	64.65	0.85	13.35	0.50	91.35	0.25	33.3	1.4E-08	
13	2016	3	8	5	6.00	37020	25.0	95	95	65.15	0.50	14.00	0.65	90.75	0.60	4.0	1.1E-08	
14	2016	3	8	13	48.00	31320	22.0	95	95	66.90	1.75	14.40	0.40	90.15	0.60	-20.0	1.2E-08	
15	2016	3	8	19	25.00	20220	22.0	95	95	67.60	0.70	14.80	0.40	89.95	0.20	33.3	1.1E-08	
16	2016	3	9	5	31.00	36360	24.0	95	95	67.70	0.10	15.50	0.70	89.35	0.60	7.7	1.3E-08	1
17	2016	3	9	11	15.00	20640	24.0	95	95	68.40	0.70	15.85	0.35	89.00	0.35	0.0	1.2E-08	1
18	2016	3	9	20	24.00	32940	22.0	95	95	69.10	0.70	16.40	0.55	88.60	0.40	15.8	1.1E-08	1
19	2016	3	10	5	0.00	30960	23.0	95	95	70.20	1.10	16.75	0.35	88.05	0.55	-22.2	1.1E-08	1
20	2016	3	10	8	24.00	12240	23.0	95	95	69.90	-0.30	17.00	0.25	87.80	0.25	0.0	1.6E-08	1
21	2016	3	10	11	24.00	10800	23.0	95	95	70.20	0.30	17.20	0.20	87.70	0.10	33.3	1.1E-08	1
22	2016	3	10	20	47.00	33780	23.0	95	95	70.40	0.20	17.80	0.60	87.40	0.30	33.3	1.0E-08	1
23	2016	3	11	4	54.00	29220	22.0	95	95	71.40	1.00	18.15	0.35	86.75	0.65	-30.0	1.4E-08	1
24	2016	3	11	7	58.00	11040	24.0	95	95	71.25	-0.15	18.35	0.20	86.65	0.10	33.3	1.0E-08	1
25																		
26																		

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 1.2E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	11
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-04, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.2E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.85	Permeant:	Water	
Sample Ht. (in)	3.55	3.51	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	869.30	961.20	Sample Specific Gravity:	2.80	Est.
Tare & Dry (g)	785.95	875.10	Confining Pressure (psi):	100.0	
Tare (g)	0.00	89.15	Burette Diameter (in):	0.250	
Sample Wt. (g)	869.30	872.05	Burette Zero (cm):	100.0	

Moisture (%)	10.6	11.0	Maximum Gradient:	8.4
Wet Density (pcf)	144.2	148.4	Average Gradient:	8.1
Dry Density (pcf)	130.4	133.7	Max. Effect. Stress (psi):	5.7
Saturation (%)	87.3	100.0	Min. Effect. Stress (psi):	4.1
			Ave. Effect. Stress (psi):	4.7

Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
2016	3	2	5	8.00		0.0	95	95	52.10		2.10		102.60				
2016	3	2	9	15.00	14820	24.0	95	95	53.45	1.35	2.75	0.65	101.85	0.75	-7.1	3.0E-08	
2016	3	2	12	10.00	10500	22.0	95	95	54.20	0.75	3.15	0.40	101.45	0.40	0.0	2.5E-08	
2016	3	2	20	40.00	30600	22.0	95	95	56.60	2.40	4.40	1.25	100.50	0.95	13.6	2.4E-08	
2016	3	3	14	6.00	62760	23.0	95	95	60.60	4.00	6.50	2.10	98.80	1.70	10.5	2.1E-08	
2016	3	3	18	50.00	17040	24.0	95	95	61.60	1.00	7.05	0.55	98.40	0.40	15.8	1.9E-08	
2016	3	4	13	25.00	66900	22.0	95	95	64.60	3.00	8.85	1.80	96.75	1.65	4.3	1.9E-08	
2016	3	4	18	51.00	19560	22.0	95	95	65.60	1.00	9.35	0.50	96.30	0.45	5.3	1.8E-08	
2016	3	7	5	16.00	210300	22.0	95	95	73.80	8.20	13.55	4.20	92.50	3.80	5.0	1.5E-08	
2016	3	7	8	15.00	10740	23.0	95	95	74.30	0.50	13.80	0.25	92.30	0.20	11.1	1.7E-08	
2016	3	7	13	27.00	18720	21.0	95	95	74.95	0.65	14.10	0.30	92.00	0.30	0.0	1.4E-08	
2016	3	7	18	46.00	19140	21.0	95	95	75.95	1.00	14.45	0.35	91.85	0.15	40.0	1.1E-08	
2016	3	8	5	6.00	37200	25.0	95	95	77.60	1.65	15.00	0.55	91.35	0.50	4.8	1.1E-08	
2016	3	8	13	50.00	31440	22.0	95	95	78.60	1.00	15.45	0.45	90.80	0.55	-10.0	1.4E-08	
2016	3	8	19	21.00	19860	22.0	95	95	79.60	1.00	15.80	0.35	90.70	0.10	55.6	9.9E-09	
2016	3	9	5	32.00	36660	24.0	95	95	80.80	1.20	16.30	0.50	90.20	0.50	0.0	1.1E-08	1
2016	3	9	11	16.00	20640	24.0	95	95	81.60	0.80	16.60	0.30	89.90	0.30	0.0	1.2E-08	1
2016	3	9	20	20.00	32640	22.0	95	95	82.25	0.65	17.10	0.50	89.60	0.30	25.0	1.1E-08	1
2016	3	10	5	0.00	31200	23.0	95	95	82.90	0.65	17.55	0.45	89.10	0.50	-5.3	1.4E-08	1
2016	3	10	8	24.00	12240	23.0	95	95	83.30	0.40	17.70	0.15	89.00	0.10	20.0	9.1E-09	1
2016	3	10	11	24.00	10800	23.0	95	95	83.50	0.20	17.85	0.15	88.85	0.15	0.0	1.2E-08	1
2016	3	10	20	43.00	33540	23.0	95	95	84.50	1.00	18.35	0.50	88.60	0.25	33.3	1.0E-08	1
2016	3	11	4	55.00	29520	22.0	95	95	84.70	0.20	18.65	0.30	88.05	0.55	-29.4	1.3E-08	1
2016	3	11	7	59.00	11040	24.0	95	95	85.30	0.60	18.85	0.20	88.00	0.05	60.0	1.0E-08	1

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 1.2E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

APPENDIX J – 2020 LABORATORY TEST RESULTS

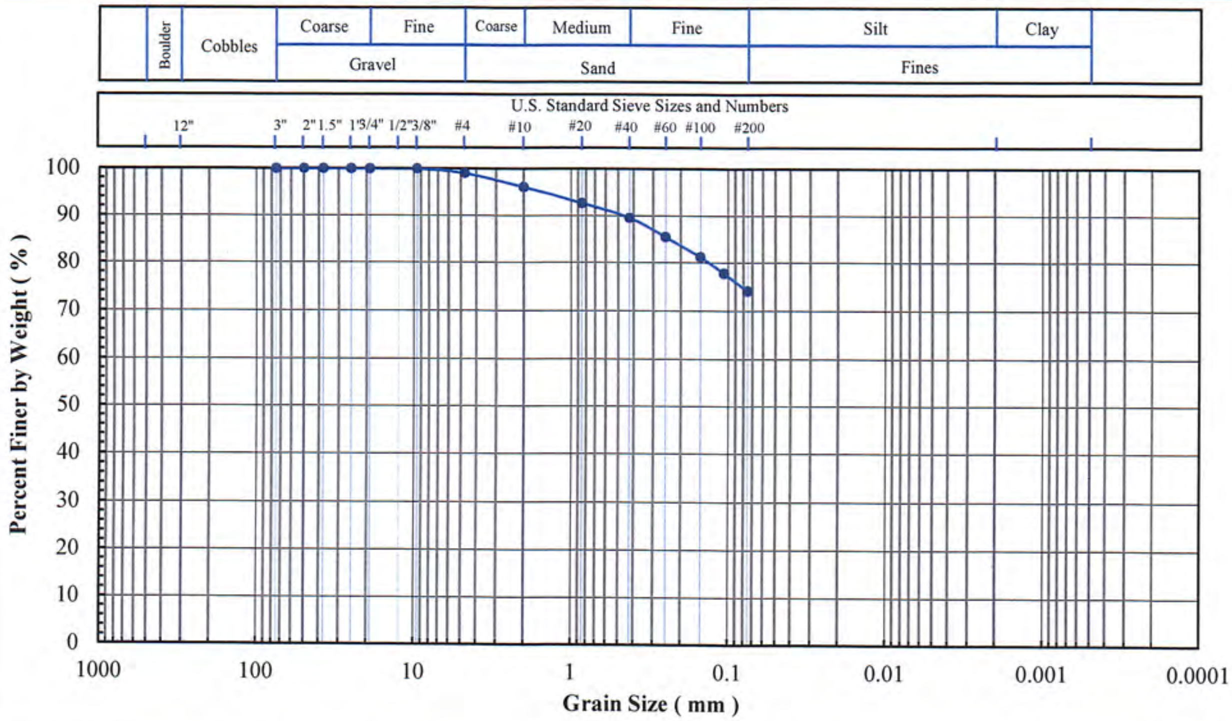
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-2 (6-16')
Lab Sample No:	20L012

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

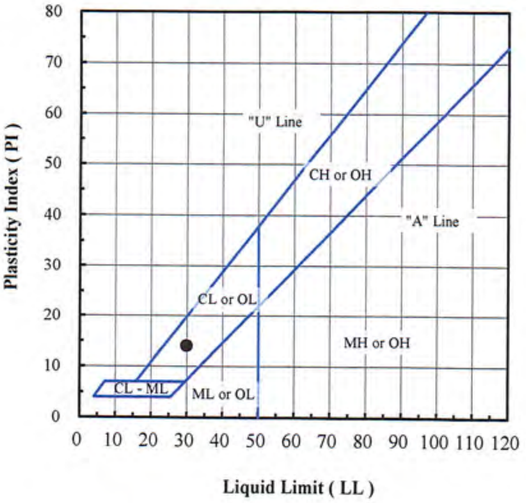


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.1
#20	0.850	92.7
#40	0.425	89.6
#60	0.250	85.5
#100	0.150	81.2
#140	0.106	77.8
#200	0.075	74.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	24.9
Fines (%):	74.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-2 (6-16')	20L012	14.8	74.1	30	16	14	CL - Lean clay with sand

Note(s):

01-20-2020
AA, VSR

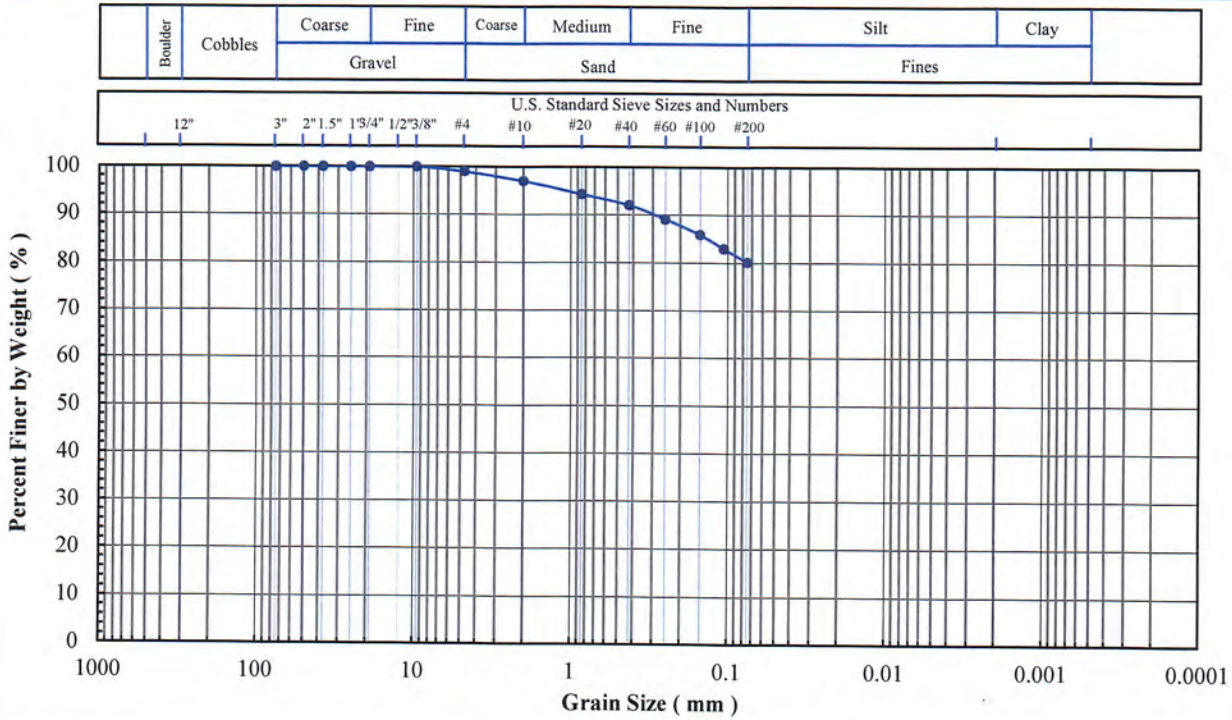
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-5 (26-36')
Lab Sample No:	20L015

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

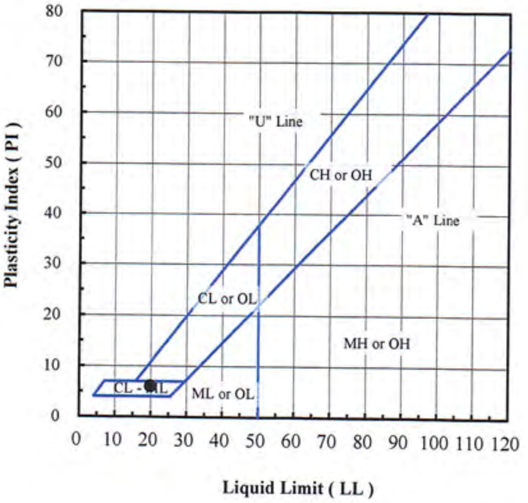


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	97.0
#20	0.850	94.3
#40	0.425	92.0
#60	0.250	89.1
#100	0.150	85.9
#140	0.106	83.0
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	18.8
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-5 (26-36')	20L015	20.8	80.2	20	14	6	CL-ML - Silty clay with sand

Note(s):

01-20-2021
AA, NSR

Excel Geotechnical Testing, Inc.

"Excellence in Testing"

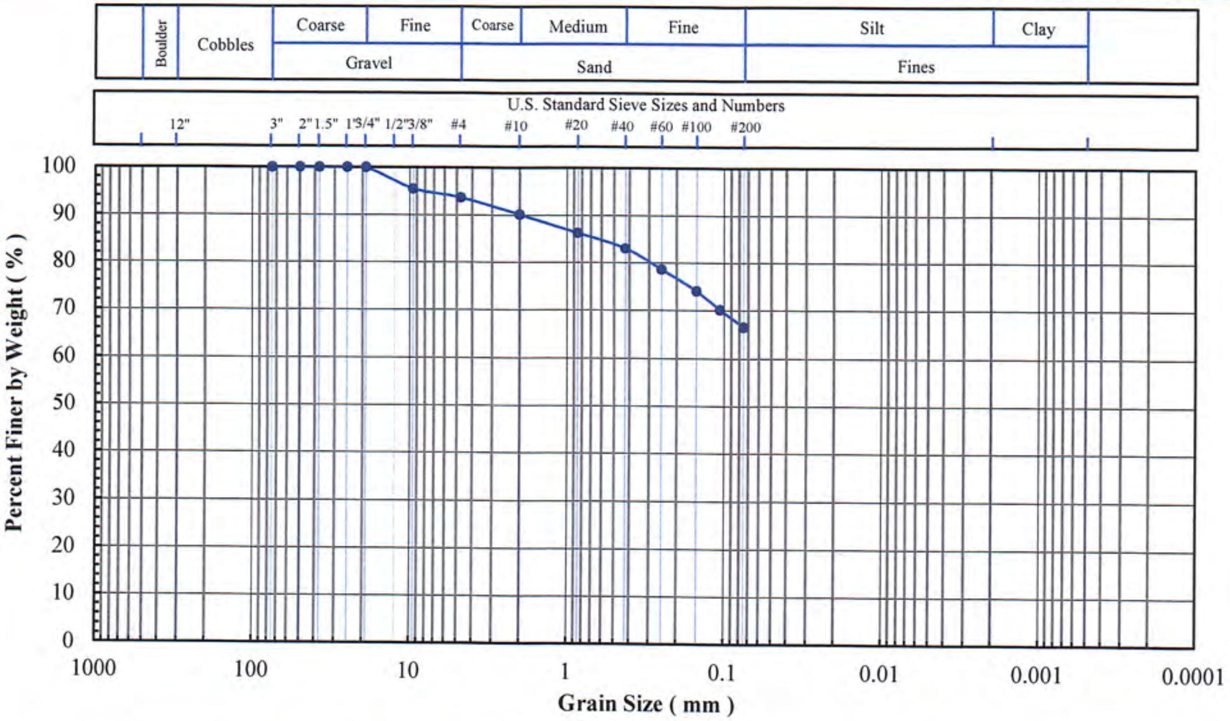
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-8 (46-56')
Lab Sample No:	20L018

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

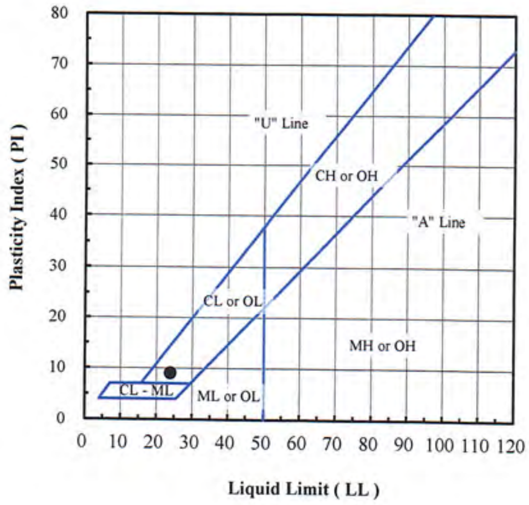


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	94
#10	2.00	90
#20	0.850	86
#40	0.425	83
#60	0.250	79
#100	0.150	74
#140	0.106	70
#200	0.075	67

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	27
Fines (%):	67
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-8 (46-56')	20L018	15.7	67	24	15	9	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

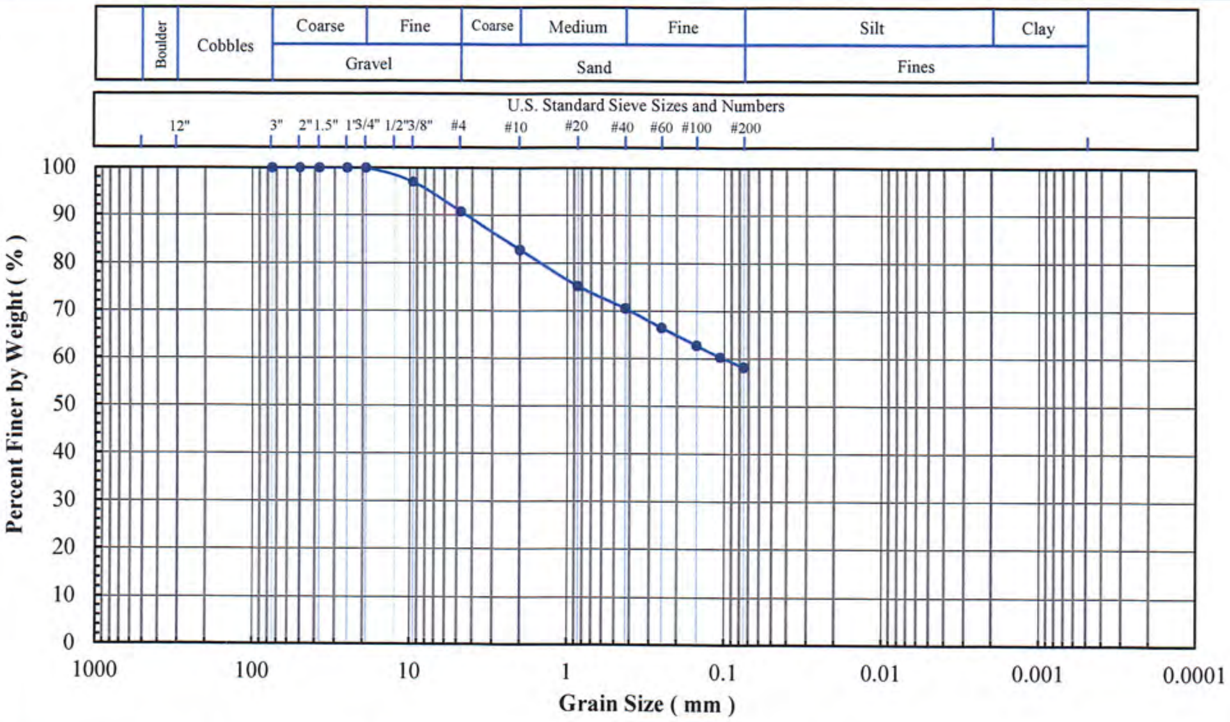
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-11 (66-76')
Lab Sample No:	20L021

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

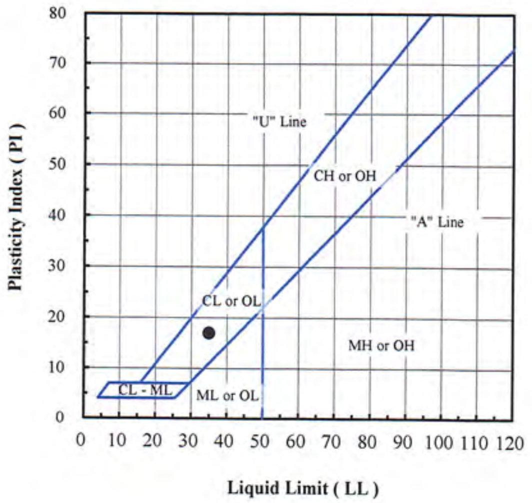


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	97
#4	4.75	91
#10	2.00	83
#20	0.850	75
#40	0.425	71
#60	0.250	66
#100	0.150	63
#140	0.106	60
#200	0.075	58

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	9
Sand (%):	33
Fines (%):	58
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-11 (66-76')	20L021	10.1	58	35	18	17	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

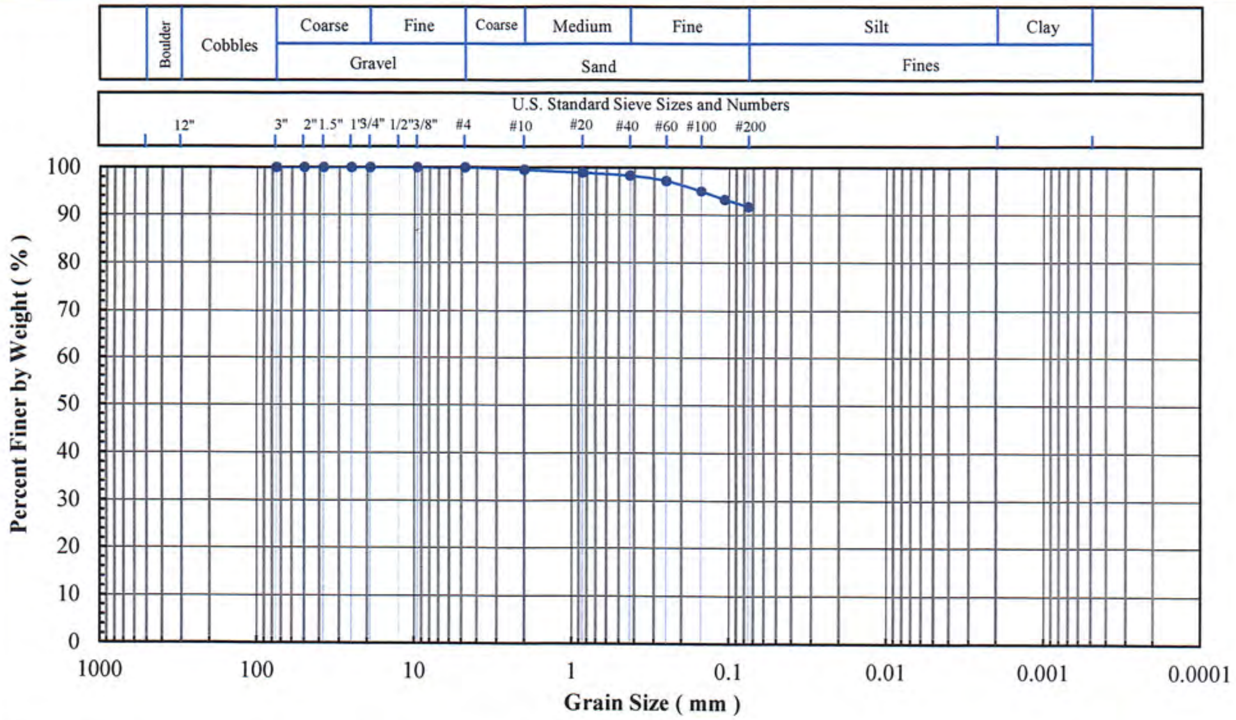
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-ST-2 (40-42')
Lab Sample No:	20L126

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

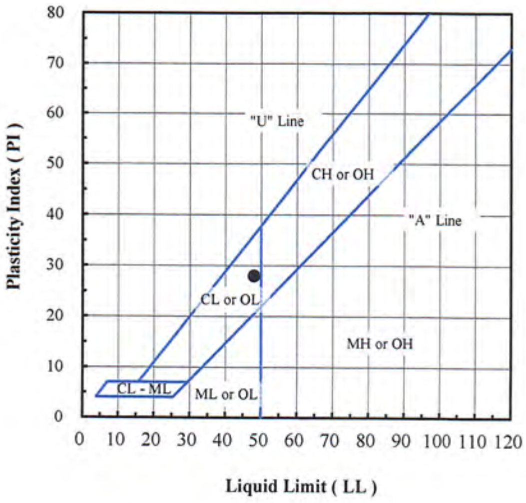


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.5
#20	0.850	98.9
#40	0.425	98.3
#60	0.250	97.2
#100	0.150	95.0
#140	0.106	93.2
#200	0.075	91.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	8.3
Fines (%):	91.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-2 (40-42')	20L126	20.0	91.7	48	20	28	CL - Lean Clay

Note(s):

01-26-2021
AA, NSR

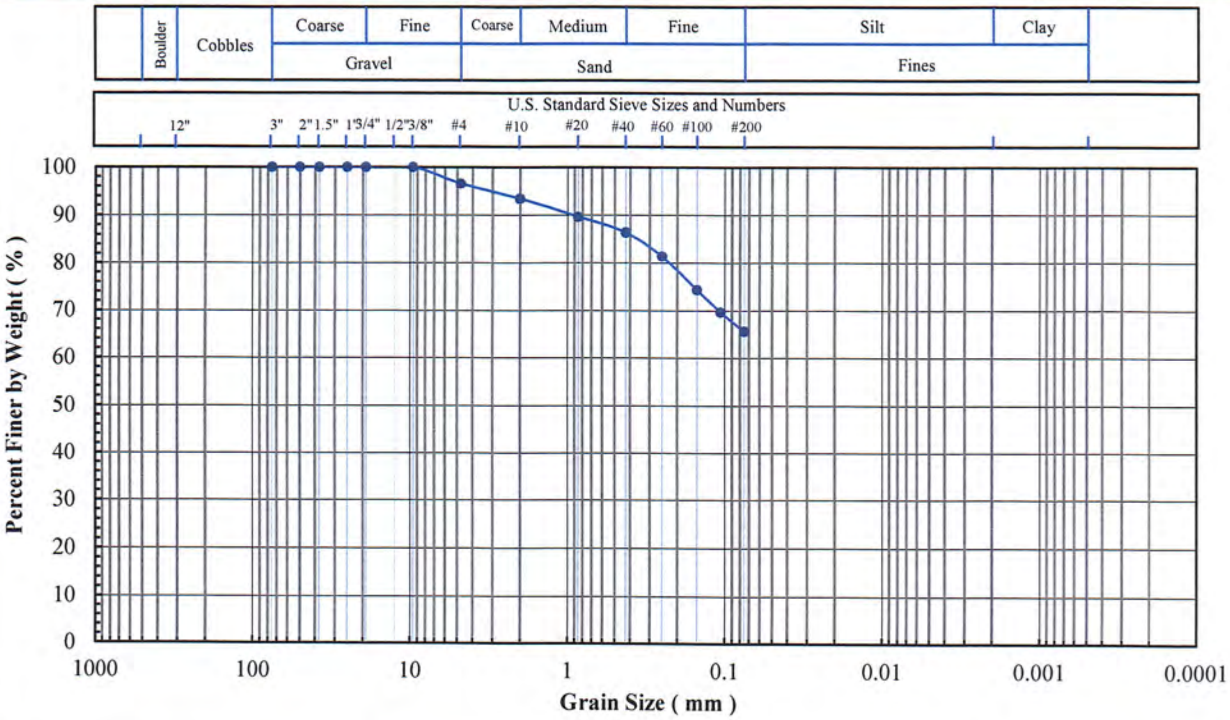
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-ST-3 (60-62')
Lab Sample No:	20L127

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

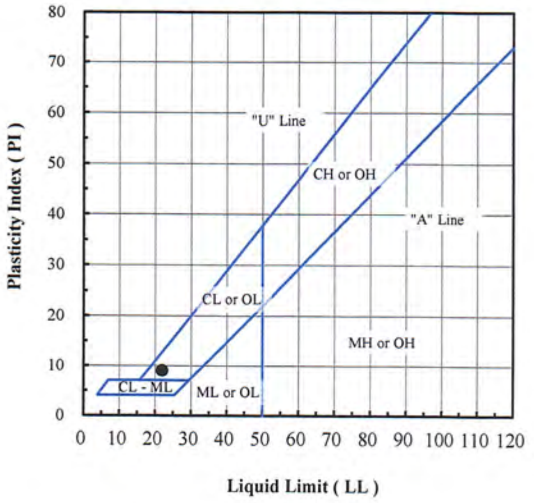


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.5
#10	2.00	93.4
#20	0.850	89.6
#40	0.425	86.4
#60	0.250	81.3
#100	0.150	74.3
#140	0.106	69.6
#200	0.075	65.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.5
Sand (%):	31.0
Fines (%):	65.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (60-62')	20L127	11.0	65.5	22	13	9	CL - Sandy lean clay

Note(s):

01-26-2021
AA, NSVR

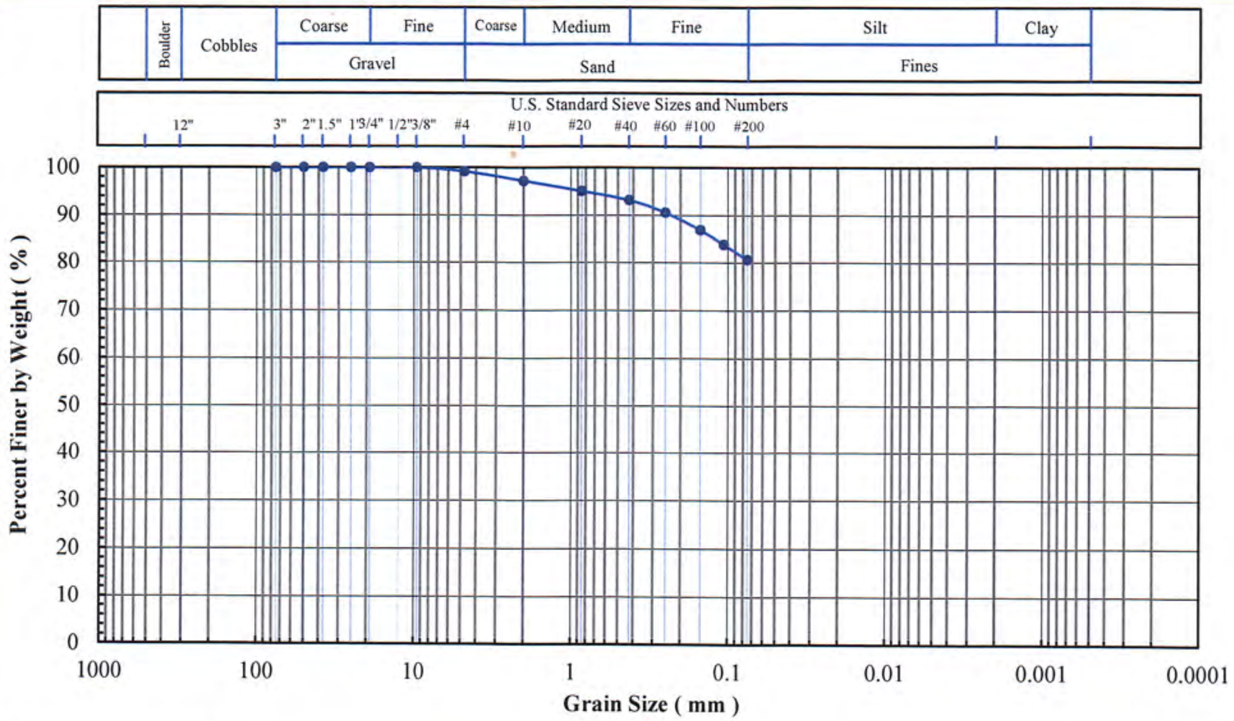
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-2 (6-16')
Lab Sample No:	20L023

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

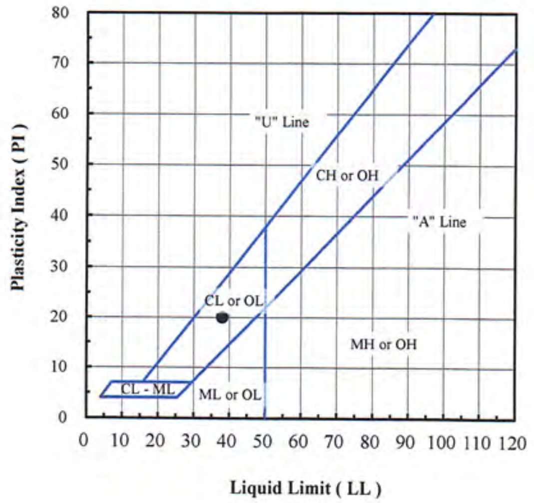


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.2
#20	0.850	95.1
#40	0.425	93.2
#60	0.250	90.6
#100	0.150	86.9
#140	0.106	83.8
#200	0.075	80.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	18.5
Fines (%):	80.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-2 (6-16')	20L023	19.5	80.7	38	18	20	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

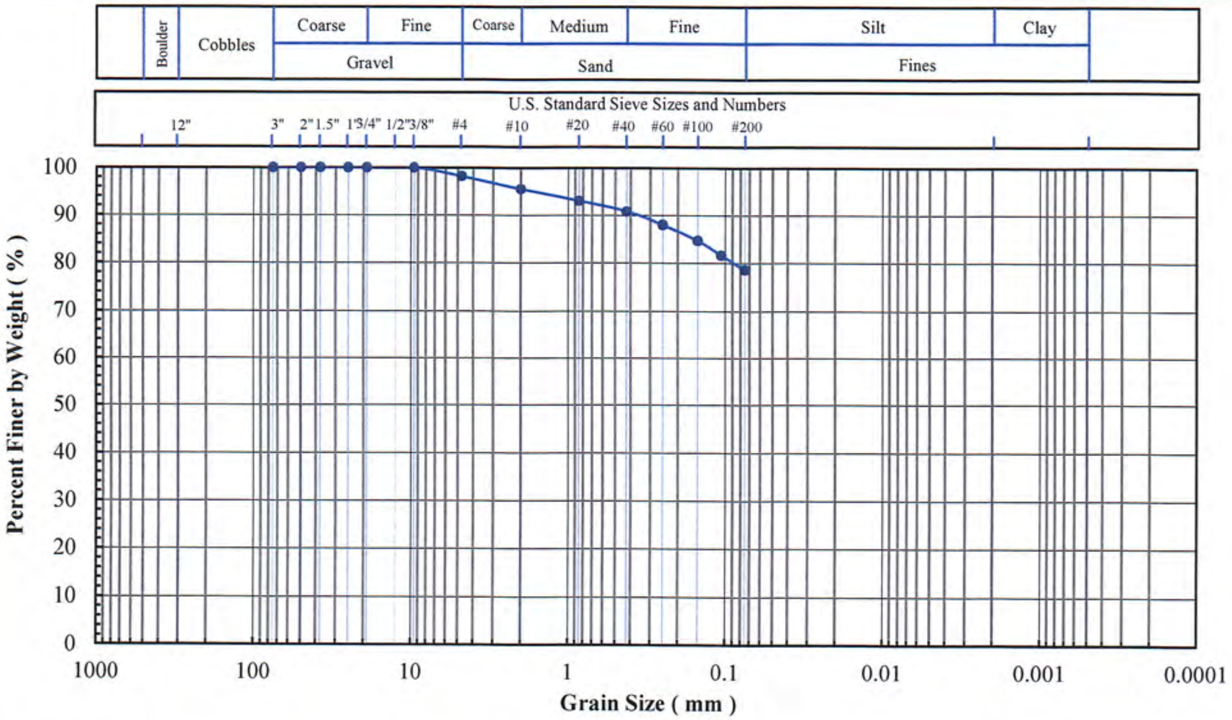
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-6 (36-46')
Lab Sample No:	20L027

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

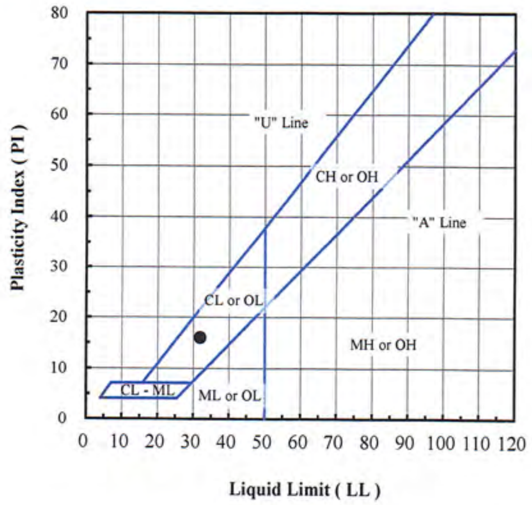


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.2
#10	2.00	95.5
#20	0.850	93.0
#40	0.425	90.8
#60	0.250	88.0
#100	0.150	84.7
#140	0.106	81.6
#200	0.075	78.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.8
Sand (%):	19.6
Fines (%):	78.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-6 (36-46')	20L027	18.6	78.6	32	16	16	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

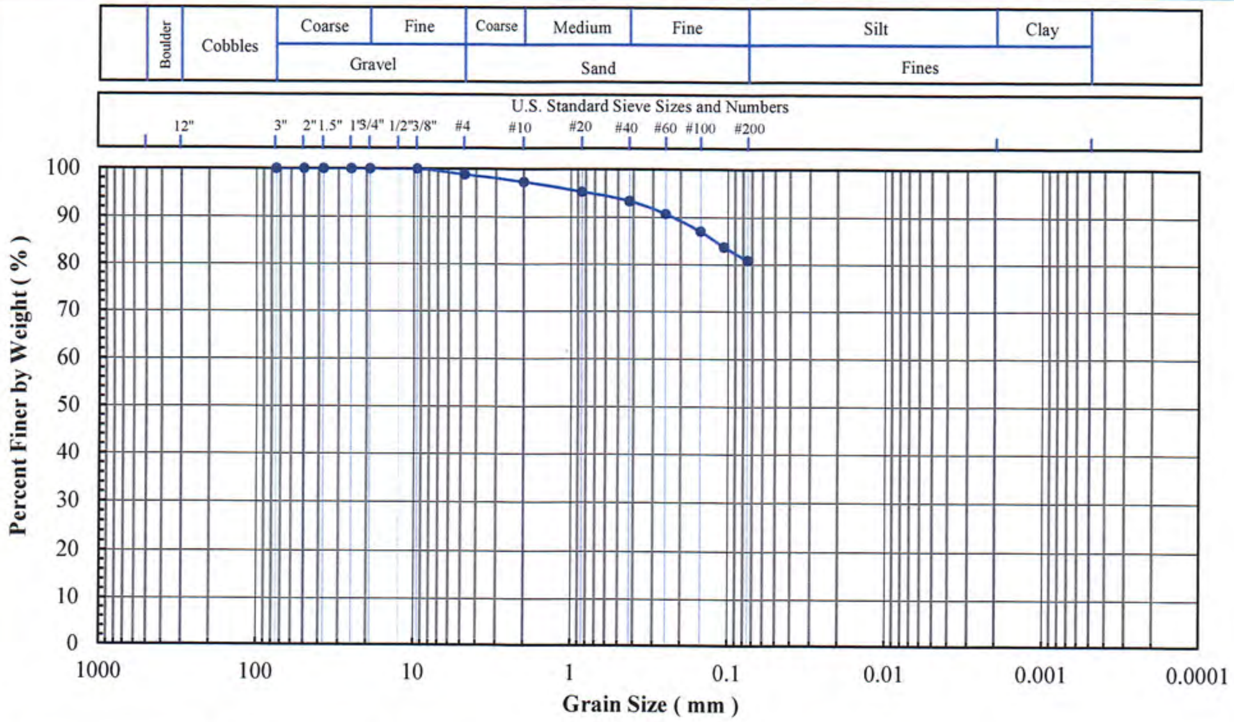
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-7 (46-56')
Lab Sample No:	20L028

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

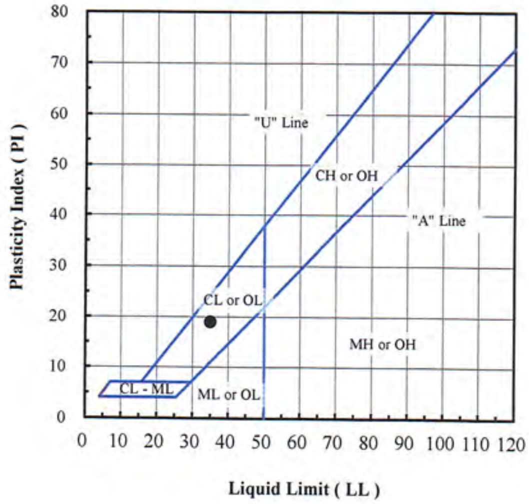


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.3
#20	0.850	95.3
#40	0.425	93.4
#60	0.250	90.7
#100	0.150	87.0
#140	0.106	83.7
#200	0.075	80.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	17.9
Fines (%):	80.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-7 (46-56')	20L028	17.9	80.9	35	16	19	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

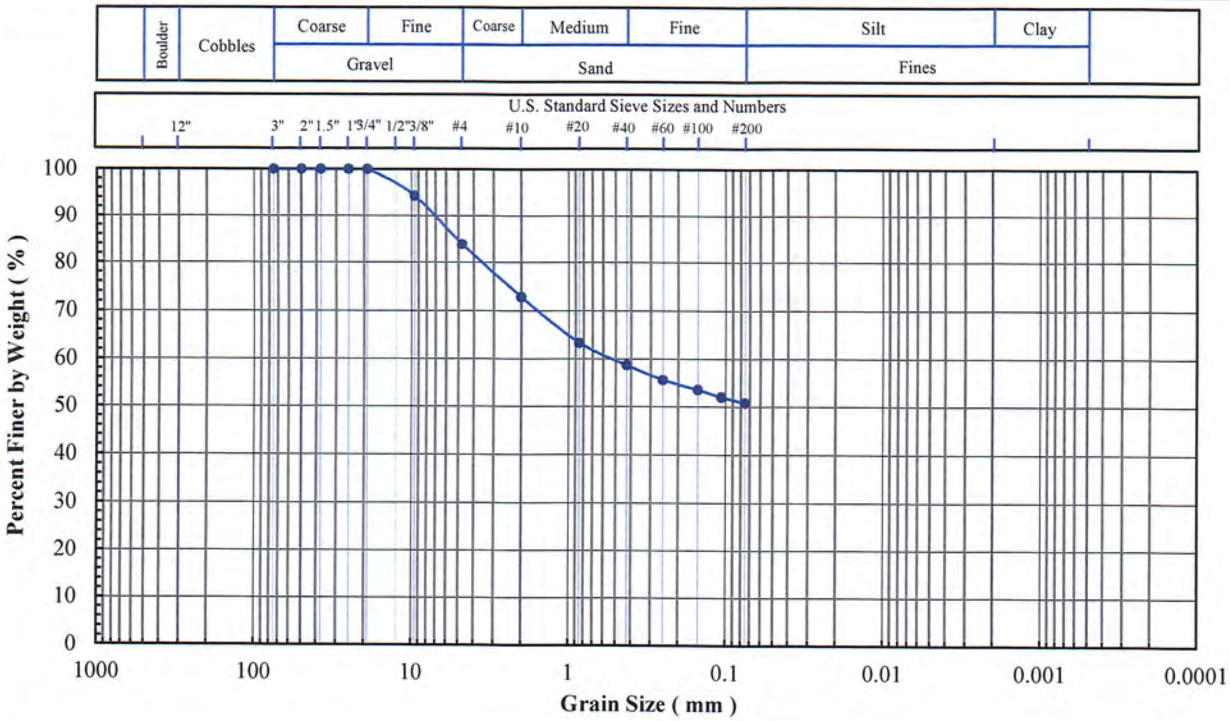
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-9 (66-76')
Lab Sample No:	20L030

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

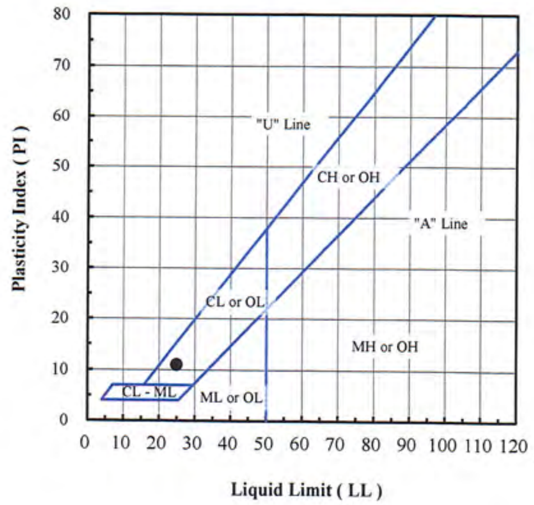


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	94
#4	4.75	84
#10	2.00	73
#20	0.850	63
#40	0.425	59
#60	0.250	56
#100	0.150	54
#140	0.106	52
#200	0.075	51

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	16
Sand (%):	33
Fines (%):	51
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-9 (66-76')	20L030	11.7	51	25	14	11	CL - Sandy lean clay with gravel

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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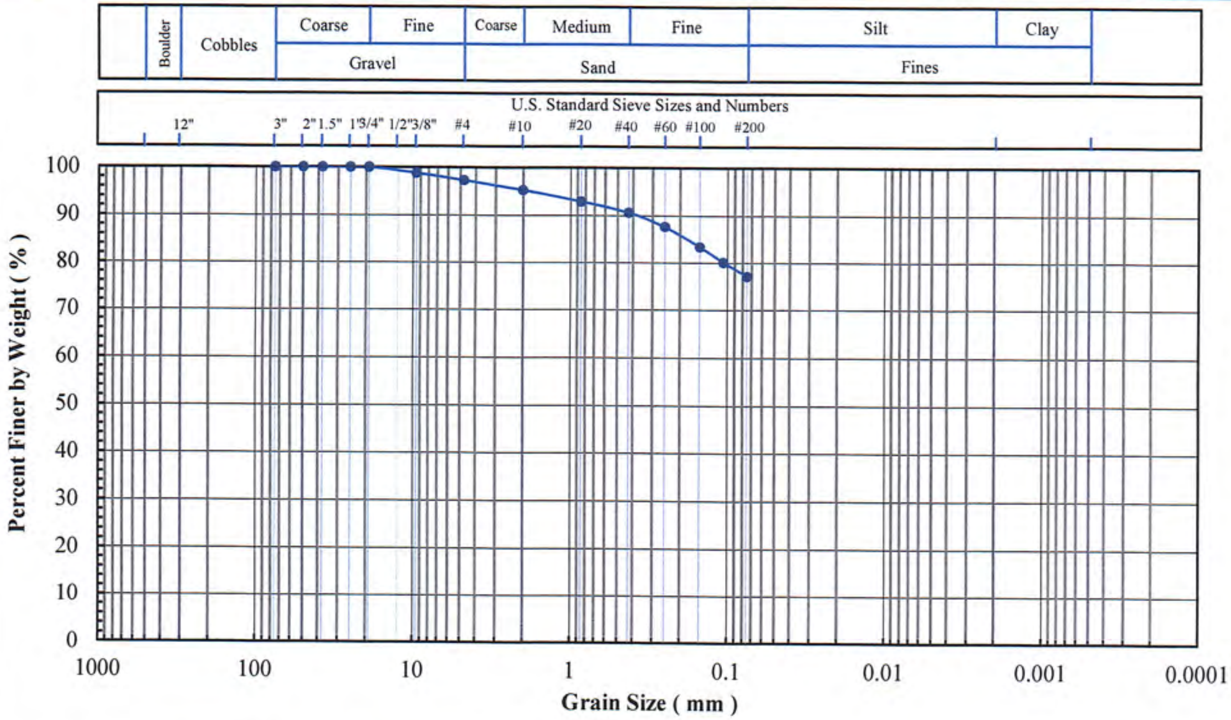
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-ST-1 (20-22')
Lab Sample No:	20L128

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

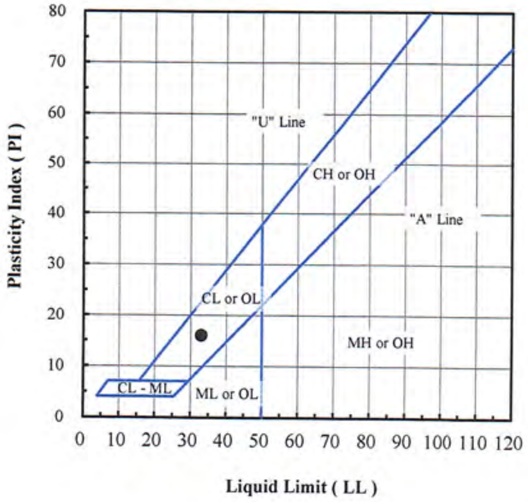


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	97
#10	2.00	95
#20	0.850	93
#40	0.425	91
#60	0.250	88
#100	0.150	83
#140	0.106	80
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	20
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-ST-1 (20-22')	20L128	16.9	77	33	17	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021
AA, NSK

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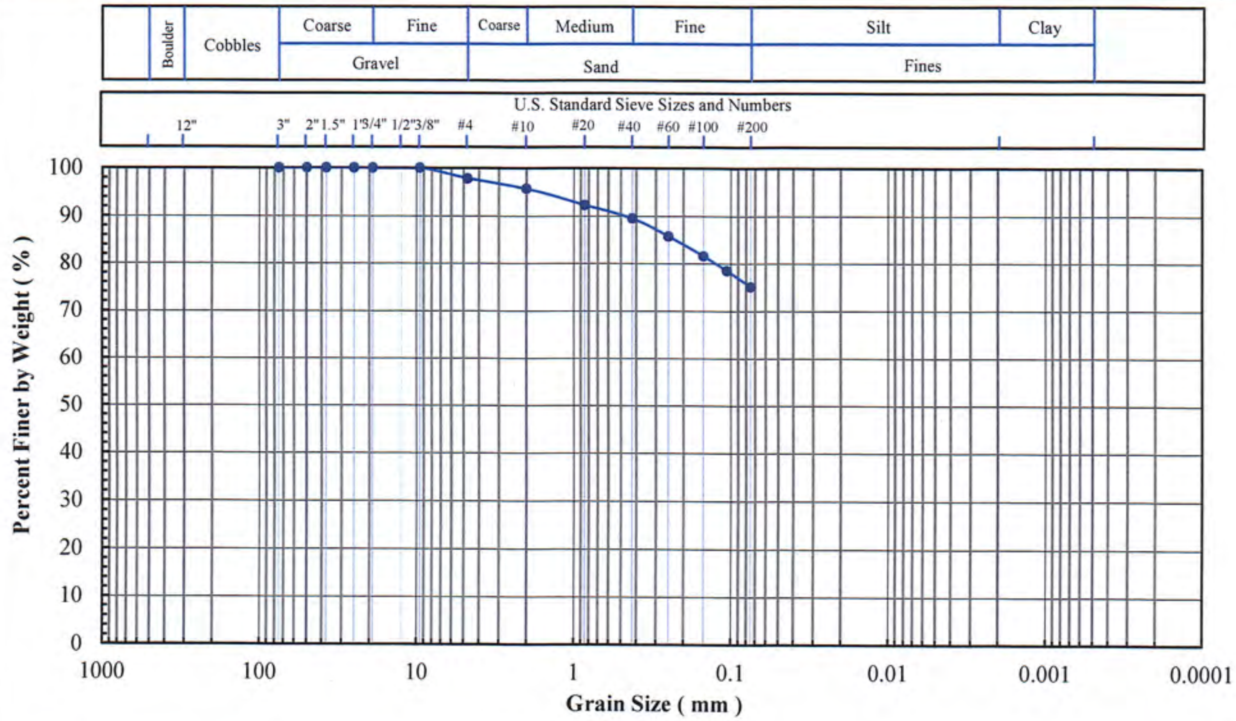
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-1 (0-10')
Lab Sample No:	20L031

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

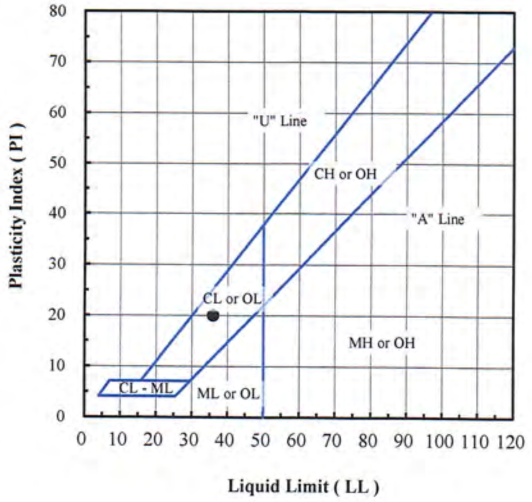


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	95.7
#20	0.850	92.3
#40	0.425	89.5
#60	0.250	85.8
#100	0.150	81.6
#140	0.106	78.5
#200	0.075	75.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	22.7
Fines (%):	75.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		Org. Content (%):		Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-1 (0-10')	20L031	15.6	75.1	36	16	20	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

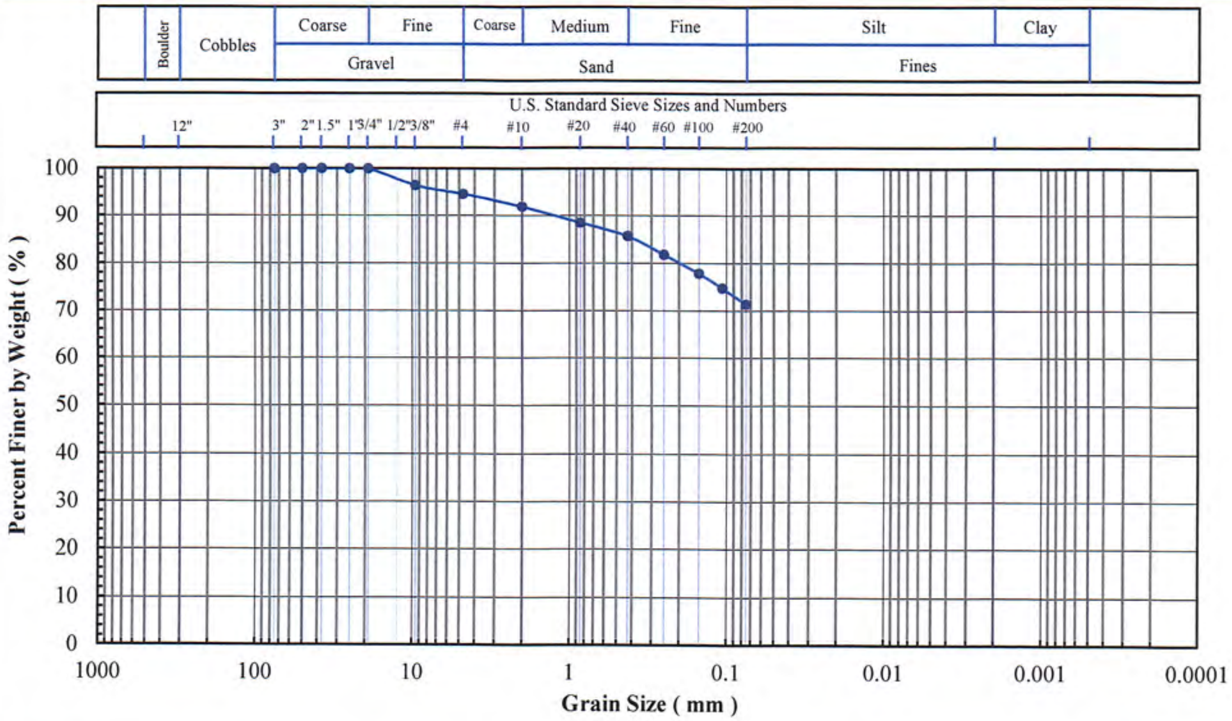
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-2 (10-16')
Lab Sample No:	20L032

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

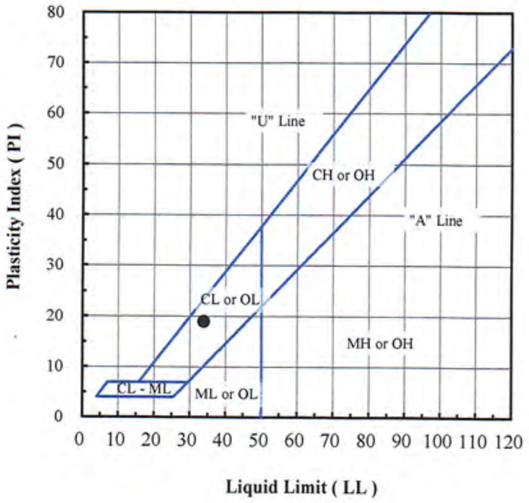


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	95
#10	2.00	92
#20	0.850	89
#40	0.425	86
#60	0.250	82
#100	0.150	78
#140	0.106	75
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	24
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-2 (10-16')	20L032	17.6	71	34	15	19	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSA

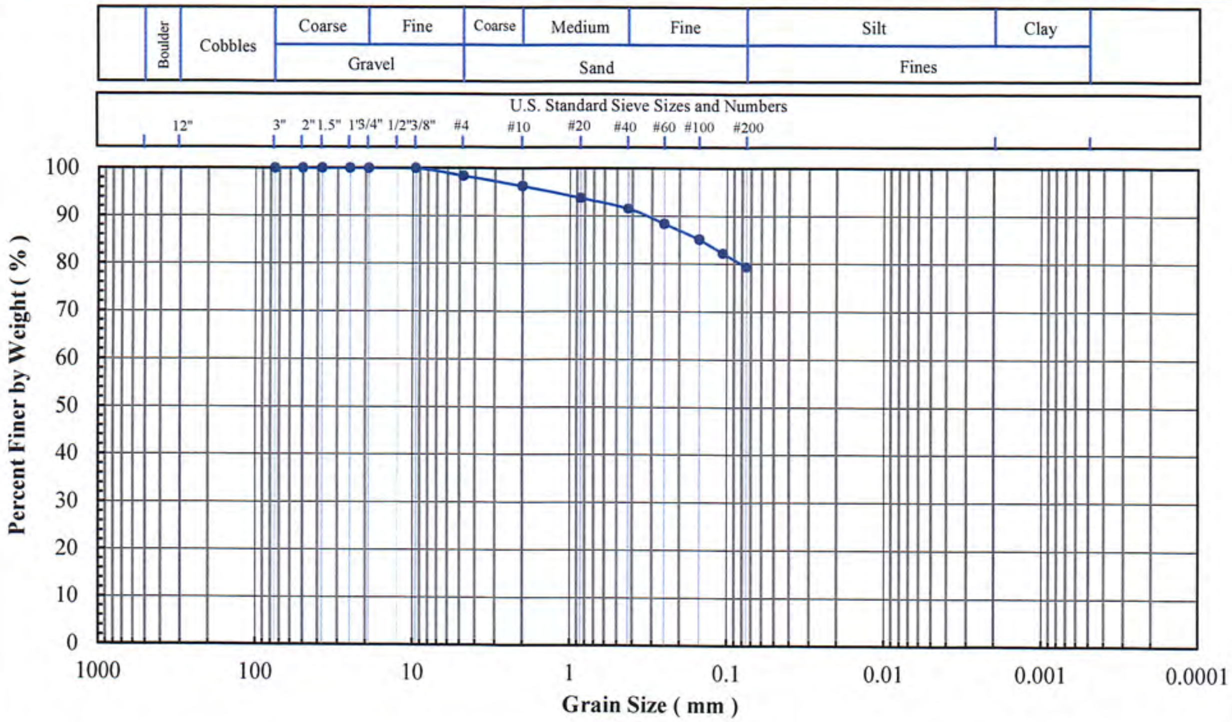
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-3 (16-26')
Lab Sample No:	20L033

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

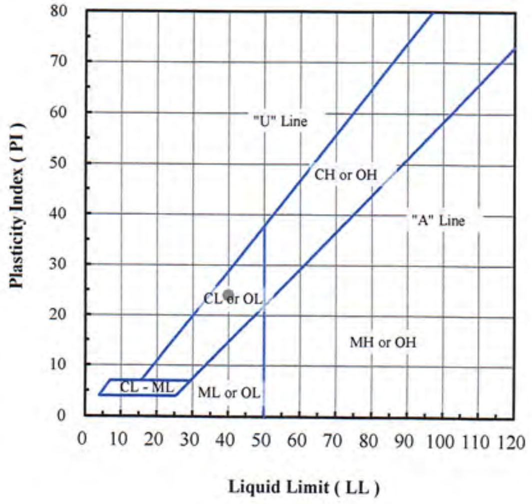


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	96.3
#20	0.850	93.8
#40	0.425	91.6
#60	0.250	88.4
#100	0.150	85.1
#140	0.106	82.2
#200	0.075	79.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.6
Sand (%):	19.1
Fines (%):	79.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-3 (16-26')	20L033	19.4	79.3	40	16	24	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

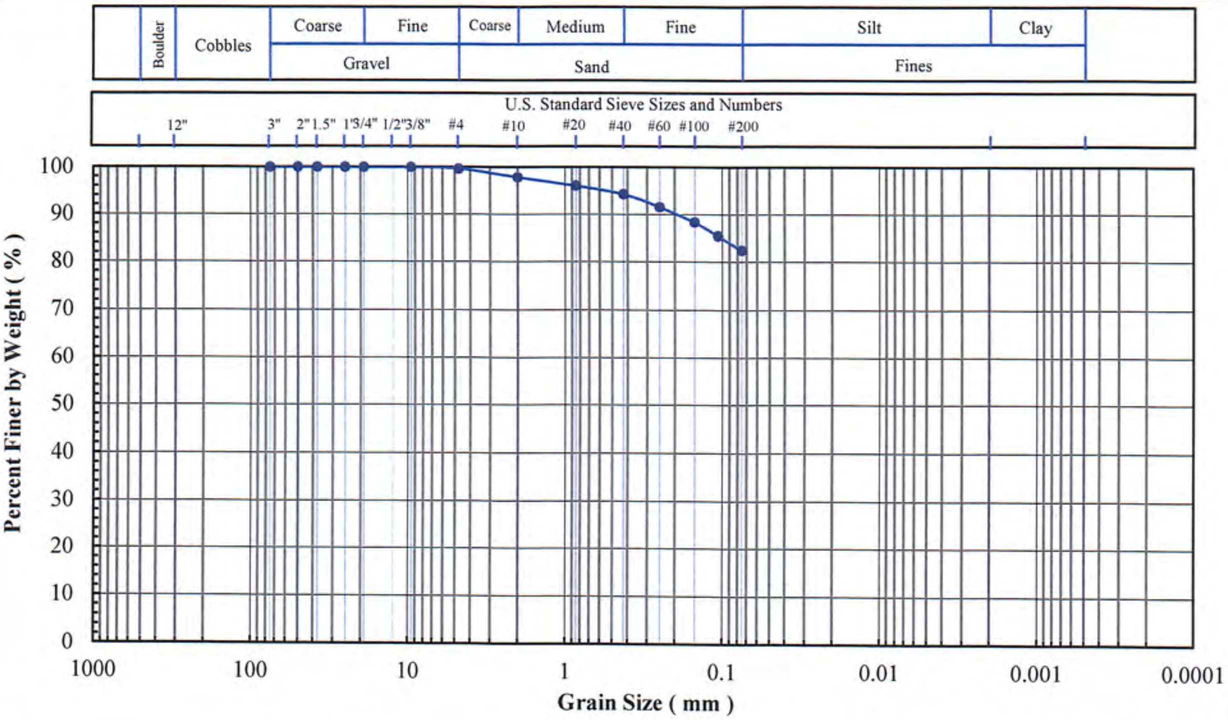
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-4 (26-36')
Lab Sample No:	20L034

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

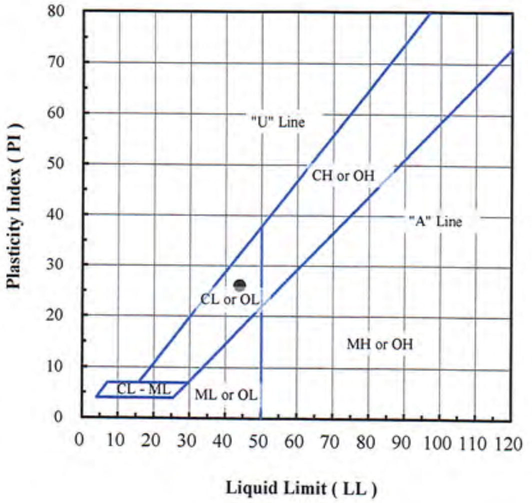


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	97.9
#20	0.850	96.1
#40	0.425	94.3
#60	0.250	91.6
#100	0.150	88.4
#140	0.106	85.5
#200	0.075	82.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	17.2
Fines (%):	82.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-4 (26-36')	20L034	17.1	82.5	44	18	26	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

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"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
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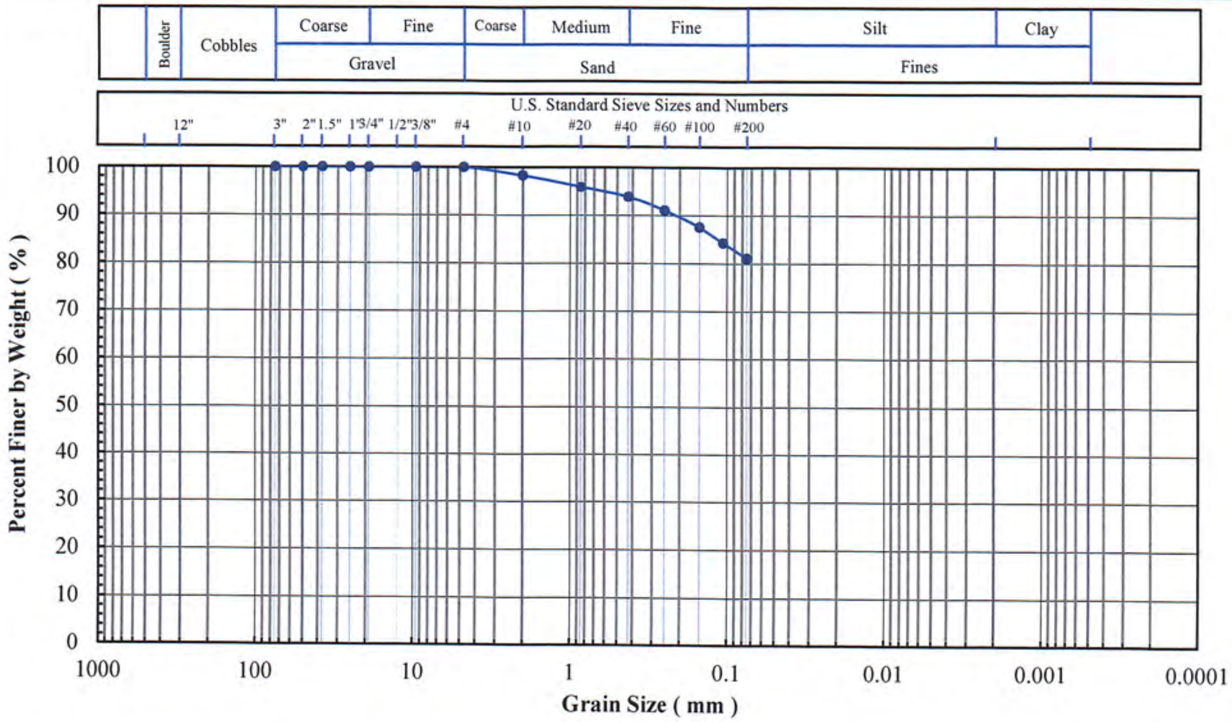
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-5 (36-46')
Lab Sample No:	20L035

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

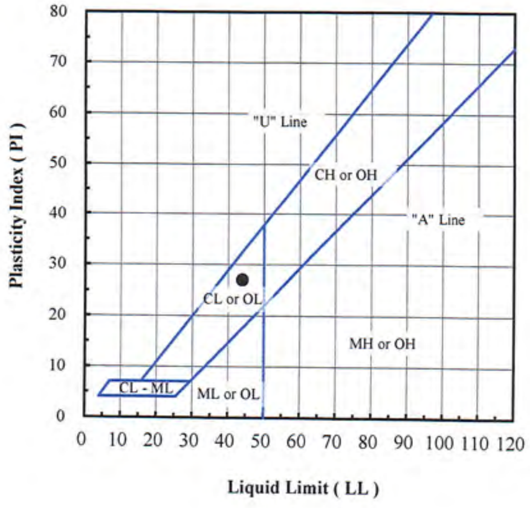


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.3
#20	0.850	95.9
#40	0.425	93.8
#60	0.250	91.0
#100	0.150	87.5
#140	0.106	84.3
#200	0.075	81.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	18.9
Fines (%):	81.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-5 (36-46')	20L035	15.9	81.1	44	17	27	CL - Lean clay with sand

Note(s):

01-20-2021
AA, WSR

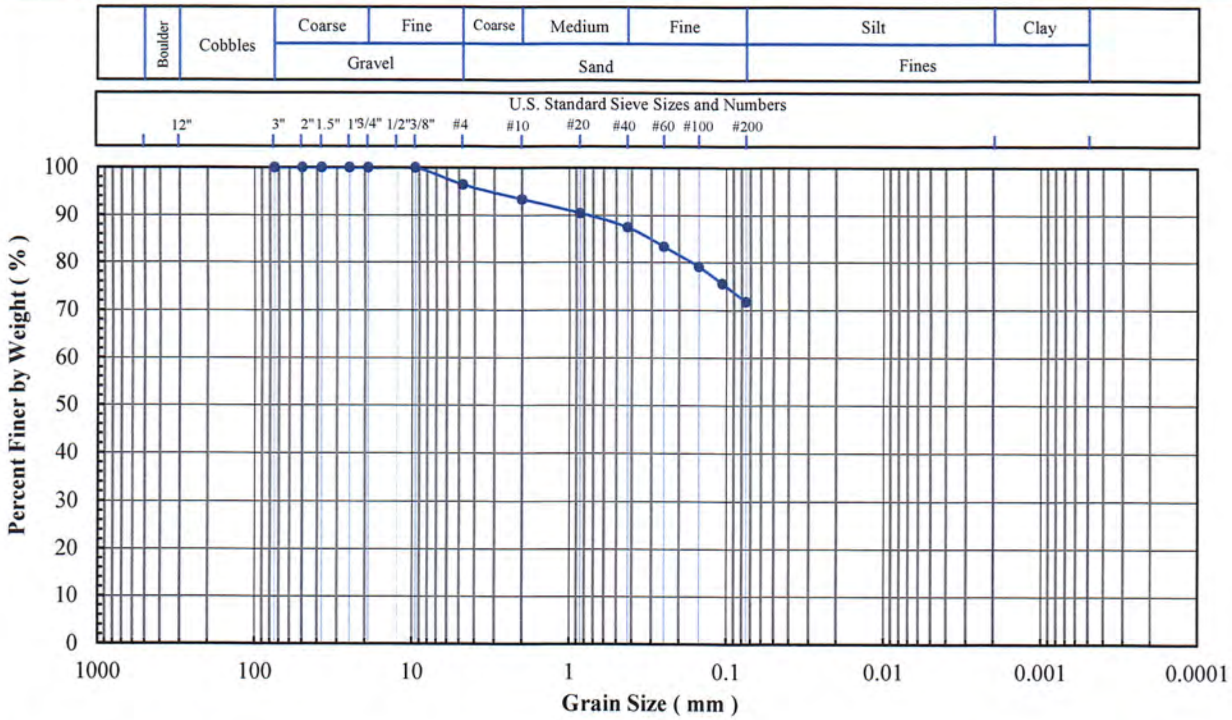
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B3-6 (46-56')
Lab Sample No: 20L036

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

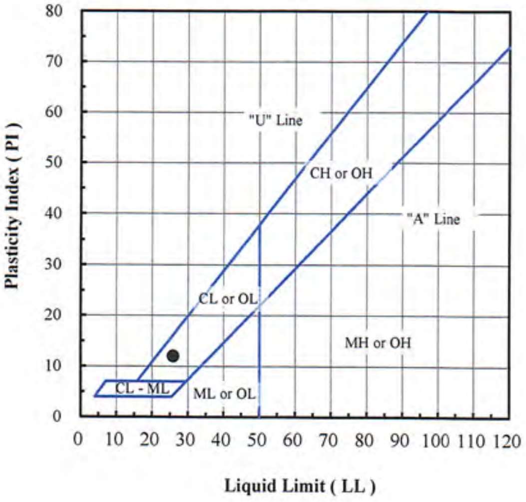


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.4
#10	2.00	93.4
#20	0.850	90.5
#40	0.425	87.5
#60	0.250	83.4
#100	0.150	79.1
#140	0.106	75.5
#200	0.075	71.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.6
Sand (%):	24.7
Fines (%):	71.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (46-56')	20L036	13.4	71.7	26	14	12	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

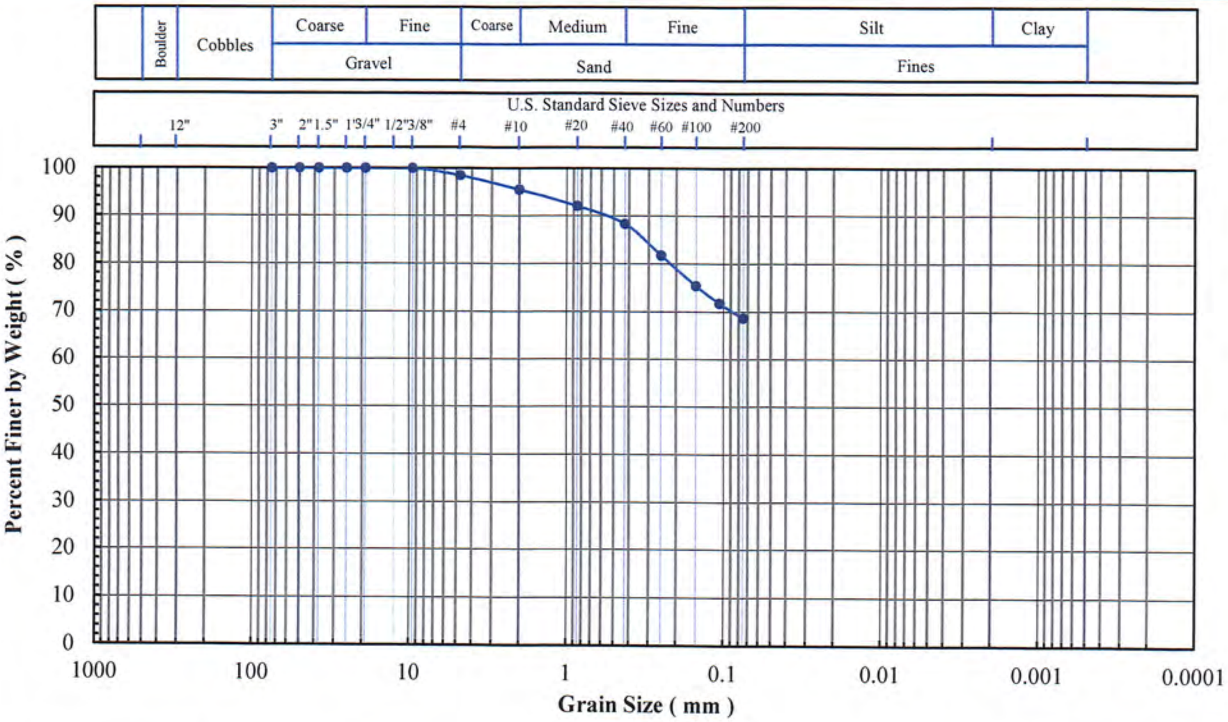
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-7 (56-66')
Lab Sample No:	20L037

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

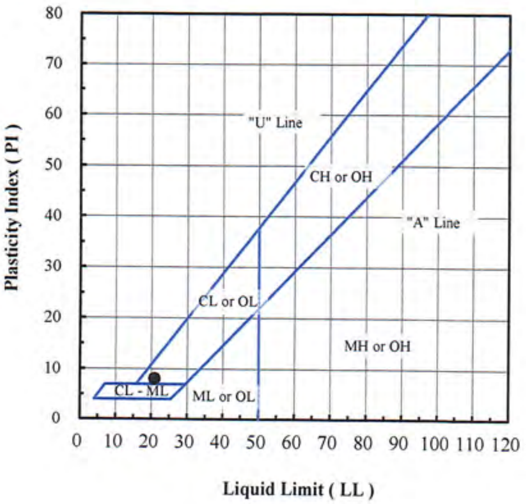


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	95.5
#20	0.850	92.0
#40	0.425	88.3
#60	0.250	81.7
#100	0.150	75.4
#140	0.106	71.7
#200	0.075	68.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	29.9
Fines (%):	68.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-7 (56-66')	20L037	15.1	68.6	21	13	8	CL - Sandy lean clay

Note(s):

01-20-2021
AA, NSR

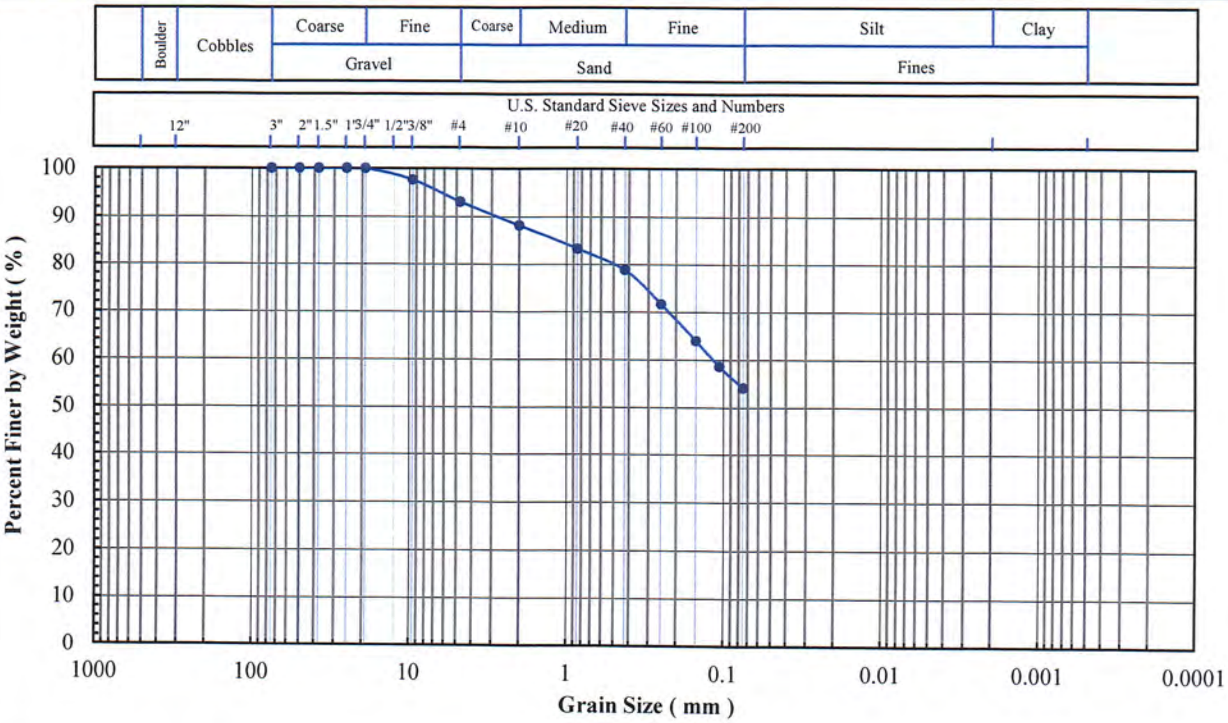
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-8 (66-76')
Lab Sample No:	20L038

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

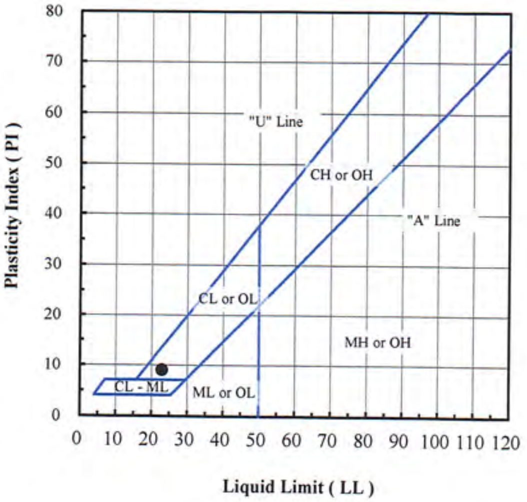


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	93
#10	2.00	88
#20	0.850	83
#40	0.425	79
#60	0.250	72
#100	0.150	64
#140	0.106	59
#200	0.075	54

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	7
Sand (%):	39
Fines (%):	54
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-8 (66-76')	20L038	7.8	54	23	14	9	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AAI NSR

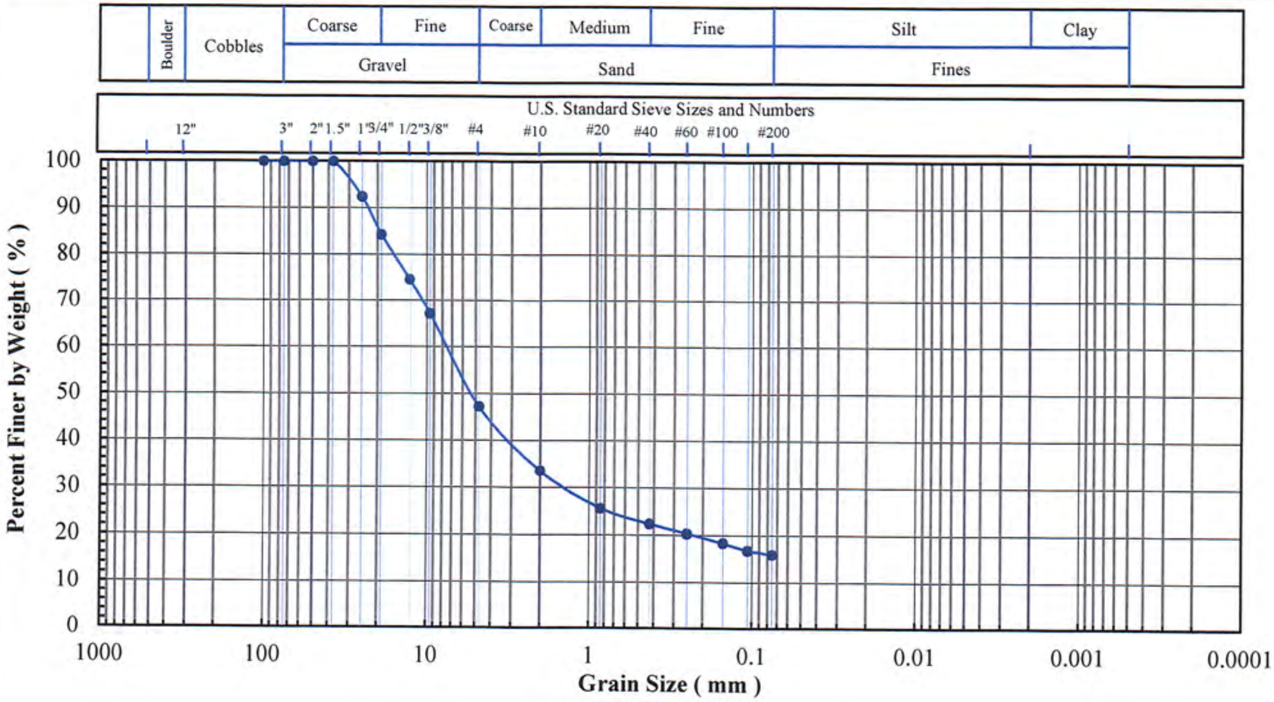
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-1 (0-6')
Lab Sample No:	20L039

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318, D 6913, D 7928

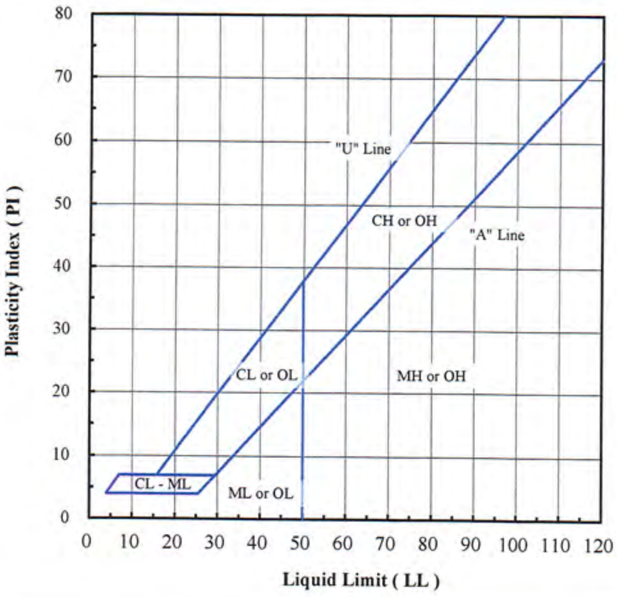
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100.0
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	92.4
3/4"	19	84.3
1/2"	13	74.6
3/8"	9.5	67.2
#4	4.75	47.2
#10	2.00	33.5
#20	0.850	25.6
#40	0.425	22.3
#60	0.250	20.3
#100	0.150	18.3
#140	0.106	16.8
#200	0.075	15.9

Gravel (%)	52.8
Sand (%)	31.3
Fines (%)	15.9
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (0-6')	20L039	7.1	15.9	NP	NP	NP	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

01-21-2021
AA, NSR

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"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
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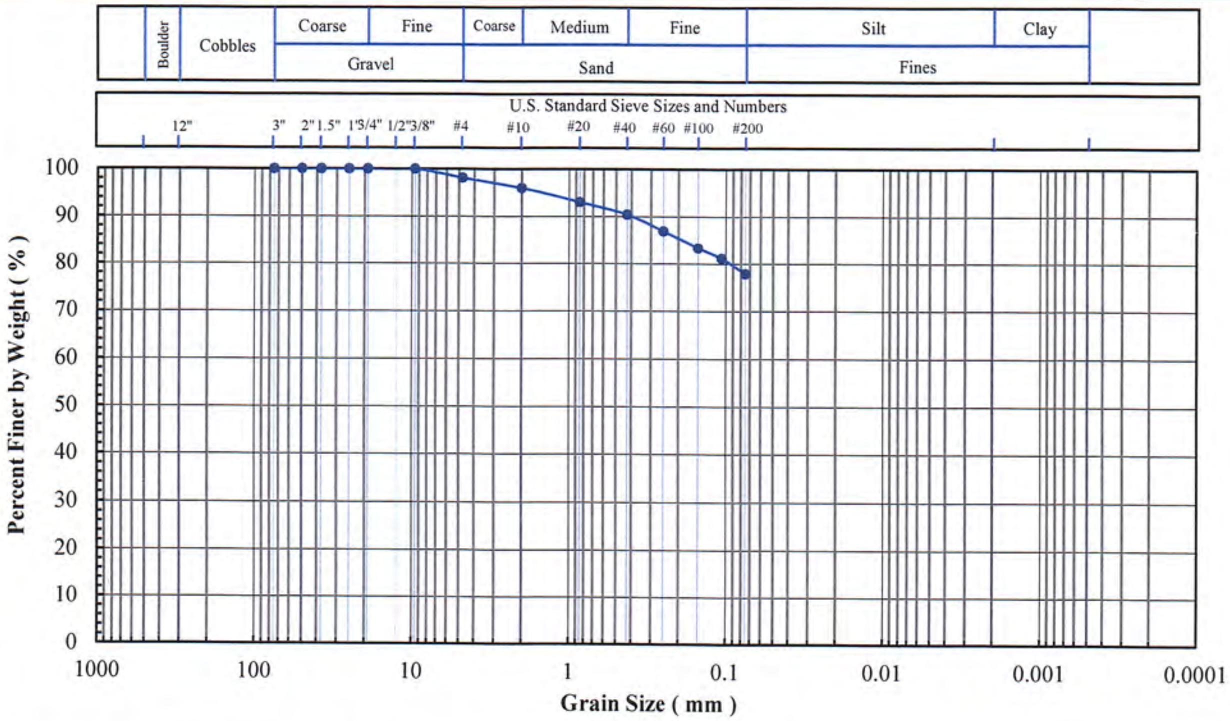
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-4 (21-26')
Lab Sample No:	20L042

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

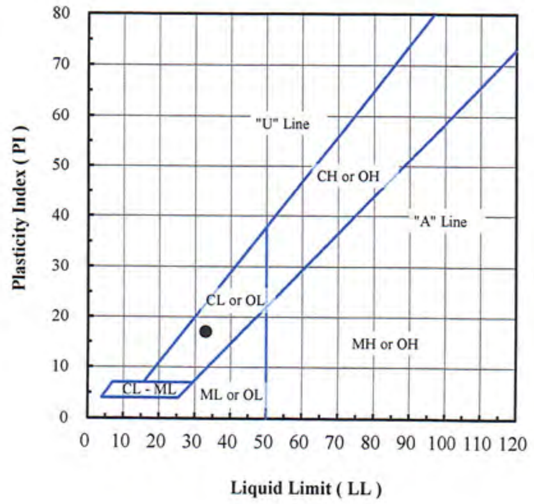


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.1
#10	2.00	96.0
#20	0.850	93.0
#40	0.425	90.4
#60	0.250	86.9
#100	0.150	83.3
#140	0.106	81.1
#200	0.075	77.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.9
Sand (%):	20.3
Fines (%):	77.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-4 (21-26')	20L042	16.1	77.8	33	16	17	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

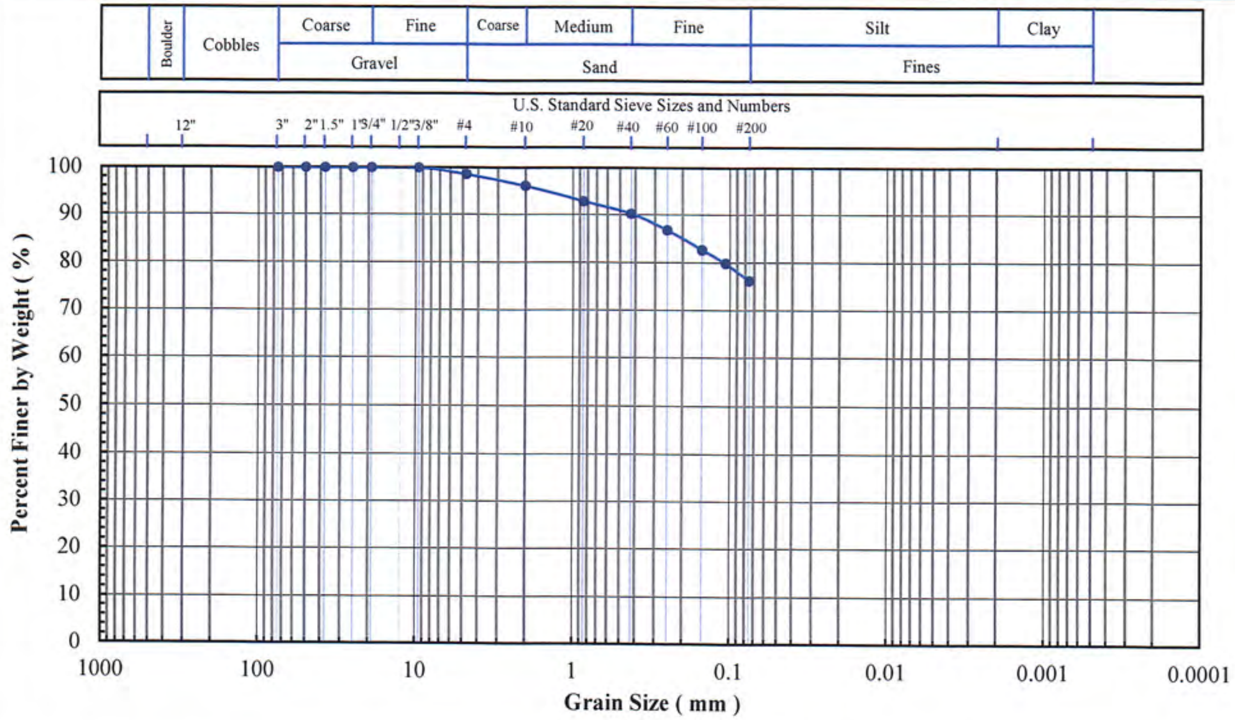
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-6 (30-35')
Lab Sample No:	20L044

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

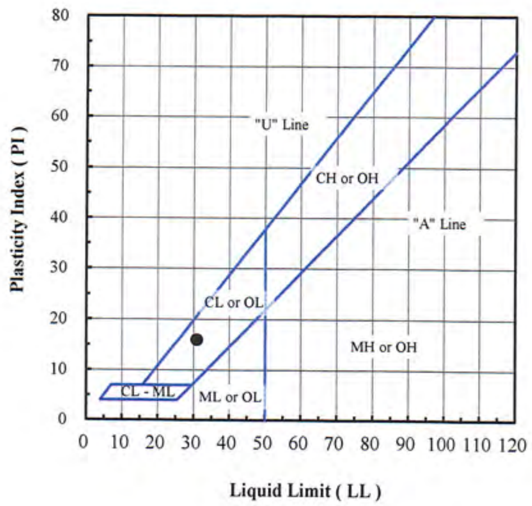


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	96.1
#20	0.850	92.8
#40	0.425	90.2
#60	0.250	86.7
#100	0.150	82.6
#140	0.106	79.8
#200	0.075	76.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	22.5
Fines (%):	76.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-6 (30-35')	20L044	15.1	76.1	31	15	16	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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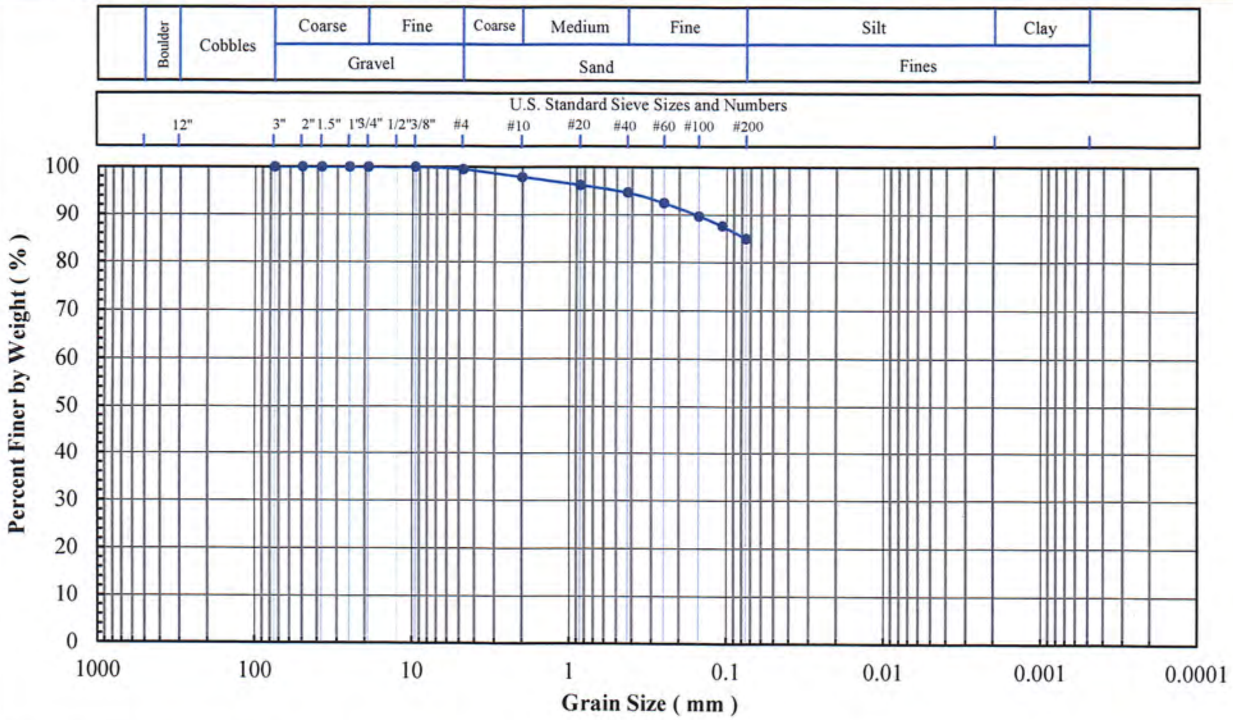
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B4-9 (46-51')
Lab Sample No: 20L047

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

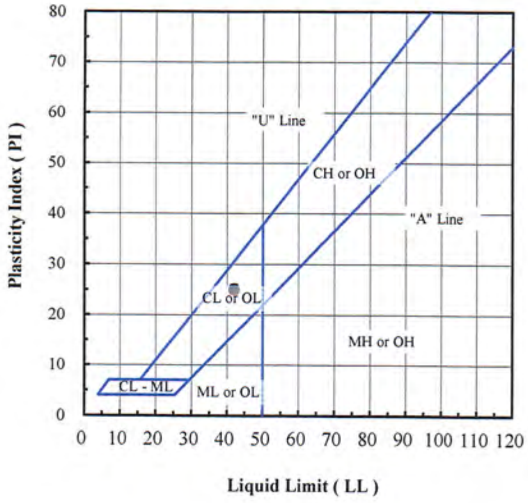


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.9
#20	0.850	96.2
#40	0.425	94.7
#60	0.250	92.5
#100	0.150	89.7
#140	0.106	87.6
#200	0.075	84.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	14.6
Fines (%):	84.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-9 (46-51')	20L047	18.3	84.9	42	17	25	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

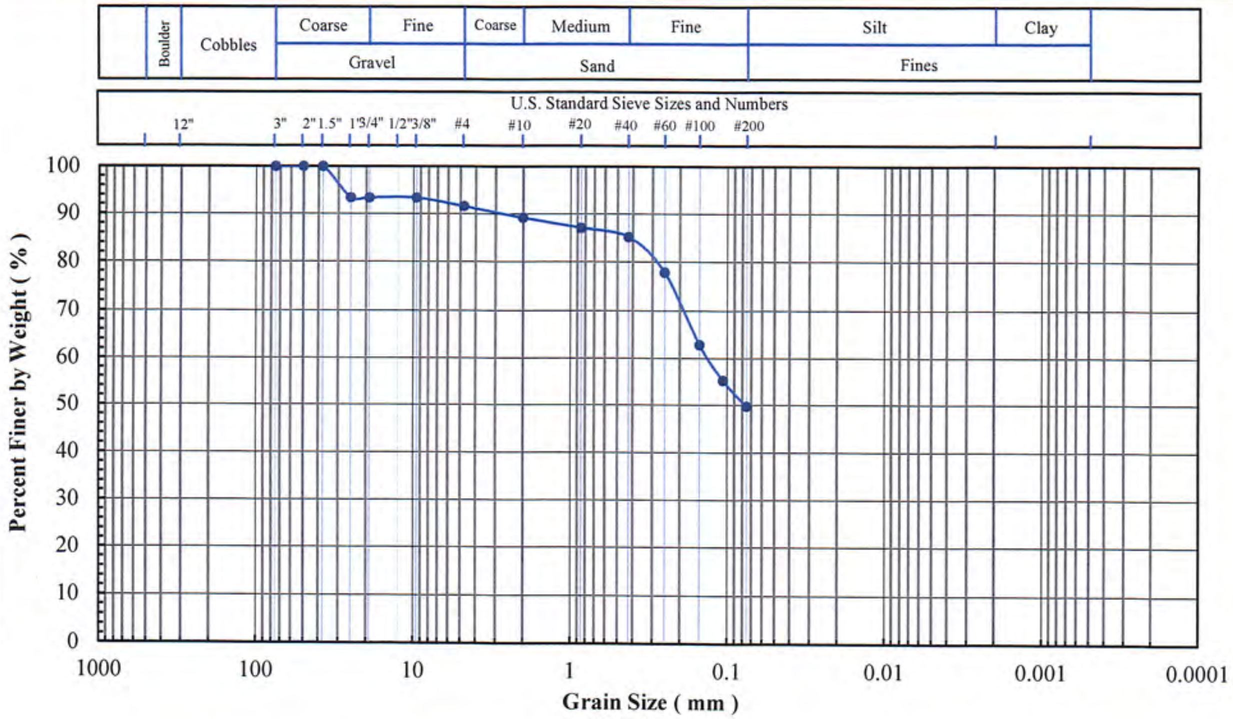
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-12 (63-66')
Lab Sample No:	20L050

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

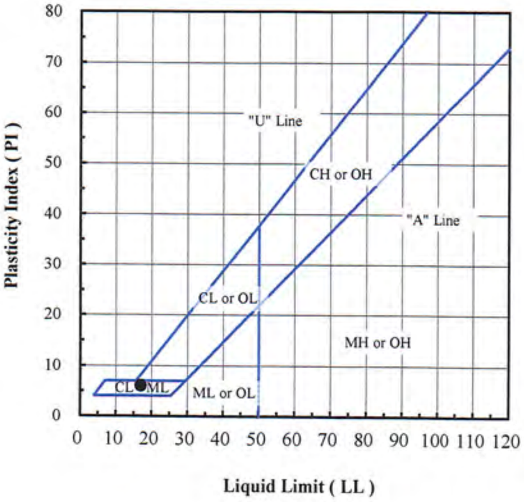


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	93
3/4"	19	93
3/8"	9.5	93
#4	4.75	92
#10	2.00	89
#20	0.850	87
#40	0.425	85
#60	0.250	78
#100	0.150	63
#140	0.106	55
#200	0.075	50

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	8
Sand (%):	42
Fines (%):	50
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (63-66')	20L050	11.1	50	17	11	6	SC-SM - Silty, clayey sand

Note(s): Sieve specimen was undersized.
Engineering classification is based on the assumption that the fines are either CL or ML.

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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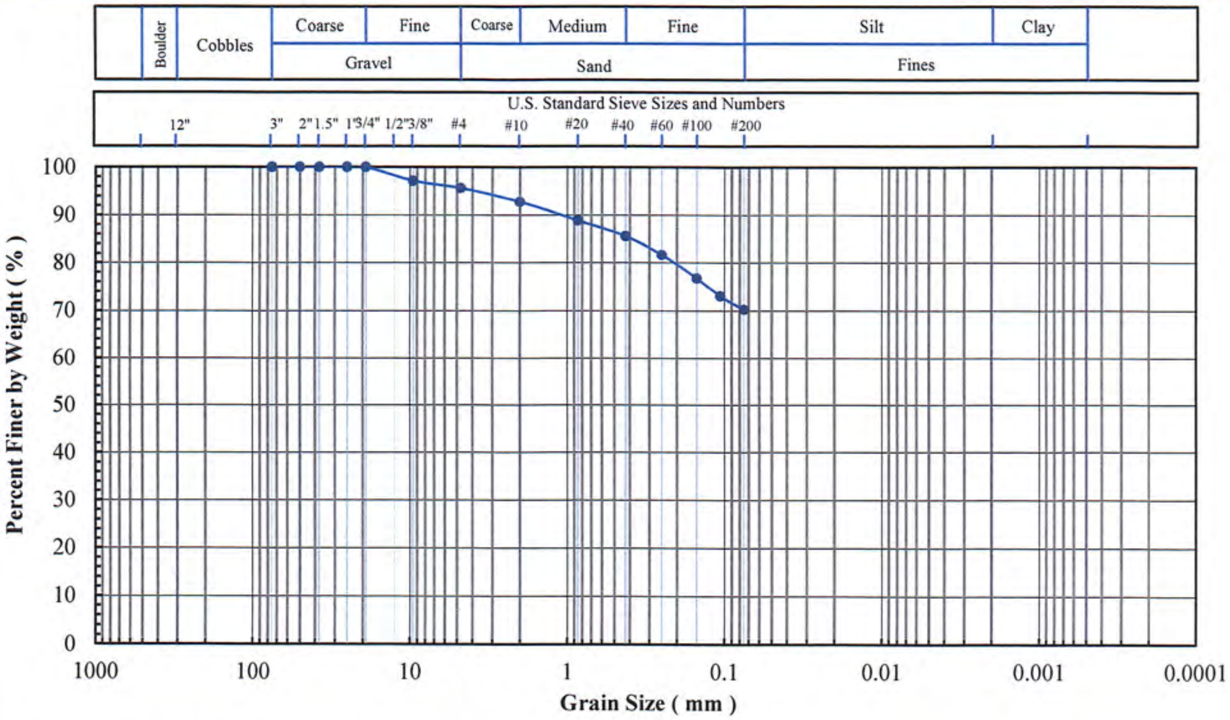
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-1 (15-17')
Lab Sample No:	20L129

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

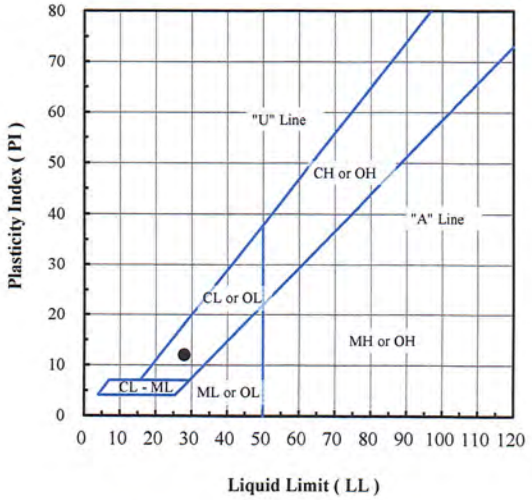


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	97
#4	4.75	96
#10	2.00	93
#20	0.850	89
#40	0.425	86
#60	0.250	82
#100	0.150	77
#140	0.106	73
#200	0.075	70

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	26
Fines (%):	70
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-1 (15-17')	20L129	15.8	70	28	16	12	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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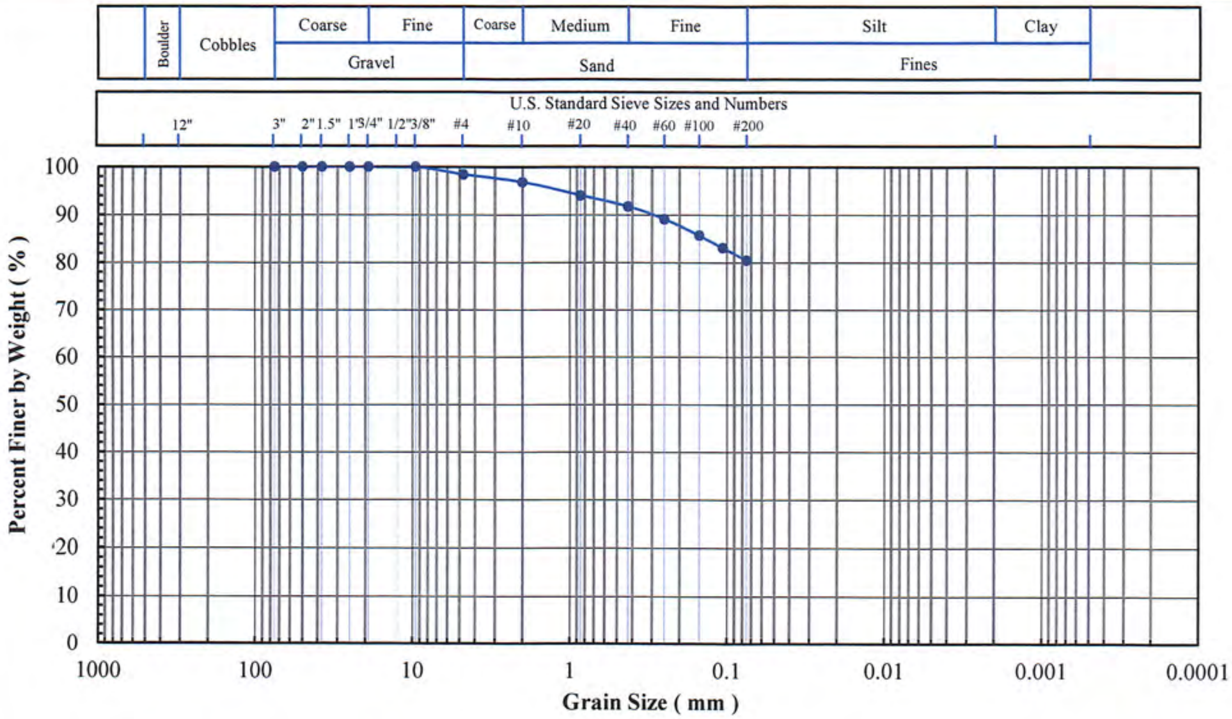
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-2 (40-42')
Lab Sample No:	20L130

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

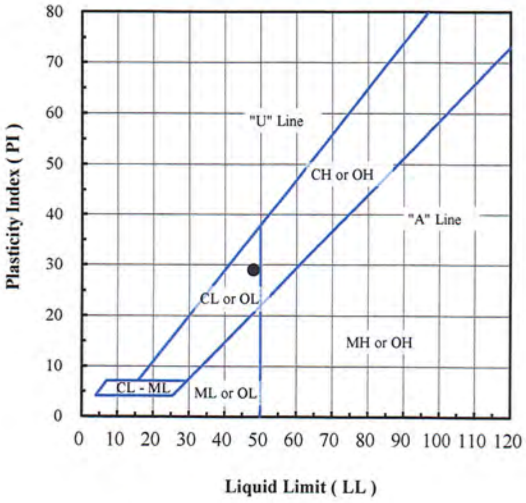


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	96.8
#20	0.850	94.0
#40	0.425	91.7
#60	0.250	89.1
#100	0.150	85.7
#140	0.106	83.1
#200	0.075	80.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.6
Sand (%):	17.9
Fines (%):	80.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-2 (40-42')	20L130	16.7	80.5	48	19	29	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSK

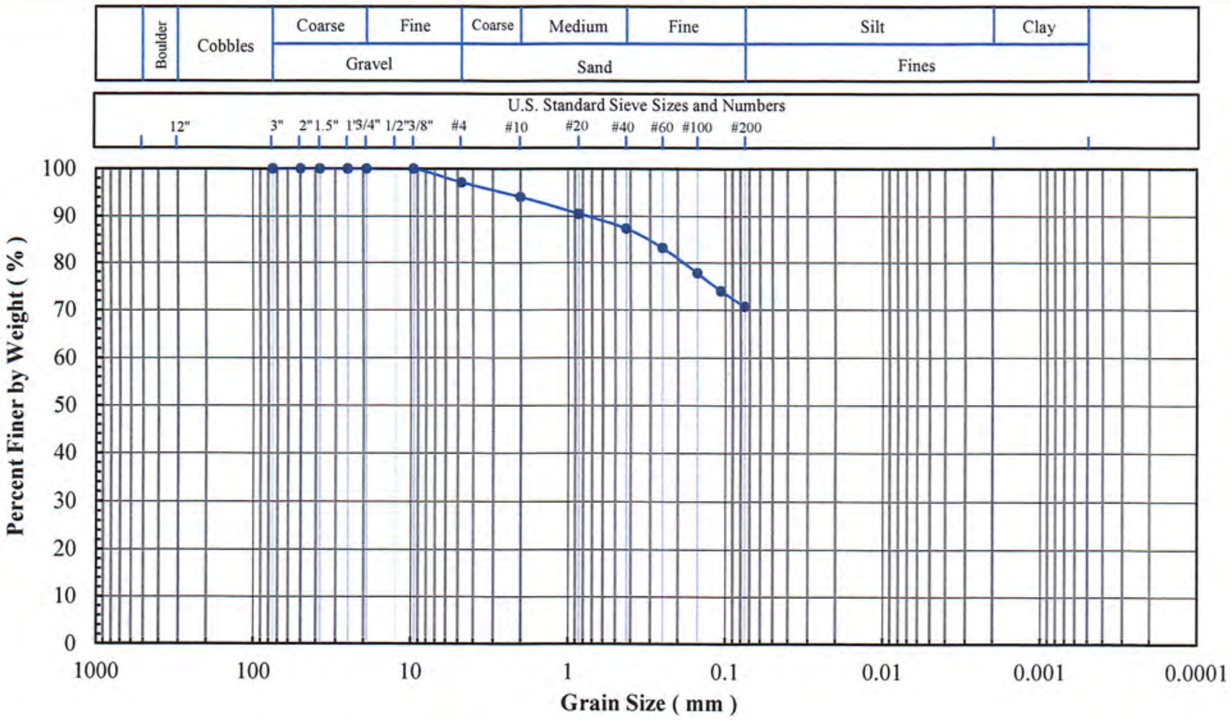
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-3 (55-57.5')
Lab Sample No:	20L131

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

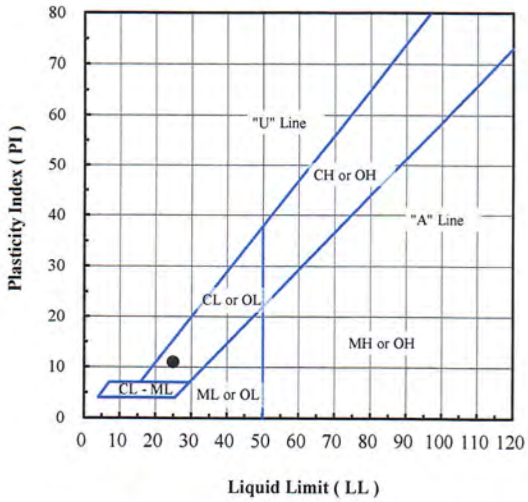


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.1
#10	2.00	94.1
#20	0.850	90.5
#40	0.425	87.4
#60	0.250	83.2
#100	0.150	77.8
#140	0.106	74.0
#200	0.075	70.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.9
Sand (%):	26.4
Fines (%):	70.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-3 (55-57.5')	20L131	14.4	70.7	25	14	11	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSR

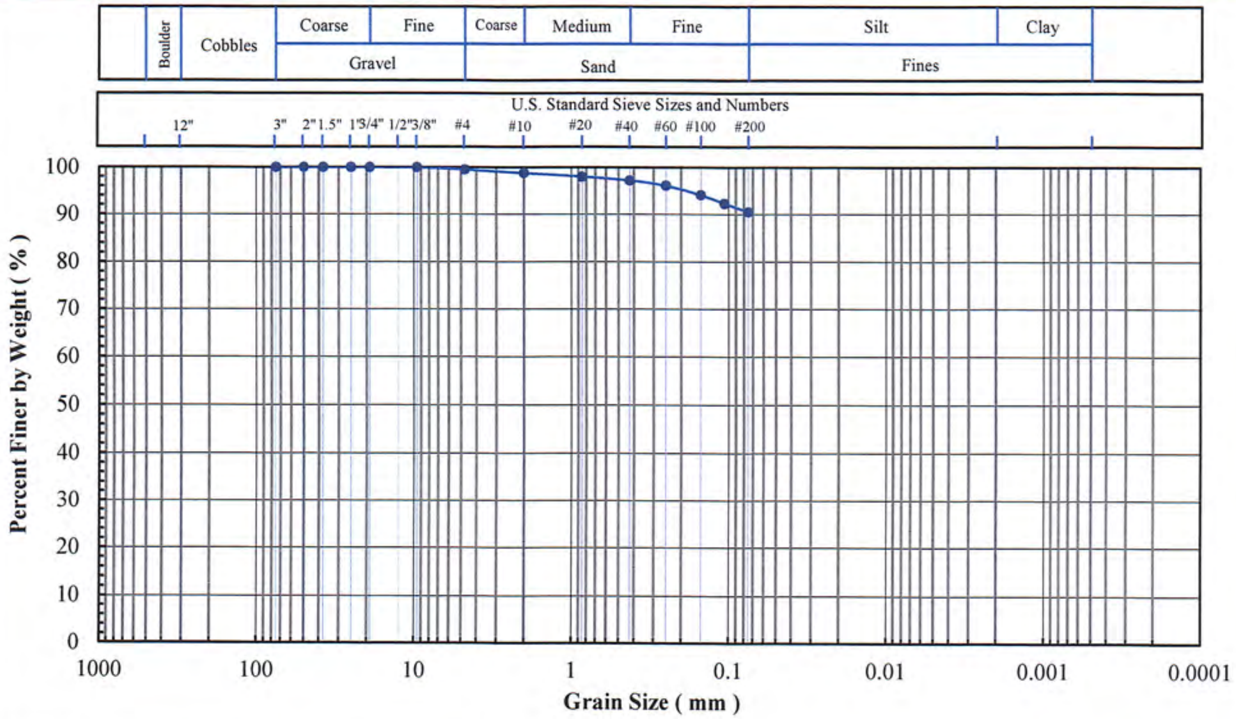
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-4 (70-72.5')
Lab Sample No:	20L132

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

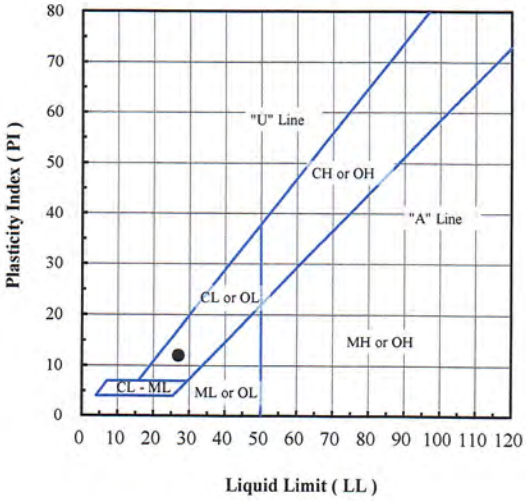


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	98.8
#20	0.850	98.0
#40	0.425	97.2
#60	0.250	96.1
#100	0.150	94.1
#140	0.106	92.3
#200	0.075	90.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	9.0
Fines (%):	90.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-ST-4 (70-72.5')	20L132	10.8	90.5	27	15	12	CL - Lean clay

Note(s):

01-27-2021
AA, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

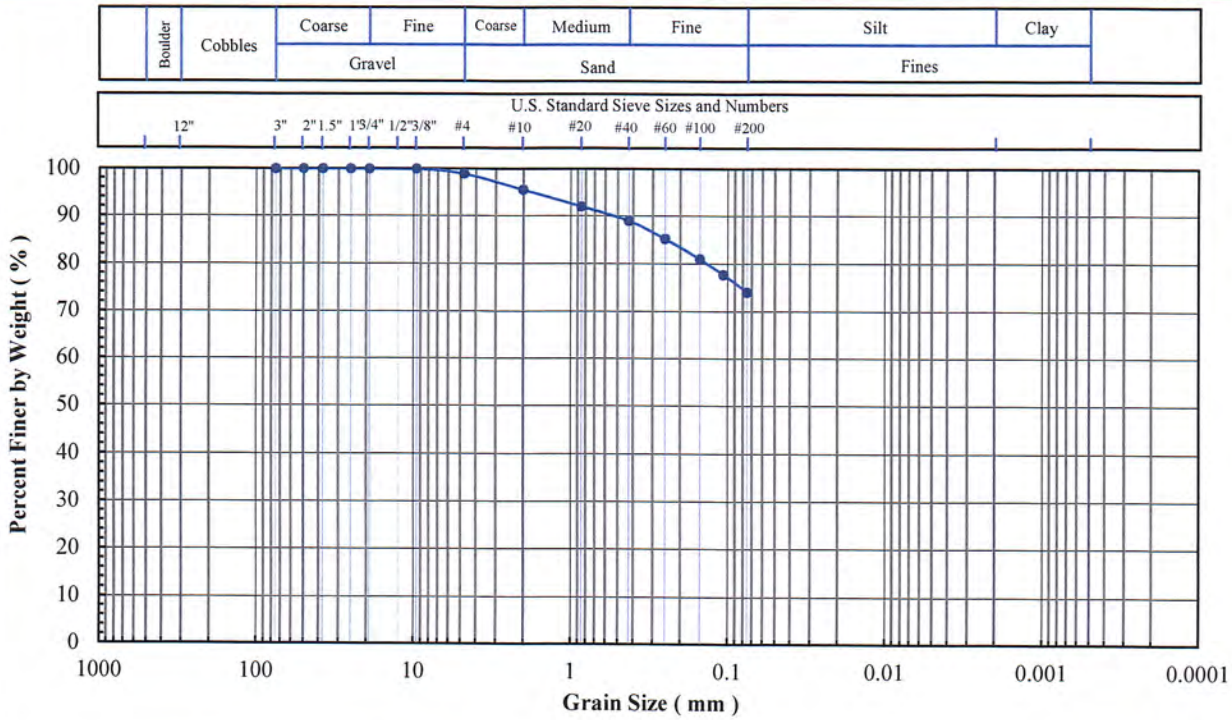
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-2 (6-11')
Lab Sample No:	20L054

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

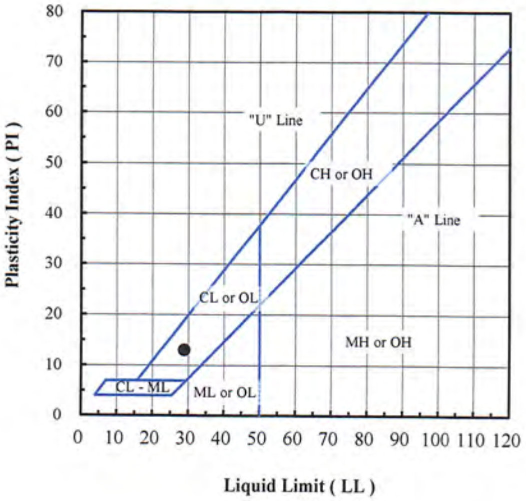


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	95.5
#20	0.850	91.9
#40	0.425	88.9
#60	0.250	85.1
#100	0.150	80.9
#140	0.106	77.7
#200	0.075	74.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	24.9
Fines (%):	74.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-2 (6-11')	20L054	18.9	74.0	29	16	13	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

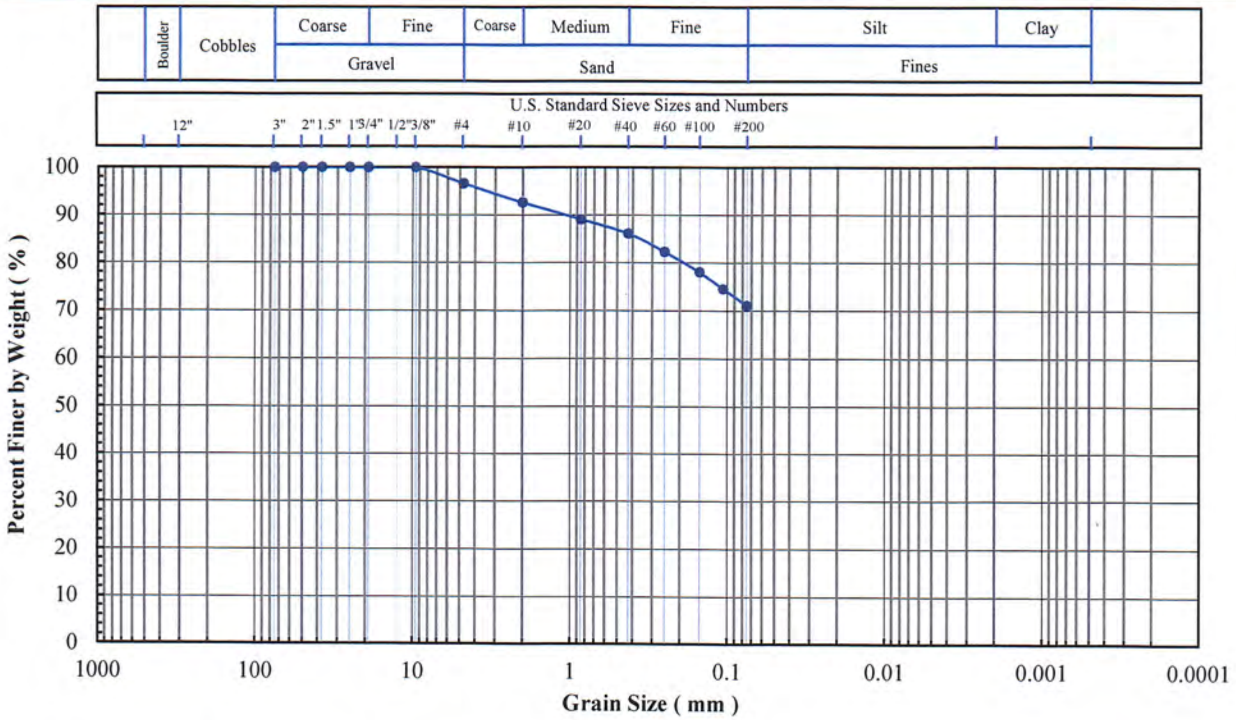
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-4 (16-21')
Lab Sample No:	20L056

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

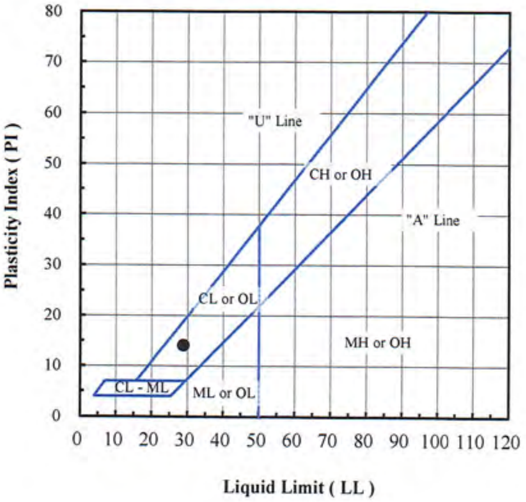


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.6
#10	2.00	92.7
#20	0.850	89.1
#40	0.425	86.1
#60	0.250	82.3
#100	0.150	78.0
#140	0.106	74.5
#200	0.075	71.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.4
Sand (%):	25.6
Fines (%):	71.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-4 (16-21')	20L056	17.9	71.0	29	15	14	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

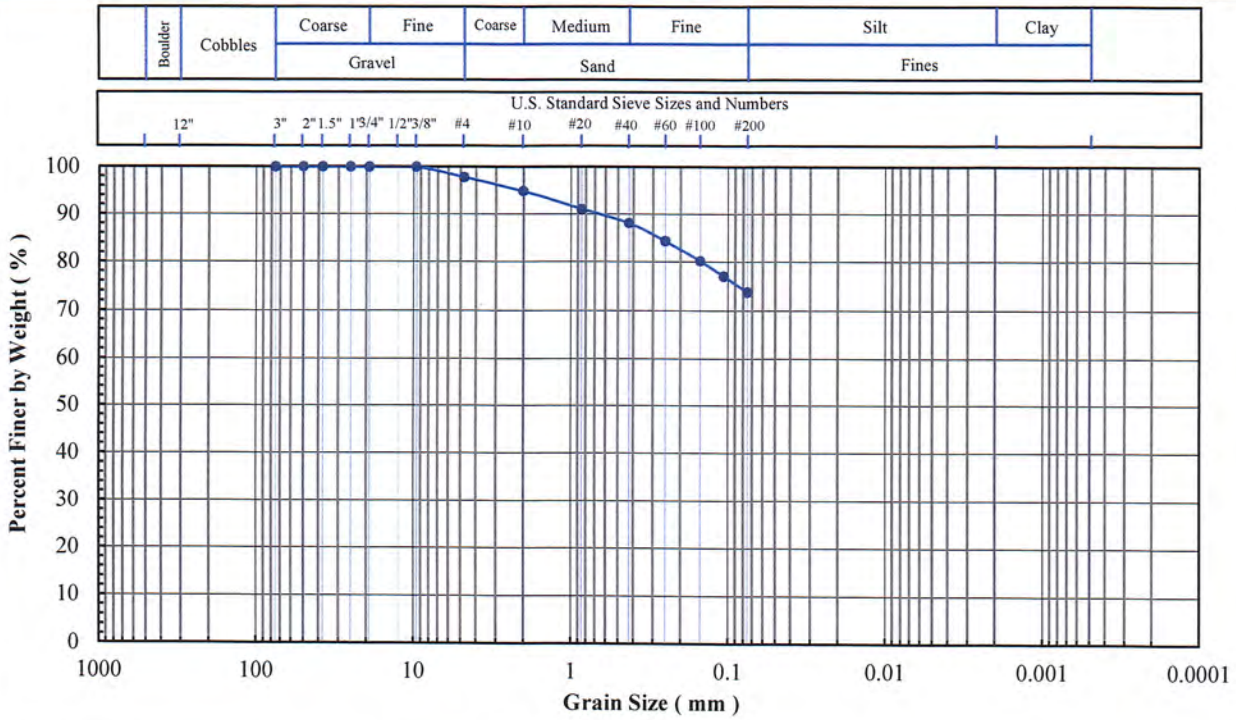
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-6 (26-31')
Lab Sample No:	20L058

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

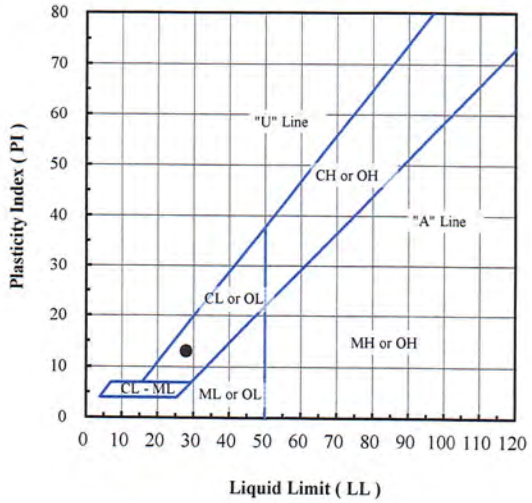


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	94.9
#20	0.850	91.1
#40	0.425	88.1
#60	0.250	84.3
#100	0.150	80.2
#140	0.106	77.0
#200	0.075	73.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	24.1
Fines (%):	73.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-6 (26-31')	20L058	20.9	73.7	28	15	13	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

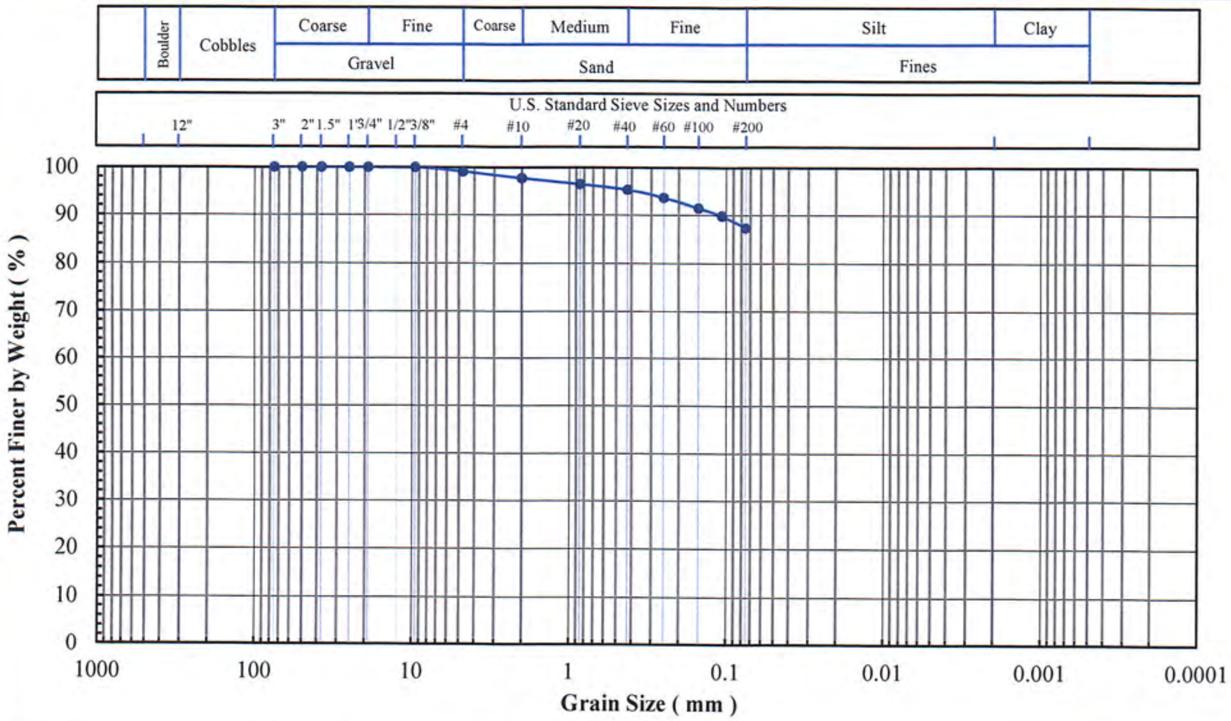
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-8 (36-42')
Lab Sample No:	20L060

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

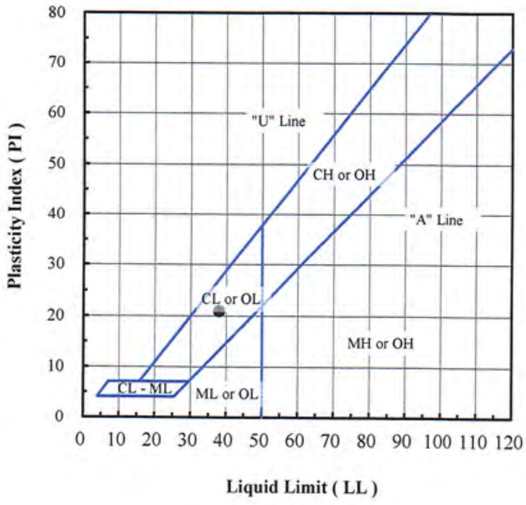


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	97.7
#20	0.850	96.4
#40	0.425	95.3
#60	0.250	93.6
#100	0.150	91.4
#140	0.106	89.8
#200	0.075	87.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	11.8
Fines (%):	87.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-8 (36-42')	20L060	20.0	87.3	38	17	21	CL - Lean clay

Note(s):

01-21-2021
AA, NSR

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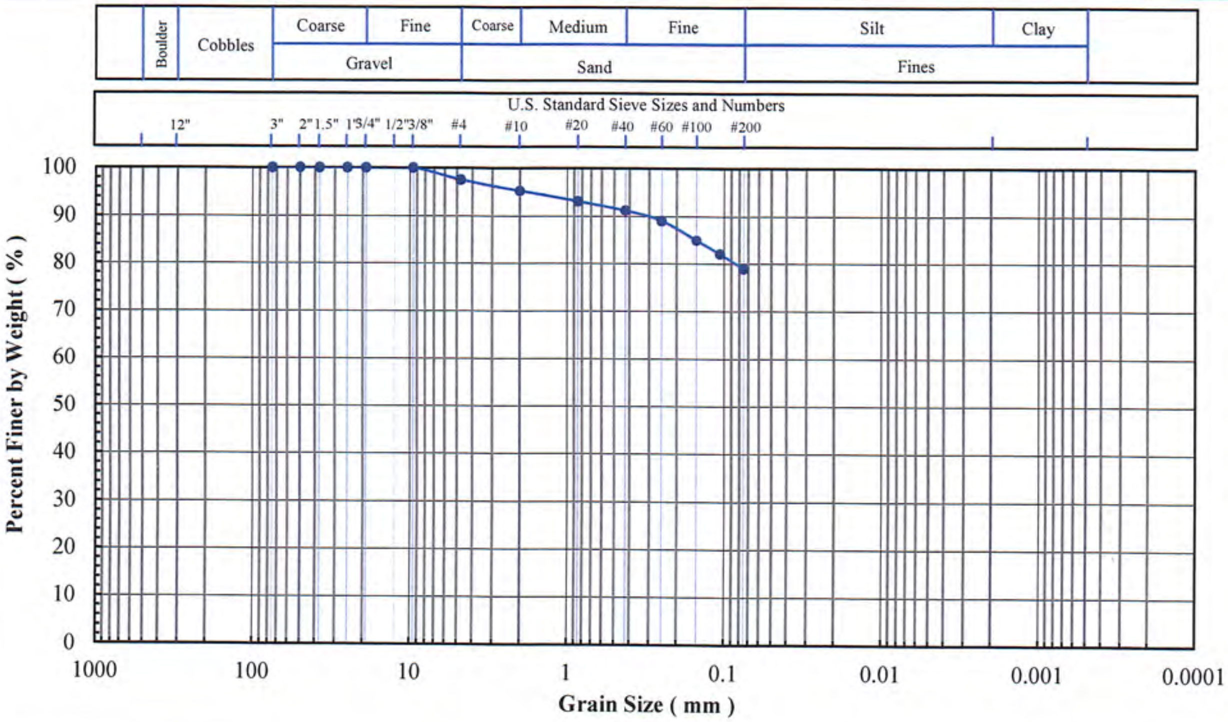
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-10 (46-51')
Lab Sample No:	20L062

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

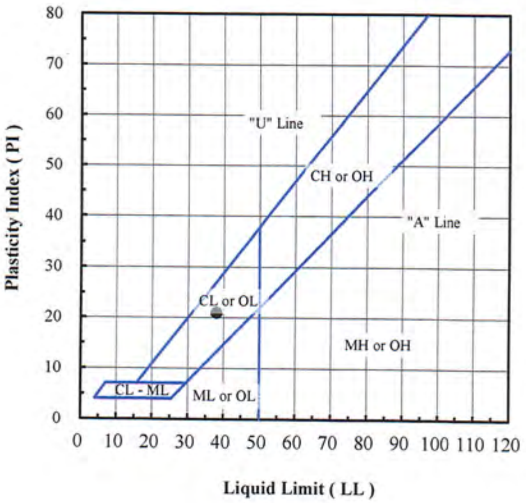


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.5
#10	2.00	95.3
#20	0.850	93.1
#40	0.425	91.2
#60	0.250	89.1
#100	0.150	85.0
#140	0.106	82.1
#200	0.075	78.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.5
Sand (%):	18.6
Fines (%):	78.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-10 (46-51')	20L062	18.0	78.9	38	17	21	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

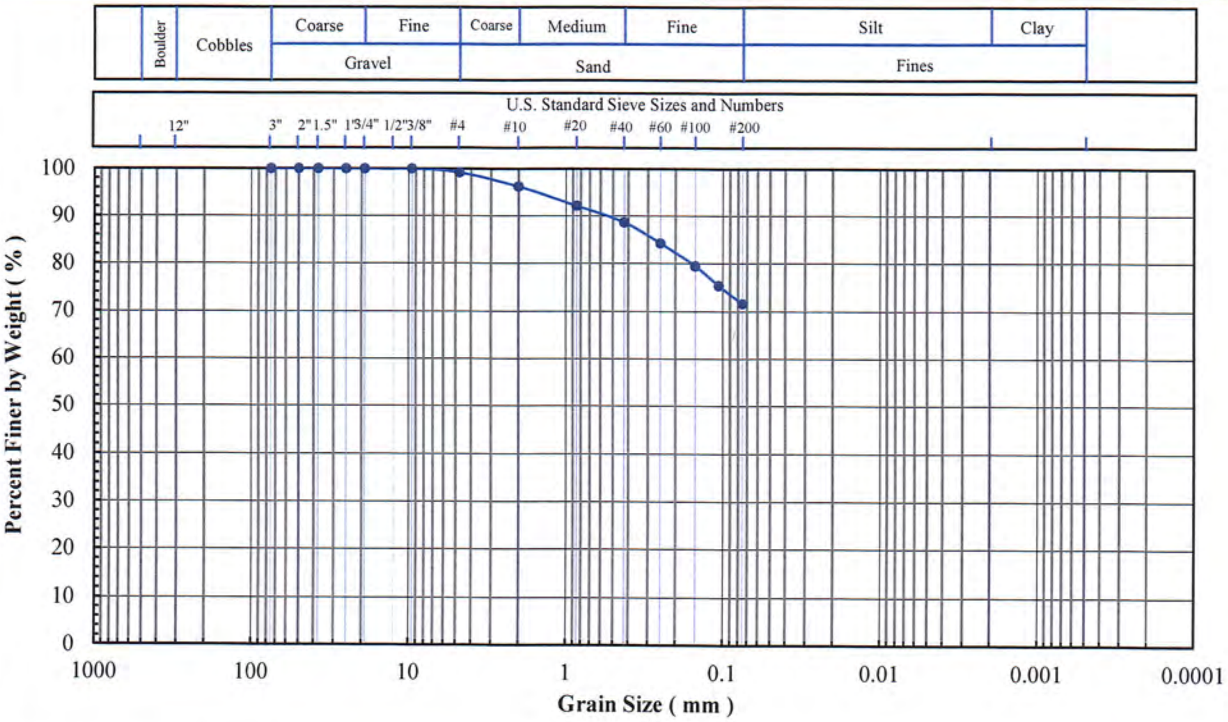
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-11 (51-56')
Lab Sample No:	20L063

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

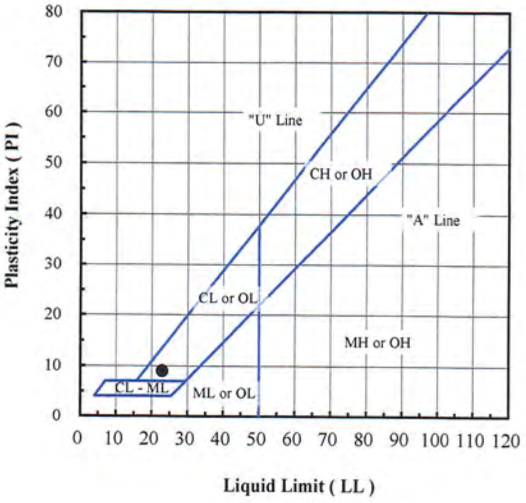


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	92.1
#40	0.425	88.6
#60	0.250	84.2
#100	0.150	79.5
#140	0.106	75.4
#200	0.075	71.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	27.6
Fines (%):	71.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-11 (51-56')	20L063	13.8	71.6	23	14	9	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSA

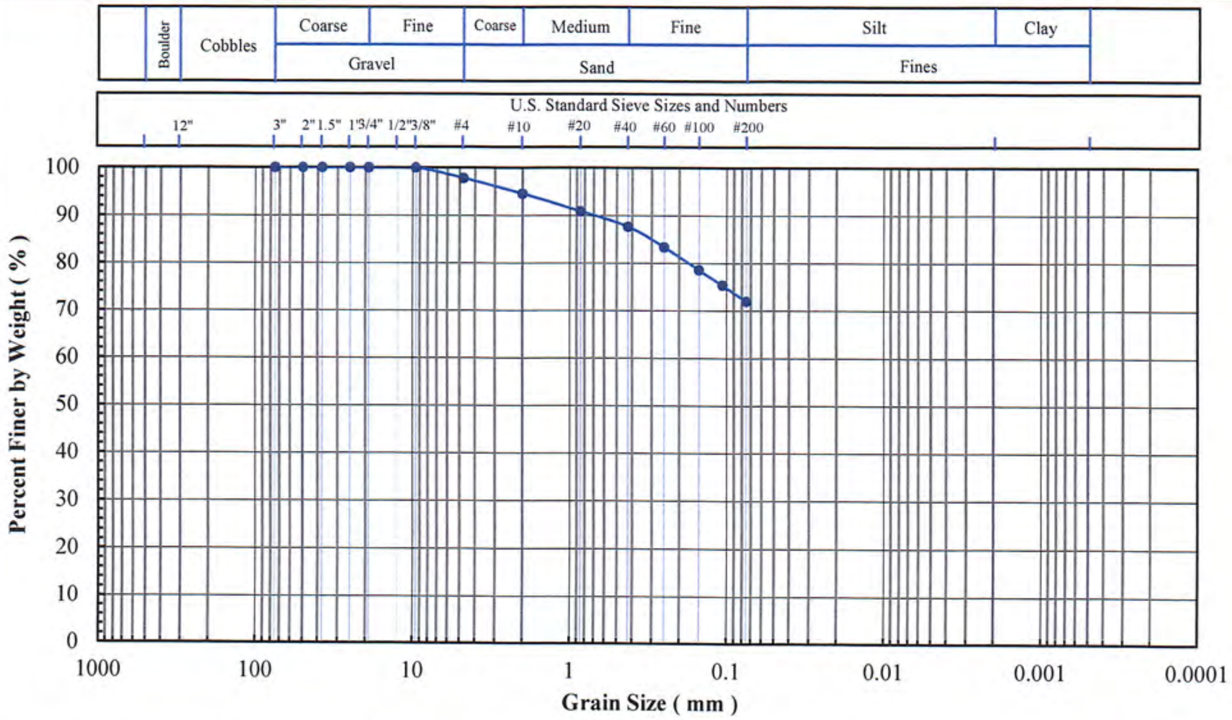
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-13 (61-66')
Lab Sample No:	20L065

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

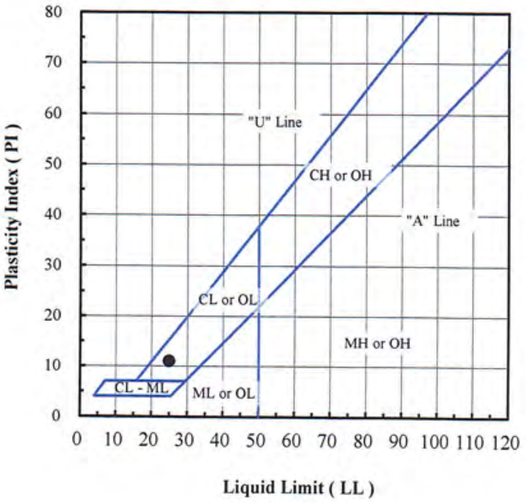


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	94.6
#20	0.850	90.9
#40	0.425	87.7
#60	0.250	83.4
#100	0.150	78.6
#140	0.106	75.4
#200	0.075	72.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	25.8
Fines (%):	72.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-13 (61-66')	20L065	14.3	72.0	25	14	11	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

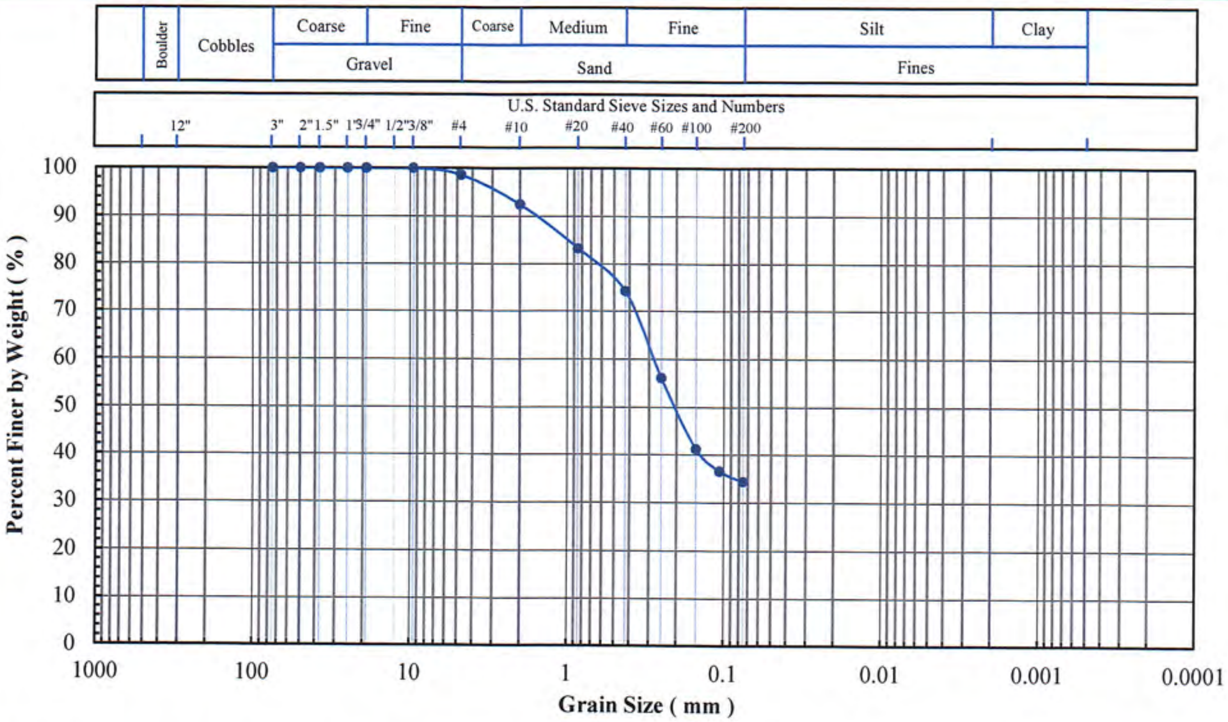
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-ST-1 (73.5-76')
Lab Sample No:	20L133

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

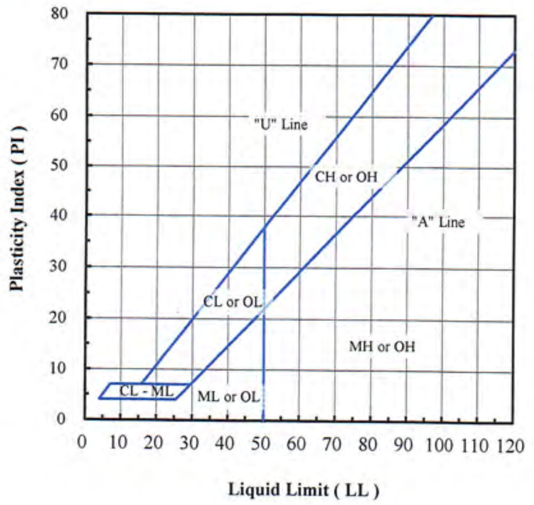


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	92.5
#20	0.850	83.3
#40	0.425	74.2
#60	0.250	56.1
#100	0.150	41.2
#140	0.106	36.6
#200	0.075	34.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	64.2
Fines (%):	34.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-ST-1 (73.5-76')	20L133	15.4	34.4	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

01-29-2021
AA, NSR

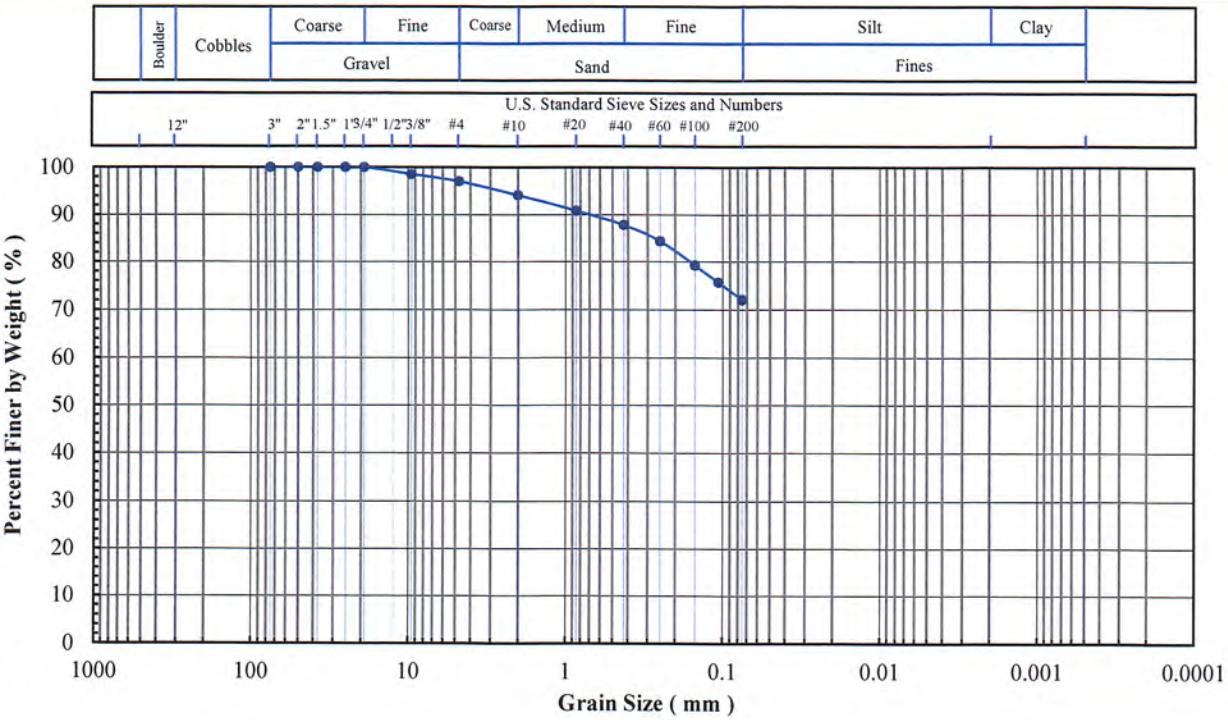
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-2 (6-11')
Lab Sample No:	20L068

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

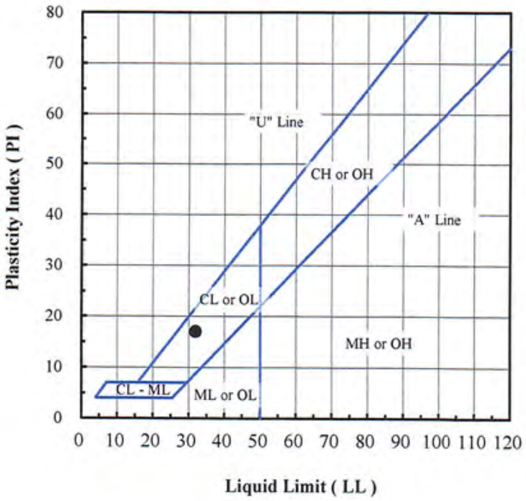


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	97
#10	2.00	94
#20	0.850	91
#40	0.425	88
#60	0.250	84
#100	0.150	79
#140	0.106	76
#200	0.075	72

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	25
Fines (%):	72
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
Org. Content (%):	
Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-2 (6-11')	20L068	16.0	72	32	15	17	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-21-2021
AA/NSR

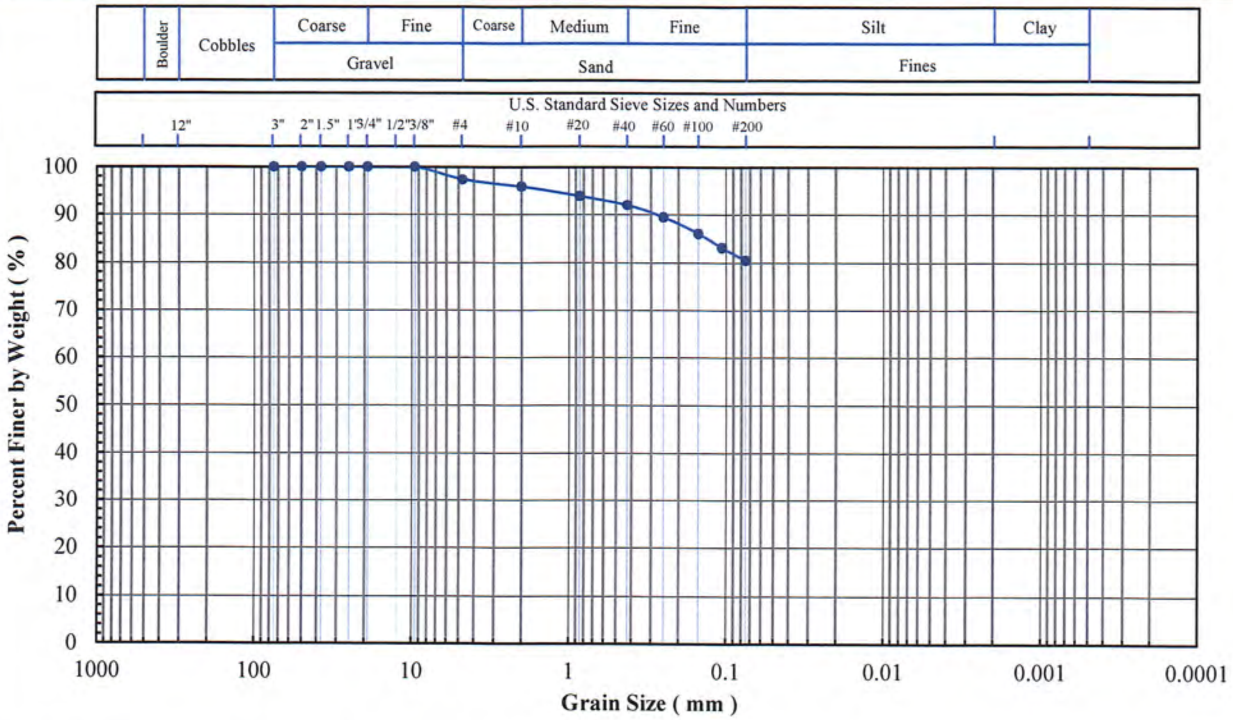
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-4 (16-21')
Lab Sample No:	20L070

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

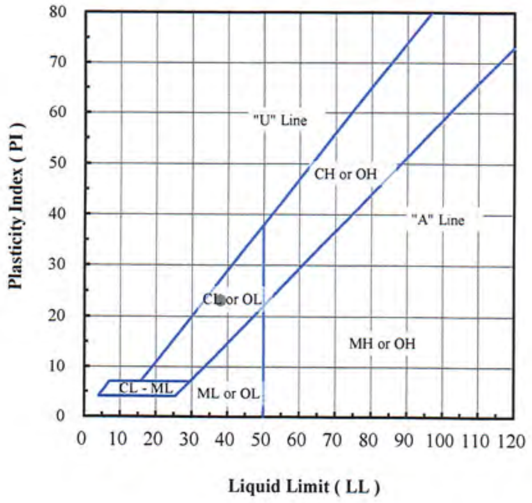


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.3
#10	2.00	95.8
#20	0.850	93.8
#40	0.425	91.9
#60	0.250	89.4
#100	0.150	86.0
#140	0.106	83.1
#200	0.075	80.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.7
Sand (%):	16.8
Fines (%):	80.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-4 (16-21')	20L070	19.9	80.5	38	15	23	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

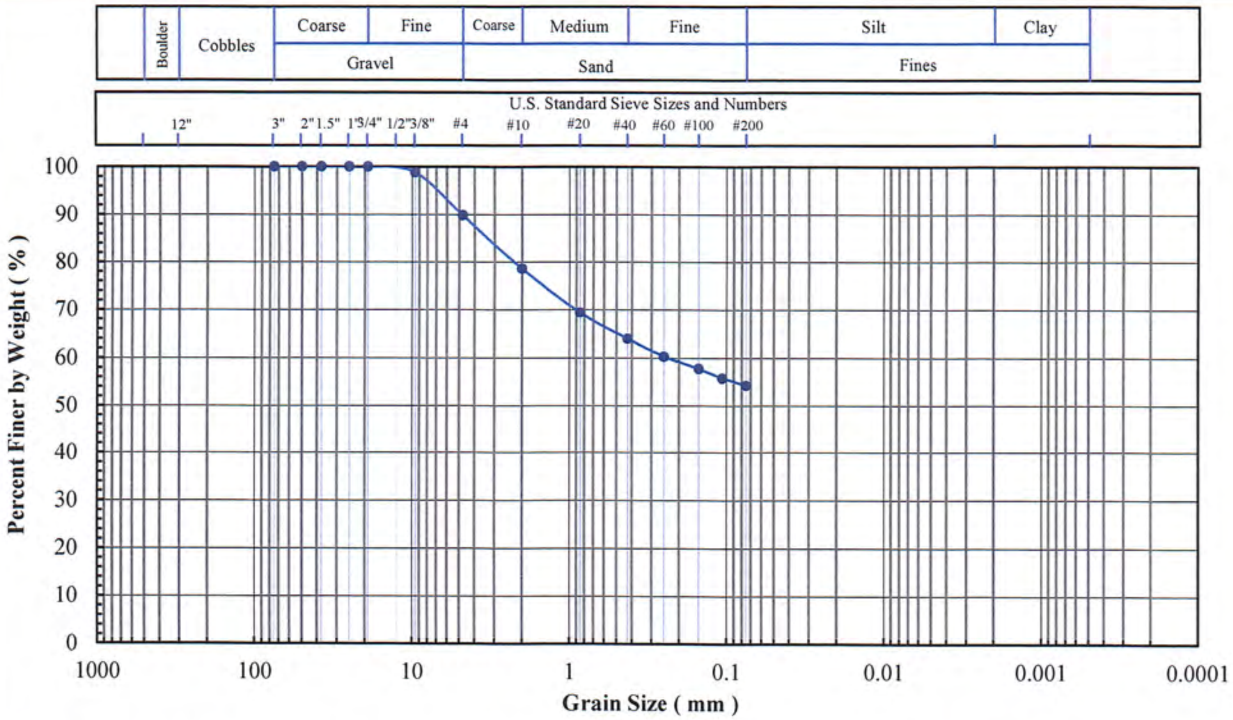
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-7 (31-36')
Lab Sample No:	20L073

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

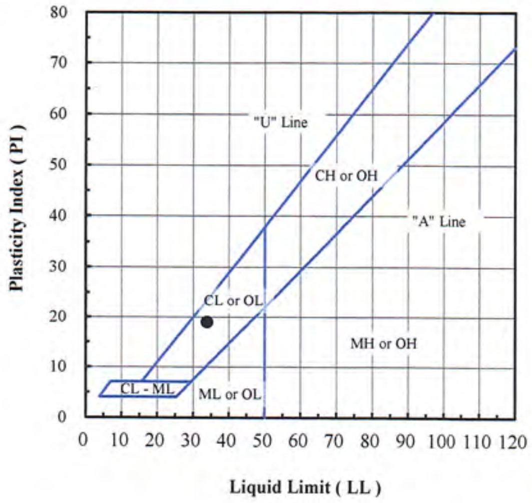


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	90
#10	2.00	79
#20	0.850	69
#40	0.425	64
#60	0.250	60
#100	0.150	58
#140	0.106	56
#200	0.075	54

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	10
Sand (%):	36
Fines (%):	54
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (31-36')	20L073	16.9	54	34	15	19	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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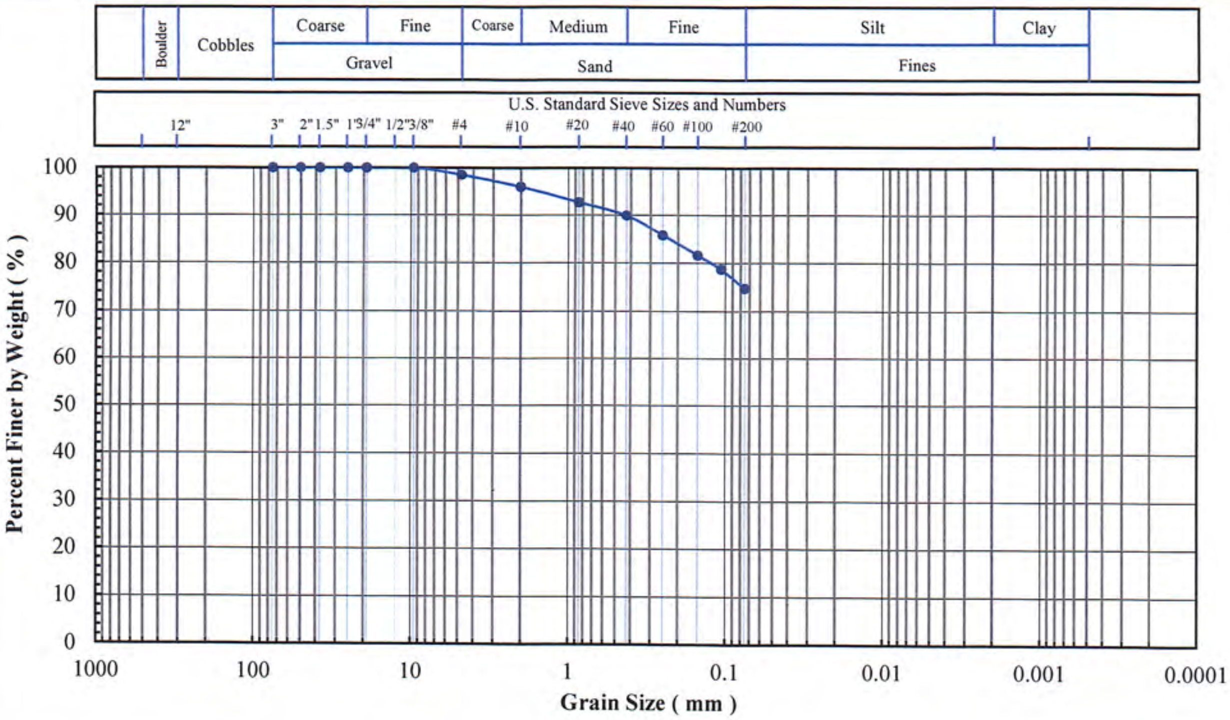
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-10 (45-50')
Lab Sample No:	20L076

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

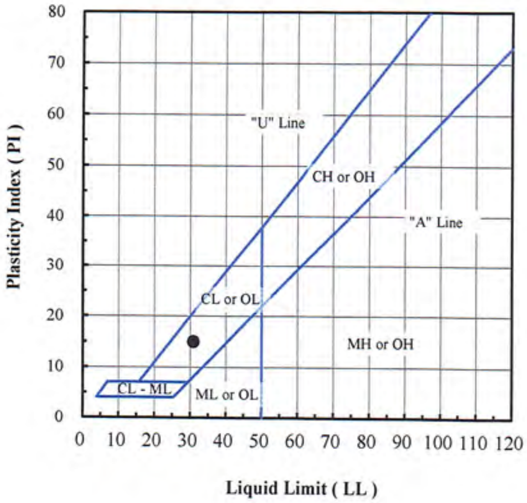


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	96.0
#20	0.850	92.7
#40	0.425	89.9
#60	0.250	85.8
#100	0.150	81.6
#140	0.106	78.7
#200	0.075	74.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	23.8
Fines (%):	74.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-10 (45-50')	20L076	15.7	74.7	31	16	15	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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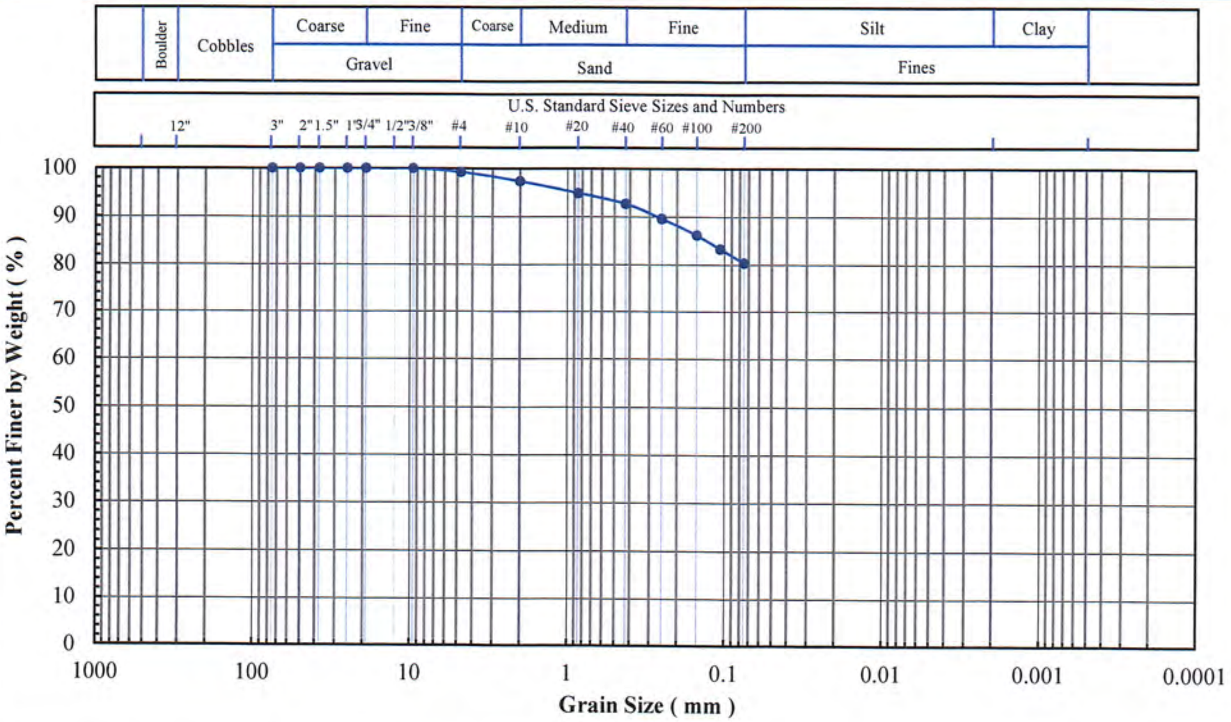
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-13 (60-65')
Lab Sample No:	20L079

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

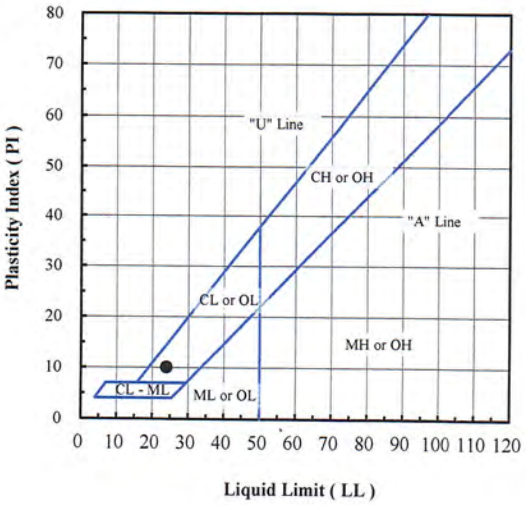


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	94.8
#40	0.425	92.6
#60	0.250	89.5
#100	0.150	86.1
#140	0.106	83.2
#200	0.075	80.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	18.9
Fines (%):	80.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-13 (60-65')	20L079	10.2	80.3	24	14	10	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

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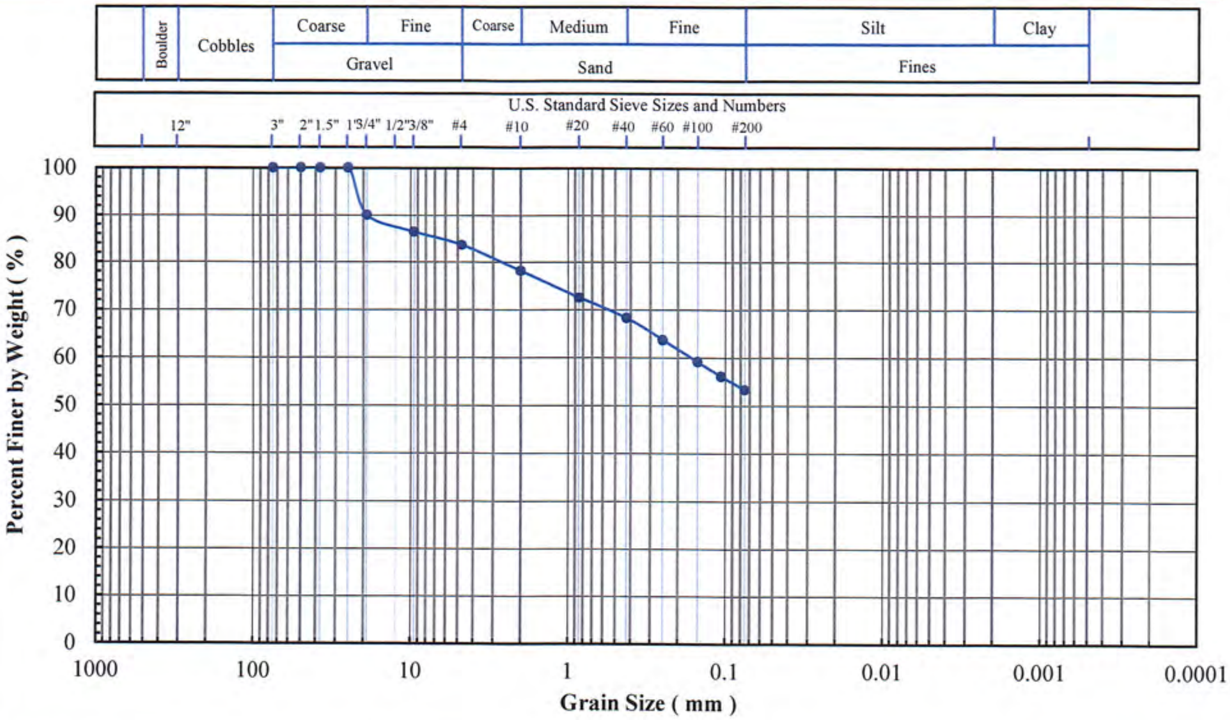
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B6-15 (70-76')
Lab Sample No: 20L081

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

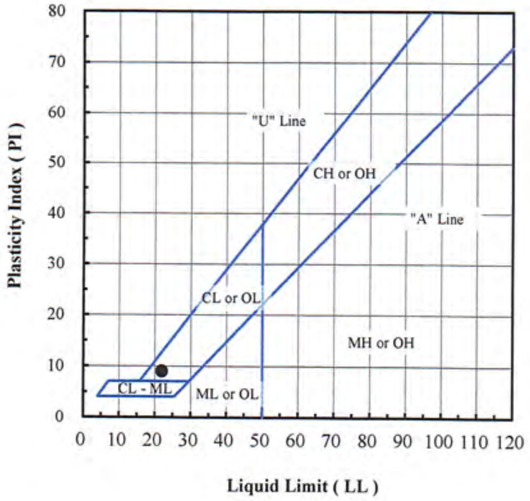


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	90
3/8"	9.5	86
#4	4.75	84
#10	2.00	78
#20	0.850	73
#40	0.425	68
#60	0.250	64
#100	0.150	59
#140	0.106	56
#200	0.075	53

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	16
Sand (%):	31
Fines (%):	53
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-15 (70-76')	20L081	8.0	53	22	13	9	CL - Sandy lean clay with gravel

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

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953 Forrest Street, Roswell, Georgia 30075
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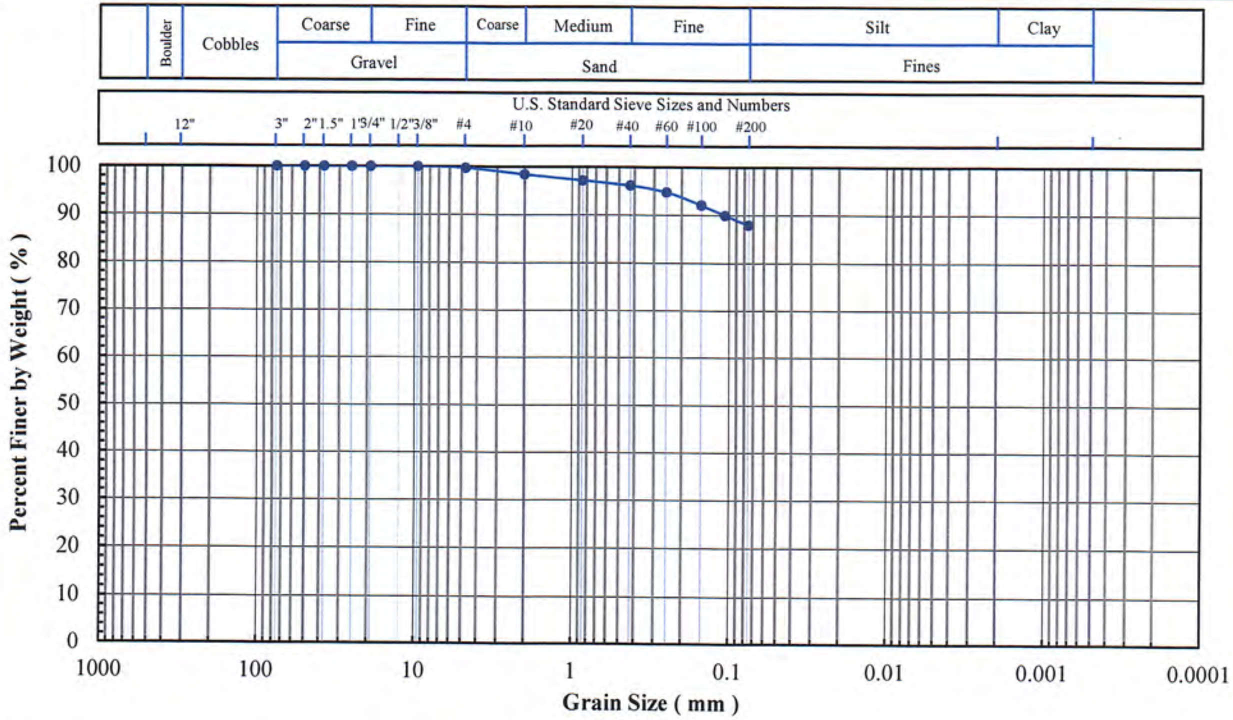
Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B6-ST-1 (25-27')
Lab Sample No: 20L134

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

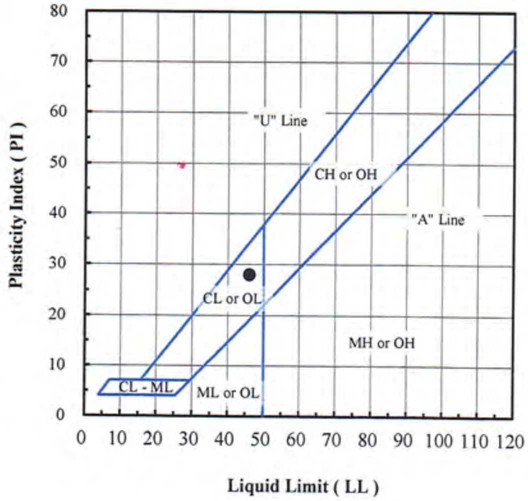


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	98.4
#20	0.850	97.1
#40	0.425	96.1
#60	0.250	94.7
#100	0.150	92.0
#140	0.106	89.9
#200	0.075	87.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	11.8
Fines (%):	87.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):
Org. Content (%):
Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-ST-1 (25-27')	20L134	18.2	87.9	46	18	28	CL - Lean clay

Note(s):

01-27-2021
AA, NSR

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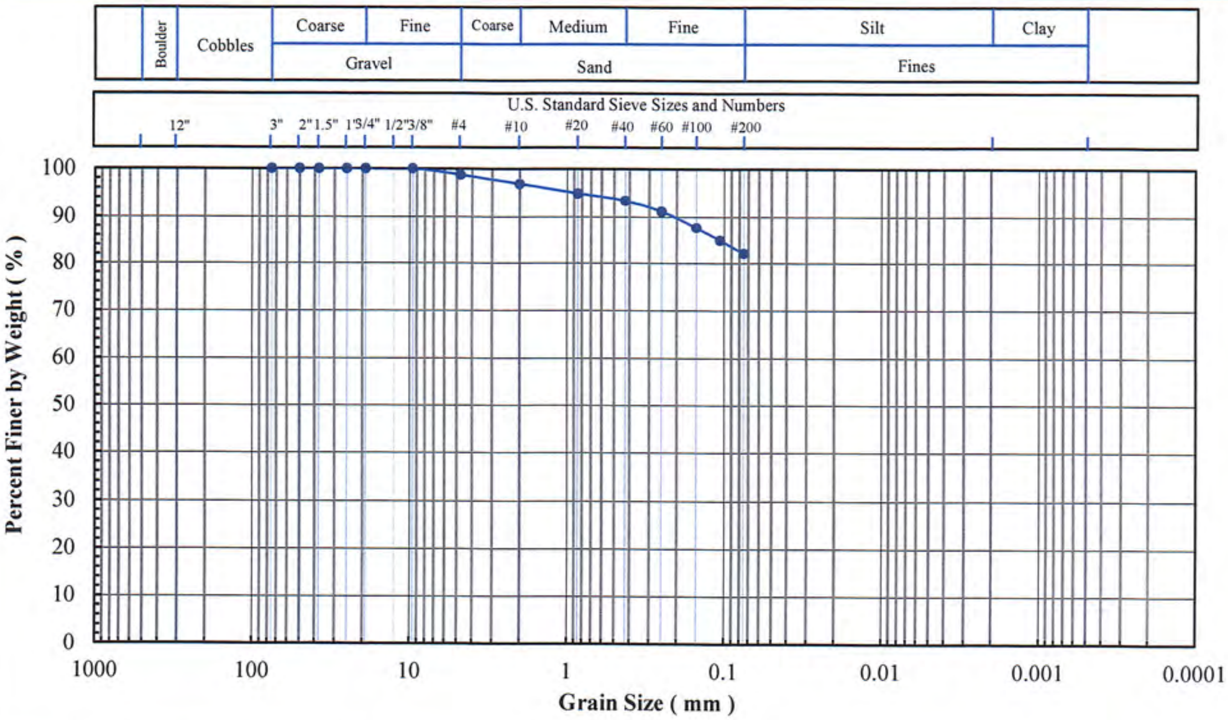
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-2 (40-42.5')
Lab Sample No:	20L135

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

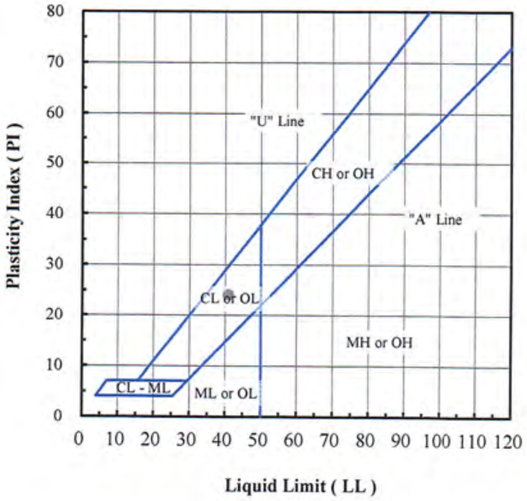


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	96.8
#20	0.850	94.8
#40	0.425	93.3
#60	0.250	91.1
#100	0.150	87.6
#140	0.106	84.9
#200	0.075	82.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	16.6
Fines (%):	82.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-ST-2 (40-42.5')	20L135	16.6	82.1	41	17	24	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSR

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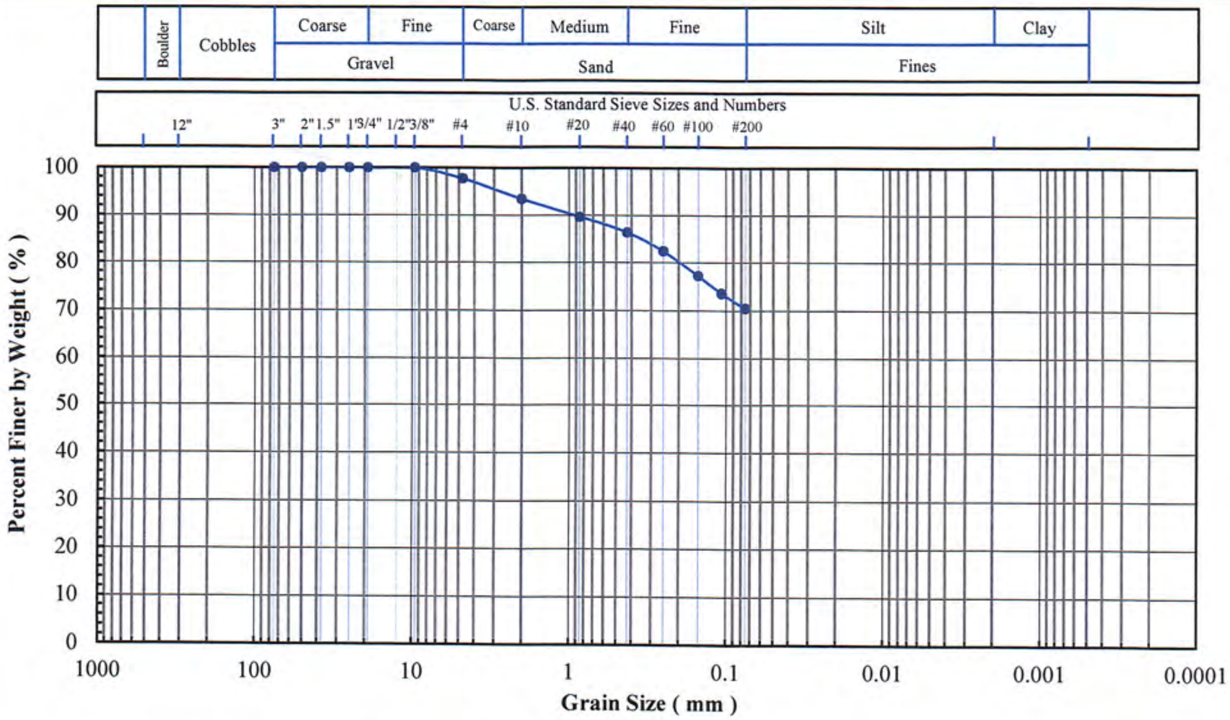
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-3 (55-57.5')
Lab Sample No:	20L136

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

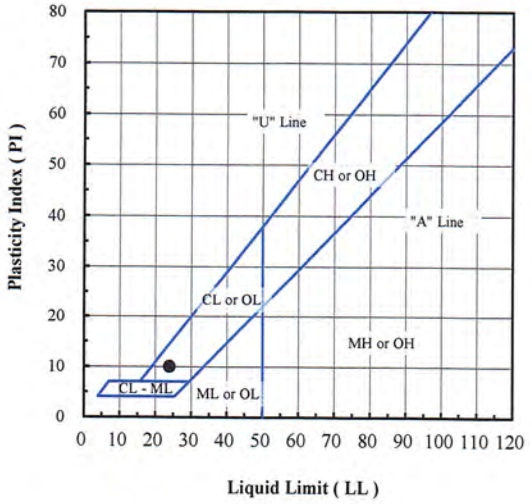


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.7
#10	2.00	93.5
#20	0.850	89.7
#40	0.425	86.4
#60	0.250	82.4
#100	0.150	77.2
#140	0.106	73.5
#200	0.075	70.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.3
Sand (%):	27.3
Fines (%):	70.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-3 (55-57.5')	20L136	13.1	70.4	24	14	10	CL - Lean clay with sand

Note(s):

01-28-2021
AA, NSR

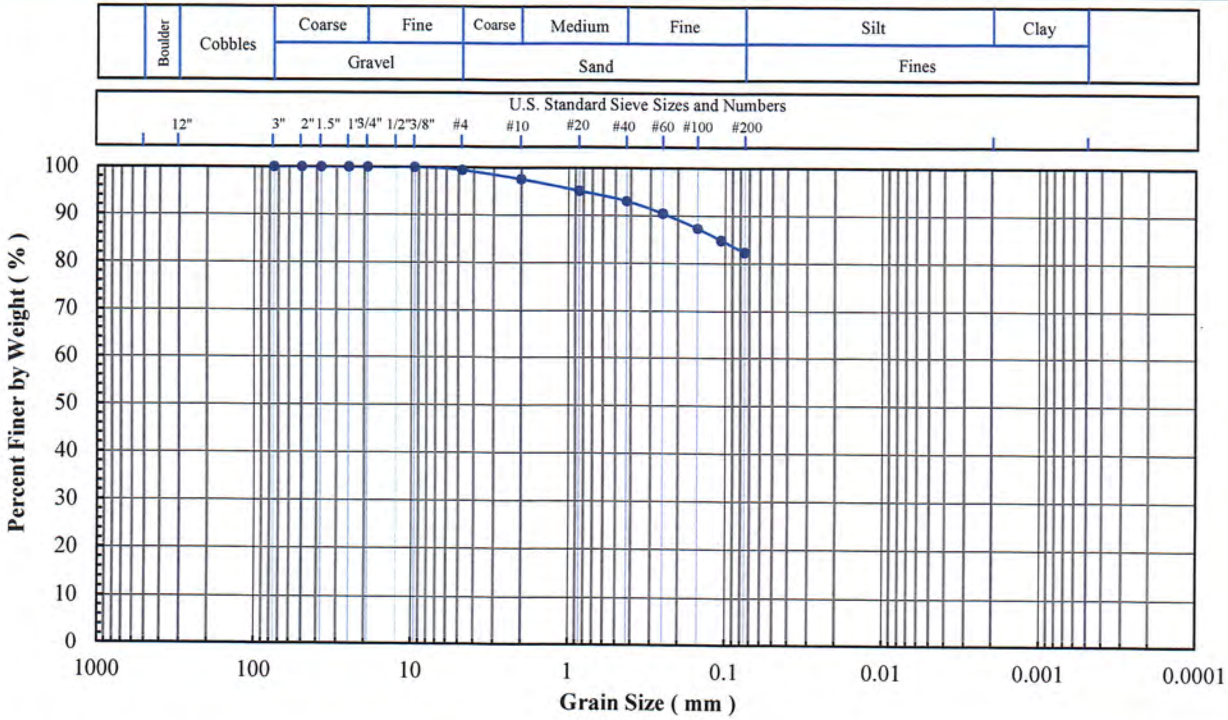
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-4 (65-67.5')
Lab Sample No:	20L137

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

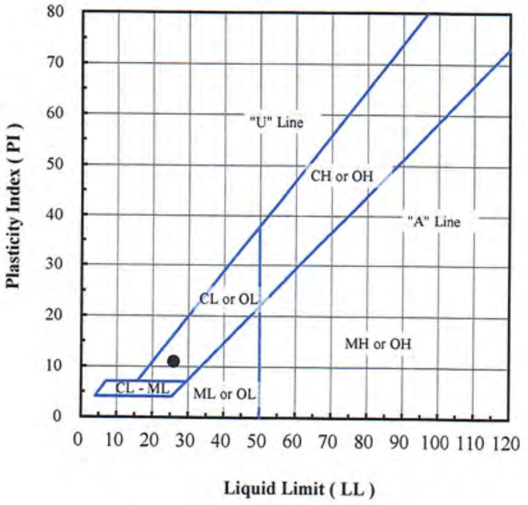


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	97.5
#20	0.850	95.1
#40	0.425	93.0
#60	0.250	90.4
#100	0.150	87.3
#140	0.106	84.8
#200	0.075	82.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	17.1
Fines (%):	82.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-4 (65-67.5')	20L137	11.4	82.3	26	15	11	CL - Lean clay with sand

Note(s):

01-28-2021
AA, NSK

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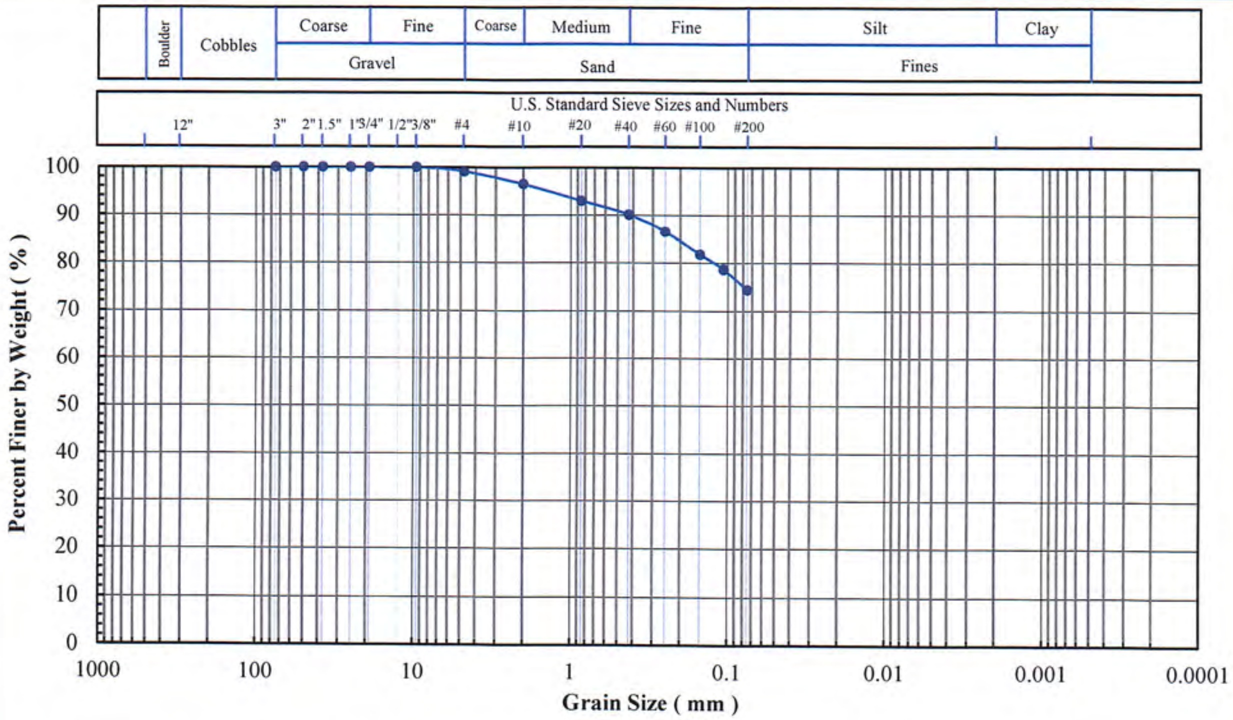
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-1 (0-6')
Lab Sample No:	20L082

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

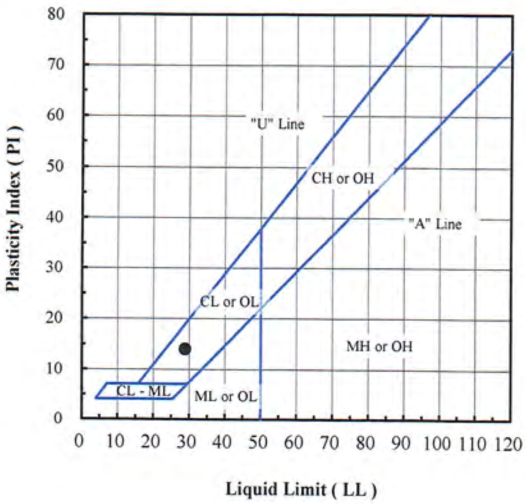


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	96.4
#20	0.850	92.9
#40	0.425	90.0
#60	0.250	86.5
#100	0.150	81.7
#140	0.106	78.6
#200	0.075	74.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	24.8
Fines (%):	74.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B7-1 (0-6')	20L082	14.0	74.3	29	15	14	CL - Lean clay with sand

Note(s):

01-21-2021
AA, JSA

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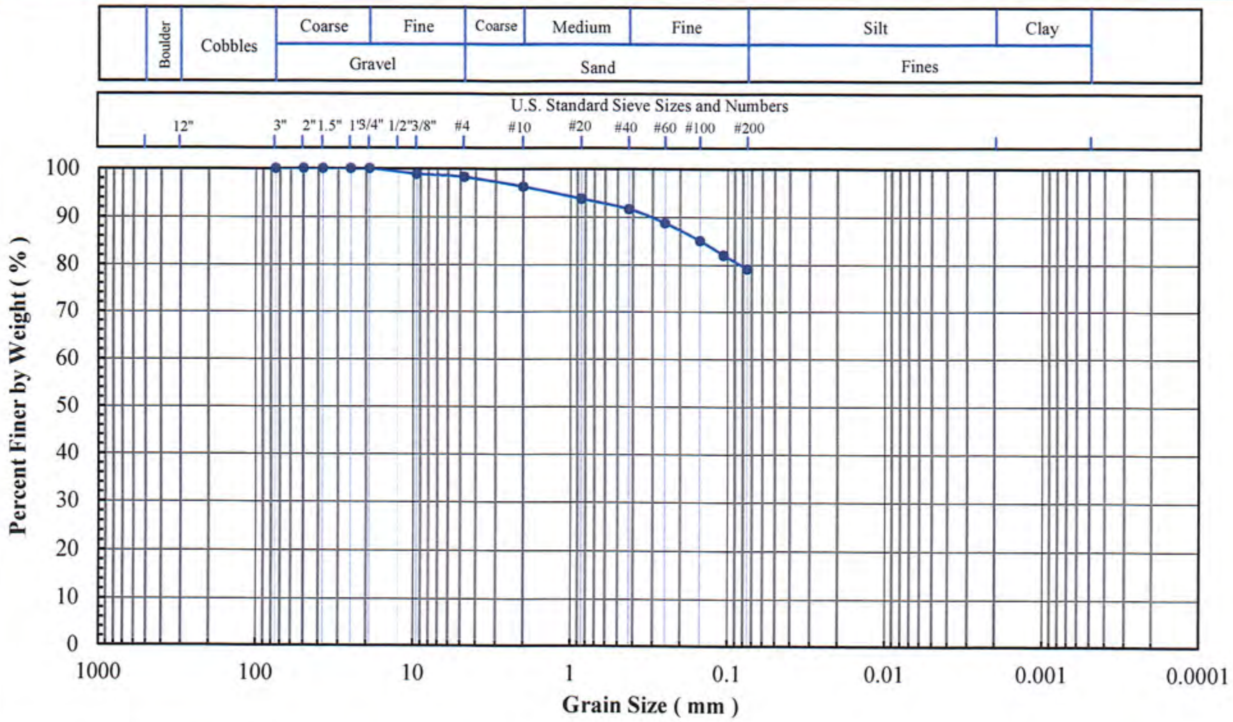
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-3 (11-16')
Lab Sample No:	20L084

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

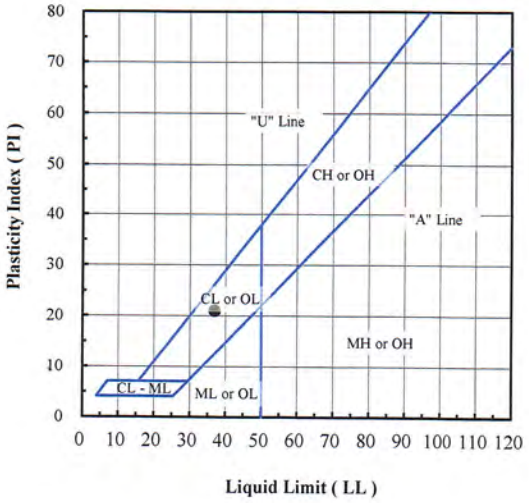


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	98
#10	2.00	96
#20	0.850	94
#40	0.425	92
#60	0.250	89
#100	0.150	85
#140	0.106	82
#200	0.075	79

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2
Sand (%):	19
Fines (%):	79
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-3 (11-16')	20L084	17.1	79	37	16	21	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-21-2021
AA/NSK

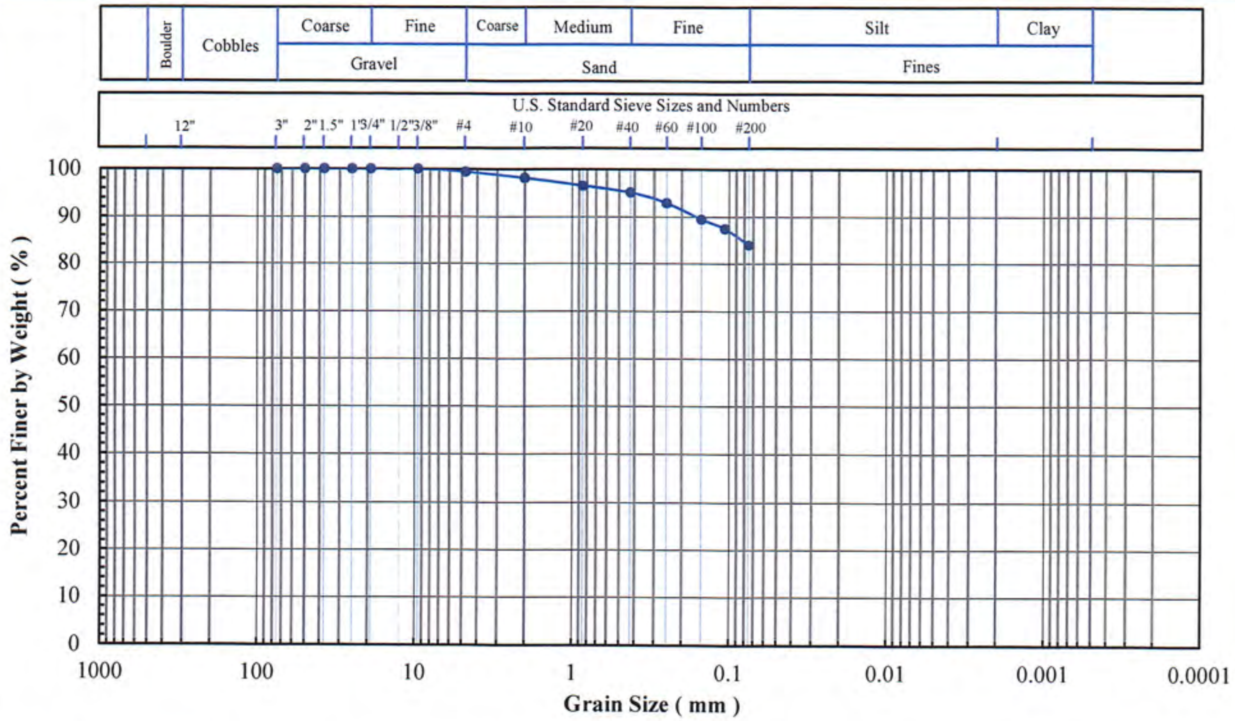
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-5 (21-26')
Lab Sample No:	20L086

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

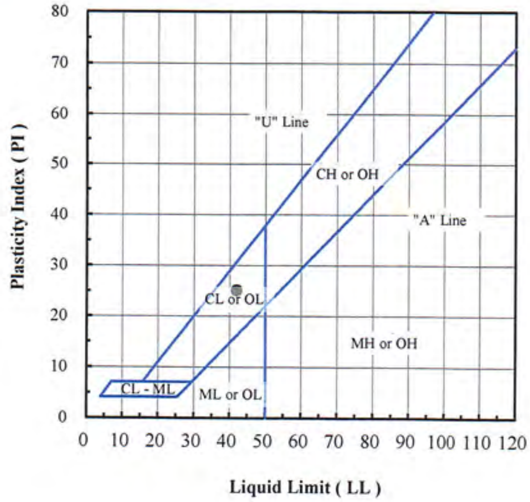


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	98.1
#20	0.850	96.5
#40	0.425	95.1
#60	0.250	92.9
#100	0.150	89.4
#140	0.106	87.4
#200	0.075	83.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	15.5
Fines (%):	83.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-5 (21-26')	20L086	18.6	83.9	42	17	25	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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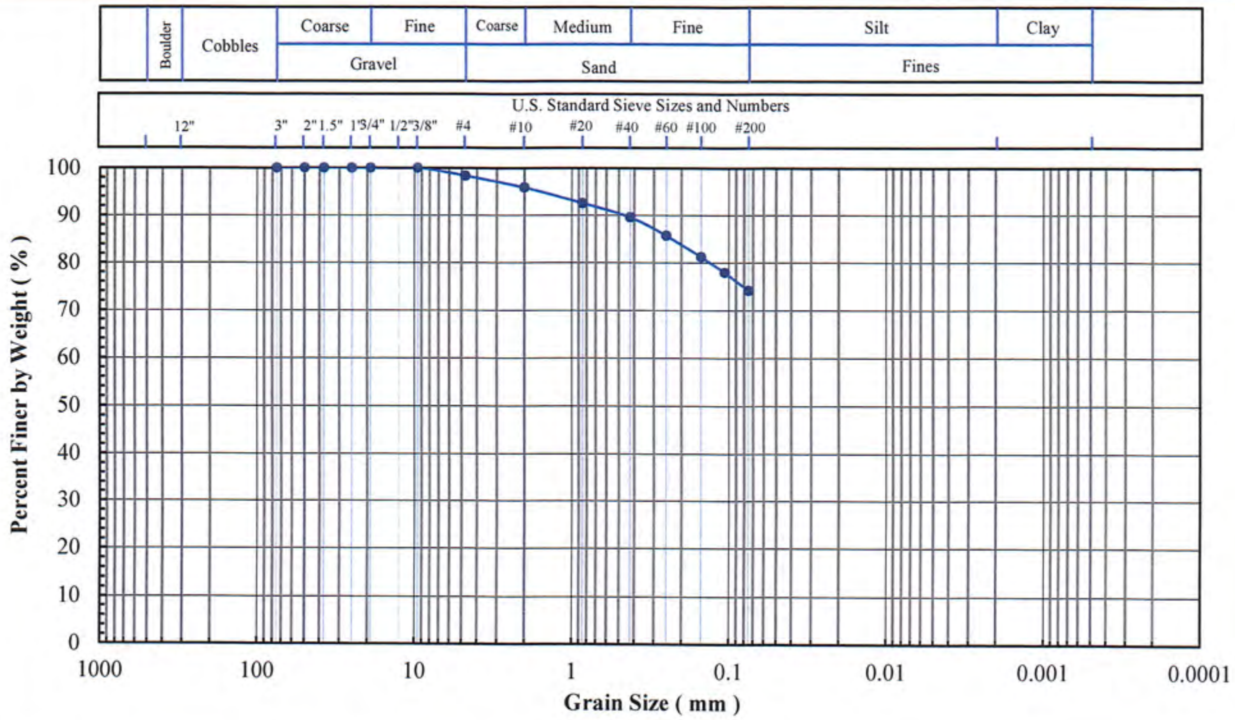
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B7-7 (31-36')
Lab Sample No: 20L088

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

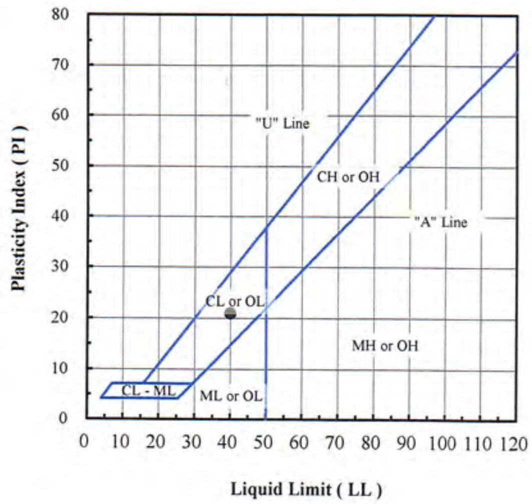


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.3
#10	2.00	95.8
#20	0.850	92.5
#40	0.425	89.5
#60	0.250	85.7
#100	0.150	81.2
#140	0.106	77.9
#200	0.075	74.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.7
Sand (%):	24.2
Fines (%):	74.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID:	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-7 (31-36')	20L088	17.5	74.1	40	19	21	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

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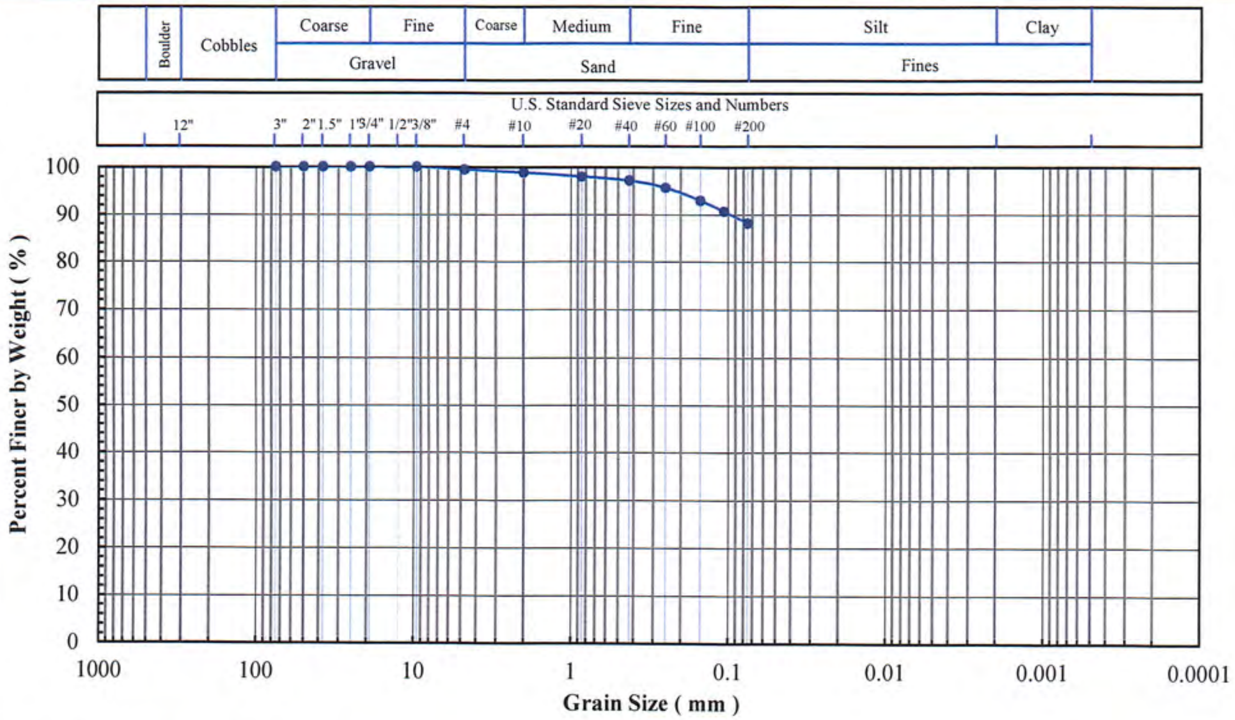
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-9 (41-46')
Lab Sample No:	20L090

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

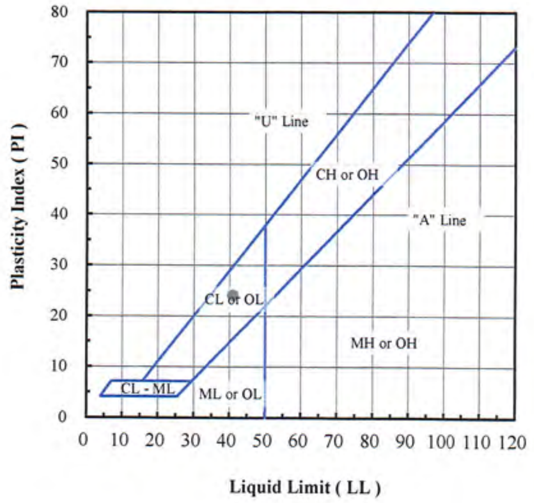


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	98.8
#20	0.850	97.9
#40	0.425	97.1
#60	0.250	95.6
#100	0.150	92.9
#140	0.106	90.6
#200	0.075	88.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	11.3
Fines (%):	88.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-9 (41-46')	20L090	20.2	88.1	41	17	24	CL - Lean clay

Note(s):

01-21-2021
AA, NSR

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"Excellence in Testing"

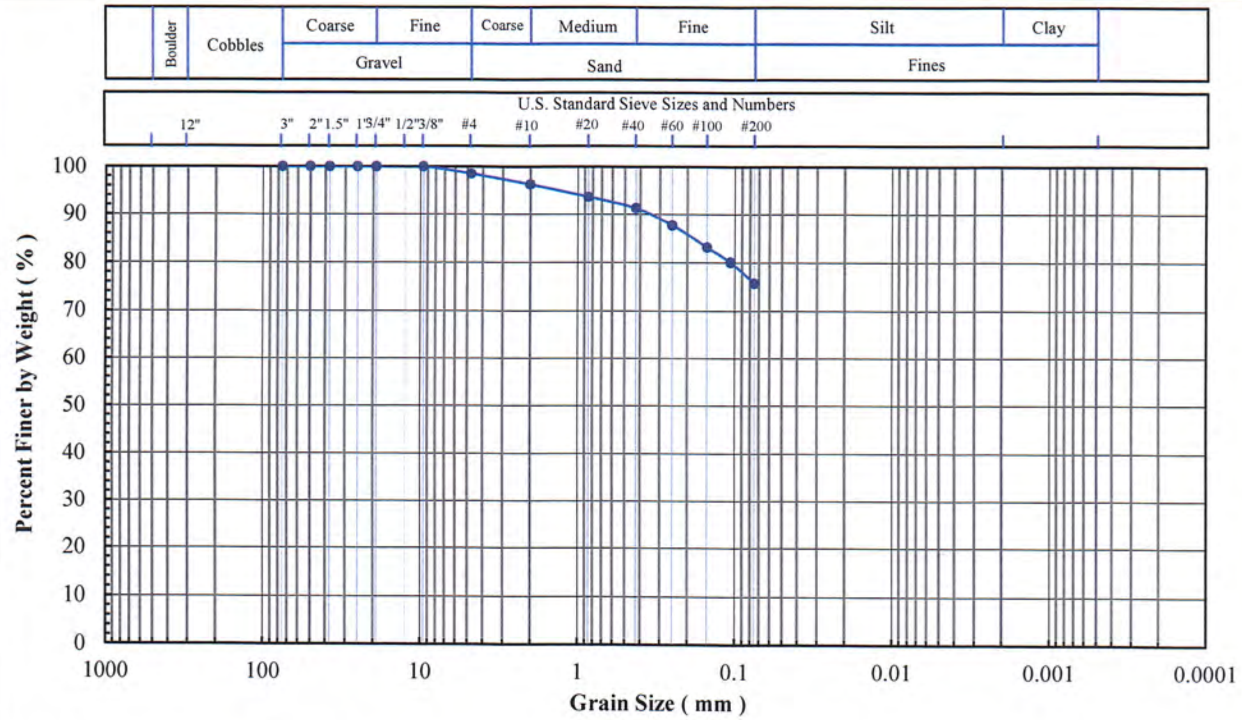
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B7-12 (56-61')
Lab Sample No: 20L093

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

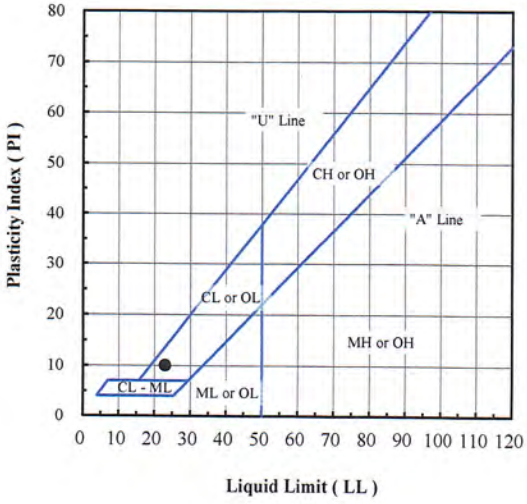


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	96.2
#20	0.850	93.6
#40	0.425	91.2
#60	0.250	87.7
#100	0.150	83.1
#140	0.106	80.0
#200	0.075	75.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	22.8
Fines (%):	75.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B7-12 (56-61')	20L093	12.9	75.7	23	13	10	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

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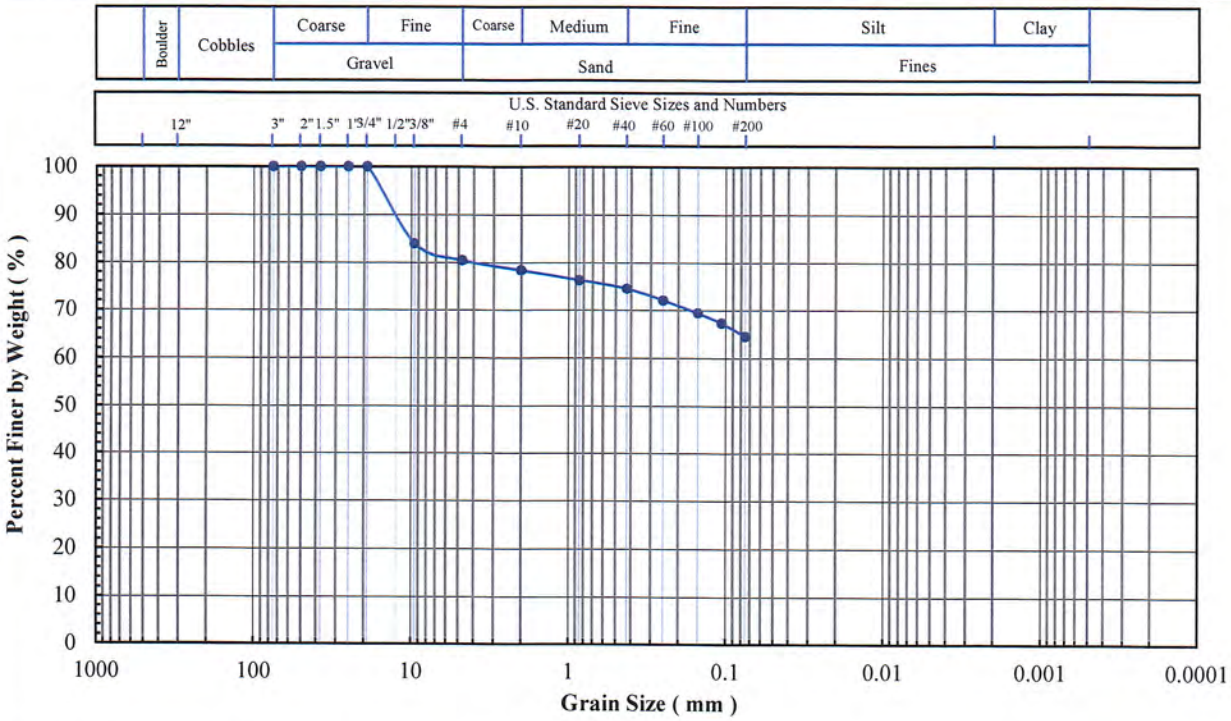
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-15 (71-76')
Lab Sample No:	20L096

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

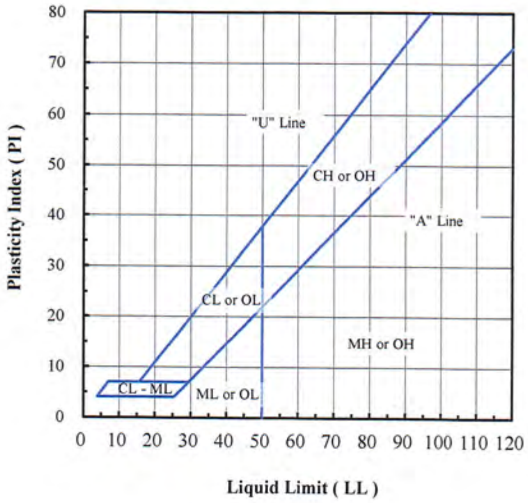


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	84
#4	4.75	81
#10	2.00	78
#20	0.850	76
#40	0.425	75
#60	0.250	72
#100	0.150	69
#140	0.106	67
#200	0.075	64

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	19
Sand (%):	17
Fines (%):	64
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B7-15 (71-76')	20L096	10.0	64	NP	NP	NP	ML - Gravelly silt with sand

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

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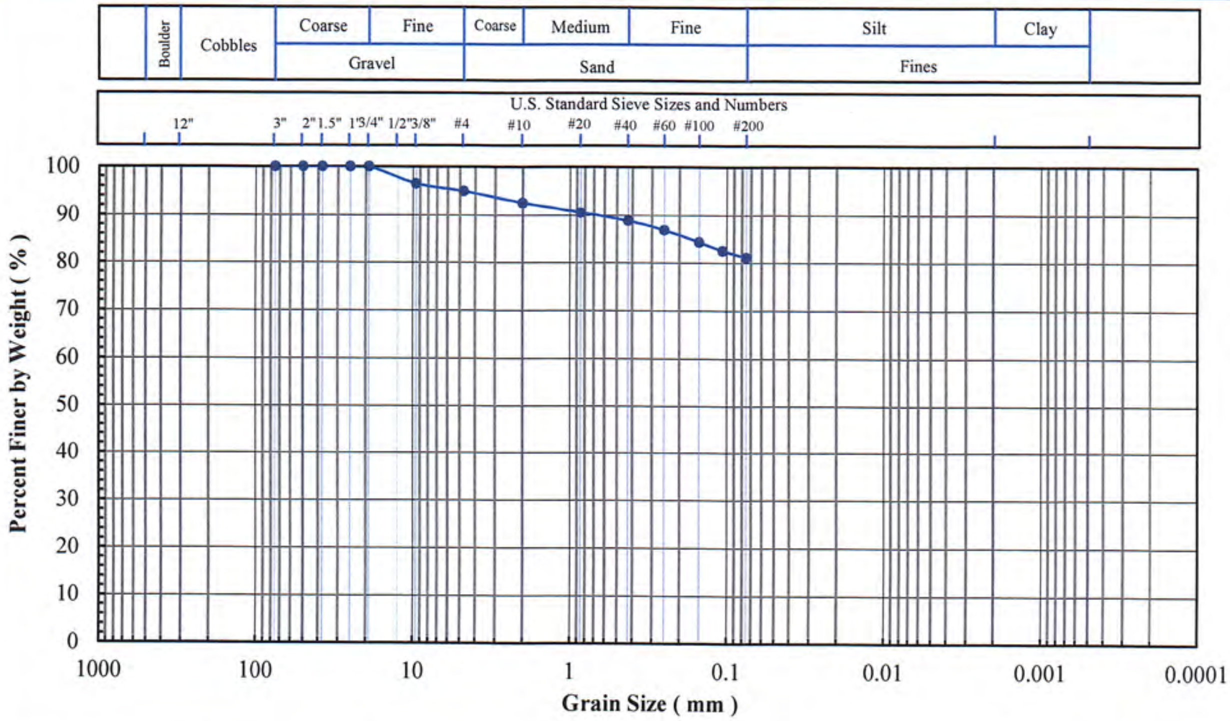
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-ST-1 (65-67.5')
Lab Sample No:	20L138

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

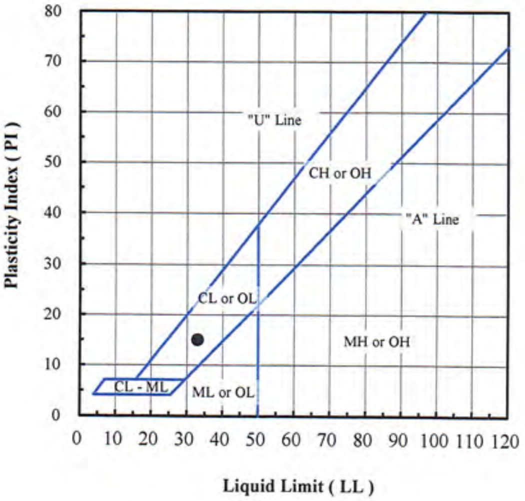


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	95
#10	2.00	93
#20	0.850	91
#40	0.425	89
#60	0.250	87
#100	0.150	84
#140	0.106	83
#200	0.075	81

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	14
Fines (%):	81
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-ST-1 (65-67.5')	20L138	13.3	81	33	18	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-28-2021
AA, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
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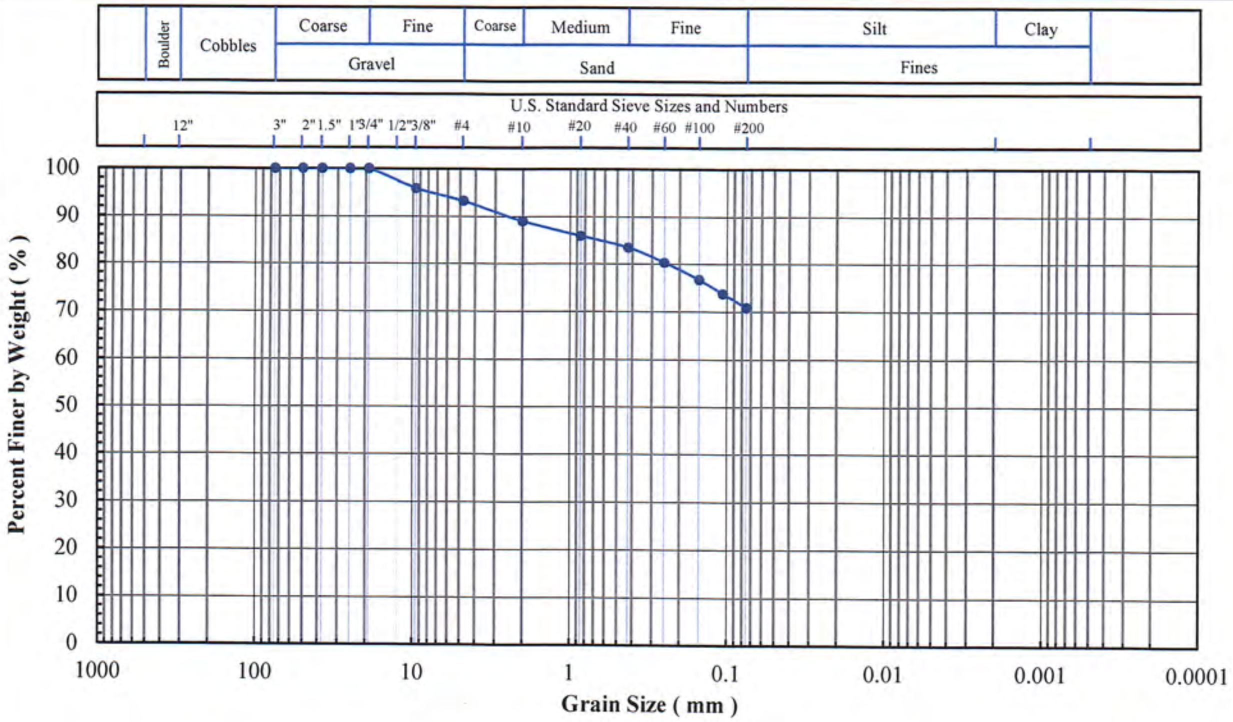
Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B8-2 (6-11')
Lab Sample No: 20L098

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

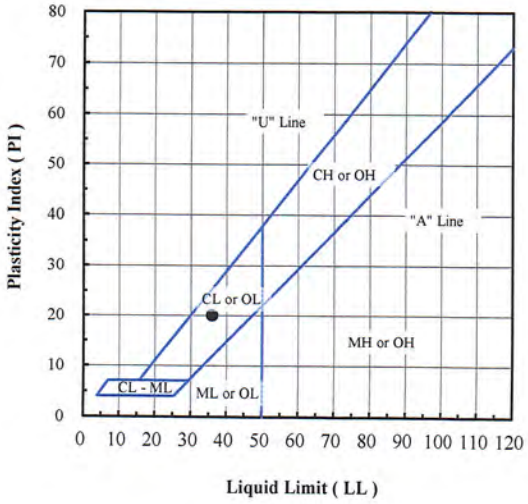


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	93
#10	2.00	89
#20	0.850	86
#40	0.425	83
#60	0.250	80
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	7
Sand (%):	22
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-2 (6-11')	20L098	17.2	71	36	16	20	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

Excel Geotechnical Testing, Inc.

"Excellence in Testing"

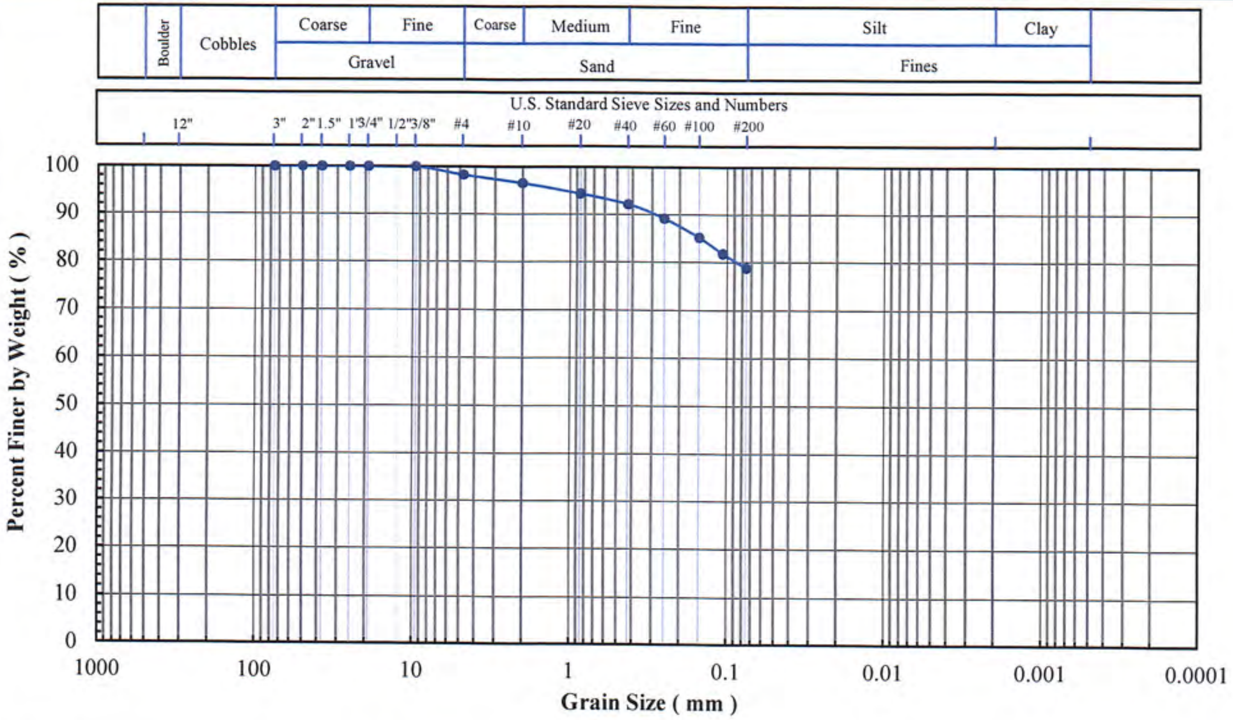
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-4 (16.21')
Lab Sample No:	20L100

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

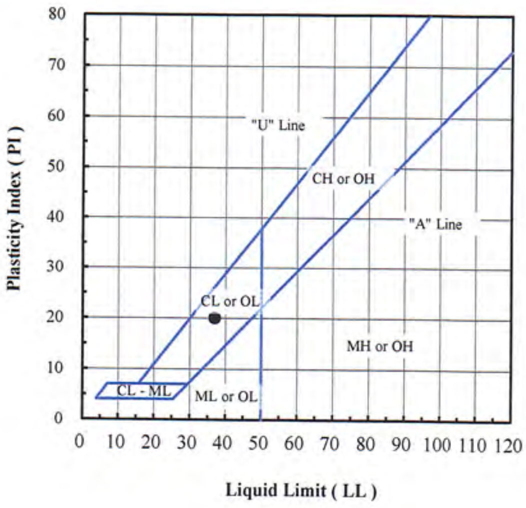


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.2
#10	2.00	96.5
#20	0.850	94.3
#40	0.425	92.1
#60	0.250	89.1
#100	0.150	85.1
#140	0.106	81.7
#200	0.075	78.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.8
Sand (%):	19.5
Fines (%):	78.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B8-4 (16.21')	20L100	20.4	78.7	37	17	20	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

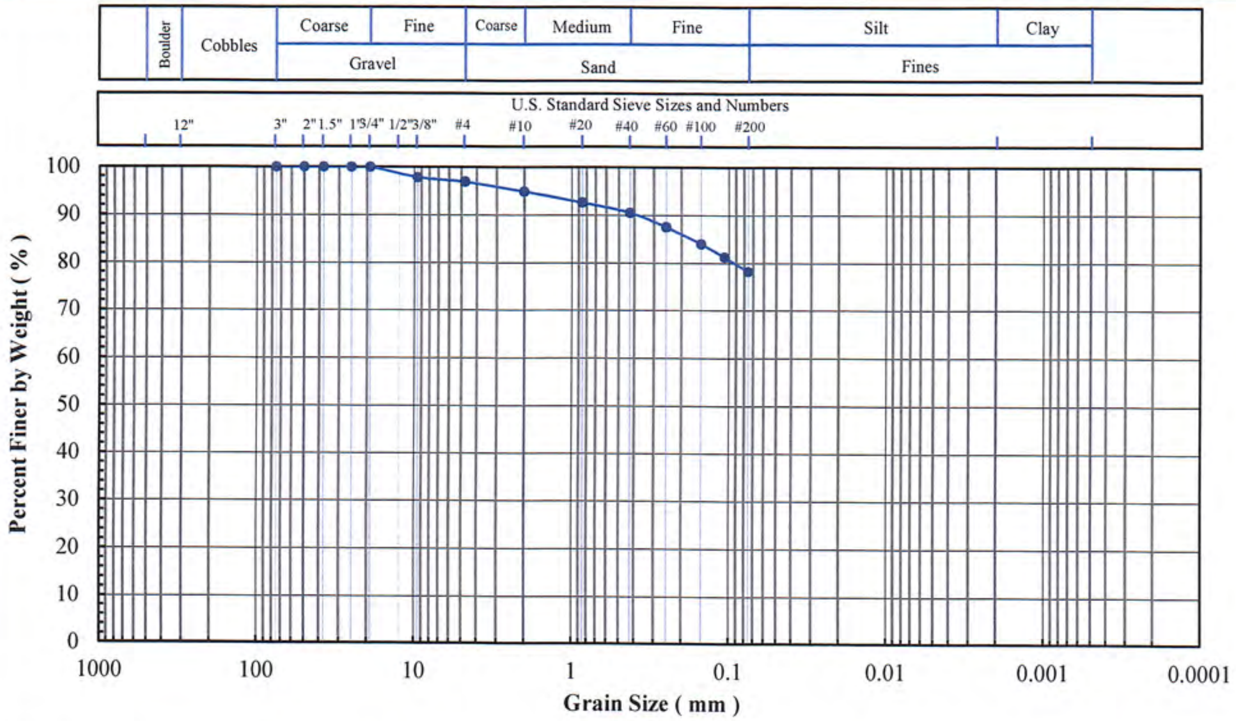
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-6 (21-31')
Lab Sample No:	20L102

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

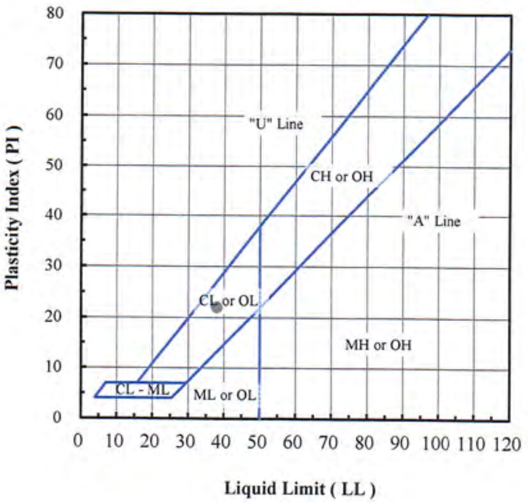


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	97
#10	2.00	95
#20	0.850	93
#40	0.425	91
#60	0.250	88
#100	0.150	84
#140	0.106	81
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	19
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-6 (21-31')	20L102	20.5	78	38	16	22	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

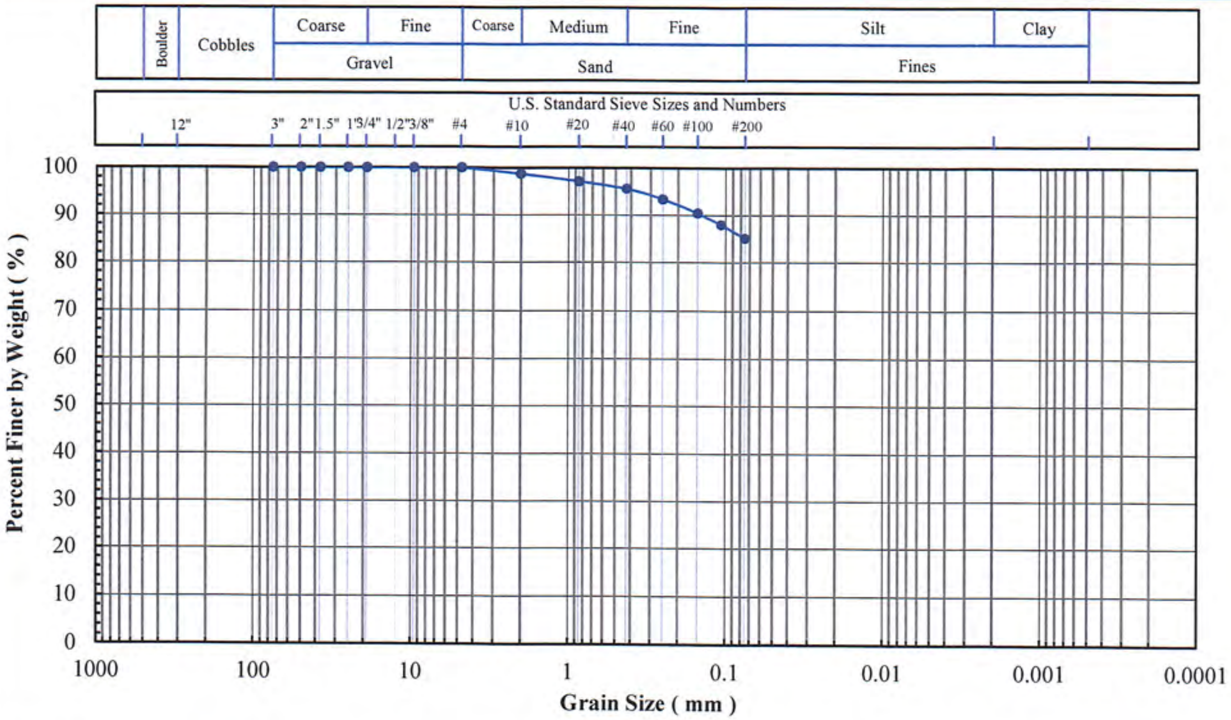
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B8-8 (36-41')
Lab Sample No: 20L104

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

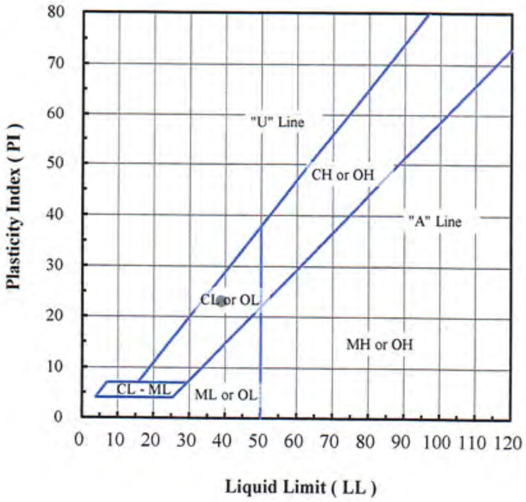


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.7
#20	0.850	97.1
#40	0.425	95.6
#60	0.250	93.4
#100	0.150	90.4
#140	0.106	87.9
#200	0.075	85.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	15.0
Fines (%):	85.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		Org. Content (%):		Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-8 (36-41')	20L104	19.6	85.0	39	16	23	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

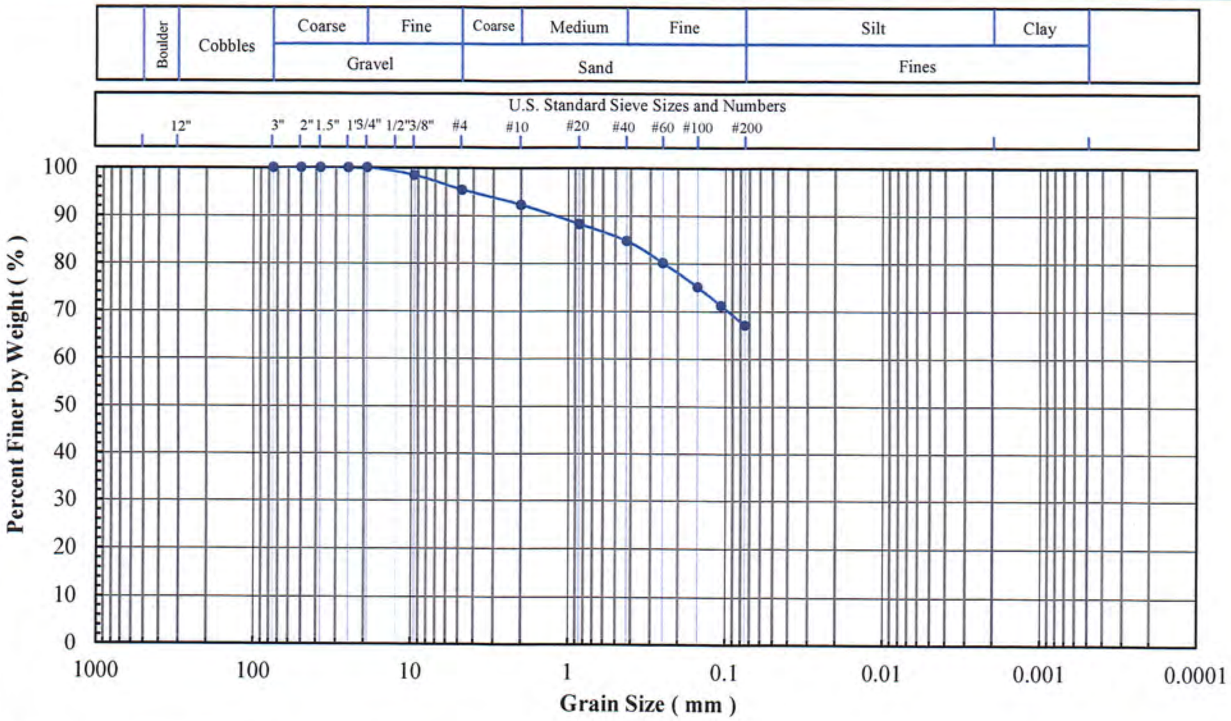
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-10 (46-51')
Lab Sample No:	20L106

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

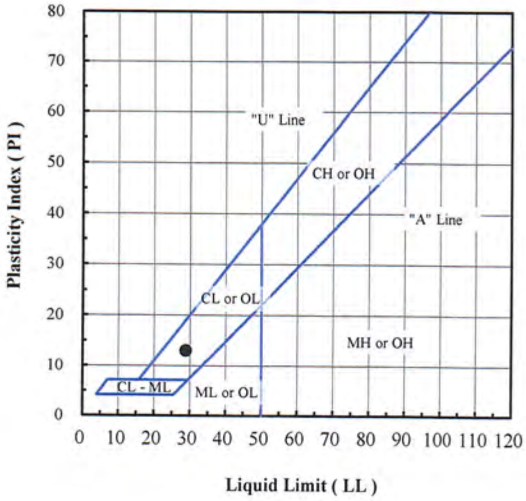


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	95
#10	2.00	92
#20	0.850	88
#40	0.425	85
#60	0.250	80
#100	0.150	75
#140	0.106	71
#200	0.075	67

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	28
Fines (%):	67
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-10 (46-51')	20L106	15.8	67	29	16	13	CL - Sandy lean clay

Note(s):

01-22-2021
AA/NSR

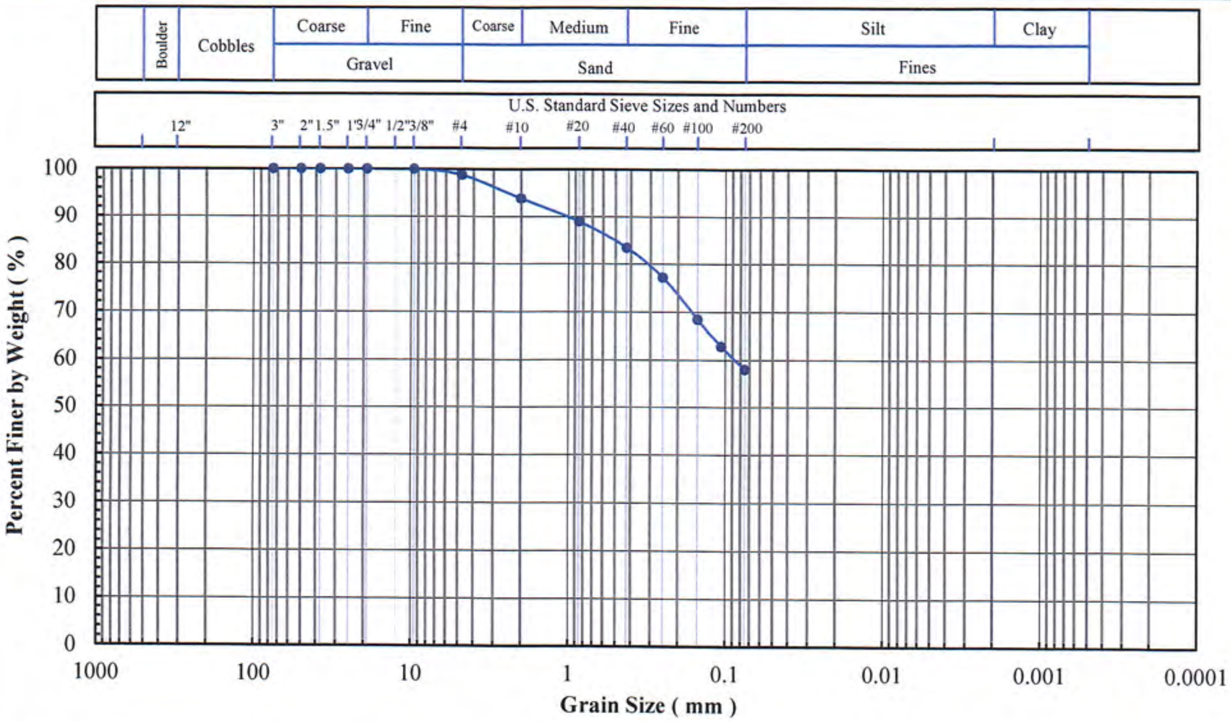
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-12 (56-61')
Lab Sample No:	20L108

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

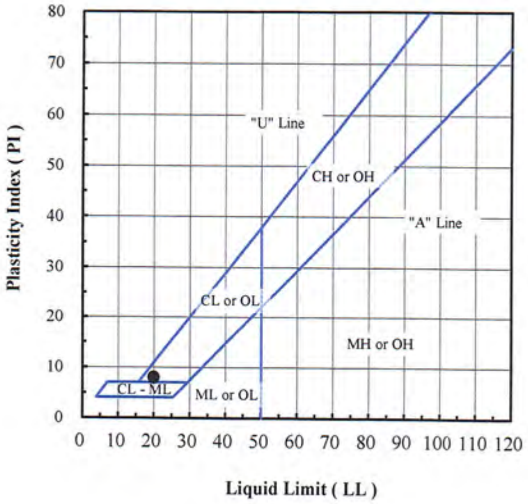


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	93.8
#20	0.850	88.9
#40	0.425	83.4
#60	0.250	77.1
#100	0.150	68.4
#140	0.106	62.7
#200	0.075	57.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	40.8
Fines (%):	57.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-12 (56-61')	20L108	8.5	57.9	20	12	8	CL - Sandy lean clay

Note(s):

01-22-2021
AA, NSR

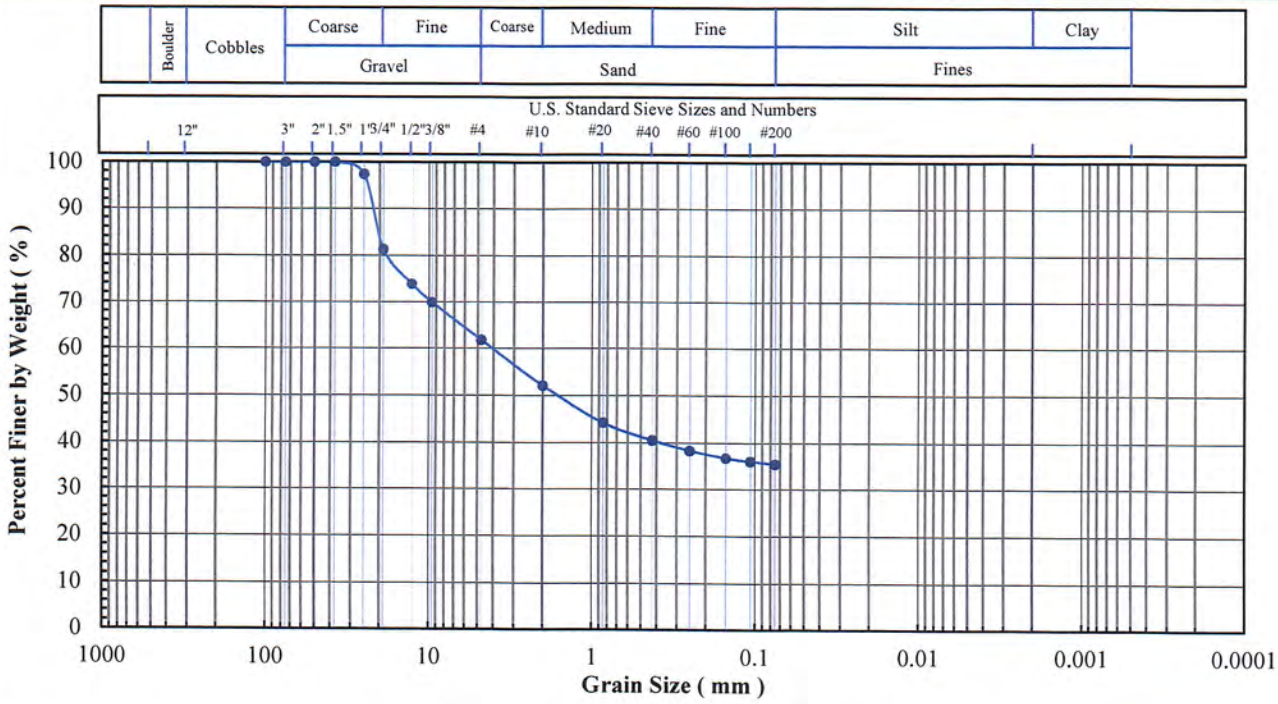
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-15 (66-71')
Lab Sample No:	20L110

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

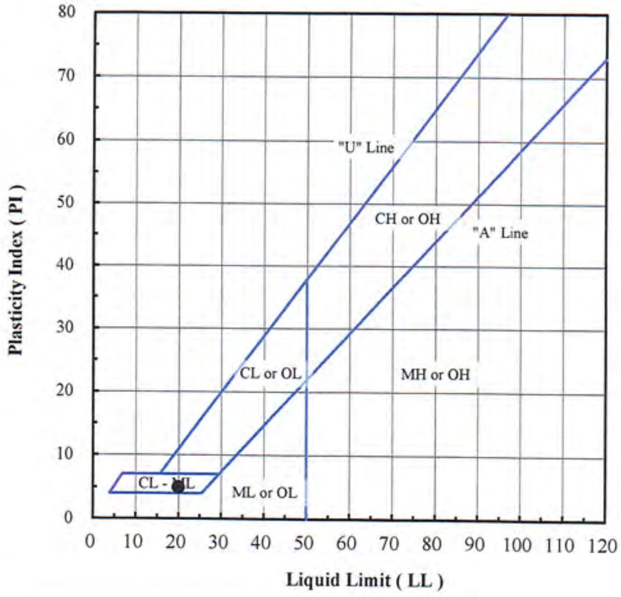
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	97
3/4"	19	81
1/2"	13	74
3/8"	9.5	70
#4	4.75	62
#10	2.00	52
#20	0.850	44
#40	0.425	41
#60	0.250	38
#100	0.150	37
#140	0.106	36
#200	0.075	35

Gravel (%)	38
Sand (%)	27
Fines (%)	35
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-15 (66-71')	20L110	10.2	35	20	15	5	GC-GM - Silty, clayey gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are CL - ML.

01-22-2021
AA, NSR

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"Excellence in Testing"

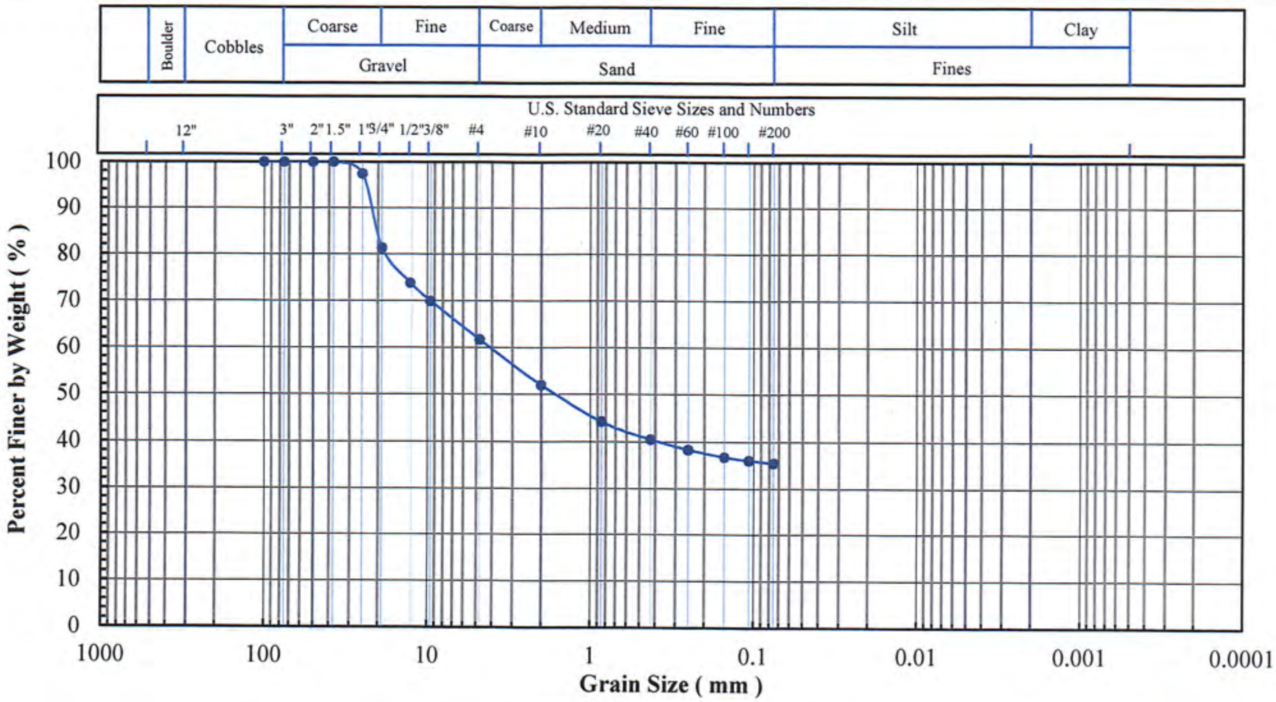
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-14 (66-71')
Lab Sample No:	20L110

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

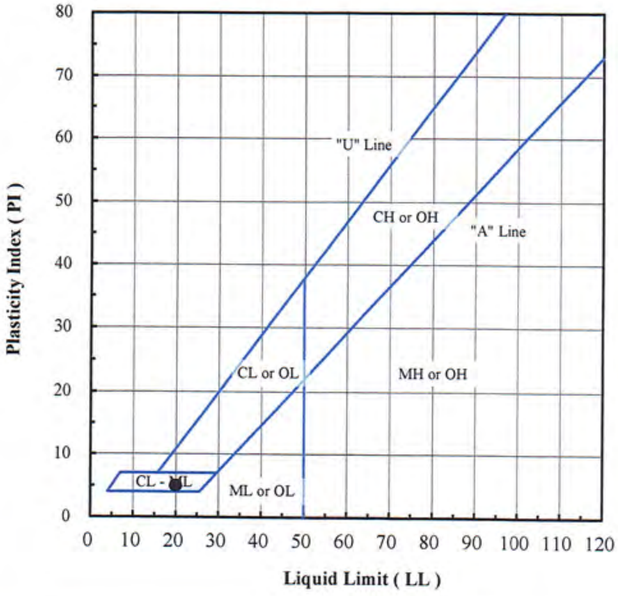
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	97
3/4"	19	81
1/2"	13	74
3/8"	9.5	70
#4	4.75	62
#10	2.00	52
#20	0.850	44
#40	0.425	41
#60	0.250	38
#100	0.150	37
#140	0.106	36
#200	0.075	35

Gravel (%)	38
Sand (%)	27
Fines (%)	35
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B8-14 (66-71')	20L110	10.2	35	20	15	5	GC-GM - Silty, clayey gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are CL - ML.

01-26-2021
AA, NSR

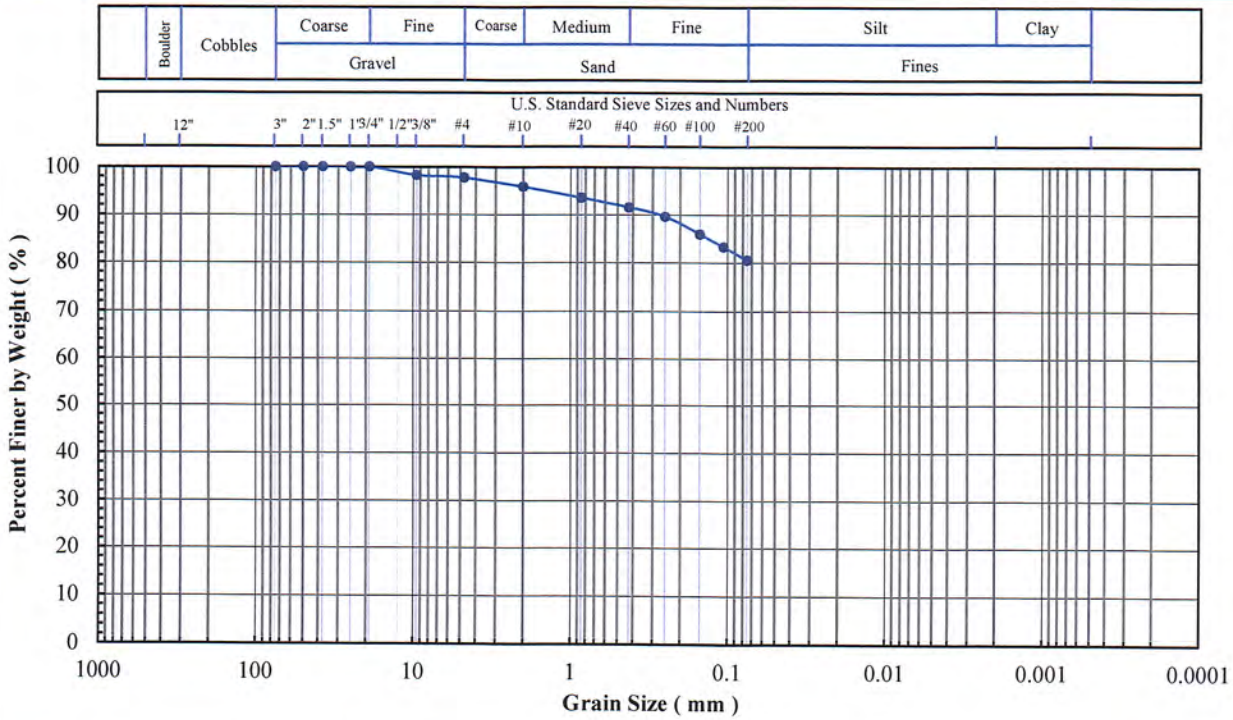
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-04 (16-21')
Lab Sample No:	20L115

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

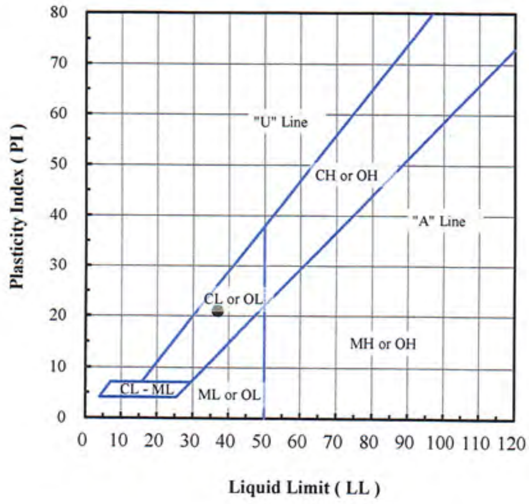


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	98
#10	2.00	96
#20	0.850	94
#40	0.425	92
#60	0.250	90
#100	0.150	86
#140	0.106	83
#200	0.075	81

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2
Sand (%):	17
Fines (%):	81
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-04 (16-21')	20L115	15.3	81	37	16	21	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

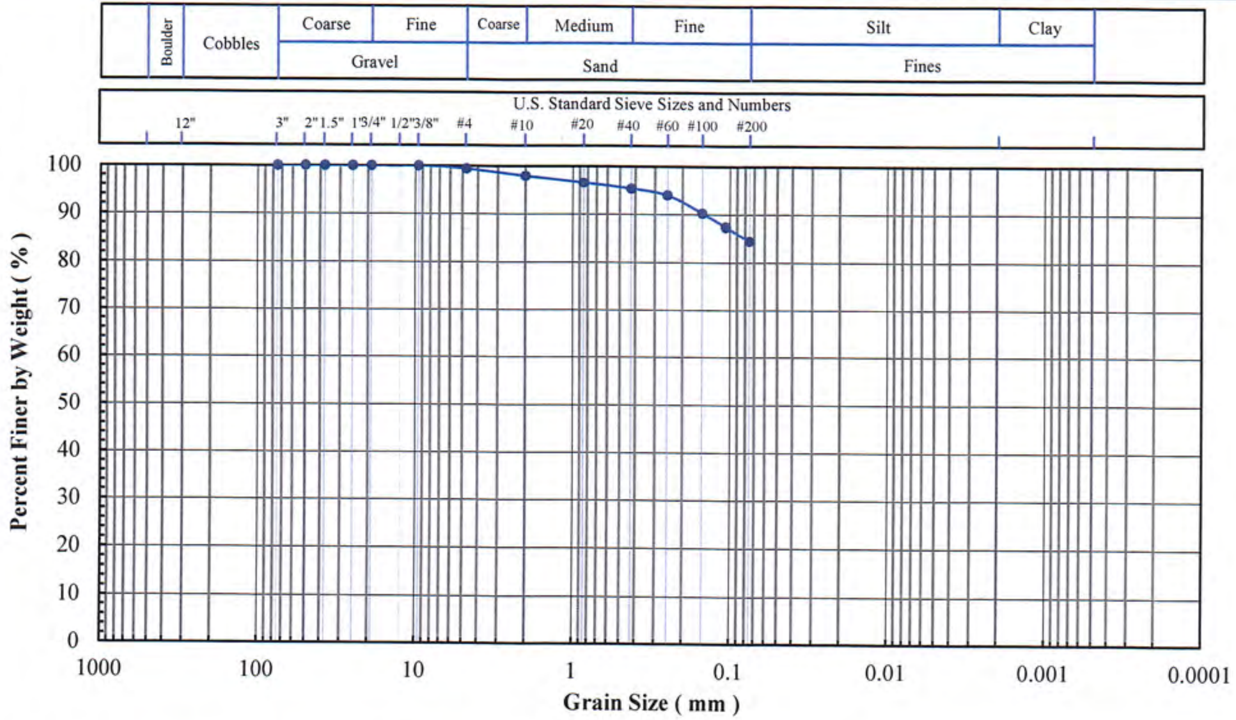
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-8 (36-40')
Lab Sample No:	20L119

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

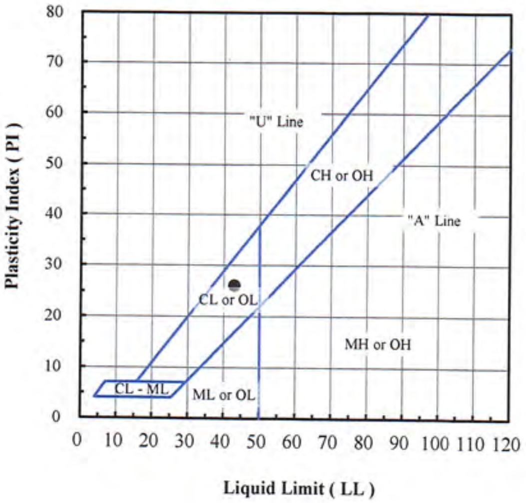


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	97.9
#20	0.850	96.5
#40	0.425	95.3
#60	0.250	93.9
#100	0.150	90.2
#140	0.106	87.4
#200	0.075	84.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	14.9
Fines (%):	84.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-8 (36-40')	20L119	23.5	84.5	43	17	26	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

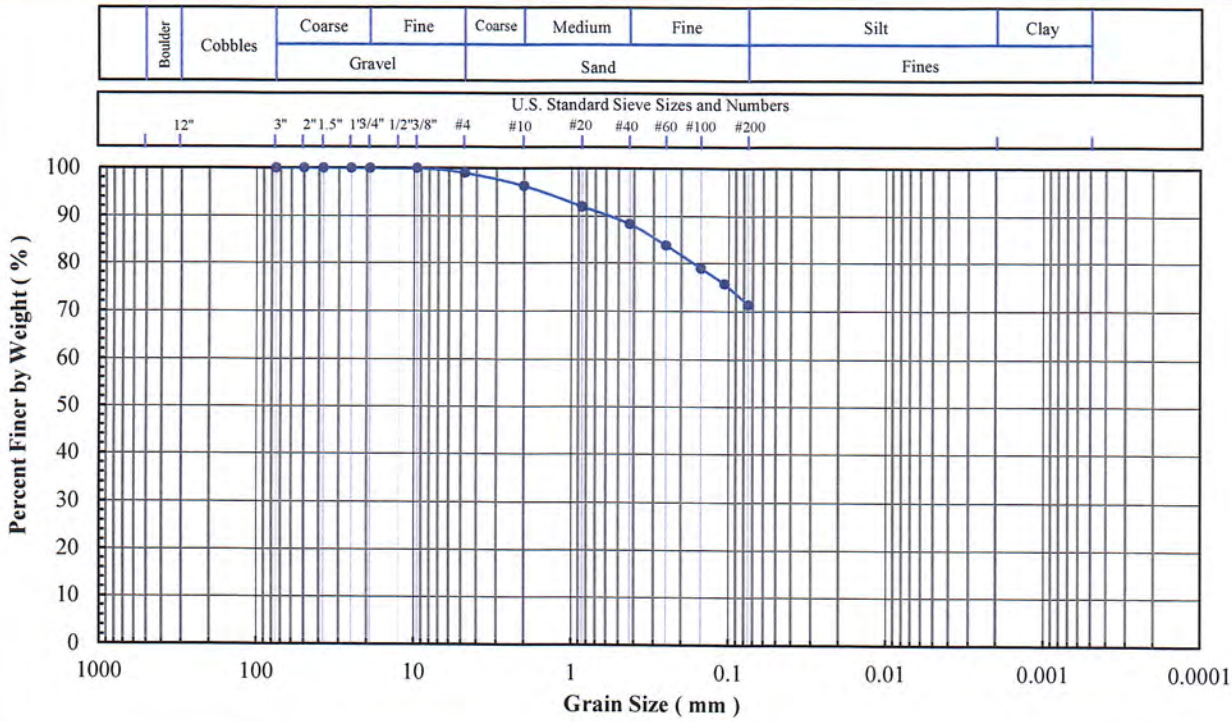
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-10 (46-50')
Lab Sample No:	20L121

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

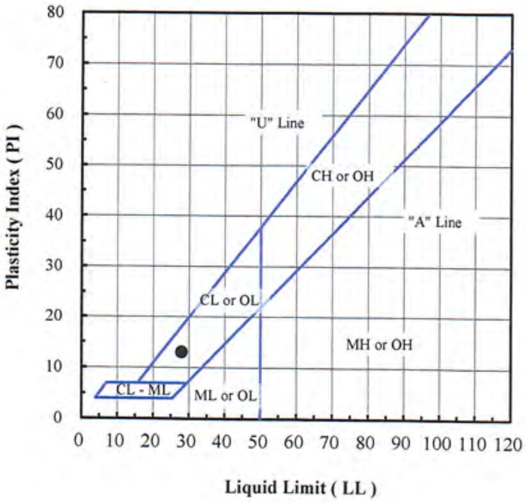


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.3
#20	0.850	92.0
#40	0.425	88.4
#60	0.250	83.8
#100	0.150	78.9
#140	0.106	75.6
#200	0.075	71.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	27.7
Fines (%):	71.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B9-10 (46-50')	20L121	16.5	71.3	28	15	13	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

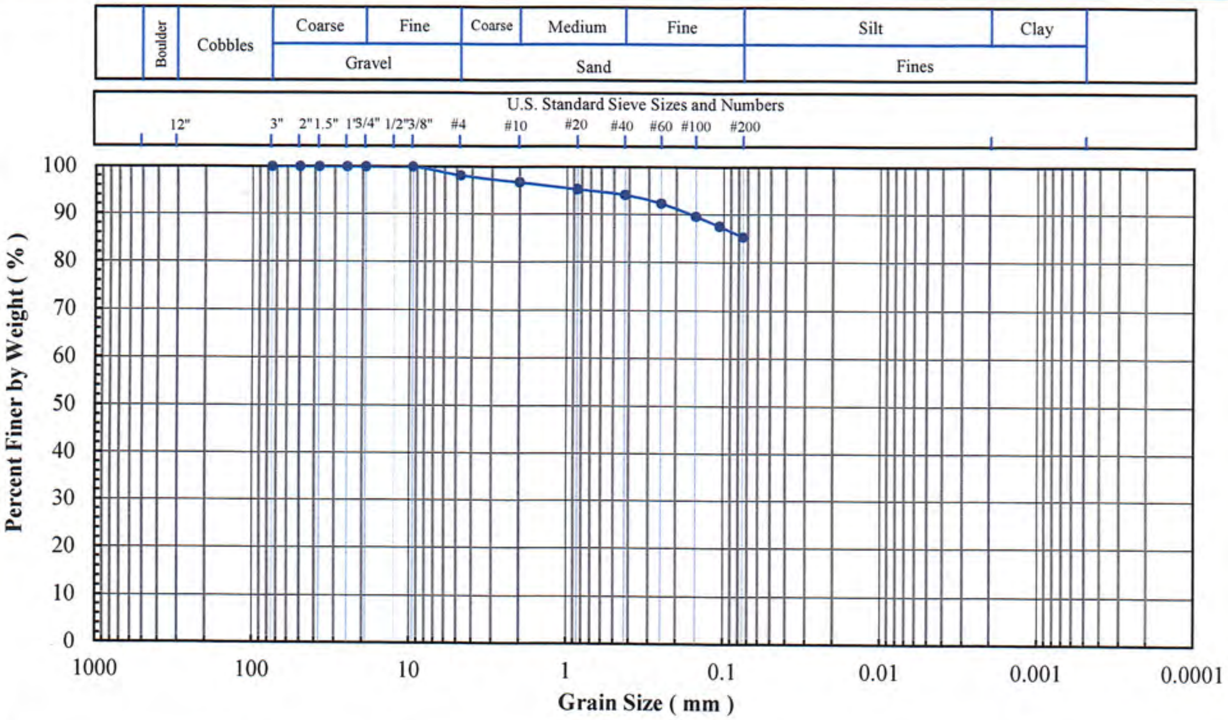
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-1 (25-27')
Lab Sample No:	20L139

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

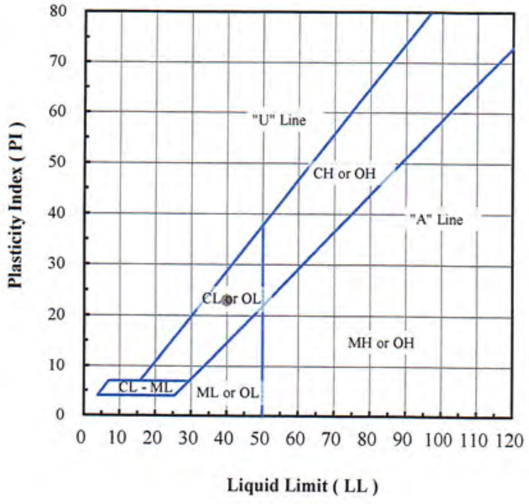


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.1
#10	2.00	96.7
#20	0.850	95.2
#40	0.425	94.1
#60	0.250	92.3
#100	0.150	89.6
#140	0.106	87.5
#200	0.075	85.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.9
Sand (%):	12.8
Fines (%):	85.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B9-ST-1 (25-27')	20L139	16.8	85.3	40	17	23	CL - Lean Clay

Note(s):

01-29-2021
AA, NSR

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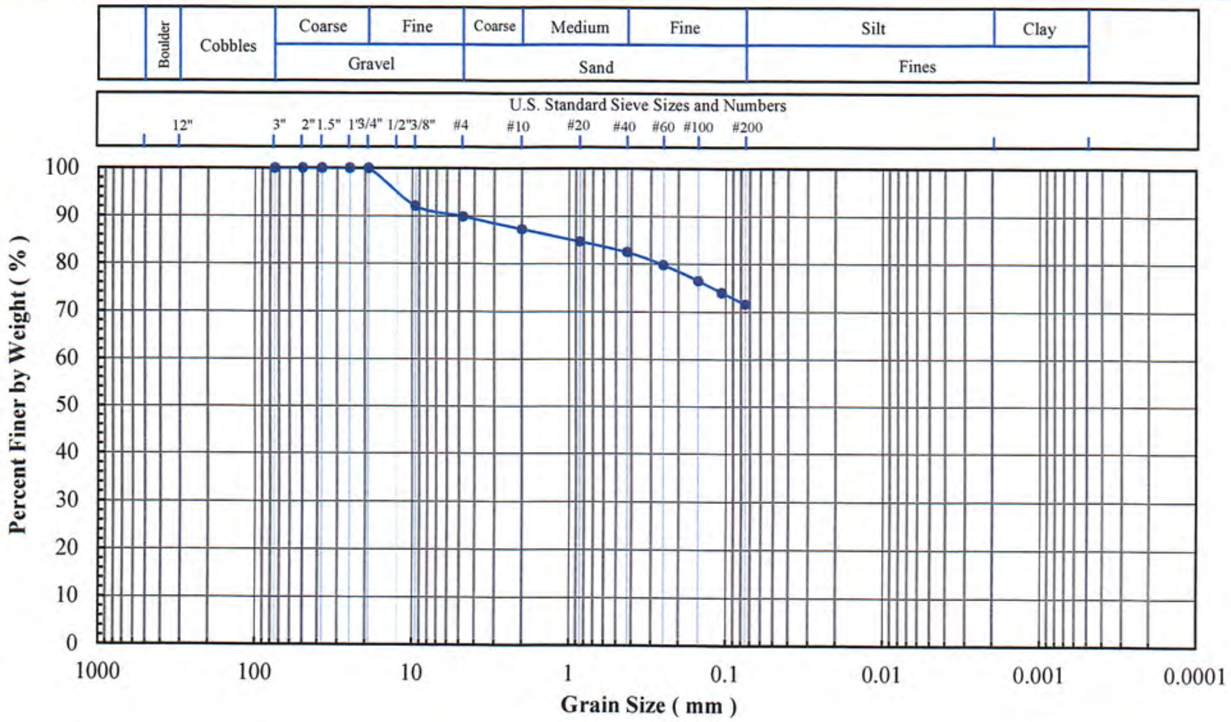
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-2 (40-42')
Lab Sample No:	20L140

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

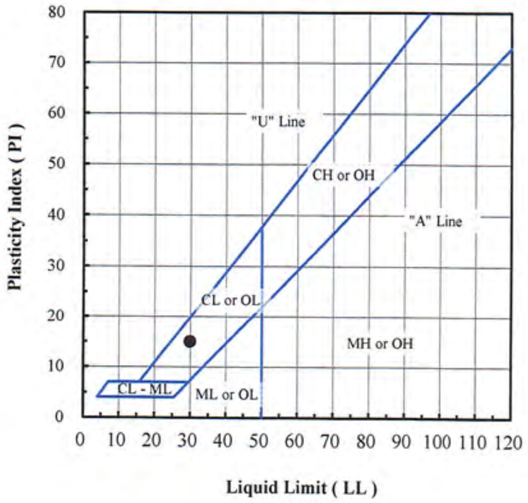


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	92
#4	4.75	90
#10	2.00	87
#20	0.850	85
#40	0.425	83
#60	0.250	80
#100	0.150	77
#140	0.106	74
#200	0.075	72

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	10
Sand (%):	18
Fines (%):	72
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-ST-2 (40-42')	20L140	13.1	72	30	15	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-29-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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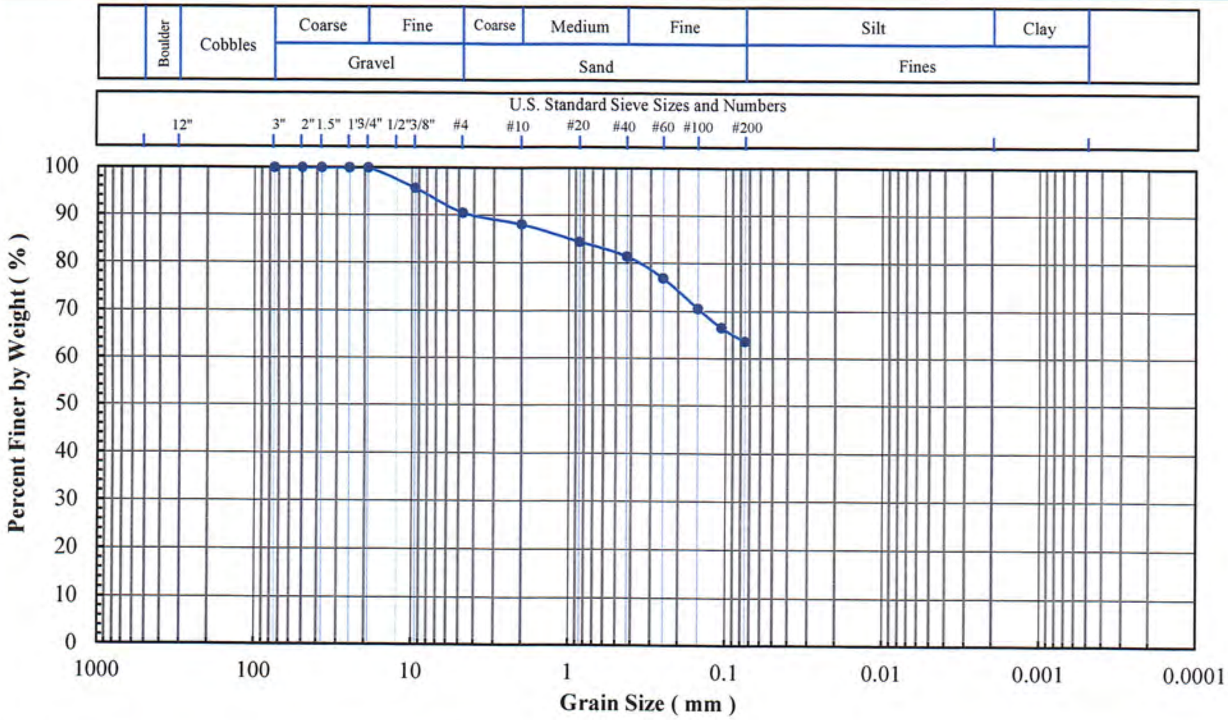
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-3 (55-57')
Lab Sample No:	20L141

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

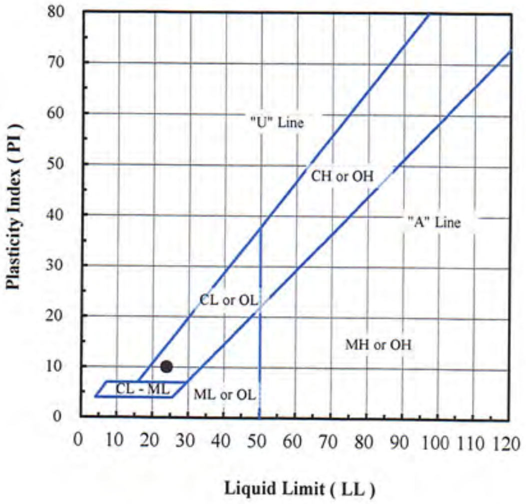


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	91
#10	2.00	88
#20	0.850	84
#40	0.425	81
#60	0.250	77
#100	0.150	71
#140	0.106	67
#200	0.075	64

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	9
Sand (%):	27
Fines (%):	64
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B9-ST-3 (55-57')	20L141	10.8	64	24	14	10	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-29-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B1-ST-2 (40-42')
Lab Sample Number:	20L126
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/19/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.58	7.23	108.9	20.1	53.0	50.0	3.0	DDW	12	6.4E-9
	3.55	7.23	110.2	19.7	64.00	50.0	14.0	DDW	14	3.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B1-ST-3 (60-62')
Lab Sample Number:	20L127
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/19/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.58	7.19	129.8	10.7	53.0	50.0	3.0	DDW	13	7.2E-8
	3.57	7.16	131.3	10.8	69.00	50.0	19.0	DDW	7	6.8E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

1-20-2021
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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B4-ST-1 (15-17')
Lab Sample Number:	20L129
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/20/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.60	7.26	113.9	16.1	53.0	50.0	3.0	DDW	10	9.2E-9
	3.58	7.27	112.2	18.5	57.00	50.0	7.0	DDW	5	8.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

1-20-2021
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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D 5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B4-ST-3 (55-57.5')
Lab Sample Number:	20L131
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/20/2021

Specimen Type (See Note2)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	(cm/s)
ST	3.61	7.25	127.3	11.4	53.0	50.0	3.0	DDW	8	2.4E-6
	3.57	7.26	128.5	11.2	68.00	50.0	18.0	DDW	8	5.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen Type: ST = Shelby Tube, DT = Drive Tube BS = Block Sample, Ot = Others
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B5-ST-1 (73.5-76')
Lab Sample Number:	20L133
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/26/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	(cm/s)
ST	3.45	7.37	121.5	15.4	53.0	50.0	3.0	DDW	12	1.1E-6
	3.48	7.20	125.5	12.4	72.00	50.0	22.0	DDW	14	8.1E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B6-ST-2 (40-42.5')
Lab Sample Number:	20L135
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/21/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	
ST	3.54	7.25	115.9	17.5	53.0	50.0	3.0	DDW	4	6.2E-9
	3.58	7.31	113.3	18.2	64.00	50.0	14.0	DDW	16	2.7E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B7-ST-1 (65-67.5')
Lab Sample Number:	20L138
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/22/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	
ST	3.55	7.22	124.6	13.0	53.0	50.0	3.0	DDW	6	1.9E-8
	3.58	7.28	121.5	14.4	70.00	50.0	20.0	DDW	12	5.8E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B9-ST-1 (25-27')
Lab Sample Number:	20L139
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/22/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid $^{(3)}$ (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.56	7.20	115.5	17.2	53.0	50.0	3.0	DDW	6	9.0E-9
	3.57	7.28	112.7	18.6	61.00	50.0	11.0	DDW	14	3.5E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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LAST PAGE

Test Applicability and Limitations:

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

Storage Policy:

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of $1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of $1.30 per sample per day will be applied after the initial 3 months storage.

APPENDIX K1 – CPT LOGS

CONETEC

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-000	20-61-21655_CP000	02-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		141685	13397097	
CPT20-002	20-61-21655_CP002	01-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		141848	13397147	
CPT20-004	20-61-21655_CP004	01-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		142006	13397236	
CPT20-006	20-61-21655_CP006	01-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142105	13397122	3
CPT20-008	20-61-21655_CP008	13-Dec-2020	C18	551:T1500F15U500	15	25.0	63.81		142194	13396905	
CPT20-010	20-61-21655_CP010	02-Dec-2020	C18	568:T1500F15U500	15	25.0	65.29		142267	13396716	
CPT20-012	20-61-21655_CP012	02-Dec-2020	C18	568:T1500F15U500	15	25.0	65.12		142346	13396528	
CPT20-014	20-61-21655_CP014	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142420	13396346	
CPT20-016	20-61-21655_CP016	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.05		142493	13396161	
CPT20-018	20-61-21655_CP018	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142568	13395971	
CPT20-020	20-61-21655_CP020	02-Dec-2020	C18	568:T1500F15U500	15	25.0	74.72		142644	13395785	
CPT20-022	20-61-21655_CP022	03-Dec-2020	C18	551:T1500F15U500	15	25.0	73.82		142715	13395602	
CPT20-024	20-61-21655_CP024	03-Dec-2020	C18	551:T1500F15U500	15	25.0	72.59		142797	13395407	
CPT20-026	20-61-21655_CP026	03-Dec-2020	C18	551:T1500F15U500	15	25.0	70.70		142864	13395239	
CPT20-028	20-61-21655_CP028	13-Dec-2020	C18	551:T1500F15U500	15	25.0	59.55		142938	13395052	
CPT20-030	20-61-21655_CP030	03-Dec-2020	C18	551:T1500F15U500	15	25.0	59.88		143004	13394895	
CPT20-032	20-61-21655_CP032	03-Dec-2020	C18	551:T1500F15U500	15	25.0	59.14		142939	13394710	
CPT20-034	20-61-21655_CP034	03-Dec-2020	C18	551:T1500F15U500	15	25.0	57.41		142785	13394560	
CPT20-036	20-61-21655_CP036	04-Dec-2020	C18	551:T1500F15U500	15	25.0	57.82		142655	13394432	
CPT20-038	20-61-21655_CP038	04-Dec-2020	C18	551:T1500F15U500	15	25.0	58.89		142596	13394252	
CPT20-040	20-61-21655_CP040	04-Dec-2020	C18	551:T1500F15U500	15	25.0	62.25		142693	13394075	
CPT20-042	20-61-21655_CP042	04-Dec-2020	C18	551:T1500F15U500	15	25.0	60.70		142835	13393929	
CPT20-044	20-61-21655_CP044	04-Dec-2020	C18	551:T1500F15U500	15	25.0	57.82		142982	13393790	
CPT20-046	20-61-21655_CP046	05-Dec-2020	C18	551:T1500F15U500	15	25.0	61.27		143108	13393655	
CPT20-048	20-61-21655_CP048	13-Dec-2020	C16	568:T1500F15U500	15	25.0	60.04		143131	13393508	
SCPT20-050	20-61-21655_SP050	05-Dec-2020	C18	551:T1500F15U500	15	25.0	62.58	5	143162	13393217	

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-052	20-61-21655_CP052	05-Dec-2020	C18	551:T1500F15U500	15	25.0	61.52		143174	13393046	
CPT20-054	20-61-21655_CP054	05-Dec-2020	C18	551:T1500F15U500	15	25.0	60.86		143198	13392845	
CPT20-056	20-61-21655_CP056	05-Dec-2020	C18	551:T1500F15U500	15	25.0	62.83		143212	13392641	
CPT20-058	20-61-21655_CP058	06-Dec-2020	C18	551:T1500F15U500	15	25.0	59.38		143229	13392449	
CPT20-060	20-61-21655_CP060	06-Dec-2020	C18	551:T1500F15U500	15	25.0	59.88		143248	13392268	
CPT20-062	20-61-21655_CP062	06-Dec-2020	C18	551:T1500F15U500	15	25.0	60.12		143281	13392058	
CPT20-064	20-61-21655_CP064	06-Dec-2020	C18	551:T1500F15U500	15	25.0	64.06		143336	13391874	
CPT20-066	20-61-21655_CP066	06-Dec-2020	C18	551:T1500F15U500	15	25.0	60.45		143404	13391672	
CPT20-068	20-61-21655_CP068	13-Dec-2020	C16	568:T1500F15U500	15	25.0	59.05		143440	13391531	
CPT20-070	20-61-21655_CP070	02-Dec-2020	C16	567:T1500F15U500	15	25.0	52.33		143314	13391366	
CPT20-072	20-61-21655_CP072	02-Dec-2020	C16	567:T1500F15U500	15	25.0	65.78		143165	13391247	
CPT20-074	20-61-21655_CP074	02-Dec-2020	C16	567:T1500F15U500	15	25.0	66.44		143014	13391154	
CPT20-076	20-61-21655_CP076	03-Dec-2020	C16	567:T1500F15U500	15	25.0	66.27		142838	13391033	
CPT20-078	20-61-21655_CP078	03-Dec-2020	C16	567:T1500F15U500	15		5.25		142629	13390894	4
CPT20-078B	20-61-21655_CP078B	03-Dec-2020	C16	567:T1500F15U500	15	25.0	61.84		142643	13390903	
CPT20-080	20-61-21655_CP080	03-Dec-2020	C16	567:T1500F15U500	15	25.0	67.26		142497	13390784	
CPT20-082	20-61-21655_CP082	03-Dec-2020	C16	567:T1500F15U500	15		6.73		142345	13390678	4
CPT20-082B	20-61-21655_CP082B	03-Dec-2020	C16	675:T1500F15U500	15	25.0	66.11		142344	13390669	
CPT20-084	20-61-21655_CP084	03-Dec-2020	C16	675:T1500F15U500	15	25.0	67.91		142185	13390553	
CPT20-086	20-61-21655_CP086	04-Dec-2020	C16	675:T1500F15U500	15	25.0	68.57		141994	13390446	
CPT20-088	20-61-21655_CP088	04-Dec-2020	C16	675:T1500F15U500	15		5.09		141837	13390373	4
CPT20-088B	20-61-21655_CP088B	04-Dec-2020	C16	675:T1500F15U500	15	25.0	67.75		141843	13390373	
CPT20-090	20-61-21655_CP090	04-Dec-2020	C16	675:T1500F15U500	15	25.0	60.04		141754	13390528	
CPT20-092	20-61-21655_CP092	05-Dec-2020	C16	675:T1500F15U500	15	25.0	66.93		141703	13390714	
CPT20-094	20-61-21655_CP094	05-Dec-2020	C16	513:T1500F15U500	15	25.0	63.81		141591	13390889	
SCPT20-096	20-61-21655_SP096	05-Dec-2020	C16	513:T1500F15U500	15	25.0	60.86	5	141475	13391090	

CONETEC

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-098	20-61-21655_CP098	05-Dec-2020	C16	513:T1500F15U500	15	25.0	66.44		141442	13391262	
CPT20-100	20-61-21655_CP100	06-Dec-2020	C16	513:T1500F15U500	15	25.0	53.48		141368	13391479	
CPT20-102	20-61-21655_CP102	06-Dec-2020	C16	513:T1500F15U500	15	25.0	57.58		141297	13391656	
CPT20-104	20-61-21655_CP104	06-Dec-2020	C16	513:T1500F15U500	15	25.0	57.58		141174	13391805	
CPT20-106	20-61-21655_CP106	06-Dec-2020	C16	513:T1500F15U500	15	25.0	55.28		140981	13391734	
CPT20-108	20-61-21655_CP108	06-Dec-2020	C16	513:T1500F15U500	15	25.0	59.55		140801	13391655	
CPT20-110	20-61-21655_CP110	06-Dec-2020	C16	513:T1500F15U500	15	25.0	56.76		140617	13391584	
CPT20-110B	20-61-21655_CP110B	07-Dec-2020	C16	513:T1500F15U500	15	25.0	61.02		140610	13391577	
CPT20-112	20-61-21655_CP112	06-Dec-2020	C16	513:T1500F15U500	15	25.0	52.33		140443	13391653	
SCPT20-114	20-61-21655_SP114	06-Dec-2020	C16	513:T1500F15U500	15	25.0	53.15	4	140335	13391822	
CPT20-116	20-61-21655_CP116	06-Dec-2020	C16	513:T1500F15U500	15	25.0	61.35		140233	13391996	
CPT20-118	20-61-21655_CP118	07-Dec-2020	C16	513:T1500F15U500	15	25.0	58.56		140123	13392169	
CPT20-120	20-61-21655_CP120	07-Dec-2020	C16	513:T1500F15U500	15	25.0	60.70		140017	13392339	
CPT20-122	20-61-21655_CP122	07-Dec-2020	C16	513:T1500F15U500	15	25.0	62.01		139912	13392507	
CPT20-124	20-61-21655_CP124	08-Dec-2020	C16	513:T1500F15U500	15	25.0	70.87		139802	13392678	
CPT20-126	20-61-21655_CP126	08-Dec-2020	C16	513:T1500F15U500	15	25.0	71.52		139694	13392854	
CPT20-128	20-61-21655_CP128	08-Dec-2020	C16	513:T1500F15U500	15	25.0	73.49		139593	13393024	
CPT20-130	20-61-21655_CP130	08-Dec-2020	C16	513:T1500F15U500	15	25.0	64.14		139484	13393198	
CPT20-132	20-61-21655_CP132	08-Dec-2020	C16	513:T1500F15U500	15	25.0	70.37		139378	13393362	
CPT20-134	20-61-21655_CP134	14-Dec-2020	C16	568:T1500F15U500	15	25.0	67.09		139281	13393532	
CPT20-136	20-61-21655_CP136	14-Dec-2020	C18	551:T1500F15U500	15	25.0	75.13		139166	13393704	
CPT20-138	20-61-21655_CP138	14-Dec-2020	C18	551:T1500F15U500	15	25.0	72.51		139110	13393797	
CPT20-140	20-61-21655_CP140	13-Dec-2020	C18	551:T1500F15U500	15	25.0	75.13		139141	13393971	
CPT20-142	20-61-21655_CP142	14-Dec-2020	C18	551:T1500F15U500	15	25.0	65.53		139293	13394120	
CPT20-144	20-61-21655_CP144	14-Dec-2020	C18	551:T1500F15U500	15	25.0	70.46		139326	13394303	
CPT20-146	20-61-21655_CP146	14-Dec-2020	C18	551:T1500F15U500	15	25.0	66.35		139290	13394504	

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-148	20-61-21655_CP148	14-Dec-2020	C18	551:T1500F15U500	15	25.0	62.50		139269	13394705	
CPT20-150	20-61-21655_CP150	14-Dec-2020	C16	568:T1500F15U500	15	25.0	65.94		139340	13394900	
CPT20-152	20-61-21655_CP152	08-Dec-2020	C18	551:T1500F15U500	15	25.0	60.53		139451	13395043	
CPT20-154	20-61-21655_CP154	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.49		139579	13395198	
CPT20-156	20-61-21655_CP156	08-Dec-2020	C18	551:T1500F15U500	15	25.0	69.64		139707	13395357	
CPT20-158	20-61-21655_CP158	08-Dec-2020	C18	551:T1500F15U500	15	25.0	60.61		139832	13395506	
CPT20-160	20-61-21655_CP160	08-Dec-2020	C18	551:T1500F15U500	15	25.0	66.93		139960	13395666	
CPT20-162	20-61-21655_CP162	08-Dec-2020	C18	551:T1500F15U500	15	25.0	66.27		140089	13395835	
CPT20-164	20-61-21655_CP164	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.49		140210	13395988	
CPT20-166	20-61-21655_CP166	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.41		140336	13396145	
CPT20-168	20-61-21655_CP168	08-Dec-2020	C18	551:T1500F15U500	15	25.0	69.72		140461	13396297	
CPT20-170	20-61-21655_CP170	07-Dec-2020	C18	551:T1500F15U500	15	25.0	68.24		140603	13396441	
CPT20-172	20-61-21655_CP172	07-Dec-2020	C18	551:T1500F15U500	15	25.0	70.70		140759	13396566	
CPT20-174	20-61-21655_CP174	07-Dec-2020	C18	551:T1500F15U500	15	25.0	73.24		140916	13396693	
CPT20-176	20-61-21655_CP176	07-Dec-2020	C18	551:T1500F15U500	15	25.0	69.72		141071	13396820	
CPT20-178	20-61-21655_CP178	07-Dec-2020	C18	551:T1500F15U500	15	25.0	69.80		141268	13396939	
SCPT20-180	20-61-21655_SP180	07-Dec-2020	C18	551:T1500F15U500	15	25.0	67.17	5	141428	13397002	
Totals	95 soundings						6001.32	19			

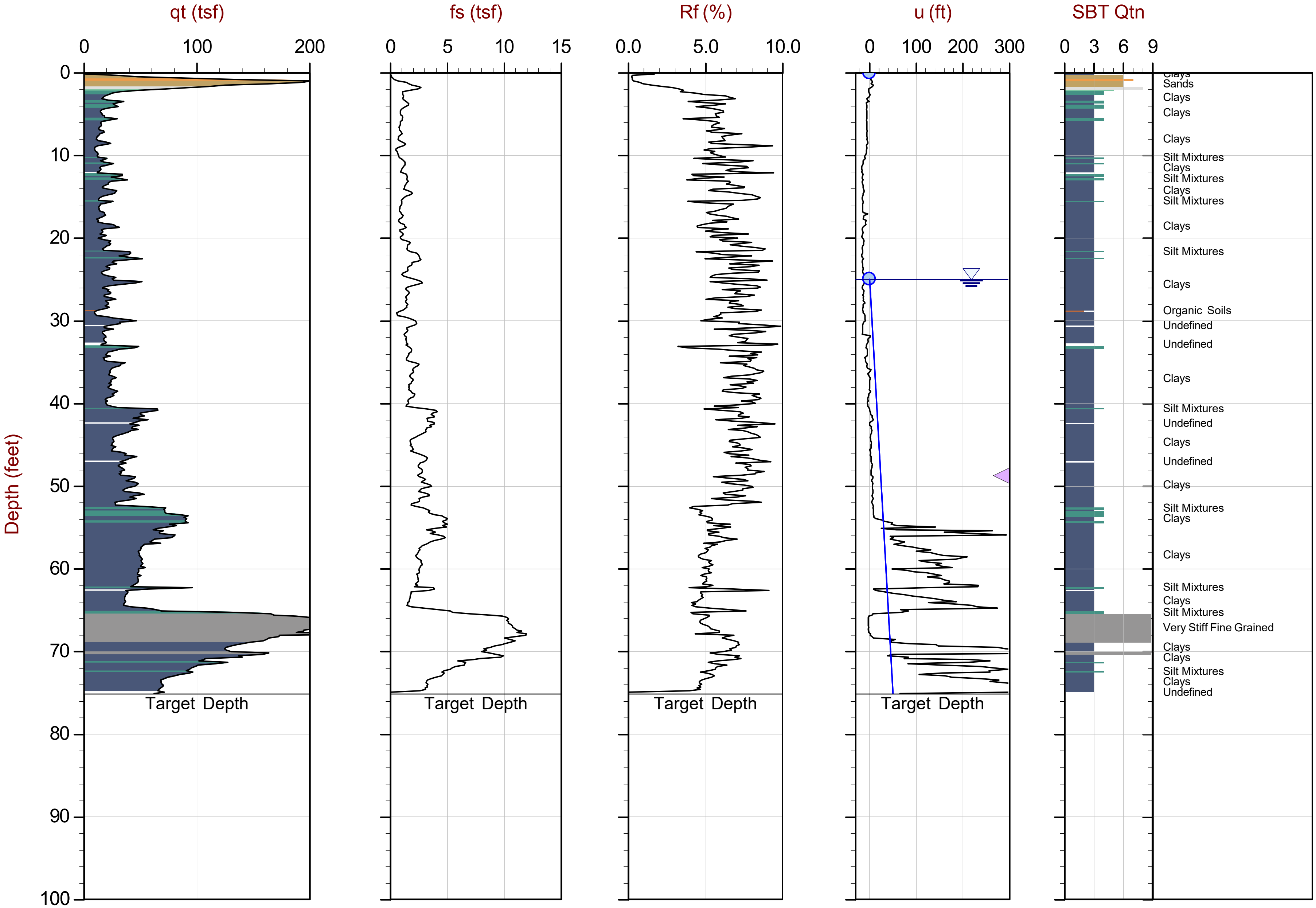
1. The assumed phreatic surface was provided by the client. Hydrostatic condictions were assumed for the calculated parameters.
2. Coordinates were acquired using a MR-350 GlobalSat GPS Receiver in datum: WGS84 / UTM Zone 17 North and were converted to Michigan State Plane South, NAD83 (international feet).
3. No pore pressure data from 16.300m- 22.925m (53.48ft - 75.21ft) due to equipment issues.
4. No clear phreatic surface detected.

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 10:20
Site: DTE Monroe Power Plant

Sounding: CPT20-000
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP000.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141685ft E: 13397097ft
Sheet No: 1 of 1

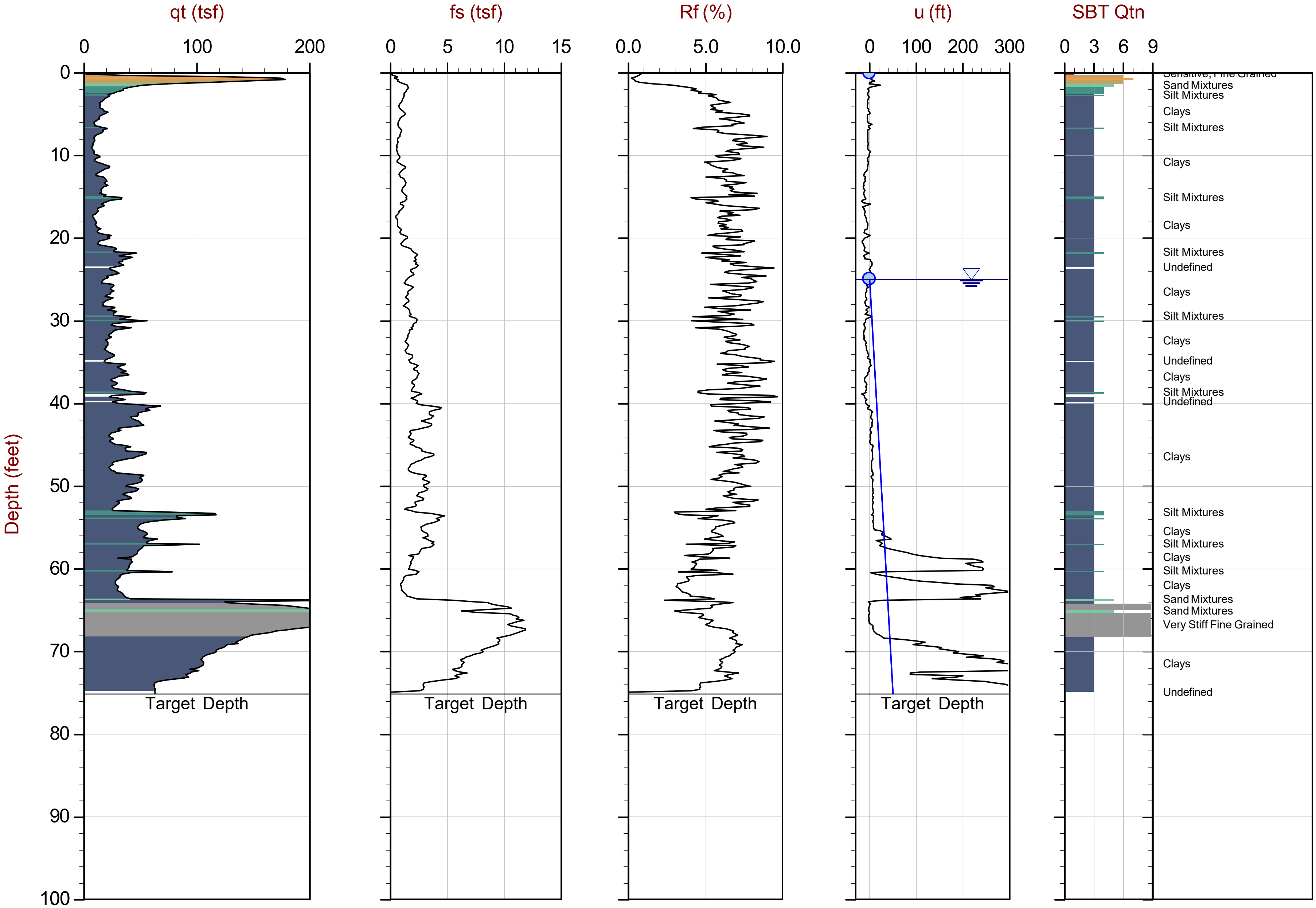
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-01 15:09
Site: DTE Monroe Power Plant

Sounding: CPT20-002
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP002.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141848ft E: 13397147ft
Sheet No: 1 of 1

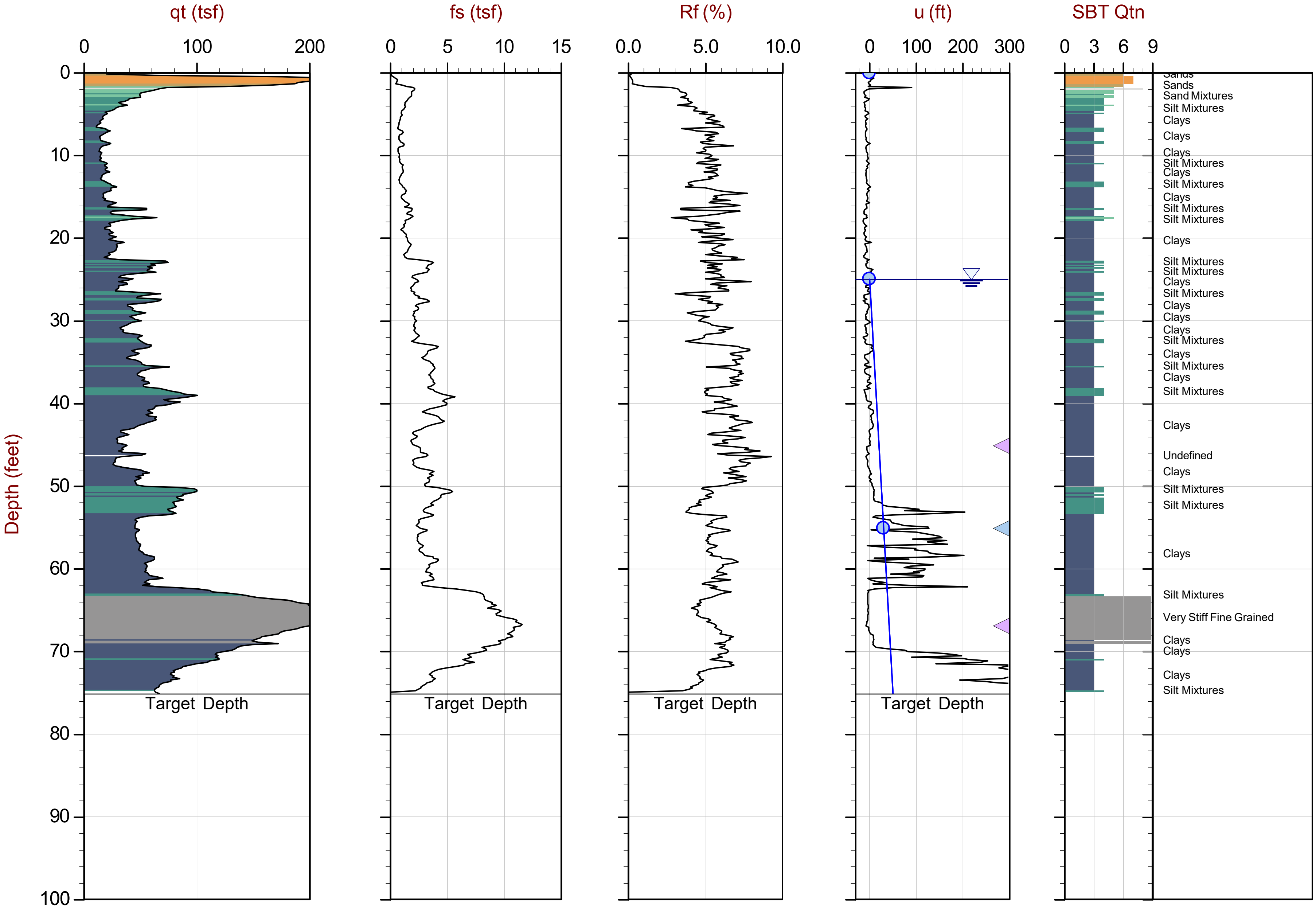
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-01 13:06
Site: DTE Monroe Power Plant

Sounding: CPT20-004
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP004.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142006ft E: 13397236ft
Sheet No: 1 of 1

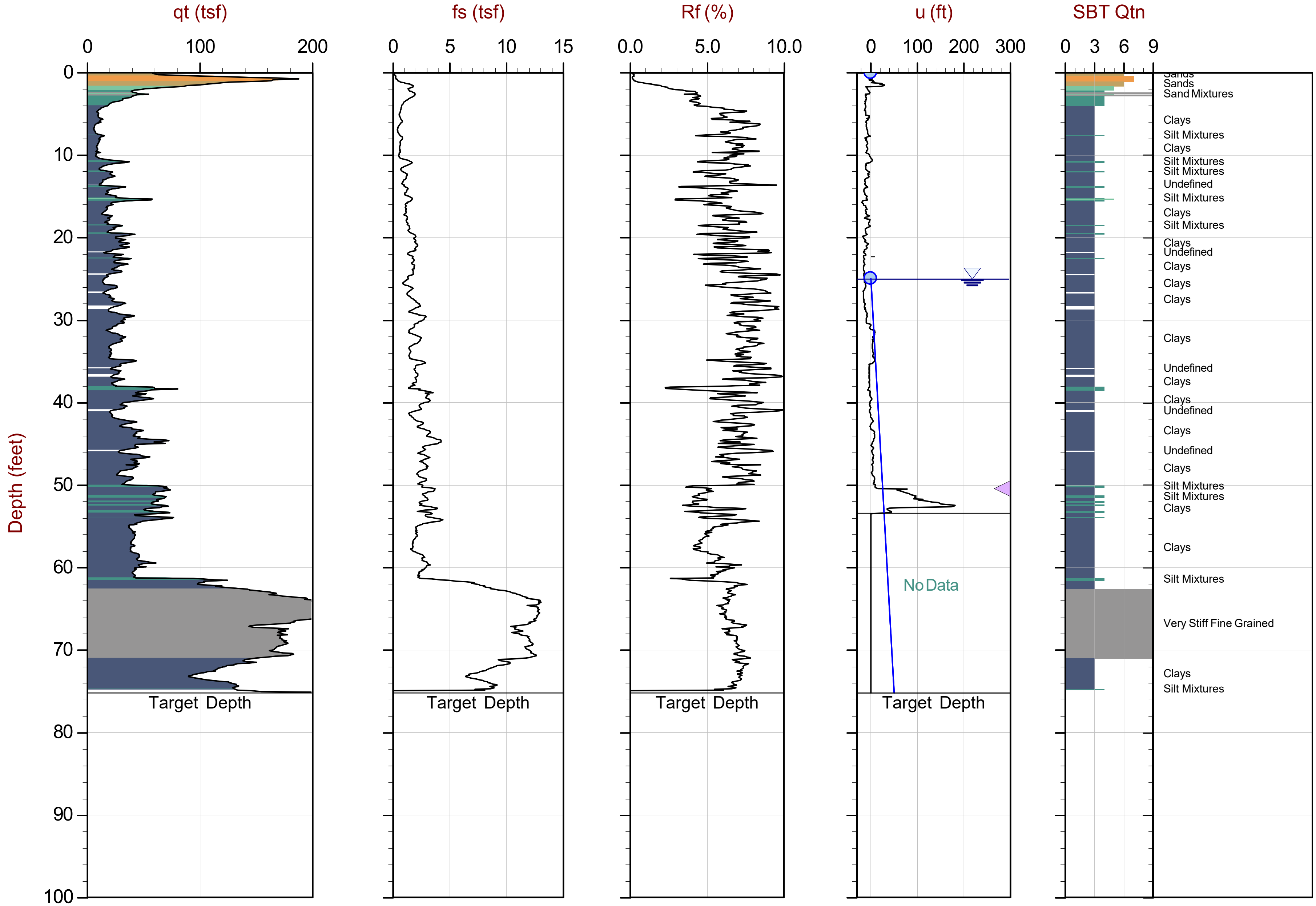
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-01 13:15
Site: DTE Monroe Power Plant

Sounding: CPT20-006
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP006.COR
Unit Wt: SBTQtn (PKR2009)

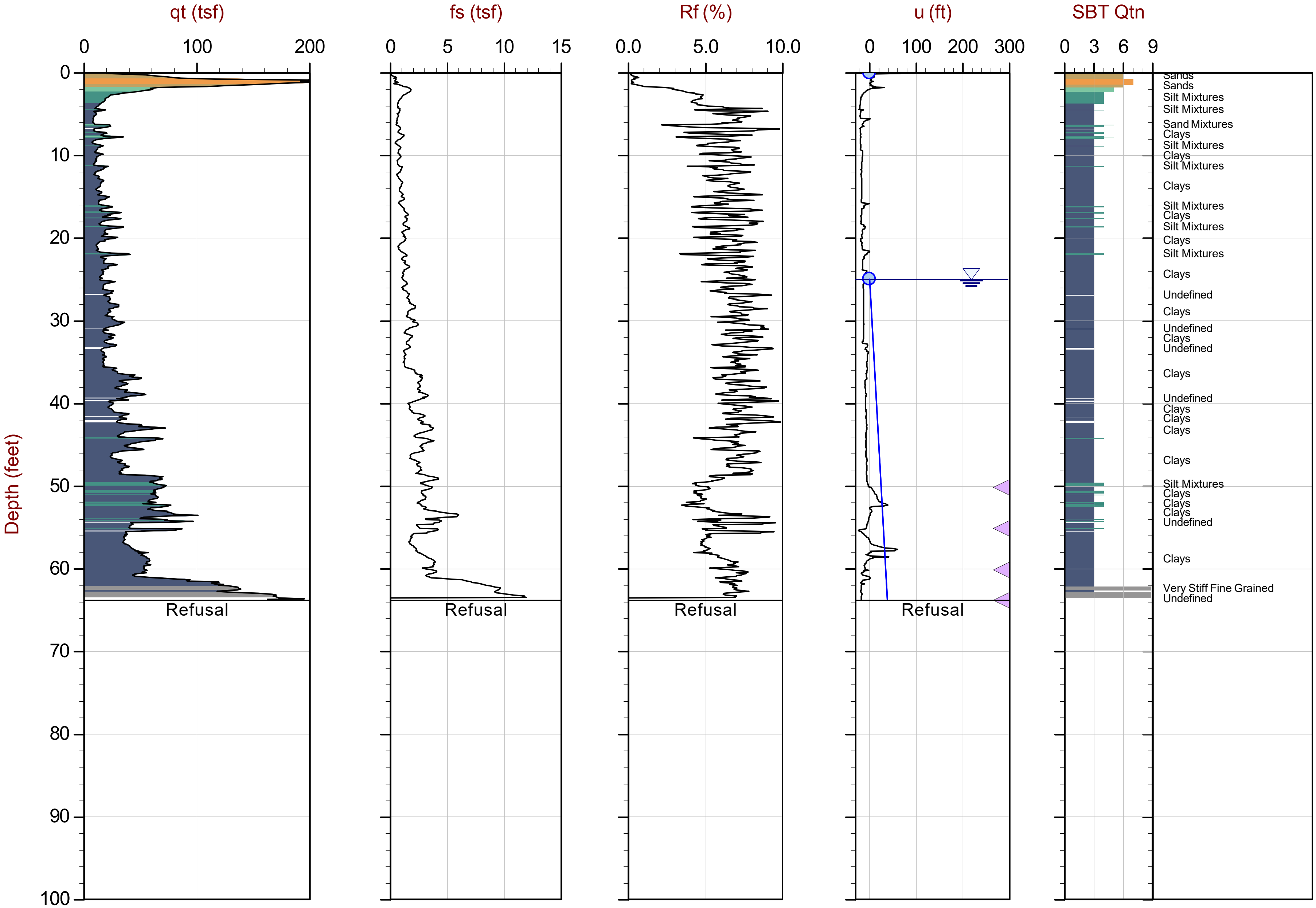
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142105ft E: 13397122ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP008.COR
Unit Wt: SBTQtn (PKR2009)

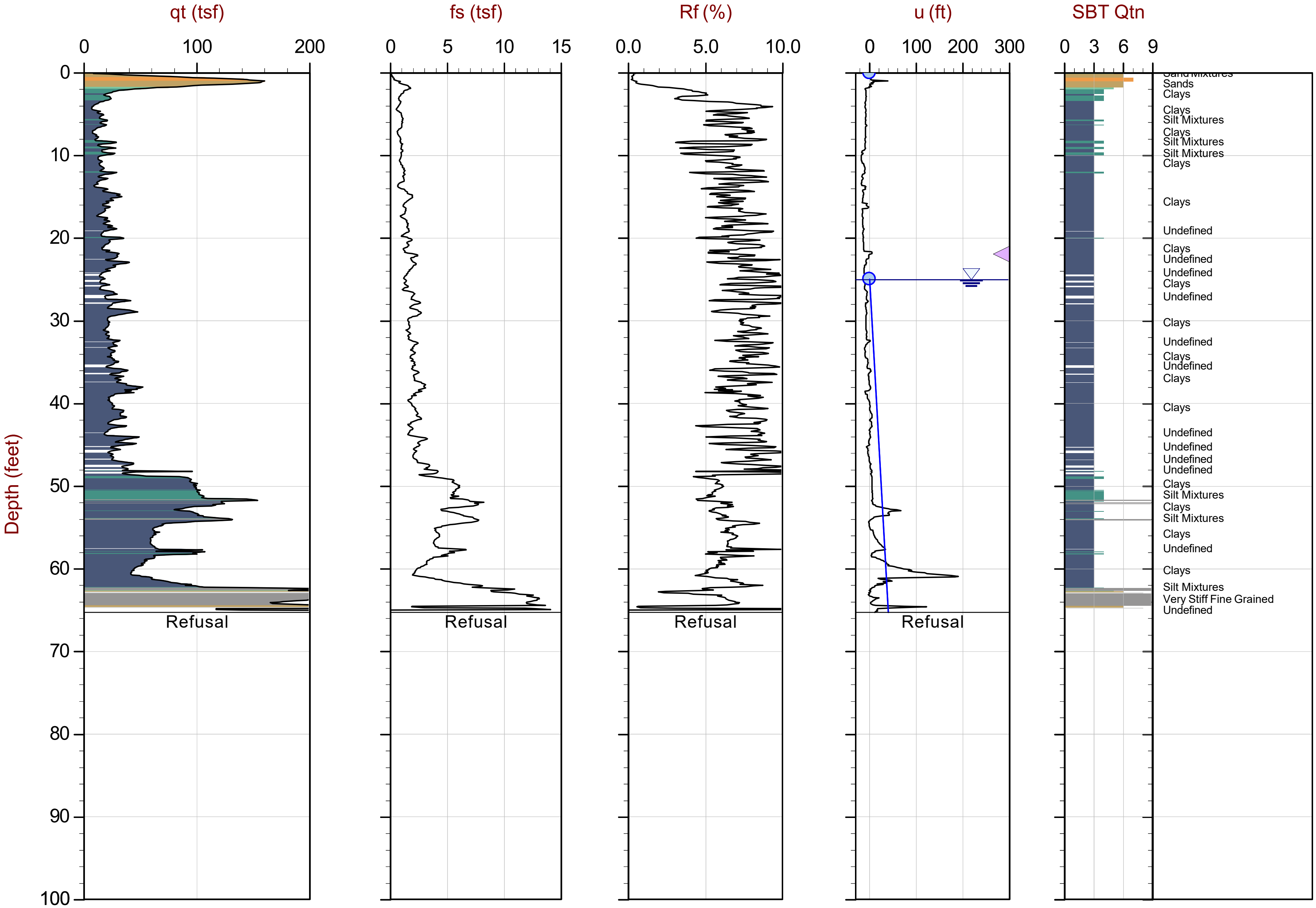
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142194ft E: 13396905ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 10:04
Site: DTE Monroe Power Plant

Sounding: CPT20-010
Cone: 568:T1500F15U500



Max Depth: 19.900 m / 65.29 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP010.COR
Unit Wt: SBTQtn (PKR2009)

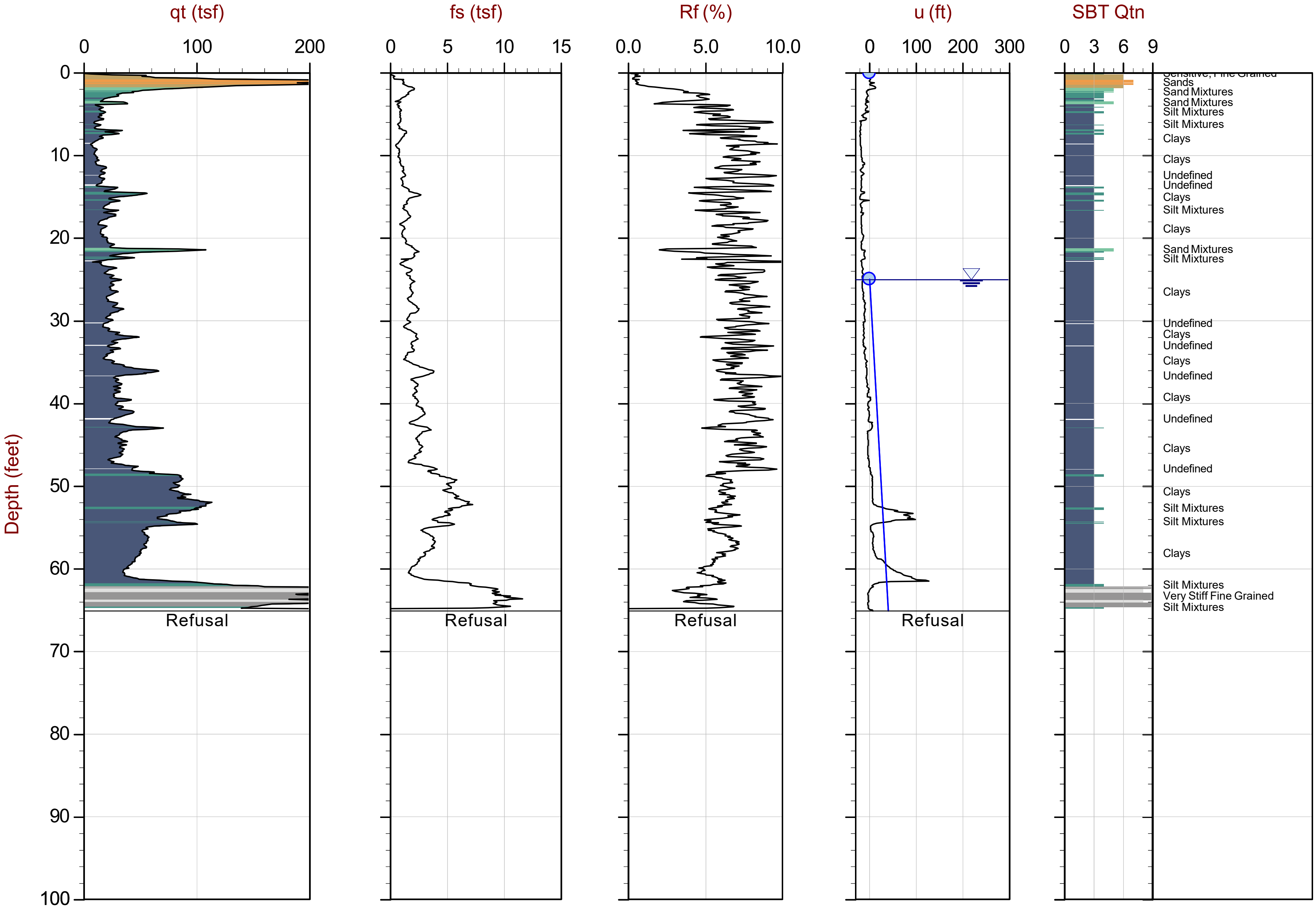
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142267ft E: 13396716ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 11:14
Site: DTE Monroe Power Plant

Sounding: CPT20-012
Cone: 568:T1500F15U500



Max Depth: 19.850 m / 65.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP012.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142346ft E: 13396528ft
Sheet No: 1 of 1

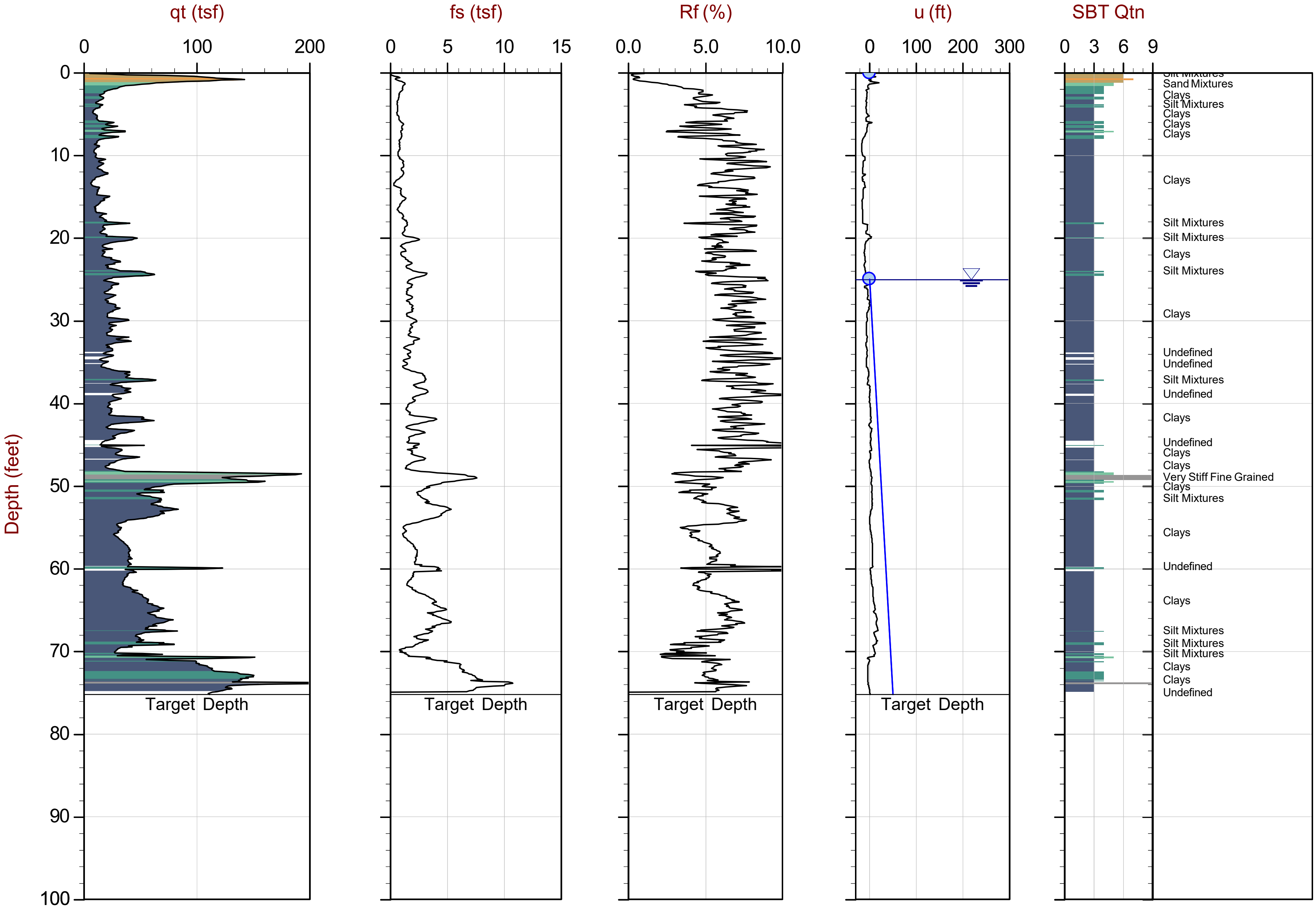
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 12:25
Site: DTE Monroe Power Plant

Sounding: CPT20-014
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP014.COR
Unit Wt: SBTQtn (PKR2009)

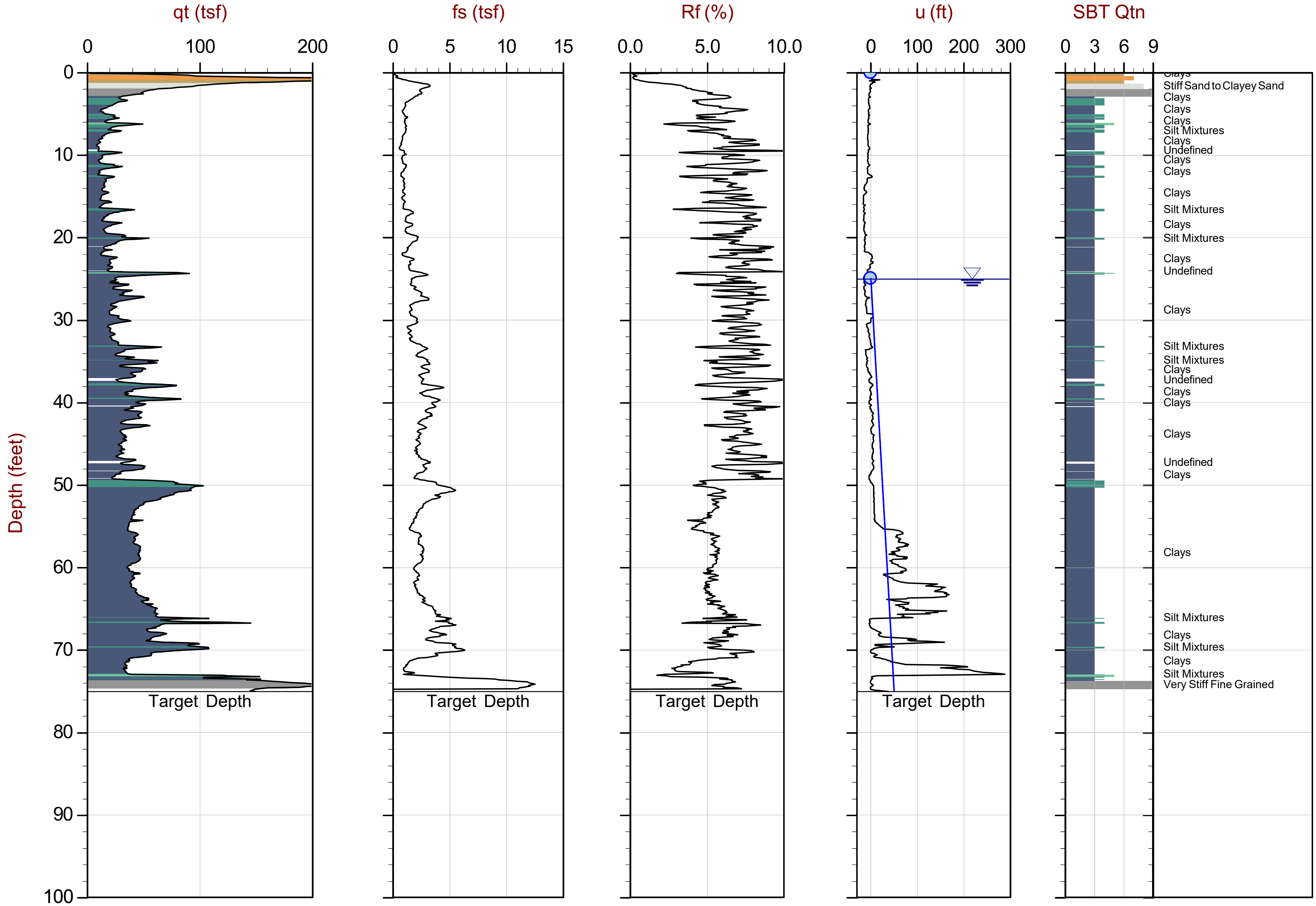
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142420ft E: 13396346ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 13:21
Site: DTE Monroe Power Plant

Sounding: CPT20-016
Cone: 568:T1500F15U500



Max Depth: 22.875 m / 75.05 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP016.COR
Unit Wt: SBTQtn (PKR2009)

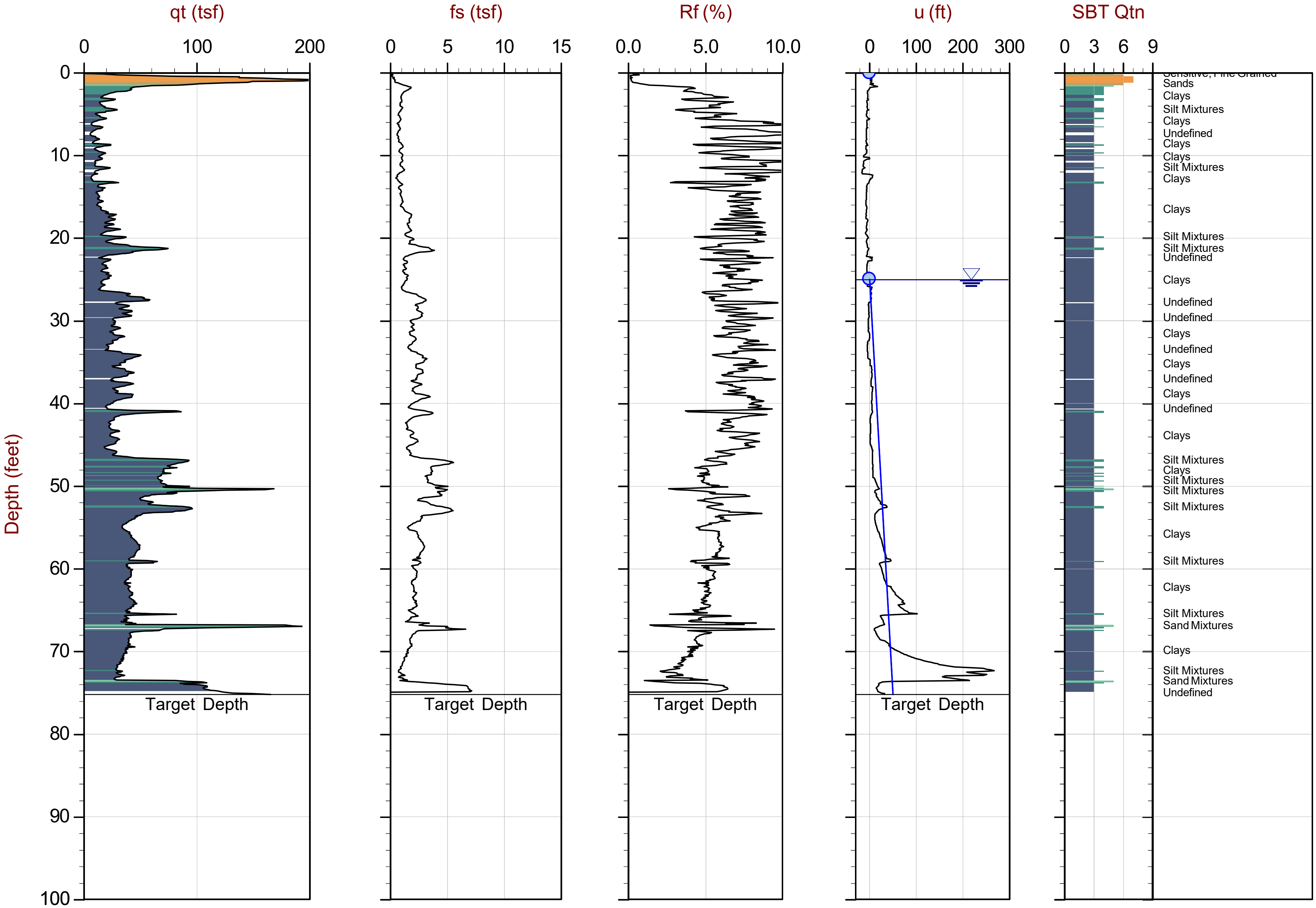
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142493ft E: 13396161ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 14:15
Site: DTE Monroe Power Plant

Sounding: CPT20-018
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP018.COR
Unit Wt: SBTQtn (PKR2009)

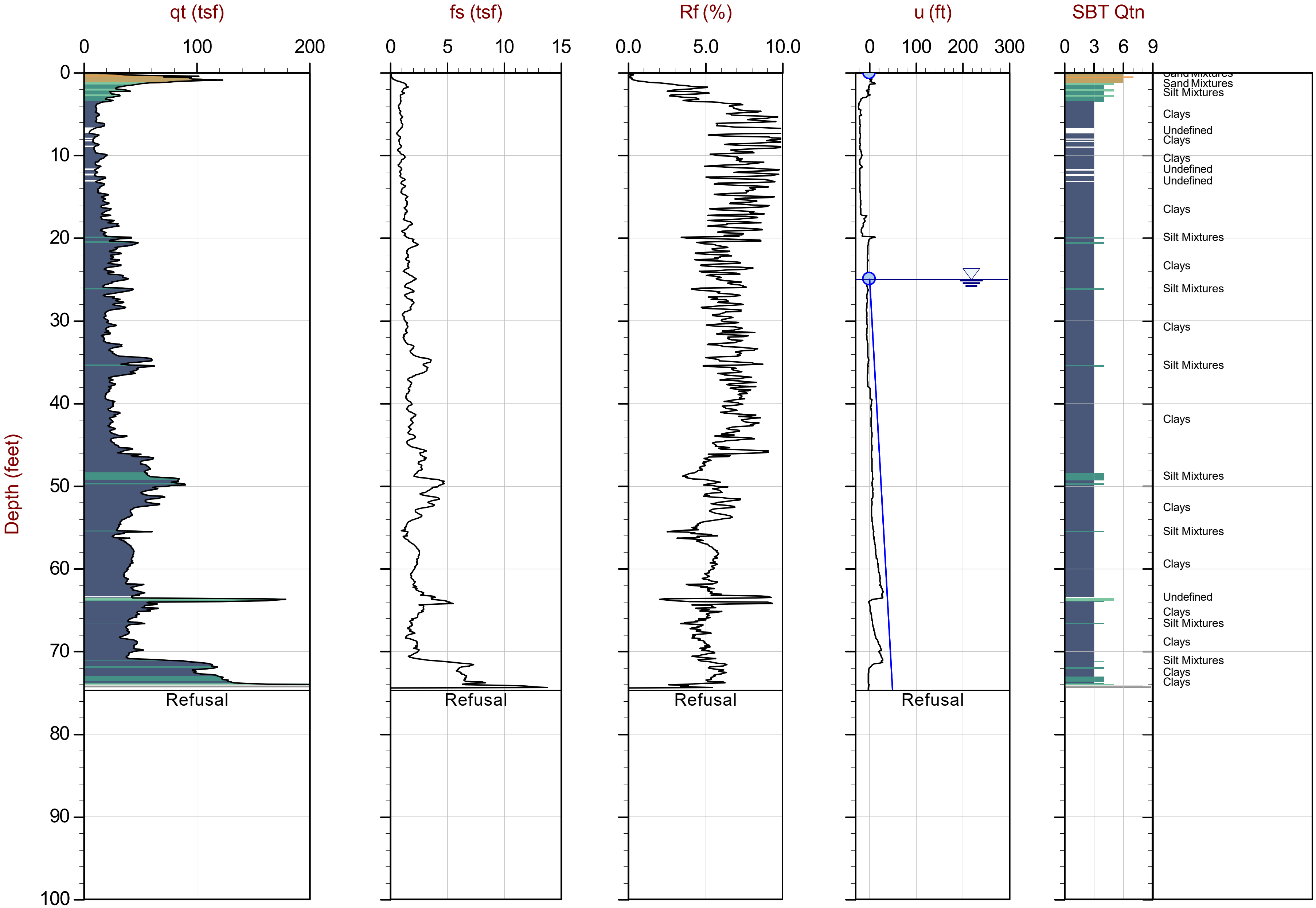
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142568ft E: 13395971ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 15:22
Site: DTE Monroe Power Plant

Sounding: CPT20-020
Cone: 568:T1500F15U500



Max Depth: 22.775 m / 74.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP020.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142644ft E: 13395785ft
Sheet No: 1 of 1

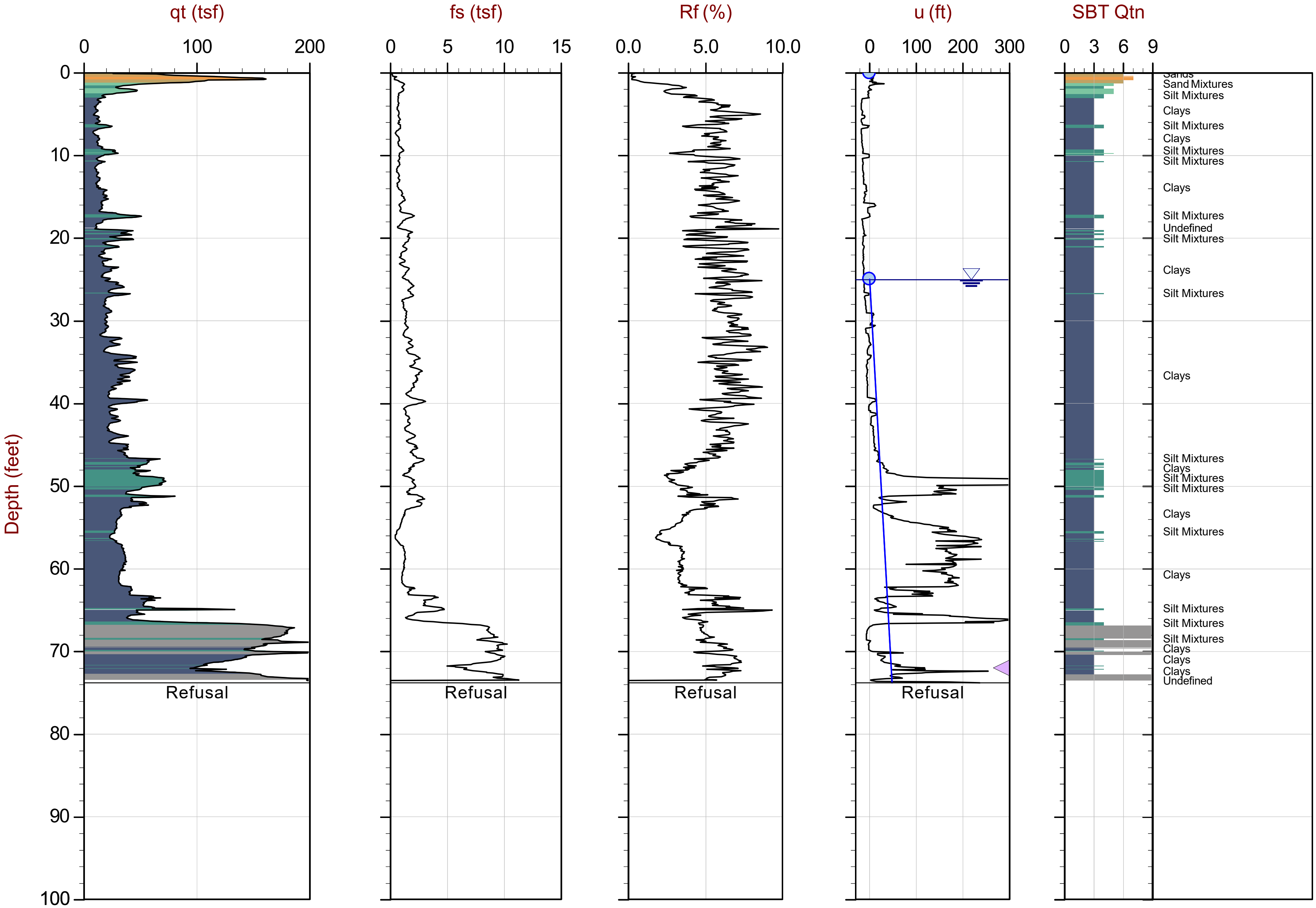
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 08:59
Site: DTE Monroe Power Plant

Sounding: CPT20-022
Cone: 551:T1500F15U500



Max Depth: 22.500 m / 73.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP022.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142715ft E: 13395602ft
Sheet No: 1 of 1

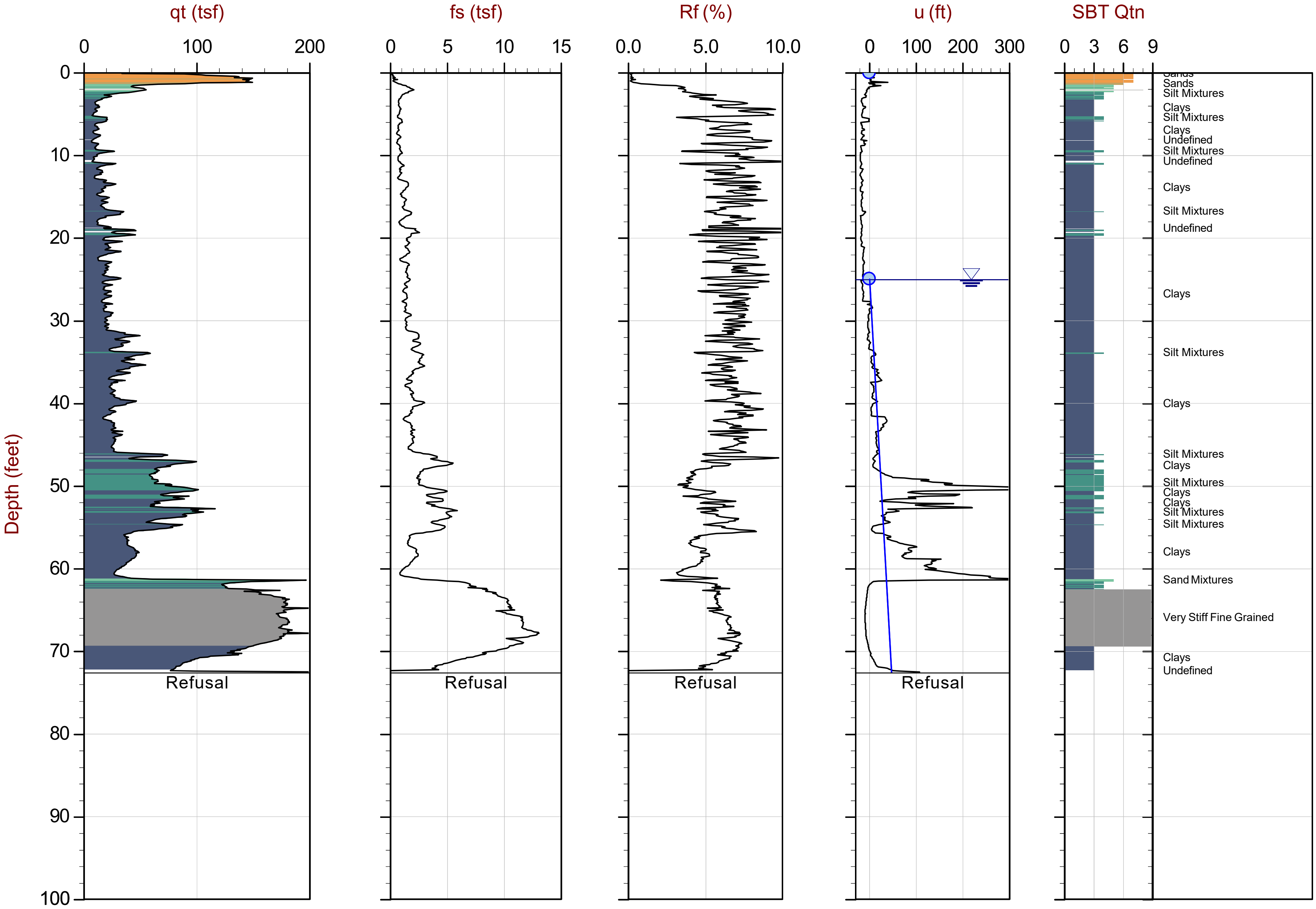
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 10:09
Site: DTE Monroe Power Plant

Sounding: CPT20-024
Cone: 551:T1500F15U500



Max Depth: 22.125 m / 72.59 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP024.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142797ft E: 13395407ft
Sheet No: 1 of 1

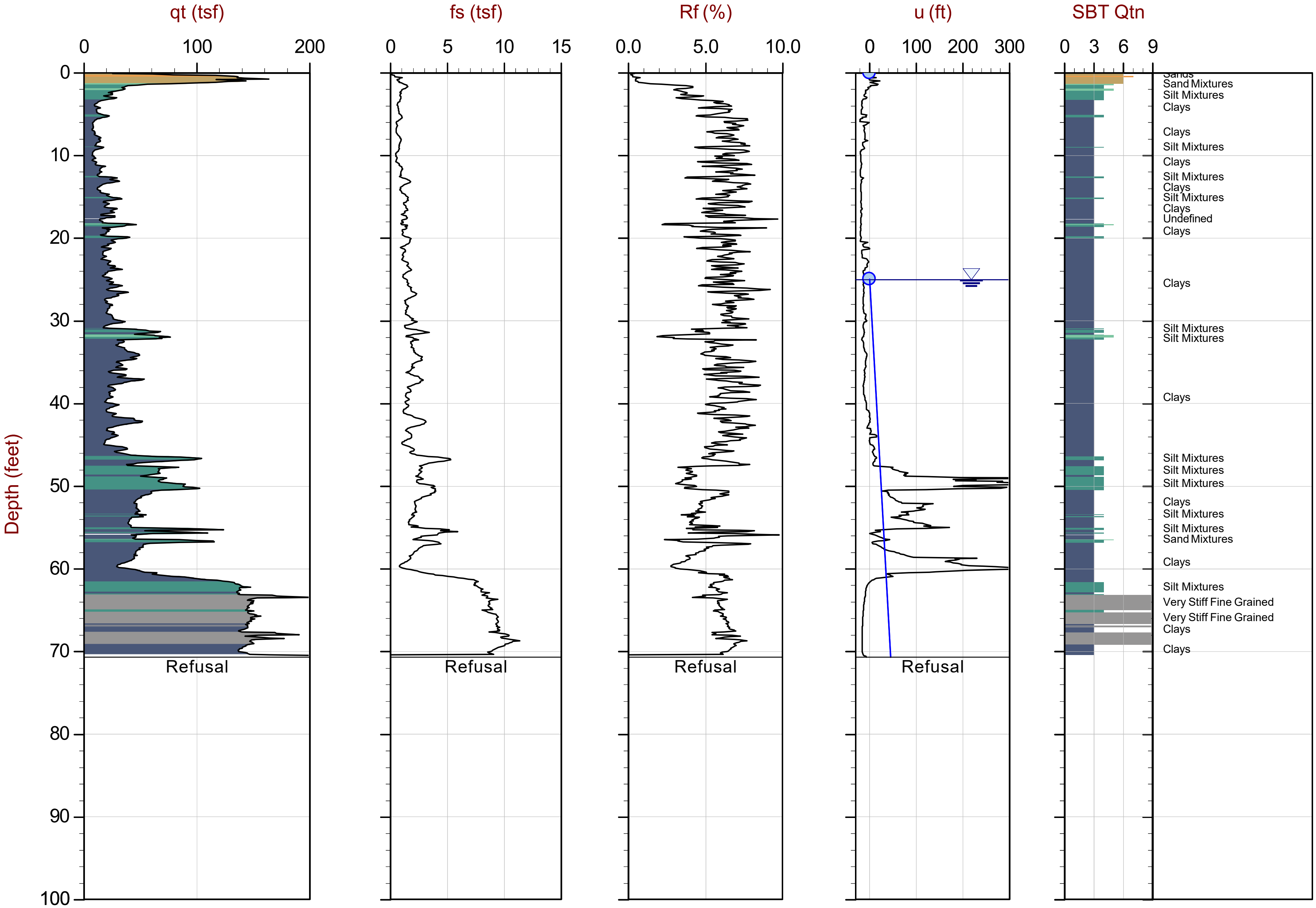
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 11:13
Site: DTE Monroe Power Plant

Sounding: CPT20-026
Cone: 551:T1500F15U500



Max Depth: 21.550 m / 70.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP026.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142864ft E: 13395239ft
Sheet No: 1 of 1

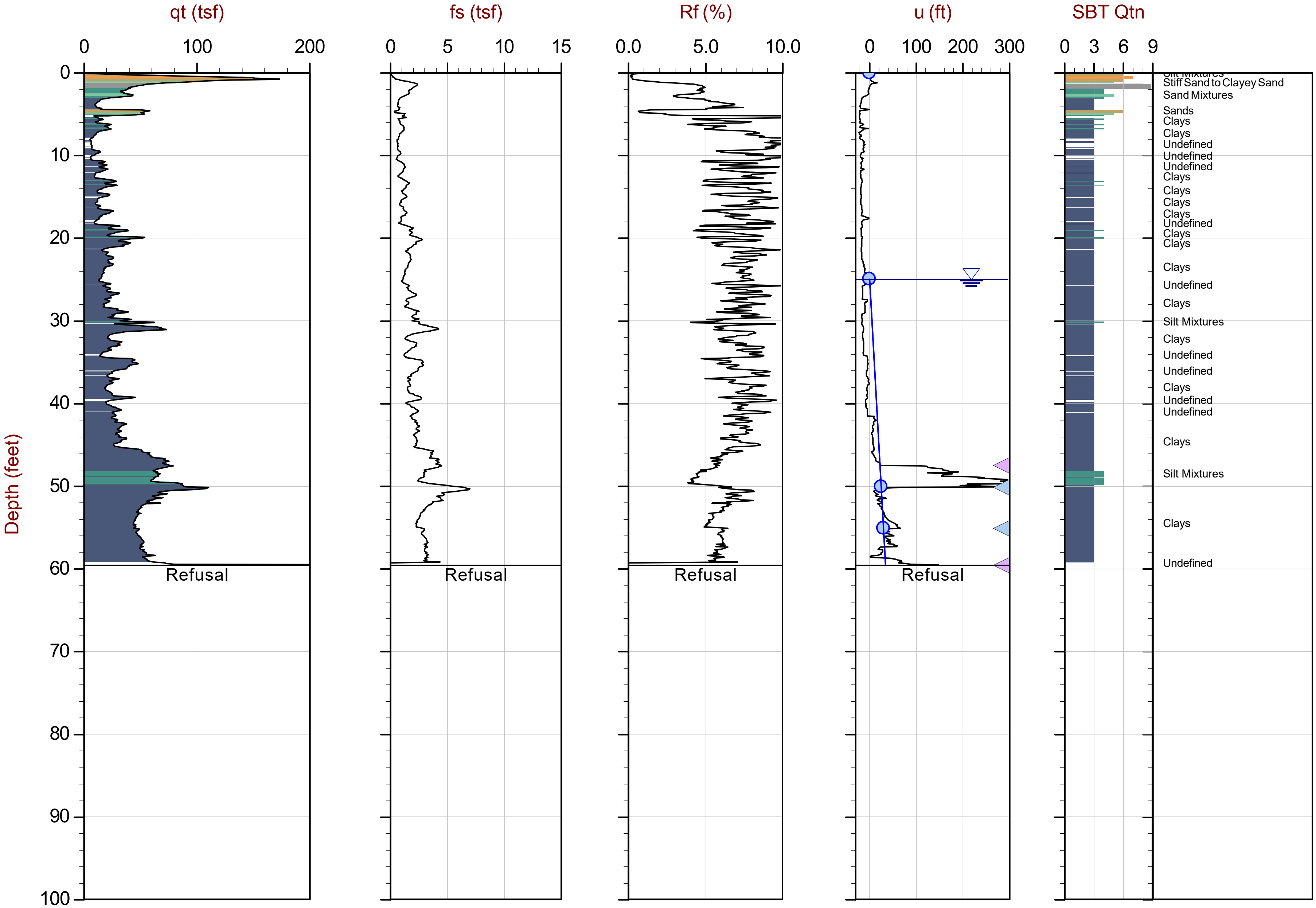
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500



Max Depth: 18.150 m / 59.55 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP028.COR
Unit Wt: SBTQtn (PKR2009)

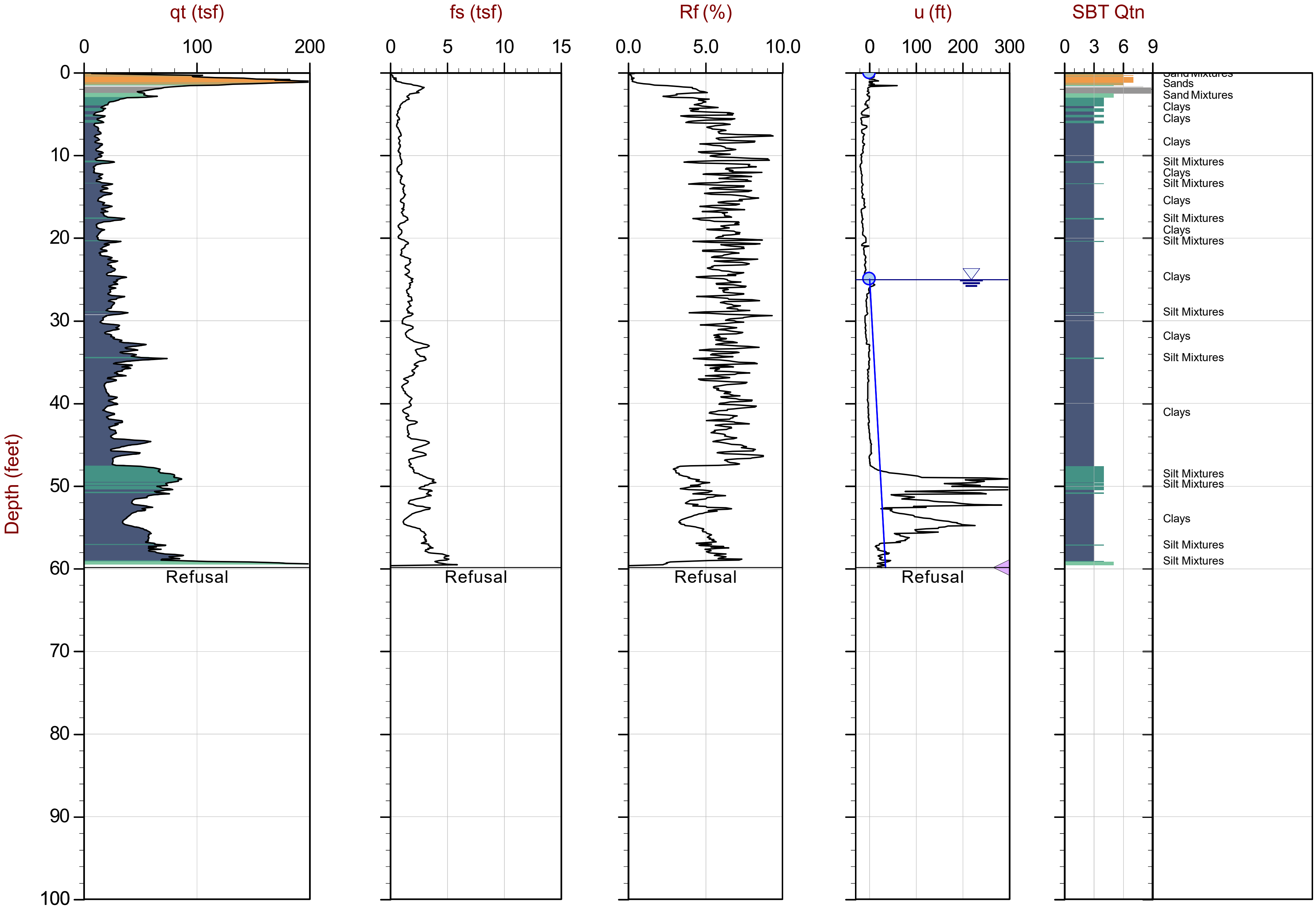
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142938ft E: 13395052ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 12:31
Site: DTE Monroe Power Plant

Sounding: CPT20-030
Cone: 551:T1500F15U500



Max Depth: 18.250 m / 59.87 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP030.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143004ft E: 13394895ft
Sheet No: 1 of 1

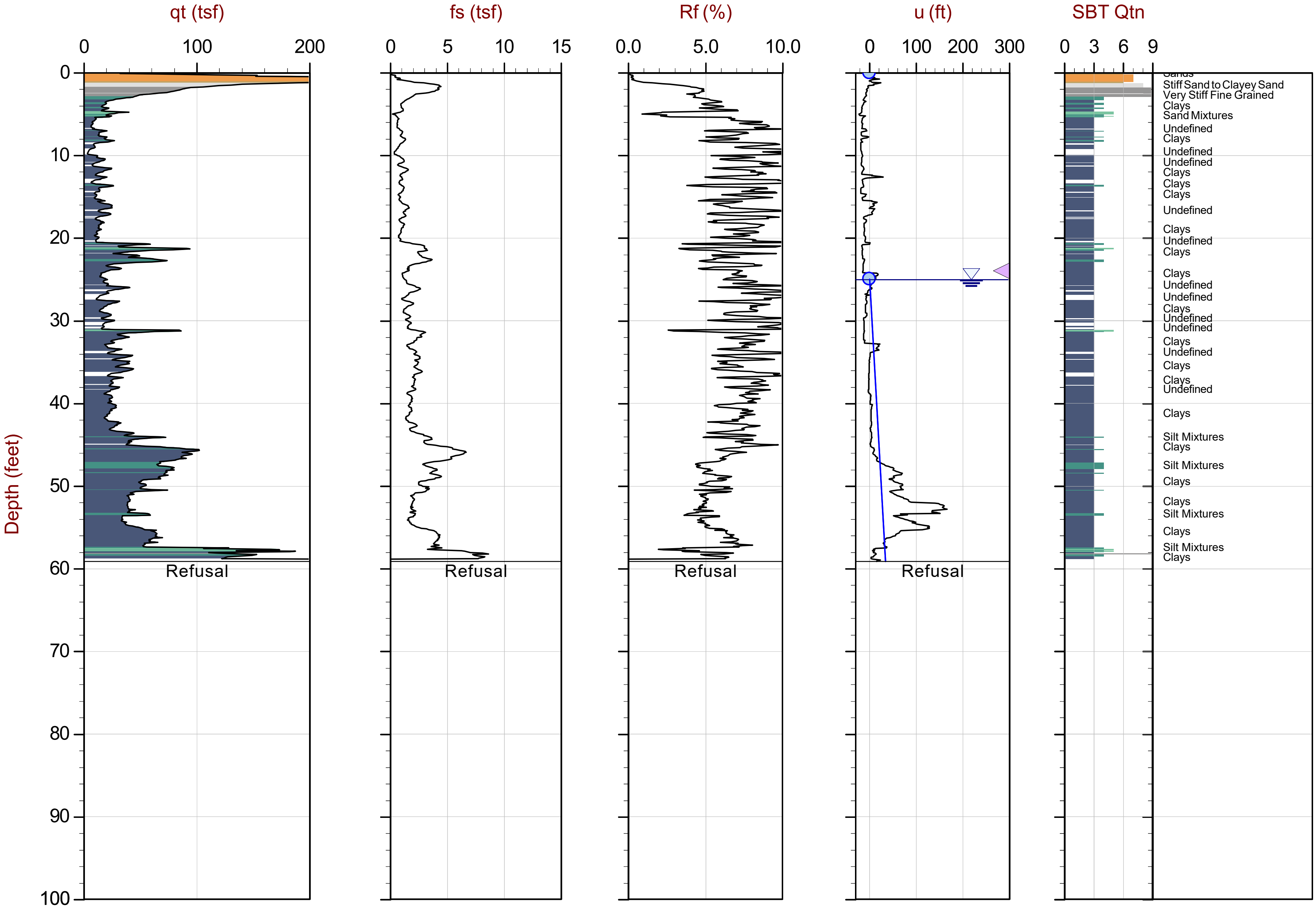
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 13:26
Site: DTE Monroe Power Plant

Sounding: CPT20-032
Cone: 551:T1500F15U500



Max Depth: 18.025 m / 59.14 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP032.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142939ft E: 13394710ft
Sheet No: 1 of 1

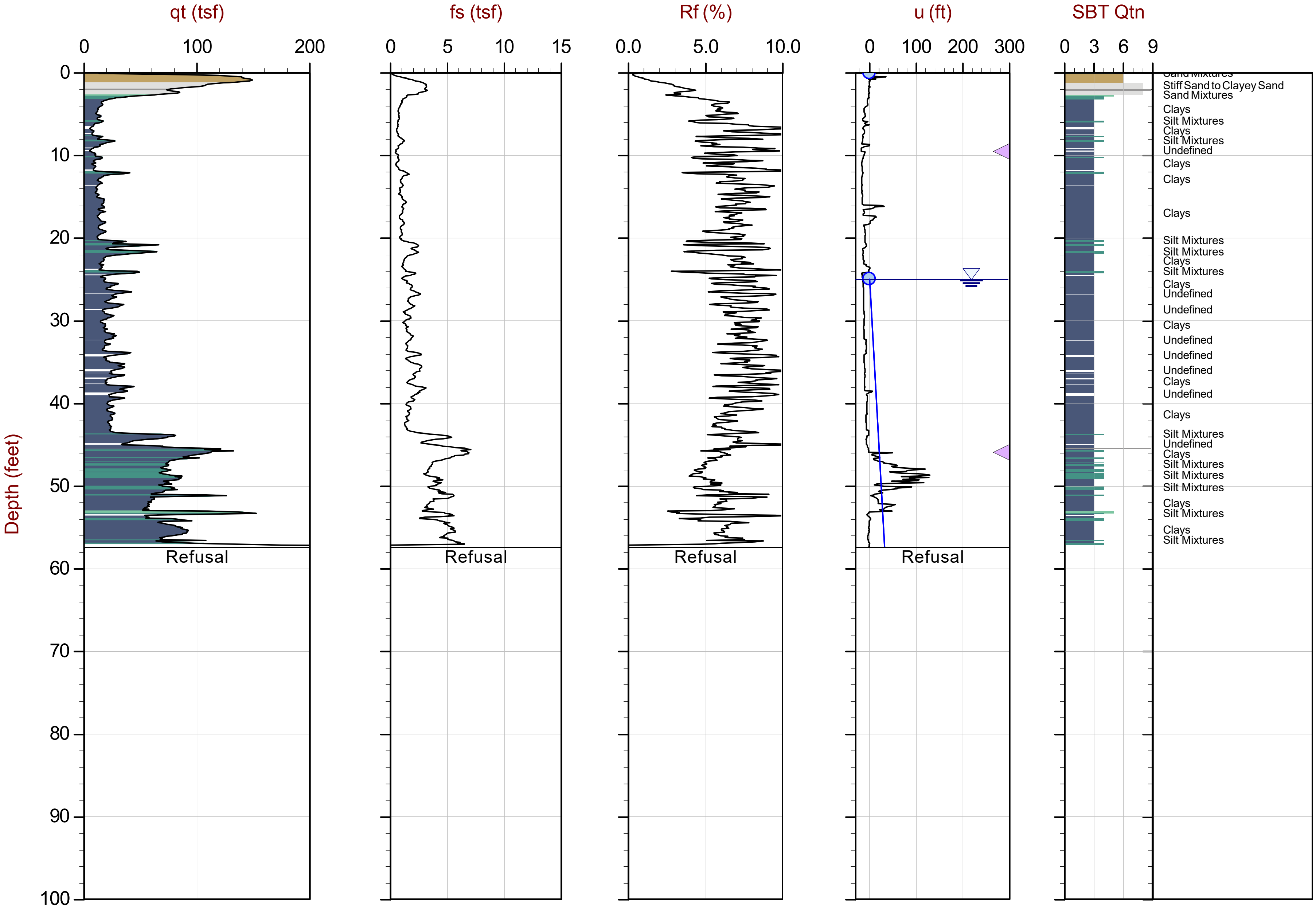
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 14:24
Site: DTE Monroe Power Plant

Sounding: CPT20-034
Cone: 551:T1500F15U500



Max Depth: 17.500 m / 57.41 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP034.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142785ft E: 13394560ft
Sheet No: 1 of 1

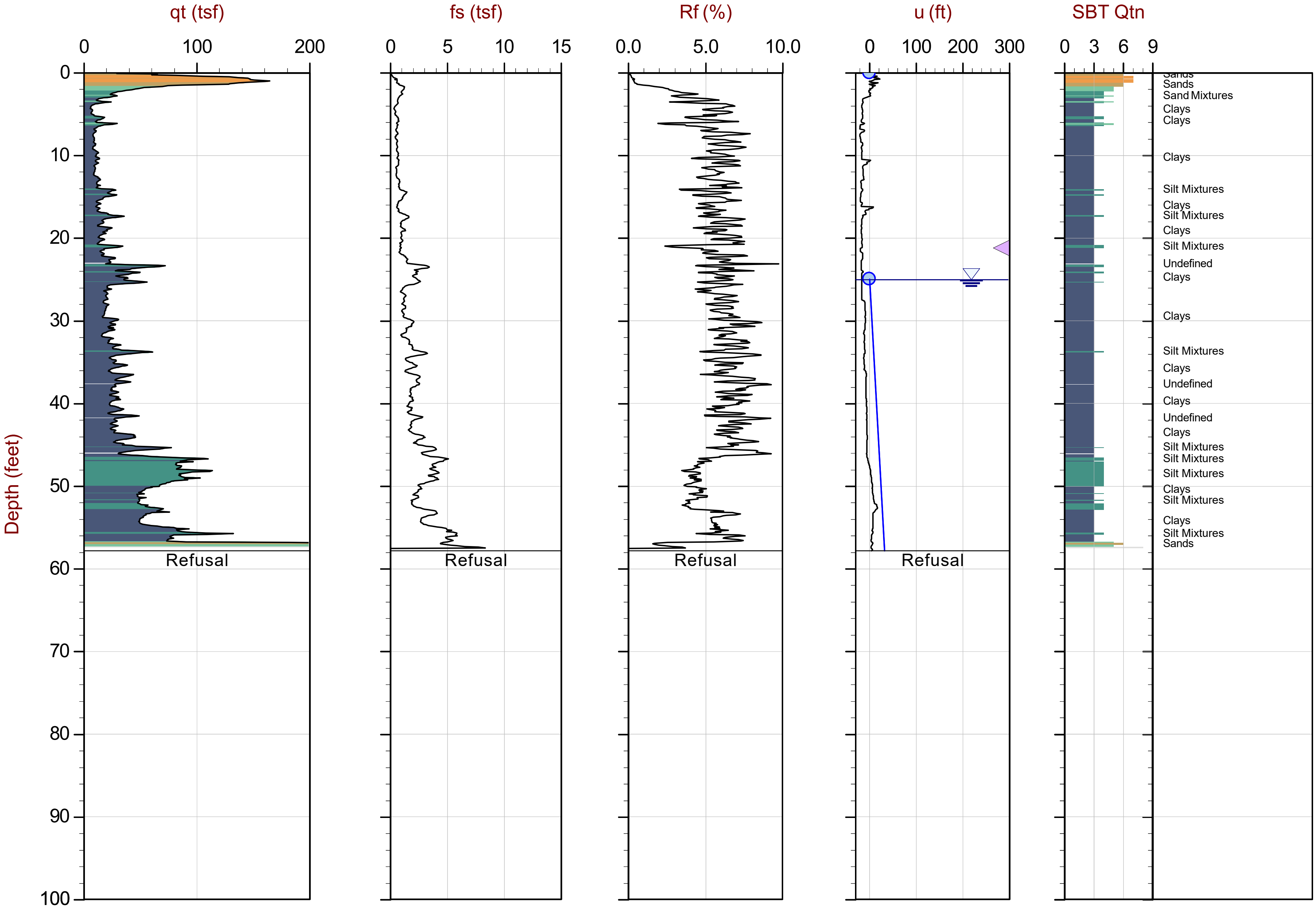
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 09:07
Site: DTE Monroe Power Plant

Sounding: CPT20-036
Cone: 551:T1500F15U500



Max Depth: 17.625 m / 57.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP036.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142655ft E: 13394432ft
Sheet No: 1 of 1

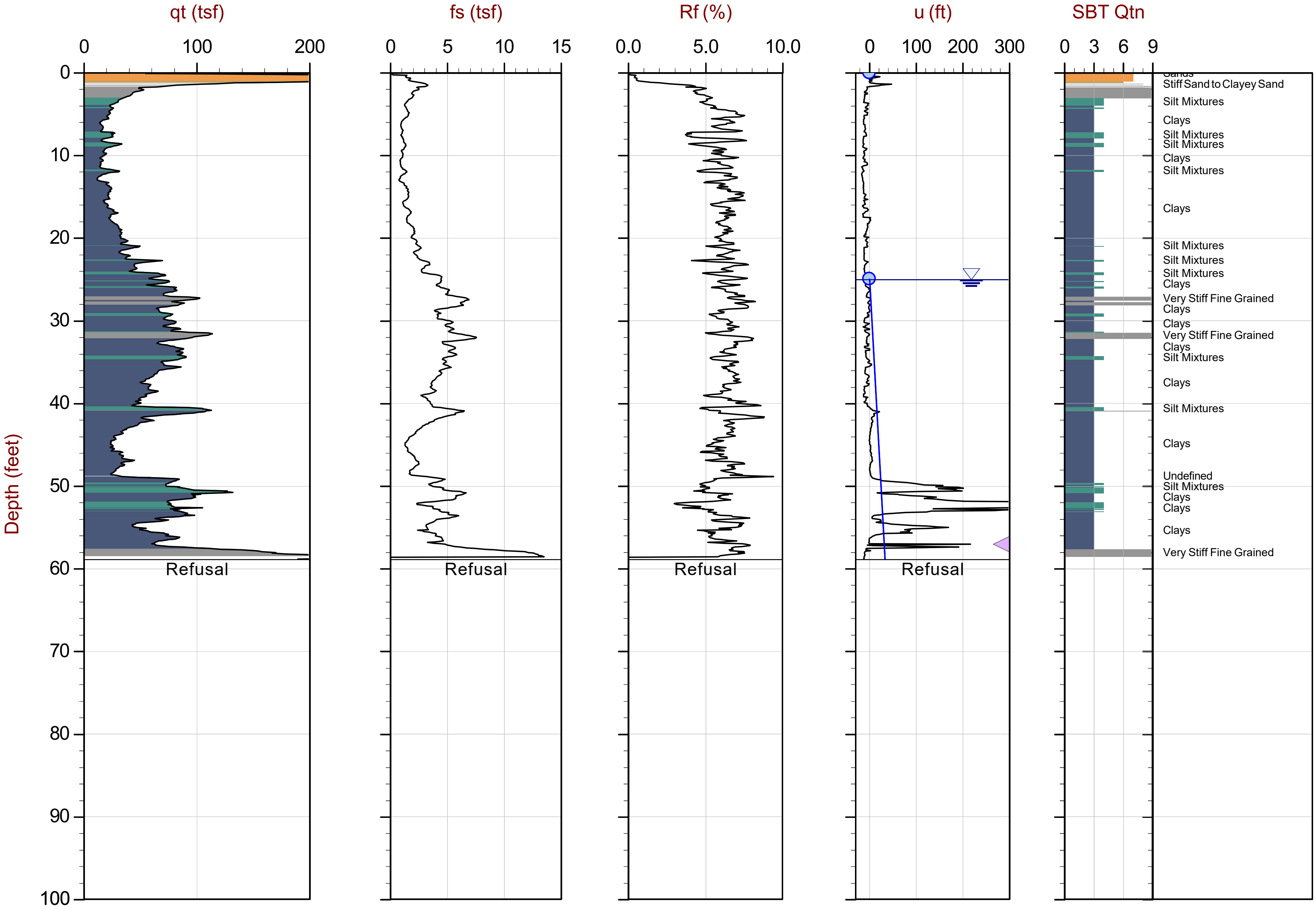
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 10:59
Site: DTE Monroe Power Plant

Sounding: CPT20-038
Cone: 551:T1500F15U500



Max Depth: 17.950 m / 58.89 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP038.COR
Unit Wt: SBTQtn (PKR2009)

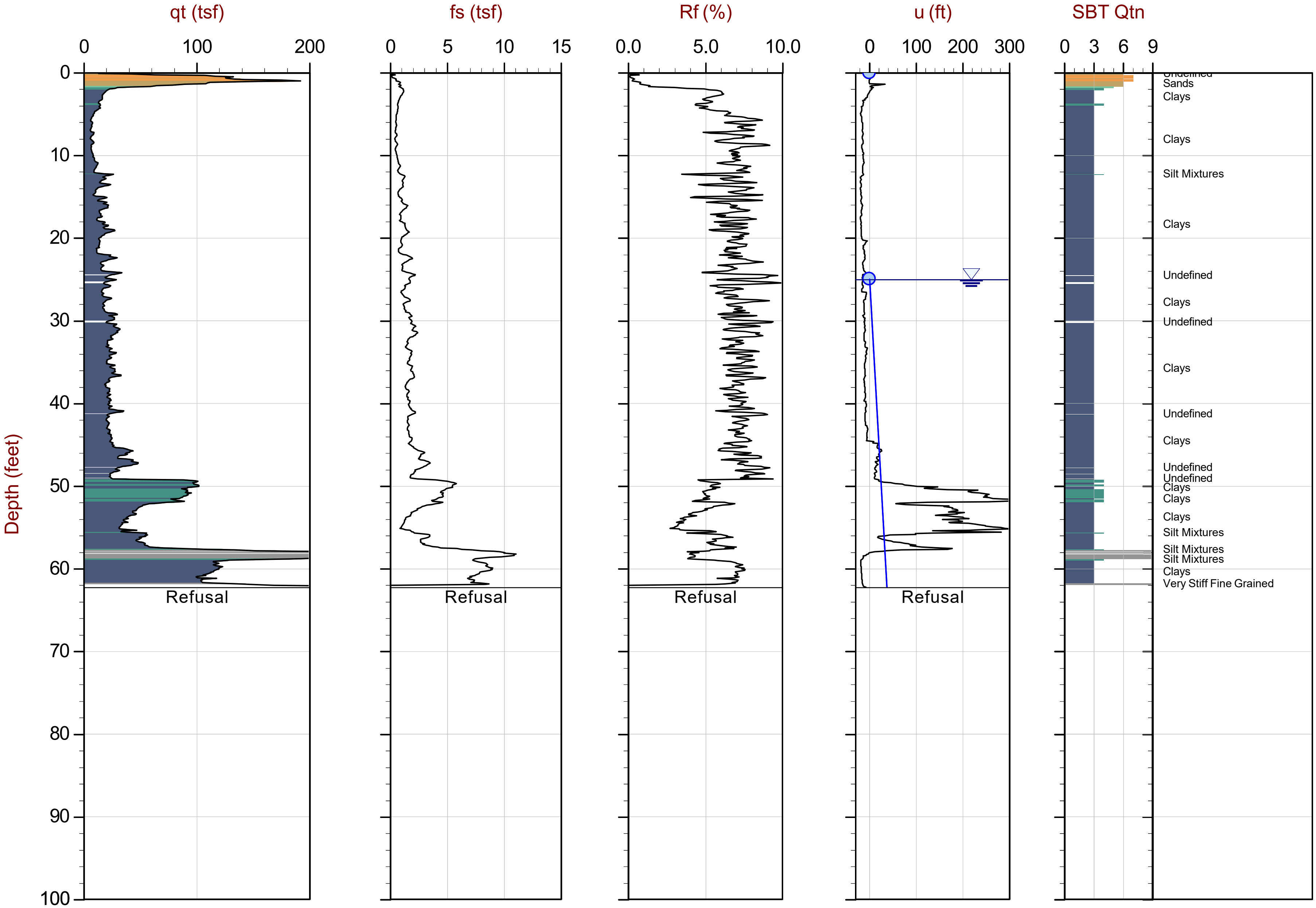
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142596ft E: 13394252ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 12:50
Site: DTE Monroe Power Plant

Sounding: CPT20-040
Cone: 551:T1500F15U500



Max Depth: 18.975 m / 62.25 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP040.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142693ft E: 13394075ft
Sheet No: 1 of 1

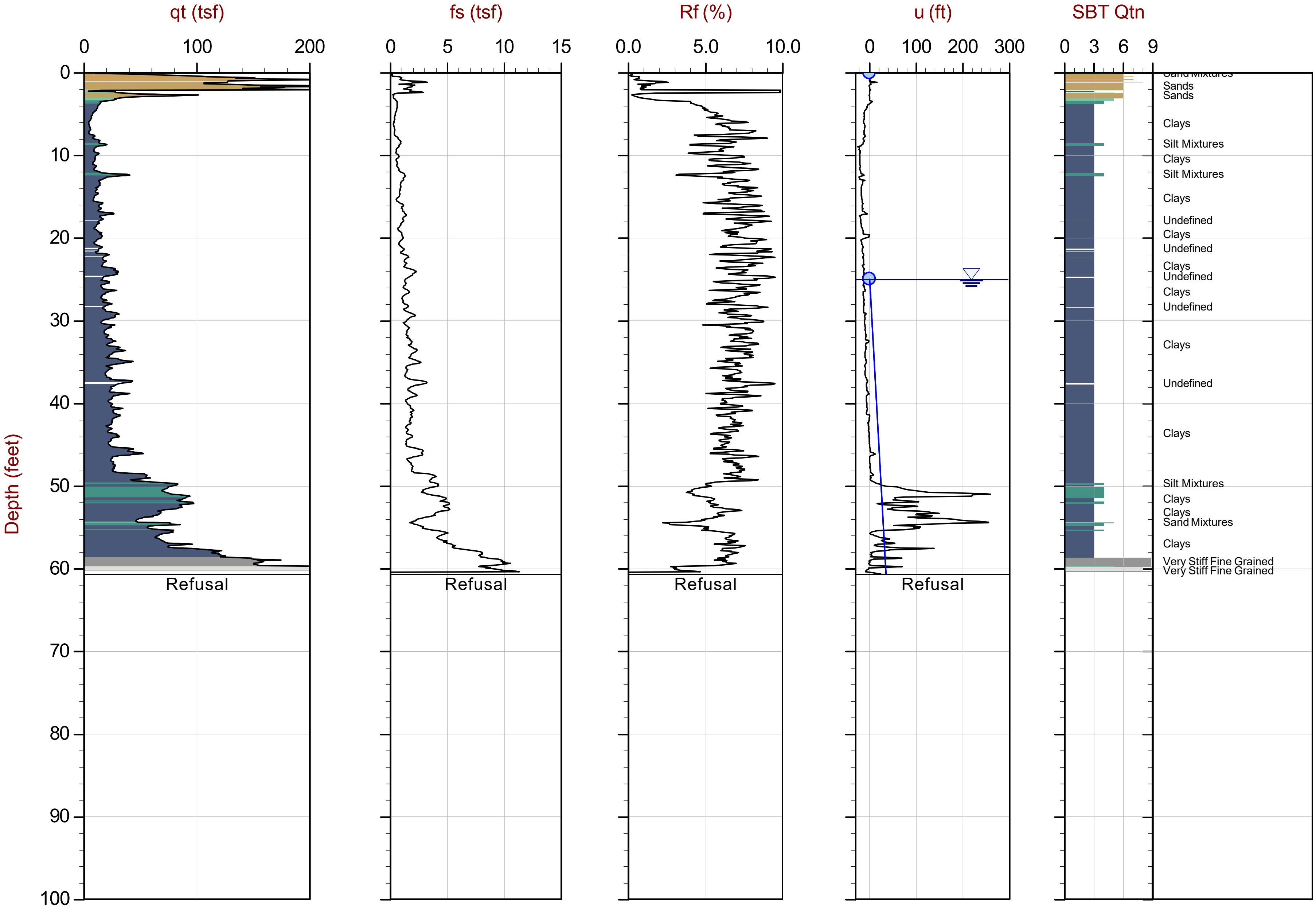
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 13:47
Site: DTE Monroe Power Plant

Sounding: CPT20-042
Cone: 551:T1500F15U500



Max Depth: 18.500 m / 60.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP042.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142835ft E: 13393929ft
Sheet No: 1 of 1

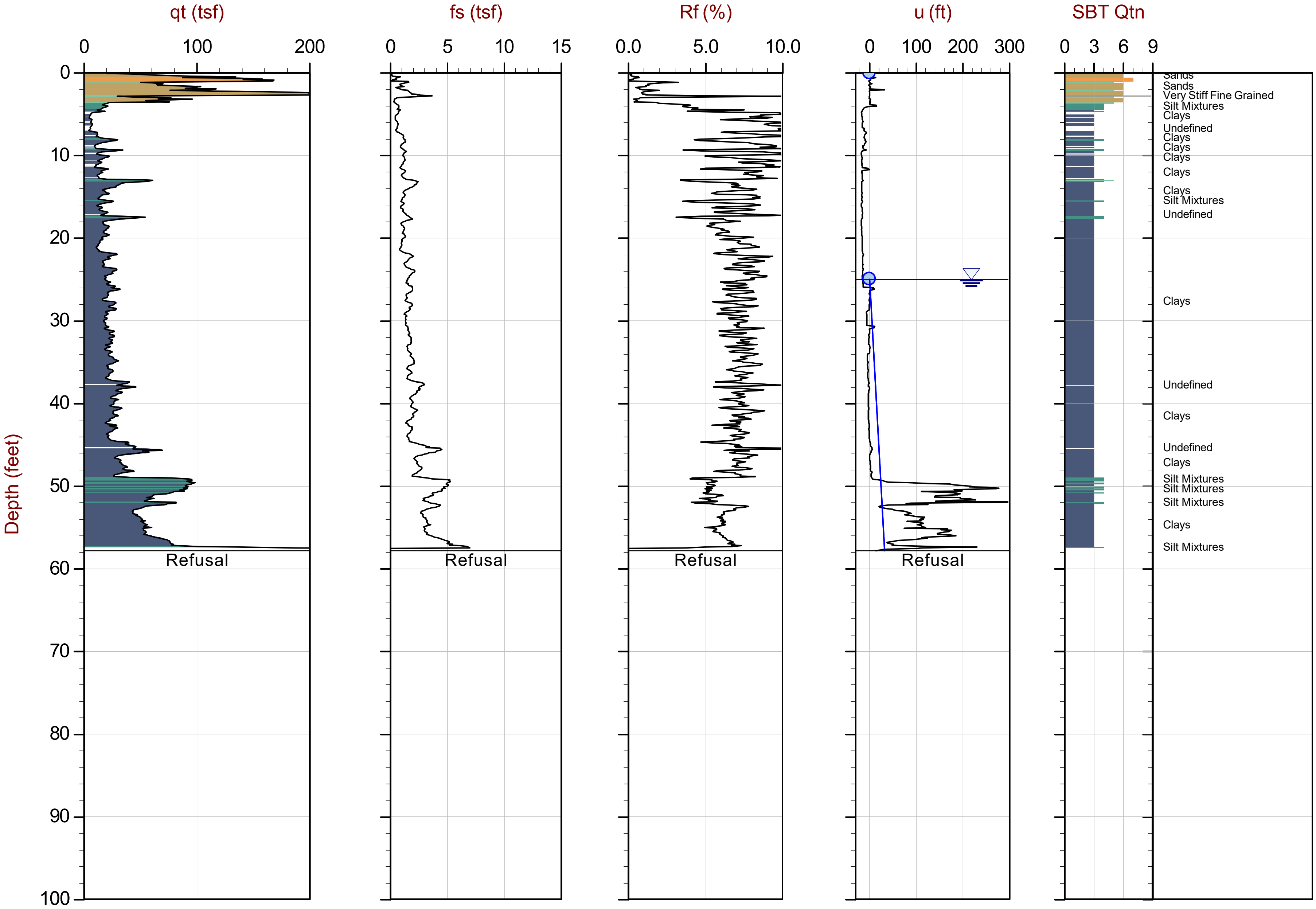
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 14:41
Site: DTE Monroe Power Plant

Sounding: CPT20-044
Cone: 551:T1500F15U500



Max Depth: 17.625 m / 57.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP044.COR
Unit Wt: SBTQtn (PKR2009)

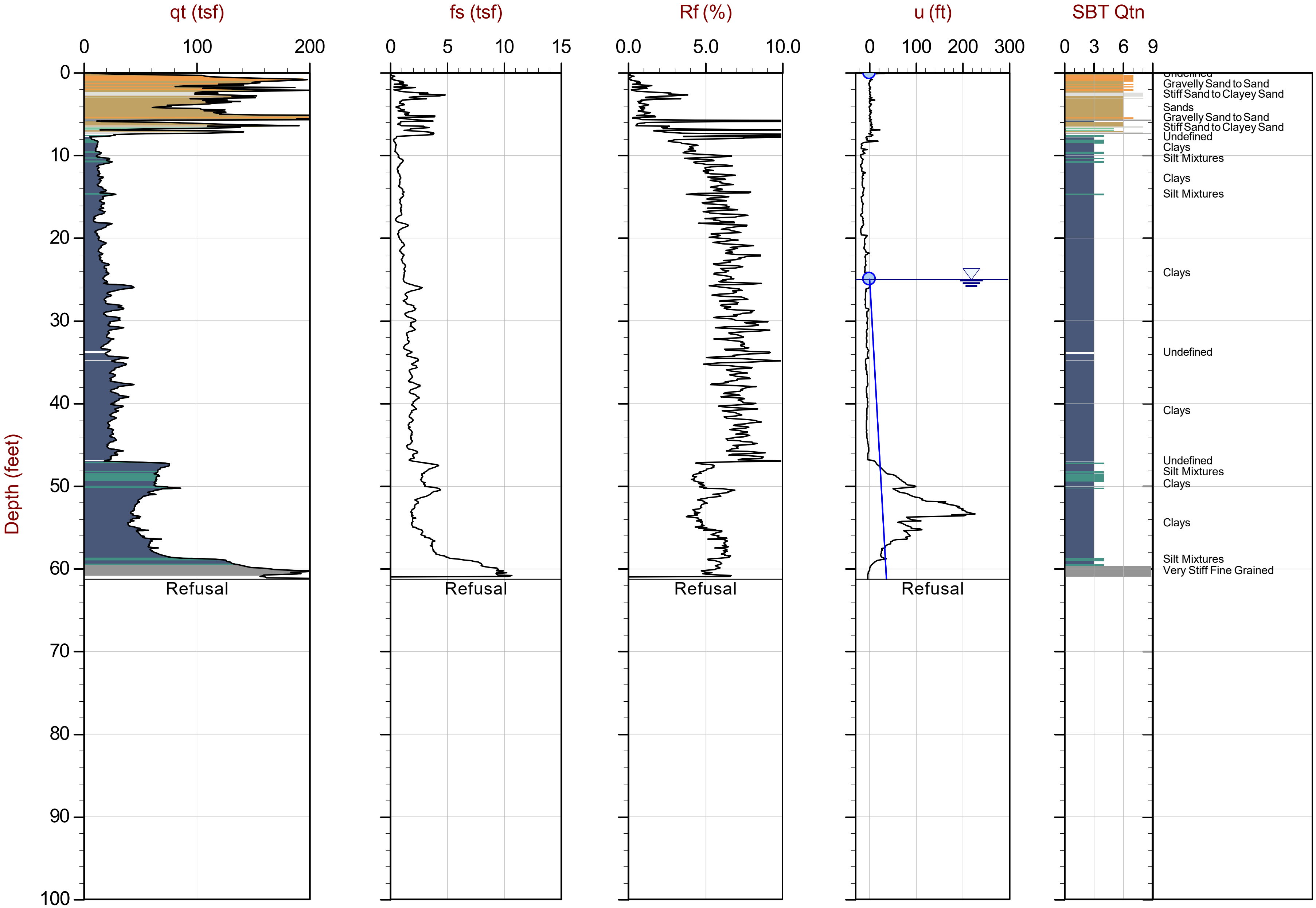
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142982ft E: 13393790ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-046
Cone: 551:T1500F15U500



Max Depth: 18.675 m / 61.27 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP046.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143108ft E: 13393655ft
Sheet No: 1 of 1

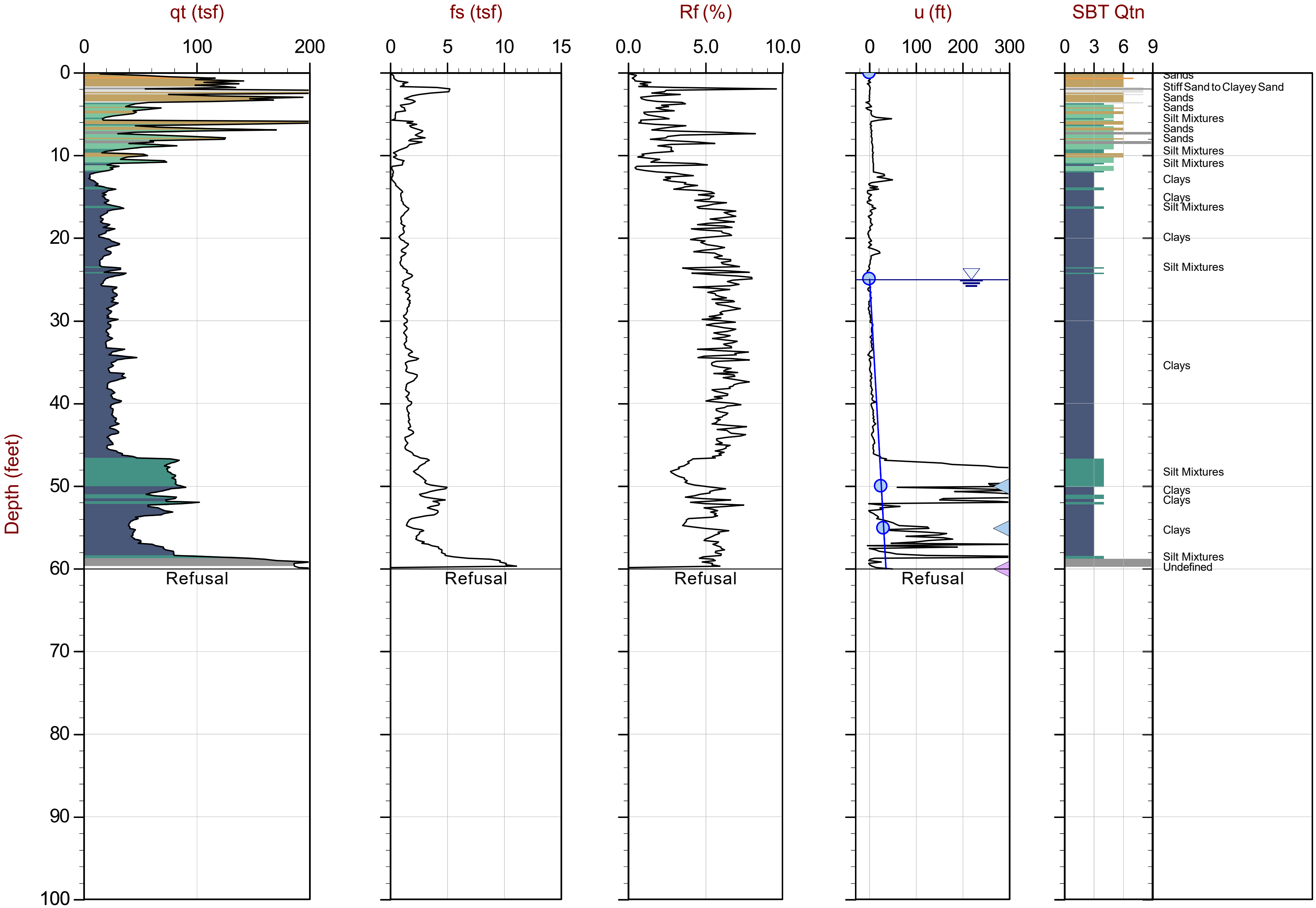
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-13 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500



Max Depth: 18.300 m / 60.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP048.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143131ft E: 13393508ft
Sheet No: 1 of 1

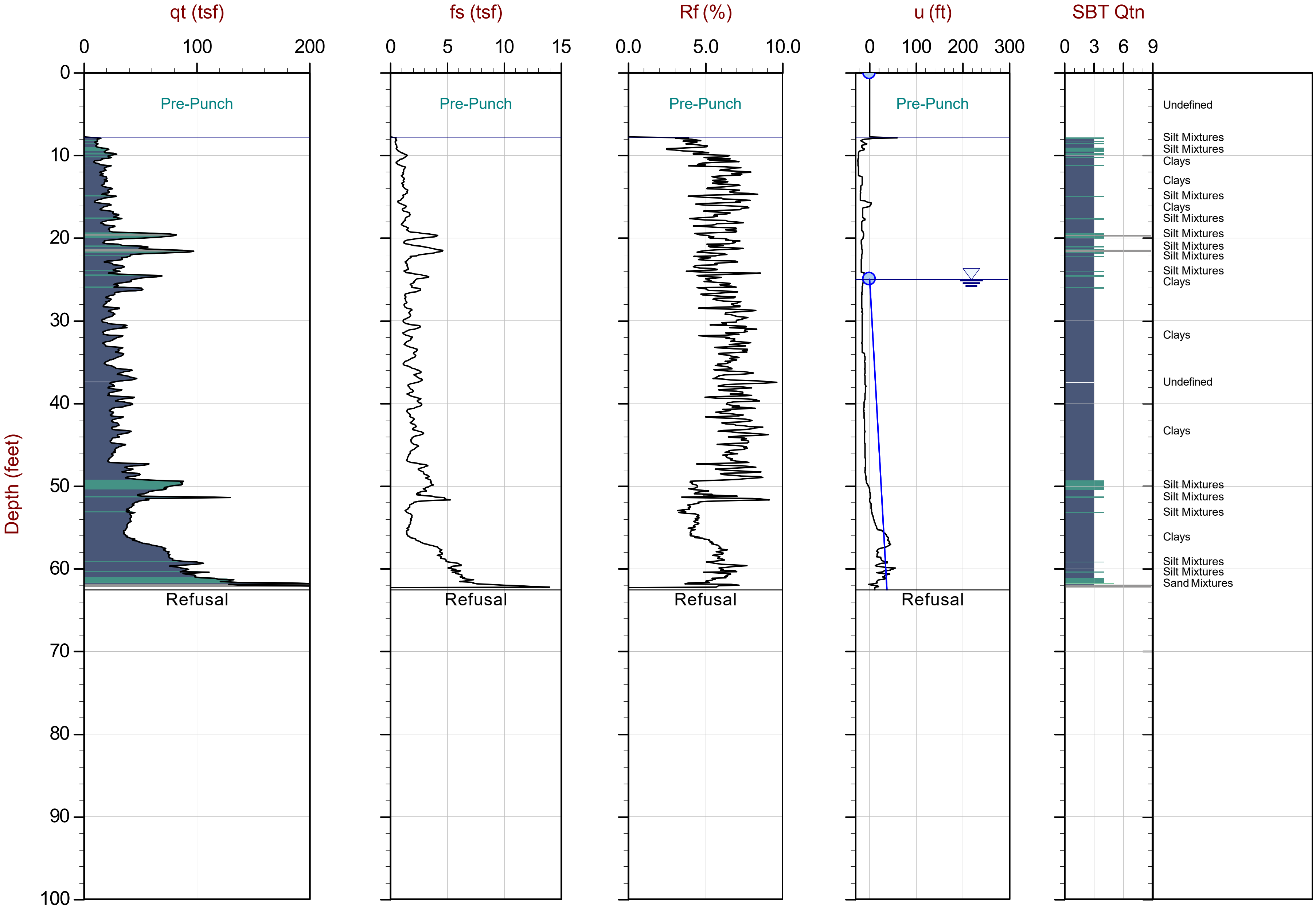
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 10:01
Site: DTE Monroe Power Plant

Sounding: SCPT20-050
Cone: 551:T1500F15U500



Max Depth: 19.075 m / 62.58 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_SP050.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143162ft E: 13393217ft
Sheet No: 1 of 1

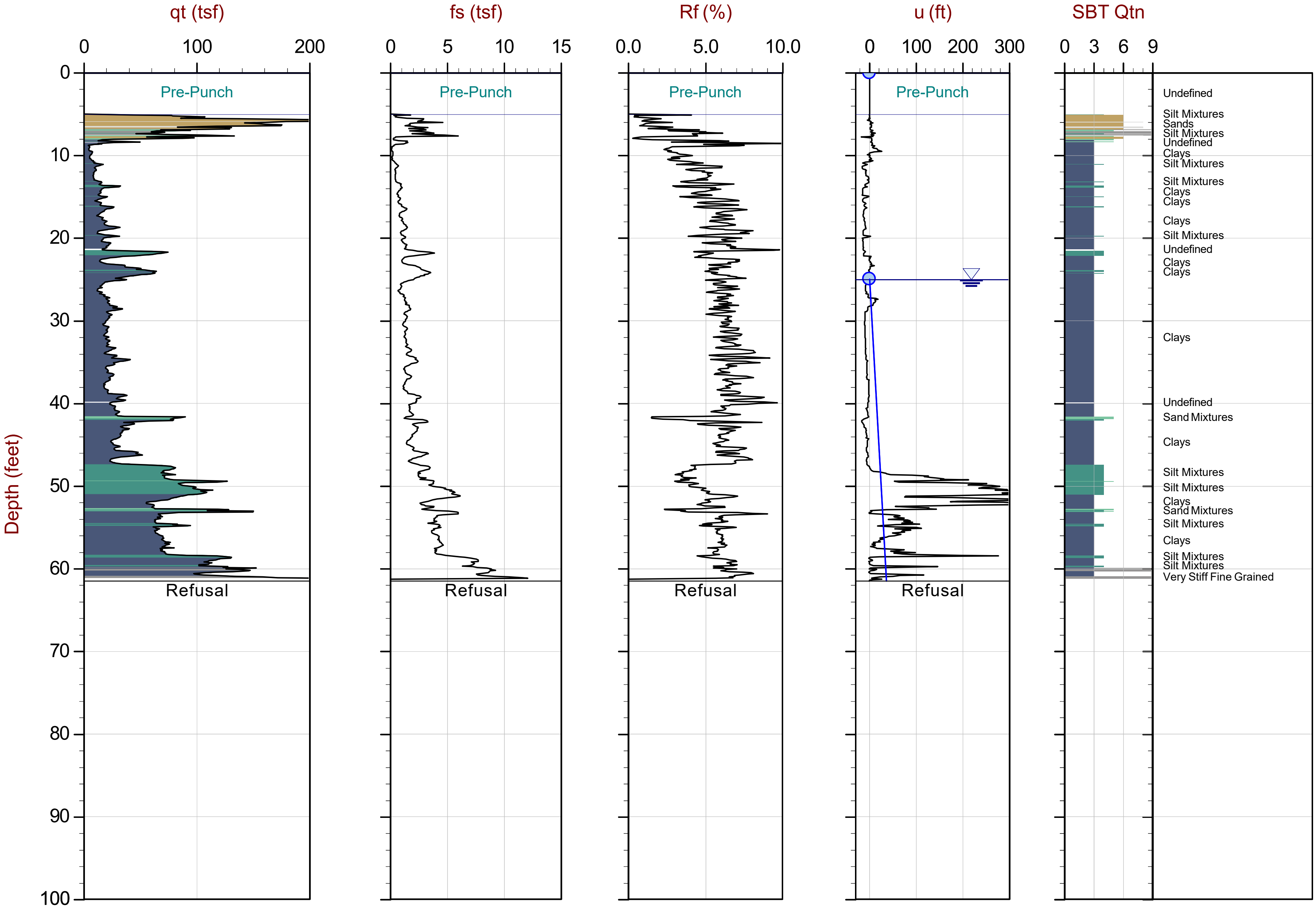
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-052
Cone: 551:T1500F15U500



Max Depth: 18.750 m / 61.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP052.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143174ft E: 13393046ft
Sheet No: 1 of 1

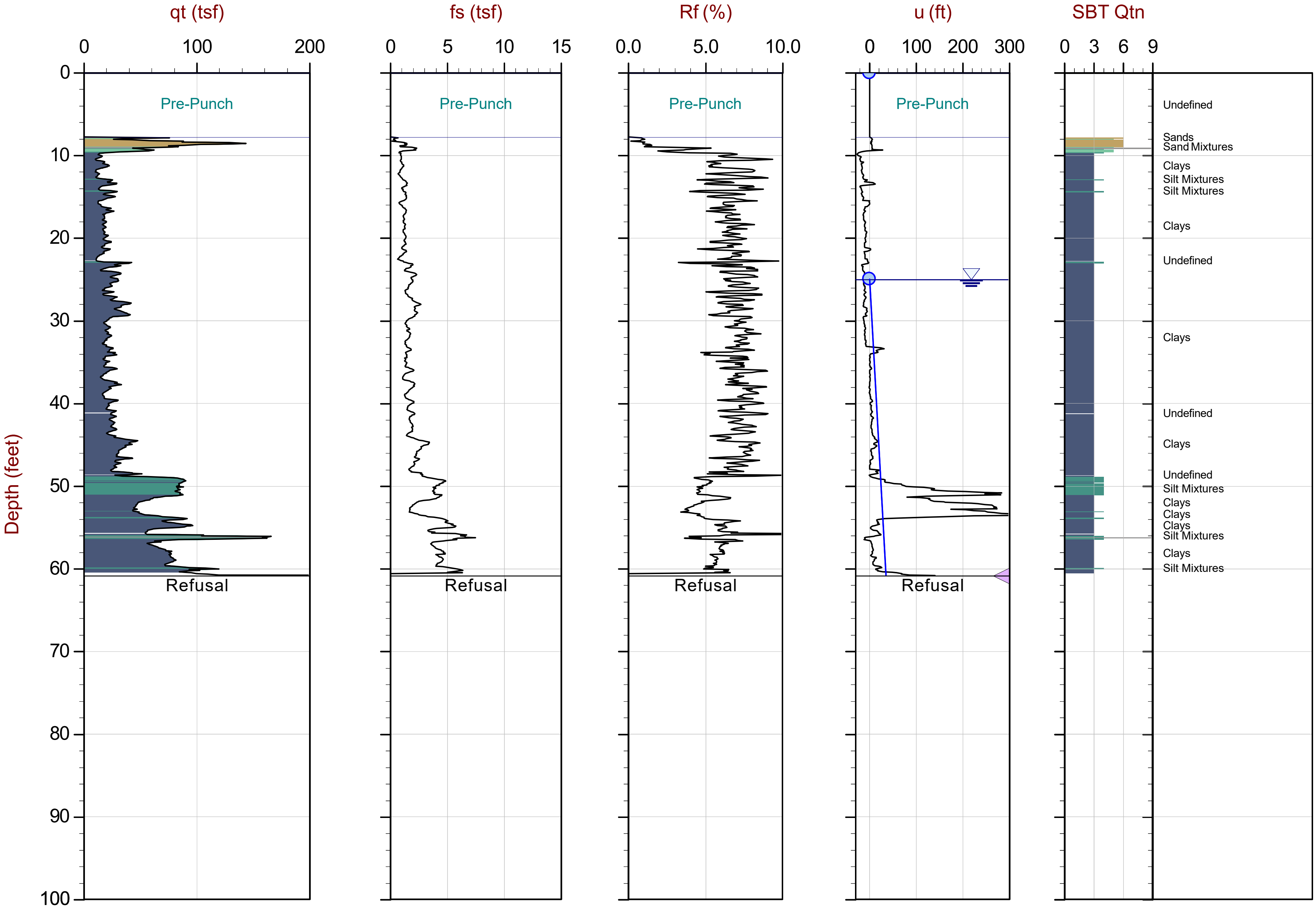
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 12:28
Site: DTE Monroe Power Plant

Sounding: CPT20-054
Cone: 551:T1500F15U500



Max Depth: 18.550 m / 60.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP054.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143198ft E: 13392845ft
Sheet No: 1 of 1

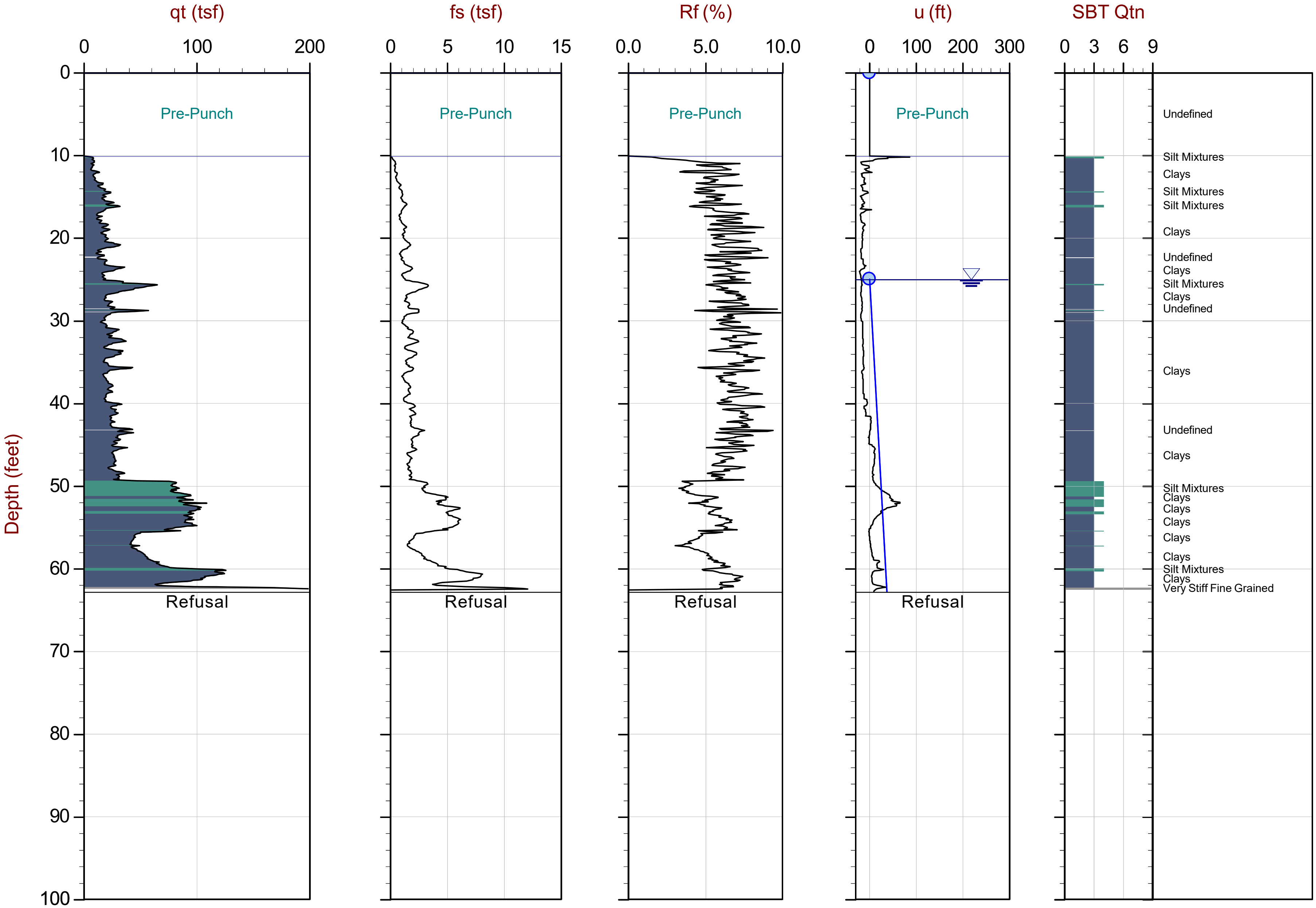
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 13:29
Site: DTE Monroe Power Plant

Sounding: CPT20-056
Cone: 551:T1500F15U500



Max Depth: 19.150 m / 62.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP056.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143212ft E: 13392641ft
Sheet No: 1 of 1

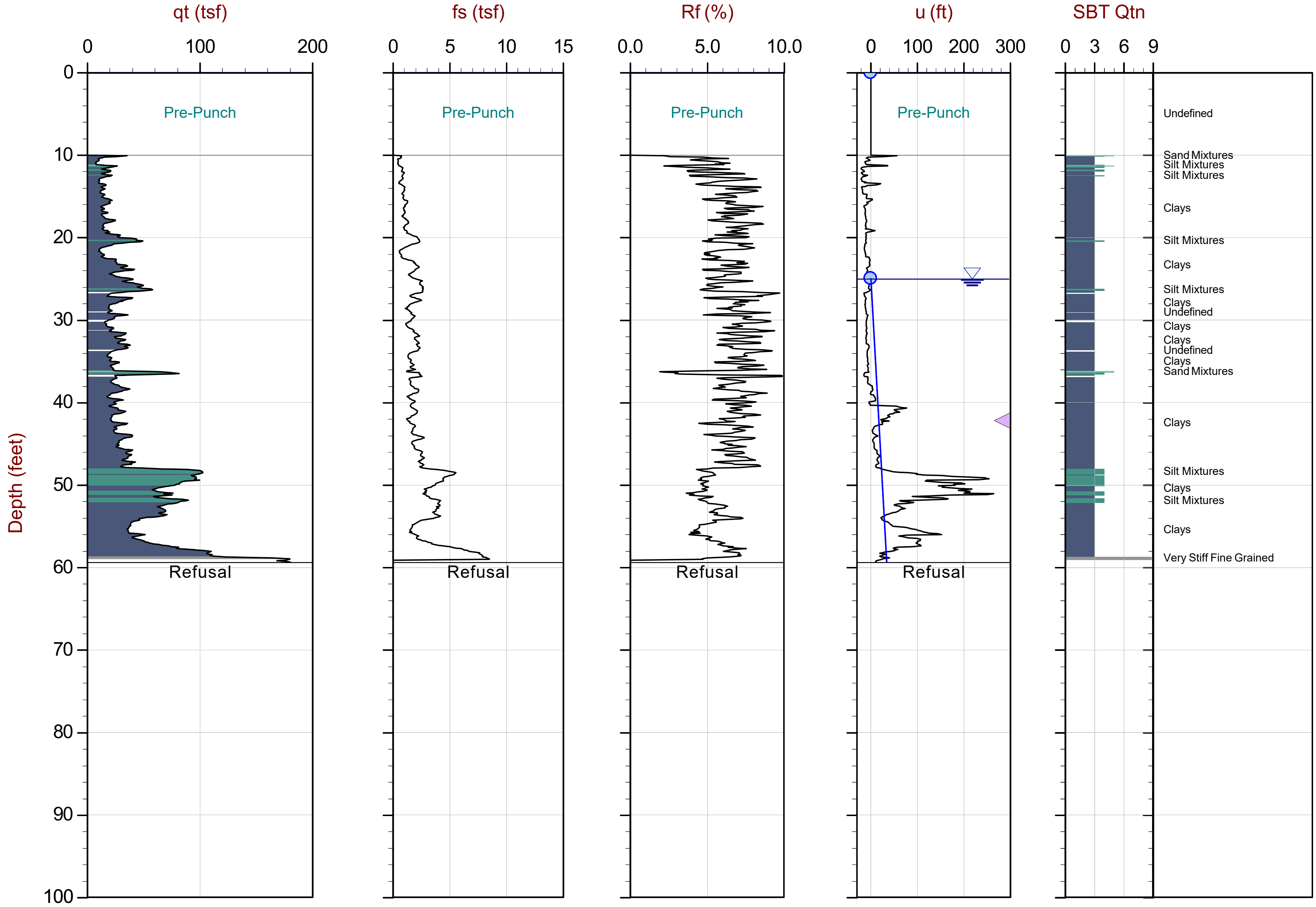
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-058
Cone: 551:T1500F15U500



Max Depth: 18.100 m / 59.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP058.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143229ft E: 13392449ft
Sheet No: 1 of 1

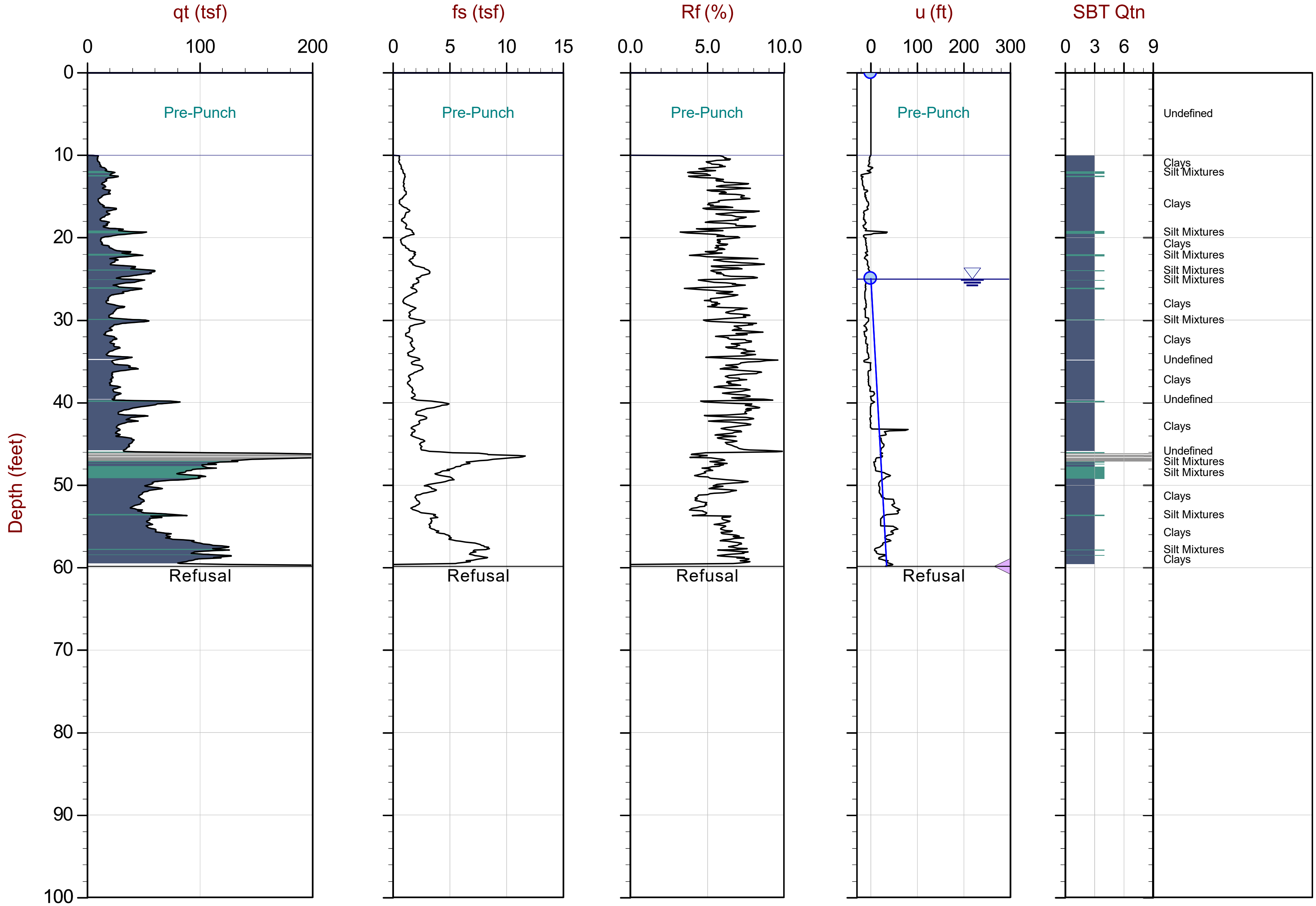
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 12:21
Site: DTE Monroe Power Plant

Sounding: CPT20-060
Cone: 551:T1500F15U500



Max Depth: 18.250 m / 59.87 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP060.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143248ft E: 13392268ft
Sheet No: 1 of 1

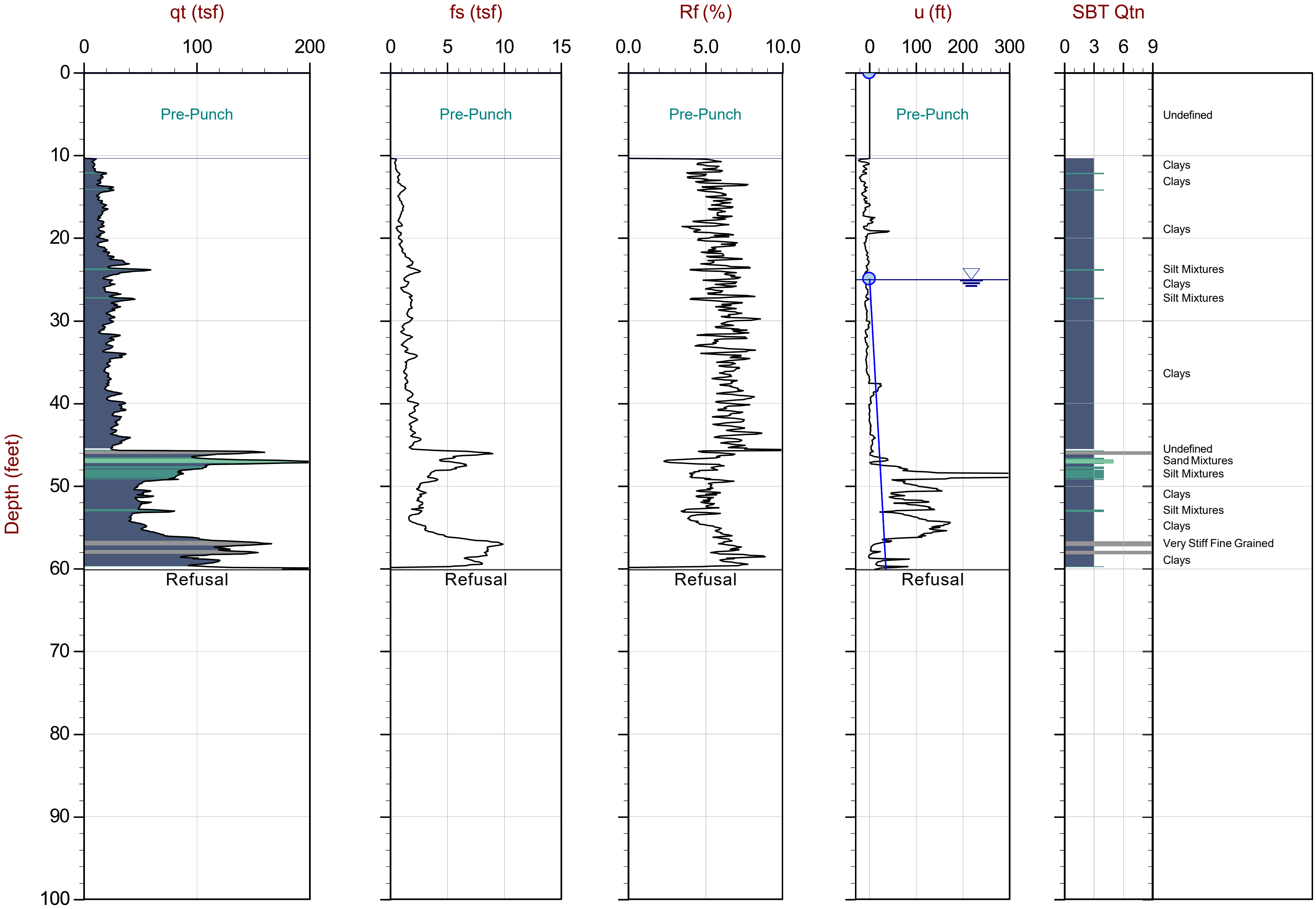
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 11:16
Site: DTE Monroe Power Plant

Sounding: CPT20-062
Cone: 551:T1500F15U500



Max Depth: 18.325 m / 60.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP062.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143281ft E: 13392058ft
Sheet No: 1 of 1

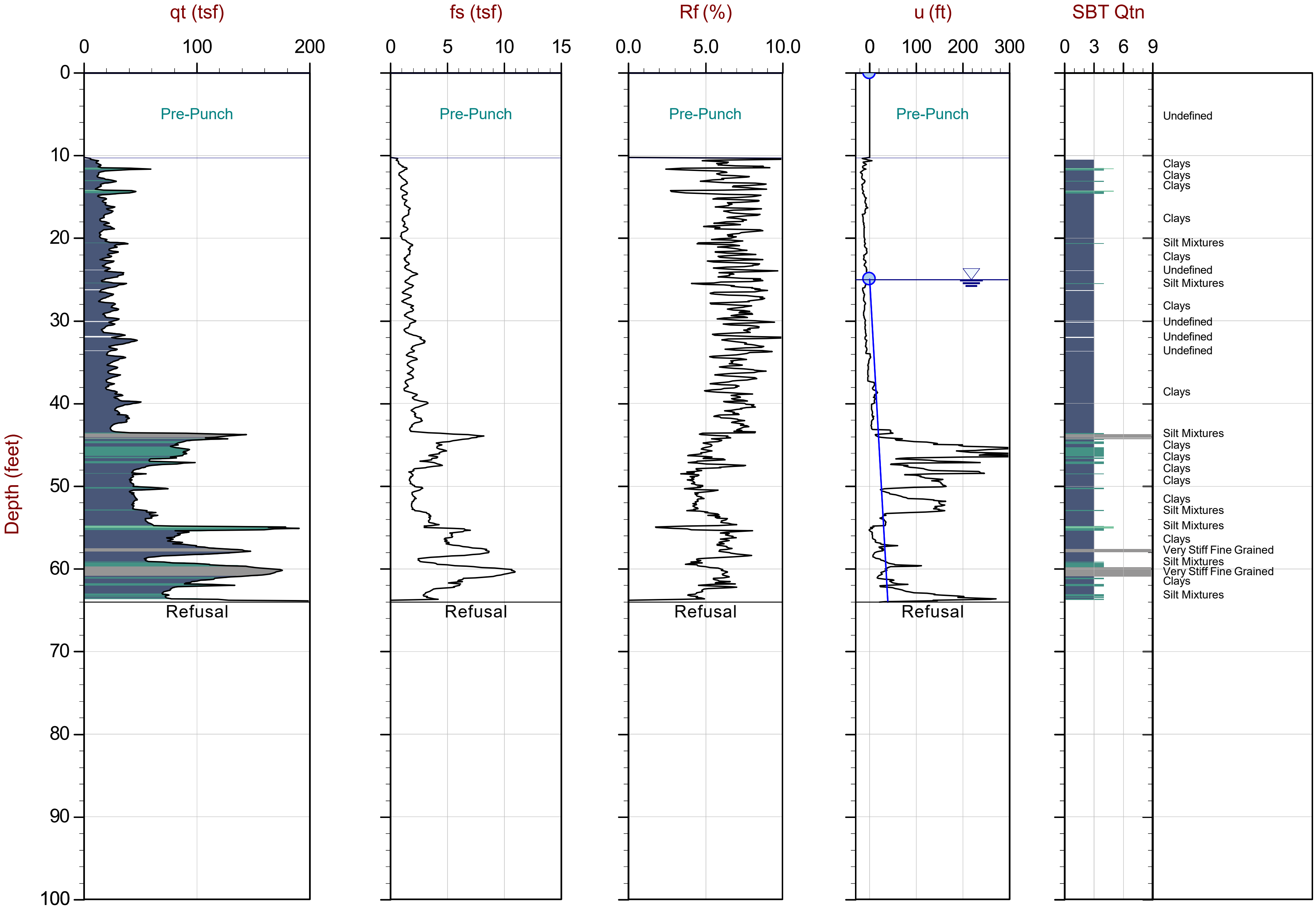
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 10:05
Site: DTE Monroe Power Plant

Sounding: CPT20-064
Cone: 551:T1500F15U500



Max Depth: 19.525 m / 64.06 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP064.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143336ft E: 13391874ft
Sheet No: 1 of 1

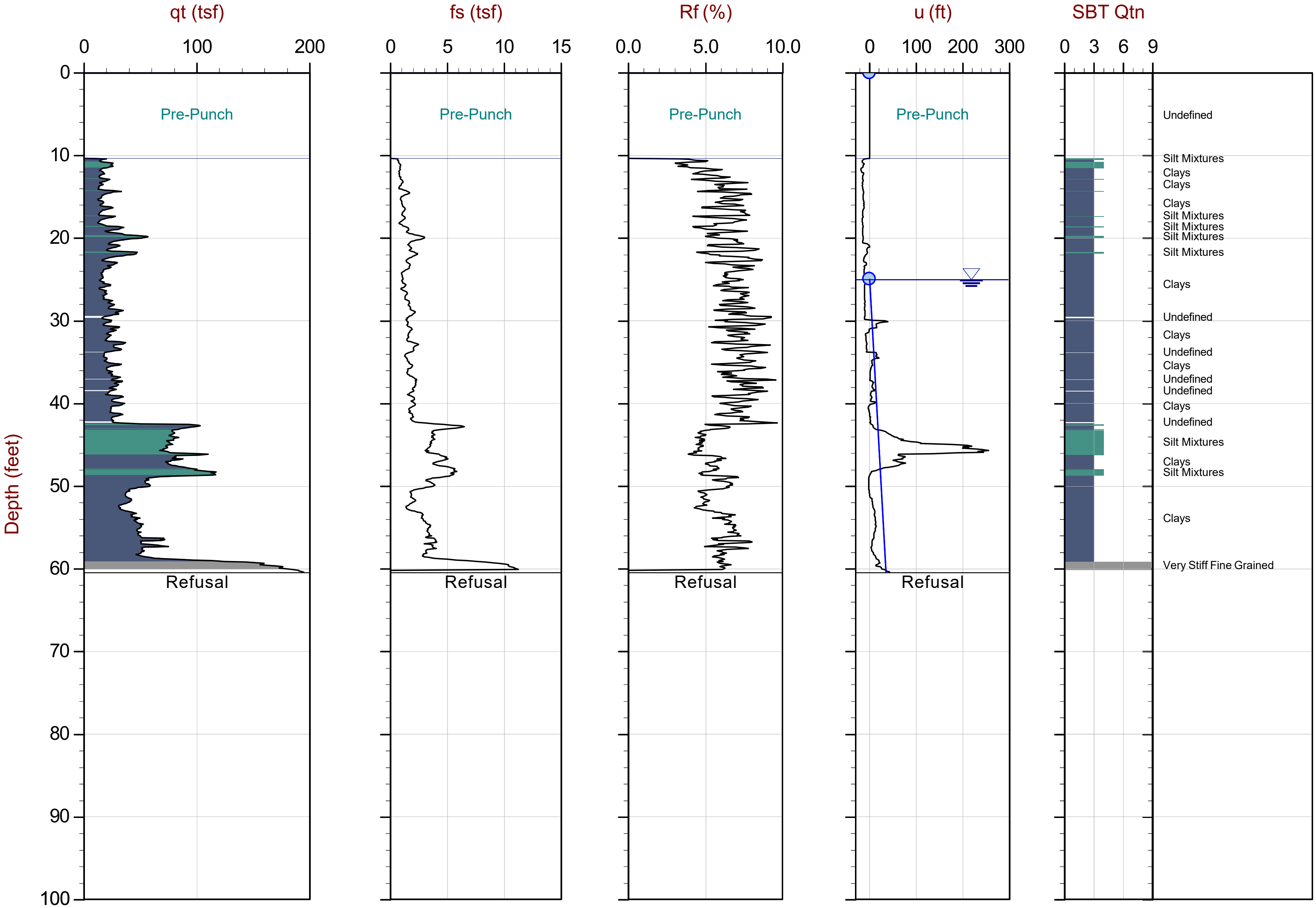
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 09:06
Site: DTE Monroe Power Plant

Sounding: CPT20-066
Cone: 551:T1500F15U500



Max Depth: 18.425 m / 60.45 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP066.COR
Unit Wt: SBTQtn (PKR2009)

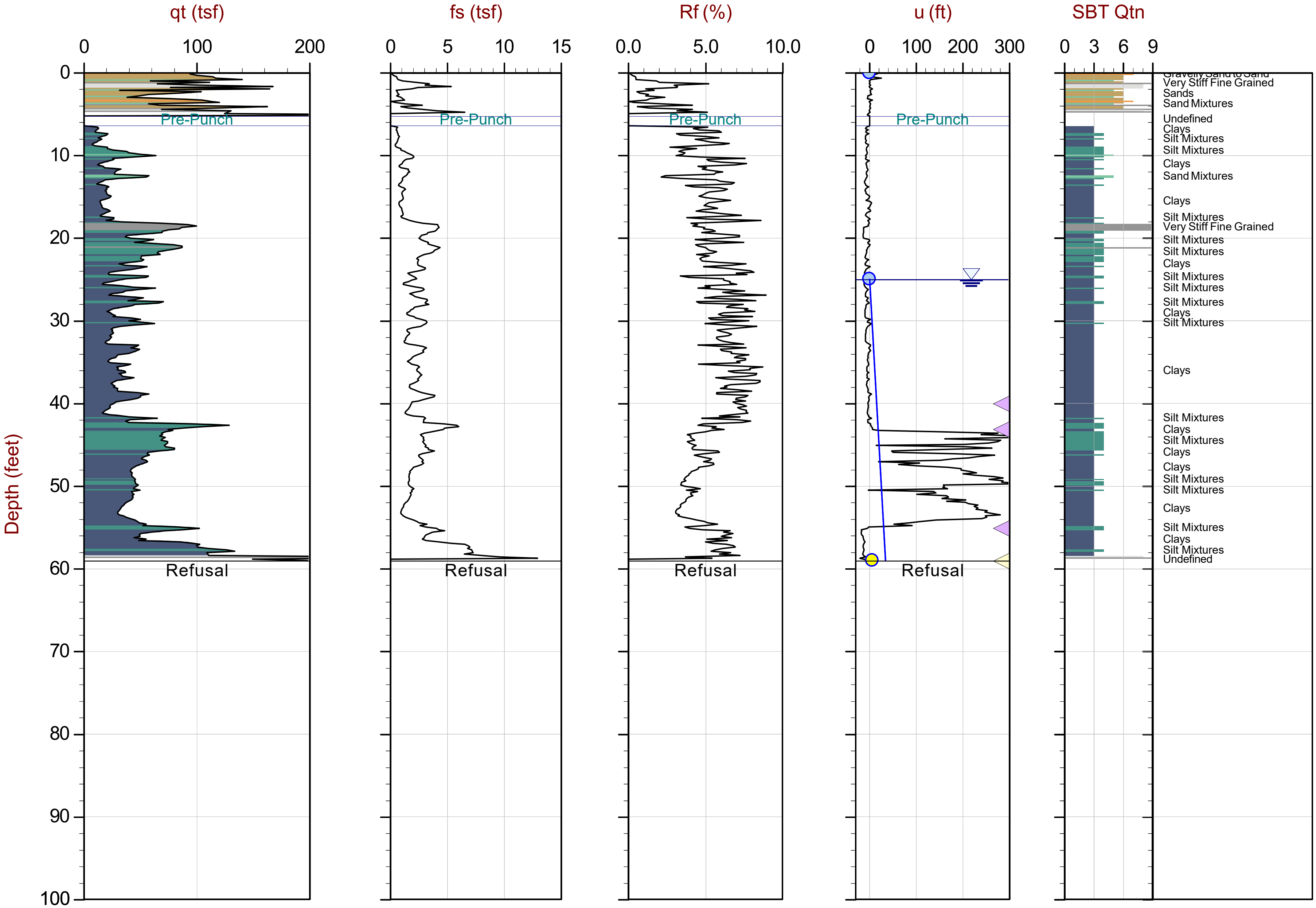
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143404ft E: 13391672ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-13 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500



Max Depth: 18.000 m / 59.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP068.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143440ft E: 13391531ft
Sheet No: 1 of 1

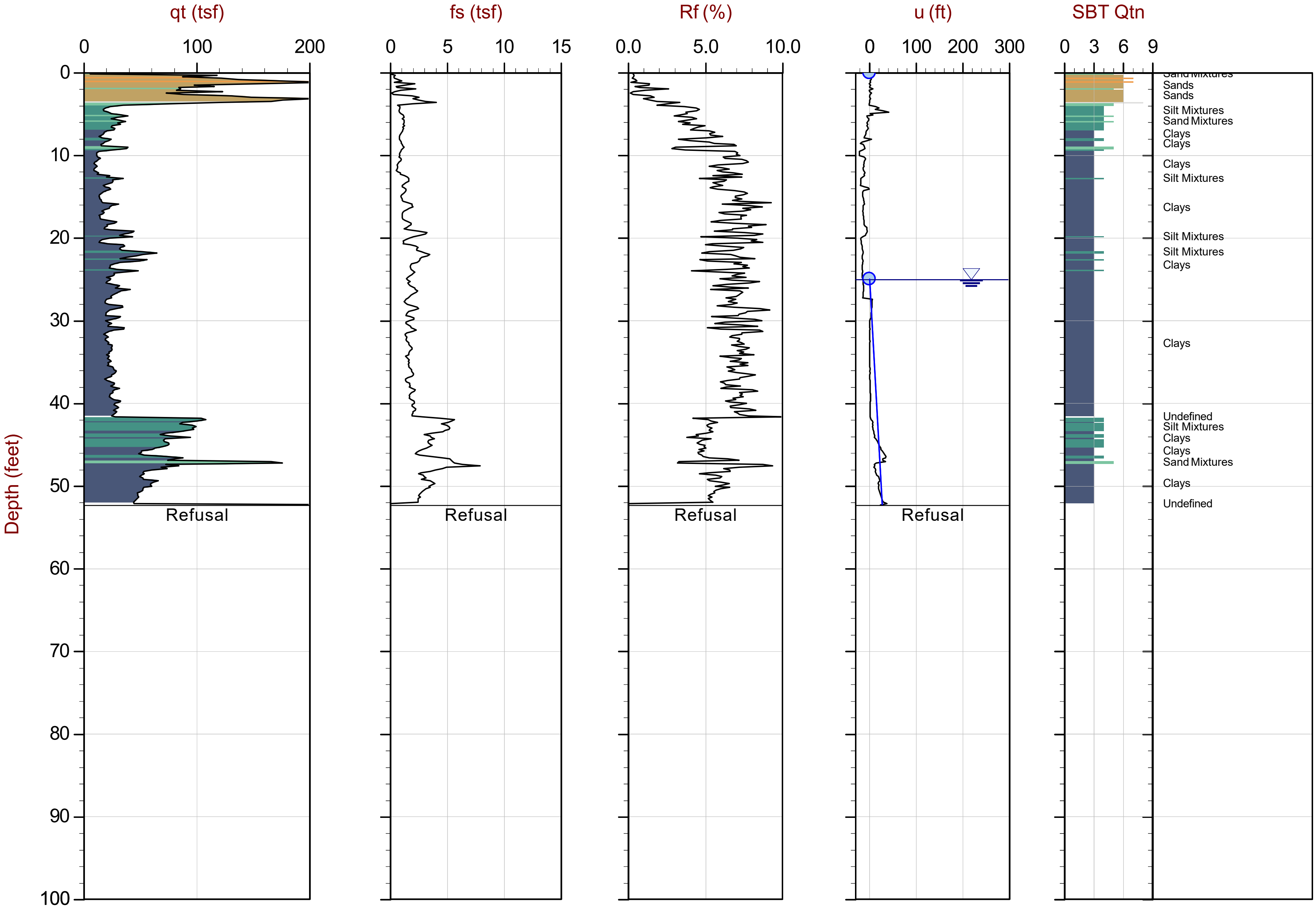
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 12:13
Site: DTE Monroe Power Plant

Sounding: CPT20-070
Cone: 567:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP070.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143314ft E: 13391366ft
Sheet No: 1 of 1

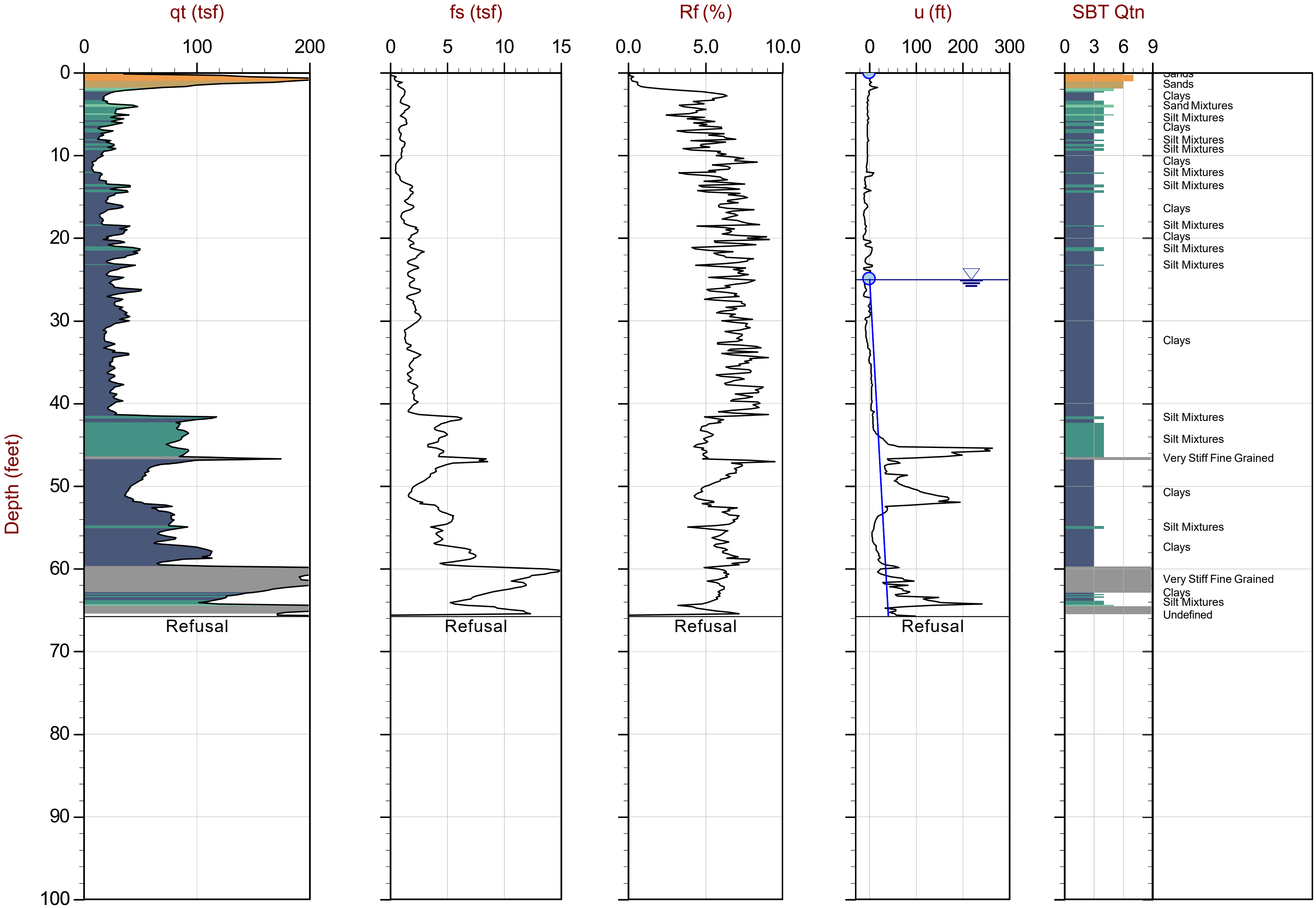
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 13:28
Site: DTE Monroe Power Plant

Sounding: CPT20-072
Cone: 567:T1500F15U500



Max Depth: 20.050 m / 65.78 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP072.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143165ft E: 13391247ft
Sheet No: 1 of 1

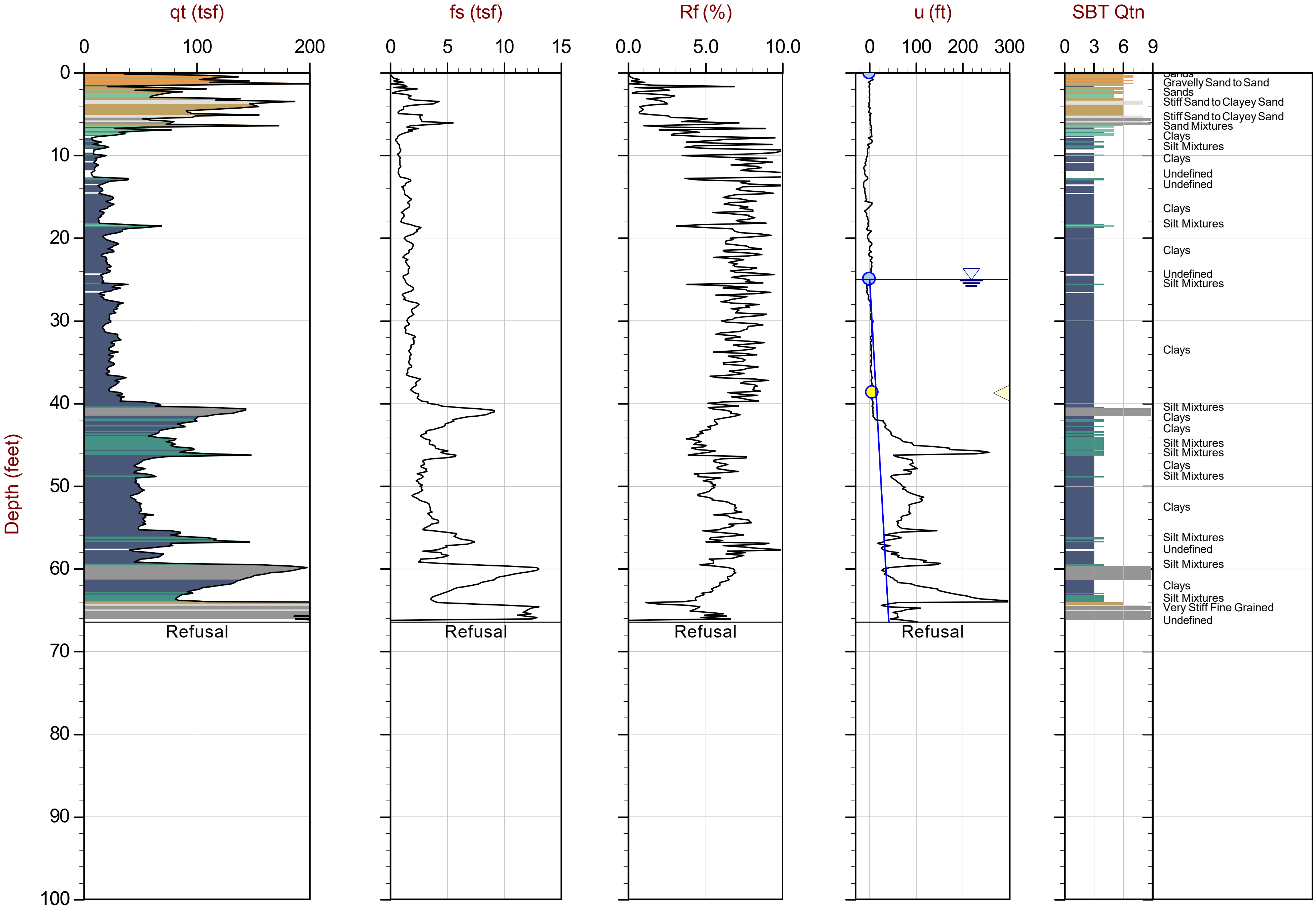
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 14:17
Site: DTE Monroe Power Plant

Sounding: CPT20-074
Cone: 567:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP074.COR
Unit Wt: SBTQtn (PKR2009)

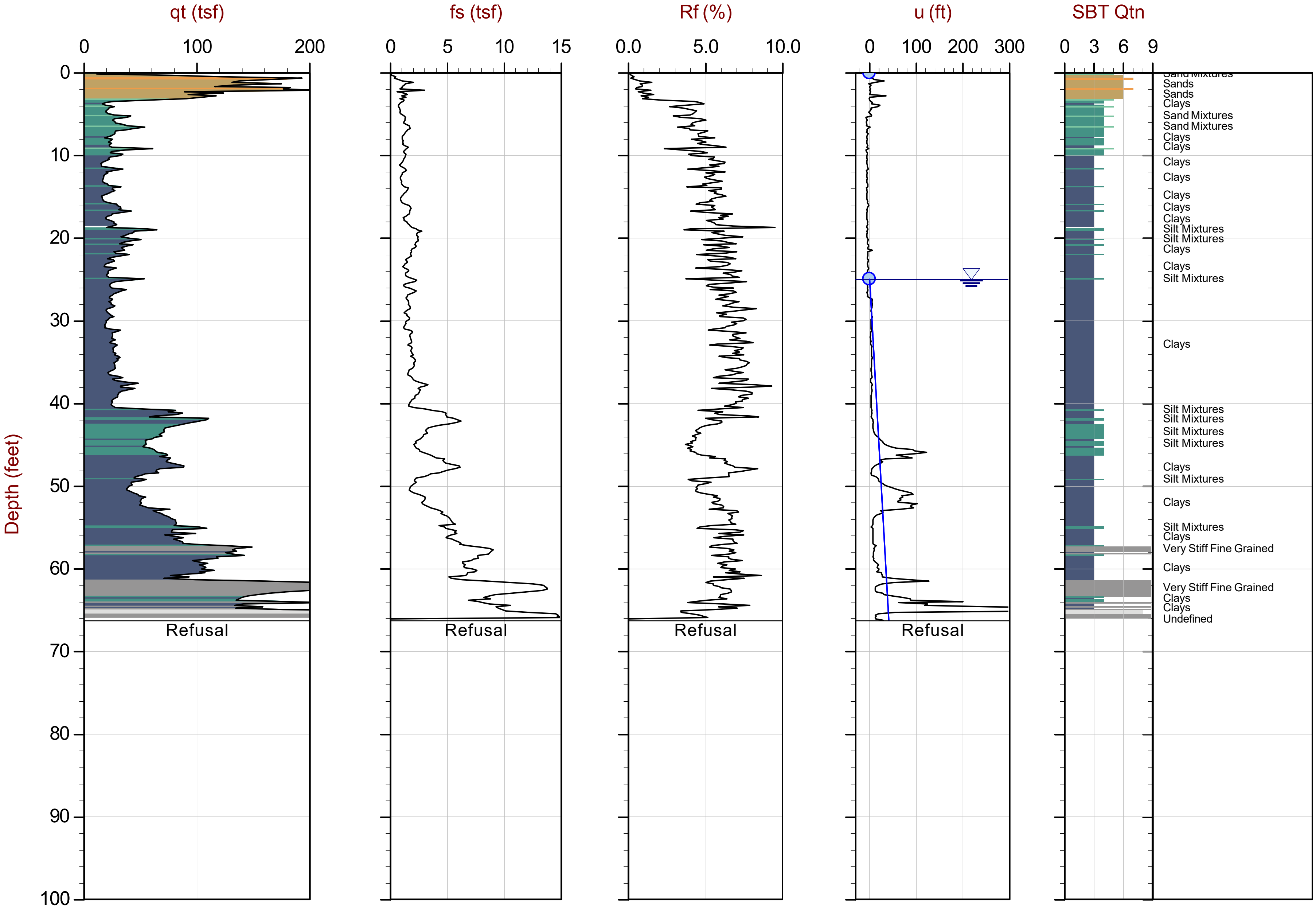
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143014ft E: 13391154ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 08:32
Site: DTE Monroe Power Plant

Sounding: CPT20-076
Cone: 567:T1500F15U500



Max Depth: 20.200 m / 66.27 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP076.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142838ft E: 13391033ft
Sheet No: 1 of 1

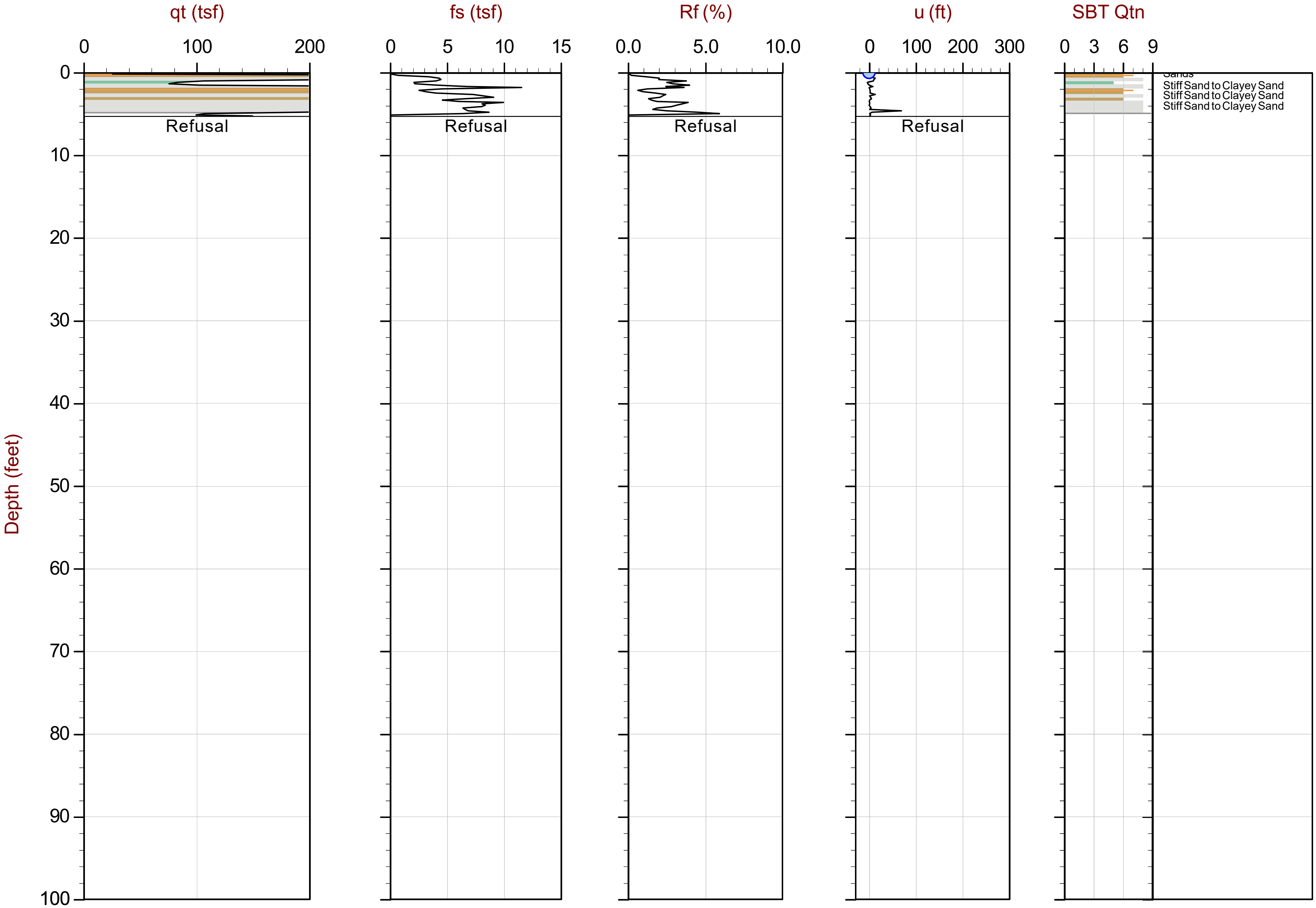
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 09:53
Site: DTE Monroe Power Plant

Sounding: CPT20-078
Cone: 567:T1500F15U500



Max Depth: 1.600 m / 5.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP078.COR
Unit Wt: SBTQtn (PKR2009)

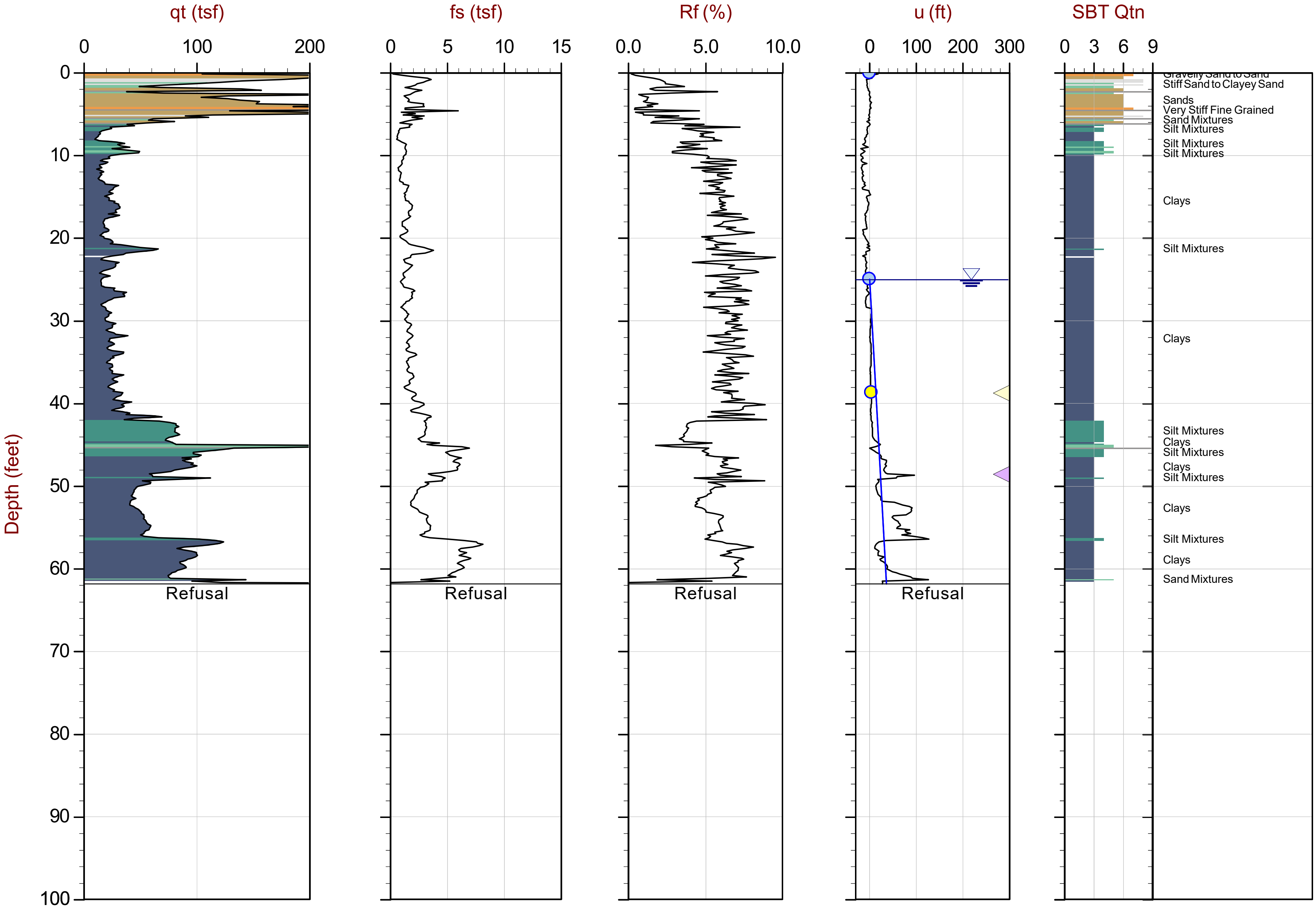
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142629ft E: 13390894ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500



Max Depth: 18.850 m / 61.84 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP078B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142643ft E: 13390903ft
Sheet No: 1 of 1

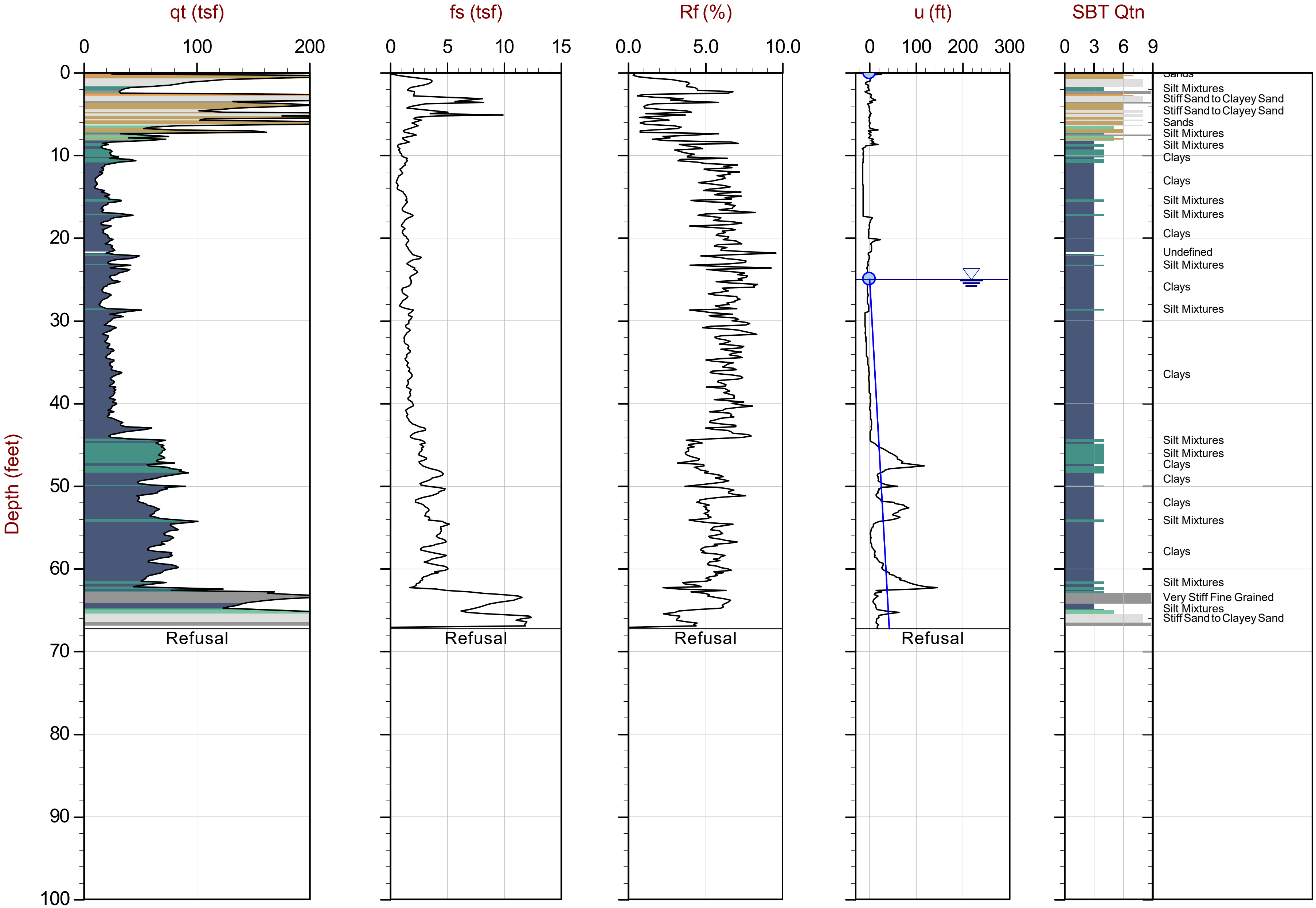
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-080
Cone: 567:T1500F15U500



Max Depth: 20.500 m / 67.26 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP080.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142497ft E: 13390784ft
Sheet No: 1 of 1

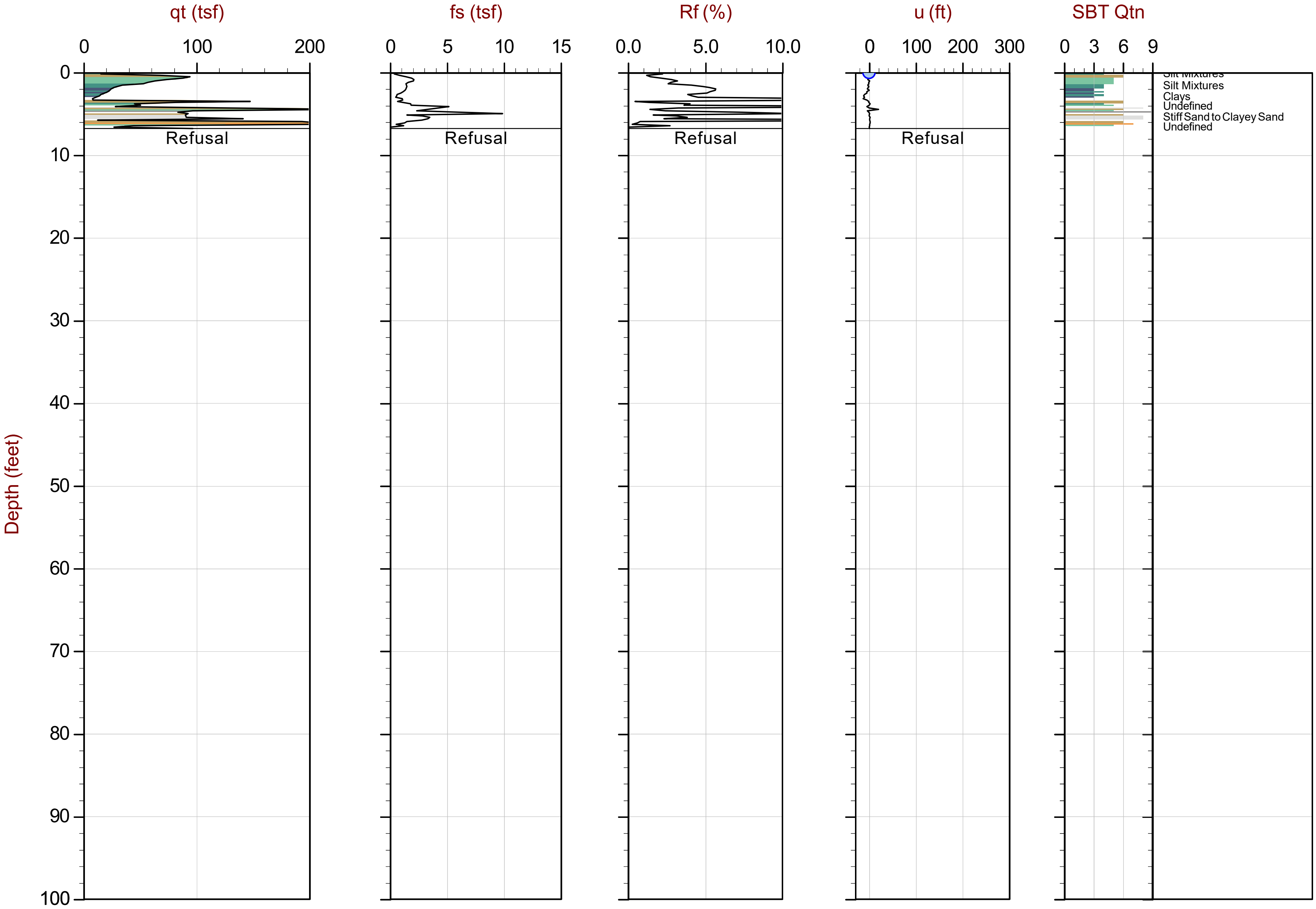
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 12:35
Site: DTE Monroe Power Plant

Sounding: CPT20-082
Cone: 567:T1500F15U500



Max Depth: 2.050 m / 6.73 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP082.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142345ft E: 13390678ft
Sheet No: 1 of 1

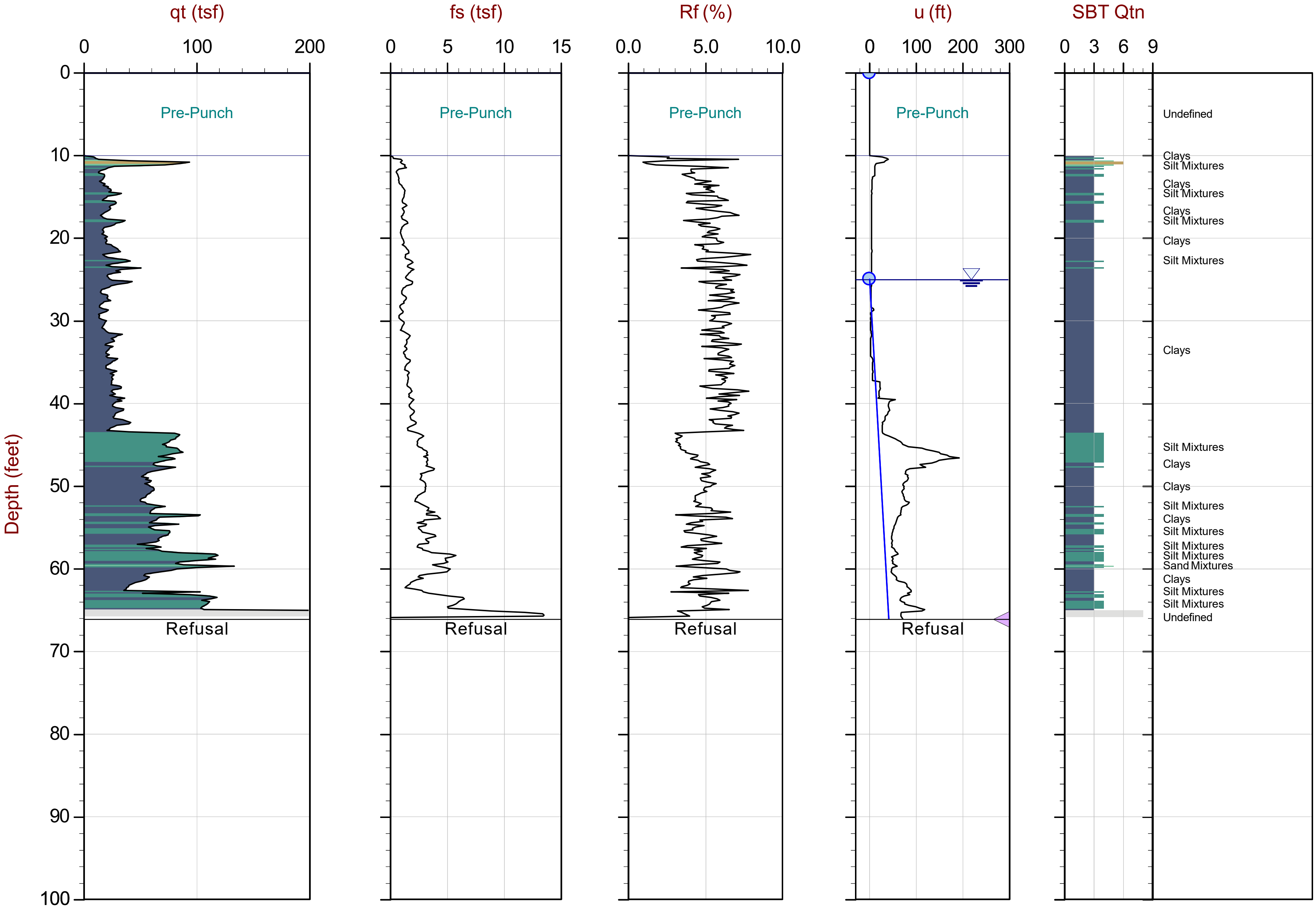
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 13:35
Site: DTE Monroe Power Plant

Sounding: CPT20-082B
Cone: 675:T1500F15U500



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP082B.COR
Unit Wt: SBTQtn (PKR2009)

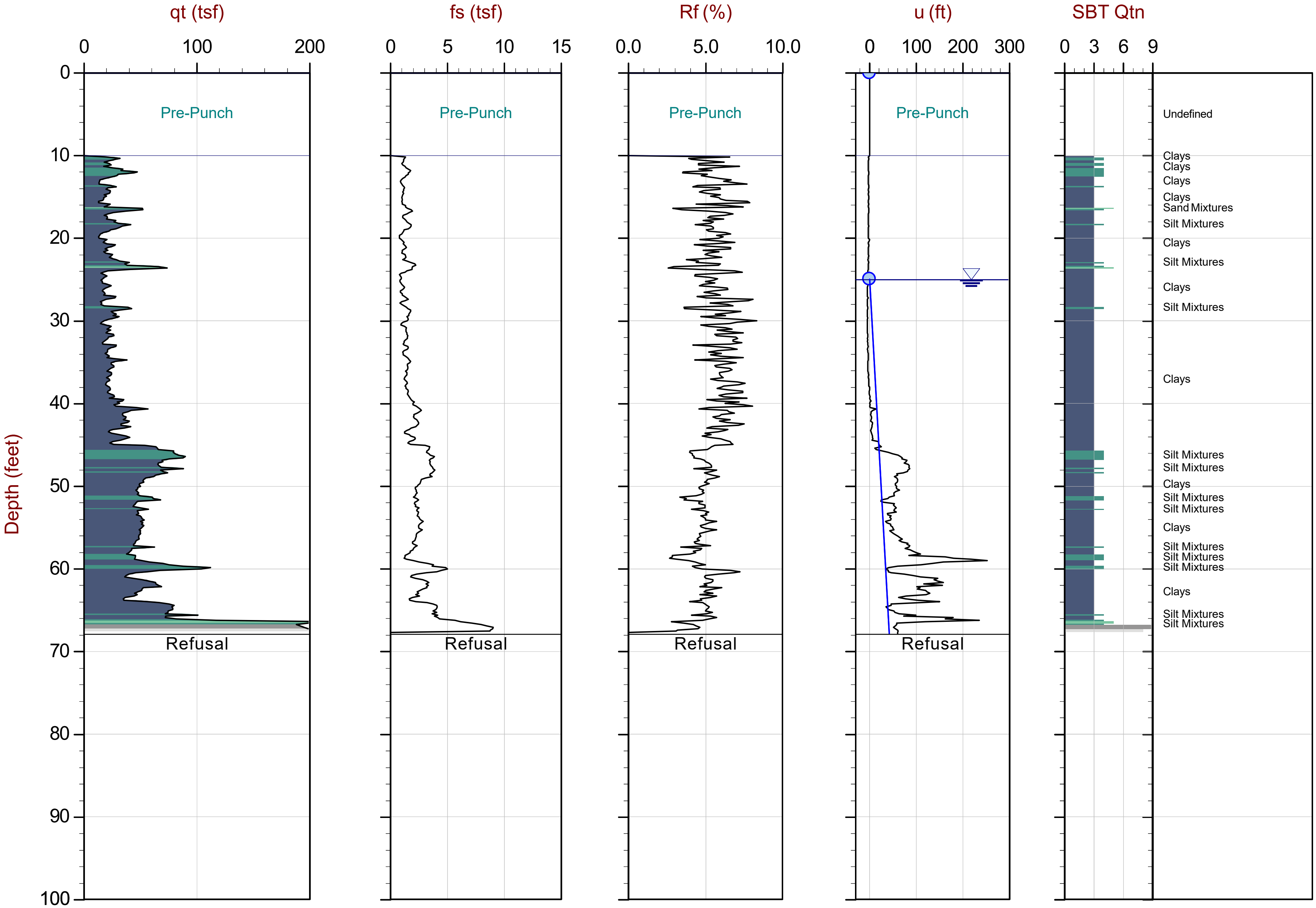
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142344ft E: 13390669ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 15:18
Site: DTE Monroe Power Plant

Sounding: CPT20-084
Cone: 675:T1500F15U500



Max Depth: 20.700 m / 67.91 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP084.COR
Unit Wt: SBTQtn (PKR2009)

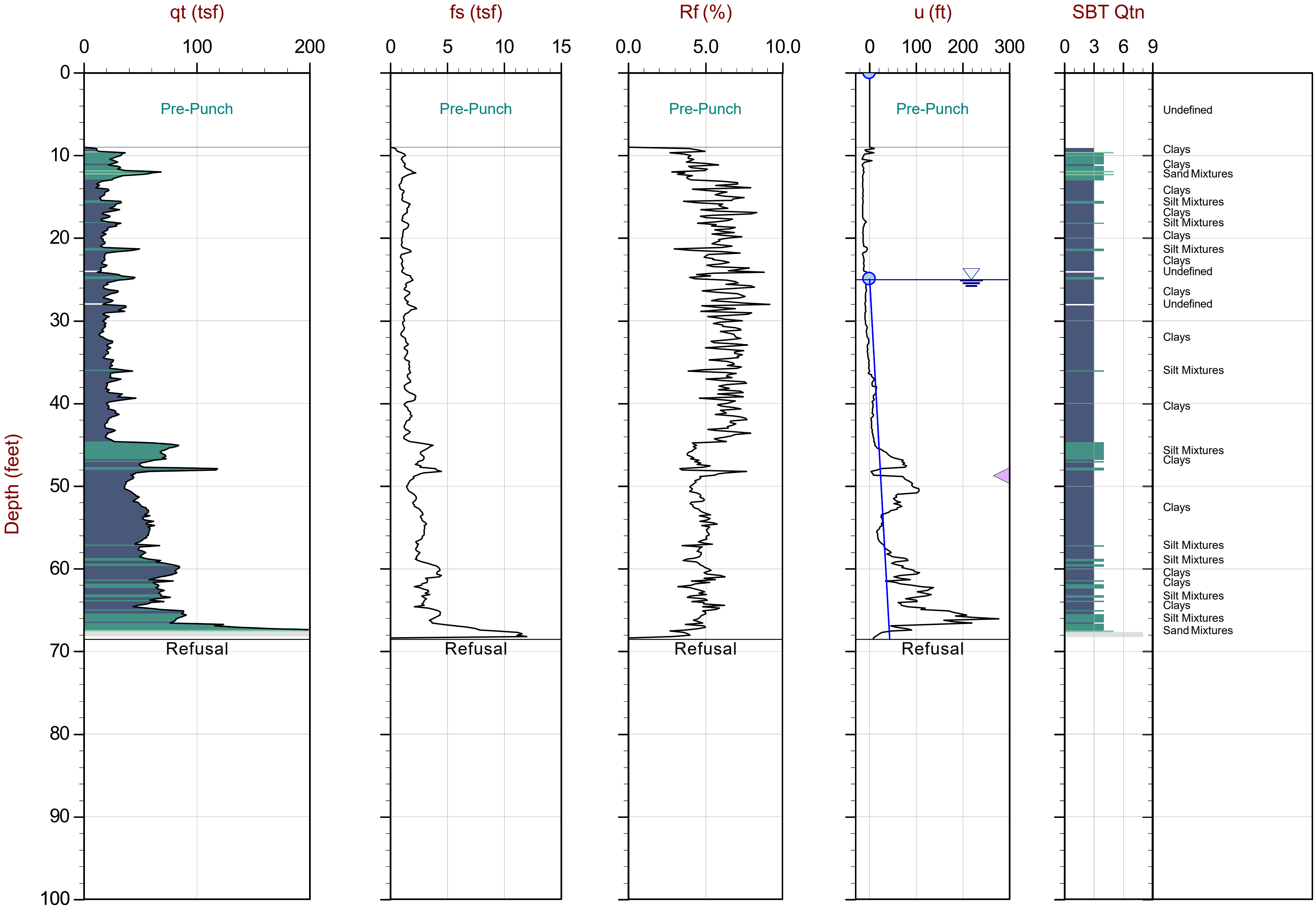
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142185ft E: 13390553ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-086
Cone: 675:T1500F15U500



Max Depth: 20.900 m / 68.57 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP086.COR
Unit Wt: SBTQtn (PKR2009)

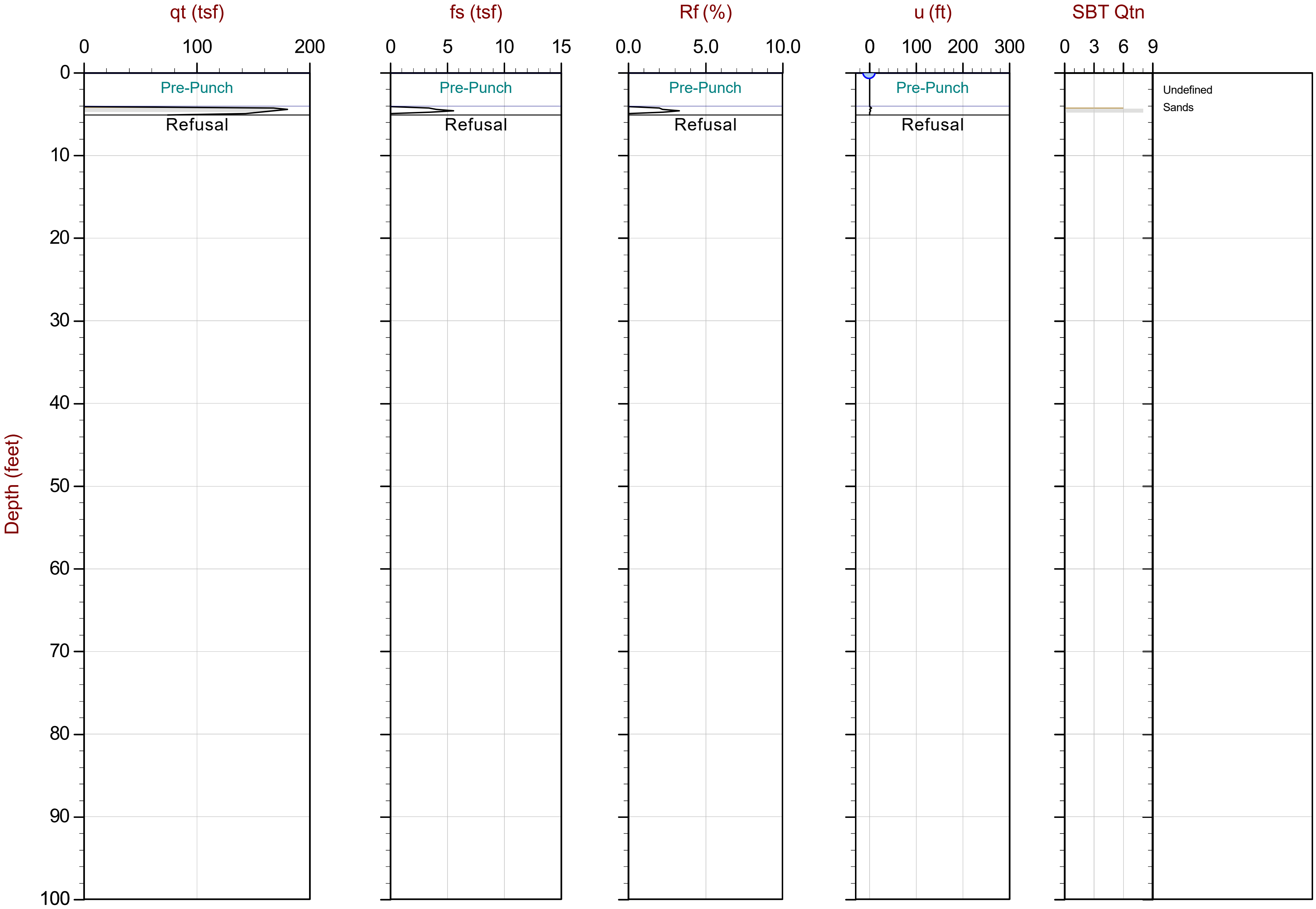
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141994ft E: 13390446ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 09:52
Site: DTE Monroe Power Plant

Sounding: CPT20-088
Cone: 675:T1500F15U500



Max Depth: 1.550 m / 5.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP088.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141837ft E: 13390373ft
Sheet No: 1 of 1

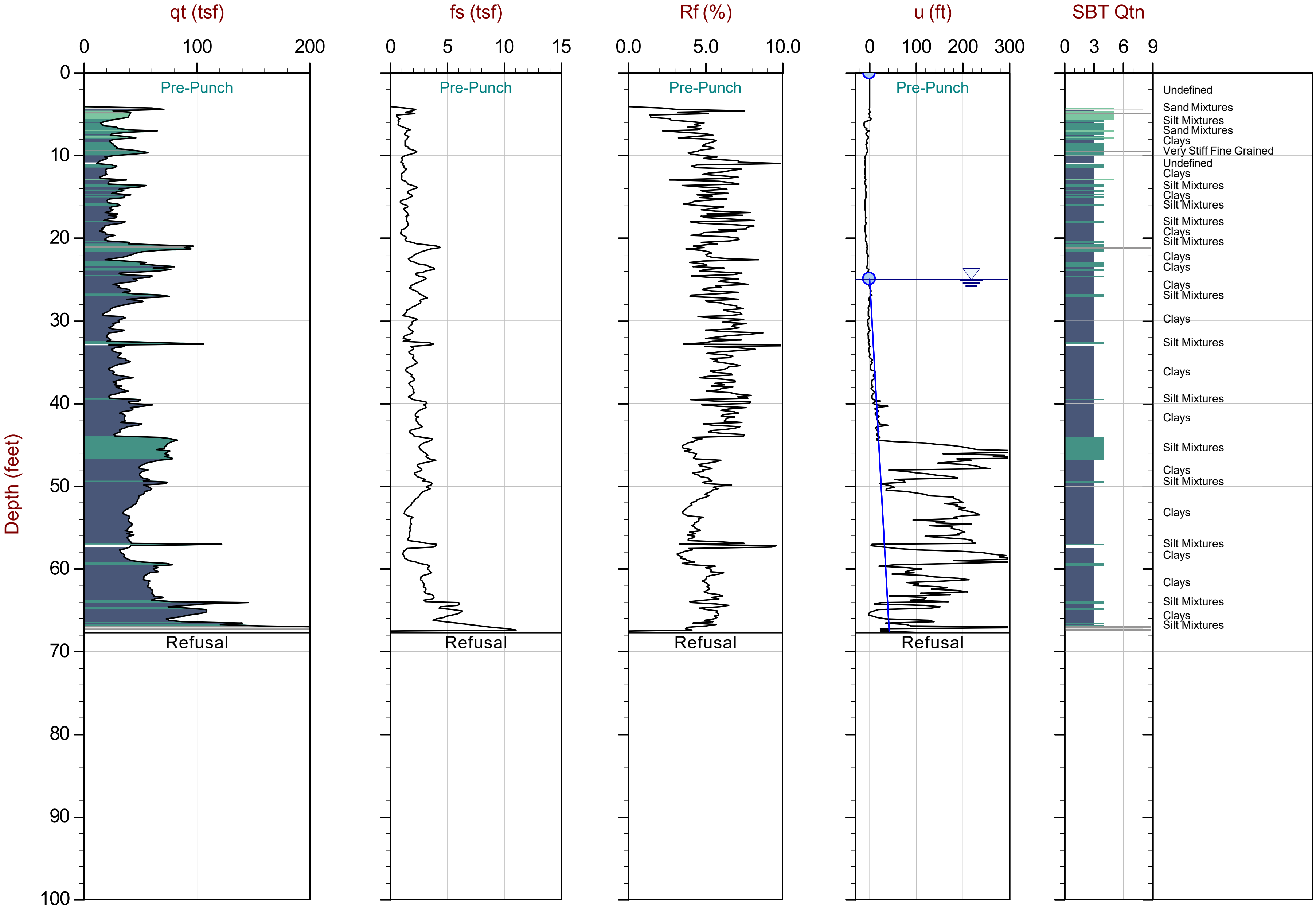
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-088B
Cone: 675:T1500F15U500



Max Depth: 20.650 m / 67.75 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP088B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141843ft E: 13390373ft
Sheet No: 1 of 1

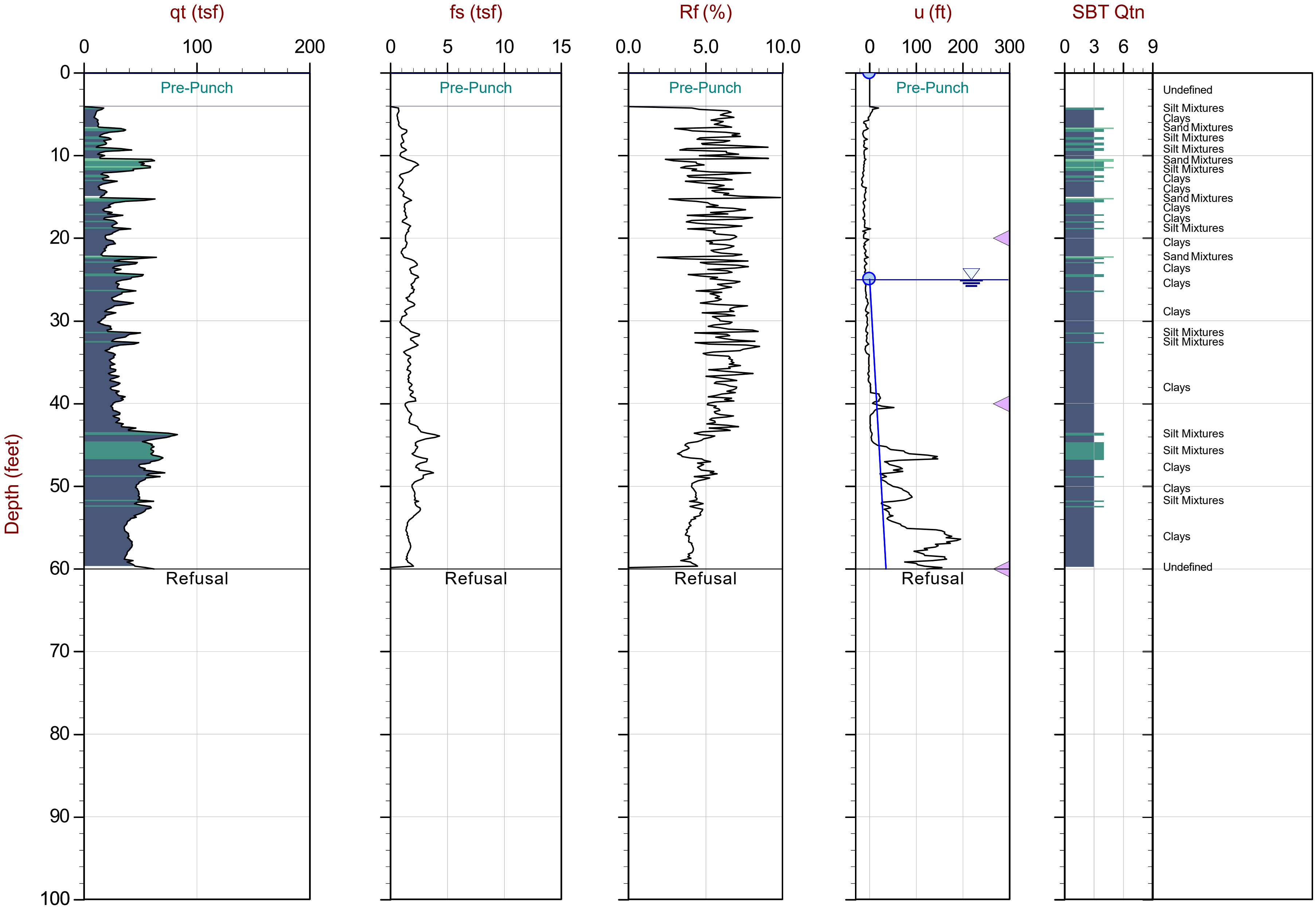
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500



Max Depth: 18.300 m / 60.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP090.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141754ft E: 13390528ft
Sheet No: 1 of 1

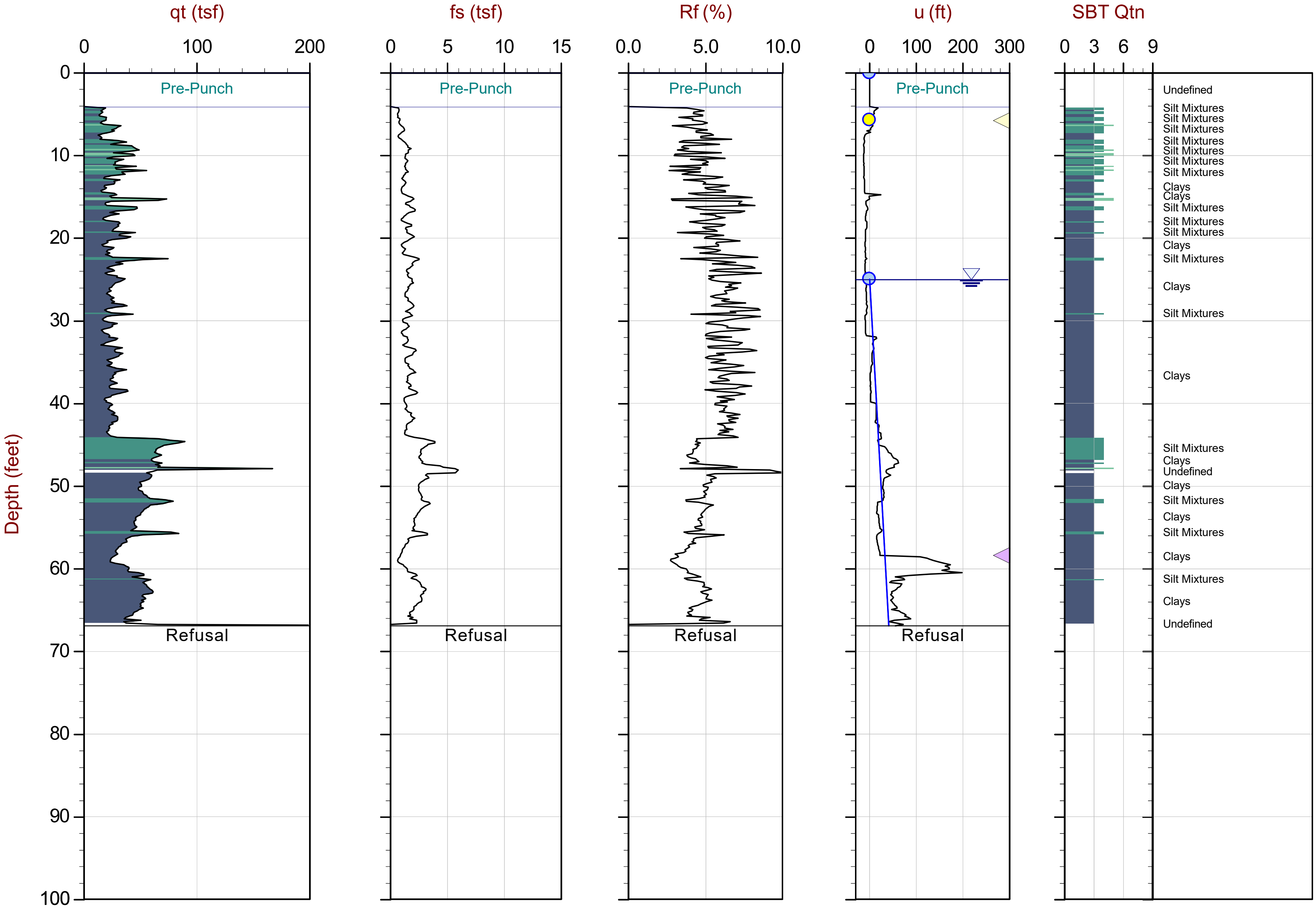
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 09:32
Site: DTE Monroe Power Plant

Sounding: CPT20-092
Cone: 675:T1500F15U500



Max Depth: 20.400 m / 66.93 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP092.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141703ft E: 13390714ft
Sheet No: 1 of 1

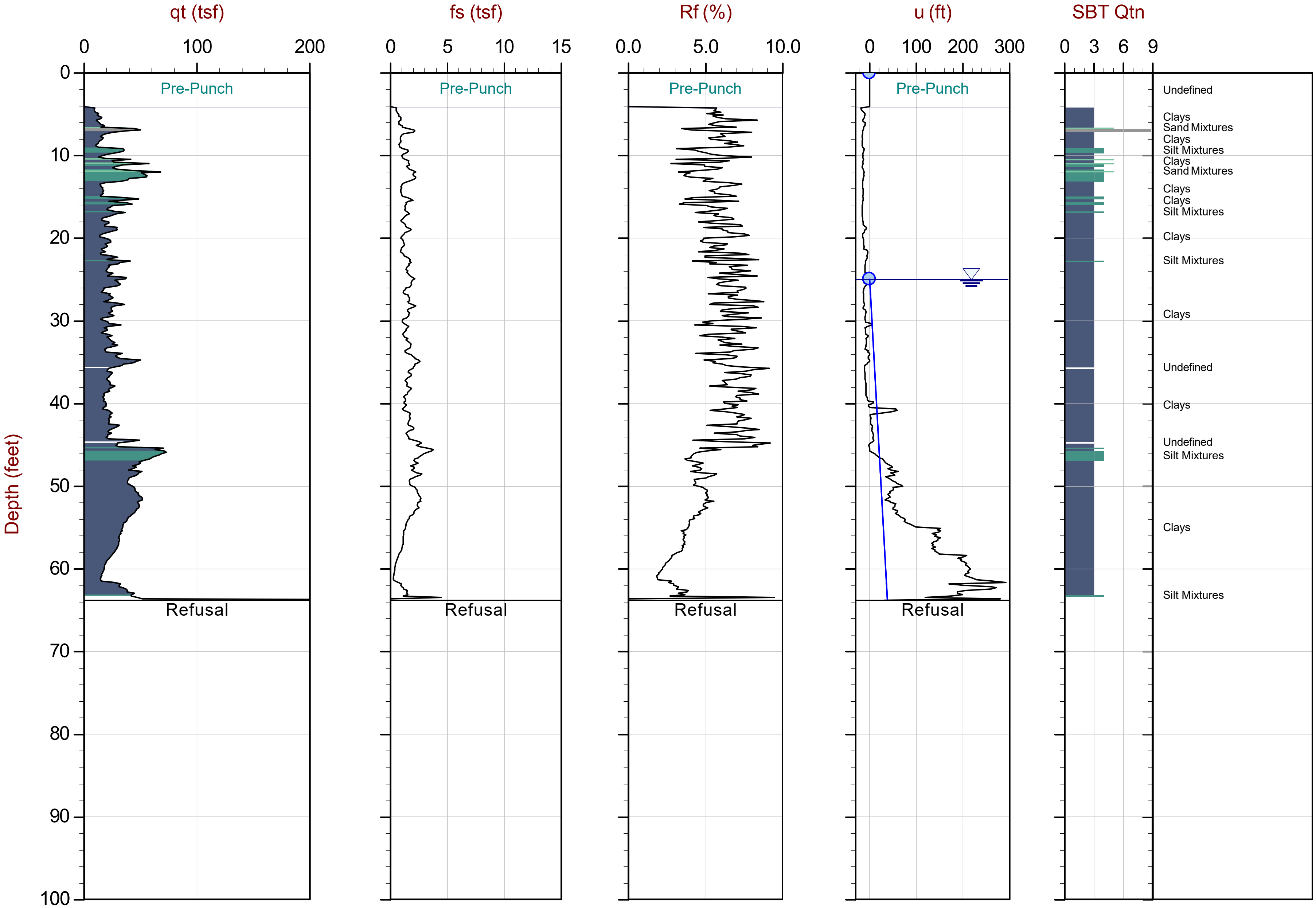
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 10:56
Site: DTE Monroe Power Plant

Sounding: CPT20-094
Cone: 513:T1500F15U500



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP094.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141591ft E: 13390889ft
Sheet No: 1 of 1

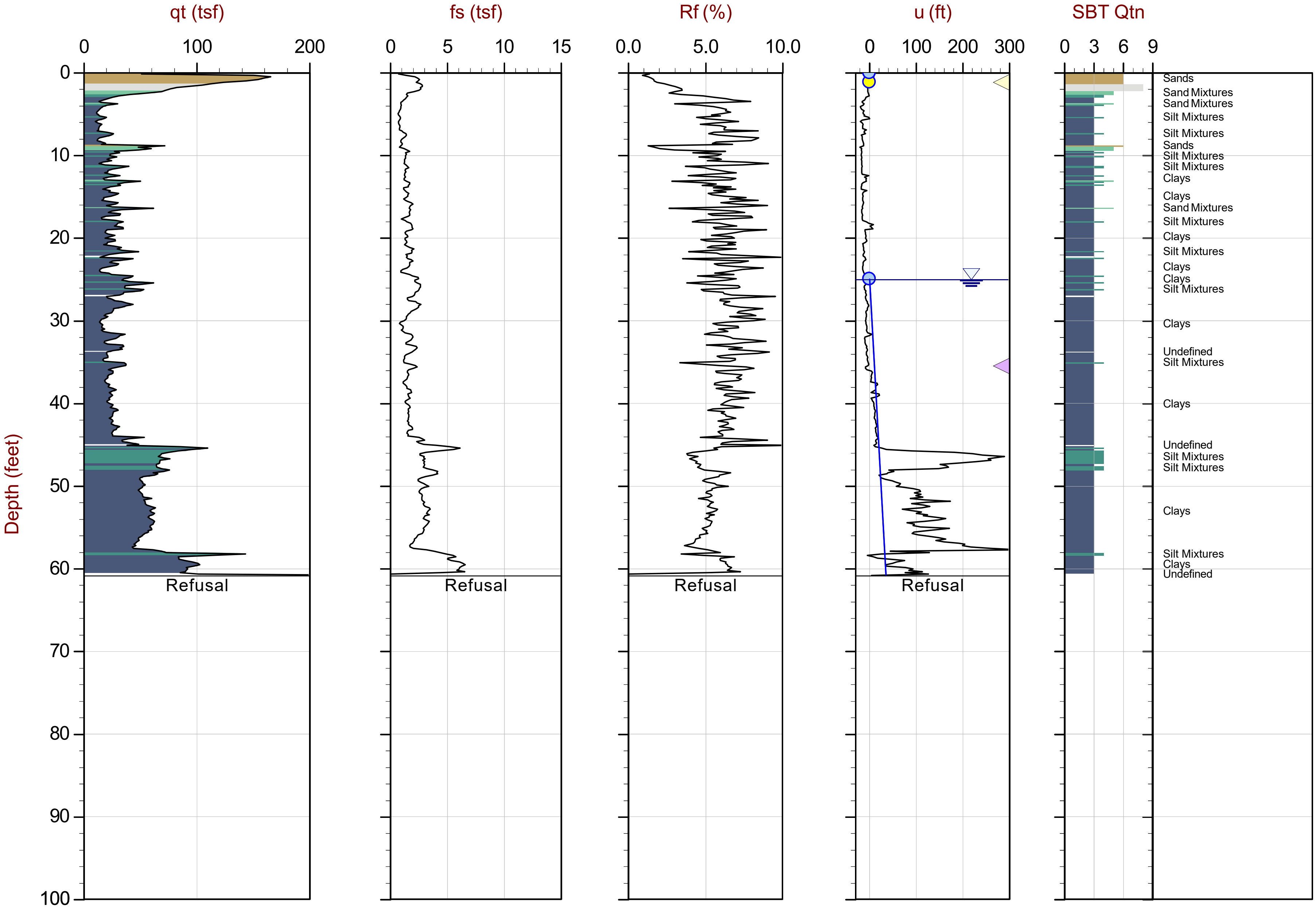
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 11:51
Site: DTE Monroe Power Plant

Sounding: SCPT20-096
Cone: 513:T1500F15U500



Max Depth: 18.550 m / 60.86 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_SP096.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141475ft E: 13391090ft
Sheet No: 1 of 1

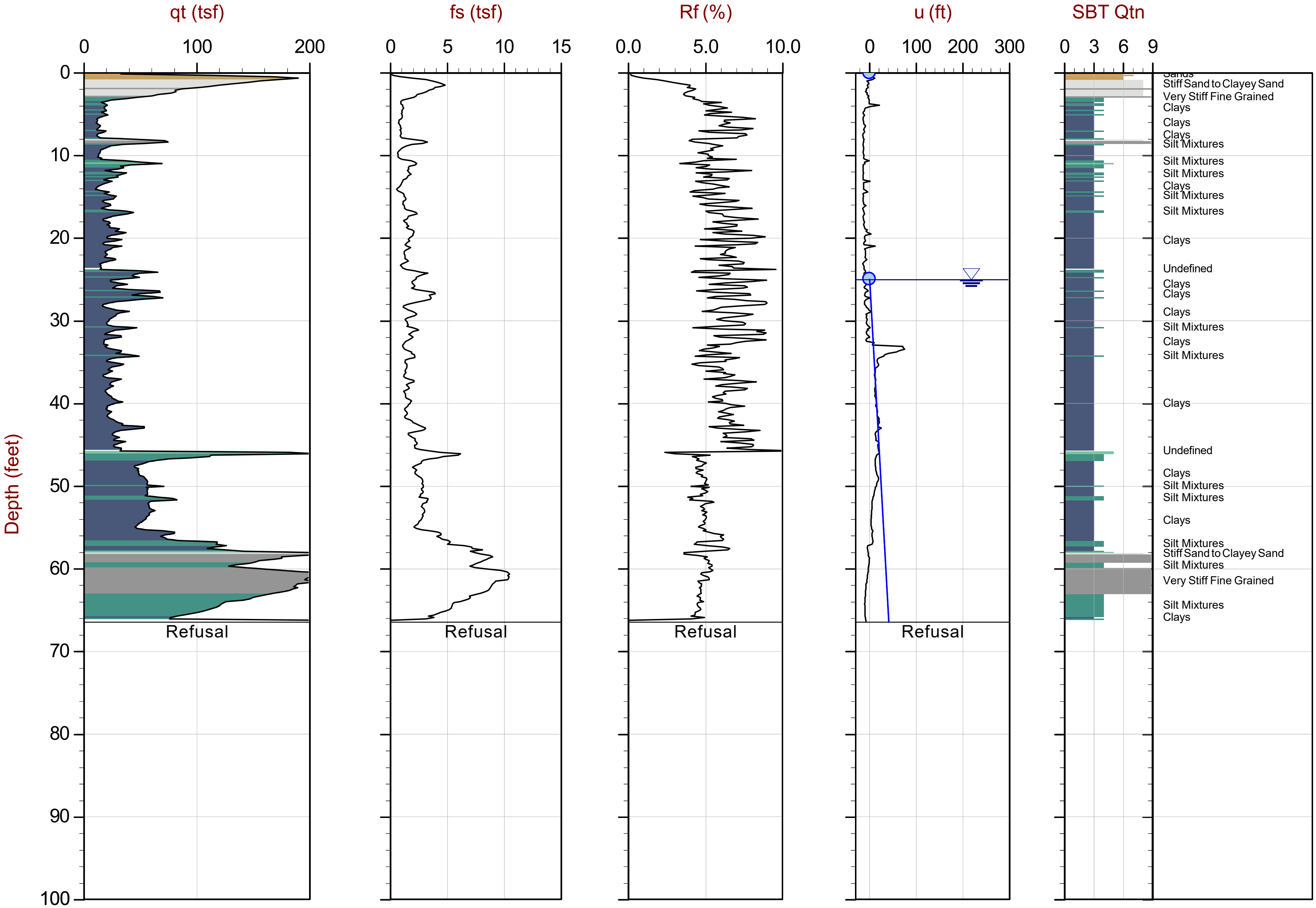
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 13:33
Site: DTE Monroe Power Plant

Sounding: CPT20-098
Cone: 513:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP098.COR
Unit Wt: SBTQtn (PKR2009)

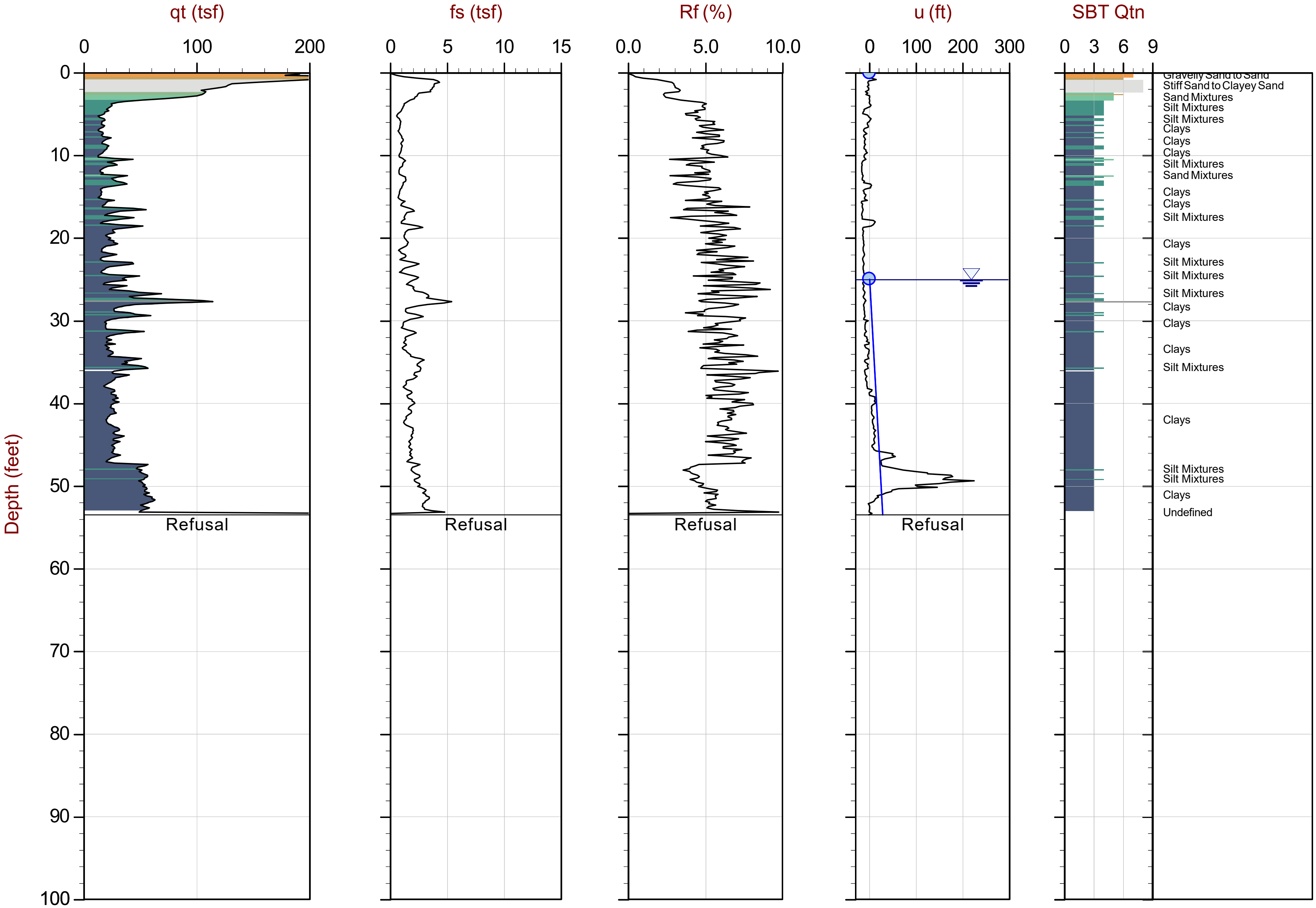
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141442ft E: 13391262ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-100
Cone: 513:T1500F15U500



Max Depth: 16.300 m / 53.48 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP100.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141368ft E: 13391479ft
Sheet No: 1 of 1

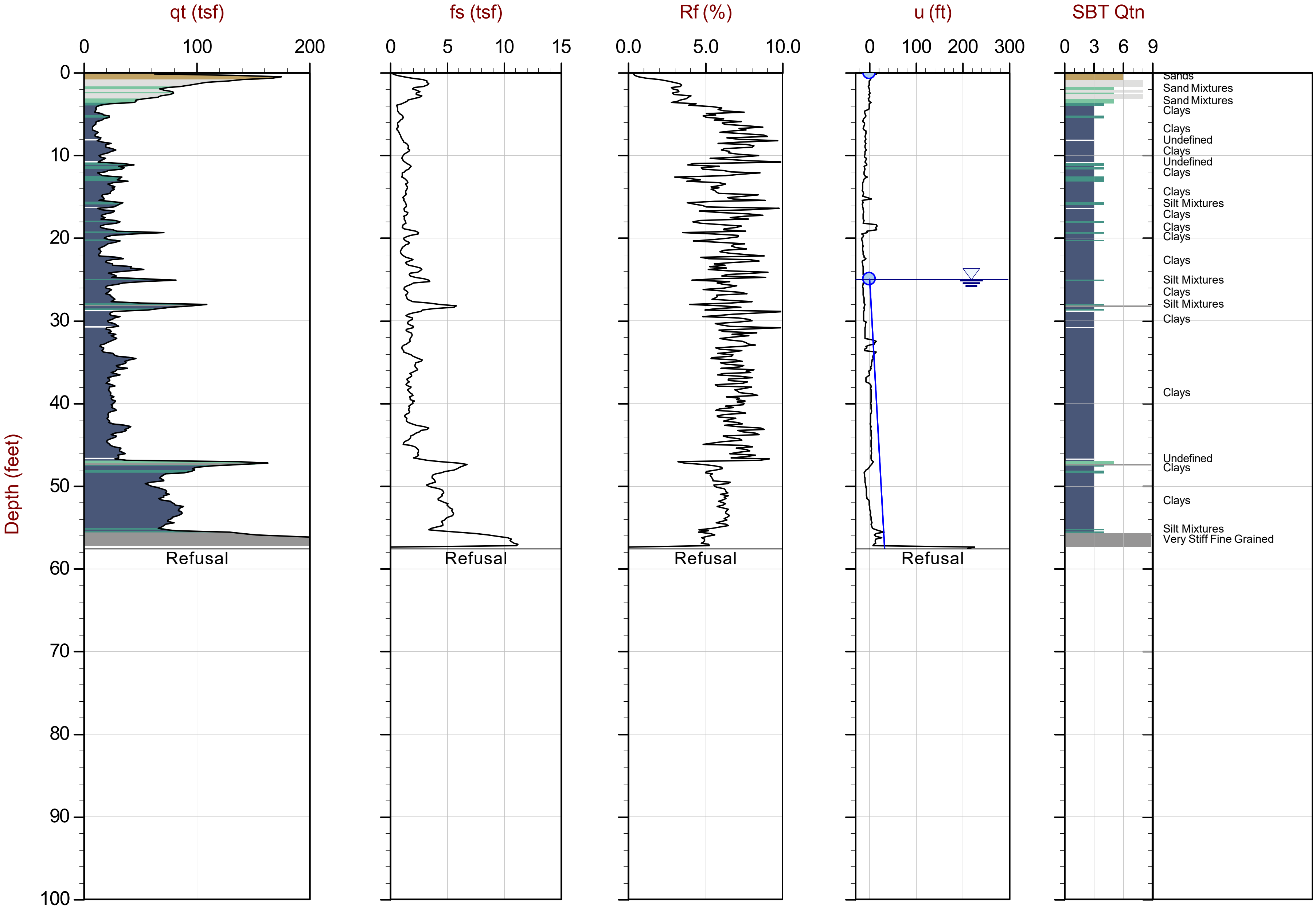
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 09:41
Site: DTE Monroe Power Plant

Sounding: CPT20-102
Cone: 513:T1500F15U500



Max Depth: 17.550 m / 57.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP102.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141297ft E: 13391656ft
Sheet No: 1 of 1

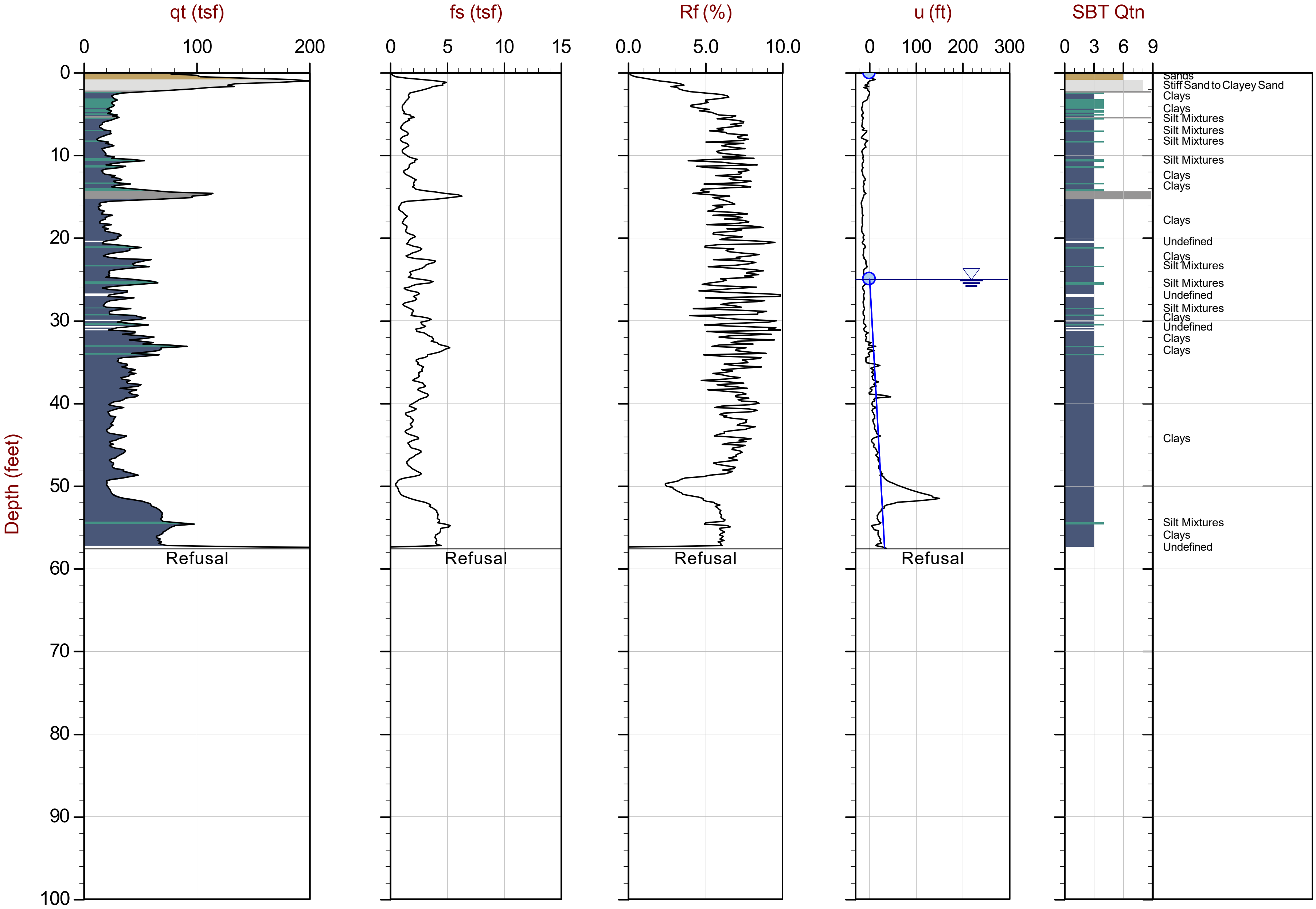
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 10:26
Site: DTE Monroe Power Plant

Sounding: CPT20-104
Cone: 513:T1500F15U500



Max Depth: 17.550 m / 57.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP104.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141174ft E: 13391805ft
Sheet No: 1 of 1

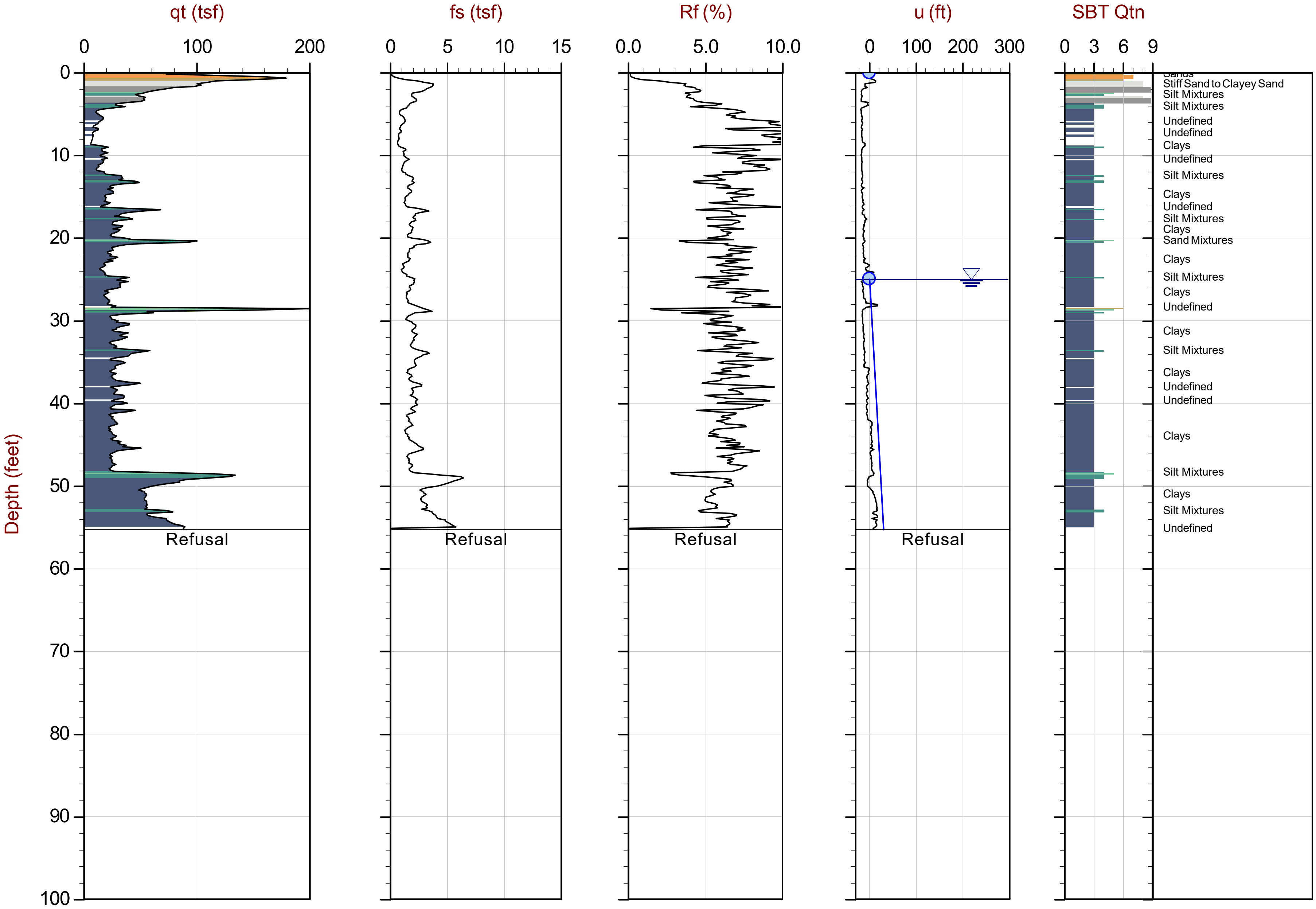
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 11:10
Site: DTE Monroe Power Plant

Sounding: CPT20-106
Cone: 513:T1500F15U500



Max Depth: 16.850 m / 55.28 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP106.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140981ft E: 13391734ft
Sheet No: 1 of 1

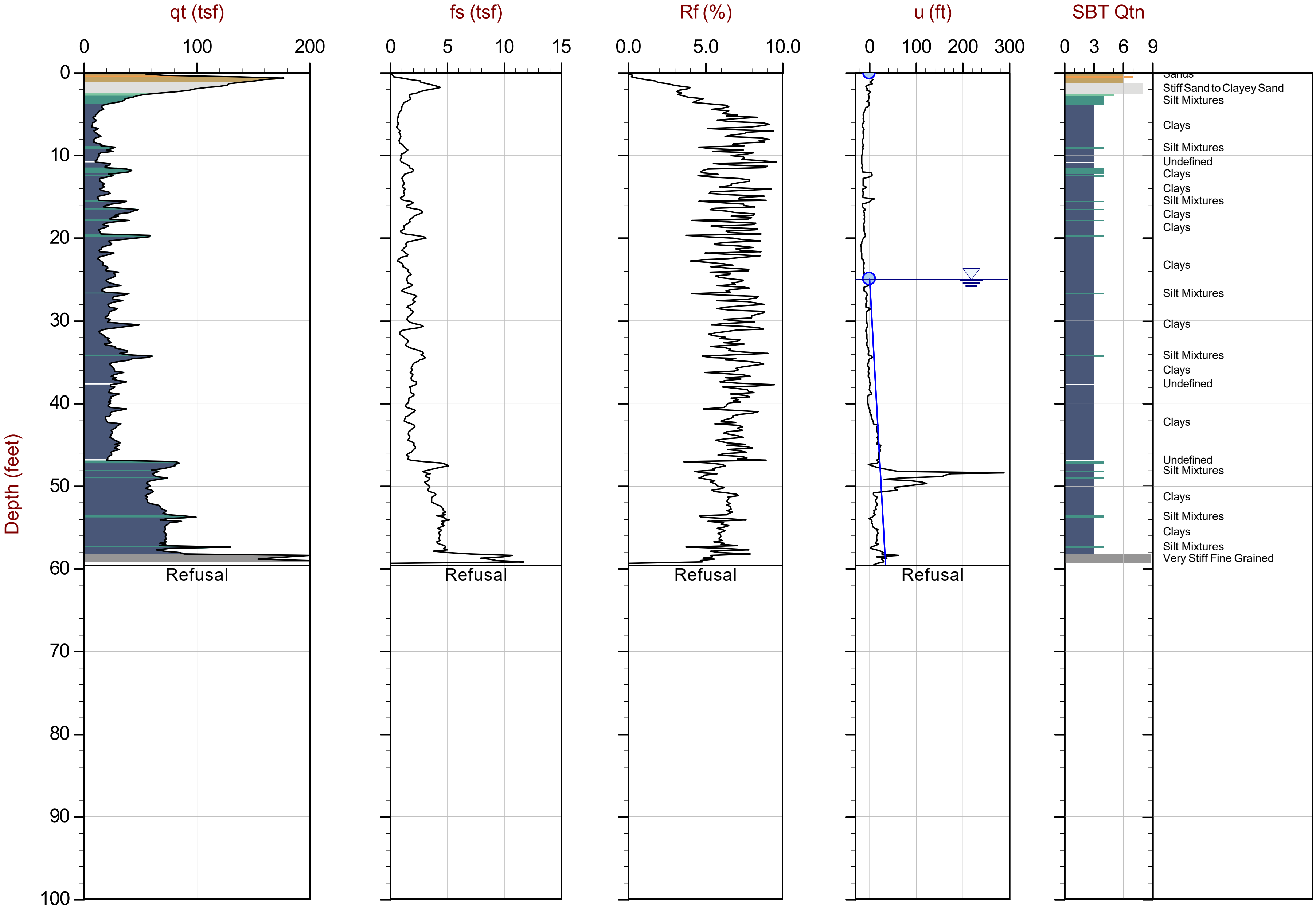
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 11:58
Site: DTE Monroe Power Plant

Sounding: CPT20-108
Cone: 513:T1500F15U500



Max Depth: 18.150 m / 59.55 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP108.COR
Unit Wt: SBTQtn (PKR2009)

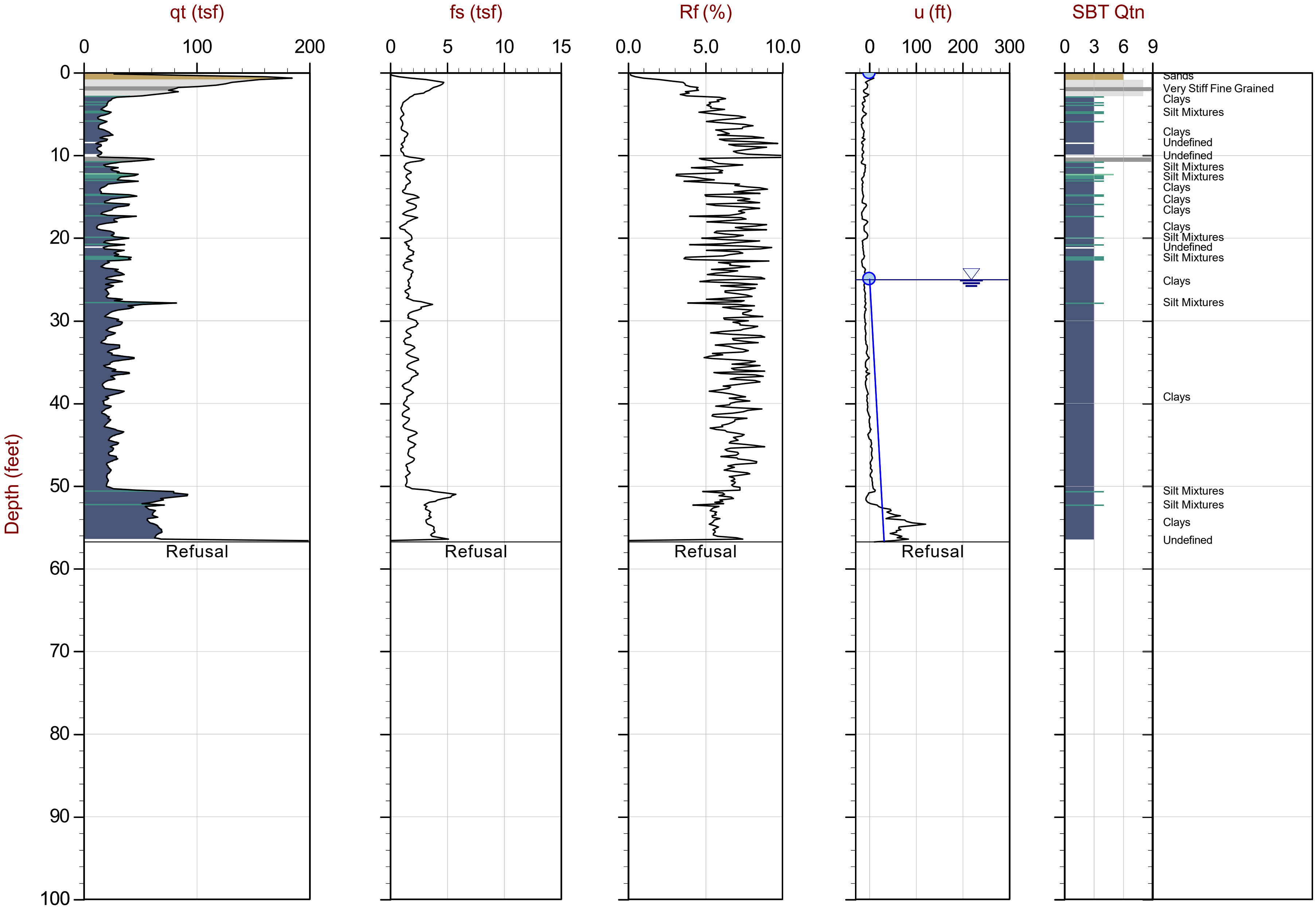
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140801ft E: 13391655ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 12:45
Site: DTE Monroe Power Plant

Sounding: CPT20-110
Cone: 513:T1500F15U500



Max Depth: 17.300 m / 56.76 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP110.COR
Unit Wt: SBTQtn (PKR2009)

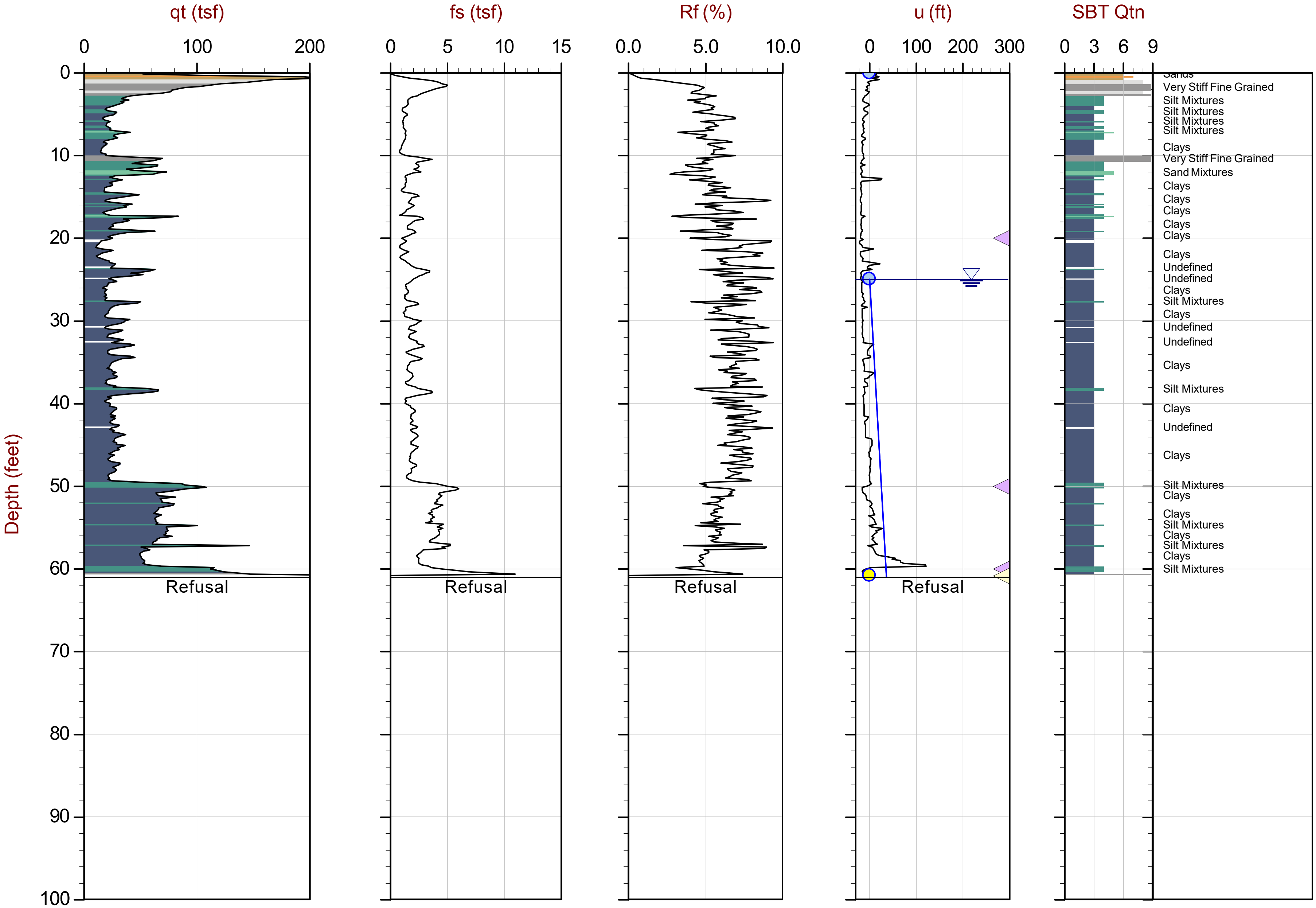
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140617ft E: 13391584ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500



Max Depth: 18.600 m / 61.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP110B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140610ft E: 13391577ft
Sheet No: 1 of 1

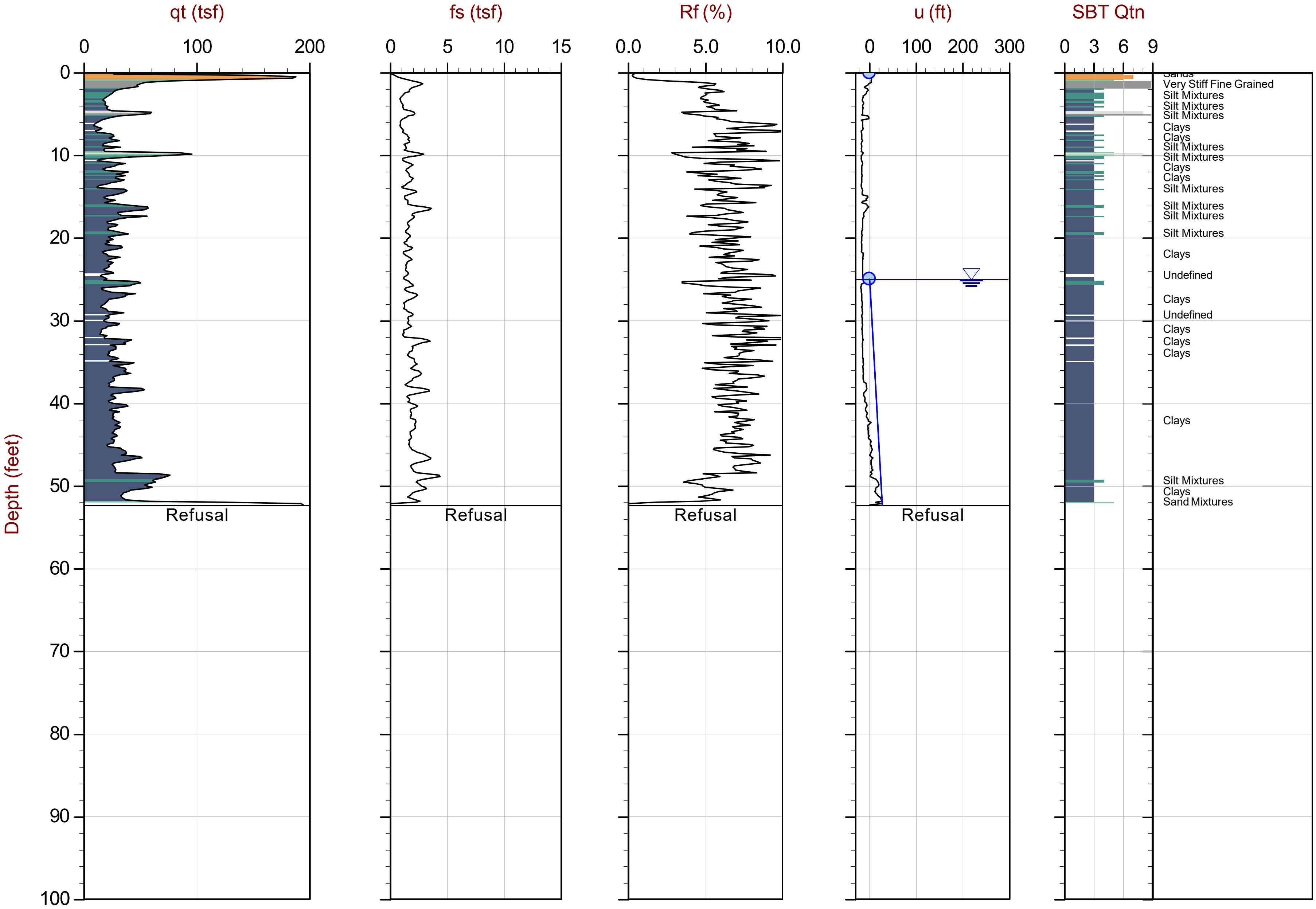
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 13:34
Site: DTE Monroe Power Plant

Sounding: CPT20-112
Cone: 513:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP112.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140443ft E: 13391653ft
Sheet No: 1 of 1

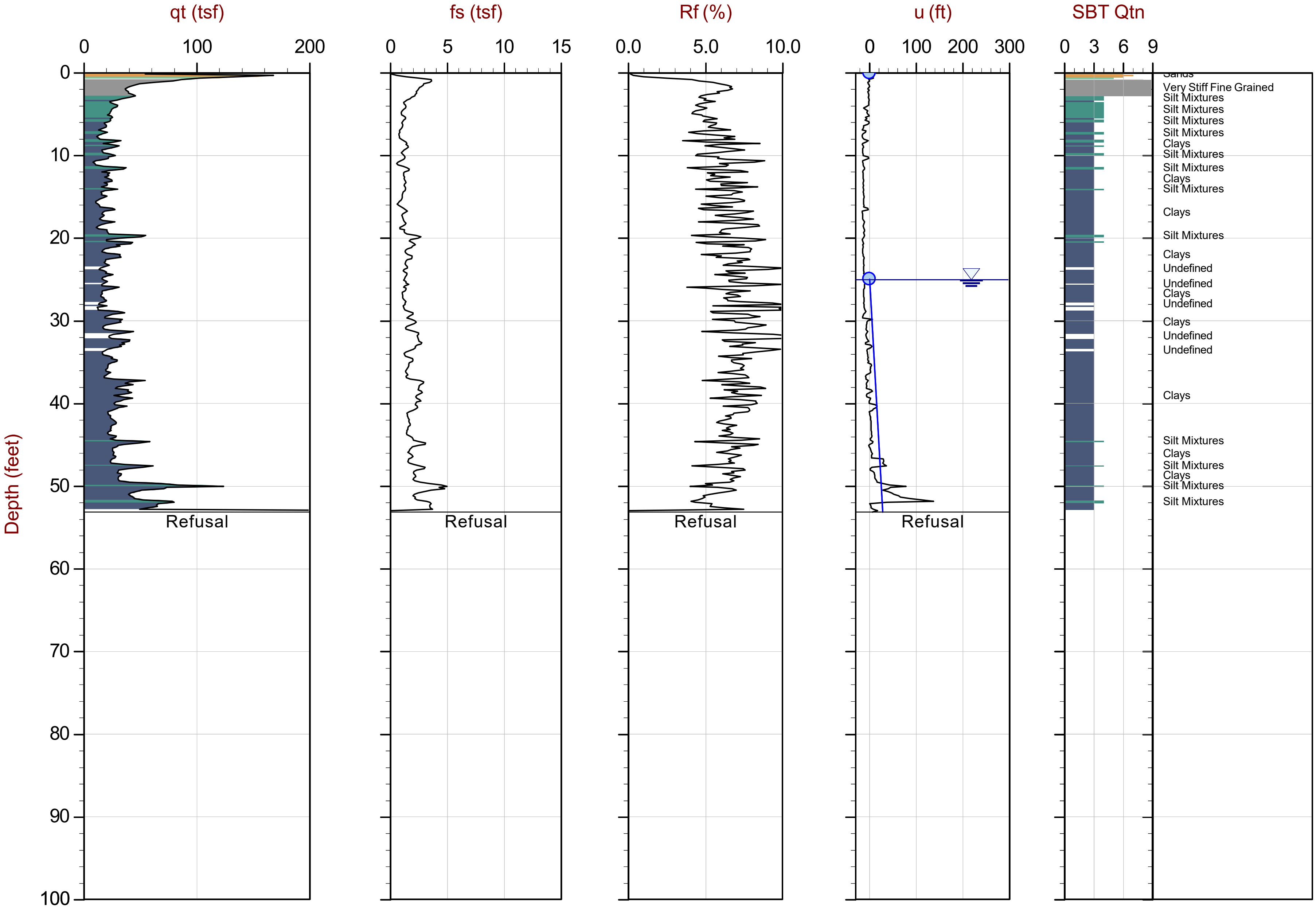
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 14:25
Site: DTE Monroe Power Plant

Sounding: SCPT20-114
Cone: 513:T1500F15U500



Max Depth: 16.200 m / 53.15 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_SP114.COR
Unit Wt: SBTQtn (PKR2009)

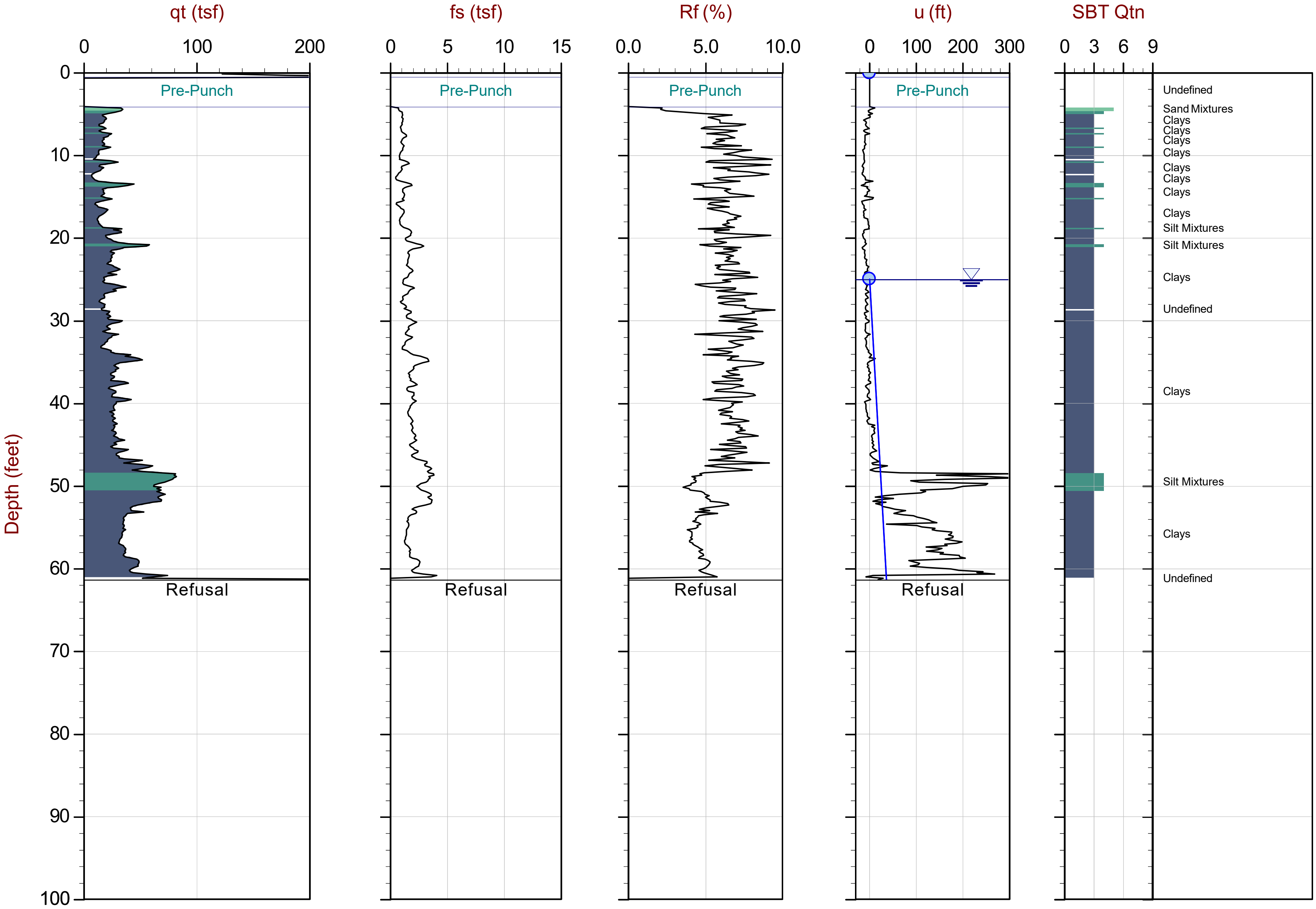
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140335ft E: 13391822ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 15:13
Site: DTE Monroe Power Plant

Sounding: CPT20-116
Cone: 513:T1500F15U500



Max Depth: 18.700 m / 61.35 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP116.COR
Unit Wt: SBTQtn (PKR2009)

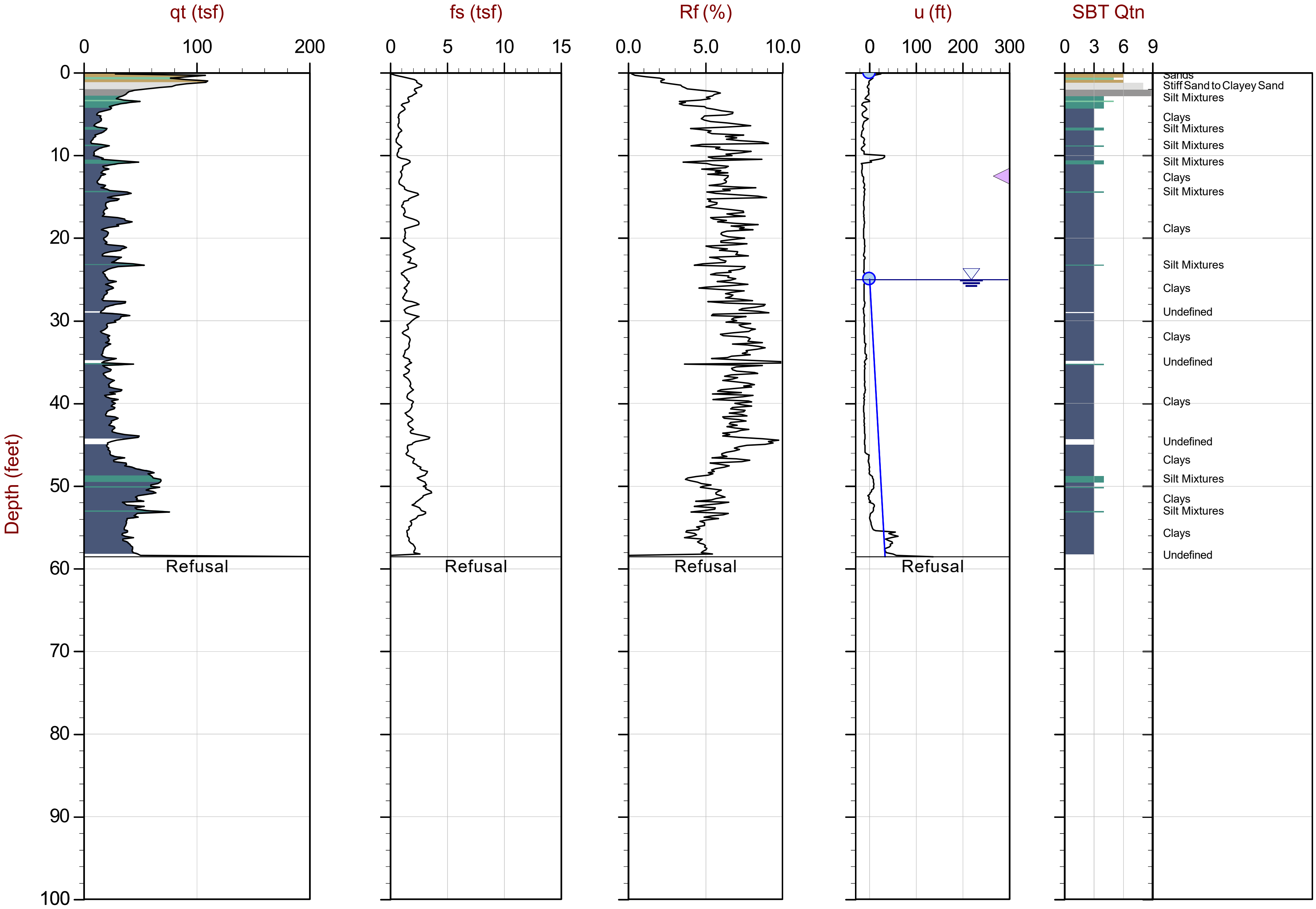
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140233ft E: 13391996ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 12:57
Site: DTE Monroe Power Plant

Sounding: CPT20-118
Cone: 513:T1500F15U500



Max Depth: 17.850 m / 58.56 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP118.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140123ft E: 13392169ft
Sheet No: 1 of 1

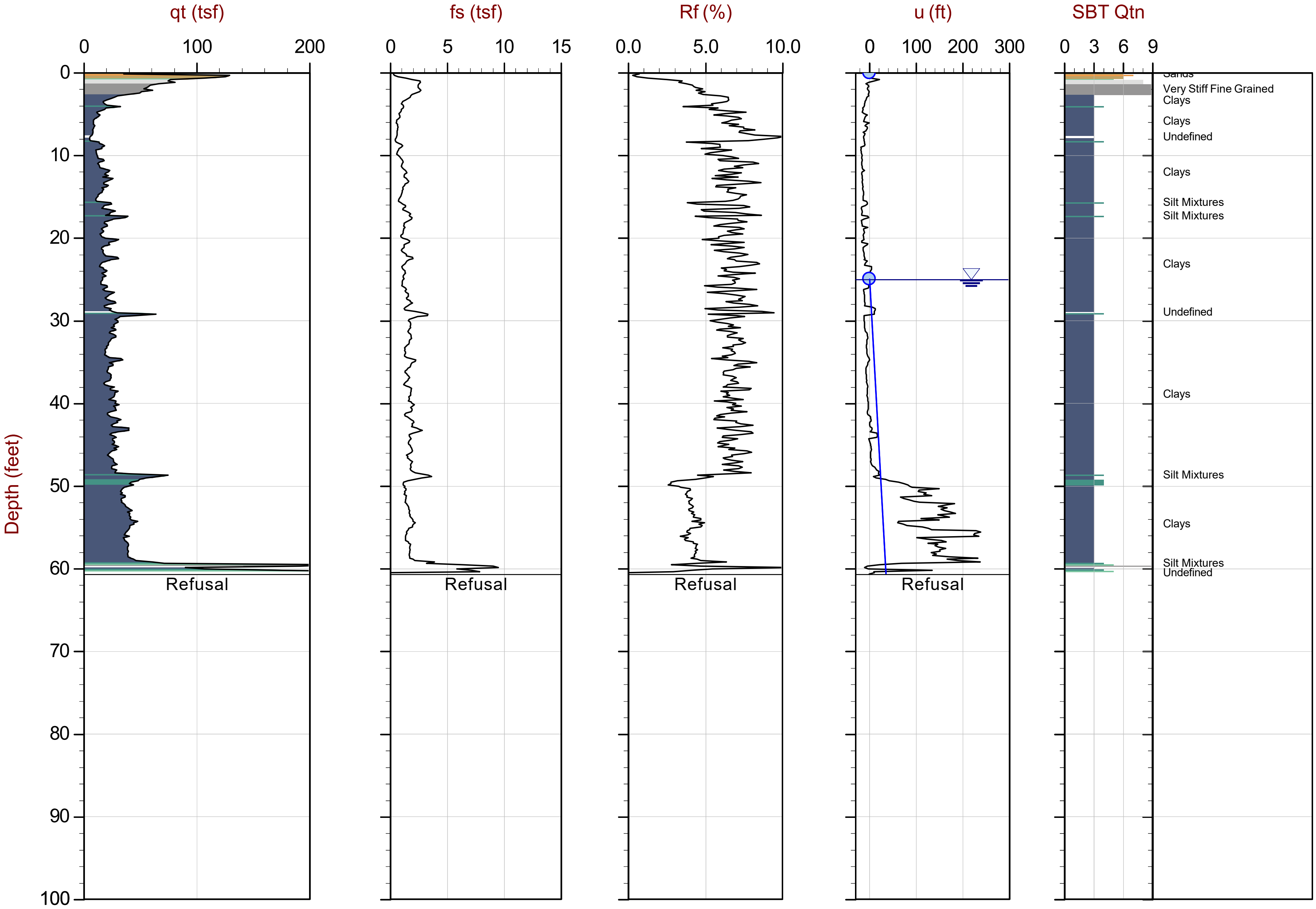
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 14:17
Site: DTE Monroe Power Plant

Sounding: CPT20-120
Cone: 513:T1500F15U500



Max Depth: 18.500 m / 60.69 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP120.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140017ft E: 13392339ft
Sheet No: 1 of 1

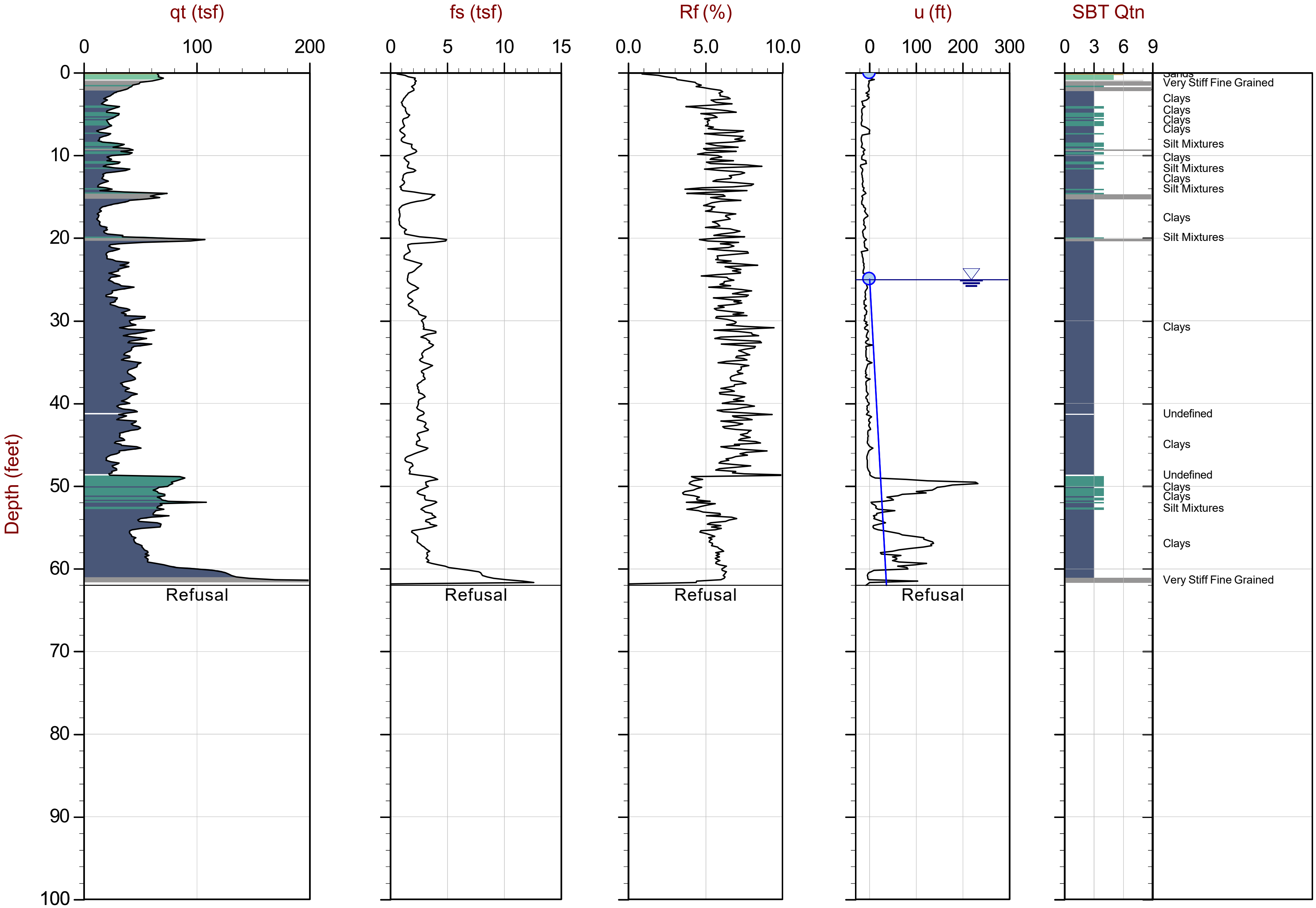
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 15:10
Site: DTE Monroe Power Plant

Sounding: CPT20-122
Cone: 513:T1500F15U500



Max Depth: 18.900 m / 62.01 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP122.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139912ft E: 13392507ft
Sheet No: 1 of 1

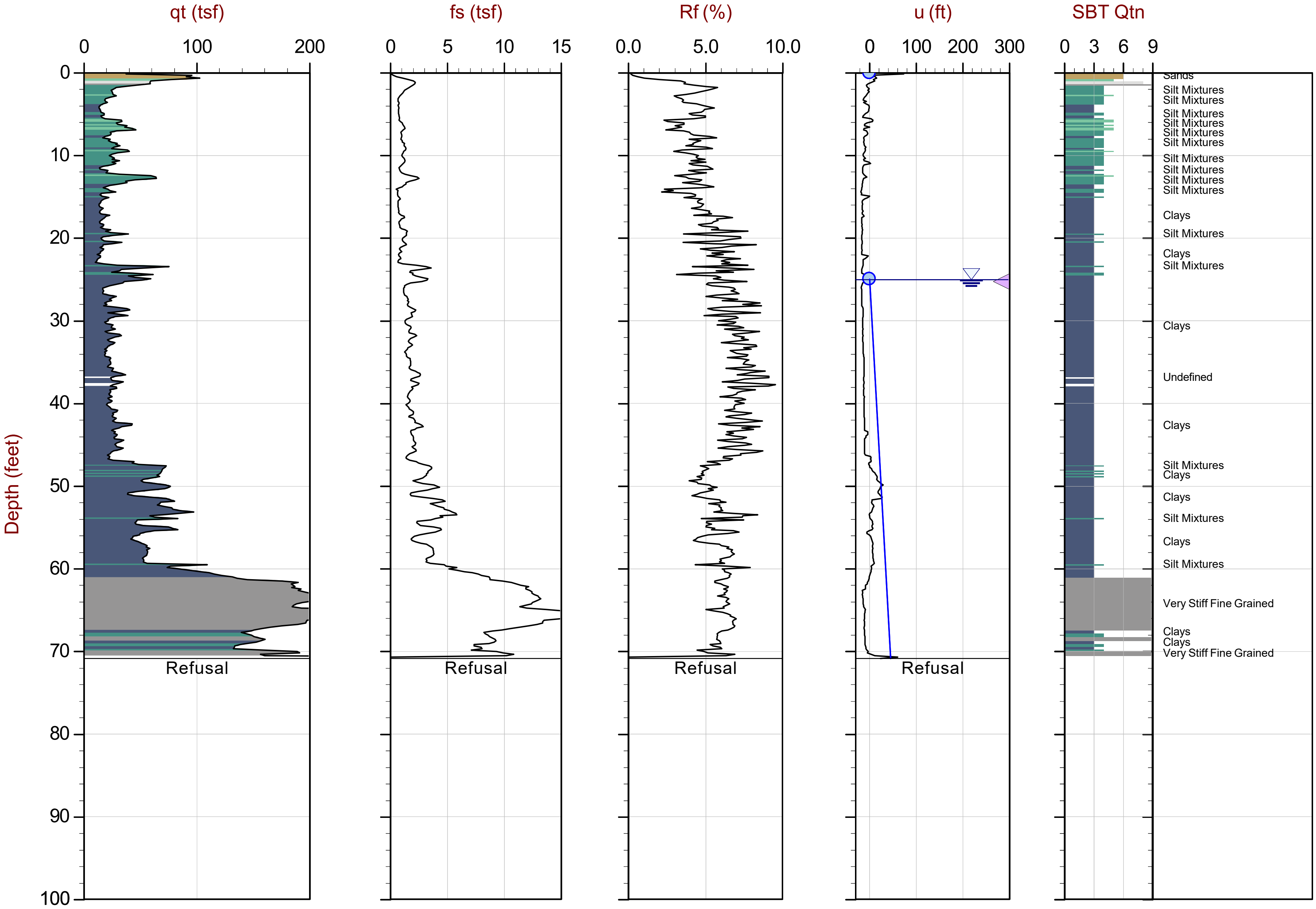
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 08:58
Site: DTE Monroe Power Plant

Sounding: CPT20-124
Cone: 513:T1500F15U500



Max Depth: 21.600 m / 70.87 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP124.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139802ft E: 13392678ft
Sheet No: 1 of 1

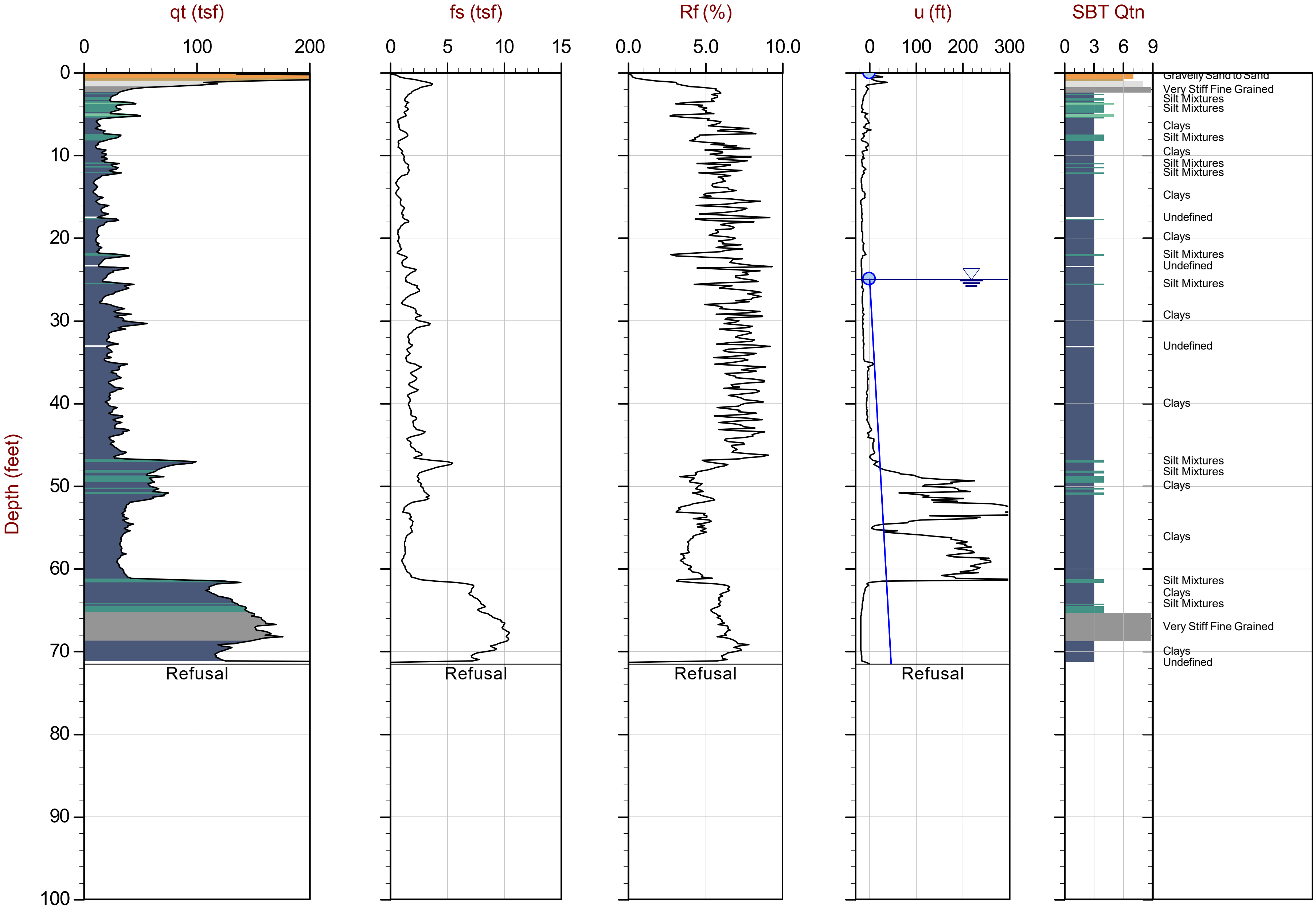
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 10:02
Site: DTE Monroe Power Plant

Sounding: CPT20-126
Cone: 513:T1500F15U500



Max Depth: 21.800 m / 71.52 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP126.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139694ft E: 13392854ft
Sheet No: 1 of 1

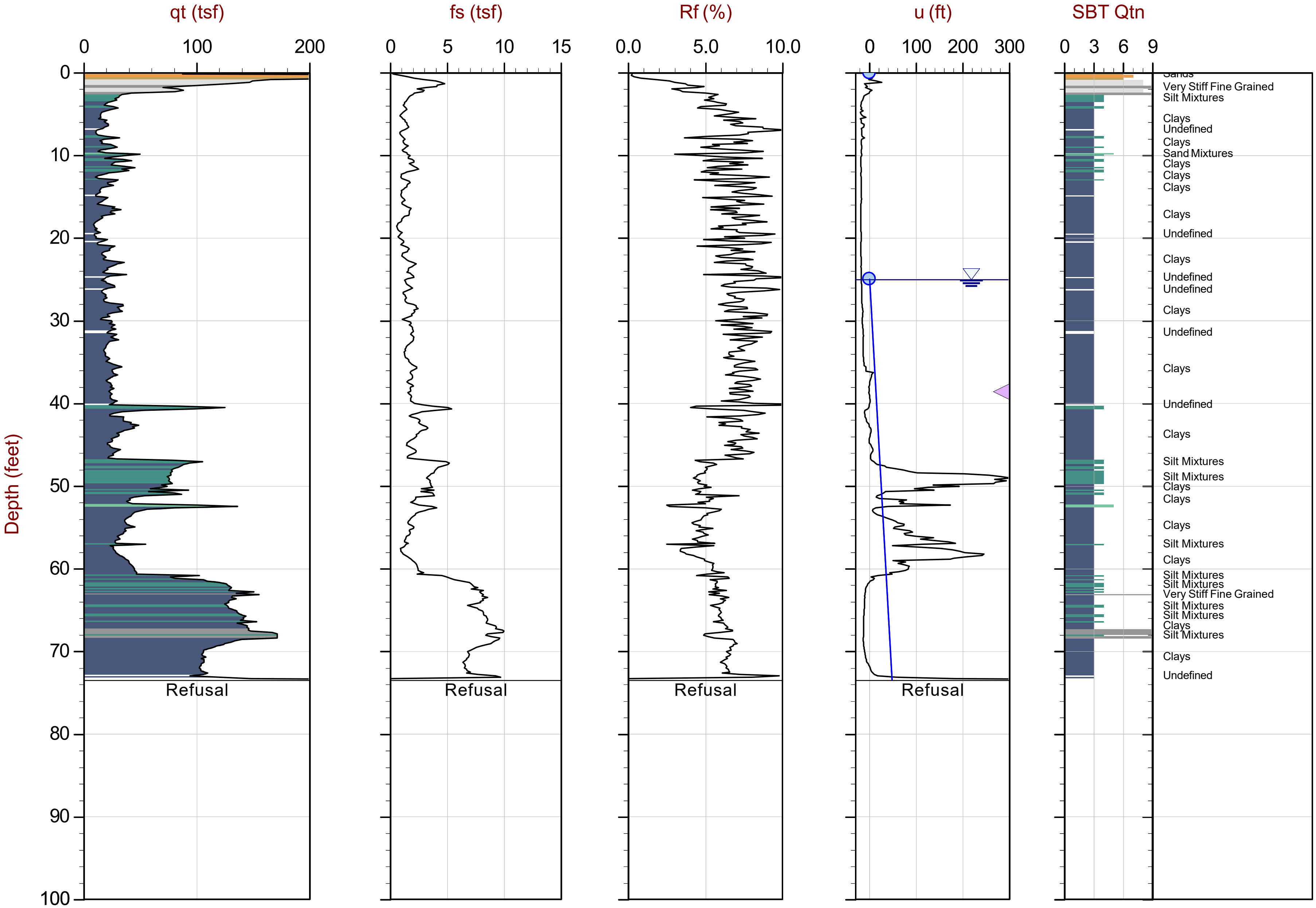
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-128
Cone: 513:T1500F15U500



Max Depth: 22.400 m / 73.49 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP128.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139593ft E: 13393024ft
Sheet No: 1 of 1

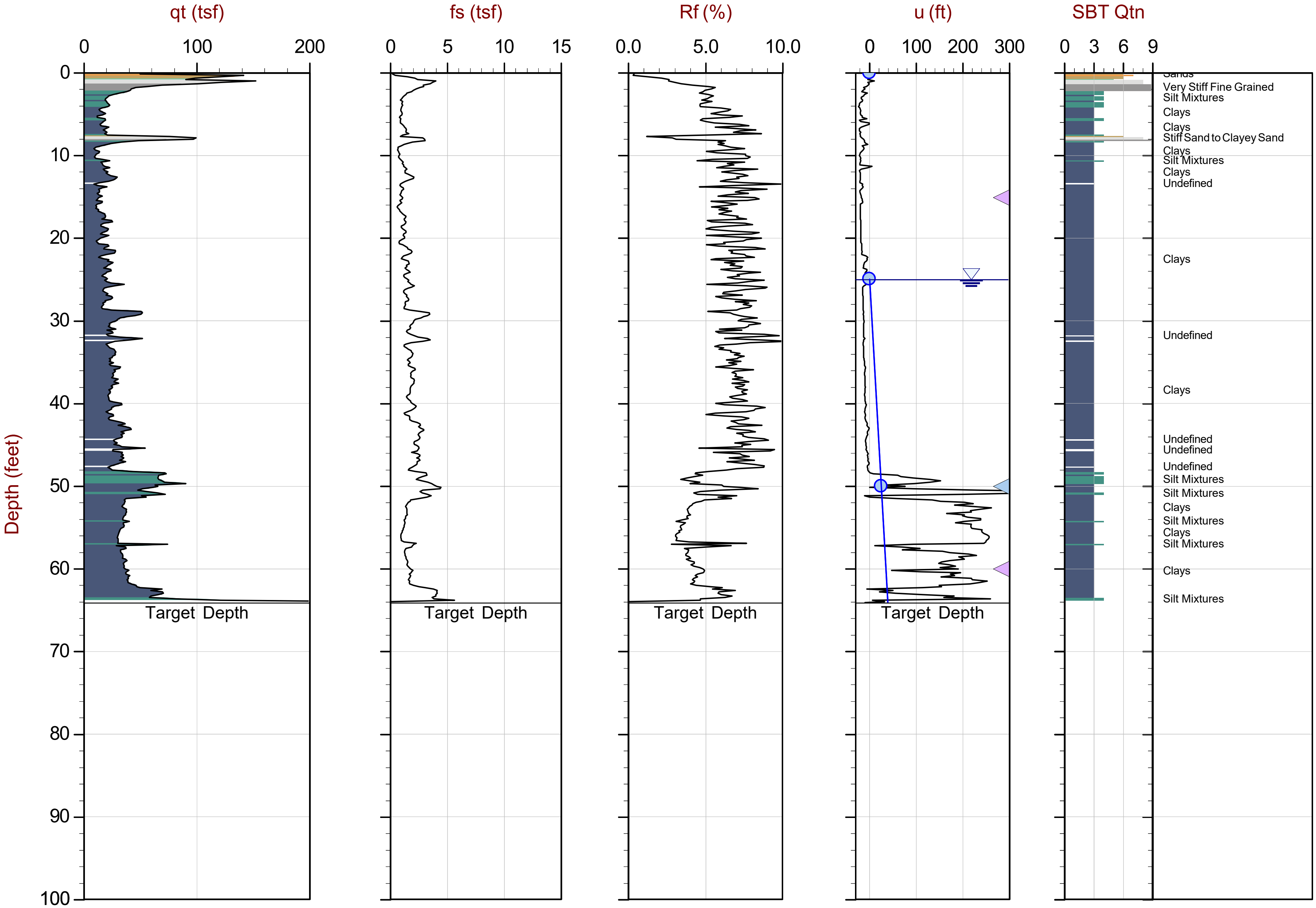
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500



Max Depth: 19.550 m / 64.14 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP130.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139484ft E: 13393198ft
Sheet No: 1 of 1

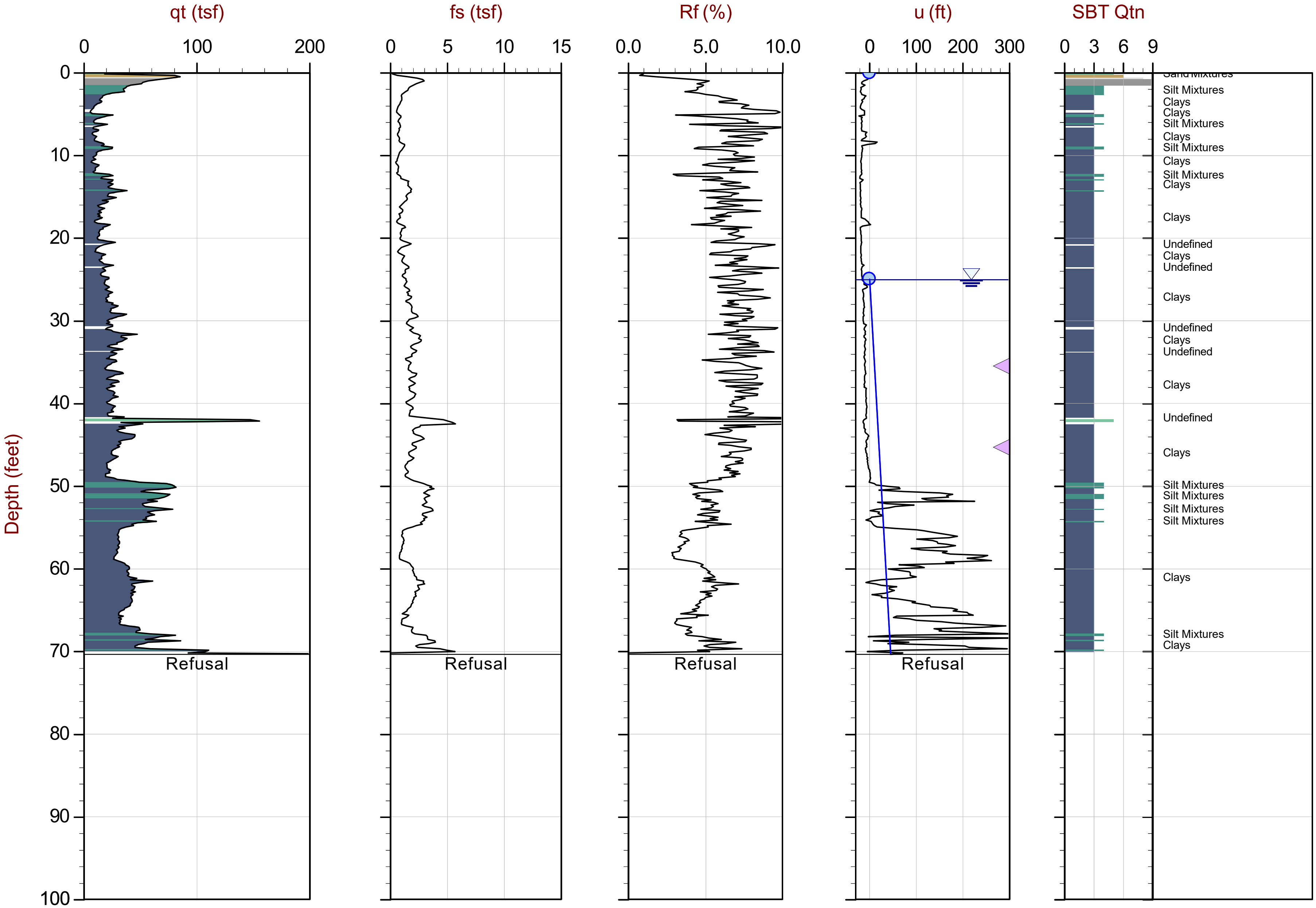
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500



Max Depth: 21.450 m / 70.37 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP132.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139378ft E: 13393362ft
Sheet No: 1 of 1

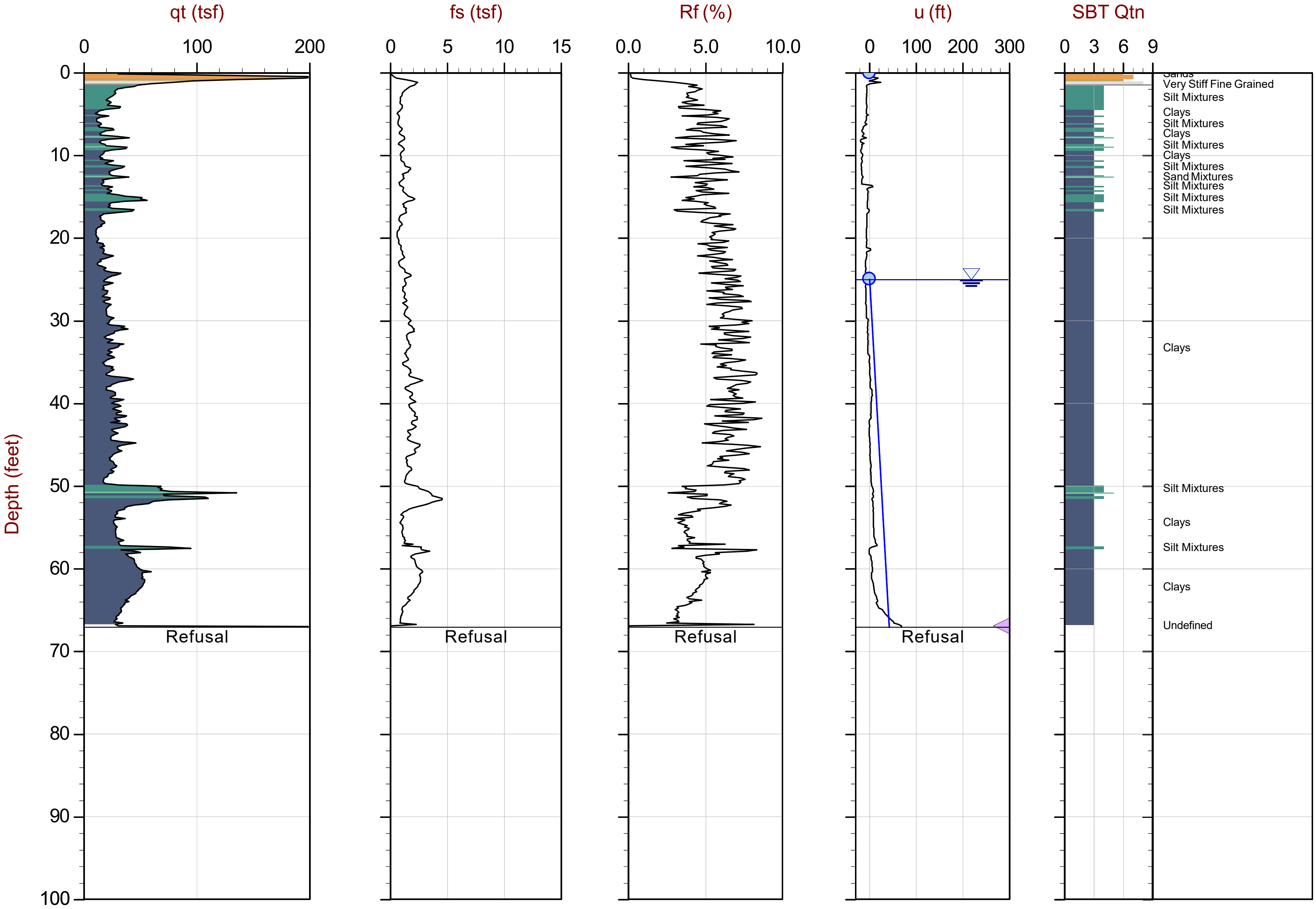
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-14 14:09
Site: DTE Monroe Power Plant

Sounding: CPT20-134
Cone: 568:T1500F15U500



Max Depth: 20.450 m / 67.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP134.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139281ft E: 13393532ft
Sheet No: 1 of 1

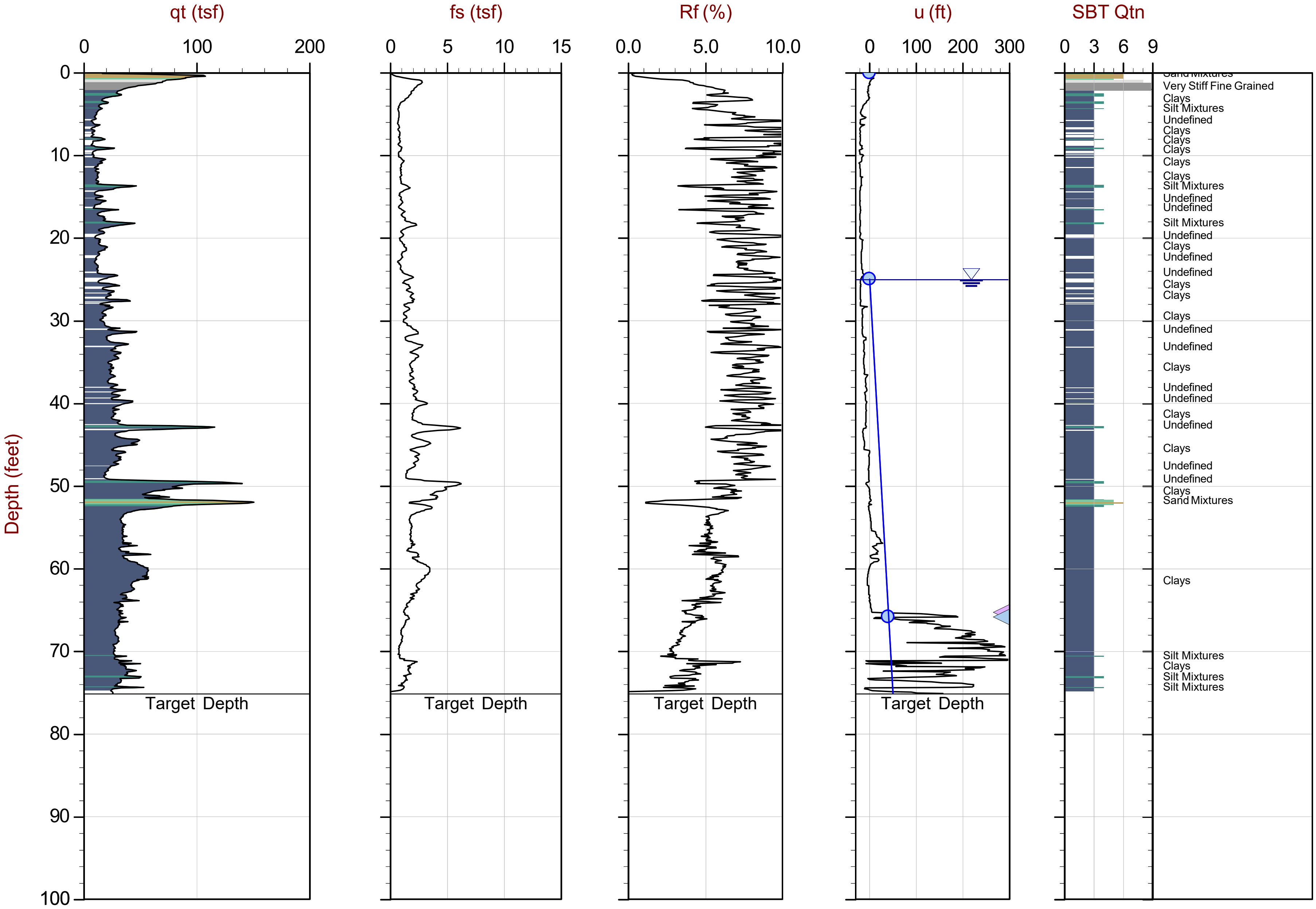
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 13:01
Site: DTE Monroe Power Plant

Sounding: CPT20-136
Cone: 551:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP136.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139166ft E: 13393704ft
Sheet No: 1 of 1

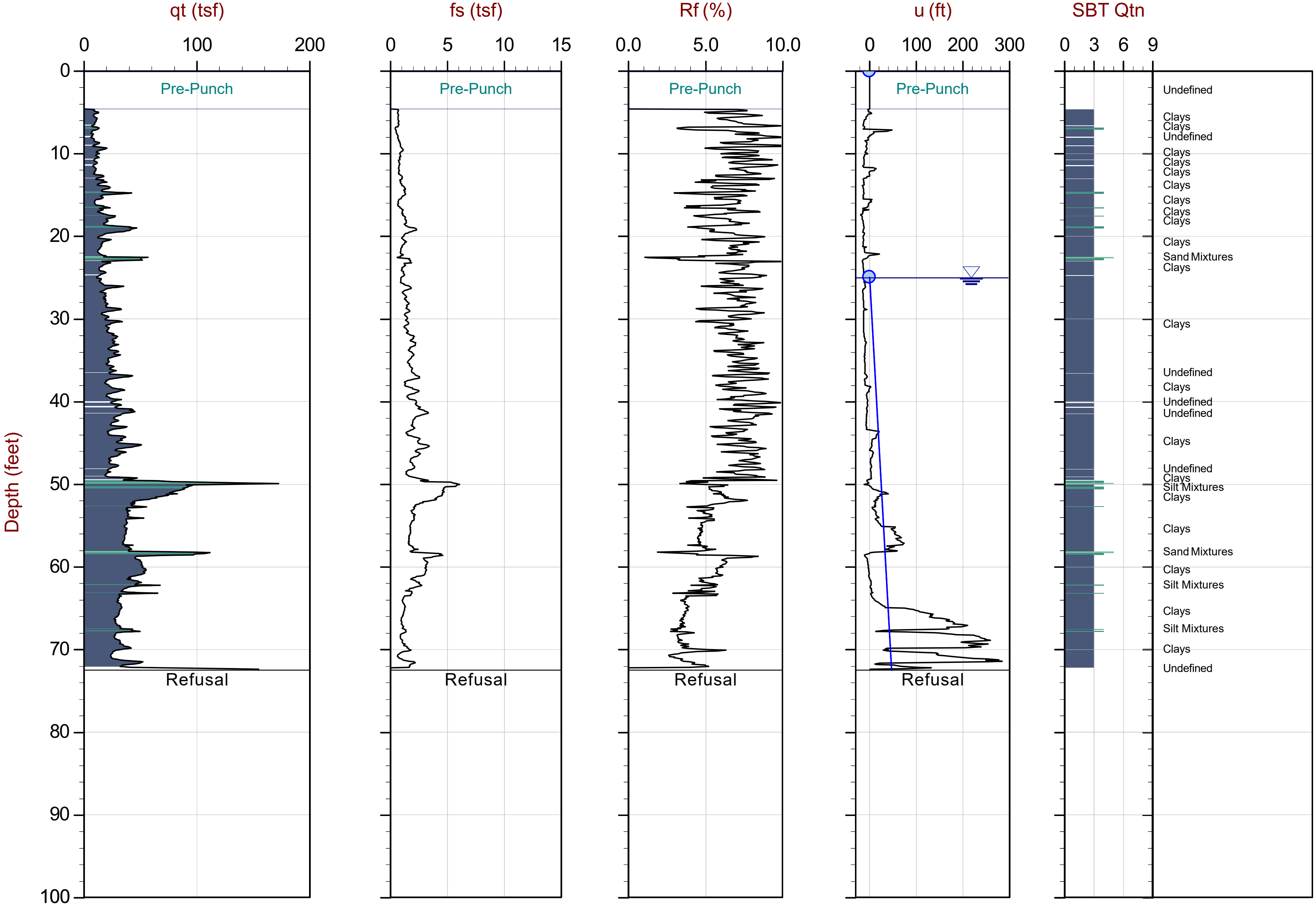
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 12:17
Site: DTE Monroe Power Plant

Sounding: CPT20-138
Cone: 551:T1500F15U500



Max Depth: 22.100 m / 72.51 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP138.COR
Unit Wt: SBTQtn (PKR2009)

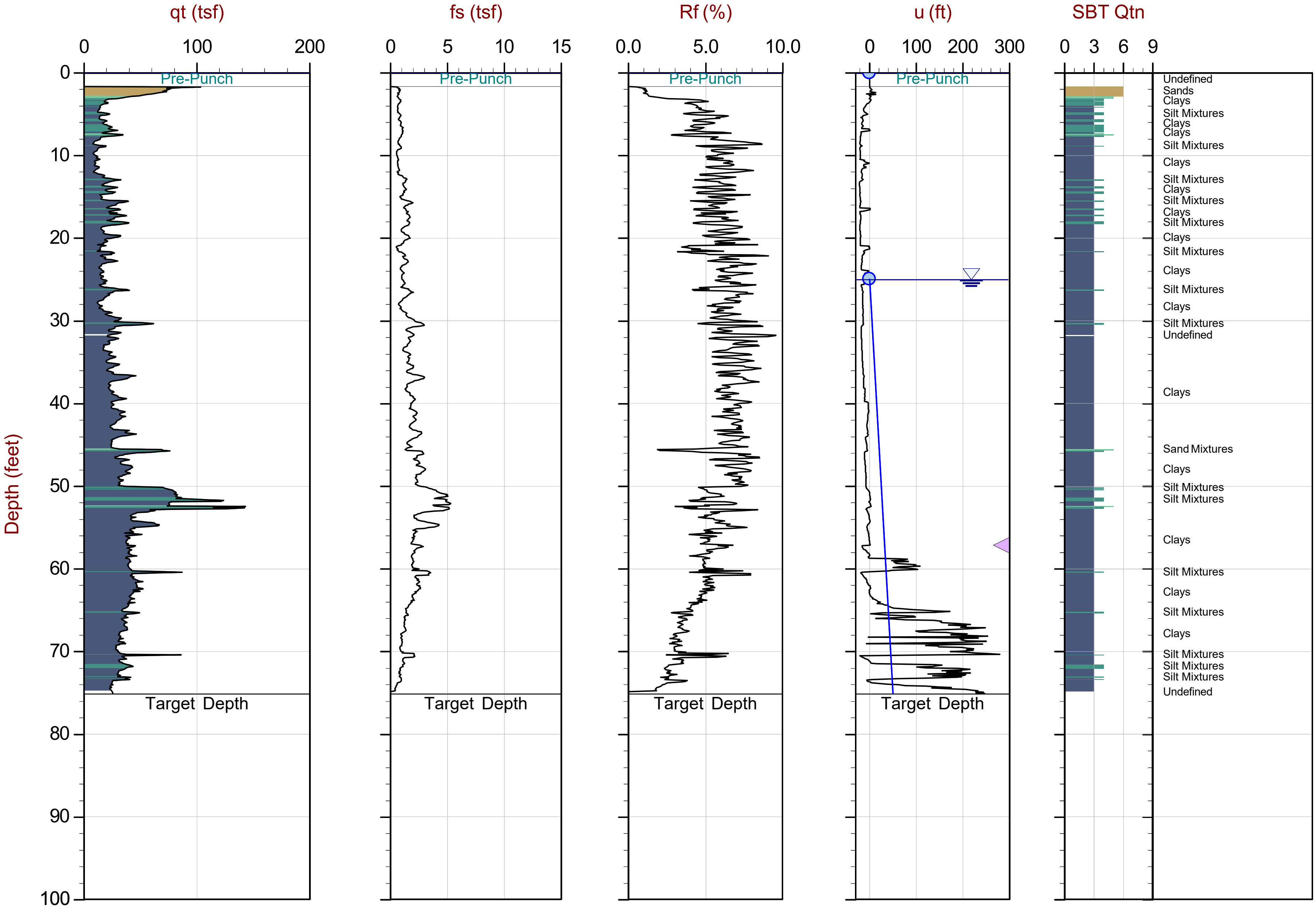
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139110ft E: 13393797ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 14:56
Site: DTE Monroe Power Plant

Sounding: CPT20-140
Cone: 551:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP140.COR
Unit Wt: SBTQtn (PKR2009)

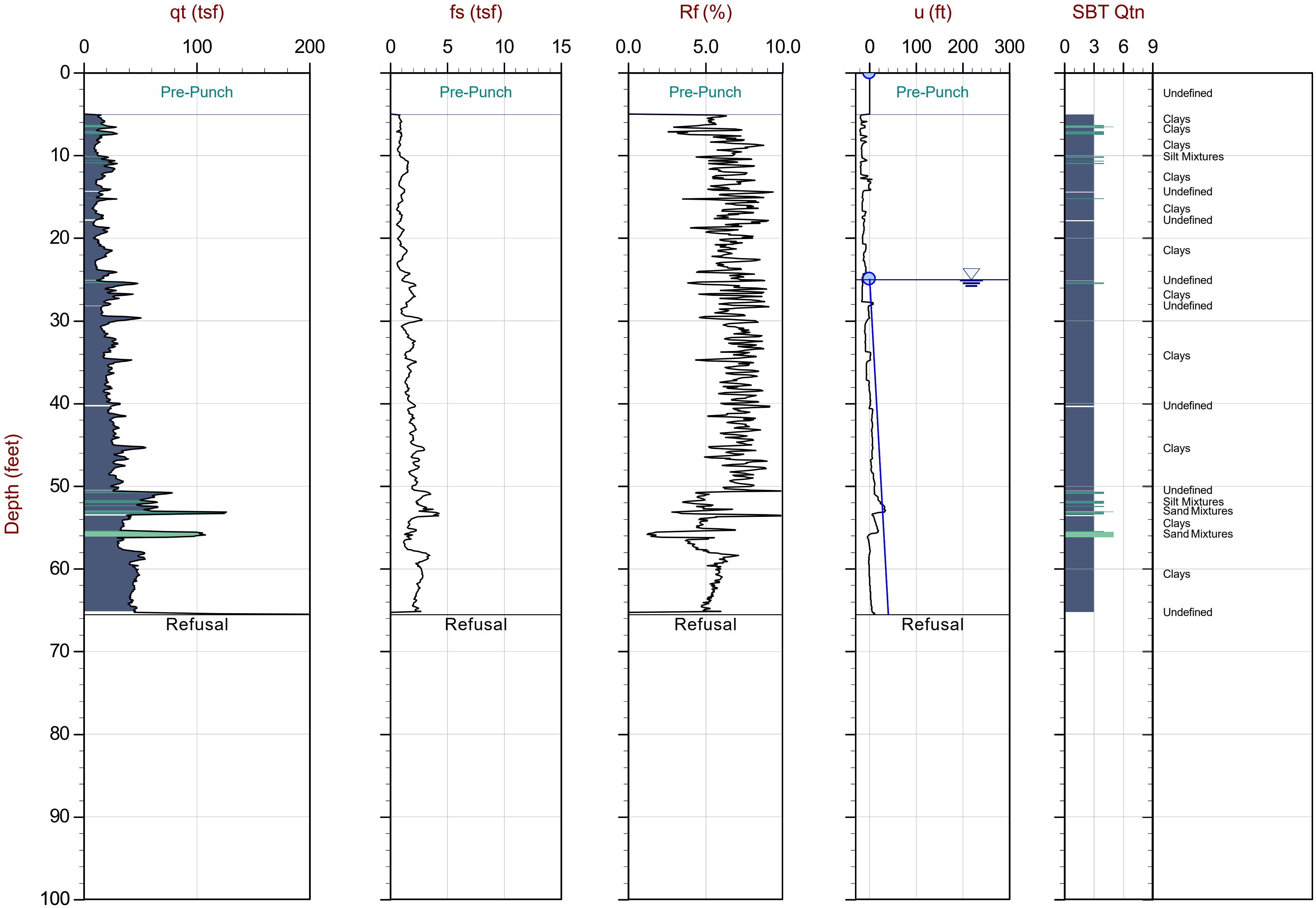
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139141ft E: 13393971ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 11:26
Site: DTE Monroe Power Plant

Sounding: CPT20-142
Cone: 551:T1500F15U500



Max Depth: 19.975 m / 65.53 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP142.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139293ft E: 13394120ft
Sheet No: 1 of 1

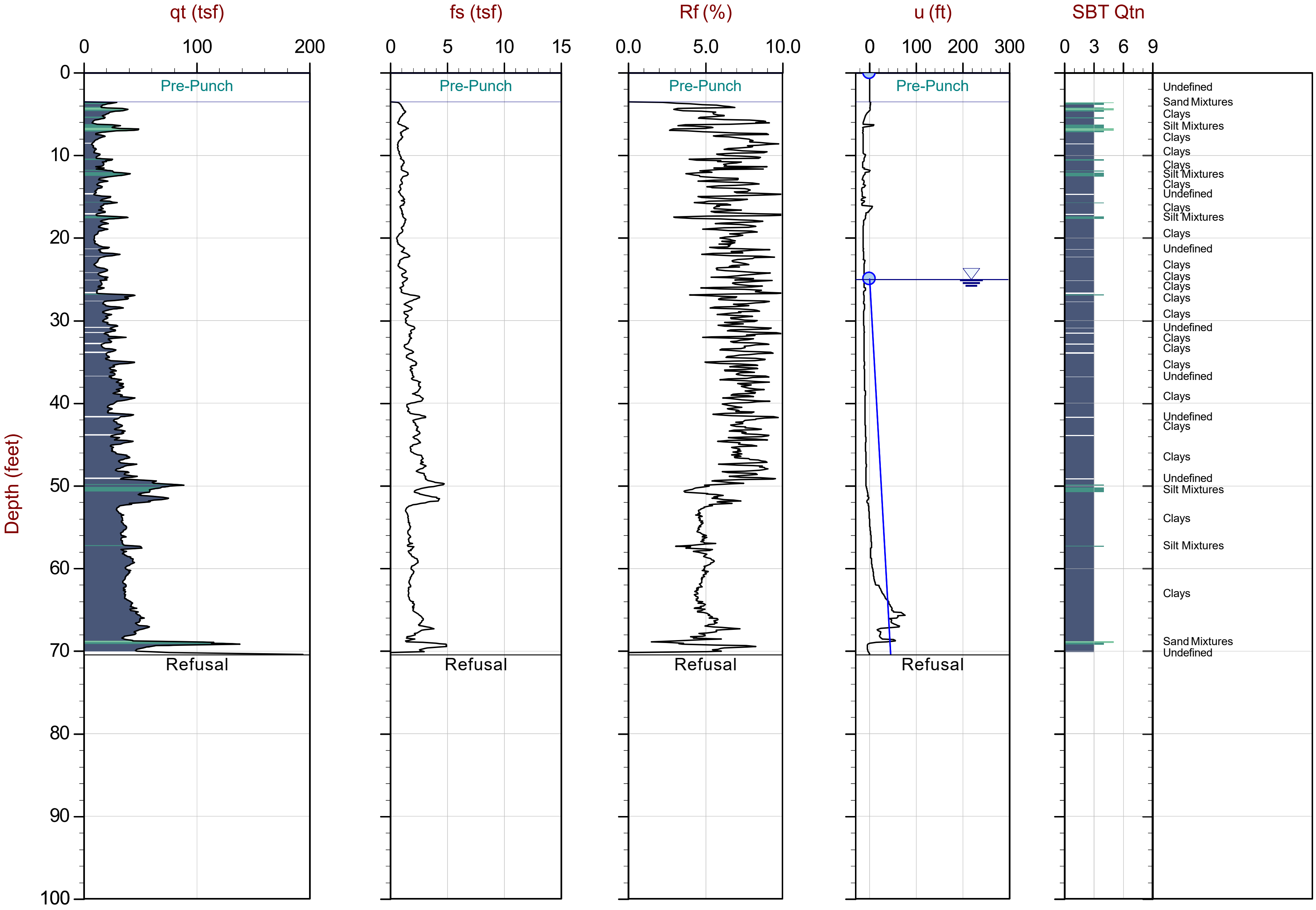
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 10:25
Site: DTE Monroe Power Plant

Sounding: CPT20-144
Cone: 551:T1500F15U500



Max Depth: 21.475 m / 70.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP144.COR
Unit Wt: SBTQtn (PKR2009)

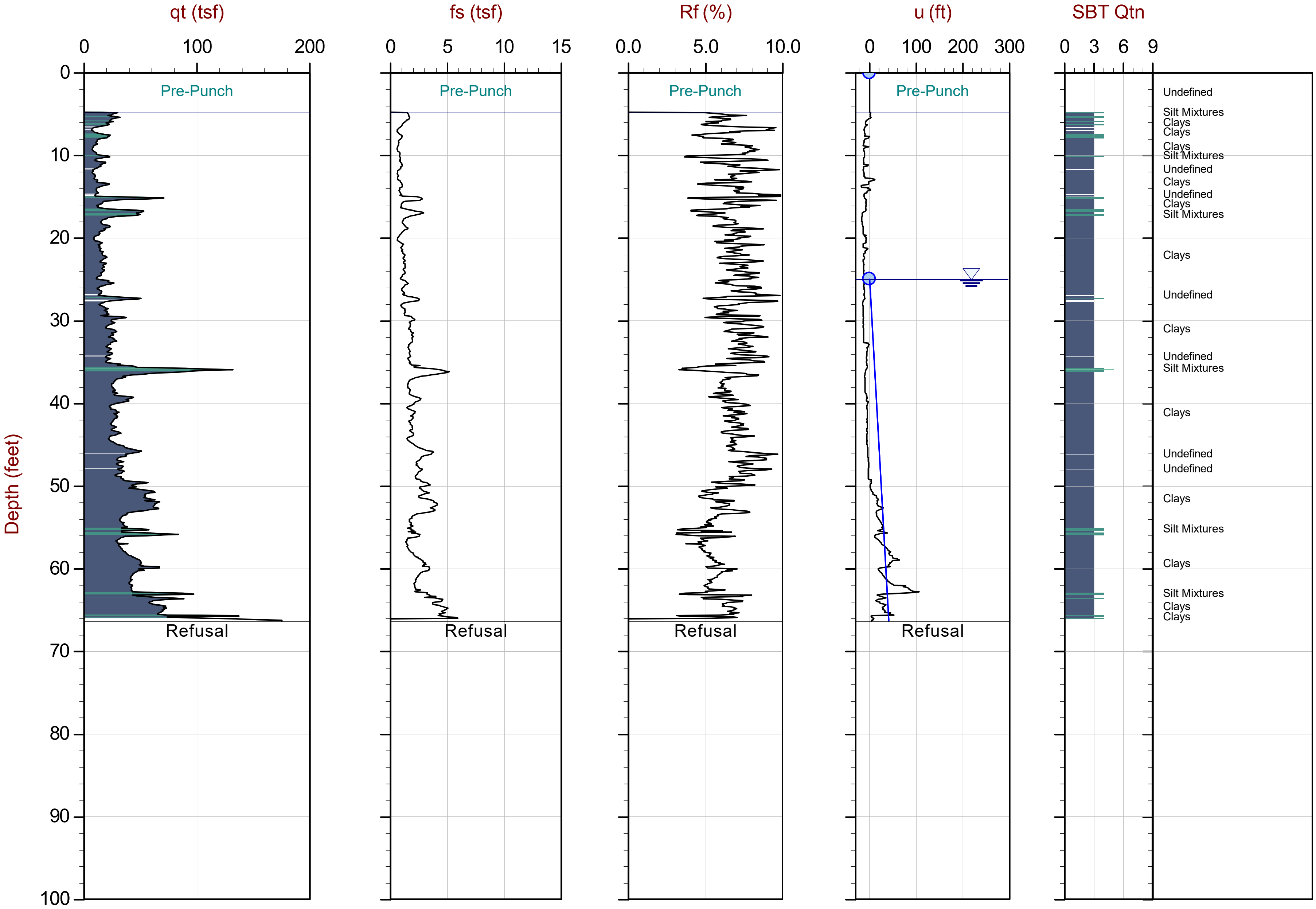
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139326ft E: 13394303ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 09:43
Site: DTE Monroe Power Plant

Sounding: CPT20-146
Cone: 551:T1500F15U500



Max Depth: 20.225 m / 66.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP146.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139290ft E: 13394504ft
Sheet No: 1 of 1

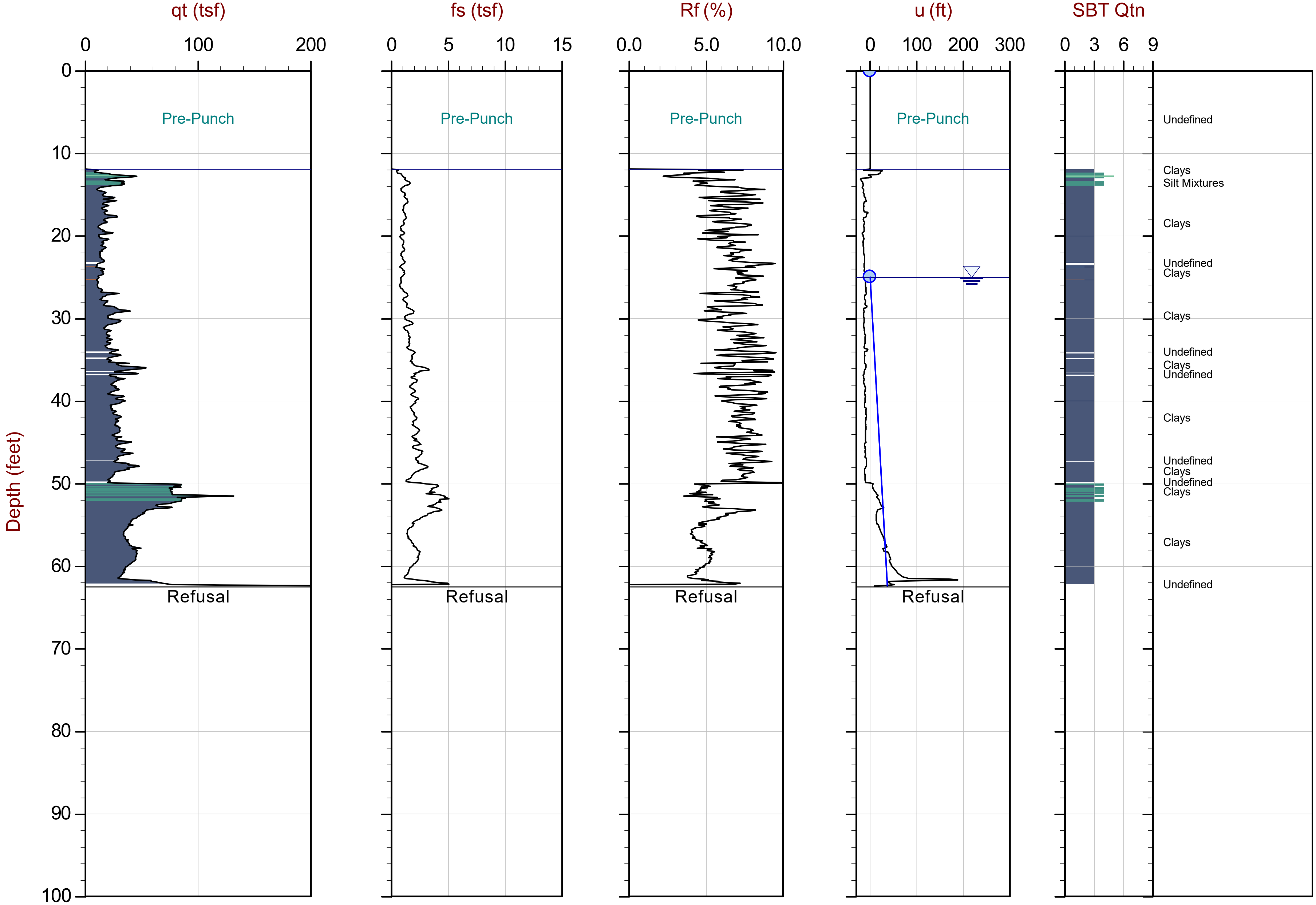
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 09:01
Site: DTE Monroe Power Plant

Sounding: CPT20-148
Cone: 551:T1500F15U500



Max Depth: 19.050 m / 62.50 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP148.COR
Unit Wt: SBTQtn (PKR2009)

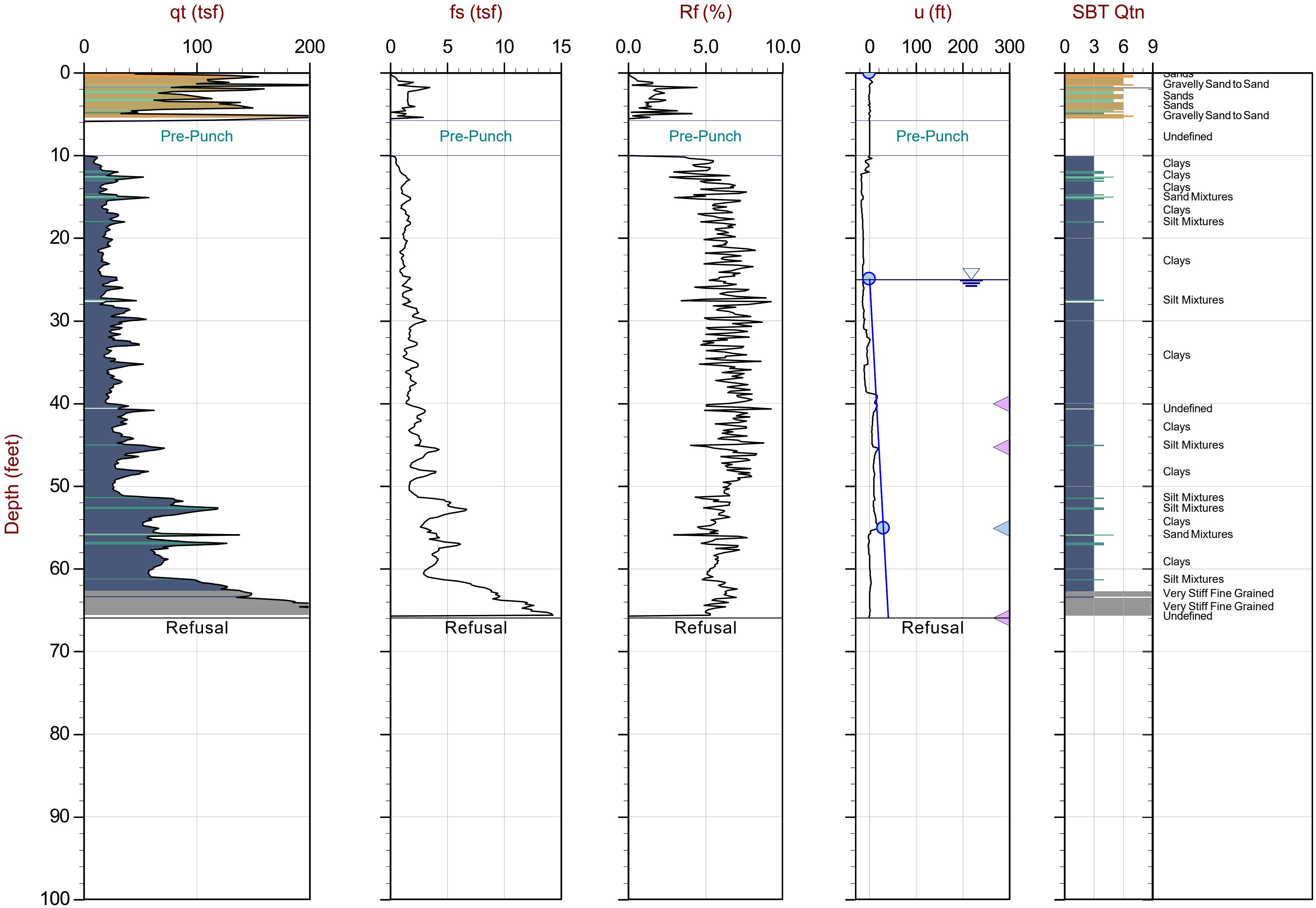
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139269ft E: 13394705ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-14 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500



Max Depth: 20.100 m / 65.94 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP150.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139340ft E: 13394900ft
Sheet No: 1 of 1

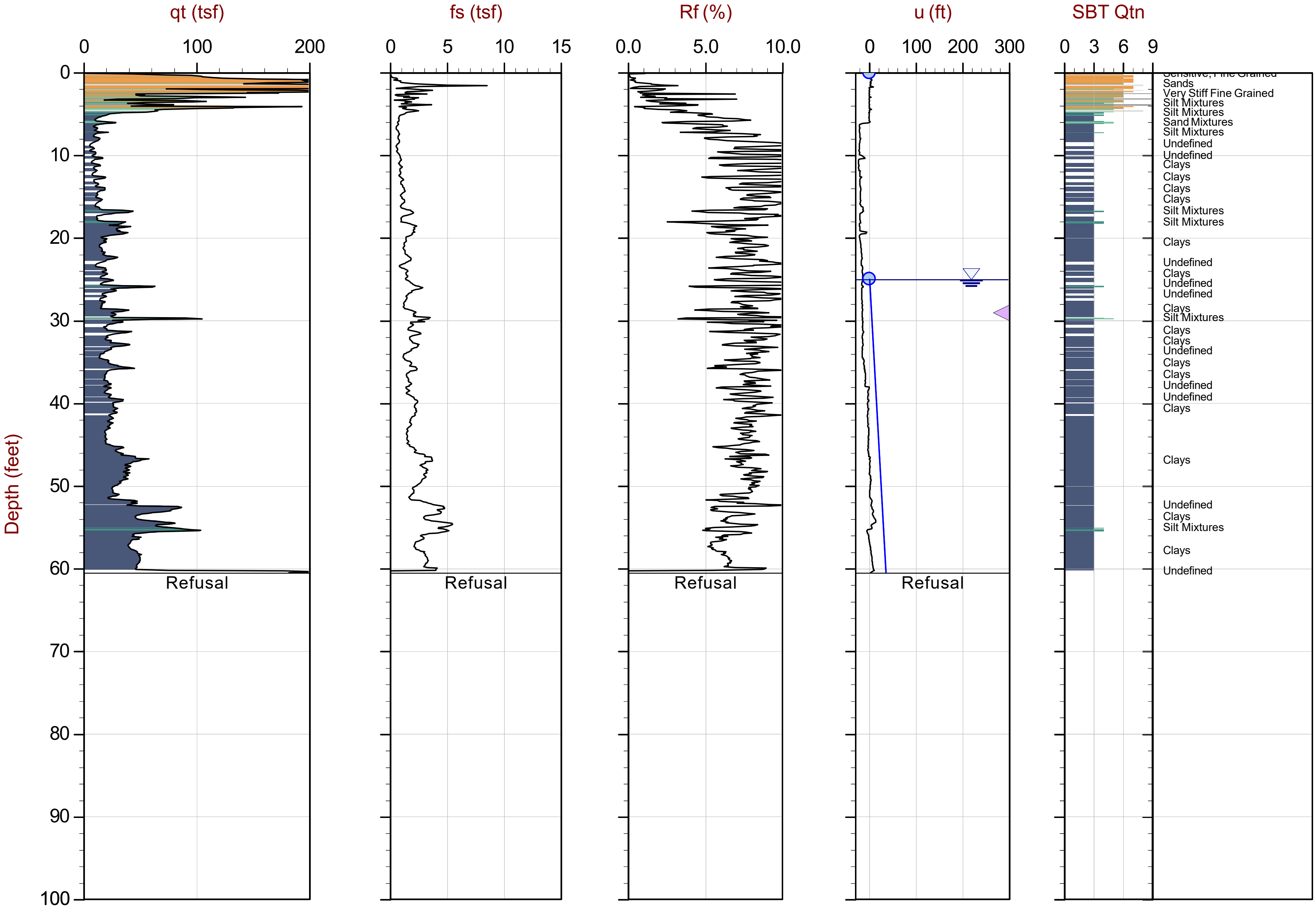
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 14:54
Site: DTE Monroe Power Plant

Sounding: CPT20-152
Cone: 551:T1500F15U500



Max Depth: 18.450 m / 60.53 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP152.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139451ft E: 13395043ft
Sheet No: 1 of 1

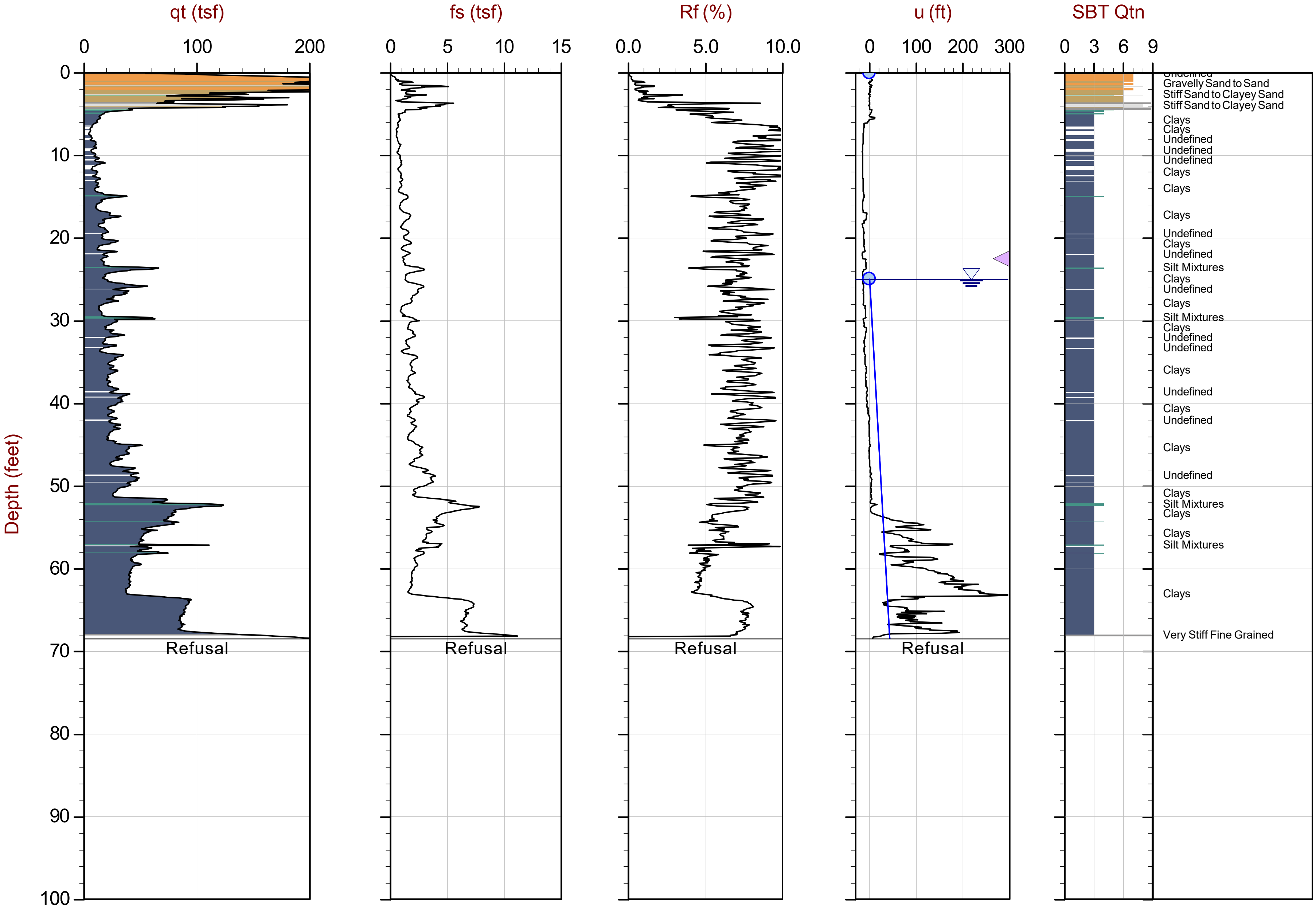
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 14:08
Site: DTE Monroe Power Plant

Sounding: CPT20-154
Cone: 551:T1500F15U500



Max Depth: 20.875 m / 68.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP154.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139579ft E: 13395198ft
Sheet No: 1 of 1

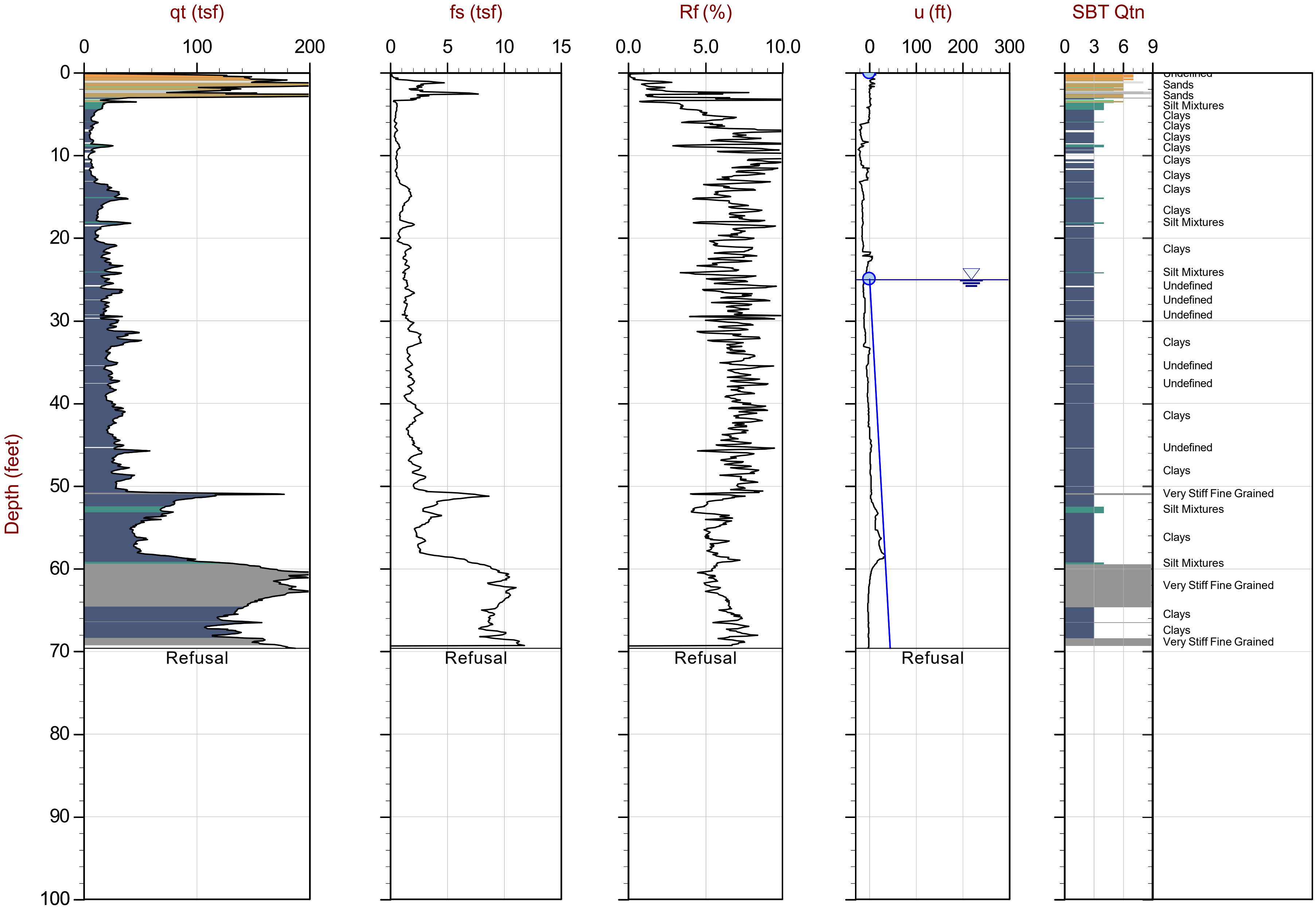
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-156
Cone: 551:T1500F15U500



Max Depth: 21.225 m / 69.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP156.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139707ft E: 13395357ft
Sheet No: 1 of 1

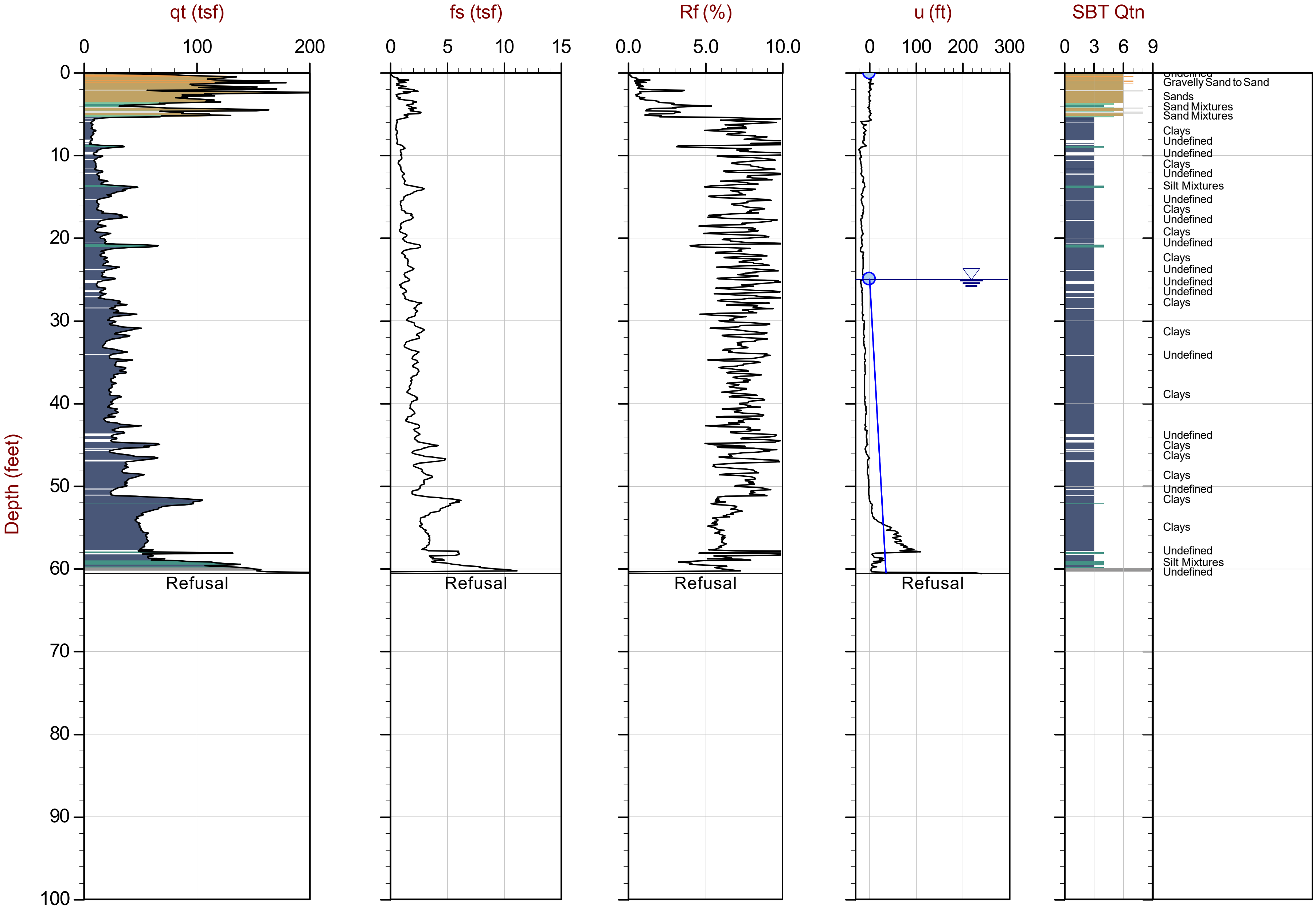
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 12:47
Site: DTE Monroe Power Plant

Sounding: CPT20-158
Cone: 551:T1500F15U500



Max Depth: 18.475 m / 60.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP158.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139832ft E: 13395506ft
Sheet No: 1 of 1

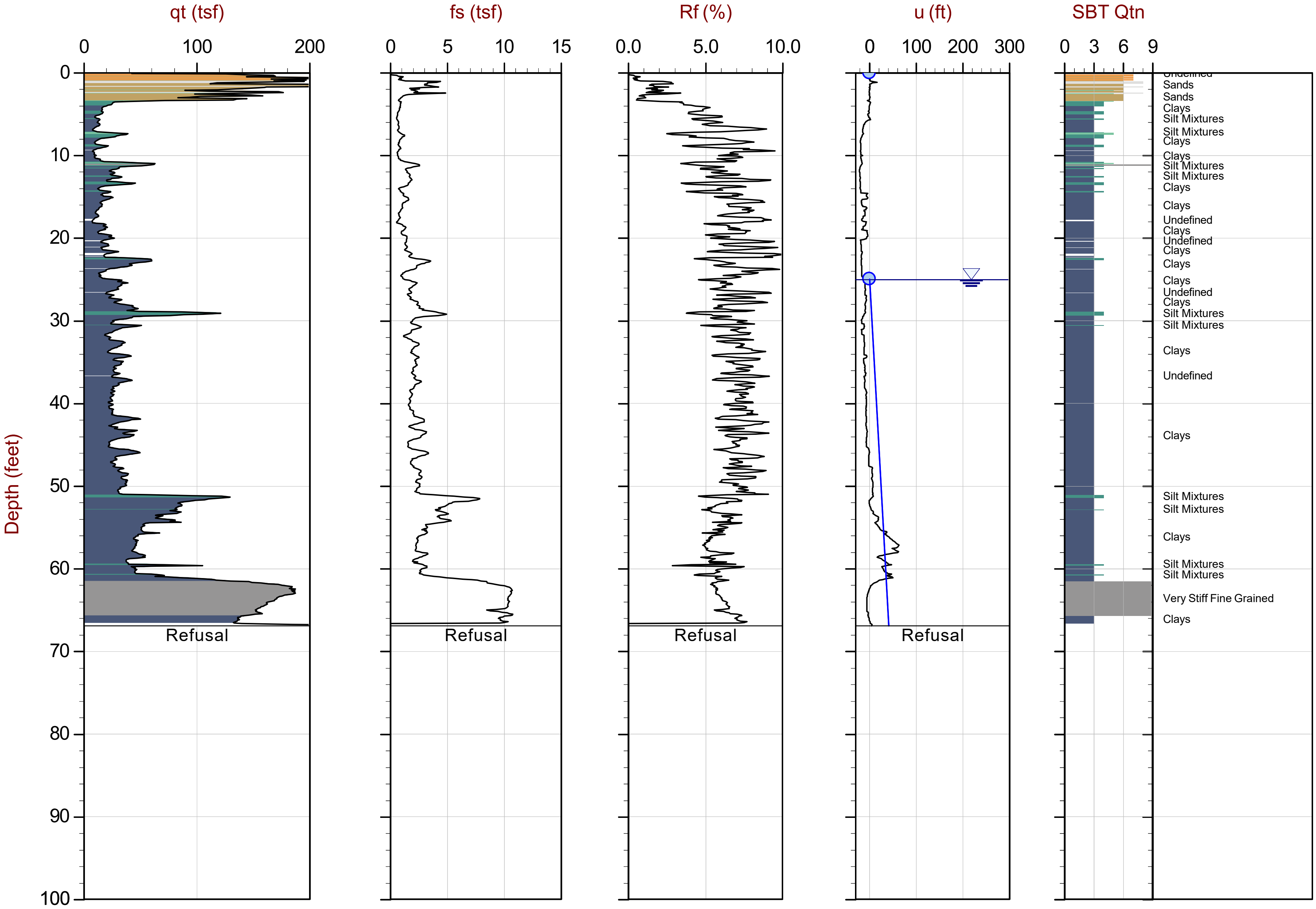
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-160
Cone: 551:T1500F15U500



Max Depth: 20.400 m / 66.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP160.COR
Unit Wt: SBTQtn (PKR2009)

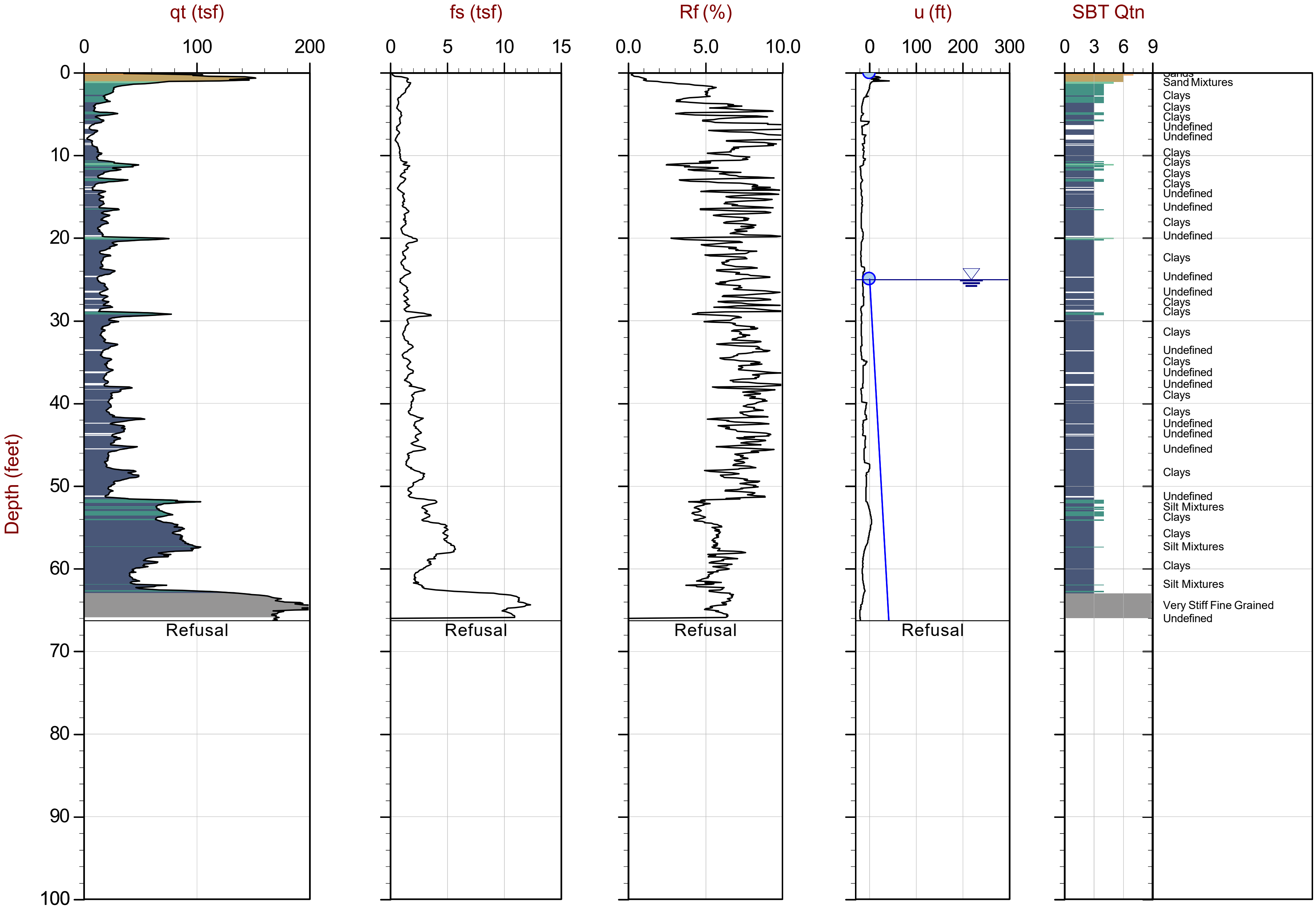
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139960ft E: 13395666ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 11:22
Site: DTE Monroe Power Plant

Sounding: CPT20-162
Cone: 551:T1500F15U500



Max Depth: 20.200 m / 66.27 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP162.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140089ft E: 13395835ft
Sheet No: 1 of 1

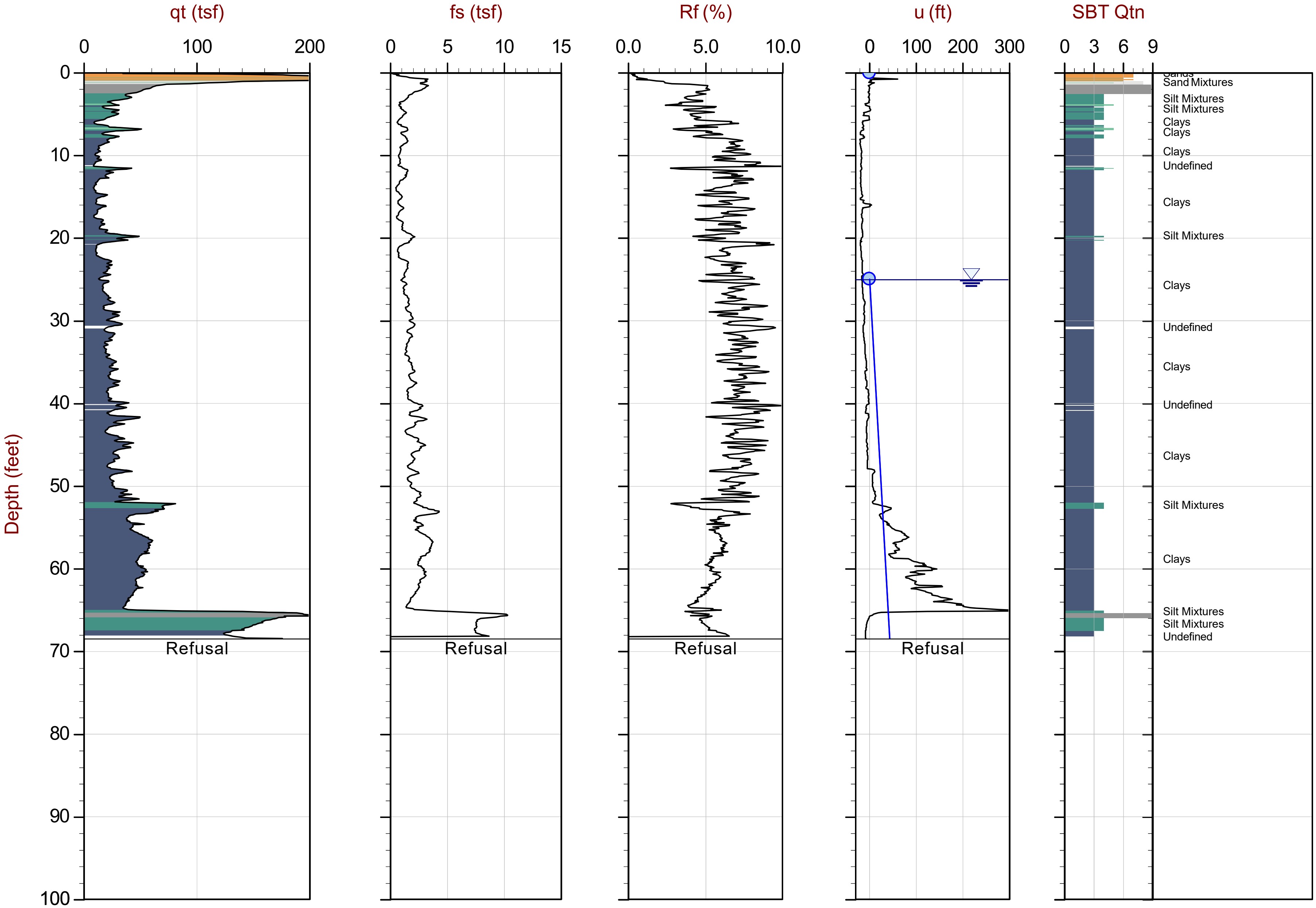
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 10:32
Site: DTE Monroe Power Plant

Sounding: CPT20-164
Cone: 551:T1500F15U500



Max Depth: 20.875 m / 68.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP164.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140210ft E: 13395988ft
Sheet No: 1 of 1

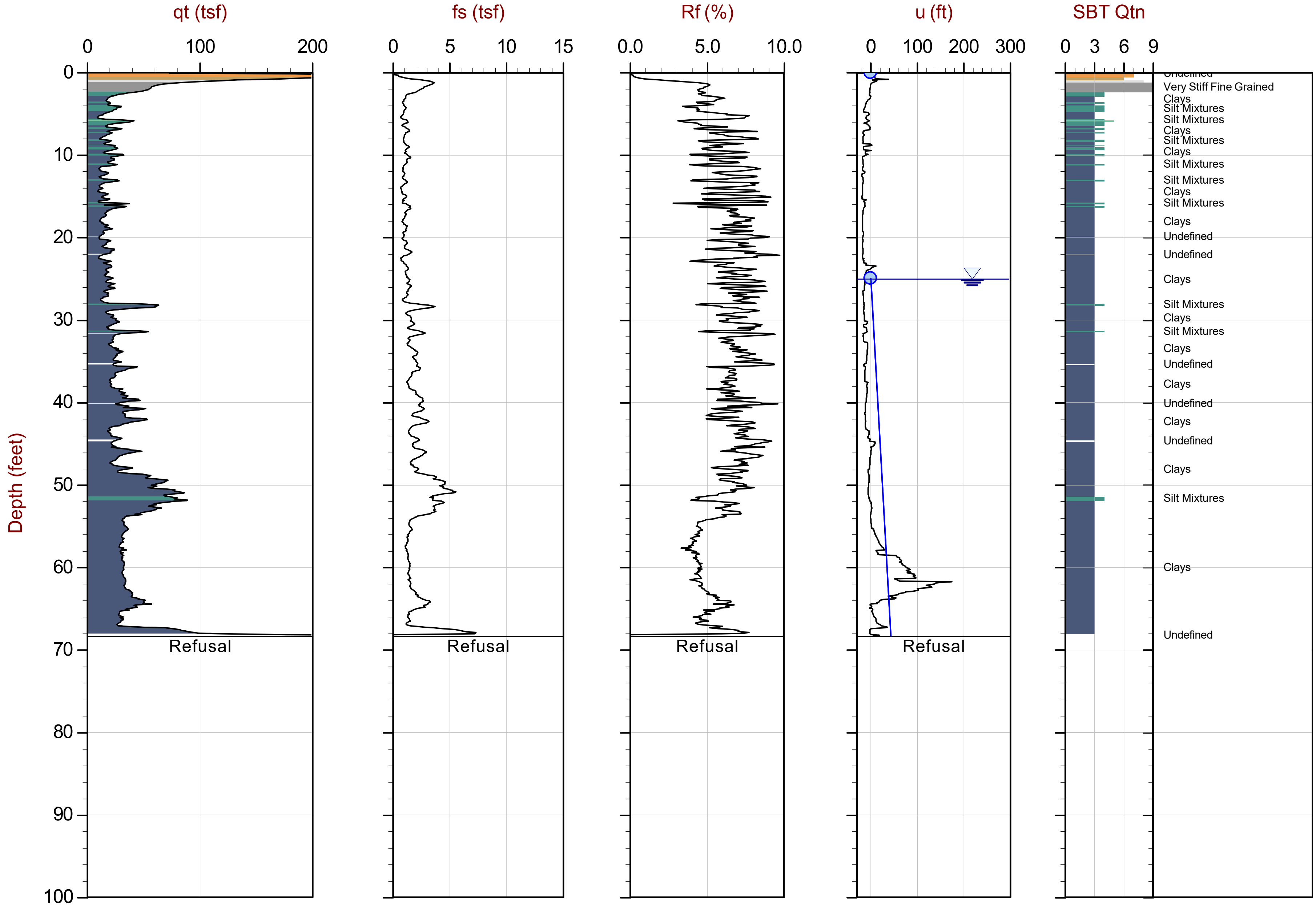
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 09:42
Site: DTE Monroe Power Plant

Sounding: CPT20-166
Cone: 551:T1500F15U500



Max Depth: 20.850 m / 68.40 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP166.COR
Unit Wt: SBTQtn (PKR2009)

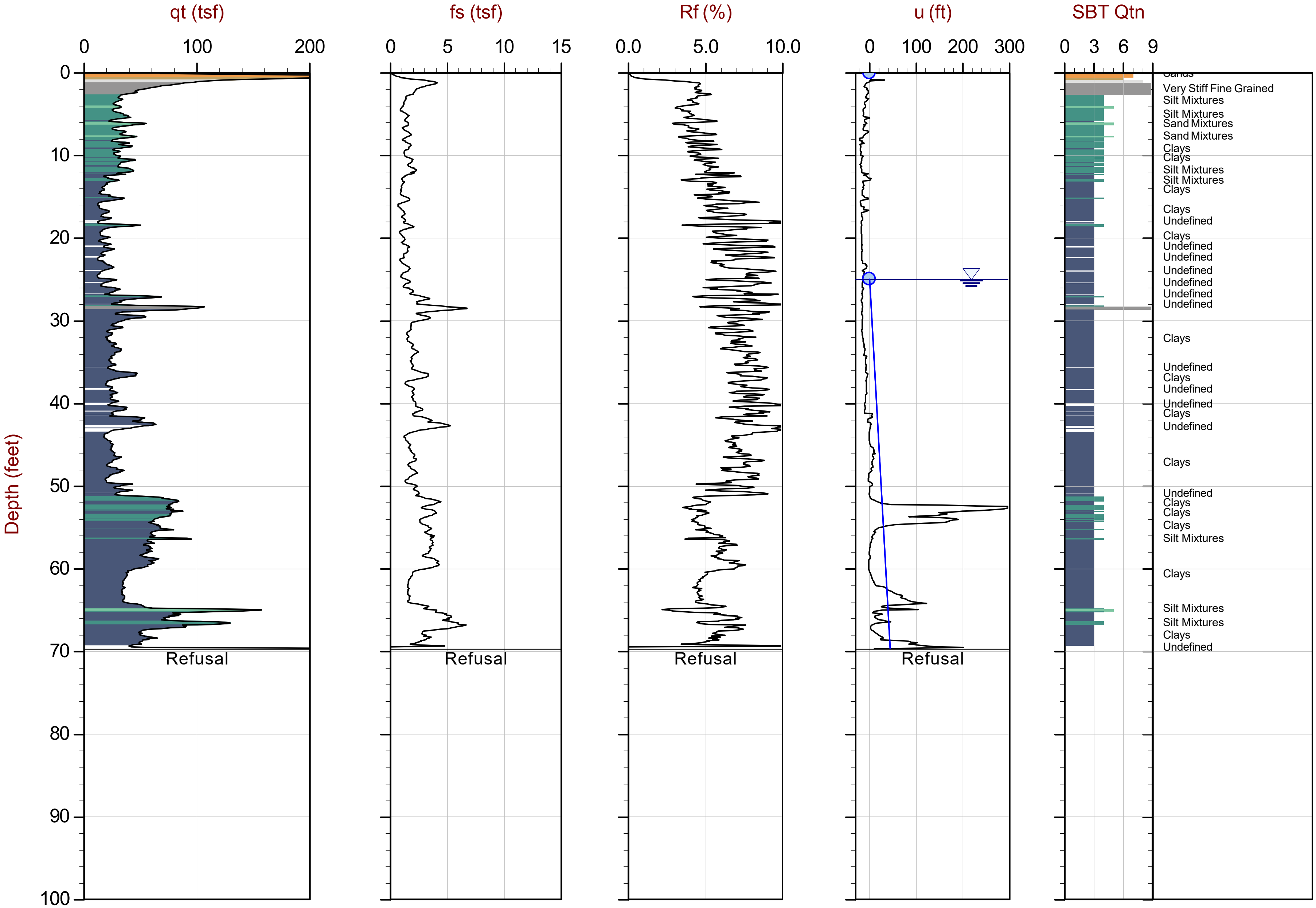
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140336ft E: 13396145ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 08:50
Site: DTE Monroe Power Plant

Sounding: CPT20-168
Cone: 551:T1500F15U500



Max Depth: 21.250 m / 69.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP168.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140461ft E: 13396297ft
Sheet No: 1 of 1

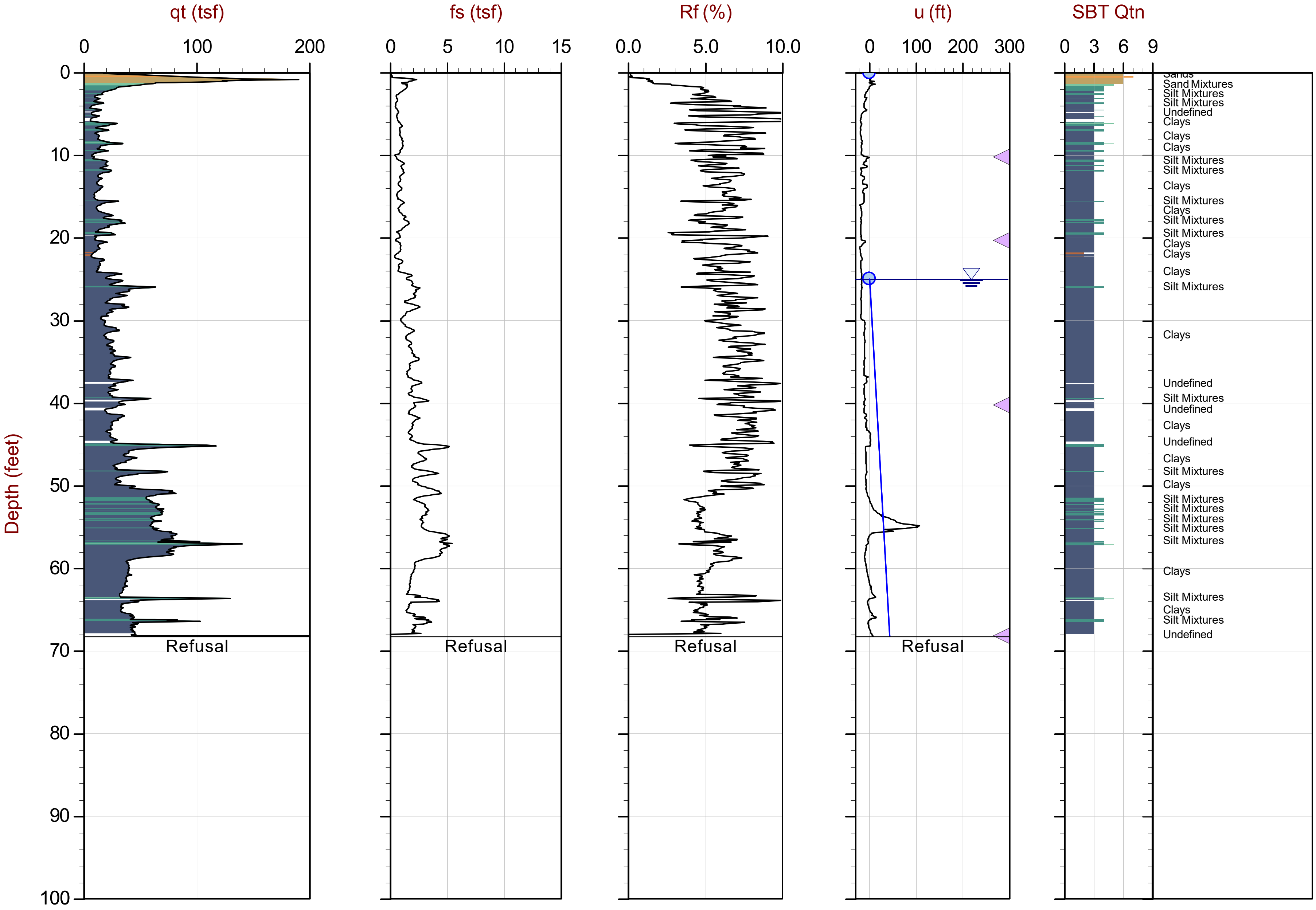
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500



Max Depth: 20.800 m / 68.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP170.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140603ft E: 13396441ft
Sheet No: 1 of 1

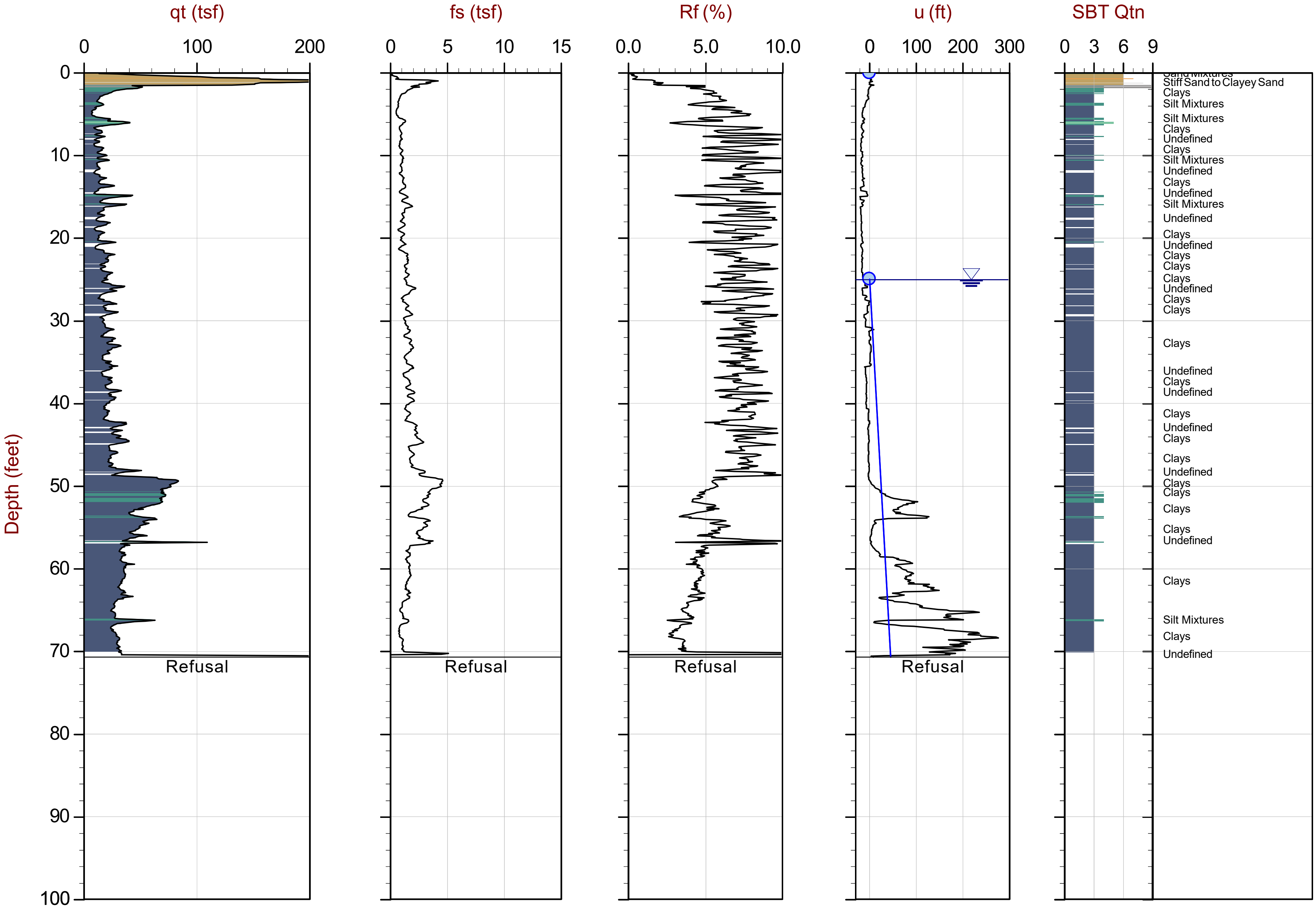
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 13:14
Site: DTE Monroe Power Plant

Sounding: CPT20-172
Cone: 551:T1500F15U500



Max Depth: 21.550 m / 70.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP172.COR
Unit Wt: SBTQtn (PKR2009)

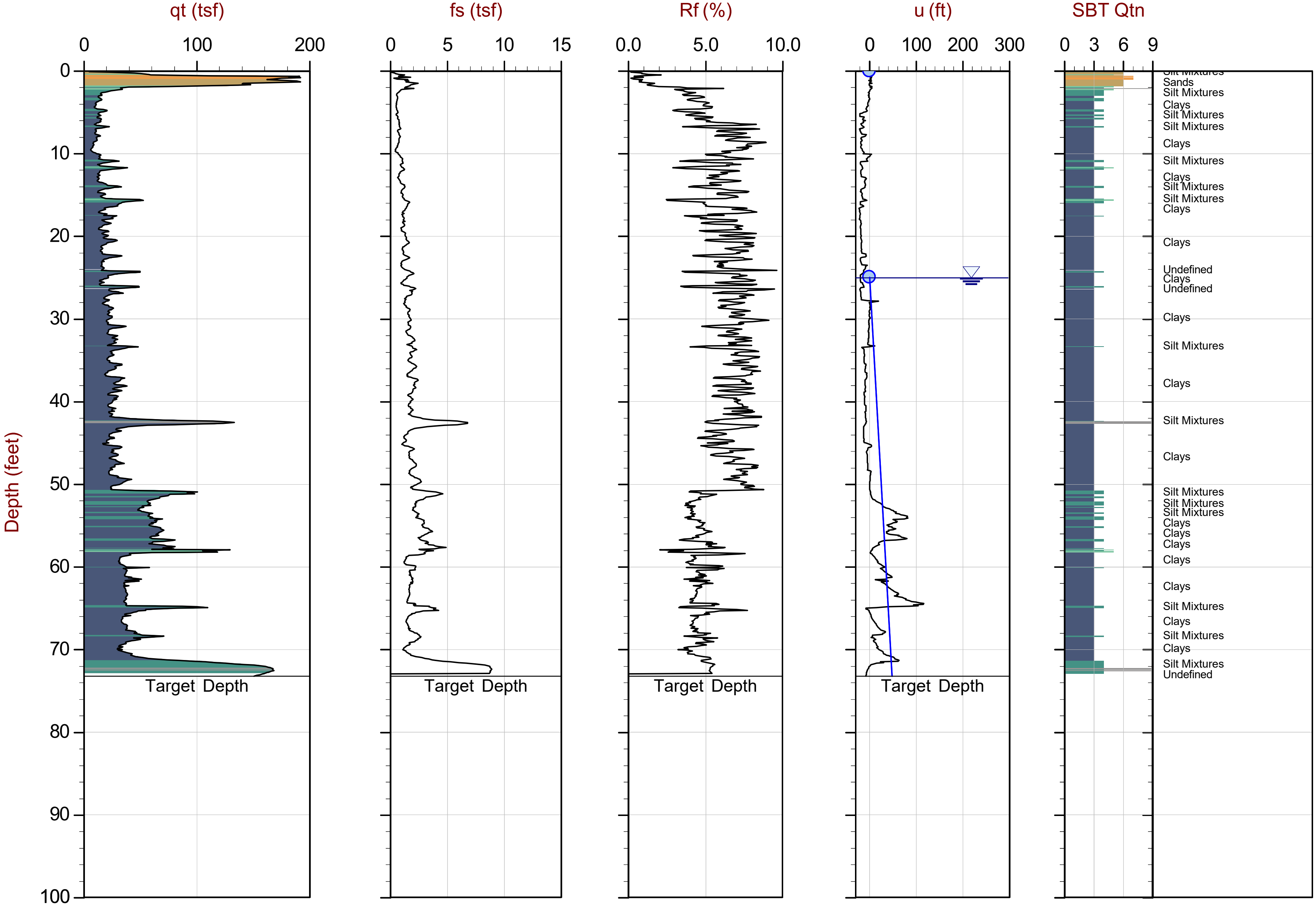
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140759ft E: 13396566ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-174
Cone: 551:T1500F15U500



Max Depth: 22.325 m / 73.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP174.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140916ft E: 13396693ft
Sheet No: 1 of 1

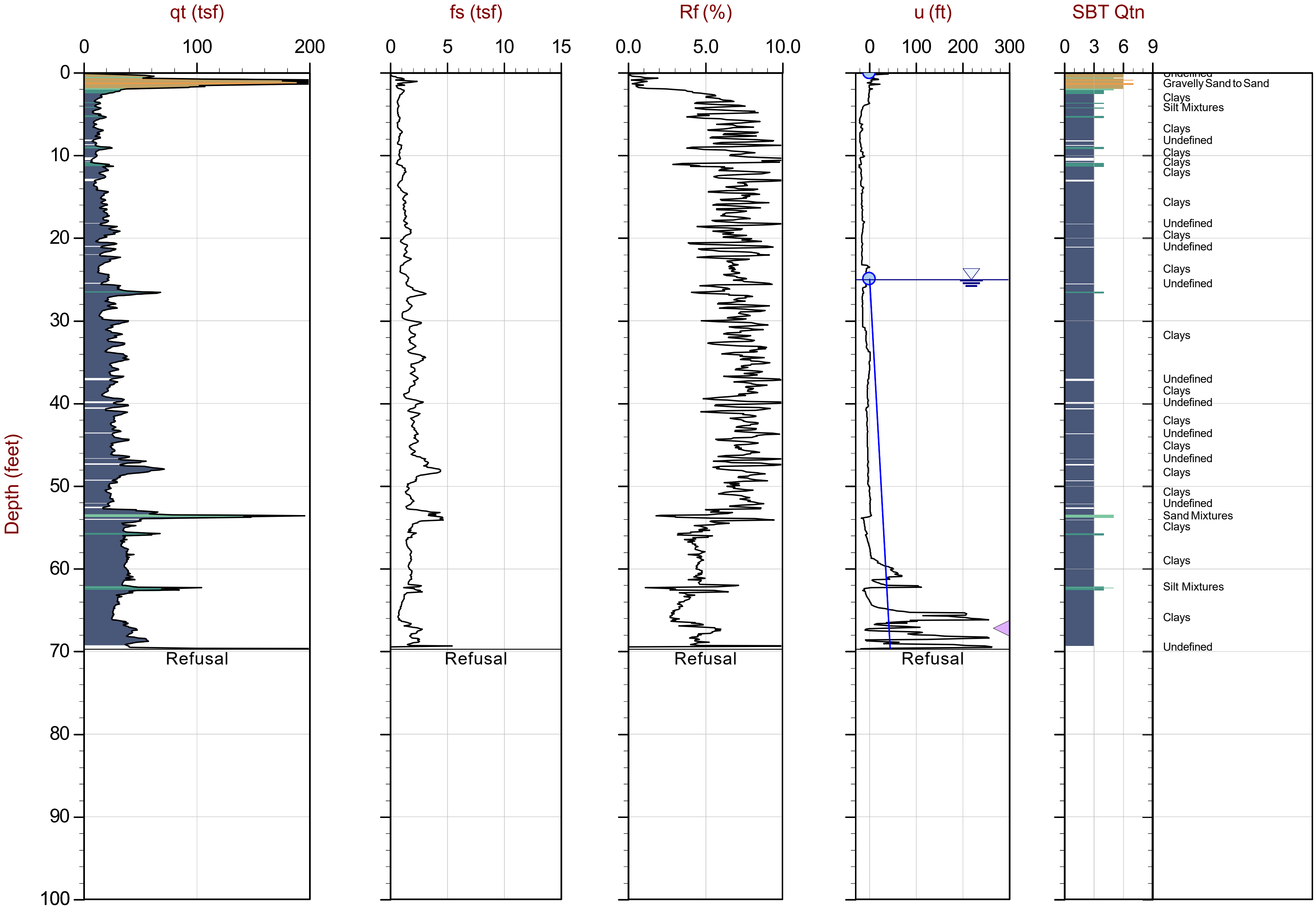
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 10:33
Site: DTE Monroe Power Plant

Sounding: CPT20-176
Cone: 551:T1500F15U500



Max Depth: 21.250 m / 69.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP176.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141071ft E: 13396820ft
Sheet No: 1 of 1

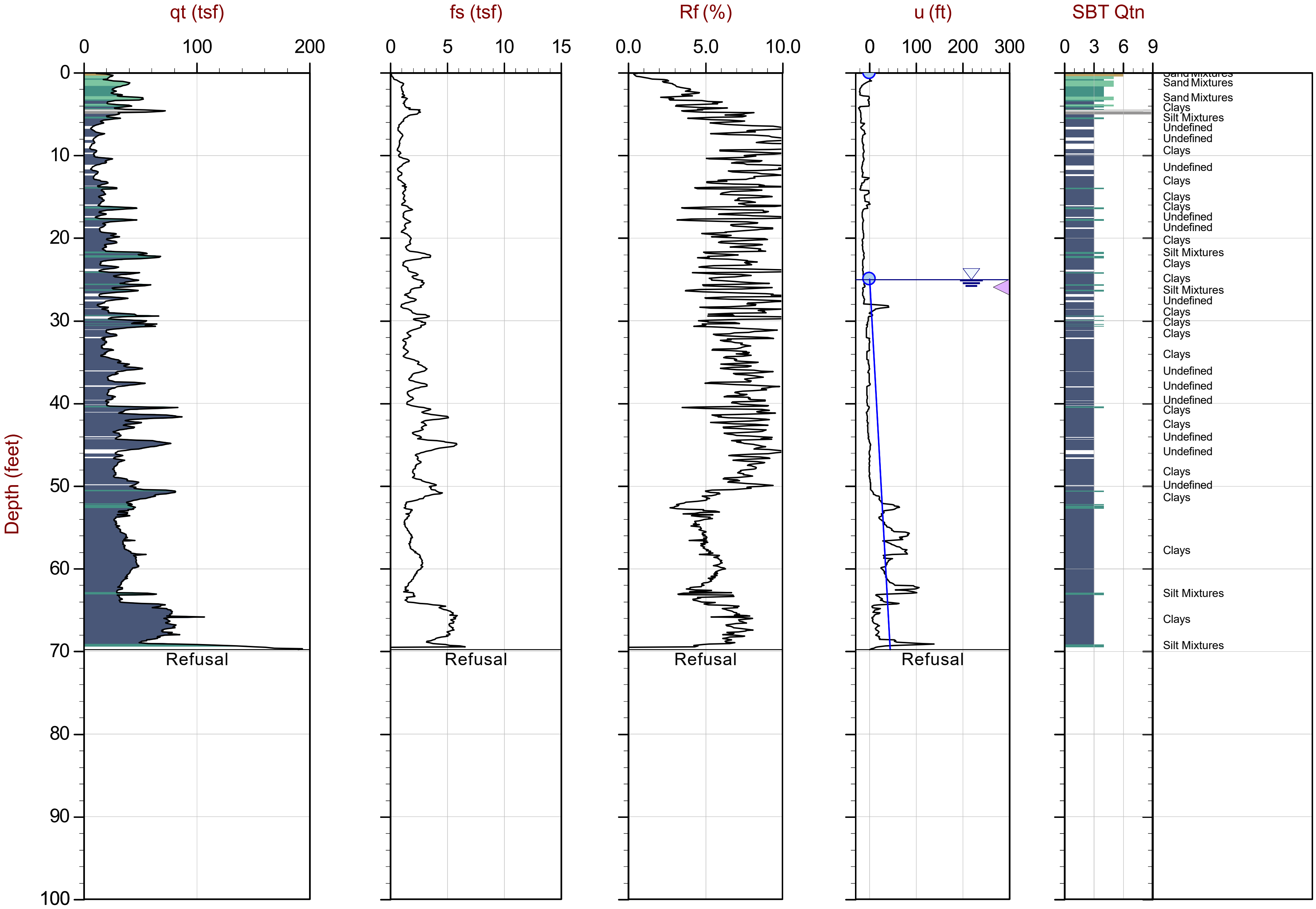
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 09:43
Site: DTE Monroe Power Plant

Sounding: CPT20-178
Cone: 551:T1500F15U500



Max Depth: 21.275 m / 69.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP178.COR
Unit Wt: SBTQtn (PKR2009)

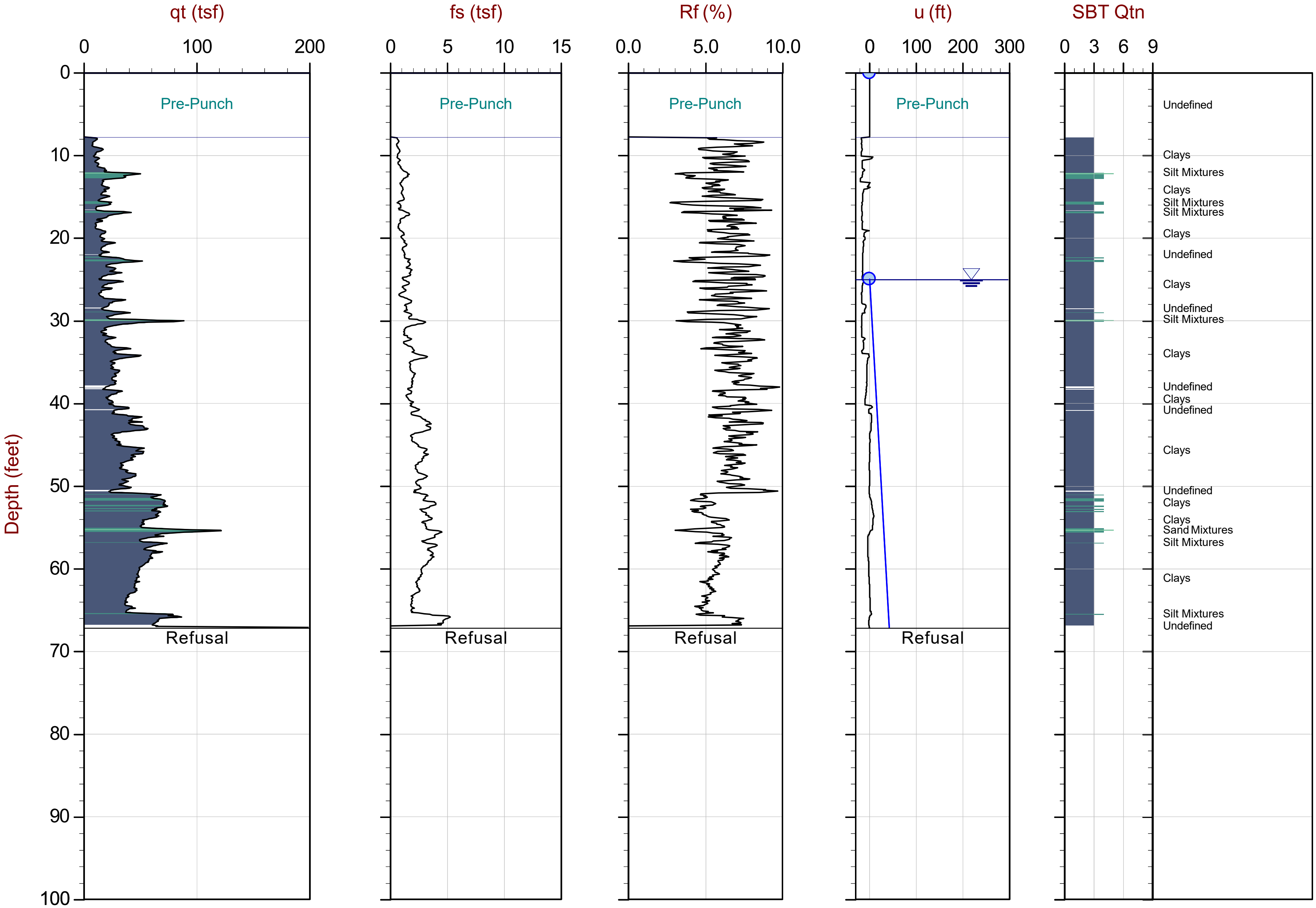
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141268ft E: 13396939ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 08:53
Site: DTE Monroe Power Plant

Sounding: SCPT20-180
Cone: 551:T1500F15U500



Max Depth: 20.475 m / 67.17 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_SP180.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141428ft E: 13397002ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

APPENDIX K2 – PPD TEST RESULTS

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-000	20-61-21655_CP000	15	105	48.720	Not Achieved						
CPT20-004	20-61-21655_CP004	15	300	45.111	Not Achieved						
CPT20-004	20-61-21655_CP004	15	3600	55.117	Not Achieved		25.0	3531	3361	0.2	
CPT20-004	20-61-21655_CP004	15	195	66.928	Not Achieved						
CPT20-006	20-61-21655_CP006	15	300	50.442	Not Achieved						
CPT20-008	20-61-21655_CP008	15	100	50.114	Not Achieved						
CPT20-008	20-61-21655_CP008	15	5190	55.117	Not Achieved						
CPT20-008	20-61-21655_CP008	15	5270	60.121	Not Achieved						
CPT20-008	20-61-21655_CP008	15	400	63.812	Not Achieved						
CPT20-010	20-61-21655_CP010	15	105	21.899	Not Achieved						
CPT20-022	20-61-21655_CP022	15	75	72.014	Not Achieved						
CPT20-028	20-61-21655_CP028	15	250	47.490	Not Achieved						
CPT20-028	20-61-21655_CP028	15	835	50.114	Not Achieved		25.0	375	325	2.2	
CPT20-028	20-61-21655_CP028	15	5225	55.117	Not Achieved		25.0	4158	3978	0.2	
CPT20-028	20-61-21655_CP028	15	580	59.547	Not Achieved						
CPT20-030	20-61-21655_CP030	15	65	59.875	Not Achieved						
CPT20-032	20-61-21655_CP032	15	150	23.950	Not Achieved						
CPT20-034	20-61-21655_CP034	15	80	9.514	Not Achieved						
CPT20-034	20-61-21655_CP034	15	235	45.931	Not Achieved						
CPT20-036	20-61-21655_CP036	15	3570	21.161	Not Achieved						

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-038	20-61-21655_CP038	15	3530	57.004	Not Achieved						
CPT20-048	20-61-21655_CP048	15	1200	50.032	Not Achieved		25.0	1023	943	0.7	
CPT20-048	20-61-21655_CP048	15	5400	55.117	Not Achieved		25.0	5189	4739	0.2	
CPT20-048	20-61-21655_CP048	15	4985	60.039	Not Achieved						75.2
CPT20-054	20-61-21655_CP054	15	70	60.859	Not Achieved						
CPT20-058	20-61-21655_CP058	15	3125	42.158	Not Achieved						
CPT20-060	20-61-21655_CP060	15	65	59.875	Not Achieved						
CPT20-068	20-61-21655_CP068	15	2700	40.026	Not Achieved						
CPT20-068	20-61-21655_CP068	15	3600	43.143	Not Achieved						
CPT20-068	20-61-21655_CP068	15	570	55.117	Not Achieved						
CPT20-068	20-61-21655_CP068	15	1800	59.054	6.4	52.6					
CPT20-074	20-61-21655_CP074	15	110	38.713	6.6	32.1					
CPT20-078B	20-61-21655_CP078B	15	100	38.713	4.4	34.3					
CPT20-078B	20-61-21655_CP078B	15	270	48.556	Not Achieved						
CPT20-086	20-61-21655_CP086	15	230	48.720	Not Achieved						
CPT20-090	20-61-21655_CP090	15	3600	20.013	Not Achieved						
CPT20-090	20-61-21655_CP090	15	7200	40.026	Not Achieved						
CPT20-090	20-61-21655_CP090	15	5365	60.039	Not Achieved						87.0
CPT20-092	20-61-21655_CP092	15	100	5.741	0.0						
CPT20-092	20-61-21655_CP092	15	210	58.398	Not Achieved						

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}^{a} (s)	Assumed Rigidity Index (I_r)	c_h^{b} (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
SCPT20-096	20-61-21655_SP096	15	85	1.148	0.0						
SCPT20-096	20-61-21655_SP096	15	405	35.433	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3600	20.013	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3600	50.032	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3605	60.039	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	485	60.859	0.0						
CPT20-118	20-61-21655_CP118	15	95	12.467	Not Achieved						
CPT20-124	20-61-21655_CP124	15	120	25.262	Not Achieved						
CPT20-128	20-61-21655_CP128	15	145	38.549	Not Achieved						
CPT20-130	20-61-21655_CP130	15	610	15.092	Not Achieved						
CPT20-130	20-61-21655_CP130	15	3600	50.032	Not Achieved		25.0	1192	1077	0.7	
CPT20-130	20-61-21655_CP130	15	3580	60.039	Not Achieved						
CPT20-132	20-61-21655_CP132	15	250	35.433	Not Achieved						
CPT20-132	20-61-21655_CP132	15	410	45.275	Not Achieved						
CPT20-134	20-61-21655_CP134	15	3600	66.928	Not Achieved						
CPT20-136	20-61-21655_CP136	15	670	65.288	Not Achieved						
CPT20-136	20-61-21655_CP136	15	6300	65.862	Not Achieved		25.0	4148	4048	0.2	
CPT20-140	20-61-21655_CP140	15	3110	57.168	Not Achieved						52.3
CPT20-150	20-61-21655_CP150	15	600	40.026	Not Achieved						
CPT20-150	20-61-21655_CP150	15	3600	45.275	Not Achieved						

CONETEC

Job No:	20-61-21655
Client:	Geosyntec Consultants
Project:	DTE Monroe Power Plant
Start Date:	01-Dec-2020
End Date:	14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-150	20-61-21655_CP150	15	7500	55.117	Not Achieved		25.0	6030	4530	0.2	
CPT20-150	20-61-21655_CP150	15	345	65.944	Not Achieved						
CPT20-152	20-61-21655_CP152	15	70	29.035	Not Achieved						
CPT20-154	20-61-21655_CP154	15	125	22.473	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	10.170	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	20.259	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	40.190	Not Achieved						
CPT20-170	20-61-21655_CP170	15	3600	68.159	Not Achieved						
CPT20-176	20-61-21655_CP176	15	3600	67.174	Not Achieved						
CPT20-178	20-61-21655_CP178	15	145	25.918	Not Achieved						
Totals	70 dissipations		2093.6 min								

a. Time is relative to where umax occurred.

b. Houlsby and Teh, 1991.

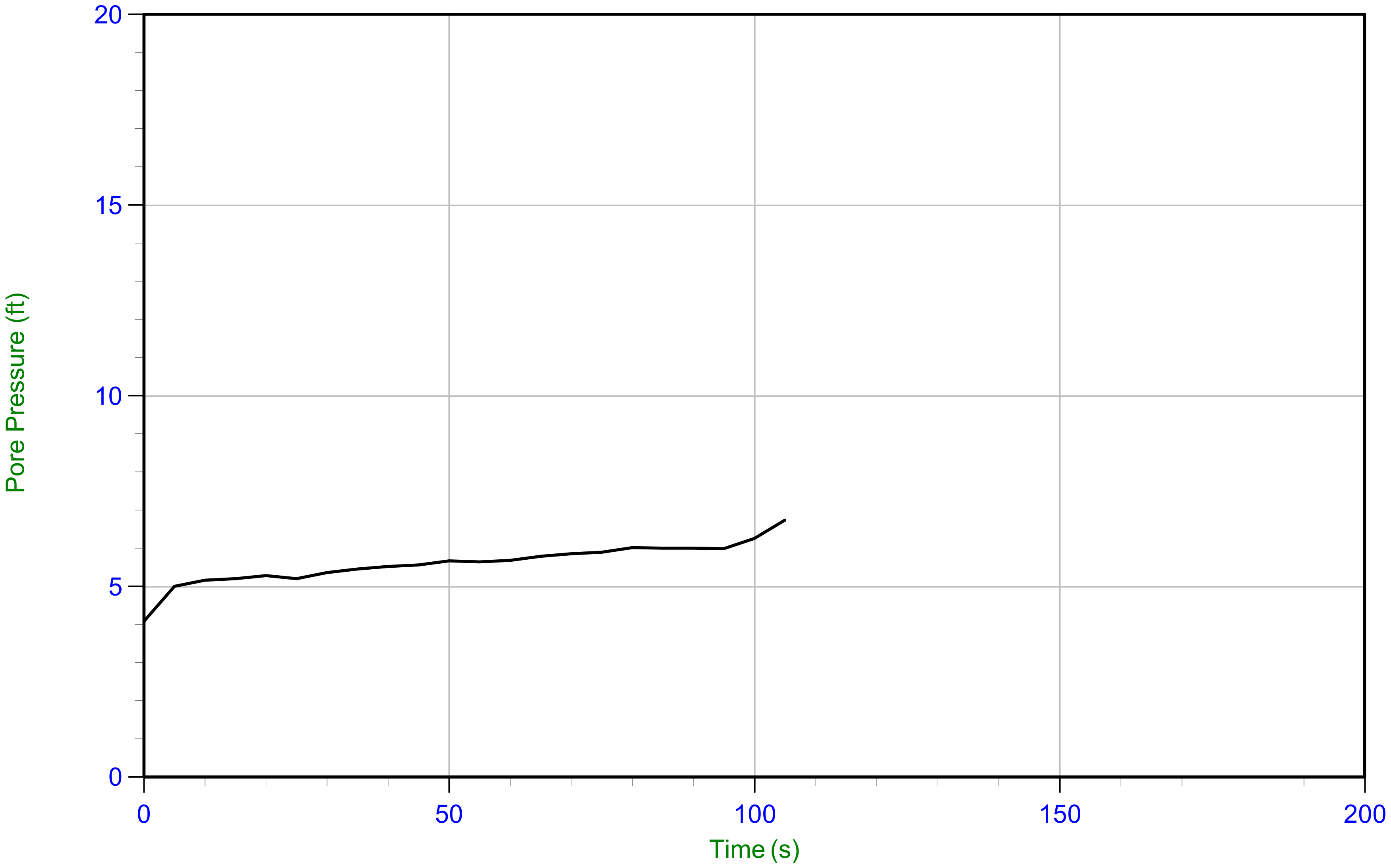
1. The cone was left in the ground overnight and final final pore pressure readings was taken the next morning.

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/02/2020 10:20
Site: DTE Monroe Power Plant

Sounding: CPT20-000
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

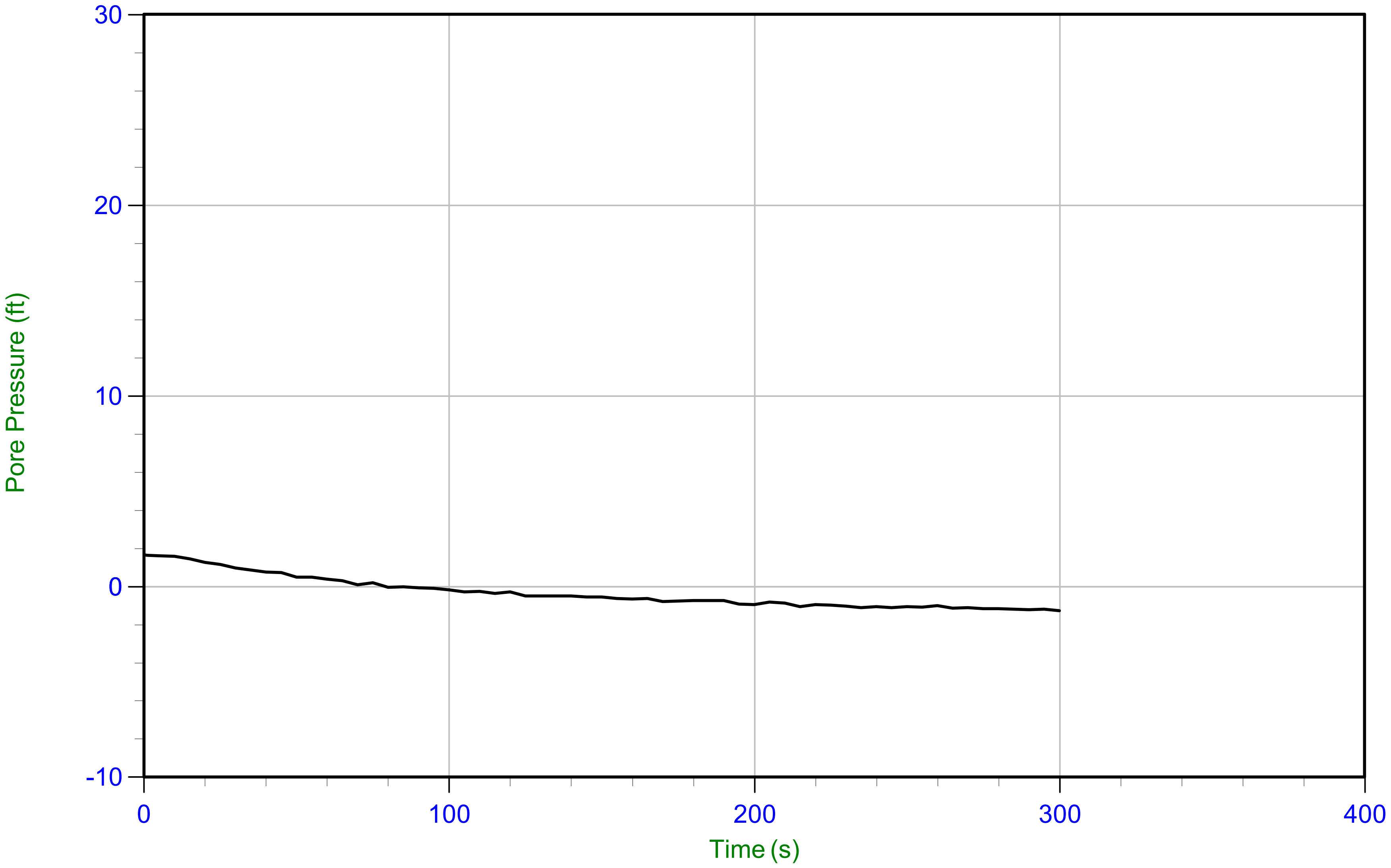
Filename: 20-61-21655_CP000.PPF
Depth: 14.850 m / 48.720 ft
Duration: 105.0 s

u Min: 4.1 ft
u Max: 6.7 ft
u Final: 6.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/01/2020 13:06
Site: DTE Monroe Power Plant

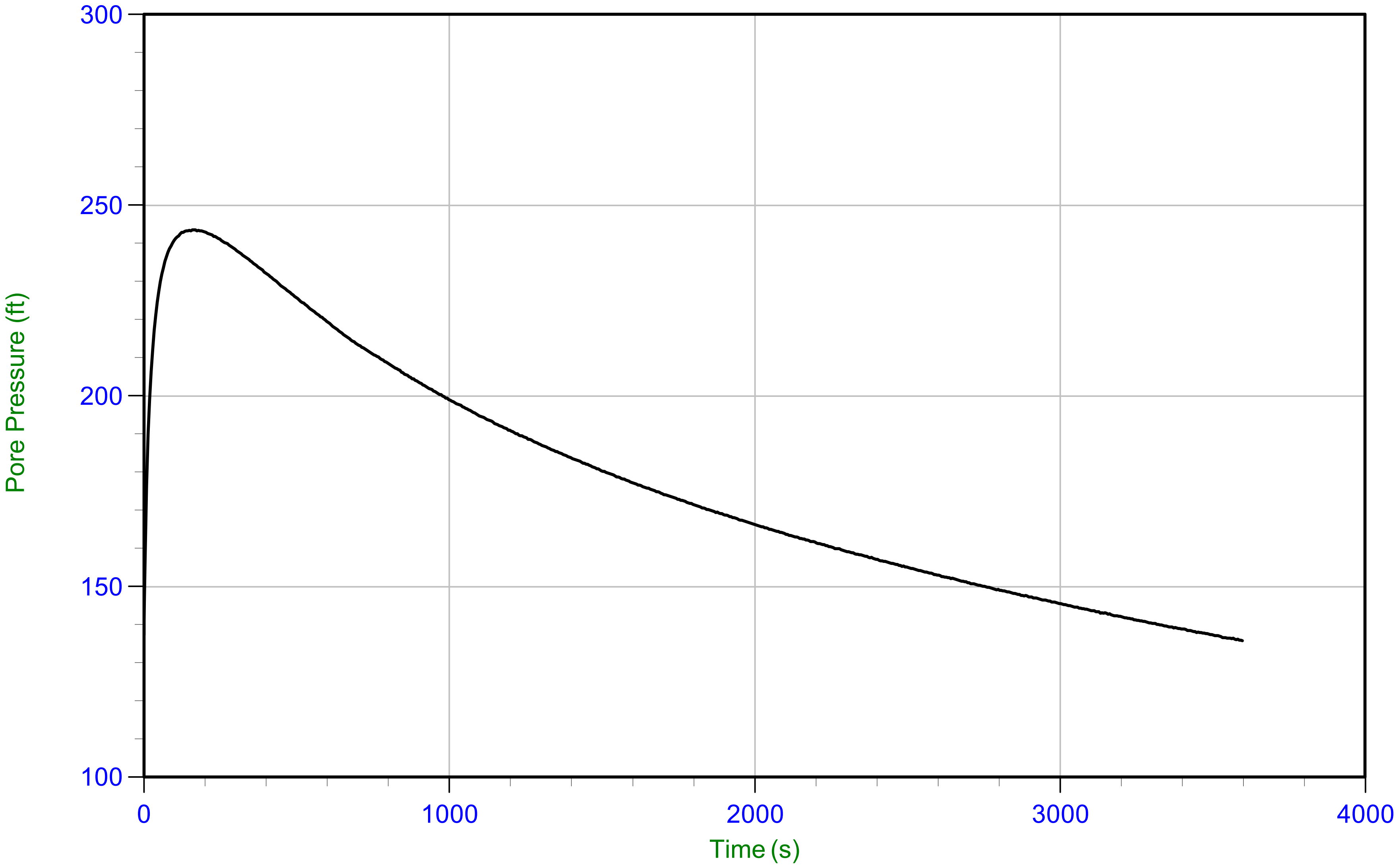
Sounding: CPT20-004
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP004.PPF
Depth: 13.750 m / 45.111 ft
Duration: 300.0 s

u Min: -1.3 ft
u Max: 1.7 ft
u Final: -1.3 ft



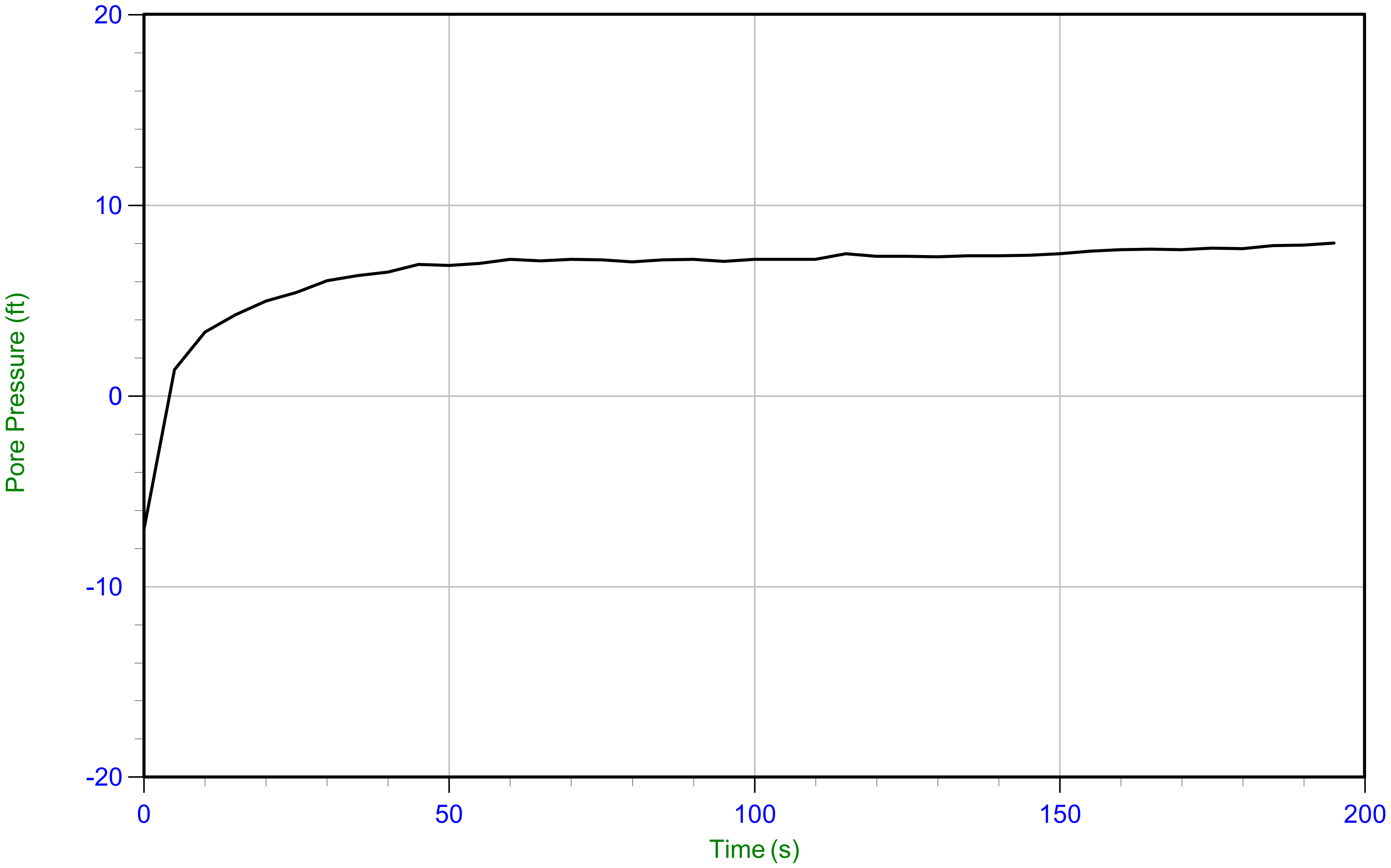
Trace Summary:

Filename: 20-61-21655_CP004.PPF
Depth: 16.800 m / 55.117 ft
Duration: 3600.0 s

u Min: 135.7 ft
u Max: 243.5 ft
u Final: 135.7 ft

WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 136.83 ft

T(50): 3361.4 s
Ir: 100
Ch: 0.2 cm²/min



Trace Summary:

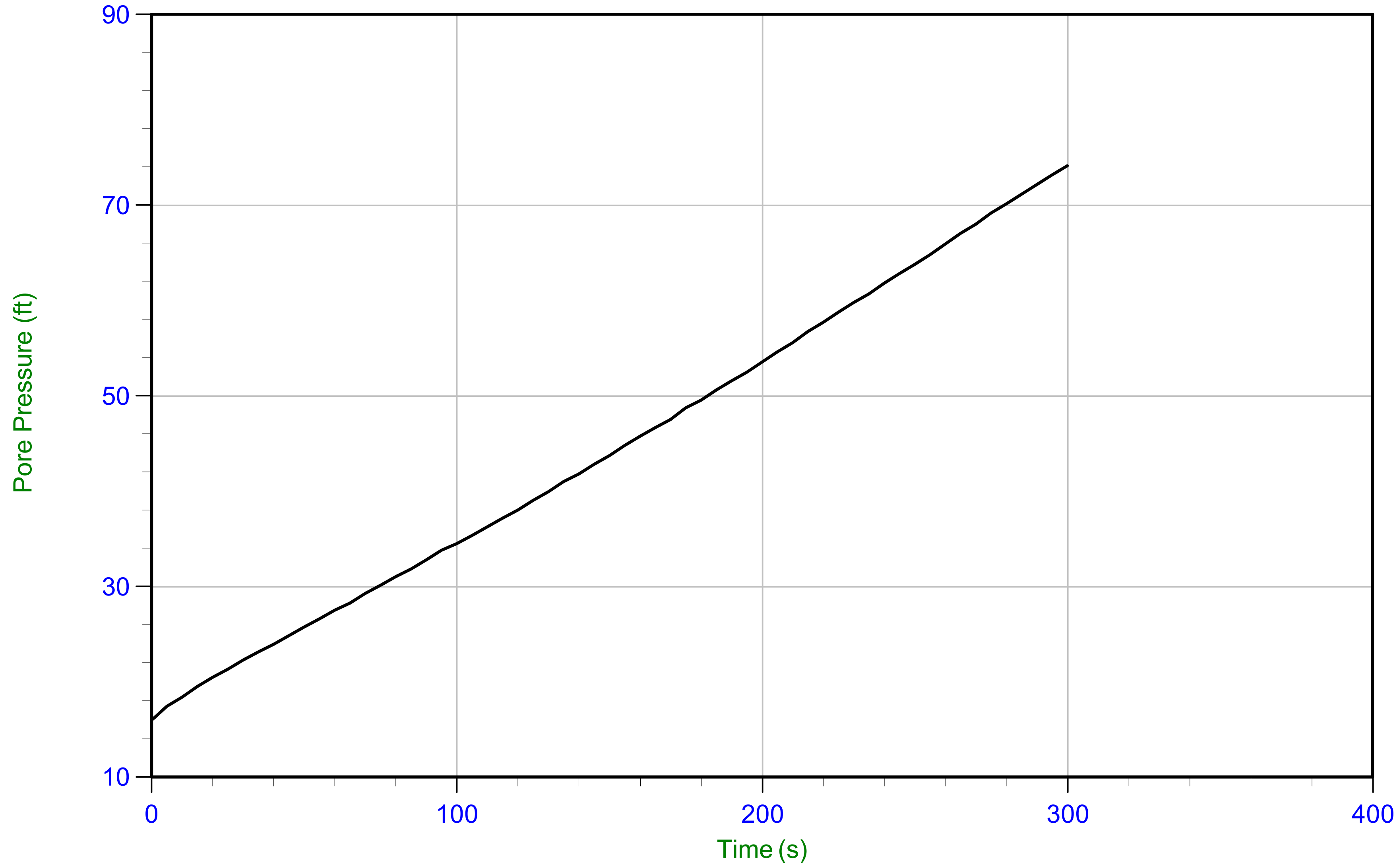
Filename: 20-61-21655_CP004.PPF
Depth: 20.400 m / 66.928 ft
Duration: 195.0 s

u Min: -7.0 ft
u Max: 8.0 ft
u Final: 8.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/01/2020 13:15
Site: DTE Monroe Power Plant

Sounding: CPT20-006
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

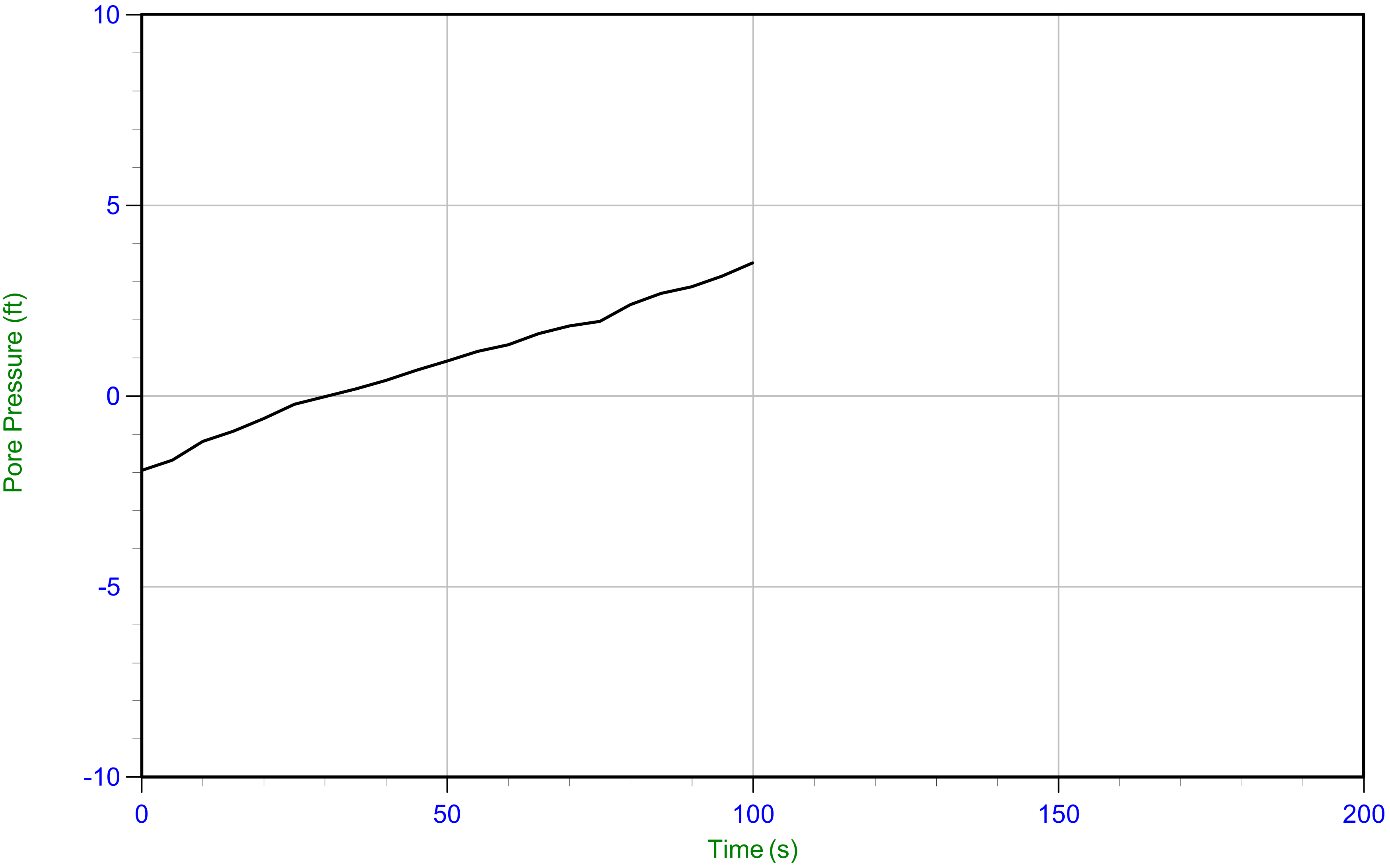
Filename: 20-61-21655_CP006.PPF
Depth: 15.375 m / 50.442 ft
Duration: 300.0 s

u Min: 16.0 ft
u Max: 74.2 ft
u Final: 74.2 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

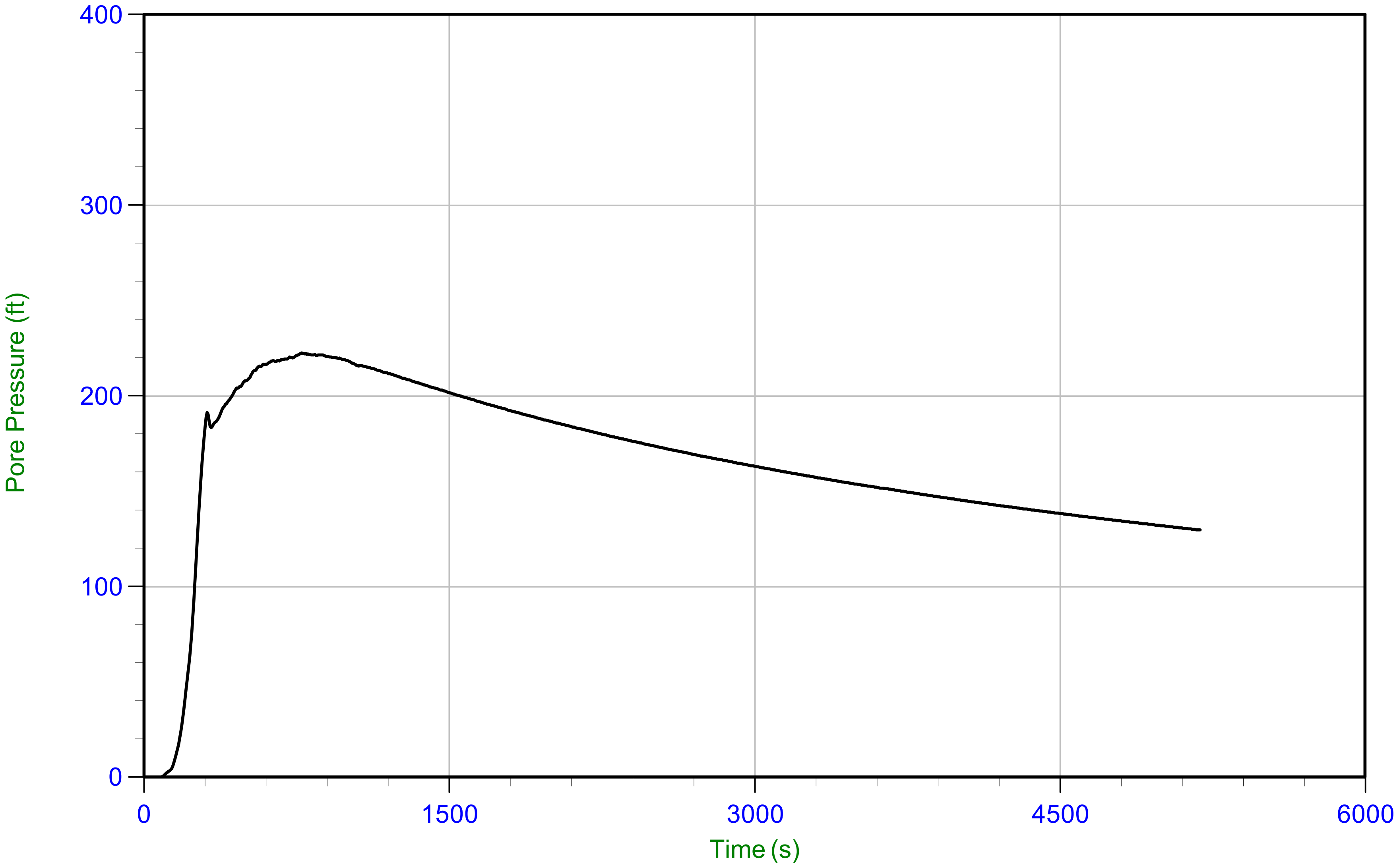
Filename: 20-61-21655_CP008.PPF
Depth: 15.275 m / 50.114 ft
Duration: 100.0 s

u Min: -1.9 ft
u Max: 3.5 ft
u Final: 3.5 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

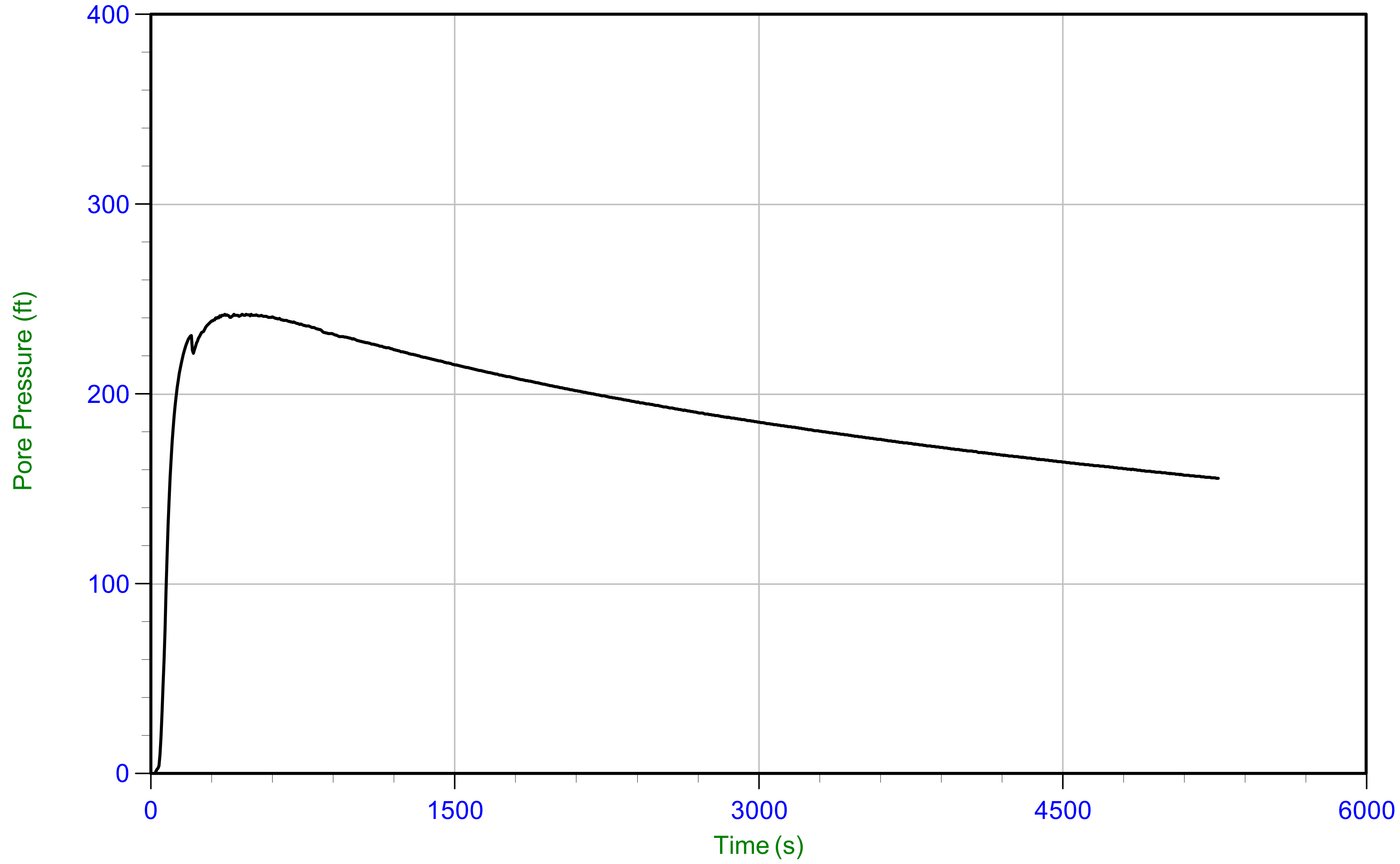
Filename: 20-61-21655_CP008.PPF
Depth: 16.800 m / 55.117 ft
Duration: 5190.0 s

u Min: -7.1 ft
u Max: 222.5 ft
u Final: 129.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

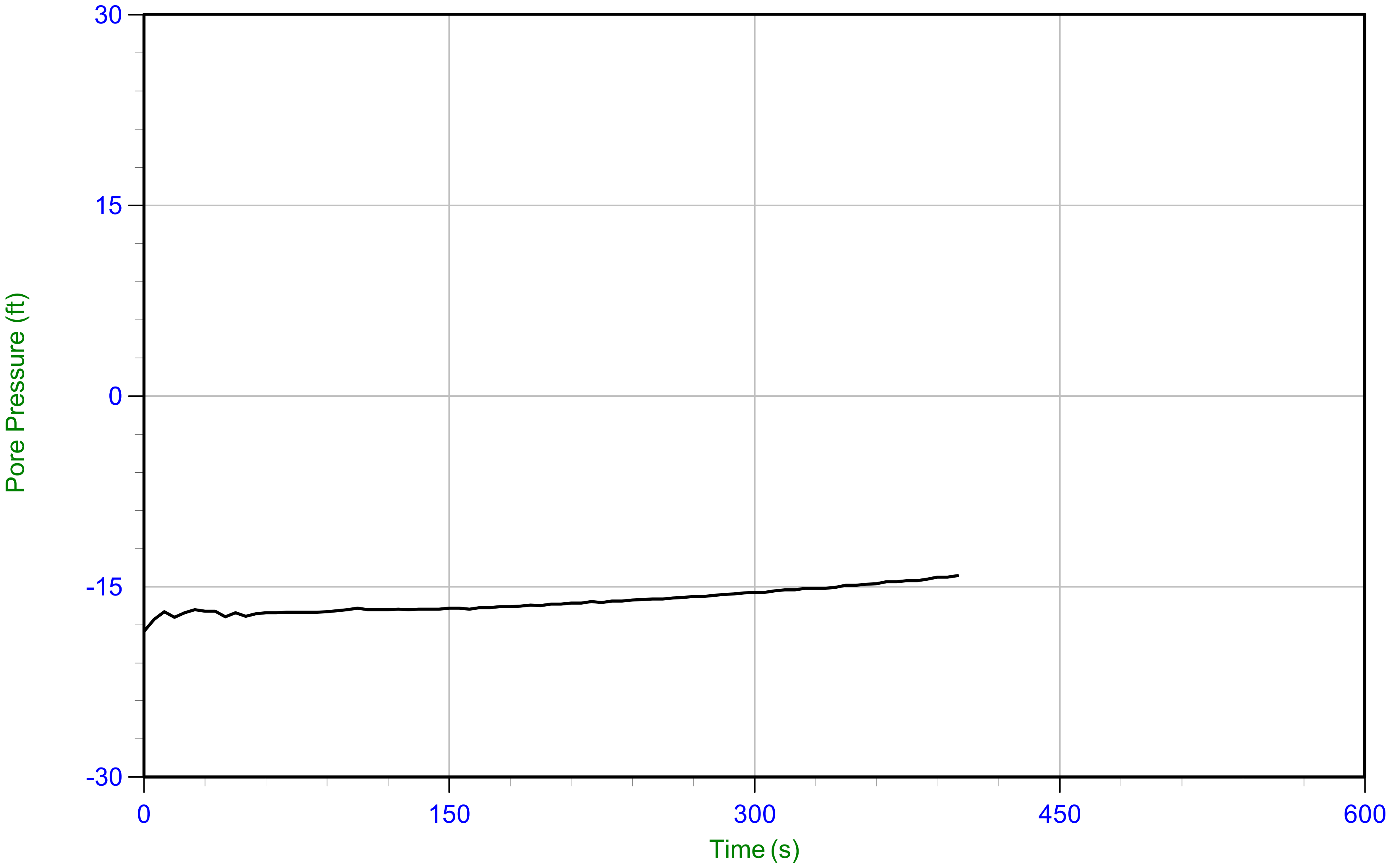
Filename: 20-61-21655_CP008.PPF
Depth: 18.325 m / 60.121 ft
Duration: 5270.0 s

u Min: -9.1 ft
u Max: 242.1 ft
u Final: 155.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

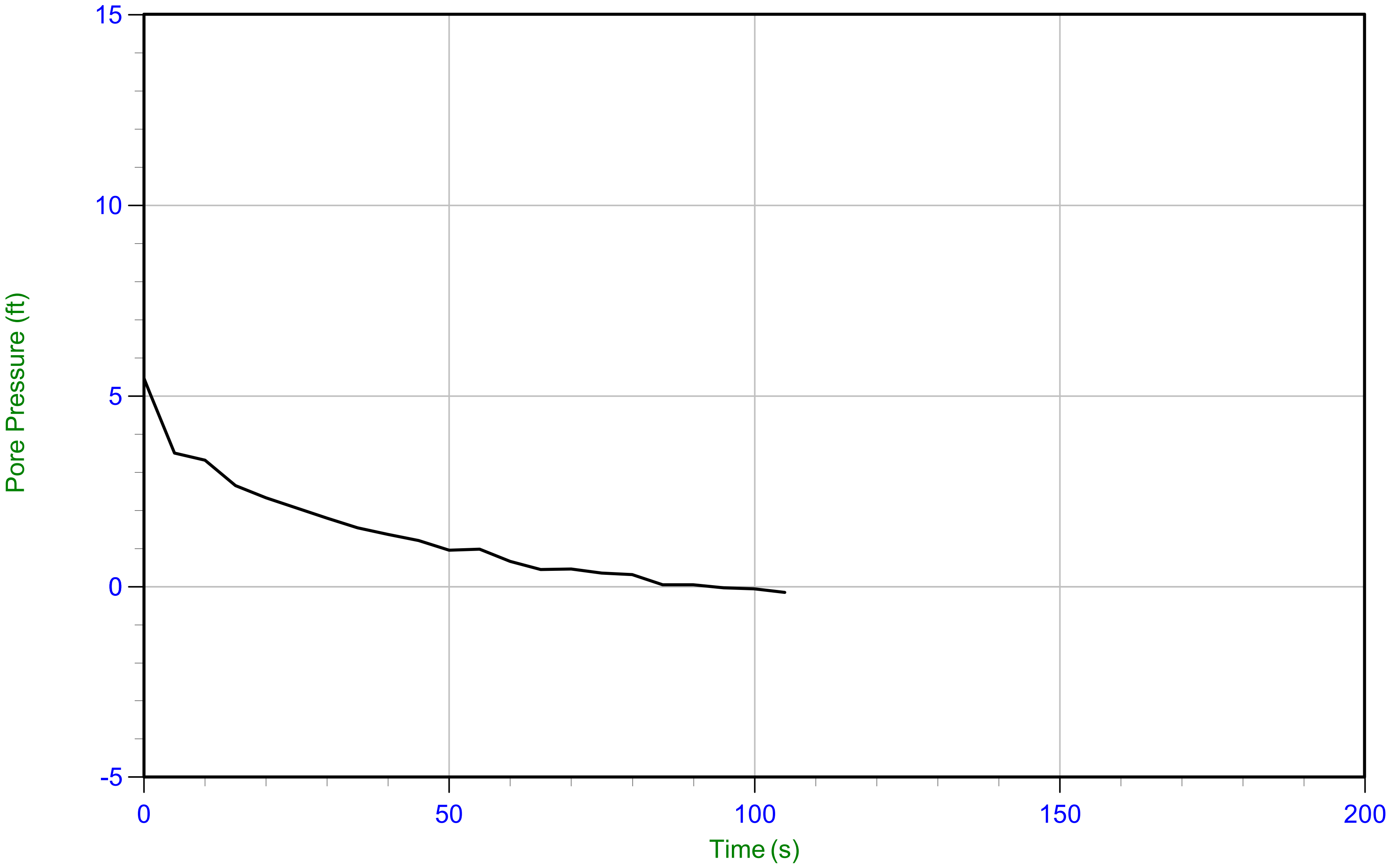
Filename: 20-61-21655_CP008.PPF
Depth: 19.450 m / 63.812 ft
Duration: 400.0 s

u Min: -18.5 ft
u Max: -14.1 ft
u Final: -14.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/02/2020 10:04
Site: DTE Monroe Power Plant

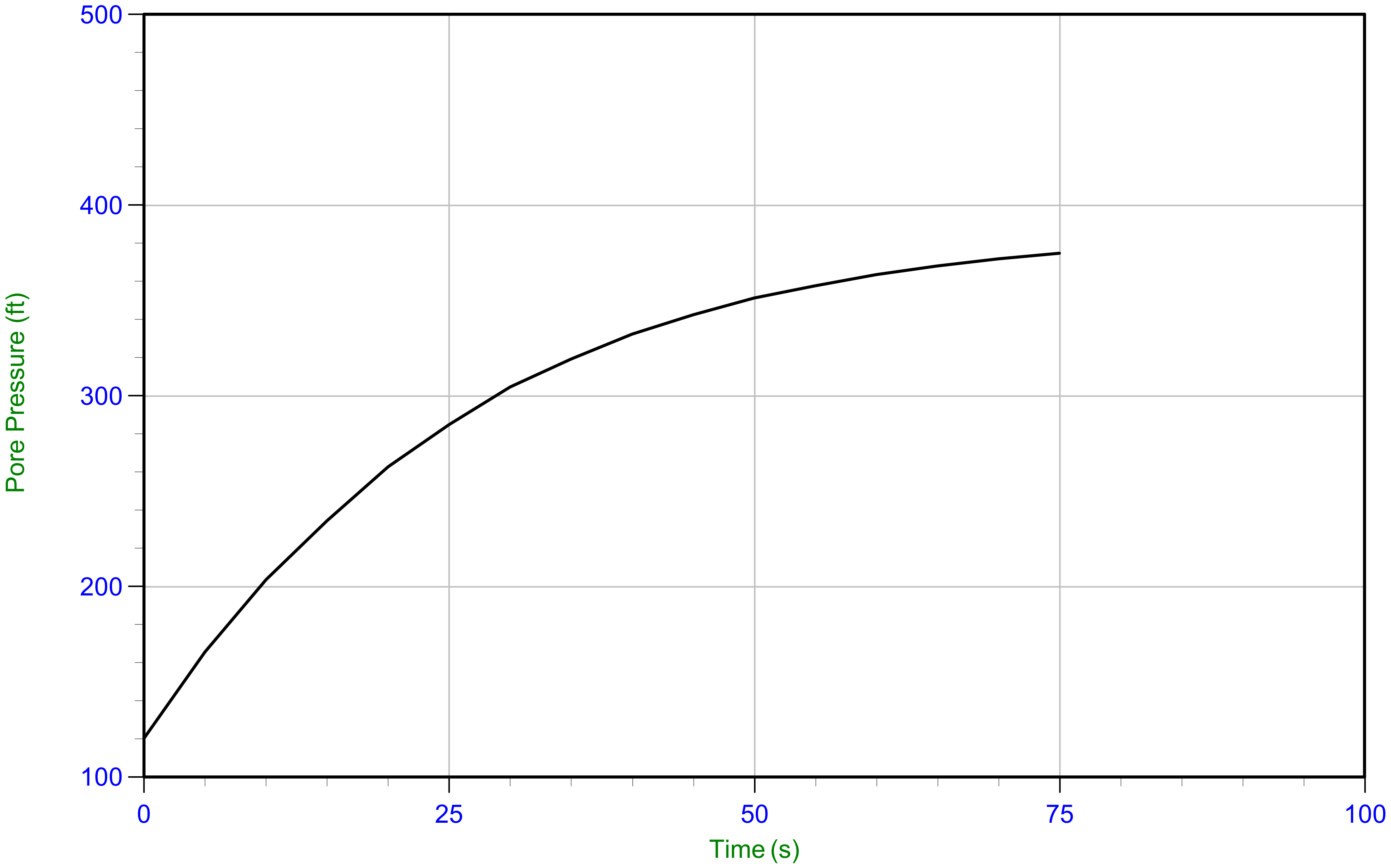
Sounding: CPT20-010
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP010.PPF
Depth: 6.675 m / 21.899 ft
Duration: 105.0 s

u Min: -0.1 ft
u Max: 5.5 ft
u Final: -0.1 ft



Trace Summary:

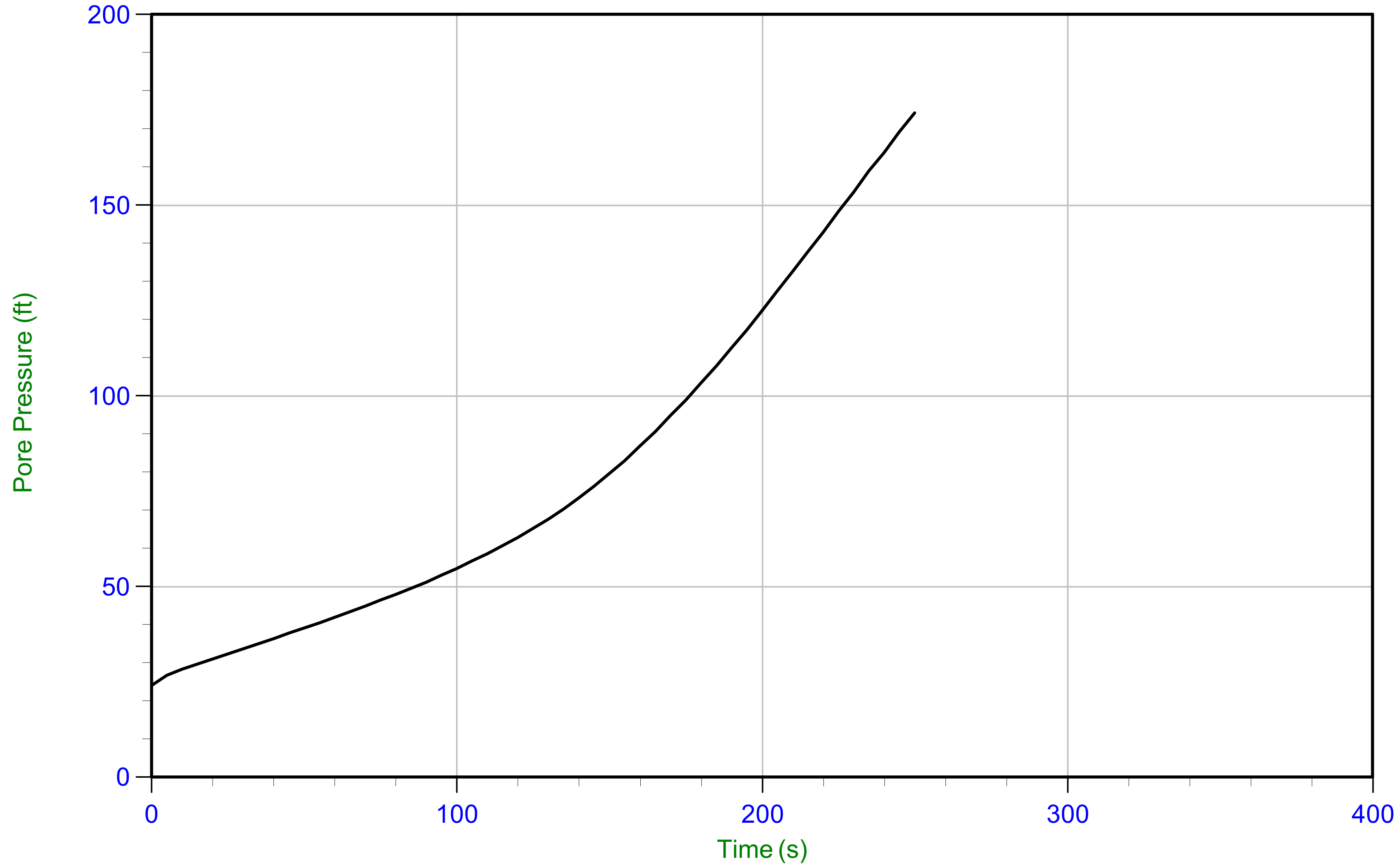
Filename: 20-61-21655_CP022.PPF
Depth: 21.950 m / 72.014 ft
Duration: 75.0 s

u Min: 120.3 ft
u Max: 374.8 ft
u Final: 374.8 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

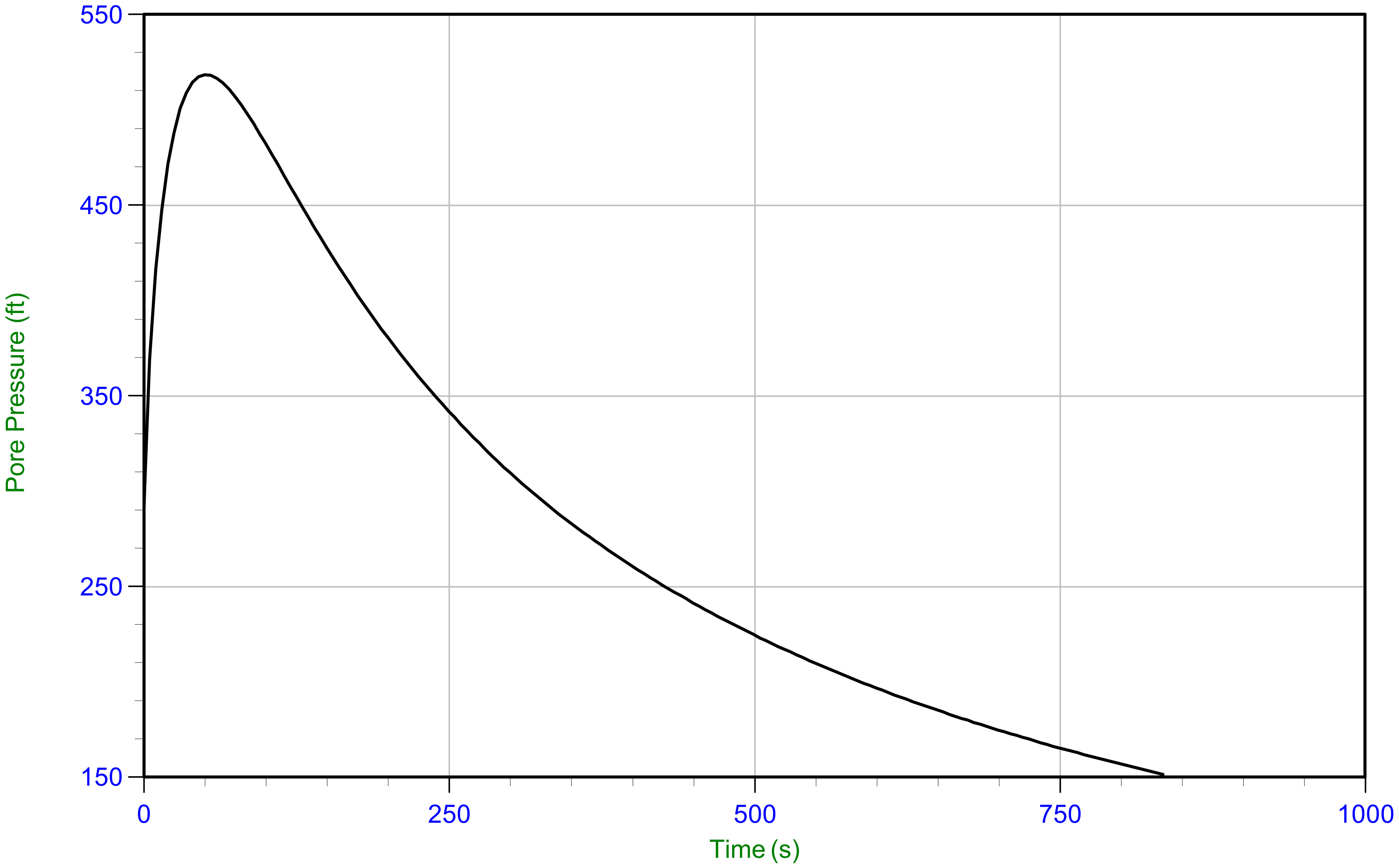
Filename: 20-61-21655_CP028.PPF
Depth: 14.475 m / 47.490 ft
Duration: 250.0 s

u Min: 24.1 ft
u Max: 174.2 ft
u Final: 174.2 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

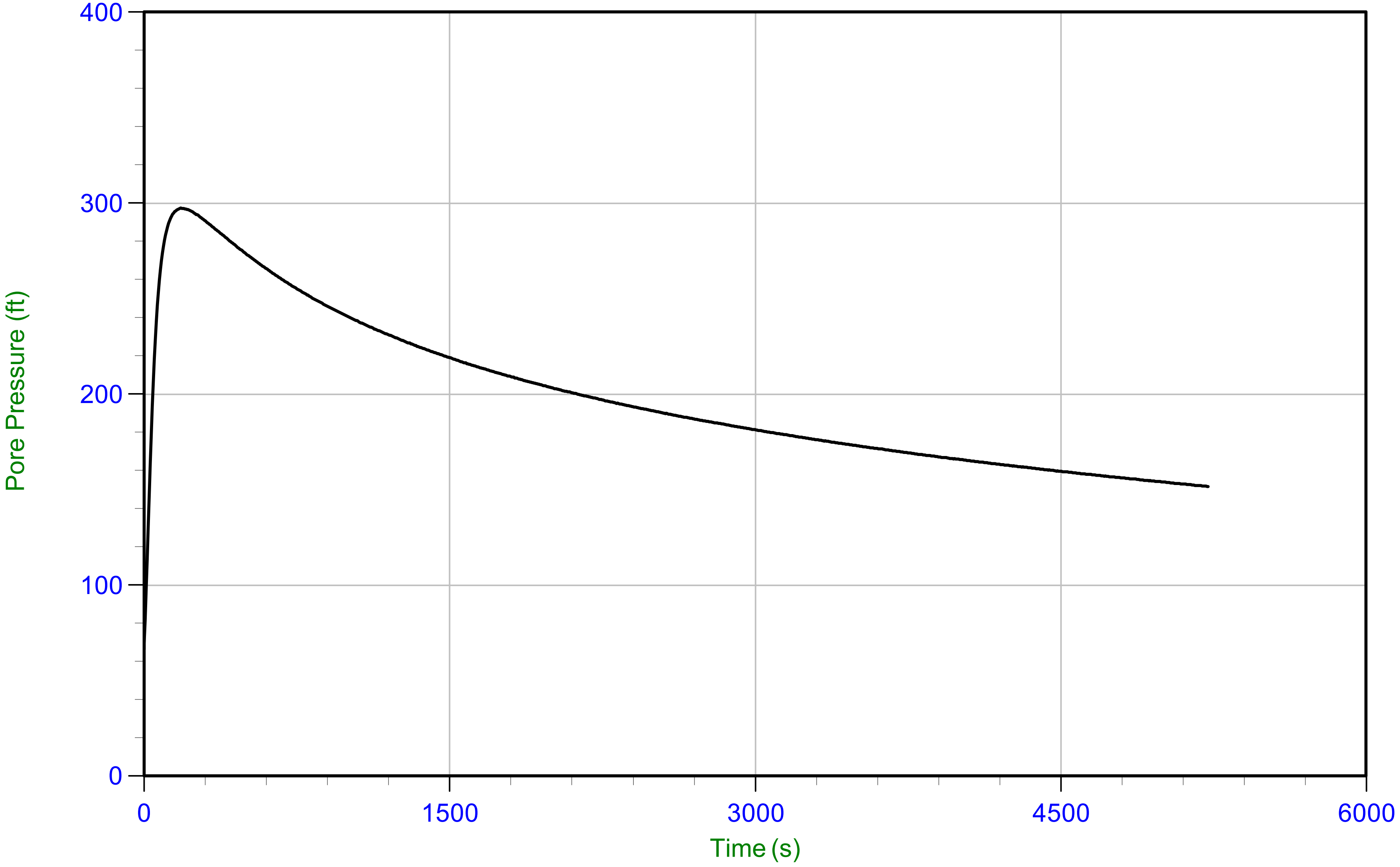
Filename: 20-61-21655_CP028.PPF	u Min: 151.5 ft	WT: 7.620 m / 25.000 ft	T(50): 325.0 s
Depth: 15.275 m / 50.114 ft	u Max: 518.4 ft	Ueq: 25.1 ft	Ir: 100
Duration: 835.0 s	u Final: 151.5 ft	U(50): 271.75 ft	Ch: 2.2 cm²/min

CONETEC

Geosyntec

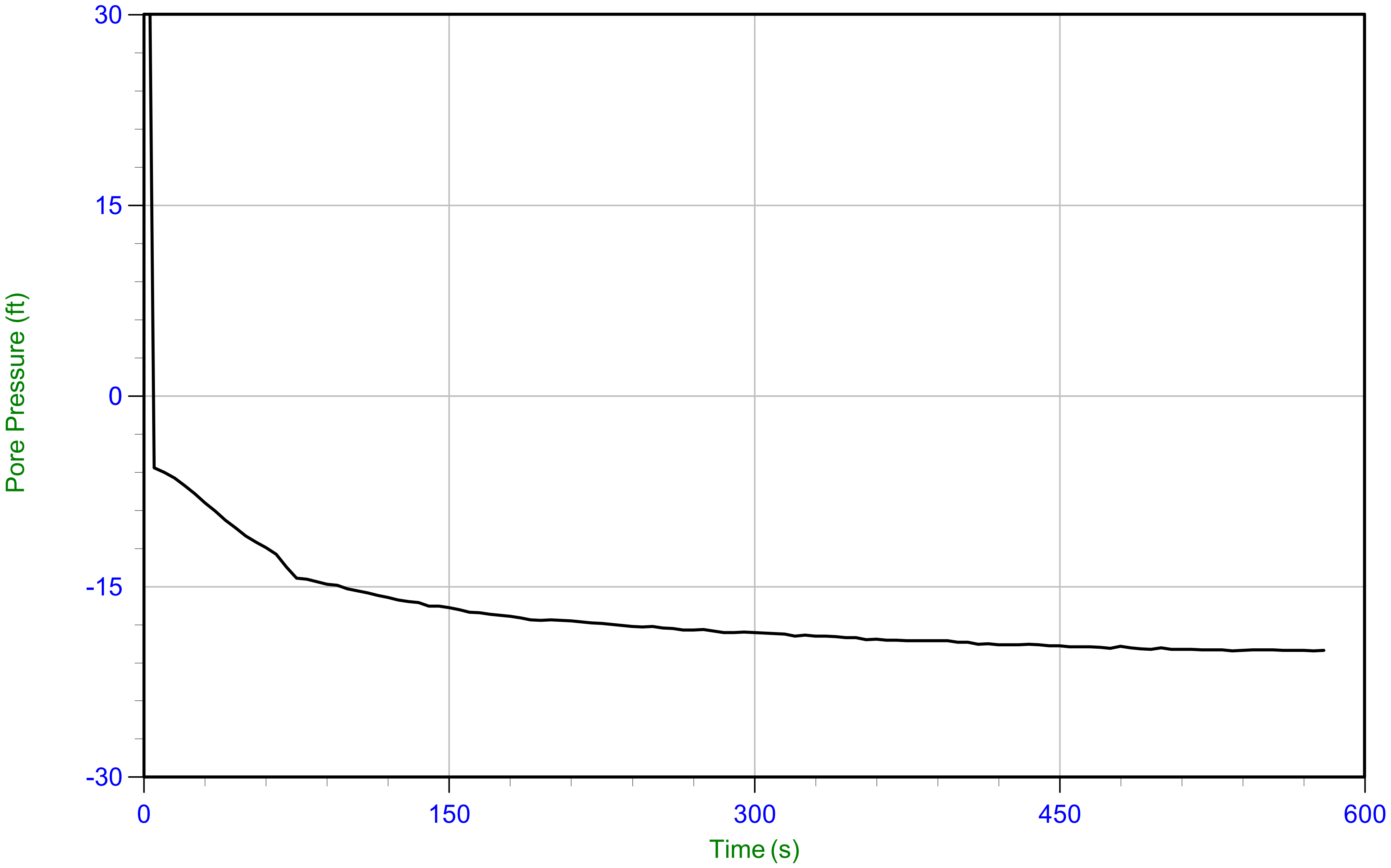
Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP028.PPF	u Min: 66.4 ft	WT: 7.620 m / 25.000 ft	T(50): 3978.2 s
Depth: 16.800 m / 55.117 ft	u Max: 297.4 ft	Ueq: 30.1 ft	Ir: 100
Duration: 5225.0 s	u Final: 151.7 ft	U(50): 163.75 ft	Ch: 0.2 cm²/min



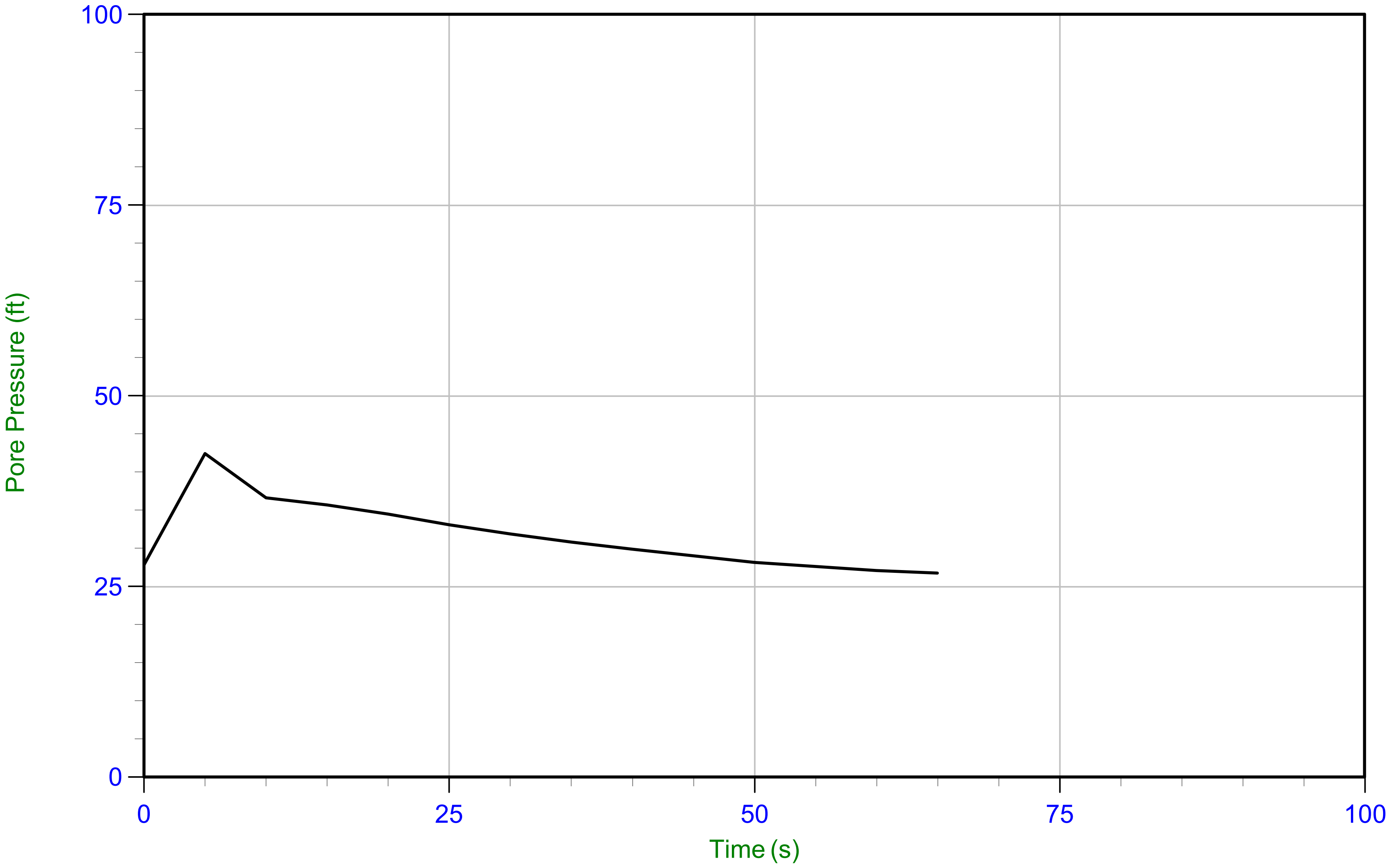
Trace Summary:	Filename: 20-61-21655_CP028.PPF	u Min: -20.1 ft
	Depth: 18.150 m / 59.547 ft	u Max: 82.2 ft
	Duration: 580.0 s	u Final: -20.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 12:31
Site: DTE Monroe Power Plant

Sounding: CPT20-030
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP030.PPF
Depth: 18.250 m / 59.875 ft
Duration: 65.0 s

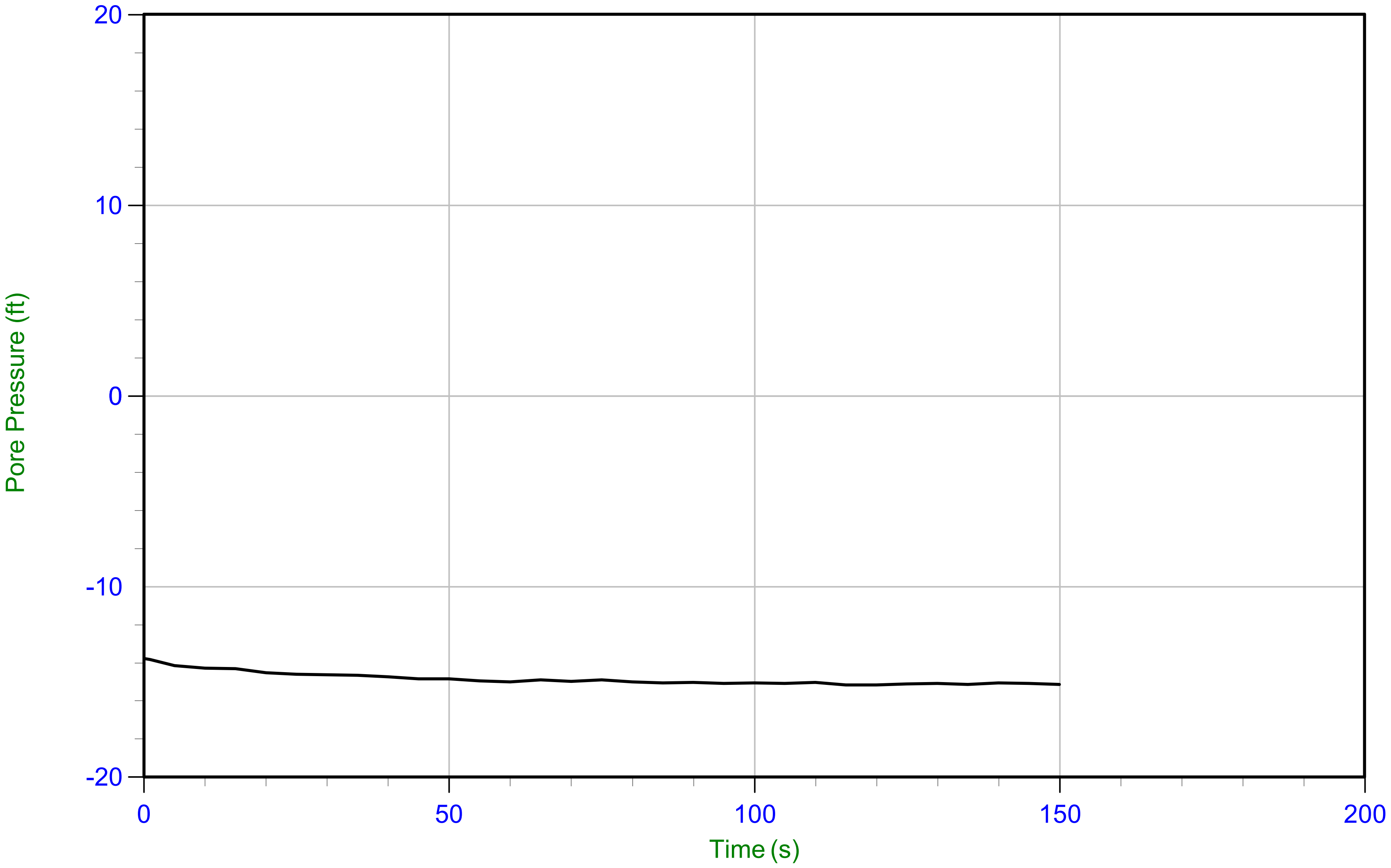
u Min: 26.8 ft
u Max: 42.5 ft
u Final: 26.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 13:26
Site: DTE Monroe Power Plant

Sounding: CPT20-032
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

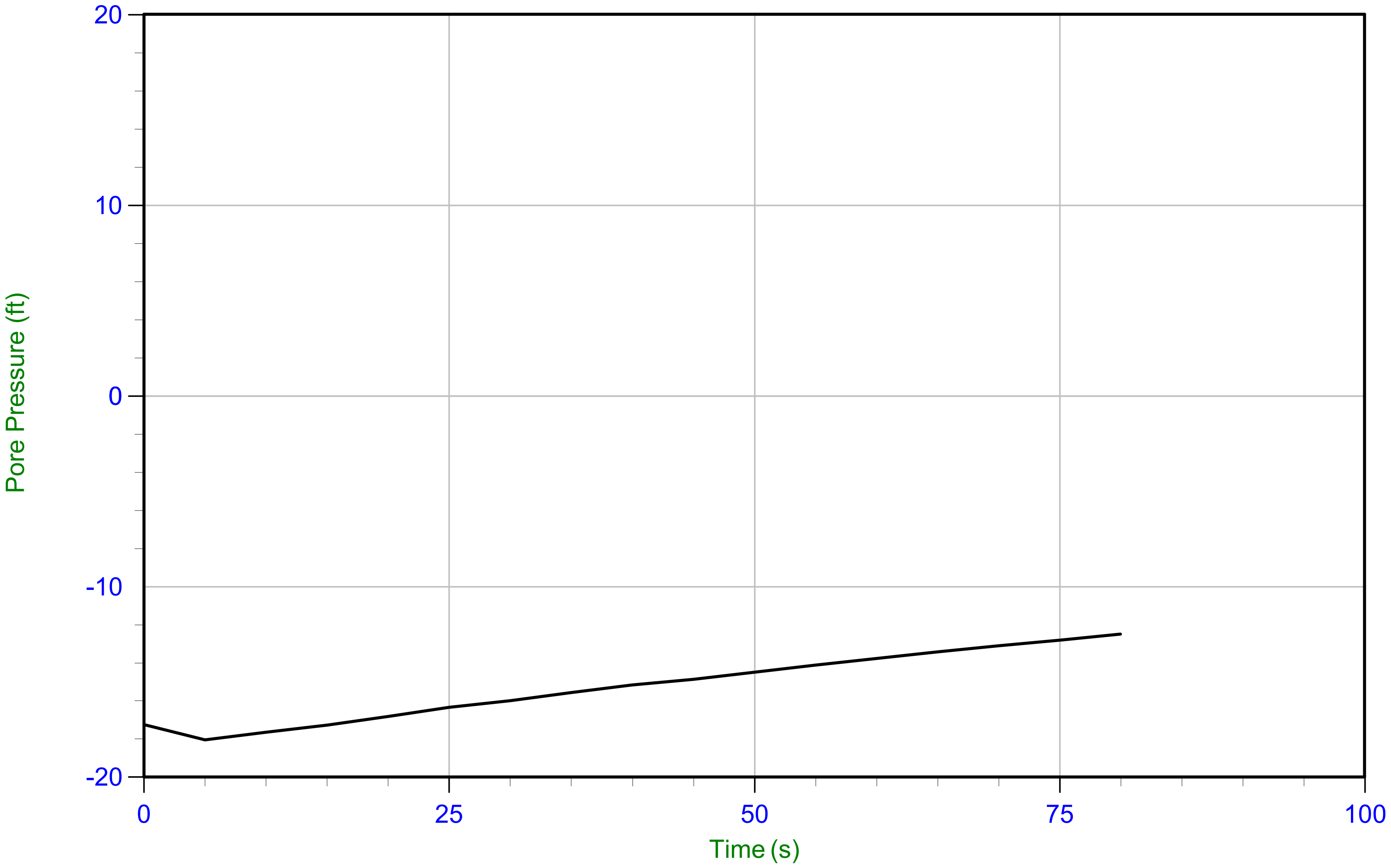
Filename: 20-61-21655_CP032.PPF
Depth: 7.300 m / 23.950 ft
Duration: 150.0 s

u Min: -15.2 ft
u Max: -13.8 ft
u Final: -15.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 14:24
Site: DTE Monroe Power Plant

Sounding: CPT20-034
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP034.PPF
Depth: 2.900 m / 9.514 ft
Duration: 80.0 s

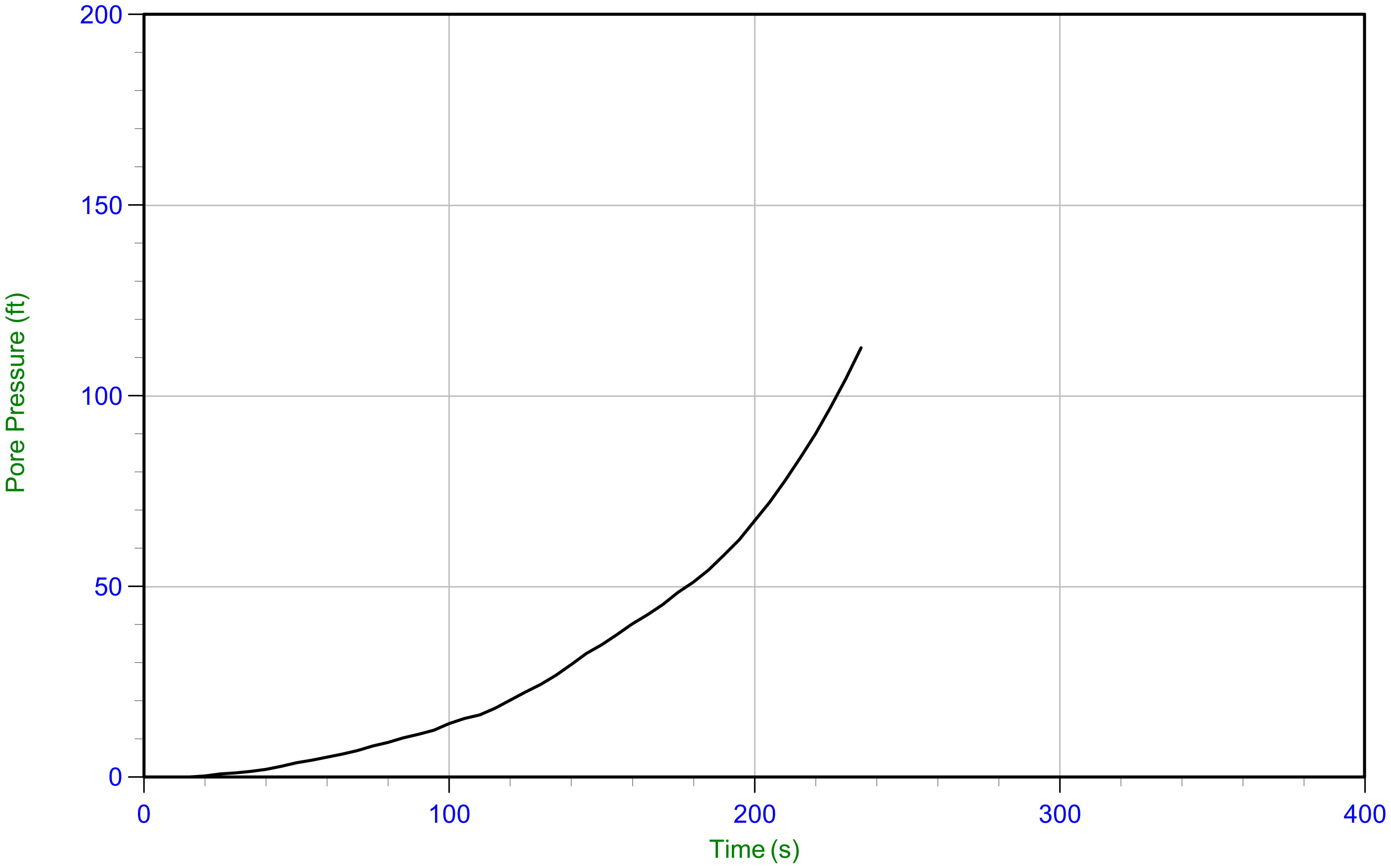
u Min: -18.0 ft
u Max: -12.5 ft
u Final: -12.5 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 14:24
Site: DTE Monroe Power Plant

Sounding: CPT20-034
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

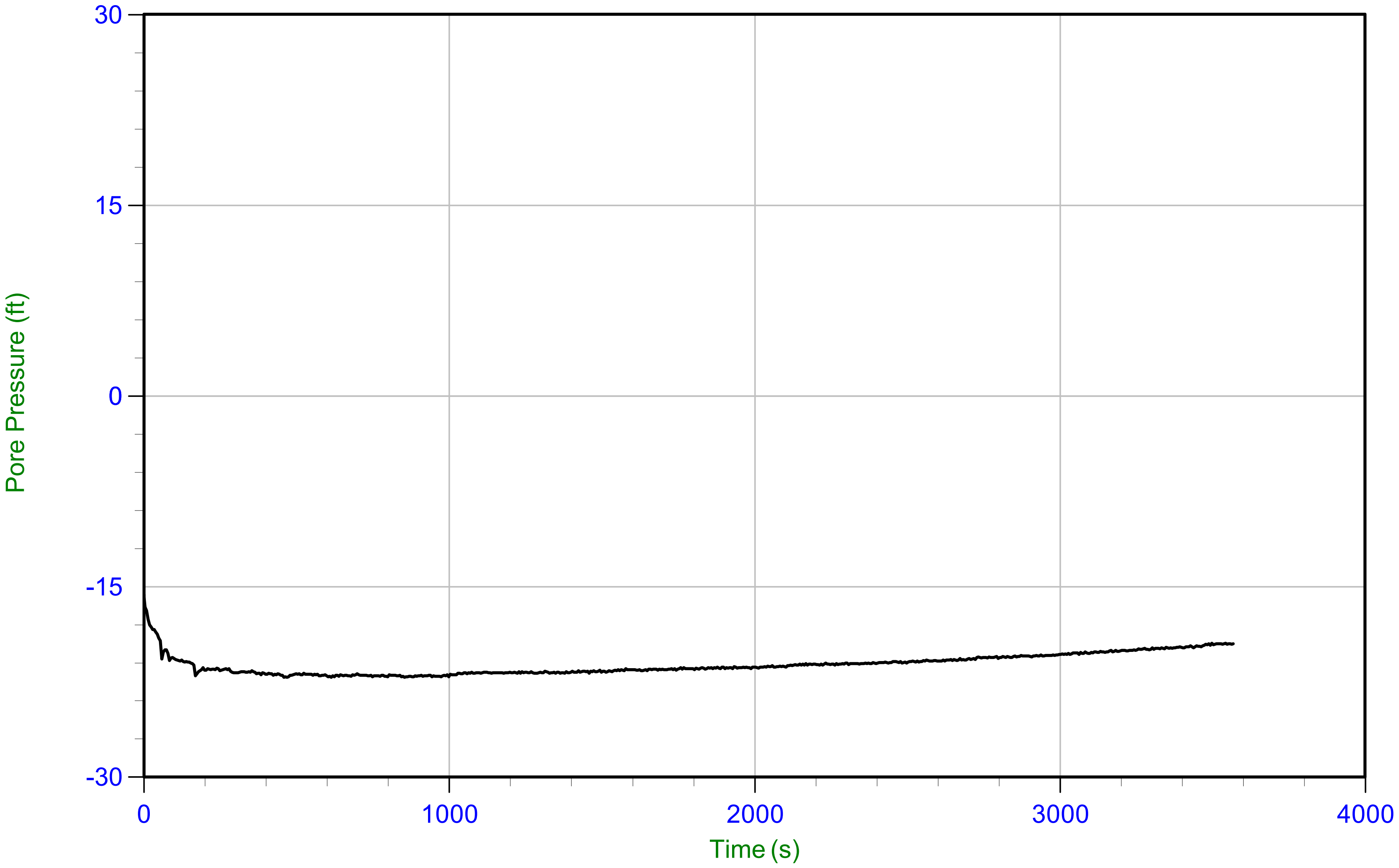
Filename: 20-61-21655_CP034.PPF
Depth: 14.000 m / 45.931 ft
Duration: 235.0 s

u Min: -1.1 ft
u Max: 112.6 ft
u Final: 112.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 09:07
Site: DTE Monroe Power Plant

Sounding: CPT20-036
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP036.PPF
Depth: 6.450 m / 21.161 ft
Duration: 3570.0 s

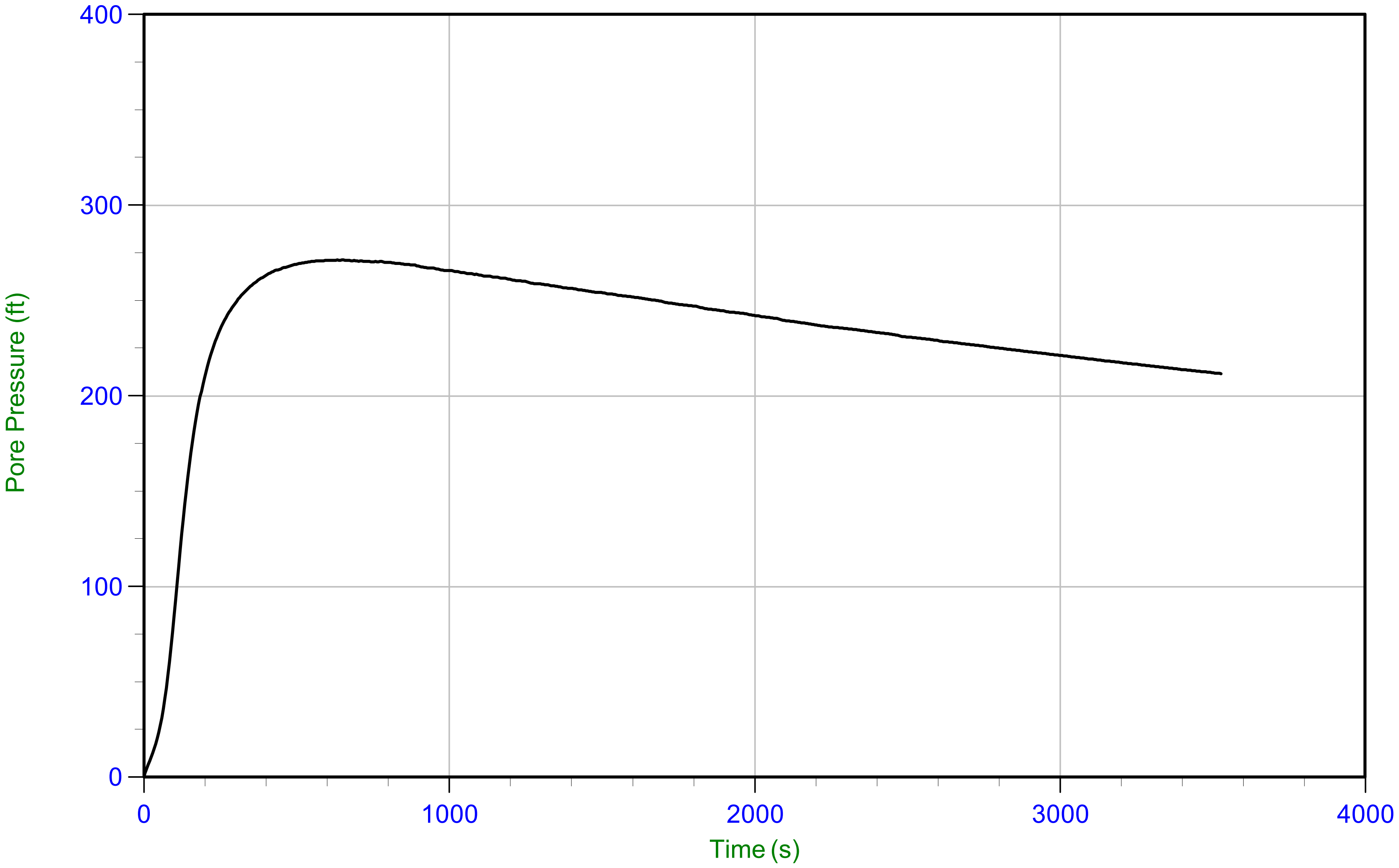
u Min: -22.2 ft
u Max: -15.6 ft
u Final: -19.5 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 10:59
Site: DTE Monroe Power Plant

Sounding: CPT20-038
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP038.PPF
Depth: 17.375 m / 57.004 ft
Duration: 3530.0 s

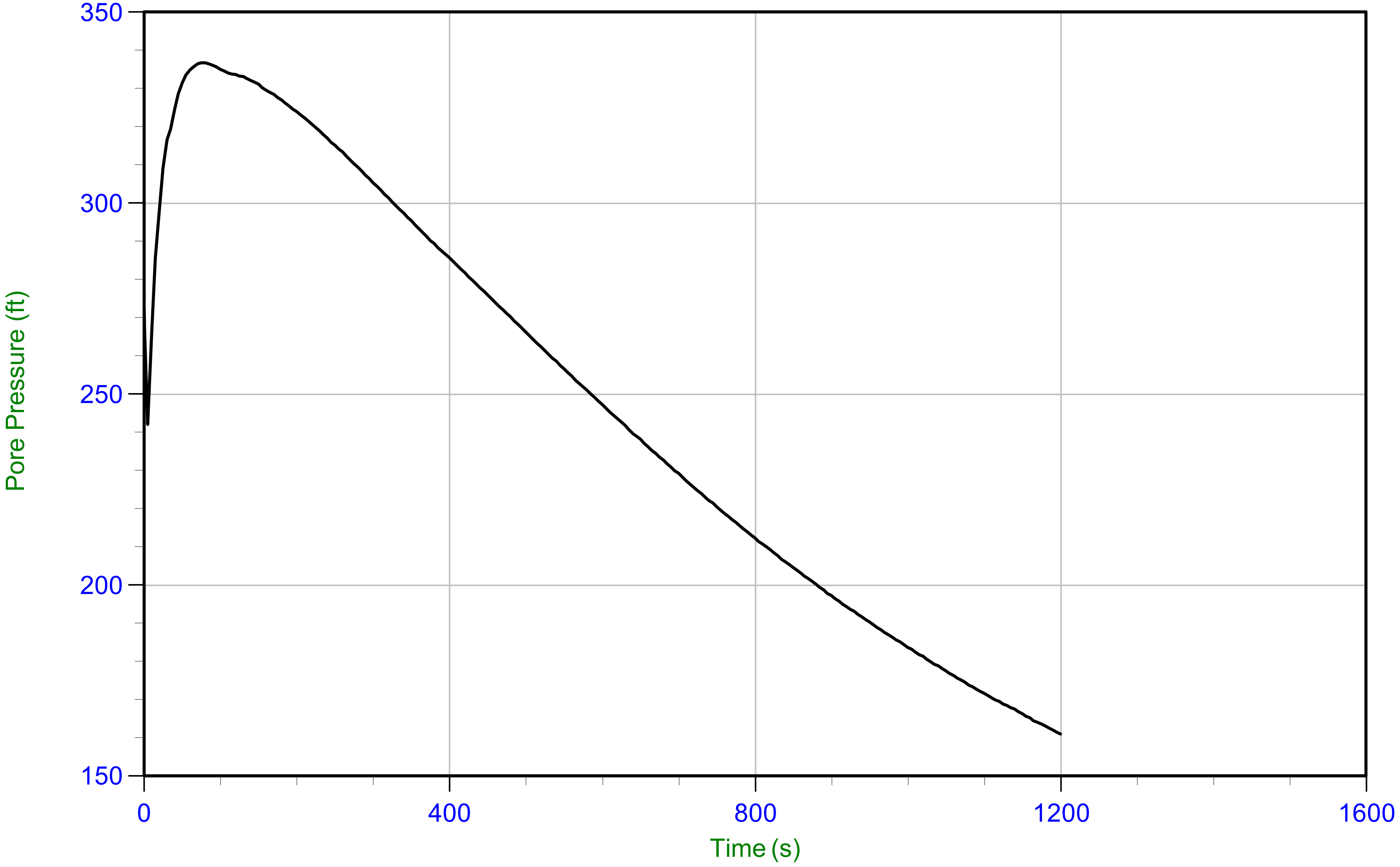
u Min: -0.1 ft
u Max: 271.3 ft
u Final: 211.6 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

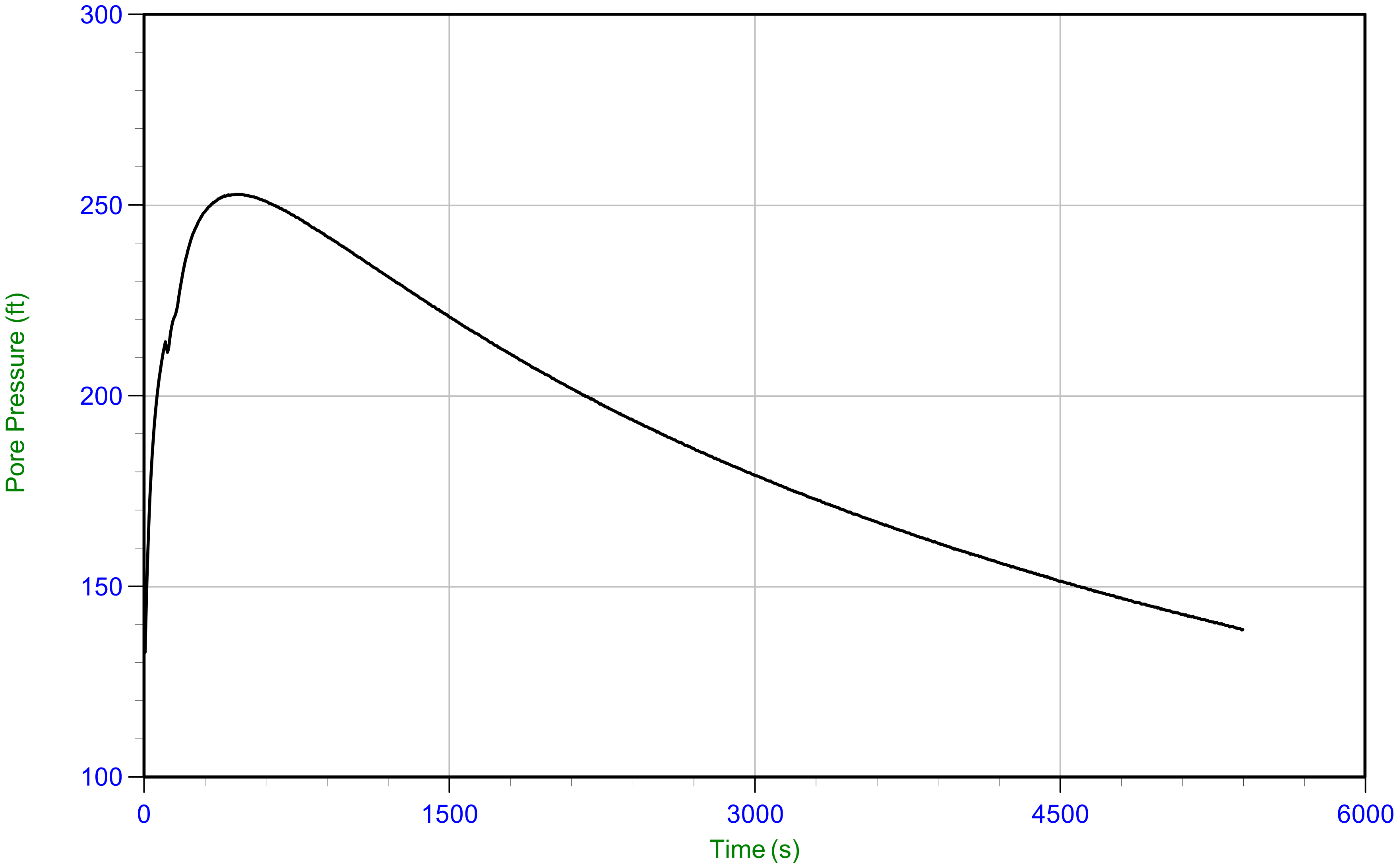
Filename: 20-61-21655_CP048.PPF	u Min: 161.0 ft	WT: 7.620 m / 25.000 ft	T(50): 943.4 s
Depth: 15.250 m / 50.032 ft	u Max: 336.7 ft	Ueq: 25.0 ft	Ir: 100
Duration: 1200.0 s	u Final: 161.0 ft	U(50): 180.88 ft	Ch: 0.7 cm²/min

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP048.PPF
Depth: 16.800 m / 55.117 ft
Duration: 5400.0 s

u Min: 132.7 ft
u Max: 252.9 ft
u Final: 138.7 ft

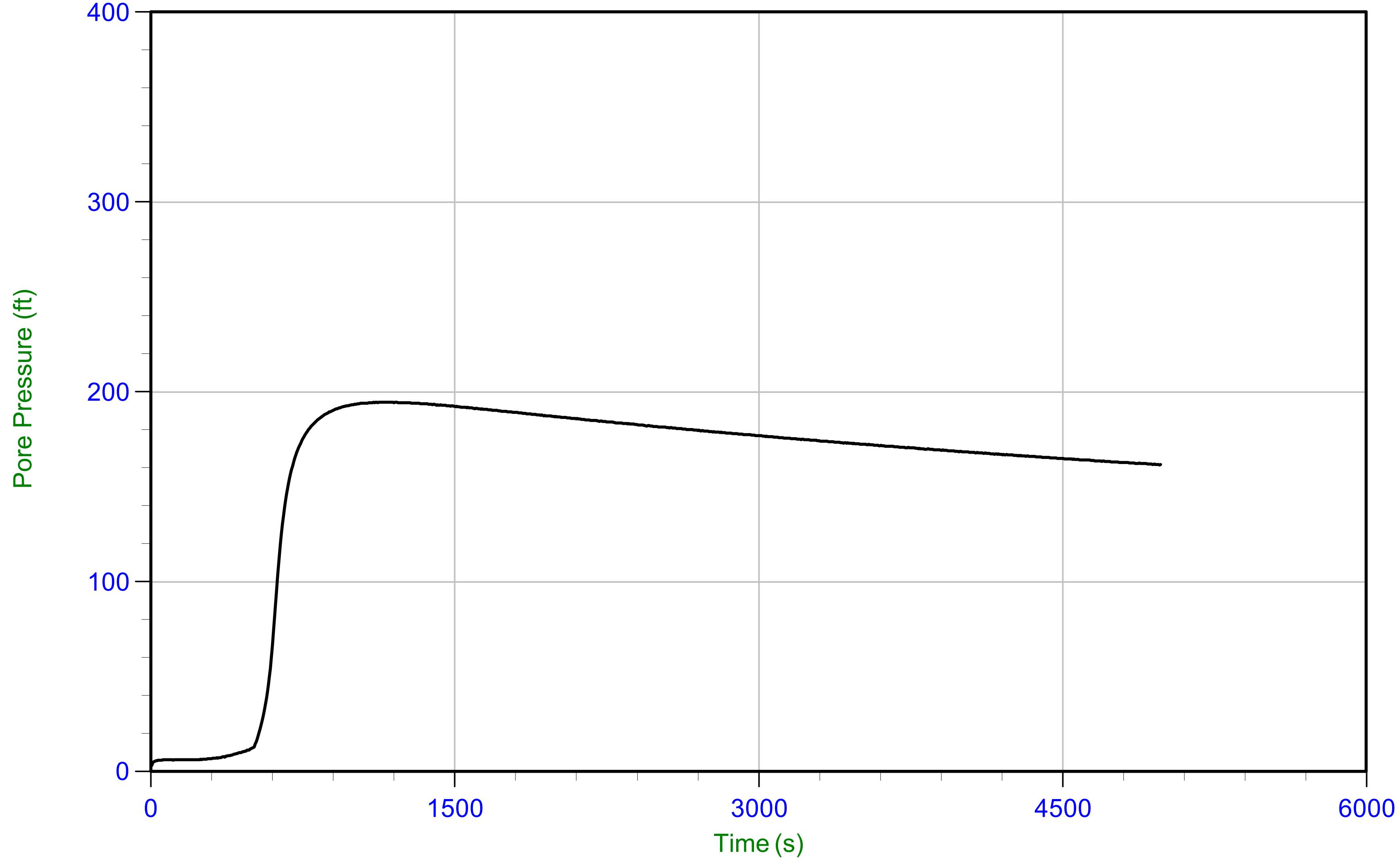
WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 141.53 ft

T(50): 4738.7 s
Ir: 100
Ch: 0.1 cm²/min

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP048.PPF
Depth: 18.300 m / 60.039 ft
Duration: 4985.0 s

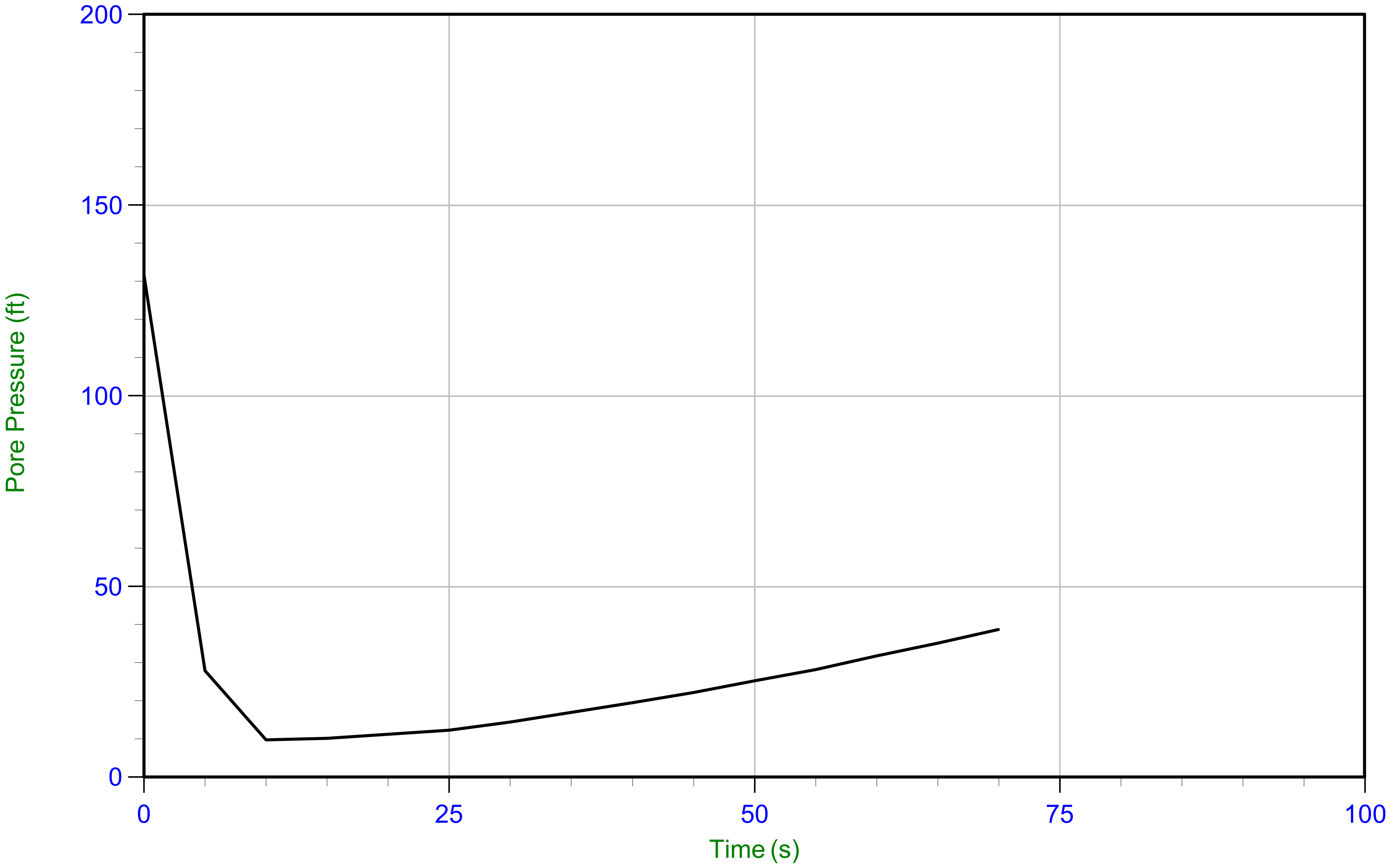
u Min: 2.6 ft
u Max: 194.6 ft
u Final: 161.7 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 12:28
Site: DTE Monroe Power Plant

Sounding: CPT20-054
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

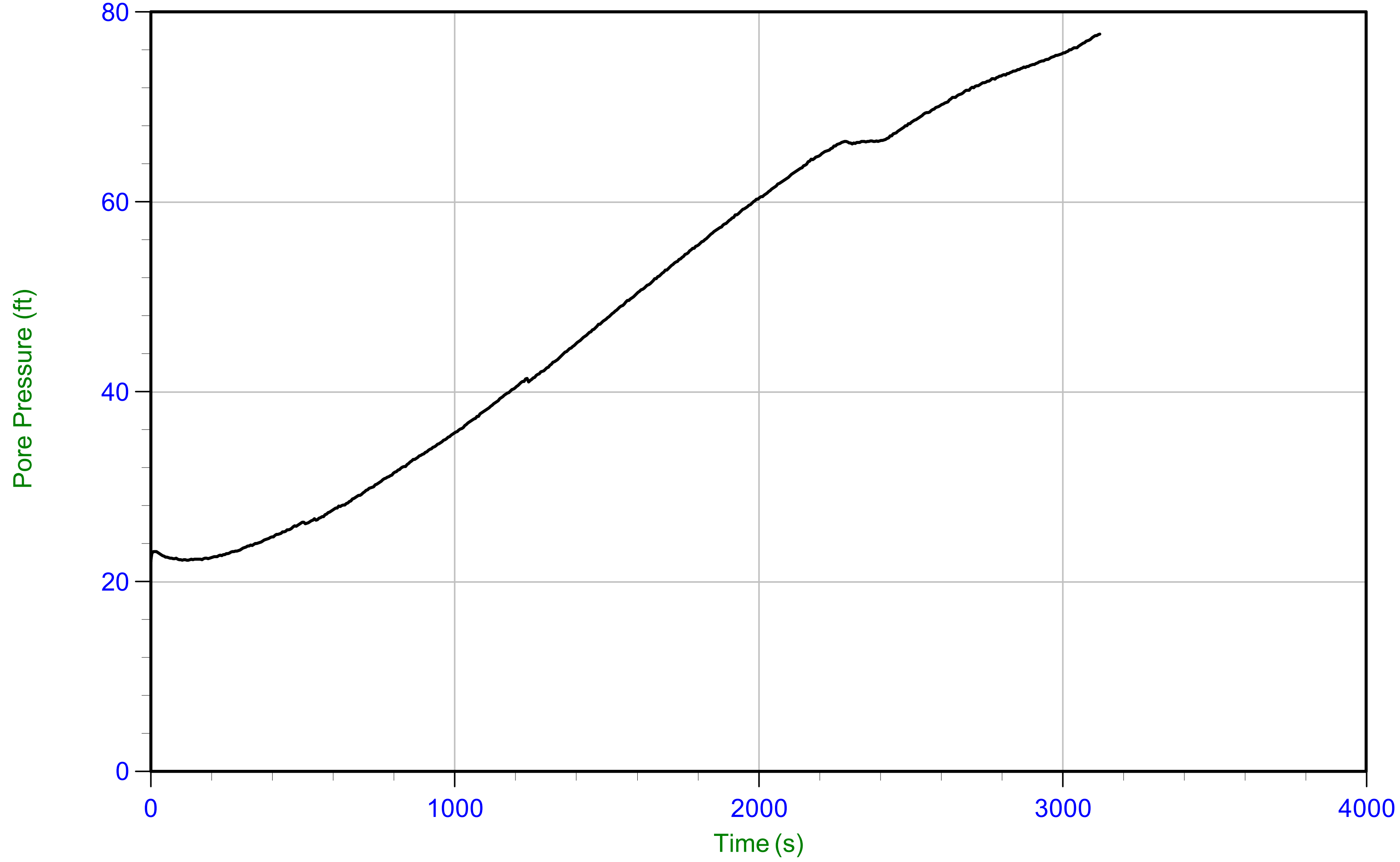
Filename: 20-61-21655_CP054.PPF
Depth: 18.550 m / 60.859 ft
Duration: 70.0 s

u Min: 9.8 ft
u Max: 131.6 ft
u Final: 38.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/06/2020 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-058
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

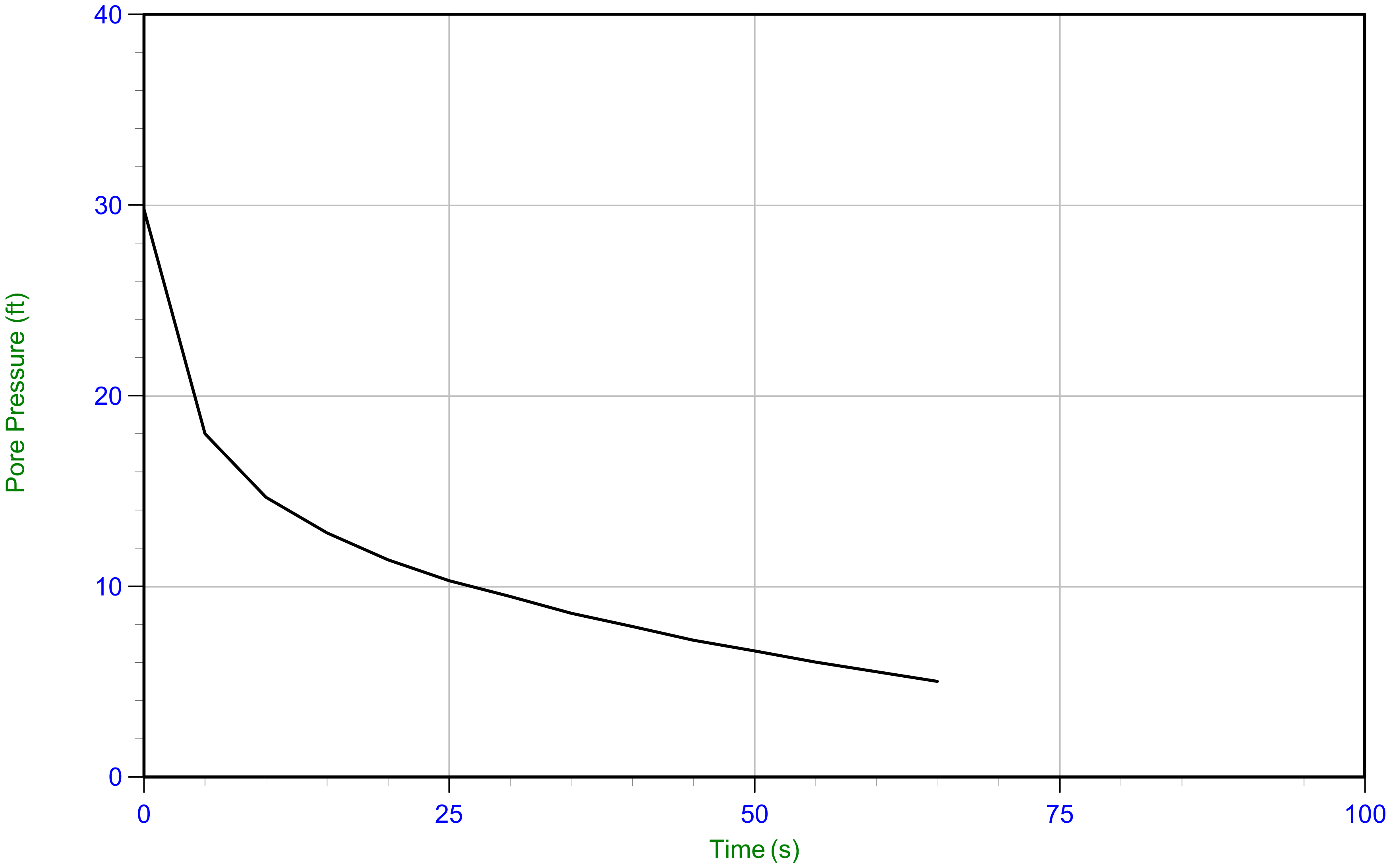
Filename: 20-61-21655_CP058.PPF
Depth: 12.850 m / 42.158 ft
Duration: 3125.0 s

u Min: 22.1 ft
u Max: 77.7 ft
u Final: 77.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/06/2020 12:21
Site: DTE Monroe Power Plant

Sounding: CPT20-060
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

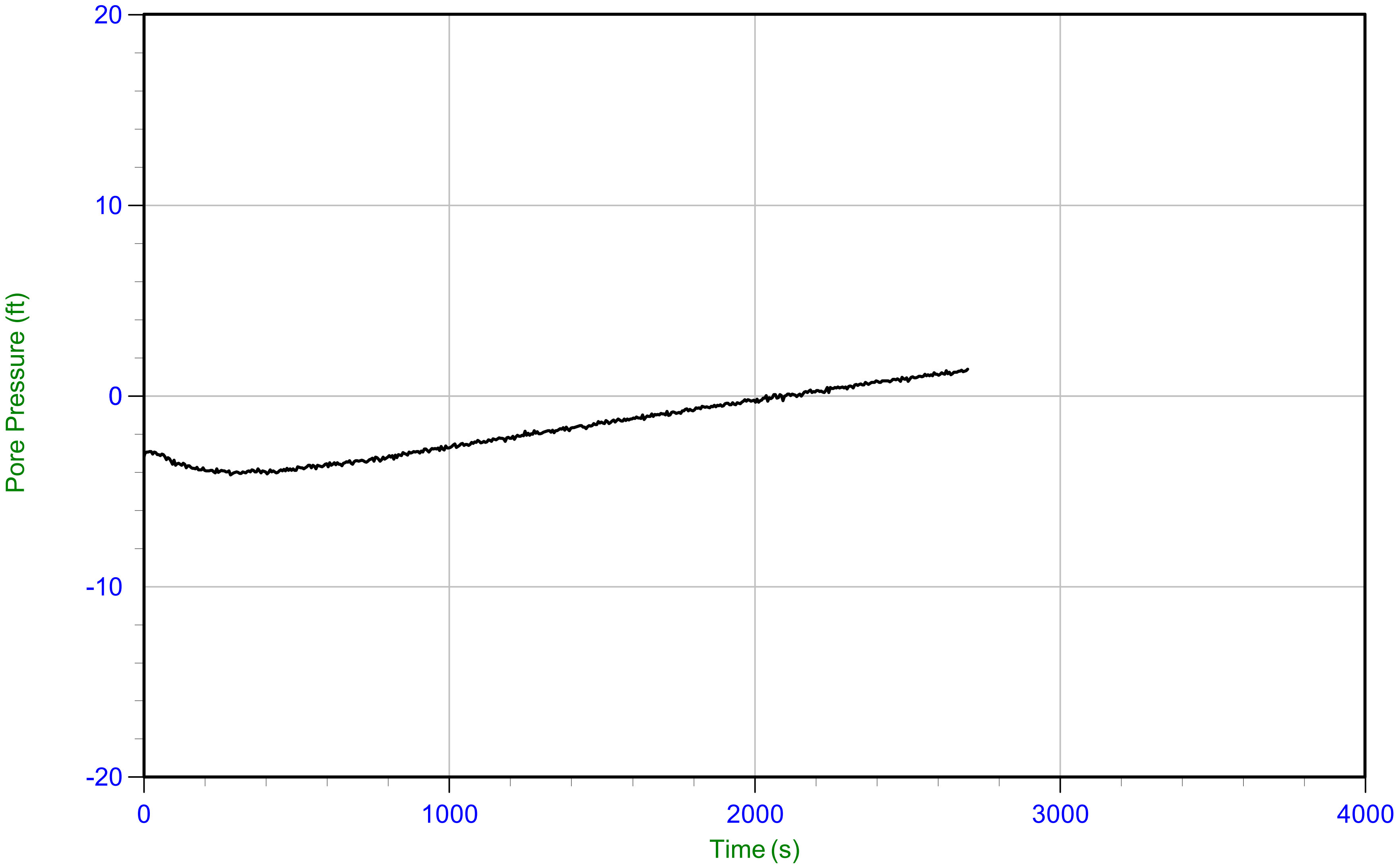
Filename: 20-61-21655_CP060.PPF
Depth: 18.250 m / 59.875 ft
Duration: 65.0 s

u Min: 5.0 ft
u Max: 29.8 ft
u Final: 5.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 12.200 m / 40.026 ft
Duration: 2700.0 s

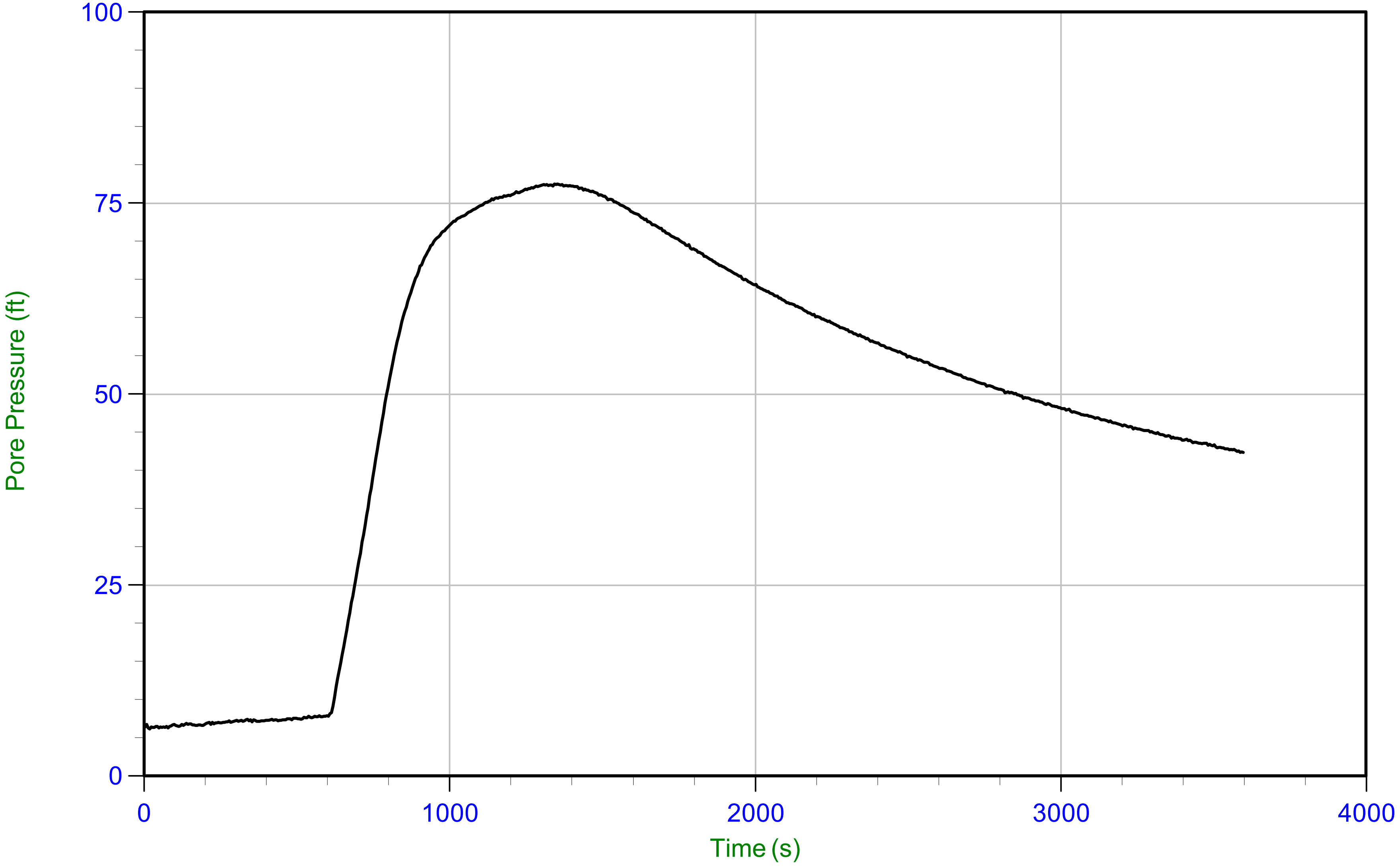
u Min: -4.1 ft
u Max: 1.4 ft
u Final: 1.4 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 13.150 m / 43.143 ft
Duration: 3600.0 s

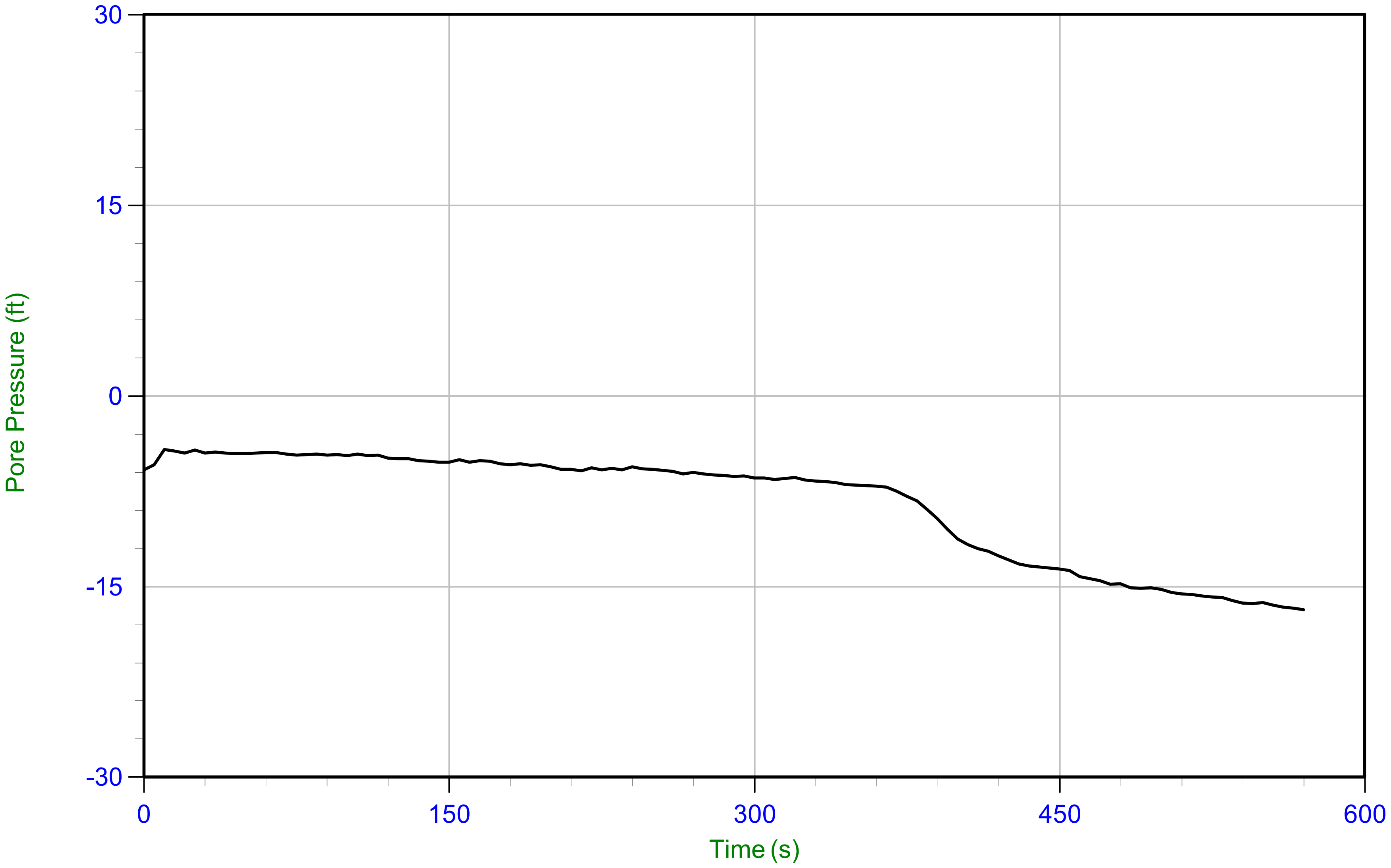
u Min: 6.2 ft
u Max: 77.5 ft
u Final: 42.4 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 16.800 m / 55.117 ft
Duration: 570.0 s

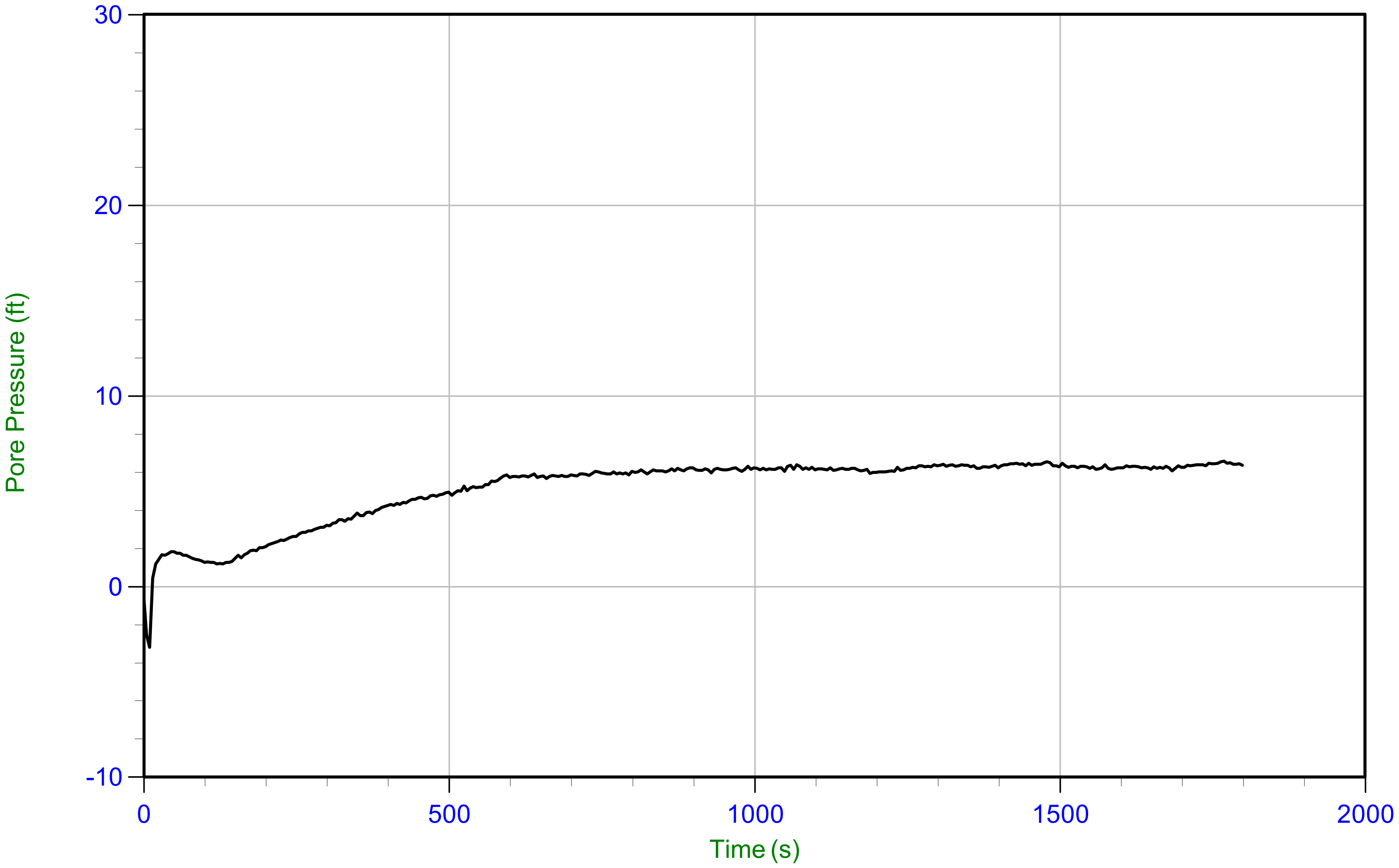
u Min: -16.8 ft
u Max: -4.2 ft
u Final: -16.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



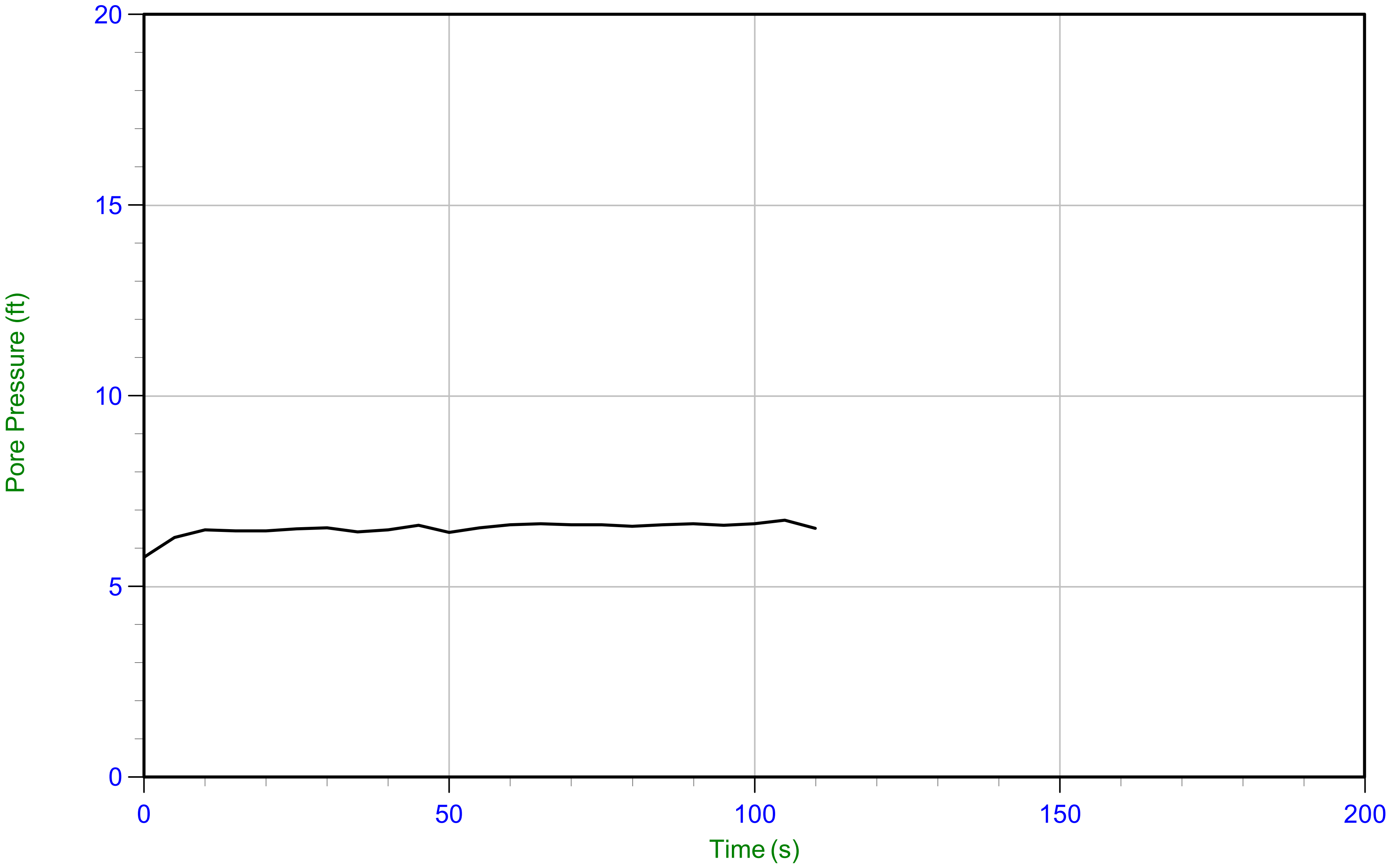
Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 18.000 m / 59.054 ft
Duration: 1800.0 s

u Min: -3.2 ft
u Max: 6.6 ft
u Final: 6.4 ft

WT: 16.043 m / 52.634 ft
Ueq: 6.4 ft

Geosyntec	Job No: 20-61-21655 Date: 12/02/2020 14:17 Site: DTE Monroe Power Plant	Sounding: CPT20-074 Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP074.PPF
Depth: 11.800 m / 38.713 ft
Duration: 110.0 s

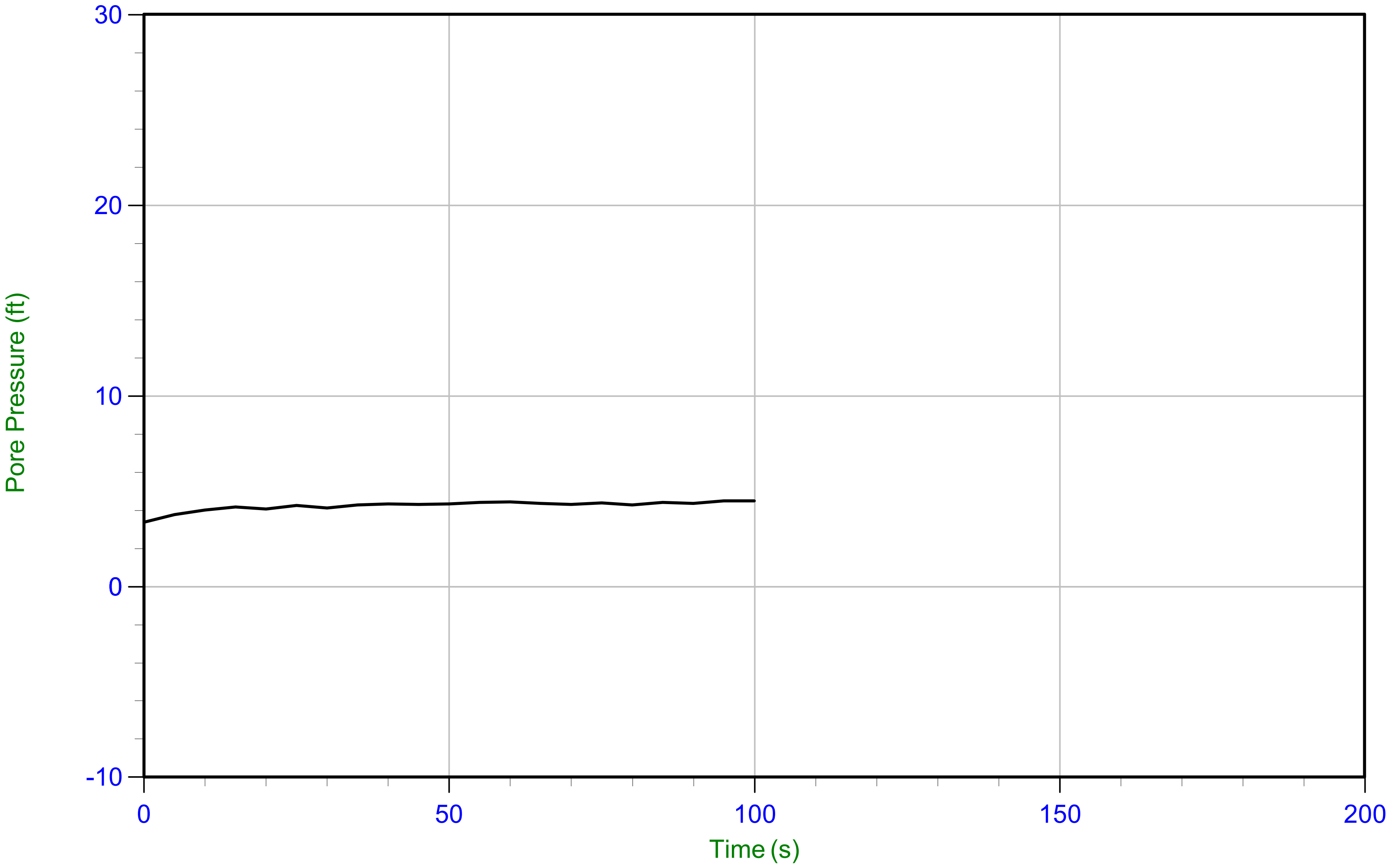
u Min: 5.8 ft
u Max: 6.7 ft
u Final: 6.5 ft

WT: 9.794 m / 32.132 ft
Ueq: 6.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP078B.PPF
Depth: 11.800 m / 38.713 ft
Duration: 100.0 s

u Min: 3.4 ft
u Max: 4.5 ft
u Final: 4.5 ft

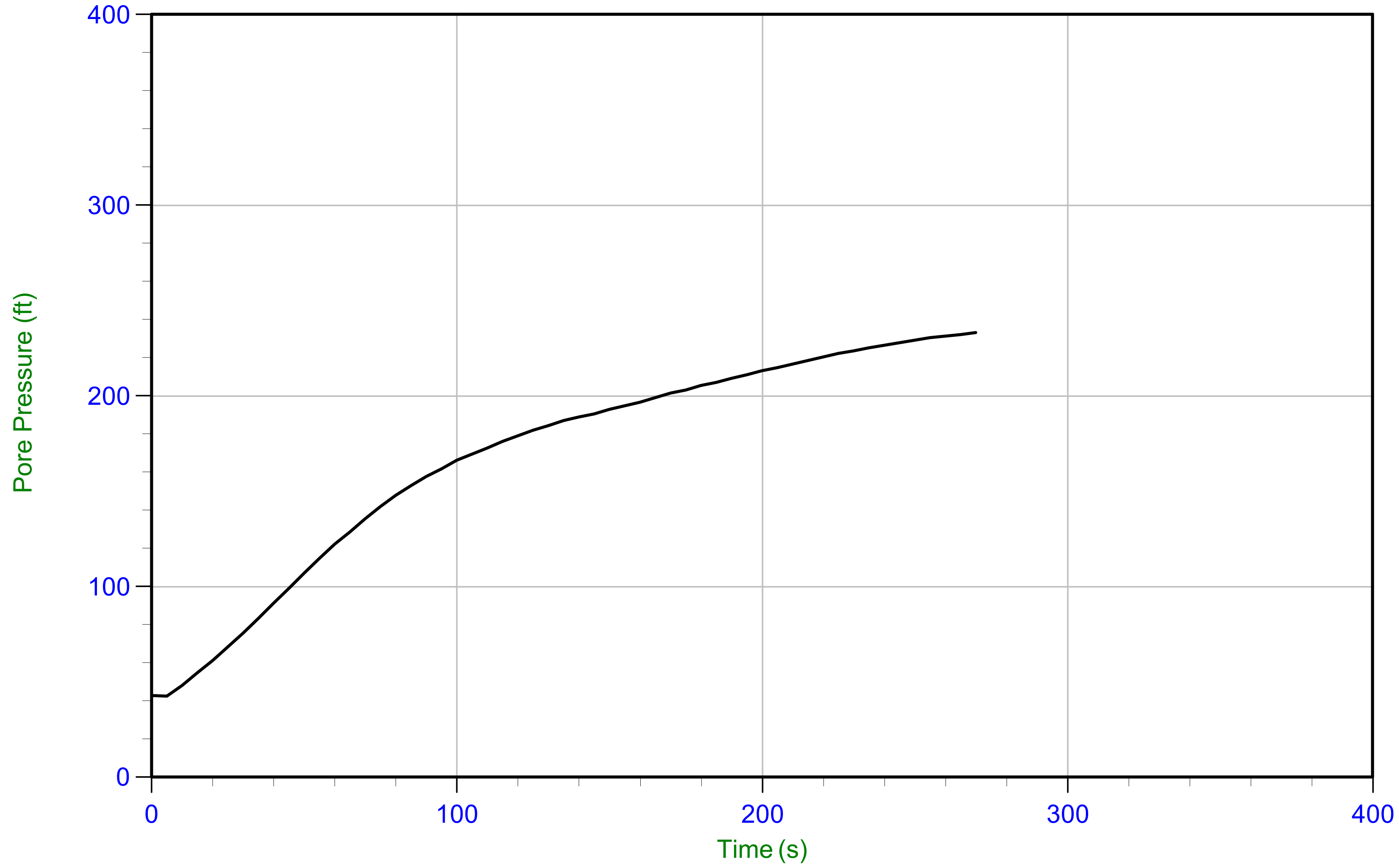
WT: 10.447 m / 34.275 ft
Ueq: 4.4 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

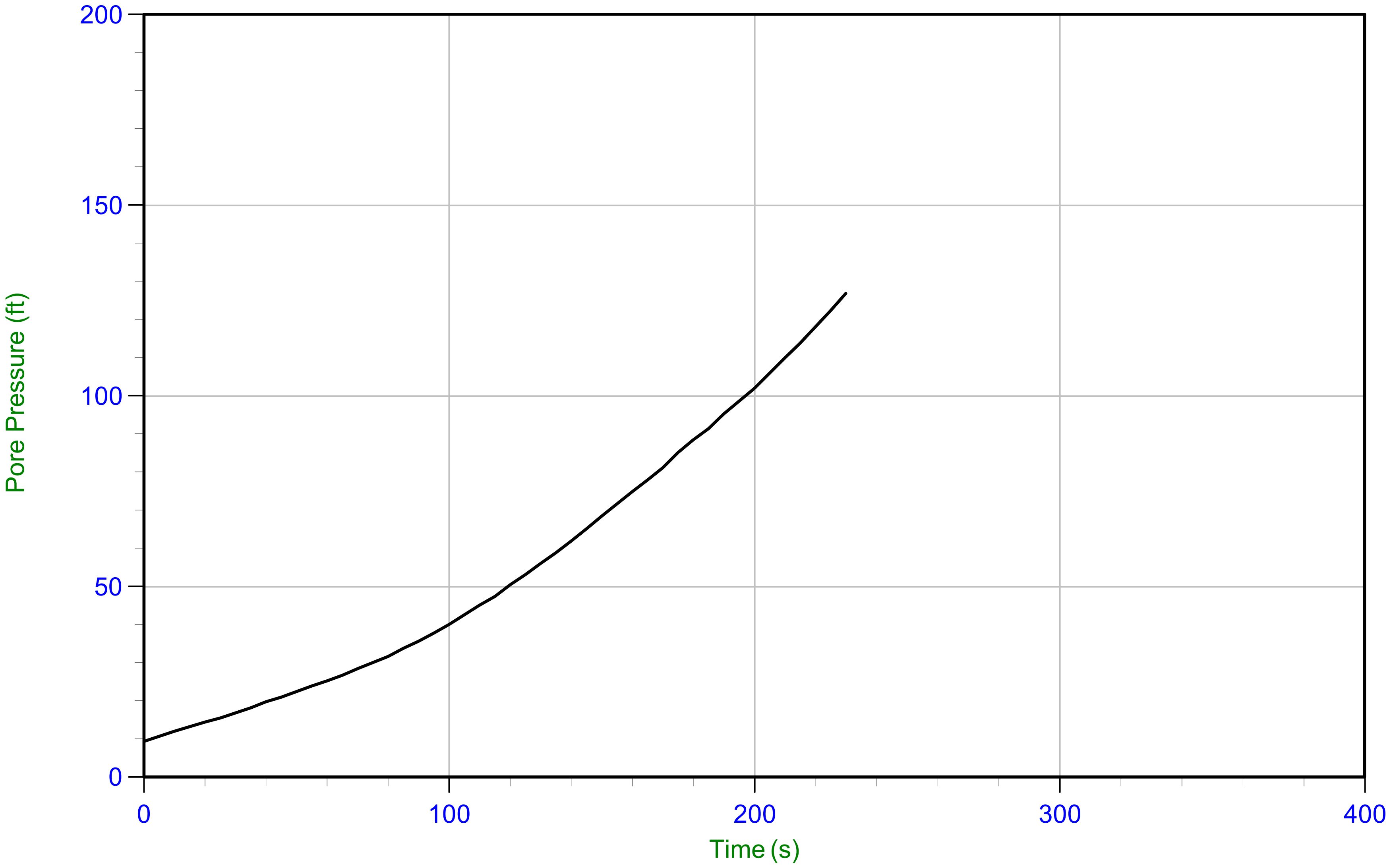
Filename: 20-61-21655_CP078B.PPF
Depth: 14.800 m / 48.556 ft
Duration: 270.0 s

u Min: 42.6 ft
u Max: 233.2 ft
u Final: 233.2 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-086
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

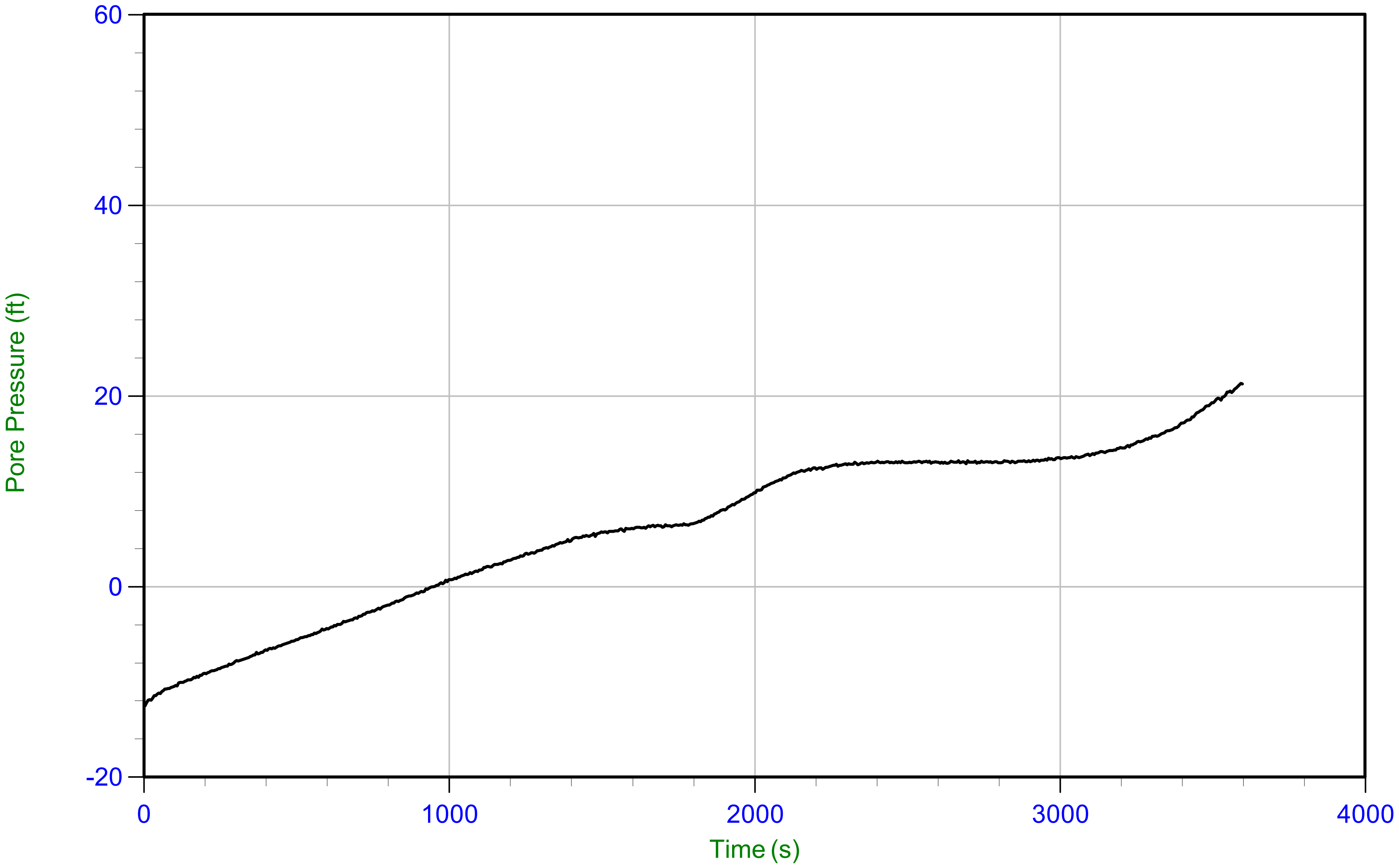
Filename: 20-61-21655_CP086.PPF
Depth: 14.850 m / 48.720 ft
Duration: 230.0 s

u Min: 9.3 ft
u Max: 126.9 ft
u Final: 126.9 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

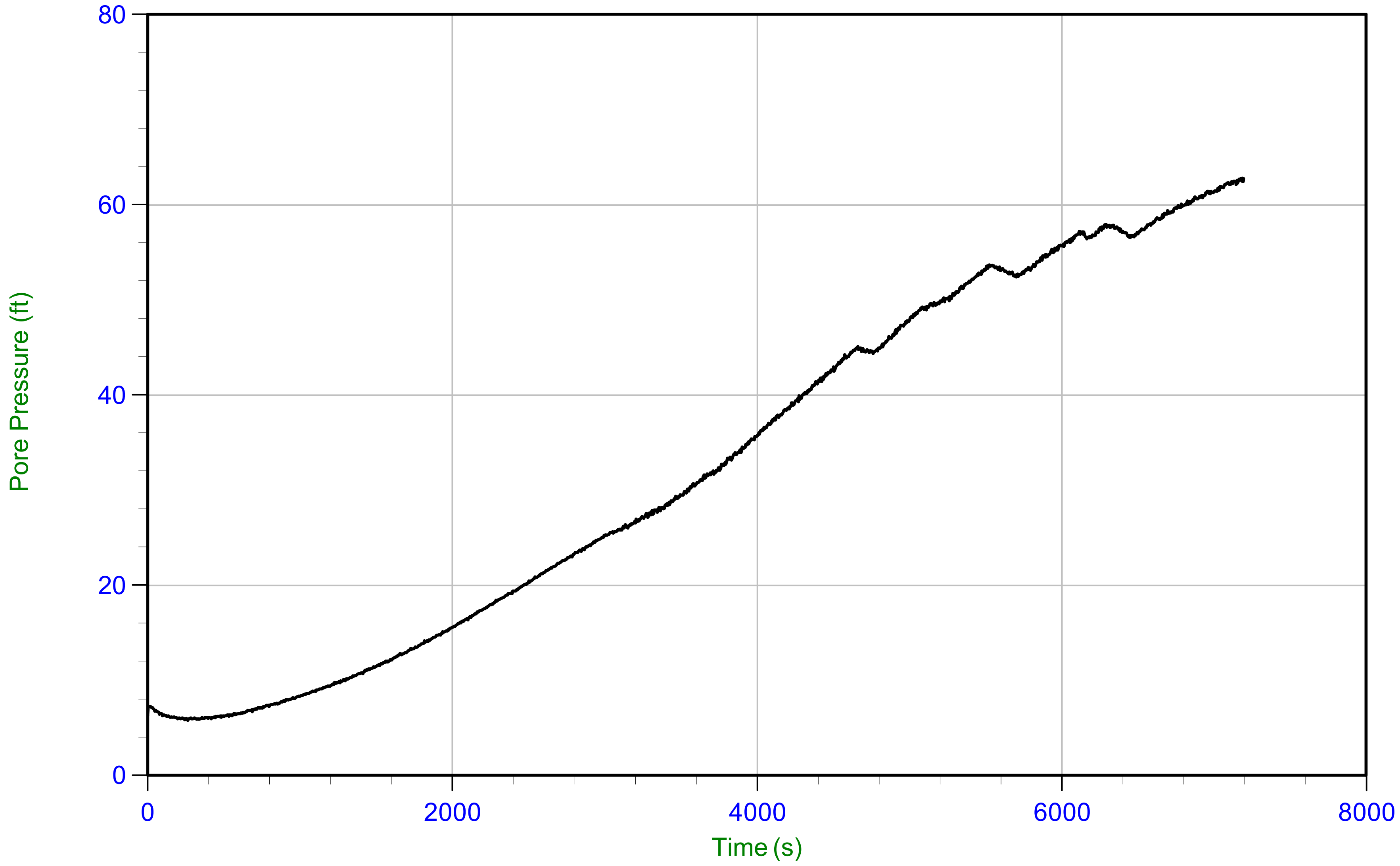
Filename: 20-61-21655_CP090.PPF
Depth: 6.100 m / 20.013 ft
Duration: 3600.0 s

u Min: -12.5 ft
u Max: 21.3 ft
u Final: 21.3 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP090.PPF
Depth: 12.200 m / 40.026 ft
Duration: 7200.0 s

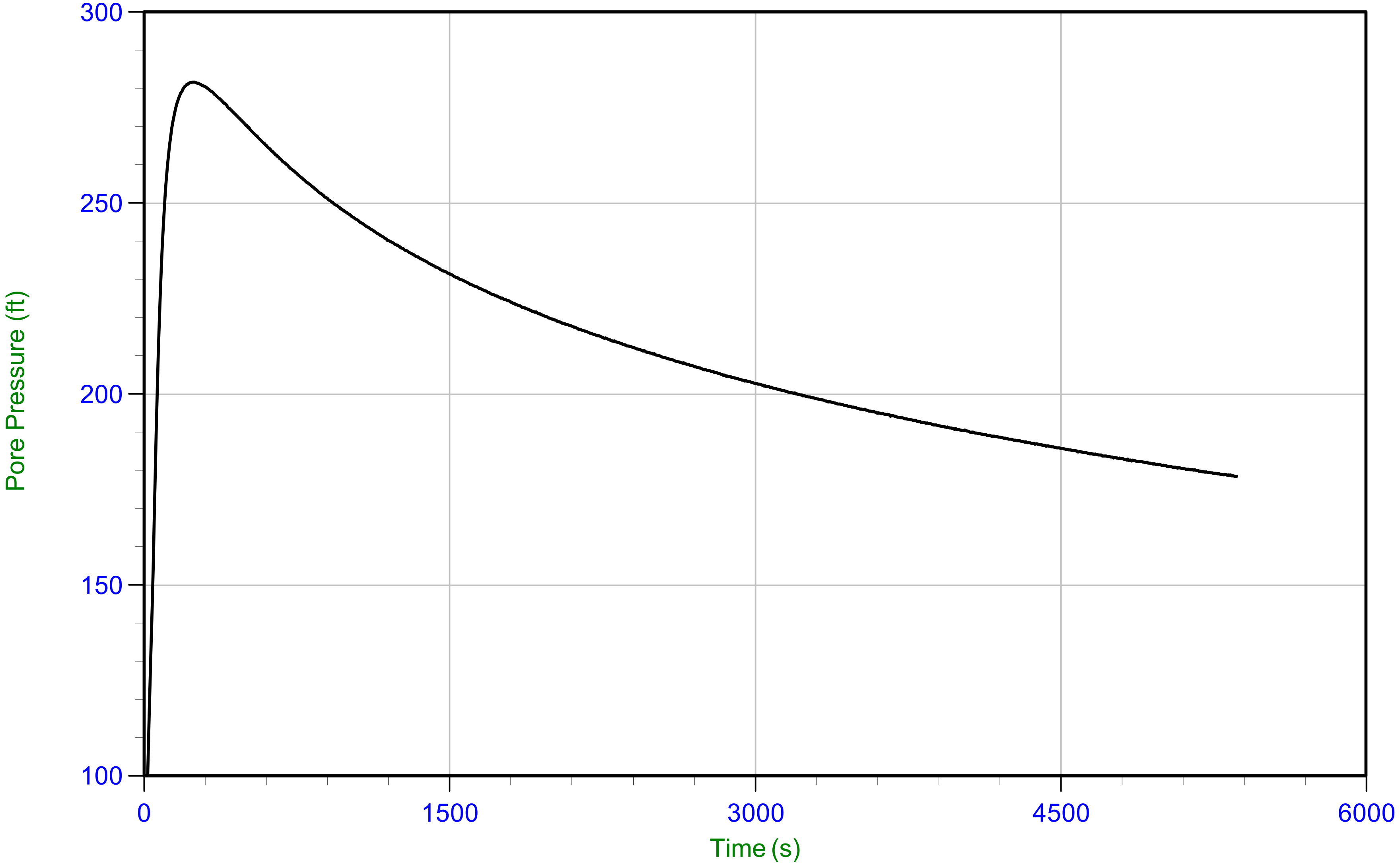
u Min: 5.8 ft
u Max: 62.8 ft
u Final: 62.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP090.PPF
Depth: 18.300 m / 60.039 ft
Duration: 5365.0 s

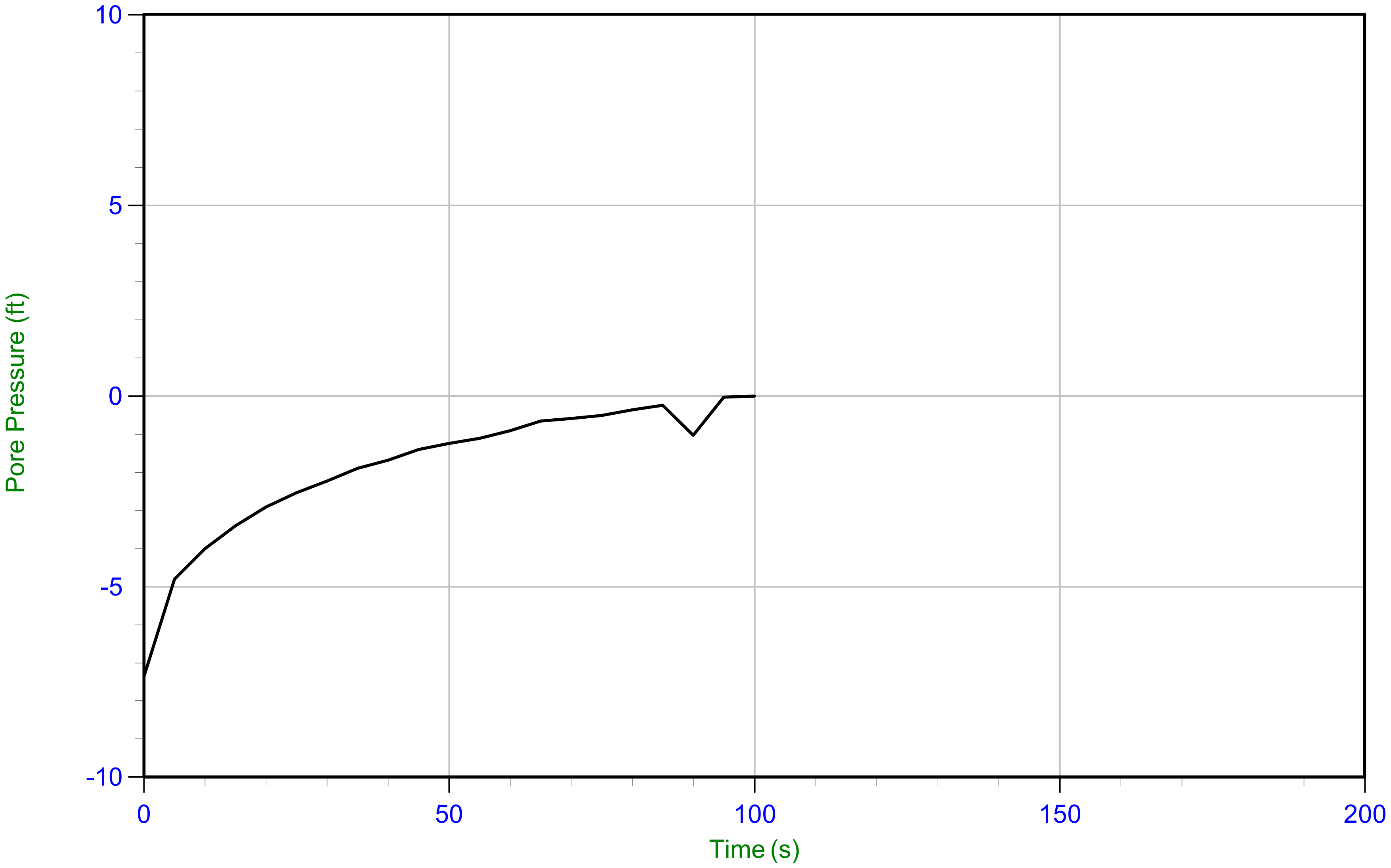
u Min: 70.0 ft
u Max: 281.7 ft
u Final: 178.5 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 09:32
Site: DTE Monroe Power Plant

Sounding: CPT20-092
Cone: 675:T1500F15U500 Area=15 cm²



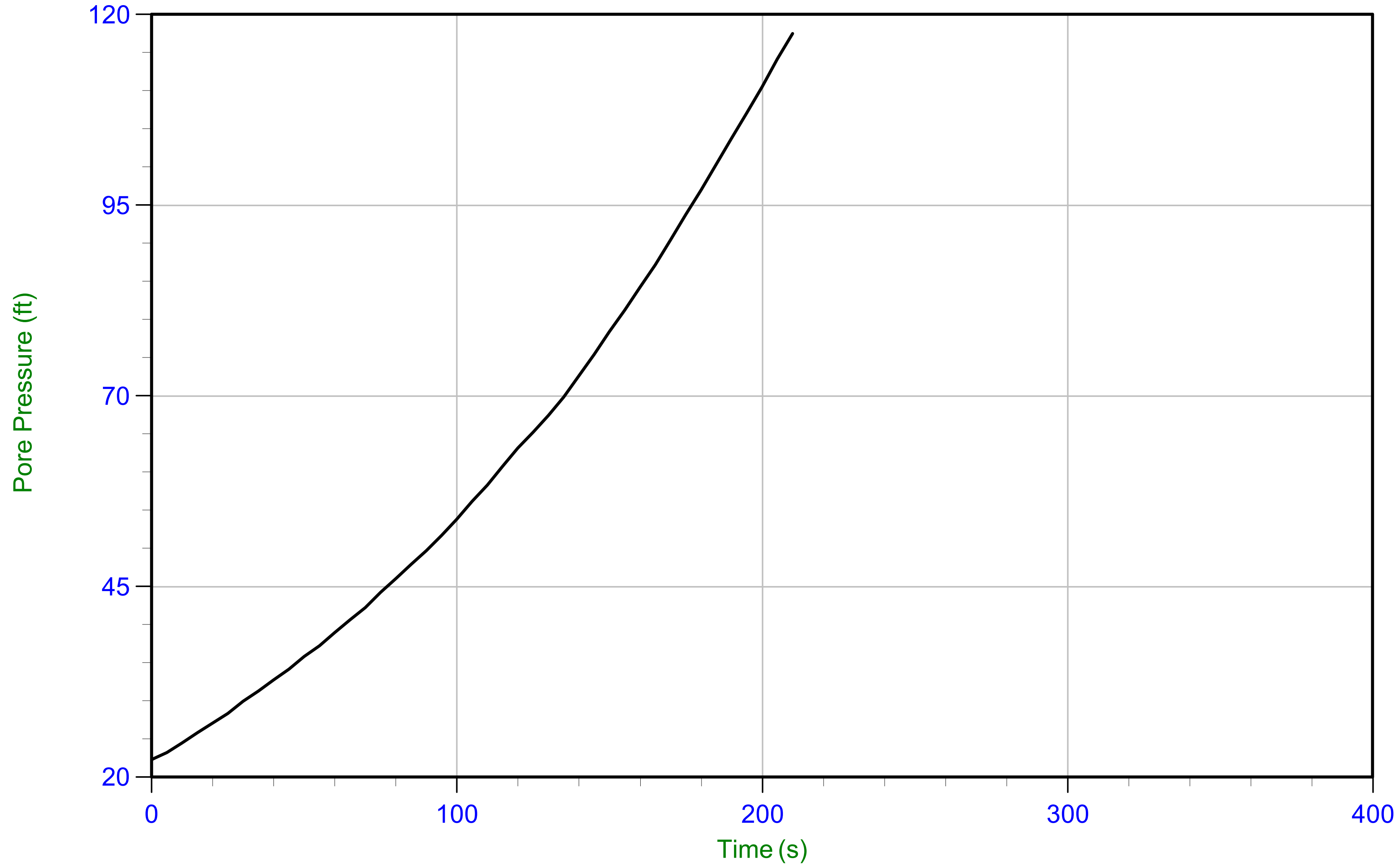
Trace Summary:

Filename: 20-61-21655_CP092.PPF
Depth: 1.750 m / 5.741 ft
Duration: 100.0 s

u Min: -7.4 ft
u Max: -0.0 ft
u Final: -0.0 ft

WT: 1.750 m / 5.741 ft
Ueq: 0.0 ft

Geosyntec	Job No: 20-61-21655 Date: 12/05/2020 09:32 Site: DTE Monroe Power Plant	Sounding: CPT20-092 Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP092.PPF
Depth: 17.800 m / 58.398 ft
Duration: 210.0 s

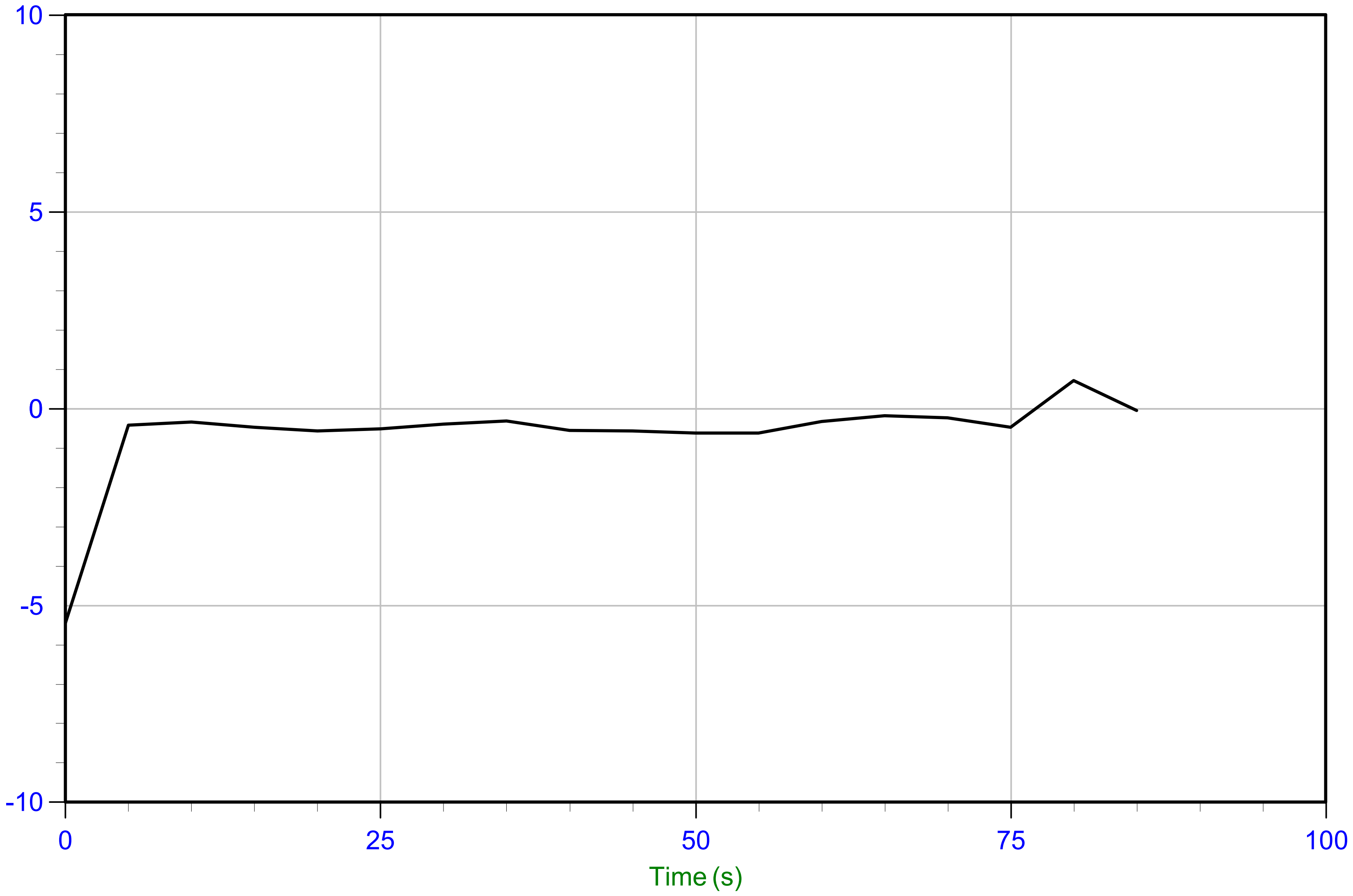
u Min: 22.3 ft
u Max: 117.5 ft
u Final: 117.5 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 11:51
Site: DTE Monroe Power Plant

Sounding: SCPT20-096
Cone: 513:T1500F15U500 Area=15 cm²



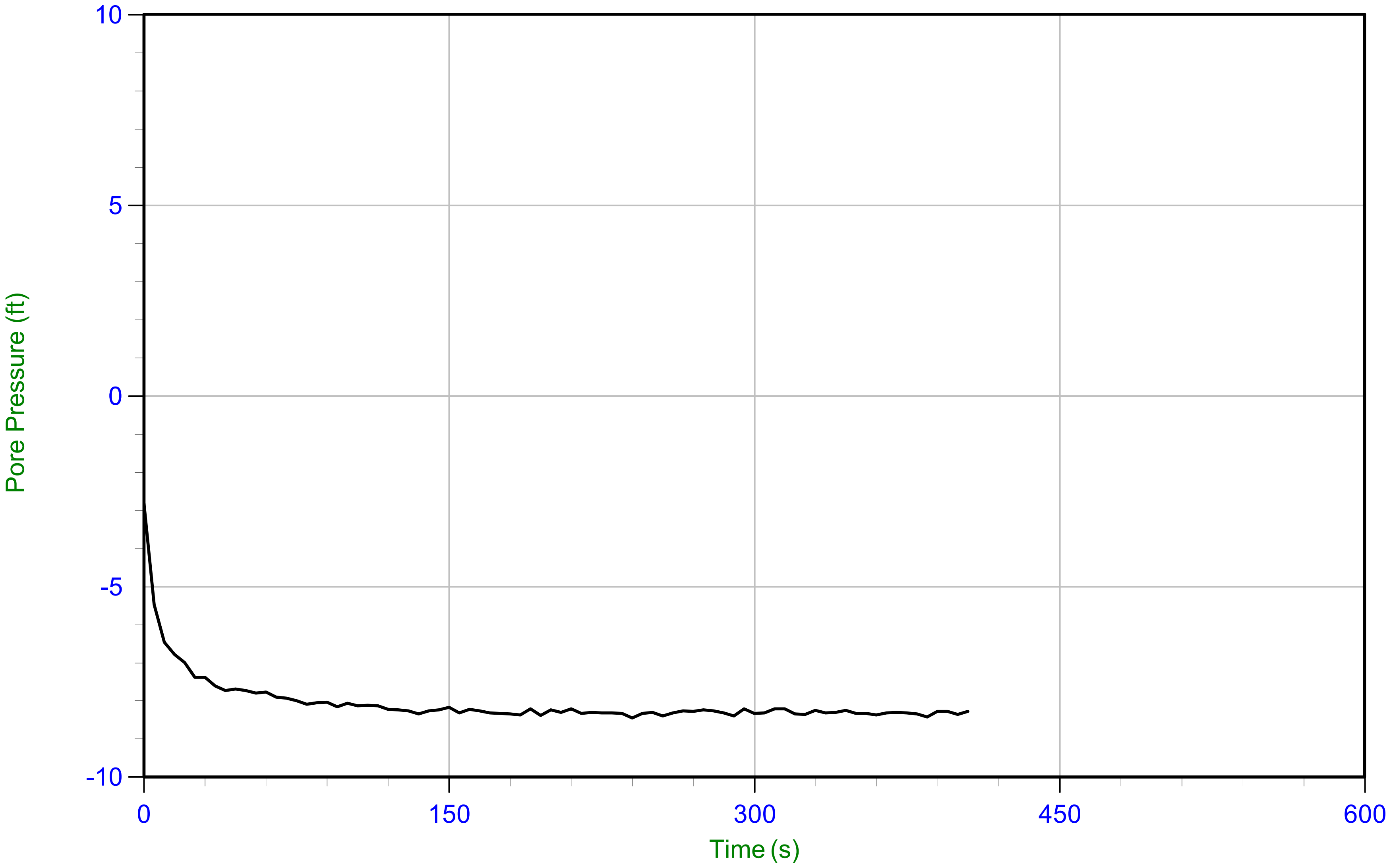
Trace Summary:

Filename: 20-61-21655_SP096.PPF
Depth: 0.350 m / 1.148 ft
Duration: 85.0 s

u Min: -5.4 ft
u Max: 0.7 ft
u Final: -0.0 ft

WT: 0.350 m / 1.148 ft
Ueq: 0.0 ft

Geosyntec	Job No: 20-61-21655 Date: 12/05/2020 11:51 Site: DTE Monroe Power Plant	Sounding: SCPT20-096 Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_SP096.PPF
Depth: 10.800 m / 35.433 ft
Duration: 405.0 s

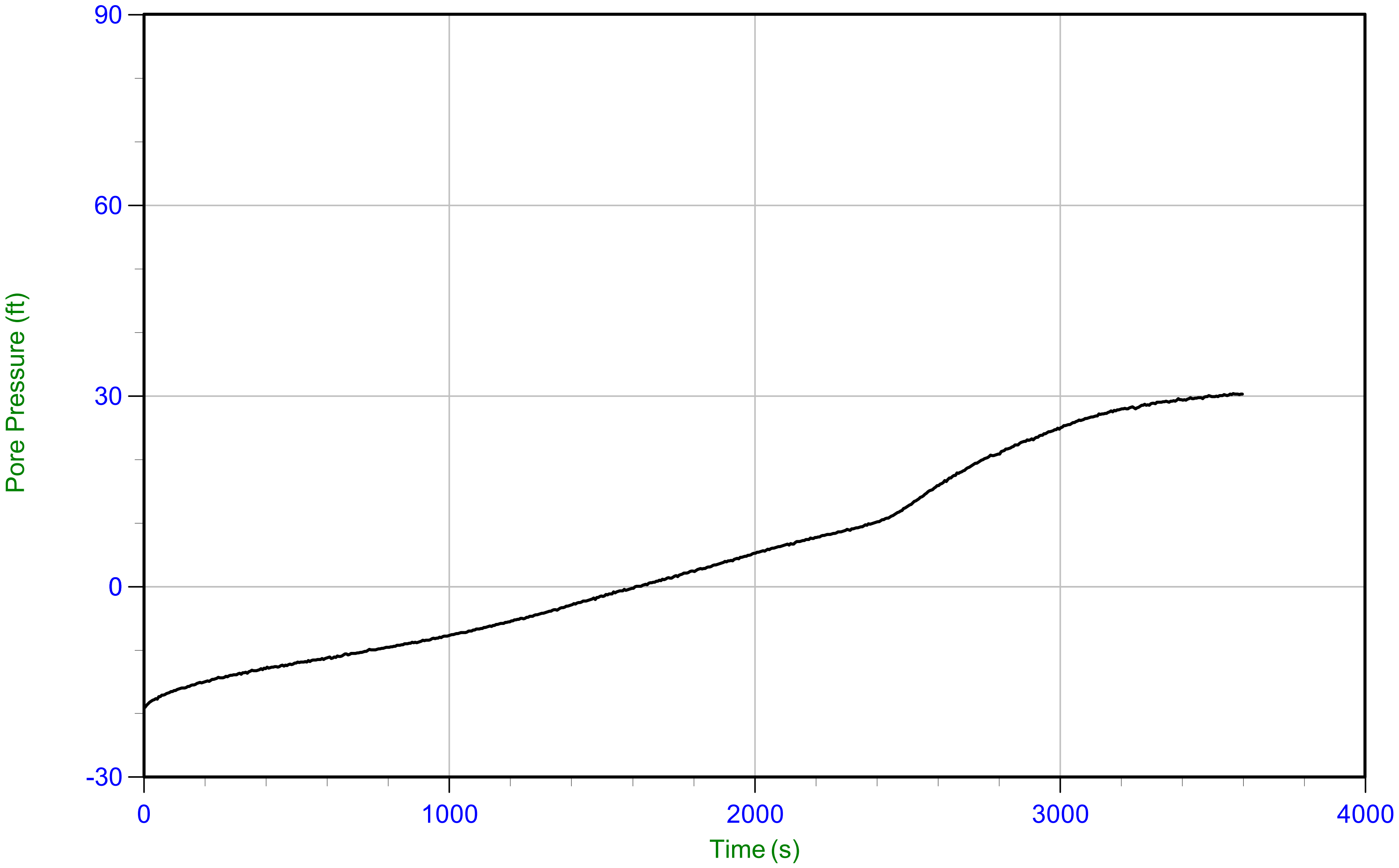
u Min: -8.4 ft
u Max: -2.8 ft
u Final: -8.3 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 6.100 m / 20.013 ft
Duration: 3600.0 s

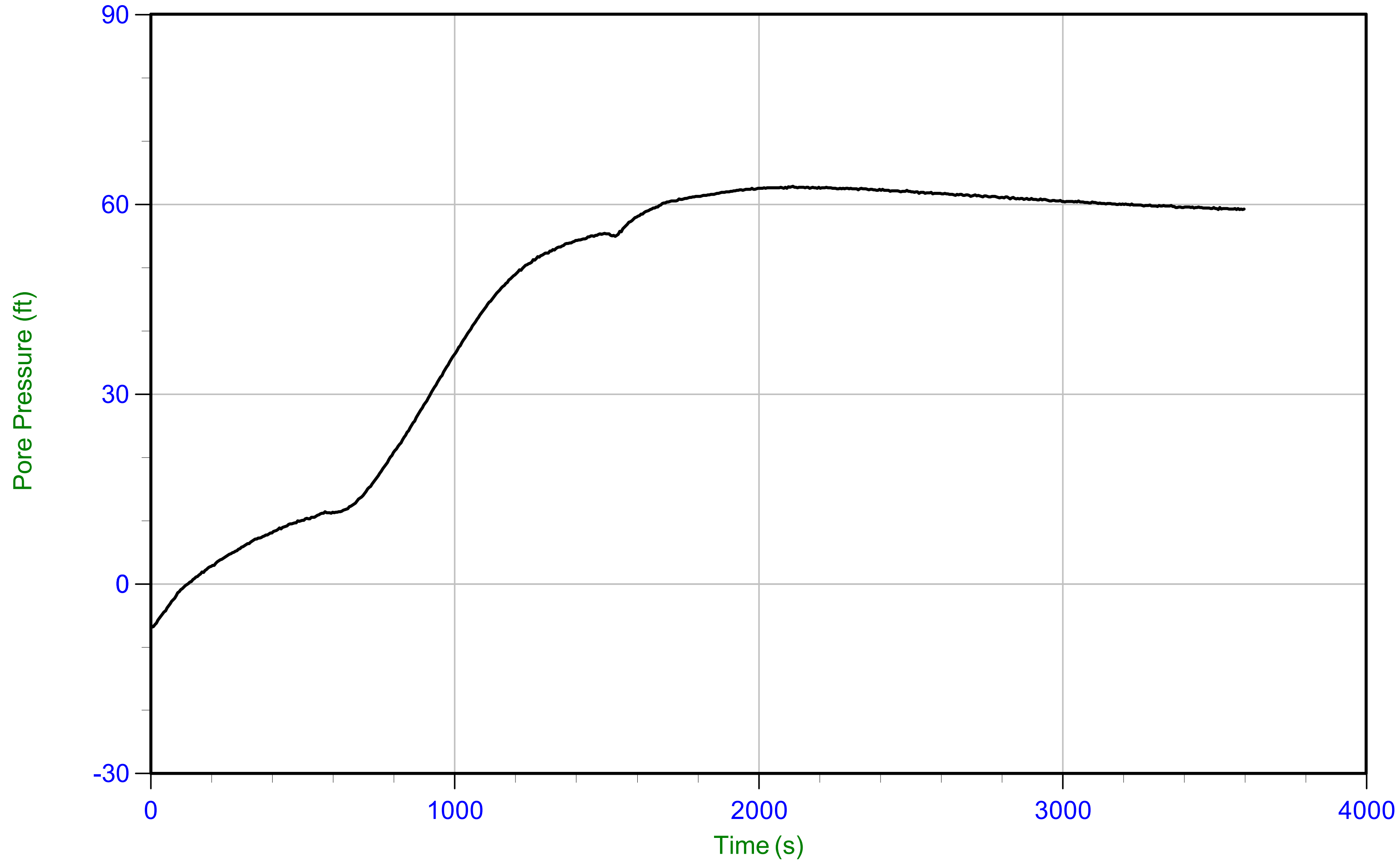
u Min: -19.0 ft
u Max: 30.4 ft
u Final: 30.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 15.250 m / 50.032 ft
Duration: 3600.0 s

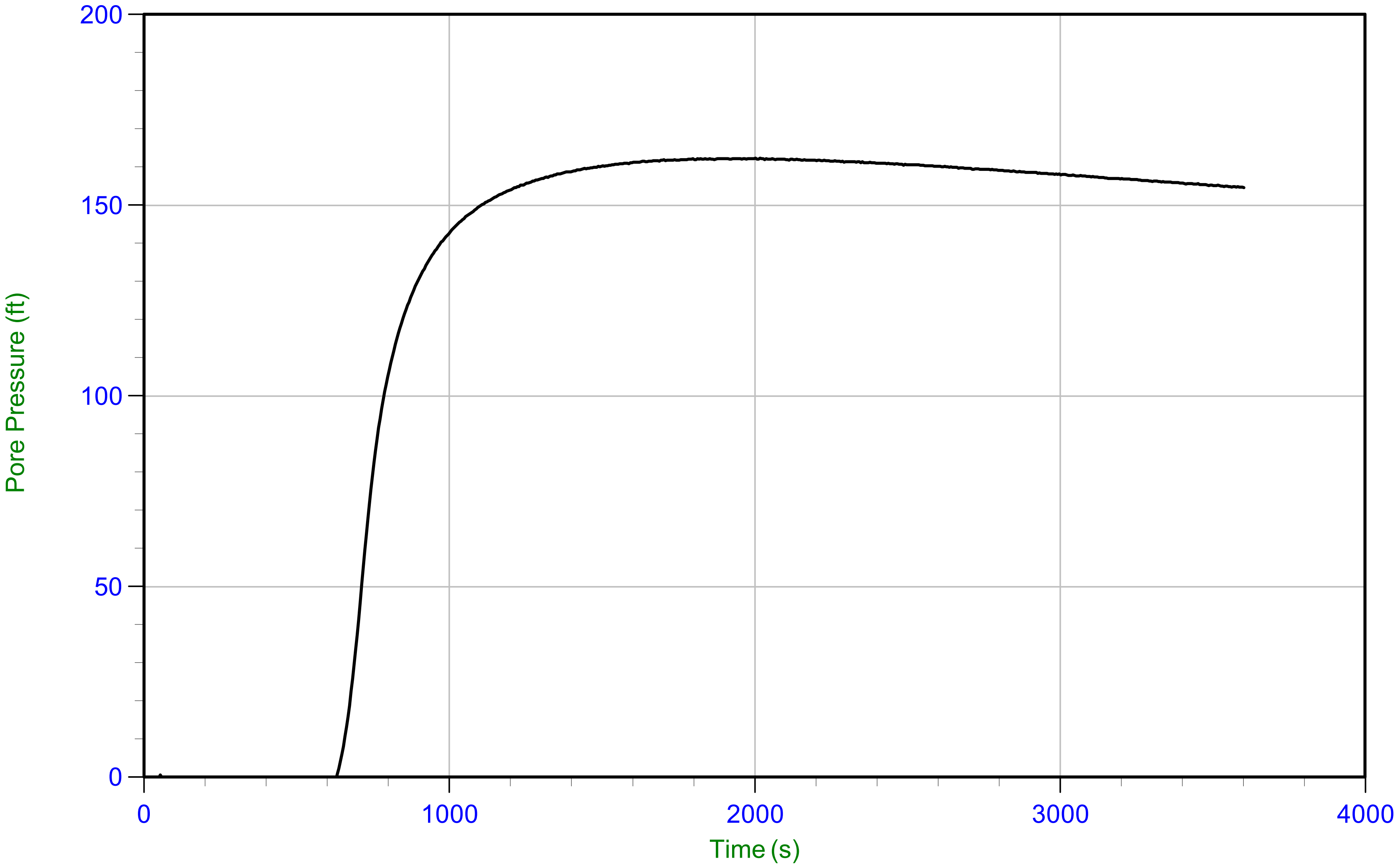
u Min: -6.9 ft
u Max: 62.8 ft
u Final: 59.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 18.300 m / 60.039 ft
Duration: 3605.0 s

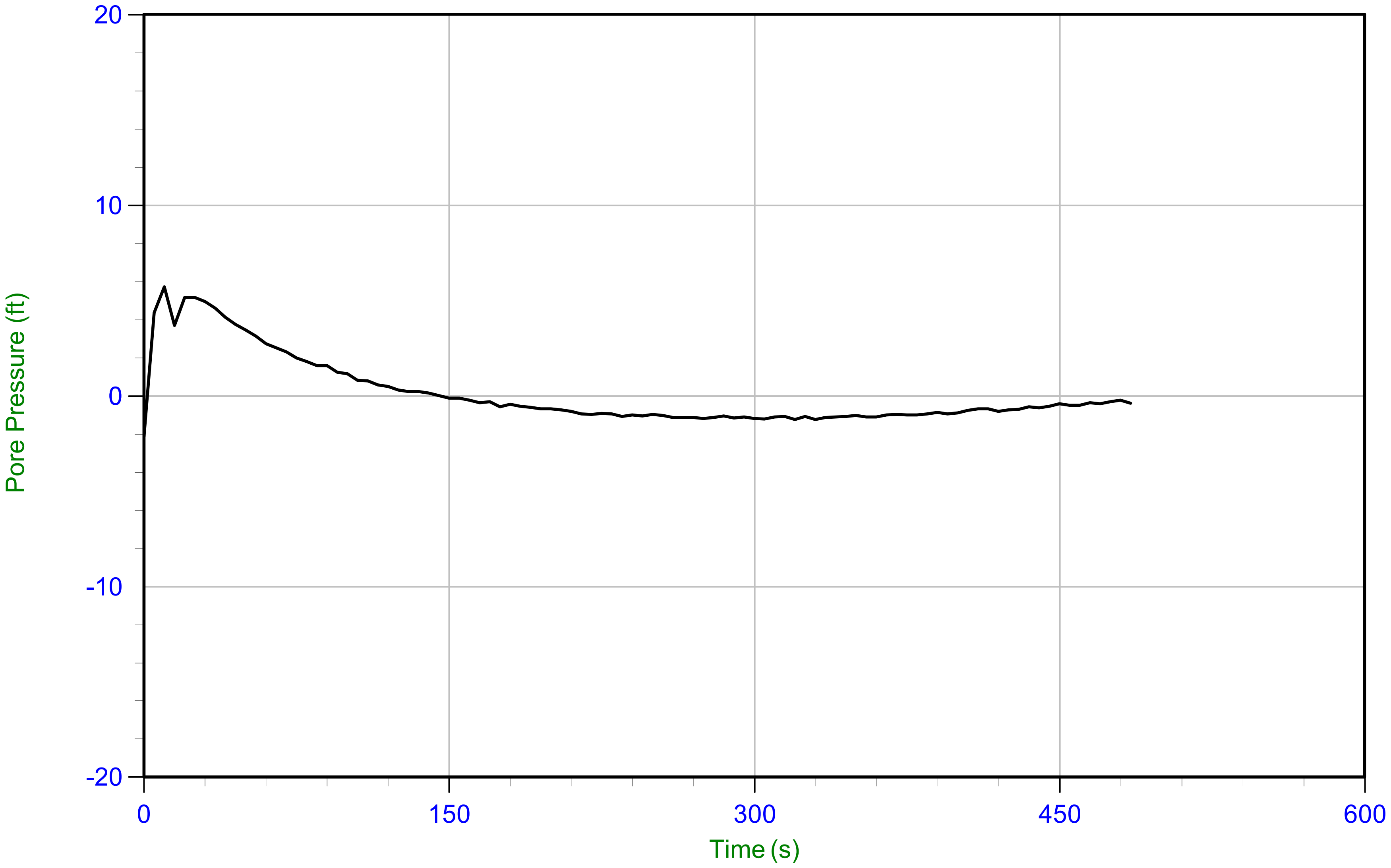
u Min: -10.2 ft
u Max: 162.3 ft
u Final: 154.6 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 18.550 m / 60.859 ft
Duration: 485.0 s

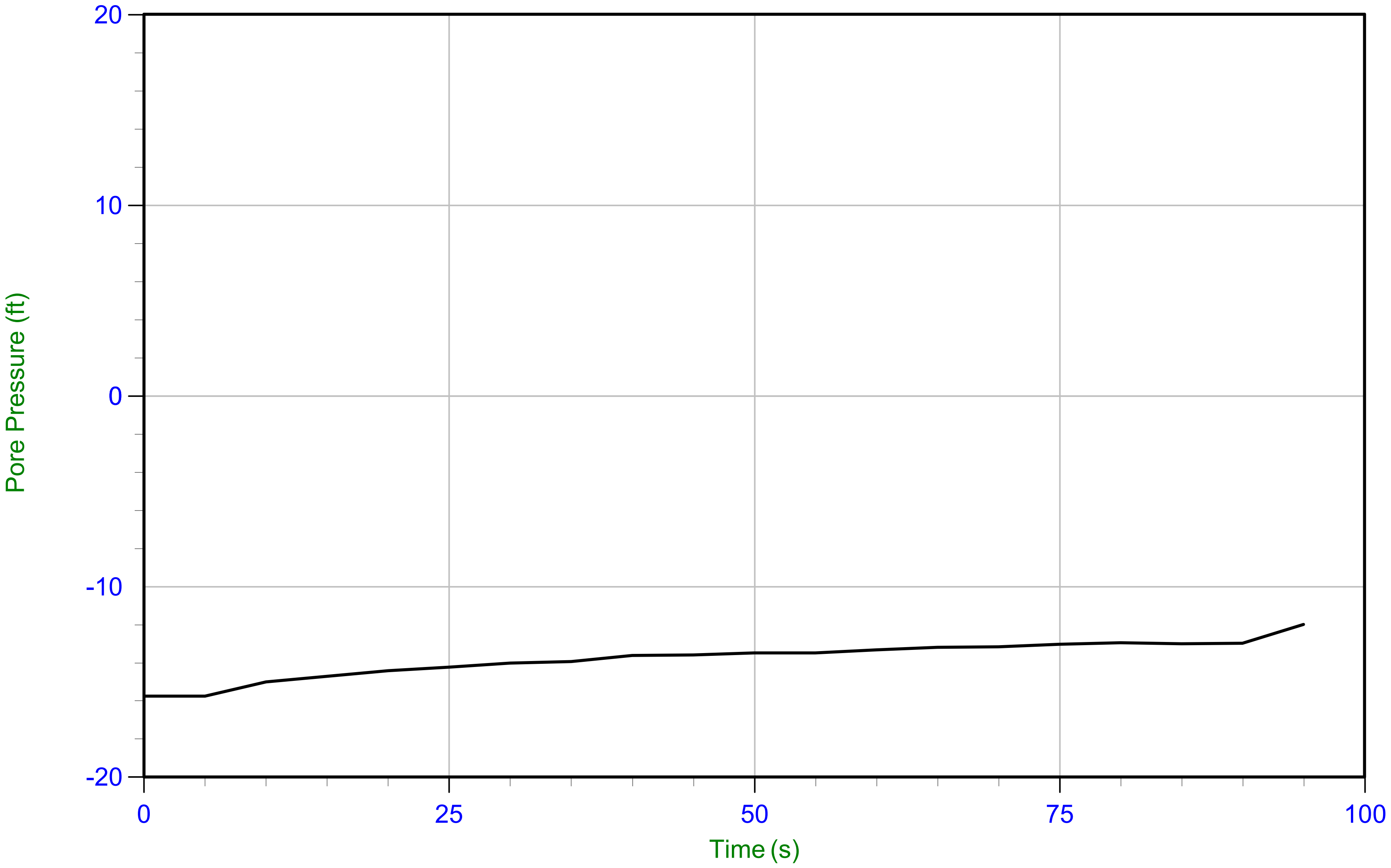
u Min: -2.1 ft
u Max: 5.7 ft
u Final: -0.4 ft

WT: 18.550 m / 60.859 ft
Ueq: 0.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 12:57
Site: DTE Monroe Power Plant

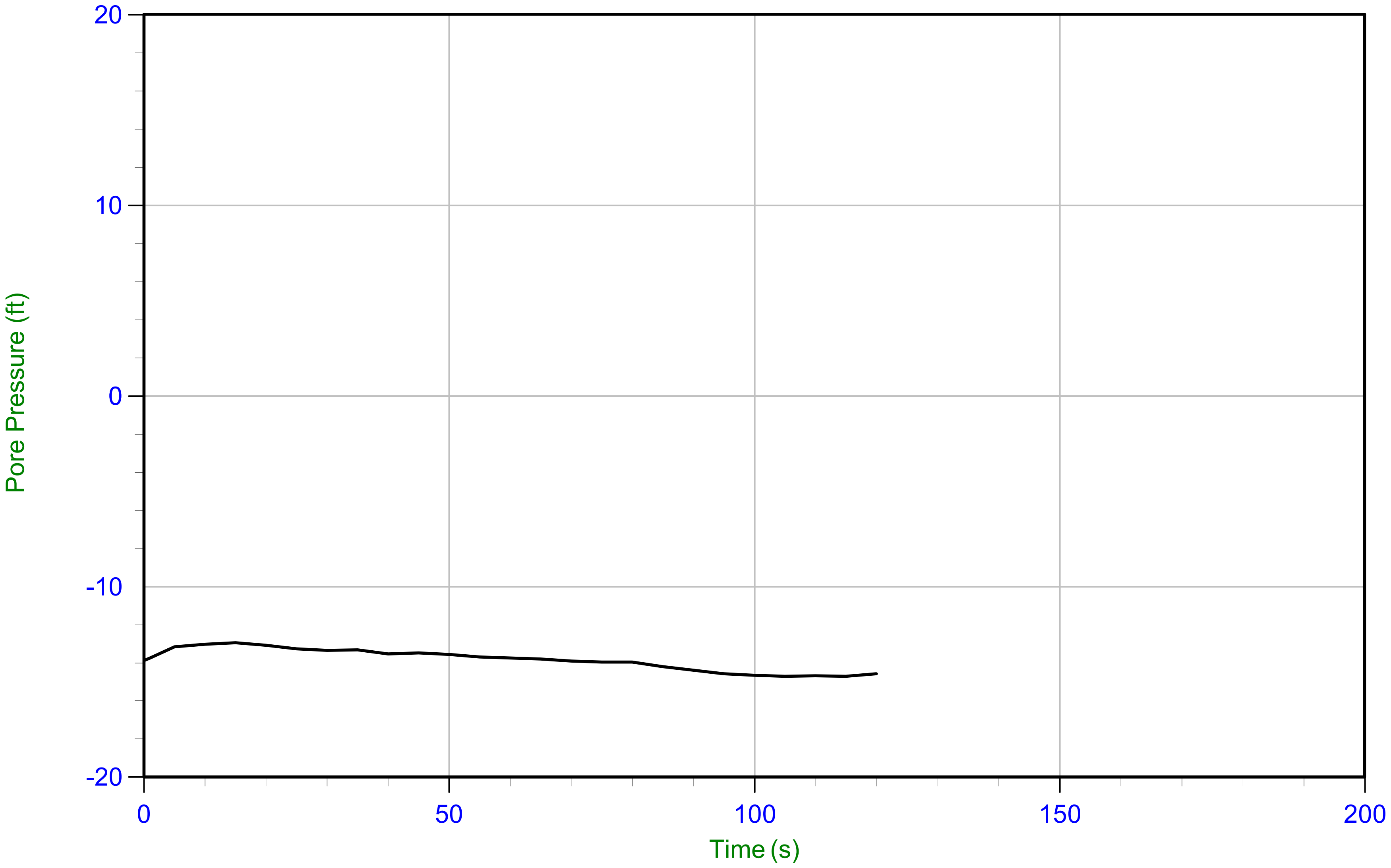
Sounding: CPT20-118
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP118.PPF
Depth: 3.800 m / 12.467 ft
Duration: 95.0 s

u Min: -15.7 ft
u Max: -12.0 ft
u Final: -12.0 ft



Trace Summary:

Filename: 20-61-21655_CP124.PPF
Depth: 7.700 m / 25.262 ft
Duration: 120.0 s

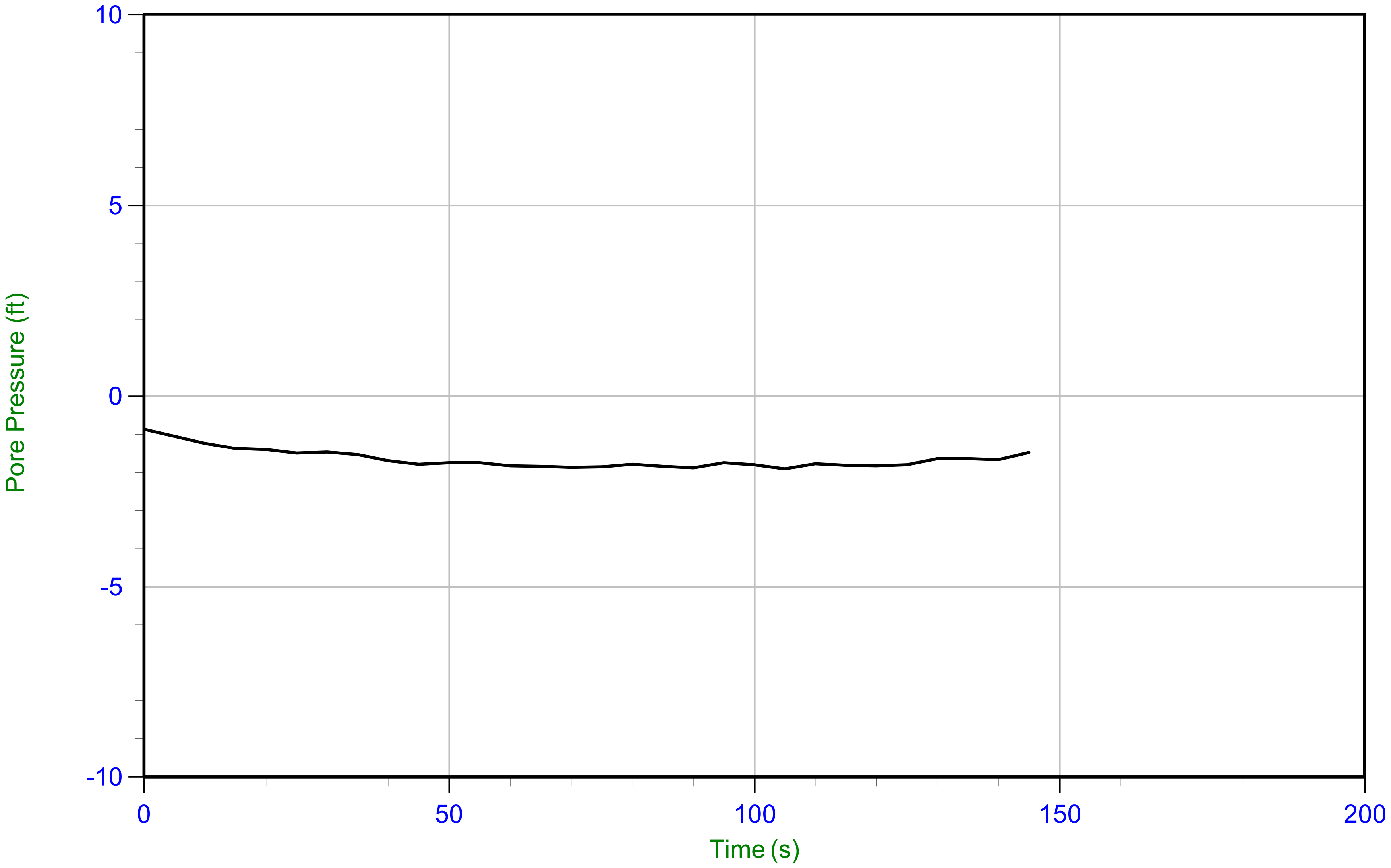
u Min: -14.7 ft
u Max: -13.0 ft
u Final: -14.6 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-128
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

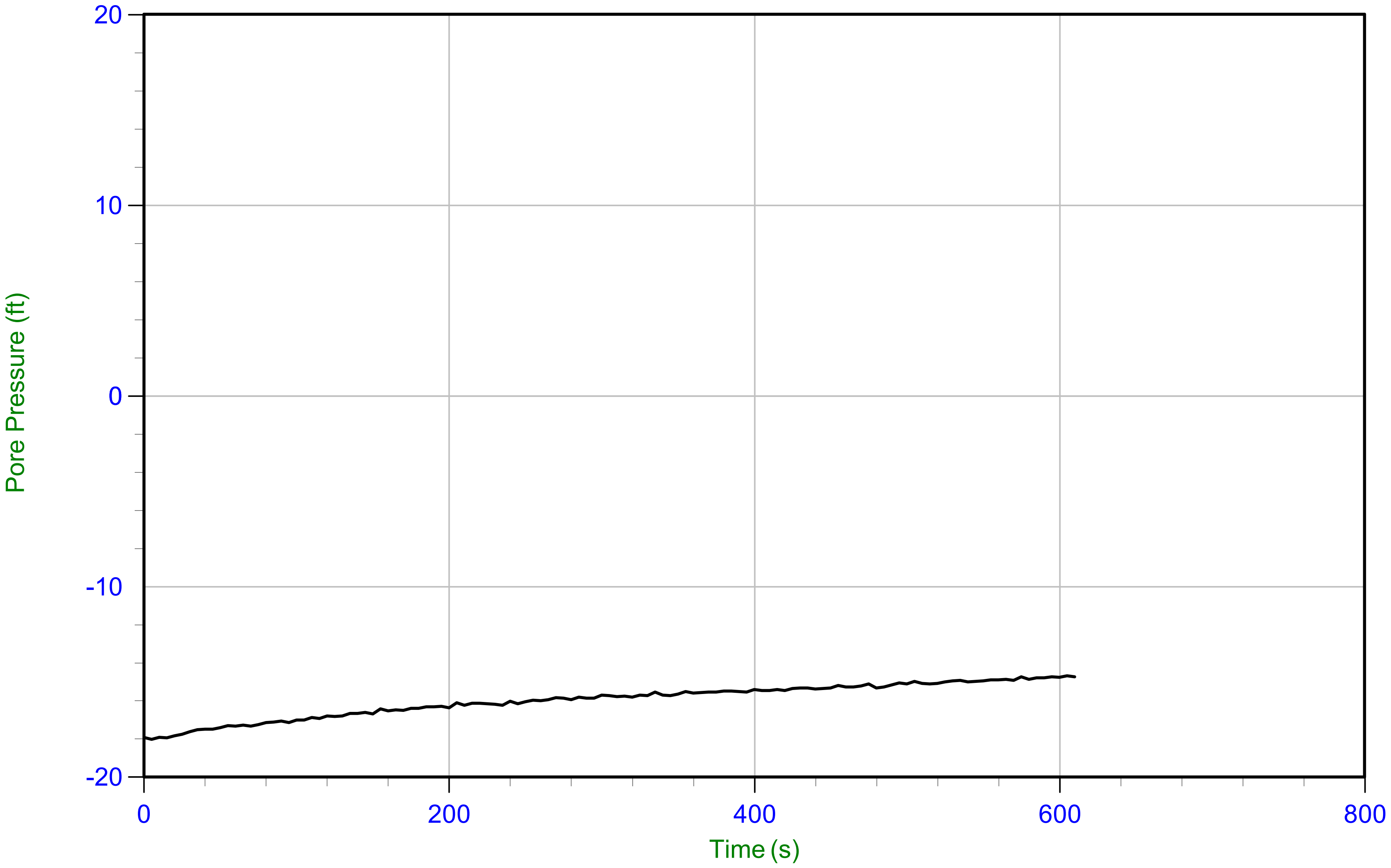
Filename: 20-61-21655_CP128.PPF
Depth: 11.750 m / 38.549 ft
Duration: 145.0 s

u Min: -1.9 ft
u Max: -0.9 ft
u Final: -1.5 ft

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP130.PPF
Depth: 4.600 m / 15.092 ft
Duration: 610.0 s

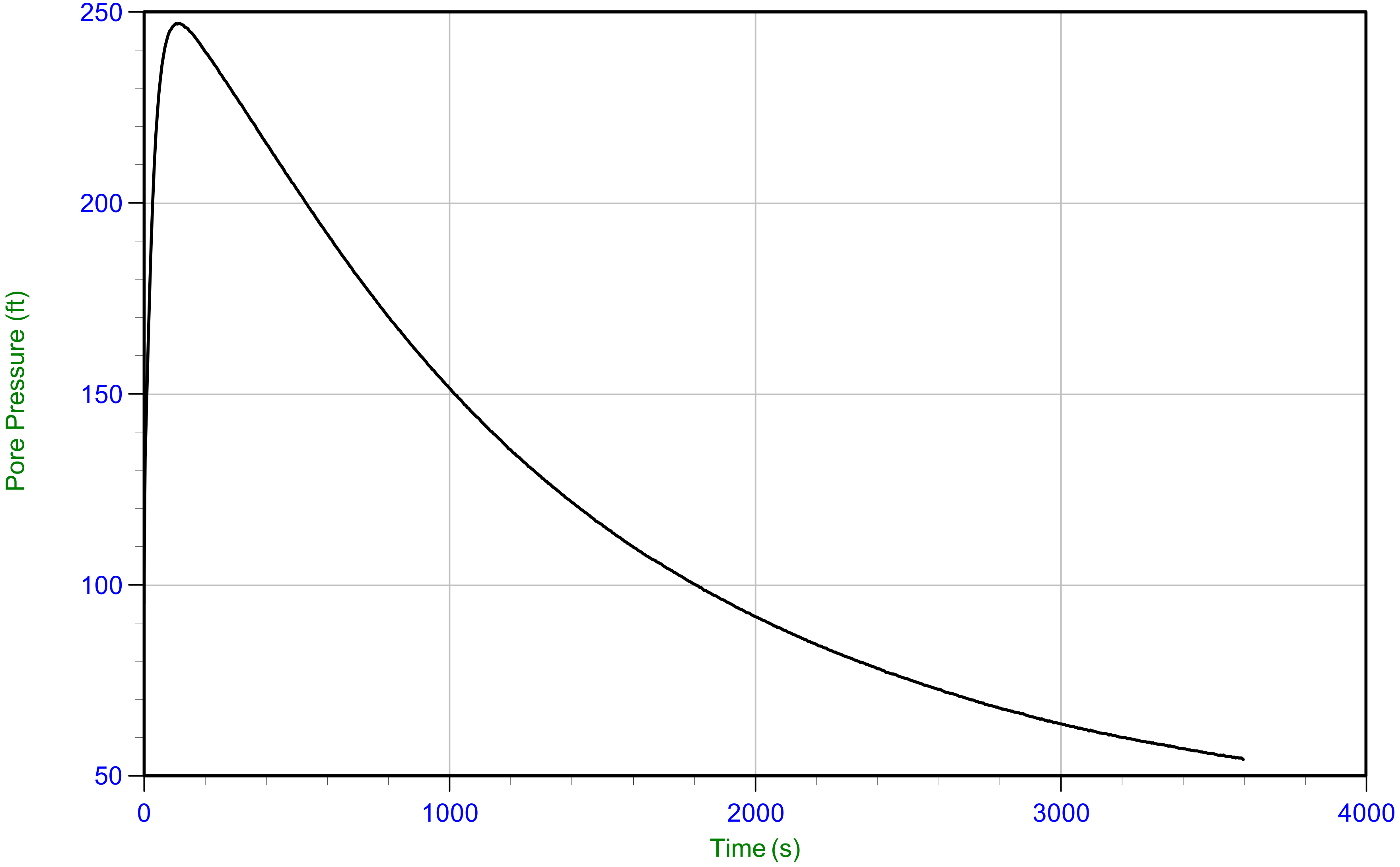
u Min: -18.0 ft
u Max: -14.7 ft
u Final: -14.7 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP130.PPF
Depth: 15.250 m / 50.032 ft
Duration: 3600.0 s

u Min: 54.4 ft
u Max: 247.0 ft
u Final: 54.4 ft

WT: 7.620 m / 25.000 ft
Ueq: 25.0 ft
U(50): 136.01 ft

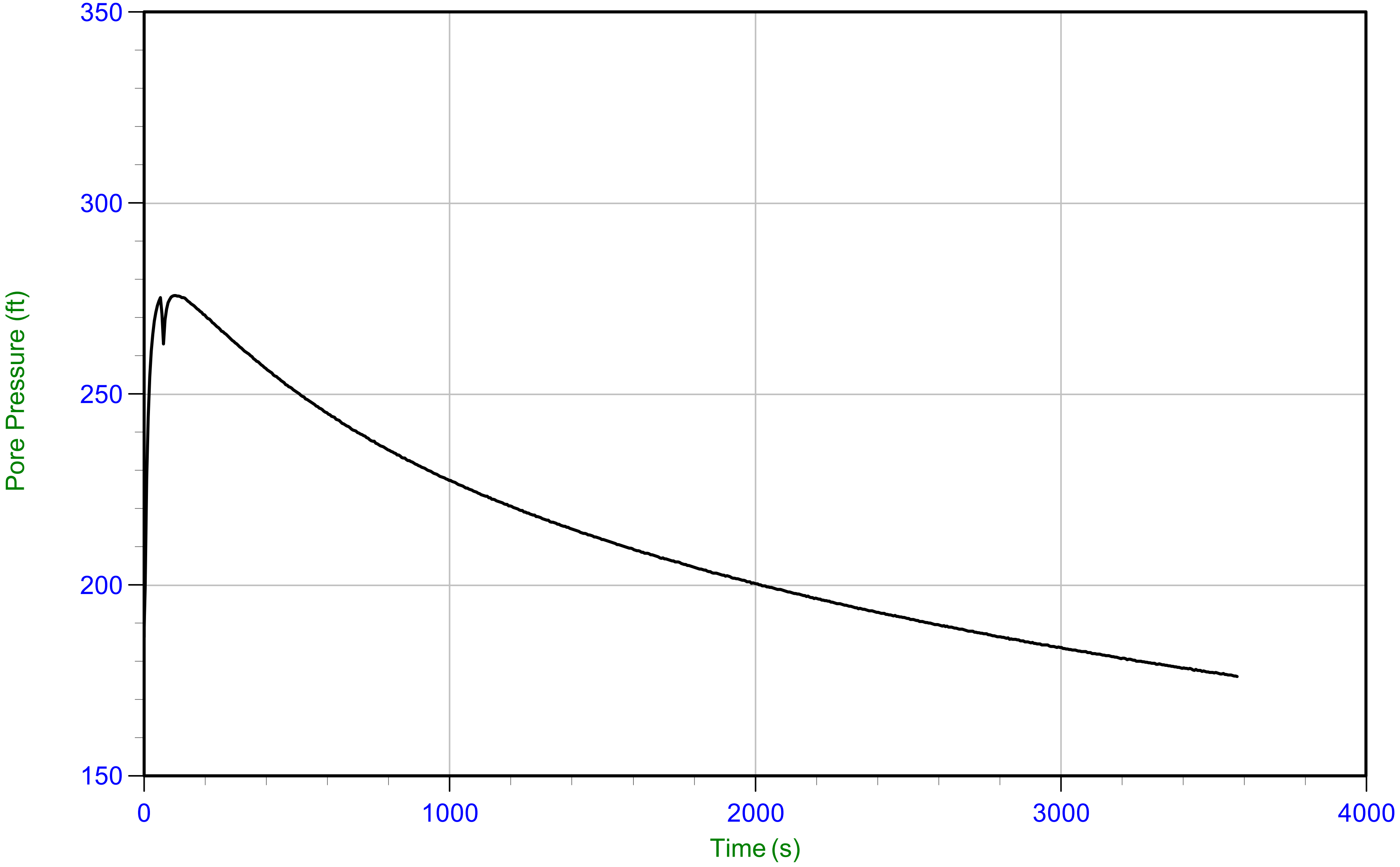
T(50): 1077.0 s
Ir: 100
Ch: 0.7 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP130.PPF
Depth: 18.300 m / 60.039 ft
Duration: 3580.0 s

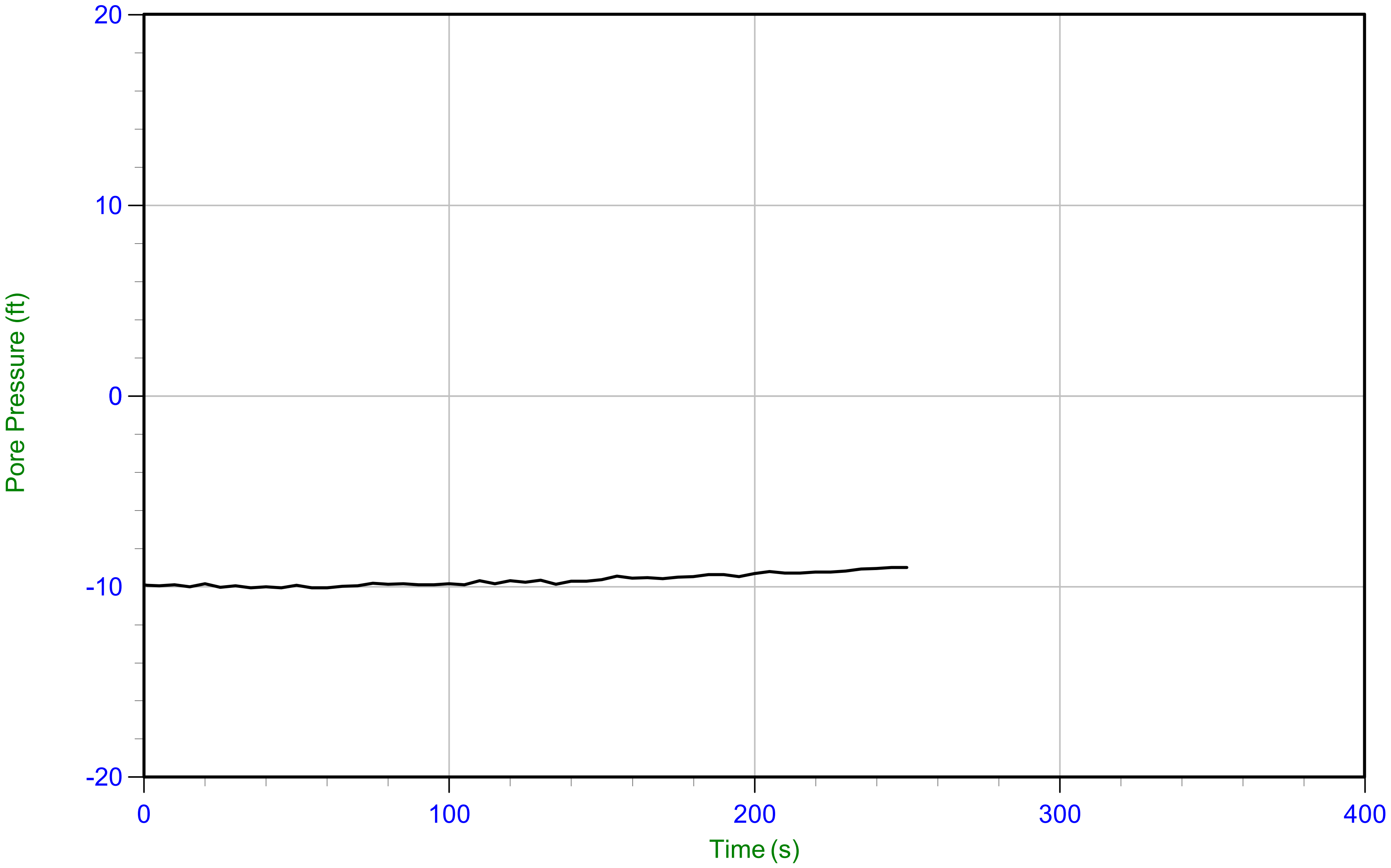
u Min: 176.1 ft
u Max: 275.8 ft
u Final: 176.1 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP132.PPF
Depth: 10.800 m / 35.433 ft
Duration: 250.0 s

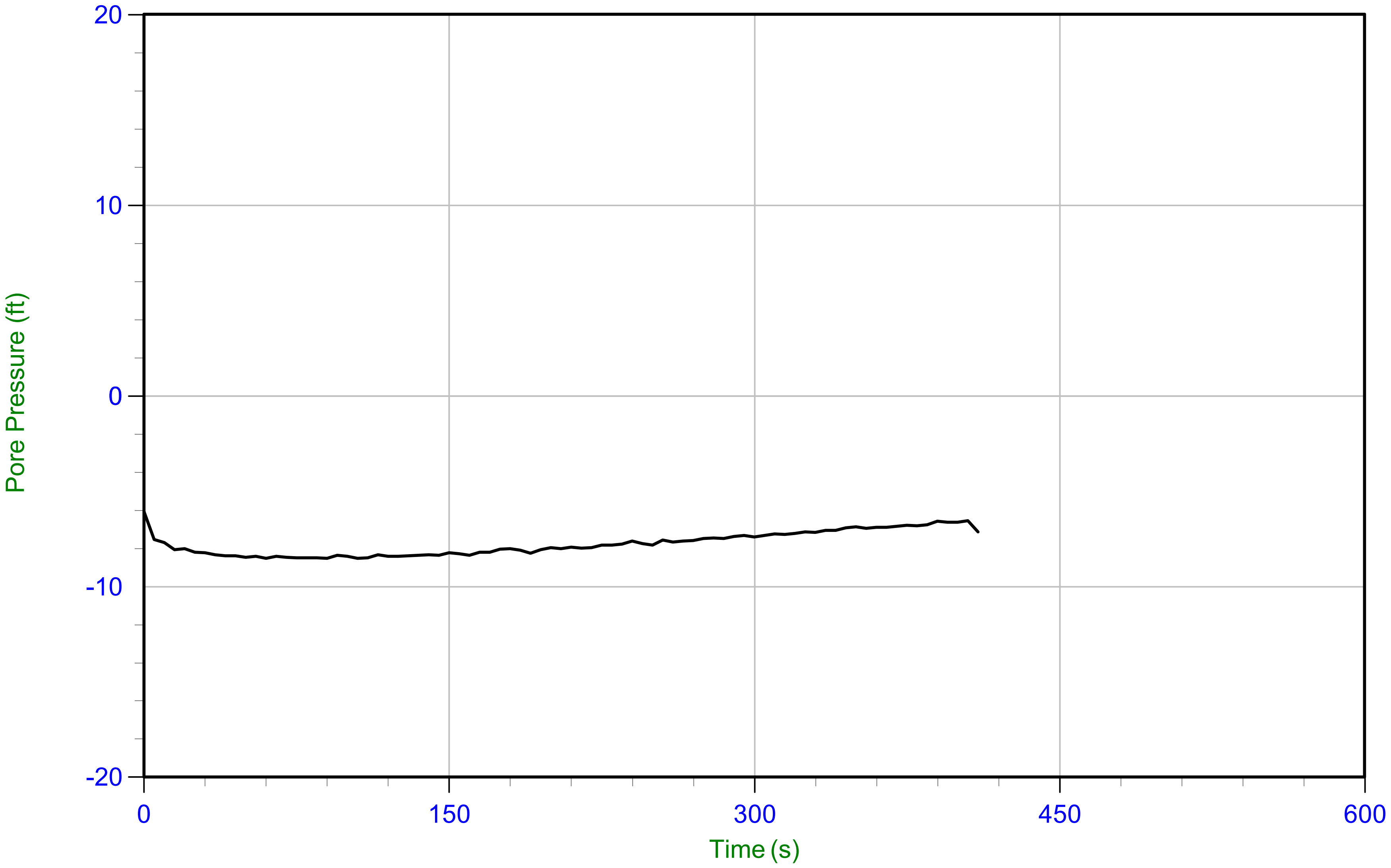
u Min: -10.1 ft
u Max: -9.0 ft
u Final: -9.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

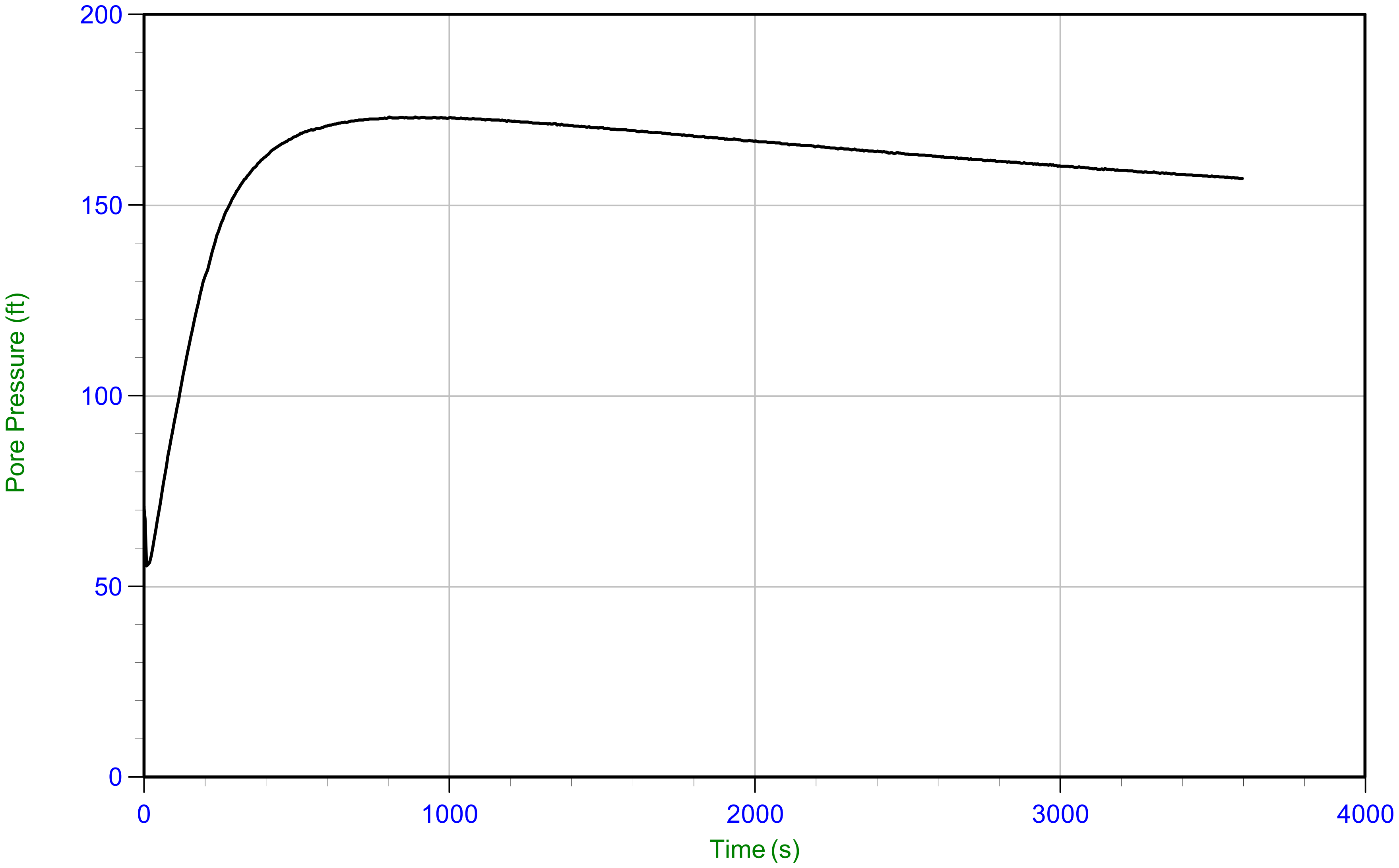
Filename: 20-61-21655_CP132.PPF
Depth: 13.800 m / 45.275 ft
Duration: 410.0 s

u Min: -8.5 ft
u Max: -6.1 ft
u Final: -7.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 14:09
Site: DTE Monroe Power Plant

Sounding: CPT20-134
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

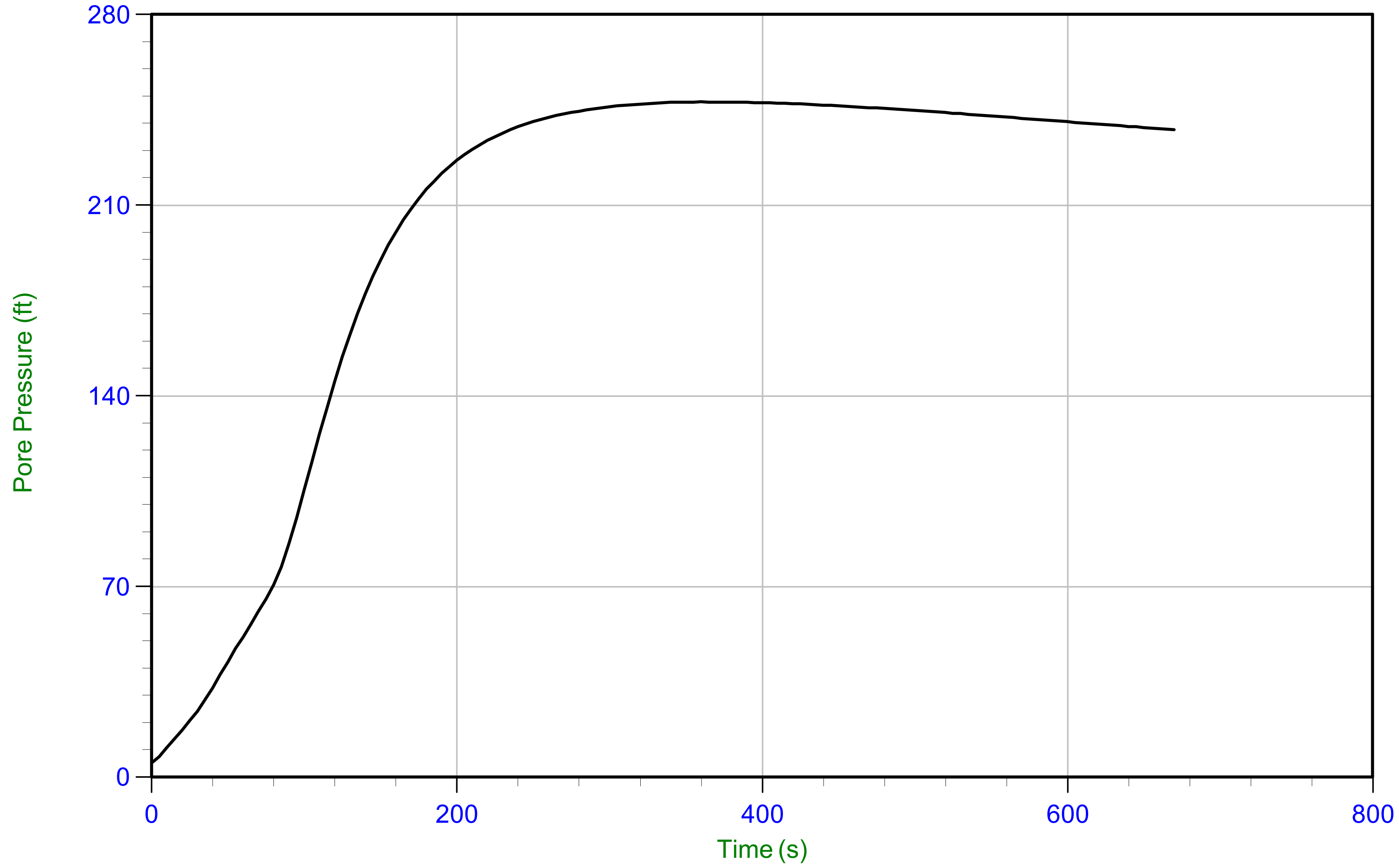
Filename: 20-61-21655_CP134.PPF
Depth: 20.400 m / 66.928 ft
Duration: 3600.0 s

u Min: 55.5 ft
u Max: 173.2 ft
u Final: 157.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 13:01
Site: DTE Monroe Power Plant

Sounding: CPT20-136
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP136.PPF
Depth: 19.900 m / 65.288 ft
Duration: 670.0 s

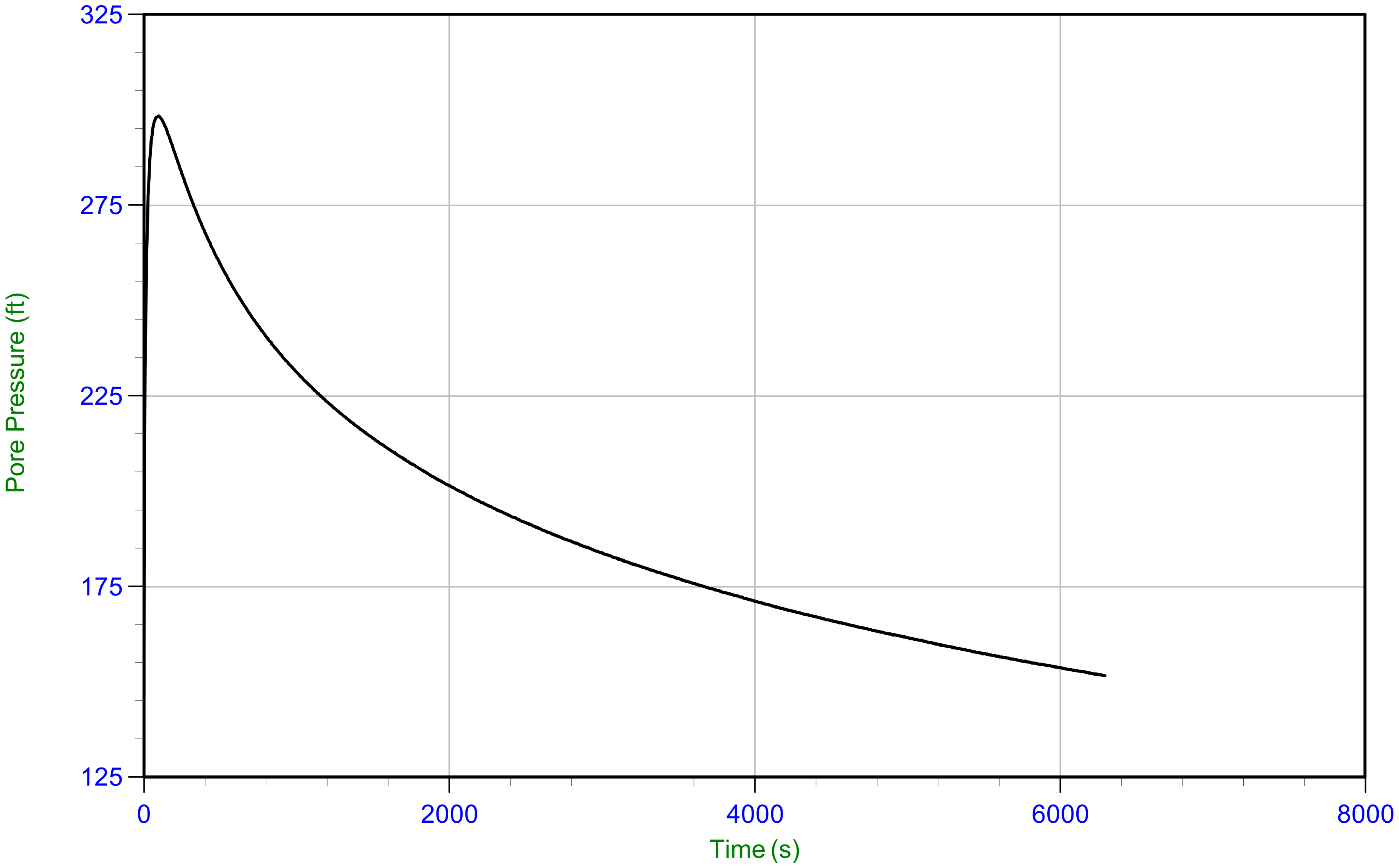
u Min: 5.3 ft
u Max: 247.9 ft
u Final: 237.6 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 13:01
Site: DTE Monroe Power Plant

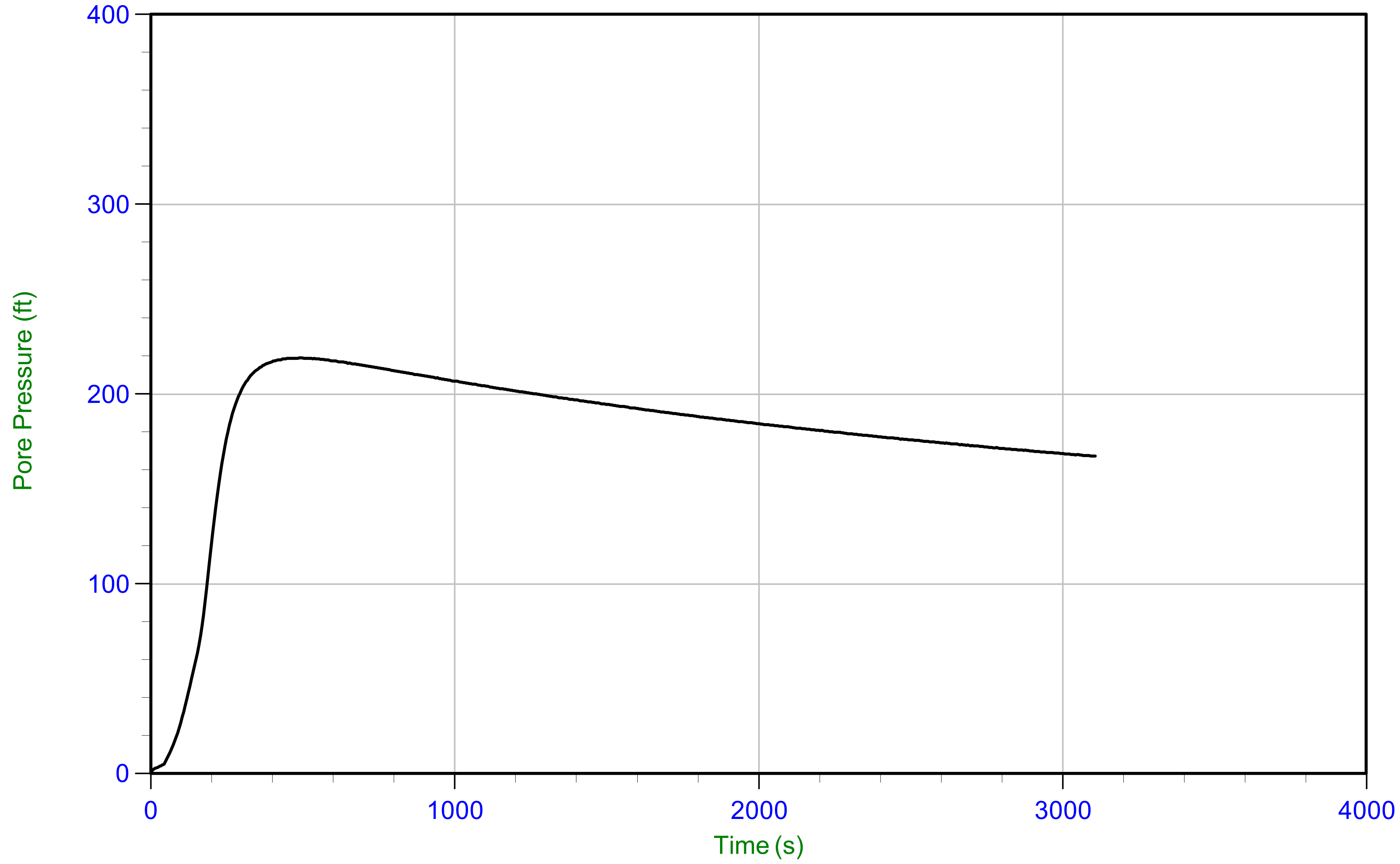
Sounding: CPT20-136
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP136.PPF	u Min: 146.3 ft	WT: 7.620 m / 25.000 ft	T(50): 4047.9 s
Depth: 20.075 m / 65.862 ft	u Max: 298.3 ft	Ueq: 40.9 ft	Ir: 100
Duration: 6300.0 s	u Final: 151.6 ft	U(50): 169.60 ft	Ch: 0.2 cm²/min

Geosyntec	Job No: 20-61-21655 Date: 12/13/2020 14:56 Site: DTE Monroe Power Plant	Sounding: CPT20-140 Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

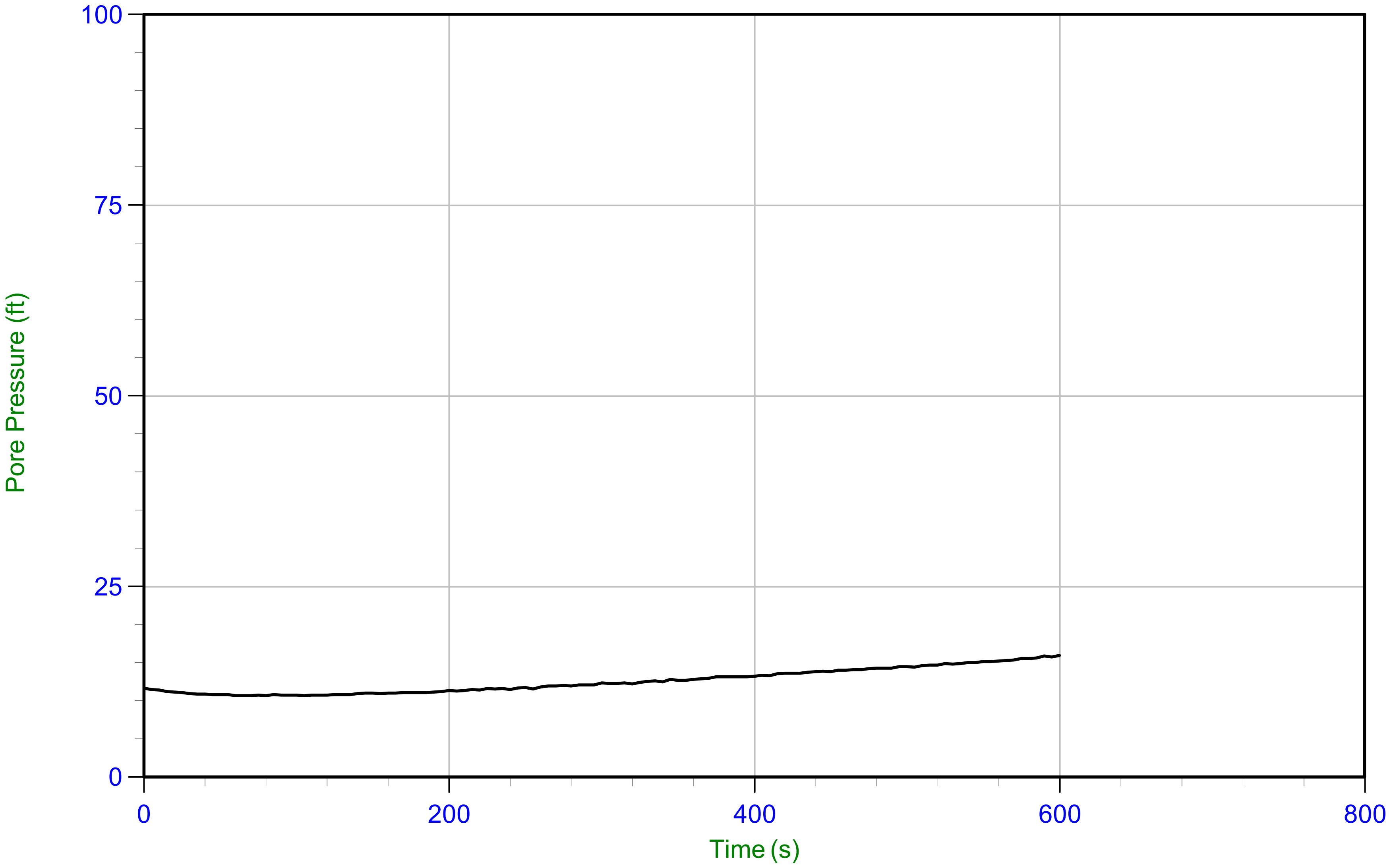
Filename: 20-61-21655_CP140.PPF
Depth: 17.425 m / 57.168 ft
Duration: 3110.0 s

u Min: 1.2 ft
u Max: 219.1 ft
u Final: 167.3 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

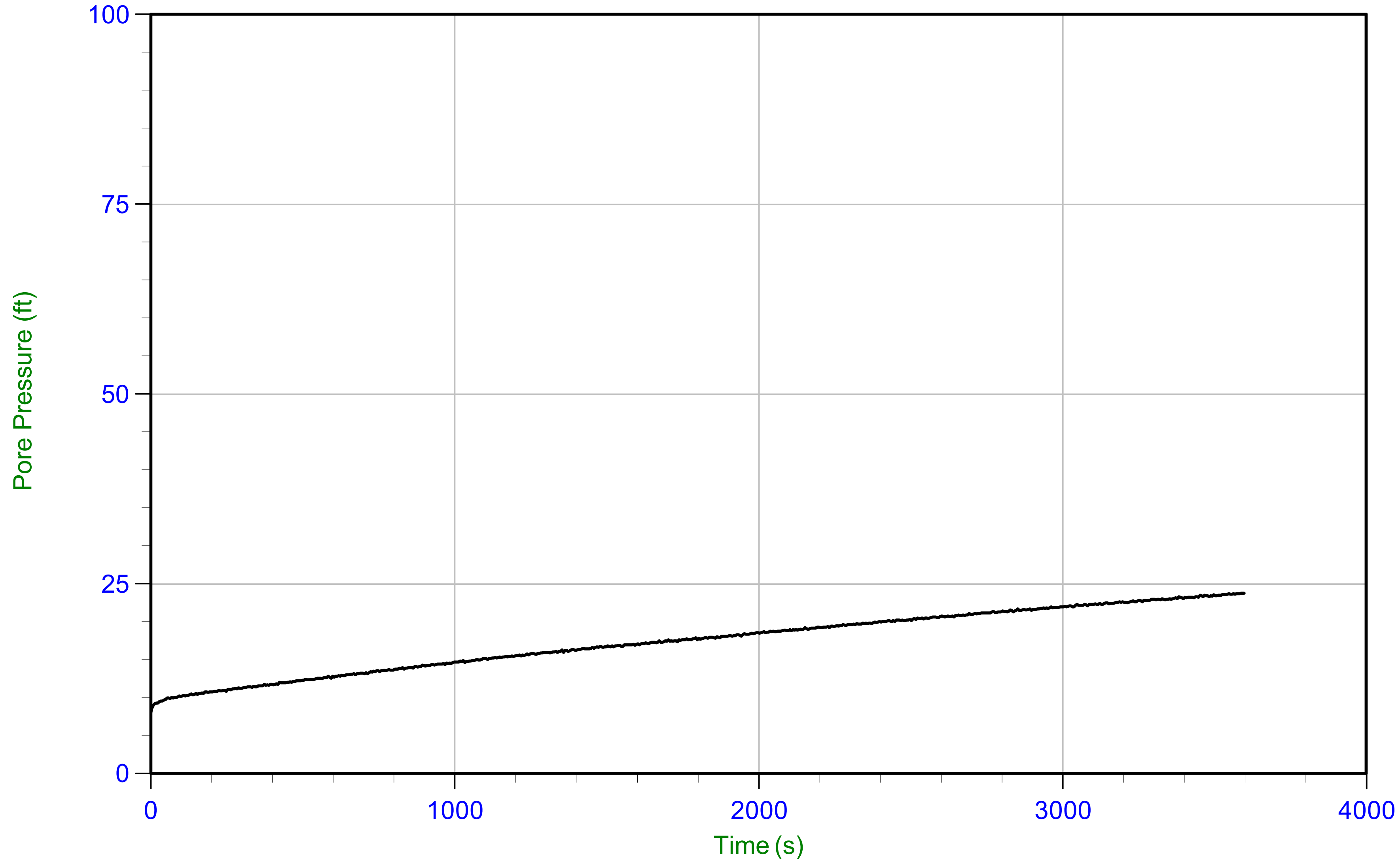
Filename: 20-61-21655_CP150.PPF
Depth: 12.200 m / 40.026 ft
Duration: 600.0 s

u Min: 10.7 ft
u Max: 16.0 ft
u Final: 16.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP150.PPF
Depth: 13.800 m / 45.275 ft
Duration: 3600.0 s

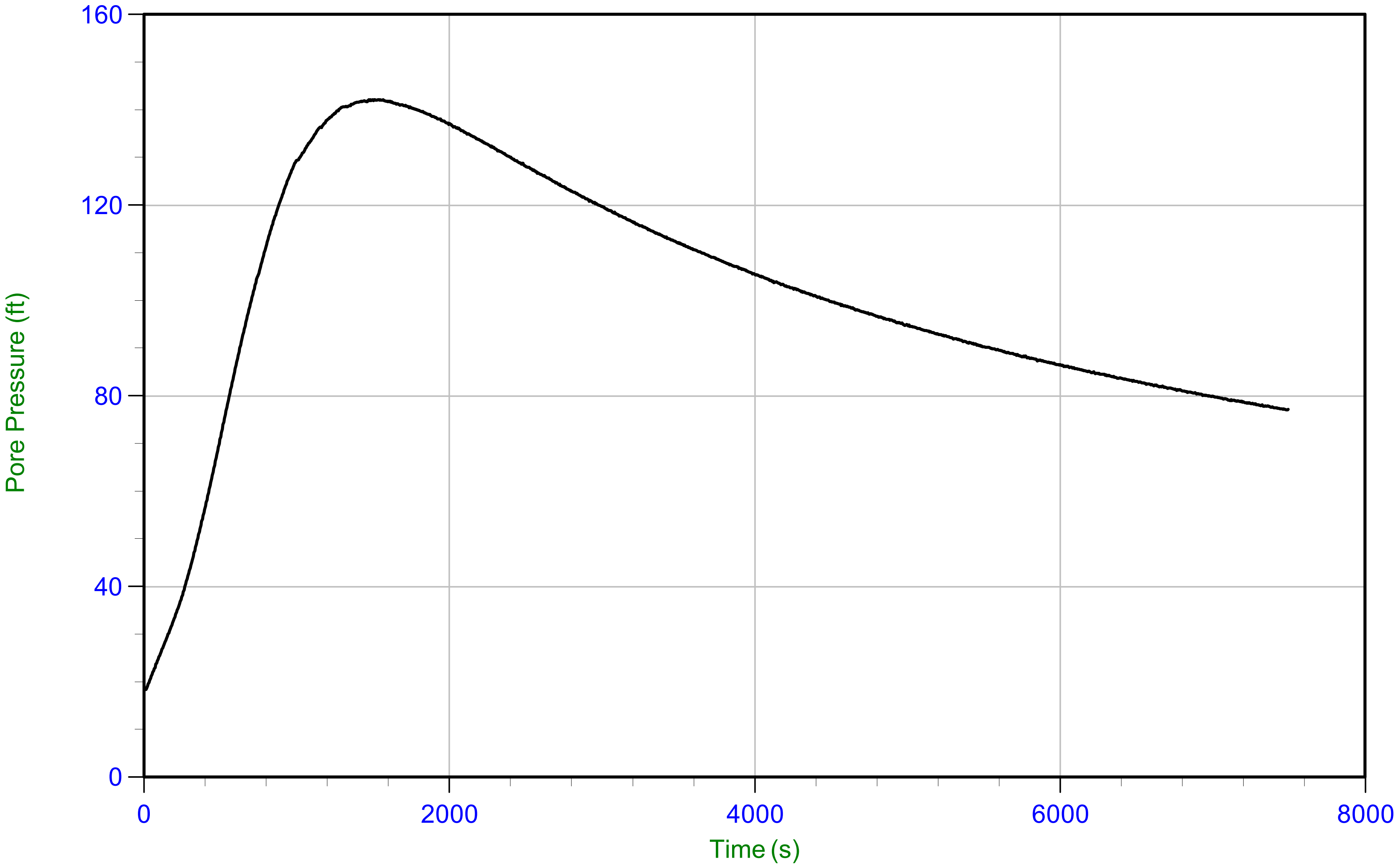
u Min: 8.0 ft
u Max: 23.8 ft
u Final: 23.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP150.PPF
Depth: 16.800 m / 55.117 ft
Duration: 7500.0 s

u Min: 18.3 ft
u Max: 142.1 ft
u Final: 77.2 ft

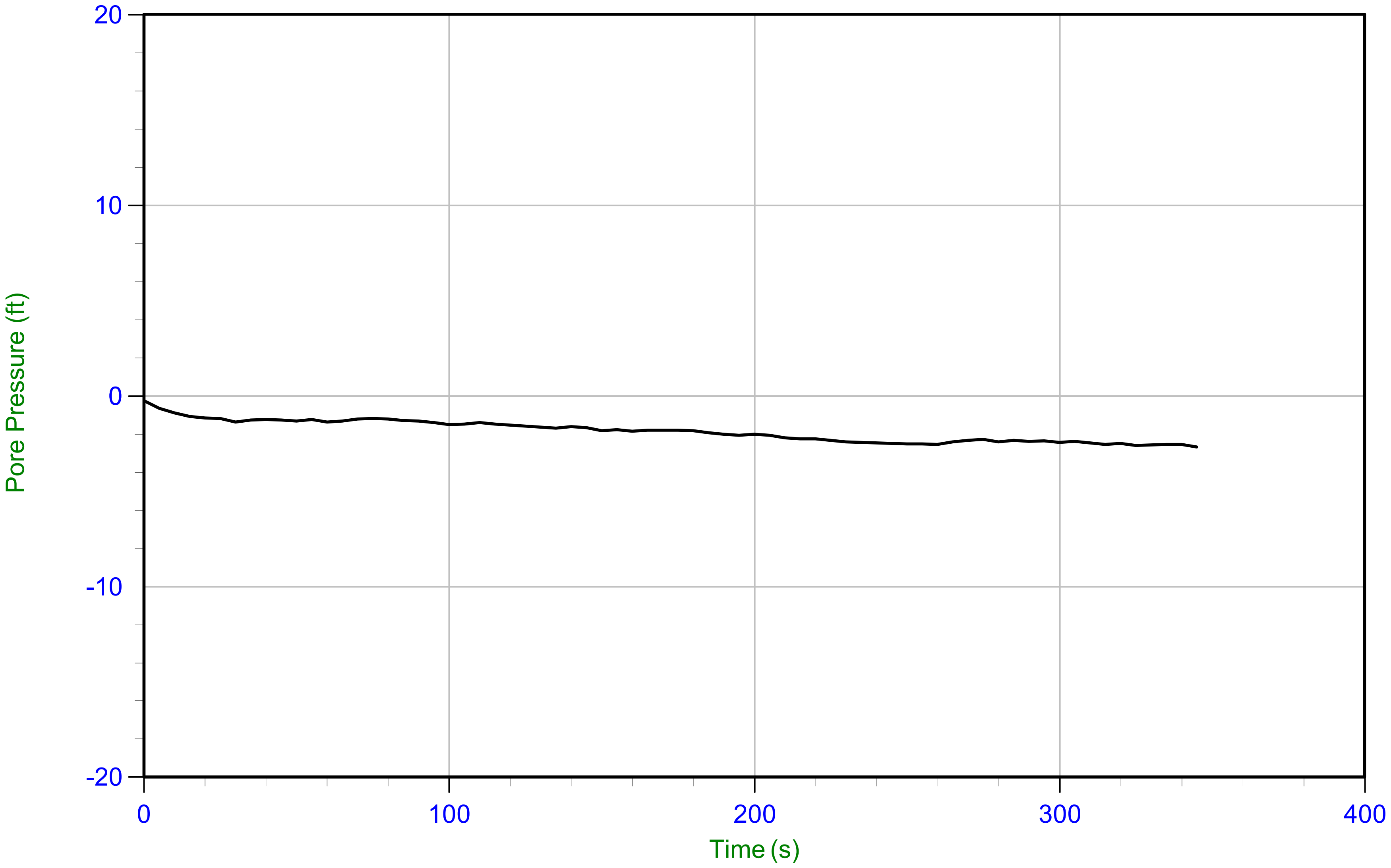
WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 86.13 ft

T(50): 4529.6 s
Ir: 100
Ch: 0.2 cm²/min

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

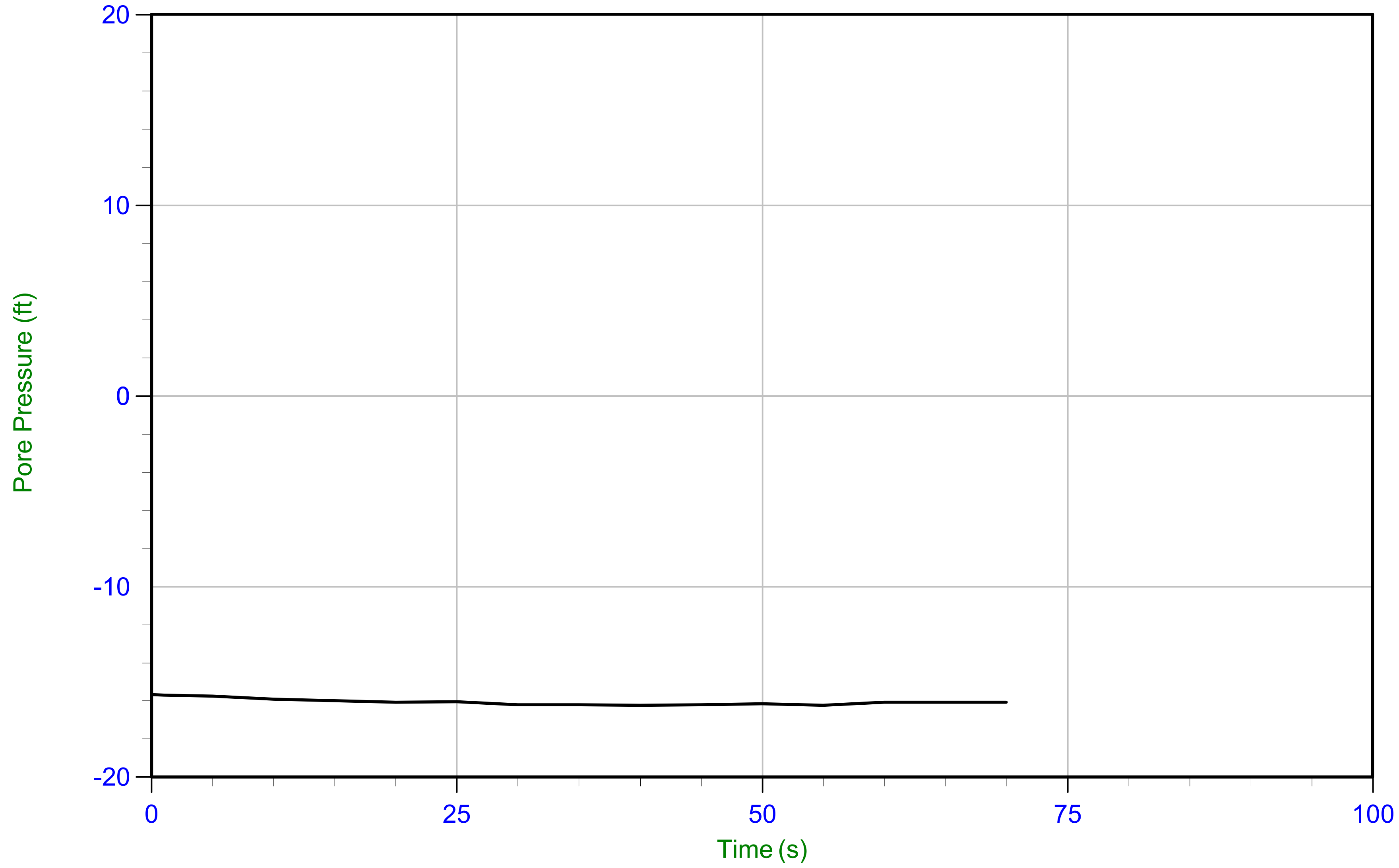
Filename: 20-61-21655_CP150.PPF
Depth: 20.100 m / 65.944 ft
Duration: 345.0 s

u Min: -2.7 ft
u Max: -0.3 ft
u Final: -2.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 14:54
Site: DTE Monroe Power Plant

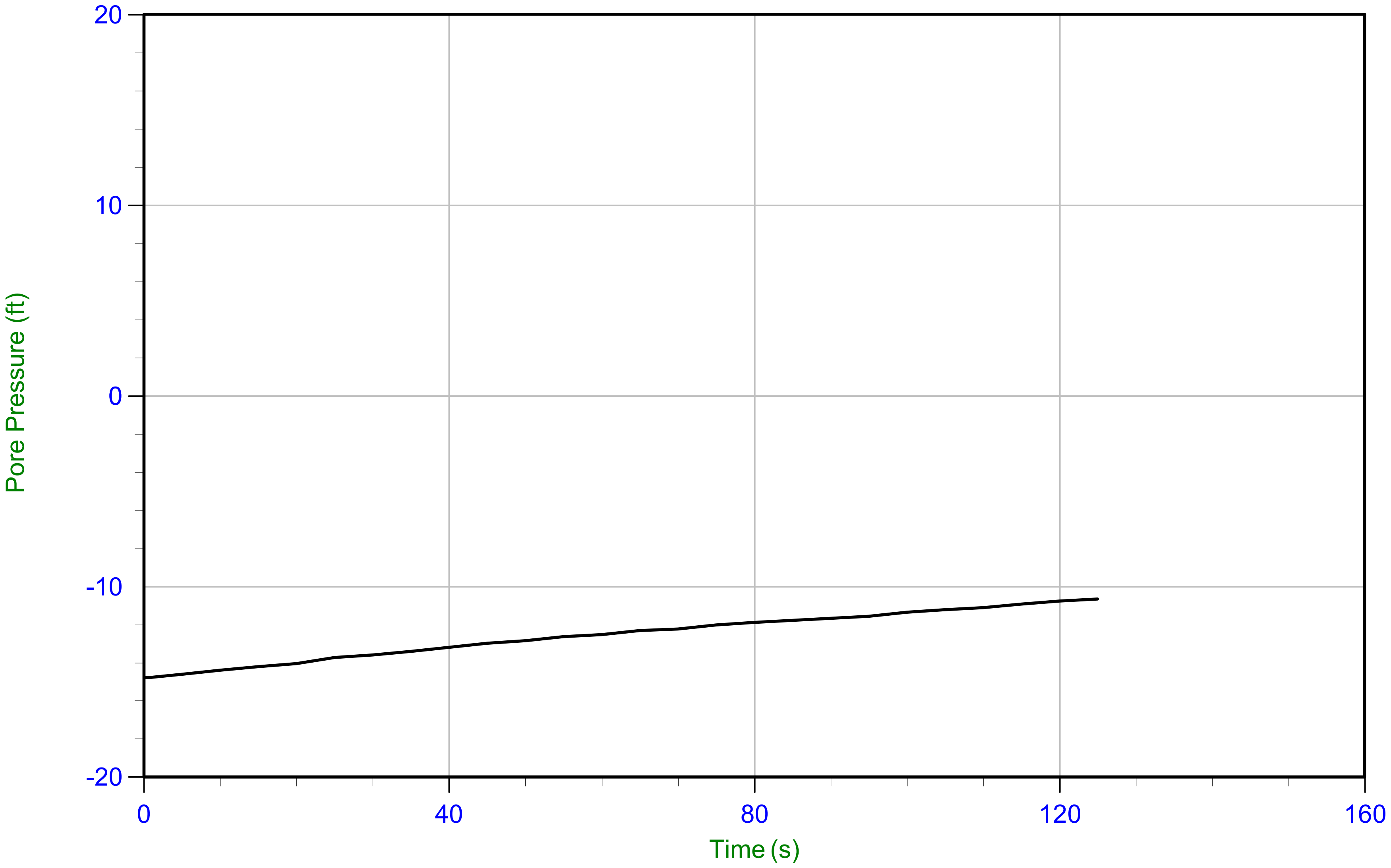
Sounding: CPT20-152
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP152.PPF
Depth: 8.850 m / 29.035 ft
Duration: 70.0 s

u Min: -16.2 ft
u Max: -15.7 ft
u Final: -16.1 ft



Trace Summary:

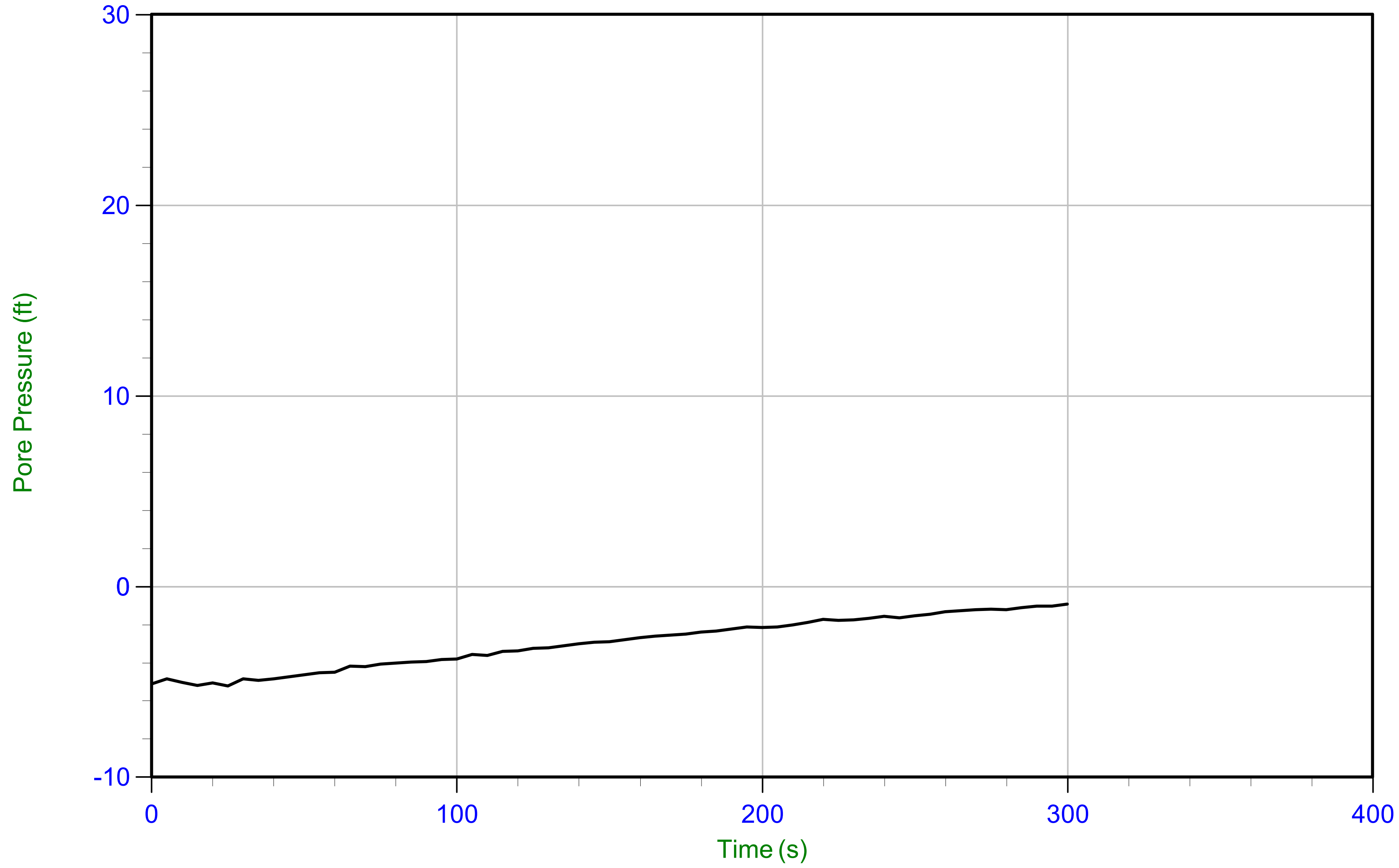
Filename: 20-61-21655_CP154.PPF
Depth: 6.850 m / 22.473 ft
Duration: 125.0 s

u Min: -14.8 ft
u Max: -10.6 ft
u Final: -10.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

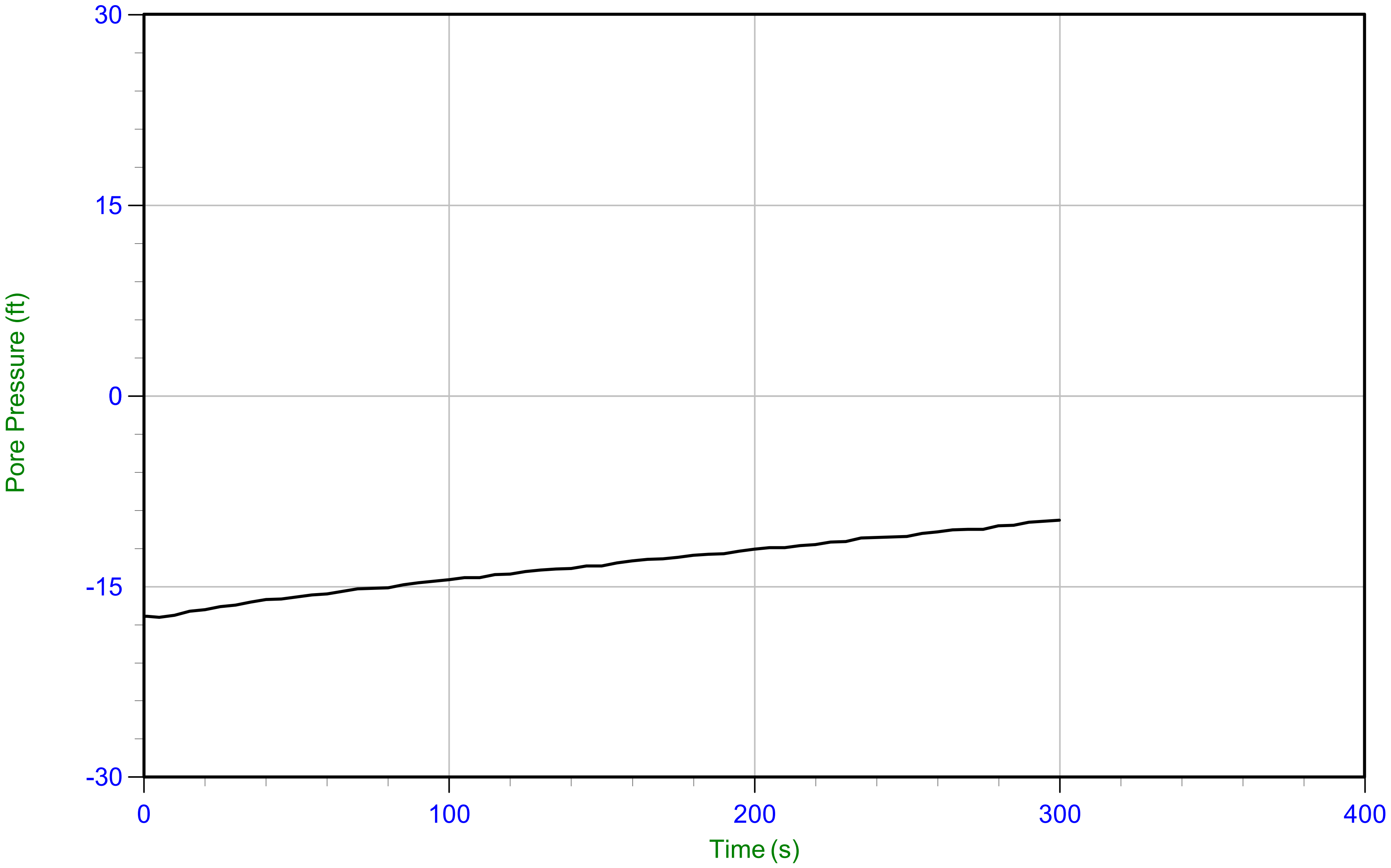
Filename: 20-61-21655_CP170.PPF
Depth: 3.100 m / 10.170 ft
Duration: 300.0 s

u Min: -5.2 ft
u Max: -0.9 ft
u Final: -0.9 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 6.175 m / 20.259 ft
Duration: 300.0 s

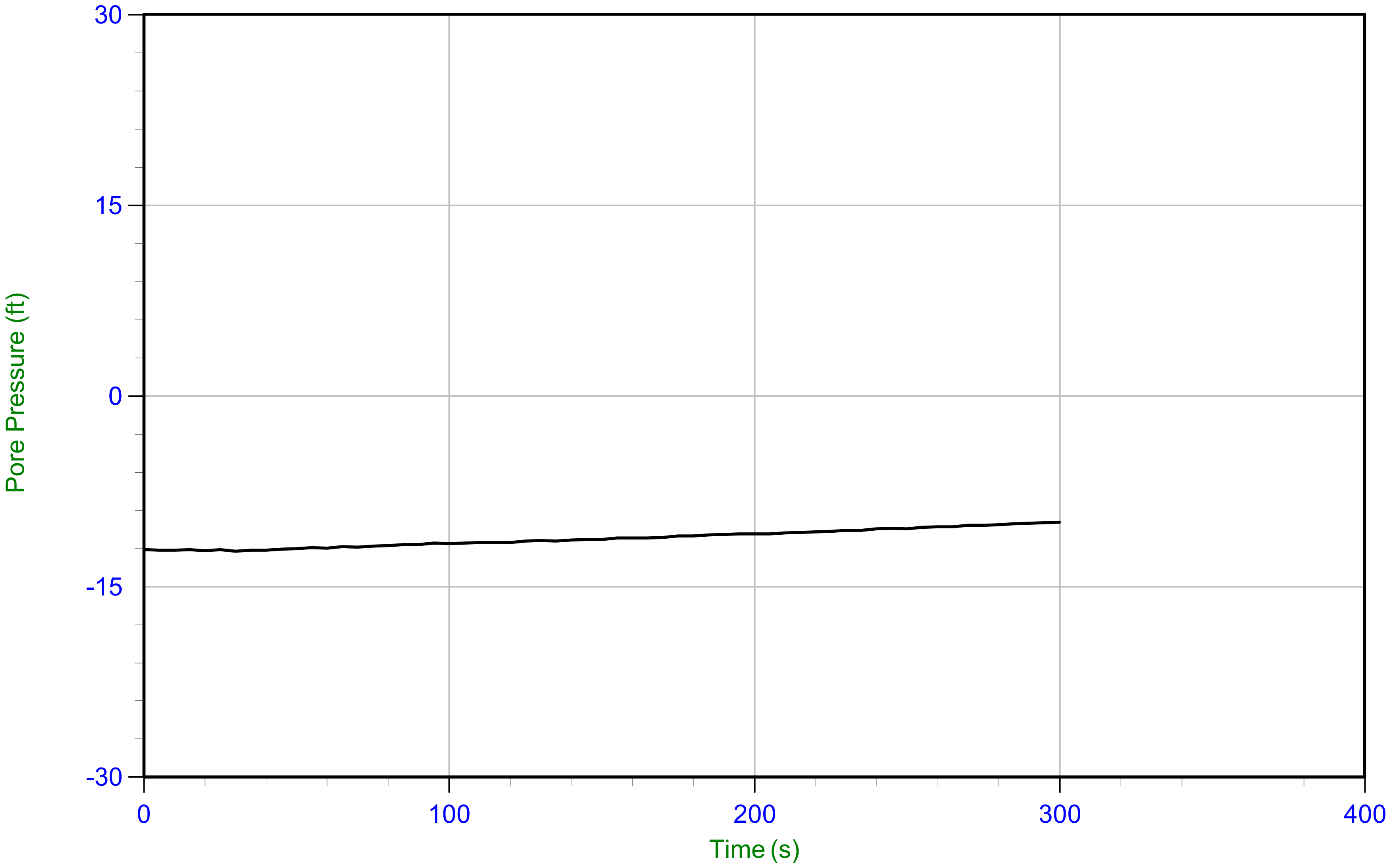
u Min: -17.4 ft
u Max: -9.8 ft
u Final: -9.8 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 12.250 m / 40.190 ft
Duration: 300.0 s

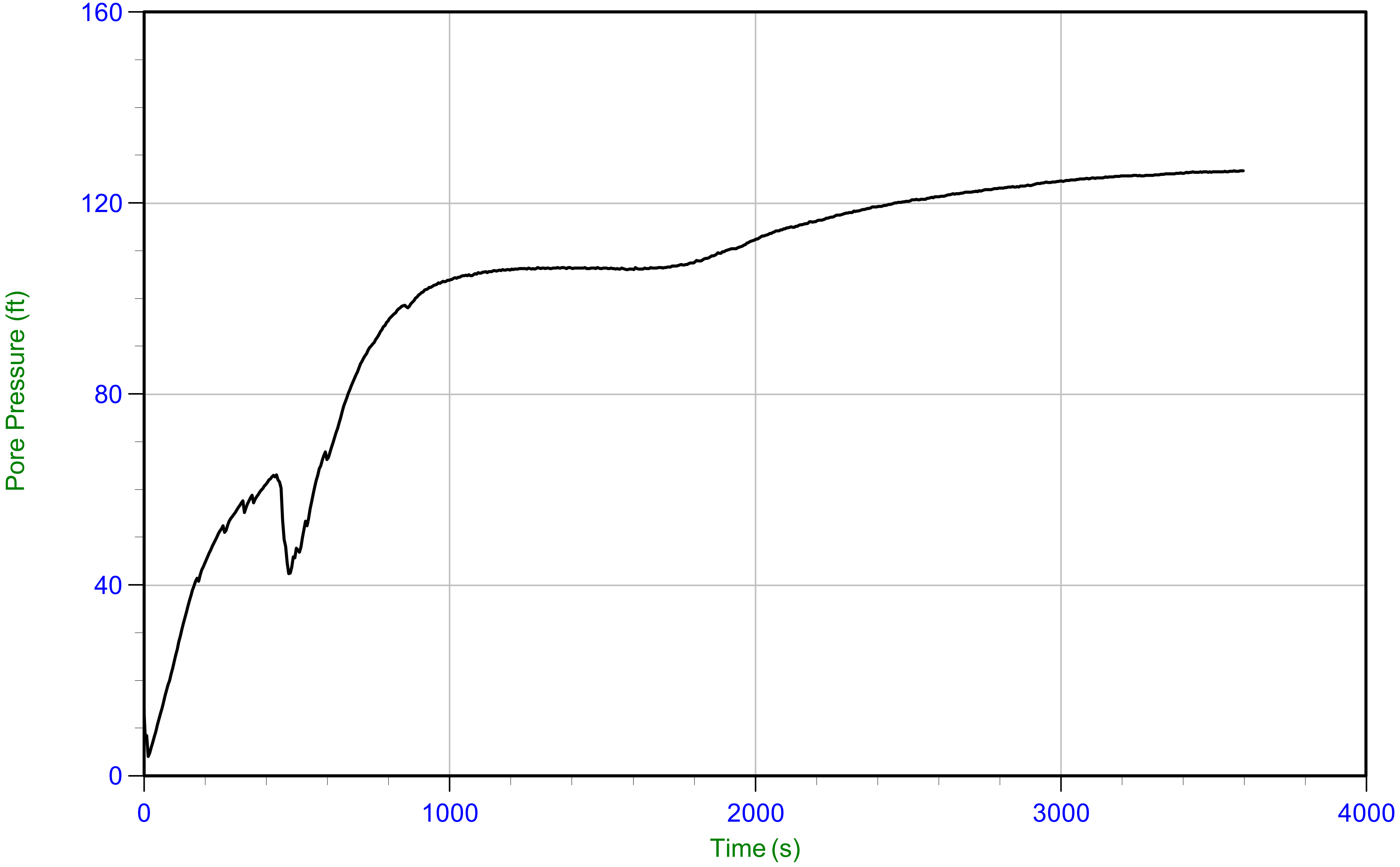
u Min: -12.2 ft
u Max: -9.9 ft
u Final: -9.9 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 20.775 m / 68.159 ft
Duration: 3600.0 s

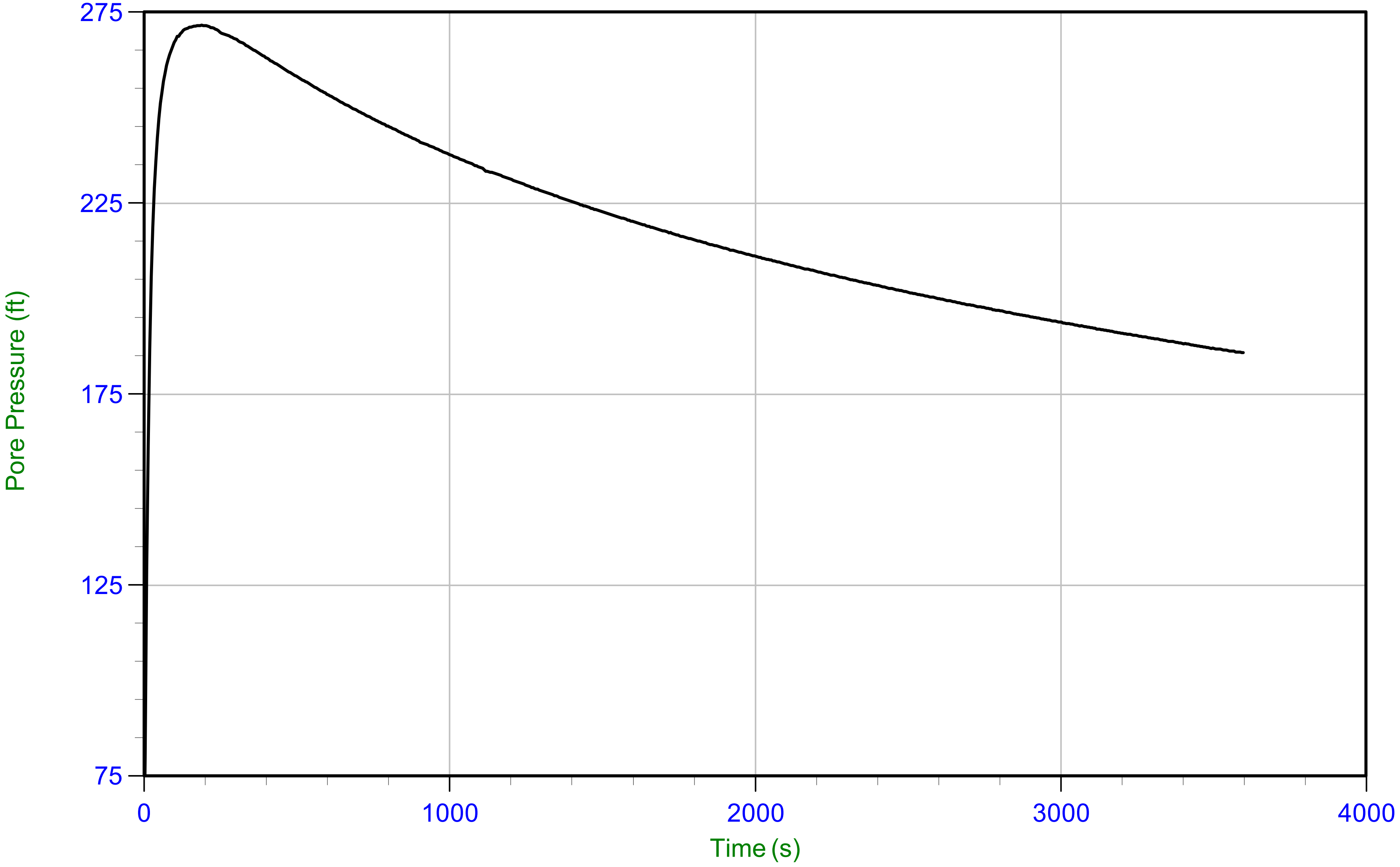
u Min: 4.1 ft
u Max: 126.8 ft
u Final: 126.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 10:33
Site: DTE Monroe Power Plant

Sounding: CPT20-176
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP176.PPF
Depth: 20.475 m / 67.174 ft
Duration: 3600.0 s

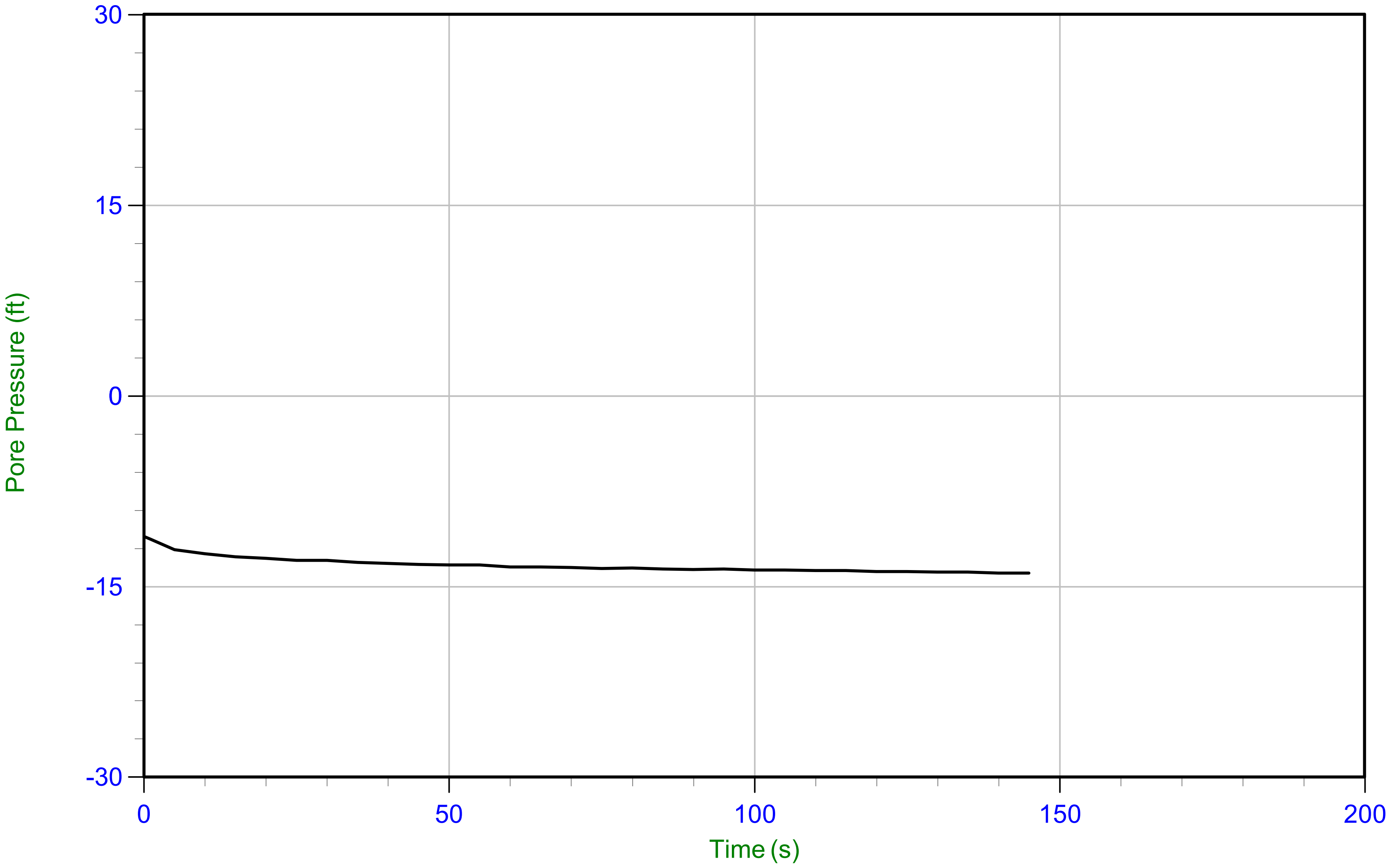
u Min: 51.2 ft
u Max: 271.6 ft
u Final: 185.9 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 09:43
Site: DTE Monroe Power Plant

Sounding: CPT20-178
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP178.PPF
Depth: 7.900 m / 25.918 ft
Duration: 145.0 s

u Min: -13.9 ft
u Max: -11.0 ft
u Final: -13.9 ft

APPENDIX L – CHEMISTRY ANALYSIS OF SITE-SPECIFIC WATER

05-Jan-2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd.
Suite 100
Ann Arbor, MI 48105

Re: **DTE- Monroe (GLP-8014)** Work Order: **20121750**

Dear Michael,

ALS Environmental received 5 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 26.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Report of Laboratory Analysis

Certificate No: MN 026-999-449

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: **20121750**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20121750-01	PZ-1	Groundwater		12/14/2020 08:00	12/18/2020 10:00	☐
20121750-02	PZ-2	Groundwater		12/14/2020 09:00	12/18/2020 10:00	☐
20121750-03	PZ-3	Groundwater		12/15/2020 08:00	12/18/2020 10:00	☐
20121750-04	PZ-4	Groundwater		12/14/2020 10:00	12/18/2020 10:00	☐
20121750-05	PZ-5	Groundwater		12/15/2020 10:00	12/18/2020 10:00	☐

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750

Case Narrative

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:
No other deviations or anomalies were noted.

Wet Chemistry:

Batch R306912, Method SW9040C, Sample PZ-3 (20121750-03B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R306825, Method SW9040C, Sample LCS-R306825: Samples were processed outside of holding time for pH, as the analysis is a field test and holding time is defined as 15 minutes.Batch R307145, Method IC_9056_W, Sample 20121752-03B MSD: 1

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750
Sample ID: PZ-1
Lab ID: 20121750-01
Collection Date: 12/14/2020 08:00 AM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:09 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Arsenic	**0.0098**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Barium	**2.1**		**0.050**	**mg/L**	10	12/31/2020 05:01 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Boron	**4.8**		**0.20**	**mg/L**	10	12/31/2020 05:01 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Calcium	**100**		**0.50**	**mg/L**	1	12/30/2020 08:54 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Iron	**0.83**		**0.080**	**mg/L**	1	12/30/2020 08:54 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:54 PM
Magnesium	**0.47**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Molybdenum	**1.1**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Potassium	**21**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Selenium	**0.051**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Sodium	**44**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**210**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**340**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**43**		**10**	**mg/L**	10	12/30/2020 03:36 PM
Fluoride	**3.4**		**0.10**	**mg/L**	1	12/30/2020 05:34 PM
Sulfate	**11**		**1.0**	**mg/L**	1	12/30/2020 05:34 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.0**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.6**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**530**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 20121750
Sample ID: PZ-2 **Lab ID:** 20121750-02
Collection Date: 12/14/2020 09:00 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:11 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Arsenic	**0.0055**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Barium	**0.50**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Boron	**4.3**		**0.20**	**mg/L**	10	12/31/2020 05:02 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Calcium	**43**		**0.50**	**mg/L**	1	12/30/2020 08:56 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Iron	**0.68**		**0.080**	**mg/L**	1	12/31/2020 05:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 08:56 PM
Magnesium	**0.46**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Molybdenum	**2.5**		**0.050**	**mg/L**	10	12/31/2020 05:02 PM
Potassium	**180**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Selenium	**0.085**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Sodium	**480**		**2.0**	**mg/L**	10	12/31/2020 05:02 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**1,000**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**1,100**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**1,300**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**31**		**20**	**mg/L**	20	12/30/2020 03:56 PM
Fluoride	**24**		**2.0**	**mg/L**	20	12/31/2020 02:21 PM
Sulfate	**51**		**20**	**mg/L**	20	12/30/2020 03:56 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.8**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**19.7**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**2,200**		**1,500**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-3	**Lab ID:**	20121750-03
Collection Date:	12/15/2020 08:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:13 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Arsenic	**0.010**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Barium	**1.3**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Boron	**2.5**		**0.20**	**mg/L**	10	12/31/2020 05:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Calcium	**88**		**0.50**	**mg/L**	1	12/30/2020 08:57 PM
Chromium	**0.0078**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Iron	**2.1**		**0.080**	**mg/L**	1	12/30/2020 08:57 PM
Lead	**0.0053**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:57 PM
Magnesium	**1.2**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Manganese	**0.0092**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Molybdenum	**0.20**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Potassium	**53**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Selenium	**0.059**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Sodium	**88**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**93**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**320**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**370**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**420**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**30**		**16**	**mg/L**	16	12/30/2020 04:48 PM
Fluoride	**0.87**		**0.10**	**mg/L**	1	12/30/2020 06:13 PM
Sulfate	**29**		**16**	**mg/L**	16	12/30/2020 04:48 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.5**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.5**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**740**		**300**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-4	**Lab ID:**	20121750-04
Collection Date:	12/14/2020 10:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:23 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Arsenic	**0.11**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Barium	**0.099**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Boron	**2.6**		**0.20**	**mg/L**	10	12/31/2020 05:07 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Calcium	**54**		**0.50**	**mg/L**	1	12/30/2020 09:03 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Iron	**0.45**		**0.080**	**mg/L**	1	12/30/2020 09:03 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Lithium	**0.36**		**0.010**	**mg/L**	1	12/30/2020 09:03 PM
Magnesium	ND		0.20	mg/L	1	12/30/2020 09:03 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Molybdenum	**2.2**		**0.050**	**mg/L**	10	12/31/2020 05:07 PM
Potassium	**66**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Selenium	**0.030**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Sodium	**52**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**120**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**390**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**510**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**33**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
Fluoride	ND		0.10	mg/L	1	12/30/2020 06:32 PM
Sulfate	**130**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.4**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.2**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**450**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-5	**Lab ID:**	20121750-05
Collection Date:	12/15/2020 10:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:25 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Arsenic	**0.038**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Barium	**0.16**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Boron	**12**		**0.20**	**mg/L**	10	12/31/2020 05:12 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Calcium	**270**		**5.0**	**mg/L**	10	12/31/2020 05:12 PM
Chromium	**0.0054**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Iron	**0.79**		**0.080**	**mg/L**	1	12/30/2020 09:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 09:04 PM
Magnesium	**0.78**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Manganese	**0.0050**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Molybdenum	**9.4**		**0.050**	**mg/L**	10	12/31/2020 05:12 PM
Potassium	**3.3**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Selenium	**0.015**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Sodium	**1.4**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**110**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**47**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**100**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**150**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**25**		**4.0**	**mg/L**	4	12/30/2020 05:22 PM
Fluoride	**0.36**		**0.10**	**mg/L**	1	12/30/2020 06:51 PM
Sulfate	**560**		**80**	**mg/L**	80	12/31/2020 02:40 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**9.90**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**21.0**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**970**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 05-Jan-21

Client: Geosyntec Consultants

Work Order: 20121750

Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **169919** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:00 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031216** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:02 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031217** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0	112	80-120	0			

MS Sample ID: **20122026-01CMS** Units: **mg/L** Analysis Date: **12/28/2020 01:41 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031239** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0			

MSD Sample ID: **20122026-01CMSD** Units: **mg/L** Analysis Date: **12/28/2020 01:43 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031240** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0.002235	0	20	

The following samples were analyzed in this batch: 20121750-01A 20121750-02A 20121750-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

MBLK	Sample ID: **MBLK-170071-170071**				Units: **mg/L**		Analysis Date: **12/30/2020 01:14 PM**			
Client ID:		Run ID: **HG4_201230A**			SeqNo: **7040771**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS	Sample ID: **LCS-170071-170071**				Units: **mg/L**		Analysis Date: **12/30/2020 01:16 PM**			
Client ID:		Run ID: **HG4_201230A**			SeqNo: **7040772**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002085	0.00020	0.002	0	104	80-120	0			

MS	Sample ID: **20121813-10DMS**				Units: **mg/L**		Analysis Date: **12/30/2020 01:55 PM**			
Client ID:		Run ID: **HG4_201230A**			SeqNo: **7040812**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00020	0.002	0.000003	109	75-125	0			

MSD	Sample ID: **20121813-10DMSD**				Units: **mg/L**		Analysis Date: **12/30/2020 01:57 PM**			
Client ID:		Run ID: **HG4_201230A**			SeqNo: **7040815**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002115	0.00020	0.002	0.000003	106	75-125	0.00219	3.48	20	

The following samples were analyzed in this batch: 20121750-04A 20121750-05A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MBLK Sample ID: **MBLK-170083-170083** Units: **mg/L** Analysis Date: **12/30/2020 08:51 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043005** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS	Sample ID: **LCS-170083-170083**		Units: **mg/L**	Analysis Date: **12/30/2020 08:52 PM**
Client ID:	Run ID: **ICPMS4_201230A**	SeqNo: **7043006**	Prep Date: **12/30/2020**	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:13 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043018** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0			
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0			
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0			
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0			
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0			
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0			
Calcium	63.88	0.50	10	53.04	108	75-125	0			O
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0			
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0			
Iron	8.964	0.080	10	0.02083	89.4	75-125	0			
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0			
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0			
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0			
Potassium	12.35	0.20	10	2.605	97.4	75-125	0			
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0			
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:35 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043031** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0			
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0			
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0			
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0			
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0			
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0			
Calcium	34.88	0.50	10	25.15	97.2	75-125	0			
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0			
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0			
Iron	9.488	0.080	10	0.143	93.5	75-125	0			
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0			
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0			
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0			
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0			
Potassium	12.88	0.20	10	3.03	98.5	75-125	0			
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0			
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:20 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046543** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:39 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046555** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:15 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043019** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20	
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20	
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20	
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20	
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20	
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20	
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20	
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20	
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20	
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20	
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20	
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20	
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20	
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20	
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20	

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:37 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043032** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:22 PM**

Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046544** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:41 PM**

Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046556** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch:

20121750-01A	20121750-02A	20121750-03A
20121750-04A	20121750-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **169592** Instrument ID **TDS** Method: **A2540 C-11**

MBLK Sample ID: **MBLK-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015778** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

LCS Sample ID: **LCS-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015777** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	466	30	495	0	94.1	85-109	0			

DUP Sample ID: **20121786-01A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015765** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	896.7	50	0	0	0	0-0	850	5.34	10	

DUP Sample ID: **20121789-04A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015771** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	510	50	0	0	0	0-0	500	1.98	10	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R306822** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK	Sample ID: **MB-R306822-R306822**	Units: **mg/L**	Analysis Date: **12/24/2020 05:06 PM**
Client ID:	Run ID: **TITRATOR 1_201224C**	SeqNo: **7028950**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS	Sample ID: **LCS-R306822-R306822**	Units: **mg/L**	Analysis Date: **12/24/2020 05:06 PM**
Client ID:	Run ID: **TITRATOR 1_201224C**	SeqNo: **7028951**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	922.4	10	925	0	99.7	88-110	0			
Alkalinity, Total (as CaCO3)	1005	10	1000	0	101	89-103	0			

DUP	Sample ID: **20122120-01C DUP**	Units: **mg/L**	Analysis Date: **12/24/2020 05:06 PM**
Client ID:	Run ID: **TITRATOR 1_201224C**	SeqNo: **7028957**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	ND	10	0	0	0	0-0	-1.17	0	10	

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306825** Instrument ID **Titrator 1** Method: **SW9040C**

LCS	Sample ID: **LCS-R306825-R306825**				Units: **s.u.**		Analysis Date: **12/24/2020 05:06 PM**			
Client ID:	Run ID: **TITRATOR 1_201224D**				SeqNo: **7029039**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.98	0.10	4	0	99.5	92-108	0			

DUP	Sample ID: **20121750-01B DUP**				Units: **s.u.**		Analysis Date: **12/24/2020 05:06 PM**			
Client ID: **PZ-1**	Run ID: **TITRATOR 1_201224D**				SeqNo: **7029041**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	11.16	0.10	0	0	0	0-0	10.96	1.81	5	H
Temperature	20.11	0.10	0	0	0		20.62	2.5		H

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK	Sample ID: **MB-R306910-R306910**	Units: **mg/L**		Analysis Date: **12/29/2020 11:55 AM**
Client ID:	Run ID: **TITRATOR 1_201229A**	SeqNo: **7033262**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS	Sample ID: **LCS-R306910-R306910**	Units: **mg/L**		Analysis Date: **12/29/2020 11:55 AM**
Client ID:	Run ID: **TITRATOR 1_201229A**	SeqNo: **7033263**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP	Sample ID: **20121803-01E DUP**	Units: **mg/L**		Analysis Date: **12/29/2020 11:55 AM**
Client ID:	Run ID: **TITRATOR 1_201229A**	SeqNo: **7033273**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP	Sample ID: **20121990-05A DUP**	Units: **mg/L**		Analysis Date: **12/29/2020 11:55 AM**
Client ID:	Run ID: **TITRATOR 1_201229A**	SeqNo: **7033276**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP	Sample ID: **20122120-08C DUP**	Units: **mg/L**		Analysis Date: **12/29/2020 11:55 AM**
Client ID:	Run ID: **TITRATOR 1_201229A**	SeqNo: **7033278**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033301** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033308** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP Sample ID: **20122120-08C DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033305** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.05	0.10	0	0	0	0-0	7.99	0.748	5	H
Temperature	20.95	0.10	0	0	0	0-0	20.76	0.911		H

DUP Sample ID: **20121990-05A DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033315** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.51	0.10	0	0	0	0-0	7.56	0.664	5	H
Temperature	20.63	0.10	0	0	0		19.96	3.3		H

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307142** Units: **mg/L** Analysis Date: **12/30/2020 04:56 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043048** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307142** Units: **mg/L** Analysis Date: **12/30/2020 05:15 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043049** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.135	0.10	2	0	107	82-116	0			
Sulfate	9.666	1.0	10	0	96.7	90-110	0			

MS Sample ID: **20122223-01D MS** Units: **mg/L** Analysis Date: **12/31/2020**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043070** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	84.26	4.0	80	0	105	82-116	0			
Sulfate	650	40	400	266.2	96	90-110	0			

MSD Sample ID: **20122223-01D MSD** Units: **mg/L** Analysis Date: **12/31/2020 12:19 AM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043071** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20	
Sulfate	651.6	40	400	266.2	96.4	90-110	650	0.246	20	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK	Sample ID: **MBLK-R307145**				Units: **mg/L**		Analysis Date: **12/30/2020 01:43 PM**			
Client ID:	Run ID: **IC4_201230A**				SeqNo: **7043217**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS	Sample ID: **LCS-R307145**				Units: **mg/L**		Analysis Date: **12/30/2020 02:39 PM**			
Client ID:	Run ID: **IC4_201230A**				SeqNo: **7043218**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS	Sample ID: **20121752-03B MS**				Units: **mg/L**		Analysis Date: **12/30/2020 07:14 PM**			
Client ID:	Run ID: **IC4_201230A**				SeqNo: **7043233**		Prep Date:		DF: **20**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD	Sample ID: **20121752-03B MSD**				Units: **mg/L**		Analysis Date: **12/30/2020 07:34 PM**			
Client ID:	Run ID: **IC4_201230A**				SeqNo: **7043234**		Prep Date:		DF: **20**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307276** Units: **mg/L** Analysis Date: **12/31/2020 01:42 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047811** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307276** Units: **mg/L** Analysis Date: **12/31/2020 02:01 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047812** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	1.976	0.10	2	0	98.8	82-116	0			
Sulfate	9.654	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20122530-06A MS** Units: **mg/L** Analysis Date: **12/31/2020 06:35 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047826** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.34	4.0	80	0	109	82-116	0			
Sulfate	424.4	40	400	43.11	95.3	90-110	0			

MSD Sample ID: **20122530-06A MSD** Units: **mg/L** Analysis Date: **12/31/2020 06:54 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047827** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.76	4.0	80	0	110	82-116	87.34	0.475	20	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20	

The following samples were analyzed in this batch: 20121750-02B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS

Cincinnati, OH
+1 513 733 5336

Everett, WA
+1 425 356 2600

Fort Collins, CO
+1 970 490 1511

Holland, MI
+1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 230464

Houston, TX
+1 281 530 5656

Middletown, PA
+1 717 944 5541

Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

20121750

ALS Project Manager:

ALS Work Order #: 33555

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	DTE - Monroe	A	Metals
Work Order		Project Number	GLP-8014	B	pH, Anions, TDS, Alkalinity
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-9063	Fax	(734) 332-9063	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	P2-1	12/14	8:00	GW	2	2	X	X									
2	P2-2	12/14	9:00	↓	↓	↓	X	X									
3	P2-3	12/15	8:00				X	X									
4	P2-4	12/14	10:00				X	X									
5	P2-5	12/15	10:00				X	X									
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box) ☒ Std 10 WK Days ☐ 5 WK Days ☐ 2 WK Days ☐ 24 Hour ☐ Other ____

Results Due Date:

Relinquished by:	Date: 12/17	Time: 3:00	Received by:
Relinquished by: FedEx	Date: 12/18/20	Time: 10:00	Received by (Laboratory):
Logged by (Laboratory): MTO	Date: 12/18/20	Time: 13:31	Checked by (Laboratory):

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes: Seperate Report

Cooler ID	Cooler Temp.
	5.8°C
	IM
	PH23

QC Package: (Check One Box Below)

☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other
☐ TRRP CheckList
☐ TRRP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name:	**GEOSYNTEC - AA**	Date/Time Received:	**18-Dec-20 10:00**
Work Order:	**20121750**	Received by:	**MJG**

Checklist completed by	Matthew Gaylord	18-Dec-20	Reviewed by:	Chad Whelton	18-Dec-20
	eSignature	Date		eSignature	Date

Matrices: Groundwater
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	5.8/5.8C	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/18/2020 1:33:02 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted:	Date Contacted:	Person Contacted:
Contacted By:	Regarding:	

Comments:

CorrectiveAction:

Ft. Collins, Colorado

Tuesday, January 19, 2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd. Suite 100
Ann Arbor, MI 48105

Re: ALS Workorder: 2012398
Project Name: DTE - Monroe
Project Number: GLP-8014

Dear Mr. Coram:

Five water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226
Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Julie Ellingson
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

2012398

Radium-228:
The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac, which is the ingrown progeny of ^{228}Ra, according to the current revision of SOP 724.

All acceptance criteria were met.

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2012398
Client Name: Geosyntec Consultants
Client Project Name: DTE - Monroe
Client Project Number: GLP-8014
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
P2-1	2012398-1		WATER	14-Dec-20	8:00
P2-2	2012398-2		WATER	14-Dec-20	9:00
P2-3	2012398-3		WATER	14-Dec-20	8:00
P2-4	2012398-4		WATER	14-Dec-20	10:00
P2-5	2012398-5		WATER	14-Dec-20	10:00

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Fort Collins, CO
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Holland, MI
+1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 230463

Houston, TX
+1 281 530 5656

Middletown, PA
+1 717 944 5541

Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

2012398

ALS Project Manager:

ALS Work Order #: 33556

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	DTE - Monroe	A	Radium 226 and 228 combined
Work Order		Project Number	GLP - 8014	B	
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-8063	Fax	(734) 332-8063	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	PZ-1 1	12/14	8:00	GW	2	2	X										
2	PZ-2 2	12/14	9:00	↓	↓	↓	X										
3	PZ-3 3	12/15	8:00				X										
4	PZ-4 4	12/14	10:00				X										
5	PZ-5 5	12/15	10:00				X										
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box) ☒ Std 10 WK Days ☐ 5 WK Days ☐ 2 WK Days ☐ 24 Hour ☐ Other ____

Results Due Date:

Relinquished by: Date: 12/17 Time: 3:00 Received by:

Notes: Seperate Report

Relinquished by: Date: Time: Received by (Laboratory):

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other ____
☐ TRRP CheckList
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
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2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID: Geosyntec MI
Workorder No: 2012398
Project Manager:
Initials: RGA
Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	☐ Drop Off	☑ YES	☐ NO
2. Are custody seals on **shipping** containers intact?	☐ NONE	☑ YES	☐ NO*
3. Are custody seals on **sample** containers intact?	☑ NONE	☐ YES	☐ NO*
4. Is there a COC (chain-of-custody) present?		☑ YES	☐ NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		☑ YES	☐ NO*
6. Are short-hold samples present?		☐ YES	☑ NO
7. Are all samples within holding times for the requested analyses?		☑ YES	☐ NO*
8. Were all sample containers received intact? (not broken or leaking)		☑ YES	☐ NO*
9. Is there sufficient sample for the requested analyses?		☑ YES	☐ NO*
10. Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		☑ YES	☐ NO*
11. Are all aqueous samples preserved correctly, if required?	☐ N/A	☐ YES	☑ NO*
12. Were unpreserved samples pH checked, if required?	☑ N/A	☐ YES	☐ NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	☑ N/A	☐ YES	☐ NO
14. Were the samples shipped on ice?		☑ YES	☐ NO
15. Were cooler temperatures measured at 0.1 - 6.0°C? IR gun used+: ☐ #3 ☑ #5	☐ Rad Only	☑ YES	☐ NO

Cooler #: 1
Temperature (°C): 3.2
# of custody seals on cooler: 1
External mR/hr reading: 12
Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008) ☐ N/A ☑ YES ☐ NO

* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012398-1-1,2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☒ N/A Contact Name Date:

Project Manager Signature / Date: 12/21/20

Form 201r30.xls
(06/04/2020)

+IR Gun #3, VWR SN 170647571
+IR Gun #5, VWR SN 192272629

ORIGIN ID:DEOA (248) 390-5748
MIKE CORAM

SUITE 100
2100 COMMONWEALTH BLVD STE 100
ANN ARBOR, MI 48105
UNITED STATES US

SHIP DATE: 17DEC20
ACTWGT: 56.90 LB
CAD: 6997566/SSF02121
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 156297-436 RRD8 EXP 11/21

TO **ALS FT. COLLINS**
ATTN: SAMPLE RECIEVING
225 COMMERCE DR

FORT COLLINS CO 80524
(618) 582-5201 REF:
INV:
PO: DEPT:

12-1
3.2

FedEx
Express

E

J202020071401uv

FRI - 18 DEC 10:30A
PRIORITY OVERNIGHT
DSR
80524
CO-US DEN

TRK# 0201 **7816 0264 9731**

NA FTCA

ALS -- Fort Collins

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-1	**Lab ID:**	2012398-1
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **1/4/2021**	PrepBy: **TRB**
Ra-226	ND (+/- 0.13)	U	0.24	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*99.8*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **1/11/2021**	PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.89 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.89 (+/- 0.64)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.1*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-2	**Lab ID:**	2012398-2
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 09:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.19)	U	0.36	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*91.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.79	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.42)	U	0.79	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*92.8*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-3	**Lab ID:**	2012398-3
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **1/4/2021**	PrepBy: **TRB**
Ra-226	**0.55 (+/- 0.35)**		**0.37**	**pCi/l**	NA	1/12/2021 11:32
Carr: BARIUM	*92.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **1/11/2021**	PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.74 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.19 (+/- 0.51)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.5*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-4	**Lab ID:**	2012398-4
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.27)	U	0.47	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*96*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.84	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.38)	U	0.84	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-5	**Lab ID:**	2012398-5
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.25)	U	0.37	pCi/l	NA	1/12/2021 11:54
Carr: BARIUM	*97.7*		*40-110*	*%REC*	DL = NA	1/12/2021 11:54
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.78	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.34)	U	0.78	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-5	**Lab ID:**	2012398-5
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

\# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

\+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Date: *1/19/2021 2:19:4*

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

QC BATCH REPORT

Batch ID: **RE210104-1-3** Instrument ID: **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

LCSD Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	40 (+/- 10)	1	46.8		84.5	67-120		46	0.44	2.13	P
Carr: BARIUM	15150		15500		97.8	40-110		15230			

MB Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

QC BATCH REPORT

Batch ID: **RA210111-1-5** Instrument ID: **GASPROP** Method: **Radium-228 Analysis by GFPC**

LCS Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

APPENDIX M – ALD HYDRAULIC CONDUCTIVITY TEST RESULTS

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID (-)	Lab No. (-)	Initial Conditions: Moisture Content (%)	Initial Conditions: Dry Unit Weight (pcf)	Final Conditions: Moisture Content (%)	Final Conditions: Dry Unit Weight (pcf)	Date (-)	Number of Days After Injection (-)	Permeability Notes 1 & 2 (cm/s)	Pore Volumes Passed After Injection Note 1 (-)	pH In Flow (-)	pH Out Flow (-)	Electrical Conductivity In Flow (μs/cm)	Electrical Conductivity Out Flow (μs/cm)	Remarks
B2-ST-1 (20-22')	20L128	17.5	115.6	-	-	2/19/2021	0	5.9E-09	0.0430	-	-	-	-	
						2/26/2021	7	5.8E-09	0.0430	-	-	-	-	
						3/05/2021	14	5.4E-09	0.0771	-	-	-	-	
						3/08/2021	17	5.1E-09	0.0870	12.8	8.2	-	-	
						3/12/2021	21	6.2E-09	0.1188	-	-	-	-	
						3/19/2021	28	5.5E-09	0.1594	-	-	-	-	
						3/26/2021	35	5.0E-09	0.1870	-	-	-	-	
						3/30/2021	39	5.1E-09	0.2014	12.7	8.3	-	-	
						4/02/2021	42	5.9E-09	0.2259	-	-	-	-	
						4/09/2021	49	5.9E-09	0.2683	-	-	-	-	
						4/16/2021	56	5.3E-09	0.2997	12.6	8.3	4800	3000	
						4/23/2021	63	5.9E-09	0.3492	-	-	-	-	
						4/30/2021	70	5.7E-09	0.3857	-	-	-	-	
						5/03/2021	73	5.3E-09	0.3969	12.9	8.4	-	-	
						5/07/2021	77	6.5E-09	0.4294	-	-	-	-	
						5/14/2021	84	5.7E-09	0.4700	-	-	-	-	
						5/19/2021	89	5.4E-09	0.4925	12.8	8.5	-	-	
						5/21/2021	91	5.1E-09	0.5106	-	-	-	-	
						5/28/2021	98	5.6E-09	0.5539	-	-	-	-	
						6/04/2021	105	4.7E-09	0.5836	12.6	8.5	4300	1744	
						6/11/2021	112	6.0E-09	0.6359	-	-	-	-	
						6/18/2021	119	5.5E-09	0.6717	-	-	-	-	
						6/22/2021	123	4.5E-09	0.6850	12.3	8.6	-	-	
									Average Values:	12.7	8.5	4553	2059	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH In Flow	pH Out Flow	Electrical Conductivity In Flow	Electrical Conductivity Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	-	-	6/25/2021	126	6.0E-09	0.7110	-	-	-	-	
						7/02/2021	133	6.0E-09	0.7563	-	-	-	-	
						7/09/2021	140	5.2E-09	0.7901	-	-	-	-	
						7/12/2021	143	5.5E-09	0.7942	12.7	8.9	-	-	
						7/16/2021	147	6.5E-09	0.8273	-	-	-	-	
						7/23/2021	154	5.6E-09	0.8625	-	-	-	-	
						7/30/2021	161	5.2E-09	0.8929	12.6	8.6	4560	1434	
						8/6/2021	168	5.7E-09	0.9424	-	-	-	-	
						8/13/2021	175	4.9E-09	0.9762	-	-	-	-	
						8/18/2021	180	4.8E-09	0.9946	12.6	8.9	-	-	
						8/20/2021	182	5.4E-09	1.0116	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 12.7 8.5 4553 2059

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	-	-	2/19/2021	0	4.6E-09	0.0176	-	-	-	-	
						2/26/2021	7	3.6E-09	0.0176	-	-	-	-	
						3/05/2021	14	3.6E-09	0.0406	-	-	-	-	
						3/12/2021	21	3.0E-09	0.0521	-	-	-	-	
						3/19/2021	28	2.8E-09	0.0651	-	-	-	-	
						3/22/2021	31	2.8E-09	0.0665	12.7	8.2	-	-	
						3/26/2021	35	3.6E-09	0.0760	-	-	-	-	
						4/02/2021	42	3.2E-09	0.0987	-	-	-	-	
						4/09/2021	49	3.2E-09	0.1175	-	-	-	-	
						4/16/2021	56	2.7E-09	0.1272	-	-	-	-	
						4/23/2021	63	2.4E-09	0.1388	12.9	8.6	-	-	
						4/30/2021	70	3.9E-09	0.1670	-	-	-	-	
						5/07/2021	77	3.7E-09	0.1900	-	-	-	-	
						5/14/2021	84	3.3E-09	0.2079	-	-	-	-	
						5/21/2021	91	3.0E-09	0.2231	-	-	-	-	
						5/23/2021	93	2.8E-09	0.2263	12.9	8.6	4840	1126	
						5/28/2021	98	3.7E-09	0.2461	-	-	-	-	
						6/04/2021	105	3.4E-09	0.2692	-	-	-	-	
						6/11/2021	112	3.5E-09	0.2888	-	-	-	-	
						6/18/2021	119	2.7E-09	0.3029	-	-	-	-	
						6/22/2021	123	2.6E-09	0.3092	12.4	8.4	-	-	
						6/25/2021	126	2.9E-09	0.3216	-	-	-	-	
						7/02/2021	133	3.9E-09	0.3512	-	-	-	-	
									Average Values:	12.7	8.4	4840	1126	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	-	-	7/09/2021	140	3.4E-09	0.3777	-	-	-	-	
						7/16/2021	147	3.3E-09	0.3976	-	-	-	-	
						7/23/2021	154	3.3E-09	0.4128	-	-	-	-	
						7/30/2021	161	3.0E-09	0.4261	12.4	8.5	-	-	
						8/06/2021	168	3.3E-09	0.4500	-	-	-	-	
						8/13/2021	175	3.3E-09	0.4724	-	-	-	-	
						8/20/2021	182	3.5E-09	0.4894	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.	Average Values:	12.7	8.4	4840	1126

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
								Notes 1 & 2	Note 1					
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	-	-	2/19/2021	0	1.8E-08	0.1220	-	-	-	-	
						2/26/2021	7	1.4E-08	0.1220	-	-	-	-	
						3/02/2021	11	1.3E-08	0.1598	12.8	8.2	-	-	
						3/05/2021	14	1.5E-08	0.2297	-	-	-	-	
						3/10/2021	19	1.4E-08	0.2953	12.9	8.3	-	-	
						3/12/2021	21	1.5E-08	0.3452	-	-	-	-	
						3/16/2021	25	1.5E-08	0.4091	13.0	8.5	4700	1534	
						3/19/2021	28	1.4E-08	0.4646	-	-	-	-	
						3/26/2021	35	1.4E-08	0.5185	12.7	8.5	-		
						4/02/2021	42	1.4E-08	0.6449	12.9	8.7	-	-	
						4/09/2021	49	1.3E-08	0.7625	12.4	8.6	4980	1274	
						4/16/2021	56	1.3E-08	0.8772	12.5	8.7	-	-	
						4/23/2021	63	1.2E-08	0.9936	12.7	8.5	-	-	
						4/30/2021	70	1.3E-08	1.1112	12.6	8.8	4120	1082	
						5/07/2021	77	1.3E-08	1.2246	12.9	8.7	-	-	
						5/14/2021	84	1.2E-08	1.3353	12.5	8.8	-	-	
						5/21/2021	91	1.2E-08	1.4508	-	-	-	-	
						5/23/2021	93	1.1E-08	1.4695	13.1	8.8	5230	1179	
						5/28/2021	98	1.2E-08	1.5563	-	-	-	-	
						6/01/2021	102	1.1E-08	1.6019	13.1	8.8	-	-	
						6/04/2021	105	1.2E-08	1.6580	-	-	-	-	
						6/10/2021	111	1.2E-08	1.7352	12.8	8.9	-	-	
						6/11/2021	112	1.2E-08	1.7539	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.	Average Values:	12.8	8.7	4650	1211

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	-	-	6/18/2021	119	1.1E-08	1.8534	13.1	8.8	4630	1162	
						6/25/2021	126	1.2E-08	1.9671	12.5	8.9	-	-	
						7/02/2021	133	1.2E-08	2.0783	-	-	-	-	
						7/06/2021	137	1.2E-08	2.1222	12.8	8.6	-	-	
						7/09/2021	140	1.1E-08	2.1756	-	-	-	-	
						7/16/2021	147	1.1E-08	2.2568	12.4	8.7	4710	1135	
						7/23/2021	154	1.1E-08	2.3688	-	-	-	-	
						7/27/2021	158	1.1E-08	2.4088	12.7	8.8	-	-	
						7/30/2021	161	1.1E-08	2.4622	-	-	-	-	
						8/06/2021	168	1.0E-08	2.5386	12.7	8.8	-	-	
						8/13/2021	175	1.0E-08	2.6367	-	-	-	-	
						8/16/2021	178	1.1E-08	2.6663	12.7	8.8	4180	1110	
						8/20/2021	182	1.1E-08	2.7318	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 12.8 8.7 4650 1211

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	-	-	2/19/2021	0	9.7E-09	0.0607	-	-	-	-	
						2/26/2021	7	8.8E-09	0.0607	-	-	-	-	
						3/05/2021	14	7.9E-09	0.1013	-	-	-	-	
						3/08/2021	17	7.2E-09	0.1117	12.9	8.4	-	-	
						3/12/2021	21	8.7E-09	0.1489	-	-	-	-	
						3/19/2021	28	7.8E-09	0.1933	-	-	-	-	
						3/24/2021	33	6.8E-09	0.2136	12.9	8.6	-	-	
						3/26/2021	35	8.1E-09	0.2311	-	-	-	-	
						4/02/2021	42	7.7E-09	0.2849	-	-	-	-	
						4/07/2021	47	7.8E-09	0.3065	12.7	8.2	5010	1614	
						4/09/2021	49	8.7E-09	0.3253	-	-	-	-	
						4/16/2021	56	8.3E-09	0.3794	-	-	-	-	
						4/20/2021	60	7.0E-09	0.3991	12.9	8.3	-	-	
						4/23/2021	63	7.9E-09	0.4307	-	-	-	-	
						4/30/2021	70	8.3E-09	0.4885	-	-	-	-	
						5/05/2021	75	7.5E-09	0.5154	13.0	8.5	-	-	
						5/07/2021	77	9.0E-09	0.5405	-	-	-	-	
						5/14/2021	84	7.9E-09	0.5927	-	-	-	-	
						5/18/2021	88	7.5E-09	0.6146	13.2	8.5	5040	1407	
						5/21/2021	91	8.4E-09	0.6440	-	-	-	-	
						5/28/2021	98	7.7E-09	0.6922	12.9	8.6	-	-	
						6/04/2021	105	7.7E-09	0.7585	-	-	-	-	
						6/11/2021	112	7.4E-09	0.8019	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values:	12.8	8.5	4685	1429

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	-	-	6/14/2021	115	7.1E-09	0.8157	12.9	8.6	-	-	
						6/18/2021	119	8.0E-09	0.8520	-	-	-	-	
						6/25/2021	126	8.1E-09	0.8956	-	-	-	-	
						6/28/2021	129	6.9E-09	0.9095	12.6	8.7	4520	1515	
						7/02/2021	133	7.7E-09	0.9427	-	-	-	-	
						7/09/2021	140	6.8E-09	0.9877	-	-	-	-	
						7/13/2021	144	6.7E-09	1.0056	12.6	8.6	-	-	
						7/16/2021	147	7.0E-09	1.0312	-	-	-	-	
						7/23/2021	154	7.3E-09	1.0809	-	-	-	-	
						7/29/2021	160	6.6E-09	1.1091	12.4	8.9	-	-	
						7/30/2021	161	7.2E-09	1.1197	-	-	-	-	
						8/06/2021	168	7.0E-09	1.1713	-	-	-	-	
						8/13/2021	175	6.5E-09	1.2076	12.4	8.5	4170	1178	
						8/20/2021	182	7.6E-09	1.2755	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 12.8 8.5 4685 1429

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	-	-	2/19/2021	0	1.2E-08	0.0817	-	-	-	-	
						2/26/2021	7	1.1E-08	0.0817	-	-	-	-	
						3/05/2021	14	9.8E-09	0.1325	12.9	8.2	-	-	
						3/12/2021	21	1.1E-08	0.1822	-	-	-	-	
						3/15/2021	24	1.1E-08	0.2045	13.0	8.1	-	-	
						3/19/2021	28	1.1E-08	0.2466	-	-	-	-	
						3/26/2021	35	1.1E-08	0.3111	-	-	-	-	
						3/29/2021	38	9.8E-09	0.3313	12.8	8.1	4900	1683	
						4/02/2021	42	1.0E-08	0.3547	-	-	-	-	
						4/09/2021	49	1.1E-08	0.4152	12.5	8.1	-	-	
						4/16/2021	56	1.1E-08	0.5045	-	-	-	-	
						4/19/2021	59	9.7E-09	0.5271	12.8	8.0	-	-	
						4/23/2021	63	1.1E-08	0.5790	-	-	-	-	
						4/29/2021	69	1.1E-08	0.6344	12.9	8.3	4800	1403	
						4/30/2021	70	1.1E-08	0.6524	-	-	-	-	
						5/07/2021	77	1.1E-08	0.7288	12.9	8.7	-	-	
						5/14/2021	84	1.1E-08	0.8141	-	-	-	-	
						5/18/2021	88	9.4E-09	0.8451	13.0	8.3	-	-	
						5/21/2021	91	1.1E-08	0.8872	-	-	-	-	
						5/28/2021	98	9.6E-09	0.9502	12.7	8.2	4720	1187	
						6/04/2021	105	1.0E-08	1.0309	-	-	-	-	
						6/07/2021	108	9.9E-09	1.0550	12.9	8.8	-	-	
						6/11/2021	112	1.1E-08	1.1108	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 12.7 8.5 4730 1342

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Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary
Compatibility Test Results
Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	-	-	6/18/2021	119	9.5E-09	1.1713	13.0	8.6	-	-	
						6/25/2021	126	1.2E-08	1.2615	-	-	-	-	
						6/28/2021	129	1.0E-08	1.2869	12.5	8.8	4350	1128	
						7/02/2021	133	1.1E-08	1.3434	-	-	-	-	
						7/09/2021	140	9.4E-09	1.4097	12.5	8.9	-	-	
						7/16/2021	147	1.0E-08	1.5004	-	-	-	-	
						7/20/2021	151	1.0E-08	1.5342	12.4	8.7	-	-	
						7/23/2021	154	1.1E-08	1.5800	-	-	-	-	
						7/30/2021	161	1.0E-08	1.6498	12.5	8.7	4880	1309	
						8/06/2021	168	1.0E-08	1.7200	-	-	-	-	
						8/10/2021	172	1.0E-08	1.7524	12.5	8.6	-	-	
						8/13/2021	175	1.1E-08	1.7931	-	-	-	-	
						8/20/2021	182	9.8E-09	1.8601	12.7	8.8	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 12.7 8.5 4730 1342

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	-	-	2/19/2021	0	1.5E-08	0.1209	-	-	-	-	
						2/26/2021	7	1.3E-08	0.1209	-	-	-	-	
						3/02/2021	11	1.2E-08	0.1599	13.0	8.1	-	-	
						3/05/2021	14	1.4E-08	0.1949	-	-	-	-	
						3/12/2021	21	1.3E-08	0.2978	12.8	8.3	-	-	
						3/19/2021	28	1.3E-08	0.4196	-	-	-	-	
						3/22/2021	31	1.2E-08	0.4476	12.9	8.2	5090	1708	
						3/26/2021	35	1.3E-08	0.5204	-	-	-	-	
						3/30/2021	39	1.3E-08	0.5755	13.0	8.3	-	-	
						4/02/2021	42	1.3E-08	0.6386	-	-	-	-	
						4/08/2021	48	1.2E-08	0.7140	12.9	7.8	-	-	
						4/09/2021	49	1.2E-08	0.7367	-	-	-	-	
						4/16/2021	56	1.2E-08	0.8458	12.8	7.8	4960	1466	
						4/23/2021	63	1.2E-08	0.9356	-	-	-	-	
						4/26/2021	66	1.1E-08	0.9649	12.5	8.0	-	-	
						4/30/2021	70	1.3E-08	1.0398	-	-	-	-	
						5/04/2021	74	1.2E-08	1.0880	12.6	8.4	-	-	
						5/07/2021	77	1.0E-08	1.1362	-	-	-	-	
						5/14/2021	84	1.1E-08	1.2299	12.4	8.4	3970	1043	
						5/21/2021	91	1.1E-08	1.3434	-	-	-	-	
						5/25/2021	95	1.0E-08	1.3973	12.9	8.4	-	-	
						5/28/2021	98	1.1E-08	1.4411	-	-	-	-	
						6/03/2021	104	9.6E-09	1.5019	12.8	8.4	-	-	
Notes: 1- Based on Specimen Initial Conditions.		2- Based on average of four readings.							Average Values:	12.7	8.4	4522	1201	

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	-	-	6/04/2021	105	9.2E-09	1.5019	-	-	-	-	
						6/11/2021	112	1.0E-08	1.5970	-	-	-	-	
						6/14/2021	115	1.0E-08	1.6246	13.0	8.6	4300	1057	
						6/18/2021	119	1.1E-08	1.6903	-	-	-	-	
						6/24/2021	125	1.0E-08	1.7538	12.6	8.7	-	-	
						6/25/2021	126	1.0E-08	1.7735	-	-	-	-	
						7/02/2021	133	1.1E-08	1.8743	12.7	8.8	-	-	
						7/09/2021	140	1.1E-08	1.9833	-	-	-	-	
						7/12/2021	143	1.0E-08	2.0118	12.7	8.5	4100	966	
						7/16/2021	147	1.1E-08	2.0810	-	-	-	-	
						7/23/2021	154	1.1E-08	2.1607	12.3	8.5	-	-	
						7/30/2021	161	1.1E-08	2.2733	-	-	-	-	
						8/02/2021	164	1.1E-08	2.3057	12.7	8.6	-	-	
						8/06/2021	168	1.2E-08	2.3749	-	-	-	-	
						8/13/2021	175	9.9E-09	2.4489	12.4	8.6	4710	963	
						8/20/2021	182	1.0E-08	2.5584	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 12.8 8.3 4484 1248

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	-	-	2/19/2021	0	1.1E-08	0.0671	-	-	-	-	
						2/26/2021	7	1.0E-08	0.0671	-	-	-	-	
						3/05/2021	14	9.4E-09	0.1098	12.8	7.9	-	-	
						3/12/2021	21	1.0E-08	0.1712	12.7	8.2	-	-	
						3/19/2021	28	1.1E-08	0.2469	-	-	-	-	
						3/24/2021	33	9.4E-09	0.2790	12.9	8.3	4940	1796	
						3/26/2021	35	1.0E-08	0.2923	-	-	-	-	
						4/02/2021	42	1.0E-08	0.3574	12.9	8.6	-	-	
						4/09/2021	49	1.1E-08	0.4318	-	-	-	-	
						4/13/2021	53	1.0E-08	0.4605	12.8	8.6	-	-	
						4/16/2021	56	1.1E-08	0.5002	-	-	-	-	
						4/23/2021	63	9.8E-09	0.5583	13.0	8.6	4380	1263	
						4/30/2021	70	1.1E-08	0.6370	-	-	-	-	
						5/03/2021	73	1.1E-08	0.6580	12.9	8.7	-	-	
						5/07/2021	77	1.2E-08	0.7098	-	-	-	-	
						5/12/2021	82	1.1E-08	0.7525	13.0	8.7	-	-	
						5/14/2021	84	1.1E-08	0.7782	-	-	-	-	
						5/21/2021	91	1.0E-08	0.8449	12.6	8.7	4940	1092	
						5/28/2021	98	1.0E-08	0.9203	12.5	8.6	-	-	
						6/04/2021	105	1.1E-08	1.0004	-	-	-	-	
						6/07/2021	108	1.0E-08	1.0234	12.8	9.0	-	-	
						6/11/2021	112	1.1E-08	1.0732	-	-	-	-	
						6/17/2021	118	1.0E-08	1.1229	12.5	8.8	4450	1170	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.		12.7	8.6	4692	1232

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	-	-	6/18/2021	119	1.1E-08	1.1396	-	-	-	-	
						6/25/2021	126	1.1E-08	1.2123	12.3	8.7	-	-	
						7/02/2021	133	1.1E-08	1.2964	-	-	-	-	
						7/06/2021	137	1.2E-08	1.3308	12.4	8.9	-	-	
						7/09/2021	140	1.1E-08	1.3715	-	-	-	-	
						7/16/2021	147	1.0E-08	1.4319	12.6	8.6	4770	1045	
						7/23/2021	154	1.1E-08	1.5143	-	-	-	-	
						7/27/2021	158	1.1E-08	1.5443	12.9	8.8	-	-	
						7/30/2021	161	1.1E-08	1.5854	-	-	-	-	
						8/06/2021	168	1.1E-08	1.6494	12.8	8.7	-	-	
						8/13/2021	175	1.1E-08	1.7319	-	-	-	-	
						8/17/2021	179	1.0E-08	1.7599	12.8	8.9	4670	1025	
						8/20/2021	182	1.1E-08	1.8013	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 12.7 8.6 4692 1232

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10.0	131.1	-	-	2/19/2021	0	2.7E-08	0.1538	-	-	-	-	
						2/26/2021	7	2.0E-08	0.1538	12.9	8.1	-	-	
						3/05/2021	14	1.9E-08	0.3054	12.6	8.2	-	-	
						3/12/2021	21	1.8E-08	0.4066	12.8	8.1	5030	1540	
						3/19/2021	28	1.7E-08	0.5500	12.8	8.6	-	-	
						3/26/2021	35	1.8E-08	0.6632	12.6	8.5	-	-	
						4/01/2021	41	2.0E-08	0.7959	13.0	8.4	4990	1302	
						4/02/2021	42	2.0E-08	0.7959	-	-	-	-	
						4/08/2021	48	1.7E-08	0.8691	12.7	7.9	-	-	
						4/09/2021	49	1.9E-08	0.8993	-	-	-	-	
						4/14/2021	54	1.7E-08	0.9992	13.0	8.4	-	-	
						4/16/2021	56	1.8E-08	1.0496	-	-	-	-	
						4/20/2021	60	1.6E-08	1.1198	13.0	8.4	4980	2430	
						4/23/2021	63	1.7E-08	1.1926	-	-	-	-	
						4/27/2021	67	1.5E-08	1.2546	12.4	8.2	-	-	
						4/30/2021	70	1.7E-08	1.3291	-	-	-	-	
						5/04/2021	74	1.6E-08	1.3881	12.6	8.5	-	-	
						5/07/2021	77	1.5E-08	1.4591	-	-	-	-	
						5/14/2021	84	1.4E-08	1.5690	12.3	8.8	4230	1155	
						5/21/2021	91	1.5E-08	1.6943	12.9	8.8	-	-	
						5/28/2021	98	1.5E-08	1.8231	12.6	9.0	-	-	
						6/04/2021	105	1.4E-08	1.9467	12.2	8.6	5080	885	
						6/11/2021	112	1.4E-08	2.0724	12.8	8.5	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 12.7 8.5 4811 1292

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Test Results Summary

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

21H21 **Project No.: PN1016** **R23**

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-3 (55-57')	20L141	10.0	131.1	-	-	6/18/2021	119	1.4E-08	2.2003	13.0	8.5	-	-	
						6/25/2021	126	1.4E-08	2.3291	12.3	8.5	5010	900	
						7/02/2021	133	1.4E-08	2.4557	13.0	8.5	-	-	
						7/09/2021	140	1.4E-08	2.5936	13.2	8.6	-	-	
						7/16/2021	147	1.4E-08	2.7197	12.3	8.6	4520	1056	
						7/23/2021	154	1.4E-08	2.8455	12.4	8.6	-	-	
						7/30/2021	161	1.4E-08	2.9626	12.3	8.6	-	-	
						8/06/2021	168	1.3E-08	3.0832	12.8	8.8	4650	1065	
						8/13/2021	175	1.2E-08	3.1948	-	-	-	-	
						8/16/2021	178	1.2E-08	3.2249	12.5	8.4	-	-	
						8/20/2021	182	1.4E-08	3.3033	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average Values: 12.7 8.5 4811 1292

PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary

Compatibility Test Results as of August 20, 2021

Project Name: Monroe Ash Basin ALD

21H21 Project No.: PN1016 R23

Site ID	Lab No.	Test Information														Remarks
		Initial Conditions				Specific Gravity ASTM D854	Date Test Started	Date Comp Started (Injection)	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Total Volume	Volume of Pores							In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(cm3)	(cm3)	(-)	(-)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	146.8	47.2	2.730	1/22/2021	2/19/2021	161	5.2E-09	0.8929	12.6	8.6	4560	1434	
									180	4.8E-09	0.9946	12.6	8.9			
									182	5.4E-09	1.0116	-	-	-	-	
B4-ST-2 (40-42')	20L130	17.9	112.2	146.6	52.4	2.797	1/24/2021	2/19/2021	93	2.8E-09	0.2263	12.9	8.6	4840	1126	
									161	3.0E-09	0.4261	12.4	8.5	-	-	
									182	3.5E-09	0.4894	-	-	-	-	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	144.2	34.7	2.748	1/24/2021	2/19/2021	178	1.1E-08	2.6663	12.7	8.8	4180	1110	
									182	1.1E-08	2.7318	-	-	-	-	
B6-ST-1 (25-27')	20L134	17.5	115.3	144.7	48.2	2.770	1/24/2021	2/19/2021	175	6.5E-09	1.2076	12.4	8.5	4170	1178	
									182	7.6E-09	1.2755	-	-	-	-	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	146.5	41.9	2.838	1/24/2021	2/19/2021	161	1.0E-08	1.6498	12.5	8.7	4880	1309	
									182	9.8E-09	1.8601	12.7	8.8	-	-	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	143.5	34.4	2.754	1/25/2021	2/19/2021	175	9.9E-09	2.4489	12.4	8.6	4710	963	
									182	1.0E-08	2.5584	-	-	-	-	
B9-ST-2 (40-42')	20L140	15.4	111.4	151.3	55.3	2.811	1/29/2021	2/19/2021	179	1.0E-08	1.7599	12.8	8.9	4670	1025	
									182	1.1E-08	1.8013	-	-	-	-	
B9-ST-3 (55-57')	20L141	10.0	131.1	142.6	34.8	2.78	1/29/2021	2/19/2021	168	1.3E-08	3.0832	12.8	8.8	4650	1065	
									178	1.2E-08	3.2249	12.5	8.4	-	-	
									182	1.4E-08	3.3033	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings.

Average: 12.6 4583

PN1016 MABA Geos Chic Omer Bozok 773-710-8885 obozok@geosyntec.com

Appendix N
Groundwater Protection Standard
Calculations

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	November 24, 2021
To:	Chris Scieszka, DTE Electric Company
From:	Vince Buening, TRC Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	413591.0001.0000 Phase 1 Task 1
Subject:	Groundwater Protection Standard Calculation – DTE Electric Company, Monroe Power Plant Fly Ash Basin

DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Monroe Power Plant (MONPP) Fly Ash Basin (FAB) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule[1] (“Part B”) that allows a facility to prepare a demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the MONPP FAB remains in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)[2], the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the MONPP FAB CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the MONPP FAB from August 2016 through July 2017, as part of

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[1] On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

[2] As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

initiating the detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to July 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the MONPP FAB were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Per the Stats Plan, the MONPP FAB CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for MONPP FAB includes MW-16-01 through MW-16-07. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of non-detects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix IV parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 1.

Tolerance Limits

Table 1 presents the calculated UTLs for the background/baseline data sets. As discussed above, the MONPP FAB CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For nonnormal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 2.

Attachments

Table 1 – Summary of Descriptive Statistics and Tolerance Limit Calculations
Table 2 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

Tables

Table 1
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Antimony (µg/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	2.1
MW-16-02	100% Non-Detect				N	PQL	2.0
MW-16-03	100% Non-Detect				N	PQL	2.0
MW-16-04	100% Non-Detect				N	PQL	2.0
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0
Arsenic (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	100% Non-Detect				N	PQL	5.0
MW-16-05	100% Non-Detect				N	PQL	5.0
MW-16-06	100% Non-Detect				N	PQL	5.0
MW-16-07	100% Non-Detect				N	PQL	5.0
Barium (µg/L)							
MW-16-01	1 < 1.24799	1 < 1.14617	0.818 > 0.773186	0.818 > 0.796129	N	Non-Parametric	22
MW-16-02	-1 < 0.250149 < 1	--	--	--	N	Parametric	10
MW-16-03	1 < 1.70053	1 < 1.34927	0.818 > 0.724093	0.818 > 0.813257	N	Non-Parametric	21
MW-16-04	-1 < -0.0503771 < 1	--	--	--	N	Parametric	13
MW-16-05	-1 < 0.148075 < 1	--	--	--	N	Parametric	18
MW-16-06	1 < 2.07628	1 < 1.70345	0.818 > 0.616693	0.818 > 0.74454	N	Non-Parametric	34
MW-16-07	-1 < 0.362311 < 1	--	--	--	N	Parametric	10

Notes:

2.14275 > 1
-1 < 0.537721 < 1
Skewness Coefficient

0.818 > 0.781314
Shapiro-Wilks 5% Critical Value
Shapiro-Wilks 'W' Statistic

PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 1
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Beryllium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0
Cadmium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0
Chromium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	2.0
MW-16-02	100% Non-Detect				N	PQL	2.0
MW-16-03	> 50% Non-Detect				N	Non-Parametric	3.1
MW-16-04	100% Non-Detect				N	PQL	2.0
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0

Notes:

2.14275 > 1 -1 < 0.537721 < 1 0.818 > 0.781314

Skewness Coefficient

Shapiro-Wilks 5%
Critical Value

Shapiro-Wilks 'W' Statistic

PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
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Table 1

Summary of Descriptive Statistics and Tolerance Limit Calculations

DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	**Natural Log Transformed Data**	**Un-Transformed Data**	**Natural Log Transformed Data**			
Cobalt (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	> 50% Non-Detect				N	Non-Parametric	1.6
MW-16-07	100% Non-Detect				N	PQL	1.0
Fluoride (mg/L)							
MW-16-01	-1.46198 < -1	-1.68889 < -1	0.881 > 0.738606	0.881 > 0.704751	N	Non-Parametric	1.8
MW-16-02	-1 < 0.305853 < 1	--	--	--	N	Parametric	1.8
MW-16-03	-1 < 0.519238 < 1	--	--	--	N	Parametric	1.7
MW-16-04	-1 < 0.0678206 < 1	--	--	--	N	Parametric	1.1
MW-16-05	-1 < 0.234243 < 1	--	--	--	N	Parametric	1.7
MW-16-06	-1 < 0.477107 < 1	--	--	--	N	Parametric	1.8
MW-16-07	-1 < 0.268653 < 1	--	--	--	N	Parametric	1.8
Lead (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	> 50% Non-Detect				N	Non-Parametric	2.5
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	> 50% Non-Detect				N	Non-Parametric	1.1
MW-16-07	100% Non-Detect				N	PQL	1.0

Notes:

2.14275 > 1 ↖ Skewness Coefficient ↗ -1 < 0.537721 < 1

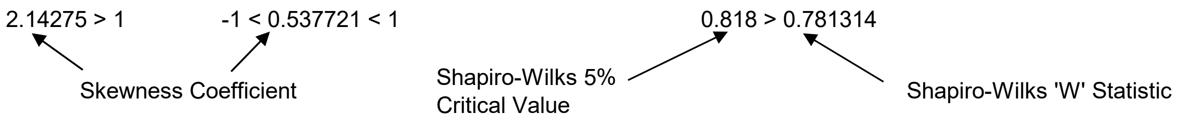
Shapiro-Wilks 5% Critical Value → 0.818 > 0.781314 ← Shapiro-Wilks 'W' Statistic

PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 1
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	**Natural Log Transformed Data**	**Un-Transformed Data**	**Natural Log Transformed Data**			
Lithium (µg/L)							
MW-16-01	-1 < -0.00922775 < 1	--	--	--	N	Parametric	92
MW-16-02	-1 < 0.354013 < 1	--	--	--	N	Parametric	120
MW-16-03	-1 < 0.238026 < 1	--	--	--	N	Parametric	130
MW-16-04	-1 < 0.528018 < 1	--	--	--	N	Parametric	23
MW-16-05	1 < 1.20828	1 < 1.11889	0.818 < 0.850222	--	N	Parametric	50
MW-16-06	-1 < 0.69322 < 1	--	--	--	N	Parametric	100
MW-16-07	-1 < 0.578591 < 1	--	--	--	N	Parametric	43
Mercury (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	0.20
MW-16-02	100% Non-Detect				N	PQL	0.20
MW-16-03	100% Non-Detect				N	PQL	0.20
MW-16-04	100% Non-Detect				N	PQL	0.20
MW-16-05	100% Non-Detect				N	PQL	0.20
MW-16-06	100% Non-Detect				N	PQL	0.20
MW-16-07	100% Non-Detect				N	PQL	0.20
Molybdenum (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	10
MW-16-02	100% Non-Detect				N	PQL	10
MW-16-03	100% Non-Detect				N	PQL	10
MW-16-04	100% Non-Detect				N	PQL	10
MW-16-05	100% Non-Detect				N	PQL	10
MW-16-06	100% Non-Detect				N	PQL	10
MW-16-07	100% Non-Detect				N	PQL	10

Notes:



PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 1
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Radium 226/228 (pCi/L)							
MW-16-01	-1 < -0.526697 < 1	--	--	--	N	Parametric	1.30
MW-16-02	-1 < 0.246436 < 1	--	--	--	N	Parametric	3.96
MW-16-03	-1 < -0.900004 < 1	--	--	--	N	Parametric	3.01
MW-16-04	-1 < 0.590727 < 1	--	--	--	N	Parametric	1.20
MW-16-05	-1 < 0.745027 < 1	--	--	--	N	Parametric	2.73
MW-16-06	1 < 1.03253	-1 < 0.756658 < 1	--	--	N	Parametric	1.09
MW-16-07	1 < 1.42309	1 < 1.05411	0.818 > 0.810823	0.818 < 0.876893	N	Parametric	1.42
Selenium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	100% Non-Detect				N	PQL	5.0
MW-16-05	100% Non-Detect				N	PQL	5.0
MW-16-06	100% Non-Detect				N	PQL	5.0
MW-16-07	100% Non-Detect				N	PQL	5.0
Thallium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0

Notes:

2.14275 > 1 ↖ -1 < 0.537721 < 1 ↗ Skewness Coefficient

0.818 > 0.781314

Shapiro-Wilks 5% Critical Value ↗ (0.818)

Shapiro-Wilks 'W' Statistic ↖ (0.781314)

PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

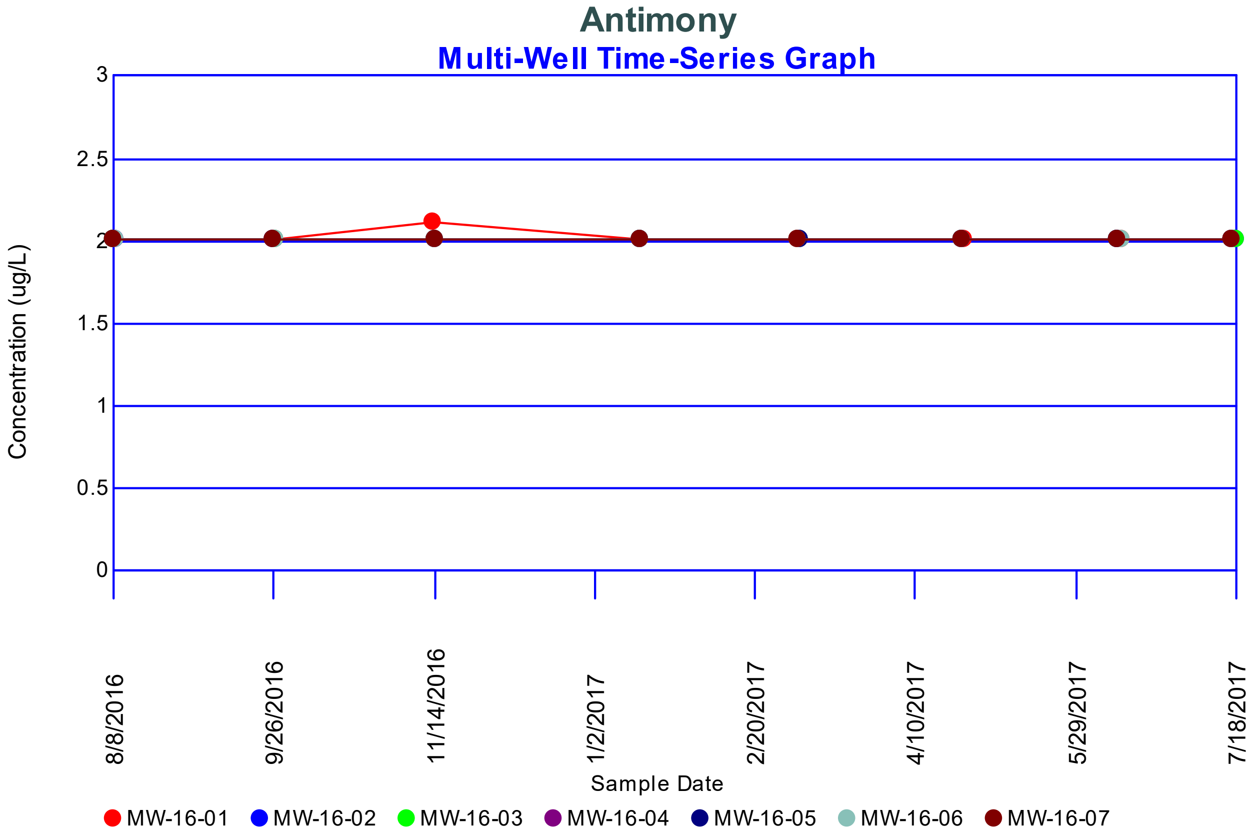
Table 2

Summary of Groundwater Protection Standards
DTE Electric Company – Monroe Fly Ash Basin

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.1	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**
Arsenic	ug/L	MCL	10	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10.0**	5.0	**10**
Barium	ug/L	MCL	2,000	22	**2,000**	10	**2,000**	21	**2,000**	13	**2,000**	18	**2,000**	34	**2,000**	10	**2,000**
Beryllium	ug/L	MCL	4	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**
Cadmium	ug/L	MCL	5	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**
Chromium	ug/L	MCL	100	2.0	**100**	2.0	**100**	3.1	**100**	2.0	**100**	2.0	**100**	2.0	**100**	2.0	**100**
Cobalt	ug/L	RSL	6	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.6	**6.0**	1.0	**6.0**
Fluoride	mg/L	MCL	4	1.8	**4.0**	1.8	**4.0**	1.7	**4.0**	1.1	**4.0**	1.7	**4.0**	1.8	**4.0**	1.8	**4.0**
Lead	ug/L	RSL	15	1.0	**15**	1.0	**15**	2.5	**15**	1.0	**15**	1.0	**15**	1.1	**15**	1.0	**15**
Lithium	ug/L	Background or RSL	40	92	**92**	120	**120**	130	**130**	23	**40**	50	**50**	100	**100**	43	**43**
Mercury	ug/L	MCL	2	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**
Molybdenum	ug/L	RSL	100	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**
Radium-226/228	pCi/L	MCL	5	1.30	**5.00**	3.96	**5.00**	3.01	**5.00**	1.20	**5.00**	2.73	**5.00**	1.09	**5.00**	1.42	**5.00**
Selenium	ug/L	MCL	50	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**
Thallium	ug/L	MCL	2	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**

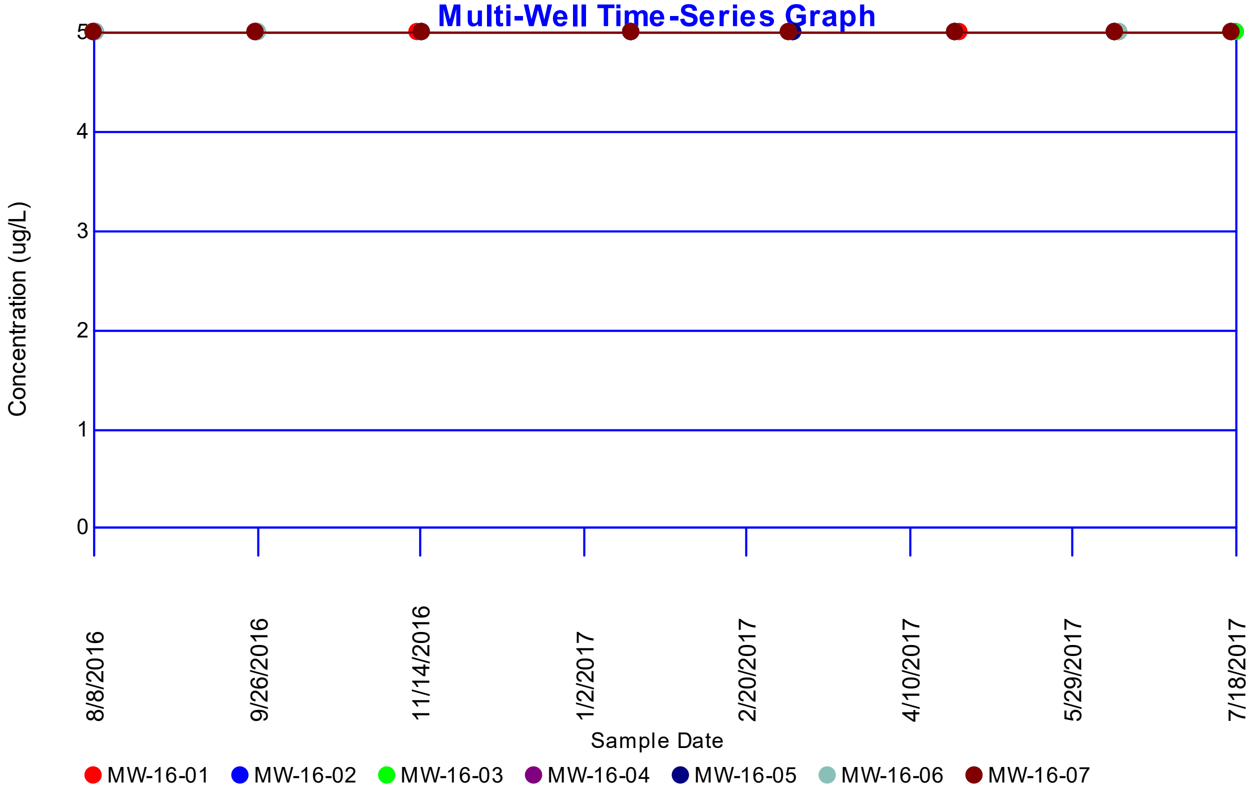
Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Attachment A
ChemStat™ Outputs


Antimony
Multi-Well Time-Series Graph
Concentration (ug/L)
3
2.5
2
1.5
1
0.5
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

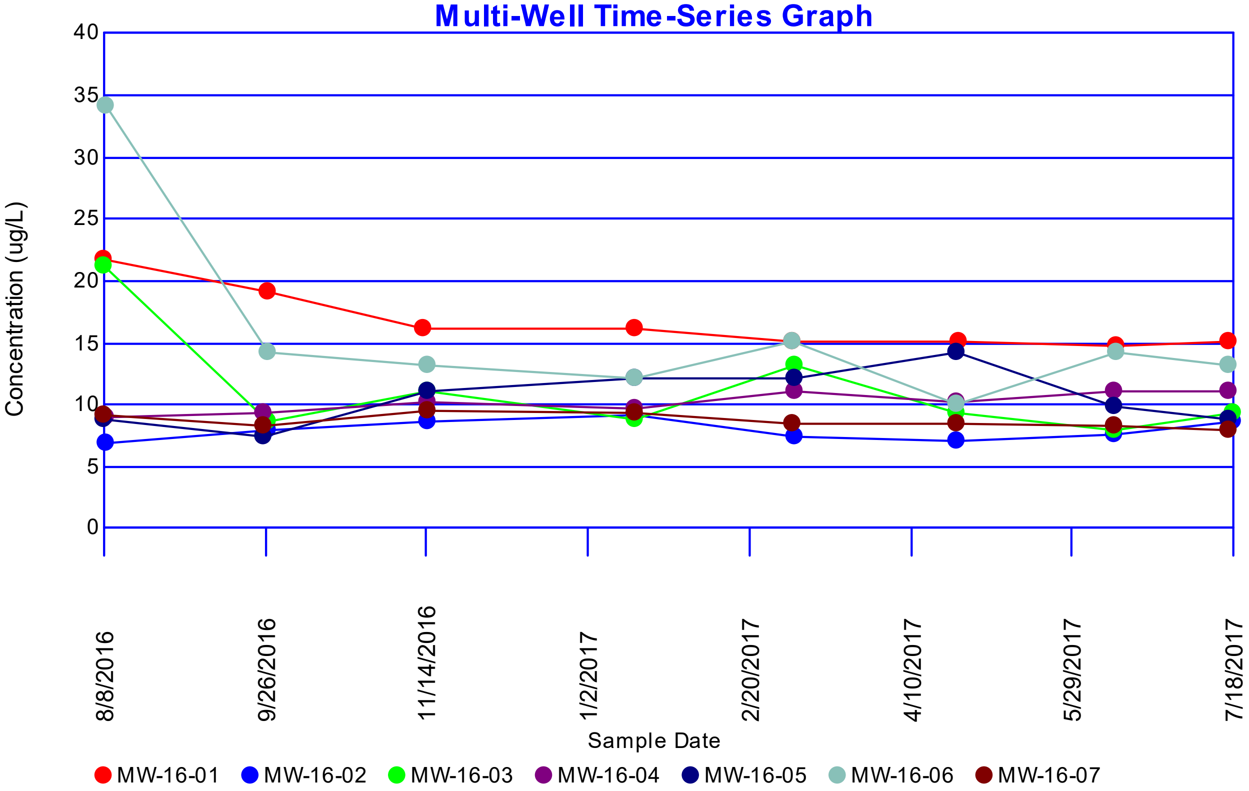
Arsenic

Multi-Well Time-Series Graph



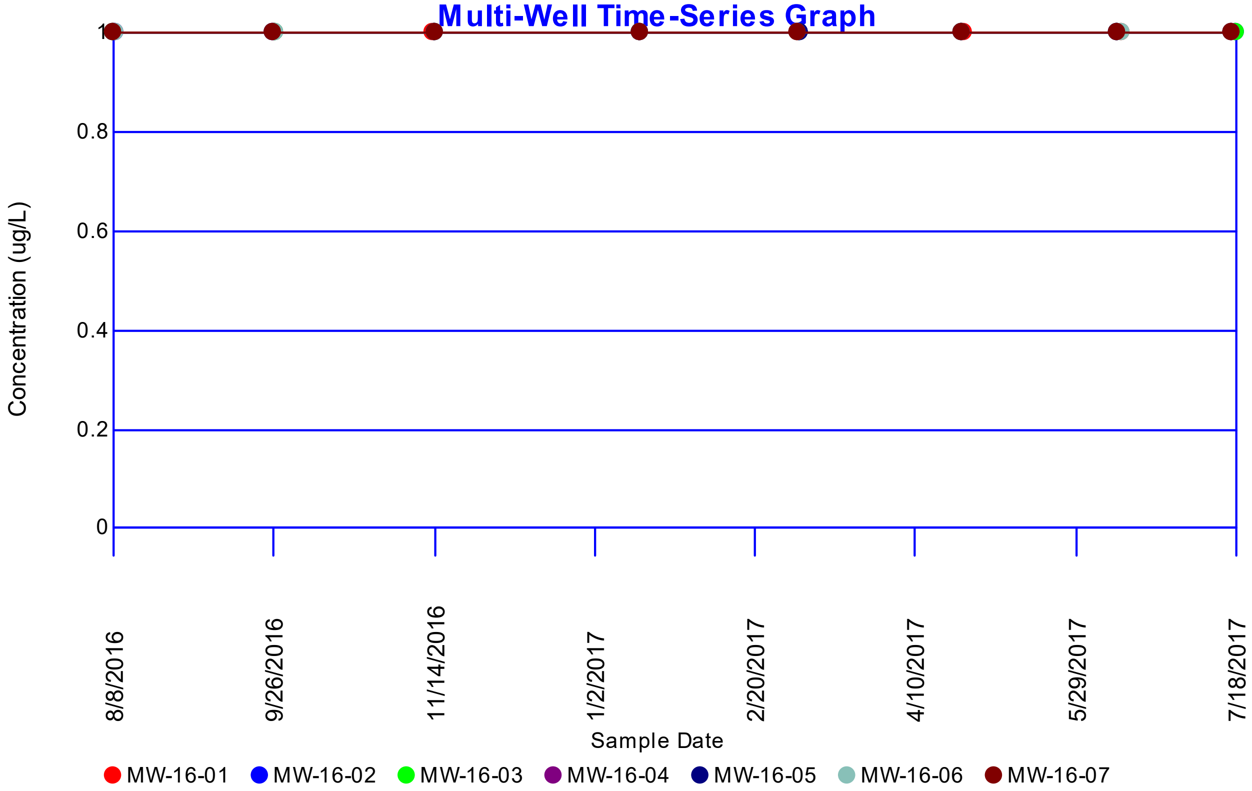
Barium

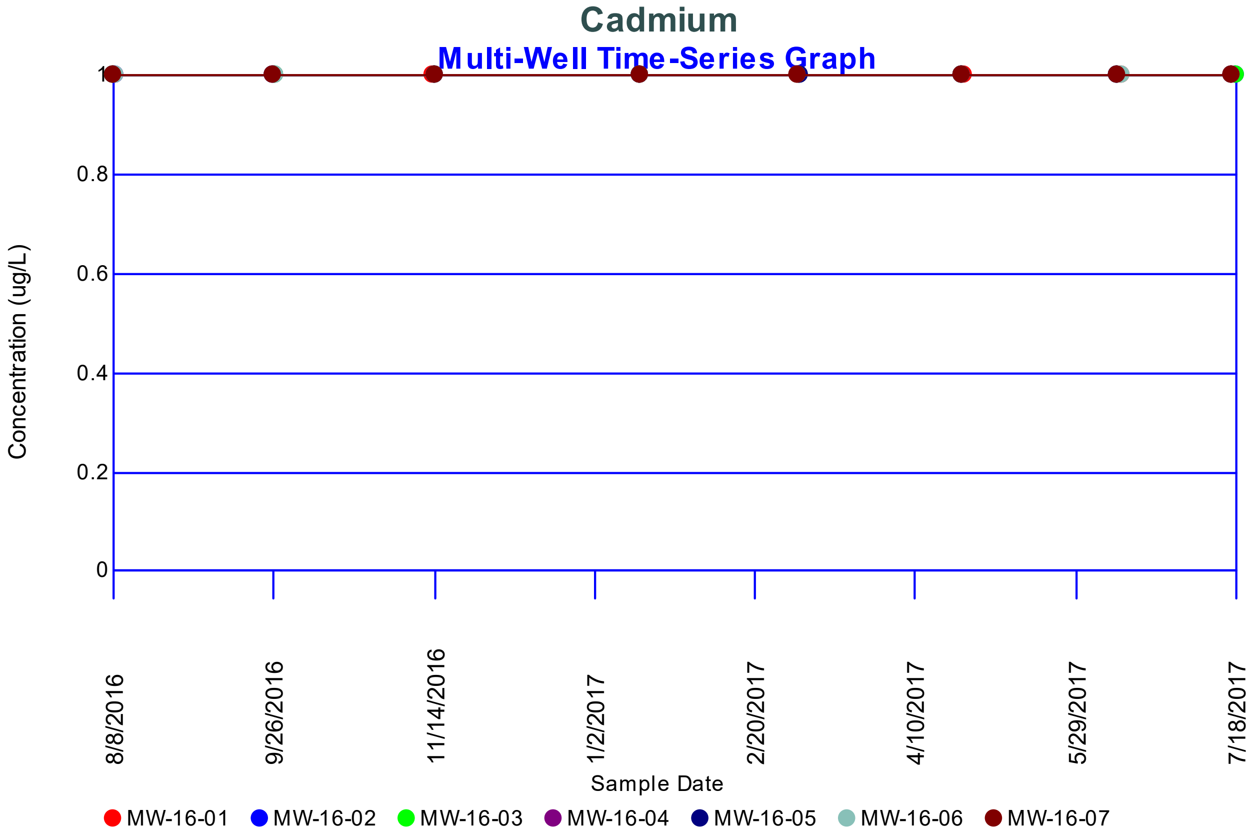
Multi-Well Time-Series Graph



Beryllium

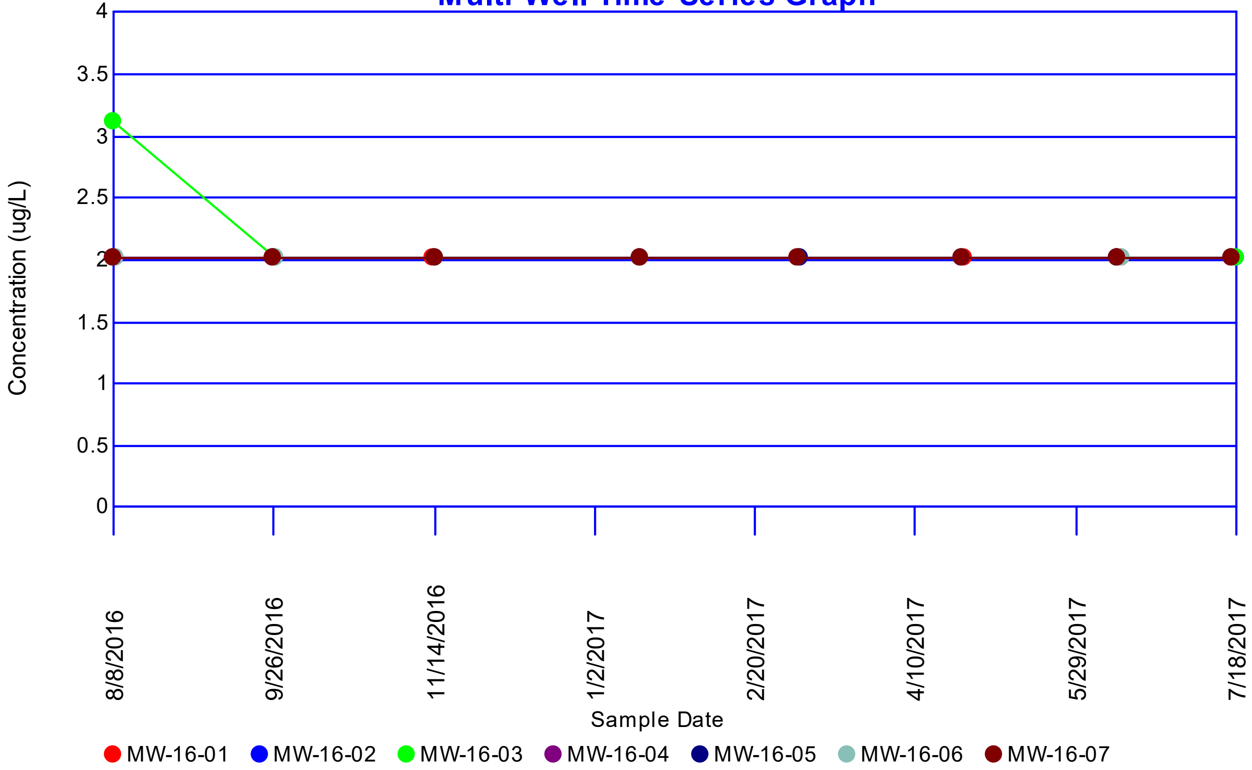
Multi-Well Time-Series Graph




Cadmium
Multi-Well Time-Series Graph
Concentration (ug/L)
1
0.8
0.6
0.4
0.2
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
● MW-16-01
● MW-16-02
● MW-16-03
● MW-16-04
● MW-16-05
● MW-16-06
● MW-16-07

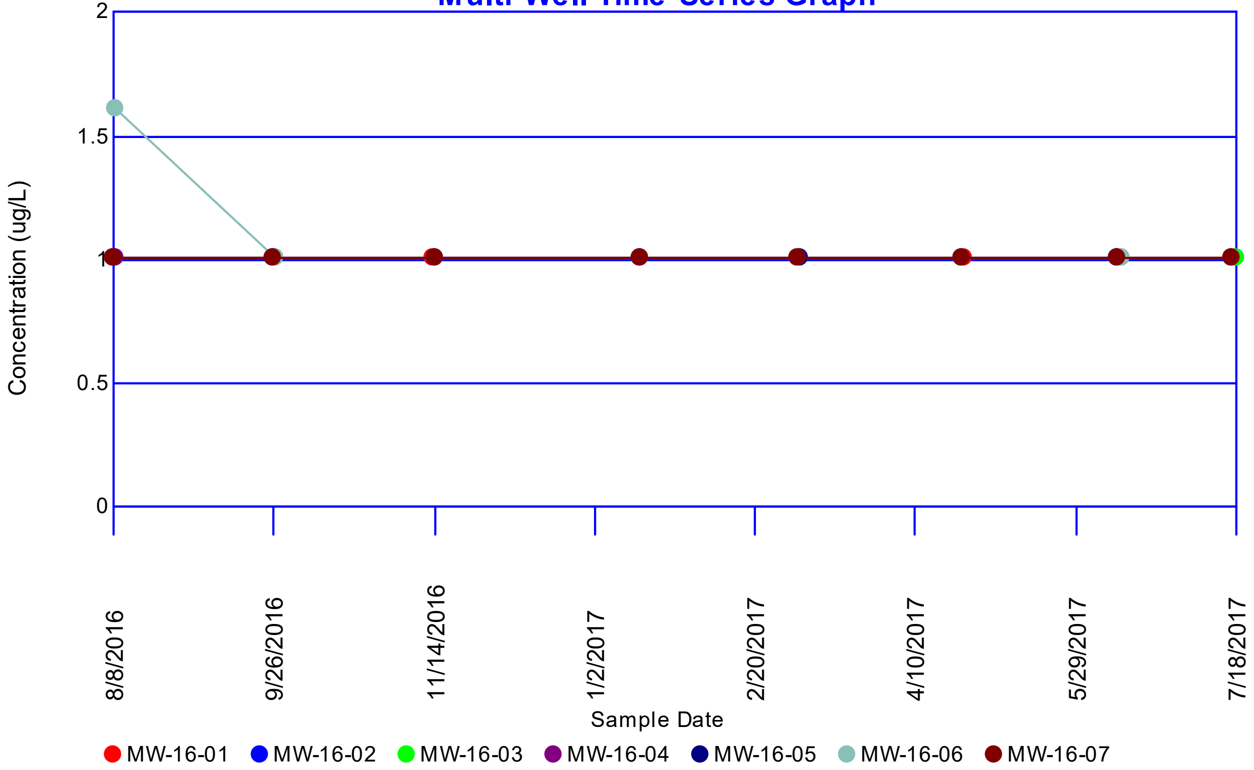
Chromium

Multi-Well Time-Series Graph



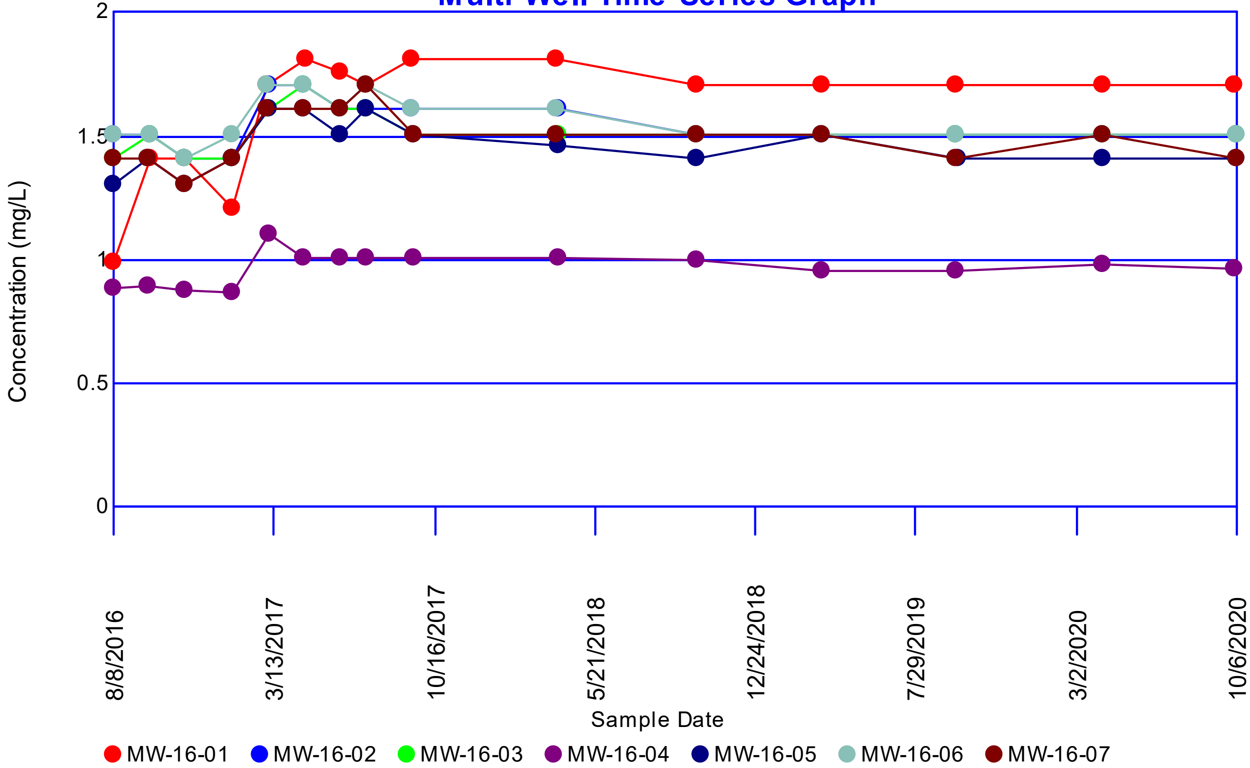
Cobalt

Multi-Well Time-Series Graph



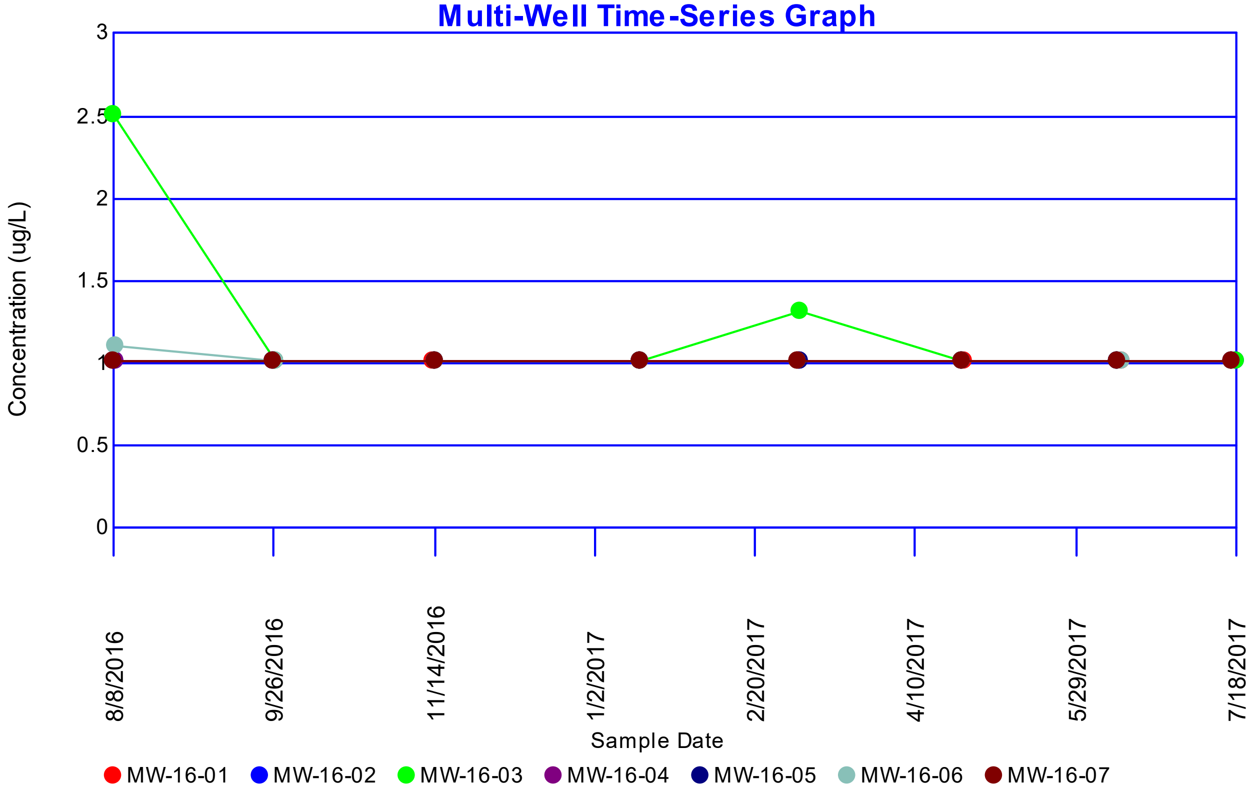
Fluoride

Multi-Well Time-Series Graph



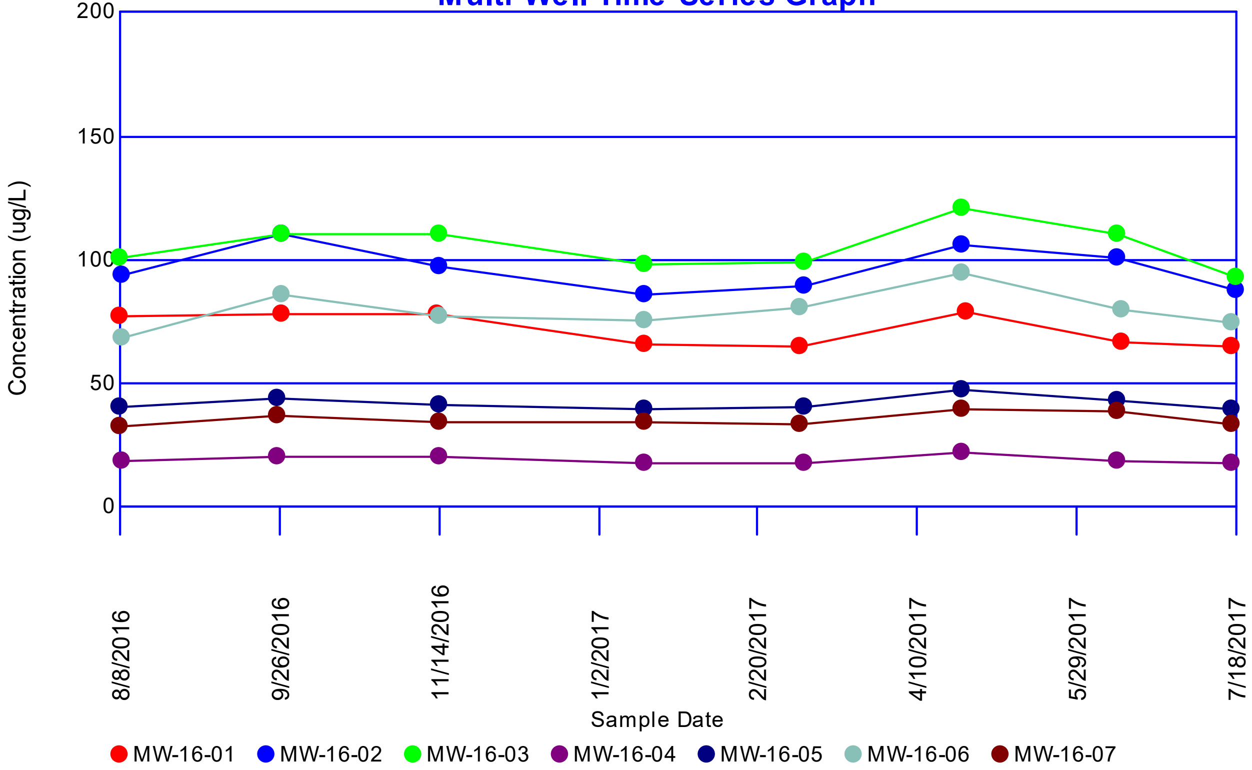
Lead

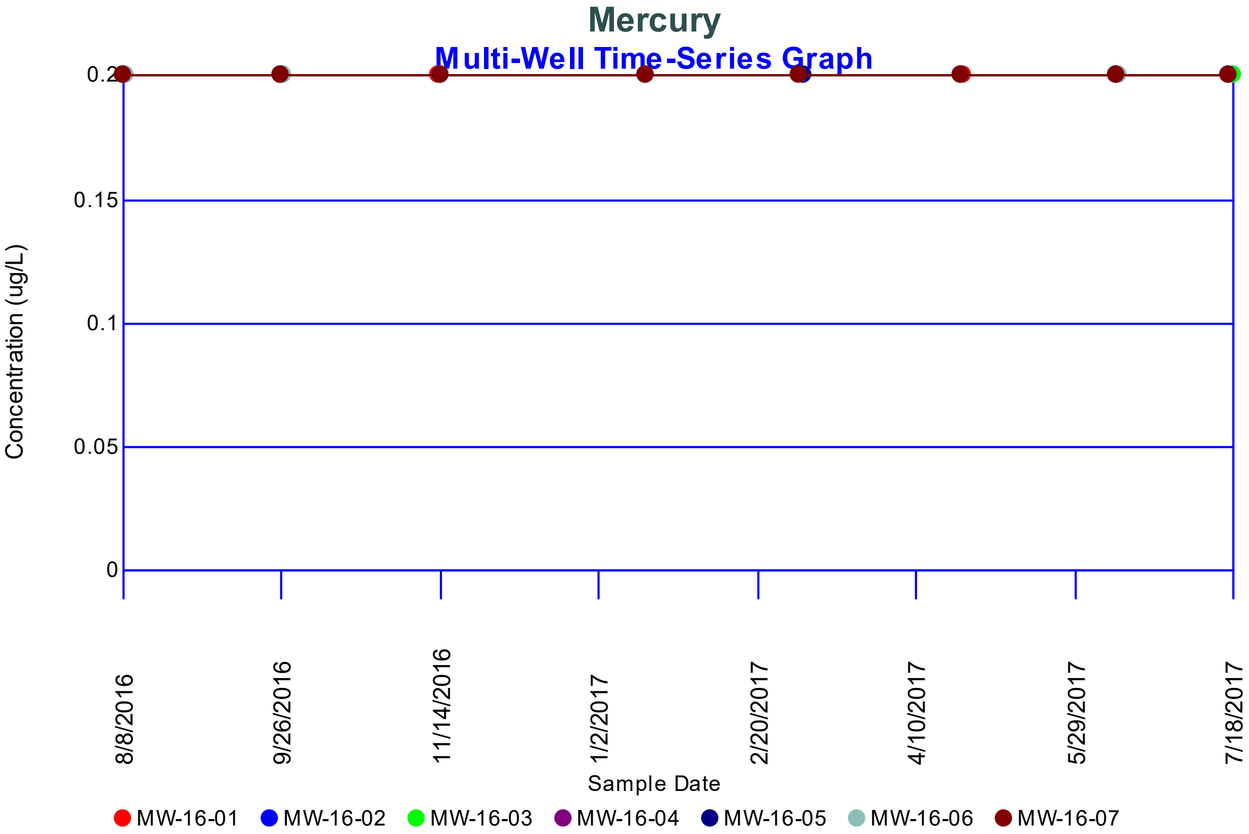
Multi-Well Time-Series Graph

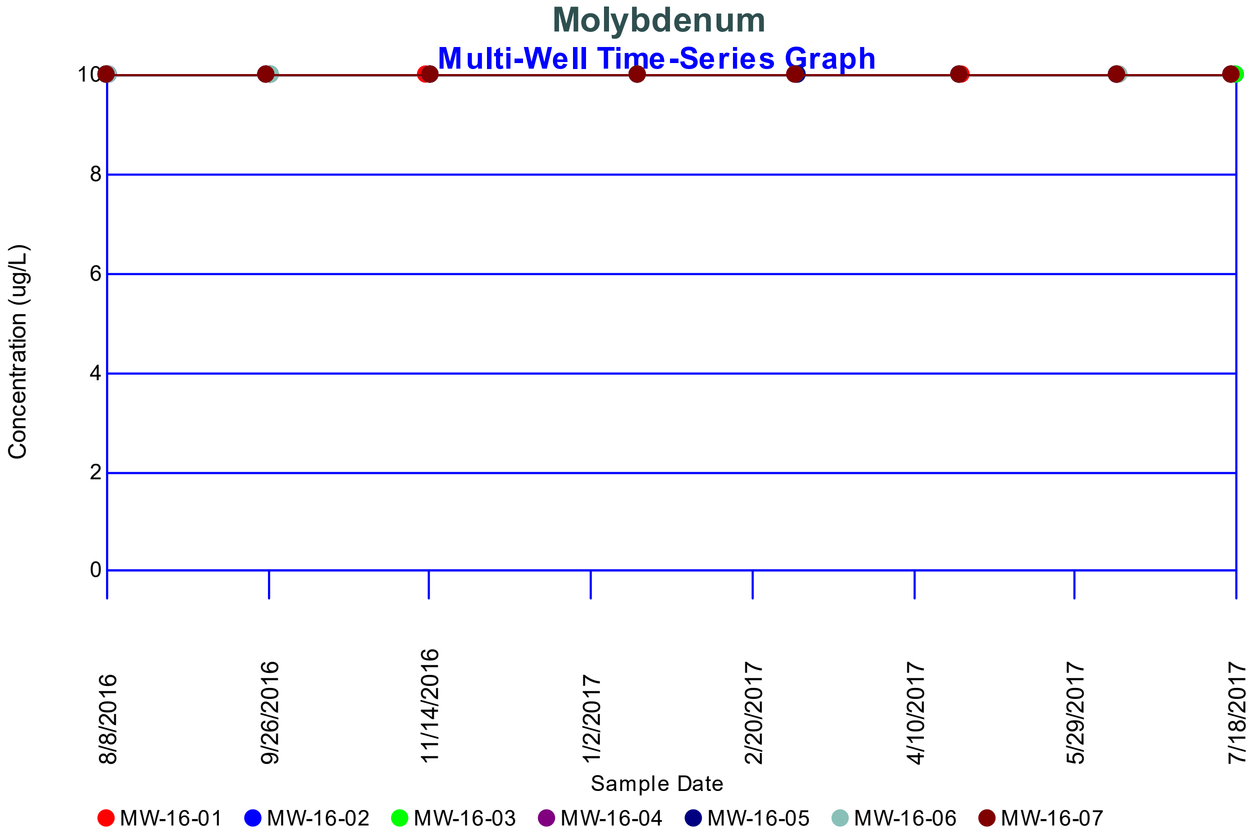


Lithium

Multi-Well Time-Series Graph




Mercury
Multi-Well Time-Series Graph
Concentration (ug/L)
0.2
0.15
0.1
0.05
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

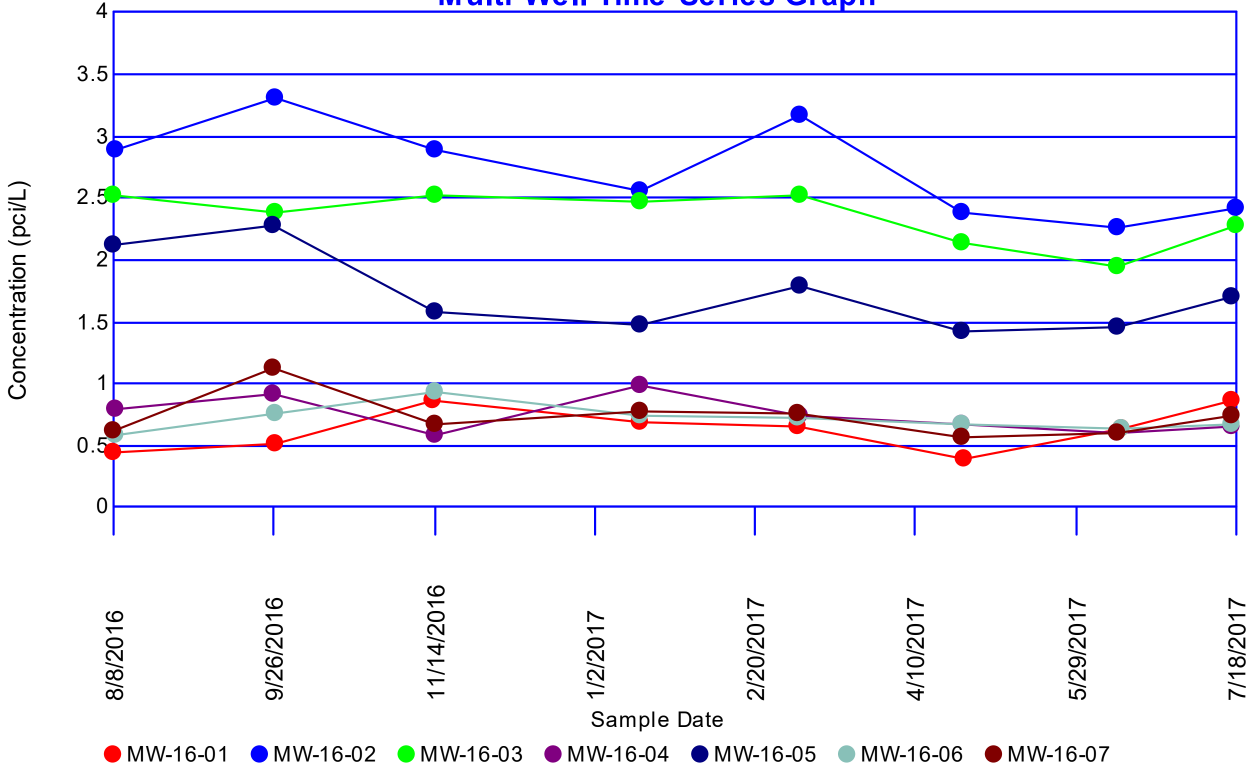


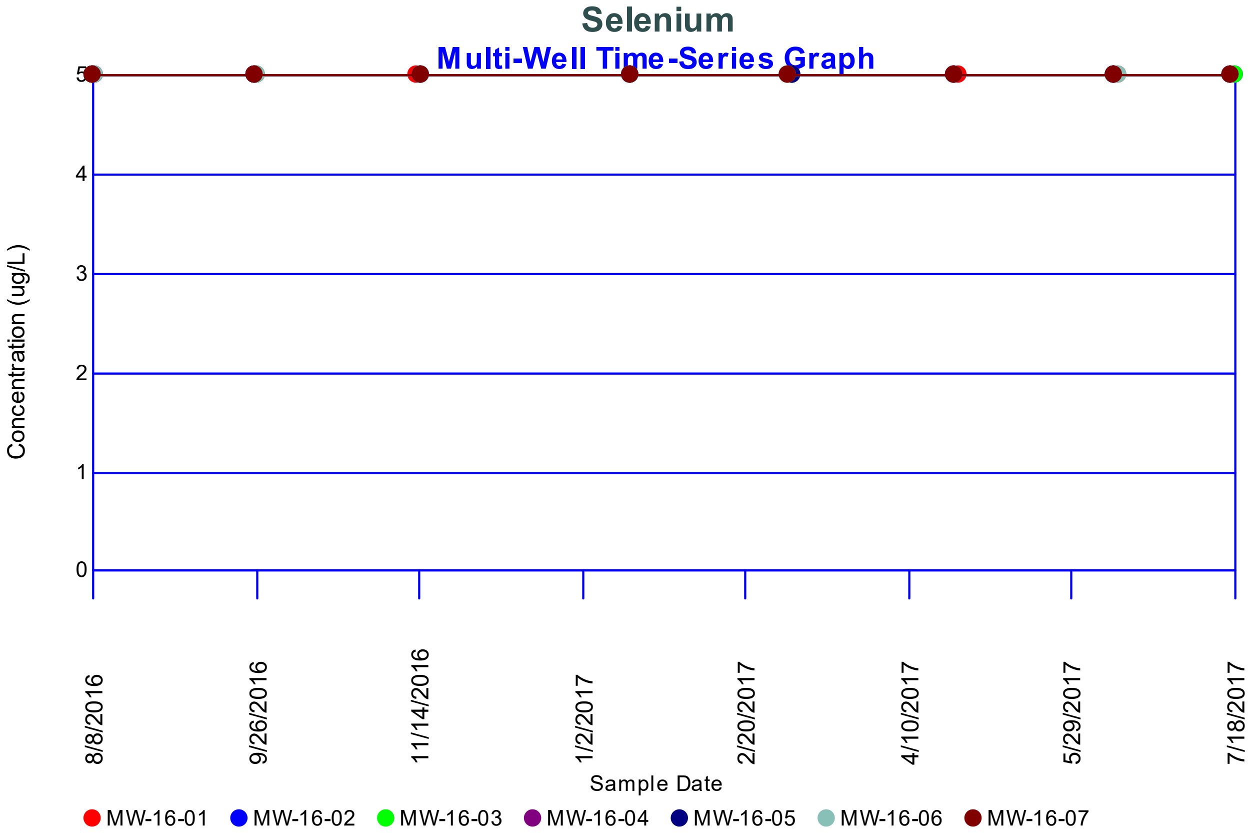
Molybdenum

Multi-Well Time-Series Graph

Radium-226/228

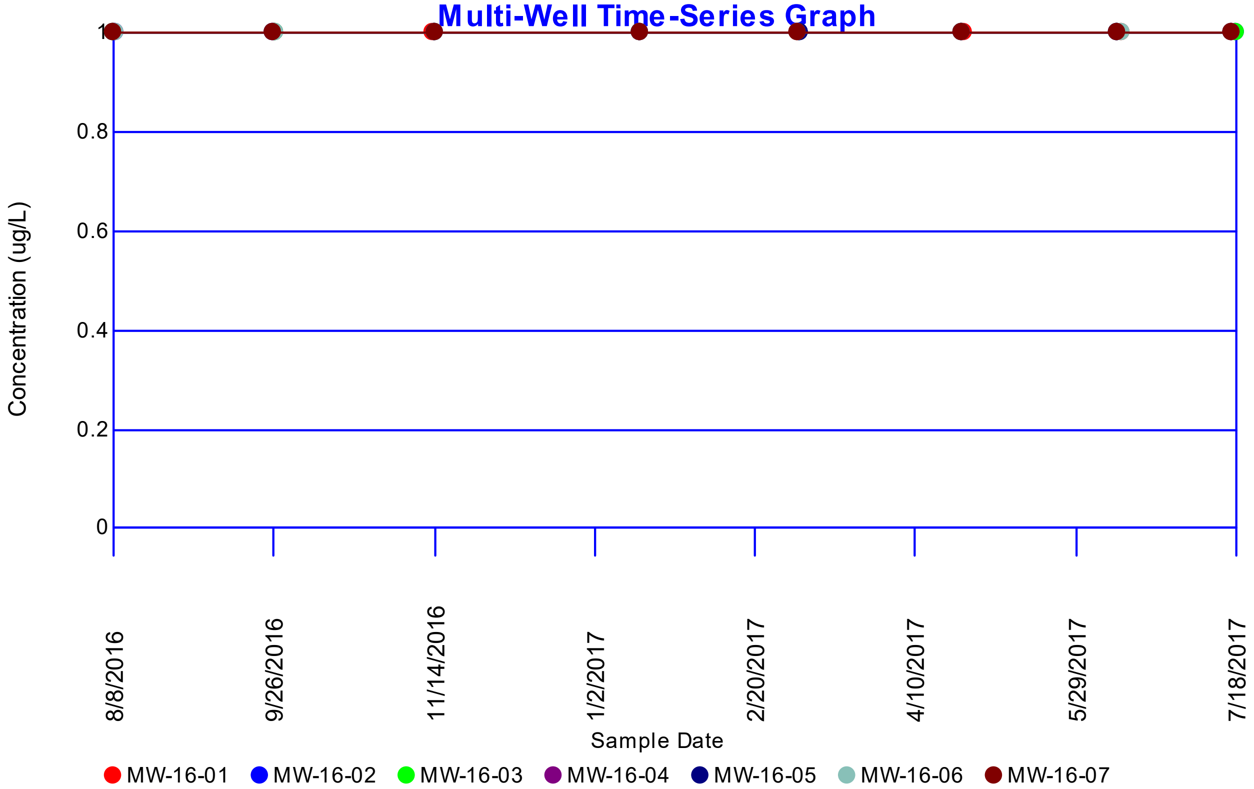
Multi-Well Time-Series Graph




Selenium
Multi-Well Time-Series Graph
Concentration (ug/L)
0
1
2
3
4
5
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

Thallium

Multi-Well Time-Series Graph



Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	7 (87.5%)	8/8/2016 ~	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/14/2016	2.1	2.1
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017 ~	ND<2 U	ND<2 U
			4/26/2017	ND<2 U	ND<2 U
			6/13/2017 ~	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016 ~	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017 ~	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/26/2016 ~	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U

			4/25/2017	ND<2 U	ND<2 U
			6/13/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017 ~	ND<2 U	ND<2 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/14/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017 ~	ND<5 U	ND<5 U
			4/26/2017	ND<5 U	ND<5 U
			6/13/2017 ~	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-02	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016 ~	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017 ~	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-04	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/26/2016 ~	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-05	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-06	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U

			4/25/2017	ND<5 U	ND<5 U
			6/13/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-07	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017 ~	ND<5 U	ND<5 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	0 (0%)	8/8/2016 ~	21.5	21.5
			9/27/2016	19	19
			11/14/2016	16	16
			1/17/2017	16	16
			3/6/2017 ~	15	15
			4/26/2017	15	15
			6/13/2017 ~	14.5	14.5
			7/17/2017	15	15
MW-16-02	8	0 (0%)	8/9/2016	6.7	6.7
			9/27/2016	7.7	7.7
			11/15/2016 ~	8.55	8.55
			1/17/2017	9	9
			3/7/2017	7.3	7.3
			4/25/2017 ~	6.9	6.9
			6/12/2017	7.4	7.4
			7/18/2017	8.4	8.4
MW-16-03	8	0 (0%)	8/8/2016	21	21
			9/27/2016	8.5	8.5
			11/15/2016	11	11
			1/17/2017	8.6	8.6
			3/7/2017	13	13
			4/25/2017	9.1	9.1
			6/12/2017	7.8	7.8
			7/18/2017	9.1	9.1
MW-16-04	8	0 (0%)	8/9/2016	8.9	8.9
			9/26/2016 ~	9.25	9.25
			11/15/2016	10	10
			1/17/2017	9.6	9.6
			3/7/2017	11	11
			4/25/2017	10	10
			6/12/2017	11	11
			7/17/2017	11	11
MW-16-05	8	0 (0%)	8/8/2016	8.7	8.7
			9/26/2016	7.2	7.2
			11/15/2016	11	11
			1/17/2017	12	12
			3/7/2017	12	12
			4/25/2017	14	14
			6/12/2017	9.7	9.7
			7/17/2017	8.7	8.7
MW-16-06	8	0 (0%)	8/9/2016	34	34
			9/27/2016	14	14
			11/15/2016	13	13
			1/17/2017	12	12
			3/6/2017	15	15

			4/25/2017	9.9	9.9
			6/13/2017	14	14
			7/17/2017	13	13
MW-16-07	8	0 (0%)	8/8/2016	9	9
			9/26/2016	8.2	8.2
			11/15/2016	9.4	9.4
			1/17/2017	9.2	9.2
			3/6/2017	8.3	8.3
			4/25/2017	8.3	8.3
			6/12/2017	8.2	8.2
			7/17/2017 ~	7.8	7.8

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/14/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017 ~	ND<2 U	ND<2 U
			4/26/2017	ND<2 U	ND<2 U
			6/13/2017 ~	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016 ~	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017 ~	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-03	8	7 (87.5%)	8/8/2016	3.1	3.1
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/26/2016 ~	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U

			4/25/2017	ND<2 U	ND<2 U
			6/13/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017 ~	ND<2 U	ND<2 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	7 (87.5%)	8/9/2016	1.6	1.6
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 105
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	15	0 (0%)	8/8/2016 ~	0.98	0.98
			9/27/2016	1.4	1.4
			11/14/2016	1.4	1.4
			1/17/2017	1.2	1.2
			3/6/2017 ~	1.7	1.7
			4/26/2017	1.8	1.8
			6/13/2017 ~	1.75	1.75
			7/17/2017	1.7	1.7
			9/18/2017	1.8	1.8
			4/2/2018	1.8	1.8
			10/8/2018 ~	1.7	1.7
			3/26/2019	1.7	1.7
			9/23/2019	1.7	1.7
			4/8/2020	1.7	1.7
			10/5/2020	1.7	1.7
MW-16-02	15	0 (0%)	8/9/2016	1.5	1.5
			9/27/2016	1.5	1.5
			11/15/2016 ~	1.4	1.4
			1/17/2017	1.4	1.4
			3/7/2017	1.7	1.7
			4/25/2017 ~	1.7	1.7
			6/12/2017	1.6	1.6
			7/18/2017	1.6	1.6
			9/18/2017	1.6	1.6
			4/3/2018	1.6	1.6
			10/8/2018	1.5	1.5
			3/25/2019	1.5	1.5
			9/23/2019 ~	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-03	15	0 (0%)	8/8/2016	1.4	1.4
			9/27/2016	1.5	1.5
			11/15/2016	1.4	1.4
			1/17/2017	1.4	1.4
			3/7/2017	1.6	1.6
			4/25/2017	1.7	1.7
			6/12/2017	1.6	1.6
			7/18/2017	1.6	1.6
			9/19/2017	1.5	1.5
			4/3/2018	1.5	1.5
			10/8/2018	1.5	1.5
			3/25/2019 ~	1.5	1.5
			9/23/2019	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-04	15	0 (0%)	8/9/2016	0.88	0.88
			9/26/2016 ~	0.885	0.885

			11/15/2016	0.87	0.87
			1/17/2017	0.86	0.86
			3/7/2017	1.1	1.1
			4/25/2017	1	1
			6/12/2017	1	1
			7/17/2017	1	1
			9/19/2017	1	1
			4/3/2018	1	1
			10/8/2018	0.99	0.99
			3/25/2019	0.95	0.95
			9/23/2019	0.95	0.95
			4/8/2020	0.97	0.97
			10/5/2020 ~	0.96	0.96
MW-16-05	15	0 (0%)	8/8/2016	1.3	1.3
			9/26/2016	1.4	1.4
			11/15/2016	1.3	1.3
			1/17/2017	1.4	1.4
			3/7/2017	1.6	1.6
			4/25/2017	1.6	1.6
			6/12/2017	1.5	1.5
			7/17/2017	1.6	1.6
			9/19/2017	1.5	1.5
			4/3/2018 ~	1.45	1.45
			10/8/2018	1.4	1.4
			3/25/2019	1.5	1.5
			9/25/2019	1.4	1.4
			4/8/2020 ~	1.4	1.4
			10/6/2020	1.4	1.4
MW-16-06	15	0 (0%)	8/9/2016	1.5	1.5
			9/27/2016	1.5	1.5
			11/15/2016	1.4	1.4
			1/17/2017	1.5	1.5
			3/6/2017	1.7	1.7
			4/25/2017	1.7	1.7
			6/13/2017	1.6	1.6
			7/17/2017	1.7	1.7
			9/18/2017	1.6	1.6
			4/2/2018	1.6	1.6
			10/8/2018	1.5	1.5
			3/25/2019	1.5	1.5
			9/23/2019	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-07	15	0 (0%)	8/8/2016	1.4	1.4
			9/26/2016	1.4	1.4
			11/15/2016	1.3	1.3
			1/17/2017	1.4	1.4
			3/6/2017	1.6	1.6
			4/25/2017	1.6	1.6
			6/12/2017	1.6	1.6
			7/17/2017 ~	1.7	1.7
			9/19/2017 ~	1.5	1.5
			4/2/2018	1.5	1.5
			10/8/2018	1.5	1.5
			3/26/2019	1.5	1.5
			9/23/2019	1.4	1.4
			4/8/2020	1.5	1.5
			10/6/2020	1.4	1.4

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56

Total Non-Detect: 53

Percent Non-Detects: 94.6429%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	6 (75%)	8/8/2016	2.5	2.5
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	1.3	1.3
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	7 (87.5%)	8/9/2016	1.1	1.1
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	0 (0%)	8/8/2016 ~	76.5	76.5
			9/27/2016	77	77
			11/14/2016	77	77
			1/17/2017	65	65
			3/6/2017 ~	64.5	64.5
			4/26/2017	78	78
			6/13/2017 ~	66	66
			7/17/2017	64	64
MW-16-02	8	0 (0%)	8/9/2016	93	93
			9/27/2016	110	110
			11/15/2016 ~	96.5	96.5
			1/17/2017	85	85
			3/7/2017	89	89
			4/25/2017 ~	105	105
			6/12/2017	100	100
			7/18/2017	87	87
MW-16-03	8	0 (0%)	8/8/2016	100	100
			9/27/2016	110	110
			11/15/2016	110	110
			1/17/2017	97	97
			3/7/2017	98	98
			4/25/2017	120	120
			6/12/2017	110	110
			7/18/2017	92	92
MW-16-04	8	0 (0%)	8/9/2016	18	18
			9/26/2016 ~	19.5	19.5
			11/15/2016	20	20
			1/17/2017	17	17
			3/7/2017	17	17
			4/25/2017	21	21
			6/12/2017	18	18
			7/17/2017	17	17
MW-16-05	8	0 (0%)	8/8/2016	40	40
			9/26/2016	43	43
			11/15/2016	41	41
			1/17/2017	39	39
			3/7/2017	40	40
			4/25/2017	47	47
			6/12/2017	42	42
			7/17/2017	39	39
MW-16-06	8	0 (0%)	8/9/2016	68	68
			9/27/2016	85	85
			11/15/2016	76	76
			1/17/2017	75	75
			3/6/2017	80	80

			4/25/2017	94	94
			6/13/2017	79	79
			7/17/2017	74	74
MW-16-07	8	0 (0%)	8/8/2016	32	32
			9/26/2016	36	36
			11/15/2016	34	34
			1/17/2017	34	34
			3/6/2017	33	33
			4/25/2017	39	39
			6/12/2017	38	38
			7/17/2017 ~	32.5	32.5

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/14/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017 ~	ND<0.2 U	ND<0.2 U
			4/26/2017	ND<0.2 U	ND<0.2 U
			6/13/2017 ~	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016 ~	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017 ~	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/18/2017	ND<0.2 U	ND<0.2 U
MW-16-03	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/18/2017	ND<0.2 U	ND<0.2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/26/2016 ~	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/26/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017	ND<0.2 U	ND<0.2 U

			4/25/2017	ND<0.2 U	ND<0.2 U
			6/13/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/26/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017 ~	ND<0.2 U	ND<0.2 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/14/2016	ND<10 UF1	ND<10 UF1
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017 ~	ND<10 U	ND<10 U
			4/26/2017	ND<10 U	ND<10 U
			6/13/2017 ~	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-02	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016 ~	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017 ~	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/18/2017	ND<10 U	ND<10 U
MW-16-03	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/18/2017	ND<10 U	ND<10 U
MW-16-04	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/26/2016 ~	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-05	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/26/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-06	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017	ND<10 U	ND<10 U

			4/25/2017	ND<10 U	ND<10 U
			6/13/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-07	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/26/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017 ~	ND<10 U	ND<10 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 1
Percent Non-Detects: 1.78571%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	1 (12.5%)	8/8/2016 ~	0.428 U	0.428 U
			9/27/2016	0.497	0.497
			11/14/2016	0.852	0.852
			1/17/2017	0.668	0.668
			3/6/2017 ~	0.6415	0.6415
			4/26/2017	ND<0.367 U	ND<0.367 U
			6/13/2017 ~	0.6165	0.6165
			7/17/2017	0.852	0.852
MW-16-02	8	0 (0%)	8/9/2016	2.88	2.88
			9/27/2016	3.3	3.3
			11/15/2016 ~	2.87	2.87
			1/17/2017	2.54	2.54
			3/7/2017	3.16	3.16
			4/25/2017 ~	2.375	2.375
			6/12/2017	2.24	2.24
			7/18/2017	2.41	2.41
MW-16-03	8	0 (0%)	8/8/2016	2.51	2.51
			9/27/2016	2.36	2.36
			11/15/2016	2.51	2.51
			1/17/2017	2.45	2.45
			3/7/2017	2.51	2.51
			4/25/2017	2.13	2.13
			6/12/2017	1.93	1.93
			7/18/2017	2.27	2.27
MW-16-04	8	0 (0%)	8/9/2016	0.775	0.775
			9/26/2016 ~	0.908	0.908
			11/15/2016	0.574	0.574
			1/17/2017	0.974	0.974
			3/7/2017	0.723	0.723
			4/25/2017	0.65	0.65
			6/12/2017	0.578	0.578
			7/17/2017	0.639	0.639
MW-16-05	8	0 (0%)	8/8/2016	2.11	2.11
			9/26/2016	2.26	2.26
			11/15/2016	1.56	1.56
			1/17/2017	1.46	1.46
			3/7/2017	1.78	1.78
			4/25/2017	1.41	1.41
			6/12/2017	1.44	1.44
			7/17/2017	1.68	1.68
MW-16-06	8	0 (0%)	8/9/2016	0.575	0.575
			9/27/2016	0.751	0.751
			11/15/2016	0.918	0.918
			1/17/2017	0.732	0.732
			3/6/2017	0.7	0.7

			4/25/2017	0.648	0.648
			6/13/2017	0.623	0.623
			7/17/2017	0.65	0.65
MW-16-07	8	0 (0%)	8/8/2016	0.595	0.595
			9/26/2016	1.11	1.11
			11/15/2016	0.654	0.654
			1/17/2017	0.763	0.763
			3/6/2017	0.751	0.751
			4/25/2017	0.558	0.558
			6/12/2017	0.585	0.585
			7/17/2017 ~	0.729	0.729

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/14/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017 ~	ND<5 U	ND<5 U
			4/26/2017	ND<5 U	ND<5 U
			6/13/2017 ~	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-02	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016 ~	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017 ~	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-04	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/26/2016 ~	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-05	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-06	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U

			4/25/2017	ND<5 U	ND<5 U
			6/13/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-07	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017 ~	ND<5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	16.5	2.46403	**1.24799**
MW-16-02	8	7.74375	0.826109	0.250149
MW-16-03	8	11.0125	4.36657	**1.70053**
MW-16-04	8	10.0938	0.833426	-0.0503771
MW-16-05	8	10.4125	2.23443	0.148075
MW-16-06	8	15.6125	7.58767	**2.07628**
MW-16-07	8	8.55	0.570714	0.362311

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	11.4179	4.61312	**2.50201**

Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	2.7945	0.138965	**1.14617**
MW-16-02	8	2.04195	0.106019	0.154402
MW-16-03	8	2.34623	0.325539	**1.34927**
MW-16-04	8	2.30891	0.0830288	-0.11872
MW-16-05	8	2.32245	0.218192	-0.142986
MW-16-06	8	2.67748	0.36549	**1.70345**
MW-16-07	8	2.14401	0.0661568	0.308397

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	2.3765	0.32531	**1.08806**

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	14.5	21.5	7	0.6052	4.2364
2	15	19	4	0.3164	1.2656
3	15	16	1	0.1743	0.1743
4	15	16	1	0.0561	0.0561
5	16	15	-1		
6	16	15	-1		
7	19	15	-4		
8	21.5	14.5	-7		

Sum of b values = 5.7324
Sample Standard Deviation = 2.46403
W Statistic = 0.773186

5% Critical value of 0.818 exceeds 0.773186
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.773186
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.67415	3.06805	0.393904	0.6052	0.238391
2	2.70805	2.94444	0.236389	0.3164	0.0747934
3	2.70805	2.77259	0.0645385	0.1743	0.0112491
4	2.70805	2.77259	0.0645385	0.0561	0.00362061
5	2.77259	2.70805	-0.0645385		
6	2.77259	2.70805	-0.0645385		
7	2.94444	2.70805	-0.236389		
8	3.06805	2.67415	-0.393904		

Sum of b values = 0.328054
Sample Standard Deviation = 0.138965
W Statistic = 0.796129

5% Critical value of 0.818 exceeds 0.796129
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.796129
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	7.8	21	13.2	0.6052	7.98864
2	8.5	13	4.5	0.3164	1.4238
3	8.6	11	2.4	0.1743	0.41832
4	9.1	9.1	0	0.0561	0
5	9.1	9.1	0		
6	11	8.6	-2.4		
7	13	8.5	-4.5		
8	21	7.8	-13.2		

Sum of b values = 9.83076
Sample Standard Deviation = 4.36657
W Statistic = 0.724093

5% Critical value of 0.818 exceeds 0.724093
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.724093
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.05412	3.04452	0.990399	0.6052	0.599389
2	2.14007	2.56495	0.424883	0.3164	0.134433
3	2.15176	2.3979	0.246133	0.1743	0.042901
4	2.20827	2.20827	0	0.0561	0
5	2.20827	2.20827	0		
6	2.3979	2.15176	-0.246133		
7	2.56495	2.14007	-0.424883		
8	3.04452	2.05412	-0.990399		

Sum of b values = 0.776723

Sample Standard Deviation = 0.325539

W Statistic = 0.813257

5% Critical value of 0.818 exceeds 0.813257

Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.813257

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	9.9	34	24.1	0.6052	14.5853
2	12	15	3	0.3164	0.9492
3	13	14	1	0.1743	0.1743
4	13	14	1	0.0561	0.0561
5	14	13	-1		
6	14	13	-1		
7	15	12	-3		
8	34	9.9	-24.1		

Sum of b values = 15.7649
Sample Standard Deviation = 7.58767
W Statistic = 0.616693

5% Critical value of 0.818 exceeds 0.616693
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.616693
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.29253	3.52636	1.23383	0.6052	0.746711
2	2.48491	2.70805	0.223144	0.3164	0.0706026
3	2.56495	2.63906	0.074108	0.1743	0.012917
4	2.56495	2.63906	0.074108	0.0561	0.00415746
5	2.63906	2.56495	-0.074108		
6	2.63906	2.56495	-0.074108		
7	2.70805	2.48491	-0.223144		
8	3.52636	2.29253	-1.23383		

Sum of b values = 0.834388
Sample Standard Deviation = 0.36549
W Statistic = 0.74454

5% Critical value of 0.818 exceeds 0.74454
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.74454
Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	15	1.602	0.244488	**-1.46198**
MW-16-02	15	1.54	0.0910259	0.305853
MW-16-03	15	1.51333	0.0833809	0.519238
MW-16-04	15	0.961	0.064868	0.0678206
MW-16-05	15	1.45	0.0981981	0.234243
MW-16-06	15	1.55333	0.0915475	0.477107
MW-16-07	15	1.48667	0.10601	0.268653

All Locations

Obs.	Mean	Std. Dev.	Skewness
105	1.44376	0.236359	**-1.04709**

Skewness Coefficient

Parameter: Fluoride

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	15	0.458162	0.175662	**-1.68889**
MW-16-02	15	0.430165	0.0587741	0.193174
MW-16-03	15	0.412918	0.0545162	0.385798
MW-16-04	15	-0.0419129	0.0676644	-0.0910013
MW-16-05	15	0.369435	0.0674477	0.125752
MW-16-06	15	0.438806	0.0582966	0.390163
MW-16-07	15	0.394179	0.0709773	0.124949

All Locations

Obs.	Mean	Std. Dev.	Skewness
105	0.351679	0.184912	**-1.35865**

Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 7 for 15 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	0.98	1.8	0.82	0.515	0.4223
2	1.2	1.8	0.6	0.3306	0.19836
3	1.4	1.8	0.4	0.2495	0.0998
4	1.4	1.75	0.35	0.1878	0.06573
5	1.7	1.7	0	0.1353	0
6	1.7	1.7	0	0.088	0
7	1.7	1.7	0	0.0433	0
8	1.7	1.7	0		
9	1.7	1.7	0		
10	1.7	1.7	0		
11	1.7	1.7	0		
12	1.75	1.4	-0.35		
13	1.8	1.4	-0.4		
14	1.8	1.2	-0.6		
15	1.8	0.98	-0.82		

Sum of b values = 0.78619
Sample Standard Deviation = 0.244488
W Statistic = 0.738606

5% Critical value of 0.881 exceeds 0.738606
Evidence of non-normality at 95% level of significance

1% Critical value of 0.835 exceeds 0.738606
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 7 for 15 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	-0.0202027	0.587787	0.607989	0.515	0.313115
2	0.182322	0.587787	0.405465	0.3306	0.134047
3	0.336472	0.587787	0.251314	0.2495	0.0627029
4	0.336472	0.559616	0.223144	0.1878	0.0419064
5	0.530628	0.530628	0	0.1353	0
6	0.530628	0.530628	0	0.088	0
7	0.530628	0.530628	0	0.0433	0
8	0.530628	0.530628	0		
9	0.530628	0.530628	0		
10	0.530628	0.530628	0		
11	0.530628	0.530628	0		
12	0.559616	0.336472	-0.223144		
13	0.587787	0.336472	-0.251314		
14	0.587787	0.182322	-0.405465		
15	0.587787	-0.0202027	-0.607989		

Sum of b values = 0.551771
Sample Standard Deviation = 0.175662
W Statistic = 0.704751

5% Critical value of 0.881 exceeds 0.704751
Evidence of non-normality at 95% level of significance

1% Critical value of 0.835 exceeds 0.704751
Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	71	6.58461	-0.00922775
MW-16-02	8	95.6875	8.88392	0.354013
MW-16-03	8	104.625	9.30342	0.238026
MW-16-04	8	18.4375	1.54544	0.528018
MW-16-05	8	41.375	2.66927	**1.20828**
MW-16-06	8	78.875	7.8638	0.69322
MW-16-07	8	34.8125	2.59033	0.578591

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	63.5446	31.0169	-0.00517004

Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	4.2589	0.0930265	-0.0150376
MW-16-02	8	4.55737	0.0918904	0.261514
MW-16-03	8	4.64695	0.0884951	0.129581
MW-16-04	8	2.91138	0.0824102	0.467853
MW-16-05	8	3.72093	0.0624385	**1.11889**
MW-16-06	8	4.36365	0.0974141	0.488391
MW-16-07	8	3.54761	0.0731464	0.522889

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	4.00097	0.595772	-0.617011

Shapiro-Wilks Test of Normality

Parameter: Lithium
Location: MW-16-05
Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	39	47	8	0.6052	4.8416
2	39	43	4	0.3164	1.2656
3	40	42	2	0.1743	0.3486
4	40	41	1	0.0561	0.0561
5	41	40	-1		
6	42	40	-2		
7	43	39	-4		
8	47	39	-8		

Sum of b values = 6.5119
Sample Standard Deviation = 2.66927
W Statistic = 0.850222

5% Critical value of 0.818 is less than 0.850222
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.850222
Data is normally distributed at 99% level of significance

Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	0.592313	0.222588	-0.526697
MW-16-02	8	2.72188	0.388403	0.246436
MW-16-03	8	2.33375	0.212464	-0.900004
MW-16-04	8	0.727625	0.148982	0.590727
MW-16-05	8	1.7125	0.319855	0.745027
MW-16-06	8	0.699625	0.105496	**1.03253**
MW-16-07	8	0.718125	0.177044	**1.42309**

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	1.35797	0.863432	0.646626

Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	-0.611848	0.49773	**-1.34561**
MW-16-02	8	0.992483	0.141867	0.132414
MW-16-03	8	0.843627	0.0952202	-0.996009
MW-16-04	8	-0.335504	0.198021	0.417552
MW-16-05	8	0.523602	0.178365	0.610595
MW-16-06	8	-0.366475	0.143131	0.756658
MW-16-07	8	-0.353994	0.220765	**1.05411**

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	0.0988416	0.662125	-0.0202772

Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	0.558	1.11	0.552	0.6052	0.33407
2	0.585	0.763	0.178	0.3164	0.0563192
3	0.595	0.751	0.156	0.1743	0.0271908
4	0.654	0.729	0.075	0.0561	0.0042075
5	0.729	0.654	-0.075		
6	0.751	0.595	-0.156		
7	0.763	0.585	-0.178		
8	1.11	0.558	-0.552		

Sum of b values = 0.421788
Sample Standard Deviation = 0.177044
W Statistic = 0.810823

5% Critical value of 0.818 exceeds 0.810823
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.810823
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	-0.583396	0.10436	0.687756	0.6052	0.41623
2	-0.536143	-0.270497	0.265646	0.3164	0.0840505
3	-0.519194	-0.28635	0.232844	0.1743	0.0405848
4	-0.424648	-0.316082	0.108566	0.0561	0.00609057
5	-0.316082	-0.424648	-0.108566		
6	-0.28635	-0.519194	-0.232844		
7	-0.270497	-0.536143	-0.265646		
8	0.10436	-0.583396	-0.687756		

Sum of b values = 0.546956
Sample Standard Deviation = 0.220765
W Statistic = 0.876893

5% Critical value of 0.818 is less than 0.876893
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.876893
Data is normally distributed at 99% level of significance

Non-Parametric Tolerance Interval MW-16-01

Parameter: Antimony

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 2.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 21.5
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-01

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 15
Maximum Background Concentration = 1.8
Minimum Coverage = 81.9%
Average Coverage = 93.75%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-01

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 71
Background standard deviation = 6.58461
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 91.9917

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 0.592313
Background standard deviation = 0.222588
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 1.30192

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Barium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 7.74375
Background standard deviation = 0.826109
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 10.3774

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.54
Background standard deviation = 0.0910259
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.77357

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 95.6875
Background standard deviation = 8.88392
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 124.009

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 2.72188
Background standard deviation = 0.388403
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 3.9601

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-03

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 21
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-03

Parameter: Chromium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 3.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-03

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.51333
Background standard deviation = 0.0833809
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.72729

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-03

Parameter: Lead

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 75%
Background measurements (n) = 8
Maximum Background Concentration = 2.5
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-03

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 104.625
Background standard deviation = 9.30342
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 134.284

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 2.33375
Background standard deviation = 0.212464
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 3.01109

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Barium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 10.0938
Background standard deviation = 0.833426
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 12.7507

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 0.961
Background standard deviation = 0.064868
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.12745

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 18.4375
Background standard deviation = 1.54544
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 23.3644

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 0.727625
Background standard deviation = 0.148982
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 1.20258

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 10.4125
Background standard deviation = 2.23443
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 17.5359

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-05

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.45
Background standard deviation = 0.0981981
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.70198

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 41.375
Background standard deviation = 2.66927
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 49.8846

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 1.7125
Background standard deviation = 0.319855
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 2.7322

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-06

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 34
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-06

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 1.6
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.55333
Background standard deviation = 0.0915475
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.78824

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-06

Parameter: Lead

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 1.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 78.875
Background standard deviation = 7.8638
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 103.945

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Radium-226/228

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = -0.366475
Background standard deviation = 0.143131
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 0.0898265

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 8.55
Background standard deviation = 0.570714
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 10.3694

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.48667
Background standard deviation = 0.10601
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.75869

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 34.8125
Background standard deviation = 2.59033
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 43.0705

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = -0.353994
Background standard deviation = 0.220765
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 0.349805

Location	Date	Value	Significant

Appendix O

Fate and Transport Model Inputs

Calculation Package

Geosyntec
consultants

COMPUTATION COVER SHEET

Client: **DTE** Project: **FAB ALD** Project/ Proposal No.: Task No. **GLP8014**

Title of Computations **Vertical Darcy Velocity and Travel Time Calculations**

Computations by:
Signature
Printed Name Nick Williams
Title Senior Staff Professional
11/17/2021 Date

Assumptions and Procedures Checked by: (peer reviewer)
Signature
Printed Name Jesse Varsho
Title
11/17/2021 Date

Computations Checked by:
Signature
Printed Name Isaiah Vaught
Title
11/17/2021 Date

Computations backchecked by: (originator)
Signature
Printed Name Nick Williams
Title
11/17/2021 Date

Approved by: (pm or designate)
Signature
Printed Name Omer Bozok
Title
11/24/2021 Date

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval

TABLE OF CONTENTS

1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Monroe Power Plant Fly Ash Basin (FAB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the FAB to the Uppermost Aquifer.

2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

3. DARCY VELOCITY SOLUTION

The Darcy velocity (q) through the model lithologies/layers is expressed in m/year =

$$= K(i) = K\left(\frac{H_1 - H_2}{l_1 - l_2}\right)$$

Where,

K = vertical hydraulic conductivity (laboratory measured)

i = vertical gradient

$H_1 - H_2$ = difference in hydraulic head between the FAB water level and the upper most aquifer potentiometric surface

$l_1 - l_2$ = distance in direction of flow

Thus:

K = Geomean of Sandy Lean Clay hydraulic conductivity value (data provided in Attachment 1) = 2.27×10^{-8} cm/s

H_1 = Total head at the bottom of FAB = 609 ft

H_2 = Average water level elevation from monitoring wells (data provided in Attachment 2) = 583.8[1] ft

l_1 = Elevation of bottom of FAB = 563 ft

l_2 = Average elevation of well screen midpoints = 532.95[1] ft

q = Darcy velocity in m/year (= cm/s * 315360) = 6.08×10^{-3} m/year

---

1. Value is an average taken from all monitoring wells with the exception of the outlier MW-16-04

4. TRAVEL TIME SOLUTION

Travel time through the model lithology is expressed in years =

$$T = t \Big/ \left(\frac{K * i}{n}\right)$$

Where:

t = minimum model thickness

K = vertical hydraulic conductivity (laboratory measured)

i = vertical gradient

n = effective porosity

Thus:

t =	Minimum model thickness per EVS model =	4.33 m
K =	Hydraulic conductivity =	2.27×10^{-8} cm/s
i =	Calculated using variables in Section 3 =	0.85
n =	Average of available porosity data, converted to effective porosity using Sara (1994) =	0.19
***T* =**	**Travel time in years (= s / 31536000) =**	**135.20 years**

Note: Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of FAB to top of uppermost aquifer.

Attachment 1

Permeability Data Evaluation
Table O-1

			Vertical Hydraulic Conductivity, k_v (cm/s)			
Location ID	**Layer**	**Elevation (ft)**	**DDW**	**Site Water**	**Lean Clay**	**Sandy Lean Clay**
TB2(1994)	Lean Clay	573.0	3.30E-08		3.30E-08	
	Sandy Lean Clay	568.0	5.80E-08			5.80E-08
	Sandy Lean Clay	563.0	1.30E-08			1.30E-08
	Sandy Lean Clay	558.0	1.50E-08			1.50E-08
	Sandy Lean Clay	553.0	2.00E-08			2.00E-08
	Sandy Lean Clay	548.0	2.00E-08			2.00E-08
TB4(1994)	Lean Clay	573.0	6.60E-08		6.60E-08	
	Sandy Lean Clay	568.0	2.10E-08			2.10E-08
	Sandy Lean Clay	563.0	4.70E-08			4.70E-08
	Sandy Lean Clay	558.0	2.10E-08			2.10E-08
	Sandy Lean Clay	553.0	3.00E-08			3.00E-08
	Sandy Lean Clay	548.0	1.80E-08			1.80E-08
TB6(1994)	Lean Clay	582.0	7.40E-08		7.40E-08	
	Lean Clay	577.0	1.80E-08		1.80E-08	
	Lean Clay	572.0	4.00E-08		4.00E-08	
	Sandy Lean Clay	567.0	6.50E-08			6.50E-08
TB8(1994)	Lean Clay	573.0	1.50E-08		1.50E-08	
	Sandy Lean Clay	568.0	2.20E-08			2.20E-08
	Sandy Lean Clay	563.0	4.80E-08			4.80E-08
	Sandy Lean Clay	558.0	1.60E-08			1.60E-08
	Sandy Lean Clay	553.0	1.70E-08			1.70E-08
	Sandy Lean Clay	548.0	4.70E-08			4.70E-08
	Sandy Lean Clay	543.0	3.80E-08			3.80E-08
	Sandy Lean Clay	538.0	1.90E-07			1.90E-07
TB10(1994)	Lean Clay	573.0	3.60E-08		3.60E-08	
	Sandy Lean Clay	568.0	1.20E-08			1.20E-08
	Sandy Lean Clay	563.0	5.30E-08			5.30E-08
	Sandy Lean Clay	558.0	3.70E-08			3.70E-08
	Sandy Lean Clay	553.0	1.50E-08			1.50E-08
B2-ST-1	Lean Clay	594.0		5.40E-09	5.40E-09	
B4-ST-2	Lean Clay	574.0		3.50E-09	3.50E-09	
B4-ST-4	Sandy Lean Clay	543.8		1.10E-08		1.10E-08
B6-ST-1	Lean Clay	589.0		7.60E-09	7.60E-09	
B6-ST-3	Sandy Lean Clay	558.8		9.80E-09		9.80E-09
B6-ST-4	Sandy Lean Clay	548.8		1.00E-08		1.00E-08
B9-ST-2	Lean Clay	574.0		1.10E-07	1.10E-07	
B9_ST-3	Sandy Lean Clay	559.0		1.40E-08		1.40E-08
MW-16-01	Sandy Lean Clay	558.5	1.60E-08			1.60E-08
MW-16-02	Sandy Lean Clay	549.0	1.30E-08			1.30E-08
MW-16-03	Sandy Lean Clay	556.9	1.20E-08			1.20E-08
MW-16-04	Sandy Lean Clay	562.2	1.20E-08			1.20E-08

Statistical Parameter	**Lean Clay**	**Sandy Lean Clay**
Mean	3.71E-08	3.07E-08
GeoMean	**2.31E-08**	**2.27E-08**
Maximum	1.10E-07	1.90E-07
Minimum	3.50E-09	9.80E-09
Count	11	30
Standard Deviation	3.38E-08	3.41E-08
GeoMean of All Data	2.28E-08	

Attachment 2

Edited by Geosyntec to assess vertical gradient - OB

Table 1

Groundwater Elevation Summary – April and October 2020
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
Monroe, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
Date Installed	2/17/2016		2/18/2016		2/16/2016		2/15/2016		4/13/2016		4/13/2016		4/14/2016	
TOC Elevation	581.74		581.81		579.95		585.54		580.42		581.94		578.40	
Geologic Unit of Screened Interval	Silt/Limestone Interface		Silt/Limestone Interface		Sand & Silty Clay Limestone Interface		Silty Sand and Gravel		Limestone		Gravel and Cobbles		Silt/Limestone Interface	
Screened Interval Elevation	530.9 to 525.9		526.4 to 521.4		540.3 to 535.3		541.6 to 536.6		540.5 to 535.5		534.2 to 529.2		540.4 to 535.4	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
04/08/2020	4.10	577.64	-4.50	586.3	-11.60	591.6	-15.00	600.5	-15.00	595.4	-1.10	583.0	-6.80	585.2
10/05/2020	4.68	577.06(1)	-0.85	582.7	-7.30	587.3	-15.00	600.5	-11.50	591.9	0.80	581.14	-4.40	582.8

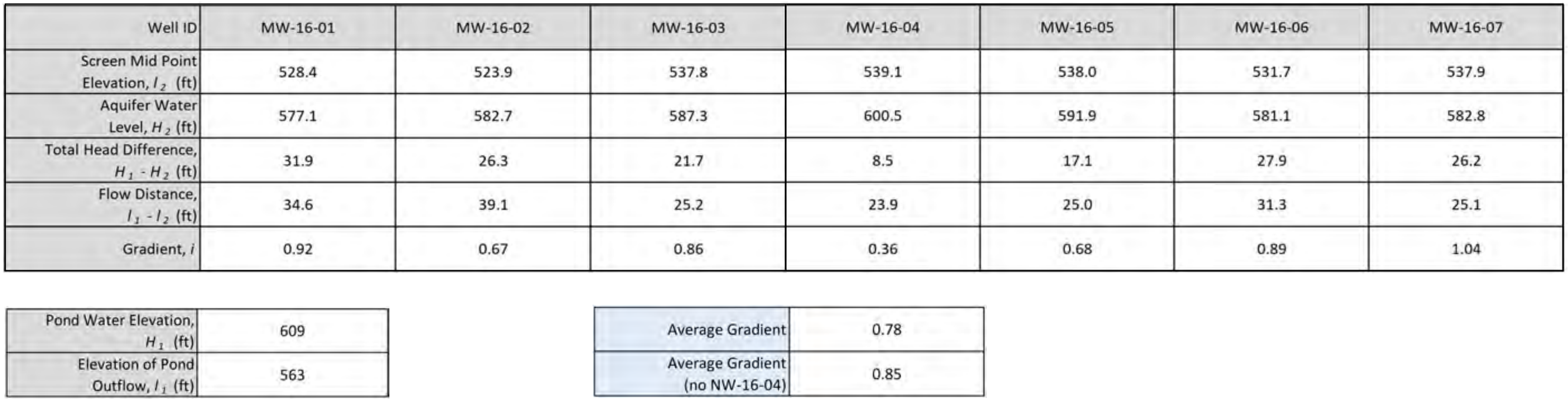
Notes:

Negative depth to water measurement indicates artesian conditions, actual measured water level is above the top of casing.

Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet below top of casing

(1) Water level meaured on October 6, 2020.



Well ID	MW-16-01	MW-16-02	MW-16-03	MW-16-04	MW-16-05	MW-16-06	MW-16-07
Screen Mid Point Elevation, l_2 (ft)	528.4	523.9	537.8	539.1	538.0	531.7	537.9
Aquifer Water Level, H_2 (ft)	577.1	582.7	587.3	600.5	591.9	581.1	582.8
Total Head Difference, $H_1 - H_2$ (ft)	31.9	26.3	21.7	8.5	17.1	27.9	26.2
Flow Distance, $l_1 - l_2$ (ft)	34.6	39.1	25.2	23.9	25.0	31.3	25.1
Gradient, i	0.92	0.67	0.86	0.36	0.68	0.89	1.04

Pond Water Elevation, H_1 (ft)	609
Elevation of Pond Outflow, l_1 (ft)	563

Average Gradient	0.78
Average Gradient (no NW-16-04)	0.85

POLLUTE Model Inputs

POLLUTE Model Inputs - Fly Ash Basin

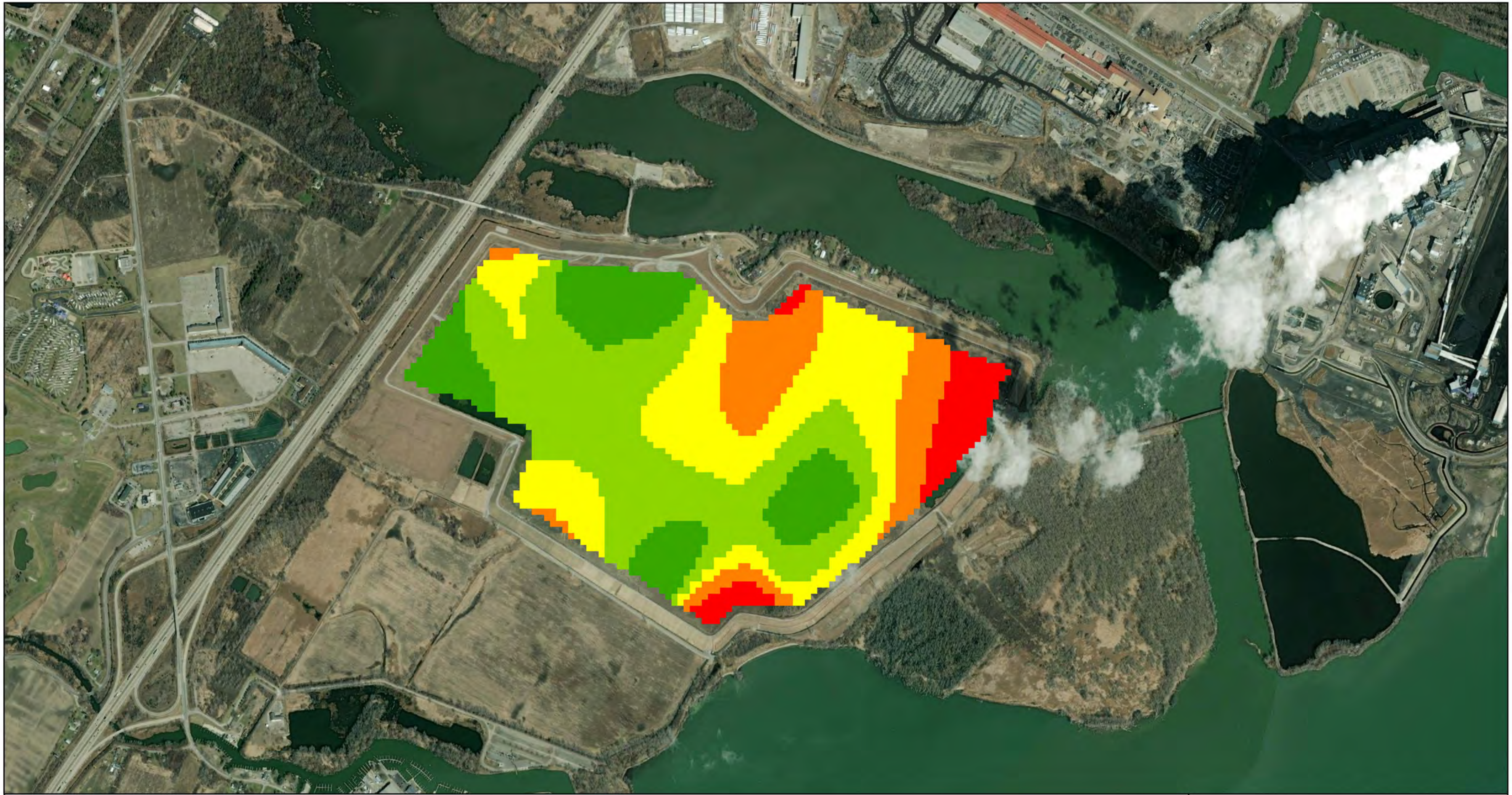
Table O-2

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity - Doubled (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Effective Porosity Max	Effective Porosity Min	Modeling Period (years)	Modeling Period for Sensitvity	Distribution Coefficient (See Note 5)	Dry Density (kg/m3)
FAB	Sandy Lean Clay	6.08E-03	1.22E-02	6.31	10.42	4.33	10	2.27E-08	0.019	0.024	0.014	0.19	0.31	0.14	67	97	0	1919

Notes:

1. Kv = Vertical Hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table O-1.
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. CoHD = Coefficient of Hydrodynamic Dispersion
4. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994.
5. Distribution Coefficient, Kd of 0.0082 m3/kg was used for Molybdenum, for minimum thickness sensitivity analysis.

Model Thickness



Legend

FAB Sandy Lean Clay Thickness (ft)

- 🟩 14.3 - 18.3
- 🟩 18.4 - 20.4
- 🟨 20.5 - 22.6
- 🟧 22.7 - 25.9
- 🟥 26 - 34.2

0 500 1,000 2,000 Feet

Sandy Lean Clay Thickness
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

Geosyntec consultants

GLP8014

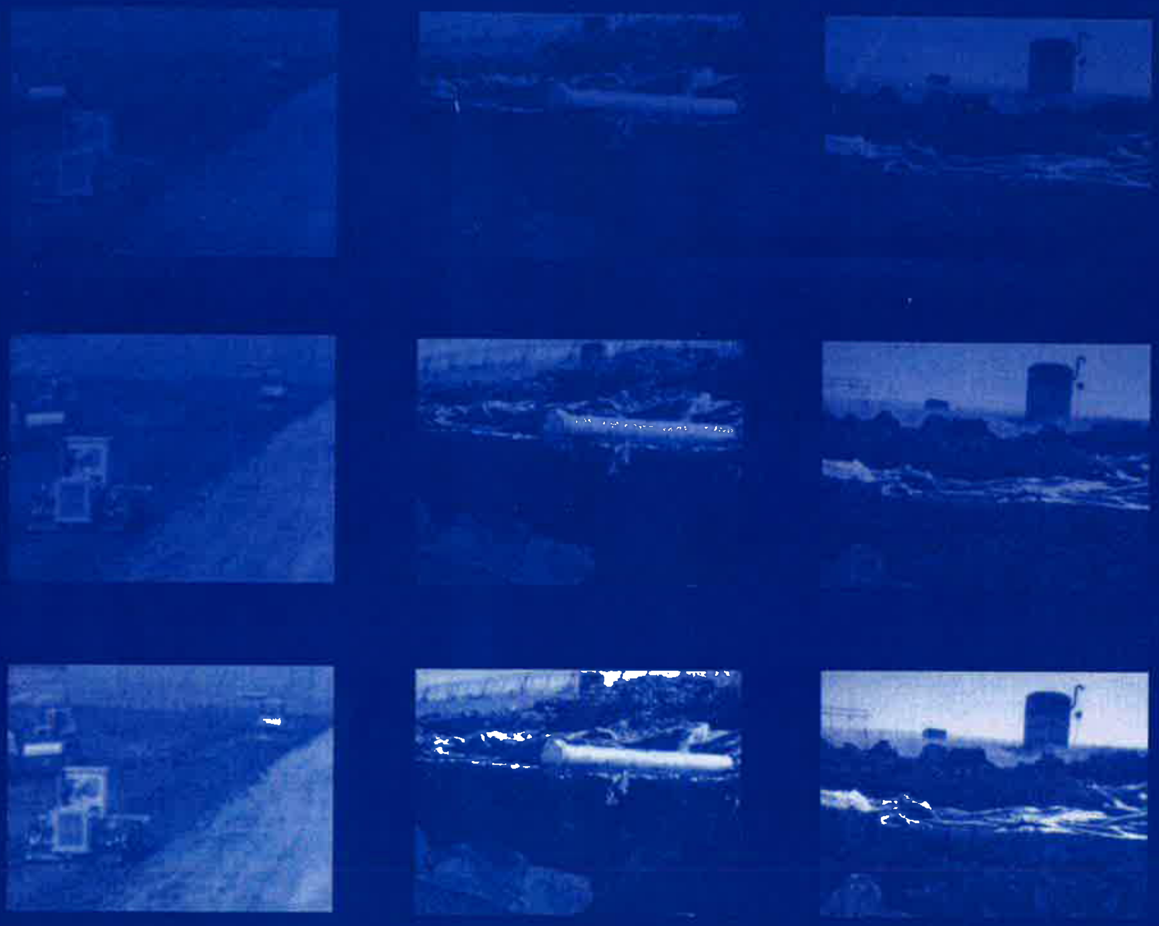
October 2021

Figure

O-1

Reference Material

CRC Press
Taylor & Francis Group
A CHAPMAN & HALL BOOK



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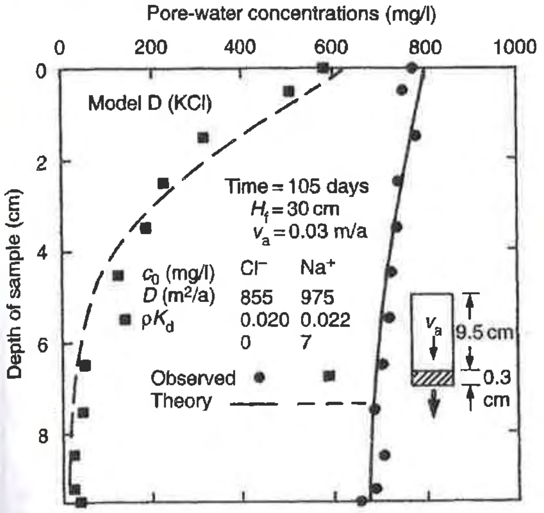

Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe *et al.*, 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some confidence in the parameters D and ρK_d for the clay and source fluids examined.

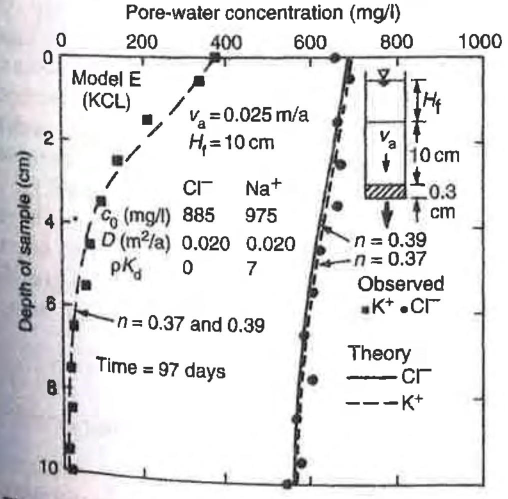

Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe *et al.*, 1988).

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient, D, for chloride was deduced for each model and ranged between 0.018 and 0.02 m^2/a with an average value of 0.019 m^2/a. This small variation in D does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m^2/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters D and K_d. Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection–diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

SITE ASSESSMENT and REMEDIATION Handbook

Second Edition

Martin N. Sara

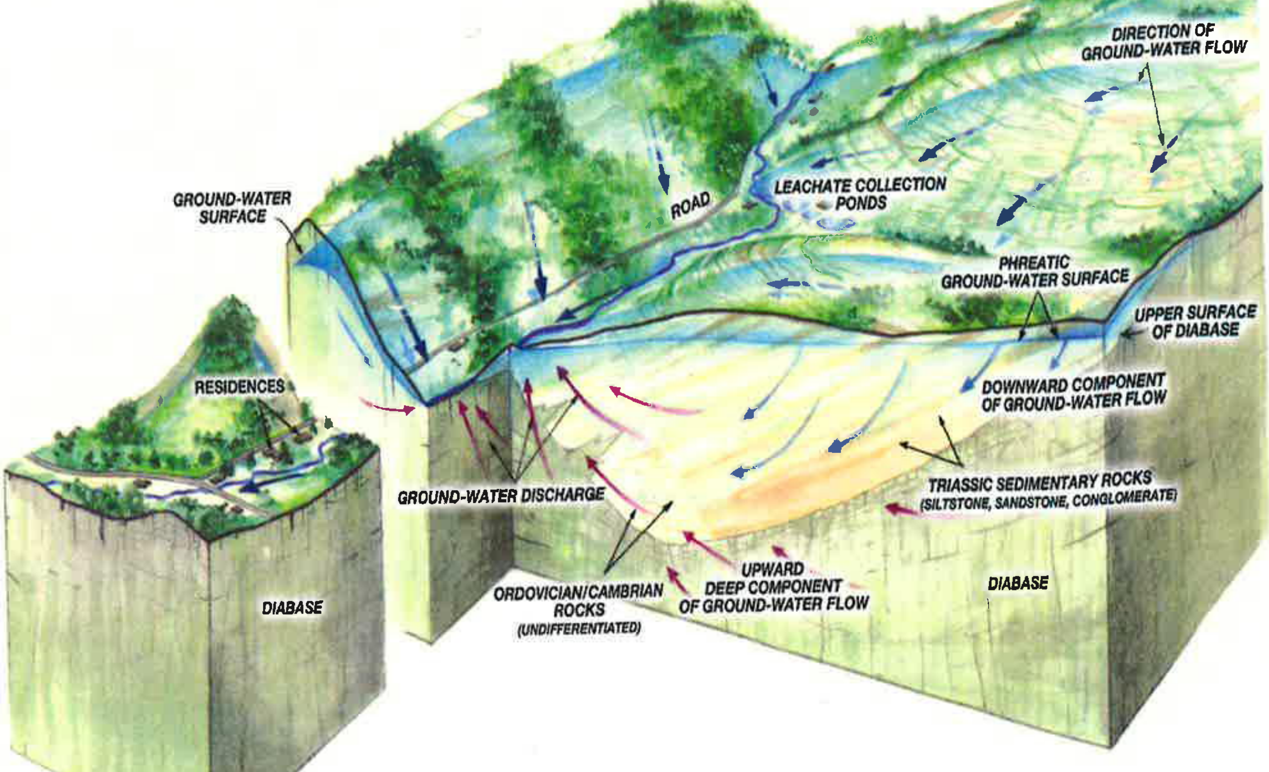

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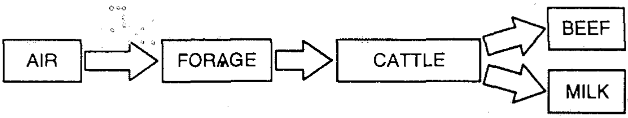
Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils

		Total	Residual	Effective
Texture Class	Sample Size	Porosity (ϕ) cm^3/cm^3	Saturation (ϕr) cm^3/cm^3	Porosity (ϕ_c) cm^3/cm^3
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

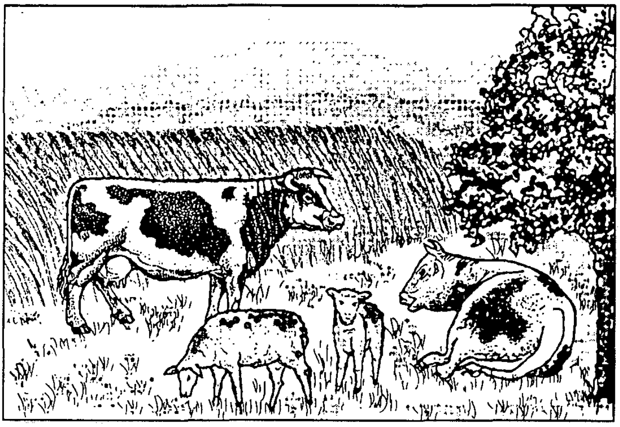
First line is the mean value
Second line is + one standard deviation about the mean

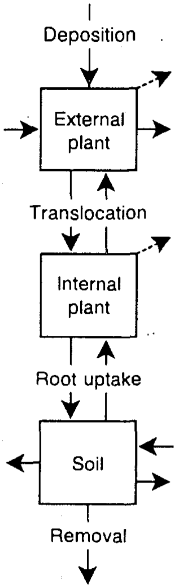
Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.



$$C_{M,i} = F_m C_{a,i} Q_F \exp(-\lambda_i t_f)$$





$$C_{s,i} = \frac{d_i[1 - \exp(-\lambda^{s}_{Ei} t_b)]}{P\lambda^{s}_{Ei}}$$

TECHNICAL REPORTS SERIES No. **364**

Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments

Produced in collaboration with the International Union of Radioecologists

INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1994

TABLE IX. PARTITION COEFFICIENT K_D OF RADIONUCLIDES IN SOILS (L/Kg) [37]

Nuclide	Soil type							
	Sand		Loam		Clay		Organic	
	Expected	Range	Expected	Range	Expected	Range	Expected	Range
Ac	4.5×10^{2}		1.5×10^{3}		2.4×10^{3}		5.4×10^{3}	
Ag	9.0×10^{1}	$2.5\times10^{0} - 3.3\times10^{3}$	1.2×10^{2}	$1.3\times10^{1} - 1.1\times10^{3}$	1.8×10^{2}	$8.1\times10^{1} - 4.0\times10^{2}$	1.5×10^{4}	$2.4\times10^{3} - 8.9\times10^{4}$
Am	2.0×10^{3}	$1.1\times10^{1} - 2.6\times10^{5}$	9.9×10^{2}	$6.0\times10^{2} - 1.6\times10^{5}$	8.1×10^{3}	$4.5\times10^{1} - 1.5\times10^{6}$	1.1×10^{5}	$3.6\times10^{3} - 3.3\times10^{6}$
Be	2.4×10^{2}		8.1×10^{2}		1.3×10^{3}		3.0×10^{3}	
Bi	1.2×10^{2}		4.0×10^{2}		6.7×10^{2}		1.5×10^{3}	
Br	1.5×10^{1}		4.9×10^{1}		7.4×10^{1}		1.8×10^{2}	
Ca	9.0×10^{0}		3.0×10^{1}		4.9×10^{1}		1.1×10^{2}	
Cd	7.4×10^{1}	$3.7\times10^{0} - 1.5\times10^{3}$	4.0×10^{1}	$1.6\times10^{0} - 9.9\times10^{2}$	5.4×10^{2}	$9.0\times10^{1} - 3.3\times10^{3}$	8.1×10^{2}	$8.2\times10^{0} - 8.1\times10^{4}$
Ce	4.9×10^{2}	$2.0\times10^{1} - 1.2\times10^{4}$	8.1×10^{3}	$4.0\times10^{2} - 1.6\times10^{5}$	2.0×10^{4}	$7.3\times10^{3} - 5.4\times10^{4}$	3.0×10^{3}	
Cm	4.0×10^{3}		1.8×10^{4}	$4.4\times10^{3} - 7.3\times10^{4}$	5.4×10^{3}		1.2×10^{4}	
Co	6.0×10^{1}	$2.2\times10^{-1} - 1.6\times10^{4}$	1.3×10^{3}	$9.9\times10^{1} - 1.8\times10^{4}$	5.4×10^{2}	$1.5\times10^{1} - 2.0\times10^{4}$	9.9×10^{2}	$4.9\times10^{1} - 2.0\times10^{4}$
Cr	6.7×10^{1}	$1.0\times10^{0} - 4.4\times10^{3}$	3.0×10^{1}	$9.1\times10^{-2} - 9.9\times10^{3}$	1.5×10^{3}		2.7×10^{2}	$1.2\times10^{0} - 6.0\times10^{4}$
Cs	2.7×10^{2}	$1.8\times10^{0} - 4.0\times10^{4}$	4.4×10^{3}	$3.3\times10^{2} - 6.0\times10^{4}$	1.8×10^{3}	$7.4\times10^{1} - 4.4\times10^{4}$	2.7×10^{2}	$2.0\times10^{-1} - 3.6\times10^{5}$
Fe	2.2×10^{2}	$1.2\times10^{0} - 4.0\times10^{4}$	8.1×10^{2}	$2.0\times10^{2} - 3.3\times10^{3}$	1.6×10^{2}	$6.7\times10^{0} - 4.0\times10^{3}$	4.9×10^{3}	
Hf	4.5×10^{2}		1.5×10^{3}		2.4×10^{3}		5.4×10^{3}	
Ho	2.4×10^{2}		8.1×10^{2}		1.3×10^{3}		3.0×10^{3}	
I	1.0×10^{0}	$1.3\times10^{-2} - 8.5\times10^{1}$	4.5×10^{0}	$8.2\times10^{-2} - 2.4\times10^{2}$	1.8×10^{2}	$8.2\times10^{-2} - 3.3\times10^{1}$	2.7×10^{1}	$5.0\times10^{-1} - 1.5\times10^{3}$
Mn	4.9×10^{1}	$3.0\times10^{0} - 8.1\times10^{2}$	7.2×10^{2}	$4.1\times10^{0} - 1.3\times10^{5}$	1.8×10^{2}	$3.3\times10^{0} - 9.9\times10^{3}$	4.9×10^{2}	
Mo	7.4×10^{0}	$8.2\times10^{-1} - 6.7\times10^{1}$	1.3×10^{2}		9.0×10^{1}	$8.2\times10^{0} - 9.9\times10^{2}$	2.7×10^{1}	$1.0\times10^{1} - 7.4\times10^{1}$
Nb	1.6×10^{2}		5.4×10^{2}		9.0×10^{2}		2.0×10^{3}	
Ni	4.0×10^{2}	$2.0\times10^{1} - 8.1\times10^{3}$	3.0×10^{2}		6.7×10^{2}	$1.6\times10^{2} - 2.7\times10^{3}$	1.1×10^{3}	$1.8\times10^{2} - 6.6\times10^{3}$
Np	4.1×10^{0}	$1.4\times10^{-1} - 1.2\times10^{2}$	2.5×10^{1}	$2.2\times10^{0} - 2.7\times10^{2}$	5.5×10^{1}	$2.7\times10^{-2} - 1.1\times10^{5}$	1.2×10^{3}	$5.4\times10^{2} - 2.7\times10^{3}$

Appendix O

Fate and Transport Model Outputs

POLLUTEv7

Version 7.13

Monroe Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	2.406E-01
	1.262E+00	1.036E-02
	1.893E+00	6.512E-05
	2.524E+00	5.518E-08
	3.155E+00	7.884E-12

	3.786E+00	1.784E-13
	4.417E+00	1.050E-14
	5.048E+00	3.552E-16
	5.679E+00	6.599E-18
	6.310E+00	6.382E-20
10	0.000E+00	1.000E+00
	6.310E-01	4.848E-01
	1.262E+00	1.063E-01
	1.893E+00	9.369E-03
	2.524E+00	3.137E-04
	3.155E+00	3.878E-06
	3.786E+00	1.742E-08
	4.417E+00	3.273E-11
	5.048E+00	1.136E-12
	5.679E+00	2.115E-13
	6.310E+00	3.070E-14
20	0.000E+00	1.000E+00
	6.310E-01	7.137E-01
	1.262E+00	3.598E-01
	1.893E+00	1.198E-01
	2.524E+00	2.531E-02
	3.155E+00	3.320E-03
	3.786E+00	2.666E-04
	4.417E+00	1.299E-05
	5.048E+00	3.816E-07
	5.679E+00	6.762E-09
	6.310E+00	8.328E-11
40	0.000E+00	1.000E+00
	6.310E-01	8.760E-01
	1.262E+00	6.701E-01
	1.893E+00	4.315E-01
	2.524E+00	2.278E-01
	3.155E+00	9.681E-02
	3.786E+00	3.272E-02
	4.417E+00	8.723E-03
	5.048E+00	1.824E-03
	5.679E+00	2.979E-04
	6.310E+00	3.789E-05
67	0.000E+00	1.000E+00
	6.310E-01	9.472E-01
	1.262E+00	8.471E-01
	1.893E+00	7.007E-01
	2.524E+00	5.265E-01
	3.155E+00	3.543E-01
	3.786E+00	2.111E-01
	4.417E+00	1.105E-01
	5.048E+00	5.054E-02
	5.679E+00	2.010E-02
	6.310E+00	6.926E-03

NOTICE

POLLUTEv7

Version 7.13

Monroe_ExtendedRun_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
10	0.000E+00	1.000E+00
	6.310E-01	3.507E-15
	1.262E+00	6.010E-30
	1.893E+00	3.839E-44
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
25	0.000E+00	1.000E+00
	6.310E-01	5.228E-09
	1.262E+00	8.355E-18
	1.893E+00	9.295E-28
	2.524E+00	2.197E-36
	3.155E+00	1.618E-46
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
50	0.000E+00	1.000E+00
	6.310E-01	4.689E-05
	1.262E+00	5.082E-14
	1.893E+00	1.512E-18
	2.524E+00	2.079E-25
	3.155E+00	2.673E-32
	3.786E+00	3.334E-38
	4.417E+00	1.540E-45
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
97	0.000E+00	1.000E+00
	6.310E-01	4.400E-03
	1.262E+00	5.038E-09
	1.893E+00	2.101E-14
	2.524E+00	1.336E-17
	3.155E+00	5.858E-22
	3.786E+00	1.145E-27
	4.417E+00	5.317E-32
	5.048E+00	4.724E-36
	5.679E+00	7.080E-41
	6.310E+00	3.637E-46

NOTICE

Although this program has been tested and experience would indicate that it is accurate within the limits given by the assumptions of the theory used, we make no warranty as to workability of this software or any other licensed material. No warranties either expressed or implied (including warranties of fitness) shall apply. No responsibility is assumed for any errors, mistakes or misrepresentations that may occur from the use of this computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

Monroe_DoubleDarcy_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.0122 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	9.584E-20
	1.262E+00	5.786E-41
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	5.876E-15
	1.262E+00	1.709E-29
	1.893E+00	1.851E-43
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	9.978E-11
	1.262E+00	2.683E-19
	1.893E+00	1.035E-30
	2.524E+00	4.585E-40
	3.155E+00	1.494E-50
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	7.909E-06
	1.262E+00	1.583E-14
	1.893E+00	4.306E-20
	2.524E+00	1.309E-28
	3.155E+00	1.232E-34
	3.786E+00	4.003E-42
	4.417E+00	3.407E-49
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	8.217E-04
	1.262E+00	4.765E-12
	1.893E+00	1.025E-15
	2.524E+00	2.389E-20
	3.155E+00	6.917E-27
	3.786E+00	8.473E-32
	4.417E+00	8.991E-37
	5.048E+00	7.293E-43
	5.679E+00	4.968E-48
	6.310E+00	0.000E+00

POLLUTEv7

Version 7.13

Monroe_CoHD_High_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.0238 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	4.639E-18
	1.262E+00	6.835E-37
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	2.805E-14
	1.262E+00	6.445E-26
	1.893E+00	5.670E-39
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	4.885E-09
	1.262E+00	7.038E-18
	1.893E+00	7.428E-28
	2.524E+00	1.576E-36
	3.155E+00	1.085E-46
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	4.306E-05
	1.262E+00	4.224E-14
	1.893E+00	1.156E-18
	2.524E+00	1.485E-25
	3.155E+00	1.704E-32
	3.786E+00	1.974E-38
	4.417E+00	8.453E-46
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	1.846E-03
	1.262E+00	2.287E-10
	1.893E+00	3.269E-15
	2.524E+00	5.068E-19
	3.155E+00	3.001E-24
	3.786E+00	2.289E-30
	4.417E+00	1.823E-34
	5.048E+00	2.422E-39
	5.679E+00	4.359E-45
	6.310E+00	7.177E-50

NOTICE

POLLUTEv7

Version 7.13

Monroe_CoHD_Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.01425 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	1.806E-01
	1.262E+00	3.160E-03
	1.893E+00	4.092E-06
	2.524E+00	3.625E-10
	3.155E+00	4.662E-13

	3.786E+00	2.122E-14
	4.417E+00	4.657E-16
	5.048E+00	4.575E-18
	5.679E+00	1.847E-20
	6.310E+00	2.778E-23
10	0.000E+00	1.000E+00
	6.310E-01	4.345E-01
	1.262E+00	6.471E-02
	1.893E+00	2.798E-03
	2.524E+00	3.269E-05
	3.155E+00	9.978E-08
	3.786E+00	8.567E-11
	4.417E+00	1.626E-12
	5.048E+00	2.459E-13
	5.679E+00	2.638E-14
	6.310E+00	1.942E-15
20	0.000E+00	1.000E+00
	6.310E-01	6.951E-01
	1.262E+00	3.050E-01
	1.893E+00	7.634E-02
	2.524E+00	1.031E-02
	3.155E+00	7.304E-04
	3.786E+00	2.667E-05
	4.417E+00	4.970E-07
	5.048E+00	4.728E-09
	5.679E+00	3.706E-11
	6.310E+00	5.747E-12
40	0.000E+00	1.000E+00
	6.310E-01	8.799E-01
	1.262E+00	6.537E-01
	1.893E+00	3.868E-01
	2.524E+00	1.751E-01
	3.155E+00	5.906E-02
	3.786E+00	1.460E-02
	4.417E+00	2.618E-03
	5.048E+00	3.380E-04
	5.679E+00	3.127E-05
	6.310E+00	2.067E-06
67	0.000E+00	1.000E+00
	6.310E-01	9.553E-01
	1.262E+00	8.550E-01
	1.893E+00	6.943E-01
	2.524E+00	4.973E-01
	3.155E+00	3.072E-01
	3.786E+00	1.611E-01
	4.417E+00	7.086E-02
	5.048E+00	2.594E-02
	5.679E+00	7.857E-03
	6.310E+00	1.961E-03

NOTICE

POLLUTEv7

Version 7.13

Monroe_Porosity_High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.31	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	2.013E-01
	1.262E+00	7.114E-03
	1.893E+00	3.651E-05
	2.524E+00	2.522E-08
	3.155E+00	3.021E-12

	3.786E+00	6.110E-14
	4.417E+00	2.930E-15
	5.048E+00	8.059E-17
	5.679E+00	1.216E-18
	6.310E+00	9.539E-21
10	0.000E+00	1.000E+00
	6.310E-01	4.126E-01
	1.262E+00	7.503E-02
	1.893E+00	5.431E-03
	2.524E+00	1.487E-04
	3.155E+00	1.500E-06
	3.786E+00	5.496E-09
	4.417E+00	8.727E-12
	5.048E+00	3.019E-13
	5.679E+00	4.601E-14
	6.310E+00	5.441E-15
20	0.000E+00	1.000E+00
	6.310E-01	6.227E-01
	1.262E+00	2.655E-01
	1.893E+00	7.349E-02
	2.524E+00	1.280E-02
	3.155E+00	1.378E-03
	3.786E+00	9.049E-05
	4.417E+00	3.600E-06
	5.048E+00	8.635E-08
	5.679E+00	1.250E-09
	6.310E+00	1.361E-11
40	0.000E+00	1.000E+00
	6.310E-01	7.902E-01
	1.262E+00	5.276E-01
	1.893E+00	2.897E-01
	2.524E+00	1.284E-01
	3.155E+00	4.539E-02
	3.786E+00	1.267E-02
	4.417E+00	2.780E-03
	5.048E+00	4.769E-04
	5.679E+00	6.377E-05
	6.310E+00	6.633E-06
67	0.000E+00	1.000E+00
	6.310E-01	8.794E-01
	1.262E+00	7.088E-01
	1.893E+00	5.152E-01
	2.524E+00	3.335E-01
	3.155E+00	1.905E-01
	3.786E+00	9.533E-02
	4.417E+00	4.160E-02
	5.048E+00	1.576E-02
	5.679E+00	5.174E-03
	6.310E+00	1.467E-03

NOTICE

Although this program has been tested and experience would indicate that it is accurate within the limits given by the assumptions of the theory used, we make no warranty as to workability of this software or any other licensed material. No warranties either expressed or implied (including warranties of fitness) shall apply. No responsibility is assumed for any errors, mistakes or misrepresentations that may occur from the use of this computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

Monroe_Porosity_Low_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.14	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	1.968E-23
	1.262E+00	6.574E-49
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	9.082E-17
	1.262E+00	6.210E-34
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	1.653E-13
	1.262E+00	4.000E-23
	1.893E+00	1.698E-35
	2.524E+00	2.696E-48
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	1.026E-07
	1.262E+00	1.821E-16
	1.893E+00	1.428E-24
	2.524E+00	2.512E-33
	3.155E+00	1.118E-41
	3.786E+00	2.433E-50
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	5.156E-05
	1.262E+00	6.659E-14
	1.893E+00	2.147E-18
	2.524E+00	2.982E-25
	3.155E+00	4.881E-32
	3.786E+00	6.312E-38
	4.417E+00	3.087E-45
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00

NOTICE

POLLUTEv7

Version 7.13

Monroe Thick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	10.4 m	10	0.019 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	1.040E+00	3.877E-02
	2.080E+00	9.884E-06
	3.120E+00	1.266E-11
	4.160E+00	3.550E-14
	5.200E+00	1.439E-16

	6.240E+00	1.105E-19
	7.280E+00	1.237E-23
	8.320E+00	4.146E-28
	9.360E+00	6.878E-31
	1.040E+01	6.438E-34
10	0.000E+00	1.000E+00
	1.040E+00	2.003E-01
	2.080E+00	3.794E-03
	3.120E+00	5.081E-06
	4.160E+00	4.440E-10
	5.200E+00	7.695E-13
	6.240E+00	3.854E-14
	7.280E+00	9.158E-16
	8.320E+00	9.567E-18
	9.360E+00	4.018E-20
	1.040E+01	6.121E-23
20	0.000E+00	1.000E+00
	1.040E+00	4.787E-01
	2.080E+00	7.932E-02
	3.120E+00	3.764E-03
	4.160E+00	4.724E-05
	5.200E+00	1.513E-07
	6.240E+00	1.342E-10
	7.280E+00	3.164E-12
	8.320E+00	5.384E-13
	9.360E+00	6.450E-14
	1.040E+01	5.270E-15
40	0.000E+00	1.000E+00
	1.040E+00	7.497E-01
	2.080E+00	3.649E-01
	3.120E+00	1.021E-01
	4.160E+00	1.539E-02
	5.200E+00	1.206E-03
	6.240E+00	4.822E-05
	7.280E+00	9.730E-07
	8.320E+00	9.891E-09
	9.360E+00	7.898E-11
	1.040E+01	1.309E-11
67	0.000E+00	1.000E+00
	1.040E+00	8.880E-01
	2.080E+00	6.508E-01
	3.120E+00	3.633E-01
	4.160E+00	1.462E-01
	5.200E+00	4.100E-02
	6.240E+00	7.851E-03
	7.280E+00	1.014E-03
	8.320E+00	8.750E-05
	9.360E+00	5.025E-06
	1.040E+01	1.914E-07

NOTICE

POLLUTEv7

Version 7.13

Monroe Thin Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	4.33 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.330E-01	5.594E-15
	8.660E-01	5.373E-29
	1.299E+00	8.305E-43
	1.732E+00	0.000E+00
	2.165E+00	0.000E+00

	2.598E+00	0.000E+00
	3.031E+00	0.000E+00
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
10	0.000E+00	1.000E+00
	4.330E-01	1.833E-10
	8.660E-01	2.558E-19
	1.299E+00	8.161E-31
	1.732E+00	6.736E-40
	2.165E+00	1.295E-50
	2.598E+00	0.000E+00
	3.031E+00	0.000E+00
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
20	0.000E+00	1.000E+00
	4.330E-01	7.801E-06
	8.660E-01	7.981E-15
	1.299E+00	2.554E-20
	1.732E+00	1.104E-28
	2.165E+00	4.434E-35
	2.598E+00	2.442E-42
	3.031E+00	7.572E-50
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
40	0.000E+00	1.000E+00
	4.330E-01	1.865E-03
	8.660E-01	2.628E-10
	1.299E+00	3.170E-15
	1.732E+00	5.208E-19
	2.165E+00	3.450E-24
	2.598E+00	2.364E-30
	3.031E+00	1.905E-34
	3.464E+00	2.807E-39
	3.897E+00	5.506E-45
	4.330E+00	7.651E-50
67	0.000E+00	1.000E+00
	4.330E-01	1.852E-02
	8.660E-01	1.382E-06
	1.299E+00	5.860E-13
	1.732E+00	2.216E-15
	2.165E+00	3.040E-18
	2.598E+00	6.476E-22
	3.031E+00	1.599E-26
	3.464E+00	8.031E-31
	3.897E+00	6.203E-34
	4.330E+00	1.604E-37

NOTICE

Attachment B

Alternative Liner Demonstration

Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

ALTERNATE LINER DEMONSTRATION FLY ASH BASIN

MONROE POWER PLANT

Monroe, Michigan

Prepared by

Geosyntec Consultants of Michigan

3011 West Grand Boulevard, Suite 2300
Detroit, Michigan 48202

GLP8014

April 2023

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1. INTRODUCTION

This report has been prepared to provide the Alternate Liner Demonstration (ALD) of Monroe Fly Ash Basin (FAB) coal combustion residuals (CCR) unit, in accordance with 40 CFR Part 257 as amended on November 12, 2020 (CCR Part B Rule). **Figure 1-1** provides the site location.

The FAB is one of two CCR units at the site. The other CCR unit is the Vertical Extension Landfill (Landfill) located within the northwest quadrant atop the FAB. DTE is planning to operate the Landfill through the end of 2040.

This report concludes that there is no reasonable probability that water from the FAB will cause a release to the groundwater that will exceed the groundwater protection standard (GWPS) at the waste boundary over the projected active life of the CCR unit.

1.1 Background

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

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

DTE submitted extension requests due to “analytical limitation” under separate covers, dated September 1, 2021 [2] and September 1, 2022 [3]. The extension requests detailed the compatibility testing program results through August 20, 2022. The USEPA has not yet responded to the extension requests.

The Part B Rule does not require the submittal of a preliminary ALD (PALD) by November 30, 2021 if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A). However, DTE provided a PALD [4] out of an abundance of caution and with confidence in the performance of the liner system as a “place holder” to comply with the requirement to submit a PALD by November 30, 2021.

The PALD detailed the site investigation, conceptual site model, laboratory study, and fate and transport model concluding that there is no reasonable probability that water from the FAB will cause a release to the groundwater that will exceed the GWPS at the waste boundary over the projected active life of the CCR unit. This ALD includes additional data analyzed subsequent to the submittal of the PALD, and confirms the appropriateness of the hydraulic conductivities used in the PALD fate and transport model.

1.2 Purpose

The purpose of this report is to provide the final ALD including the approach, analysis details, and final results in accordance with the CCR Rule.

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.

- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific porewater, and discussion of results.

- Section 4 – provides analysis approach, details, GWPS, and evaluation of results as to whether the FAB meets the ALD requirement of the CCR Rule.

- Section 5 – provides a summary of the report.

- Section 6 – provides certification.

- Section 7 – provides references.

1.4 Terms of Reference

This report was prepared by Mike Coram C.P.G., Clinton Carlson Ph.D., P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec Consultants of Michigan, Inc. (Geosyntec).

2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

> *§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*
>
> *(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*
>
> *(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*
>
> *(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*
>
> *(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*
>
>> *(i) Samples are advanced to a depth less than the top of the groundwater table or 20 feet beneath the bottom of the nearest water body, whichever is greater, and/or*
>>
>> *(ii) Samples are spaced further apart than 200 feet around the impoundment perimeter;*
>
> *(5) A narrative description of site geological history; and*
>
> *(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*
>
>> *(i) The relative location of the impoundment with depth of ponded water noted;*
>>
>> *(ii) Monitoring wells with screening depth noted;*
>>
>> *(iii) Depiction of the location of other samples used in the development of the model;*

> *(iv) The upper and lower limits of the uppermost aquifer across the site;*
>
> *(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and*
>
> *(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.*

2.1 Introduction

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

2.2 Site Geology

The geology of Monroe County consists of primarily unconsolidated (soil) alluvium and glacial till deposits overlying bedrock. The unconsolidated material consists of shallow/surficial alluvium deposits (sand and gravel) on top of clay-rich glacial drift with some sporadic glaciofluvial deposits that range from not present to more than 150-feet (ft) thick, with an average thickness of about 50 ft [1].

In the area of the FAB, clay-rich glacial drift directly overlies the bedrock and varies in thickness from 14- to 34-ft thick. There does not appear to be glaciolacustrine or glaciofluvial deposits as there are few sand and gravel lenses. It appears the drift was deposited directly from glacial events as there is a relatively consistent clay-rich glacial drift with minimal sands and gravels usually associated with a meltwater discharge. Bedrock in Monroe County is predominantly Devonian and Silurian-aged carbonates and includes the Antrim Shale, Traverse Group, Dundee Formation (limestone and some dolostone), Detroit River Group, Sylvania Sandstone, Bass Islands Group, and Salina Group. Monroe County’s eastern boundary is Lake Erie, and in general, regional groundwater flow is to the east towards Lake Erie [1]. Much of the carbonate bedrock aquifer in Monroe County is confined and naturally artesian. Saturated bedrock of the Bass Islands Group is generally encountered from 37 to 53.5 ft below ground surface (ft-bgs). Groundwater flow in the carbonate bedrock aquifer in Monroe County is primarily through secondary porosity consisting of fractures often evident along bedding-plane partings [1].

2.2.1 Fly Ash Basin Site-Specific Geology

The FAB is located about one mile southwest of the Monroe Power Plant (MPP) in Monroe, Michigan, and is bounded on the east by Lake Erie and the MPP discharge canal, on the west by Interstate Highway 75 (I-75), on the south by an agricultural field, and on the north by residential property and Plum Creek. The FAB is encapsulated by an embankment that is up to 46 ft in height. The perimeter of the embankment crest defines the outer limits of the watershed, which is the plan area of rainfall. There is no outer watershed area that flows directly into the FAB.

During the ALD investigation in December 2020, 95 cone penetration tests (CPTs) and 9 soil borings were drilled along the top of the embankment to augment existing data. Based on the data from Geosyntec's 2020 investigation, the geology was relatively consistent with previous geologic interpretations that the underlying clay-rich soil had consistently low hydraulic conductivities. Although the geology was consistent, the clay-rich soil descriptions are redefined below:

- The embankment was created with the upper 10 ft of clay-rich native soils and compacted to act as a perimeter dike for the FAB. The embankment material is described as a compacted lean clay.

- Directly underlying the embankment, the native soils consist of up to approximately 15-ft thick lean clay. Under the FAB (starting at approximate elevation 563 ft[1]) the geology consists of a 14- to 34-ft thick clay-rich soil identified as sandy lean clay. The sandy lean clay descriptor is consistent with ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) [5] and differs from previous soil descriptions.

- There is a transitional unit that also differs from previous soil descriptions and is identified as weathered bedrock and/or a mix of clay, sand and gravel. This unit is approximately 5- to 10-ft thick and directly underlies the sandy lean clay and sits atop the bedrock.

The transitional unit is saturated and considered a part of the underlying fractured bedrock. For the purposes of this report, the transitional, weathered unit is considered the "uppermost aquifer unit" and is further discussed in Section 2.3.

2.3 Uppermost Aquifer Field Testing and Hydrogeology

The uppermost aquifer unit exhibits artesian conditions. In 2016, TRC installed seven bedrock monitoring wells to the north, east, south and west of the FAB. All monitoring wells exhibit artesian conditions except MW-16-01. Monitoring well MW-16-01 is located within several hundred feet of several off-site domestic residential wells located to the north along Dunbar Road adjacent to Plum Creek that likely lower the hydraulic head in the area of MW-16-01 [1]. Wells located hydraulically upgradient of the FAB include MW-16-03, MW-16-04 and MW-16-05 on

---

[1] Elevations are referenced to National Geodetic Vertical Datum of 1929.

the southwestern and southern part of the FAB. These wells exhibit artesian conditions, in which potentiometric elevations are significantly above the ground surface (generally 10 to 15 ft above ground surface). Downgradient monitoring wells MW-16-01, MW-16-06 and MW 16-07 range from slightly artesian to not artesian (MW-16-01).

The general flow lines within the uppermost aquifer at the site are to the northeast towards Plum Creek. The average hydraulic gradient to the northeast ranges from 0.002 to 0.0025 foot/foot along the eastern part of the FAB to 0.004 to 0.005 foot/foot in the center and northwestern part of the FAB, with an overall mean of 0.004 foot/foot.

In 2016, a hydraulic conductivity of approximately 1.5E-3 centimeters per second (cm/s) was measured at monitoring well MW-16-01 using a single well hydraulic conductivity test. In 2021, TRC conducted slug tests at monitoring wells MW-16-02 through MW-16-07 using a modified single well hydraulic conductivity test. Measured hydraulic conductivities ranged from 2.6E-3 cm/s to 3.5E-2 cm/s. Test results are provided in **Appendix A**. The monitoring well construction details are presented in **Appendix B.**

2.4 Summary of Data Used for Site Characterization

Data from many investigations were used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included the 1970s, 1990s, and 2016, which are included in the initial ALD Application [1]. Data from Geosyntec's 2020 ALD Investigation were used to supplement the previous data sets. In total, these investigations included 57 borings, 95 CPTs, and seven monitoring wells. **Figure 2-1** provides investigation locations.

Boring logs from the 1970s, 1990s, 2016, and 2020 field investigations are provided in **Appendices C** through **F**, respectively. These investigations were conducted within the FAB (prior to excavation in the 1970s), outside of the FAB embankment, and through the embankment (conducted by Geosyntec in 2020 as described in Section 2.5).

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and pore pressure dissipation (PPD) tests at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices G** through **J** for the 1970s, 1990s, 2016, and 2020 laboratory studies, respectively.

It is Geosyntec's opinion that the combined data used in building the site model are sufficient to capture the variability that may exist in soil conditions.

2.5 ALD-Specific Site Investigation Details

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the embankment and native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to augment the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted at 200-ft intervals at the top of the embankment from elevation 615 ft down to 75 ft-bgs to an approximate elevation of 540 ft. The nearest surface water body is Plum Creek, to which groundwater flows, located north of the FAB. The investigation extends down to 20 ft below the bottom of Plum Creek, which is at an approximate elevation of 562 ft.

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

2.5.1 Cone Penetration Tests

Ninety-five CPTs were completed atop the embankment in 200 ft intervals to characterize the FAB embankment and native soils. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or down to approximately 75 ft-bgs. PPD tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 70 PPD tests were completed at CPTs advanced on top of the embankment; however, equilibrium pore pressure was not achieved in many of the PPD tests due to the long wait-time associated with the fine-grained low hydraulic conductivity soils, so only six PPD tests were used for calculating hydraulic conductivity. The tests that did not achieve pore pressure equilibrium would likely have hydraulic conductivities less than the values observed for the PPD tests that converged. Hydraulic conductivity values were estimated to range between 1.66E-7 cm/s and 3.29E-8 cm/s. Results are summarized in **Table 2-2**.

CPT logs are provided in **Appendix K1**, and PPD tests are provided in **Appendix K2**.

2.5.2 Sonic Drilling

In December 2020, nine soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples for characterization of native soils and the embankment. Soil samples were collected continuously in 2 to 10-ft sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS).

Shelby tubes were collected from the FAB embankment soils, and native soils at approximately 20-ft intervals from each of the sonic borings in accordance with ASTM D1587 [6]. For stiff soil samples where Shelby tube sampling was not feasible, samples were collected with a Pitcher barrel sampler in accordance with ASTM D6519 [7]. The soil borings were advanced to depths of approximately 75 ft-bgs to characterize the embankment and native soils. Sonic drilling locations are provided in **Figure 2-1.** Boring logs are provided in **Appendix F**. Soil stratigraphy is discussed in Section 2.6.

2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. One hundred thirty-one soil samples were collected from nine borings from depths between 5 ft-bgs and 75 ft-bgs for hydraulic conductivity testing to capture stiff to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 131 Moisture Content tests (ASTM D2216)
- 8 Specific Gravity tests (ASTM D854)
- 75 Grain Size Mechanical Sieve tests (ASTM D6913)
- 8 Grain Size Hydrometer tests (ASTM D7928)
- 75 Atterberg Limits tests (ASTM D4318)

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

2.6 Conceptual Site Model

A comprehensive conceptual site model was developed from the data collected during the field investigations and an EVS model was developed for the site. Based on the EVS model, the overall conceptual site model of the FAB lithology is relatively consistent with low hydraulic conductivity clay-rich glacial deposits with non-interconnected sand seams. Within the FAB footprint, the uppermost aquifer includes the bedrock and overlying transition zone. The uppermost aquifer is assumed to extend from the top of the transitional unit to the base of the bedrock. The vertical extent of fractures within the fractured bedrock aquifer is unknown, so it is assumed the entire bedrock beneath the FAB is fractured.

Cross-sections (**Figures 2-2** through **2-7**) were created from the EVS model and analyzed to determine the various changes in lithology across the FAB. Upon review of the transects, the lithology beneath the FAB consists of (from the embankment downward) (1) lean clay, (2) sandy lean clay, (3) transitional unit, and (4) bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]; however, the naming of the units has been updated. Previous soil descriptions identify the main clay unit underlying the FAB as a "silty clay". However, geotechnical laboratory index test results (i.e., Atterberg limits and grain size distribution tests) indicate the soil is classified as a "sandy lean clay" as shown in **Figure 2-8**.

A second discrepancy is the identification of the transitional unit that was included in the descriptors. There appears to be some variation in the description of the unit directly atop the bedrock. The transitional unit was encountered below the sandy lean clay and atop the bedrock and mainly consists of weathered bedrock and clay mixed with gravel, sand and silt. The uppermost aquifer was identified as the top of the transitional unit and includes the transitional unit and bedrock. The lithology directly underlying the FAB consist of the following:

- (1) Lean clay – This unit represents the compacted lean clay (i.e., embankment) and native lean clay soils immediately below the embankment. This unit consists of soils that are generally classified as lean clay with sand (i.e., percent retained above sieve #200 is less than approximately 30%). In some cases, it is classified as sandy lean clay (i.e., percent retained above sieve #200 is greater than approximately 30%). Hereafter, the embankment, which is approximately 40-ft thick to an approximate elevation of 573 ft, is referred to as "lean clay". This unit consists of mainly compacted stiff clay and minimal sand seams. The embankment soils were sourced from the native lean clays.

- (2) Sandy lean clay – This unit is encountered directly beneath the FAB and ranges from 14- to 34-ft thick with an average thickness of 21 ft. This unit has an increasing thickness from south to north and consists of low plasticity clay. There were minimal observed sand lenses and they do not appear to be interconnected within the sandy lean clay unit. Based on the PPD test data, the hydraulic conductivity values ranged between 1.66E-7 cm/s and 3.29E-8 cm/s for native soils. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1] and are adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit.

- (3) Uppermost Aquifer Unit - The weathered bedrock and mixed clays with sand, silt and gravel is referred to as the transition unit and it sits atop the bedrock. The uppermost aquifer unit begins at the top of the transition unit and extends into the underlying fractured bedrock. The uppermost aquifer exhibits artesian conditions. At its thinnest section, the FAB has approximately 14 ft of clay-rich soil separating the bottom of the FAB from the uppermost aquifer. It is assumed the uppermost aquifer unit extends from the top of the transition unit to the base of the bedrock, which can extend to approximately 300 ft-bgs [6].

3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

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

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

3.1 Site-Specific Soil and Porewater Details

3.1.1 Soil Samples for Hydraulic Conductivity Testing

Sixteen site-specific soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs with PPDs and earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in the natural soils and the embankment present at the FAB.

3.1.2 Site-Specific Porewater Testing and Results

Site-specific CCR porewater samples were collected from five open standpipe wells screened in CCR for geochemical analyses to assess the representative composition of an “aggressive” solution for use in the hydraulic conductivity compatibility testing. Samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific porewater samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All porewater samples were found to be basic, with pH values ranging from 9.73 to 11.8 SU. Total dissolved solids (TDS) concentrations ranged from 390 to 1600 milligrams per liter (mg/L), although four of the five samples were found to have TDS concentrations less than 1000 mg/L, which is defined by the United States Geological Survey (USGS) as “freshwater”. Major ion compositions of these samples are illustrated on the Piper diagram in **Figure 3-1**. Three of the five samples suggest that the anion composition of the basin water is predominantly alkalinity, with variable contributions of sulfate. The cation composition is highly variable, with a range of calcium and monovalent cation (potassium and sodium) proportions and very little magnesium.

The analytical results are provided in **Appendix L** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist’s Workbench (GWB) v12.0.4. The GWB thermodynamic dataset ‘thermo.com.V8.R6_.tdat’ was used for the calculations to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of mg/L and the ionic strength of each sample was calculated in units of molality (m).

All samples contained similar ionic strength values (0.0124 m to 0.0311 m) with the exception of PZ-2, which contained an ionic strength of 0.0723 m. The PZ-2 sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

3.2 Hydraulic Conductivity Testing Procedure

Eight soil samples were tested for hydraulic conductivity, *k*, using deionized water in accordance with ASTM D5084 [9] to establish a baseline hydraulic conductivity. The other eight samples were selected for compatibility testing in accordance with ASTM D7100 [10] using site-specific porewater. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25;

- The hydraulic conductivity is steady, defined as four or more consecutive hydraulic conductivity measurements falling within ±25 % of the mean value if the mean hydraulic conductivity is greater than or equal to 1.0E-8 cm/s or within ±50 % if the mean hydraulic conductivity is less than 1.0E-8 cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;

- At least two pore volumes (PV) of flow have passed through the sample; and

- pH and electrical conductivity of effluent are within 10% of that for the influent with no significant increasing or decreasing trends.

3.3 Hydraulic Conductivity Test Results and Assessment

The final measured hydraulic conductivities based on ASTM D5084 for the samples range from 2.7E-9 to 8.1E-8 cm/s. **Table 3-2** presents a summary of the measured hydraulic conductivities for the samples and more details are provided in **Appendix J**.

Results for the hydraulic conductivity compatibility tests are provided in **Appendix M** with measurements through December 23, 2022 and summarized in **Table 3-3**. The table provides sample ID, the start date for testing, amount of PV passed through the sample, and hydraulic conductivity measurements.

A set of figures is included to present:

- PV passed with time;

- hydraulic conductivity with time;

- hydraulic conductivity versus PV passed;

- pH of inflow and outflow with time; and

- electrical conductivity (EC) of inflow and outflow with time.

These plots are provided in **Figures 3-2** through **3-41**.

The final measured hydraulic conductivities of samples range between 3.3E-9 and 1.0E-8 cm/s. The amount of PV that passed through the samples range from 1.5 to 7.8. All but sample B4-ST-2 (40-42') have passed more than 2 PV to satisfy the termination criterion. The hydraulic conductivities generally remained steady or slightly decreased with time and PV passed.

pH measurements are provided in **Table 3-4.** The average pH of inflow ranges from 12.5 to 12.6, and the average pH of outflow ranges from 8.5 to 8.7. The average pH of outflow are not within 10% of the average pH of inflow. The pH measurements of the inflow and outflow have remained steady over the two years of testing.

EC measurements are provided in **Table 3-5.** The average EC of inflow ranges from 5,639 to 5,905, and the average EC of outflow ranges from 1,080 to 1,833. The EC measurements of outflow and inflow are not within 10% for all the samples.

Table 3-6 summarizes if the samples have reached the termination criteria for PV, hydraulic conductivity, pH, and EC in December 2022. As summarized in the table, all but one sample (B4-ST-2) have reached the termination criteria for PV passed and hydraulic conductivity. None of the samples have reached the termination criteria for pH and EC.

Overall, the average hydraulic conductivity measurements for the samples (2.9E-9 to 1.1E-8 cm/s) have remained steady or slightly decreased from the average measurements (3.5E-9 to 1.4E-8 cm/s) presented in the PALD [4]. The average hydraulic conductivity measured for samples B2-ST-1 (5.4E-9 to 5.5E-9 cm/s) and B6-ST-3 (9.8E-9 to 1.0E-8) slightly increased from the PALD [4].

The results do not present inflow versus outflow data. The project team decided to keep the inflow constant to provide a more stable hydraulic gradient across the sample, more accurate estimation of hydraulic conductivity, faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion was satisfied during the two years of testing because of the consistently low hydraulic conducitivity results and constant hydraulic conductivity measurements (not significantly increasing or decreasing).

4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

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

> *(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*
>
> *(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*
>
> *(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

4.1 Introduction

A fate and transport model analysis was performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the FAB exceeds the GWPS at the waste boundary throughout its active life.

The model considers flow of CCR porewater Constituents of Concern (COC) migrating through the sandy lean clay down to the top of the uppermost aquifer (top of transition zone). The model does not consider additional migration of COCs horizontally to the waste boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COCs; thus, the model presents a conservative assessment.

According to §257.71(2)(ii)(C)(*3*), the owner must submit "…*a final demonstration that updates only the finalized hydraulic conductivity data to confirm that the model results in the preliminary demonstration are accurate*." The hydraulic conductivity used in the calculation of the Darcy velocity for the baseline fate and transport model corresponds to the geometric mean of all available data. For the PALD [4], a hydraulic conductivity of 2.27E-8 cm/s was used for the baseline model. The recalculated geometric mean hydraulic conductivity based on the updated laboratory test results presented in Section 3.3 is approximately 2.24E-8 cm/s, or a decrease of approximately 1%. Furthermore, a sensitivity analysis was performed as part of the fate and transport analyses in the PALD [4] that captured this change in hydraulic conductivity data within the range of hydraulic conductivities evaluated. Therefore, the model results for the fate and transport analysis presented in the PALD [4] are considered accurate and not updated for this ALD. The following sections summarize the fate and transport analyses from the PALD for convenience.

As discussed in Section 4.6.1 the results of the model predict COC concentrations that are very low such that there is no reasonable probability that water from the FAB will cause releases to the groundwater that will exceed the GWPS at the waste boundary over the projected active life of the FAB.

4.2 Groundwater Protection Standards

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

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

4.3 Consideration of Background Groundwater Concentrations

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

4.4 CCR Porewater Quality Results

CCR porewater quality samples from the FAB were collected in December of 2020 and January of 2021. Samples were analyzed for Appendix IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest CCR porewater concentration was used as the established concentration of the constituent (C_o) when calculating the predicted groundwater concentrations (PGC_t), as discussed further below. The CCR porewater quality data are summarized in **Table 4-2**.

In addition to the site-specific CCR porewater concentrations, 90th percentile concentrations from the 2014 EPA study [11] were considered in the analysis. This data is summarized in **Table 4-2**.

4.5 Fate and Transport Model

4.5.1 Analysis Model

A one-dimensional fate and transport model was performed to further understand the potential for contaminant transport from the FAB to the uppermost aquifer. The model was developed with a contaminant transport process through the sandy lean clay layer under the FAB. Contaminant transport processes are discussed in Section 4.5.2.1.

The modeling program POLLUTE [12] was selected for the one-dimensional fate and transport evaluation. POLLUTE uses the input parameters to perform calculations for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

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

4.5.2 Proposed Mathematical and Associated Computer Model

4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the FAB for the various modeled layer include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [13]:

$$\boldsymbol{Equation\ No.1}: \qquad n\frac{\delta c}{\delta t} = nD\frac{\delta^2 c}{\delta z^2} - V_\alpha\frac{\delta c}{\delta z} - \rho \mathrm{K}_d\frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

V_α = Darcy velocity in the vertical direction

K_d = distribution coefficient

ρ = dry density of soil

λ= decay constant of the contaminant species

t = time

POLLUTE assumes that the transport phenomena are governed by Equation No. 1.

4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the CCR porewater. The results from the model can thus be used as a prediction factor for estimating the future concentration of any COC in groundwater. Multiplying the output prediction factor by the initial CCR porewater concentration returns the predicted groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

Equation No. 2: $PGC_t = PF_t * C_o$

Where:

PGC_t =predicted groundwater concentration after t years.

PF_t = prediction factored after t years, which is the output of the model.

C_o = established CCR porewater concentration of the COC.

4.5.3 Fate and Transport Model Inputs

4.5.3.1 *Initial CCR Porewater or Source Concentration*

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

4.5.3.2 *Number of Layers and Layer Thickness*

One layer was modeled at the site: the sandy lean clay layer. At the FAB, the sandy lean clay layer has an average thickness of 20.7 ft. The average thickness of the layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer and averaging the difference over the footprint of the FAB. Model documentation for the average thickness can be found in **Appendix O**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The sandy lean clay layer was divided into 10 sublayers at the FAB.

4.5.3.3 *Modeling Period*

The model was run for an operating period of 67 years. This modeling period captures the amount of time elapsed from 1975, when operations started at the FAB, to 2041, when the Landfill within the FAB is planned to be closed.

4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters, or they can be selected by the user. The default Talbot parameters were used in this demonstration [14].

4.5.3.5 *Boundary Conditions*

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

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used. Therefore, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the sandy lean clay layer and the underlying uppermost aquifer (the transition zone overlying the limestone bedrock).

4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model. The Darcy velocity was calculated for the FAB using a vertical gradient and the vertical hydraulic conductivity of the sandy lean clay layer. For the FAB, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the elevation of the typical operation water level within the FAB. These parameters were chosen to produce a conservative value for the Darcy velocity. A Darcy velocity value of 6.08E-3 m/year was calculated for the FAB as provided in **Appendix O**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing program for the vertical hydraulic conductivity data of sandy lean clay.

4.5.3.7 *Hydrodynamic Dispersion Coefficient*

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

Equation No. 3: $D = D^* + av$

Where:

D = the hydrodynamic dispersion coefficient (m^2/year);

D* = the effective diffusion coefficient (m^2/year).

a = the dispersivity (m);

v = the groundwater seepage velocity (m/year).

For this demonstration, a coefficient of hydrodynamic dispersion value (D) of 0.19 m^2/year was input into the model. This value was based on the effective diffusion coefficient (D*) for chloride 0.19 m^2/yr, as calculated by Rowe et al. [15]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest. Therefore, it is a conservative constituent to model among the COCs.

The second part of Equation 3, the product of dispersivity and groundwater seepage velocity, is related to dispersion. Rowe et al. [15] discusses when the seepage velocity (6.08E-3 m/year) is low (i.e., clay soils), diffusion will control the hydrodynamic dispersion (D) and dispersion is negligible.

4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. An average of 24 percent porosity was estimated for the modeled sandy lean clay layer.

Based on empirical data provided by Sara [16], the laboratory porosity data was converted to effective porosities. An effective porosity value of 19 percent was used for the modeled sandy lean clay layer.

Density values from laboratory testing were also used to determine a suitable model input. The average density of 1,919 kg/m^3 (119.8 pcf) was estimated from the available data. This value was used in the POLLUTE model.

4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of contaminants in the modeled layers, while degradation simulates the breakdown of contaminants over time. Adsorption and degradation are assumed to be zero for the baseline model, which is conservative. Adsorption for molybdenum was considered for the sensitivity analysis including the minimum vertical flow path, extended time, increased Darcy velocity, the minimum effective porosity, and the high coefficient of hydrodynamic dispersion. For these sensitivity analyses, an adsorption coefficient of 0.0082 m3/kg was used [17]. More on sensitivity analyses are provided in Section 4.6.2.

4.6 Fate and Transport Analysis Results and Evaluation

4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. The baseline model calculated a PF_t of 6.97E-3. With both the C_o and PF_t established, the PGC_t (i.e., predicted concentration) was calculated and compared to the established GWPS for the FAB. As provided in **Table 4-3**, the predicted groundwater quality results, both for site-specific CCR porewater and the 90th percentile concentrations from the 2014 EPA study [11], are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in the 2016-2017 groundwater sampling events and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Table 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of the active life of the FAB.

The driving mechanism for the transport is chemical diffusion because the advective flow would take more than 130 years for a water molecule to travel from the bottom of the FAB to the uppermost aquifer. **Appendix O** provides calculations for the time of travel.

The baseline model outputs for the FAB are included in **Appendix P**.

4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or PF_t, given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**.

The resulting PF_t, from each sensitivity analysis was compared to a threshold prediction value, $PF_{threshold}$. The $PF_{threshold}$ value represents the PF_t at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the FAB (1.06E-2). $PF_{threshold}$ is calculated using the Equation No. 4:

Equation No. 4:

$$PF_{threshold} = \min\left\{\frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \ldots, \frac{GWPS_i}{C_i}, \ldots, \frac{GWPS_n}{C_n}\right\}$$

Where:

$PF_{threshold}$ = threshold prediction factor

$GWPS_i$ = groundwater protection standard for constituent ‘i’

C_i = maximum porewater concentration of the COC ‘i’

4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity. A Darcy velocity of 1.22E-2 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing [15], and thus a 25% increase and decrease are considered a satisfactory variation for the purposes of a sensitivity analysis.

4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results, which are 14 percent and 31 percent, respectively.

4.6.2.4 *Layer Thickness*

The isopach map was used to calculate the maximum and minimum thickness for the sandy lean clay layer (see **Appendix O**). Using the minimum and maximum thickness values as inputs, two additional models were run for the FAB to evaluate model sensitivities to layer thickness. In each model, only the thickness variable was changed.

4.6.2.5 *Modeling Period*

The modeling period used was 67 years (the "baseline"). To further evaluate the impact of modeling runtime on the resultant PF_t, one model was run with a modeling period of 97 years to capture the post-closure care period.

4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5**, using more conservative model input parameters resulted in PF_t values ranging from 7.18E-50 to 1.96E-3, all of which are less than the threshold value. Thus, this sensitivity analysis demonstrates that the FAB is not predicted to impact groundwater quality based on conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix P**.

4.6.3 Reliability of Computer Model

The computer-based fate and transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications ([14], [18], [19], [13], [20]) demonstratethe versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

4.6.4 Degree of Conservativeness in Model Results

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

- The maximum measured leachate (i.e., porewater) concentration for each constituent was used for the fate and transport model prediction table;
- Constant leachate concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decreased leachate concentrations over time, but to be conservative the model considered constant CCR porewater concentration over time;

- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays, which would retard or slow down the migration. The baseline model and about half of the sensitivity analyses, the model assumed no adsorption would occur over time;

- Degradation of concentrations (input values) through either the biologic or chemical process was assumed not to occur during the modeling period. By assuming no degradation, the model overestimated the predicted groundwater quality over time; and

- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of the FAB to the top of the uppermost aquifer; the analysis does not consider a horizontal flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

5. SUMMARY

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

Site-specific water was collected from different wells screened in CCR at the FAB and tested to assess which had the more aggressive water. Water from PZ-2 was deemed to be more aggressive and used for compatibility testing to estimate the impacts on the hydraulic conductivity of soil samples. The results of the testing program are presented in this ALD.

A comprehensive subsurface stratigraphy model was created using the available data set incorporated into the conceptual site model. Fate and transport analyses were conducted with PZ-2 chemistry water data to assess whether there is a reasonable probability that water from the FAB may result in a release to the groundwater during its active life that would exceed the GWPS at the waste boundary. The baseline fate and transport analysis was conducted using the available site-specific data and an operating time period of 67 years, which captures the period from 1975, when operations started at the FAB, to 2041, when the existing Landfill within the FAB is planned to be closed.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than 130 years for a water molecule to travel from the bottom of the FAB to the uppermost aquifer. Therefore, the analyses results indicate that, due to the low hydraulic conductivity of the in-situ soils, chemical diffusion is the dominant transport mechanism compared to advection or seepage flow. Consequently, the hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow.

A sensitivity analysis was performed as part of additional fate and transport analyses to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS.

The sensitivity analyses results show that there is no reasonable probability that water from the FAB will result in a release to the groundwater that would exceed the GWPS at the waste boundary over the projected active life of the FAB.

6. CERTIFICATION

CCR Unit: DTE Electric Company; Monroe Power Plant, Fly Ash Basin (FAB)

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

Clinton P. Carlson, Ph.D.
Printed Name

Clinton Carlson April 10, 2023
Signature Date

6201066842 Michigan February 16, 2025
Registration Number State Expiration Date

CLINTON
CARLSON
ENGINEER
No.
6201066842

Affix Seal

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TABLES

Table 2-1 – Field and Laboratory Testing Summary

Test	Current ASTM	Number Used in Characterization
Pocket Penetrometer	WK27337	418
Slug Test	D4044	8
Grain Size Distribution	D6913	124
Atterberg Limits	D4318	136
Water Content	D2216	754
Unit Weight	D7263	352
Specific Gravity	D854	34
Hydraulic Conductivity	D5084/D7100	41/8
Cone Penetration Test	D3441	95

Table 2-2 – Pore Pressure Dissipation Tests Results

CPT ID	Lithology Unit	Test Elevation (ft)	Hydraulic Conductivity (cm/s)
CPT20-028	Native	564.9	6.98E-7
CPT20-028	Native	559.9	2.77E-8
CPT20-048	Native	565.0	1.84E-7
CPT20-048	Native	559.9	2.41E-8
CPT20-130	Native	565.0	1.66E-7
CPT20-136	Native	549.1	3.29E-8

Table 3-1 – Chemistry Results of Site-Specific Filtered CCR Porewater

Sample ID	**Units**	**PZ-1**	**PZ-2**	**PZ-3**	**PZ-4**	**PZ-5**
Alkalinity, Total (as CaCO3)	mg/L	460	1400	580	170	130
Antimony	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.0092
Arsenic	mg/L	0.0158	0.0129	0.0079	0.218	0.058
Barium	mg/L	4.6	1.2	2.8	0.189	0.207
Beryllium	mg/L	0.00222	0.00224	0.004	0.00244	0.004
Boron	mg/L	11	8.9	6.3	4.9	24
Cadmium	mg/L	0.00217	0.004	0.004	0.0022	0.00169
Calcium	mg/L	230	74	187	111	550
Chloride	mg/L	48	32	34	37	26
Chromium	mg/L	0.0067	0.0082	0.0066	0.0075	0.01
Cobalt	mg/L	0.00569	0.00268	0.0055	0.0059	0.00534
Fluoride	mg/L	3.6	23	1.2	0.83	0.4
Iron	mg/L	0.62	0.95	0.51	0.77	0.21
Lead	mg/L	0.0062	0.0072	0.00593	0.0073	0.01

Lithium	mg/L	0.034	0.0135	0.032	0.77	0.0106
Magnesium	mg/L	0.42	1.04	0.4	0.46	1.34
Manganese	mg/L	0.01	0.0101	0.01	0.0105	0.01
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	2.4	3.9	0.39	3.9	19.2
Potassium	mg/L	39	430	116	124	6.8
Selenium	mg/L	0.093	0.2	0.09	0.056	0.0193
Sodium	mg/L	78	1050	183	97	3.3
Sulfate	mg/L	11	67	27	140	530
Thallium	mg/L	0.01	0.00141	0.00057	0.00531	0.00048
Ionic Strength	**molal (m)**	**0.0135**	**0.0723**	**0.0203**	**0.0124**	**0.0311**

Notes:

U - Analyzed but not detected above the method detection limit. The method detection limit is shown.

Table 3-2 – Summary of Hydraulic Conductivity Tests Results [9]

ID	Date	Hydraulic Conductivity (cm/s)
B1-ST-2 (40-42')	January 19, 2021	3.4E-9
B1-ST-3 (60-62')	January 19, 2021	6.8E-9
B4-ST-1 (15-17')	January 20, 2021	8.4E-9
B4-ST-3 (55-57.5')	January 20, 2021	5.4E-9
B5-ST-1 (73.5-76')	January 26, 2021	8.1E-8
B6-ST-2 (40-42.5')	January 21, 2021	2.7E-9
B7-ST-1 (65-67.5')	January 22, 2021	5.8E-9
B9-ST-1 (25-27')	January 22, 2021	3.5E-9

Table 3-3 – Summary of Compatibility Tests [10] - Hydraulic Conductivity and Pore Volumes Passed Results

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection
B2-ST-1 (20-22')	February 19, 2021	0	5.9E-9	0
	December 23, 2022	672	5.9E-9	3.09
B4-ST-2 (40-42')	February 19, 2021	0	4.7E-9	0
	December 23, 2022	672	3.3E-9	1.46
B4-ST-4 (70-72.5')	February 19, 2021	0	1.8E-8	0
	December 23, 2022	672	6.8E-9	6.77
B6-ST-1 (25-27')	February 19, 2021	0	9.6E-9	0
	December 23, 2022	672	6.6E-9	4.06
B6-ST-3 (55-57.5')	February 19, 2021	0	1.2E-8	0
	December 23, 2022	672	8.5E-9	5.97
B6-ST-4 (65-67.5')	February 19, 2021	0	1.5E-8	0
	December 23, 2022	672	6.2E-9	6.40
B9-ST-2 (40-42')	February 19, 2021	0	1.1E-8	0
	December 23, 2022	672	1.0E-8	5.65
B9-ST-3 (55-57')	February 19, 2021	0	2.7E-8	0
	December 23, 2022	672	6.7E-9	7.78

Table 3-4 – Summary of Compatibility Tests [10] **- pH Results**

Sample ID	Parameter	pH Inflow	pH Outflow
B2-ST-1 (20-22')	Min	12.2	8.2
	Max	13.1	9.1
	Average	12.5	8.6
B4-ST-2 (40-42')	Min	12.1	8.2
	Max	13.0	9.3
	Average	12.5	8.5
B5-ST-4 (70-72.5')	Min	12.1	8.2
	Max	13.3	10.1
	Average	12.6	8.7
B6-ST-1 (25-27')	Min	12.1	8.2
	Max	13.6	9.9
	Average	12.6	8.7
B6-ST-3 (55-57.5')	Min	11.4	8.0
	Max	13.0	9.5
	Average	12.5	8.7
B6-ST-4 (65.67.5')	Min	12.1	7.8
	Max	13.2	8.9
	Average	12.6	8.5
B9-ST-2 (40-42')	Min	11.7	7.9
	Max	13.1	9.5
	Average	12.5	8.7
B9-ST-3 (55-57')	Min	12.1	7.9
	Max	13.2	9.0
	Average	12.6	8.5

Table 3-5 – Summary of Compatibility Tests [10] **- Electrical Conductivity Results**

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)
B2-ST-1 (20-22')	Min	4300	1111
	Max	6660	3000
	Average	5842	1623
B4-ST-2 (40-42')	Min	4780	990
	Max	6330	1163
	Average	5807	1080
B5-ST-4 (70-72.5')	Min	4120	1082
	Max	6670	2360
	Average	5833	1536
B6-ST-1 (25-27')	Min	4170	928
	Max	9390	2660
	Average	5905	1450
B6-ST-3 (55-57.5')	Min	4350	1128
	Max	6780	3930
	Average	5792	1833
B6-ST-4 (65.67.5')	Min	3970	963
	Max	6570	3830
	Average	5639	1421
B9-ST-2 (40-42')	Min	4380	976
	Max	6570	3190
	Average	5859	1558
B9-ST-3 (55-57')	Min	4230	885
	Max	6480	2760
	Average	5742	1391

Table 3-6 – Summary of Compatibility Tests [10] - Termination Criteria

	Termination Criterion Reached (as of December 23, 2022)			
Sample ID	Pore Volumes Passed	Steady Hydraulic Conductivity	pH	Electrical Conductivity
B2-ST-1 (20-22')	Yes	Yes	No	No
B4-ST-2 (40-42')	No	Yes	No	No
B4-ST-4 (70-72.5')	Yes	Yes	No	No
B6-ST-1 (25-27')	Yes	Yes	No	No
B6-ST-3 (55-57.5')	Yes	Yes	No	No
B6-ST-4 (65.67.5')	Yes	Yes	No	No
B9-ST-2 (40-42')	Yes	Yes	No	No
B9-ST-3 (55-57')	Yes	Yes	No	No

Table 4-1 – Groundwater Protection Standards

Constituents	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.1E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**
Arsenic	mg/L	MCL	1.0E-02	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**
Barium	mg/L	MCL	2.0E+00	2.2E-02	**2.0E+00**	1.0E-02	**2.0E+00**	2.1E-02	**2.0E+00**	1.3E-02	**2.0E+00**	1.8E-02	**2.0E+00**	3.4E-02	**2.0E+00**	1.0E-02	**2.0E+00**
Beryllium	mg/L	MCL	4.0E-03	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**
Chromium	mg/L	MCL	1.0E-01	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	3.1E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**	2.0E-03	**1.0E-01**
Cobalt	mg/L	RSL	6.0E-03	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.6E-03	**6.0E-03**	1.0E-03	**6.0E-03**
Fluoride	mg/L	MCL	4.0E+00	1.8E+00	**4.0E+00**	1.8E+00	**4.0E+00**	1.7E+00	**4.0E+00**	1.1E+00	**4.0E+00**	1.7E+00	**4.0E+00**	1.8E+00	**4.0E+00**	1.8E+00	**4.0E+00**
Lead	mg/L	RSL	1.5E-02	1.0E-03	**1.5E-02**	1.0E-03	**1.5E-02**	2.5E-03	**1.5E-02**	1.0E-03	**1.5E-02**	1.0E-03	**1.5E-02**	1.1E-03	**1.5E-02**	1.0E-03	**1.5E-02**
Lithium	mg/L	Background or RSL	4.0E-02	9.2E-02	**9.2E-02**	1.2E-01	**1.2E-01**	1.3E-01	**1.3E-01**	2.3E-02	**4.0E-02**	5.0E-02	**5.0E-02**	1.0E-01	**1.0E-01**	4.3E-02	**4.3E-02**
Mercury	mg/L	MCL	2.0E-03	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**
Molybdenum	mg/L	RSL	1.0E-01	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**	1.0E-02	**1.0E-01**
Radium-226/228	pCi/L	MCL	5.0E+00	1.3E+00	**5.0E+00**	4.0E+00	**5.0E+00**	3.0E+00	**5.0E+00**	1.2E+00	**5.0E+00**	2.7E+00	**5.0E+00**	1.1E+00	**5.0E+00**	1.4E+00	**5.0E+00**
Selenium	mg/L	MCL	5.0E-02	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**
Thallium	mg/L	MCL	2.0E-03	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-2 –Baseline Fate and Transport Results

	Constituents	Units	Maximum Observed Concentration	90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer		Most Conservative GWPS	Outcome - Site (Pass/Fail)	Outcome - 90th Percentile (Pass/Fail)
						FAB	90th Percentile			
Appendix IV	Antimony*	mg/L	5.0E-03	4.0E-02	7.0E-03	3.5E-05	2.8E-04	6.0E-03	PASS	PASS
	Arsenic	mg/L	1.1E-01	7.8E-01	7.0E-03	7.7E-04	5.4E-03	1.0E-02	PASS	PASS
	Barium	mg/L	2.1E+00	2.1E-01	7.0E-03	1.5E-02	1.5E-03	2.0E+00	PASS	PASS
	Beryllium*	mg/L	2.0E-03	1.0E-03	7.0E-03	1.4E-05	7.0E-06	4.0E-03	PASS	PASS
	Cadmium*	mg/L	2.0E-03	6.0E-02	7.0E-03	1.4E-05	4.2E-04	5.0E-03	PASS	PASS
	Chromium	mg/L	7.8E-03	2.0E-01	7.0E-03	5.4E-05	1.4E-03	1.0E-01	PASS	PASS
	Cobalt	mg/L	2.6E-03	5.0E-02	7.0E-03	1.8E-05	3.5E-04	6.0E-03	PASS	PASS
	Fluoride	mg/L	2.4E+01	2.1E+01	7.0E-03	1.7E-01	1.5E-01	4.0E+00	PASS	PASS
	Lead	mg/L	5.3E-03	1.0E-01	7.0E-03	3.7E-05	7.0E-04	1.5E-02	PASS	PASS
	Lithium	mg/L	3.6E-01	4.5E-01	7.0E-03	2.5E-03	3.1E-03	4.0E-02	PASS	PASS
	Mercury*	mg/L	2.0E-04	7.0E-06	7.0E-03	1.4E-06	4.9E-08	2.0E-03	PASS	PASS
	Molybdenum	mg/L	9.4E+00	7.1E+00	7.0E-03	6.6E-02	4.9E-02	1.0E-01	PASS	PASS
	Combined Radium	pCi/L	1.9E+00	-	7.0E-03	1.3E-02	-	5.0E+00	PASS	NA
	Selenium	mg/L	8.5E-02	3.2E-01	7.0E-03	5.9E-04	2.2E-03	5.0E-02	PASS	PASS
	Thallium	mg/L	7.5E-04	3.0E-03	7.0E-03	5.2E-06	2.1E-05	2.0E-03	PASS	PASS

Notes:

* = Laboratory RL is used here; all analyses were below the RL.

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3
Background and Maximum Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-01				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.1E-03	2.0E-06	2.1E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	2.3E-02	8.4E-04	2.4E-02	2.0	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	0.10	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.80	9.6E-03	1.81	4.0	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	7.8E-02	1.4E-04	7.8E-02	9.2E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	0.10	**Pass**
Radium-226/228	pCi/L	MCL	8.5E-04	7.6E-04	1.6E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-02 Data Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	9.0E-03	8.4E-04	9.8E-03	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.71	4.00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	1.1E-01	1.4E-04	1.1E-01	1.2E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	3.3E-03	7.6E-04	4.1E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-03				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	2.1E-02	8.4E-04	2.2E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	3.1E-03	3.1E-06	3.1E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	2.5E-03	2.1E-06	2.5E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	1.2E-01	1.4E-04	1.2E-01	1.3E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	5.8E-04	7.6E-04	1.3E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-04				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	0	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	GWPS	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	6	MCL	1.1E-02	8.4E-04	1.2E-02	2.0E+00	**Pass**
Beryllium	10	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	2000	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	4	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	5	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	100	MCL	1.10	9.6E-03	1.1E+00	4.0E+00	**Pass**
Lead	6	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	4	RSL	2.1E-02	1.4E-04	2.1E-02	4.0E-02	**Pass**
Mercury	15	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	40	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	9.7E-04	7.6E-04	1.7E-03	5.0E-03	**Pass**
Selenium	100	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	5	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-05				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	1.4E-02	8.4E-04	1.5E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	4.7E-02	1.4E-04	4.7E-02	5.0E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	2.3E-03	7.6E-04	3.0E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

ug/L = micrograms per liter
mg/L = milligrams per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-06				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.4E-02	8.4E-04	3.5E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.6E-03	1.0E-06	1.6E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.7E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.1E-03	2.1E-06	1.1E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	9.4E-02	1.4E-04	9.4E-02	1.0E-01	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	9.2E-04	7.6E-04	1.7E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3
Background and Predicted Concentrations Compared to GWPS

Constituent	Unit	GWPS Selection	MW-16-07				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	9.4E-03	8.4E-04	1.0E-02	2.0E+00	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.70	9.6E-03	1.7E+00	4.0E+00	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	3.9E-02	1.4E-04	3.9E-02	4.3E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	1.0E-02	3.8E-03	1.4E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	1.1E-03	7.6E-04	1.9E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

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mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-4 – Sensitivity Analysis Model Inputs

	Baseline	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**	**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**	**Baseline**	**Sensitivity Analysis**
Layer Properties	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr) Doubled	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)	Kd (m3/kg)	Kd Molybdenum (m3/kg)
Sandy Lean Clay	6.31	10.42	4.33	6.08E-03	1.22E-02	0.019	0.024	0.014	0.24	0.38	0.17	0.19	0.31	0.14	67	97	0	0.0082

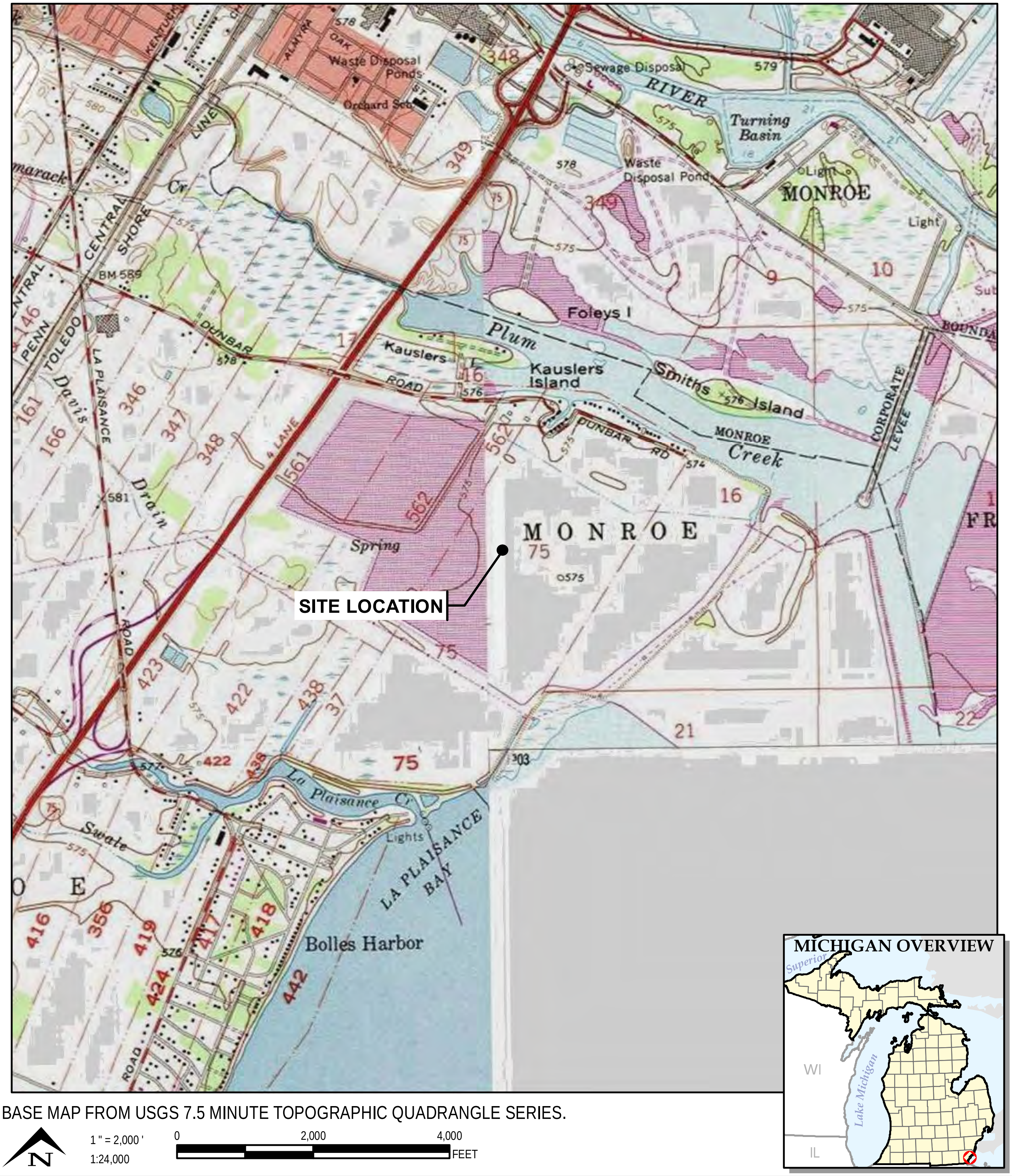
Dv = Vertical Darcy Velocity
CoHD = Coefficient of Hydrodynamic Dispersion

Table 4-5 – Sensitivity Analysis Model Results

Monroe Ash Basin Sensitivity Analysis			
Model Name	**Description**	**Prediction Factor**	**Pass?***
Monroe_Baseline	Baseline model for the Bottom Ash Basins.	6.97E-03	YES
Monroe_ExtendedRun_Kd	Model runtime was extended from 67 years to 97 years; distribution coefficient applied for Molybdenum.	3.64E-46	YES
Monroe_DoubleDarcy_Kd	Darcy velocity value was doubled; distribution coefficient applied for Molybdenum.	4.97E-48**	YES
Monroe_CoHD_High_Kd	Coefficient of Hydrodynamic Dispersion was increased by 25%. Distribution coefficient applied for Molybdenum.	7.18E-50	YES
Monroe_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	1.96E-03	YES
Monroe_Porosity_High	Used the highest effective porosity; derived from data in project database.	1.47E-03	YES
Monroe_Porosity_Low_Kd	Used the lowest effective porosity; derived from data in project database. Distribution coefficient applied for Molybdenum.	3.09E-45**	YES
Monroe_Thick	Used thickest interval seen in project model; derived from project EVS model.	1.91E-07	YES
Monroe_Thin_Kd	Used thinnest interval seen in project model; distribution coefficient applied for Molybdenum.	1.60E-37	YES

* Indicates value less that $PF_{threshold}$, as discussed in Section 4.6.2.
** This sensitivity model run did not come to full convergence, because the prediction factor was below 10^{-50}. Therefore, the lowest calculated prediction factor was reported.

FIGURES



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

TRC

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TRC - GIS

PROJECT:

DTE ELECTRIC COMPANY
MONROE POWER PLANT
FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:

SITE LOCATION MAP

DRAWN BY:	S.MAJOR
CHECKED BY:	B. YELEN
APPROVED BY:	V. BUENING
DATE:	JANUARY 2020
PROJ. NO.:	320511.0001
FILE:	320511-0001-008SLM-MPP-Fig01.mxd

FIGURE 1

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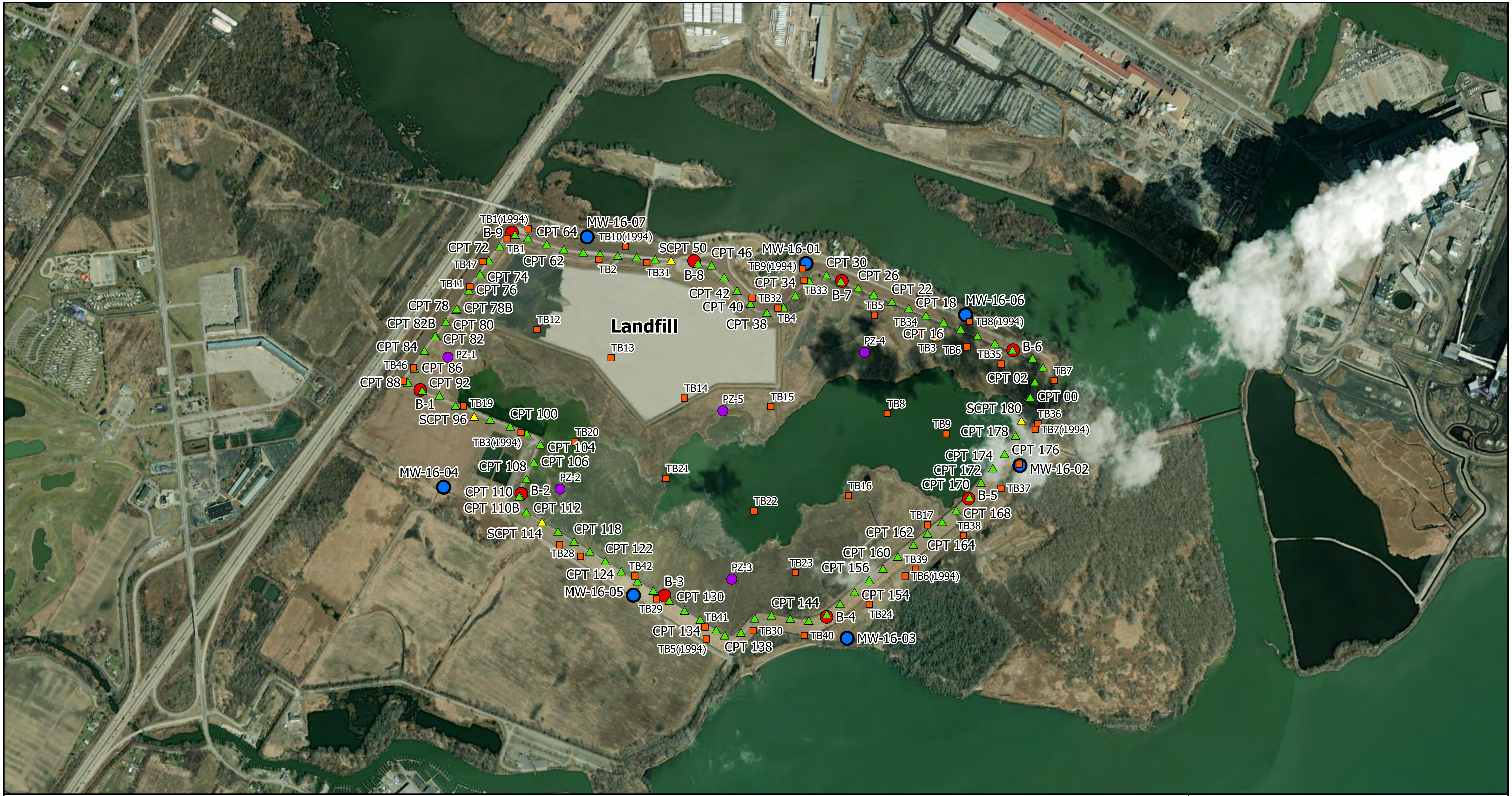
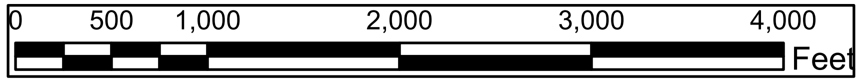


Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

N

Note: For clarity purposes, not all CPT IDs are provided.



Field Investigation Locations
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

Geosyntec consultants
Geosyntec Consultants of Michigan

GLP8014 | April 2023

Figure 2-1

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Boring - Pre-construction Borings
- 🟣 Piezometer - Geosyntec

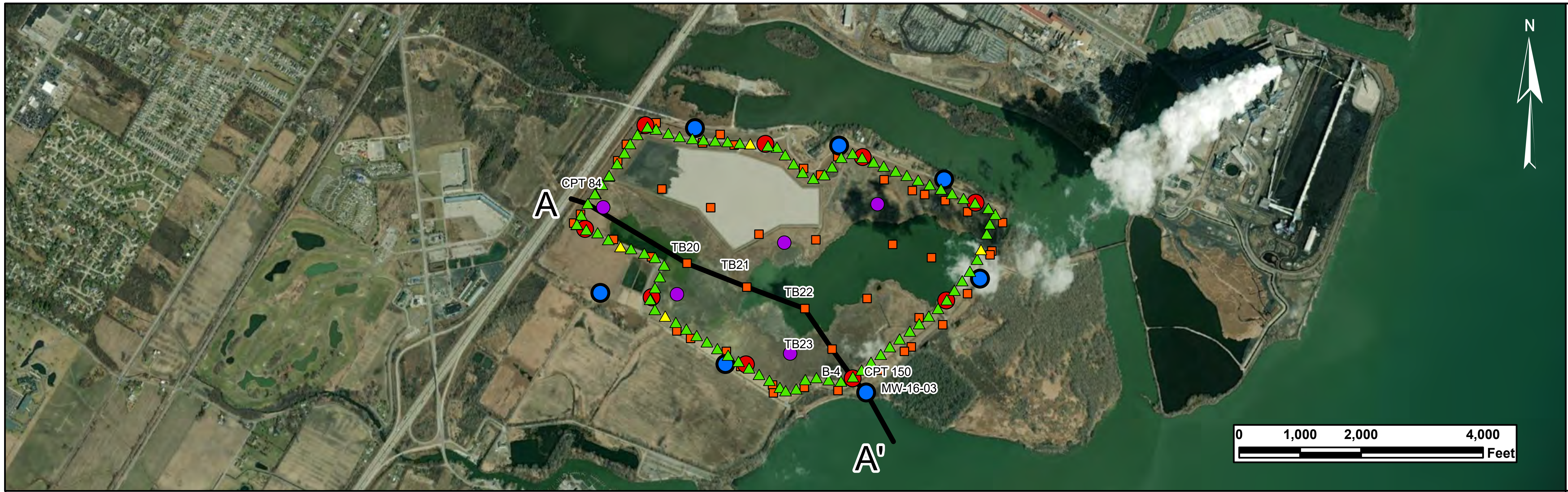
0 500 1,000 2,000 3,000 4,000 Feet

Cross Section Locations
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

Geosyntec consultants
Geosyntec Consultants of Michigan

GLP8014
April 2023

Figure
2-2

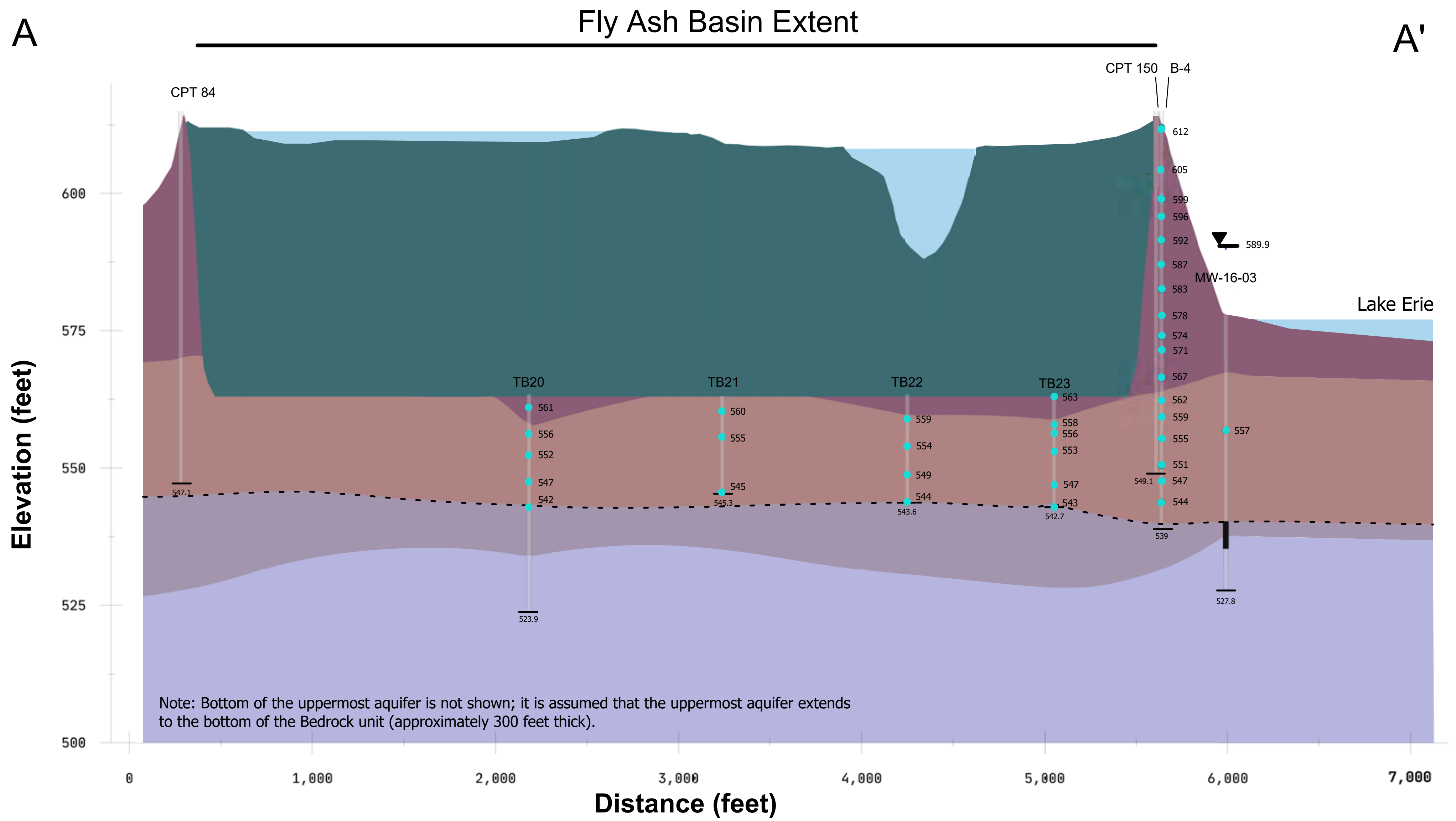


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- ■ Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

▨	Ponded Water
▨	Fly Ash
▨	Lean Clay
▨	Sandy Lean Clay
▨	Transition Zone
▨	Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section A - A'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

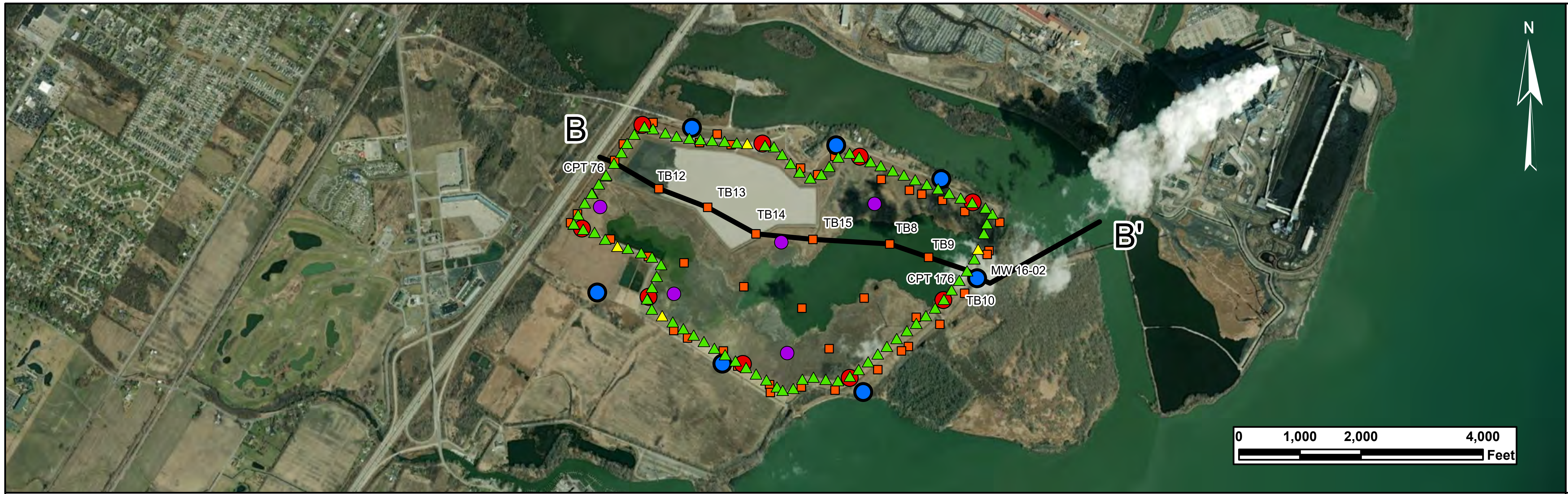
Geosyntec consultants
Geosyntec Consultants of Michigan

Figure

2-3

GLP8014

April 2023

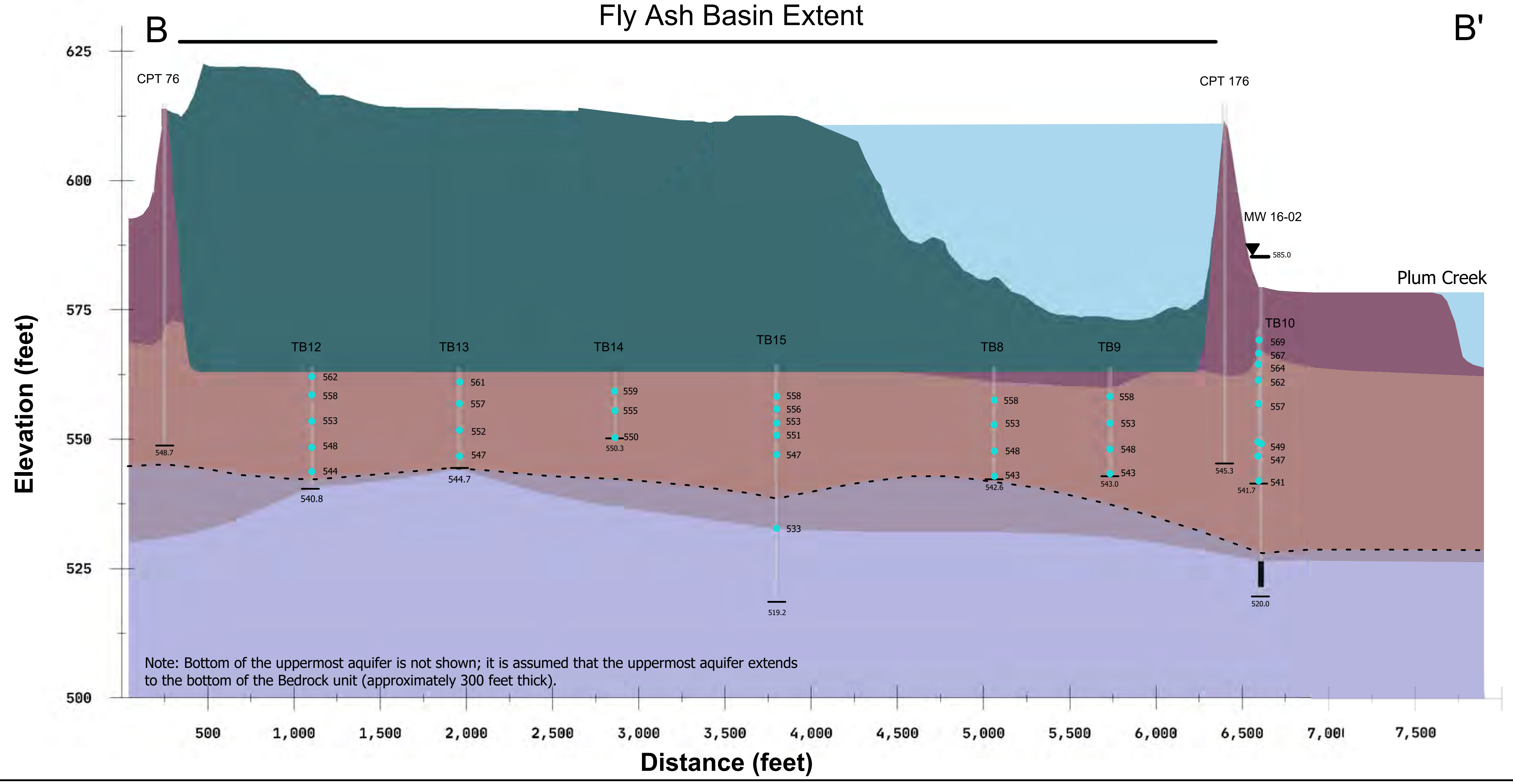


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- ▲ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- ▨ Ponded Water
- ▨ Fly Ash
- ▨ Lean Clay
- ▨ Sandy Lean Clay
- ▨ Transition Zone
- ▨ Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section B - B'
Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

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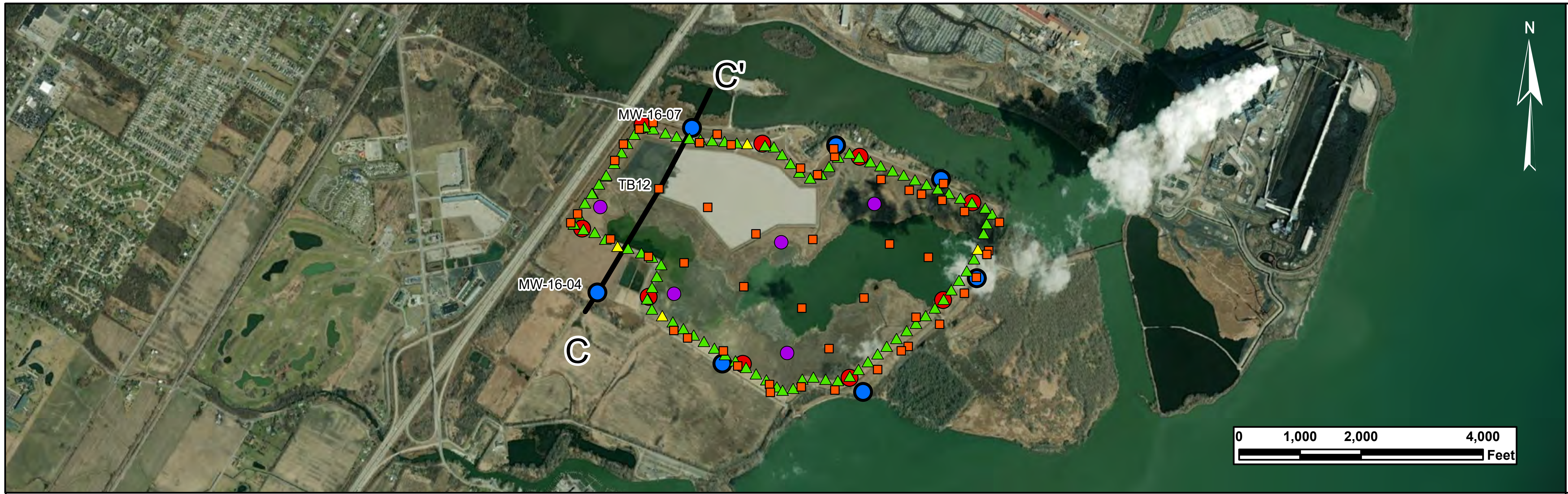
Figure

2-4

GLP8014

April 2023

G:\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_YW.aprx 11/22/2021 9:22 AM

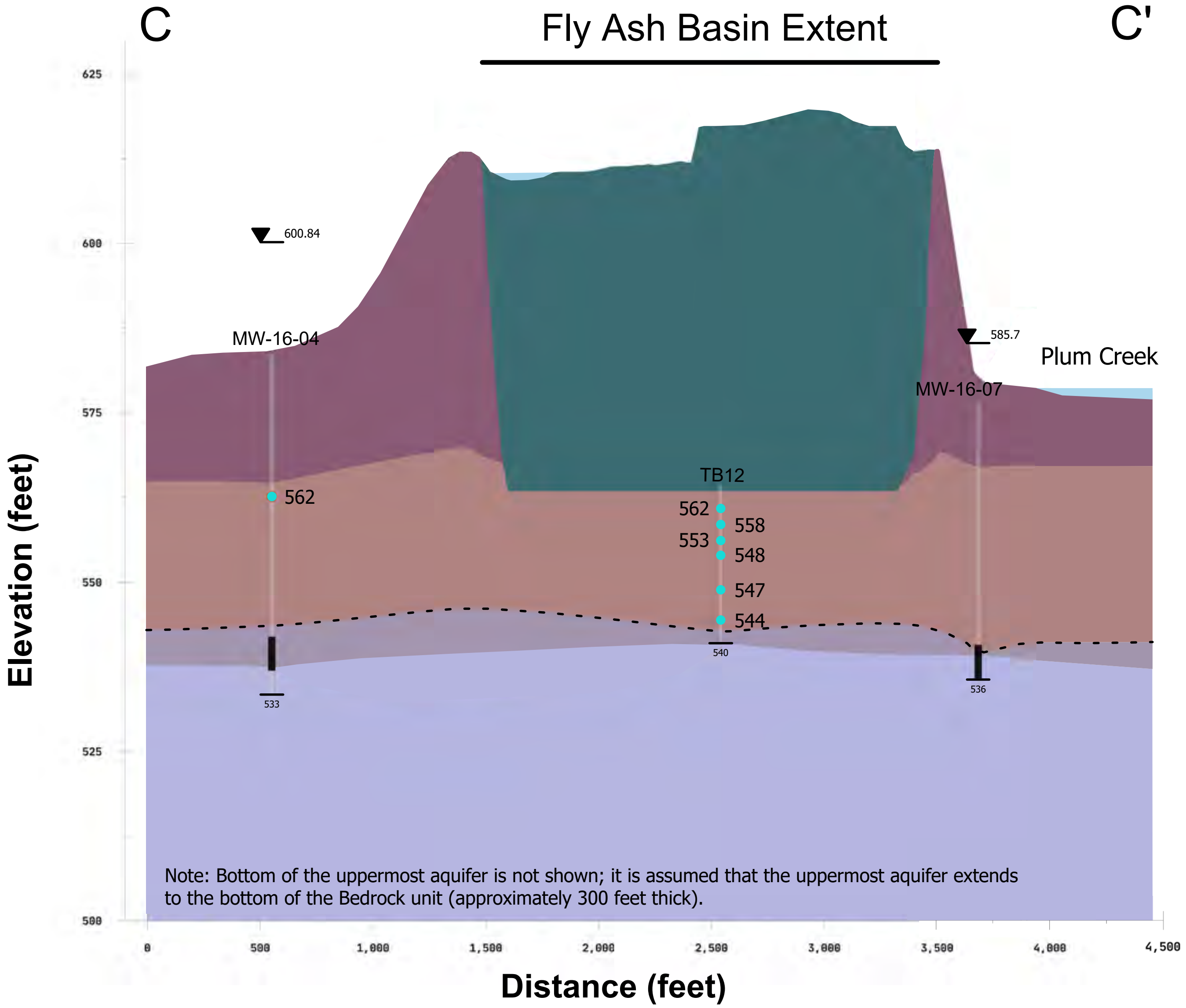


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- ■ Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- Ponded Water
- Fly Ash
- Lean Clay
- Sandy Lean Clay
- Transition Zone
- Bedrock

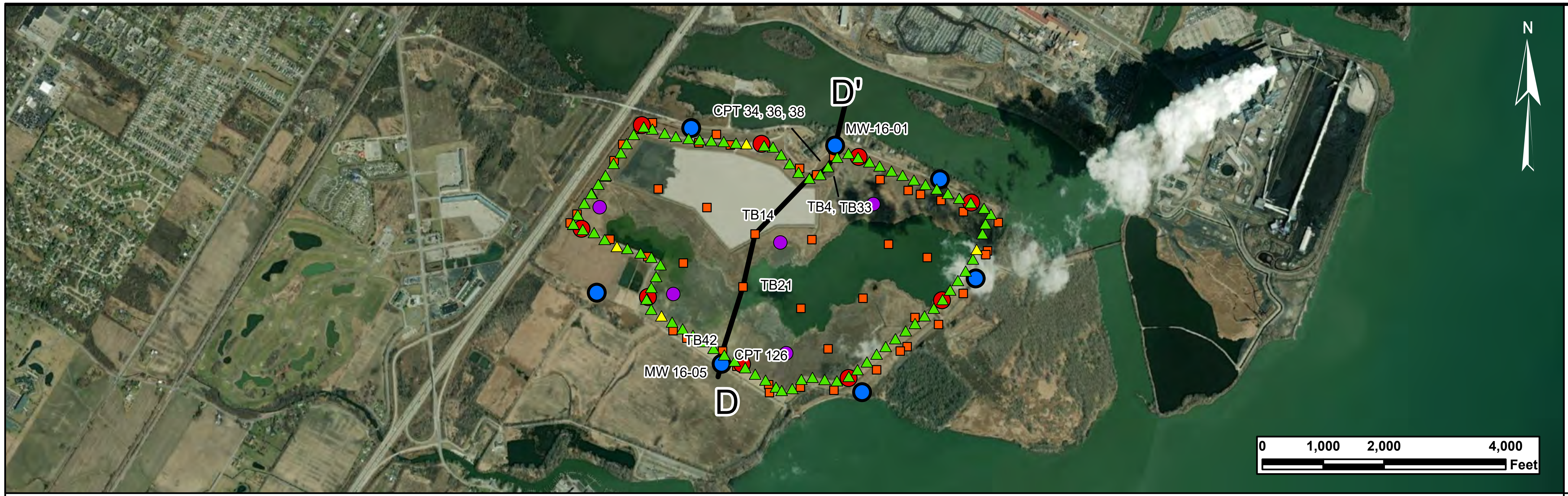
Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section C - C'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

Geosyntec consultants
Geosyntec Consultants of Michigan

Figure
2-5

GLP8014
April 2023

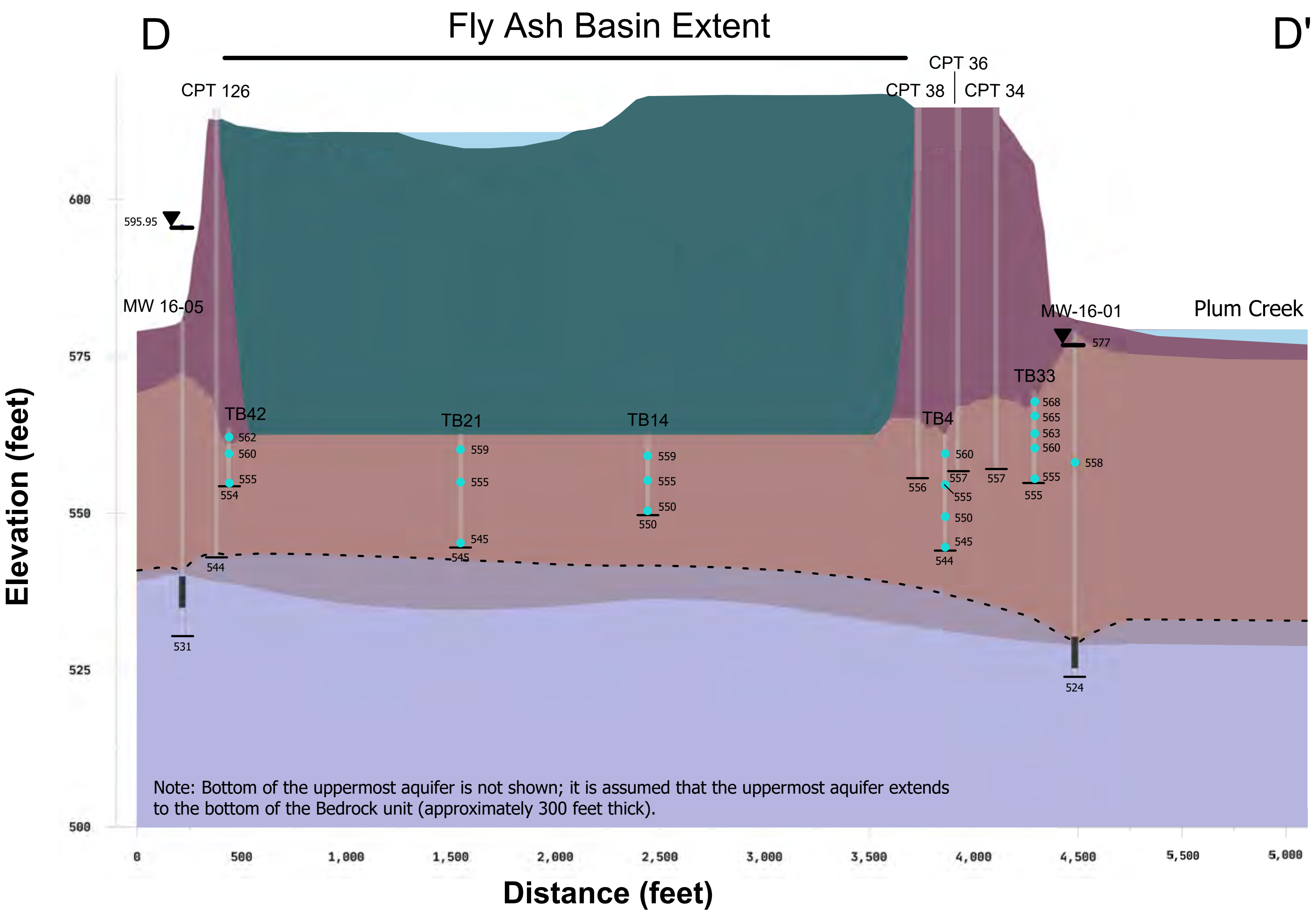


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ▼ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- ▨ Ponded Water
- ▨ Fly Ash
- ▨ Lean Clay
- ▨ Sandy Lean Clay
- ▨ Transition Zone
- ▨ Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section D - D'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

Geosyntec consultants
Geosyntec Consultants of Michigan

GLP8014	April 2023	**Figure 2-6**

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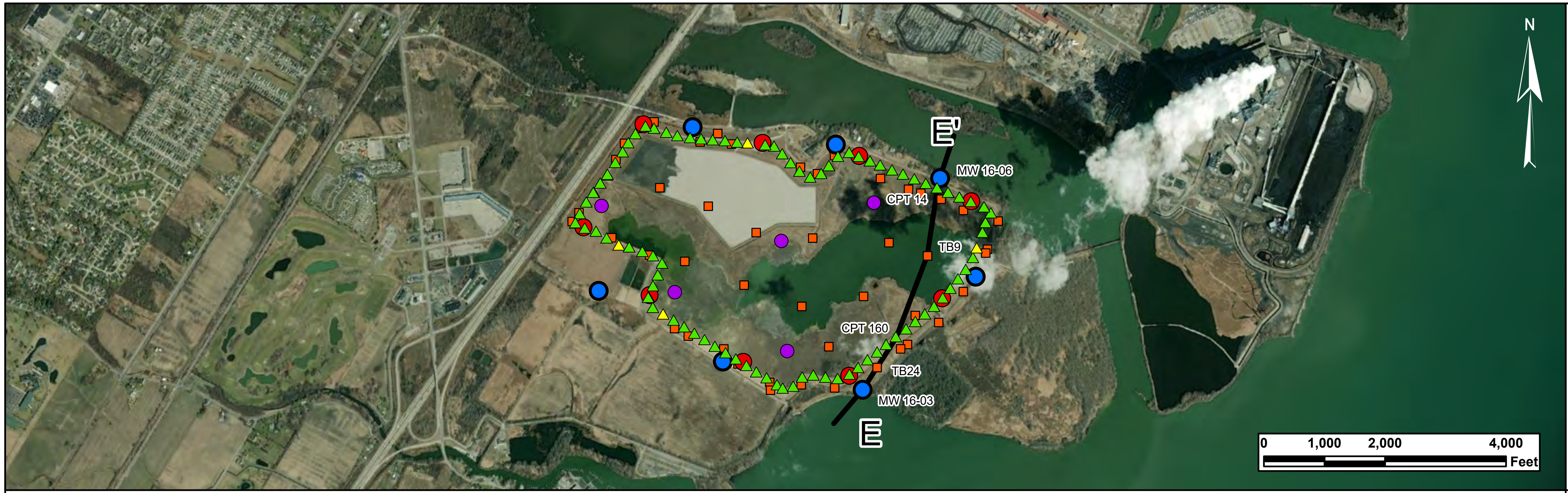
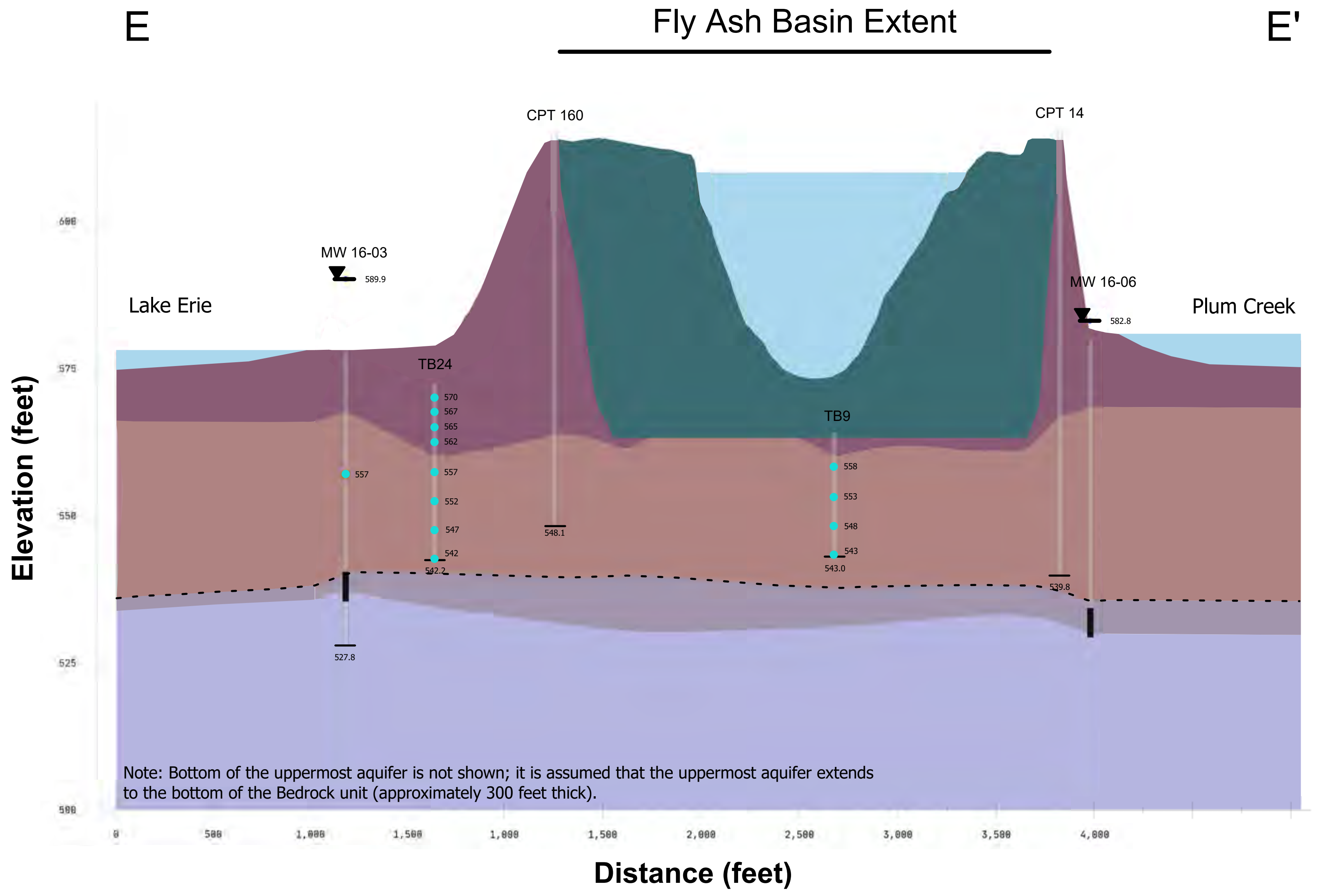


Legend

Boring Locations

- 🔴 Boring - Geosyntec
- ▲ CPT - Geosyntec
- 🔵 MW - TRC
- △ Seismic and CPT
- 🟧 Pre-2000 Borings
- 🟣 Piezometer - Geosyntec

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



Note: Bottom of the uppermost aquifer is not shown; it is assumed that the uppermost aquifer extends to the bottom of the Bedrock unit (approximately 300 feet thick).

Legend

- ● Geotechnical Sample Elevation
- — End of Investigation Elevation
- ⊻ Water Elevation in Upper Most Aquifer
- ▮ Well Screen Interval
- - - - Top of Uppermost Aquifer Unit

Lithology

- Ponded Water
- Fly Ash
- Lean Clay
- Sandy Lean Clay
- Transition Zone
- Bedrock

Notes
All Pre-construction borings have been truncated at 563 feet within the Ash Basin.
Vertical Scale: 1-inch = 25-feet
Horizontal Scale: 1-inch = 750-feet
Elevations are in Average Mean Sea Level

Cross Section E - E'
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

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Figure
2-7

GLP8014
April 2023

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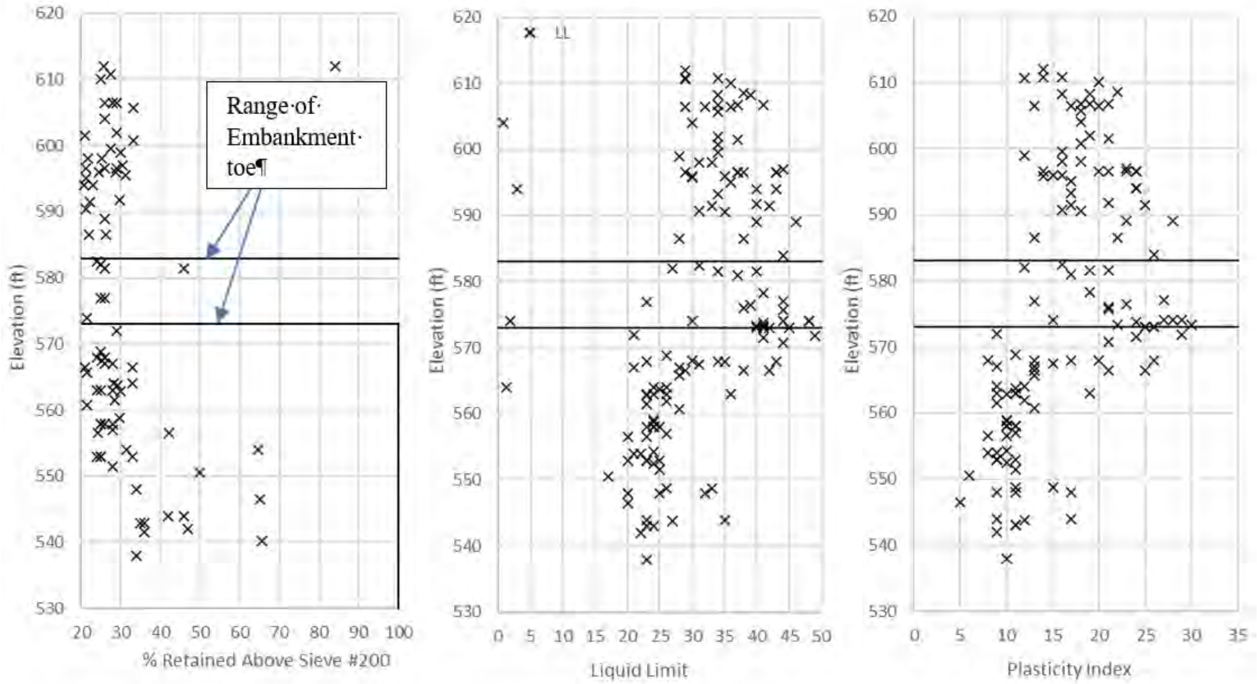

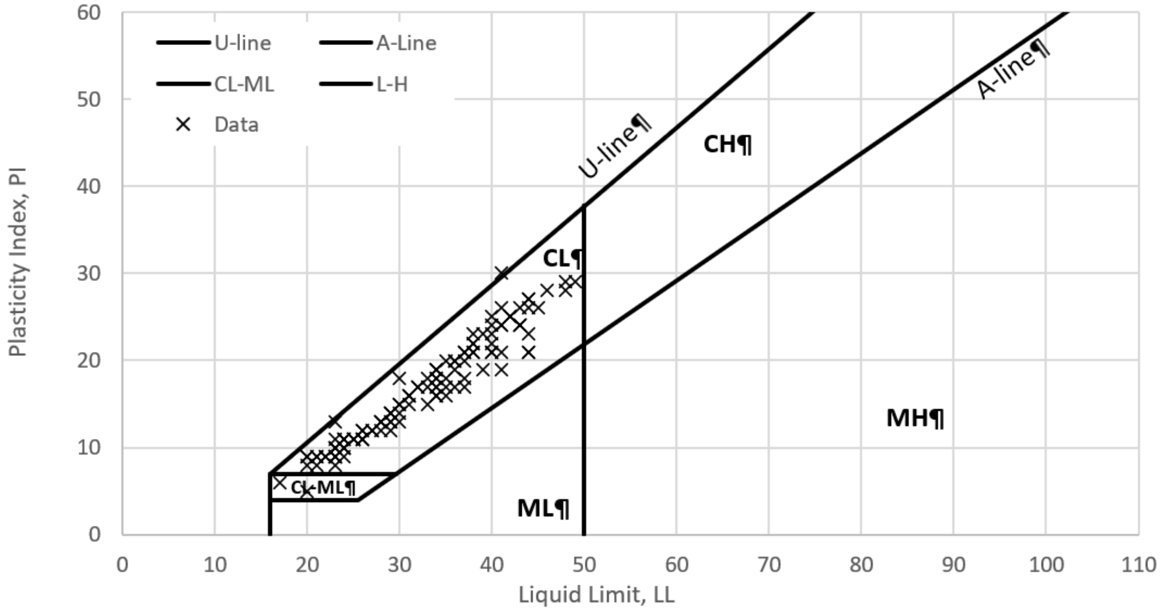

2020 Geotechnical Laboratory Index Test Data

MONROE POWER PLANT
MONROE, MICHIGAN

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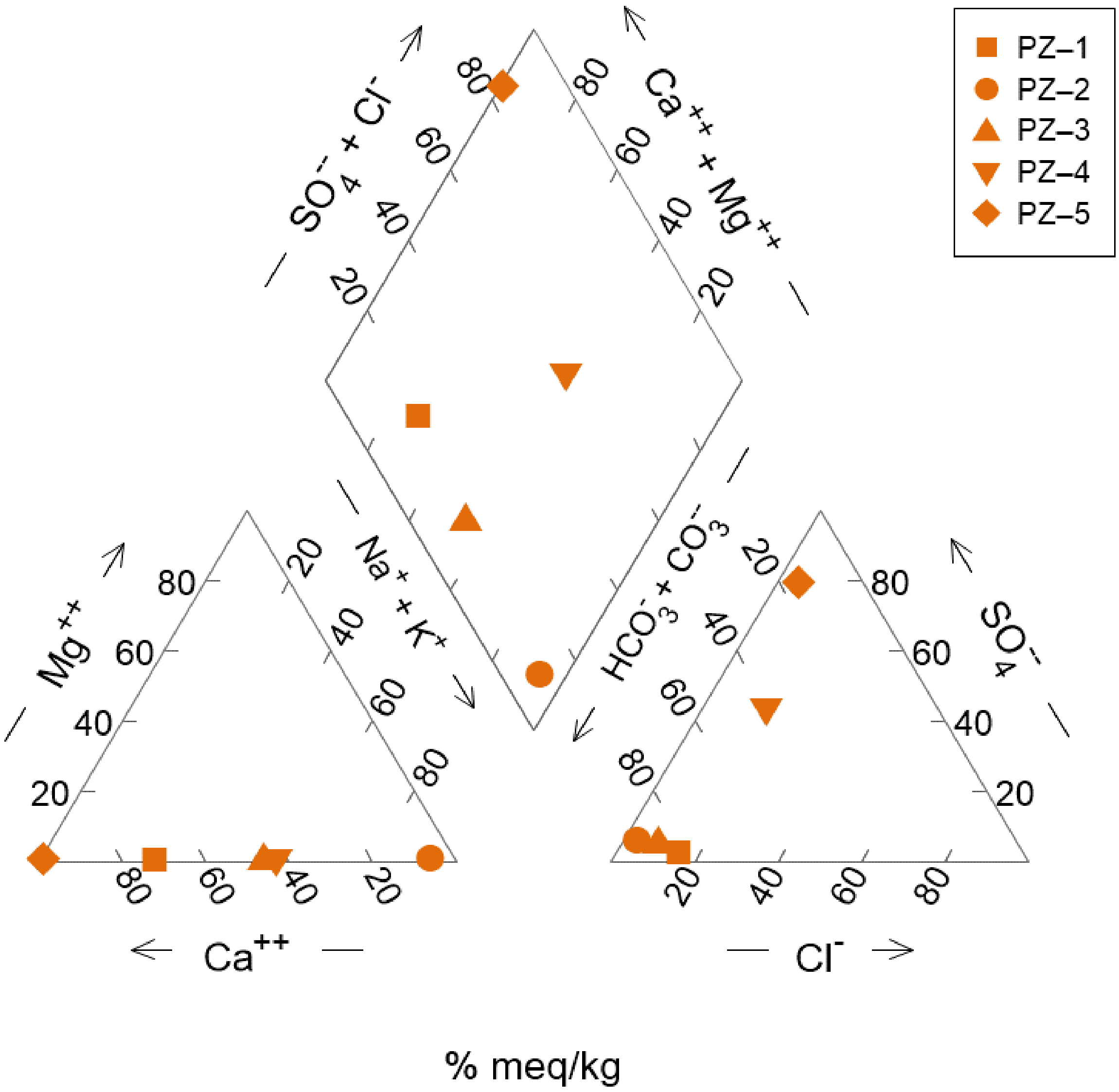
Figure

2-8

Detroit, MI	April 2023



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

Filtered Porewater Sample Piper Diagram

Monroe Power Plant Fly Ash Basin (FAB)
Monroe, MI

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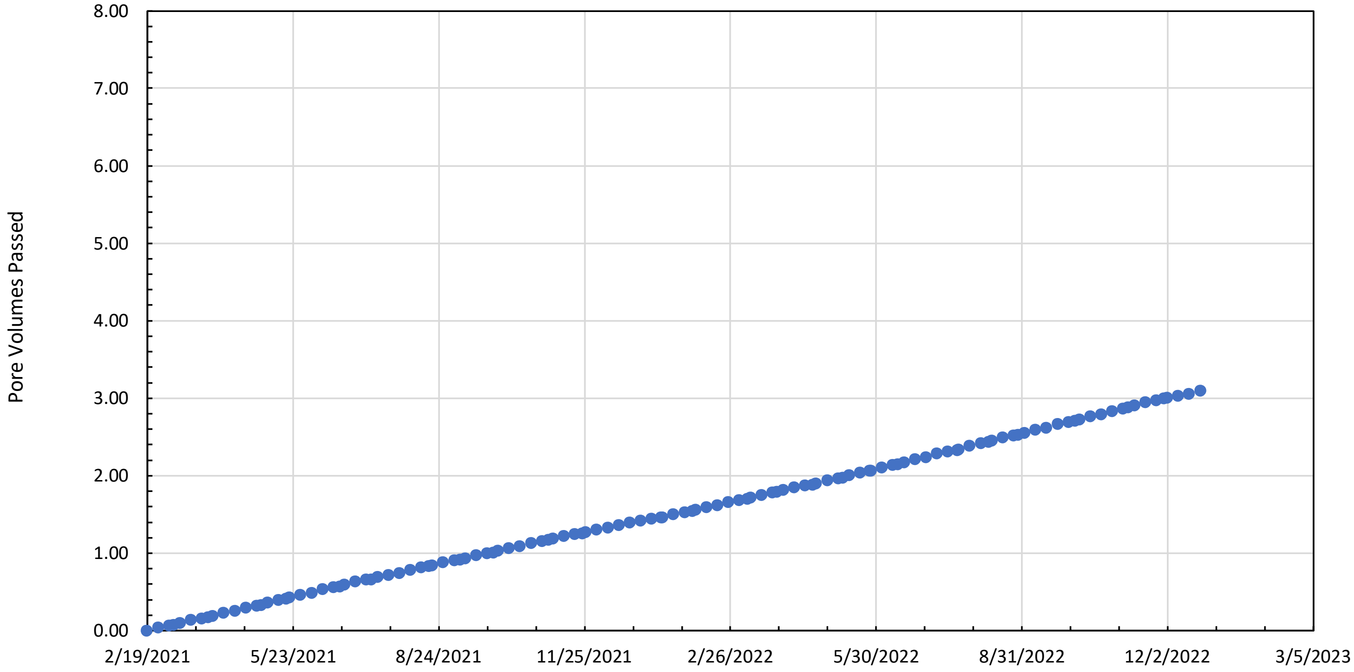
GLP8014

April 2023

Figure

3-1



B2-ST-1 (20-22') PV Passed with Time

MONROE POWER PLANT
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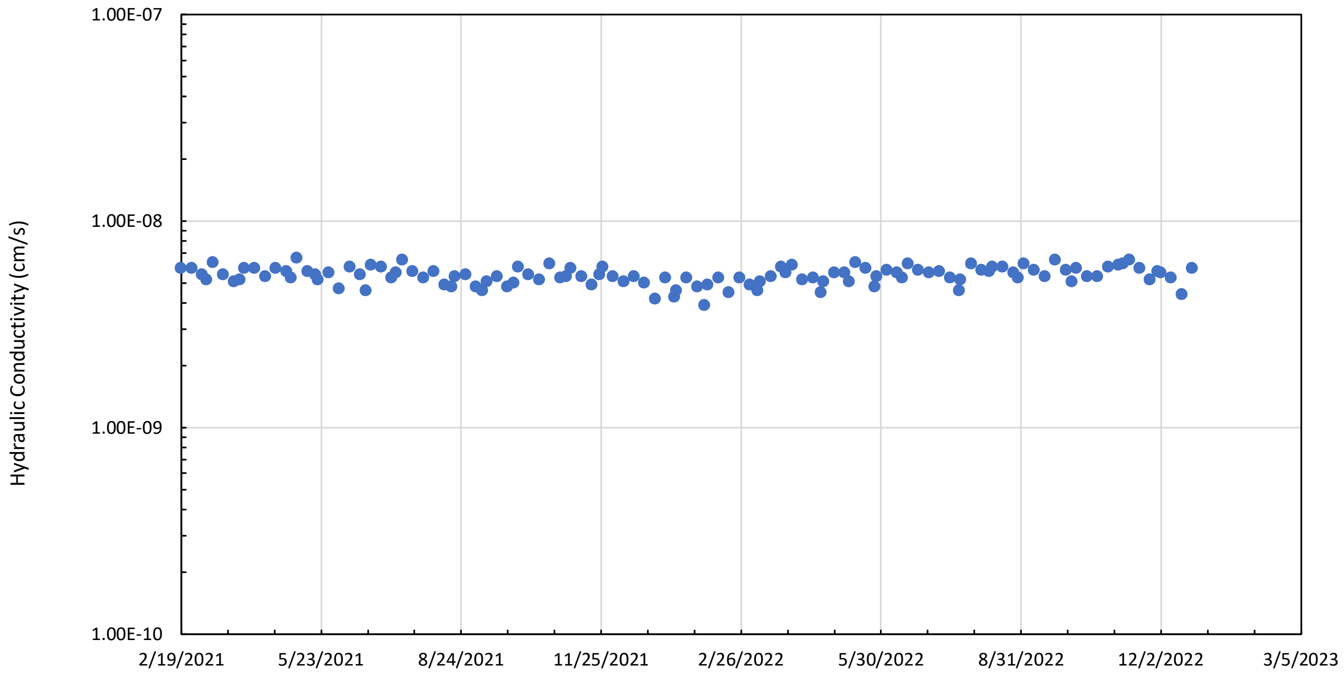
Detroit, MI	April 2023	**Figure** **3-2**



B2-ST-1 (20-22') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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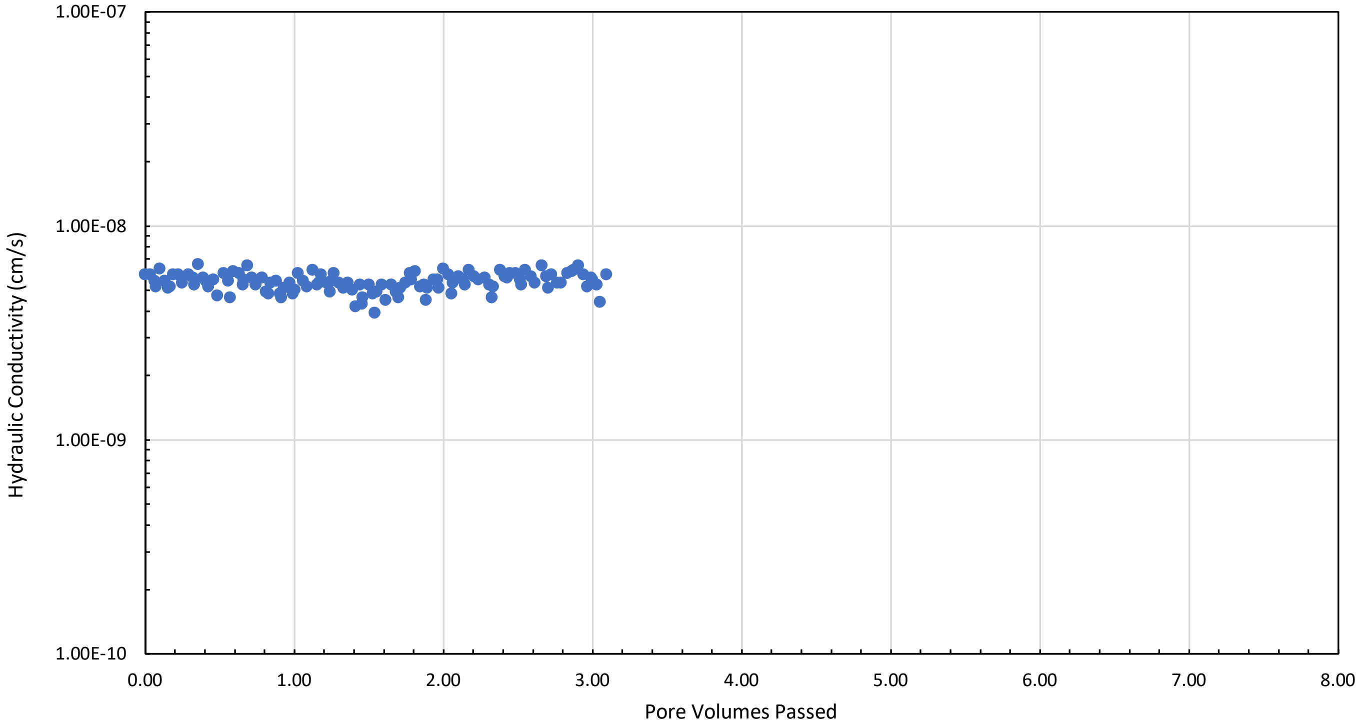
Detroit, MI	April 2023	**Figure** **3-3**



B2-ST-1 (20-22') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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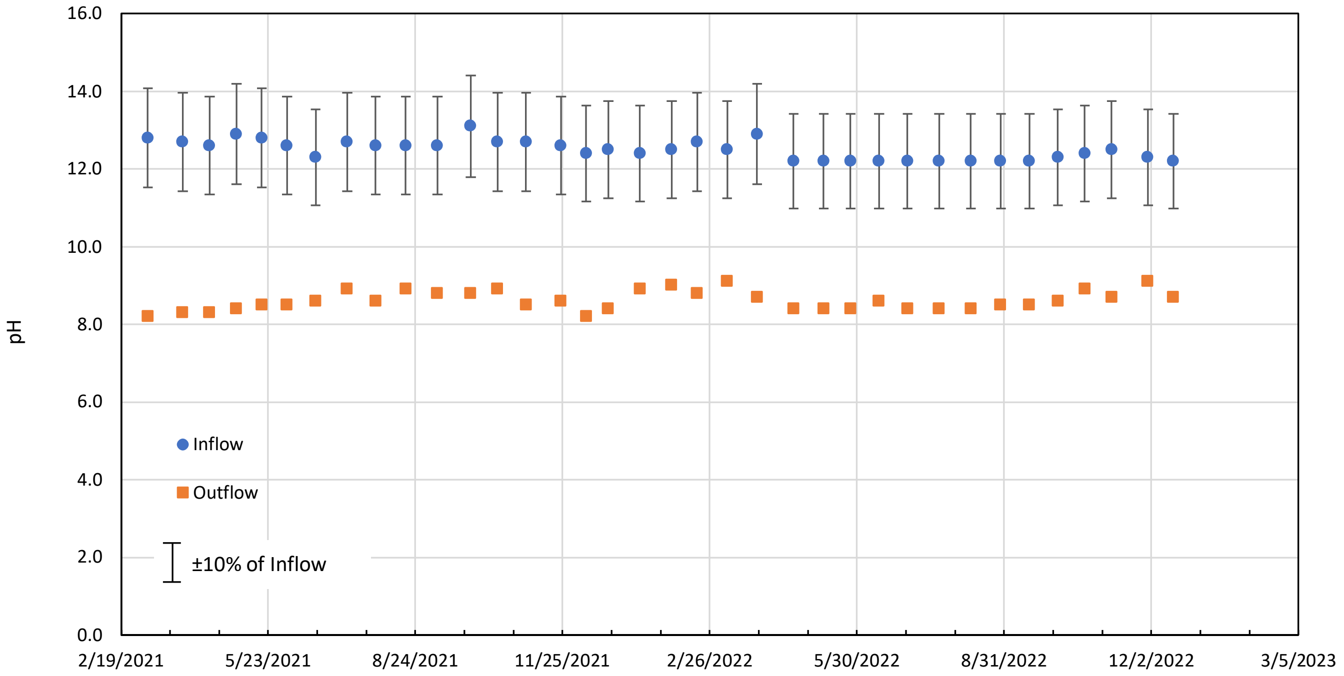
Geosyntec Consultants of Michigan

Detroit, MI | April 2023

Figure

3-4



B2-ST-1 (20-22') pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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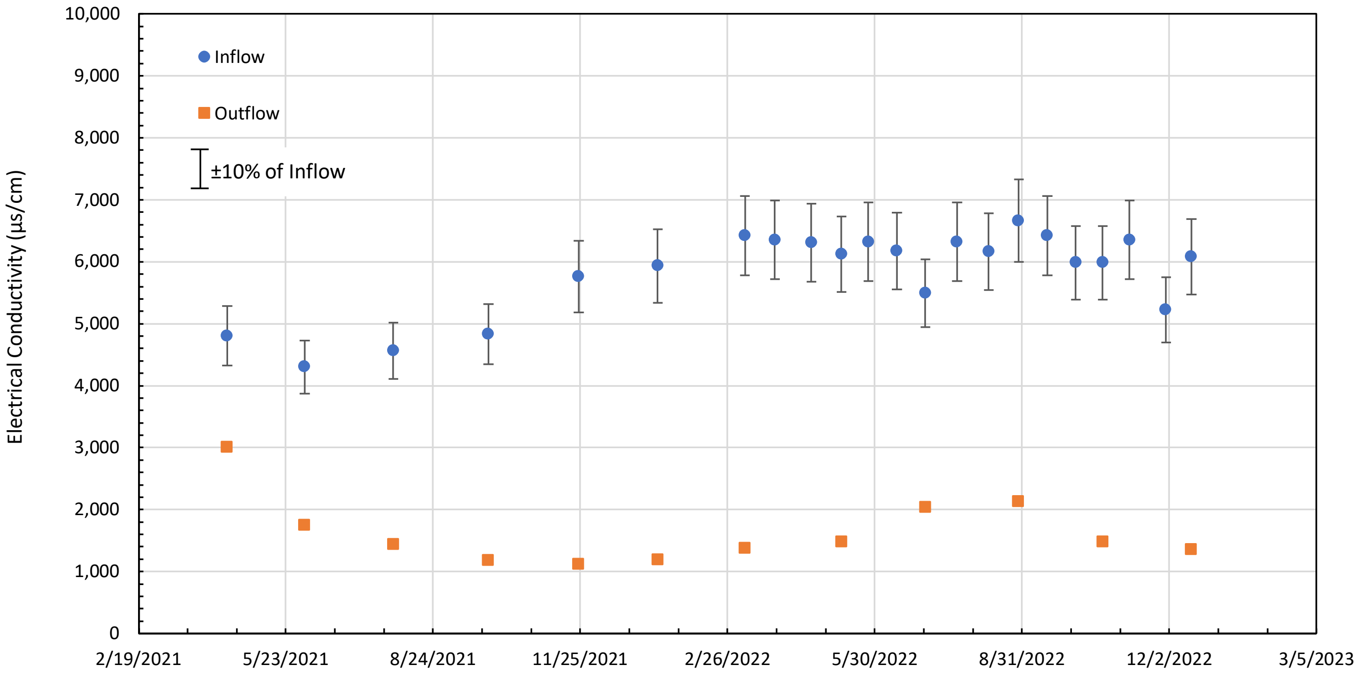
Geosyntec Consultants of Michigan

Detroit, MI	April 2023	**Figure** **3-5**



B2-ST-1 (20-22') Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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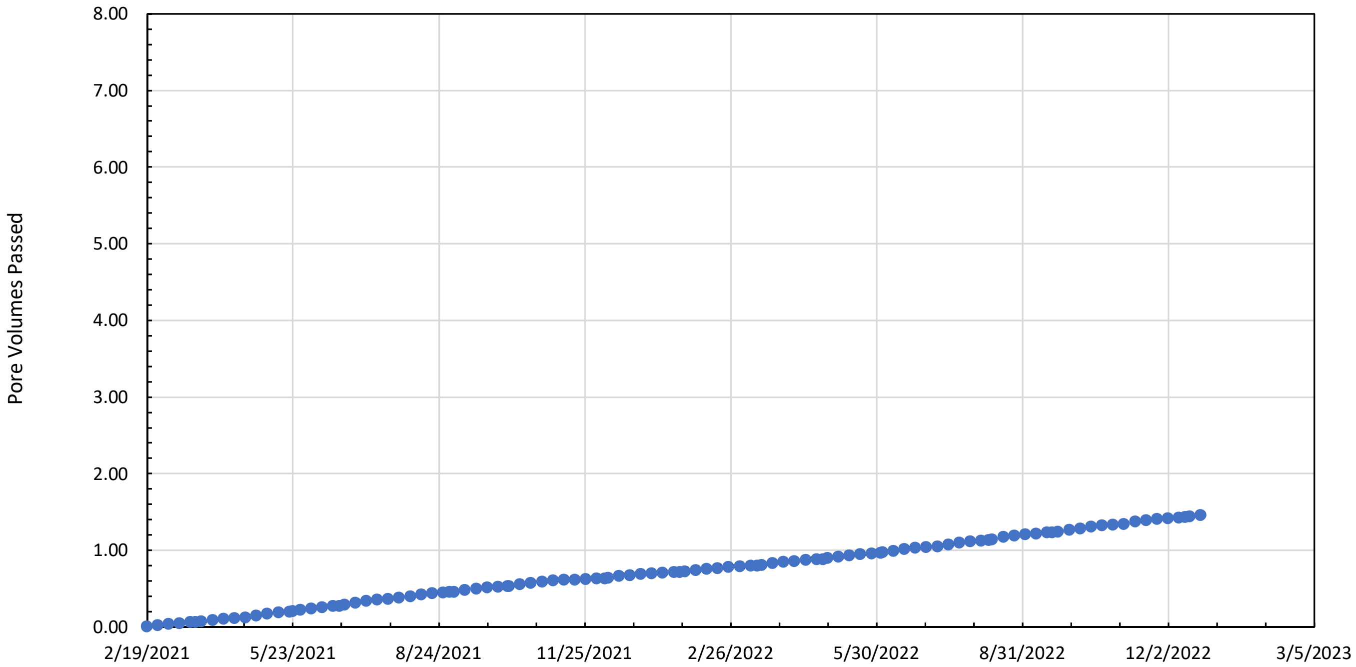
Figure

3-6



B4-ST-2 (40-42') PV Passed with Time

MONROE POWER PLANT
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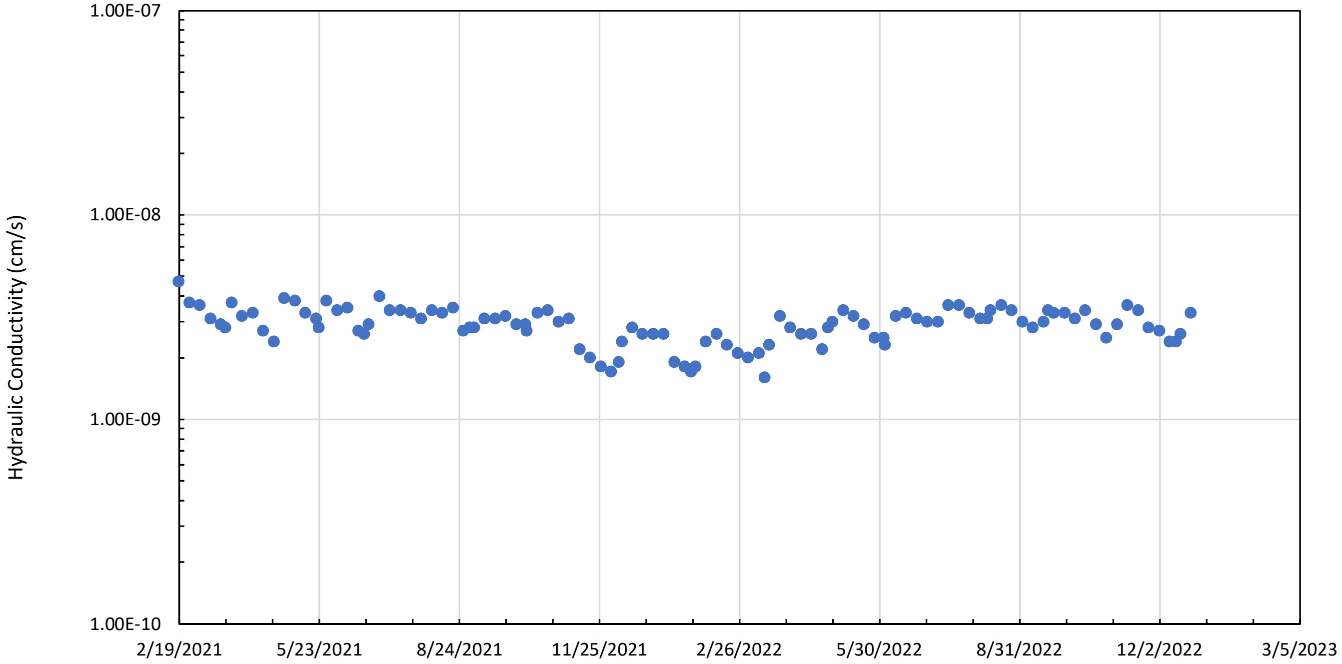
Figure

3-7



B4-ST-2 (40-42') HydraulicConductivity with Time

MONROE POWER PLANT
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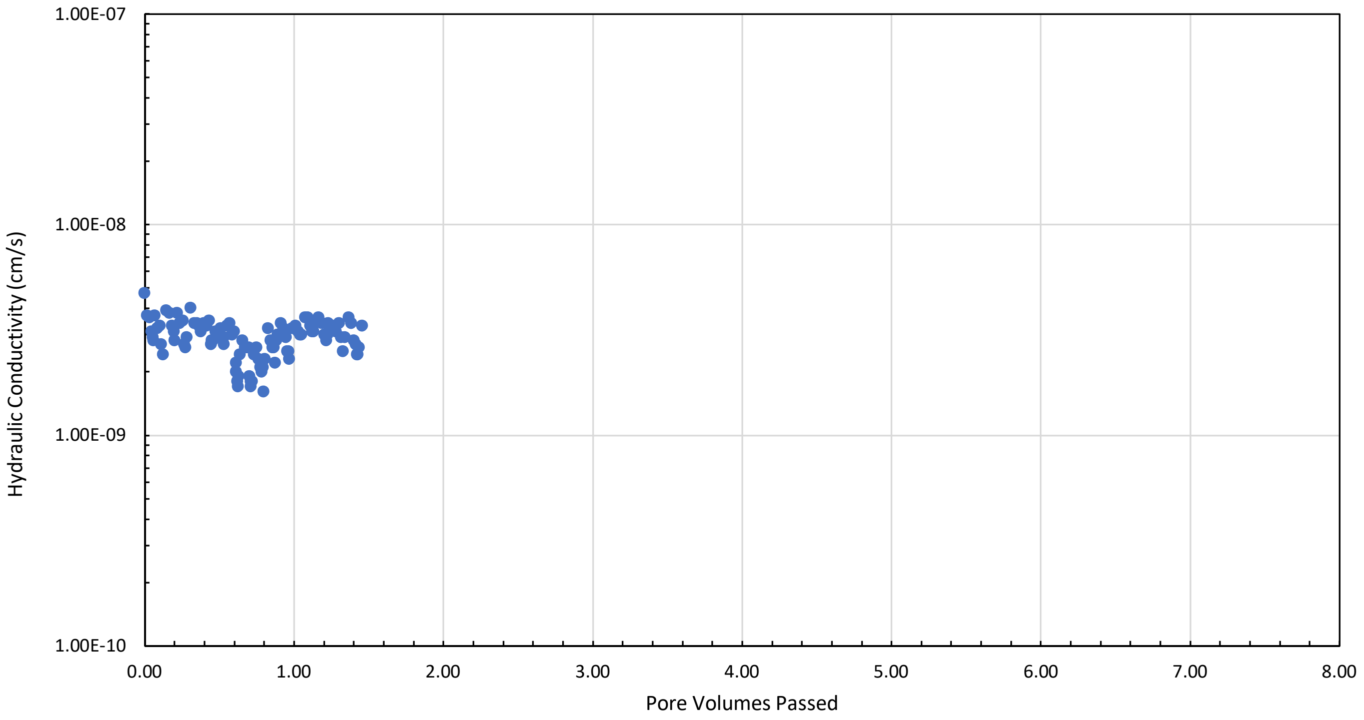
Detroit, MI	April 2023	**Figure** **3-8**



B4-ST-2 (40-42') Hydraulic Conductivity with PV

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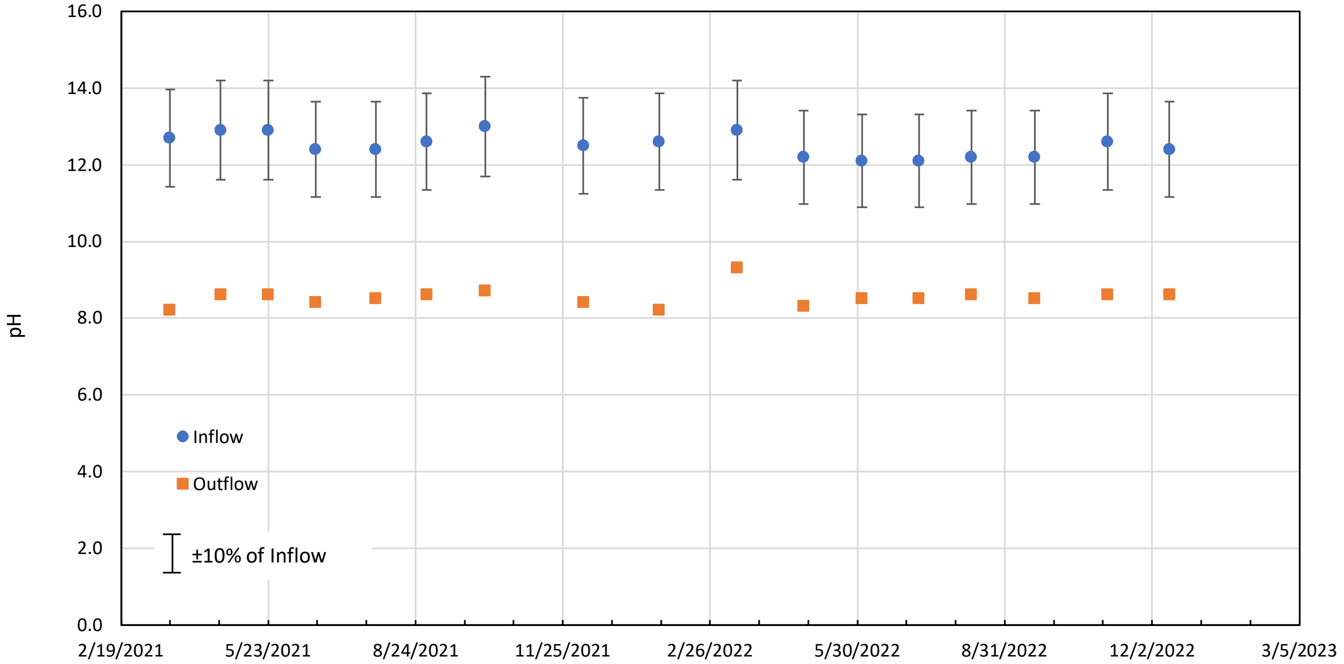
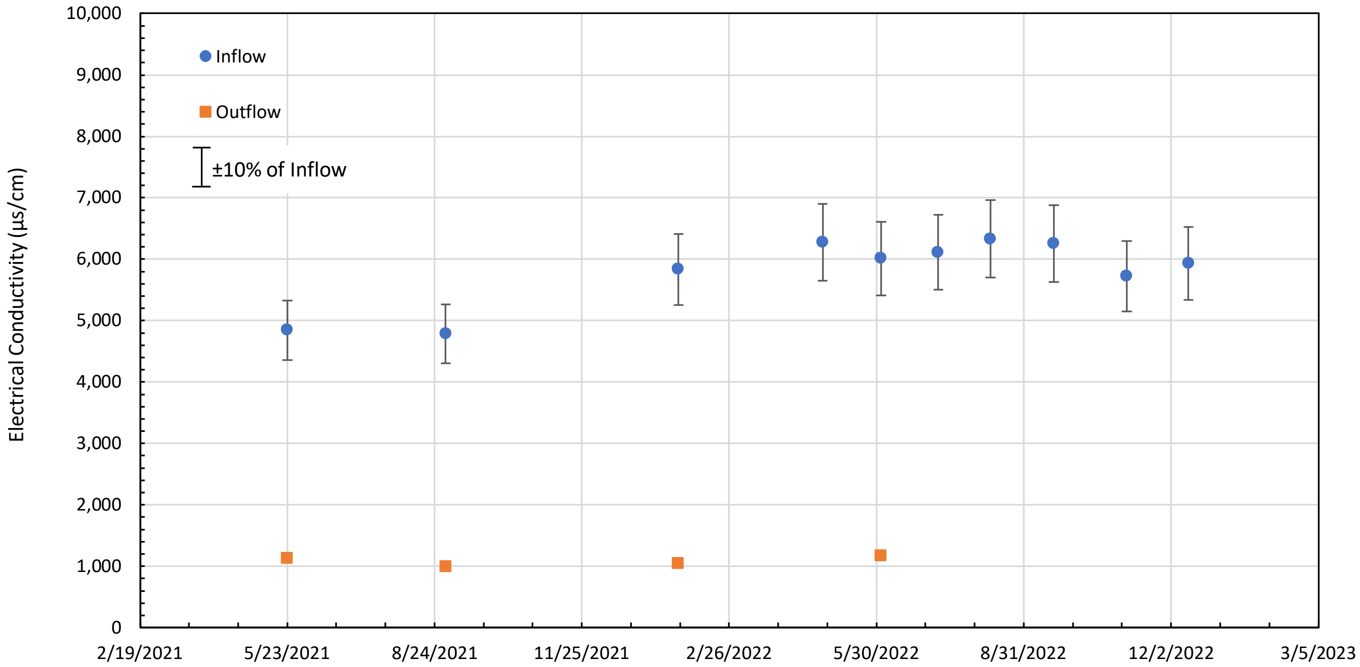
Detroit, MI	April 2023	**Figure** **3-9**



B4-ST-2 (40-42') pH of Inflow and Outflow with Time	
MONROE POWER PLANT MONROE, MICHIGAN	
Geosyntec consultants Geosyntec Consultants of Michigan	Figure 3-10
Detroit, MI	April 2023



B4-ST-2 (40-42') Electrical Conductivity (EC) with Time

MONROE POWER PLANT
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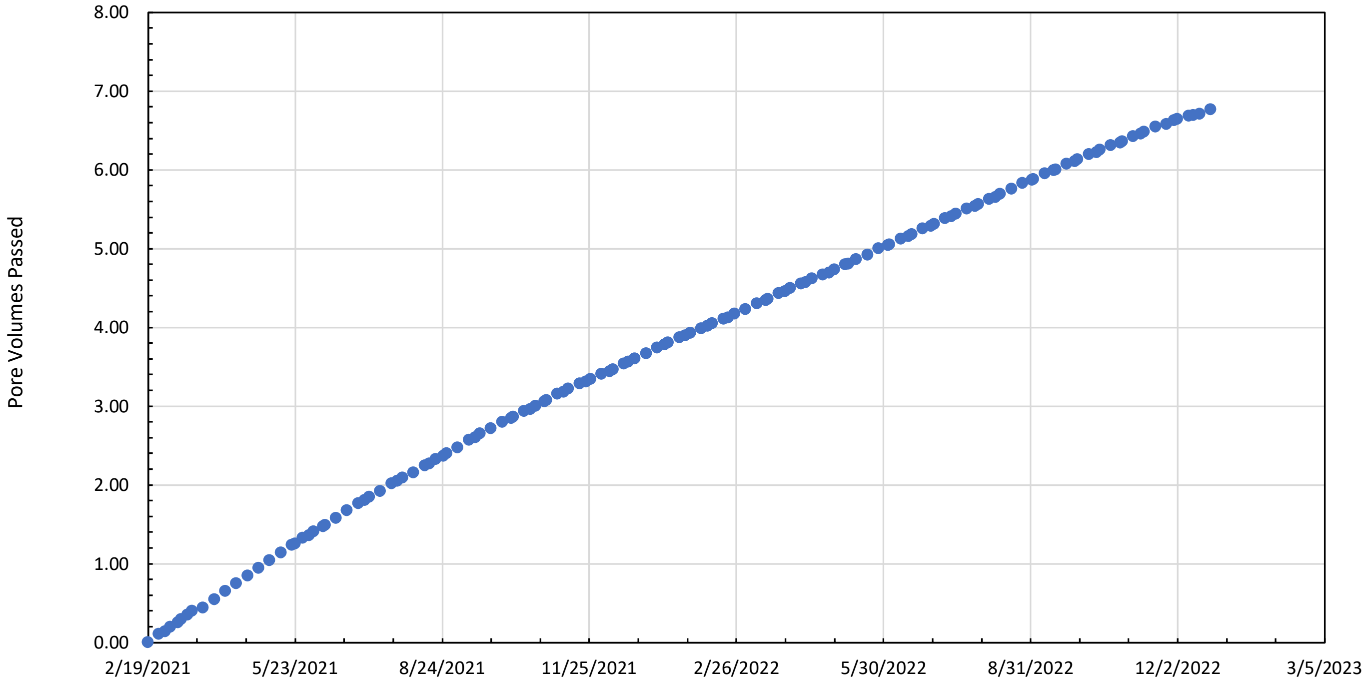
Detroit, MI	April 2023	**Figure 3-11**



B4-ST-4 (70-72.5') PV Passed with Time

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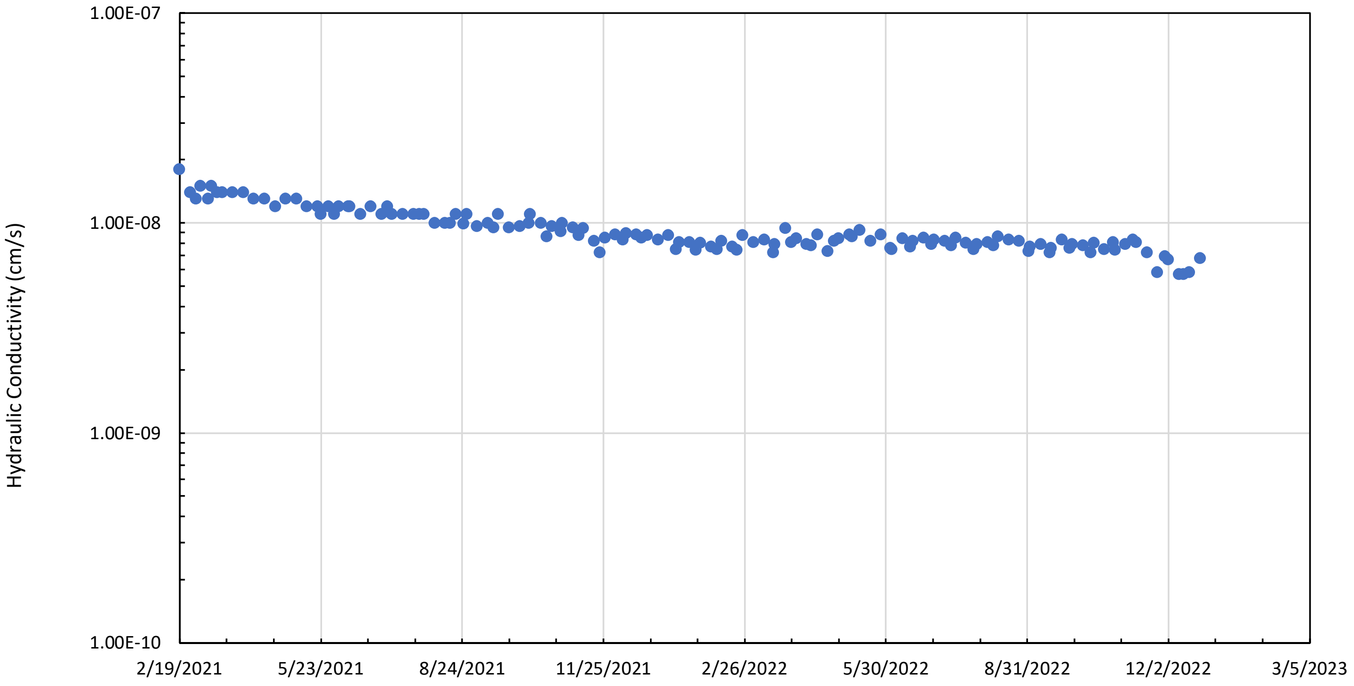
Figure

3-12



B4-ST-4 (70-72.5') Hydraulic Conductivity with Time

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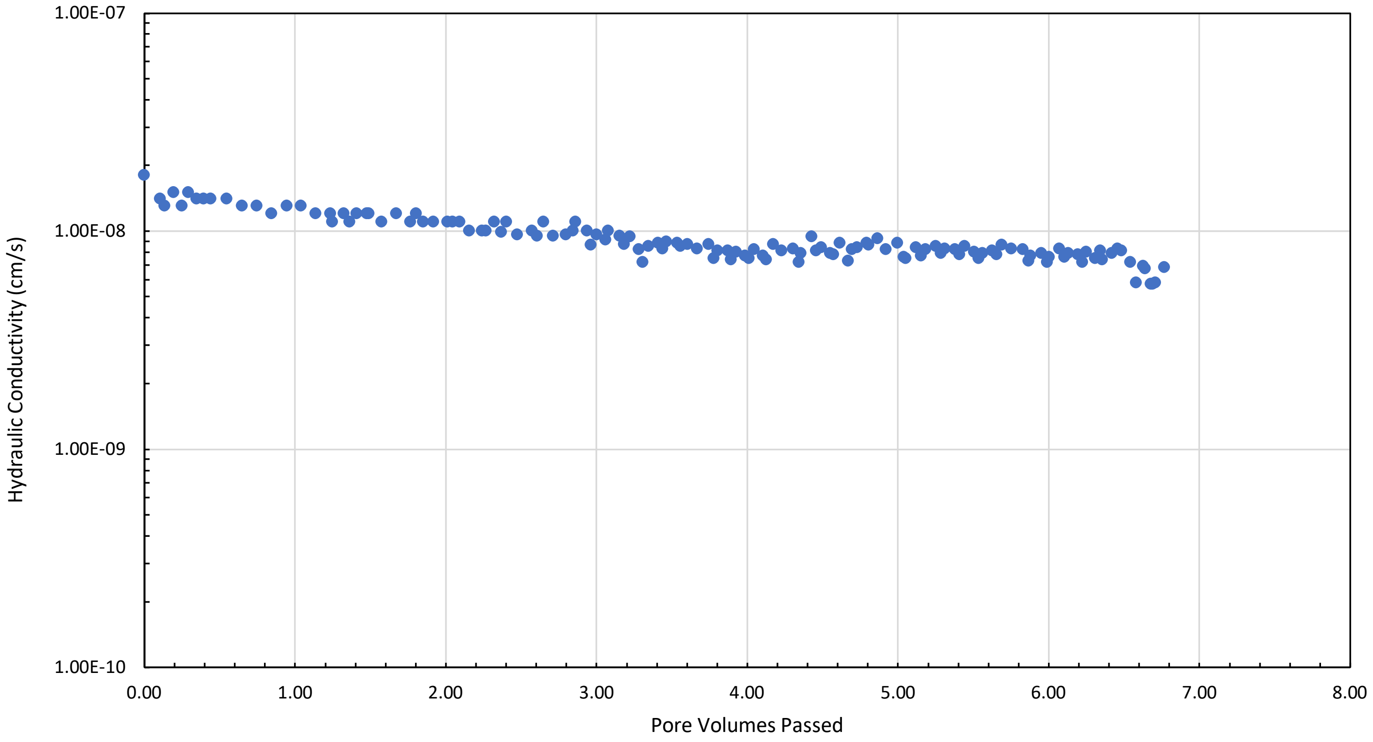
Figure

3-13



B4-ST-4 (70-72.5') Hydraulic Conductivity with PV

MONROE POWER PLANT
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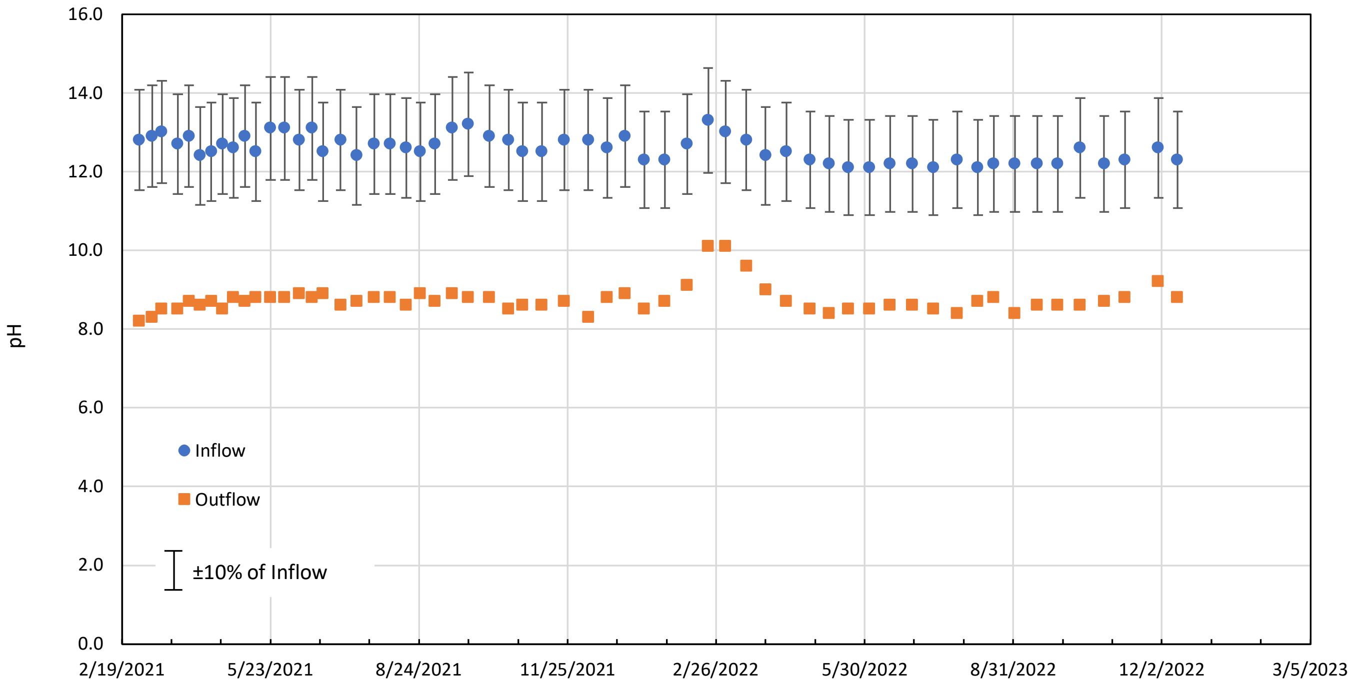
Figure

3-14



B4-ST-4 (70-72.5') pH of Inflow and Outflow with Time

MONROE POWER PLANT
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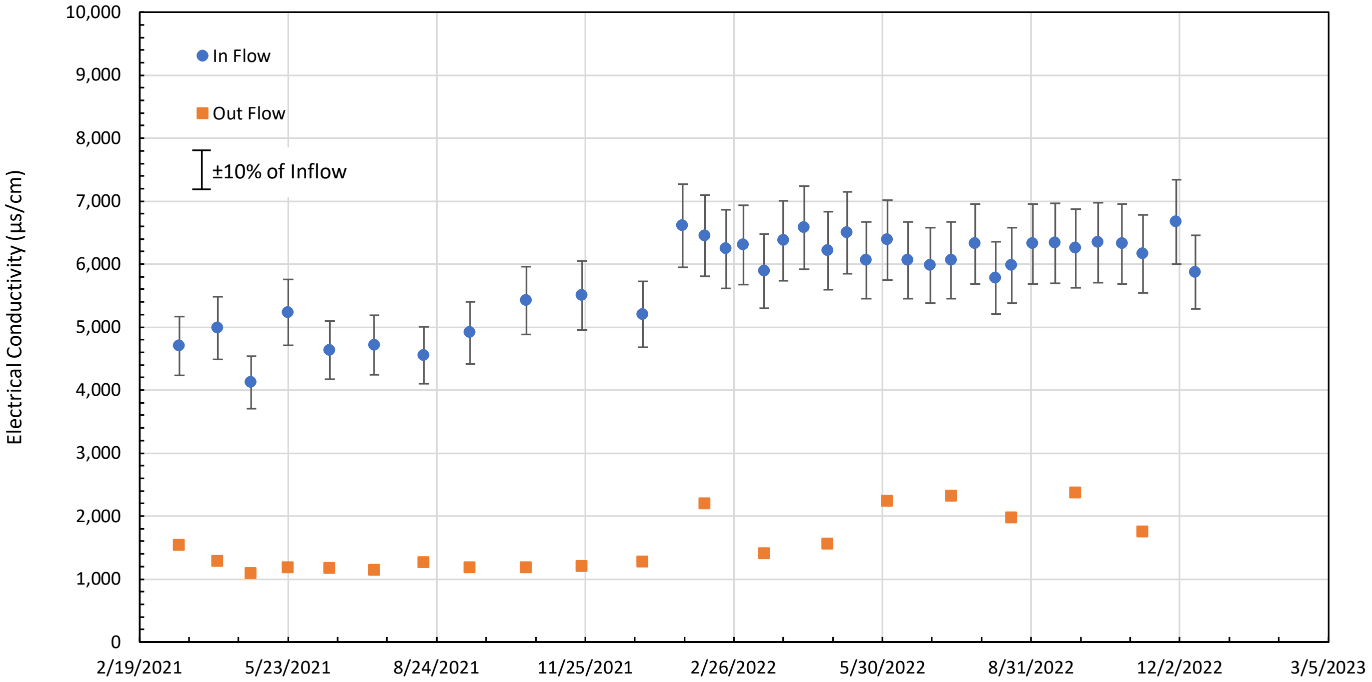
Figure

3-15



B4-ST-4 (70-72.5') Electrical Conductivity (EC) with Time

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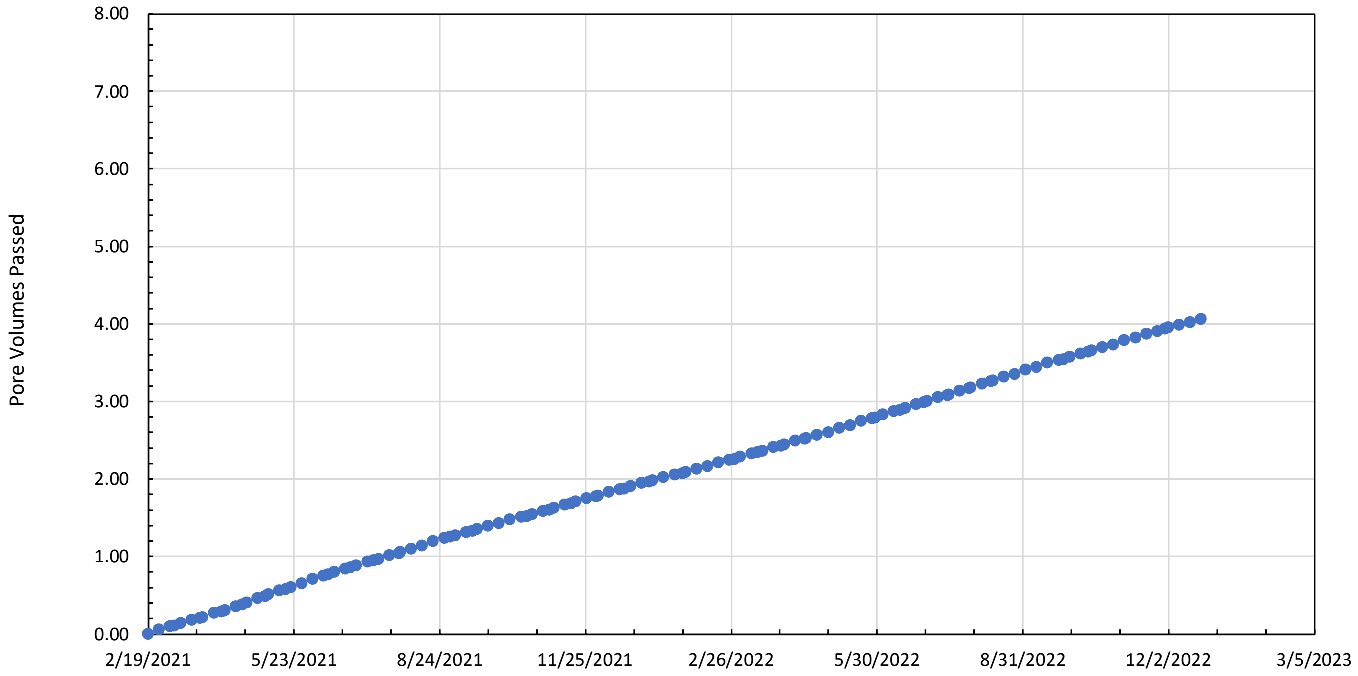
Figure

3-16



B6-ST-1 (25-27') PV Passed with Time

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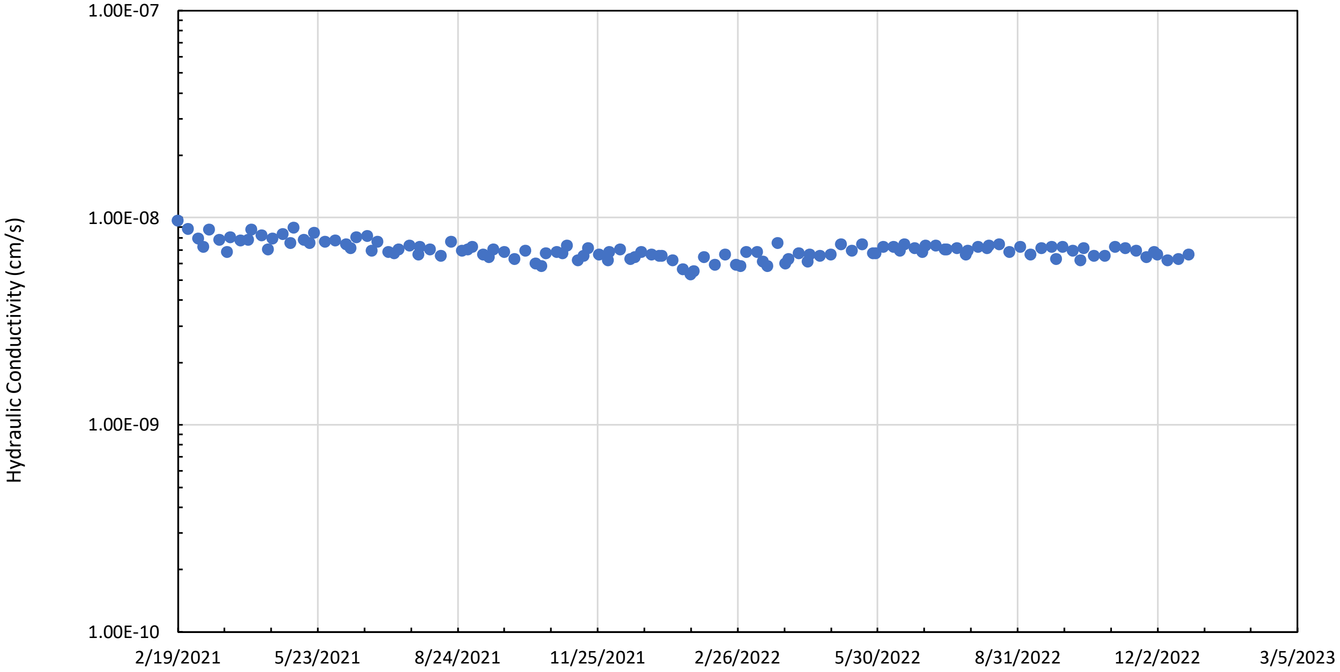
Figure

3-17



B6-ST-1 (25-27') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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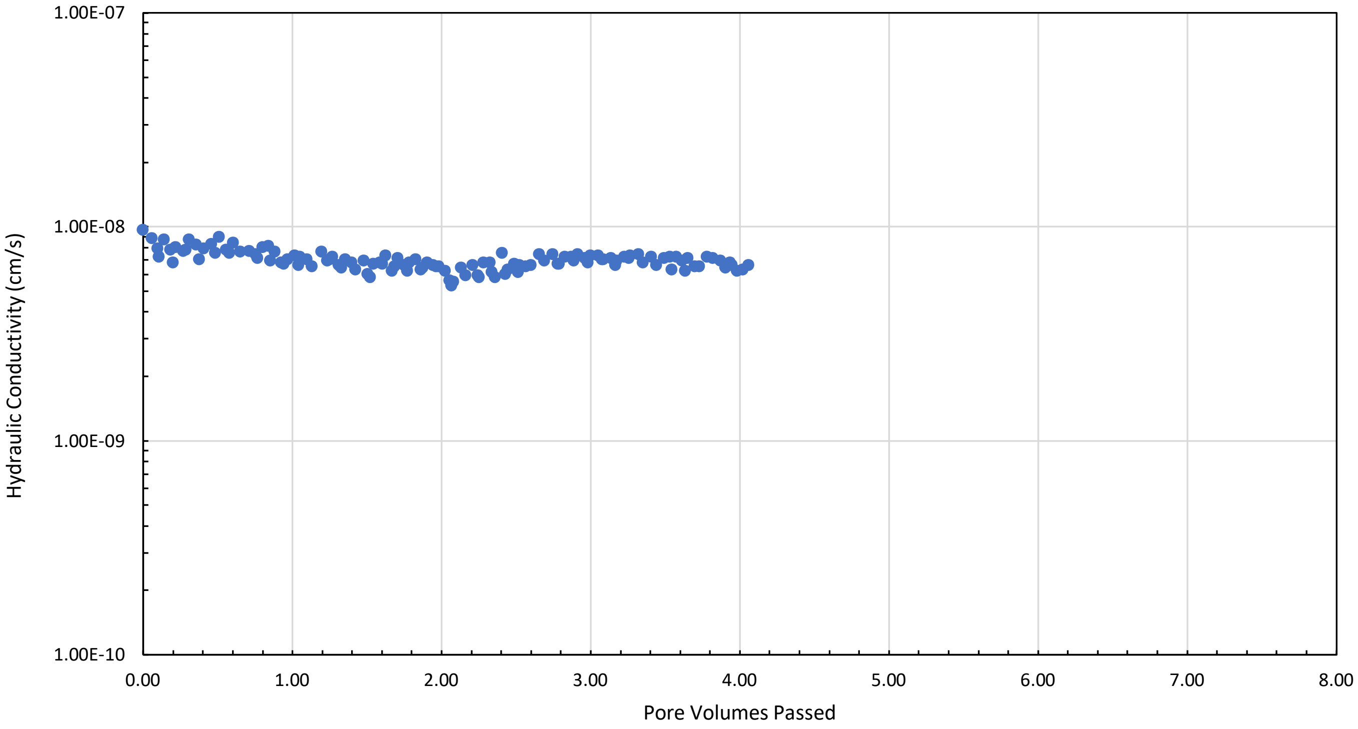
Figure

3-18



B6-ST-1 (25-27') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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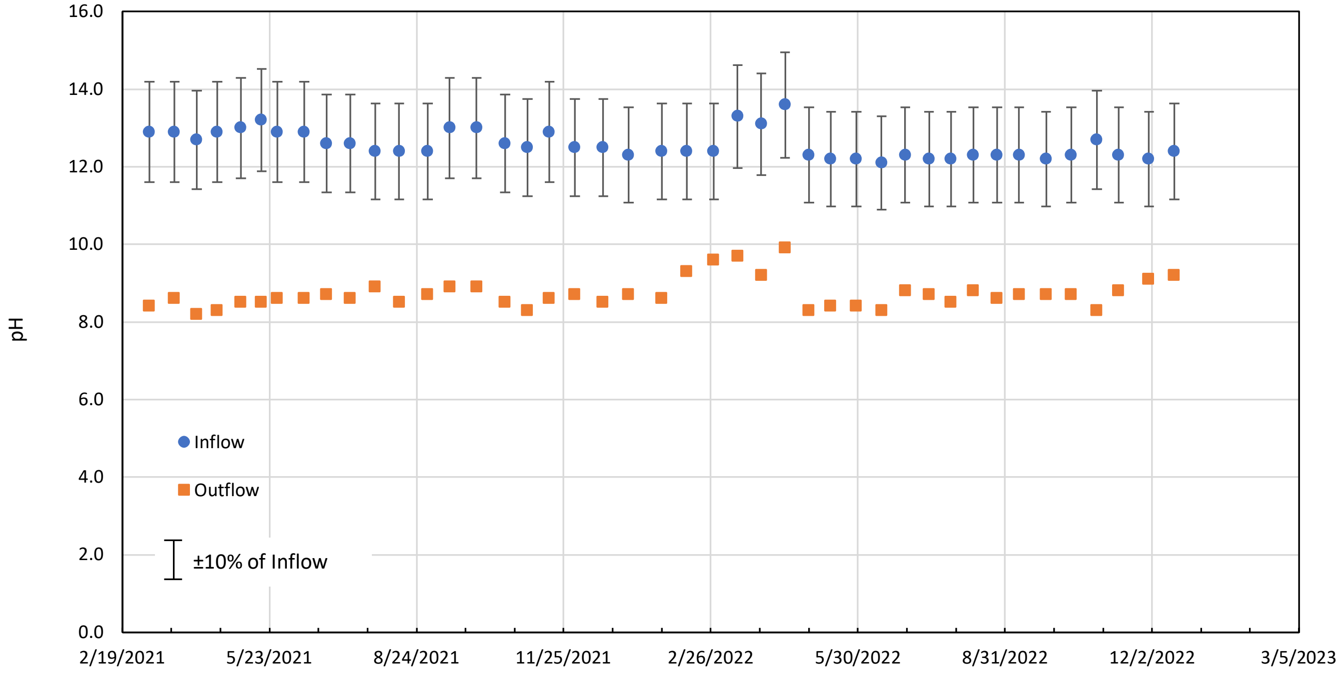
Figure

3-19



B6-ST-1 (25-27') pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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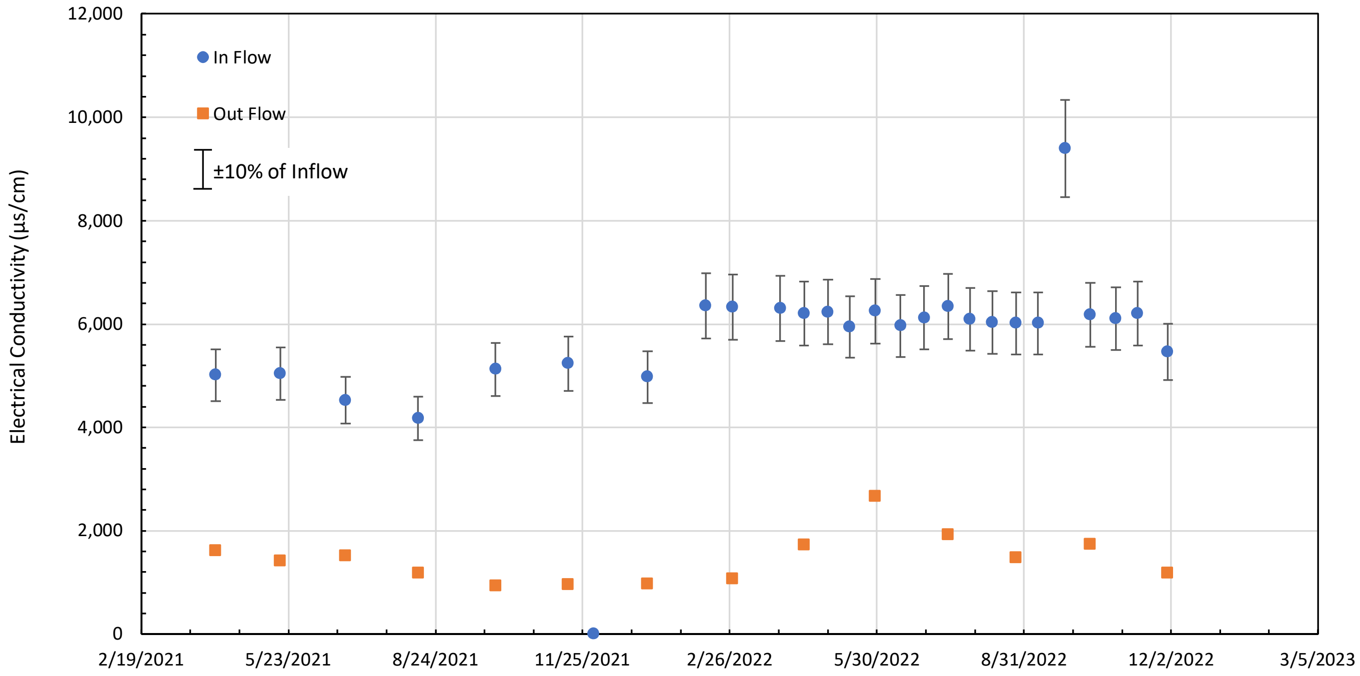
Detroit, MI

April 2023

Figure

3-20



B6-ST-1 (25-27) Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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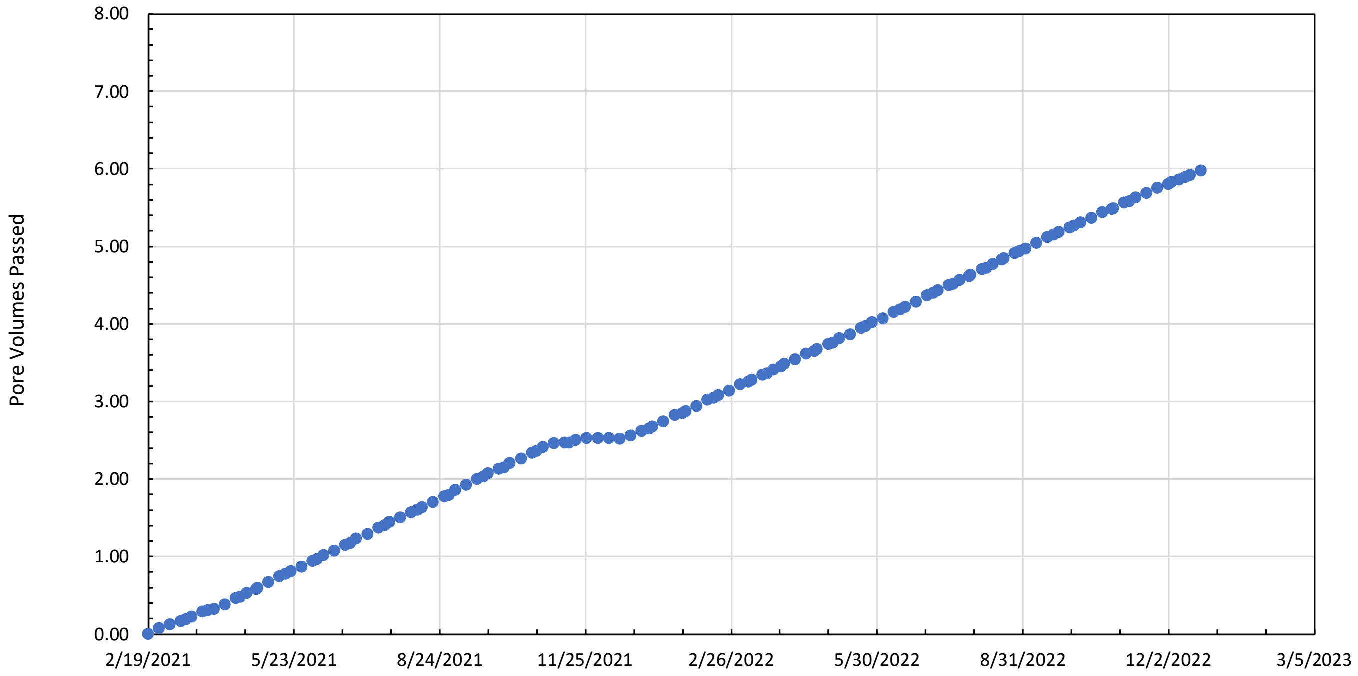
Detroit, MI	April 2023	Figure 3-21



B6-ST-3 (55-57.5') PV Passed with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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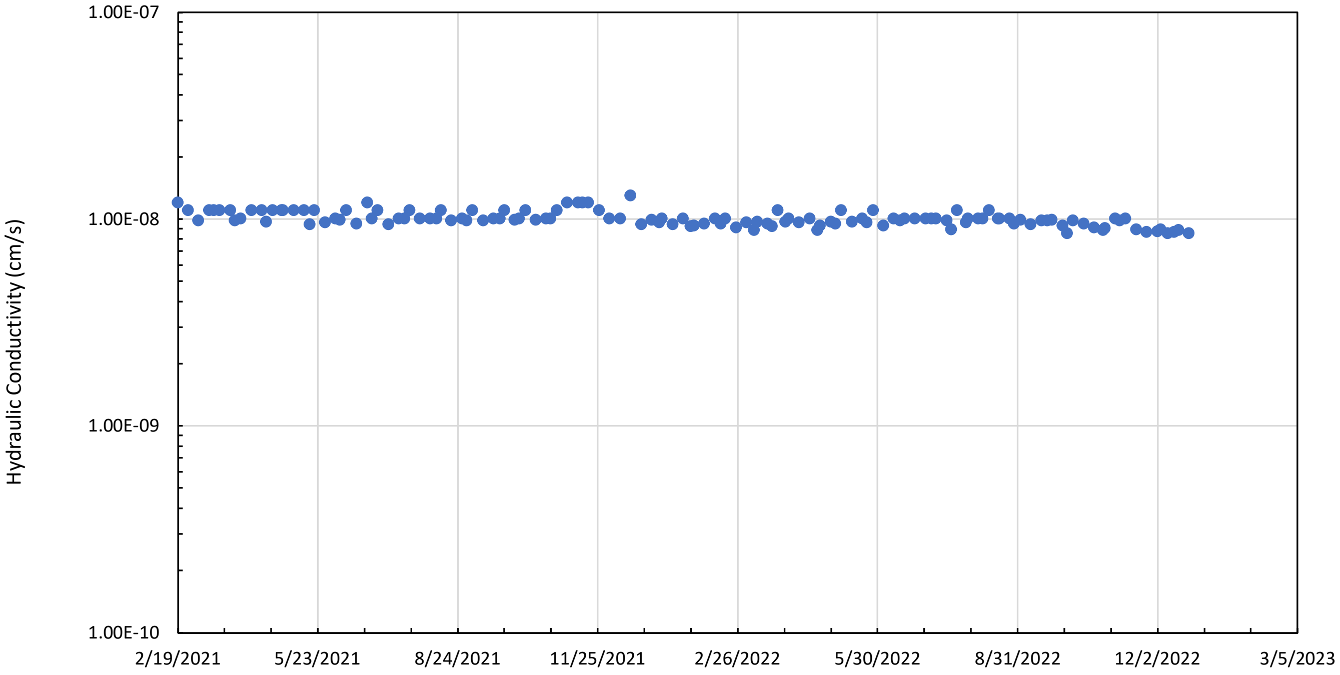
Figure

3-22



B6-ST-3 (55-57.5') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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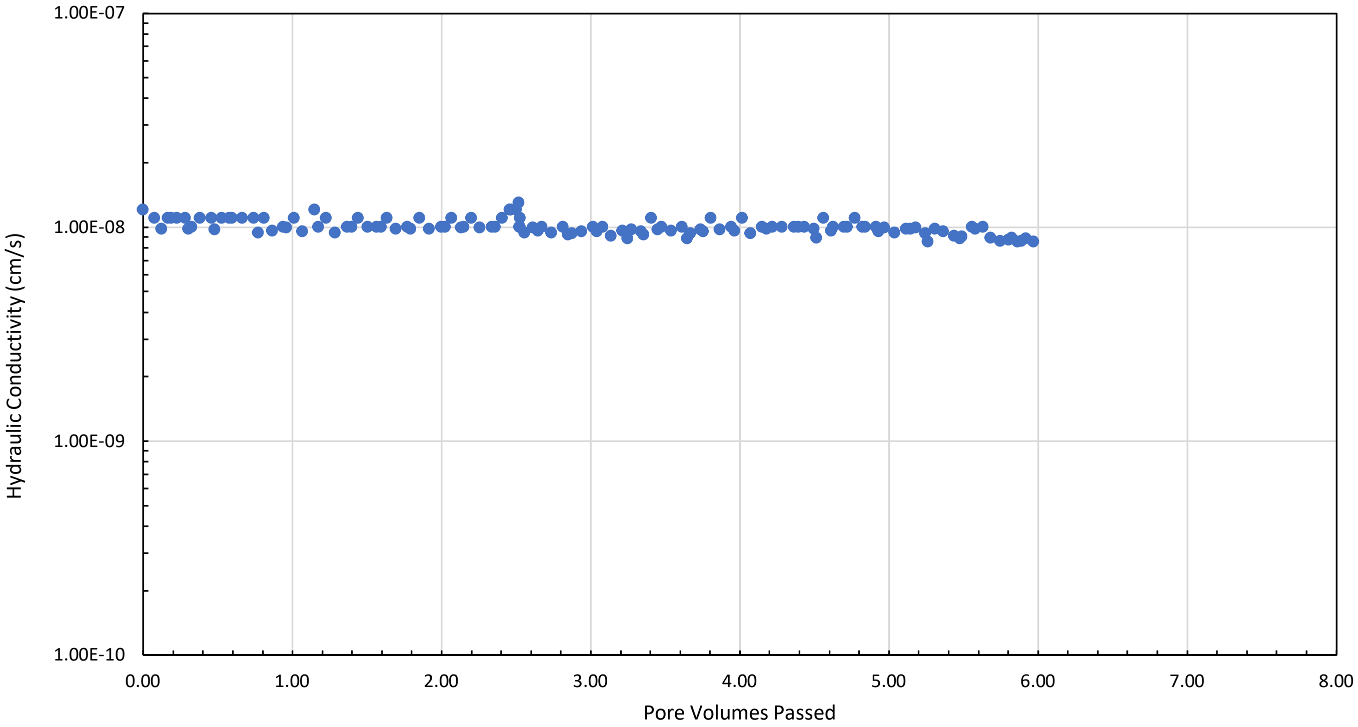
Figure

3-23

Detroit, MI

April 2023



B6-ST-3 (55-57.5') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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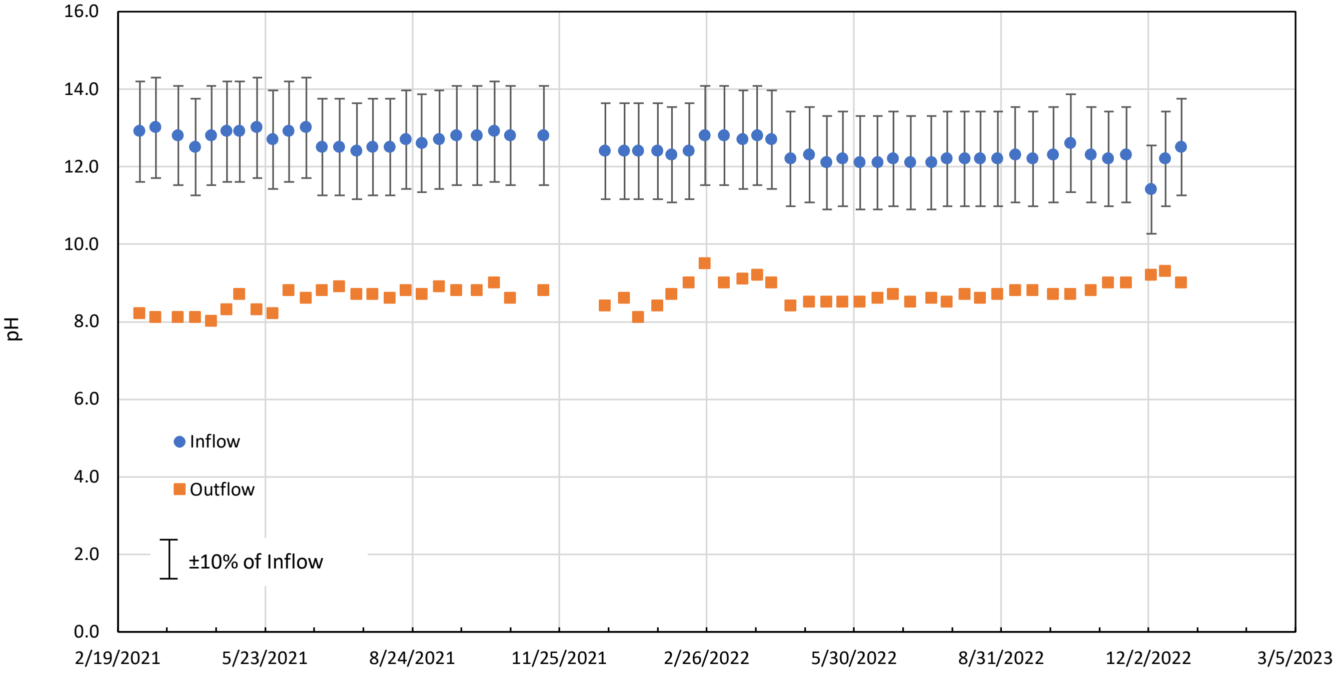
Detroit, MI	April 2023

Figure

3-24



B6-ST-3 (55-57.5') pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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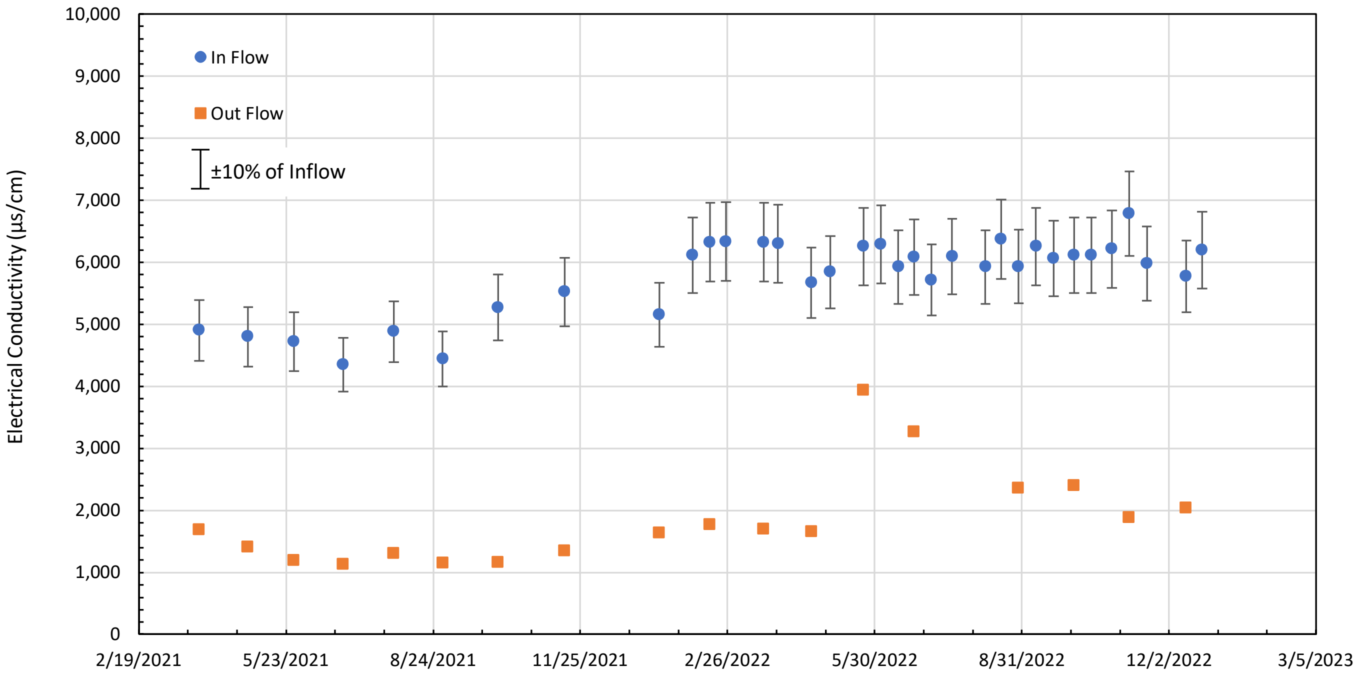
Detroit, MI

April 2023

Figure

3-25



B6-ST-3 (55-57.5') Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

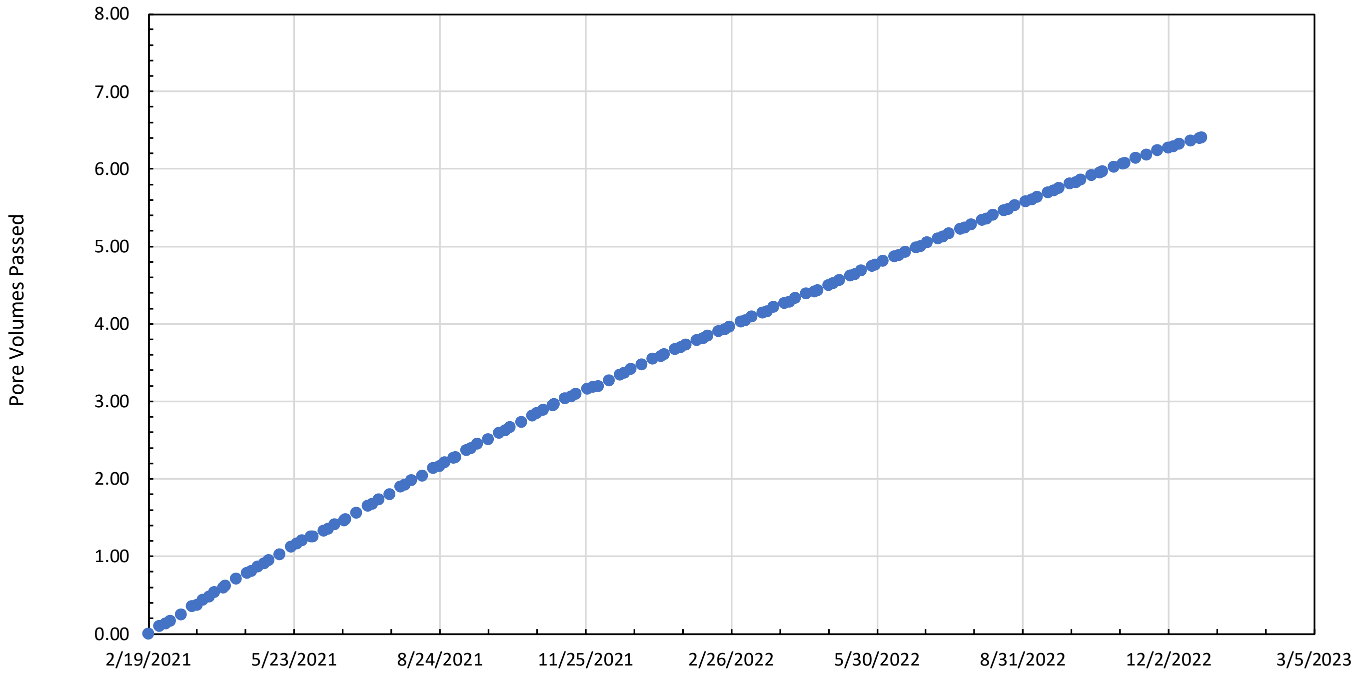
Geosyntec consultants
Geosyntec Consultants of Michigan

Detroit, MI

April 2023

Figure

3-26



B6-ST-4 (65-67.5') PV Passed with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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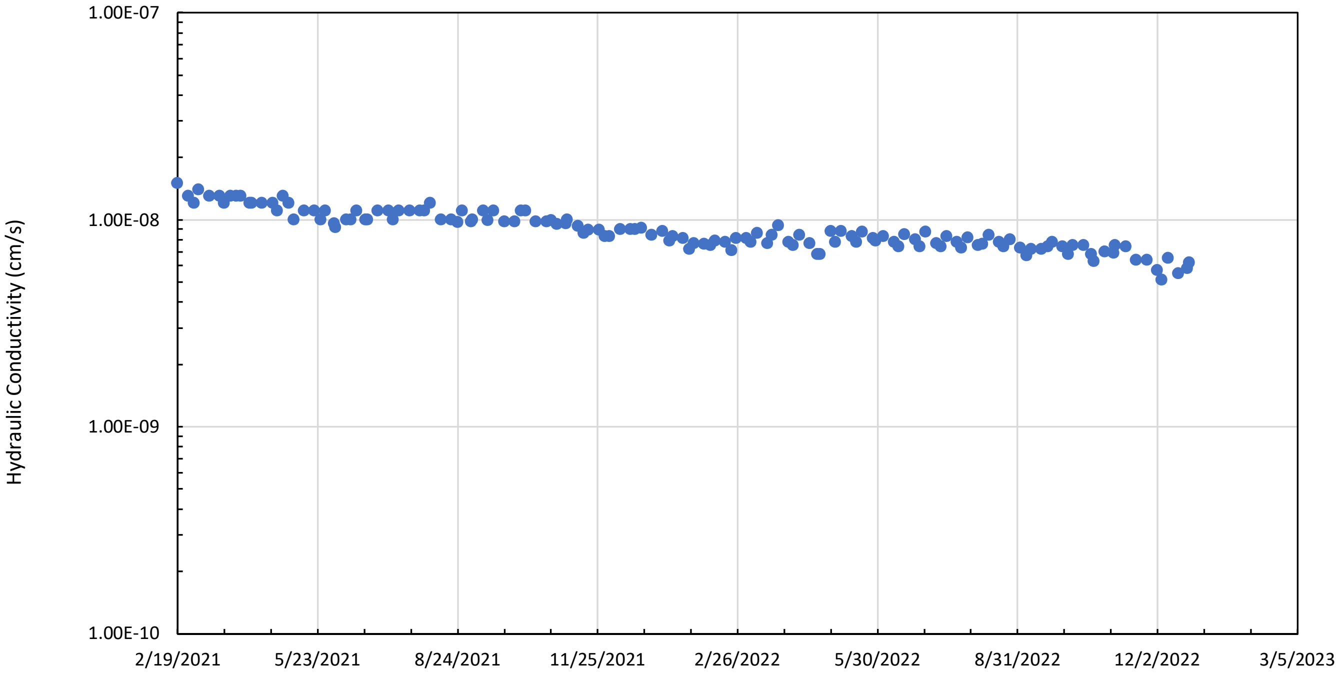
Detroit, MI	April 2023

Figure

3-27



B6-ST-4 (65-67.5') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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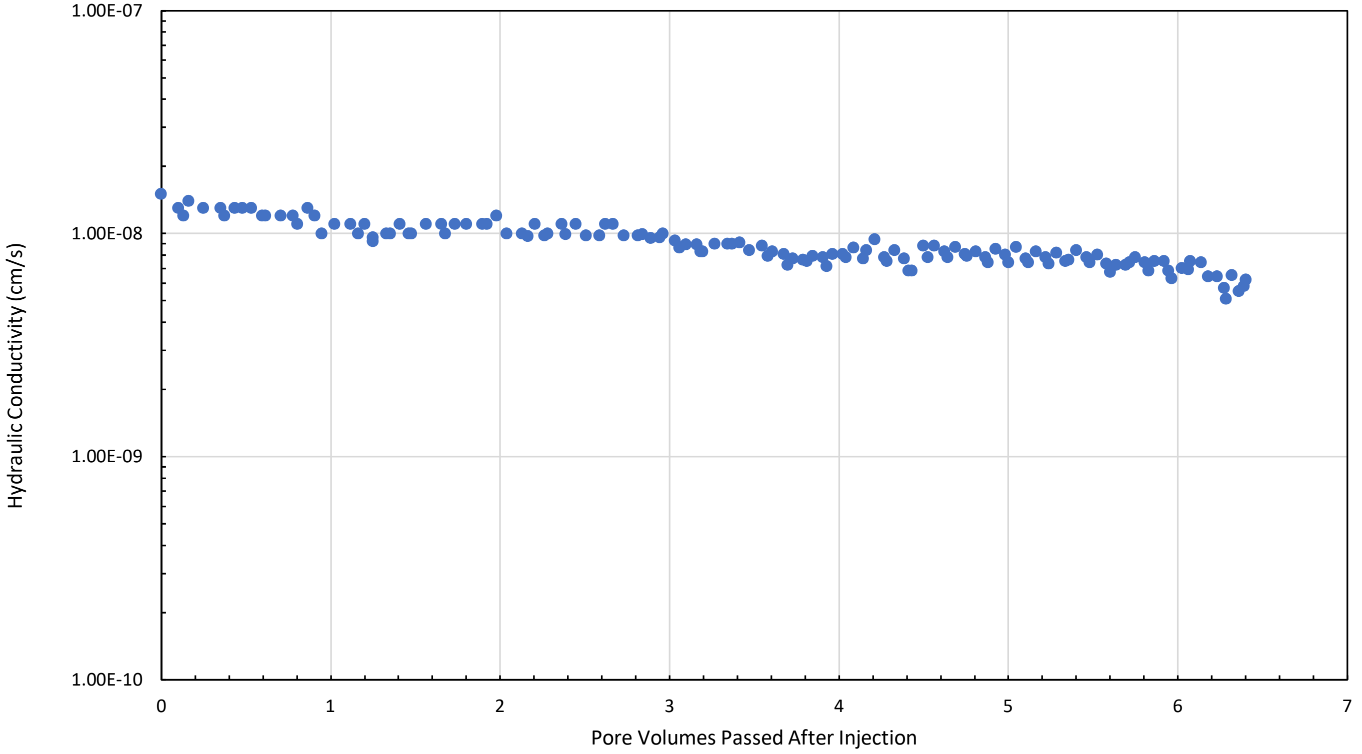
Figure

3-28

Detroit, MI	April 2023



B6-ST-4 (65-67.5') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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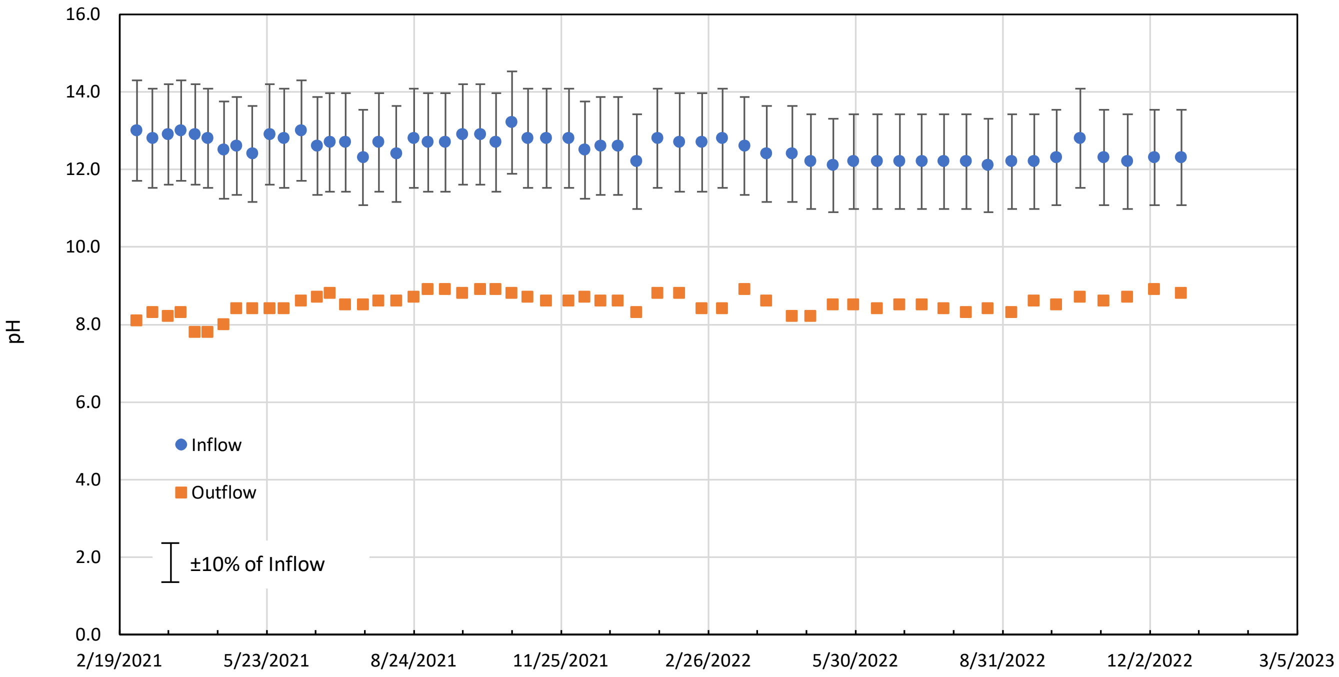
Geosyntec Consultants of Michigan

Detroit, MI | April 2023

Figure

3-29

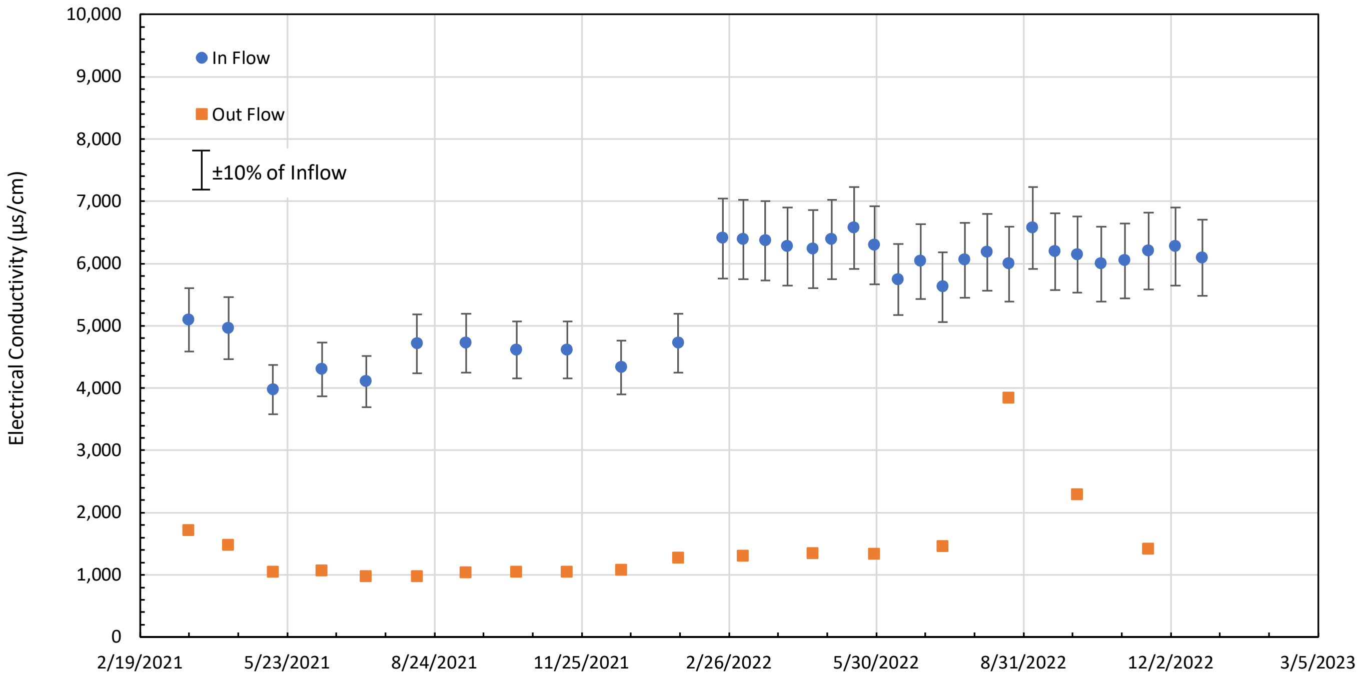


B6-ST-4 (65-67.5') pH of Inflow and Outflow with Time

MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec consultants
Geosyntec Consultants of Michigan

Detroit, MI	April 2023	**Figure** 3-30



B6-ST-4 (65-67.5') Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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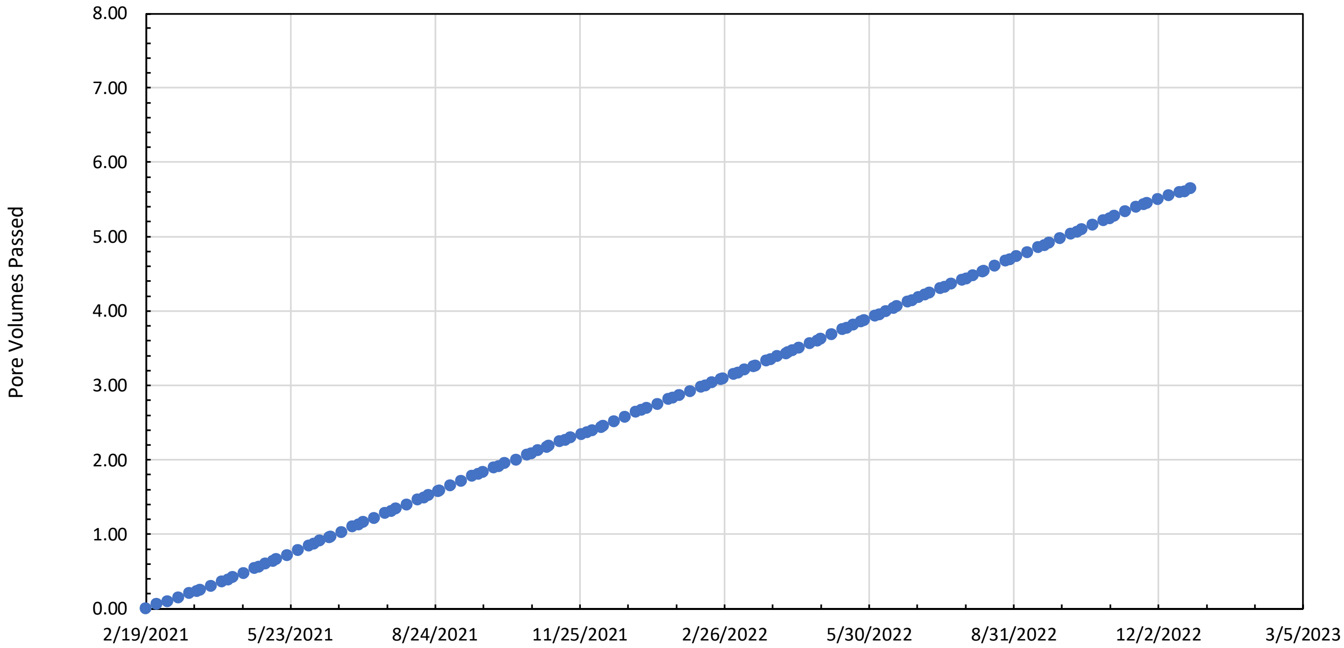
Detroit, MI	April 2023

Figure

3-31



B9-ST-2 (40-42') PV Passed with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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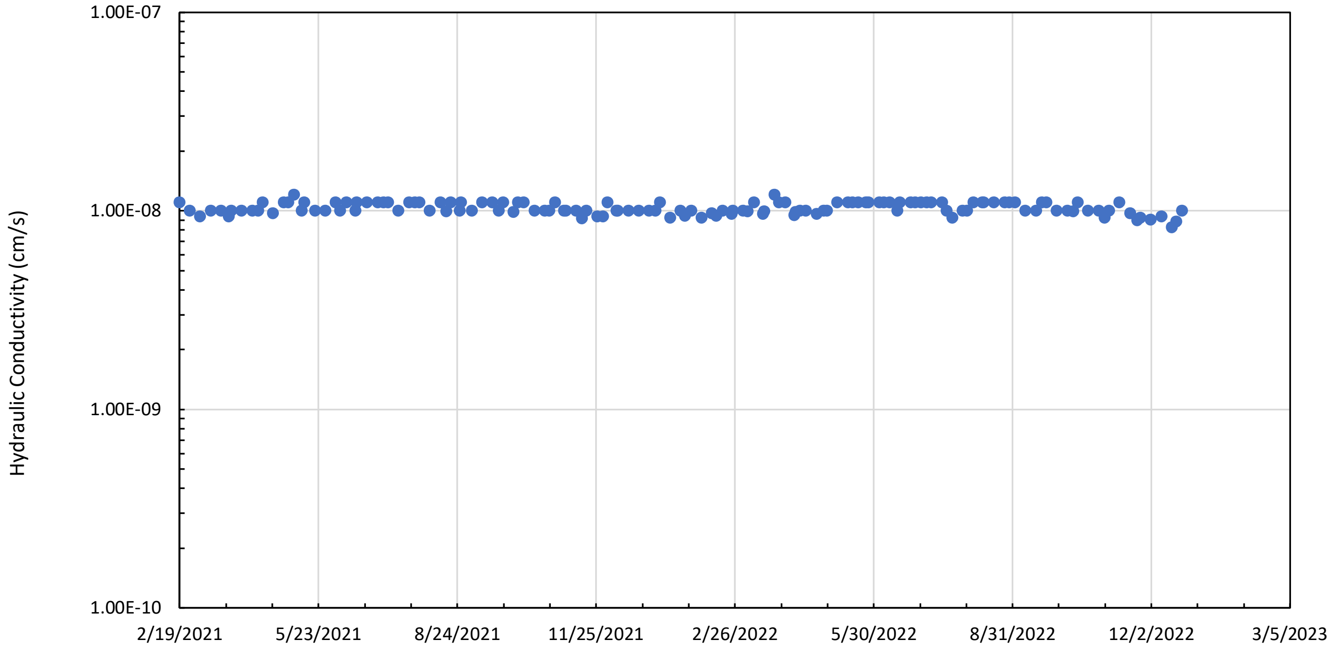
Detroit, MI	April 2023	**Figure** **3-32**



B9-ST-2 (40-42') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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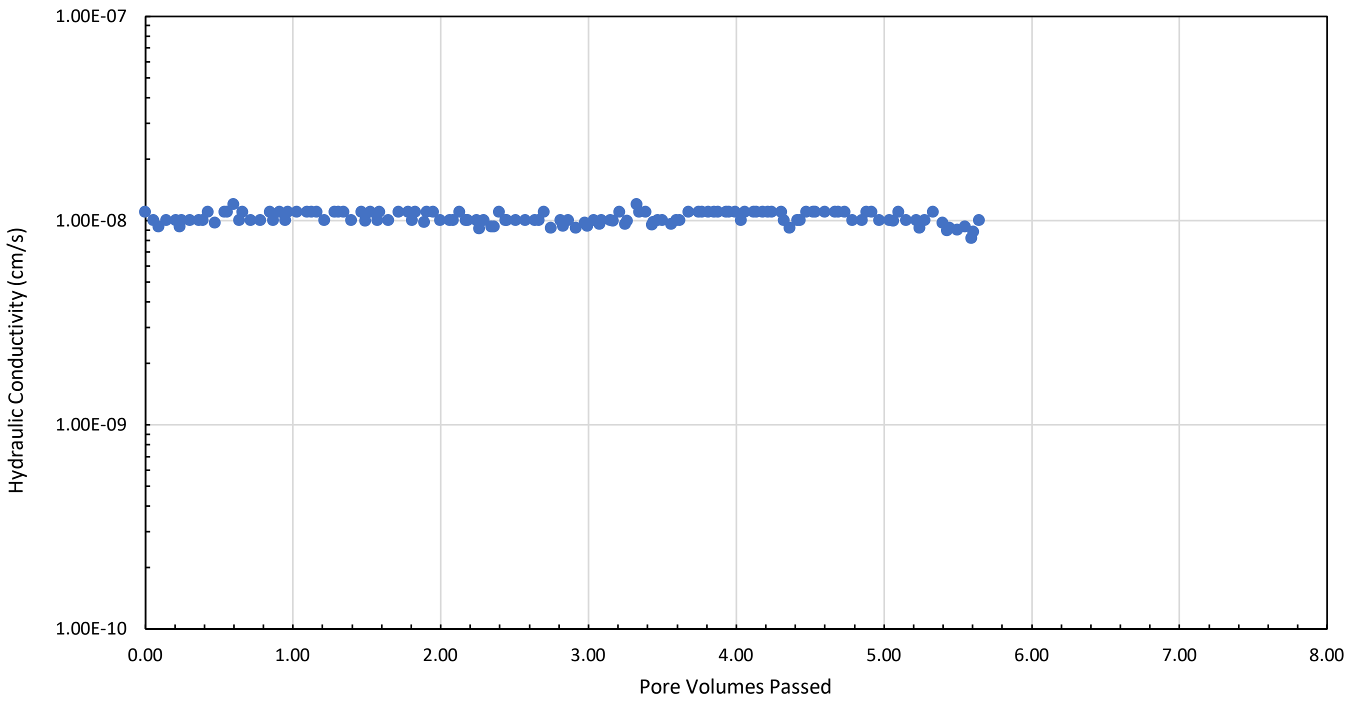
Detroit, MI	April 2023	**Figure** **3-33**



B9-ST-2 (40-42') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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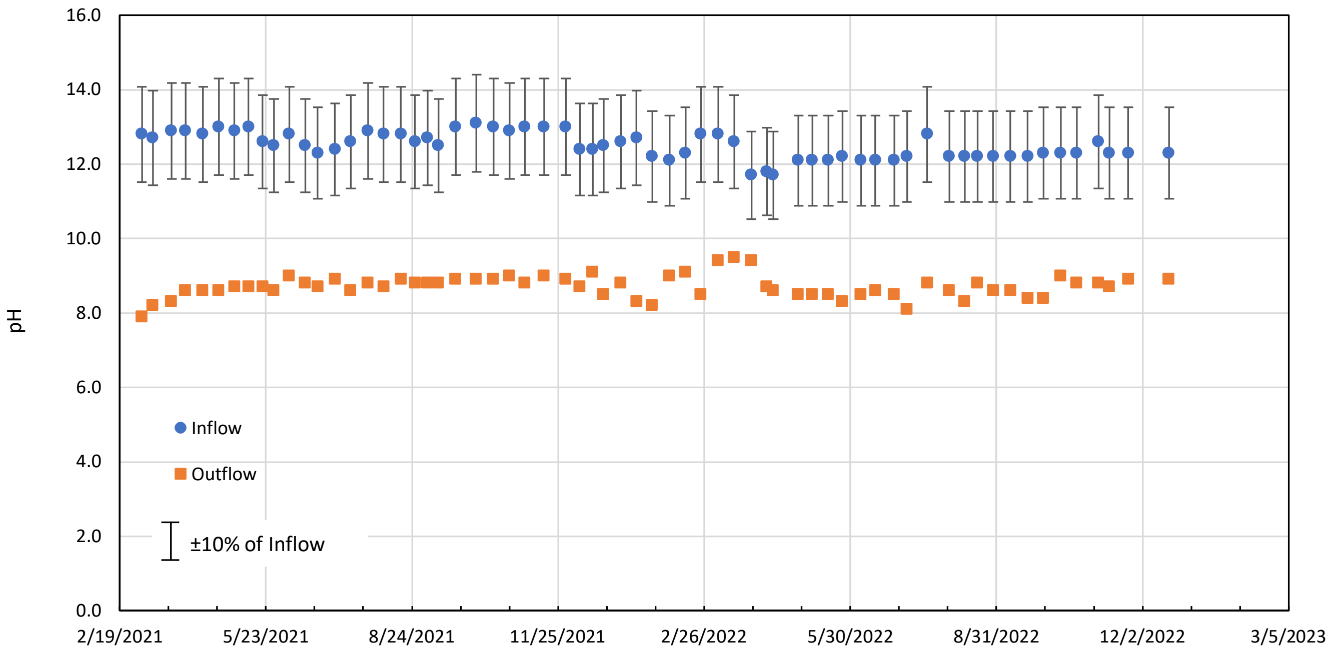
Detroit, MI	April 2023	**Figure** **3-34**

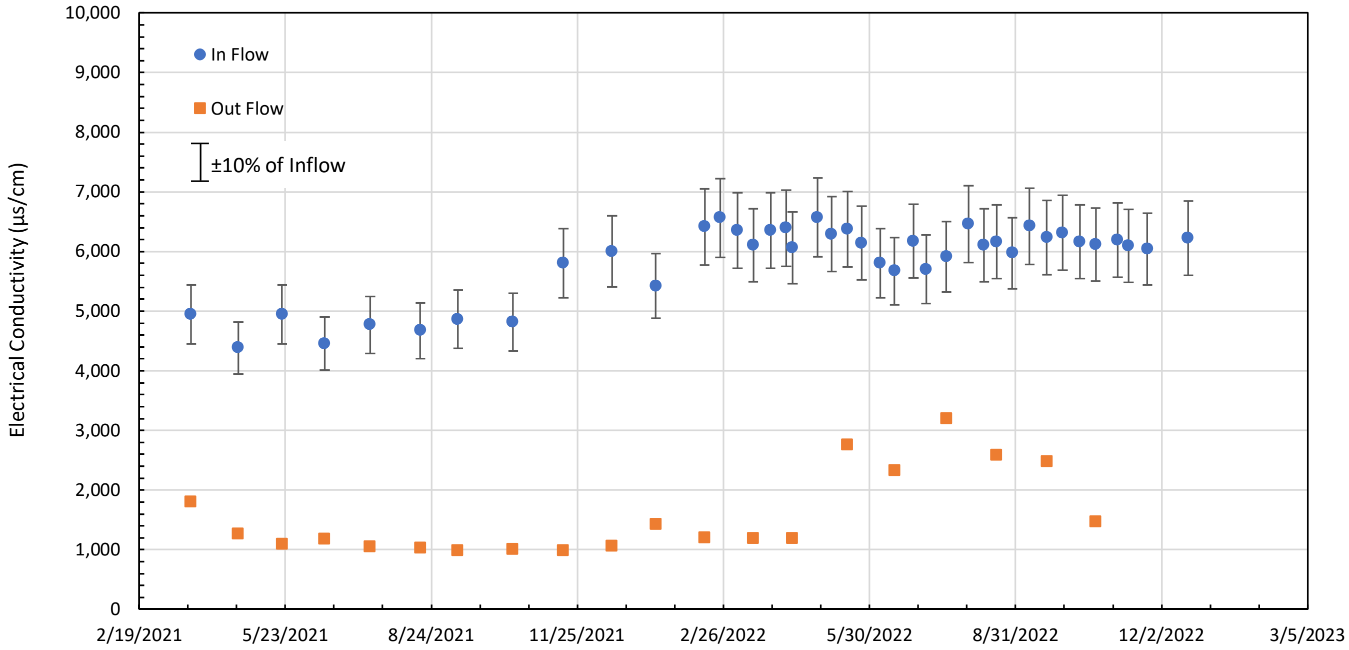


B9-ST-2 (40-42') pH of Inflow and Outflow with Time

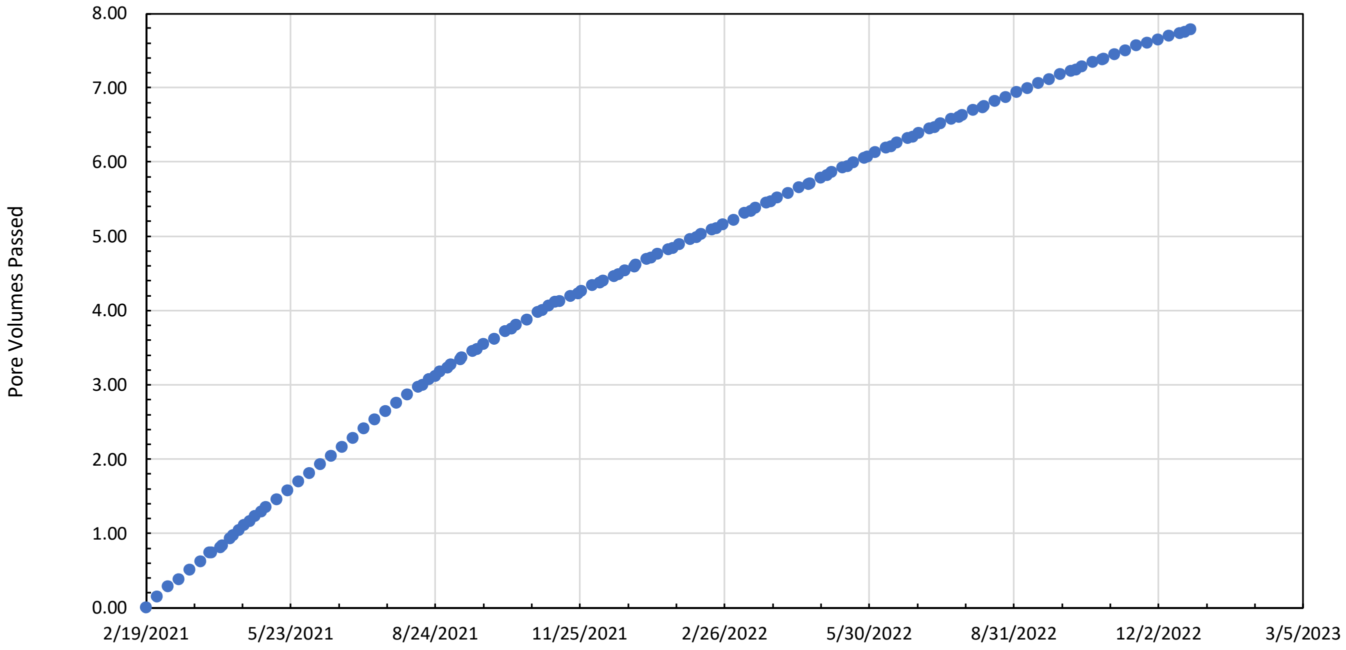
MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec consultants
Geosyntec Consultants of Michigan

Detroit, MI	April 2023	**Figure** **3-35**



B9-ST-2 (40-42') Electrical Conductivity (EC) with Time		
MONROE POWER PLANT MONROE, MICHIGAN		
Geosyntec consultants Geosyntec Consultants of Michigan		Figure 3-36
Detroit, MI	April 2023	



B9-ST-3 (55-57') PV Passed with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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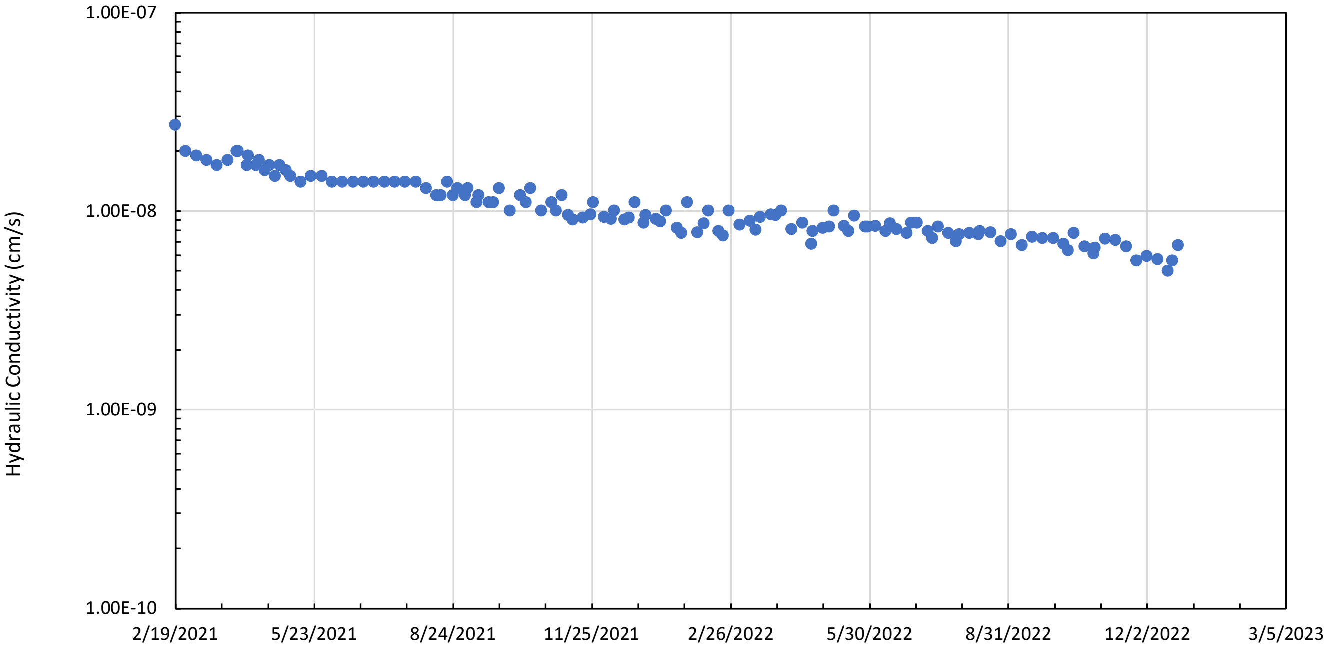
Detroit, MI	April 2023	**Figure 3-37**



B9-ST-3 (55-57') Hydraulic Conductivity with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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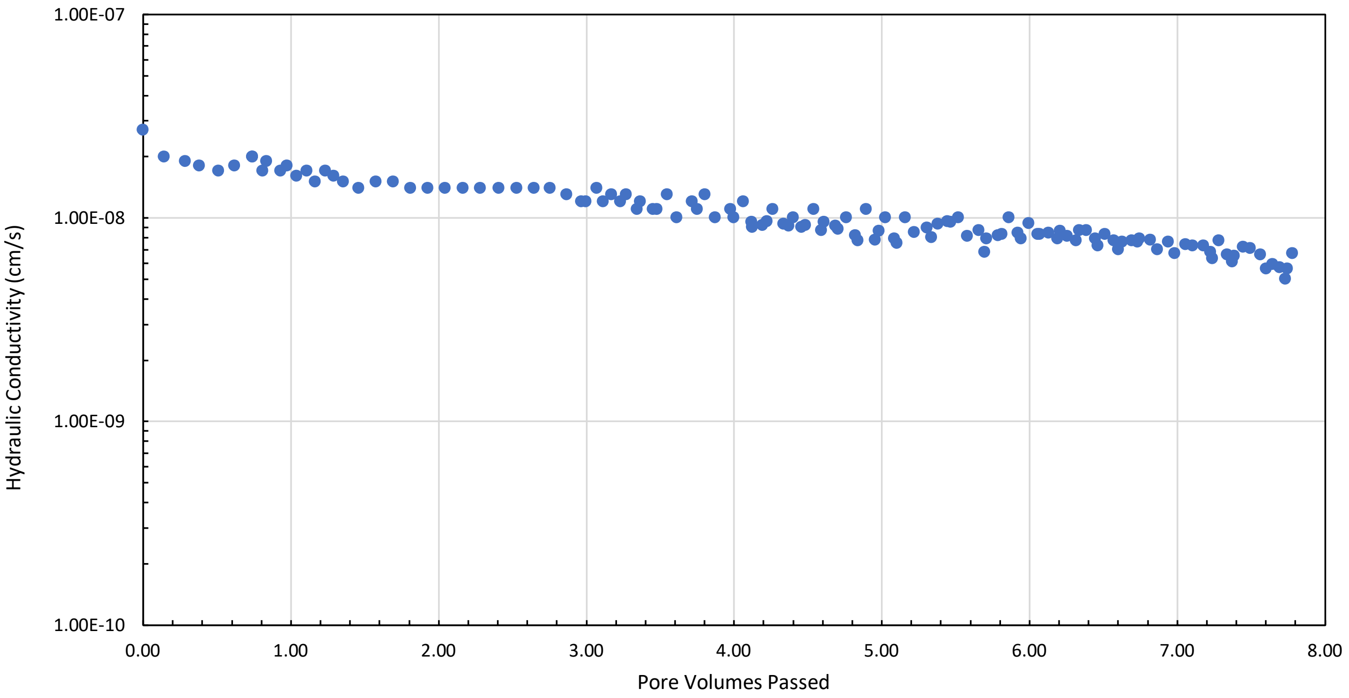
Detroit, MI | April 2023

Figure

3-38



B9-ST-3 (55-57') Hydraulic Conductivity with PV

MONROE POWER PLANT
MONROE, MICHIGAN

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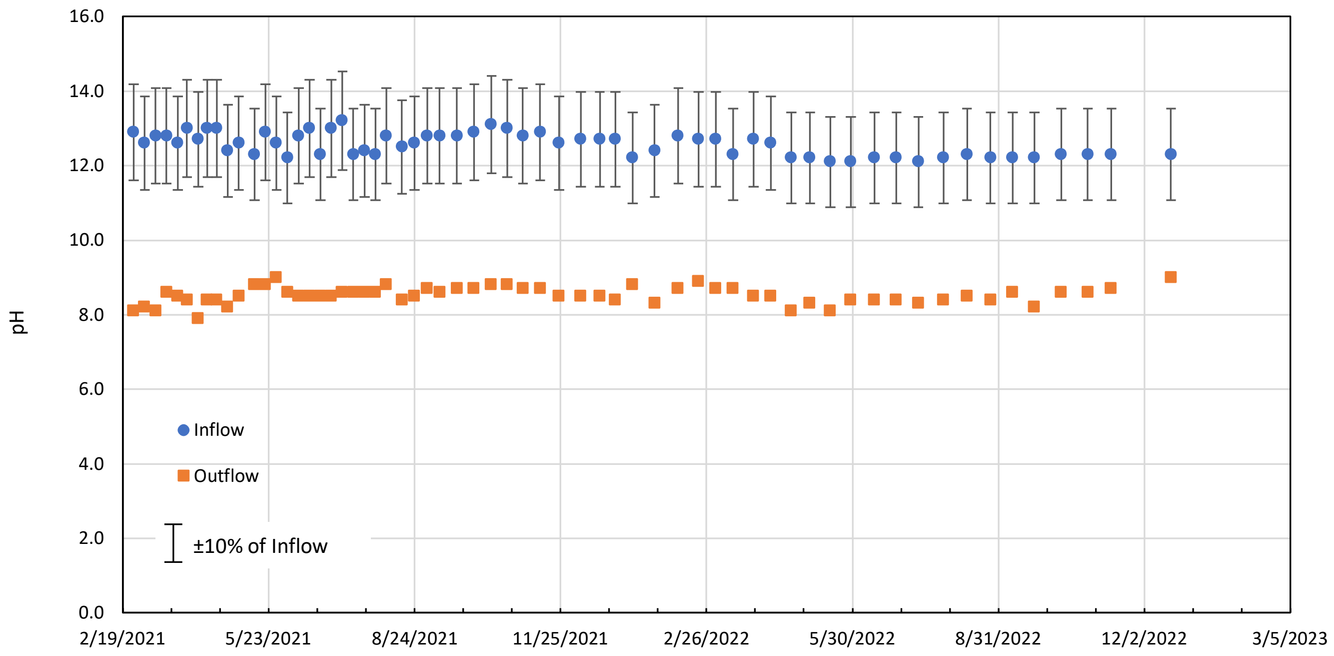
Detroit, MI	April 2023	**Figure** **3-39**



B9-ST-3 (55-57') pH of Inflow and Outflow with Time

MONROE POWER PLANT
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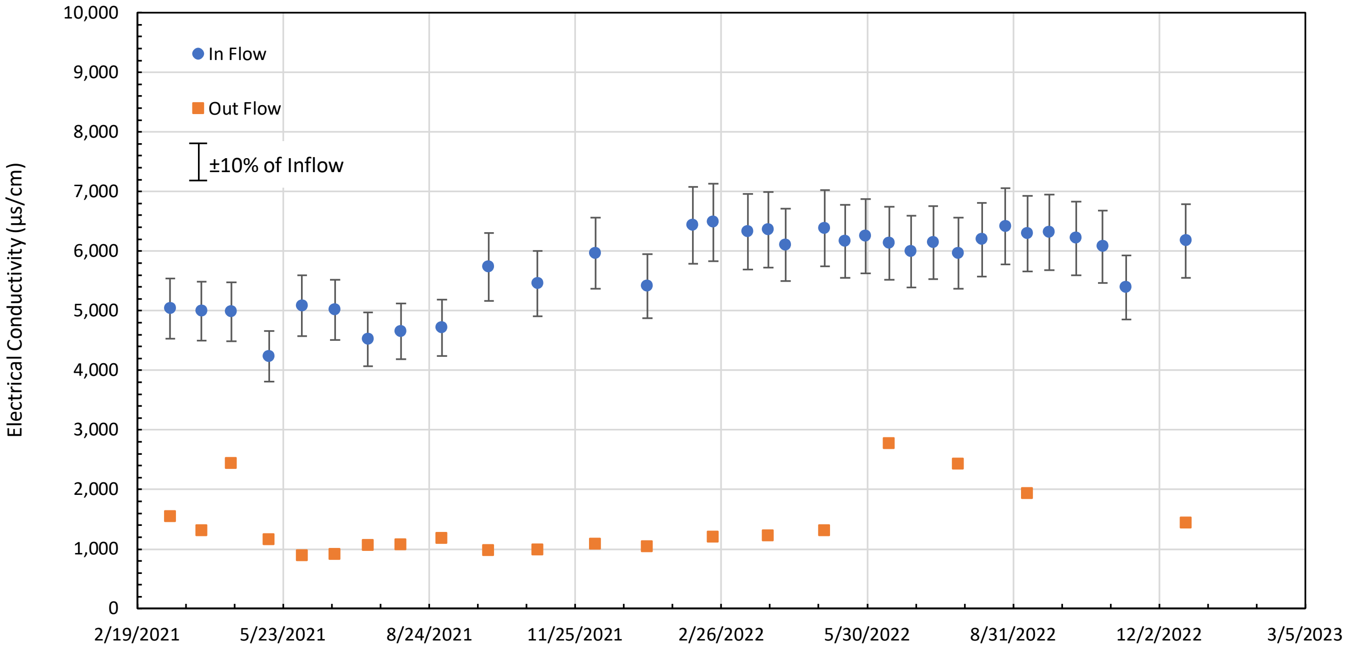
Detroit, MI | April 2023

Figure

3-40



B9-ST-3 (55-57') Electrical Conductivity (EC) with Time

MONROE POWER PLANT
MONROE, MICHIGAN

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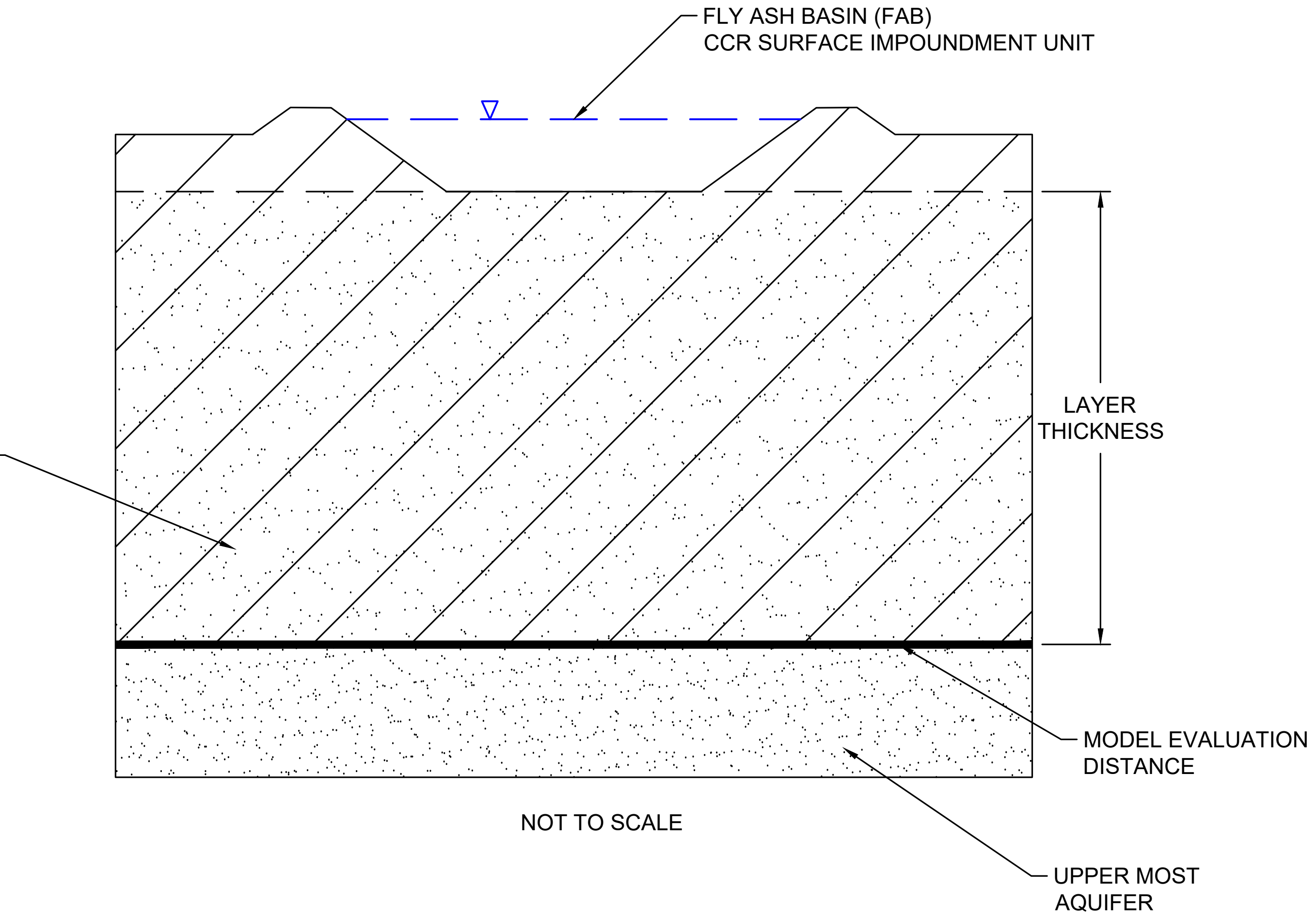
Detroit, MI	April 2023	**Figure 3-41**

SANDY LEAN CLAY LAYER		
INPUT PARAMETER	**UNITS**	**VALUE**
DARCY VELOCITY	M/YR	1.91E-03
TOTAL THICKNESS	METERS	6.31
COEFFICIENT OF HYDODYNAMIC DISPERSION	M^2/a	0.019
EFFECTIVE POROSITY		0.58
DENSITY	KG/M3	1919
DISTRIBUTION COEFFICIENT	M^3/KG	0
DEGRADATION		0



NOT TO SCALE

LEGEND

▨ LEAN CLAY UNIT

▨ SANDY LEAN CLAY UNIT

░ UPPER MOST AQUIFER (TRANSITION ZONE)

FATE AND TRANSPORT CONCEPTUAL MODEL MONROE ALD - FAB

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PROJECT NO: GLP8014

April 2023

FIGURE 4-1

APPENDIX A – MONITORING WELL SLUG TEST RESULTS

2016 Slug Test Results

Hydraulic Conductivity Results

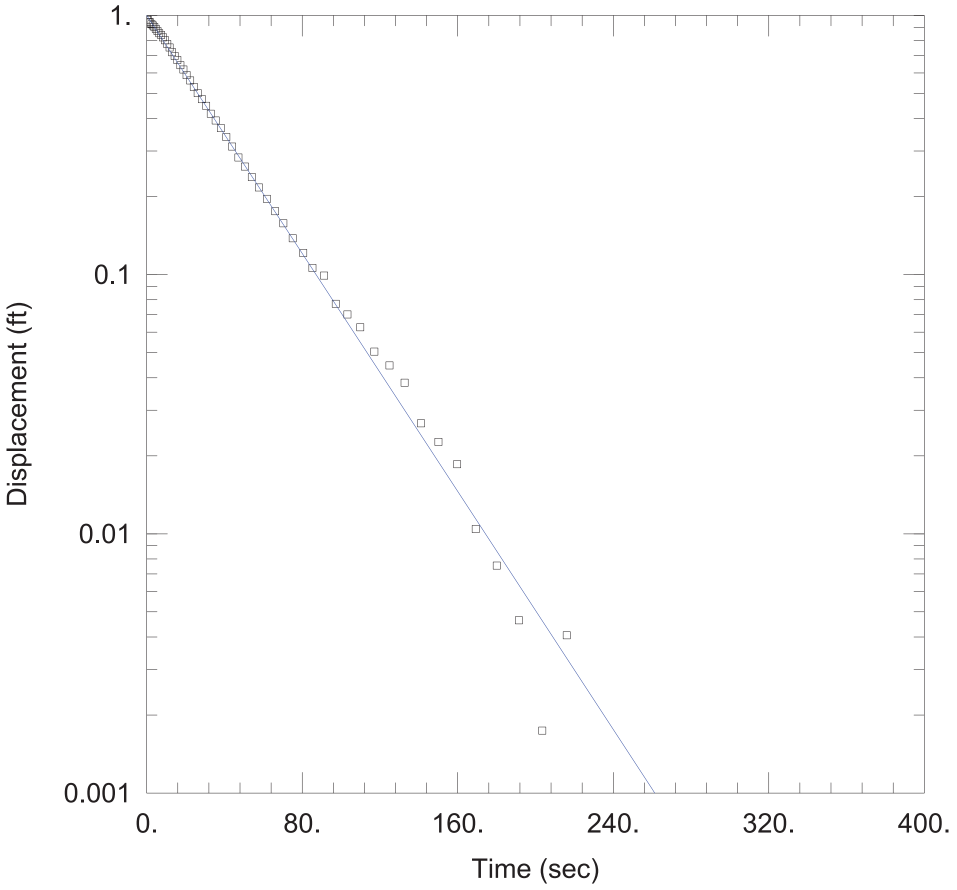
DTE Electric Company Monroe Power Plant Fly Ash Basin
Monroe, Michigan

Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01	3/1/2016	Falling Head	1.91E-03	5.403
		Rising Head	1.08E-03	3.053
		Average	**1.49E-03**	**4.228**

Conversion:

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

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



FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-01 IN.aqt
Date: 11/27/17 Time: 14:21:09

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE MFAB CCR
Project: 231828.0001.0000
Location: Monroe, MI
Test Well: MW-16-01
Test Date: 3/2/16

AQUIFER DATA

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

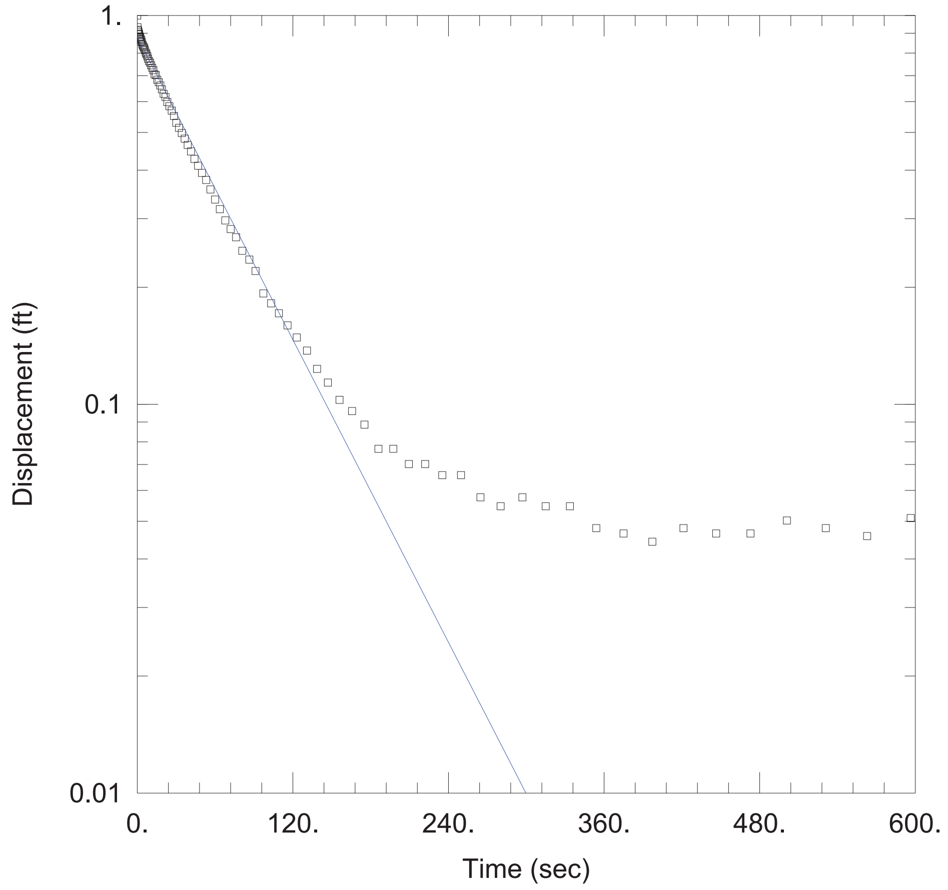
WELL DATA (MW-16-01)

Initial Displacement: 1.724 ft
Static Water Column Height: 48.77 ft
Total Well Penetration Depth: 53.21 ft
Screen Length: 5. ft
Casing Radius: 0.08333 ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001906 cm/sec
y0 = 1.725 ft



RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01 OUT.aqt
Date: 11/27/17
Time: 14:23:00

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE MFAB CCR
Project: 231828.0001.0000
Location: Monroe, MI
Test Well: MW-16-01
Test Date: 3/2/16

AQUIFER DATA

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

WELL DATA (MW-16-01)

Initial Displacement: 1.354 ft
Static Water Column Height: 48.77 ft
Total Well Penetration Depth: 53.21 ft
Screen Length: 5. ft
Casing Radius: 0.08333 ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.001077 cm/sec
y0 = 1.191 ft

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2021 Slug Test Results

2021 Hydraulic Conductivity Results Summary
DTE Electric Company Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill
7955 East Dunbar Road, Monroe, Michigan

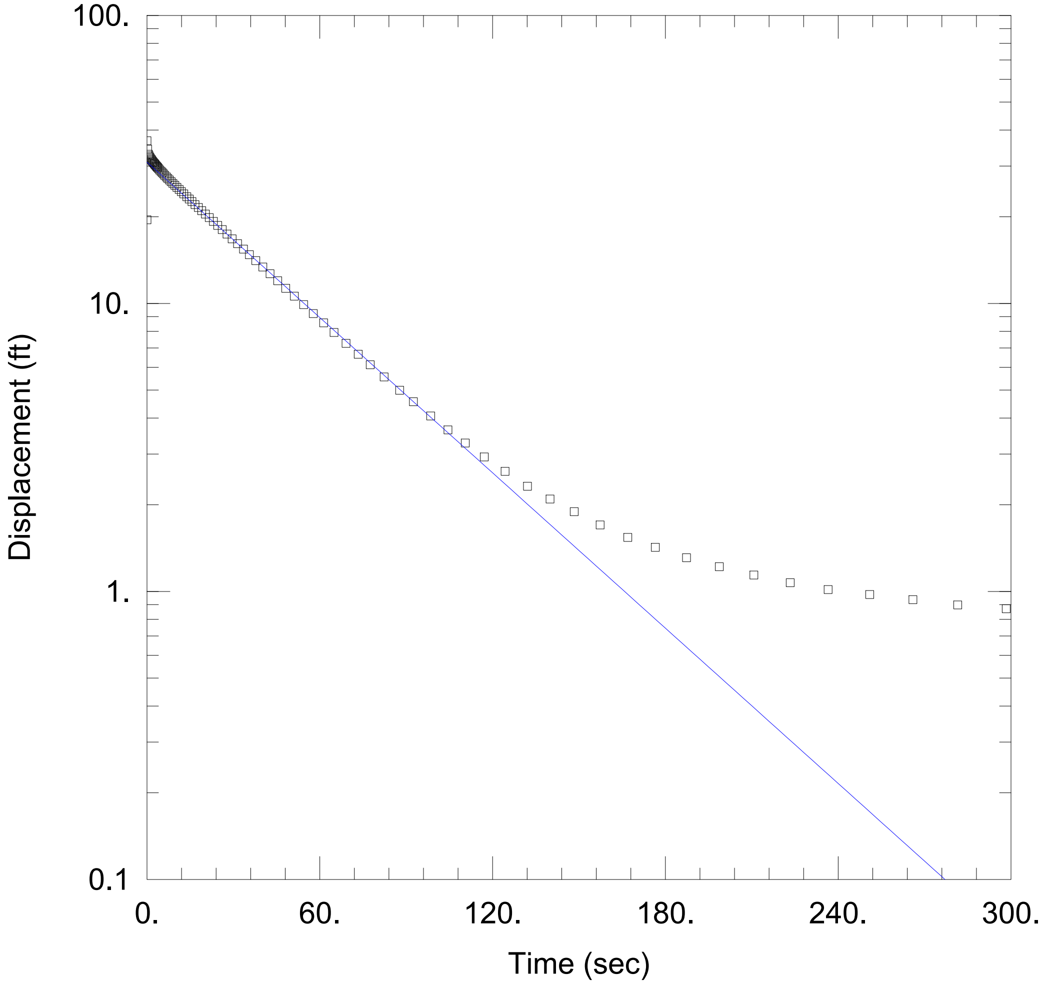
Slug Test	WC (ft)	K (cm/s)	K (ft/d)	Comment/K Geometric mean (cm/s)	K Geometric Mean (ft/d)
MW-16-02 Test 1	63	NA	NA	Not a good match, use tests 2 and 3	NA
MW-16-02 Test 2	63	2.5E-03	7.0	2.6E-03	7.4
MW-16-02 Test 3	63	2.7E-03	7.8		
MW-16-03 Test 1	55	4.3E-03	12.2	4.5E-03	12.9
MW-16-03 Test 2	55	4.4E-03	12.5		
MW-16-03 Test 3	55	4.9E-03	14.0		
MW-16-04 Test 1	63	3.9E-02	110.9	3.5E-02	99.6
MW-16-04 Test 2	63	3.4E-02	95.5		
MW-16-04 Test 3	63	3.3E-02	93.3		
MW-16-05 Test 1	60	9.9E-03	28.1	1.0E-02	28.4
MW-16-05 Test 2	60	1.0E-02	28.5		
MW-16-05 Test 3	60	1.0E-02	28.7		
MW-16-06 Test 1	53	3.8E-03	10.7	3.3E-03	9.5
MW-16-06 Test 2	53	3.4E-03	9.5		
MW-16-06 Test 3	53	2.9E-03	8.3		
MW-16-07 Test 1	50	3.5E-03	9.9	4.1E-03	11.7
MW-16-07 Test 2	50	4.4E-03	12.5		
MW-16-07 Test 3	50	4.5E-03	12.9		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A pneumatic air slug was utilized to complete slug tests in these artesian free flowing wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 1.aqt
Date: 10/29/21 Time: 13:27:14

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

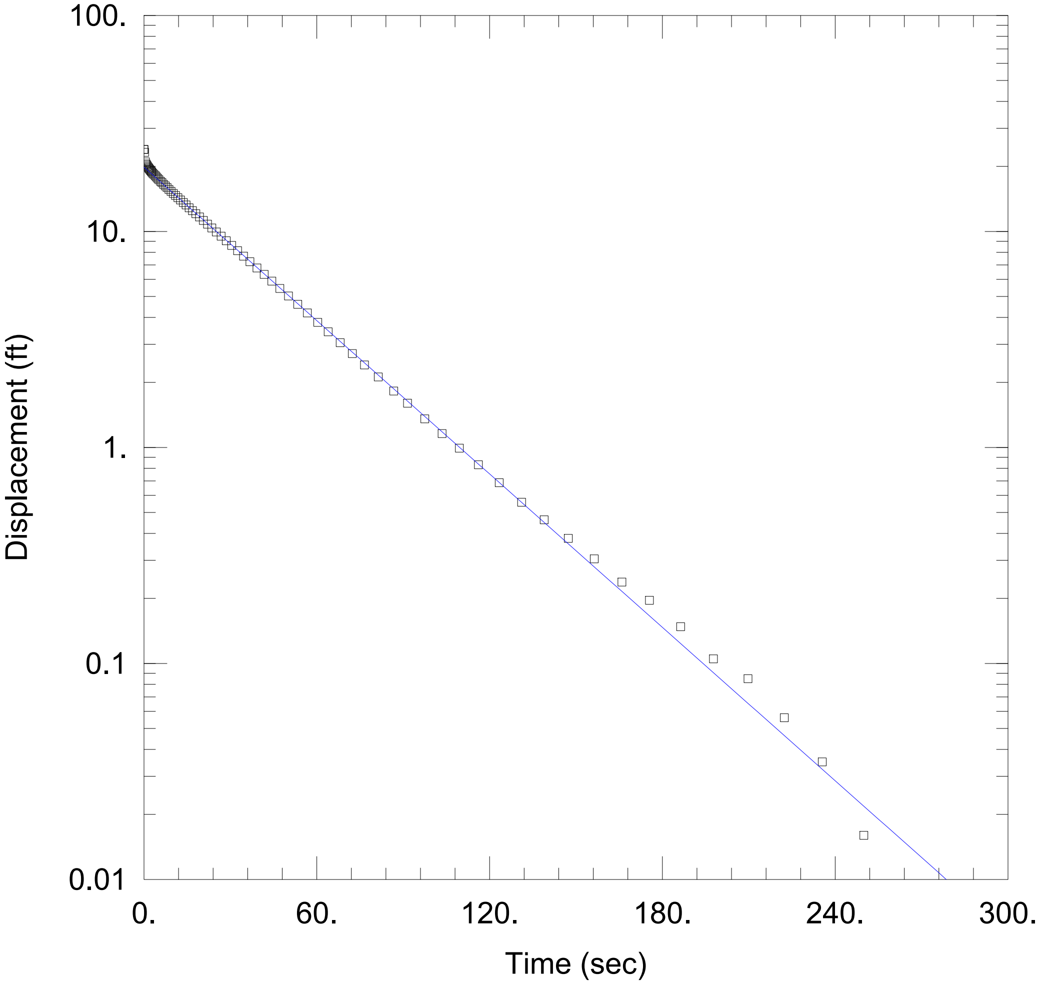
WELL DATA (MW-16-02)

Initial Displacement: 19.52 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.001862 cm/sec
y0 = 30.93 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 2.aqt
Date: 10/29/21 Time: 13:30:29

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

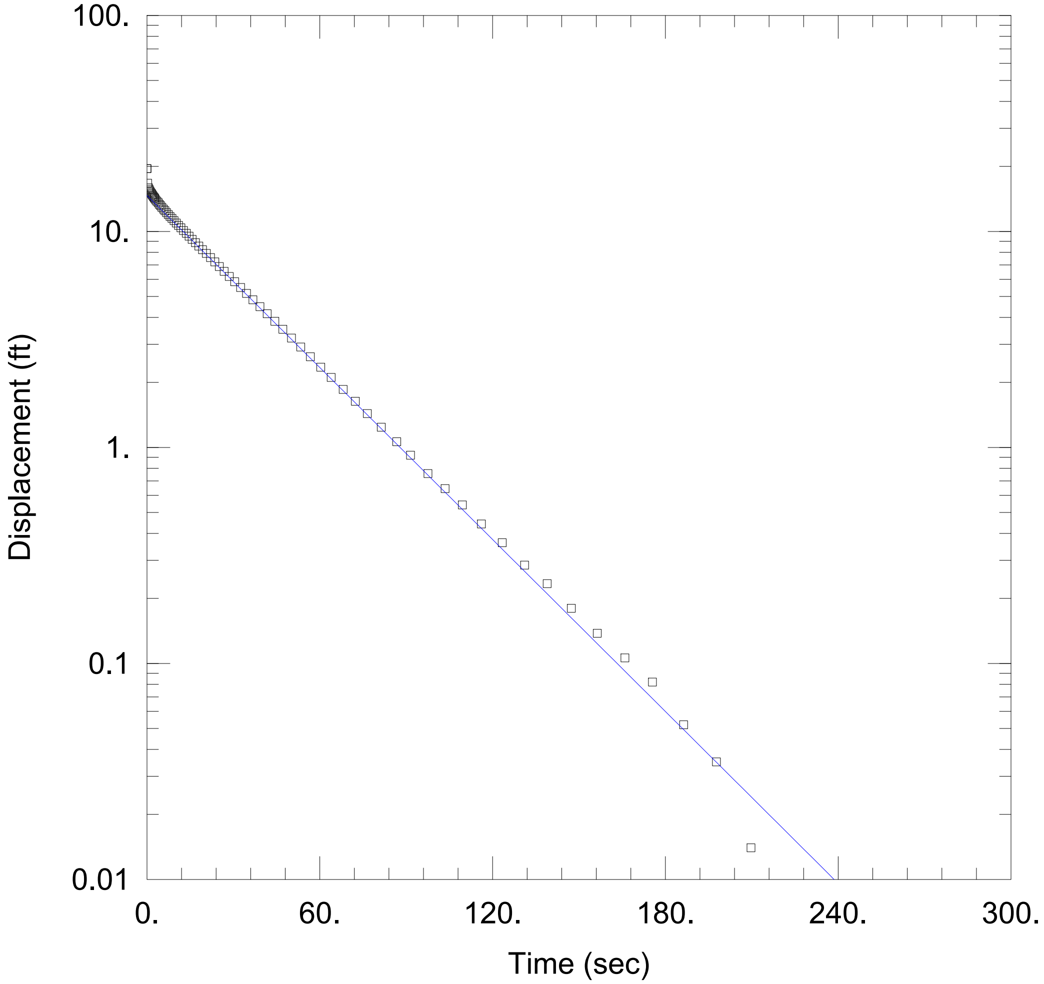
WELL DATA (MW-16-02)

Initial Displacement: 23.98 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.002452 cm/sec
y0 = 19.83 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-02 test 3.aqt
Date: 10/29/21 Time: 13:29:03

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-02
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

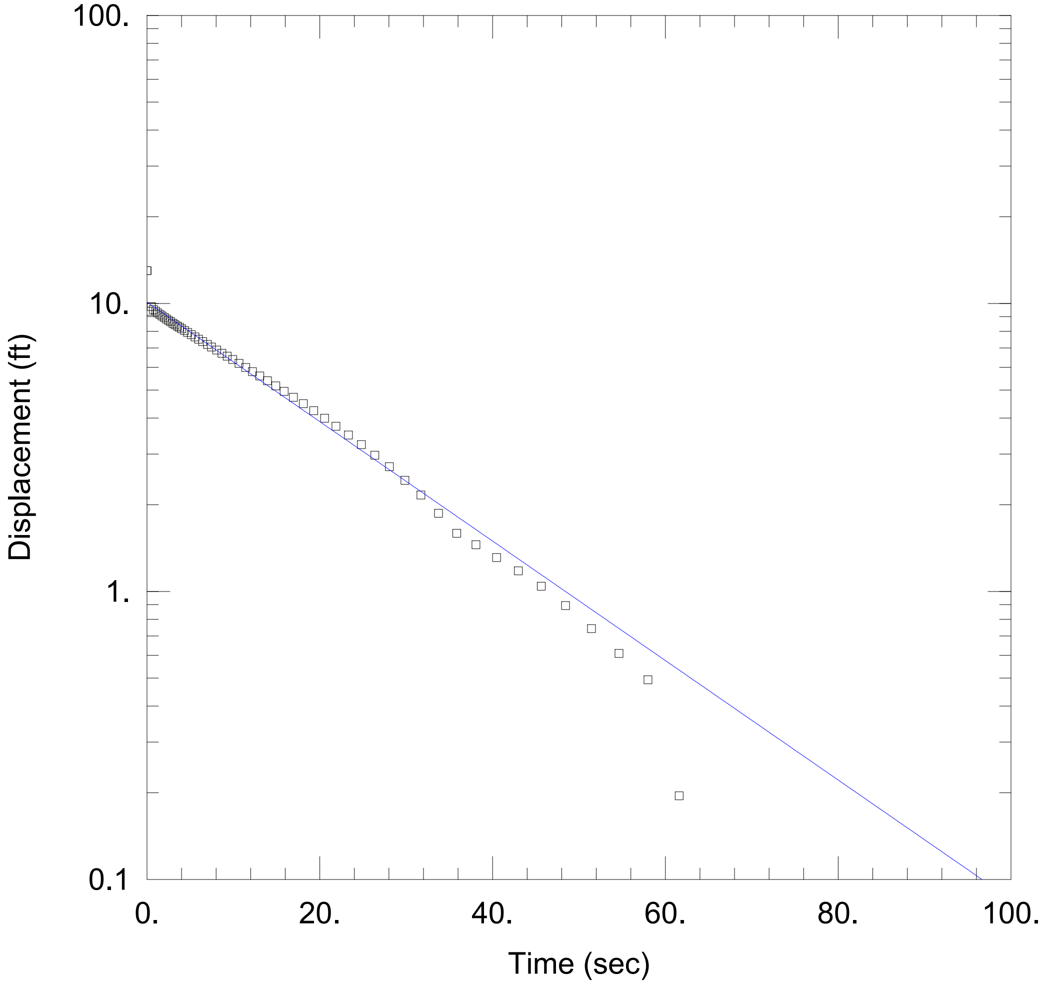
WELL DATA (MW-16-02)

Initial Displacement: 19.52 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.002749 cm/sec
y0 = 14.65 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 1.aqt
Date: 10/29/21 Time: 13:34:12

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

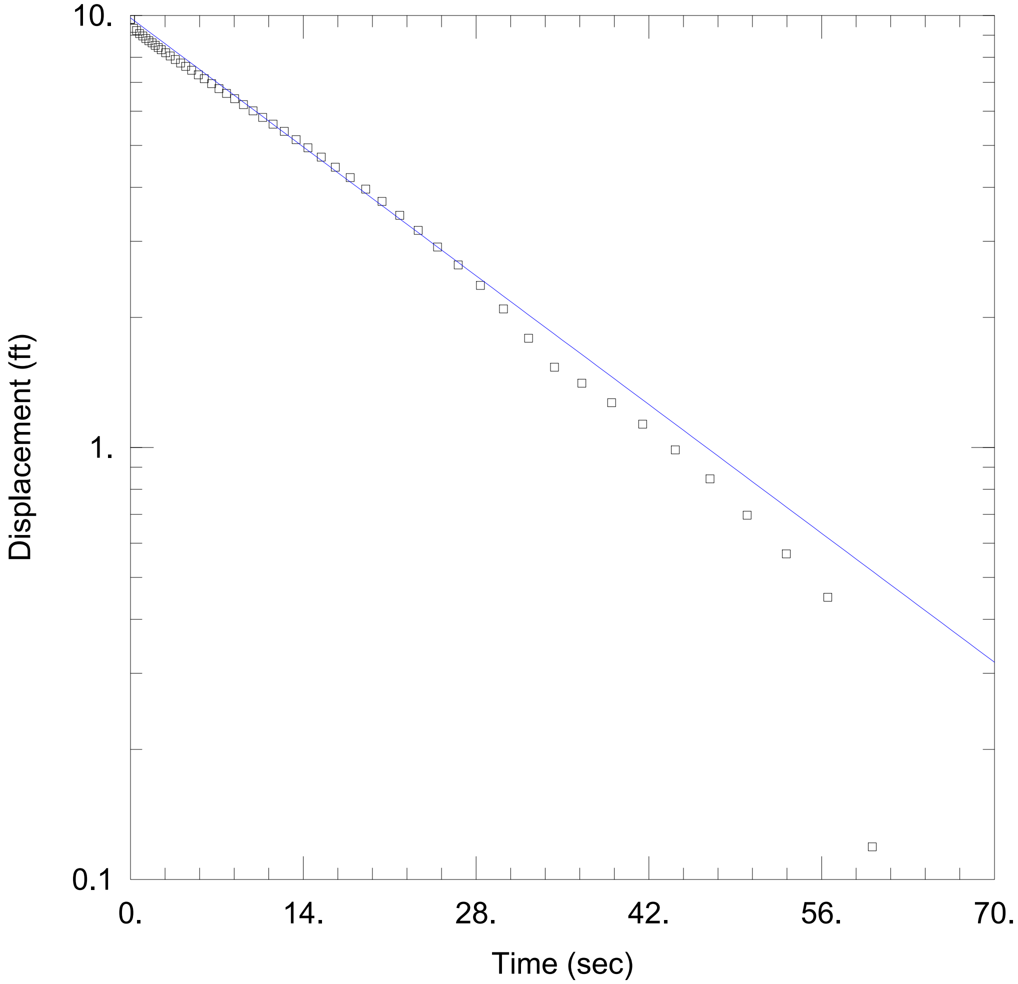
WELL DATA (MW-16-03)

Initial Displacement: 12.99 ft
Static Water Column Height: 55. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004296 cm/sec
y0 = 10.1 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 2.aqt
Date: 10/29/21 Time: 13:36:40

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

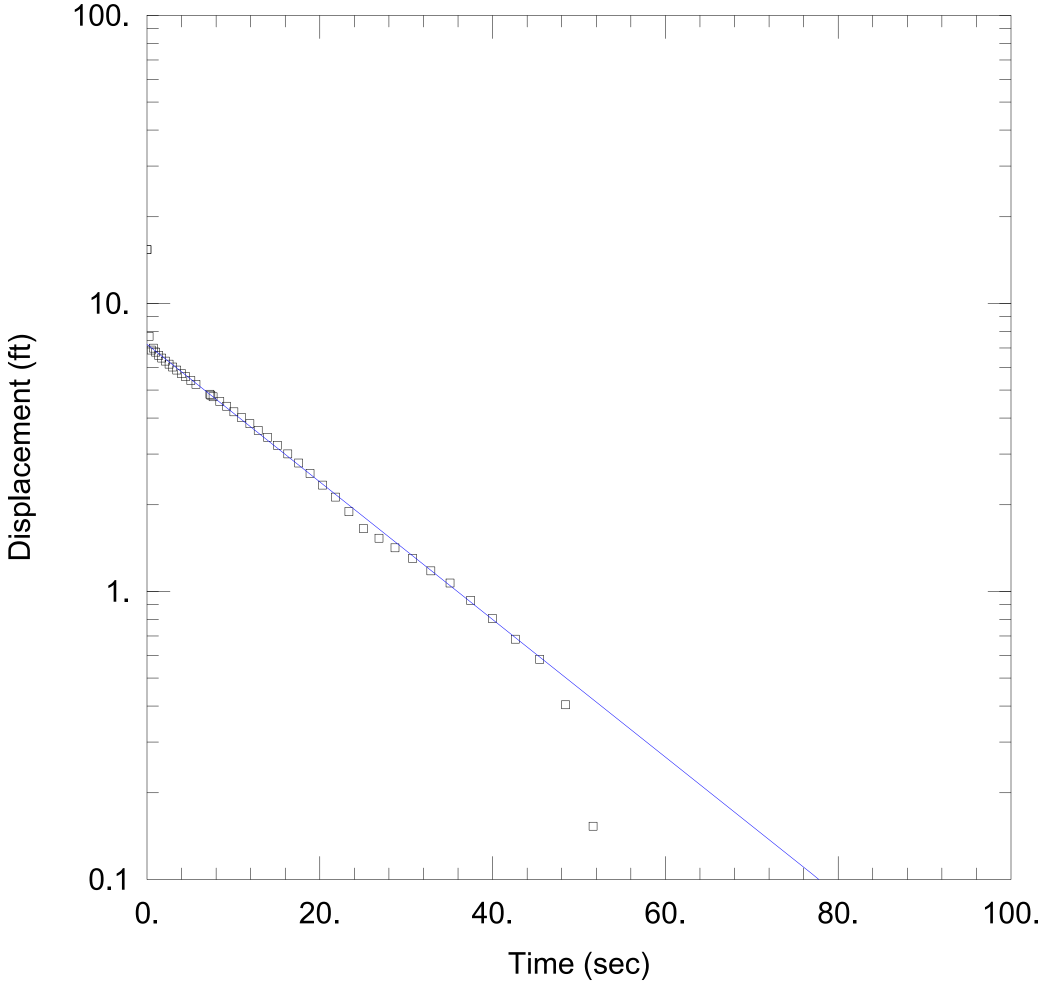
WELL DATA (MW-16-03)

Initial Displacement: 9.789 ft
Static Water Column Height: 55. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004413 cm/sec
y0 = 9.867 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-03 test 3.aqt
Date: 10/29/21 Time: 13:38:09

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-03
Test Date: 9/22/2021

AQUIFER DATA

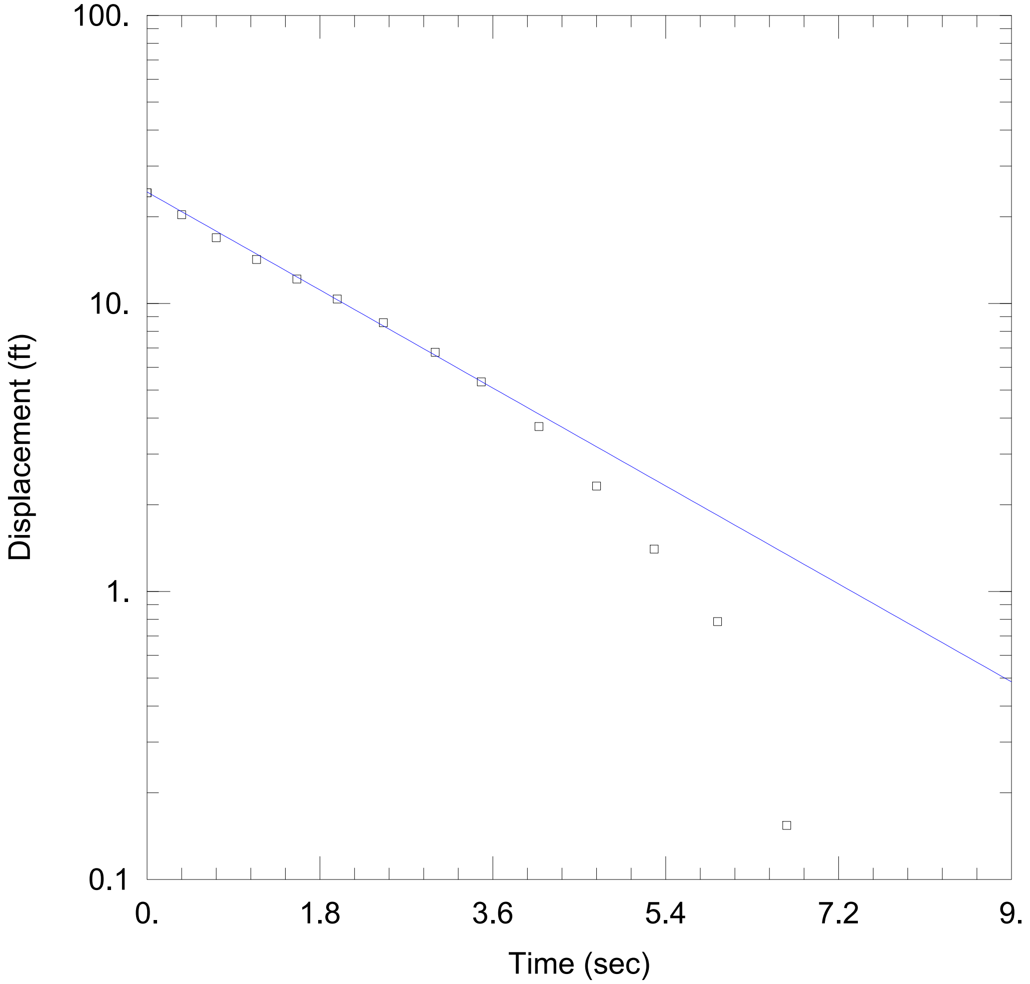
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 15.37 ft
Static Water Column Height: 55. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.004948 cm/sec
y0 = 7.209 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 1.aqt
Date: 10/29/21 Time: 14:05:30

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

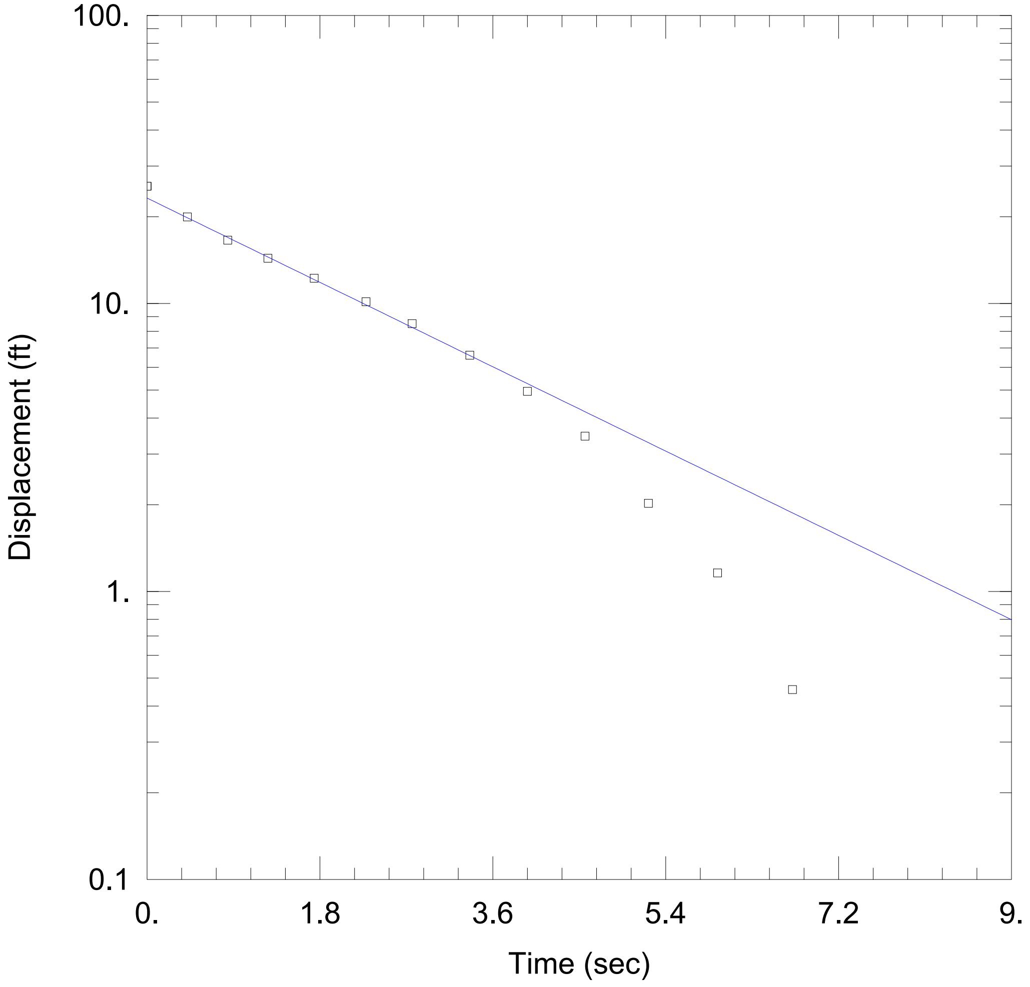
WELL DATA (MW-16-04)

Initial Displacement: 24.21 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03914 cm/sec
y0 = 24.37 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 2.aqt
Date: 10/29/21 Time: 14:07:50

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

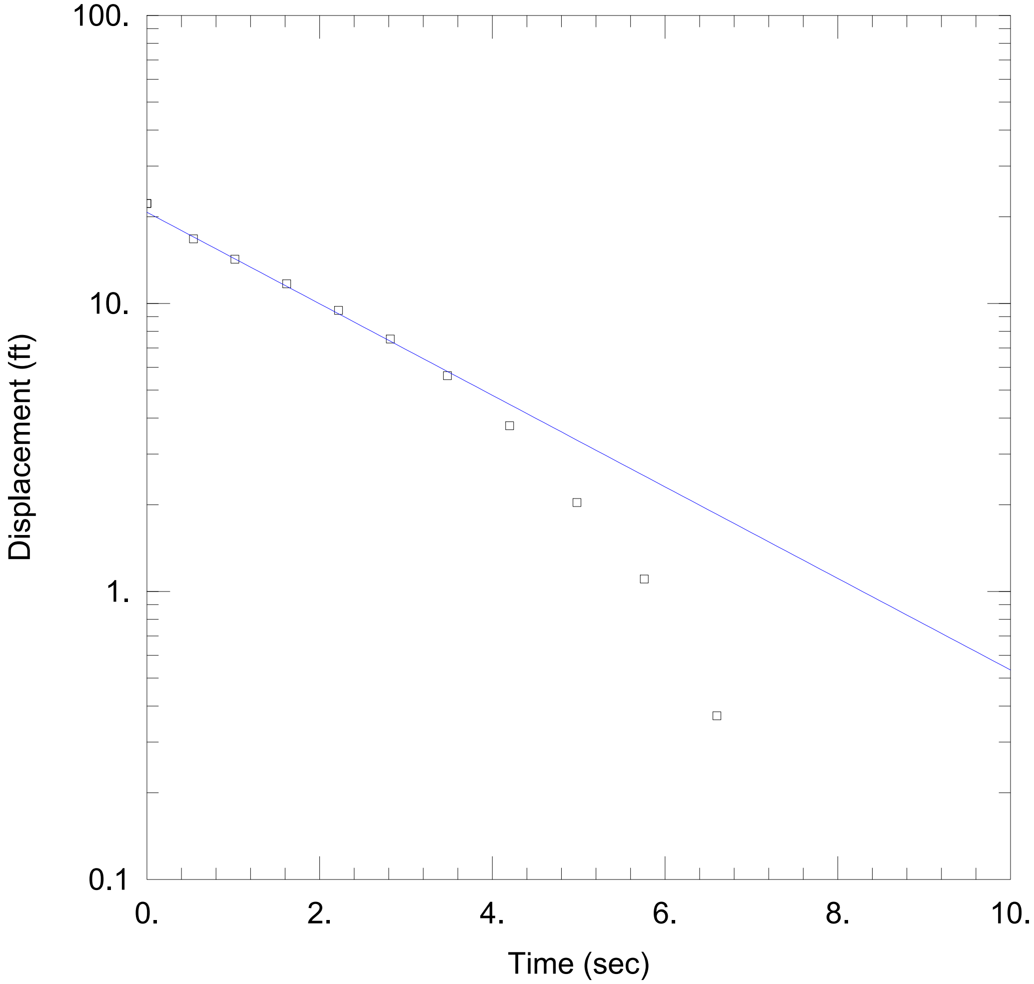
WELL DATA (MW-16-04)

Initial Displacement: 25.52 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03369 cm/sec
y0 = 23.21 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-04 test 3.aqt
Date: 10/29/21 Time: 14:11:31

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-04
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

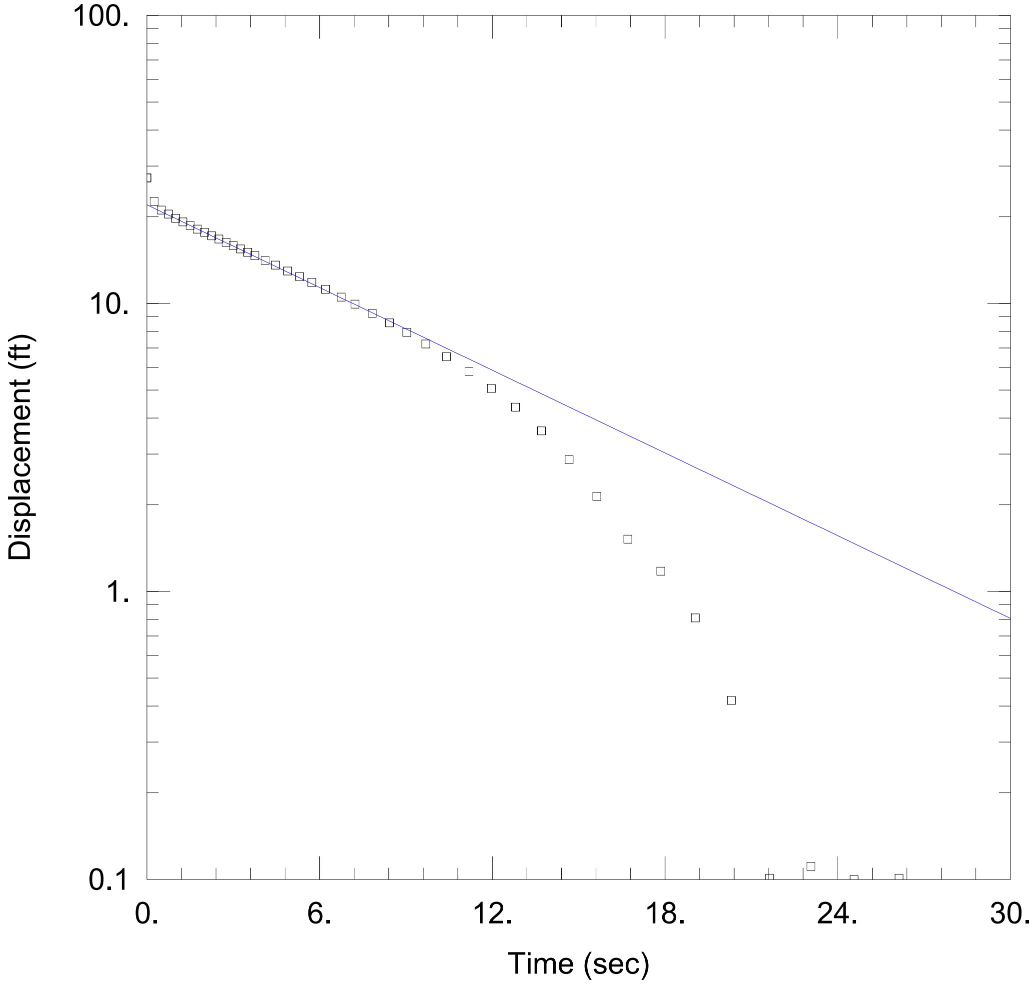
WELL DATA (MW-16-04)

Initial Displacement: 22.22 ft
Static Water Column Height: 63. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.03291 cm/sec
y0 = 20.73 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 1.aqt
Date: 10/29/21 Time: 14:16:43

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

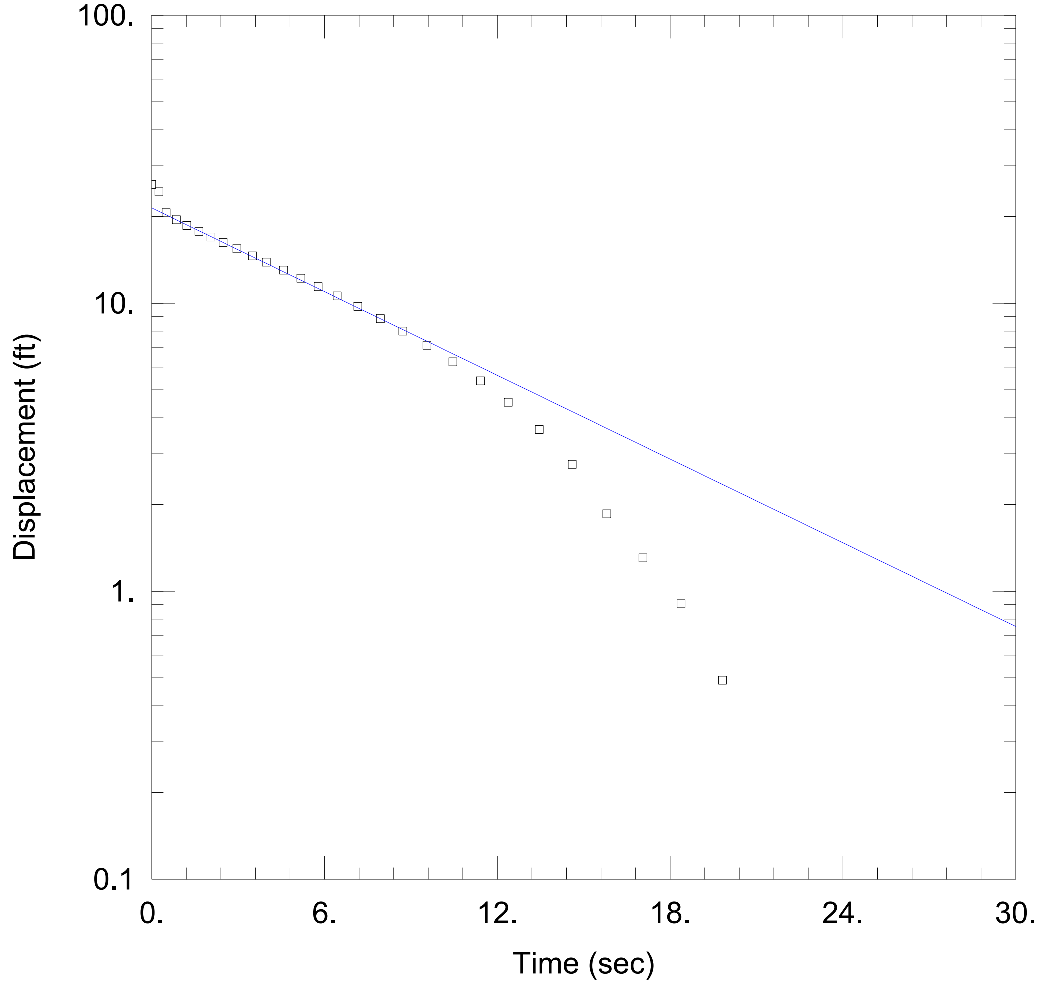
WELL DATA (MW-16-05)

Initial Displacement: 27.27 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.009917 cm/sec
y0 = 22.01 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 2.aqt
Date: 10/29/21 Time: 14:18:42

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

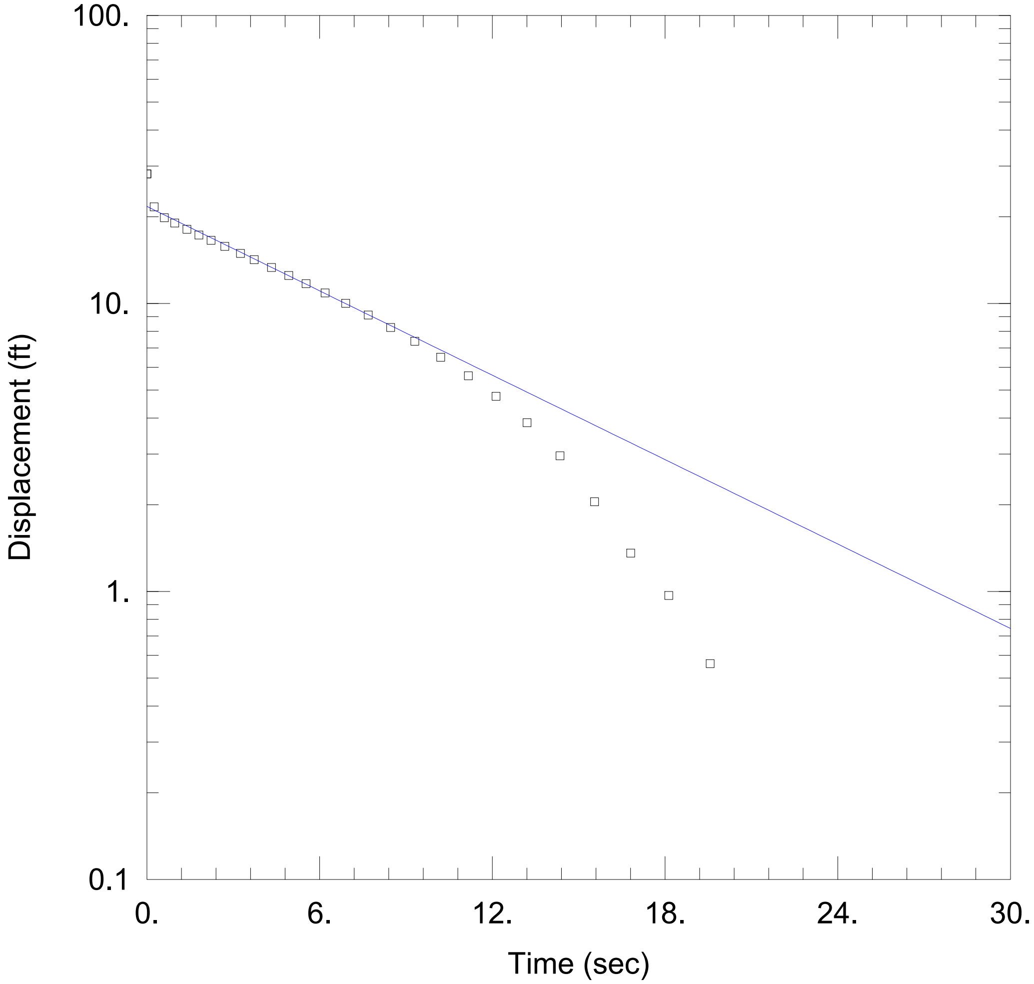
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-05)

Initial Displacement: 25.85 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.01004 cm/sec
y0 = 21.42 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-05 test 3.aqt
Date: 10/29/21 Time: 14:20:26

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-05
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

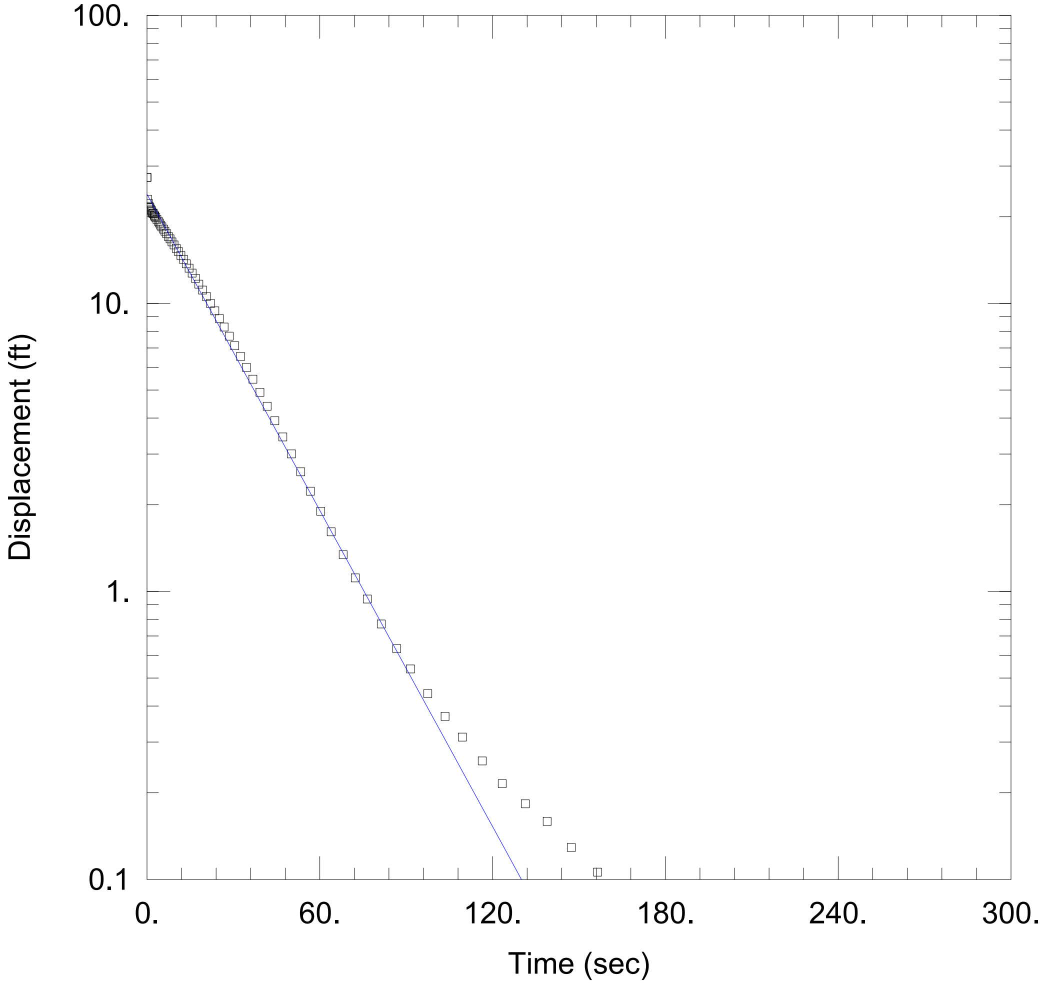
WELL DATA (MW-16-05)

Initial Displacement: 28.15 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.01012 cm/sec
y0 = 21.72 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 1.aqt
Date: 10/29/21 Time: 14:25:42

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

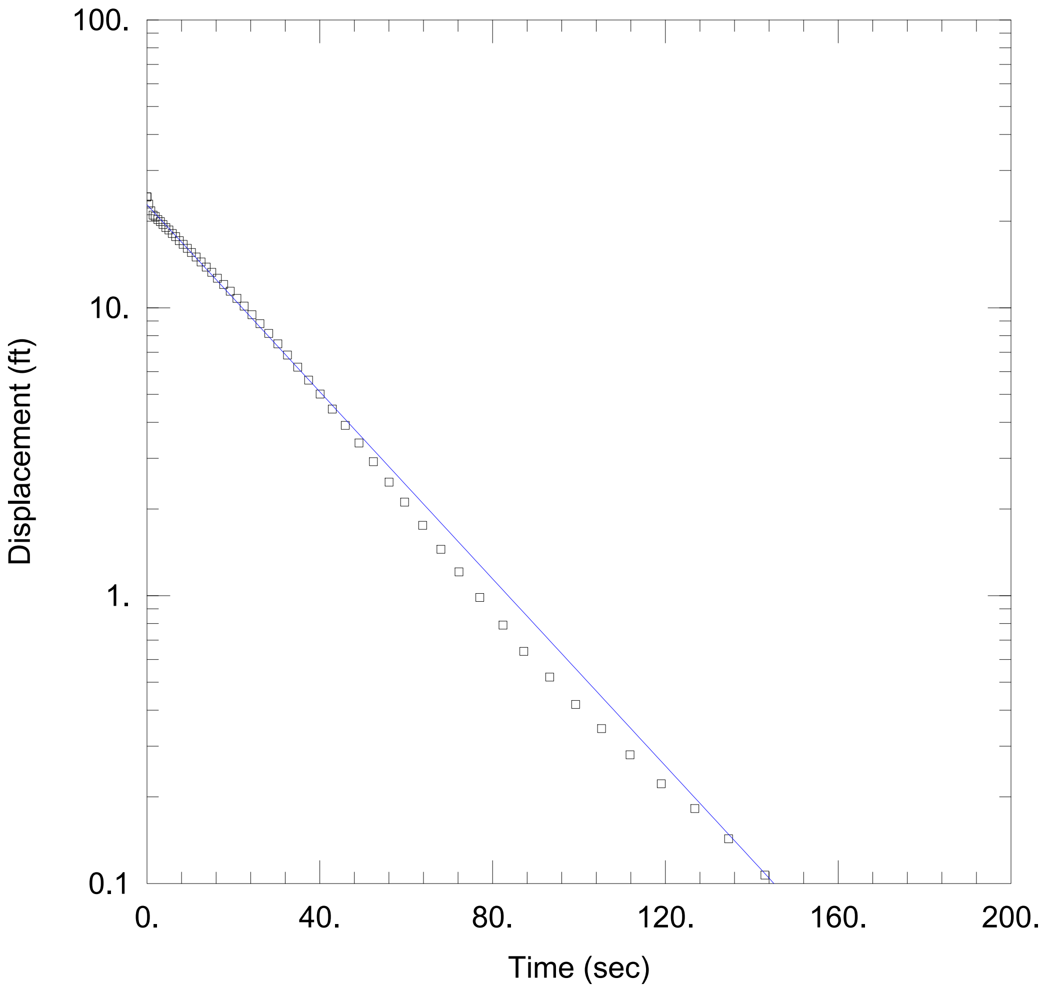
WELL DATA (MW-16-06)

Initial Displacement: 27.37 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003791 cm/sec
y0 = 23.95 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 2.aqt
Date: 10/29/21 Time: 14:27:18

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

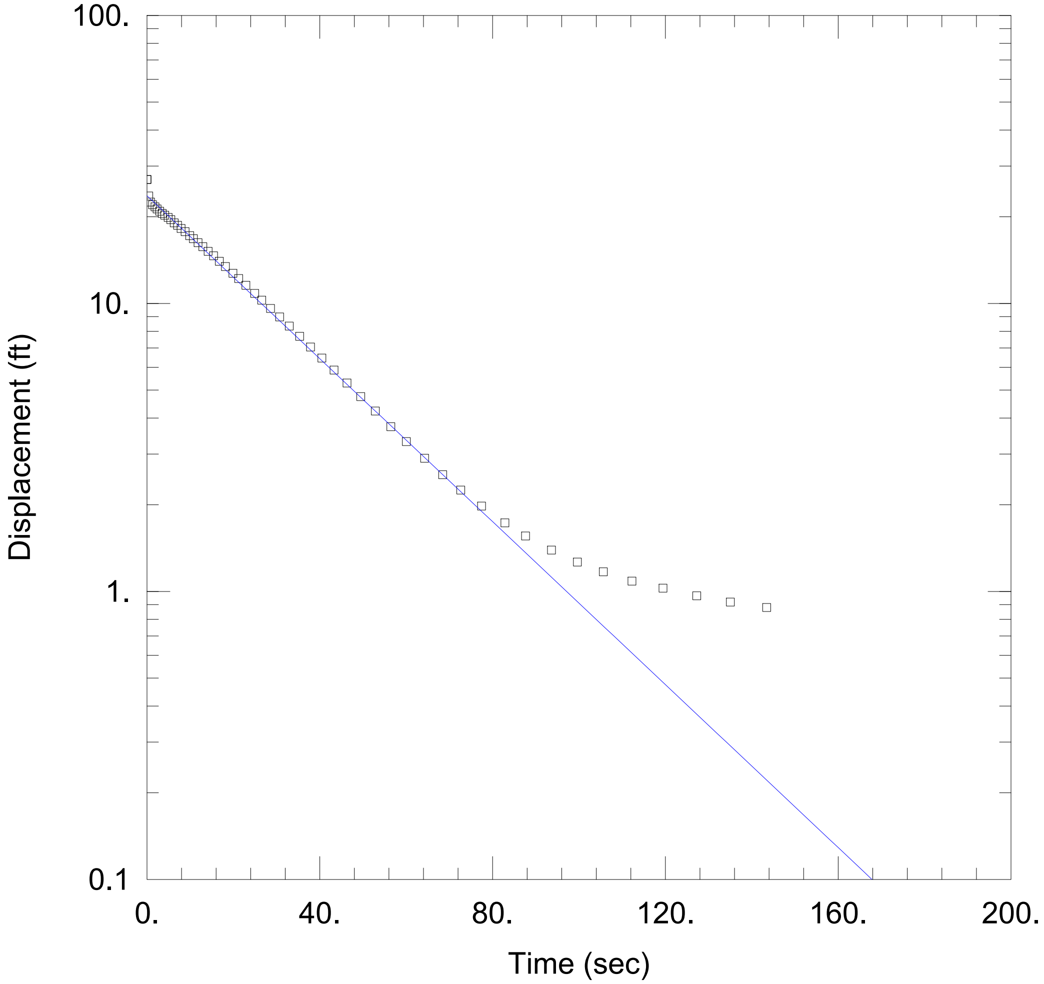
WELL DATA (MW-16-06)

Initial Displacement: 24.27 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003365 cm/sec
y0 = 22.8 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-06 test 3.aqt
Date: 10/29/21 Time: 14:29:09

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-06
Test Date: 9/22/2021

AQUIFER DATA

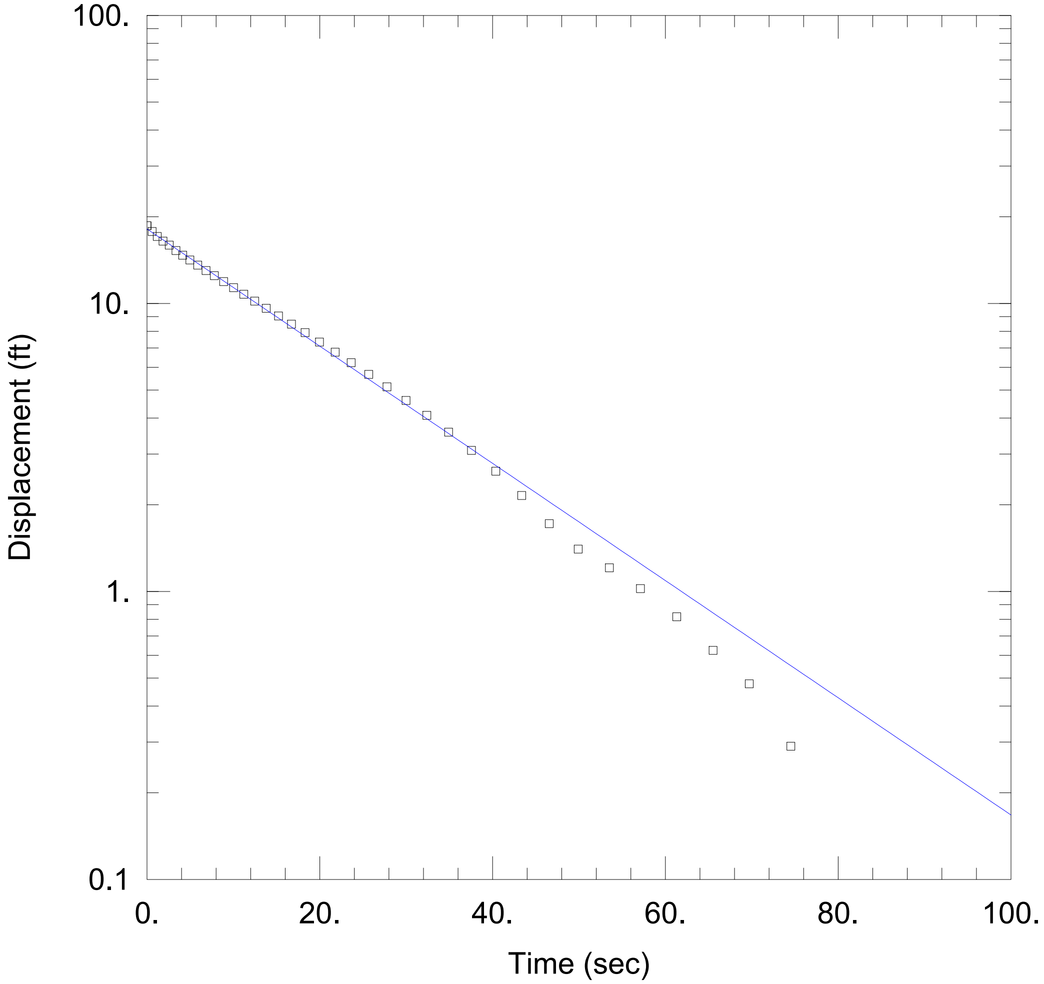
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 26.94 ft
Static Water Column Height: 53. ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.00293 cm/sec
y0 = 23.65 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 1.aqt
Date: 10/29/21 Time: 14:33:05

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

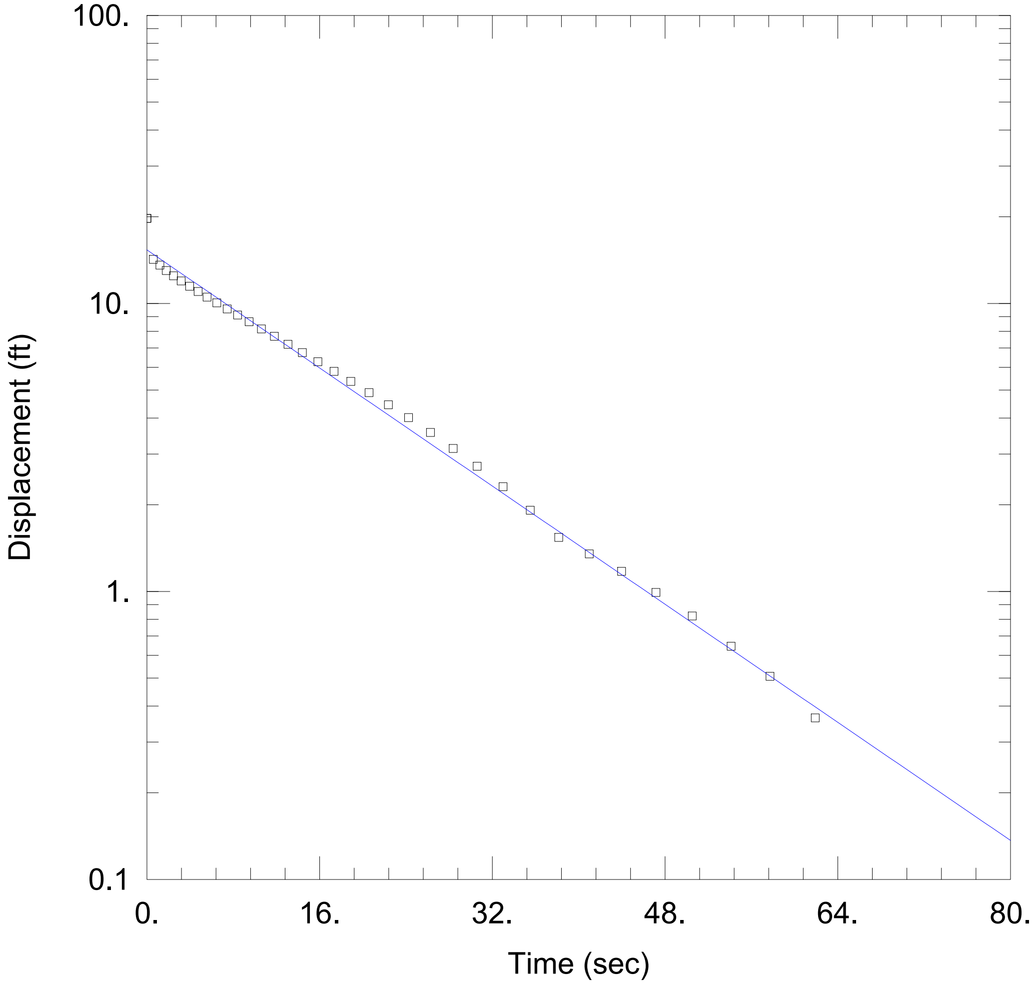
WELL DATA (MW-16-07)

Initial Displacement: 18.61 ft
Static Water Column Height: 50. ft
Total Well Penetration Depth: 18.5 ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003492 cm/sec
y0 = 18.14 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 2.aqt
Date: 10/29/21 Time: 14:36:35

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

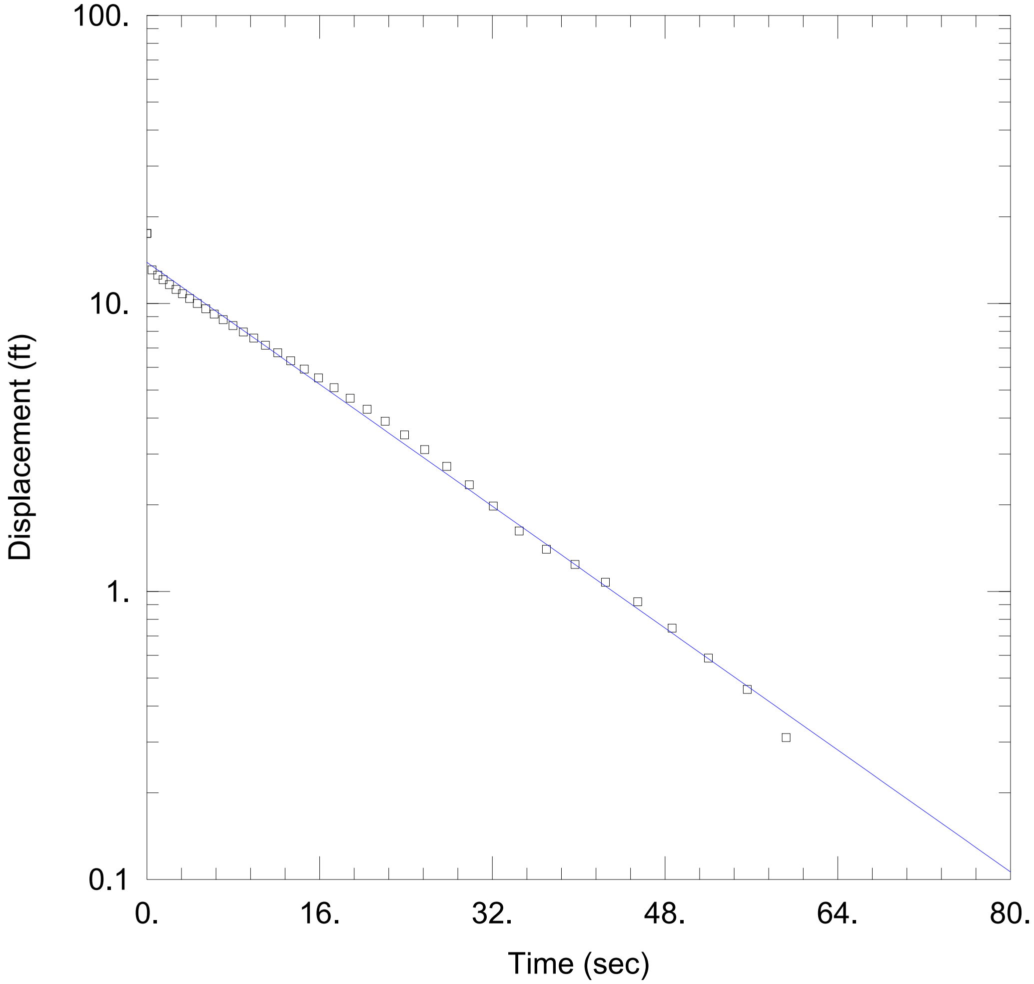
WELL DATA (MW-16-07)

Initial Displacement: 19.73 ft
Static Water Column Height: 50. ft
Total Well Penetration Depth: 18.5 ft
Screen Length: 5. ft
Casing Radius: 0.0861 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004398 cm/sec
y0 = 15.34 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Monroe FAB\MW-16-07 test 3.aqt
Date: 10/29/21 Time: 14:34:43

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Monroe FAB
Test Well: MW-16-07
Test Date: 9/22/2021

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-07)

Initial Displacement: 17.51 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.0861 ft
Static Water Column Height: 50. ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

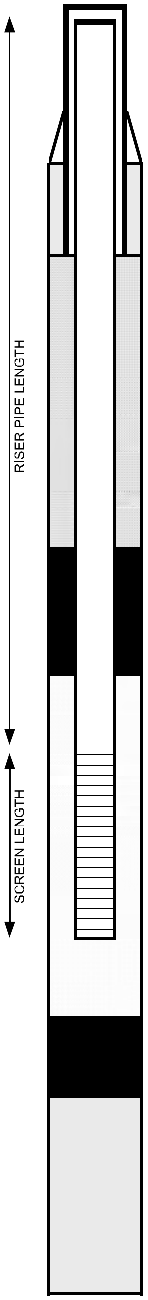
Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.004539 cm/sec
y0 = 13.88 ft

APPENDIX B – MONITORING WELL CONSTRUCTION DIAGRAMS

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-01**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/17/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.74	2.8	TOP OF CASING
578.91	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL	GROUT SLURRY
50.8	GROUT/BACKFILL METHOD	TREMIE
	39.5	GROUT
	BENTONITE SEAL MATERIAL	PELLETS
	44.0	BENTONITE SEAL
530.9	48.0	TOP OF SCREEN
5.0	FILTER PACK MATERIAL	MEDIUM, WASHED SAND
525.9	53.0	BOTTOM OF SCREEN
	53.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
	BACKFILL MATERIAL	WASHED SAND
523.91	55.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 55 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 50 MINUTES
WATER REMOVED: 100 GALLONS
WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID
COLOR BEFORE: DARK GRAY
CLARITY AFTER: CLEAR
COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

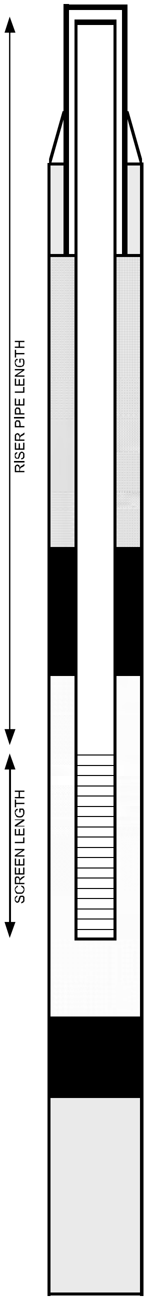
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	57.30	T/PVC	2/19/2016	11:00
SWL BEFORE DEVELOPING:	4.69	T/PVC	2/19/2016	10:00
SWL AFTER DEVELOPING:	4.80	T/PVC	3/17/2016	8:45
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO
LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation			WELL ID: **MW-16-02**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/18/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.81	2.4	TOP OF CASING
579.44	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD: TREMIE
55.4		
	40.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	44.0	BENTONITE SEAL
526.4	53.0	TOP OF SCREEN
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
5.0		
521.4	58.0	BOTTOM OF SCREEN
	60.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
519.44	60.0	HOLE BOTTOM

NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 60 FT.
___ IN. FROM ___ TO ___ FT.

SURF. CASING DIAMETER: ___ IN. FROM ___ TO ___ FT.
___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 2,880 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY TO CLOUDY

COLOR BEFORE: LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	61.03	T/PVC	3/17/2016	9:30
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	2.42	ATOC	3/17/2016	9:30
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

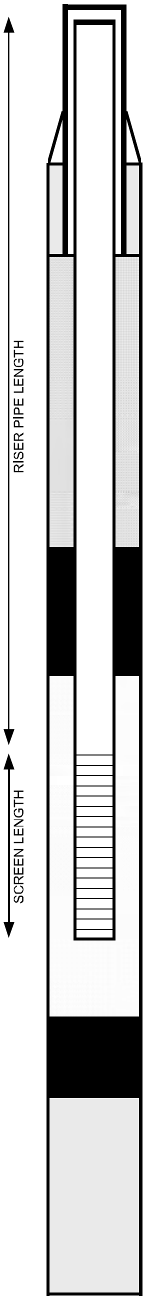
PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-03**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/16/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
579.95	2.7	TOP OF CASING
577.29	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
39.7		GROUT/BACKFILL METHOD: TREMIE
	28.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	32.0	BENTONITE SEAL
540.3	37.0	TOP OF SCREEN
5.0		FILTER PACK MATERIAL: PEA STONE
535.3	42.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
527.29	50.0	HOLE BOTTOM

NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC
PIPE SCHEDULE: 40
PIPE JOINTS: THREADED O-RINGS
SCREEN TYPE: 2-INCH PVC
SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL
TIME DEVELOPING: 16 HOURS
WATER REMOVED: 7,200 GALLONS
WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID
COLOR BEFORE: DARK GRAY
CLARITY AFTER: CLEAR
COLOR AFTER: NONE

ODOR (IF PRESENT): SULFUR

WATER LEVEL SUMMARY

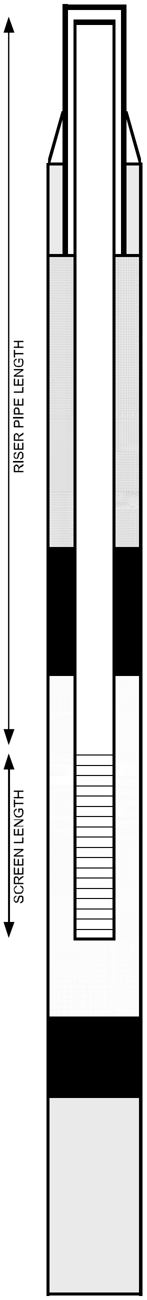
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	44.65	T/PVC	3/17/2016	9:25
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	11.20	ATOC	3/17/2016	9:25
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO
LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-04**
PROJ. NO: 231828.0001	DATE INSTALLED: 2/15/2016 INSTALLED BY: C. Scieszka	CHECKED BY: C. Scieszka	



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
585.54	2.9	TOP OF CASING
582.64	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD: TREMIE
43.9		
	32.0	GROUT
		BENTONITE SEAL MATERIAL: PELLETS
	36.0	BENTONITE SEAL
541.6	41.0	TOP OF SCREEN
		FILTER PACK MATERIAL: PEA STONE
5.0		
536.6	46.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
532.64	50.0	HOLE BOTTOM

NOTES:
ARTESIAN MONITORING WELL

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM ___ TO ___ FT.

SURF. CASING DIAMETER: ___ IN. FROM ___ TO ___ FT.
___ IN. FROM ___ TO ___ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 16 HOURS

WATER REMOVED: 28,900 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): SULFUR

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	49.45	T/PVC	3/17/2016	10:15
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	16.50	ATOC	3/17/2016	10:15
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

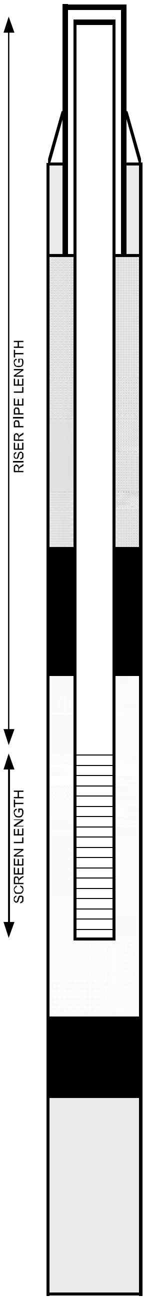
LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-05**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/13/2016 INSTALLED BY: J. REED		CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
583.25	2.7	TOP OF CASING
580.51	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL CEMENT/GROUT SLURRY
42.7		GROUT/BACKFILL METHOD TREMIE
	33.0	GROUT
		BENTONITE SEAL MATERIAL PELLETS
	35.0	BENTONITE SEAL
540.5	40.0	TOP OF SCREEN
5.0		FILTER PACK MATERIAL PEA STONE
535.5	45.0	BOTTOM OF SCREEN
	45.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL PEA STONE
530.51	50.0	HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 12 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: VERY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): VERY SLIGHT TO NONE SULFUR

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	14.00	ATOC	5/5/2016	12:47
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

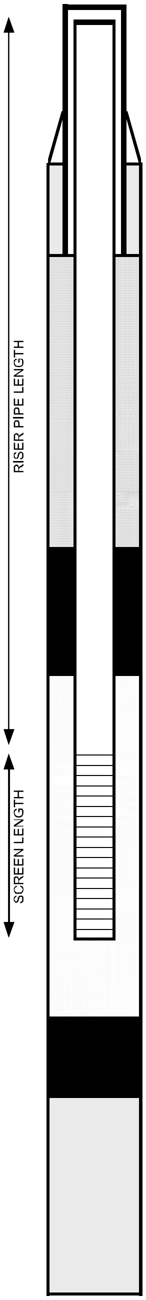
PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE EC: MFAB CCR MW Installation	WELL ID:	**MW-16-06**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/13/2016	INSTALLED BY: J. REED	CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
581.94	2.7	TOP OF CASING
579.20	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL CEMENT/GROUT SLURRY
		GROUT/BACKFILL METHOD TREMIE
47.7		
	38.0	GROUT
		BENTONITE SEAL MATERIAL PELLETS
	40.0	BENTONITE SEAL
534.20	45.0	TOP OF SCREEN
5.0		FILTER PACK MATERIAL PEA STONE
529.20	50.0	BOTTOM OF SCREEN
	50.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL NA
529.20	50.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 50 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 240-250 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: SLIGHTLY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	0.75	ATOC	5/5/2016	9:30
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

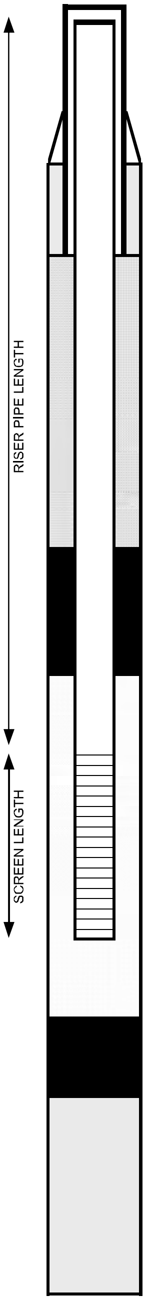
PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE EC: MFAB CCR MW Installation		WELL ID:	**MW-16-07**
PROJ. NO: 231828.0001	DATE INSTALLED: 4/14/2016 INSTALLED BY: J. REED		CHECKED BY: C. Scieszka



ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)
578.40	3.0 TOP OF CASING
575.41	0.0 GROUND SURFACE
	1.0 CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL: CEMENT/GROUT SLURRY
	GROUT/BACKFILL METHOD: TREMIE
38.0	
	27.0 GROUT
	BENTONITE SEAL MATERIAL: PELLETS
	30.0 BENTONITE SEAL
540.4	35.0 TOP OF SCREEN
5.0	
	FILTER PACK MATERIAL: PEA STONE
535.4	40.0 BOTTOM OF SCREEN
	40.0 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL: NA
535.41	40.0 HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 40 FT.
IN. FROM TO FT.

SURF. CASING DIAMETER: IN. FROM TO FT.
IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: ARTESIAN WELL

TIME DEVELOPING: 24 HOURS

WATER REMOVED: 240 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY CLOUDY

COLOR BEFORE: SLIGHTLY LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWL BEFORE DEVELOPING:	--	T/PVC	--	--
SWL AFTER DEVELOPING:	8.80	ATOC	5/5/2016	10:44
OTHER SWL:	.	T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

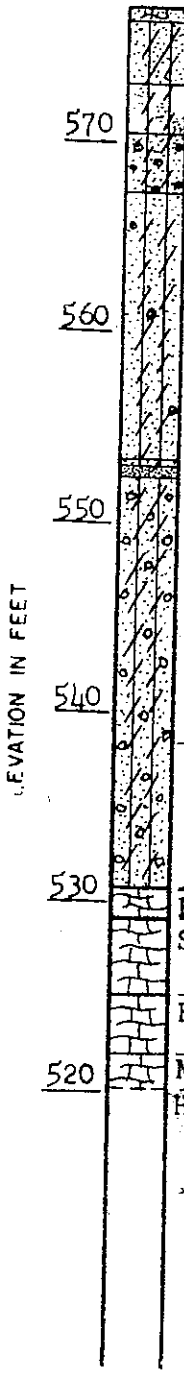
LOCK KEY NUMBER: 3120

REVISED 11/2013

APPENDIX C - 1970s BORING LOGS

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 577.0 Ft. (IGLD Datum)

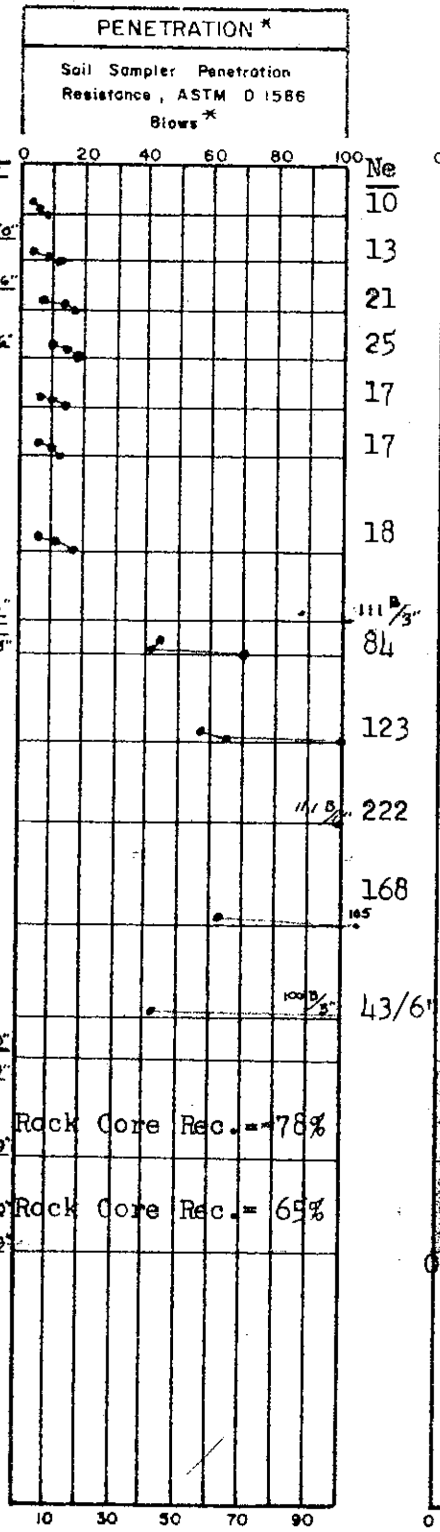


- TOPSOIL; Soft Dk.Brn.SEMI-ORG.SILTY CLAY. 9"
- V.Stiff Brown & Gray VERY SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 4'0"
- V.Stiff Brown & Gray SILTY CLAY, w/Sand Pockets, Traces of Gravel. 6'6"
- Hard Mottled Brown F. SANDY SILTY CLAY, w/Some Gravel. 9'6"
- Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel. 23'6"
- Hd.Gr.SILTY CLAY, w/Some Sand & Grav. 23'11"
- Compact Gray FINE SAND. Moist. 24'3"
- V. Hard Gray V.F. SANDY SILTY CLAY, Very Gravelly in Some Zones, Generally Gravelly, w/Rock Fragments. (GLACIAL TILL). *
- Top of Rock, EL. 531.0 46'0"
- Hd.Lt.Gray Broken LIMESTONE BRECCIA. 47'9"
- Soft Light Gray to Brown V.Fragmented LIMESTONE, w/Seams of Hard Limestone. 51'9"
- Hd.Lt.Gr.to Brn.Mod.Fragmented DOLOMITIC LIMESTONE, w/ZoneMed.Hard Shale. 55'0"
- Med.Hard.Gr.Mod.Fragmented LIMESTONE. 56'9"

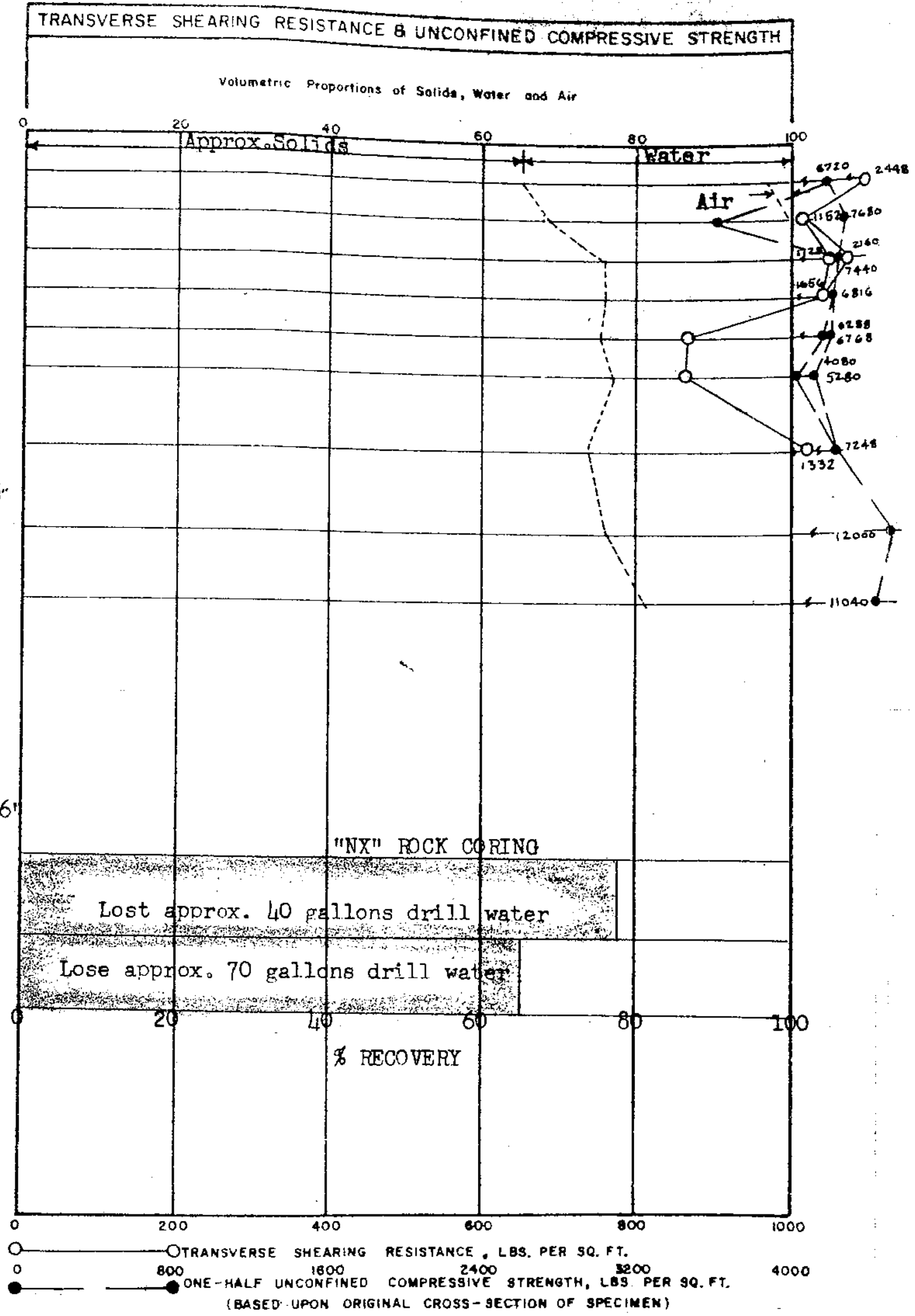
Hole dry augered to d=34';
46' 9" of 3-inch casing used after auger.

* Encountered artesian water; See Note
Hole grouted w/2 bags cement;
no water flow during final inspection on Sept. 9, 1970

PENETRATION *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	574.5	V.Stiff	17.8	109.4
LS-2	5.0	572.0	V.Stiff	17.4	114.2
LS-3	7.5	569.5	Hard	12.1	[illegible]
LS-4	10.0	567.0	Hard	12.0	127.8
LS-5	12.5	564.5	Stiff	11.9	136.7
LS-6	15.0	562.0	Stiff	12.3	129.4
LS-7	20.0	557.0	Hard	12.4	123.7
BS-8	23.8	553.2	Hard		
LS-8	25.3	551.7	V.Hard	11.4	127.9
LS-9	30.0	547.0	V.Hard	8.3	136.5
BS-11	34.0	543.0	V.Hard		
BS-12	39.5	537.5	V.Hard		
BS-13	44.3	532.7	V.Hard		
	46.8	530.2			
Core Run No.1	51.8	525.2			
No.2	56.8	520.2			

MON 169

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan
N-4350; W-1100
TOTAL DEPTH: 56'9"

BORING STARTED: July 15, 1970
BORING COMPLETED: July 16, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: B.Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 46'9" feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.
ROCK CORE SIZE: NX (2 1/8")

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

NOTE: Artesian water encountered at d=38'6" (El. 538.5); head rose to 1'10" above ground.
Upon completion, w/46'9" casing in place, artesian water was flowing 1'10" above ground at 15 gpm, with strong sulphur odor.
Artesian head was 6 ft. above ground 2 hrs. after completion, and static.

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 1 TB1

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

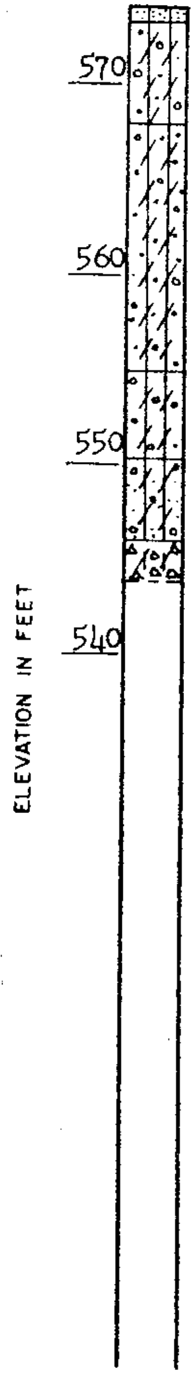
THE DETROIT EDISON COMPANY

APPR: GAO	DATE: 6-7-71	JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 574.1 Ft. (IGLD Datum)



TOPSOIL; Dark SANDY CLAY. Damp. 10½"

Medium Brown SILTY CLAY,
w/Trace Coarse Sand & Gravel. Damp. 6'0"

Hard Mottled Brown SILTY CLAY,
w/Some Coarse Sand & Fine Gravel. 19'0"

V.Stiff to Hard Gray SILTY CLAY,
w/Some Fine Gravel. (GLACIAL TILL) 23'6"

Hard Gray SILTY CLAY, (GLACIAL TILL)
w/Some Coarse Sand & Gravel. 27'9"

Gr.LIMESTONE CHIPS, w/Some Silt & Clay. 30'0"

* Hole dry augered to full depth.
5'0" of 4-in. casing used.
Hole grouted with 3 bags cement.

* Encountered artesian water at flow of 0.3 gpm.
Static artesian head reached at 1'2" above ground surface, and remained static for one hour.
No water flow during final inspection on Sept. 9, 1970

See Test Boring Location Plan

LOCATION: N-4500; W-100
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: J.Corbin
CONTRACTOR: Able Drilling, Inc.

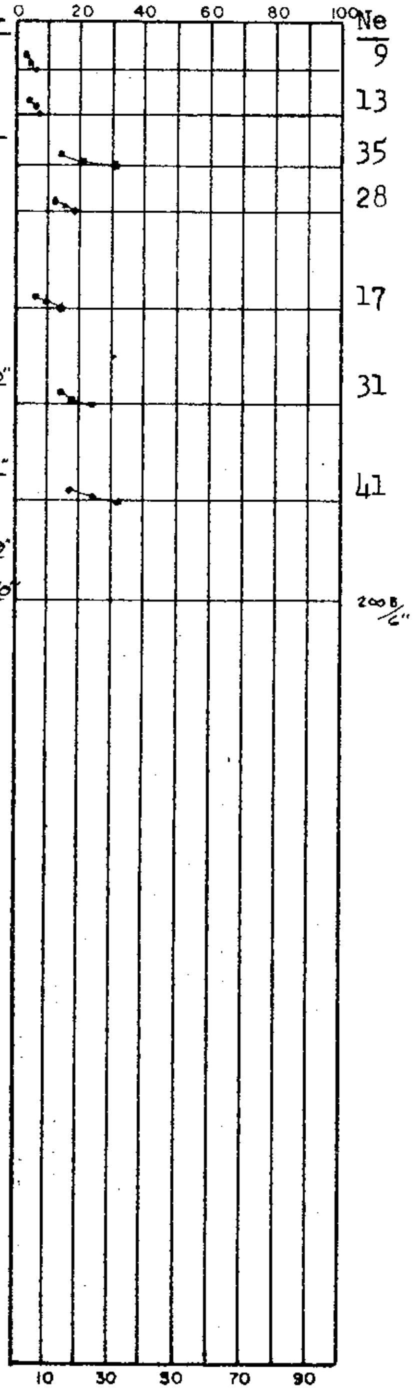
WATER LEVEL in hole at indicated number of hours after completion of boring; 5'0" feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

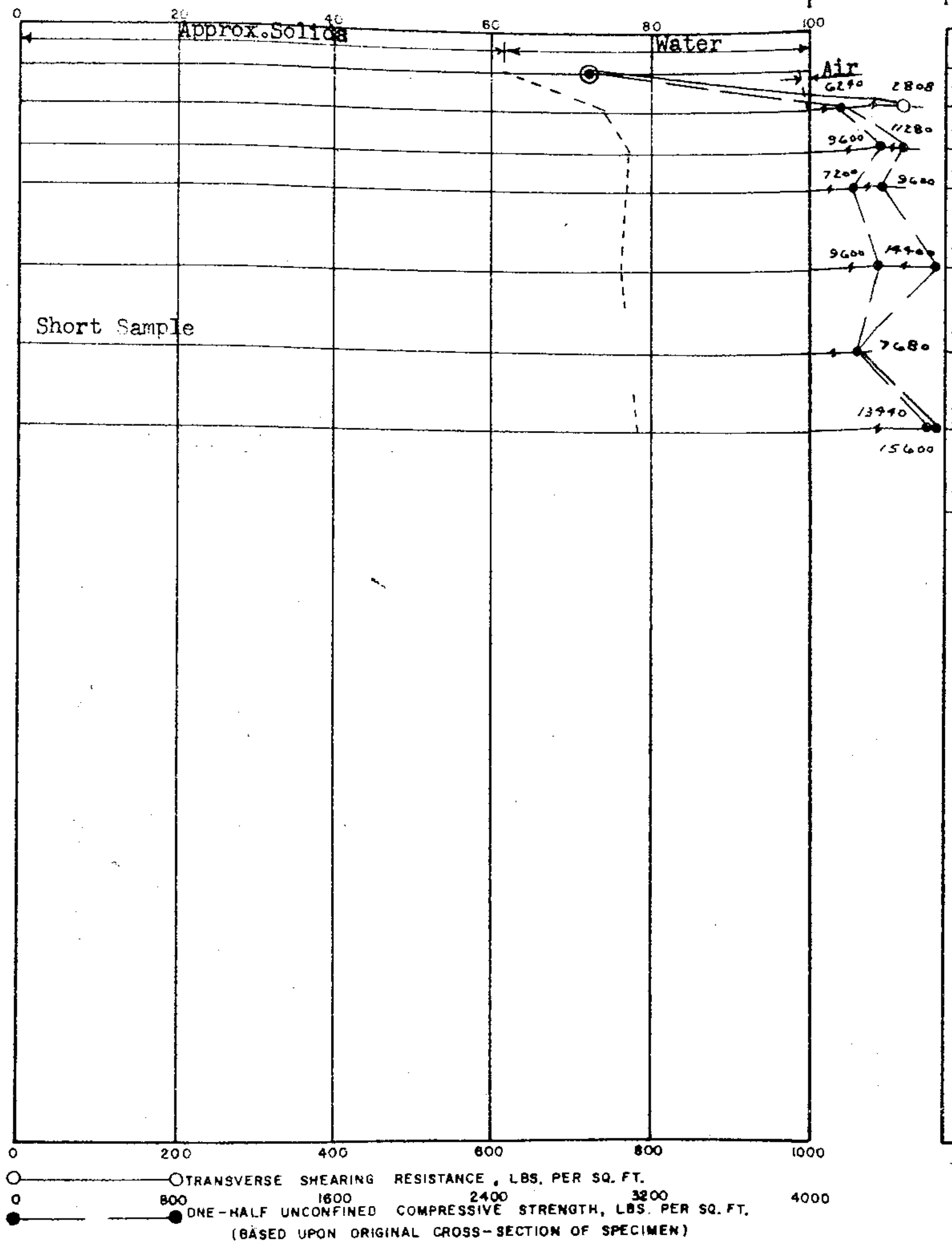
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sample used through LS-7;
2.00" O.D. Heavy wall sampler used for BS-8

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f
LS-1	2.5	571.6	Firm to Stiff	22.1	104.1
LS-2	5.0	569.1	Hard	13.0	124.8
LS-3	7.5	566.6	V.Hard	10.8	128.9
LS-4	10.0	564.1	Hard to V.Hard	11.4	128.2
LS-5	15.0	559.1	V.Hard	10.9	127.4
LS-6	20.0	554.1	Hard	11.3	--
LS-7	25.0	549.1	V.Hard	10.7	130.6
BS-8	30.0	544.1	Limestone Fragments		
			MON	170	

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 2 TB2

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

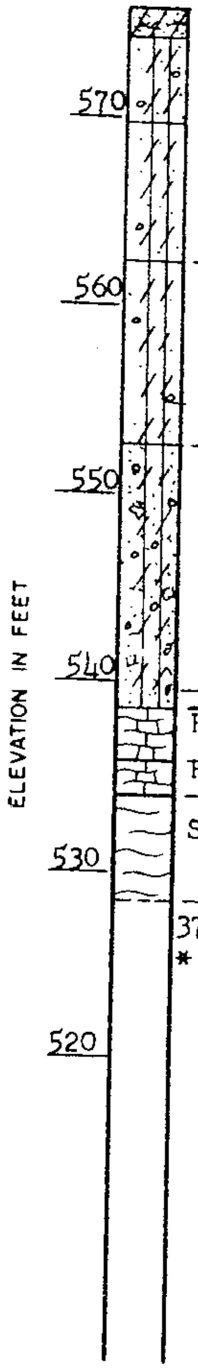
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.9 Ft. (IGLD Datum)



TOPSOIL;Brn.SEMI-ORGANIC F.SANDY SILT. 1'6"

V.Stiff to Hard Mtld.Brown SILTY CLAY, w/Some Sand, Little Gravel. (Partially Fill?) 6'0"

V.Stiff to Hard Brown & Gray SILTY CLAY, w/Little Sand, Sl.Trace of Gravel. 15'3"

V.Hard Gray (w/Some Brown to d=15'0") SILTY CLAY, w/Traces of Sand & Gravel. 25'0"

V.Hard Dark Gray F.SANDY SILTY CLAY, Gravelly, w/Many Rock Fragments. (GLACIAL TILL.)

—* TOP OF ROCK 37'0"

Hard Lt.Brn.Med. Fragmented DOLOMITIC LIMESTONE. Fractures close. 39'9"

Hd.Lt.Gr.-Brn.V.Fragmented LIMESTONE. Fracts close from El.535.45 to El.534.10 42'0"

Soft Gray Weathered SHALE, w/Med.Hd.Zone from El.533.90 to El.532.30 47'1"

37'0" NX casing used.

* Encountered ground water;water level after 30-min.and 60-min. remained steady at d=8'3" (El.567.6).

Upon completion of coring, water level rose to d=1'2" (El.574.7),but dropped to d=8'3" (El.567.6) during grouting.

Hole grouted with cement in rock phase and bentonite in soil phase.

No water flow during final inspection on Sept. 9, 1970

See Test Boring Location Plan

LOCATION: N-4800; E-900
TOTAL DEPTH: 47'1"

BORING STARTED: July 23, 1970
BORING COMPLETED: July 24, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

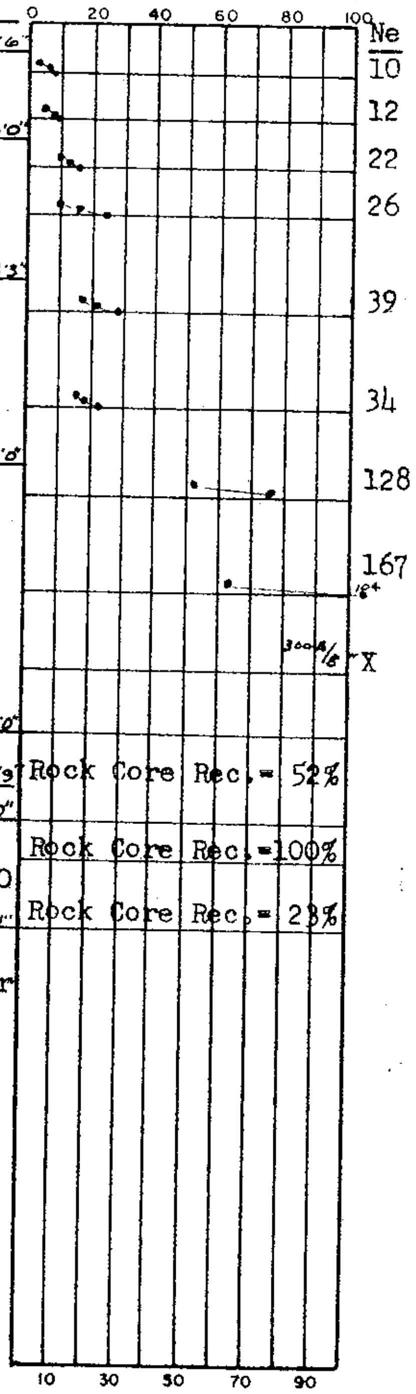
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 37'0" feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall.

ROCK CORE DIAMETER: NX (2⅛") Ne = Evaluated Blows/Foot.

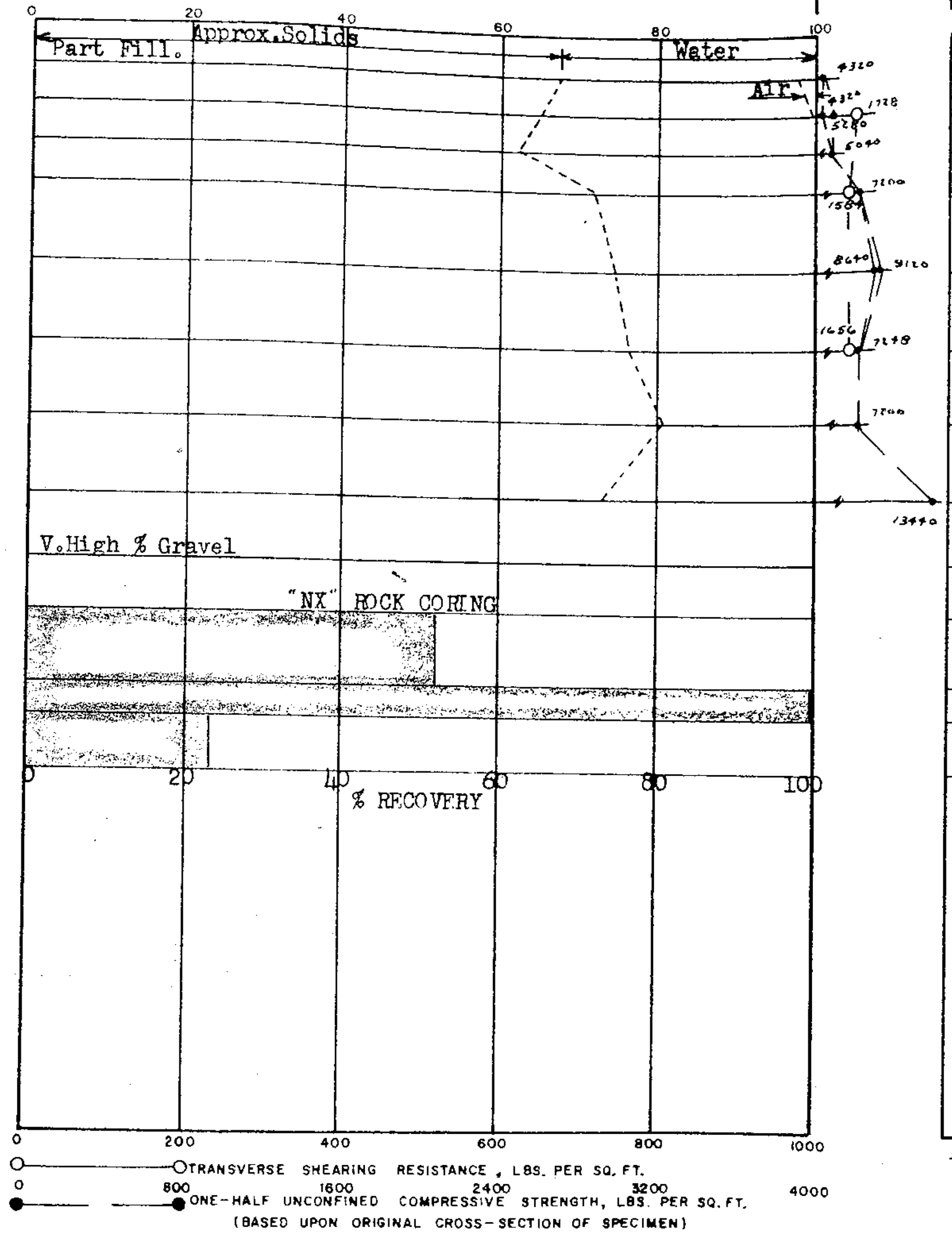
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-4; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field So No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	573.4	Part Fill; V.Stiff	16.6	113.5
LS-2	5.0	570.9	V.Stiff to Hard	21.2	108.9
LS-3	7.5	568.4	V.Stiff	23.4	104.5
LS-4	10.0	565.9	Hard	15.4	119.7
LS-5	15.0	560.9	V.Hard	12.2	125.8
LS-6	20.0	555.9	V.Hard	11.8	128.3
LS-7	24.5	551.4	V.Hard	8.1	136.6
LS-8	29.5	546.4	V.Hard	13.5	123.8
LS-9	33.5	542.4	V.Hard	8.4	--
	37.0	538.9			
Core Run No. 1	41.5	535.4			
No. 2	43.6	532.3			
No. 3	47.1	528.8			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 171.

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 3 TB3

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

SFA FORM 7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.2 Ft. (IGLD Datum)

ELEVATION IN FEET

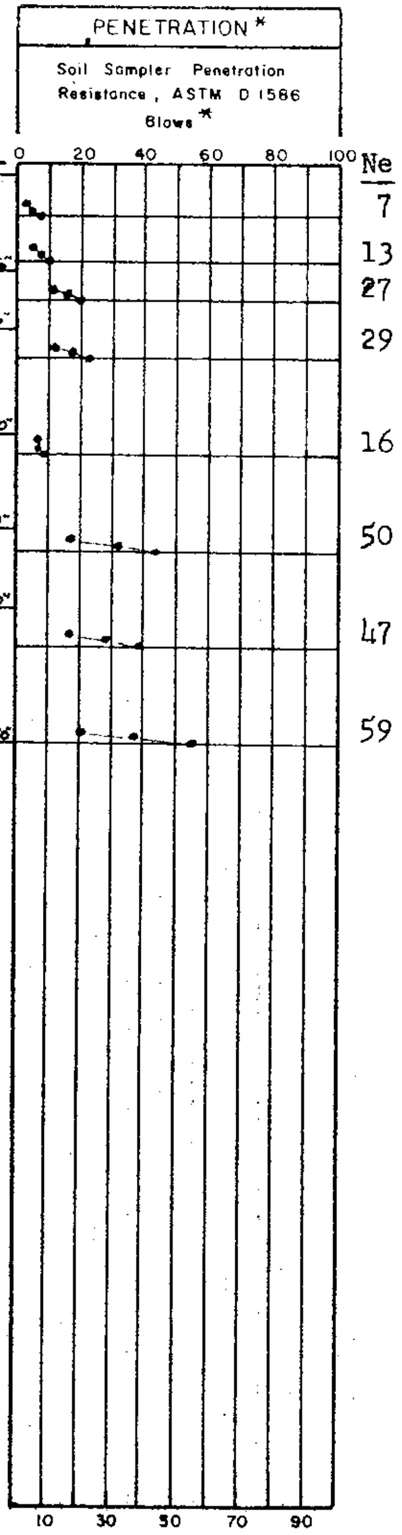
Elevation	Description	Depth
	TOPSOIL; Dark SANDY CLAY. Damp.	7"
570	Plastic to Firm Brn.& Gr.Mtld.SILTY CLAY, w/Trace Very Fine Sand. Damp.	5'6"
	V.Stiff Brown w/Gray Mottling SILTY CLAY, w/Trace of Very Fine Sand. Moist.	8'6"
560	V.Stiff Brown w/Gray SILTY CLAY, w/Trace Very Fine Sand & Few Pebbles. Damp.	14'0"
	Firm Grav SILTY CLAY, w/Some Fine Sand. Damp.	18'9"
550	Compact Gray VERY FINE SAND, w/Some Silt. Damp.	23'0"
	Hard Gray SILTY CLAY, w/Trace Very Fine Sand & Gravel. Damp. * (GLACIAL TILL)	30'0"
540		

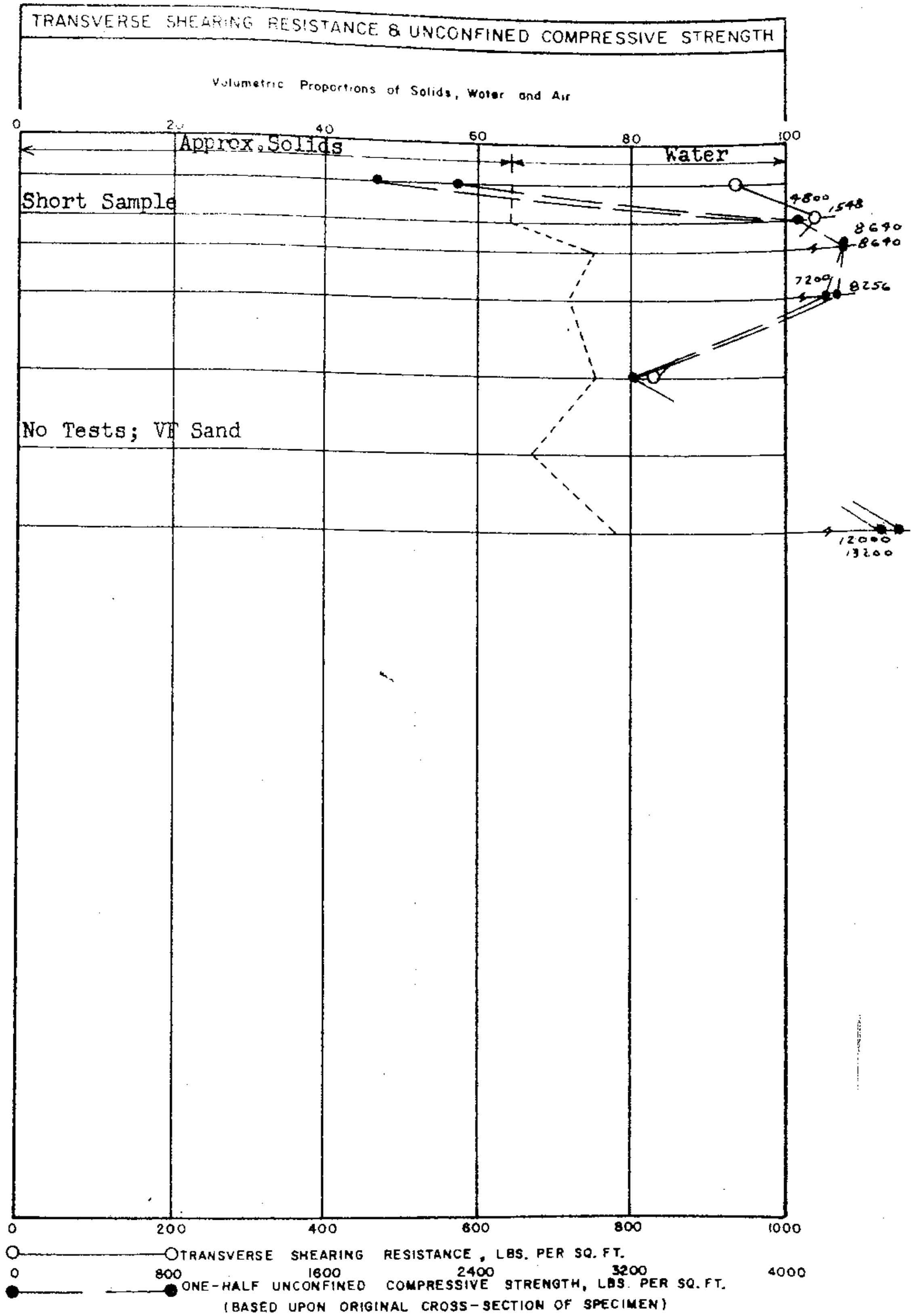
* Ground water encountered

Water level in 1 hr. at El.562.9

Hole grouted with 3 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970





** 1.75" O.D. Michigan Liner Sampler used through LS-4; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	570.7	Plastic to Firm	21.3	107.6
LS-2	5.0	568.2	Hard	20.7	108.0
LS-3	7.0	566.2	V.Hard	12.4	126.1
LS-4	10.0	563.2	Hard to V.Hard	13.8	121.3
LS-5	15.0	558.2	Firm to Stiff	12.3	126.6
LS-6	20.0	553.2	Compact VF Sand	17.5	111.6
LS-7	25.0	548.2	V.Hard	10.7	131.2
BS-8	30.0	543.2	Limestone Fragments W/Slt&Cly		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 172

See Test Boring Location Plan
LOCATION: N-4700; E-1900
TOTAL DEPTH: 30'0"

BORING STARTED: August 5, 1970
BORING COMPLETED: August 5, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: J. Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 4 TB4

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

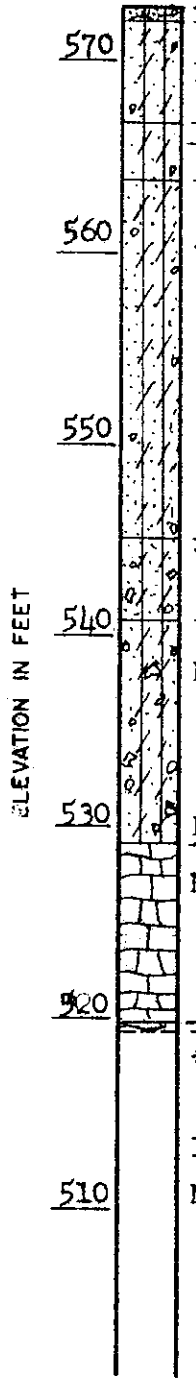
THE DETROIT EDISON COMPANY

APPR: GAO	DATE: 6-7-71	JOB NO. 128-A

SFA FORM -7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.9 Ft. (IGLD Datum)



TOPSOIL; Dk. Brn. SEMI-ORGANIC SANDY CLAY.

Firm to Stiff Brown & Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 6'0"

*Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 9'0"

Very Stiff to Hard Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. (GLACIAL TILL?) 27'6"

Very Hard Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL) 32'0"

Hard to Very Hard Dk.Gr.F.SANDY SILTY CLAY, Gravelly, w/Many Rock Fragments. (GLACIAL TILL)

TOP OF ROCK:

Refusal w/Gear Bit; Set NX casing. 43'6"

Med.Hd.Lt.Brown Fragmented LIMESTONE, w/Few Shale partings & Zone Dolomitic Limestone. Fractures moderately close.

Soft Dark Gray SHALE. 53'0" 53'6"

* Encountered ground water; water level rose to Elev. 568.2 in 1-hour; drove 10' of 4" casing.

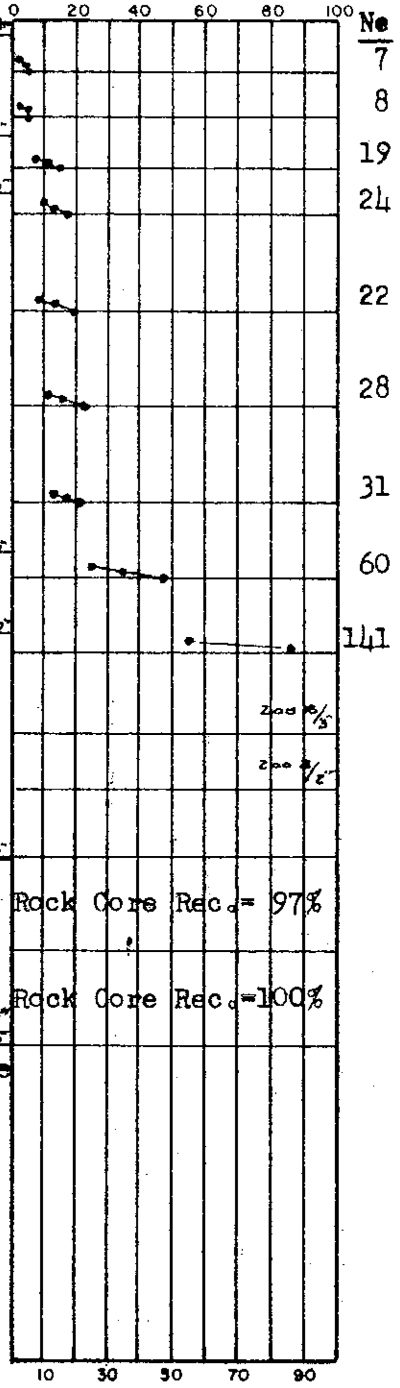
10' of 4" in. casing & 43'6" NX casing used.

NOTE: No artesian flow encountered in rock; hole grouted immediately upon completion w/3 bags of cement. No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

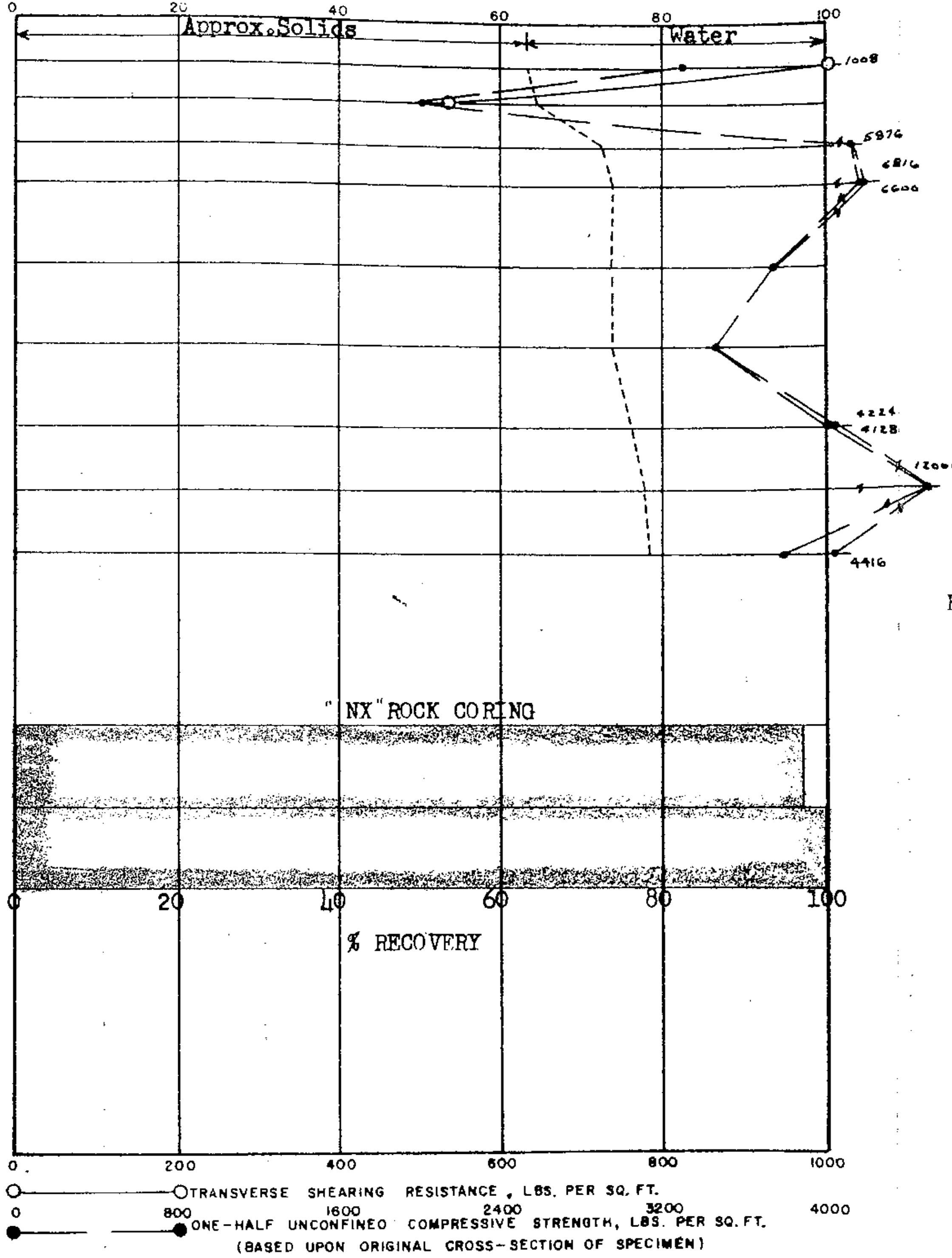
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows **



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used through LS-7; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	[illegible]
LS-1	2.5	570.4	Stiff	21.8	106.5
LS-2	5.0	567.9	Firm	20.6	10[illegible] 5
LS-3	7.5	565.4	Hard	13.9	122.5
LS-4	10.0	562.9	Hard	13.0	124.1
LS-5	15.0	557.9	Hard	13.3	123.9
LS-6	20.0	552.9	V.Stiff	12.4	124.1
LS-7	25.0	547.9	V.Stiff	10.3	128.4
LS-8	29.0	543.9	V.Hard	9.5	-
LS-9	33.0	539.9	Hard	10.4	132.6
No Recovery	37.3	535.6			
No Rec.	40.2	532.7			
	43.5	529.4			
Core Run No.1	48.5	524.4			
No.2	53.5	519.4			

* Laboratory consistency based upon visual examination of sample independent of field evaluation and strength determined in laboratory test.

LOCATION: N-5000; E-2900
TOTAL DEPTH: 53'6"
BORING STARTED: July 31, 1970
BORING COMPLETED: Aug. 3, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ____ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NX ($2\frac{1}{8}$")

MON 173

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 5 TB5

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

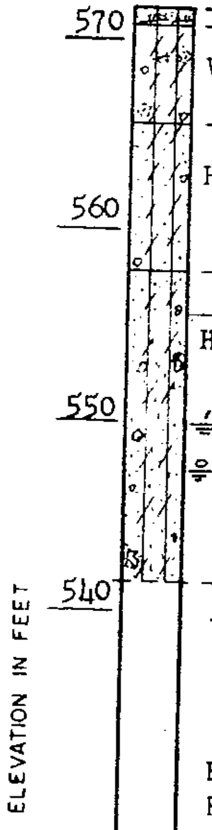
THE DETROIT EDISON COMPANY

APPR: [illegible] | DATE: 10-20-70 | JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.9 Ft. (IGLD Datum)



TOPSOIL: Bk.Brn.SEMI-ORGANIC SANDY CLAY. 9"

V.Stiff to Hard Brown & Gray SILTY CLAY, w/Few Sand Pockets, Traces of Gravel. 6'0"

Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel. 15'6"

— *
Hard to V. Hard Gray F. SANDY SILTY CLAY, w/Some Coarse Sand, Gravel & Rock Fragments.
(GLACIAL TILL) 30'0"

* Encountered ground water, ground water at El.547.8 upon completion, rose to El.555.9 and seeped out; dropped to El.550.1 in 1-hr.

Hole dry augered; no casing used.
Hole grouted w/2 bags of cement & 1 bag of bentonite; no water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-5100; E-3900
TOTAL DEPTH: 30'0"

BORING STARTED: August 11, 1970
BORING COMPLETED: August 11, 1970

INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

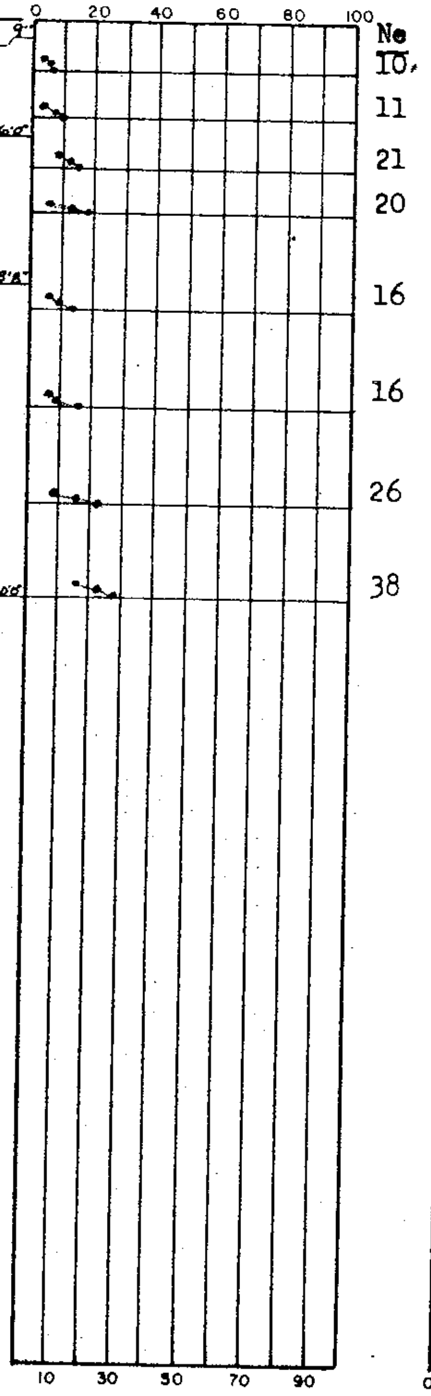
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

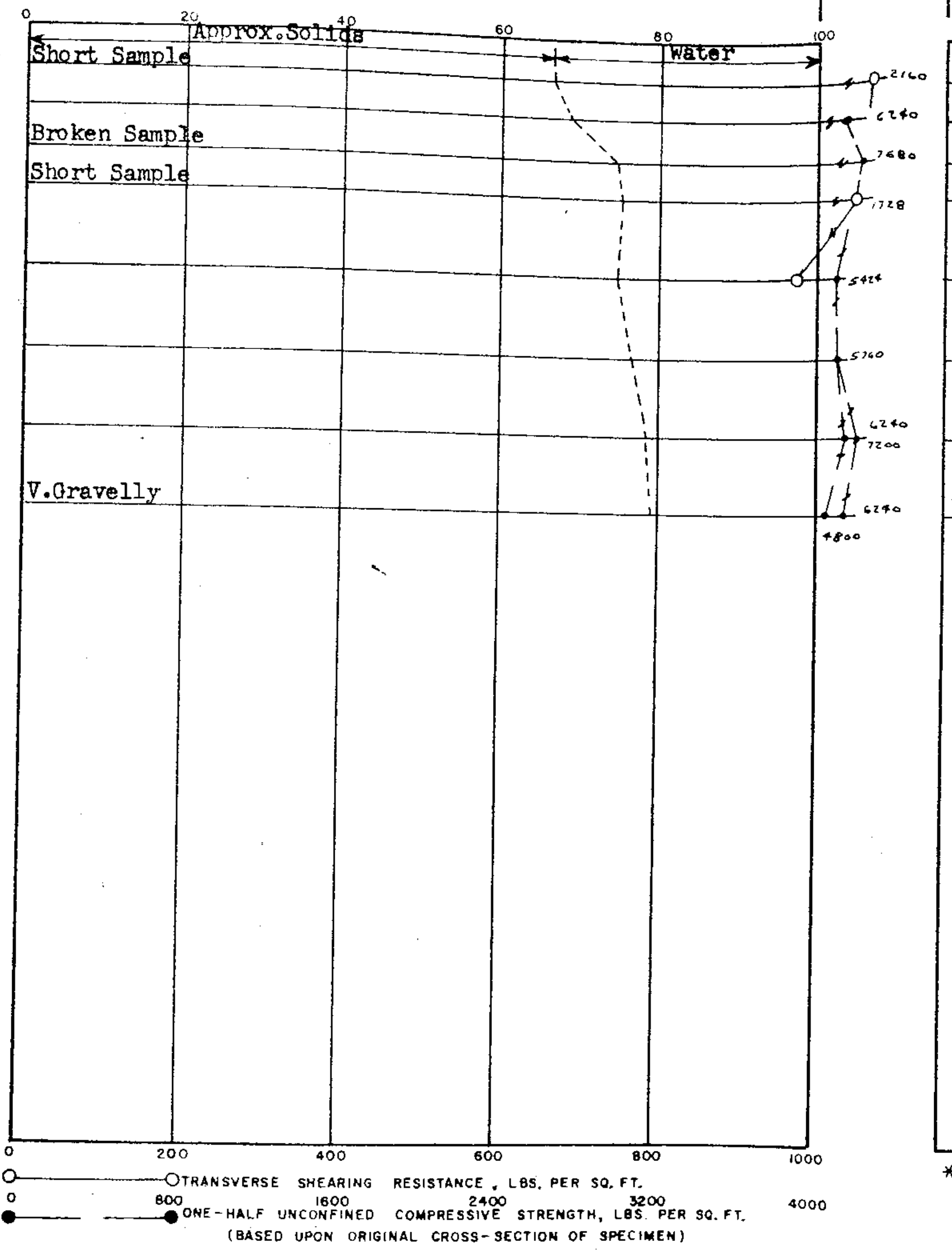
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	569.4	V.Stiff to Hard	19.1	112.2
LS-2	5.0	566.9	V.Stiff	16.0	116.3
LS-3	7.5	564.4	Hard	13.0	125.6
LS-4	10.0	561.9	Hard	12.4	126.6
LS-5	15.0	556.9	Hard	11.9	126.2
LS-6	20.0	551.9	Hard	11.0	128.4
LS-7	25.0	546.9	V.Hard	10.6	132.0
LS-8	30.0	541.9	Hard	9.8	132.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 174

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 6 TB6

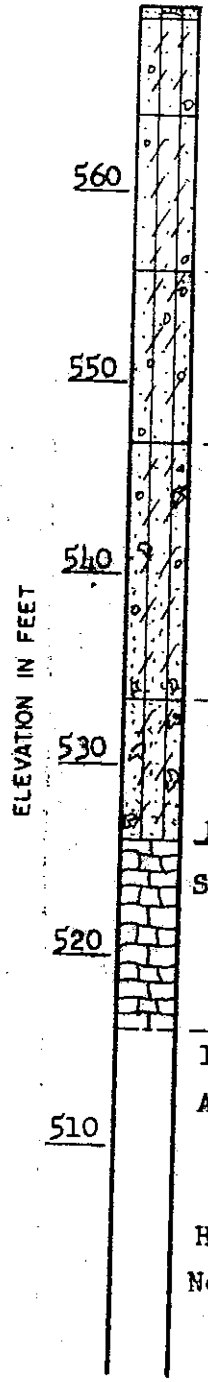
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 10-26-70 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 569.9 Ft. (IGLD Datum)



TOPSOIL; Dk. Brn. SEMI-ORG. V. SANDY CLAY. 4"

Stiff Brown & Gray SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 5'6"

Stiff to V. Stiff Mtld. Brown SILFY CLAY, w/Some Sand, Traces of Gravel. 13'6"

V.Stiff Gray SILTY CLAY, w/Some Sand & Gravel. (GLACIAL TILL?) 23'6"

V. Hard Gray FINE SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL) 36'0"

V.Hard Dark Gray FINE SANDY SILTY CLAY, w/Many Rock Fragments. (GLACIAL TILL)

TOP OF ROCK:
Refusal w/Gear Bit; Set NX casing 43'4"

Soft to Medium Hard Lt. Brn. V. Fragmented DOLOMITIC LIMESTONE & LIMESTONE. Fractures Close to Mod. Close. 53'4"

10' of 4-in. casing set with hole at d=29 ft.

Artesian water noted upon completion of rock coring, w/flow of 50 gpm; static head established at 4.2 ft. above ground surface (El. 574.1)

Hole was grouted w/3bags of cement.

No water flow during final inspection on Sept. 9, 1970.

LOCATION: See Test Boring Location Plan
N-5100; E-4900
TOTAL DEPTH: 53'4"

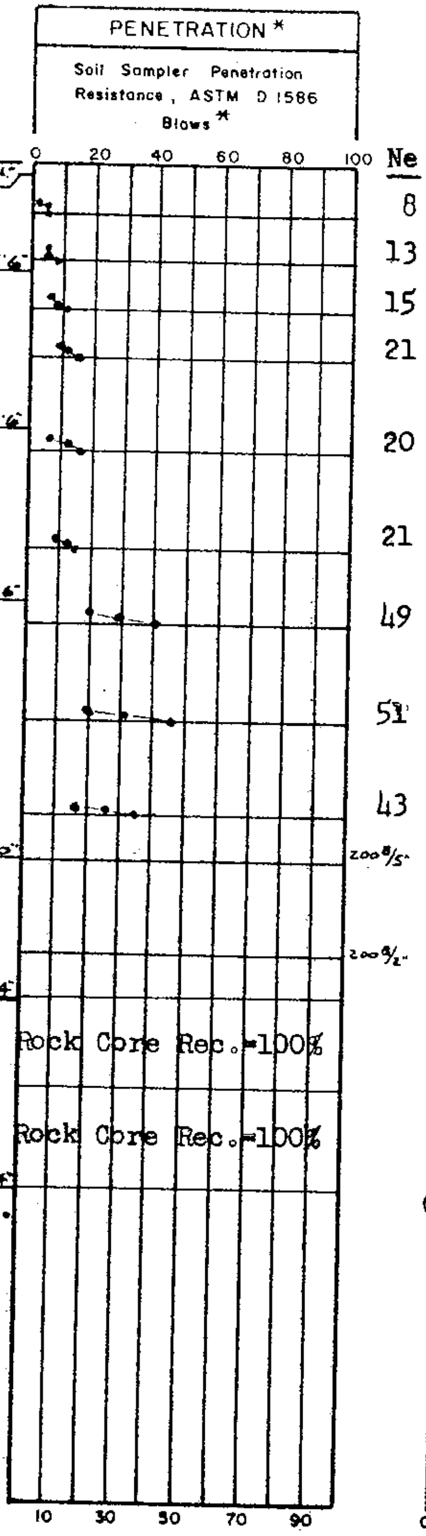
BORING STARTED: August 4, 1970
BORING COMPLETED: August 5, 1970

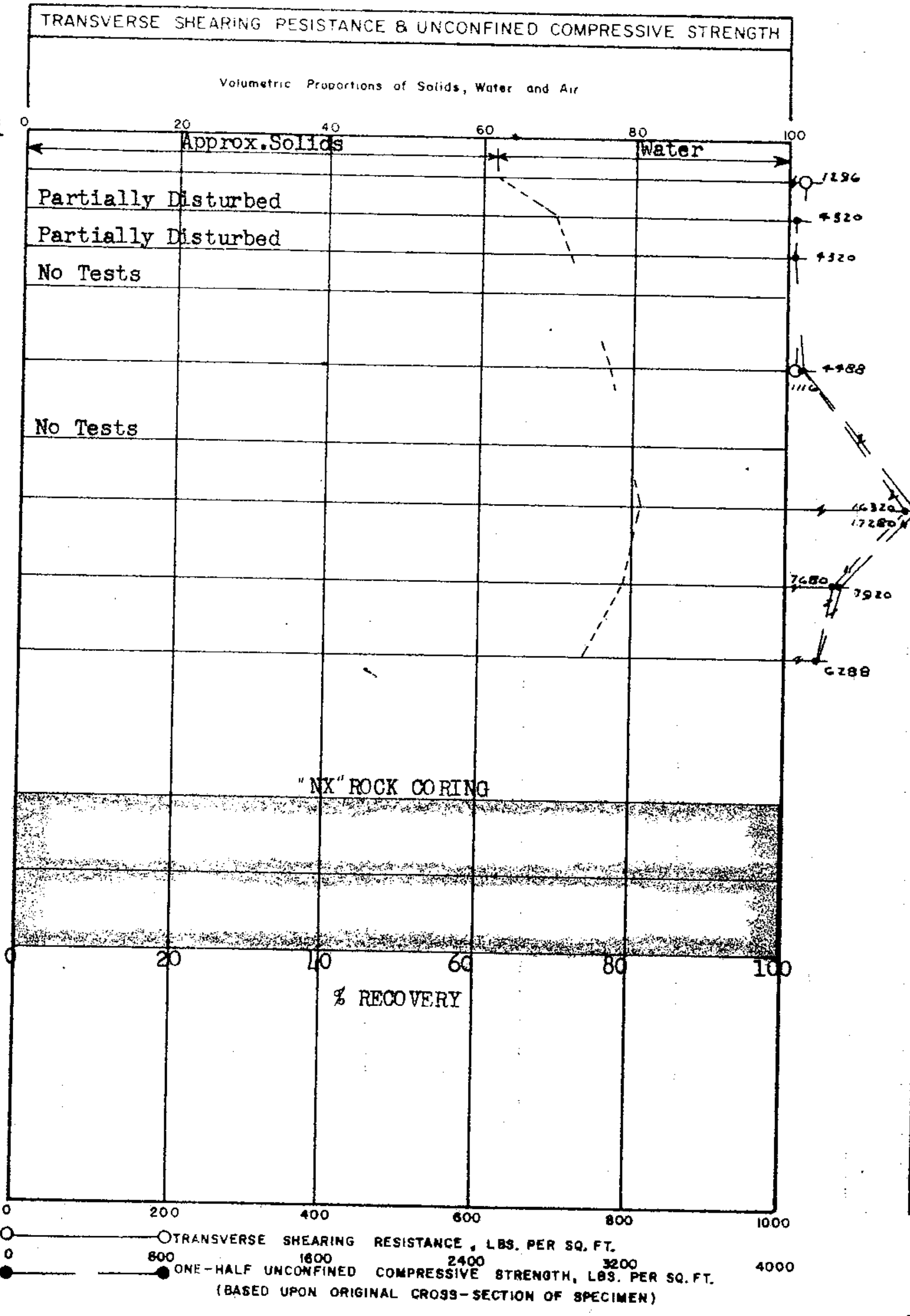
INSPECTOR: J.O.Wanzeck (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NX (2-7/8")





** 1.75" O.D. Michigan Liner Sampler used through LS-6; 2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev, Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	567.4	V.Stiff	22.9	104.4
LS-2	5.0	564.9	Stiff	16.2	117.1
LS-3	7.5	562.4	Stiff	14.8	120.2
LS-4	10.0	559.9	V.Stiff	--	--
LS-5	15.0	554.9	V.Stiff	11.3	129.4
LS-6	20.0	549.9	V.Stiff	--	--
LS-7	24.0	545.9	V.Hard	8.8	136.5
LS-8	29.0	540.9	V.Hard	9.6	132.9
LS-9	34.0	535.9	Hard	12.7	123.9
BS-10	36.3	533.6	Rock Frags		
BS-11	41.2	528.7	Rock Frags w/Hd.Clay		
	43.3	526.6			
Core Run No.1	48.3	521.6			
No.2	53.3	516.6			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 175

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 7 TB7

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

SFA FORM 1-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.1 Ft. (IGLD Datum)

TOPSOIL; Bk. Brn. SEMI-ORG. F. SANDY CLAY.

Medium Mtld. Brown SILTY CLAY, w/Trace of Sand, Slight Traces Gravel. — 5.6'

Firm Mtld. Brown SILTY CLAY, w/Traces of Sand. — 8.6'

V. Stiff Brown SILTY CLAY, w/Some Sand, Traces of Gravel. — 11.6'

Firm to Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel. — 21.0'

V. Stiff to Hard Dk. Gr. FINE SANDY SILTY CLAY w/Some Gravel & Rock Fragments. (GLACIAL TILL) — 30.0'

Hole dry augered, dry upon completion.

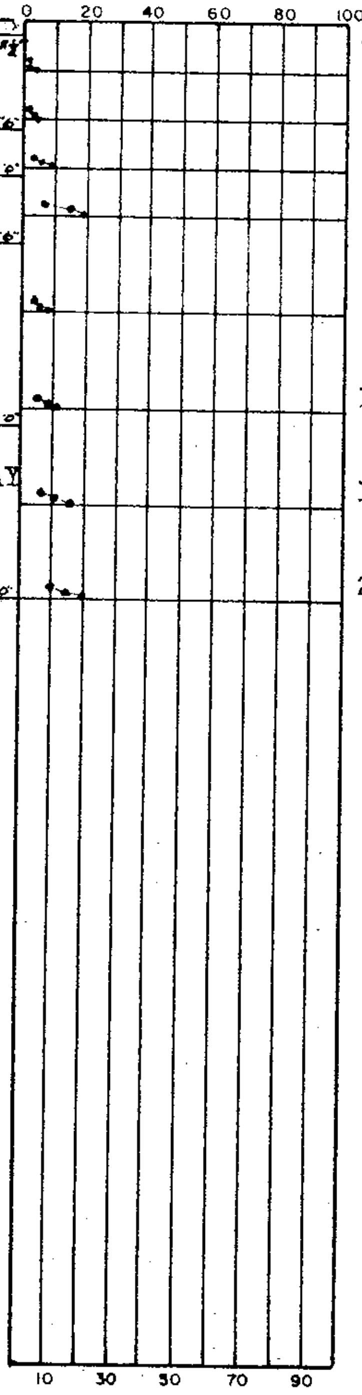
Hole grouted w/1 bag cement & 1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

PENETRATION *

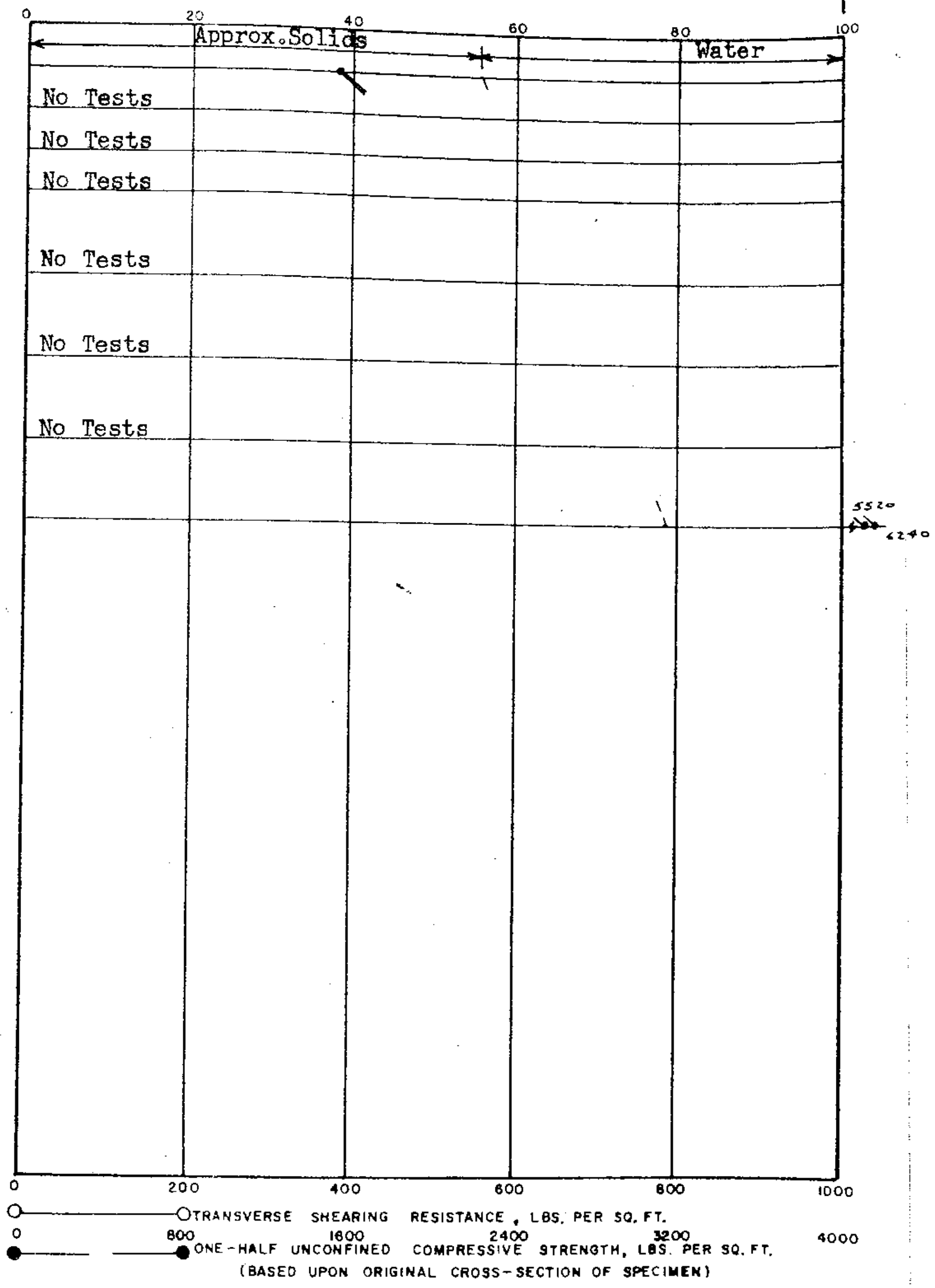
Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



Ne
4
5
8
23
9
13
18
25

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.6	Medium	29.4	93.0
LS-2	5.0	566.1	Medium	--	--
LS-3	7.5	563.6	Firm	--	--
LS-4	10.0	561.1	V.Stiff	--	--
LS-5	15.0	556.1	Firm	--	--
LS-6	20.0	551.1	V.Stiff	--	--
LS-7	25.0	546.1	V.Stiff	--	--
LS-8	30.0	541.1	Hard	10.2	131.8

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 176

LOCATION: N-4100; E-3400
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: B.W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ____ inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NONE

SFA FORM LS-7

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 8 TB 8

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.5 Ft. (IGLD Datum)

VATION IN FEET

570

TOPSOIL;Dk.Brn.SEMI-ORG.F.SANDY CLAY. 10"

Firm to Stiff Brown & Gray SILTY CLAY,
w/Some Sand, Traces of Gravel. 8'6"

560

Stiff Brown SILTY CLAY,
w/Little Sand, Few Sand Pockets,
Traces of Gravel. 13'3"

Stiff Gray SILTY CLAY,
w/Some Sand, Few Sand Partings,
Little to Some Gravel. 23'8"

550

Hard To V.Hard Dk.Gr.F.SANDY SILTY CLAY,
* w/Some Gravel & Rock Fragments.
(GLACIAL TILL) 30'0"

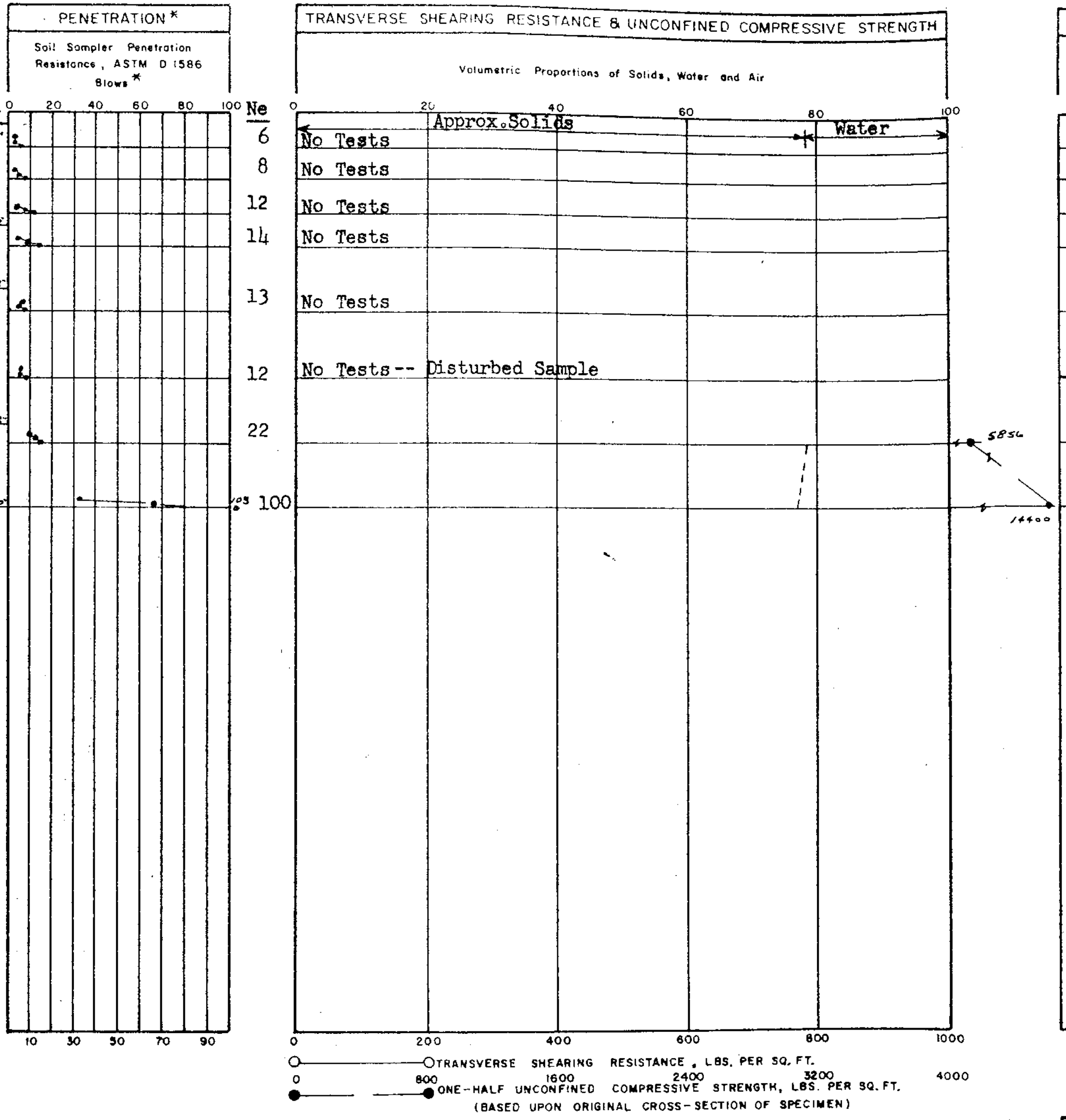
540

Hole dry augered.

* Encountered ground water (slight).

Hole grouted w/2 bags of cement.

No Water flow during final inspection
on Sept. 9, 1970.



** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	569.0	Firm	--	--
LS-2	5.0	566.5	Firm	--	--
LS-3	7.5	564.0	Stiff	--	--
LS-4	10.0	561.5	Stiff	--	--
LS-5	15.0	556.5	Stiff	--	--
LS-6	20.0	551.5	Stiff	--	--
LS-7	25.0	546.5	Hard	9.9	132.9
LS-8	30.0	541.5	V.Hard	9.8	130.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 177

See Test Boring Location Plan

LOCATION: N-4100; E-4150
TOTAL DEPTH: 30'0"

BORING STARTED: August 12, 1970
BORING COMPLETED: August 12, 1970

INSPECTOR: M.M.Dragicevic (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 9 TB 9

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

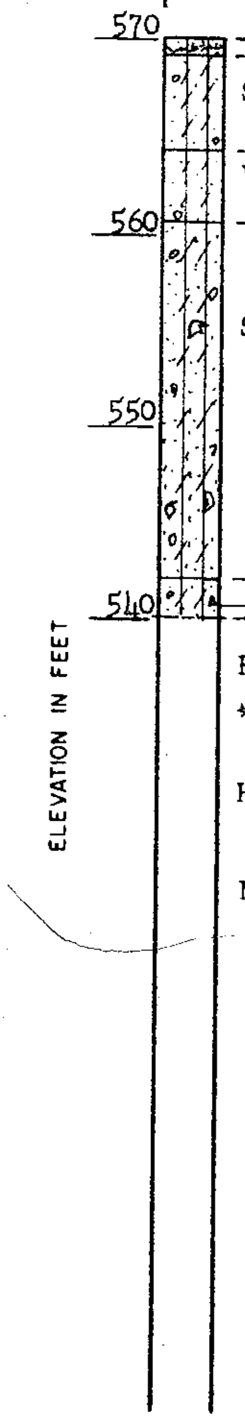
THE DETROIT EDISON COMPANY

APPR: GAO DATE: 10-20-70 JOB NO. 128-A

SFA FORM L-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.2 Ft. (IGLD Datum)



TOPSOIL; Dk.Brn.SEMI-ORG.F.SANDYCLAY.

Stiff to V.Stiff Brown & Gray SILTY CLAY, w/Some Sand, Traces of Gravel. 5.0'

V.Stiff Brown SILTY CLAY, w/Some Fine Sand, Traces of Gravel. 9.5'

Stiff to Hard Gray FINE SANDY SILTY CLAY, w/Some Gravel & Few Rock Fragments. (GLACIAL TILL, in lower elevation) 28.0'

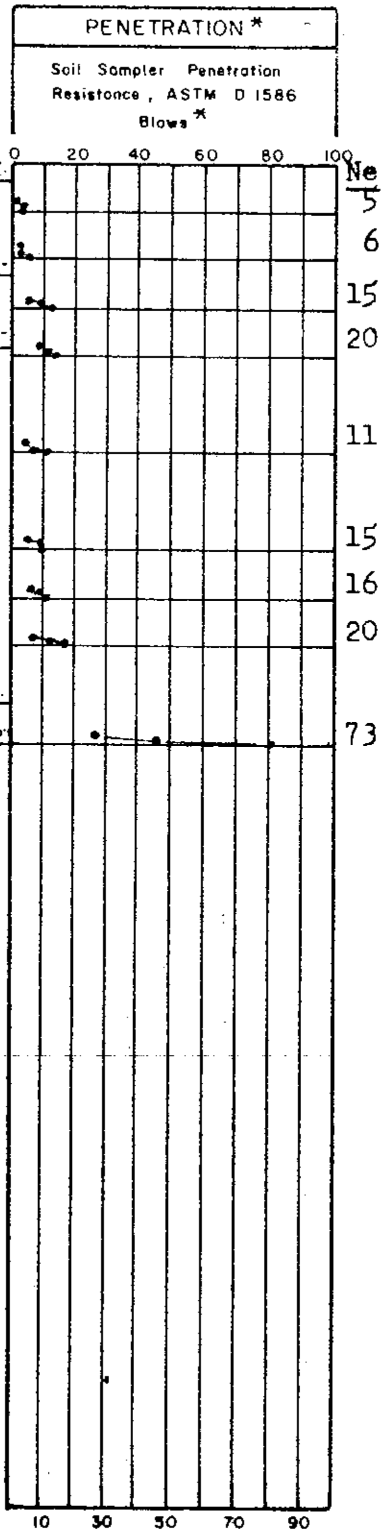
* V.Hard Dk.Gray F.SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL) 30.0'

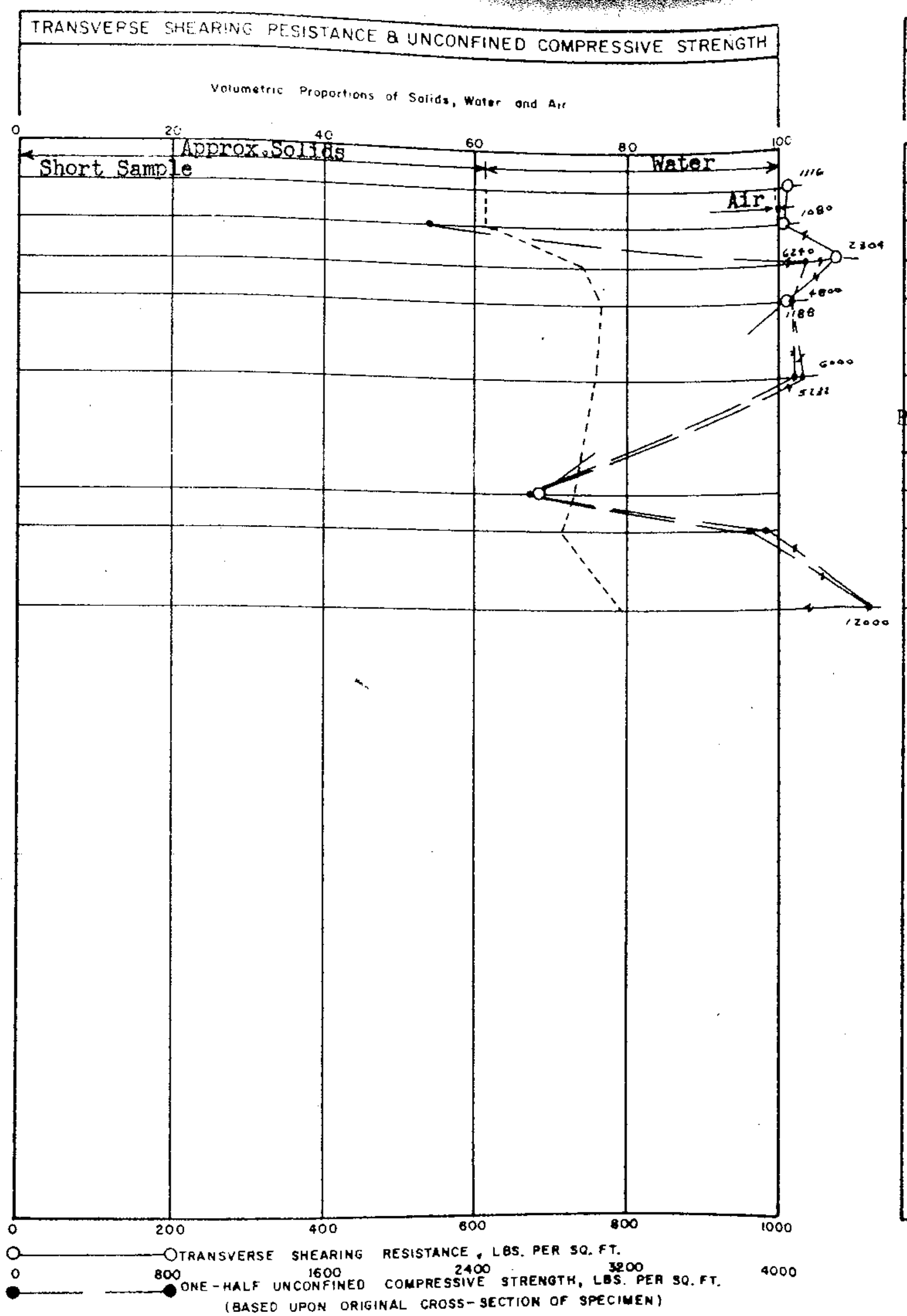
Hole dry augered.

* Encountered ground water; water level rose 3" in 1 hour.

Hole grouted w/1 bag cement & 2 bags bentonite.

No water flow during final inspection on Sept. 9, 1970.





** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	567.7	V.Stiff	22.9	103.4
LS-2	5.0	565.2	Stiff to V.Stiff	23.7	103.8
LS-3	7.5	562.7	V.Stiff to Hard	13.4	124.8
LS-4	10.0	560.2	V.Stiff	12.1	127.2
LS-5	15.0	555.2	Hard	12.3	126.5
No Recovery	20.0	550.2			
LS-6	22.5	547.7	Firm to Stiff	14.1	123.1
LS-7	25.0	545.2	Stiff	12.6	120.8
LS-8	30.0	540.2	V.Hard	9.5	134.7

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 178

See Test Boring Location Plan

LOCATION: N-4100; E-4800
TOTAL DEPTH: 30'0"

BORING STARTED: August 12, 1970
BORING COMPLETED: August 12, 1970

INSPECTOR: B.W.Behrman (S&FA)
DRILLER: D.T.Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 10 TB10

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 577.3 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Depth	Description
	9"	Medium Dark Brown SANDY TOPSOIL.
	4'0"	V.Stiff Mtld. Brown & Gray SILTY CLAY, w/Sand Pockets & Tr.Gravel.
570	10'0"	Stiff to V.Stiff Mottled Brown SILTY CLAY, w/Some Sand & Gravel, Few Sand Pockets.
	14'0"	Stiff Gray (w/Some Brown) SILTY CLAY, w/Some Sand, Traces of Gravel.
560	23'6"	Stiff to V.Stiff Light Gray SILTY CLAY, w/Little Sand, Traces of Fine Gravel.
550	33'6"	Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)
540	35'2"	* Lt.Gray Broken DOLOMITE.(Roller bit used)

Hole dry-augered to d=15'
Used 18'6" of 3" casing.

* Encountered ground water;
artesian flow; initial = 4 gpm,
after 30 minutes = 4.1 gpm

Artesian head = El.589.5 at completion;
= El.590.4 after 2 hours.

Hole grouted w/3bags of cement & 1 bag dry concrete.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-3600; W-1350
TOTAL DEPTH: 35'2"

BORING STARTED: July 17, 1970
BORING COMPLETED: July 17, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

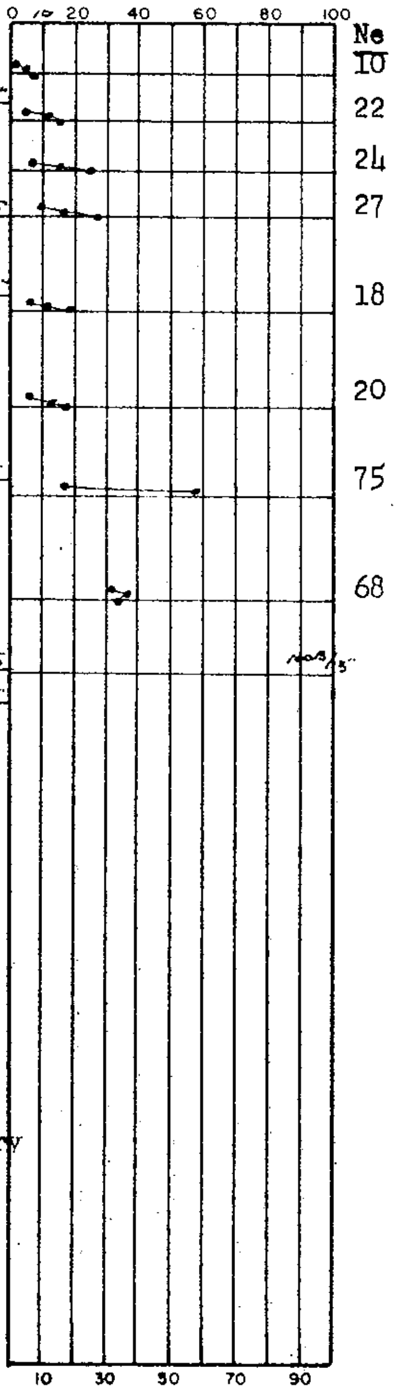
≡ WATER LEVEL in hole at indicated number of hours after completion of boring; 18.5 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: None

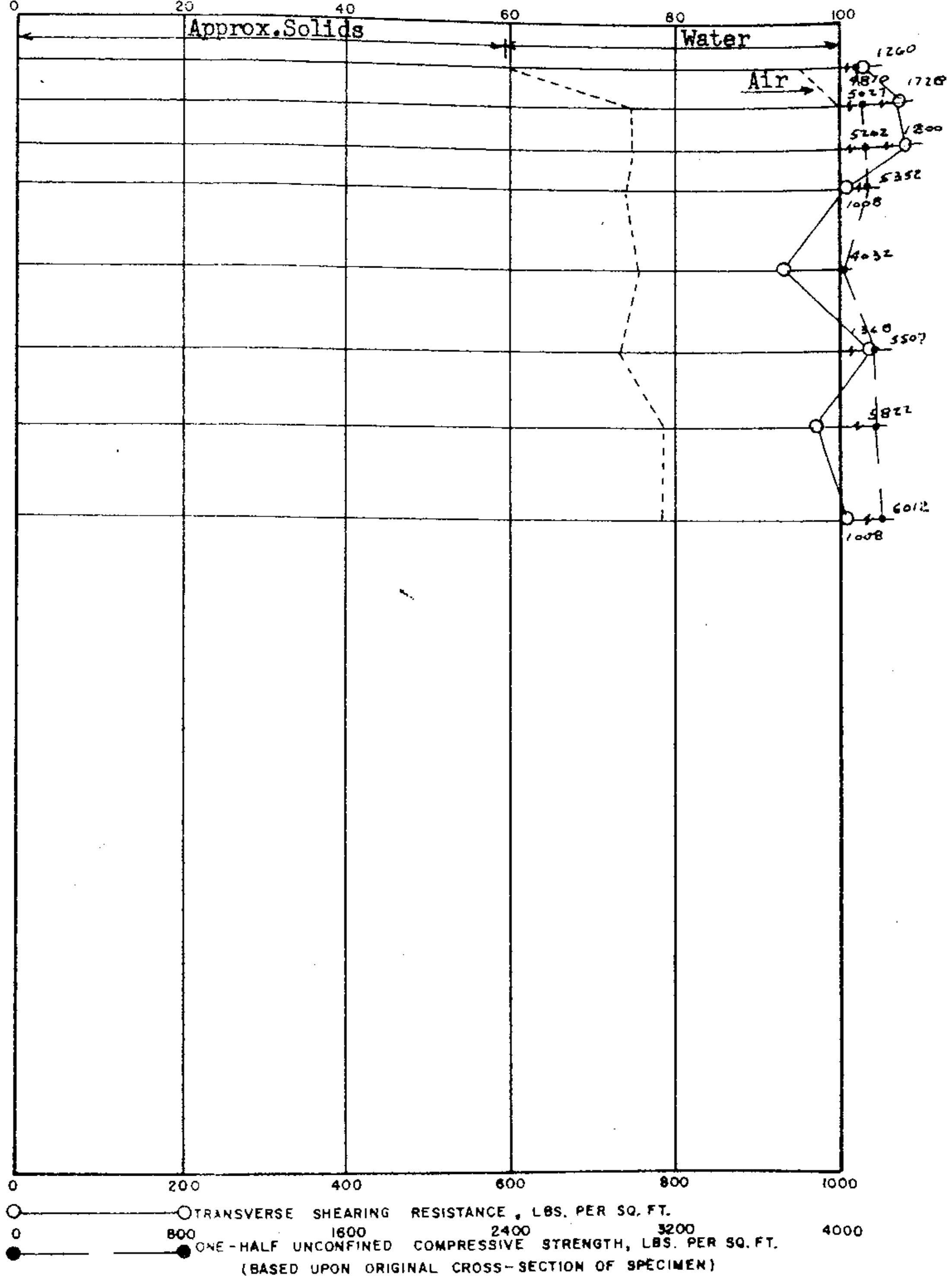
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●——— ———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-7;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f
LS-1	2.5	574.8	V.Stiff	22.0	100.8
LS-2	5.0	572.3	V.Stiff	12.5	125.9
LS-3	7.5	569.8	V.Stiff	12.5	126.0
LS-4	10.0	567.3	V.Stiff	13.5	124.1
LS-5	15.0	562.3	Stiff	12.2	127.2
LS-6	20.0	557.3	Hard	12.4	123.1
LS-7	24.5	552.8	Hard	11.2	132.4
LS-8	30.0	547.3	Hard	10.4	132.7
No Recovery	33.8	543.5			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 179

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 11 TB 11

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 12[illegible]

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.3 Ft. (IGLD Datum)

LEVATION IN FEET: 570, 560, 550, 540, 530

TOPSOIL; Medium Dk.Brn/Gray SILTY CLAY. [illegible]

Hard Brown w/Gray, SILTY CLAY, w/Sand Pockets, Traces of Gravel. 3'6"

V. Stiff Mottled Brown SILTY CLAY, w/Traces of Sand. 6'0"

Hard Mottled Brown SILTY CLAY, w/Little Sand, Traces of Gravel. 8'0"

Hard Gray, w/Some Brown streaks, SILTY CLAY w/Few Sand Pockets, Traces of Gravel. 17'0"

Hard Gray SILTY CLAY, w/Some Sand (frequently in pockets), and Traces of Gravel. 21'9"

V.Hard Gray SILTY CLAY, w/Some Sand & Fine Gravel, Few Rock Fragments. (GLACIAL TILL) 31'6"

Hard Gray VF SANDY SILTY CLAY, w/Some Gravel&Rock Frags.GLACIAL TILL. 34'0"

Gray Broken DOLOMITE/LIMESTONE. 36'0"

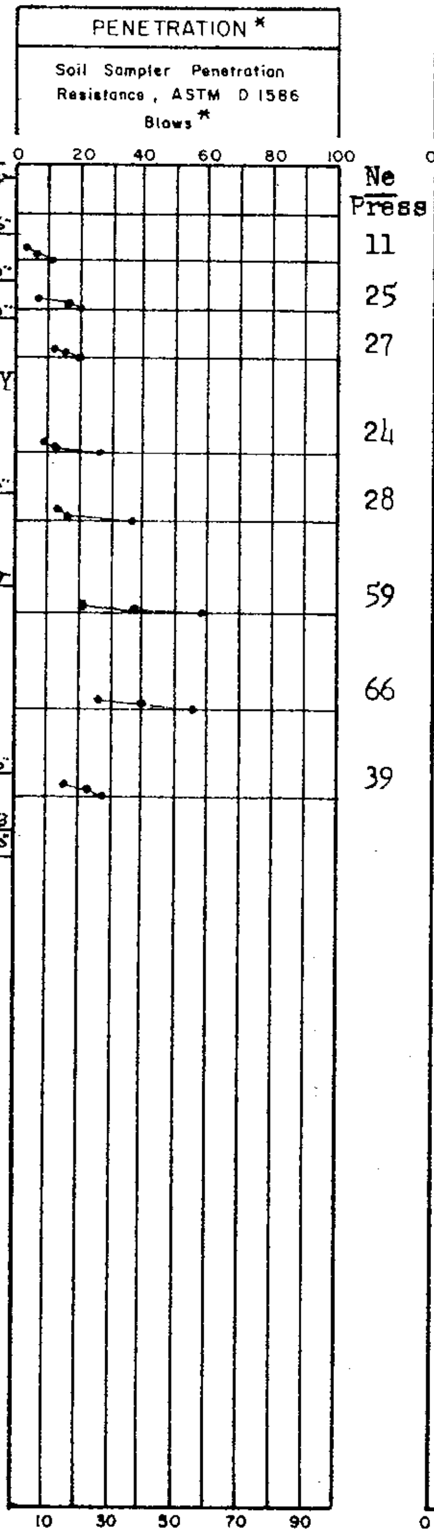
8' of NX casing, 10' of 4" casing used.

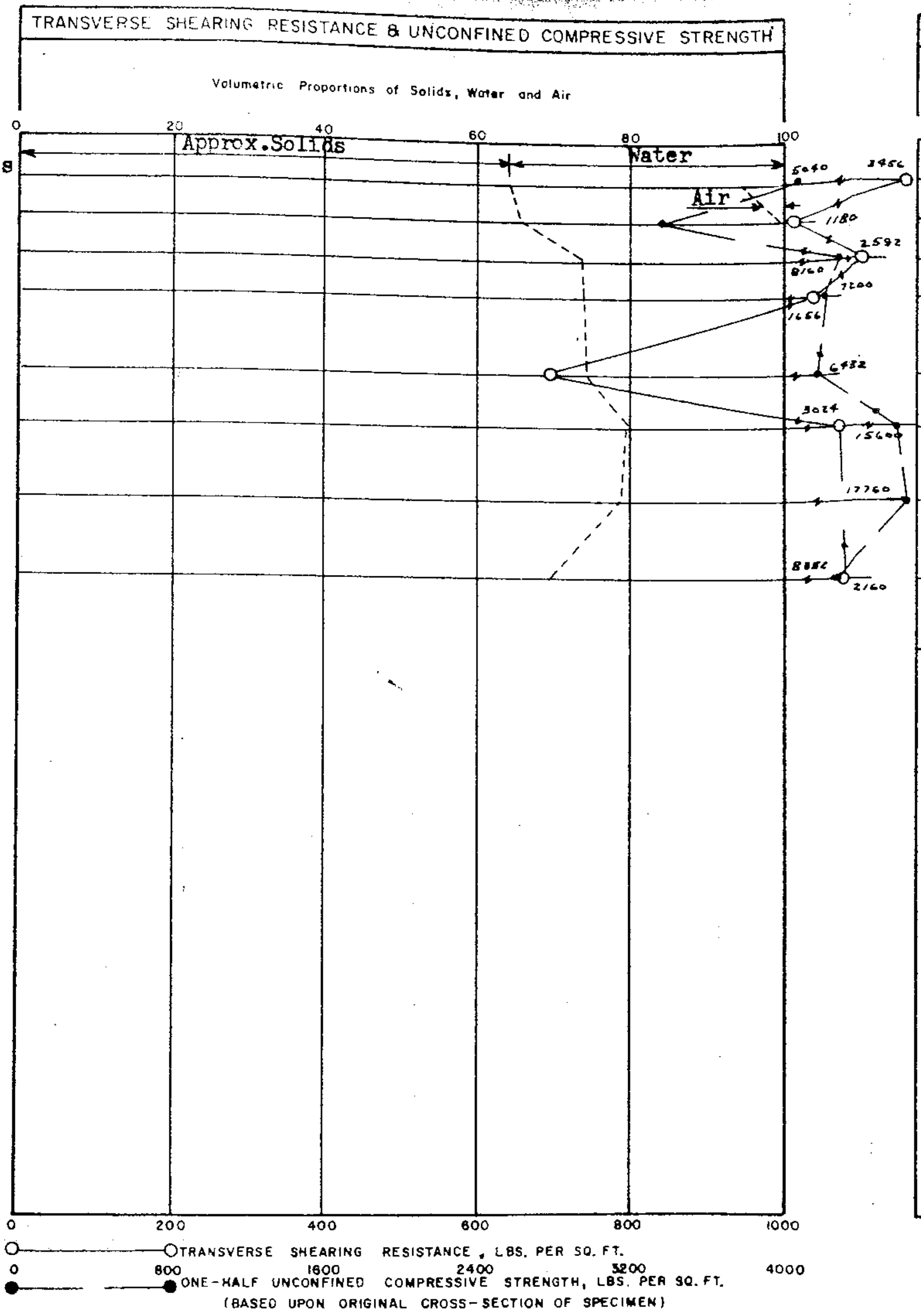
* Encountered artesian ground water; initial flow= 15 gpm; after 30-min. flow= 14 gpm.

Static head established at d=12'7" (El.562.7)

Hole grouted w/4 bags of cement.

No water flow during final inspection on Sept. 9, 1970.





** 1.75" O.D. Michigan Liner Sampler used through LS-5;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	572.8	Hard	17.5	108.6
LS-2	5.0	570.3	V.Stiff	17.3	110.3
LS-3	7.5	567.8	Hard	12.7	123.8
LS-4	10.0	565.3	Hard	12.4	124.5
LS-5	15.0	560.3	Stiff to Hard	12.1	126.0
LS-6	18.5	556.8	Hard	8.7	133.3
LS-7	23.3	552.0	V.Hard	10.2	132.2
LS-8	28.3	547.0	V.Hard	16.0	116.7
BS-9	33.0	542.3	V.Compact Clayey Silt		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan N-3600; W-600
TOTAL DEPTH: 36'0"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

INSPECTOR: J. C. Vanzeck (S&FA)
DRILLER: J. Corbin
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.
ROCK CORE DIAMETER: None

MON 180

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 12 TB 12

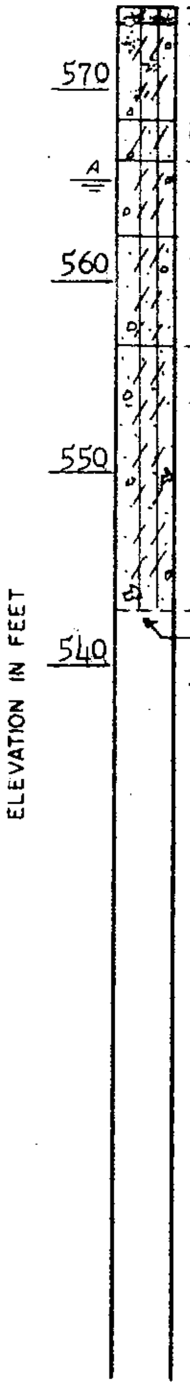
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO	DATE: 6-7-70	JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.2 Ft. (IGLD Datum)



TOPSOIL; Dk. Brn.-Gr. SEMI-ORG. SILTY CLAY. 11"

Firm to Stiff Brown & Gray SILTY CLAY,
w/Some Sand Pockets, Traces of Gravel. 6'0"

Stiff Light Brown SILTY CLAY,
w/Some Sand, Traces of Gravel. 8'0"

V.Stiff Light Brown SILTY CLAY,
w/Traces of Gravel. 12'0"

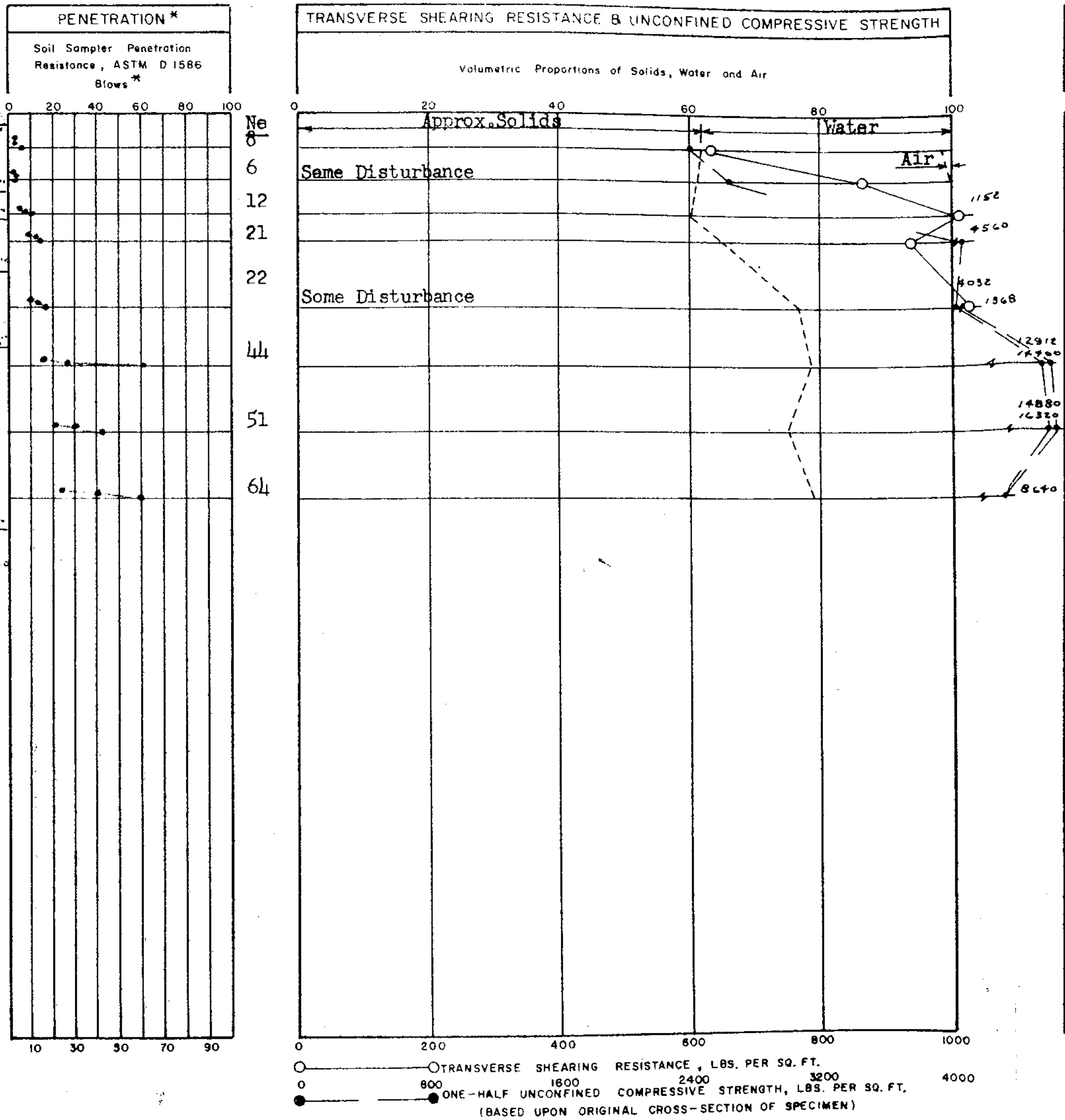
V.Stiff Gray SILTY CLAY,
w/Some Sand, Traces of Gravel. 17'6"

V.Hard Gray SILTY CLAY,
w/Some Sand, Some Fine Gravel,
& Rock Fragments. GLACIAL TILL.

* 31'4"

Refusal.
10' of 4-in. casing, 7' of NX casing used.
* Ground water encountered (Artesian);
flow varied from 15 to 17 gpm.;
static head 8'9" (El. 865.4)

Hole grouted upon completion w/8 bags
cement; no flow as of Sept. 9, 1970
final inspection.



** 1.75" O.D. Michigan Liner Sampler used through LS-4;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	571.7	Firm	22.1	103.1
LS-2	5.0	569.2	Firm to Stiff	25.1	102.0
LS-3	7.5	566.7	Stiff	23.0	101.3
LS-4	9.5	564.7	V.Stiff	20.8	109.0
LS-5	14.5	559.7	V.Stiff	12.0	128.6
LS-6	19.0	555.2	V.Hard	12.1	132.6
LS-7	24.0	550.2	V.Hard	11.2	127.4
LS-8	29.0	545.2	V.Hard	8.9	133.9

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3600; E-400
TOTAL DEPTH: 31'4"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.
ROCK CORE DIAMETER: None

MON 181

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 13 TB 13

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.8 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Description	Depth
	TOPSOIL;Dk.Brn.-Gr.SEMI-ORG.V.SILTY CLAY.	1'2"
570	Firm to Stiff Mtld.Lt.Brown SILTY CLAY, w/Traces of Sand & Gravel.	3'6"
	V.Stiff Mtld.Light Brown SILTY CLAY, w/Traces of Sand & Gravel.	5'6"
	Hard Mtld.Light Brown SILTY CLAY, w/Some Sand, Traces of Gravel.	8'6"
	Hard Brown SILTY CLAY, w/Silt Lenses, Some Sand, Little Gravel.	11'0"
560	Stiff to Hard Gray SILTY CLAY, w/Some Sand, Traces of Gravel.	18'6"
550	V.Hard Gray SILTY CLAY, w/Some Sand & Gravel, Few Rock Fragments. GLACIAL TILL.	25'0"
540		

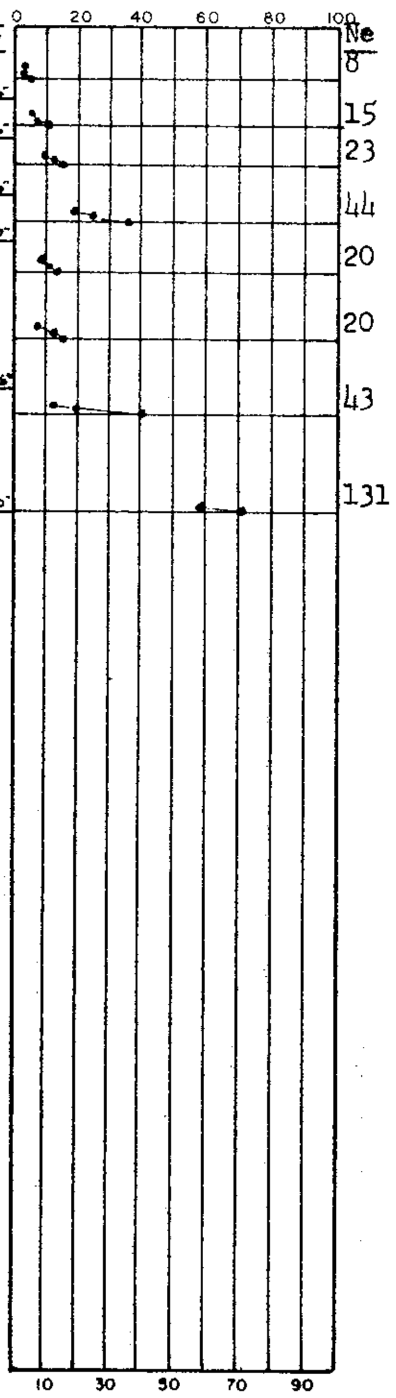
No ground water encountered.

Hole dry augered full depth; no casing used.

Hole filled w/bentonite slurry immediately upon completion; no flow as of Sept. 9, 1970 final inspection.

PENETRATION *

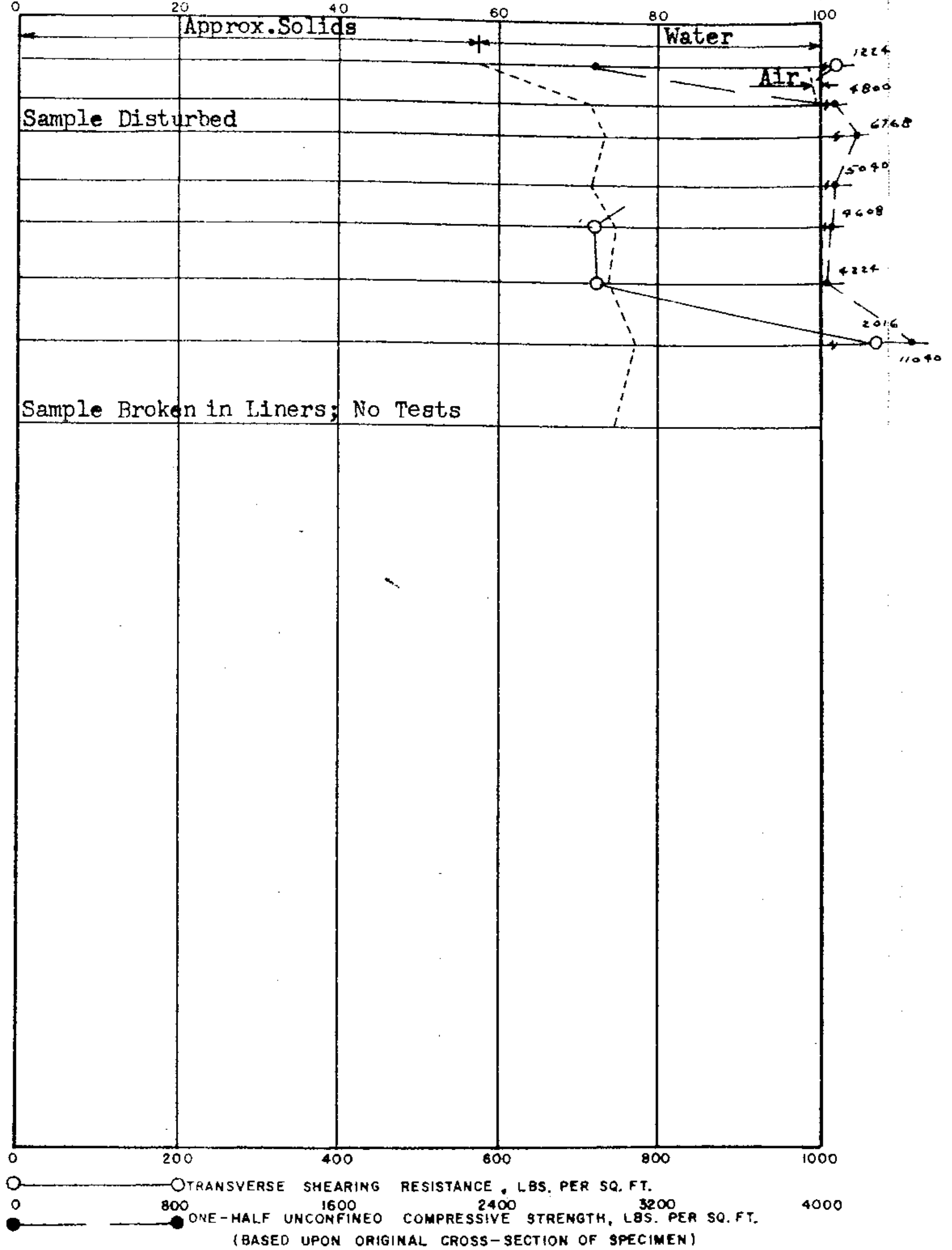
Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



Ne
8
15
23
44
20
20
43
131

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



Sample Disturbed

Sample Broken in Liners; No Tests

** 1.75" O.D. Michigan Liner Sampler used through LS-3;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field So. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	571.3	Firm to Stiff	25.9	97.7
LS-2	5.0	568.8	V.Stiff	14.8	120.6
LS-3	7.0	566.8	Hard	13.6	123.2
LS-4	10.0	563.8	Hard	14.1	120.9
LS-5	12.5	561.3	Stiff to Hard	11.1	126.5
LS-6	16.0	557.8	Stiff to Hard	12.2	123.2
LS-7	20.0	553.8	V.Hard	9.4	128.0
LS-8	25.0	548.8	V.Hard	8.8	125.8

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3600; E-1400
TOTAL DEPTH: 25'0"

BORING STARTED: July 22, 1970
BORING COMPLETED: July 22, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place.
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot
ROCK CORE DIAMETER: None

MON 182

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 14 TB 14

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

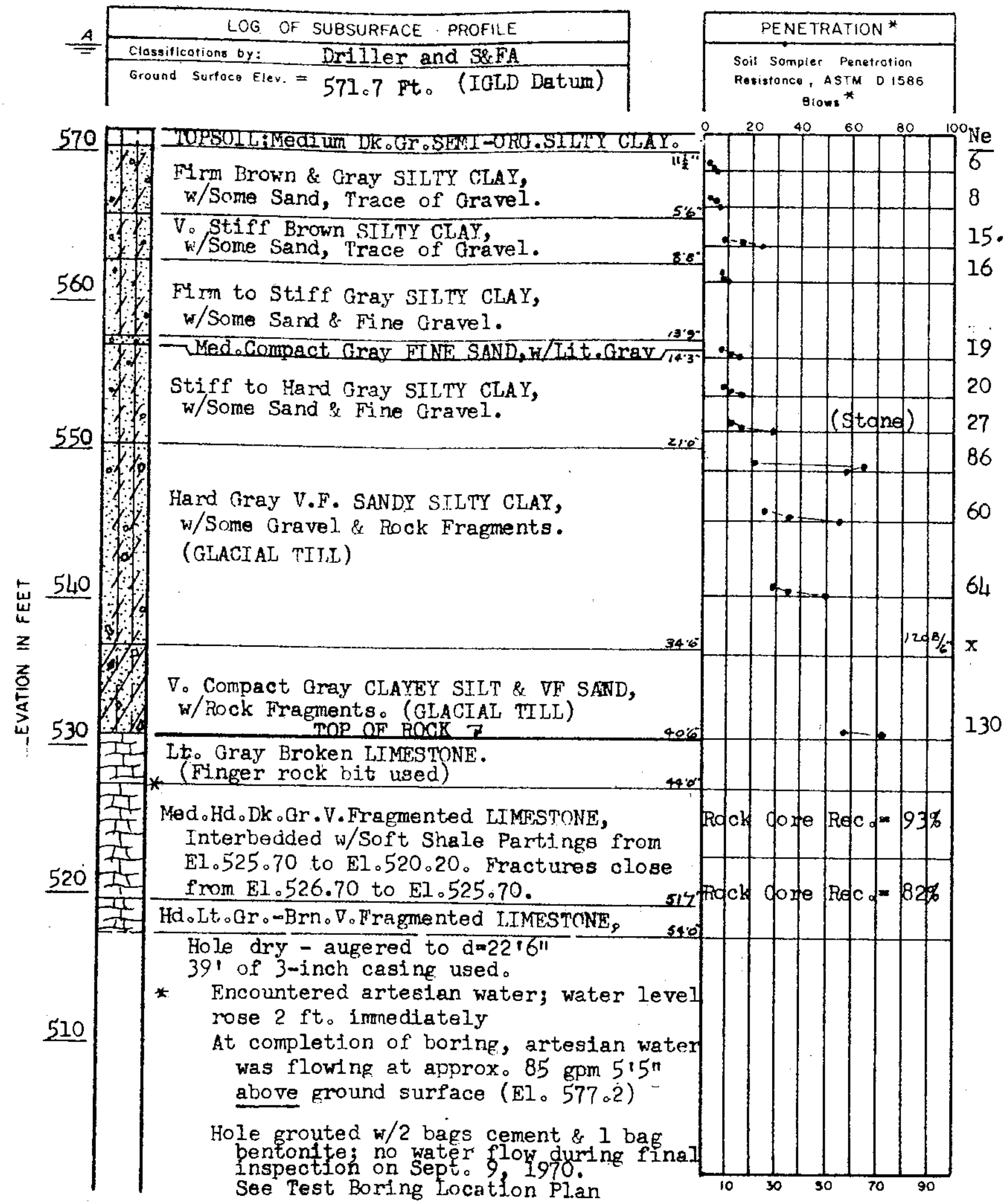
THE DETROIT EDISON COMPANY

APPR: GAo
DATE: 6-7-71
JOB NO. 128-A

SFA FORM S-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.7 Ft. (IGLD Datum)



TOPSOIL; Medium Dk. Gr. SEMI-ORG. SILTY CLAY.

Firm Brown & Gray SILTY CLAY, w/Some Sand, Trace of Gravel.

V. Stiff Brown SILTY CLAY, w/Some Sand, Trace of Gravel.

Firm to Stiff Gray SILTY CLAY, w/Some Sand & Fine Gravel.

Med. Compact Gray FINE SAND, w/Lit. Grav.

Stiff to Hard Gray SILTY CLAY, w/Some Sand & Fine Gravel.

Hard Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)

V. Compact Gray CLAYEY SILT & VF SAND, w/Rock Fragments. (GLACIAL TILL)

TOP OF ROCK

Lt. Gray Broken LIMESTONE. (Finger rock bit used)

Med. Hd. Dk. Gr. V. Fragmented LIMESTONE, Interbedded w/Soft Shale Partings from El. 525.70 to El. 520.20. Fractures close from El. 526.70 to El. 525.70. — Rock Core Rec. = 93%

Hd. Lt. Gr.-Brn. V. Fragmented LIMESTONE, — Rock Core Rec. = 82%

Hole dry - augered to d=22'6"
39' of 3-inch casing used.

* Encountered artesian water; water level rose 2 ft. immediately
At completion of boring, artesian water was flowing at approx. 85 gpm 5'5" above ground surface (El. 577.2)

Hole grouted w/2 bags cement & 1 bag bentonite; no water flow during final inspection on Sept. 9, 1970.
See Test Boring Location Plan

LOCATION: N-3600; E-2400
TOTAL DEPTH: 54'0"

BORING STARTED: July 21, 1970
BORING COMPLETED: July 21, 1970

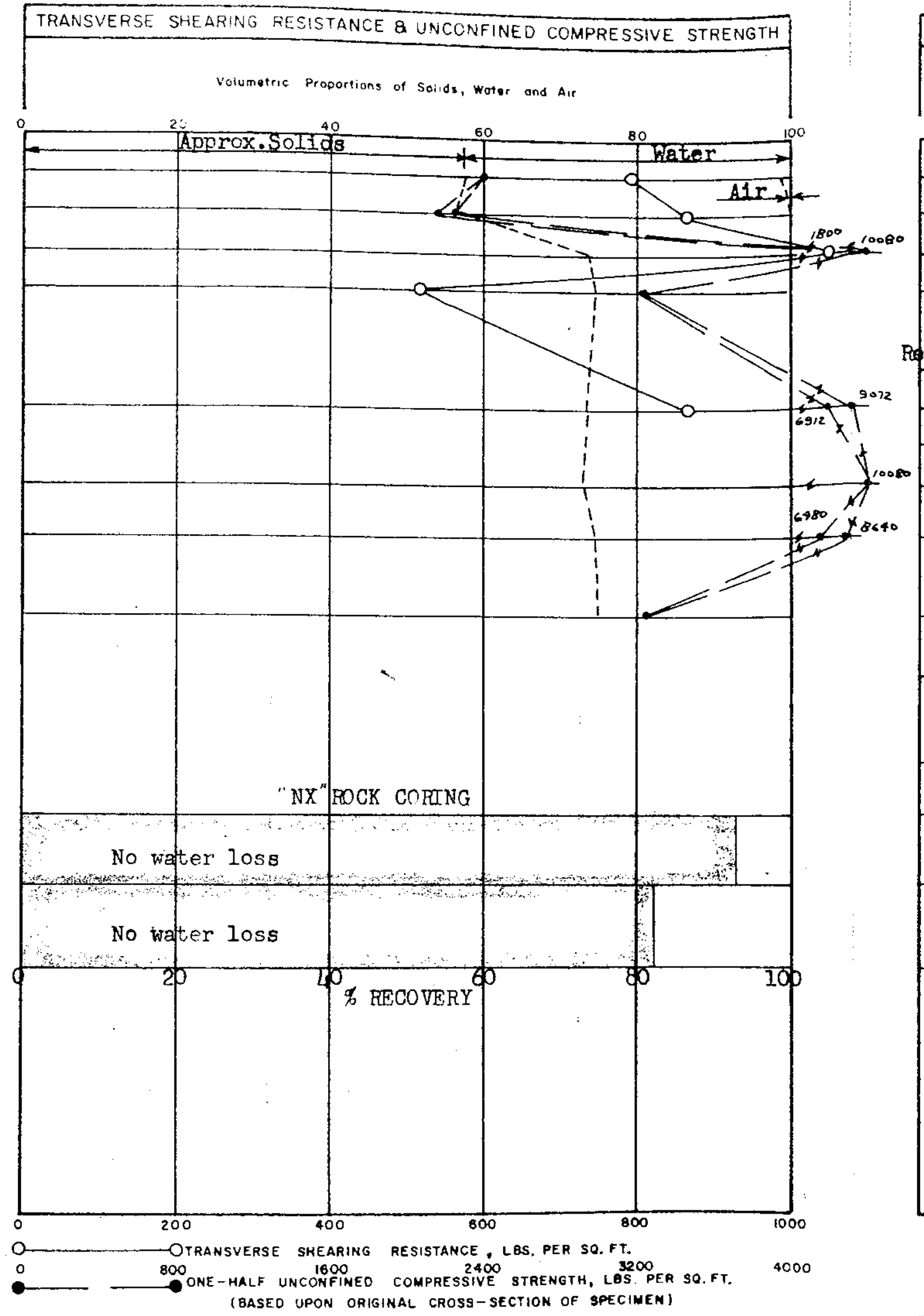
INSPECTOR: B. W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: NX (2⅛")

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



** 1.75" O.D. Michigan Liner Sampler used through LS-5;
2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.2	Firm	26.3	97.5
LS-2	5.0	566.7	Firm to Stiff	28.9	95.8
LS-3	7.5	564.2	Hard	13.1	124.3
LS-4	10.0	561.7	Firm	12.3	124.8
No Recovery	15.0	556.7			
LS-5	17.5	554.2	Stiff to Hard	12.4	123.2
BS-6	20.0	551.7	Compact Clayey Sd.		
LS-6	22.5	549.2	V. Hard	9.2	123.0
LS-7	26.0	545.7	Hard	10.9	126.1
LS-8	31.0	540.7	Stiff	11.2	127.0
BS-10	35.0	536.7	Hard Silty Clay		
BS-11	40.5	531.2	V. Compact Silt		
	44.0	527.7			
Core Run No. 1	48.5	523.2			
No. 2	54.0	517.7			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MDN 183

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 15 TB 15

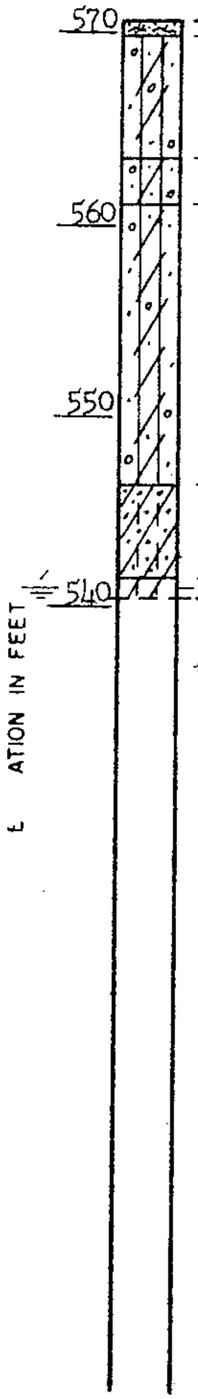
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.6 Ft. (IGLD Datum)



Elev.	Depth	Description
570		TOPSOIL:Med.Dk.Gr. SEMI-ORG. SANDY CLAY
	10½"	Medium to Firm Brown & Gray V.SILTY CLAY, w/Traces of Sand, Gravel & Organic.
	7'0"	Stiff Brown V.SILTY CLAY, w/Little Sand, Tr. Gravel & Rock Frags.
560	9'4"	Firm to Stiff Gray V. SILTY CLAY, w/Little Sand, Tr. Gravel & Rk. Frags (GLACIAL TILL)
550		
	24'0"	Hard Dark Gray V. CLAYEY SILT & VF SAND, w/Traces of C. Sand & Rock Frags. (GLACIAL TILL)
540	28'11"	*V.Hd. Dk.Gr. CLAYEY SILT.(GLACIAL TILL)
	30'0"	

* Encountered Ground Water (V.slight)

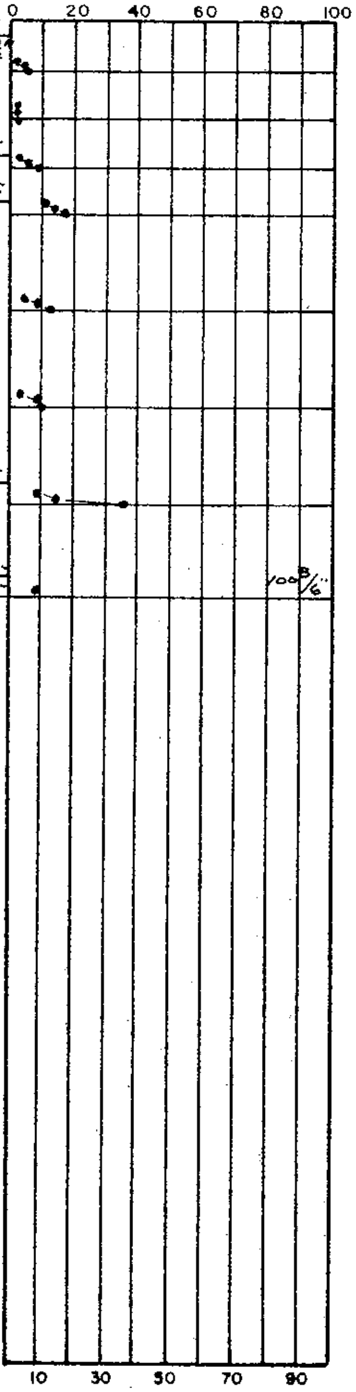
Hole dry augered.

Hole grouted w/2 bags of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air

0 20 40 60 80 100

No Tests

Ne	
6	Not Tested
4	Not Tested
9	Not Tested
25	Not Tested
14	Not Tested
12	Not Tested; Broken in Liner
24	Not Tested
109	

0 200 400 600 800 1000
○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
0 800 1600 2400 3200 4000
●——— ———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT.
(BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.1	Firm	--	--
LS-2	5.0	565.6	Medium	--	--
LS-3	7.5	563.1	Firm to Stiff	--	--
BS-4	9.1	561.5	Hard	--	--
LS-4	10.0	560.6	Hard		
LS-5	15.0	555.6	Stiff	--	--
LS-6	20.0	550.6	Stiff	--	--
LS-7	25.0	545.6	Hard	--	--
BS-7	30.0	540.6	V.Hard		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3100; E-3400
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: M. M. Dragecivic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling Inc.

≡ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

MON 184

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 16TB16

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 5-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 569.8 Ft. (IGLD Datum)

Elevation	Depth	Description
	1'6"	TOPSOIL: Soft Blk. SEMI-ORG. SANDY CLAY.
	3'6"	Medium Dk. Gray & Brown V. SILTY CLAY, w/Some Organic Matter
	6'0"	V. Soft Brown & Gray VERY SILTY CLAY, w/Traces of Sand.
	8'6"	Firm Brown & Gray VERY SILTY CLAY, w/Traces of Sand.
560	11'9"	V. Stiff Mtld. Brown VERY SILTY CLAY, w/Some Sand, Traces of Gravel.
550	21'6"	Firm to Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel.
	22'0"	ROCK FRAGMENTS, w/SILT & F. SAND
540	33'4"	Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Traces of Gravel & Rock Fragments. (GLACIAL TILL)
530	41'6"	* V. Compact Dk. Gray SILT & VF SAND, Mixed w/Rock Fragments TOP OF ROCK, EL. 528.3
		Hard Lt. Brown to Gray DOLOMITIC LIMESTONE; Generally Solid, but V. Fragmented, El. 526.8 to El. 526.3. Seven-inch clay layer, El. 525.
520	51'6"	Hard Lt. Gray Thinly Bedded LIMESTONE & DOLOMITIC LIMESTONE, w/Few Shale Partings. Moderately Fractured.
510		

ELEVATION IN FEET

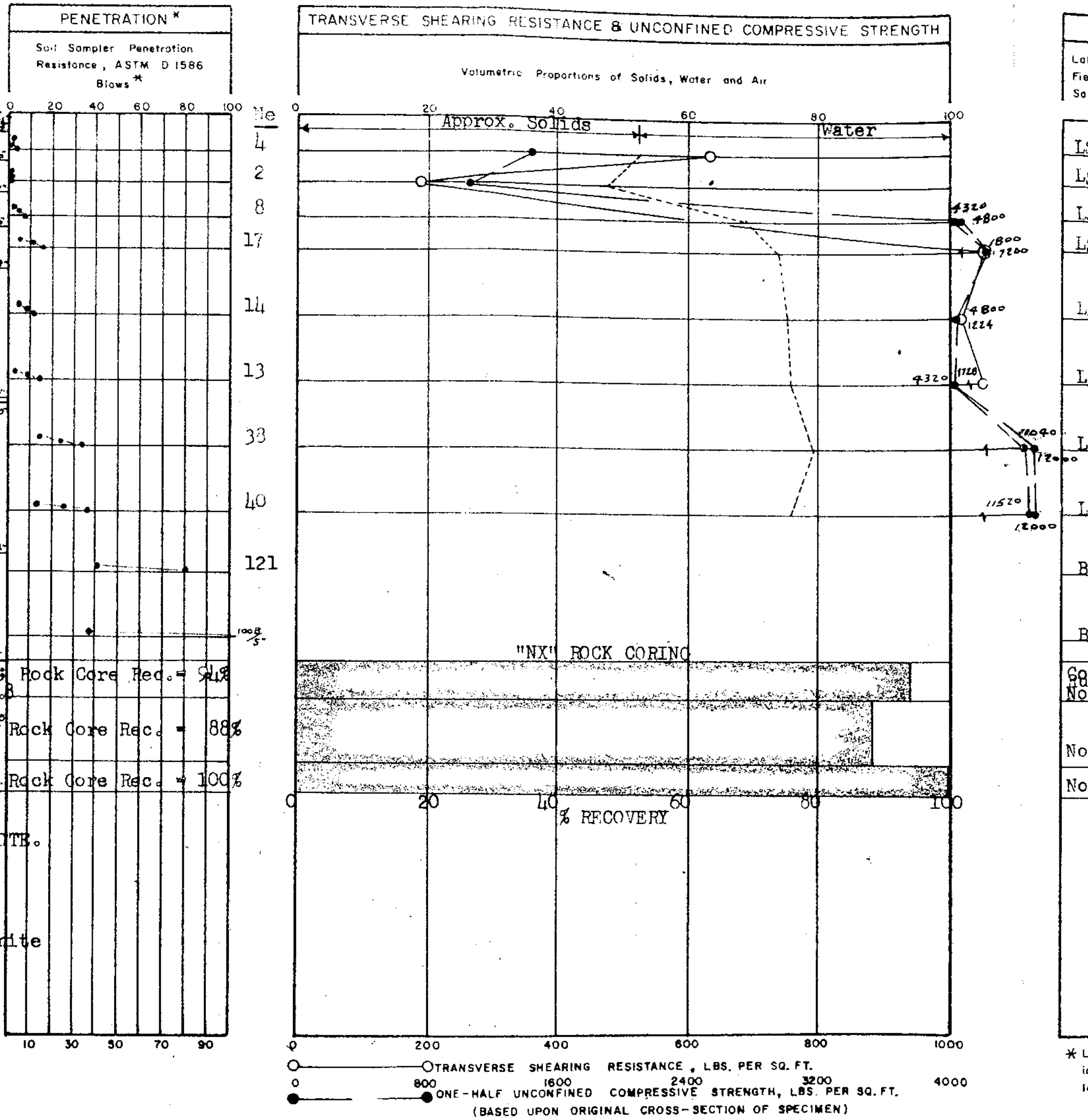
* Encountered artesian water; level rose to 1'10" above ground (El. 571.6) See NOTE.

3-inch casing set to d= 41'6"

Hole grouted w/5 bags of cement, 1 bag of dry concrete, & 1 bag of bentonite

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan



SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	567.3	Soft-Med. Topsoil	33.3	88.2
LS-2	5.0	564.8	V. Soft	32.9	89.0
LS-3	7.5	562.3	Firm	17.3	115.2
LS-4	10.0	559.8	V.Stiff	13.5	123.5
LS-5	15.0	554.8	Stiff	12.0	125.4
LS-6	20.0	549.8	Firm to Stiff	12.7	126.7
LS-7	25.0	544.8	Hard	10.1	132.6
LS-8	30.0	539.8	Hard	12.3	128.7
BS-8	34.5	535.3	Limestone Fragments		
BS-9	39.5	530.3	Weathered Shale		
	41.5	528.3			
Core Run No. 1	44.3	525.5			
No. 2	49.3	520.5			
No. 3	51.5	518.3			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-3100; E-4328
TOTAL DEPTH: 51'6"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 11, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 41.5 feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: NX (2 1/8")

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6; 2.00" O.D. Heavy Wall Sampler used for all below LS-6.

NOTE: Artesian water flowed at rate of 2.5 gpm after first core run, with casing 1'3" above ground (El. 571.5)
Artesian water flowed at rate of 5.0 gpm after completion of boring, with casing 1'8" above ground (El. 571.5)

MON 185

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 17 TB 17

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 575.6 Ft. (IGLD Datum)

ELEVATION IN FEET

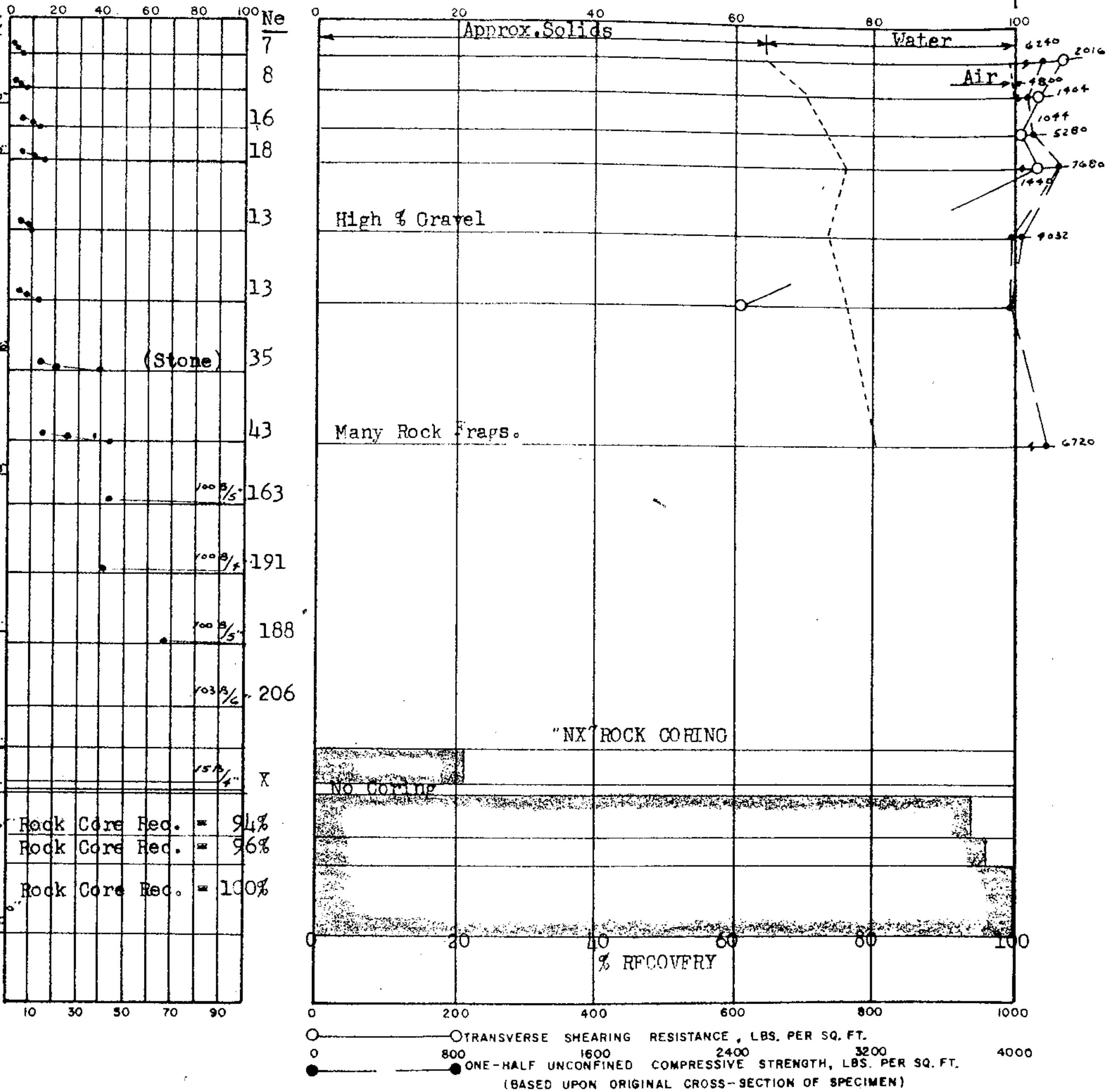
Elev.	Description	Depth	Ne
	TOPSOIL;Brn.-Gr.SEMI-ORGANIC SILTY CLAY.	1'0"	
570	Stiff to Hard Mtld. Brown SILTY CLAY, w/Some Fine Sand, Traces of Gravel.	6'0"	7 8
	V.Stiff Brown SILTY CLAY, w/Some Sand, Traces of Gravel.	9'6"	16 18
560	V. Stiff Gray SILTY CLAY, w/Some Sand, Some Fine Gravel.	23'6"	13 13
550	Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel, Few Rock Fragments. (GLACIAL TILL)	33'3"	35 43
	—*		
540	V. Hard Dark Gray VF SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL)	43'6"	163 191
530	V.Compact Dark Gr. CLAYEY SILT & VF SAND, w/Many Rock Fragments. (GLACIAL TILL) TOP OF ROCK, EL. 524.7	51'10"	188 206
520	Soft Light Gray Broken LIMESTONE, w/Seams Gray Shale.	55'6"	X
	Soft Lt. Gr.-Brn. Fragmented LIMESTONE. Fractures Close.	58'0"	
	Med.Hard Light Gray Solid LIMESTONE, w/Zones Dolomitic Limestone & Some Shale Seams.	64'0"	
510	Mod.Fractured LIMESTONE BRECCIA.	65'0"	

54'10" 3-inch casing used.
* Encountered artesian water; see NOTE
See Test Boring Location Plan

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight pcf
LS-1	2.5	573.1	Hard	20.1	108.8
LS-2	5.0	570.6	V.Stiff	16.0	117.6
LS-3	7.5	568.1	V.Stiff	13.8	122.8
LS-4	10.0	565.6	Hard	11.8	127.8
LS-5	15.0	560.6	V.Stiff	12.8	123.5
LS-6	20.0	555.6	Firm to V.Stiff	12.3	127.6
BS-7	25.0	550.6	Hard		
LS-7	30.0	545.6	Hard	9.2	136.3
BS-9	34.5	541.1	V.Hard		
BS-10	39.3	536.3	Rock Fragments		
BS-11	44.4	531.2	Rock Fragments w/Silt&Clay		
BS-12	49.0	526.6	Rock Fragments		
	51.9	524.7			
Core Run No1	54.1	521.5			
No.2	55.0 58.0	520.6 517.6			
No.3	60.0	515.6			
No.4	65.0	510.6			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-2600; W-1600
TOTAL DEPTH: 65'0"

BORING STARTED: July 28, 1970
BORING COMPLETED: July 29, 1970

INSPECTOR: J.O.Wanzeck & B.W.Behrman(S&FA)
DRILLER: B.Singleton
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne-Evaluated Blows/Foot
ROCK CORE DIAMETER: NX (2⅛")

** 1.75" O.D. Michigan Liner Sampler used through LS-6;
2.00" O.D. Heavy wall sampler used below

NOTE: Artesian water encountered at d=32'3"(El.543.3), flowed over casing at 1'8" above ground surface at 33 gpm; drove casing to d=39'(El.536.6), water flowed at rate of 37.5 gpm 3 ft. above ground surface. With casing extended above ground static head was reached in 20 minutes at 15'10" above ground (El.591.4). With casing extended to d=51'(El.524.6), overnite static head was 19'2" above ground surface (El.594.8), flow was approx. 37 gpm when upper casing was removed.

At completion of boring artesian water flowed at rate of 75 gpm with casing 1'8" above ground surface. Casing capped overnite; extended to 20'8" above ground surface (El.606.3) at rate of approx. 100 gpm.

Extreme difficulty experienced in grouting hole and stopping artesian flow; used 28 bags of cement, 7 bags of dry-mix concrete & 1 bag of bentonite during period of 16 hours to stop flow.

MON 186

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 18 TB 18

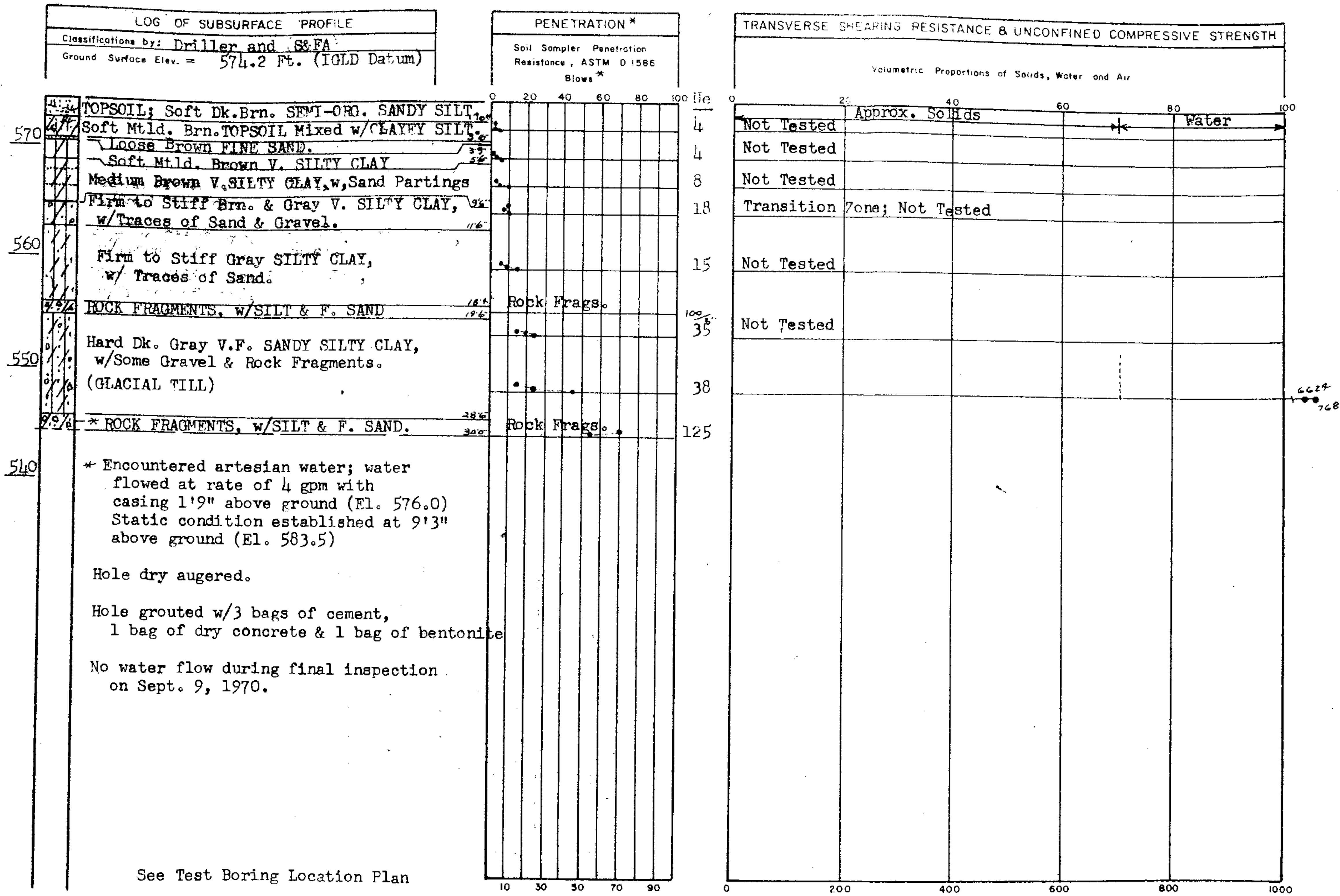
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 8-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.2 Ft. (IGLD Datum)



TOPSOIL; Soft Dk. Brn. SEMI-ORG. SANDY SILT	1'0"	4	Not Tested
Soft Mtld. Brn. TOPSOIL Mixed w/CLAYEY SILT.	3'6"		
Loose Brown FINE SAND.	3'9"	4	Not Tested
Soft Mtld. Brown V. SILTY CLAY	5'6"		
Medium Brown V. SILTY CLAY, w, Sand Partings		8	Not Tested
Firm to Stiff Brn. & Gray V. SILTY CLAY, w/Traces of Sand & Gravel.	9'6" 11'6"	18	Transition Zone; Not Tested
Firm to Stiff Gray SILTY CLAY, w/ Traces of Sand.		15	Not Tested
ROCK FRAGMENTS, w/SILT & F. SAND	18'6" 19'6"	Rock Frags.	
Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)		100/5" 35	Not Tested
		38	
* ROCK FRAGMENTS, w/SILT & F. SAND.	28'6" 30'0"	Rock Frags. 125	

* Encountered artesian water; water flowed at rate of 4 gpm with casing 1'9" above ground (El. 576.0) Static condition established at 9'3" above ground (El. 583.5)

Hole dry augered.

Hole grouted w/3 bags of cement, 1 bag of dry concrete & 1 bag of bentonite

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-2600; W-600
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able, Drilling Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; ____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

○————○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
0 800 1600 2400 3200 4000
●—— ——● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

**1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-5; 2.00" O.D. Heavy Wall Sampler used below.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight pcf
LS-1	2.5	571.7	Soft Topsoil	--	--
LS-2	5.0	569.2	Soft	--	--
LS-3	7.5	566.7	Medium	--	--
LS-4	10.0	564.2	Firm to Stiff	--	--
LS-5	15.0	559.2	Stiff		
BS-6	18.7	555.5	Loose Silt& Rock Frags.		
LS-6	20.0	553.2	Hard	--	--
LS-7	25.0	548.2	Hard	15.8	118.4
No Recovery	30.0	544.2			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 187

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 19 TB 19

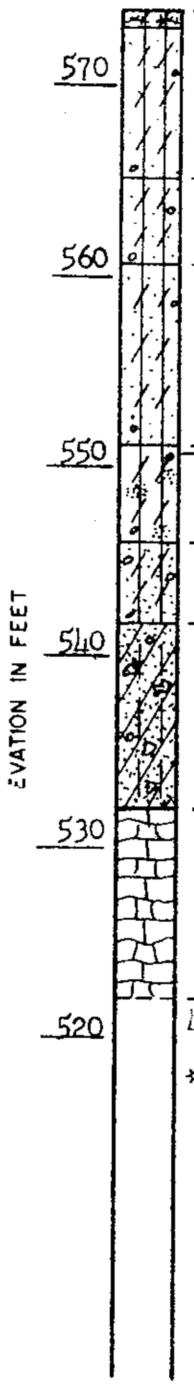
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: G40 | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.9 Ft. (IGLD Datum)



~~TOPSOIL; Dk. Gray SEMI-ORGANIC SILTY CLAY.~~ 10"

Firm to V.Stiff Brown & Gray SILTY CLAY, w/Few Silt Lenses, Little Sand, Traces of Fine Gravel. 8'6"

V.Stiff to Hard Brown & Gray SILTY CLAY, w/Little Sand, Traces of Gravel. 13'0"

Hard Gray SILTY CLAY, w/Some Fine Sand, Sl.Tr.Gravel. 22'6"

* Hard Gray SILTY CLAY, w/Sand Pockets, Traces of Gravel. (GLACIAL TILL) 27'6"

V.Hard Dk. Gray VF SANDY SILTY CLAY, w/Some Gravel. (GLACIAL TILL) 32'0"

V.Compact Dark Gray CLAYEY SILT & VF SAND, w/Some Gravel & Many Rock Fragments.

(GLACIAL TILL)

TOP OF ROCK, EL. 532.4 41'6"

Med.Hd.Lt.Gr.-Brn.Mod.to V.Fragmented LIMESTONE, w/Soft Shale Layer from El.528.20 to El.527.40. Fracture moderately close from El.527.30 to El.522.40. 51'6"

41'6" NX casing used.

* Encountered artesian water; water level rose immediately to d=18'6" (El.555.4), and remained static for 30 minutes.

With 41'6" casing in artesian water rose to h=13'1" (El.587.0), at measured flow of 1 gpm. Level was static for 1-hr.

Hole was grouted with 7 bags cement. No water flow during final inspection on Sept. 9, 1970.

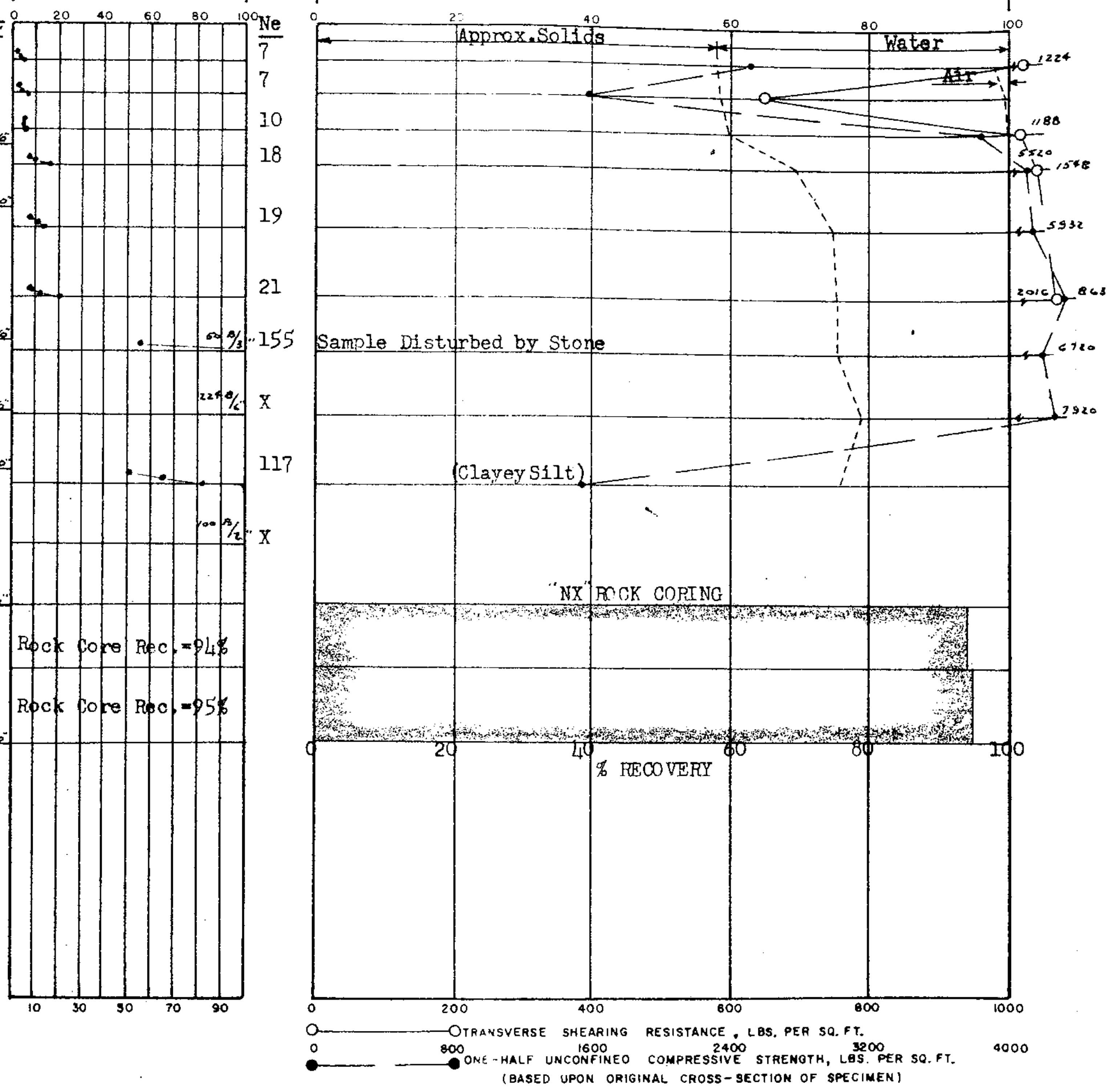
See Test Boring Location Plan

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-6; 2.00" O.D. Heavy wall sampler used below

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	571.4	Variable: Firm-Hard	25.5	97.5
LS-2	5.0	568.9	Firm to Stiff	26.0	98.5
LS-3	7.5	566.4	V.Stiff	24.5	100.9
LS-4	10.0	563.9	V.Stiff to Hard	16.4	116.9
LS-5	14.5	559.4	Hard	12.3	125.3
LS-6	19.5	554.4	V.Hard	11.9	126.5
LS-7	23.3	550.6	Hard, w/ Sd.Pockets	10.4	127.0
LS-8	28.0	545.9	V.Hard	9.4	133.6
LS-9	33.0	540.9	V.Compact Silt	12.9	126.1
BS-10	37.2	536.7	Rock Frags w/Silt&Clay		
	41.5	532.4			
Core Run No.1	46.0	527.9			
No.2	51.5	522.4			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-2600; E-400
TOTAL DEPTH: 51'6"

BORING STARTED: July 27, 1970
BORING COMPLETED: July 28, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; 41.5 feet of casing in place. Artesian
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall.
ROCK CORE DIAMETER: NX (2⅛)
Ne = Evaluated Blows/Foot

MON 108

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 20 TB 20

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO.128-A

SFA FORM E-7

Classified by: Driller and S&FA
Ground Surface Elev.: 573.6 Ft. (IGLD Datum)

Elevation in Feet	Description
	TOPSOIL; Med.Dk.Gr. SEMI-ORG. V.SDY. CLAY.
570	Firm to Stiff Brown & Gray V.SILTY CLAY, w/Traces of Sand & Gravel.
	V.Stiff Brown VERY SILTY CLAY, w/Traces of Sand & Gravel.
560	V.Stiff to Hard Dk. Gray SILTY CLAY, w/Some Sand & Gravel, Few Rock Frags. (GLACIAL TILL?)
550	V.Hard Dk. Gray V.F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments (GLACIAL TILL)
540	

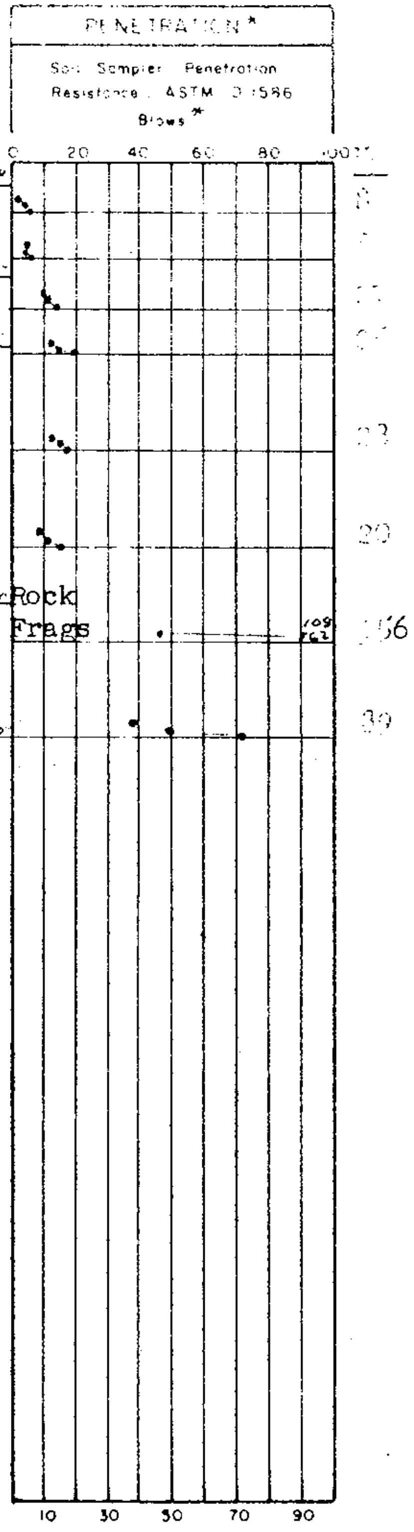
Hole dry augered.

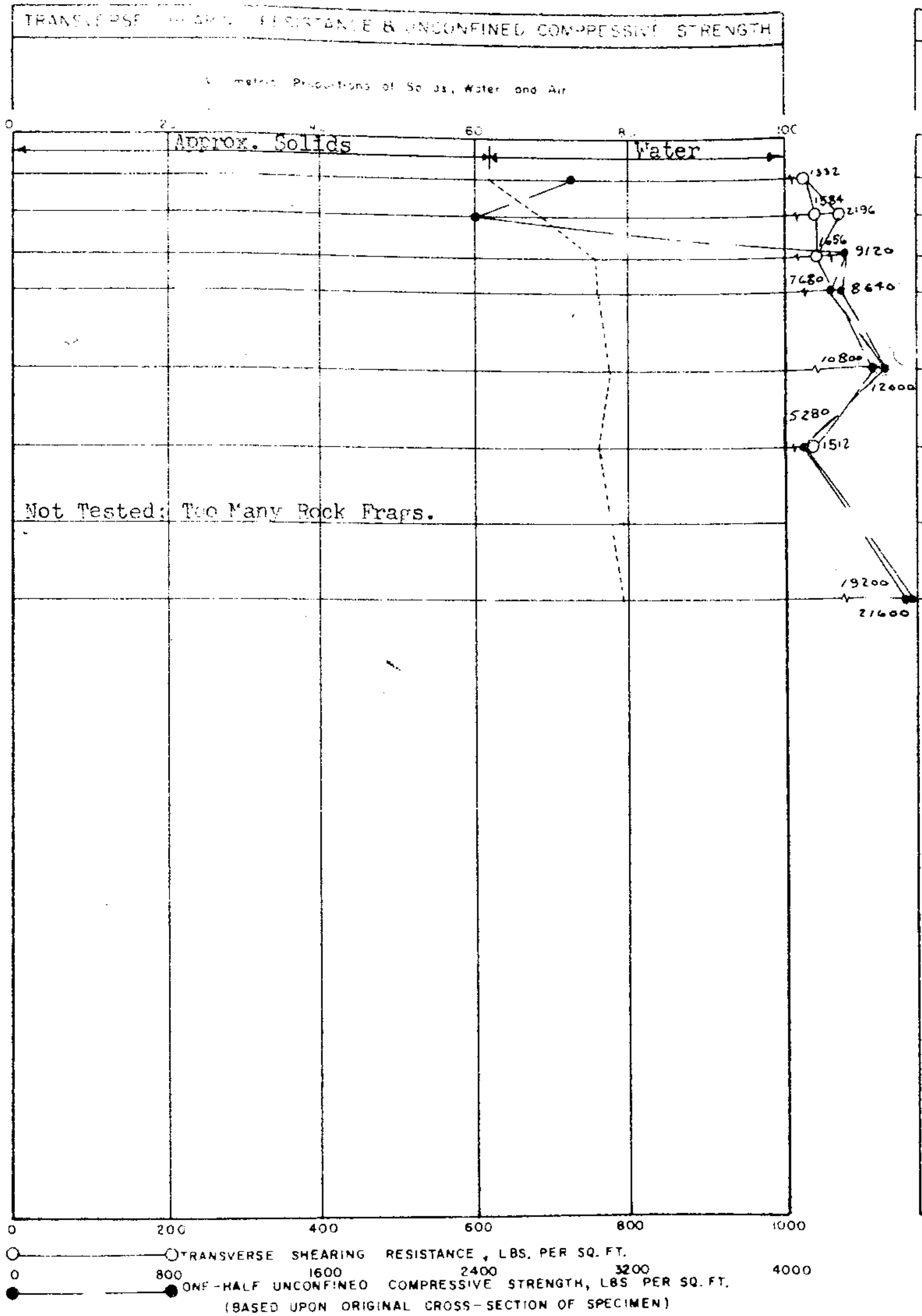
No ground water encountered.

Hole grouted w/2 bags of cement.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan





** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6; 2.00" O.D. Heavy wall sampler used for LS-7 and LS-8.

LAB SAMPLE DATA

Lab & Field Sa. No.	Sample Depth Feet	Sample Elev. Feet	Laboratory Consistency*	Water Content % by Dry Wt	Dry Unit Weight pcf
LS-1	2.5	571.1	Variable; Firm-Stiff	21.6	106.3
LS-2	5.0	568.6	Variable; Firm-Stiff	17.8	114.2
LS-3	7.5	566.1	V.Stiff	12.6	126.6
LS-4	10.0	563.6	V.Stiff	11.9	127.0
LS-5	15.0	558.6	Hard	11.4	130.1
LS-6	20.0	553.6	V.Stiff	12.8	127.1
LS-7	25.0	548.6	V.Hard	--	--
LS-8	30.0	543.6	V.Hard	10.0	134.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-2600; E-1100
TOTAL DEPTH: 30'0"

BORING STARTED: August 13, 1970
BORING COMPLETED: August 13, 1970

INSPECTOR: J. O. Wangeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Allo Drilling, Inc.

═ WATER LEVEL in hole of indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot
ROCK CORE DIAMETER: None

MON 189

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 21 TB 21

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 4-2-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.1 Ft. (IGLD Datum)

ELEVATION IN FEET	Description	Depth
570	TOPSOIL: Med. Dk. Gr. SEMI-ORG. SDY. SIL. CLAY	0"
	Med. to Firm Brown (w/Some Gray) SILTY CLAY w/Little Sand, Traces of Gravel.	5'6"
560	Stiff to V.Stiff Brown V. SILTY CLAY, w/Some Sand, Traces of Gravel & Decomposed Rock Fragments.	14'0"
550	V.Stiff to Hard Dk. Gr. V.F. SDY. SILTY CLAY w/Some Gravel & Rock Fragments. (GLACIAL TILL)	29'3"
540	V. Hard Dk. Gr. VF SDY. SILTY CLAY w/Many Rock Fragments	30'0"

Hole dry augered.

No ground water encountered.

Hole grouted w/3 bags of bentonite.

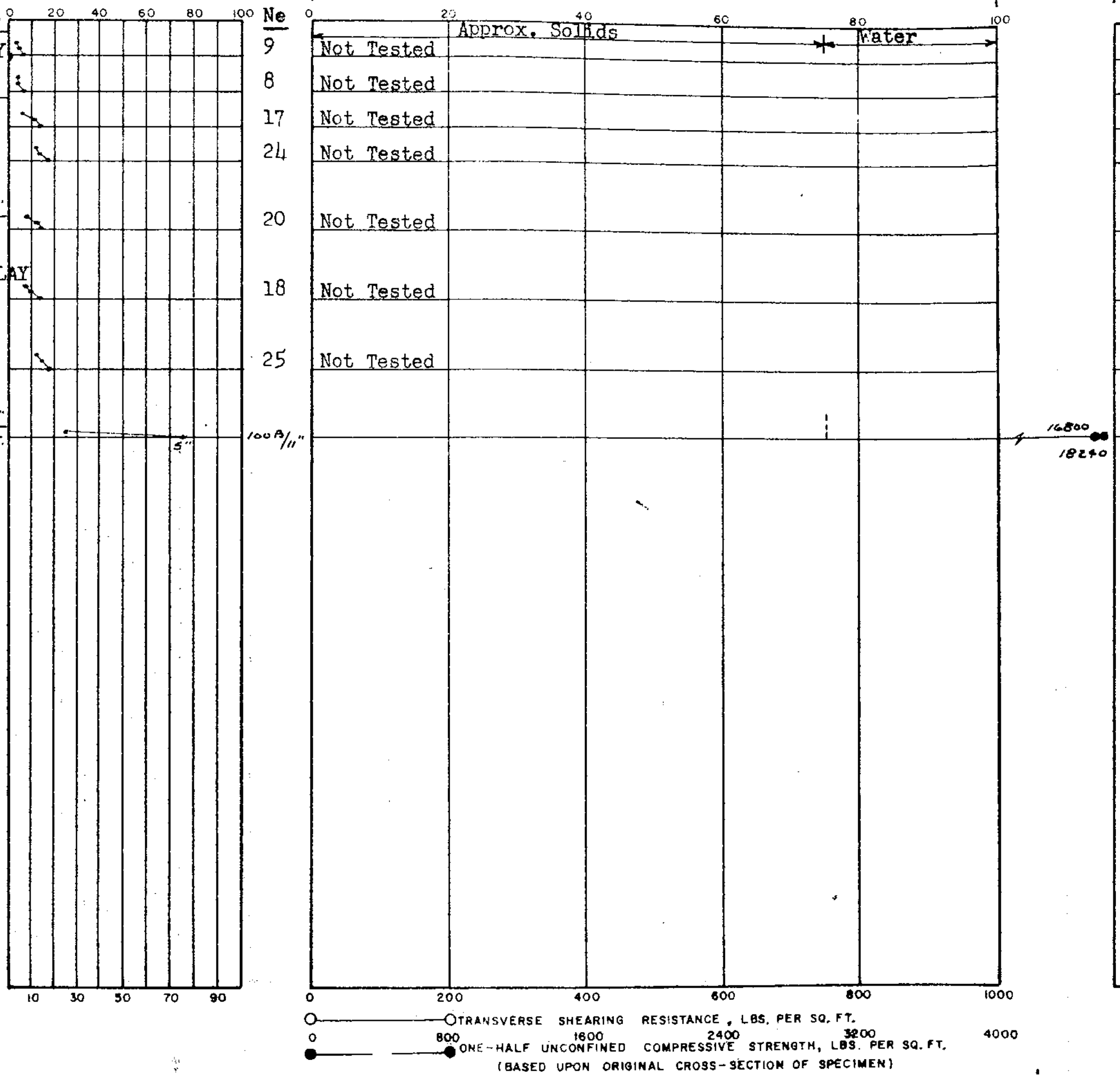
No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



Ne	Transverse Shearing Resistance & Unconfined Compressive Strength
9	Not Tested
8	Not Tested
17	Not Tested
24	Not Tested
20	Not Tested
18	Not Tested
25	Not Tested
100 B/11"	16800 18240

** 1.75" O.D. Michigan Liner Sampler used thru LS-7;
2.00" O.D. Heavy wall sampler used for LS-8.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.6	Medium to Firm	--	--
LS-2	5.0	567.1	Medium to Firm	--	--
LS-3	7.5	564.6	Stiff	--	--
LS-4	10.0	562.1	V. Stiff	--	--
LS-5	15.0	557.1	V. Stiff	--	--
LS-6	20.0	552.1	V. Stiff	--	--
LS-7	25.0	547.1	Hard	--	--
LS-8	30.0	542.1	V. Hard	12.1	127.5

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-2600; E-2400
TOTAL DEPTH: 30'0"

BORING STARTED: August 6, 1970
BORING COMPLETED: August 6, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

MON 190

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 22 TB 22

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

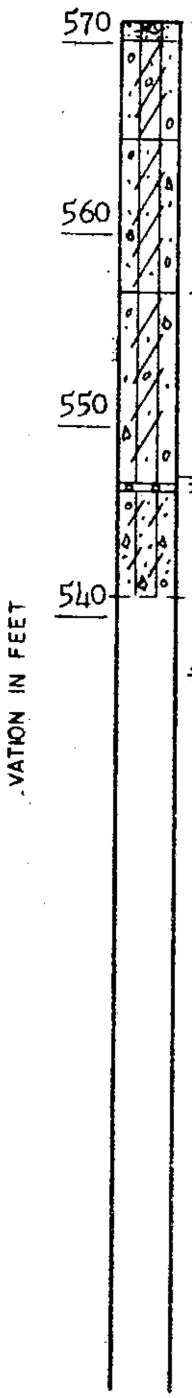
APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

SFA FORM 8-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 571.2 Ft. (IGLD Datum)



TOPSOIL;Dk.Brn.SEMI-ORG.SDY.SLY.CLAY 0'6"

Med. to Firm Mtld. Brown V. SILTY CLAY, w/Little Sand & Gravel. Traces Organic. 6'0"

Firm to Stiff Brown, w/Gray Streaks, VERY SILTY CLAY. w/Some Sand, Traces Gravel & Rk. Frags. 14'0"

Stiff Gray VERY SILTY CLAY, w/Some Sand, Gravel & Rock Frags (GLACIAL TILL?) 24'0"

* ROCK FRAGMENTS or BOULDER 24'5"

V. Hard Dk.Gray VF SANDY SILTY CLAY, w/Some Gravel, Many Rock Frags. (GLACIAL TILL) 30'0"

T.B.-23;
Hole dry augered

* Encountered ground water; rose 16" to El. 548.9 in 1 hour.

Hole grouted w/2 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970

T.B.-23A:
Hole offset 3-ft. from TB-23.

Hole augered w/o sampling to d=24'5"

No ground water encountered, dry upon completion.

Hole grouted w/3 bags of bentonite and 1 bag of cement.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-2100; E-3150
TOTAL DEPTH: 30'0"

BORING STARTED: August 7, 1970
BORING COMPLETED: August 10,1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: D.T. Corbin
CONTRACTOR: Able Drilling, Inc.

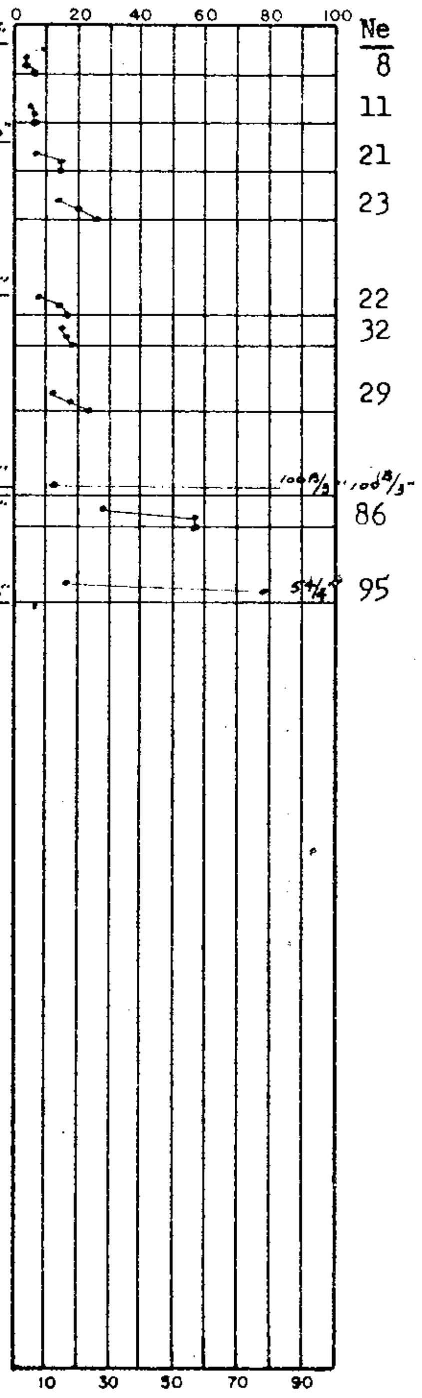
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

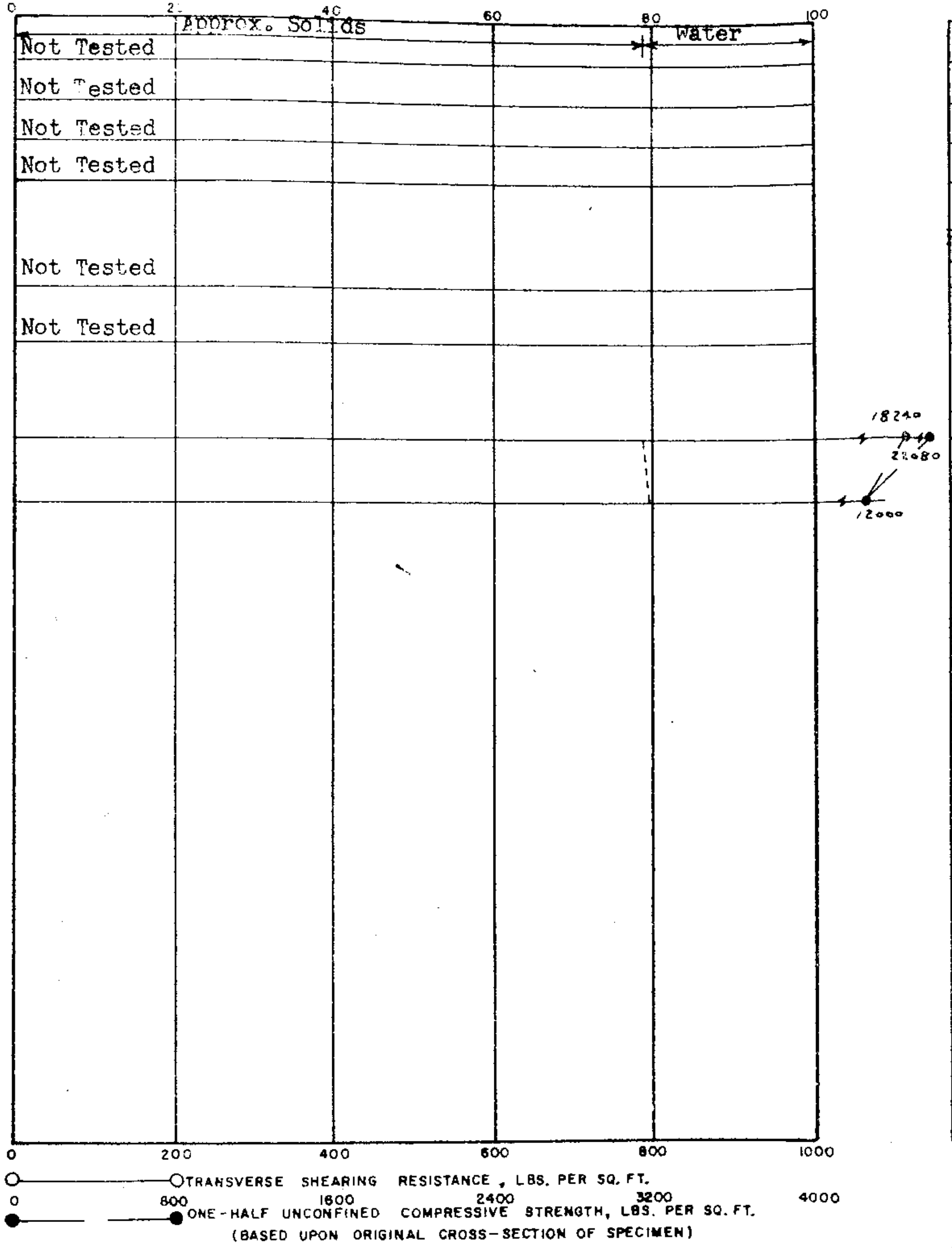
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field So. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt	Dry Unit Weight p.c.f.
LS-1	2.5	568.7	Medium to Firm	--	--
LS-2	5.0	566.2	Firm	--	--
LS-3	7.5	563.7	Firm to Stiff	--	--
LS-4	10.0	561.2	Firm to Stiff	--	--
No Recovery	15.0	556.2			
LS-5	16.5	554.7	Stiff	--	--
LS-6	20.0	551.2	Stiff	--	--
BS-7	24.3	546.9	V.Stiff		
LS-7	26.0	545.2	V.Hard	9.3	133.0
LS-8	30.0	541.2	V.Hard	7.7	136.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 191

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 23 & 23A

PLUM CREEK PROPERTY TB 23
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

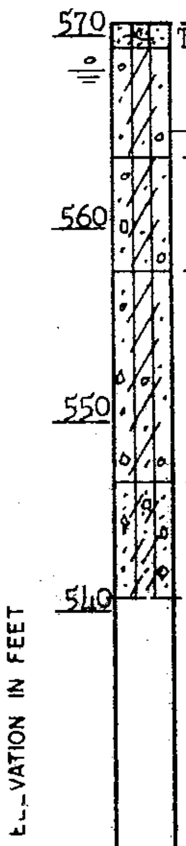
APPR: GAO DATE: 5-7-71 JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 570.8 Ft. (IGLD Datum)



TOPSOIL;Med.Dk.Gray SEMI-ORG.SDY.SILTY CLAY.

Med. to Firm Brown & Gray V.SILTY CLAY, w/Traces of Sand & Gravel. *

7.0'

V.Stiff to Hard Brown & Gray V.SILTY CLAY, w/Some Sand, Traces of Gravel & Rk.Frags.

13.0'

V.Stiff Dk.Gray V. SILTY CLAY, w/Some Sand, Little Gravel & Few Rock Frags. (GLACIAL TILL?)

24.0'

V.Hard Dk. Gray VF SANDY SILTY CLAY, w/Traces of Gravel, Many Rock Frags. (GLACIAL TILL)

30.0'

Hole dry augered.

* Encountered ground water; rose 3'0" in 1 hour to El. 568.0.

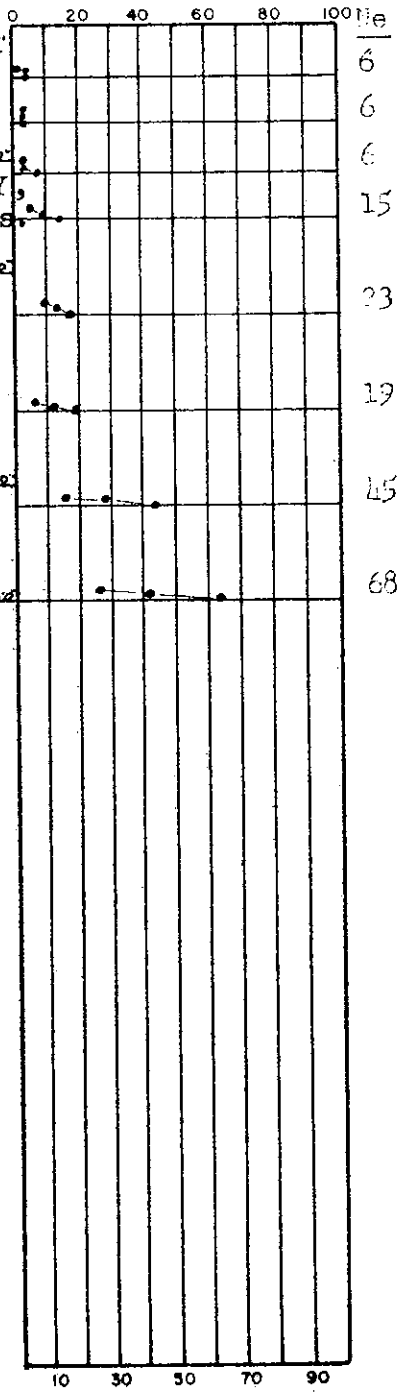
Hole grouted w/2 bags of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

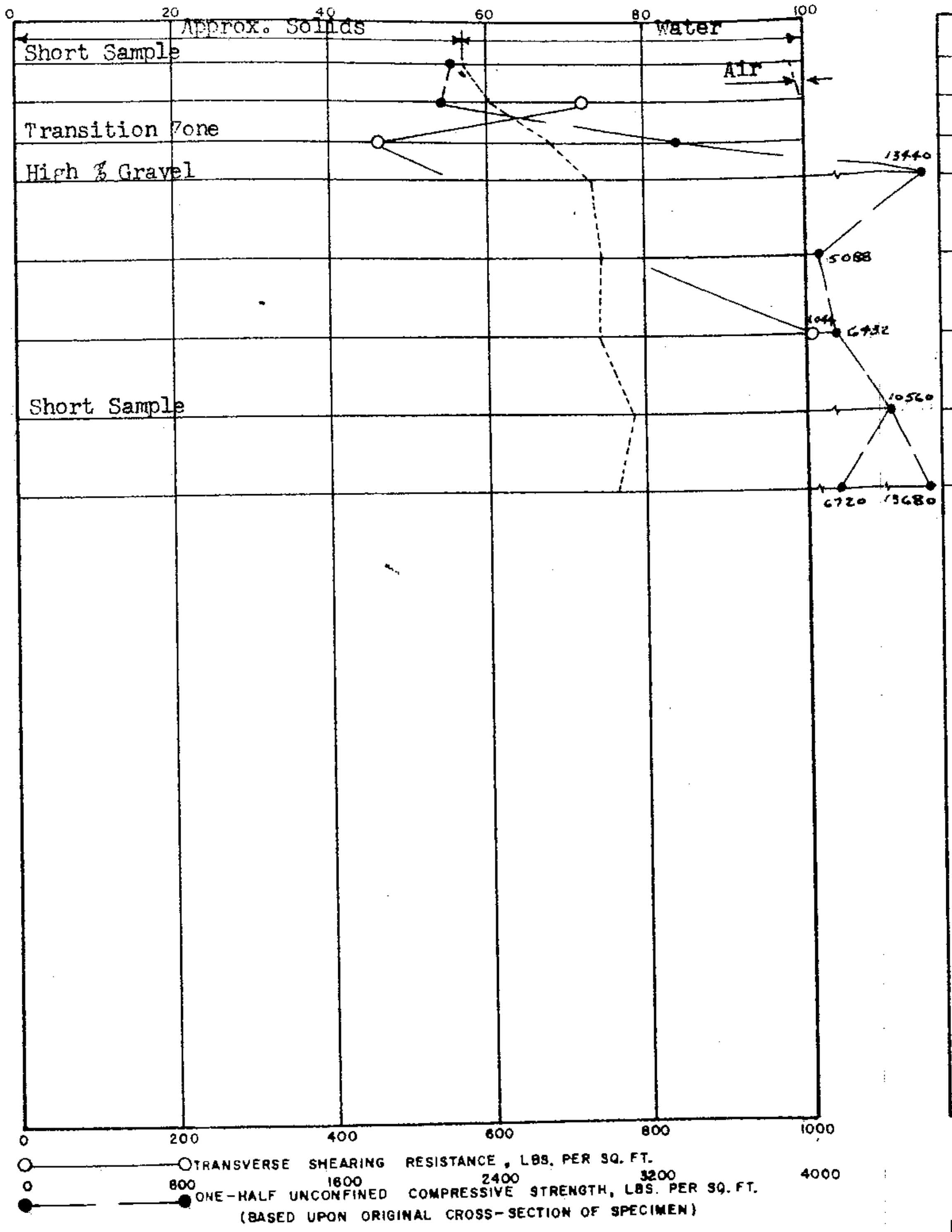
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	2.5	568.3	Medium	27.0	96.3
LS-2	5.0	565.8	Medium to Firm	25.4	101.3
LS-3	7.5	563.3	Medium to Firm	18.2	113.4
LS-4	10.0	560.8	Hard	11.7	123.1
LS-5	15.0	555.8	V. Stiff	12.5	126.0
LS-6	20.0	550.8	Stiff	12.7	125.8
LS-7	25.0	545.8	V. Hard	9.8	132.0
LS-8	30.0	540.8	Hard to V. Hard	11.0	129.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 192

LOCATION: N-2100; E-3900
TOTAL DEPTH: 30'0"

BORING STARTED: August 10, 1970
BORING COMPLETED: August 10, 1970

INSPECTOR: J. G. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 24 TB 24

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 573.3 Ft. (IGLD Datum)

ELEVATION IN FEET

570
560
550
540
530
520

TOPSOIL; Med.Dk.Gr.SEMI-ORG.V.SDY.CLAY. 1'0"

Firm to Stiff Mtld. Brown V.SILTY CLAY, w/Traces of Sand & Organic Matter. 6'0"

V.Stiff to Hard Brown (w/Some Gray) VERY SILTY CLAY, w/Few Silt Lenses, Little Sand, Traces of Gravel. 15'8"

Firm to Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel. 22'6"

V.Hard Dk.Gray VF SANDY SILTY CLAY, w/Little Gravel, Many Rock Frags., Few Cobbles. (GLACIAL TILL) 33'0"

V.Hard Dk.Gray VF SANDY SILTY CLAY, V.Gravelly, Many Rock Frags.(GLACIAL TILL) 36'6"

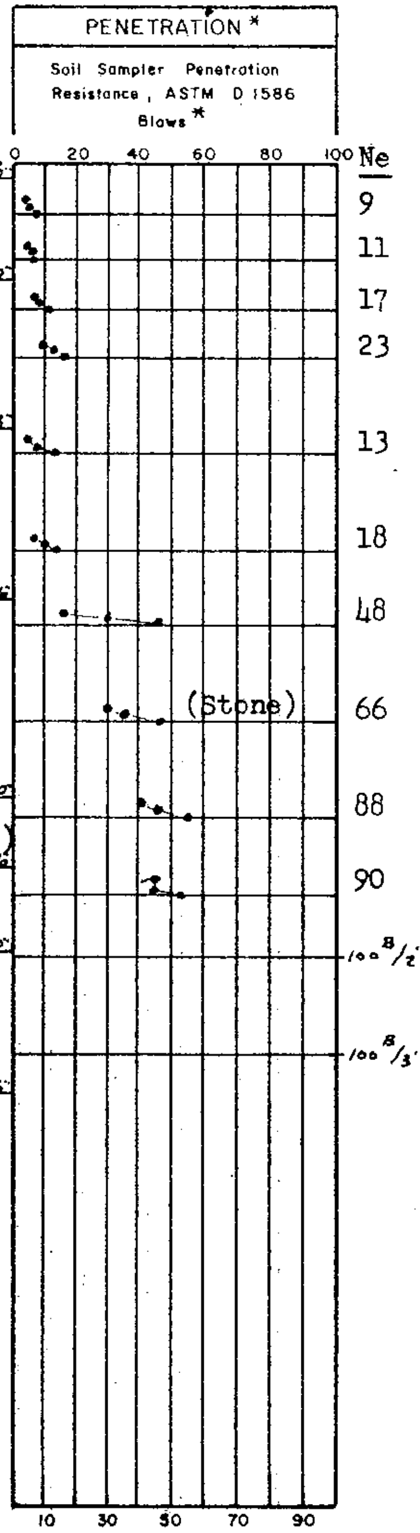
*V.Hard Dk.Gray VERY SANDY SILTY CLAY, w/Seams of Sand, Some Gravel&Rk. Frags. (GLACIAL TILL) 41'0"

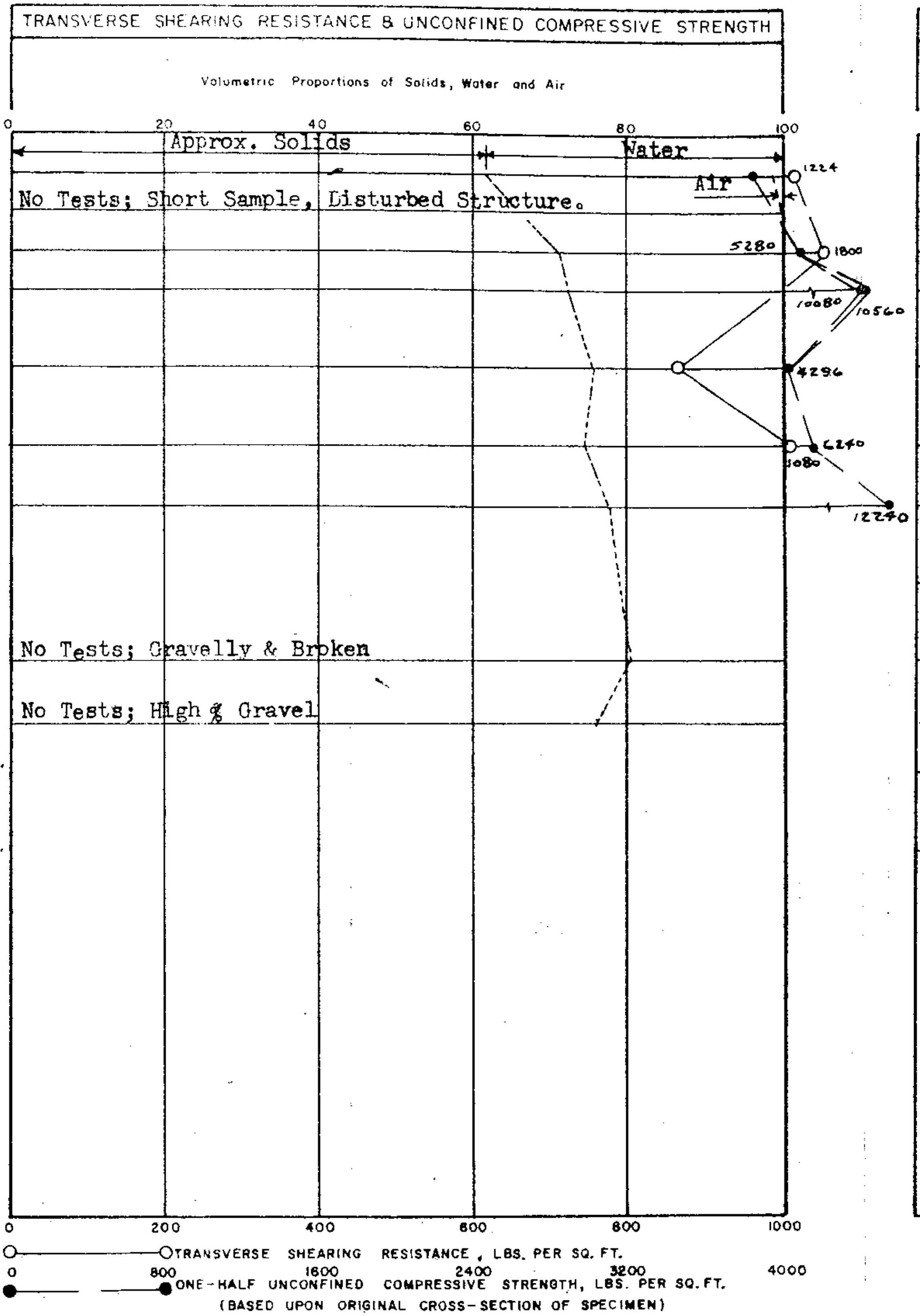
V.Hard Dk.Gray VERY SANDY SILTY CLAY, Mixed w/Gravel & Many Rock Frags. (GLACIAL TILL)

REFUSAL ON GEAR BIT
*48'5"

10' of 4-inch, 45' of NX casing used.
Hole advanced by roller type gear bit; wrench dropped in hole, and rock coring was prevented.

See Test Boring Location Plan





Lab & Field Sa. No.	Sample Depth, Feet	S E F		ter ntent by ..y Wt	Dry Unit Weight p.c.f.
LS-1	2.5	570.8	Firm to Stiff	21.9	104.5
LS-2	5.0	568.3	Firm to Stiff	21.3	--
LS-3	7.5	565.8	V.Stiff to Hard	14.8	119.8
LS-4	10.0	563.3	V.Hard	13.6	122.8
LS-5	15.0	558.3	Firm to Stiff	12.7	126.7
LS-6	20.0	553.3	Firm to Stiff	12.1	126.0
LS-7	24.0	549.3	V. Hard	10.4	130.0
BS-8	29.0	544.3	V. Hard		
LS-8	34.0	539.3	V. Hard	10.6	135.6
LS-9	38.0	535.3	V. Hard	12.0	127.6
BS-11	41.2	532.1	V. Hard		
No Rec.	46.3	527.0			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-1450; E-900
TOTAL DEPTH: 48'5"

BORING STARTED: July 29, 1970
BORING COMPLETED: July 30, 1970

INSPECTOR: J. O. Wanzeck (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 45 feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler (6) inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6; 2.00" O.D. Heavy Wall Sampler used below.

* Encountered artesian water at d=37'6" (El.535.8); flow remained steady at 3 gpm for 1 hour; eased off.
Encountered artesian water at d=48'5" (El.524.9); flow of approx. 29 gpm reached static head at El. 591.6 and remained steady for 1 hour.
Hole grouted w/6 bags of cement and 1 bag of bentonite.
No water flow during final inspection on Sept. 9, 1970.

MON 196

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 28 TB 28

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA

Ground Surface Elev. = 572.3 Ft. (IGLD Datum)

ELEVATION IN FEET

TOPSOIL; Med.Dk.Gr.SEMI-ORG.SDY.SLY.CLAY. 9"

570

Medium to Stiff Brown & Gray SILTY CLAY, w/Little Sand, Traces of Roots. 6'0"

Stiff to Hard Mtld. Brown SILTY CLAY, w/Little Sand, Traces of Gravel.

560

14'3"

Medium to Stiff Gray SILTY CLAY w/Some F. Sand, Some Gravel.

550

— *

23'6"

V.Hard Mtld. Dk.Gray VF SANDY SILTY CLAY, w/Some Gravel & Rook Fragments. (GLACIAL TILL)

30'0"

540

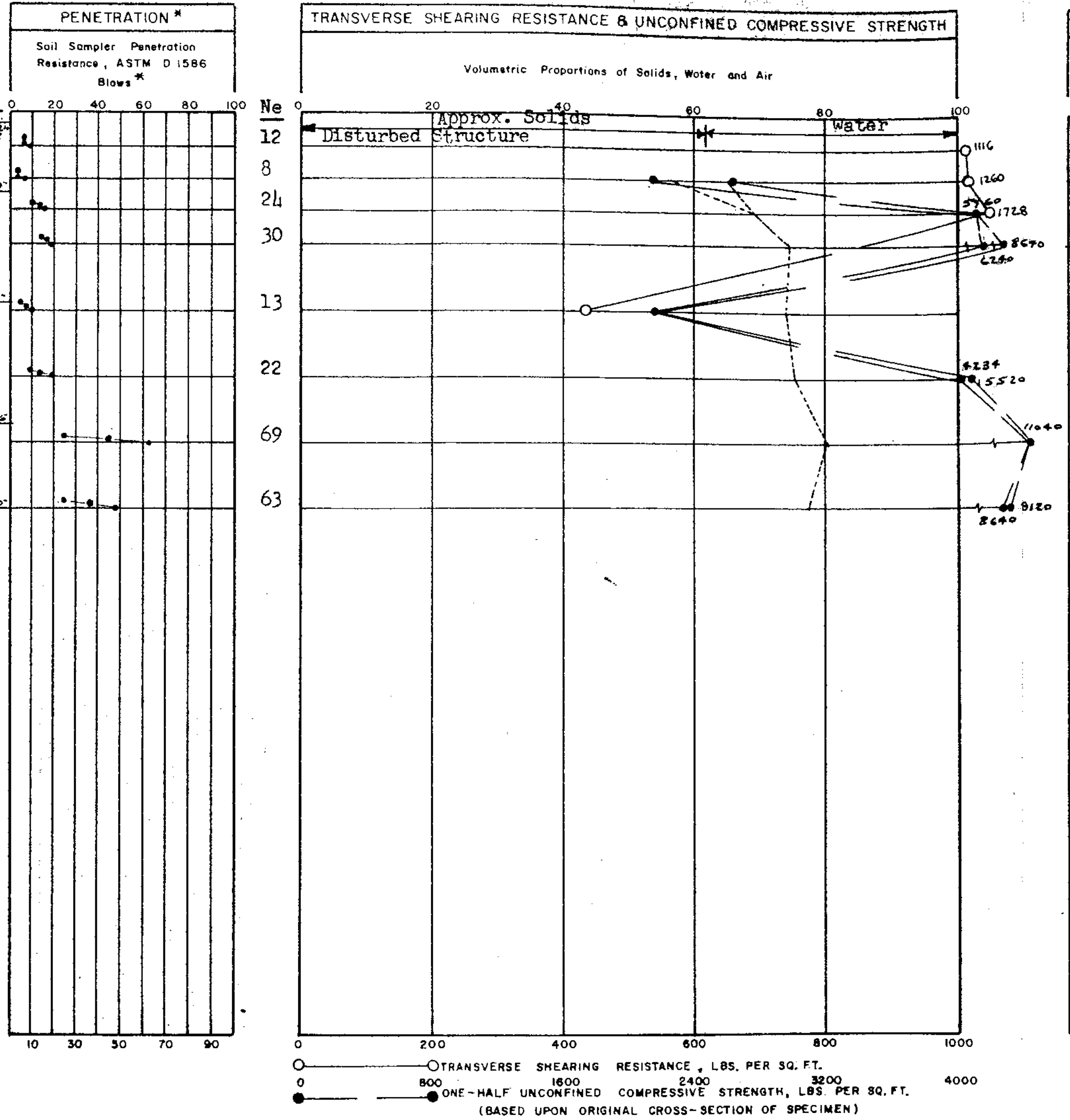
Hole dry augered.

* Encountered ground water.

Hole grouted w/3 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan



Lab & Field Sa. No.	Sample Depth, Feet	Feet		Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	569.8	Stiff	18.6	--
			Stiff —	20.7	110.4
LS-2	5.0	567.3	Medium —	27.9	95.2
LS-3	7.5	564.8	V.Stiff	15.4	117.7
LS-4	10.0	562.3	Stiff to Hard	13.1	125.6
LS-5	15.0	557.3	Medium	12.9	124.7
LS-6	20.0	552.3	Firm to Stiff	12.7	126.6
LS-7	25.0	547.3	V. Hard	9.0	135.5
LS-8	30.0	542.3	V. Hard	10.3	131.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 197

LOCATION: N-1300; E-1900
TOTAL DEPTH: 30'0"

BORING STARTED: August 7, 1970
BORING COMPLETED: August 7, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: D. T. Corbin
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler ⑥ inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 29 TB 29

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA | DATE: 6-7-71 | JOB NO. 128-A

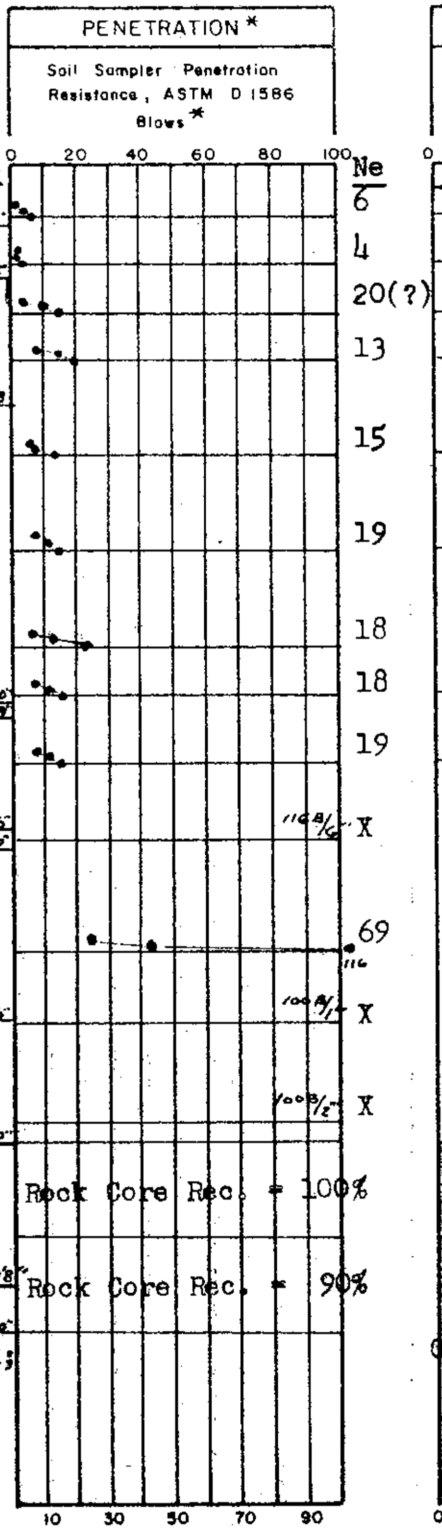
LOG OF SUBSURFACE PROFILE

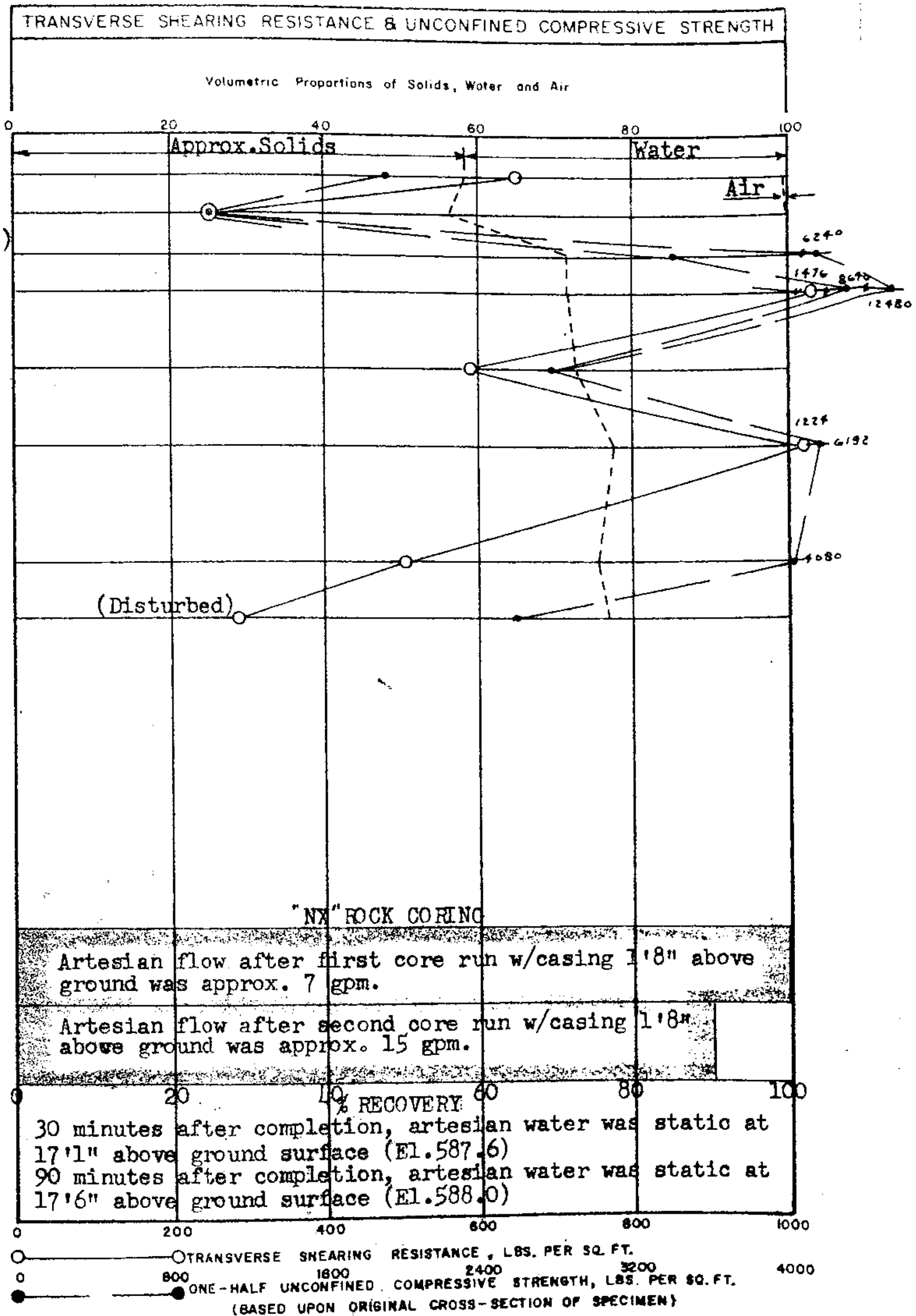
Classifications by: Driller and S&FA
Ground Surface Elev. = 570.5 Ft. (IGLD Datum)

EVATION IN FEET

Elevation	Description	Depth
570	TOPSOIL: Dk. Brn. SEMI-ORGANIC V. SILTY CLAY.	10"
	Firm Brown & Gray SILTY CLAY, w/Some Sand, Traces of Gravel.	3'0"
	Medium Brown & Gray SILTY CLAY, w/Little Sand.	5'8"
560	Stiff to Hard Mtld. Brown SILTY CLAY, w/Some Sand & Fine Gravel.	12'3"
550	Firm to Stiff & Hard (Varies) Gray SILTY CLAY, w/Some Sand & Fine Gravel.	28'0"
540	Med. Comp. Gr. FINE SAND, w/Little Gravel.	28'9"
	Firm to Stiff Gray SILTY CLAY, w/Some Sand & Gravel. (GLACIAL TILL?)	34'6"
	ROCK FRAGMENTS.	35'6"
530	V. Hard Dk. Gray F. SANDY SILTY CLAY, w/Some F. Gravel, Many Rock Fragments. (GLACIAL TILL.)	44'6"
520	V. Compact Gray SILT & ROCK FRAGMENTS. Wet. (GLACIAL TILL.) TOP OF ROCK	51'0"
	Med. Hard Light Gr.-Brn. Solid LIMESTONE, w/Some Thin Fragmented Zones.	58'8"
510	Med. Hard Lt. Brown Solid LIMESTONE.	61'0"
500		

* Artesian flow w/sulphur odor encountered; hole cased to d=35'6"; head 2'2" above ground surface.
Cased to d=44'6", and artesian flow continued at rate of 4 gpm, w/head 7'6" above ground surface. See other info in rock coring.





Artesian flow after first core run w/casing 1'8" above ground was approx. 7 gpm.

Artesian flow after second core run w/casing 1'8" above ground was approx. 15 gpm.

30 minutes after completion, artesian water was static at 17'1" above ground surface (El. 587.6)
90 minutes after completion, artesian water was static at 17'6" above ground surface (El. 588.0)

** 1.75" O.D. Michigan Liner Sampler used through LS-4;
2.00" O.D. Heavy wall sampler used below.

NOTE: Extreme difficulty was experienced in stopping artesian water flow. During a total grouting period of 14 hours, 10 bags of cement, 4 bags of dry-mix concrete and 1 bag of bentonite were used.

Lab & Field Sa. No	Sample Depth, Feet	S E Feet		er ntent by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	2.5	568.0	Firm	26.4	98.0
LS-2	5.0	565.5	Medium	29.1	95.0
LS-3	7.5	563.0	Stiff to V.Stiff	14.0	120.3
LS-4	10.0	560.5	Hard	13.9	120.5
LS-5	15.0	555.5	Firm	13.5	122.4
LS-6	20.0	550.5	V.Stiff to Hard	12.2	130.0
No Rec.	25.0	545.5			
LS-7	27.5	543.0	Firm to Stiff	11.4	127.0
LS-8	31.0	539.5	Firm to Stiff	11.9	129.6
BS-9	35.0	535.5	V.Hard V. Silty Clay		
BS-10	41.0	529.5	V.Hard V. Silty Clay		
No Rec.	44.6	525.9			
No Rec.	49.7	520.8			
	51.0	519.5			
Core Run No. 1	56.0	514.5			
No. 2	61.0	509.5			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: See Test Boring Location Plan
N-1350; E-2900
TOTAL DEPTH: 61'0"

BORING STARTED: July 22, 1970
BORING COMPLETED: July 24, 1970

INSPECTOR: J. O. Wanzeck & B. W. Behrman (S&FA)
DRILLER: B. Singleton
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; _____ feet of casing in place. Artesian

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot

ROCK CORE DIAMETER: NX (2⅛")

MON 198

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 30 TB 30

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 574.0 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Description	Depth
	Loose Yellow SAND.	3"
	TOPSOIL, MOSS & PEAT	1'6"
570	Medium to Firm Mtld. Brown & Gray V.SILTY CLAY, W/Trace Fine Sand.	5'6"
	V.Stiff Brown VERY SILTY CLAY, w/Tr. Sand, Little Gravel, Tr. Organic	8'6"
	V.Stiff to Hard Brown SILTY CLAY, w/Some Sand, Little Gravel.	11'6"
560	Hard Mtld. Gray SILTY CLAY, w/Some Sand, Little Gravel, Many Rock Fragments.	15'8"
	V.Hard Dk.Gray VF SANDY SILTY CLAY, w/Some Sand & Gravel, Many Rock Frags. (GLACIAL TILL)	20'0"
550		

Hole dry augered.

No ground water encountered.

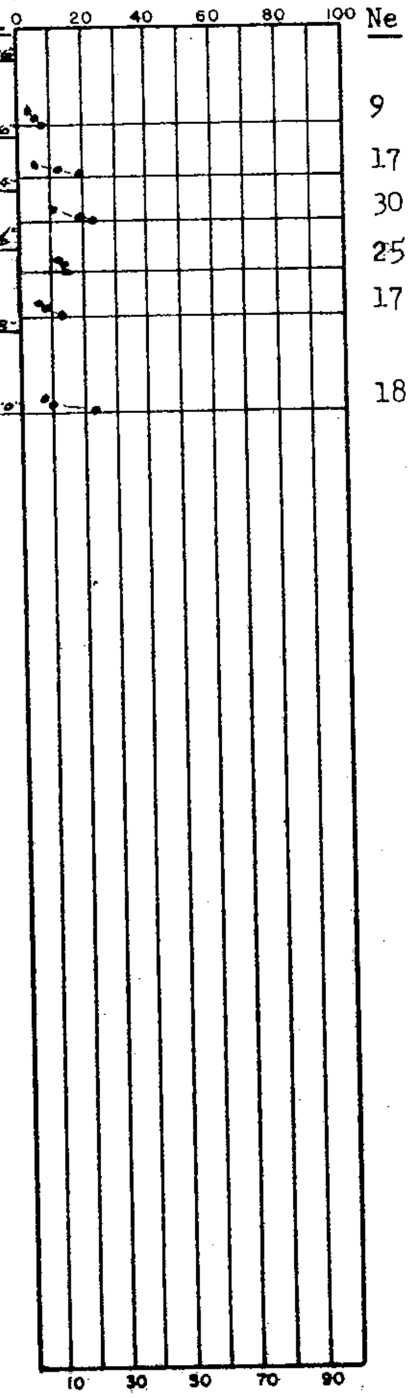
Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

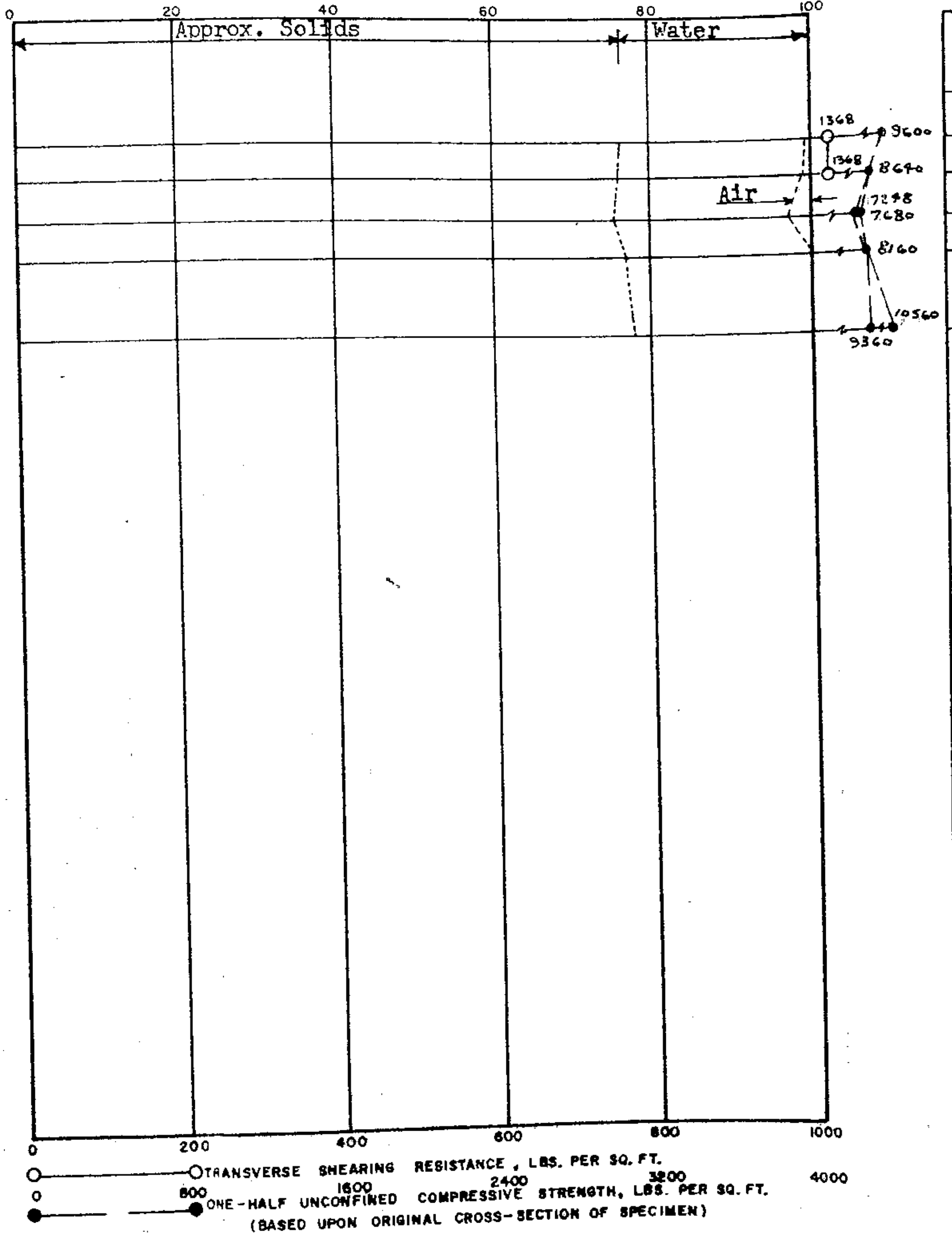
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○——○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●——● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	569.0			
LS-1	7.5	566.5		11.7	128.0
LS-2	10.0	564.0		11.7	127.1
LS-3	12.5	561.5		10.8	126.5
LS-4	15.0	559.0		11.4	128.3
LS-5	20.0	554.0		10.3	132.1

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

LOCATION: N-4650; E-400
TOTAL DEPTH: 20'0"

BORING STARTED: August 25, 1970
BORING COMPLETED: August 25, 1970

INSPECTOR: M. M. Dragicevic (S&FA)
DRILLER: R. F. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows / Foot

ROCK CORE DIAMETER: None

SFA FORM S-Y

MON 199

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 31 TB 31

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GMO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA

Ground Surface Elev. = 573.1 Ft. (IGLD Datum)

Elevation in Feet	Description	Depth	Ne	Transverse Shearing Resistance & Unconfined Compressive Strength
	TOPSOIL;Med.Dk.Gr. SEMI-ORG.CLAYEY SILT.	1'6"		
570	Loose Brown FINE TO MEDIUM SAND.	4'6"	15	
	V.Stiff Mtld. Brown VERY SILTY CLAY, w/Little Sand, Traces of Gravel.	7'9"	13	Broken in Liner
	Hard Mtld. Brown SILTY CLAY, w/Some Fine Sand.	10'4"	25	Not Tested
560	24		15	Not Tested
	V.Stiff Gray VERY SILTY CLAY, w/Some Sand, Traces of Gravel.	17'10"	13	Not Tested
	V.Hard Dk.Gr. V. CLAYEY SILTY SAND. (GLACIAL TILL)	19'6"	134	Not Tested
550				

Hole dry augered; dry at completion.

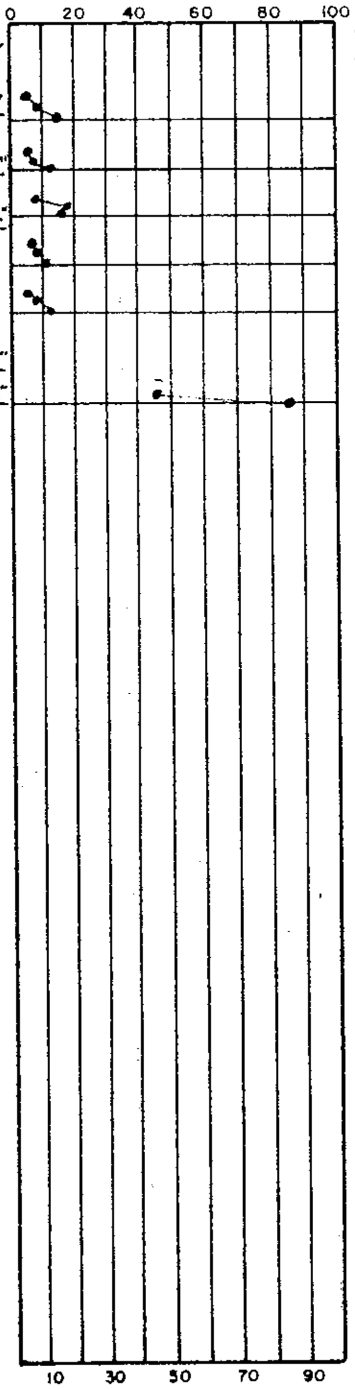
Hole grouted w/1 bag of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

ELEVATION IN FEET

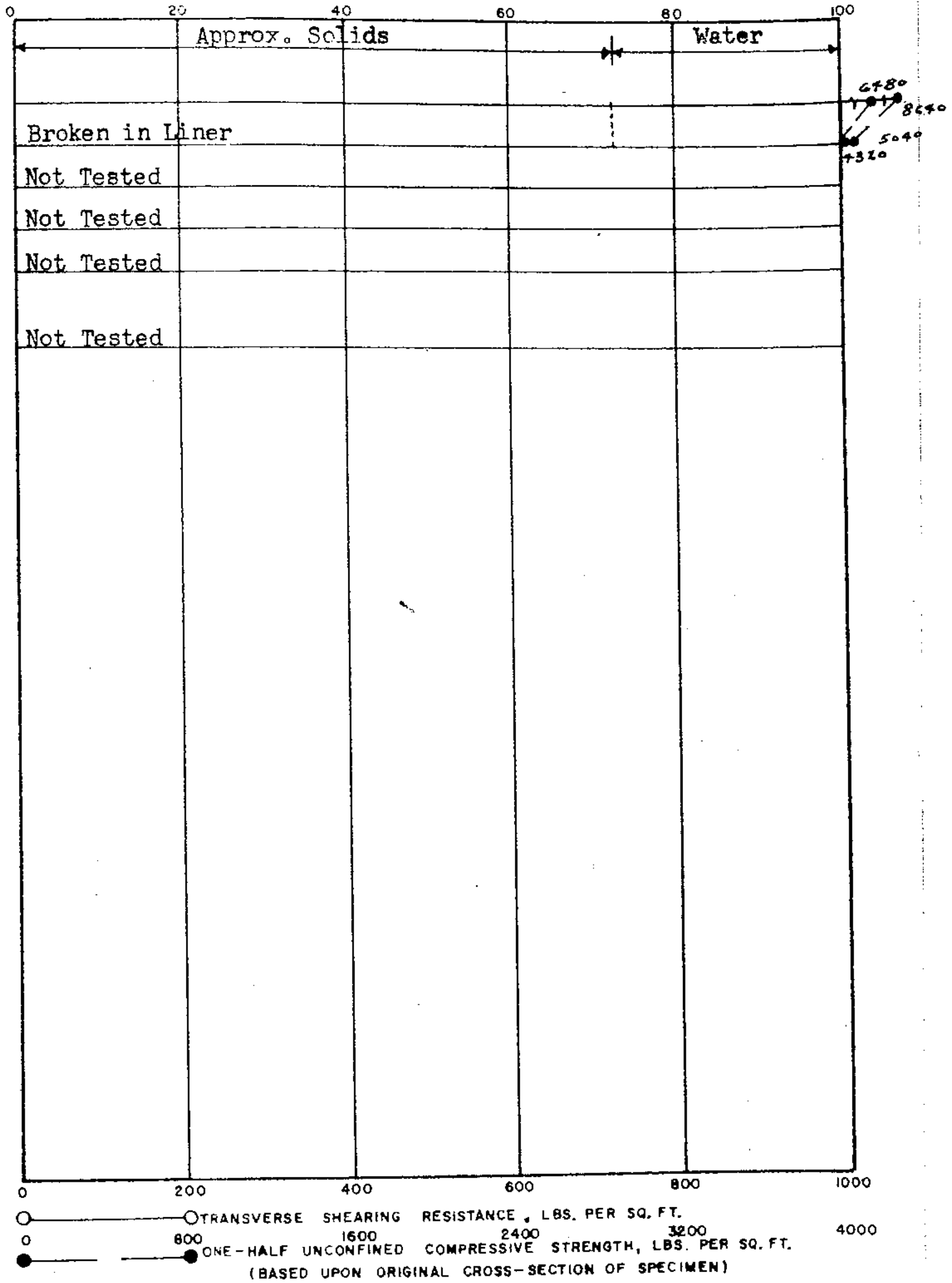
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○————○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

●————● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used through LS-5; 2.00").D. Heavy wall sampler used for LS-6.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
LS-1	5.0	568.1	Stiff to Hard	14.3	121.3
LS-2	7.5	565.6	V. Stiff	14.2	121.9
LS-3	10.0	563.1	Hard	--	--
LS-4	12.5	560.6	V. Stiff	--	--
LS-5	15.0	558.1	Stiff	--	--
LS-6	19.5	553.6	V. Hard	--	--

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan

LOCATION: N-4700; E-1600

TOTAL DEPTH: 19'6"

BORING STARTED: September 2, 1970

BORING COMPLETED: September 3, 1970

INSPECTOR: M.M. Dragicevic (S&FA)

DRILLER: R.E. Rudzeika

CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 6 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

MON 200

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 32 TB 32

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO	DATE: 6-7-71	JOB NO. 128-A

SFA FORM E-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 573.9 Ft. (IGLD Datum)

EVATION IN FEET	Description	Depth	Ne	Transverse Shearing Resistance & Unconfined Compressive Strength
	TOPSOIL; Med.Dk.Brn.V.CLAYEY SILT over 8" Yellow FINE SAND.	1'3"		
570	Medium Brown VERY SILTY CLAY, w/Some Fine Sand, Traces Gravel.	6'3"	11	
	V.Stiff Brown (w/Red Pockets), VERY SILTY CLAY, w/Some Sand, Traces Gravel.	10'9"	21	
			19	Not Tested
560	V.Stiff Gray VF SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL?)		18	Not Tested
24			12	Not Tested
	554.8 ft	19'1"		
	ROCK FRAGMENTS Mixed w/SILTY CLAY & SAND		35	Not Tested; Sand.
550	Compact Dk.Gray FINE SAND, Mixed w/V.Hard Dk.Gr. VF SDY.SILTY CLAY (GLACIAL TILL)	20'0"		

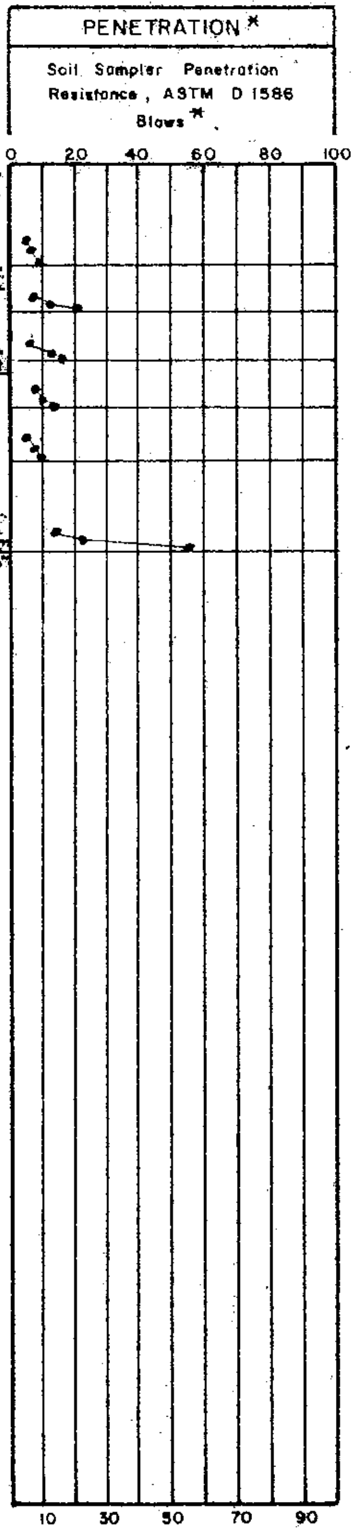
Hole dry augered, dry at completion.

Hole grouted w/1 bag of cement and 1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

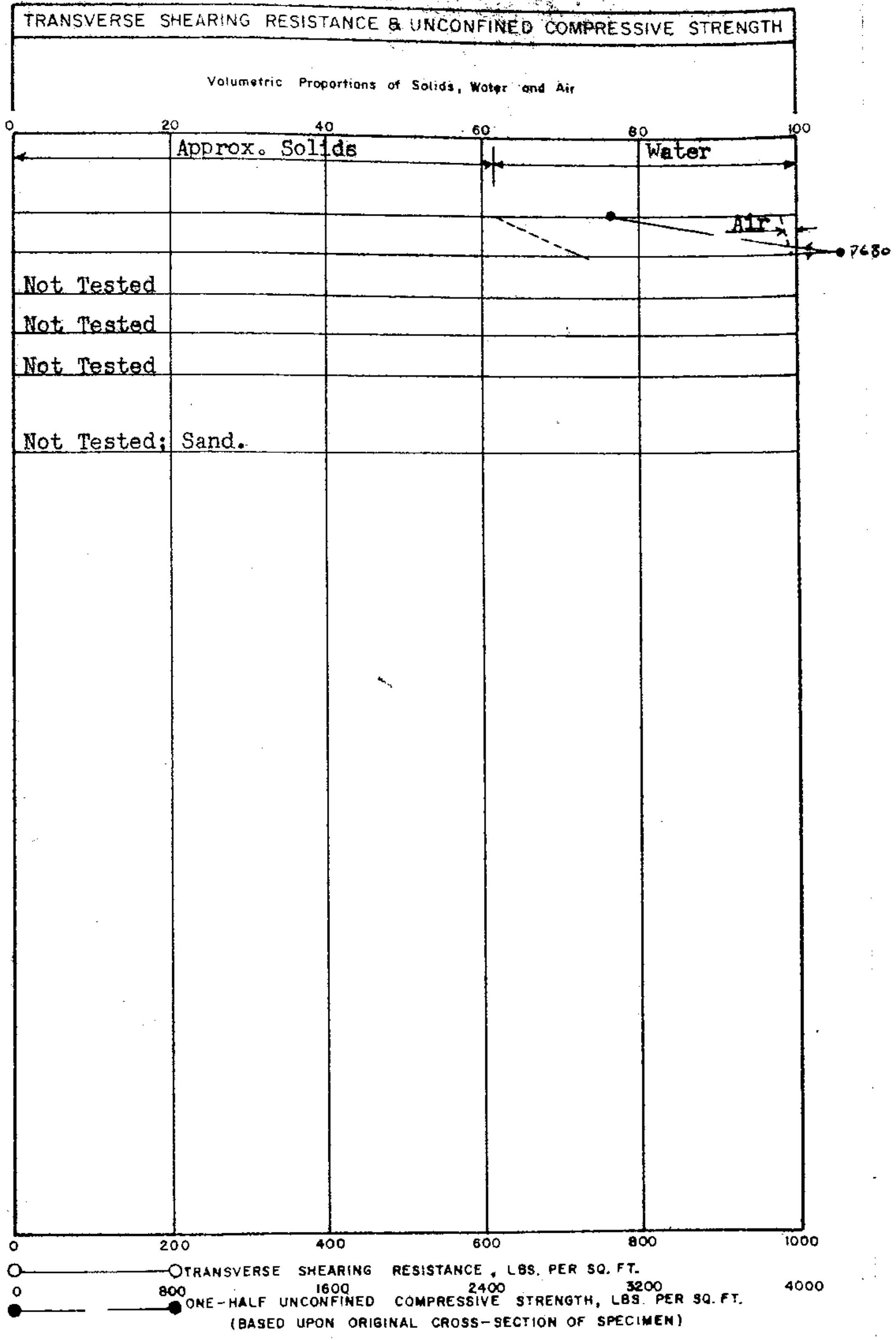
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.
●———● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT.
(BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	5.0	568.9	Medium	21.7	103.3
LS-2	7.5	566.4	V. Stiff	13.2	123.2
LS-3	10.0	563.9	V. Stiff	--	--
LS-4	12.5	561.4	V. Stiff	--	--
LS-5	15.0	558.9	Firm to Stiff	--	--
LS-6	20.0	553.9	Compact Fine Sand	--	--

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-5050; E-2100
TOTAL DEPTH: 20'0"

BORING STARTED: September 2, 1970
BORING COMPLETED: September 2, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

MON 201

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 33 TB33

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAD
DATE: 6-7-71
JOB NO. 128-A

SFA FORM L-7

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 572.9 Ft. (IGLD Datum)

VATION IN FEET

Elev.	Description	Depth
	TOPSOIL; Dk.Brn.SEMI-ORG.F.SANDY CLAY.	10"
570	Firm to V. Stiff Mtld.Brown SILTY CLAY, w/Some Sand, Traces Rock Fragments.	5'9"
	V.Stiff Brown SILTY CLAY, w/Little Sand, Traces of Gravel.	8'4"
	Hard Brown SILTY CLAY, w/Little Sand, Traces of Gravel.	10'6"
560	Stiff Gray SILTY CLAY, w/Some Sand & Gravel.	12'6"
550	Stiff to Very Stiff Gray SILTY CLAY, w/Some Sand, Traces of Gravel, * Many Small Rock Fragments. (GLACIAL TILL)	25'0"
540		

Hole dry augered.

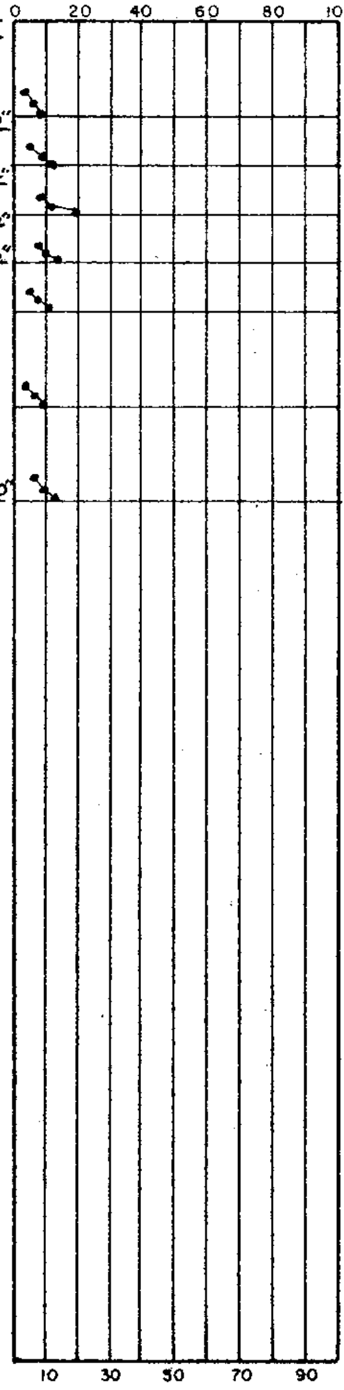
* Encountered ground water (v.slight).

Hole dry at completion of drilling; grouted w/1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



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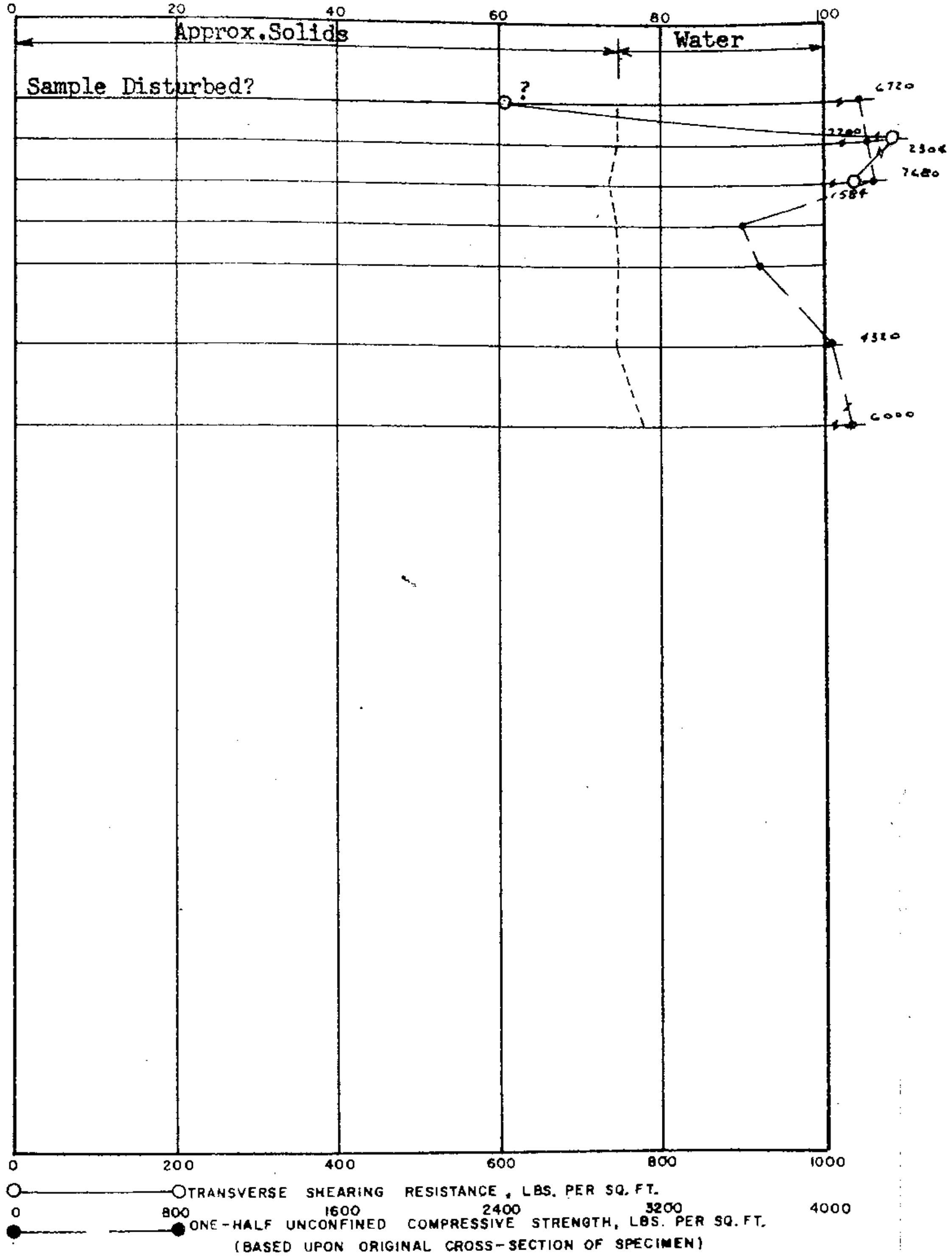
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev, Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
LS-1	5.0	567.9	Firm to V.Stiff	13.6	125.8
LS-2	7.5	565.4	V.Stiff to Hard	13.0	125.6
LS-3	10.0	562.9	Hard	13.3	124.1
LS-4	12.5	560.4	Stiff	12.3	125.9
LS-5	15.0	557.9	Stiff	12.6	125.7
LS-6	20.0	552.9	Stiff	13.4	126.2
LS-7	25.0	547.9	V.Stiff	11.3	131.7

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-5100; E-3400
TOTAL DEPTH: 25'0"

BORING STARTED: September 2, 1970
BORING COMPLETED: September 2, 1970

INSPECTOR: M.M.Dragicevic (S&FA)
DRILLER: R.E.Budzeika
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 1.75 inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: NONE

SFA FORM E-7

MON 202

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 34 TB 34

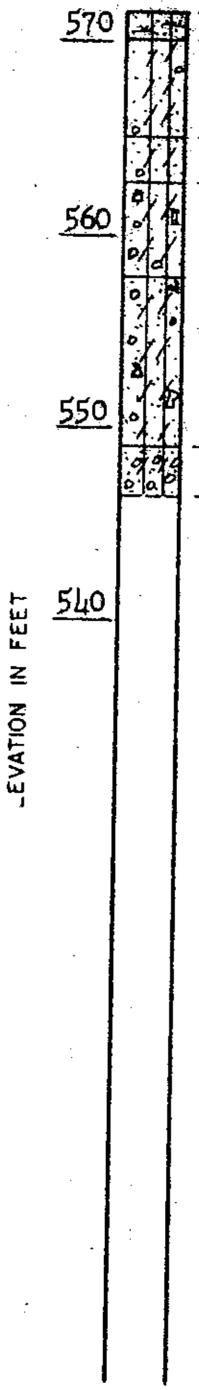
PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 10-20-70
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 571.6 Ft. (IGLD Datum)



TOPSOIL: Dk. Brn. SEMI-ORG. V. SANDY CLAY.	1'1"
Firm Brown & Gray SILTY CLAY, w/Little Sand, Traces of Fine Gravel.	6'4"
Hard Mottled Brown SILTY CLAY, w/Some Sand, Traces of Gravel.	8'8"
V. Stiff to Hard Brown SILTY CLAY, w/Little Sand, Traces Gravel & Rock Frags.	13'8"
V. Stiff to Hard Gray F. SANDY SILTY CLAY, w/Some Gravel & Rock Fragments. (GLACIAL TILL)	22'4"
V. Hard Dark Gray FINE SANDY SILTY CLAY, V. Gravelly, w/Many Rock Fragments.	25'0"

Hole dry augered; dry upon completion.

Hole grouted w/1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-5050; E-4400
TOTAL DEPTH: 25'0"

BORING STARTED: Sept. 1, 1970
BORING COMPLETED: Sept. 1, 1970

INSPECTOR: M.N. Dragicevic (S&FA)
DRILLER: R.E. Budzeika
CONTRACTOR: Able Drilling, Inc.

═ WATER LEVEL in hole at indicated number of hours after completion of boring; _____ feet of casing in place.

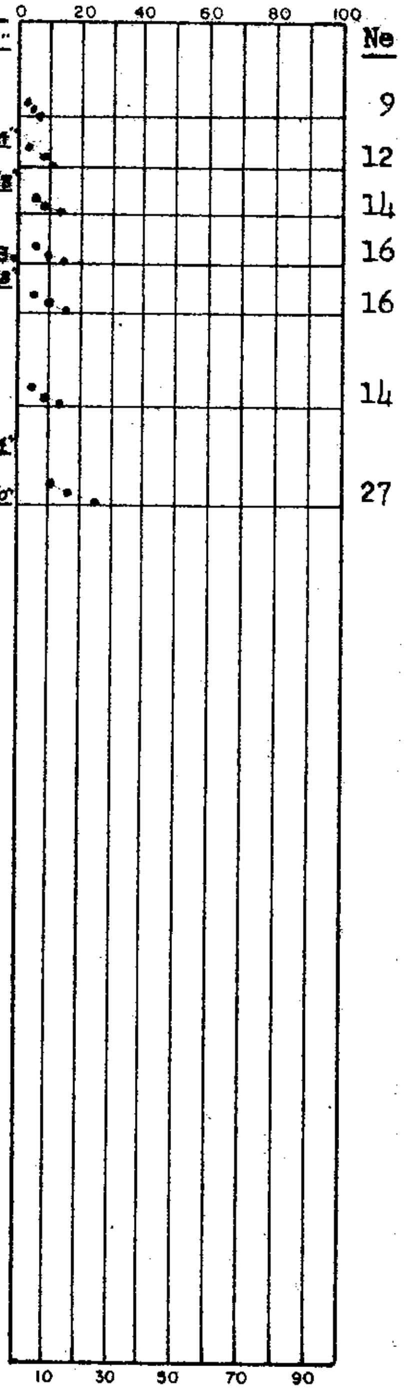
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler ___ inches, using 140 lb. weight with 30 inch free fall.

Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

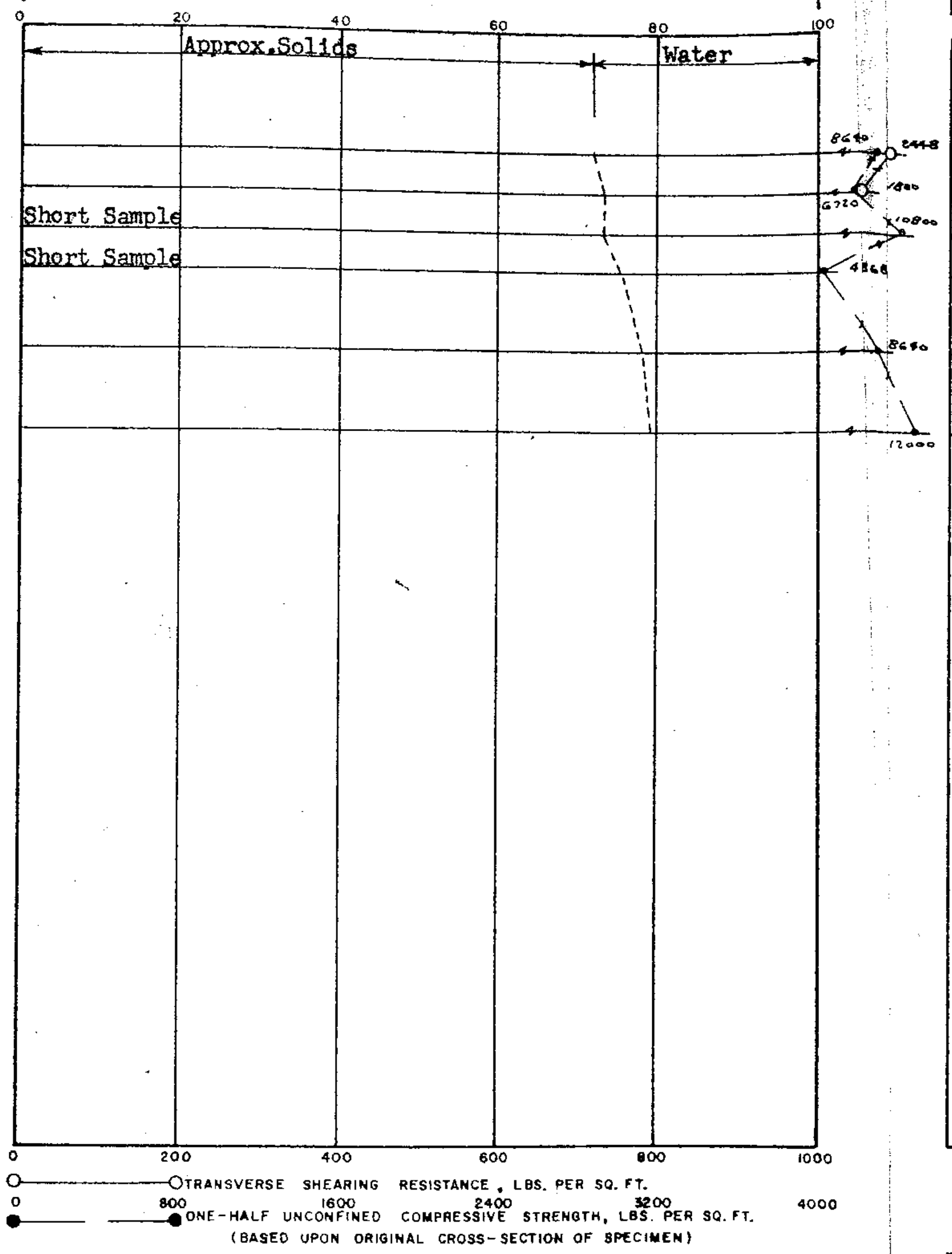
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used in all Liner Samples
2.00" O.D. Heavy wall Sampler used in BS-1 only.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.6	Firm		
LS-1	7.5	564.1	Hard	14.1	122.2
LS-2	10.0	561.6	V. Stiff to Hard	13.5	124.3
LS-3	12.5	559.1	Hard	13.5	122.1
LS-4	15.0	556.6	V. Stiff	12.3	125.7
LS-5	20.0	551.6	Hard	10.1	132.3
LS-6	25.0	546.6	V. Hard	9.6	134.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 203

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 35 TB 35

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller and S&FA
Ground Surface Elev. = 570.7 Ft. (IGLD Datum)

VATION IN FEET

Elevation	Depth	Description
570		TOPSOIL; Dk. Brn. SEMI-ORG. F. SANDY CLAY.
	1'1"	Medium Brown & Gray SILTY CLAY, w/Traces of Sand & Fine Gravel.
	6'6"	V. Stiff Mtld. Brown SILTY CLAY, w/Some Sand, Traces of Gravel.
	8'4"	V. Stiff Brown SILTY CLAY, w/Traces of Sand & Gravel.
560	10'8"	Hard Gray & Brown SILTY CLAY, w/Some Sand, Gravelly (GLACIAL TILL?)
24	13'6"	V. Stiff Gray FINE SANDY SILTY CLAY, w/Some Gravel, Many Rock Fragments. (GLACIAL TILL)
550		
	23'11"	Refusal; Boulder or Rock
540		

Hole dry augered; dry upon completion.

Hole grouted w/1 bag cement & 1 bag bentonite.

No water flow during final inspection on Sept. 9, 1970.

See Test Boring Location Plan

LOCATION: N-4600; E-4900
TOTAL DEPTH: 23'11"

BORING STARTED: September 1, 1970
BORING COMPLETED: September 1, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R.E. Budzeika
CONTRACTOR: Able Drilling, Inc.

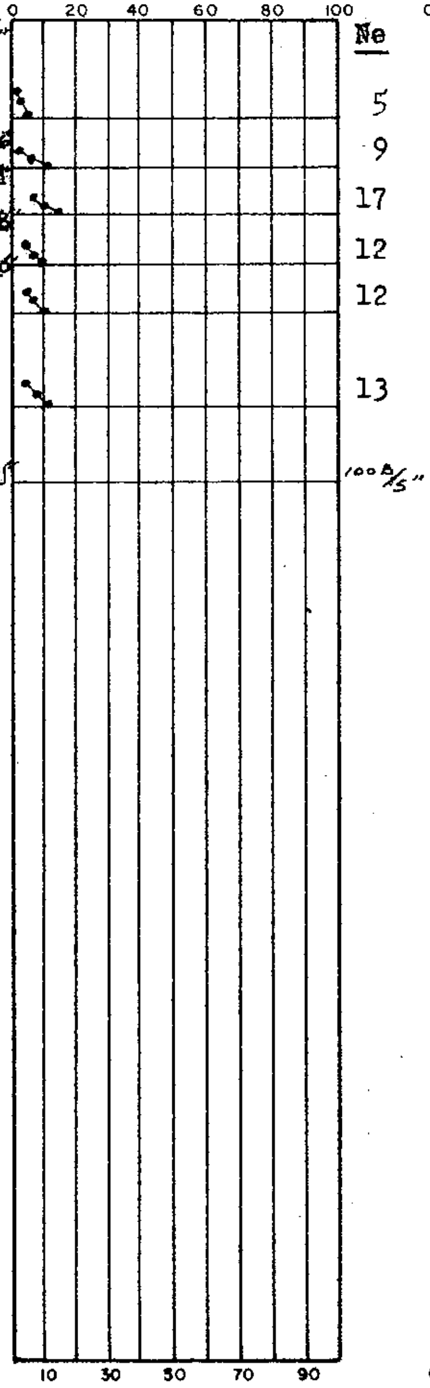
WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne = Evaluated Blows/Foot.

ROCK CORE DIAMETER: None

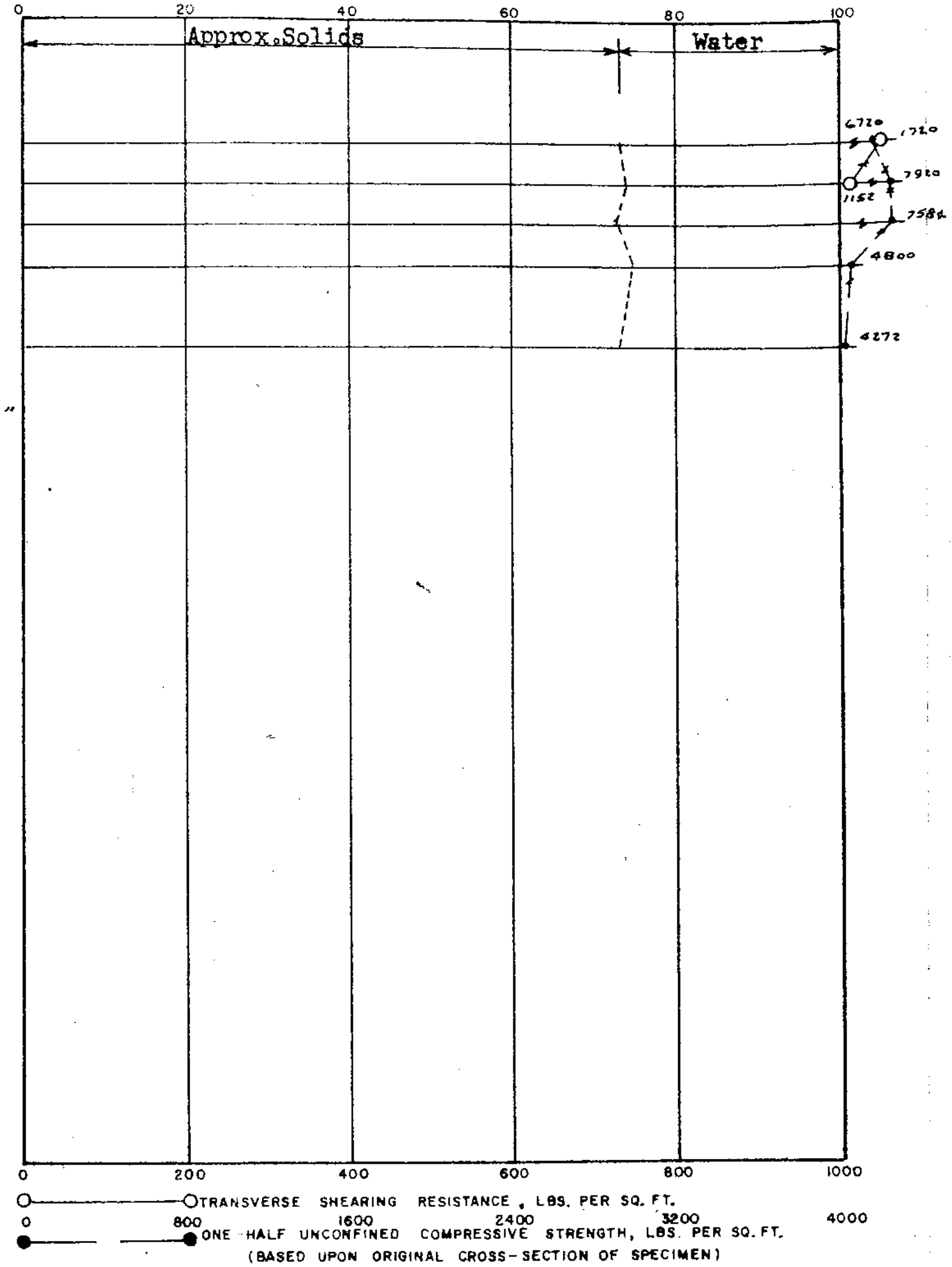
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used in all Liner Samples; 2.00" O.D. Heavy wall sampler used in BS-1 & BS-7 only.

SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.7	Medium		
LS-1	7.5	563.2	V. Stiff	13.6	123.6
LS-2	10.0	560.7	V. Stiff to Hard	13.9	124.7
LS-3	12.5	558.2	Hard	13.9	122.1
LS-4	15.0	555.7	V. Stiff	12.2	127.1
LS-5	20.0	550.7	V. Stiff	13.2	123.5
BS-7	23.9	546.8	Rock Fragments		

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 204

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 36 TB 36

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 10-20-70 | JOB NO. 128-X

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 571.3 Ft. (IGLD Datum)

ELEVATION IN FEET: 570, 560, 550, 540

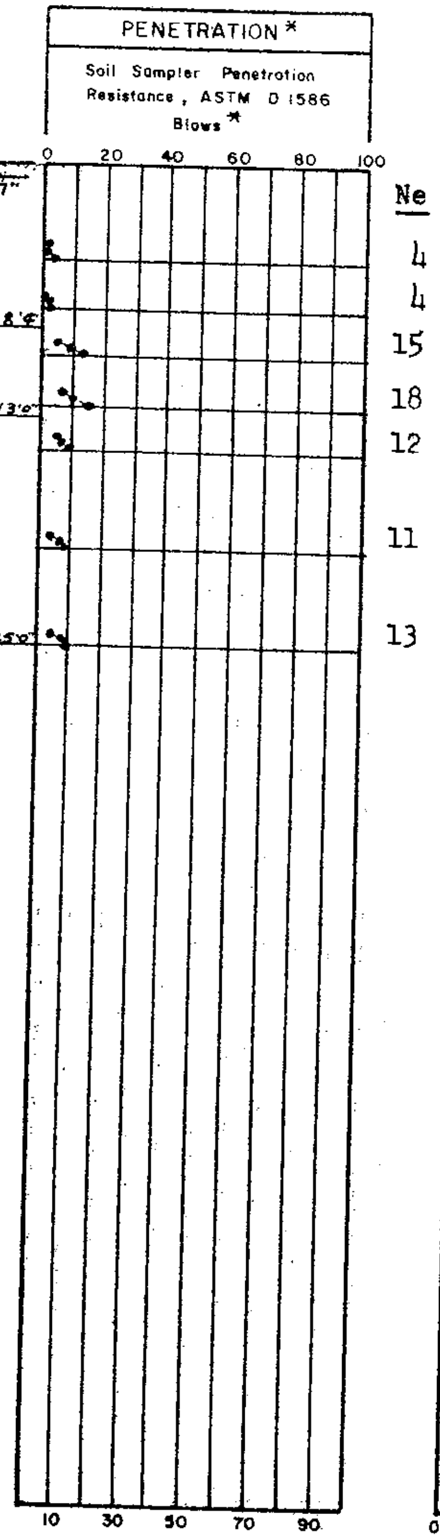
TOPSOIL: Loose Dk. Brn. SEMI-ORG. V. SILTY CLAY — 7"

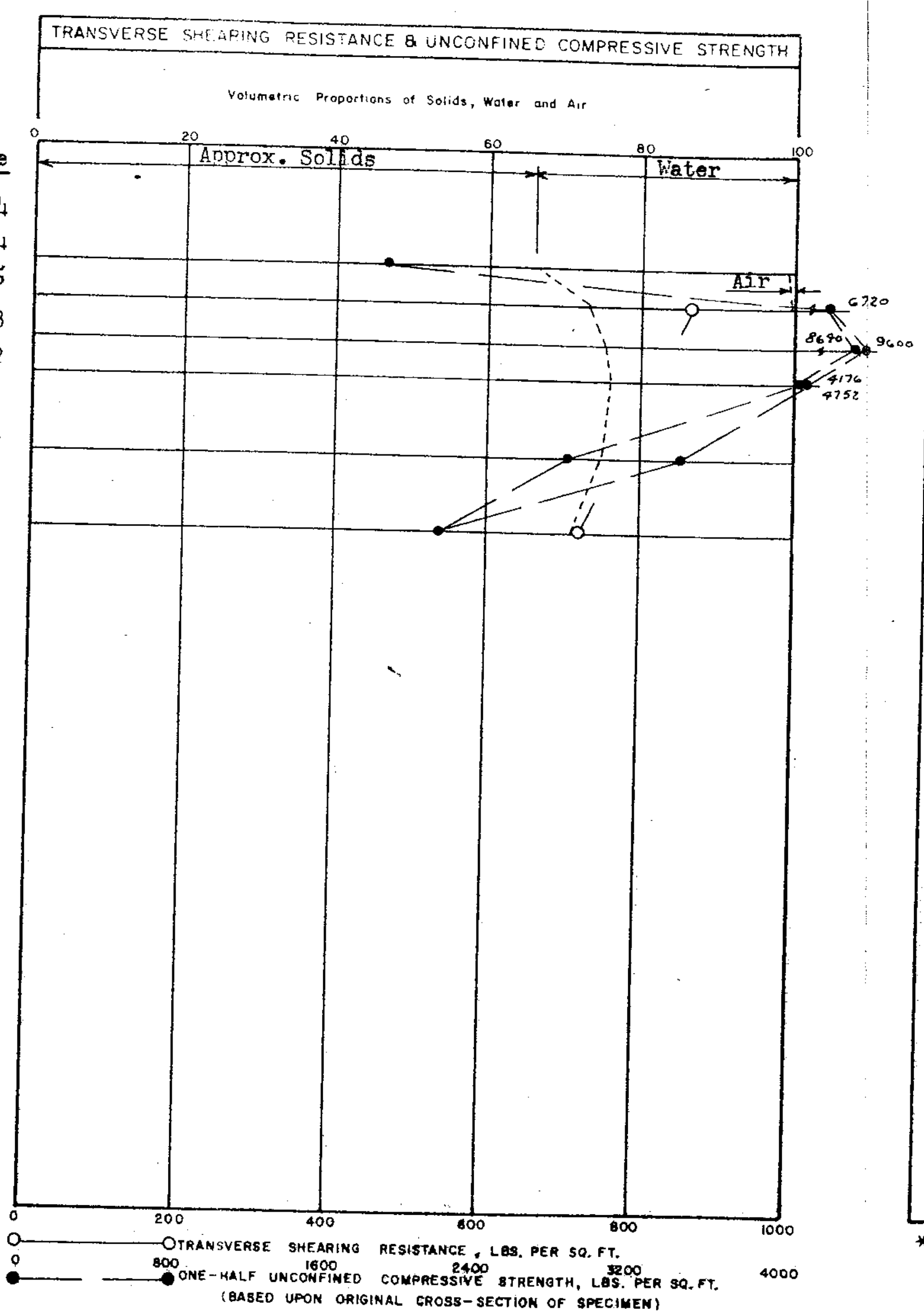
Soft Brown & Gray SILTY CLAY, w/Some Fine Sand & Gravel. — 8'6"

Stiff to V. Stiff Brown SILTY CLAY, w/Some Fine Sand & Gravel. — 13'0"

Firm to V. Stiff Gray SILTY CLAY, w/Some Sand, Gravel & Rock Frags. (GLACIAL TILL?) — 25'0"

Hole Dry augered full depth.
*Ground water encountered.
Water level in hole after sampling at d=10' was at d=5'6" (El. 565.8)
Water level upon completion was at d=6'6" (El. 564.8).
Hole grouted w/1 bag of bentonite.
No water flow during final inspection on Sept. 9, 1970





** 1.75" O.D. Michigan Liner Sampler used for all LS samples; 2.00" O.D. Heavy wall sampler used for BS-1.

SOIL SAMPLE DATA

Lab & Field Sa No	Sample Depth, Feet	Sample Elev, Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.3	Soft		
LS-1	7.5	563.8	Soft to Medium	18.7	111.2
LS-2	10.0	561.3	Stiff to V. Stiff	14.1	122.8
LS-3	12.5	558.8	Hard	12.5	125.4
LS-4	15.0	556.3	V. Stiff	12.8	126.8
LS-5	20.0	551.3	Firm to Stiff	13.1	125.3
LS-6	25.0	546.3	Firm to Stiff	14.7	121.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 205

See Test Boring Location Plan
LOCATION: N-3750; E-4800
TOTAL DEPTH: 25'0"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 28, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 37 TB 3

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT
THE DETROIT EDISON COMPANY

APPR: | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 570.5 Ft. (IGLD Datum)

ELEVATION IN FEET

Elev.	Description	Depth
570	TOPSOIL;Med.Dk.Gr. SEMI-ORG.CLAYEY SILT.	1'8"
48	Soft to Med. Brown (w/Some Gray) SILT, w/Some Fine Sand & Clay.	5'8"
	Med to Firm Brown & Gray SILTY CLAY, w/Few Sand Partings.	8'4"
560	Firm Brown VERY SILTY CLAY, w/Some Sand, Little Gravel.	10'6"
	Firm Mottled Gray SILTY CLAY, w/Some Sand, Little Gravel.	13'6"
	Firm to Stiff Gray VERY SILTY CLAY, w/Little Sand, Traces of Gravel.	16'6"
550	Firm to Stiff Dk. Gr. VF SDY. SILTY CLAY, w/Little Gravel, Some Rock Frags. (GLACIAL TILL)	27'4"
540		

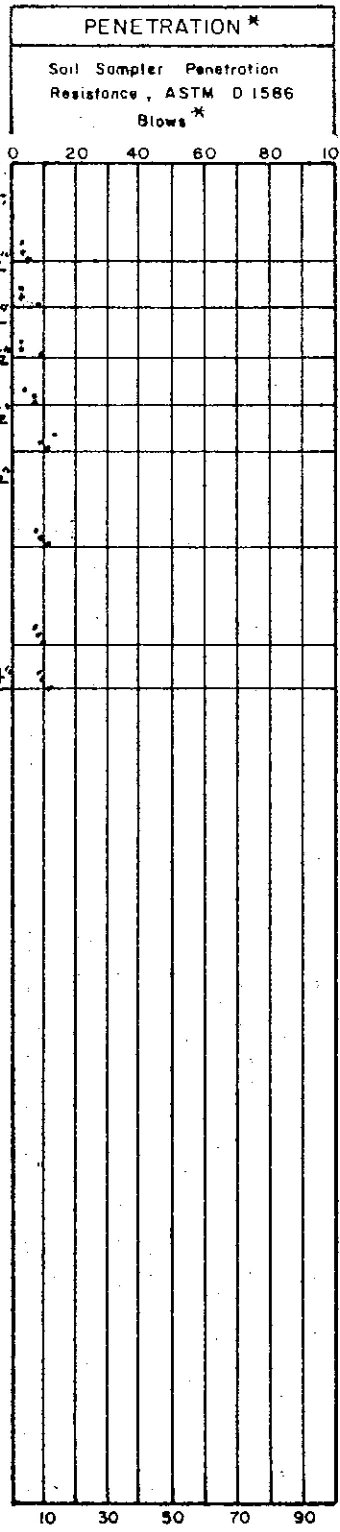
Hole dry augered; ground water seepage encountered between d=1'8" & d= 5'8".

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



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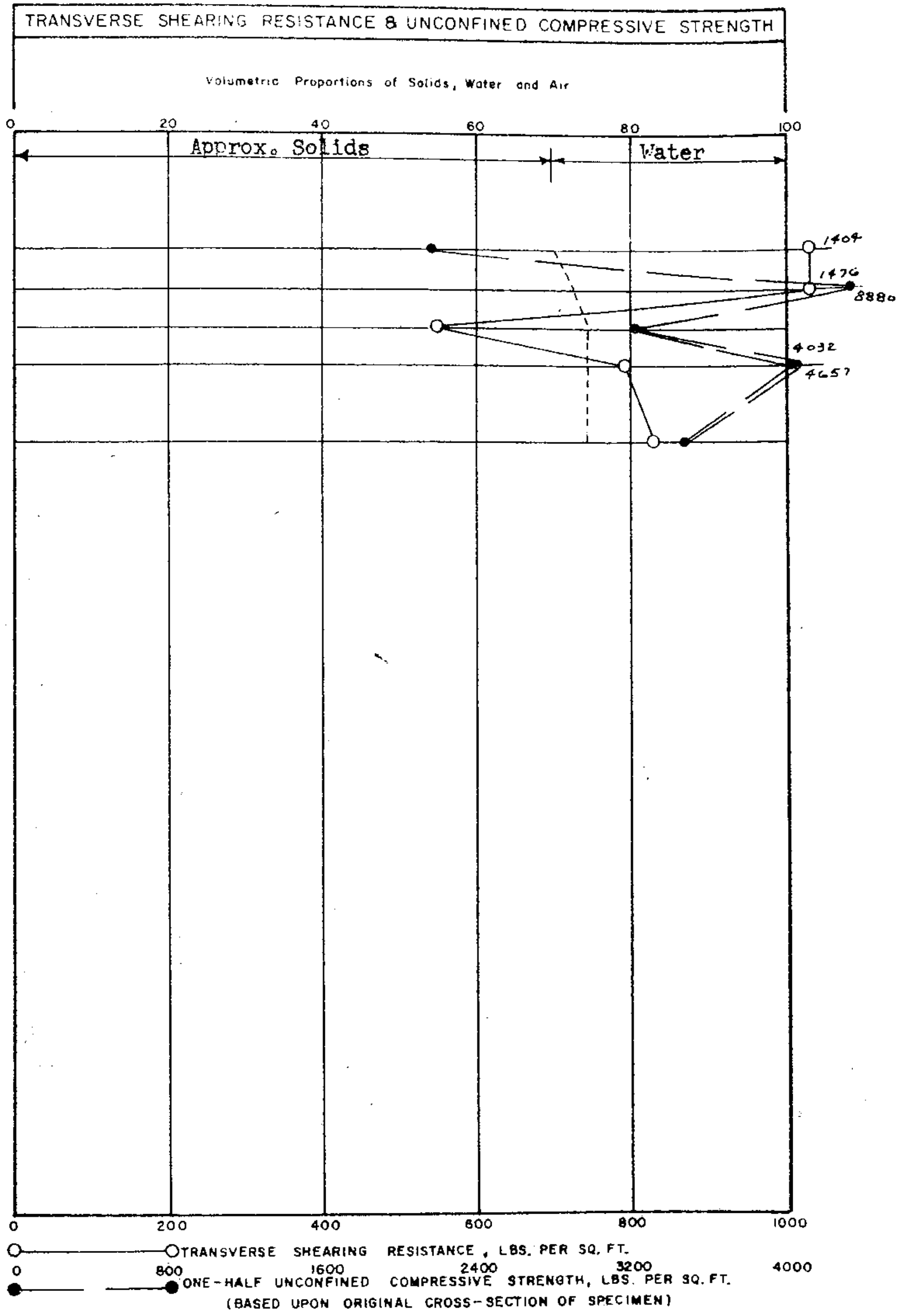
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH



** 1.75" O.D. Michigan Liner Sampler used for LS samples;
2.00" O.D. Heavy wall sampler used for BS-1 & No Recovery samples.

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.5	Soft to Medium		
LS-1	7.5	563.0	Firm to Stiff	16.4	117.6
LS-2	10.0	560.5	Firm to V Stiff	13.9	122.2
LS-3	12.5	558.0	Firm	13.1	125.6
LS-4	15.0	555.5	Firm to Stiff	12.6	126.9
LS-5	20.0	550.5	Firm to Stiff	13.1	125.0
No Rec.	25.0	545.5			
No Rec.	27.3	543.2			

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3200; E-4600
TOTAL DEPTH: 27'4"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 31, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

MON 206

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 38 TB 38

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 5-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 570.2 Ft. (IGLD Datum)

ELEVATION IN FEET

Elevation	Description	Depth
570	TOPSOIL;Med.Dk.Brn.SEMI-ORG.CLAYEY SILT.	11"
8-4	Medium to Firm Brn & Gr. V.SILTY CLAY, w/Traces of Fine Sand.	5'4"
	Stiff Brown (w/Some Red)V.SILTY CLAY, w/Silt Partings,Traces Sd.&Grav.	7'8"
560	Stiff Gray (w/Some Red) V.SILTY CLAY, w/Some Fine Sand, Little Gravel.	10'4"
	Stiff Brown & Gray SILTY CLAY, w/Traces of Sand & Gravel.	13'4"
	V.Stiff Gray SILTY CLAY, w/Some Sd.&Grav., Few Rk.Frags.	16'4"
550	Firm to Stiff Gray SILTY CLAY, w/Some Sand & Traces of Gravel.	21'6"

Refusal; Boulder or Bedrock?
(could not penetrate)

540

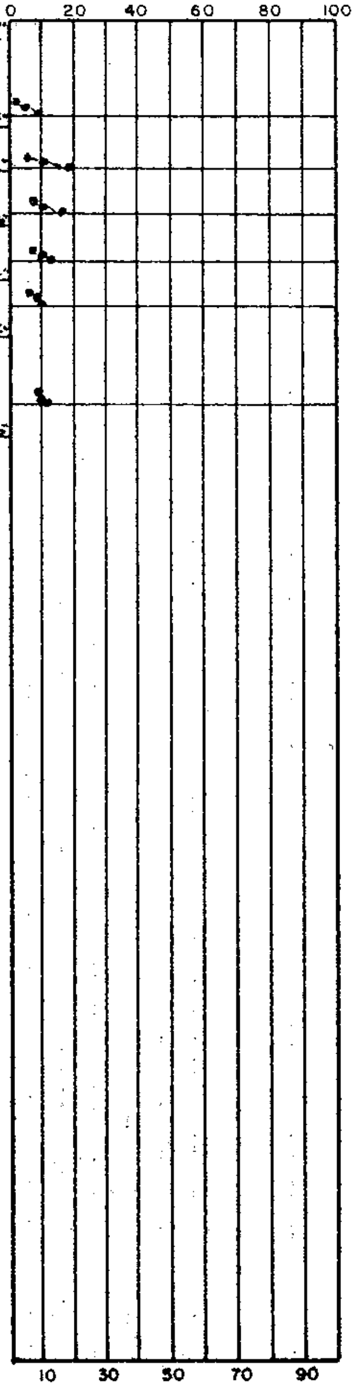
Hole dry augered, no ground water encountered.

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



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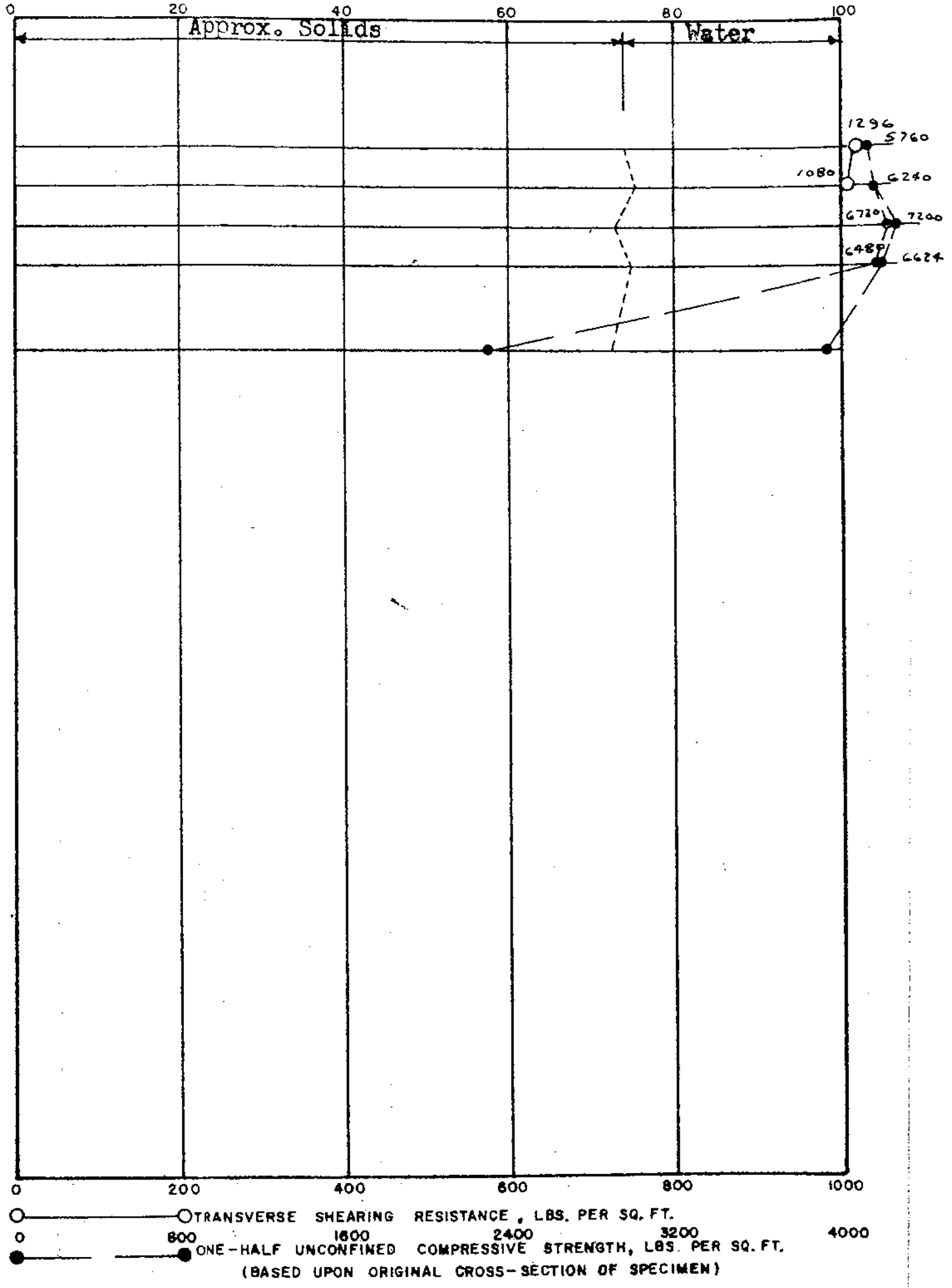
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used for all LS samples;
2.00" O.D. Heavy wall sampler used for BS-1

SOIL SAMPLE DATA

Lab & Field Sa. No.	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	565.2	Medium		
LS-1	7.5	562.7	V. Stiff	13.5	122.7
LS-2	10.0	560.2	V. Stiff	12.0	126.9
LS-3	12.5	557.7	Hard	13.7	122.8
LS-4	15.0	555.2	Hard	12.0	126.2
LS-5	20.0	550.2	Firm to Stiff	13.4	122.6

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-2600; E-4300
TOTAL DEPTH: 21'6"

BORING STARTED: August 28, 1970
BORING COMPLETED: August 28, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling

WATER LEVEL in hole at indicated number of hours after completion of boring; 2 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

MON 207

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 39 TB39

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO DATE: 6-7-71 JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 570.2 Ft. (IGLD Datum)

VATION IN FEET

570
TOPSOIL;Med.Dk.Brn.SFMI-ORG.V.SLY.CLAY 10"

Medium Brown & Gray VERY SILTY CLAY,
w/Some Fine Sand, Traces of Gravel. 5'8"

V.Stiff Mtld.Brown VERY SILTY CLAY,
w/Some Fine Sand, Traces of Gravel. 8'4"

560
Hard Brown SILTY CLAY,
w/Some Fine Sand, Traces of Gravel. 10'8"

Stiff to Hard Gray (w/Traces of Brown)
VF SANDY SILTY CLAY,
w/Traces of Gravel & Rock Frags.
(GLACIAL TILL)
550
20'6"

V.Hard Dk.Gray VF SANDY SILTY CLAY,
w/Some Gravel & Rock Fragments.
(GLACIAL TILL)
540
30'0"

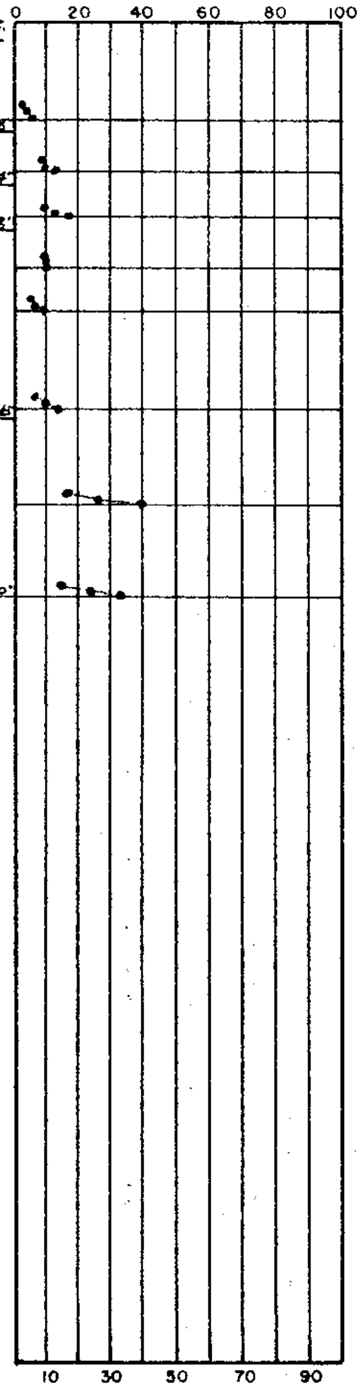
Hole dry augered; no ground water encountered.

Hole grouted w/2 bags of bentonite.

No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586
Blows *



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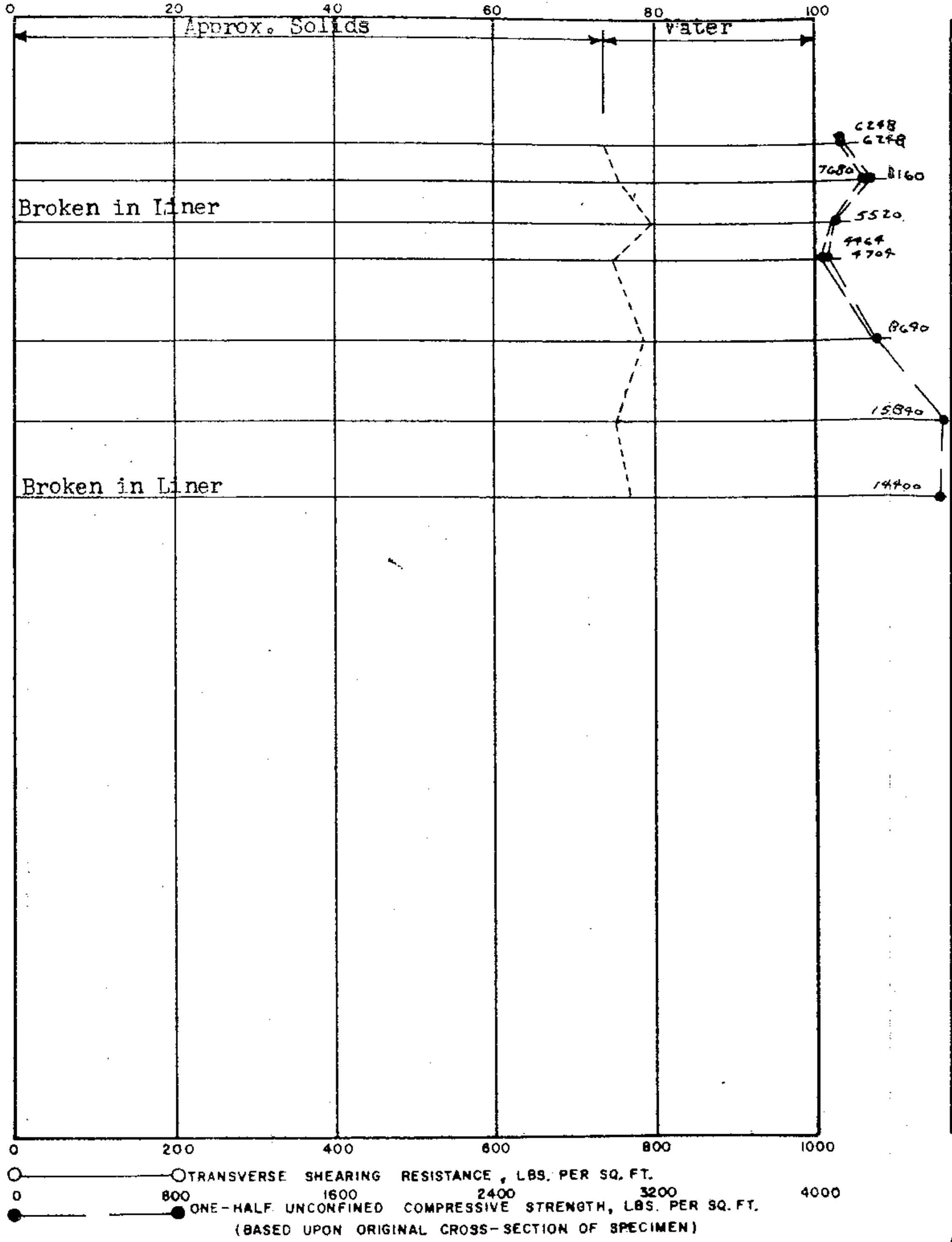
TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL

Lab & Field Sa. No	Sample Depth, Feet	Samp Elev Feet			Dry Unit Weight p.c.f
BS-1	5.0	565.2	Medium		
LS-1	7.5	562.7	V. Stiff to Hard	13.6	123.8
LS-2	10.0	560.2	Hard	12.8	126.6
LS-3	12.5	557.7	V. Stiff	11.1	132.8
LS-4	15.0	555.2	Stiff	12.8	125.6
LS-5	20.0	550.2	Hard	9.9	132.2
LS-6	25.0	545.2	V. Hard	11.5	127.5
LS-7	30.0	540.2	V. Hard	11.2	130.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-1500; E-3400
TOTAL DEPTH: 30'0"

BORING STARTED: August 27, 1970
BORING COMPLETED: August 27, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Pudzeika
CONTRACTOR: Able Drilling, Inc.
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.
* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches; using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-6;
2.00" O.D. Heavy wall sampler used for BS-1 & LS-7.

MON 208

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 40 TB 40

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO
DATE: 6-7-71
JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA

Ground Surface Elev. = 571.6 Ft. (IGLD Datum)

Elev.	Description	Depth	Ne
570	TOPSOIL; Med. Dk. Brn. SEMI-ORG. V. SILTY CLAY	11"	
	Soft to Med. Brown & Gray SILTY CLAY, w/Little Sand.	5'6"	5
	Med. to Firm Mtld. Brown V. SILTY CLAY, w/Traces of Sand & Gravel.	8'6"	6
560	Hard Brown to Gray SILTY CLAY, w/Traces of Fine Sand & Gravel.	10'6"	28
	Firm Gray VF SANDY SILTY CLAY, w/Little Gravel & Few Rock Frags. (GLACIAL TILL)	15'6"	14 16
550	Stiff to Hard Dk. Gray VF SDY. SILTY CLAY, w/Little Gravel & Some Rock Frags. (GLACIAL TILL)	25'0"	21 26

* Encountered ground water w/hole at d=8'6"; drilling stopped for 16 hours and ground water rose 2 ft. to El. 568.6.

Hole continued by dry augering.

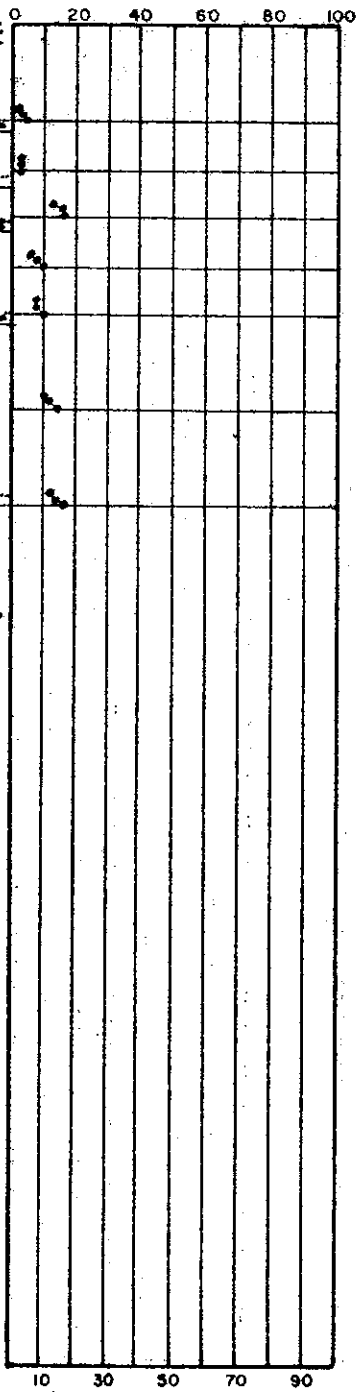
Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.

540

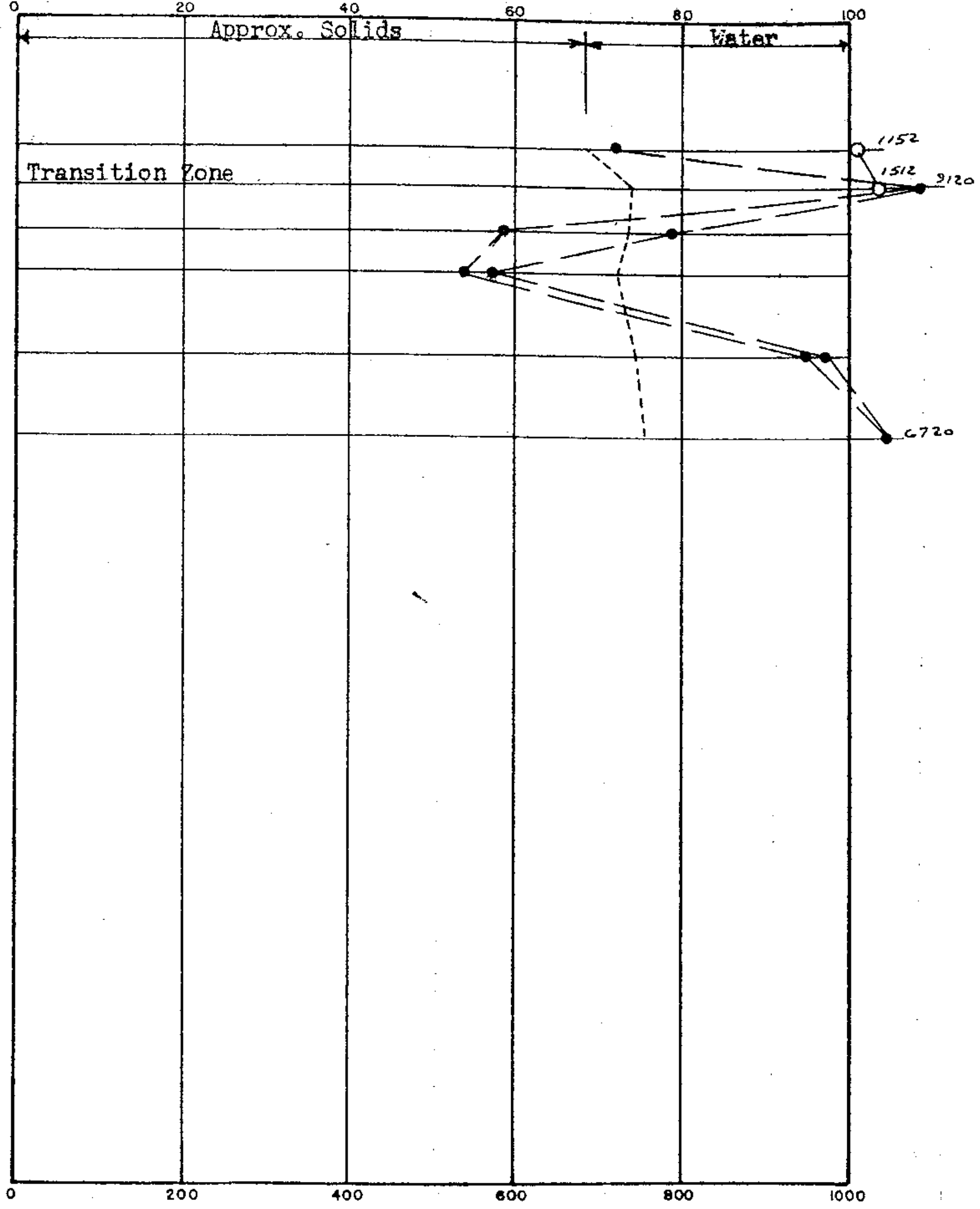
PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



○———○ TRANSVERSE SHEARING RESISTANCE, LBS. PER SQ. FT.

0 800 1600 2400 3200 4000

●——● ONE-HALF UNCONFINED COMPRESSIVE STRENGTH, LBS. PER SQ. FT. (BASED UPON ORIGINAL CROSS-SECTION OF SPECIMEN)

** 1.75" O.D. Michigan Liner Sampler used for all LS samples; 2.00" O.D. Heavy wall sampler used for BS-1.

Lab & Field Sa. No	Sam Dep Fee			Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	566.6	Medium		
LS-1	7.5	564.1	Firm to Stiff	17.5	115.2
LS-2	10.0	561.6	Hard	13.2	124.5
LS-3	12.5	559.1	Firm	12.9	123.2
LS-4	15.0	556.6	Firm	13.7	121.5
LS-5	20.0	551.6	Stiff	12.3	125.7
LS-6	25.0	546.6	V. Stiff to Hard	12.1	128.4

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 209

See Test Boring Location Plan

LOCATION: N-1300; E-2400
TOTAL DEPTH: 25'0"

BORING STARTED: August 26, 1970
BORING COMPLETED: August 27, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot

ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 41 TB 41

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 573.2Ft. (IGLD Datum)

EVATION IN FEET

Elev.	Description	Depth
	TOPSOIL;Med.Dk.Brn.SEMI-ORG.CLAYEY SILT.	1'5"
570	Firm Brown CLAYEY SILT, w/Pockets of Fine Sand.	5'8"
	Soft to Hard (Varies) Brown & Gray V.SILTY CLAY, w/Some Sand & Gravel.	8'6"
	Hard Brown SILTY CLAY, w/Tr. Sd.&Gravel	10'6"
560	V.Stiff to Hard Brown (w/Some Gray) SILTY CLAY, w/Traces Sand & Gravel.	15'8"
½ ¼	V.Stiff to Hard Dk.Gray VF SDY.SILTY CLAY, w/Little Gravel, Few Rock Frags. (GLACIAL TILL)	20'0"
550		

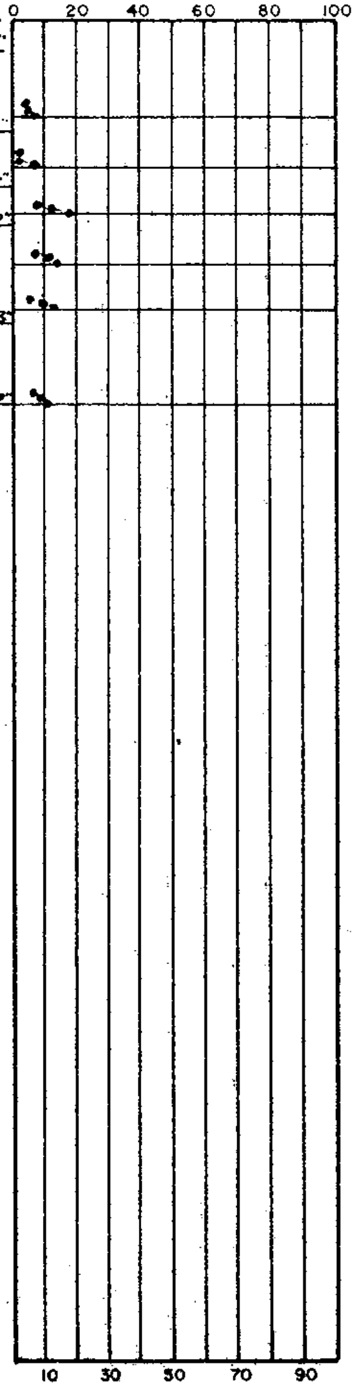
Hole dry augered; no ground water encountered.

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on September 9, 1970.

PENETRATION *

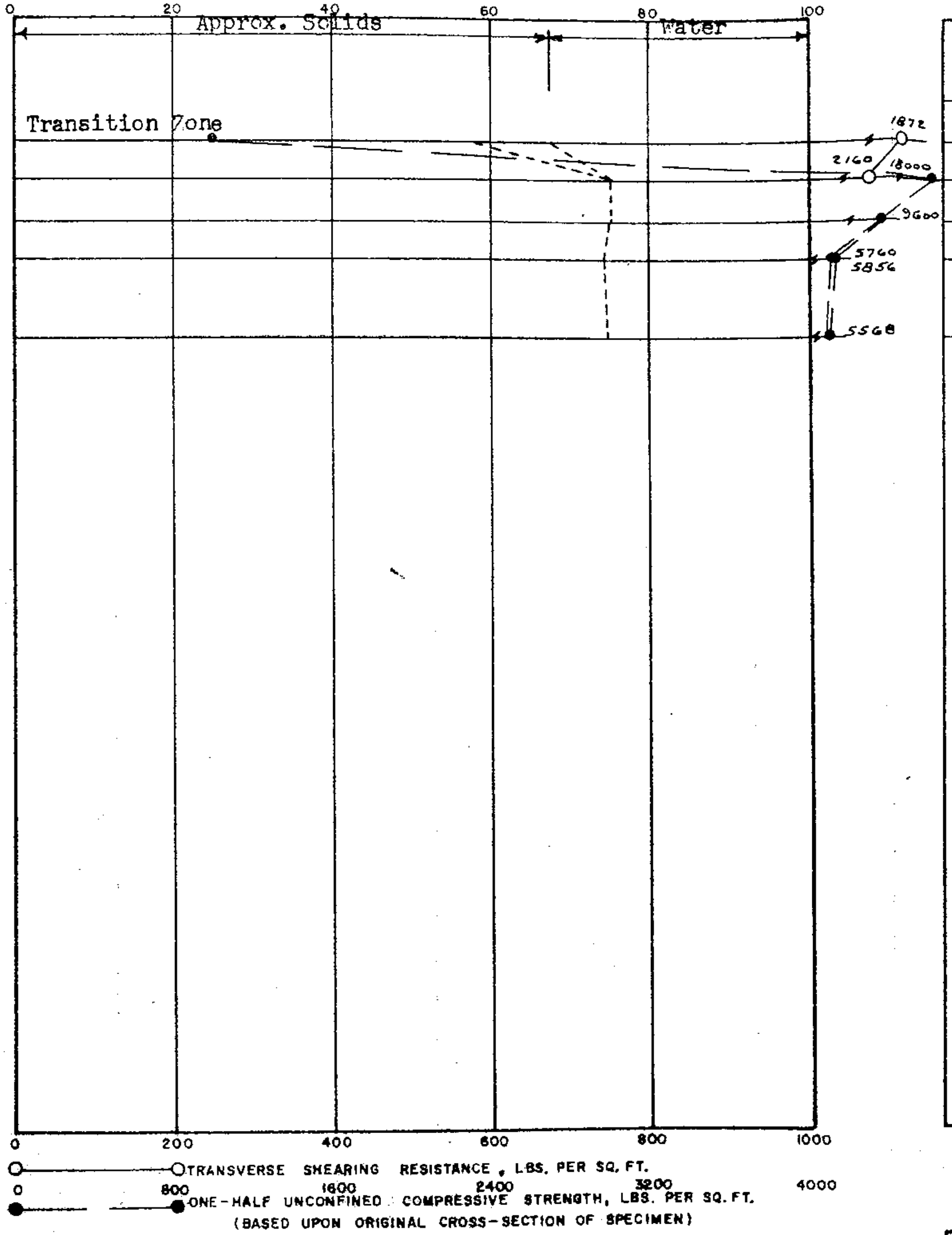
Soil Sampler Penetration Resistance, ASTM D 1586 Blows *



Ne
9
4
20
20
15
16

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



** 1.75" O.D. Michigan Liner Sampler used for all LS samples;
2.00" O.D. Heavy wall sampler used for BS-1

SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	568.2	Firm		
LS-1	7.5	565.7	Soft — Hard —	27.6 17.6	96.9 114.5
LS-2	10.0	563.2	Hard	12.9	125.8
LS-3	12.5	560.7	Hard	13.1	125.9
LS-4	15.0	558.2	V. Stiff to Hard	13.3	124.1
LS-5	20.0	553.2	V. Stiff to Hard	12.4	125.3

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-1500; E-1400
TOTAL DEPTH: 20'0"

BORING STARTED: August 26, 1970
BORING COMPLETED: August 26, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler [illegible] inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

MON 210

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 42 TB 42

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: G4 | DATE: 9-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

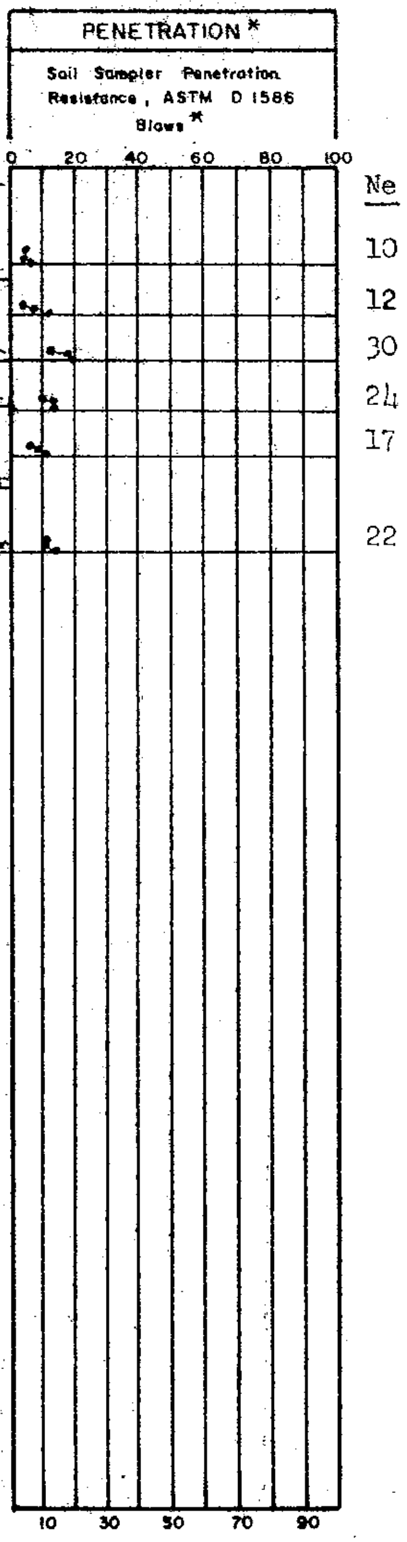
Classifications by: Driller & S&FA
Ground Surface Elev. = 576.4 Ft. (IGLD Datum)

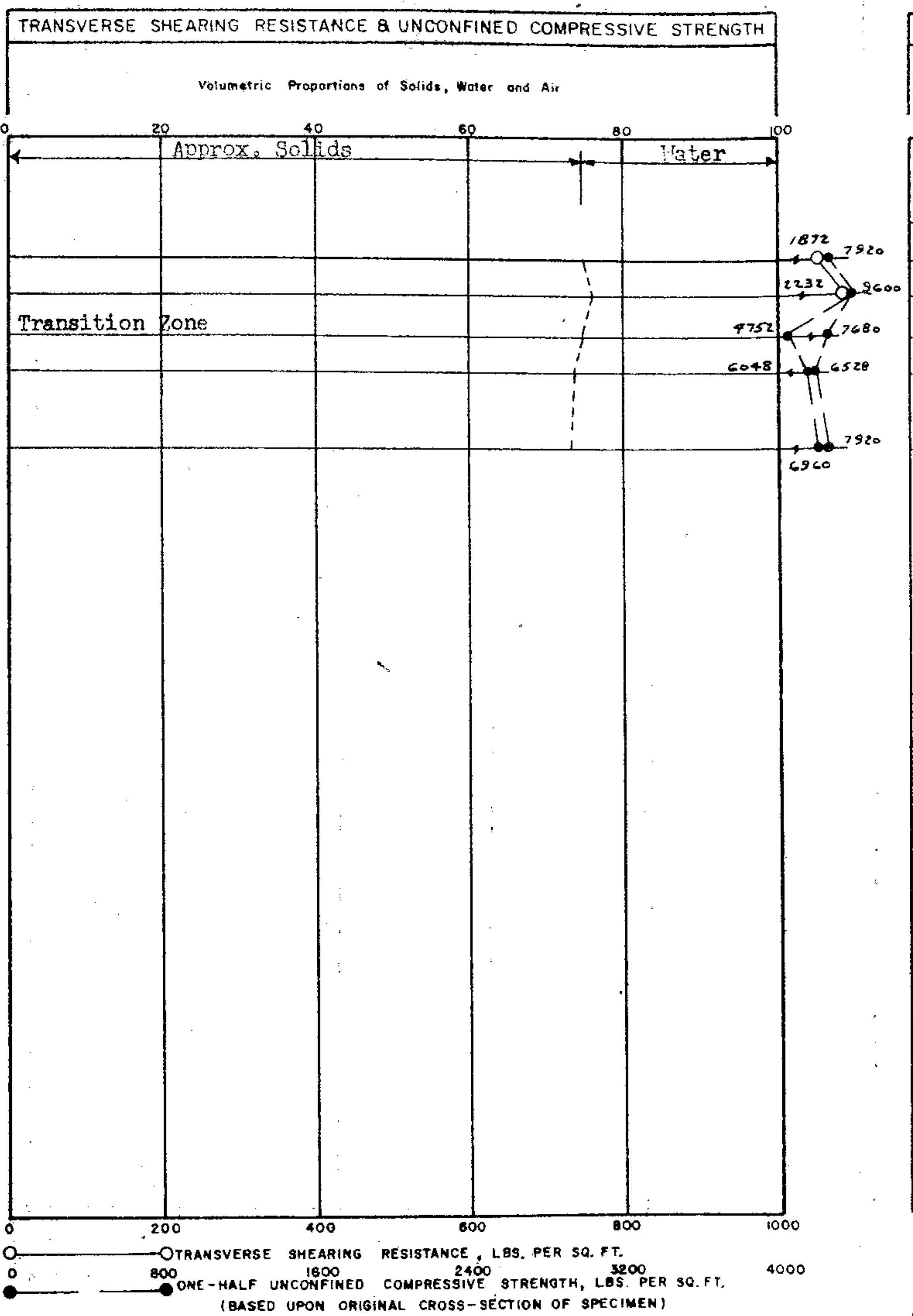
Elev.	Description	Depth
	Med.Dk.Brn. SEMI-ORG. V.SILTY CLAY.	3'2"
570	Firm Reddish-Brown (w/Some Gray) VERY SILTY CLAY, w/Some Sand.	5'6"
	V.Stiff to V.Hard Brown SILTY CLAY, w/Some Sand, Traces of Gravel.	10'0"
	Stiff to V.Hard (Varies) Gray (w/Some Brn.) SILTY CLAY, w/Few Sand Partings, Tr.Grav.	12'4"
560	V.Stiff Gray SILTY CLAY, w/Some Sand, Little Gravel. (GLACIAL TILL?)	16'6"
	Hard Dk.Gray VF SDY. SILTY CLAY, w/Some Grav. & Rk. Frags. (GLACIAL TILL)	20'0"
550		

Hole dry augered; no ground water encountered.

Hole grouted w/1 bag of bentonite.

No water flow during final inspection on Sept. 9, 1970.





SOIL SAMPLE DATA

Lab & Field Sa. No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f.
BS-1	5.0	571.4	Firm		
LS-1	7.5	568.9	V. Stiff to Hard	13.8	124.6
LS-2	10.0	566.4	V. Hard	12.5	126.9
LS-3	12.5	563.9	Stiff to V. Hard	12.2	125.1
LS-4	15.0	561.4	V. Stiff	12.6	124.1
LS-5	20.0	556.4	Hard	13.4	124.2

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

See Test Boring Location Plan
LOCATION: N-3100; W-1400
TOTAL DEPTH: 20'0"

BORING STARTED: August 24, 1970
BORING COMPLETED: August 24, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R.E. Budzeika
CONTRACTOR: Able Drilling, Inc.
═ WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive ** inch O.D. soil sampler 12 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

** 1.75" O.D. Michigan Liner Sampler used for LS-1 thru LS-4;
2.00" O.D. Heavy wall sampler used for BS-1 and LS-5.

MON 214

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 46 TB46

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GAO | DATE: 6-7-71 | JOB NO. 128-A

LOG OF SUBSURFACE PROFILE

Classifications by: Driller & S&FA
Ground Surface Elev. = 577.4 Ft. (IGLD Datum)

EVATION IN FEET

~~TOPSOIL;Soft Dk.Brn.SEMI-ORG.V.SILTY CLAY.~~

Hard Lt.Brown & Gray CLAYEY SILT,
w/Little Sand.

570

6'6"

V.Hard Brown VERY SILTY CLAY,
w/Traces of Sand & Gravel.

10'8"

~~Hard Gr.(w/Some Brn.) VF SDY. SILTY CLAY,~~
~~w/Traces Gray.&Rk.Frags.(GLACIAL TILL?)~~ 13'0"

Hard Dk.Gray VF SDY.SILTY CLAY,
w/Little Gravel. Few Rock Fragments.
(GLACIAL TILL)

560

20'0"

Hole dry augered; no ground water encountered.

550

Hole grouted w/1 bag of bentonite.

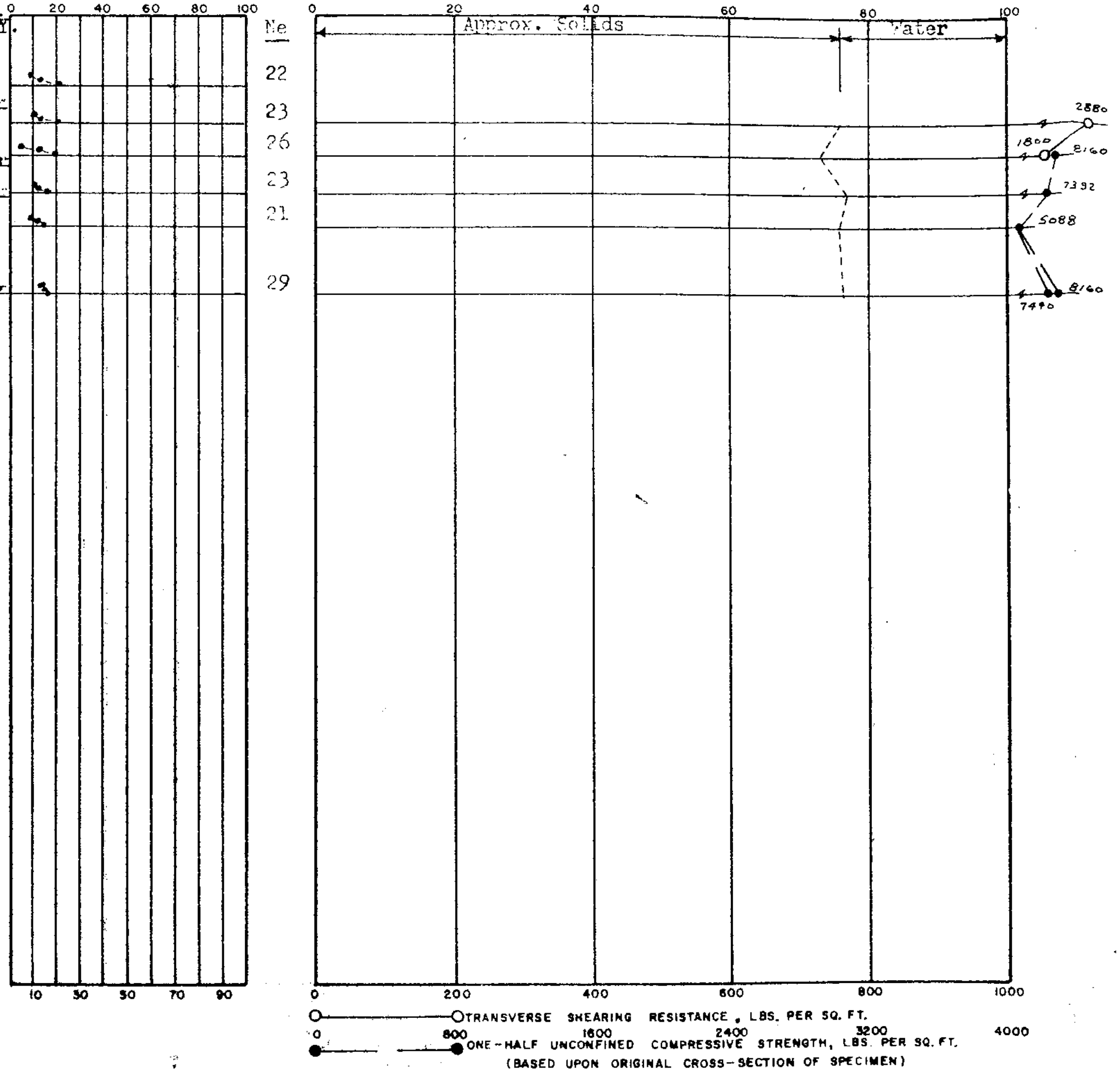
No water flow during final inspection on Sept. 9, 1970.

PENETRATION *

Soil Sampler Penetration Resistance, ASTM D 1586 Blows *

TRANSVERSE SHEARING RESISTANCE & UNCONFINED COMPRESSIVE STRENGTH

Volumetric Proportions of Solids, Water and Air



SOIL SAMPLE DATA

Lab & Field So No	Sample Depth, Feet	Sample Elev., Feet	Laboratory Consistency *	Water Content % by Dry Wt.	Dry Unit Weight p.c.f
BS-1	5.0	572.4	Hard		
LS-1	7.5	569.9	V. Hard	12.3	127.6
LS-2	10.0	567.4	Hard	13.3	122.8
LS-3	12.5	564.9	Hard	11.5	128.5
LS-4	15.0	562.4	V. Stiff	12.5	126.0
LS-5	20.0	557.4	Hard	11.6	127.2

* Laboratory consistency based upon visual examination of sample, independent of field evaluation and strength determined by laboratory test.

MON 215

LOCATION: See Test Boring Location Plan
N-3950; W-1200
TOTAL DEPTH: 20'0"

BORING STARTED: August 24, 1970
BORING COMPLETED: August 24, 1970

INSPECTOR: M.M. Dragicevic (S&FA)
DRILLER: R.T. Budzeika
CONTRACTOR: Able Drilling, Inc.

WATER LEVEL in hole at indicated number of hours after completion of boring; 0 feet of casing in place.

* PENETRATION: Number of blows required to drive 2.00 inch O.D. soil sampler 18 inches, using 140 lb. weight with 30 inch free fall. Ne= Evaluated Blows/Foot
ROCK CORE DIAMETER: None

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

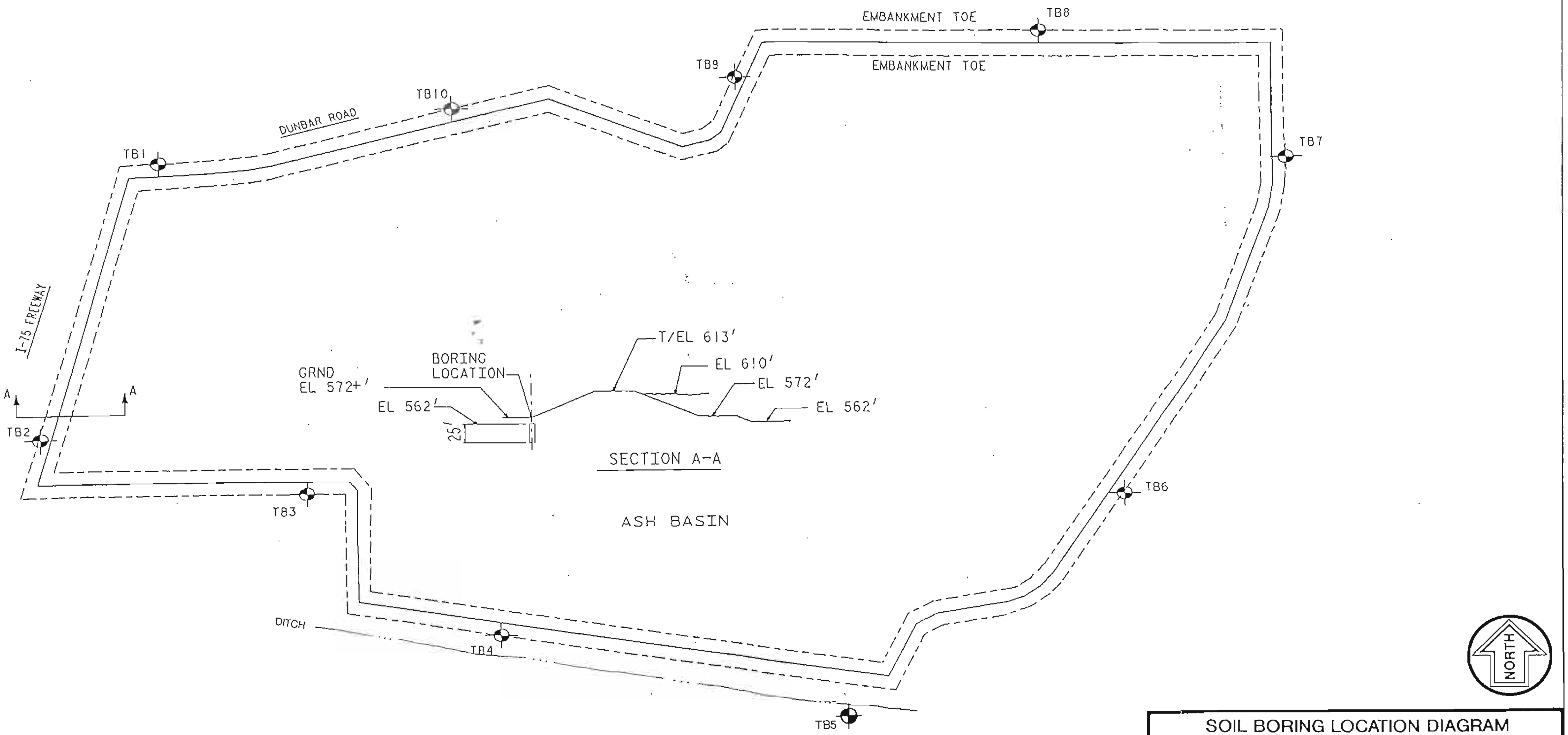
LOG OF TEST BORING NO. 17 TB47

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

APPR: GA DATE: 4-7-71 JOB NO. 123-A

APPENDIX D – 1990s BORING LOGS



NOTE:

THE SOIL BORING ELEVATIONS AND LOCATIONS WERE DETERMINED BY DETROIT EDISON.

TO THE BEST OF OUR KNOWLEDGE, THE BORINGS SHOWN ON THIS PLAN ARE AT THEIR APPROXIMATE LOCATIONS.

SOIL BORING LOCATION DIAGRAM
VERIFICATION OF SOIL BARRIER
MONROE, MICHIGAN

sme
soil and materials engineers, inc

BAY CITY
KALAMAZOO
LANSING
PLYMOUTH
TOLEDO

Date	11-9-94
Drawn By	ARR
Scale	NTS
Job	PG 22087

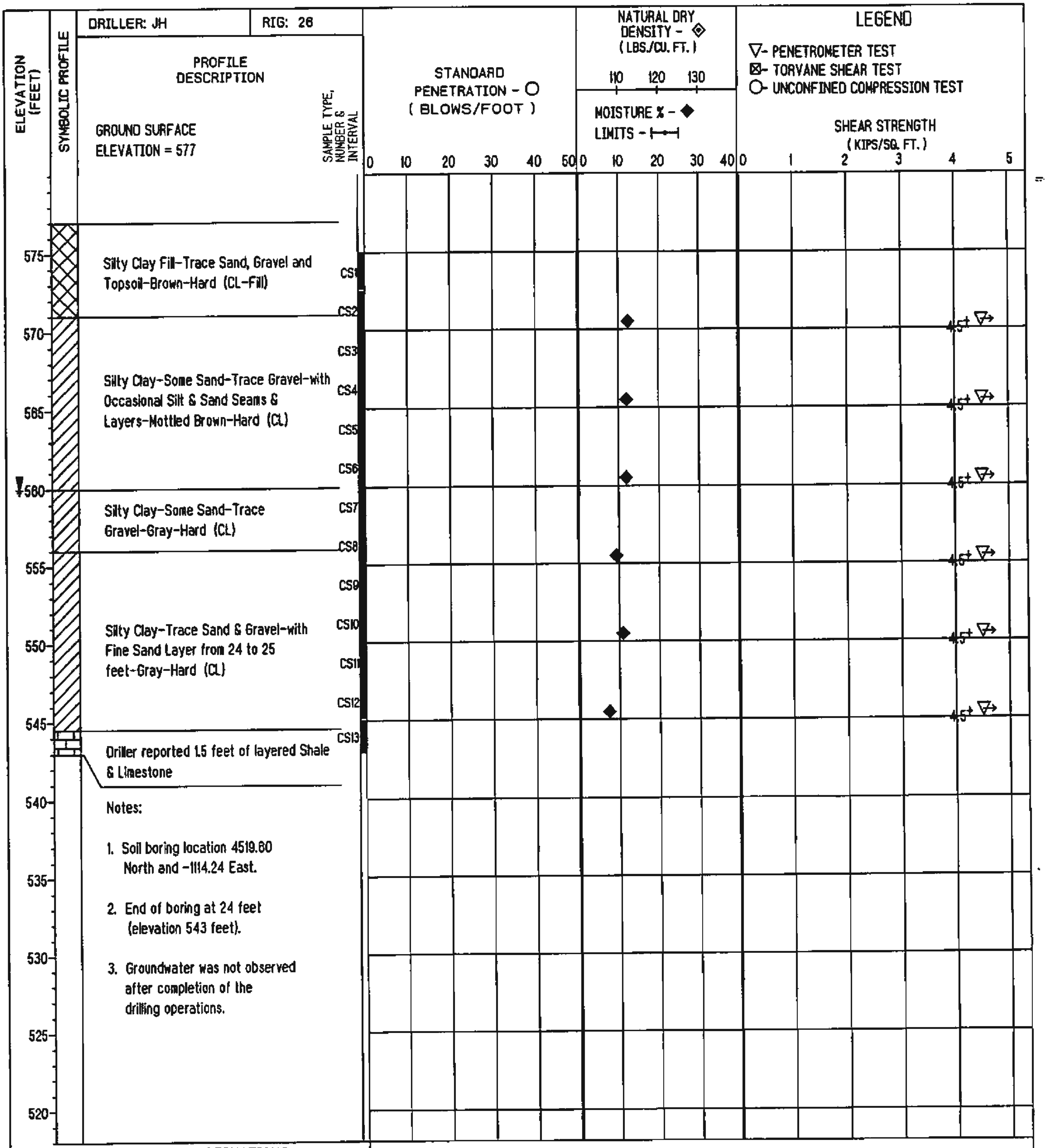
soil and materials engineers, inc.

MON 844

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/12/94
JOB NUMBER: PG22087

BORING TB1
SHEET: 1



DRILLER: JH RIG: 26

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 577

Silty Clay Fill-Trace Sand, Gravel and Topsoil-Brown-Hard (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-with Occasional Silt & Sand Seams & Layers-Mottled Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)

Silty Clay-Trace Sand & Gravel-with Fine Sand Layer from 24 to 25 feet-Gray-Hard (CL)

Driller reported 1.5 feet of layered Shale & Limestone

Notes:

1. Soil boring location 4519.60 North and -1114.24 East.
2. End of boring at 24 feet (elevation 543 feet).
3. Groundwater was not observed after completion of the drilling operations.

LEGEND

▽- PENETROMETER TEST
☒- TORVANE SHEAR TEST
○- UNCONFINED COMPRESSION TEST

WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

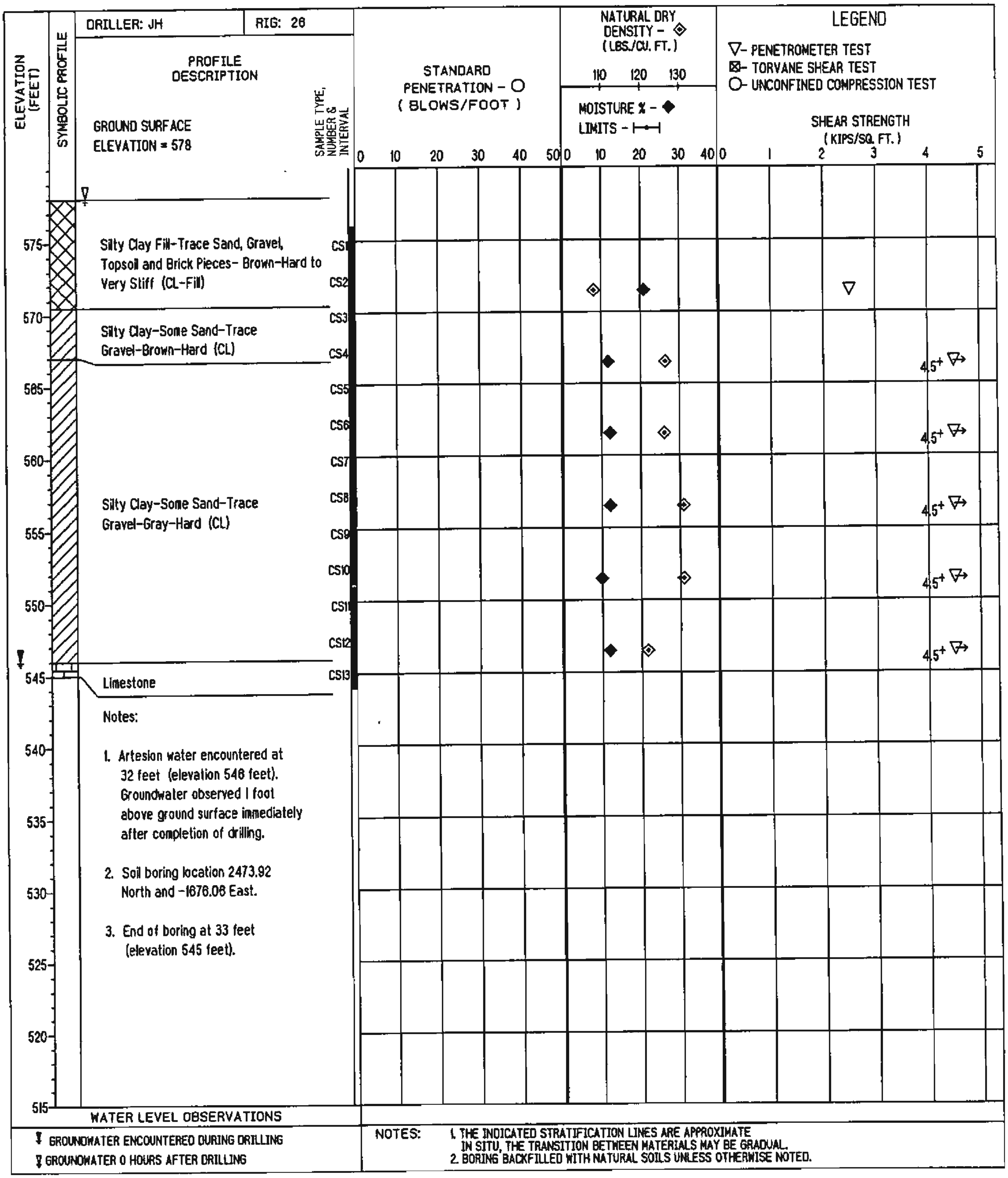
MON 845

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN **DATE:** 9/20/94
JOB NUMBER: PG22087

BORING TB2
SHEET: 1

DRILLER: JH **RIG:** 26



GROUND SURFACE ELEVATION = 578

Silty Clay Fill–Trace Sand, Gravel, Topsoil and Brick Pieces– Brown–Hard to Very Stiff (CL–Fill)

Silty Clay–Some Sand–Trace Gravel–Brown–Hard (CL)

Silty Clay–Some Sand–Trace Gravel–Gray–Hard (CL)

Limestone

Notes:

1. Artesion water encountered at 32 feet (elevation 546 feet). Groundwater observed 1 foot above ground surface immediately after completion of drilling.
2. Soil boring location 2473.92 North and –1676.06 East.
3. End of boring at 33 feet (elevation 545 feet).

WATER LEVEL OBSERVATIONS

Ŧ GROUNDWATER ENCOUNTERED DURING DRILLING
Ṫ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

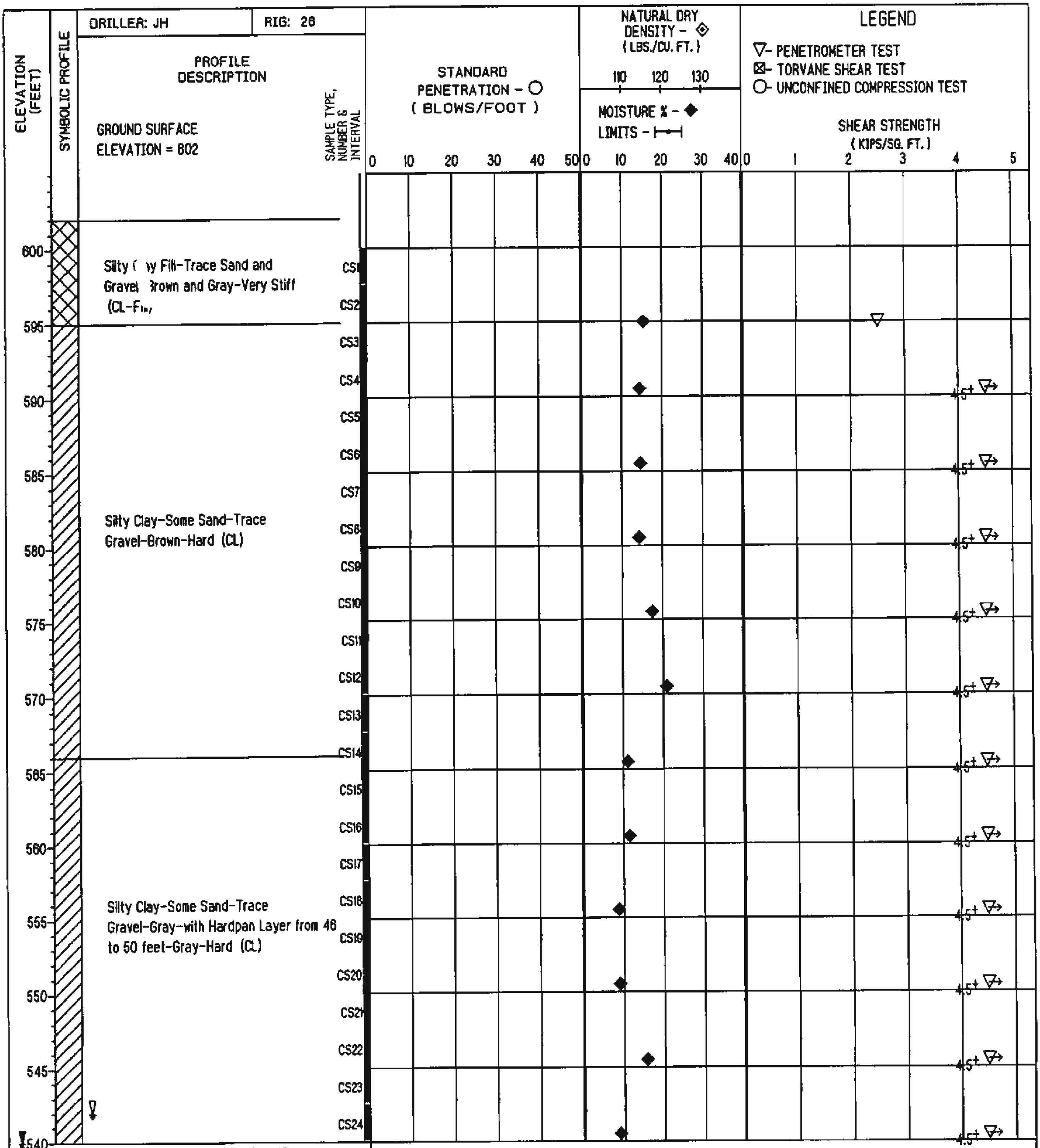
MON 846

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/19/94
JOB NUMBER: PG22087

BORING TB3
SHEET: 1

DRILLER: JH
RIG: 26



GROUND SURFACE ELEVATION = 602

Silty Clay Fill-Trace Sand and Gravel-Brown and Gray-Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-with Hardpan Layer from 46 to 50 feet-Gray-Hard (CL)

WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/19/94
JOB NUMBER: PG22087

BORING TB3
SHEET: 2

DRILLER: JH RIG: 26

ELEVATION (FEET)

SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 602

SAMPLE TYPE, NUMBER & INTERVAL

STANDARD PENETRATION - ○ (BLOWS/FOOT)
0 10 20 30 40 50

NATURAL DRY DENSITY - ◈ (LBS./CU. FT.)
110 120 130

MOISTURE % - ◆
LIMITS - ├─•─┤
0 10 20 30 40

LEGEND
▽- PENETROMETER TEST
☒- TORVANE SHEAR TEST
○- UNCONFINED COMPRESSION TEST

SHEAR STRENGTH (KIPS/SQ. FT.)
0 1 2 3 4 5

Weathered Limestone CS25

Notes:

1. Soil boring location 2441.20 North and -291.12 East.

2. End of boring at 63 feet (elevation 539 feet).

535
530
525
520
515
510
505
500
495
490
485
480
475

WATER LEVEL OBSERVATIONS

Ꭵ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

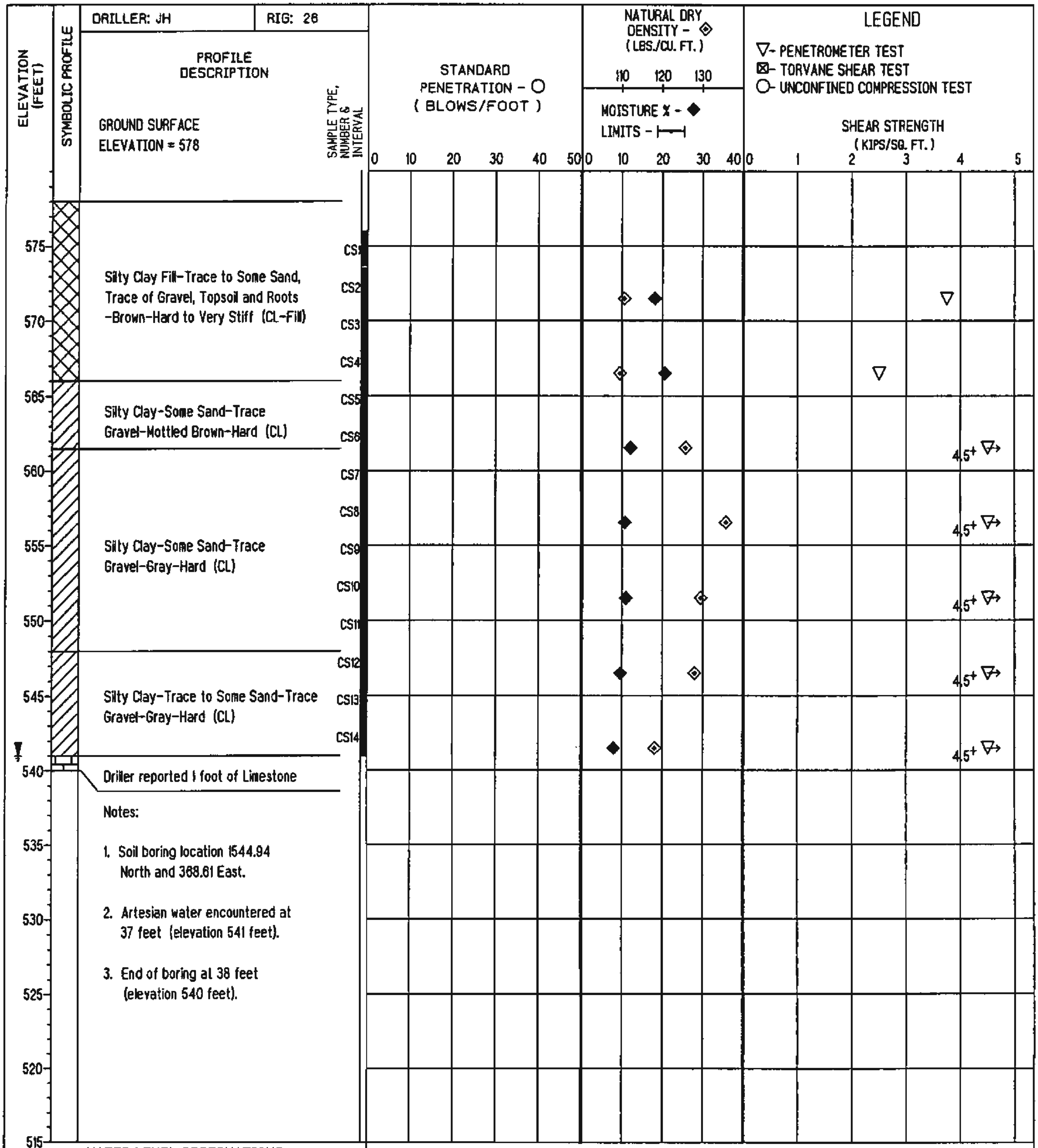
MON 847

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/16/94
JOB NUMBER: PG22087

BORING TB4
SHEET: 1

DRILLER: JH
RIG: 26



GROUND SURFACE ELEVATION = 578

Silty Clay Fill-Trace to Some Sand, Trace of Gravel, Topsoil and Roots -Brown-Hard to Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Mottled Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)

Silty Clay-Trace to Some Sand-Trace Gravel-Gray-Hard (CL)

Driller reported 1 foot of Limestone

Notes:

1. Soil boring location 1544.94 North and 368.61 East.
2. Artesian water encountered at 37 feet (elevation 541 feet).
3. End of boring at 38 feet (elevation 540 feet).

WATER LEVEL OBSERVATIONS

⊥ GROUNDWATER ENCOUNTERED DURING DRILLING

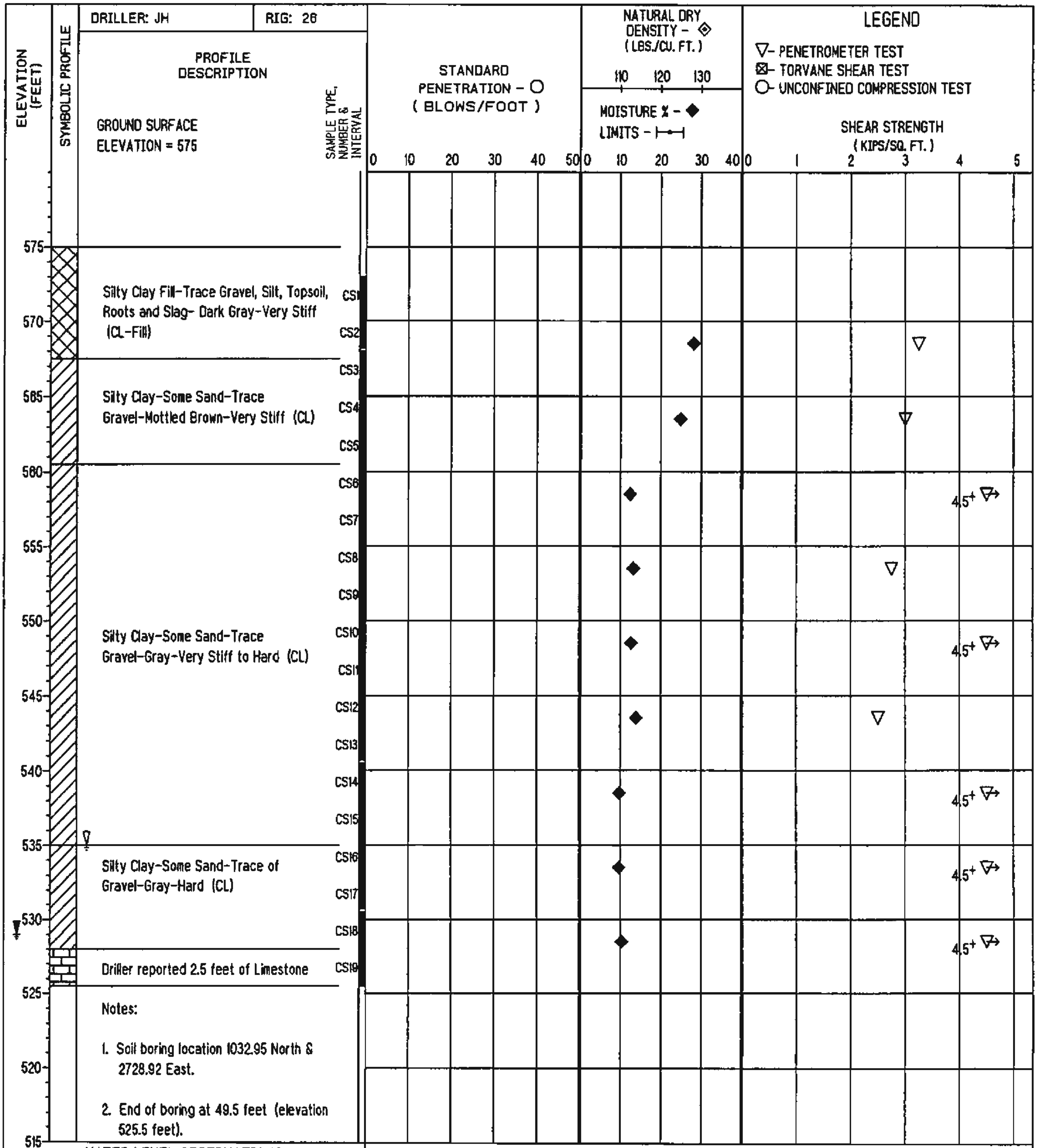
NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 848

JOB NAME:	VERIFICATION OF SOIL BARRIER	A/E:			
JOB LOCATION:	MONROE, MICHIGAN	BY: SDN	DATE: 9/15/94		BORING TB5
OWNER:	DETROIT EDISON	JOB NUMBER:	PG22087		SHEET: 1

DRILLER: JH RIG: 26



GROUND SURFACE ELEVATION = 575

Silty Clay Fill-Trace Gravel, Silt, Topsoil, Roots and Slag- Dark Gray-Very Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-Mottled Brown-Very Stiff (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Very Stiff to Hard (CL)

Silty Clay-Some Sand-Trace of Gravel-Gray-Hard (CL)

Driller reported 2.5 feet of Limestone

Notes:

1. Soil boring location 1032.95 North & 2728.92 East.

2. End of boring at 49.5 feet (elevation 525.5 feet).

WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING

▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:

1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

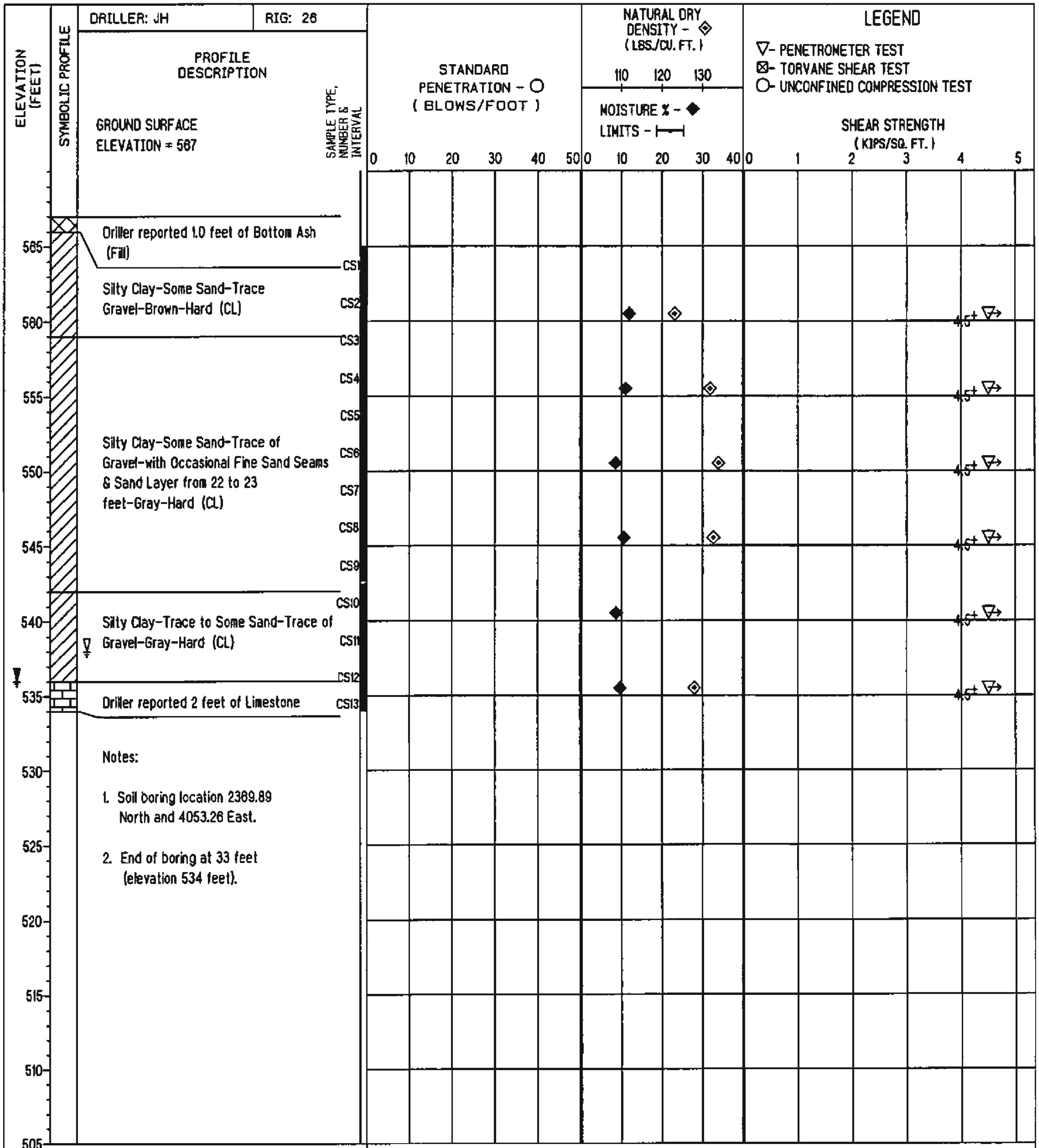
MON 849

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/14/94
JOB NUMBER: PG22087

BORING TB6
SHEET: 1

DRILLER: JH
RIG: 26



GROUND SURFACE ELEVATION = 567

Driller reported 1.0 feet of Bottom Ash (Fill)

Silty Clay-Some Sand-Trace Gravel-Brown-Hard (CL)

Silty Clay-Some Sand-Trace of Gravel-with Occasional Fine Sand Seams & Sand Layer from 22 to 23 feet-Gray-Hard (CL)

Silty Clay-Trace to Some Sand-Trace of Gravel-Gray-Hard (CL)

Driller reported 2 feet of Limestone

Notes:

1. Soil boring location 2369.89 North and 4053.26 East.

2. End of boring at 33 feet (elevation 534 feet).

WATER LEVEL OBSERVATIONS

Ⅰ GROUNDWATER ENCOUNTERED DURING DRILLING
Ⅰ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

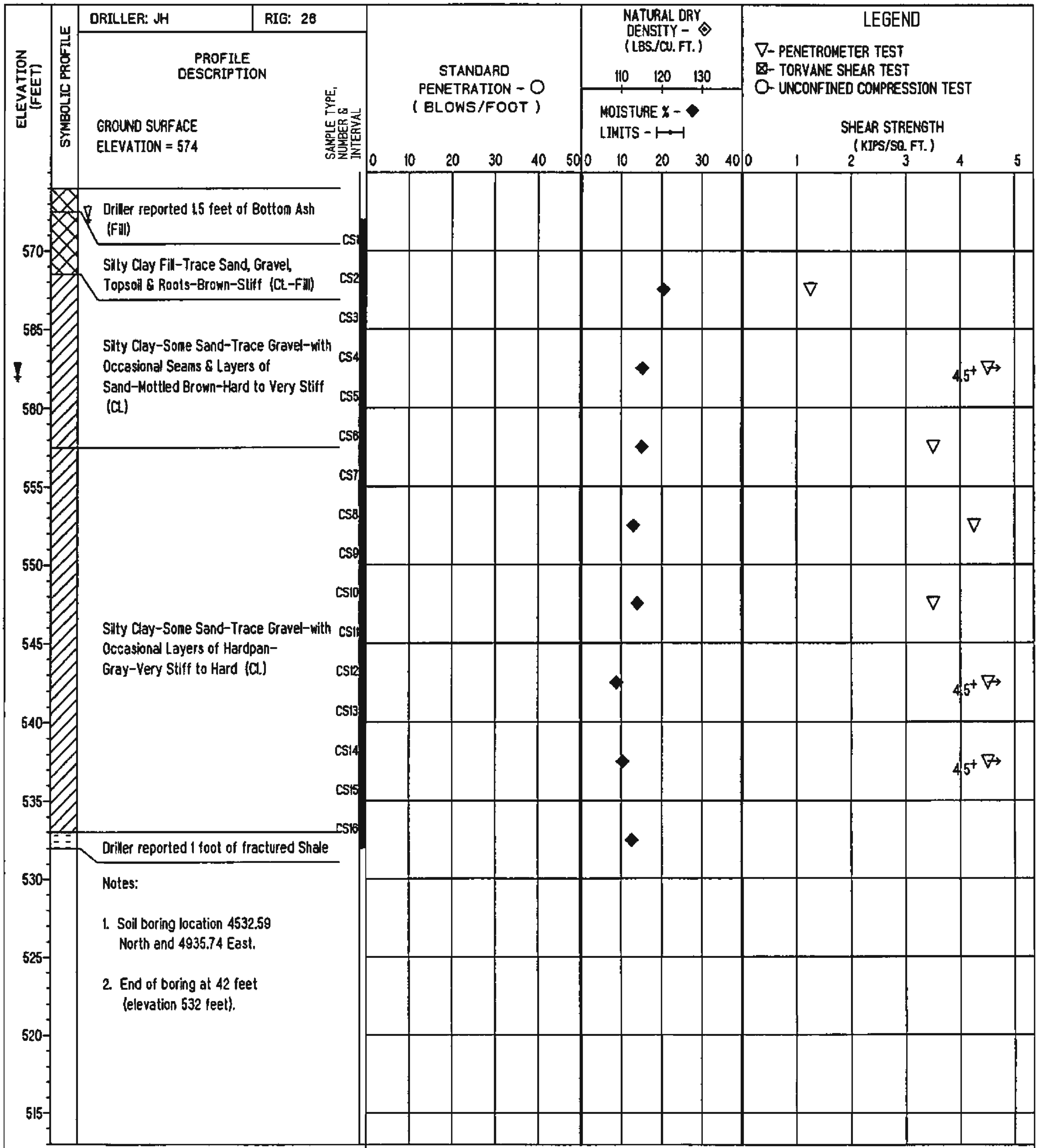
MON 850

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/13/94
JOB NUMBER: PG22087

BORING TB7
SHEET: 1

DRILLER: JH RIG: 28



GROUND SURFACE
ELEVATION = 574

Driller reported 1.5 feet of Bottom Ash (Fill)

Silty Clay Fill-Trace Sand, Gravel, Topsoil & Roots-Brown-Stiff (CL-Fill)

Silty Clay-Some Sand-Trace Gravel-with Occasional Seams & Layers of Sand-Mottled Brown-Hard to Very Stiff (CL)

Silty Clay-Some Sand-Trace Gravel-with Occasional Layers of Hardpan-Gray-Very Stiff to Hard (CL)

Driller reported 1 foot of fractured Shale

Notes:

1. Soil boring location 4532.59 North and 4935.74 East.

2. End of boring at 42 feet (elevation 532 feet).

WATER LEVEL OBSERVATIONS

⯒ GROUNDWATER ENCOUNTERED DURING DRILLING
⯒ GROUNDWATER 24 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

MON 851

JOB NAME: VERIFICATION OF SOIL BARRIER
A/E:
JOB LOCATION: MONROE, MICHIGAN
BY: LMJ/SDN **DATE:** 9/13/94 **BORING TB8**
OWNER: DETROIT EDISON
JOB NUMBER: PG22087 **SHEET:** 1

DRILLER: JH RIG: 28

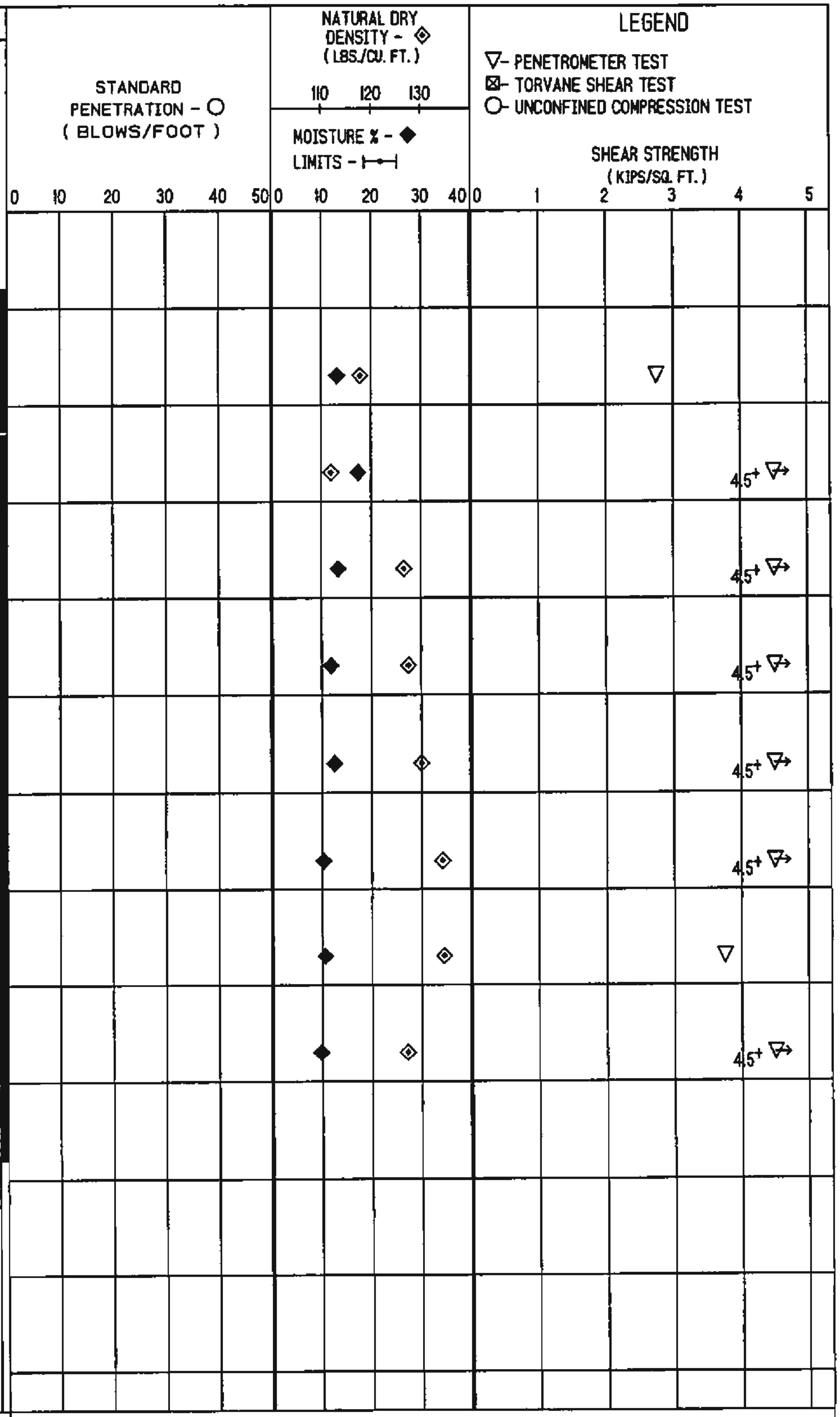
ELEVATION (FEET) | SYMBOLIC PROFILE | PROFILE DESCRIPTION | SAMPLE TYPE, NUMBER & INTERVAL

GROUND SURFACE ELEVATION = 578

ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE, NUMBER & INTERVAL
578–571	Silty Clay Fill-Trace Sand, Gravel and Brick-Brown-Very Stiff to Stiff (CL-Fill)	CS1 CS2
571–561	Silty Clay-Trace Sand and Gravel-with Occasional Sand Seams- Mottled Brown-Hard (CL)	CS3 CS4 CS5 CS6
561–548	Silty Clay-Some Sand-Trace of Gravel-with Occasional Sand Seams-Gray-Hard (CL)	CS7 CS8 CS9 CS10 CS11
548–537	Silty Clay-Some Sand-Trace of Gravel-with Occasional Silt Layers-Gray-Hard (CL)	CS12 CS13 CS14 CS15 CS16
537–532	Weathered Shale-with Occasional Silt & Sand Layers	CS17 CS18

Notes:

1. Soil boring location 5291.48 North and 3558.45 East.
2. End of boring at 46 feet (elevation 532 feet).



WATER LEVEL OBSERVATIONS

- ▼ GROUNDWATER ENCOUNTERED DURING DRILLING
- ▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

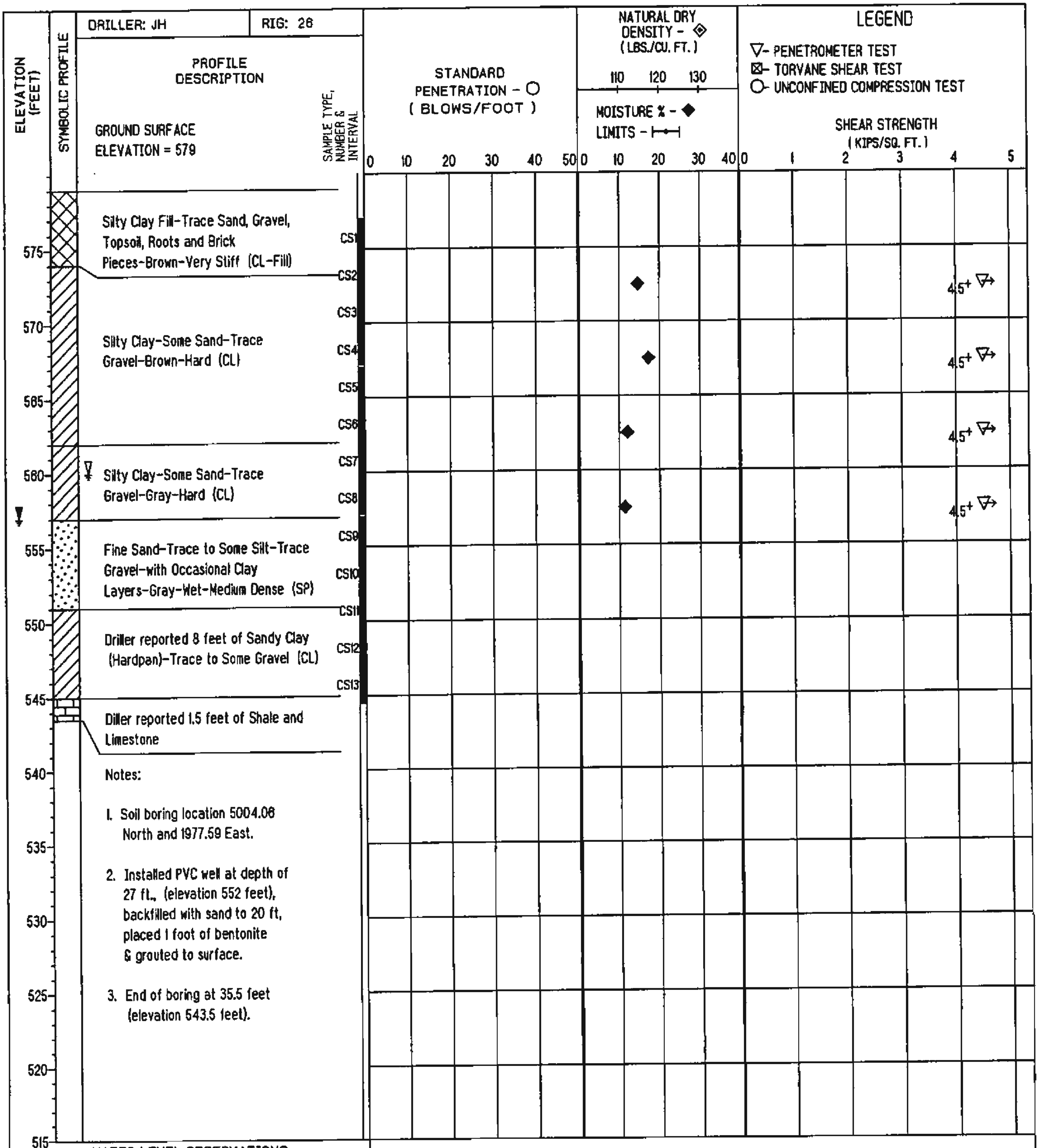
MON 852

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/12/94
JOB NUMBER: PG22087

BORING TB9
SHEET: 1

DRILLER: JH
RIG: 26



LEGEND
▽– PENETROMETER TEST
☒– TORVANE SHEAR TEST
○– UNCONFINED COMPRESSION TEST

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 579

Silty Clay Fill–Trace Sand, Gravel, Topsoil, Roots and Brick Pieces–Brown–Very Stiff (CL–Fill)

Silty Clay–Some Sand–Trace Gravel–Brown–Hard (CL)

Silty Clay–Some Sand–Trace Gravel–Gray–Hard (CL)

Fine Sand–Trace to Some Silt–Trace Gravel–with Occasional Clay Layers–Gray–Wet–Medium Dense (SP)

Driller reported 8 feet of Sandy Clay (Hardpan)–Trace to Some Gravel (CL)

Diller reported 1.5 feet of Shale and Limestone

Notes:

1. Soil boring location 5004.06 North and 1977.59 East.
2. Installed PVC well at depth of 27 ft., (elevation 552 feet), backfilled with sand to 20 ft, placed 1 foot of bentonite & grouted to surface.
3. End of boring at 35.5 feet (elevation 543.5 feet).

WATER LEVEL OBSERVATIONS
▼ GROUNDWATER ENCOUNTERED DURING DRILLING
▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

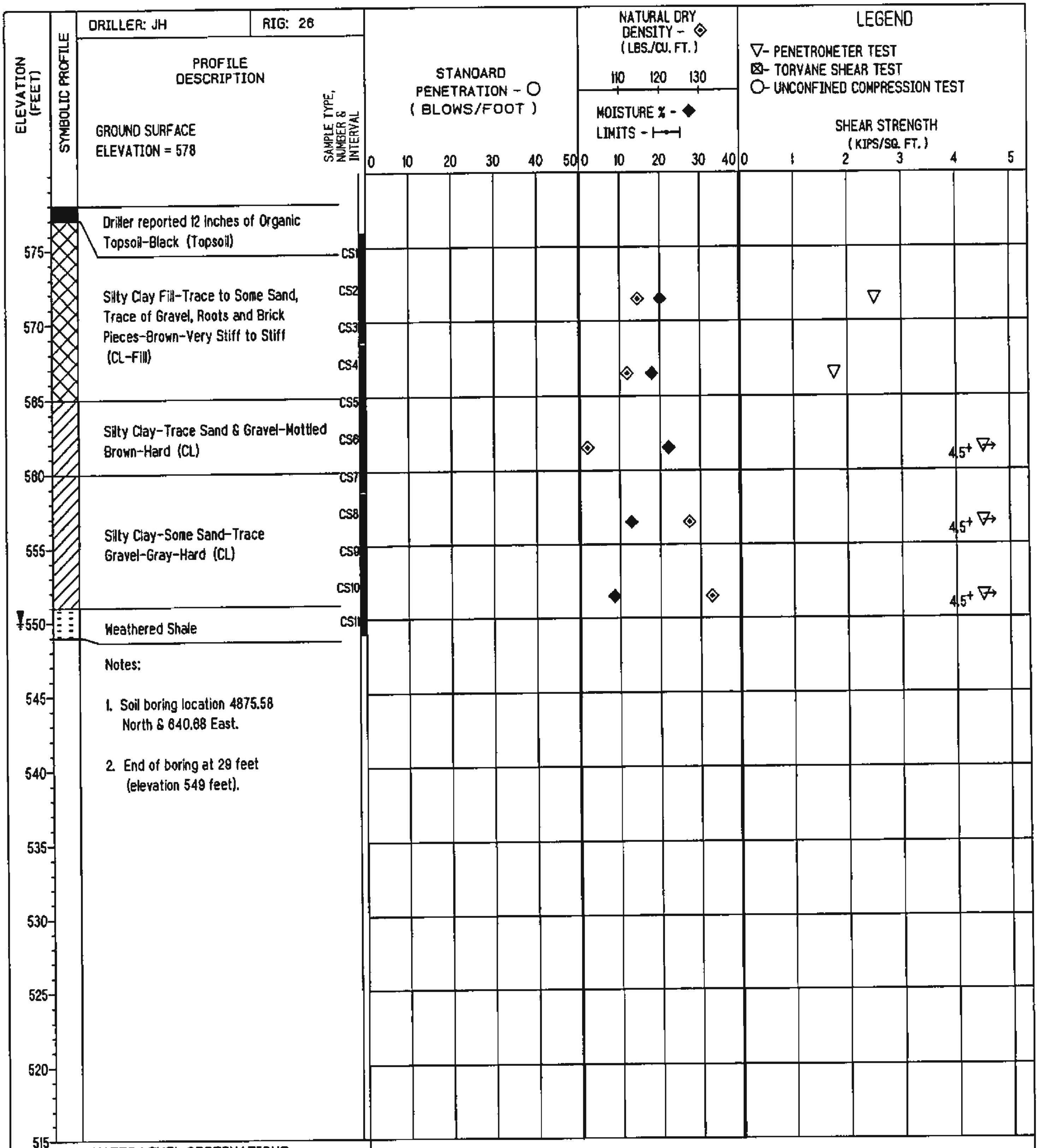
MON 853

JOB NAME: VERIFICATION OF SOIL BARRIER
JOB LOCATION: MONROE, MICHIGAN
OWNER: DETROIT EDISON

A/E:
BY: SDN DATE: 9/9/94
JOB NUMBER: PG22087

BORING TB10
SHEET: 1

DRILLER: JH RIG: 26



GROUND SURFACE
ELEVATION = 578

Driller reported 12 inches of Organic Topsoil-Black (Topsoil)

Silty Clay Fill-Trace to Some Sand, Trace of Gravel, Roots and Brick Pieces-Brown-Very Stiff to Stiff (CL-Fill)

Silty Clay-Trace Sand & Gravel-Mottled Brown-Hard (CL)

Silty Clay-Some Sand-Trace Gravel-Gray-Hard (CL)

Weathered Shale

Notes:

1. Soil boring location 4875.58 North & 640.68 East.
2. End of boring at 29 feet (elevation 549 feet).

WATER LEVEL OBSERVATIONS

⫫ GROUNDWATER ENCOUNTERED DURING DRILLING

NOTES:
1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

APPENDIX E – 2016 BORING LOGS

LEGEND

⌖ MONITORING WELLS

— APPROXIMATE BOUNDARY OF FLY ASH BASIN

NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN MARCH AND MAY 2016.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

DTE ELECTRIC COMPANY
MONROE POWER PLANT FLY ASH BASIN
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:

MONITORING NETWORK AND SITE PLAN

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0001
CHECKED BY:	C. SCIESZKA	**FIGURE 1**	
APPROVED BY:	V. BUENING		
DATE:	OCTOBER 2017		

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trcsolutions.com

FILE NO.: 265996-0001-000_Stat.mxd

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 17N (Meter)
Map Rotation: 0

Plot Date: 10/4/2017, 13:56:35 PM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0001-000_Stat.mxd

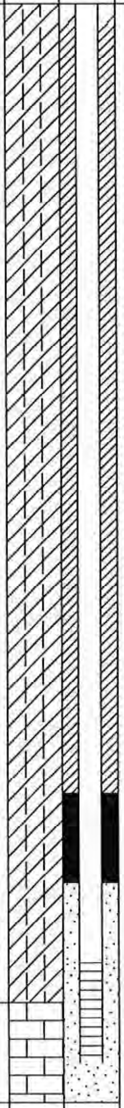
WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 2/17/16	Date Drilling Completed: 2/17/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 578.91	TOC Elevation (ft) 581.74	Total Depth (ft bgs) 60.0 / Borehole Dia. (in) 6
Boring Location: SW of fly ash basin. N: 143121.86 E: 13394675.84		Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic
Civil Town/City/or Village: Monroe, MI	County: Monroe / State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 08:45 ▼ Depth (ft bgs) 2.00		

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	65			▼ **SILTY CLAY** mostly clay, some silt, low plasticity, very dark gray (7.5YR 3/1), no odor, moist, medium stiff, high organic content, roots and grass. Change to no roots at 3.5 feet. Change to hard at 5.0 feet. Change to medium stiff at 5.5 feet. Change to trace to few gravel at 6.0 feet.				
2 CS	95		10	Change to medium plasticity, dark gray (10YR 4/1) mottled with yellowish brown (10YR 5/6), at 12.5 feet. Change to dark gray (10YR 4/1), very stiff at 17.5 feet.				
3 ST	60		20					
4 CS	100				CL-ML			
5 CS	100		30	Change to weathered limestone appearance, light gray (10YR 7/1), slight odor, stiff at 32.5 feet.				
6 CS	95		40	Change to not cohesive at 42.5 feet. Change to little silt, few coarse sand at 43.5 feet. Change to some silt, trace coarse sand at 45.0 feet. Grades to wet from 40 to 48 feet. Change to bedrock fragments encountered, wet at 48.0 feet.				
7 CS	100		50	**LIMESTONE** very weathered, light gray (10YR 7/1), moist, medium dense, similar to silt.				
				End of boring at 55.0 feet below ground surface.				



Signature: Reed

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734-971-7080
Fax 734-971-9022

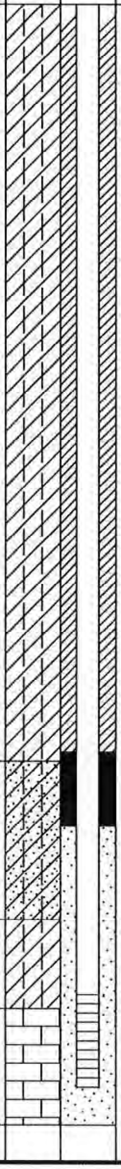
WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 2/18/16	Date Drilling Completed: 2/18/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 579.44	TOC Elevation (ft) 581.81	Total Depth (ft bgs) 55.0 / Borehole Dia. (in) 6
Boring Location: S of fly ash basin. N: 140938.78 E: 13396986.03		Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic
Civil Town/City/or Village: Monroe, MI	County: Monroe / State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 09:30 Depth (ft bgs) -4.82		

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	90			**SILTY CLAY** mostly clay, some silt, trace to few sand, trace to few gravel, low plasticity, dark brown (10YR 3/3), no odor, moist, hard. Change to dry at 3.25 feet. Change to dark gray (10YR 4/1) at 5.0 feet.		Artesian well conditions present.
2 CS	95		10	Change to moist at 9.5 feet Change to very stiff at 10.5 feet. Change to dark gray (10YR 4/1), mottled with light reddish brown (5YR 6/3) at 12.0 feet.		
3 ST	65		20		CL-ML	
4 CS	100			Change to no mottling at 25.0 feet.		
5 ST	95		30			
6 CS	100					
7 CS	100		40	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine to coarse sand, low plasticity, dark gray (10YR 4/1), no odor, moist, very stiff. Change to light gray (10YR 7/1), slight odor at 42.5 feet.	CL-ML	
8 CS	100		50	**SILTY CLAY** mostly clay, some silt, few gravel, very low plasticity, light gray (10YR 7/1), slight odor, moist, hard. Change to dry, not cohesive at 51.5 feet.	CL-ML	
				LIMESTONE weathered, slight odor, saturated.		
			60	End of boring at 60.0 feet below ground surface.		



Signature:

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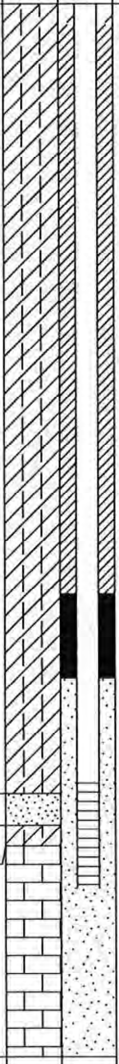
WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 2/16/16	Date Drilling Completed: 2/16/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 577.29	TOC Elevation (ft) 579.95
Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6		
Boring Location: E of fly ash basin. N: 139040.68 E: 13395136.56	Personnel Logged By - Chris Scieszka Driller - Austin Goldsmith	Drilling Equipment: TerraSonic	
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	

Water Level Observations:
While Drilling: Date/Time Depth (ft bgs)
After Drilling: Date/Time 3/17/16 09:25 Depth (ft bgs) -13.95



SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	70			**SILTY CLAY** mostly clay, some silt, low plasticity, very dark brown (10YR 2/2), no odor, moist, medium stiff (2.0 tsf), high organics, roots. Change to no roots, trace fine gravel at 2.5 feet. Change to wood fragments present at 8.0 feet.		Artesian well conditions present.
2 CS	60		10	Change to medium to high plasticity, dark gray (10YR 4/1), mottled with yellowish brown (10YR 5/6) and light reddish brown (5YR 6/3), no organics at 10.0 feet. Change to trace to few fine to coarse sand, trace to few fine gravel low plasticity, yellowish brown (10YR 5/4), at 12.0 feet. Change to dark gray (10YR 4/1), very stiff (3.0 tsf) at 17.0 feet.	CL-ML	
3 ST	100		20			
4 CS	100					
5 CS	100		30	Change to hard (>4.0 tsf) at 30.0 feet. **SAND** mostly fine to coarse sand, trace to few silt, very dark gray (10YR 3/1), no odor, moist, loose.	SP	
6 CS	100		40	**SILTY CLAY** mostly clay, some silt, low plasticity, dark gray (10YR 4/1), no odor, moist, very stiff (3.0 tsf). **LIMESTONE** light gray (10YR 7/1), slight odor, weathered, saturated. Change to very weathered, moist at 41.0 feet. Change to competent, dry.	CL-ML	
			50	End of boring at 50.0 feet below ground surface.		

Signature:

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WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Page 1 of 1

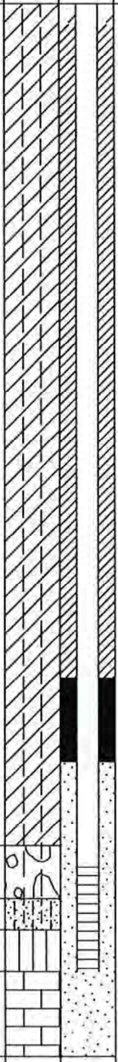
Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 2/15/16	Date Drilling Completed: 2/15/16	Project Number: 231828.0001.0000

Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 582.64	TOC Elevation (ft) 585.54	Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6

Boring Location: N of fly ash basin. N: 140704.67 E: 13390758.97	Personnel Logged By - Chris Scieszka Driller - Austin Goldsmith	Drilling Equipment: TerraSonic

Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 3/17/16 10:15 Depth (ft bgs) -19.40

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	20			**SILTY CLAY** mostly clay, little to some silt, trace to few fine to coarse sand, trace to few fine to coarse gravel, low plasticity, dark brown (10YR 3/3), no odor, dry, hard (>4.0 tsf).		Artesian well conditions present.
			10	Change to soft (0.5 tsf) at 10.0 feet.		
2 CS	100			Change to very stiff (3 to 4 tsf) at 15.0 feet.		
3 ST	80		20	Change to dark gray (10YR 4/1) at 19.0 feet.	CL-ML	
				Change to very stiff to hard (3 to >4 tsf) at 22.0 feet.		
4 CS	100					
			30	Change to cobble present at 29.5 feet. Change to hard (>4.0 tsf) at 31.0 feet.		
5 CS	100					
6 CS	80		40	**SILTY GRAVEL** mostly fine to coarse gravel, little to some silt, few fine to coarse sand, gray (10YR 5/1), no odor, saturated, medium dense to dense.	GM	
				SILTY SAND mostly fine to medium sand, little to some silt, gray (10YR 5/1), no odor, moist to saturated, dense to very dense.	SM	
				SILT mostly silt, trace to few fine sand, no plasticity, dark grayish brown (10YR 4/2), no odor, dry, very dense.	ML	
			50	**LIMESTONE** gray (10YR 5/1) to dark gray (10 R 4/1), dry, competent but fractured.		
				End of boring at 50.0 feet below ground surface.		



Signature:

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734-971-7080
Fax 734-971-9022

SOIL BORING WELL CONSTRUCTION LOG 231828.0001.GPJ TRC_CORP.GDT 231828.0001.0000 5/16/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB	Date Drilling Started: 4/12/16	Date Drilling Completed: 4/13/16	Project Number: 231828.0001.0000

Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft): 580.51	TOC Elevation (ft): 583.25	Total Depth (ft bgs): 50.0	Borehole Dia. (in): 6

Boring Location: S edge of fly ash basin, along farm field edge.
N: 139537.14 E: 13392810.51

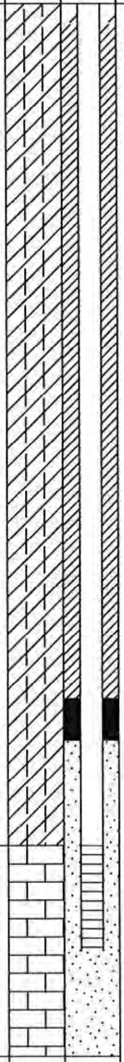
Personnel
Logged By - Jennifer Reed
Driller - Austin Goldsmith

Drilling Equipment: TerraSonic

Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan

Water Level Observations:
While Drilling: Date/Time Depth (ft bgs)
After Drilling: Date/Time 5/5/16 12:47 Depth (ft bgs) -16.70

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
1 CS	75			**SILTY CLAY** mostly clay, little to some silt, low plasticity, very dark brown (10YR 2/2), no odor, moist, medium stiff, organic material present, roots and grass. Change to few to little fine to coarse sand at 2.5 feet. Change to brown (10YR 5/3), very stiff, no organic material at 5.0 feet. Change to trace to few gravel, gray (10YR 5/1) at 7.5 feet.	CL-ML	Artesian well conditions present.
2 CS	100		10			
3 CS	100		20			
4 CS	100		30	Change to no to trace fine to medium sand, no gravel, dark gray (10YR 4/1), hard at 30 feet.		
5 CS	100		40	**LIMESTONE** weathered, light gray (10YR 7/1), slight odor, moist to dry. Change to competent at 46.5 feet.		
			50	End of boring at 50.0 feet below ground surface.		



Signature: Reed	Firm: TRC Environmental Corporation 1540 Eisenhower Place Ann Arbor, Michigan	734-971-7080 Fax 734-971-9022

TRC

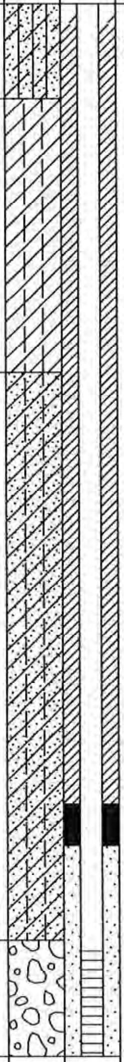
WELL CONSTRUCTION LOG

WELL NO. MW-16-06

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB			Date Drilling Started: 4/13/16	Date Drilling Completed: 4/13/16		Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic		Surface Elev. (ft) 579.20	TOC Elevation (ft) 581.94	Total Depth (ft bgs) 50.0	Borehole Dia. (in) 6
Boring Location: NE of fly ash basin, along the river's edge. N: 142566.72 E: 13396398.37			Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic	
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 5/5/16 09:30 Depth (ft bgs) -3.45			

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	98			**CLAYEY SILT WITH SAND** mostly silt, few to little fine to coarse sand, few to little clay, black (10YR 2/1), no odor, moist, medium stiff, high organic content, roots and grass. Change to very dark gray (10YR 3/1) at 2.5 feet.	ML-CL			Artesian well conditions present.
				SILTY CLAY mostly clay, some silt, few to little fine to coarse sand, light yellowish brown (10YR 6/4), moist, medium stiff. Change to brown (10YR 5/3), very stiff to hard at 7.0 feet.				
			10	Change to dark gray (10YR 4/1), hard at 11.5 feet.	CL-ML			
2 CS	100			Change to no to trace sand at 15.0 feet.				
				SILTY CLAY WITH SAND mostly clay, some silt, little fine to coarse sand, dark gray (10YR 4/1), moist, hard.				
			20					
3 CS	100							
			30		CL-ML			
4 CS	100							
			40					
5 CS	100			**GRAVEL AND COBBLES** large broken limestone boulders, and cobbles, saturated.	GP			
			50	End of boring at 50.0 feet below ground surface.				



Signature: Reed

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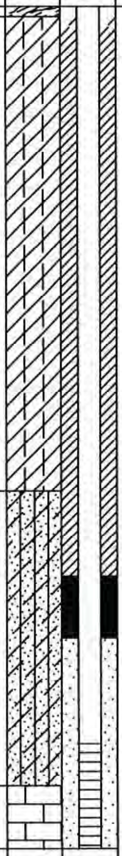
1540 Eisenhower Place Ann Arbor, Michigan
734-971-7080
Fax 734-971-9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

Page 1 of 1

Facility/Project Name: DTE EC: Monroe FAB		Date Drilling Started: 4/14/16	Date Drilling Completed: 4/14/16	Project Number: 231828.0001.0000
Drilling Firm: Stock Drilling	Drilling Method: Sonic	Surface Elev. (ft) 575.41	TOC Elevation (ft) 578.40	Total Depth (ft bgs) 40.0
				Borehole Dia. (in) 6
Boring Location: N of fly ash basin, S of E Dunbar Road, W of main gate. N: 143408.82 E: 13392311.01		Personnel Logged By - Jennifer Reed Driller - Austin Goldsmith		Drilling Equipment: TerraSonic
Civil Town/City/or Village: Monroe, MI	County: Monroe	State: Michigan	Water Level Observations: While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 5/5/16 10:44 Depth (ft bgs)	



SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	COMMENTS
				TOPSOIL		
				SILTY CLAY mostly clay, some silt, few to little sand, brown (10YR 5/3) to gray (10YR 5/1), no odor, moist, medium stiff.		Artesian well conditions present.
1 CS	95					
			10	Change to dark gray (10YR 4/1) at 9.5 feet.	CL-ML	
2 CS	100					
			20			
				SANDY SILT WITH CLAY mostly silt, little sand, little clay, dark gray (10YR 4/1), moist, medium to very stiff.		
3 CS	100			Change to little to some sand at 25.0 feet.		
				Change to gray (GLEY1 5/N), crumbly at 28.5 feet.		
			30		ML-CL	
4 CS	100			Change to wet at 35.0 feet.		
				LIMESTONE weathered, light gray (10YR 7/1), slight odor, wet.		
			40	Change to saturated at 39.5 feet.		
				End of boring at 40.0 feet below ground surface.		
			50			

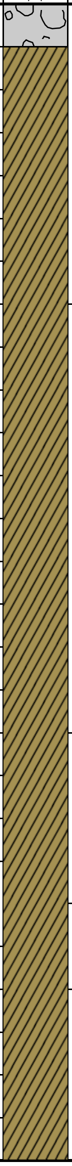
Signature: for J Reed

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734-971-7080
Fax 734-971-9022

APPENDIX F – 2020 BORING LOGS

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-1**

Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847	-83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610		6'/6'	B-1-1 (0-6')	GRAVEL (GP) - Gray gravel fill with coarse sand SILTY CLAY (CL) - Dark brown, slight reddish brown mottling, trace coarse and fine gravel, little sand, stiff to hard, moist	>4.5, 1.5, 3.5, 1.0	Boring drilled through the crest of the embankment at Station 90+00
605 600		10.5'/ 10'	B-1-2 (6-16')	Becomes grayish brown to brown Becomes dark brown, more gravelly Becomes less gravelly	2.0, 4.0, 3.0, 4.0, 1.0, 3.5, 1.0	
595		4'/4'	B-1-3 (16-20')	Becomes medium stiff to very stiff Becomes light brown	1.0, 1.0, 2.0, 0.5	
		50%	B-1-ST-1 (20-22.5')		>4.5	
590		6'/3.5'	B-1-4 (22.5-26')	Becomes dark brown, slight reddish brown mottling, some coarse gravel and sand, trace fine gravel, stiff to hard, moist	4.0, 1.5, 2.0	

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-1

Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847 -83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585 580	▨	9.5'/ 10'	B-1-5 (26-36')	Same as above, little sand Becomes more gravelly from 32' to 35'	2.0, 4.0, 4.5, 4.0, 1.5	
575	▨	6'/4'	B-1-6 (36-40')	Becomes medium to dark brown, some sand, hard, moist	4.0, 4.5	
	▨	75%	B-1-ST-2 (40-42.5')		>4.5	
570	▨	6'/3.5'	B-1-7 (42.5-46')	Becomes gray to dark gray, some brown mottling, some coarse gravel and sand, hard, moist to dry	>4.5	
565 560	▨	11'/10'	B-1-8 (46-56')	Same as above, few gravel Same as above, very stiff to hard	>4.5, 3.5, 2.5, 3.0, 2.5, 4.5, 4.0	

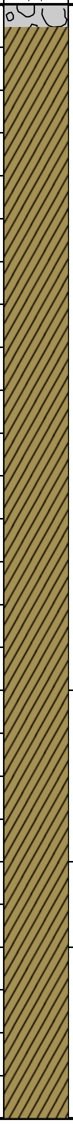
Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-1**

Drilling Start Date:	12/1/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/2/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8847	-83.3855

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY (ft.)**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	5.5'/ 4'	B-1-9 (56-60')	Same as above, very stiff	3.0, 2.0	
		100%	B-1-ST-3 (60-62.5)	Become gray to dark gray, some brown mottling, some coarse gravel and sand, hard, moist to dry	4.5	
550		5'/3.5'	B-1-10 (62.5-66')	Becomes dark gray, some coarse and fine gravel, some sand, very stiff to hard, moist	4.5, 4.5	
		9'/10'	B-1-11 (66-76')		3.0	
545 540				Same as above, beomces few gravel End of boring at 76'		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-2**

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816	-83.3816



Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610		4'/6'	B-2-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with sand from 0" to 4" SILTY CLAY (CL) - Light brown silty clay, some sand, few coarse and fine gravel, stiff to hard, moist	>4.5, 2.5, 3.5, 2.5	Boring drilled through the crest of the embankment at Station 110+00
605 600		7'/10'	B-2-2 (6'-16')	Becomes few gravel, little sand, medium stiff to hard, moist Becomes more sandy from 6' to 8' Becomes more gravelly from 15' to 17'	1.0, 2.5, 1.5, 4.5, 0.5, 0.5	
		3'/4'	B-2-3 (16'-20')		0.5, 0.5, 1.0	
595		75%	B-2-ST-2 (20'-22')		1.0	
590		4'/4'	B-2-4 (22'-26')	Becomes sandier, few coarse and fine gravel, medium stiff to hard, moist Slight reddish-brown mottling from 24' to 25'	1.0, >4.5, 3.5	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-2**

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816 | -83.3816

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585 580	▨	8'/10'	B-2-5 (26'-36')	Same as above	2.0, 4.0, >4.5, 3.5, 1.5	
575 570	▨	7'/10'	B-2-6 (36'-46')	Becomes dark brown, few reddish-brown mottling, coarse gravel, little sand, stiff to hard, moist	1.5, 2.5, >4.5, 2.5, 2.5, 1.5	
565 560	▨	10'/10'	B-2-7 (46'-56')	Becomes dark gray to brownish gray, few reddish-brown mottling, stiff to hard, moist	1.5, 3.0, 1.5, 2.5, >4.5, 4.5	

Geosyntec consultants	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-2**

Drilling Start Date:	12/2/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs)**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8816 -83.3816

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨			Becomes very stiff to hard		
	▨			Same as above, with white to light gray gravelly coarse sand, some coarse gravel from 59' to 60'		
555	▨	10'/10'	B-2-8 (56'-66')		4.5, 2.5, >4.5, >4.5, >4.5	
550	▨					
	▨			Becomes medium gray, moist to wet, slight odor		
545	▨			Becomes more gravelly	>4.5, >4.5, 2.5, 1.5, 3.0, 2.0, 4.0	
	▨	10'/10'	B-2-9 (66'-76')			
	▨					Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout
540	▨					
	▨			*End of boring at 76'*		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-3**

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785	-83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615				GRAVEL (GP) - Gray gravel fill with coarse sand 0" to 6"		Boring drilled through the crest of the embankment at Station 130+00
610	▨	7'/10'	B-3-1 (0'-10')	SILTY CLAY (CL) - Medium brown with few reddish-brown mottling, trace gravel, little sand, medium stiff to hard, moist to dry	2.5, 3.0, 4.5, >4.5, 0.5	
605	▨	3.5'/6'	B-3-2 (10'-16')	Same as above, with consistency from stiff to hard Becomes less sandy, more silty	4.0, 1.5, 2.0	
600 595 590	▨	8'/10'	B-3-3 (16'-26')	Same as above, becomes dark brown with few reddish-brown mottling, trace gravel, stiff to hard, moist to dry Slight reddish-brown mottling from 24' to 25'	1.5, 2.5, 2.5, 4.5	

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-3

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785 -83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585 580	▨	9'/10'	B-3-4 (26'-36')	Same as above	3.0, 3.0, 4.0, >4.5	
575 570	▨	10'/10'	B-3-5 (36'-46')	Same as above, no gravel Becomes less sandy, more silty	4.0, 2.5, 3.5, 4.5, >4.5	
565 560	▨	10'/10'	B-3-6 (46'-56')	Some reddish-brown mottling, more gravelly Color changes gradually from brown to gray from 50 to 53'	>4.5, 3.5, 4.0, 3.5, 4.0, 3.0, 4.0, 3.0, 2.5	

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-3

Drilling Start Date:	12/3/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/3/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8785	-83.376

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨			Becomes medium gray, trace gravel, little sand, moist		
	▨			Becomes more gravelly	3.0, 1.5, 0.5, 1.0, 1.5, <0.5	
555	▨	10'/10'	B-3-7 (56'-66')			
	▨			Trace white fine sand, becomes more gravelly		
550	▨			Becomes dark gray, more gravelly, some medium to coarse sand, few clay, dry		
545	▨	10'/10'	B-3-8 (66'-76')	Same as above	>4.5, >4.5, >4.5, >4.5	
540	▨			*End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-4

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779	-83.3696

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610	○	3.5'/6'	B-4-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0" to 6" Becomes light brown		Boring drilled through the crest of the embankment at Station 150+00
605	▨	3'/9'	B-4-2 (6'-15')	SILTY CLAY (CL) - Light to medium brown, little coarse gravel, few fine gravel, few sand, stiff to very stiff, moist	1.5, 1.5, 1.5, 2.5	
600	▨	83%	B-4-ST-1 (15'-17')	Becomes trace gravel, little sand	4.0	
595	▨	3.5'/4'	B-4-3 (17'-21')	Becomes less gravelly; few reddish-brown mottling	1.5, 1.5, 4.0	
590	▨	4'/5'	B-4-4 (21'-26')		1.5, 2.0, 3.0	

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779 -83.3696

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨	10'/14'	B-4-5 (26-30')	Same as above, with medium stiff to very stiff consistency	0.5, 3.5	
585			B-4-6 (30'-35')	Becomes medium to dark brown, very stiff to hard, moist to dry	2.0, 2.0, 2.5, 3.5	
580			B-4-7 (35'-40')	Same as above Becomes brownish-gray from 39.5' to 40'	>4.5, 3.5	
575		96%	B-4-ST-2 (40'-42')		3.5	
		3'/4'	B-4-8 (42'-46')	Same as above	4.5	
570		11'/9'	B-4-9 (46'-51')	Becomes less gravelly	2.5, 4.5, 4.5	
565			B-4-10 (51'-55')	Becomes dark gray, few brown mottling, some fine gravel, little coarse gravel, little sand, very stiff to hard, dry	3.5, >4.5, >4.5, 3.5	
560		100%	B-4-ST-3 (55'-57.5')	Becomes trace gravel	> 4.5	

Drilling Start Date:	12/4/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/4/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8779	-83.3696

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6/5.5'	B-4-11 (57.5'-63')		1.5, >4.5	
550	▨	3'/3'	B-4-12 (63'-66')	Becomes CL-ML, few gravel, some sand, stiff to hard, dry 3" dark gray sand seam at 65.5'	> 4.5	
	▨	6.5'/4'	B-4-13 (66'-70')	Becomes medium gray, little coarse black sand, few coarse and fine gravel, stiff to hard, moist	> 4.5, 2.5, 2.0	
545	▨	83%	B-4-ST-3 (70'-72.5')		4.0	
540	▨	6'/3.5'	B-4-14 (72.5-76')	Becomes sandy, wet at 72.5' to 73.5' *End of boring at 76'*	1.5, >4.5	Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants
engineers | scientists | innovators

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-5

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813 -83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615		4'/6'	B-5-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0' to 1'		Boring drilled through the crest of the embankment at Station 170+00
				SILTY CLAY - Medium to dark brown, little coarse gravel, few fine gravel, few sand, medium stiff to very stiff, moist	4.0, 4.0, 0.5, 2.0	
610						
		9.5'/10'	B-5-2 (6'-11')	Becomes trace gravel, little sand Trace reddish-brown mottling from 6' to 8'	1.5, 1.5, 2.5, 2.0, 1.0	
605						
			B-5-3 (11'-16')	Few gray silt 11' to 12'		
600						
		3'/5'	B-5-4 (16'-21')	Same as above, with medium stiff consistency Increasing gray silt from 17' to 22'	1.5, 1.5, 1.5	
595						
		2'/5'	B-5-5 (21'-26')	Becomes medium to dark brown, little coarse gravel, few fine gravel, few sand, very stiff, moist	3.5, 2.5	
590						

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813	-83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
585	▨	8.5'/10'	B-5-6 (26'-31')	Becomes trace gravel, little sand Becomes dark brown, some coarse gravel, little fine gravel, little sand, very stiff to hard, moist to dry	4.5, 4.5, 4.5, >4.5, 3.5	
580	▨		B-5-7 (31'-36')			
575	▨	7'/6'	B-5-8 (36'-42')	Becomes trace gravel, few sand	2.5, 4.5, 2.5	
570	▨	4'/4'	B-5-9 (42'-46')	Same as above	>4.5, 2.5	
565	▨	11'/10'	B-5-10 (46'-51')	Becomes less gravelly Becomes medium gray, very stiff to hard, moist to dry	>4.5, 2.5, 3.0, 2.0, >4.5,	
560	▨		B-5-11 (51'-56')			

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/5/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Pitcher Barrel, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft. bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft. bgs):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8813	-83.3638

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6'/5'	B-5-12 (56'-61')	Same as above	4.0, 2.5	
550	▨	5'/5'	B-5-13 (61'-66')	Becomes medium gray, stiff to very stiff Becomes less gravelly from 62' to 69'	3.5, 2.5	
	▨	2.5'/4'	B-5-14 (66'-70')	Same as above	1.5, 1.0, 2.0	
545		Attempted to collect Shelby Tube sample, no recovery				Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout
540	░	27%	B-5-ST-1 (73.5'-76')	SILTY SAND (SM), medium gray, trace gravel *End of boring at 76'*		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-6**

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857 -83.362

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615	░	6/6'	B-6-1 (0'-6')	GRAVEL (GP) - Medium gray gravel fill with coarse sand 0' to 1.5'		Boring drilled through the crest of the embankment at Station 8+00
610	▨			SILTY CLAY (CL) - Medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, stiff to very stiff, moist to dry	3.5, 2.0, 1.5	
605	▨	9.5'/10'	B-6-2 (6'-11')	Becomes trace gravel, little sand	2.5, 3.5, 3.0, 1.5, 2.0	
600	▨		B-6-3 (11'-16")	Pockets of few gray silty clay from 12' to 14'		
595	▨	4'/5'	B-6-4 (16'-21')	Same as above	2.0, 1.5	
590	▨	4'/4'	B-6-5 (21'-25')	Becomes medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, very stiff, moist to dry	2.5, 3.0	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-6**

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857 -83.362

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨	73%	B-6-ST-1 (25'-27')	Becomes less sandy	3.5	
585	▨	11'/9'	B-6-6 (27'-31')	Reddish-brown mottling becomes more abundant	4.0, 3.5, 1.5, 2.0, 4.0, 2.5	
580	▨		B-6-7 (31'-36')	Becomes few gravel, with pockets of gray silty clay		
575	▨	4'/4'	B-6-8 (36'-40')	Same as above, with very stiff to hard consistency Becomes less gravelly from 36' to 45'	>4.5, 4.5, 3.0, 2.5	
	▨	50%	B-6-ST-2 (40'-42.5')	Becomes trace gravel	>4.5	
570	▨	13.5'/ 12.5'	B-6-9 (42.5'-45')	Becomes medium brown, few reddish-brown mottling, some sand, little coarse and fine gravel, stiff to very stiff, moist to dry	3.0, 1.5	
565	▨		B-6-10 (45'-50')	Becomes dark brown, some gray mottling, trace gravel, little sand, very stiff to hard, moist to dry	3.0, 2.0, >4.5, >4.5, >4.5, 2.5	
560	▨		B-6-11 (50'-55')	Becomes medium gray, little coarse gravel, few fine gravel, few sand, very stiff to hard, moist to dry		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-6**

Drilling Start Date:	12/5/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8857 -83.362

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨	100%	B-6-ST-3 (55'-57.5')	Becomes more sandy	>4.5	
555	▨	2.5'/ 2.5'	B-6-12 (57.5'-60')	Becomes dark gray, some coarse gravel, little fine gravel, little sand, hard, dry	>4.5	
550	▨	5'/5'	B-6-13 (60'-65')	Becomes trace gravel	>4.5, >4.5, >4.5	
	▨	100%	B-6-ST-4 (65'-67.5')		>4.5	
545	▨	9'/7.5'	B-6-14 (67.5'-70')	Becomes less gravelly	>4.5	
540	▨		B-6-15 (70'-76')	Becomes more gravelly Some coarse gray sand *End of boring at 76'*	>4.5, >4.5	Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-7**

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878	-83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615	░	4'/6'	B-7-1 (0'-6')	GRAVEL (GP) - Gray gravel fill with coarse sand 0' to 1'		Boring drilled through the crest of the embankment at Station 28+00
610	▨			SILTY CLAY (CL) - Medium to dark brown, few reddish-brown mottling, trace gravel, little sand, stiff to very stiff, moist to dry	3.5, 3.5, 2.0	
605	▨	8'/10'	B-7-2 (6'-11')	Becomes less gravelly and sandy Few gray silty clay from 7' to 20'	2.0, 1.5, 2.0, 2.5, 2.5, 3.5	
600	▨		B-7-3 (11'-16')	Same as above		
595	▨	4'/5'	B-7-4 (16'-21')	Same as above, with consistency from medium stiff to hard	2.0, 2.5, 4.5	
590	▨	4'/5'	B-7-5 (21'-26')	Becomes medium to dark brown, few reddish-brown mottling, stiff to very stiff, moist to dry	2.0, 1.5, 2.5	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-7**

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878	-83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
	▨		B-7-6 (26-31")	Few grayish-black silty clay from 26' to 28'		
585	▨	9.5'/10'		Becomes dark brown, some gray silty clay interspersed, little reddish-brown mottling, very stiff to hard, moist	2.0, 2.5, >4.5, 4.5, >4.5, 4.5	
580	▨		B-7-7 (31'-36')			
	▨	3'/5'	B-7-8 (36'-41')	Same as above	2.5, 4.5	
575	▨					
	▨	3'/5'	B-7-9 (41'-46')	Same as above	>4.5, 3.5	
570	▨					
	▨		B-7-10 (46'-51')			
565	▨	9.5'/10'		Becomes medium gray, moist to dry	4.0, 3.0, 3.0, >4.5	
560	▨		B-7-11 (51'-56')			

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-7

Drilling Start Date:	12/6/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/6/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8878 -83.3688

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	5.5'/5'	B-7-12 (56'-61')	Same as above, with hard consistency	4.0, 4.5, >4.5	
	▨	6'/4'	B-7-13 (61'-65')	Becomes more sandy beginning at 64'	2.5, 4.0	
550	▨	100%	B-7-ST-1 (65'-67.5')		>4.5	
545	▨	10.5'/ 8.5'	B-7-14 (67.5'-71')	Becomes medium to dark gray, hard, dry	>4.5, >4.5, >4.5	
540	▨		B-7-15 (71'-76')	Becomes more gravelly Becomes moist to wet *End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Client: DTE Energy

Project: DTE Monroe Alternative Liner Demonstration Boring Logs

Monroe Power Plant

Boring: B-8

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884 -83.3747

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610		4'/6'	B-8-1 (0'-6')	GRAVEL (GP) - Light to medium gray gravel fill Becomes brown, clayey, and moist at 3' Becomes light gray, sandy at 4'		Boring drilled through the crest of the embankment at Station 48+00
605		7'/10'	B-8-2 (6'-11')	SILTY CLAY (CL) - Medium to dark brown, few gravel, little sand, very stiff to hard, moist	4.0, 3.5, 3.0, 2.5, >4.5	
600			B-8-3 (11'-16")	Same as above		
595		3.5'/5'	B-8-4 (16'-21')	Becomes trace gravel, stiff to very stiff consistency	3.0, 2.0, 3.0	
590		3.5'/5'	B-8-5 (21'-26')	Becomes medium to dark brown, stiff to very stiff Few gray silty clay from 23' to 26'	2.5, 2.0	

Geosyntec consultants	Client: DTE Energy Project: DTE Monroe Alternative Liner Demonstration Boring Logs Monroe Power Plant	Boring: B-8

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884 -83.3747

Elevation (ft. amsl)	LITHOLOGY	RECOVERY	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
585	▨	7.5'/10'	B-8-6 (26-31")	Same as above	1.0, 3.5, 4.5	
580	▨		B-8-7 (31'-36')	Few gray silty clay at 32'		
575	▨	6.5'/5'	B-8-8 (36'-41')	Becomes dark brown with few gray silty clay, few reddish-brown mottling very stiff to hard, moist	3.5, >4.5	
570	▨	5'/5'	B-8-9 (41'-46')	Same as above	>4.5, >4.5, 3.5, 2.5	
565	▨	12'/10'	B-8-10 (46'-51')	Becomes more gravelly Becomes medium to dark gray, few gravel, some reddish-brown mottling, few black mottling, moist to dry	3.5, 3.5, 3.5, >4.5, >4.5	
560	▨		B-8-11 (51'-56')			

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-8**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76	
Drilling End Date:	12/7/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Grab Sample	
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-	
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-	
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615	
Logged By:	Sean Karoly	**Location (Y, X):**	41.8884	-83.3747

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
555	▨	6'/5'	B-8-12 (56'-61')	Becomes more sandy	2.5, 4.0, 4.5, >4.5	
550	▨	6'/5'	B-8-13 (61'-66')	Becomes more gravelly and sandy at 65.5'	>4.5, >4.5, 2.5, 4.0	
545	▧	8.5'/10'	B-8-14 (66'-71')	CLAYEY GRAVEL (GC) - Light to dark gray some sand and clay, wet, slight odor		
540	▧		B-8-15 (71'-76')	Becomes sandier, dry, stronger odor *End of boring at 76'*		Borehole grouted with grout mixture; 25 to 30 gallons of water per 1 bag of Halliburton Quik-Grout 20% Solids Pumpable Bentonite Grout

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-9**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893 -83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
615 610	○	3.5'/6'	B-9-1 (0'-6')	GRAVEL - Light gray to light brown gravel fill with coarse sand from 0' to 6' Becomes sandy at 2'		Boring drilled through the crest of the embankment at Station 68+00
605	▨	9.5'/10'	B-9-2 (6'-11')	SILTY CLAY - Medium to dark brown, few coarse and fine gravel, few sand, very stiff to hard, moist	3.5, 2.5, 3.5, 4.5, 4.0	
600	▨		B-9-3 (11'-16")	Same as above		
595	▨	5'/5'	B-9-4 (16'-21')	Becomes trace gravel, little sand	3.5, 4.0	
	▨	4'/4'	B-9-5 (21'-25')	Becomes less gravelly from 25' to 32'	>4.5, >4.5, 4.0	

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-9**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893 -83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
590	▨	100%	B-9-ST-1 (25'-27')	Becomes few sand	3.0	
	▨	9.5'/9'	B-9-6 (27'-30')	Same as above, with very stiff to hard consistency	2.0, 3.0, >4.5, 4.0, 4.5	
585 580	▨		B-9-7 (30'-36')	Pockets of gray silty clay from 33' to 36', becomes sandier		
	▨	4'/4'	B-9-8 (36'-40')	Becomes brownish gray from 36' to 38'	1.5, 3.5, 3.5	
575	▨	100%	B-9-ST-2 (40'-42')	Becomes more gravelly	4.5	
570	▨	6'/4'	B-9-9 (42'-46')	Few pinkish-red clay at 42' Becomes dark brown, few reddish-brown mottling, trace gravel, little sand, hard, moist	4.5, >4.5	
	▨	11.5'/9'	B-9-10 (46'-50')		>4.5, 3.5, 3.0, 4.5	
565	▨		B-9-11 (50'-55')	Becomes medium to dark gray, some reddish-brown mottling, few coarse and fine gravel, few sand, very stiff to hard, moist		

Geosyntec consultants engineers | scientists | innovators	**Client: DTE Energy** **Project: DTE Monroe Alternative Liner Demonstration Boring Logs** **Monroe Power Plant**	**Boring: B-9**

Drilling Start Date:	12/7/2020	**Boring Depth (ft):**	76
Drilling End Date:	12/8/2020	**Boring Diameter (in.)**	4.25 inner casing, 6 outer casing
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample, Pitcher Barrel
Drilling Method:	Sonic	**DTW During Drilling (ft):**	-
Drilling Equipment:	600T	**DTW After Drilling (ft):**	-
Driller Name:	Rob Howell	**Ground Surface Elev. (ft):**	615
Logged By:	Sean Karoly	**Location (Y, X):**	41.8893 -83.3818

Elevation (ft. amsl)	**LITHOLOGY**	**RECOVERY**	**SAMPLE**	**MATERIAL DESCRIPTION**	**PENETROMETER**	**REMARKS**
560	▨	63%	B-9-ST-3 (55'-57')	Becomes sandier	4.0	
	▨	6'/5'	B-9-12 (57'-60')	Becomes less sandy, hard consistency	4.0	
555	▨	5'/5'	B-9-13 (60'-65')	Becomes more gravelly at 63' Becomes dark gray, sandy at 64.5'	>4.5, >4.5, 4.5	
550	▨	33%	B-9-ST-4 (65'-67')	*End of boring at 67' (refusal)*		

APPENDIX G – 1970s LABORATORY TEST RESULTS

UNIFIED SOIL CLASSIFICATION

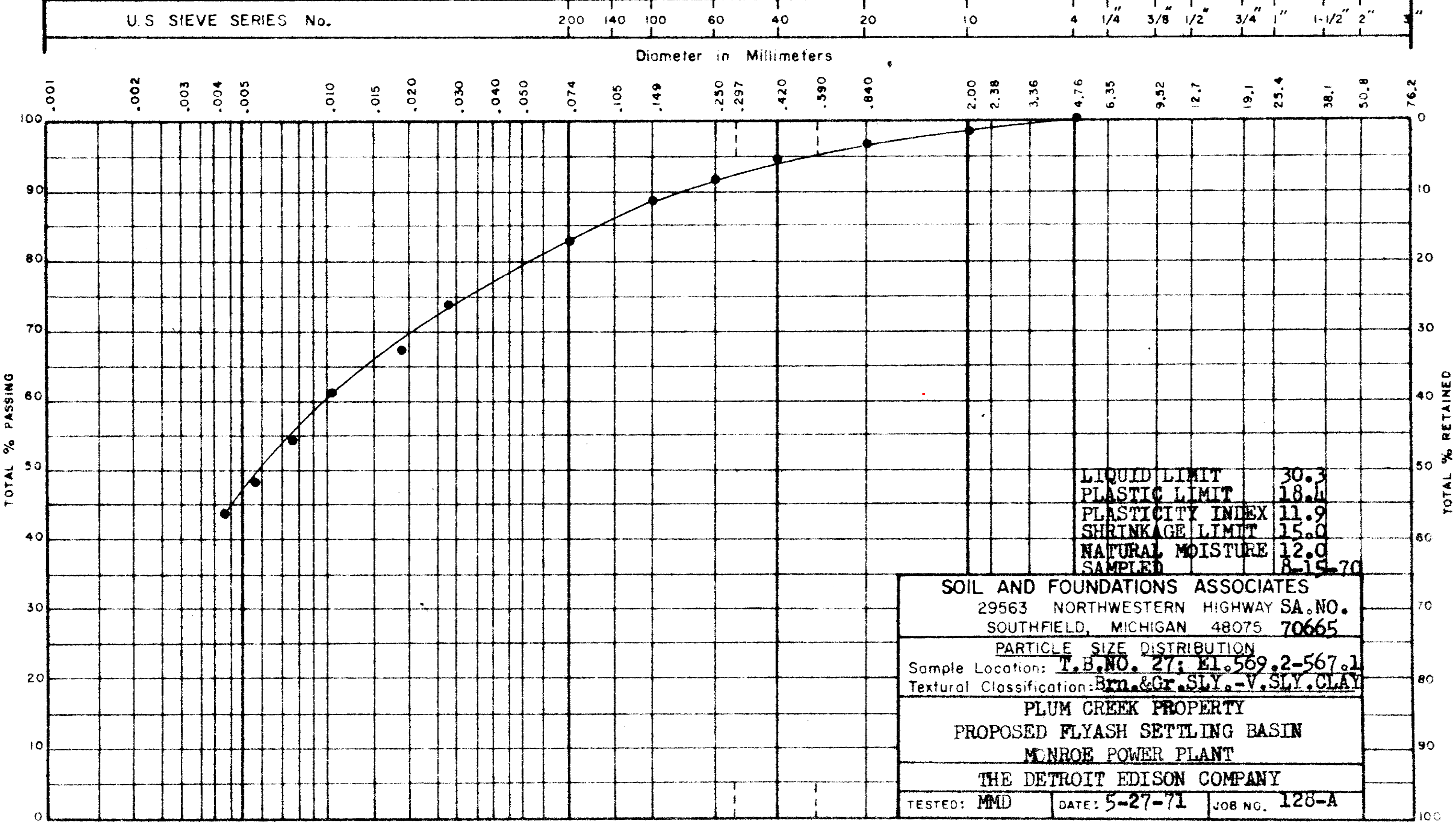
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 47 %	Silt 36 %	Fine Sand 11 %	Medium Sand 05 %	C. Sand 01 %	Gravel 00 %



LIQUID LIMIT	30.3
PLASTIC LIMIT	18.4
PLASTICITY INDEX	11.9
SHRINKAGE LIMIT	15.0
NATURAL MOISTURE	12.0
SAMPLED	8-15-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. NO. 70665

PARTICLE SIZE DISTRIBUTION

Sample Location: T.B. NO. 27; El. 569.2-567.1

Textural Classification: Brn.&Gr. SLY.-V.SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD | DATE: 5-27-71 | JOB NO. 128-A

UNIFIED SOIL CLASSIFICATION

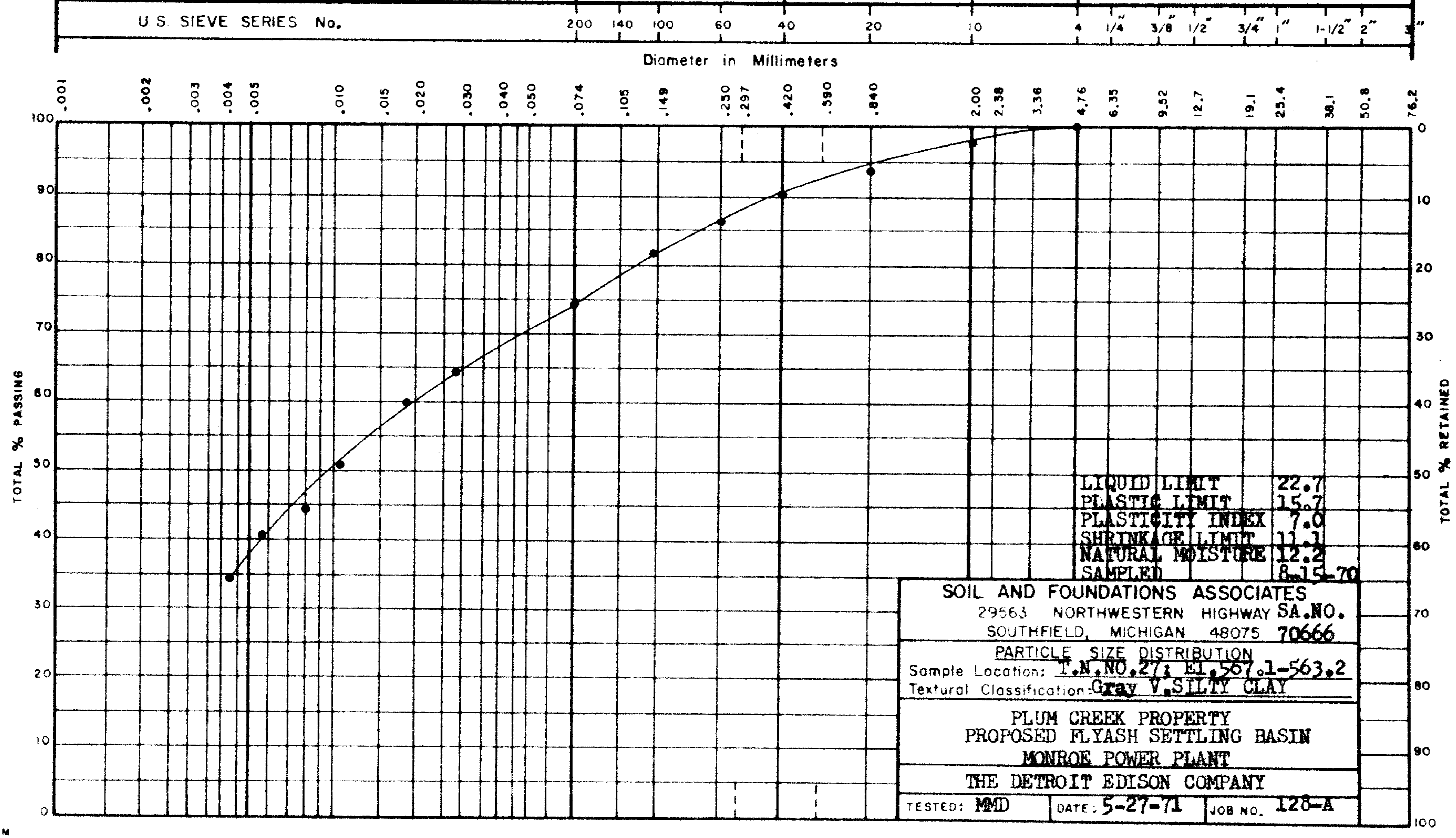
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 %	Silt 36 %	Fine Sand 16 %	Medium Sand 08 %	C. Sand 02 %	Gravel 00 %



LIQUID LIMIT	22.7
PLASTIC LIMIT	15.7
PLASTICITY INDEX	7.0
SHRINKAGE LIMIT	11.1
NATURAL MOISTURE	12.2
SAMPLED	8-15-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA.NO. 70666

PARTICLE SIZE DISTRIBUTION

Sample Location: T.N.NO.27; El.567.1-563.2

Textural Classification: Gray V.SILTY CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD | DATE: 5-27-71 | JOB NO. 128-A

SFA FORM 6

UNIFIED SOIL CLASSIFICATION

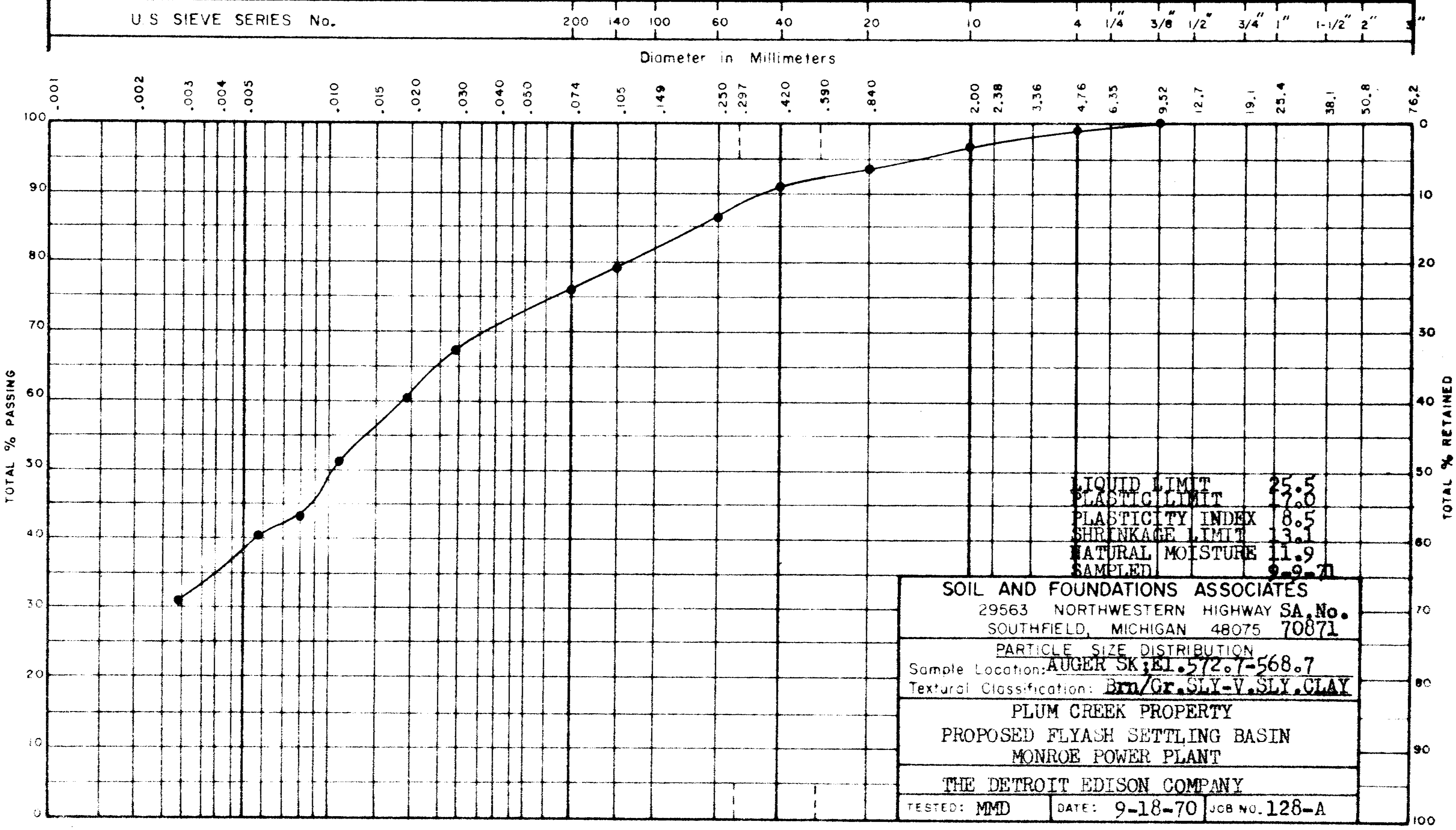
Clay & Silt ___%	Fine Sand ___%	Medium Sand ___%	C. Sand ___%	Fine Gravel ___%	Cse. Gravel ___%

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___%	Silt ___%	Fine Sand ___%	Coarse Sand ___%	Gravel ___%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 %	Silt 38 %	Fine Sand 15 %	Medium Sand 06 %	C. Sand 02 %	Gravel 01 %



LIQUID LIMIT 25.5
PLASTIC LIMIT 17.0
PLASTICITY INDEX 8.5
SHRINKAGE LIMIT 13.1
NATURAL MOISTURE 11.9
SAMPLED 9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075
SA. No. 70871

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SK; El. 572.7-568.7

Textural Classification: Brn/Gr. SLY-V. SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD	DATE: 9-18-70	JOB NO. 128-A

SFA FORM F-6

UNIFIED SOIL CLASSIFICATION

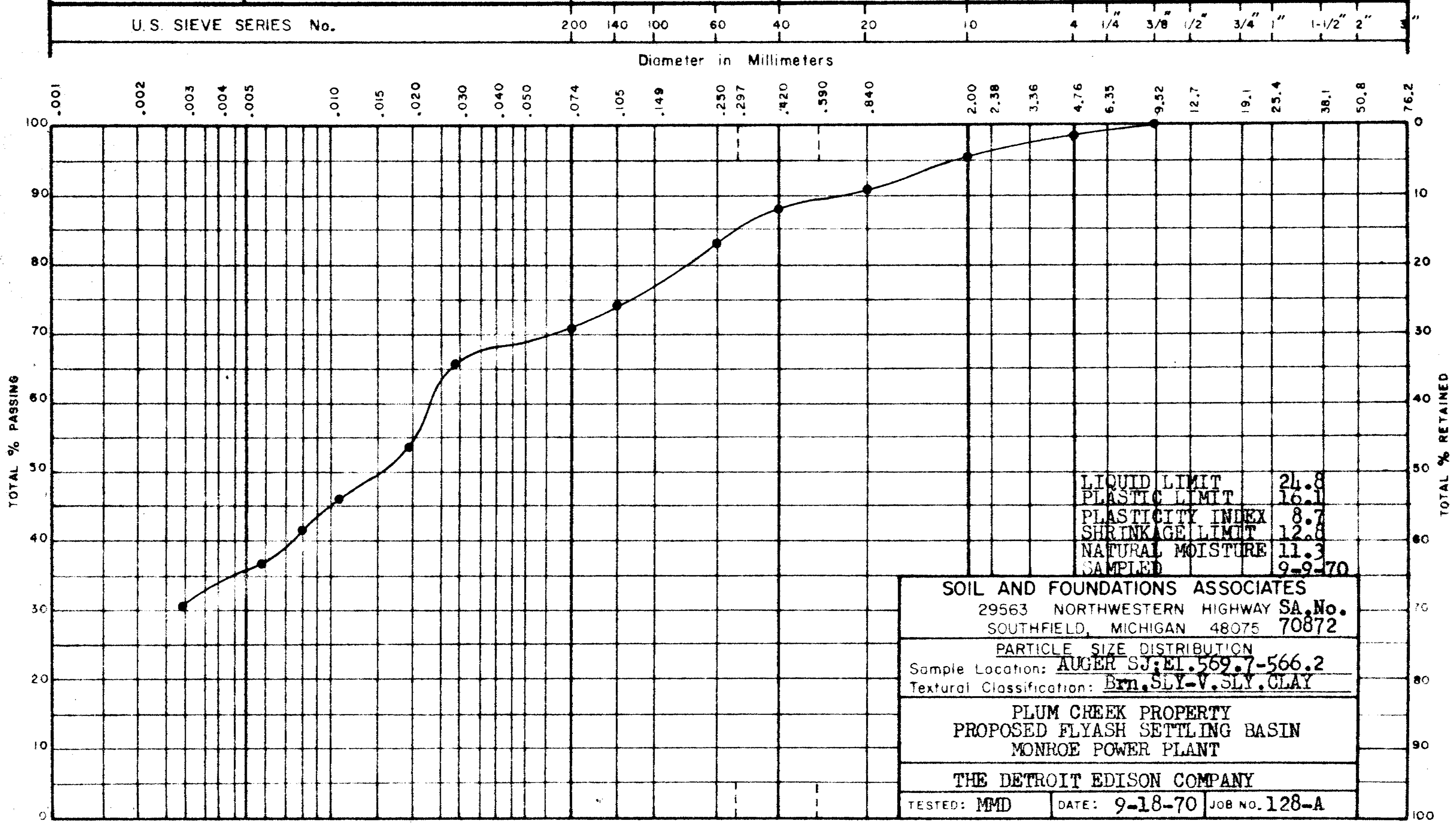
Clay & Silt ___ %	Fine Sand ___ %	Medium Sand ___ %	C. Sand ___ %	Fine Gravel ___ %	Cse. Gravel ___ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___ %	Silt ___ %	Fine Sand ___ %	Coarse Sand ___ %	Gravel ___ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 36 %	Silt 35 %	Fine Sand 17 %	Medium Sand 08 %	C. Sand 03 %	Gravel 01 %



LIQUID LIMIT	24.8
PLASTIC LIMIT	16.1
PLASTICITY INDEX	8.7
SHRINKAGE LIMIT	12.8
NATURAL MOISTURE	11.3
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075
SA. No. 70872

PARTICLE SIZE DISTRIBUTION
Sample Location: AUGER SJ; El. 569.7-566.2
Textural Classification: Brn. SLY-V. SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD
DATE: 9-18-70
JOB NO. 128-A

SFA
FORM
E-6

UNIFIED SOIL CLASSIFICATION

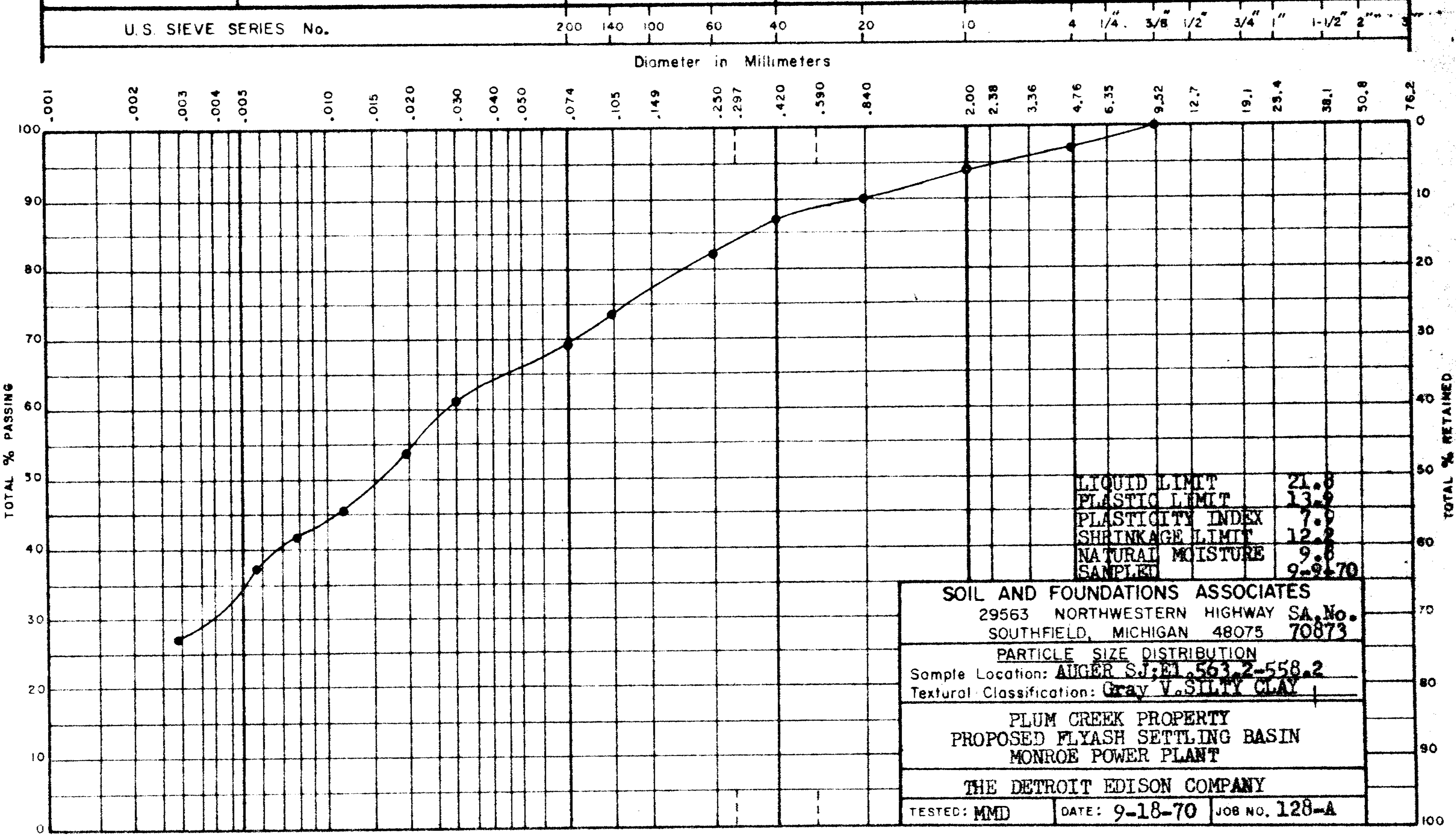
Clay & Silt ____ %	Fine Sand ____ %	Medium Sand ____ %	C. Sand ____ %	Fine Gravel ____ %	Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ %	Silt ____ %	Fine Sand ____ %	Coarse Sand ____ %	Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 34 %	Silt 35 %	Fine Sand 18 %	Medium Sand 07 %	C. Sand 03 %	Gravel 03 %



LIQUID LIMIT 21.8
PLASTIC LIMIT 13.9
PLASTICITY INDEX 7.9
SHRINKAGE LIMIT 12.2
NATURAL MOISTURE 9.6
SAMPLED 9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. No. 70873

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SJ;El.563.2-558.2

Textural Classification: Gray V.SILTY CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD | DATE: 9-18-70 | JOB NO. 128-A

SFA
FORM
E-6

UNIFIED SOIL CLASSIFICATION

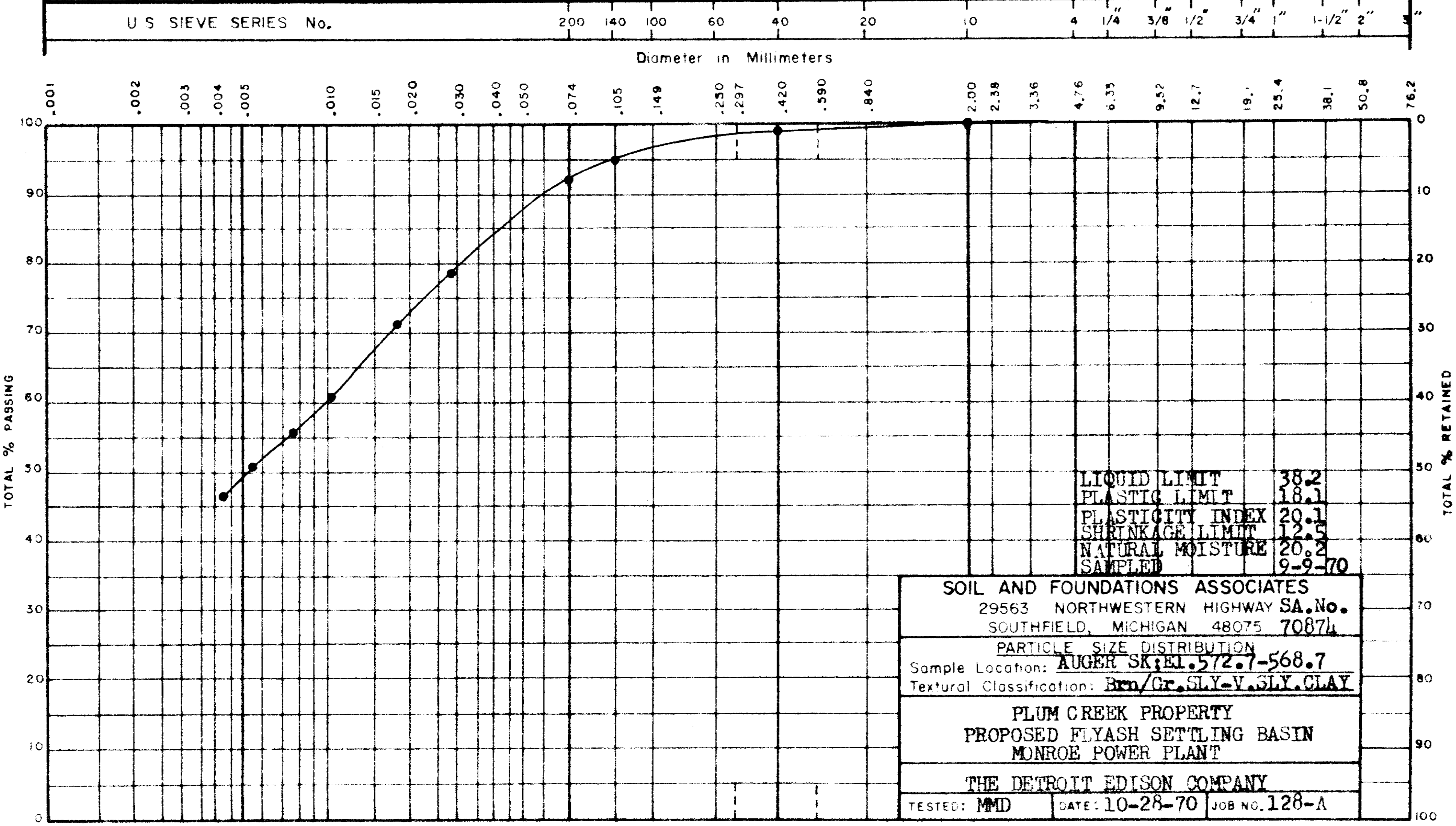
Clay & Silt ____%	Fine Sand ____%	Medium Sand ____%	C. Sand ____%	Fine Gravel ____%	Cse. Gravel ____%

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____%	Silt ____%	Fine Sand ____%	Coarse Sand ____%	Gravel ____%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 49 %	Silt 43 %	Fine Sand 07 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	38.2
PLASTIC LIMIT	18.1
PLASTICITY INDEX	20.1
SHRINKAGE LIMIT	12.5
NATURAL MOISTURE	20.2
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075
SA.No. 70874

PARTICLE SIZE DISTRIBUTION
Sample Location: AUGER SK;El.572.7-568.7
Textural Classification: Brn/Gr.SLY-V.SLY.CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD
DATE: 10-28-70
JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

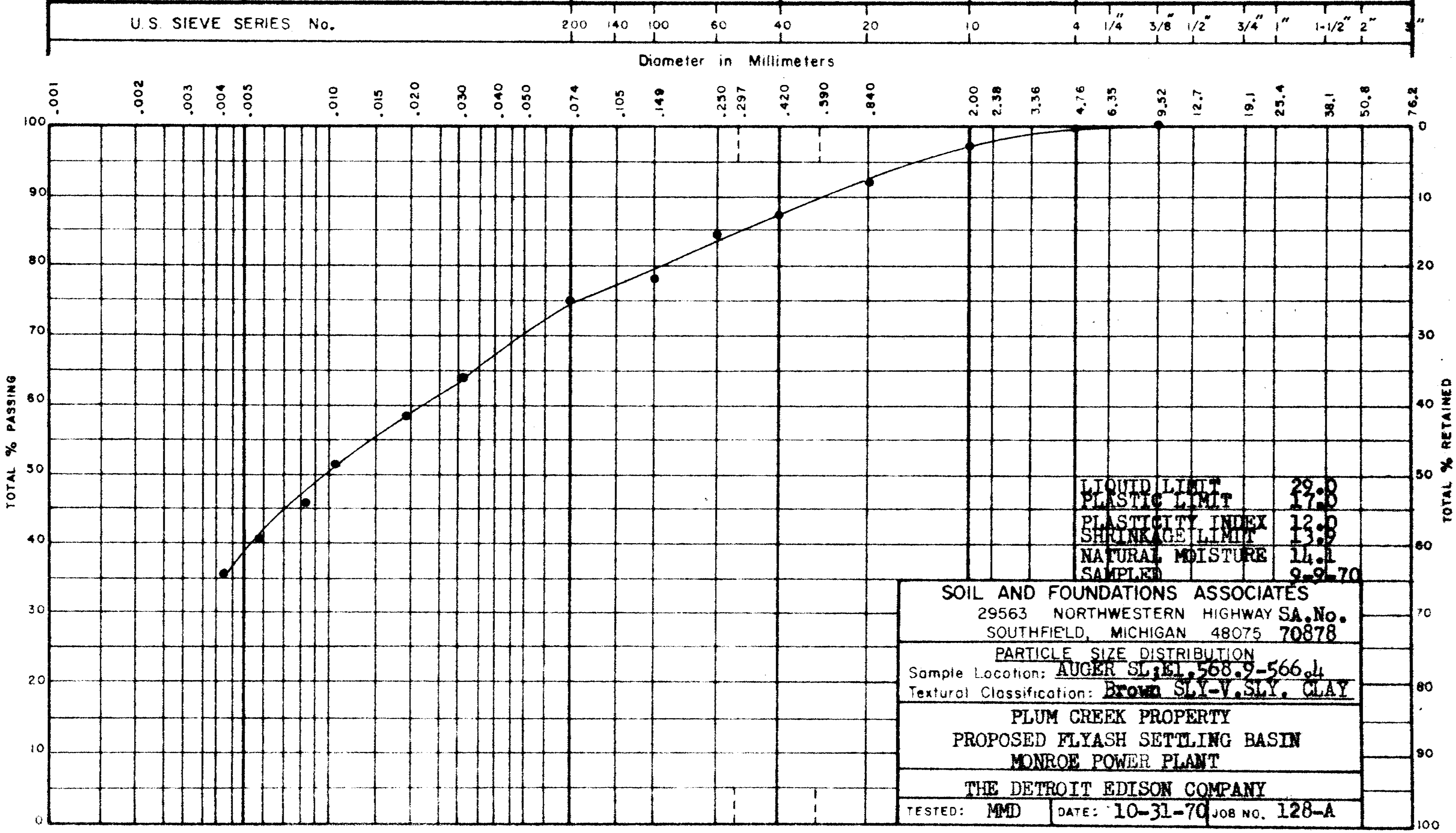
Clay & Silt ____ % | Fine Sand ____ % | Medium Sand ____ % | C. Sand ___ % | Fine Gravel ____ % | Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ % | Silt ____ % | Fine Sand ____ % | Coarse Sand ____ % | Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 38 % | Silt 37 % | Fine Sand 12 % | Medium Sand 10 % | C. Sand 02 % | Gravel 01 %



LIQUID LIMIT	29.0
PLASTIC LIMIT	17.0
PLASTICITY INDEX	12.0
SHRINKAGE LIMIT	13.9
NATURAL MOISTURE	14.1
SAMPLED	9-9-70

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA. No. 70878

PARTICLE SIZE DISTRIBUTION

Sample Location: AUGER SL; El. 568.9-566.4

Textural Classification: Brown SLY-V.SLY. CLAY

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: MMD | DATE: 10-31-70 | JOB NO. 128-A

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

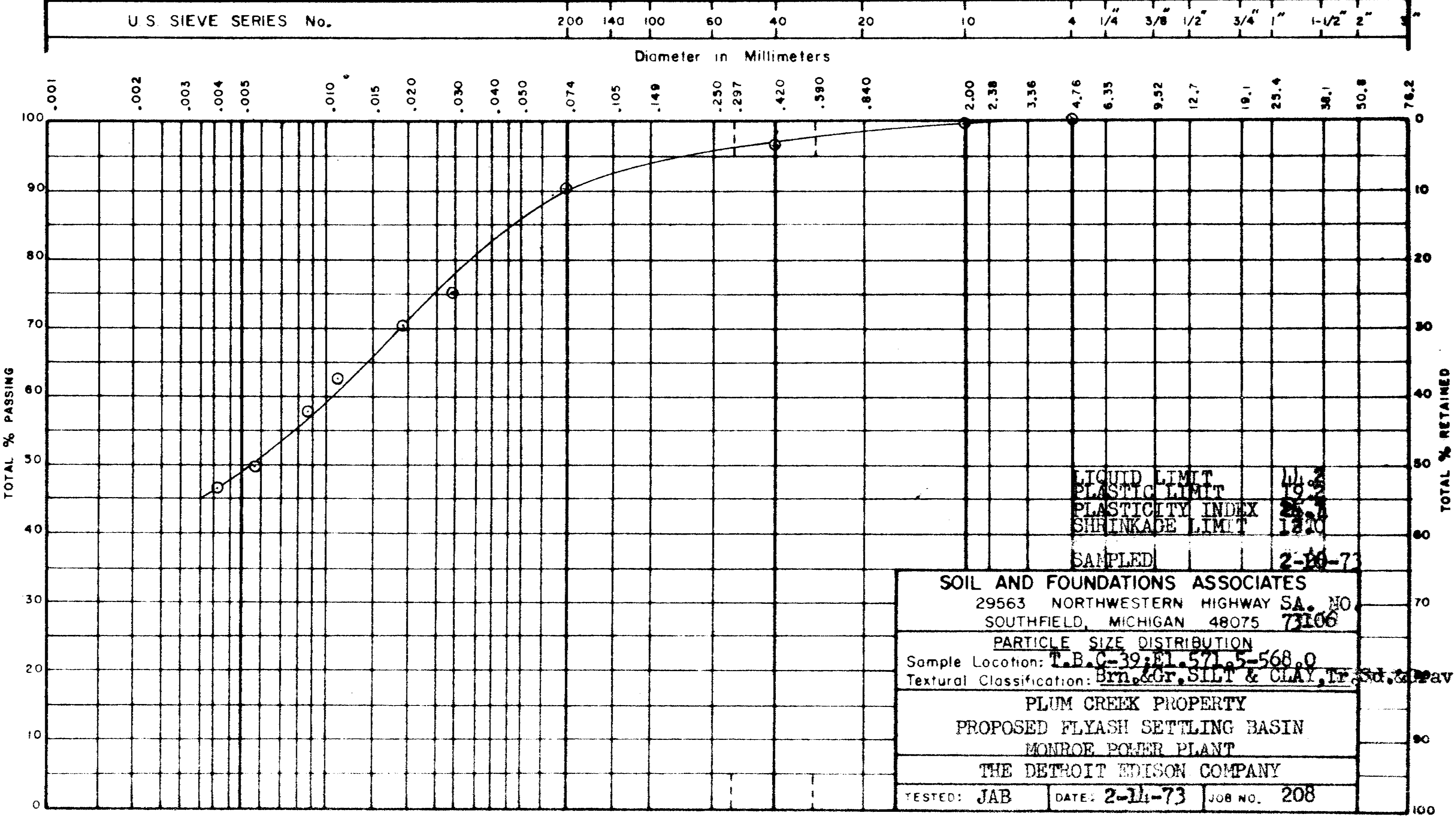
Clay & Silt ____ %	Fine Sand ____ %	Medium Sand ____ %	C. Sand ____ %	Fine Gravel ____ %	Cse. Gravel ____ %

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____ %	Silt ____ %	Fine Sand ____ %	Coarse Sand ____ %	Gravel ____ %

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 47 %	Silt 43 %	Fine Sand 07 %	Medium Sand 03 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	44.3
PLASTIC LIMIT	19.2
PLASTICITY INDEX	25.1
SHRINKAGE LIMIT	12.0
SAMPLED	2-10-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY SA. NO.
SOUTHFIELD, MICHIGAN 48075 73106

PARTICLE SIZE DISTRIBUTION

Sample Location: T.B.C-39;El.571.5-568.0

Textural Classification: Brn.&Gr.SILT & CLAY,Tr.Sd.&Grav.

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: JAB | DATE: 2-14-73 | JOB NO. 208

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

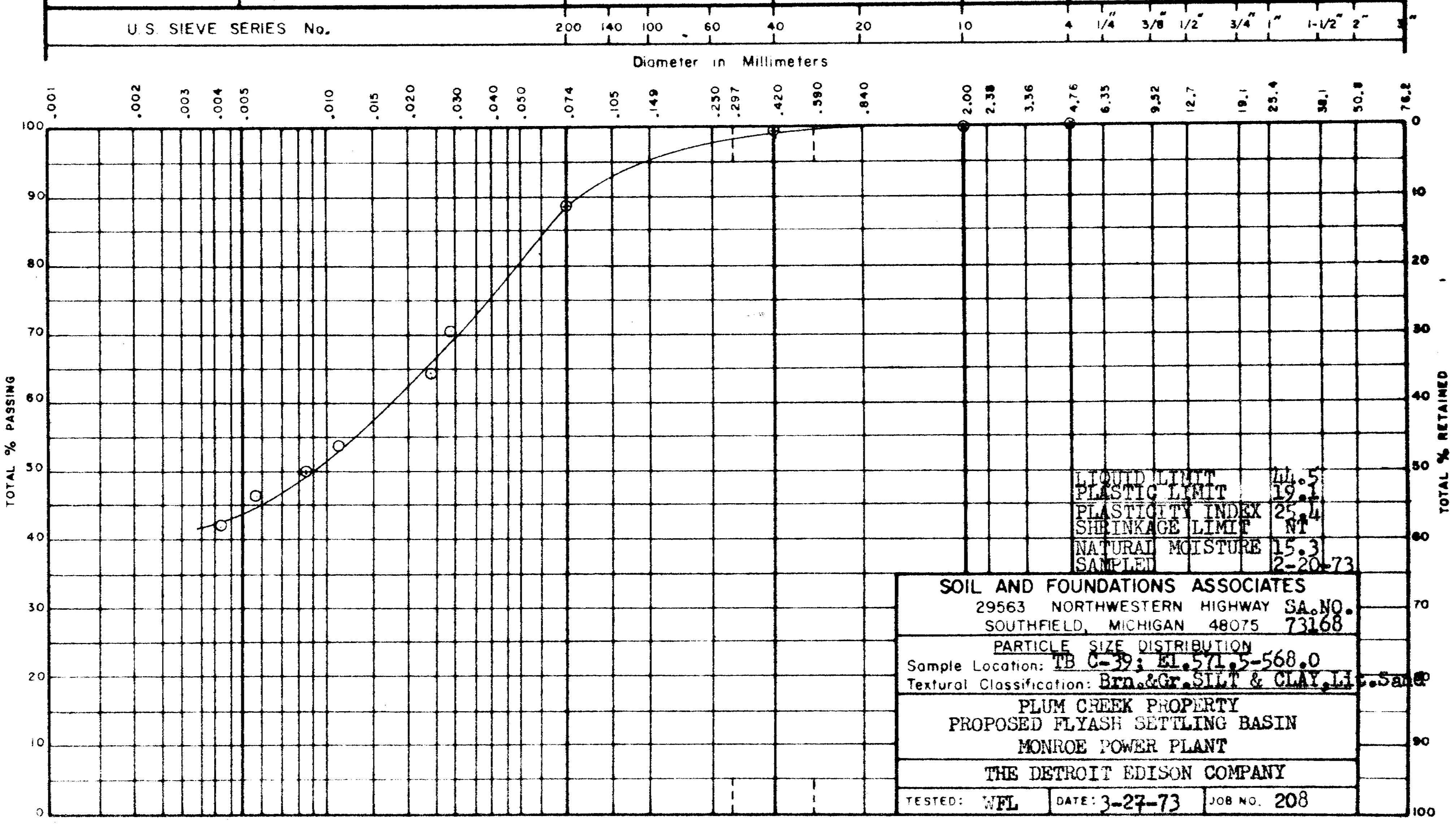
Clay & Silt ___%	Fine Sand ___%	Medium Sand ___%	C. Sand ___%	Fine Gravel ___%	Cse. Gravel

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ___%	Silt ___%	Fine Sand ___%	Coarse Sand ___%	Gravel ___%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 44 %	Silt 44 %	Fine Sand 11 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT	44.5
PLASTIC LIMIT	19.1
PLASTICITY INDEX	25.4
SHRINKAGE LIMIT	NT
NATURAL MOISTURE	15.3
SAMPLED	2-20-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

SA.NO. 73168

PARTICLE SIZE DISTRIBUTION

Sample Location: TB C-39; El.571.5-568.0

Textural Classification: Brn.&Gr.SILT & CLAY,Lit.Sand

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: WFL

DATE: 3-27-73

JOB NO. 208

SFA FORM E-6

UNIFIED SOIL CLASSIFICATION

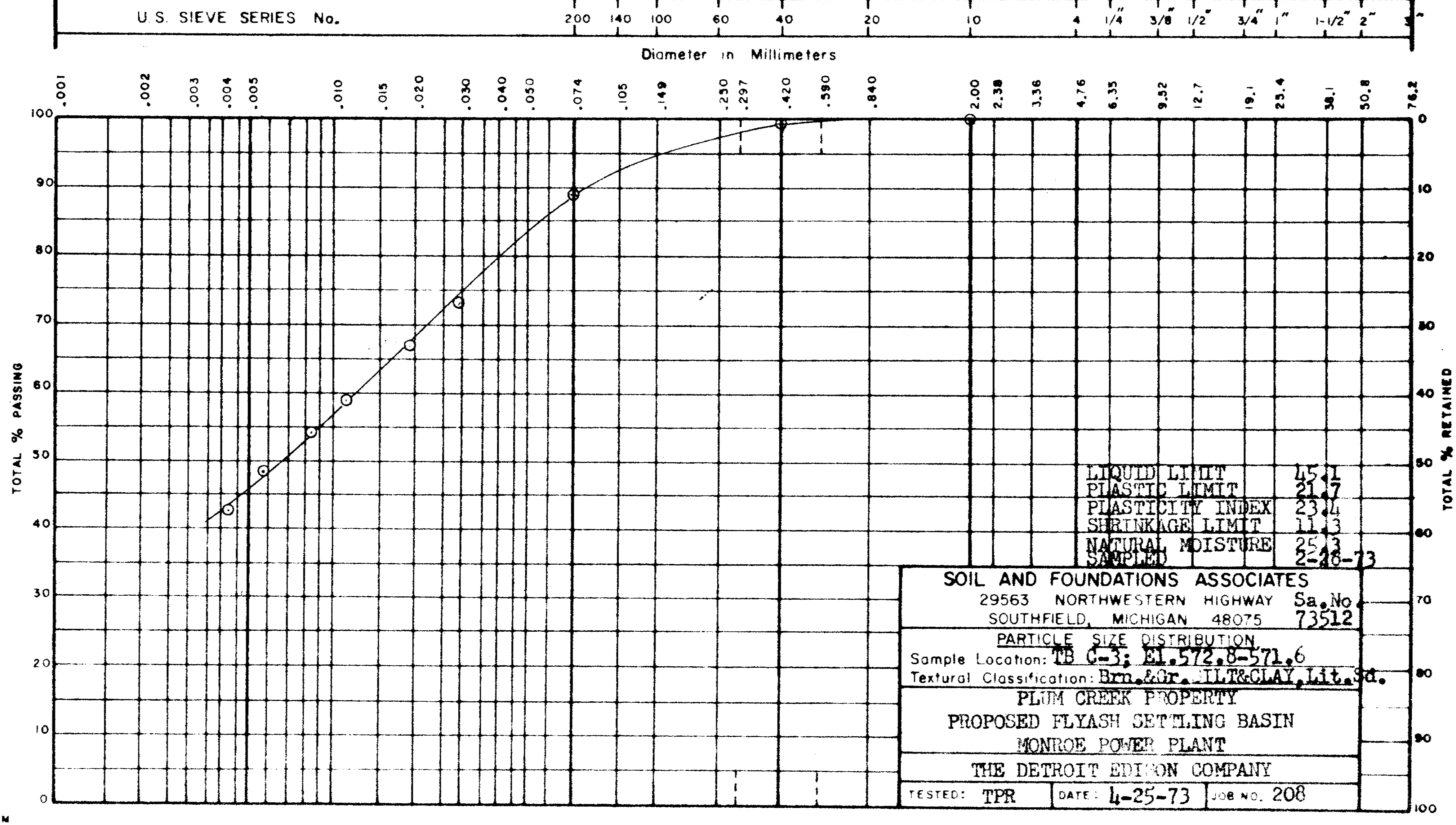
Clay & Silt ____%	Fine Sand ____%	Medium Sand ____%	C. Sand ____%	Fine Gravel ____%	Cse. Gravel ____%

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS CLASSIFICATION

Clay ____%	Silt ____%	Fine Sand ____%	Coarse Sand ____%	Gravel ____%

AMERICAN SOCIETY FOR TESTING AND MATERIALS CLASSIFICATION

Clay 45 %	Silt 44 %	Fine Sand 10 %	Medium Sand 01 %	C. Sand 00 %	Gravel 00 %



LIQUID LIMIT 45.1
PLASTIC LIMIT 21.7
PLASTICITY INDEX 23.4
SHRINKAGE LIMIT 11.3
NATURAL MOISTURE 25.3
SAMPLED 2-28-73

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

Sa. No. 73512

PARTICLE SIZE DISTRIBUTION

Sample Location: TB C-3; El.572.8-571.6

Textural Classification: Brn.&Gr. SILT&CLAY, Lit. Sd.

PLUM CREEK PROPERTY
PROPOSED FLYASH SETTLING BASIN
MONROE POWER PLANT

THE DETROIT EDISON COMPANY

TESTED: TPR DATE: 4-25-73 JOB NO. 208

SFA FORM E-6

APPENDIX H – 1990s LABORATORY TEST RESULTS

TABLE 1

LABORATORY TEST RESULTS
VERIFICATION OF NATURAL SOIL BARRIER - MONROE ASH BASIN
SME PROJECT NO. PG-22087

BORING NO.	SAMPLE NO.	DEPTH (feet)	CLASSIFICATION SYMBOL	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	SPECIFIC GRAVITY	VOID RATIO (calculated)	ATTERBERG LIMITS			PARTICLE SIZE DISTRIBUTION (%)						COEFFICIENT OF PERMEABILITY (cm/sec)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	
B2	CS2	6.5	CL	21	108	2.73	0.58	42	17	25	0	0	2	5	36	57	3.3E-08
B2	CS4	11.5	CL	12	126	2.68	0.33	23	15	8	0	0	8	18	39	35	5.8E-08
B2	CS6	16.5	CL	12	126	2.72	0.35	23	14	9	0	0	8	16	40	36	1.3E-08
B2	CS8	21.5	CL	12	127	2.72	0.34	24	13	11	0	0	8	17	38	37	1.5E-08
B2	CS10	26.5	CL	10	131	2.75	0.31	20	11	9	0	0	9	24	34	33	2.0E-08
B2	CS12	31.5	CL	12	122	2.73	0.40	32	15	17	0	0	5	9	39	47	2.0E-08
B4	CS2	6.5	CL	18	111	2.73	0.53	45	19	26	0	0	2	8	37	53	6.6E-08
B4	CS4	11.5	CL	21	109	2.73	0.56	43	17	26	0	0	3	11	36	50	2.1E-08
B4	CS6	16.5	CL	12	126	2.71	0.34	24	13	11	0	0	8	17	41	34	4.7E-08
B4	CS8	21.5	CL	11	136	2.70	0.24	23	13	10	0	0	8	18	37	37	2.1E-08
B4	CS10	26.5	CL	11	130	2.73	0.31	23	14	9	0	0	8	17	38	37	3.0E-08
B4	CS12	31.5	CL	10	128	2.71	0.32	25	14	11	0	0	4	11	44	41	1.8E-08
B4	CS14	36.5	CL	8	118	2.73	0.44	24	13	11	0	0	13	23	44	20	*
B6	CS2	6.5	CL	12	123	2.70	0.37	27	15	12	0	0	8	17	39	36	7.4E-08
B6	CS4	11.5	CL	11	132	2.72	0.29	23	13	10	0	0	8	17	39	36	1.8E-08
B6	CS6	16.5	CL	8	134	2.72	0.27	21	12	9	0	0	7	22	38	33	4.0E-08
B6	CS8	21.5	CL	11	133	2.75	0.29	21	12	9	0	0	7	21	37	35	6.5E-08
B6	CS10	26.5	CL	9	125	2.71	0.35	26	14	12	0	0	5	13	39	43	*
B6	CS12	31.5	CL	10	128	2.74	0.34	26	15	11	0	0	11	17	33	39	*
B8	CS2	6.5	CL	13	118	2.73	0.44	41	15	26	0	0	3	12	35	50	1.5E-08
B8	CS4	11.5	CL	17	112	2.73	0.52	34	17	17	0	0	7	17	38	38	2.2E-08
B8	CS6	16.5	CL	13	127	2.73	0.34	26	15	11	0	0	9	19	38	34	4.8E-08
B8	CS8	21.5	CL	12	129	2.74	0.33	24	14	10	0	0	8	17	40	35	1.6E-08
B8	CS10	26.5	CL	13	130	2.76	0.32	25	14	11	0	0	7	18	36	39	1.7E-08
B8	CS12	31.5	CL	10	134	2.73	0.27	20	11	9	0	0	10	24	41	25	4.7E-08
B8	CS14	36.5	CL	11	135	2.75	0.27	23	12	11	0	0	11	24	31	34	3.8E-08
B8	CS16	41.5	CL	10	127	2.78	0.37	23	13	10	0	0	15	19	46	20	1.9E-07

TABLE 1

LABORATORY TEST RESULTS

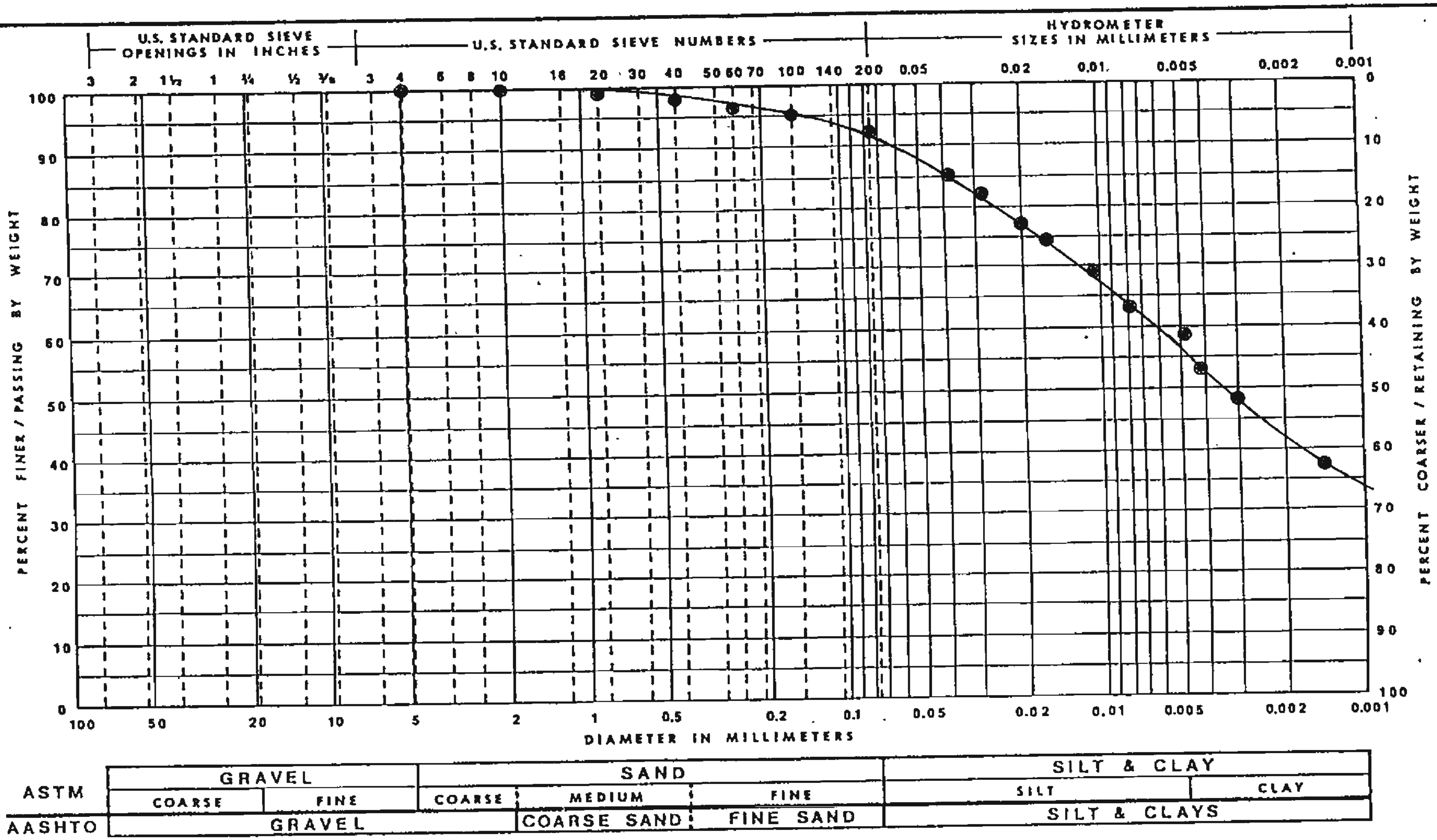
VERIFICATION OF NATURAL SOIL BARRIER - MONROE ASH BASIN

SME PROJECT NO. PG-22087

BORING NO.	SAMPLE NO.	DEPTH (feet)	CLASSIFICATION SYMBOL	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	SPECIFIC GRAVITY	VOID RATIO (calculated)	ATTERBERG LIMITS			PARTICLE SIZE DISTRIBUTION (%)						COEFFICIENT OF PERMEABILITY (cm/sec)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	
B10	CS2	6.5	CL	20	114	2.72	0.49	40	15	25	0	0	3	13	35	49	3.6E-08
B10	CS4	11.5	CL	18	112	2.75	0.53	35	15	20	0	0	2	9	39	50	1.2E-08
B10	CS6	16.5	CL	22	102	2.74	0.68	36	17	19	0	0	1	2	37	60	5.3E-08
B10	CS8	21.5	CL	13	127	2.71	0.33	25	14	11	0	0	8	17	37	38	3.7E-08
B10	CS10	26.5	CL	10	133	2.74	0.29	23	14	9	0	0	7	17	39	37	1.5E-08

NOTE:

* Sample too small or disturbed to run test.



CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS2	6.5	Silty Clay- Trace of Sand, Gravel, Topsoil & Brick Pieces- Brown (CL)	93	

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

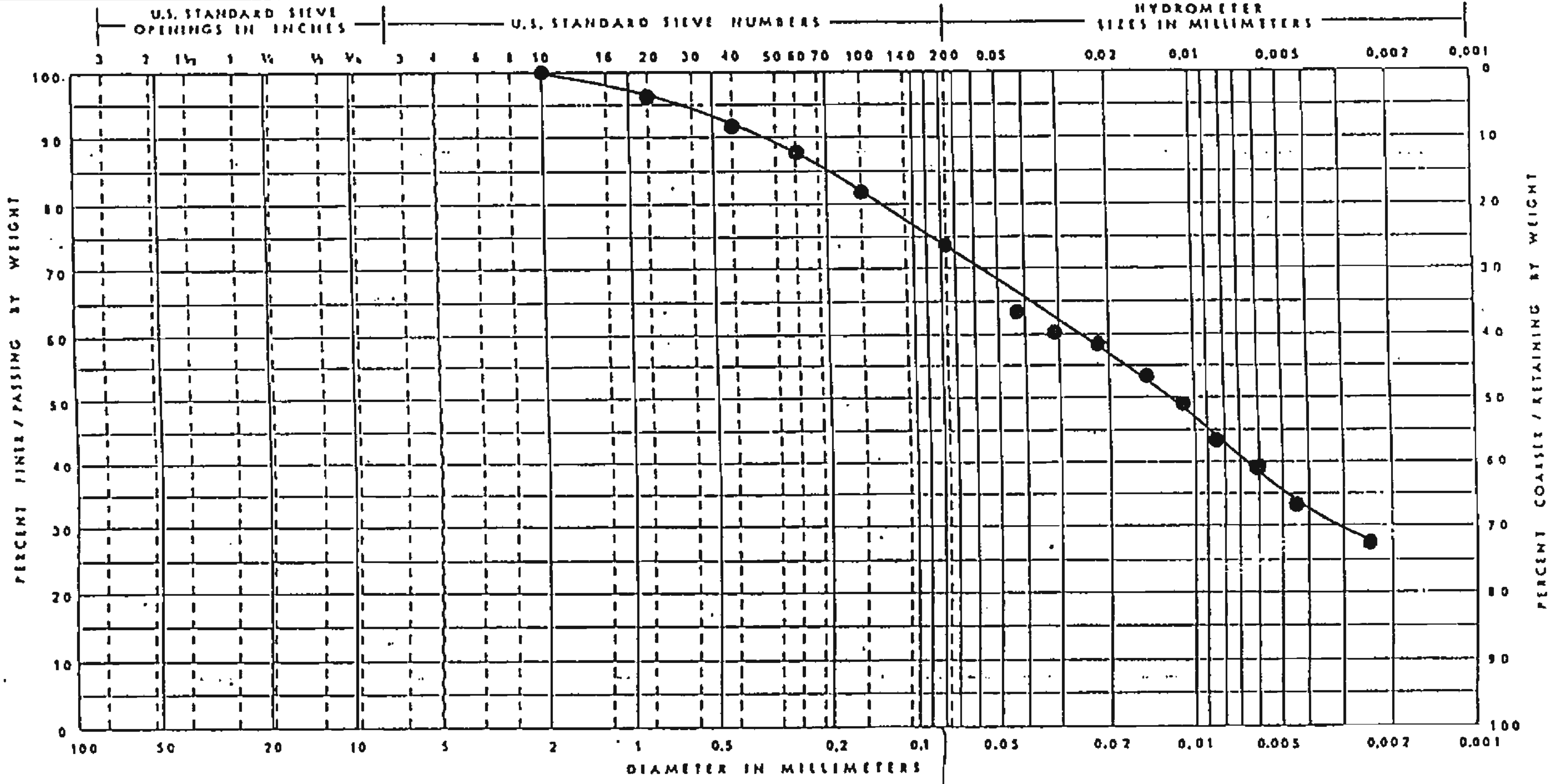
DRAWN SDN

APP'D

DATE 12/14/94

JOB PG22087

soil and materials engineers, inc



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS4	11.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	74	

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

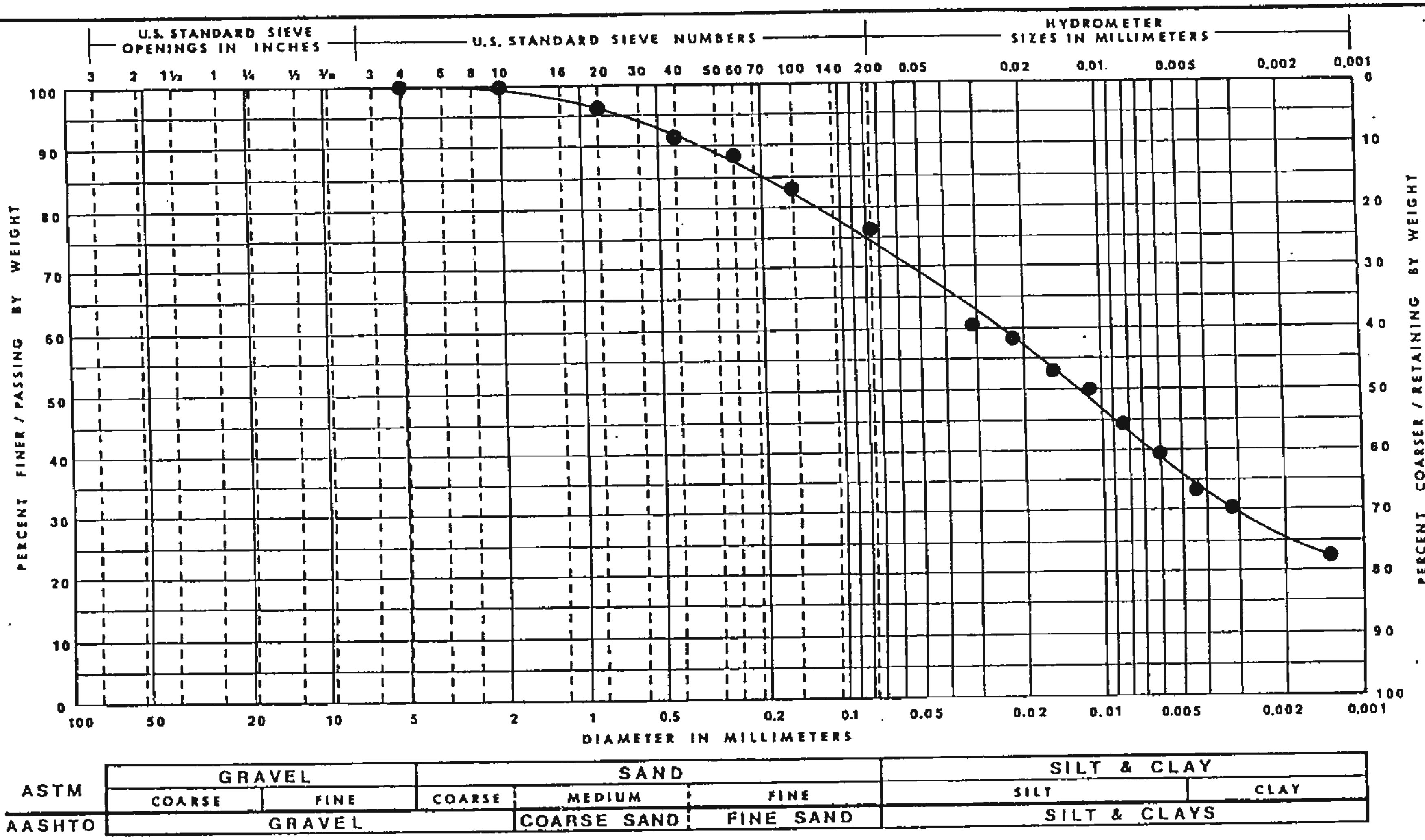
DRAWN MCS

APP'D

DATE 10/25/94

JOB PG-22087

soil and materials engineers, inc



CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS6	16.5	Silty Clay-Some Sand-Trace of	76	
				Gravel-Gray (CL)		

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

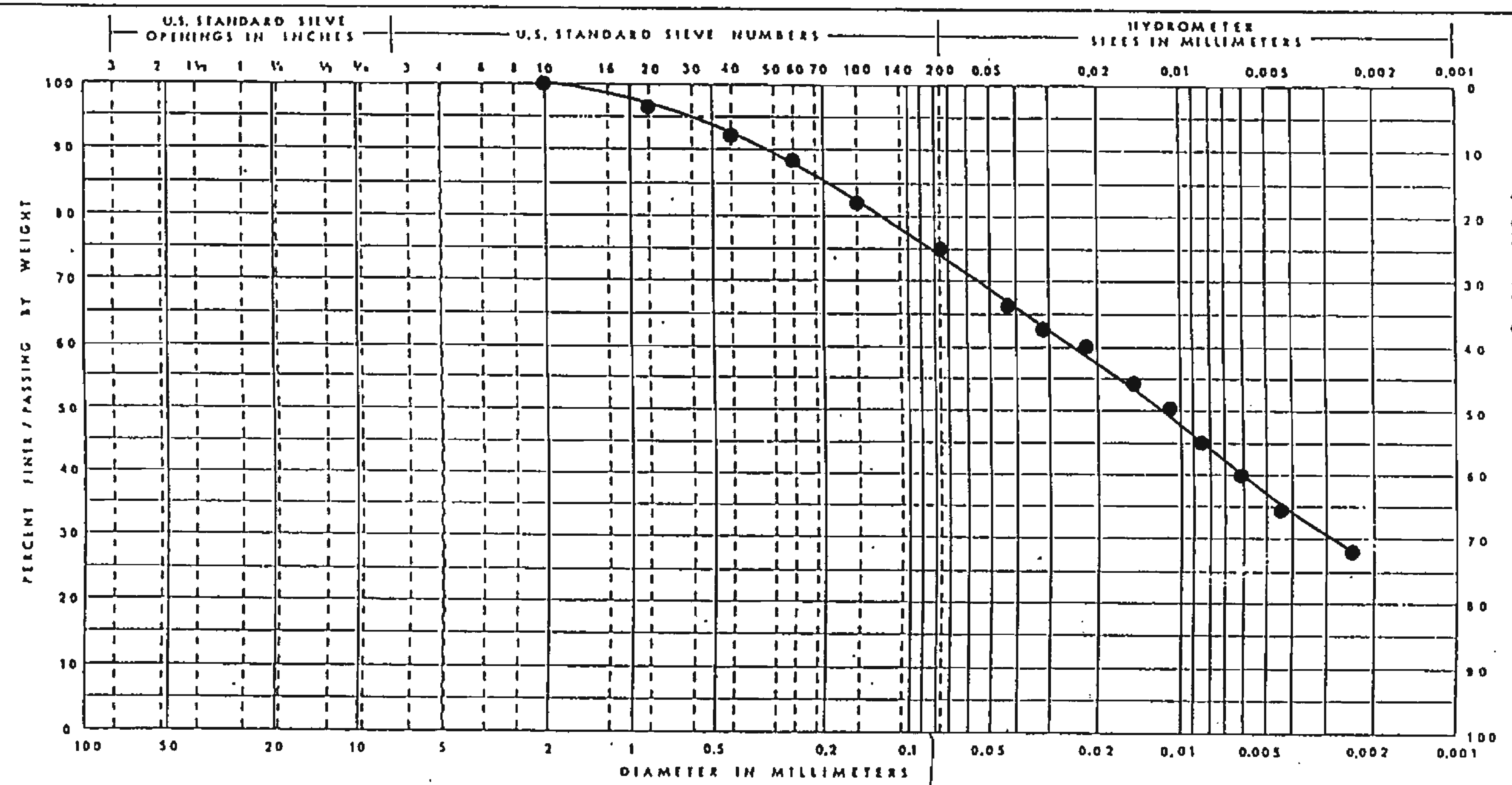
DRAWN
MCS

APP'D

DATE
12/15/94

JOB
PG22087

soil and materials engineers, inc



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS8	21.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	75	

MONROE ASH BASIN
DETROIT,EDISION
MONROE MICHIGAN

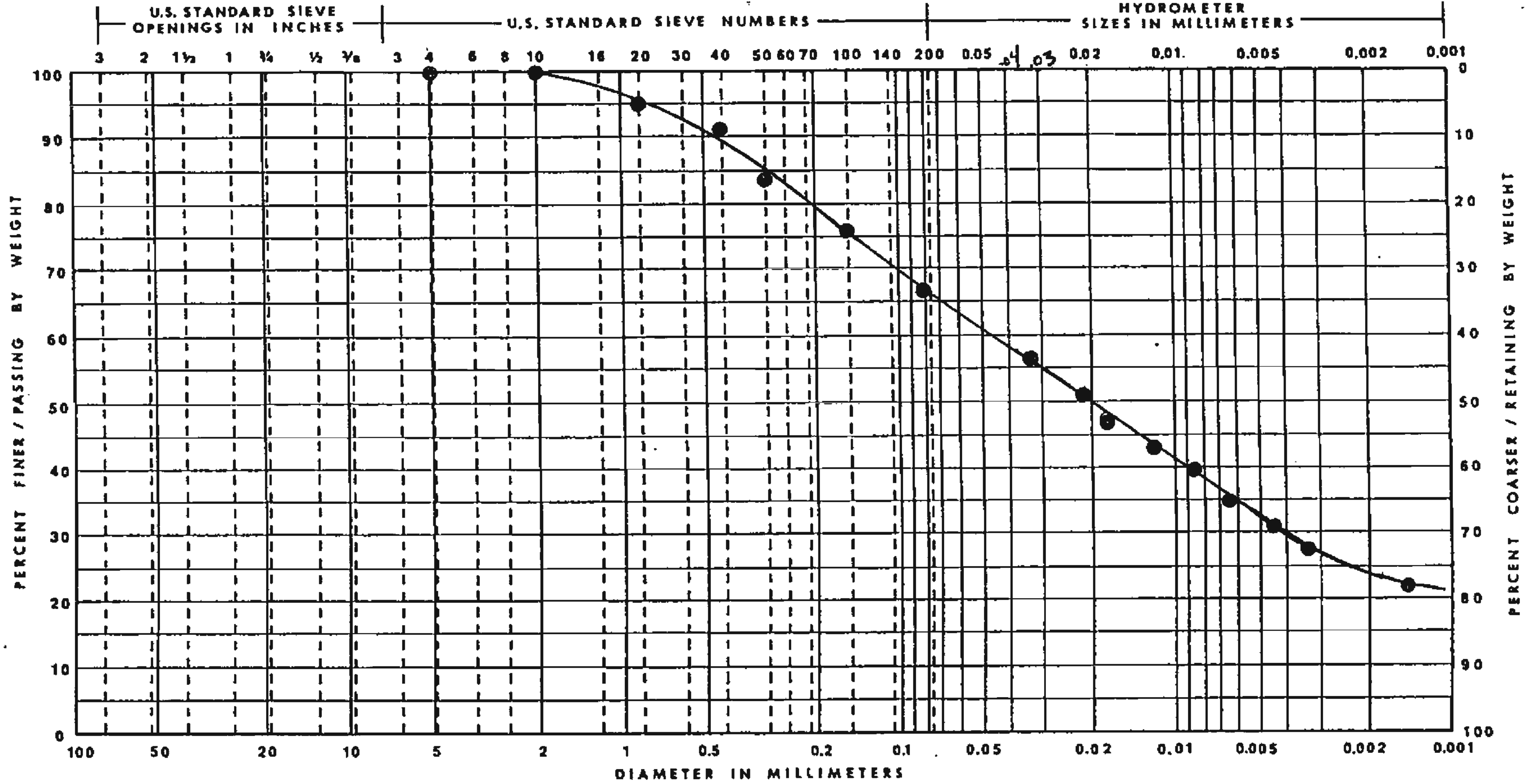
DRAWN
MCS

APP'D

DATE
10/25/94

JOB
PG-22087

soil and materials engineers, inc



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	%< 0.074 mm	
	B2	CS10	26.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	67	

MONROE ASH BASIN
DETROIT EDISON
MONROE, MICHIGAN

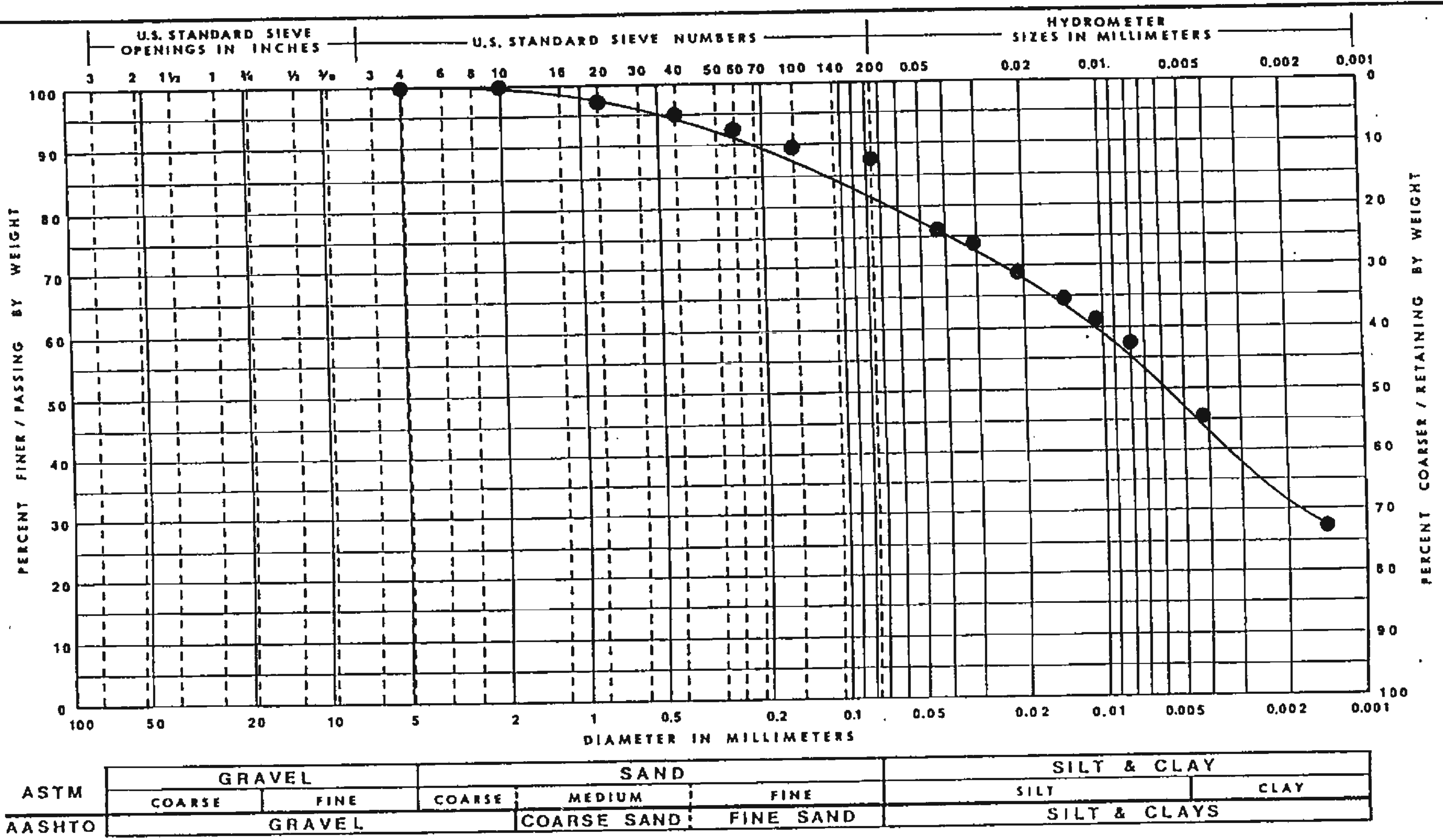
DRAWN SDN

APP'D

DATE 12/14/94

JOB PG22087

soil and materials engineers, inc



CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B2	CS12	34.5	Silty Clay-Trace to Some Sand-Trace of Gravel-Gray (CL)	86	

MONROE ASH BASIN
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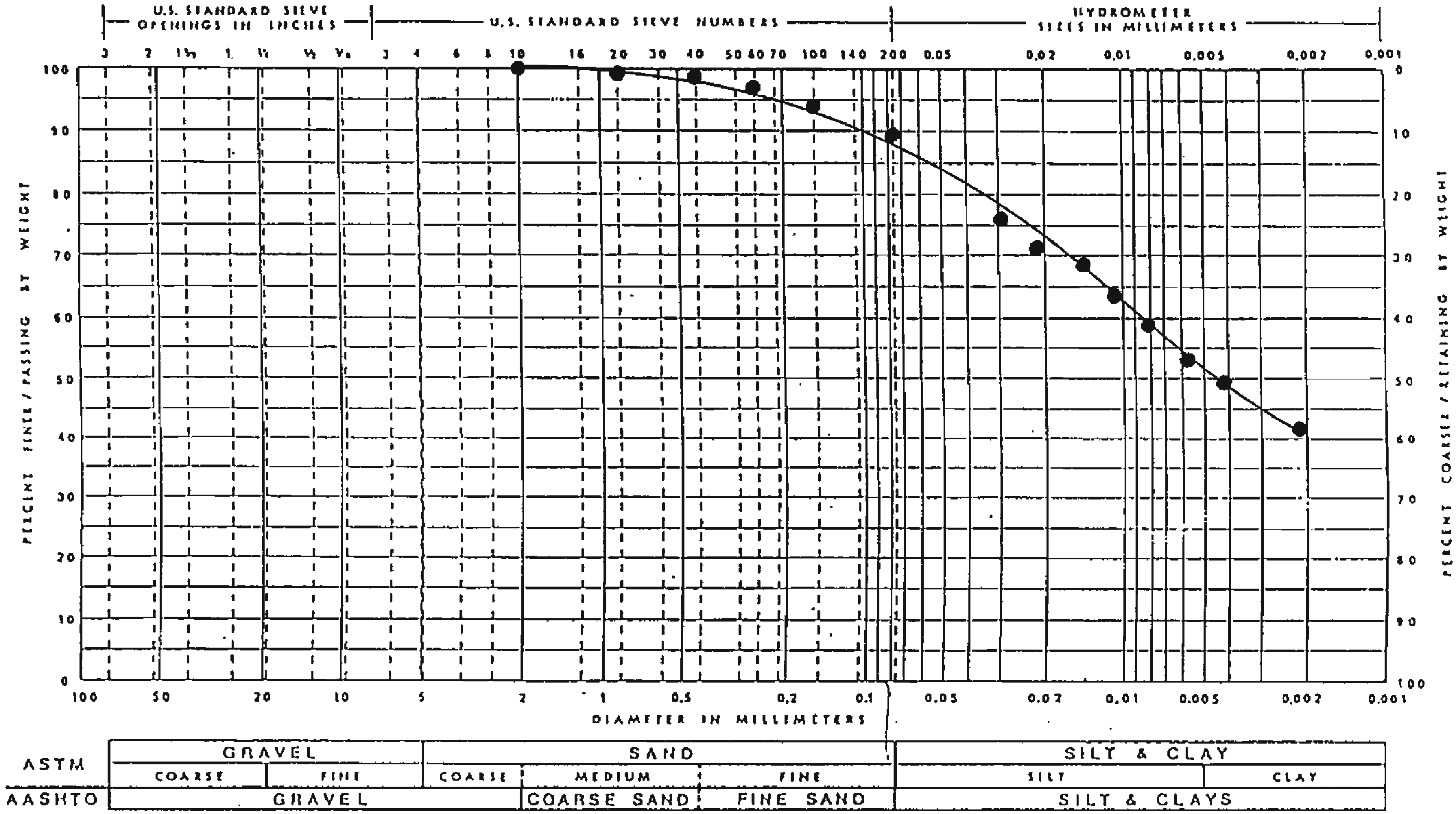

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B4	CS2	6.5	Silty Clay, Trace to Some	90	
				Sand, Trace Gravel, Mottled		
				Brown (CL)		

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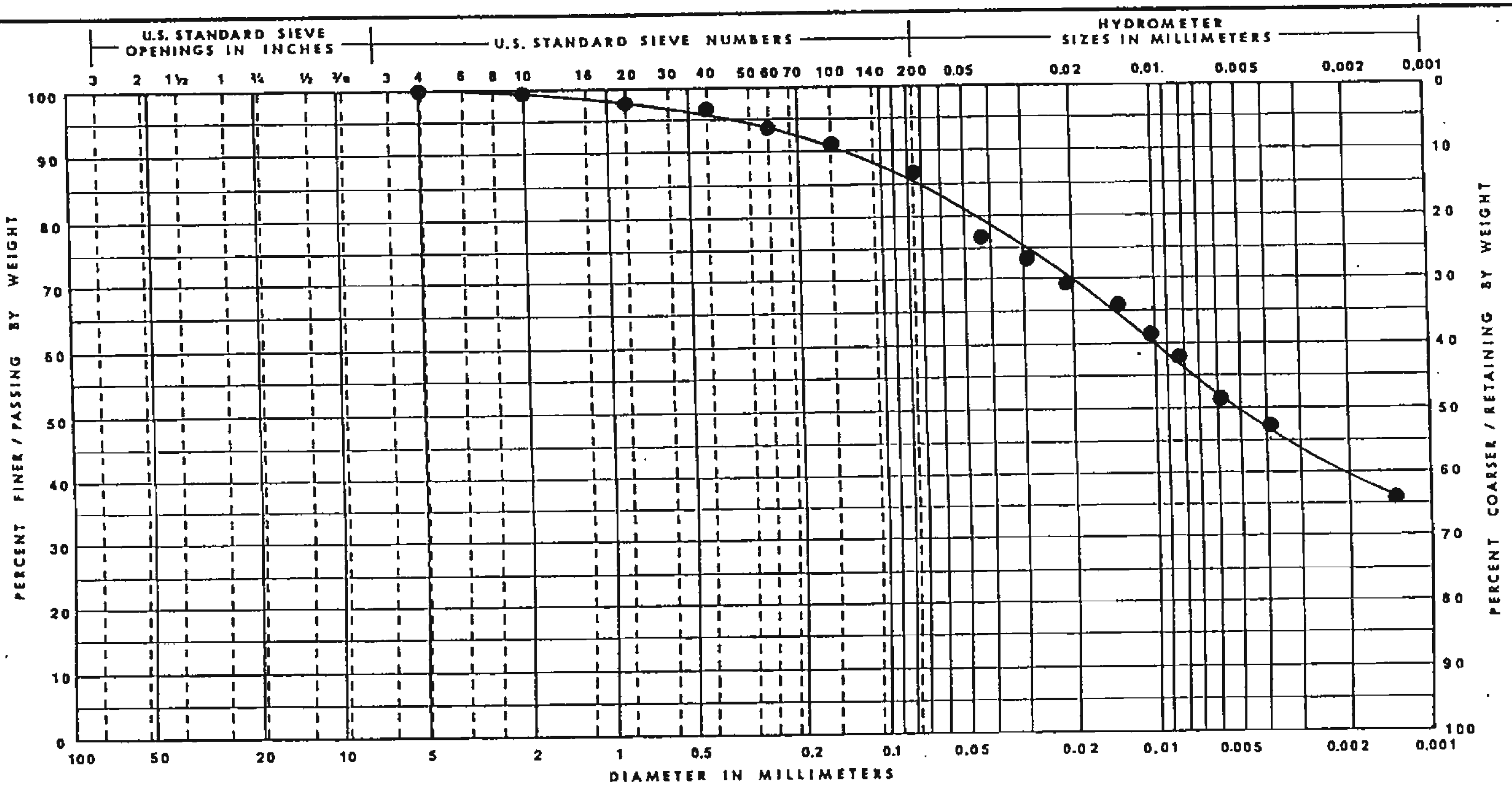

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS4	11.5	Silty Clay-Trace to Some Sand-Trace of Gravel, Topsoil & Roots-Brown (CL)	86	

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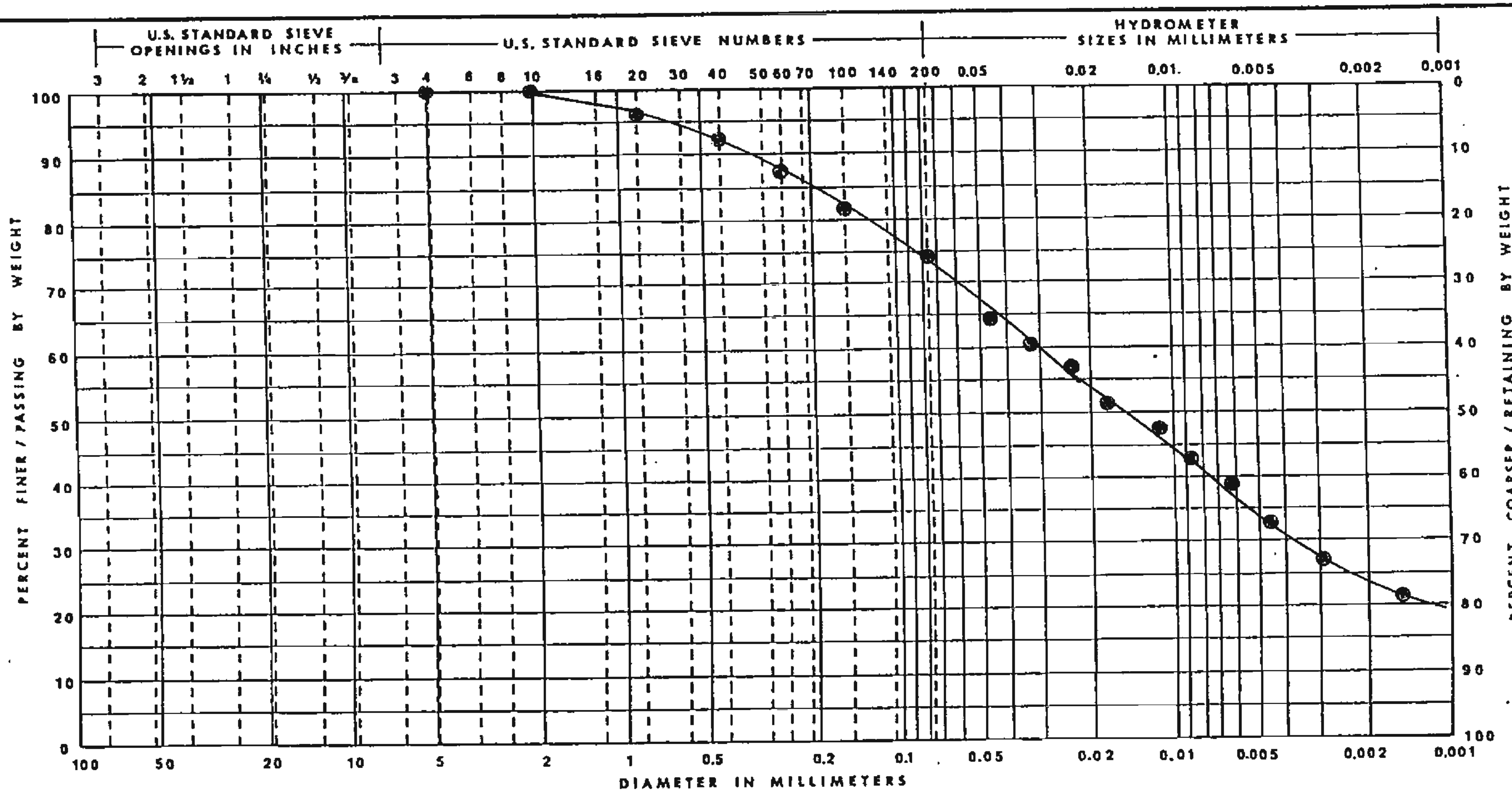

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS6	16.5	Silty Clay-Some Sand-Trace of Gravel-Mottled Brown (CL)	75	

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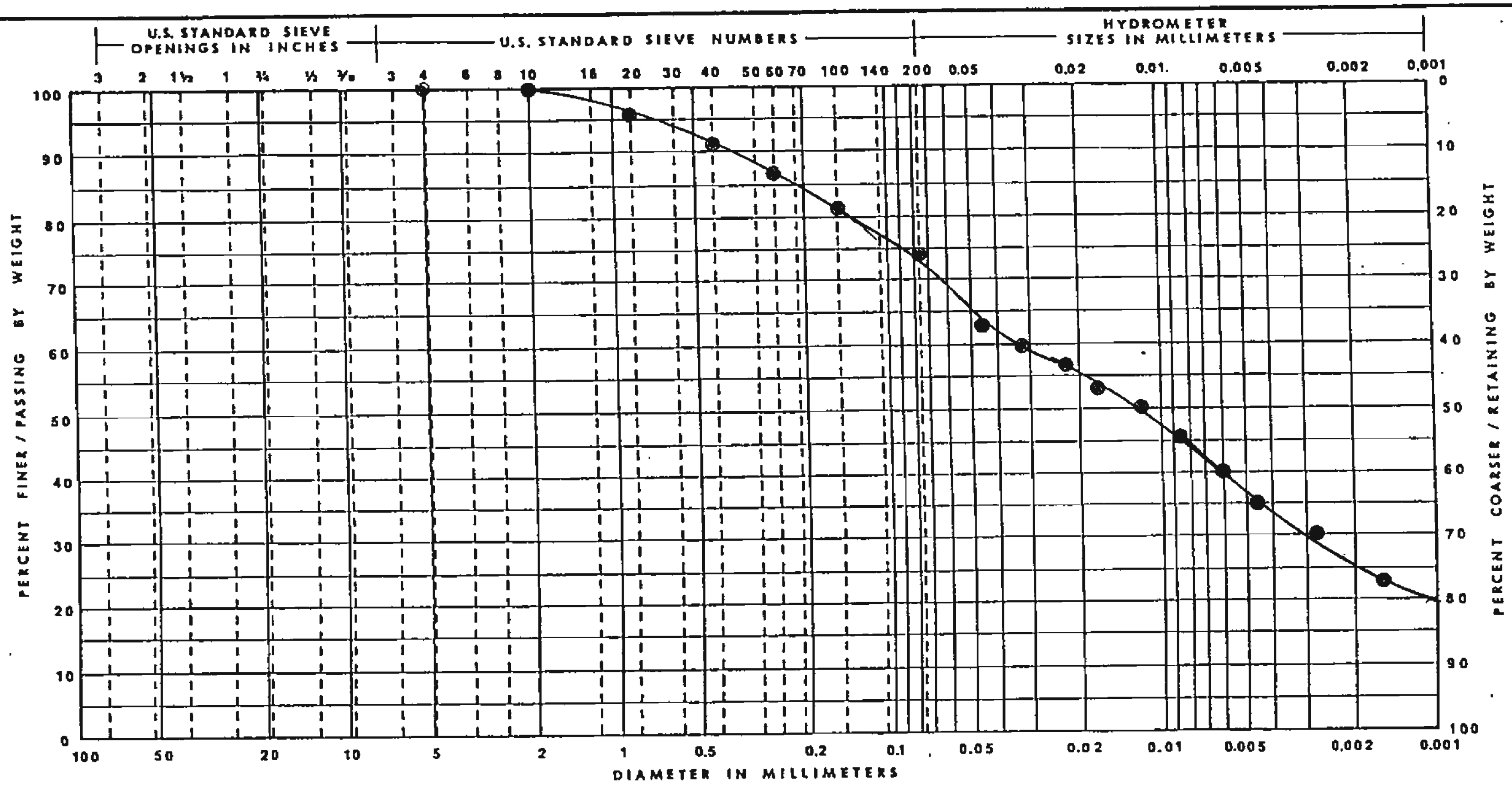

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS8	21.5	Silty Clay-Some Sand-Trace of	74	
				Gravel-Gray (CL)		

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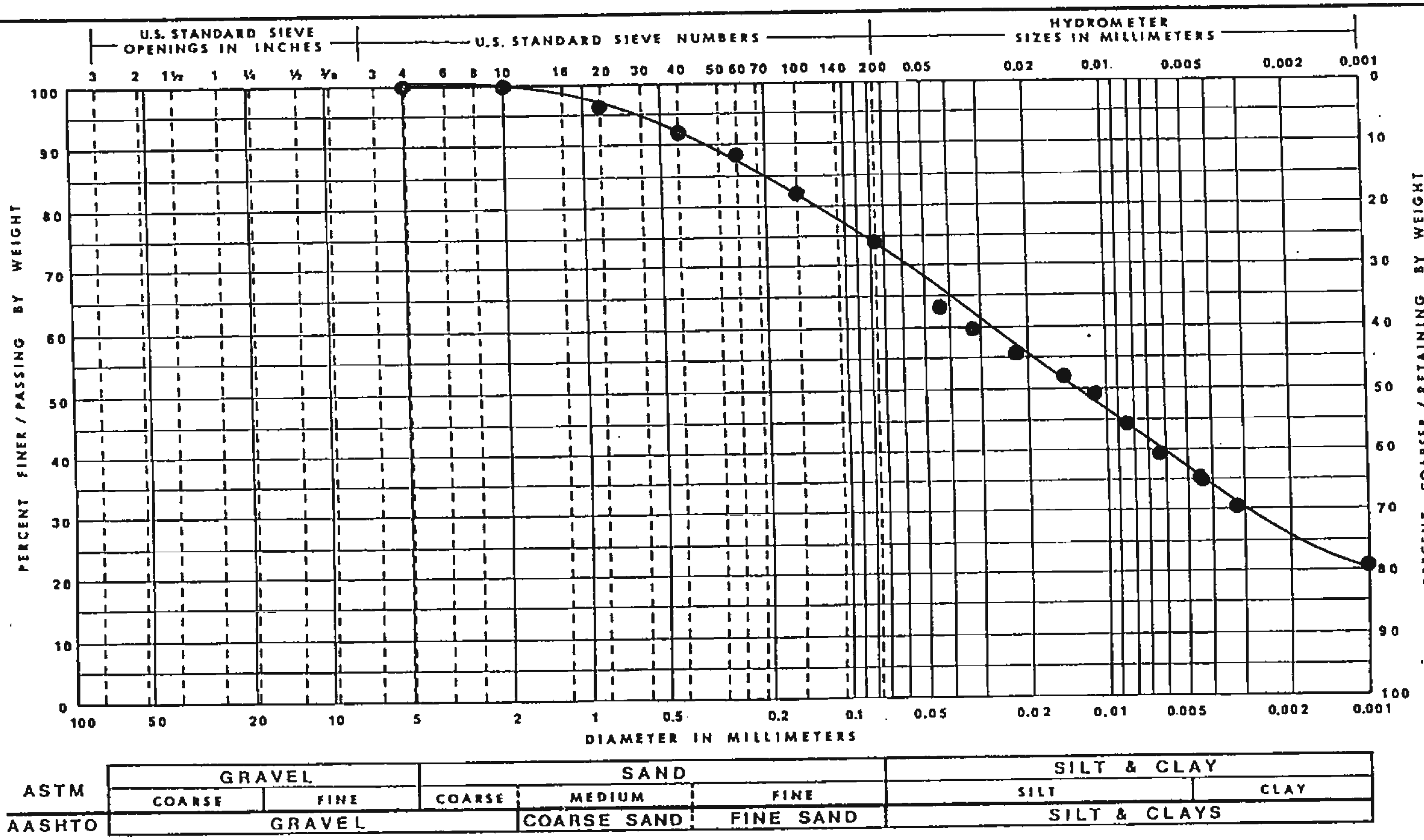

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS10	26.5	Silty Clay-Some Sand-Trace of	75	
				Gravel-Gray (CL)		

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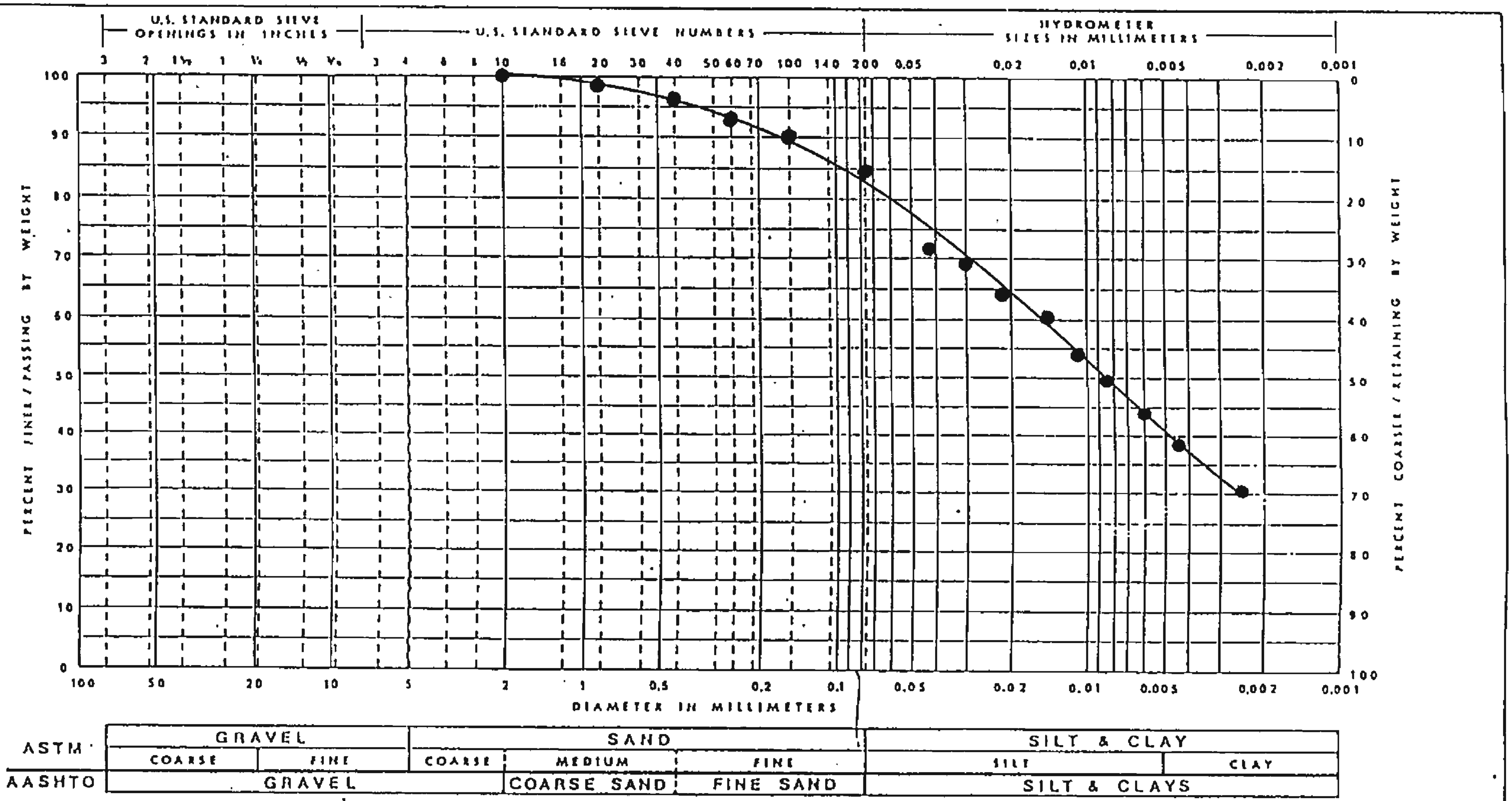

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS12	31.5	Silty Clay, Trace to Some Sand, Trace of Gravel, Gray (CL)	85	

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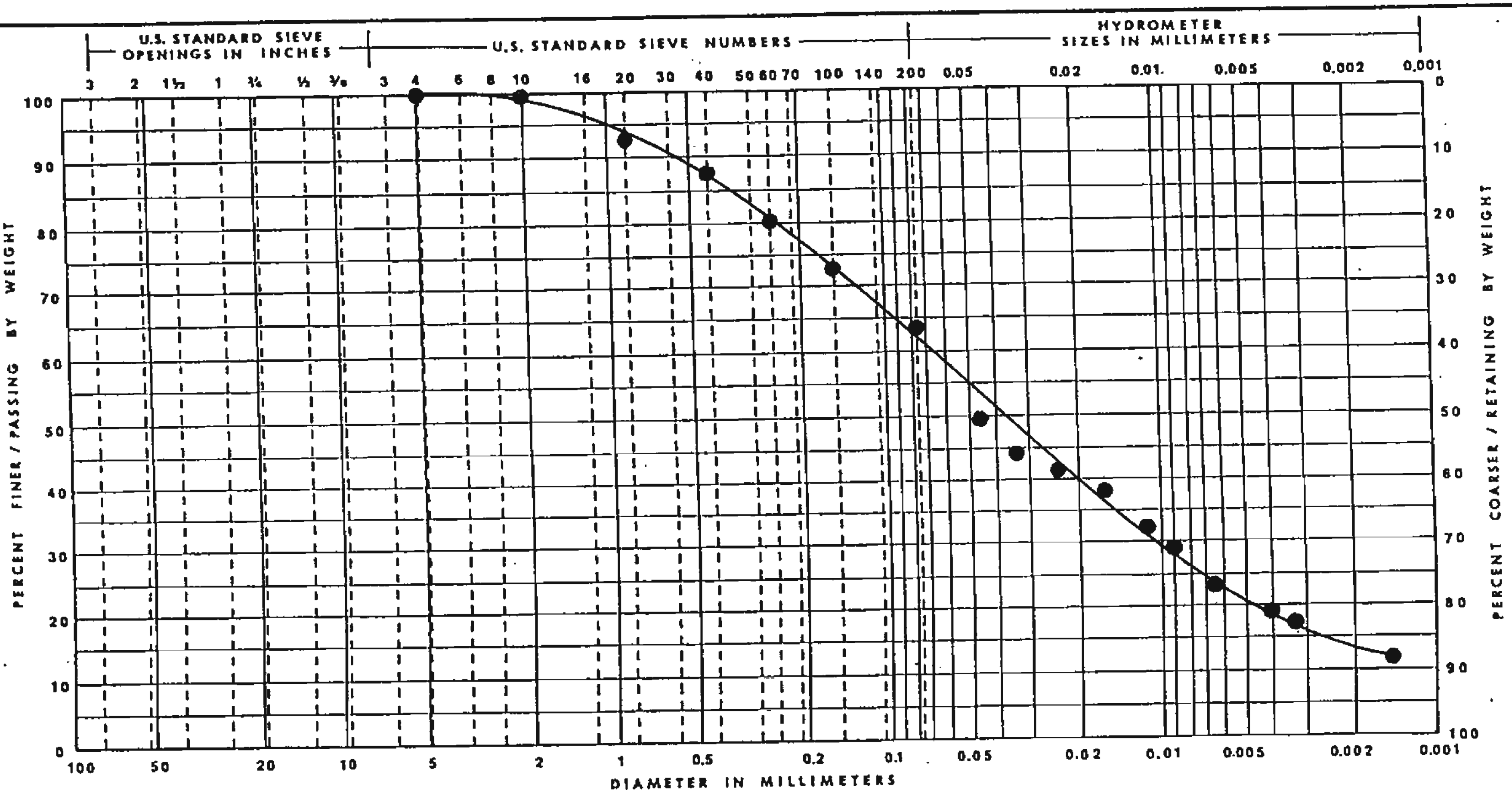

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B4	CS14	36.5	Limestone	64	

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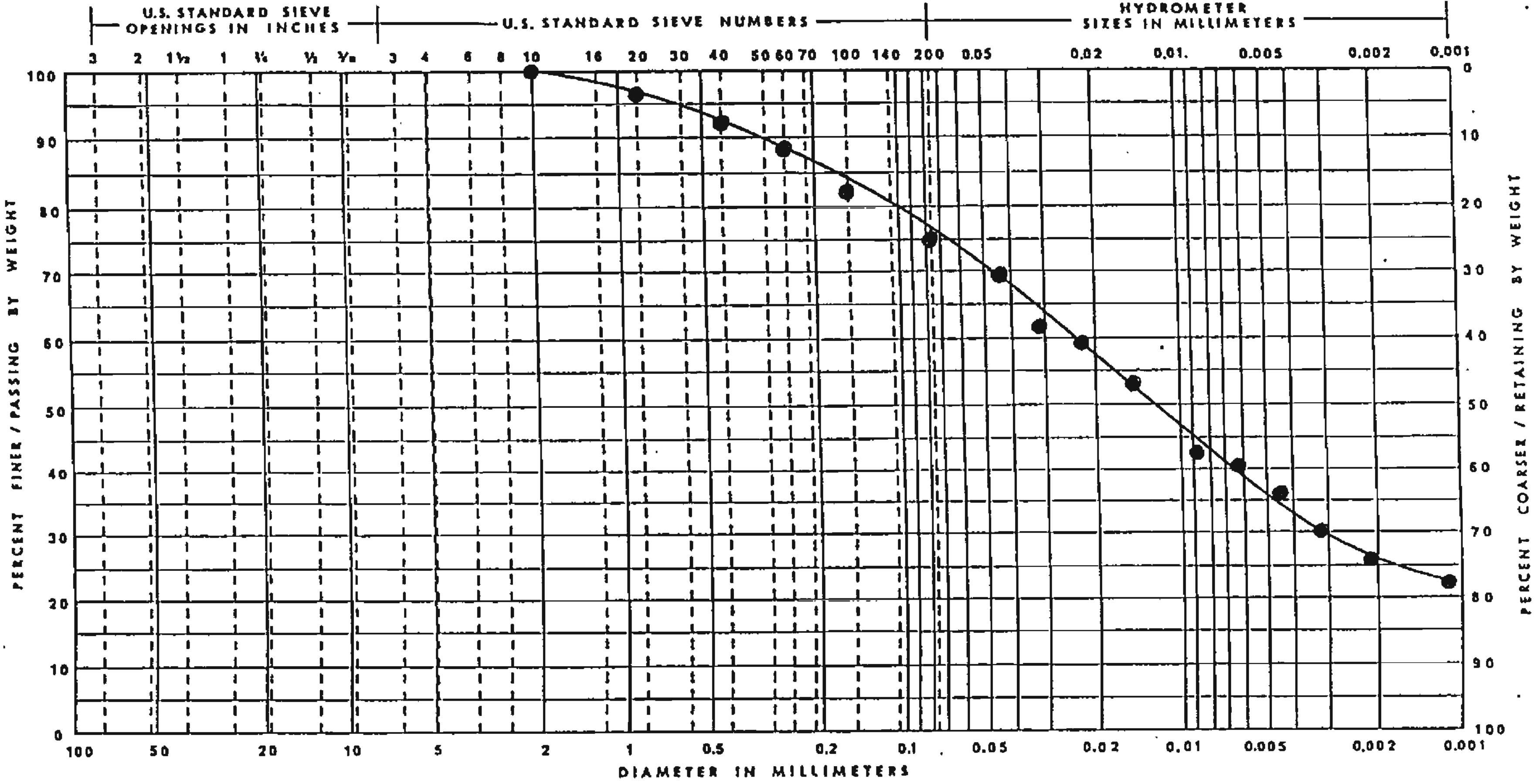

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	%< 0.074 mm	
	B6	CS2	6.5	Silty Clay, Some Sand, Trace	75	
				of Gravel, Mottled Brown (CL)		

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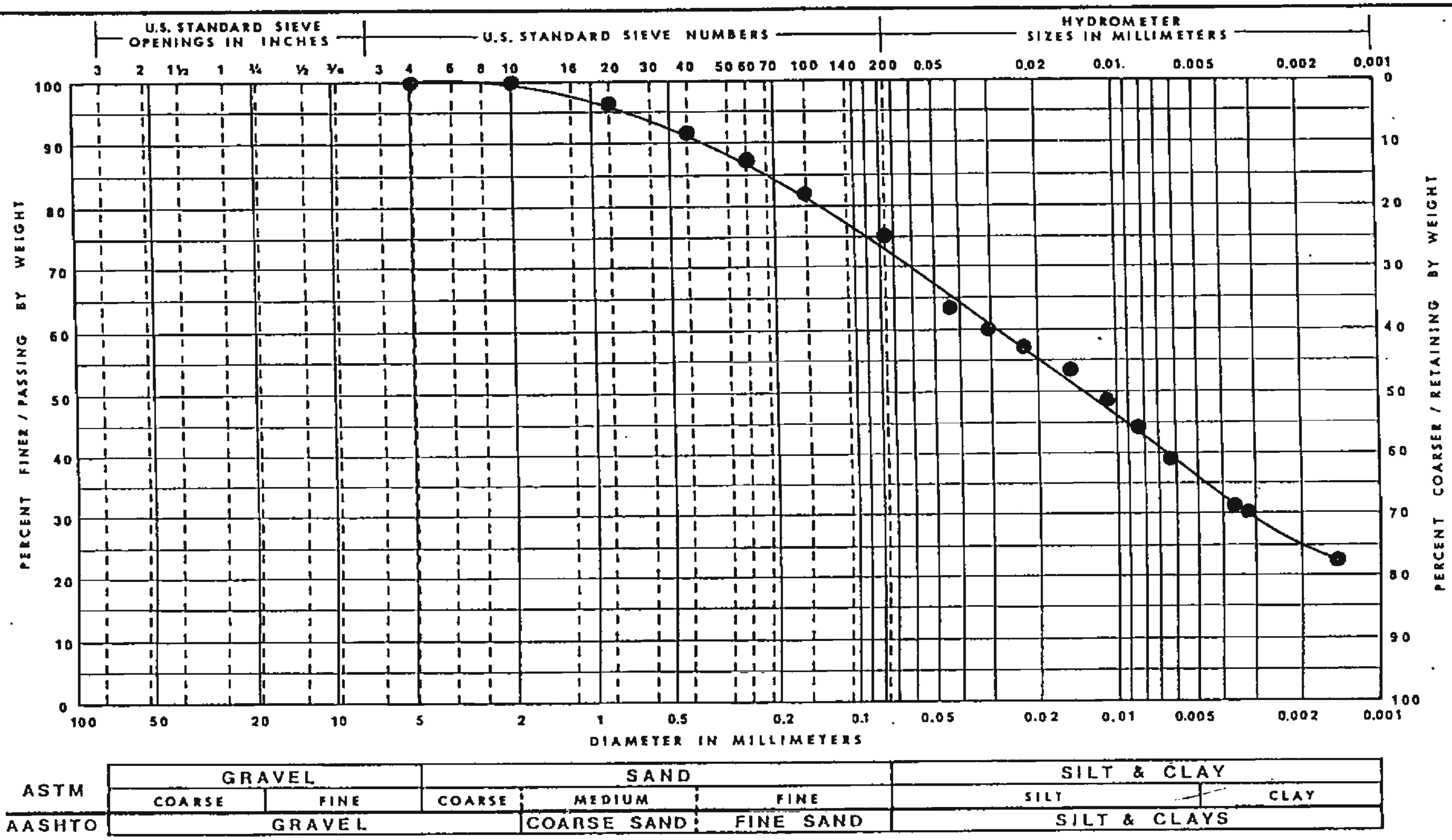

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS4	11.5	Silty Clay-Some Sand-Trace of	75	
				Gravel-Gray (CL)		

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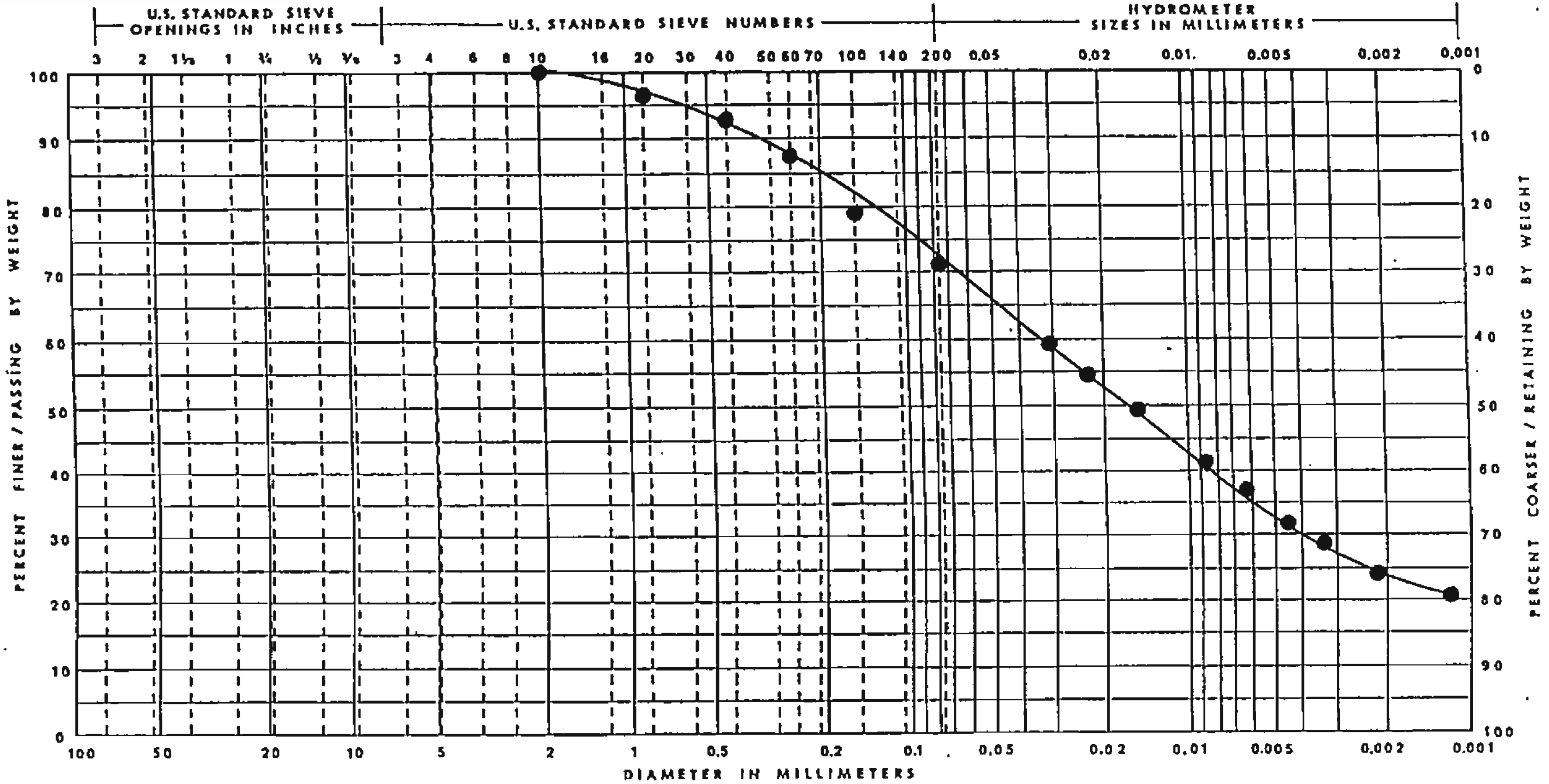

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS6	16.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	71	

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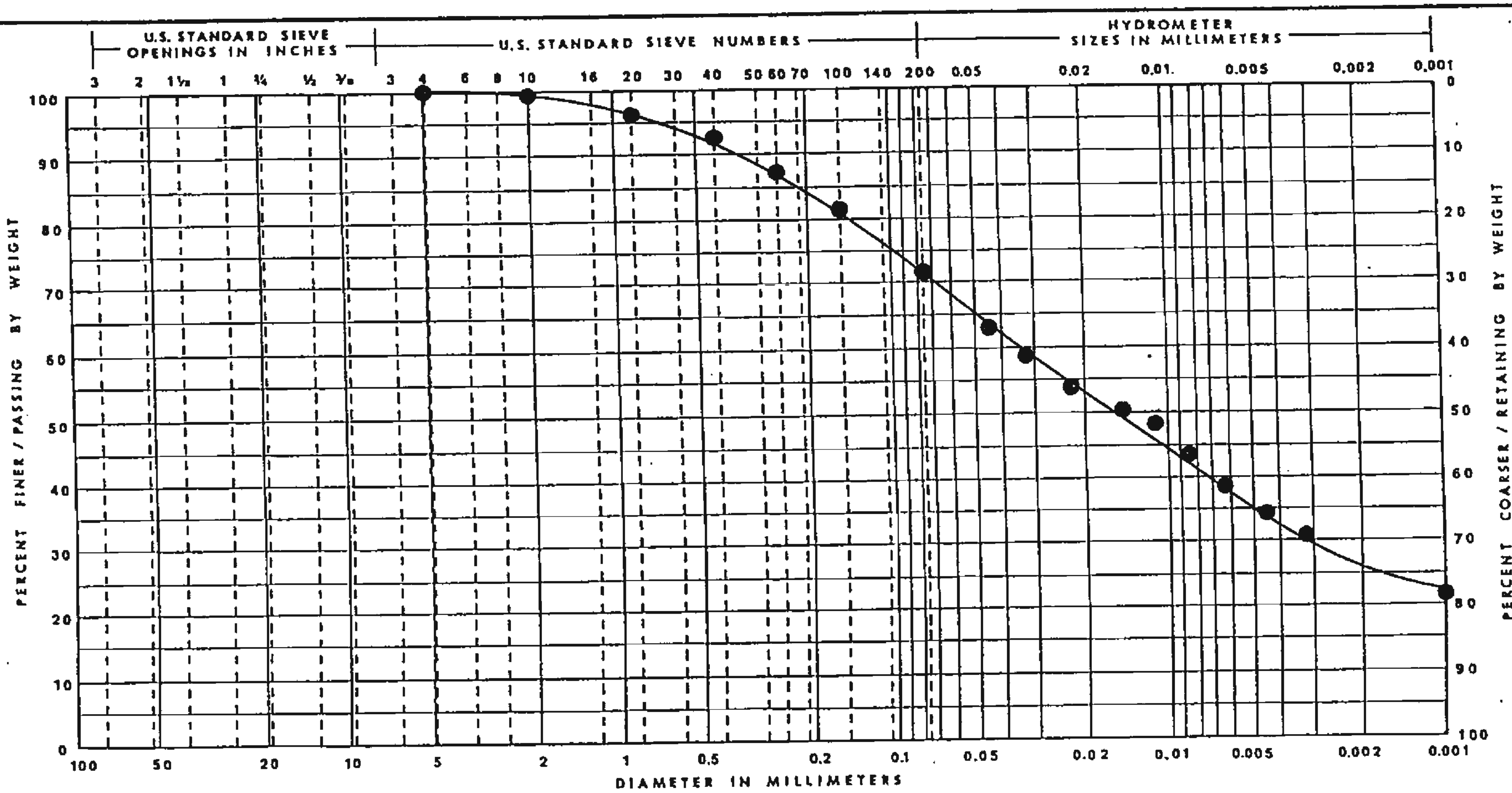

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS8	21.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	72	

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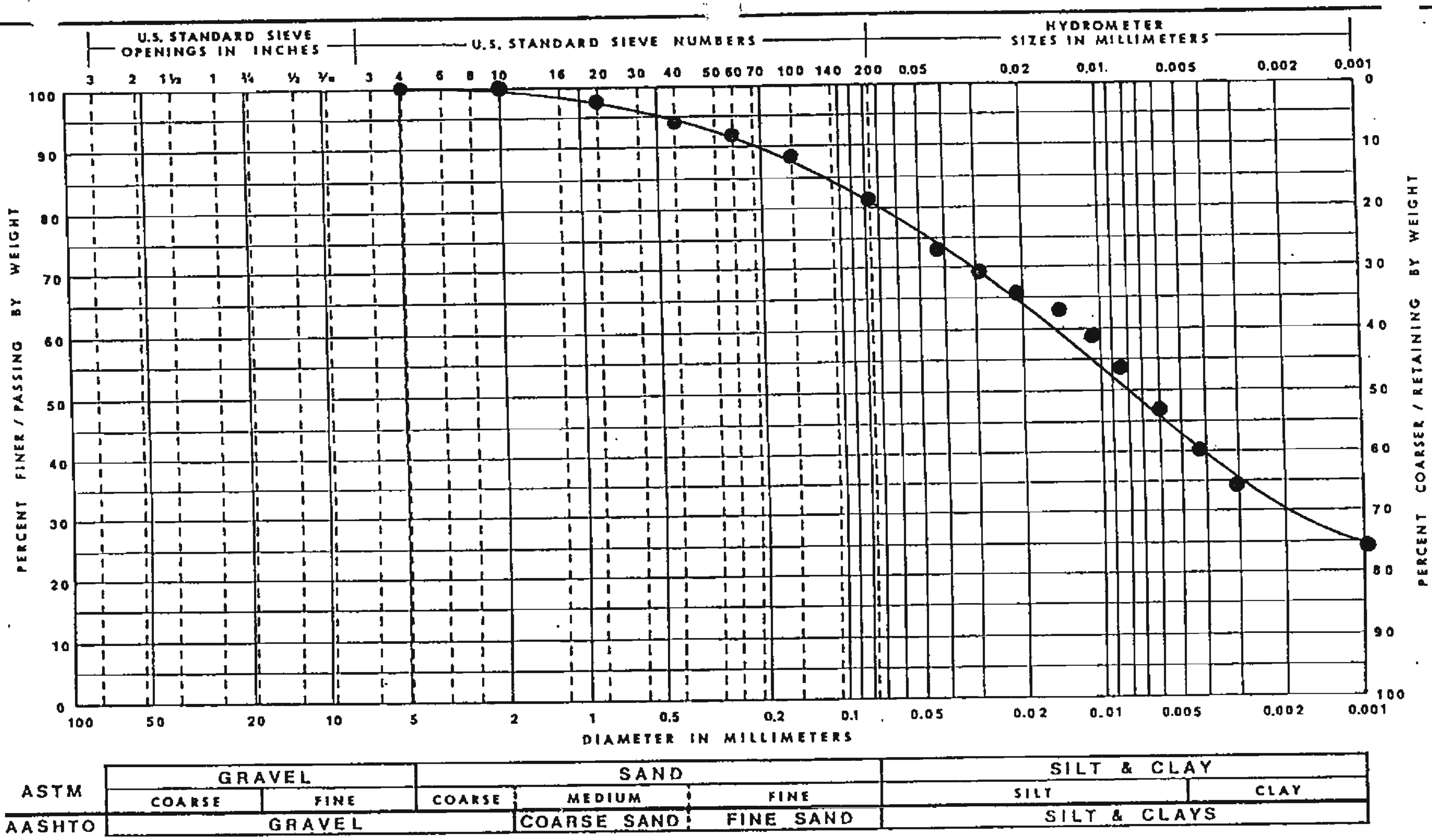

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS10	26.5	Silty Clay-Trace to Some Sand- Trace of Gravel-Gray (CL)	81	

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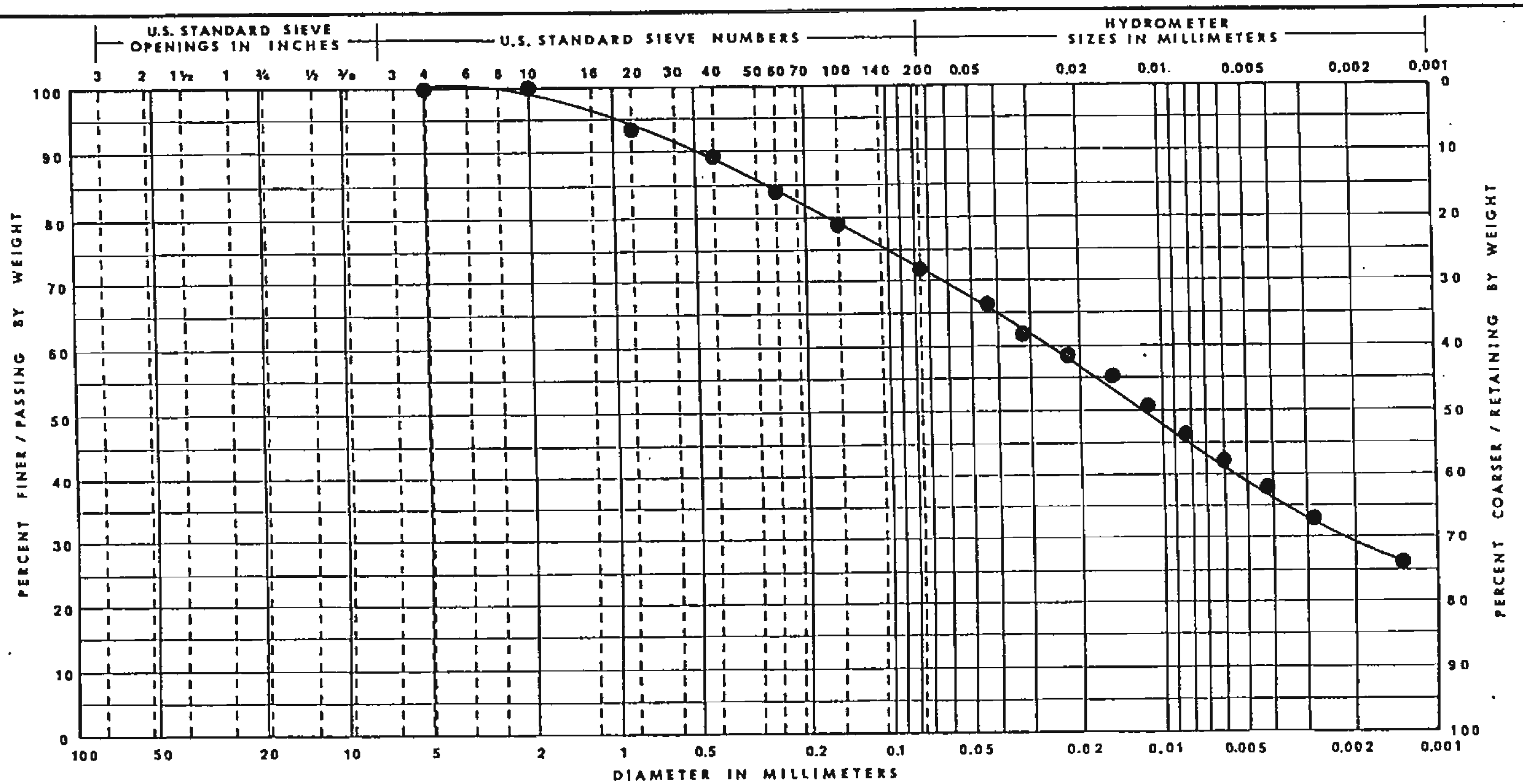

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B6	CS12	31.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	72	

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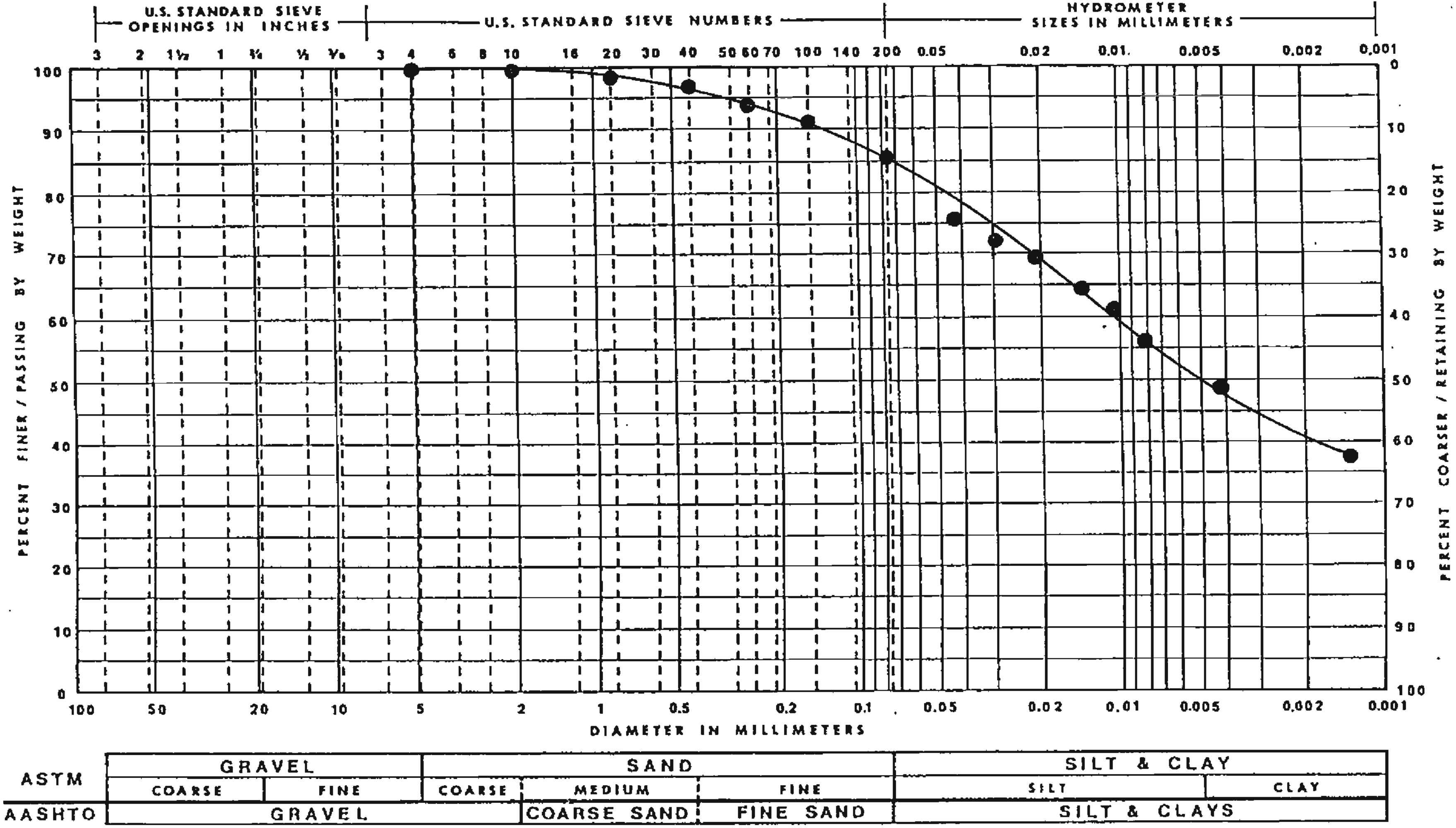

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS2	6.5	Silty Clay-Trace to Some Sand-	85	
				Trace of Gravel-Mottled Brown		
				(CL)		

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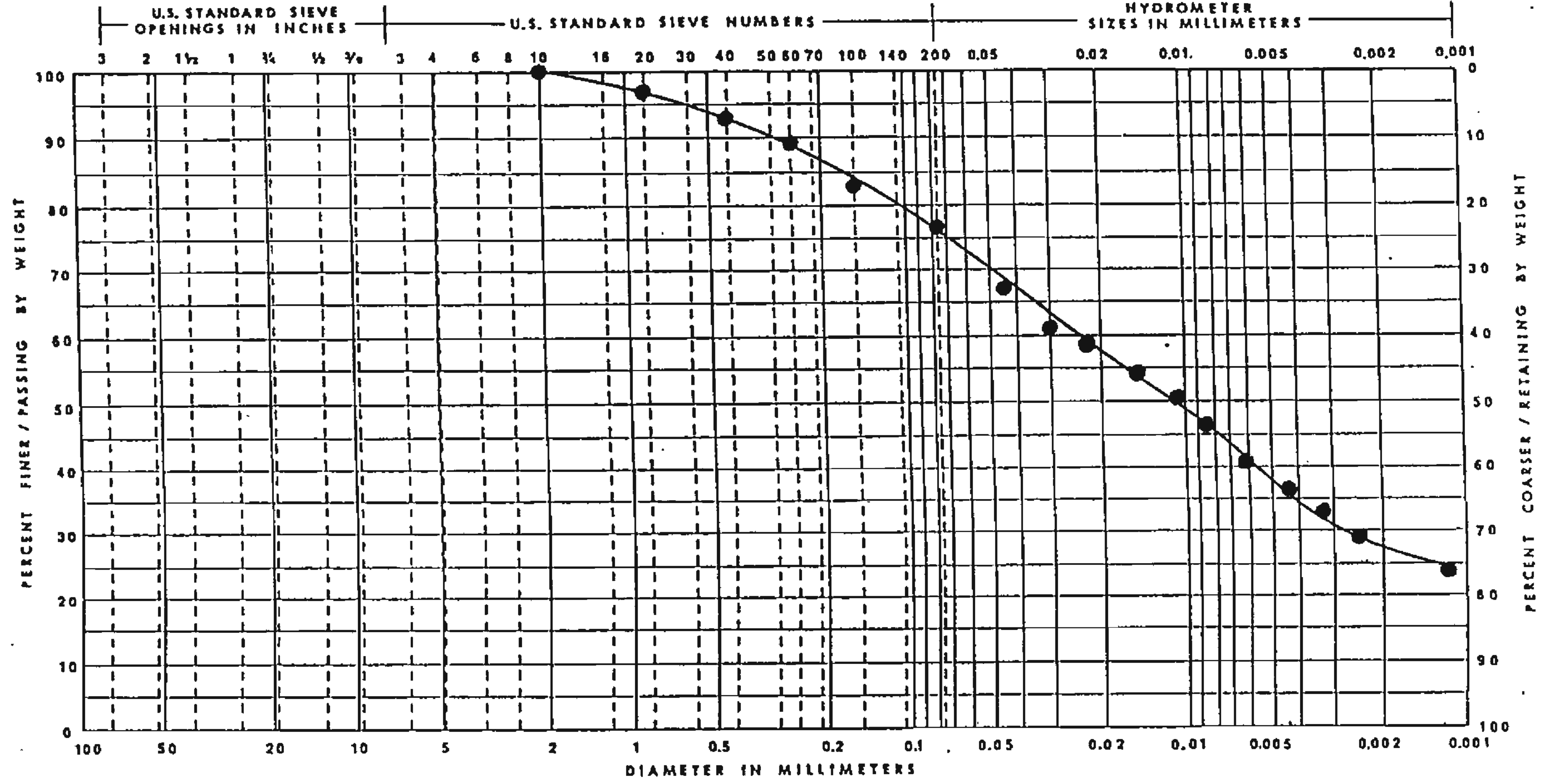

	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS4	11.5	Silty Clay, Some Sand, Trace of Gravel, Mottled Brown (CL)	76	

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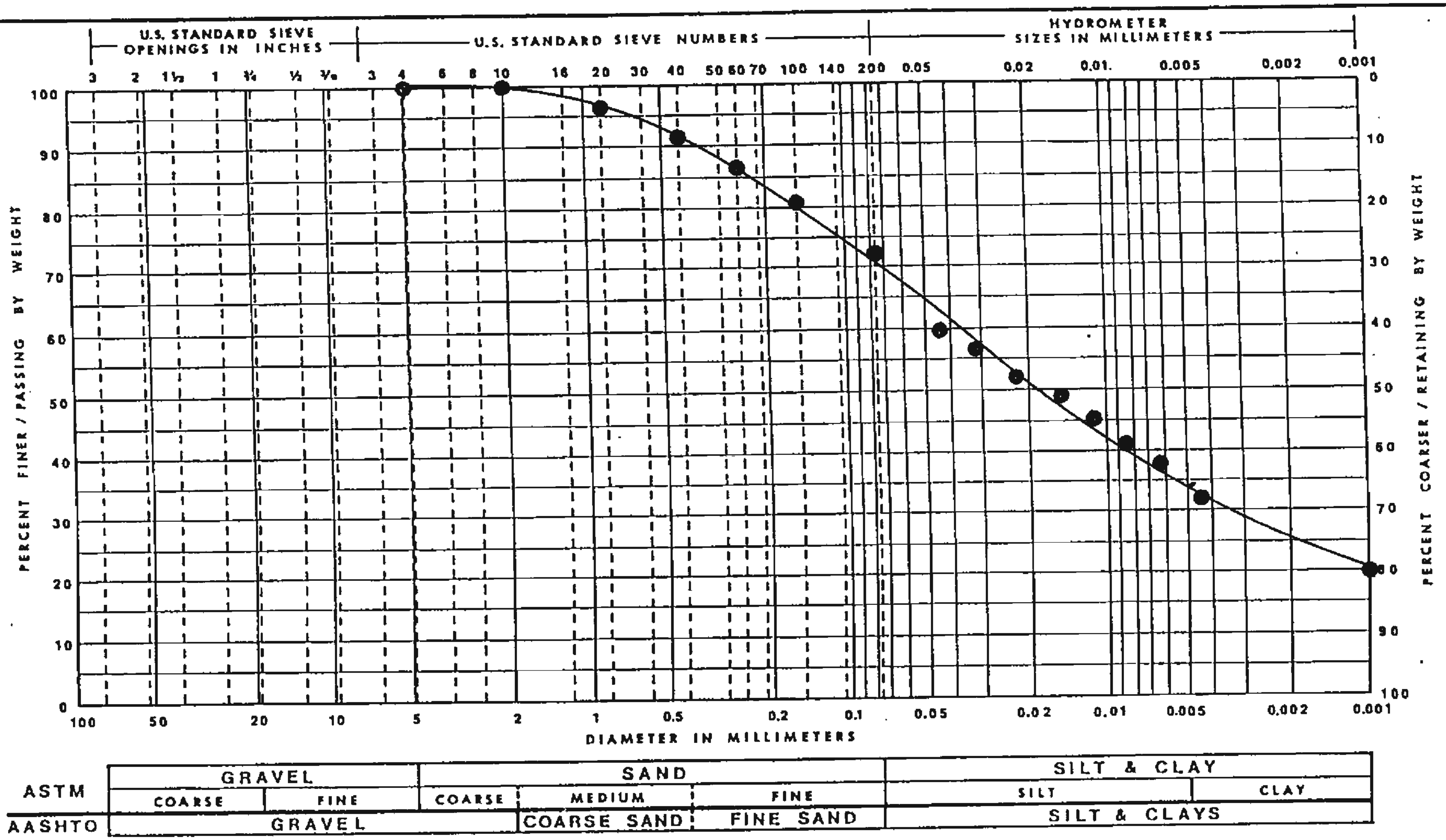

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	%< 0.074 mm	
	B8	CS6	16.5	Silty Clay-Some Sand-Trace of Gravel-Mottled Brown (CL)	72	

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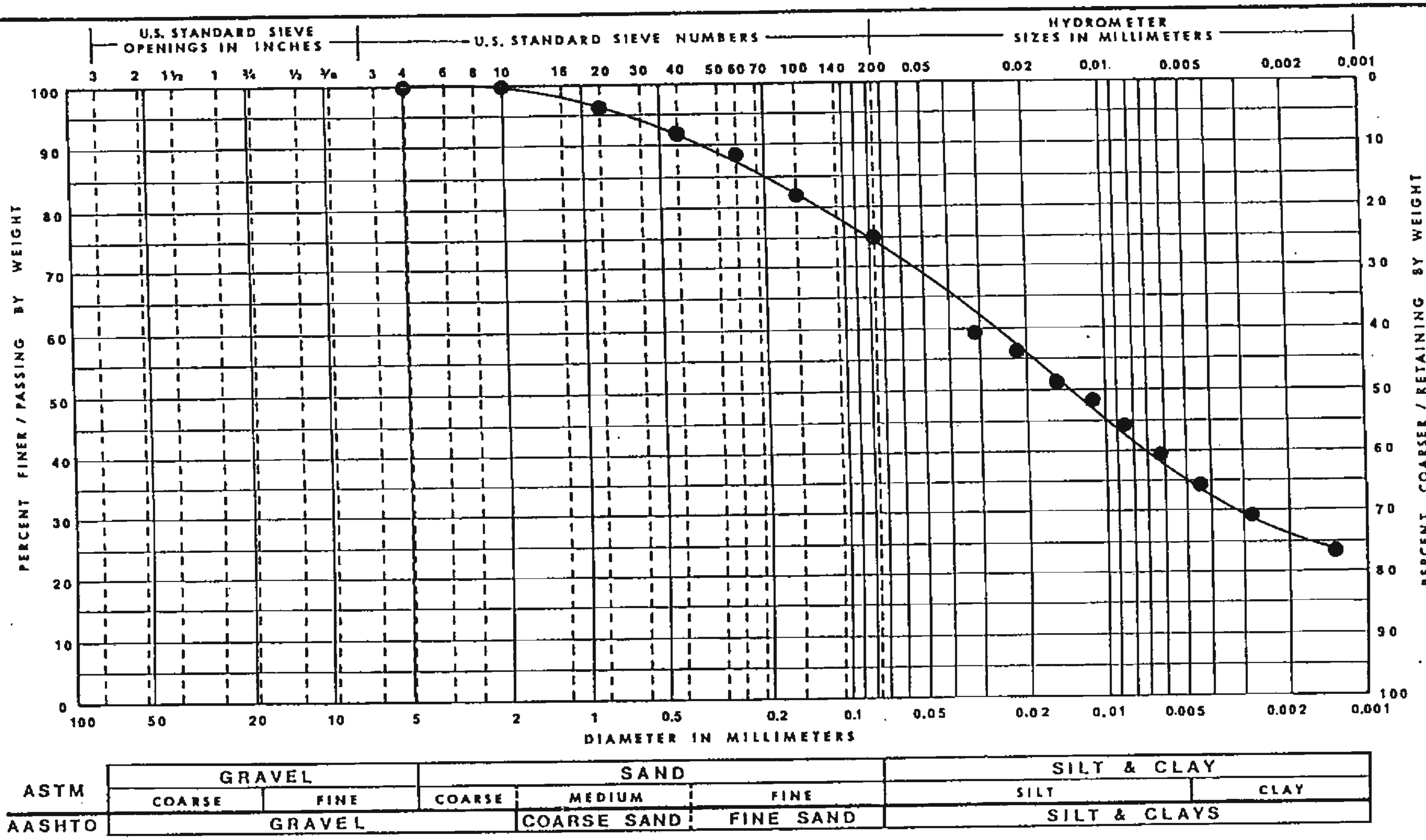

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS8	21.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	75	

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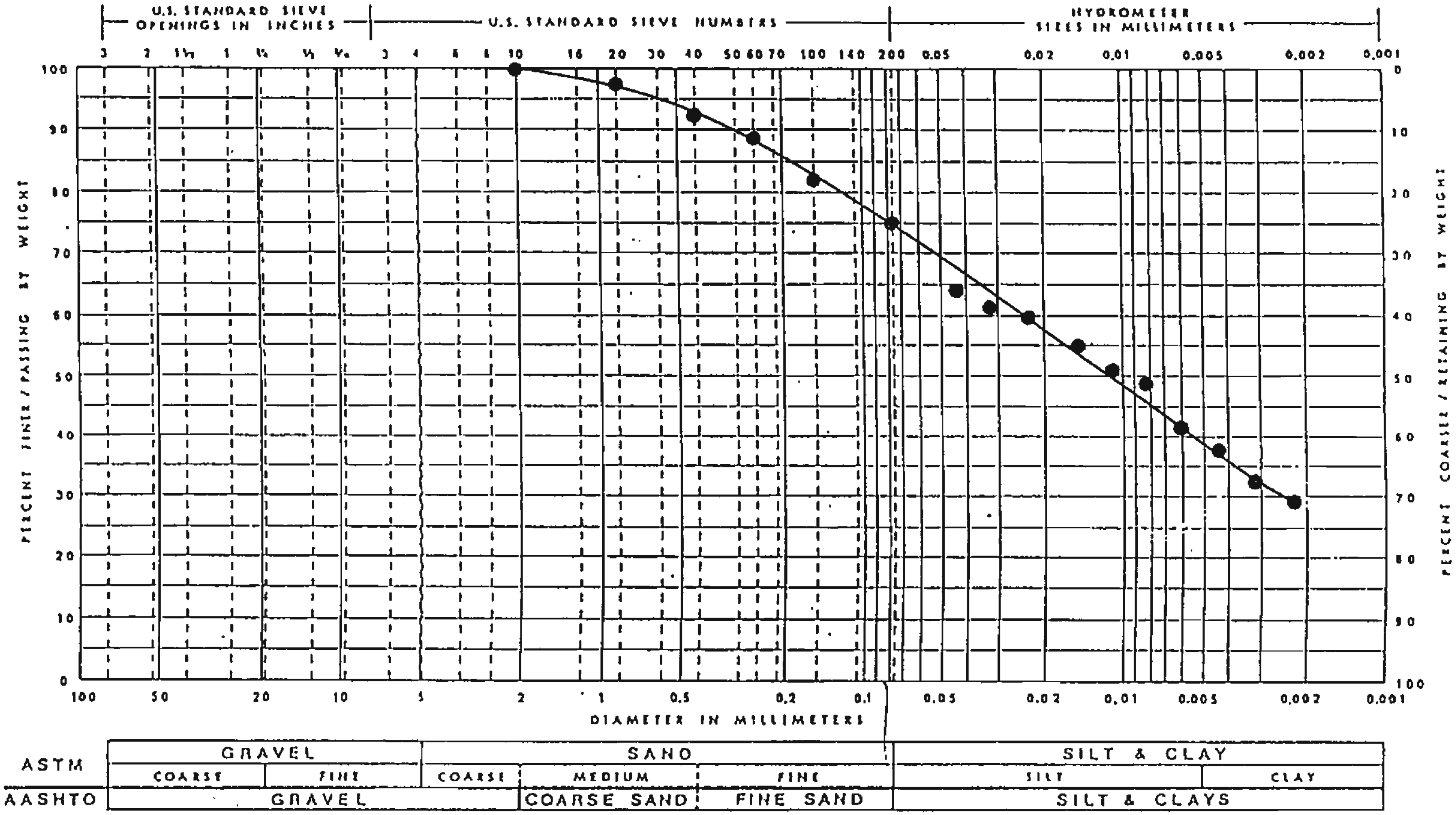

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION /	% < 0.074 mm	
	B8	CS10	26.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	75	

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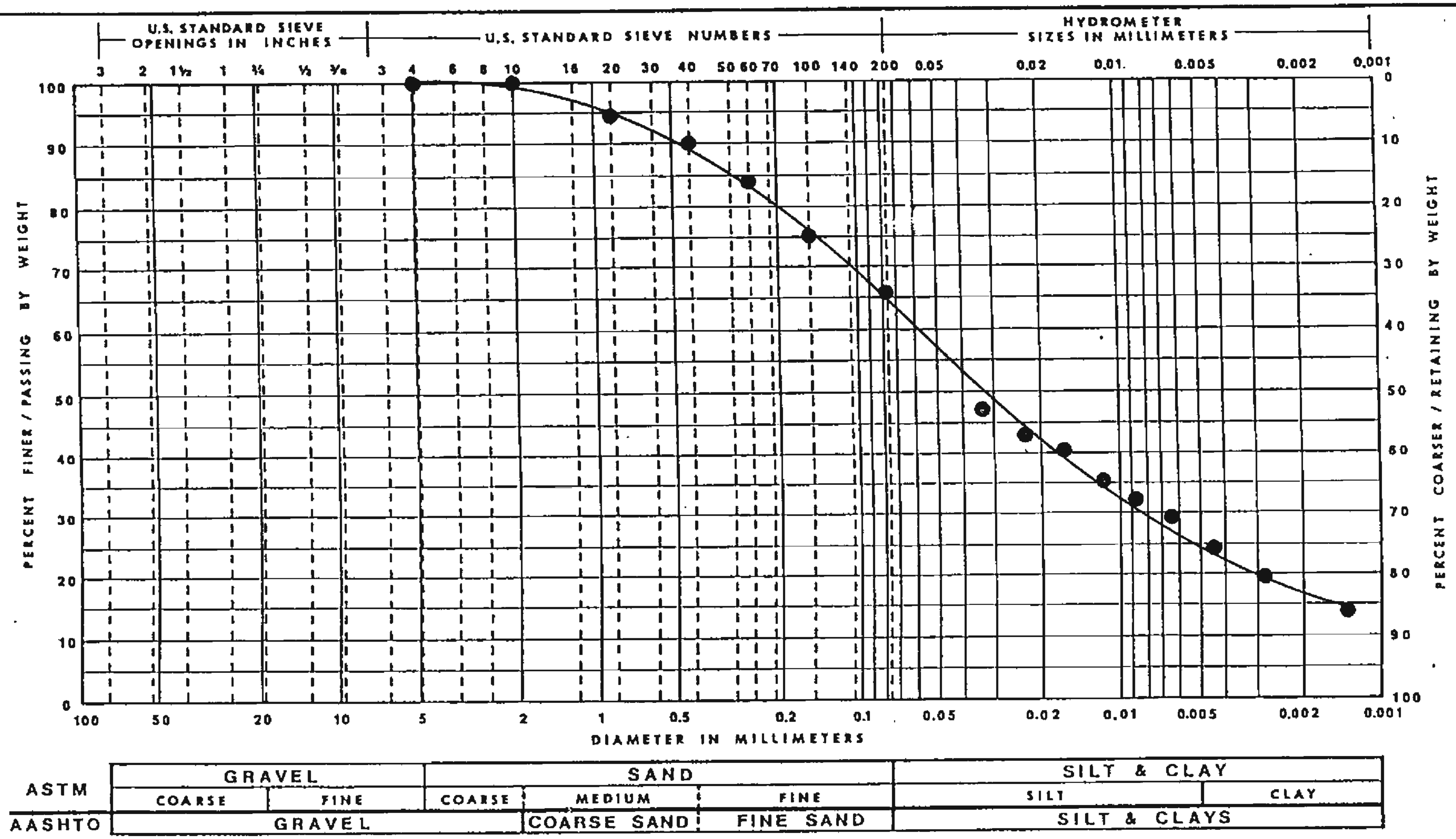

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS12	31.5	Silty Clay-Some Sand-Trace of	66	
				Gravel-Gray (CL)		

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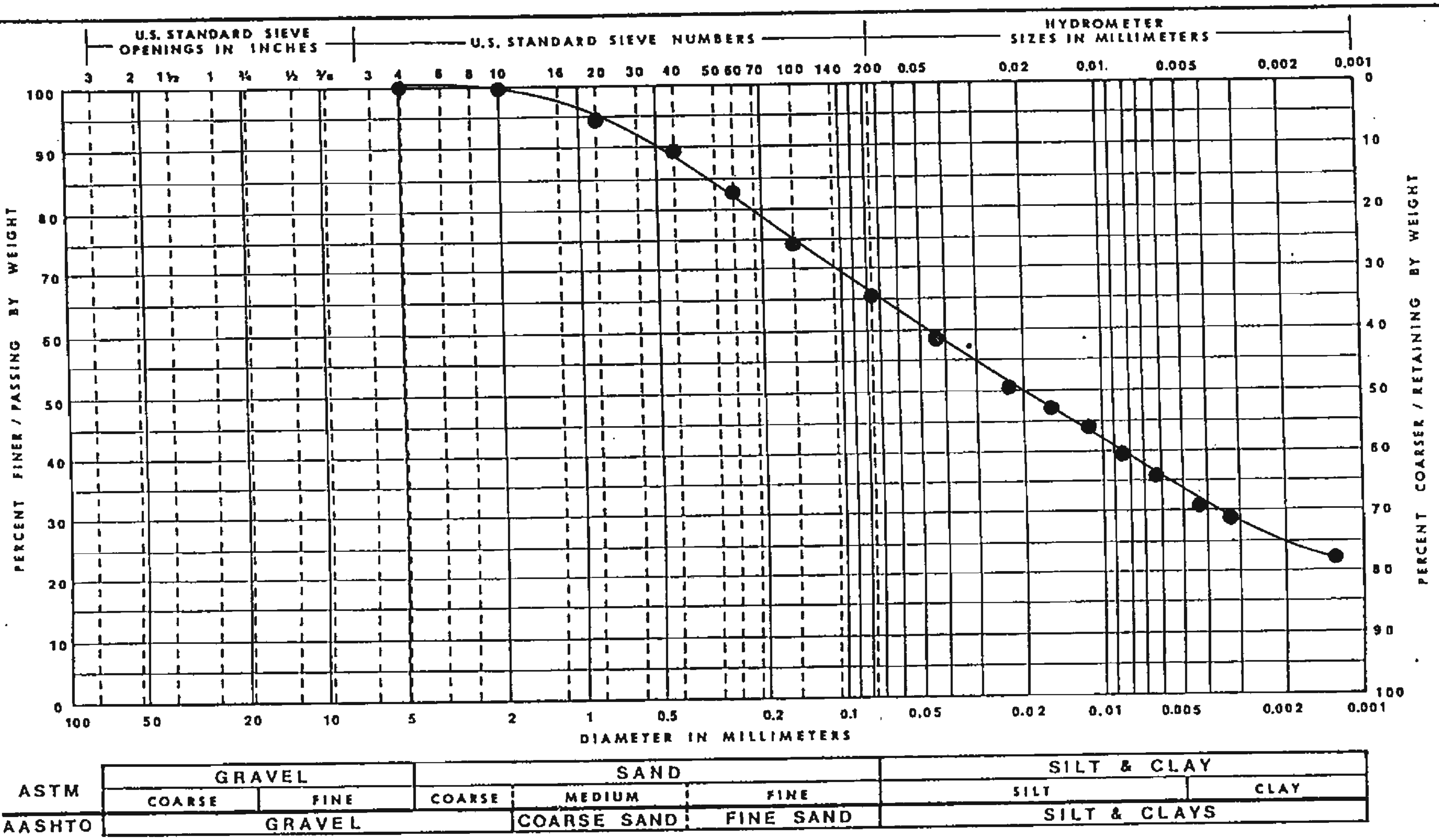

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS14	36.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	65	

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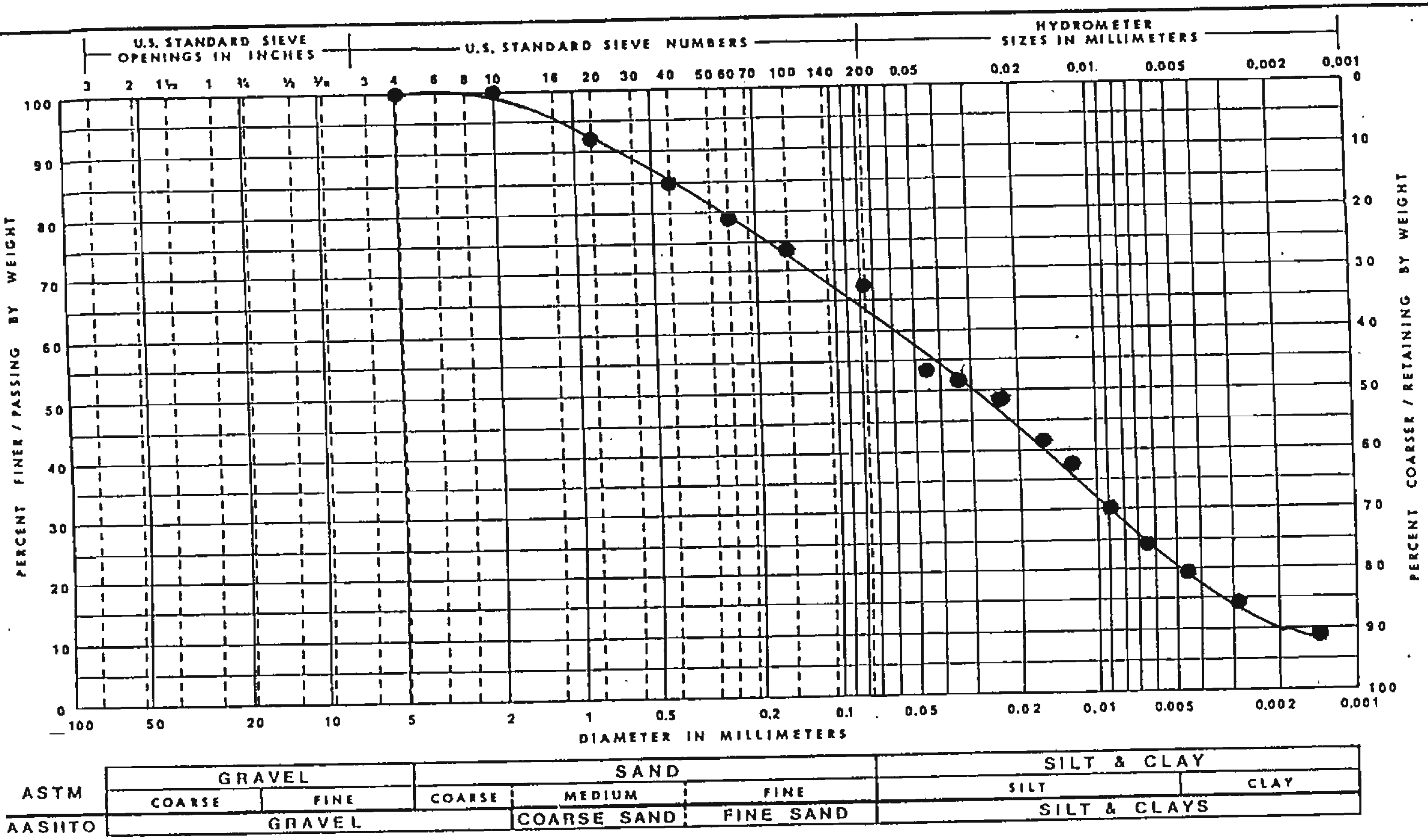

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B8	CS16	41.5	Clayey Silt-Some Sand-Trace of Gravel-Gray (CL)	66	

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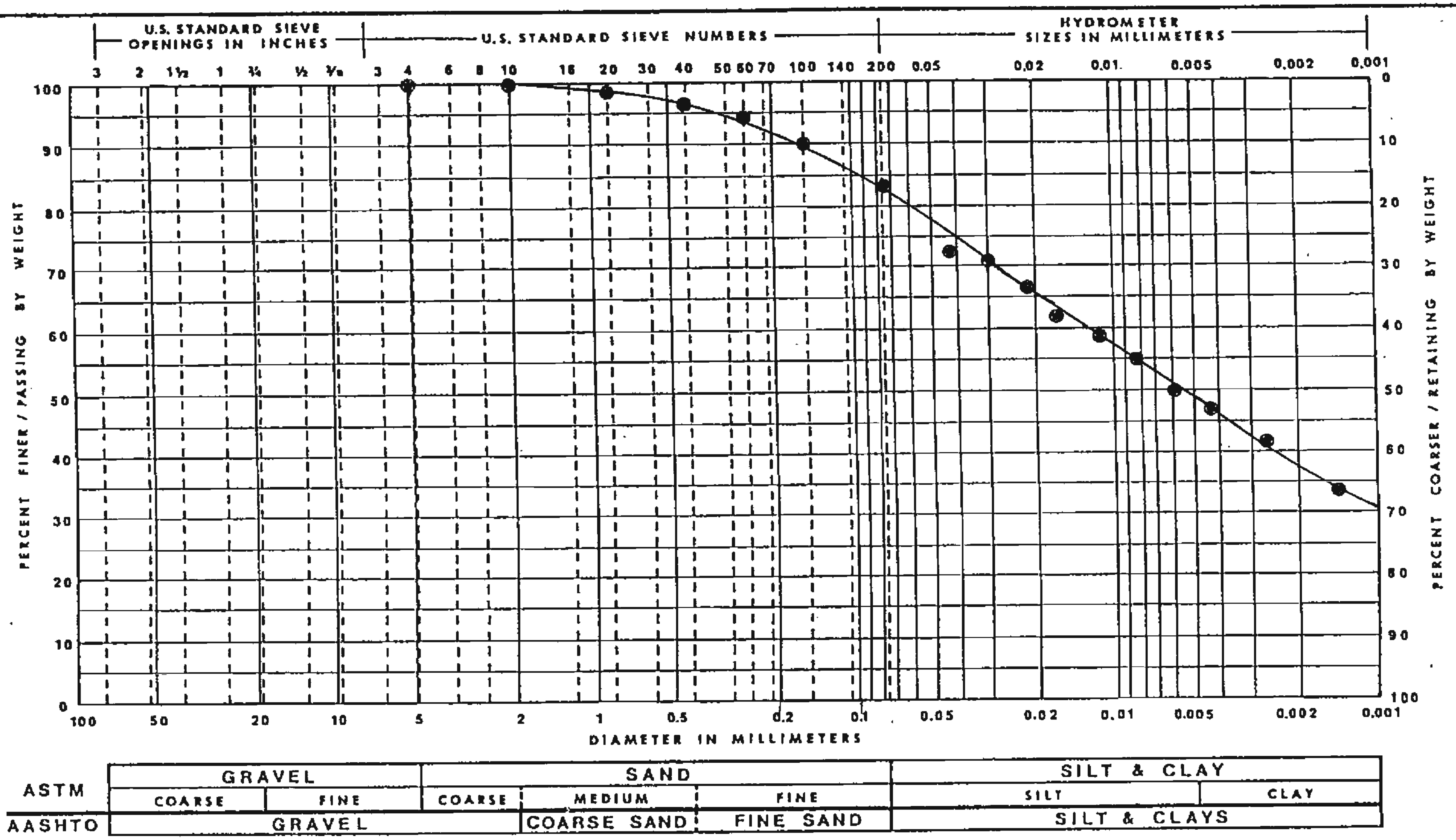

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS2	6.5	Silty Clay-Trace to Some Sand- Trace of Gravel, Roots & Brick Pieces-Brown (CL)	84	

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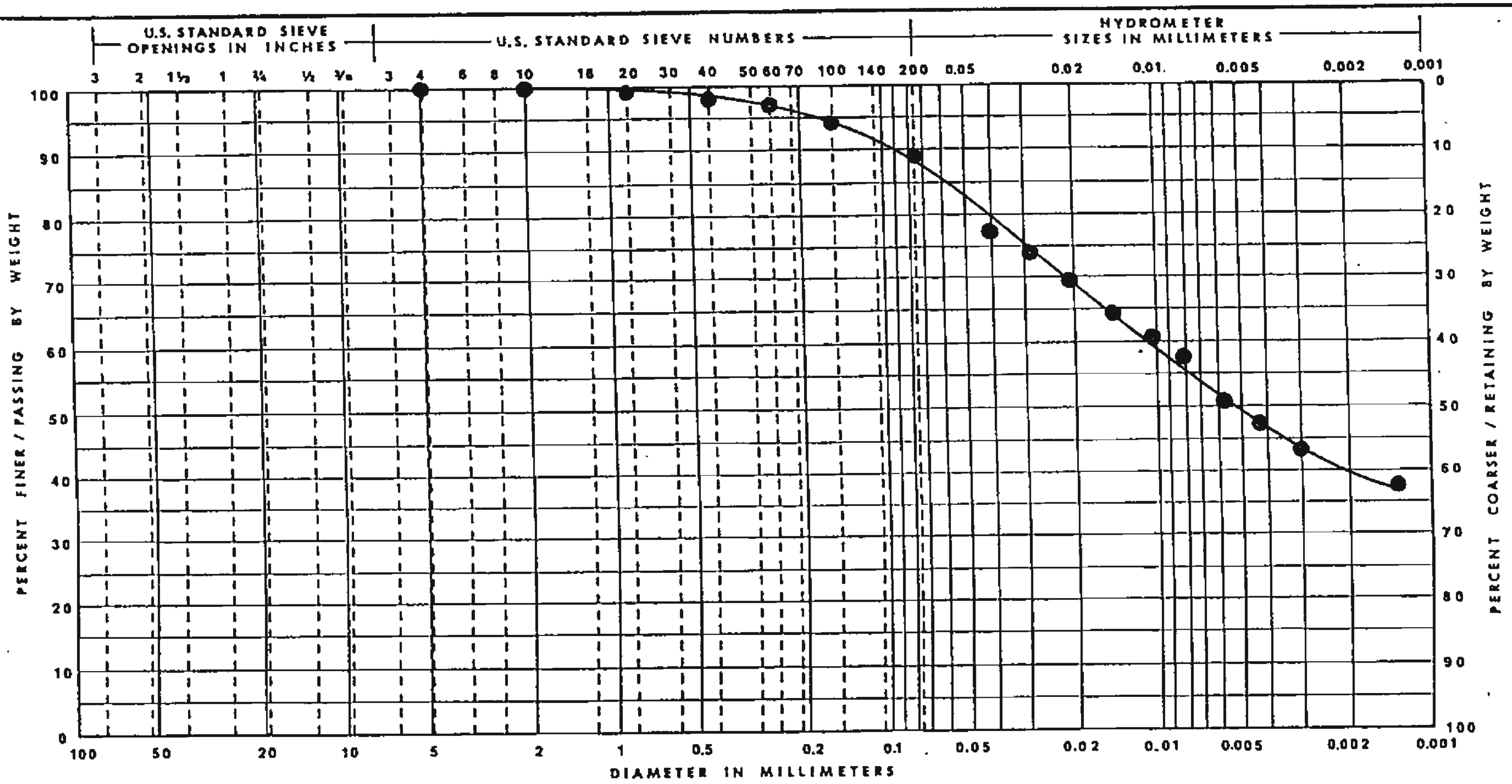

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS4	11.5	Silty Clay-Trace to Some Sand-Trace of Gravel, Roots & Brick Pieces-Brown (CL)	89	

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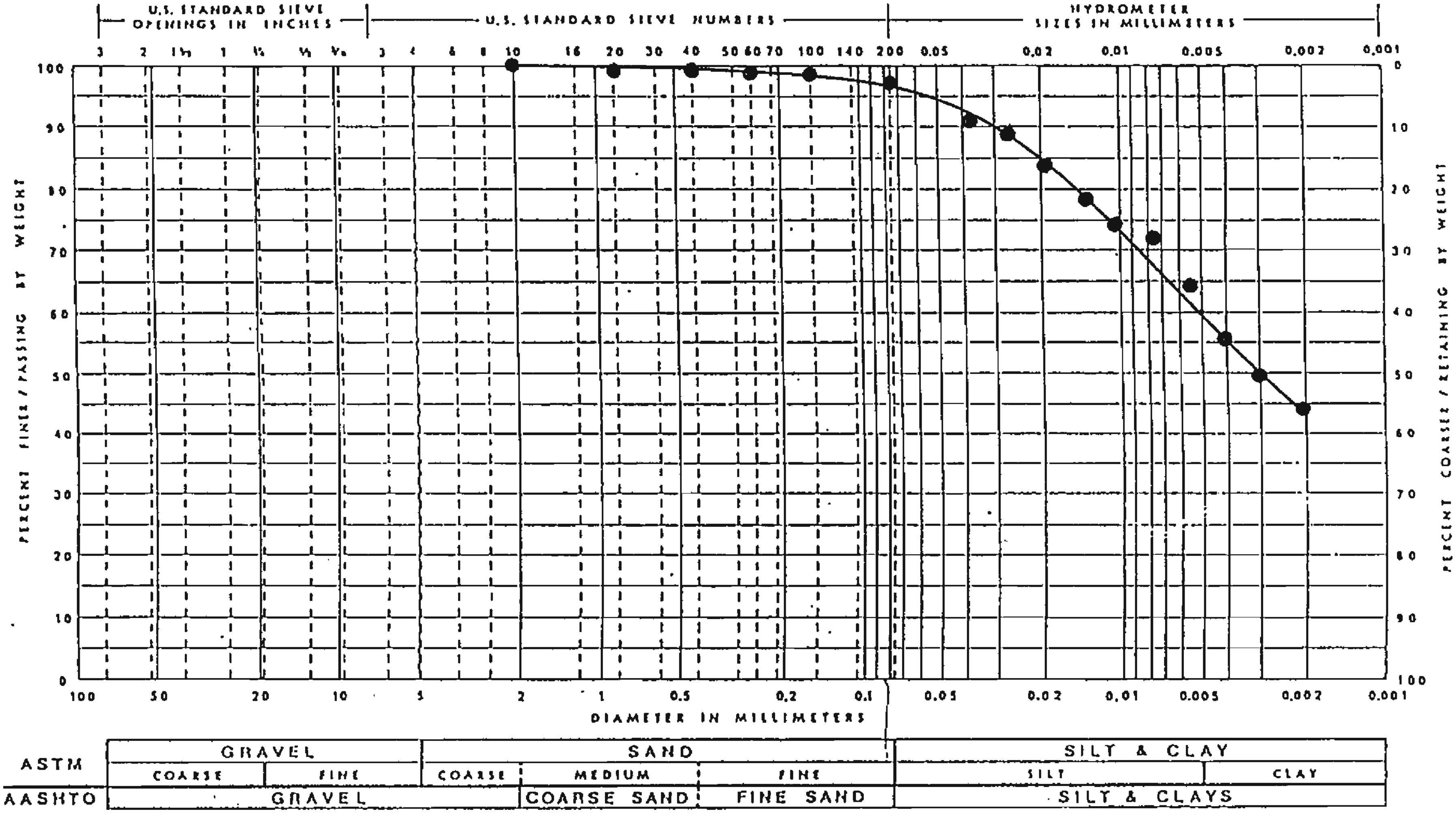

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION ,	% < 0.074 mm	
	B10	CS6	16.5	Silty Clay, Trace of Sand and Gravel, Mottled Brown (CL)	97	

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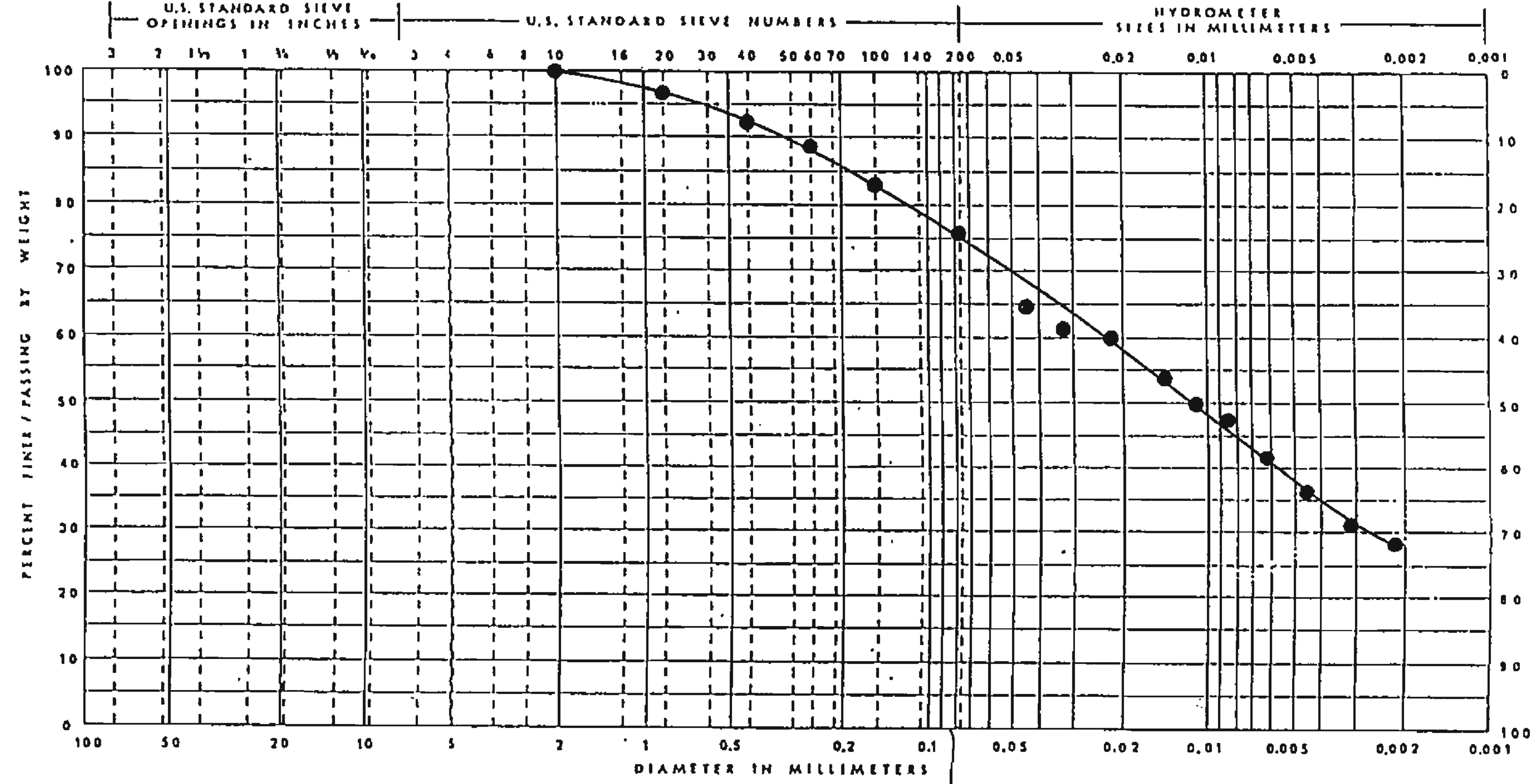

ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

URVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS8	21.5	Silty Clay, Some Sand, Trace of Gravel, Gray (CL)	75	

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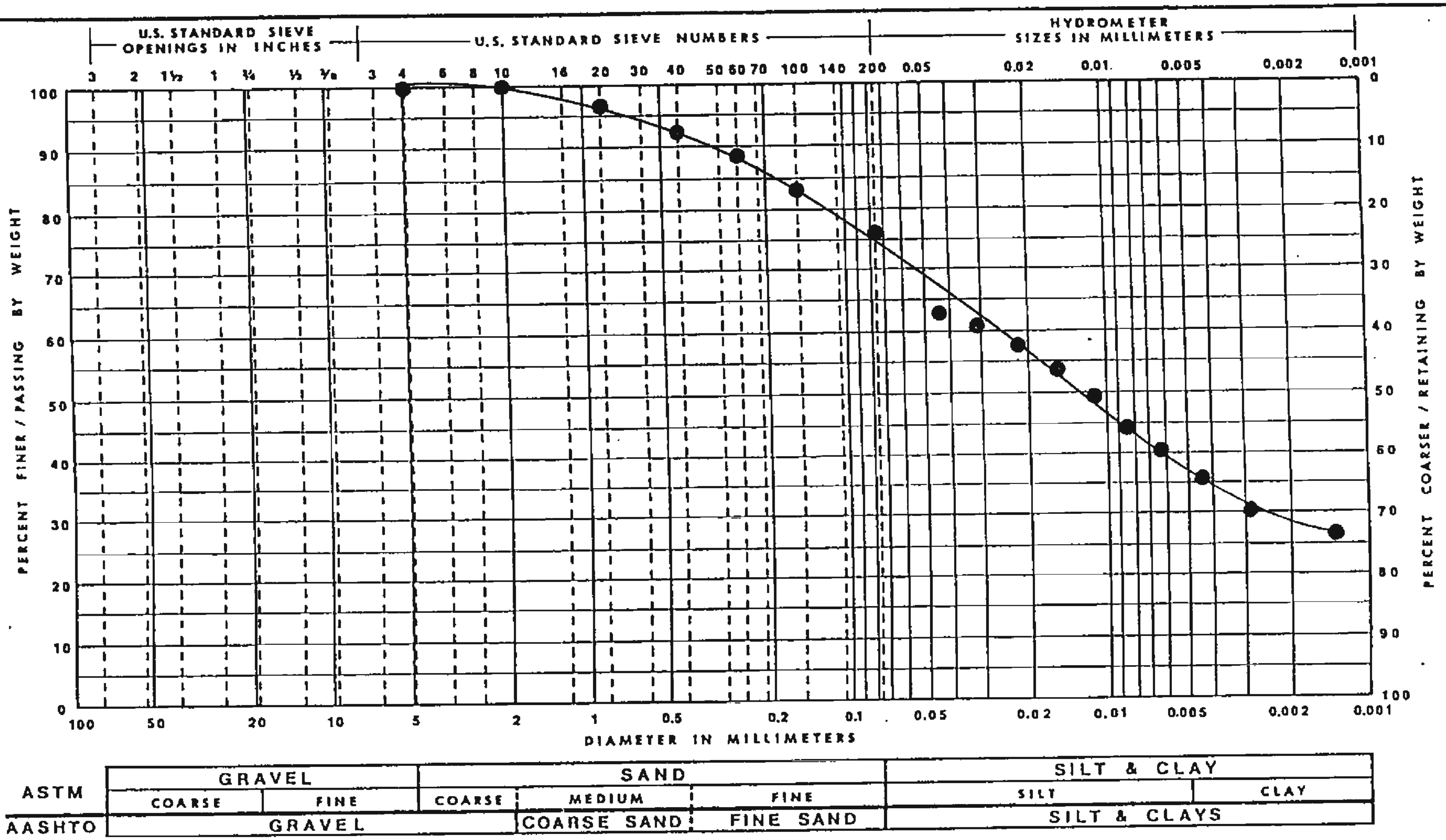

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
	B10	CS10	26.5	Silty Clay-Some Sand-Trace of Gravel-Gray (CL)	76	

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APPENDIX I – 2016 LABORATORY TEST RESULTS

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	8
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-01, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.6E-08 cm/s

		Initial Values	Final Values			
Sample Type:	Undisturbed					
Sample Dia. (in)		2.87	2.87	Permeant:	Water	
Sample Ht. (in)		3.31	3.31	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		542.53	912.90	Sample Specific Gravity:	2.81	Est.
Tare & Dry (g)		495.80	821.70	Confining Pressure (psi):	100.0	
Tare (g)		90.23	91.36	Burette Diameter (in):	0.250	
Sample Wt. (g)		816.00	821.54	Burette Zero (cm):	100.0	

Moisture (%)	11.5	12.5	Maximum Gradient:	6.7
Wet Density (pcf)	145.1	146.0	Average Gradient:	6.5
Dry Density (pcf)	130.1	129.8	Max. Effect. Stress (psi):	5.8
Saturation (%)	92.9	100.0	Min. Effect. Stress (psi):	4.4
			Ave. Effect. Stress (psi):	4.9

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	2	5	6.00		0.0	95	95	45.70		2.90		102.20				
2	2016	3	2	9	13.00	14820	24.0	95	95	46.50	0.80	4.15	1.25	100.65	1.55	-10.7	5.6E-08	
3	2016	3	2	12	8.00	10500	22.0	95	95	46.70	0.20	4.95	0.80	99.85	0.80	0.0	4.8E-08	
4	2016	3	2	20	42.00	30840	22.0	95	95	48.30	1.60	7.20	2.25	97.85	2.00	5.9	4.5E-08	
5	2016	3	3	14	8.00	62760	23.0	95	95	50.95	2.65	10.90	3.70	94.55	3.30	5.7	3.8E-08	
6	2016	3	3	18	52.00	17040	24.0	95	95	51.50	0.55	11.80	0.90	93.80	0.75	9.1	3.4E-08	
7	2016	3	4	13	27.00	66900	22.0	95	95	53.20	1.70	14.70	2.90	91.15	2.65	4.5	3.2E-08	
8	2016	3	4	18	53.00	19560	22.0	95	95	53.80	0.60	15.45	0.75	90.45	0.70	3.4	3.0E-08	
9	2016	3	7	5	14.00	210060	22.0	95	95	58.95	5.15	21.05	5.60	85.35	5.10	4.7	2.2E-08	
10	2016	3	7	8	14.00	10800	23.0	95	95	59.30	0.35	21.30	0.25	85.15	0.20	11.1	1.9E-08	
11	2016	3	7	13	26.00	18720	22.0	95	95	59.75	0.45	21.65	0.35	84.80	0.35	0.0	1.8E-08	
12	2016	3	7	18	47.00	19260	21.0	95	95	60.50	0.75	22.05	0.40	84.55	0.25	23.1	1.7E-08	
13	2016	3	8	5	5.00	37080	25.0	95	95	61.50	1.00	22.75	0.70	83.85	0.70	0.0	1.7E-08	
14	2016	3	8	13	23.00	29880	22.0	95	95	62.20	0.70	23.30	0.55	83.30	0.55	0.0	1.8E-08	
15	2016	3	8	19	23.00	21600	22.0	95	95	63.10	0.90	23.70	0.40	83.10	0.20	33.3	1.4E-08	
16	2016	3	9	5	30.00	36420	24.0	95	95	63.80	0.70	24.30	0.60	82.40	0.70	-7.7	1.8E-08	
17	2016	3	9	11	14.00	20640	24.0	95	95	64.30	0.50	24.65	0.35	82.15	0.25	16.7	1.5E-08	
18	2016	3	9	20	22.00	32880	22.0	95	95	64.70	0.40	25.25	0.60	81.70	0.45	14.3	1.7E-08	
19	2016	3	10	4	59.00	31020	23.0	95	95	65.20	0.50	25.70	0.45	81.20	0.50	-5.3	1.6E-08	1
20	2016	3	10	8	24.00	12300	23.0	95	95	65.40	0.20	25.90	0.20	81.00	0.20	0.0	1.7E-08	1
21	2016	3	10	11	23.00	10740	23.0	95	95	65.40	0.00	26.05	0.15	80.85	0.15	0.0	1.5E-08	1
22	2016	3	10	20	45.00	33720	23.0	95	95	66.20	0.80	26.65	0.60	80.45	0.40	20.0	1.6E-08	1
23	2016	3	11	4	53.00	29280	22.0	95	95	66.20	0.00	27.05	0.40	79.95	0.50	-11.1	1.8E-08	1
24	2016	3	11	7	57.00	11040	24.0	95	95	66.60	0.40	27.20	0.15	79.80	0.15	0.0	1.5E-08	1
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.6E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	9
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-02, 30-32'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.3E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.86	Permeant:	Water	
Sample Ht. (in)	3.06	3.03	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	392.27	822.40	Sample Specific Gravity:	2.80	Est.
Tare & Dry (g)	353.20	733.00	Confining Pressure (psi):	100.0	
Tare (g)	89.98	90.41	Burette Diameter (in):	0.250	
Sample Wt. (g)	733.20	731.99	Burette Zero (cm):	100.0	

Moisture (%)	14.8	13.9	Maximum Gradient:	9.2
Wet Density (pcf)	141.0	143.2	Average Gradient:	9.0
Dry Density (pcf)	122.8	125.7	Max. Effect. Stress (psi):	5.7
Saturation (%)	98.2	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.8

Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
2016	3	2	5	7.00		0.0	95	95	55.10		2.10		101.90				
2016	3	2	9	14.00	14820	24.0	95	95	55.90	0.80	2.65	0.55	101.15	0.75	-15.4	2.4E-08	
2016	3	2	12	9.00	10500	22.0	95	95	56.20	0.30	2.95	0.30	100.75	0.40	-14.3	1.9E-08	
2016	3	2	20	43.00	30840	22.0	95	95	57.75	1.55	4.05	1.10	99.90	0.85	12.8	1.8E-08	
2016	3	3	14	9.00	62760	23.0	95	95	60.30	2.55	5.95	1.90	98.50	1.40	15.2	1.5E-08	
2016	3	3	18	53.00	17040	24.0	95	95	60.85	0.55	6.50	0.55	98.00	0.50	4.8	1.8E-08	
2016	3	4	13	28.00	66900	22.0	95	95	62.50	1.65	8.30	1.80	96.55	1.45	10.8	1.5E-08	
2016	3	4	18	54.00	19560	22.0	95	95	63.10	0.60	8.80	0.50	96.15	0.40	11.1	1.5E-08	
2016	3	7	5	15.00	210060	22.0	95	95	67.80	4.70	13.70	4.90	92.40	3.75	13.3	1.4E-08	
2016	3	7	8	14.00	10740	23.0	95	95	68.30	0.50	13.95	0.25	92.20	0.20	11.1	1.5E-08	
2016	3	7	13	26.00	18720	21.0	95	95	68.60	0.30	14.35	0.40	92.00	0.20	33.3	1.2E-08	
2016	3	7	18	48.00	19320	21.0	95	95	69.35	0.75	14.80	0.45	91.75	0.25	28.6	1.3E-08	
2016	3	8	5	5.00	37020	25.0	95	95	70.40	1.05	15.60	0.80	91.15	0.60	14.3	1.3E-08	
2016	3	8	13	48.00	31380	22.0	95	95	70.40	0.00	16.15	0.55	90.70	0.45	10.0	1.2E-08	
2016	3	8	19	24.00	20160	22.0	95	95	71.75	1.35	16.60	0.45	90.55	0.15	50.0	1.1E-08	
2016	3	9	5	31.00	36420	24.0	95	95	72.40	0.65	17.25	0.65	90.15	0.40	23.8	1.1E-08	
2016	3	9	11	15.00	20640	24.0	95	95	72.80	0.40	17.65	0.40	89.85	0.30	14.3	1.3E-08	
2016	3	9	20	23.00	32880	22.0	95	95	73.20	0.40	18.35	0.70	89.55	0.30	40.0	1.2E-08	
2016	3	10	4	59.00	30960	23.0	95	95	73.60	0.40	18.85	0.50	89.10	0.45	5.3	1.2E-08	1
2016	3	10	8	23.00	12240	23.0	95	95	73.80	0.20	19.10	0.25	88.90	0.20	11.1	1.4E-08	1
2016	3	10	11	23.00	10800	23.0	95	95	73.80	0.00	19.30	0.20	88.70	0.20	0.0	1.5E-08	1
2016	3	10	20	46.00	33780	23.0	95	95	74.50	0.70	20.00	0.70	88.45	0.25	47.4	1.1E-08	1
2016	3	11	4	54.00	29280	22.0	95	95	74.40	-0.10	20.45	0.45	87.85	0.60	-14.3	1.5E-08	1
2016	3	11	7	58.00	11040	24.0	95	95	74.80	0.40	20.70	0.25	87.75	0.10	42.9	1.3E-08	1

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.3E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC:	JPH
QA:	JPH

Project Name:	DTE - Monroe FAB	Cell #:	10
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-03, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.2E-08 cm/s

Sample Type:	Undisturbed	Initial Values	Final Values		
Sample Dia. (in)		2.87	2.87	Permeant:	Water
Sample Ht. (in)		3.00	3.01	Permeant Specific Gravity:	1.00
Tare & Wet (g)		563.98	834.70	Sample Specific Gravity:	2.82 Est.
Tare & Dry (g)		512.90	750.80	Confining Pressure (psi):	100.0
Tare (g)		88.99	90.55	Burette Diameter (in):	0.250
Sample Wt. (g)		740.10	744.15	Burette Zero (cm):	100.0

Moisture (%)	12.0	12.7	Maximum Gradient:	9.8
Wet Density (pcf)	145.3	145.8	Average Gradient:	9.4
Dry Density (pcf)	129.7	129.4	Max. Effect. Stress (psi):	5.7
Saturation (%)	95.6	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.8

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	2	5	8.00		0.0	95	95	50.70		2.00		101.60				
2	2016	3	2	9	14.00	14760	24.0	95	95	50.40	-0.30	2.65	0.65	100.90	0.70	-3.7	2.4E-08	
3	2016	3	2	12	9.00	10500	22.0	95	95	51.00	0.60	2.95	0.30	100.50	0.40	-14.3	1.9E-08	
4	2016	3	2	20	44.00	30900	22.0	95	95	52.65	1.65	3.85	0.90	99.75	0.75	9.1	1.5E-08	
5	2016	3	3	14	10.00	62760	23.0	95	95	55.10	2.45	5.50	1.65	98.30	1.45	6.5	1.4E-08	
6	2016	3	3	18	54.00	17040	24.0	95	95	55.30	0.20	6.00	0.50	97.90	0.40	11.1	1.5E-08	
7	2016	3	4	13	29.00	66900	22.0	95	95	57.20	1.90	7.55	1.55	96.50	1.40	5.1	1.3E-08	
8	2016	3	4	18	55.00	19560	22.0	95	95	57.70	0.50	8.00	0.45	96.00	0.50	-5.3	1.5E-08	
9	2016	3	7	5	15.00	210000	22.0	95	95	63.25	5.55	12.30	4.30	92.10	3.90	4.9	1.3E-08	
10	2016	3	7	8	15.00	10800	23.0	95	95	63.40	0.15	12.60	0.30	91.90	0.20	20.0	1.6E-08	
11	2016	3	7	13	27.00	18720	21.0	95	95	63.80	0.40	12.85	0.25	91.60	0.30	-9.1	1.1E-08	
12	2016	3	7	18	49.00	19320	21.0	95	95	64.65	0.85	13.35	0.50	91.35	0.25	33.3	1.4E-08	
13	2016	3	8	5	6.00	37020	25.0	95	95	65.15	0.50	14.00	0.65	90.75	0.60	4.0	1.1E-08	
14	2016	3	8	13	48.00	31320	22.0	95	95	66.90	1.75	14.40	0.40	90.15	0.60	-20.0	1.2E-08	
15	2016	3	8	19	25.00	20220	22.0	95	95	67.60	0.70	14.80	0.40	89.95	0.20	33.3	1.1E-08	
16	2016	3	9	5	31.00	36360	24.0	95	95	67.70	0.10	15.50	0.70	89.35	0.60	7.7	1.3E-08	1
17	2016	3	9	11	15.00	20640	24.0	95	95	68.40	0.70	15.85	0.35	89.00	0.35	0.0	1.2E-08	1
18	2016	3	9	20	24.00	32940	22.0	95	95	69.10	0.70	16.40	0.55	88.60	0.40	15.8	1.1E-08	1
19	2016	3	10	5	0.00	30960	23.0	95	95	70.20	1.10	16.75	0.35	88.05	0.55	-22.2	1.1E-08	1
20	2016	3	10	8	24.00	12240	23.0	95	95	69.90	-0.30	17.00	0.25	87.80	0.25	0.0	1.6E-08	1
21	2016	3	10	11	24.00	10800	23.0	95	95	70.20	0.30	17.20	0.20	87.70	0.10	33.3	1.1E-08	1
22	2016	3	10	20	47.00	33780	23.0	95	95	70.40	0.20	17.80	0.60	87.40	0.30	33.3	1.0E-08	1
23	2016	3	11	4	54.00	29220	22.0	95	95	71.40	1.00	18.15	0.35	86.75	0.65	-30.0	1.4E-08	1
24	2016	3	11	7	58.00	11040	24.0	95	95	71.25	-0.15	18.35	0.20	86.65	0.10	33.3	1.0E-08	1
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.2E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	DTE - Monroe FAB	Cell #:	11
Project #:	231828.0001.0000	USCS Description:	N/A
Sample Name:	MW-16-04, 20-22'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	1.2E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.85	Permeant:	Water	
Sample Ht. (in)	3.55	3.51	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	869.30	961.20	Sample Specific Gravity:	2.80	Est.
Tare & Dry (g)	785.95	875.10	Confining Pressure (psi):	100.0	
Tare (g)	0.00	89.15	Burette Diameter (in):	0.250	
Sample Wt. (g)	869.30	872.05	Burette Zero (cm):	100.0	

Moisture (%)	10.6	11.0	Maximum Gradient:	8.4
Wet Density (pcf)	144.2	148.4	Average Gradient:	8.1
Dry Density (pcf)	130.4	133.7	Max. Effect. Stress (psi):	5.7
Saturation (%)	87.3	100.0	Min. Effect. Stress (psi):	4.1
			Ave. Effect. Stress (psi):	4.7

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	2	5	8.00		0.0	95	95	52.10		2.10		102.60				
2	2016	3	2	9	15.00	14820	24.0	95	95	53.45	1.35	2.75	0.65	101.85	0.75	-7.1	3.0E-08	
3	2016	3	2	12	10.00	10500	22.0	95	95	54.20	0.75	3.15	0.40	101.45	0.40	0.0	2.5E-08	
4	2016	3	2	20	40.00	30600	22.0	95	95	56.60	2.40	4.40	1.25	100.50	0.95	13.6	2.4E-08	
5	2016	3	3	14	6.00	62760	23.0	95	95	60.60	4.00	6.50	2.10	98.80	1.70	10.5	2.1E-08	
6	2016	3	3	18	50.00	17040	24.0	95	95	61.60	1.00	7.05	0.55	98.40	0.40	15.8	1.9E-08	
7	2016	3	4	13	25.00	66900	22.0	95	95	64.60	3.00	8.85	1.80	96.75	1.65	4.3	1.9E-08	
8	2016	3	4	18	51.00	19560	22.0	95	95	65.60	1.00	9.35	0.50	96.30	0.45	5.3	1.8E-08	
9	2016	3	7	5	16.00	210300	22.0	95	95	73.80	8.20	13.55	4.20	92.50	3.80	5.0	1.5E-08	
10	2016	3	7	8	15.00	10740	23.0	95	95	74.30	0.50	13.80	0.25	92.30	0.20	11.1	1.7E-08	
11	2016	3	7	13	27.00	18720	21.0	95	95	74.95	0.65	14.10	0.30	92.00	0.30	0.0	1.4E-08	
12	2016	3	7	18	46.00	19140	21.0	95	95	75.95	1.00	14.45	0.35	91.85	0.15	40.0	1.1E-08	
13	2016	3	8	5	6.00	37200	25.0	95	95	77.60	1.65	15.00	0.55	91.35	0.50	4.8	1.1E-08	
14	2016	3	8	13	50.00	31440	22.0	95	95	78.60	1.00	15.45	0.45	90.80	0.55	-10.0	1.4E-08	
15	2016	3	8	19	21.00	19860	22.0	95	95	79.60	1.00	15.80	0.35	90.70	0.10	55.6	9.9E-09	
16	2016	3	9	5	32.00	36660	24.0	95	95	80.80	1.20	16.30	0.50	90.20	0.50	0.0	1.1E-08	1
17	2016	3	9	11	16.00	20640	24.0	95	95	81.60	0.80	16.60	0.30	89.90	0.30	0.0	1.2E-08	1
18	2016	3	9	20	20.00	32640	22.0	95	95	82.25	0.65	17.10	0.50	89.60	0.30	25.0	1.1E-08	1
19	2016	3	10	5	0.00	31200	23.0	95	95	82.90	0.65	17.55	0.45	89.10	0.50	-5.3	1.4E-08	1
20	2016	3	10	8	24.00	12240	23.0	95	95	83.30	0.40	17.70	0.15	89.00	0.10	20.0	9.1E-09	1
21	2016	3	10	11	24.00	10800	23.0	95	95	83.50	0.20	17.85	0.15	88.85	0.15	0.0	1.2E-08	1
22	2016	3	10	20	43.00	33540	23.0	95	95	84.50	1.00	18.35	0.50	88.60	0.25	33.3	1.0E-08	1
23	2016	3	11	4	55.00	29520	22.0	95	95	84.70	0.20	18.65	0.30	88.05	0.55	-29.4	1.3E-08	1
24	2016	3	11	7	59.00	11040	24.0	95	95	85.30	0.60	18.85	0.20	88.00	0.05	60.0	1.0E-08	1
25																		
26																		

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 1.2E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

APPENDIX J – 2020 LABORATORY TEST RESULTS

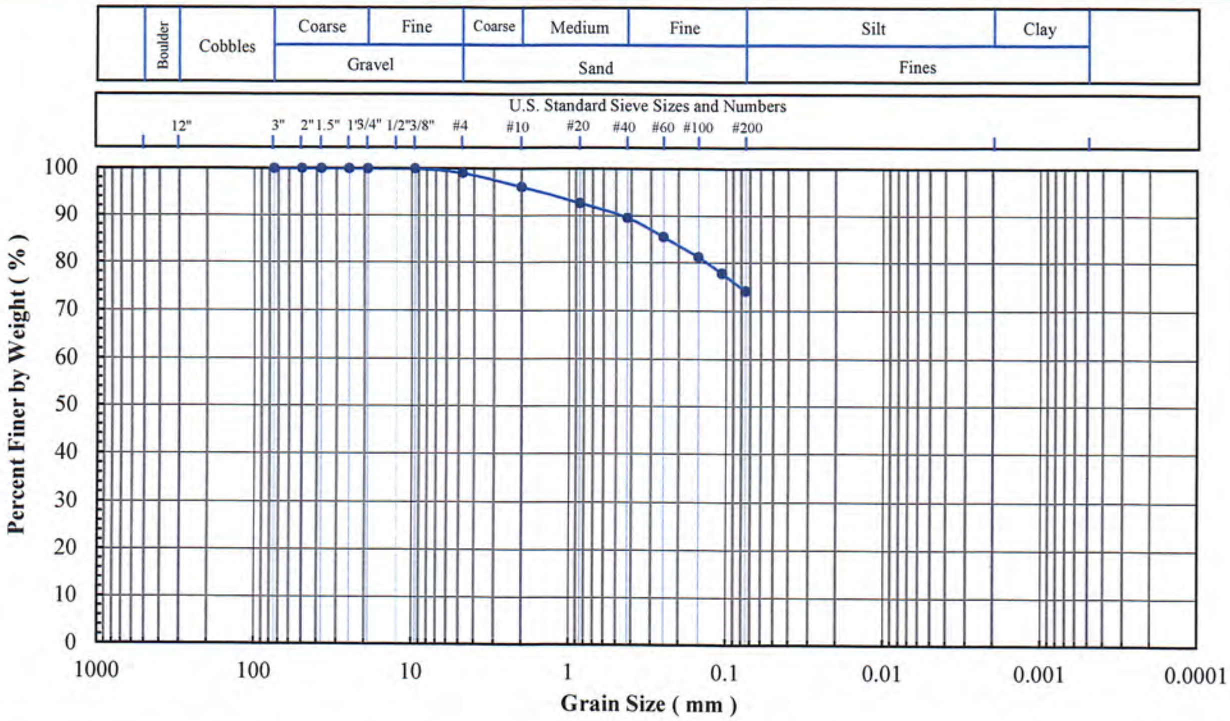
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-2 (6-16')
Lab Sample No:	20L012

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

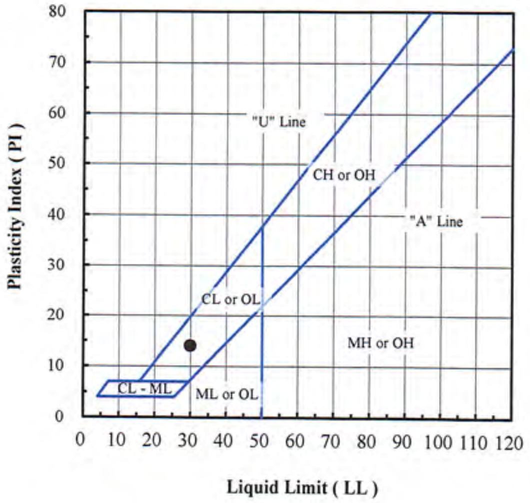


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.1
#20	0.850	92.7
#40	0.425	89.6
#60	0.250	85.5
#100	0.150	81.2
#140	0.106	77.8
#200	0.075	74.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	24.9
Fines (%):	74.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-2 (6-16')	20L012	14.8	74.1	30	16	14	CL - Lean clay with sand

Note(s):

01-20-2020
AA, VSR

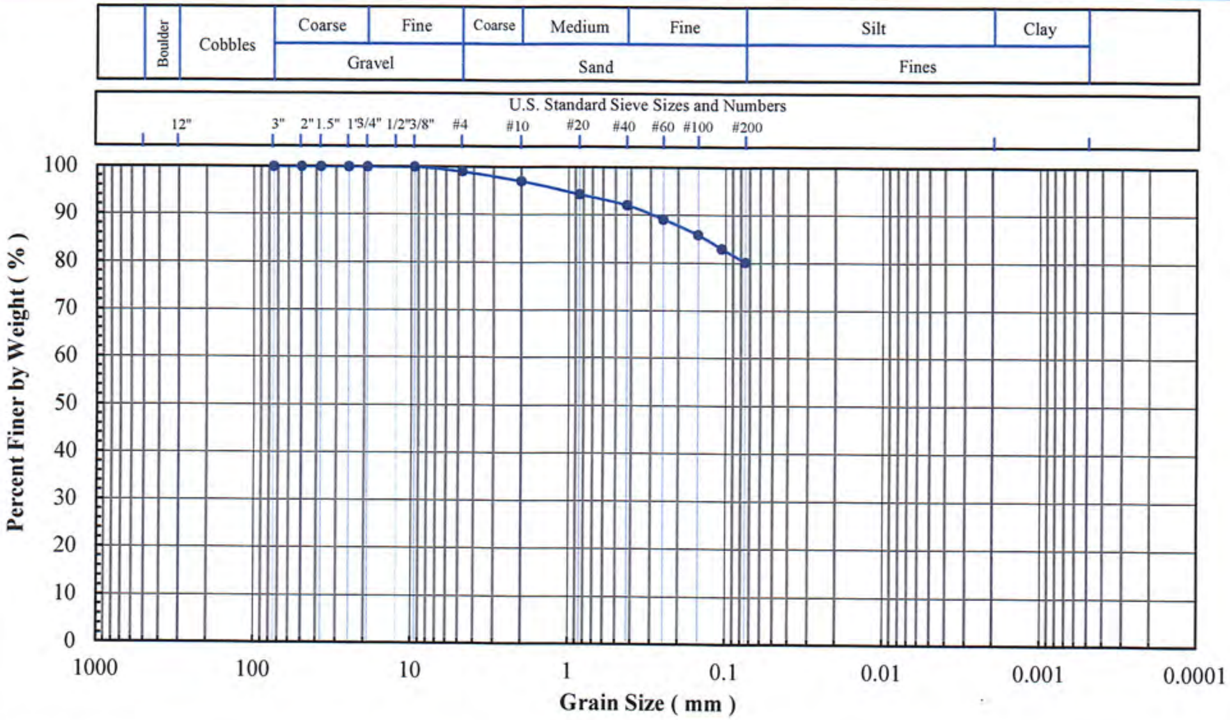
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-5 (26-36')
Lab Sample No:	20L015

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

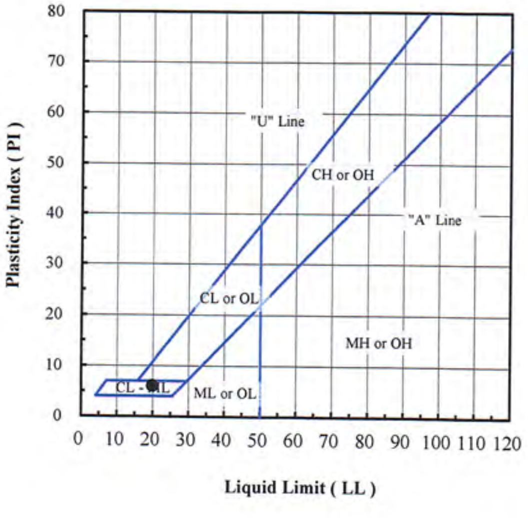


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	97.0
#20	0.850	94.3
#40	0.425	92.0
#60	0.250	89.1
#100	0.150	85.9
#140	0.106	83.0
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	18.8
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-5 (26-36')	20L015	20.8	80.2	20	14	6	CL-ML - Silty clay with sand

Note(s):

01-20-2021
AA, NSR

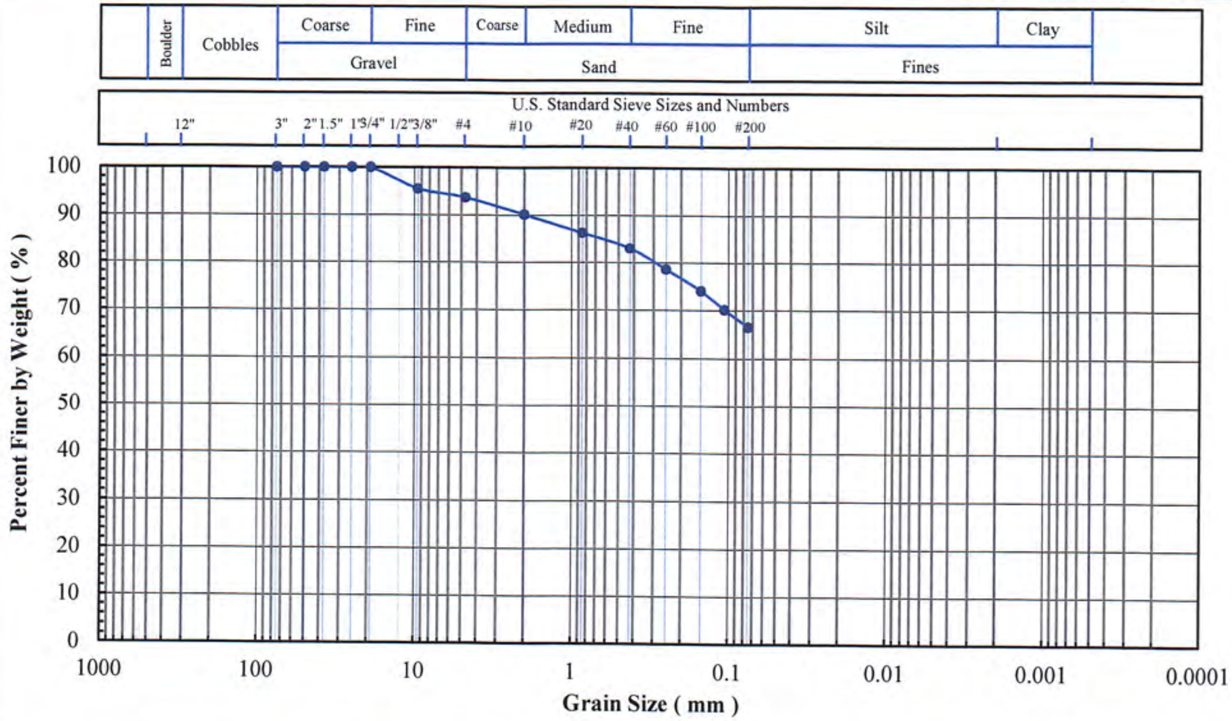
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B1-8 (46-56')
Lab Sample No: 20L018

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

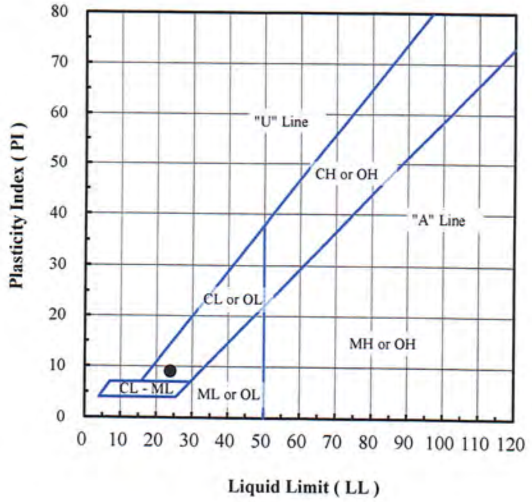


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	94
#10	2.00	90
#20	0.850	86
#40	0.425	83
#60	0.250	79
#100	0.150	74
#140	0.106	70
#200	0.075	67

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	27
Fines (%):	67
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-8 (46-56')	20L018	15.7	67	24	15	9	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

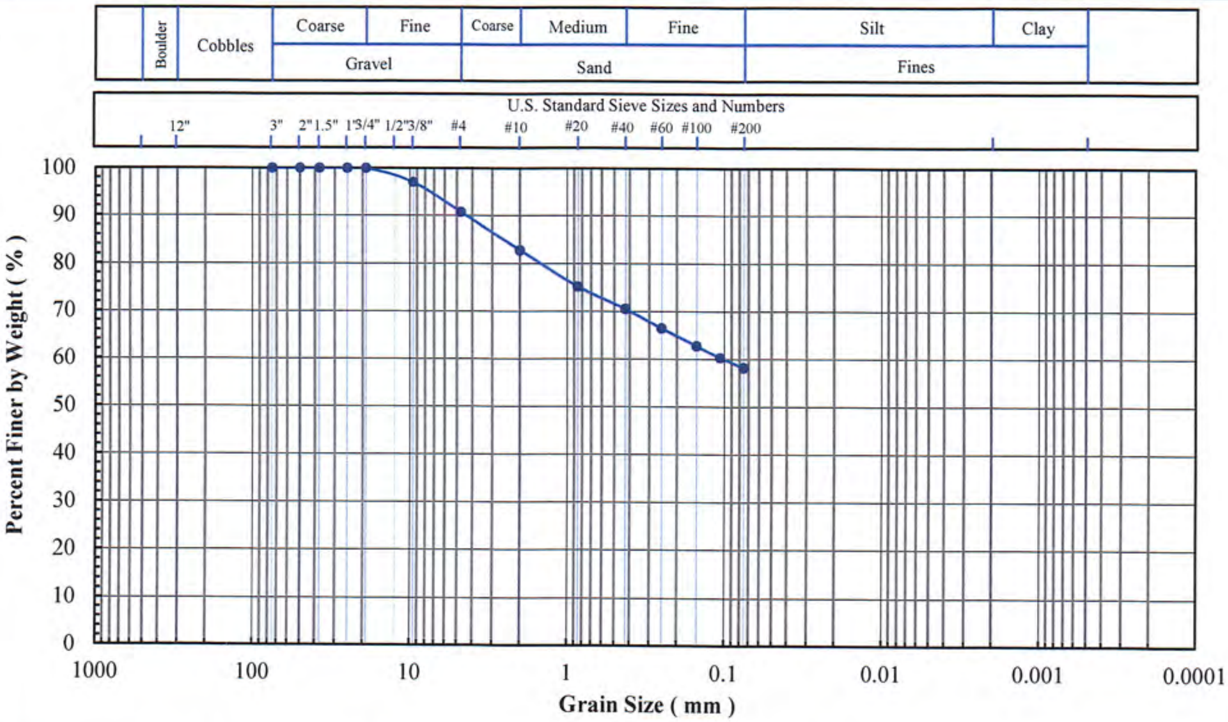
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-11 (66-76')
Lab Sample No:	20L021

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

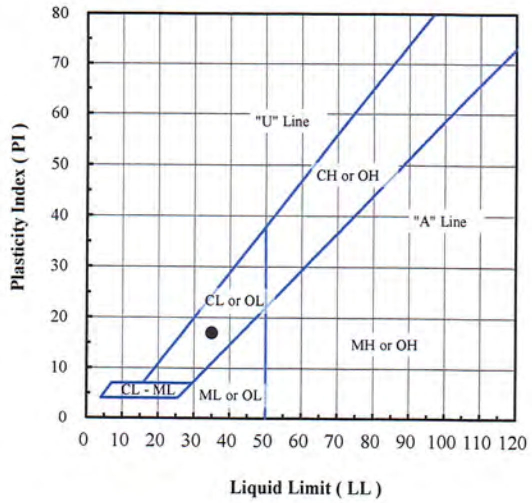


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	97
#4	4.75	91
#10	2.00	83
#20	0.850	75
#40	0.425	71
#60	0.250	66
#100	0.150	63
#140	0.106	60
#200	0.075	58

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	9
Sand (%):	33
Fines (%):	58
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-11 (66-76')	20L021	10.1	58	35	18	17	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

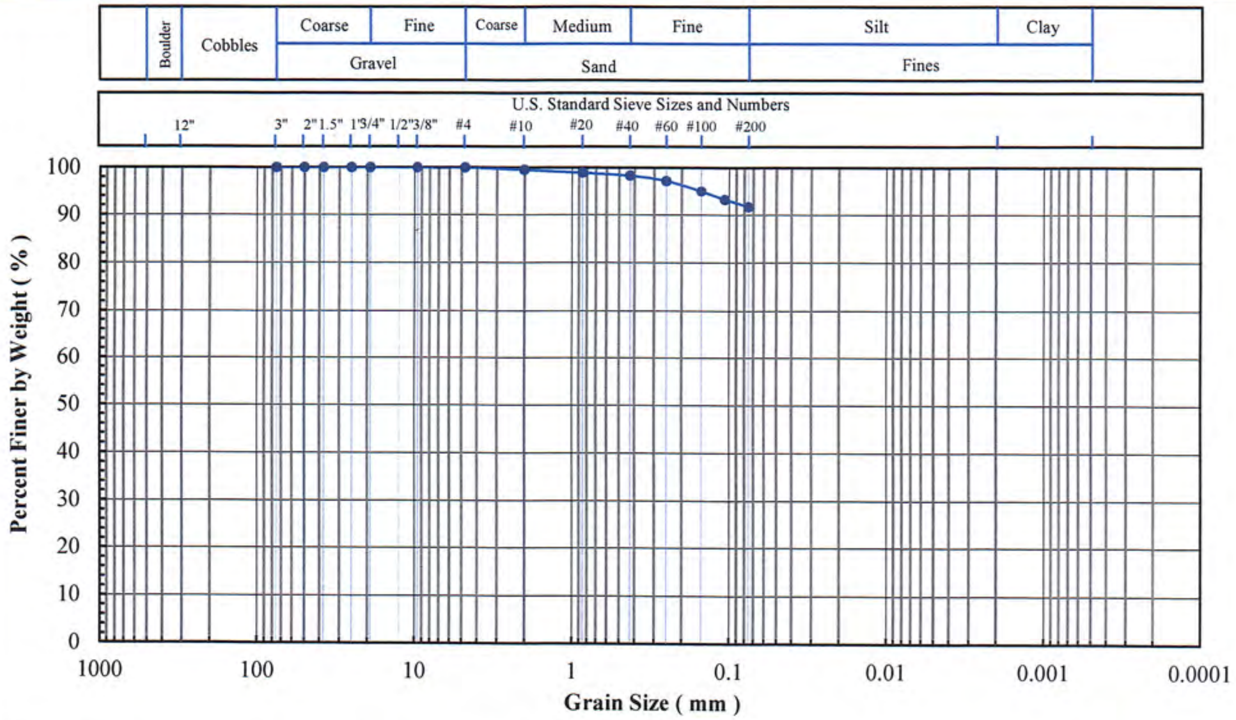
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B1-ST-2 (40-42')
Lab Sample No: 20L126

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

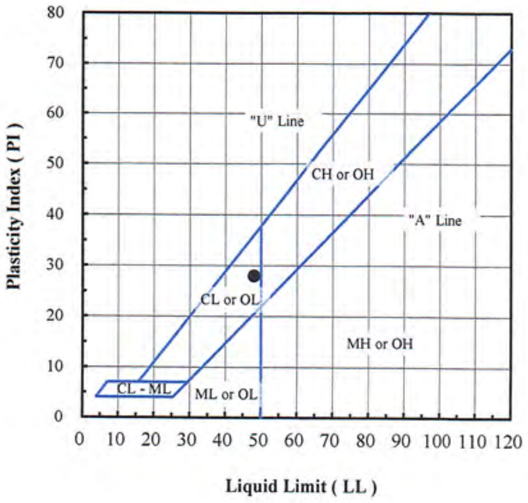


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.5
#20	0.850	98.9
#40	0.425	98.3
#60	0.250	97.2
#100	0.150	95.0
#140	0.106	93.2
#200	0.075	91.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	8.3
Fines (%):	91.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-2 (40-42')	20L126	20.0	91.7	48	20	28	CL - Lean Clay

Note(s):

01-26-2021
AA, NSR

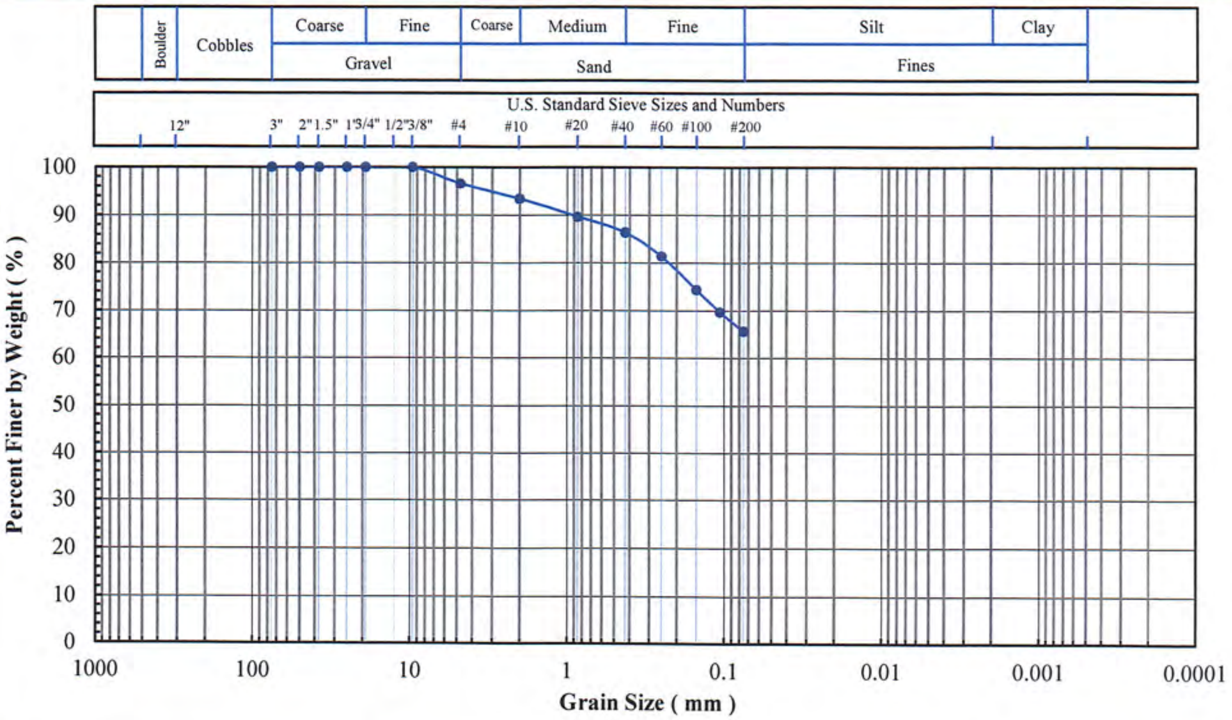
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B1-ST-3 (60-62')
Lab Sample No:	20L127

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

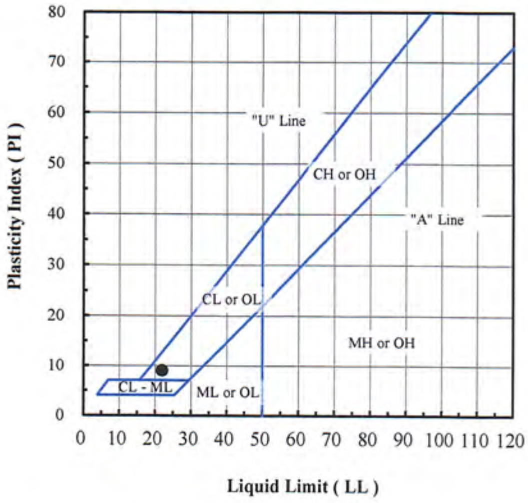


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.5
#10	2.00	93.4
#20	0.850	89.6
#40	0.425	86.4
#60	0.250	81.3
#100	0.150	74.3
#140	0.106	69.6
#200	0.075	65.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.5
Sand (%):	31.0
Fines (%):	65.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B1-ST-3 (60-62')	20L127	11.0	65.5	22	13	9	CL - Sandy lean clay

Note(s):

01-26-2021
AA, NSVR

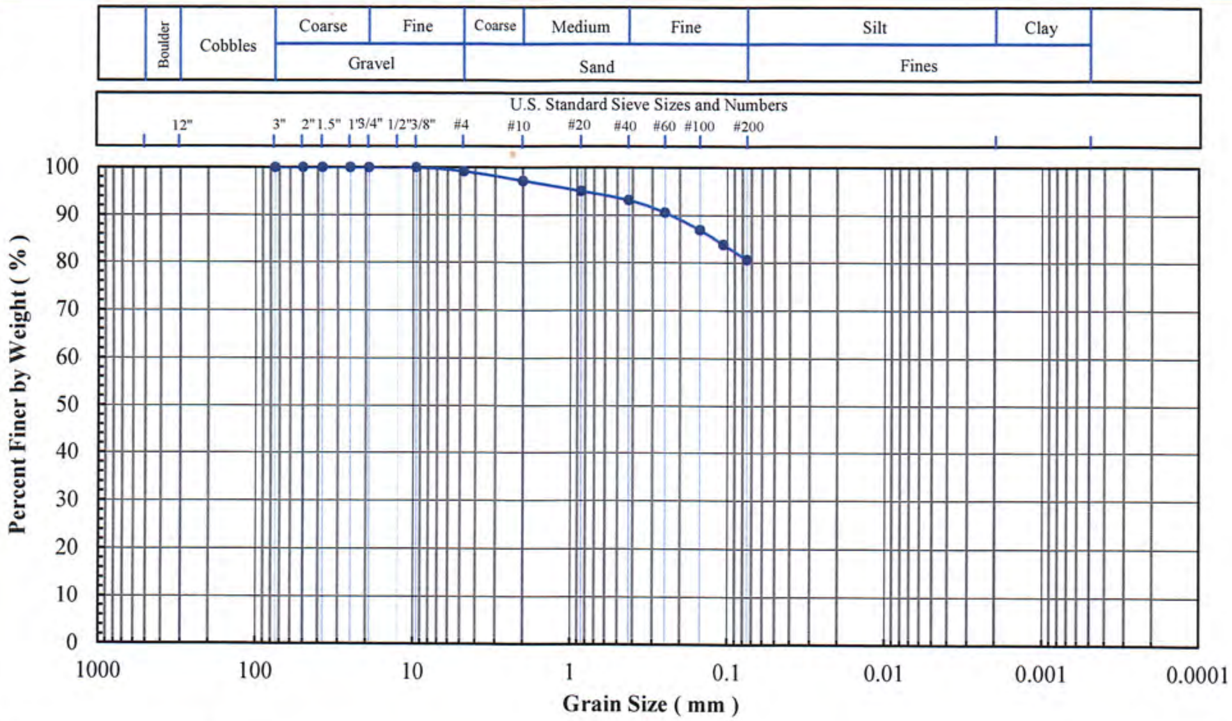
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-2 (6-16')
Lab Sample No:	20L023

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

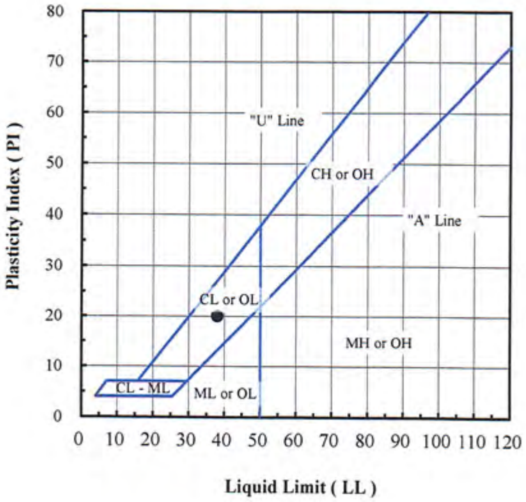


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.2
#20	0.850	95.1
#40	0.425	93.2
#60	0.250	90.6
#100	0.150	86.9
#140	0.106	83.8
#200	0.075	80.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	18.5
Fines (%):	80.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-2 (6-16')	20L023	19.5	80.7	38	18	20	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

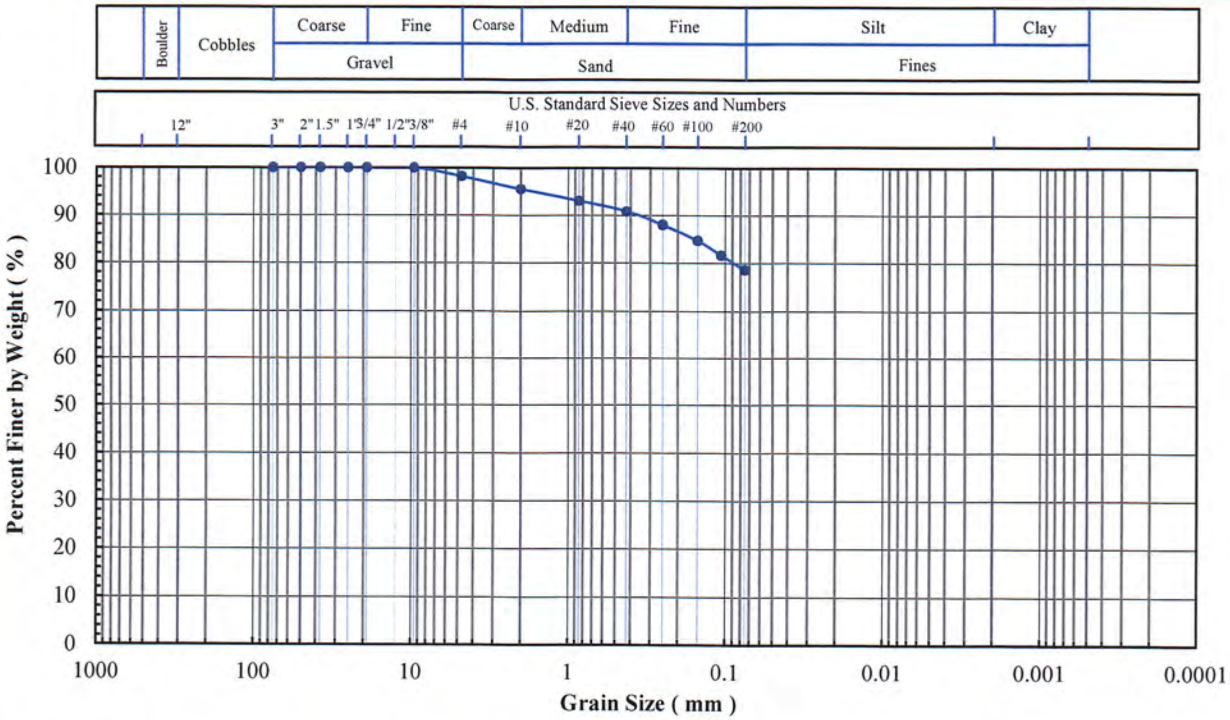
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-6 (36-46')
Lab Sample No:	20L027

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

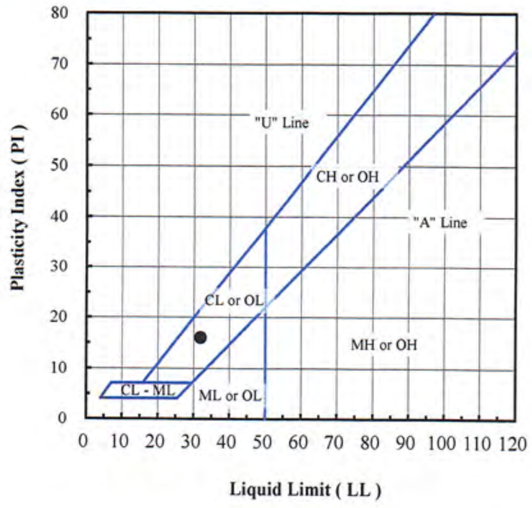


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.2
#10	2.00	95.5
#20	0.850	93.0
#40	0.425	90.8
#60	0.250	88.0
#100	0.150	84.7
#140	0.106	81.6
#200	0.075	78.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.8
Sand (%):	19.6
Fines (%):	78.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-6 (36-46')	20L027	18.6	78.6	32	16	16	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

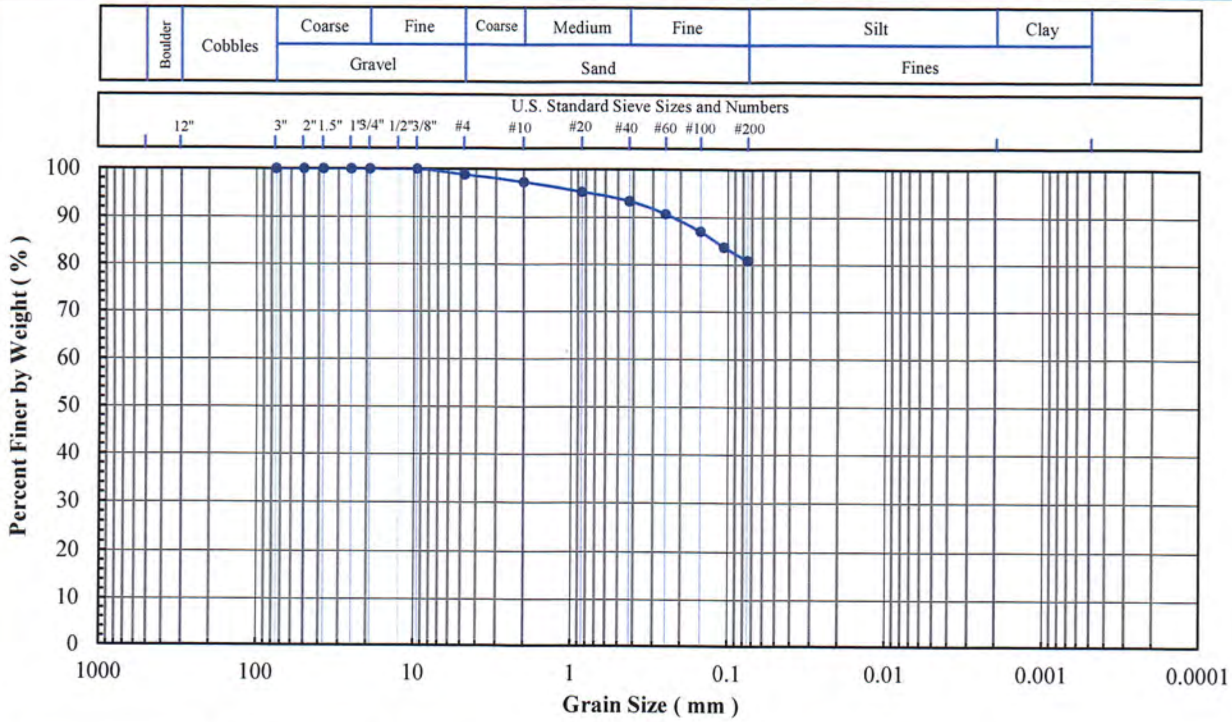
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B2-7 (46-56')
Lab Sample No:	20L028

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

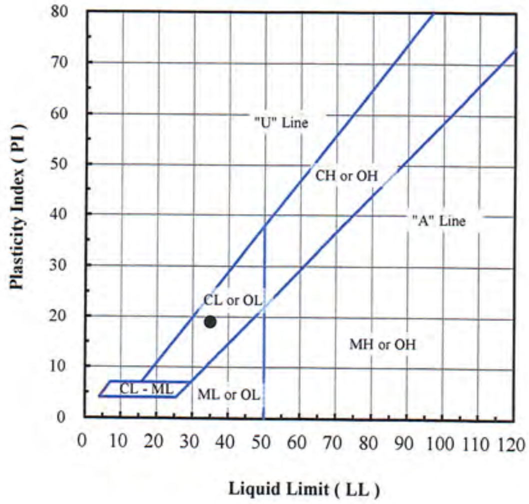


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.3
#20	0.850	95.3
#40	0.425	93.4
#60	0.250	90.7
#100	0.150	87.0
#140	0.106	83.7
#200	0.075	80.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	17.9
Fines (%):	80.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-7 (46-56')	20L028	17.9	80.9	35	16	19	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

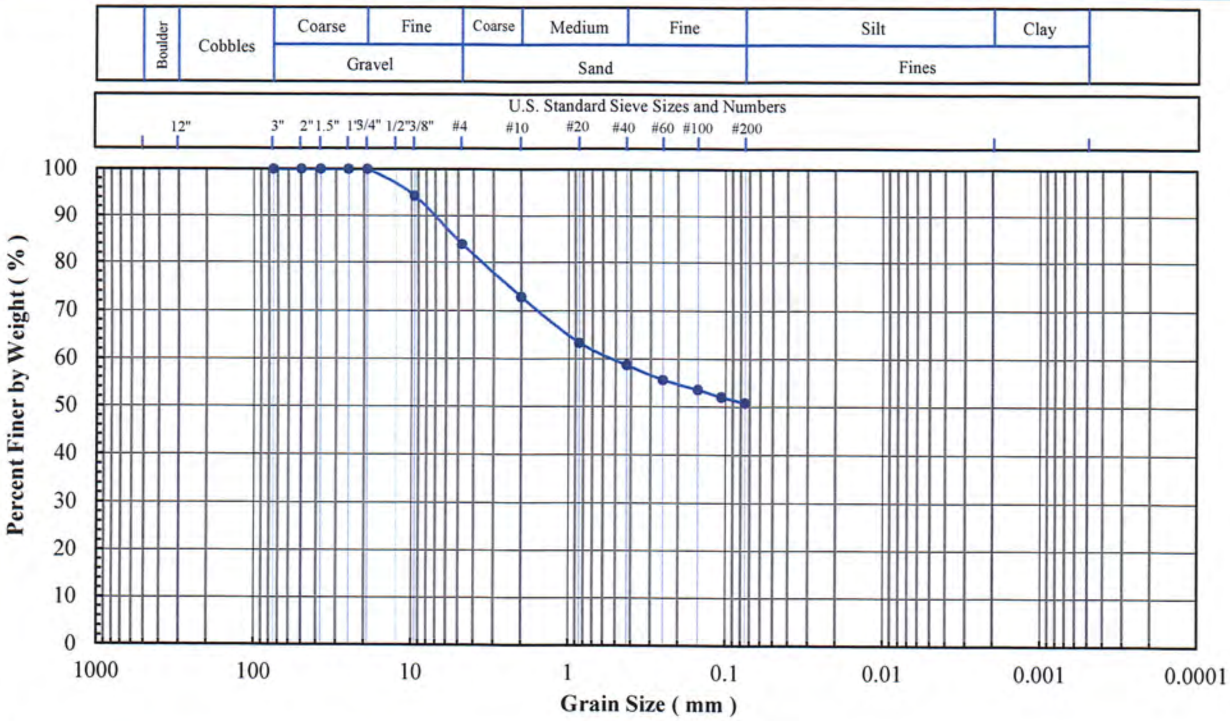
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotechnical.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B2-9 (66-76')
Lab Sample No: 20L030

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

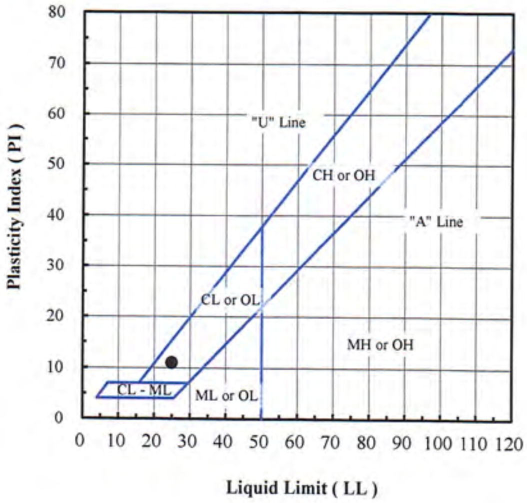


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	94
#4	4.75	84
#10	2.00	73
#20	0.850	63
#40	0.425	59
#60	0.250	56
#100	0.150	54
#140	0.106	52
#200	0.075	51

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	16
Sand (%):	33
Fines (%):	51
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B2-9 (66-76')	20L030	11.7	51	25	14	11	CL - Sandy lean clay with gravel

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSR

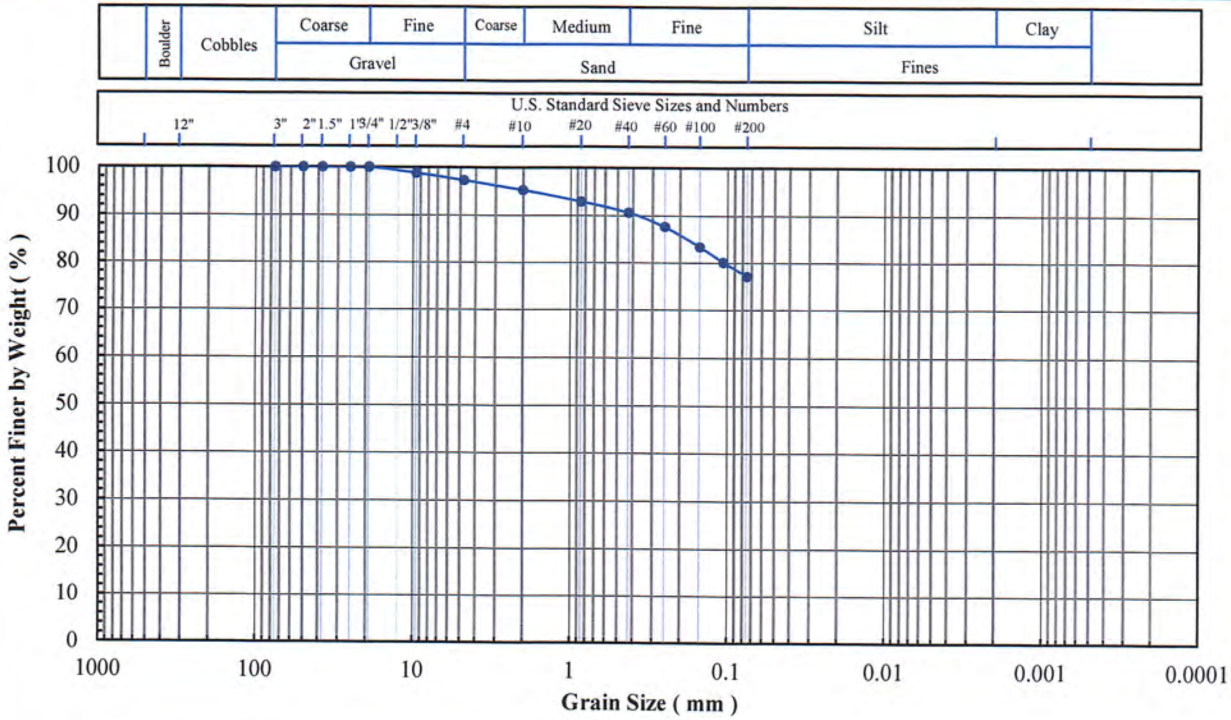
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B2-ST-1 (20-22')
Lab Sample No: 20L128

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

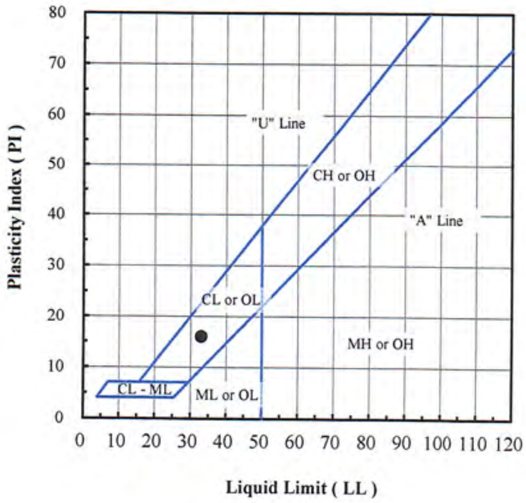


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	97
#10	2.00	95
#20	0.850	93
#40	0.425	91
#60	0.250	88
#100	0.150	83
#140	0.106	80
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	20
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B2-ST-1 (20-22')	20L128	16.9	77	33	17	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021
AA, NSK

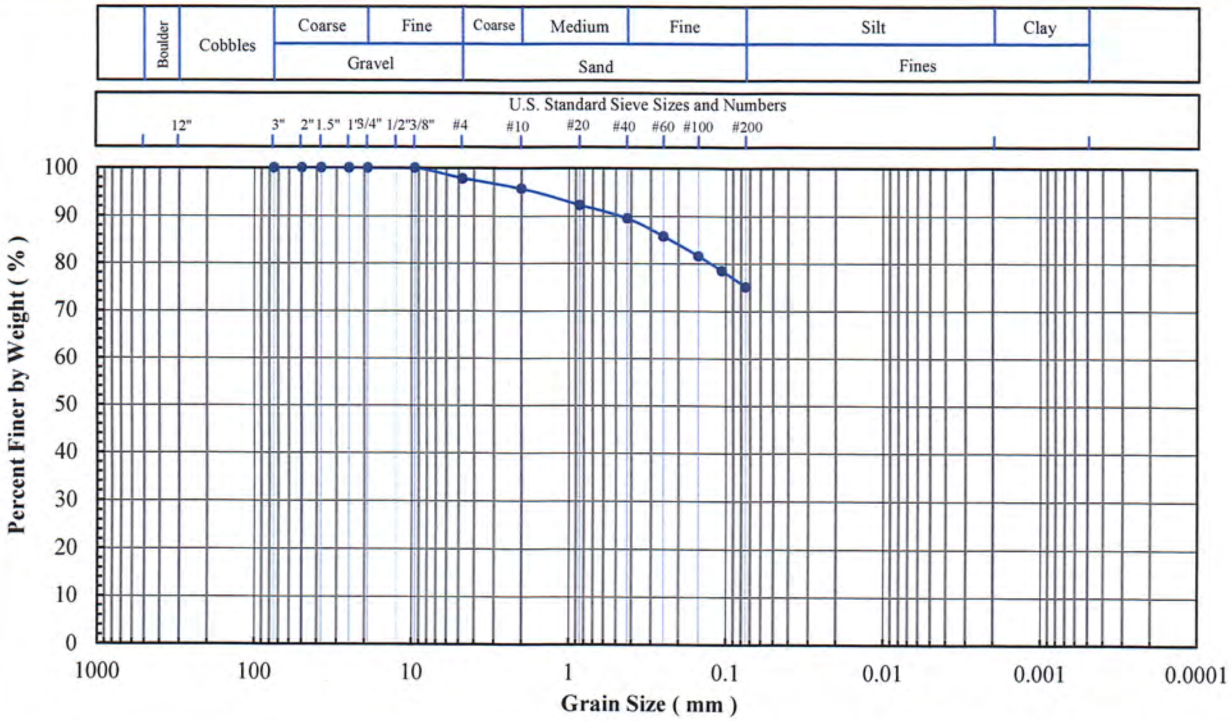
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-1 (0-10')
Lab Sample No:	20L031

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

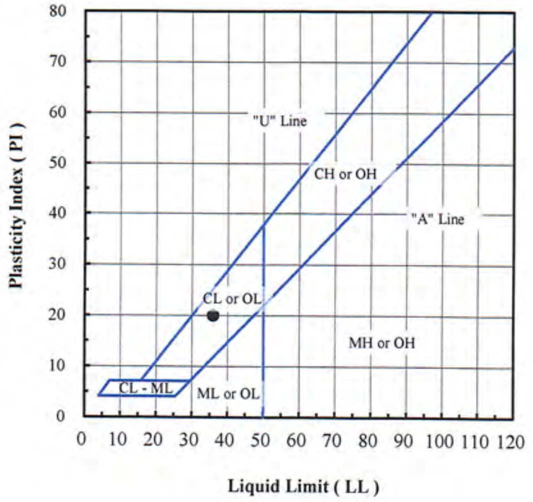


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	95.7
#20	0.850	92.3
#40	0.425	89.5
#60	0.250	85.8
#100	0.150	81.6
#140	0.106	78.5
#200	0.075	75.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	22.7
Fines (%):	75.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-1 (0-10')	20L031	15.6	75.1	36	16	20	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

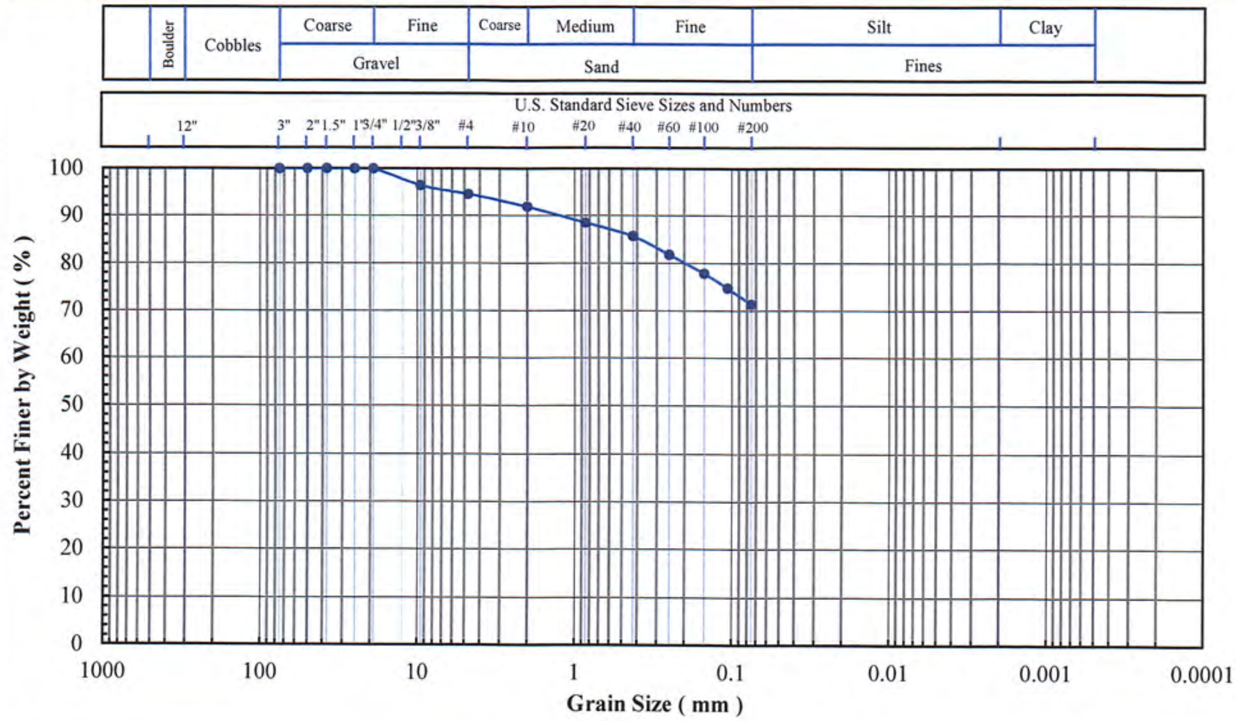
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-2 (10-16')
Lab Sample No:	20L032

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

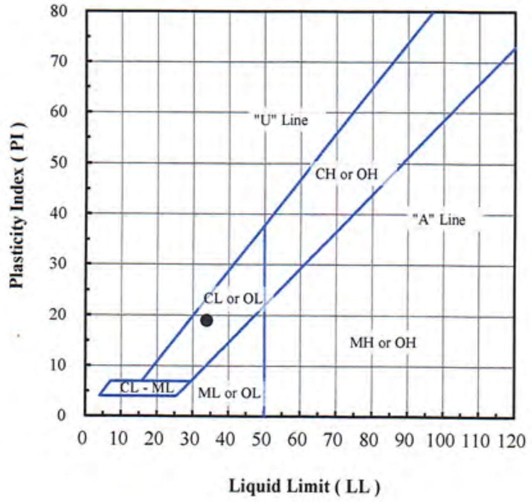


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	95
#10	2.00	92
#20	0.850	89
#40	0.425	86
#60	0.250	82
#100	0.150	78
#140	0.106	75
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	24
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-2 (10-16')	20L032	17.6	71	34	15	19	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-20-2021
AA, NSA

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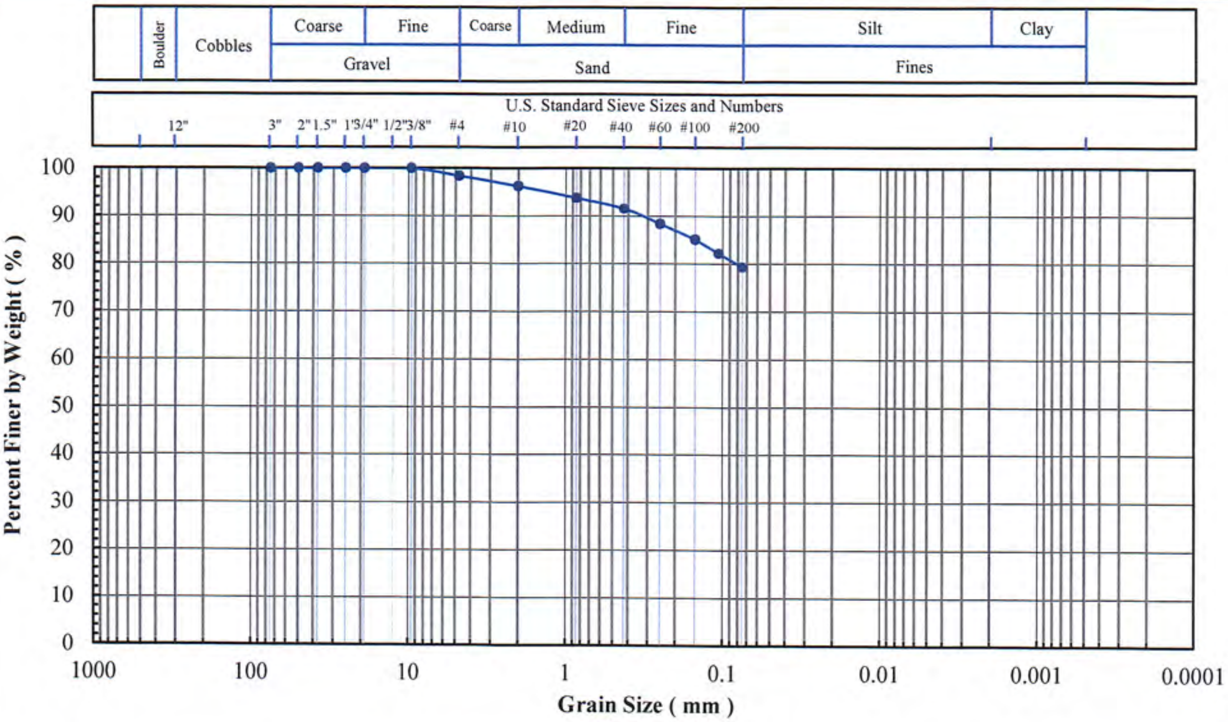
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-3 (16-26')
Lab Sample No:	20L033

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

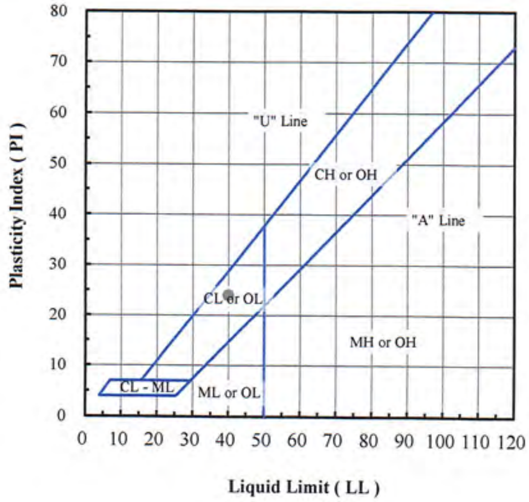


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	96.3
#20	0.850	93.8
#40	0.425	91.6
#60	0.250	88.4
#100	0.150	85.1
#140	0.106	82.2
#200	0.075	79.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.6
Sand (%):	19.1
Fines (%):	79.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B3-3 (16-26')	20L033	19.4	79.3	40	16	24	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

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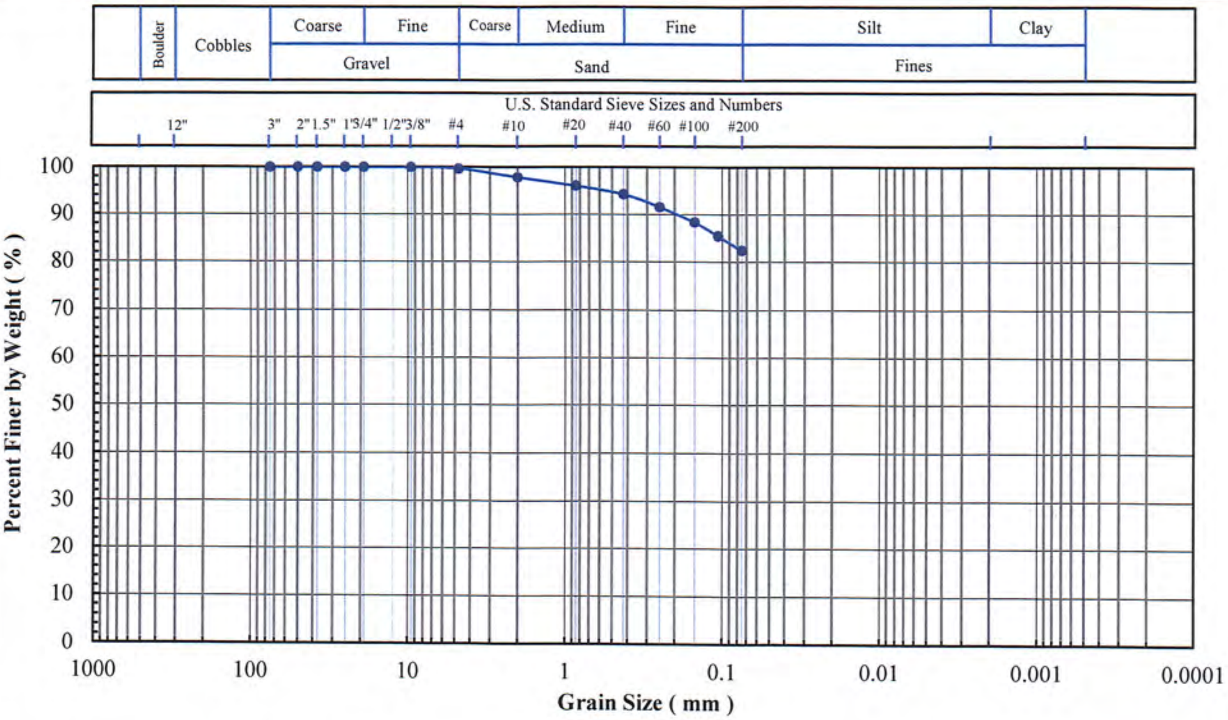
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-4 (26-36')
Lab Sample No:	20L034

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

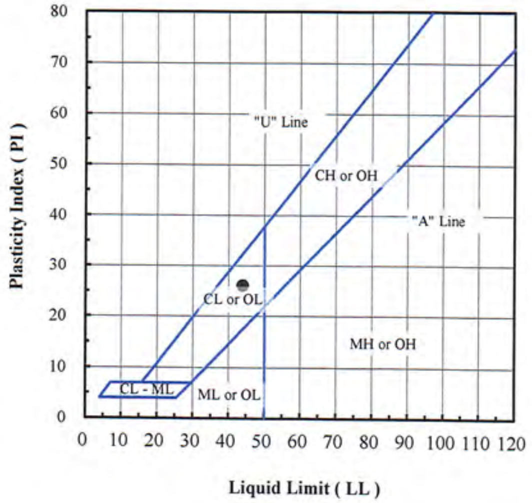


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	97.9
#20	0.850	96.1
#40	0.425	94.3
#60	0.250	91.6
#100	0.150	88.4
#140	0.106	85.5
#200	0.075	82.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	17.2
Fines (%):	82.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-4 (26-36')	20L034	17.1	82.5	44	18	26	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSR

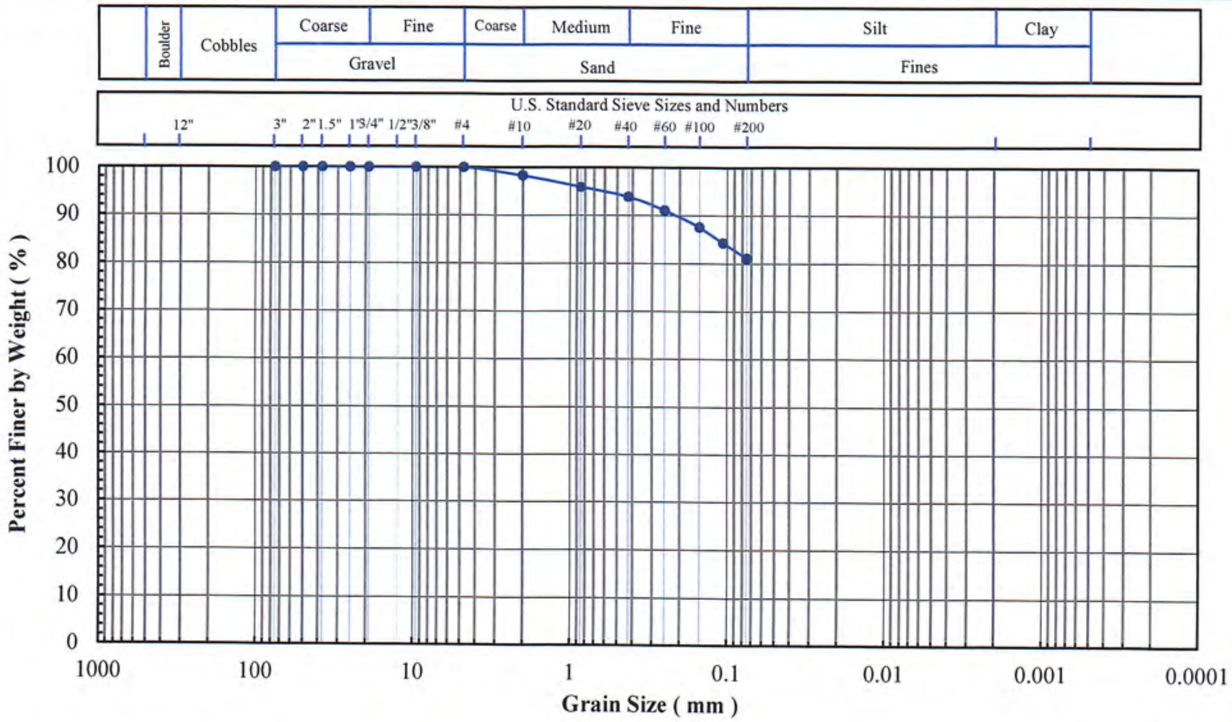
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-5 (36-46')
Lab Sample No:	20L035

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

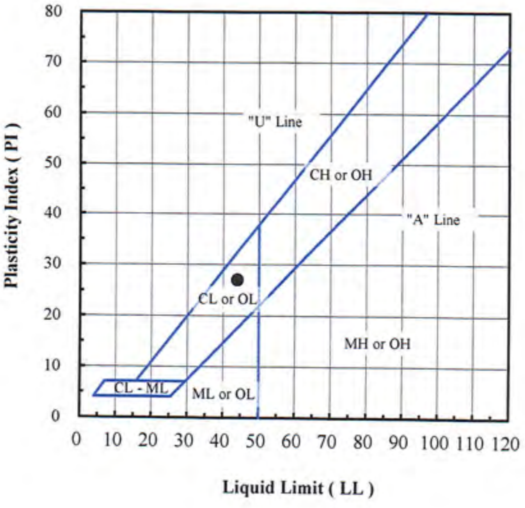


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.3
#20	0.850	95.9
#40	0.425	93.8
#60	0.250	91.0
#100	0.150	87.5
#140	0.106	84.3
#200	0.075	81.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	18.9
Fines (%):	81.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-5 (36-46')	20L035	15.9	81.1	44	17	27	CL - Lean clay with sand

Note(s):

01-20-2021
AA, WSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

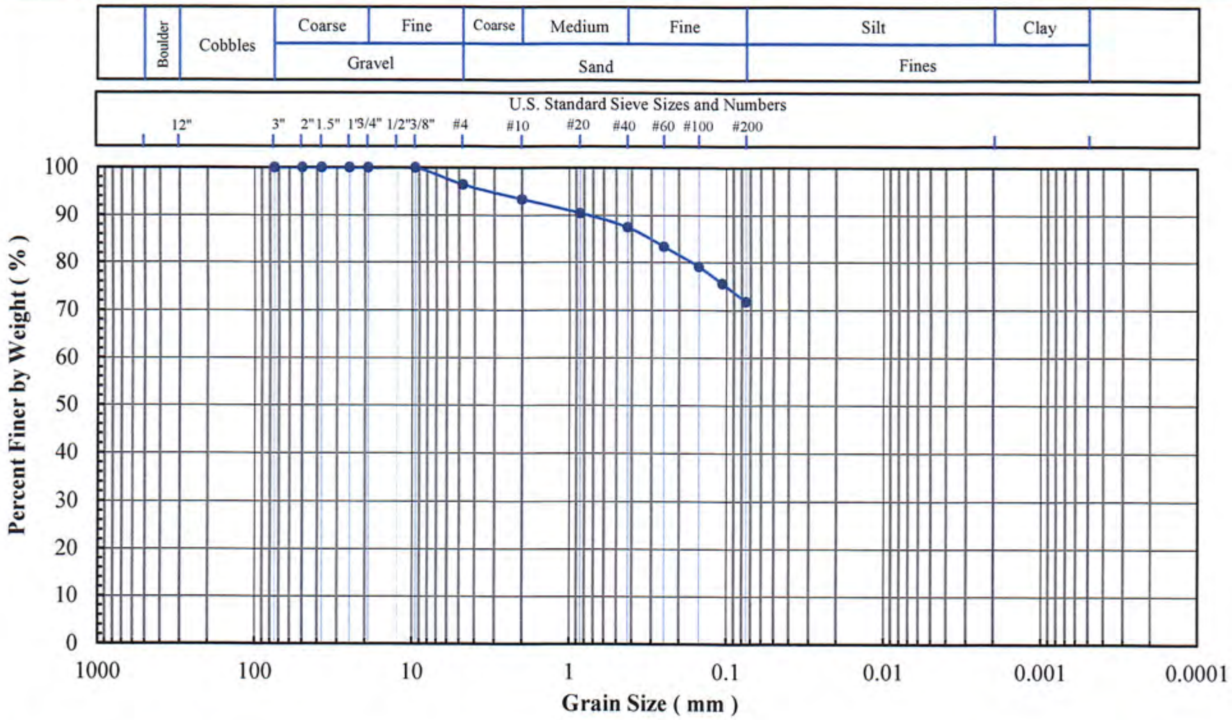
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-6 (46-56')
Lab Sample No:	20L036

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

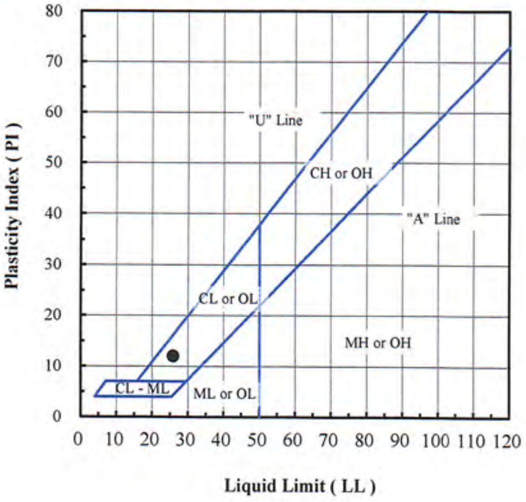


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.4
#10	2.00	93.4
#20	0.850	90.5
#40	0.425	87.5
#60	0.250	83.4
#100	0.150	79.1
#140	0.106	75.5
#200	0.075	71.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.6
Sand (%):	24.7
Fines (%):	71.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-6 (46-56')	20L036	13.4	71.7	26	14	12	CL - Lean clay with sand

Note(s):

01-20-2021
AA, NSK

Excel Geotechnical Testing, Inc.

"Excellence in Testing"

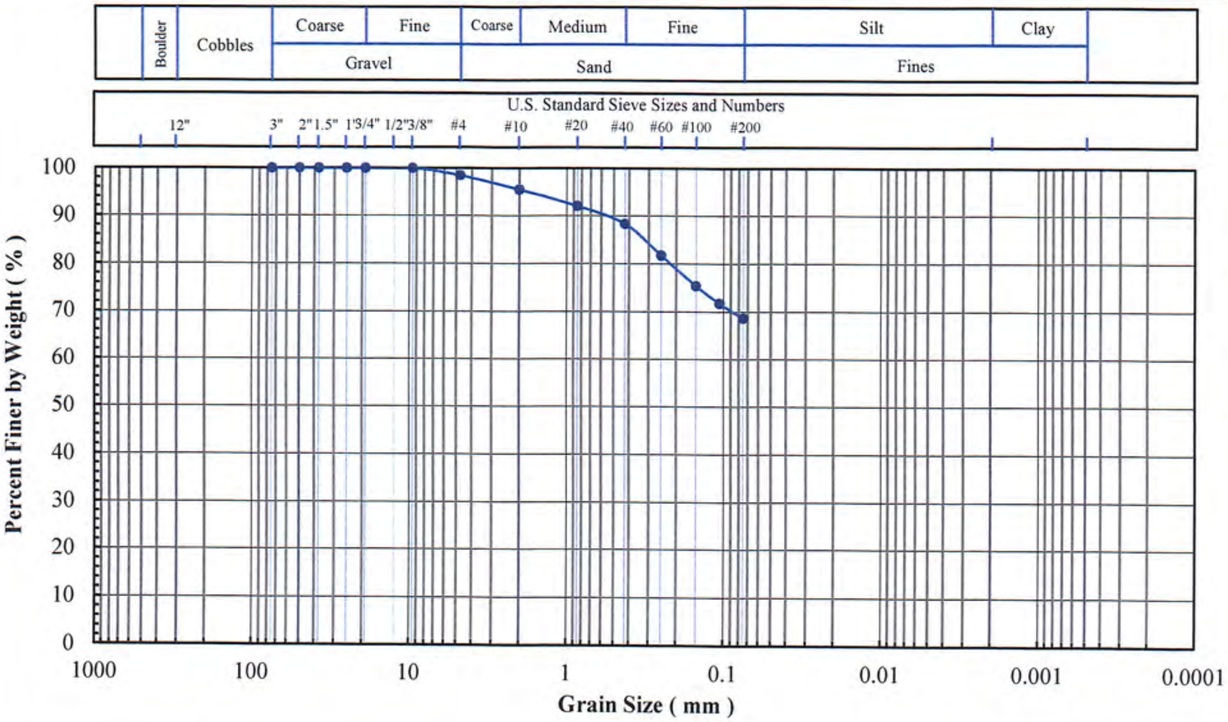
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-7 (56-66')
Lab Sample No:	20L037

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

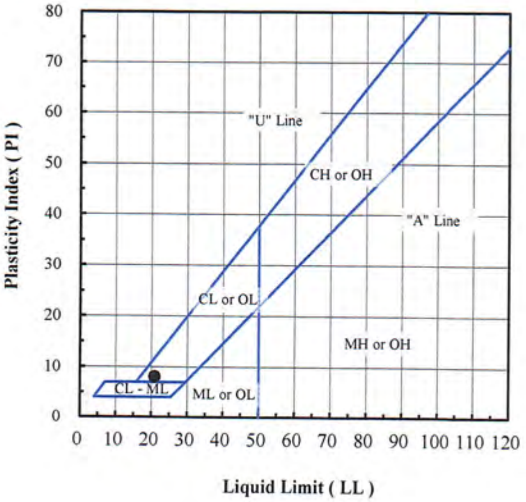


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	95.5
#20	0.850	92.0
#40	0.425	88.3
#60	0.250	81.7
#100	0.150	75.4
#140	0.106	71.7
#200	0.075	68.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	29.9
Fines (%):	68.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-7 (56-66')	20L037	15.1	68.6	21	13	8	CL - Sandy lean clay

Note(s):

01-20-2021
AA, NSR

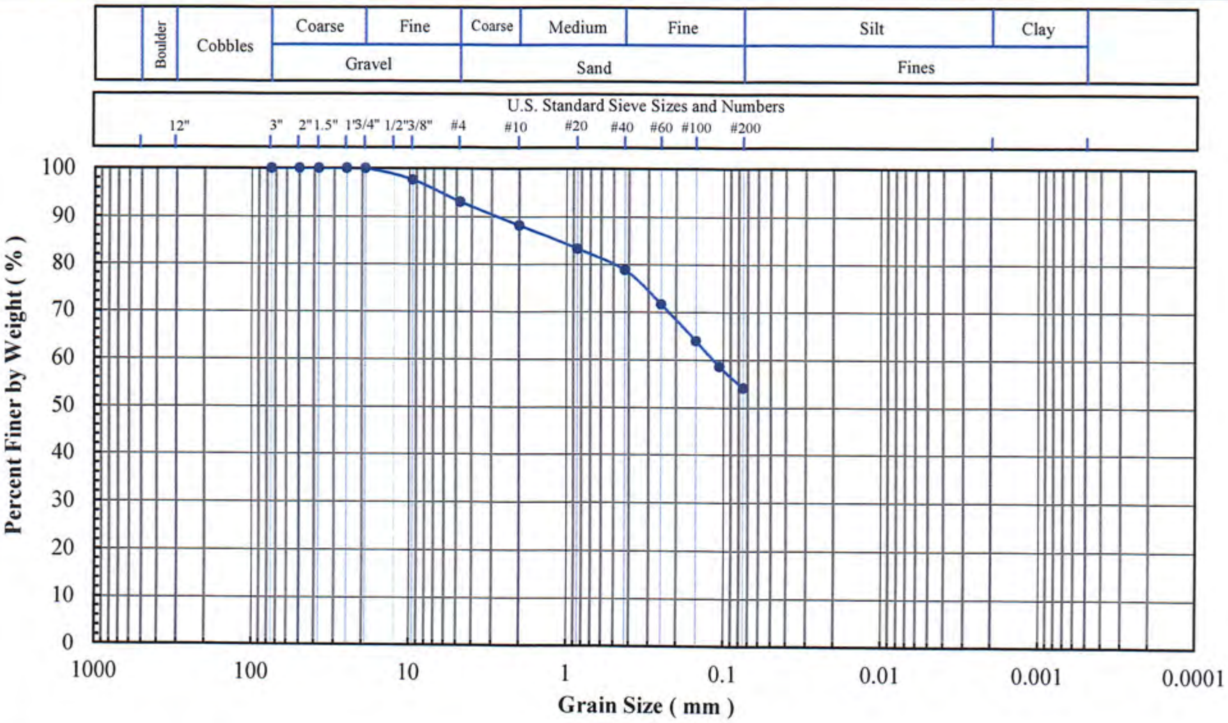
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B3-8 (66-76')
Lab Sample No:	20L038

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

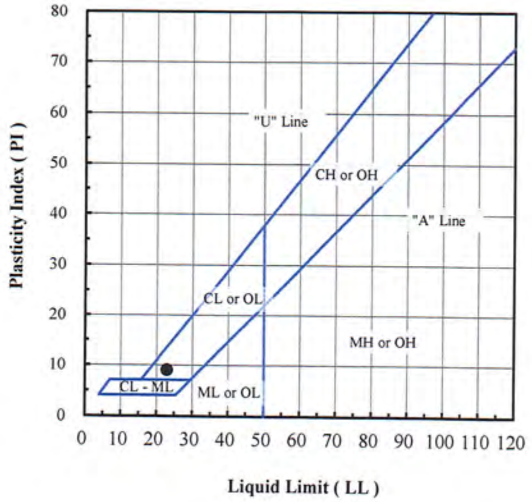


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	93
#10	2.00	88
#20	0.850	83
#40	0.425	79
#60	0.250	72
#100	0.150	64
#140	0.106	59
#200	0.075	54

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	7
Sand (%):	39
Fines (%):	54
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B3-8 (66-76')	20L038	7.8	54	23	14	9	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-20-2021
AAINSR

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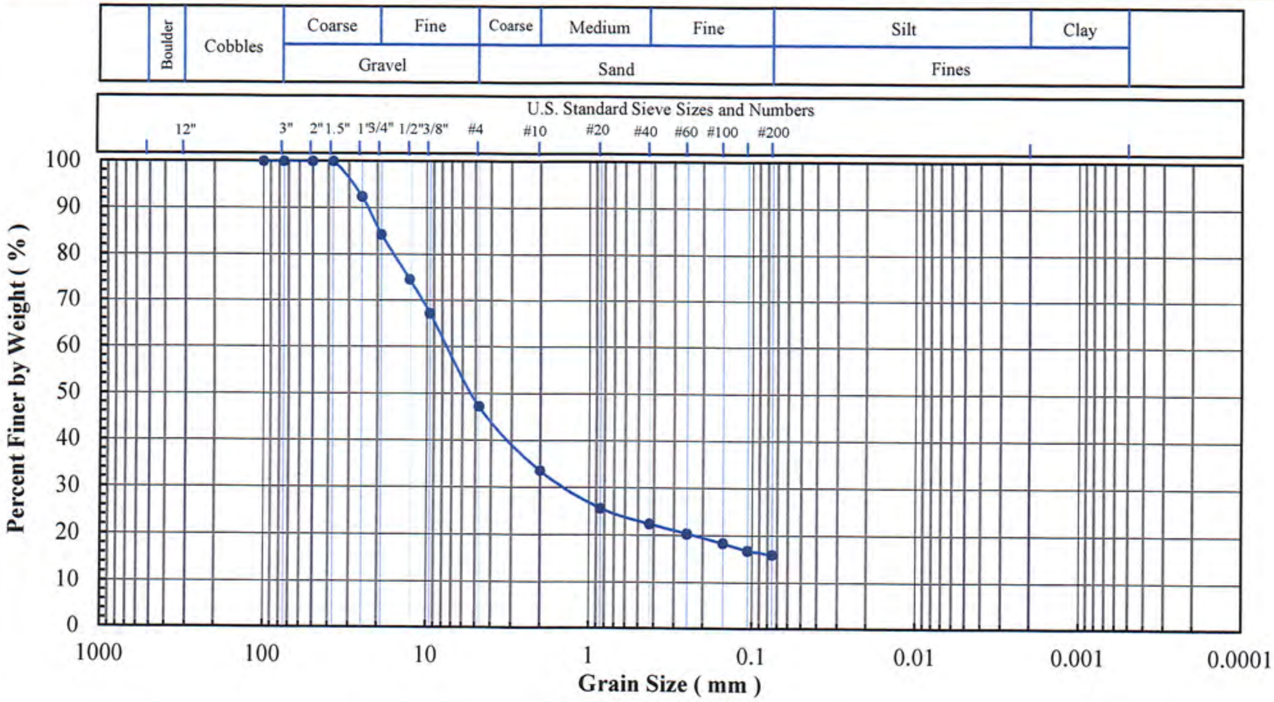
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-1 (0-6')
Lab Sample No:	20L039

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

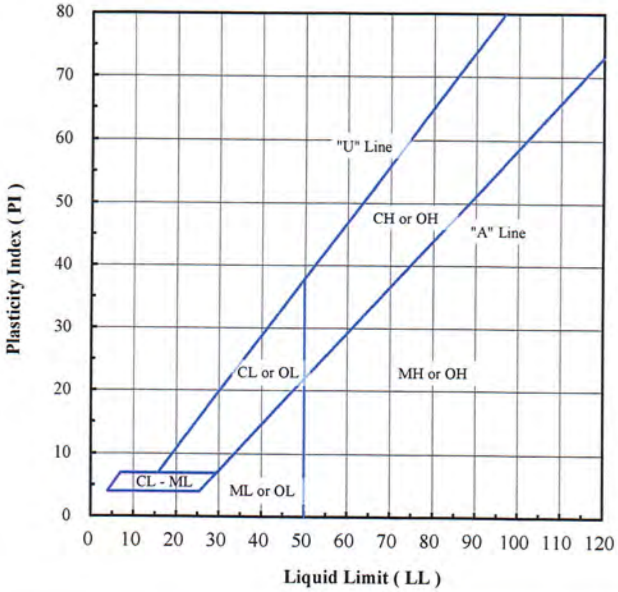
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100.0
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	92.4
3/4"	19	84.3
1/2"	13	74.6
3/8"	9.5	67.2
#4	4.75	47.2
#10	2.00	33.5
#20	0.850	25.6
#40	0.425	22.3
#60	0.250	20.3
#100	0.150	18.3
#140	0.106	16.8
#200	0.075	15.9

Gravel (%)	52.8
Sand (%)	31.3
Fines (%)	15.9
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-1 (0-6')	20L039	7.1	15.9	NP	NP	NP	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

01-21-2021
AA, NSR

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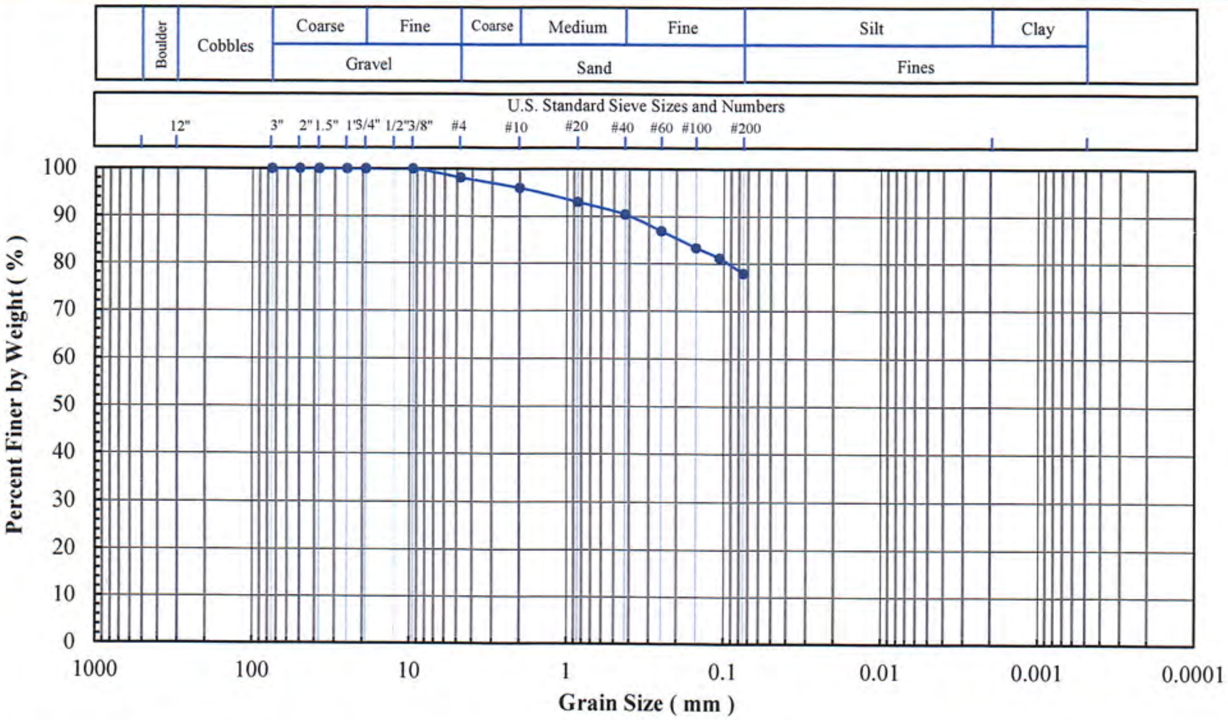
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-4 (21-26')
Lab Sample No:	20L042

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

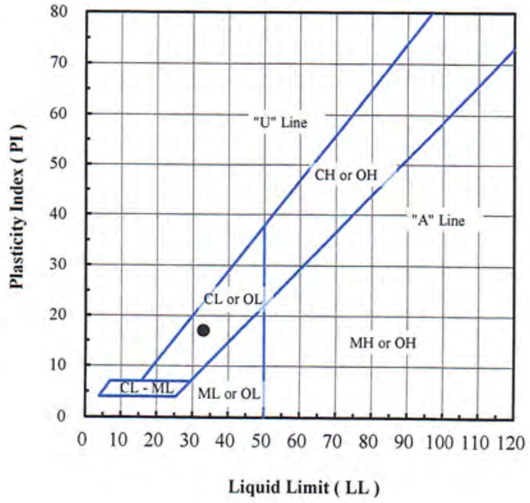


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.1
#10	2.00	96.0
#20	0.850	93.0
#40	0.425	90.4
#60	0.250	86.9
#100	0.150	83.3
#140	0.106	81.1
#200	0.075	77.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.9
Sand (%):	20.3
Fines (%):	77.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B4-4 (21-26')	20L042	16.1	77.8	33	16	17	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

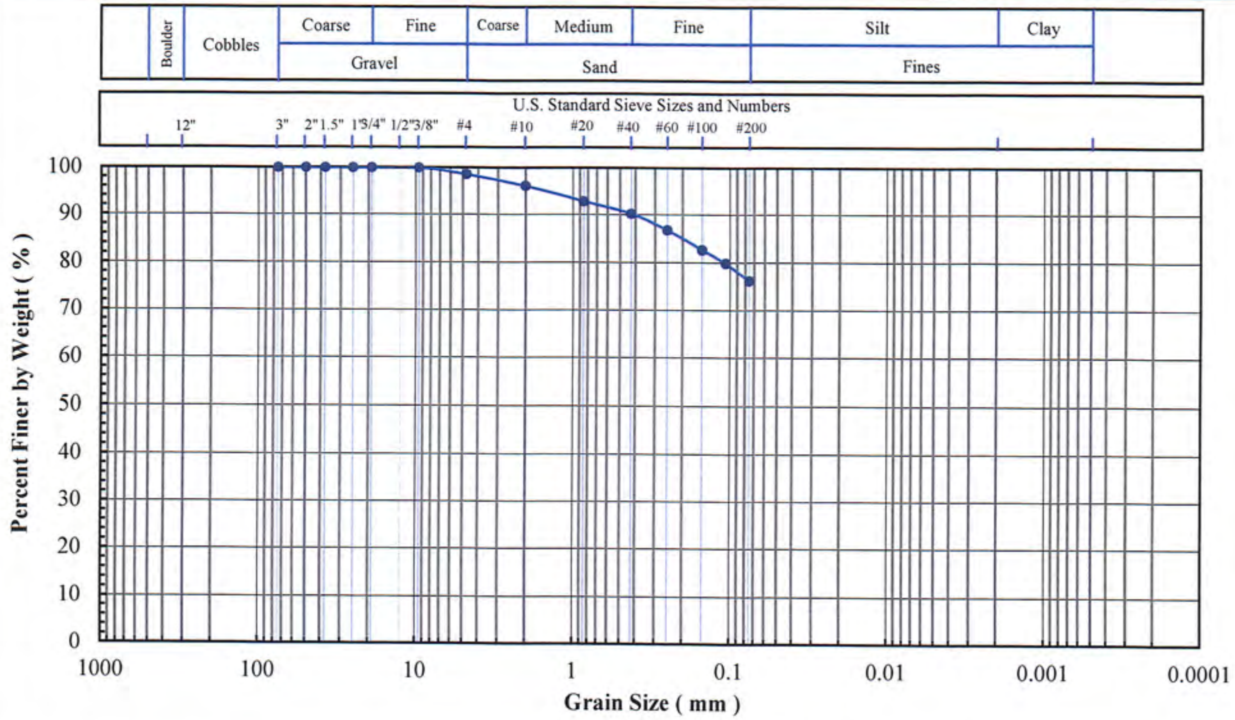
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-6 (30-35')
Lab Sample No:	20L044

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

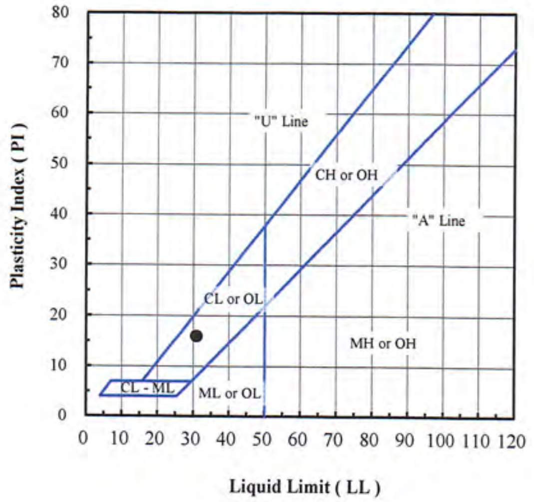


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	96.1
#20	0.850	92.8
#40	0.425	90.2
#60	0.250	86.7
#100	0.150	82.6
#140	0.106	79.8
#200	0.075	76.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	22.5
Fines (%):	76.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-6 (30-35')	20L044	15.1	76.1	31	15	16	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

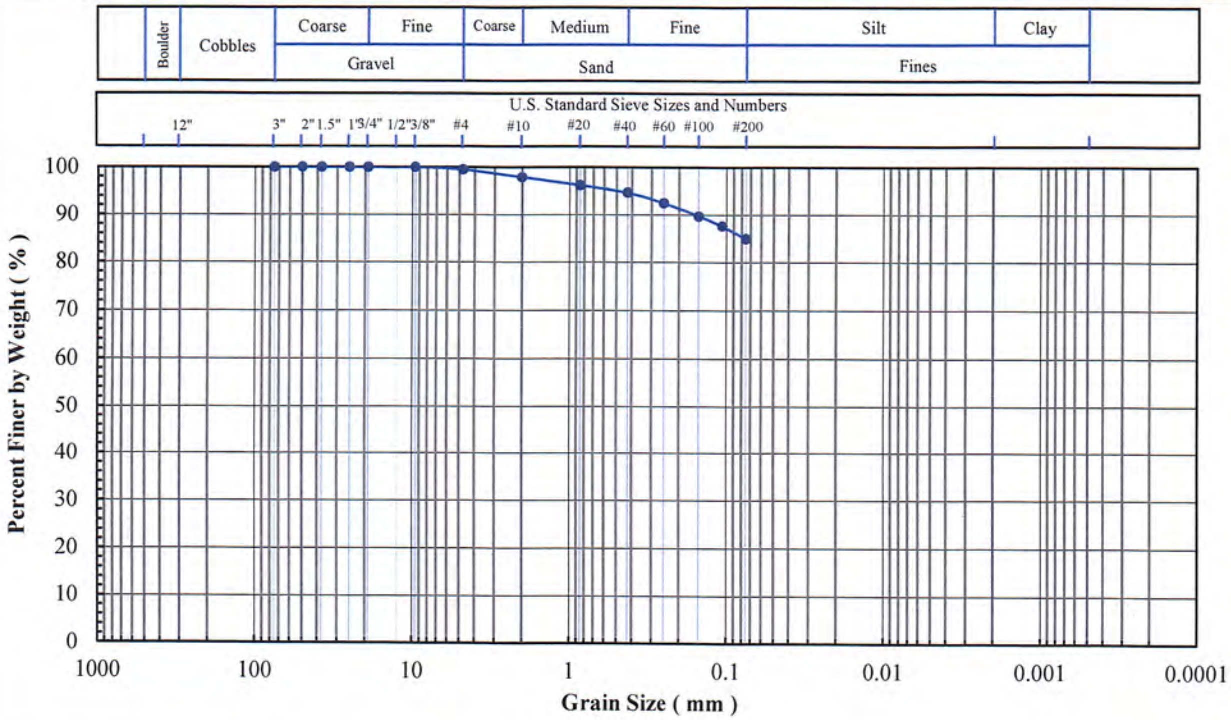
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-9 (46-51')
Lab Sample No:	20L047

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

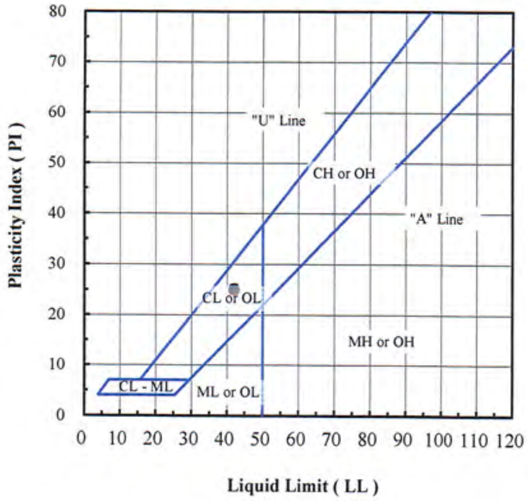


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.9
#20	0.850	96.2
#40	0.425	94.7
#60	0.250	92.5
#100	0.150	89.7
#140	0.106	87.6
#200	0.075	84.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	14.6
Fines (%):	84.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-9 (46-51')	20L047	18.3	84.9	42	17	25	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

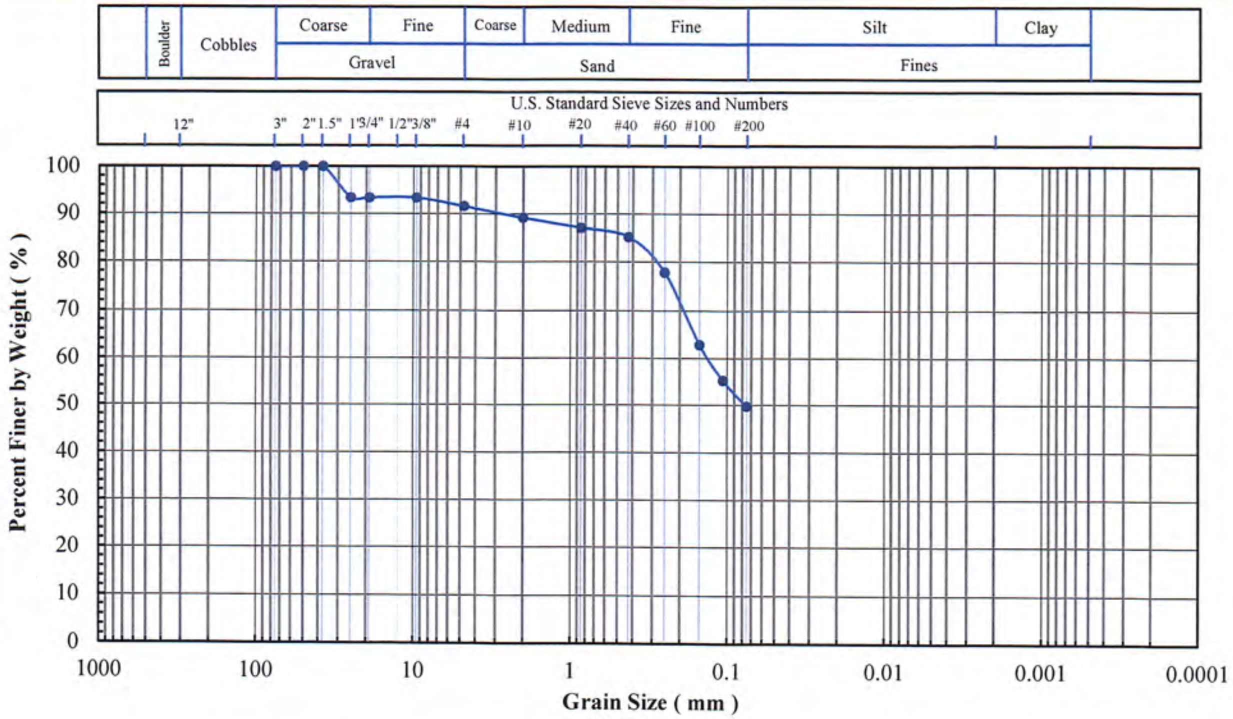
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-12 (63-66')
Lab Sample No:	20L050

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

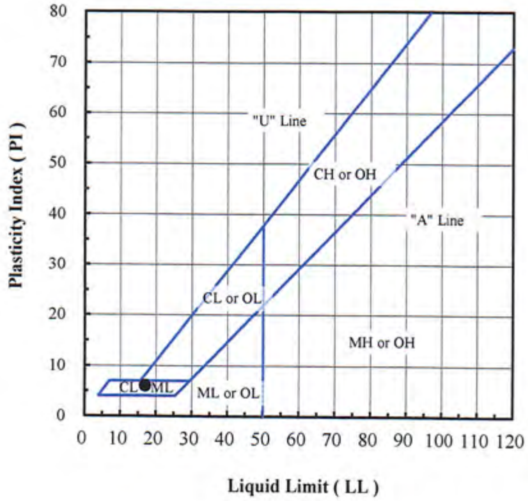


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	93
3/4"	19	93
3/8"	9.5	93
#4	4.75	92
#10	2.00	89
#20	0.850	87
#40	0.425	85
#60	0.250	78
#100	0.150	63
#140	0.106	55
#200	0.075	50

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	8
Sand (%):	42
Fines (%):	50
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-12 (63-66')	20L050	11.1	50	17	11	6	SC-SM - Silty, clayey sand

Note(s): Sieve specimen was undersized.
Engineering classification is based on the assumption that the fines are either CL or ML.

01-21-2021
AA, NSR

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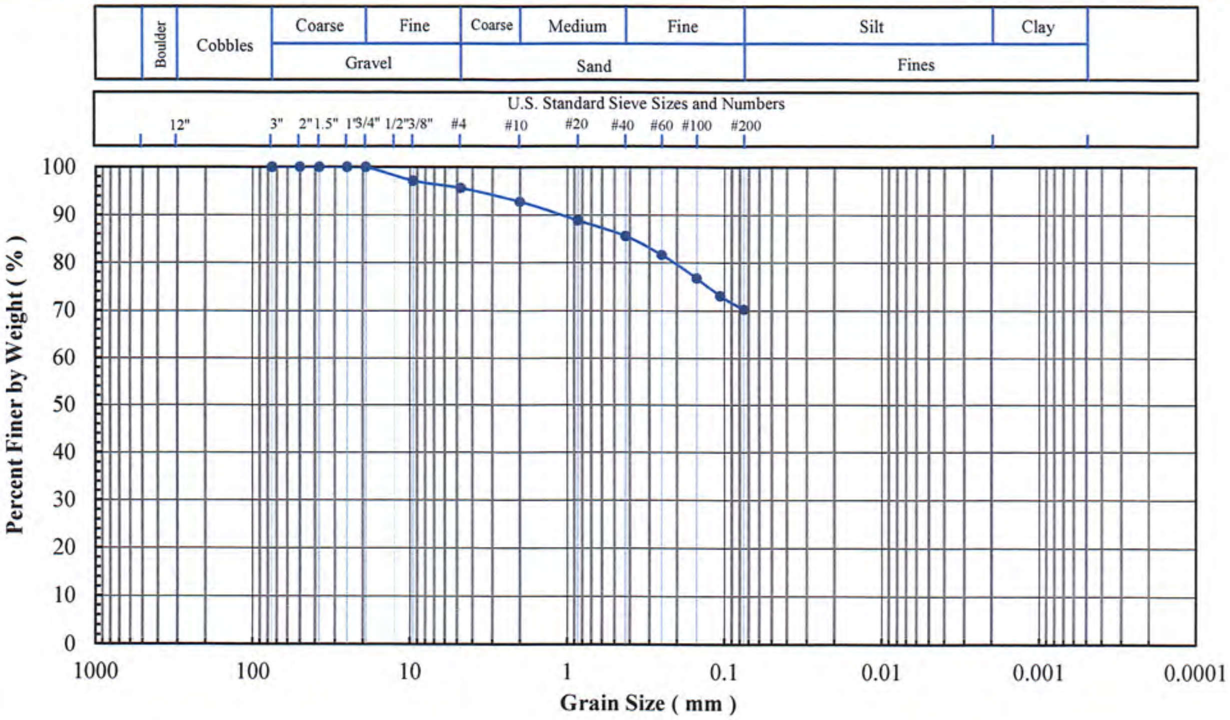
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-1 (15-17')
Lab Sample No:	20L129

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

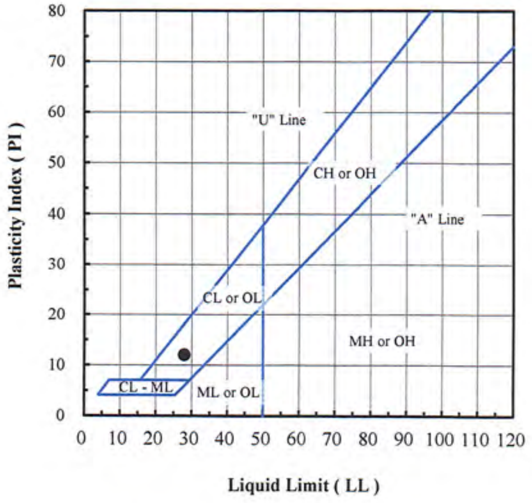


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	97
#4	4.75	96
#10	2.00	93
#20	0.850	89
#40	0.425	86
#60	0.250	82
#100	0.150	77
#140	0.106	73
#200	0.075	70

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	26
Fines (%):	70
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-1 (15-17')	20L129	15.8	70	28	16	12	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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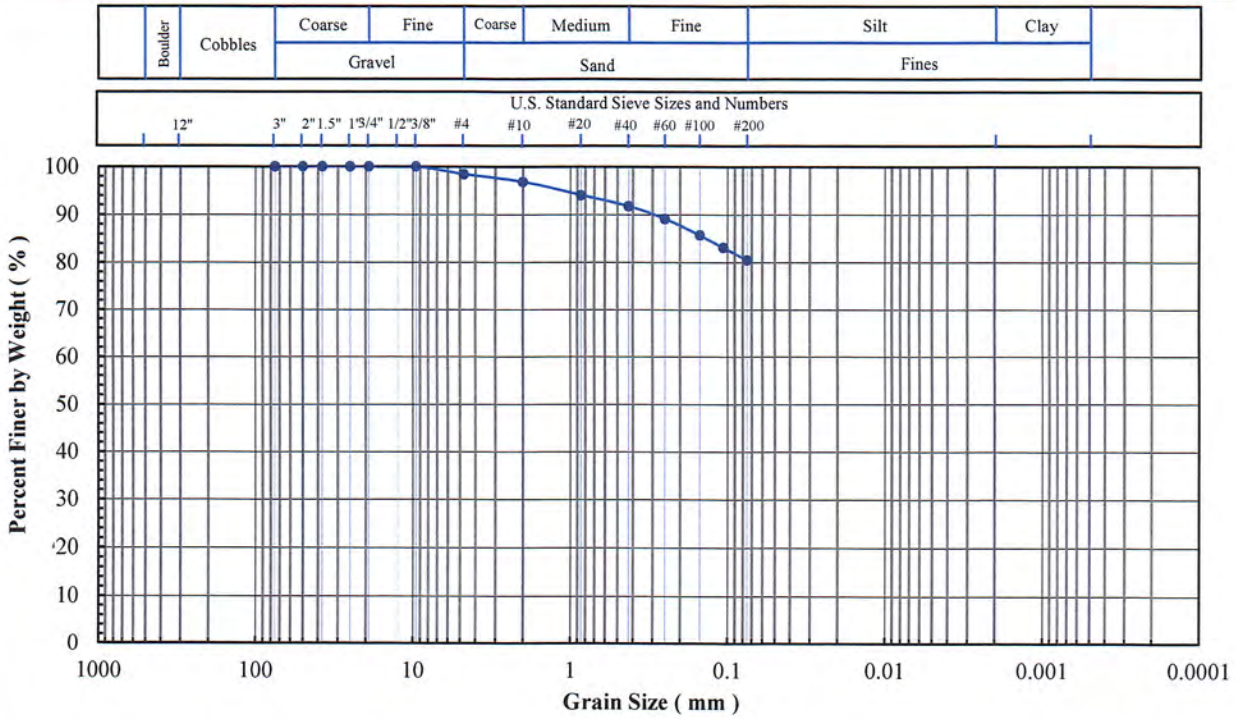
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-2 (40-42')
Lab Sample No:	20L130

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

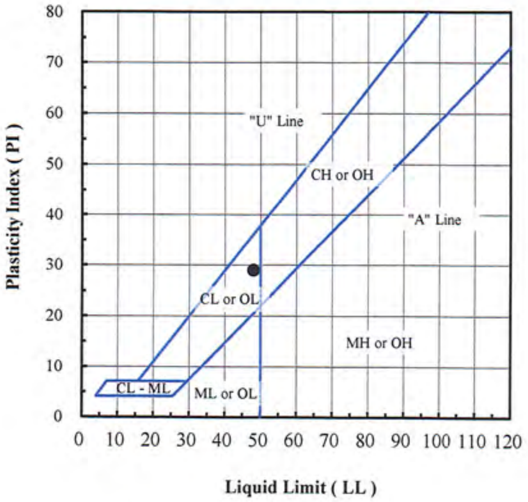


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	96.8
#20	0.850	94.0
#40	0.425	91.7
#60	0.250	89.1
#100	0.150	85.7
#140	0.106	83.1
#200	0.075	80.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.6
Sand (%):	17.9
Fines (%):	80.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-2 (40-42')	20L130	16.7	80.5	48	19	29	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSK

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953 Forrest Street, Roswell, Georgia 30075
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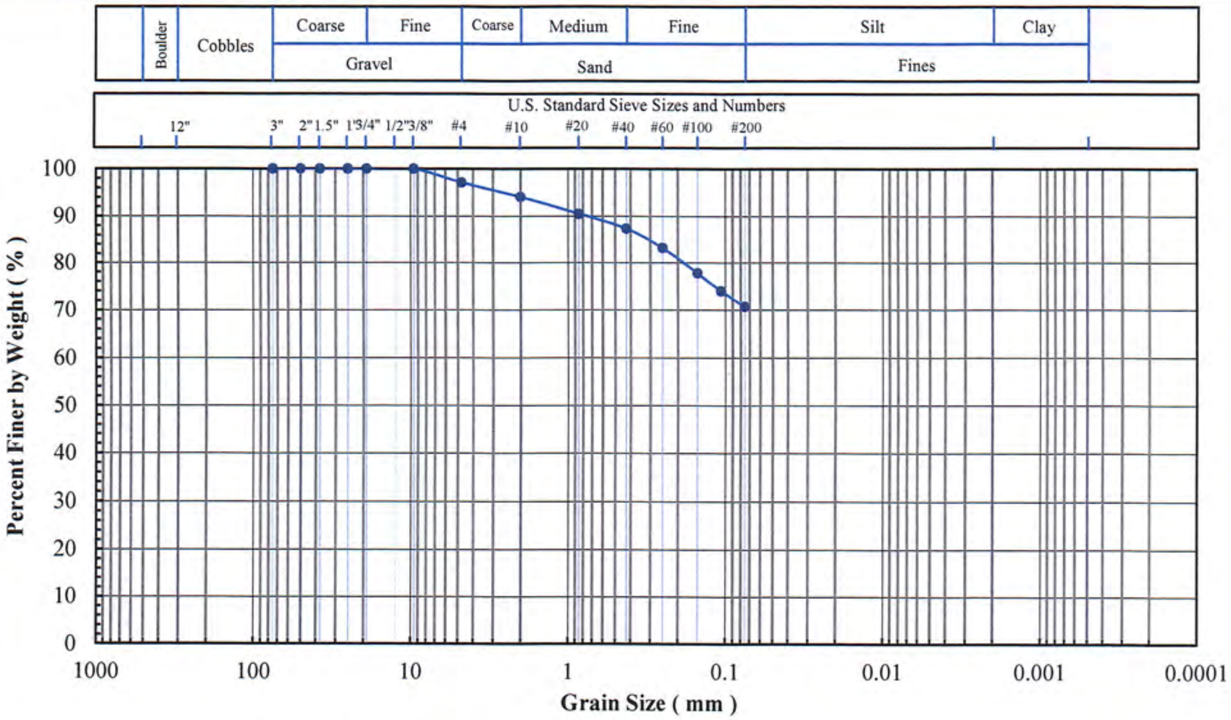
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-3 (55-57.5')
Lab Sample No:	20L131

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

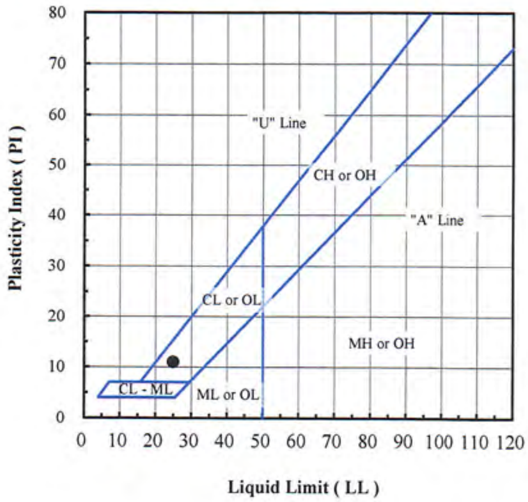


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.1
#10	2.00	94.1
#20	0.850	90.5
#40	0.425	87.4
#60	0.250	83.2
#100	0.150	77.8
#140	0.106	74.0
#200	0.075	70.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.9
Sand (%):	26.4
Fines (%):	70.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-3 (55-57.5')	20L131	14.4	70.7	25	14	11	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSR

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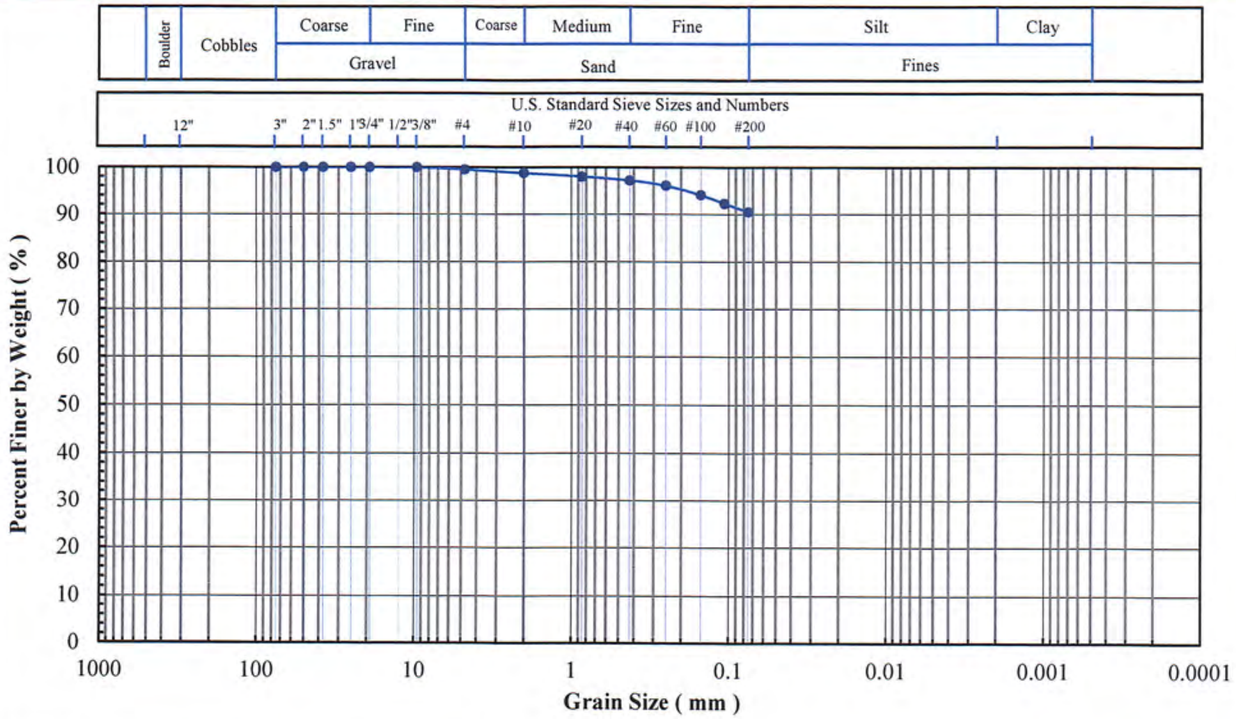
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B4-ST-4 (70-72.5')
Lab Sample No:	20L132

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

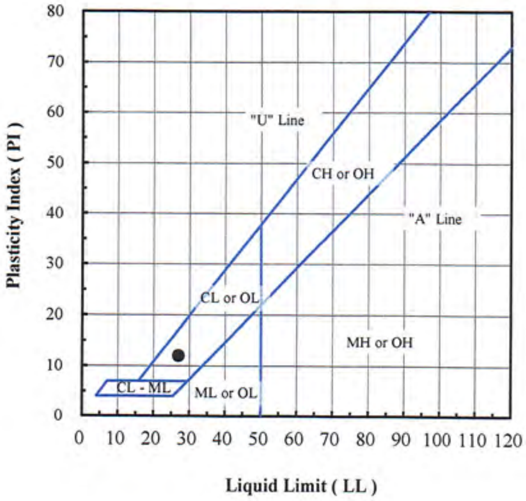


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	98.8
#20	0.850	98.0
#40	0.425	97.2
#60	0.250	96.1
#100	0.150	94.1
#140	0.106	92.3
#200	0.075	90.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	9.0
Fines (%):	90.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B4-ST-4 (70-72.5')	20L132	10.8	90.5	27	15	12	CL - Lean clay

Note(s):

01-27-2021
AA, NSR

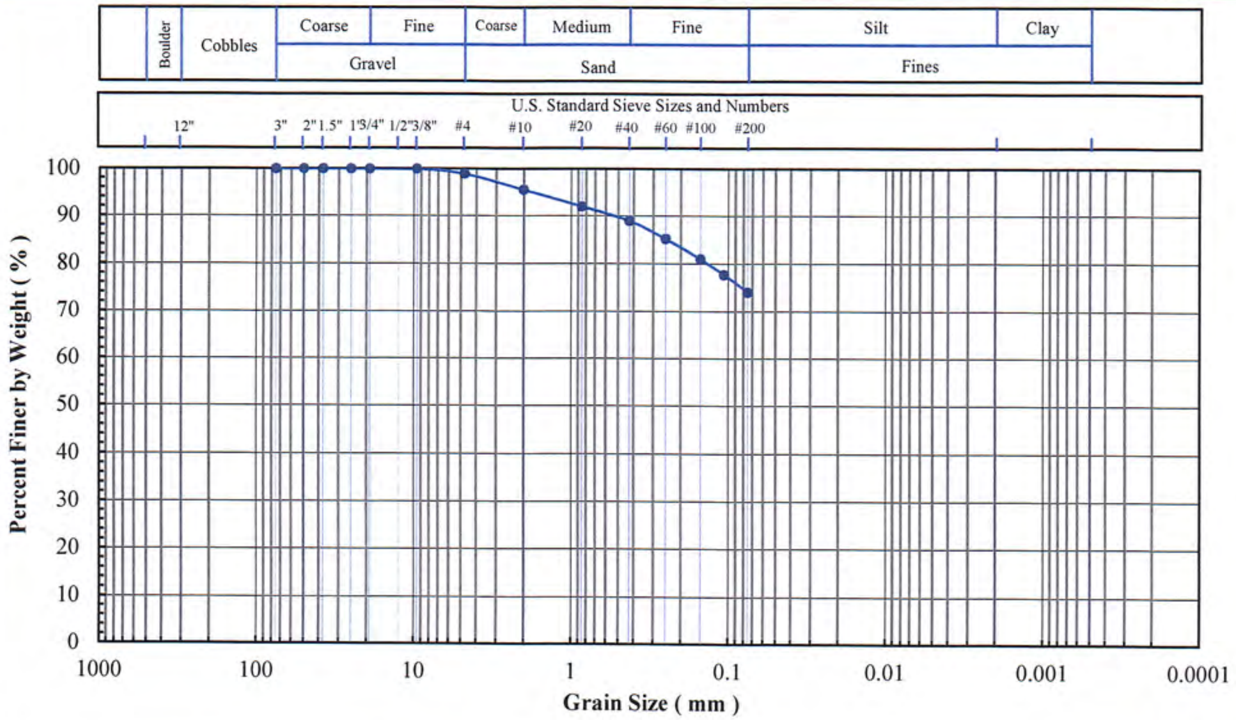
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-2 (6-11')
Lab Sample No:	20L054

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

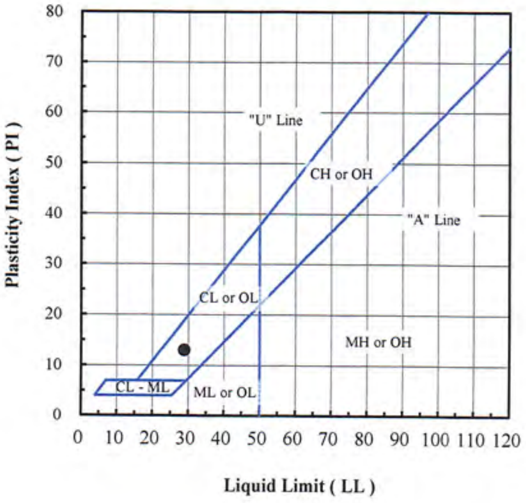


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	95.5
#20	0.850	91.9
#40	0.425	88.9
#60	0.250	85.1
#100	0.150	80.9
#140	0.106	77.7
#200	0.075	74.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	24.9
Fines (%):	74.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-2 (6-11')	20L054	18.9	74.0	29	16	13	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

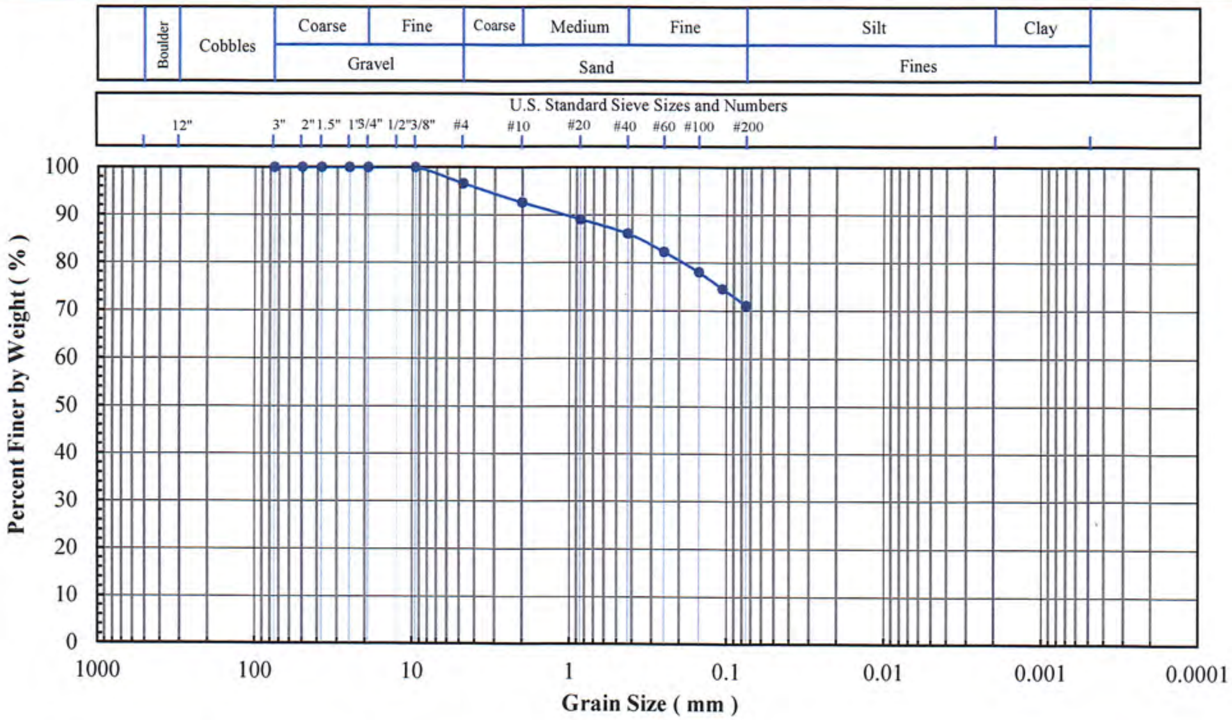
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-4 (16-21')
Lab Sample No:	20L056

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

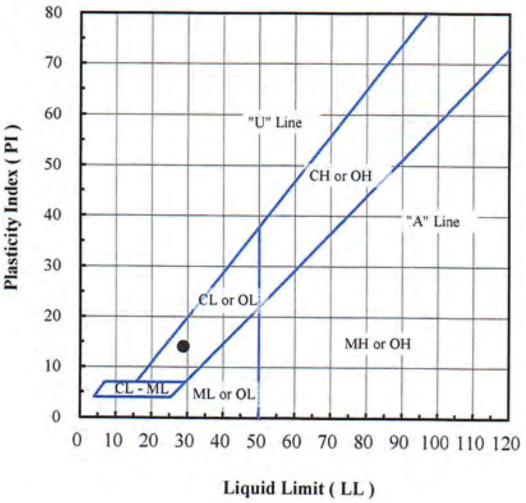


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.6
#10	2.00	92.7
#20	0.850	89.1
#40	0.425	86.1
#60	0.250	82.3
#100	0.150	78.0
#140	0.106	74.5
#200	0.075	71.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.4
Sand (%):	25.6
Fines (%):	71.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-4 (16-21')	20L056	17.9	71.0	29	15	14	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

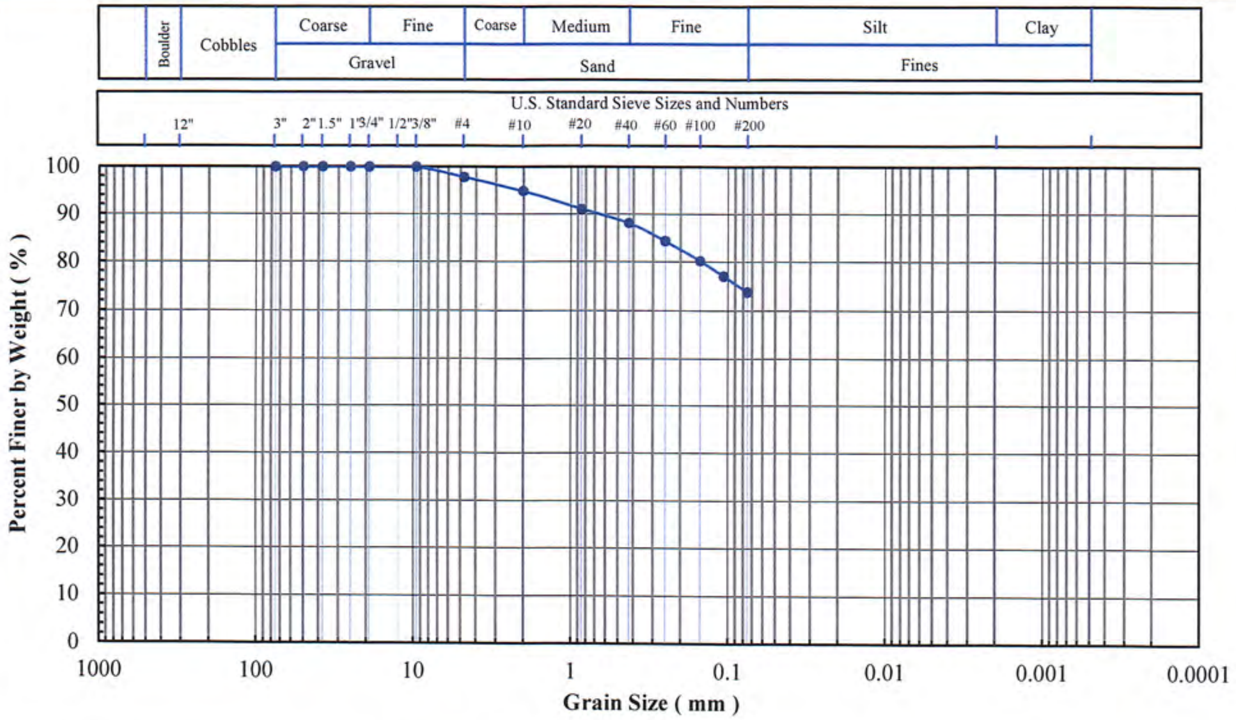
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B5-6 (26-31')
Lab Sample No: 20L058

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

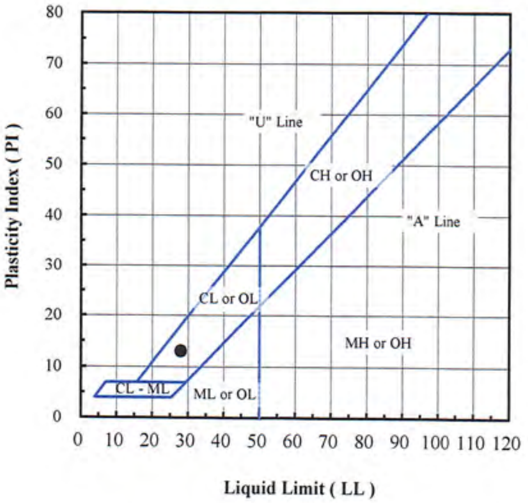


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	94.9
#20	0.850	91.1
#40	0.425	88.1
#60	0.250	84.3
#100	0.150	80.2
#140	0.106	77.0
#200	0.075	73.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	24.1
Fines (%):	73.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		Org. Content (%):		Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-6 (26-31')	20L058	20.9	73.7	28	15	13	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.
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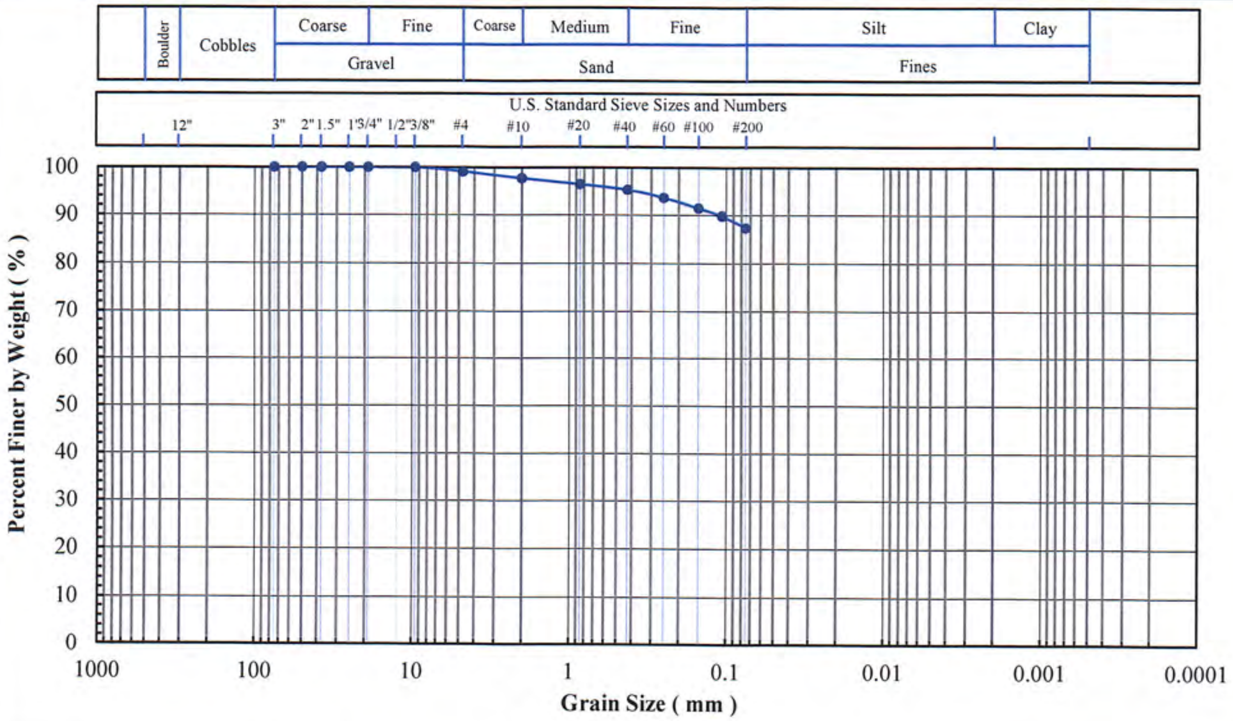
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-8 (36-42')
Lab Sample No:	20L060

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

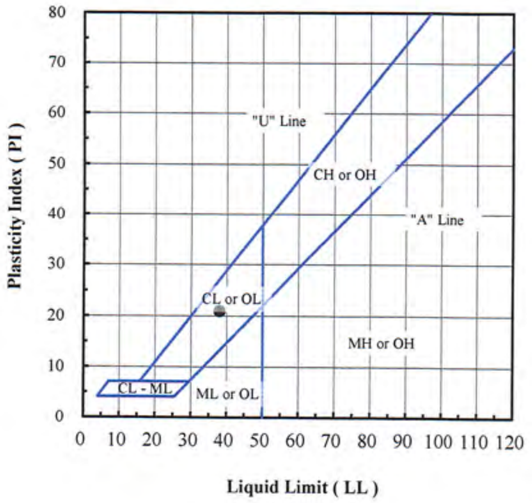


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	97.7
#20	0.850	96.4
#40	0.425	95.3
#60	0.250	93.6
#100	0.150	91.4
#140	0.106	89.8
#200	0.075	87.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	11.8
Fines (%):	87.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-8 (36-42')	20L060	20.0	87.3	38	17	21	CL - Lean clay

Note(s):

01-21-2021
AA, NSR

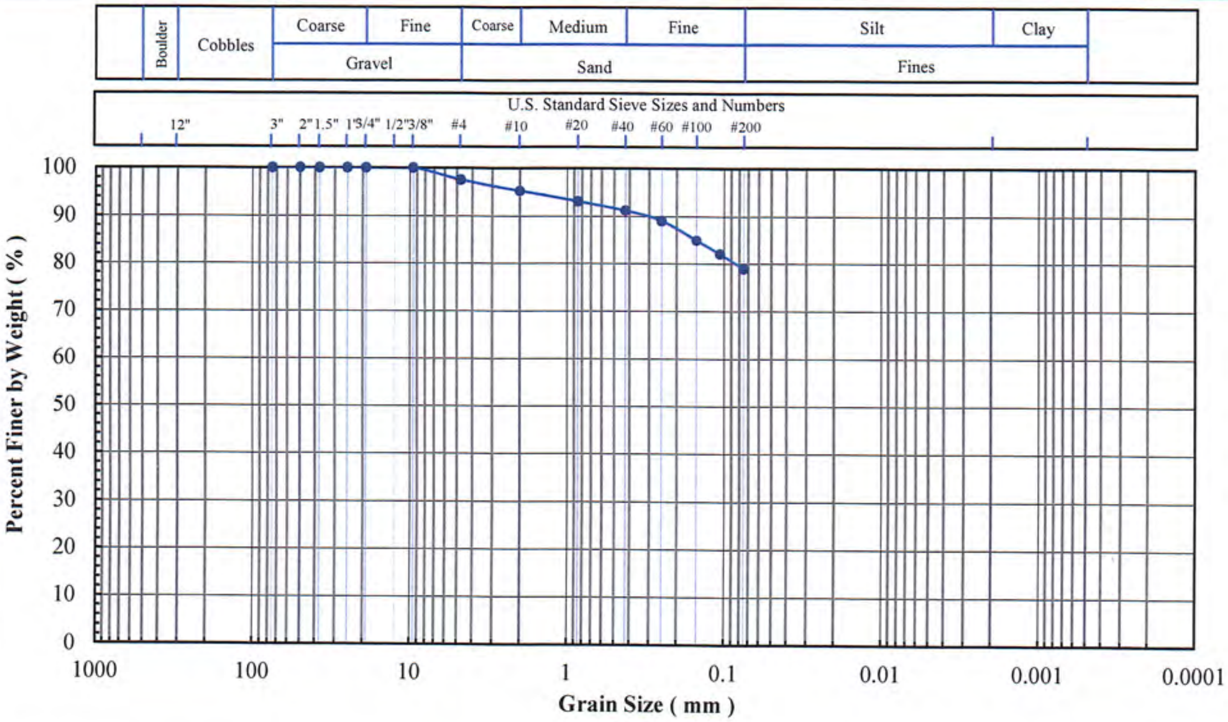
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-10 (46-51')
Lab Sample No:	20L062

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

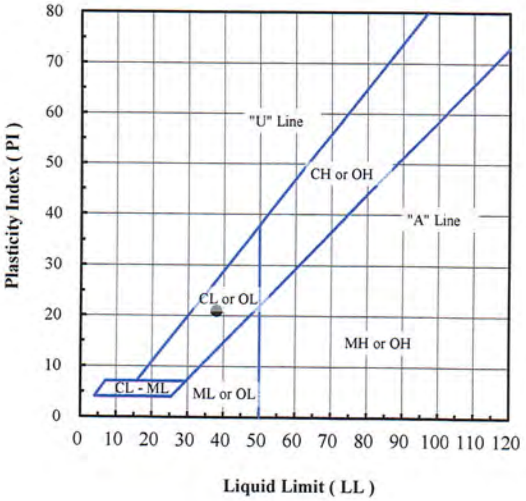


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.5
#10	2.00	95.3
#20	0.850	93.1
#40	0.425	91.2
#60	0.250	89.1
#100	0.150	85.0
#140	0.106	82.1
#200	0.075	78.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.5
Sand (%):	18.6
Fines (%):	78.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		Org. Content (%):		Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-10 (46-51')	20L062	18.0	78.9	38	17	21	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

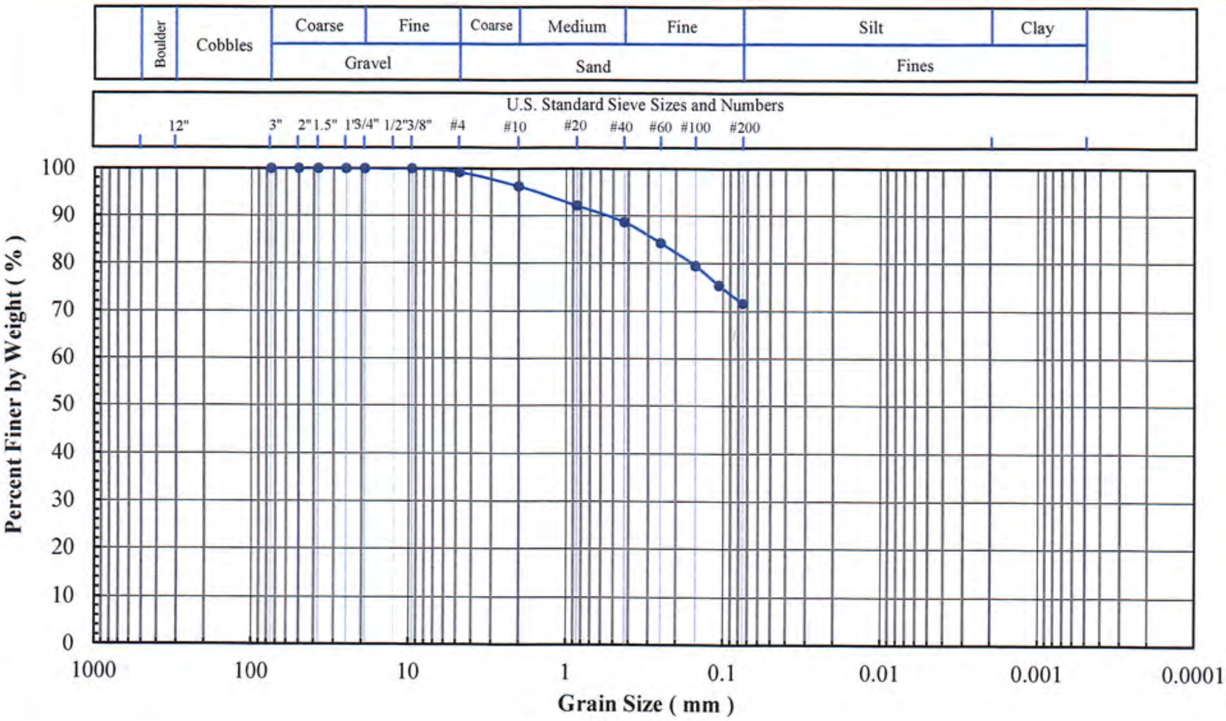
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-11 (51-56')
Lab Sample No:	20L063

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

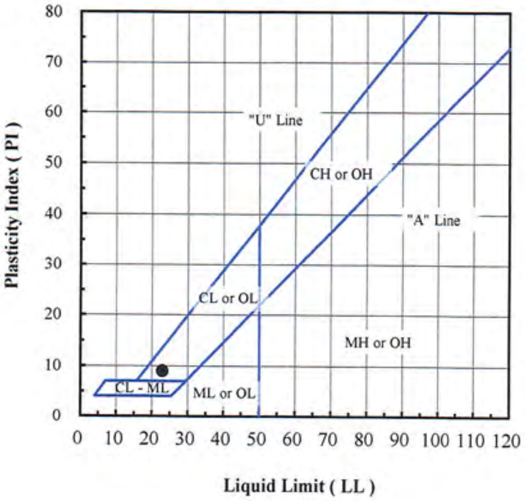


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	92.1
#40	0.425	88.6
#60	0.250	84.2
#100	0.150	79.5
#140	0.106	75.4
#200	0.075	71.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	27.6
Fines (%):	71.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B5-11 (51-56')	20L063	13.8	71.6	23	14	9	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSA

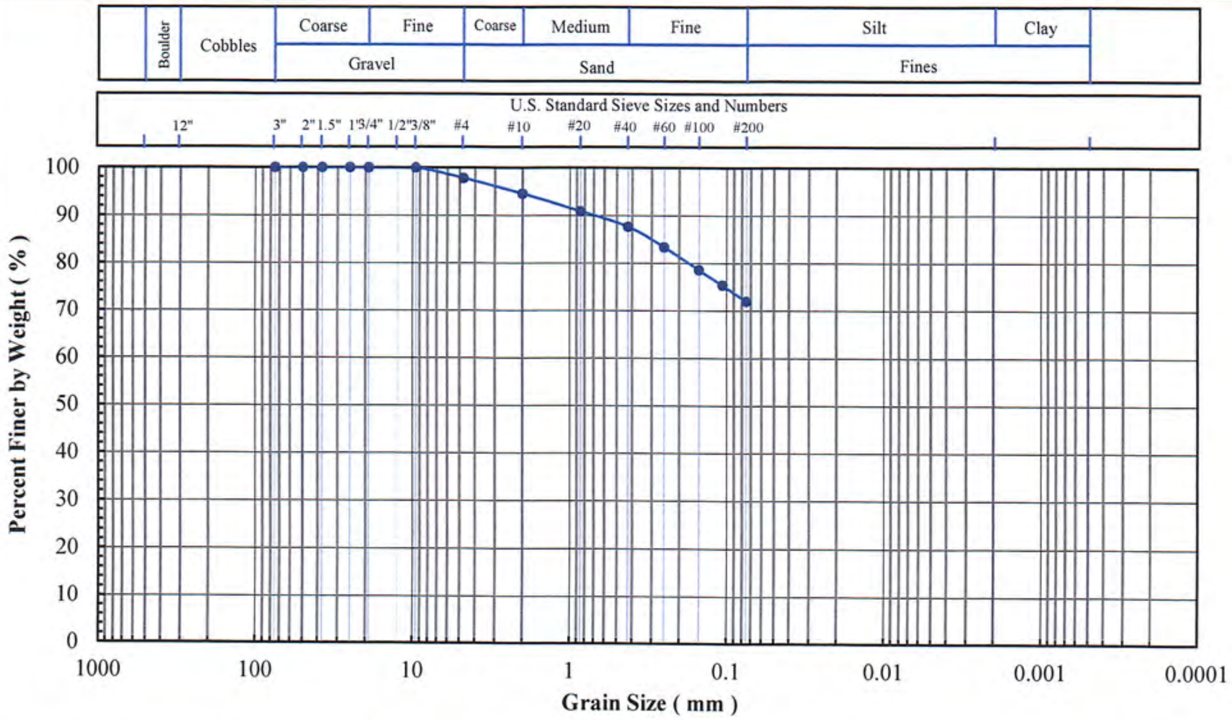
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-13 (61-66')
Lab Sample No:	20L065

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

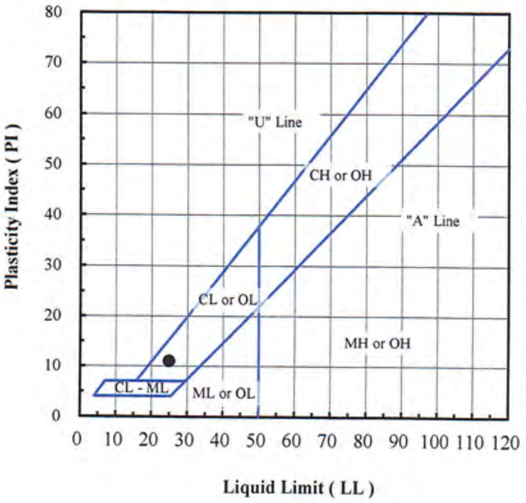


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	94.6
#20	0.850	90.9
#40	0.425	87.7
#60	0.250	83.4
#100	0.150	78.6
#140	0.106	75.4
#200	0.075	72.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.2
Sand (%):	25.8
Fines (%):	72.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-13 (61-66')	20L065	14.3	72.0	25	14	11	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

Excel Geotechnical Testing, Inc.

"Excellence in Testing"

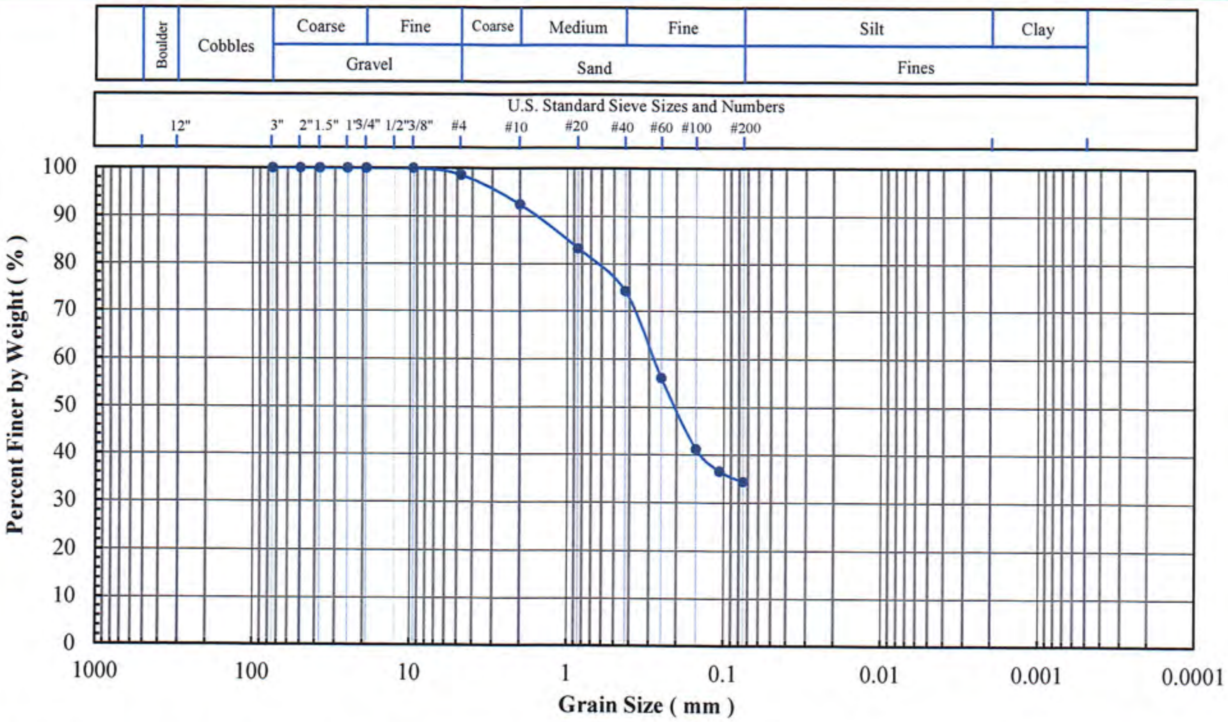
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B5-ST-1 (73.5-76')
Lab Sample No:	20L133

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

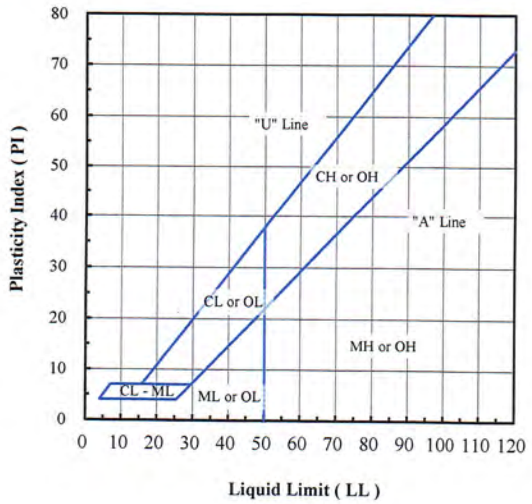


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	92.5
#20	0.850	83.3
#40	0.425	74.2
#60	0.250	56.1
#100	0.150	41.2
#140	0.106	36.6
#200	0.075	34.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	64.2
Fines (%):	34.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B5-ST-1 (73.5-76')	20L133	15.4	34.4	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

01-29-2021
AA, NSR

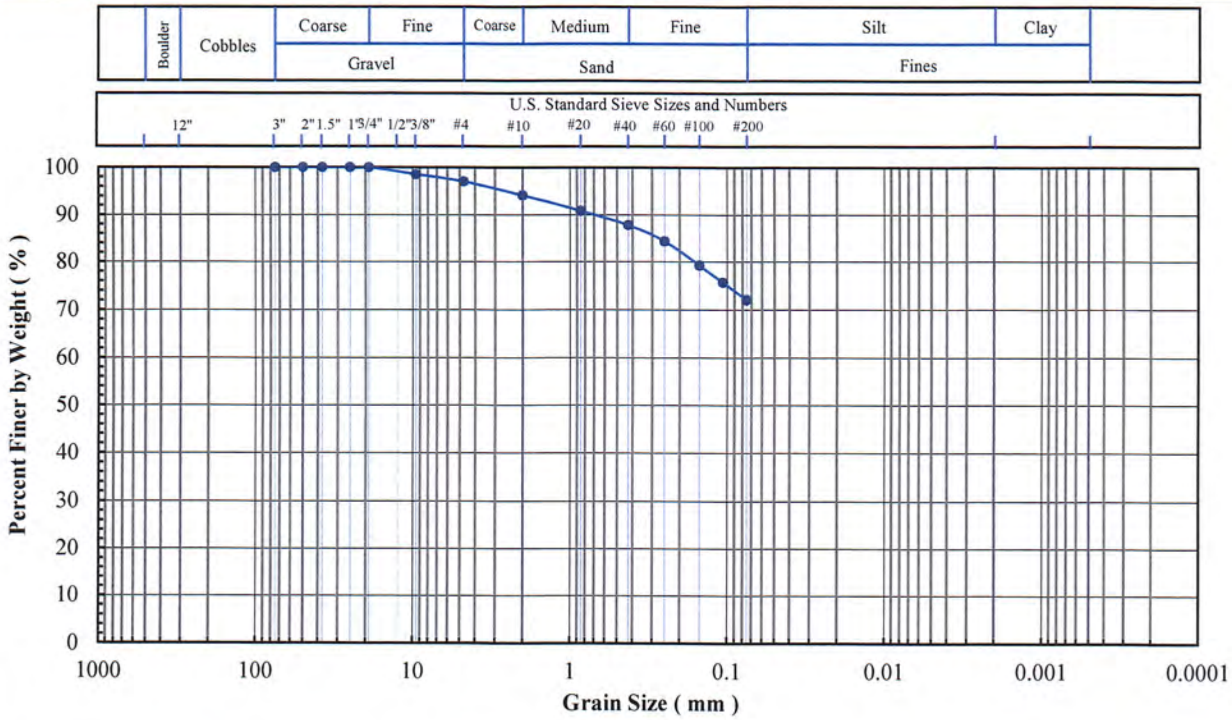
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-2 (6-11')
Lab Sample No:	20L068

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

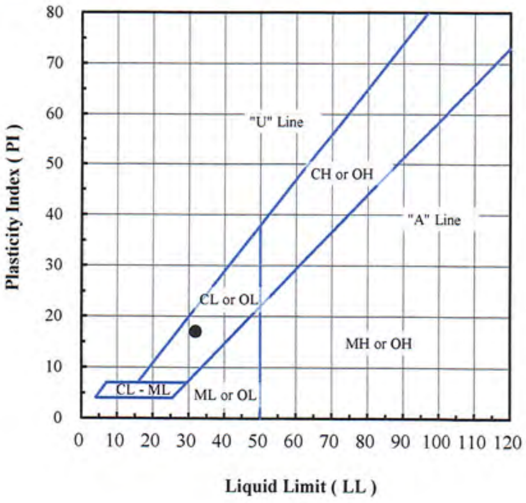


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	97
#10	2.00	94
#20	0.850	91
#40	0.425	88
#60	0.250	84
#100	0.150	79
#140	0.106	76
#200	0.075	72

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	25
Fines (%):	72
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-2 (6-11')	20L068	16.0	72	32	15	17	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-21-2021
AA/NJR

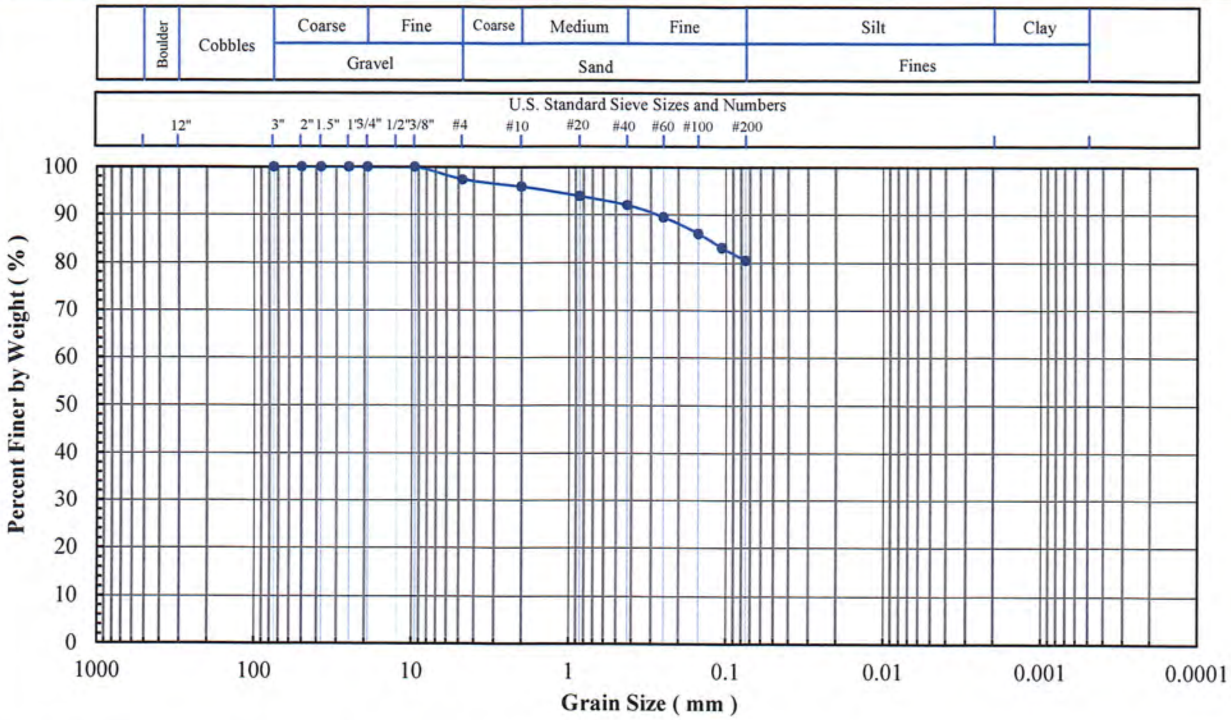
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-4 (16-21')
Lab Sample No:	20L070

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

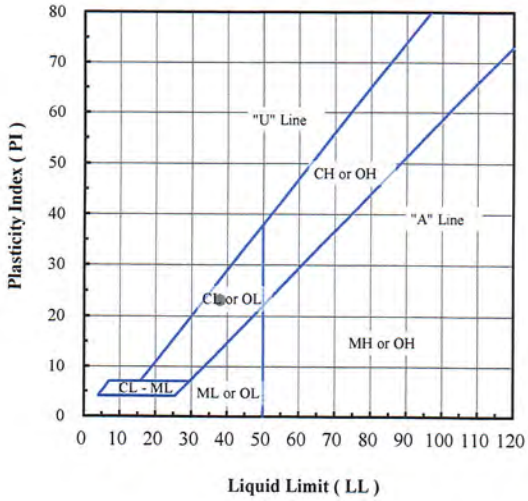


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.3
#10	2.00	95.8
#20	0.850	93.8
#40	0.425	91.9
#60	0.250	89.4
#100	0.150	86.0
#140	0.106	83.1
#200	0.075	80.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.7
Sand (%):	16.8
Fines (%):	80.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-4 (16-21')	20L070	19.9	80.5	38	15	23	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

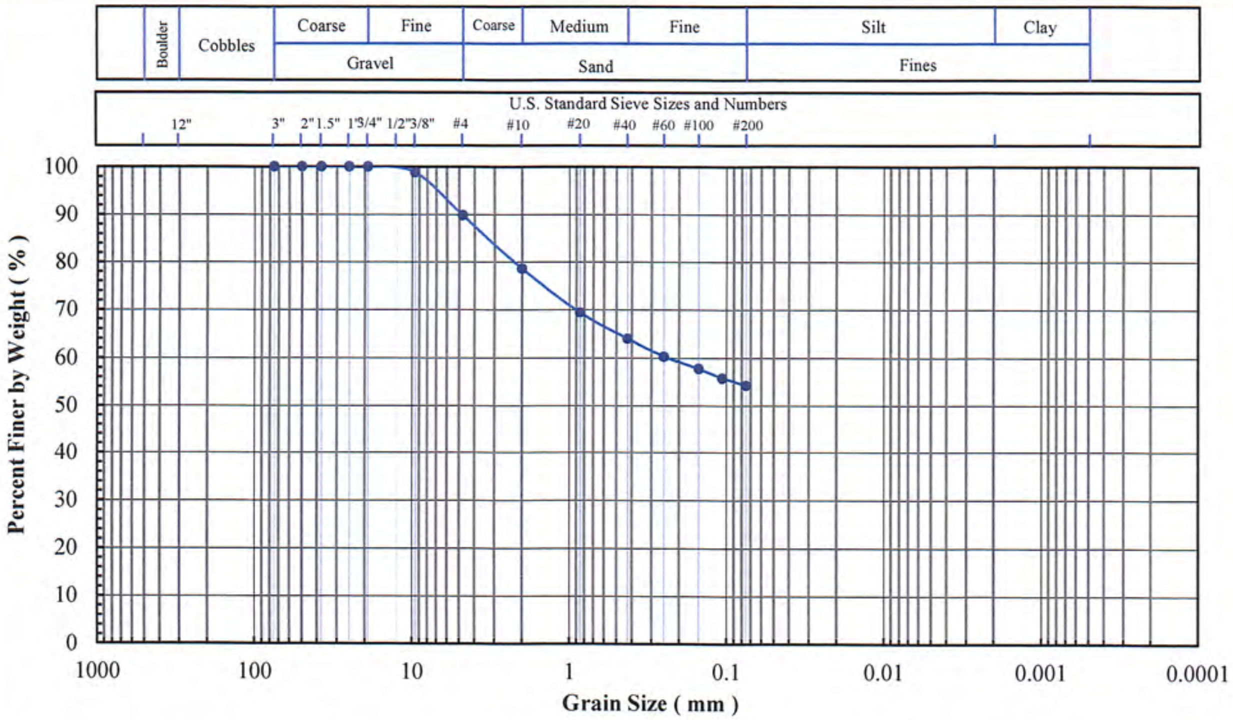
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-7 (31-36')
Lab Sample No:	20L073

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont., Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

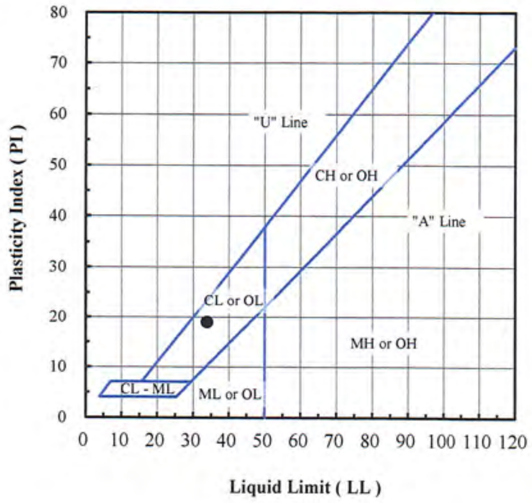


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	90
#10	2.00	79
#20	0.850	69
#40	0.425	64
#60	0.250	60
#100	0.150	58
#140	0.106	56
#200	0.075	54

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	10
Sand (%):	36
Fines (%):	54
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-7 (31-36')	20L073	16.9	54	34	15	19	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

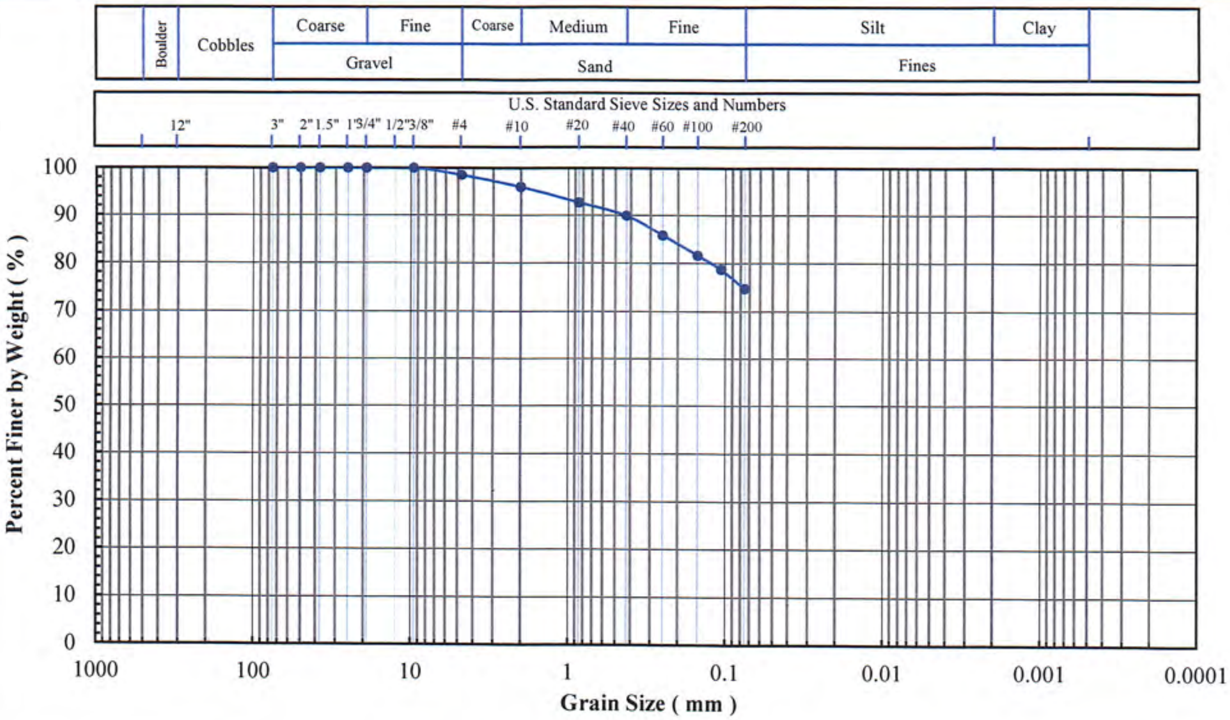
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-10 (45-50')
Lab Sample No:	20L076

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

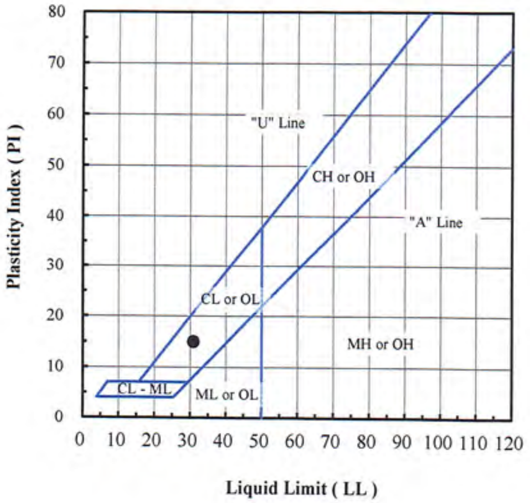


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	96.0
#20	0.850	92.7
#40	0.425	89.9
#60	0.250	85.8
#100	0.150	81.6
#140	0.106	78.7
#200	0.075	74.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	23.8
Fines (%):	74.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-10 (45-50')	20L076	15.7	74.7	31	16	15	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

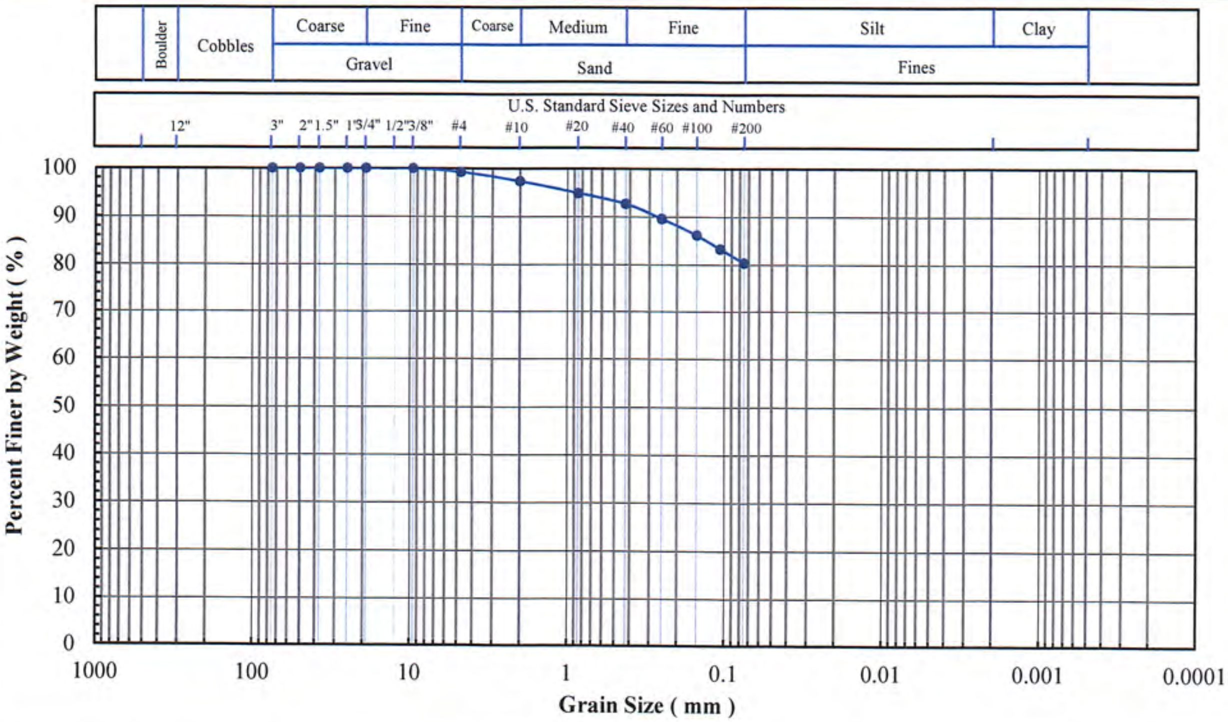
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-13 (60-65')
Lab Sample No:	20L079

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

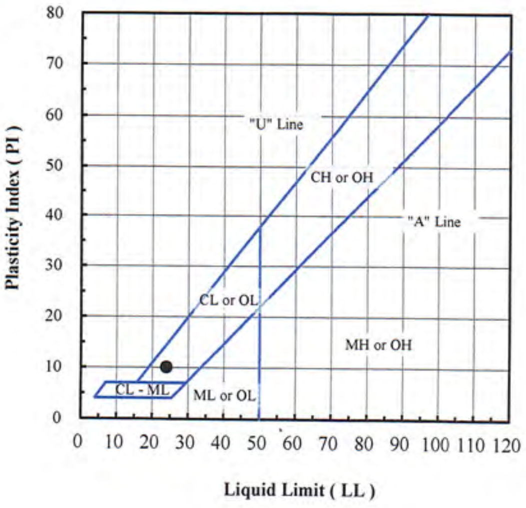


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	94.8
#40	0.425	92.6
#60	0.250	89.5
#100	0.150	86.1
#140	0.106	83.2
#200	0.075	80.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	18.9
Fines (%):	80.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-13 (60-65')	20L079	10.2	80.3	24	14	10	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

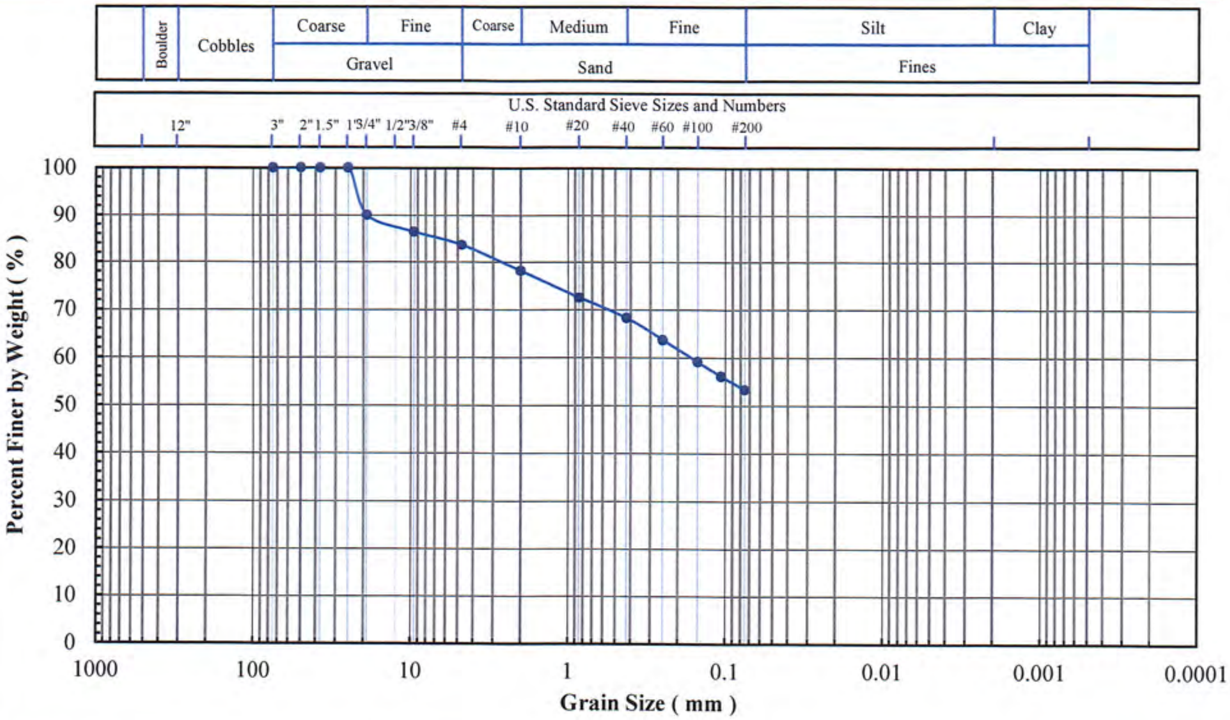
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-15 (70-76')
Lab Sample No:	20L081

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

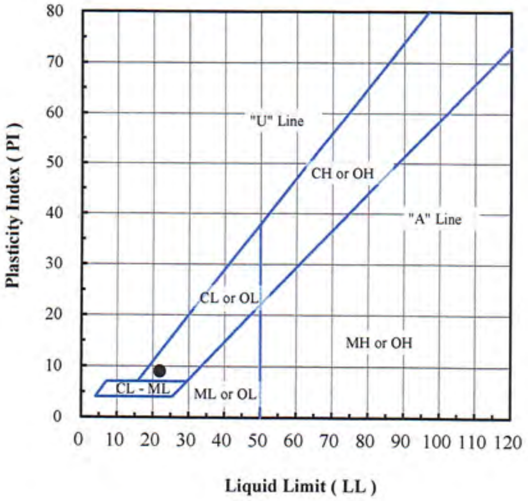


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	90
3/8"	9.5	86
#4	4.75	84
#10	2.00	78
#20	0.850	73
#40	0.425	68
#60	0.250	64
#100	0.150	59
#140	0.106	56
#200	0.075	53

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	16
Sand (%):	31
Fines (%):	53
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-15 (70-76')	20L081	8.0	53	22	13	9	CL - Sandy lean clay with gravel

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

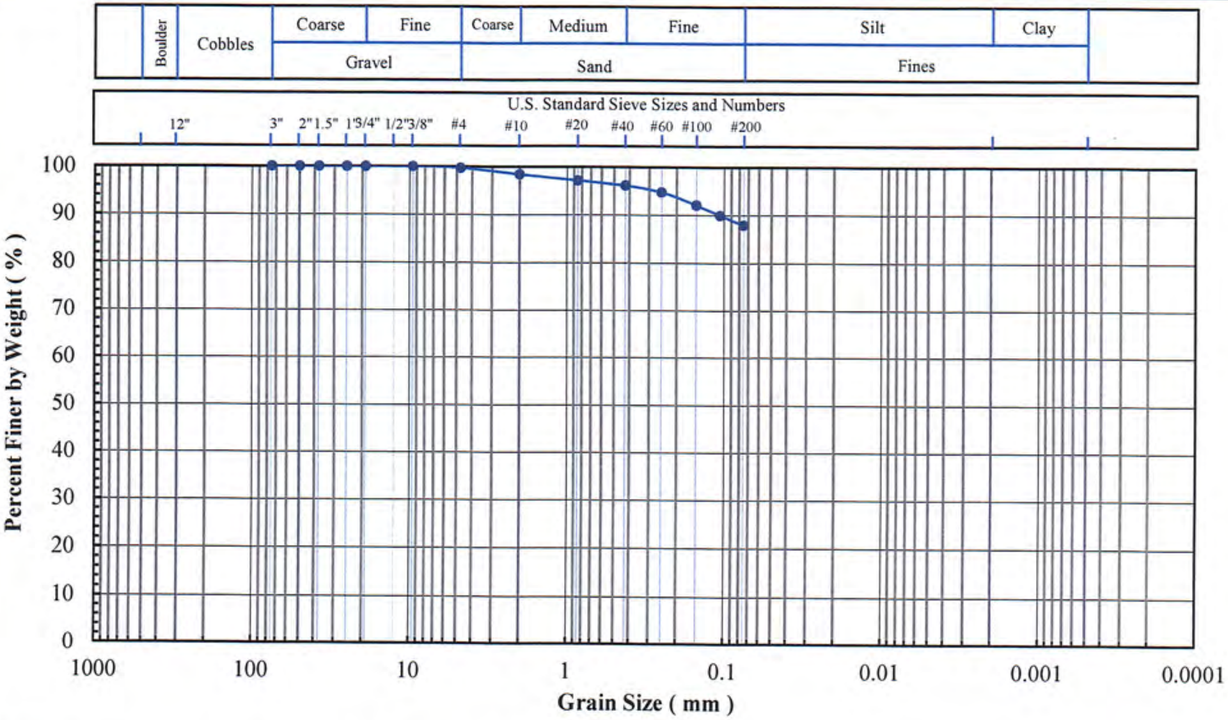
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-1 (25-27')
Lab Sample No:	20L134

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

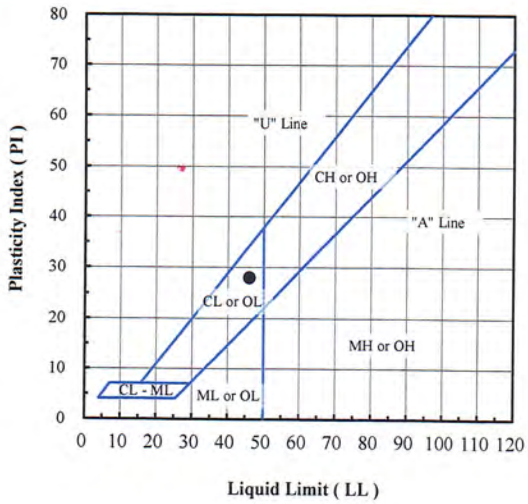


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	98.4
#20	0.850	97.1
#40	0.425	96.1
#60	0.250	94.7
#100	0.150	92.0
#140	0.106	89.9
#200	0.075	87.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	11.8
Fines (%):	87.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-1 (25-27')	20L134	18.2	87.9	46	18	28	CL - Lean clay

Note(s):

01-27-2021
AA, NSR

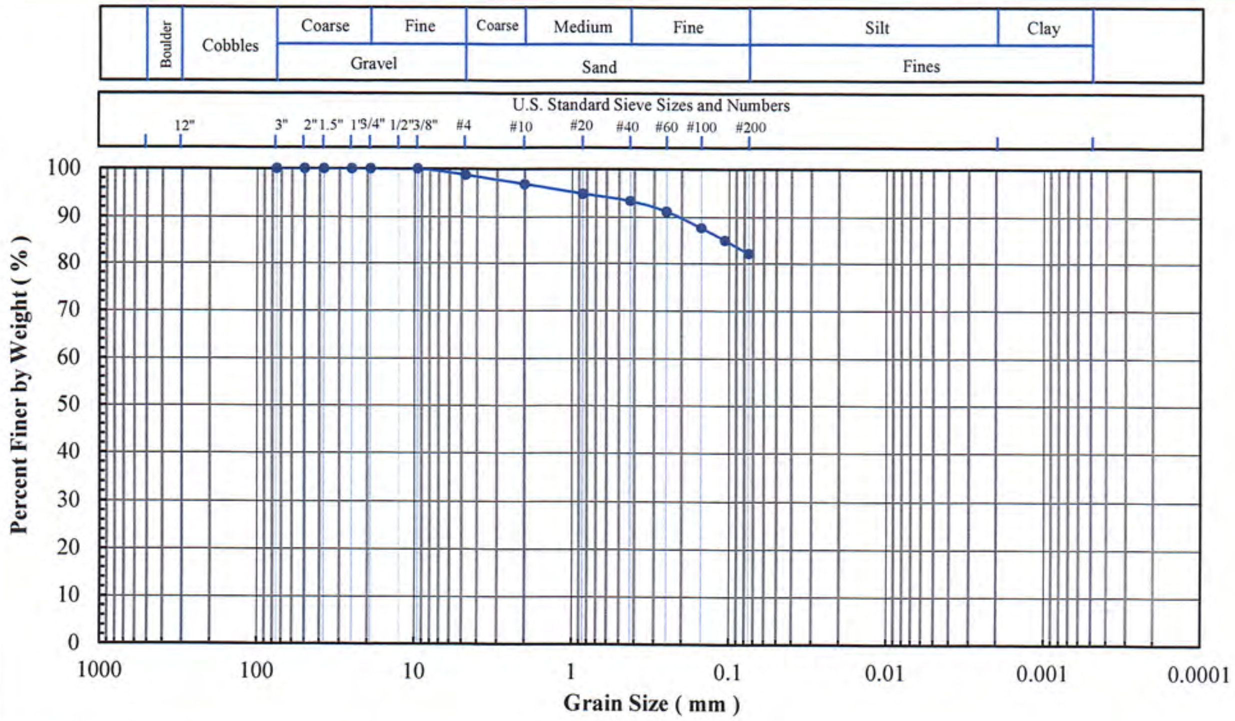
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-2 (40-42.5')
Lab Sample No:	20L135

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

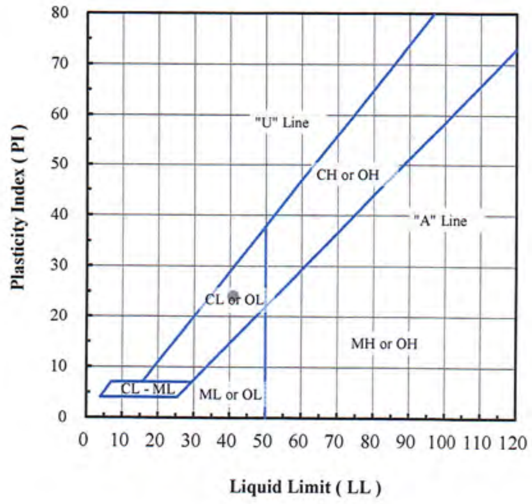


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	96.8
#20	0.850	94.8
#40	0.425	93.3
#60	0.250	91.1
#100	0.150	87.6
#140	0.106	84.9
#200	0.075	82.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	16.6
Fines (%):	82.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-2 (40-42.5')	20L135	16.6	82.1	41	17	24	CL - Lean clay with sand

Note(s):

01-27-2021
AA, NSB

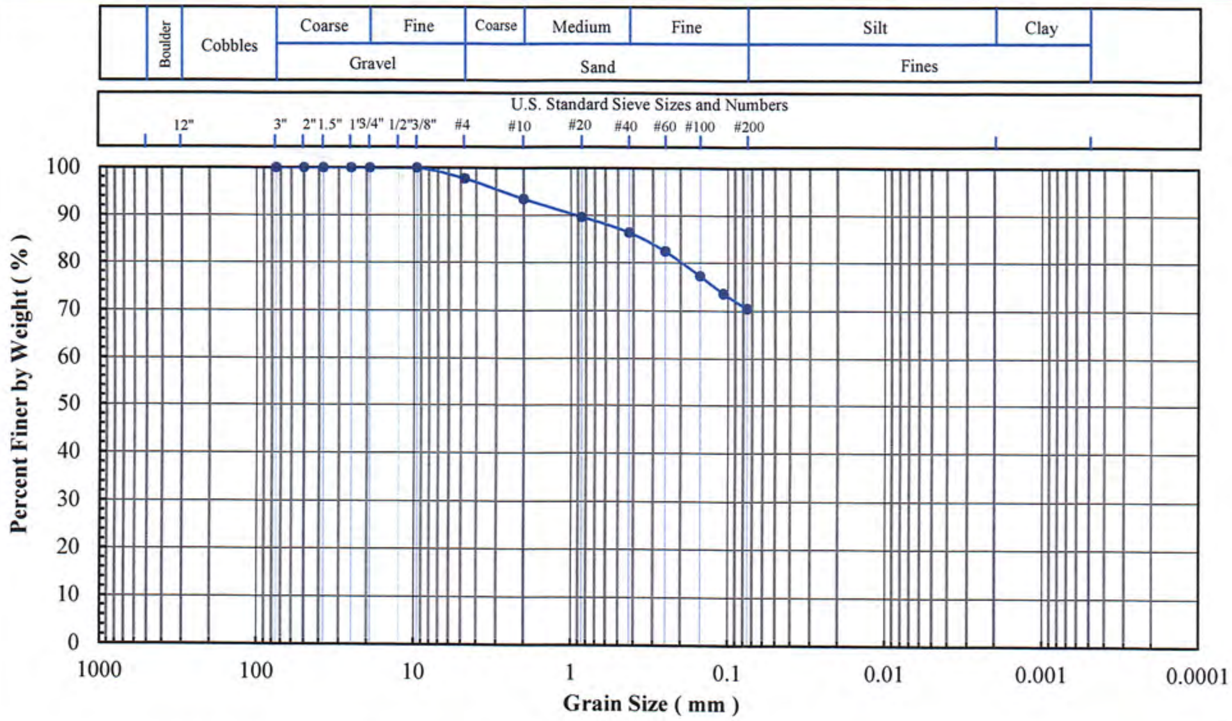
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-3 (55-57.5')
Lab Sample No:	20L136

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

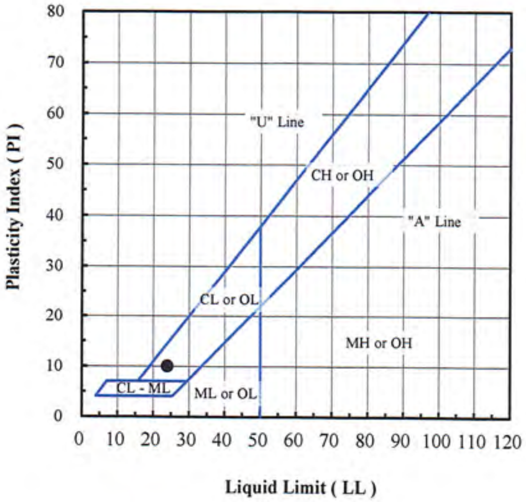


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.7
#10	2.00	93.5
#20	0.850	89.7
#40	0.425	86.4
#60	0.250	82.4
#100	0.150	77.2
#140	0.106	73.5
#200	0.075	70.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.3
Sand (%):	27.3
Fines (%):	70.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-3 (55-57.5')	20L136	13.1	70.4	24	14	10	CL - Lean clay with sand

Note(s):

01-28-2021
AA, NSR

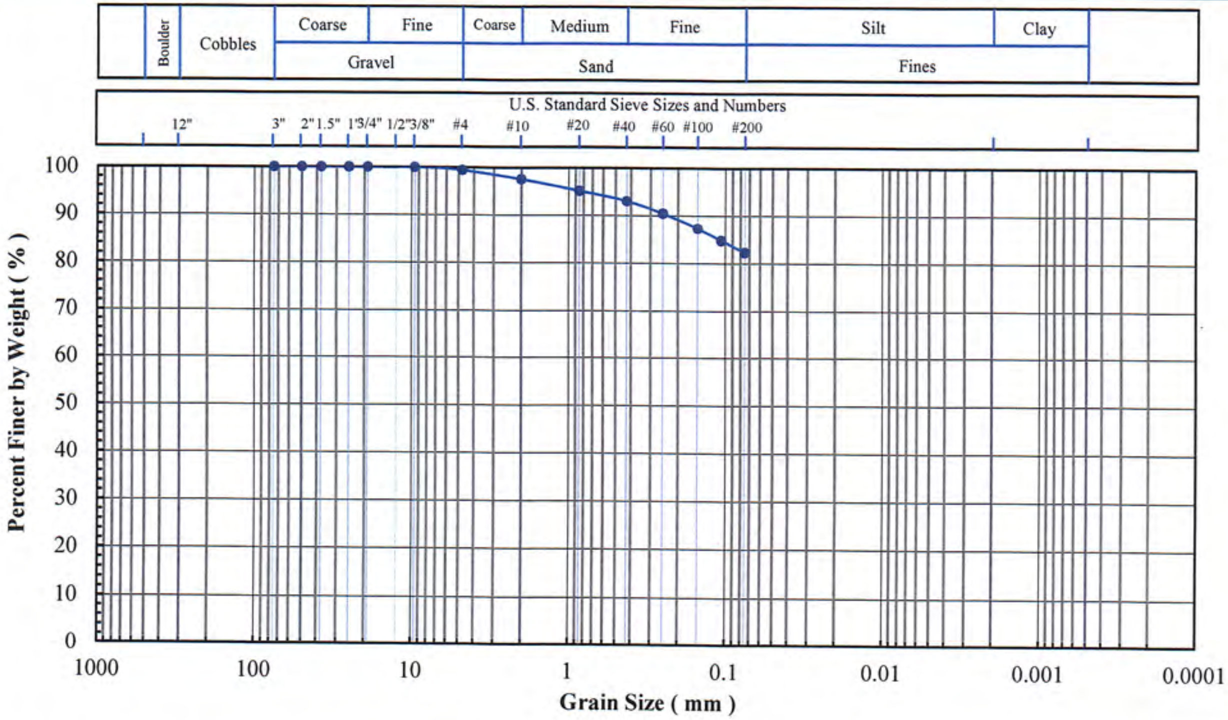
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B6-ST-4 (65-67.5')
Lab Sample No:	20L137

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

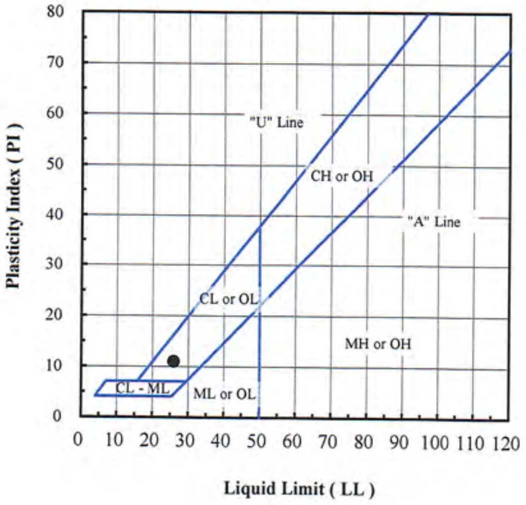


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	97.5
#20	0.850	95.1
#40	0.425	93.0
#60	0.250	90.4
#100	0.150	87.3
#140	0.106	84.8
#200	0.075	82.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	17.1
Fines (%):	82.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B6-ST-4 (65-67.5')	20L137	11.4	82.3	26	15	11	CL - Lean clay with sand

Note(s):

01-28-2021
AA, NSK

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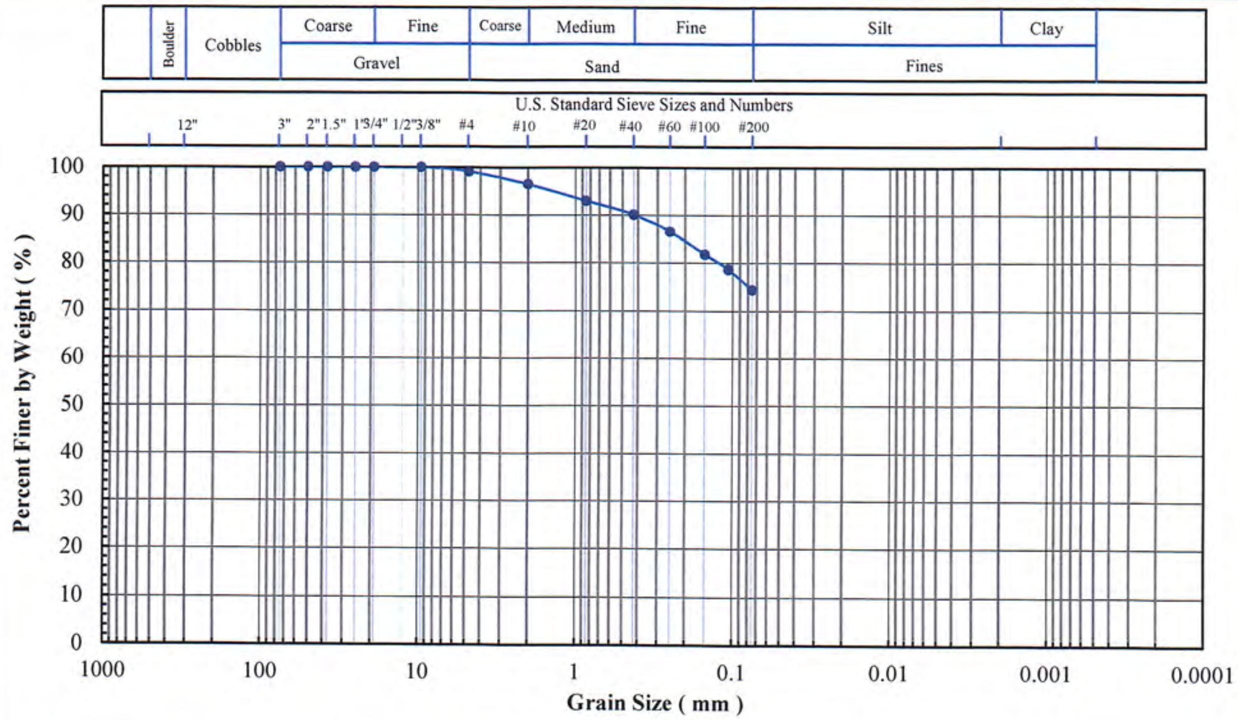
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-1 (0-6')
Lab Sample No:	20L082

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

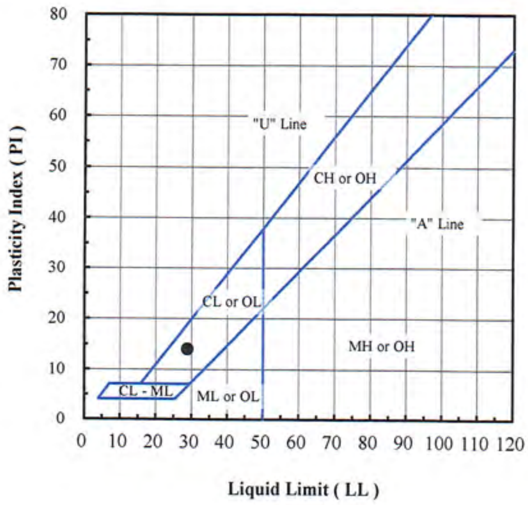


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	96.4
#20	0.850	92.9
#40	0.425	90.0
#60	0.250	86.5
#100	0.150	81.7
#140	0.106	78.6
#200	0.075	74.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	24.8
Fines (%):	74.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-1 (0-6')	20L082	14.0	74.3	29	15	14	CL - Lean clay with sand

Note(s):

01-21-2021
AA, JSA

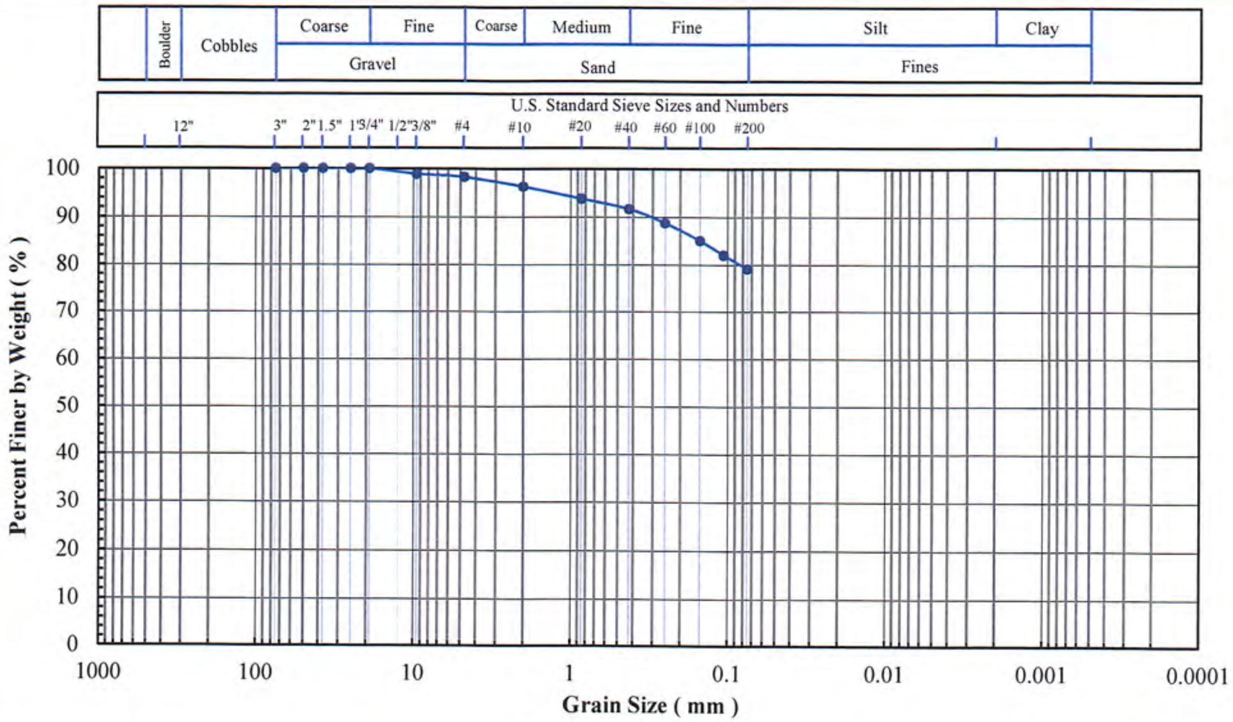
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-3 (11-16')
Lab Sample No:	20L084

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

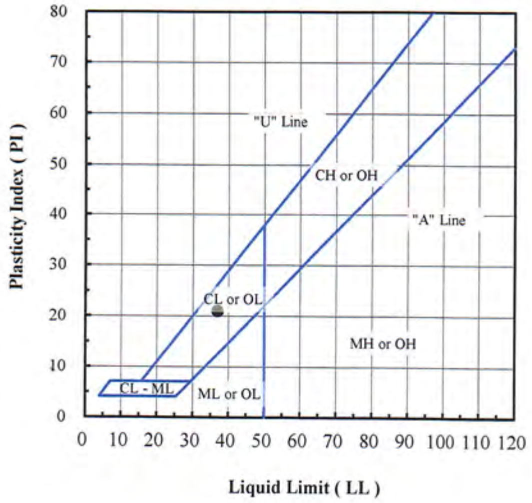


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	99
#4	4.75	98
#10	2.00	96
#20	0.850	94
#40	0.425	92
#60	0.250	89
#100	0.150	85
#140	0.106	82
#200	0.075	79

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2
Sand (%):	19
Fines (%):	79
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-3 (11-16')	20L084	17.1	79	37	16	21	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-21-2021
AA/NSK

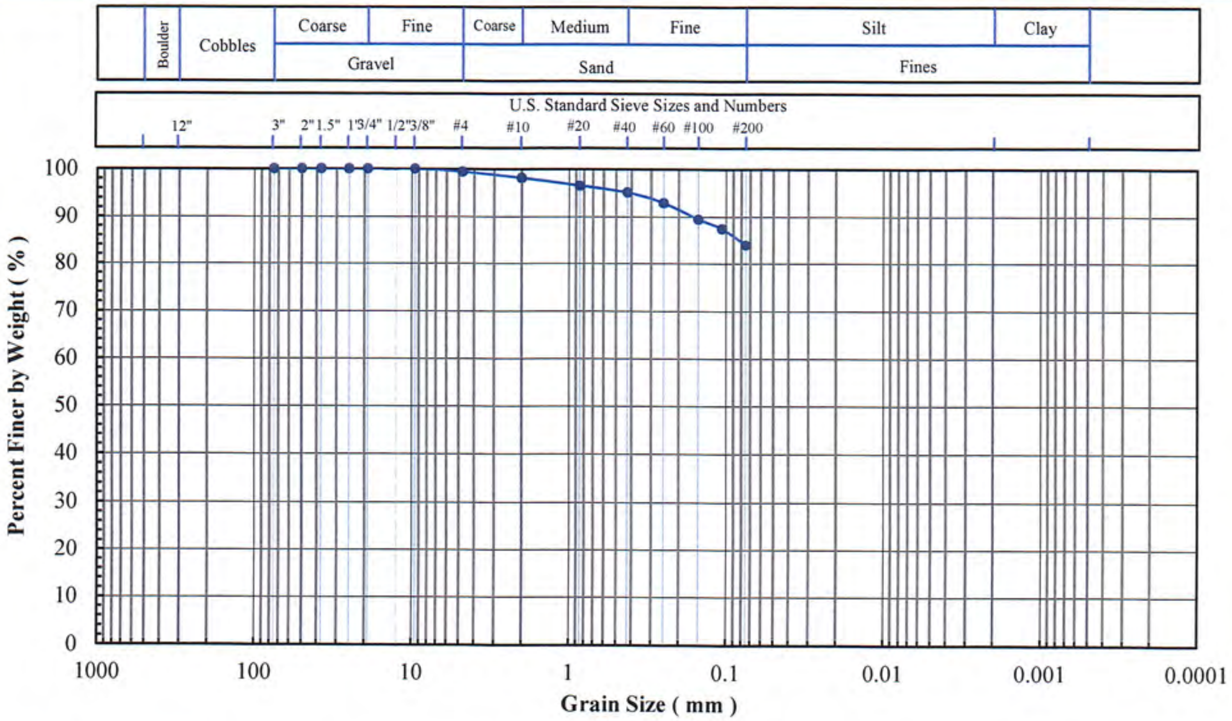
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-5 (21-26')
Lab Sample No:	20L086

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

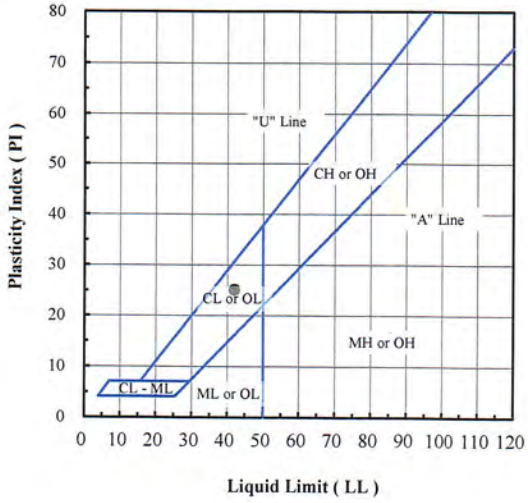


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	98.1
#20	0.850	96.5
#40	0.425	95.1
#60	0.250	92.9
#100	0.150	89.4
#140	0.106	87.4
#200	0.075	83.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	15.5
Fines (%):	83.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-5 (21-26')	20L086	18.6	83.9	42	17	25	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

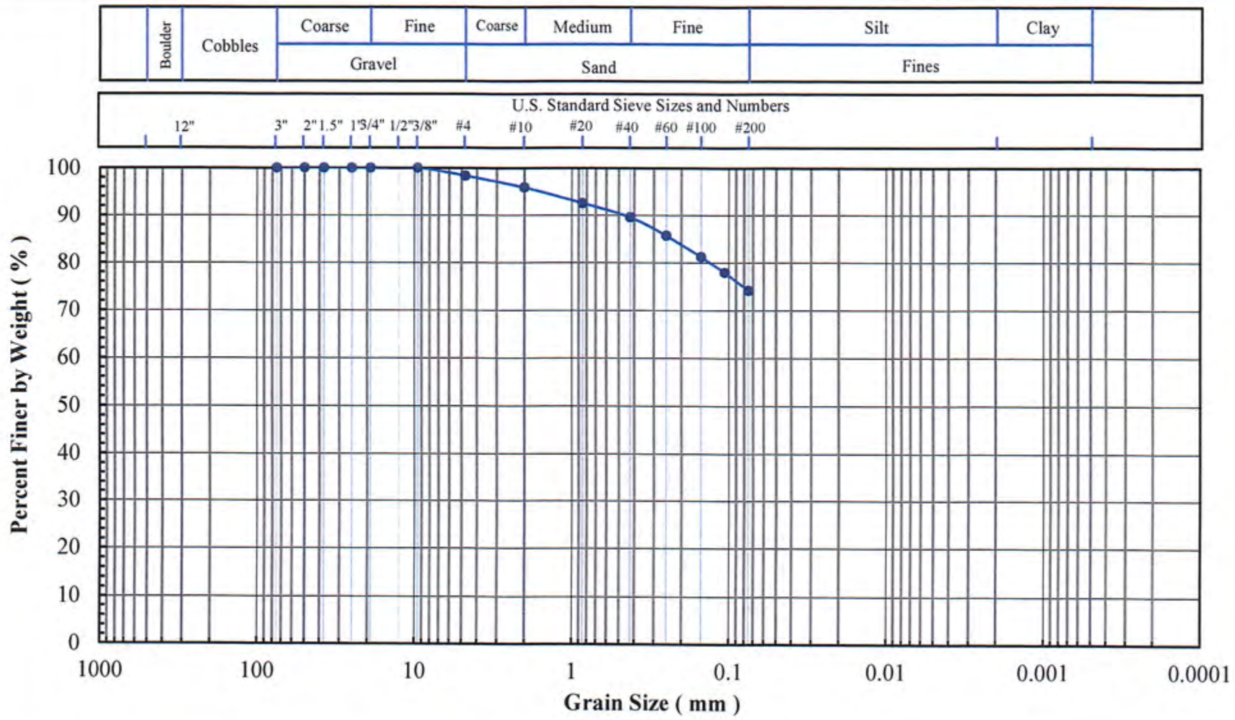
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-7 (31-36')
Lab Sample No:	20L088

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

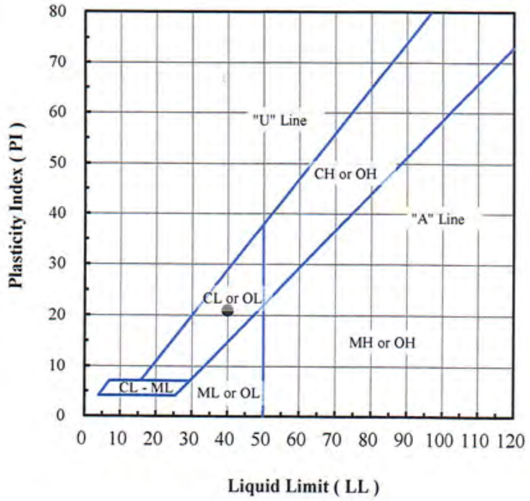


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.3
#10	2.00	95.8
#20	0.850	92.5
#40	0.425	89.5
#60	0.250	85.7
#100	0.150	81.2
#140	0.106	77.9
#200	0.075	74.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.7
Sand (%):	24.2
Fines (%):	74.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID:	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-7 (31-36')	20L088	17.5	74.1	40	19	21	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

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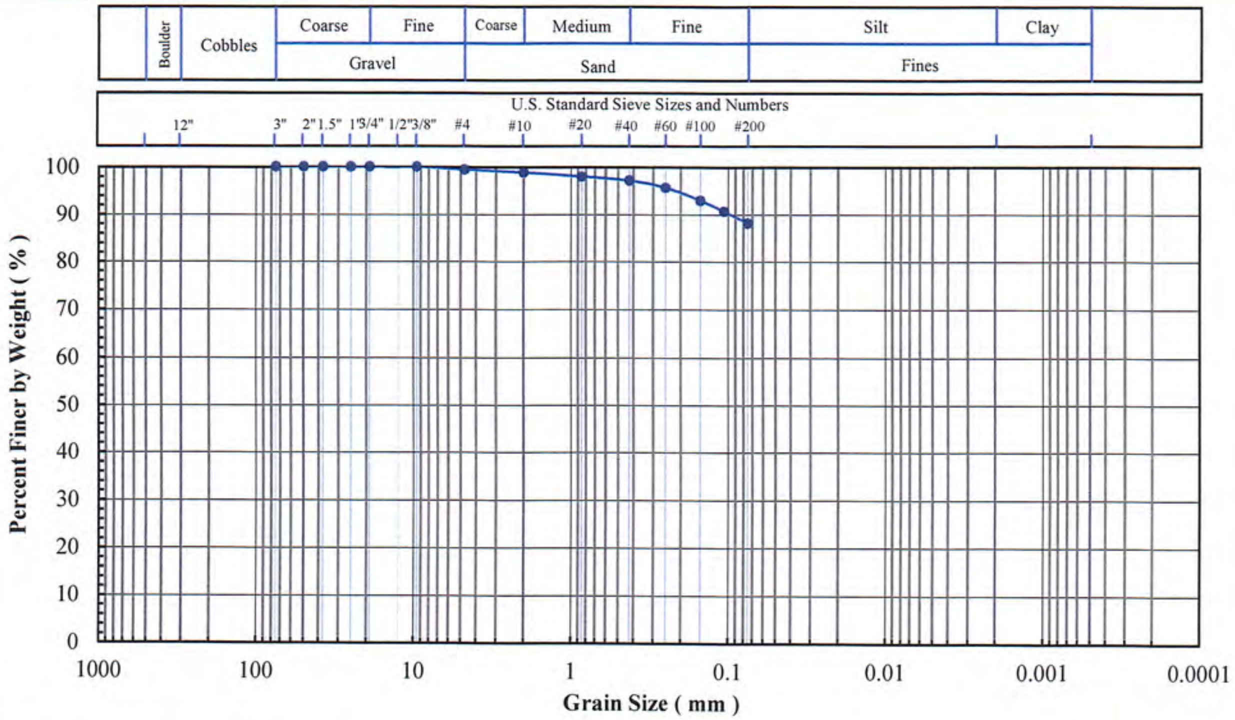
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-9 (41-46')
Lab Sample No:	20L090

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

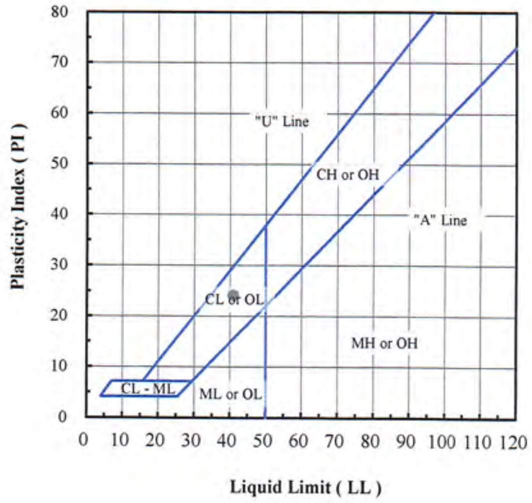


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	98.8
#20	0.850	97.9
#40	0.425	97.1
#60	0.250	95.6
#100	0.150	92.9
#140	0.106	90.6
#200	0.075	88.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	11.3
Fines (%):	88.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B7-9 (41-46')	20L090	20.2	88.1	41	17	24	CL - Lean clay

Note(s):

01-21-2021
AA, NSR

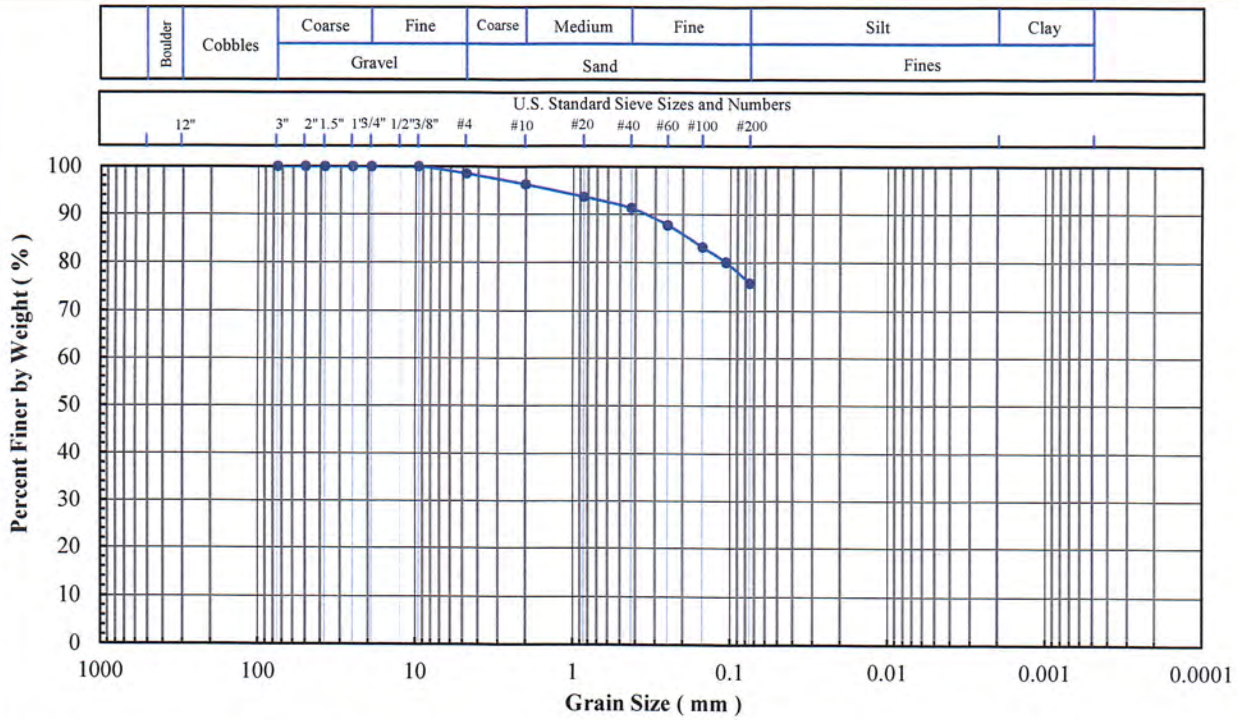
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-12 (56-61')
Lab Sample No:	20L093

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

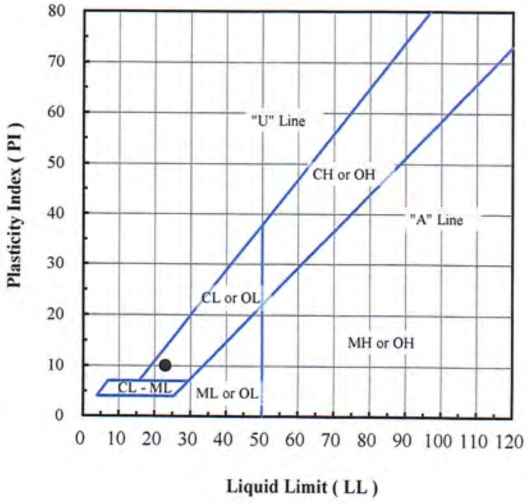


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	96.2
#20	0.850	93.6
#40	0.425	91.2
#60	0.250	87.7
#100	0.150	83.1
#140	0.106	80.0
#200	0.075	75.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	22.8
Fines (%):	75.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B7-12 (56-61')	20L093	12.9	75.7	23	13	10	CL - Lean clay with sand

Note(s):

01-21-2021
AA, NSR

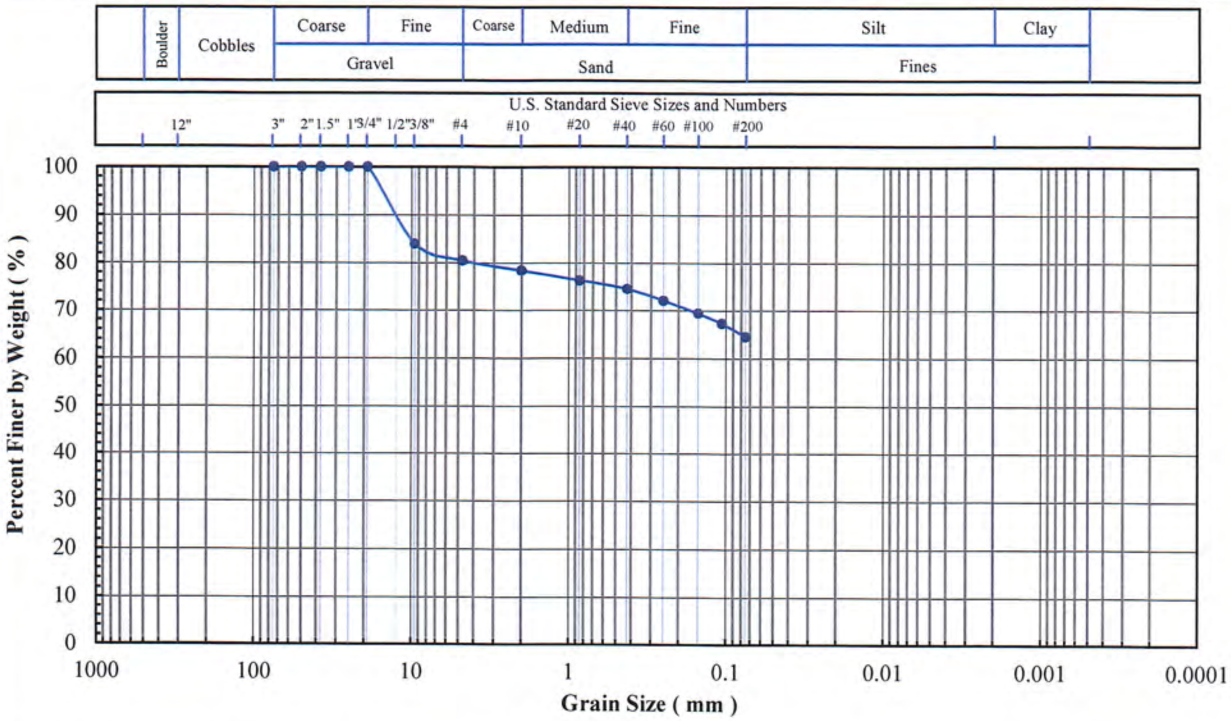
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B7-15 (71-76')
Lab Sample No: 20L096

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

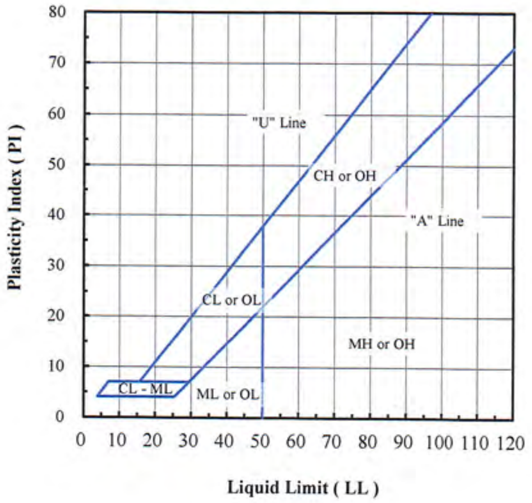


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	84
#4	4.75	81
#10	2.00	78
#20	0.850	76
#40	0.425	75
#60	0.250	72
#100	0.150	69
#140	0.106	67
#200	0.075	64

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	19
Sand (%):	17
Fines (%):	64
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-15 (71-76')	20L096	10.0	64	NP	NP	NP	ML - Gravelly silt with sand

Note(s): Sieve specimen was undersized.

01-21-2021
AA, NSR

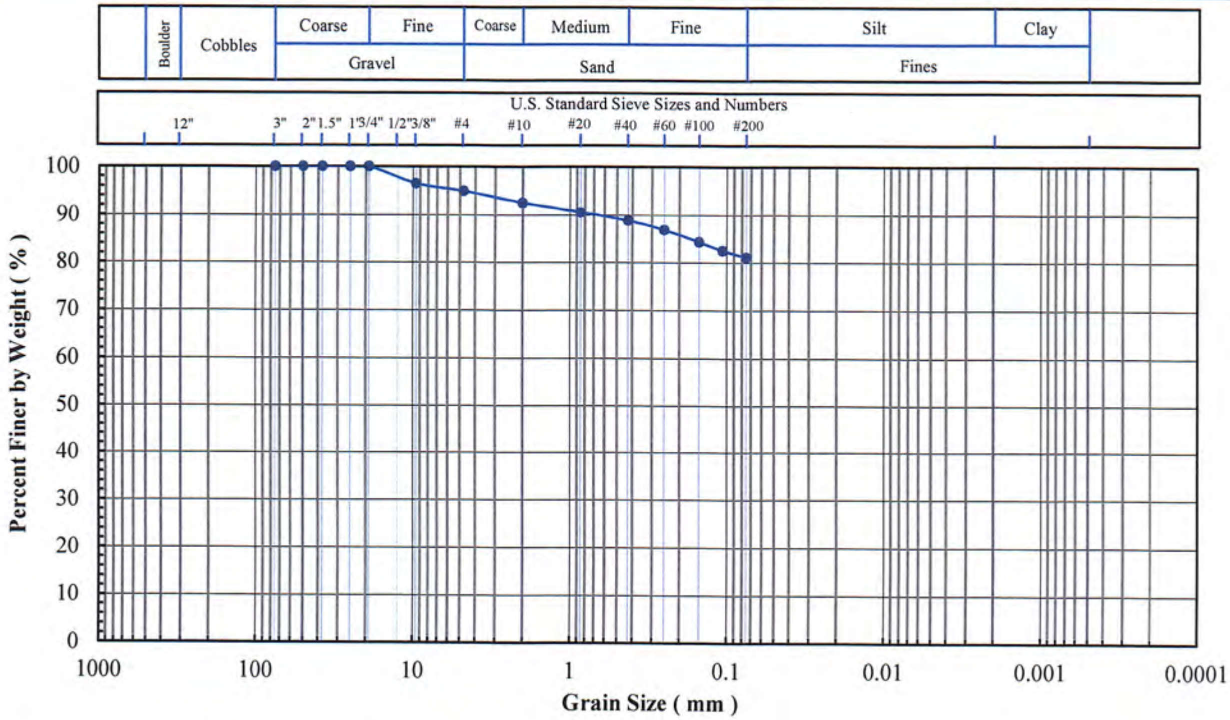
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B7-ST-1 (65-67.5')
Lab Sample No:	20L138

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

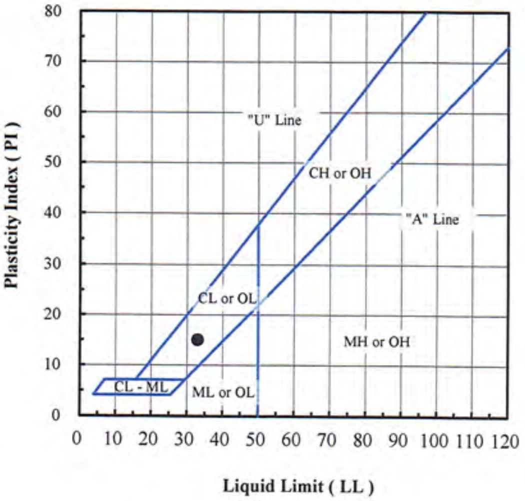


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	95
#10	2.00	93
#20	0.850	91
#40	0.425	89
#60	0.250	87
#100	0.150	84
#140	0.106	83
#200	0.075	81

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	14
Fines (%):	81
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B7-ST-1 (65-67.5')	20L138	13.3	81	33	18	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-28-2021
AA, NSR

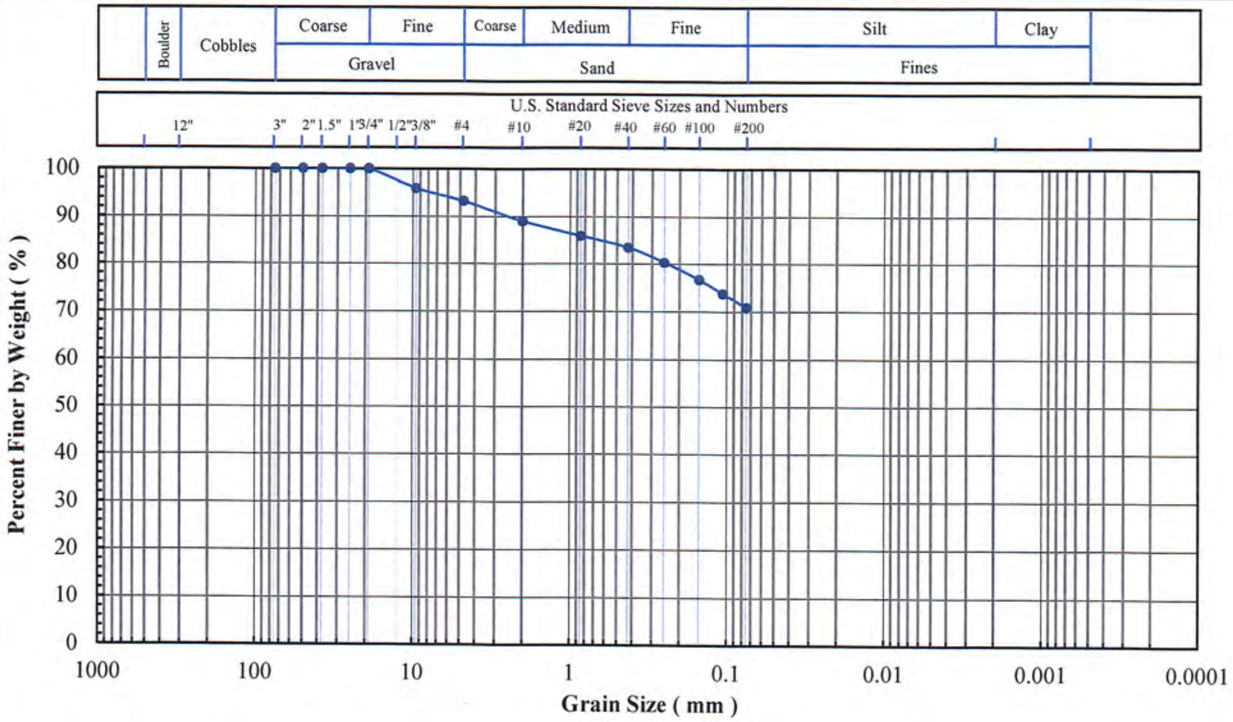
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B8-2 (6-11')
Lab Sample No: 20L098

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

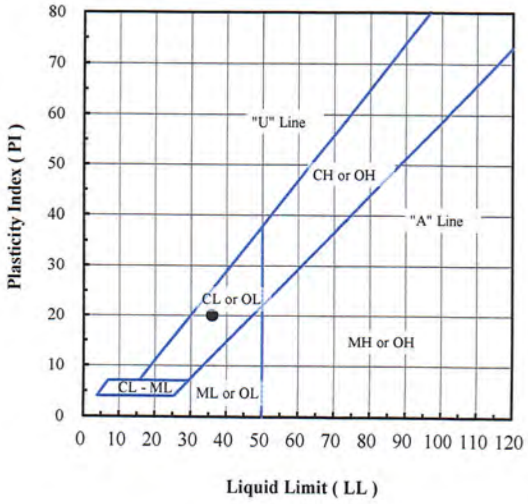


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	93
#10	2.00	89
#20	0.850	86
#40	0.425	83
#60	0.250	80
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	7
Sand (%):	22
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B8-2 (6-11')	20L098	17.2	71	36	16	20	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

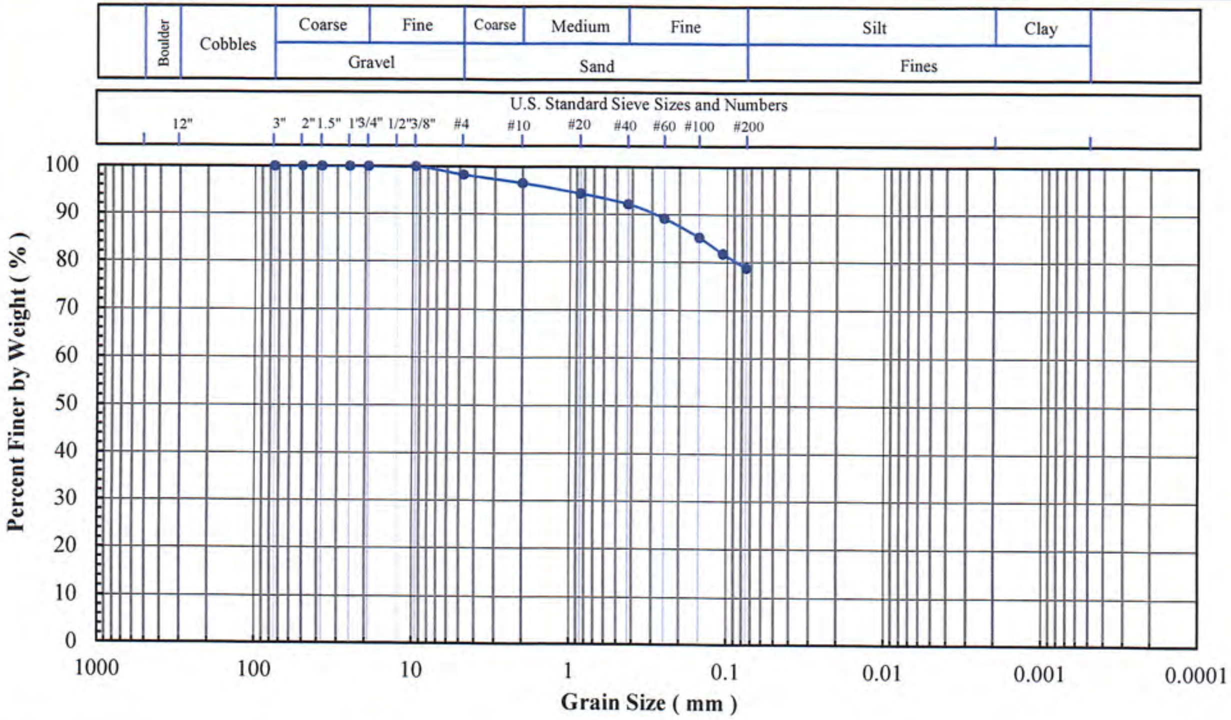
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-4 (16.21')
Lab Sample No:	20L100

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

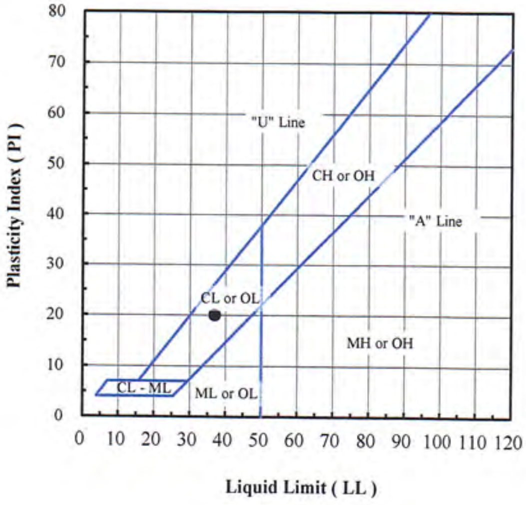


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.2
#10	2.00	96.5
#20	0.850	94.3
#40	0.425	92.1
#60	0.250	89.1
#100	0.150	85.1
#140	0.106	81.7
#200	0.075	78.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.8
Sand (%):	19.5
Fines (%):	78.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
Org. Content (%):	
Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-4 (16.21')	20L100	20.4	78.7	37	17	20	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

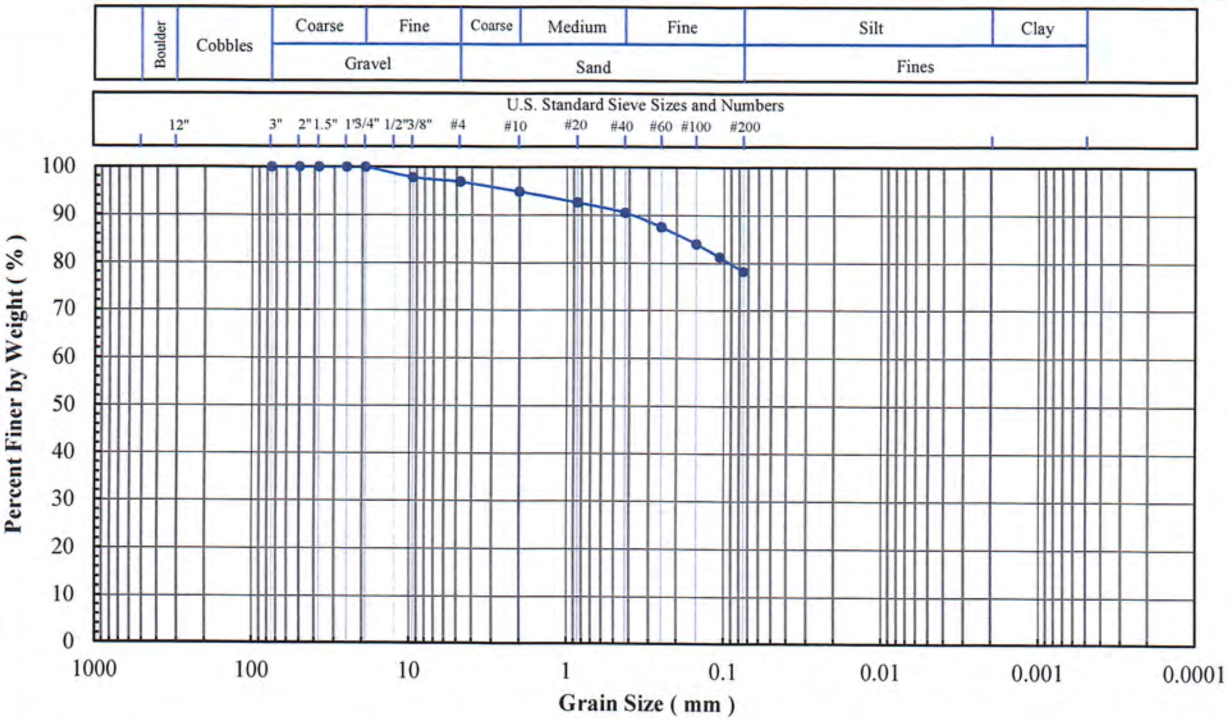
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-6 (21-31')
Lab Sample No:	20L102

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

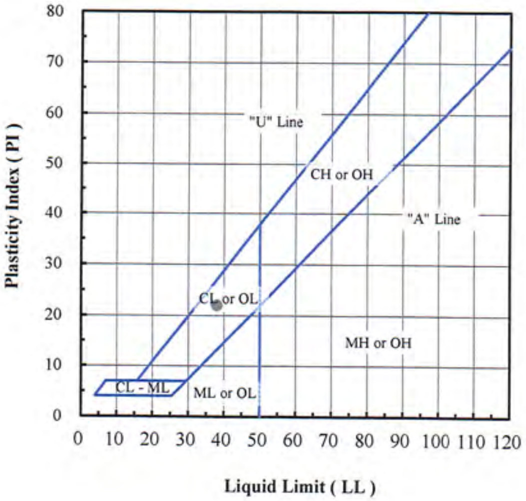


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	97
#10	2.00	95
#20	0.850	93
#40	0.425	91
#60	0.250	88
#100	0.150	84
#140	0.106	81
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3
Sand (%):	19
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-6 (21-31')	20L102	20.5	78	38	16	22	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

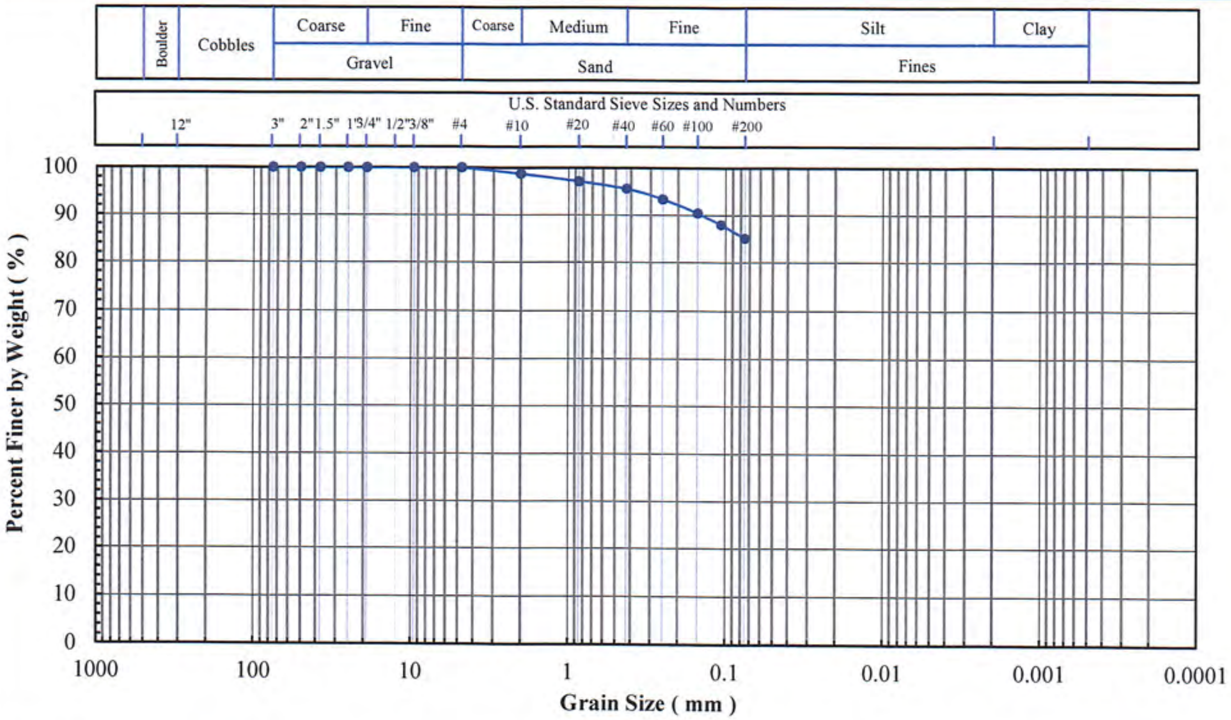
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B8-8 (36-41')
Lab Sample No: 20L104

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

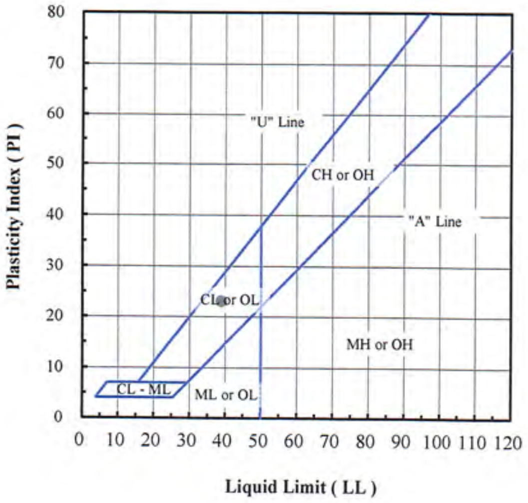


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.7
#20	0.850	97.1
#40	0.425	95.6
#60	0.250	93.4
#100	0.150	90.4
#140	0.106	87.9
#200	0.075	85.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	15.0
Fines (%):	85.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-8 (36-41')	20L104	19.6	85.0	39	16	23	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

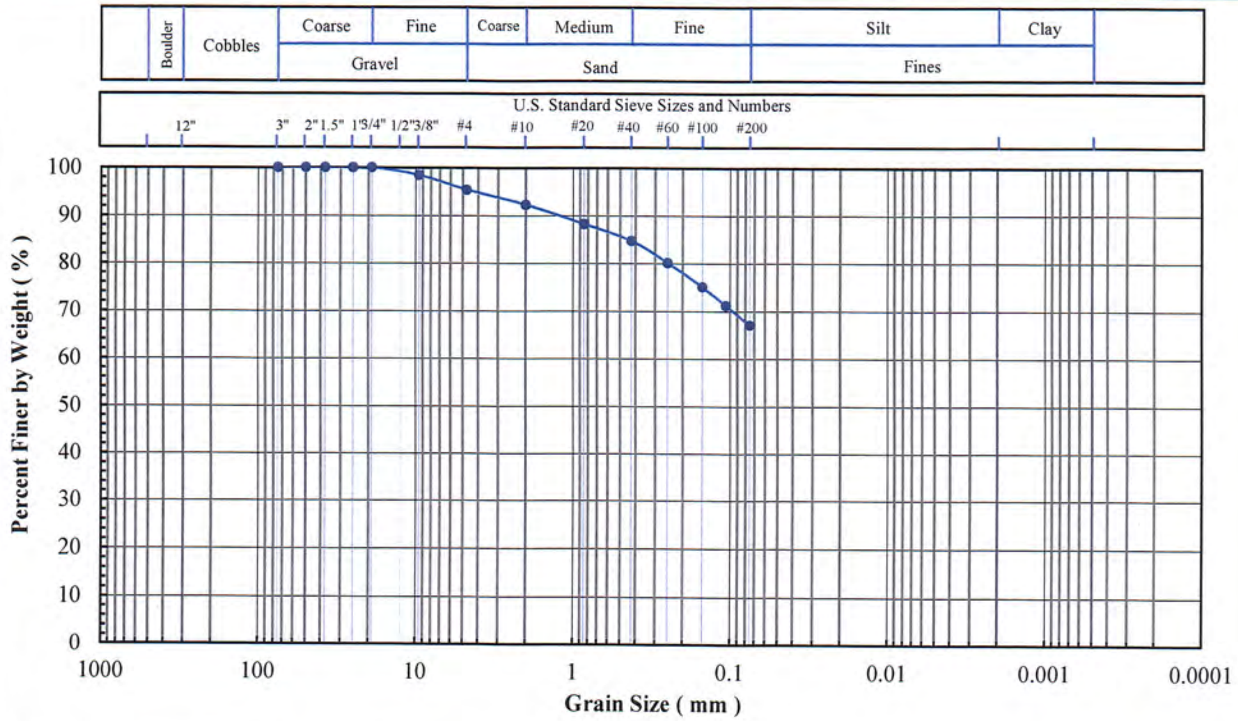
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-10 (46-51')
Lab Sample No:	20L106

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

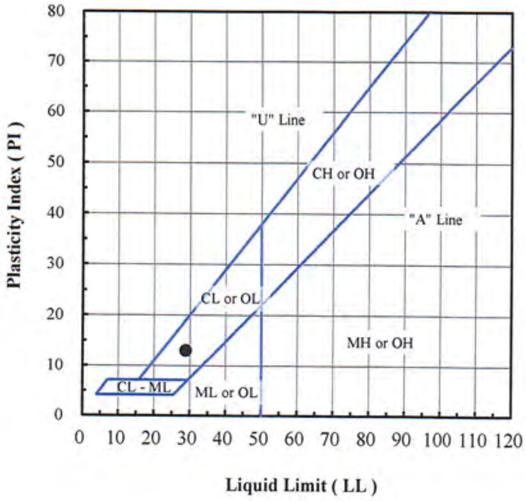


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	95
#10	2.00	92
#20	0.850	88
#40	0.425	85
#60	0.250	80
#100	0.150	75
#140	0.106	71
#200	0.075	67

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5
Sand (%):	28
Fines (%):	67
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-10 (46-51')	20L106	15.8	67	29	16	13	CL - Sandy lean clay

Note(s):

01-22-2021
AA/NSR

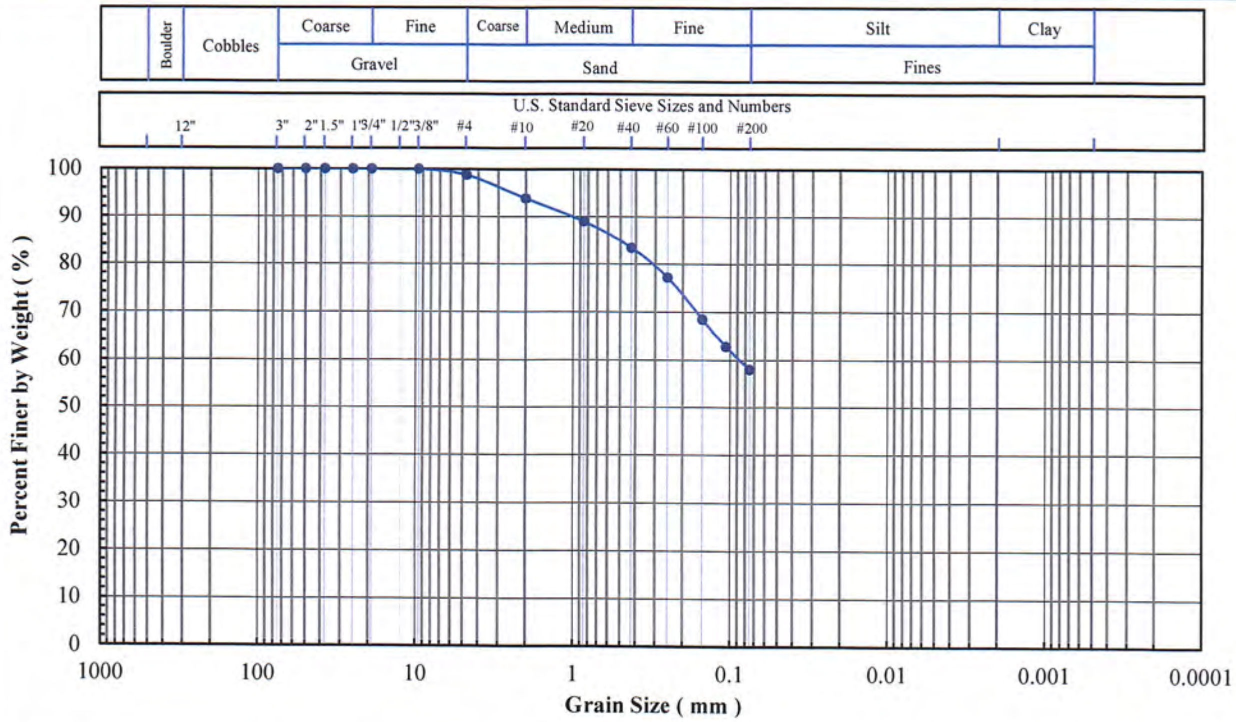
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name: Monroe Ash Basin ALD
Project No: PN1016
Client Sample ID: B8-12 (56-61')
Lab Sample No: 20L108

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

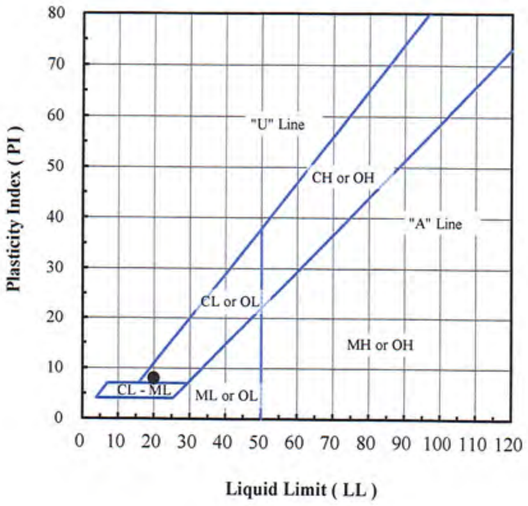


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	93.8
#20	0.850	88.9
#40	0.425	83.4
#60	0.250	77.1
#100	0.150	68.4
#140	0.106	62.7
#200	0.075	57.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	40.8
Fines (%):	57.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-12 (56-61')	20L108	8.5	57.9	20	12	8	CL - Sandy lean clay

Note(s):

01-22-2021
AA, NSR

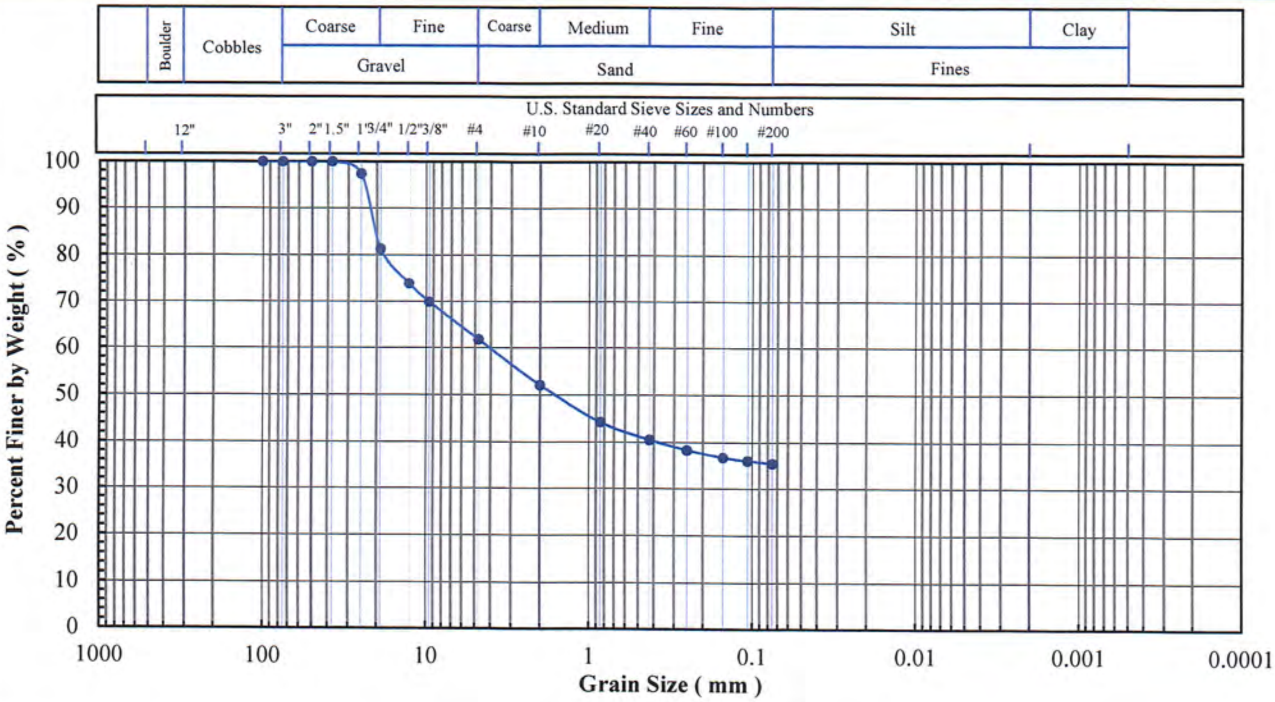
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-15 (66-71')
Lab Sample No:	20L110

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

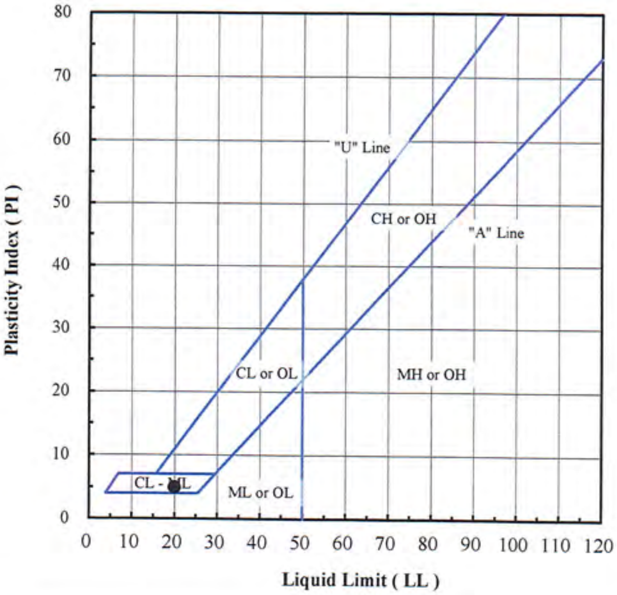
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	97
3/4"	19	81
1/2"	13	74
3/8"	9.5	70
#4	4.75	62
#10	2.00	52
#20	0.850	44
#40	0.425	41
#60	0.250	38
#100	0.150	37
#140	0.106	36
#200	0.075	35

Gravel (%)	38
Sand (%)	27
Fines (%)	35
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B8-15 (66-71')	20L110	10.2	35	20	15	5	GC-GM - Silty, clayey gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are CL - ML.

01-22-2021
AA, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

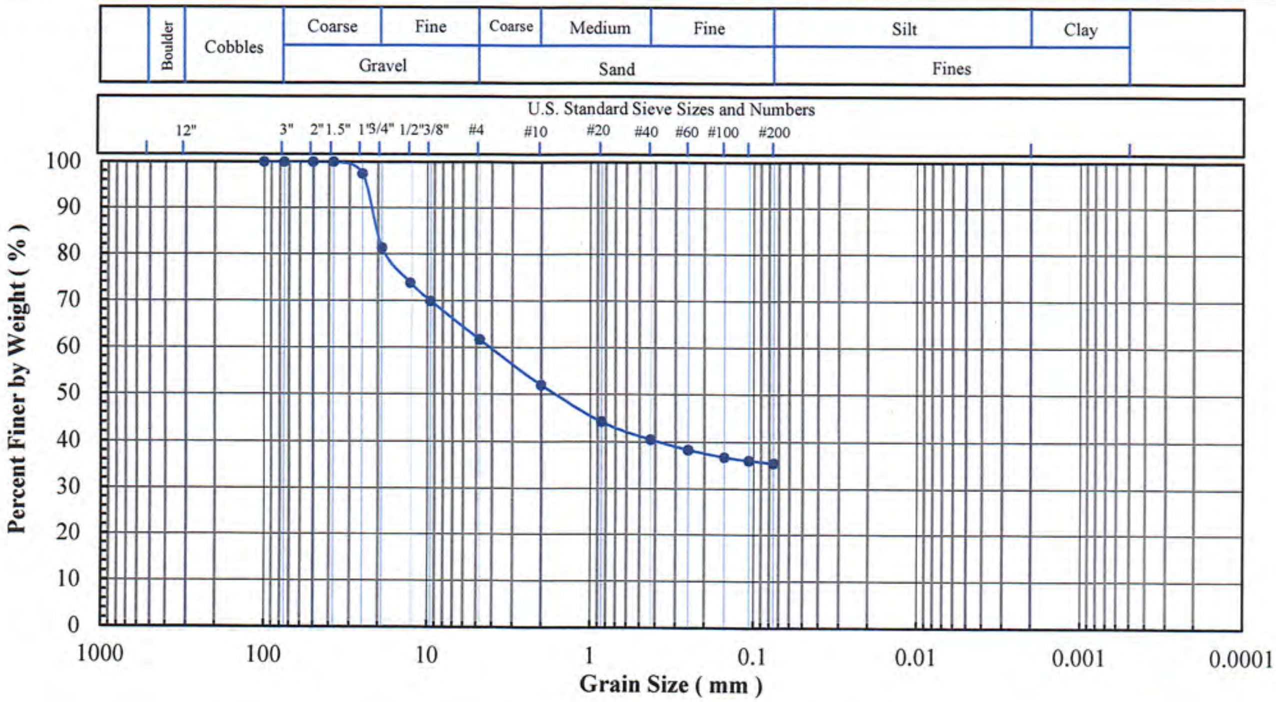
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B8-14 (66-71')
Lab Sample No:	20L110

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318, D 6913, D 7928

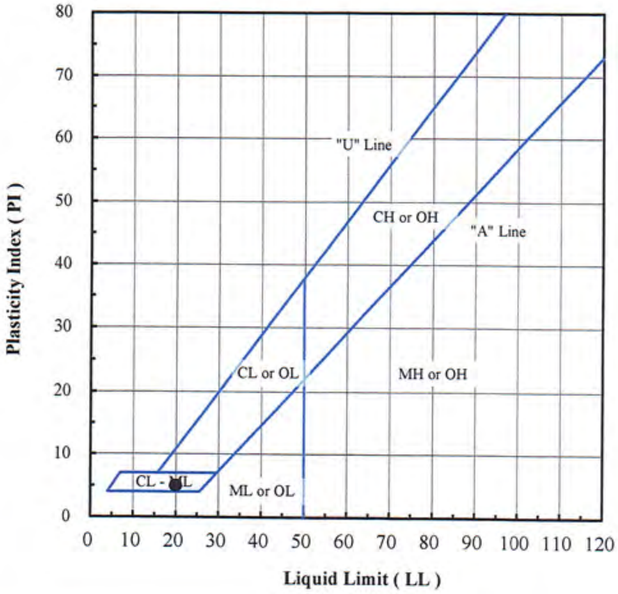
SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
4"	100	100
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	97
3/4"	19	81
1/2"	13	74
3/8"	9.5	70
#4	4.75	62
#10	2.00	52
#20	0.850	44
#40	0.425	41
#60	0.250	38
#100	0.150	37
#140	0.106	36
#200	0.075	35

Gravel (%)	38
Sand (%)	27
Fines (%)	35
Silt (%)	
Clay (%)	
Coeff. Unif. (Cu)	
Coeff. Curv. (Cc)	
Specific Gravity (-)	
Organic Cont. (%)	
Carbonate Cont. (%)	
pH in Water (-)	
pH in CC (-)	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B8-14 (66-71')	20L110	10.2	35	20	15	5	GC-GM - Silty, clayey gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are CL - ML.

01-26-2021
AA, NSR

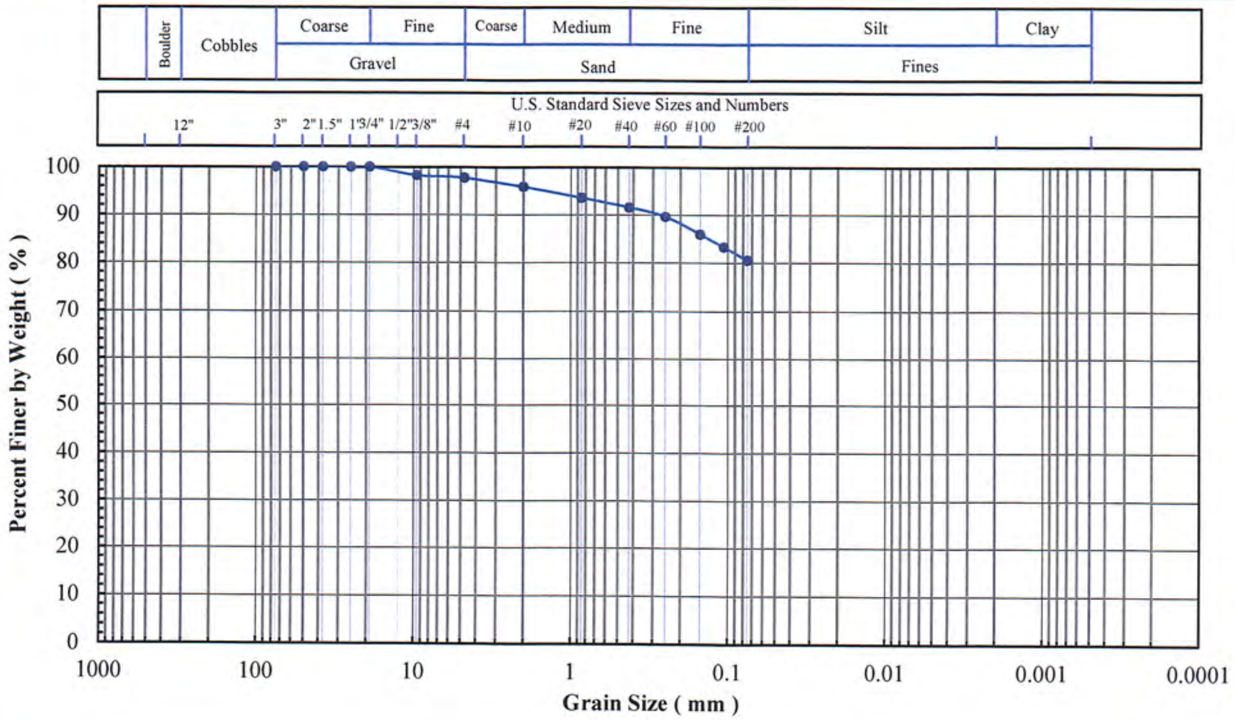
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-04 (16-21')
Lab Sample No:	20L115

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

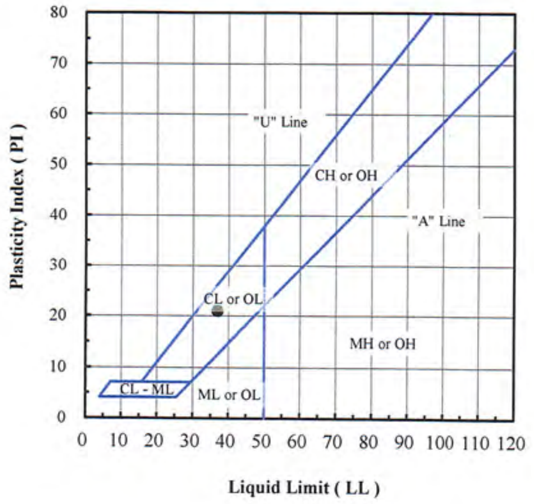


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	98
#10	2.00	96
#20	0.850	94
#40	0.425	92
#60	0.250	90
#100	0.150	86
#140	0.106	83
#200	0.075	81

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2
Sand (%):	17
Fines (%):	81
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-04 (16-21')	20L115	15.3	81	37	16	21	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-22-2021
AA, NSR

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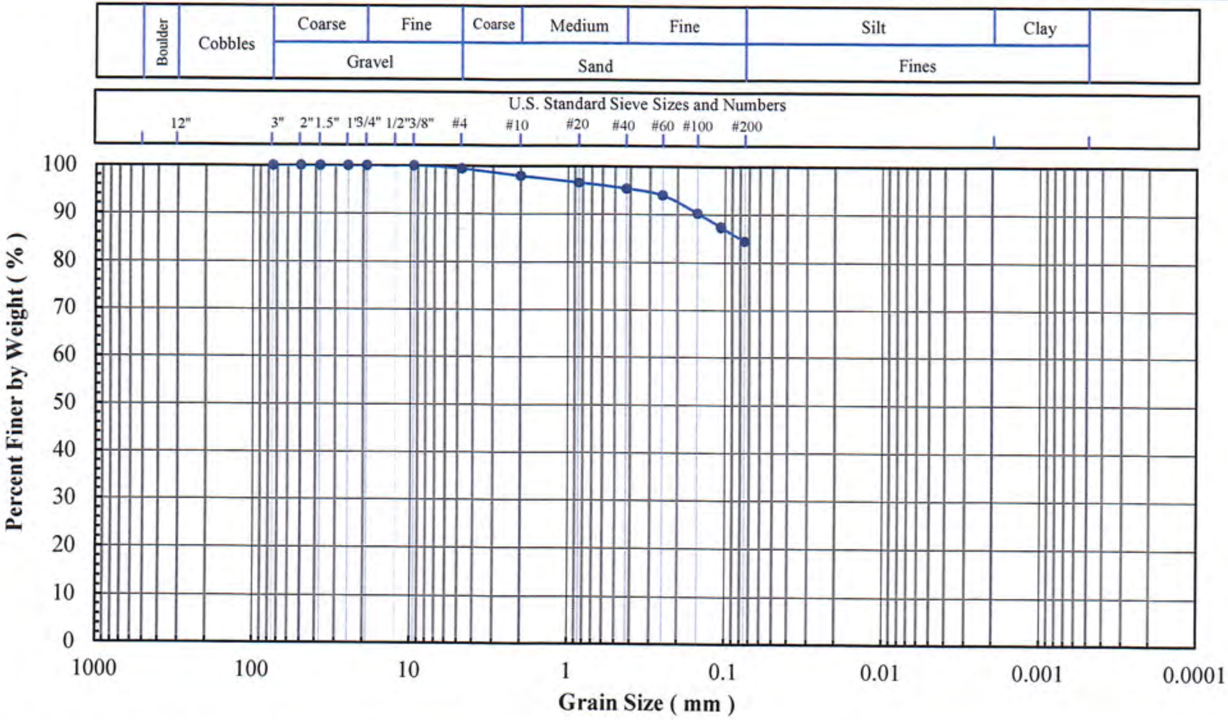
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-8 (36-40')
Lab Sample No:	20L119

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

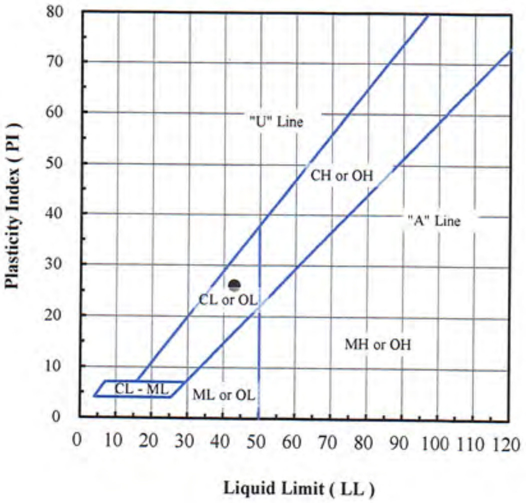


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	97.9
#20	0.850	96.5
#40	0.425	95.3
#60	0.250	93.9
#100	0.150	90.2
#140	0.106	87.4
#200	0.075	84.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	14.9
Fines (%):	84.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-8 (36-40')	20L119	23.5	84.5	43	17	26	CL - Lean clay with sand

Note(s):

01-22-2021
AA, NSR

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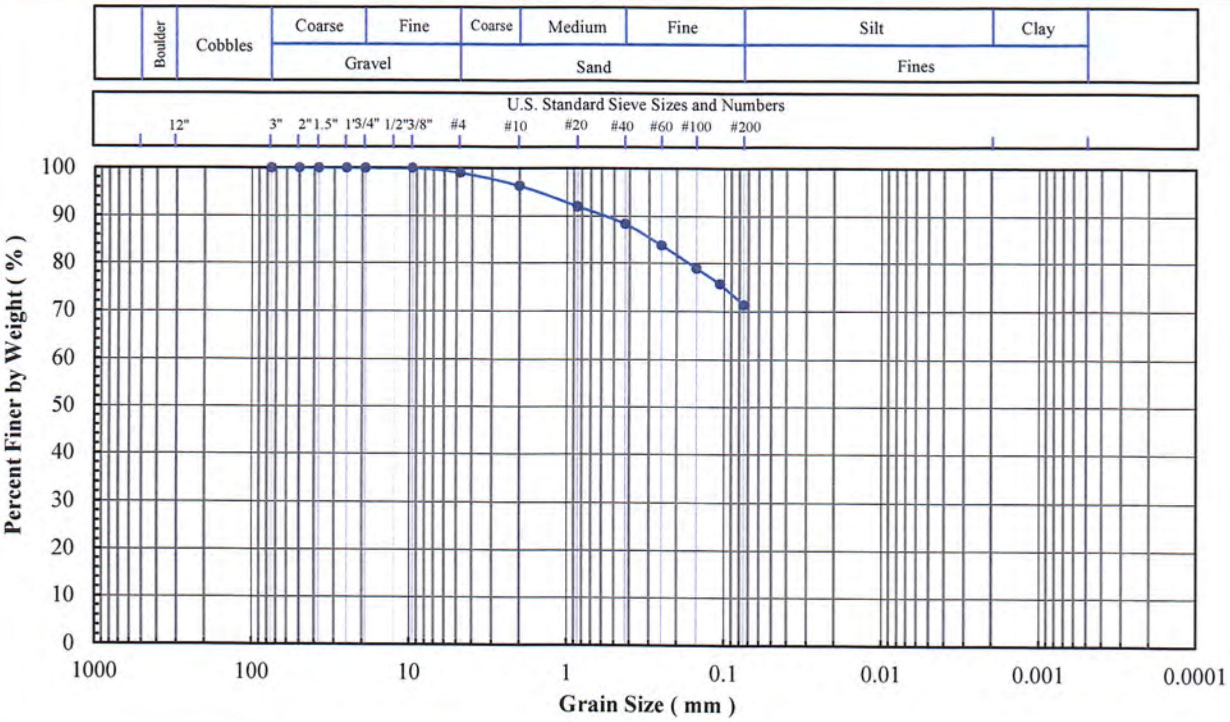
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-10 (46-50')
Lab Sample No:	20L121

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

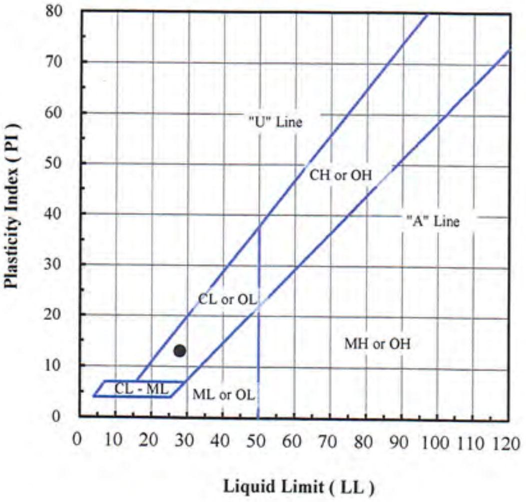


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.3
#20	0.850	92.0
#40	0.425	88.4
#60	0.250	83.8
#100	0.150	78.9
#140	0.106	75.6
#200	0.075	71.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	27.7
Fines (%):	71.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
Org. Content (%):	
Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B9-10 (46-50')	20L121	16.5	71.3	28	15	13	CL - Lean clay with sand

Note(s):

01-22-2021
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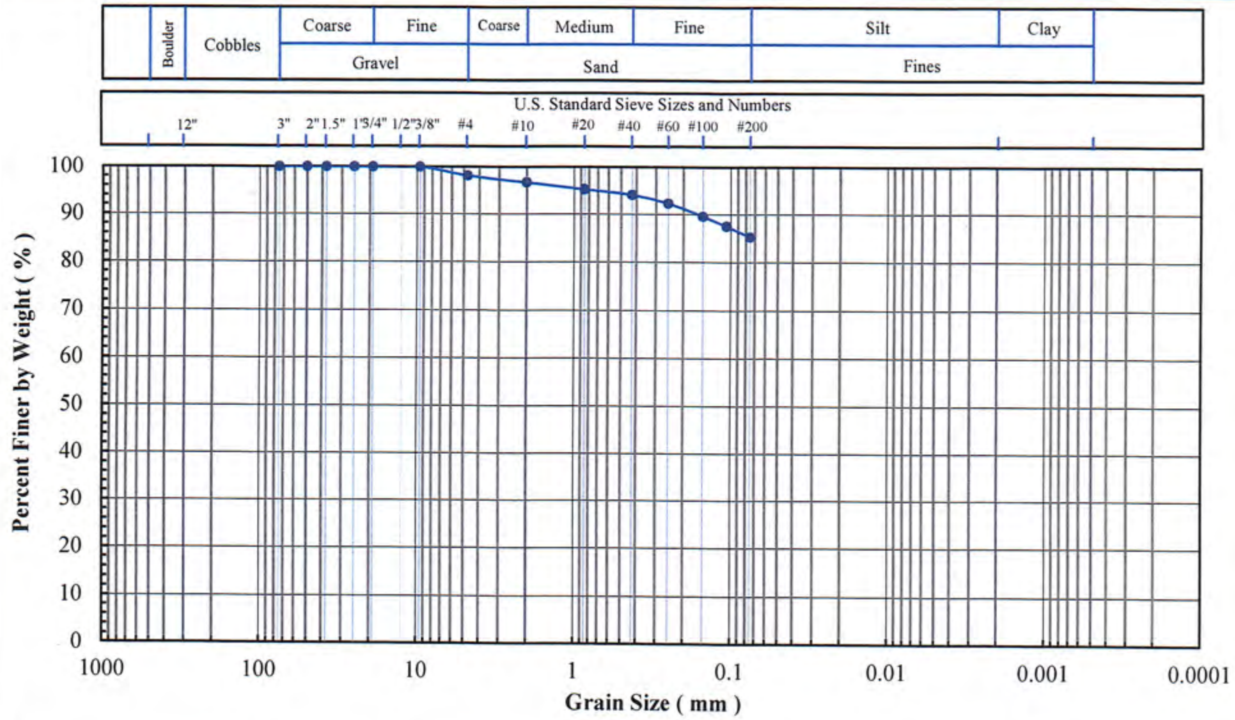
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-1 (25-27')
Lab Sample No:	20L139

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

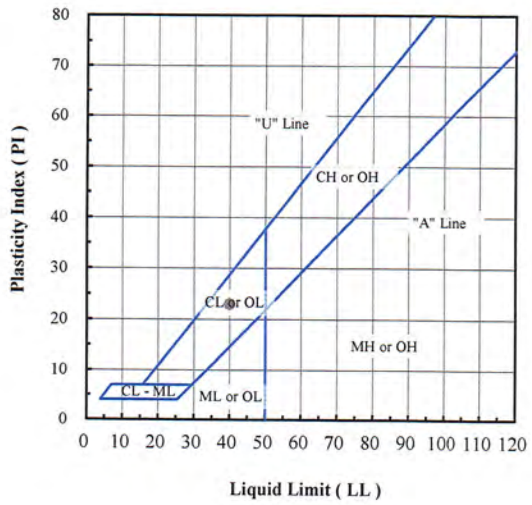


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.1
#10	2.00	96.7
#20	0.850	95.2
#40	0.425	94.1
#60	0.250	92.3
#100	0.150	89.6
#140	0.106	87.5
#200	0.075	85.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.9
Sand (%):	12.8
Fines (%):	85.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):		**Org. Content (%):**		**Carbon. Content (%):**	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-ST-1 (25-27')	20L139	16.8	85.3	40	17	23	CL - Lean Clay

Note(s):

01-29-2021
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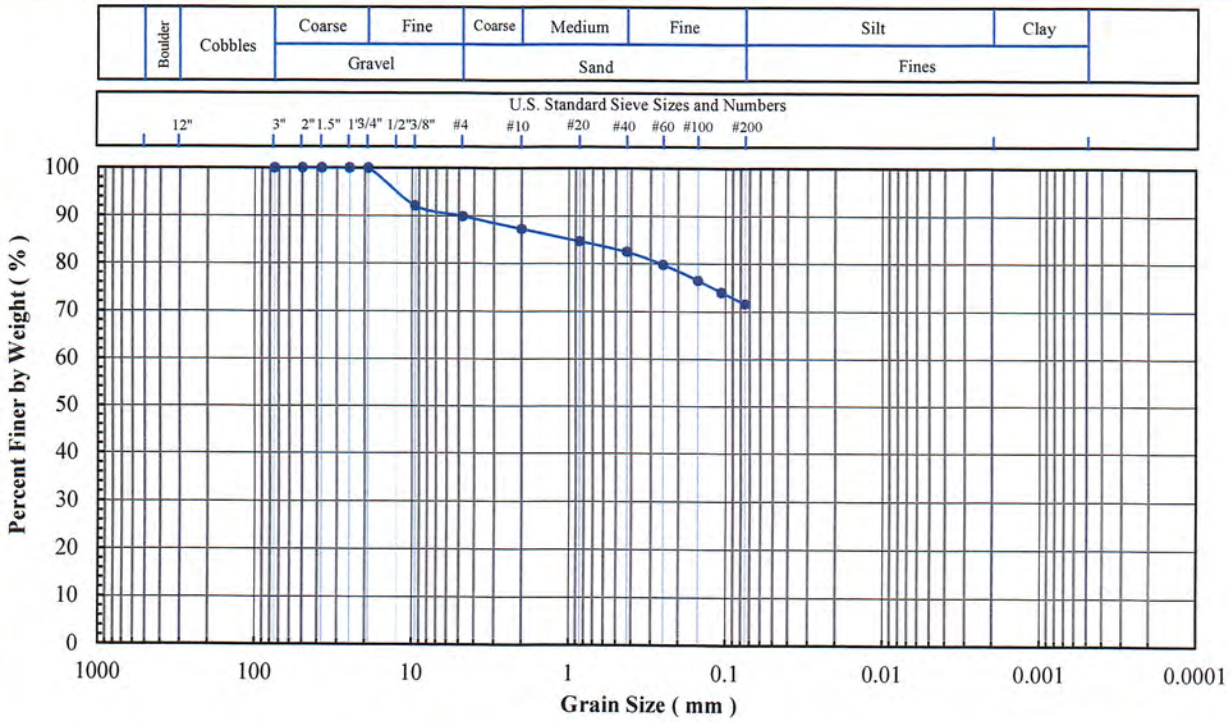
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-2 (40-42')
Lab Sample No:	20L140

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

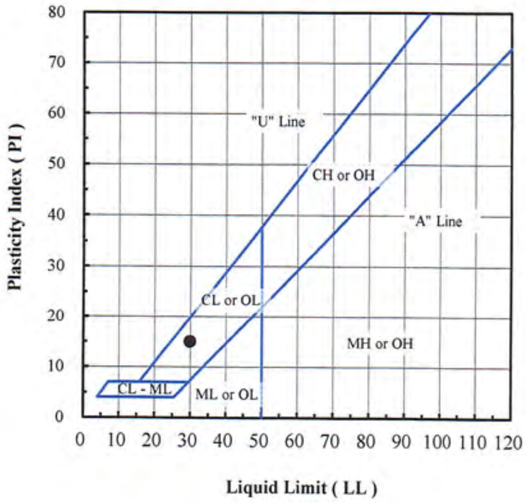


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	92
#4	4.75	90
#10	2.00	87
#20	0.850	85
#40	0.425	83
#60	0.250	80
#100	0.150	77
#140	0.106	74
#200	0.075	72

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	10
Sand (%):	18
Fines (%):	72
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):

Org. Content (%):

Carbon. Content (%):

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-ST-2 (40-42')	20L140	13.1	72	30	15	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-29-2021
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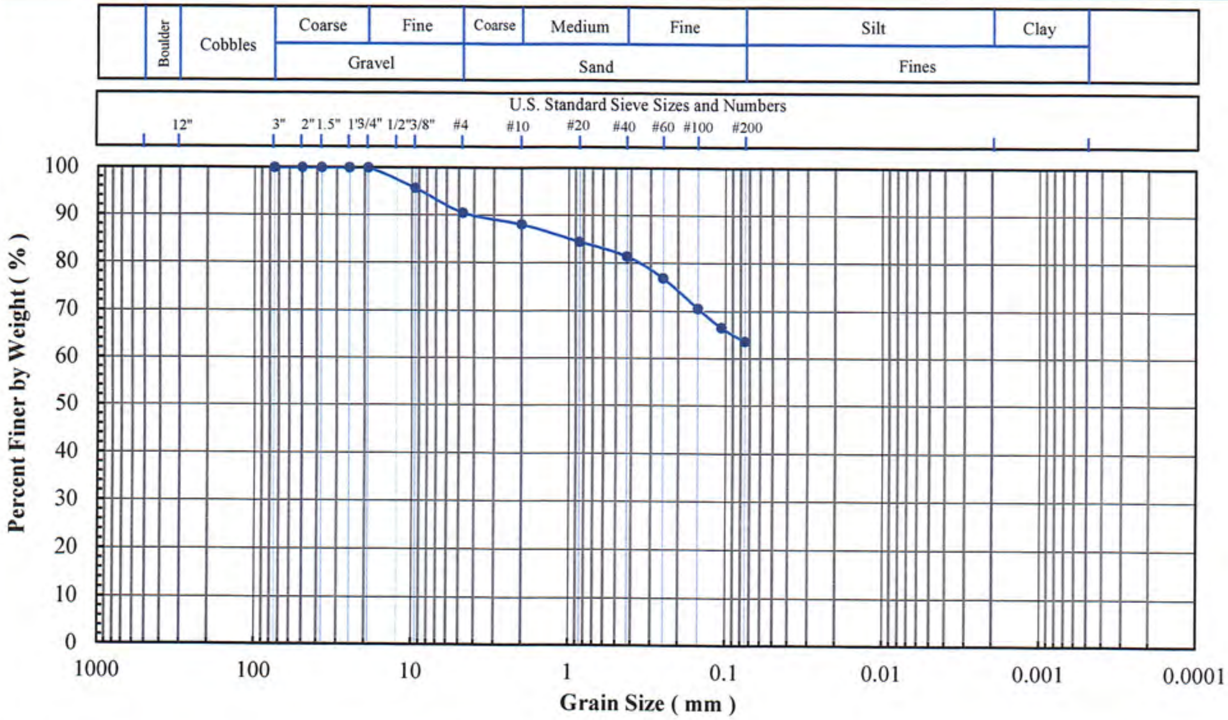
Project Name:	Monroe Ash Basin ALD
Project No:	PN1016
Client Sample ID:	B9-ST-3 (55-57')
Lab Sample No:	20L141

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

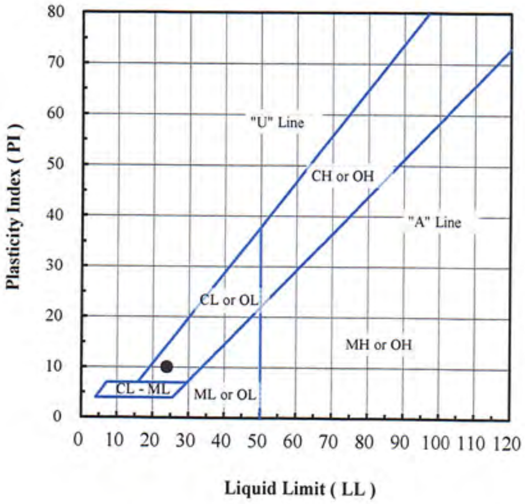


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	96
#4	4.75	91
#10	2.00	88
#20	0.850	84
#40	0.425	81
#60	0.250	77
#100	0.150	71
#140	0.106	67
#200	0.075	64

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	9
Sand (%):	27
Fines (%):	64
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
B9-ST-3 (55-57')	20L141	10.8	64	24	14	10	CL - Sandy lean clay

Note(s): Sieve specimen was undersized.

01-29-2021
AA, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B1-ST-2 (40-42')
Lab Sample Number:	20L126
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/19/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.58	7.23	108.9	20.1	53.0	50.0	3.0	DDW	12	6.4E-9
	3.55	7.23	110.2	19.7	64.00	50.0	14.0	DDW	14	3.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
ATK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B1-ST-3 (60-62')
Lab Sample Number:	20L127
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/19/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid $^{(3)}$ (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.58	7.19	129.8	10.7	53.0	50.0	3.0	DDW	13	7.2E-8
	3.57	7.16	131.3	10.8	69.00	50.0	19.0	DDW	7	6.8E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

1-20-2021
APK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B4-ST-1 (15-17')
Lab Sample Number:	20L129
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/20/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	(cm/s)
ST	3.60	7.26	113.9	16.1	53.0	50.0	3.0	DDW	10	9.2E-9
	3.58	7.27	112.2	18.5	57.00	50.0	7.0	DDW	5	8.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

1-20-2021
APK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D 5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B4-ST-3 (55-57.5')
Lab Sample Number:	20L131
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/20/2021

Specimen Type (See Note2)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	(cm/s)
ST	3.61	7.25	127.3	11.4	53.0	50.0	3.0	DDW	8	2.4E-6
	3.57	7.26	128.5	11.2	68.00	50.0	18.0	DDW	8	5.4E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen Type: ST = Shelby Tube, DT = Drive Tube BS = Block Sample, Ot = Others
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

1-20-2021
APK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B5-ST-1 (73.5-76')
Lab Sample Number:	20L133
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/26/2021

Specimen	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic
Type (See Note2) (-)	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	Conductivity (cm/s)
ST	3.45	7.37	121.5	15.4	53.0	50.0	3.0	DDW	12	1.1E-6
	3.48	7.20	125.5	12.4	72.00	50.0	22.0	DDW	14	8.1E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
APK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B6-ST-2 (40-42.5')
Lab Sample Number:	20L135
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/21/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	
ST	3.54	7.25	115.9	17.5	53.0	50.0	3.0	DDW	4	6.2E-9
	3.58	7.31	113.3	18.2	64.00	50.0	14.0	DDW	16	2.7E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
APK, NSK

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B7-ST-1 (65-67.5')
Lab Sample Number:	20L138
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/22/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid $^{(3)}$ (-)	Average Gradient (-)	
ST	3.55	7.22	124.6	13.0	53.0	50.0	3.0	DDW	6	1.9E-8
	3.58	7.28	121.5	14.4	70.00	50.0	20.0	DDW	12	5.8E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
APK, NSR

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FLEXIBLE WALL PERMEABILITY TEST (1)

ASTM D5084

Project Name:	Monroe Ash Basin ALD
Project Number:	PN1016
Client Name:	Geosyntec Consultants
Site Sample ID:	B9-ST-1 (25-27')
Lab Sample Number:	20L139
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/22/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid (3) (-)	Average Gradient (-)	
ST	3.56	7.20	115.5	17.2	53.0	50.0	3.0	DDW	6	9.0E-9
	3.57	7.28	112.7	18.6	61.00	50.0	11.0	DDW	14	3.5E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-20-2021
ARK, NSR

LAST PAGE

Test Applicability and Limitations:

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

Storage Policy:

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of $1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of $1.30 per sample per day will be applied after the initial 3 months storage.

APPENDIX K1 – CPT LOGS

CONETEC

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-000	20-61-21655_CP000	02-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		141685	13397097	
CPT20-002	20-61-21655_CP002	01-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		141848	13397147	
CPT20-004	20-61-21655_CP004	01-Dec-2020	C16	567:T1500F15U500	15	25.0	75.13		142006	13397236	
CPT20-006	20-61-21655_CP006	01-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142105	13397122	3
CPT20-008	20-61-21655_CP008	13-Dec-2020	C18	551:T1500F15U500	15	25.0	63.81		142194	13396905	
CPT20-010	20-61-21655_CP010	02-Dec-2020	C18	568:T1500F15U500	15	25.0	65.29		142267	13396716	
CPT20-012	20-61-21655_CP012	02-Dec-2020	C18	568:T1500F15U500	15	25.0	65.12		142346	13396528	
CPT20-014	20-61-21655_CP014	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142420	13396346	
CPT20-016	20-61-21655_CP016	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.05		142493	13396161	
CPT20-018	20-61-21655_CP018	02-Dec-2020	C18	568:T1500F15U500	15	25.0	75.21		142568	13395971	
CPT20-020	20-61-21655_CP020	02-Dec-2020	C18	568:T1500F15U500	15	25.0	74.72		142644	13395785	
CPT20-022	20-61-21655_CP022	03-Dec-2020	C18	551:T1500F15U500	15	25.0	73.82		142715	13395602	
CPT20-024	20-61-21655_CP024	03-Dec-2020	C18	551:T1500F15U500	15	25.0	72.59		142797	13395407	
CPT20-026	20-61-21655_CP026	03-Dec-2020	C18	551:T1500F15U500	15	25.0	70.70		142864	13395239	
CPT20-028	20-61-21655_CP028	13-Dec-2020	C18	551:T1500F15U500	15	25.0	59.55		142938	13395052	
CPT20-030	20-61-21655_CP030	03-Dec-2020	C18	551:T1500F15U500	15	25.0	59.88		143004	13394895	
CPT20-032	20-61-21655_CP032	03-Dec-2020	C18	551:T1500F15U500	15	25.0	59.14		142939	13394710	
CPT20-034	20-61-21655_CP034	03-Dec-2020	C18	551:T1500F15U500	15	25.0	57.41		142785	13394560	
CPT20-036	20-61-21655_CP036	04-Dec-2020	C18	551:T1500F15U500	15	25.0	57.82		142655	13394432	
CPT20-038	20-61-21655_CP038	04-Dec-2020	C18	551:T1500F15U500	15	25.0	58.89		142596	13394252	
CPT20-040	20-61-21655_CP040	04-Dec-2020	C18	551:T1500F15U500	15	25.0	62.25		142693	13394075	
CPT20-042	20-61-21655_CP042	04-Dec-2020	C18	551:T1500F15U500	15	25.0	60.70		142835	13393929	
CPT20-044	20-61-21655_CP044	04-Dec-2020	C18	551:T1500F15U500	15	25.0	57.82		142982	13393790	
CPT20-046	20-61-21655_CP046	05-Dec-2020	C18	551:T1500F15U500	15	25.0	61.27		143108	13393655	
CPT20-048	20-61-21655_CP048	13-Dec-2020	C16	568:T1500F15U500	15	25.0	60.04		143131	13393508	
SCPT20-050	20-61-21655_SP050	05-Dec-2020	C18	551:T1500F15U500	15	25.0	62.58	5	143162	13393217	

CONETEC

Job No:	20-61-21655
Client:	Geosyntec Consultants
Project:	DTE Monroe Power Plant
Start Date:	01-Dec-2020
End Date:	14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-052	20-61-21655_CP052	05-Dec-2020	C18	551:T1500F15U500	15	25.0	61.52		143174	13393046	
CPT20-054	20-61-21655_CP054	05-Dec-2020	C18	551:T1500F15U500	15	25.0	60.86		143198	13392845	
CPT20-056	20-61-21655_CP056	05-Dec-2020	C18	551:T1500F15U500	15	25.0	62.83		143212	13392641	
CPT20-058	20-61-21655_CP058	06-Dec-2020	C18	551:T1500F15U500	15	25.0	59.38		143229	13392449	
CPT20-060	20-61-21655_CP060	06-Dec-2020	C18	551:T1500F15U500	15	25.0	59.88		143248	13392268	
CPT20-062	20-61-21655_CP062	06-Dec-2020	C18	551:T1500F15U500	15	25.0	60.12		143281	13392058	
CPT20-064	20-61-21655_CP064	06-Dec-2020	C18	551:T1500F15U500	15	25.0	64.06		143336	13391874	
CPT20-066	20-61-21655_CP066	06-Dec-2020	C18	551:T1500F15U500	15	25.0	60.45		143404	13391672	
CPT20-068	20-61-21655_CP068	13-Dec-2020	C16	568:T1500F15U500	15	25.0	59.05		143440	13391531	
CPT20-070	20-61-21655_CP070	02-Dec-2020	C16	567:T1500F15U500	15	25.0	52.33		143314	13391366	
CPT20-072	20-61-21655_CP072	02-Dec-2020	C16	567:T1500F15U500	15	25.0	65.78		143165	13391247	
CPT20-074	20-61-21655_CP074	02-Dec-2020	C16	567:T1500F15U500	15	25.0	66.44		143014	13391154	
CPT20-076	20-61-21655_CP076	03-Dec-2020	C16	567:T1500F15U500	15	25.0	66.27		142838	13391033	
CPT20-078	20-61-21655_CP078	03-Dec-2020	C16	567:T1500F15U500	15		5.25		142629	13390894	4
CPT20-078B	20-61-21655_CP078B	03-Dec-2020	C16	567:T1500F15U500	15	25.0	61.84		142643	13390903	
CPT20-080	20-61-21655_CP080	03-Dec-2020	C16	567:T1500F15U500	15	25.0	67.26		142497	13390784	
CPT20-082	20-61-21655_CP082	03-Dec-2020	C16	567:T1500F15U500	15		6.73		142345	13390678	4
CPT20-082B	20-61-21655_CP082B	03-Dec-2020	C16	675:T1500F15U500	15	25.0	66.11		142344	13390669	
CPT20-084	20-61-21655_CP084	03-Dec-2020	C16	675:T1500F15U500	15	25.0	67.91		142185	13390553	
CPT20-086	20-61-21655_CP086	04-Dec-2020	C16	675:T1500F15U500	15	25.0	68.57		141994	13390446	
CPT20-088	20-61-21655_CP088	04-Dec-2020	C16	675:T1500F15U500	15		5.09		141837	13390373	4
CPT20-088B	20-61-21655_CP088B	04-Dec-2020	C16	675:T1500F15U500	15	25.0	67.75		141843	13390373	
CPT20-090	20-61-21655_CP090	04-Dec-2020	C16	675:T1500F15U500	15	25.0	60.04		141754	13390528	
CPT20-092	20-61-21655_CP092	05-Dec-2020	C16	675:T1500F15U500	15	25.0	66.93		141703	13390714	
CPT20-094	20-61-21655_CP094	05-Dec-2020	C16	513:T1500F15U500	15	25.0	63.81		141591	13390889	
SCPT20-096	20-61-21655_SP096	05-Dec-2020	C16	513:T1500F15U500	15	25.0	60.86	5	141475	13391090	

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-098	20-61-21655_CP098	05-Dec-2020	C16	513:T1500F15U500	15	25.0	66.44		141442	13391262	
CPT20-100	20-61-21655_CP100	06-Dec-2020	C16	513:T1500F15U500	15	25.0	53.48		141368	13391479	
CPT20-102	20-61-21655_CP102	06-Dec-2020	C16	513:T1500F15U500	15	25.0	57.58		141297	13391656	
CPT20-104	20-61-21655_CP104	06-Dec-2020	C16	513:T1500F15U500	15	25.0	57.58		141174	13391805	
CPT20-106	20-61-21655_CP106	06-Dec-2020	C16	513:T1500F15U500	15	25.0	55.28		140981	13391734	
CPT20-108	20-61-21655_CP108	06-Dec-2020	C16	513:T1500F15U500	15	25.0	59.55		140801	13391655	
CPT20-110	20-61-21655_CP110	06-Dec-2020	C16	513:T1500F15U500	15	25.0	56.76		140617	13391584	
CPT20-110B	20-61-21655_CP110B	07-Dec-2020	C16	513:T1500F15U500	15	25.0	61.02		140610	13391577	
CPT20-112	20-61-21655_CP112	06-Dec-2020	C16	513:T1500F15U500	15	25.0	52.33		140443	13391653	
SCPT20-114	20-61-21655_SP114	06-Dec-2020	C16	513:T1500F15U500	15	25.0	53.15	4	140335	13391822	
CPT20-116	20-61-21655_CP116	06-Dec-2020	C16	513:T1500F15U500	15	25.0	61.35		140233	13391996	
CPT20-118	20-61-21655_CP118	07-Dec-2020	C16	513:T1500F15U500	15	25.0	58.56		140123	13392169	
CPT20-120	20-61-21655_CP120	07-Dec-2020	C16	513:T1500F15U500	15	25.0	60.70		140017	13392339	
CPT20-122	20-61-21655_CP122	07-Dec-2020	C16	513:T1500F15U500	15	25.0	62.01		139912	13392507	
CPT20-124	20-61-21655_CP124	08-Dec-2020	C16	513:T1500F15U500	15	25.0	70.87		139802	13392678	
CPT20-126	20-61-21655_CP126	08-Dec-2020	C16	513:T1500F15U500	15	25.0	71.52		139694	13392854	
CPT20-128	20-61-21655_CP128	08-Dec-2020	C16	513:T1500F15U500	15	25.0	73.49		139593	13393024	
CPT20-130	20-61-21655_CP130	08-Dec-2020	C16	513:T1500F15U500	15	25.0	64.14		139484	13393198	
CPT20-132	20-61-21655_CP132	08-Dec-2020	C16	513:T1500F15U500	15	25.0	70.37		139378	13393362	
CPT20-134	20-61-21655_CP134	14-Dec-2020	C16	568:T1500F15U500	15	25.0	67.09		139281	13393532	
CPT20-136	20-61-21655_CP136	14-Dec-2020	C18	551:T1500F15U500	15	25.0	75.13		139166	13393704	
CPT20-138	20-61-21655_CP138	14-Dec-2020	C18	551:T1500F15U500	15	25.0	72.51		139110	13393797	
CPT20-140	20-61-21655_CP140	13-Dec-2020	C18	551:T1500F15U500	15	25.0	75.13		139141	13393971	
CPT20-142	20-61-21655_CP142	14-Dec-2020	C18	551:T1500F15U500	15	25.0	65.53		139293	13394120	
CPT20-144	20-61-21655_CP144	14-Dec-2020	C18	551:T1500F15U500	15	25.0	70.46		139326	13394303	
CPT20-146	20-61-21655_CP146	14-Dec-2020	C18	551:T1500F15U500	15	25.0	66.35		139290	13394504	

CONETEC

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing (ft)	Easting (ft)	Refer to Notation Number
CPT20-148	20-61-21655_CP148	14-Dec-2020	C18	551:T1500F15U500	15	25.0	62.50		139269	13394705	
CPT20-150	20-61-21655_CP150	14-Dec-2020	C16	568:T1500F15U500	15	25.0	65.94		139340	13394900	
CPT20-152	20-61-21655_CP152	08-Dec-2020	C18	551:T1500F15U500	15	25.0	60.53		139451	13395043	
CPT20-154	20-61-21655_CP154	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.49		139579	13395198	
CPT20-156	20-61-21655_CP156	08-Dec-2020	C18	551:T1500F15U500	15	25.0	69.64		139707	13395357	
CPT20-158	20-61-21655_CP158	08-Dec-2020	C18	551:T1500F15U500	15	25.0	60.61		139832	13395506	
CPT20-160	20-61-21655_CP160	08-Dec-2020	C18	551:T1500F15U500	15	25.0	66.93		139960	13395666	
CPT20-162	20-61-21655_CP162	08-Dec-2020	C18	551:T1500F15U500	15	25.0	66.27		140089	13395835	
CPT20-164	20-61-21655_CP164	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.49		140210	13395988	
CPT20-166	20-61-21655_CP166	08-Dec-2020	C18	551:T1500F15U500	15	25.0	68.41		140336	13396145	
CPT20-168	20-61-21655_CP168	08-Dec-2020	C18	551:T1500F15U500	15	25.0	69.72		140461	13396297	
CPT20-170	20-61-21655_CP170	07-Dec-2020	C18	551:T1500F15U500	15	25.0	68.24		140603	13396441	
CPT20-172	20-61-21655_CP172	07-Dec-2020	C18	551:T1500F15U500	15	25.0	70.70		140759	13396566	
CPT20-174	20-61-21655_CP174	07-Dec-2020	C18	551:T1500F15U500	15	25.0	73.24		140916	13396693	
CPT20-176	20-61-21655_CP176	07-Dec-2020	C18	551:T1500F15U500	15	25.0	69.72		141071	13396820	
CPT20-178	20-61-21655_CP178	07-Dec-2020	C18	551:T1500F15U500	15	25.0	69.80		141268	13396939	
SCPT20-180	20-61-21655_SP180	07-Dec-2020	C18	551:T1500F15U500	15	25.0	67.17	5	141428	13397002	
Totals	95 soundings						6001.32	19			

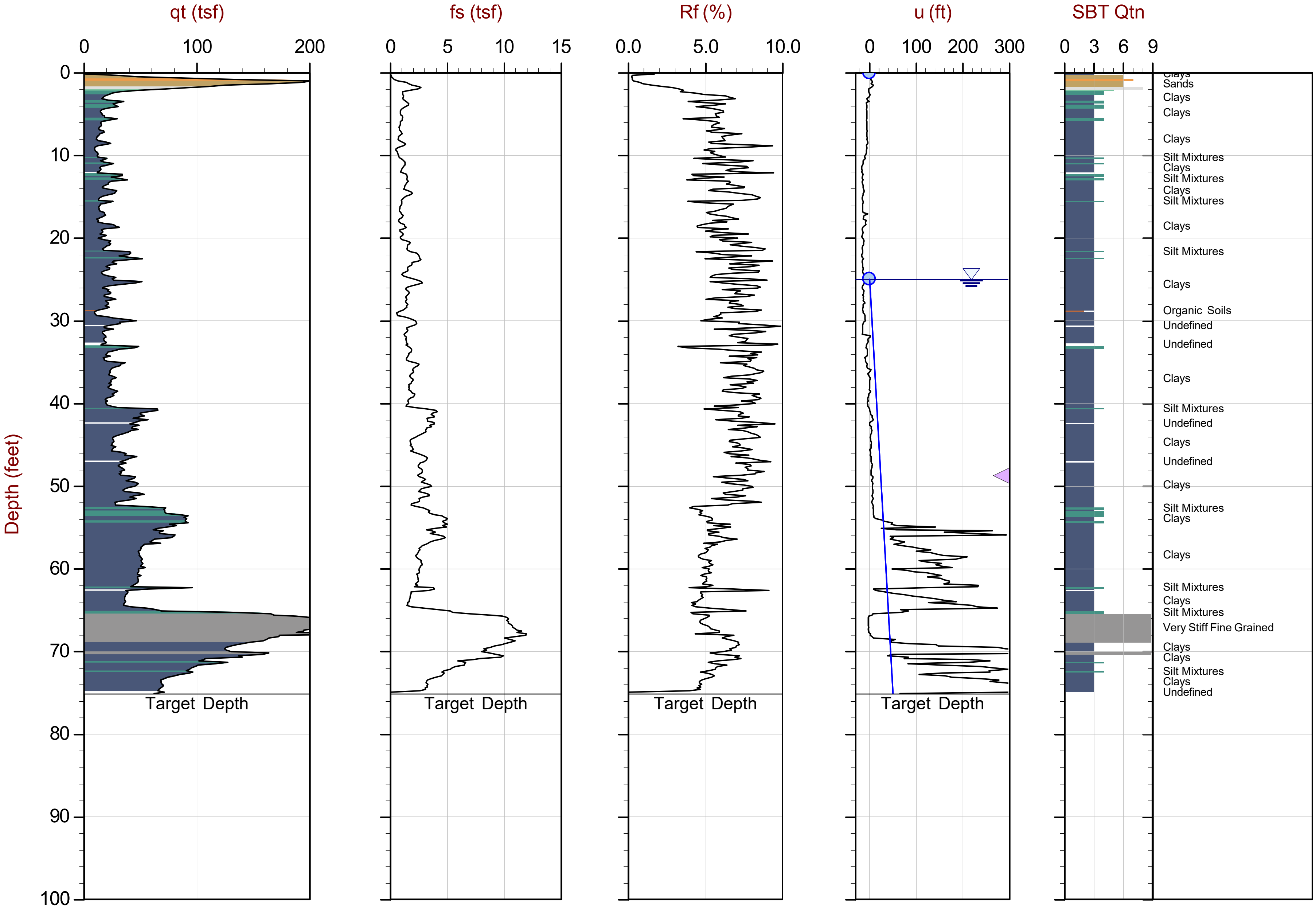
1. The assumed phreatic surface was provided by the client. Hydrostatic condictions were assumed for the calculated parameters.
2. Coordinates were acquired using a MR-350 GlobalSat GPS Receiver in datum: WGS84 / UTM Zone 17 North and were converted to Michigan State Plane South, NAD83 (international feet).
3. No pore pressure data from 16.300m- 22.925m (53.48ft - 75.21ft) due to equipment issues.
4. No clear phreatic surface detected.

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 10:20
Site: DTE Monroe Power Plant

Sounding: CPT20-000
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP000.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141685ft E: 13397097ft
Sheet No: 1 of 1

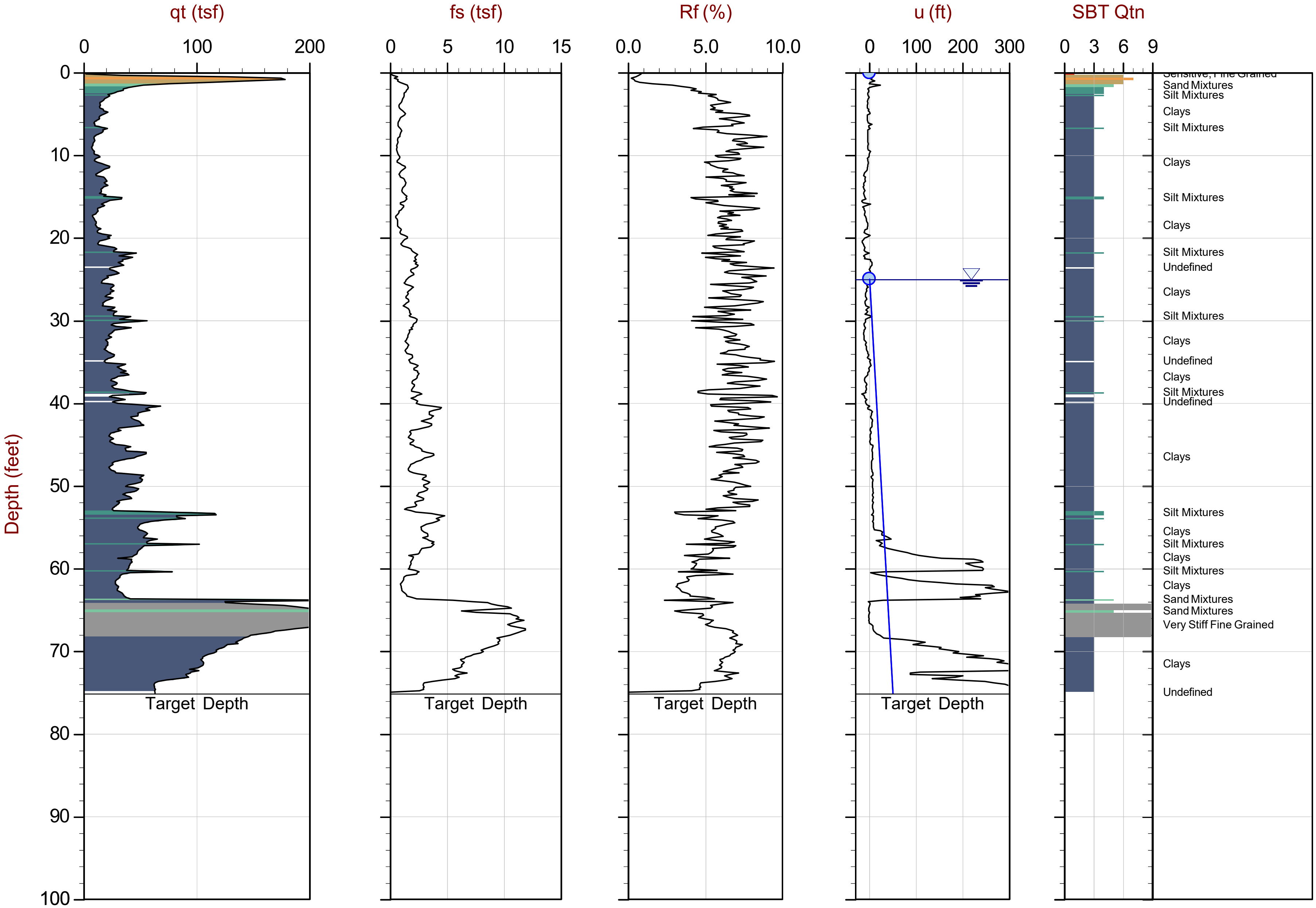
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-01 15:09
Site: DTE Monroe Power Plant

Sounding: CPT20-002
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP002.COR
Unit Wt: SBTQtn (PKR2009)

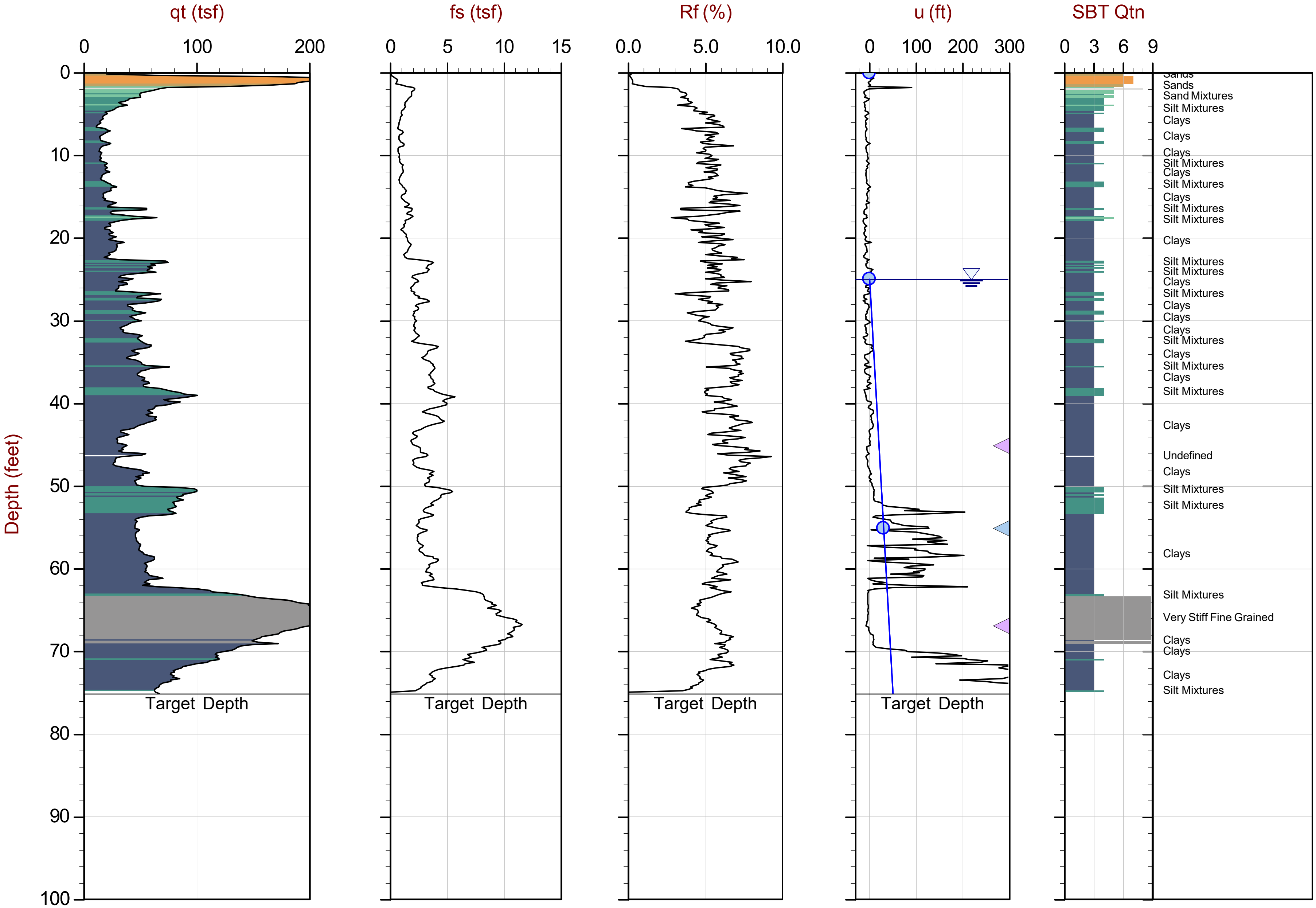
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141848ft E: 13397147ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-01 13:06
Site: DTE Monroe Power Plant

Sounding: CPT20-004
Cone: 567:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP004.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142006ft E: 13397236ft
Sheet No: 1 of 1

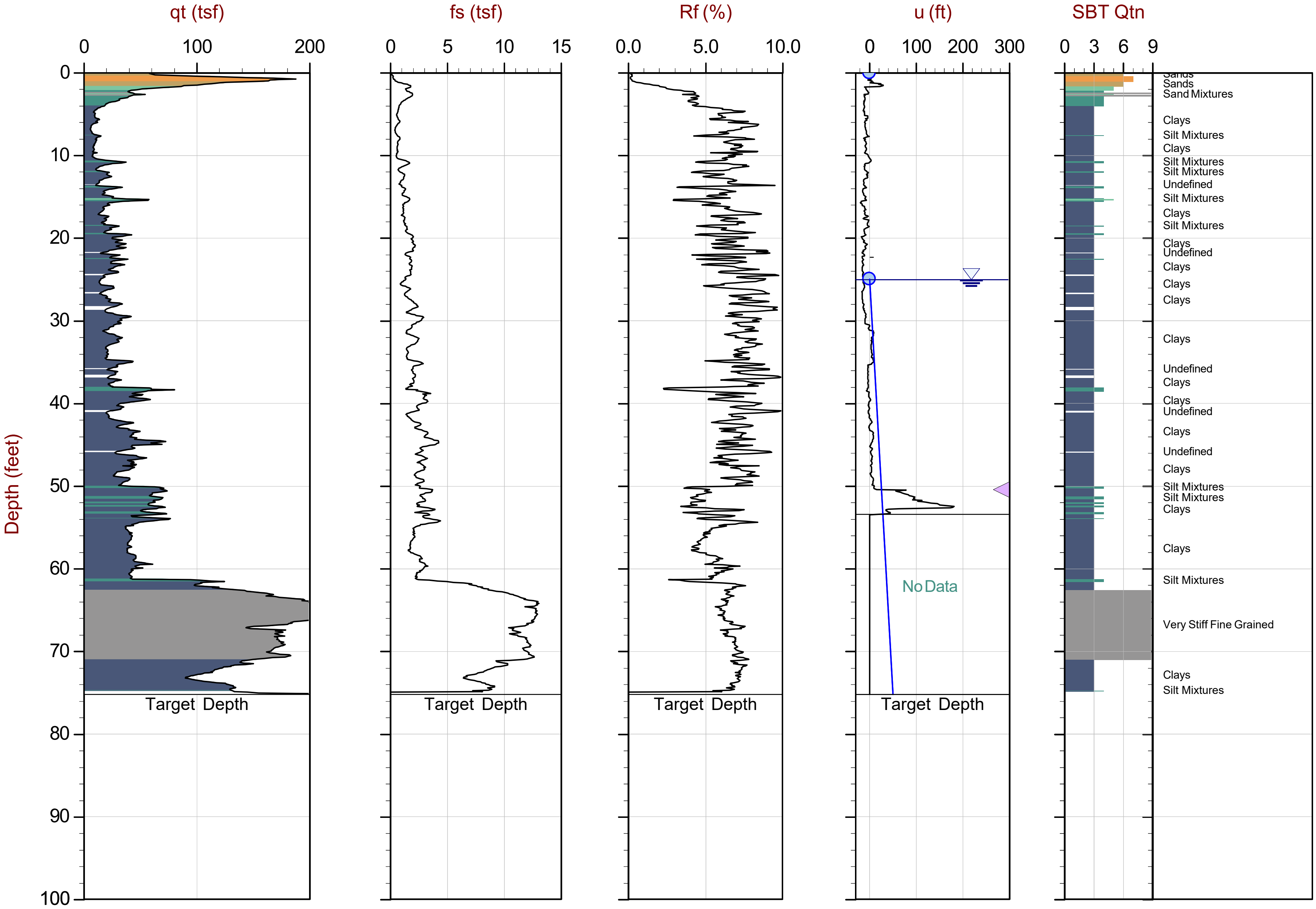
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-01 13:15
Site: DTE Monroe Power Plant

Sounding: CPT20-006
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP006.COR
Unit Wt: SBTQtn (PKR2009)

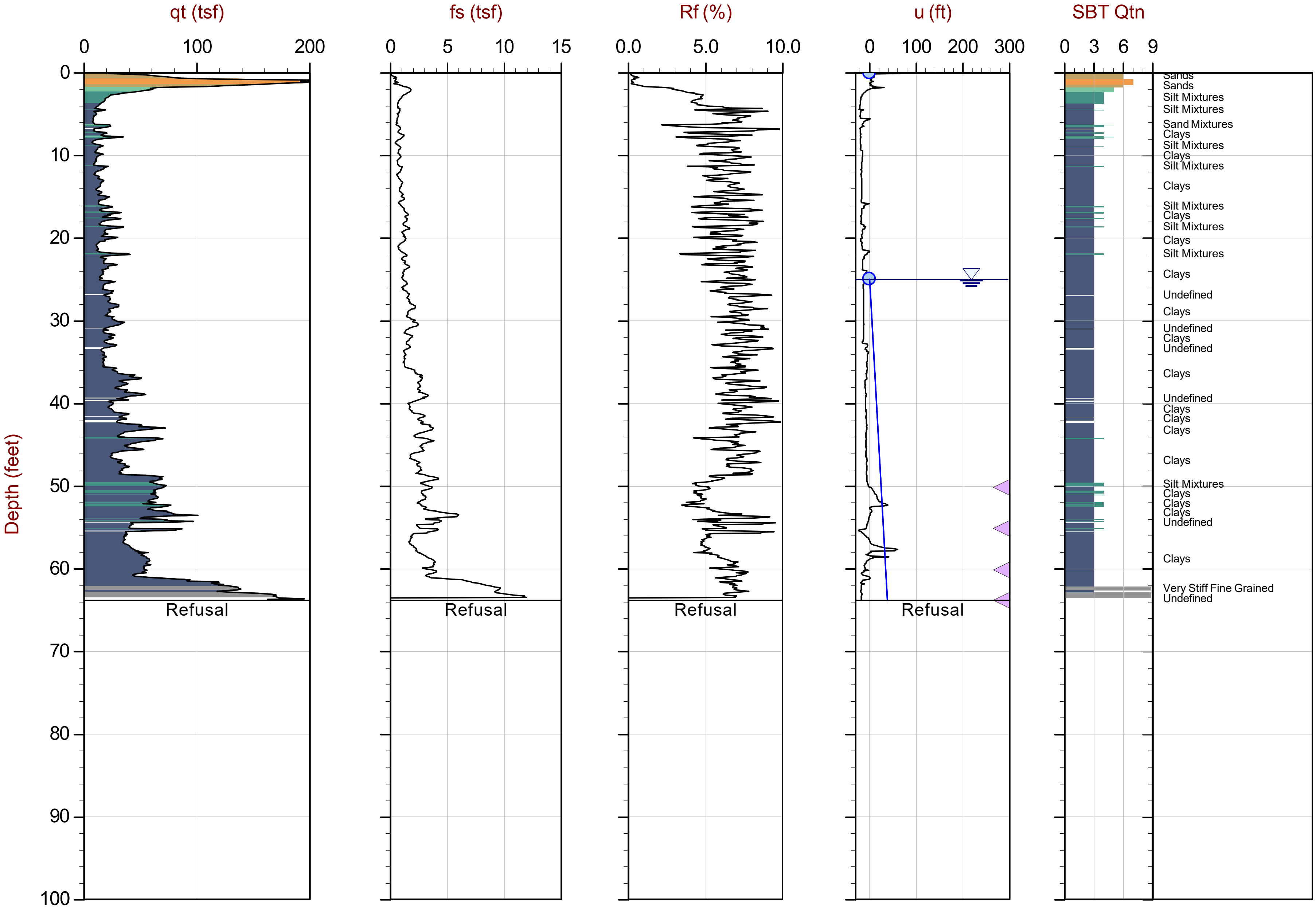
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142105ft E: 13397122ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP008.COR
Unit Wt: SBTQtn (PKR2009)

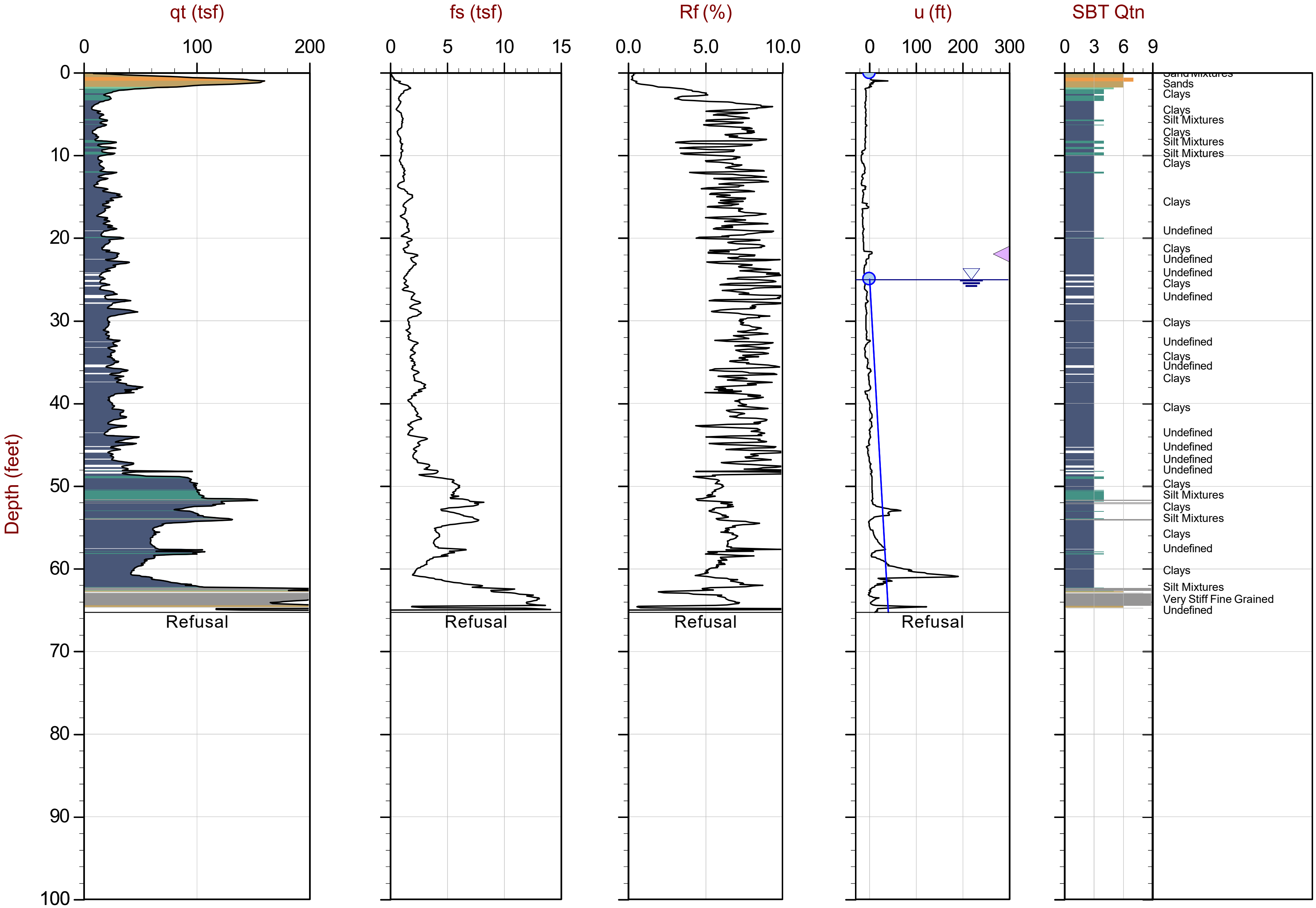
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142194ft E: 13396905ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 10:04
Site: DTE Monroe Power Plant

Sounding: CPT20-010
Cone: 568:T1500F15U500



Max Depth: 19.900 m / 65.29 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP010.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142267ft E: 13396716ft
Sheet No: 1 of 1

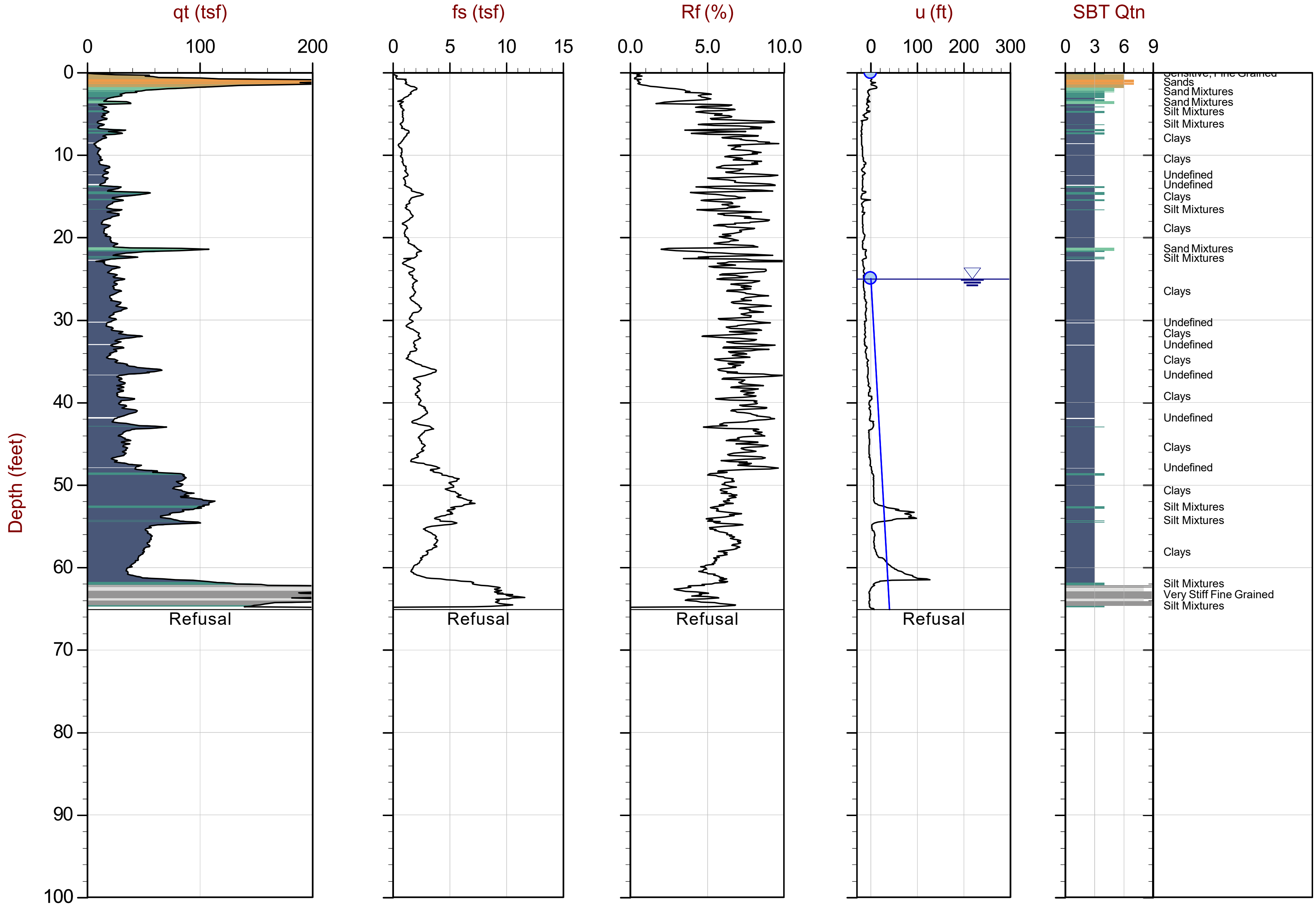
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 11:14
Site: DTE Monroe Power Plant

Sounding: CPT20-012
Cone: 568:T1500F15U500



Max Depth: 19.850 m / 65.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP012.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142346ft E: 13396528ft
Sheet No: 1 of 1

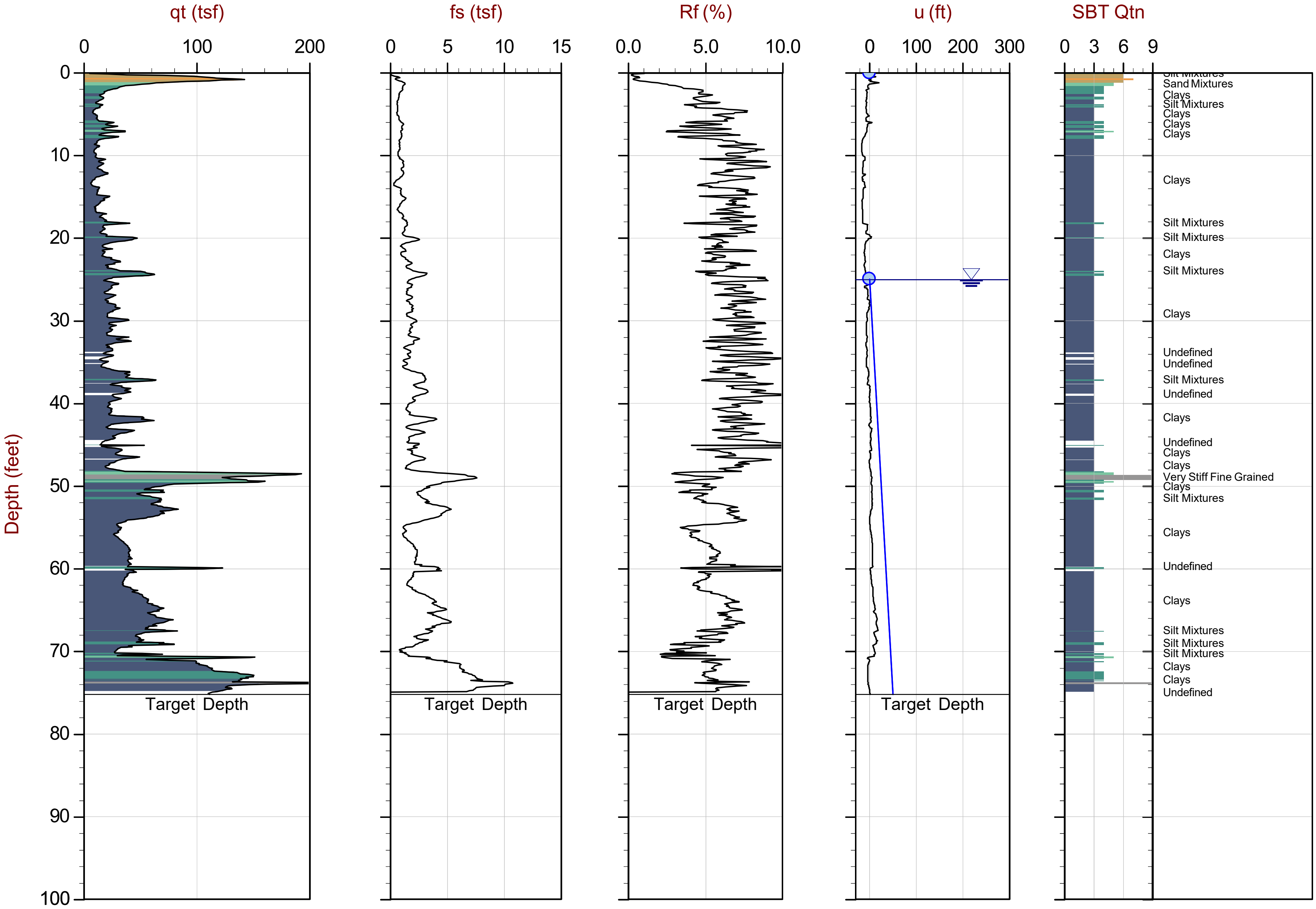
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 12:25
Site: DTE Monroe Power Plant

Sounding: CPT20-014
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP014.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142420ft E: 13396346ft
Sheet No: 1 of 1

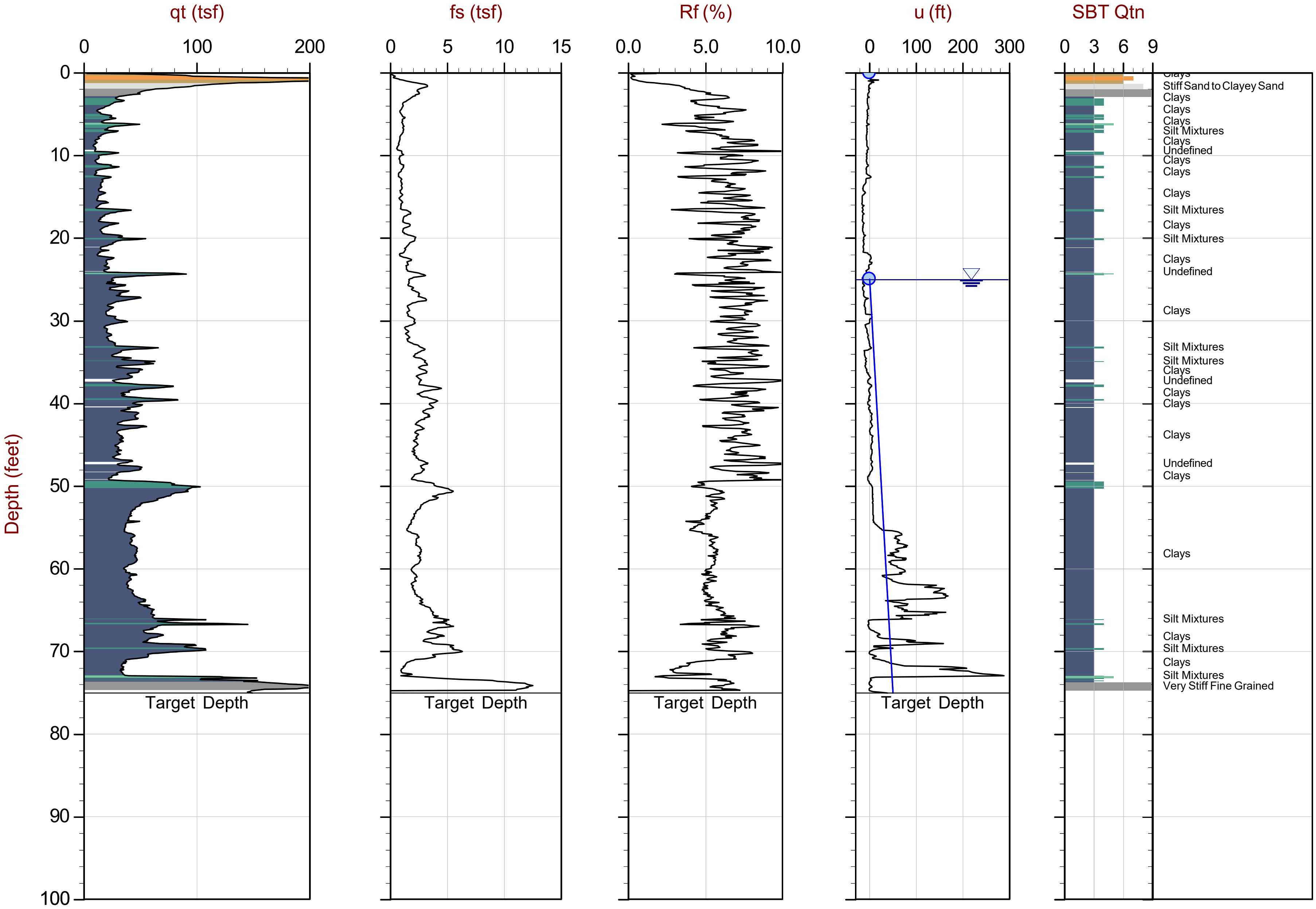
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 13:21
Site: DTE Monroe Power Plant

Sounding: CPT20-016
Cone: 568:T1500F15U500



Max Depth: 22.875 m / 75.05 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP016.COR
Unit Wt: SBTQtn (PKR2009)

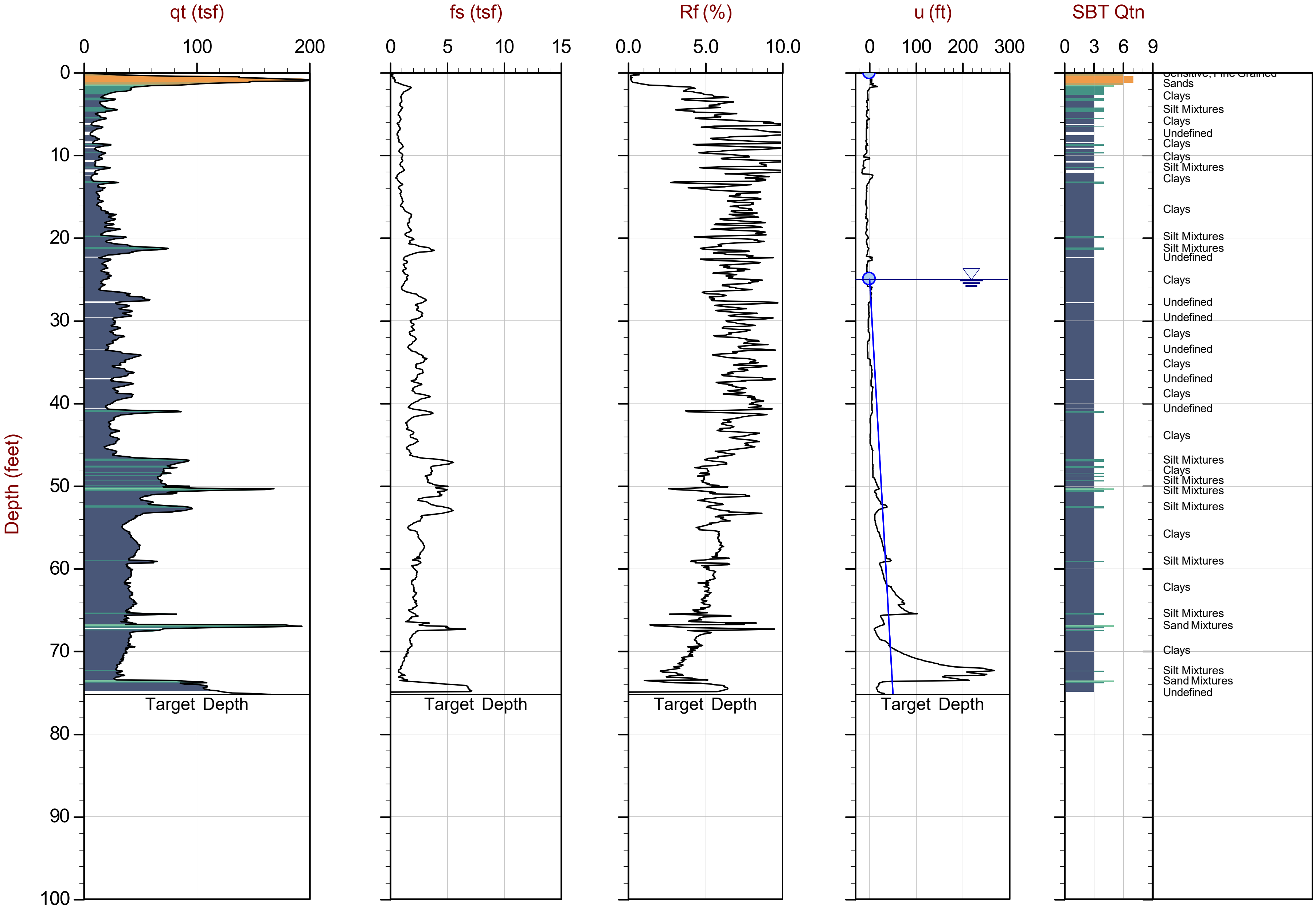
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142493ft E: 13396161ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 14:15
Site: DTE Monroe Power Plant

Sounding: CPT20-018
Cone: 568:T1500F15U500



Max Depth: 22.925 m / 75.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP018.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142568ft E: 13395971ft
Sheet No: 1 of 1

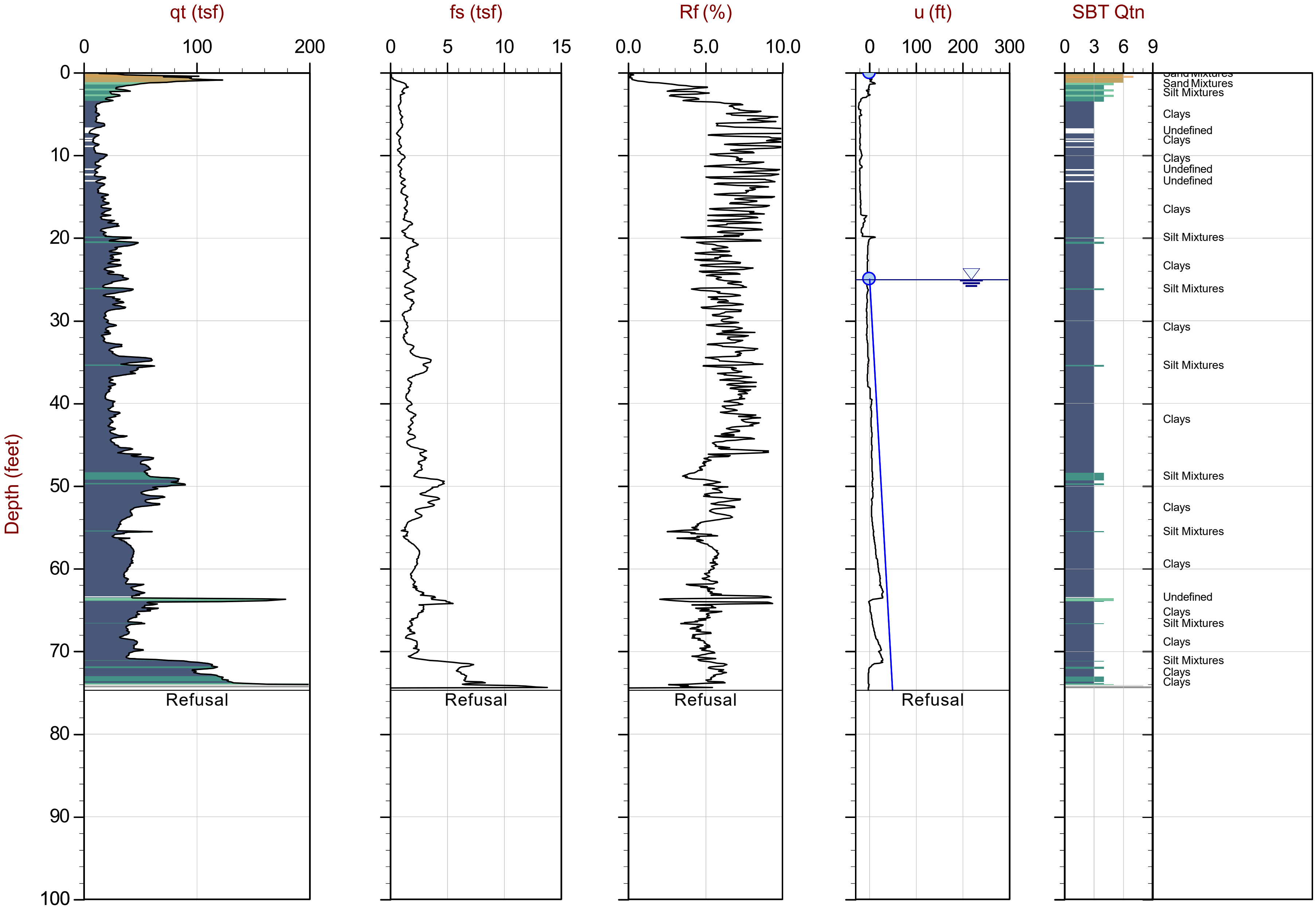
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-02 15:22
Site: DTE Monroe Power Plant

Sounding: CPT20-020
Cone: 568:T1500F15U500



Max Depth: 22.775 m / 74.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP020.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142644ft E: 13395785ft
Sheet No: 1 of 1

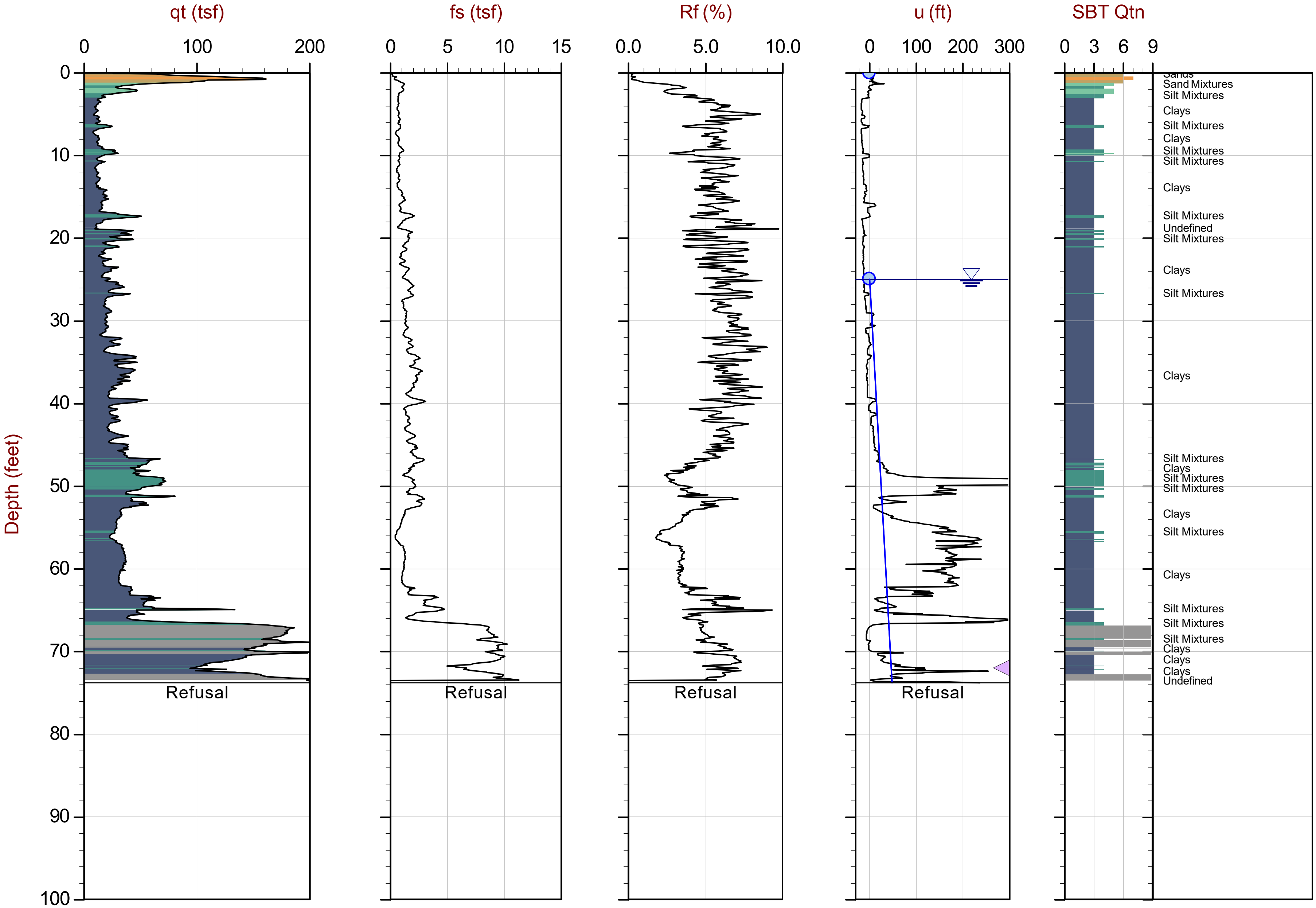
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 08:59
Site: DTE Monroe Power Plant

Sounding: CPT20-022
Cone: 551:T1500F15U500



Max Depth: 22.500 m / 73.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP022.COR
Unit Wt: SBTQtn (PKR2009)

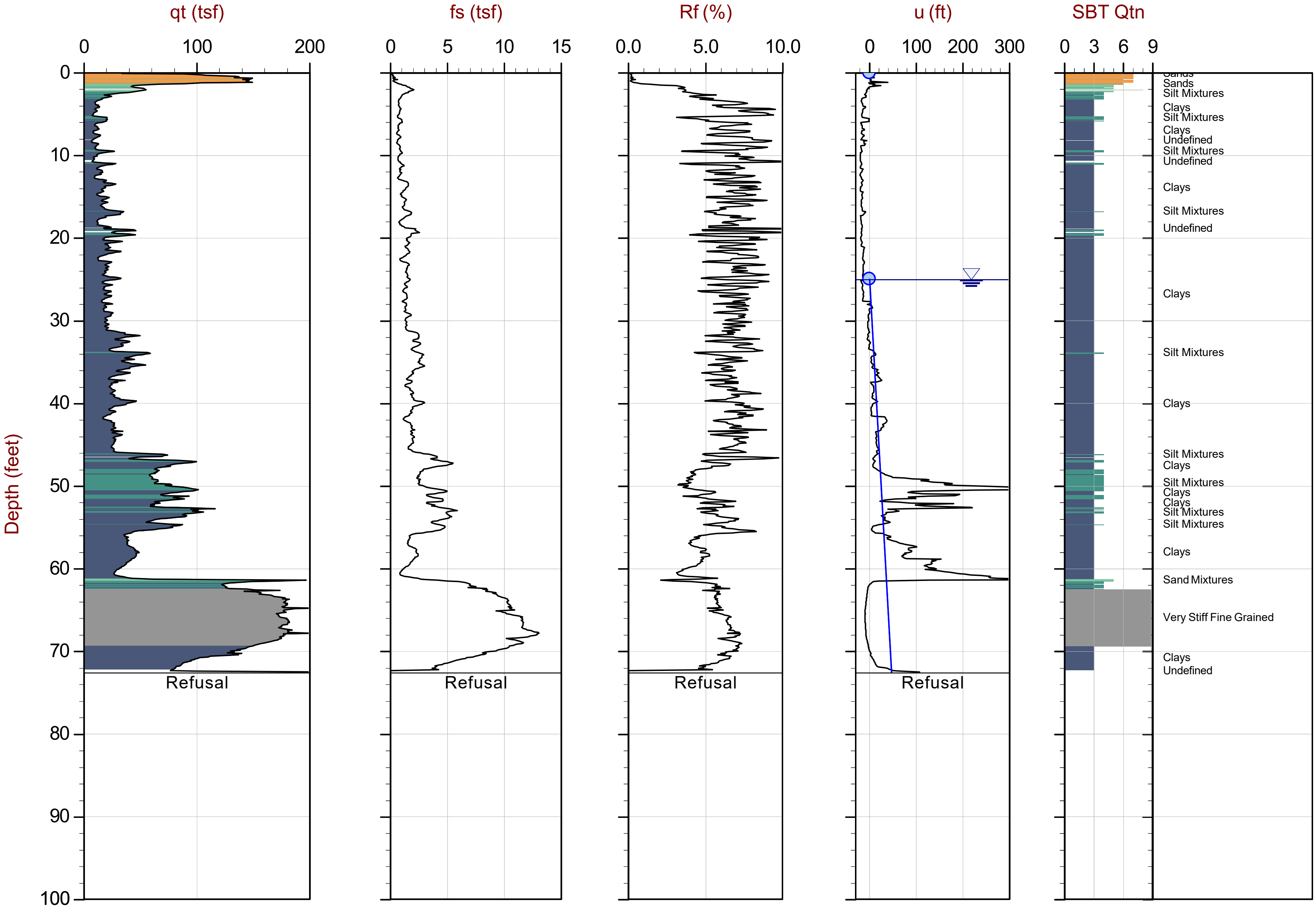
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142715ft E: 13395602ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 10:09
Site: DTE Monroe Power Plant

Sounding: CPT20-024
Cone: 551:T1500F15U500



Max Depth: 22.125 m / 72.59 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP024.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142797ft E: 13395407ft
Sheet No: 1 of 1

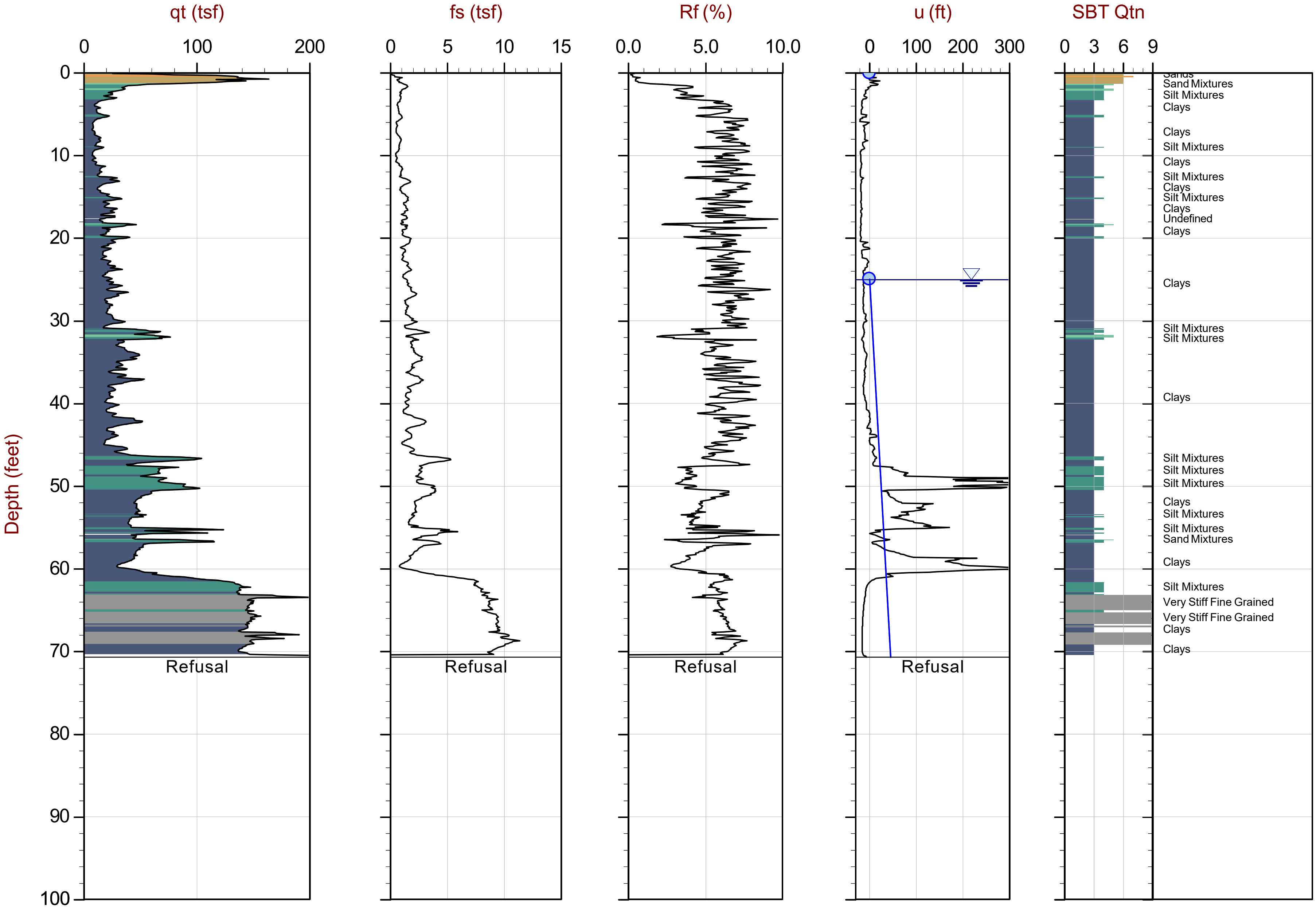
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 11:13
Site: DTE Monroe Power Plant

Sounding: CPT20-026
Cone: 551:T1500F15U500



Max Depth: 21.550 m / 70.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP026.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142864ft E: 13395239ft
Sheet No: 1 of 1

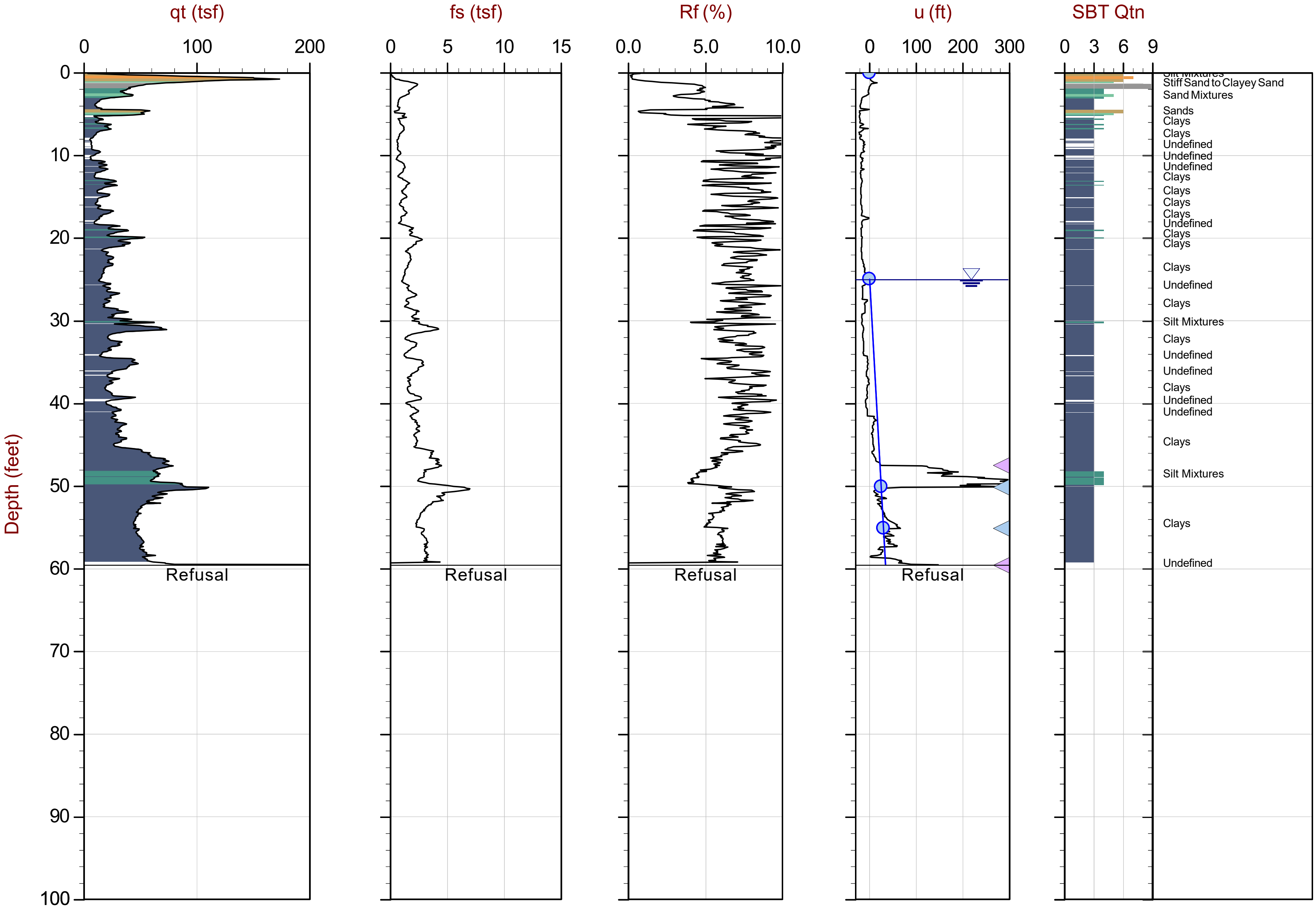
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500



Max Depth: 18.150 m / 59.55 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP028.COR
Unit Wt: SBTQtn (PKR2009)

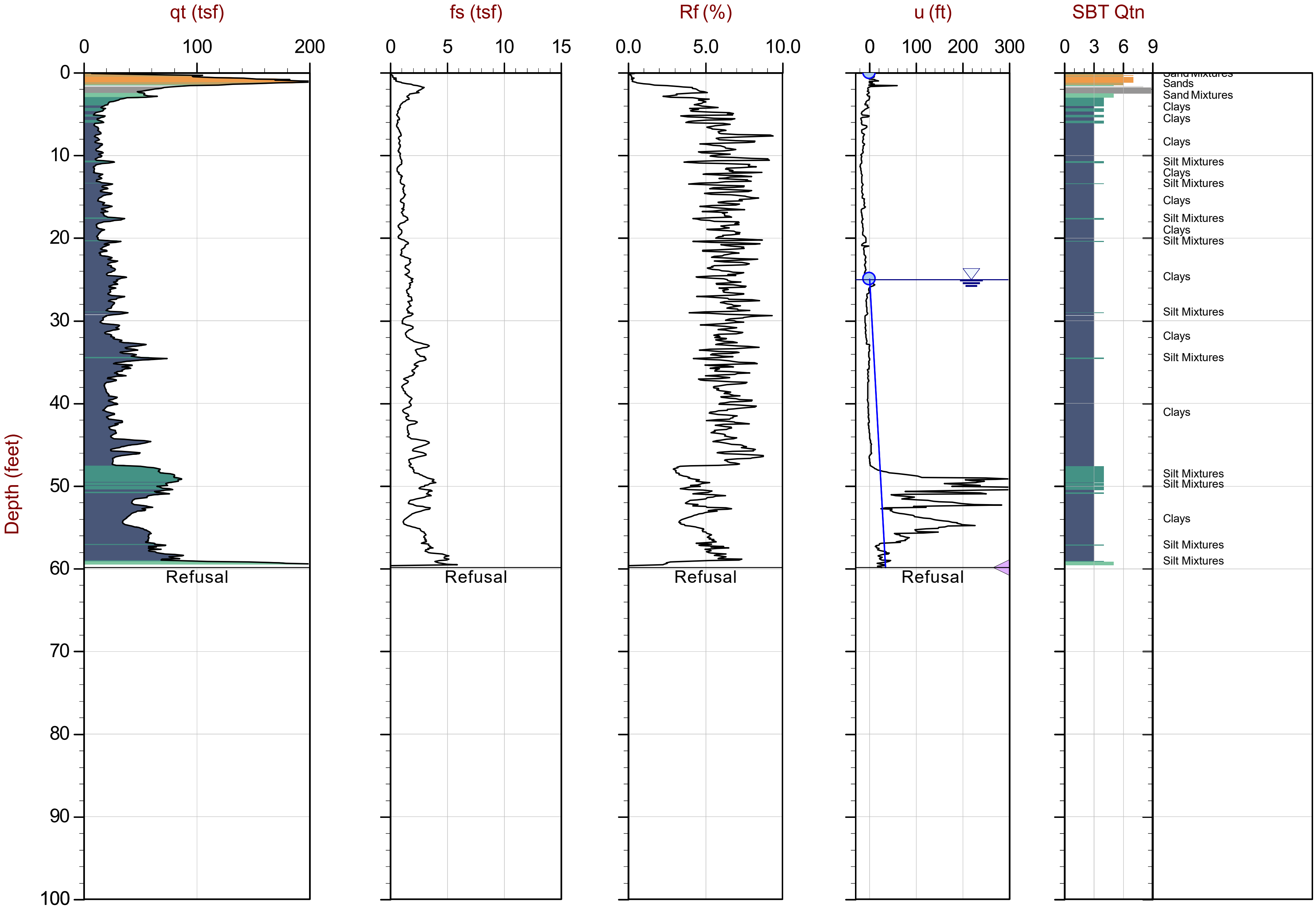
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142938ft E: 13395052ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 12:31
Site: DTE Monroe Power Plant

Sounding: CPT20-030
Cone: 551:T1500F15U500



Max Depth: 18.250 m / 59.87 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP030.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143004ft E: 13394895ft
Sheet No: 1 of 1

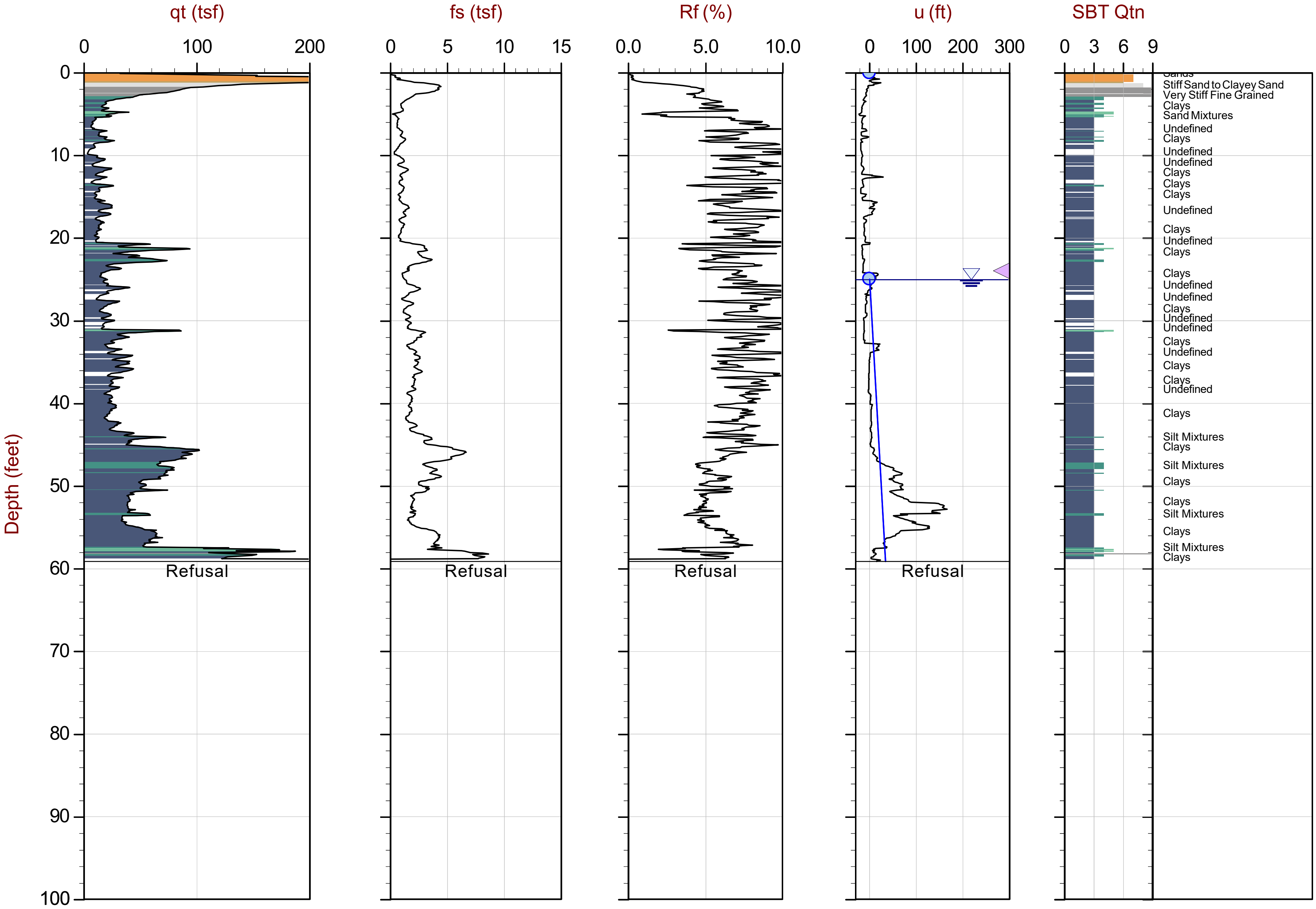
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 13:26
Site: DTE Monroe Power Plant

Sounding: CPT20-032
Cone: 551:T1500F15U500



Max Depth: 18.025 m / 59.14 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP032.COR
Unit Wt: SBTQtn (PKR2009)

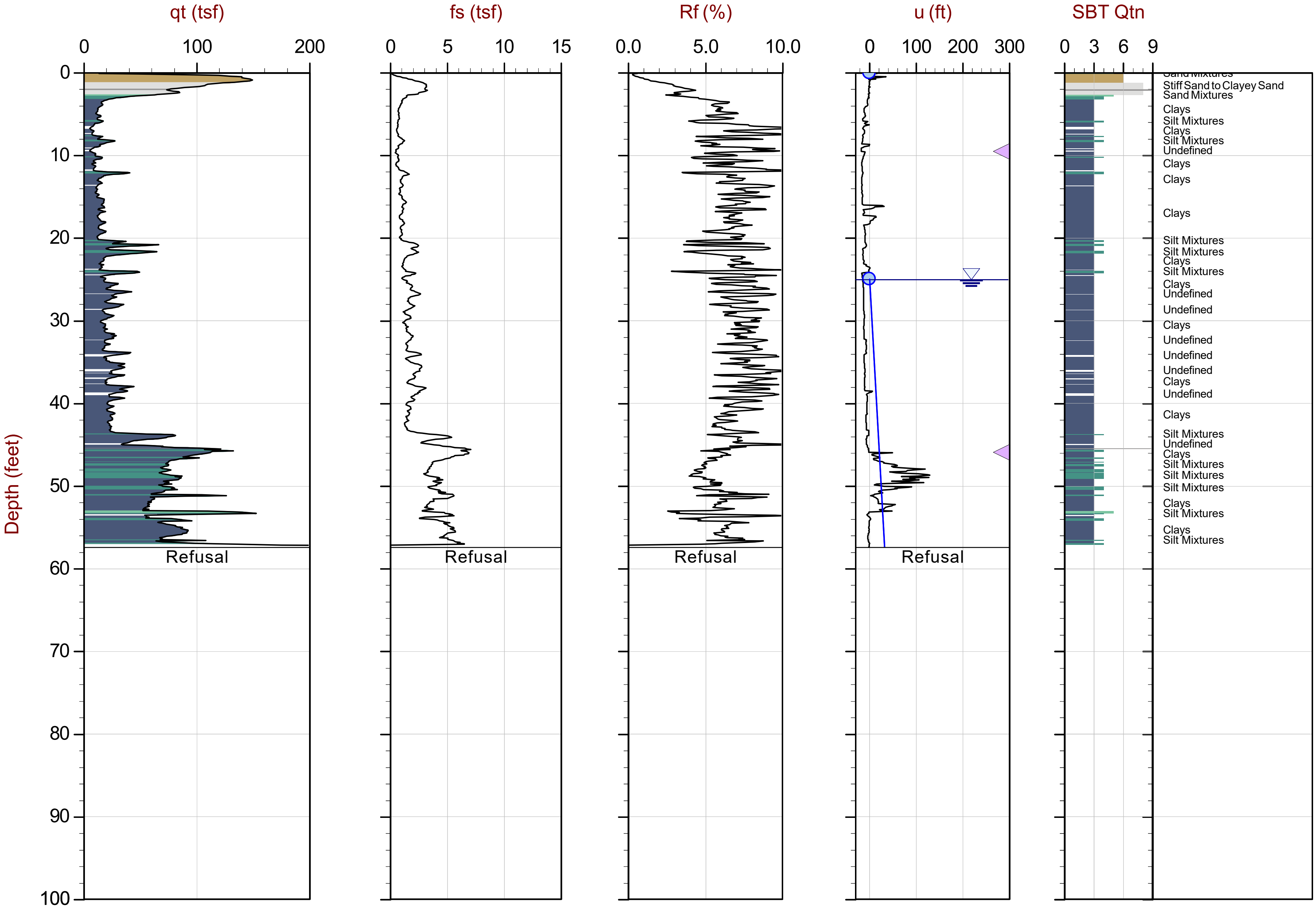
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142939ft E: 13394710ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-03 14:24
Site: DTE Monroe Power Plant

Sounding: CPT20-034
Cone: 551:T1500F15U500



Max Depth: 17.500 m / 57.41 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP034.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142785ft E: 13394560ft
Sheet No: 1 of 1

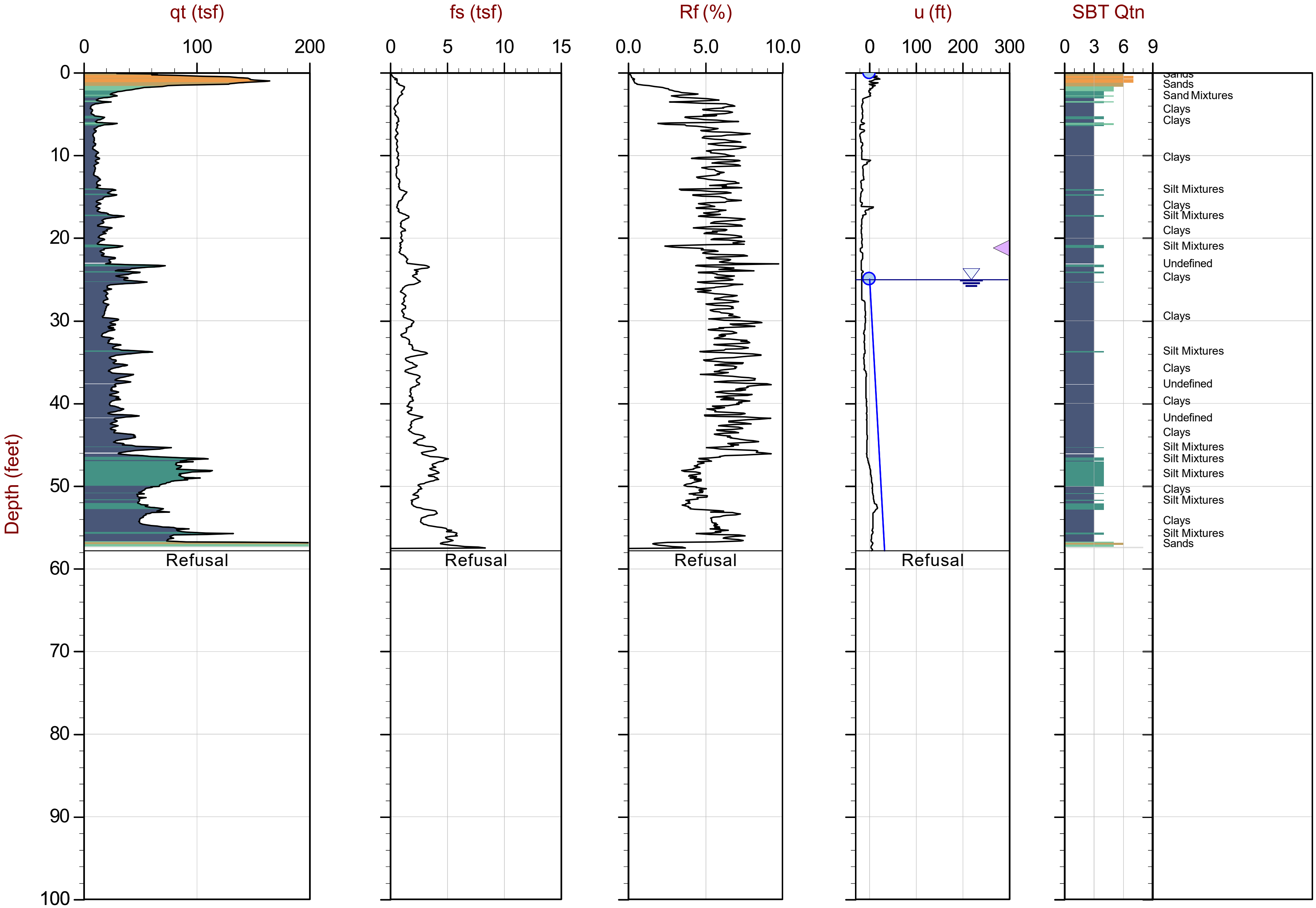
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 09:07
Site: DTE Monroe Power Plant

Sounding: CPT20-036
Cone: 551:T1500F15U500



Max Depth: 17.625 m / 57.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP036.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142655ft E: 13394432ft
Sheet No: 1 of 1

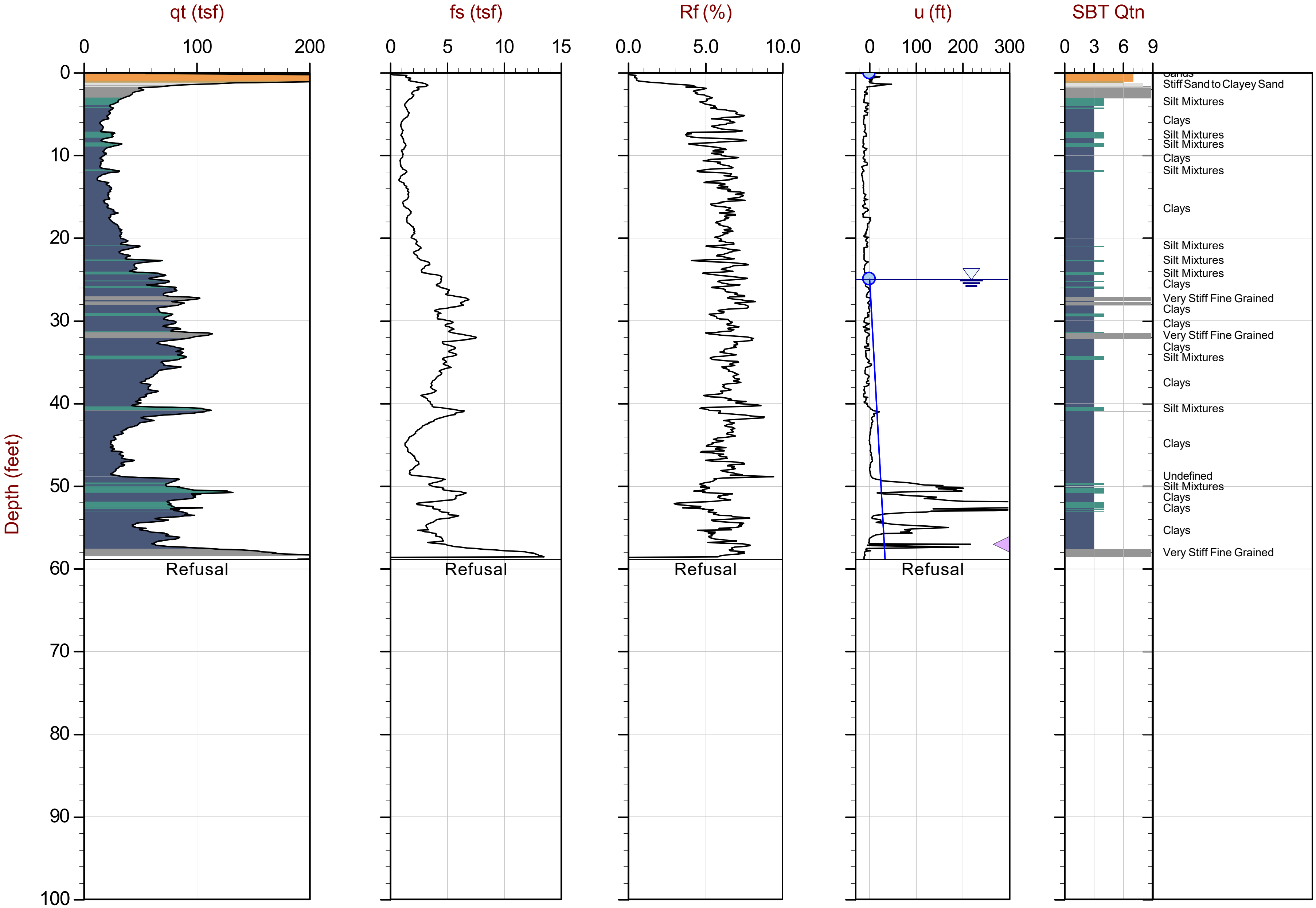
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 10:59
Site: DTE Monroe Power Plant

Sounding: CPT20-038
Cone: 551:T1500F15U500



Max Depth: 17.950 m / 58.89 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP038.COR
Unit Wt: SBTQtn (PKR2009)

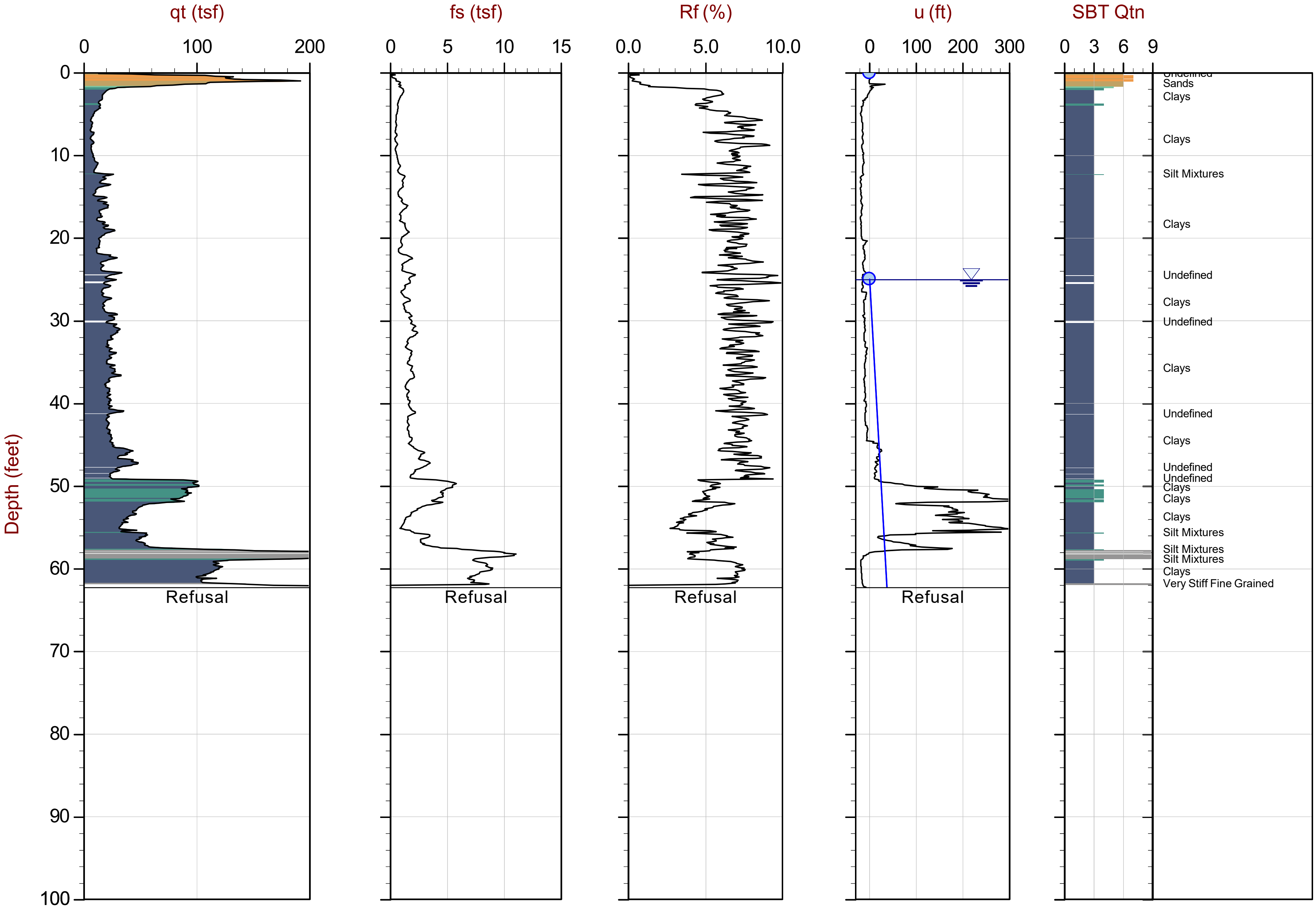
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142596ft E: 13394252ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 12:50
Site: DTE Monroe Power Plant

Sounding: CPT20-040
Cone: 551:T1500F15U500



Max Depth: 18.975 m / 62.25 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP040.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142693ft E: 13394075ft
Sheet No: 1 of 1

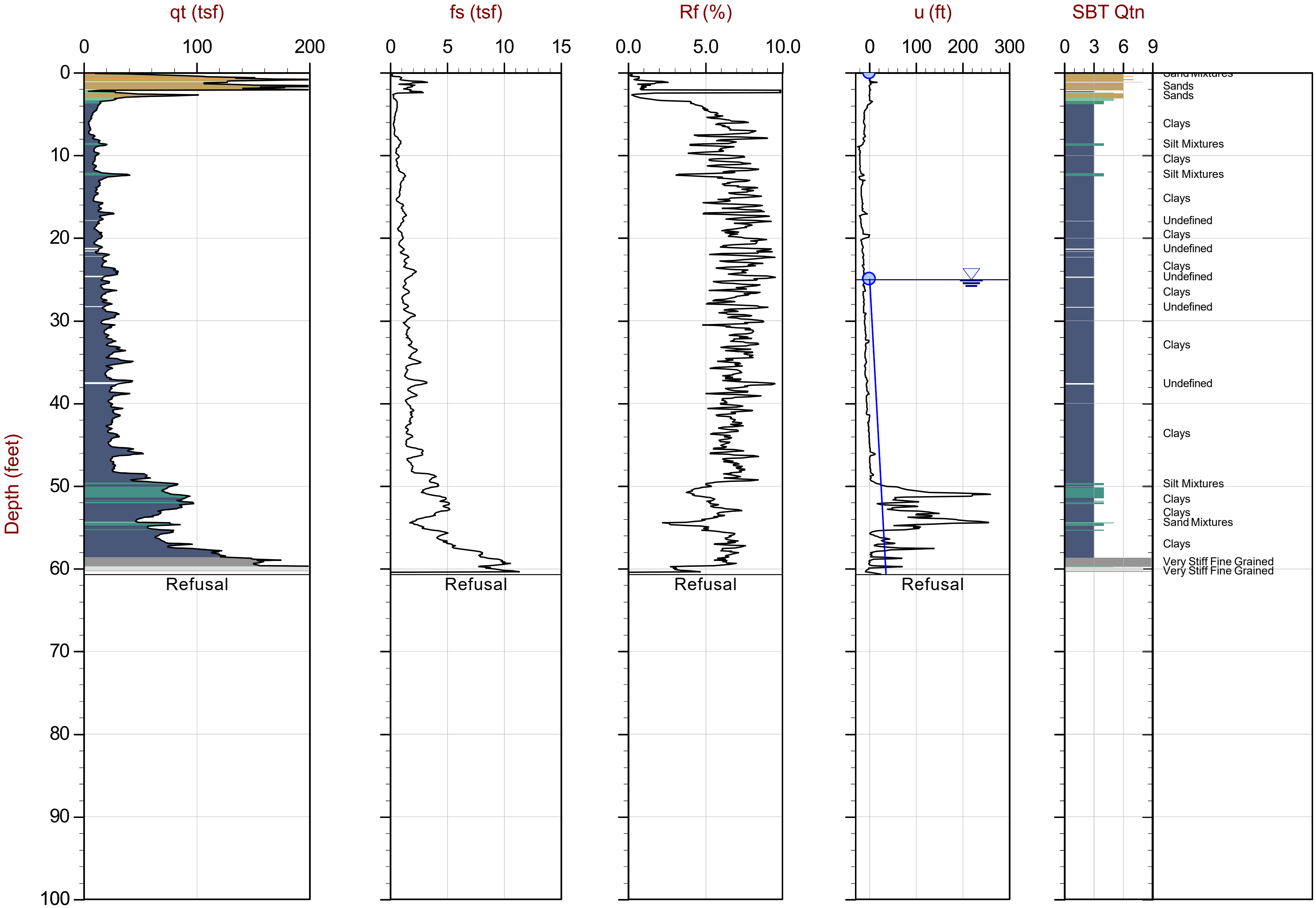
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 13:47
Site: DTE Monroe Power Plant

Sounding: CPT20-042
Cone: 551:T1500F15U500



Max Depth: 18.500 m / 60.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP042.COR
Unit Wt: SBTQtn (PKR2009)

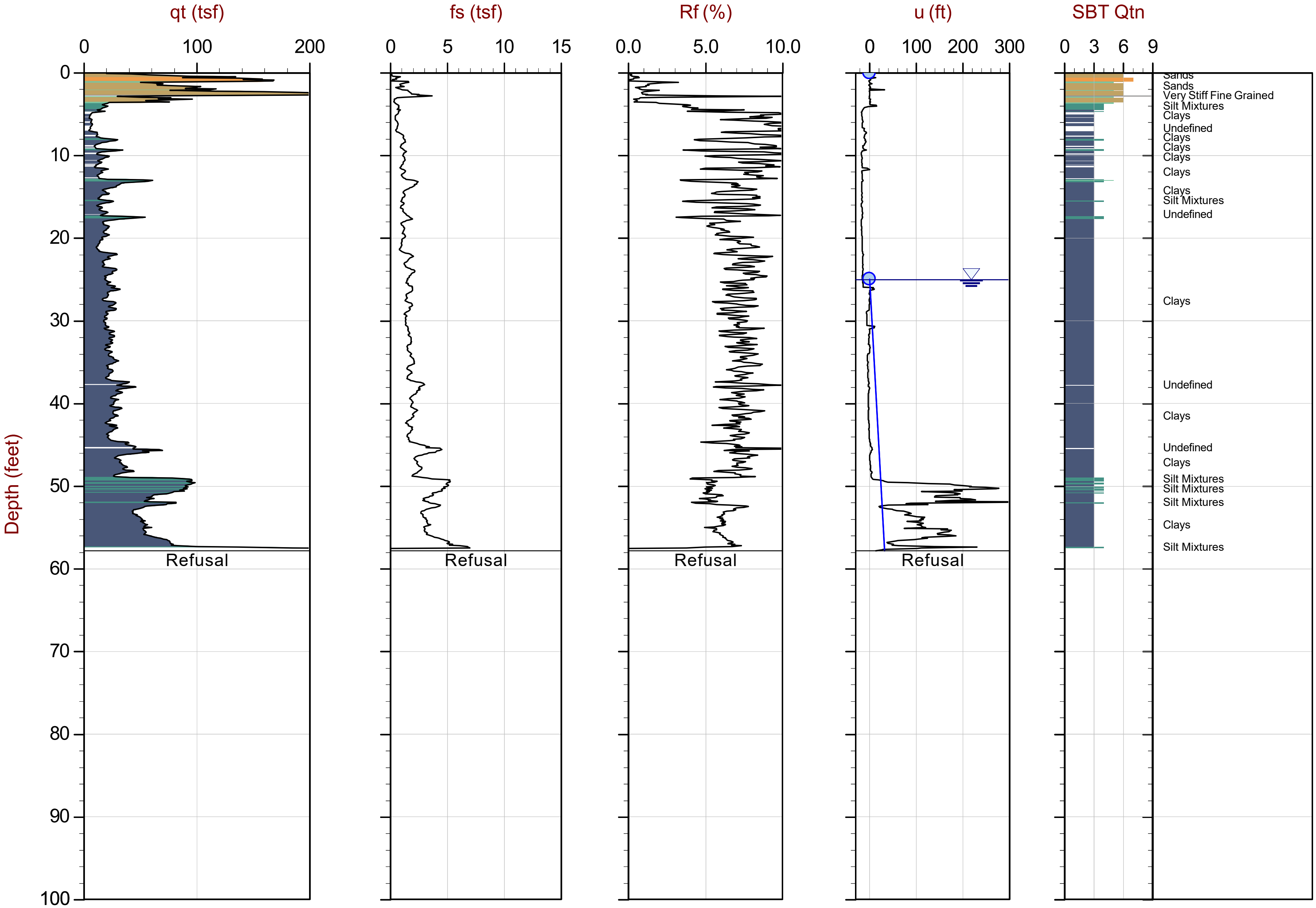
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142835ft E: 13393929ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-04 14:41
Site: DTE Monroe Power Plant

Sounding: CPT20-044
Cone: 551:T1500F15U500



Max Depth: 17.625 m / 57.82 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP044.COR
Unit Wt: SBTQtn (PKR2009)

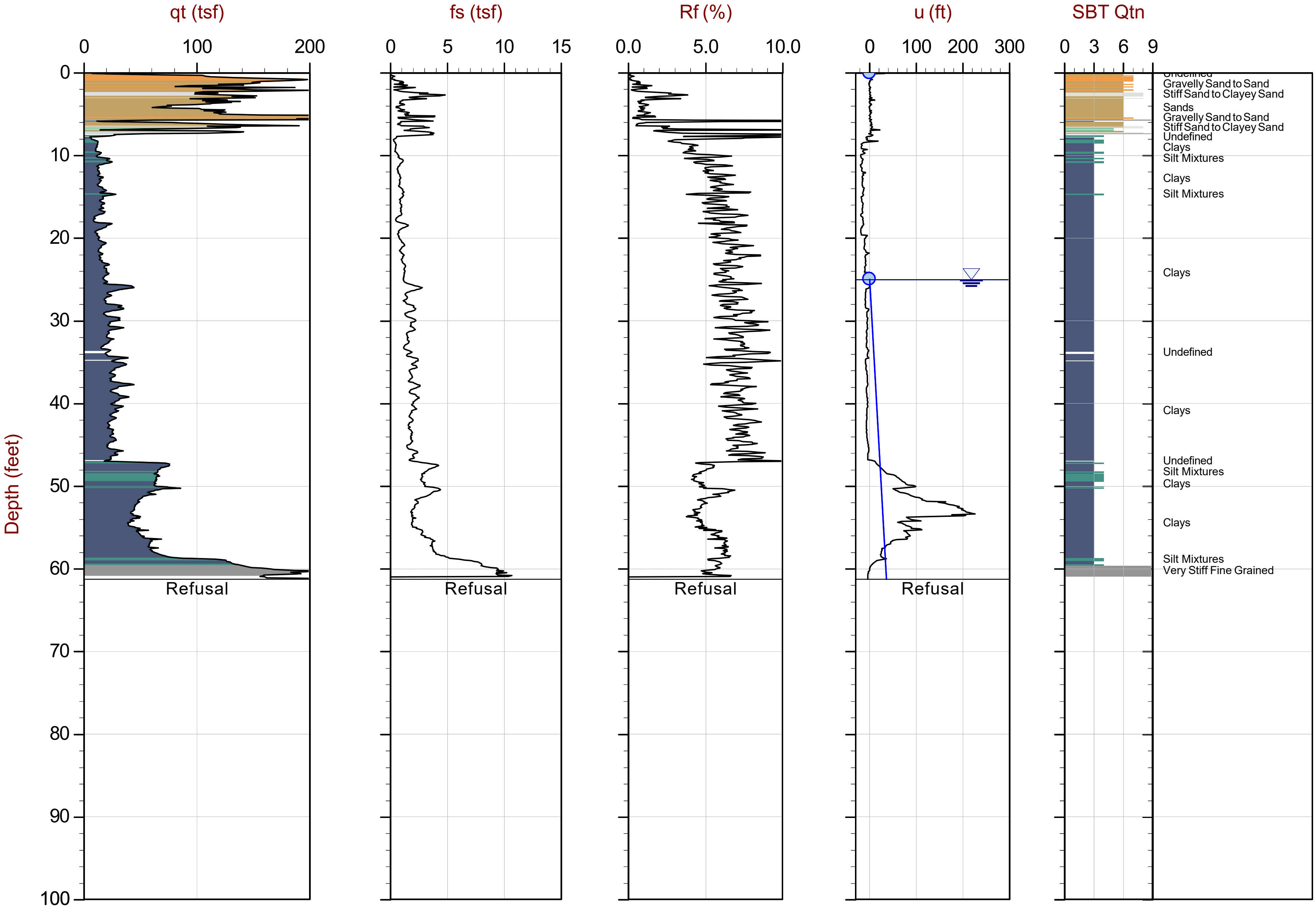
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142982ft E: 13393790ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-046
Cone: 551:T1500F15U500



Max Depth: 18.675 m / 61.27 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP046.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143108ft E: 13393655ft
Sheet No: 1 of 1

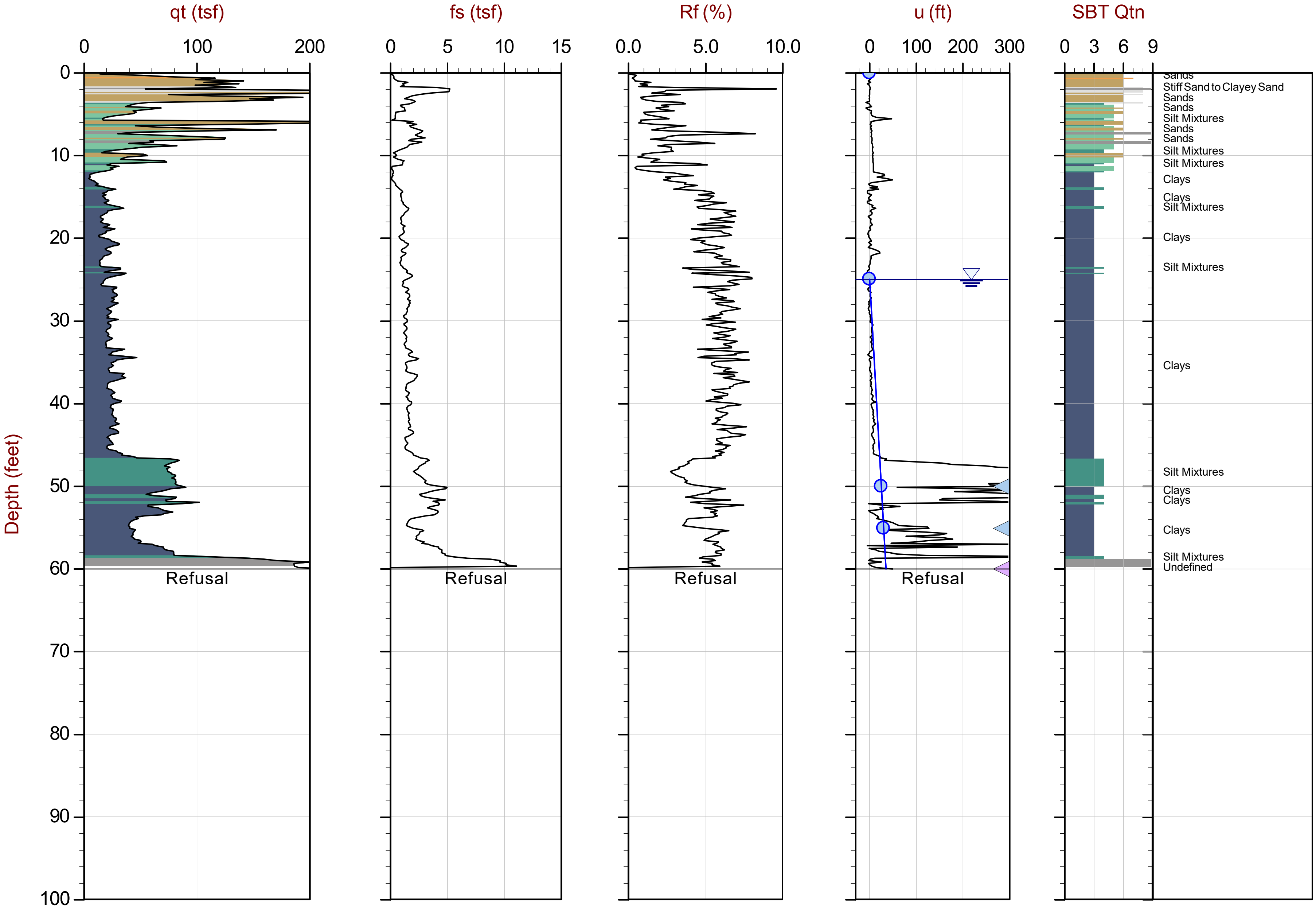
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-13 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500



Max Depth: 18.300 m / 60.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP048.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143131ft E: 13393508ft
Sheet No: 1 of 1

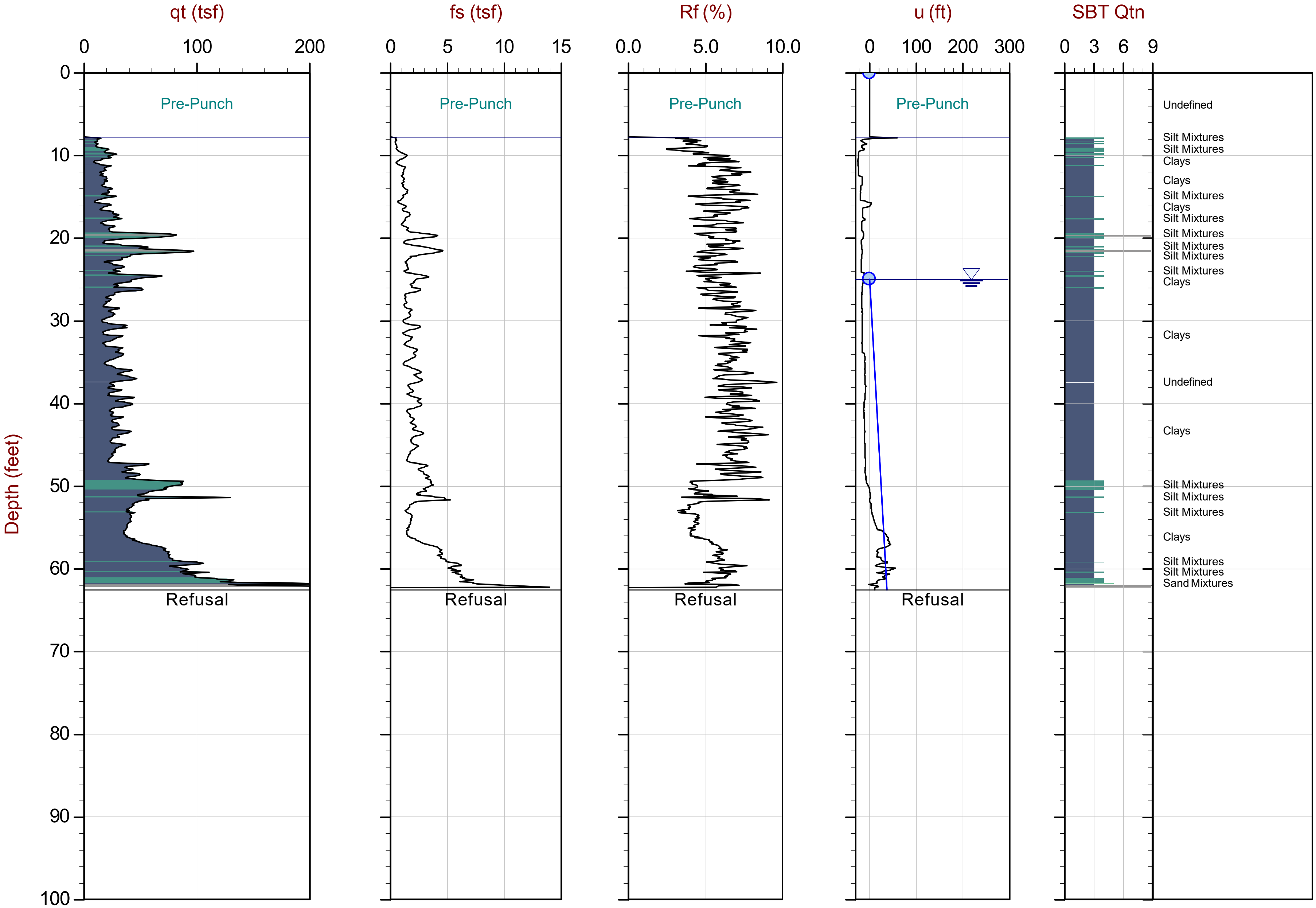
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 10:01
Site: DTE Monroe Power Plant

Sounding: SCPT20-050
Cone: 551:T1500F15U500



Max Depth: 19.075 m / 62.58 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_SP050.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143162ft E: 13393217ft
Sheet No: 1 of 1

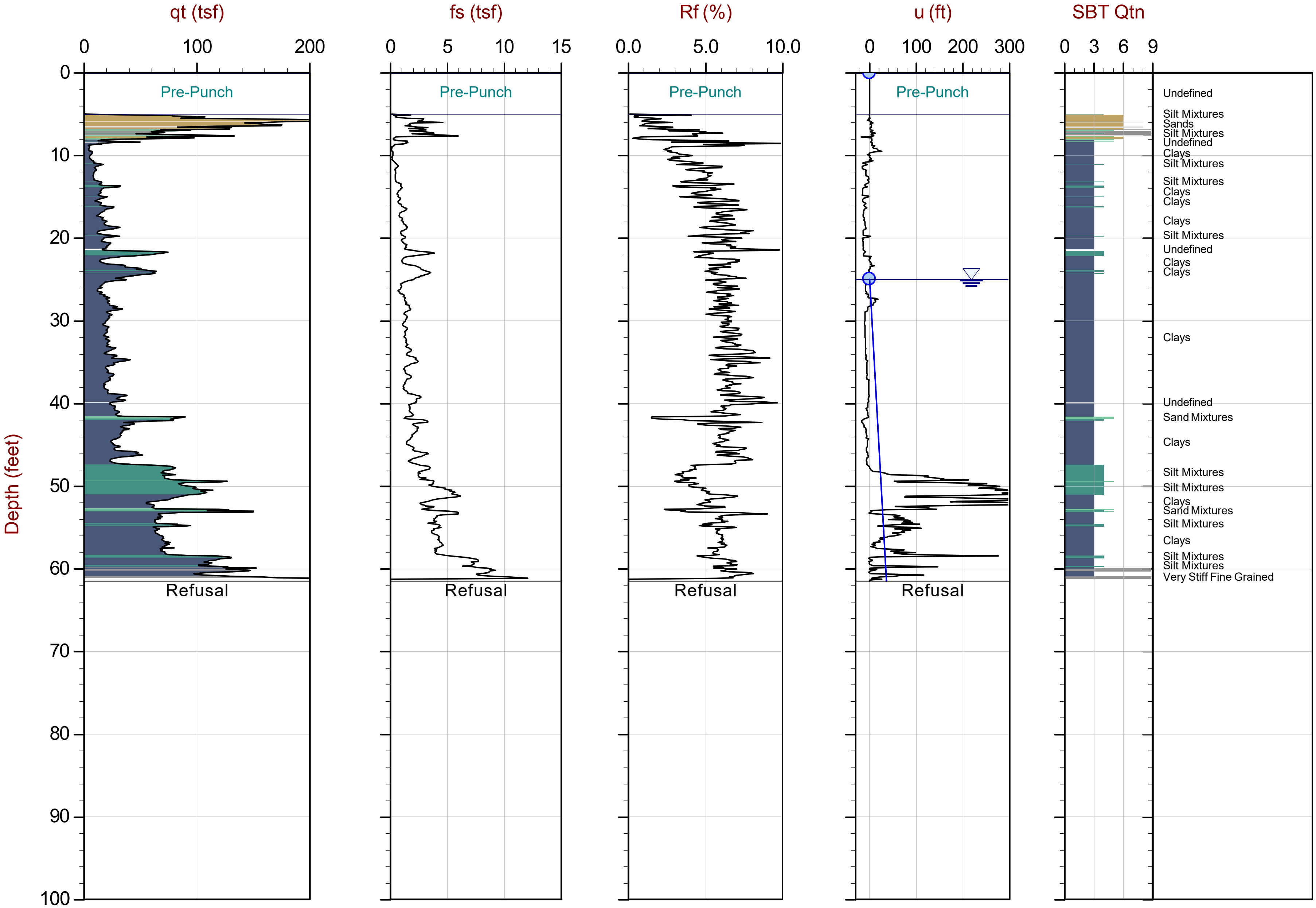
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-052
Cone: 551:T1500F15U500



Max Depth: 18.750 m / 61.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP052.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143174ft E: 13393046ft
Sheet No: 1 of 1

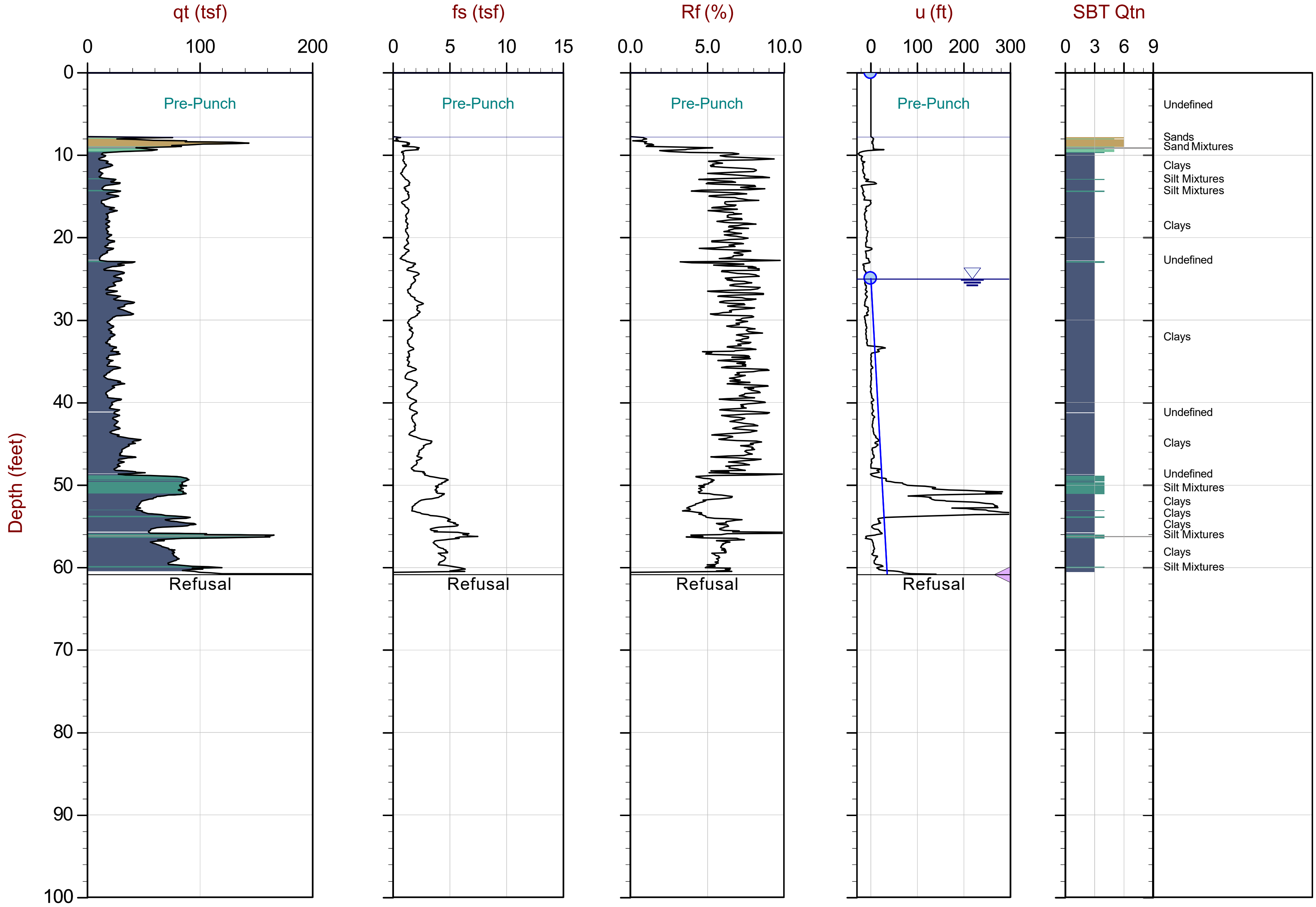
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 12:28
Site: DTE Monroe Power Plant

Sounding: CPT20-054
Cone: 551:T1500F15U500



Max Depth: 18.550 m / 60.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP054.COR
Unit Wt: SBTQtn (PKR2009)

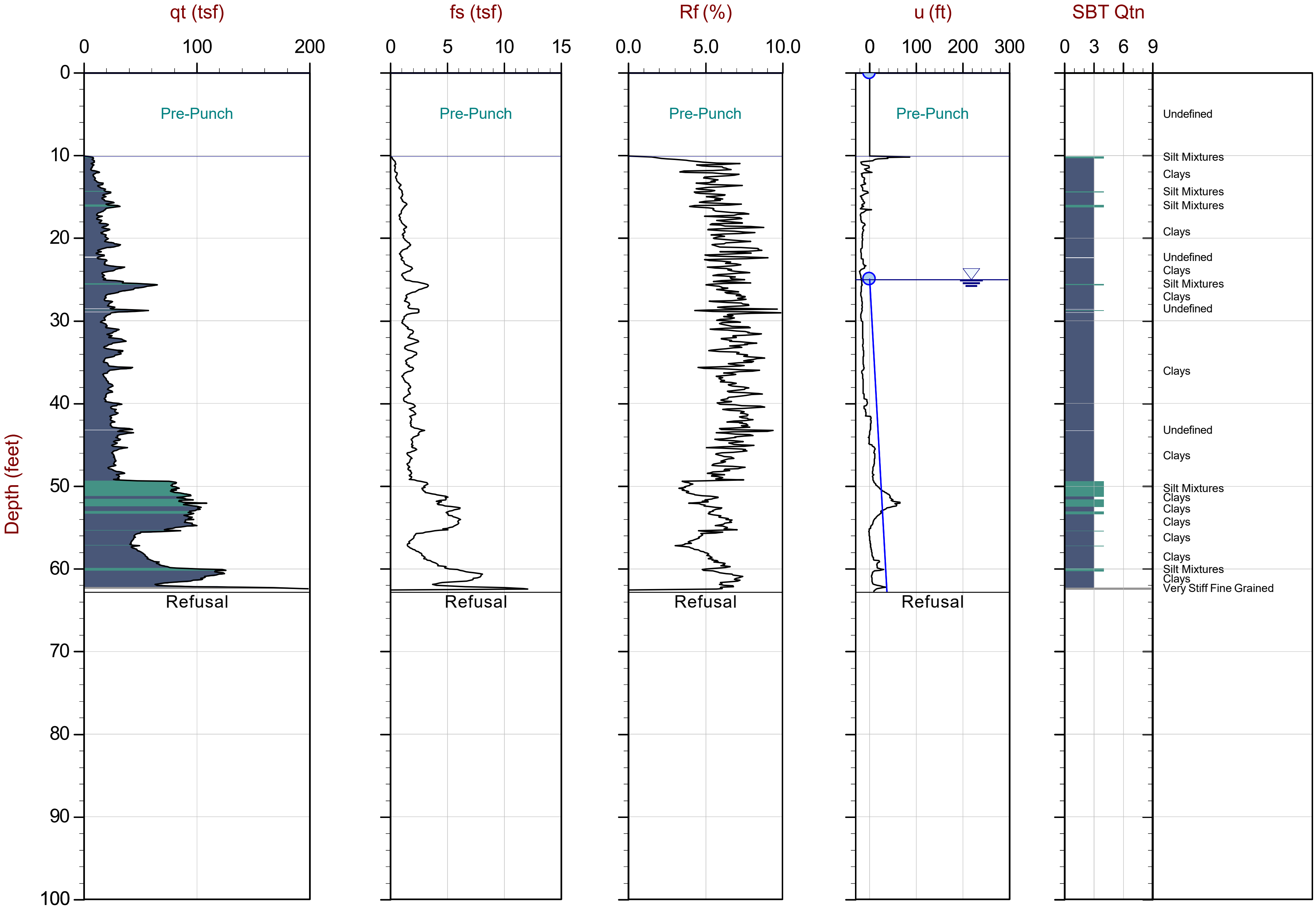
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143198ft E: 13392845ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-05 13:29
Site: DTE Monroe Power Plant

Sounding: CPT20-056
Cone: 551:T1500F15U500



Max Depth: 19.150 m / 62.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP056.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143212ft E: 13392641ft
Sheet No: 1 of 1

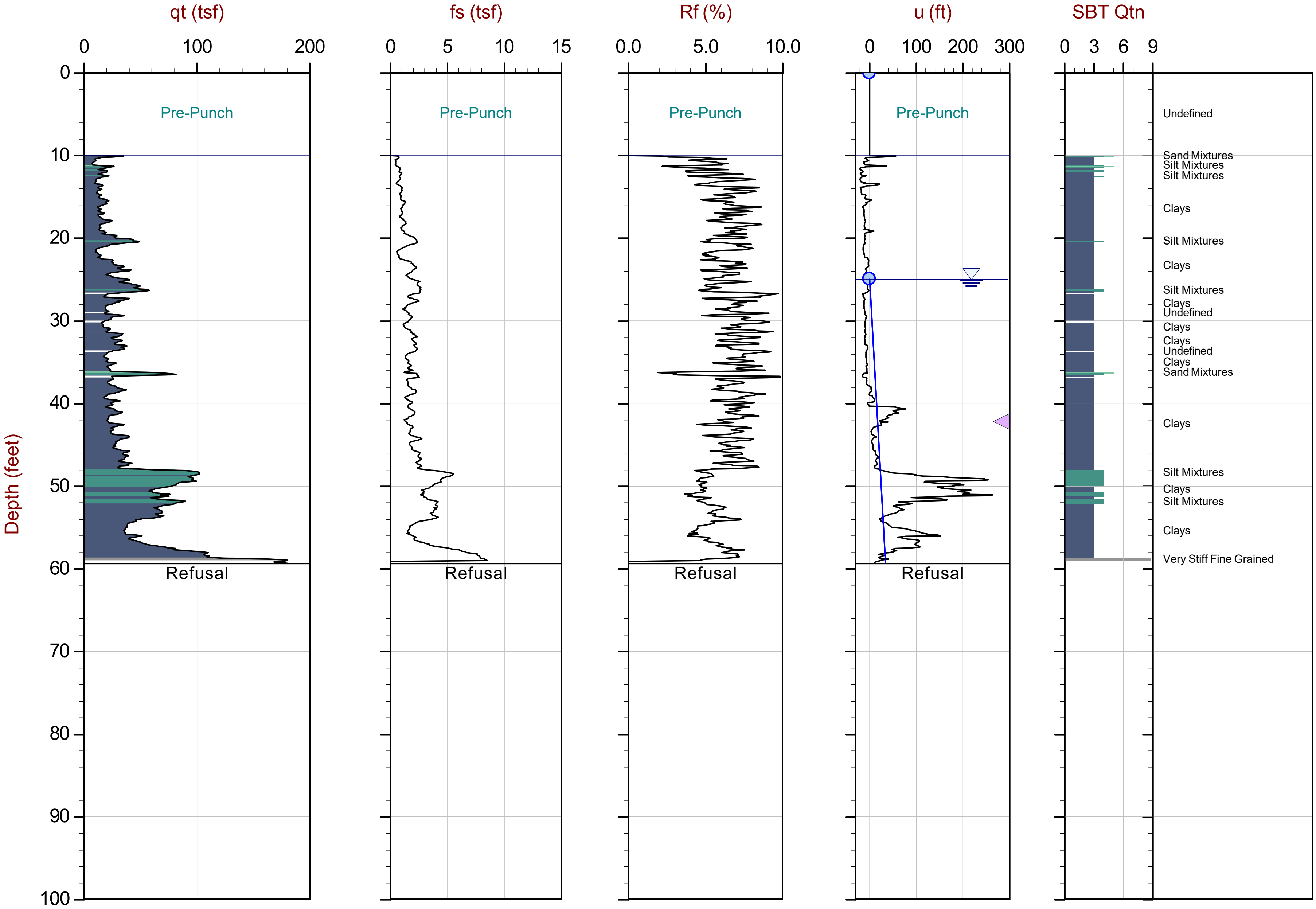
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-058
Cone: 551:T1500F15U500



Max Depth: 18.100 m / 59.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP058.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143229ft E: 13392449ft
Sheet No: 1 of 1

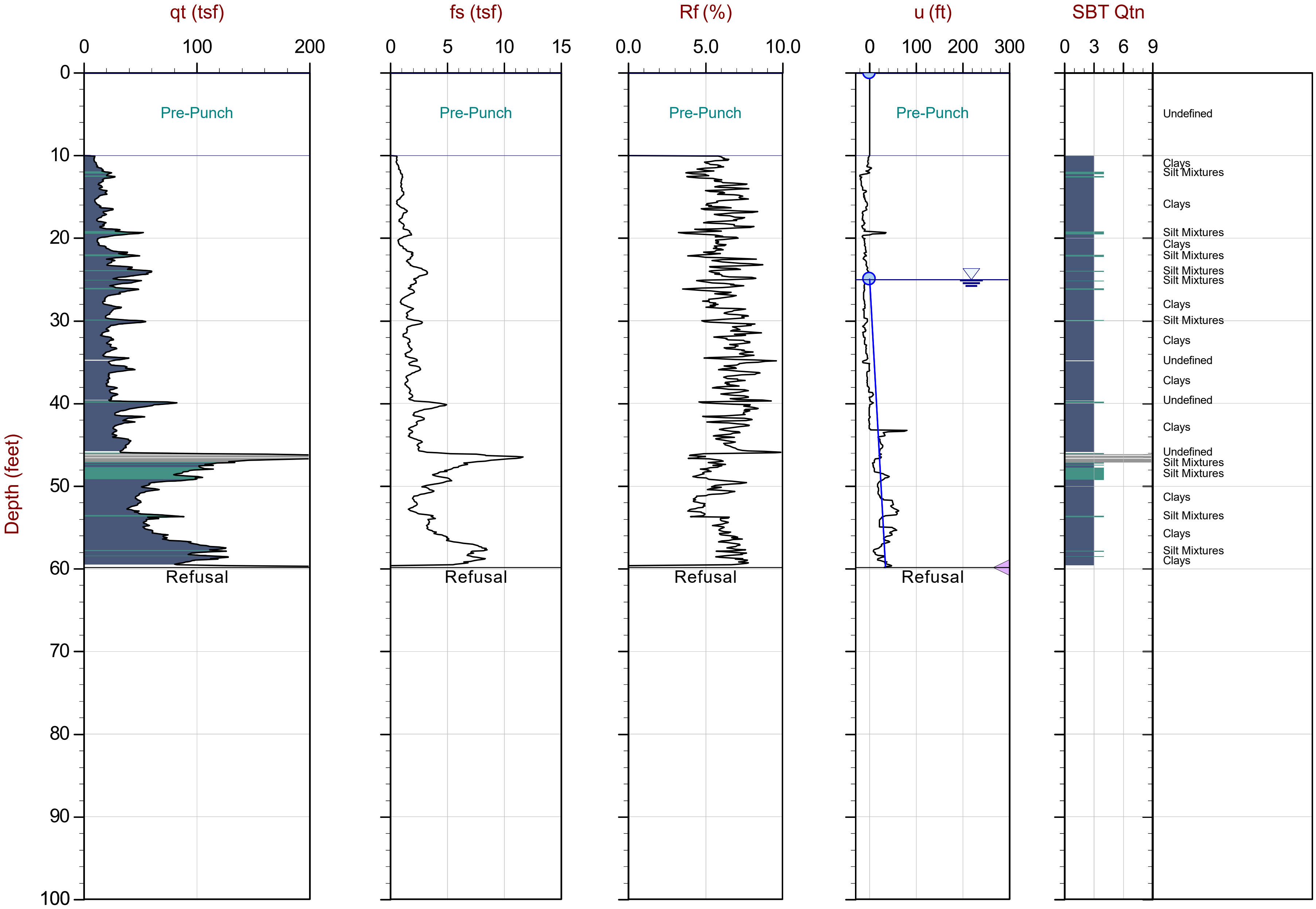
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 12:21
Site: DTE Monroe Power Plant

Sounding: CPT20-060
Cone: 551:T1500F15U500



Max Depth: 18.250 m / 59.87 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP060.COR
Unit Wt: SBTQtn (PKR2009)

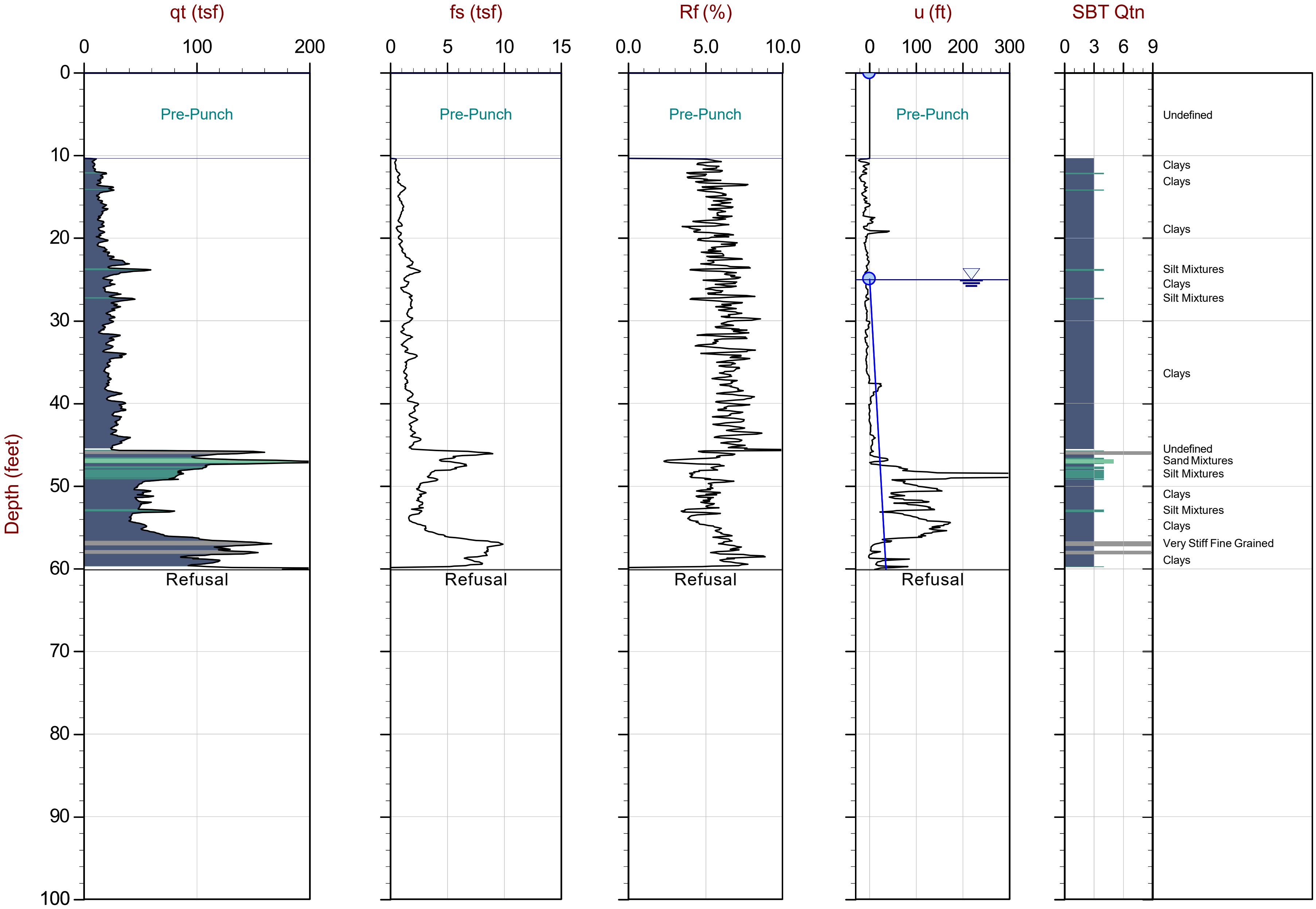
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143248ft E: 13392268ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 11:16
Site: DTE Monroe Power Plant

Sounding: CPT20-062
Cone: 551:T1500F15U500



Max Depth: 18.325 m / 60.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP062.COR
Unit Wt: SBTQtn (PKR2009)

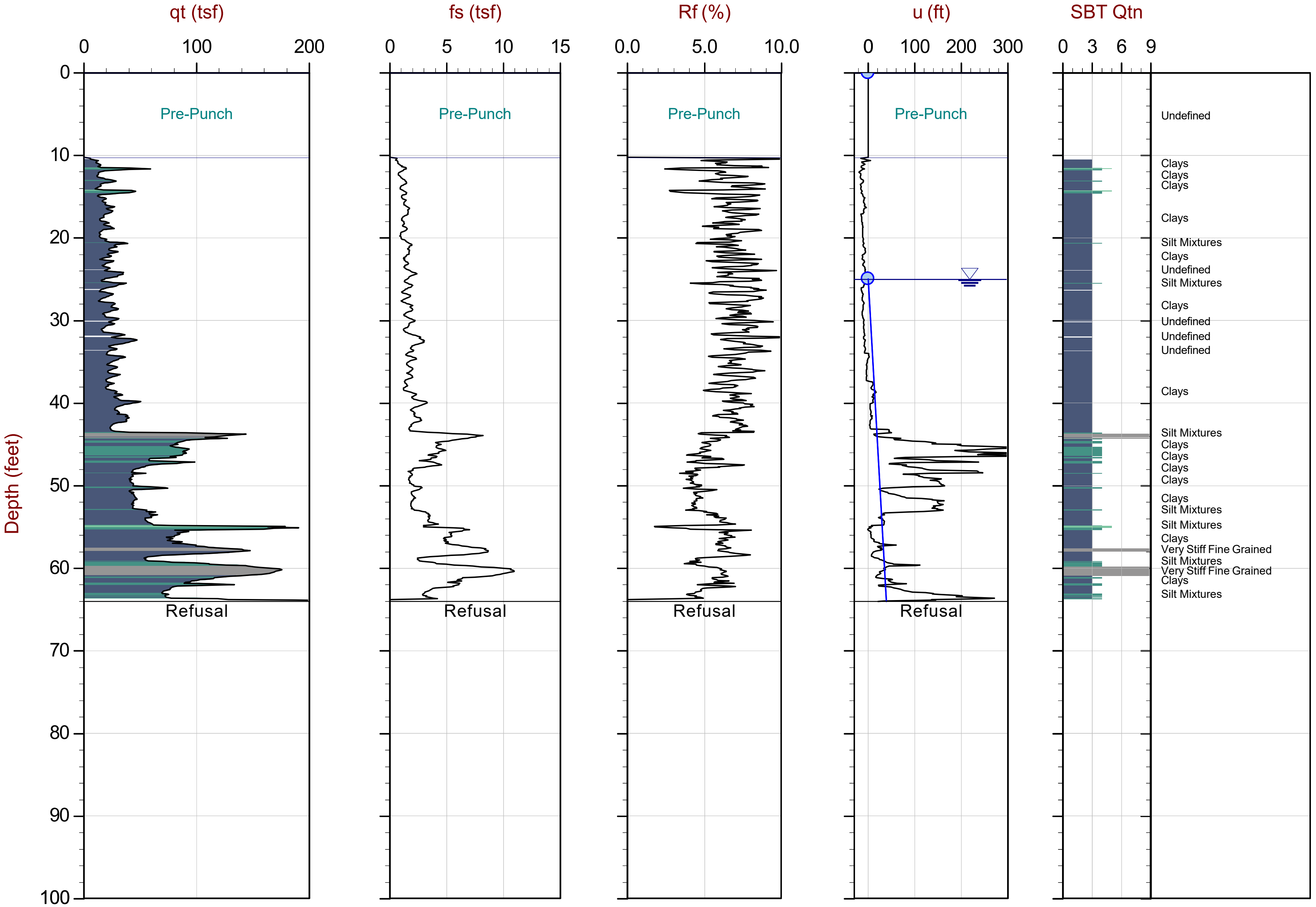
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143281ft E: 13392058ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 10:05
Site: DTE Monroe Power Plant

Sounding: CPT20-064
Cone: 551:T1500F15U500



Max Depth: 19.525 m / 64.06 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP064.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143336ft E: 13391874ft
Sheet No: 1 of 1

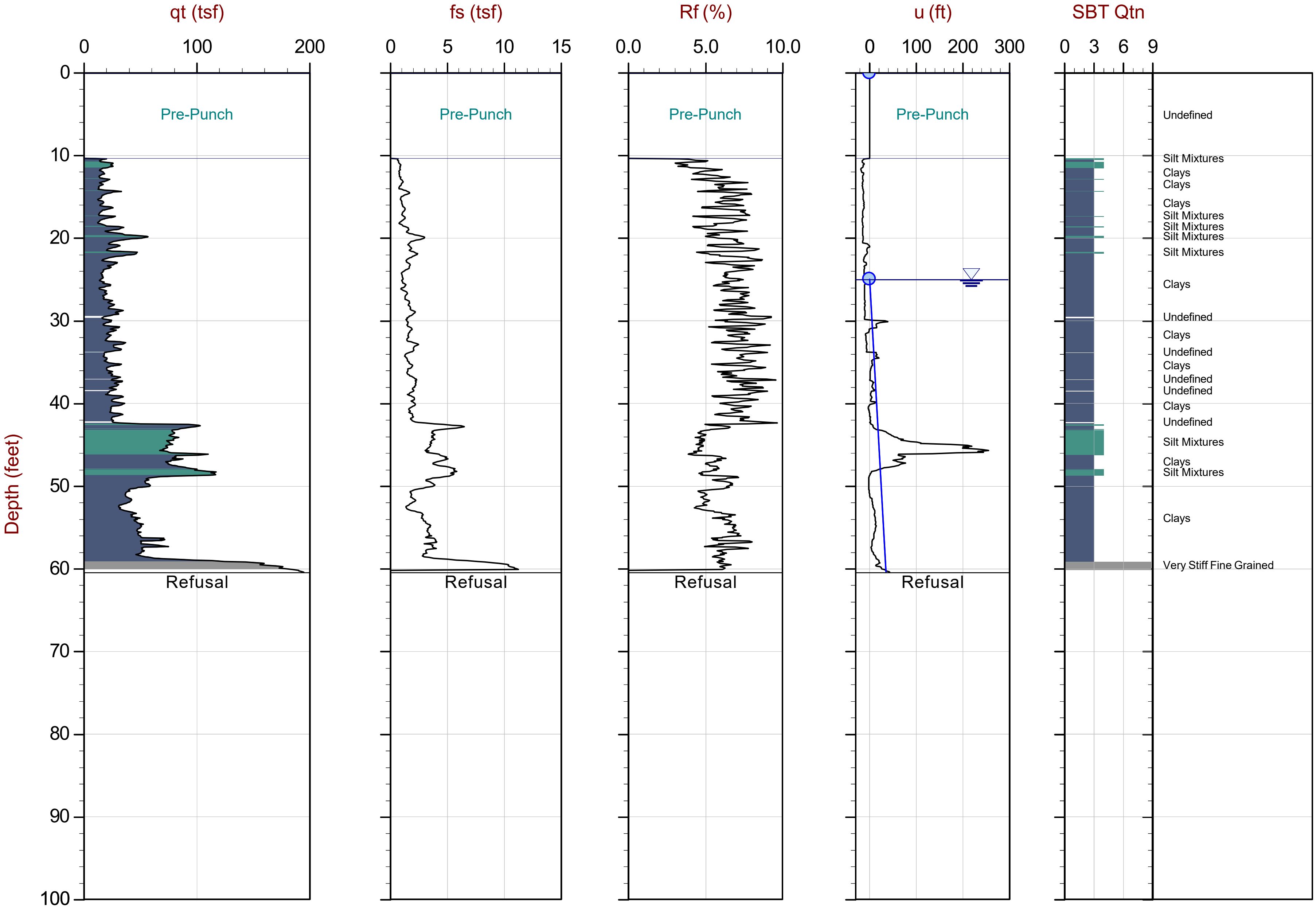
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-06 09:06
Site: DTE Monroe Power Plant

Sounding: CPT20-066
Cone: 551:T1500F15U500



Max Depth: 18.425 m / 60.45 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP066.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143404ft E: 13391672ft
Sheet No: 1 of 1

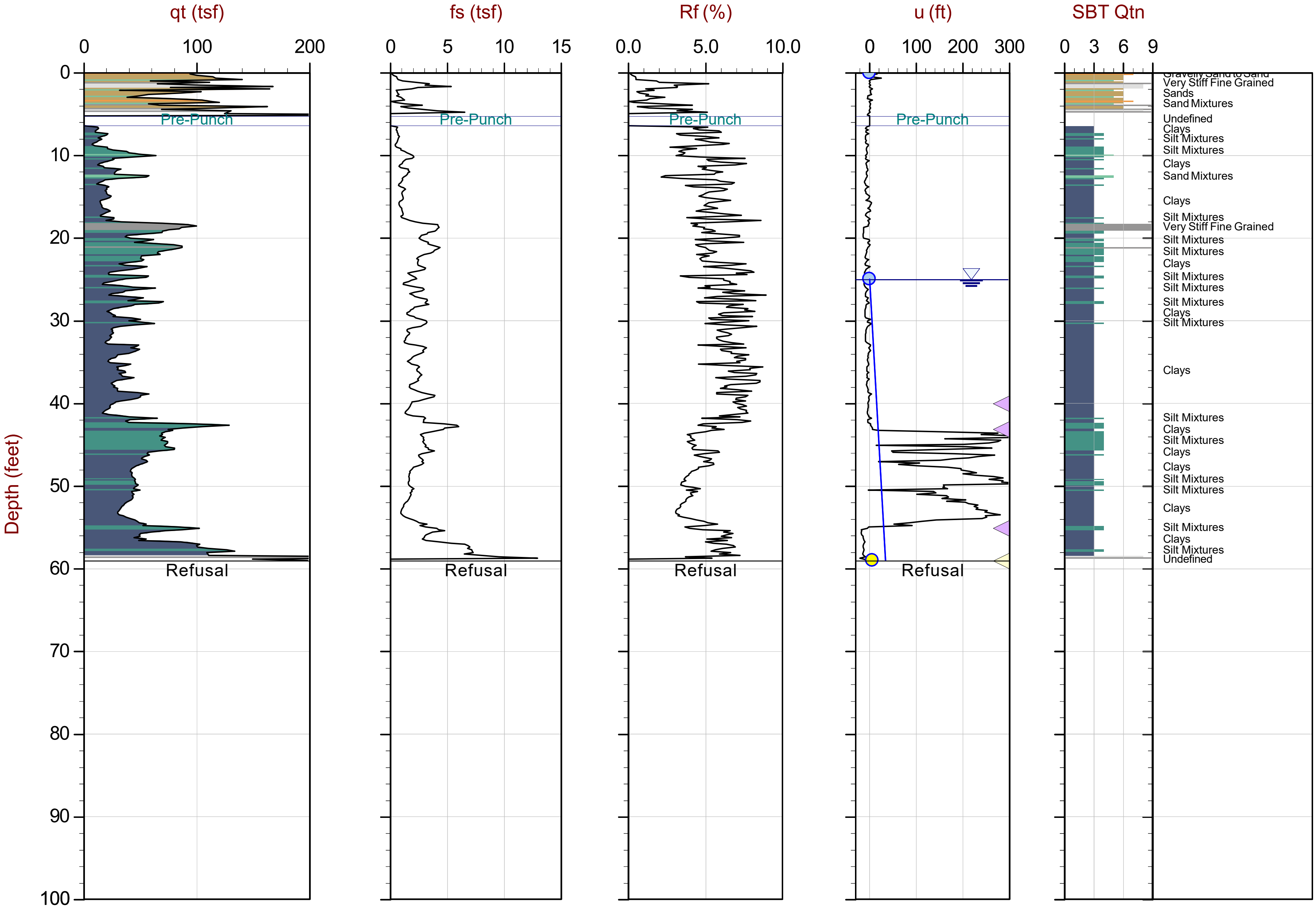
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-13 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500



Max Depth: 18.000 m / 59.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP068.COR
Unit Wt: SBTQtn (PKR2009)

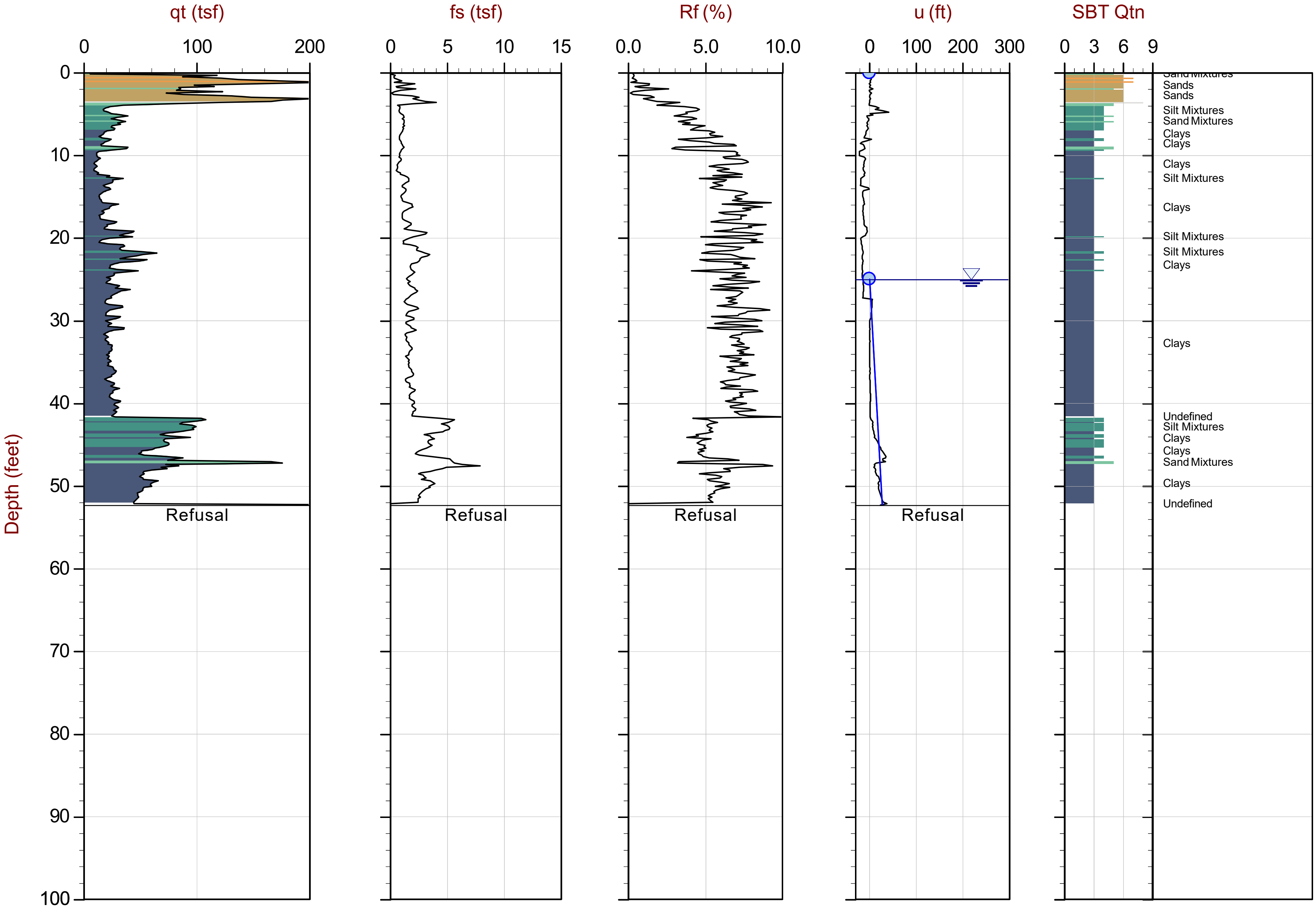
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143440ft E: 13391531ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 12:13
Site: DTE Monroe Power Plant

Sounding: CPT20-070
Cone: 567:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP070.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143314ft E: 13391366ft
Sheet No: 1 of 1

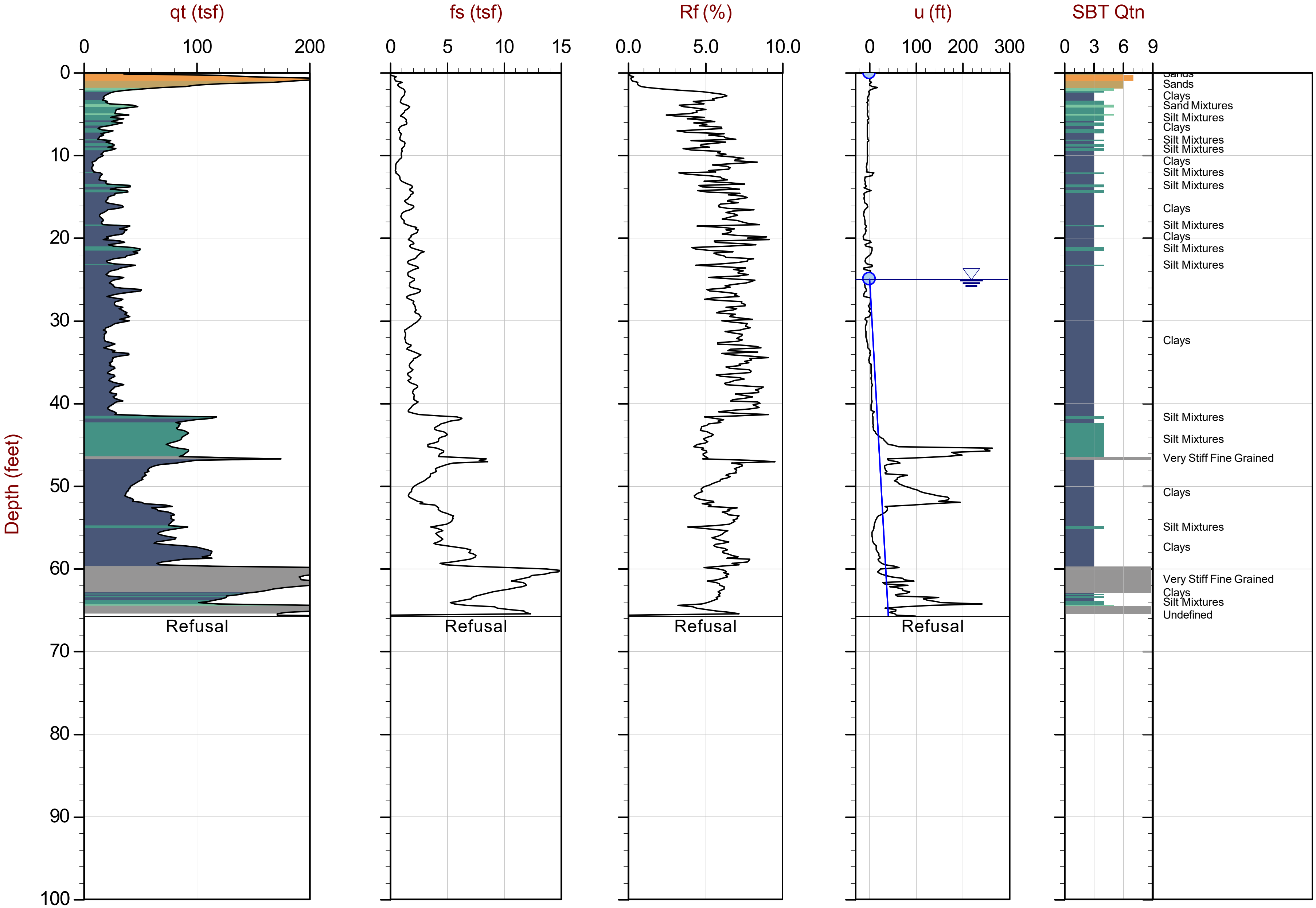
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 13:28
Site: DTE Monroe Power Plant

Sounding: CPT20-072
Cone: 567:T1500F15U500



Max Depth: 20.050 m / 65.78 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP072.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143165ft E: 13391247ft
Sheet No: 1 of 1

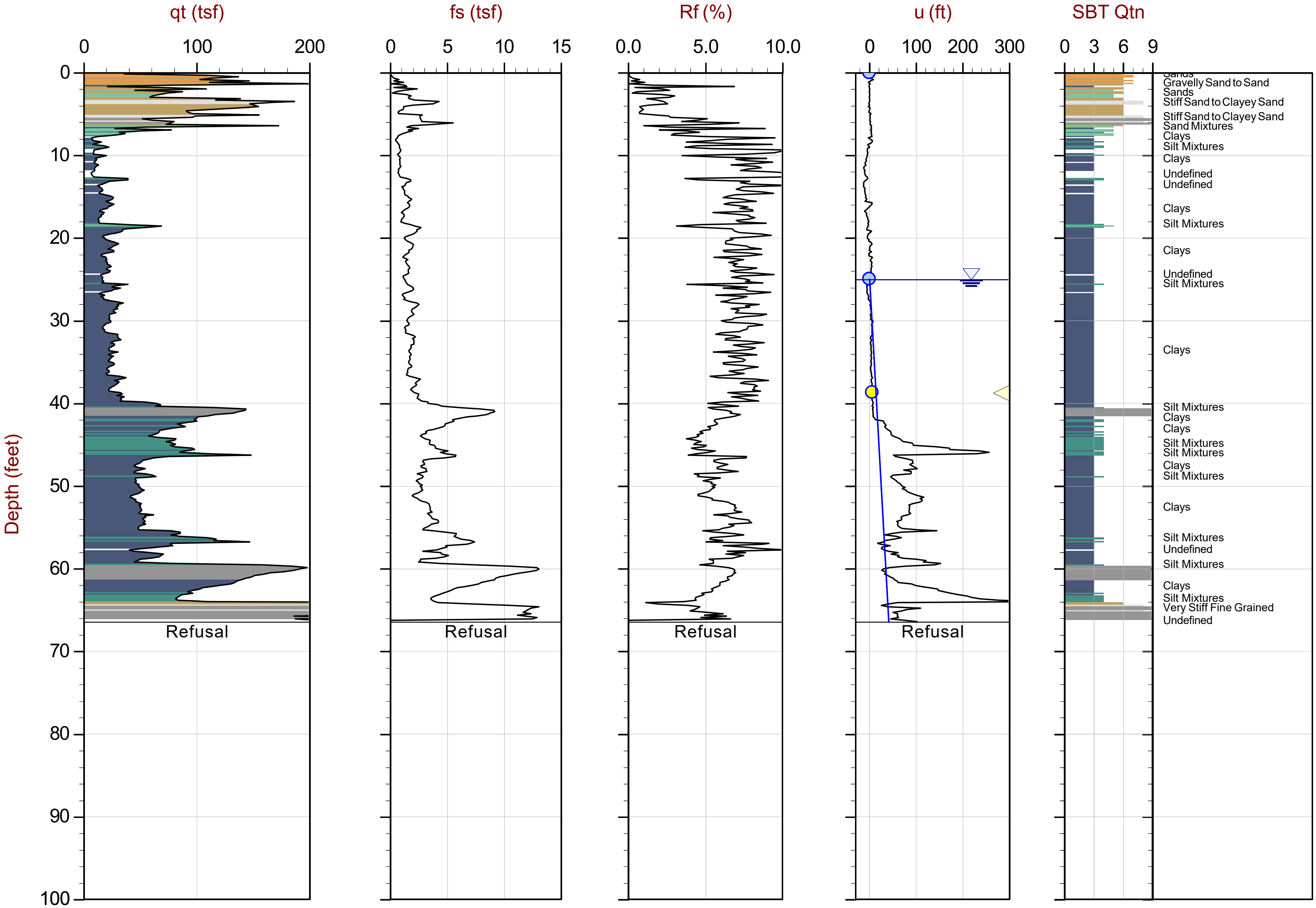
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-02 14:17
Site: DTE Monroe Power Plant

Sounding: CPT20-074
Cone: 567:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP074.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 143014ft E: 13391154ft
Sheet No: 1 of 1

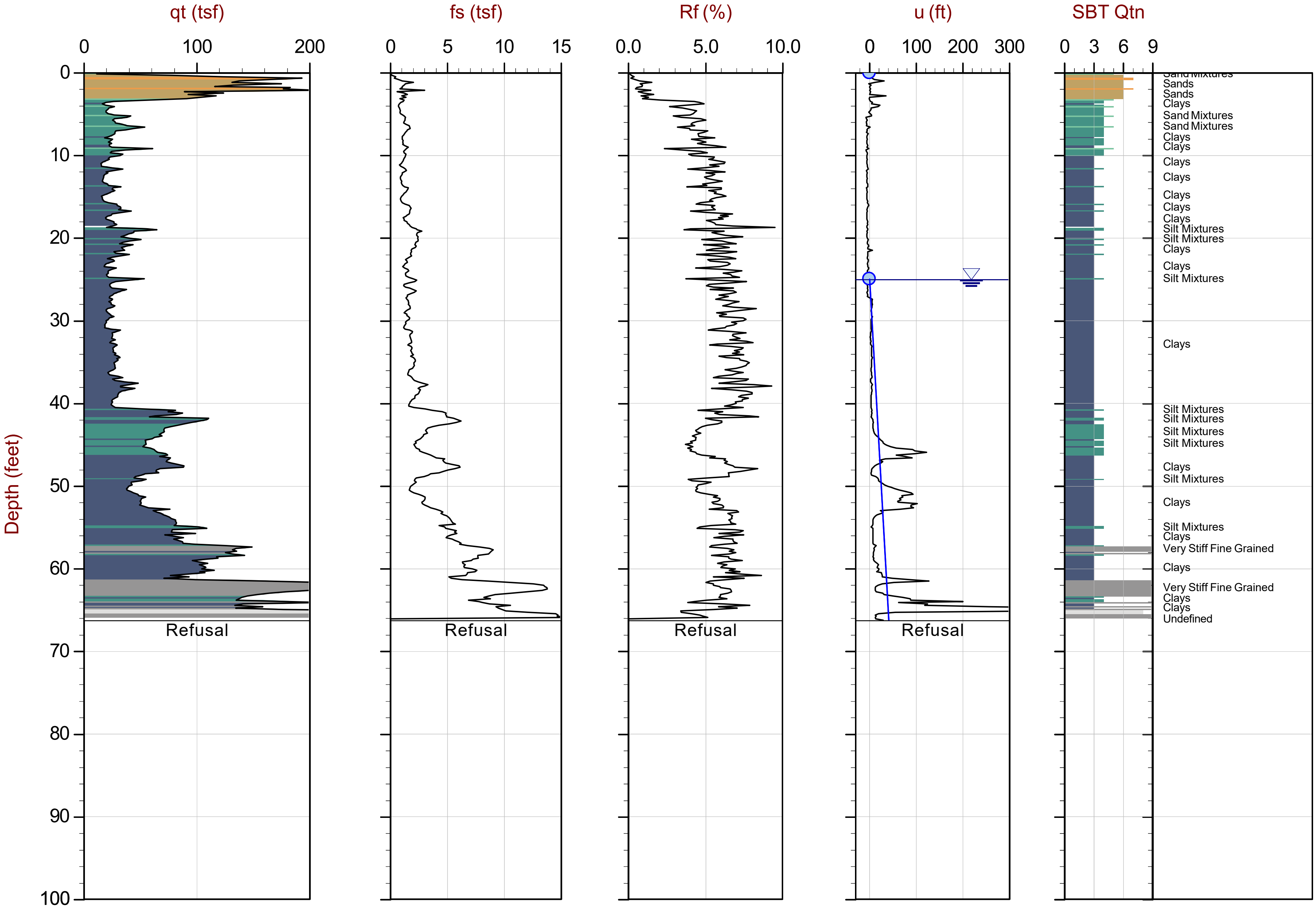
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 08:32
Site: DTE Monroe Power Plant

Sounding: CPT20-076
Cone: 567:T1500F15U500



Max Depth: 20.200 m / 66.27 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP076.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142838ft E: 13391033ft
Sheet No: 1 of 1

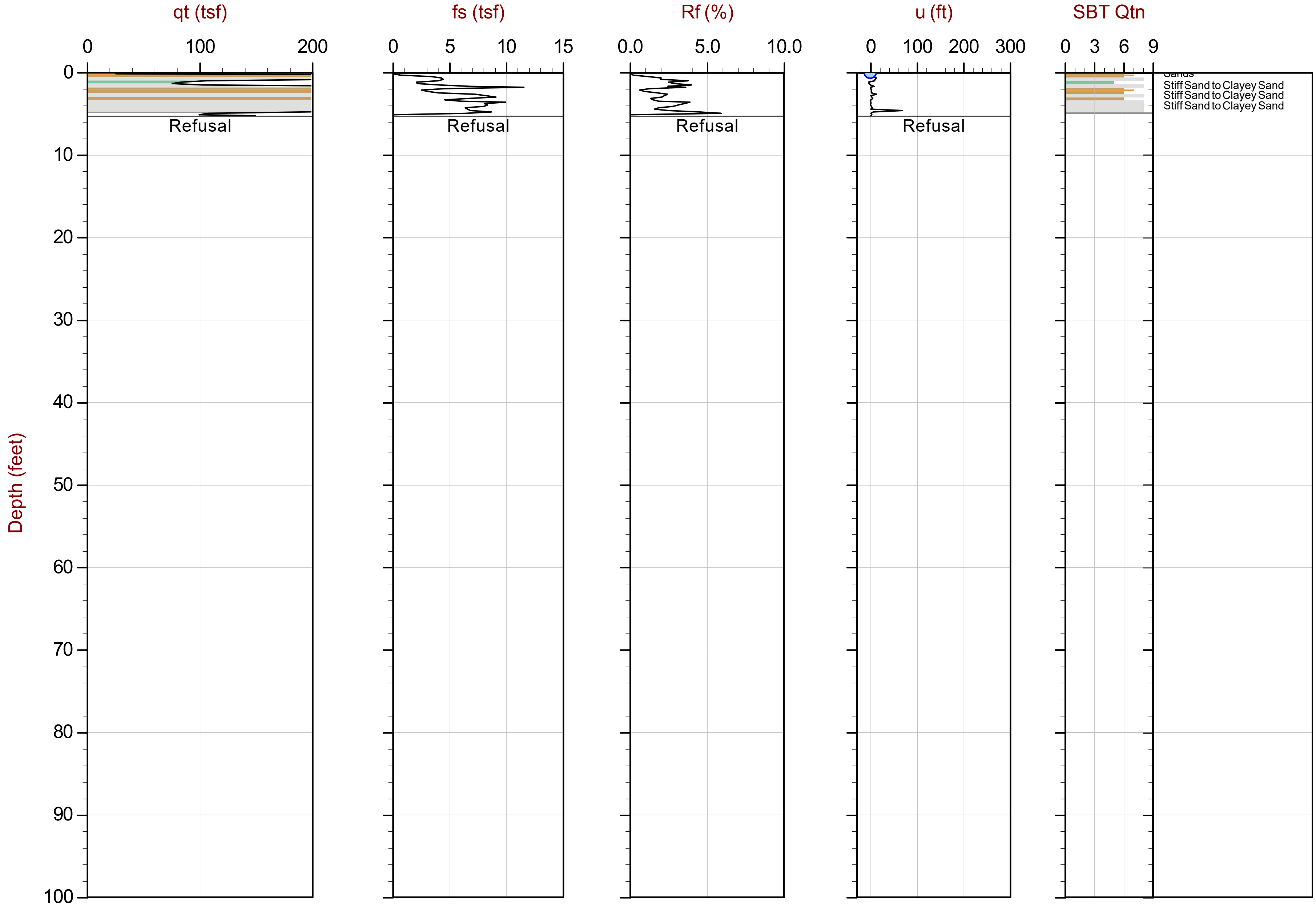
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 09:53
Site: DTE Monroe Power Plant

Sounding: CPT20-078
Cone: 567:T1500F15U500



Max Depth: 1.600 m / 5.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP078.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142629ft E: 13390894ft
Sheet No: 1 of 1

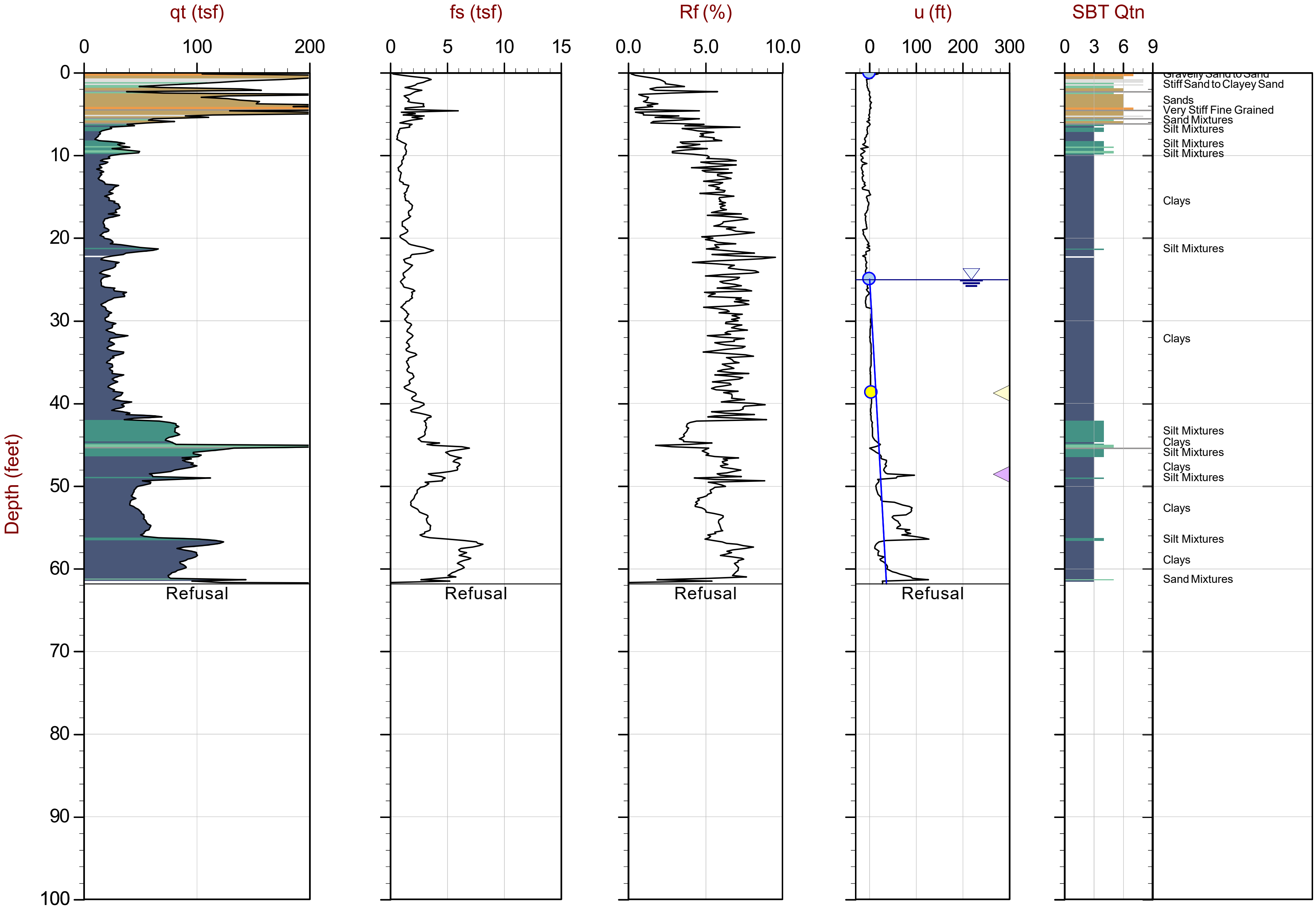
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500



Max Depth: 18.850 m / 61.84 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP078B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142643ft E: 13390903ft
Sheet No: 1 of 1

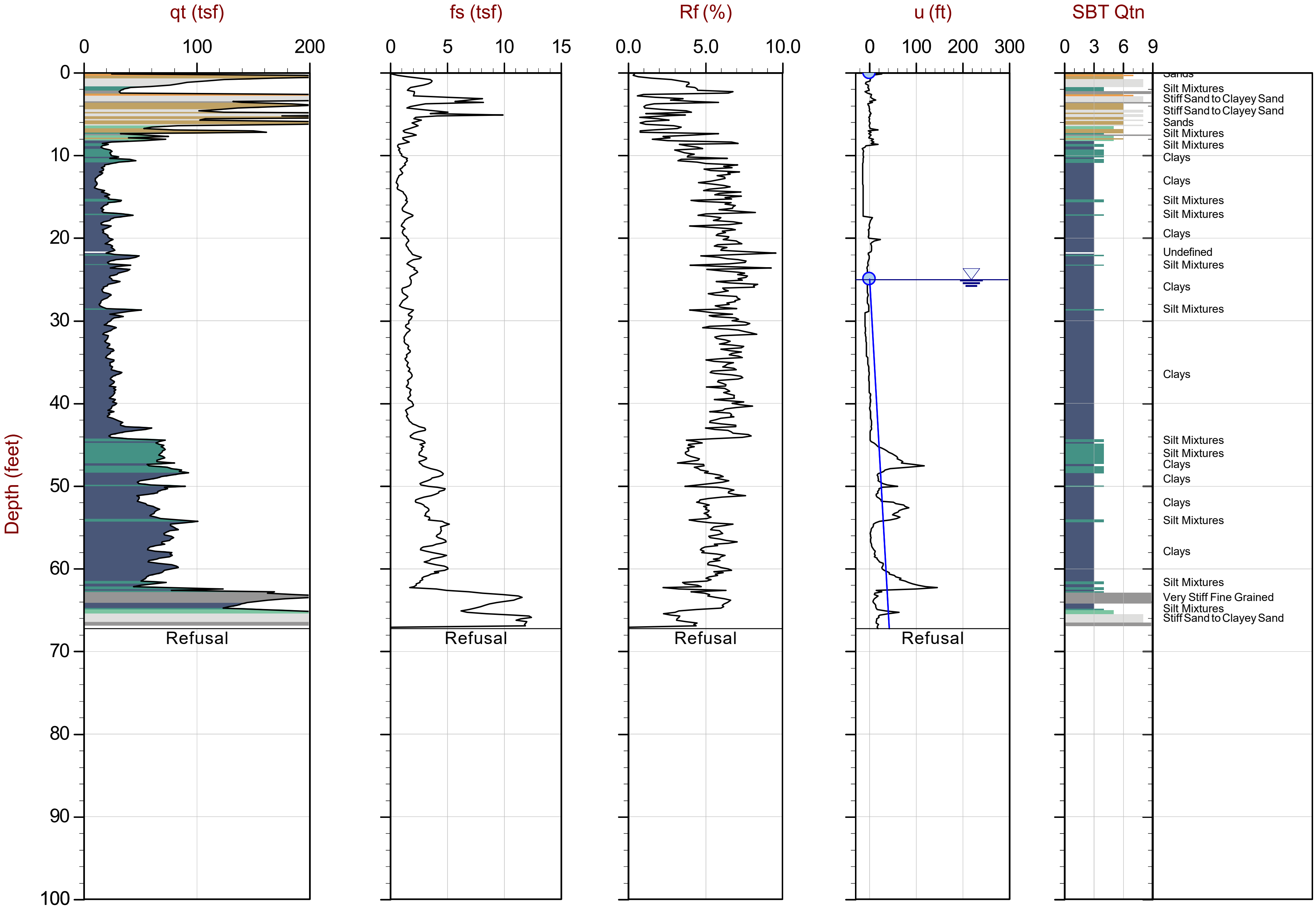
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-080
Cone: 567:T1500F15U500



Max Depth: 20.500 m / 67.26 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP080.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142497ft E: 13390784ft
Sheet No: 1 of 1

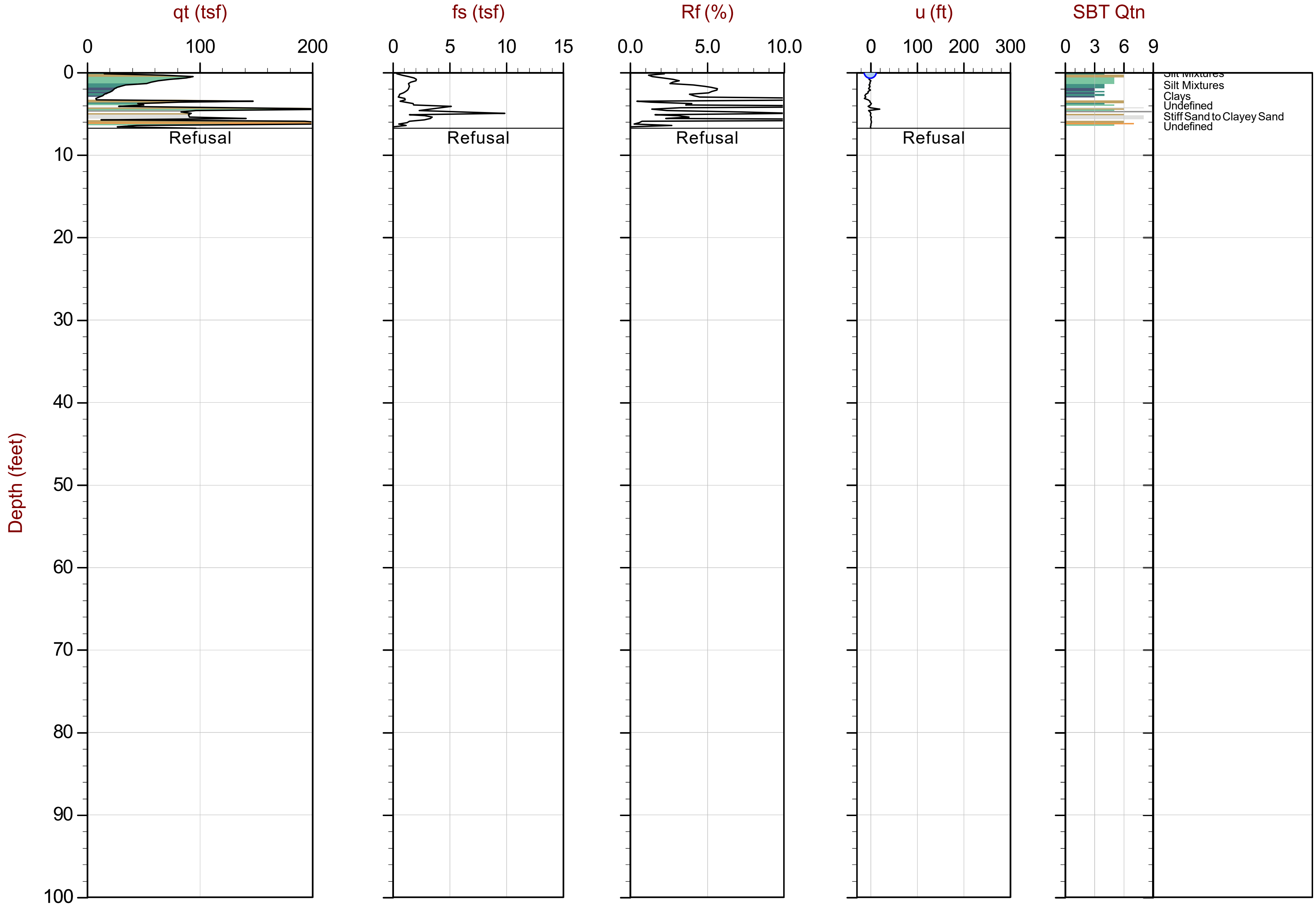
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 12:35
Site: DTE Monroe Power Plant

Sounding: CPT20-082
Cone: 567:T1500F15U500



Max Depth: 2.050 m / 6.73 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP082.COR
Unit Wt: SBTQtn (PKR2009)

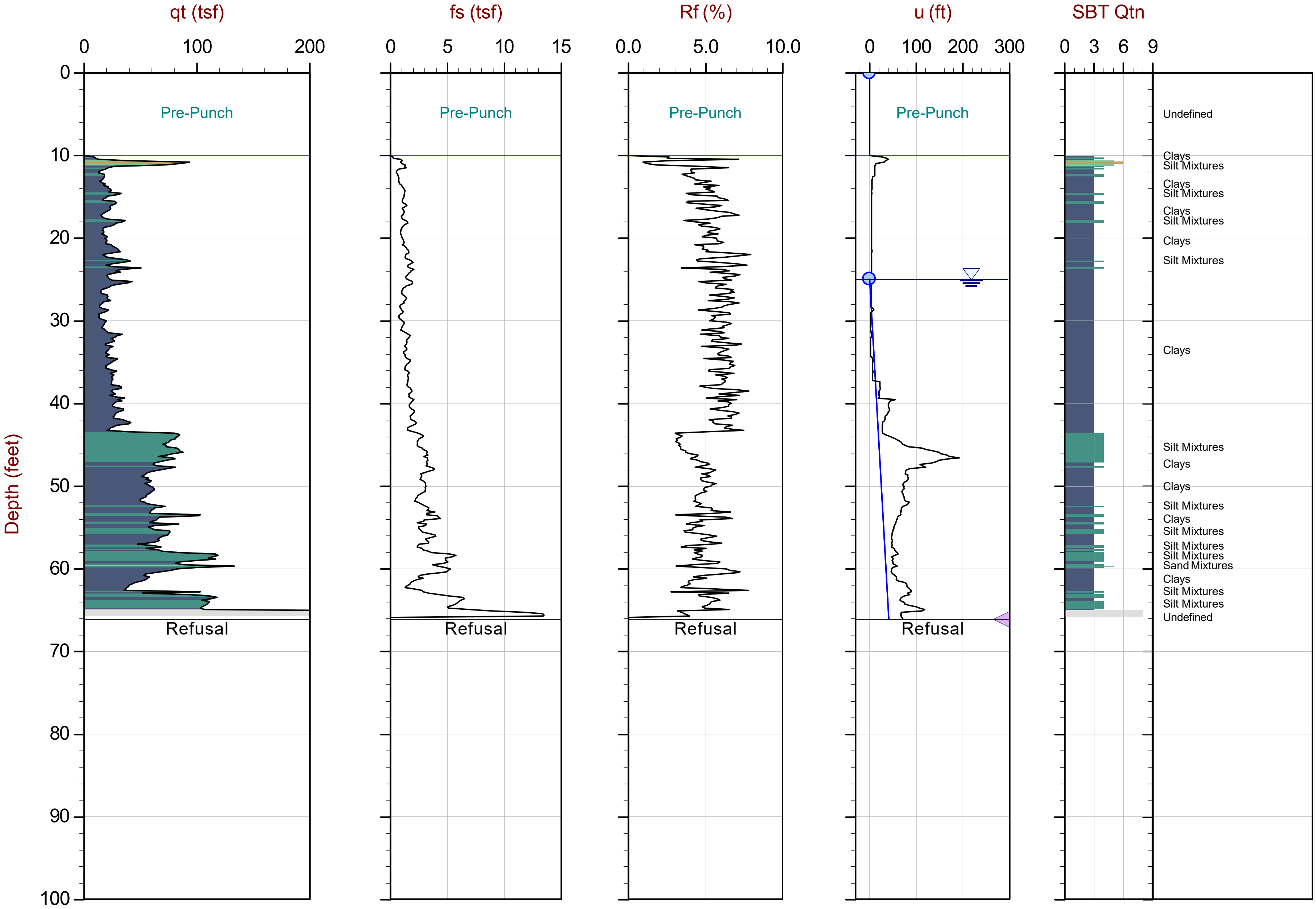
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142345ft E: 13390678ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 13:35
Site: DTE Monroe Power Plant

Sounding: CPT20-082B
Cone: 675:T1500F15U500



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP082B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142344ft E: 13390669ft
Sheet No: 1 of 1

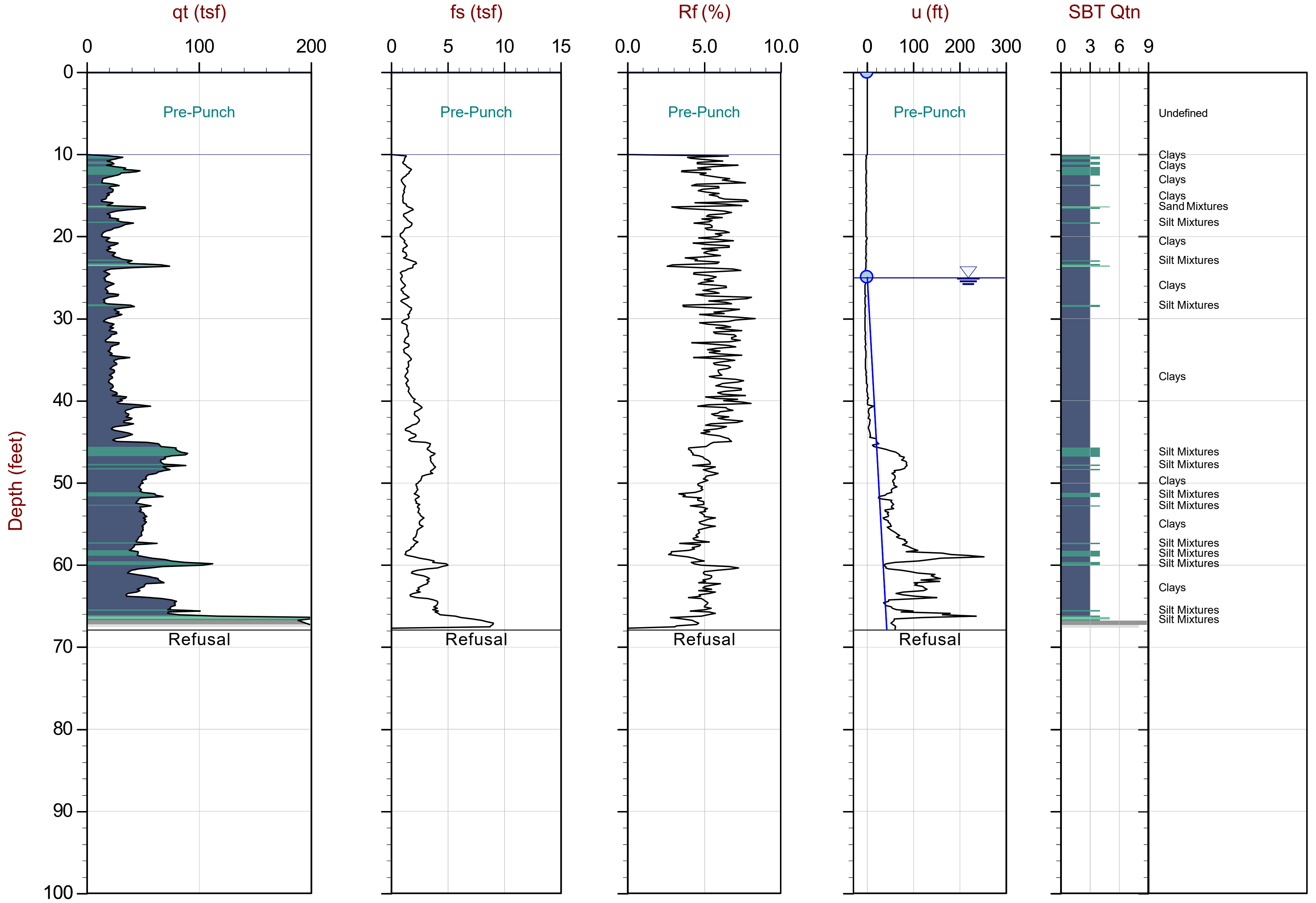
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-03 15:18
Site: DTE Monroe Power Plant

Sounding: CPT20-084
Cone: 675:T1500F15U500



Max Depth: 20.700 m / 67.91 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP084.COR
Unit Wt: SBTQtn (PKR2009)

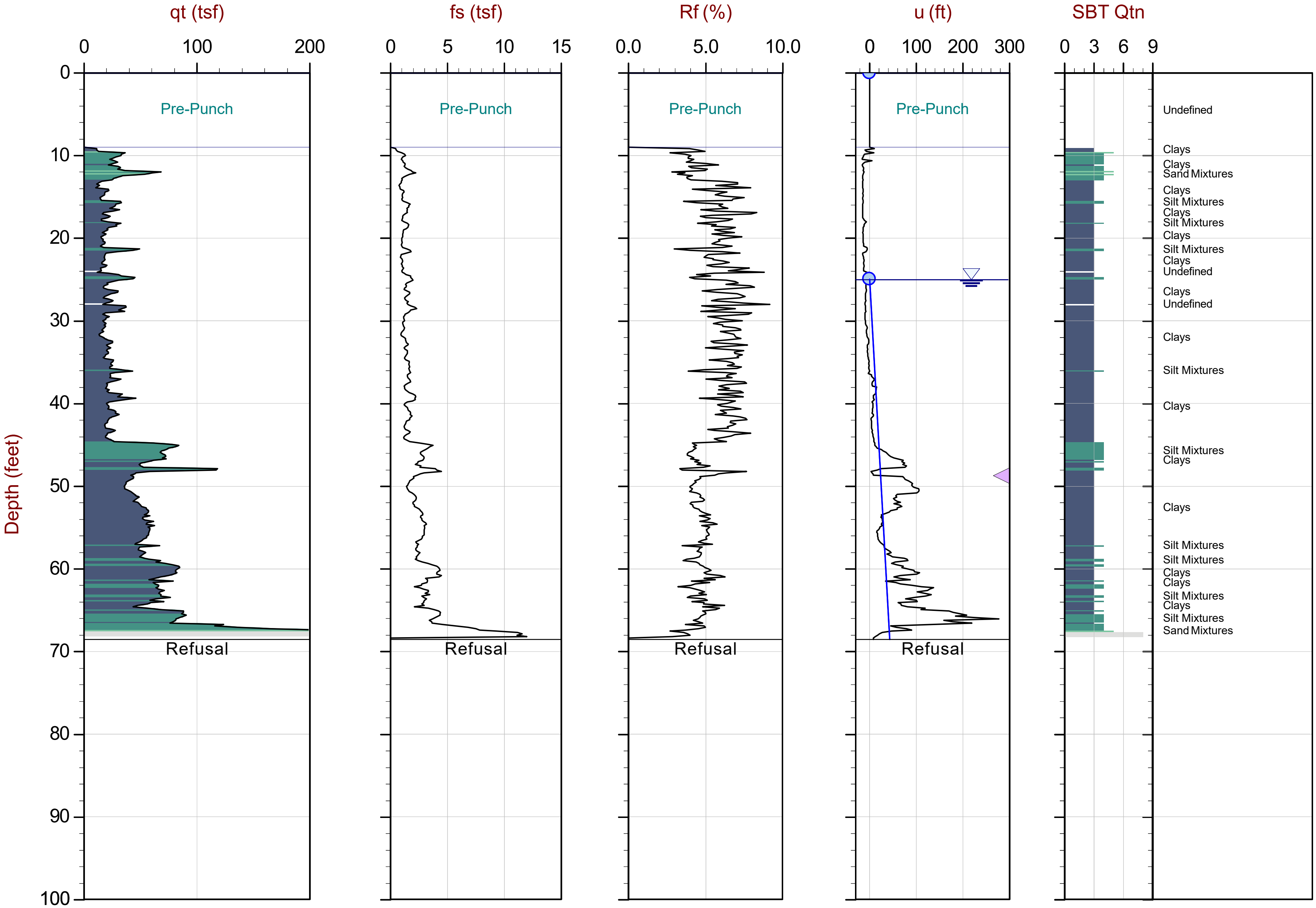
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 142185ft E: 13390553ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-086
Cone: 675:T1500F15U500



Max Depth: 20.900 m / 68.57 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP086.COR
Unit Wt: SBTQtn (PKR2009)

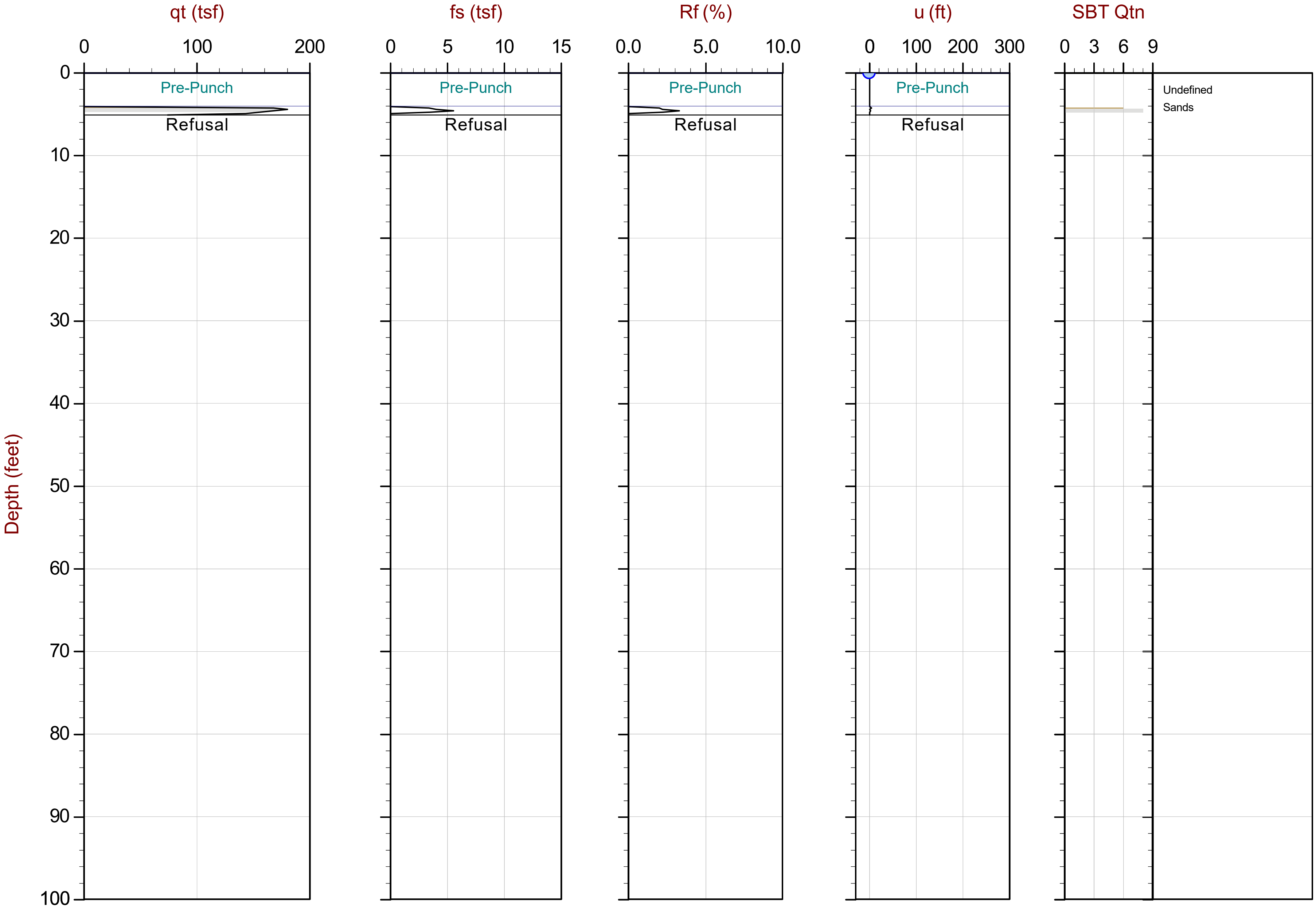
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141994ft E: 13390446ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 09:52
Site: DTE Monroe Power Plant

Sounding: CPT20-088
Cone: 675:T1500F15U500



Max Depth: 1.550 m / 5.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP088.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141837ft E: 13390373ft
Sheet No: 1 of 1

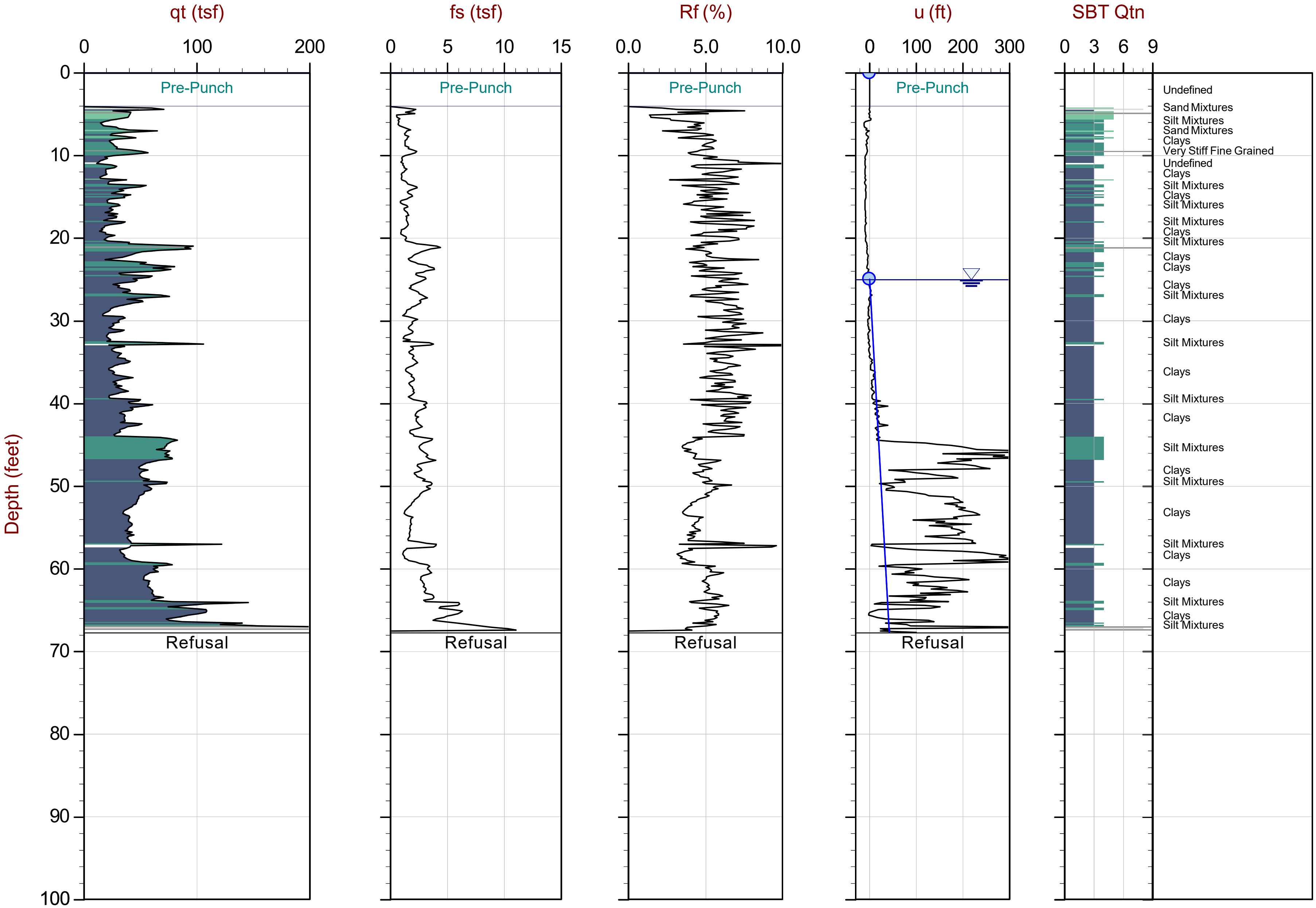
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-088B
Cone: 675:T1500F15U500



Max Depth: 20.650 m / 67.75 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP088B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141843ft E: 13390373ft
Sheet No: 1 of 1

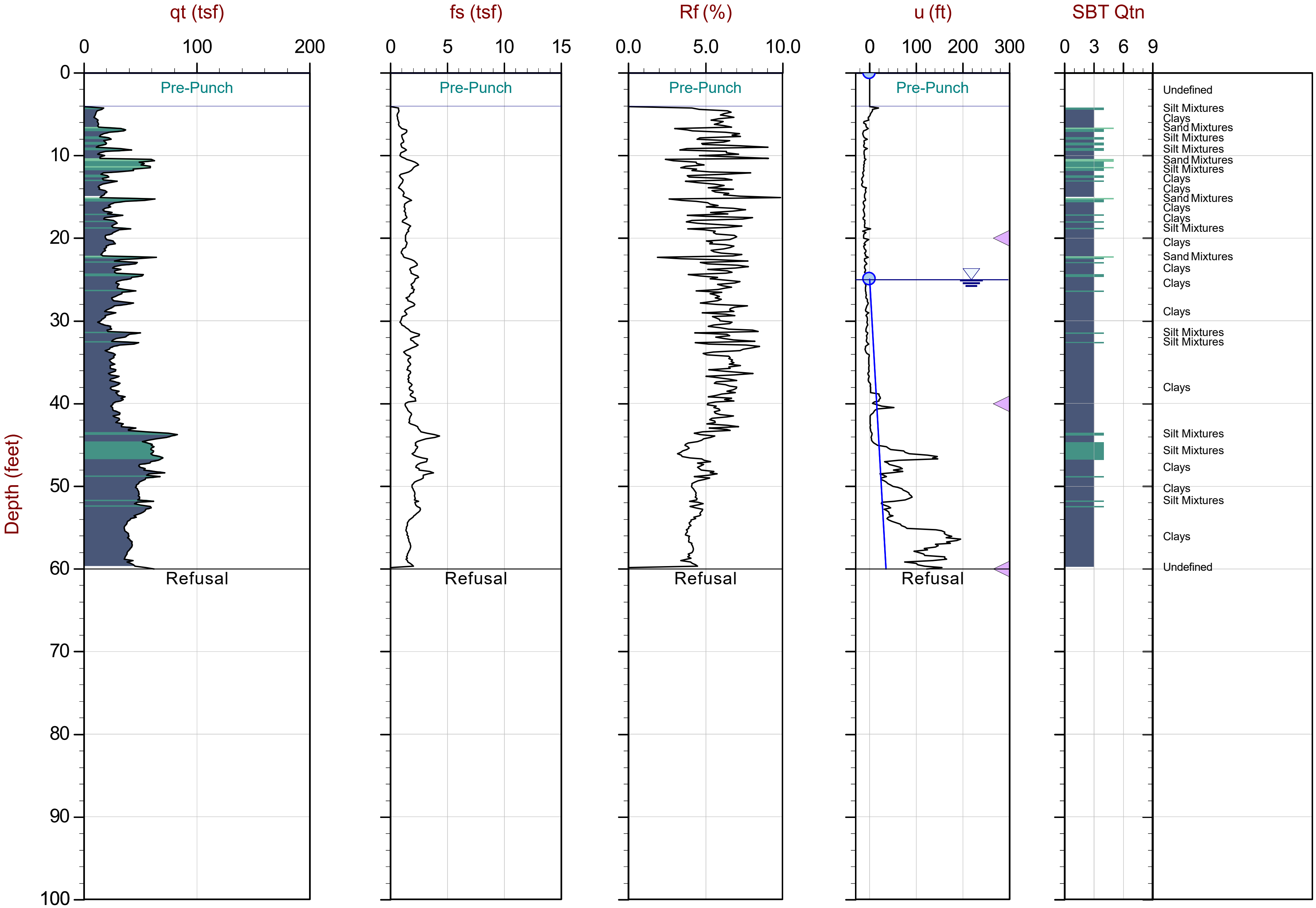
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-04 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500



Max Depth: 18.300 m / 60.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP090.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141754ft E: 13390528ft
Sheet No: 1 of 1

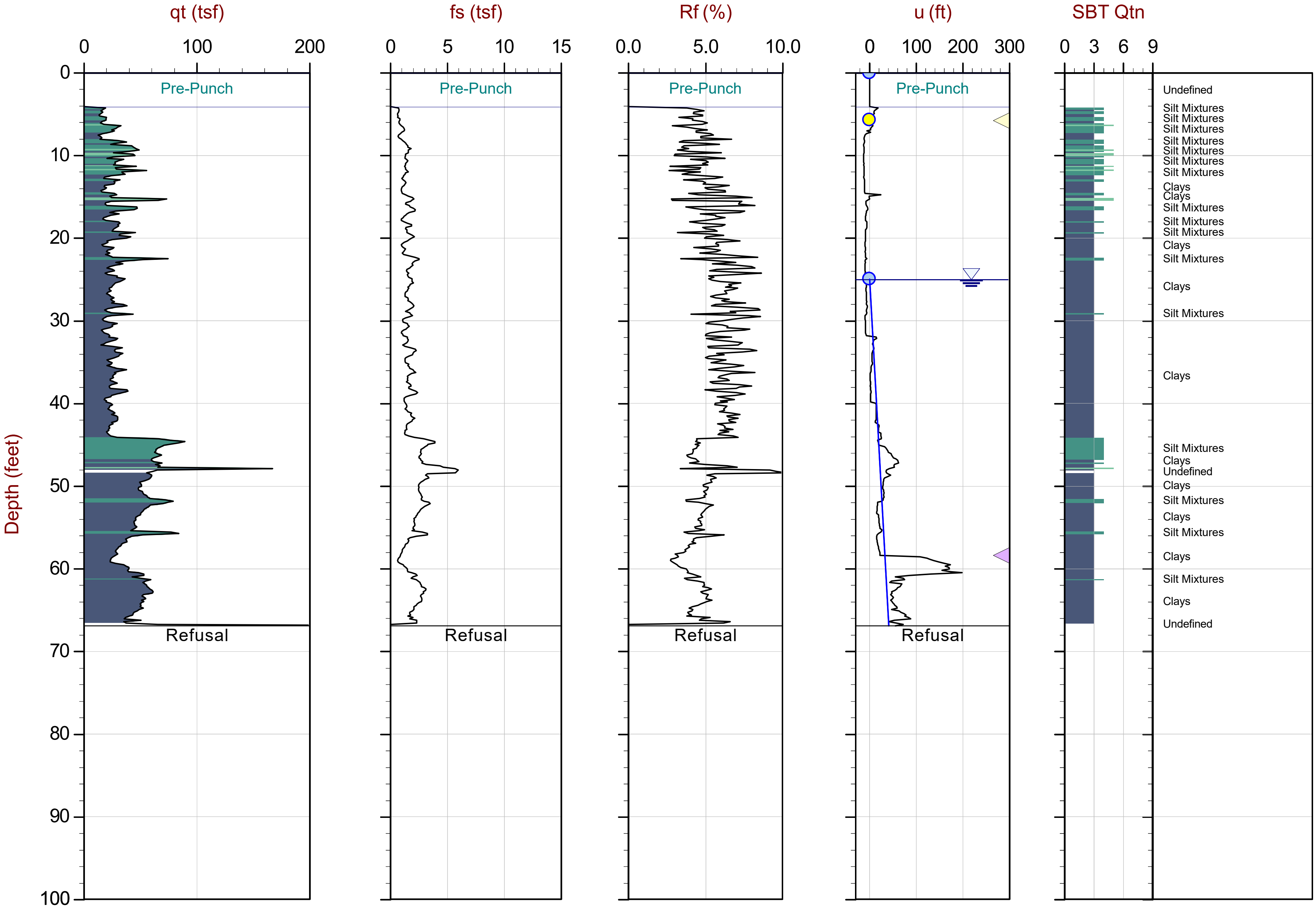
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 09:32
Site: DTE Monroe Power Plant

Sounding: CPT20-092
Cone: 675:T1500F15U500



Max Depth: 20.400 m / 66.93 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP092.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141703ft E: 13390714ft
Sheet No: 1 of 1

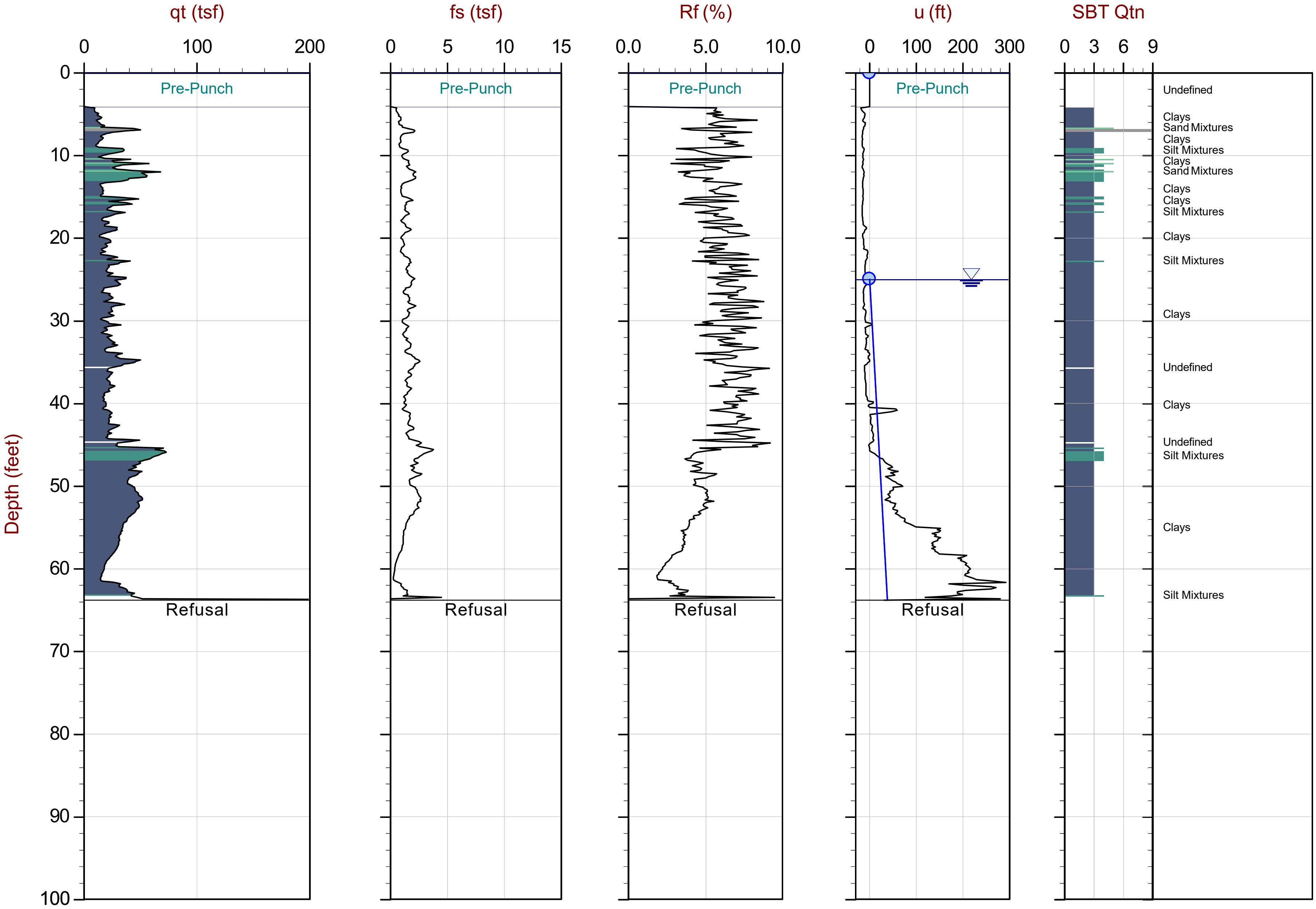
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 10:56
Site: DTE Monroe Power Plant

Sounding: CPT20-094
Cone: 513:T1500F15U500



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP094.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141591ft E: 13390889ft
Sheet No: 1 of 1

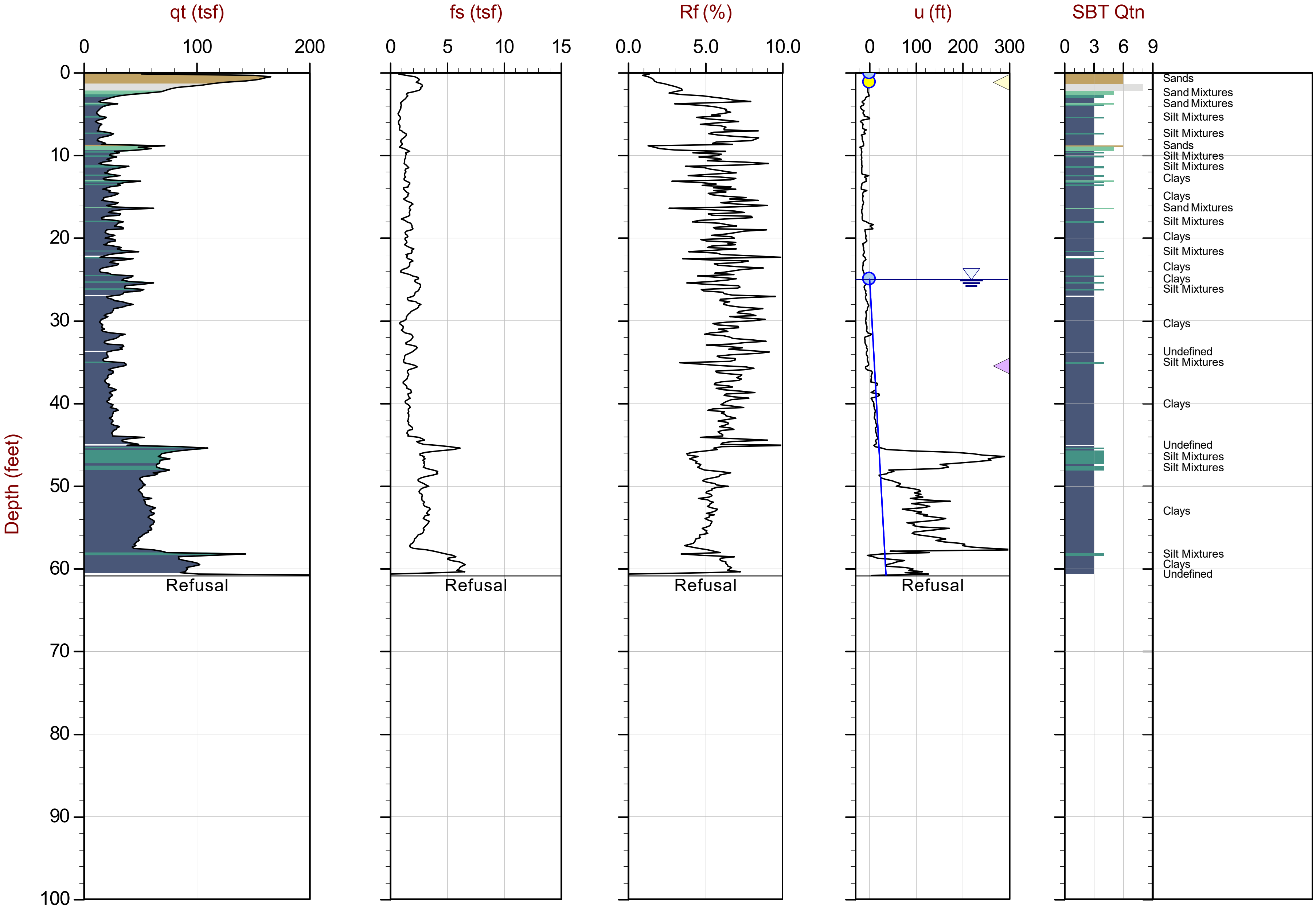
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 11:51
Site: DTE Monroe Power Plant

Sounding: SCPT20-096
Cone: 513:T1500F15U500



Max Depth: 18.550 m / 60.86 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_SP096.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141475ft E: 13391090ft
Sheet No: 1 of 1

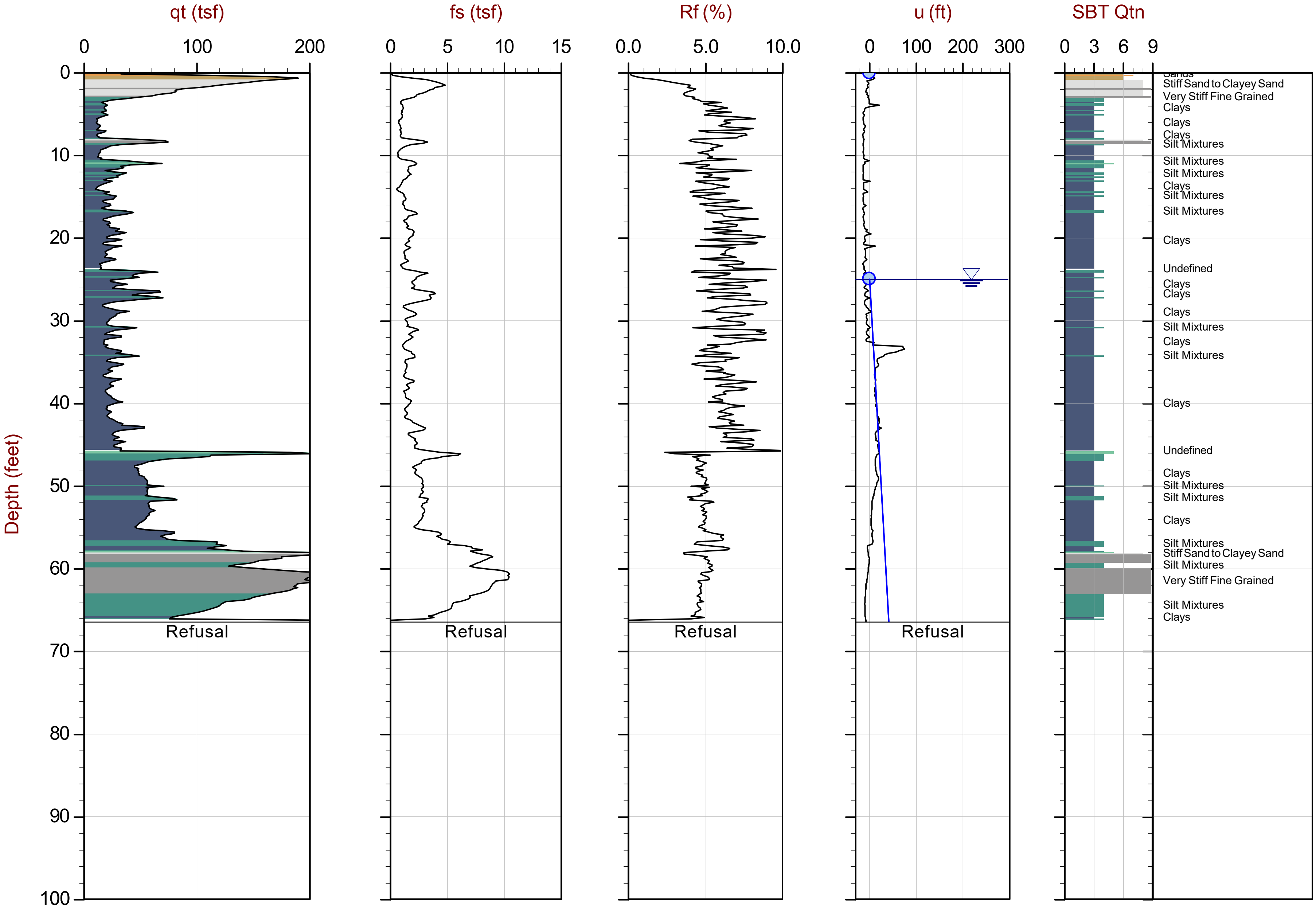
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-05 13:33
Site: DTE Monroe Power Plant

Sounding: CPT20-098
Cone: 513:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP098.COR
Unit Wt: SBTQtn (PKR2009)

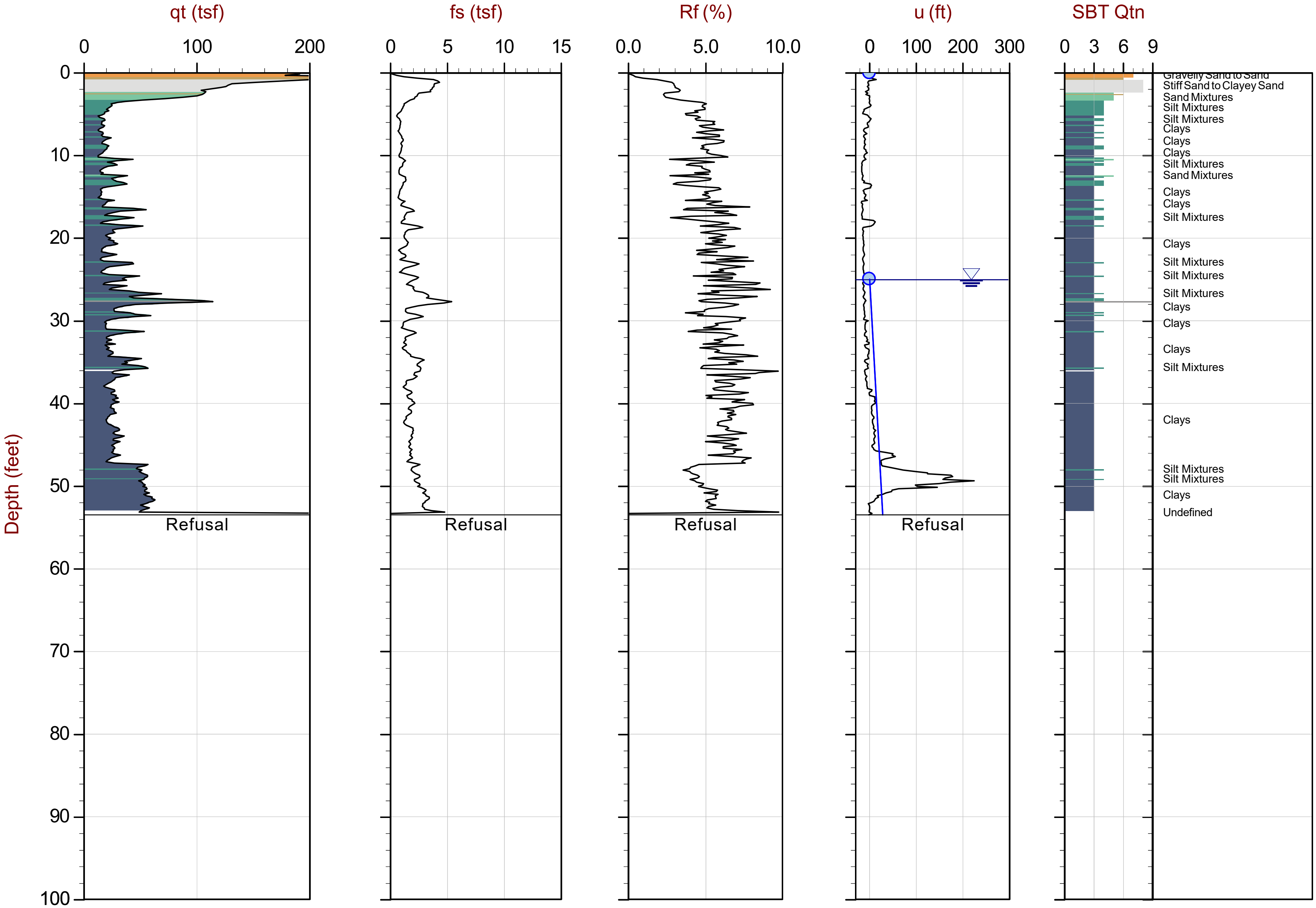
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141442ft E: 13391262ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-100
Cone: 513:T1500F15U500



Max Depth: 16.300 m / 53.48 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP100.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141368ft E: 13391479ft
Sheet No: 1 of 1

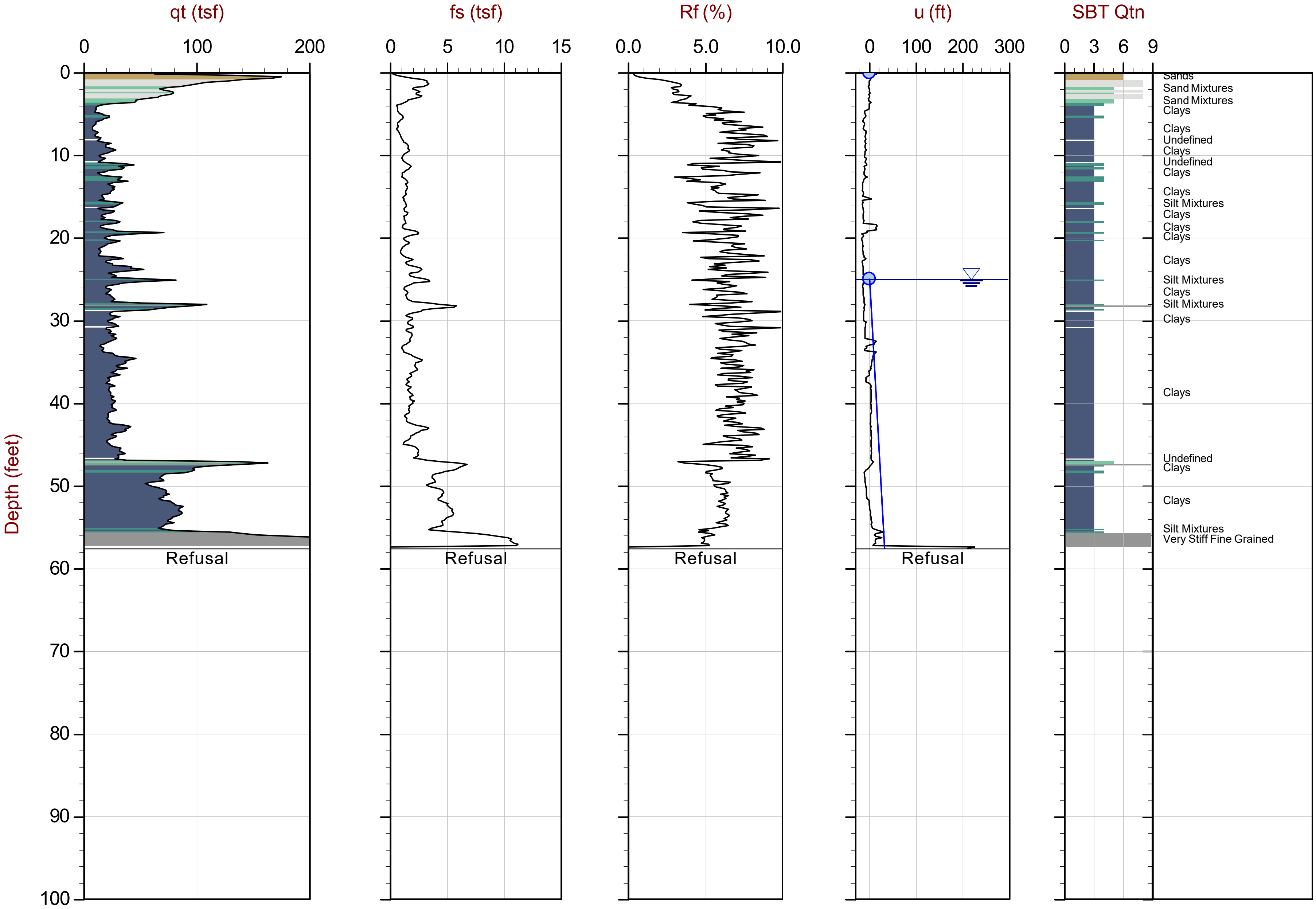
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 09:41
Site: DTE Monroe Power Plant

Sounding: CPT20-102
Cone: 513:T1500F15U500



Max Depth: 17.550 m / 57.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP102.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141297ft E: 13391656ft
Sheet No: 1 of 1

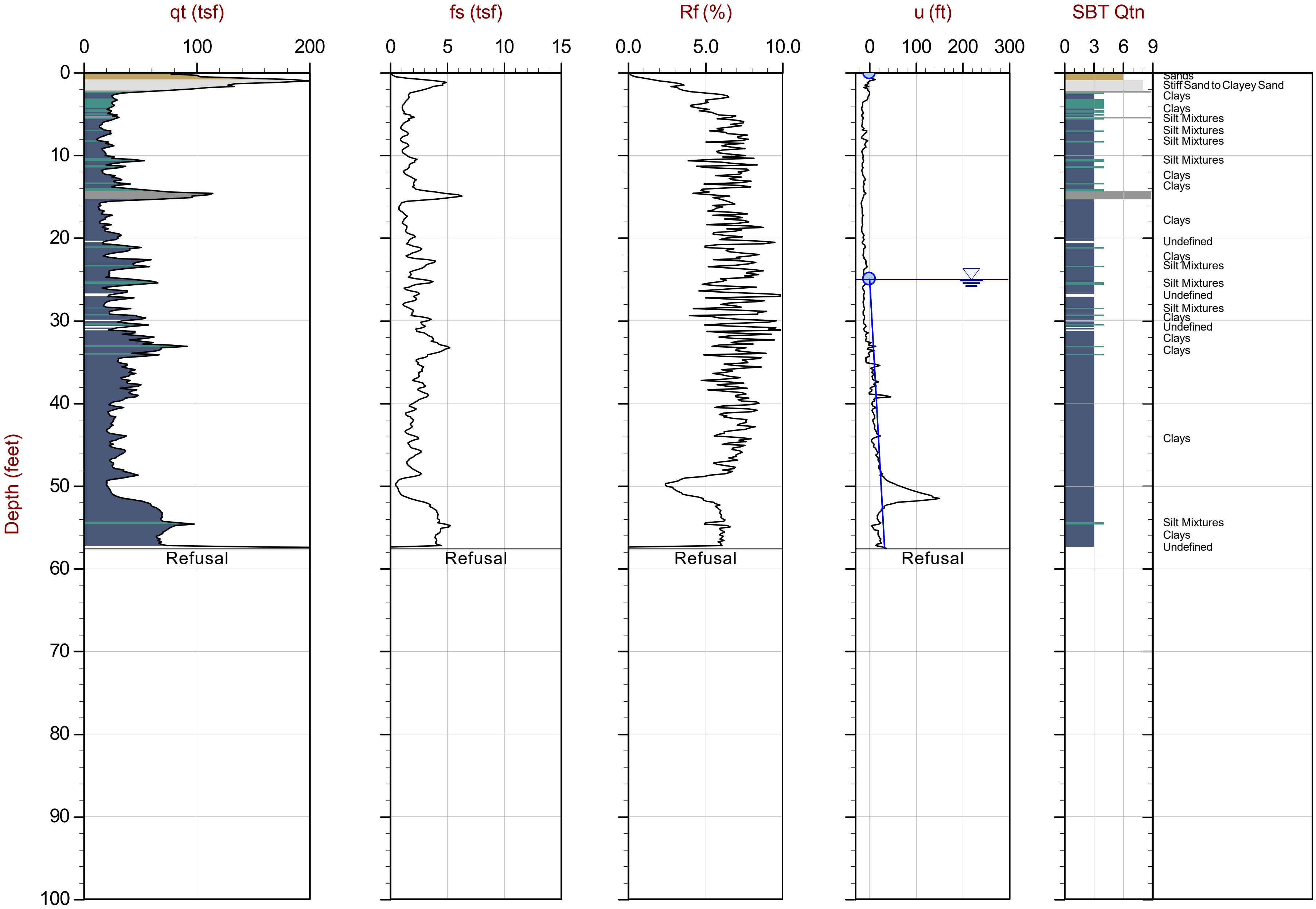
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 10:26
Site: DTE Monroe Power Plant

Sounding: CPT20-104
Cone: 513:T1500F15U500



Max Depth: 17.550 m / 57.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP104.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141174ft E: 13391805ft
Sheet No: 1 of 1

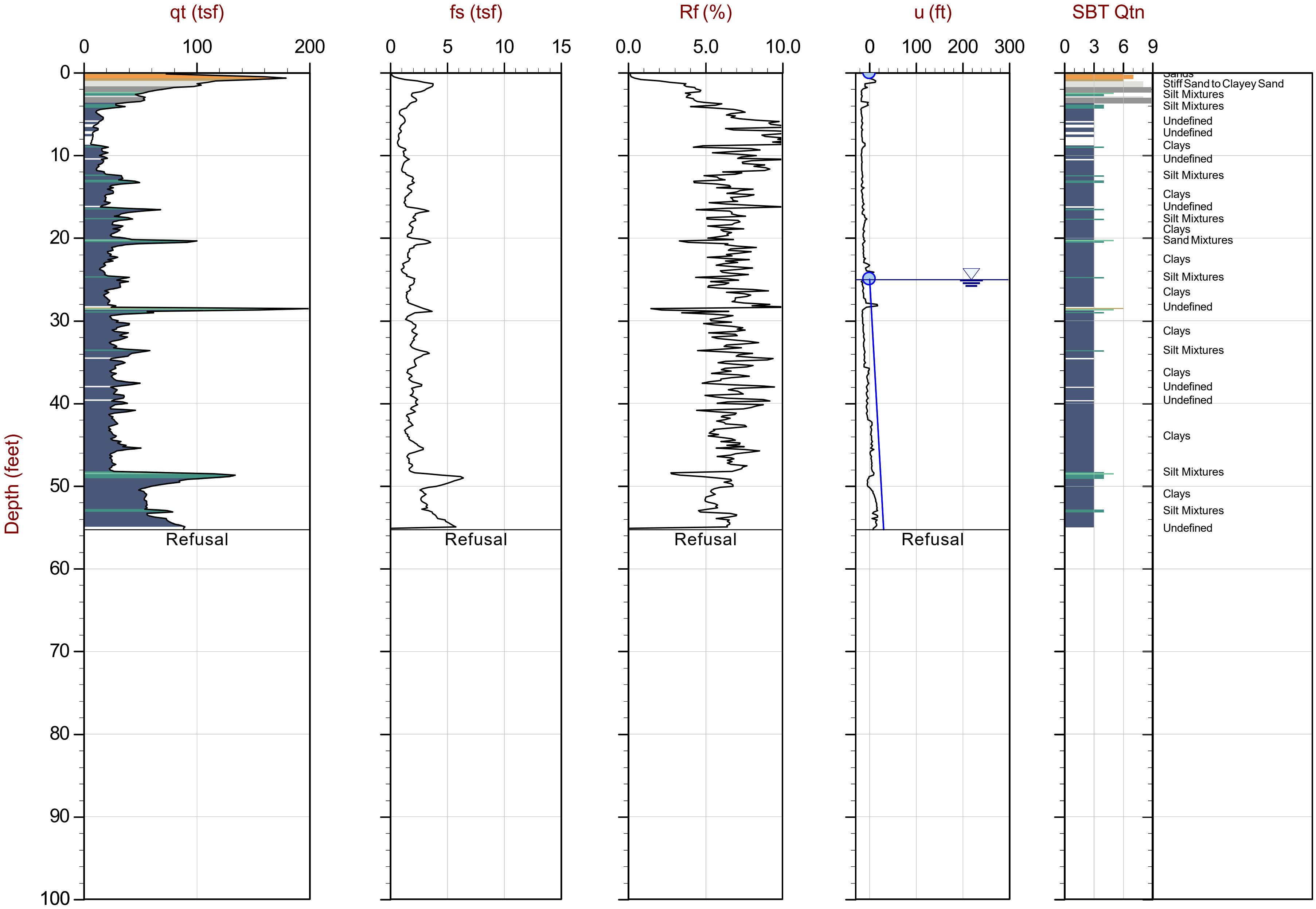
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 11:10
Site: DTE Monroe Power Plant

Sounding: CPT20-106
Cone: 513:T1500F15U500



Max Depth: 16.850 m / 55.28 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP106.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140981ft E: 13391734ft
Sheet No: 1 of 1

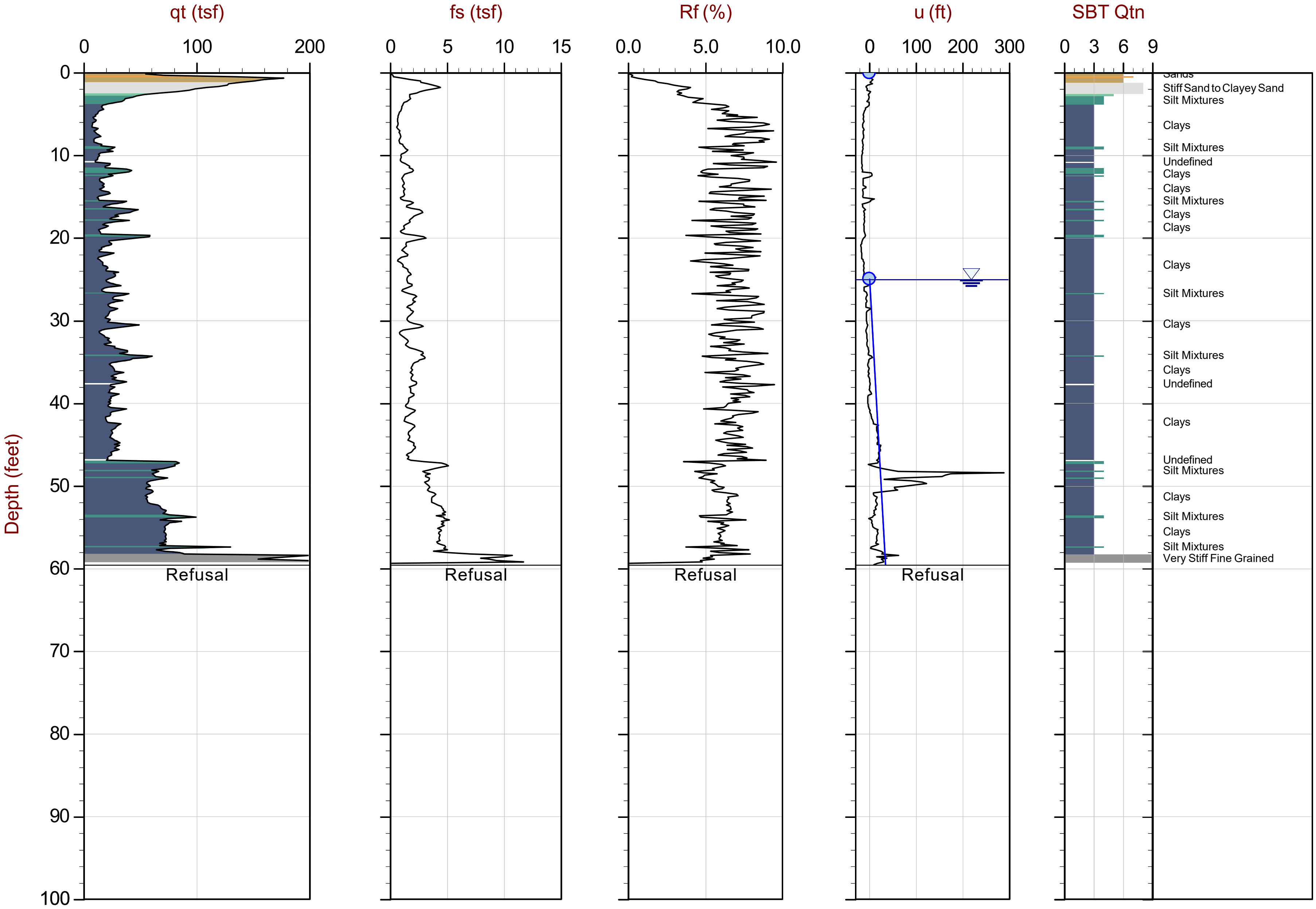
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 11:58
Site: DTE Monroe Power Plant

Sounding: CPT20-108
Cone: 513:T1500F15U500



Max Depth: 18.150 m / 59.55 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP108.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140801ft E: 13391655ft
Sheet No: 1 of 1

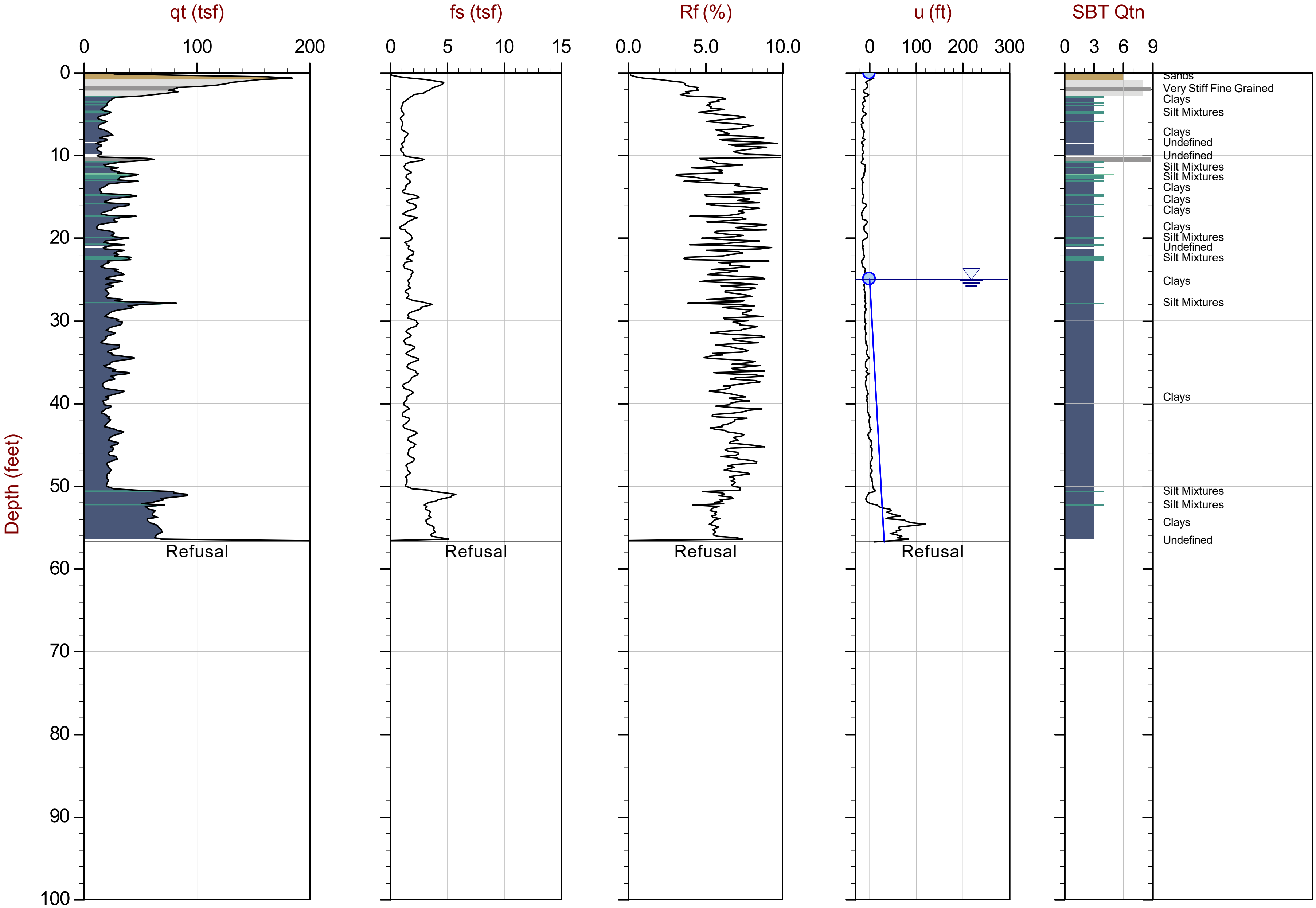
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 12:45
Site: DTE Monroe Power Plant

Sounding: CPT20-110
Cone: 513:T1500F15U500



Max Depth: 17.300 m / 56.76 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP110.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140617ft E: 13391584ft
Sheet No: 1 of 1

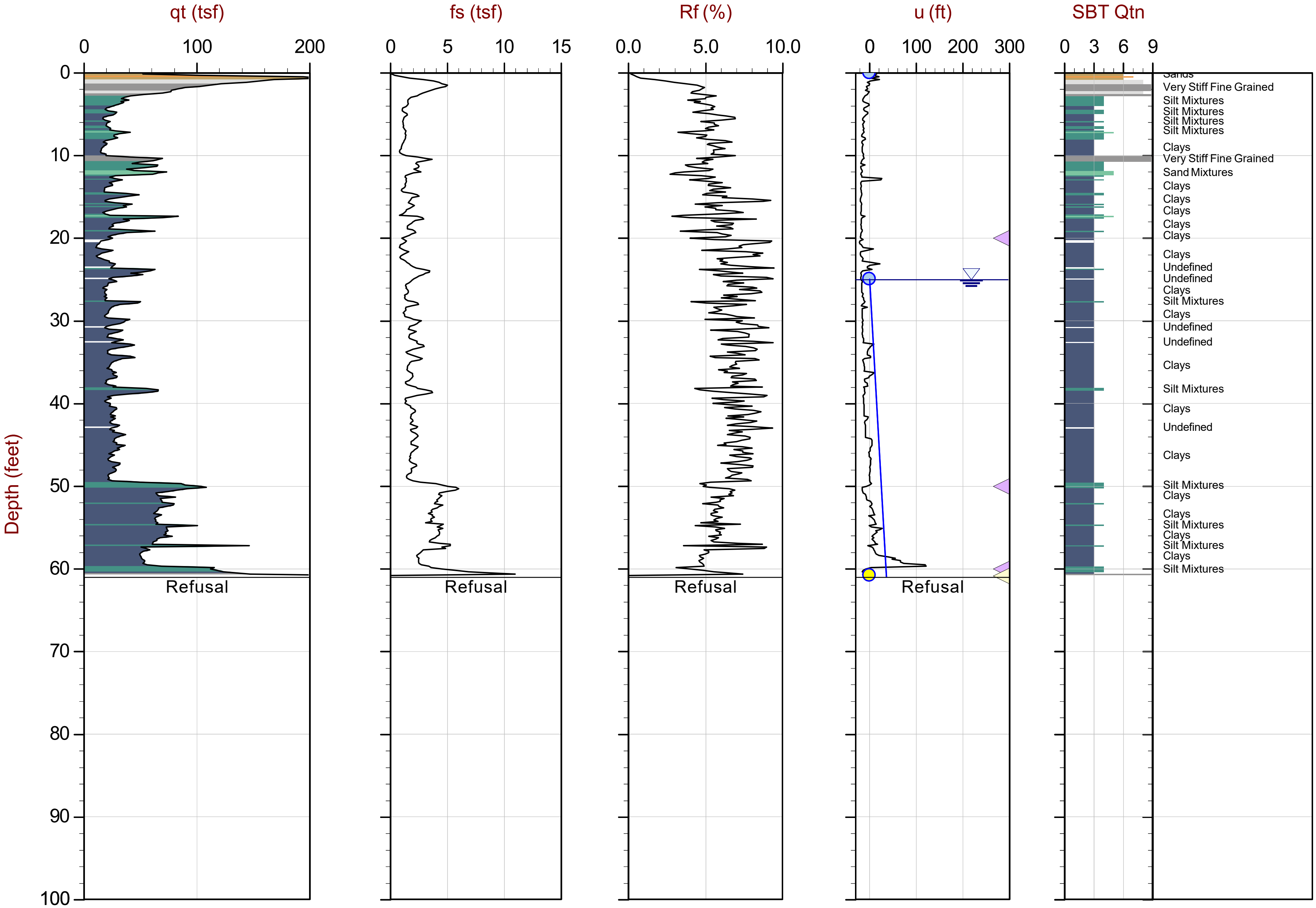
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

ConeTec

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500



Max Depth: 18.600 m / 61.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP110B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140610ft E: 13391577ft
Sheet No: 1 of 1

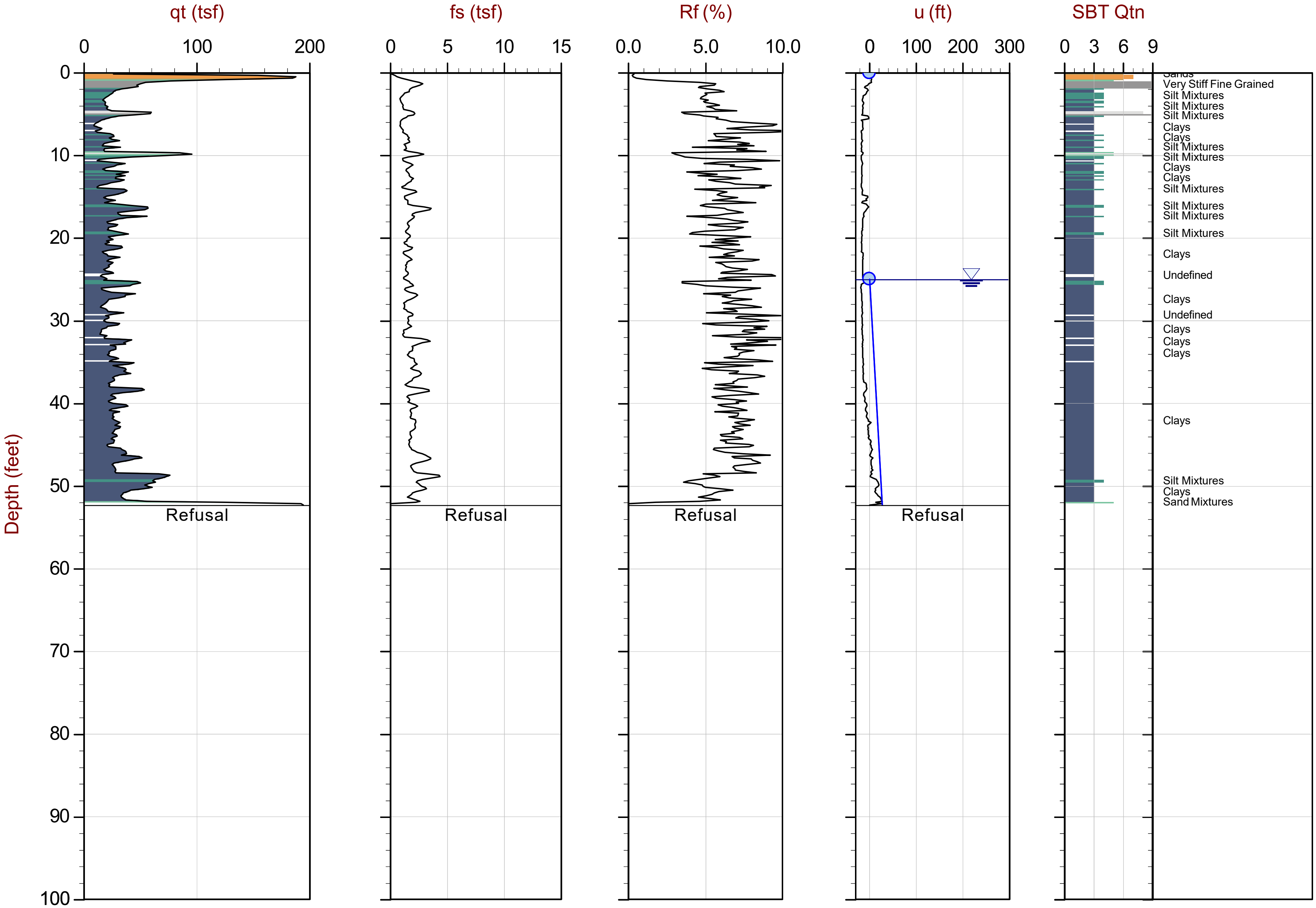
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 13:34
Site: DTE Monroe Power Plant

Sounding: CPT20-112
Cone: 513:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP112.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140443ft E: 13391653ft
Sheet No: 1 of 1

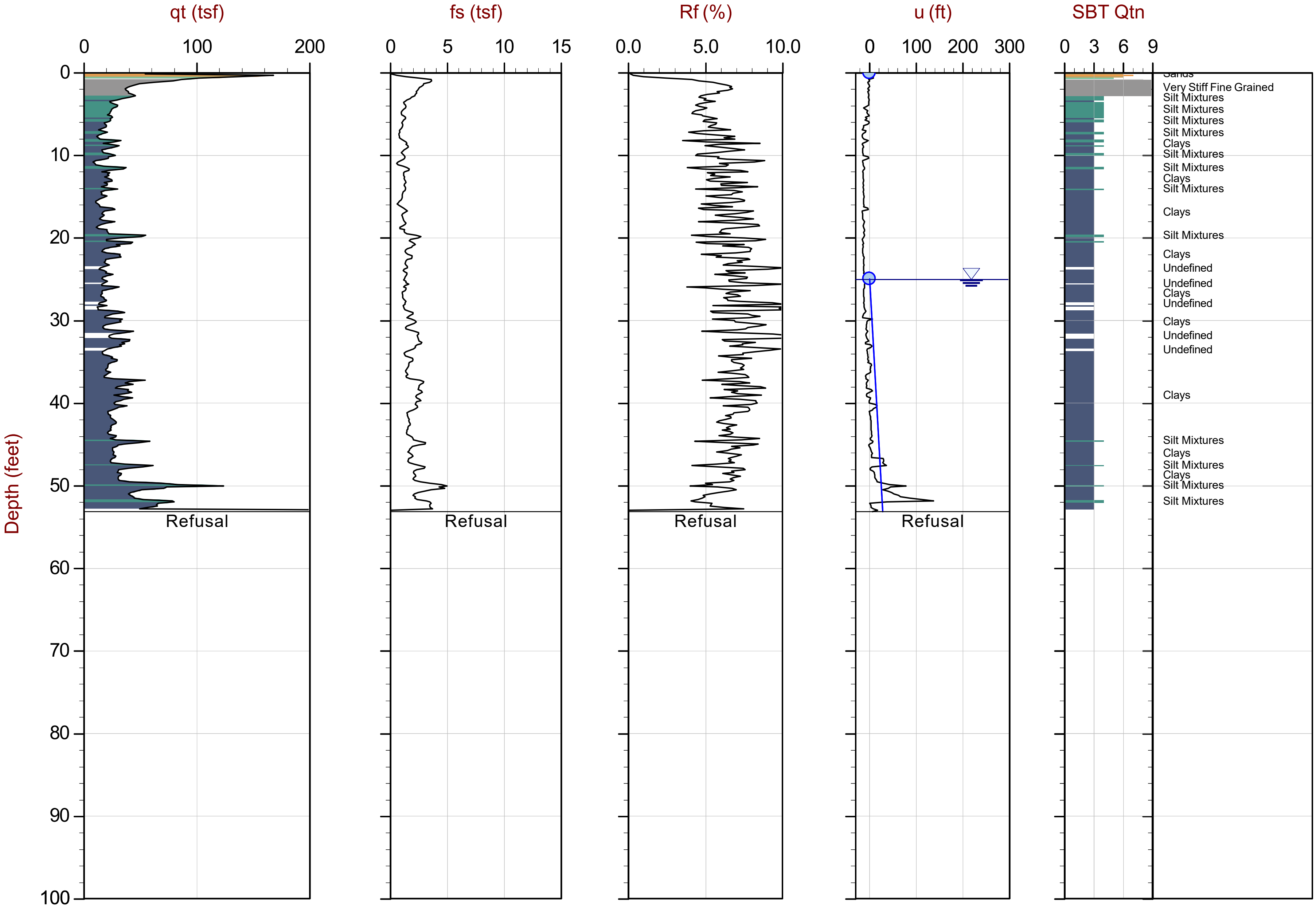
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 14:25
Site: DTE Monroe Power Plant

Sounding: SCPT20-114
Cone: 513:T1500F15U500



Max Depth: 16.200 m / 53.15 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_SP114.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140335ft E: 13391822ft
Sheet No: 1 of 1

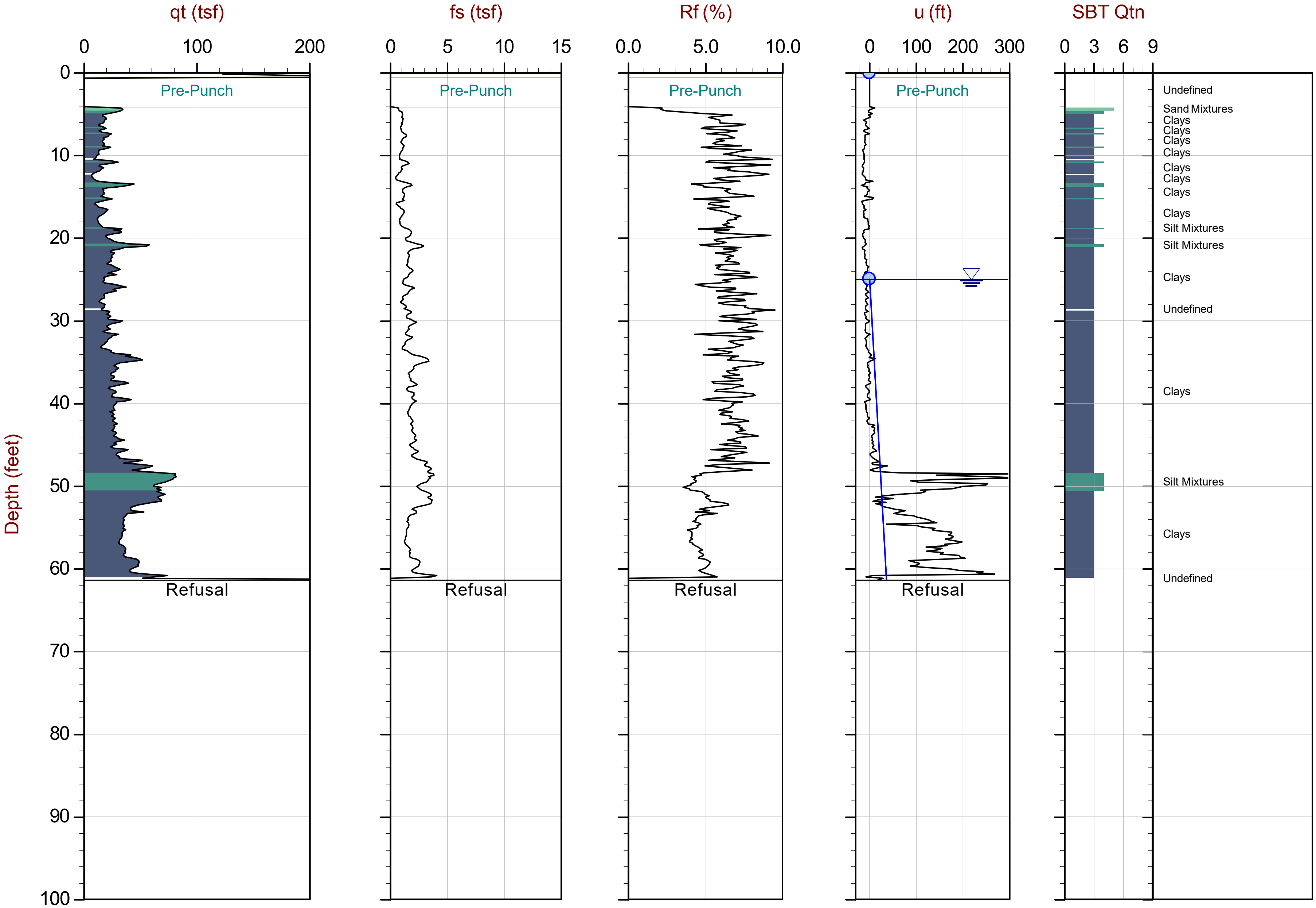
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-06 15:13
Site: DTE Monroe Power Plant

Sounding: CPT20-116
Cone: 513:T1500F15U500



Max Depth: 18.700 m / 61.35 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP116.COR
Unit Wt: SBTQtn (PKR2009)

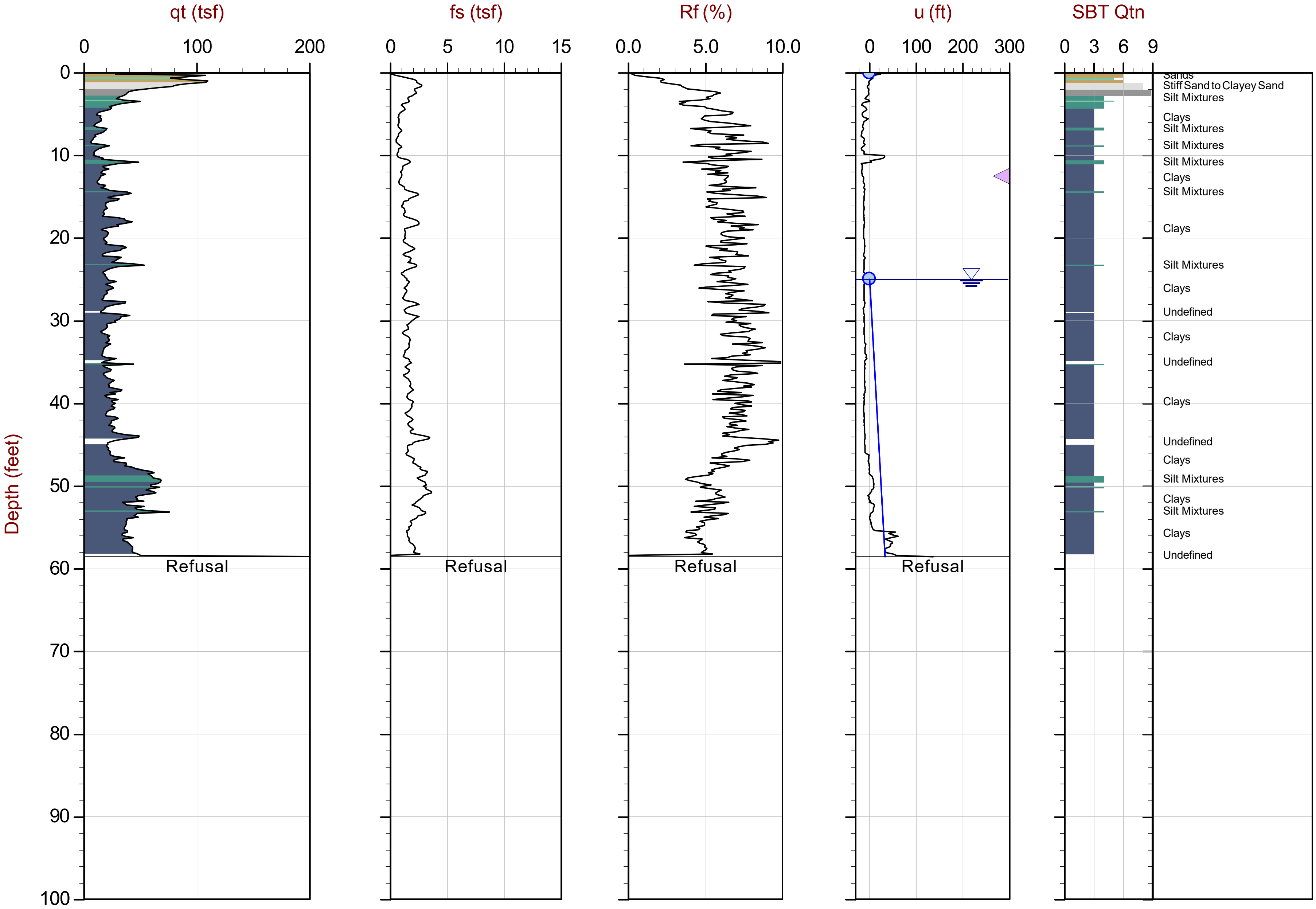
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140233ft E: 13391996ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 12:57
Site: DTE Monroe Power Plant

Sounding: CPT20-118
Cone: 513:T1500F15U500



Max Depth: 17.850 m / 58.56 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP118.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140123ft E: 13392169ft
Sheet No: 1 of 1

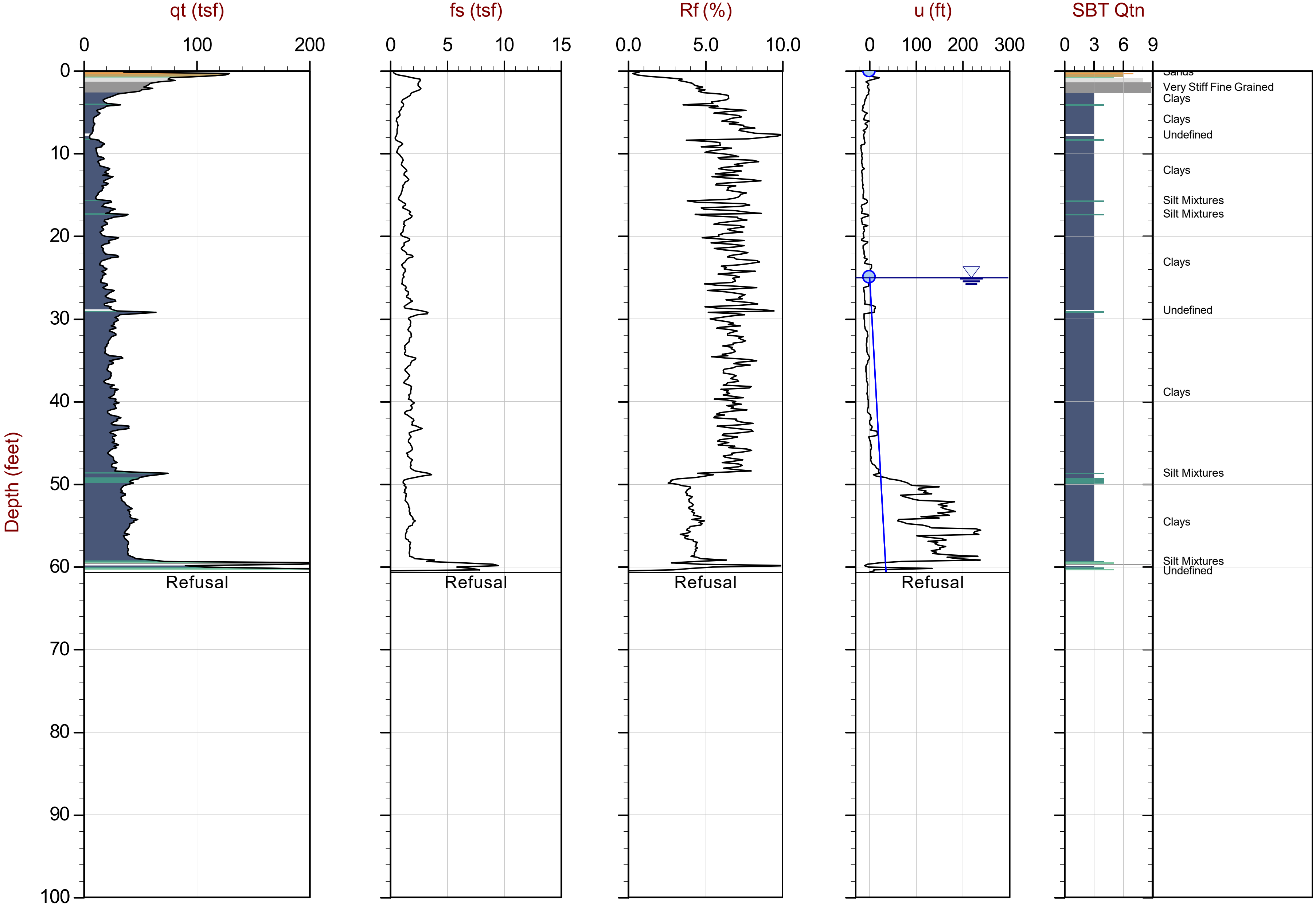
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 14:17
Site: DTE Monroe Power Plant

Sounding: CPT20-120
Cone: 513:T1500F15U500



Max Depth: 18.500 m / 60.69 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP120.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140017ft E: 13392339ft
Sheet No: 1 of 1

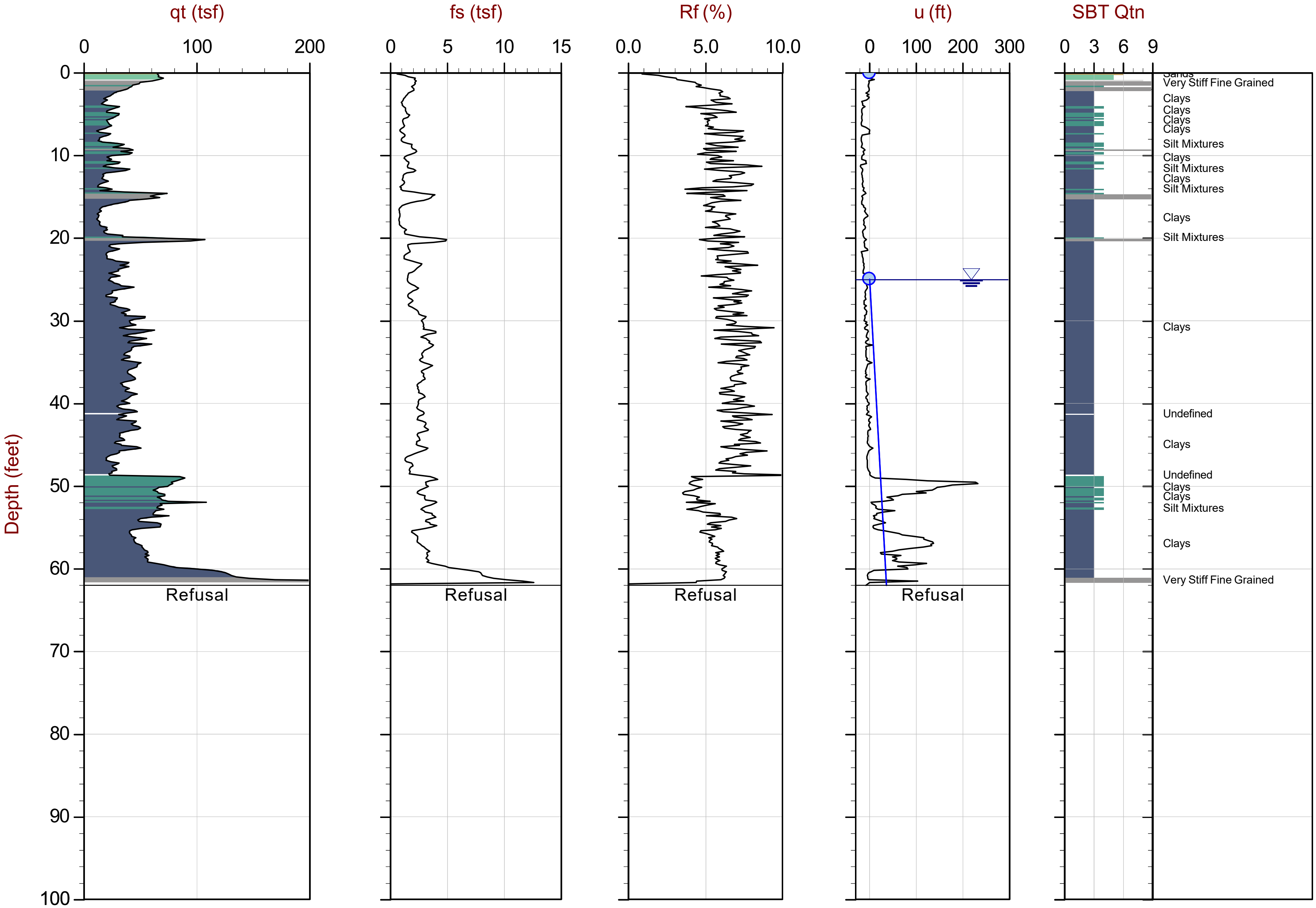
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-07 15:10
Site: DTE Monroe Power Plant

Sounding: CPT20-122
Cone: 513:T1500F15U500



Max Depth: 18.900 m / 62.01 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP122.COR
Unit Wt: SBTQtn (PKR2009)

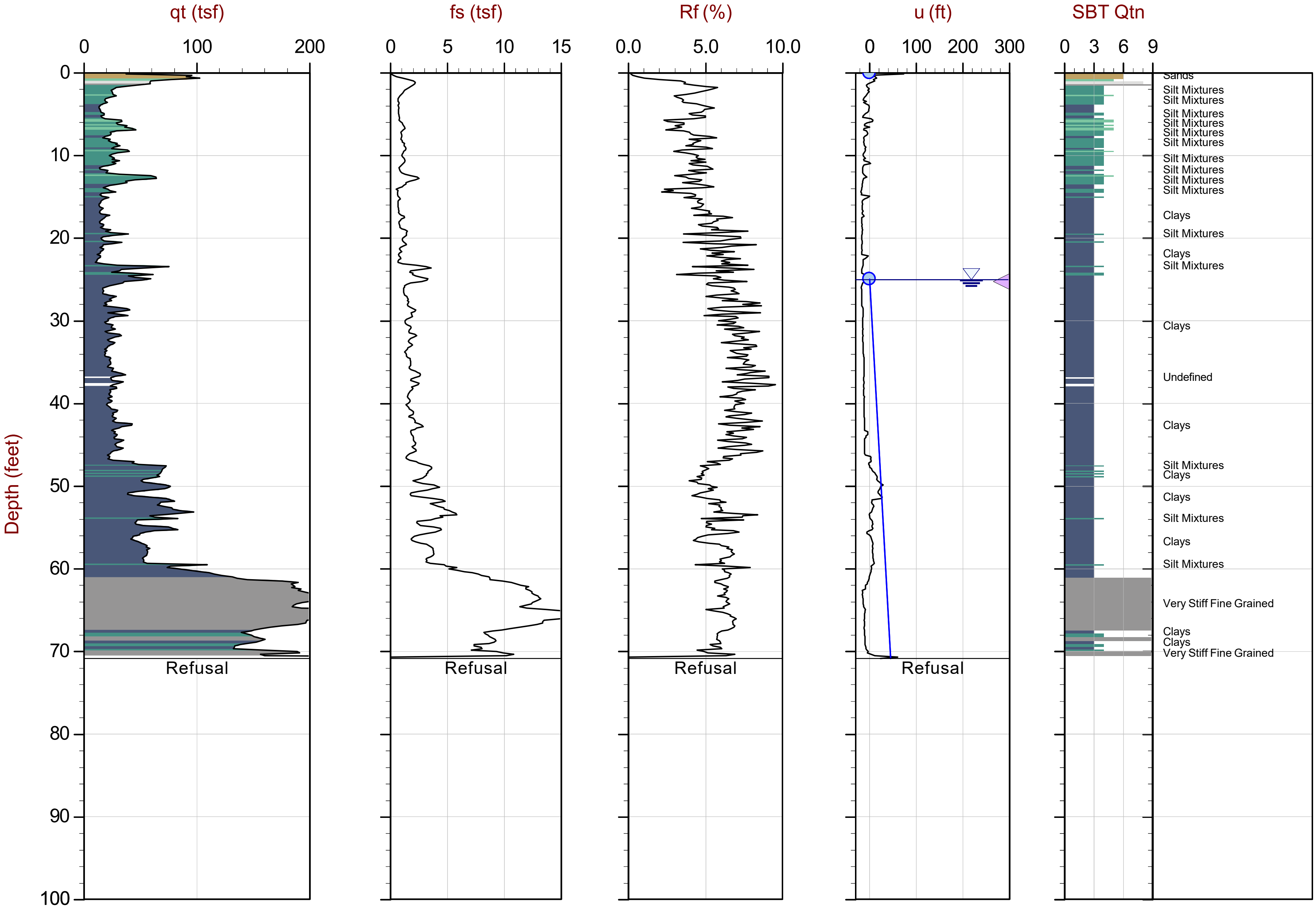
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139912ft E: 13392507ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 08:58
Site: DTE Monroe Power Plant

Sounding: CPT20-124
Cone: 513:T1500F15U500



Max Depth: 21.600 m / 70.87 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP124.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139802ft E: 13392678ft
Sheet No: 1 of 1

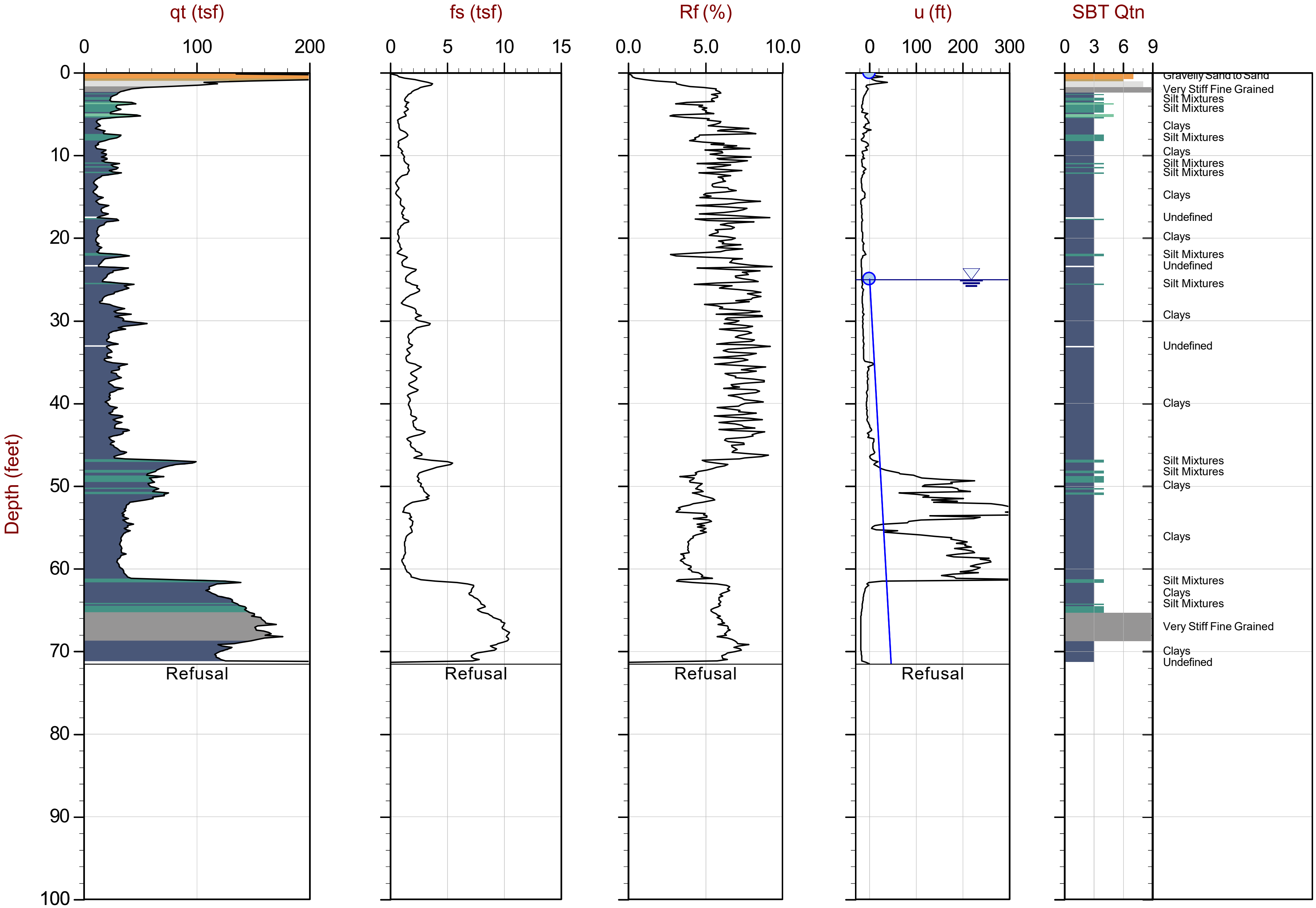
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 10:02
Site: DTE Monroe Power Plant

Sounding: CPT20-126
Cone: 513:T1500F15U500



Max Depth: 21.800 m / 71.52 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP126.COR
Unit Wt: SBTQtn (PKR2009)

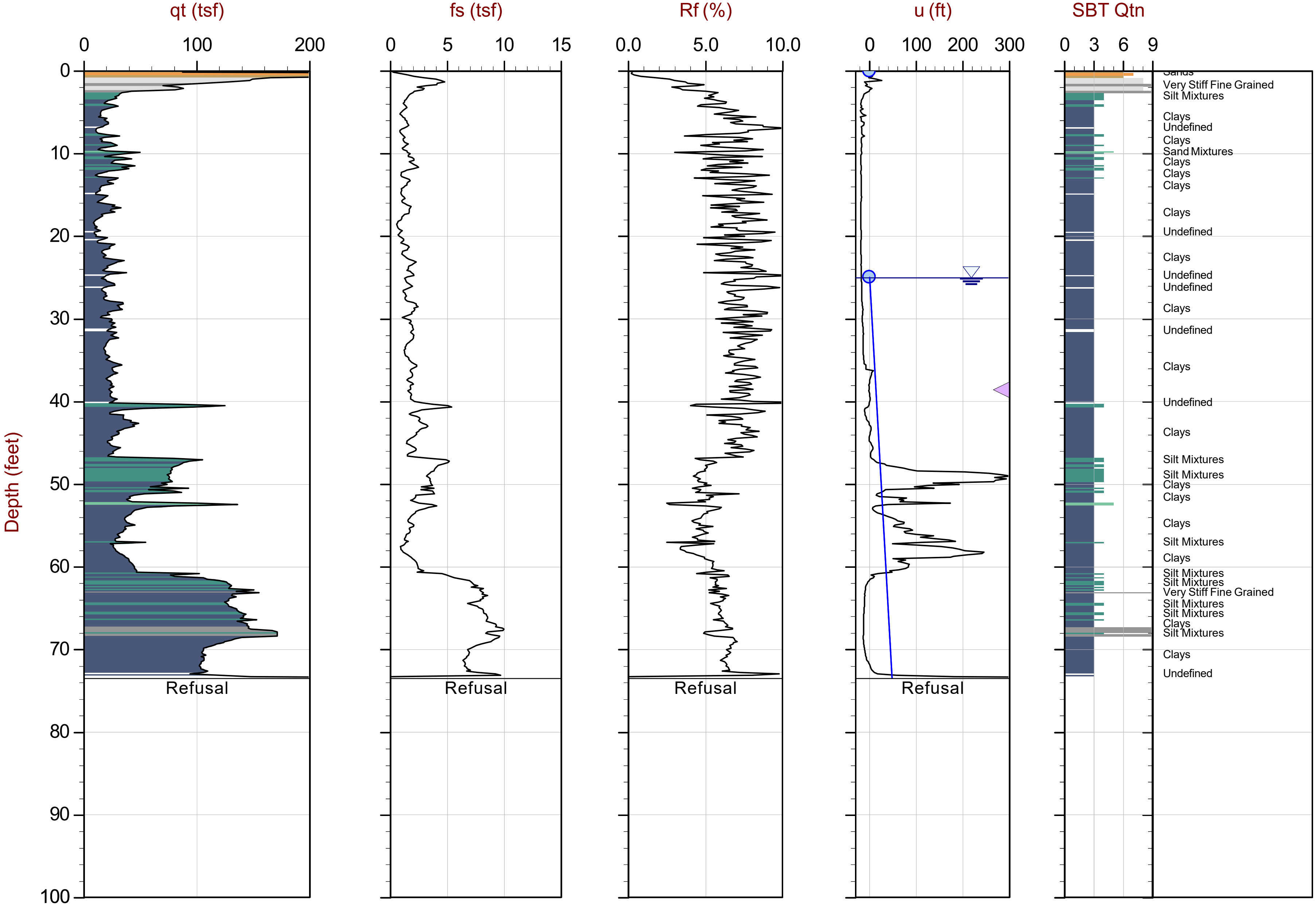
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139694ft E: 13392854ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-128
Cone: 513:T1500F15U500



Max Depth: 22.400 m / 73.49 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP128.COR
Unit Wt: SBTQtn (PKR2009)

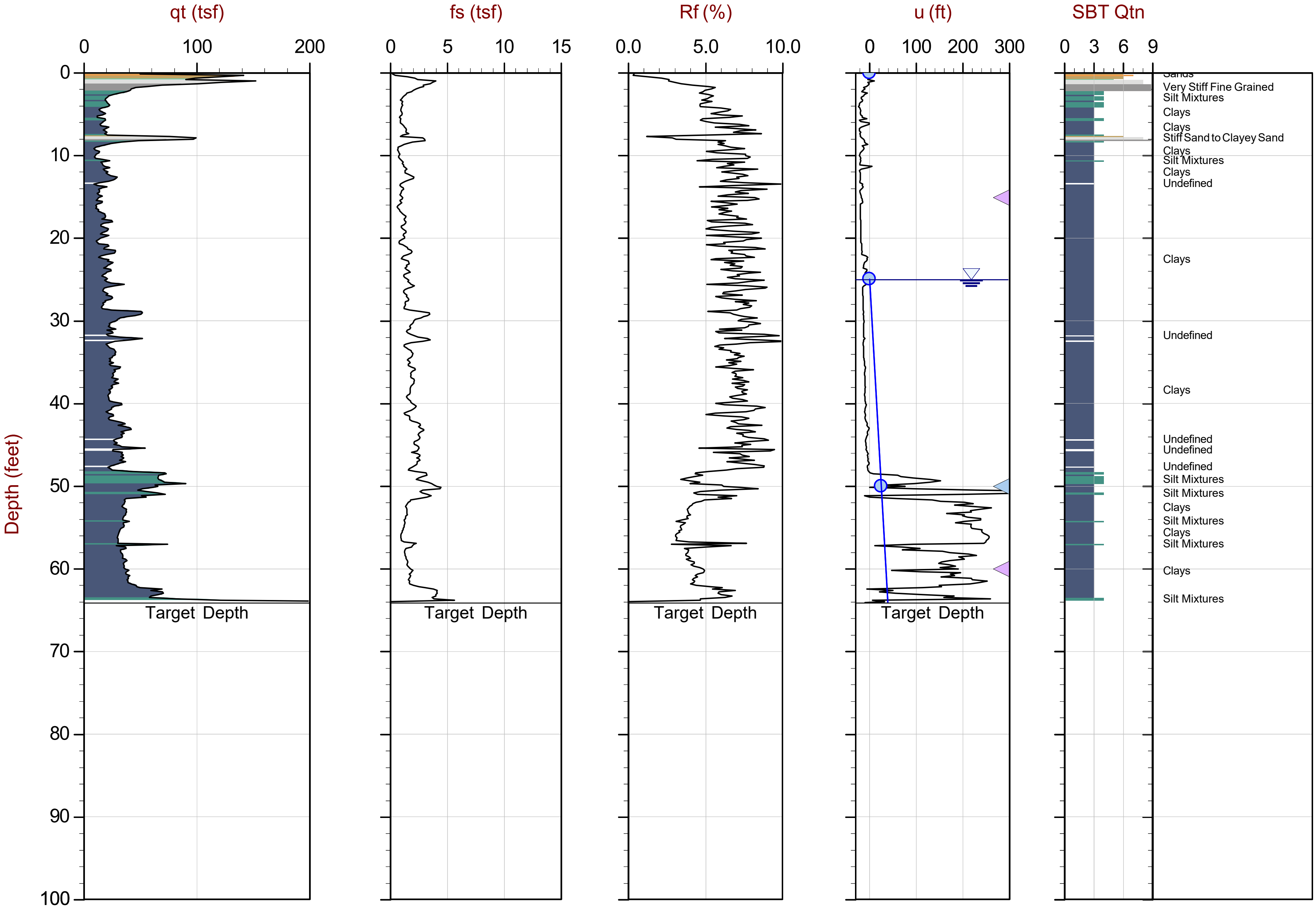
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139593ft E: 13393024ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500



Max Depth: 19.550 m / 64.14 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP130.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139484ft E: 13393198ft
Sheet No: 1 of 1

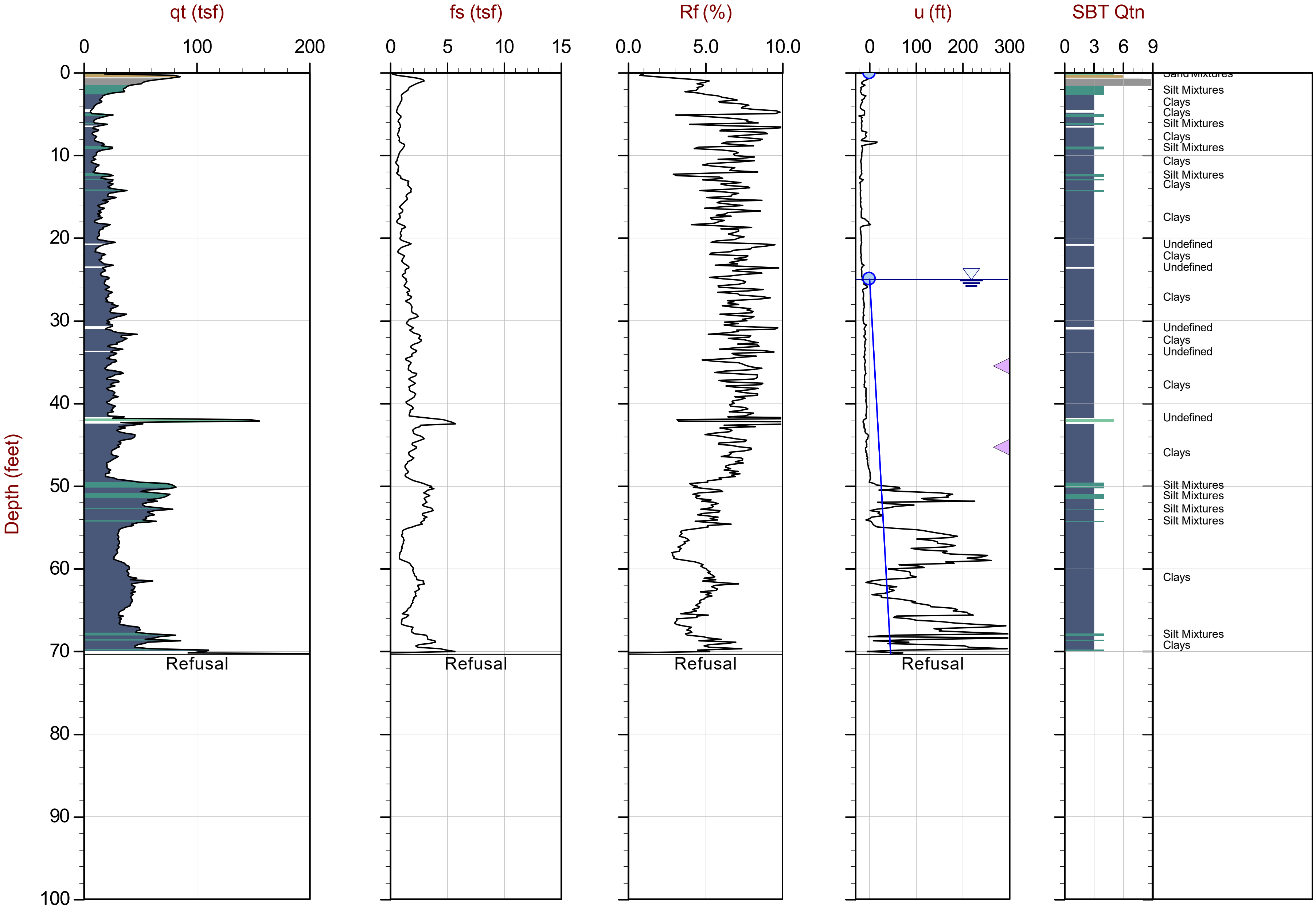
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-08 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500



Max Depth: 21.450 m / 70.37 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP132.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139378ft E: 13393362ft
Sheet No: 1 of 1

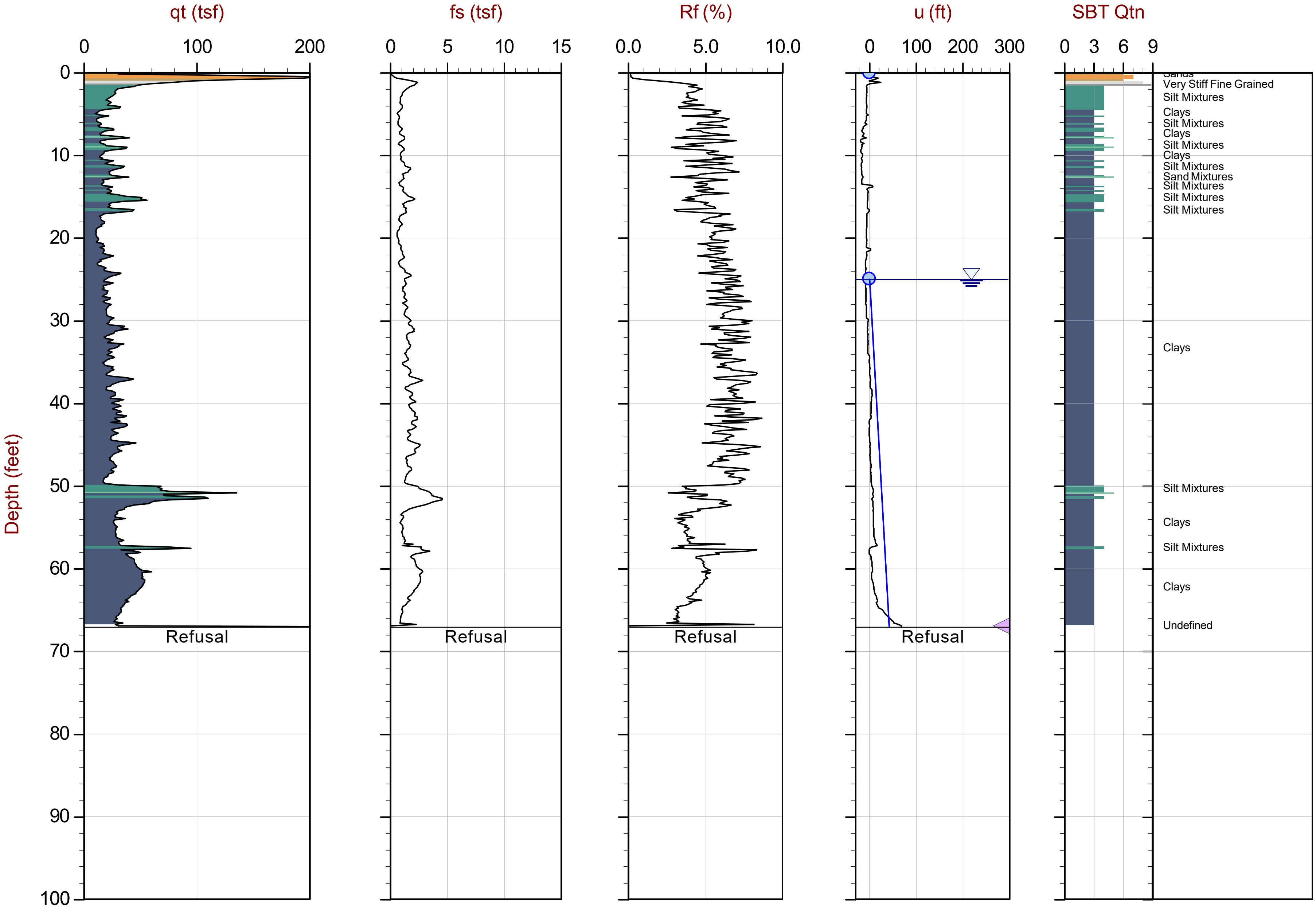
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-14 14:09
Site: DTE Monroe Power Plant

Sounding: CPT20-134
Cone: 568:T1500F15U500



Max Depth: 20.450 m / 67.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP134.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139281ft E: 13393532ft
Sheet No: 1 of 1

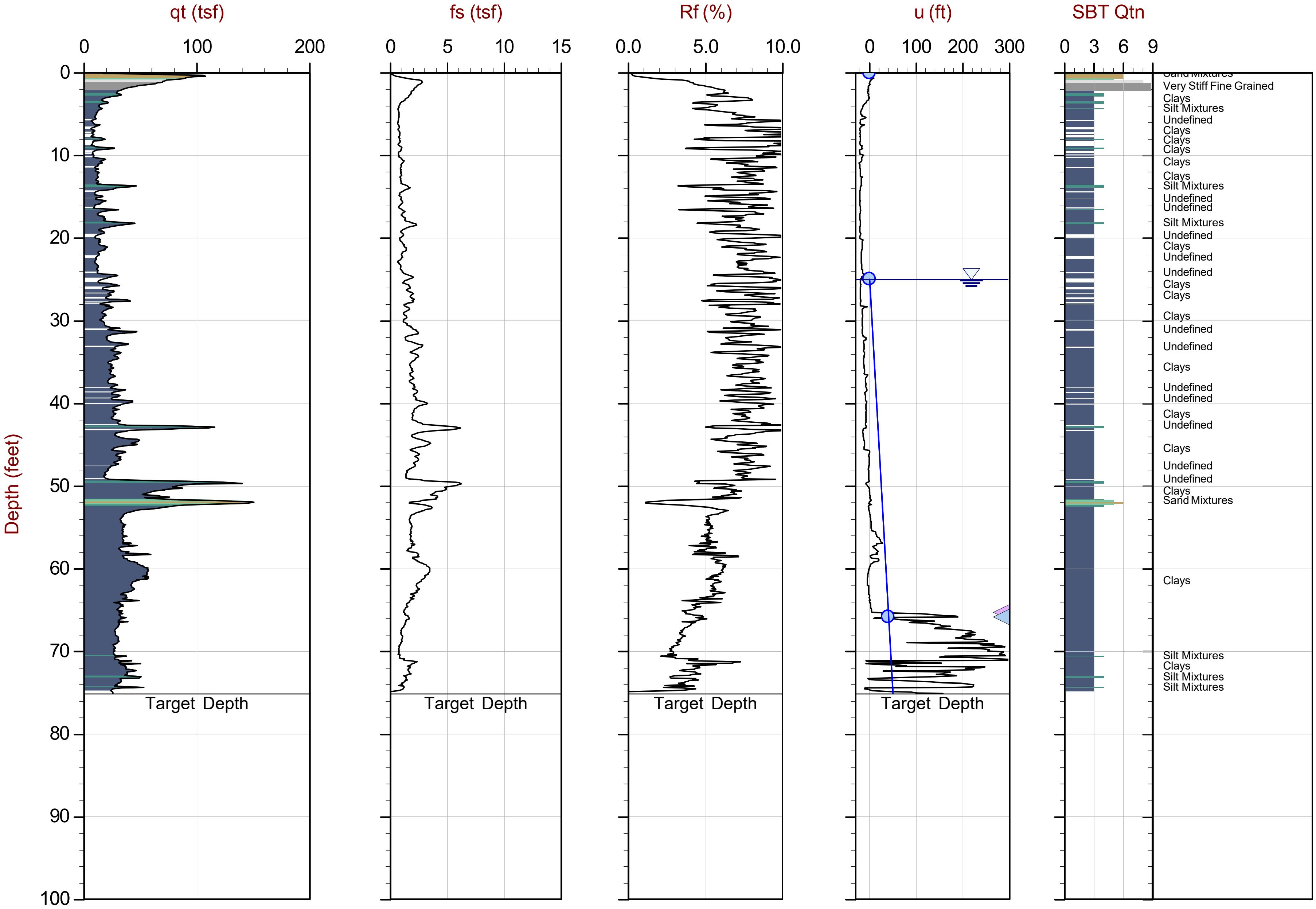
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 13:01
Site: DTE Monroe Power Plant

Sounding: CPT20-136
Cone: 551:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP136.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139166ft E: 13393704ft
Sheet No: 1 of 1

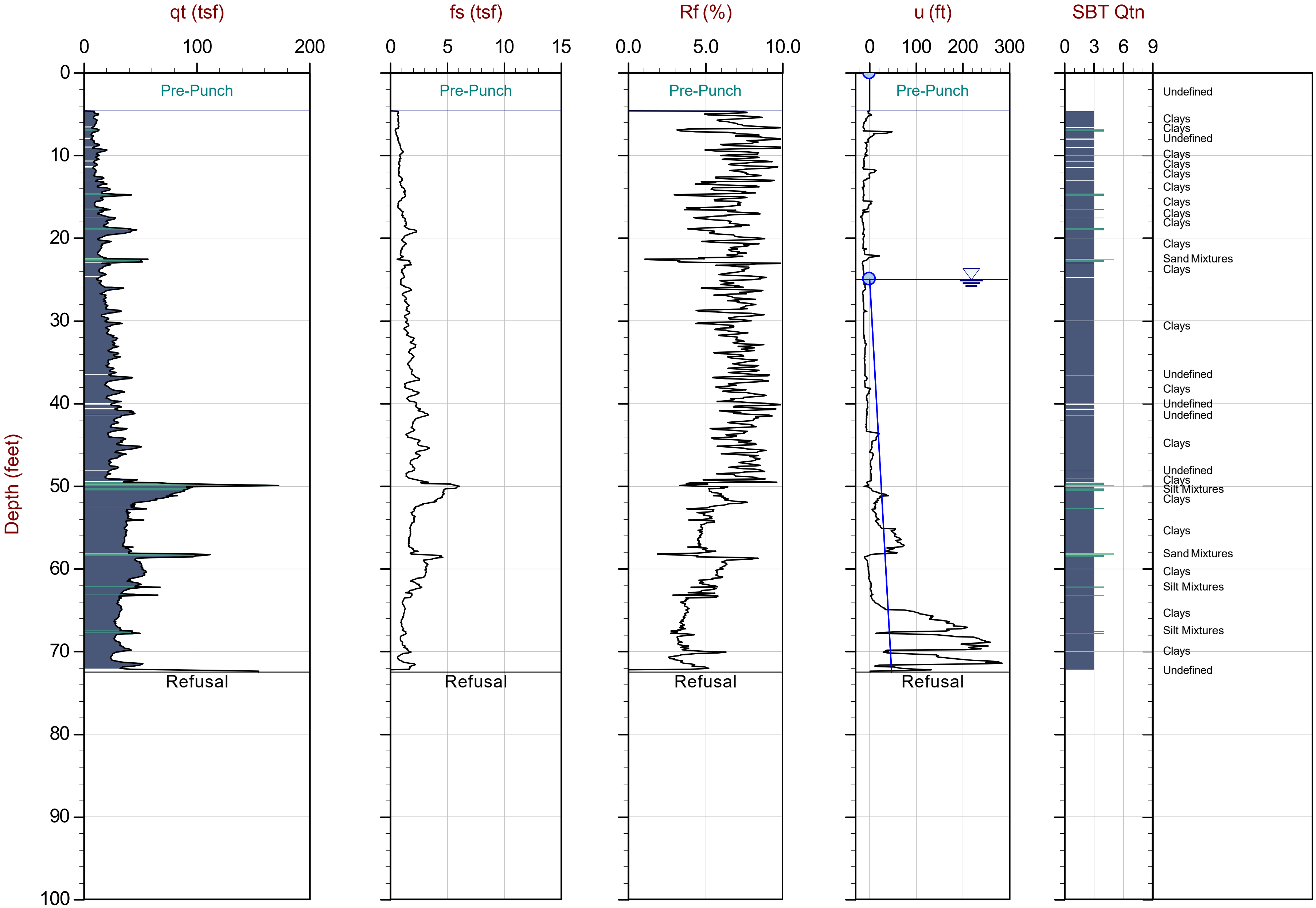
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 12:17
Site: DTE Monroe Power Plant

Sounding: CPT20-138
Cone: 551:T1500F15U500



Max Depth: 22.100 m / 72.51 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP138.COR
Unit Wt: SBTQtn (PKR2009)

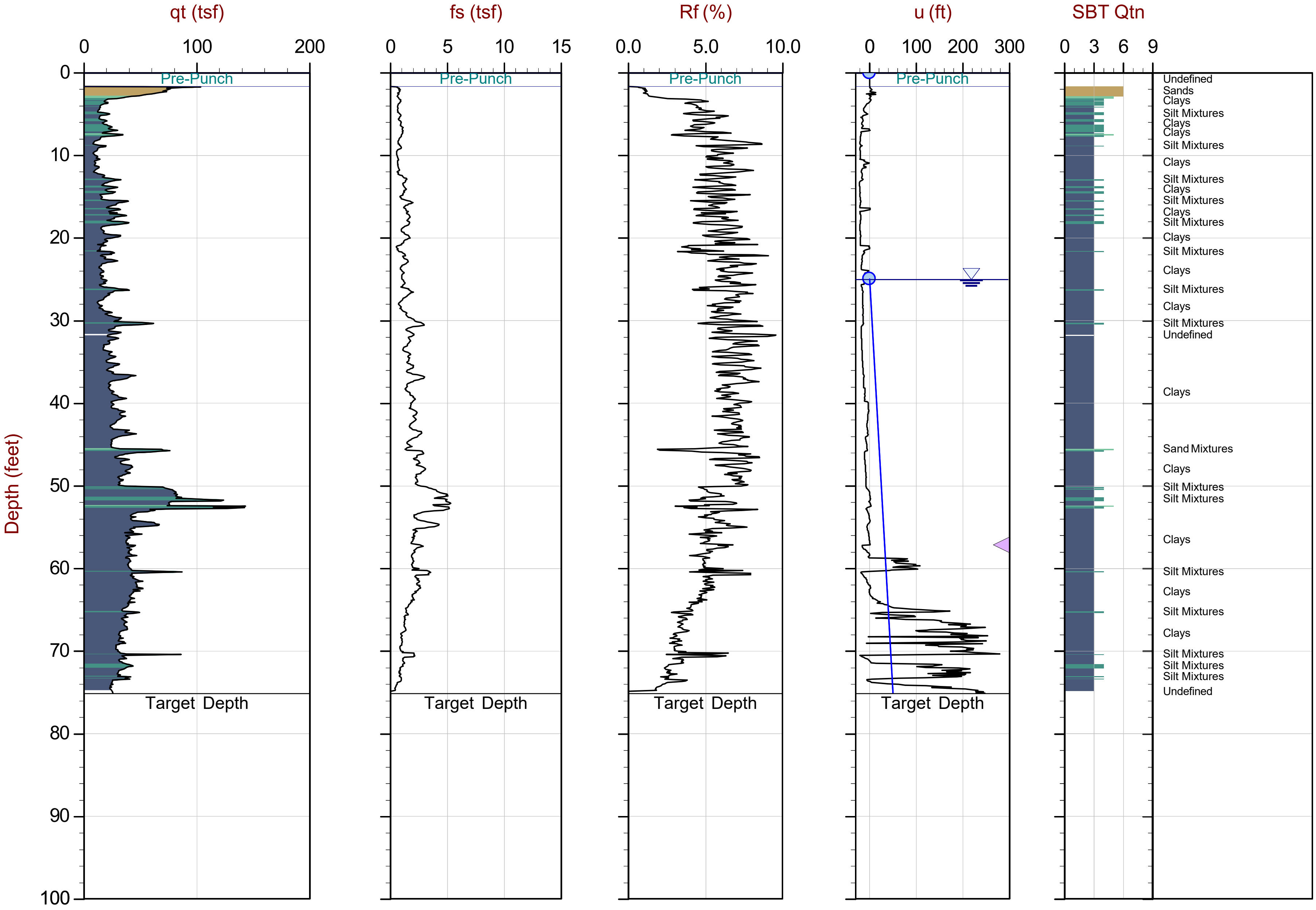
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139110ft E: 13393797ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-13 14:56
Site: DTE Monroe Power Plant

Sounding: CPT20-140
Cone: 551:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP140.COR
Unit Wt: SBTQtn (PKR2009)

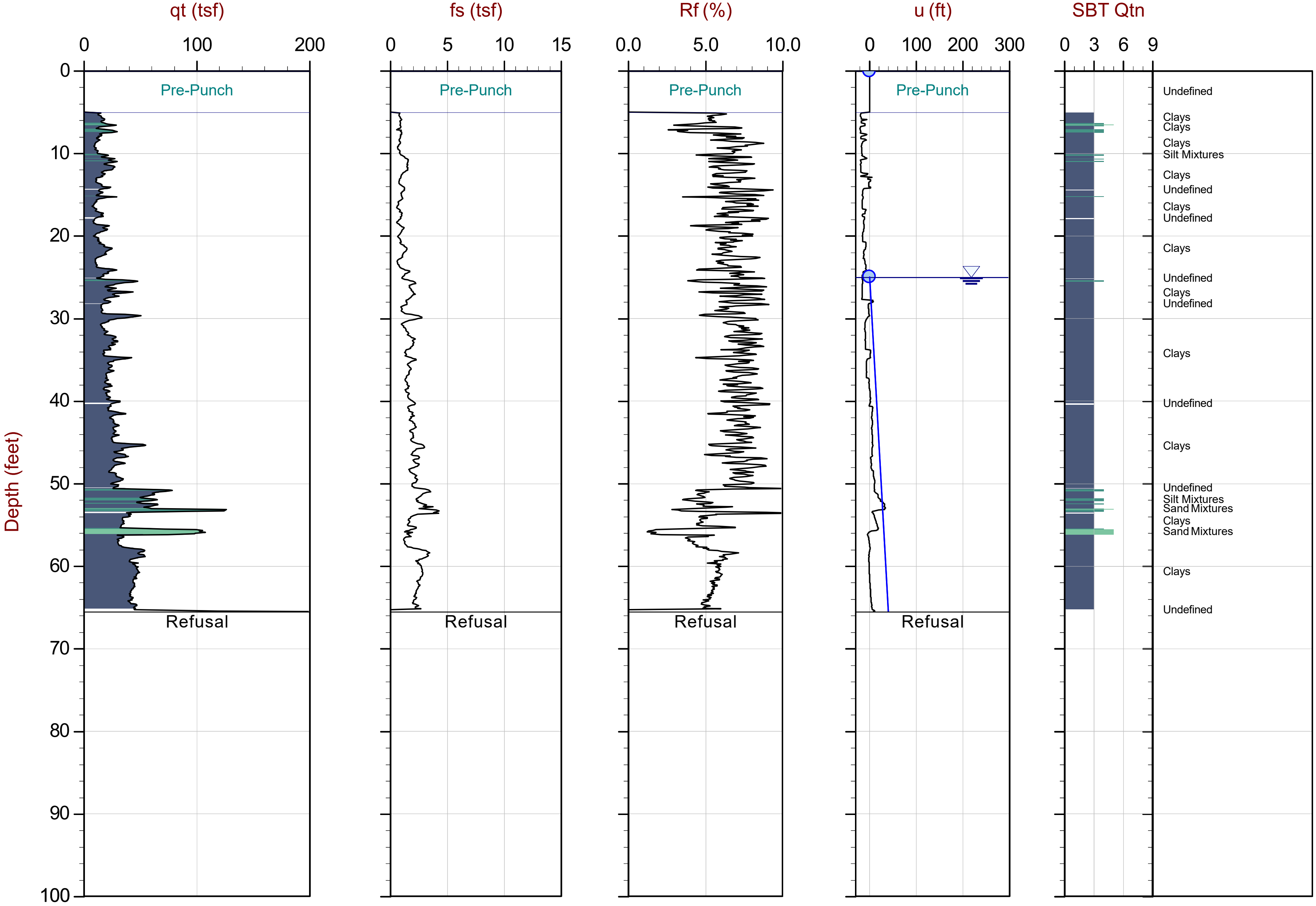
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139141ft E: 13393971ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 11:26
Site: DTE Monroe Power Plant

Sounding: CPT20-142
Cone: 551:T1500F15U500



Max Depth: 19.975 m / 65.53 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP142.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139293ft E: 13394120ft
Sheet No: 1 of 1

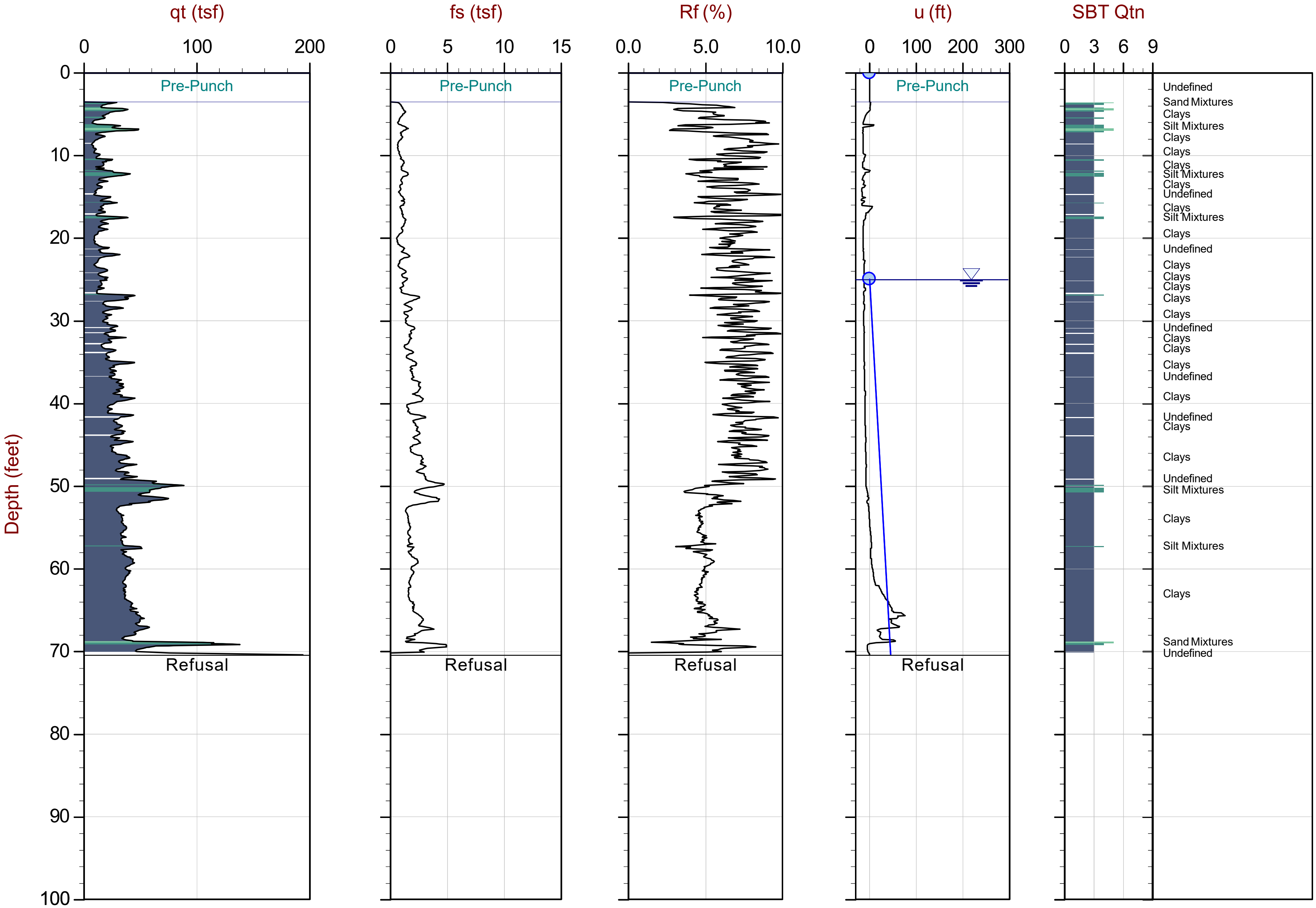
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 10:25
Site: DTE Monroe Power Plant

Sounding: CPT20-144
Cone: 551:T1500F15U500



Max Depth: 21.475 m / 70.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP144.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139326ft E: 13394303ft
Sheet No: 1 of 1

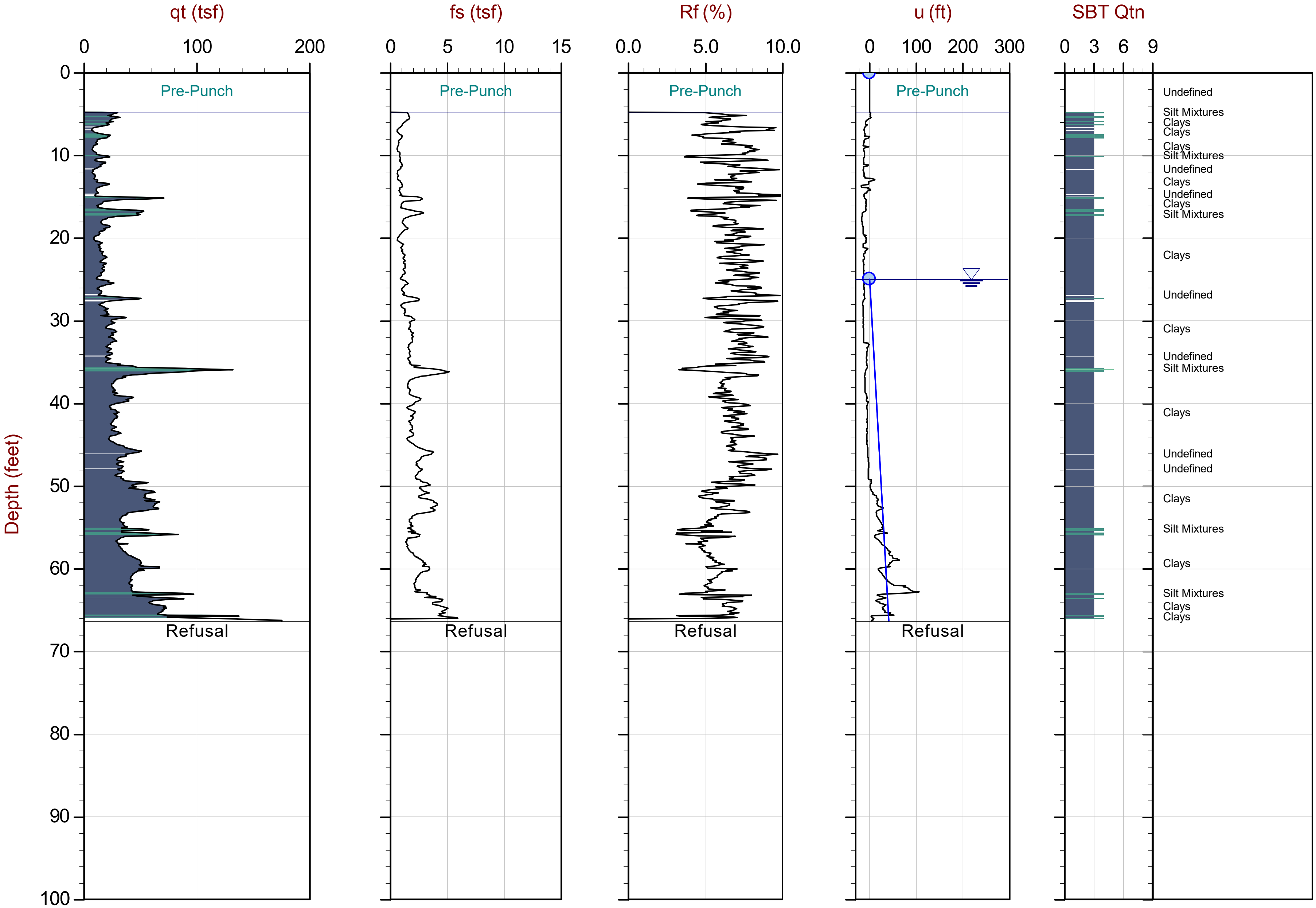
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 09:43
Site: DTE Monroe Power Plant

Sounding: CPT20-146
Cone: 551:T1500F15U500



Max Depth: 20.225 m / 66.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP146.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139290ft E: 13394504ft
Sheet No: 1 of 1

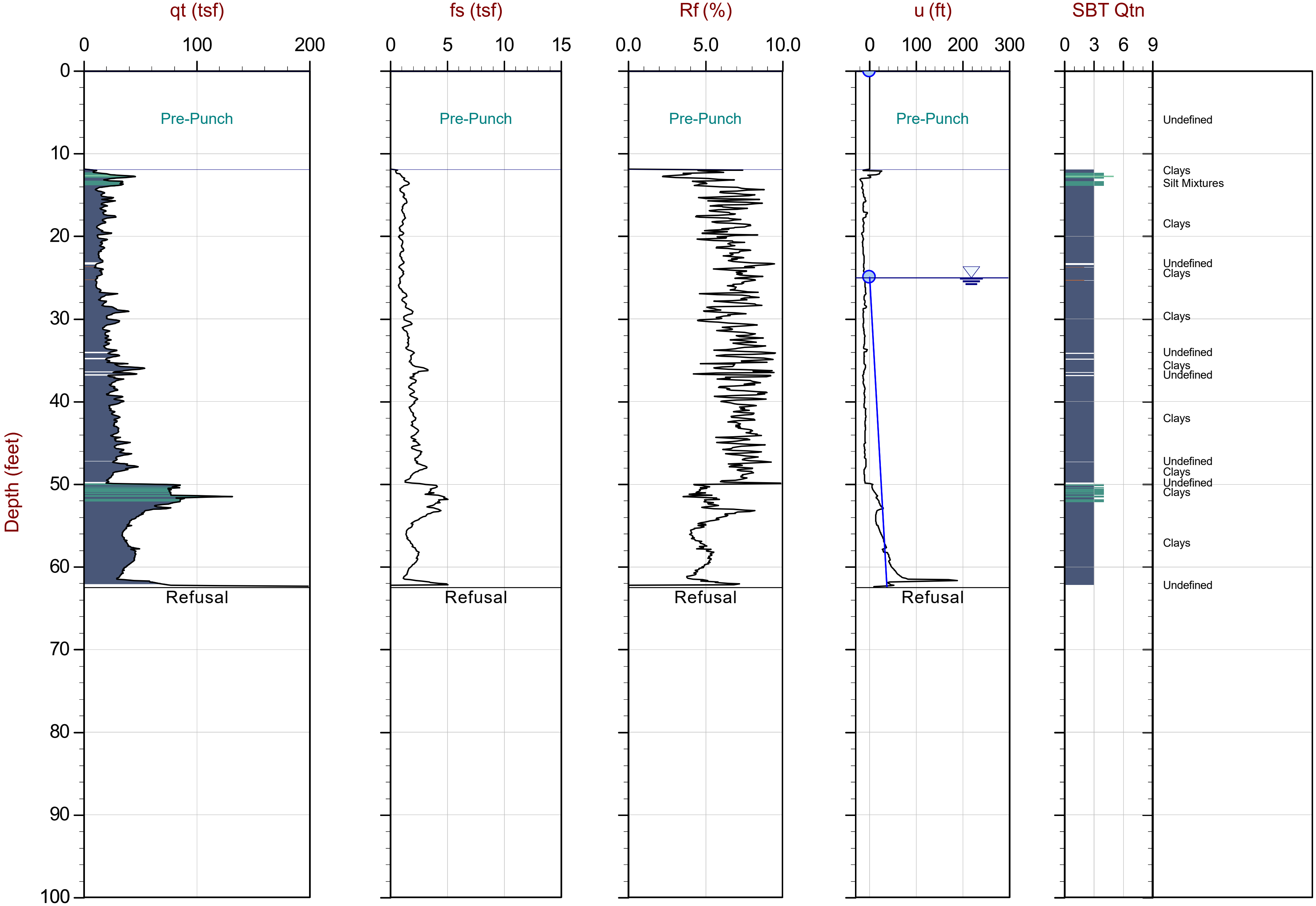
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-14 09:01
Site: DTE Monroe Power Plant

Sounding: CPT20-148
Cone: 551:T1500F15U500



Max Depth: 19.050 m / 62.50 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP148.COR
Unit Wt: SBTQtn (PKR2009)

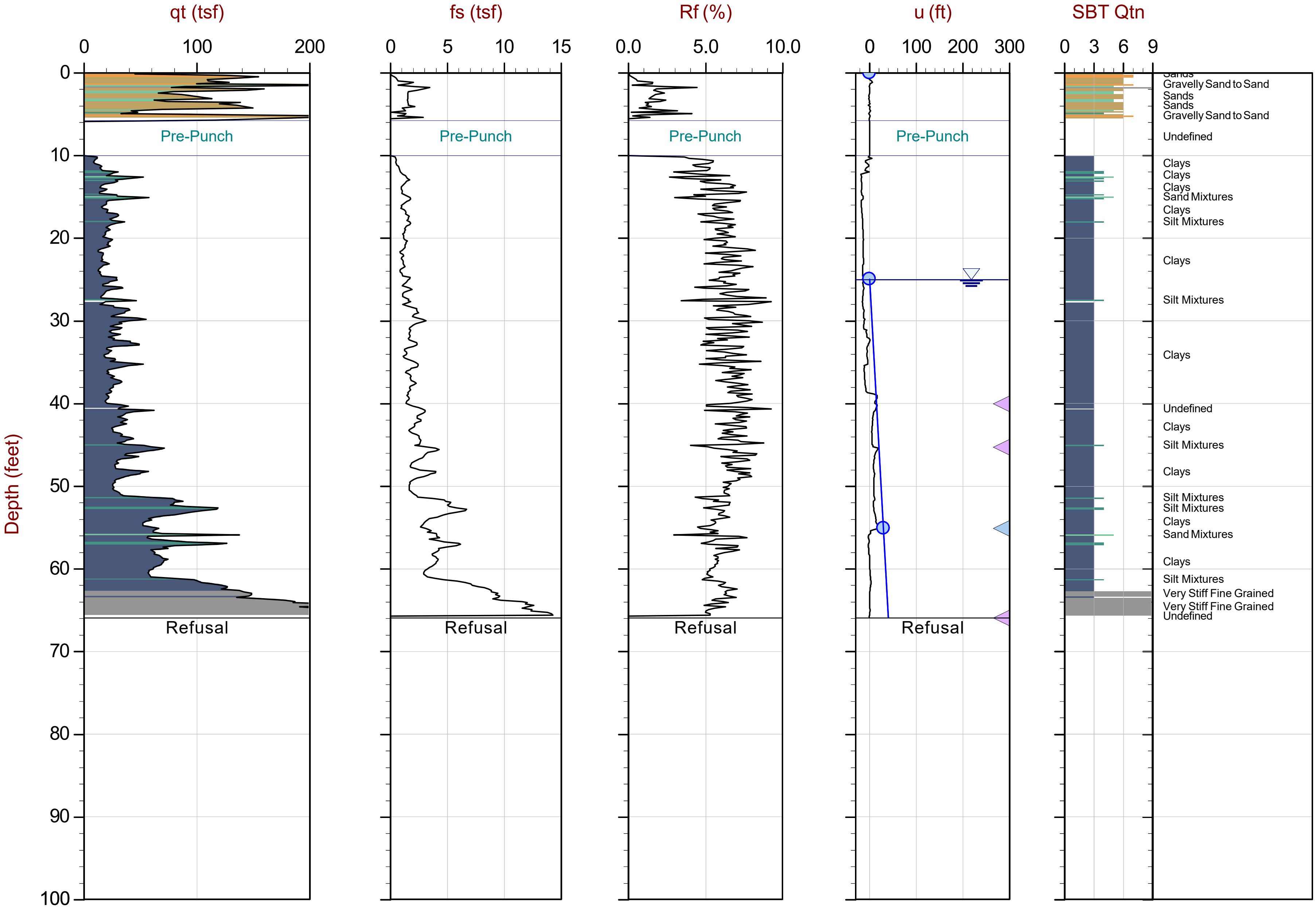
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139269ft E: 13394705ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21655
Date: 2020-12-14 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500



Max Depth: 20.100 m / 65.94 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21655_CP150.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139340ft E: 13394900ft
Sheet No: 1 of 1

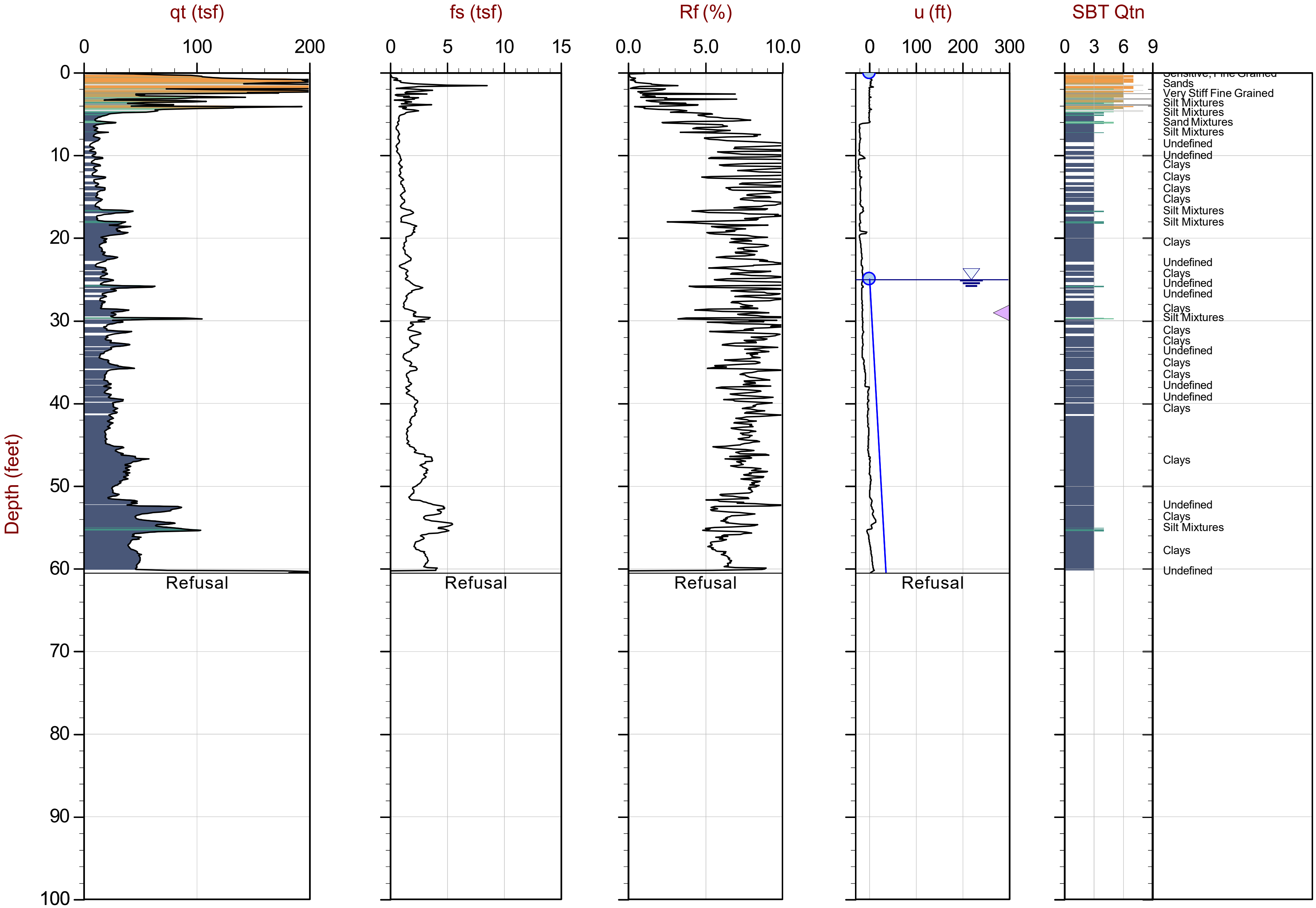
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 14:54
Site: DTE Monroe Power Plant

Sounding: CPT20-152
Cone: 551:T1500F15U500



Max Depth: 18.450 m / 60.53 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP152.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139451ft E: 13395043ft
Sheet No: 1 of 1

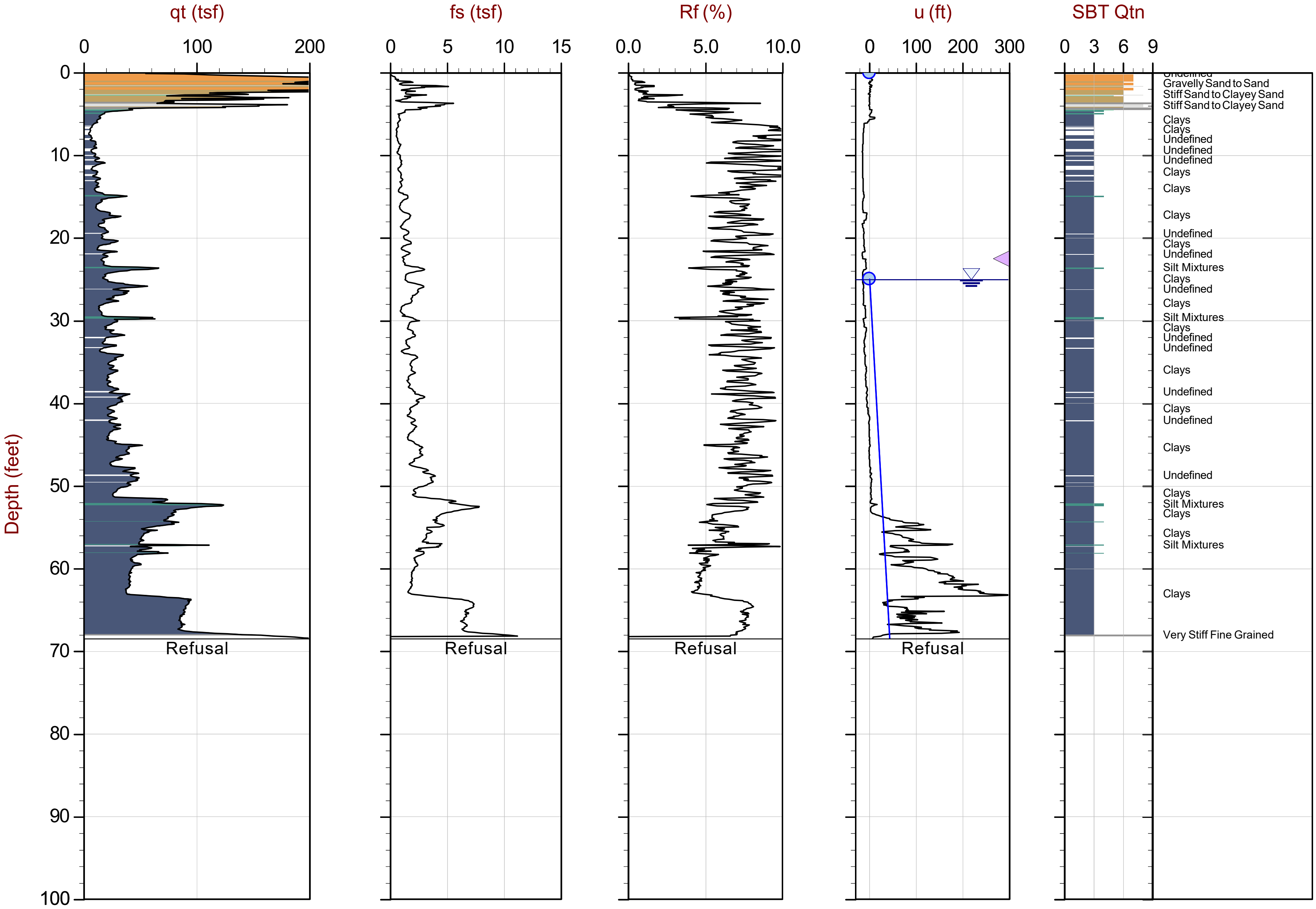
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 14:08
Site: DTE Monroe Power Plant

Sounding: CPT20-154
Cone: 551:T1500F15U500



Max Depth: 20.875 m / 68.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP154.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139579ft E: 13395198ft
Sheet No: 1 of 1

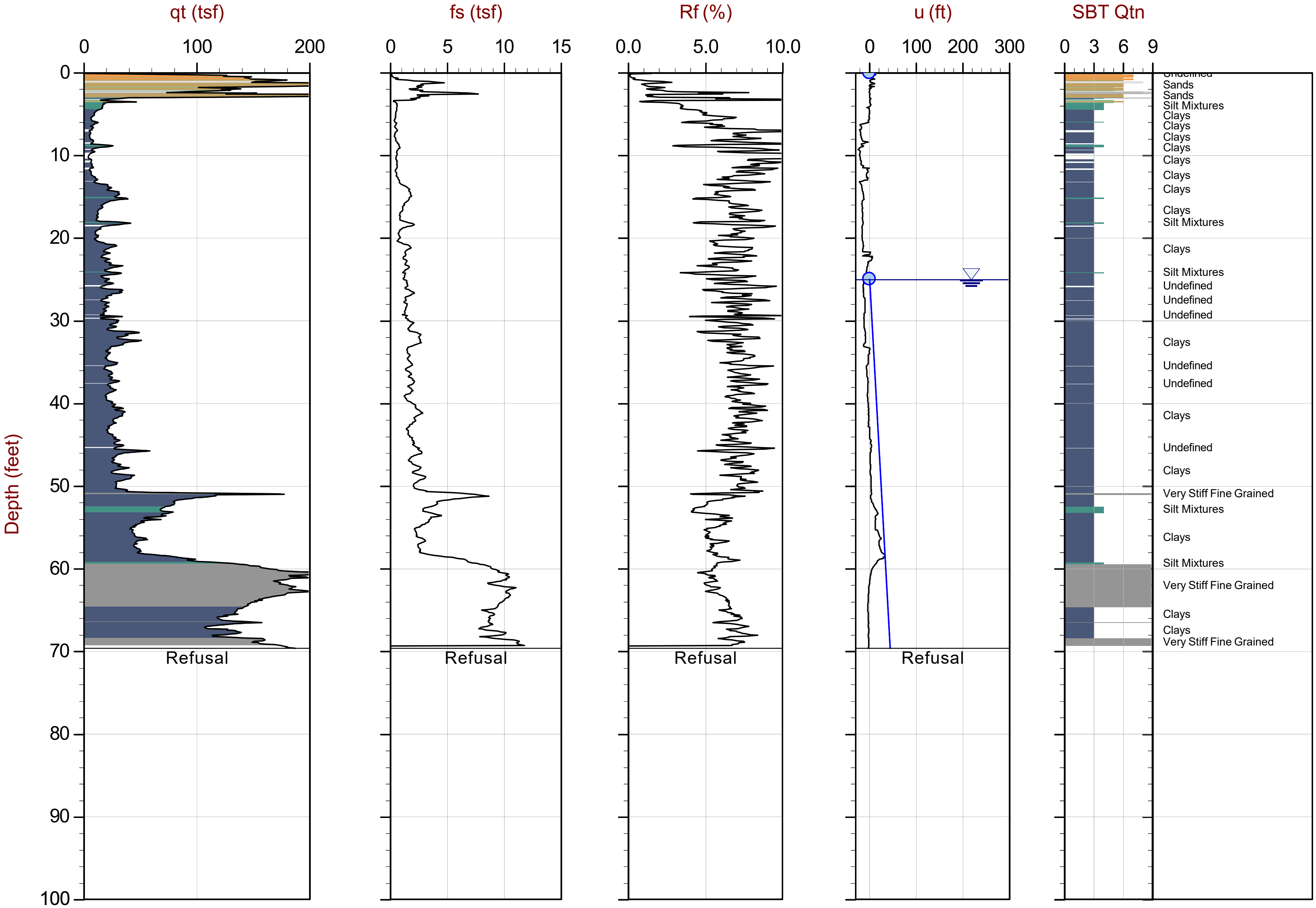
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-156
Cone: 551:T1500F15U500



Max Depth: 21.225 m / 69.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP156.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139707ft E: 13395357ft
Sheet No: 1 of 1

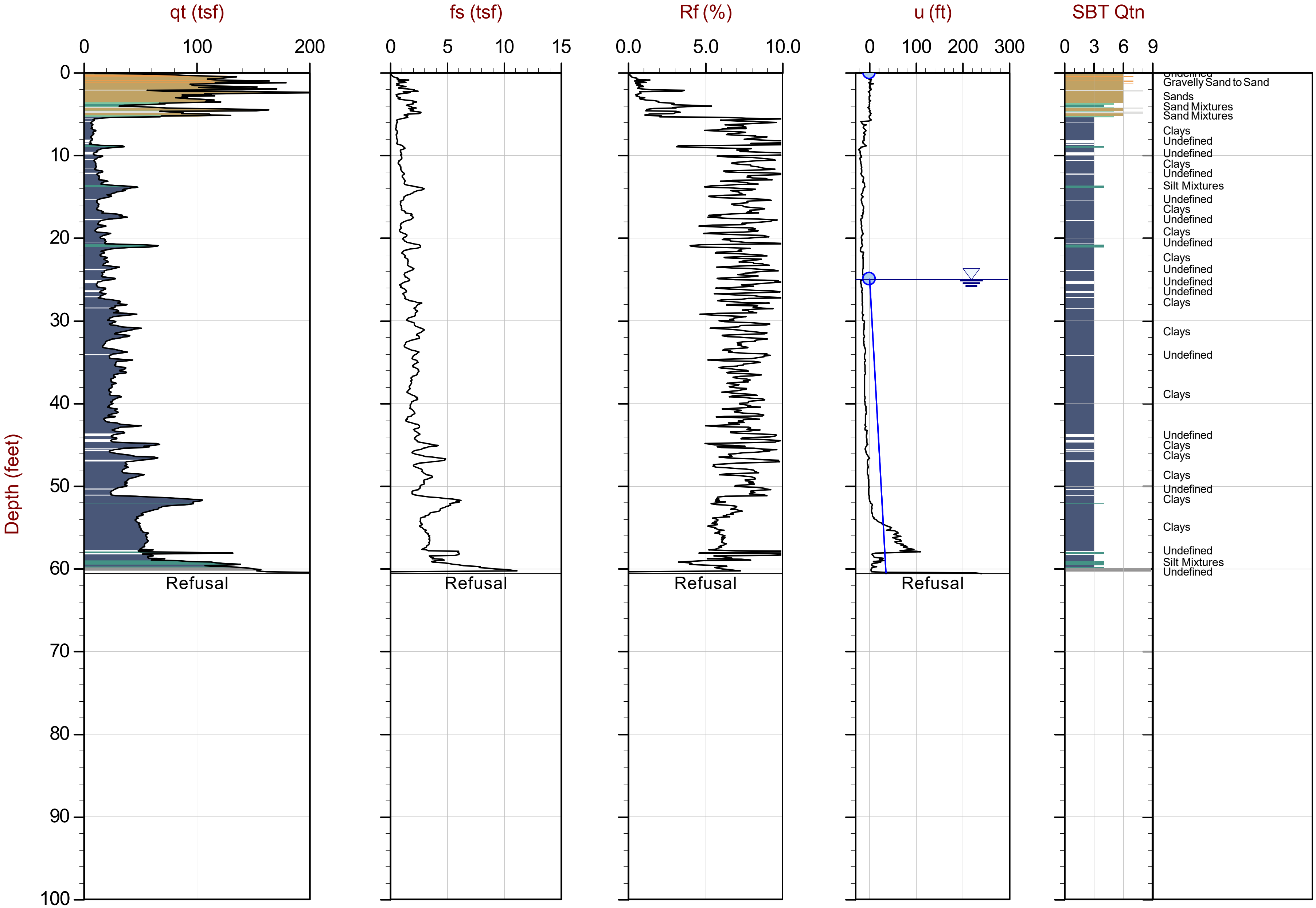
Overplot Item: 🟡 Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 12:47
Site: DTE Monroe Power Plant

Sounding: CPT20-158
Cone: 551:T1500F15U500



Max Depth: 18.475 m / 60.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP158.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139832ft E: 13395506ft
Sheet No: 1 of 1

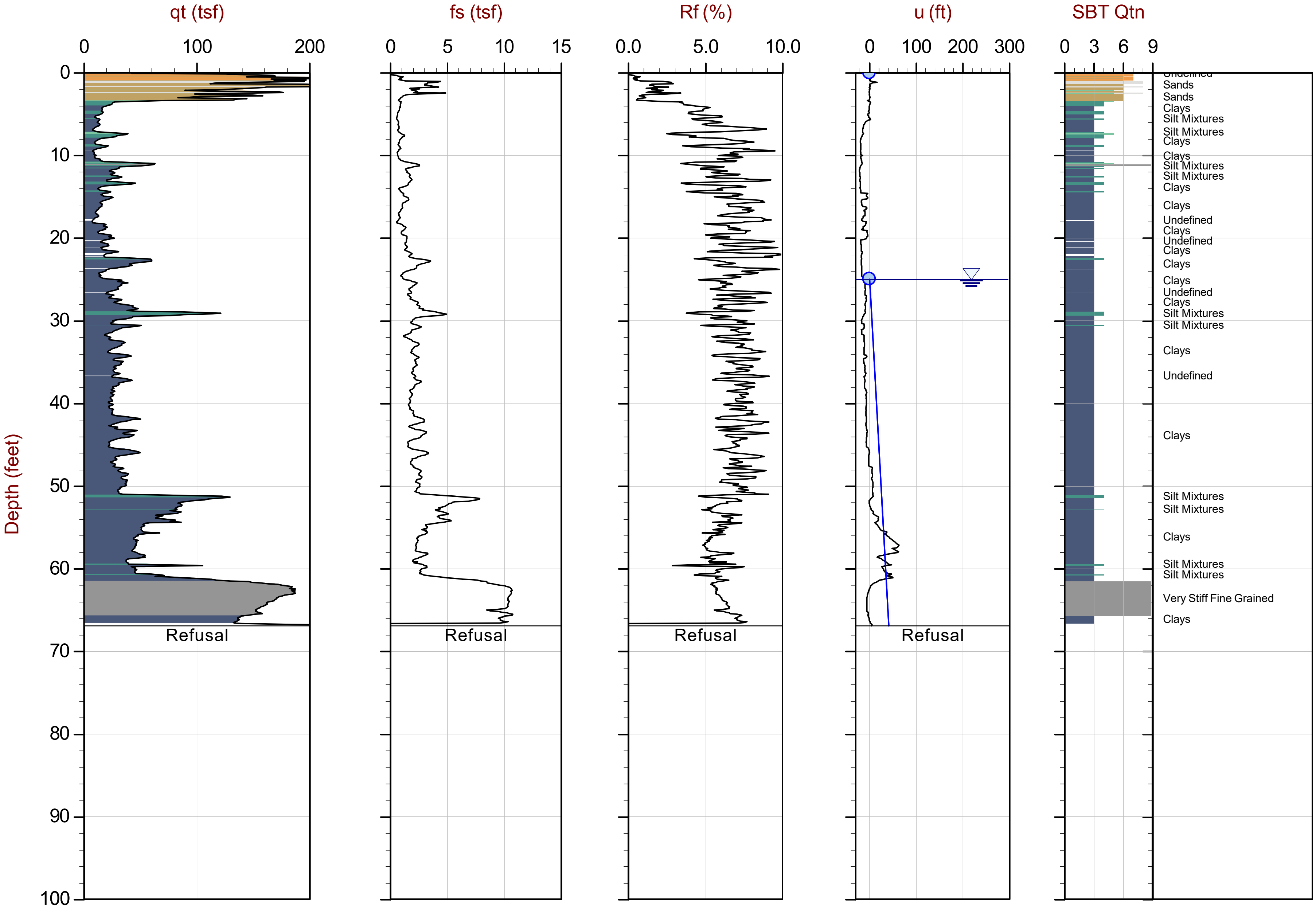
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-160
Cone: 551:T1500F15U500



Max Depth: 20.400 m / 66.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP160.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 139960ft E: 13395666ft
Sheet No: 1 of 1

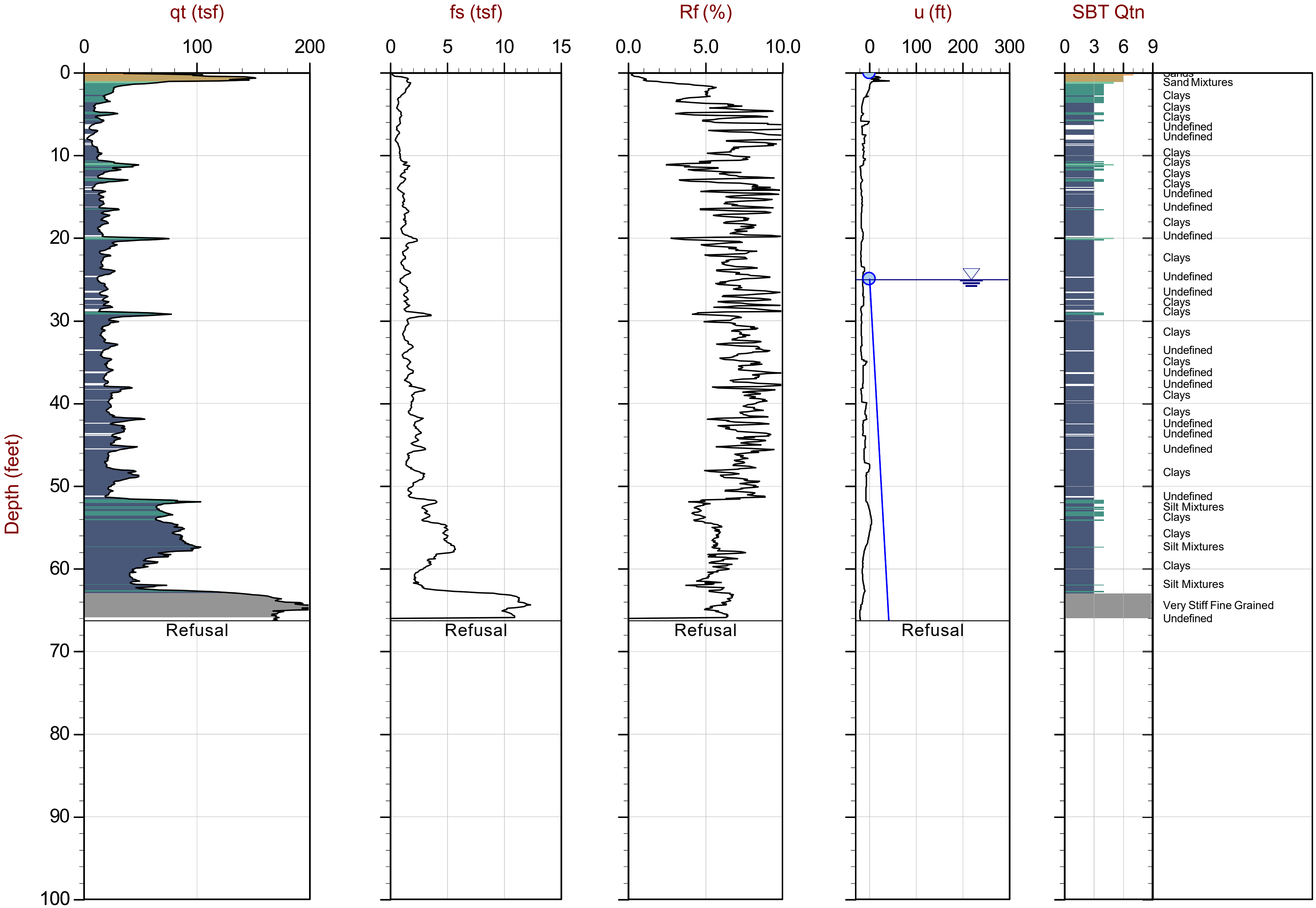
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 11:22
Site: DTE Monroe Power Plant

Sounding: CPT20-162
Cone: 551:T1500F15U500



Max Depth: 20.200 m / 66.27 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP162.COR
Unit Wt: SBTQtn (PKR2009)

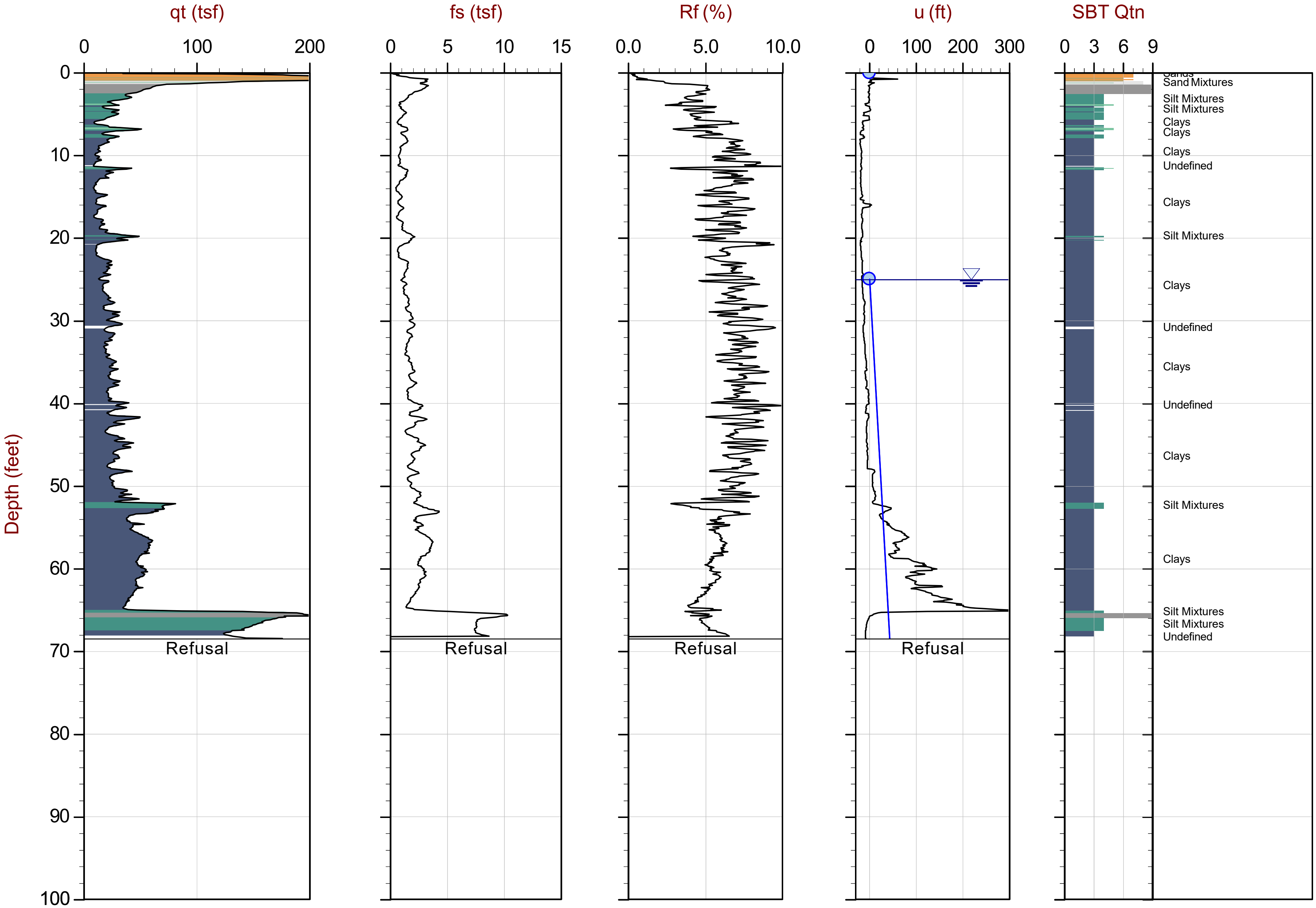
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140089ft E: 13395835ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 10:32
Site: DTE Monroe Power Plant

Sounding: CPT20-164
Cone: 551:T1500F15U500



Max Depth: 20.875 m / 68.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP164.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140210ft E: 13395988ft
Sheet No: 1 of 1

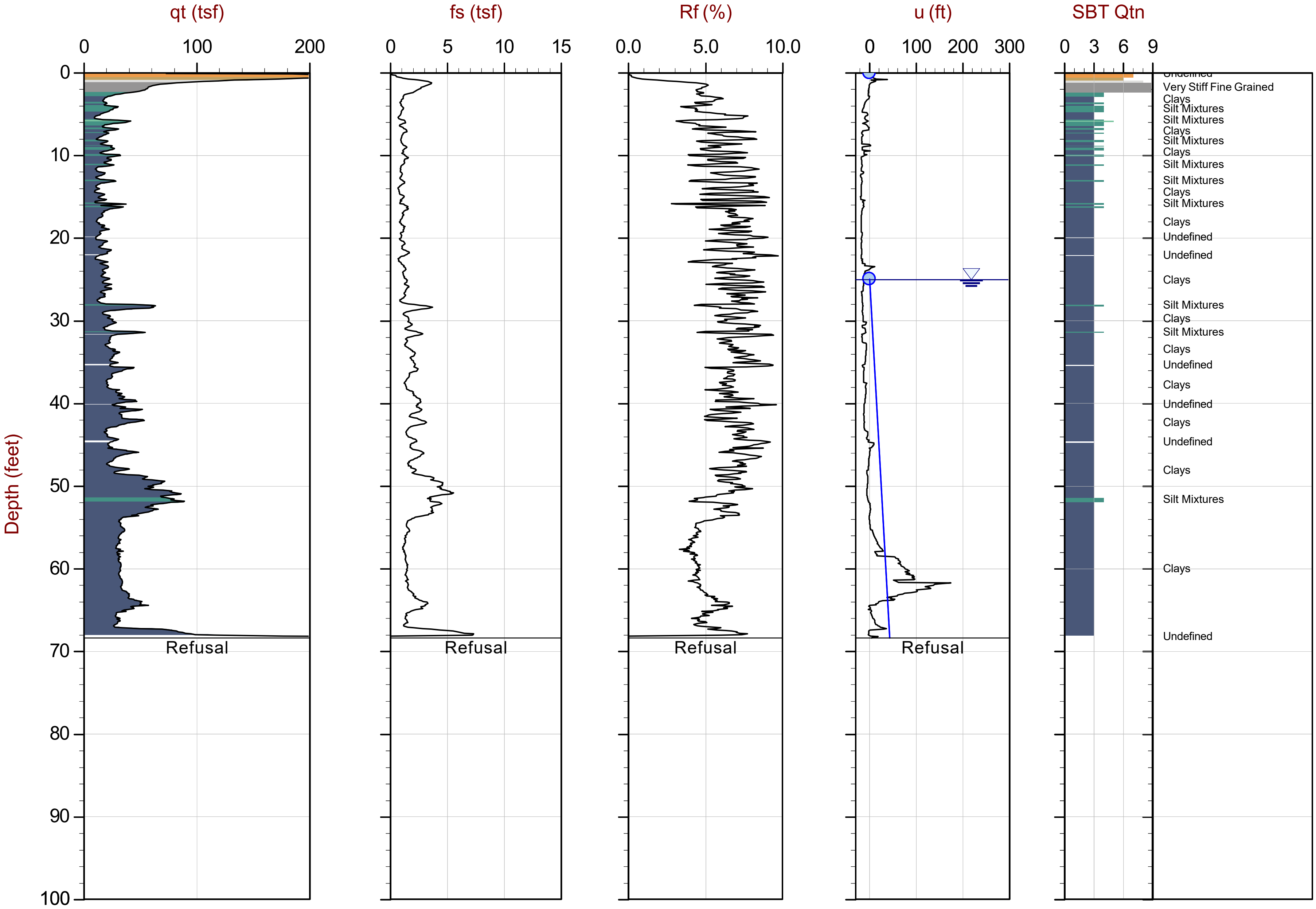
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 09:42
Site: DTE Monroe Power Plant

Sounding: CPT20-166
Cone: 551:T1500F15U500



Max Depth: 20.850 m / 68.40 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP166.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140336ft E: 13396145ft
Sheet No: 1 of 1

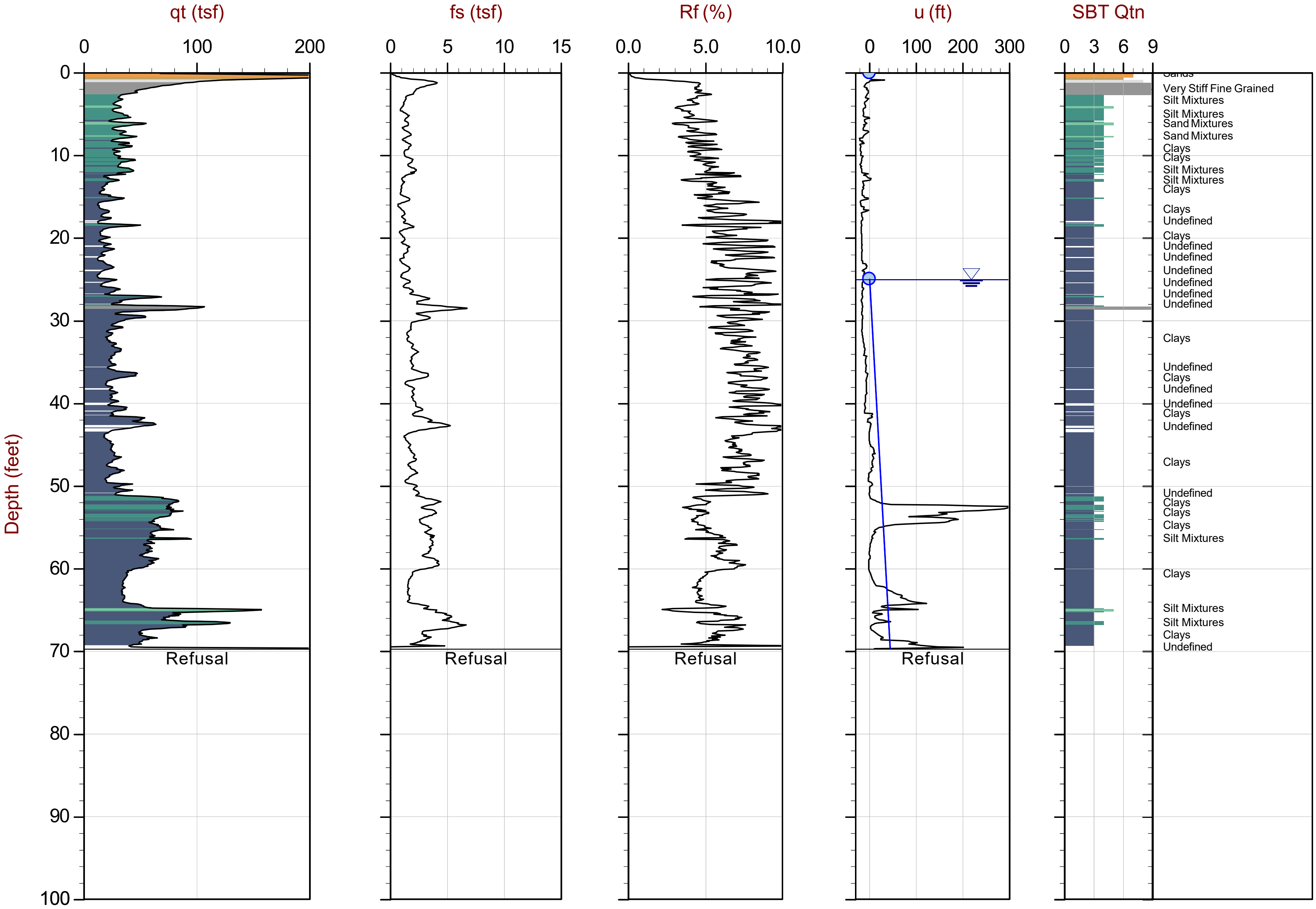
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-08 08:50
Site: DTE Monroe Power Plant

Sounding: CPT20-168
Cone: 551:T1500F15U500



Max Depth: 21.250 m / 69.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP168.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140461ft E: 13396297ft
Sheet No: 1 of 1

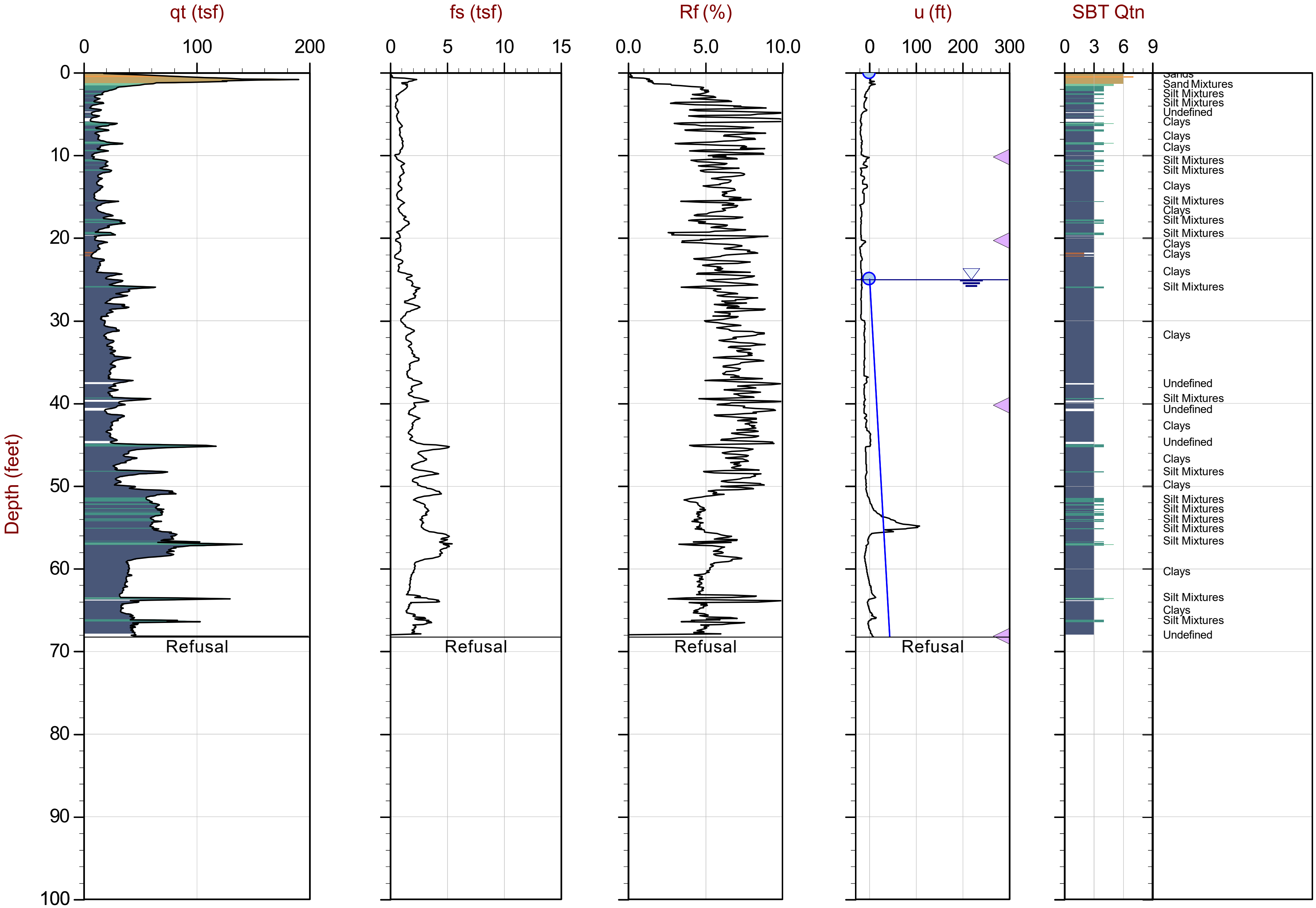
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500



Max Depth: 20.800 m / 68.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP170.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140603ft E: 13396441ft
Sheet No: 1 of 1

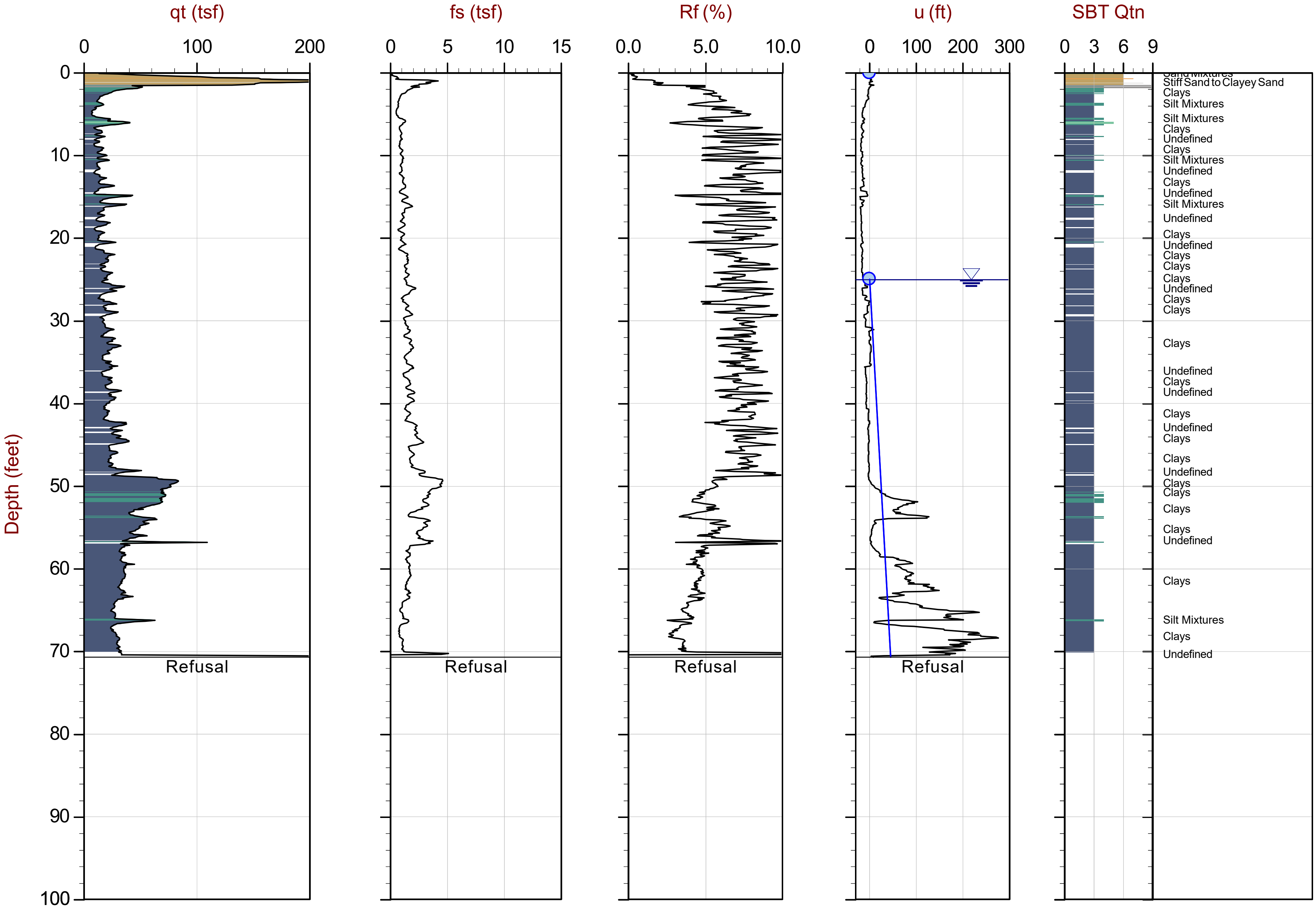
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 13:14
Site: DTE Monroe Power Plant

Sounding: CPT20-172
Cone: 551:T1500F15U500



Max Depth: 21.550 m / 70.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP172.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140759ft E: 13396566ft
Sheet No: 1 of 1

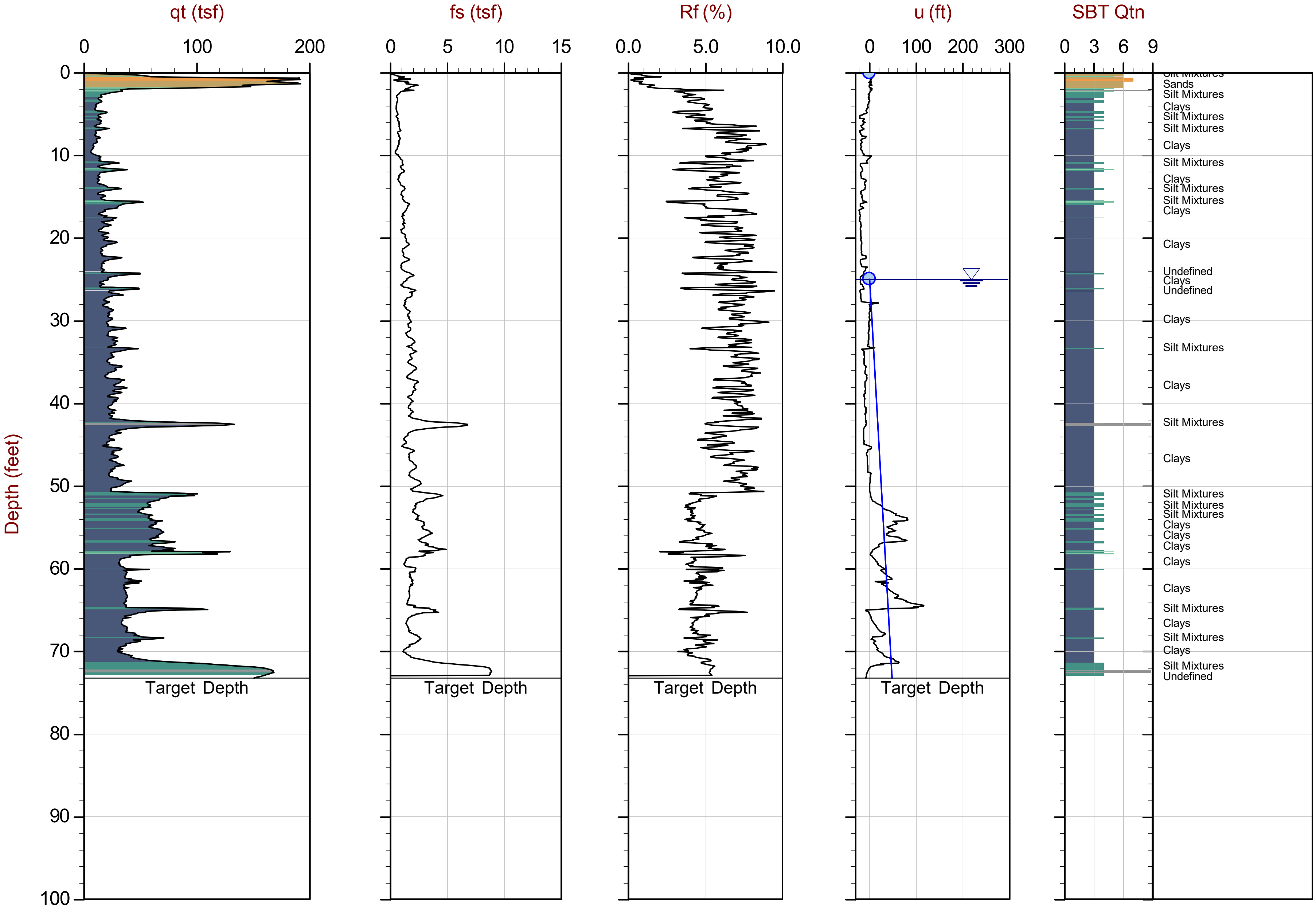
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-174
Cone: 551:T1500F15U500



Max Depth: 22.325 m / 73.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP174.COR
Unit Wt: SBTQtn (PKR2009)

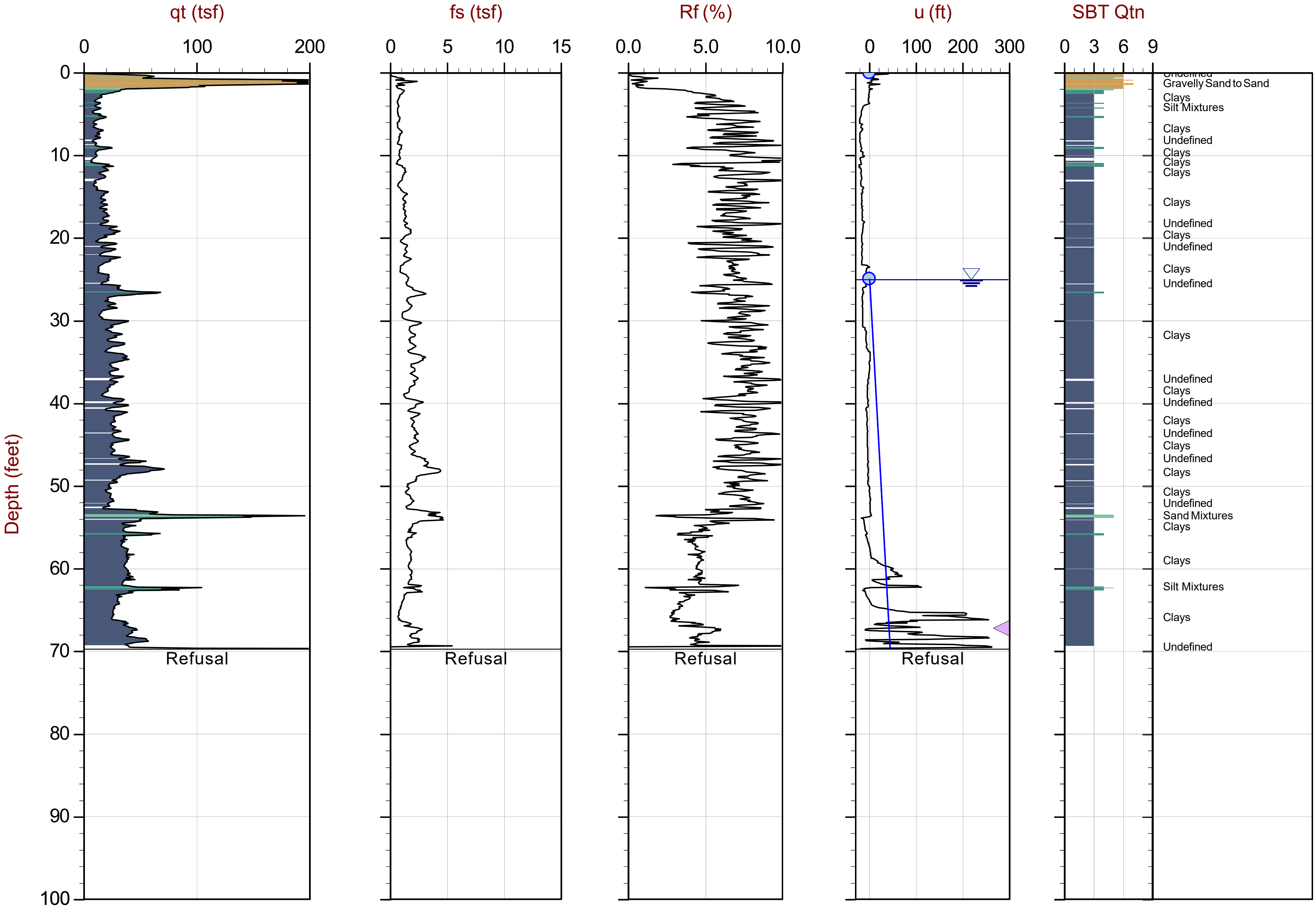
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 140916ft E: 13396693ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 10:33
Site: DTE Monroe Power Plant

Sounding: CPT20-176
Cone: 551:T1500F15U500



Max Depth: 21.250 m / 69.72 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP176.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141071ft E: 13396820ft
Sheet No: 1 of 1

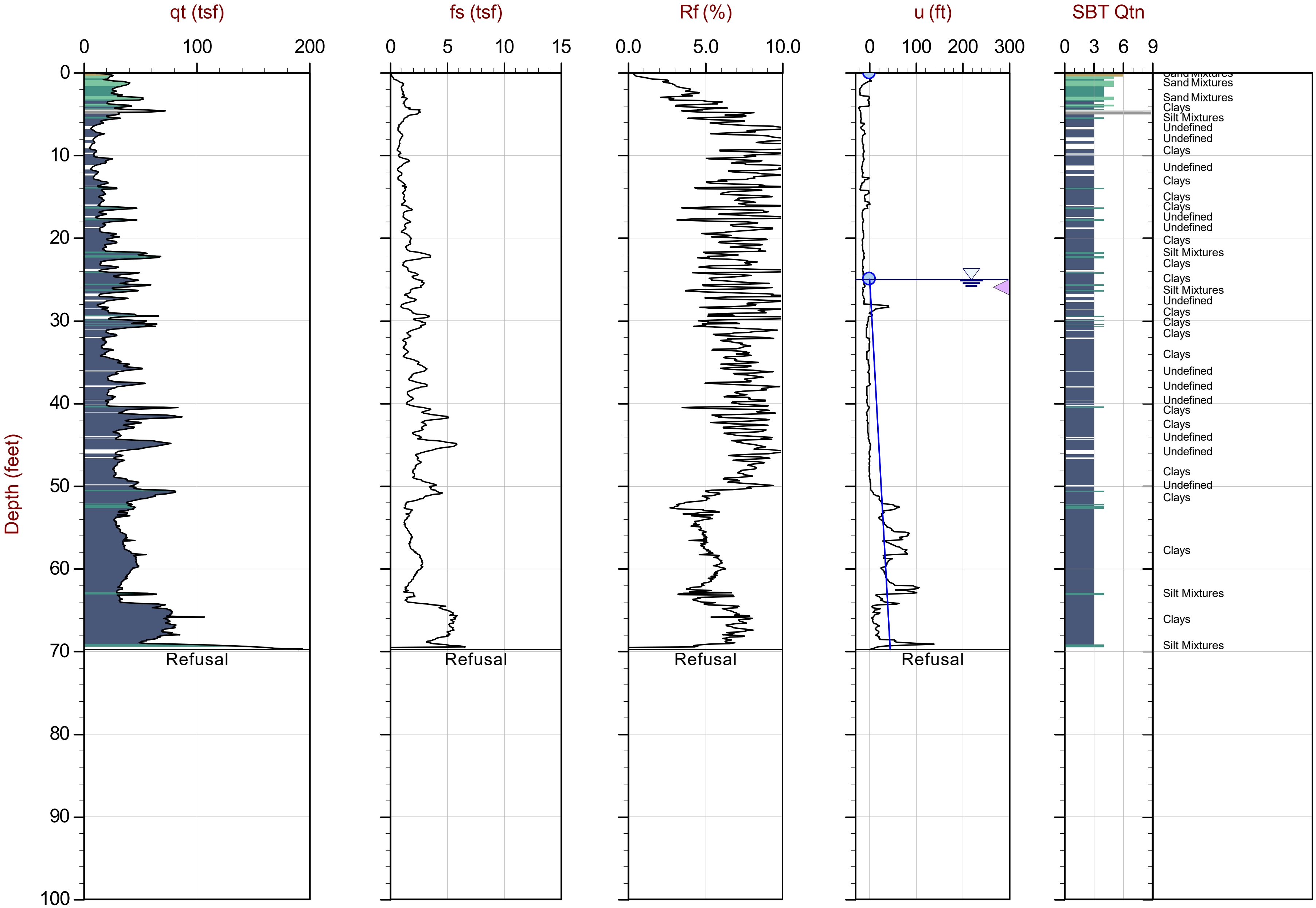
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 09:43
Site: DTE Monroe Power Plant

Sounding: CPT20-178
Cone: 551:T1500F15U500



Max Depth: 21.275 m / 69.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_CP178.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141268ft E: 13396939ft
Sheet No: 1 of 1

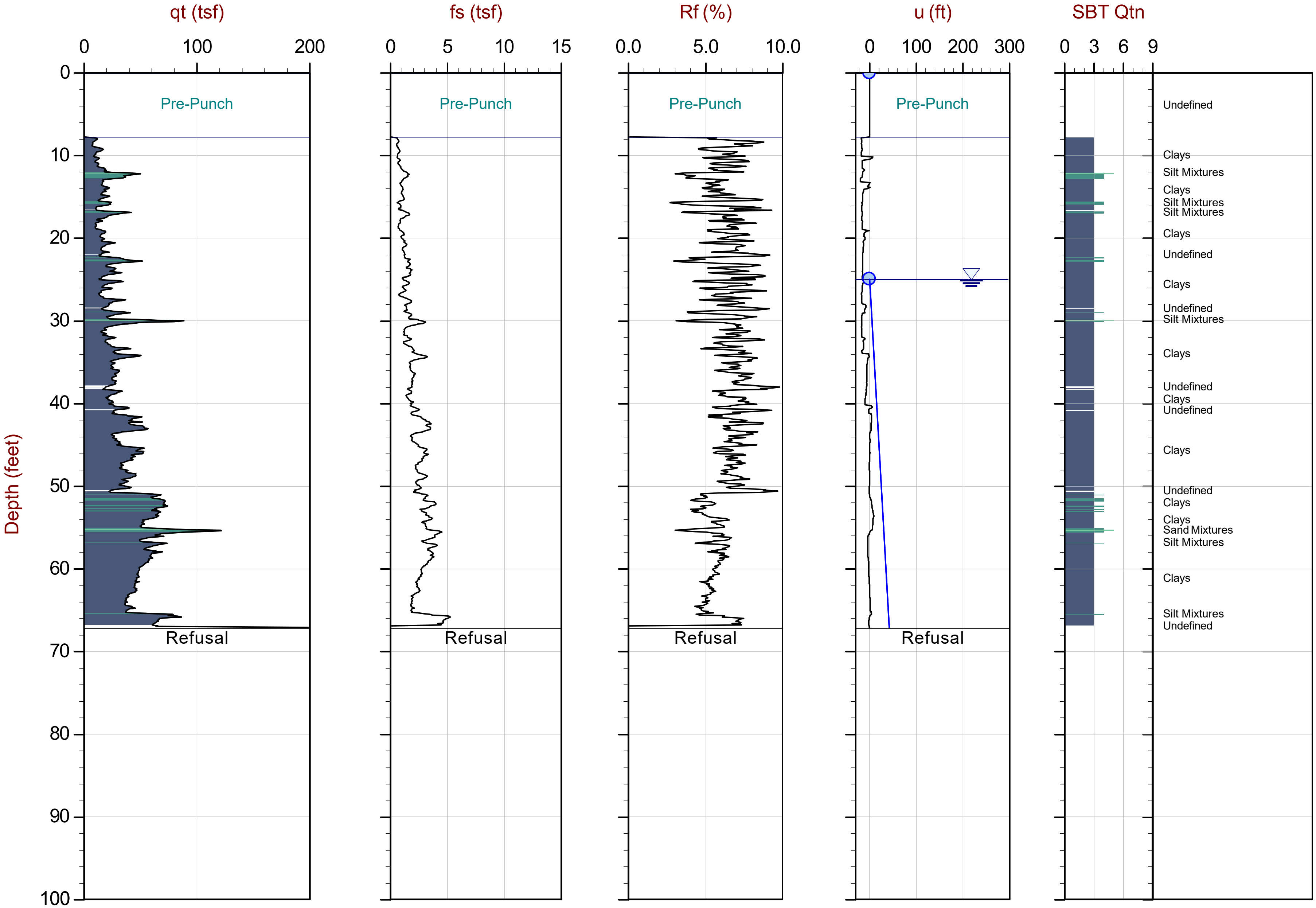
Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21665
Date: 2020-12-07 08:53
Site: DTE Monroe Power Plant

Sounding: SCPT20-180
Cone: 551:T1500F15U500



Max Depth: 20.475 m / 67.17 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-61-21655_SP180.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 141428ft E: 13397002ft
Sheet No: 1 of 1

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

APPENDIX K2 – PPD TEST RESULTS

CONETEC

Job No:	20-61-21655
Client:	Geosyntec Consultants
Project:	DTE Monroe Power Plant
Start Date:	01-Dec-2020
End Date:	14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-000	20-61-21655_CP000	15	105	48.720	Not Achieved						
CPT20-004	20-61-21655_CP004	15	300	45.111	Not Achieved						
CPT20-004	20-61-21655_CP004	15	3600	55.117	Not Achieved		25.0	3531	3361	0.2	
CPT20-004	20-61-21655_CP004	15	195	66.928	Not Achieved						
CPT20-006	20-61-21655_CP006	15	300	50.442	Not Achieved						
CPT20-008	20-61-21655_CP008	15	100	50.114	Not Achieved						
CPT20-008	20-61-21655_CP008	15	5190	55.117	Not Achieved						
CPT20-008	20-61-21655_CP008	15	5270	60.121	Not Achieved						
CPT20-008	20-61-21655_CP008	15	400	63.812	Not Achieved						
CPT20-010	20-61-21655_CP010	15	105	21.899	Not Achieved						
CPT20-022	20-61-21655_CP022	15	75	72.014	Not Achieved						
CPT20-028	20-61-21655_CP028	15	250	47.490	Not Achieved						
CPT20-028	20-61-21655_CP028	15	835	50.114	Not Achieved		25.0	375	325	2.2	
CPT20-028	20-61-21655_CP028	15	5225	55.117	Not Achieved		25.0	4158	3978	0.2	
CPT20-028	20-61-21655_CP028	15	580	59.547	Not Achieved						
CPT20-030	20-61-21655_CP030	15	65	59.875	Not Achieved						
CPT20-032	20-61-21655_CP032	15	150	23.950	Not Achieved						
CPT20-034	20-61-21655_CP034	15	80	9.514	Not Achieved						
CPT20-034	20-61-21655_CP034	15	235	45.931	Not Achieved						
CPT20-036	20-61-21655_CP036	15	3570	21.161	Not Achieved						

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-038	20-61-21655_CP038	15	3530	57.004	Not Achieved						
CPT20-048	20-61-21655_CP048	15	1200	50.032	Not Achieved		25.0	1023	943	0.7	
CPT20-048	20-61-21655_CP048	15	5400	55.117	Not Achieved		25.0	5189	4739	0.2	
CPT20-048	20-61-21655_CP048	15	4985	60.039	Not Achieved						75.2
CPT20-054	20-61-21655_CP054	15	70	60.859	Not Achieved						
CPT20-058	20-61-21655_CP058	15	3125	42.158	Not Achieved						
CPT20-060	20-61-21655_CP060	15	65	59.875	Not Achieved						
CPT20-068	20-61-21655_CP068	15	2700	40.026	Not Achieved						
CPT20-068	20-61-21655_CP068	15	3600	43.143	Not Achieved						
CPT20-068	20-61-21655_CP068	15	570	55.117	Not Achieved						
CPT20-068	20-61-21655_CP068	15	1800	59.054	6.4	52.6					
CPT20-074	20-61-21655_CP074	15	110	38.713	6.6	32.1					
CPT20-078B	20-61-21655_CP078B	15	100	38.713	4.4	34.3					
CPT20-078B	20-61-21655_CP078B	15	270	48.556	Not Achieved						
CPT20-086	20-61-21655_CP086	15	230	48.720	Not Achieved						
CPT20-090	20-61-21655_CP090	15	3600	20.013	Not Achieved						
CPT20-090	20-61-21655_CP090	15	7200	40.026	Not Achieved						
CPT20-090	20-61-21655_CP090	15	5365	60.039	Not Achieved						87.0
CPT20-092	20-61-21655_CP092	15	100	5.741	0.0						
CPT20-092	20-61-21655_CP092	15	210	58.398	Not Achieved						

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
SCPT20-096	20-61-21655_SP096	15	85	1.148	0.0						
SCPT20-096	20-61-21655_SP096	15	405	35.433	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3600	20.013	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3600	50.032	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	3605	60.039	Not Achieved						
CPT20-110B	20-61-21655_CP110B	15	485	60.859	0.0						
CPT20-118	20-61-21655_CP118	15	95	12.467	Not Achieved						
CPT20-124	20-61-21655_CP124	15	120	25.262	Not Achieved						
CPT20-128	20-61-21655_CP128	15	145	38.549	Not Achieved						
CPT20-130	20-61-21655_CP130	15	610	15.092	Not Achieved						
CPT20-130	20-61-21655_CP130	15	3600	50.032	Not Achieved		25.0	1192	1077	0.7	
CPT20-130	20-61-21655_CP130	15	3580	60.039	Not Achieved						
CPT20-132	20-61-21655_CP132	15	250	35.433	Not Achieved						
CPT20-132	20-61-21655_CP132	15	410	45.275	Not Achieved						
CPT20-134	20-61-21655_CP134	15	3600	66.928	Not Achieved						
CPT20-136	20-61-21655_CP136	15	670	65.288	Not Achieved						
CPT20-136	20-61-21655_CP136	15	6300	65.862	Not Achieved		25.0	4148	4048	0.2	
CPT20-140	20-61-21655_CP140	15	3110	57.168	Not Achieved						52.3
CPT20-150	20-61-21655_CP150	15	600	40.026	Not Achieved						
CPT20-150	20-61-21655_CP150	15	3600	45.275	Not Achieved						

Job No: 20-61-21655
Client: Geosyntec Consultants
Project: DTE Monroe Power Plant
Start Date: 01-Dec-2020
End Date: 14-Dec-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50}[a] (s)	Assumed Rigidity Index (I_r)	c_h[b] (cm^2/min)	Overnight Pore Pressure Reading[1] (ft)
CPT20-150	20-61-21655_CP150	15	7500	55.117	Not Achieved		25.0	6030	4530	0.2	
CPT20-150	20-61-21655_CP150	15	345	65.944	Not Achieved						
CPT20-152	20-61-21655_CP152	15	70	29.035	Not Achieved						
CPT20-154	20-61-21655_CP154	15	125	22.473	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	10.170	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	20.259	Not Achieved						
CPT20-170	20-61-21655_CP170	15	300	40.190	Not Achieved						
CPT20-170	20-61-21655_CP170	15	3600	68.159	Not Achieved						
CPT20-176	20-61-21655_CP176	15	3600	67.174	Not Achieved						
CPT20-178	20-61-21655_CP178	15	145	25.918	Not Achieved						
Totals	70 dissipations		2093.6 min								

a. Time is relative to where umax occurred.

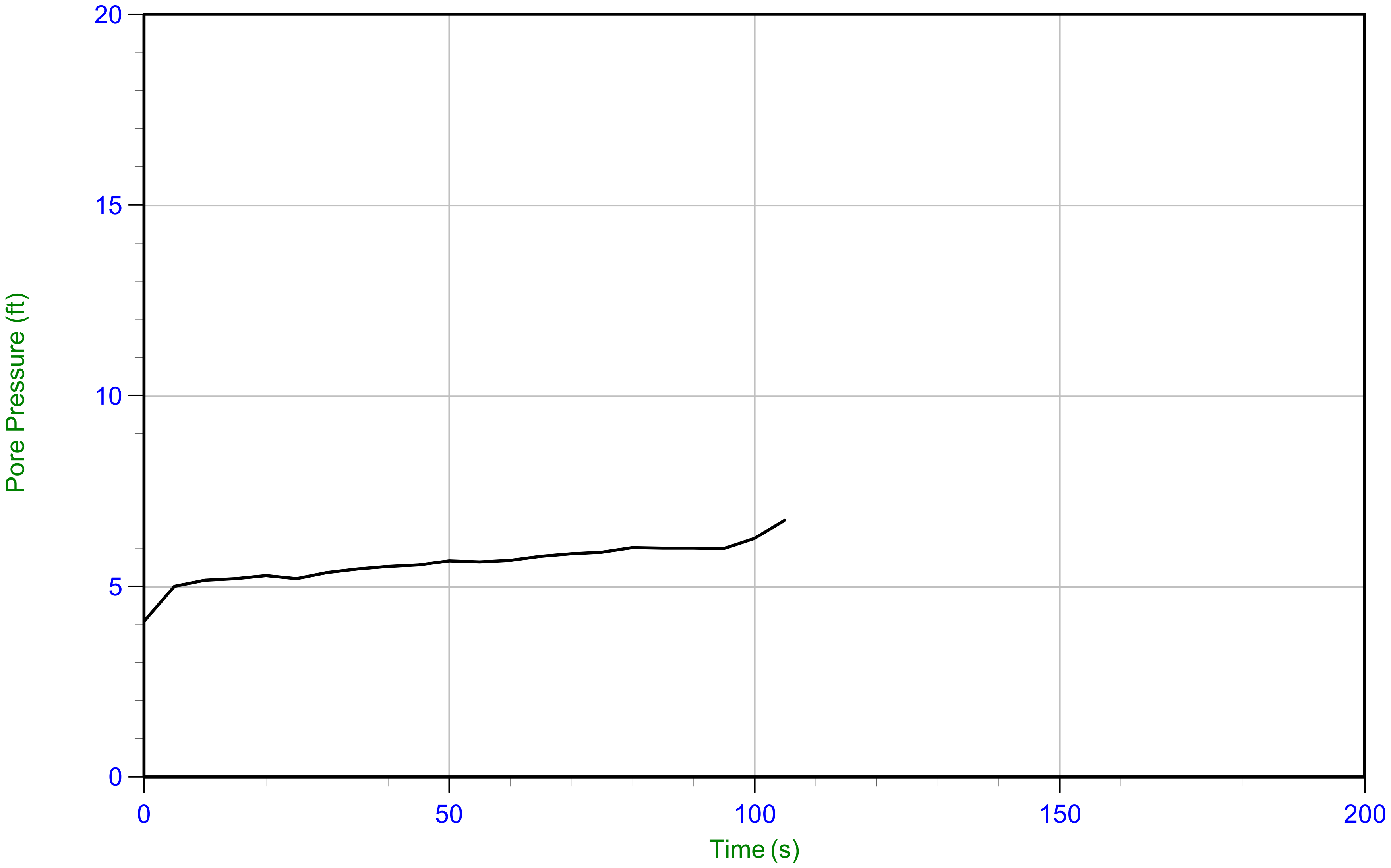
b. Houlsby and Teh, 1991.

1. The cone was left in the ground overnight and final final pore pressure readings was taken the next morning.

Geosyntec

Job No: 20-61-21655
Date: 12/02/2020 10:20
Site: DTE Monroe Power Plant

Sounding: CPT20-000
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

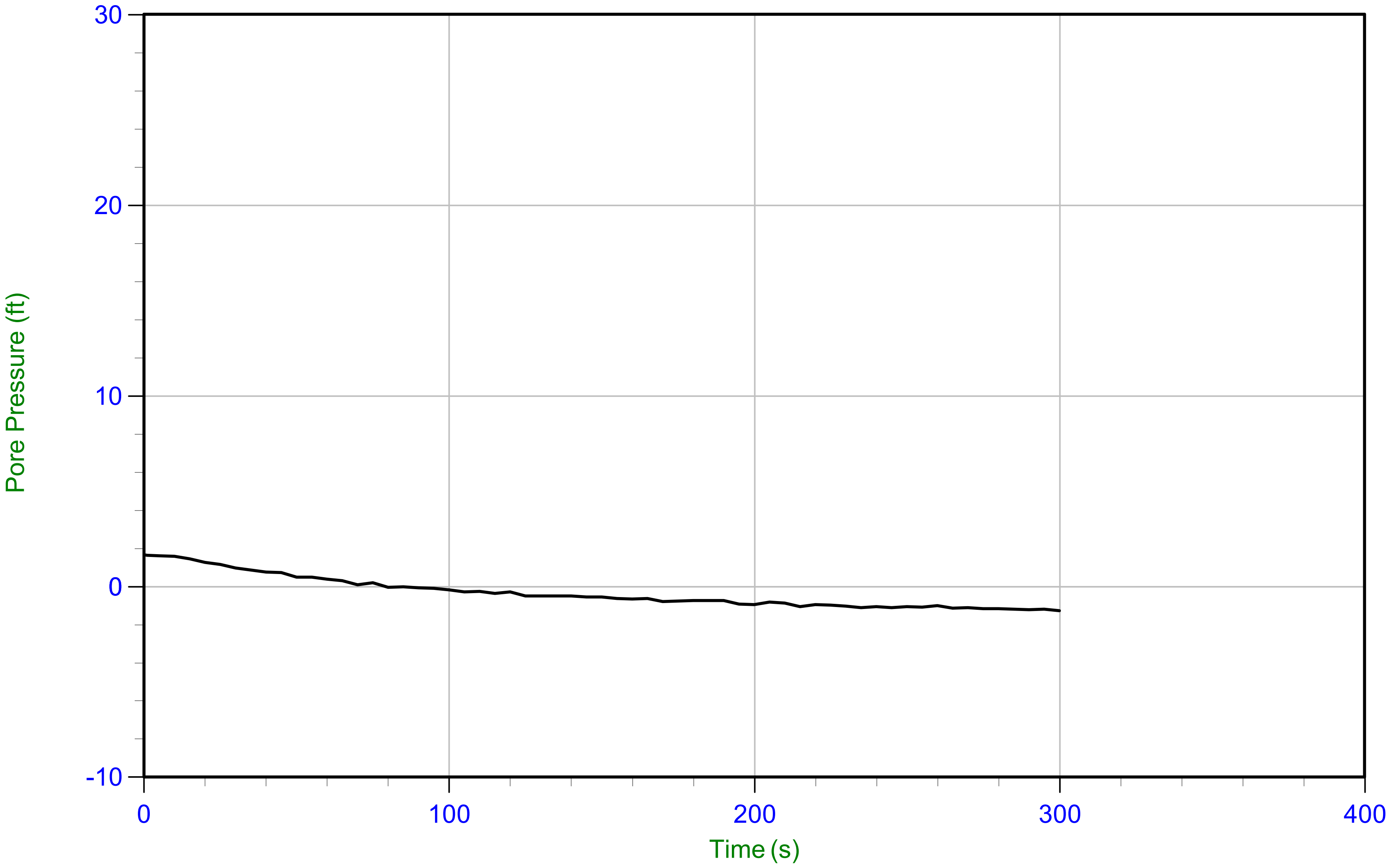
Filename: 20-61-21655_CP000.PPF
Depth: 14.850 m / 48.720 ft
Duration: 105.0 s

u Min: 4.1 ft
u Max: 6.7 ft
u Final: 6.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/01/2020 13:06
Site: DTE Monroe Power Plant

Sounding: CPT20-004
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP004.PPF
Depth: 13.750 m / 45.111 ft
Duration: 300.0 s

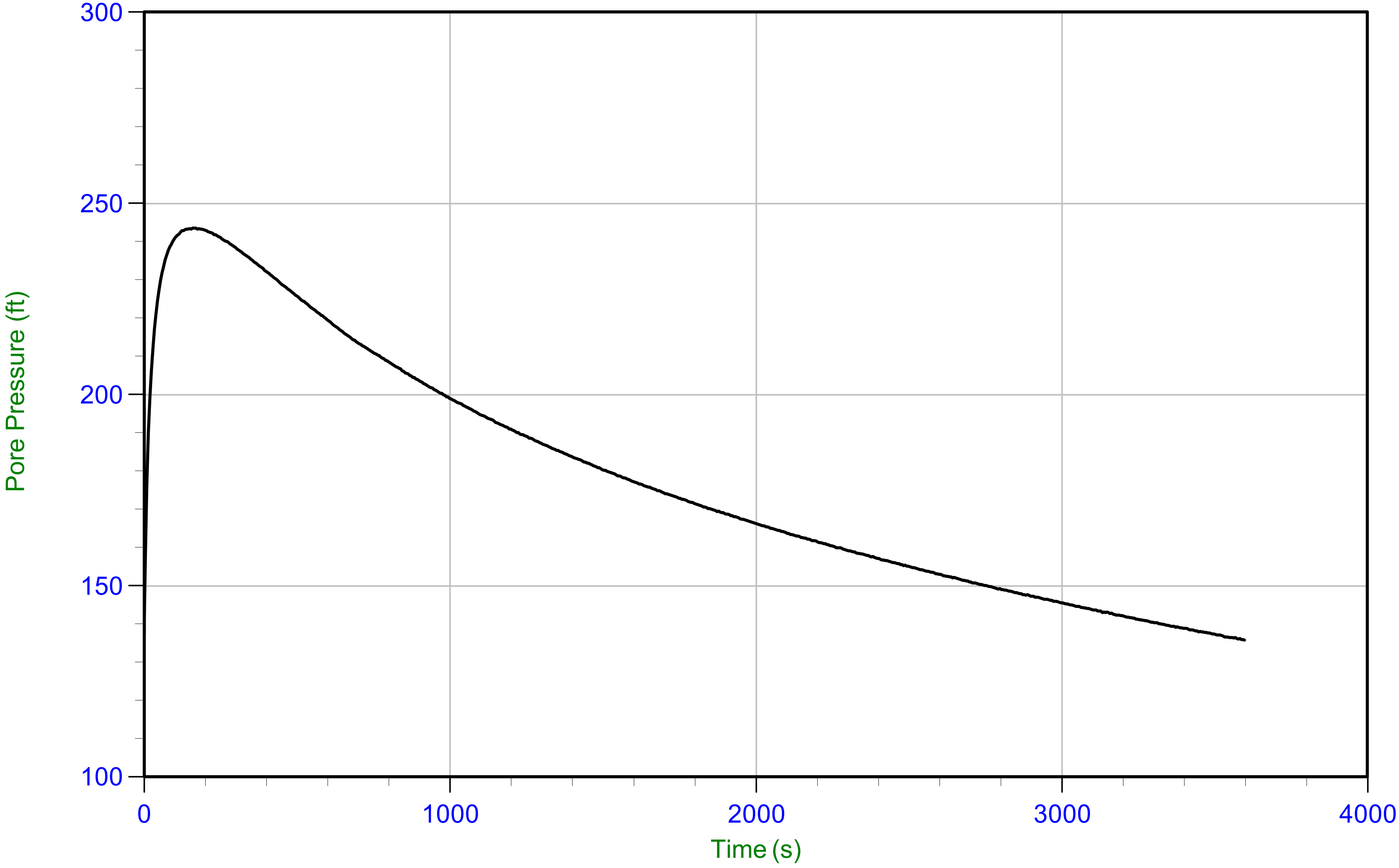
u Min: -1.3 ft
u Max: 1.7 ft
u Final: -1.3 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/01/2020 13:06
Site: DTE Monroe Power Plant

Sounding: CPT20-004
Cone: 567:T1500F15U500 Area=15 cm²



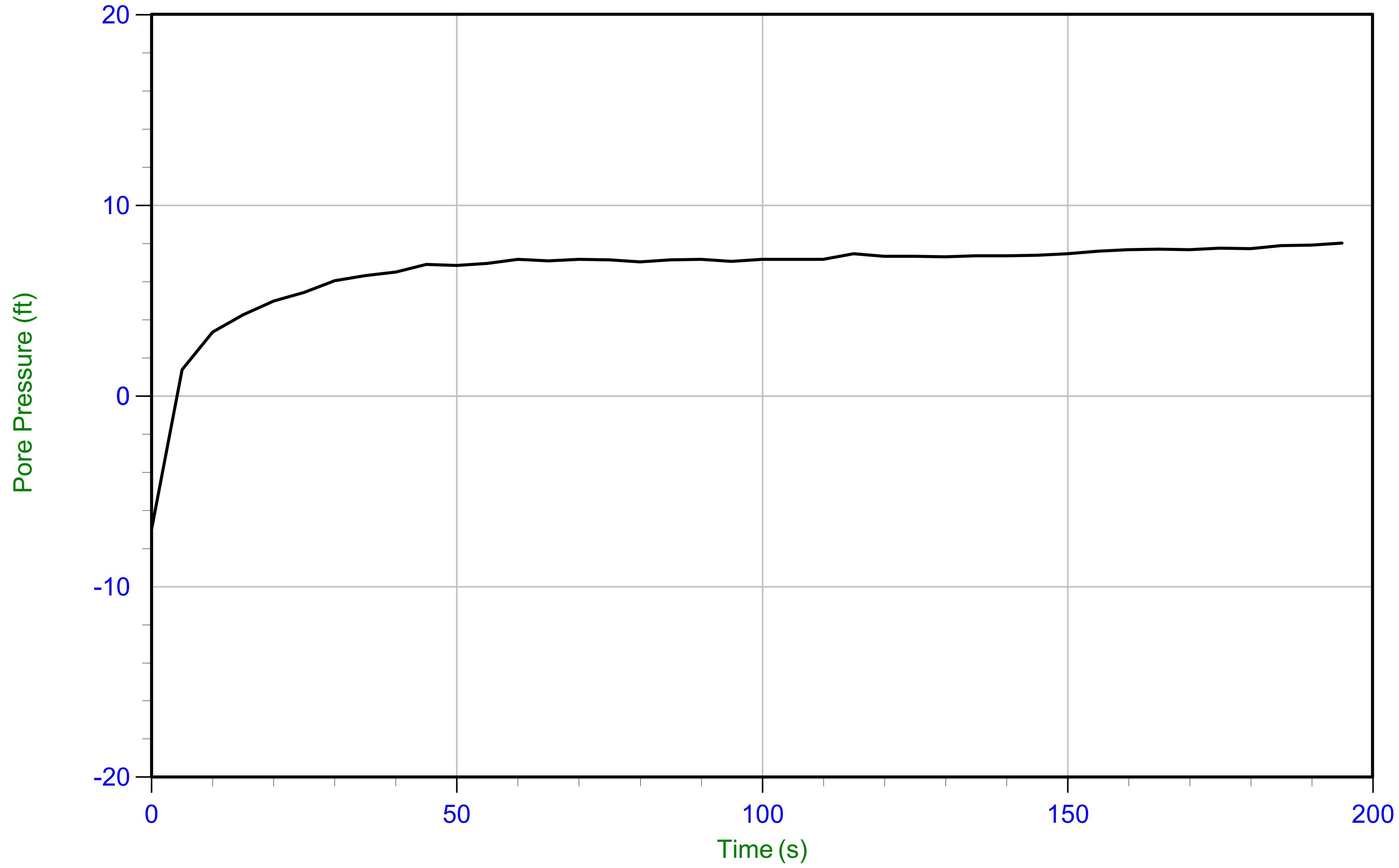
Trace Summary:

Filename: 20-61-21655_CP004.PPF
Depth: 16.800 m / 55.117 ft
Duration: 3600.0 s

u Min: 135.7 ft
u Max: 243.5 ft
u Final: 135.7 ft

WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 136.83 ft

T(50): 3361.4 s
Ir: 100
Ch: 0.2 cm²/min



Trace Summary:

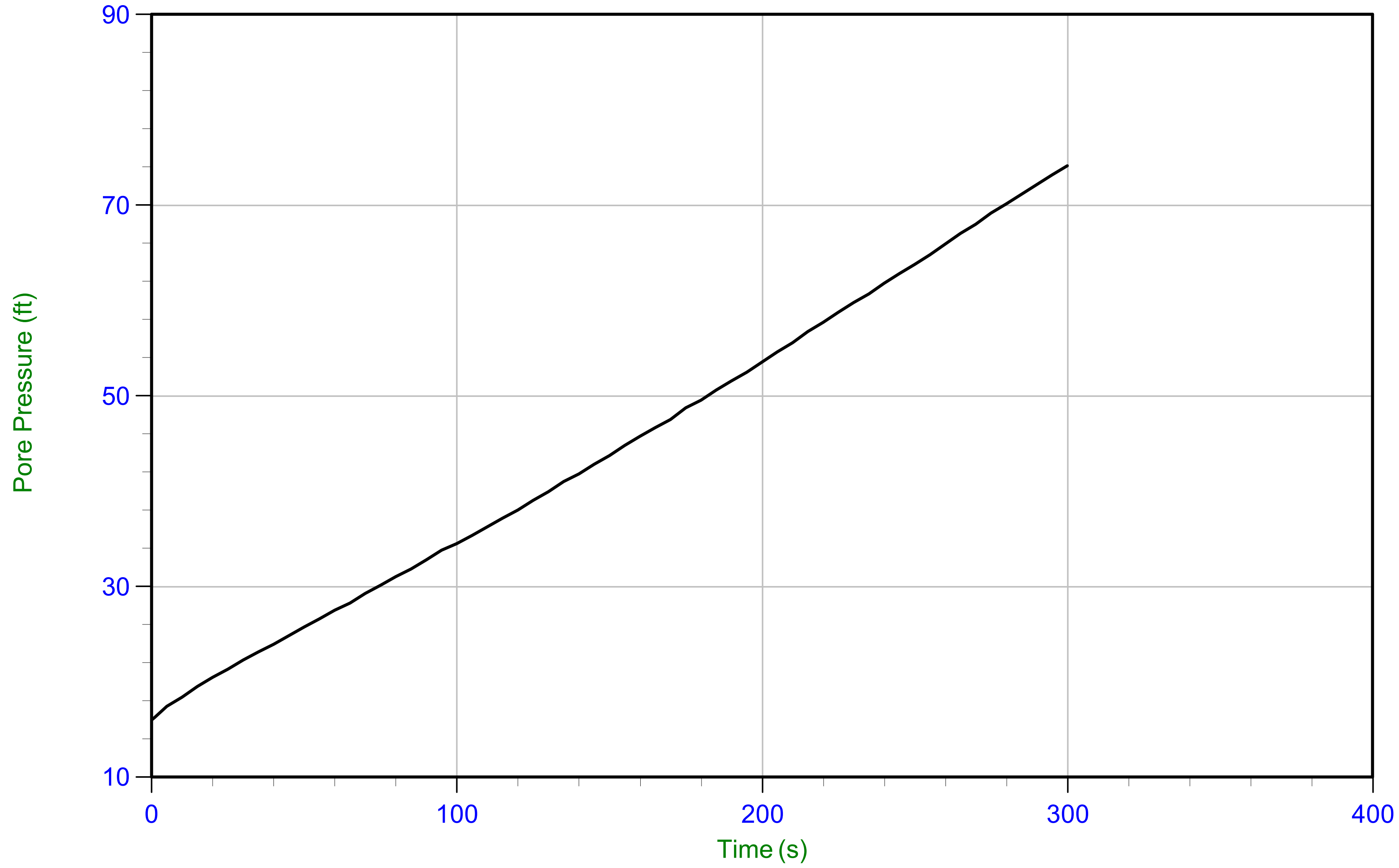
Filename: 20-61-21655_CP004.PPF
Depth: 20.400 m / 66.928 ft
Duration: 195.0 s

u Min: -7.0 ft
u Max: 8.0 ft
u Final: 8.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/01/2020 13:15
Site: DTE Monroe Power Plant

Sounding: CPT20-006
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP006.PPF
Depth: 15.375 m / 50.442 ft
Duration: 300.0 s

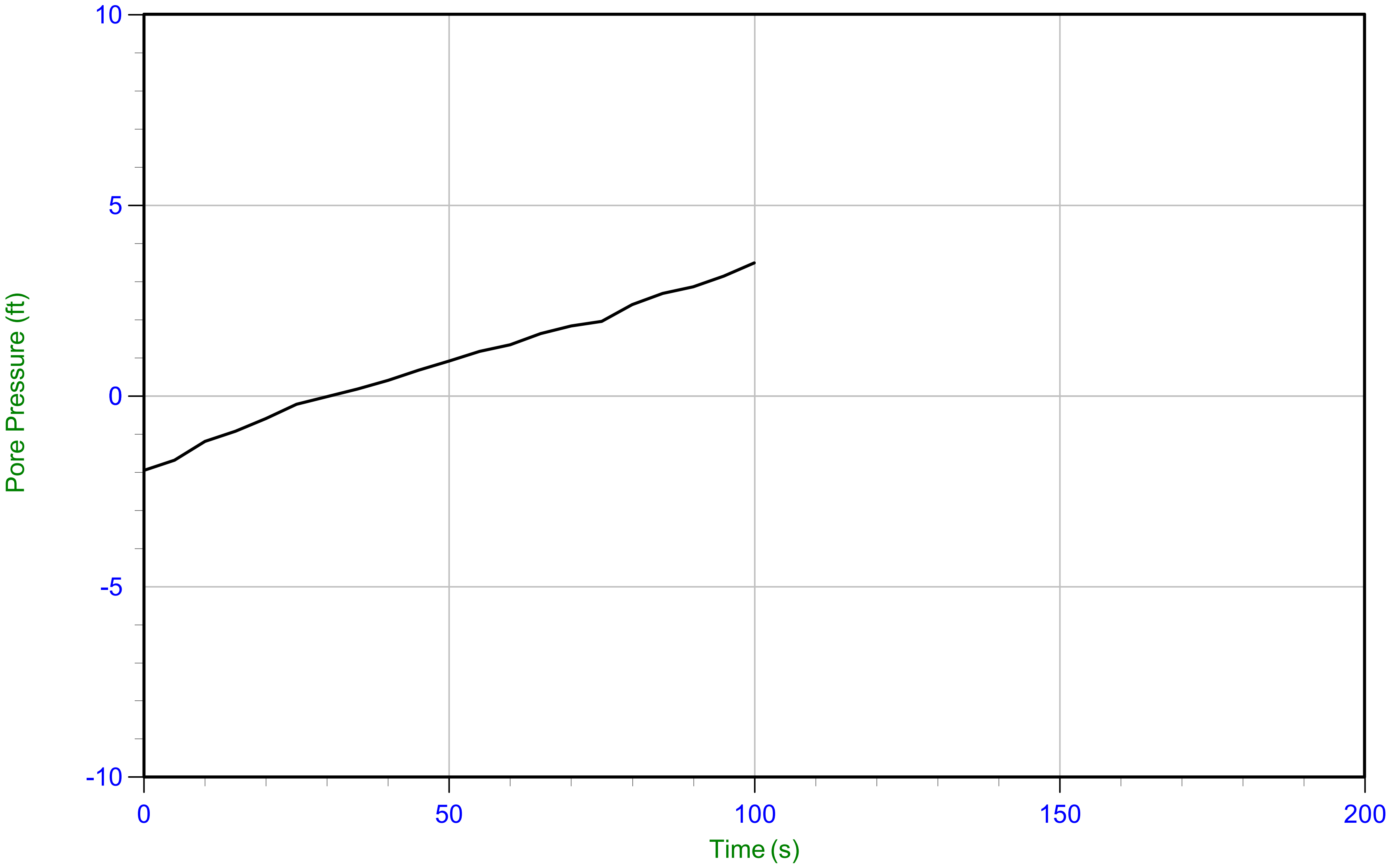
u Min: 16.0 ft
u Max: 74.2 ft
u Final: 74.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP008.PPF
Depth: 15.275 m / 50.114 ft
Duration: 100.0 s

u Min: -1.9 ft
u Max: 3.5 ft
u Final: 3.5 ft

Trace Summary:

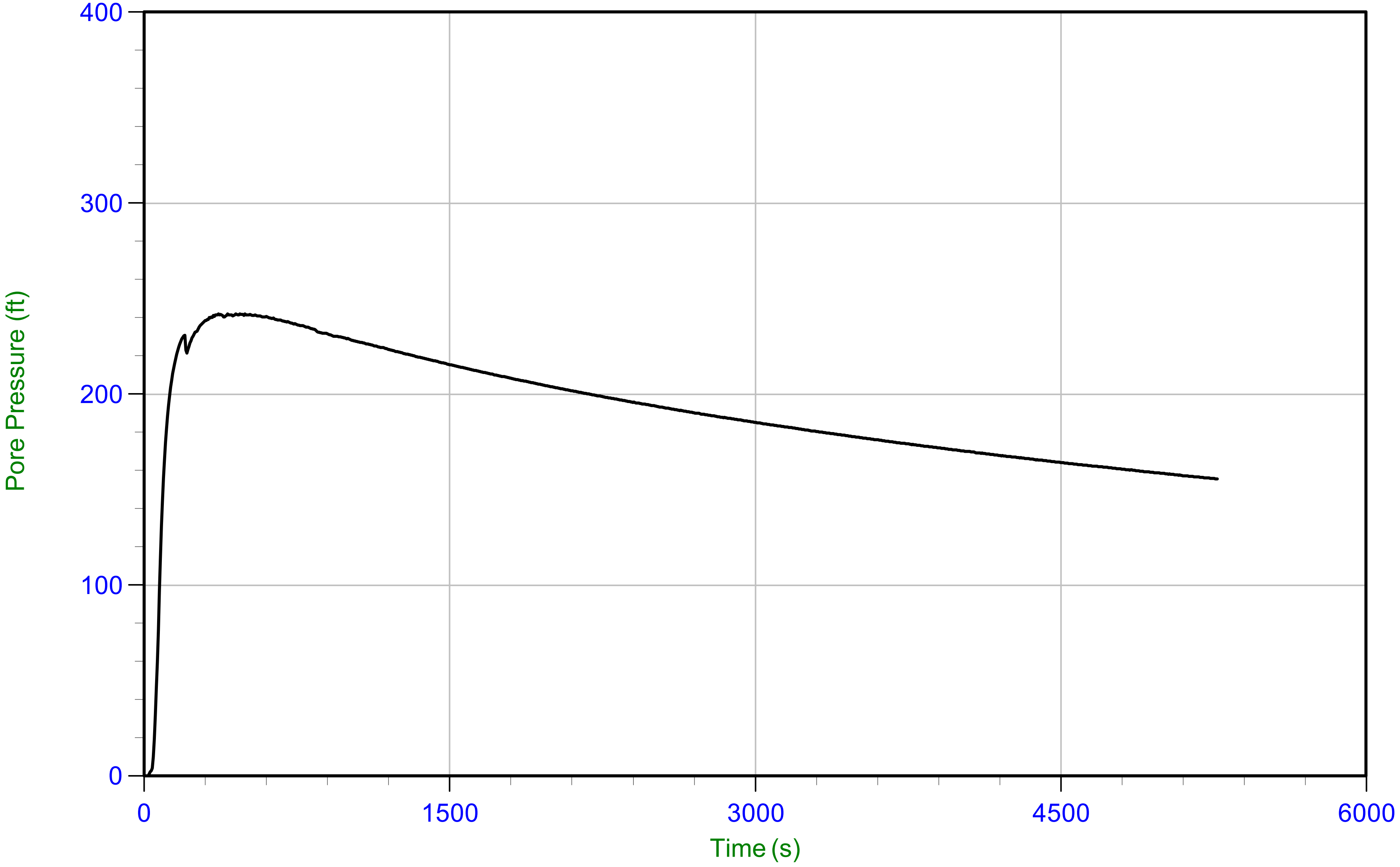
Filename: 20-61-21655_CP008.PPF
Depth: 16.800 m / 55.117 ft
Duration: 5190.0 s

u Min: -7.1 ft
u Max: 222.5 ft
u Final: 129.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

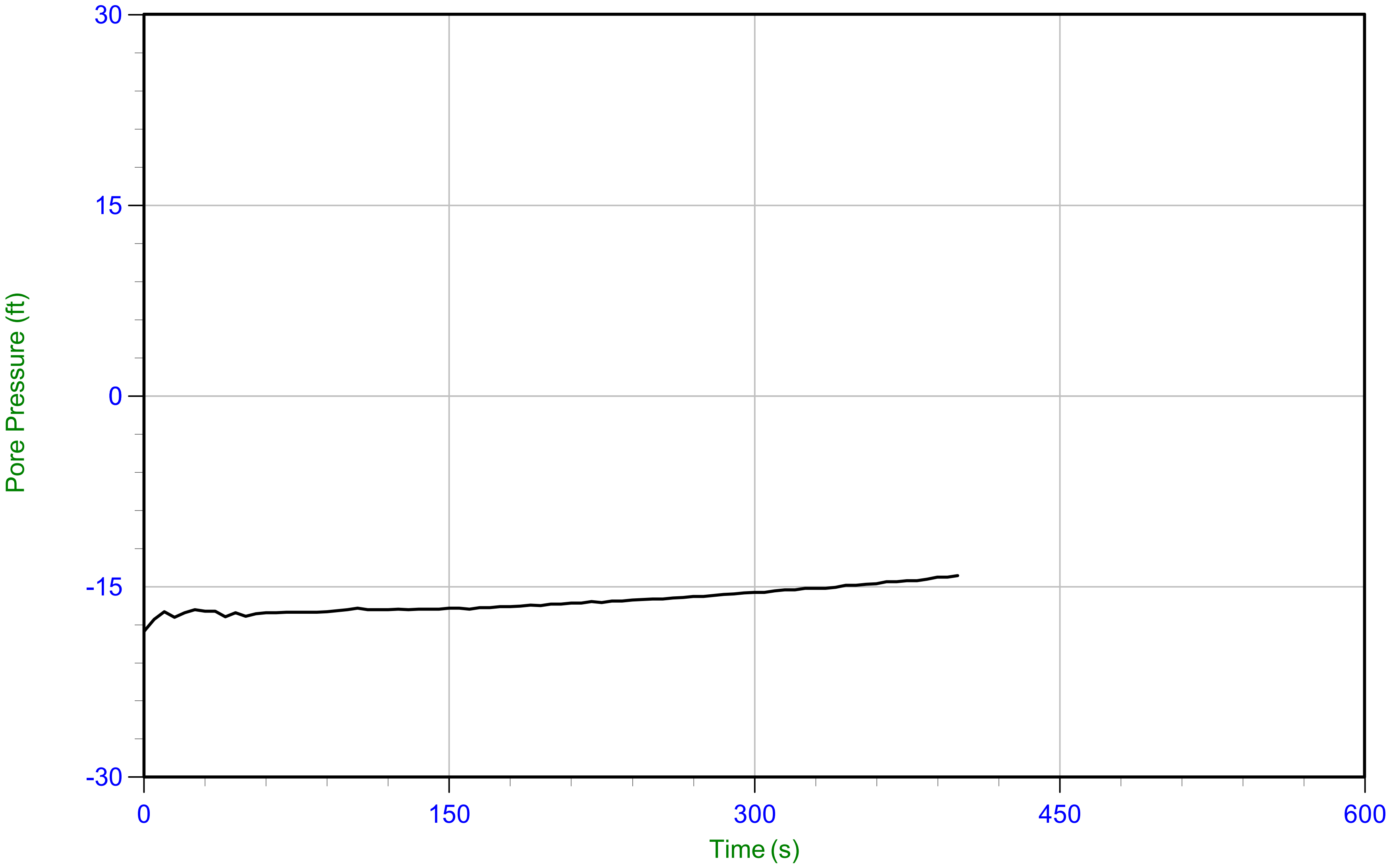
Filename: 20-61-21655_CP008.PPF
Depth: 18.325 m / 60.121 ft
Duration: 5270.0 s

u Min: -9.1 ft
u Max: 242.1 ft
u Final: 155.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:23
Site: DTE Monroe Power Plant

Sounding: CPT20-008
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP008.PPF
Depth: 19.450 m / 63.812 ft
Duration: 400.0 s

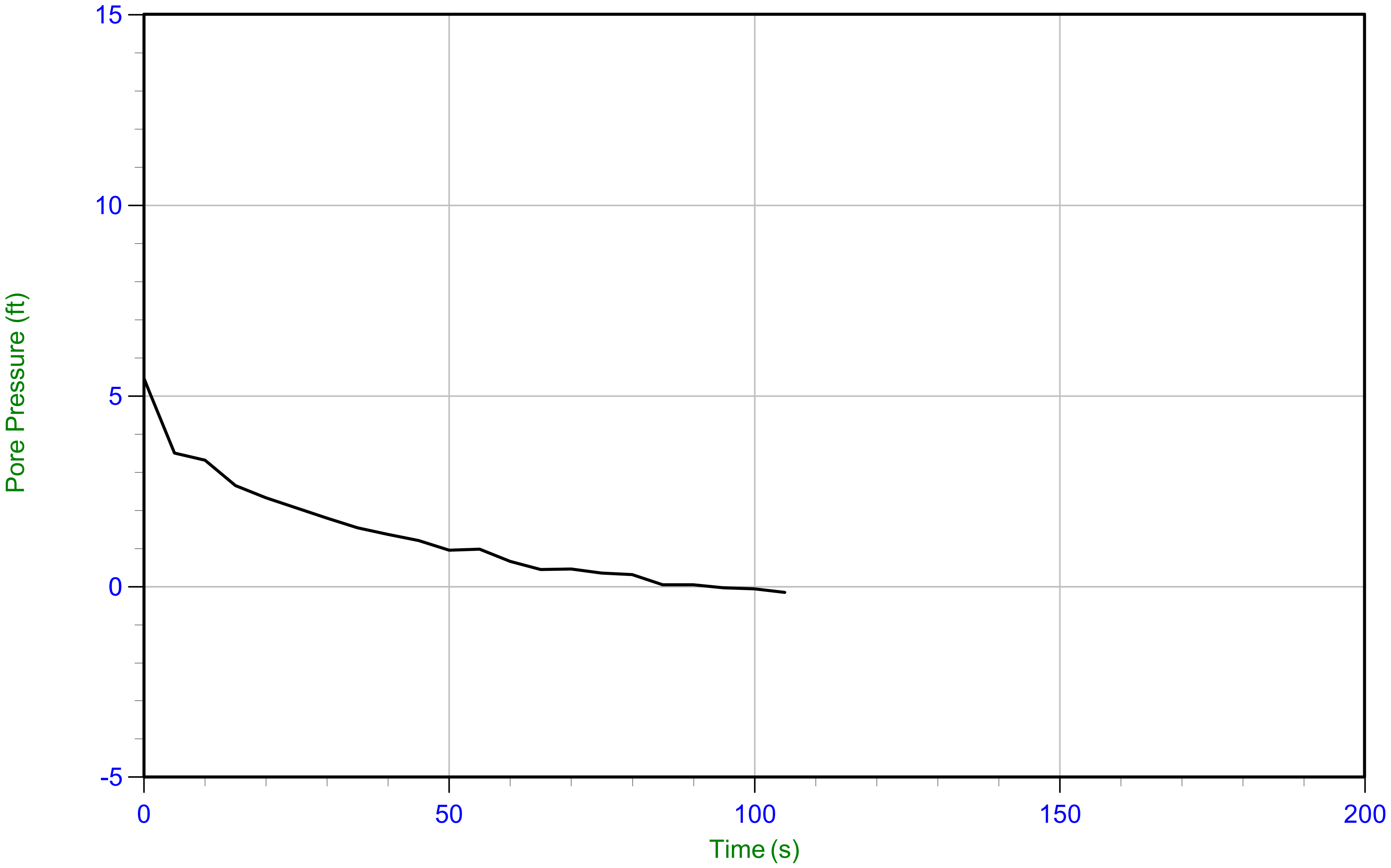
u Min: -18.5 ft
u Max: -14.1 ft
u Final: -14.1 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/02/2020 10:04
Site: DTE Monroe Power Plant

Sounding: CPT20-010
Cone: 568:T1500F15U500 Area=15 cm²



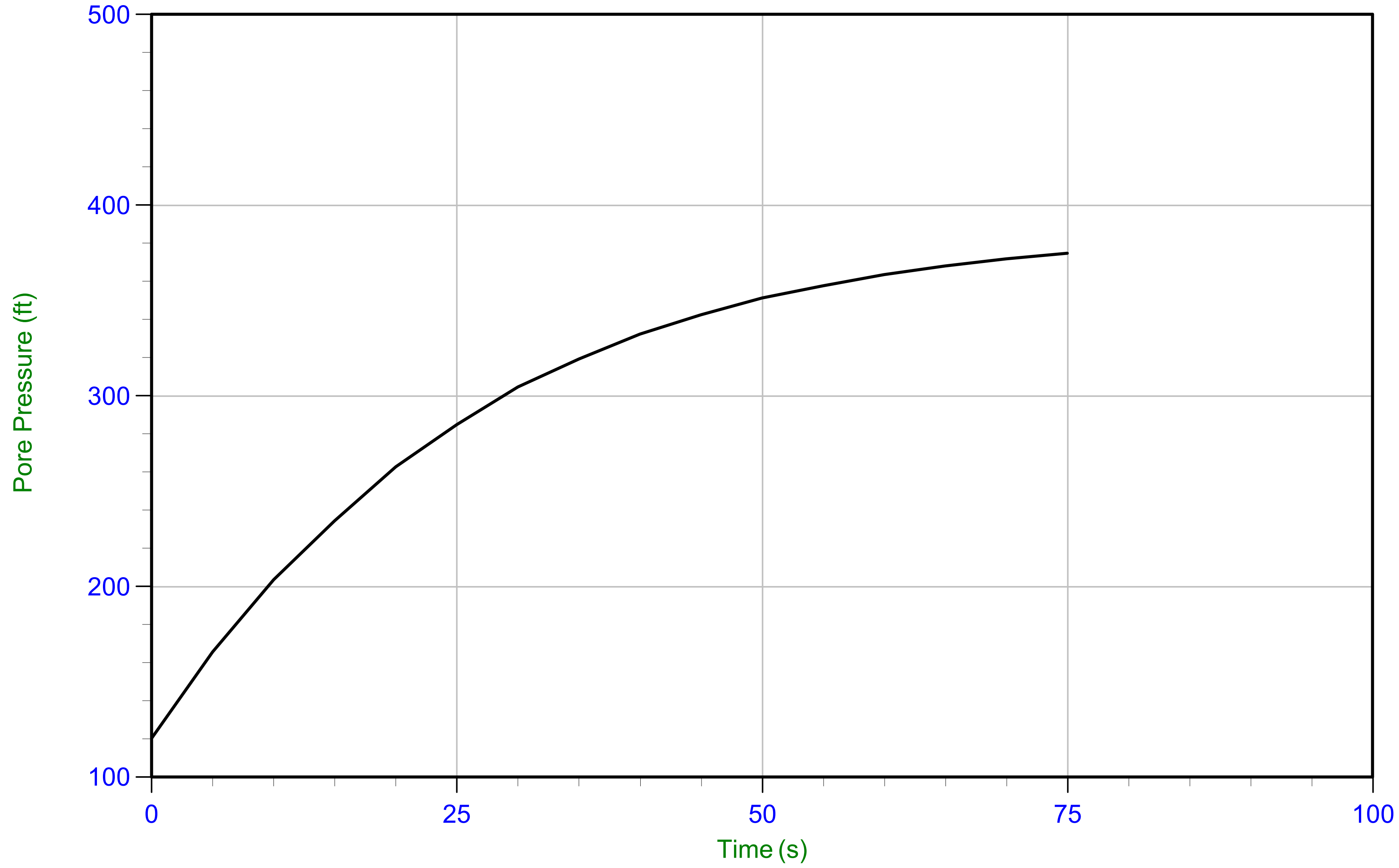
Trace Summary:

Filename: 20-61-21655_CP010.PPF		u Min: -0.1 ft
Depth: 6.675 m / 21.899 ft		u Max: 5.5 ft
Duration: 105.0 s		u Final: -0.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 08:59
Site: DTE Monroe Power Plant

Sounding: CPT20-022
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

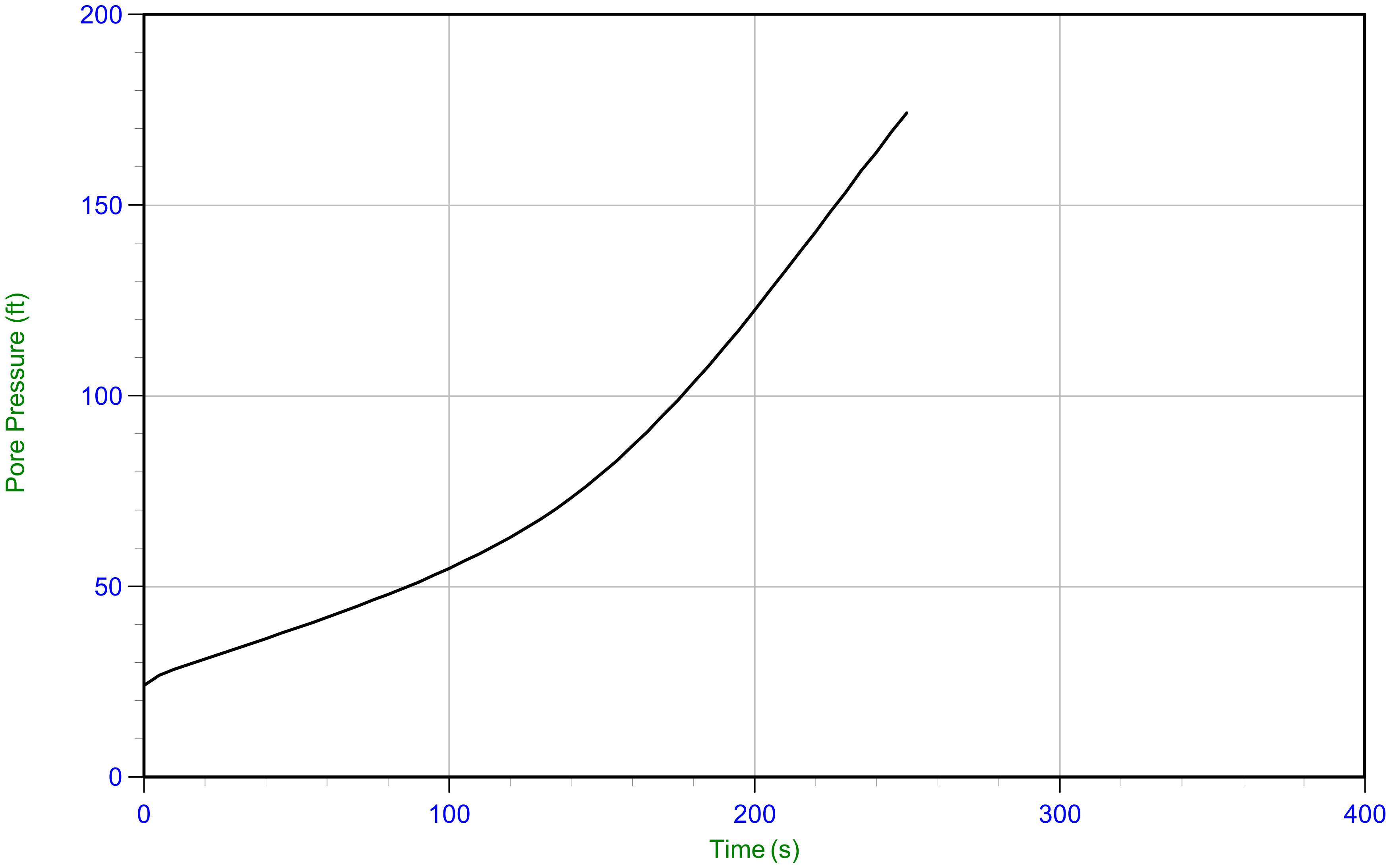
Filename: 20-61-21655_CP022.PPF
Depth: 21.950 m / 72.014 ft
Duration: 75.0 s

u Min: 120.3 ft
u Max: 374.8 ft
u Final: 374.8 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP028.PPF
Depth: 14.475 m / 47.490 ft
Duration: 250.0 s

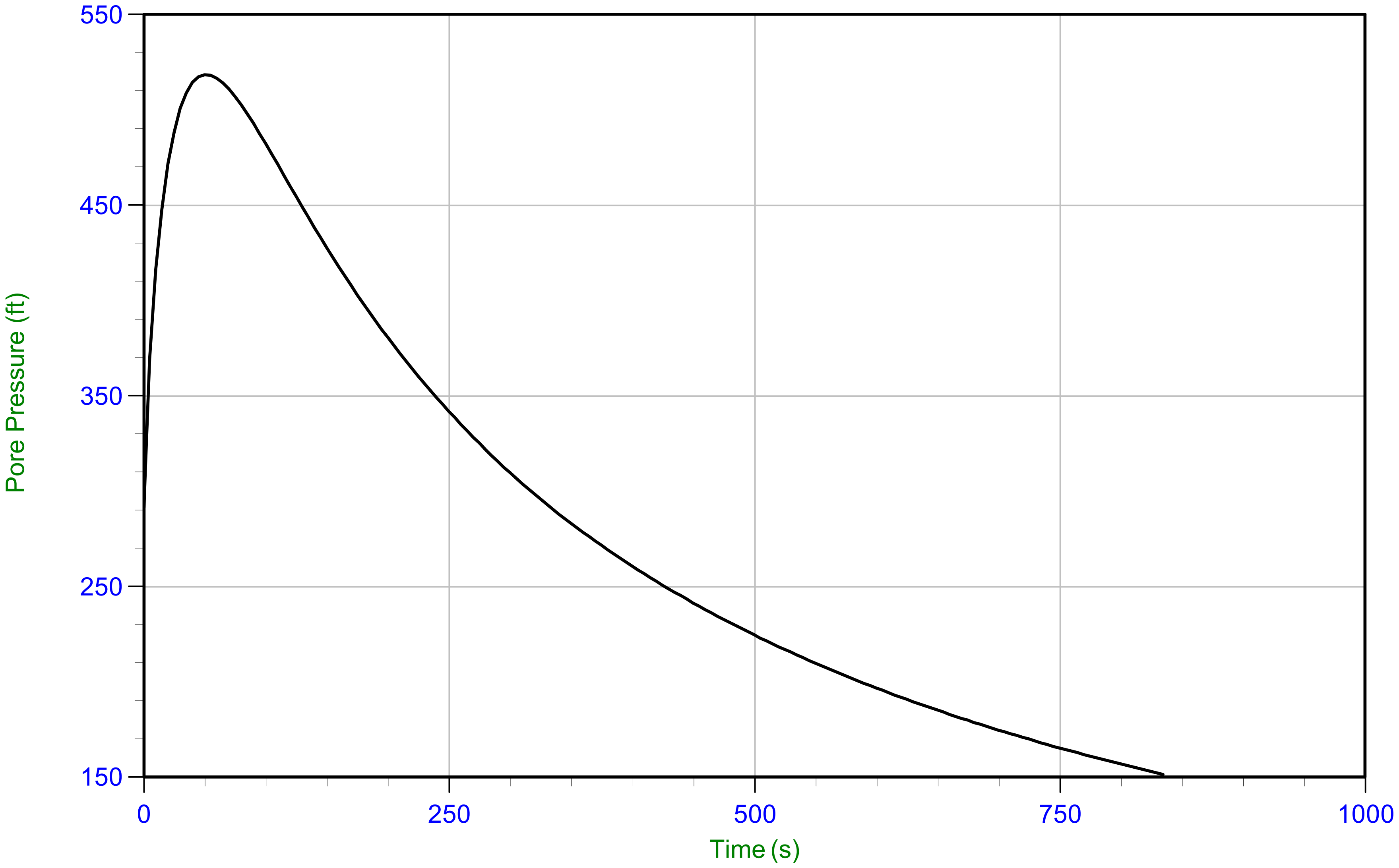
u Min: 24.1 ft
u Max: 174.2 ft
u Final: 174.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

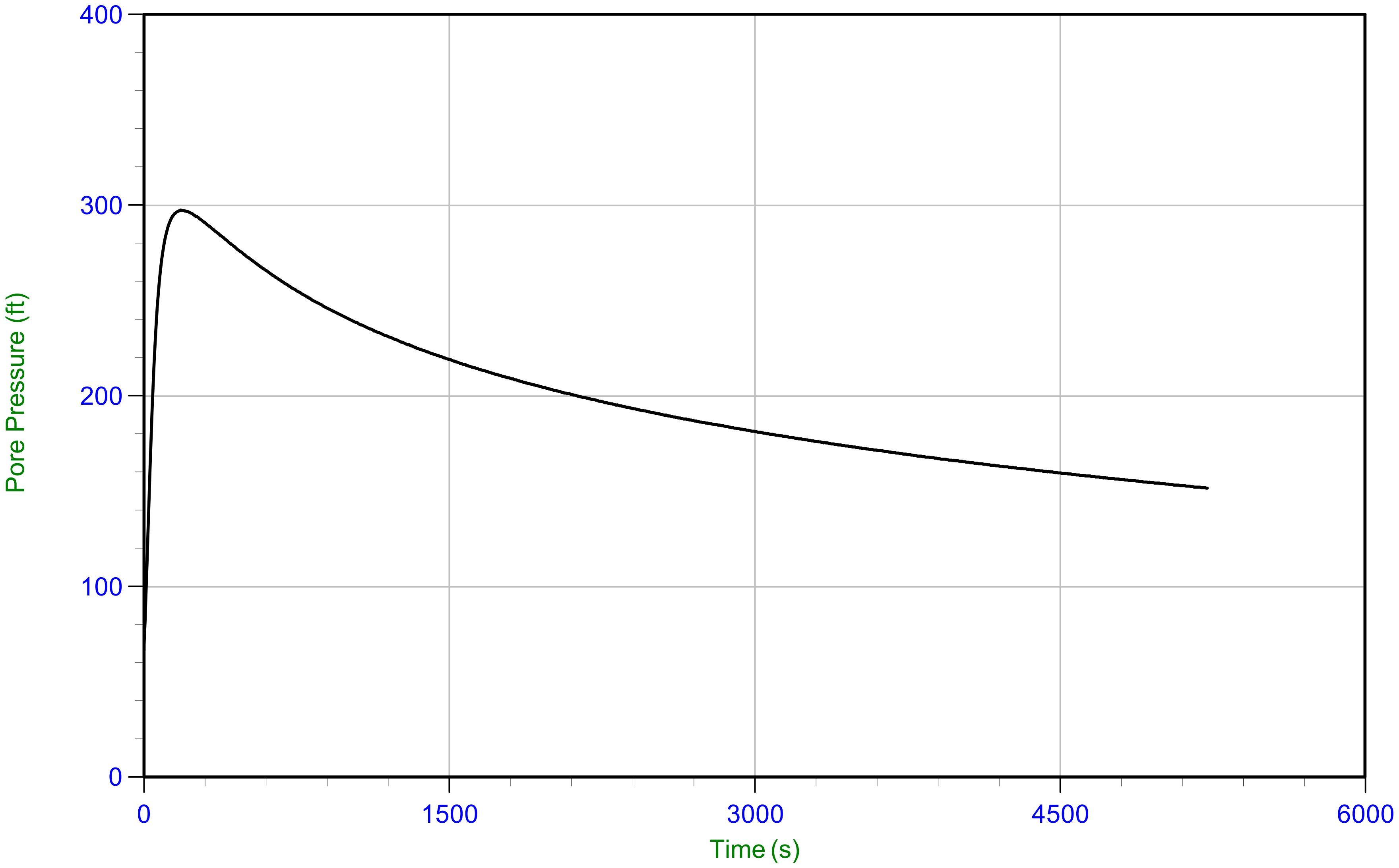
Filename: 20-61-21655_CP028.PPF	u Min: 151.5 ft	WT: 7.620 m / 25.000 ft	T(50): 325.0 s
Depth: 15.275 m / 50.114 ft	u Max: 518.4 ft	Ueq: 25.1 ft	Ir: 100
Duration: 835.0 s	u Final: 151.5 ft	U(50): 271.75 ft	Ch: 2.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP028.PPF
Depth: 16.800 m / 55.117 ft
Duration: 5225.0 s

u Min: 66.4 ft
u Max: 297.4 ft
u Final: 151.7 ft

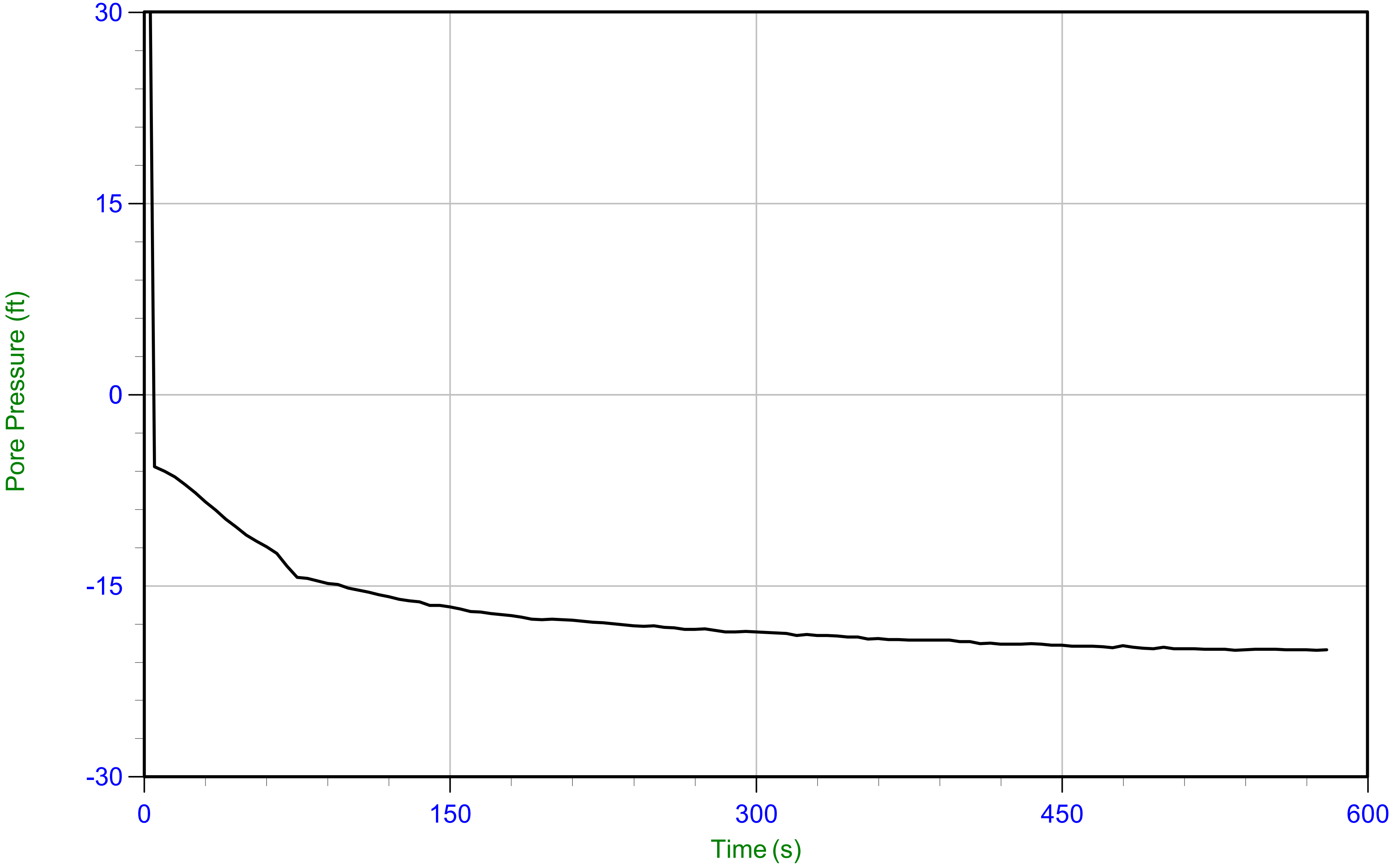
WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 163.75 ft

T(50): 3978.2 s
Ir: 100
Ch: 0.2 cm²/min

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:08
Site: DTE Monroe Power Plant

Sounding: CPT20-028
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP028.PPF
Depth: 18.150 m / 59.547 ft
Duration: 580.0 s

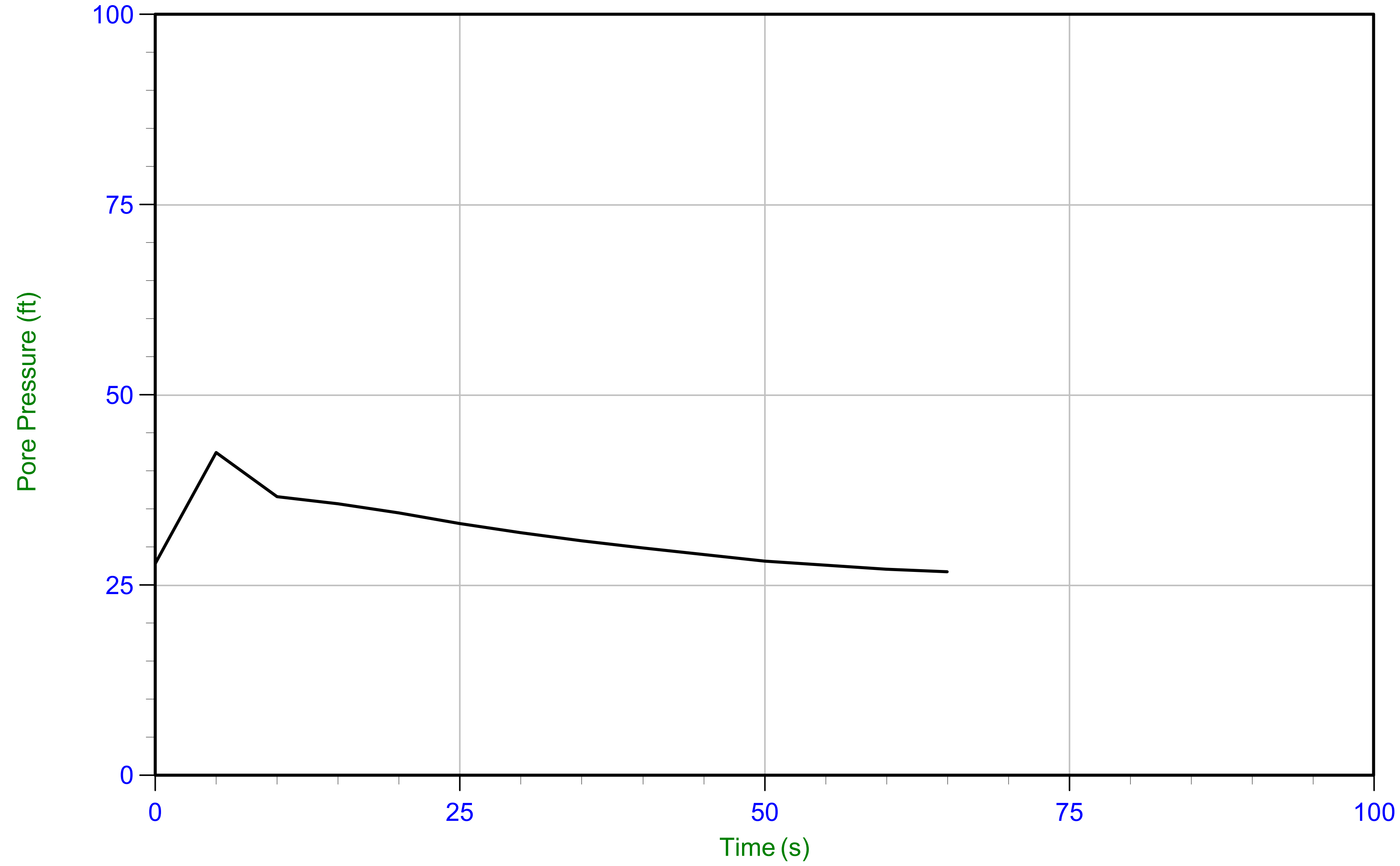
u Min: -20.1 ft
u Max: 82.2 ft
u Final: -20.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 12:31
Site: DTE Monroe Power Plant

Sounding: CPT20-030
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

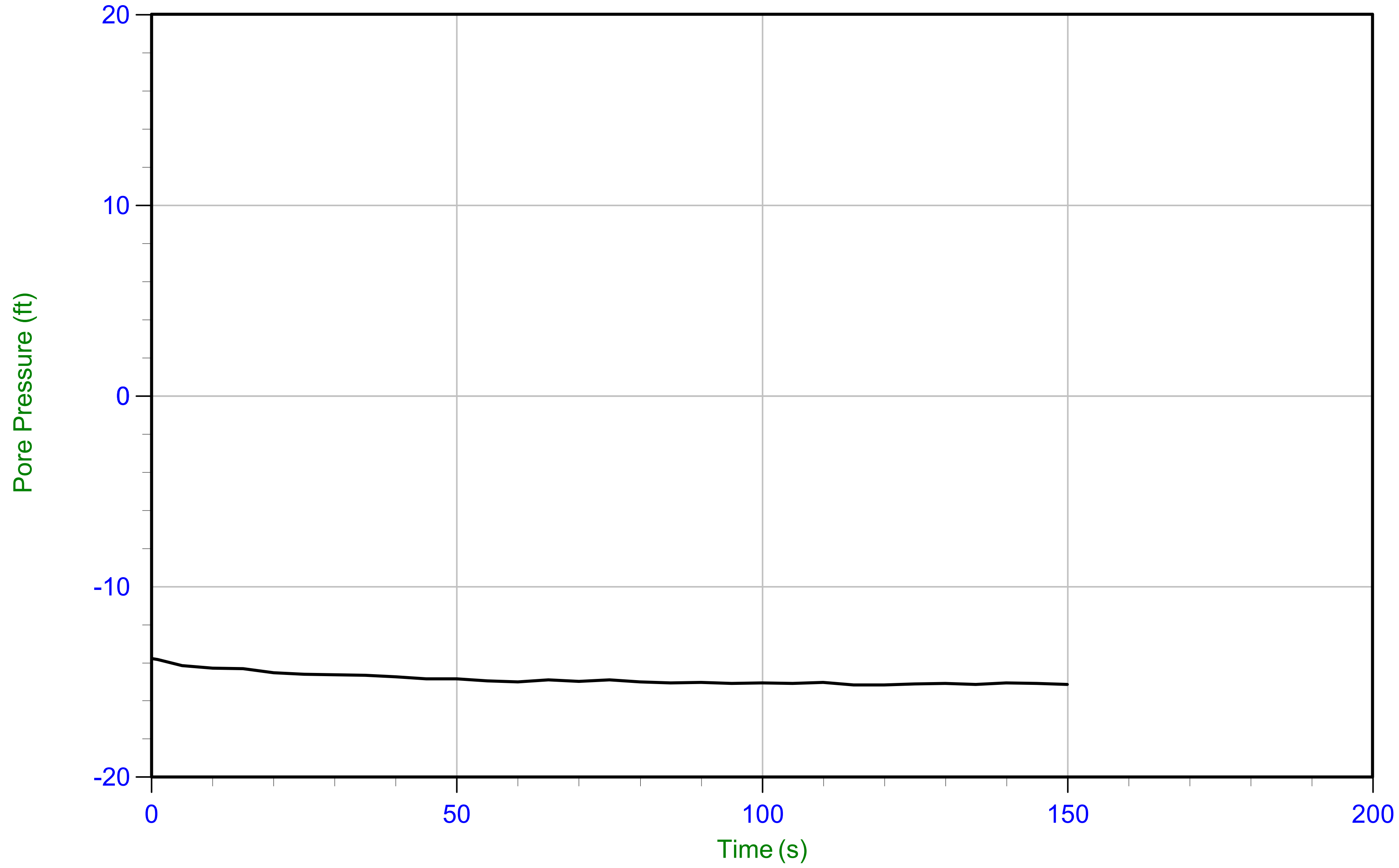
Filename: 20-61-21655_CP030.PPF
Depth: 18.250 m / 59.875 ft
Duration: 65.0 s

u Min: 26.8 ft
u Max: 42.5 ft
u Final: 26.8 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 13:26
Site: DTE Monroe Power Plant

Sounding: CPT20-032
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

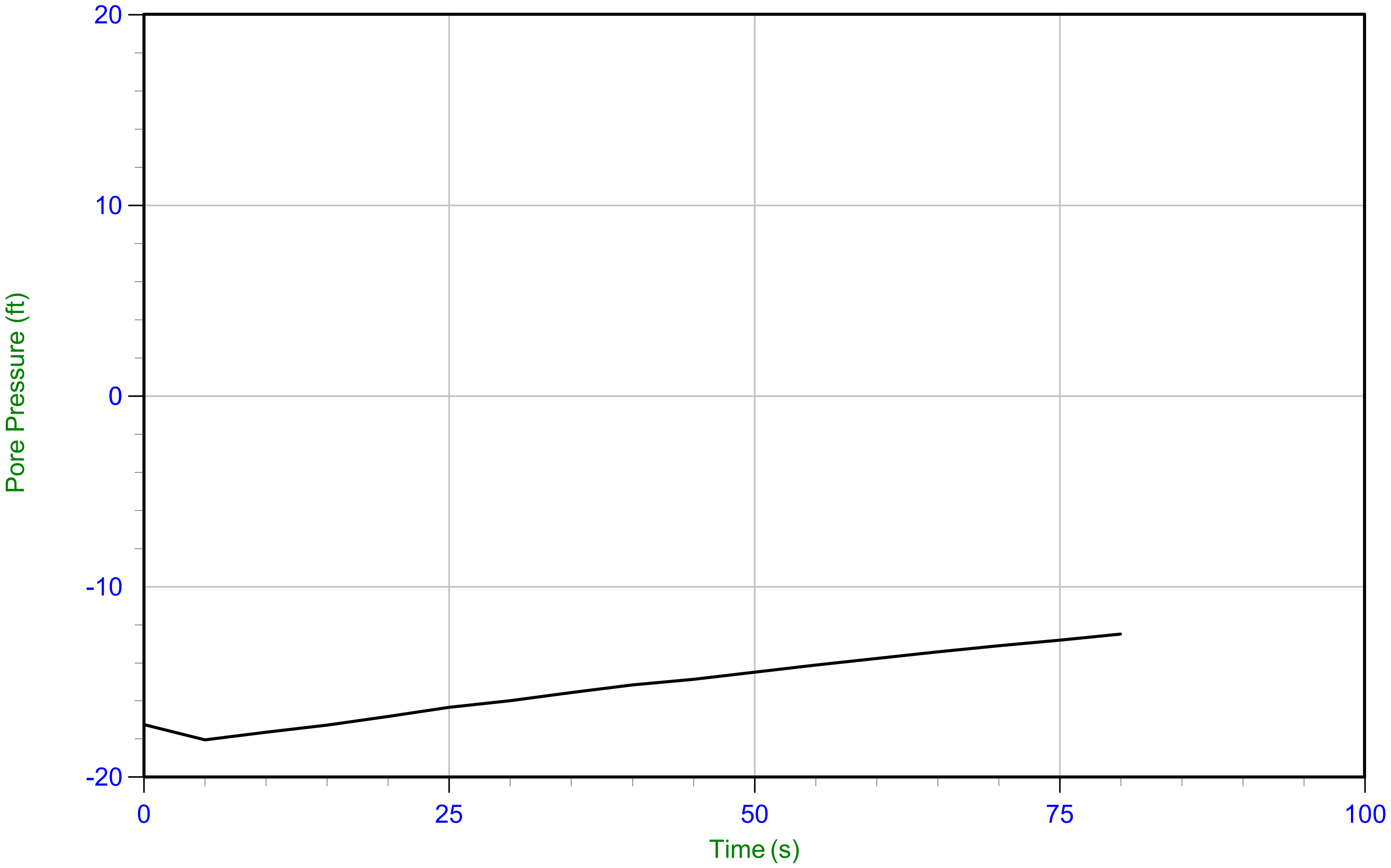
Filename: 20-61-21655_CP032.PPF
Depth: 7.300 m / 23.950 ft
Duration: 150.0 s

u Min: -15.2 ft
u Max: -13.8 ft
u Final: -15.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 14:24
Site: DTE Monroe Power Plant

Sounding: CPT20-034
Cone: 551:T1500F15U500 Area=15 cm²

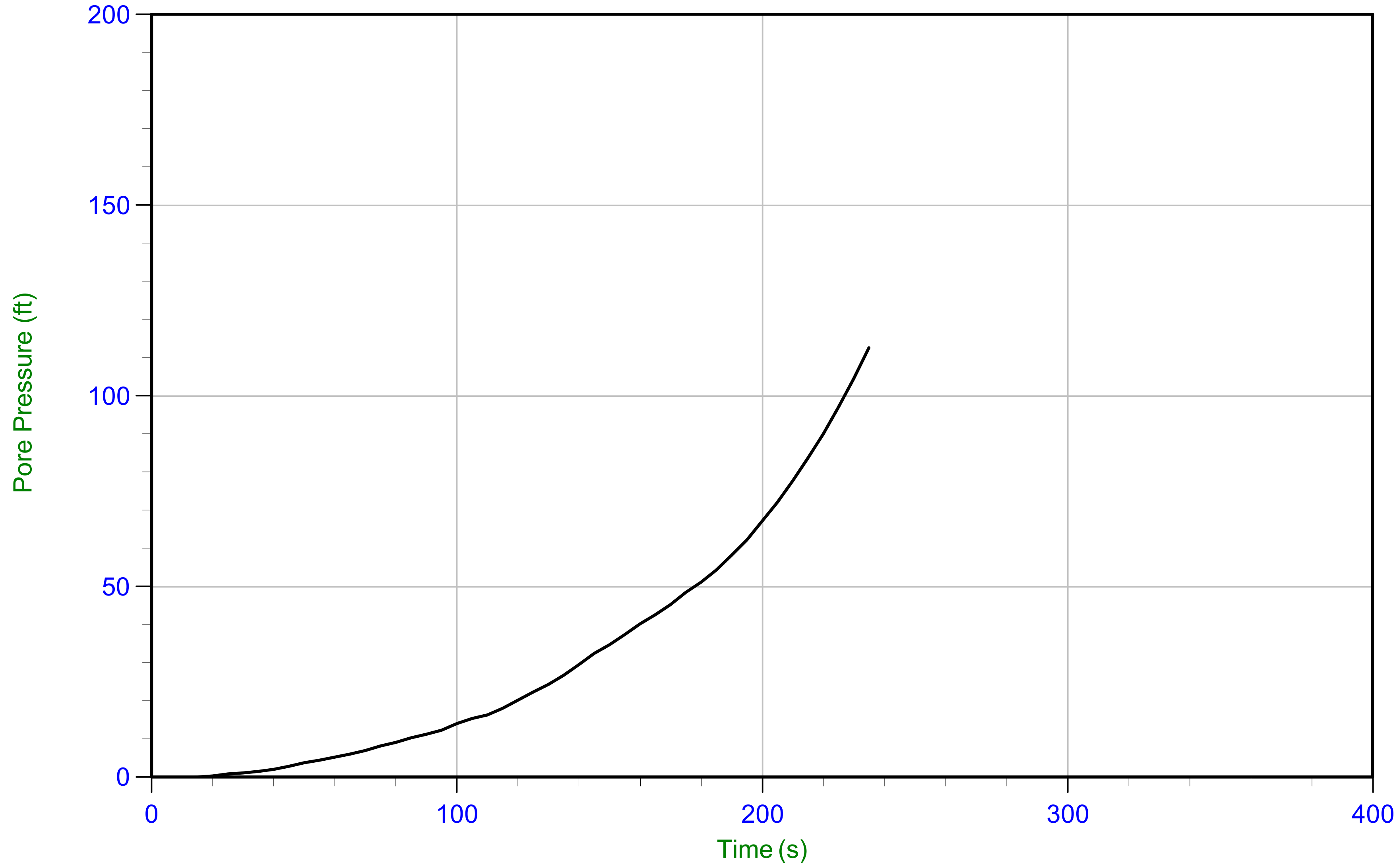


Trace Summary:

Filename: 20-61-21655_CP034.PPF
Depth: 2.900 m / 9.514 ft
Duration: 80.0 s

u Min: -18.0 ft
u Max: -12.5 ft
u Final: -12.5 ft

Geosyntec	Job No: 20-61-21655 Date: 12/03/2020 14:24 Site: DTE Monroe Power Plant	Sounding: CPT20-034 Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP034.PPF
Depth: 14.000 m / 45.931 ft
Duration: 235.0 s

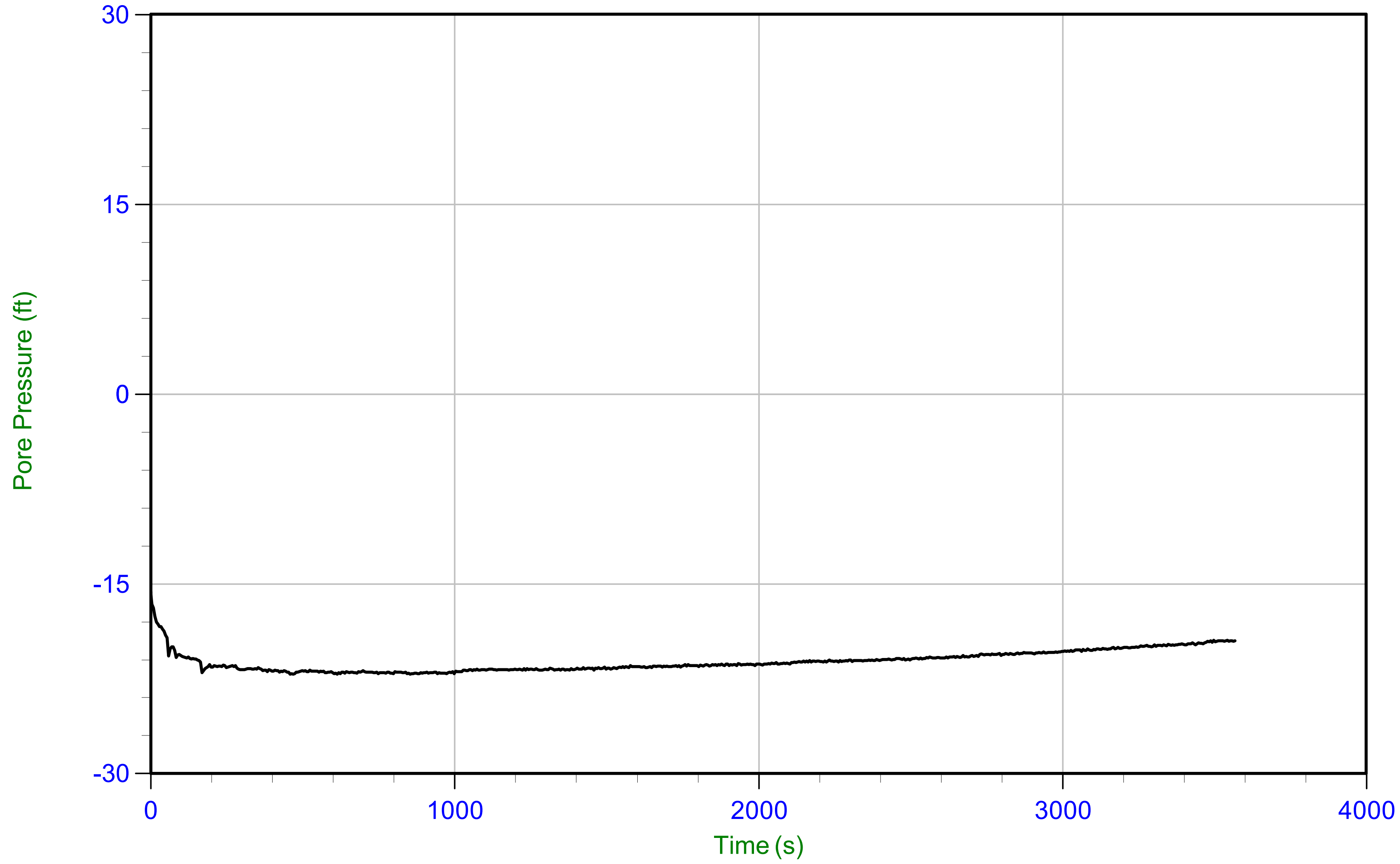
u Min: -1.1 ft
u Max: 112.6 ft
u Final: 112.6 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 09:07
Site: DTE Monroe Power Plant

Sounding: CPT20-036
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

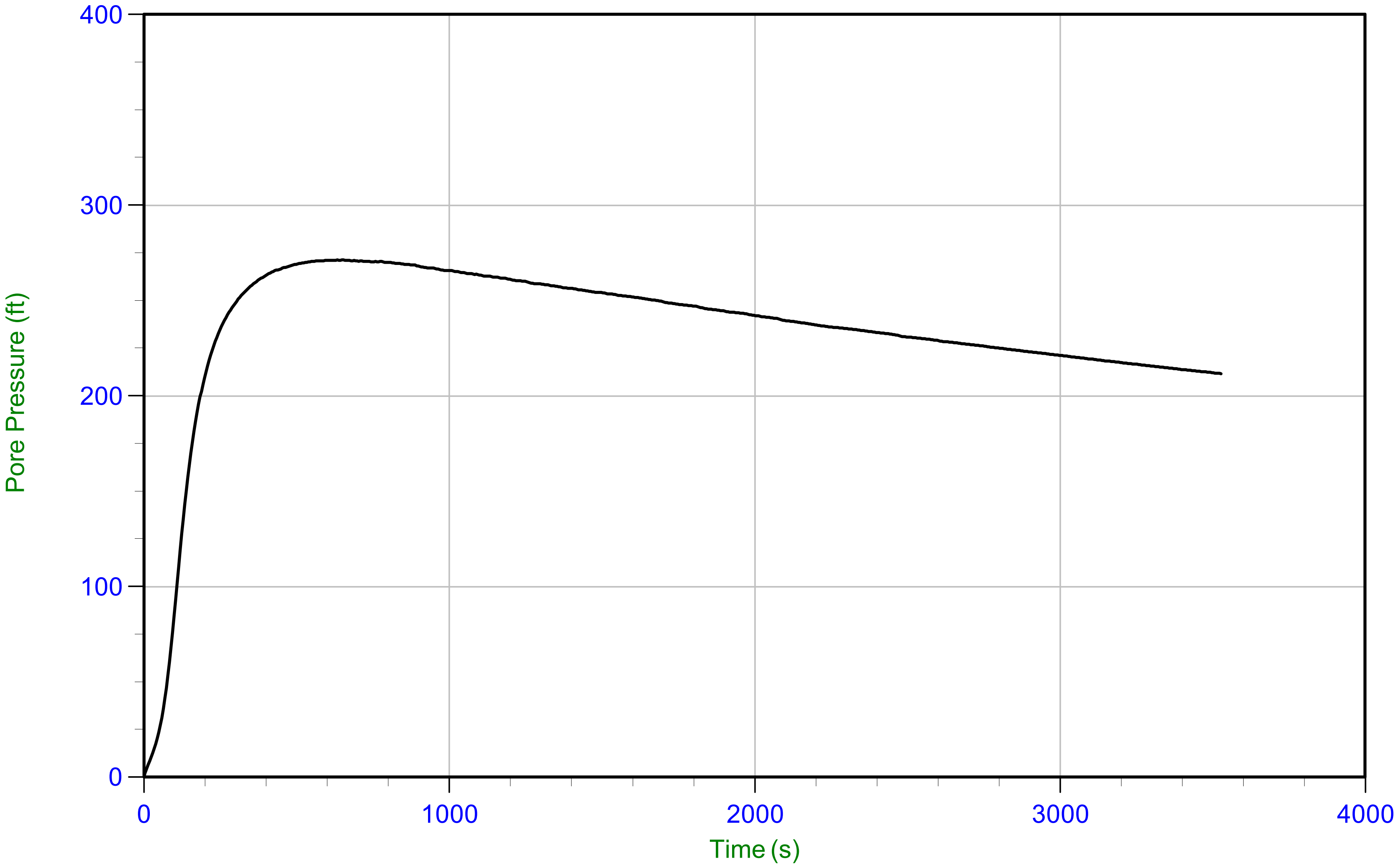
Filename: 20-61-21655_CP036.PPF
Depth: 6.450 m / 21.161 ft
Duration: 3570.0 s

u Min: -22.2 ft
u Max: -15.6 ft
u Final: -19.5 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 10:59
Site: DTE Monroe Power Plant

Sounding: CPT20-038
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

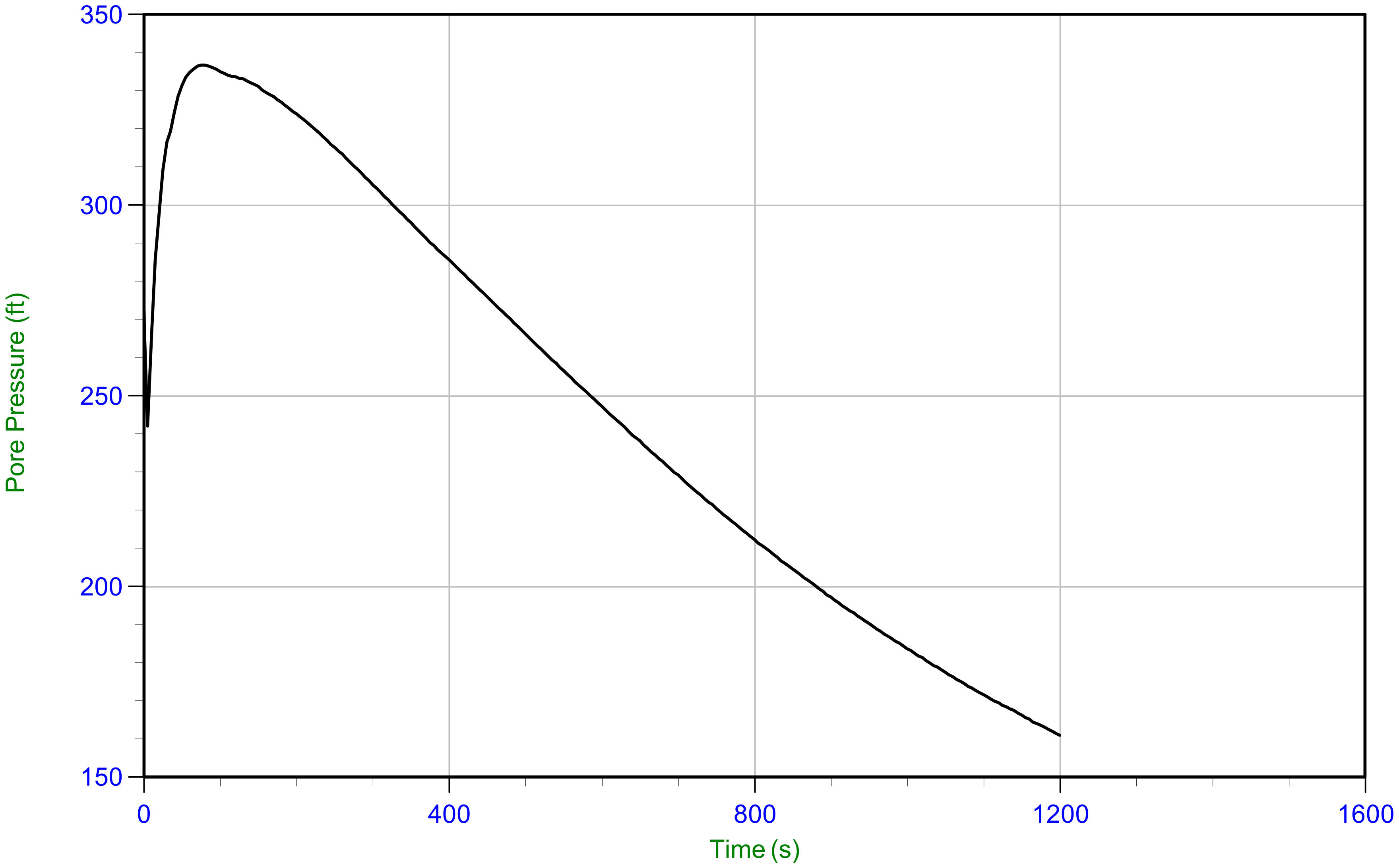
Filename: 20-61-21655_CP038.PPF
Depth: 17.375 m / 57.004 ft
Duration: 3530.0 s

u Min: -0.1 ft
u Max: 271.3 ft
u Final: 211.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP048.PPF
Depth: 15.250 m / 50.032 ft
Duration: 1200.0 s

u Min: 161.0 ft
u Max: 336.7 ft
u Final: 161.0 ft

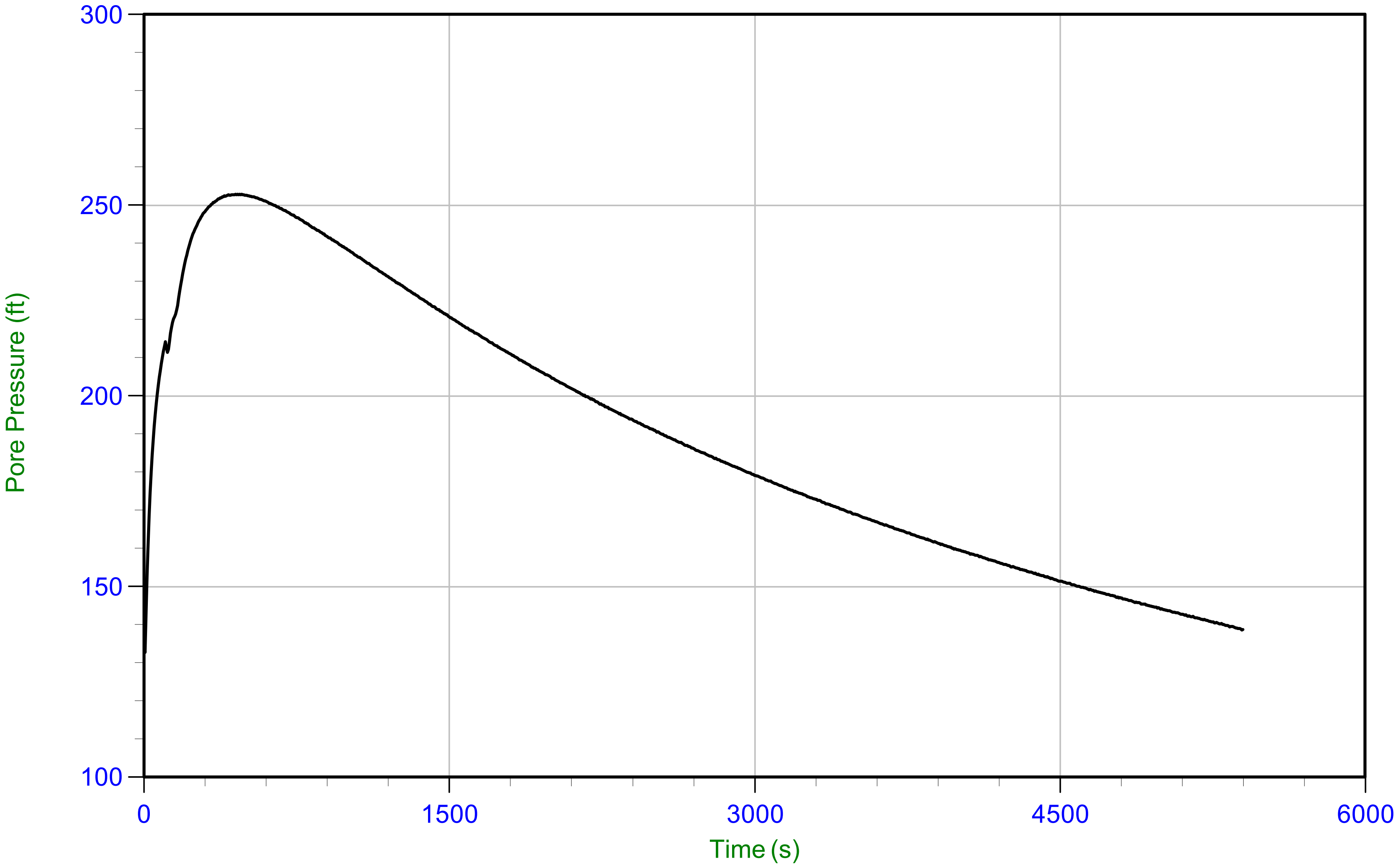
WT: 7.620 m / 25.000 ft
Ueq: 25.0 ft
U(50): 180.88 ft

T(50): 943.4 s
Ir: 100
Ch: 0.7 cm²/min

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 12:22
Site: DTE Monroe Power Plant

Sounding: CPT20-048
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

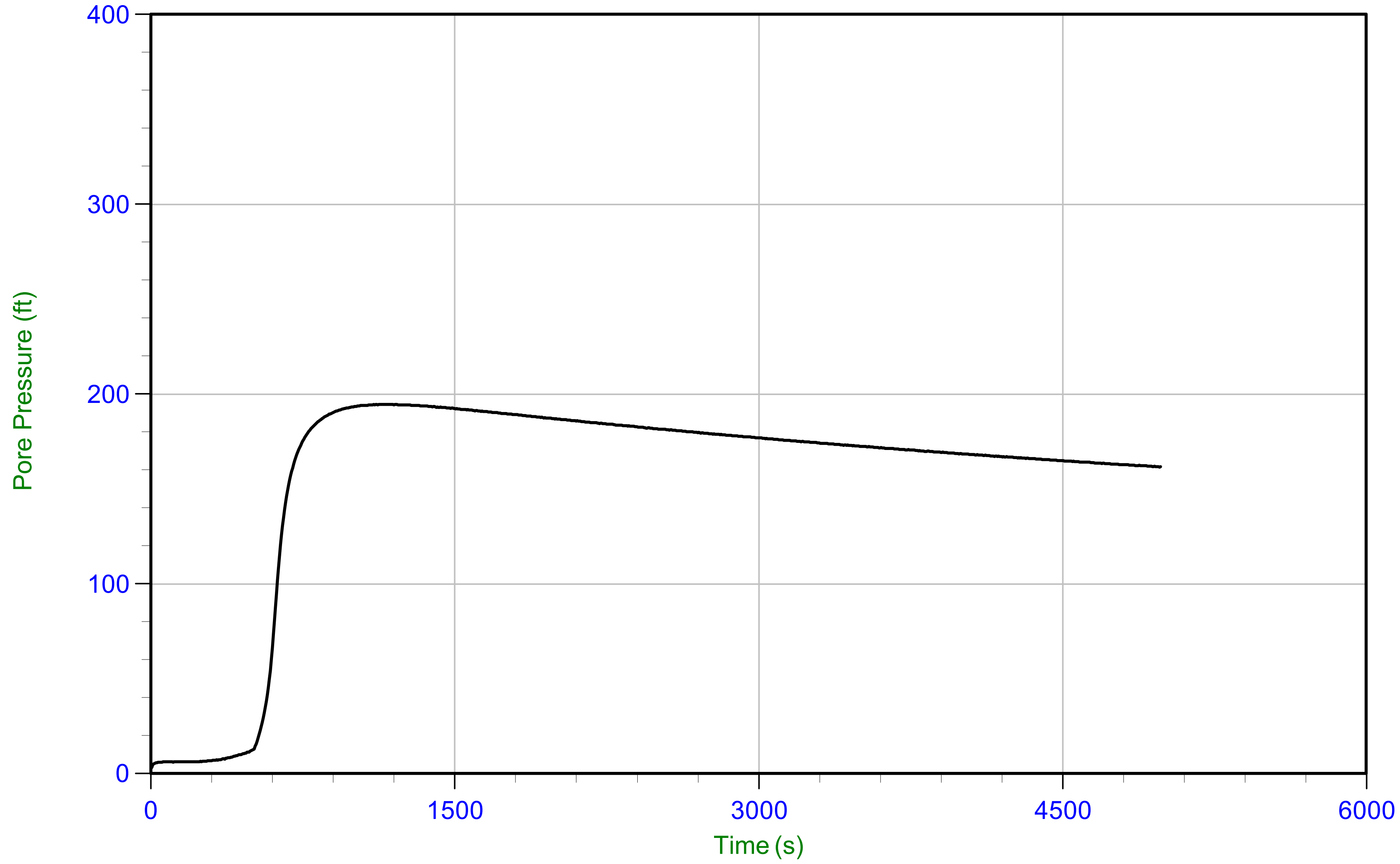
Filename: 20-61-21655_CP048.PPF
Depth: 16.800 m / 55.117 ft
Duration: 5400.0 s

u Min: 132.7 ft
u Max: 252.9 ft
u Final: 138.7 ft

WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 141.53 ft

T(50): 4738.7 s
Ir: 100
Ch: 0.1 cm²/min

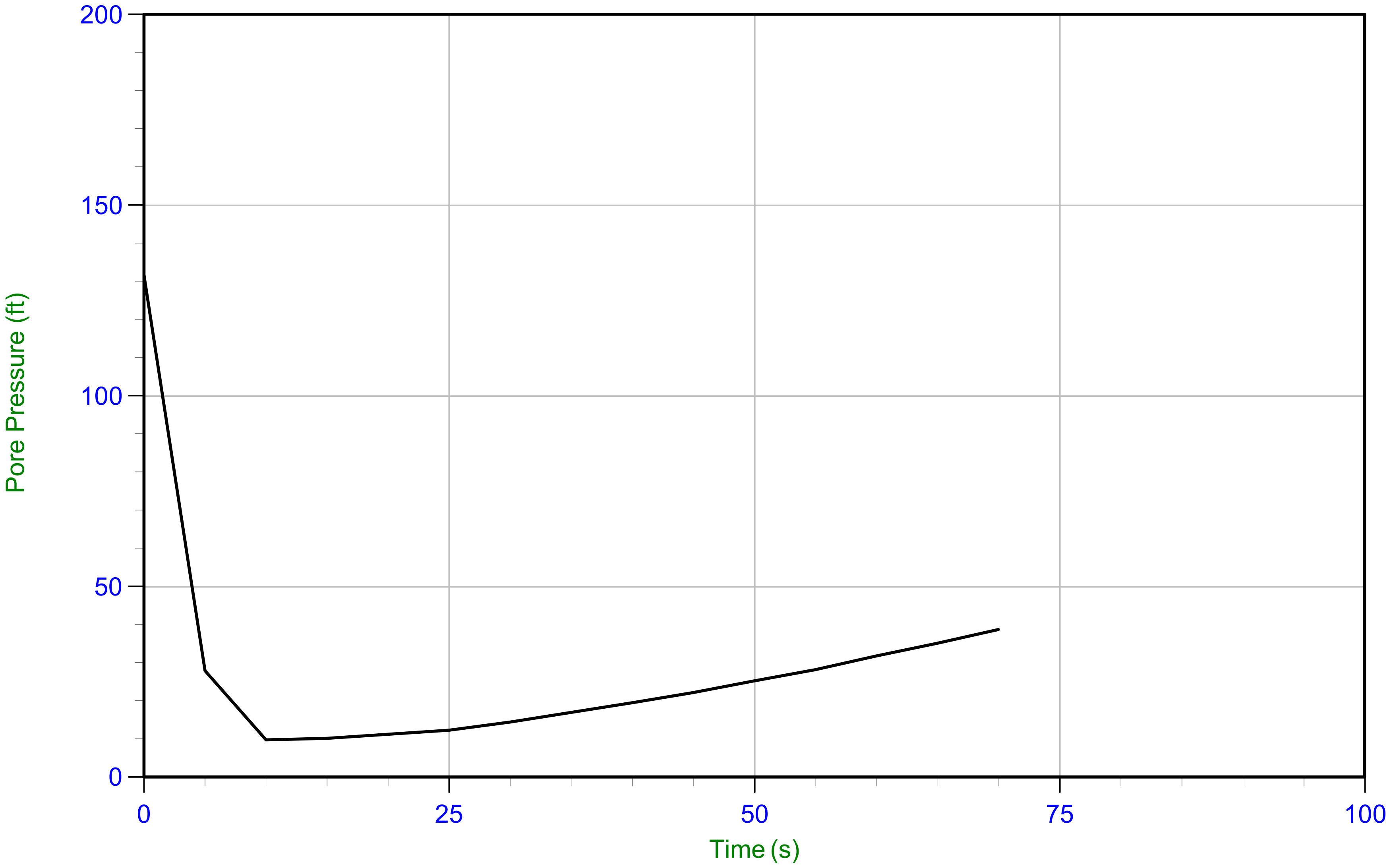
Geosyntec	Job No: 20-61-21655 Date: 12/13/2020 12:22 Site: DTE Monroe Power Plant	Sounding: CPT20-048 Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP048.PPF
Depth: 18.300 m / 60.039 ft
Duration: 4985.0 s

u Min: 2.6 ft
u Max: 194.6 ft
u Final: 161.7 ft



Trace Summary:

Filename: 20-61-21655_CP054.PPF
Depth: 18.550 m / 60.859 ft
Duration: 70.0 s

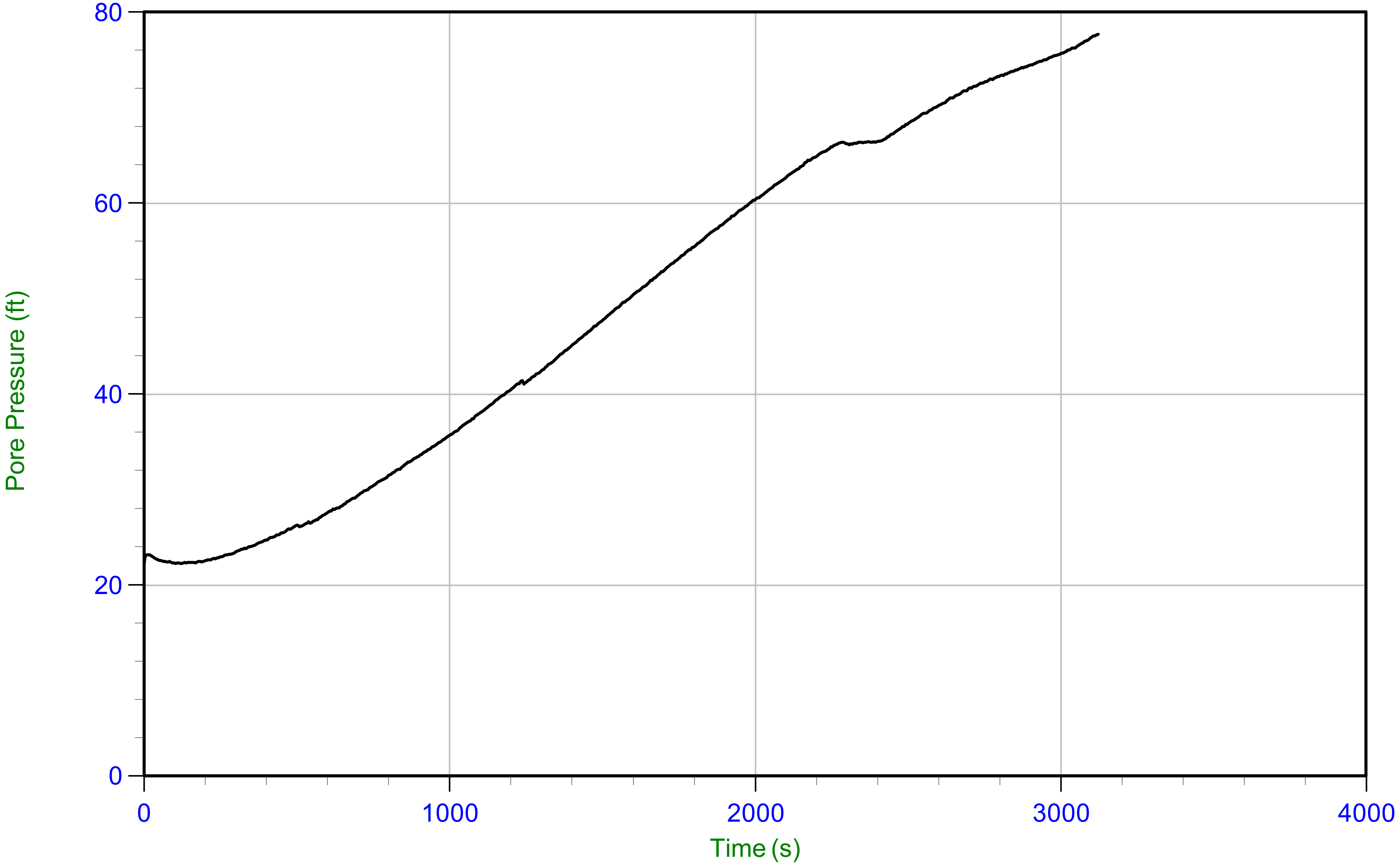
u Min: 9.8 ft
u Max: 131.6 ft
u Final: 38.7 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/06/2020 13:22
Site: DTE Monroe Power Plant

Sounding: CPT20-058
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

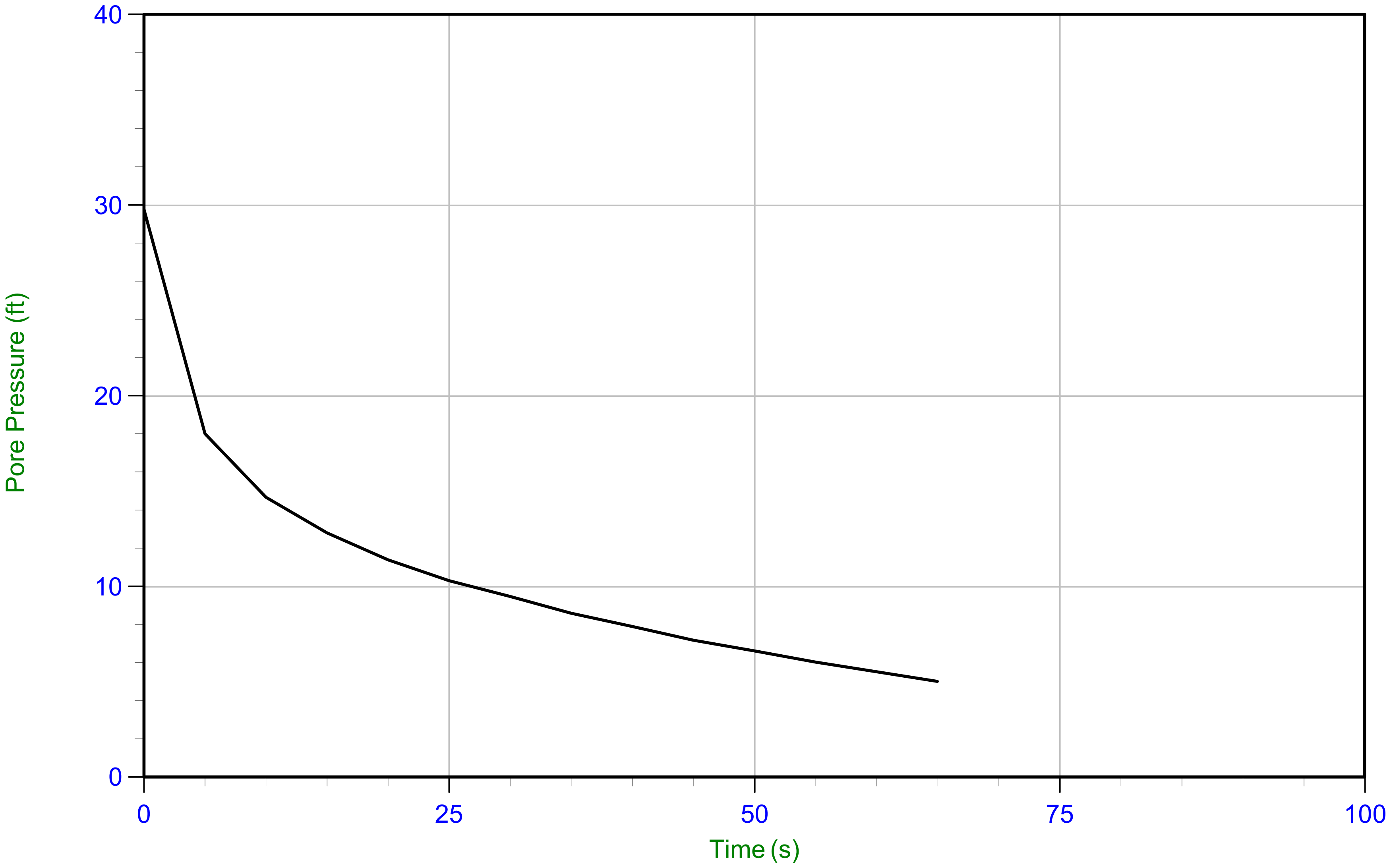
Filename: 20-61-21655_CP058.PPF
Depth: 12.850 m / 42.158 ft
Duration: 3125.0 s

u Min: 22.1 ft
u Max: 77.7 ft
u Final: 77.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/06/2020 12:21
Site: DTE Monroe Power Plant

Sounding: CPT20-060
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP060.PPF
Depth: 18.250 m / 59.875 ft
Duration: 65.0 s

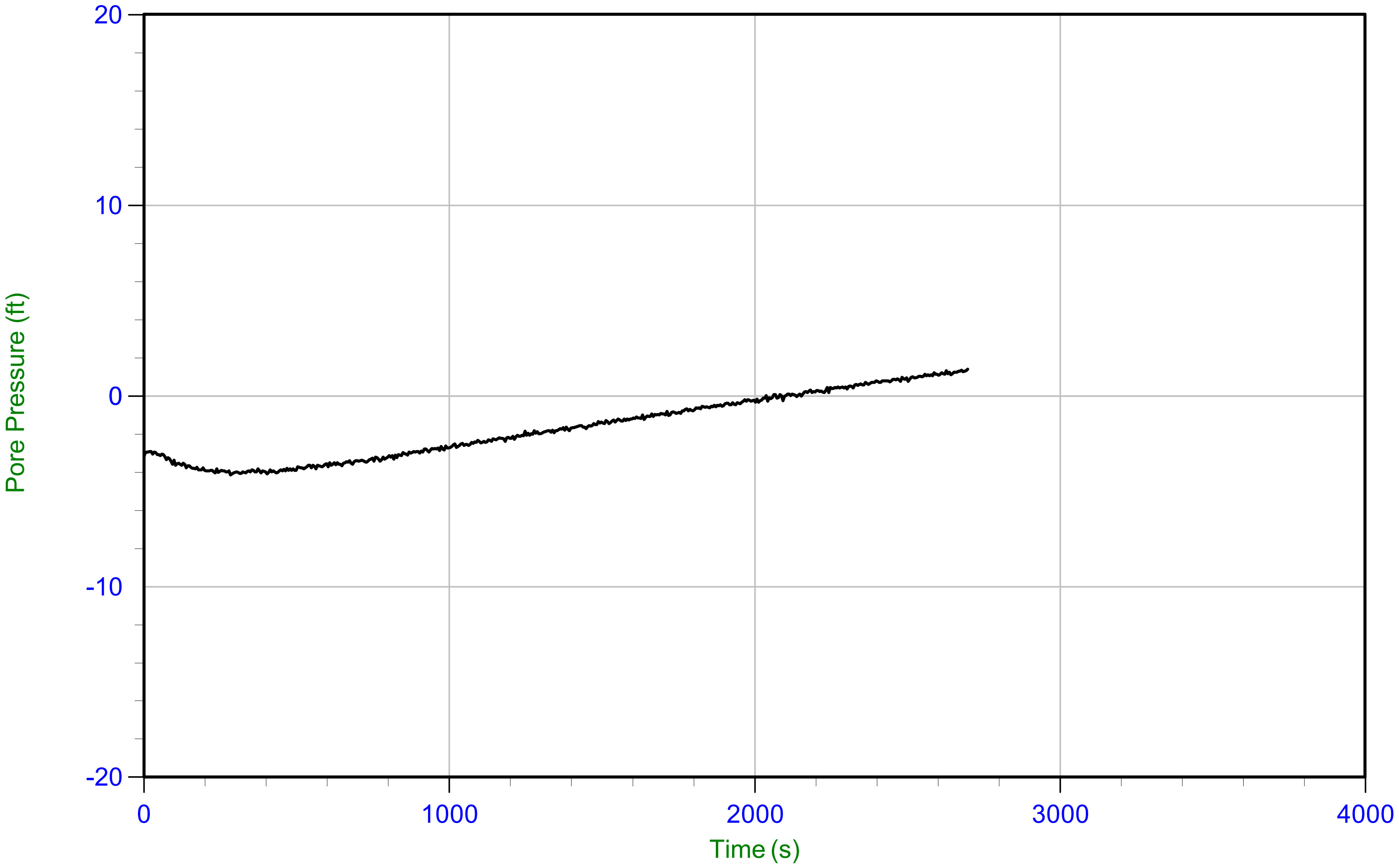
u Min: 5.0 ft
u Max: 29.8 ft
u Final: 5.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 12.200 m / 40.026 ft
Duration: 2700.0 s

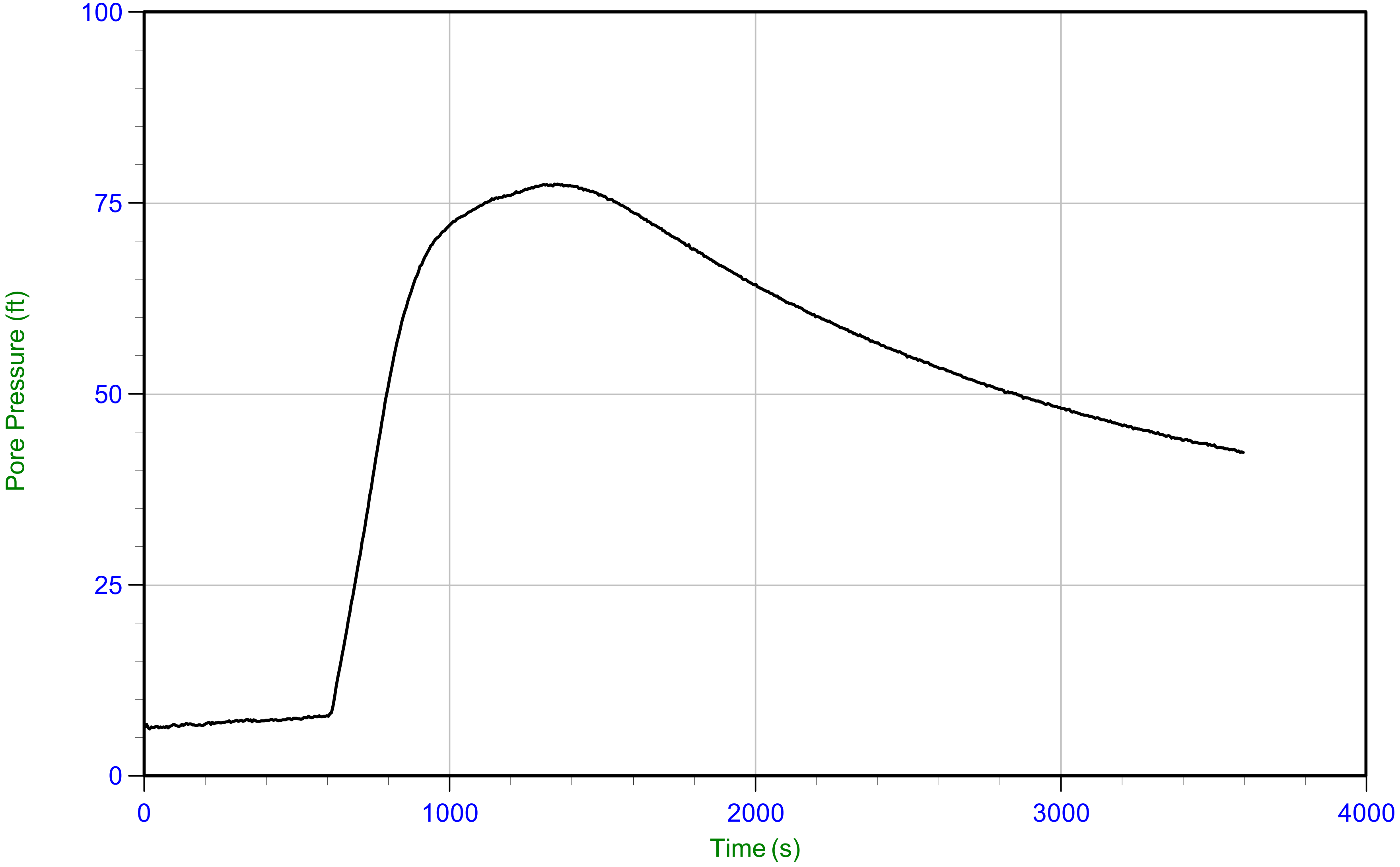
u Min: -4.1 ft
u Max: 1.4 ft
u Final: 1.4 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

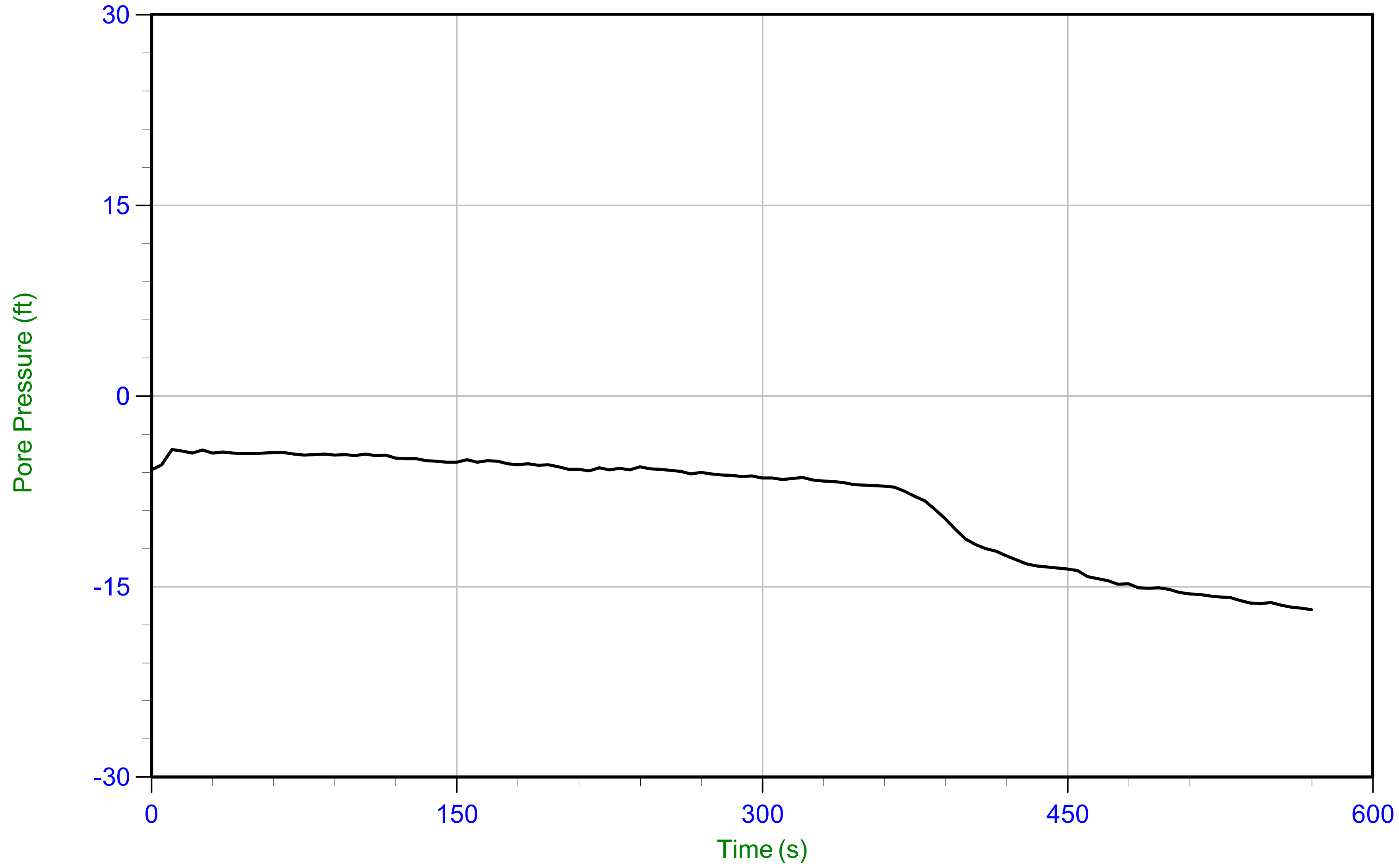
Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 13.150 m / 43.143 ft
Duration: 3600.0 s

u Min: 6.2 ft
u Max: 77.5 ft
u Final: 42.4 ft



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 16.800 m / 55.117 ft
Duration: 570.0 s

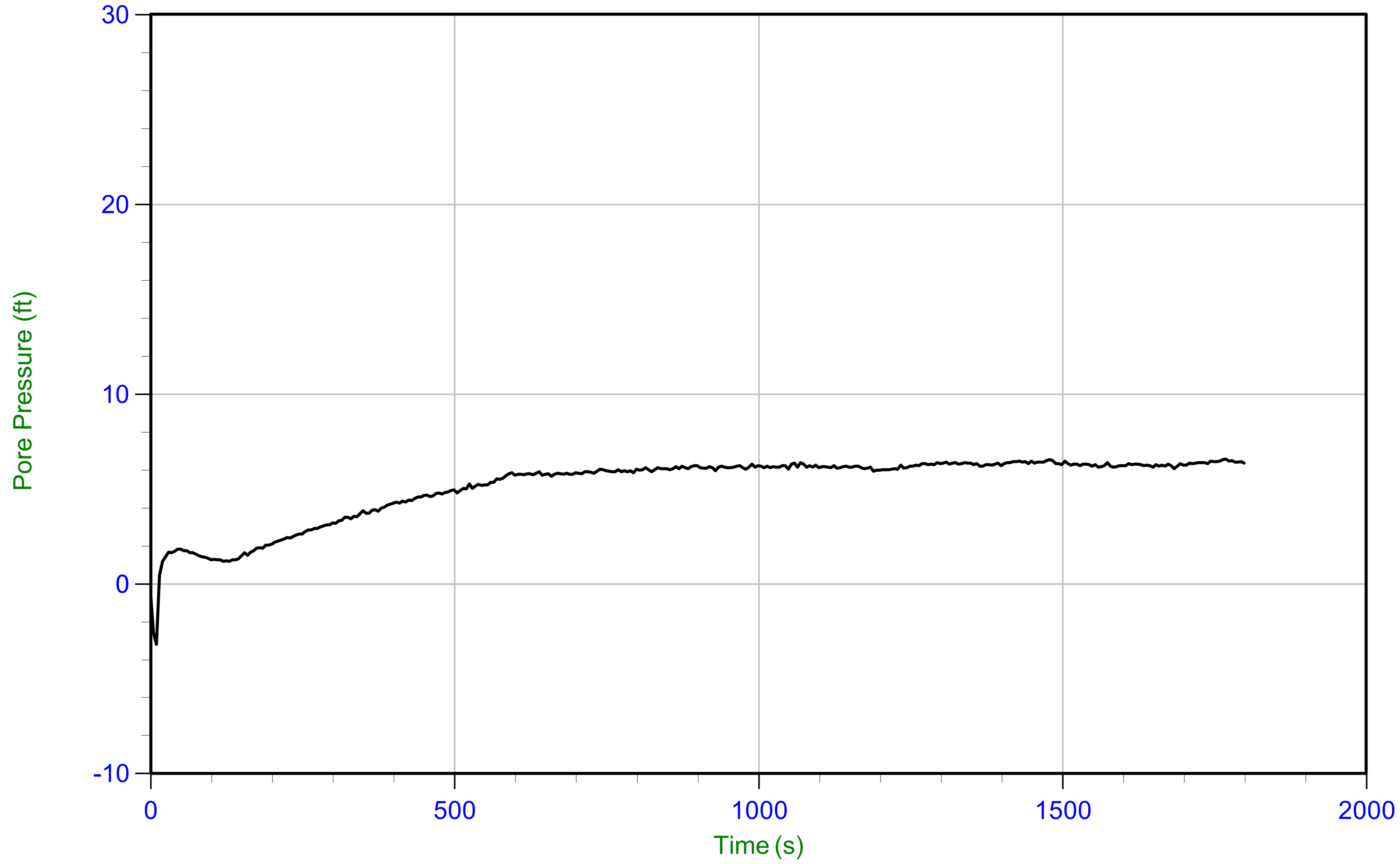
u Min: -16.8 ft
u Max: -4.2 ft
u Final: -16.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 08:36
Site: DTE Monroe Power Plant

Sounding: CPT20-068
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP068.PPF
Depth: 18.000 m / 59.054 ft
Duration: 1800.0 s

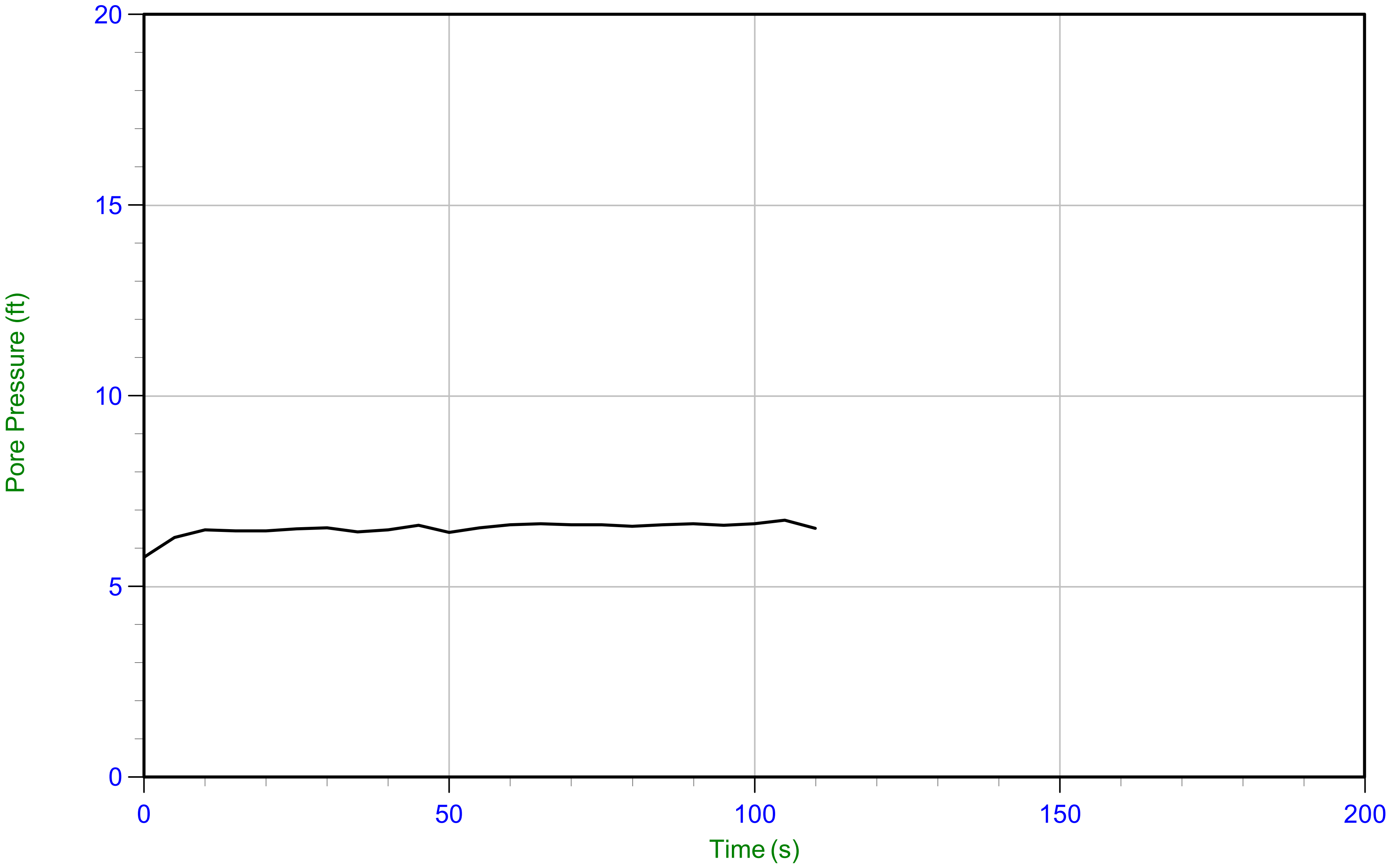
u Min: -3.2 ft
u Max: 6.6 ft
u Final: 6.4 ft

WT: 16.043 m / 52.634 ft
Ueq: 6.4 ft

Geosyntec

Job No: 20-61-21655
Date: 12/02/2020 14:17
Site: DTE Monroe Power Plant

Sounding: CPT20-074
Cone: 567:T1500F15U500 Area=15 cm²



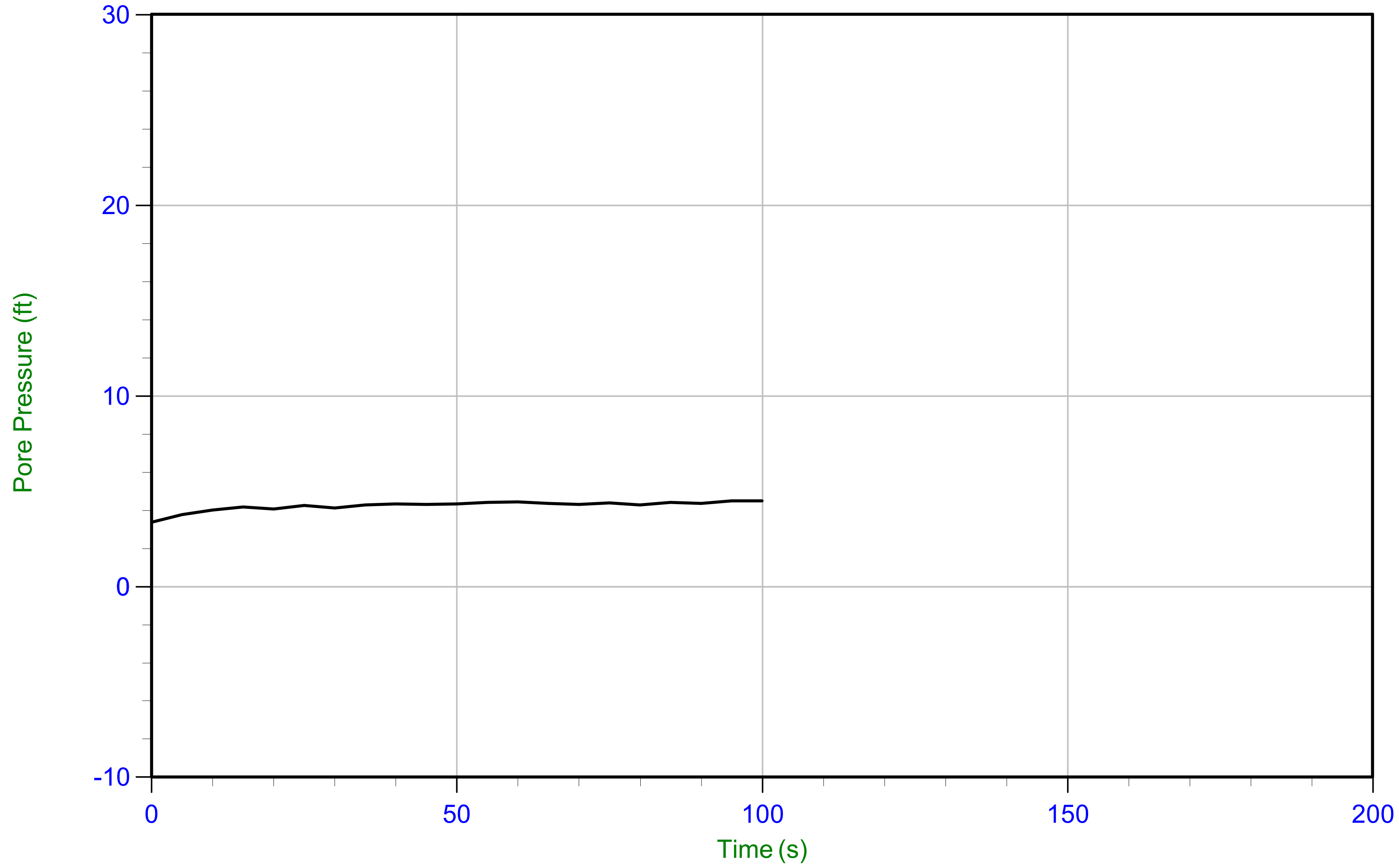
Trace Summary:
Filename: 20-61-21655_CP074.PPF
Depth: 11.800 m / 38.713 ft
Duration: 110.0 s
u Min: 5.8 ft
u Max: 6.7 ft
u Final: 6.5 ft
WT: 9.794 m / 32.132 ft
Ueq: 6.6 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP078B.PPF
Depth: 11.800 m / 38.713 ft
Duration: 100.0 s

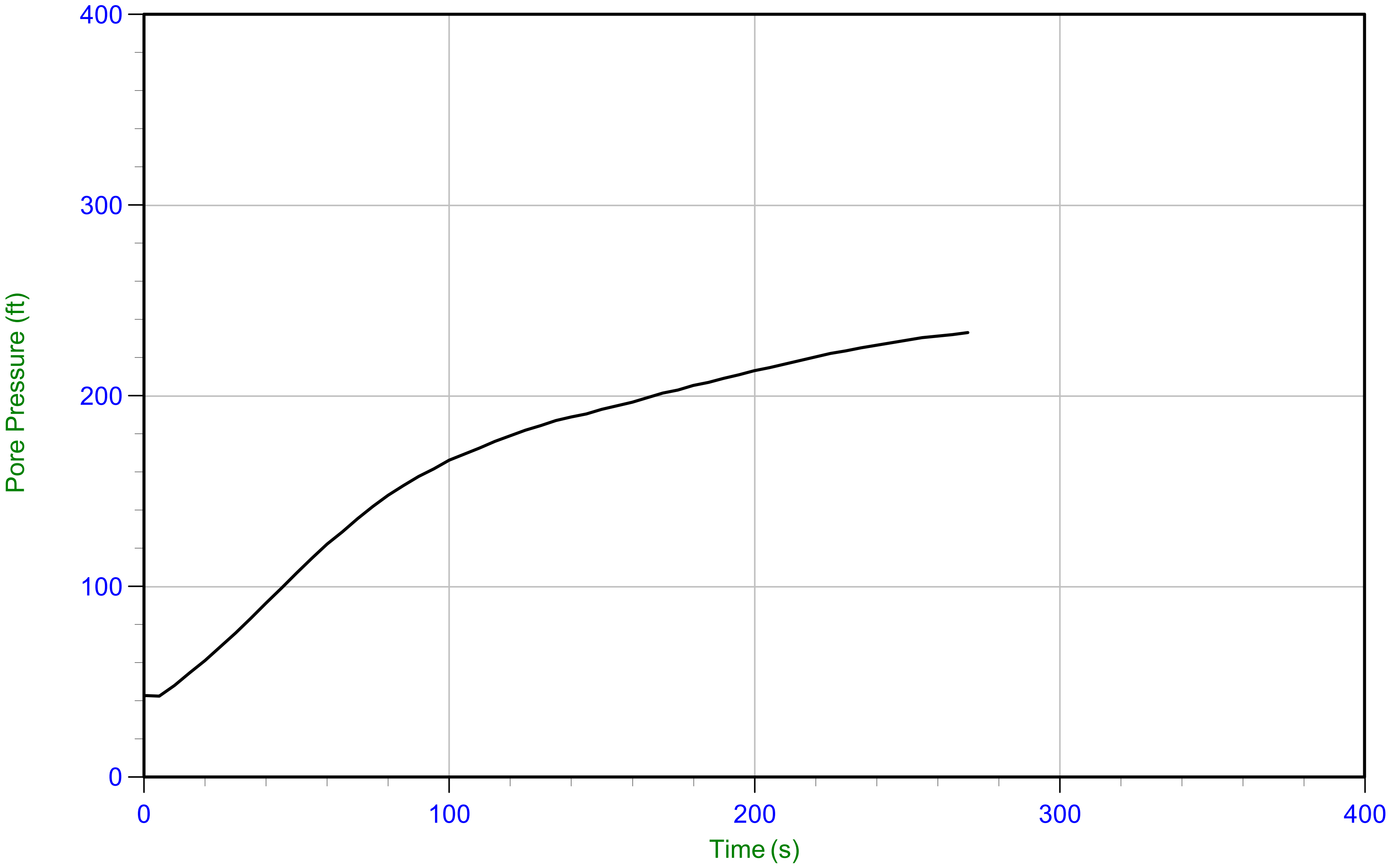
u Min: 3.4 ft
u Max: 4.5 ft
u Final: 4.5 ft

WT: 10.447 m / 34.275 ft
Ueq: 4.4 ft

Geosyntec

Job No: 20-61-21655
Date: 12/03/2020 10:17
Site: DTE Monroe Power Plant

Sounding: CPT20-078B
Cone: 567:T1500F15U500 Area=15 cm²



Trace Summary:

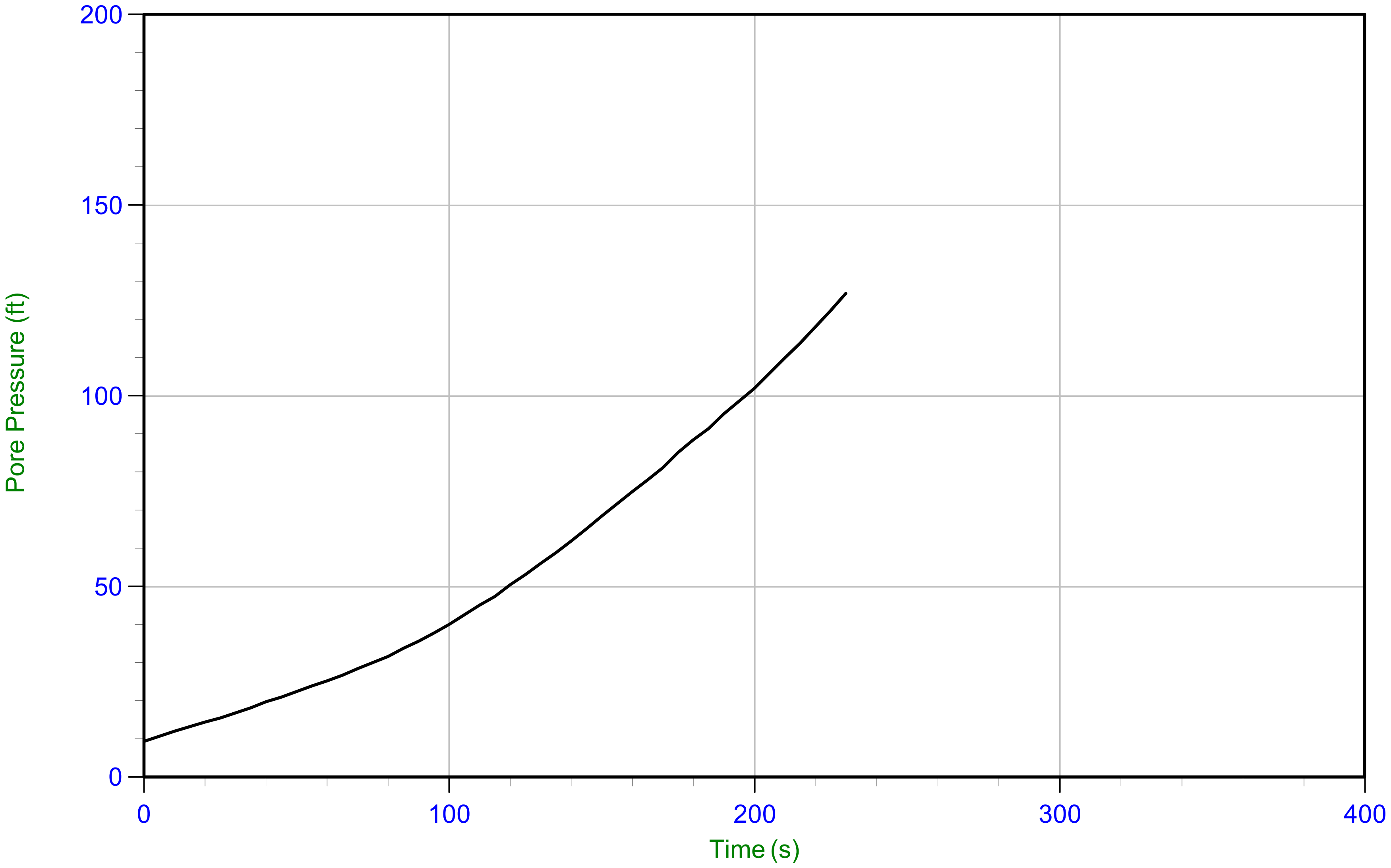
Filename: 20-61-21655_CP078B.PPF
Depth: 14.800 m / 48.556 ft
Duration: 270.0 s

u Min: 42.6 ft
u Max: 233.2 ft
u Final: 233.2 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 08:46
Site: DTE Monroe Power Plant

Sounding: CPT20-086
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP086.PPF
Depth: 14.850 m / 48.720 ft
Duration: 230.0 s

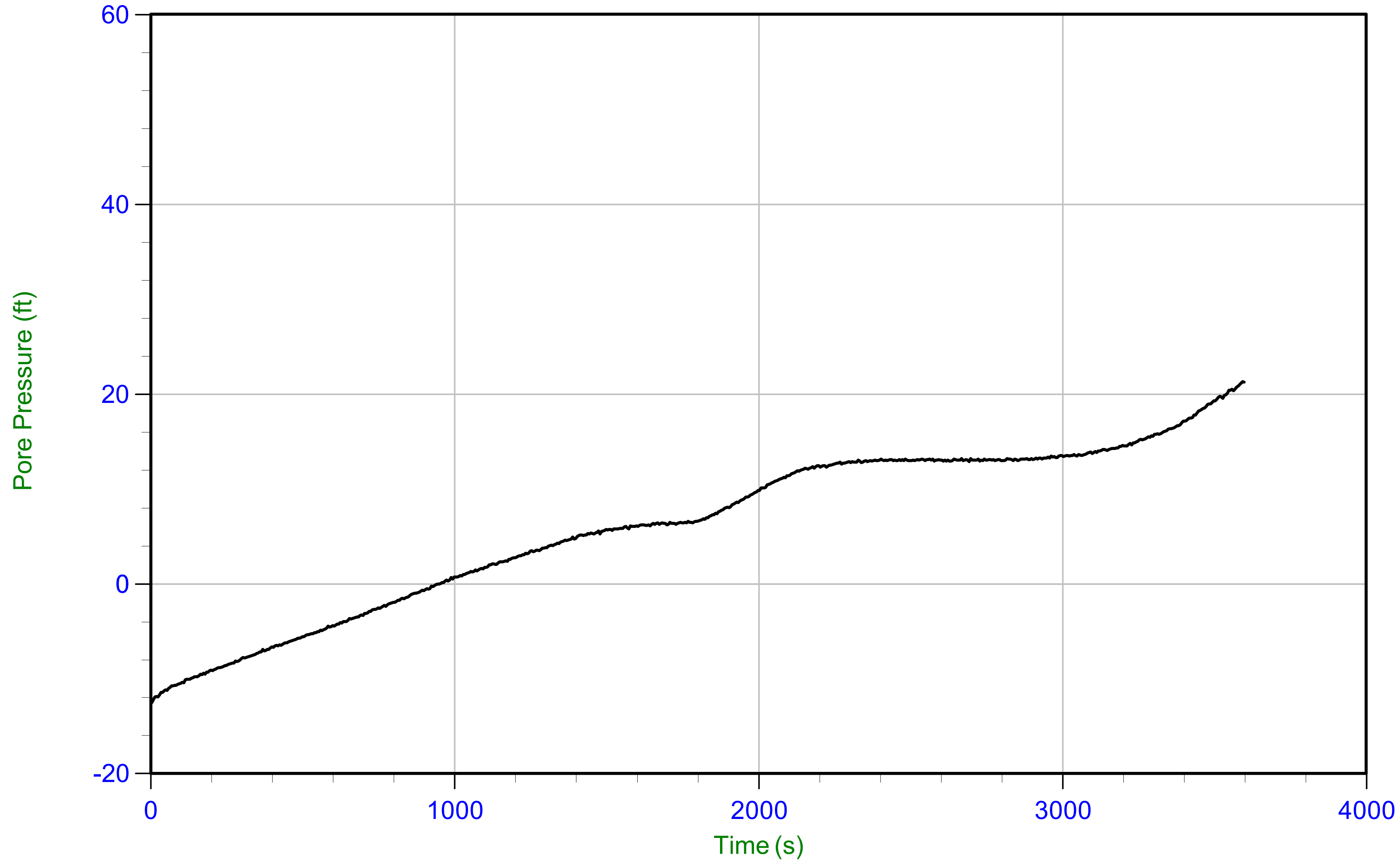
u Min: 9.3 ft
u Max: 126.9 ft
u Final: 126.9 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP090.PPF
Depth: 6.100 m / 20.013 ft
Duration: 3600.0 s

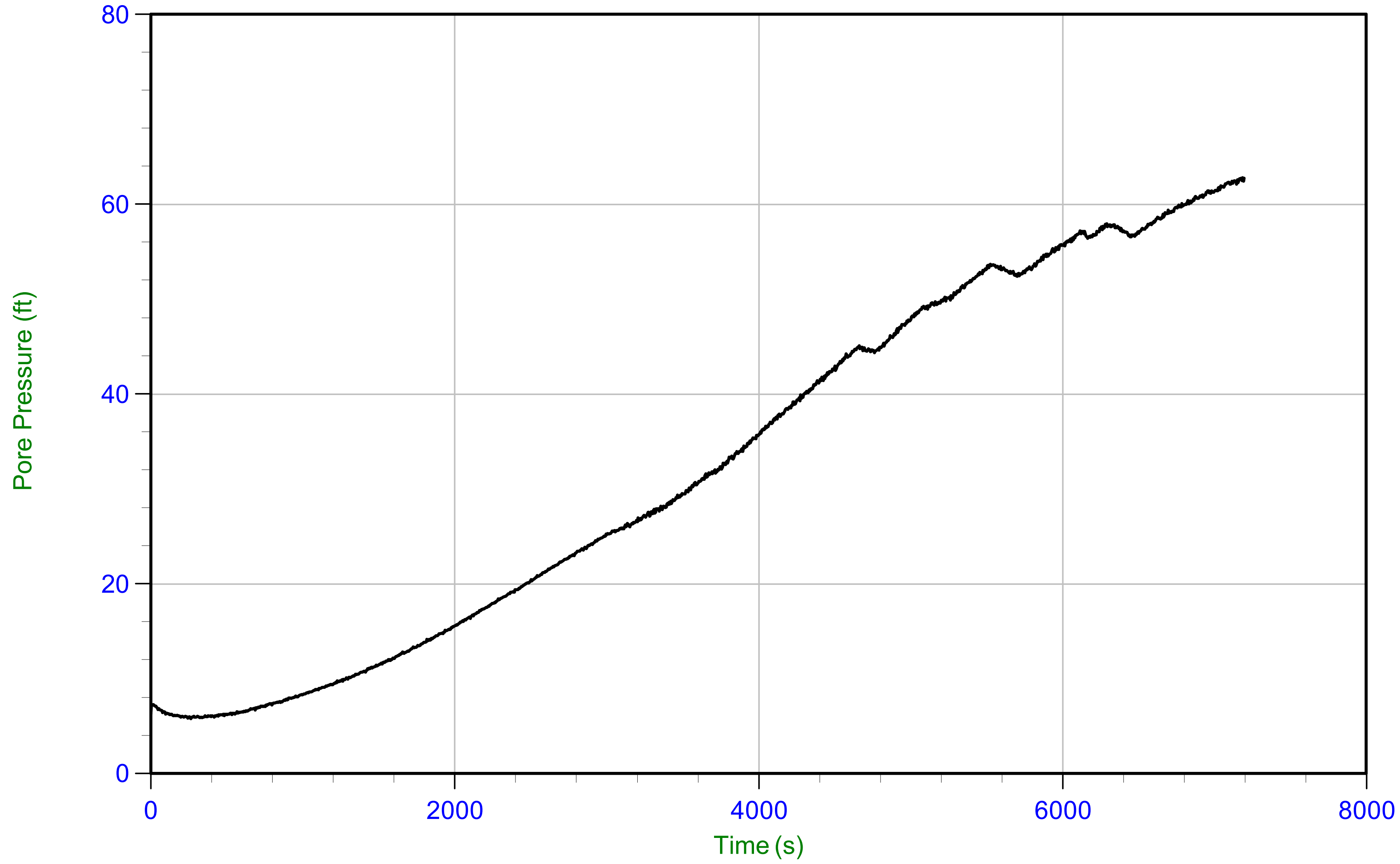
u Min: -12.5 ft
u Max: 21.3 ft
u Final: 21.3 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

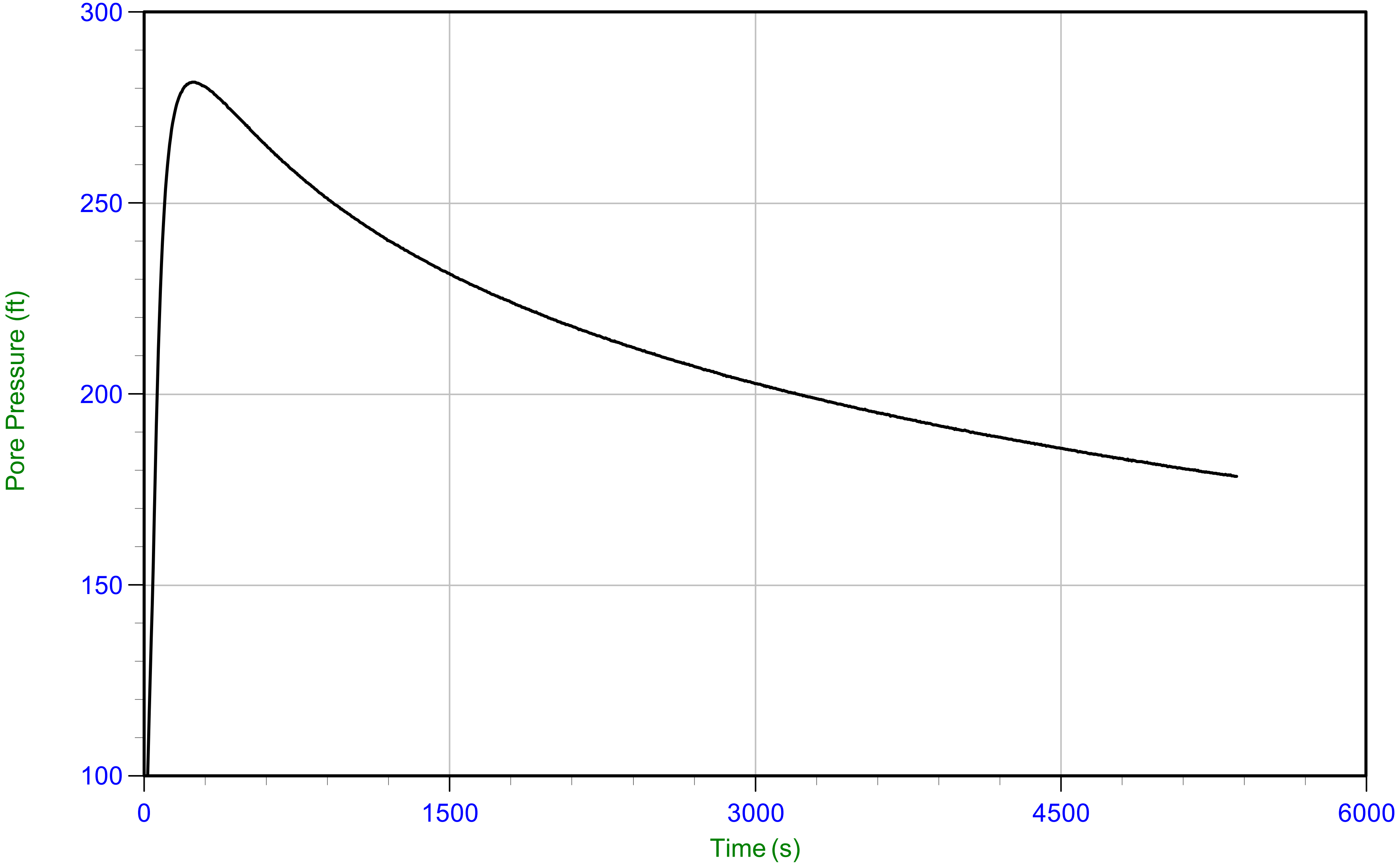
Filename: 20-61-21655_CP090.PPF
Depth: 12.200 m / 40.026 ft
Duration: 7200.0 s

u Min: 5.8 ft
u Max: 62.8 ft
u Final: 62.8 ft

Geosyntec

Job No: 20-61-21655
Date: 12/04/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-090
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

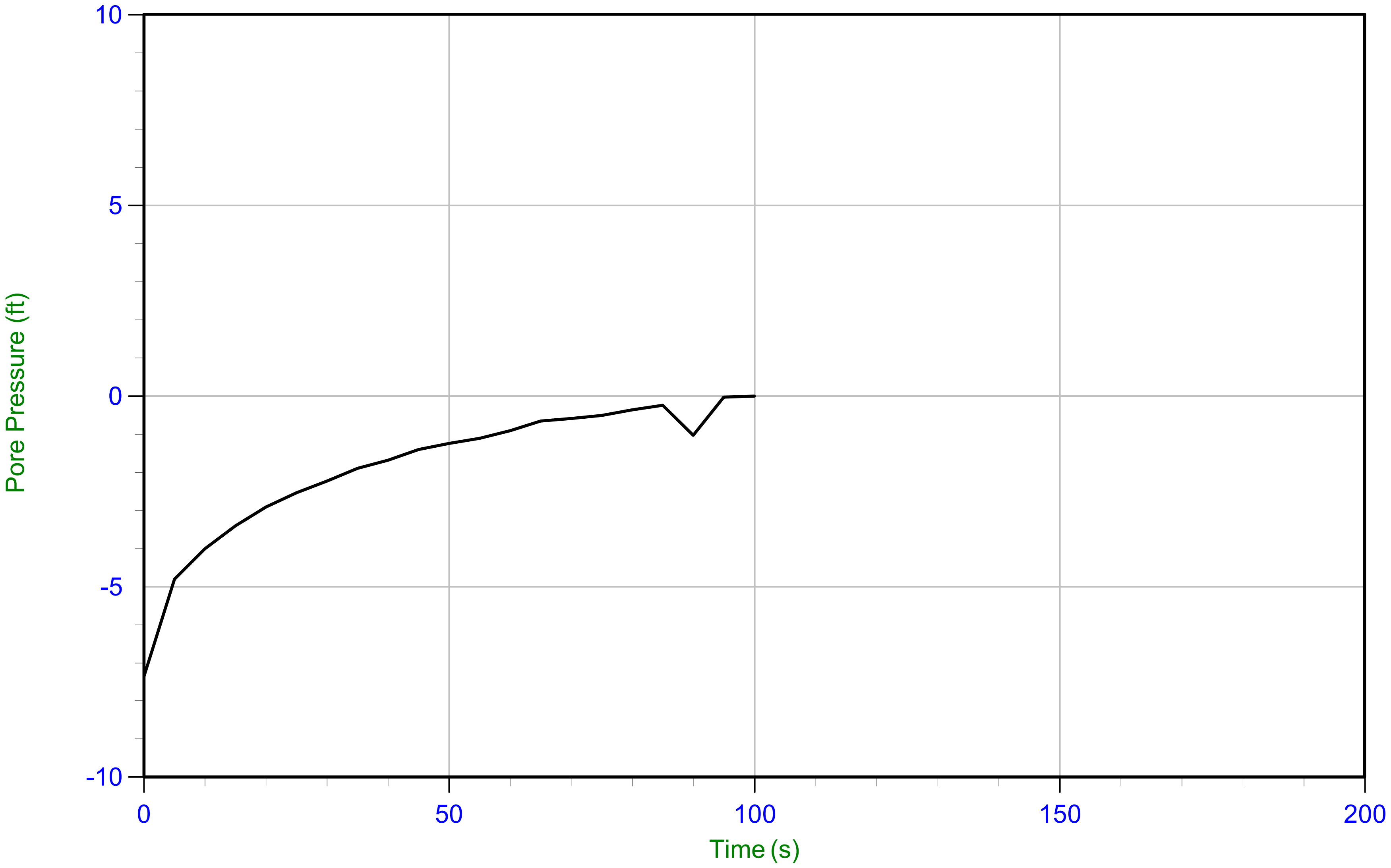
Filename: 20-61-21655_CP090.PPF
Depth: 18.300 m / 60.039 ft
Duration: 5365.0 s

u Min: 70.0 ft
u Max: 281.7 ft
u Final: 178.5 ft

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 09:32
Site: DTE Monroe Power Plant

Sounding: CPT20-092
Cone: 675:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP092.PPF
Depth: 1.750 m / 5.741 ft
Duration: 100.0 s

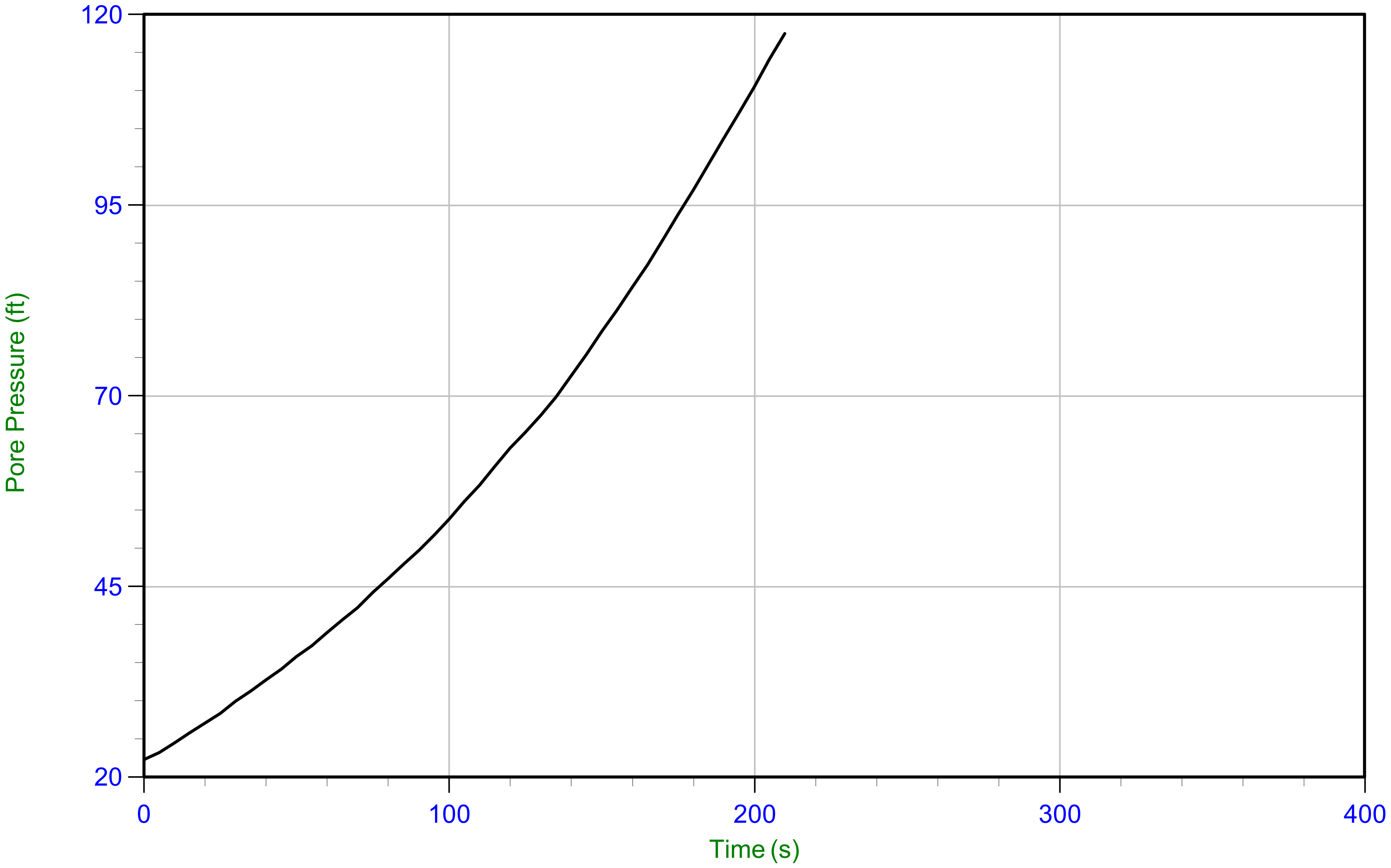
u Min: -7.4 ft
u Max: -0.0 ft
u Final: -0.0 ft

WT: 1.750 m / 5.741 ft
Ueq: 0.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 09:32
Site: DTE Monroe Power Plant

Sounding: CPT20-092
Cone: 675:T1500F15U500 Area=15 cm²

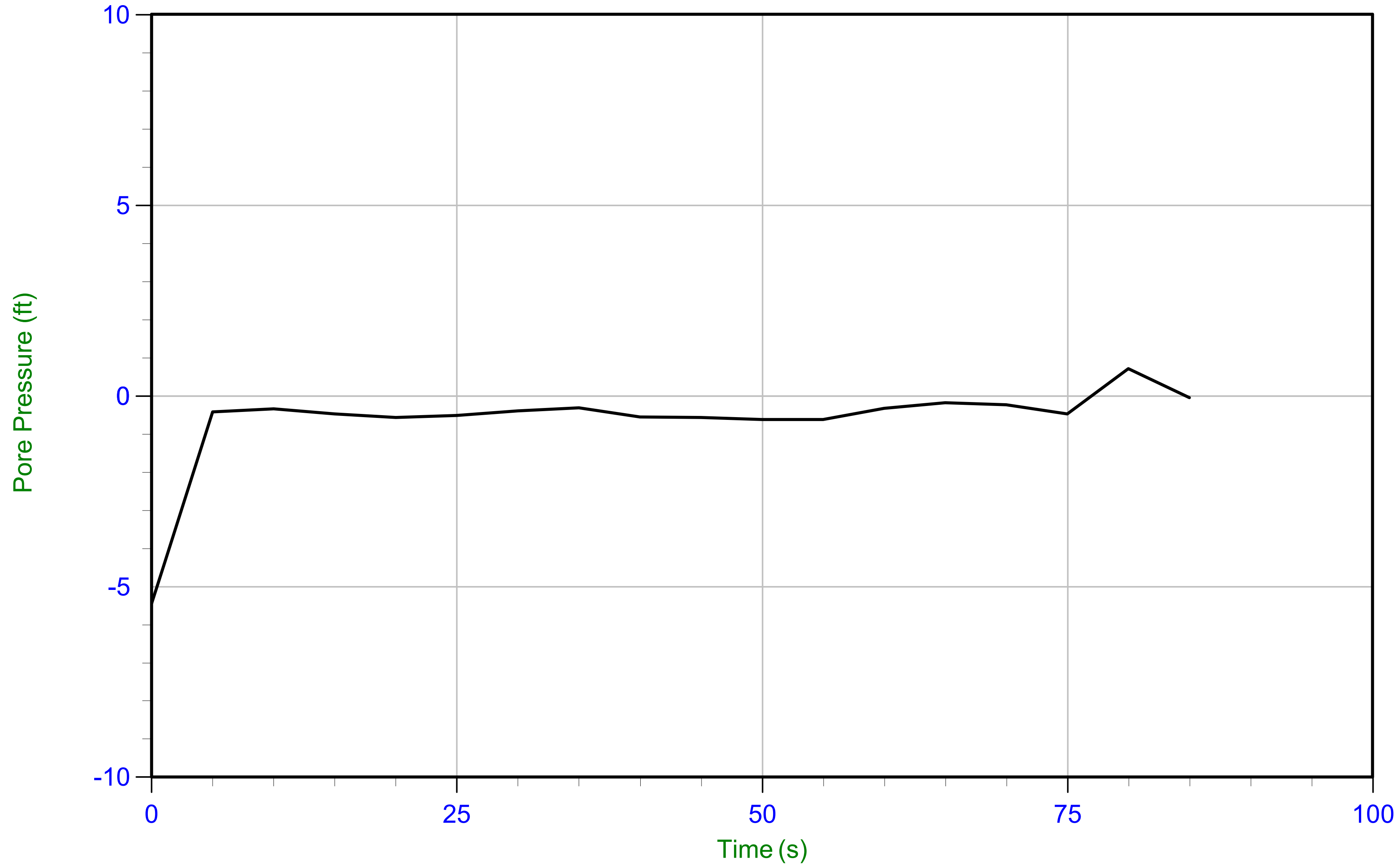


Trace Summary:

Filename: 20-61-21655_CP092.PPF
Depth: 17.800 m / 58.398 ft
Duration: 210.0 s

u Min: 22.3 ft
u Max: 117.5 ft
u Final: 117.5 ft

Geosyntec	Job No: 20-61-21655 Date: 12/05/2020 11:51 Site: DTE Monroe Power Plant	Sounding: SCPT20-096 Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_SP096.PPF
Depth: 0.350 m / 1.148 ft
Duration: 85.0 s

u Min: -5.4 ft
u Max: 0.7 ft
u Final: -0.0 ft

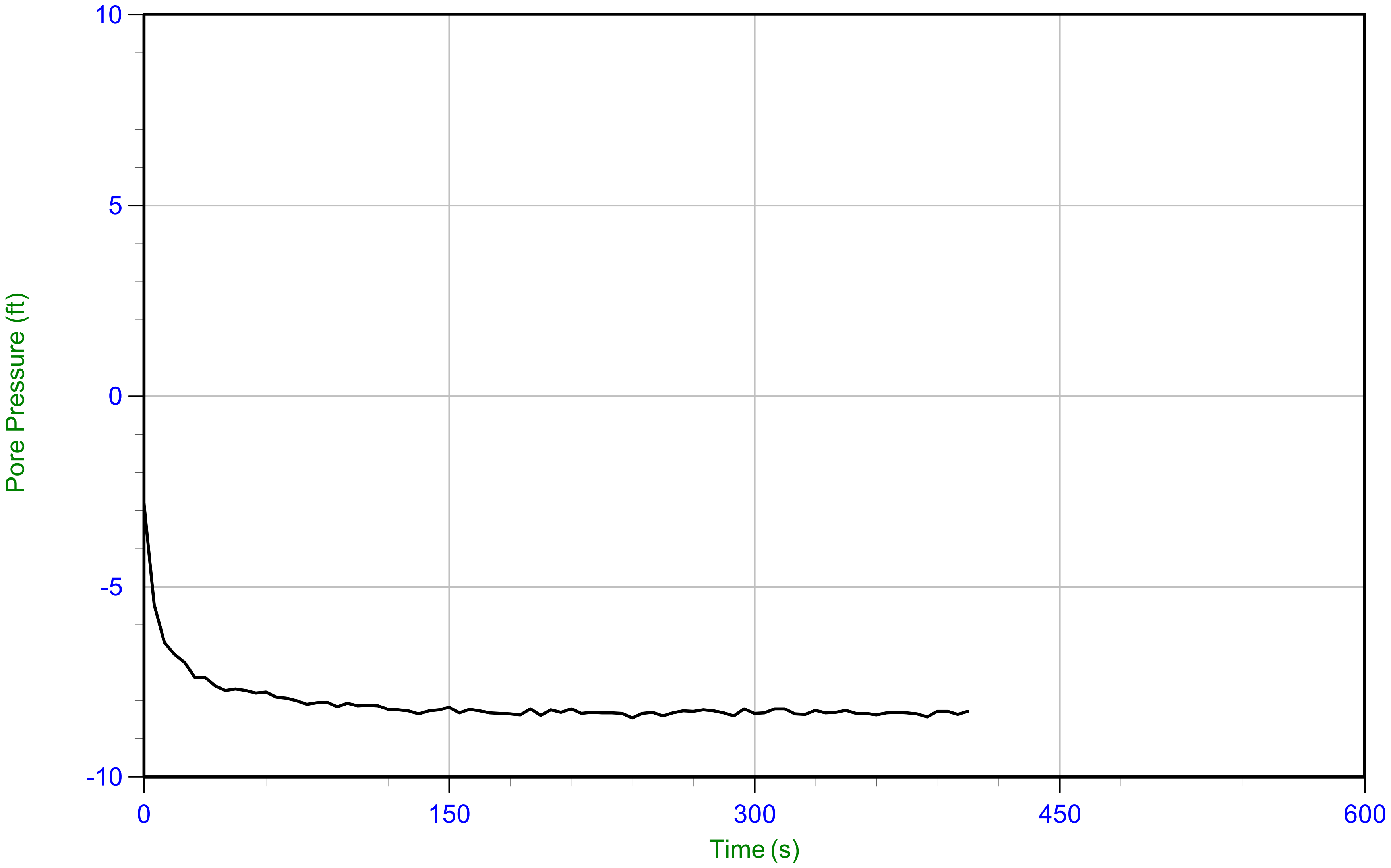
WT: 0.350 m / 1.148 ft
Ueq: 0.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/05/2020 11:51
Site: DTE Monroe Power Plant

Sounding: SCPT20-096
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

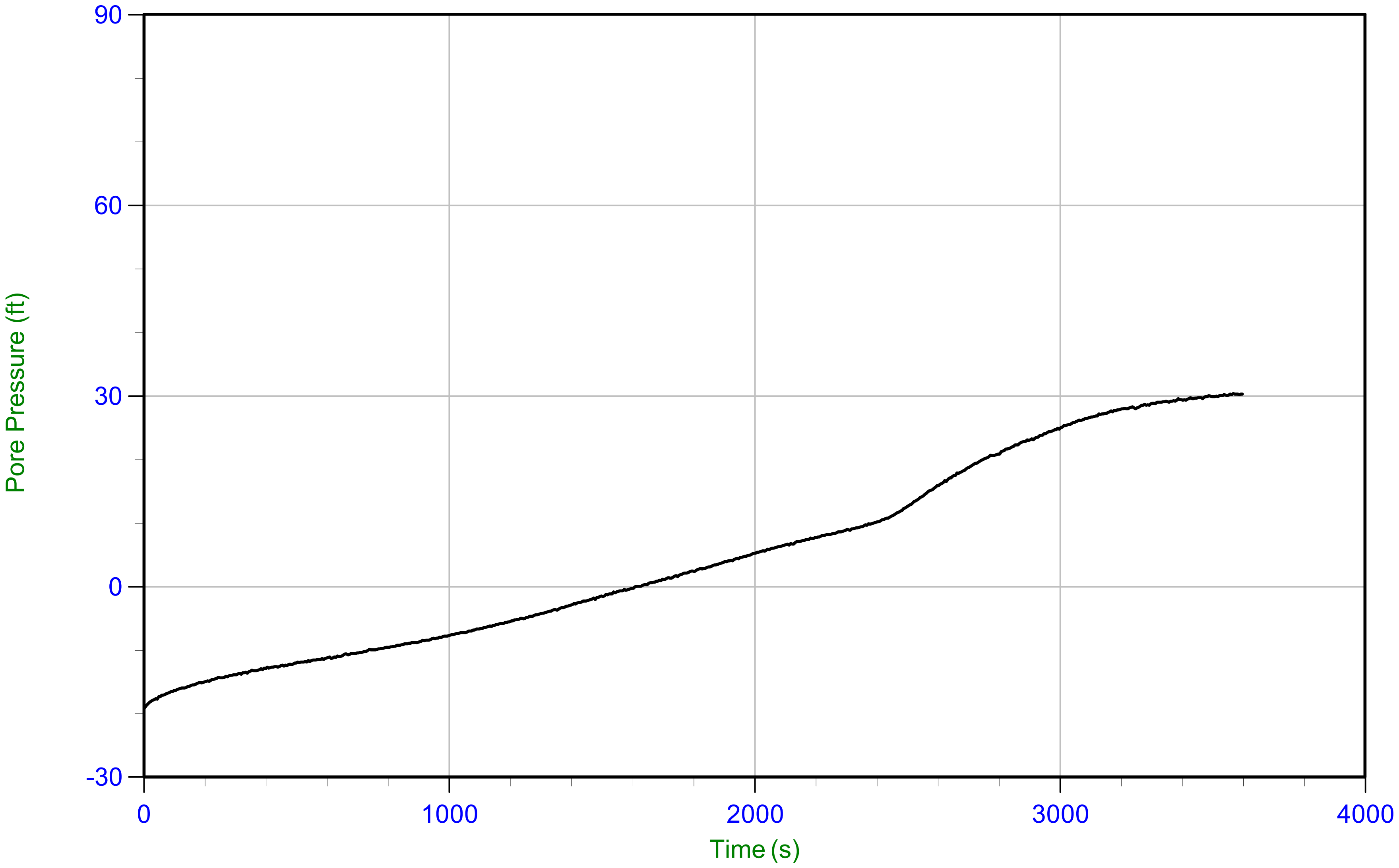
Filename: 20-61-21655_SP096.PPF
Depth: 10.800 m / 35.433 ft
Duration: 405.0 s

u Min: -8.4 ft
u Max: -2.8 ft
u Final: -8.3 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 6.100 m / 20.013 ft
Duration: 3600.0 s

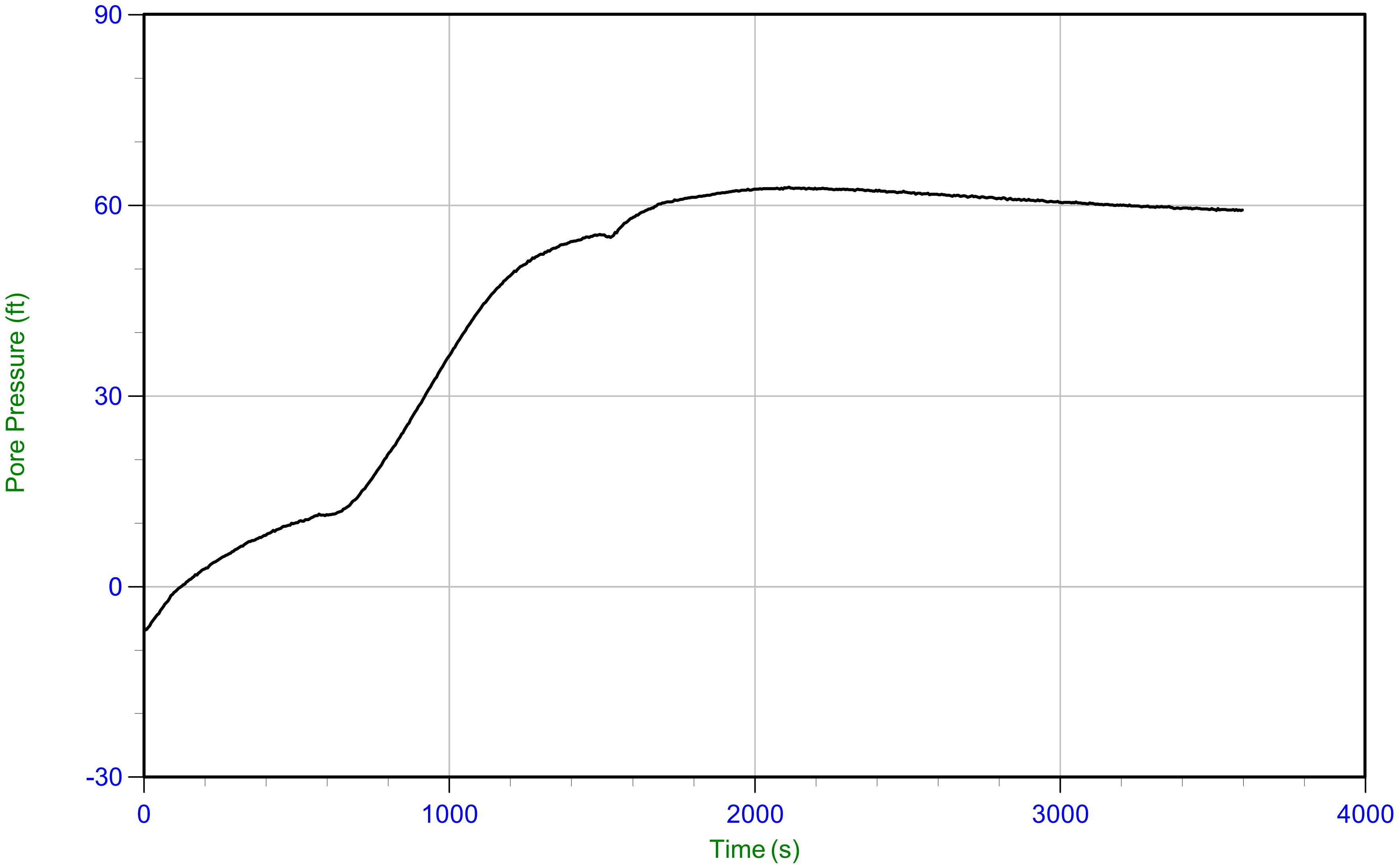
u Min: -19.0 ft
u Max: 30.4 ft
u Final: 30.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 15.250 m / 50.032 ft
Duration: 3600.0 s

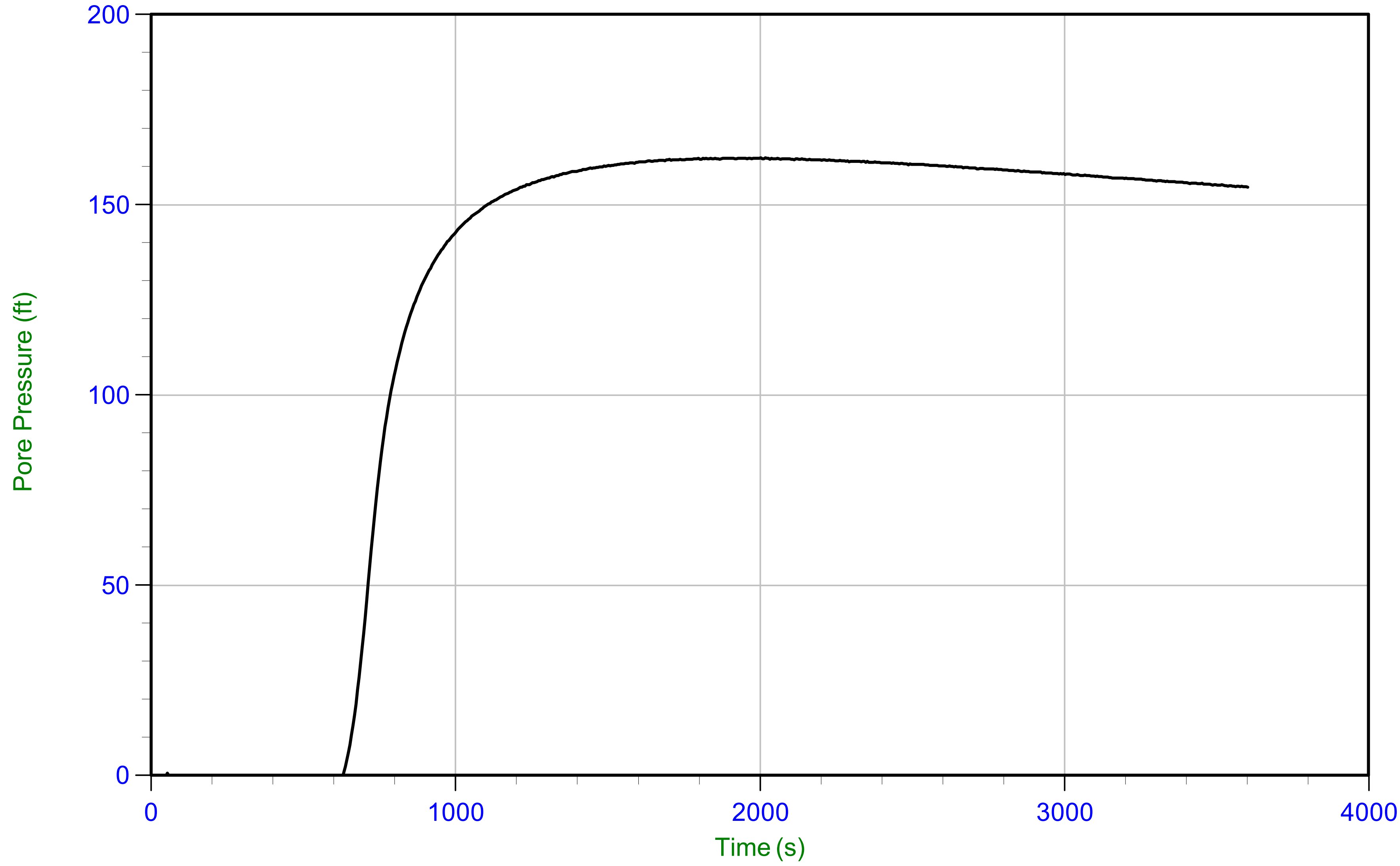
u Min: -6.9 ft
u Max: 62.8 ft
u Final: 59.2 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

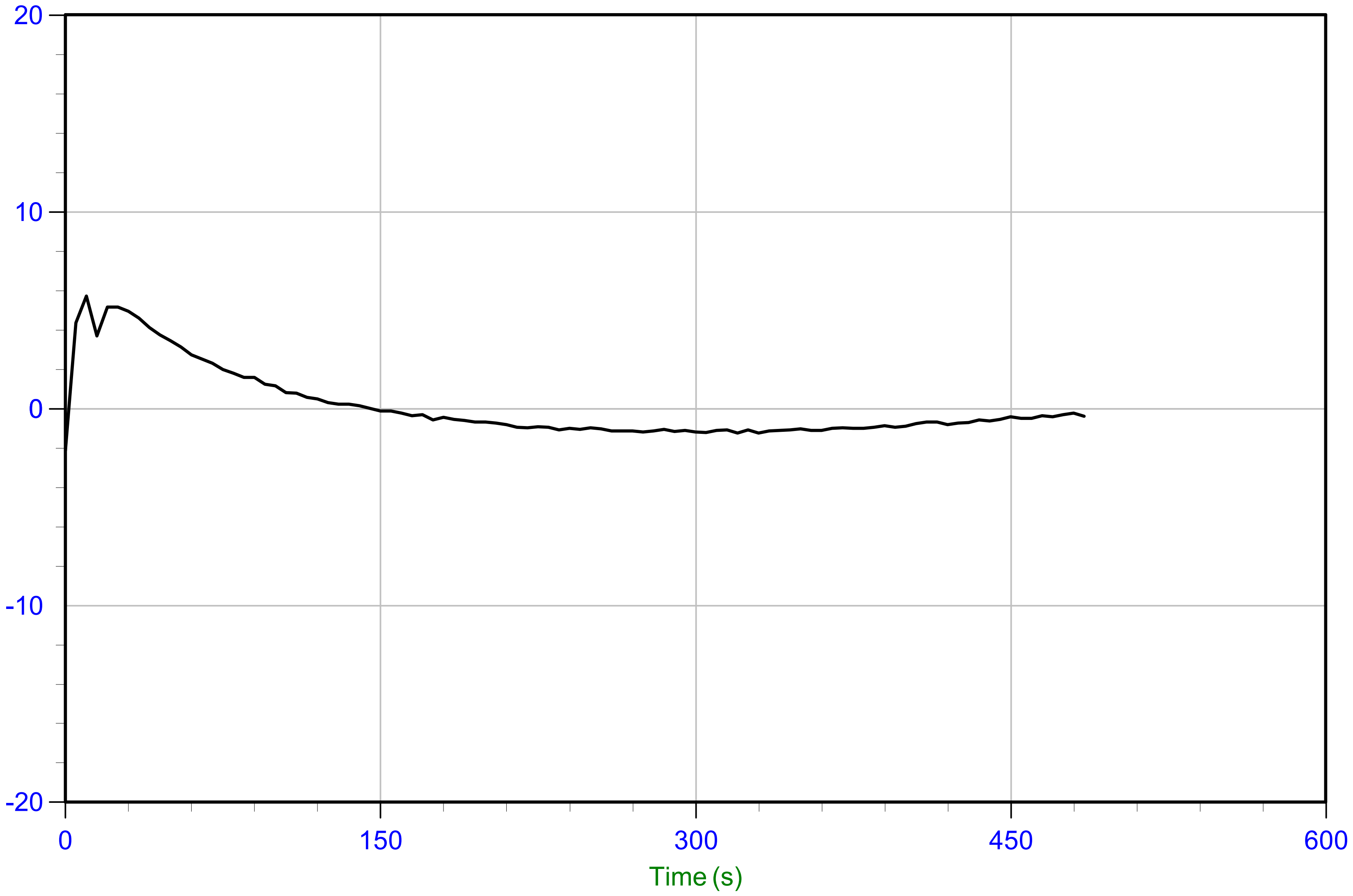
Filename: 20-61-21655_CP110B.PPF
Depth: 18.300 m / 60.039 ft
Duration: 3605.0 s

u Min: -10.2 ft
u Max: 162.3 ft
u Final: 154.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 08:49
Site: DTE Monroe Power Plant

Sounding: CPT20-110B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP110B.PPF
Depth: 18.550 m / 60.859 ft
Duration: 485.0 s

u Min: -2.1 ft
u Max: 5.7 ft
u Final: -0.4 ft

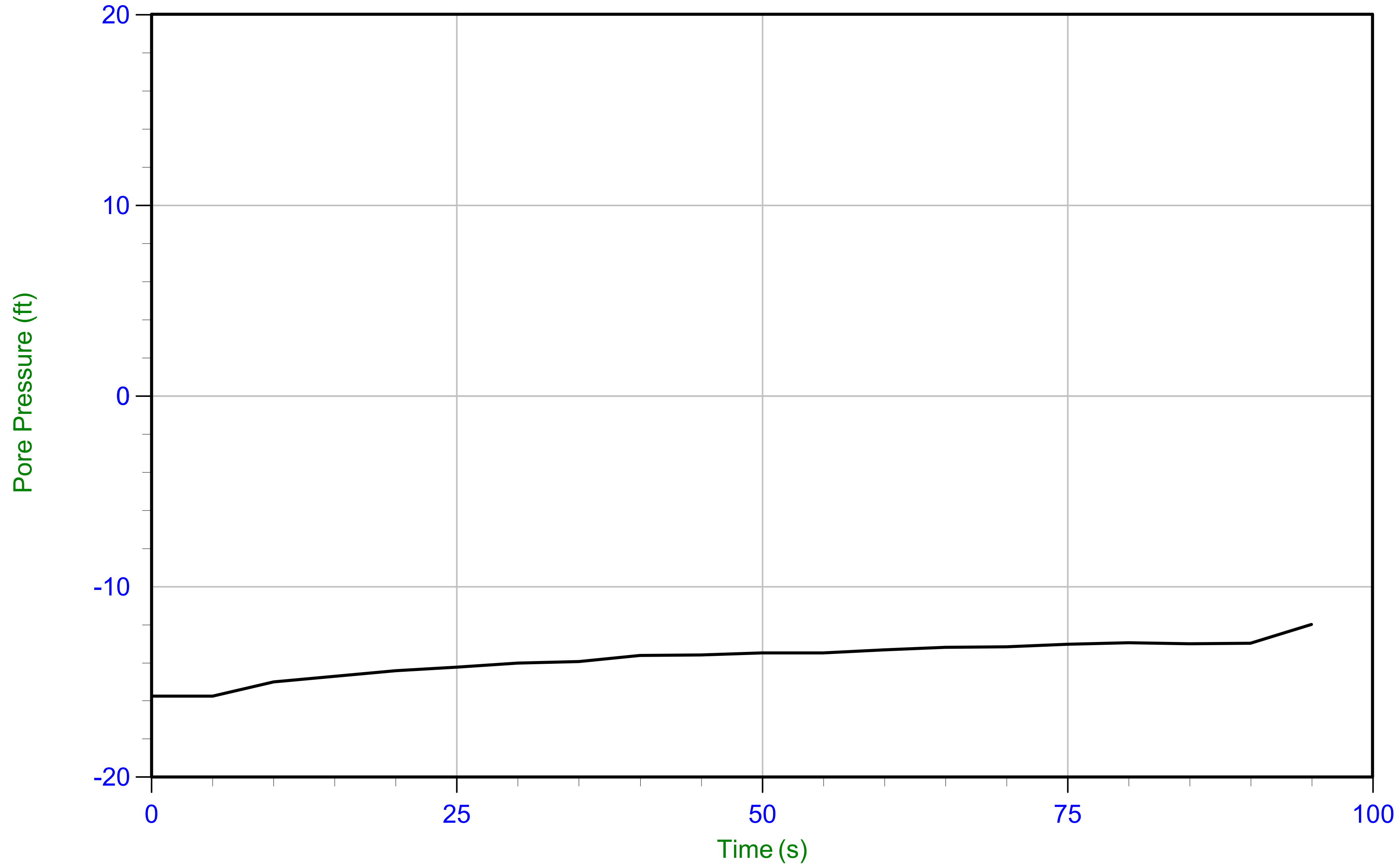
WT: 18.550 m / 60.859 ft
Ueq: 0.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 12:57
Site: DTE Monroe Power Plant

Sounding: CPT20-118
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

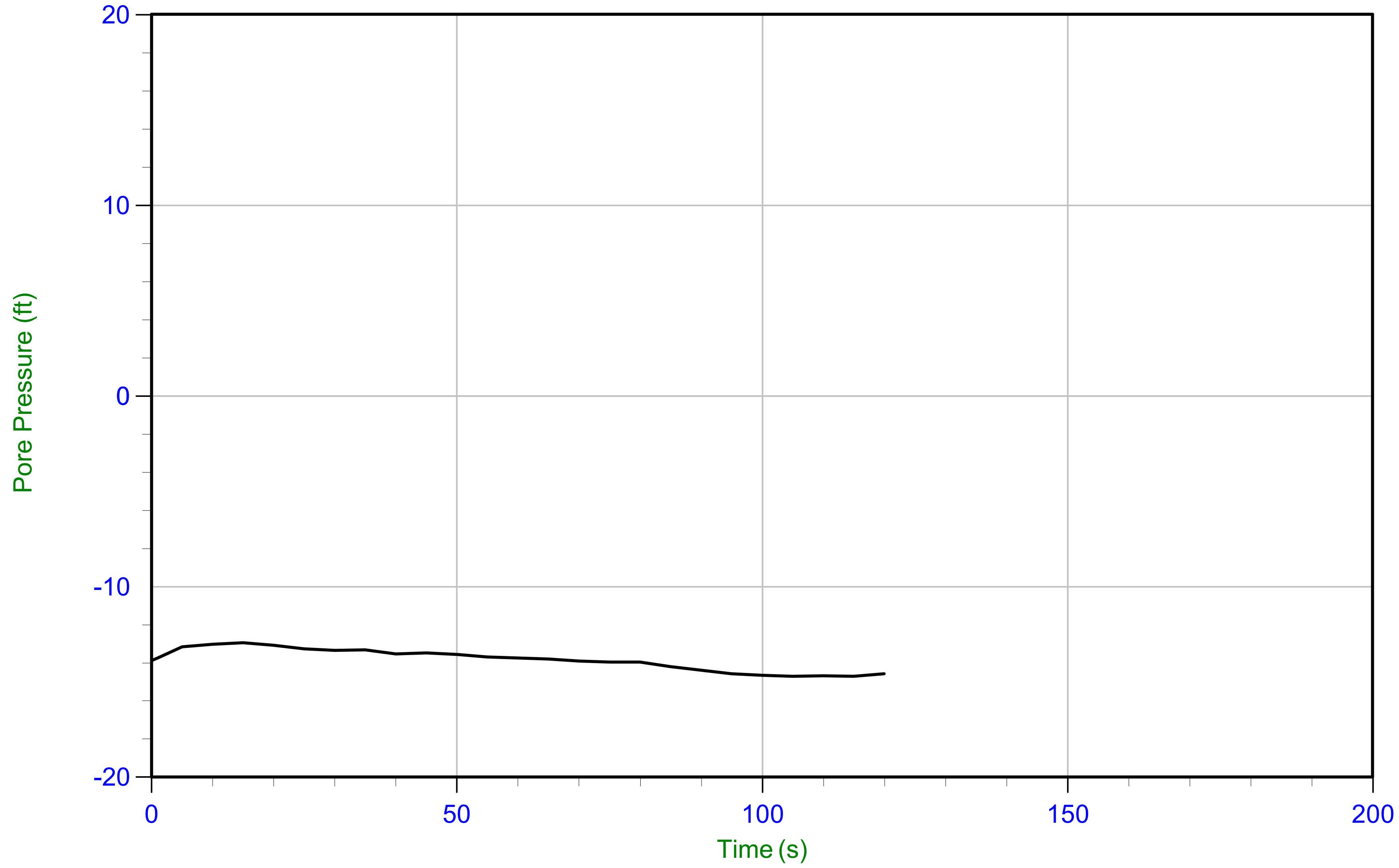
Filename: 20-61-21655_CP118.PPF
Depth: 3.800 m / 12.467 ft
Duration: 95.0 s

u Min: -15.7 ft
u Max: -12.0 ft
u Final: -12.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 08:58
Site: DTE Monroe Power Plant

Sounding: CPT20-124
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP124.PPF
Depth: 7.700 m / 25.262 ft
Duration: 120.0 s

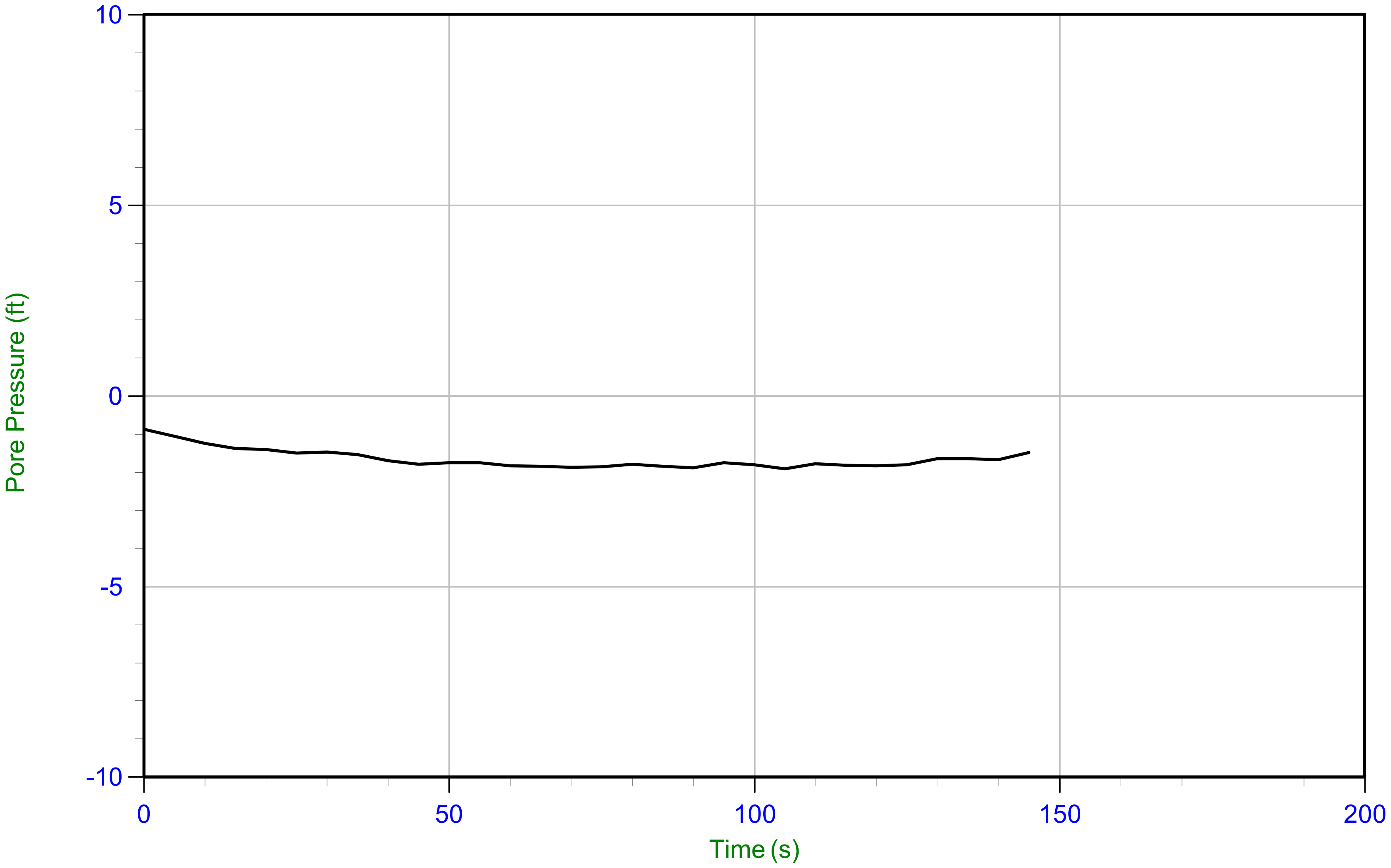
u Min: -14.7 ft
u Max: -13.0 ft
u Final: -14.6 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 11:17
Site: DTE Monroe Power Plant

Sounding: CPT20-128
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP128.PPF
Depth: 11.750 m / 38.549 ft
Duration: 145.0 s

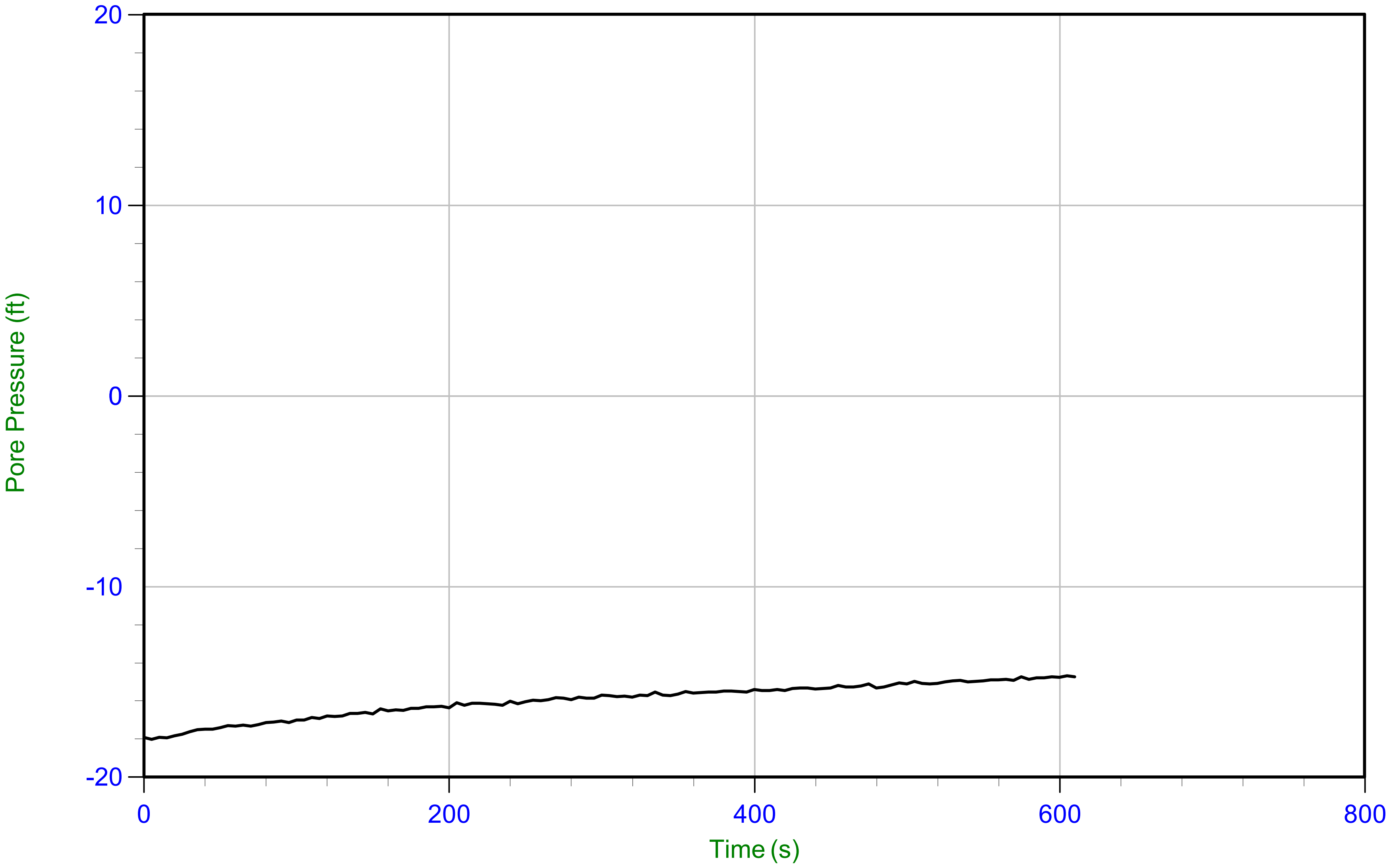
u Min: -1.9 ft
u Max: -0.9 ft
u Final: -1.5 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

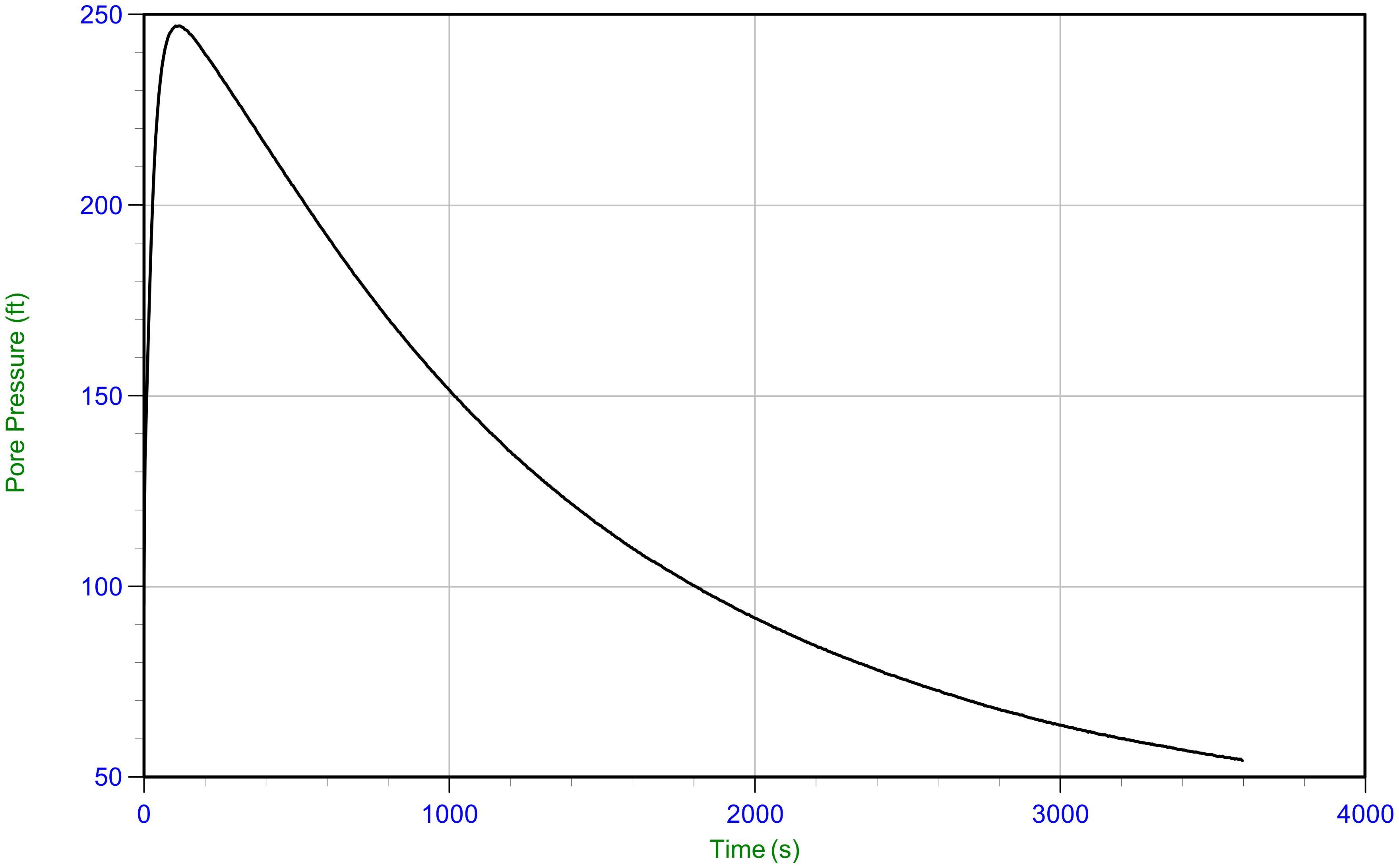
Filename: 20-61-21655_CP130.PPF
Depth: 4.600 m / 15.092 ft
Duration: 610.0 s

u Min: -18.0 ft
u Max: -14.7 ft
u Final: -14.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP130.PPF
Depth: 15.250 m / 50.032 ft
Duration: 3600.0 s

u Min: 54.4 ft
u Max: 247.0 ft
u Final: 54.4 ft

WT: 7.620 m / 25.000 ft
Ueq: 25.0 ft
U(50): 136.01 ft

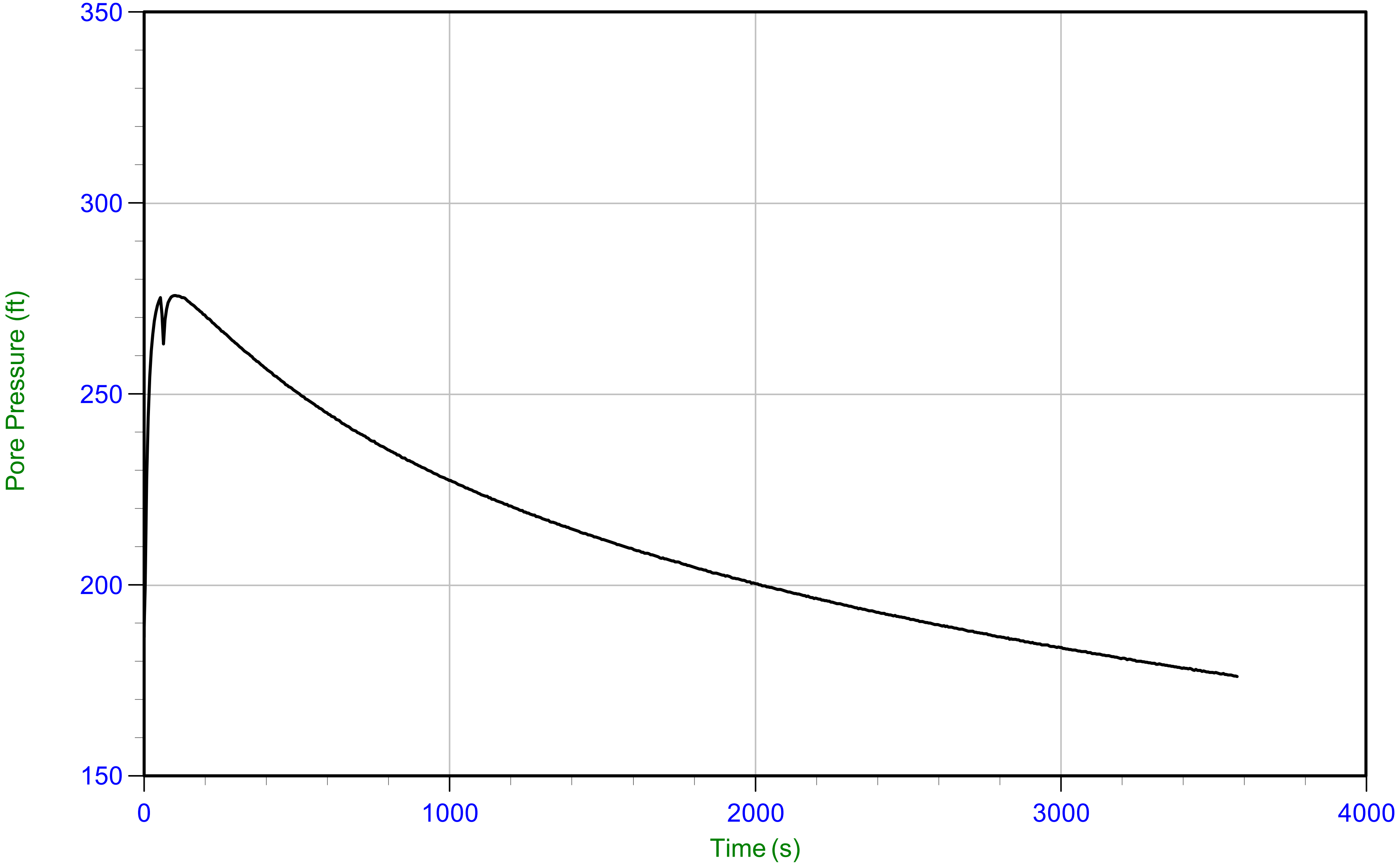
T(50): 1077.0 s
Ir: 100
Ch: 0.7 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 12:06
Site: DTE Monroe Power Plant

Sounding: CPT20-130
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP130.PPF
Depth: 18.300 m / 60.039 ft
Duration: 3580.0 s

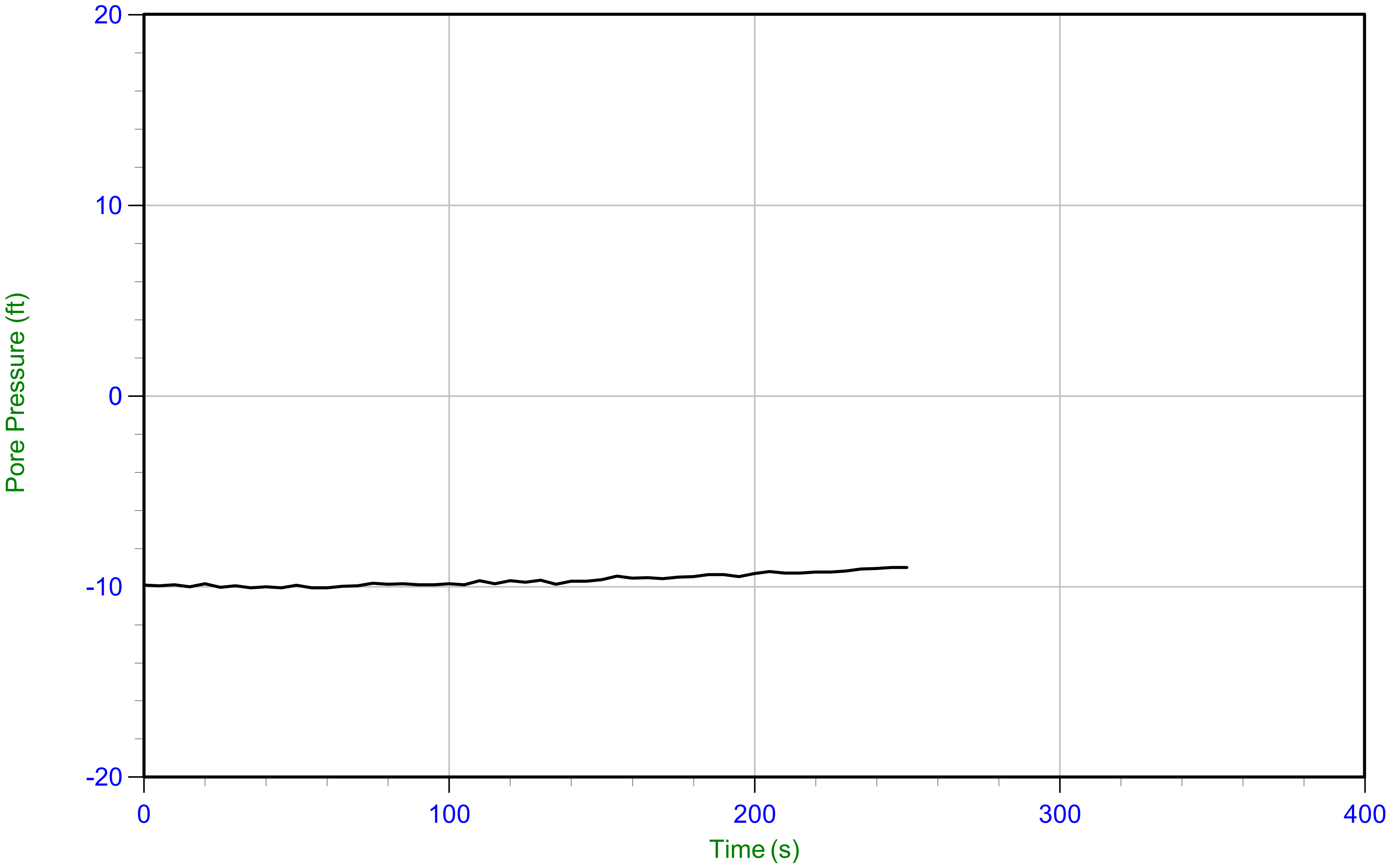
u Min: 176.1 ft
u Max: 275.8 ft
u Final: 176.1 ft

ConeTec

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP132.PPF
Depth: 10.800 m / 35.433 ft
Duration: 250.0 s

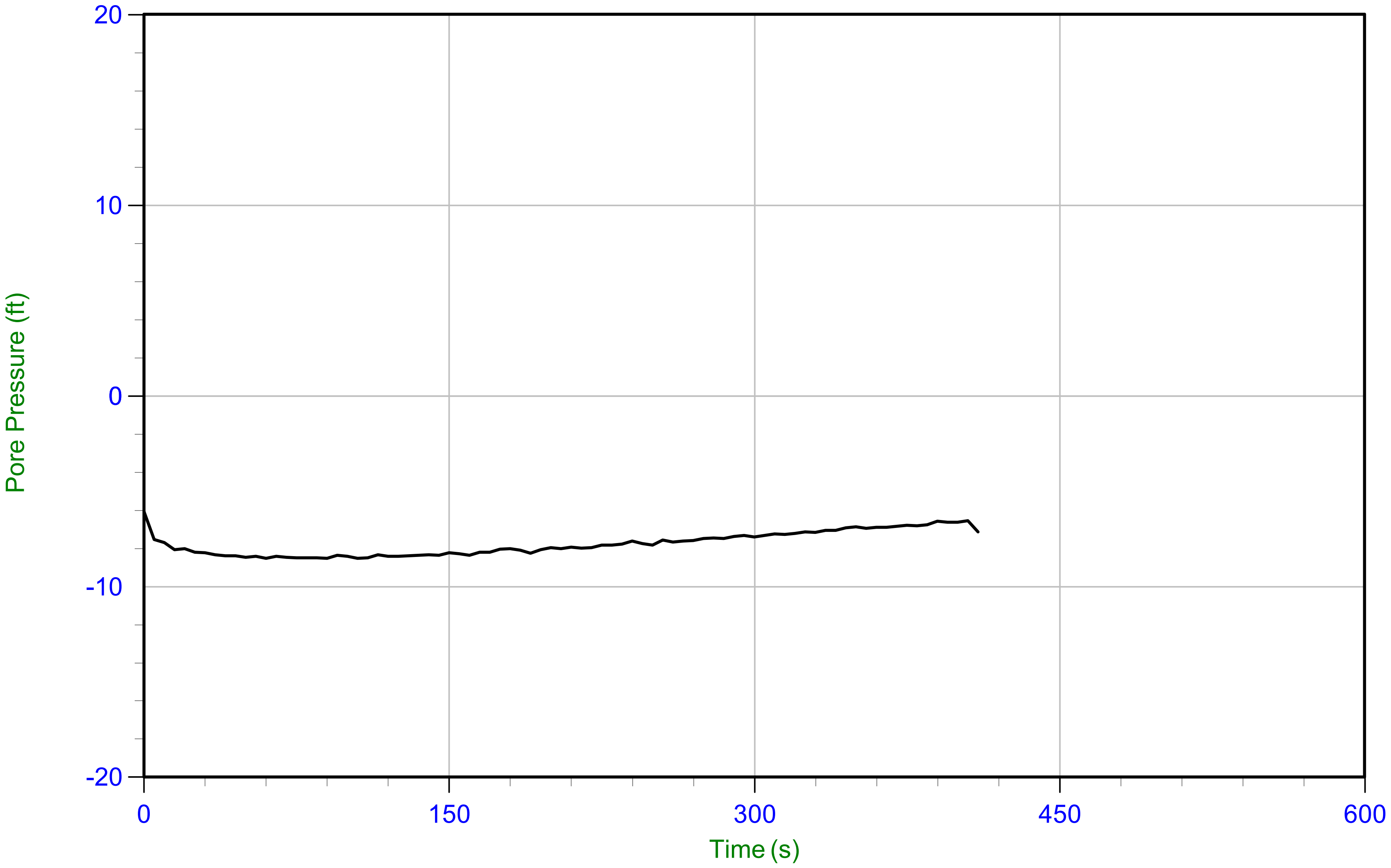
u Min: -10.1 ft
u Max: -9.0 ft
u Final: -9.0 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 15:16
Site: DTE Monroe Power Plant

Sounding: CPT20-132
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

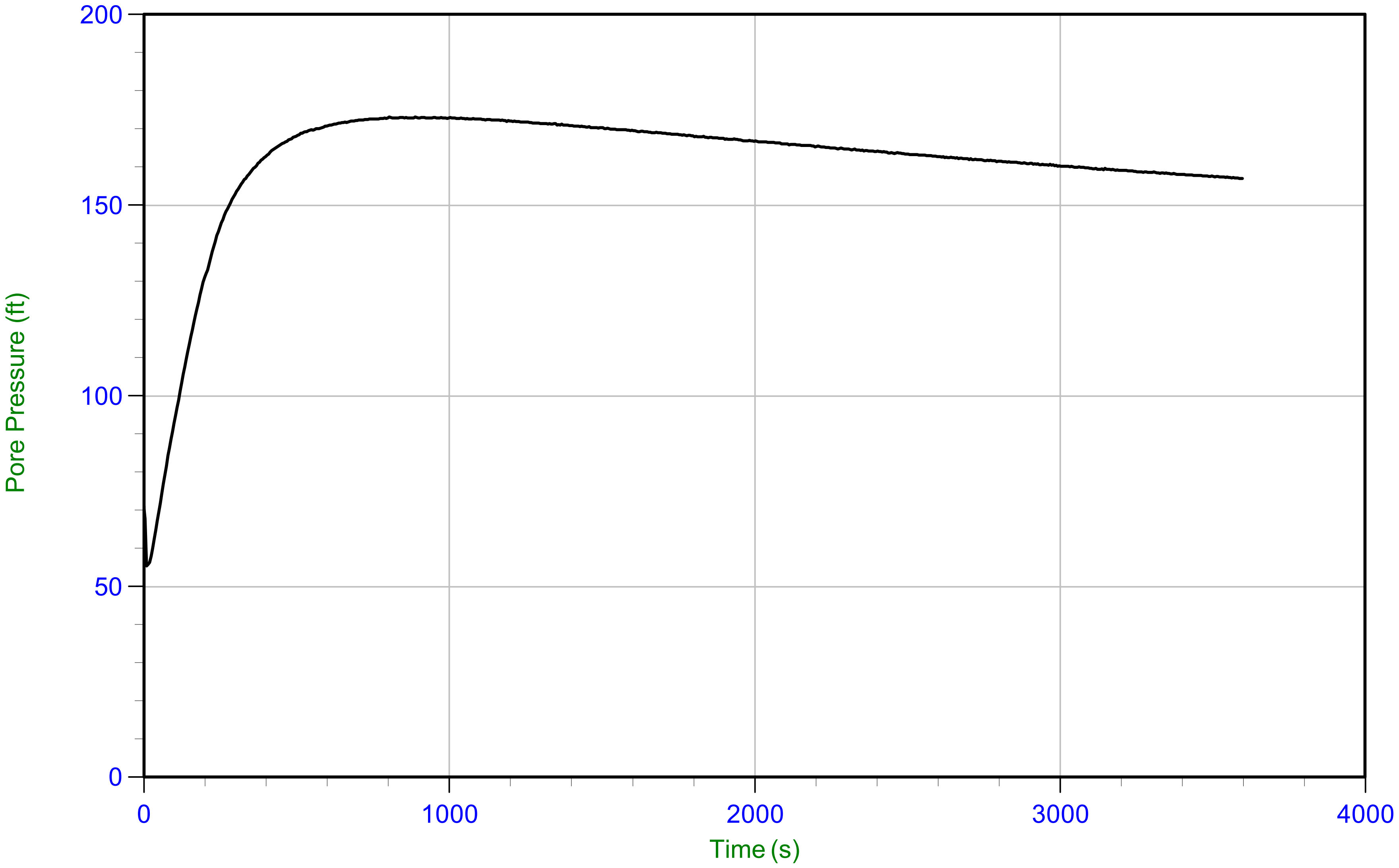
Filename: 20-61-21655_CP132.PPF
Depth: 13.800 m / 45.275 ft
Duration: 410.0 s

u Min: -8.5 ft
u Max: -6.1 ft
u Final: -7.1 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 14:09
Site: DTE Monroe Power Plant

Sounding: CPT20-134
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

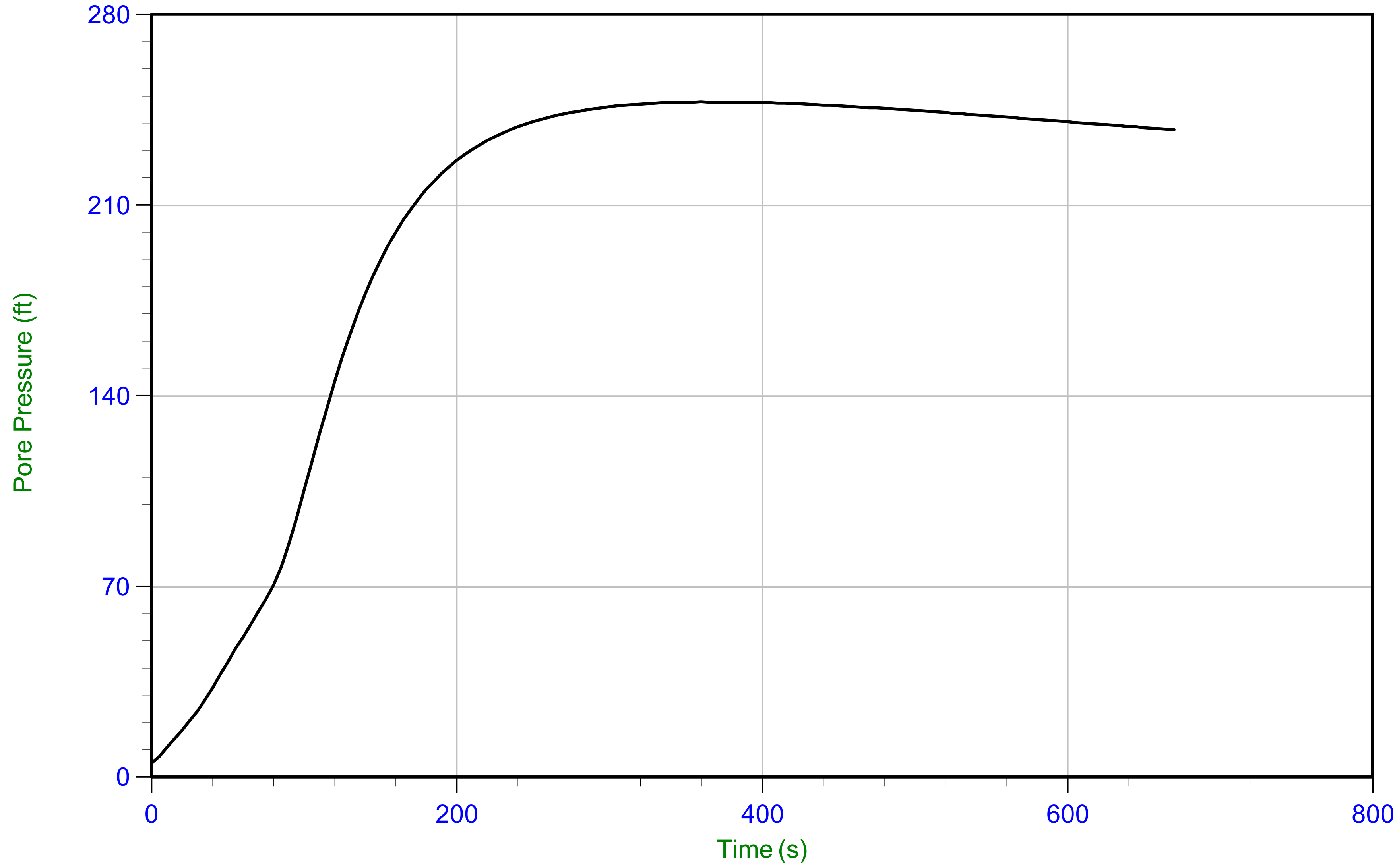
Filename: 20-61-21655_CP134.PPF
Depth: 20.400 m / 66.928 ft
Duration: 3600.0 s

u Min: 55.5 ft
u Max: 173.2 ft
u Final: 157.0 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 13:01
Site: DTE Monroe Power Plant

Sounding: CPT20-136
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP136.PPF
Depth: 19.900 m / 65.288 ft
Duration: 670.0 s

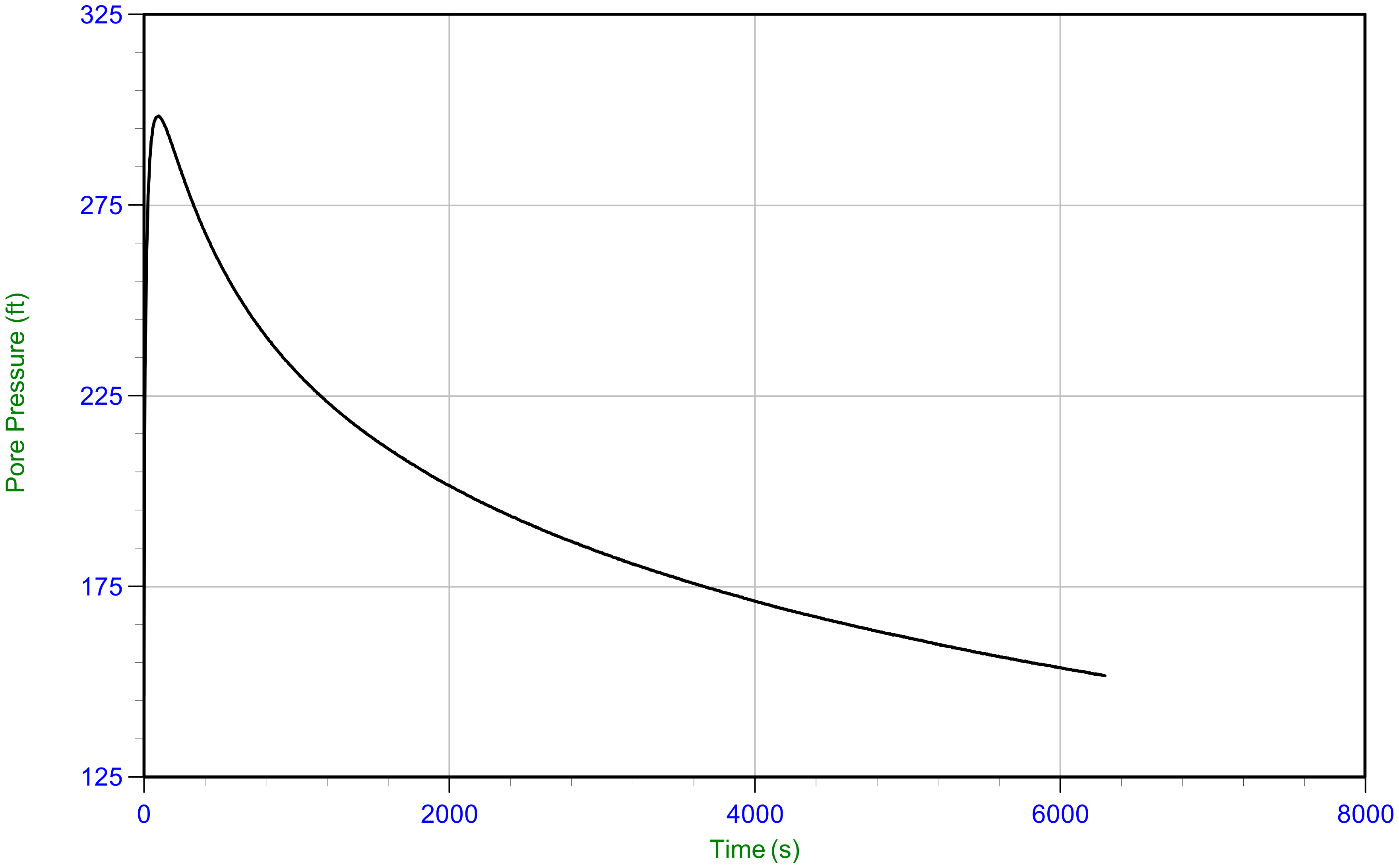
u Min: 5.3 ft
u Max: 247.9 ft
u Final: 237.6 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 13:01
Site: DTE Monroe Power Plant

Sounding: CPT20-136
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP136.PPF
Depth: 20.075 m / 65.862 ft
Duration: 6300.0 s

u Min: 146.3 ft
u Max: 298.3 ft
u Final: 151.6 ft

WT: 7.620 m / 25.000 ft
Ueq: 40.9 ft
U(50): 169.60 ft

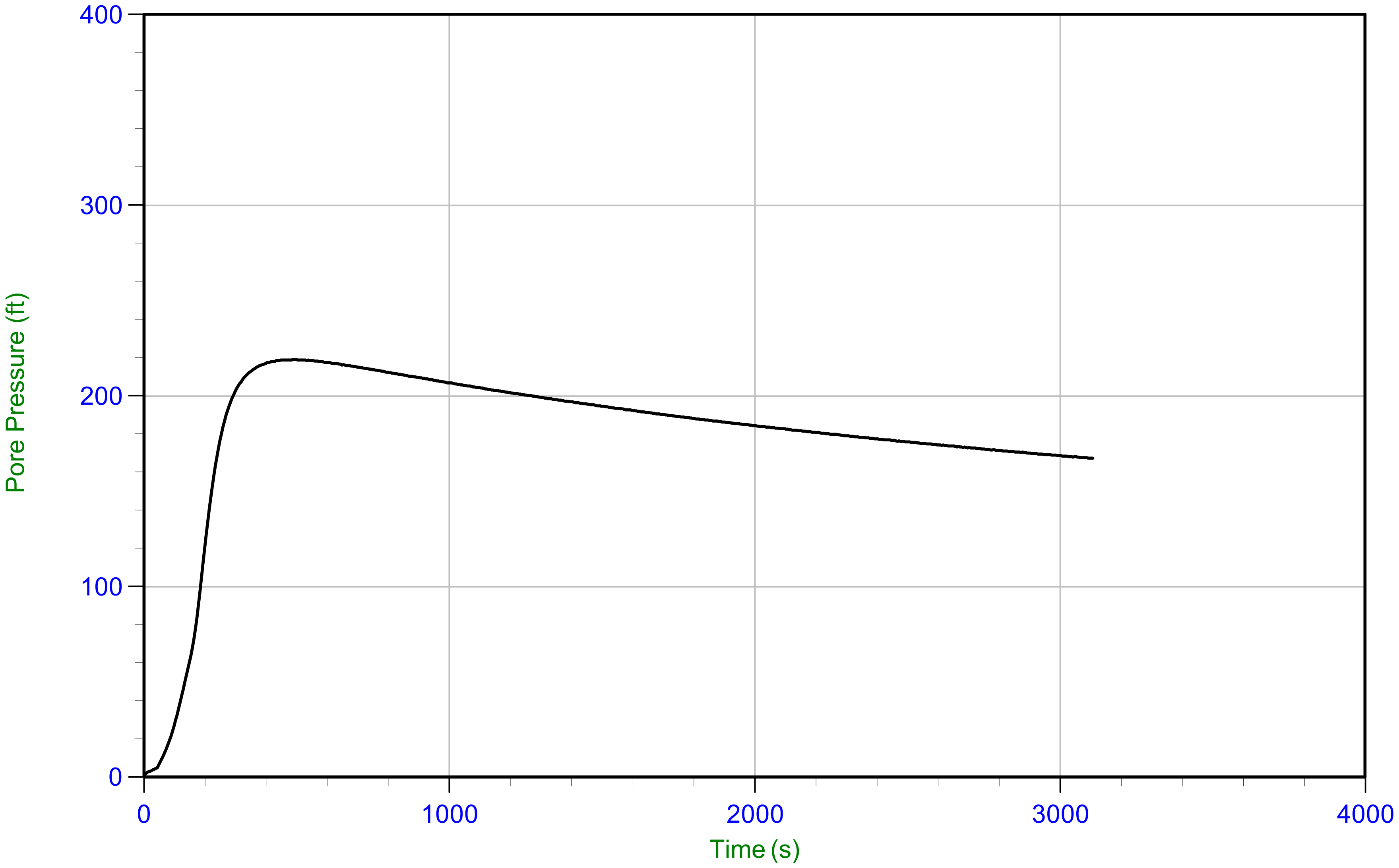
T(50): 4047.9 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/13/2020 14:56
Site: DTE Monroe Power Plant

Sounding: CPT20-140
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

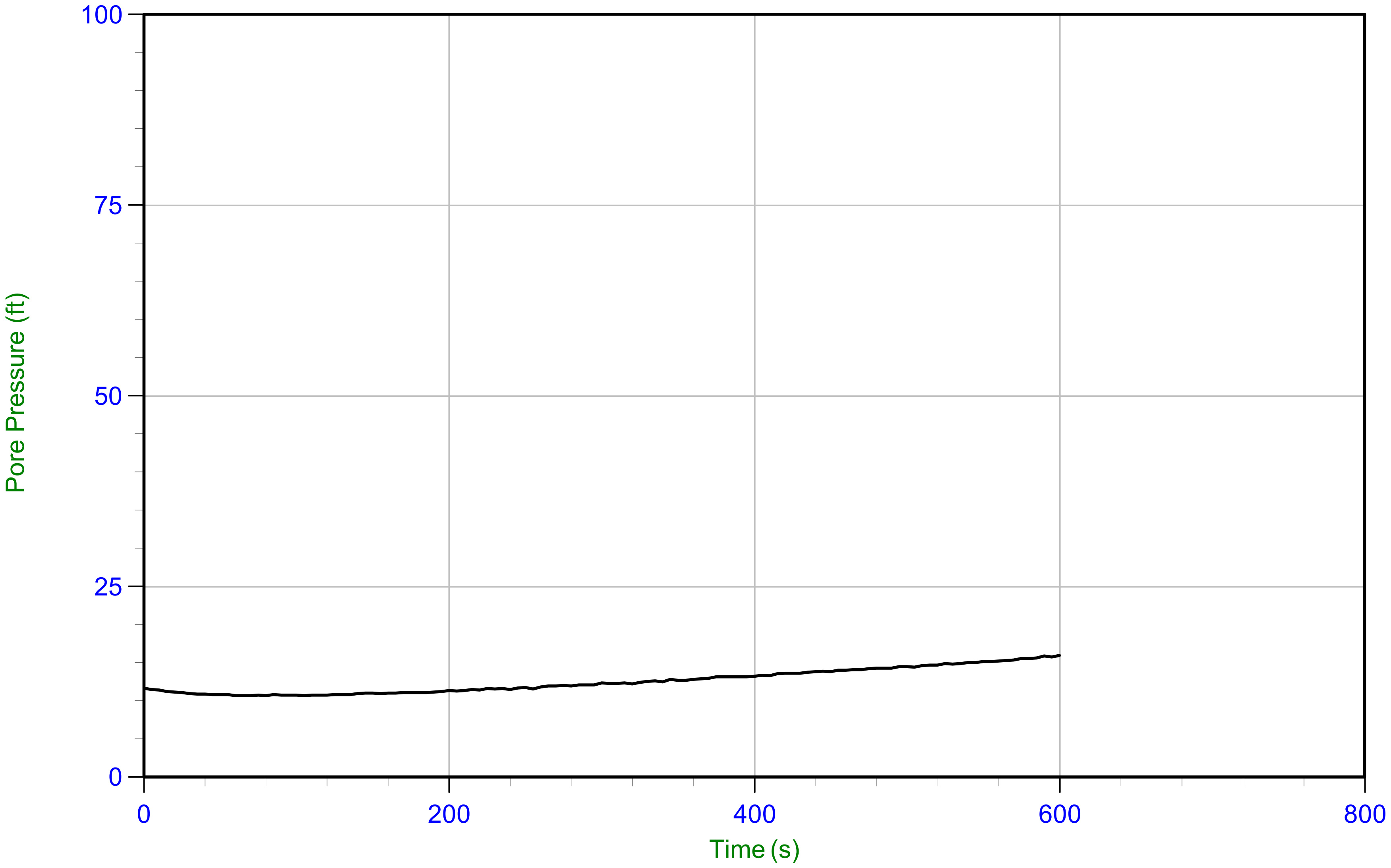
Filename: 20-61-21655_CP140.PPF
Depth: 17.425 m / 57.168 ft
Duration: 3110.0 s

u Min: 1.2 ft
u Max: 219.1 ft
u Final: 167.3 ft

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

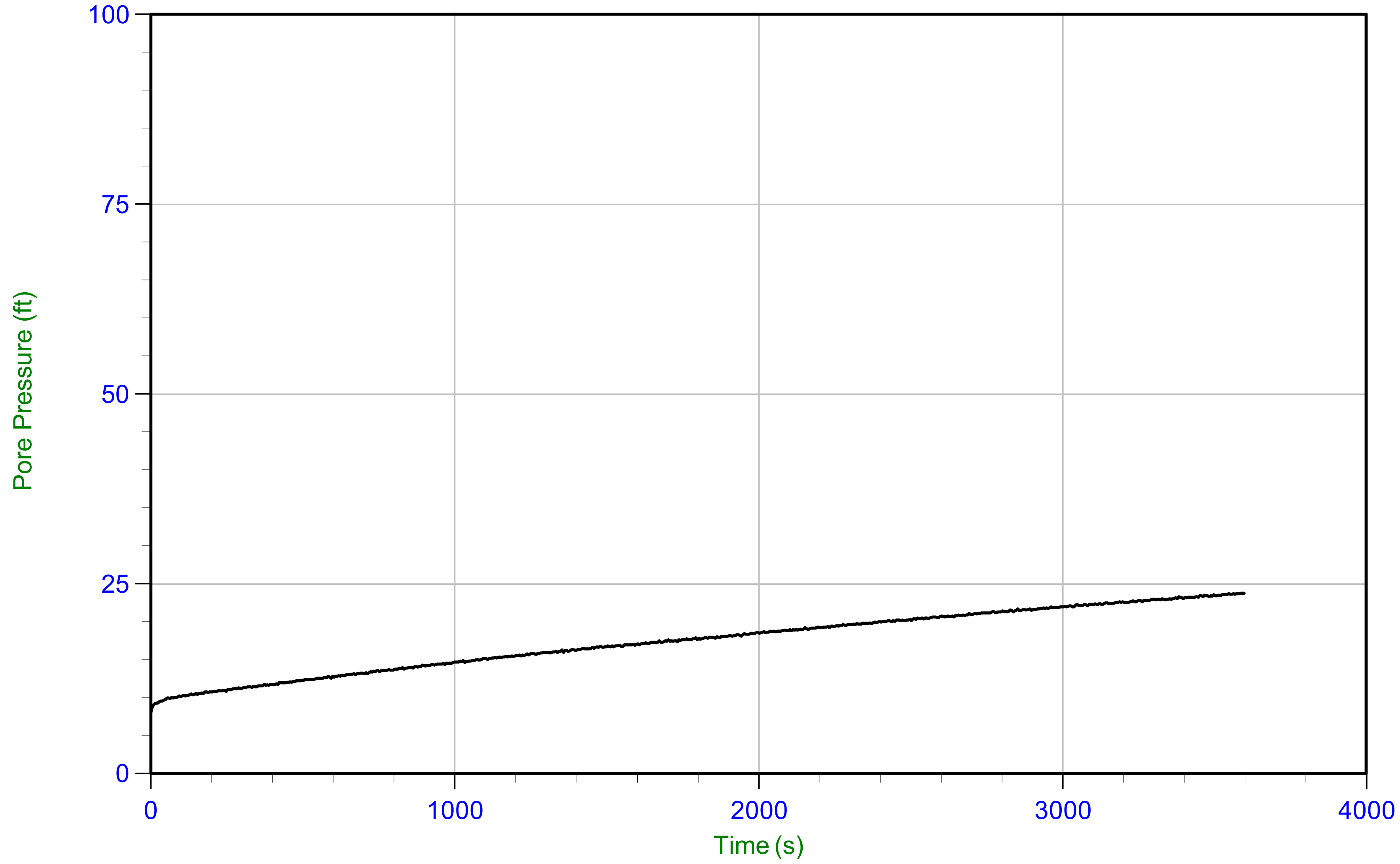
Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP150.PPF
Depth: 12.200 m / 40.026 ft
Duration: 600.0 s

u Min: 10.7 ft
u Max: 16.0 ft
u Final: 16.0 ft



Trace Summary:

Filename: 20-61-21655_CP150.PPF
Depth: 13.800 m / 45.275 ft
Duration: 3600.0 s

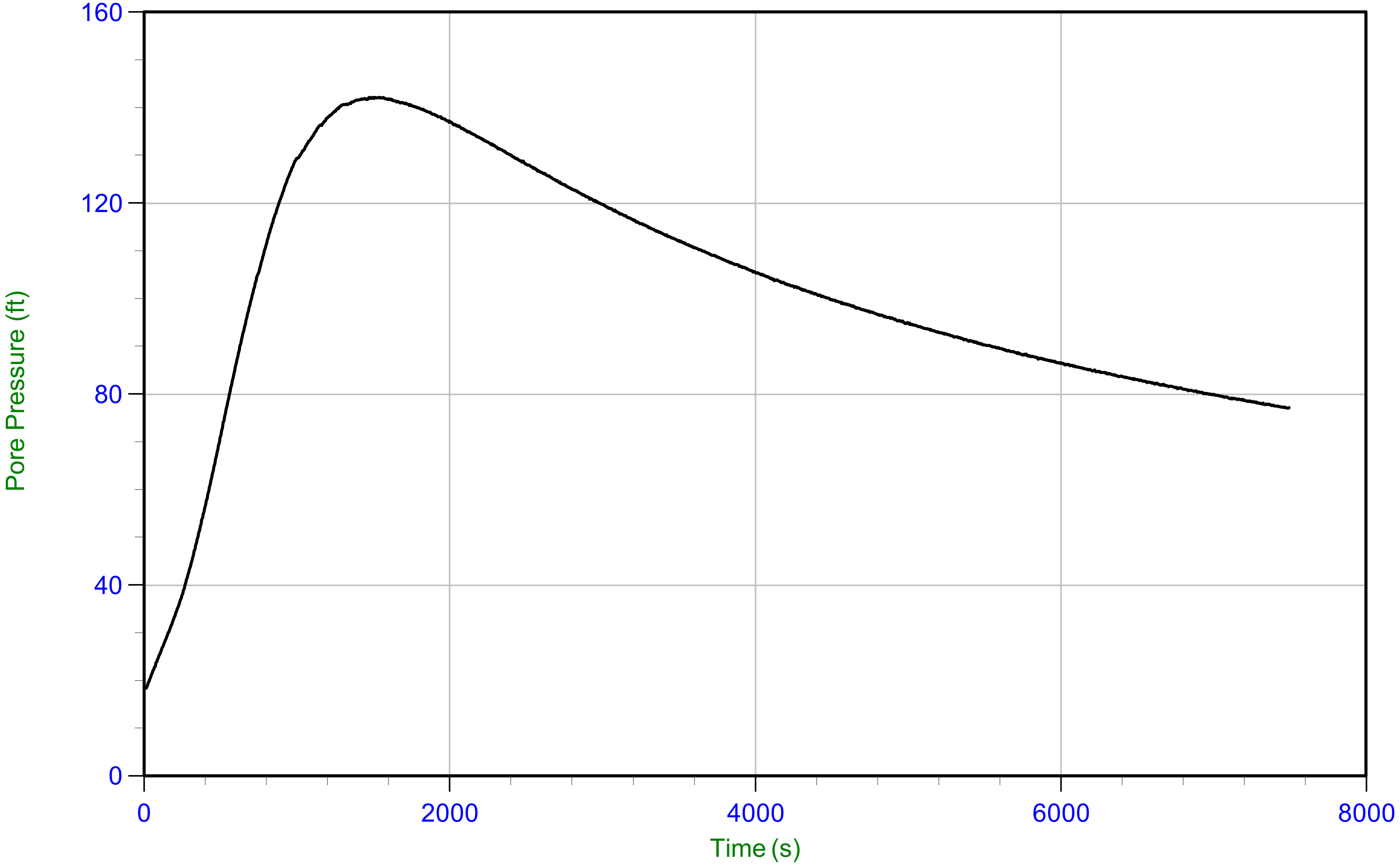
u Min: 8.0 ft
u Max: 23.8 ft
u Final: 23.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP150.PPF
Depth: 16.800 m / 55.117 ft
Duration: 7500.0 s

u Min: 18.3 ft
u Max: 142.1 ft
u Final: 77.2 ft

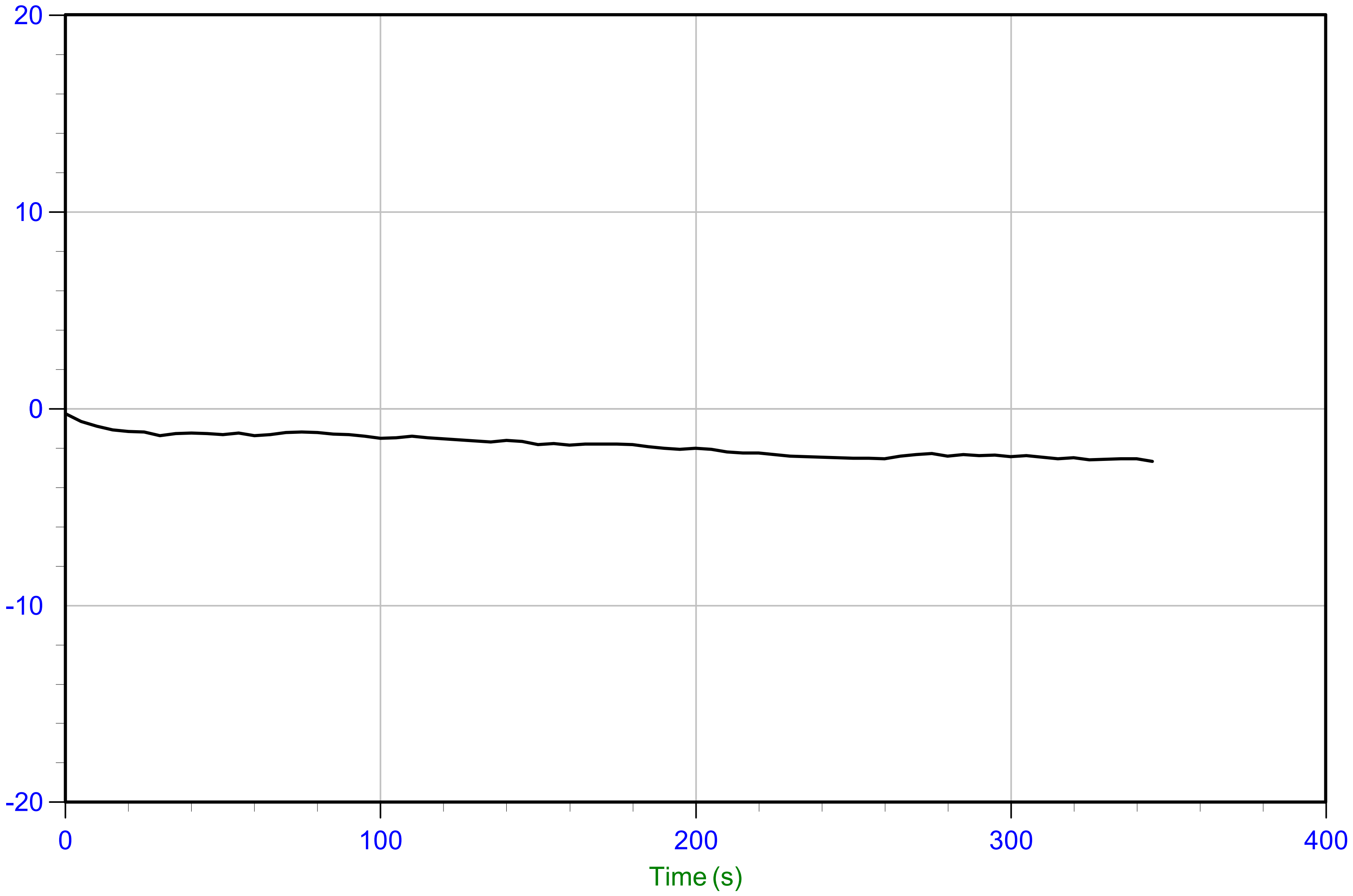
WT: 7.620 m / 25.000 ft
Ueq: 30.1 ft
U(50): 86.13 ft

T(50): 4529.6 s
Ir: 100
Ch: 0.2 cm²/min

Geosyntec

Job No: 20-61-21655
Date: 12/14/2020 08:55
Site: DTE Monroe Power Plant

Sounding: CPT20-150
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

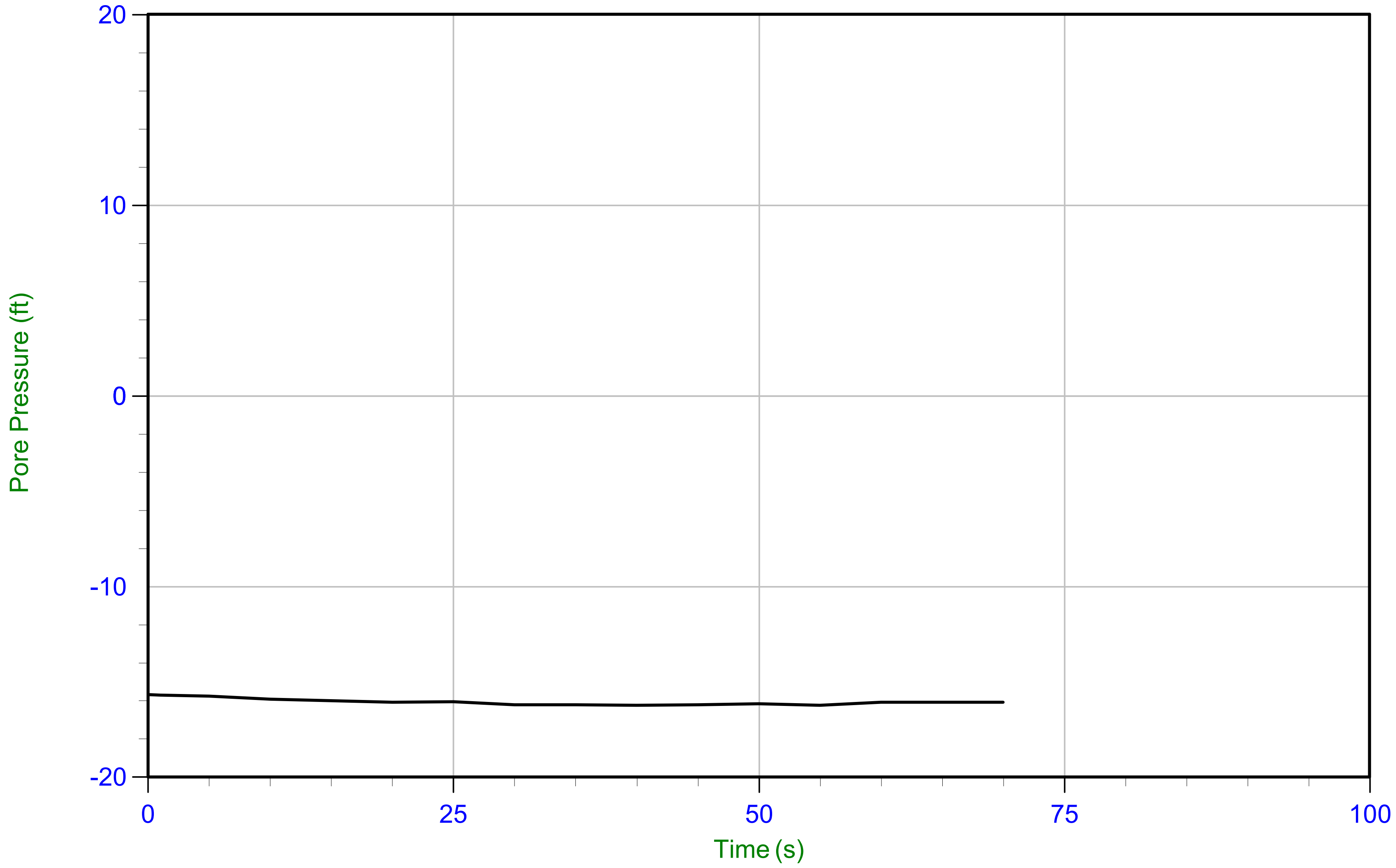
Filename: 20-61-21655_CP150.PPF
Depth: 20.100 m / 65.944 ft
Duration: 345.0 s

u Min: -2.7 ft
u Max: -0.3 ft
u Final: -2.7 ft

Geosyntec

Job No: 20-61-21655
Date: 12/08/2020 14:54
Site: DTE Monroe Power Plant

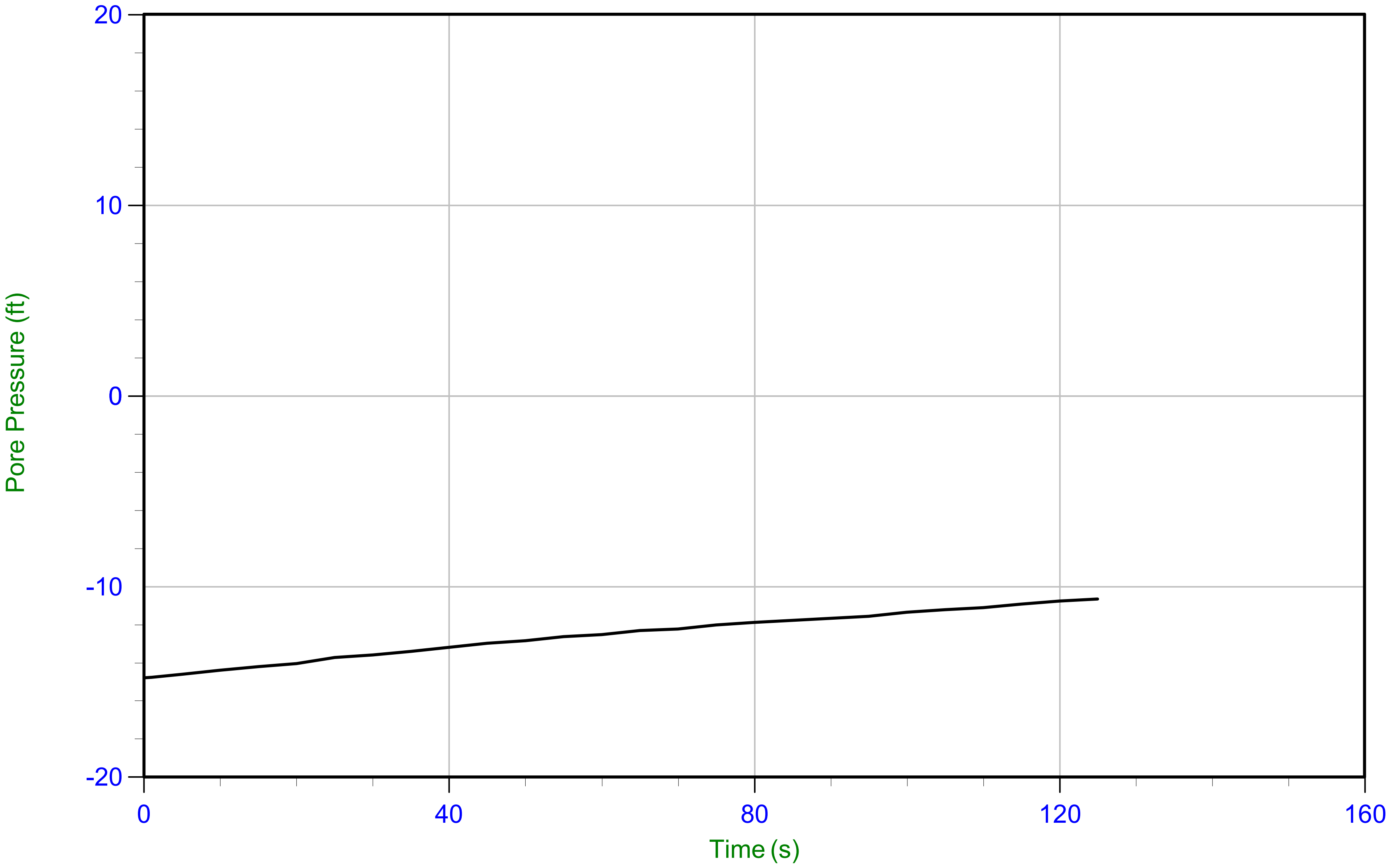
Sounding: CPT20-152
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP152.PPF
Depth: 8.850 m / 29.035 ft
Duration: 70.0 s

u Min: -16.2 ft
u Max: -15.7 ft
u Final: -16.1 ft



Trace Summary:

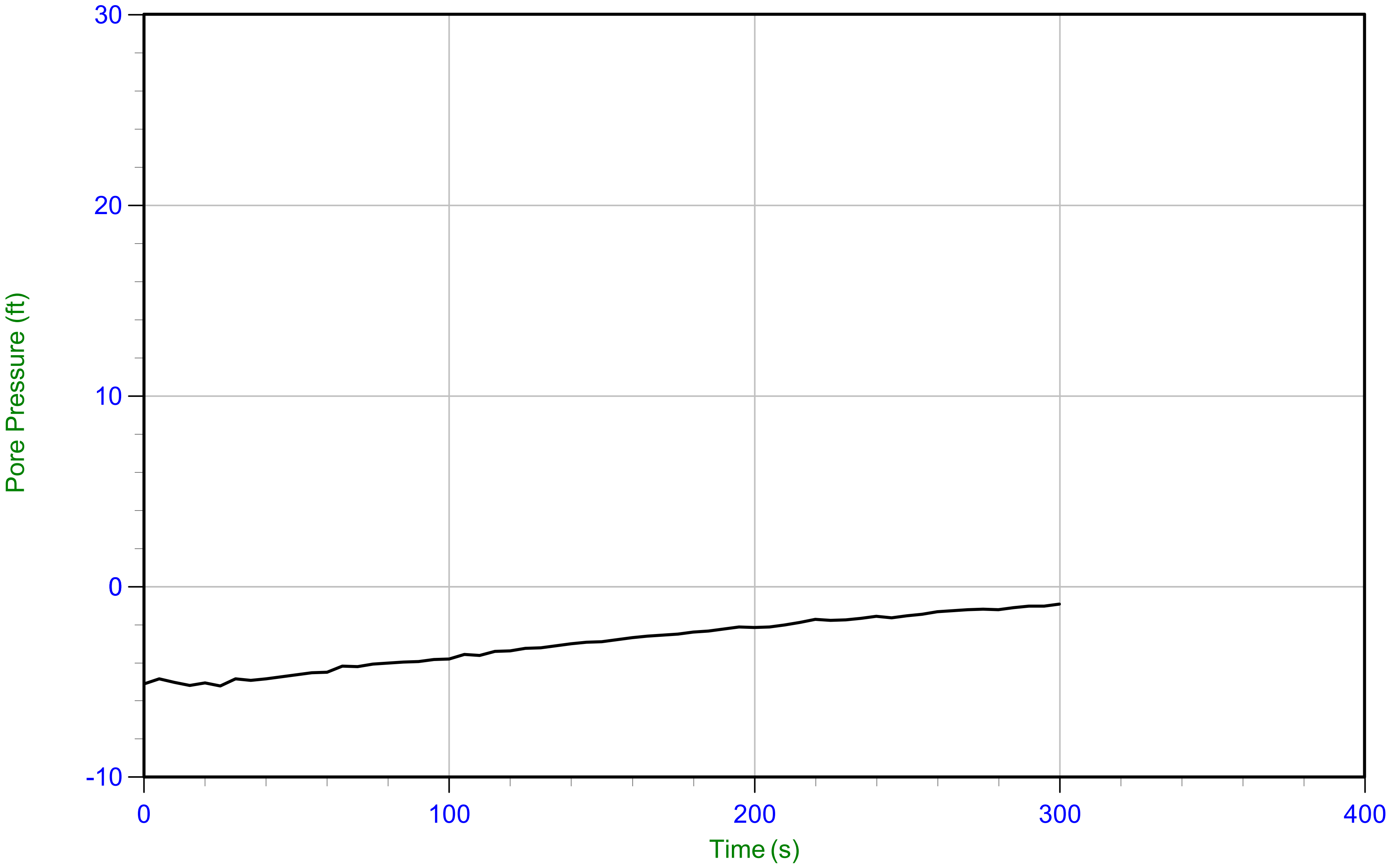
Filename: 20-61-21655_CP154.PPF
Depth: 6.850 m / 22.473 ft
Duration: 125.0 s

u Min: -14.8 ft
u Max: -10.6 ft
u Final: -10.6 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 3.100 m / 10.170 ft
Duration: 300.0 s

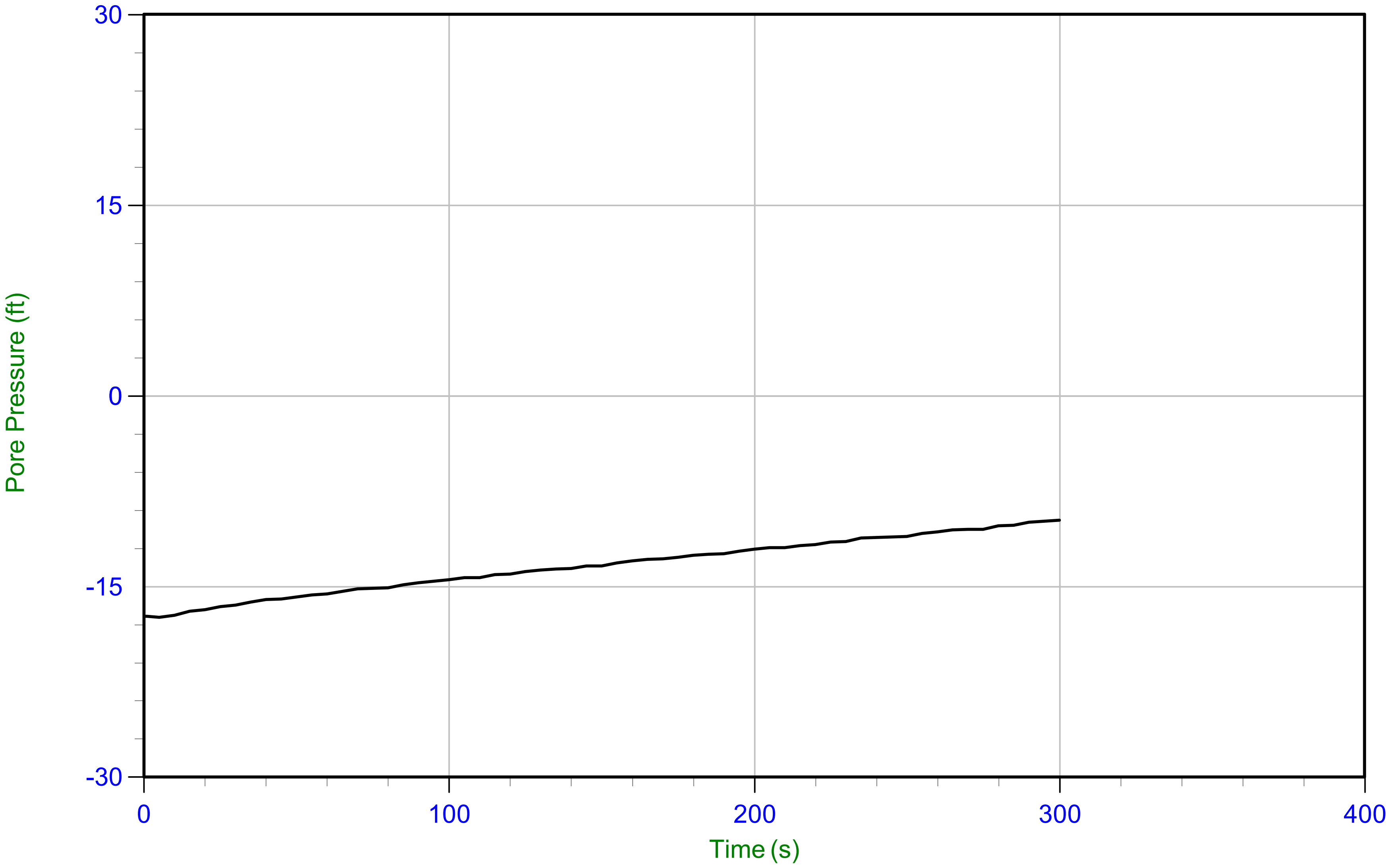
u Min: -5.2 ft
u Max: -0.9 ft
u Final: -0.9 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

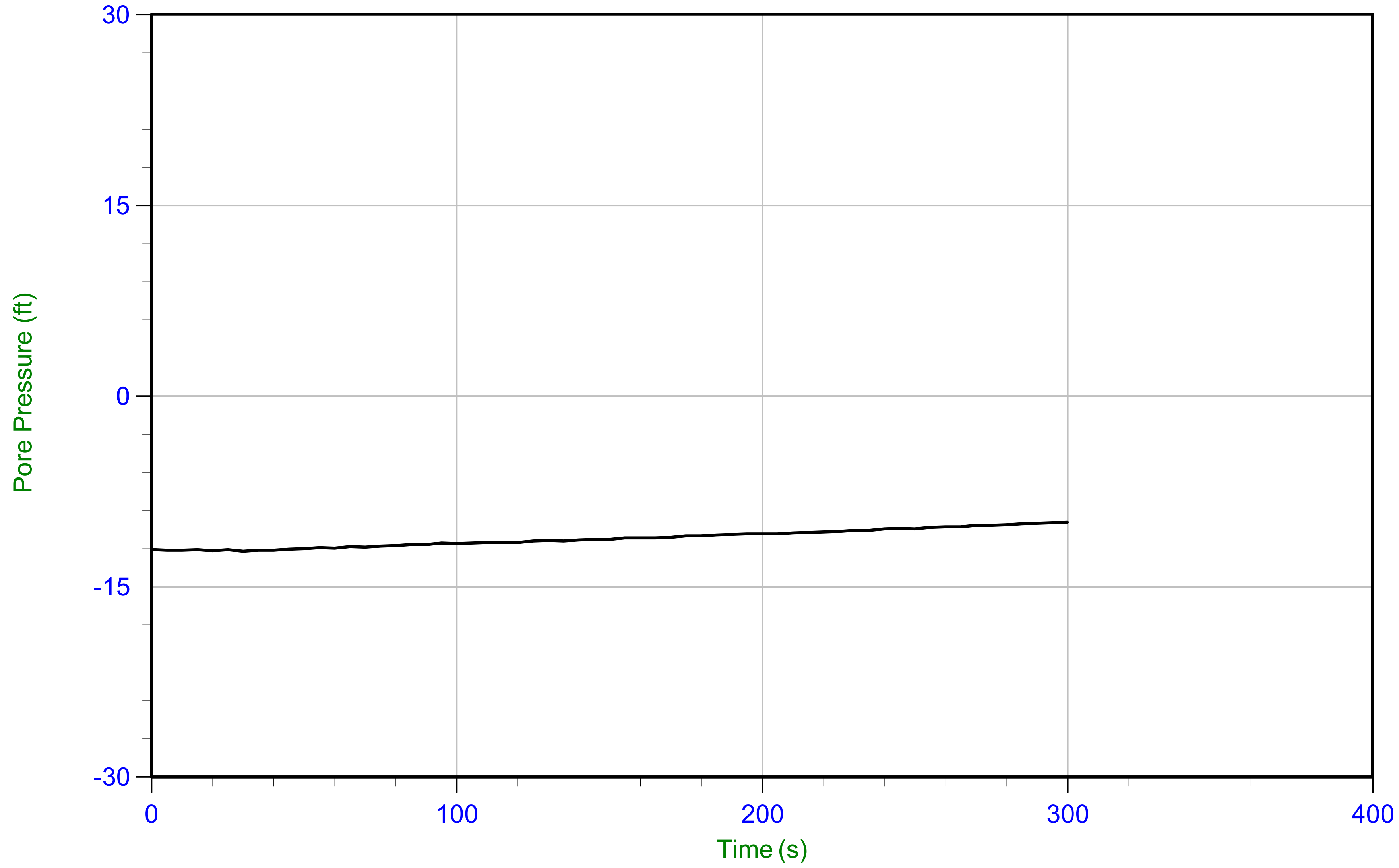
Filename: 20-61-21655_CP170.PPF
Depth: 6.175 m / 20.259 ft
Duration: 300.0 s

u Min: -17.4 ft
u Max: -9.8 ft
u Final: -9.8 ft

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 13:59
Site: DTE Monroe Power Plant

Sounding: CPT20-170
Cone: 551:T1500F15U500 Area=15 cm²



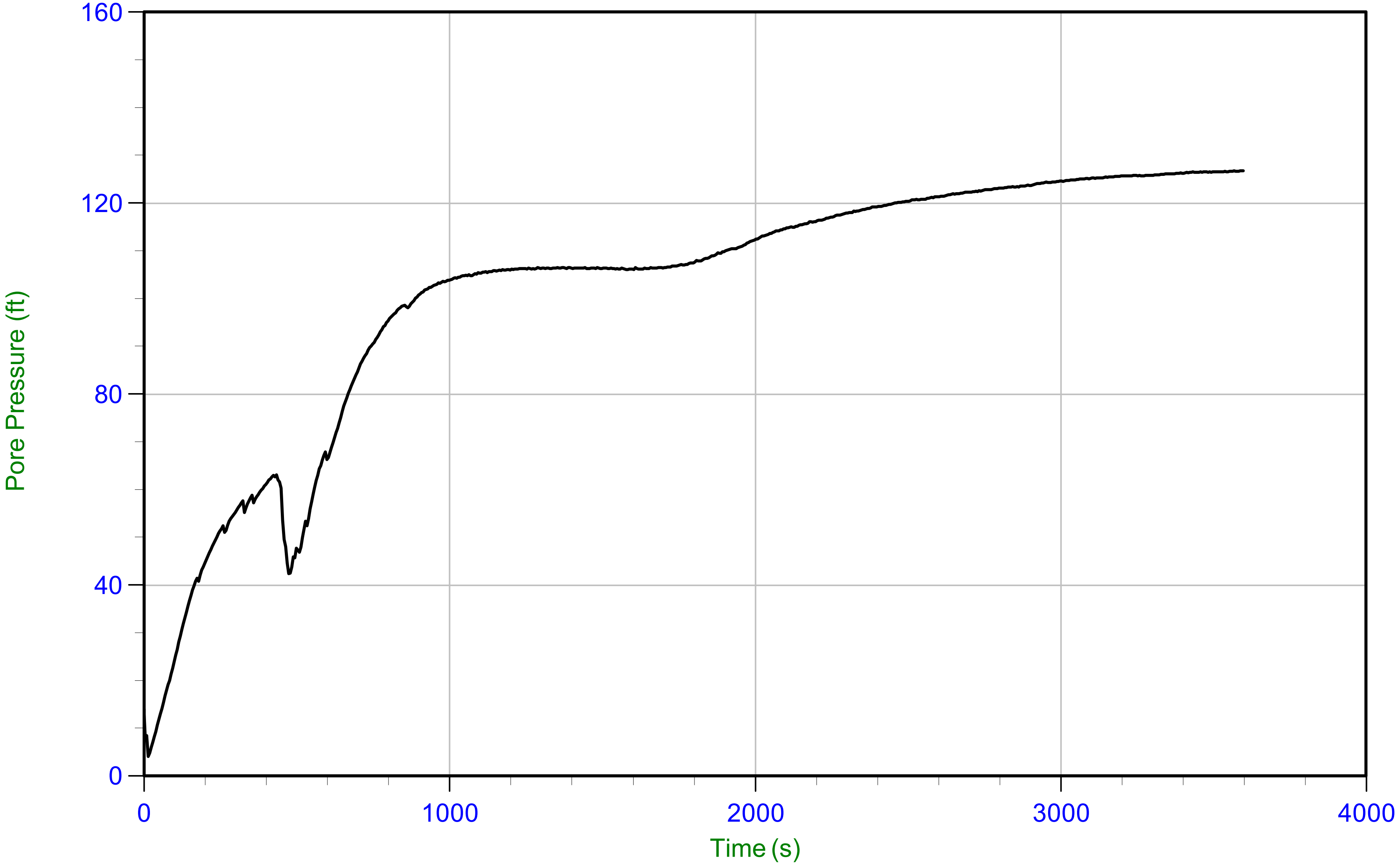
Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 12.250 m / 40.190 ft
Duration: 300.0 s

u Min: -12.2 ft
u Max: -9.9 ft
u Final: -9.9 ft

CONETEC

Geosyntec	Job No: 20-61-21655 Date: 12/07/2020 13:59 Site: DTE Monroe Power Plant	Sounding: CPT20-170 Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP170.PPF
Depth: 20.775 m / 68.159 ft
Duration: 3600.0 s

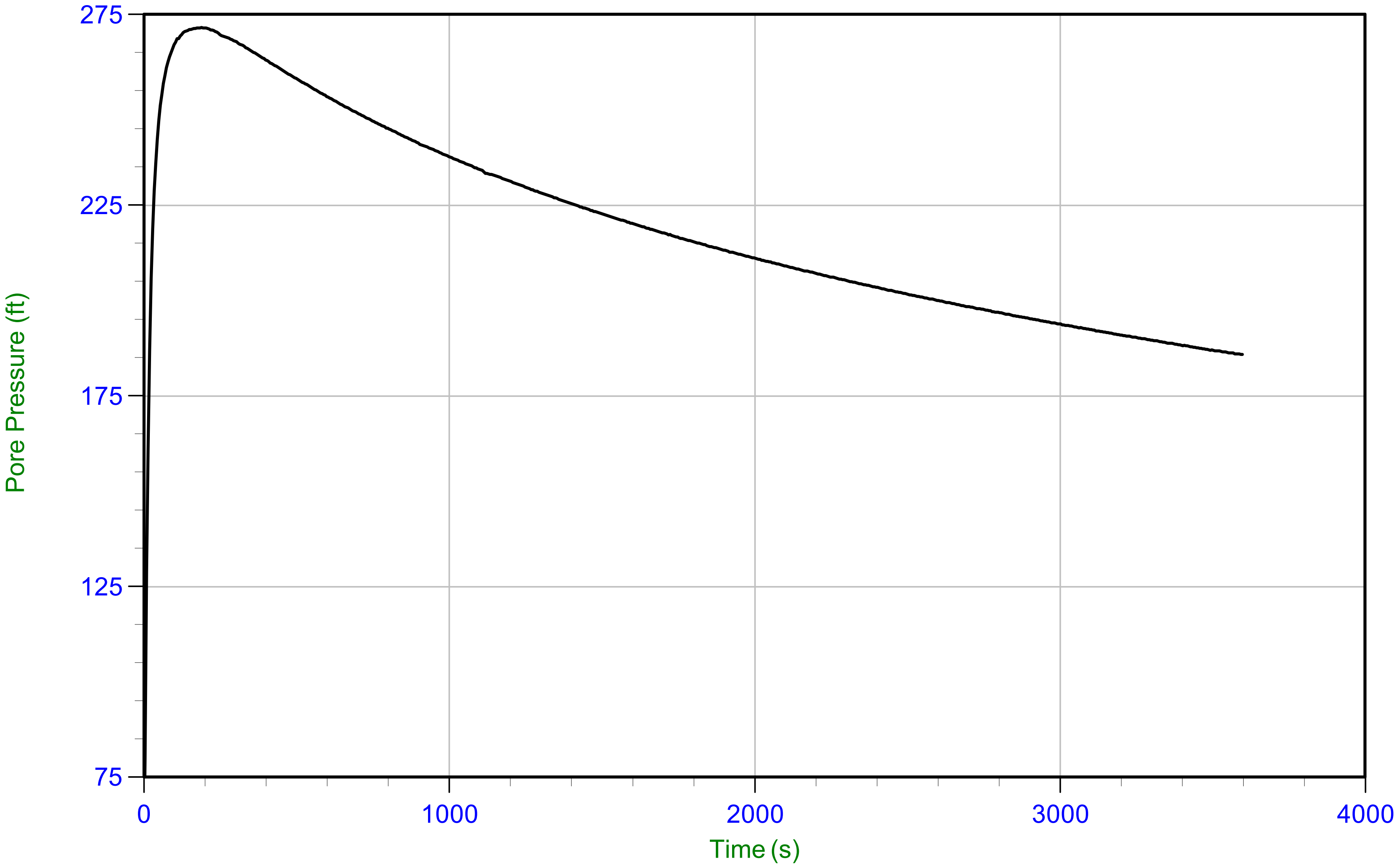
u Min: 4.1 ft
u Max: 126.8 ft
u Final: 126.8 ft

CONETEC

Geosyntec

Job No: 20-61-21655
Date: 12/07/2020 10:33
Site: DTE Monroe Power Plant

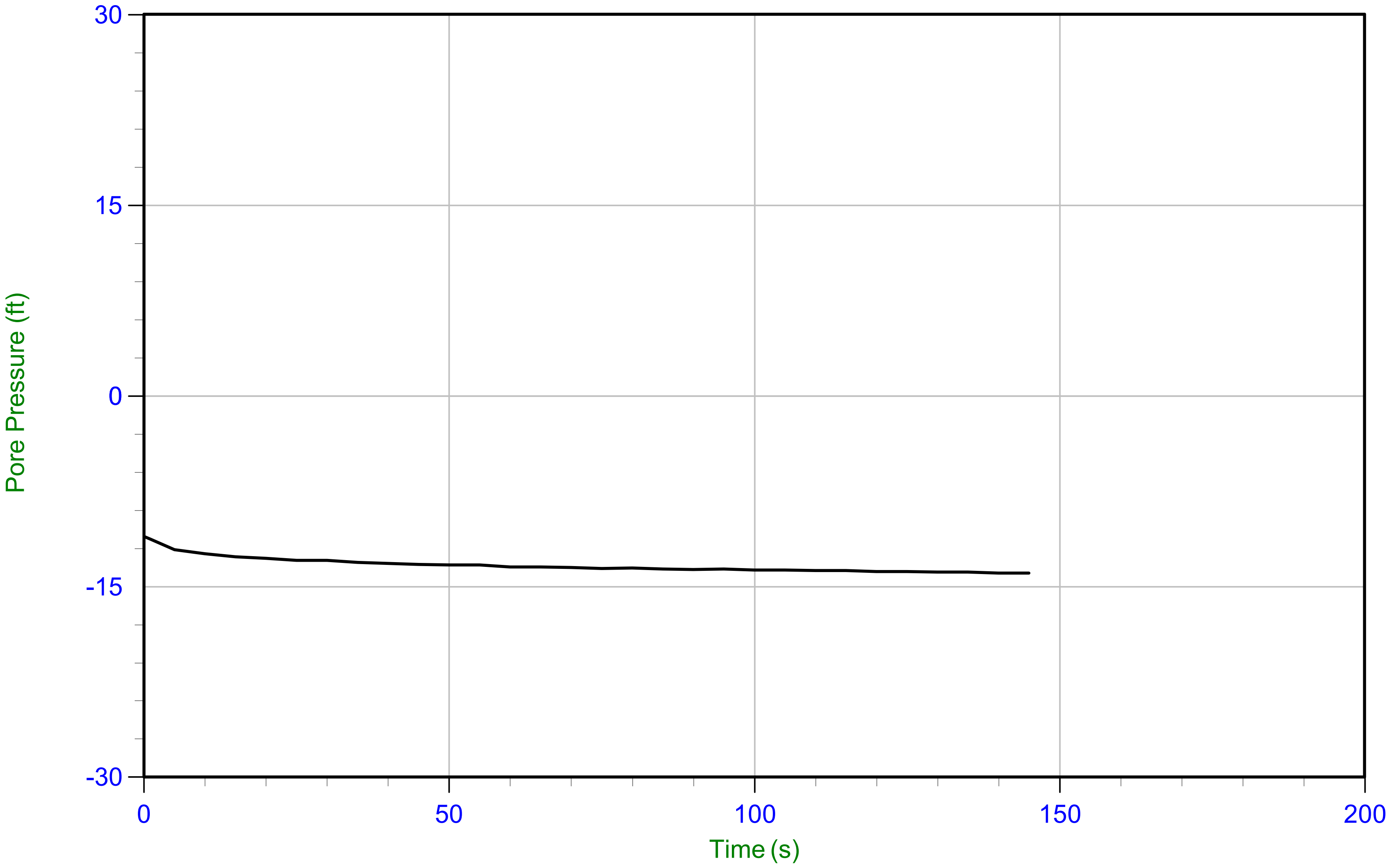
Sounding: CPT20-176
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21655_CP176.PPF
Depth: 20.475 m / 67.174 ft
Duration: 3600.0 s

u Min: 51.2 ft
u Max: 271.6 ft
u Final: 185.9 ft



Trace Summary:

Filename: 20-61-21655_CP178.PPF
Depth: 7.900 m / 25.918 ft
Duration: 145.0 s

u Min: -13.9 ft
u Max: -11.0 ft
u Final: -13.9 ft

APPENDIX L – CHEMISTRY ANALYSIS OF SITE-SPECIFIC WATER

05-Jan-2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd.
Suite 100
Ann Arbor, MI 48105

Re: **DTE- Monroe (GLP-8014)** Work Order: **20121750**

Dear Michael,

ALS Environmental received 5 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 26.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Date: 05-Jan-21

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: **20121750**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20121750-01	PZ-1	Groundwater		12/14/2020 08:00	12/18/2020 10:00	☐
20121750-02	PZ-2	Groundwater		12/14/2020 09:00	12/18/2020 10:00	☐
20121750-03	PZ-3	Groundwater		12/15/2020 08:00	12/18/2020 10:00	☐
20121750-04	PZ-4	Groundwater		12/14/2020 10:00	12/18/2020 10:00	☐
20121750-05	PZ-5	Groundwater		12/15/2020 10:00	12/18/2020 10:00	☐

ALS Group, USA *Date: 05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750

Case Narrative

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:
No other deviations or anomalies were noted.

Wet Chemistry:

Batch R306912, Method SW9040C, Sample PZ-3 (20121750-03B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R306825, Method SW9040C, Sample LCS-R306825: Samples were processed outside of holding time for pH, as the analysis is a field test and holding time is defined as 15 minutes.Batch R307145, Method IC_9056_W, Sample 20121752-03B MSD: 1

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 20121750
Sample ID: PZ-1 **Lab ID:** 20121750-01
Collection Date: 12/14/2020 08:00 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:09 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Arsenic	**0.0098**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Barium	**2.1**		**0.050**	**mg/L**	10	12/31/2020 05:01 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Boron	**4.8**		**0.20**	**mg/L**	10	12/31/2020 05:01 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Calcium	**100**		**0.50**	**mg/L**	1	12/30/2020 08:54 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Iron	**0.83**		**0.080**	**mg/L**	1	12/30/2020 08:54 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:54 PM
Magnesium	**0.47**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Molybdenum	**1.1**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Potassium	**21**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Selenium	**0.051**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Sodium	**44**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**210**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**340**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**43**		**10**	**mg/L**	10	12/30/2020 03:36 PM
Fluoride	**3.4**		**0.10**	**mg/L**	1	12/30/2020 05:34 PM
Sulfate	**11**		**1.0**	**mg/L**	1	12/30/2020 05:34 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.0**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.6**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**530**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750
Sample ID: PZ-2
Lab ID: 20121750-02
Collection Date: 12/14/2020 09:00 AM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:11 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Arsenic	**0.0055**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Barium	**0.50**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Boron	**4.3**		**0.20**	**mg/L**	10	12/31/2020 05:02 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Calcium	**43**		**0.50**	**mg/L**	1	12/30/2020 08:56 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Iron	**0.68**		**0.080**	**mg/L**	1	12/31/2020 05:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 08:56 PM
Magnesium	**0.46**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Molybdenum	**2.5**		**0.050**	**mg/L**	10	12/31/2020 05:02 PM
Potassium	**180**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Selenium	**0.085**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Sodium	**480**		**2.0**	**mg/L**	10	12/31/2020 05:02 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**1,000**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**1,100**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**1,300**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**31**		**20**	**mg/L**	20	12/30/2020 03:56 PM
Fluoride	**24**		**2.0**	**mg/L**	20	12/31/2020 02:21 PM
Sulfate	**51**		**20**	**mg/L**	20	12/30/2020 03:56 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.8**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**19.7**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**2,200**		**1,500**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-3	**Lab ID:**	20121750-03
Collection Date:	12/15/2020 08:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:13 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Arsenic	**0.010**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Barium	**1.3**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Boron	**2.5**		**0.20**	**mg/L**	10	12/31/2020 05:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Calcium	**88**		**0.50**	**mg/L**	1	12/30/2020 08:57 PM
Chromium	**0.0078**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Iron	**2.1**		**0.080**	**mg/L**	1	12/30/2020 08:57 PM
Lead	**0.0053**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:57 PM
Magnesium	**1.2**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Manganese	**0.0092**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Molybdenum	**0.20**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Potassium	**53**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Selenium	**0.059**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Sodium	**88**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**93**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**320**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**370**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**420**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**30**		**16**	**mg/L**	16	12/30/2020 04:48 PM
Fluoride	**0.87**		**0.10**	**mg/L**	1	12/30/2020 06:13 PM
Sulfate	**29**		**16**	**mg/L**	16	12/30/2020 04:48 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.5**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.5**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**740**		**300**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750
Sample ID: PZ-4
Lab ID: 20121750-04
Collection Date: 12/14/2020 10:00 AM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:23 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Arsenic	**0.11**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Barium	**0.099**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Boron	**2.6**		**0.20**	**mg/L**	10	12/31/2020 05:07 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Calcium	**54**		**0.50**	**mg/L**	1	12/30/2020 09:03 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Iron	**0.45**		**0.080**	**mg/L**	1	12/30/2020 09:03 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Lithium	**0.36**		**0.010**	**mg/L**	1	12/30/2020 09:03 PM
Magnesium	ND		0.20	mg/L	1	12/30/2020 09:03 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Molybdenum	**2.2**		**0.050**	**mg/L**	10	12/31/2020 05:07 PM
Potassium	**66**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Selenium	**0.030**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Sodium	**52**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**120**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**390**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**510**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**33**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
Fluoride	ND		0.10	mg/L	1	12/30/2020 06:32 PM
Sulfate	**130**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.4**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.2**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**450**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750
Sample ID: PZ-5
Lab ID: 20121750-05
Collection Date: 12/15/2020 10:00 AM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:25 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Arsenic	**0.038**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Barium	**0.16**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Boron	**12**		**0.20**	**mg/L**	10	12/31/2020 05:12 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Calcium	**270**		**5.0**	**mg/L**	10	12/31/2020 05:12 PM
Chromium	**0.0054**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Iron	**0.79**		**0.080**	**mg/L**	1	12/30/2020 09:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 09:04 PM
Magnesium	**0.78**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Manganese	**0.0050**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Molybdenum	**9.4**		**0.050**	**mg/L**	10	12/31/2020 05:12 PM
Potassium	**3.3**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Selenium	**0.015**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Sodium	**1.4**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**110**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**47**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**100**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**150**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**25**		**4.0**	**mg/L**	4	12/30/2020 05:22 PM
Fluoride	**0.36**		**0.10**	**mg/L**	1	12/30/2020 06:51 PM
Sulfate	**560**		**80**	**mg/L**	80	12/31/2020 02:40 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**9.90**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**21.0**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**970**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **169919** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:00 PM**
Client ID: Run ID: **HG4_201228A** SeqNo: **7031216** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:02 PM**
Client ID: Run ID: **HG4_201228A** SeqNo: **7031217** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0	112	80-120	0			

MS Sample ID: **20122026-01CMS** Units: **mg/L** Analysis Date: **12/28/2020 01:41 PM**
Client ID: Run ID: **HG4_201228A** SeqNo: **7031239** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0			

MSD Sample ID: **20122026-01CMSD** Units: **mg/L** Analysis Date: **12/28/2020 01:43 PM**
Client ID: Run ID: **HG4_201228A** SeqNo: **7031240** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0.002235	0	20	

The following samples were analyzed in this batch: 20121750-01A 20121750-02A 20121750-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:14 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040771** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:16 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040772** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002085	0.00020	0.002	0	104	80-120	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 01:55 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040812** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00020	0.002	0.000003	109	75-125	0			

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 01:57 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040815** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002115	0.00020	0.002	0.000003	106	75-125	0.00219	3.48	20	

The following samples were analyzed in this batch: 20121750-04A 20121750-05A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MBLK Sample ID: **MBLK-170083-170083** Units: **mg/L** Analysis Date: **12/30/2020 08:51 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043005** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS	Sample ID: **LCS-170083-170083**				Units: **mg/L**		Analysis Date: **12/30/2020 08:52 PM**			
Client ID:		Run ID: **ICPMS4_201230A**			SeqNo: **7043006**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:13 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043018** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0			
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0			
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0			
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0			
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0			
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0			
Calcium	63.88	0.50	10	53.04	108	75-125	0			O
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0			
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0			
Iron	8.964	0.080	10	0.02083	89.4	75-125	0			
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0			
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0			
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0			
Potassium	12.35	0.20	10	2.605	97.4	75-125	0			
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0			
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:35 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043031** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0			
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0			
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0			
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0			
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0			
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0			
Calcium	34.88	0.50	10	25.15	97.2	75-125	0			
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0			
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0			
Iron	9.488	0.080	10	0.143	93.5	75-125	0			
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0			
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0			
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0			
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0			
Potassium	12.88	0.20	10	3.03	98.5	75-125	0			
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0			
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:20 PM**

Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046543** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:39 PM**

Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046555** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:15 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043019** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20	
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20	
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20	
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20	
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20	
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20	
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20	
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20	
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20	
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20	
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20	
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20	
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20	
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20	
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MSD	Sample ID: **20121813-10DMSD**				Units: **mg/L**		Analysis Date: **12/30/2020 09:37 PM**			
Client ID:	Run ID: **ICPMS4_201230A**				SeqNo: **7043032**		Prep Date: **12/30/2020**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD	Sample ID: **20121813-01DMSD**				Units: **mg/L**		Analysis Date: **12/31/2020 05:22 PM**			
Client ID:	Run ID: **ICPMS4_201231A**				SeqNo: **7046544**		Prep Date: **12/30/2020**		DF: **10**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD	Sample ID: **20121813-10DMSD**				Units: **mg/L**		Analysis Date: **12/31/2020 05:41 PM**			
Client ID:	Run ID: **ICPMS4_201231A**				SeqNo: **7046556**		Prep Date: **12/30/2020**		DF: **10**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch:

20121750-01A	20121750-02A	20121750-03A
20121750-04A	20121750-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **169592** Instrument ID **TDS** Method: **A2540 C-11**

MBLK Sample ID: **MBLK-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015778** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

LCS Sample ID: **LCS-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015777** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	466	30	495	0	94.1	85-109	0			

DUP Sample ID: **20121786-01A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015765** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	896.7	50	0	0	0	0-0	850	5.34	10	

DUP Sample ID: **20121789-04A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015771** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	510	50	0	0	0	0-0	500	1.98	10	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R306822** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK Sample ID: **MB-R306822-R306822** Units: **mg/L** Analysis Date: **12/24/2020 05:06 PM**
Client ID: Run ID: **TITRATOR 1_201224C** SeqNo: **7028950** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS Sample ID: **LCS-R306822-R306822** Units: **mg/L** Analysis Date: **12/24/2020 05:06 PM**
Client ID: Run ID: **TITRATOR 1_201224C** SeqNo: **7028951** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	922.4	10	925	0	99.7	88-110	0			
Alkalinity, Total (as CaCO3)	1005	10	1000	0	101	89-103	0			

DUP Sample ID: **20122120-01C DUP** Units: **mg/L** Analysis Date: **12/24/2020 05:06 PM**
Client ID: Run ID: **TITRATOR 1_201224C** SeqNo: **7028957** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	ND	10	0	0	0	0-0	-1.17	0	10	

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306825** Instrument ID **Titrator 1** Method: **SW9040C**

LCS Sample ID: **LCS-R306825-R306825** Units: **s.u.** Analysis Date: **12/24/2020 05:06 PM**
Client ID: Run ID: **TITRATOR 1_201224D** SeqNo: **7029039** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.98	0.10	4	0	99.5	92-108	0			

DUP Sample ID: **20121750-01B DUP** Units: **s.u.** Analysis Date: **12/24/2020 05:06 PM**
Client ID: **PZ-1** Run ID: **TITRATOR 1_201224D** SeqNo: **7029041** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	11.16	0.10	0	0	0	0-0	10.96	1.81	5	H
Temperature	20.11	0.10	0	0	0		20.62	2.5		H

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK Sample ID: **MB-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033262** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS Sample ID: **LCS-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033263** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP Sample ID: **20121803-01E DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033273** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP Sample ID: **20121990-05A DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033276** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP Sample ID: **20122120-08C DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033278** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033301** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033308** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP Sample ID: **20122120-08C DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033305** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.05	0.10	0	0	0	0-0	7.99	0.748	5	H
Temperature	20.95	0.10	0	0	0	0-0	20.76	0.911		H

DUP Sample ID: **20121990-05A DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033315** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.51	0.10	0	0	0	0-0	7.56	0.664	5	H
Temperature	20.63	0.10	0	0	0		19.96	3.3		H

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK	Sample ID: **MBLK-R307142**		Units: **mg/L**	Analysis Date: **12/30/2020 04:56 PM**
Client ID:	Run ID: **IC3_201230A**	SeqNo: **7043048**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS	Sample ID: **LCS-R307142**		Units: **mg/L**	Analysis Date: **12/30/2020 05:15 PM**
Client ID:	Run ID: **IC3_201230A**	SeqNo: **7043049**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.135	0.10	2	0	107	82-116	0			
Sulfate	9.666	1.0	10	0	96.7	90-110	0			

MS	Sample ID: **20122223-01D MS**		Units: **mg/L**	Analysis Date: **12/31/2020**
Client ID:	Run ID: **IC3_201230A**	SeqNo: **7043070**	Prep Date:	DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	84.26	4.0	80	0	105	82-116	0			
Sulfate	650	40	400	266.2	96	90-110	0			

MSD	Sample ID: **20122223-01D MSD**		Units: **mg/L**	Analysis Date: **12/31/2020 12:19 AM**
Client ID:	Run ID: **IC3_201230A**	SeqNo: **7043071**	Prep Date:	DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20	
Sulfate	651.6	40	400	266.2	96.4	90-110	650	0.246	20	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307145** Units: **mg/L** Analysis Date: **12/30/2020 01:43 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043217** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307145** Units: **mg/L** Analysis Date: **12/30/2020 02:39 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20121752-03B MS** Units: **mg/L** Analysis Date: **12/30/2020 07:14 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043233** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD Sample ID: **20121752-03B MSD** Units: **mg/L** Analysis Date: **12/30/2020 07:34 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043234** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307276** Units: **mg/L** Analysis Date: **12/31/2020 01:42 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047811** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307276** Units: **mg/L** Analysis Date: **12/31/2020 02:01 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047812** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	1.976	0.10	2	0	98.8	82-116	0			
Sulfate	9.654	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20122530-06A MS** Units: **mg/L** Analysis Date: **12/31/2020 06:35 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047826** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.34	4.0	80	0	109	82-116	0			
Sulfate	424.4	40	400	43.11	95.3	90-110	0			

MSD Sample ID: **20122530-06A MSD** Units: **mg/L** Analysis Date: **12/31/2020 06:54 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047827** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.76	4.0	80	0	110	82-116	87.34	0.475	20	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20	

The following samples were analyzed in this batch: 20121750-02B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS

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Chain of Custody Form

Page ____ of ____

COC ID: 230464

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Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

20121750

ALS Project Manager:		**ALS Work Order #:**	33555

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		**Project Name**	DTE - Monroe	A	Metals
Work Order		**Project Number**	GLP-8014	B	pH, Anions, TDS, Alkalinity
Company Name	Geosyntec Consultants	**Bill To Company**	Geosyntec Consultants	C	
Send Report To	Michael Coram	**Invoice Attn**	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	**Address**	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	**City/State/Zip**	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	**Phone**	(734) 794-1547	H	
Fax	(734) 332-9063	**Fax**	(734) 332-9063	I	
e-Mail Address		**e-Mail Address**		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	P2-1	12/14	8:00	GW	2	2	X	X									
2	P2-2	12/14	9:00	↓	↓	↓	X	X									
3	P2-3	12/15	8:00				X	X									
4	P2-4	12/14	10:00				X	X									
5	P2-5	12/15	10:00				X	X									
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box) ☒ Std 10 WK Days ☐ 5 WK Days ☐ Other ____ ☐ 2 WK Days ☐ 24 Hour

Results Due Date:

Relinquished by:	**Date:** 12/17	**Time:** 3:00	**Received by:**
Relinquished by: Fedex	**Date:** 12/18/20	**Time:** 10:00	**Received by (Laboratory):**
Logged by (Laboratory): MTO	**Date:** 12/18/20	**Time:** 13:31	**Checked by (Laboratory):**

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes: Seperate Report

Cooler ID	Cooler Temp.
	5.8°C
	IM
	PH23

QC Package: (Check One Box Below)
☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other
☐ TRRP CheckList
☐ TRRP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121750**

Received by: **MJG**

Checklist completed by Matthew Gaylord (eSignature) 18-Dec-20 (Date)

Reviewed by: Chad Whelton (eSignature) 18-Dec-20 (Date)

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	5.8/5.8C	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/18/2020 1:33:02 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:

Tuesday, January 19, 2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd. Suite 100
Ann Arbor, MI 48105

Re: ALS Workorder: 2012398
Project Name: DTE - Monroe
Project Number: GLP-8014

Dear Mr. Coram:

Five water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

- Radium-226
- Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

Julie Ellingson

ALS Environmental
Julie Ellingson
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

2012398

Radium-228:
The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac, which is the ingrown progeny of ^{228}Ra, according to the current revision of SOP 724.

All acceptance criteria were met.

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2012398
Client Name: Geosyntec Consultants
Client Project Name: DTE - Monroe
Client Project Number: GLP-8014
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
P2-1	2012398-1		WATER	14-Dec-20	8:00
P2-2	2012398-2		WATER	14-Dec-20	9:00
P2-3	2012398-3		WATER	14-Dec-20	8:00
P2-4	2012398-4		WATER	14-Dec-20	10:00
P2-5	2012398-5		WATER	14-Dec-20	10:00

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Page 1 of 1

COC ID: 230463

Houston, TX
+1 281 530 5656

Middletown, PA
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Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

2012398

ALS Project Manager:		**ALS Work Order #:**	33556

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		**Project Name**	DTE - Monroe	A	Radium 226 and 228 combined
Work Order		**Project Number**	GLP - 8014	B	
Company Name	Geosyntec Consultants	**Bill To Company**	Geosyntec Consultants	C	
Send Report To	Michael Coram	**Invoice Attn**	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	**Address**	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	**City/State/Zip**	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	**Phone**	(734) 794-1547	H	
Fax	(734) 332-8063	**Fax**	(734) 332-8063	I	
e-Mail Address		**e-Mail Address**		J	

No.	Sample Description		Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	PZ-1	1	12/14	8:00	GW	2	2	X										
2	PZ-2	2	12/14	9:00	↓	↓	↓	X										
3	PZ-3	3	12/15	8:00				X										
4	PZ-4	4	12/14	10:00				X										
5	PZ-5	5	12/15	10:00				X										
6																		
7																		
8																		
9																		
10																		

Sampler(s) Please Print & Sign Mike Coram	**Shipment Method** Fed EX	**Required Turnaround Time: (Check Box)** ☒ Std 10 WK Days ☐ 5 WK Days ☐ 2 WK Days ☐ 24 Hour ☐ Other ______	**Results Due Date:**

Relinquished by:	**Date:** 12/17	**Time:** 3:00	**Received by:**	**Notes:** Seperate Report
Relinquished by:	**Date:**	**Time:**	**Received by (Laboratory):**	
Logged by (Laboratory):	**Date:**	**Time:**	**Checked by (Laboratory):**	

Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)
		☒ Level II Std QC ☐ Level III Std QC/Raw Data ☐ Level IV SW846/CLP ☐ Other ______ ☐ TRRP CheckList ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID: Geosyntec MI

Workorder No: 2012398

Project Manager:

Initials: RGA

Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	☐ Drop Off	☑ YES	☐ NO
2. Are custody seals on **shipping** containers intact?	☐ NONE	☑ YES	☐ NO*
3. Are custody seals on **sample** containers intact?	☑ NONE	☐ YES	☐ NO*
4. Is there a COC (chain-of-custody) present?		☑ YES	☐ NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		☑ YES	☐ NO*
6. Are short-hold samples present?		☐ YES	☑ NO
7. Are all samples within holding times for the requested analyses?		☑ YES	☐ NO*
8. Were all sample containers received intact? (not broken or leaking)		☑ YES	☐ NO*
9. Is there sufficient sample for the requested analyses?		☑ YES	☐ NO*
10. Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		☑ YES	☐ NO*
11. Are all aqueous samples preserved correctly, if required?	☐ N/A	☐ YES	☑ NO*
12. Were unpreserved samples pH checked, if required?	☑ N/A	☐ YES	☐ NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	☑ N/A	☐ YES	☐ NO
14. Were the samples shipped on ice?		☑ YES	☐ NO
15. Were cooler temperatures measured at 0.1 - 6.0°C? IR gun used+: ☐ #3 ☑ #5	☐ Rad Only	☑ YES	☐ NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008) ☐ N/A ☑ YES ☐ NO

* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012398-1-1,2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☒ N/A Contact Name Date:

Project Manager Signature / Date: 12/21/20

Form 201r30.xls
(06/04/2020)

+IR Gun #3, VWR SN 170647571
+IR Gun #5, VWR SN 192272629

ORIGIN ID:DEOA (248) 390-5748
MIKE CORAM

SUITE 100
2100 COMMONWEALTH BLVD STE 100
ANN ARBOR, MI 48105
UNITED STATES US

SHIP DATE: 17DEC20
ACTWGT: 56.90 LB
CAD: 6997568/SSF02121
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 156297-436 RRDB EXP 11/21

TO **ALS FT. COLLINS**
ATTN: SAMPLE RECIEVING
225 COMMERCE DR

FORT COLLINS CO 80524
(618) 582-5201 REF:
INV:
PO: DEPT:

12-1
3.2

FedEx
Express
E

J202020071401uv

FRI - 18 DEC 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7816 0264 9731**

DSR
80524
CO-US **DEN**

NA FTCA

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-1	**Lab ID:**	2012398-1
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.13)	U	0.24	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*99.8*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.89 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.89 (+/- 0.64)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.1*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-2	**Lab ID:**	2012398-2
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 09:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.19)	U	0.36	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*91.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.79	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.42)	U	0.79	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*92.8*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-3	**Lab ID:**	2012398-3
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	**0.55 (+/- 0.35)**		**0.37**	**pCi/l**	NA	1/12/2021 11:32
Carr: BARIUM	*92.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.74 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.19 (+/- 0.51)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.5*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-4	**Lab ID:**	2012398-4
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.27)	U	0.47	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*96*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.84	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.38)	U	0.84	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

ALS -- Fort Collins

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-5	**Lab ID:**	2012398-5
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.25)	U	0.37	pCi/l	NA	1/12/2021 11:54
Carr: BARIUM	*97.7*		*40-110*	*%REC*	DL = NA	1/12/2021 11:54
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.78	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.34)	U	0.78	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-5	**Lab ID:**	2012398-5
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Date: *1/19/2021 2:19:4*

QC BATCH REPORT

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

Batch ID: **RE210104-1-3** Instrument ID: **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

LCSD Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	40 (+/- 10)	1	46.8		84.5	67-120		46	0.44	2.13	P
Carr: BARIUM	15150		15500		97.8	40-110		15230			

MB Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

QC BATCH REPORT

Batch ID: **RA210111-1-5** Instrument ID: **GASPROP** Method: **Radium-228 Analysis by GFPC**

LCS Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

APPENDIX M – ALD HYDRAULIC CONDUCTIVITY TEST RESULTS

Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	2/19/2021	0	5.9E-09	0.0000	-	-	-	-	
						2/26/2021	7	5.9E-09	0.0358	-	-	-	-	
						3/05/2021	14	5.5E-09	0.0641	-	-	-	-	
						3/08/2021	17	5.2E-09	0.0724	12.8	8.2	-	-	
						3/12/2021	21	6.3E-09	0.0988	-	-	-	-	
						3/19/2021	28	5.5E-09	0.1325	-	-	-	-	
						3/26/2021	35	5.1E-09	0.1555	-	-	-	-	
						3/30/2021	39	5.2E-09	0.1675	12.7	8.3	-	-	
						4/02/2021	42	5.9E-09	0.1879	-	-	-	-	
						4/09/2021	49	5.9E-09	0.2231	-	-	-	-	
						4/16/2021	56	5.4E-09	0.2492	12.6	8.3	4800	3000	
						4/23/2021	63	5.9E-09	0.2904	-	-	-	-	
						4/30/2021	70	5.7E-09	0.3207	-	-	-	-	
						5/03/2021	73	5.3E-09	0.3301	12.9	8.4	-	-	
						5/07/2021	77	6.6E-09	0.3571	-	-	-	-	
						5/14/2021	84	5.7E-09	0.3908	-	-	-	-	
						5/19/2021	89	5.5E-09	0.4096	12.8	8.5	-	-	
						5/21/2021	91	5.2E-09	0.4246	-	-	-	-	
						5/28/2021	98	5.6E-09	0.4607	-	-	-	-	
						6/04/2021	105	4.7E-09	0.4854	12.6	8.5	4300	1744	
						6/11/2021	112	6.0E-09	0.5288	-	-	-	-	
						6/18/2021	119	5.5E-09	0.5586	-	-	-	-	
						6/22/2021	123	4.6E-09	0.5696	12.3	8.6	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	6/25/2021	126	6.1E-09	0.5912	-	-	-	-	
						7/02/2021	133	6.0E-09	0.6290	-	-	-	-	
						7/09/2021	140	5.3E-09	0.6571	-	-	-	-	
						7/12/2021	143	5.6E-09	0.6605	12.7	8.9	-	-	
						7/16/2021	147	6.5E-09	0.6880	-	-	-	-	
						7/23/2021	154	5.7E-09	0.7172	-	-	-	-	
						7/30/2021	161	5.3E-09	0.7425	12.6	8.6	4560	1434	
						8/6/2021	168	5.7E-09	0.7837	-	-	-	-	
						8/13/2021	175	4.9E-09	0.8118	-	-	-	-	
						8/18/2021	180	4.8E-09	0.8271	12.6	8.9	-	-	
						8/20/2021	182	5.4E-09	0.8413	-	-	-	-	
						8/27/2021	189	5.5E-09	0.8785	-	-	-	-	
						9/03/2021	196	4.8E-09	0.9037	-	-	-	-	
						9/07/2021	200	4.6E-09	0.9145	12.6	8.8	-	-	
						9/10/2021	203	5.1E-09	0.9327	-	-	-	-	
						9/17/2021	210	5.4E-09	0.9679	-	-	-	-	
						9/24/2021	217	4.8E-09	0.9926	-	-	-	-	
						9/28/2021	221	5.0E-09	1.0042	13.1	8.8	4830	1179	
						10/01/2021	224	6.0E-09	1.0246	-	-	-	-	
						10/08/2021	231	5.5E-09	1.0595	-	-	-	-	
						10/15/2021	238	5.2E-09	1.0845	12.7	8.9	-	-	
						10/22/2021	245	6.2E-09	1.1257	-	-	-	-	
						10/29/2021	252	5.3E-09	1.1543	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	11/02/2021	256	5.4E-09	1.1682	12.7	8.5	-	-	
						11/05/2021	259	5.9E-09	1.1819	-	-	-	-	
						11/12/2021	266	5.4E-09	1.2168	-	-	-	-	
						11/19/2021	273	4.9E-09	1.2406	-	-	-	-	
						11/24/2021	278	5.5E-09	1.2537	12.6	8.6	5760	1111	
						11/26/2021	280	6.0E-09	1.2670	-	-	-	-	
						12/03/2021	287	5.4E-09	1.3019	-	-	-	-	
						12/10/2021	294	5.1E-09	1.3286	12.4	8.2	-	-	
						12/17/2021	301	5.4E-09	1.3601	-	-	-	-	
						12/24/2021	308	5.0E-09	1.3891	12.5	8.4	-	-	
						12/31/2021	315	4.2E-09	1.4132	-	-	-	-	
						1/7/2022	322	5.3E-09	1.4433	-	-	-	-	
						1/13/2022	328	4.3E-09	1.4546	12.4	8.9	5930	1188	
						1/14/2022	329	4.6E-09	1.4603	-	-	-	-	
						1/21/2022	336	5.3E-09	1.5006	-	-	-	-	
						1/28/2022	343	4.8E-09	1.5270	-	-	-	-	
						2/2/2022	348	3.9E-09	1.5412	12.5	9.0	-	-	
						2/4/2022	350	4.9E-09	1.5534	-	-	-	-	
						2/11/2022	357	5.3E-09	1.5897	-	-	-	-	
						2/18/2022	364	4.5E-09	1.6150	12.7	8.8	-	-	
						2/25/2022	371	5.3E-09	1.6530	-	-	-	-	
						3/4/2022	378	4.9E-09	1.6817	-	-	-	-	
						3/9/2022	383	4.6E-09	1.6976	12.5	9.1	6420	1375	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	3/11/2022	385	5.1E-09	1.7106	-	-	-	-	
						3/18/2022	392	5.4E-09	1.7475	-	-	-	-	
						3/25/2022	399	6.0E-09	1.7771	-	-	-	-	
						3/28/2022	402	5.6E-09	1.7870	12.9	8.7	6350	-	
						4/1/2022	406	6.1E-09	1.8125	-	-	-	-	
						4/8/2022	413	5.2E-09	1.8452	-	-	-	-	
						4/15/2022	420	5.3E-09	1.8702	-	-	-	-	
						4/20/2022	425	4.5E-09	1.8824	12.2	8.4	6300	-	
						4/22/2022	427	5.1E-09	1.8949	-	-	-	-	
						4/29/2022	434	5.6E-09	1.9346	-	-	-	-	
						5/6/2022	441	5.6E-09	1.9635	-	-	-	-	
						5/9/2022	444	5.1E-09	1.9721	12.2	8.4	6120	1471	
						5/13/2022	448	6.3E-09	1.9990	-	-	-	-	
						5/20/2022	455	5.9E-09	2.0356	-	-	-	-	
						5/26/2022	461	4.8E-09	2.0566	12.2	8.4	6320	-	
						5/27/2022	462	5.4E-09	2.0640	-	-	-	-	
						6/3/2022	469	5.8E-09	2.1046	-	-	-	-	
						6/10/2022	476	5.6E-09	2.1341	-	-	-	-	
						6/13/2022	479	5.3E-09	2.1443	12.2	8.6	6170	-	
						6/17/2022	483	6.2E-09	2.1710	-	-	-	-	
						6/24/2022	490	5.8E-09	2.2079	-	-	-	-	
						7/1/2022	497	5.6E-09	2.2346	12.2	8.4	5490	2030	
						7/8/2022	504	5.7E-09	2.2800	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	7/15/2022	511	5.3E-09	2.3098	-	-	-	-	
						7/21/2022	517	4.6E-09	2.3280	12.2	8.4	6320	-	
						7/22/2022	518	5.2E-09	2.3356	-	-	-	-	
						7/29/2022	525	6.2E-09	2.3813	-	-	-	-	
						8/5/2022	532	5.8E-09	2.4126	-	-	-	-	
						8/10/2022	537	5.7E-09	2.4307	12.2	8.4	6160	-	
						8/12/2022	539	6.0E-09	2.4446	-	-	-	-	
						8/19/2022	546	6.0E-09	2.4858	-	-	-	-	
						8/26/2022	553	5.6E-09	2.5139	-	-	-	-	
						8/29/2022	556	5.3E-09	2.5235	12.2	8.5	6660	2120	
						9/2/2022	560	6.2E-09	2.5505	-	-	-	-	
						9/9/2022	567	5.8E-09	2.5871	-	-	-	-	
						9/16/2022	574	5.4E-09	2.6132	12.2	8.5	6420	-	
						9/23/2022	581	6.5E-09	2.6595	-	-	-	-	
						9/30/2022	588	5.8E-09	2.6907	-	-	-	-	
						10/4/2022	592	5.1E-09	2.7035	12.3	8.6	5980	-	
						10/7/2022	595	5.9E-09	2.7242	-	-	-	-	
						10/14/2022	602	5.4E-09	2.7631	-	-	-	-	
						10/21/2022	609	5.4E-09	2.7901	12.4	8.9	5980	1471	
						10/28/2022	616	6.0E-09	2.8323	-	-	-	-	
						11/4/2022	623	6.1E-09	2.8641	-	-	-	-	
						11/7/2022	626	6.2E-09	2.8761	12.5	8.7	6350	-	
						11/11/2022	630	6.5E-09	2.9042	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (20-22')	20L128	17.5	115.6	19.7	111.2	11/18/2022	637	5.9E-09	2.9416	-	-	-	-	
						11/25/2022	644	5.2E-09	2.9657	-	-	-	-	
						11/30/2022	649	5.7E-09	2.9913	12.3	9.1	5220	-	
						12/2/2022	651	5.6E-09	3.0018	-	-	-	-	
						12/9/2022	658	5.3E-09	3.0307	-	-	-	-	
						12/16/2022	665	4.4E-09	3.0517	12.2	8.7	6080	1353	
						12/23/2022	672	5.9E-09	3.0929	-	-	-	-	
						12/31/2022	680	4.7E-09	3.1233	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Test Information: Initial Conditions: Dry Unit Weight	Test Information: Final Conditions: Moisture Content	Test Information: Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	22.0	107.4	2/19/2021	0	4.6E-09	0.0000	-	-	-	-	
						2/26/2021	7	3.7E-09	0.0158	-	-	-	-	
						3/05/2021	14	3.6E-09	0.0364	-	-	-	-	
						3/12/2021	21	3.1E-09	0.0468	-	-	-	-	
						3/19/2021	28	2.9E-09	0.0584	-	-	-	-	
						3/22/2021	31	2.8E-09	0.0597	12.7	8.2	-	-	
						3/26/2021	35	3.7E-09	0.0682	-	-	-	-	
						4/02/2021	42	3.2E-09	0.0886	-	-	-	-	
						4/09/2021	49	3.3E-09	0.1054	-	-	-	-	
						4/16/2021	56	2.7E-09	0.1142	-	-	-	-	
						4/23/2021	63	2.4E-09	0.1245	12.9	8.6	-	-	
						4/30/2021	70	3.9E-09	0.1498	-	-	-	-	
						5/07/2021	77	3.7E-09	0.1705	-	-	-	-	
						5/14/2021	84	3.3E-09	0.1865	-	-	-	-	
						5/21/2021	91	3.1E-09	0.2002	-	-	-	-	
						5/23/2021	93	2.8E-09	0.2030	12.9	8.6	4840	1126	
						5/28/2021	98	3.8E-09	0.2208	-	-	-	-	
						6/04/2021	105	3.4E-09	0.2415	-	-	-	-	
						6/11/2021	112	3.5E-09	0.2591	-	-	-	-	
						6/18/2021	119	2.7E-09	0.2717	-	-	-	-	
						6/22/2021	123	2.6E-09	0.2774	12.4	8.4	-	-	
						6/25/2021	126	2.9E-09	0.2885	-	-	-	-	
						7/02/2021	133	4.0E-09	0.3151	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	22.0	107.4	7/09/2021	140	3.4E-09	0.3389	-	-	-	-	
						7/16/2021	147	3.4E-09	0.3567	-	-	-	-	
						7/23/2021	154	3.3E-09	0.3704	-	-	-	-	
						7/30/2021	161	3.1E-09	0.3823	12.4	8.5	-	-	
						8/06/2021	168	3.4E-09	0.4037	-	-	-	-	
						8/13/2021	175	3.3E-09	0.4239	-	-	-	-	
						8/20/2021	182	3.5E-09	0.4391	-	-	-	-	
						8/27/2021	189	2.7E-09	0.4515	-	-	-	-	
						8/31/2021	193	2.7E-09	0.4577	12.6	8.6	4780	990	
						9/03/2021	196	2.8E-09	0.4636	-	-	-	-	
						9/10/2021	203	3.1E-09	0.4843	-	-	-	-	
						9/17/2021	210	3.1E-09	0.5021	-	-	-	-	
						9/24/2021	217	3.2E-09	0.5174	-	-	-	-	
						10/01/2021	224	2.9E-09	0.5279	-	-	-	-	
						10/07/2021	230	2.9E-09	0.5372	13.0	8.7	-	-	
						10/08/2021	231	2.7E-09	0.5396	-	-	-	-	
						10/15/2021	238	3.3E-09	0.5613	-	-	-	-	
						10/22/2021	245	3.4E-09	0.5804	-	-	-	-	
						10/29/2021	252	3.0E-09	0.5969	-	-	-	-	
						11/05/2021	259	3.1E-09	0.6106	-	-	-	-	
						11/12/2021	266	2.2E-09	0.6199	-	-	-	-	
						11/19/2021	273	2.0E-09	0.6222	-	-	-	-	
						11/26/2021	280	1.8E-09	0.6297	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	22.0	107.4	12/03/2021	287	1.7E-09	0.6359	-	-	-	-	
						12/08/2021	292	1.9E-09	0.6411	12.5	8.4	-	-	
						12/10/2021	294	2.4E-09	0.6468	-	-	-	-	
						12/17/2021	301	2.8E-09	0.6672	-	-	-	-	
						12/24/2021	308	2.6E-09	0.6809	-	-	-	-	
						12/31/2021	315	2.6E-09	0.6951	-	-	-	-	
						1/7/2022	322	2.6E-09	0.7080	-	-	-	-	
						1/14/2022	329	1.9E-09	0.7124	-	-	-	-	
						1/21/2022	336	1.8E-09	0.7201	-	-	-	-	
						1/25/2022	340	1.7E-09	0.7235	12.6	8.2	5830	1041	
						1/28/2022	343	1.7E-09	0.7292	-	-	-	-	
						2/4/2022	350	2.4E-09	0.7459	-	-	-	-	
						2/11/2022	357	2.6E-09	0.7627	-	-	-	-	
						2/18/2022	364	2.3E-09	0.7762	-	-	-	-	
						2/25/2022	371	2.1E-09	0.7870	-	-	-	-	
						3/4/2022	378	2.0E-09	0.7968	-	-	-	-	
						3/11/2022	385	2.1E-09	0.8054	-	-	-	-	
						3/15/2022	389	1.6E-09	0.8092	12.9	9.3	-	-	
						3/18/2022	392	2.3E-09	0.8172	-	-	-	-	
						3/25/2022	399	3.2E-09	0.8374	-	-	-	-	
						4/1/2022	406	2.8E-09	0.8547	-	-	-	-	
						4/8/2022	413	2.6E-09	0.8684	-	-	-	-	
						4/15/2022	420	2.6E-09	0.8800	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	22.0	107.4	4/22/2022	427	2.2E-09	0.8893	-	-	-	-	
						4/26/2022	431	2.8E-09	0.8952	12.2	8.3	6270	-	
						4/29/2022	434	3.0E-09	0.9048	-	-	-	-	
						5/6/2022	441	3.4E-09	0.9270	-	-	-	-	
						5/13/2022	448	3.2E-09	0.9448	-	-	-	-	
						5/20/2022	455	2.9E-09	0.9598	-	-	-	-	
						5/27/2022	462	2.5E-09	0.9714	-	-	-	-	
						6/2/2022	468	2.5E-09	0.9797	12.1	8.5	6010	1163	
						6/3/2022	469	2.3E-09	0.9823	-	-	-	-	
						6/10/2022	476	3.2E-09	1.0055	-	-	-	-	
						6/17/2022	483	3.3E-09	1.0259	-	-	-	-	
						6/24/2022	490	3.1E-09	1.0417	-	-	-	-	
						7/1/2022	497	3.0E-09	1.0549	-	-	-	-	
						7/8/2022	504	3.0E-09	1.0636	12.1	8.5	6110	-	
						7/15/2022	511	3.6E-09	1.0895	-	-	-	-	
						7/22/2022	518	3.6E-09	1.1109	-	-	-	-	
						7/29/2022	525	3.3E-09	1.1280	-	-	-	-	
						8/5/2022	532	3.1E-09	1.1406	-	-	-	-	
						8/10/2022	537	3.1E-09	1.1499	12.2	8.6	6330	-	
						8/12/2022	539	3.4E-09	1.1579	-	-	-	-	
						8/19/2022	546	3.6E-09	1.1840	-	-	-	-	
						8/26/2022	553	3.4E-09	1.2044	-	-	-	-	
						9/2/2022	560	3.0E-09	1.2207	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-2 (40-42')	20L130	17.9	112.2	22.0	107.4	9/9/2022	567	2.8E-09	1.2336	-	-	-	-	
						9/16/2022	574	3.0E-09	1.2444	-	-	-	-	
						9/19/2022	577	3.4E-09	1.2496	12.2	8.5	6250	-	
						9/23/2022	581	3.3E-09	1.2537	-	-	-	-	
						9/30/2022	588	3.3E-09	1.2796	-	-	-	-	
						10/7/2022	595	3.1E-09	1.3018	-	-	-	-	
						10/14/2022	602	3.4E-09	1.3217	-	-	-	-	
						10/21/2022	609	2.9E-09	1.3369	-	-	-	-	
						10/28/2022	616	2.5E-09	1.3488	-	-	-	-	
						11/4/2022	623	2.9E-09	1.3596	12.6	8.6	5720	-	
						11/11/2022	630	3.6E-09	1.3881	-	-	-	-	
						11/18/2022	637	3.4E-09	1.4067	-	-	-	-	
						11/25/2022	644	2.8E-09	1.4211	-	-	-	-	
						12/2/2022	651	2.7E-09	1.4335	-	-	-	-	
						12/9/2022	658	2.4E-09	1.4431	-	-	-	-	
						12/13/2022	662	2.3E-09	1.4488	12.4	8.6	5930	-	
						12/16/2022	665	2.6E-09	1.4573	-	-	-	-	
						12/23/2022	672	3.3E-09	1.4774	-	-	-	-	
						12/31/2022	680	2.7E-09	1.4947	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
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Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

		Test Information												
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
Site ID (-)	Lab No. (-)	Moisture Content (%)	Dry Unit Weight (pcf)	Moisture Content (%)	Dry Unit Weight (pcf)	(-)	(-)	Notes 1 & 2 (cm/s)	Note 1 (-)	In Flow (-)	Out Flow (-)	In Flow (μs/cm)	Out Flow (μs/cm)	Remarks
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	2/19/2021	0	1.8E-08	0.0000	-	-	-	-	
						2/26/2021	7	1.4E-08	0.1037	-	-	-	-	
						3/02/2021	11	1.3E-08	0.1359	12.8	8.2	-	-	
						3/05/2021	14	1.5E-08	0.1953	-	-	-	-	
						3/10/2021	19	1.3E-08	0.2511	12.9	8.3	-	-	
						3/12/2021	21	1.5E-08	0.2935	-	-	-	-	
						3/16/2021	25	1.4E-08	0.3478	13.0	8.5	4700	1534	
						3/19/2021	28	1.4E-08	0.3950	-	-	-	-	
						3/26/2021	35	1.4E-08	0.4408	12.7	8.5	-		
						4/02/2021	42	1.4E-08	0.5483	12.9	8.7	-	-	
						4/09/2021	49	1.3E-08	0.6483	12.4	8.6	4980	1274	
						4/16/2021	56	1.3E-08	0.7458	12.5	8.7	-	-	
						4/23/2021	63	1.2E-08	0.8447	12.7	8.5	-	-	
						4/30/2021	70	1.3E-08	0.9448	12.6	8.8	4120	1082	
						5/07/2021	77	1.3E-08	1.0412	12.9	8.7	-	-	
						5/14/2021	84	1.2E-08	1.1353	12.5	8.8	-	-	
						5/21/2021	91	1.2E-08	1.2335	-	-	-	-	
						5/23/2021	93	1.1E-08	1.2494	13.1	8.8	5230	1179	
						5/28/2021	98	1.2E-08	1.3232	-	-	-	-	
						6/01/2021	102	1.1E-08	1.3620	13.1	8.8	-	-	
						6/04/2021	105	1.2E-08	1.4096	-	-	-	-	
						6/10/2021	111	1.2E-08	1.4753	12.8	8.9	-	-	
						6/11/2021	112	1.2E-08	1.4912	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	6/18/2021	119	1.1E-08	1.5758	13.1	8.8	4630	1162	
						6/25/2021	126	1.2E-08	1.6725	12.5	8.9	-	-	
						7/02/2021	133	1.1E-08	1.7670	-	-	-	-	
						7/06/2021	137	1.2E-08	1.8043	12.8	8.6	-	-	
						7/09/2021	140	1.1E-08	1.8497	-	-	-	-	
						7/16/2021	147	1.1E-08	1.9188	12.4	8.7	4710	1135	
						7/23/2021	154	1.1E-08	2.0140	-	-	-	-	
						7/27/2021	158	1.1E-08	2.0480	12.7	8.8	-	-	
						7/30/2021	161	1.1E-08	2.0934	-	-	-	-	
						8/06/2021	168	1.0E-08	2.1584	12.7	8.8	-	-	
						8/13/2021	175	1.0E-08	2.2418	-	-	-	-	
						8/16/2021	178	1.0E-08	2.2669	12.6	8.6	4550	1252	
						8/20/2021	182	1.1E-08	2.3227	-	-	-	-	
						8/25/2021	187	9.9E-09	2.3699	12.5	8.9	-	-	
						8/27/2021	189	1.1E-08	2.4024	-	-	-	-	
						9/03/2021	196	9.6E-09	2.4751	12.7	8.7	-	-	
						9/10/2021	203	1.0E-08	2.5719	-	-	-	-	
						9/14/2021	207	9.5E-09	2.6058	13.1	8.9	4910	1180	
						9/17/2021	210	1.1E-08	2.6483	-	-	-	-	
						9/24/2021	217	9.5E-09	2.7129	13.2	8.8	-	-	
						10/01/2021	224	9.6E-09	2.7967	-	-	-	-	
						10/07/2021	230	1.0E-08	2.8443	12.9	8.8	-	-	
						10/08/2021	231	1.1E-08	2.8606	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID (-)	Lab No. (-)	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content (%)	Dry Unit Weight (pcf)	Moisture Content (%)	Dry Unit Weight (pcf)	(-)	(-)	Notes 1 & 2 (cm/s)	Note 1 (-)	In Flow (-)	Out Flow (-)	In Flow (µs/cm)	Out Flow (µs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	10/15/2021	238	1.0E-08	2.9374	-	-	-	-	
						10/19/2021	242	8.6E-09	2.9640	12.8	8.5	5420	1180	
						10/22/2021	245	9.6E-09	3.0020	-	-	-	-	
						10/28/2021	251	9.1E-09	3.0618	12.5	8.6	-	-	
						10/29/2021	252	1.0E-08	3.0769	-	-	-	-	
						11/05/2021	259	9.5E-09	3.1541	-	-	-	-	
						11/09/2021	263	8.7E-09	3.1825	12.5	8.6	-	-	
						11/12/2021	266	9.4E-09	3.2228	-	-	-	-	
						11/19/2021	273	8.2E-09	3.2830	-	-	-	-	
						11/23/2021	277	7.2E-09	3.3062	12.8	8.7	5500	1193	
						11/26/2021	280	8.5E-09	3.3450	-	-	-	-	
						12/03/2021	287	8.8E-09	3.4074	-	-	-	-	
						12/08/2021	292	8.3E-09	3.4373	12.8	8.3	-	-	
						12/10/2021	294	8.9E-09	3.4628	-	-	-	-	
						12/17/2021	301	8.8E-09	3.5363	-	-	-	-	
						12/20/2021	304	8.5E-09	3.5584	12.6	8.8	-	-	
						12/24/2021	308	8.7E-09	3.6064	-	-	-	-	
						12/31/2021	315	8.3E-09	3.6673	12.9	8.9	5200	1269	
						1/7/2022	322	8.7E-09	3.7445	-	-	-	-	
						1/12/2022	327	7.5E-09	3.7785	12.3	8.5	-	-	
						1/14/2022	329	8.1E-09	3.8032	-	-	-	-	
						1/21/2022	336	8.1E-09	3.8715	-	-	-	-	
						1/25/2022	340	7.4E-09	3.8948	12.3	8.7	6610	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	1/28/2022	343	8.0E-09	3.9291	-	-	-	-	
						2/4/2022	350	7.7E-09	3.9885	-	-	-	-	
						2/8/2022	354	7.5E-09	4.0137	12.7	9.1	6450	2190	
						2/11/2022	357	8.2E-09	4.0480	-	-	-	-	
						2/18/2022	364	7.7E-09	4.1074	-	-	-	-	
						2/21/2022	367	7.4E-09	4.1259	13.3	10.1	6240	-	
						2/25/2022	371	8.7E-09	4.1720	-	-	-	-	
						3/4/2022	378	8.1E-09	4.2300	13.0	10.1	6300	-	
						3/11/2022	385	8.3E-09	4.3035	-	-	-	-	
						3/17/2022	391	7.2E-09	4.3437	12.8	9.6	5890	1394	
						3/18/2022	392	7.9E-09	4.3563	-	-	-	-	
						3/25/2022	399	9.4E-09	4.4297	-	-	-	-	
						3/29/2022	403	8.1E-09	4.4578	12.4	9.0	6370	-	
						4/1/2022	406	8.4E-09	4.4940	-	-	-	-	
						4/8/2022	413	7.9E-09	4.5534	-	-	-	-	
						4/11/2022	416	7.8E-09	4.5719	12.5	8.7	6580	-	
						4/15/2022	420	8.8E-09	4.6162	-	-	-	-	
						4/22/2022	427	7.3E-09	4.6697	-	-	-	-	
						4/26/2022	431	8.2E-09	4.6945	12.3	8.5	6210	1555	
						4/29/2022	434	8.4E-09	4.7299	-	-	-	-	
						5/6/2022	441	8.8E-09	4.7941	-	-	-	-	
						5/8/2022	443	8.6E-09	4.8085	12.2	8.4	6500	-	
						5/13/2022	448	9.2E-09	4.8650	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	5/20/2022	455	8.2E-09	4.9208	12.1	8.5	6060	-	
						5/27/2022	462	8.8E-09	4.9979	-	-	-	-	
						6/2/2022	468	7.6E-09	5.0389	12.1	8.5	6380	2230	
						6/3/2022	469	7.5E-09	5.0507	-	-	-	-	
						6/10/2022	476	8.4E-09	5.1227	-	-	-	-	
						6/15/2022	481	7.7E-09	5.1563	12.2	8.6	6060	-	
						6/17/2022	483	8.2E-09	5.1833	-	-	-	-	
						6/24/2022	490	8.5E-09	5.2538	-	-	-	-	
						6/29/2022	495	7.9E-09	5.2874	12.2	8.6	5980	-	
						7/1/2022	497	8.3E-09	5.3132	-	-	-	-	
						7/8/2022	504	8.2E-09	5.3816	-	-	-	-	
						7/12/2022	508	7.8E-09	5.4074	12.1	8.5	6060	2310	
						7/15/2022	511	8.5E-09	5.4443	-	-	-	-	
						7/22/2022	518	8.0E-09	5.5067	-	-	-	-	
						7/27/2022	523	7.5E-09	5.5370	12.3	8.4	6320	-	
						7/29/2022	525	7.9E-09	5.5628	-	-	-	-	
						8/5/2022	532	8.1E-09	5.6274	-	-	-	-	
						8/9/2022	536	7.8E-09	5.6540	12.1	8.7	5780	-	
						8/12/2022	539	8.6E-09	5.6917	-	-	-	-	
						8/19/2022	546	8.3E-09	5.7548	12.2	8.8	5980	1965	
						8/26/2022	553	8.2E-09	5.8287	-	-	-	-	
						9/1/2022	559	7.3E-09	5.8700	12.2	8.4	6320	-	
						9/2/2022	560	7.7E-09	5.8829	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	9/9/2022	567	7.9E-09	5.9509	-	-	-	-	
						9/15/2022	573	7.2E-09	5.9893	12.2	8.6	6330	-	
						9/16/2022	574	7.6E-09	6.0022	-	-	-	-	
						9/23/2022	581	8.3E-09	6.0723	-	-	-	-	
						9/28/2022	586	7.6E-09	6.1059	12.2	8.6	6250	2360	
						9/30/2022	588	7.9E-09	6.1296	-	-	-	-	
						10/7/2022	595	7.8E-09	6.1931	-	-	-	-	
						10/12/2022	600	7.2E-09	6.2248	12.6	8.6	6340	-	
						10/14/2022	602	8.0E-09	6.2495	-	-	-	-	
						10/21/2022	609	7.5E-09	6.3116	-	-	-	-	
						10/27/2022	615	8.1E-09	6.3426	12.2	8.7	6320	-	
						10/28/2022	616	7.4E-09	6.3551	-	-	-	-	
						11/4/2022	623	7.9E-09	6.4220	-	-	-	-	
						11/9/2022	628	8.3E-09	6.4593	12.3	8.8	6160	1747	
						11/11/2022	630	8.1E-09	6.4818	-	-	-	-	
						11/18/2022	637	7.2E-09	6.5438	-	-	-	-	
						11/25/2022	644	5.8E-09	6.5811	-	-	-	-	
						11/30/2022	649	6.9E-09	6.6272	12.6	9.2	6670	-	
						12/2/2022	651	6.7E-09	6.6424	-	-	-	-	
						12/9/2022	658	5.7E-09	6.6808	-	-	-	-	
						12/12/2022	661	5.7E-09	6.6937	12.3	8.8	5870	-	
						12/16/2022	665	5.8E-09	6.7103	-	-	-	-	
						12/23/2022	672	6.8E-09	6.7690	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

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Test Results Summary (Page 7)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-4 (70-72.5')	20L132	10.4	130.4	13.5	124.9	12/31/2022	680	5.3E-09	6.8063	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

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Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	2/19/2021	0	9.6E-09	0.0000	-	-	-	-	
						2/26/2021	7	8.8E-09	0.0569	-	-	-	-	
						3/05/2021	14	7.9E-09	0.0951	-	-	-	-	
						3/08/2021	17	7.2E-09	0.1048	12.9	8.4	-	-	
						3/12/2021	21	8.7E-09	0.1397	-	-	-	-	
						3/19/2021	28	7.8E-09	0.1814	-	-	-	-	
						3/24/2021	33	6.8E-09	0.2005	12.9	8.6	-	-	
						3/26/2021	35	8.0E-09	0.2169	-	-	-	-	
						4/02/2021	42	7.7E-09	0.2674	-	-	-	-	
						4/07/2021	47	7.8E-09	0.2876	12.7	8.2	5010	1614	
						4/09/2021	49	8.7E-09	0.3053	-	-	-	-	
						4/16/2021	56	8.2E-09	0.3560	-	-	-	-	
						4/20/2021	60	7.0E-09	0.3745	12.9	8.3	-	-	
						4/23/2021	63	7.9E-09	0.4042	-	-	-	-	
						4/30/2021	70	8.3E-09	0.4585	-	-	-	-	
						5/05/2021	75	7.5E-09	0.4837	13.0	8.5	-	-	
						5/07/2021	77	8.9E-09	0.5072	-	-	-	-	
						5/14/2021	84	7.8E-09	0.5562	-	-	-	-	
						5/18/2021	88	7.5E-09	0.5768	13.2	8.5	5040	1407	
						5/21/2021	91	8.4E-09	0.6044	-	-	-	-	
						5/28/2021	98	7.6E-09	0.6496	12.9	8.6	-	-	
						6/04/2021	105	7.7E-09	0.7118	-	-	-	-	
						6/11/2021	112	7.4E-09	0.7526	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	6/14/2021	115	7.1E-09	0.7655	12.9	8.6	-	-	
						6/18/2021	119	8.0E-09	0.7995	-	-	-	-	
						6/25/2021	126	8.1E-09	0.8405	-	-	-	-	
						6/28/2021	129	6.9E-09	0.8536	12.6	8.7	4520	1515	
						7/02/2021	133	7.6E-09	0.8847	-	-	-	-	
						7/09/2021	140	6.8E-09	0.9269	-	-	-	-	
						7/13/2021	144	6.7E-09	0.9437	12.6	8.6	-	-	
						7/16/2021	147	7.0E-09	0.9677	-	-	-	-	
						7/23/2021	154	7.3E-09	1.0144	-	-	-	-	
						7/29/2021	160	6.6E-09	1.0408	12.4	8.9	-	-	
						7/30/2021	161	7.2E-09	1.0508	-	-	-	-	
						8/06/2021	168	7.0E-09	1.0992	-	-	-	-	
						8/13/2021	175	6.5E-09	1.1333	12.4	8.5	4170	1178	
						8/20/2021	182	7.6E-09	1.1970	-	-	-	-	
						8/27/2021	189	6.9E-09	1.2369	-	-	-	-	
						8/31/2021	193	7.0E-09	1.2539	12.4	8.7	-	-	
						9/03/2021	196	7.2E-09	1.2698	-	-	-	-	
						9/10/2021	203	6.6E-09	1.3120	-	-	-	-	
						9/14/2021	207	6.4E-09	1.3296	13.0	8.9	-	-	
						9/17/2021	210	7.0E-09	1.3537	-	-	-	-	
						9/24/2021	217	6.8E-09	1.3960	-	-	-	-	
						10/01/2021	224	6.3E-09	1.4253	13.0	8.9	5120	928	
						10/08/2021	231	6.9E-09	1.4782	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	10/15/2021	238	6.0E-09	1.5066	-	-	-	-	
						10/19/2021	242	5.8E-09	1.5210	12.6	8.5	-	-	
						10/22/2021	245	6.7E-09	1.5430	-	-	-	-	
						10/29/2021	252	6.8E-09	1.5850	-	-	-	-	
						11/02/2021	256	6.7E-09	1.6032	12.5	8.3	-	-	
						11/05/2021	259	7.3E-09	1.6273	-	-	-	-	
						11/12/2021	266	6.2E-09	1.6675	-	-	-	-	
						11/16/2021	270	6.5E-09	1.6851	12.9	8.6	5230	952	
						11/19/2021	273	7.1E-09	1.7077	-	-	-	-	
						11/26/2021	280	6.6E-09	1.7494	-	-	-	-	
						12/02/2021	286	6.2E-09	1.7734	12.5	8.7	`	-	
						12/03/2021	287	6.8E-09	1.7825	-	-	-	-	
						12/10/2021	294	7.0E-09	1.8289	-	-	-	-	
						12/17/2021	301	6.3E-09	1.8621	-	-	-	-	
						12/20/2021	304	6.4E-09	1.8729	12.5	8.5	-	-	
						12/24/2021	308	6.8E-09	1.9026	-	-	-	-	
						12/31/2021	315	6.6E-09	1.9440	-	-	-	-	
						1/5/2022	320	6.5E-09	1.9666	12.3	8.7	4970	971	
						1/7/2022	322	6.5E-09	1.9818	-	-	-	-	
						1/14/2022	329	6.2E-09	2.0232	-	-	-	-	
						1/21/2022	336	5.6E-09	2.0540	-	-	-	-	
						1/26/2022	341	5.3E-09	2.0687	12.4	8.6	-	-	
						1/28/2022	343	5.5E-09	2.0828	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	2/4/2022	350	6.4E-09	2.1301	-	-	-	-	
						2/11/2022	357	5.9E-09	2.1626	12.4	9.3	6350	-	
						2/18/2022	364	6.6E-09	2.2108	-	-	-	-	
						2/25/2022	371	5.9E-09	2.2419	-	-	-	-	
						2/28/2022	374	5.8E-09	2.2536	12.4	9.6	6320	1062	
						3/4/2022	378	6.8E-09	2.2833	-	-	-	-	
						3/11/2022	385	6.8E-09	2.3238	-	-	-	-	
						3/15/2022	389	6.1E-09	2.3396	13.3	9.7	-	-	
						3/18/2022	392	5.8E-09	2.3614	-	-	-	-	
						3/25/2022	399	7.5E-09	2.4063	-	-	-	-	
						3/30/2022	404	6.0E-09	2.4289	13.1	9.2	6300	-	
						4/1/2022	406	6.3E-09	2.4441	-	-	-	-	
						4/8/2022	413	6.7E-09	2.4879	-	-	-	-	
						4/14/2022	419	6.1E-09	2.5149	13.6	9.9	6200	1716	
						4/15/2022	420	6.6E-09	2.5222	-	-	-	-	
						4/22/2022	427	6.5E-09	2.5677	-	-	-	-	
						4/29/2022	434	6.6E-09	2.6020	12.3	8.3	6230	-	
						5/6/2022	441	7.4E-09	2.6549	-	-	-	-	
						5/13/2022	448	6.9E-09	2.6898	12.2	8.4	5940	-	
						5/20/2022	455	7.4E-09	2.7447	-	-	-	-	
						5/27/2022	462	6.7E-09	2.7808	-	-	-	-	
						5/29/2022	464	6.7E-09	2.7896	12.2	8.4	6250	2660	
						6/3/2022	469	7.2E-09	2.8286	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	6/10/2022	476	7.2E-09	2.8715	-	-	-	-	
						6/14/2022	480	6.9E-09	2.8894	12.1	8.3	5960	-	
						6/17/2022	483	7.4E-09	2.9149	-	-	-	-	
						6/24/2022	490	7.1E-09	2.9601	-	-	-	-	
						6/29/2022	495	6.8E-09	2.9830	12.3	8.8	6120	-	
						7/1/2022	497	7.3E-09	3.0004	-	-	-	-	
						7/8/2022	504	7.3E-09	3.0505	-	-	-	-	
						7/14/2022	510	7.0E-09	3.0781	12.2	8.7	6340	1915	
						7/15/2022	511	7.0E-09	3.0869	-	-	-	-	
						7/22/2022	518	7.1E-09	3.1374	-	-	-	-	
						7/28/2022	524	6.6E-09	3.1680	12.2	8.5	6090	-	
						7/29/2022	525	6.9E-09	3.1773	-	-	-	-	
						8/5/2022	532	7.2E-09	3.2272	-	-	-	-	
						8/11/2022	538	7.1E-09	3.2589	12.3	8.8	6030	-	
						8/12/2022	539	7.3E-09	3.2677	-	-	-	-	
						8/19/2022	546	7.4E-09	3.3194	-	-	-	-	
						8/26/2022	553	6.8E-09	3.3529	12.3	8.6	6010	1468	
						9/2/2022	560	7.2E-09	3.4063	-	-	-	-	
						9/9/2022	567	6.6E-09	3.4421	12.3	8.7	6010	-	
						9/16/2022	574	7.1E-09	3.4943	-	-	-	-	
						9/23/2022	581	7.2E-09	3.5319	-	-	-	-	
						9/26/2022	584	6.3E-09	3.5428	12.2	8.7	9390	-	
						9/30/2022	588	7.2E-09	3.5745	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-1 (25-27')	20L134	17.5	115.3	19.3	113.0	10/7/2022	595	6.9E-09	3.6156	-	-	-	-	
						10/12/2022	600	6.2E-09	3.6370	12.3	8.7	6180	1737	
						10/14/2022	602	7.1E-09	3.6543	-	-	-	-	
						10/21/2022	609	6.5E-09	3.6992	-	-	-	-	
						10/28/2022	616	6.5E-09	3.7315	12.7	8.3	6100	-	
						11/4/2022	623	7.2E-09	3.7829	-	-	-	-	
						11/11/2022	630	7.1E-09	3.8210	12.3	8.8	6200	-	
						11/18/2022	637	6.9E-09	3.8730	-	-	-	-	
						11/25/2022	644	6.4E-09	3.9053	-	-	-	-	
						11/30/2022	649	6.8E-09	3.9352	12.2	9.1	5460	1174	
						12/2/2022	651	6.6E-09	3.9481	-	-	-	-	
						12/9/2022	658	6.2E-09	3.9833	-	-	-	-	
						12/16/2022	665	6.3E-09	4.0212	12.4	9.2	-	-	
						12/23/2022	672	6.6E-09	4.0620	-	-	-	-	
						12/31/2022	680	5.6E-09	4.0972	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
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953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	2/19/2021	0	1.2E-08	0.0000	-	-	-	-	
						2/26/2021	7	1.1E-08	0.0806	-	-	-	-	
						3/05/2021	14	9.8E-09	0.1307	12.9	8.2	-	-	
						3/12/2021	21	1.1E-08	0.1797	-	-	-	-	
						3/15/2021	24	1.1E-08	0.2018	13.0	8.1	-	-	
						3/19/2021	28	1.1E-08	0.2433	-	-	-	-	
						3/26/2021	35	1.1E-08	0.3069	-	-	-	-	
						3/29/2021	38	9.8E-09	0.3268	12.8	8.1	4900	1683	
						4/02/2021	42	1.0E-08	0.3499	-	-	-	-	
						4/09/2021	49	1.1E-08	0.4096	12.5	8.1	-	-	
						4/16/2021	56	1.1E-08	0.4977	-	-	-	-	
						4/19/2021	59	9.7E-09	0.5201	12.8	8.0	-	-	
						4/23/2021	63	1.1E-08	0.5712	-	-	-	-	
						4/29/2021	69	1.1E-08	0.6259	12.9	8.3	4800	1403	
						4/30/2021	70	1.1E-08	0.6437	-	-	-	-	
						5/07/2021	77	1.1E-08	0.7190	12.9	8.7	-	-	
						5/14/2021	84	1.1E-08	0.8032	-	-	-	-	
						5/18/2021	88	9.5E-09	0.8337	13.0	8.3	-	-	
						5/21/2021	91	1.1E-08	0.8753	-	-	-	-	
						5/28/2021	98	9.6E-09	0.9374	12.7	8.2	4720	1187	
						6/04/2021	105	1.0E-08	1.0170	-	-	-	-	
						6/07/2021	108	1.0E-08	1.0408	12.9	8.8	-	-	
						6/11/2021	112	1.1E-08	1.0959	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	6/18/2021	119	9.6E-09	1.1556	13.0	8.6	-	-	
						6/25/2021	126	1.2E-08	1.2446	-	-	-	-	
						6/28/2021	129	1.0E-08	1.2696	12.5	8.8	4350	1128	
						7/02/2021	133	1.1E-08	1.3254	-	-	-	-	
						7/09/2021	140	9.5E-09	1.3907	12.5	8.9	-	-	
						7/16/2021	147	1.0E-08	1.4802	-	-	-	-	
						7/20/2021	151	1.0E-08	1.5136	12.4	8.7	-	-	
						7/23/2021	154	1.1E-08	1.5587	-	-	-	-	
						7/30/2021	161	1.0E-08	1.6277	12.5	8.7	4880	1309	
						8/06/2021	168	1.0E-08	1.6969	-	-	-	-	
						8/10/2021	172	1.0E-08	1.7289	12.5	8.6	-	-	
						8/13/2021	175	1.1E-08	1.7690	-	-	-	-	
						8/20/2021	182	9.8E-09	1.8351	12.7	8.8	-	-	
						8/27/2021	189	1.0E-08	1.9200	-	-	-	-	
						8/30/2021	192	9.8E-09	1.9413	12.6	8.7	4440	1145	
						9/03/2021	196	1.1E-08	2.0070	-	-	-	-	
						9/10/2021	203	9.8E-09	2.0767	12.7	8.9	-	-	
						9/17/2021	210	1.0E-08	2.1633	-	-	-	-	
						9/21/2021	214	1.0E-08	2.1939	12.8	8.8	-	-	
						9/24/2021	217	1.1E-08	2.2390	-	-	-	-	
						10/01/2021	224	9.9E-09	2.3065	-	-	-	-	
						10/04/2021	227	1.0E-08	2.3253	12.8	8.8	5270	1158	
						10/08/2021	231	1.1E-08	2.3839	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

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Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	10/15/2021	238	9.9E-09	2.4447	12.9	9.0	-	-	
						10/22/2021	245	1.0E-08	2.5296	-	-	-	-	
						10/25/2021	248	1.0E-08	2.5555	12.8	8.6	-	-	
						10/29/2021	252	1.1E-08	2.6081	-	-	-	-	
						11/05/2021	259	1.2E-08	2.6600	-	-	-	-	
						11/12/2021	266	1.2E-08	2.6685	-	-	-	-	
						11/15/2021	269	1.2E-08	2.6685	12.8	8.8	5520	1348	
						11/19/2021	273	1.2E-08	2.7086	-	-	-	-	
						11/26/2021	280	1.1E-08	2.7346	-	-	-	-	
						12/03/2021	287	1.0E-08	2.7367	-	-	-	-	
						12/10/2021	294	1.0E-08	2.7306	-	-	-	-	
						12/17/2021	301	1.3E-08	2.7250	-	-	-	-	
						12/24/2021	308	9.4E-09	2.7672	12.4	8.4	-	-	
						12/31/2021	315	9.9E-09	2.8280	-	-	-	-	
						1/5/2022	320	9.6E-09	2.8660	12.4	8.6	-	-	
						1/7/2022	322	1.0E-08	2.8951	-	-	-	-	
						1/14/2022	329	9.4E-09	2.9647	12.4	8.1	5150	1638	
						1/21/2022	336	1.0E-08	3.0500	-	-	-	-	
						1/26/2022	341	9.2E-09	3.0845	12.4	8.4	-	-	
						1/28/2022	343	9.3E-09	3.1118	-	-	-	-	
						2/4/2022	350	9.6E-09	3.1818	12.3	8.7	6110	-	
						2/11/2022	357	1.0E-08	3.2646	-	-	-	-	
						2/15/2022	361	9.6E-09	3.2958	12.4	9.0	6320	1769	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	2/18/2022	364	1.0E-08	3.3360	-	-	-	-	
						2/25/2022	371	9.1E-09	3.3981	12.8	9.5	6330	-	
						3/4/2022	378	9.6E-09	3.4791	-	-	-	-	
						3/9/2022	383	8.8E-09	3.5157	12.8	9.0	-	-	
						3/11/2022	385	9.7E-09	3.5441	-	-	-	-	
						3/18/2022	392	9.5E-09	3.6130	-	-	-	-	
						3/21/2022	395	9.2E-09	3.6340	12.7	9.1	6320	1696	
						3/25/2022	399	1.1E-08	3.6908	-	-	-	-	
						3/30/2022	404	9.7E-09	3.7374	12.8	9.2	6300	-	
						4/1/2022	406	1.0E-08	3.7651	-	-	-	-	
						4/8/2022	413	9.6E-09	3.8336	12.7	9.0	-	-	
						4/15/2022	420	1.0E-08	3.9146	-	-	-	-	
						4/20/2022	425	8.8E-09	3.9501	12.2	8.4	5670	1660	
						4/22/2022	427	9.4E-09	3.9736	-	-	-	-	
						4/29/2022	434	9.8E-09	4.0471	-	-	-	-	
						5/2/2022	437	9.5E-09	4.0681	12.3	8.5	5840	-	
						5/6/2022	441	1.1E-08	4.1235	-	-	-	-	
						5/13/2022	448	9.8E-09	4.1850	12.1	8.5	-	-	
						5/20/2022	455	1.0E-08	4.2695	-	-	-	-	
						5/23/2022	458	9.7E-09	4.2933	12.2	8.5	6250	3930	
						5/27/2022	462	1.1E-08	4.3473	-	-	-	-	
						6/3/2022	469	9.4E-09	4.4080	12.1	8.5	6290	-	
						6/10/2022	476	1.0E-08	4.4944	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	6/14/2022	480	9.9E-09	4.5260	12.1	8.6	5920	-	
						6/17/2022	483	1.0E-08	4.5679	-	-	-	-	
						6/24/2022	490	1.0E-08	4.6372	12.2	8.7	6080	3260	
						7/1/2022	497	1.0E-08	4.7242	-	-	-	-	
						7/5/2022	501	1.0E-08	4.7572	12.1	8.5	5710	-	
						7/8/2022	504	1.0E-08	4.8013	-	-	-	-	
						7/15/2022	511	9.8E-09	4.8688	-	-	-	-	
						7/18/2022	514	8.9E-09	4.8872	12.1	8.6	6090	-	
						7/22/2022	518	1.1E-08	4.9412	-	-	-	-	
						7/28/2022	524	9.6E-09	4.9963	12.2	8.5	-	-	
						7/29/2022	525	1.0E-08	5.0109	-	-	-	-	
						8/5/2022	532	1.0E-08	5.0890	-	-	-	-	
						8/8/2022	535	1.0E-08	5.1125	12.2	8.7	5920	-	
						8/12/2022	539	1.1E-08	5.1675	-	-	-	-	
						8/18/2022	545	1.0E-08	5.2254	12.2	8.6	6370	-	
						8/19/2022	546	1.0E-08	5.2403	-	-	-	-	
						8/26/2022	553	1.0E-08	5.3188	-	-	-	-	
						8/29/2022	556	9.5E-09	5.3412	12.2	8.7	5930	2360	
						9/2/2022	560	9.9E-09	5.3817	-	-	-	-	
						9/9/2022	567	9.4E-09	5.4560	12.3	8.8	6250	-	
						9/16/2022	574	9.8E-09	5.5380	-	-	-	-	
						9/20/2022	578	9.8E-09	5.5703	12.2	8.8	6060	-	
						9/23/2022	581	1.0E-08	5.6112	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-3 (55-57.5')	20L136	12.8	126.5	13.7	125.7	9/30/2022	588	9.4E-09	5.6773	-	-	-	-	
						10/3/2022	591	8.5E-09	5.6957	12.3	8.7	6110	2400	
						10/7/2022	595	9.8E-09	5.7472	-	-	-	-	
						10/14/2022	602	9.5E-09	5.8091	12.6	8.7	6110	-	
						10/21/2022	609	9.1E-09	5.8869	-	-	-	-	
						10/27/2022	615	8.9E-09	5.9305	12.3	8.8	6210	-	
						10/28/2022	616	9.1E-09	5.9448	-	-	-	-	
						11/4/2022	623	1.0E-08	6.0194	-	-	-	-	
						11/7/2022	626	9.8E-09	6.0435	12.2	9.0	6780	1882	
						11/11/2022	630	1.0E-08	6.0957	-	-	-	-	
						11/18/2022	637	8.9E-09	6.1554	12.3	9.0	5980	-	
						11/25/2022	644	8.6E-09	6.2250	-	-	-	-	
						12/2/2022	651	8.7E-09	6.2851	-	-	-	-	
						12/4/2022	653	8.9E-09	6.3064	11.4	9.2	-	-	
						12/9/2022	658	8.5E-09	6.3465	-	-	-	-	
						12/13/2022	662	8.6E-09	6.3781	12.2	9.3	5770	2040	
						12/16/2022	665	8.8E-09	6.4098	-	-	-	-	
						12/23/2022	672	8.5E-09	6.4666	12.5	9.0	6190	-	
						12/31/2022	680	8.3E-09	6.5472	-	-	-	-	

Approved By: NSR
3-29-2023

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID (-)	Lab No. (-)	Test Information: Initial Conditions: Moisture Content (%)	Initial Conditions: Dry Unit Weight (pcf)	Final Conditions: Moisture Content (%)	Final Conditions: Dry Unit Weight (pcf)	Date (-)	Number of Days After Injection (-)	Permeability Notes 1 & 2 (cm/s)	Pore Volumes Passed After Injection Note 1 (-)	pH: In Flow (-)	pH: Out Flow (-)	Electrical Conductivity: In Flow (µs/cm)	Electrical Conductivity: Out Flow (µs/cm)	Remarks
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	2/19/2021	0	1.5E-08	0.0000	-	-	-	-	
						2/26/2021	7	1.3E-08	0.1036	-	-	-	-	
						3/02/2021	11	1.2E-08	0.1370	13.0	8.1	-	-	
						3/05/2021	14	1.4E-08	0.1670	-	-	-	-	
						3/12/2021	21	1.3E-08	0.2552	12.8	8.3	-	-	
						3/19/2021	28	1.3E-08	0.3596	-	-	-	-	
						3/22/2021	31	1.2E-08	0.3836	12.9	8.2	5090	1708	
						3/26/2021	35	1.3E-08	0.4459	-	-	-	-	
						3/30/2021	39	1.3E-08	0.4932	13.0	8.3	-	-	
						4/02/2021	42	1.3E-08	0.5472	-	-	-	-	
						4/08/2021	48	1.2E-08	0.6118	12.9	7.8	-	-	
						4/09/2021	49	1.2E-08	0.6313	-	-	-	-	
						4/16/2021	56	1.2E-08	0.7248	12.8	7.8	4960	1466	
						4/23/2021	63	1.2E-08	0.8017	-	-	-	-	
						4/26/2021	66	1.1E-08	0.8269	12.5	8.0	-	-	
						4/30/2021	70	1.3E-08	0.8910	-	-	-	-	
						5/04/2021	74	1.2E-08	0.9323	12.6	8.4	-	-	
						5/07/2021	77	1.0E-08	0.9736	-	-	-	-	
						5/14/2021	84	1.1E-08	1.0539	12.4	8.4	3970	1043	
						5/21/2021	91	1.1E-08	1.1511	-	-	-	-	
						5/25/2021	95	1.0E-08	1.1973	12.9	8.4	-	-	
						5/28/2021	98	1.1E-08	1.2348	-	-	-	-	
						6/03/2021	104	9.6E-09	1.2870	12.8	8.4	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information Initial Conditions Moisture Content	 Initial Conditions Dry Unit Weight	 Final Conditions Moisture Content	 Final Conditions Dry Unit Weight	 Date	 Number of Days After Injection	 Permeability Notes 1 & 2	 Pore Volumes Passed After Injection Note 1	 pH In Flow	 pH Out Flow	 Electrical Conductivity In Flow	 Electrical Conductivity Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	6/04/2021	105	9.2E-09	1.2870	-	-	-	-	
						6/11/2021	112	1.0E-08	1.3685	-	-	-	-	
						6/14/2021	115	1.0E-08	1.3921	13.0	8.6	4300	1057	
						6/18/2021	119	1.1E-08	1.4484	-	-	-	-	
						6/24/2021	125	1.0E-08	1.5028	12.6	8.7	-	-	
						6/25/2021	126	1.0E-08	1.5197	-	-	-	-	
						7/02/2021	133	1.1E-08	1.6060	12.7	8.8	-	-	
						7/09/2021	140	1.1E-08	1.6995	-	-	-	-	
						7/12/2021	143	1.0E-08	1.7239	12.7	8.5	4100	966	
						7/16/2021	147	1.1E-08	1.7832	-	-	-	-	
						7/23/2021	154	1.1E-08	1.8515	12.3	8.5	-	-	
						7/30/2021	161	1.1E-08	1.9480	-	-	-	-	
						8/02/2021	164	1.1E-08	1.9757	12.7	8.6	-	-	
						8/06/2021	168	1.2E-08	2.0350	-	-	-	-	
						8/13/2021	175	9.9E-09	2.0985	12.4	8.6	4710	963	
						8/20/2021	182	1.0E-08	2.1923	-	-	-	-	
						8/24/2021	186	9.6E-09	2.2242	12.8	8.7	-	-	
						8/27/2021	189	1.1E-08	2.2693	-	-	-	-	
						9/02/2021	195	9.7E-09	2.3282	12.7	8.9	-	-	
						9/03/2021	196	1.0E-08	2.3443	-	-	-	-	
						9/10/2021	203	1.1E-08	2.4329	-	-	-	-	
						9/13/2021	206	9.8E-09	2.4562	12.7	8.9	4720	1028	
						9/17/2021	210	1.1E-08	2.5158	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	9/24/2021	217	9.8E-09	2.5778	12.9	8.8	-	-	
						10/01/2021	224	9.8E-09	2.6619	-	-	-	-	
						10/05/2021	228	1.1E-08	2.6964	12.9	8.9	-	-	
						10/08/2021	231	1.1E-08	2.7414	-	-	-	-	
						10/15/2021	238	9.8E-09	2.8101	12.7	8.9	4610	1034	
						10/22/2021	245	9.7E-09	2.8953	-	-	-	-	
						10/25/2021	248	9.9E-09	2.9223	13.2	8.8	-	-	
						10/29/2021	252	9.5E-09	2.9715	-	-	-	-	
						11/04/2021	258	9.6E-09	3.0267	12.8	8.7	-	-	
						11/05/2021	259	1.0E-08	3.0447	-	-	-	-	
						11/12/2021	266	9.2E-09	3.1205	-	-	-	-	
						11/16/2021	270	8.6E-09	3.1472	12.8	8.6	4610	1043	
						11/19/2021	273	8.9E-09	3.1847	-	-	-	-	
						11/26/2021	280	8.9E-09	3.2515	-	-	-	-	
						11/30/2021	284	8.3E-09	3.2744	12.8	8.6	-	-	
						12/03/2021	287	8.3E-09	3.2872	-	-	-	-	
						12/10/2021	294	9.0E-09	3.3600	12.5	8.7	-	-	
						12/17/2021	301	9.0E-09	3.4388	-	-	-	-	
						12/20/2021	304	9.0E-09	3.4632	12.6	8.6	4330	1069	
						12/24/2021	308	9.1E-09	3.5108	-	-	-	-	
						12/31/2021	315	8.4E-09	3.5702	12.6	8.6	-	-	
						1/7/2022	322	8.8E-09	3.6482	-	-	-	-	
						1/12/2022	327	7.9E-09	3.6828	12.2	8.3	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	1/14/2022	329	8.3E-09	3.7079	-	-	-	-	
						1/21/2022	336	8.1E-09	3.7781	-	-	-	-	
						1/25/2022	340	7.2E-09	3.8014	12.8	8.8	4720	1270	
						1/28/2022	343	7.7E-09	3.8348	-	-	-	-	
						2/4/2022	350	7.6E-09	3.8952	-	-	-	-	
						2/8/2022	354	7.4E-09	3.9203	12.7	8.8	-	-	
						2/11/2022	357	7.9E-09	3.9549	-	-	-	-	
						2/18/2022	364	7.8E-09	4.0157	-	-	-	-	
						2/22/2022	368	7.1E-09	4.0389	12.7	8.4	6400	-	
						2/25/2022	371	8.1E-09	4.0761	-	-	-	-	
						3/4/2022	378	8.1E-09	4.1384	-	-	-	-	
						3/7/2022	381	7.8E-09	4.1575	12.8	8.4	6380	1301	
						3/11/2022	385	8.6E-09	4.2045	-	-	-	-	
						3/18/2022	392	7.7E-09	4.2604	-	-	-	-	
						3/21/2022	395	8.4E-09	4.2803	12.6	8.9	6360	-	
						3/25/2022	399	9.4E-09	4.3321	-	-	-	-	
						4/1/2022	406	7.8E-09	4.3899	-	-	-	-	
						4/4/2022	409	7.5E-09	4.4068	12.4	8.6	6270	-	
						4/8/2022	413	8.3E-09	4.4526	-	-	-	-	
						4/15/2022	420	7.7E-09	4.5100	-	-	-	-	
						4/20/2022	425	6.8E-09	4.5359	12.4	8.2	6230	1337	
						4/22/2022	427	6.7E-09	4.5550	-	-	-	-	
						4/29/2022	434	8.8E-09	4.6256	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	5/2/2022	437	7.8E-09	4.6526	12.2	8.2	6380	-	
						5/6/2022	441	8.8E-09	4.6909	-	-	-	-	
						5/13/2022	448	8.2E-09	4.7532	-	-	-	-	
						5/16/2022	451	7.7E-09	4.7723	12.1	8.5	6570	-	
						5/20/2022	455	8.7E-09	4.8196	-	-	-	-	
						5/27/2022	462	8.1E-09	4.8789	-	-	-	-	
						5/29/2022	464	7.9E-09	4.8921	12.2	8.5	6290	1331	
						6/3/2022	469	8.2E-09	4.9469	-	-	-	-	
						6/10/2022	476	7.8E-09	5.0024	-	-	-	-	
						6/13/2022	479	7.4E-09	5.0193	12.2	8.4	5740	-	
						6/17/2022	483	8.5E-09	5.0658	-	-	-	-	
						6/24/2022	490	7.9E-09	5.1240	-	-	-	-	
						6/27/2022	493	7.4E-09	5.1417	12.2	8.5	6030	-	
						7/1/2022	497	8.7E-09	5.1893	-	-	-	-	
						7/8/2022	504	7.7E-09	5.2479	-	-	-	-	
						7/11/2022	507	7.4E-09	5.2655	12.2	8.5	5620	1450	
						7/15/2022	511	8.3E-09	5.3121	-	-	-	-	
						7/22/2022	518	7.8E-09	5.3702	-	-	-	-	
						7/25/2022	521	7.3E-09	5.3883	12.2	8.4	6050	-	
						7/29/2022	525	8.2E-09	5.4340	-	-	-	-	
						8/5/2022	532	7.5E-09	5.4892	-	-	-	-	
						8/8/2022	535	7.6E-09	5.5080	12.2	8.3	6180	-	
						8/12/2022	539	8.4E-09	5.5568	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	8/19/2022	546	7.8E-09	5.6183	-	-	-	-	
						8/22/2022	549	7.4E-09	5.6371	12.1	8.4	5990	3830	
						8/26/2022	553	8.0E-09	5.6821	-	-	-	-	
						9/2/2022	560	7.3E-09	5.7381	-	-	-	-	
						9/6/2022	564	6.7E-09	5.7602	12.2	8.3	6570	-	
						9/9/2022	567	7.2E-09	5.7940	-	-	-	-	
						9/16/2022	574	7.2E-09	5.8533	-	-	-	-	
						9/20/2022	578	7.4E-09	5.8788	12.2	8.6	6190	-	
						9/23/2022	581	7.8E-09	5.9126	-	-	-	-	
						9/30/2022	588	7.4E-09	5.9715	-	-	-	-	
						10/4/2022	592	6.8E-09	5.9948	12.3	8.5	6140	2280	
						10/7/2022	595	7.5E-09	6.0274	-	-	-	-	
						10/14/2022	602	7.5E-09	6.0864	-	-	-	-	
						10/19/2022	607	6.8E-09	6.1156	12.8	8.7	5990	-	
						10/21/2022	609	6.3E-09	6.1333	-	-	-	-	
						10/28/2022	616	7.0E-09	6.1978	-	-	-	-	
						11/3/2022	622	6.8E-09	6.2335	12.3	8.6	6040	-	
						11/4/2022	623	7.5E-09	6.2459	-	-	-	-	
						11/11/2022	630	7.4E-09	6.3127	-	-	-	-	
						11/18/2022	637	6.4E-09	6.3547	12.2	8.7	6200	1409	
						11/25/2022	644	6.3E-09	6.4110	-	-	-	-	
						12/2/2022	651	5.7E-09	6.4512	-	-	-	-	
						12/5/2022	654	5.1E-09	6.4628	12.3	8.9	6270	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 7)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

		Test Information												
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
Site ID	Lab No.	Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B6-ST-4 (65-67.5')	20L137	10.4	130.7	12.8	125.4	12/9/2022	658	6.5E-09	6.4981	-	-	-	-	
						12/16/2022	665	5.5E-09	6.5428	-	-	-	-	
						12/22/2022	671	5.8E-09	6.5724	12.3	8.8	6090	-	
						12/23/2022	672	6.1E-09	6.5829	-	-	-	-	
						12/31/2022	680	5.6E-09	6.6422	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	2/19/2021	0	1.1E-08	0.0000	-	-	-	-	
						2/26/2021	7	1.0E-08	0.0579	-	-	-	-	
						3/05/2021	14	9.3E-09	0.0949	12.8	7.9	-	-	
						3/12/2021	21	1.0E-08	0.1479	12.7	8.2	-	-	
						3/19/2021	28	1.0E-08	0.2133	-	-	-	-	
						3/24/2021	33	9.3E-09	0.2410	12.9	8.3	4940	1796	
						3/26/2021	35	1.0E-08	0.2526	-	-	-	-	
						4/02/2021	42	1.0E-08	0.3088	12.9	8.6	-	-	
						4/09/2021	49	1.0E-08	0.3731	-	-	-	-	
						4/13/2021	53	1.0E-08	0.3979	12.8	8.6	-	-	
						4/16/2021	56	1.1E-08	0.4322	-	-	-	-	
						4/23/2021	63	9.7E-09	0.4823	13.0	8.6	4380	1263	
						4/30/2021	70	1.1E-08	0.5504	-	-	-	-	
						5/03/2021	73	1.1E-08	0.5685	12.9	8.7	-	-	
						5/07/2021	77	1.2E-08	0.6132	-	-	-	-	
						5/12/2021	82	1.0E-08	0.6501	13.0	8.7	-	-	
						5/14/2021	84	1.1E-08	0.6723	-	-	-	-	
						5/21/2021	91	1.0E-08	0.7300	12.6	8.7	4940	1092	
						5/28/2021	98	1.0E-08	0.7952	12.5	8.6	-	-	
						6/04/2021	105	1.1E-08	0.8643	-	-	-	-	
						6/07/2021	108	1.0E-08	0.8842	12.8	9.0	-	-	
						6/11/2021	112	1.1E-08	0.9272	-	-	-	-	
						6/17/2021	118	9.9E-09	0.9702	12.5	8.8	4450	1170	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID (-)	Lab No. (-)	Test Information: Initial Conditions: Moisture Content (%)	Initial Conditions: Dry Unit Weight (pcf)	Final Conditions: Moisture Content (%)	Final Conditions: Dry Unit Weight (pcf)	Date (-)	Number of Days After Injection (-)	Permeability Notes 1 & 2 (cm/s)	Pore Volumes Passed After Injection Note 1 (-)	pH: In Flow (-)	pH: Out Flow (-)	Electrical Conductivity: In Flow (µs/cm)	Electrical Conductivity: Out Flow (µs/cm)	Remarks
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	6/18/2021	119	1.1E-08	0.9846	-	-	-	-	
						6/25/2021	126	1.1E-08	1.0474	12.3	8.7	-	-	
						7/02/2021	133	1.1E-08	1.1201	-	-	-	-	
						7/06/2021	137	1.1E-08	1.1498	12.4	8.9	-	-	
						7/09/2021	140	1.1E-08	1.1849	-	-	-	-	
						7/16/2021	147	1.0E-08	1.2371	12.6	8.6	4770	1045	
						7/23/2021	154	1.1E-08	1.3083	-	-	-	-	
						7/27/2021	158	1.1E-08	1.3343	12.9	8.8	-	-	
						7/30/2021	161	1.1E-08	1.3698	-	-	-	-	
						8/06/2021	168	1.0E-08	1.4251	12.8	8.7	-	-	
						8/13/2021	175	1.1E-08	1.4963	-	-	-	-	
						8/17/2021	179	9.9E-09	1.5205	12.8	8.9	4670	1025	
						8/20/2021	182	1.1E-08	1.5563	-	-	-	-	
						8/26/2021	188	1.0E-08	1.6050	12.6	8.8	-	-	
						8/27/2021	189	1.1E-08	1.6180	-	-	-	-	
						9/03/2021	196	1.0E-08	1.6817	12.7	8.8	-	-	
						9/10/2021	203	1.0E-08	1.7495	12.5	8.8	4860	976	
						9/17/2021	210	1.1E-08	1.8178	-	-	-	-	
						9/21/2021	214	1.0E-08	1.8420	13.0	8.9	-	-	
						9/24/2021	217	1.1E-08	1.8671	-	-	-	-	
						10/01/2021	224	9.8E-09	1.9288	-	-	-	-	
						10/04/2021	227	1.1E-08	1.9449	13.1	8.9	-	-	
						10/08/2021	231	1.1E-08	1.9896	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	10/15/2021	238	1.0E-08	2.0380	13.0	8.9	4811	997	
						10/22/2021	245	1.0E-08	2.1055	-	-	-	-	
						10/25/2021	248	1.0E-08	2.1260	12.9	9.0	-	-	
						10/29/2021	252	1.1E-08	2.1687	-	-	-	-	
						11/04/2021	258	1.0E-08	2.2133	13.0	8.8	-	-	
						11/05/2021	259	1.0E-08	2.2263	-	-	-	-	
						11/12/2021	266	1.0E-08	2.2877	-	-	-	-	
						11/16/2021	270	9.1E-09	2.3088	13.0	9.0	5800	985	
						11/19/2021	273	1.0E-08	2.3399	-	-	-	-	
						11/26/2021	280	9.3E-09	2.3912	-	-	-	-	
						11/30/2021	284	9.2E-09	2.4103	13.0	8.9	-	-	
						12/03/2021	287	1.1E-08	2.4425	-	-	-	-	
						12/09/2021	293	1.0E-08	2.4875	12.4	8.7	-	-	
						12/10/2021	294	1.0E-08	2.4988	-	-	-	-	
						12/17/2021	301	1.0E-08	2.5605	12.4	9.1	6000	1059	
						12/24/2021	308	1.0E-08	2.6268	12.5	8.5	-	-	
						12/31/2021	315	1.0E-08	2.6928	-	-	-	-	
						1/4/2022	319	1.0E-08	2.7182	12.6	8.8	-	-	
						1/7/2022	322	1.1E-08	2.7510	-	-	-	-	
						1/14/2022	329	9.2E-09	2.8021	12.7	8.3	5420	1418	
						1/21/2022	336	1.0E-08	2.8675	-	-	-	-	
						1/24/2022	339	9.4E-09	2.8845	12.2	8.2	-	-	
						1/28/2022	343	1.0E-08	2.9229	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	2/4/2022	350	9.2E-09	2.9725	12.1	9.0	-	-	
						2/11/2022	357	9.7E-09	3.0356	-	-	-	-	
						2/14/2022	360	9.4E-09	3.0552	12.3	9.1	6410	1190	
						2/18/2022	364	1.0E-08	3.0958	-	-	-	-	
						2/24/2022	370	9.6E-09	3.1385	12.8	8.5	6560	-	
						2/25/2022	371	1.0E-08	3.1501	-	-	-	-	
						3/4/2022	378	1.0E-08	3.2126	-	-	-	-	
						3/7/2022	381	9.9E-09	3.2305	12.8	9.4	6350	-	
						3/11/2022	385	1.1E-08	3.2729	-	-	-	-	
						3/17/2022	391	9.6E-09	3.3158	12.6	9.5	6100	1187	
						3/18/2022	392	9.9E-09	3.3268	-	-	-	-	
						3/25/2022	399	1.2E-08	3.3931	-	-	-	-	
						3/28/2022	402	1.1E-08	3.4118	11.7	9.4	6350	-	
						4/1/2022	406	1.1E-08	3.4548	-	-	-	-	
						4/7/2022	412	9.5E-09	3.4975	11.8	8.7	6390	-	
						4/8/2022	413	9.8E-09	3.5084	-	-	-	-	
						4/11/2022	416	1.0E-08	3.5387	11.7	8.6	6060	1189	
						4/15/2022	420	1.0E-08	3.5710	-	-	-	-	
						4/22/2022	427	9.6E-09	3.6312	-	-	-	-	
						4/27/2022	432	1.0E-08	3.6681	12.1	8.5	6570	-	
						4/29/2022	434	1.0E-08	3.6906	-	-	-	-	
						5/6/2022	441	1.1E-08	3.7526	12.1	8.5	6290	-	
						5/13/2022	448	1.1E-08	3.8227	-	-	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	5/16/2022	451	1.1E-08	3.8431	12.1	8.5	6370	2750	
						5/20/2022	455	1.1E-08	3.8881	-	-	-	-	
						5/25/2022	460	1.1E-08	3.9282	12.2	8.3	6140	-	
						5/27/2022	462	1.1E-08	3.9530	-	-	-	-	
						6/3/2022	469	1.1E-08	4.0127	-	-	-	-	
						6/6/2022	472	1.1E-08	4.0305	12.1	8.5	5800	-	
						6/10/2022	476	1.1E-08	4.0752	-	-	-	-	
						6/15/2022	481	1.0E-08	4.1147	12.1	8.6	5670	2320	
						6/17/2022	483	1.1E-08	4.1398	-	-	-	-	
						6/24/2022	490	1.1E-08	4.2006	-	-	-	-	
						6/27/2022	493	1.1E-08	4.2188	12.1	8.5	6170	-	
						7/1/2022	497	1.1E-08	4.2641	-	-	-	-	
						7/5/2022	501	1.1E-08	4.2978	12.2	8.1	5700	-	
						7/8/2022	504	1.1E-08	4.3249	-	-	-	-	
						7/15/2022	511	1.1E-08	4.3904	-	-	-	-	
						7/18/2022	514	1.0E-08	4.4094	12.8	8.8	5910	3190	
						7/22/2022	518	9.2E-09	4.4483	-	-	-	-	
						7/29/2022	525	1.0E-08	4.5042	-	-	-	-	
						8/1/2022	528	1.0E-08	4.5198	12.2	8.6	6460	-	
						8/5/2022	532	1.1E-08	4.5648	-	-	-	-	
						8/11/2022	538	1.1E-08	4.6121	12.2	8.3	6100	-	
						8/12/2022	539	1.1E-08	4.6247	-	-	-	-	
						8/19/2022	546	1.1E-08	4.6925	12.2	8.8	6160	2580	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	8/26/2022	553	1.1E-08	4.7637	-	-	-	-	
						8/29/2022	556	1.1E-08	4.7842	12.2	8.6	5970	-	
						9/2/2022	560	1.1E-08	4.8292	-	-	-	-	
						9/9/2022	567	1.0E-08	4.8805	12.2	8.6	6420	-	
						9/16/2022	574	1.0E-08	4.9497	-	-	-	-	
						9/20/2022	578	1.1E-08	4.9771	12.2	8.4	6230	2470	
						9/23/2022	581	1.1E-08	5.0128	-	-	-	-	
						9/30/2022	588	1.0E-08	5.0690	12.3	8.4	6310	-	
						10/7/2022	595	1.0E-08	5.1376	-	-	-	-	
						10/11/2022	599	9.9E-09	5.1636	12.3	9.0	6160	-	
						10/14/2022	602	1.1E-08	5.1979	-	-	-	-	
						10/21/2022	609	1.0E-08	5.2527	12.3	8.8	6110	1460	
						10/28/2022	616	1.0E-08	5.3219	-	-	-	-	
						11/1/2022	620	9.2E-09	5.3461	-	-	-	-	
						11/4/2022	623	1.0E-08	5.3807	12.6	8.8	6190	-	
						11/11/2022	630	1.1E-08	5.4386	12.3	8.7	6090	-	
						11/18/2022	637	9.7E-09	5.5050	-	-	-	-	
						11/23/2022	642	8.9E-09	5.5338	12.3	8.9	6040	-	
						11/25/2022	644	9.2E-09	5.5543	-	-	-	-	
						12/2/2022	651	9.0E-09	5.6064	-	-	-	-	
						12/9/2022	658	9.3E-09	5.6580	-	-	-	-	
						12/16/2022	665	8.1E-09	5.7016	-	-	-	-	
						12/19/2022	668	8.8E-09	5.7169	12.3	8.9	6220	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

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Test Results Summary (Page 7)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-2 (40-42')	20L140	15.4	111.4	19.3	113.2	12/23/2022	672	1.0E-08	5.7564	-	-	-	-	
						12/31/2022	680	7.9E-09	5.8048	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

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Test Results Summary (Page 1)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10.0	131.1	11.9	129.7	2/19/2021	0	2.7E-08	0.0000	-	-	-	-	
						2/26/2021	7	2.0E-08	0.1488	12.9	8.1	-	-	
						3/05/2021	14	1.9E-08	0.2955	12.6	8.2	-	-	
						3/12/2021	21	1.8E-08	0.3934	12.8	8.1	5030	1540	
						3/19/2021	28	1.7E-08	0.5322	12.8	8.6	-	-	
						3/26/2021	35	1.8E-08	0.6418	12.6	8.5	-	-	
						4/01/2021	41	2.0E-08	0.7702	13.0	8.4	4990	1302	
						4/02/2021	42	2.0E-08	0.7702	-	-	-	-	
						4/08/2021	48	1.7E-08	0.8410	12.7	7.9	-	-	
						4/09/2021	49	1.9E-08	0.8702	-	-	-	-	
						4/14/2021	54	1.7E-08	0.9669	13.0	8.4	-	-	
						4/16/2021	56	1.9E-08	1.0156	-	-	-	-	
						4/20/2021	60	1.6E-08	1.0836	13.0	8.4	4980	2430	
						4/23/2021	63	1.7E-08	1.1540	-	-	-	-	
						4/27/2021	67	1.5E-08	1.2140	12.4	8.2	-	-	
						4/30/2021	70	1.7E-08	1.2861	-	-	-	-	
						5/04/2021	74	1.6E-08	1.3432	12.6	8.5	-	-	
						5/07/2021	77	1.5E-08	1.4120	-	-	-	-	
						5/14/2021	84	1.4E-08	1.5183	12.3	8.8	4230	1155	
						5/21/2021	91	1.5E-08	1.6395	12.9	8.8	-	-	
						5/28/2021	98	1.5E-08	1.7642	12.6	9.0	-	-	
						6/04/2021	105	1.4E-08	1.8838	12.2	8.6	5080	885	
						6/11/2021	112	1.4E-08	2.0055	12.8	8.5	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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Test Results Summary (Page 2)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10.0	131.1	11.9	129.7	6/18/2021	119	1.4E-08	2.1292	13.0	8.5	-	-	
						6/25/2021	126	1.4E-08	2.2538	12.3	8.5	5010	900	
						7/02/2021	133	1.4E-08	2.3764	13.0	8.5	-	-	
						7/09/2021	140	1.4E-08	2.5097	13.2	8.6	-	-	
						7/16/2021	147	1.4E-08	2.6319	12.3	8.6	4520	1056	
						7/23/2021	154	1.4E-08	2.7535	12.4	8.6	-	-	
						7/30/2021	161	1.4E-08	2.8669	12.3	8.6	-	-	
						8/06/2021	168	1.3E-08	2.9836	12.8	8.8	4650	1065	
						8/13/2021	175	1.2E-08	3.0915	-	-	-	-	
						8/16/2021	178	1.2E-08	3.1207	12.5	8.4	-	-	
						8/20/2021	182	1.4E-08	3.1966	-	-	-	-	
						8/24/2021	186	1.2E-08	3.2449	12.6	8.5	-	-	
						8/27/2021	189	1.4E-08	3.3037	-	-	-	-	
						9/01/2021	194	1.2E-08	3.3637	12.8	8.7	4710	1170	
						9/03/2021	196	1.3E-08	3.4058	-	-	-	-	
						9/09/2021	202	1.1E-08	3.4812	12.8	8.6	-	-	
						9/10/2021	203	1.2E-08	3.5045	-	-	-	-	
						9/17/2021	210	1.2E-08	3.5971	-	-	-	-	
						9/20/2021	213	1.1E-08	3.6212	12.8	8.7	-	-	
						9/24/2021	217	1.3E-08	3.6942	-	-	-	-	
						10/01/2021	224	1.0E-08	3.7642	12.9	8.7	5730	974	
						10/08/2021	231	1.2E-08	3.8721	-	-	-	-	
						10/12/2021	235	1.1E-08	3.9071	13.1	8.8	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

Test Results Summary (Page 3)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10	131.1	11.9	129.7	10/15/2021	238	1.3E-08	3.9609	-	-	-	-	
						10/22/2021	245	1.0E-08	4.0313	13.0	8.8	-	-	
						10/29/2021	252	1.1E-08	4.1397	-	-	-	-	
						11/01/2021	255	1.1E-08	4.1659	12.8	8.7	5450	983	
						11/05/2021	259	1.2E-08	4.2318	-	-	-	-	
						11/09/2021	263	9.6E-09	4.2893	-	-	-	-	
						11/12/2021	266	9.1E-09	4.2960	12.9	8.7	-	-	
						11/19/2021	273	9.3E-09	4.3647	-	-	-	-	
						11/24/2021	278	9.6E-09	4.4006	12.6	8.5	-	-	
						11/26/2021	280	1.1E-08	4.4402	-	-	-	-	
						12/03/2021	287	9.4E-09	4.5152	-	-	-	-	
						12/08/2021	292	9.2E-09	4.5502	12.7	8.5	5960	1077	
						12/10/2021	294	1.0E-08	4.5819	-	-	-	-	
						12/17/2021	301	9.1E-09	4.6436	-	-	-	-	
						12/20/2021	304	9.3E-09	4.6669	12.7	8.5	-	-	
						12/24/2021	308	1.1E-08	4.7273	-	-	-	-	
						12/30/2021	314	8.8E-09	4.7823	12.7	8.4	-	-	
						12/31/2021	315	9.6E-09	4.8007	-	-	-	-	
						1/7/2022	322	9.2E-09	4.8832	-	-	-	-	
						1/10/2022	325	8.8E-09	4.9003	12.2	8.8	5410	1032	
						1/14/2022	329	1.0E-08	4.9570	-	-	-	-	
						1/21/2022	336	8.3E-09	5.0224	-	-	-	-	
						1/24/2022	339	7.7E-09	5.0391	12.4	8.3	-	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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Test Results Summary (Page 4)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight					In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10	131.1	11.9	129.7	1/28/2022	343	1.1E-08	5.0962	-	-	-	-	
						2/4/2022	350	7.9E-09	5.1591	-	-	-	-	
						2/8/2022	354	8.7E-09	5.1878	12.8	8.7	6430	-	
						2/11/2022	357	1.0E-08	5.2333	-	-	-	-	
						2/18/2022	364	8.0E-09	5.2966	-	-	-	-	
						2/21/2022	367	7.5E-09	5.3158	12.7	8.9	6480	1194	
						2/25/2022	371	1.1E-08	5.3737	-	-	-	-	
						3/4/2022	378	8.6E-09	5.4362	12.7	8.7	-	-	
						3/11/2022	385	8.9E-09	5.5267	-	-	-	-	
						3/15/2022	389	8.0E-09	5.5575	12.3	8.7	6320	-	
						3/18/2022	392	9.4E-09	5.6017	-	-	-	-	
						3/25/2022	399	9.7E-09	5.6717	-	-	-	-	
						3/28/2022	402	9.6E-09	5.6934	12.7	8.5	6350	1218	
						4/1/2022	406	1.0E-08	5.7496	-	-	-	-	
						4/8/2022	413	8.2E-09	5.8088	12.6	8.5	6100	-	
						4/15/2022	420	8.8E-09	5.8938	-	-	-	-	
						4/21/2022	426	6.9E-09	5.9334	12.2	8.1	-	-	
						4/22/2022	427	7.9E-09	5.9464	-	-	-	-	
						4/29/2022	434	8.3E-09	6.0255	-	-	-	-	
						5/3/2022	438	8.4E-09	6.0568	12.2	8.3	6380	1304	
						5/6/2022	441	1.0E-08	6.1026	-	-	-	-	
						5/13/2022	448	8.5E-09	6.1681	-	-	-	-	
						5/16/2022	451	8.0E-09	6.1881	12.1	8.1	6160	-	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

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Test Results Summary (Page 5)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(μs/cm)	(μs/cm)	
B9-ST-3 (55-57')	20L141	10	131.1	11.9	129.7	5/20/2022	455	9.5E-09	6.2423	-	-	-	-	
						5/27/2022	462	8.3E-09	6.3060	-	-	-	-	
						5/29/2022	464	8.4E-09	6.3206	12.1	8.4	6250	-	
						6/3/2022	469	8.5E-09	6.3840	-	-	-	-	
						6/10/2022	476	8.0E-09	6.4456	-	-	-	-	
						6/13/2022	479	8.7E-09	6.4665	12.2	8.4	6130	2760	
						6/17/2022	483	8.1E-09	6.5169	-	-	-	-	
						6/24/2022	490	7.8E-09	6.5803	-	-	-	-	
						6/27/2022	493	8.8E-09	6.5998	12.2	8.4	5990	-	
						7/1/2022	497	8.8E-09	6.6511	-	-	-	-	
						7/8/2022	504	8.0E-09	6.7153	-	-	-	-	
						7/11/2022	507	7.4E-09	6.7332	12.1	8.3	6140	-	
						7/15/2022	511	8.4E-09	6.7832	-	-	-	-	
						7/22/2022	518	7.8E-09	6.8457	-	-	-	-	
						7/27/2022	523	7.0E-09	6.8766	12.2	8.4	5960	2420	
						7/29/2022	525	7.6E-09	6.9032	-	-	-	-	
						8/5/2022	532	7.7E-09	6.9712	-	-	-	-	
						8/11/2022	538	7.7E-09	7.0133	12.3	8.5	6190	-	
						8/12/2022	539	8.0E-09	7.0270	-	-	-	-	
						8/19/2022	546	7.9E-09	7.1020	-	-	-	-	
						8/26/2022	553	7.1E-09	7.1500	12.2	8.4	6410	-	
						9/2/2022	560	7.6E-09	7.2258	-	-	-	-	
						9/9/2022	567	6.8E-09	7.2750	12.2	8.6	6290	1929	

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

3-29-2023
Approved By: NSR

Test Results Summary (Page 6)

Compatibility Test Results

Project Name: Monroe Ash Basin ALD

Project No.: PN1016

Site ID	Lab No.	Test Information: Initial Conditions: Moisture Content	Initial Conditions: Dry Unit Weight	Final Conditions: Moisture Content	Final Conditions: Dry Unit Weight	Date	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH: In Flow	pH: Out Flow	Electrical Conductivity: In Flow	Electrical Conductivity: Out Flow	Remarks
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B9-ST-3 (55-57')	20L141	10	131.1	11.9	129.7	9/16/2022	574	7.5E-09	7.3500	-	-	-	-	
						9/23/2022	581	7.3E-09	7.4013	12.2	8.2	6310	-	
						9/30/2022	588	7.4E-09	7.4755	-	-	-	-	
						10/7/2022	595	6.8E-09	7.5238	-	-	-	-	
						10/10/2022	598	6.3E-09	7.5396	12.3	8.6	6210	-	
						10/14/2022	602	7.7E-09	7.5863	-	-	-	-	
						10/21/2022	609	6.7E-09	7.6434	-	-	-	-	
						10/27/2022	615	6.2E-09	7.6784	12.3	8.6	6070	-	
						10/28/2022	616	6.5E-09	7.6913	-	-	-	-	
						11/4/2022	623	7.3E-09	7.7576	-	-	-	-	
						11/11/2022	630	7.2E-09	7.8068	12.3	8.7	5390	-	
						11/18/2022	637	6.6E-09	7.8776	-	-	-	-	
						11/25/2022	644	5.7E-09	7.9189	-	-	-	-	
						12/2/2022	651	5.9E-09	7.9626	-	-	-	-	
						12/9/2022	658	5.7E-09	8.0143	-	-	-	-	
						12/16/2022	665	5.1E-09	8.0518	-	-	-	-	
						12/19/2022	668	5.6E-09	8.0664	12.3	9.0	6170	1430	
						12/23/2022	672	6.8E-09	8.1056	-	-	-	-	
						12/31/2022	680	5.4E-09	8.1585	-	-	-	-	

3-29-2023
Approved By: NSR

Notes: 1- Based on Specimen Final Conditions. 2- Based on average of four readings.

APPENDIX N – GROUNDWATER PROTECTION STANDARD CALCULATIONS

TRC
1540 Eisenhower Pl.
Ann Arbor, MI 48108
T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date: November 24, 2021

To: Chris Scieszka, DTE Electric Company

From: Vince Buening, TRC
Sarah Holmstrom, TRC
Kristin Lowery, TRC

Project No.: 413591.0001.0000 Phase 1 Task 1

Subject: Groundwater Protection Standard Calculation – DTE Electric Company, Monroe Power Plant Fly Ash Basin

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DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Monroe Power Plant (MONPP) Fly Ash Basin (FAB) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule[1] ("Part B") that allows a facility to prepare a demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the MONPP FAB remains in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)[2], the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the MONPP FAB CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the MONPP FAB from August 2016 through July 2017, as part of

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[1] On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.

[2] As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

initiating the detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to July 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the MONPP FAB were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Per the Stats Plan, the MONPP FAB CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for MONPP FAB includes MW-16-01 through MW-16-07. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of non-detects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix IV parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 1.

Tolerance Limits

Table 1 presents the calculated UTLs for the background/baseline data sets. As discussed above, the MONPP FAB CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For nonnormal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 2.

Attachments

Table 1 – Summary of Descriptive Statistics and Tolerance Limit Calculations
Table 2 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

Tables

Table 1

Summary of Descriptive Statistics and Tolerance Limit Calculations

DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Antimony (µg/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	2.1
MW-16-02	100% Non-Detect				N	PQL	2.0
MW-16-03	100% Non-Detect				N	PQL	2.0
MW-16-04	100% Non-Detect				N	PQL	2.0
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0
Arsenic (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	100% Non-Detect				N	PQL	5.0
MW-16-05	100% Non-Detect				N	PQL	5.0
MW-16-06	100% Non-Detect				N	PQL	5.0
MW-16-07	100% Non-Detect				N	PQL	5.0
Barium (µg/L)							
MW-16-01	1 < 1.24799	1 < 1.14617	0.818 > 0.773186	0.818 > 0.796129	N	Non-Parametric	22
MW-16-02	-1 < 0.250149 < 1	--	--	--	N	Parametric	10
MW-16-03	1 < 1.70053	1 < 1.34927	0.818 > 0.724093	0.818 > 0.813257	N	Non-Parametric	21
MW-16-04	-1 < -0.0503771 < 1	--	--	--	N	Parametric	13
MW-16-05	-1 < 0.148075 < 1	--	--	--	N	Parametric	18
MW-16-06	1 < 2.07628	1 < 1.70345	0.818 > 0.616693	0.818 > 0.74454	N	Non-Parametric	34
MW-16-07	-1 < 0.362311 < 1	--	--	--	N	Parametric	10

Notes:

2.14275 > 1 -1 < 0.537721 < 1 0.818 > 0.781314

Skewness Coefficient

Shapiro-Wilks 5%
Critical Value

Shapiro-Wilks 'W' Statistic

PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

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DTE Electric Company – Monroe Fly Ash Basin

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	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Beryllium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0
Cadmium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0
Chromium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	2.0
MW-16-02	100% Non-Detect				N	PQL	2.0
MW-16-03	> 50% Non-Detect				N	Non-Parametric	3.1
MW-16-04	100% Non-Detect				N	PQL	2.0
MW-16-05	100% Non-Detect				N	PQL	2.0
MW-16-06	100% Non-Detect				N	PQL	2.0
MW-16-07	100% Non-Detect				N	PQL	2.0

Notes:

2.14275 > 1 ↖ Skewness Coefficient ↗ -1 < 0.537721 < 1

Shapiro-Wilks 5% Critical Value ↗ 0.818 > 0.781314 ↖ Shapiro-Wilks 'W' Statistic

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	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Cobalt (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	> 50% Non-Detect				N	Non-Parametric	1.6
MW-16-07	100% Non-Detect				N	PQL	1.0
Fluoride (mg/L)							
MW-16-01	-1.46198 < -1	-1.68889 < -1	0.881 > 0.738606	0.881 > 0.704751	N	Non-Parametric	1.8
MW-16-02	-1 < 0.305853 < 1	--	--	--	N	Parametric	1.8
MW-16-03	-1 < 0.519238 < 1	--	--	--	N	Parametric	1.7
MW-16-04	-1 < 0.0678206 < 1	--	--	--	N	Parametric	1.1
MW-16-05	-1 < 0.234243 < 1	--	--	--	N	Parametric	1.7
MW-16-06	-1 < 0.477107 < 1	--	--	--	N	Parametric	1.8
MW-16-07	-1 < 0.268653 < 1	--	--	--	N	Parametric	1.8
Lead (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	> 50% Non-Detect				N	Non-Parametric	2.5
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	> 50% Non-Detect				N	Non-Parametric	1.1
MW-16-07	100% Non-Detect				N	PQL	1.0

Notes:

2.14275 > 1 -1 < 0.537721 < 1 0.818 > 0.781314

Skewness Coefficient Shapiro-Wilks 5% Critical Value Shapiro-Wilks 'W' Statistic

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Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Lithium (µg/L)							
MW-16-01	-1 < -0.00922775 < 1	--	--	--	N	Parametric	92
MW-16-02	-1 < 0.354013 < 1	--	--	--	N	Parametric	120
MW-16-03	-1 < 0.238026 < 1	--	--	--	N	Parametric	130
MW-16-04	-1 < 0.528018 < 1	--	--	--	N	Parametric	23
MW-16-05	1 < 1.20828	1 < 1.11889	0.818 < 0.850222	--	N	Parametric	50
MW-16-06	-1 < 0.69322 < 1	--	--	--	N	Parametric	100
MW-16-07	-1 < 0.578591 < 1	--	--	--	N	Parametric	43
Mercury (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	0.20
MW-16-02	100% Non-Detect				N	PQL	0.20
MW-16-03	100% Non-Detect				N	PQL	0.20
MW-16-04	100% Non-Detect				N	PQL	0.20
MW-16-05	100% Non-Detect				N	PQL	0.20
MW-16-06	100% Non-Detect				N	PQL	0.20
MW-16-07	100% Non-Detect				N	PQL	0.20
Molybdenum (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	10
MW-16-02	100% Non-Detect				N	PQL	10
MW-16-03	100% Non-Detect				N	PQL	10
MW-16-04	100% Non-Detect				N	PQL	10
MW-16-05	100% Non-Detect				N	PQL	10
MW-16-06	100% Non-Detect				N	PQL	10
MW-16-07	100% Non-Detect				N	PQL	10

Notes:

2.14275 > 1 -1 < 0.537721 < 1 0.818 > 0.781314

Skewness Coefficient

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Table 1
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DTE Electric Company – Monroe Fly Ash Basin

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Radium 226/228 (pCi/L)							
MW-16-01	-1 < -0.526697 < 1	--	--	--	N	Parametric	1.30
MW-16-02	-1 < 0.246436 < 1	--	--	--	N	Parametric	3.96
MW-16-03	-1 < -0.900004 < 1	--	--	--	N	Parametric	3.01
MW-16-04	-1 < 0.590727 < 1	--	--	--	N	Parametric	1.20
MW-16-05	-1 < 0.745027 < 1	--	--	--	N	Parametric	2.73
MW-16-06	1 < 1.03253	-1 < 0.756658 < 1	--	--	N	Parametric	1.09
MW-16-07	1 < 1.42309	1 < 1.05411	0.818 > 0.810823	0.818 < 0.876893	N	Parametric	1.42
Selenium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	100% Non-Detect				N	PQL	5.0
MW-16-05	100% Non-Detect				N	PQL	5.0
MW-16-06	100% Non-Detect				N	PQL	5.0
MW-16-07	100% Non-Detect				N	PQL	5.0
Thallium (µg/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-05	100% Non-Detect				N	PQL	1.0
MW-16-06	100% Non-Detect				N	PQL	1.0
MW-16-07	100% Non-Detect				N	PQL	1.0

Notes:

2.14275 > 1 -1 < 0.537721 < 1 0.818 > 0.781314

Skewness Coefficient

Shapiro-Wilks 5% Critical Value

Shapiro-Wilks 'W' Statistic

PQL = Practical Quantitation Limit
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pCi/L = picocuries per liter

Table 2
Summary of Groundwater Protection Standards
DTE Electric Company – Monroe Fly Ash Basin

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.1	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**
Arsenic	ug/L	MCL	10	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10**	5.0	**10.0**	5.0	**10**
Barium	ug/L	MCL	2,000	22	**2,000**	10	**2,000**	21	**2,000**	13	**2,000**	18	**2,000**	34	**2,000**	10	**2,000**
Beryllium	ug/L	MCL	4	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**
Cadmium	ug/L	MCL	5	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**
Chromium	ug/L	MCL	100	2.0	**100**	2.0	**100**	3.1	**100**	2.0	**100**	2.0	**100**	2.0	**100**	2.0	**100**
Cobalt	ug/L	RSL	6	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.0	**6.0**	1.6	**6.0**	1.0	**6.0**
Fluoride	mg/L	MCL	4	1.8	**4.0**	1.8	**4.0**	1.7	**4.0**	1.1	**4.0**	1.7	**4.0**	1.8	**4.0**	1.8	**4.0**
Lead	ug/L	RSL	15	1.0	**15**	1.0	**15**	2.5	**15**	1.0	**15**	1.0	**15**	1.1	**15**	1.0	**15**
Lithium	ug/L	Background or RSL	40	92	**92**	120	**120**	130	**130**	23	**40**	50	**50**	100	**100**	43	**43**
Mercury	ug/L	MCL	2	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**
Molybdenum	ug/L	RSL	100	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**	10	**100**
Radium-226/228	pCi/L	MCL	5	1.30	**5.00**	3.96	**5.00**	3.01	**5.00**	1.20	**5.00**	2.73	**5.00**	1.09	**5.00**	1.42	**5.00**
Selenium	ug/L	MCL	50	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**
Thallium	ug/L	MCL	2	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**

Notes:

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

RSL - Regional Screening Level from 83 FR 36435.

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

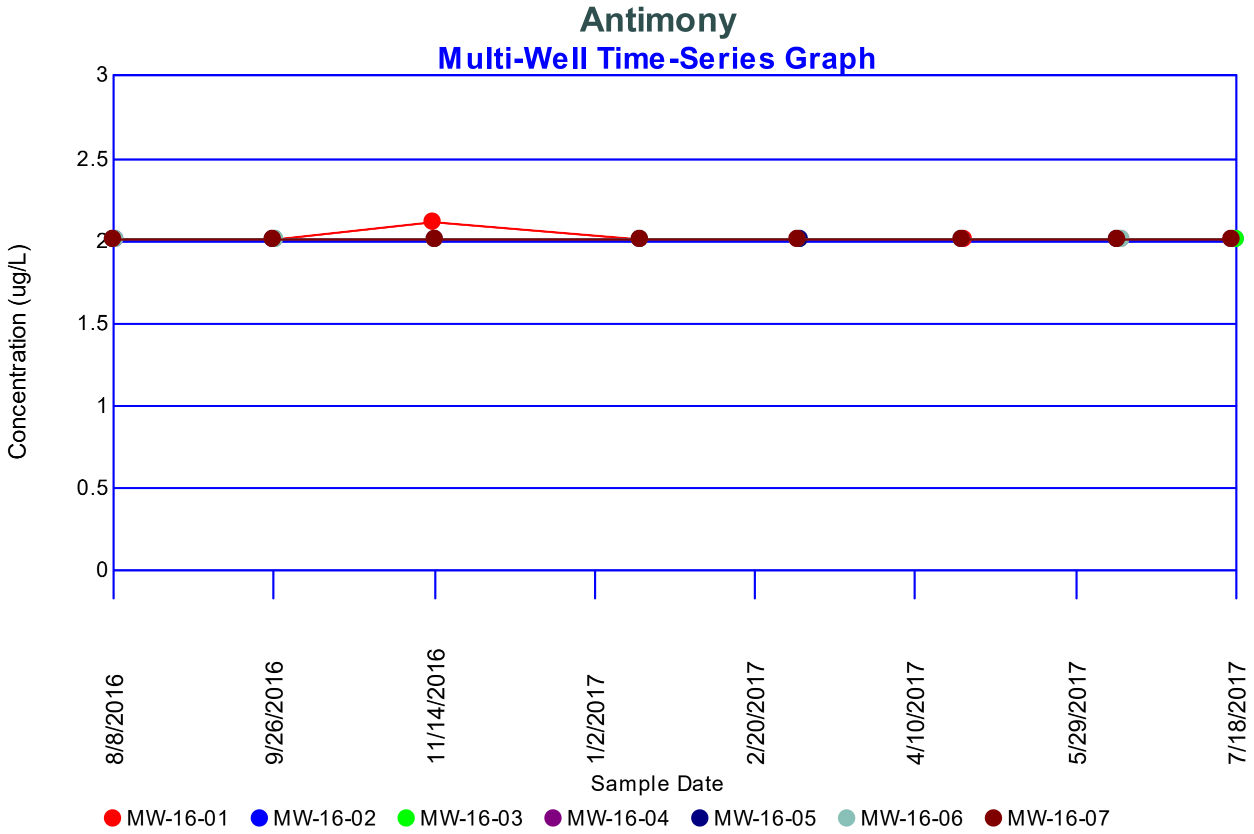
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

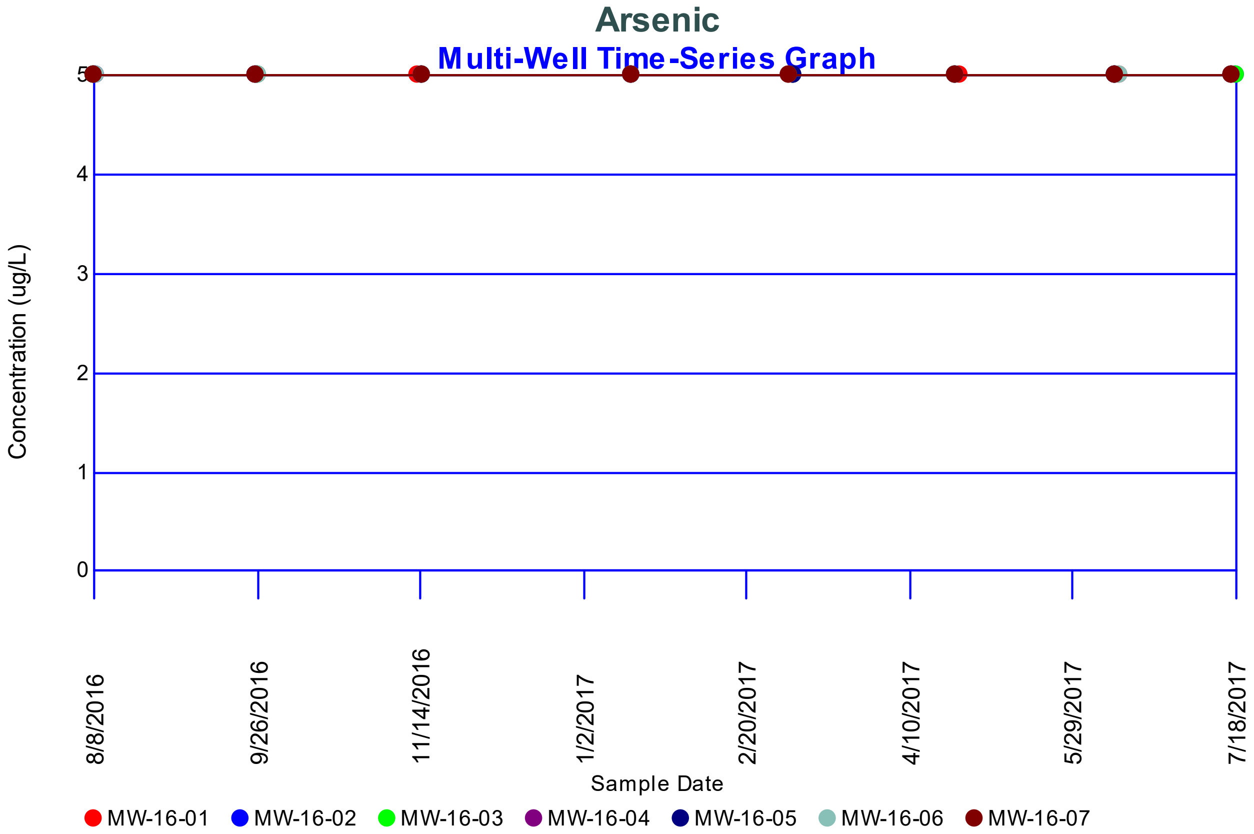
ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

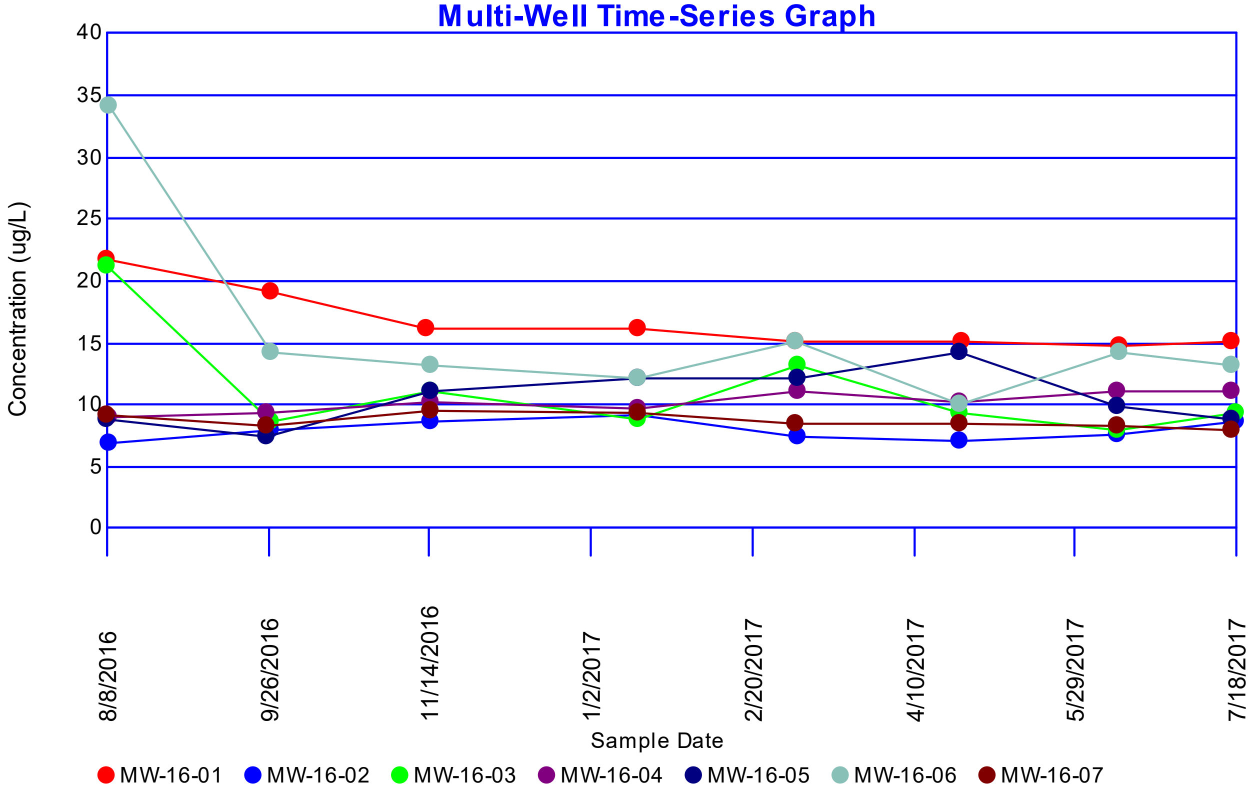
Attachment A
ChemStat™ Outputs

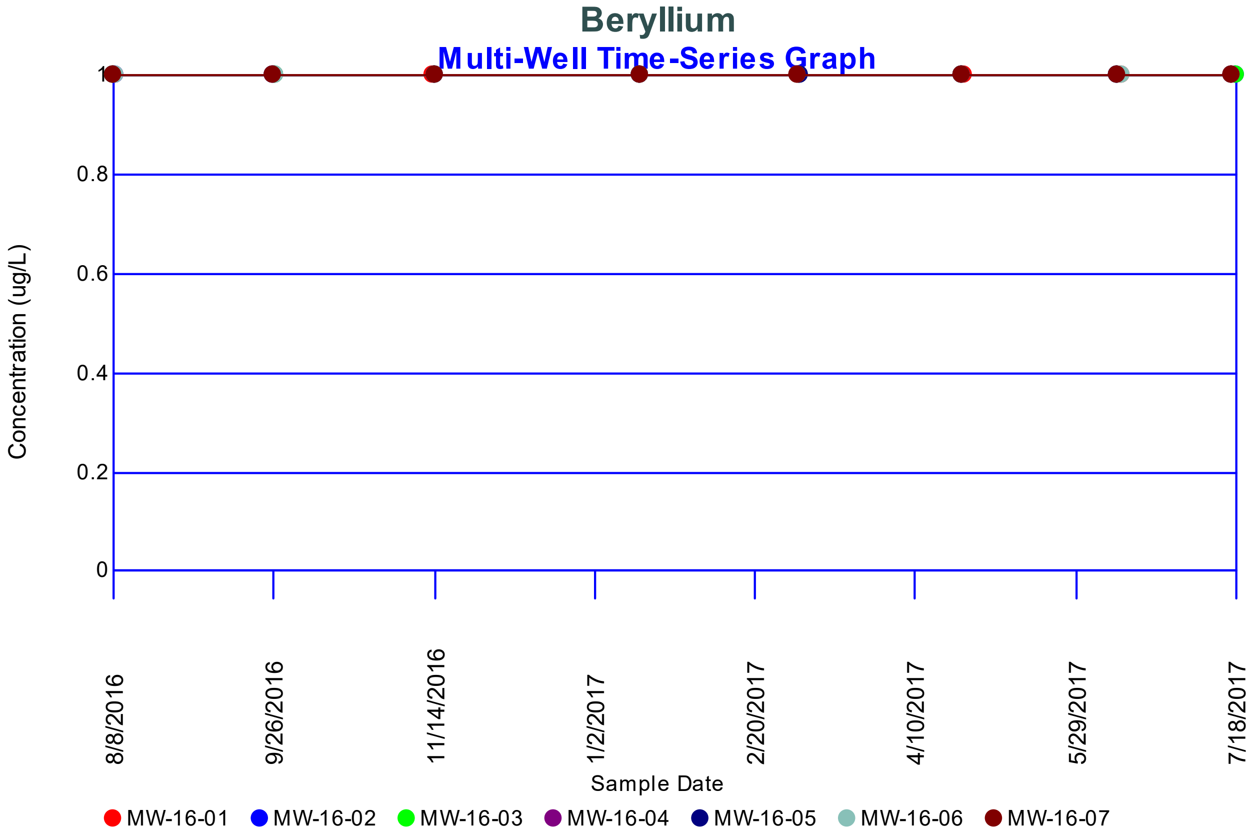

Antimony
Multi-Well Time-Series Graph
Concentration (ug/L)
3
2.5
2
1.5
1
0.5
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
● MW-16-01
● MW-16-02
● MW-16-03
● MW-16-04
● MW-16-05
● MW-16-06
● MW-16-07

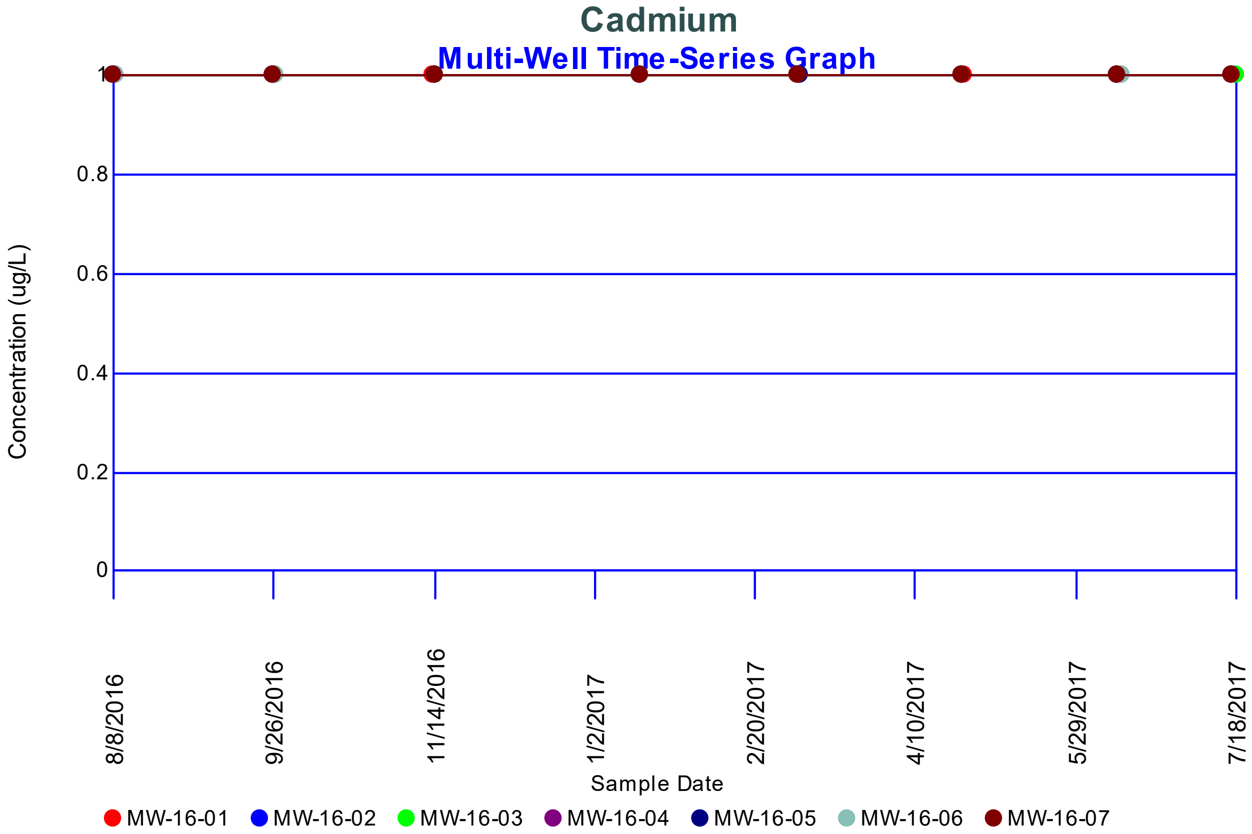

Arsenic
Multi-Well Time-Series Graph
Concentration (ug/L)
0
1
2
3
4
5
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
● MW-16-01
● MW-16-02
● MW-16-03
● MW-16-04
● MW-16-05
● MW-16-06
● MW-16-07

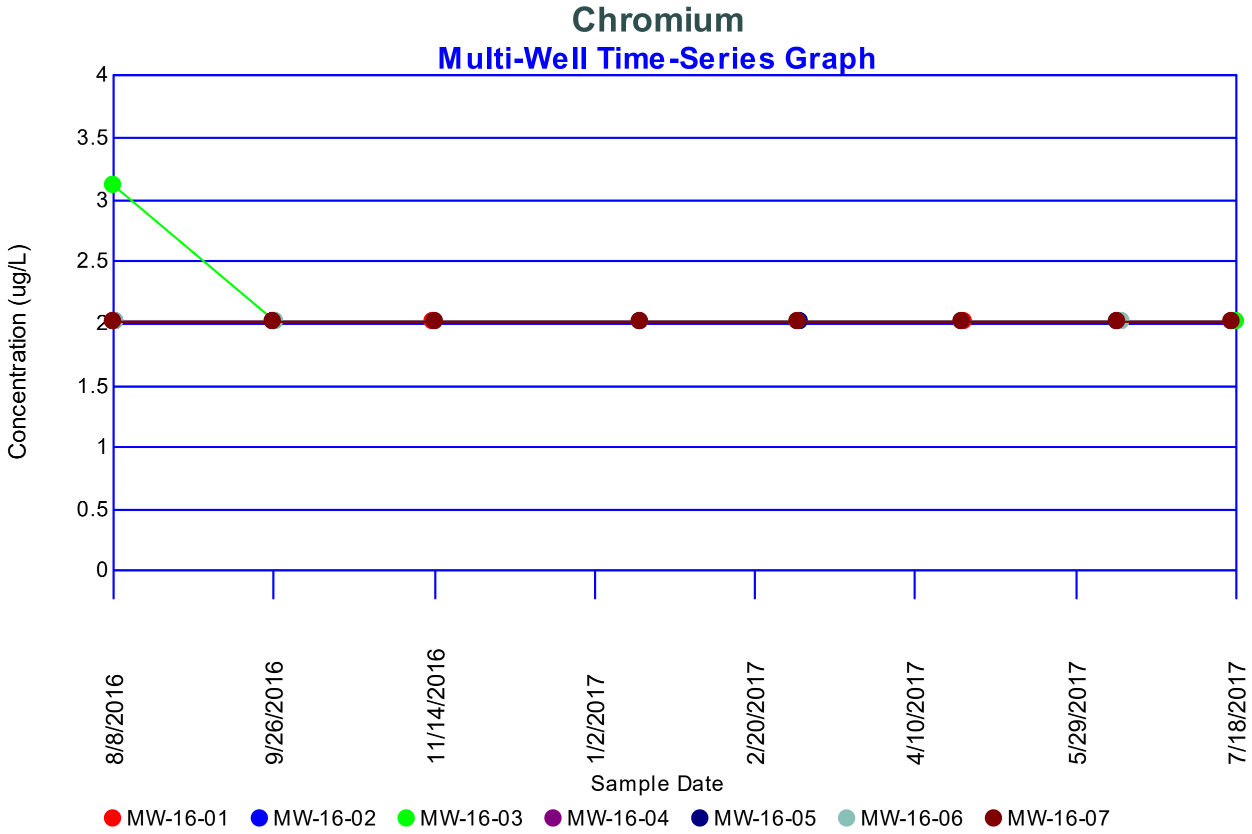
Barium

Multi-Well Time-Series Graph



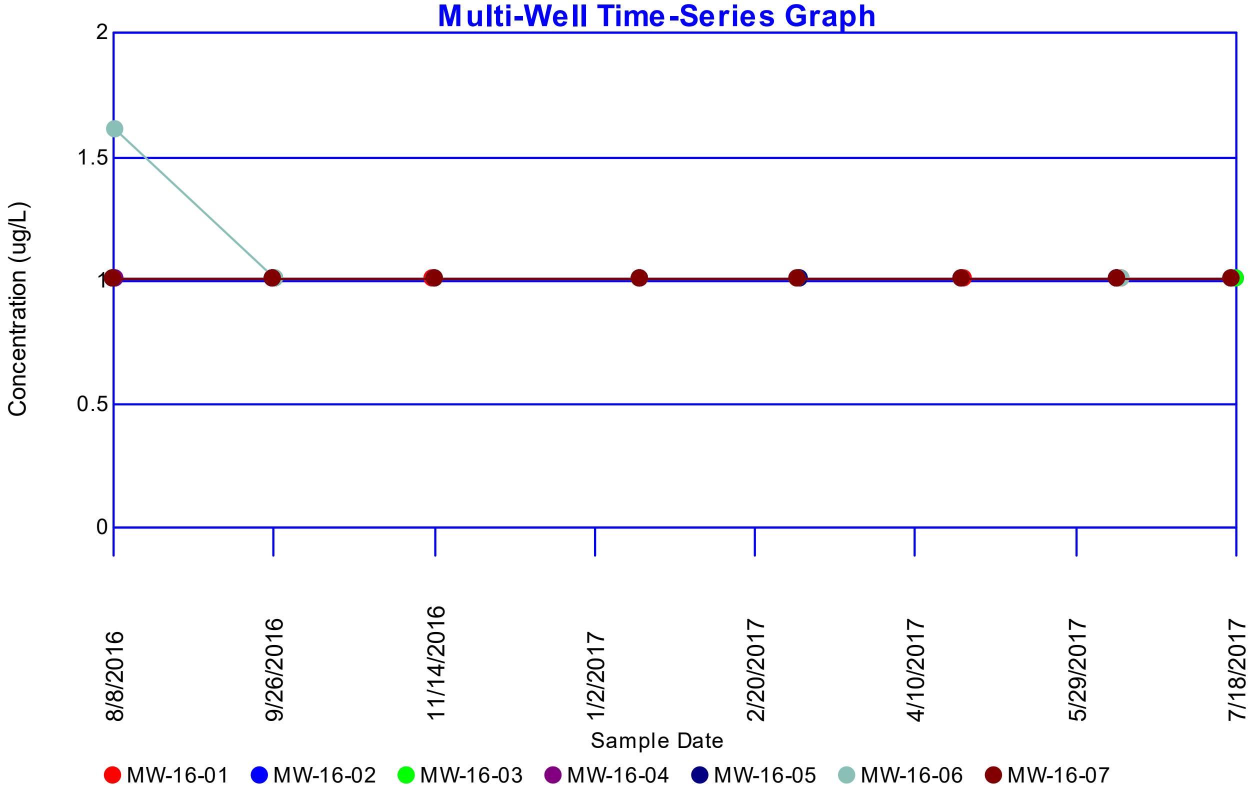

Beryllium
Multi-Well Time-Series Graph
Concentration (ug/L)
1
0.8
0.6
0.4
0.2
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

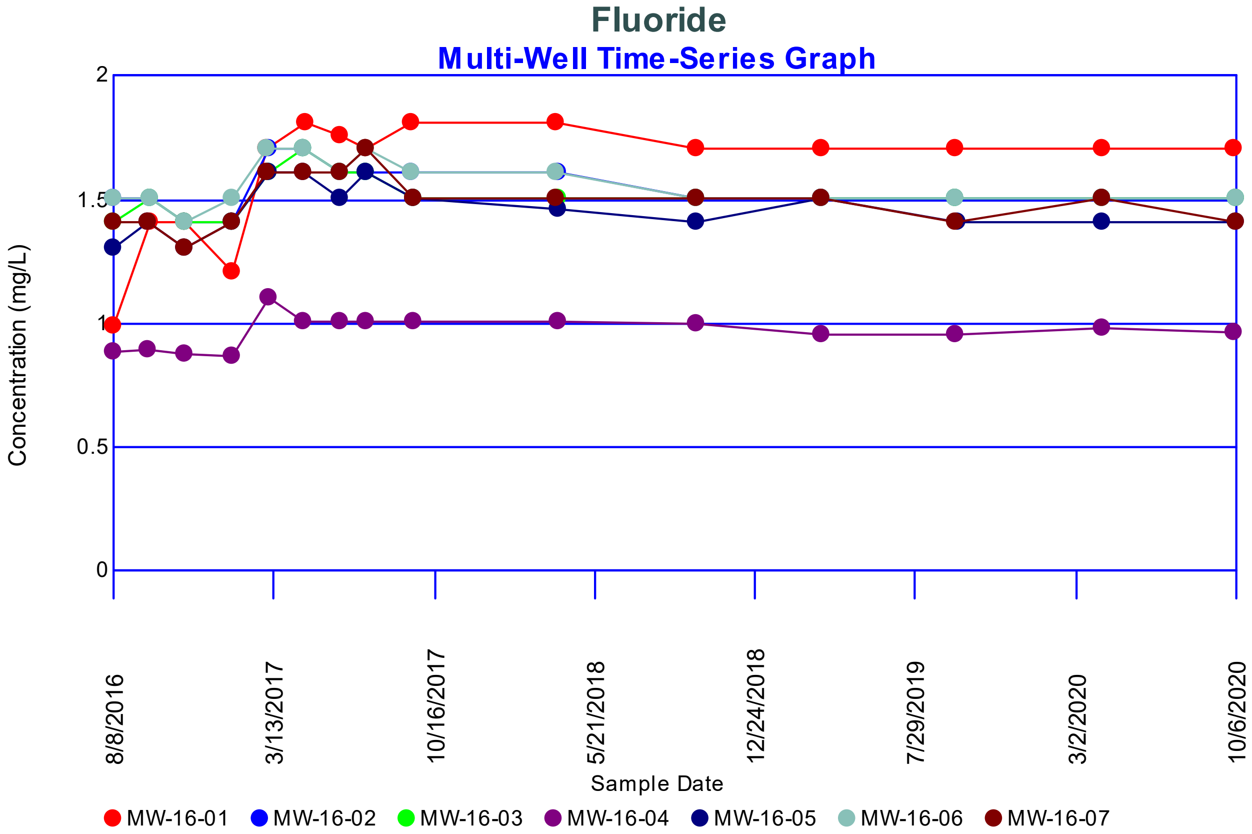

Cadmium
Multi-Well Time-Series Graph
Concentration (ug/L)
1
0.8
0.6
0.4
0.2
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07


Chromium
Multi-Well Time-Series Graph
Concentration (ug/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

Cobalt

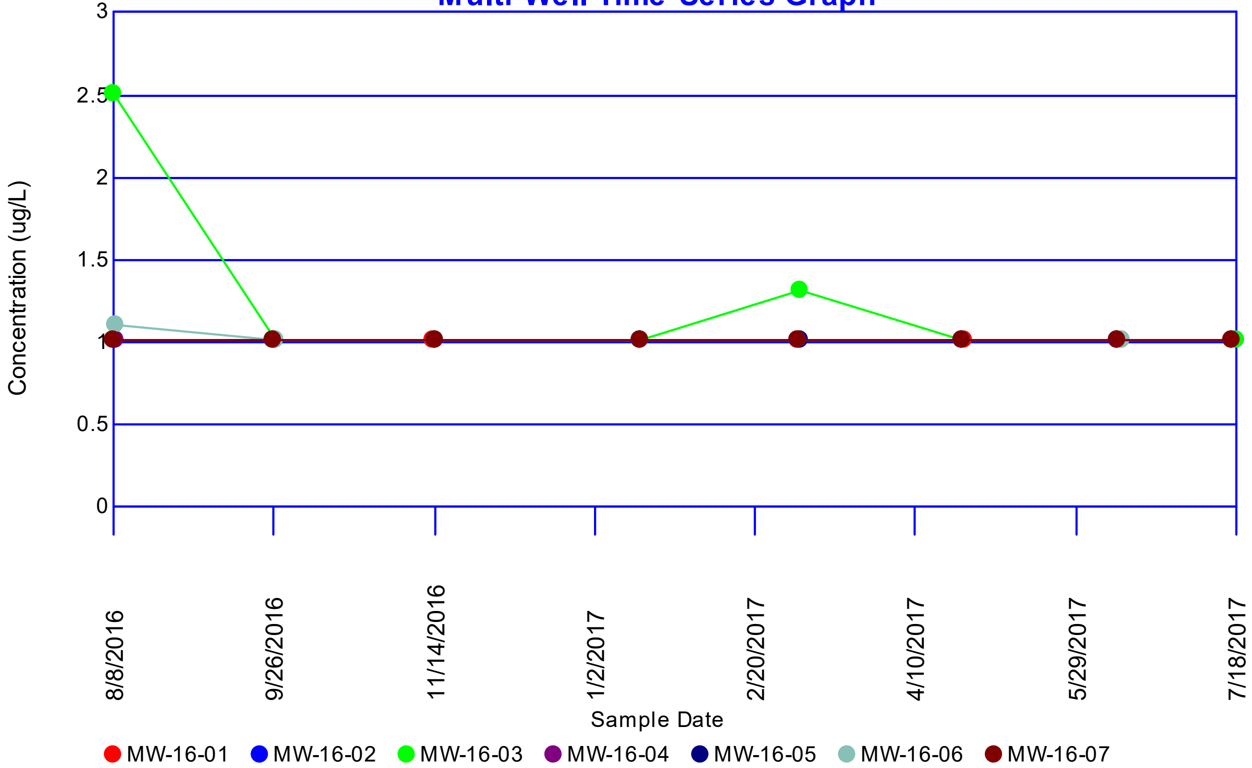
Multi-Well Time-Series Graph




Fluoride
Multi-Well Time-Series Graph
Concentration (mg/L)
2
1.5
1
0.5
0
8/8/2016
3/13/2017
10/16/2017
5/21/2018
12/24/2018
7/29/2019
3/2/2020
10/6/2020
Sample Date
● MW-16-01
● MW-16-02
● MW-16-03
● MW-16-04
● MW-16-05
● MW-16-06
● MW-16-07

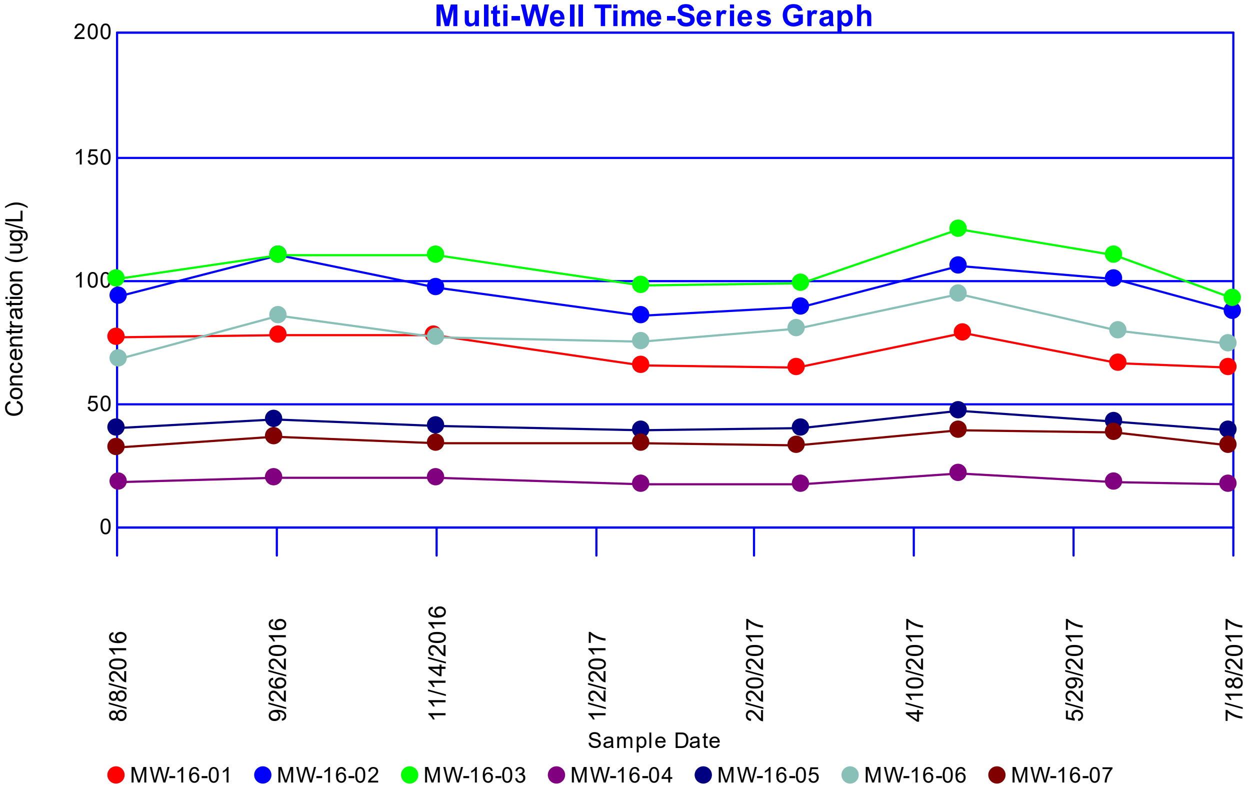
Lead

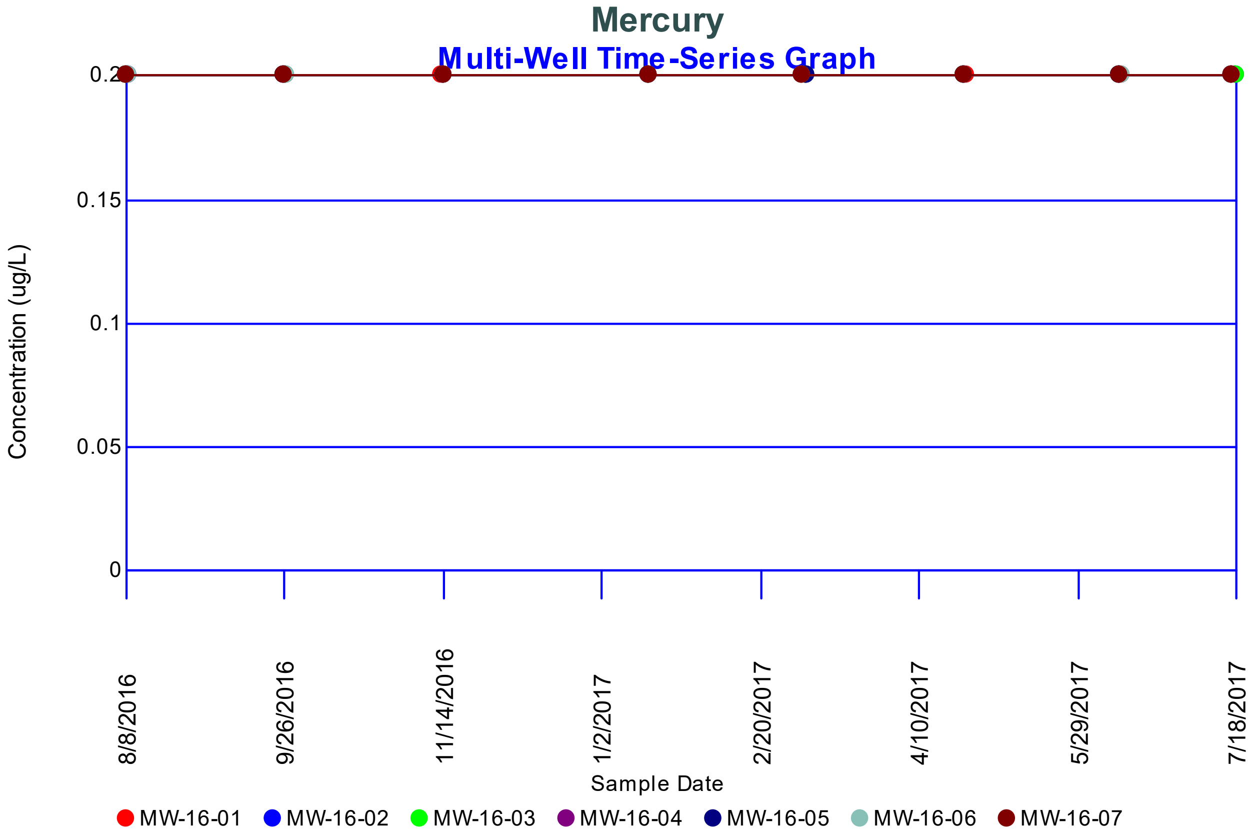
Multi-Well Time-Series Graph

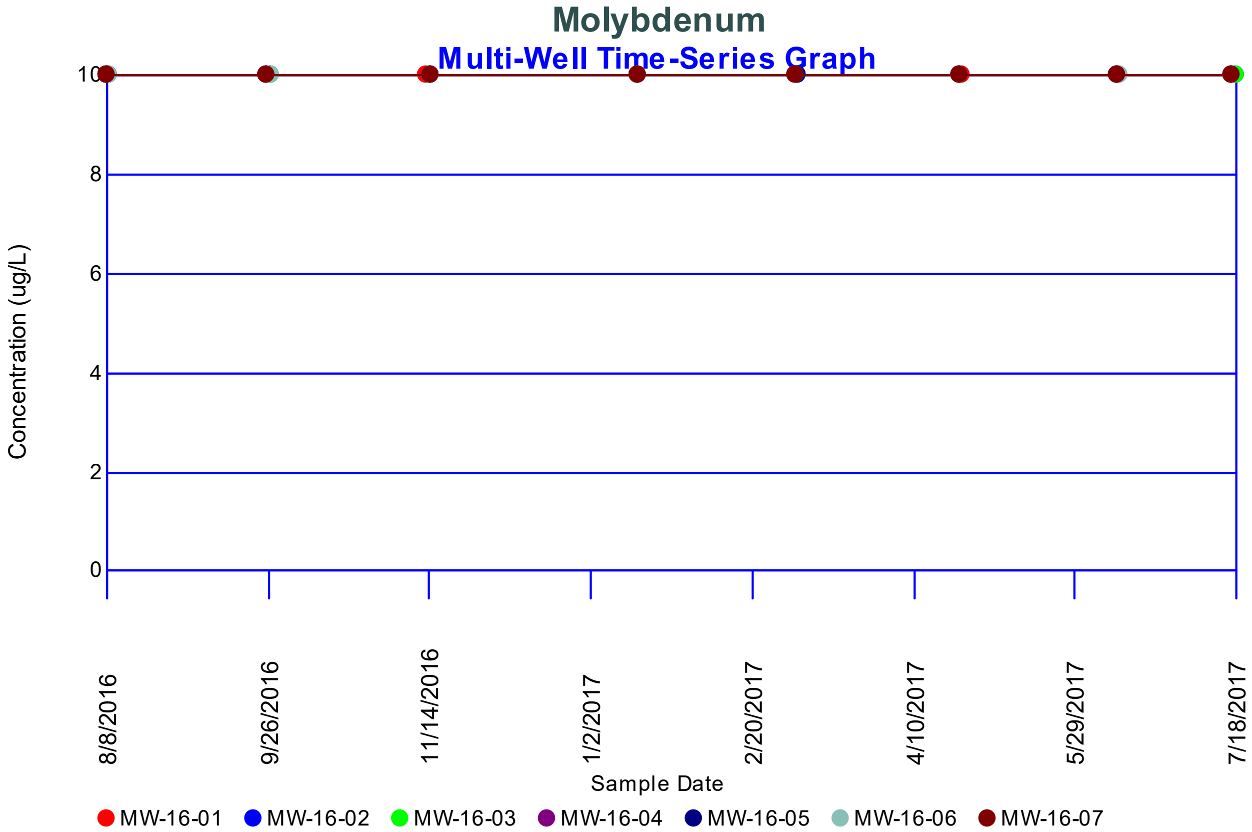


Lithium

Multi-Well Time-Series Graph

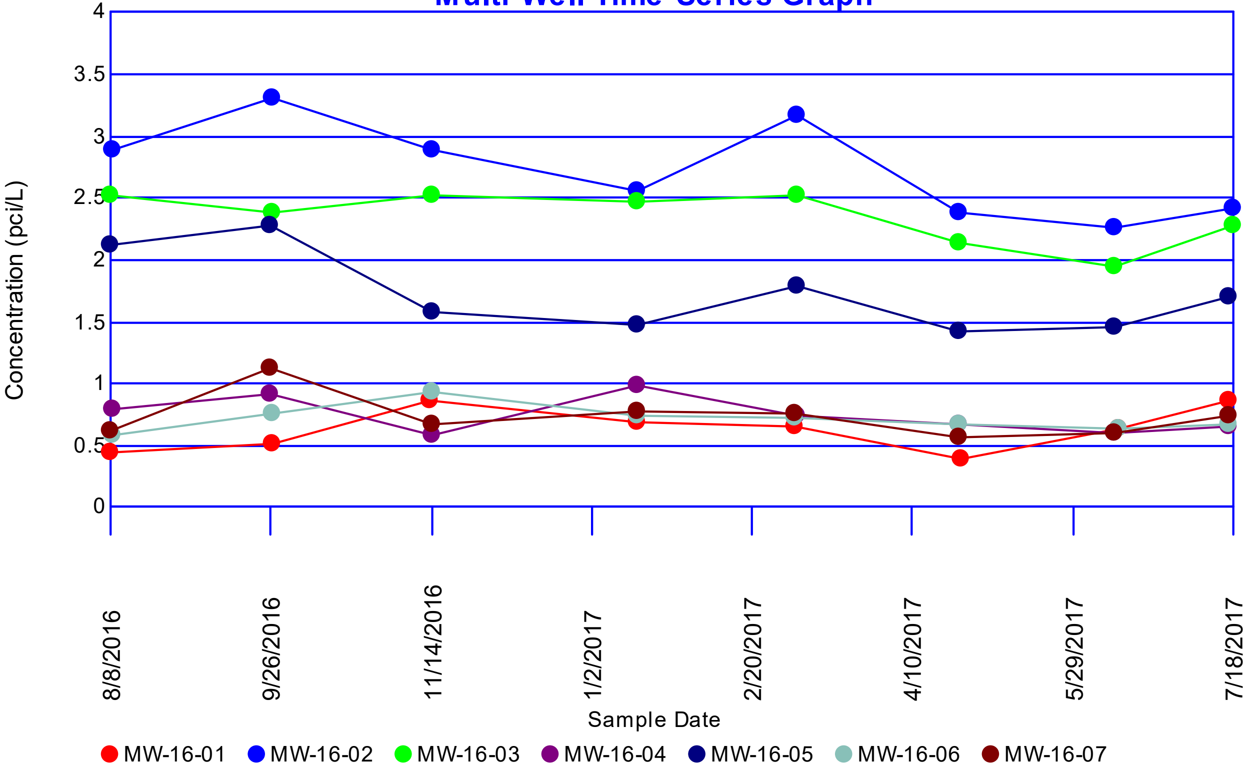



Mercury
Multi-Well Time-Series Graph
Concentration (ug/L)
0.2
0.15
0.1
0.05
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07


Molybdenum
Multi-Well Time-Series Graph
Concentration (ug/L)
10
8
6
4
2
0
8/8/2016
9/26/2016
11/14/2016
1/2/2017
2/20/2017
4/10/2017
5/29/2017
7/18/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-05
MW-16-06
MW-16-07

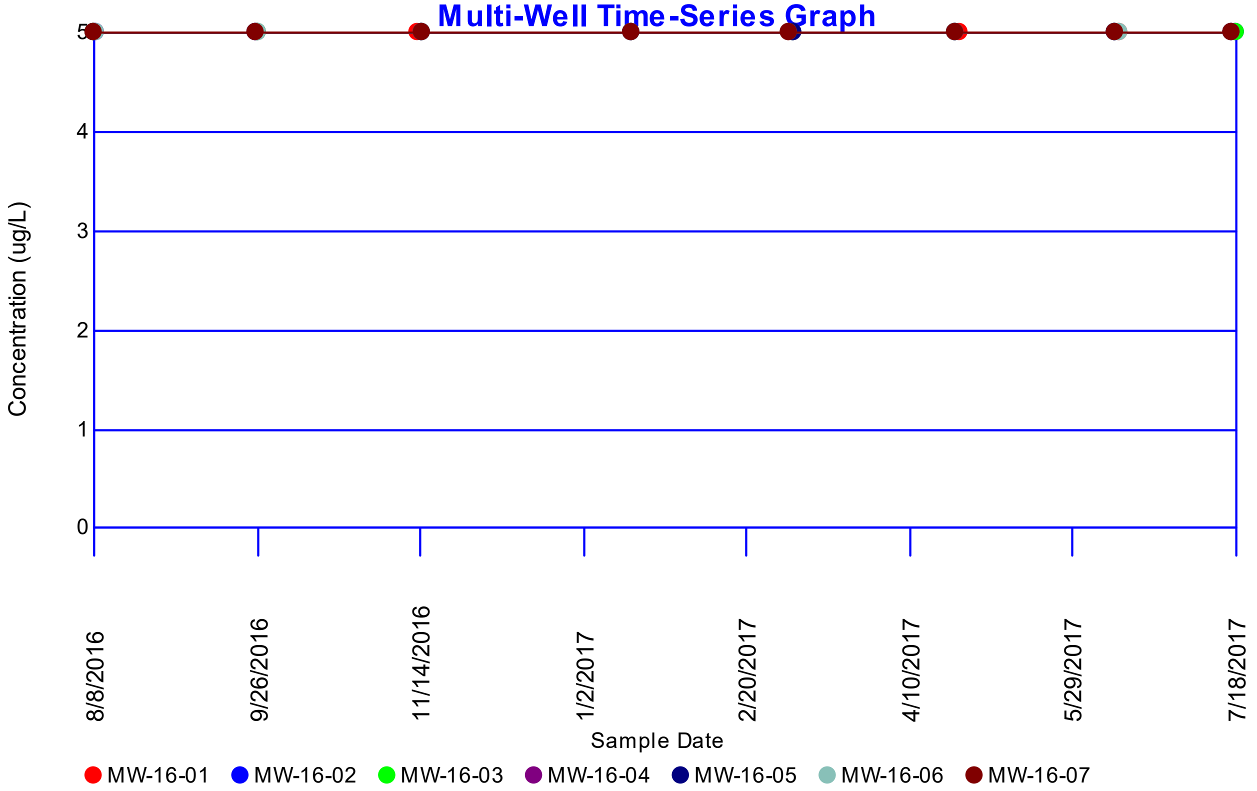
Radium-226/228

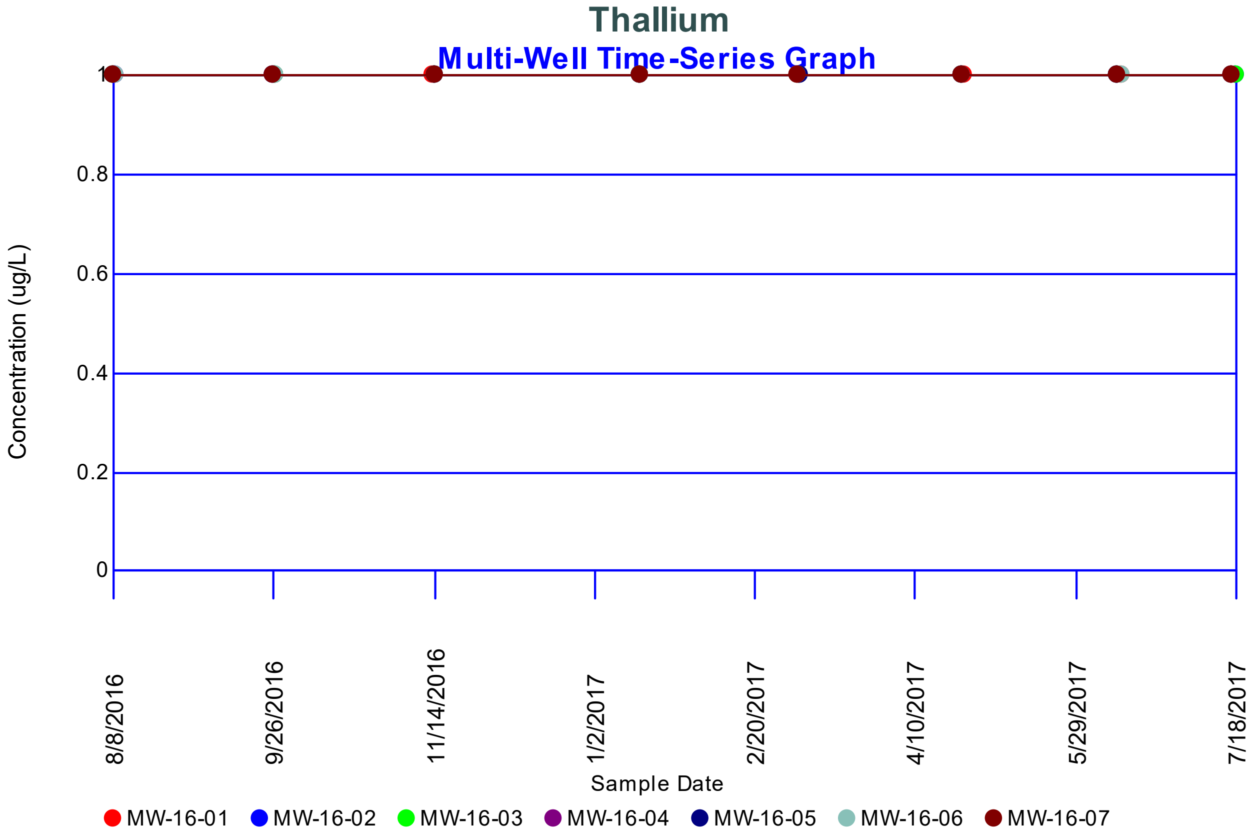
Multi-Well Time-Series Graph



Selenium

Multi-Well Time-Series Graph





Thallium

Multi-Well Time-Series Graph

Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	7 (87.5%)	8/8/2016 ~	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/14/2016	2.1	2.1
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017 ~	ND<2 U	ND<2 U
			4/26/2017	ND<2 U	ND<2 U
			6/13/2017 ~	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016 ~	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017 ~	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/26/2016 ~	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U

Loc.	Meas.	ND	Date	Conc.	Original
			4/25/2017	ND<2 U	ND<2 U
			6/13/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017 ~	ND<2 U	ND<2 U

There are 0 unused locations

Loc. **Meas.** **ND** **Date** **Conc.** **Original**

Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/14/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017 ~	ND<5 U	ND<5 U
			4/26/2017	ND<5 U	ND<5 U
			6/13/2017 ~	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-02	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016 ~	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017 ~	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-04	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/26/2016 ~	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-05	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-06	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U

Loc.	Meas.	ND	Date	Conc.	Original
			4/25/2017	ND<5 U	ND<5 U
			6/13/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-07	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017 ~	ND<5 U	ND<5 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	0 (0%)	8/8/2016 ~	21.5	21.5
			9/27/2016	19	19
			11/14/2016	16	16
			1/17/2017	16	16
			3/6/2017 ~	15	15
			4/26/2017	15	15
			6/13/2017 ~	14.5	14.5
			7/17/2017	15	15
MW-16-02	8	0 (0%)	8/9/2016	6.7	6.7
			9/27/2016	7.7	7.7
			11/15/2016 ~	8.55	8.55
			1/17/2017	9	9
			3/7/2017	7.3	7.3
			4/25/2017 ~	6.9	6.9
			6/12/2017	7.4	7.4
			7/18/2017	8.4	8.4
MW-16-03	8	0 (0%)	8/8/2016	21	21
			9/27/2016	8.5	8.5
			11/15/2016	11	11
			1/17/2017	8.6	8.6
			3/7/2017	13	13
			4/25/2017	9.1	9.1
			6/12/2017	7.8	7.8
			7/18/2017	9.1	9.1
MW-16-04	8	0 (0%)	8/9/2016	8.9	8.9
			9/26/2016 ~	9.25	9.25
			11/15/2016	10	10
			1/17/2017	9.6	9.6
			3/7/2017	11	11
			4/25/2017	10	10
			6/12/2017	11	11
			7/17/2017	11	11
MW-16-05	8	0 (0%)	8/8/2016	8.7	8.7
			9/26/2016	7.2	7.2
			11/15/2016	11	11
			1/17/2017	12	12
			3/7/2017	12	12
			4/25/2017	14	14
			6/12/2017	9.7	9.7
			7/17/2017	8.7	8.7
MW-16-06	8	0 (0%)	8/9/2016	34	34
			9/27/2016	14	14
			11/15/2016	13	13
			1/17/2017	12	12
			3/6/2017	15	15

Loc.	Meas.	ND	Date	Conc.	Original
			4/25/2017	9.9	9.9
			6/13/2017	14	14
			7/17/2017	13	13
MW-16-07	8	0 (0%)	8/8/2016	9	9
			9/26/2016	8.2	8.2
			11/15/2016	9.4	9.4
			1/17/2017	9.2	9.2
			3/6/2017	8.3	8.3
			4/25/2017	8.3	8.3
			6/12/2017	8.2	8.2
			7/17/2017 ~	7.8	7.8

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/14/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017 ~	ND<2 U	ND<2 U
			4/26/2017	ND<2 U	ND<2 U
			6/13/2017 ~	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016 ~	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017 ~	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-03	8	7 (87.5%)	8/8/2016	3.1	3.1
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/18/2017	ND<2 U	ND<2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/26/2016 ~	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/7/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<2 U	ND<2 U
			9/27/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U

			4/25/2017	ND<2 U	ND<2 U
			6/13/2017	ND<2 U	ND<2 U
			7/17/2017	ND<2 U	ND<2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<2 U	ND<2 U
			9/26/2016	ND<2 U	ND<2 U
			11/15/2016	ND<2 U	ND<2 U
			1/17/2017	ND<2 U	ND<2 U
			3/6/2017	ND<2 U	ND<2 U
			4/25/2017	ND<2 U	ND<2 U
			6/12/2017	ND<2 U	ND<2 U
			7/17/2017 ~	ND<2 U	ND<2 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 55
Percent Non-Detects: 98.2143%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	7 (87.5%)	8/9/2016	1.6	1.6
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 105
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	15	0 (0%)	8/8/2016 ~	0.98	0.98
			9/27/2016	1.4	1.4
			11/14/2016	1.4	1.4
			1/17/2017	1.2	1.2
			3/6/2017 ~	1.7	1.7
			4/26/2017	1.8	1.8
			6/13/2017 ~	1.75	1.75
			7/17/2017	1.7	1.7
			9/18/2017	1.8	1.8
			4/2/2018	1.8	1.8
			10/8/2018 ~	1.7	1.7
			3/26/2019	1.7	1.7
			9/23/2019	1.7	1.7
			4/8/2020	1.7	1.7
			10/5/2020	1.7	1.7
MW-16-02	15	0 (0%)	8/9/2016	1.5	1.5
			9/27/2016	1.5	1.5
			11/15/2016 ~	1.4	1.4
			1/17/2017	1.4	1.4
			3/7/2017	1.7	1.7
			4/25/2017 ~	1.7	1.7
			6/12/2017	1.6	1.6
			7/18/2017	1.6	1.6
			9/18/2017	1.6	1.6
			4/3/2018	1.6	1.6
			10/8/2018	1.5	1.5
			3/25/2019	1.5	1.5
			9/23/2019 ~	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-03	15	0 (0%)	8/8/2016	1.4	1.4
			9/27/2016	1.5	1.5
			11/15/2016	1.4	1.4
			1/17/2017	1.4	1.4
			3/7/2017	1.6	1.6
			4/25/2017	1.7	1.7
			6/12/2017	1.6	1.6
			7/18/2017	1.6	1.6
			9/19/2017	1.5	1.5
			4/3/2018	1.5	1.5
			10/8/2018	1.5	1.5
			3/25/2019 ~	1.5	1.5
			9/23/2019	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-04	15	0 (0%)	8/9/2016	0.88	0.88
			9/26/2016 ~	0.885	0.885

			11/15/2016	0.87	0.87
			1/17/2017	0.86	0.86
			3/7/2017	1.1	1.1
			4/25/2017	1	1
			6/12/2017	1	1
			7/17/2017	1	1
			9/19/2017	1	1
			4/3/2018	1	1
			10/8/2018	0.99	0.99
			3/25/2019	0.95	0.95
			9/23/2019	0.95	0.95
			4/8/2020	0.97	0.97
			10/5/2020 ~	0.96	0.96
MW-16-05	15	0 (0%)	8/8/2016	1.3	1.3
			9/26/2016	1.4	1.4
			11/15/2016	1.3	1.3
			1/17/2017	1.4	1.4
			3/7/2017	1.6	1.6
			4/25/2017	1.6	1.6
			6/12/2017	1.5	1.5
			7/17/2017	1.6	1.6
			9/19/2017	1.5	1.5
			4/3/2018 ~	1.45	1.45
			10/8/2018	1.4	1.4
			3/25/2019	1.5	1.5
			9/25/2019	1.4	1.4
			4/8/2020 ~	1.4	1.4
			10/6/2020	1.4	1.4
MW-16-06	15	0 (0%)	8/9/2016	1.5	1.5
			9/27/2016	1.5	1.5
			11/15/2016	1.4	1.4
			1/17/2017	1.5	1.5
			3/6/2017	1.7	1.7
			4/25/2017	1.7	1.7
			6/13/2017	1.6	1.6
			7/17/2017	1.7	1.7
			9/18/2017	1.6	1.6
			4/2/2018	1.6	1.6
			10/8/2018	1.5	1.5
			3/25/2019	1.5	1.5
			9/23/2019	1.5	1.5
			4/8/2020	1.5	1.5
			10/6/2020	1.5	1.5
MW-16-07	15	0 (0%)	8/8/2016	1.4	1.4
			9/26/2016	1.4	1.4
			11/15/2016	1.3	1.3
			1/17/2017	1.4	1.4
			3/6/2017	1.6	1.6
			4/25/2017	1.6	1.6
			6/12/2017	1.6	1.6
			7/17/2017 ~	1.7	1.7
			9/19/2017 ~	1.5	1.5
			4/2/2018	1.5	1.5
			10/8/2018	1.5	1.5
			3/26/2019	1.5	1.5
			9/23/2019	1.4	1.4
			4/8/2020	1.5	1.5
			10/6/2020	1.4	1.4

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56

Total Non-Detect: 53

Percent Non-Detects: 94.6429%

Total Background Measurements: 0

There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	6 (75%)	8/8/2016	2.5	2.5
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	1.3	1.3
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	7 (87.5%)	8/9/2016	1.1	1.1
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Measurements: 56
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	0 (0%)	8/8/2016 ~	76.5	76.5
			9/27/2016	77	77
			11/14/2016	77	77
			1/17/2017	65	65
			3/6/2017 ~	64.5	64.5
			4/26/2017	78	78
			6/13/2017 ~	66	66
			7/17/2017	64	64
MW-16-02	8	0 (0%)	8/9/2016	93	93
			9/27/2016	110	110
			11/15/2016 ~	96.5	96.5
			1/17/2017	85	85
			3/7/2017	89	89
			4/25/2017 ~	105	105
			6/12/2017	100	100
			7/18/2017	87	87
MW-16-03	8	0 (0%)	8/8/2016	100	100
			9/27/2016	110	110
			11/15/2016	110	110
			1/17/2017	97	97
			3/7/2017	98	98
			4/25/2017	120	120
			6/12/2017	110	110
			7/18/2017	92	92
MW-16-04	8	0 (0%)	8/9/2016	18	18
			9/26/2016 ~	19.5	19.5
			11/15/2016	20	20
			1/17/2017	17	17
			3/7/2017	17	17
			4/25/2017	21	21
			6/12/2017	18	18
			7/17/2017	17	17
MW-16-05	8	0 (0%)	8/8/2016	40	40
			9/26/2016	43	43
			11/15/2016	41	41
			1/17/2017	39	39
			3/7/2017	40	40
			4/25/2017	47	47
			6/12/2017	42	42
			7/17/2017	39	39
MW-16-06	8	0 (0%)	8/9/2016	68	68
			9/27/2016	85	85
			11/15/2016	76	76
			1/17/2017	75	75
			3/6/2017	80	80

			4/25/2017	94	94
			6/13/2017	79	79
			7/17/2017	74	74
MW-16-07	8	0 (0%)	8/8/2016	32	32
			9/26/2016	36	36
			11/15/2016	34	34
			1/17/2017	34	34
			3/6/2017	33	33
			4/25/2017	39	39
			6/12/2017	38	38
			7/17/2017 ~	32.5	32.5

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/14/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017 ~	ND<0.2 U	ND<0.2 U
			4/26/2017	ND<0.2 U	ND<0.2 U
			6/13/2017 ~	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-02	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016 ~	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017 ~	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/18/2017	ND<0.2 U	ND<0.2 U
MW-16-03	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/18/2017	ND<0.2 U	ND<0.2 U
MW-16-04	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/26/2016 ~	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-05	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/26/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/7/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-06	8	8 (100%)	8/9/2016	ND<0.2 U	ND<0.2 U
			9/27/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017	ND<0.2 U	ND<0.2 U

			4/25/2017	ND<0.2 U	ND<0.2 U
			6/13/2017	ND<0.2 U	ND<0.2 U
			7/17/2017	ND<0.2 U	ND<0.2 U
MW-16-07	8	8 (100%)	8/8/2016	ND<0.2 U	ND<0.2 U
			9/26/2016	ND<0.2 U	ND<0.2 U
			11/15/2016	ND<0.2 U	ND<0.2 U
			1/17/2017	ND<0.2 U	ND<0.2 U
			3/6/2017	ND<0.2 U	ND<0.2 U
			4/25/2017	ND<0.2 U	ND<0.2 U
			6/12/2017	ND<0.2 U	ND<0.2 U
			7/17/2017 ~	ND<0.2 U	ND<0.2 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/14/2016	ND<10 UF1	ND<10 UF1
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017 ~	ND<10 U	ND<10 U
			4/26/2017	ND<10 U	ND<10 U
			6/13/2017 ~	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-02	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016 ~	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017 ~	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/18/2017	ND<10 U	ND<10 U
MW-16-03	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/18/2017	ND<10 U	ND<10 U
MW-16-04	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/26/2016 ~	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-05	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/26/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/7/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-06	8	8 (100%)	8/9/2016	ND<10 U	ND<10 U
			9/27/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017	ND<10 U	ND<10 U

			4/25/2017	ND<10 U	ND<10 U
			6/13/2017	ND<10 U	ND<10 U
			7/17/2017	ND<10 U	ND<10 U
MW-16-07	8	8 (100%)	8/8/2016	ND<10 U	ND<10 U
			9/26/2016	ND<10 U	ND<10 U
			11/15/2016	ND<10 U^	ND<10 U^
			1/17/2017	ND<10 U	ND<10 U
			3/6/2017	ND<10 U	ND<10 U
			4/25/2017	ND<10 U	ND<10 U
			6/12/2017	ND<10 U	ND<10 U
			7/17/2017 ~	ND<10 U	ND<10 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 1
Percent Non-Detects: 1.78571%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	1 (12.5%)	8/8/2016 ~	0.428 U	0.428 U
			9/27/2016	0.497	0.497
			11/14/2016	0.852	0.852
			1/17/2017	0.668	0.668
			3/6/2017 ~	0.6415	0.6415
			4/26/2017	ND<0.367 U	ND<0.367 U
			6/13/2017 ~	0.6165	0.6165
			7/17/2017	0.852	0.852
MW-16-02	8	0 (0%)	8/9/2016	2.88	2.88
			9/27/2016	3.3	3.3
			11/15/2016 ~	2.87	2.87
			1/17/2017	2.54	2.54
			3/7/2017	3.16	3.16
			4/25/2017 ~	2.375	2.375
			6/12/2017	2.24	2.24
			7/18/2017	2.41	2.41
MW-16-03	8	0 (0%)	8/8/2016	2.51	2.51
			9/27/2016	2.36	2.36
			11/15/2016	2.51	2.51
			1/17/2017	2.45	2.45
			3/7/2017	2.51	2.51
			4/25/2017	2.13	2.13
			6/12/2017	1.93	1.93
			7/18/2017	2.27	2.27
MW-16-04	8	0 (0%)	8/9/2016	0.775	0.775
			9/26/2016 ~	0.908	0.908
			11/15/2016	0.574	0.574
			1/17/2017	0.974	0.974
			3/7/2017	0.723	0.723
			4/25/2017	0.65	0.65
			6/12/2017	0.578	0.578
			7/17/2017	0.639	0.639
MW-16-05	8	0 (0%)	8/8/2016	2.11	2.11
			9/26/2016	2.26	2.26
			11/15/2016	1.56	1.56
			1/17/2017	1.46	1.46
			3/7/2017	1.78	1.78
			4/25/2017	1.41	1.41
			6/12/2017	1.44	1.44
			7/17/2017	1.68	1.68
MW-16-06	8	0 (0%)	8/9/2016	0.575	0.575
			9/27/2016	0.751	0.751
			11/15/2016	0.918	0.918
			1/17/2017	0.732	0.732
			3/6/2017	0.7	0.7

Loc.	Meas.	ND	Date	Conc.	Original
			4/25/2017	0.648	0.648
			6/13/2017	0.623	0.623
			7/17/2017	0.65	0.65
MW-16-07	8	0 (0%)	8/8/2016	0.595	0.595
			9/26/2016	1.11	1.11
			11/15/2016	0.654	0.654
			1/17/2017	0.763	0.763
			3/6/2017	0.751	0.751
			4/25/2017	0.558	0.558
			6/12/2017	0.585	0.585
			7/17/2017 ~	0.729	0.729

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/14/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017 ~	ND<5 U	ND<5 U
			4/26/2017	ND<5 U	ND<5 U
			6/13/2017 ~	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-02	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016 ~	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017 ~	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/18/2017	ND<5 U	ND<5 U
MW-16-04	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/26/2016 ~	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-05	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/7/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-06	8	8 (100%)	8/9/2016	ND<5 U	ND<5 U
			9/27/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U

			4/25/2017	ND<5 U	ND<5 U
			6/13/2017	ND<5 U	ND<5 U
			7/17/2017	ND<5 U	ND<5 U
MW-16-07	8	8 (100%)	8/8/2016	ND<5 U	ND<5 U
			9/26/2016	ND<5 U	ND<5 U
			11/15/2016	ND<5 U	ND<5 U
			1/17/2017	ND<5 U	ND<5 U
			3/6/2017	ND<5 U	ND<5 U
			4/25/2017	ND<5 U	ND<5 U
			6/12/2017	ND<5 U	ND<5 U
			7/17/2017 ~	ND<5 U	ND<5 U

There are 0 unused locations

Loc.	**Meas.**	**ND**	**Date**	**Conc.**	**Original**

Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 56
Total Non-Detect: 56
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 7 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	8	8 (100%)	8/8/2016 ~	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/14/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017 ~	ND<1 U	ND<1 U
			4/26/2017	ND<1 U	ND<1 U
			6/13/2017 ~	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-02	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016 ~	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017 ~	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/18/2017	ND<1 U	ND<1 U
MW-16-04	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/26/2016 ~	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-05	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/7/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-06	8	8 (100%)	8/9/2016	ND<1 U	ND<1 U
			9/27/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U

			4/25/2017	ND<1 U	ND<1 U
			6/13/2017	ND<1 U	ND<1 U
			7/17/2017	ND<1 U	ND<1 U
MW-16-07	8	8 (100%)	8/8/2016	ND<1 U	ND<1 U
			9/26/2016	ND<1 U	ND<1 U
			11/15/2016	ND<1 U	ND<1 U
			1/17/2017	ND<1 U	ND<1 U
			3/6/2017	ND<1 U	ND<1 U
			4/25/2017	ND<1 U	ND<1 U
			6/12/2017	ND<1 U	ND<1 U
			7/17/2017 ~	ND<1 U	ND<1 U

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	16.5	2.46403	**1.24799**
MW-16-02	8	7.74375	0.826109	0.250149
MW-16-03	8	11.0125	4.36657	**1.70053**
MW-16-04	8	10.0938	0.833426	-0.0503771
MW-16-05	8	10.4125	2.23443	0.148075
MW-16-06	8	15.6125	7.58767	**2.07628**
MW-16-07	8	8.55	0.570714	0.362311

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	11.4179	4.61312	**2.50201**

Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	2.7945	0.138965	**1.14617**
MW-16-02	8	2.04195	0.106019	0.154402
MW-16-03	8	2.34623	0.325539	**1.34927**
MW-16-04	8	2.30891	0.0830288	-0.11872
MW-16-05	8	2.32245	0.218192	-0.142986
MW-16-06	8	2.67748	0.36549	**1.70345**
MW-16-07	8	2.14401	0.0661568	0.308397

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	2.3765	0.32531	**1.08806**

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	14.5	21.5	7	0.6052	4.2364
2	15	19	4	0.3164	1.2656
3	15	16	1	0.1743	0.1743
4	15	16	1	0.0561	0.0561
5	16	15	-1		
6	16	15	-1		
7	19	15	-4		
8	21.5	14.5	-7		

Sum of b values = 5.7324
Sample Standard Deviation = 2.46403
W Statistic = 0.773186

5% Critical value of 0.818 exceeds 0.773186
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.773186
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.67415	3.06805	0.393904	0.6052	0.238391
2	2.70805	2.94444	0.236389	0.3164	0.0747934
3	2.70805	2.77259	0.0645385	0.1743	0.0112491
4	2.70805	2.77259	0.0645385	0.0561	0.00362061
5	2.77259	2.70805	-0.0645385		
6	2.77259	2.70805	-0.0645385		
7	2.94444	2.70805	-0.236389		
8	3.06805	2.67415	-0.393904		

Sum of b values = 0.328054
Sample Standard Deviation = 0.138965
W Statistic = 0.796129

5% Critical value of 0.818 exceeds 0.796129
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.796129
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	7.8	21	13.2	0.6052	7.98864
2	8.5	13	4.5	0.3164	1.4238
3	8.6	11	2.4	0.1743	0.41832
4	9.1	9.1	0	0.0561	0
5	9.1	9.1	0		
6	11	8.6	-2.4		
7	13	8.5	-4.5		
8	21	7.8	-13.2		

Sum of b values = 9.83076
Sample Standard Deviation = 4.36657
W Statistic = 0.724093

5% Critical value of 0.818 exceeds 0.724093
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.724093
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.05412	3.04452	0.990399	0.6052	0.599389
2	2.14007	2.56495	0.424883	0.3164	0.134433
3	2.15176	2.3979	0.246133	0.1743	0.042901
4	2.20827	2.20827	0	0.0561	0
5	2.20827	2.20827	0		
6	2.3979	2.15176	-0.246133		
7	2.56495	2.14007	-0.424883		
8	3.04452	2.05412	-0.990399		

Sum of b values = 0.776723

Sample Standard Deviation = 0.325539

W Statistic = 0.813257

5% Critical value of 0.818 exceeds 0.813257

Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.813257

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	9.9	34	24.1	0.6052	14.5853
2	12	15	3	0.3164	0.9492
3	13	14	1	0.1743	0.1743
4	13	14	1	0.0561	0.0561
5	14	13	-1		
6	14	13	-1		
7	15	12	-3		
8	34	9.9	-24.1		

Sum of b values = 15.7649
Sample Standard Deviation = 7.58767
W Statistic = 0.616693

5% Critical value of 0.818 exceeds 0.616693
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.616693
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-06

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.29253	3.52636	1.23383	0.6052	0.746711
2	2.48491	2.70805	0.223144	0.3164	0.0706026
3	2.56495	2.63906	0.074108	0.1743	0.012917
4	2.56495	2.63906	0.074108	0.0561	0.00415746
5	2.63906	2.56495	-0.074108		
6	2.63906	2.56495	-0.074108		
7	2.70805	2.48491	-0.223144		
8	3.52636	2.29253	-1.23383		

Sum of b values = 0.834388
Sample Standard Deviation = 0.36549
W Statistic = 0.74454

5% Critical value of 0.818 exceeds 0.74454
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 exceeds 0.74454
Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	15	1.602	0.244488	**-1.46198**
MW-16-02	15	1.54	0.0910259	0.305853
MW-16-03	15	1.51333	0.0833809	0.519238
MW-16-04	15	0.961	0.064868	0.0678206
MW-16-05	15	1.45	0.0981981	0.234243
MW-16-06	15	1.55333	0.0915475	0.477107
MW-16-07	15	1.48667	0.10601	0.268653

All Locations

Obs.	Mean	Std. Dev.	Skewness
105	1.44376	0.236359	**-1.04709**

Skewness Coefficient

Parameter: Fluoride

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	15	0.458162	0.175662	**-1.68889**
MW-16-02	15	0.430165	0.0587741	0.193174
MW-16-03	15	0.412918	0.0545162	0.385798
MW-16-04	15	-0.0419129	0.0676644	-0.0910013
MW-16-05	15	0.369435	0.0674477	0.125752
MW-16-06	15	0.438806	0.0582966	0.390163
MW-16-07	15	0.394179	0.0709773	0.124949

All Locations

Obs.	Mean	Std. Dev.	Skewness
105	0.351679	0.184912	**-1.35865**

Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 7 for 15 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	0.98	1.8	0.82	0.515	0.4223
2	1.2	1.8	0.6	0.3306	0.19836
3	1.4	1.8	0.4	0.2495	0.0998
4	1.4	1.75	0.35	0.1878	0.06573
5	1.7	1.7	0	0.1353	0
6	1.7	1.7	0	0.088	0
7	1.7	1.7	0	0.0433	0
8	1.7	1.7	0		
9	1.7	1.7	0		
10	1.7	1.7	0		
11	1.7	1.7	0		
12	1.75	1.4	-0.35		
13	1.8	1.4	-0.4		
14	1.8	1.2	-0.6		
15	1.8	0.98	-0.82		

Sum of b values = 0.78619
Sample Standard Deviation = 0.244488
W Statistic = 0.738606

5% Critical value of 0.881 exceeds 0.738606
Evidence of non-normality at 95% level of significance

1% Critical value of 0.835 exceeds 0.738606
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Fluoride

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 7 for 15 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	-0.0202027	0.587787	0.607989	0.515	0.313115
2	0.182322	0.587787	0.405465	0.3306	0.134047
3	0.336472	0.587787	0.251314	0.2495	0.0627029
4	0.336472	0.559616	0.223144	0.1878	0.0419064
5	0.530628	0.530628	0	0.1353	0
6	0.530628	0.530628	0	0.088	0
7	0.530628	0.530628	0	0.0433	0
8	0.530628	0.530628	0		
9	0.530628	0.530628	0		
10	0.530628	0.530628	0		
11	0.530628	0.530628	0		
12	0.559616	0.336472	-0.223144		
13	0.587787	0.336472	-0.251314		
14	0.587787	0.182322	-0.405465		
15	0.587787	-0.0202027	-0.607989		

Sum of b values = 0.551771
Sample Standard Deviation = 0.175662
W Statistic = 0.704751

5% Critical value of 0.881 exceeds 0.704751
Evidence of non-normality at 95% level of significance

1% Critical value of 0.835 exceeds 0.704751
Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	71	6.58461	-0.00922775
MW-16-02	8	95.6875	8.88392	0.354013
MW-16-03	8	104.625	9.30342	0.238026
MW-16-04	8	18.4375	1.54544	0.528018
MW-16-05	8	41.375	2.66927	**1.20828**
MW-16-06	8	78.875	7.8638	0.69322
MW-16-07	8	34.8125	2.59033	0.578591

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	63.5446	31.0169	-0.00517004

Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	4.2589	0.0930265	-0.0150376
MW-16-02	8	4.55737	0.0918904	0.261514
MW-16-03	8	4.64695	0.0884951	0.129581
MW-16-04	8	2.91138	0.0824102	0.467853
MW-16-05	8	3.72093	0.0624385	**1.11889**
MW-16-06	8	4.36365	0.0974141	0.488391
MW-16-07	8	3.54761	0.0731464	0.522889

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	4.00097	0.595772	-0.617011

Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	39	47	8	0.6052	4.8416
2	39	43	4	0.3164	1.2656
3	40	42	2	0.1743	0.3486
4	40	41	1	0.0561	0.0561
5	41	40	-1		
6	42	40	-2		
7	43	39	-4		
8	47	39	-8		

Sum of b values = 6.5119
Sample Standard Deviation = 2.66927
W Statistic = 0.850222

5% Critical value of 0.818 is less than 0.850222
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.850222
Data is normally distributed at 99% level of significance

Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	0.592313	0.222588	-0.526697
MW-16-02	8	2.72188	0.388403	0.246436
MW-16-03	8	2.33375	0.212464	-0.900004
MW-16-04	8	0.727625	0.148982	0.590727
MW-16-05	8	1.7125	0.319855	0.745027
MW-16-06	8	0.699625	0.105496	**1.03253**
MW-16-07	8	0.718125	0.177044	**1.42309**

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	1.35797	0.863432	0.646626

Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	8	-0.611848	0.49773	**-1.34561**
MW-16-02	8	0.992483	0.141867	0.132414
MW-16-03	8	0.843627	0.0952202	-0.996009
MW-16-04	8	-0.335504	0.198021	0.417552
MW-16-05	8	0.523602	0.178365	0.610595
MW-16-06	8	-0.366475	0.143131	0.756658
MW-16-07	8	-0.353994	0.220765	**1.05411**

All Locations

Obs.	Mean	Std. Dev.	Skewness
56	0.0988416	0.662125	-0.0202772

Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	0.558	1.11	0.552	0.6052	0.33407
2	0.585	0.763	0.178	0.3164	0.0563192
3	0.595	0.751	0.156	0.1743	0.0271908
4	0.654	0.729	0.075	0.0561	0.0042075
5	0.729	0.654	-0.075		
6	0.751	0.595	-0.156		
7	0.763	0.585	-0.178		
8	1.11	0.558	-0.552		

Sum of b values = 0.421788
Sample Standard Deviation = 0.177044
W Statistic = 0.810823

5% Critical value of 0.818 exceeds 0.810823
Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.810823
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Radium-226/228

Location: MW-16-07

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	-0.583396	0.10436	0.687756	0.6052	0.41623
2	-0.536143	-0.270497	0.265646	0.3164	0.0840505
3	-0.519194	-0.28635	0.232844	0.1743	0.0405848
4	-0.424648	-0.316082	0.108566	0.0561	0.00609057
5	-0.316082	-0.424648	-0.108566		
6	-0.28635	-0.519194	-0.232844		
7	-0.270497	-0.536143	-0.265646		
8	0.10436	-0.583396	-0.687756		

Sum of b values = 0.546956
Sample Standard Deviation = 0.220765
W Statistic = 0.876893

5% Critical value of 0.818 is less than 0.876893
Data is normally distributed at 95% level of significance

1% Critical value of 0.749 is less than 0.876893
Data is normally distributed at 99% level of significance

Non-Parametric Tolerance Interval MW-16-01

Parameter: Antimony

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 2.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 21.5
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-01

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 15
Maximum Background Concentration = 1.8
Minimum Coverage = 81.9%
Average Coverage = 93.75%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-01

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 71
Background standard deviation = 6.58461
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 91.9917

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 0.592313
Background standard deviation = 0.222588
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 1.30192

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 7.74375
Background standard deviation = 0.826109
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 10.3774

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.54
Background standard deviation = 0.0910259
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.77357

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 95.6875
Background standard deviation = 8.88392
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 124.009

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 2.72188
Background standard deviation = 0.388403
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 3.9601

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-03

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 21
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-03

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 3.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-03

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.51333
Background standard deviation = 0.0833809
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.72729

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-03

Parameter: Lead

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 75%
Background measurements (n) = 8
Maximum Background Concentration = 2.5
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 104.625
Background standard deviation = 9.30342
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 134.284

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 2.33375
Background standard deviation = 0.212464
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 3.01109

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 10.0938
Background standard deviation = 0.833426
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 12.7507

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 0.961
Background standard deviation = 0.064868
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.12745

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 18.4375
Background standard deviation = 1.54544
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 23.3644

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 0.727625
Background standard deviation = 0.148982
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 1.20258

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Barium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 10.4125
Background standard deviation = 2.23443
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 17.5359

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.45
Background standard deviation = 0.0981981
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.70198

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 41.375
Background standard deviation = 2.66927
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 49.8846

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-05

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 1.7125
Background standard deviation = 0.319855
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 2.7322

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-06

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 34
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-06

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 1.6
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-06

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.55333
Background standard deviation = 0.0915475
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.78824

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-06

Parameter: Lead

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 87.5%
Background measurements (n) = 8
Maximum Background Concentration = 1.1
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 78.875
Background standard deviation = 7.8638
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 103.945

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-06

Parameter: Radium-226/228

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = -0.366475
Background standard deviation = 0.143131
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 0.0898265

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 8.55
Background standard deviation = 0.570714
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 10.3694

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Fluoride

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.48667
Background standard deviation = 0.10601
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.75869

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Lithium

Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 34.8125
Background standard deviation = 2.59033
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 43.0705

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-07

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = -0.353994
Background standard deviation = 0.220765
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 0.349805

Location	Date	Value	Significant

APPENDIX O – FATE AND TRANSPORT MODEL INPUTS

Calculation Package

Geosyntec
consultants

COMPUTATION COVER SHEET

Client: **DTE**
Project: **FAB ALD**
Project/ Proposal No.: Task No.: **GLP8014**

Title of Computations: **Vertical Darcy Velocity and Travel Time Calculations**

Computations by:
Signature
Printed Name: Nick Williams
Title: Senior Staff Professional
Date: 11/17/2021

Assumptions and Procedures Checked by: (peer reviewer)
Signature
Printed Name: Jesse Varsho
Title
Date: 11/17/2021

Computations Checked by:
Signature
Printed Name: Isaiah Vaught
Title
Date: 11/17/2021

Computations backchecked by: (originator)
Signature
Printed Name: Nick Williams
Title
Date: 11/17/2021

Approved by: (pm or designate)
Signature
Printed Name: Omer Bozok
Title
Date: 11/24/2021

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval

TABLE OF CONTENTS

1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Monroe Power Plant Fly Ash Basin (FAB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the FAB to the Uppermost Aquifer.

2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

3. DARCY VELOCITY SOLUTION

The Darcy velocity (q) through the model lithologies/layers is expressed in m/year =

$$= K(i) = K\left(\frac{H_1 - H_2}{l_1 - l_2}\right)$$

Where,

K = vertical hydraulic conductivity (laboratory measured)

i = vertical gradient

$H_1 - H_2$ = difference in hydraulic head between the FAB water level and the upper most aquifer potentiometric surface

$l_1 - l_2$ = distance in direction of flow

Thus:

K = Geomean of Sandy Lean Clay hydraulic conductivity value (data provided in Attachment 1) = 2.27×10^{-8} cm/s

H_1 = Total head at the bottom of FAB = 609 ft

H_2 = Average water level elevation from monitoring wells (data provided in Attachment 2) = 583.8[1] ft

l_1 = Elevation of bottom of FAB = 563 ft

l_2 = Average elevation of well screen midpoints = 532.95[1] ft

q = Darcy velocity in m/year (= cm/s * 315360) = 6.08×10^{-3} m/year

---

[1] Value is an average taken from all monitoring wells with the exception of the outlier MW-16-04

4. TRAVEL TIME SOLUTION

Travel time through the model lithology is expressed in years =

$$T = t \, / \left(\frac{K * i}{n} \right)$$

Where:

t = minimum model thickness

K = vertical hydraulic conductivity (laboratory measured)

i = vertical gradient

n = effective porosity

Thus:

t =	Minimum model thickness per EVS model =	4.33 m
K =	Hydraulic conductivity =	2.27×10^{-8} cm/s
i =	Calculated using variables in Section 3 =	0.85
n =	Average of available porosity data, converted to effective porosity using Sara (1994) =	0.19
***T* =**	**Travel time in years (= s / 31536000) =**	**135.20 years**

Note: Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of FAB to top of uppermost aquifer.

Attachment 1

Permeability Data Evaluation
Table O-1

			Vertical Hydraulic Conductivity, k_v (cm/s)			
Location ID	**Layer**	**Elevation (ft)**	**DDW**	**Site Water**	**Lean Clay**	**Sandy Lean Clay**
TB2(1994)	Lean Clay	573.0	3.30E-08		3.30E-08	
	Sandy Lean Clay	568.0	5.80E-08			5.80E-08
	Sandy Lean Clay	563.0	1.30E-08			1.30E-08
	Sandy Lean Clay	558.0	1.50E-08			1.50E-08
	Sandy Lean Clay	553.0	2.00E-08			2.00E-08
	Sandy Lean Clay	548.0	2.00E-08			2.00E-08
TB4(1994)	Lean Clay	573.0	6.60E-08		6.60E-08	
	Sandy Lean Clay	568.0	2.10E-08			2.10E-08
	Sandy Lean Clay	563.0	4.70E-08			4.70E-08
	Sandy Lean Clay	558.0	2.10E-08			2.10E-08
	Sandy Lean Clay	553.0	3.00E-08			3.00E-08
	Sandy Lean Clay	548.0	1.80E-08			1.80E-08
TB6(1994)	Lean Clay	582.0	7.40E-08		7.40E-08	
	Lean Clay	577.0	1.80E-08		1.80E-08	
	Lean Clay	572.0	4.00E-08		4.00E-08	
	Sandy Lean Clay	567.0	6.50E-08			6.50E-08
TB8(1994)	Lean Clay	573.0	1.50E-08		1.50E-08	
	Sandy Lean Clay	568.0	2.20E-08			2.20E-08
	Sandy Lean Clay	563.0	4.80E-08			4.80E-08
	Sandy Lean Clay	558.0	1.60E-08			1.60E-08
	Sandy Lean Clay	553.0	1.70E-08			1.70E-08
	Sandy Lean Clay	548.0	4.70E-08			4.70E-08
	Sandy Lean Clay	543.0	3.80E-08			3.80E-08
	Sandy Lean Clay	538.0	1.90E-07			1.90E-07
TB10(1994)	Lean Clay	573.0	3.60E-08		3.60E-08	
	Sandy Lean Clay	568.0	1.20E-08			1.20E-08
	Sandy Lean Clay	563.0	5.30E-08			5.30E-08
	Sandy Lean Clay	558.0	3.70E-08			3.70E-08
	Sandy Lean Clay	553.0	1.50E-08			1.50E-08
B2-ST-1	Lean Clay	594.0		5.40E-09	5.40E-09	
B4-ST-2	Lean Clay	574.0		3.50E-09	3.50E-09	
B4-ST-4	Sandy Lean Clay	543.8		1.10E-08		1.10E-08
B6-ST-1	Lean Clay	589.0		7.60E-09	7.60E-09	
B6-ST-3	Sandy Lean Clay	558.8		9.80E-09		9.80E-09
B6-ST-4	Sandy Lean Clay	548.8		1.00E-08		1.00E-08
B9-ST-2	Lean Clay	574.0		1.10E-07	1.10E-07	
B9_ST-3	Sandy Lean Clay	559.0		1.40E-08		1.40E-08
MW-16-01	Sandy Lean Clay	558.5	1.60E-08			1.60E-08
MW-16-02	Sandy Lean Clay	549.0	1.30E-08			1.30E-08
MW-16-03	Sandy Lean Clay	556.9	1.20E-08			1.20E-08
MW-16-04	Sandy Lean Clay	562.2	1.20E-08			1.20E-08

Statistical Parameter	**Lean Clay**	**Sandy Lean Clay**
Mean	3.71E-08	3.07E-08
GeoMean	**2.31E-08**	**2.27E-08**
Maximum	1.10E-07	1.90E-07
Minimum	3.50E-09	9.80E-09
Count	11	30
Standard Deviation	3.38E-08	3.41E-08
GeoMean of All Data	2.28E-08	

Attachment 2

Edited by Geosyntec to assess vertical gradient - OB

Table 1
Groundwater Elevation Summary – April and October 2020
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
Monroe, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-05		MW-16-06		MW-16-07	
Date Installed	2/17/2016		2/18/2016		2/16/2016		2/15/2016		4/13/2016		4/13/2016		4/14/2016	
TOC Elevation	581.74		581.81		579.95		585.54		580.42		581.94		578.40	
Geologic Unit of Screened Interval	Silt/Limestone Interface		Silt/Limestone Interface		Sand & Silty Clay Limestone Interface		Silty Sand and Gravel		Limestone		Gravel and Cobbles		Silt/Limestone Interface	
Screened Interval Elevation	530.9 to 525.9		526.4 to 521.4		540.3 to 535.3		541.6 to 536.6		540.5 to 535.5		534.2 to 529.2		540.4 to 535.4	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
04/08/2020	4.10	577.64	-4.50	586.3	-11.60	591.6	-15.00	600.5	-15.00	595.4	-1.10	583.0	-6.80	585.2
10/05/2020	4.68	577.06(1)	-0.85	582.7	-7.30	587.3	-15.00	600.5	-11.50	591.9	0.80	581.14	-4.40	582.8

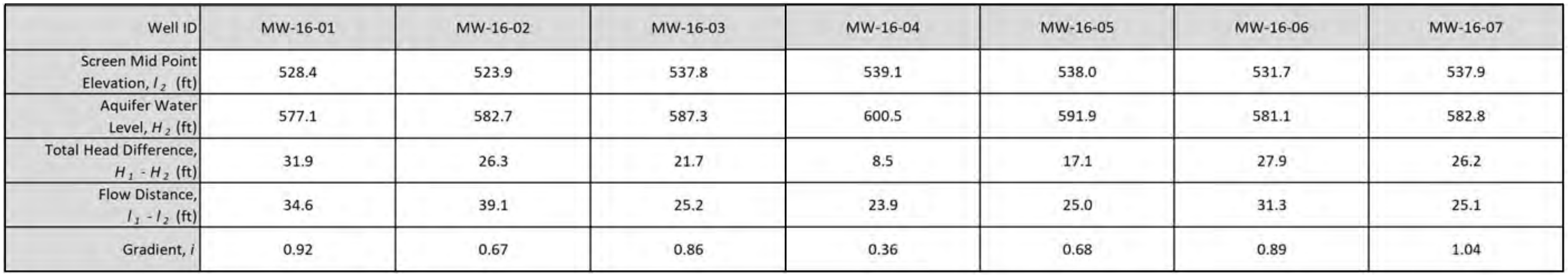
Notes:

Negative depth to water measurement indicates artesian conditions, actual measured water level is above the top of casing.

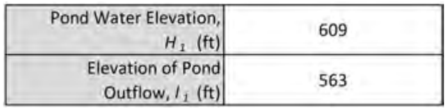
Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet below top of casing

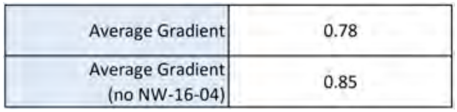
(1) Water level meaured on October 6, 2020.



Well ID	MW-16-01	MW-16-02	MW-16-03	MW-16-04	MW-16-05	MW-16-06	MW-16-07
Screen Mid Point Elevation, I_2 (ft)	528.4	523.9	537.8	539.1	538.0	531.7	537.9
Aquifer Water Level, H_2 (ft)	577.1	582.7	587.3	600.5	591.9	581.1	582.8
Total Head Difference, $H_1 - H_2$ (ft)	31.9	26.3	21.7	8.5	17.1	27.9	26.2
Flow Distance, $I_1 - I_2$ (ft)	34.6	39.1	25.2	23.9	25.0	31.3	25.1
Gradient, i	0.92	0.67	0.86	0.36	0.68	0.89	1.04



Pond Water Elevation, H_1 (ft)	609
Elevation of Pond Outflow, I_1 (ft)	563



Average Gradient	0.78
Average Gradient (no NW-16-04)	0.85

POLLUTE Model Inputs

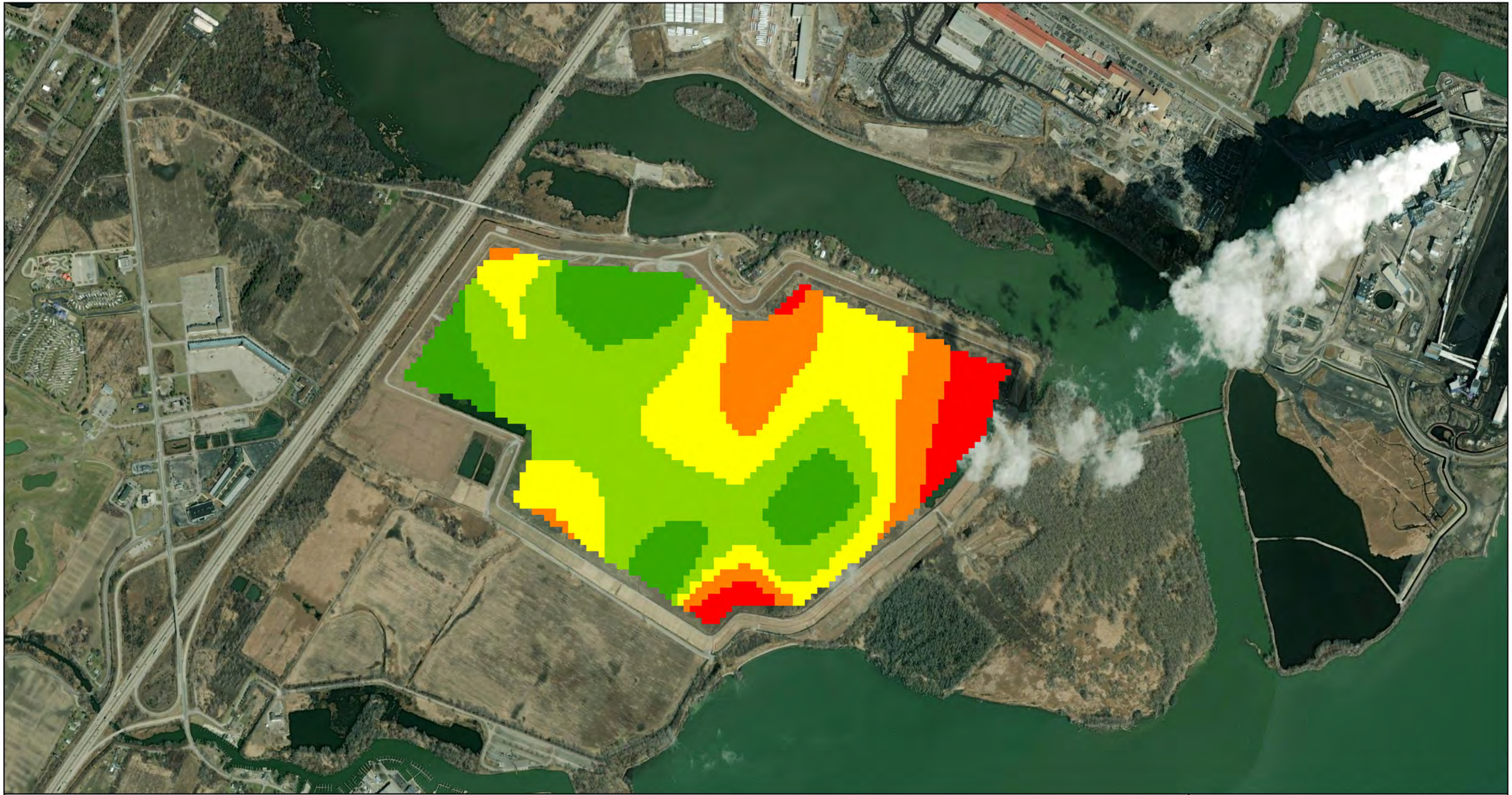
POLLUTE Model Inputs - Fly Ash Basin
Table O-2

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity - Doubled (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Effective Porosity Max	Effective Porosity Min	Modeling Period (years)	Modeling Period for Sensitvity	Distribution Coefficient (See Note 5)	Dry Density (kg/m3)
FAB	Sandy Lean Clay	6.08E-03	1.22E-02	6.31	10.42	4.33	10	2.27E-08	0.019	0.024	0.014	0.19	0.31	0.14	67	97	0	1919

Notes:

1. Kv = Vertical Hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table O-1.
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. CoHD = Coefficient of Hydrodynamic Dispersion
4. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994.
5. Distribution Coefficient, Kd of 0.0082 m3/kg was used for Molybdenum, for minimum thickness sensitivity analysis.

Model Thickness



Legend

FAB Sandy Lean Clay Thickness (ft)

🟩 14.3 - 18.3
🟩 18.4 - 20.4
🟨 20.5 - 22.6
🟧 22.7 - 25.9
🟥 26 - 34.2

0 500 1,000 2,000
Feet

Sandy Lean Clay Thickness
Monroe Power Plant Flyash Basin (FAB)
Monroe, MI

Geosyntec consultants

GLP8014 | October 2021

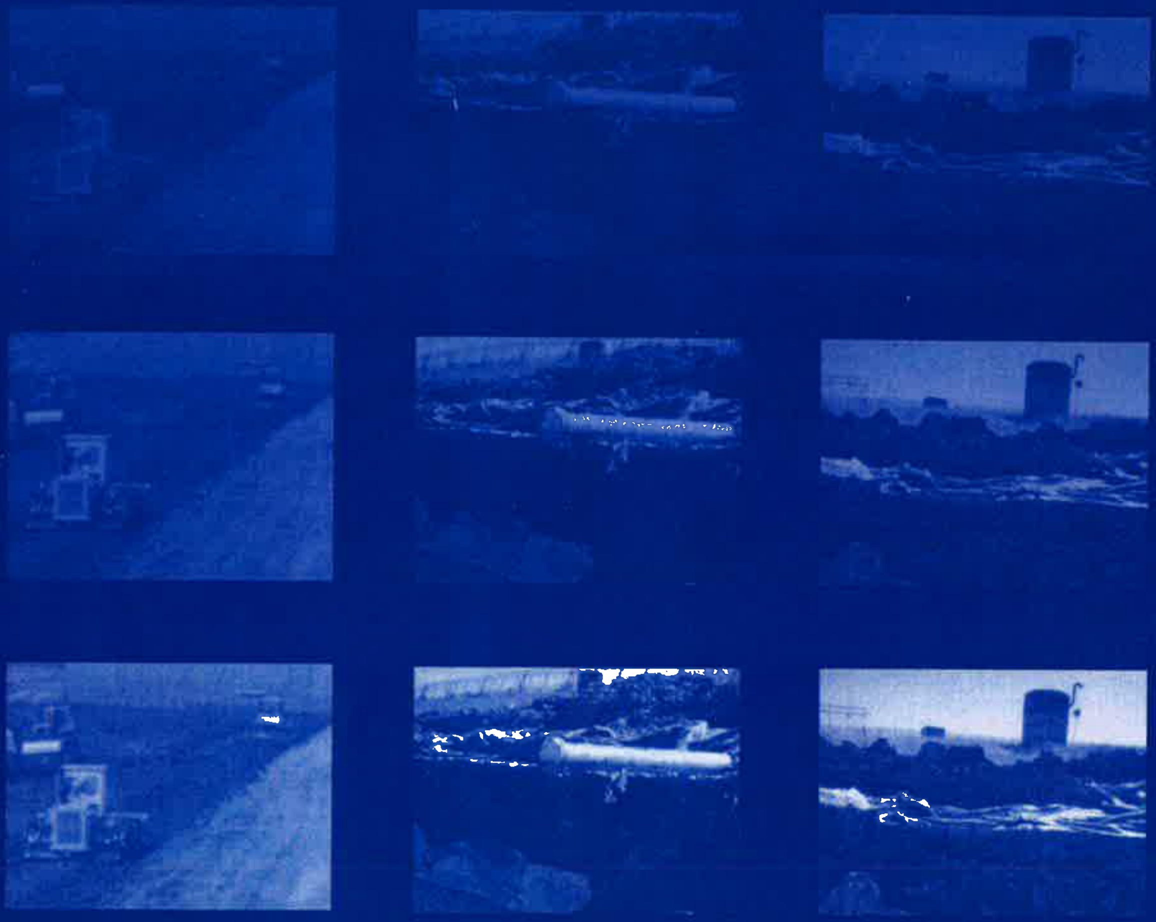
Figure

O-1

\\chicago-01\Data\prj1\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\500 - Technical\GIS\Monroe_Sections\Monroe_Sections_NJW.aprx 10/29/2021 11:48 AM

Reference Material

CRC Press
Taylor & Francis Group
A CHAPMAN & HALL BOOK



BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES

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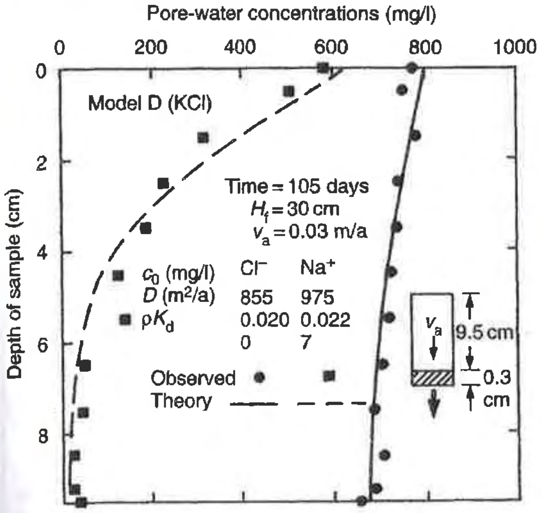


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe *et al.*, 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some confidence in the parameters D and ρK_d for the clay and source fluids examined.

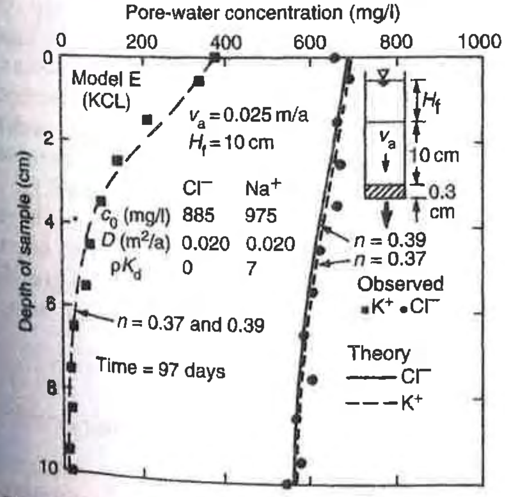


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe *et al.*, 1988).

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient, D, for chloride was deduced for each model and ranged between 0.018 and 0.02 m^2/a with an average value of 0.019 m^2/a. This small variation in D does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m^2/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters D and K_d. Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

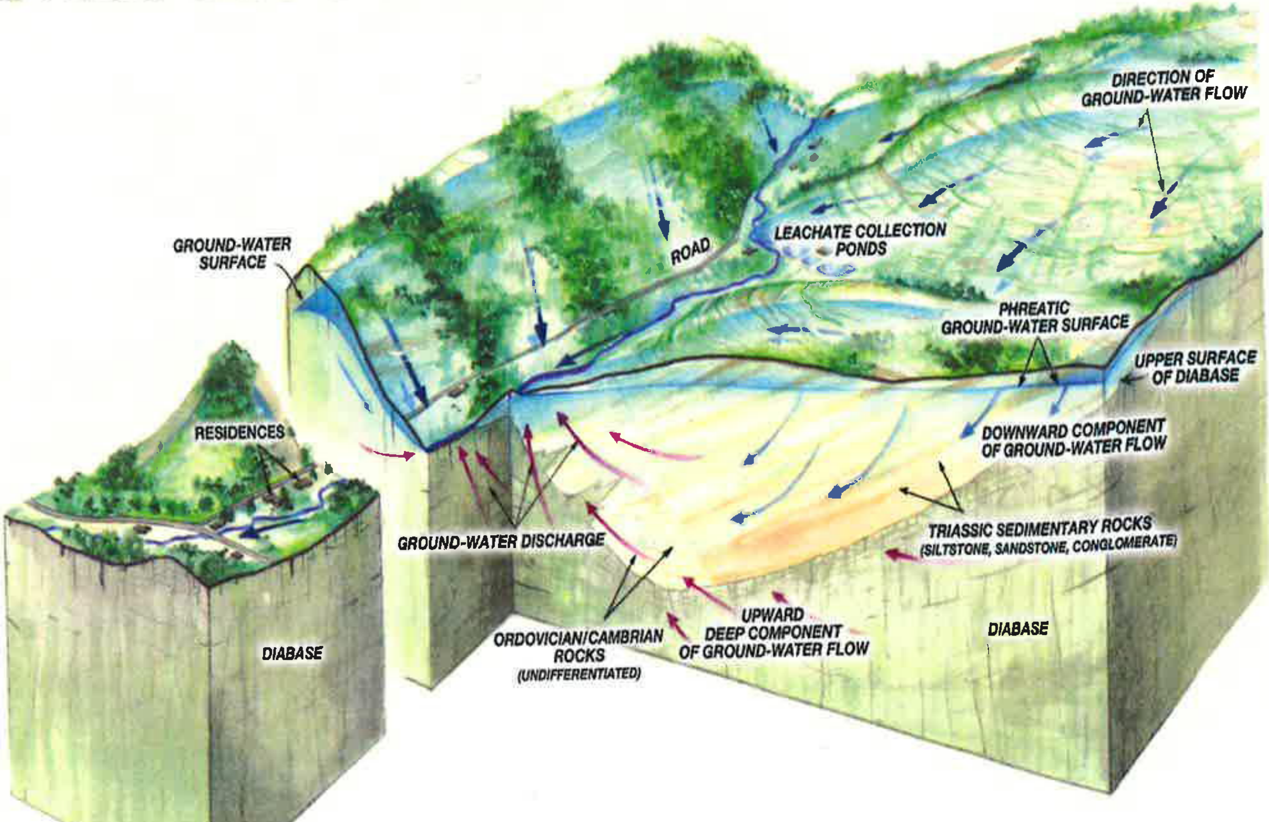
8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection–diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

SITE ASSESSMENT and REMEDIATION Handbook

Second Edition

Martin N. Sara



LEWIS PUBLISHERS

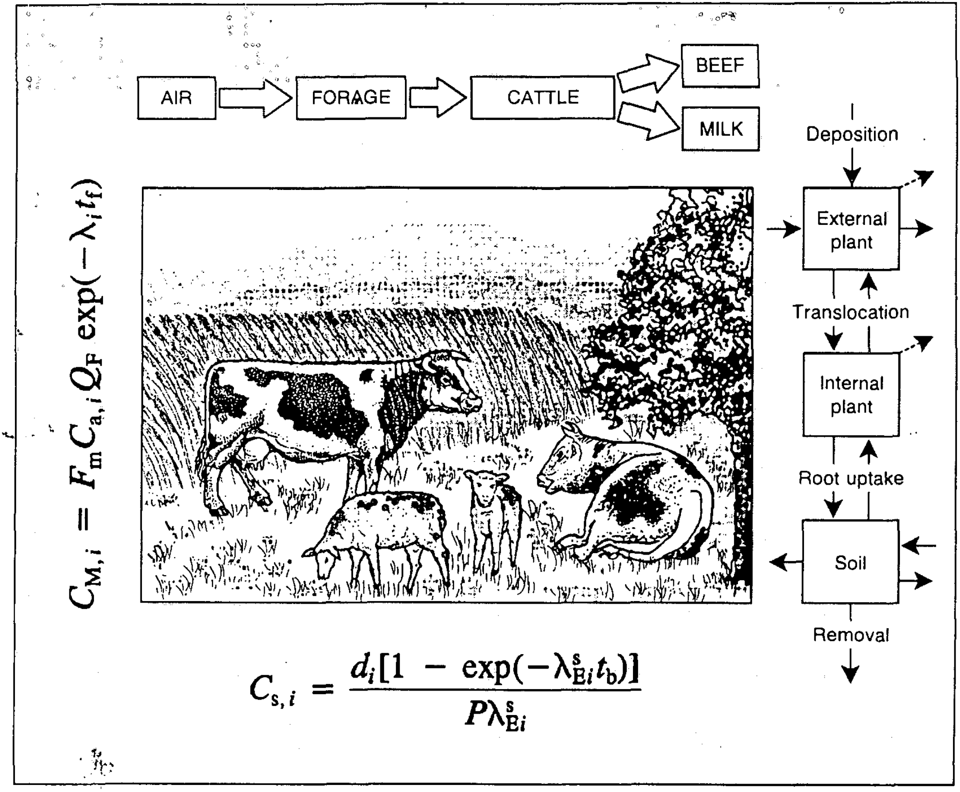
Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils

Texture Class	Sample Size	Total Porosity (ϕ) cm^3/cm^3	Residual Saturation (ϕr) cm^3/cm^3	Effective Porosity (ϕ_c) cm^3/cm^3
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value
Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.



$$C_{M,i} = F_m C_{a,i} Q_F \exp(-\lambda_i t_f)$$

$$C_{s,i} = \frac{d_i[1 - \exp(-\lambda^{s}_{Ei} t_b)]}{P\lambda^{s}_{Ei}}$$

TECHNICAL REPORTS SERIES No. 364

Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments

Produced in collaboration with the
International Union of Radioecologists

INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1994

TABLE IX. PARTITION COEFFICIENT K_D OF RADIONUCLIDES IN SOILS (L/Kg) [37]

Nuclide	Soil type							
	Sand		Loam		Clay		Organic	
	Expected	Range	Expected	Range	Expected	Range	Expected	Range
Ac	4.5×10^{2}		1.5×10^{3}		2.4×10^{3}		5.4×10^{3}	
Ag	9.0×10^{1}	$2.5\times10^{0} - 3.3\times10^{3}$	1.2×10^{2}	$1.3\times10^{1} - 1.1\times10^{3}$	1.8×10^{2}	$8.1\times10^{1} - 4.0\times10^{2}$	1.5×10^{4}	$2.4\times10^{3} - 8.9\times10^{4}$
Am	2.0×10^{3}	$1.1\times10^{1} - 2.6\times10^{5}$	9.9×10^{2}	$6.0\times10^{2} - 1.6\times10^{5}$	8.1×10^{3}	$4.5\times10^{1} - 1.5\times10^{6}$	1.1×10^{5}	$3.6\times10^{3} - 3.3\times10^{6}$
Be	2.4×10^{2}		8.1×10^{2}		1.3×10^{3}		3.0×10^{3}	
Bl	1.2×10^{2}		4.0×10^{2}		6.7×10^{2}		1.5×10^{3}	
Br	1.5×10^{1}		4.9×10^{1}		7.4×10^{1}		1.8×10^{2}	
Ca	9.0×10^{0}		3.0×10^{1}		4.9×10^{1}		1.1×10^{2}	
Cd	7.4×10^{1}	$3.7\times10^{0} - 1.5\times10^{3}$	4.0×10^{1}	$1.6\times10^{0} - 9.9\times10^{2}$	5.4×10^{2}	$9.0\times10^{1} - 3.3\times10^{3}$	8.1×10^{2}	$8.2\times10^{0} - 8.1\times10^{4}$
Ce	4.9×10^{2}	$2.0\times10^{1} - 1.2\times10^{4}$	8.1×10^{3}	$4.0\times10^{2} - 1.6\times10^{5}$	2.0×10^{4}	$7.3\times10^{3} - 5.4\times10^{4}$	3.0×10^{3}	
Cm	4.0×10^{3}		1.8×10^{4}	$4.4\times10^{3} - 7.3\times10^{4}$	5.4×10^{3}		1.2×10^{4}	
Co	6.0×10^{1}	$2.2\times10^{-1} - 1.6\times10^{4}$	1.3×10^{3}	$9.9\times10^{1} - 1.8\times10^{4}$	5.4×10^{2}	$1.5\times10^{1} - 2.0\times10^{4}$	9.9×10^{2}	$4.9\times10^{1} - 2.0\times10^{4}$
Cr	6.7×10^{1}	$1.0\times10^{0} - 4.4\times10^{3}$	3.0×10^{1}	$9.1\times10^{-2} - 9.9\times10^{3}$	1.5×10^{3}		2.7×10^{2}	$1.2\times10^{0} - 6.0\times10^{4}$
Cs	2.7×10^{2}	$1.8\times10^{0} - 4.0\times10^{4}$	4.4×10^{3}	$3.3\times10^{2} - 6.0\times10^{4}$	1.8×10^{3}	$7.4\times10^{1} - 4.4\times10^{4}$	2.7×10^{2}	$2.0\times10^{-1} - 3.6\times10^{5}$
Fe	2.2×10^{2}	$1.2\times10^{0} - 4.0\times10^{4}$	8.1×10^{2}	$2.0\times10^{2} - 3.3\times10^{3}$	1.6×10^{2}	$6.7\times10^{0} - 4.0\times10^{3}$	4.9×10^{3}	
Hf	4.5×10^{2}		1.5×10^{3}		2.4×10^{3}		5.4×10^{3}	
Ho	2.4×10^{2}		8.1×10^{2}		1.3×10^{3}		3.0×10^{3}	
I	1.0×10^{0}	$1.3\times10^{-2} - 8.5\times10^{1}$	4.5×10^{0}	$8.2\times10^{-2} - 2.4\times10^{2}$	1.8×10^{2}	$8.2\times10^{-2} - 3.3\times10^{1}$	2.7×10^{1}	$5.0\times10^{-1} - 1.5\times10^{3}$
Mn	4.9×10^{1}	$3.0\times10^{0} - 8.1\times10^{2}$	7.2×10^{2}	$4.1\times10^{0} - 1.3\times10^{5}$	1.8×10^{2}	$3.3\times10^{0} - 9.9\times10^{3}$	4.9×10^{2}	
Mo	7.4×10^{0}	$8.2\times10^{-1} - 6.7\times10^{1}$	1.3×10^{2}		9.0×10^{1}	$8.2\times10^{0} - 9.9\times10^{2}$	2.7×10^{1}	$1.0\times10^{1} - 7.4\times10^{1}$
Nb	1.6×10^{2}		5.4×10^{2}		9.0×10^{2}		2.0×10^{3}	
Ni	4.0×10^{2}	$2.0\times10^{1} - 8.1\times10^{3}$	3.0×10^{2}		6.7×10^{2}	$1.6\times10^{2} - 2.7\times10^{3}$	1.1×10^{3}	$1.8\times10^{2} - 6.6\times10^{3}$
Np	4.1×10^{0}	$1.4\times10^{-1} - 1.2\times10^{2}$	2.5×10^{1}	$2.2\times10^{0} - 2.7\times10^{2}$	5.5×10^{1}	$2.7\times10^{-2} - 1.1\times10^{5}$	1.2×10^{3}	$5.4\times10^{2} - 2.7\times10^{3}$

APPENDIX P – FATE AND TRANSPORT MODEL OUTPUTS

POLLUTEv7

Version 7.13

Monroe Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	2.406E-01
	1.262E+00	1.036E-02
	1.893E+00	6.512E-05
	2.524E+00	5.518E-08
	3.155E+00	7.884E-12

	3.786E+00	1.784E-13
	4.417E+00	1.050E-14
	5.048E+00	3.552E-16
	5.679E+00	6.599E-18
	6.310E+00	6.382E-20
10	0.000E+00	1.000E+00
	6.310E-01	4.848E-01
	1.262E+00	1.063E-01
	1.893E+00	9.369E-03
	2.524E+00	3.137E-04
	3.155E+00	3.878E-06
	3.786E+00	1.742E-08
	4.417E+00	3.273E-11
	5.048E+00	1.136E-12
	5.679E+00	2.115E-13
	6.310E+00	3.070E-14
20	0.000E+00	1.000E+00
	6.310E-01	7.137E-01
	1.262E+00	3.598E-01
	1.893E+00	1.198E-01
	2.524E+00	2.531E-02
	3.155E+00	3.320E-03
	3.786E+00	2.666E-04
	4.417E+00	1.299E-05
	5.048E+00	3.816E-07
	5.679E+00	6.762E-09
	6.310E+00	8.328E-11
40	0.000E+00	1.000E+00
	6.310E-01	8.760E-01
	1.262E+00	6.701E-01
	1.893E+00	4.315E-01
	2.524E+00	2.278E-01
	3.155E+00	9.681E-02
	3.786E+00	3.272E-02
	4.417E+00	8.723E-03
	5.048E+00	1.824E-03
	5.679E+00	2.979E-04
	6.310E+00	3.789E-05
67	0.000E+00	1.000E+00
	6.310E-01	9.472E-01
	1.262E+00	8.471E-01
	1.893E+00	7.007E-01
	2.524E+00	5.265E-01
	3.155E+00	3.543E-01
	3.786E+00	2.111E-01
	4.417E+00	1.105E-01
	5.048E+00	5.054E-02
	5.679E+00	2.010E-02
	6.310E+00	6.926E-03

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POLLUTEv7

Version 7.13

Monroe_ExtendedRun_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
10	0.000E+00	1.000E+00
	6.310E-01	3.507E-15
	1.262E+00	6.010E-30
	1.893E+00	3.839E-44
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
25	0.000E+00	1.000E+00
	6.310E-01	5.228E-09
	1.262E+00	8.355E-18
	1.893E+00	9.295E-28
	2.524E+00	2.197E-36
	3.155E+00	1.618E-46
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
50	0.000E+00	1.000E+00
	6.310E-01	4.689E-05
	1.262E+00	5.082E-14
	1.893E+00	1.512E-18
	2.524E+00	2.079E-25
	3.155E+00	2.673E-32
	3.786E+00	3.334E-38
	4.417E+00	1.540E-45
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
97	0.000E+00	1.000E+00
	6.310E-01	4.400E-03
	1.262E+00	5.038E-09
	1.893E+00	2.101E-14
	2.524E+00	1.336E-17
	3.155E+00	5.858E-22
	3.786E+00	1.145E-27
	4.417E+00	5.317E-32
	5.048E+00	4.724E-36
	5.679E+00	7.080E-41
	6.310E+00	3.637E-46

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POLLUTEv7

Version 7.13

Monroe_DoubleDarcy_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.0122 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	9.584E-20
	1.262E+00	5.786E-41
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	5.876E-15
	1.262E+00	1.709E-29
	1.893E+00	1.851E-43
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	9.978E-11
	1.262E+00	2.683E-19
	1.893E+00	1.035E-30
	2.524E+00	4.585E-40
	3.155E+00	1.494E-50
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	7.909E-06
	1.262E+00	1.583E-14
	1.893E+00	4.306E-20
	2.524E+00	1.309E-28
	3.155E+00	1.232E-34
	3.786E+00	4.003E-42
	4.417E+00	3.407E-49
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	8.217E-04
	1.262E+00	4.765E-12
	1.893E+00	1.025E-15
	2.524E+00	2.389E-20
	3.155E+00	6.917E-27
	3.786E+00	8.473E-32
	4.417E+00	8.991E-37
	5.048E+00	7.293E-43
	5.679E+00	4.968E-48
	6.310E+00	0.000E+00

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POLLUTEv7

Version 7.13

Monroe_CoHD_High_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.0238 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	4.639E-18
	1.262E+00	6.835E-37
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	2.805E-14
	1.262E+00	6.445E-26
	1.893E+00	5.670E-39
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	4.885E-09
	1.262E+00	7.038E-18
	1.893E+00	7.428E-28
	2.524E+00	1.576E-36
	3.155E+00	1.085E-46
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	4.306E-05
	1.262E+00	4.224E-14
	1.893E+00	1.156E-18
	2.524E+00	1.485E-25
	3.155E+00	1.704E-32
	3.786E+00	1.974E-38
	4.417E+00	8.453E-46
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	1.846E-03
	1.262E+00	2.287E-10
	1.893E+00	3.269E-15
	2.524E+00	5.068E-19
	3.155E+00	3.001E-24
	3.786E+00	2.289E-30
	4.417E+00	1.823E-34
	5.048E+00	2.422E-39
	5.679E+00	4.359E-45
	6.310E+00	7.177E-50

POLLUTEv7

Version 7.13

Monroe CoHD Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.01425 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	1.806E-01
	1.262E+00	3.160E-03
	1.893E+00	4.092E-06
	2.524E+00	3.625E-10
	3.155E+00	4.662E-13

	3.786E+00	2.122E-14
	4.417E+00	4.657E-16
	5.048E+00	4.575E-18
	5.679E+00	1.847E-20
	6.310E+00	2.778E-23
10	0.000E+00	1.000E+00
	6.310E-01	4.345E-01
	1.262E+00	6.471E-02
	1.893E+00	2.798E-03
	2.524E+00	3.269E-05
	3.155E+00	9.978E-08
	3.786E+00	8.567E-11
	4.417E+00	1.626E-12
	5.048E+00	2.459E-13
	5.679E+00	2.638E-14
	6.310E+00	1.942E-15
20	0.000E+00	1.000E+00
	6.310E-01	6.951E-01
	1.262E+00	3.050E-01
	1.893E+00	7.634E-02
	2.524E+00	1.031E-02
	3.155E+00	7.304E-04
	3.786E+00	2.667E-05
	4.417E+00	4.970E-07
	5.048E+00	4.728E-09
	5.679E+00	3.706E-11
	6.310E+00	5.747E-12
40	0.000E+00	1.000E+00
	6.310E-01	8.799E-01
	1.262E+00	6.537E-01
	1.893E+00	3.868E-01
	2.524E+00	1.751E-01
	3.155E+00	5.906E-02
	3.786E+00	1.460E-02
	4.417E+00	2.618E-03
	5.048E+00	3.380E-04
	5.679E+00	3.127E-05
	6.310E+00	2.067E-06
67	0.000E+00	1.000E+00
	6.310E-01	9.553E-01
	1.262E+00	8.550E-01
	1.893E+00	6.943E-01
	2.524E+00	4.973E-01
	3.155E+00	3.072E-01
	3.786E+00	1.611E-01
	4.417E+00	7.086E-02
	5.048E+00	2.594E-02
	5.679E+00	7.857E-03
	6.310E+00	1.961E-03

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POLLUTEv7

Version 7.13

Monroe_Porosity_High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.31	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	2.013E-01
	1.262E+00	7.114E-03
	1.893E+00	3.651E-05
	2.524E+00	2.522E-08
	3.155E+00	3.021E-12

	3.786E+00	6.110E-14
	4.417E+00	2.930E-15
	5.048E+00	8.059E-17
	5.679E+00	1.216E-18
	6.310E+00	9.539E-21
10	0.000E+00	1.000E+00
	6.310E-01	4.126E-01
	1.262E+00	7.503E-02
	1.893E+00	5.431E-03
	2.524E+00	1.487E-04
	3.155E+00	1.500E-06
	3.786E+00	5.496E-09
	4.417E+00	8.727E-12
	5.048E+00	3.019E-13
	5.679E+00	4.601E-14
	6.310E+00	5.441E-15
20	0.000E+00	1.000E+00
	6.310E-01	6.227E-01
	1.262E+00	2.655E-01
	1.893E+00	7.349E-02
	2.524E+00	1.280E-02
	3.155E+00	1.378E-03
	3.786E+00	9.049E-05
	4.417E+00	3.600E-06
	5.048E+00	8.635E-08
	5.679E+00	1.250E-09
	6.310E+00	1.361E-11
40	0.000E+00	1.000E+00
	6.310E-01	7.902E-01
	1.262E+00	5.276E-01
	1.893E+00	2.897E-01
	2.524E+00	1.284E-01
	3.155E+00	4.539E-02
	3.786E+00	1.267E-02
	4.417E+00	2.780E-03
	5.048E+00	4.769E-04
	5.679E+00	6.377E-05
	6.310E+00	6.633E-06
67	0.000E+00	1.000E+00
	6.310E-01	8.794E-01
	1.262E+00	7.088E-01
	1.893E+00	5.152E-01
	2.524E+00	3.335E-01
	3.155E+00	1.905E-01
	3.786E+00	9.533E-02
	4.417E+00	4.160E-02
	5.048E+00	1.576E-02
	5.679E+00	5.174E-03
	6.310E+00	1.467E-03

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POLLUTEv7

Version 7.13

Monroe Porosity Low Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	6.31 m	10	0.019 m2/a	0.14	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	6.310E-01	1.968E-23
	1.262E+00	6.574E-49
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00

	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
10	0.000E+00	1.000E+00
	6.310E-01	9.082E-17
	1.262E+00	6.210E-34
	1.893E+00	0.000E+00
	2.524E+00	0.000E+00
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
20	0.000E+00	1.000E+00
	6.310E-01	1.653E-13
	1.262E+00	4.000E-23
	1.893E+00	1.698E-35
	2.524E+00	2.696E-48
	3.155E+00	0.000E+00
	3.786E+00	0.000E+00
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
40	0.000E+00	1.000E+00
	6.310E-01	1.026E-07
	1.262E+00	1.821E-16
	1.893E+00	1.428E-24
	2.524E+00	2.512E-33
	3.155E+00	1.118E-41
	3.786E+00	2.433E-50
	4.417E+00	0.000E+00
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00
67	0.000E+00	1.000E+00
	6.310E-01	5.156E-05
	1.262E+00	6.659E-14
	1.893E+00	2.147E-18
	2.524E+00	2.982E-25
	3.155E+00	4.881E-32
	3.786E+00	6.312E-38
	4.417E+00	3.087E-45
	5.048E+00	0.000E+00
	5.679E+00	0.000E+00
	6.310E+00	0.000E+00

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Version 7.13

Monroe Thick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	10.4 m	10	0.019 m2/a	0.19	0 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7   **N =** 20   **SIG =** 0   **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	1.040E+00	3.877E-02
	2.080E+00	9.884E-06
	3.120E+00	1.266E-11
	4.160E+00	3.550E-14
	5.200E+00	1.439E-16

	6.240E+00	1.105E-19
	7.280E+00	1.237E-23
	8.320E+00	4.146E-28
	9.360E+00	6.878E-31
	1.040E+01	6.438E-34
10	0.000E+00	1.000E+00
	1.040E+00	2.003E-01
	2.080E+00	3.794E-03
	3.120E+00	5.081E-06
	4.160E+00	4.440E-10
	5.200E+00	7.695E-13
	6.240E+00	3.854E-14
	7.280E+00	9.158E-16
	8.320E+00	9.567E-18
	9.360E+00	4.018E-20
	1.040E+01	6.121E-23
20	0.000E+00	1.000E+00
	1.040E+00	4.787E-01
	2.080E+00	7.932E-02
	3.120E+00	3.764E-03
	4.160E+00	4.724E-05
	5.200E+00	1.513E-07
	6.240E+00	1.342E-10
	7.280E+00	3.164E-12
	8.320E+00	5.384E-13
	9.360E+00	6.450E-14
	1.040E+01	5.270E-15
40	0.000E+00	1.000E+00
	1.040E+00	7.497E-01
	2.080E+00	3.649E-01
	3.120E+00	1.021E-01
	4.160E+00	1.539E-02
	5.200E+00	1.206E-03
	6.240E+00	4.822E-05
	7.280E+00	9.730E-07
	8.320E+00	9.891E-09
	9.360E+00	7.898E-11
	1.040E+01	1.309E-11
67	0.000E+00	1.000E+00
	1.040E+00	8.880E-01
	2.080E+00	6.508E-01
	3.120E+00	3.633E-01
	4.160E+00	1.462E-01
	5.200E+00	4.100E-02
	6.240E+00	7.851E-03
	7.280E+00	1.014E-03
	8.320E+00	8.750E-05
	9.360E+00	5.025E-06
	1.040E+01	1.914E-07

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Version 7.13

Monroe_Thin_Kd

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00608 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Lower Native	4.33 m	10	0.019 m2/a	0.19	0.0082 m3/kg	1919 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.330E-01	5.594E-15
	8.660E-01	5.373E-29
	1.299E+00	8.305E-43
	1.732E+00	0.000E+00
	2.165E+00	0.000E+00

	2.598E+00	0.000E+00
	3.031E+00	0.000E+00
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
10	0.000E+00	1.000E+00
	4.330E-01	1.833E-10
	8.660E-01	2.558E-19
	1.299E+00	8.161E-31
	1.732E+00	6.736E-40
	2.165E+00	1.295E-50
	2.598E+00	0.000E+00
	3.031E+00	0.000E+00
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
20	0.000E+00	1.000E+00
	4.330E-01	7.801E-06
	8.660E-01	7.981E-15
	1.299E+00	2.554E-20
	1.732E+00	1.104E-28
	2.165E+00	4.434E-35
	2.598E+00	2.442E-42
	3.031E+00	7.572E-50
	3.464E+00	0.000E+00
	3.897E+00	0.000E+00
	4.330E+00	0.000E+00
40	0.000E+00	1.000E+00
	4.330E-01	1.865E-03
	8.660E-01	2.628E-10
	1.299E+00	3.170E-15
	1.732E+00	5.208E-19
	2.165E+00	3.450E-24
	2.598E+00	2.364E-30
	3.031E+00	1.905E-34
	3.464E+00	2.807E-39
	3.897E+00	5.506E-45
	4.330E+00	7.651E-50
67	0.000E+00	1.000E+00
	4.330E-01	1.852E-02
	8.660E-01	1.382E-06
	1.299E+00	5.860E-13
	1.732E+00	2.216E-15
	2.165E+00	3.040E-18
	2.598E+00	6.476E-22
	3.031E+00	1.599E-26
	3.464E+00	8.031E-31
	3.897E+00	6.203E-34
	4.330E+00	1.604E-37

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Attachment C

Additional Aquifer Characterization Report

Additional Uppermost Aquifer Characterization Study

Monroe Power Plant Fly Ash Basin CCR Unit, 7955 East Dunbar Road, Monroe, Michigan

April 2023

Prepared For:

DTE Electric Company

Prepared By:

TRC
1540 Eisenhower Pl.
Ann Arbor, MI 48108

Clint Miller

Clint Miller, PhD., PG.
Senior Project Geochemist

Alexander Eklund

Alexander Eklund
Data Scientist

Vincent C. Buening

Vincent Buening, C.P.G.
Senior Project Manager

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1.0 Introduction

1.1 Purpose and Objectives

The objective of this report is to document TRC's Additional Aquifer Characterization Study performed at the Monroe Power Plant (MONPP) Fly Ash Basin (FAB) Coal Combustion Residual unit (hereinafter "the CCR unit"), which is located at the Monroe Power Plant, Monroe, Michigan. This study was performed to determine if additional data, collected in December 2022, provide further lines of evidence to substantiate that groundwater in the uppermost aquifer is unimpacted by CCR operations. This additional uppermost aquifer characterization study is complementary to the preliminary alternative liner demonstration (ALD) prepared in accordance with 40 CFR §257.71 (d) that was submitted to the United States Environmental Protection Agency (EPA) on November 30, 2021 (Geosyntec, November 2021), and the previous studies (TRC, 2017, Detroit Edison, 1995) performed to establish the groundwater monitoring program developed pursuant to 40 CFR §257.91.

Previous studies performed at the site including the ALD have demonstrated and verified that the site is underlain by a thick laterally- continuous clay-rich deposit which meets the requirements of an alternate liner per 40 CFR §257.71 (d). The site characterization and groundwater data collected to-date from the CCR unit indicate that the natural underlying clay hydraulically separates the CCR unit from the uppermost aquifer and that groundwater quality is not affected by the CCR unit or any associated management activities. The data and analysis presented within the preliminary ALD further confirms the pre-existing site conceptual model, and through rigorous field testing and site-specific flow and transport modeling demonstrates the effectiveness of the clay. The preliminary ALD demonstrates that there is no reasonable probability that water from the CCR unit will result in a release to the uppermost aquifer throughout the CCR units active life, nor will data exceed the groundwater protection standard at the waste boundaries over the projected active life and post closure of the CCR unit.

This additional characterization study included the collection of additional groundwater samples during December 2022, along with further analyses of existing data to further characterize the uppermost aquifer. Water samples were collected from the CCR unit groundwater monitoring well network, the pore water from the CCR Fly Ash Basin (FAB), the FAB discharge point, and from nearby surface water bodies (Plum Creek and Lake Erie). Laboratory analysis performed during December 2022 included additional geochemical indicators, stable isotopes, and radiometric isotopes. Stable isotopes do not decay, but preferentially fractionate under physical, chemical and or environmental conditions. Radiometric isotopes are unstable and do decay; decay is at a constant rate, and therefore can be useful for age-dating different water sources. Additionally, data collected as part of monitoring under the state program (2020 to 2022) and the federal CCR program (2015-2022) were used as described and presented within this report.

In summary, the data collected in this assessment confirms that the uppermost aquifer is not in communication with the CCR unit water, groundwater geochemistry in the uppermost aquifer is reflective of the geogenic natural environmental conditions, and is therefore unaffected by the CCR unit. Each of the multiple lines of evidence presented in this report independently supports this conclusion as discussed below.

1.2 Site Overview and Operational History

The MONPP FAB is located about one mile southwest of the MONPP in Section 16, Township 7 South, Range 9 East at 7955 East Dunbar Road, Monroe, Monroe County, Michigan (Figure 1). The MONPP FAB is bounded by Dunbar Road and Plum Creek to the north and northeast, Interstate 75 to the northwest, a 200-acre peninsula into Lake Erie to the east and southeast, Lake Erie to the south, and a large open field to the southwest (Figure 2).

The property has been used continuously for the operation of the CCR unit since approximately 1975 and is constructed over a natural clay-rich soil base. The MONPP FAB are owned by DTE Electric, and currently receive coal ash from DTE Electric's MONPP. The MONPP FAB is operated in accordance with Michigan Part 115 of the Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended, and are licensed as a Coal Ash Surface Impoundment and a Coal Ash Landfill under the current operating license number 9579.

1.3 Geology/Hydrogeology

The geologic and hydrogeologic conditions at the CCR unit have been extensively studied and these studies (including TRC, 2017, Detroit Edison 1995 and Geosyntec 2020), provide specific details on the hydrogeology and geology in the region, and at the MONPP. A brief discussion is provided below.

The CCR unit is located approximately 200 feet southwest of Plum Creek and approximately 250 feet northwest of Lake Erie. The uppermost aquifer consists of saturated limestone of the Bass Islands Group and a 5- to 10-foot thick layer of weathered limestone mixed with clay, sand, and/or gravel just above the limestone interface, both present beneath at least 14 to 34 feet of a contiguous glacially compacted natural clay liner that serves as a natural confining hydraulic barrier isolating the underlying uppermost aquifer (TRC, 2017 and Geosyntec, 2021). The limestone bedrock aquifer is artesian in every location except MW 16-01, where the static water level was approximately 1 to 2 feet below ground surface (ft bgs). Monitoring wells MW-16-01 through MW-16-07 are all screened in the top of the limestone uppermost aquifer, which is up to 350 feet thick in Monroe County.

Potentiometric groundwater elevation data from 2016 through 2022 suggest that there is horizontal flow within the upper aquifer unit generally to the northeast towards Plum Creek (TRC, January 2023). The average hydraulic gradient was 0.004 foot/foot in 2022 (Figure 4).

2.0 Additional Data Collection

The additional groundwater, CCR unit FAB water and surface water sample collection was performed from December 9 to 13, 2022 to provide data to further characterize the uppermost aquifer at the CCR unit. These samples were collected in general accordance with the procedures outlined in the *CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Monroe Power Plant Coal Combustion Residual Fly Ash Basin* (QAPP) (TRC, August 2016; revised March 2017).

2.1 Groundwater Sample Collection

Groundwater samples were collected from the seven monitoring wells within the CCR unit uppermost aquifer monitoring well network (MW-16-01 through MW-16-07) (Figure 2).

2.2 Fly Ash Basin Water Sample Collection

A water sample was collected from the FAB at the discharge point to Lake Erie (called SW-001 for the December 2022 sample) (Figure 2). In addition, water samples were collected from five existing piezometers (PZ-01 through PZ-05) that were installed in late 2020 to collect pore water samples from the CCR within the FAB (Figure 2).

2.3 Surface Water Sample Collection

Surface water samples (P-01 from Plum Creek and LE-01 from Lake Erie) were collected from the approximate locations shown on Figure 3.

The samples were submitted to the laboratories listed below for analysis of the following parameters to support the additional uppermost aquifer characterization:

- Eurofins Environment Testing for analysis of calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO_4), chloride (Cl), HCO_3 and alkalinity (bicarbonate (HCO_3), carbonate (CO_3) and total alkalinity), boron (B), lithium (Li) and strontium (Sr);
- ALS Scandinavia for analysis of $\delta^{11}B$, $\delta^{87}Sr$ and $\delta^{7}Li$;
- Waterloo Environmental Isotope Laboratory for analysis of $\delta^{2}H$ and $\delta^{18}O$; and
- Miami Tritium Laboratory for analysis of tritium.

Note: the δ notation is explained in Section 3. The December 2022 water data are summarized in Tables 1 through 3 and the December 2022 laboratory data for these water samples are provided in Appendix A.

3.0 Geochemical and Isotopic Data Analysis

3.1 Geochemistry

In order to provide a comprehensive evaluation of the data collected in December 2022, all of the existing Appendix III and Appendix IV data from groundwater samples collected from 2016 through 2022, as provided in the 2017 to 2022 Annual Reports (TRC, January 2018 through January 2023) were also included in the evaluation. These parameters included boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228 combined. Additionally, concentrations of magnesium, potassium, sodium, strontium, and total organic carbon (TOC), as well as field measured parameters including oxidation-reduction potential (ORP), dissolved oxygen (DO), specific conductivity (SC), temperature, and turbidity were analyzed/measured and utilized in this evaluation. The December 2022 field data are summarized in Table 1, and data for samples collected from the CCR unit water (2020 to 2022) and groundwater data collected from the uppermost aquifer monitoring wells (December 2022) are summarized in Table 2.

Analyte concentrations were compared to their historical values to verify consistency with past data (when possible). Samples collected from piezometers screened within the CCR unit (from PZ-1 to PZ-5) were compared to groundwater samples collected from the uppermost aquifer (MW-16-01 to MW-16-07). In addition, surface water samples for analysis were collected at Lake Erie (LE-01) and Plum Creek (P-01) to provide analytical data independent of both the CCR unit water or the uppermost aquifer groundwater (Figure 3). This data serves to augment the conceptual site model (CSM) by providing background information of other water types in the area, particularly the source of some of the stable isotopes.

3.1.1 General Chemistry

Data show that the December 2022 sampling results are consistent with historical data, and the results were within typical ranges of previously analyzed samples. The uppermost aquifer groundwater, FAB CCR unit water, and Lake Erie/Plum Creek sample geochemistries are broadly differentiated from each other in virtually every analysis. Figure 5 provides a Piper Diagram which plots the concentrations into groups or facies commonly recognized for comparison of major ions. Lake Erie and Plum Creek surface water samples plot in the magnesium-bicarbonate and mixed-no dominant facies while the uppermost aquifer groundwater is tightly packed at the top of the calcium-sulfate group. The CCR unit water varies in type but generally falls into the mixed-sodium/bicarbonate facies and is distinctively different from the uppermost aquifer groundwater. The uppermost aquifer results match those in the United Stated Geological Survey (USGS) report, Hydrology, Water Quality, and Effects of Drought in Monroe County (Nicholas, 1996).

Sulfate concentrations within the uppermost aquifer groundwater ranged from 1,300 milligrams per liter (mg/L) to 1,500 mg/L while the CCR unit water ranged from 14 mg/L to 560 mg/L (Figure 6). Chloride concentrations overlapped somewhat (uppermost aquifer groundwater 7.6 - 35 mg/L, CCR unit water 27 - 45 mg/L). Boron concentrations in the CCR unit water (2,800 – 13,000 micrograms per liter (µg/L)) were, on average 28 times higher than the uppermost aquifer groundwater (150 – 430 ug/L) . Barium and molybdenum concentrations in the CCR unit water were an average of two orders of magnitude and three orders of magnitude, respectively, higher than the uppermost aquifer groundwater (Figure 7).

Calcium and magnesium were both considerably more concentrated in the uppermost aquifer groundwater than the CCR unit water (average 3 times and 100 times higher, respectively), but sodium and potassium were more concentrated in the CCR unit water than in the uppermost aquifer groundwater (average 18 times and 26 times, higher respectively). Groundwater in the uppermost aquifer was close to neutral (pH 6.93 - 7.11 standard units (SU)) while the CCR unit water was highly alkaline (pH 10.80 – 12.79 SU), and the uppermost aquifer ORP was low positive (3 – 46.3 millivolts [mV]) while the CCR unit water varied considerably (-45.1 – 129.3 mV). Table 4 below provides a summary of the data, which is discussed more fully in Section 3.1.2..

Table 4 - Summary of Water Chemistry Results

Parameter	Units	Aquifer Avg	CCR unit Avg	Lake Erie	Plum Creek
$Na^{+} + K^{+} + Li^{+}$	mg/L	12.4	225	15.3	60.8
$Ca^{2+} + Mg^{2+} + Ba^{2+}$	mg/L	520	112	48.3	111
B^{3+}	mg/L	0.27	6.7	<0.1	<0.1
$HCO_3^{-} + CO_3^{2-} + SO_4^{2-} + Cl^{-} + F^{-}$	mg/L	1,615	634	159	471
pH	SU	7.0	12.0	8.4	7.8
Eh	mV	34.5	55.1	99.1	117

3.1.2 Ionic Speciation and Mineral Saturation

Using the measured data, the dominant dissolved species of each measured element was determined. The dominant cationic monovalent species were Na+ and K+ in all the groups. Due to the large pH difference between the uppermost aquifer groundwater and the CCR unit water, dominant species were shifted because of the large quantity of hydroxide ions in the CCR unit water (e.g., bicarbonate to carbonate and boric acid to borate). HCO_3^{-}, SO_4^{-}, Cl^{-}, and F^{-} were the dominant anions in all groups, except for the high pH CCR waters, where OH becomes important.

Geochemical parameters for the CCR unit water and the uppermost aquifer groundwater were calculated from the measured data using Geochemist's Workbench® (GW). The average of the chemical parameters for each water are presented below in Table 5.

Table 5 - Calculated Average Geochemical Parameters

Parameter	Units	CCR Unit Water Average	Uppermost Aquifer Average
f O2(g)	fugacity	2.527E-36	1.629E-57
pe	pe	0.9765	0.6122
Eh ($O_2(aq)/H_2O$)	Millivolts	0.05506	0.03453
Ionic strength	molal	0.02159	0.0403
Chlorinity	molal	0.0009718	0.0004265
Electrical conductivity	Microsiemens/centimeter	2044	2093
Hardness	Micrograms/Liter (as $CaCO_3$)	279	1,312
Hardness (carbonate)	Micrograms/Liter (as $CaCO_3$)	279	128.9
Hardness (non-carbonate)	Micrograms/Liter (as $CaCO_3$)	0	1,179
Carbonate alkalinity	Micrograms/Liter (as $CaCO_3$)	704.2	132.9
Charge imbalance	milliequivalents/Liter	-0.008	-0.005426
Charge imbalance error	percentage	-0.2842	-0.1291

Fugacity is a thermodynamic parameter that can be used to differentiate water masses based on their geochemical properties. Fugacity is a measure of the escaping tendency of a gas or volatile substance from a liquid or solid phase, and it is commonly used to describe the behavior of gases and other volatile substances in aqueous environments. A very low fugacity, as observed in each of these waters, means that a gas or volatile substance is not readily escaping from a liquid or solid phase. Both pe and Eh can be used to describe water masses based on their oxidative or reducing potential. The pe and Eh values correspond to relatively oxidizing environments, as it is greater than 0 and indicates that the activity of oxidants is greater than the activity of reductants. In other words, there is a relatively high concentration of electron acceptors (such as oxygen) compared to electron donors (such as ferrous iron) in the system. Ionic strength is a measure of the concentration of charged ions (e.g., Na^+, Cl^-, Mg^{2+}, etc.) in a solution. The values determined for both water masses indicates that that the concentration of charged ions in the water is sufficient to contribute to the overall ionic strength of the solution. Chlorinity is a measure of the concentration of chloride ions (Cl^-) in a solution and is often used as a proxy for salinity.

Electrical conductivity is a measure of the water's ability to conduct an electric current and reflects the concentration and mobility of charged ions in a solution. The values observed in both waters is relatively conductive, meaning they contain a relatively high concentration of dissolved ions such as dissolved salts.

Carbonate and non-carbonate hardness are two measures of water hardness that can be used to differentiate water masses based on their composition. Carbonate hardness, also known as temporary hardness, is caused by the presence of dissolved bicarbonate and carbonate ions in the water. These ions are derived from the dissolution of calcium and magnesium carbonates in the rock formations through which the water has passed. Non-carbonate hardness, also known as permanent hardness, is caused by the presence of dissolved calcium and magnesium ions in the water that are not associated with carbonate or bicarbonate ions. This type of hardness is typically caused by the dissolution of calcium and magnesium sulfates or chlorides in the water. The difference in carbonate hardness between the CCR unit water and the uppermost aquifer groundwater indicates that these two water masses have different sources or have been subjected to different geochemical processes. The differences of 150.1 µg/L (as $CaCO_3$) carbonate hardness and 1,179 µg/L (as $CaCO_3$) noncarbonate hardness between the CCR unit water and the uppermost aquifer groundwater are relatively large and demonstrates that they have significantly different sources or have undergone different geochemical processes, such as dissolution or precipitation of carbonate minerals.

By comparing the ratio of carbonate hardness to non-carbonate hardness, it is possible to differentiate water masses that have different sources and chemical compositions. For example, water masses that originate from carbonate-rich aquifers or limestone formations are likely to have higher carbonate hardness relative to non-carbonate hardness, while water masses that originate from sulfate-rich formations or are influenced by seawater intrusion are likely to have higher non-carbonate hardness relative to carbonate hardness. The very high ratio (undefined but taken as 279 for descriptive purposes here) in the context of the CCR unit water, high carbonate hardness can come from a variety of sources. Coal and coal combustion residuals typically contain significant amounts of calcium and magnesium carbonates. When these materials are exposed to water, they can dissolve, contributing to high levels of carbonate hardness in the water. Conversely, the ratio of carbonate and noncarbonate hardness in the uppermost aquifer groundwater is very low (0.1) indicating that, although there is limestone in the uppermost aquifer, the noncarbonate hardness is higher (likely related to the high sulfate content) than in the CCR unit water.

Mineral saturation indices of 102 mineral phases were also calculated using GW. Log(Q/K) mineral saturation data is typically used to determine the saturation state of minerals. Q represents the activity of a particular mineral species, while K represents the equilibrium constant for the mineral reaction in question. The logarithm of the ratio of Q to K is taken to calculate log(Q/K), which provides an indication of the saturation state of the mineral. If log(Q/K) is positive, it indicates that the mineral is oversaturated and may precipitate out of solution. If log(Q/K) is negative, it indicates that the mineral is undersaturated and may dissolve into solution. If log(Q/K) is zero, it indicates that the mineral is in a state of equilibrium. The saturation results are provided in Table 6.

In general, based on the calculations presented in Table 6, minerals with boron, barium, chloride, lithium, potassium, and sodium were slightly undersaturated and minerals with calcium and magnesium were near saturation in both waters. Oxides were oversaturated or near equilibrium in all samples. Carbonates were at equilibrium in the uppermost aquifer groundwater, but were oversaturated in the CCR unit water. Sulfate minerals were near saturation in the uppermost aquifer groundwater, but were undersaturated in the CCR water. This is also presented in Figure 6, which provides the concentration of calcium plus magnesium as a function of concentration of dissolved sulfate as shown in Figure 32 of the Monroe County USGS report (Nicholas, 1996). The uppermost aquifer groundwater results plot below the gypsum dissolution line just as the report notes for other groundwater samples in the area.

Based on these results, boron, barium, chloride, lithium, potassium, and sodium are likely slowly dissolving out of the natural uppermost aquifer materials into the uppermost aquifer groundwater. This is observed in the data. Boron, barium, lithium, and potassium concentrations are slightly higher in the downgradient wells than the cross gradient and upgradient monitoring wells. Chloride and sodium do not increase in concentration downgradient, but this is expected since they are unlikely to be available in the aquifer material to contribute to the groundwater. Although the carbonates are oversaturated in the CCR unit water, they may not be precipitating due to the pH. In alkaline conditions, carbonates can dissolve due to the formation of bicarbonate ions in solution. Note that calcium plus magnesium concentration as a function of the concentration of dissolved bicarbonate is provided in Figure 10 (discussed below) as shown in Figure 31 of the Monroe County USGS report (Nicholas, 1996). The uppermost aquifer groundwater plots above the carbonate dissolution line identically to the USGS report data, indicating that the carbonate chemistry in the uppermost aquifer groundwater is the same as those sampled across Monroe County.

3.2 Stable Isotopes

While concentration, speciation, and saturation data provide useful geochemical information to characterize water types, and can be particularly useful to determine if one body of water is in hydraulic connection with another, stable isotope analyses can provide unique “signatures” to differentiate and source waters. In order to build on the information presented above, several isotopic evaluations were also performed. For this study, lithium, boron strontium, hydrogen and oxygen isotopic data were used to determine the sources of various analytes and to build a CSM of the hydrogeologic and geochemical conditions. The stable isotope water data collected in December 2022 is summarized in Table 3.

Isotopes are commonly expressed with the delta notation (δ). The delta notation is a common way to express the relative abundance of isotopes in a sample, relative to a standard reference material. It is used to express the differences in the isotopic composition of a sample relative to the reference material, in parts per thousand (per mil or ‰). The delta notation is defined as:

$$\delta = \left(\frac{R_{Sample}}{R_{Standard}} - 1\right) 1{,}000$$

Where R is typically the rare isotope abundance divided by the abundant isotope abundance.

3.2.1 Lithium (δ^7Li) and Boron (δ^{11}B)

Lithium (δ^7Li) and boron (δ^{11}B) isotopes can be used to distinguish CCR water from background because the isotopic composition of lithium and boron in CCR is typically distinct from the composition in natural sources, such as rocks and sediments. The isotopic composition of lithium and boron in CCR is different from that of natural sources because coal has a unique isotopic signature due to its geological origins and the processes involved in its formation.

The isotopic composition of lithium can change during coal formation due to several factors, including the geological origins of the coal, the depositional environment, and the processes involved in coal formation (Owen, 2015). Lithium has two stable isotopes, lithium-6 and lithium-7, and their relative abundance can be expressed as the delta value (δ^7Li) relative to a standard reference material (LSVEC NIST 8545 RM). The δ^7Li value can be used to track changes in the isotopic composition of lithium during coal formation (Teichert, 2022). The δ^7Li value of coal generally increases with increasing rank, or maturity, of the coal. This is because as coal is buried and subjected to increasing pressure and temperature, it undergoes a process called devolatilization, in which the volatile components of the coal, including lithium, are released. The released lithium preferentially enriches the remaining coal in the lighter isotope, lithium-6, leading to enrichment in the ^{7}Li in the coal. The exact extent to which the δ^7Li value changes during coal formation can also depend on other factors, such as the depositional environment and the source of the organic matter that forms the coal. For example, coal formed from organic matter derived from plants that preferentially take up lithium-6 during growth may have a higher δ^7Li value than coal formed from marine organisms that have a higher δ^7Li value (Schlesinger, 2021).

Boron is a trace element that can be found in coal in varying amounts. The isotopic composition of boron in coal can change during coal formation, but the specifics of this process depend on several factors, including the source of boron, the depositional environment, and the conditions during coalification (Williams, 2004). In general, boron is derived from several sources during coal formation, including volcanic activity, seawater, and groundwater. Boron has two stable isotopes, boron-10 and boron-11, and their relative abundance can be expressed as the delta value (δ^{11}B) relative to a standard reference material (NIST SRM 951 RM). The isotopic composition of boron in these sources can vary, with different isotopic ratios of boron-10 to boron-11. During coal formation, boron can be incorporated into organic matter or minerals in the coal, and the isotopic composition of boron can be affected by processes such as adsorption, diffusion, and precipitation. For example, boron may be adsorbed onto clay minerals or organic matter in the coal, leading to a shift in the isotopic composition of boron towards the composition of the adsorbent (Williams, 2004). The depositional environment can also play a role in determining the isotopic composition of boron in coal. In marine environments, boron may be more enriched in boron-11 due to the fractionation of boron isotopes during seawater evaporation (Xiao, 2007). In freshwater environments, boron isotopes may be more fractionated due to differences in boron uptake by plants (Xiao, 2022).

For these reasons, the δ^7Li and δ^{11}B values in water can provide information about the source and transport of CCR and CCR affected water. The unique isotopic composition of lithium and boron in CCRs can be used as a tracer. Therefore, this additional uppermost aquifer characterization utilized the measurement of δ^7Li and δ^{11}B values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. In order to make this effort even more robust, surface water samples were collected from the nearby Lake Erie and Plum Creek upgradient from the CCR unit (Figure 3) in order to determine their δ^7Li and δ^{11}B values.

The δ^7Li and δ^{11}B of the CCR unit water ranged from 7.78 to 24.25 per mil (‰) and -17.58 to -3.0 ‰, respectively, and the uppermost aquifer groundwater ranged from 11.09 to 14.23 ‰ and -0.36 to 5.38 ‰, respectively. As observed in Figure 8, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups that are statistically different ($p = 0.0052$ for a one-sided t-test at 95% confidence). The Lake Erie and Plum Creek surface water each plot approximately 5 ‰ heavier than the uppermost aquifer groundwater. The average δ^{11}B of the CCR unit water was 13.5 ‰ and 18.5 ‰ δ^{11}B lighter than the uppermost aquifer groundwater and Lake Erie/Plum Creek surface water samples, respectively. The CCR unit water lithium and boron isotopic compositions fall within ranges commonly observed of fractionated CCR material (Davidson, 1993; Spivak-Birndorf, 2006; Harkness 2015; Teichert, 2022). The δ^7Li and δ^{11}B vales of the uppermost aquifer groundwater samples and the surface water samples from Lake Erie and Plum Creek are compositionally distinct from the CCR values (Ruhl, 2014; Owen, 2015) and fall within ranges commonly observed in the natural environment (Gonfiantini, 2006). The statistical results are provided in Appendix B.

3.2.2 Strontium (^{87}Sr/^{86}Sr)

Similar to lithium and boron, the isotopic composition of strontium can be used to identify coal combustion residuals because coal and the minerals associated with it have a distinct strontium isotope signature that is different from other geologic materials (Brandt, 2018). During the coal combustion process, the strontium isotopic composition of the coal and any associated minerals is altered. CCR, including fly ash and bottom ash, can therefore be identified by analyzing their strontium isotopic composition and comparing it to the strontium isotopic composition of nearby liquids and solids that have not been affected by coal combustion (Hurst, 1981). The isotopic composition of strontium can be determined as a ratio of two of the stable isotopes, Sr-86, Sr-87, expressed as the ratio ^{87}Sr/^{86}Sr relative to a standard reference material (NIST SRM 987).

Strontium is a trace element that occurs naturally in coal-forming environments, and its isotopic composition can be affected by the source of the sedimentary materials, as well as by diagenetic processes. During coal formation, organic matter is buried and subjected to heat and pressure, which causes it to transform into coal. This process can lead to the release of fluids from the sedimentary rocks surrounding the coal seam, which can affect the isotopic composition of strontium in the coal (Spivak-Birndorf, 2012). In particular, the fluids may contain different concentrations of strontium isotopes compared to the original sedimentary rocks, which can lead to changes in the isotopic composition of strontium in the coal.

In addition, strontium can be incorporated into the organic matter itself during coal formation, which can also alter its isotopic composition. The extent to which strontium is incorporated into the organic matter is dependent on several factors, including the original concentration of strontium in the sedimentary materials and the conditions during coal formation. The isotopic composition of strontium in coal can be influenced by both the source materials and the processes that occur during coal formation (Korte, 2003). This makes it a useful tool for determining if CCR impacted waters are in hydraulic connection with natural water.

Therefore, this additional uppermost aquifer characterization utilized the measurement of $^{87}Sr/^{86}Sr$ values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the groundwater. Surface water samples were collected from the nearby Lake Erie and Plum Creek (Figure 3) in order to determine their $^{87}Sr/^{86}Sr$ values.

The $^{87}Sr/^{86}Sr$ ratios of the CCR unit water ranged from 0.709300 to 0.711936 while the uppermost aquifer groundwater ranged from 0.708454 to 0.708488. The average $^{87}Sr/^{86}Sr$ ratio of the CCR unit water was approximately 0.002 higher than the uppermost aquifer groundwater, which although seeming small, amounts to 68 times the internal range of all uppermost aquifer groundwater sample results. The Lake Erie and Plum creek strontium ratios were 0.708391 and 0.708543, respectively, which is essentially identical to the uppermost aquifer groundwater. As observed in Figure 9, the CCR unit water and the aquifer water plot in two distinct groups that are statistically different ($p = 0.00324$ for a one-sided t-test at 95% confidence). The statistical results are provided in Appendix B. The $^{87}Sr/^{86}Sr$ ratios of the CCR unit water are within published ranges of CCR leachate (Ruhl, 2014; Wang, 2020), and the uppermost aquifer groundwater samples and Lake Erie and Plum Creek sample composition fit with values observed in natural waters (Shahand, 2009).

3.2.3 Hydrogen (δ^2H) and Oxygen ($\delta^{18}O$)

Hydrogen and oxygen isotopes are commonly used in environmental studies to trace the sources and fate of water molecules. The use of hydrogen and oxygen isotopes in water can provide valuable insights into the impacts of CCRs on water quality. In the case of CCR impacts in water, hydrogen and oxygen isotopes can be used to determine the source of water in ponds and if those molecules have migrated to natural waters (Liu, 2006). The isotopic composition of water molecules within these CCR water bodies can be compared to the isotopic composition of nearby uncontaminated water bodies. The isotopic composition of hydrogen and oxygen in water molecules is expressed as δ^2H and $\delta^{18}O$, respectively, and is measured in ‰ relative to a standard (Vienna Standard Mean Ocean Water [VMOW]). The isotopic signature of CCRs can vary depending on the source of coal, combustion conditions, and post-combustion processing (Huang, 2017).

Additionally, precipitation can have a significant effect on hydrogen and oxygen isotopes in groundwater. This is because the isotopic composition of precipitation varies in different regions (global and local meteoric water lines) due to variations in temperature, altitude, and atmospheric circulation patterns (Jouzel, 1984). When precipitation falls to the ground, it can either infiltrate into the soil and recharge the groundwater, or it can run off and enter streams or ponds. In the case of infiltration, the isotopic composition of the precipitation is generally preserved as it moves through the soil and into the groundwater. This means that the δ^2H and $\delta^{18}O$ values of the groundwater will be similar to those of the precipitation that recharged it. The degree to which precipitation affects the isotopic composition of groundwater can vary depending on factors such as the depth and age of the groundwater, the nature of the subsurface materials, and the rate of recharge. Therefore, δ^2H and $\delta^{18}O$ values in groundwater can be used to trace the origin and movement of water in aquifers and to Identify if CCR has impacted water.

For these reasons this additional uppermost aquifer characterization utilized the measurement of δ^2H and $\delta^{18}O$ values in the CCR unit water and the uppermost aquifer groundwater to determine if the unique CCR unit isotopic composition is observed in the uppermost aquifer groundwater. Surface water samples were collected from the nearby Lake Erie and Plum Creek where shown on Figure 3 in order to determine their δ^2H and $\delta^{18}O$ compositions.

The δ^2H and $\delta^{18}O$ compositions of the CCR unit water ranged from -51.38 to -48.02 ‰ and -7.51 to -6.95 ‰, respectively, and the uppermost aquifer groundwater compositions ranged from -55.98 to -50.26 ‰ and -9.00 to -7.62 ‰, respectively. The uppermost aquifer groundwater samples all plot above the global meteoric water line[1], and the CCR unit water samples straddle the line (Craig, 1961). The Lake Erie and Plum creek δ^2H and $\delta^{18}O$ compositions were -49.86/-6.88 ‰ and -53.18/-7.66 ‰, respectively. The CCR unit water δ^2H, on average was 2 ‰ lighter than the uppermost aquifer groundwater, and the $\delta^{18}O$ was 0.63 ‰ $\delta^{18}O$ lighter. As observed in Figure 10, the CCR unit water and the uppermost aquifer groundwater plot in two distinct groups that are statistically different (hydrogen $p = 0.02759$ and oxygen $p = 0.004214$ for one-sided t-tests at 95% confidence). The statistical results are provided in Appendix B.

3.3 Age Dating with Tritium Isotopes

The use of the isotope tritium to age date water is a well-established science and it has been successfully used to age date water sources for decades (Schlosser, 1988). Tritium (^3H) is a radioactive isotope of hydrogen, that decays at a constant rate to Helium-3 ($^3He^*$) with a half-life of about 12.3 years. It is a naturally occurring radioactive isotope, but also can be produced by human activities such as nuclear weapons testing. Tritium can be used to determine the age of groundwater because it can serve as a tracer of the time since the water was last in contact with the atmosphere (Telloli, 2022). Tritium is introduced into the atmosphere through nuclear weapons testing and naturally occurring cosmic radiation. It then becomes incorporated into precipitation and infiltrates into the ground, where it is taken up by plants or recharges groundwater. There are no subsurface reactions that generate tritium. Because tritium has a relatively short half-life, its concentration in precipitation, surface water and groundwater can be used to determine the age of the water (Dove, 2021).

When groundwater is recharged by precipitation that contains tritium, the concentration of tritium in the groundwater will be proportional to the age of the water since it was last in contact with the atmosphere. For example, if the concentration of tritium in the groundwater is high, it indicates that the water was recharged relatively recently, whereas if the concentration of tritium is low or undetectable, it indicates that the water is older. This information is important for understanding the hydrology of aquifers and for managing and protecting groundwater

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[1] The global meteoric water line describes the global annual average relationship between hydrogen and oxygen isotope ratios (deuterium and oxygen 18) in natural meteoric waters. It is widely used to track water masses in environmental geochemistry and hydrogeology (Craig, 1961).

resources.

The groundwater age can be estimated using the concentration of tritium in the water and the known rate of decay of tritium. The basic equation for calculating tritium age is:

$$Age\ = ln\left(\frac{{}^{A}/{}_{A_0}}{\lambda}\right)$$

Where A is the measured tritium in the water sample in tritium units (TU), A_0 is the tritium concentration in precipitation, and λ is the decay constant which is 0.693 divided by the half-life of 12.3 years. The tritium age calculated from this equation represents the time since the water was last in contact with the atmosphere. However, it is important to note that the tritium age reflects the time since the water entered the subsurface but may not necessarily reflect the time since the water was first recharged into the aquifer. This is because the water may have spent some time in the unsaturated zone (i.e., the soil and rock above the water table) before entering the aquifer, and this time is not accounted for in the tritium age calculation.

This additional uppermost aquifer characterization utilized tritium to determine if water from the CCR unit was impacting the uppermost aquifer groundwater . This was accomplished by collecting water samples from within the CCR unit water, uppermost aquifer groundwater samples, and surface water samples from Lake Erie and Plum Creek upgradient of the unit. The tritium water data collected in December 2022 is summarized in Table 3. The Lake Erie and Plum Creek measured tritium values were 23.8 and 20.0 TU while the CCR unit water (collected from piezometers within the unit) ranged from 5.92 to 10.8 TU. The uppermost aquifer groundwater sample collected upgradient of the CCR Unit (MW-16-04) tritium value was 3.41 TU and all the other uppermost aquifer groundwater samples were below the detection limit of 0.1 TU.

Using the equation above, as a conservative approach the Lake Erie sample can be used to represent A_0. Using this estimate, the water in Plum Creek would be 2.7 years old and the CCR Unit water ranges from 13 to 17 years old (Figure 11). The MW-16-04 upgradient uppermost aquifer groundwater sample would therefore be approximately 20 years old from when it was recharged from further upgradient to the southwest and groundwater at all the other uppermost aquifer wells, including all the down hydraulic gradient wells were each last recharged at least 95 years ago (older than when the FAB entered service in ~1975 about 48 years ago; Figure 11). Therefore, if the CCR unit water were traveling vertically through the confining layer it would be observed in the tritium data at MW-16-01, MW-16-06 and MW-16-07, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

It is important to note that diffusion may affect tritium concentrations. Diffusion can affect tritium values in groundwater by altering the concentration gradient of tritium in the subsurface. Diffusion is the process by which molecules move from areas of high concentration to areas of low concentration due to random thermal motion. In the subsurface, diffusion can cause tritium to move from areas of higher concentration to areas of lower concentration, resulting in a decrease in tritium concentration over time. In groundwater systems, tritium is introduced into the subsurface through infiltration of tritium-containing precipitation. The tritium concentration in the groundwater is initially highest near the recharge zone, and decreases as the water flows through the subsurface. As the tritium moves through the subsurface, it can be affected by diffusion, which can cause it to move from areas of higher concentration to areas of lower concentration.

The rate of diffusion of tritium in groundwater is therefore primarily dependent on the hydraulic conductivity of the subsurface materials and the concentration gradient of tritium. It is important to consider the effects of diffusion when interpreting tritium data in groundwater studies, as it can impact the accuracy of age estimates and the interpretation of the hydrogeological processes in the subsurface.

The control of diffusion in a groundwater system can be demonstrated by calculating the Peclet number. The Peclet number is a dimensionless number that describes the relative importance of advection and diffusion in a fluid system. In groundwater, the Peclet number can be calculated using the following equation:

$$Pe = \frac{(Lv)}{D}$$

where Pe is the Peclet number, L is the characteristic length scale of the system (e.g. the distance between the source and the monitoring well), v is the groundwater velocity, and D is the molecular diffusion coefficient. A Peclet number greater than 1 indicates that advection is dominant, while a Peclet number less than 1 indicates that diffusion is dominant. Given the distance (150 ft) to the monitoring wells and a seepage velocity of 73 ft/year, at standard temperature and pressure the Peclet number for tritium is greater than 10. Therefore, diffusion cannot be significantly influencing the measured tritium concentrations in the monitoring wells.

4.0 Statistical Analysis

TRC performed statistical evaluations of the data collected as part of this study to evaluate additional lines of evidence to support aquifer characterization. In order to compare the different water groups (CCR unit vs uppermost aquifer water) to each other in a holistic manner, principal component analysis (PCA) and linear discriminant analysis (LDA) were selected as appropriate data analysis tools. PCA and LDA are statistical techniques that are used for large data sets containing a high number of dimensions/features per observation allowing for visualization of multidimensional data. PCA is a well-established statistical method for evaluating data and has been around for over 100 years. Likewise, LDA analysis is a statistical method that has been used to evaluate large data sets since the 1930s. Geochemists and groundwater statisticians use these tools because they are effective to evaluate large data sets that are typical for sites that have numerous wells and numerous parameters tested, which result in potentially large data dimensionality.

The data used for this analysis consisted of the uppermost aquifer monitoring well network collected from August 2016 through December 2022, FAB water samples collected from April 2020 through December 2022, and CCR FAB piezometer CCR pore water samples collected from December 2020 through December 2022. Based on the recommendations from the Electric Power Research Institute (EPRI) New Techniques in Alternative Source Demonstrations (EPRI, October 2022) guidance and the minimum requirements of LDA, only the Appendix III analytes (boron, calcium, chloride, fluoride, sulfate, pH, and total dissolved solids (TDS)) were retained for analysis. Furthermore, it was found that TDS was not consistently reported in all the CCR unit water data and therefore TDS was removed from the analyte suite leaving boron, calcium, chloride, fluoride, sulfate, and pH. Non-detects were multiplied by 0.5 as this has been found to produce the most accurate results for PCA (Farnham et al, 2002).

4.1 Principal Component Analysis

The goal of the principal component analysis is to reduce the dimensionality of the data while preserving the variation contained within the dataset. To reduce the dimensionality, the data is linearly transformed from *n* dimensions to *n* linearly transformed dimensions or principal components (PCs). These resulting PCs are ordered in terms of which components contain the most variation of the original dataset from PC1 having the most variation to PC*n* having the least variation. The amount of variation each PC contains can be found in the eigenvalue of the PC, with higher eigenvalues corresponding to a higher percentage of the original dataset variation explained. These eigenvalues can be plotted to compare PCs to each other on what's known as a scree plot. Typically, the first two PCs are retained for further analysis, but any PCs with eigenvalues near or above 1 can be beneficial for analysis. The results of the PCA are commonly presented on a plot that contains both the loading scores of the PCs and the original data points projected using the PCs in what is known as a biplot. The loading scores indicate how much each analyte affects the corresponding PC and the projected points can be used to find clusters of similar data within the original dataset.

Figure 12, called a Scree plot, shows the eigenvalues for the six PCs created from the original data. PC1 and PC2 are near or above 1 and are therefore retained for further analysis. Figure 13 (Biplot) contains two layers of data, the blue arrows centered around the origin represent the loading scores for the PCs and the colored points represented the projected data. As can be seen in the percentages provided for each axis, PC1 contains 62.18% of the variation of the original dataset, meaning that most of the variation of the data can be seen in the horizontal axis. PC2 contains 16.16% of the variation of the original dataset. Together PC1 and PC2 account for 78.34% of the variation of the original data, showing that the data has been reduced from six dimensions to two dimensions while only losing 21.66% of the variation. There is no established criteria for how much variation is required to be explained by the PCs but at least 70% is a common target which the first two PCs meet (Jolliffe and Cadima 2016). Because the data are standardized before PCA is performed, the loading scores are multiplied to the standardized score of each analyte. As can be seen on Figure 13 (Biplot) by the arrows, sulfate and calcium point almost directly left, meaning that higher than average concentrations of sulfate or calcium in a sample would project that sample further to the left on the biplot. Conversely, if a sample has lower than average concentrations of sulfate or calcium it would be projected more to the right. From the loading scores we can see that PC1 is strongly influenced by sulfate, calcium, pH, boron, and chloride and weakly influenced by fluoride. PC2 is strongly influenced by fluoride and chloride and weakly influenced by boron, calcium, and sulfate, PC2 is not significantly influenced by pH. The standardized data points are projected using the loading scores and are displayed as the color-coded points on the biplot. 95% confidence intervals were calculated to demonstrate the separation between the groups. As can be seen on Figure 13, the uppermost aquifer groundwater is significantly separated from the CCR FAB piezometer and basin water groups, showing that the analytical composition of the three groups are all distinctively different from each other.

4.2 Linear Discriminant Analysis

In addition to PCA, linear discriminant analysis (LDA) was performed to further provide evidence of separation between the groups. LDA is similar to PCA in that it performs dimensionality reduction on the data; however, instead of preserving the most variation of the dataset, it attempts to separate the provided groups based on the distance between them and then predicts the group membership of each data point. Because LDA is a classification method, we can directly measure the separability of the groups based on the performance of the model.

Figure 14 (LDA Origin) shows the eigenvalues, canonical variables which are analogous to principal components in PCA, the prediction matrix, and the error rate of the LDA. Because LDA is maximizing the distance between the groups, the canonical variables can explain all of the variation between groups in two variables instead of the six PCA produced. Similar to PCA, when we observe the standardized canonical coefficients table, we can see that CV1 is strongly influenced by boron, calcium, chloride, sulfate, and pH while only being weakly influenced by fluoride. CV2 is strongly influenced by calcium, sulfate, and pH and weakly influenced by boron, chloride, and fluoride. Because CV2 accounts for a low amount of variance, only CV1 was retained for further analysis.

The classification count table shows the predicted classification of each point in the columns while the actual classification are the rows. Where the predicted class column intersects the matching actual class row represents the correct classification, where the prediction class column doesn’t match the actual class row represents a misclassification. The LDA model only classified the points into the correct classes, demonstrating that the groups are separate from each other, this can also be seen in the Error Rate table that the total error rate is 0%.

Figure 15 (LDA Density of LDA Scores) visually represents where each point is projected to using CV1. Each subplot contains samples of only one class while the colors represent the model's prediction. As can be seen, the model perfectly separated the groups and there is significant distance between all of them showing that the units are distinct from each other. Additionally, an analysis of variance (ANOVA) was performed on the projected data that demonstrates a statistically significant difference between the three groups, the output of this analysis is presented in Figure 16 (LDA ANOVA). As can be seen in the figure, at the 95% confidence level the population means are significantly different between the uppermost aquifer groundwater and CCR FAB piezometer and basin water groups.

4.3 Time-Series and Background

To demonstrate analyte concentration consistency over time and natural variability between the uppermost aquifer wells, Figure 17 is included. The time series for the Appendix III analytes show that over the past six years of monitoring there have been no significant trends and the concentrations are relatively stable; further demonstrating that the uppermost aquifer groundwater is not being affected by CCR from the FAB. In addition to the relative stability of the analytes over time, it can be observed that there exists natural variability in concentrations between monitoring wells across the uppermost aquifer groundwater. Most notably in the graphs for chloride, fluoride, and boron, there is a clear distinction between the groundwater concentrations within the uppermost aquifer wells that remains relatively consistent over time.

5.0 Findings and Conclusions

The data analyzed in this assessment demonstrate that the CCR unit water is not in hydraulic communication with the uppermost aquifer and therefore has not impacted the uppermost aquifer groundwater. Each of the individual analyzes provides a line of evidence in support of this conclusion.

5.1 Geochemistry

The geochemistry data provides four distinct lines of evidence that the uppermost aquifer and the CCR unit are not in communication. The first is the distribution of mass or concentration of individual analytes in the three water groups (uppermost aquifer groundwater, Lake Erie/Plum Creek upgradient surface water, and CCR unit water). The second is the geochemical condition of each water group, the third is the geochemical similarity of the uppermost aquifer groundwater and the extensive USGS study of the groundwater across Monroe County, and the fourth are calculated environmental conditions calculated from the first two lines of evidence. From a simple perspective it can be seen that the concentrations of individual analytes in the CCR unit water are very different than within the uppermost aquifer groundwater. These differences are not minor. For example, the Ba^{2+} is up to two orders of magnitude more concentrated in CCR unit water than in the underlying groundwater. Na^+ and K^+ are 18 and 26 times more concentrated in the CCR unit water. Sulfate is almost nine times more concentrated in the uppermost aquifer groundwater than the CCR unit water.

Indeed, these differences are typically statistically significant to a 95% confidence interval. When two water masses become hydraulically connected, they tend to become more like each other chemically and physically. Geochemical conditions in the CCR unit water are very different from the uppermost aquifer groundwater. The pH of the CCR unit water pH is approximately 12 SU, but the uppermost aquifer groundwater is only approximately pH 7 SU. This means that there are approximately 100,000 times as many hydroxide ions in the CCR unit water than in the underlying uppermost aquifer groundwater. If the CCR unit water and uppermost aquifer groundwater were connected, the pH would be much closer.

The third line of evidence is that the uppermost aquifer groundwater is essentially identical to the groundwater in nearby wells on other properties. The USGS published an exhaustive description of the groundwater geochemical conditions across Monroe County (Nicholas, 1996). The groundwater data collected as part of this assessment, particularly carbonate and sulfate geochemistry, fit well with the USGS data.

The fourth line of calculated geochemical evidence adds weight to the first three. The water geochemistry demonstrates that the uppermost aquifer groundwater and the CCR unit water are not in communication, the existing concentrations of Appendix III and IV analytes in groundwater are geogenic and the uppermost aquifer has not been affected.

5.2 Stable Isotopes

Similar to the multiple lines of evidence described in the preceding section, the stable isotope results reinforce the conclusions described above. The stable isotope analyses provide five distinct lines of evidence (δ^7Li, $\delta^{11}B$, $^{87}Sr/^{86}Sr$, δ^2H, and $\delta^{18}O$) which unequivocally show that the lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater does not come from nor is it in communication with the CCR unit water. Not only do the compositions of each of these species fall within well-known natural ranges in the uppermost aquifer groundwater, but each is also statistically different than the corresponding composition in the CCR unit water at 95% confidence intervals. Therefore, the stable isotopes demonstrate that the uppermost aquifer groundwater and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

5.3 Age Dating with Tritium Isotopes

Each of the previously discussed lines of evidence develops different aspects of the CSM. Similar to puzzle pieces, they elucidate different aspects of the hydrogeologic system. The tritium data, likewise reinforces the concept that the uppermost aquifer groundwater is not in communication with the CCR unit. Tritium has a half-life of 12.3 years, and the reporting limit is 0.1 TU. Therefore, groundwater ages up to 95 years in age from recharge should be observable. If a significant amount of CCR-impacted water were entering the groundwater, we should see an impact on the tritium concentration.

The thickness of the contiguous silty clay confining layer is 14 to 34 ft., and three of the monitoring wells (MW-16-01, MW-16-06 and MW-16-07) located immediately downgradient of the CCR unit did not have tritium detected above its laboratory detection limit (0.1 TU). Therefore, the groundwater within these down hydraulic gradient wells were each last recharged at least 95 years ago (older than when the FAB entered service in 1975 about 48 years ago). The lateral groundwater flow rate within the uppermost aquifer is approximately 73 ft/yr. Therefore, if the CCR unit water were traveling vertically through the confining layer it would be observed in the tritium data at MW-16-01, MW-16-06 and MW-16-07, the downgradient uppermost aquifer groundwater is not in hydraulic communication with the CCR unit water and the uppermost aquifer has not been affected.

5.4 Statistical Analysis

PCA was performed on MONPP FAB samples for App III analytes to compare the aquifer water to the CCR unit water in a holistic manner. The PCA was successful in separating the different units into clearly distinct groupings with no overlap at the 95% confidence level, demonstrating that the uppermost aquifer groundwater and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

LDA was performed to further provide evidence that the units are not in communication with each other. LDA is similar to PCA in that they are both dimensionality reduction techniques, but LDA attempts to separate the groups while PCA simply attempts to preserve the variance within the dataset. The model created by the LDA had perfect accuracy and was able to completely separate the groups from each other with a large distance between them. To further provide evidence that the separation is strong, an ANOVA was performed on the data transformed by the LDA. ANOVA compares groups of data to each other to determine if it is statistically probably for the data to be from the same population or different populations. The results of the ANOVA showed that at the 95% confidence level, the units are distinct from each other demonstrating that the uppermost aquifer groundwater, and the CCR unit water are not in communication and the uppermost aquifer has not been affected.

5.5 Final Assessment

In conclusion, the data collected in this assessment confirms that the uppermost aquifer is not in hydraulic communication with the CCR unit water. This conclusion is supported by each of the multiple lines of evidence presented in this report:

- The geochemical composition of the uppermost aquifer groundwater is independent of and statistically distinct from the CCR unit water;
- The geochemical composition of the uppermost aquifer groundwater is the same as regional groundwater, as published in USGS reports, demonstrating that the uppermost aquifer groundwater is unaffected by the CCR unit water;
- The source of lithium, boron, strontium, hydrogen, and oxygen in the uppermost aquifer groundwater is from upgradient groundwater and, as demonstrated by the stable isotope data is distinct from the CCR unit water; and
- Age dating with tritium validates that the uppermost aquifer groundwater is not hydraulically connected to the CCR unit.

These multiple lines of evidence come together in an additive fashion to further validate the CSM established in the ALD and previous studies, which holds that the contiguous glacially compacted natural clay-rich liner system serves as a natural confining hydraulic barrier isolating the underlying uppermost aquifer from the CCR unit and the uppermost aquifer groundwater is unaffected by the CCR unit water.

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Tables

Table 1

Summary of Field Data – December 2022
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
Monroe, Michigan

Sample Location	Sample Date	**Dissolved Oxygen (mg/L)**	**Oxidation Reduction Potential (mV)**	**pH (SU)**	**Specific Conductivity (umhos/cm)**	**Temperature (deg C)**	**Turbidity (NTU)**
Monitoring Wells/Uppermost Aquifer							
MW-16-01	12/12/2022	1.66	38.8	7.1	1,873	11.1	2.65
MW-16-02	12/12/2022	1.47	27.5	7.1	1,899	10.6	2.07
MW-16-03	12/12/2022	1.27	36.2	7.0	1,982	11.3	3.72
MW-16-04	12/12/2022	1.30	46.3	7.0	1,870	10.8	1.38
MW-16-05	12/12/2022	1.27	39.9	7.0	1,873	11.6	1.36
MW-16-06	12/12/2022	1.38	19.9	7.1	1,882	11.0	20.9
MW-16-07	12/9/2022	1.18	33.1	6.9	1,761	11.4	3.47
Piezometers/Fly Ash Basin CCR Pore Water							
PZ-1	12/13/2022	1.57	67.9	12.2	1,225	10.6	2.10
PZ-2	12/12/2022	1.44	-45.1	12.8	5,657	12.4	1.72
PZ-3	12/13/2022	1.48	74.4	12.4	1,842	11.7	1.41
PZ-4	12/13/2022	1.66	129.3	11.6	732	9.7	3.96
PZ-5	12/13/2022	1.59	48.8	10.8	959	10.8	3.00
Fly Ash Basin Water							
SW-001	12/13/2022	12.52	67.6	9.2	776	4.3	5.91
Surface Water							
P-01	12/13/2022	8.83	116.7	7.8	669	3.7	3.96
LE-01	12/13/2022	13.06	99.1	8.4	207	2.8	9.46

Notes:
mg/L -Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celsius.
NTU - Nephelometric Turbidity Unit
P-01 Plum Creek, LE-01 = Lake Erie, SW-001 = Discharge Point from Fly Ash Basin

Table 2

Summary of Analytical Results – December 2020 to December 2022
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
China Township, Michigan

	Constituent:	Alkalinity, bicarbonate	Alkalinity, carbonate	Alkalinity, total	Barium	Boron	Calcium	Chloride	Fluoride	Lithium	Magnesium	Molybdenum	Potassium	Sodium	Sulfate	Total Organic Carbon
	Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Location	Sample Date															
Monitoring Wells/Uppermost Aquifer																
MW-16-01	12/12/2022	**210**	< 5	**210**	**0.0087**	**0.24**	**360**	**10**	**1.8**	**0.064**	**140**	< 0.005	**3.3**	**6.1**	**1,400**	**1.3**
MW-16-02	12/12/2022	**190**	< 5	**190**	**0.0062**	**0.37**	**390**	**13**	**1.6**	**0.095**	**150**	< 0.005	**3.9**	**10**	**1,500**	**1.1**
MW-16-03	12/12/2022	**190**	< 5	**190**	**0.0062**	**0.43**	**400**	**18**	**1.6**	**0.10**	**150**	< 0.005	**3.9**	**12**	**1,500**	**1.2**
MW-16-04	12/12/2022	**230**	< 5	**230**	**0.010**	**0.15**	**500**	**35**	**1.0**	**0.018**	**42**	< 0.005	**2.1**	**11**	**1,300**	**1.6**
MW-16-05	12/12/2022	**190**	< 5	**190**	**0.0054**	**0.19**	**380**	**11**	**1.5**	**0.039**	**130**	< 0.005	**2.9**	**7.6**	**1,400**	**1.3**
MW-16-06	12/12/2022	**190**	< 5	**190**	**0.011**	**0.31**	**360**	**11**	**1.6**	**0.078**	**140**	< 0.005	**3.8**	**10**	**1,400**	**1.2**
MW-16-07	12/9/2022	**190**	< 5	**190**	**0.0062**	**0.19**	**380**	**7.6**	**1.6**	**0.034**	**120**	< 0.005	**2.7**	**6.9**	**1,300**	**1.3**
Piezometers/Fly Ash Basin CCR Pore Water																
PZ-1	12/14/2020	< 10	**210**	**450**	**2.1**	**4.8**	**100**	**43**	**3.4**	**0.016**	**0.47**	**1.1**	**21**	**44**	**11**	**--**
	1/28/2021	< 10	**170**	**460**	**2.4**	**5.6**	**120**	**48**	**3.6**	**0.018**	**0.22**	**1.2**	**20**	**40**	**11**	--
	12/13/2022	< 5	**100**	**260**	**2.3**	**8.1**	**120**	**45**	**0.48**	**0.016**	< 1	**1.4**	**23**	**52**	**25**	**11**
PZ-2	12/14/2020	< 10	**240**	**1,300**	**0.50**	**4.3**	**43**	**31**	**24**	< 0.01	**0.46**	**2.5**	**180**	**480**	**51**	**--**
	1/28/2021	< 10	**260**	**1,400**	**0.66**	**4.5**	**40**	**32**	**23**	< 0.01	**0.84**	**1.9**	**220**	**530**	**67**	--
	12/12/2022	< 5	**610**	**1,400**	**0.60**	**5.9**	**29**	**33**	**3.7**	< 0.008	< 1	**2.1**	**230**	**560**	**84**	**96**
PZ-3	12/15/2020	< 10	**93**	**420**	**1.3**	**2.5**	**88**	**30**	**0.87**	**0.016**	**1.2**	**0.20**	**53**	**88**	**29**	**--**
	1/28/2021	< 10	**150**	**580**	**1.4**	**3.1**	**95**	**34**	**1.2**	**0.016**	**0.20**	**0.20**	**59**	**93**	**27**	--
	12/13/2022	< 5	**80**	**320**	**1.8**	**3.9**	**100**	**33**	**0.84**	**0.038**	< 1	**0.17**	**60**	**94**	**14**	0.73 J
PZ-4	12/14/2020	< 10	**120**	**510**	**0.099**	**2.6**	**54**	**33**	< 0.1	**0.36**	< 0.2	**2.2**	**66**	**52**	**130**	**--**
	1/28/2021	< 10	**89**	**170**	**0.12**	**2.5**	**57**	**37**	**0.83**	**0.39**	**0.26**	**2.0**	**63**	**49**	**140**	--
	12/13/2022	< 5	**44**	**78**	**0.11**	**2.8**	**61**	**34**	**0.36**	**0.44**	< 1	**1.5**	**62**	**40**	**140**	**2.0**
PZ-5	12/15/2020	< 10	**110**	**150**	**0.16**	**12**	**270**	**25**	**0.36**	< 0.01	**0.78**	**9.4**	**3.3**	**1.4**	**560**	**--**
	1/28/2021	< 10	**83**	**130**	**0.11**	**12**	**280**	**26**	< 0.4	< 0.01	**0.70**	**9.8**	**3.5**	**1.6**	**530**	--
	12/13/2022	< 5	**70**	**110**	**0.083**	**13**	**240**	**27**	**0.10**	< 0.008	< 1	**9.6**	**3.0**	< 1	**560**	**2.5**
Fly Ash Basin Water																
SW-001	12/13/2022	**90**	**30**	**120**	**0.32**	**1.3**	**190**	**22**	**0.76**	**0.14**	**20**	**0.53**	**5.7**	**38**	**510**	**2.2**
Surface Water																
P-01	12/13/2022	**180**	< 5	**180**	**0.034**	< 0.1	**90**	**110**	**0.61**	< 0.008	**21**	**0.019**	**2.8**	**58**	**180**	**3.4**
LE-01	12/13/2022	**110**	< 5	**110**	**0.026**	< 0.1	**37**	**21**	**0.13**	< 0.008	**11**	**0.0056**	**3.3**	**12**	**28**	**2.6**

Notes:

mg/L = milligram per liter, -- = not analyzed.

Bold font denotes concentrations detected above laboratory reporting limits.

J = estimated value. Concentration above the laboratory method detection limit but below the reporting limit.

P-01 Plum Creek, LE-01 = Lake Erie, SW-001 = Discharge Point from Fly Ash Basin

December 2020 and January 2021 groundwater samples collected by Geosyntec and included in the November 2021 Preliminary Alternative Liner Demonstration Report

Table 3
Summary of Stable Isotope and Tritium Results – December 2022
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
China Township, Michigan

	Constituent:	δ^{87}Sr	δ^{11}B	δ^{7}Li	δ^{2}H	δ^{18}O	Tritium
	Units:	‰	‰	‰	‰	‰	TU
Sample Location	Sample Date						
Monitoring Wells/Uppermost Aquifer							
MW-16-01 (Dup-01)	12/12/2022	**0.708475**	**-0.36**	**12.17**	**-51.64**	**-7.79**	< 0.1
MW-16-01	12/12/2022	**0.708454**	**-0.17**	**12.22**	**-50.79**	**-7.63**	< 0.1
MW-16-01, r.2	12/12/2022	**0.708488**	**-0.40**	**11.99**	--	--	--
MW-16-02	12/12/2022	**0.708472**	**3.75**	**14.23**	**-50.26**	**-7.62**	< 0.1
MW-16-03	12/12/2022	**0.708469**	**5.38**	**14.11**	**-50.30**	**-7.79**	< 0.1
MW-16-04	12/12/2022	**0.708478**	**5.14**	**13.22**	**-55.98**	**-9.00**	**3.34**(1)
MW-16-05	12/12/2022	**0.708472**	**2.47**	**11.63**	**-51.63**	**-7.95**	< 0.1
MW-16-06	12/12/2022	**0.708473**	**2.32**	**13.60**	**-50.81**	**-7.86**	< 0.1
MW-16-07	12/9/2012	**0.708479**	**2.31**	**11.09**	**-52.53**	**-8.20**	< 0.1
Piezometers/Fly Ash Basin CCR Pore Water							
PZ-1	12/13/2022	**0.710655**	**-11.37**	**16.48**	**-48.31**	**-7.38**	**6.32**
PZ-2	12/12/2022	**0.711936**	**-4.12**	**18.07***	**-51.38**	**-7.49**	**10.8**
PZ-3	12/13/2022	**0.711467**	**-3.00**	**24.25**	**-50.85**	**-7.43**	**10.2**
PZ-4	12/13/2022	**0.710690**	**-17.58**	**8.72**	**-49.92**	**-7.51**	**5.97**
PZ-4, r.2	12/13/2022	**0.710664**	**-16.94**	**7.78**	--	--	--
PZ-5	12/13/2022	**0.709300**	**-16.26**	**14.95**	**-48.02**	**-6.95**	**5.92**
Fly Ash Basin Water							
SW-001	12/13/2022	**0.711685**	**-9.60**	**3.41**	**-47.60**	**-6.69**	**21.3**
Surface Water							
P-01	12/13/2022	**0.708543**	**9.09**	**19.32**	**-53.18**	**-7.66**	**20.0**
LE-01	12/13/2022	**0.708391**	**6.98**	**18.18**	**-49.86**	**-6.88**	**23.8**

<u>Notes:</u>

‰ = per mil

TU = Tritium Units

-- = not analyzed.

Bold font denotes concentrations detected above laboratory reporting limits.

* - Lithium content is too low for precise measurement.

P-01 Plum Creek, LE-01 = Lake Erie, SW-001 = Discharge Point from Fly Ash Basin

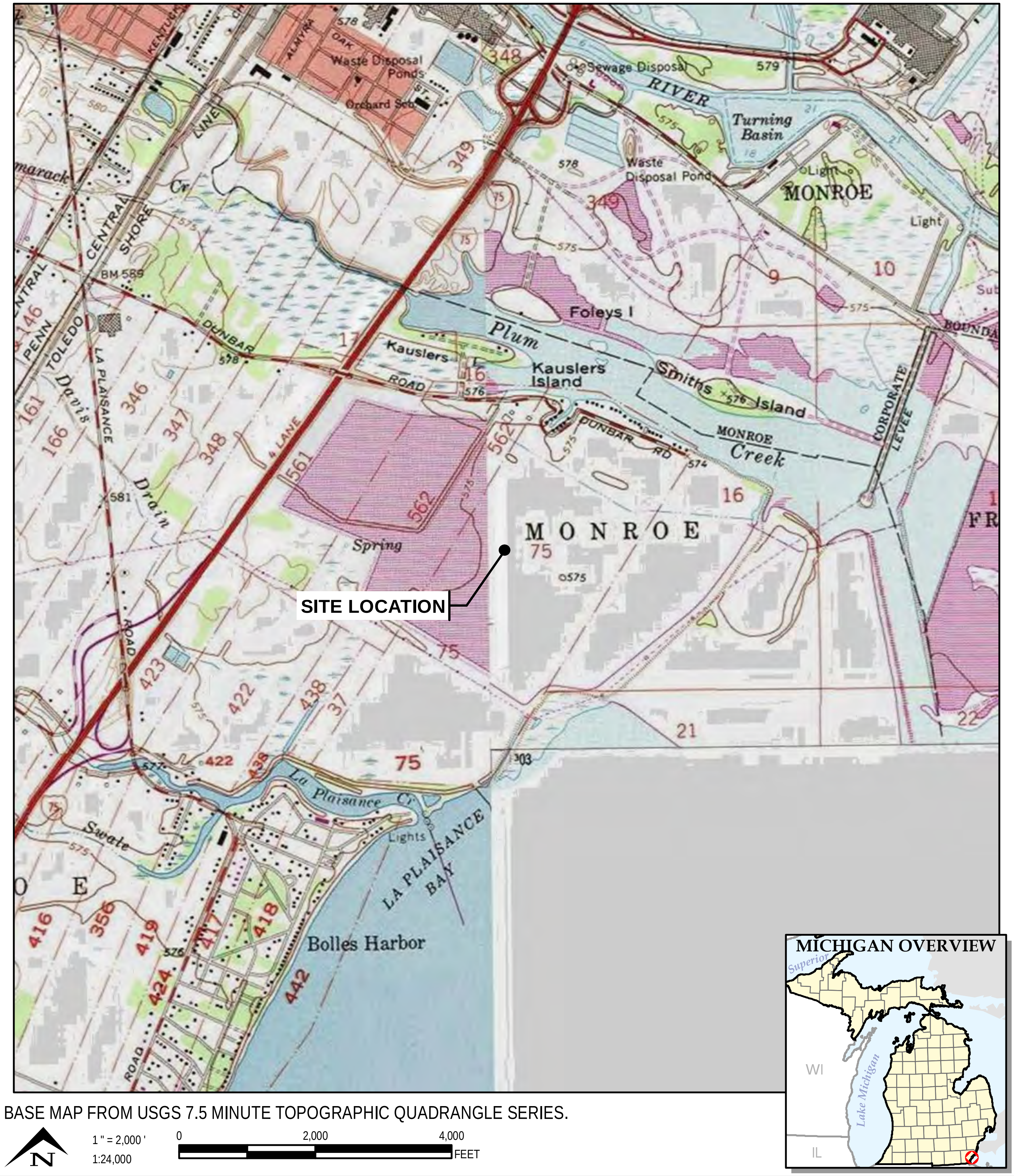
1) - Value displayed is the average of laboratory original and re-run of the sample.

Table 6
Summary Calculated Mineral Saturation – December 2022
Monroe Power Plant Fly Ash Basin and Vertical Extension Landfill – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location	Unit	LE-01	MW-16-01	MW-16-02	MW-16-03	MW-16-04	MW-16-05	MW-16-06	MW-16-07	P-01	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5	SW-001
Alstonite (BaCa(CO$_3$)$_2$)	log Q/K	-1.90	-4.16	-4.55	-4.78	-4.20	-4.86	-4.33	-10.98	-2.40	4.35	3.83	4.30	1.95	1.80	0.95
Anhydrite (CaSO$_4$)	log Q/K	-2.81	-0.66	-0.65	-0.63	-0.56	-0.66	-0.69	-3.53	-1.81	-2.79	-3.64	-3.23	-2.10	-1.07	-1.18
Antarcticite (CaCl ·6H O)	log Q/K	-13.70	-13.82	-13.60	-13.31	-12.61	-13.75	-13.77	-17.06	-12.03	-13.05	-14.64	-13.51	-13.36	-13.06	-13.23
Aragonite (CaCO)	log Q/K	0.24	-0.08	-0.16	-0.26	-0.03	-0.28	-0.19	-3.36	0.15	2.50	2.04	2.46	1.94	2.29	1.53
Arcanite (K$_2$SO4)	log Q/K	-9.83	-8.70	-8.57	-8.59	-9.15	-8.86	-8.61	-14.73	-9.33	-8.46	-6.26	-7.93	-6.78	-9.00	-8.36
Artinite (Mg (OH) ·3H O)	log Q/K	-6.28	-7.62	-7.76	-8.05	-8.97	-8.16	-7.79	-14.45	-7.35	1.20	2.16	1.60	-0.09	-1.94	-3.60
Ba(OH)2^8H2O	log Q/K	-15.41	-18.48	-18.78	-18.97	-18.70	-19.03	-18.53	-22.16	-16.54	-5.61	-5.17	-5.26	-8.16	-10.08	-12.91
BaCl2(c)	log Q/K	-15.77	-17.35	-17.39	-17.10	-16.29	-17.57	-17.27	-20.87	-14.40	-13.25	-14.42	-13.67	-14.85	-15.39	-14.99
BaCl2^2H2O	log Q/K	-13.34	-15.07	-15.10	-14.83	-14.00	-15.30	-14.98	-18.60	-11.98	-10.96	-12.17	-11.40	-12.54	-13.11	-12.58
BaCl2^H2O	log Q/K	-14.14	-15.80	-15.84	-15.56	-14.74	-16.03	-15.72	-19.33	-12.78	-11.70	-12.89	-12.13	-13.29	-13.85	-13.37
BaF2(c)	log Q/K	-11.46	-10.31	-10.62	-10.63	-10.73	-10.72	-10.35	-13.55	-10.20	-8.52	-7.65	-8.18	-10.11	-11.58	-9.20
BaO(c)	log Q/K	-41.64	-43.61	-43.98	-44.08	-43.87	-44.09	-43.67	-47.25	-42.65	-30.81	-30.12	-30.31	-33.47	-35.25	-38.94
Barite (BaSO$_4$)	log Q/K	-0.17	0.18	-0.04	-0.06	0.14	-0.13	0.19	-2.97	0.49	1.40	0.90	0.97	0.84	0.99	1.70
Barytocalcite (BaCa(CO))	log Q/K	-2.06	-4.32	-4.72	-4.94	-4.36	-5.02	-4.49	-11.14	-2.57	4.19	3.66	4.14	1.78	1.64	0.79
BaS(c)	log Q/K	-74.78	-54.93	-53.49	-53.84	-55.33	-54.35	-52.08	-55.83	-72.07	-98.59	-87.76	-101.60	-103.40	-85.08	-74.71
Bassanite (CaSO ·1/2H O)	log Q/K	-3.44	-1.30	-1.28	-1.27	-1.20	-1.29	-1.32	-4.16	-2.45	-3.42	-4.27	-3.86	-2.73	-1.70	-1.82
Bischofite (MgCl ·6H O)	log Q/K	-14.73	-14.58	-14.36	-14.08	-14.03	-14.55	-14.52	-17.90	-13.14	-15.46	-16.36	-15.86	-15.50	-15.77	-14.66
Bloedite (Bloedite)	log Q/K	-15.27	-12.31	-11.88	-11.73	-12.42	-12.21	-11.93	-21.00	-12.33	-15.69	-13.61	-15.85	-14.13	-16.46	-12.04
Borax (Na H B O)	log Q/K	-26.64	-27.72	-26.58	-26.33	-28.20	-28.14	-26.88	-46.33	-26.28	-20.75	-20.66	-21.94	-21.66	-20.73	-20.22
Boric acid (H3BO3)	log Q/K	-6.16	-5.62	-5.42	-5.34	-5.81	-5.69	-5.49	-8.70	-6.11	-6.89	-7.64	-7.42	-6.78	-5.32	-5.19
Brucite (Mg(OH))	log Q/K	-4.67	-5.81	-5.87	-6.04	-6.55	-6.09	-5.88	-9.28	-5.55	2.07	2.83	2.46	1.06	-0.56	-2.85
Burkeite (Na6(CO3)(SO4)2)	log Q/K	-29.99	-30.87	-29.72	-29.42	-29.56	-30.66	-29.77	-48.53	-25.03	-24.97	-17.87	-23.97	-24.45	-33.49	-24.32
Ca(OH)2(c)	log Q/K	-10.75	-11.94	-12.01	-12.16	-12.03	-12.17	-12.02	-15.33	-11.53	-2.43	-2.31	-2.07	-3.73	-4.75	-8.49
Ca2Cl2(OH)2^H2O	log Q/K	-23.60	-25.09	-24.94	-24.81	-23.96	-25.26	-25.12	-31.73	-22.73	-14.80	-16.31	-14.93	-16.39	-17.14	-20.90
Ca4Cl2(OH)6^13H2O	log Q/K	-37.72	-43.22	-43.11	-43.43	-42.21	-43.95	-43.40	-56.70	-38.59	-13.81	-15.43	-13.45	-17.82	-20.84	-30.79
CaCl2^2H2O	log Q/K	-18.39	-18.23	-18.03	-17.72	-17.03	-18.14	-18.18	-21.47	-16.69	-17.48	-19.01	-17.91	-17.82	-17.49	-17.86
CaCl2^4H2O	log Q/K	-14.70	-14.73	-14.52	-14.22	-13.53	-14.65	-14.68	-17.97	-13.02	-13.97	-15.54	-14.42	-14.28	-13.98	-14.21
CaCl2^H2O	log Q/K	-18.63	-18.43	-18.23	-17.92	-17.23	-18.34	-18.39	-21.67	-16.93	-17.68	-19.21	-18.11	-18.02	-17.69	-18.10
Calcite (CaCO3)	log Q/K	0.41	0.08	0.01	-0.10	0.13	-0.12	-0.02	-3.19	0.32	2.67	2.21	2.63	2.10	2.46	1.70
Carnallite (KMgCl3·6(H2O))	log Q/K	-21.67	-22.08	-21.70	-21.29	-21.21	-22.10	-21.95	-28.61	-19.49	-21.39	-21.58	-21.54	-21.10	-22.85	-21.43
CaSO4^1/2H2O(beta)	log Q/K	-3.64	-1.48	-1.47	-1.45	-1.38	-1.48	-1.50	-4.34	-2.64	-3.61	-4.45	-4.04	-2.92	-1.89	-2.01
Celestite (SrSO4)	log Q/K	-2.87	-0.24	-0.21	-0.22	-0.08	-0.23	-0.26	-0.04	-1.62	-1.60	-2.23	-1.87	-1.68	-0.47	-0.91
Chloromagnesite (MgCl2)	log Q/K	-34.18	-33.26	-33.09	-32.74	-32.75	-33.19	-33.22	-36.56	-32.50	-34.19	-34.93	-34.49	-34.31	-34.48	-33.96
Colemanite (Ca2B6O11·5H2O)	log Q/K	-33.41	-33.18	-32.10	-31.98	-34.47	-34.12	-32.57	-58.45	-34.79	-21.74	-26.17	-24.30	-23.62	-17.01	-23.21
Dolomite (CaMg(CO3)2)	log Q/K	1.29	0.83	0.68	0.46	0.27	0.39	0.63	-5.79	1.01	4.36	4.11	4.34	3.50	3.64	3.44
Dolomite-dis (CaMg(CO3)2)	log Q/K	-0.43	-0.82	-0.97	-1.19	-1.38	-1.26	-1.02	-7.44	-0.70	2.71	2.47	2.69	1.84	1.99	1.74
Dolomite-ord (CaMg(CO3)2)	log Q/K	1.29	0.83	0.68	0.46	0.27	0.39	0.63	-5.79	1.01	4.36	4.11	4.34	3.50	3.64	3.44
Epsomite (MgSO4·7H2O)	log Q/K	-5.25	-3.06	-3.04	-3.05	-3.62	-3.12	-3.08	-6.01	-4.36	-6.83	-7.04	-7.23	-5.84	-5.41	-4.07
Fe(OH)3(ppd)	log Q/K	-1.25	-1.45	-1.08	-0.61	-1.56	-0.61	-0.36	-0.77	-1.29	-3.02	-3.52	-3.39	-2.31	-2.29	-0.97
Fe2(SO4)3(c)	log Q/K	-56.08	-44.22	-43.34	-41.72	-43.95	-41.69	-41.87	-41.20	-50.58	-82.40	-85.82	-85.21	-75.25	-68.75	-57.02
FeF3(c)	log Q/K	-16.86	-10.54	-10.19	-9.42	-10.95	-9.47	-9.44	-9.19	-13.30	-28.73	-28.56	-29.09	-26.61	-25.90	-16.89
Ferrite-2-Ca (Ca2Fe2O5)	log Q/K	-26.64	-29.12	-28.54	-27.88	-29.52	-27.87	-27.11	-34.53	-28.25	-13.25	-13.94	-13.23	-14.46	-16.44	-21.49
Ferrite-Ca (Ca(FeO2)2)	log Q/K	-2.09	-3.82	-3.15	-2.37	-4.12	-2.37	-1.72	-5.86	-2.97	2.56	1.66	2.17	2.70	1.69	0.71
Ferrite-Mg (MgFe2O4)	log Q/K	-2.16	-3.67	-3.00	-2.22	-4.63	-2.26	-1.57	-5.78	-3.13	1.07	0.84	0.73	1.48	-0.11	0.23
Fluorite (CaF2)	log Q/K	-2.31	0.29	0.23	0.23	0.01	0.17	0.21	-2.68	-0.75	-1.25	-0.81	-0.97	-1.56	-2.19	-0.36
Gaylussite (Na Ca(CO) ·5H O)	log Q/K	-8.20	-11.06	-10.77	-10.91	-10.58	-11.35	-10.84	-20.51	-7.43	-3.33	-1.29	-2.85	-4.50	-7.68	-5.35
Goethite (α-FeO(OH))	log Q/K	3.40	3.09	3.47	3.93	2.99	3.93	4.19	3.77	3.35	1.53	1.02	1.15	2.25	2.26	3.66
Graphite (C)	log Q/K	-33.00	-22.21	-21.39	-21.50	-22.26	-21.72	-20.81	-20.96	-31.27	-51.58	-46.46	-53.27	-52.99	-42.50	-34.85
Gypsum (CaSO 4·2H2O)	log Q/K	-2.40	-0.35	-0.32	-0.32	-0.25	-0.35	-0.37	-3.21	-1.42	-2.47	-3.33	-2.92	-1.77	-0.75	-0.80
Halite (NaCl)	log Q/K	-8.09	-8.83	-8.53	-8.32	-8.06	-8.72	-8.60	-11.90	-6.73	-7.20	-6.42	-7.09	-7.41	-9.16	-7.64
Hematite (Fe2O3)	log Q/K	7.69	7.10	7.85	8.78	6.90	8.78	9.29	8.46	7.58	3.98	2.95	3.22	5.42	5.43	8.22
Hexahydrite (MgSO4 · 6H2O)	log Q/K	-5.63	-3.40	-3.38	-3.38	-3.96	-3.45	-3.42	-6.35	-4.74	-7.17	-7.37	-7.56	-6.19	-5.75	-4.45
Huntite (Mg3Ca(CO3)4)	log Q/K	-4.19	-4.66	-4.97	-5.40	-6.46	-5.58	-5.06	-17.97	-4.80	0.74	0.96	0.78	-0.73	-1.01	-0.25
Hydroboracite (CaMgB6O8(OH)6·3H2	log Q/K	-28.50	-29.75	-28.57	-28.60	-31.65	-30.84	-29.12	-55.16	-30.16	-19.86	-23.97	-22.58	-21.29	-15.46	-19.03
Hydromagnesite (Mg (CO) (OH) ·4H	log Q/K	-13.65	-15.06	-15.44	-16.04	-18.26	-16.31	-15.53	-31.93	-15.23	-3.43	-1.78	-2.94	-5.63	-8.11	-8.30
Hydrophilite (CaCl2)	log Q/K	-22.60	-22.26	-22.06	-21.74	-21.06	-22.16	-22.21	-25.48	-20.88	-21.51	-23.01	-21.92	-21.87	-21.51	-22.04
Jarosite-K (KFe3(SO4)2(OH)6)	log Q/K	-16.23	-10.50	-9.23	-7.52	-10.78	-7.64	-7.09	-10.66	-13.35	-32.58	-34.26	-34.50	-26.71	-24.59	-15.46
Jarosite-Na (NaFe3(SO4)2(OH)6)	log Q/K	-16.75	-12.36	-10.89	-9.18	-12.16	-9.42	-8.79	-12.42	-13.23	-34.31	-36.18	-36.53	-28.86	-27.16	-15.92
K2CO3^3/2H2O	log Q/K	-15.46	-16.92	-16.87	-17.02	-17.42	-17.29	-16.91	-23.36	-16.05	-11.96	-9.40	-11.05	-11.53	-14.44	-14.34
K8H4(CO3)6^3H2O	log Q/K	-56.35	-60.14	-59.97	-60.45	-61.85	-61.53	-60.13	-85.66	-57.33	-54.17	-45.00	-51.29	-51.02	-59.85	-53.78
Kainite (KMg(SO4)Cl·3H2O)	log Q/K	-14.55	-12.71	-12.54	-12.40	-12.95	-12.80	-12.65	-18.86	-13.04	-14.92	-14.36	-15.04	-13.62	-14.64	-13.16
Kalicinite (KHCO3)	log Q/K	-6.41	-6.62	-6.60	-6.65	-6.80	-6.78	-6.63	-9.78	-6.36	-7.61	-6.60	-7.34	-7.04	-7.79	-6.32
Kieserite (MgSO4·H2O)	log Q/K	-7.75	-5.26	-5.26	-5.24	-5.83	-5.30	-5.29	-8.20	-6.82	-9.04	-9.19	-9.41	-8.09	-7.62	-6.51
KMgCl3	log Q/K	-40.60	-40.26	-39.93	-39.45	-39.41	-40.24	-40.14	-46.76	-38.33	-39.62	-39.64	-39.67	-39.40	-41.05	-40.22
KMgCl3^2H2O	log Q/K	-32.51	-32.48	-32.13	-31.67	-31.62	-32.47	-32.35	-38.99	-30.28	-31.82	-31.90	-31.91	-31.57	-33.26	-32.19
KNaCO3^6H2O	log Q/K	-10.18	-12.44	-12.22	-12.33	-12.46	-12.69	-12.27	-18.76	-10.08	-7.37	-4.90	-6.69	-7.43	-10.69	-8.89
Leonhardtite (MgSO4•4H2O)	log Q/K	-6.65	-4.30	-4.28	-4.28	-4.86	-4.34	-4.32	-7.24	-5.74	-8.07	-8.25	-8.45	-7.10	-6.65	-5.44
Lime (CaO)	log Q/K	-21.78	-22.61	-22.71	-22.83	-22.71	-22.82	-22.70	-25.99	-22.52	-13.12	-12.93	-12.72	-14.46	-15.44	-19.45
Magnesite (MgCO3)	log Q/K	-0.90	-0.97	-1.05	-1.15	-1.58	-1.21	-1.06	-4.32	-1.07	-0.03	0.19	0.00	-0.33	-0.54	-0.01
Mercallite (KHSO4)	log Q/K	-14.18	-11.81	-11.71	-11.63	-11.95	-11.77	-11.74	-14.56	-13.03	-17.52	-16.88	-17.64	-15.70	-15.77	-13.74
Mg2Cl(OH)3^4H2O	log Q/K	-12.09	-14.27	-14.23	-14.39	-15.10	-14.72	-14.35	-21.16	-12.68	-2.86	-2.30	-2.55	-4.34	-6.98	-9.42
MgCl2^2H2O	log Q/K	-24.14	-23.58	-23.39	-23.07	-23.05	-23.53	-23.53	-26.89	-22.50	-24.49	-25.31	-24.83	-24.57	-24.79	-23.99
MgCl2^4H2O	log Q/K	-18.04	-17.74	-17.54	-17.24	-17.20	-17.70	-17.69	-21.06	-16.43	-18.63	-19.51	-19.01	-18.68	-18.94	-17.94
MgCl2^H2O	log Q/K	-27.87	-27.17	-26.99	-26.65	-26.64	-27.11	-27.12	-30.47	-26.22	-28.08	-28.87	-28.41	-28.18	-28.38	-27.70
MgF2(c)	log Q/K	-5.91	-2.96	-3.03	-3.02	-3.90	-3.11	-3.04	-6.00	-4.41	-6.15	-5.01	-5.79	-6.20	-7.39	-4.34
MgOHCl	log Q/K	-16.02	-16.22	-16.16	-16.08	-16.33	-16.33	-16.24	-19.61	-15.64	-12.74	-12.75	-12.70	-13.29	-14.20	-15.02
MgSO4(c)	log Q/K	-13.41	-10.73	-10.73	-10.70	-11.30	-10.75	-10.75	-13.66	-12.47	-14.52	-14.62	-14.85	-13.59	-13.09	-12.14
MHSH(Mg1.5)	log Q/K	-11.36	-9.36	-9.39	-9.45	-10.31	-9.54	-9.42	-14.04	-10.87	-9.21	-8.96	-9.36	-8.77	-9.10	-9.20
Mirabilite (Na2SO4·10H2O)	log Q/K	-8.22	-7.87	-7.45	-7.33	-7.41	-7.75	-7.48	-13.63	-6.22	-7.47	-5.27	-7.29	-6.85	-9.66	-6.25
Misenite (K8H8(SO4)7)	log Q/K	-93.52	-78.48	-77.72	-77.25	-79.74	-78.38	-77.94	-101.00	-86.11	-112.50	-106.50	-112.70	-99.84	-102.50	-89.45
Molysite (FeCl3)	log Q/K	-45.77	-42.88	-42.17	-40.91	-41.10	-41.50	-41.61	-41.93	-41.97	-57.65	-60.40	-59.06	-55.61	-53.42	-47.89
Monohydrocalcite (CaCO3·H2O)	log Q/K	-0.55	-0.89	-0.96	-1.07	-0.84	-1.08	-0.99	-4.16	-0.65	1.70	1.24	1.66	1.14	1.49	0.73
Na3H(SO4)2	log Q/K	-23.93	-21.27	-20.62	-20.31	-20.51	-20.94	-20.66	-29.63	-20.00	-26.51	-23.60	-26.58	-24.64	-27.77	-21.21
NaFeO2(c)	log Q/K	-12.33	-13.69	-13.17	-12.69	-13.67	-12.87	-12.43	-16.14	-12.23	-9.25	-8.09	-9.09	-9.27	-11.64	-10.68
Nesquehonite (MgCO3 · 3H2O)	log Q/K	-4.14	-4.07	-4.15	-4.25	-4.69	-4.30	-4.17	-7.41	-4.30	-3.14	-2.89	-3.10	-3.45	-3.65	-3.23
Pentahydrite (MgSO4•5(H2O))	log Q/K	-5.95	-3.72	-3.70	-3.71	-4.28	-3.77	-3.74	-6.67	-5.06	-7.49	-7.69	-7.88	-6.51	-6.07	-4.76
Pirssonite (Na2Ca(CO3)2•2(H2O))	log Q/K	-9.22	-11.75	-11.48	-11.59	-11.29	-12.03	-11.53	-21.19	-8.41	-4.04	-1.93	-3.52	-5.24	-8.38	-6.31
Portlandite (Ca(OH)2)	log Q/K	-10.75	-11.94	-12.01	-12.16	-12.03	-12.17	-12.02	-15.33	-11.53	-2.43	-2.31	-2.07	-3.73	-4.75	-8.49
Sr(OH)2(c)	log Q/K	-17.47	-17.97	-18.05	-18.20	-18.00	-18.18	-18.06	-18.30	-17.98	-7.71	-7.32	-7.16	-9.80	-10.62	-14.83
SrCl2(c)	log Q/K	-19.98	-19.21	-19.01	-18.71	-17.96	-19.11	-19.17	-19.39	-18.01	-17.70	-18.99	-17.95	-18.83	-18.30	-19.09
SrCl2^2H2O	log Q/K	-14.82	-14.26	-14.04	-13.76	-13.00	-14.17	-14.21	-14.44	-12.87	-12.74	-14.07	-13.01	-13.84	-13.34	-13.97
SrCl2^6H2O	log Q/K	-12.45	-12.07	-11.85	-11.58	-10.81	-12.00	-12.03	-12.26	-10.52	-10.54	-11.91	-10.84	-11.62	-11.15	-11.63
SrCl2^H2O	log Q/K	-16.51	-15.87	-15.66	-15.36	-14.61	-15.77	-15.82	-16.05	-14.55	-14.35	-15.66	-14.61	-15.46	-14.95	-15.64
SrF2(c)	log Q/K	-7.38	-4.13	-4.18	-4.19	-4.35	-4.22	-4.21	-4.03	-5.54	-4.91	-4.21	-4.44	-6.00	-6.44	-5.05
SrO(c)	log Q/K	-33.31	-33.31	-33.42	-33.53	-33.37	-33.50	-33.41	-33.62	-33.76	-23.08	-22.59	-22.47	-25.23	-25.98	-30.58
SrS(c)	log Q/K	-74.86	-52.80	-51.10	-51.45	-53.00	-51.89	-49.99	-50.35	-71.56	-99.03	-88.35	-101.90	-103.30	-83.98	-74.71
Strontianite (SrCO3)	log Q/K	1.05	1.19	1.12	0.99	1.30	0.99	1.08	0.97	1.21	4.54	4.30	4.66	3.20	3.73	2.67
Sulfur-Rhmb (S)	log Q/K	-44.33	-26.52	-25.17	-25.27	-26.59	-25.61	-24.32	-24.30	-41.03	-71.80	-64.31	-74.58	-72.97	-57.32	-46.35
Sylvite (KCl)	log Q/K	-8.06	-8.59	-8.43	-8.29	-8.26	-8.64	-8.51	-11.80	-7.46	-7.02	-6.29	-6.77	-6.69	-8.16	-7.89
Tachyhydrite (CaMg2Cl6·12H2O)	log Q/K	-48.24	-47.73	-47.11	-46.21	-45.45	-47.58	-47.57	-57.61	-43.34	-48.74	-52.08	-49.96	-49.16	-49.37	-47.55
Thenardite (Na2SO4)	log Q/K	-10.08	-9.37	-8.97	-8.81	-8.92	-9.22	-8.98	-15.11	-8.04	-8.98	-6.71	-8.76	-8.41	-11.17	-8.04
Witherite (BaCO3)	log Q/K	2.01	-0.09	-0.40	-0.54	-0.17	-0.60	-0.15	-3.65	1.58	5.85	5.74	5.82	4.02	3.50	3.55

Notes:
Positive values are oversaturated and may precipitate out of solution
Negative values are undersaturated and may dissolve into solution

Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

TRC - GIS

PROJECT:	DTE ELECTRIC COMPANY MONROE POWER PLANT FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL 7955 EAST DUNBAR ROAD MONROE, MICHIGAN
TITLE:	SITE LOCATION MAP

DRAWN BY:	A. FOJTIK
CHECKED BY:	H. SCHNAIDT
APPROVED BY:	H. SCHNAIDT
DATE:	JANUARY 2023
PROJ. NO.:	461816.0001
FILE:	461816-0001-004SLM.mxd

FIGURE 1

E:\DTE\CCR_Sites\2017_265996\461816-0001-004SLM.mxd -- Saved By: MOPEL on 1/4/2023, 10:31:13 AM

TRC - GIS

LEGEND

◆ MONITORING WELLS

◆ PIEZOMETERS

● SURFACE WATER SAMPLE POINT

― APPROXIMATE BOUNDARY OF FLY ASH BASIN

― APPROXIMATE BOUNDARY OF VERTICAL EXTENSION LANDFILL

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
2. MONITORING WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN MARCH AND MAY 2016.
3. PIEZOMETER LOCATION DATA COLLECTED WITH PORTABLE GPS UNIT BY GEOSYNTECH IN DECEMBER 2020.

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
DTE ELECTRIC COMPANY
MONROE POWER PLANT
FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:

MONITORING NETWORK AND SITE PLAN

DRAWN BY:	A. ADAIR	PROJ NO.:	522171.0002
CHECKED BY:	J. KRENZ	FIGURE 2	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

FILE NO.: 461816_005_MNSP.mxd

Plot Date: 1/20/2023, 22:20:42 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\DTE_Energy\MonroeMI_PP\461816_0001\461816_005_MNSP.mxd

Coordinate System: NAD 1983 UTM Zone 17N (Meter)
Map Rotation: 0

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 17N (Meter)
Map Rotation: 0

Plot Date: 4/7/2023, 13:29:06 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\DTE_Energy\MonroeMI_PP\522171_0002\522171_009_OFF.mxd

LEGEND

SURFACE WATER SAMPLE

APPROXIMATE FLY ASH BASIN BOUNDARY

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
2. SURFACE WATER SAMPLE LOCATION IS APPROXIMATE.

0 2,000 4,000 Feet

1 " = 2,000 '
1:24,000

N

PROJECT:
DTE ELECTRIC COMPANY
MONROE POWER PLANT
FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:
OFFSITE SURFACE WATER SAMPLE LOCATIONS

DRAWN BY: A. ADAIR
CHECKED BY: J. KRENZ
APPROVED BY: V. BUENING
DATE: JANUARY 2023
PROJ NO.: 522171.0002

FIGURE 3

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

FILE NO.: 522171_009_OFF.mxd

LEGEND

✦	MONITORING WELL
	APPROXIMATE BOUNDARY OF FLY ASH BASIN
	APPROXIMATE BOUNDARY OF VERTICAL EXTENSION LANDFILL
	POTENTIOMETRIC SURFACE CONTOUR
	INFERRED POTENTIOMETRIC SURFACE CONTOUR
→	INFERRED GROUNDWATER FLOW DIRECTION
(582.84)	STATIC WATER ELEVATION IN FEET (NAVD, 1988)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN MARCH AND MAY 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

0 600 1,200
Feet
1 " = 600 '
1:7,200

N

PROJECT:
DTE ELECTRIC COMPANY
MONROE POWER PLANT
FLY ASH BASIN AND VERTICAL EXTENSION LANDFILL
7955 EAST DUNBAR ROAD
MONROE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP
OCTOBER 2022

DRAWN BY:	A. ADAIR	PROJ NO.:	461816.0001
CHECKED BY:	H. SCHNAIDT	FIGURE 4	
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2023		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

FILE NO.: 461816_007_OCTGW.mxd

TRC - GIS

Plot Date: 1/5/2023, 12:08:06 PM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\DTE_Energy\MonroeMI_PP\461816_0001\461816_007_OCTGW.mxd
Coordinate System: NAD 1983 UTM Zone 17N (Meter)
Map Rotation: 0

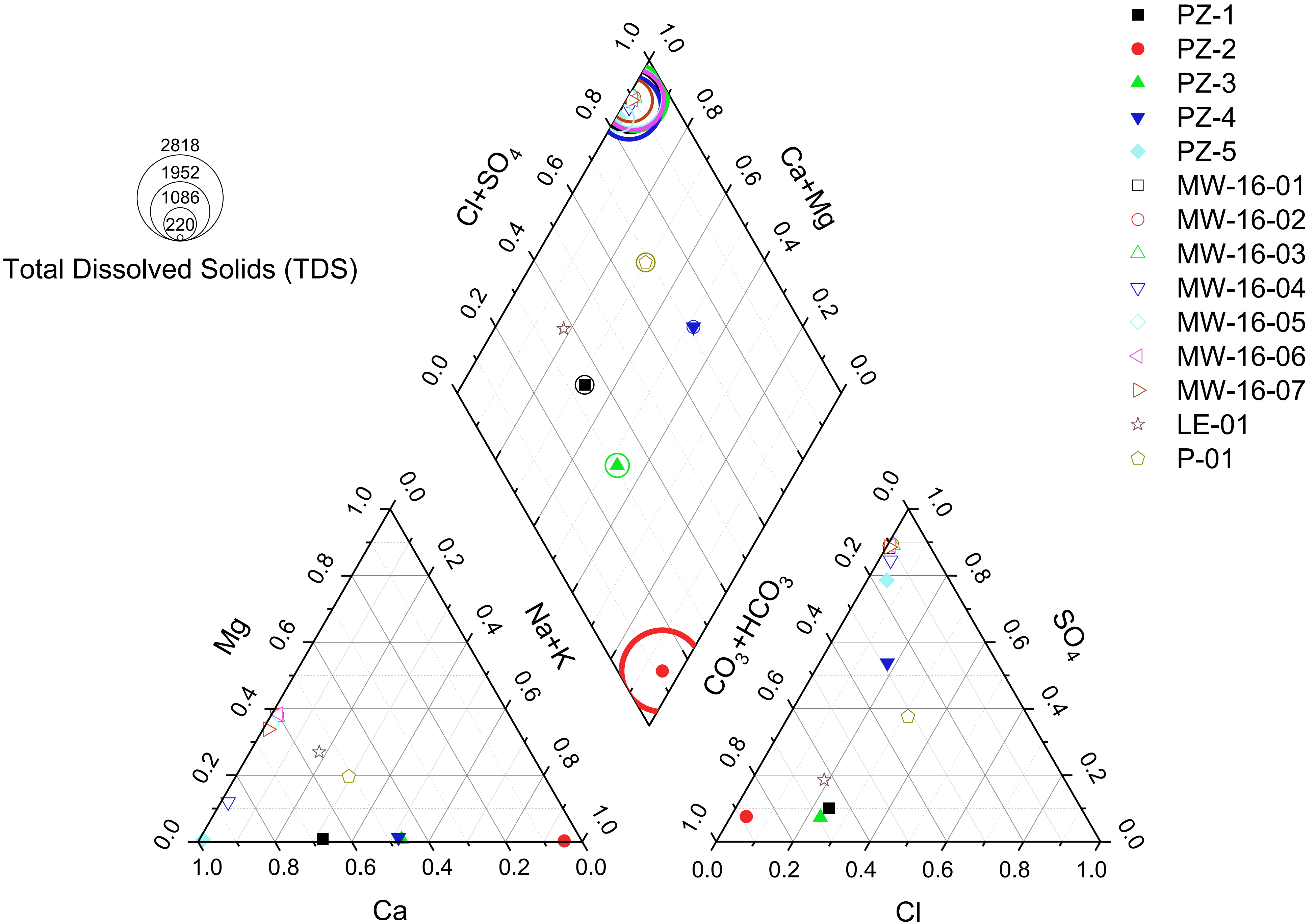


Figure 5 - Piper Diagram
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

Figure 6

Summary of Caclium and Sulfate Saturation with Chloride and Sulfate Concentrations
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

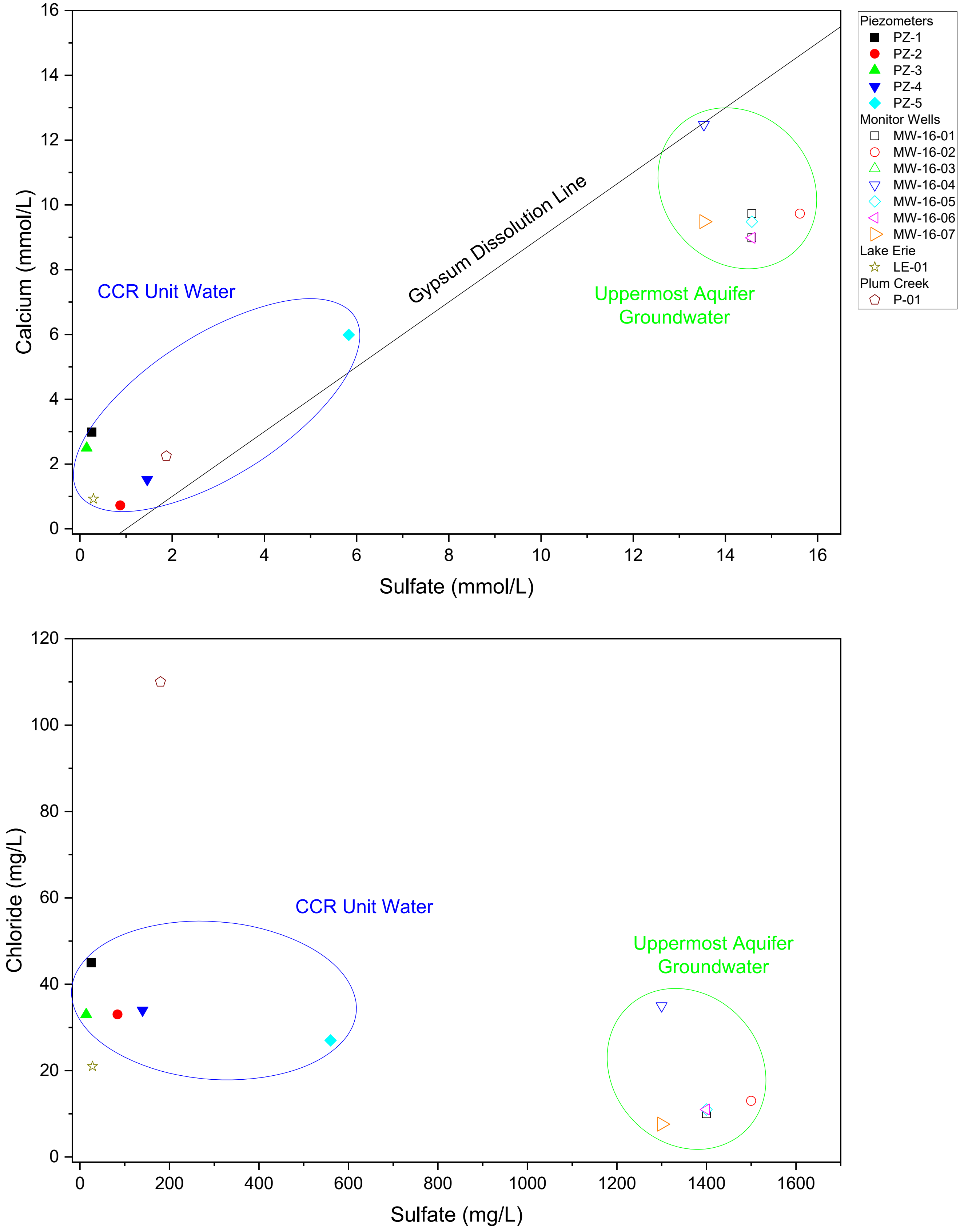
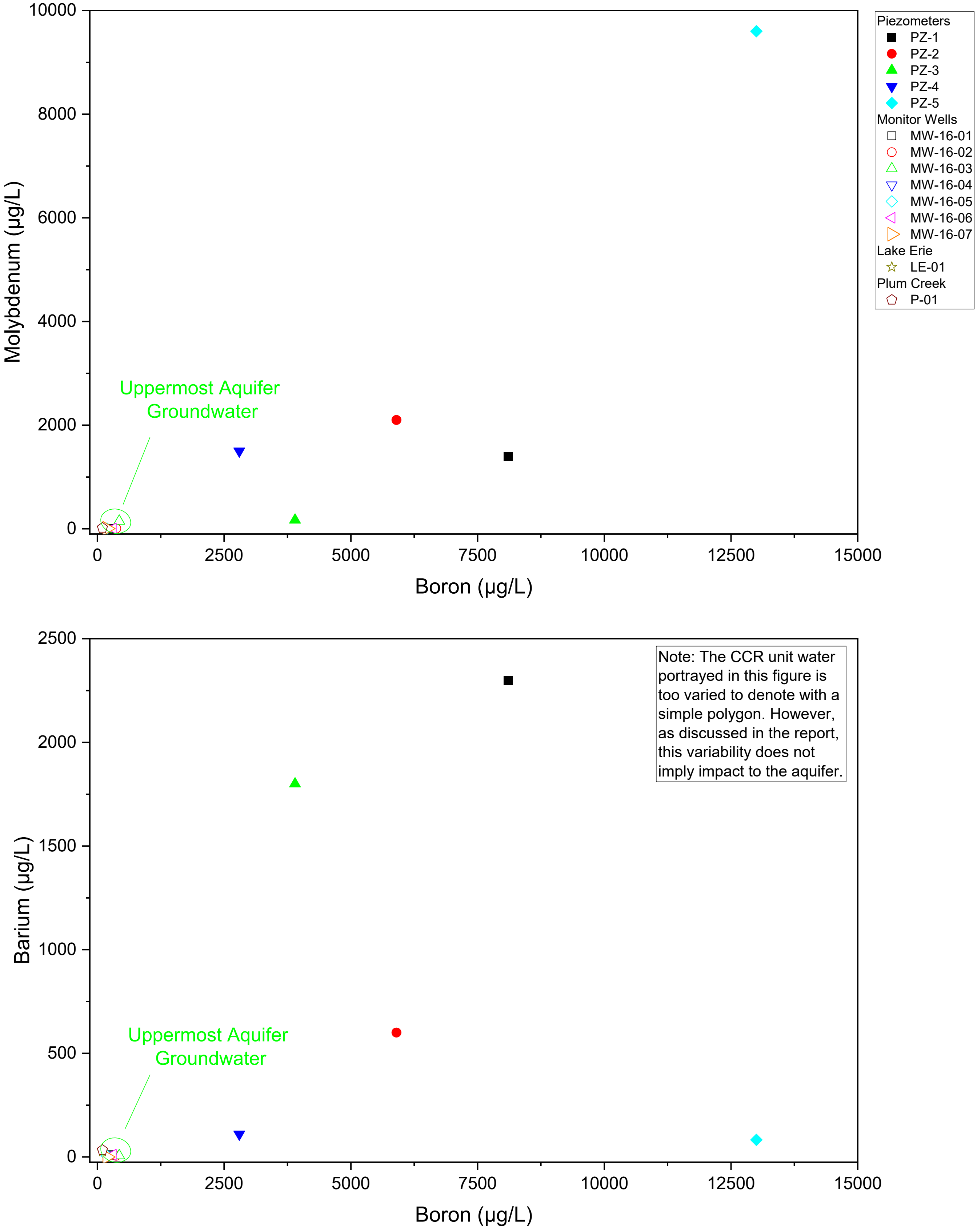


Figure 7

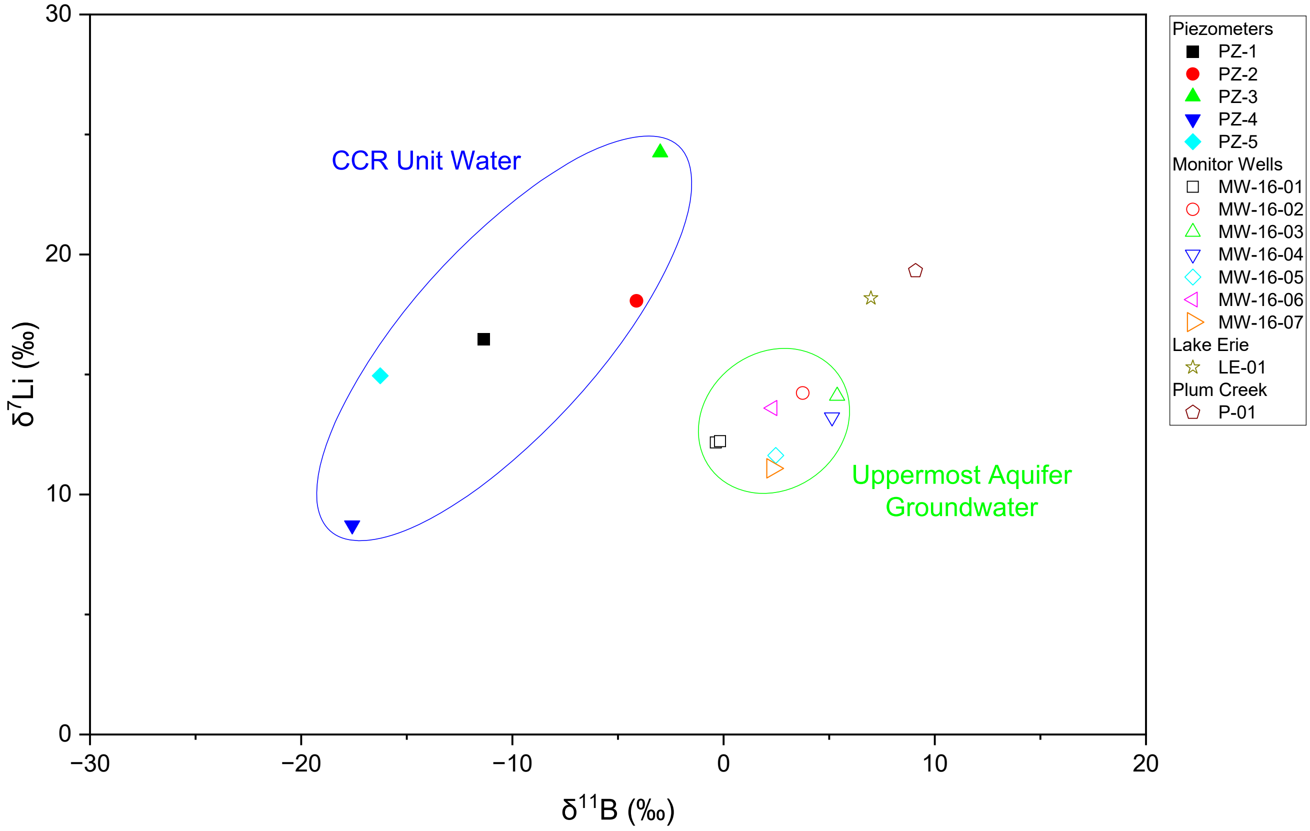
Molybdenum and Barium with Boron Concentrations
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

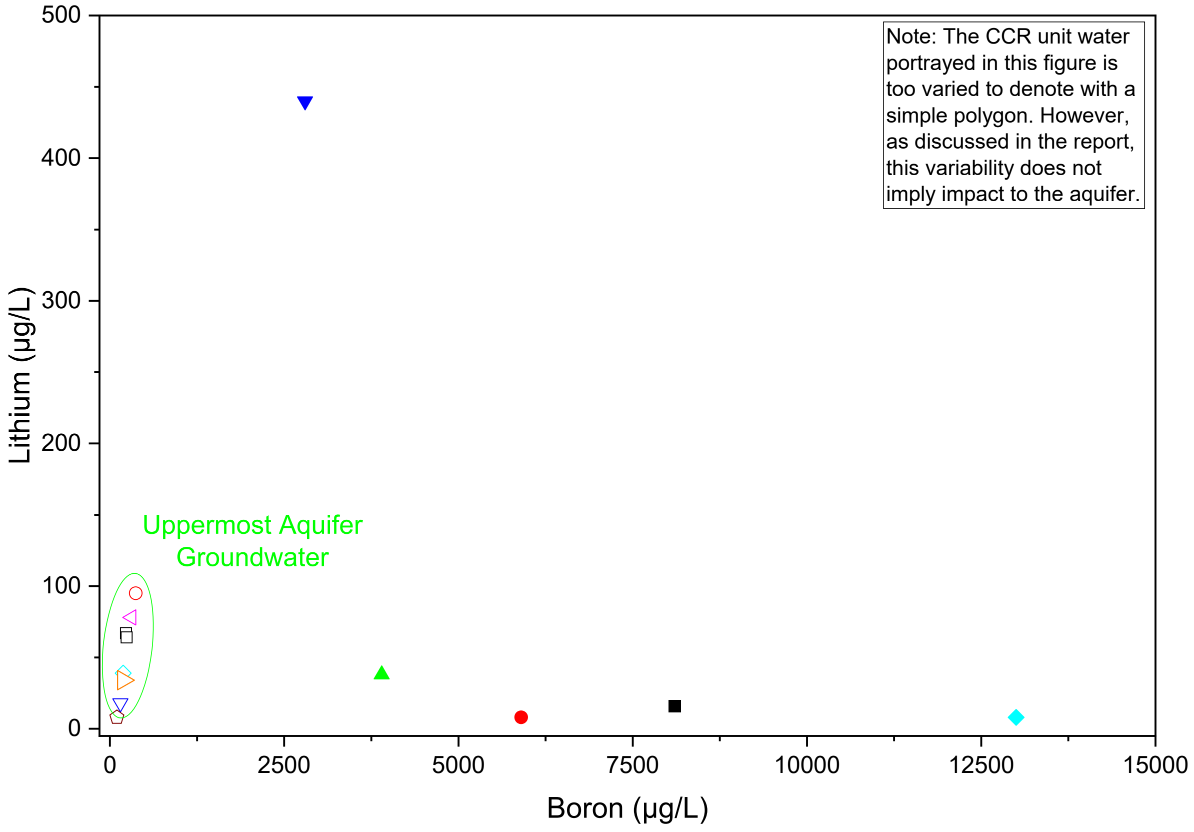


Note: The CCR unit water portrayed in this figure is too varied to denote with a simple polygon. However, as discussed in the report, this variability does not imply impact to the aquifer.

Figure 8

Summary of Lithium and Boron Isotopic and Concentration Results
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

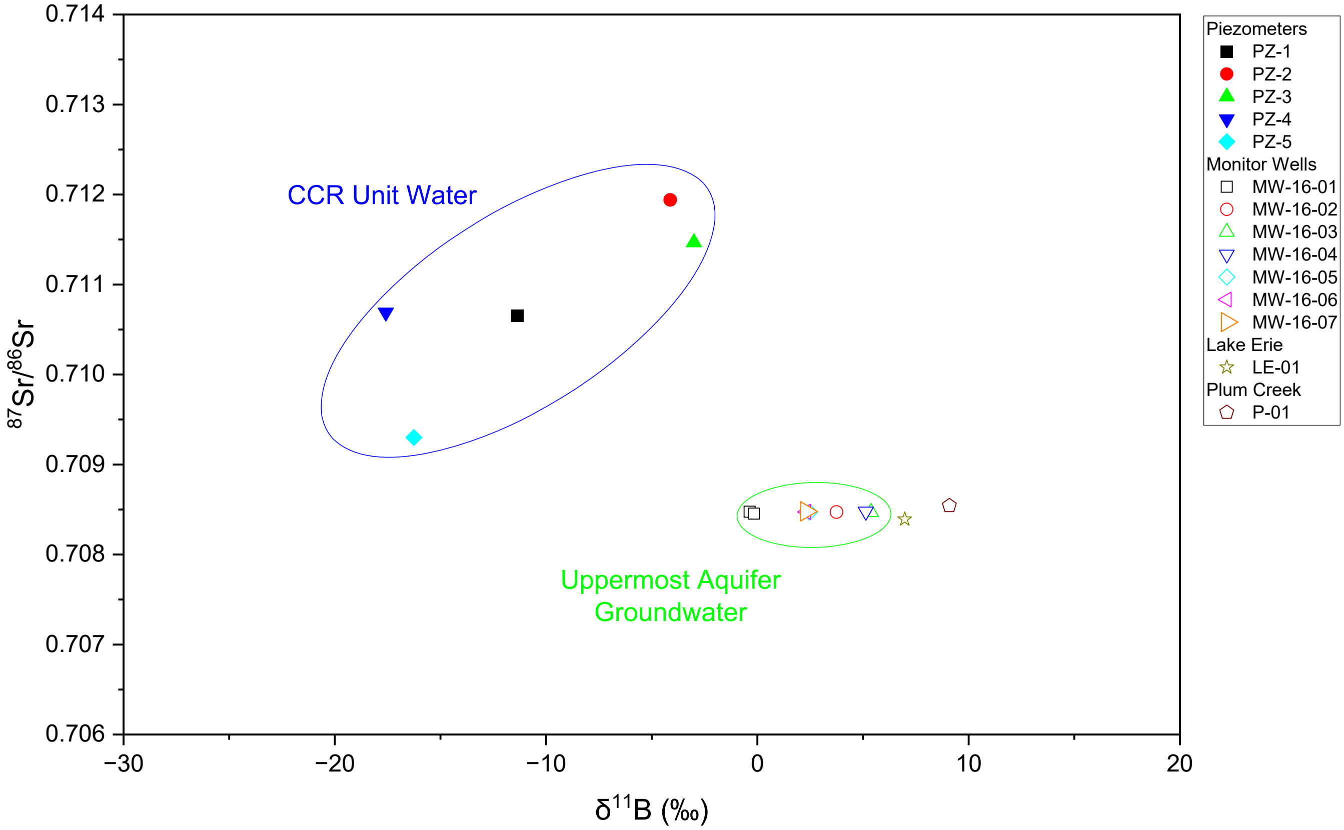


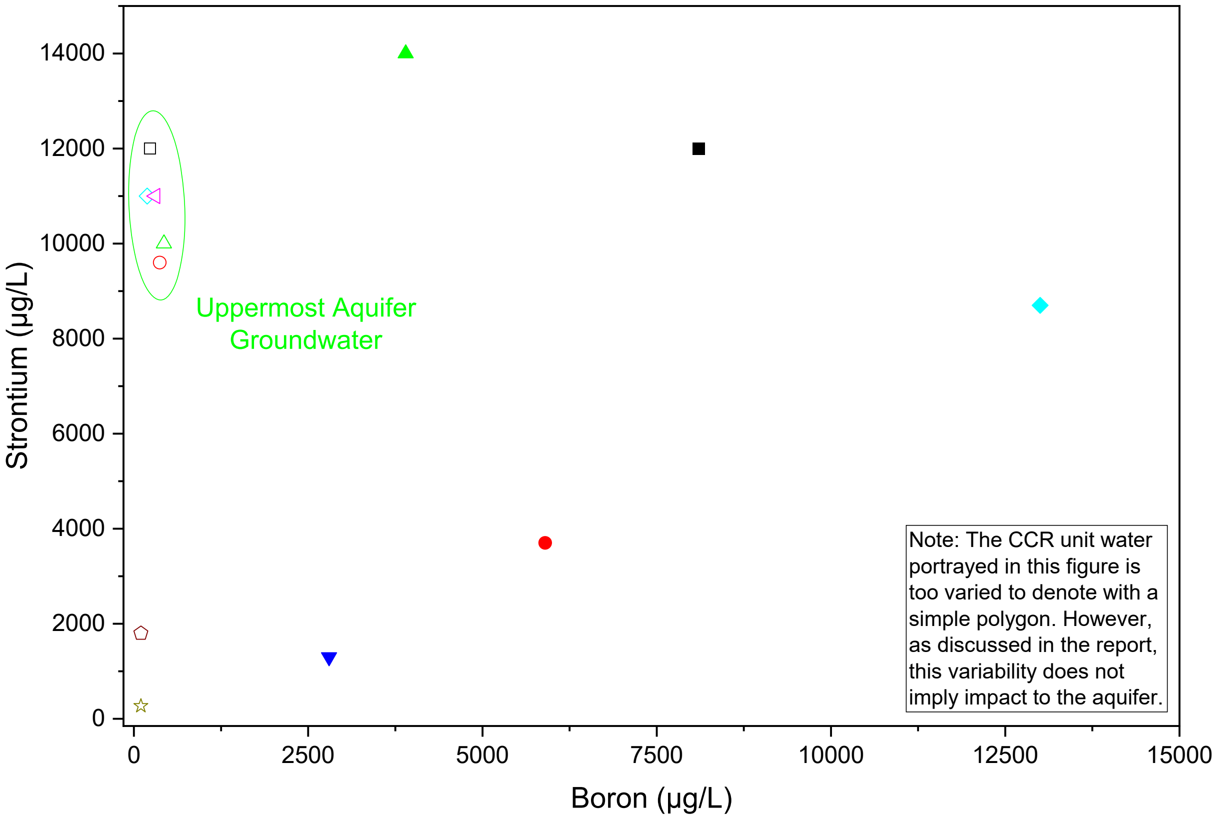


Note: The CCR unit water portrayed in this figure is too varied to denote with a simple polygon. However, as discussed in the report, this variability does not imply impact to the aquifer.

Figure 9

Summary of Strontium and Boron Isotopic and Concentration Results
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

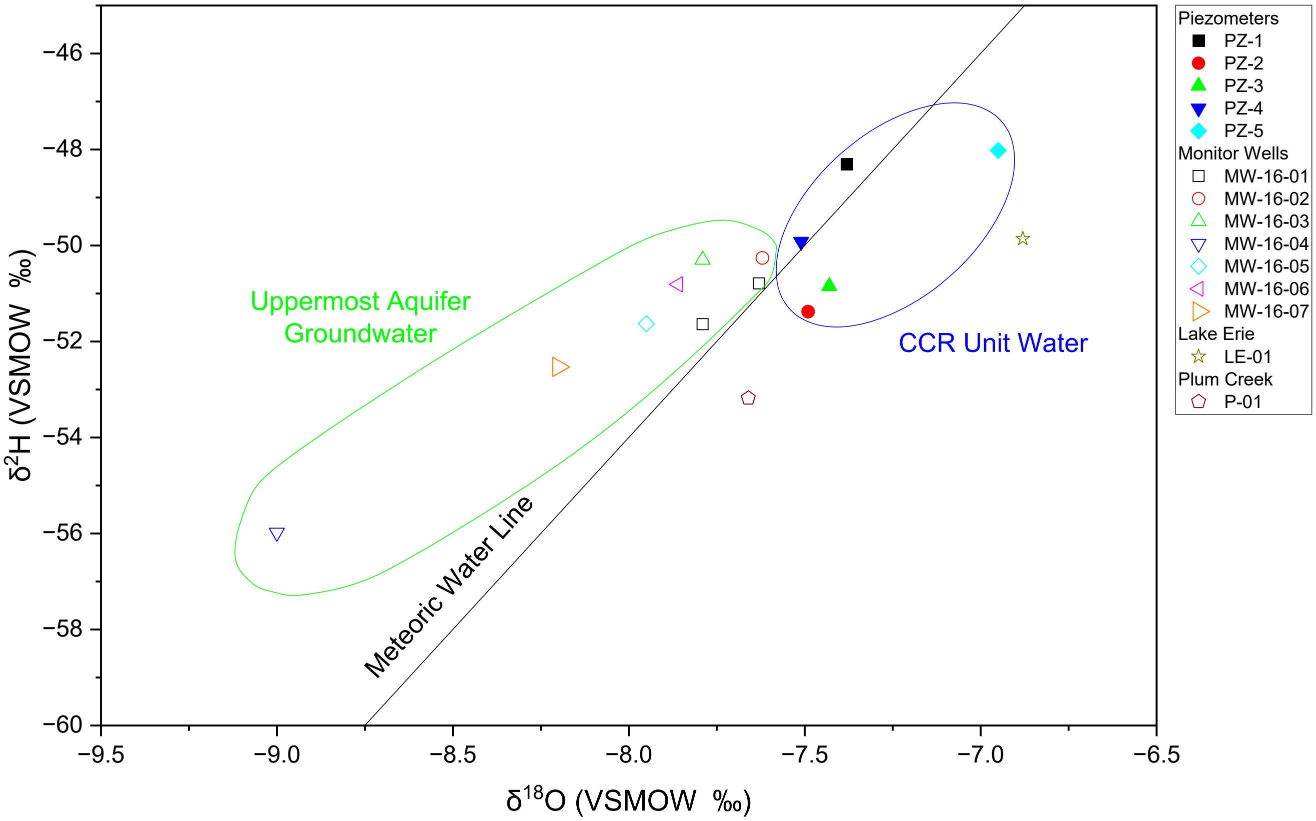




Note: The CCR unit water portrayed in this figure is too varied to denote with a simple polygon. However, as discussed in the report, this variability does not imply impact to the aquifer.

Figure 10

Summary of Hydrogen and Oxygen Isotopic Results with Carbonate Solubility
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan



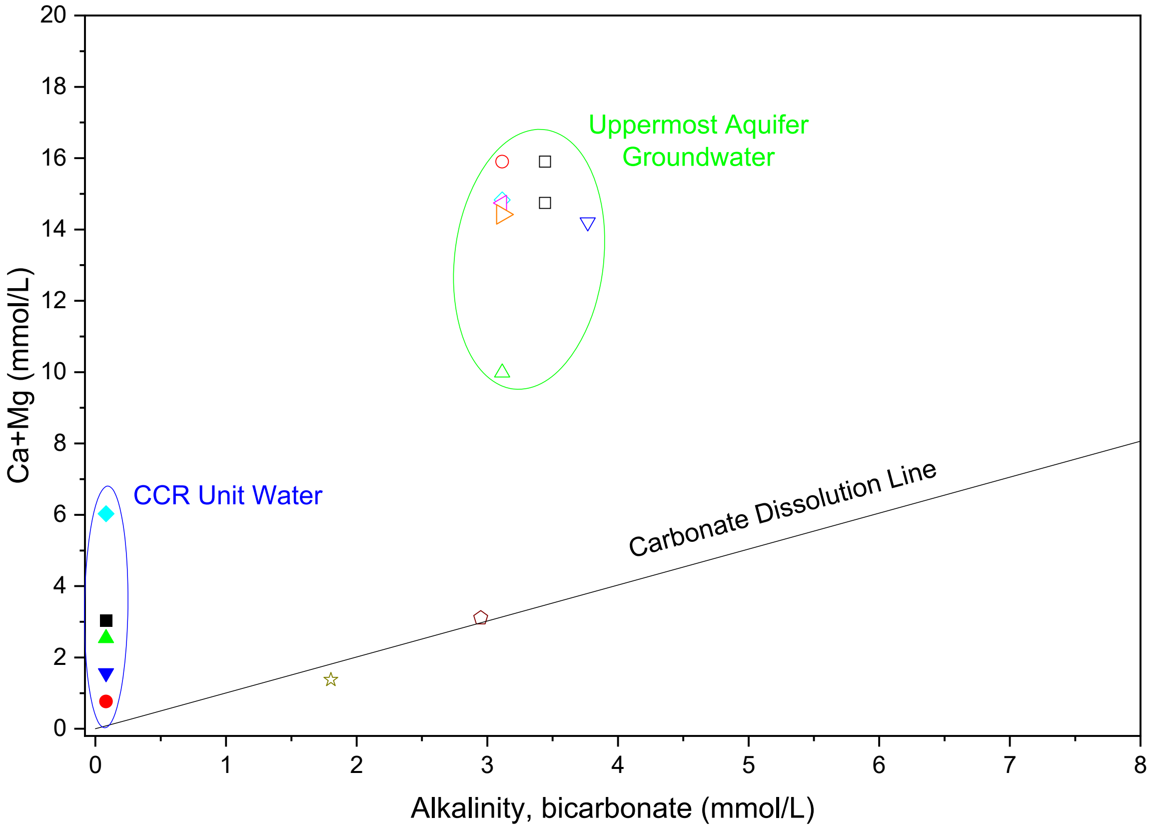
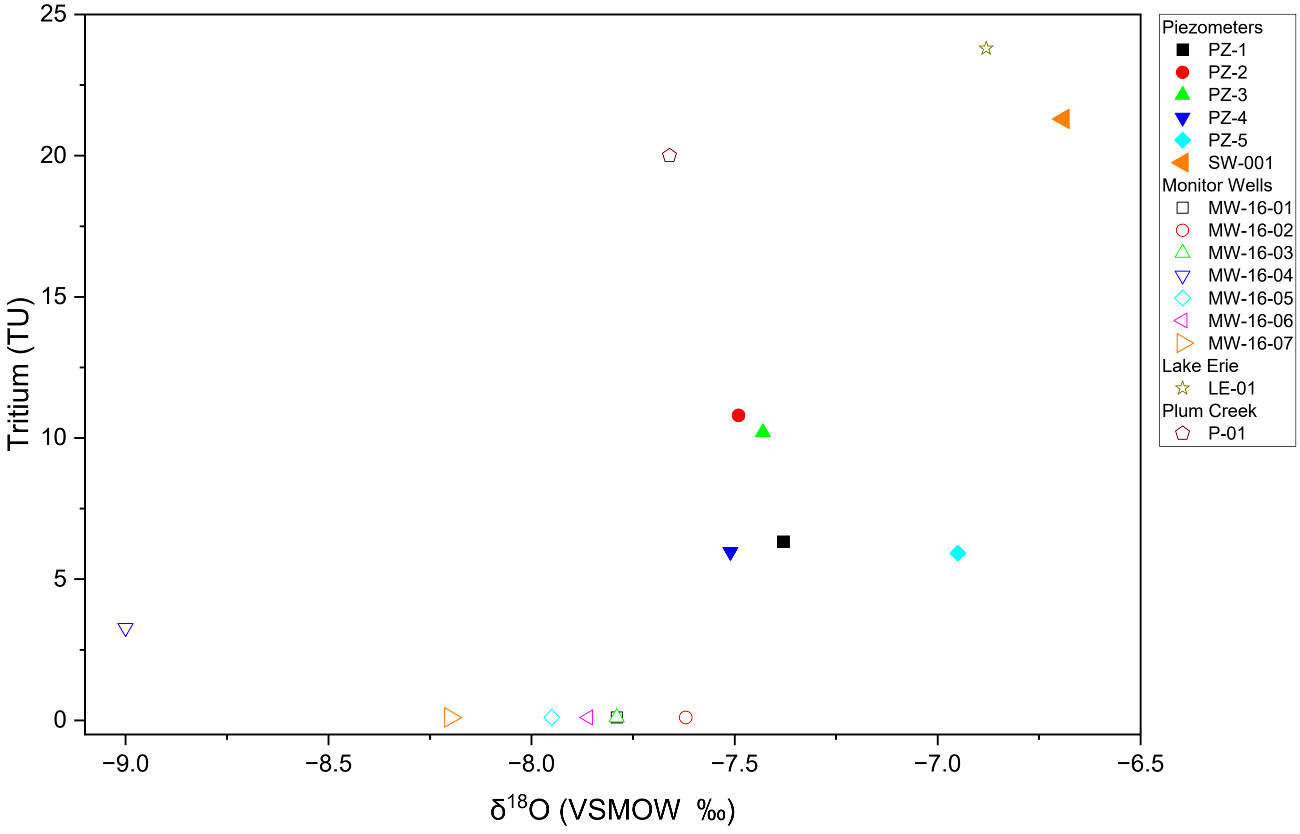


Figure 11

Tritium Data and Age Model
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan



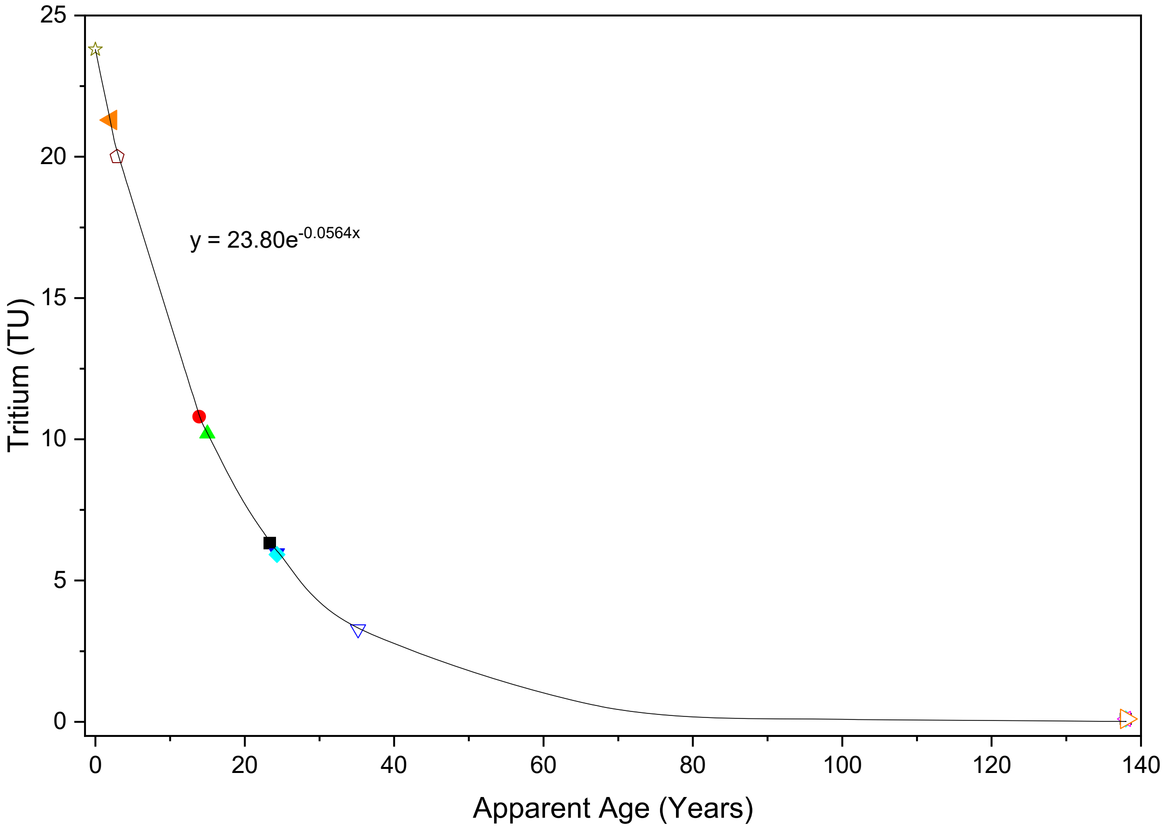


Figure 12 - Scree Plot
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

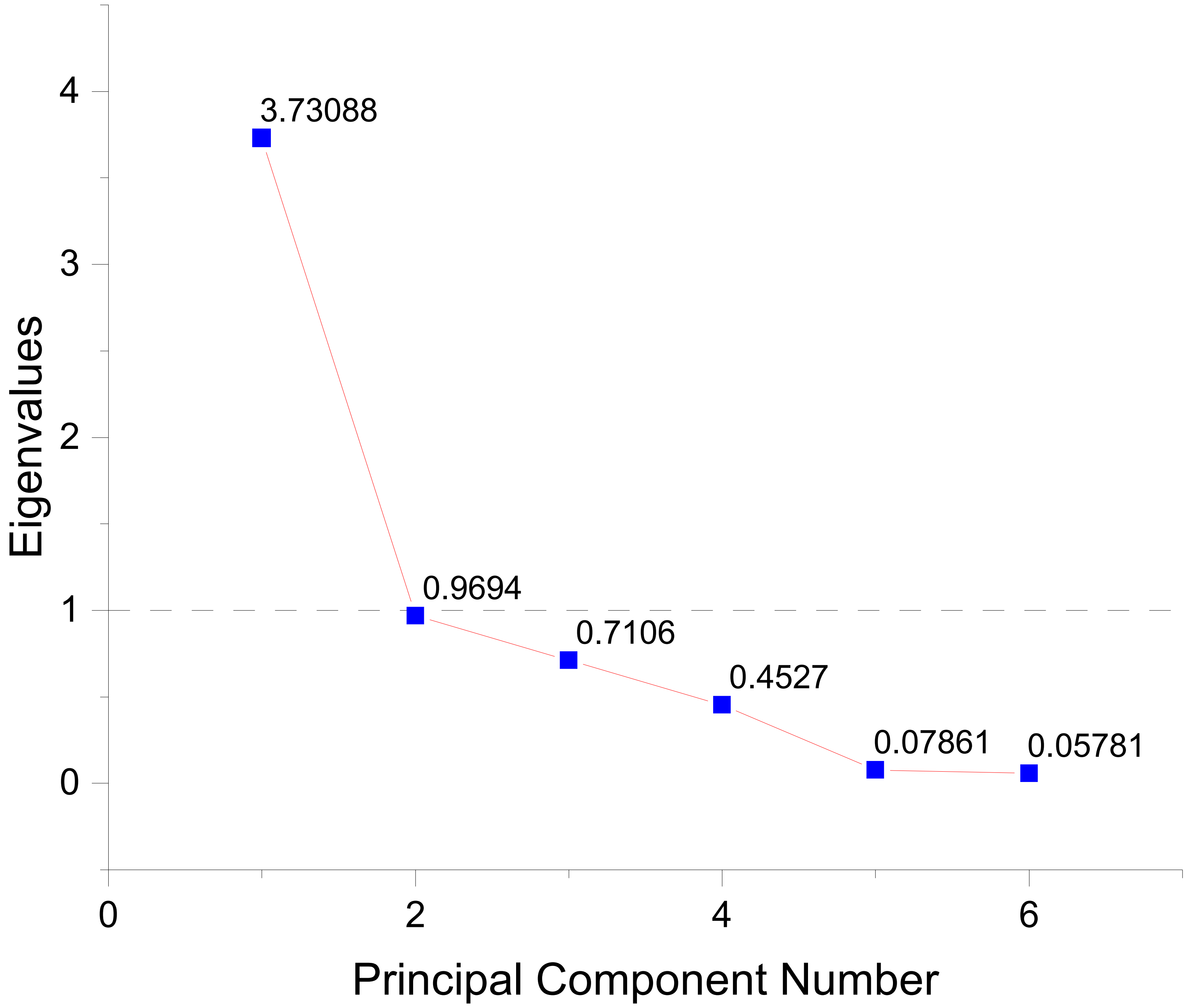


Figure 13 - Biplot
Monroe Power Plant Fly Ash Basin CCR Unit
7955 East Dunbar Road, Monroe, Michigan

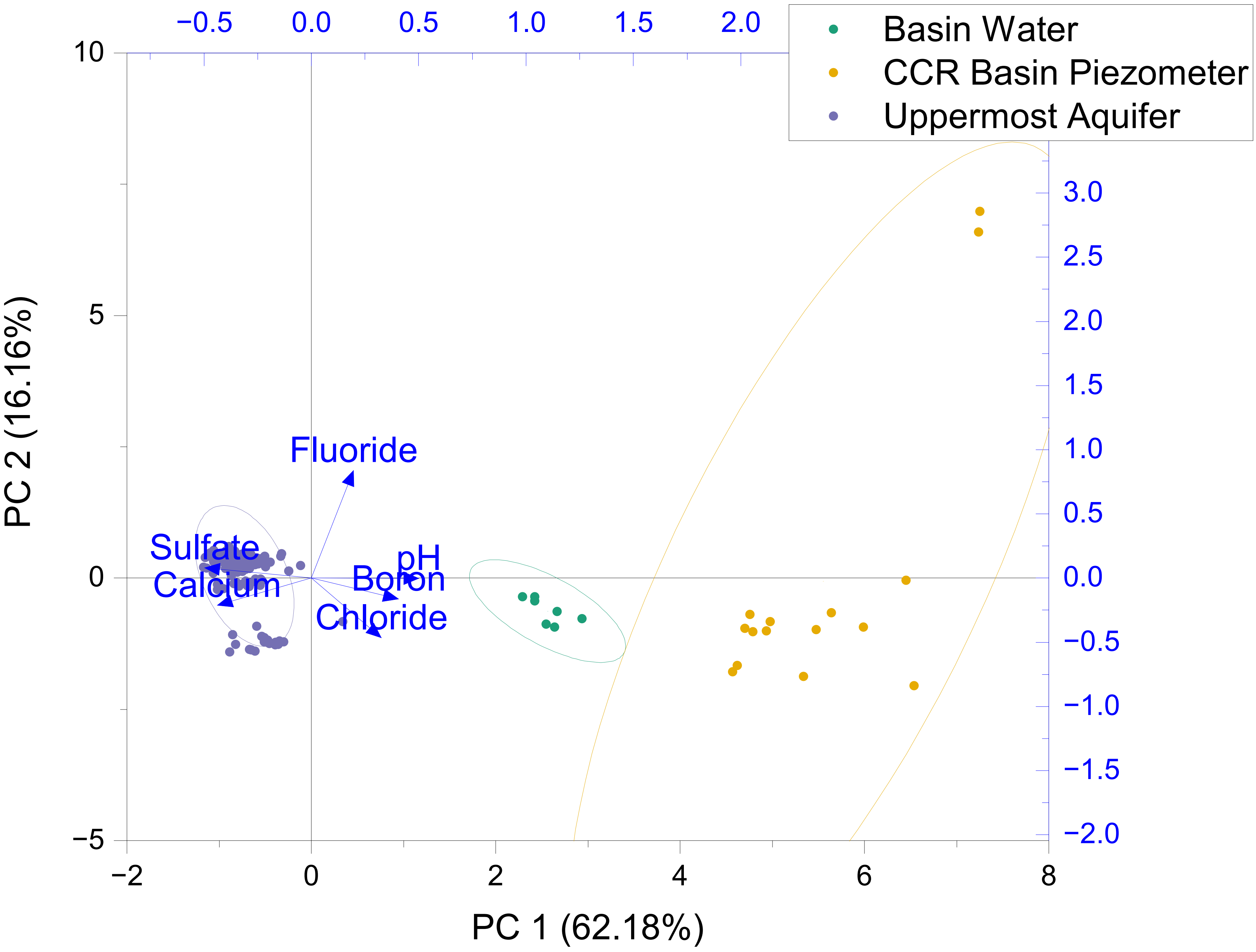


Figure 14. MONPP FAB LDA Origin

Discriminant Analysis (3/1/2023 09:36:57)

Canonical Discriminant Analysis

Eigenvalues

	Eigenvalue	Percentage of Variance	Cumulative	Canonical Correlation
1	60.62996	98.12%	98.12%	0.99185
2	1.15879	1.88%	100.00%	0.73265

Standardized Canonical Coefficients

	Canonical Variable 1	Canonical Variable 2
Boron	1.04953	0.2047
Calcium	-0.68412	0.52185
Chloride	0.40409	-0.14495
Fluoride	-0.07827	0.2455
Sulfate	-0.75829	0.68184
pH	0.50549	0.85646

Classification Summary for Training Data

Classification Count

	Predicted Group			
	Basin Water	CCR Basin Piezometer	Uppermost Aquifer	Total
Basin Water	7	0	0	7
	100.00%	0.00%	0.00%	100.00%
CCR Basin Piezometer	0	15	0	15
	0.00%	100.00%	0.00%	100.00%
Uppermost Aquifer	0	0	140	140
	0.00%	0.00%	100.00%	100.00%
Total	7	15	140	162
	4.32%	9.26%	86.42%	100.00%

Error Rate

	Basin Water	CCR Basin Piezometer	Uppermost Aquifer	Total
Prior	0.33333	0.33333	0.33333	
Rate	0.00%	0.00%	0.00%	0.00%

Error rate for classification of training data is 0.00%.

Figure 15. MONPP FAB Density of LDA Scores

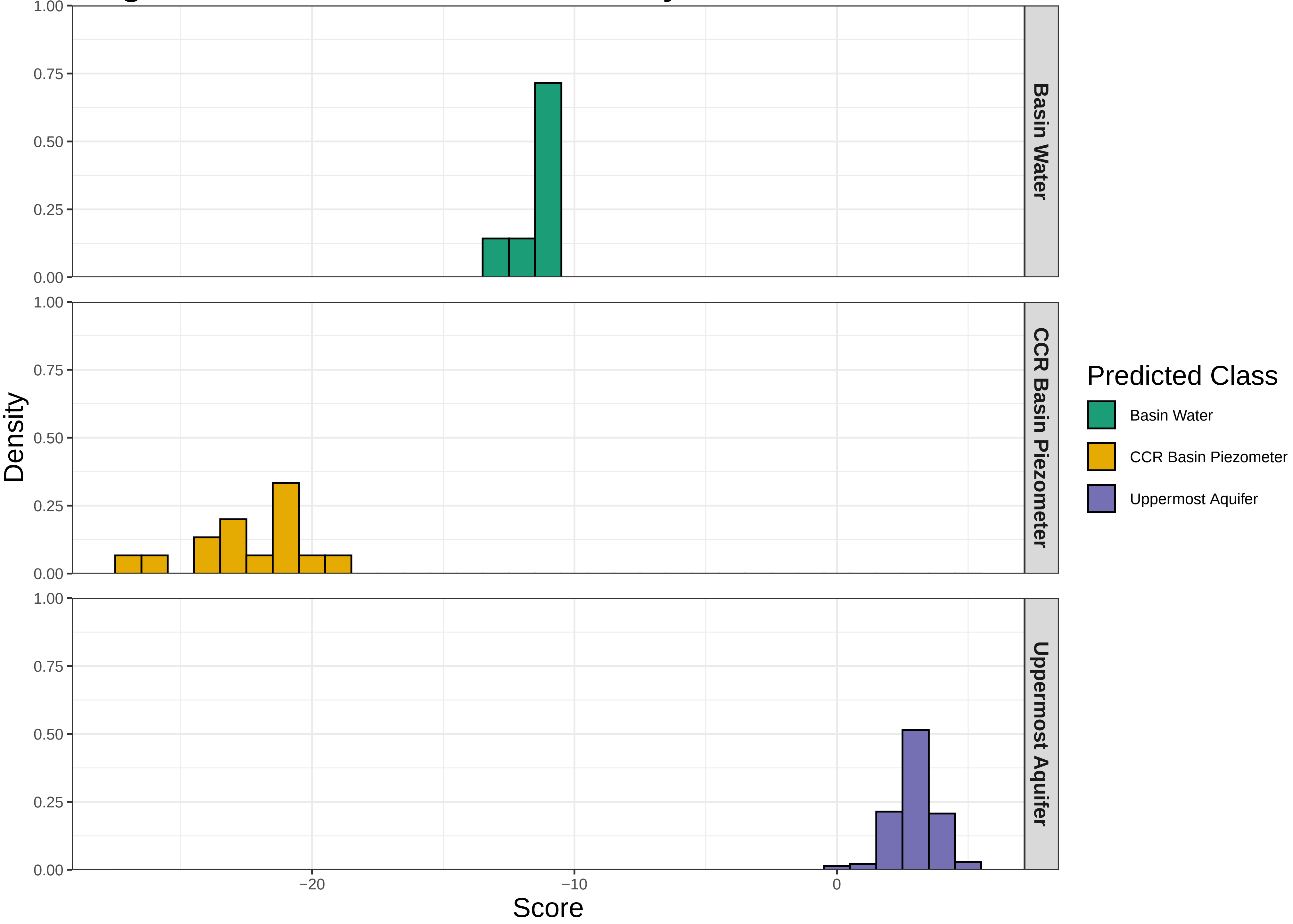
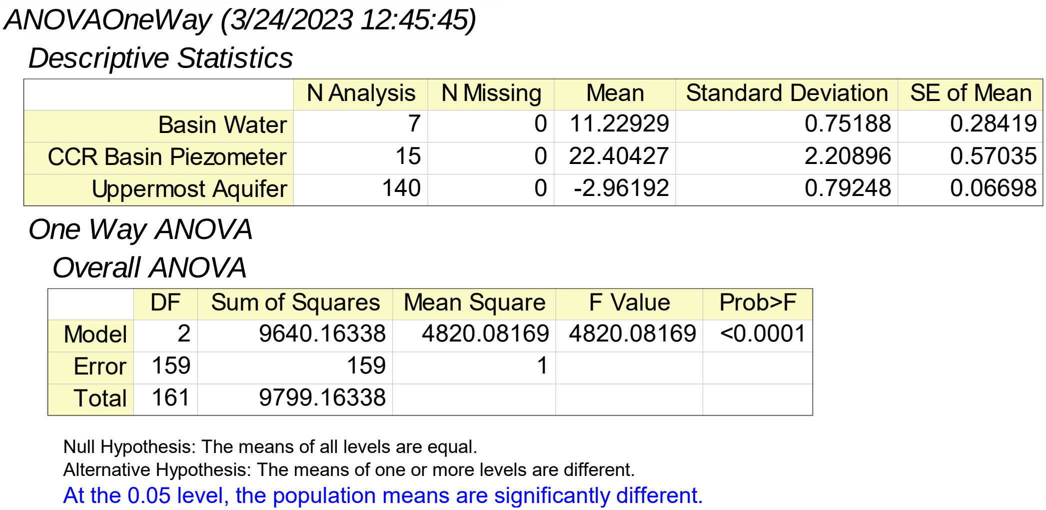


Figure 16. MONPP FAB LDA ANOVA



ANOVAOneWay (3/24/2023 12:45:45)

Descriptive Statistics

	N Analysis	N Missing	Mean	Standard Deviation	SE of Mean
Basin Water	7	0	11.22929	0.75188	0.28419
CCR Basin Piezometer	15	0	22.40427	2.20896	0.57035
Uppermost Aquifer	140	0	-2.96192	0.79248	0.06698

One Way ANOVA

Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	9640.16338	4820.08169	4820.08169	<0.0001
Error	159	159	1		
Total	161	9799.16338			

Null Hypothesis: The means of all levels are equal.
Alternative Hypothesis: The means of one or more levels are different.
At the 0.05 level, the population means are significantly different.

Figure 17. MONPP FAB Time Series (1 of 2)

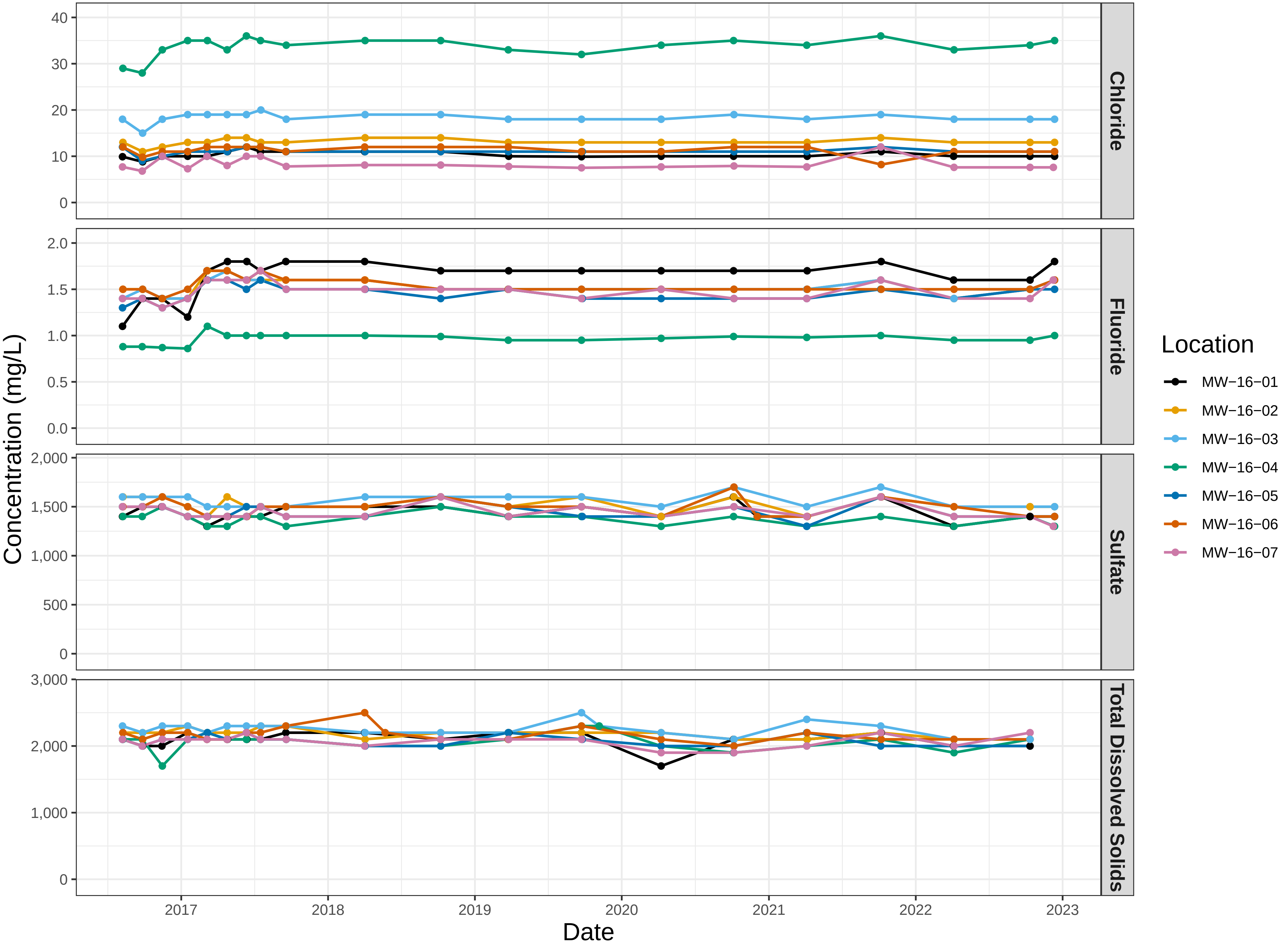
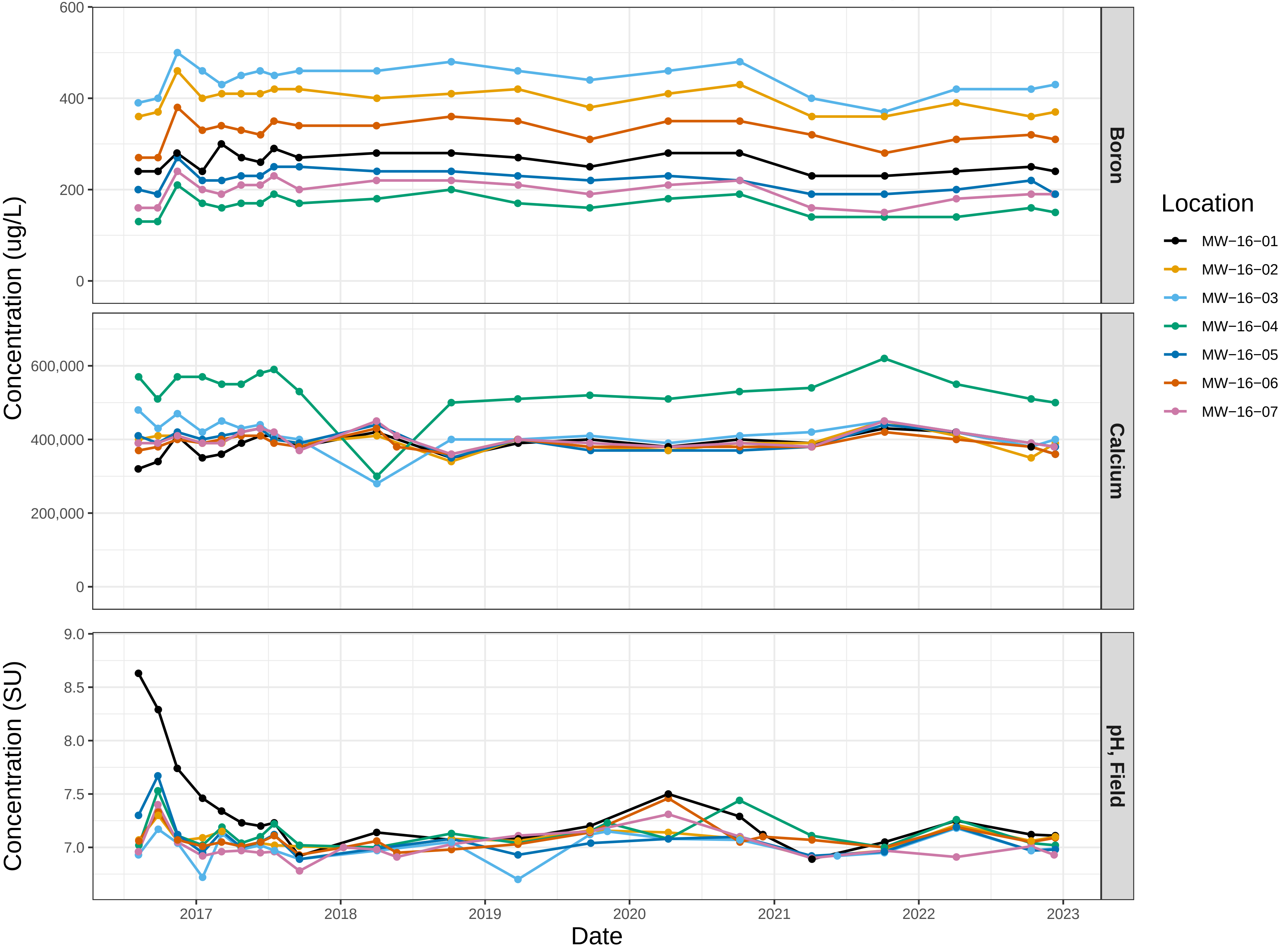


Figure 17. MONPP FAB Time Series (2 of 2)



Appendix A
December 2022 Laboratory Data

ALS Environmental

05-Jan-2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd.
Suite 100
Ann Arbor, MI 48105

Re: **DTE- Monroe (GLP-8014)** Work Order: **20121750**

Dear Michael,

ALS Environmental received 5 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 26.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Report of Laboratory Analysis

Certificate No: MN 026-999-449

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: **20121750**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20121750-01	PZ-1	Groundwater		12/14/2020 08:00	12/18/2020 10:00	☐
20121750-02	PZ-2	Groundwater		12/14/2020 09:00	12/18/2020 10:00	☐
20121750-03	PZ-3	Groundwater		12/15/2020 08:00	12/18/2020 10:00	☐
20121750-04	PZ-4	Groundwater		12/14/2020 10:00	12/18/2020 10:00	☐
20121750-05	PZ-5	Groundwater		12/15/2020 10:00	12/18/2020 10:00	☐

ALS Group, USA

Date: 05-Jan-21

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: 20121750

Case Narrative

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:
No other deviations or anomalies were noted.

Wet Chemistry:

Batch R306912, Method SW9040C, Sample PZ-3 (20121750-03B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R306825, Method SW9040C, Sample LCS-R306825: Samples were processed outside of holding time for pH, as the analysis is a field test and holding time is defined as 15 minutes.Batch R307145, Method IC_9056_W, Sample 20121752-03B MSD: 1

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

ALS Group, USA

Date: *05-Jan-21*

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-1	**Lab ID:**	20121750-01
Collection Date:	12/14/2020 08:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:09 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Arsenic	**0.0098**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Barium	**2.1**		**0.050**	**mg/L**	10	12/31/2020 05:01 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Boron	**4.8**		**0.20**	**mg/L**	10	12/31/2020 05:01 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:54 PM
Calcium	**100**		**0.50**	**mg/L**	1	12/30/2020 08:54 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Iron	**0.83**		**0.080**	**mg/L**	1	12/30/2020 08:54 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:54 PM
Magnesium	**0.47**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
Molybdenum	**1.1**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Potassium	**21**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Selenium	**0.051**		**0.0050**	**mg/L**	1	12/30/2020 08:54 PM
Sodium	**44**		**0.20**	**mg/L**	1	12/30/2020 08:54 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:54 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**210**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**340**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**43**		**10**	**mg/L**	10	12/30/2020 03:36 PM
Fluoride	**3.4**		**0.10**	**mg/L**	1	12/30/2020 05:34 PM
Sulfate	**11**		**1.0**	**mg/L**	1	12/30/2020 05:34 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.0**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.6**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**530**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 20121750
Sample ID: PZ-2 **Lab ID:** 20121750-02
Collection Date: 12/14/2020 09:00 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:11 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Arsenic	**0.0055**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Barium	**0.50**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Boron	**4.3**		**0.20**	**mg/L**	10	12/31/2020 05:02 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:56 PM
Calcium	**43**		**0.50**	**mg/L**	1	12/30/2020 08:56 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Iron	**0.68**		**0.080**	**mg/L**	1	12/31/2020 05:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 08:56 PM
Magnesium	**0.46**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
Molybdenum	**2.5**		**0.050**	**mg/L**	10	12/31/2020 05:02 PM
Potassium	**180**		**0.20**	**mg/L**	1	12/30/2020 08:56 PM
Selenium	**0.085**		**0.0050**	**mg/L**	1	12/30/2020 08:56 PM
Sodium	**480**		**2.0**	**mg/L**	10	12/31/2020 05:02 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:56 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**240**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**1,000**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**1,100**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**1,300**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**31**		**20**	**mg/L**	20	12/30/2020 03:56 PM
Fluoride	**24**		**2.0**	**mg/L**	20	12/31/2020 02:21 PM
Sulfate	**51**		**20**	**mg/L**	20	12/30/2020 03:56 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.8**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**19.7**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**2,200**		**1,500**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 20121750
Sample ID: PZ-3 **Lab ID:** 20121750-03
Collection Date: 12/15/2020 08:00 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/28/20 11:57	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/28/2020 01:13 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Arsenic	**0.010**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Barium	**1.3**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Boron	**2.5**		**0.20**	**mg/L**	10	12/31/2020 05:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 08:57 PM
Calcium	**88**		**0.50**	**mg/L**	1	12/30/2020 08:57 PM
Chromium	**0.0078**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
Iron	**2.1**		**0.080**	**mg/L**	1	12/30/2020 08:57 PM
Lead	**0.0053**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	12/30/2020 08:57 PM
Magnesium	**1.2**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Manganese	**0.0092**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Molybdenum	**0.20**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Potassium	**53**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Selenium	**0.059**		**0.0050**	**mg/L**	1	12/30/2020 08:57 PM
Sodium	**88**		**0.20**	**mg/L**	1	12/30/2020 08:57 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 08:57 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**93**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**320**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**370**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**420**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**30**		**16**	**mg/L**	16	12/30/2020 04:48 PM
Fluoride	**0.87**		**0.10**	**mg/L**	1	12/30/2020 06:13 PM
Sulfate	**29**		**16**	**mg/L**	16	12/30/2020 04:48 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.5**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.5**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**740**		**300**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	20121750
Sample ID:	PZ-4	**Lab ID:**	20121750-04
Collection Date:	12/14/2020 10:00 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:23 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Arsenic	**0.11**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Barium	**0.099**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Boron	**2.6**		**0.20**	**mg/L**	10	12/31/2020 05:07 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:03 PM
Calcium	**54**		**0.50**	**mg/L**	1	12/30/2020 09:03 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Iron	**0.45**		**0.080**	**mg/L**	1	12/30/2020 09:03 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Lithium	**0.36**		**0.010**	**mg/L**	1	12/30/2020 09:03 PM
Magnesium	ND		0.20	mg/L	1	12/30/2020 09:03 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
Molybdenum	**2.2**		**0.050**	**mg/L**	10	12/31/2020 05:07 PM
Potassium	**66**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Selenium	**0.030**		**0.0050**	**mg/L**	1	12/30/2020 09:03 PM
Sodium	**52**		**0.20**	**mg/L**	1	12/30/2020 09:03 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:03 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/24/2020 05:06 PM
Alkalinity, Carbonate (as CaCO3)	**120**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Hydroxide (as CaCO3)	**390**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Phenolphthalein (as CaCO3	**450**		**10**	**mg/L**	1	12/24/2020 05:06 PM
Alkalinity, Total (as CaCO3)	**510**		**10**	**mg/L**	1	12/24/2020 05:06 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**33**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
Fluoride	ND		0.10	mg/L	1	12/30/2020 06:32 PM
Sulfate	**130**		**8.0**	**mg/L**	8	12/30/2020 05:05 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.4**	H	**0.100**	**s.u.**	1	12/24/2020 05:06 PM
Temperature	**20.2**	H	**0.100**	**°C**	1	12/24/2020 05:06 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**450**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 20121750
Sample ID: PZ-5 **Lab ID:** 20121750-05
Collection Date: 12/15/2020 10:00 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:25 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Arsenic	**0.038**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Barium	**0.16**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Boron	**12**		**0.20**	**mg/L**	10	12/31/2020 05:12 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:04 PM
Calcium	**270**		**5.0**	**mg/L**	10	12/31/2020 05:12 PM
Chromium	**0.0054**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Iron	**0.79**		**0.080**	**mg/L**	1	12/30/2020 09:04 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
Lithium	ND		0.010	mg/L	1	12/30/2020 09:04 PM
Magnesium	**0.78**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Manganese	**0.0050**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Molybdenum	**9.4**		**0.050**	**mg/L**	10	12/31/2020 05:12 PM
Potassium	**3.3**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Selenium	**0.015**		**0.0050**	**mg/L**	1	12/30/2020 09:04 PM
Sodium	**1.4**		**0.20**	**mg/L**	1	12/30/2020 09:04 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:04 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**110**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	**47**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**100**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**150**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**25**		**4.0**	**mg/L**	4	12/30/2020 05:22 PM
Fluoride	**0.36**		**0.10**	**mg/L**	1	12/30/2020 06:51 PM
Sulfate	**560**		**80**	**mg/L**	80	12/31/2020 02:40 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**9.90**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**21.0**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/20/20 17:42	Analyst: **ERW**
Total Dissolved Solids	**970**		**100**	**mg/L**	1	12/22/2020 02:09 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 05-Jan-21

Client: Geosyntec Consultants

Work Order: 20121750

Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **169919** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:00 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031216** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-169919-169919** Units: **mg/L** Analysis Date: **12/28/2020 01:02 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031217** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0	112	80-120	0			

MS Sample ID: **20122026-01CMS** Units: **mg/L** Analysis Date: **12/28/2020 01:41 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031239** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0			

MSD Sample ID: **20122026-01CMSD** Units: **mg/L** Analysis Date: **12/28/2020 01:43 PM**

Client ID: Run ID: **HG4_201228A** SeqNo: **7031240** Prep Date: **12/28/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002235	0.00020	0.002	0.0000015	112	75-125	0.002235	0	20	

The following samples were analyzed in this batch: 20121750-01A 20121750-02A 20121750-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:14 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040771** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:16 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040772** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002085	0.00020	0.002	0	104	80-120	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 01:55 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040812** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00020	0.002	0.000003	109	75-125	0			

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 01:57 PM**
Client ID: Run ID: **HG4_201230A** SeqNo: **7040815** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002115	0.00020	0.002	0.000003	106	75-125	0.00219	3.48	20	

The following samples were analyzed in this batch: 20121750-04A 20121750-05A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MBLK Sample ID: **MBLK-170083-170083** Units: **mg/L** Analysis Date: **12/30/2020 08:51 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043005** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client:	Geosyntec Consultants
Work Order:	20121750
Project:	DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS Sample ID: **LCS-170083-170083** Units: **mg/L** Analysis Date: **12/30/2020 08:52 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043006** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:13 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043018** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0			
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0			
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0			
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0			
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0			
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0			
Calcium	63.88	0.50	10	53.04	108	75-125	0			O
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0			
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0			
Iron	8.964	0.080	10	0.02083	89.4	75-125	0			
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0			
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0			
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0			
Potassium	12.35	0.20	10	2.605	97.4	75-125	0			
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0			
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:35 PM**

Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043031** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0			
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0			
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0			
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0			
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0			
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0			
Calcium	34.88	0.50	10	25.15	97.2	75-125	0			
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0			
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0			
Iron	9.488	0.080	10	0.143	93.5	75-125	0			
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0			
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0			
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0			
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0			
Potassium	12.88	0.20	10	3.03	98.5	75-125	0			
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0			
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:20 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046543** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:39 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046555** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:15 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043019** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20	
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20	
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20	
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20	
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20	
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20	
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20	
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20	
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20	
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20	
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20	
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20	
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20	
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20	
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20	

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:37 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043032** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:22 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046544** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:41 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046556** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch:

20121750-01A	20121750-02A	20121750-03A
20121750-04A	20121750-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **169592** Instrument ID **TDS** Method: **A2540 C-11**

MBLK Sample ID: **MBLK-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015778** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

LCS Sample ID: **LCS-169592-169592** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015777** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	466	30	495	0	94.1	85-109	0			

DUP Sample ID: **20121786-01A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015765** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	896.7	50	0	0	0	0-0	850	5.34	10	

DUP Sample ID: **20121789-04A DUP** Units: **mg/L** Analysis Date: **12/22/2020 02:09 PM**
Client ID: Run ID: **TDS_201222B** SeqNo: **7015771** Prep Date: **12/20/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	510	50	0	0	0	0-0	500	1.98	10	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306822** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK	Sample ID: **MB-R306822-R306822**					Units: **mg/L**		Analysis Date: **12/24/2020 05:06 PM**			
Client ID:	Run ID: **TITRATOR 1_201224C**					SeqNo: **7028950**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Bicarbonate (as CaCO3)	ND	10									
Alkalinity, Carbonate (as CaCO3)	ND	10									
Alkalinity, Hydroxide (as CaCO3)	ND	10									
Alkalinity, Phenolphthalein (as CaCO3	ND	10									
Alkalinity, Total (as CaCO3)	ND	10									

LCS	Sample ID: **LCS-R306822-R306822**					Units: **mg/L**		Analysis Date: **12/24/2020 05:06 PM**			
Client ID:	Run ID: **TITRATOR 1_201224C**					SeqNo: **7028951**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Carbonate (as CaCO3)	922.4	10	925	0	99.7	88-110	0				
Alkalinity, Total (as CaCO3)	1005	10	1000	0	101	89-103	0				

DUP	Sample ID: **20122120-01C DUP**					Units: **mg/L**		Analysis Date: **12/24/2020 05:06 PM**			
Client ID:	Run ID: **TITRATOR 1_201224C**					SeqNo: **7028957**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Alkalinity, Total (as CaCO3)	ND	10	0	0	0	0-0	-1.17	0	10		

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306825** Instrument ID **Titrator 1** Method: **SW9040C**

LCS Sample ID: **LCS-R306825-R306825** Units: **s.u.** Analysis Date: **12/24/2020 05:06 PM**

Client ID: Run ID: **TITRATOR 1_201224D** SeqNo: **7029039** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.98	0.10	4	0	99.5	92-108	0			

DUP Sample ID: **20121750-01B DUP** Units: **s.u.** Analysis Date: **12/24/2020 05:06 PM**

Client ID: **PZ-1** Run ID: **TITRATOR 1_201224D** SeqNo: **7029041** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	11.16	0.10	0	0	0	0-0	10.96	1.81	5	H
Temperature	20.11	0.10	0	0	0		20.62	2.5		H

The following samples were analyzed in this batch: 20121750-01B 20121750-02B 20121750-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK Sample ID: **MB-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033262** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS Sample ID: **LCS-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033263** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP Sample ID: **20121803-01E DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033273** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP Sample ID: **20121990-05A DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033276** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP Sample ID: **20122120-08C DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033278** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033301** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033308** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP Sample ID: **20122120-08C DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033305** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.05	0.10	0	0	0	0-0	7.99	0.748	5	H
Temperature	20.95	0.10	0	0	0	0-0	20.76	0.911		H

DUP Sample ID: **20121990-05A DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033315** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.51	0.10	0	0	0	0-0	7.56	0.664	5	H
Temperature	20.63	0.10	0	0	0		19.96	3.3		H

The following samples were analyzed in this batch: 20121750-03B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307142** Units: **mg/L** Analysis Date: **12/30/2020 04:56 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043048** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307142** Units: **mg/L** Analysis Date: **12/30/2020 05:15 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043049** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.135	0.10	2	0	107	82-116	0			
Sulfate	9.666	1.0	10	0	96.7	90-110	0			

MS Sample ID: **20122223-01D MS** Units: **mg/L** Analysis Date: **12/31/2020**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043070** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	84.26	4.0	80	0	105	82-116	0			
Sulfate	650	40	400	266.2	96	90-110	0			

MSD Sample ID: **20122223-01D MSD** Units: **mg/L** Analysis Date: **12/31/2020 12:19 AM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043071** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20	
Sulfate	651.6	40	400	266.2	96.4	90-110	650	0.246	20	

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307145** Units: **mg/L** Analysis Date: **12/30/2020 01:43 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043217** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307145** Units: **mg/L** Analysis Date: **12/30/2020 02:39 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20121752-03B MS** Units: **mg/L** Analysis Date: **12/30/2020 07:14 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043233** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD Sample ID: **20121752-03B MSD** Units: **mg/L** Analysis Date: **12/30/2020 07:34 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043234** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch:

20121750-01B	20121750-02B	20121750-03B
20121750-04B	20121750-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121750
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307276** Units: **mg/L** Analysis Date: **12/31/2020 01:42 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047811** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307276** Units: **mg/L** Analysis Date: **12/31/2020 02:01 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047812** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	1.976	0.10	2	0	98.8	82-116	0			
Sulfate	9.654	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20122530-06A MS** Units: **mg/L** Analysis Date: **12/31/2020 06:35 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047826** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.34	4.0	80	0	109	82-116	0			
Sulfate	424.4	40	400	43.11	95.3	90-110	0			

MSD Sample ID: **20122530-06A MSD** Units: **mg/L** Analysis Date: **12/31/2020 06:54 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047827** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	87.76	4.0	80	0	110	82-116	87.34	0.475	20	
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20	

The following samples were analyzed in this batch: 20121750-02B 20121750-05B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS

Cincinnati, OH
+1 513 733 5336

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Houston, TX
+1 281 530 5656

Middletown, PA
+1 717 944 5541

Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

Chain of Custody Form

Page ____ of ____

COC ID: 230464

2012750

ALS Project Manager:

ALS Work Order #: 33555

Customer Information		**Project Information**		**Parameter/Method Request for Analysis**	
Purchase Order		Project Name	DTE - Monroe	A	Metals
Work Order		Project Number	GLP-8014	B	pH, Anions, TDS, Alkalinity
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-9063	Fax	(734) 332-9063	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	P2-1	12/14	8:00	GW	2	2	X	X									
2	P2-2	12/14	9:00	↓	↓	↓	X	X									
3	P2-3	12/15	8:00				X	X									
4	P2-4	12/14	10:00				X	X									
5	P2-5	12/15	10:00				X	X									
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram

Shipment Method: Fed EX

Required Turnaround Time: (Check Box)
☒ Std 10 WK Days ☐ 5 WK Days ☐ 2 WK Days ☐ 24 Hour ☐ Other ______

Results Due Date:

Relinquished by:	Date: 12/17	Time: 3:00	Received by:		
Relinquished by: Fedex	Date: 12/18/20	Time: 10:00	Received by (Laboratory):		
Logged by (Laboratory): MTO	Date: 12/18/20	Time: 13:31	Checked by (Laboratory):		

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes: Seperate Report

Cooler ID	Cooler Temp.
	5.8°C
	IM
	pH23

QC Package: (Check One Box Below)
☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other
☐ TRRP CheckList
☐ TRRP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA**

Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121750**

Received by: **MJG**

Checklist completed by Matthew Gaylord (eSignature) 18-Dec-20 (Date)

Reviewed by: Chad Whelton (eSignature) 18-Dec-20 (Date)

Matrices: Groundwater

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	5.8/5.8C	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/18/2020 1:33:02 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:

Ft. Collins, Colorado

Tuesday, January 19, 2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd. Suite 100
Ann Arbor, MI 48105

Re: ALS Workorder: 2012398
Project Name: DTE - Monroe
Project Number: GLP-8014

Dear Mr. Coram:

Five water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226
Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

Julie Ellingson

ALS Environmental
Julie Ellingson
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

2012398

Radium-228:
The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac, which is the ingrown progeny of ^{228}Ra, according to the current revision of SOP 724.

All acceptance criteria were met.

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2012398
Client Name: Geosyntec Consultants
Client Project Name: DTE - Monroe
Client Project Number: GLP-8014
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
P2-1	2012398-1		WATER	14-Dec-20	8:00
P2-2	2012398-2		WATER	14-Dec-20	9:00
P2-3	2012398-3		WATER	14-Dec-20	8:00
P2-4	2012398-4		WATER	14-Dec-20	10:00
P2-5	2012398-5		WATER	14-Dec-20	10:00

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Chain of Custody Form

Page 1 of 1

COC ID: 230463

Houston, TX
+1 281 530 5656

Middletown, PA
+1 717 944 5541

Spring City, PA
+1 610 948 4903

Salt Lake City, UT
+1 801 266 7700

South Charleston, WV
+1 304 356 3168

York, PA
+1 717 505 5280

2012398

ALS Project Manager:		**ALS Work Order #:**	33556

Customer Information		**Project Information**		**Parameter/Method Request for Analysis**	
Purchase Order		Project Name	DTE - Monroe	A	Radium 226 and 228 combined
Work Order		Project Number	GLP - 8014	B	
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-8062	Fax	(734) 332-8062	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	PZ-1 1	12/14	8:00	GW	2	2	X										
2	PZ-2 2	12/14	9:00	↓	↓	↓	X										
3	PZ-3 3	12/15	8:00				X										
4	PZ-4 4	12/14	10:00				X										
5	PZ-5 5	12/15	10:00				X										
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign Mike Coram	**Shipment Method** Fed Ex	**Required Turnaround Time: (Check Box)** ☒ Std 10 WK Days ☐ 5 WK Days ☐ 2 WK Days ☐ 24 Hour ☐ Other ______	**Results Due Date:**

Relinquished by:	**Date:** 12/17	**Time:** 3:00	**Received by:**	**Notes:** Seperate Report
Relinquished by:	**Date:**	**Time:**	**Received by (Laboratory):**	
Logged by (Laboratory):	**Date:**	**Time:**	**Checked by (Laboratory):**	

Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)
		☒ Level II Std QC ☐ Level III Std QC/Raw Data ☐ Level IV SW846/CLP ☐ Other ______ ☐ TRRP CheckList ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID: Geosyntec MI Workorder No: 2012398

Project Manager: Initials: RGA Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	☐ Drop Off	☑ YES	☐ NO
2. Are custody seals on **shipping** containers intact?	☐ NONE	☑ YES	☐ NO*
3. Are custody seals on **sample** containers intact?	☑ NONE	☐ YES	☐ NO*
4. Is there a COC (chain-of-custody) present?		☑ YES	☐ NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		☑ YES	☐ NO*
6. Are short-hold samples present?		☐ YES	☑ NO
7. Are all samples within holding times for the requested analyses?		☑ YES	☐ NO*
8. Were all sample containers received intact? (not broken or leaking)		☑ YES	☐ NO*
9. Is there sufficient sample for the requested analyses?		☑ YES	☐ NO*
10. Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		☑ YES	☐ NO*
11. Are all aqueous samples preserved correctly, if required?	☐ N/A	☐ YES	☑ NO*
12. Were unpreserved samples pH checked, if required?	☑ N/A	☐ YES	☐ NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	☑ N/A	☐ YES	☐ NO
14. Were the samples shipped on ice?		☑ YES	☐ NO
15. Were cooler temperatures measured at 0.1 - 6.0°C? IR gun used+: ☐ #3 ☑ #5	☐ Rad Only	☑ YES	☐ NO

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008) ☐ N/A ☑ YES ☐ NO

* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012398-1-1,2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☒ N/A Contact Name Date:

Project Manager Signature / Date: 12/21/20

Form 201r30.xls
(06/04/2020)

+IR Gun #3, VWR SN 170647571
+IR Gun #5, VWR SN 192272629

ORIGIN ID:DEOA (248) 390-5748
MIKE CORAM

SUITE 100
2100 COMMONWEALTH BLVD STE 100
ANN ARBOR, MI 48105
UNITED STATES US

SHIP DATE: 17DEC20
ACTWGT: 56.90 LB
CAD: 6997566/SSF02121
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 156297-435 RRD8 EXP 11/21

TO **ALS FT. COLLINS**
ATTN: SAMPLE RECIEVING
225 COMMERCE DR

FORT COLLINS CO 80524
(618) 582-5201 REF:
INV:
PO: DEPT:

12-1
3.2

FedEx
Express

E

J202020071401uv

FRI - 18 DEC 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7816 0264 9731**

DSR
80524
CO-US **DEN**

NA FTCA

ALS -- Fort Collins

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-1	**Lab ID:**	2012398-1
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.13)	U	0.24	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*99.8*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.89 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.89 (+/- 0.64)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.1*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

SAMPLE SUMMARY REPORT

Client: Geosyntec Consultants
Date: *19-Jan-21*
Project: GLP-8014 DTE - Monroe
Work Order: 2012398
Sample ID: P2-2
Lab ID: 2012398-2
Legal Location:
Matrix: WATER
Collection Date: 12/14/2020 09:00
Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.19)	U	0.36	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*91.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.79	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.42)	U	0.79	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*92.8*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

ALS -- Fort Collins

SAMPLE SUMMARY REPORT

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-3	**Lab ID:**	2012398-3
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 08:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	**0.55 (+/- 0.35)**		**0.37**	**pCi/l**	NA	1/12/2021 11:32
Carr: BARIUM	*92.2*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.74 (+/- 0)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**1.19 (+/- 0.51)**		**0.85**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*92.5*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-4	**Lab ID:**	2012398-4
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.27)	U	0.47	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*96*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.84	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.38)	U	0.84	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8014 DTE - Monroe	**Work Order:**	2012398
Sample ID:	P2-5	**Lab ID:**	2012398-5
Legal Location:		**Matrix:**	WATER
Collection Date:	12/14/2020 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **1/4/2021**		PrepBy: **TRB**
Ra-226	ND (+/- 0.25)	U	0.37	pCi/l	NA	1/12/2021 11:54
Carr: BARIUM	*97.7*		*40-110*	*%REC*	DL = NA	1/12/2021 11:54
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **1/11/2021**		PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	0.78	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.34)	U	0.78	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*91.4*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client: Geosyntec Consultants
Date: *19-Jan-21*
Project: GLP-8014 DTE - Monroe
Work Order: 2012398
Sample ID: P2-5
Lab ID: 2012398-5
Legal Location:
Matrix: WATER
Collection Date: 12/14/2020 10:00
Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

ALS -- Fort Collins

Date: *1/19/2021 2:19:4*

QC BATCH REPORT

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

Batch ID: **RE210104-1-3** Instrument ID: **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

LCSD Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	40 (+/- 10)	1	46.8		84.5	67-120		46	0.44	2.13	P
Carr: BARIUM	15150		15500		97.8	40-110		15230			

MB Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**
Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

Client: Geosyntec Consultants
Work Order: 2012398
Project: GLP-8014 DTE - Monroe

QC BATCH REPORT

Batch ID: **RA210111-1-5** Instrument ID: **GASPROP** Method: **Radium-228 Analysis by GFPC**

LCS Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch:

2012398-1	2012398-2	2012398-3
2012398-4	2012398-5	

11-Feb-2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd.
Suite 100
Ann Arbor, MI 48105

Re: **DTE- Monroe (GLP-8014)** Work Order: **21020221**

Dear Michael,

ALS Environmental received 5 samples on 03-Feb-2021 09:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 30.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Report of Laboratory Analysis

Certificate No: MN 026-999-449

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014)
Work Order: **21020221**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
21020221-01	PZ-1	Groundwater		1/28/2021 10:40	2/3/2021 09:00	☐
21020221-02	PZ-2	Groundwater		1/28/2021 11:35	2/3/2021 09:00	☐
21020221-03	PZ-3	Groundwater		1/28/2021 12:20	2/3/2021 09:00	☐
21020221-04	PZ-4	Groundwater		1/28/2021 13:15	2/3/2021 09:00	☐
21020221-05	PZ-5	Groundwater		1/28/2021 14:00	2/3/2021 09:00	☐

Date: 11-Feb-21

Client:	Geosyntec Consultants
Project:	DTE- Monroe (GLP-8014)
Work Order:	21020221

Case Narrative

Samples for the above noted Work Order were received on 02/03/2021. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:

Batch 171827, Method SW6020B, Sample 21020221-05C MS/MSD: The MS/MSD recoveries were outside of the control limits for Boron, Calcium, and Molybdenum; however, the results in the parent sample are greater than 4x the spike amount. No qualification is required.

Wet Chemistry:

Batch R309524, Method SW9040C, Sample PZ-1 (21020221-01B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R309524, Method SW9040C, Sample PZ-1 (21020221-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample PZ-2 (21020221-02B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R309524, Method SW9040C, Sample PZ-2 (21020221-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample PZ-3 (21020221-03B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R309524, Method SW9040C, Sample PZ-3 (21020221-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample PZ-4 (21020221-04B): Possible bias due to sodium error at pH > 10. A low sodium electrode is not used in the measurement process.

Batch R309524, Method SW9040C, Sample PZ-4 (21020221-04B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309524, Method SW9040C, Sample PZ-5 (21020221-05B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R309401, Method SW9056A, Sample PZ-5 (21020221-05B): The reporting limit for fluoride is elevated due to dilution for high concentrations of non-target analytes.

ALS Group, USA

Date: 11-Feb-21

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

ALS Group, USA

Date: *11-Feb-2021*

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-1	**Lab ID:**	21020221-01
Collection Date:	1/28/2021 10:40 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 2/8/21 13:14	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:55 PM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 2/8/21 13:14	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:57 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 2/9/21 15:19	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
Arsenic	**0.0090**		**0.0050**	**mg/L**	1	2/9/2021 05:37 PM
Barium	**2.4**		**0.050**	**mg/L**	10	2/10/2021 08:17 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:37 PM
Boron	**5.6**		**0.20**	**mg/L**	10	2/10/2021 08:17 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:37 PM
Calcium	**120**		**0.50**	**mg/L**	1	2/9/2021 05:37 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
Iron	**0.54**		**0.080**	**mg/L**	1	2/9/2021 05:37 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
Lithium	**0.018**		**0.010**	**mg/L**	1	2/9/2021 05:37 PM
Magnesium	**0.22**		**0.20**	**mg/L**	1	2/9/2021 05:37 PM
Manganese	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
Molybdenum	**1.2**		**0.0050**	**mg/L**	1	2/9/2021 05:37 PM
Potassium	**20**		**0.20**	**mg/L**	1	2/9/2021 05:37 PM
Selenium	**0.048**		**0.0050**	**mg/L**	1	2/9/2021 05:37 PM
Sodium	**40**		**0.20**	**mg/L**	1	2/9/2021 05:37 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:37 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: FILTER 2/9/21 09:47	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
Arsenic	**0.0068**		**0.0050**	**mg/L**	1	2/9/2021 04:35 PM
Barium	**2.2**		**0.050**	**mg/L**	10	2/10/2021 07:51 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:35 PM
Boron	**5.4**		**0.20**	**mg/L**	10	2/10/2021 07:51 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:35 PM
Calcium	**110**		**0.50**	**mg/L**	1	2/9/2021 04:35 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:35 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	2/9/2021 04:35 PM
Magnesium	ND		0.20	mg/L	1	2/9/2021 04:35 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 21020221
Sample ID: PZ-1 **Lab ID:** 21020221-01
Collection Date: 1/28/2021 10:40 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
Molybdenum	**1.2**		**0.0050**	**mg/L**	1	2/9/2021 04:35 PM
Potassium	**19**		**0.20**	**mg/L**	1	2/9/2021 04:35 PM
Selenium	**0.045**		**0.0050**	**mg/L**	1	2/9/2021 04:35 PM
Sodium	**38**		**0.20**	**mg/L**	1	2/9/2021 04:35 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:35 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	**170**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	**290**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3	**370**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	**460**		**10**	**mg/L**	1	2/9/2021 12:49 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**48**		**40**	**mg/L**	40	2/5/2021 11:11 PM
Fluoride	**3.6**		**0.10**	**mg/L**	1	2/5/2021 10:13 PM
Sulfate	**11**		**1.0**	**mg/L**	1	2/5/2021 10:13 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.2**	H	**0.10**	**s.u.**	1	2/9/2021 12:49 PM
Temperature	**20.1**	H	**0.10**	**°C**	1	2/9/2021 12:49 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 2/7/21 15:44	Analyst: **ERW**
Total Dissolved Solids	**590**		**100**	**mg/L**	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 21020221
Sample ID: PZ-2 **Lab ID:** 21020221-02
Collection Date: 1/28/2021 11:35 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 2/8/21 13:14	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/8/2021 01:59 PM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 2/8/21 13:14	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/8/2021 02:00 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 2/9/21 15:19	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:39 PM
Arsenic	**0.0075**		**0.0050**	**mg/L**	1	2/9/2021 05:39 PM
Barium	**0.66**		**0.0050**	**mg/L**	1	2/9/2021 05:39 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:39 PM
Boron	**4.5**		**0.20**	**mg/L**	10	2/10/2021 08:18 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:39 PM
Calcium	**40**		**0.50**	**mg/L**	1	2/9/2021 05:39 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:39 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:39 PM
Iron	**0.87**		**0.080**	**mg/L**	1	2/9/2021 05:39 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:39 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 05:39 PM
Magnesium	**0.84**		**0.20**	**mg/L**	1	2/9/2021 05:39 PM
Manganese	**0.0051**		**0.0050**	**mg/L**	1	2/9/2021 05:39 PM
Molybdenum	**1.9**		**0.050**	**mg/L**	10	2/10/2021 08:18 PM
Potassium	**220**		**2.0**	**mg/L**	10	2/10/2021 08:18 PM
Selenium	**0.10**		**0.0050**	**mg/L**	1	2/9/2021 05:39 PM
Sodium	**530**		**2.0**	**mg/L**	10	2/10/2021 08:18 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:39 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: FILTER 2/9/21 09:47	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
Arsenic	**0.0054**		**0.0050**	**mg/L**	1	2/9/2021 04:37 PM
Barium	**0.54**		**0.0050**	**mg/L**	1	2/9/2021 04:37 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:37 PM
Boron	**4.4**		**0.20**	**mg/L**	10	2/10/2021 07:52 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:37 PM
Calcium	**34**		**0.50**	**mg/L**	1	2/9/2021 04:37 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:37 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 04:37 PM
Magnesium	ND		0.20	mg/L	1	2/9/2021 04:37 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-2	**Lab ID:**	21020221-02
Collection Date:	1/28/2021 11:35 AM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
Molybdenum	**2.0**		**0.050**	**mg/L**	10	2/10/2021 07:52 PM
Potassium	**210**		**2.0**	**mg/L**	10	2/10/2021 07:52 PM
Selenium	**0.10**		**0.0050**	**mg/L**	1	2/9/2021 04:37 PM
Sodium	**520**		**2.0**	**mg/L**	10	2/10/2021 07:52 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:37 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	**260**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	**1,100**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3	**1,200**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	**1,400**		**10**	**mg/L**	1	2/9/2021 12:49 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**32**		**16**	**mg/L**	16	2/5/2021 11:49 PM
Fluoride	**23**		**1.6**	**mg/L**	16	2/5/2021 11:49 PM
Sulfate	**67**		**16**	**mg/L**	16	2/5/2021 11:49 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.8**	H	**0.10**	**s.u.**	1	2/9/2021 12:49 PM
Temperature	**20.1**	H	**0.10**	**°C**	1	2/9/2021 12:49 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 2/7/21 15:44	Analyst: **ERW**
Total Dissolved Solids	**1,600**		**1,500**	**mg/L**	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *11-Feb-2021*

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-3	**Lab ID:**	21020221-03
Collection Date:	1/28/2021 12:20 PM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:13 PM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:15 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 2/9/21 15:19	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Barium	**1.4**		**0.0050**	**mg/L**	1	2/9/2021 05:41 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:41 PM
Boron	**3.1**		**0.20**	**mg/L**	10	2/10/2021 08:20 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:41 PM
Calcium	**95**		**0.50**	**mg/L**	1	2/9/2021 05:41 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Iron	**0.43**		**0.080**	**mg/L**	1	2/9/2021 05:41 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	2/9/2021 05:41 PM
Magnesium	**0.20**		**0.20**	**mg/L**	1	2/9/2021 05:41 PM
Manganese	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
Molybdenum	**0.20**		**0.0050**	**mg/L**	1	2/9/2021 05:41 PM
Potassium	**59**		**0.20**	**mg/L**	1	2/9/2021 05:41 PM
Selenium	**0.046**		**0.0050**	**mg/L**	1	2/9/2021 05:41 PM
Sodium	**93**		**0.20**	**mg/L**	1	2/9/2021 05:41 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:41 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: FILTER 2/9/21 09:47	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Arsenic	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Barium	**1.4**		**0.0050**	**mg/L**	1	2/9/2021 04:39 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:39 PM
Boron	**3.2**		**0.20**	**mg/L**	10	2/10/2021 07:54 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:39 PM
Calcium	**92**		**0.50**	**mg/L**	1	2/9/2021 04:39 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:39 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Lithium	**0.016**		**0.010**	**mg/L**	1	2/9/2021 04:39 PM
Magnesium	ND		0.20	mg/L	1	2/9/2021 04:39 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-3	**Lab ID:**	21020221-03
Collection Date:	1/28/2021 12:20 PM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
Molybdenum	**0.19**		**0.0050**	**mg/L**	1	2/9/2021 04:39 PM
Potassium	**57**		**0.20**	**mg/L**	1	2/9/2021 04:39 PM
Selenium	**0.044**		**0.0050**	**mg/L**	1	2/9/2021 04:39 PM
Sodium	**90**		**0.20**	**mg/L**	1	2/9/2021 04:39 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:39 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	**150**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	**430**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3	**500**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	**580**		**10**	**mg/L**	1	2/9/2021 12:49 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**34**		**16**	**mg/L**	16	2/6/2021 12:28 AM
Fluoride	**1.2**		**0.10**	**mg/L**	1	2/6/2021 12:09 AM
Sulfate	**27**		**16**	**mg/L**	16	2/6/2021 12:28 AM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**11.4**	H	**0.10**	**s.u.**	1	2/9/2021 12:49 PM
Temperature	**20.4**	H	**0.10**	**°C**	1	2/9/2021 12:49 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 2/7/21 15:44	Analyst: **ERW**
Total Dissolved Solids	**660**		**300**	**mg/L**	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-4	**Lab ID:**	21020221-04
Collection Date:	1/28/2021 01:15 PM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:17 PM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:18 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 2/9/21 15:19	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:42 PM
Arsenic	**0.12**		**0.0050**	**mg/L**	1	2/9/2021 05:42 PM
Barium	**0.12**		**0.0050**	**mg/L**	1	2/9/2021 05:42 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:42 PM
Boron	**2.5**		**0.20**	**mg/L**	10	2/10/2021 08:22 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:42 PM
Calcium	**57**		**0.50**	**mg/L**	1	2/9/2021 05:42 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:42 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:42 PM
Iron	**0.69**		**0.080**	**mg/L**	1	2/9/2021 05:42 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:42 PM
Lithium	**0.39**		**0.010**	**mg/L**	1	2/9/2021 05:42 PM
Magnesium	**0.26**		**0.20**	**mg/L**	1	2/9/2021 05:42 PM
Manganese	**0.0055**		**0.0050**	**mg/L**	1	2/9/2021 05:42 PM
Molybdenum	**2.0**		**0.050**	**mg/L**	10	2/10/2021 08:22 PM
Potassium	**63**		**0.20**	**mg/L**	1	2/9/2021 05:42 PM
Selenium	**0.028**		**0.0050**	**mg/L**	1	2/9/2021 05:42 PM
Sodium	**49**		**0.20**	**mg/L**	1	2/9/2021 05:42 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:42 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: FILTER 2/9/21 09:47	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
Arsenic	**0.098**		**0.0050**	**mg/L**	1	2/9/2021 04:40 PM
Barium	**0.069**		**0.0050**	**mg/L**	1	2/9/2021 04:40 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:40 PM
Boron	**2.4**		**0.20**	**mg/L**	10	2/10/2021 07:56 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:40 PM
Calcium	**54**		**0.50**	**mg/L**	1	2/9/2021 04:40 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:40 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
Lithium	**0.38**		**0.010**	**mg/L**	1	2/9/2021 04:40 PM
Magnesium	ND		0.20	mg/L	1	2/9/2021 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-4	**Lab ID:**	21020221-04
Collection Date:	1/28/2021 01:15 PM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
Molybdenum	**1.9**		**0.050**	**mg/L**	10	2/10/2021 07:56 PM
Potassium	**61**		**0.20**	**mg/L**	1	2/9/2021 04:40 PM
Selenium	**0.028**		**0.0050**	**mg/L**	1	2/9/2021 04:40 PM
Sodium	**48**		**0.20**	**mg/L**	1	2/9/2021 04:40 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:40 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	**89**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	**84**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3	**130**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	**170**		**10**	**mg/L**	1	2/9/2021 12:49 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**37**		**16**	**mg/L**	16	2/6/2021 01:06 AM
Fluoride	**0.83**		**0.10**	**mg/L**	1	2/6/2021 12:47 AM
Sulfate	**140**		**16**	**mg/L**	16	2/6/2021 01:06 AM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**10.8**	H	**0.10**	**s.u.**	1	2/9/2021 12:49 PM
Temperature	**20.1**	H	**0.10**	**°C**	1	2/9/2021 12:49 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 2/7/21 15:44	Analyst: **ERW**
Total Dissolved Solids	**390**		**50**	**mg/L**	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Monroe (GLP-8014) **Work Order:** 21020221
Sample ID: PZ-5 **Lab ID:** 21020221-05
Collection Date: 1/28/2021 02:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:20 PM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 2/9/21 12:00	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	2/9/2021 12:22 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 2/9/21 15:19	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
Arsenic	**0.031**		**0.0050**	**mg/L**	1	2/9/2021 05:44 PM
Barium	**0.11**		**0.0050**	**mg/L**	1	2/9/2021 05:44 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 05:44 PM
Boron	**12**		**0.20**	**mg/L**	10	2/10/2021 08:23 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 05:44 PM
Calcium	**280**		**5.0**	**mg/L**	10	2/10/2021 08:23 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
Iron	**0.13**		**0.080**	**mg/L**	1	2/9/2021 05:44 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 05:44 PM
Magnesium	**0.70**		**0.20**	**mg/L**	1	2/9/2021 05:44 PM
Manganese	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
Molybdenum	**9.8**		**0.050**	**mg/L**	10	2/10/2021 08:23 PM
Potassium	**3.5**		**0.20**	**mg/L**	1	2/9/2021 05:44 PM
Selenium	**0.011**		**0.0050**	**mg/L**	1	2/9/2021 05:44 PM
Sodium	**1.6**		**0.20**	**mg/L**	1	2/9/2021 05:44 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 05:44 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: FILTER 2/9/21 09:47	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
Arsenic	**0.027**		**0.0050**	**mg/L**	1	2/9/2021 04:42 PM
Barium	**0.097**		**0.0050**	**mg/L**	1	2/9/2021 04:42 PM
Beryllium	ND		0.0020	mg/L	1	2/9/2021 04:42 PM
Boron	**12**		**0.20**	**mg/L**	10	2/10/2021 07:57 PM
Cadmium	ND		0.0020	mg/L	1	2/9/2021 04:42 PM
Calcium	**270**		**5.0**	**mg/L**	10	2/10/2021 07:57 PM
Chromium	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
Cobalt	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
Iron	ND		0.080	mg/L	1	2/9/2021 04:42 PM
Lead	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
Lithium	ND		0.010	mg/L	1	2/9/2021 04:42 PM
Magnesium	**0.64**		**0.20**	**mg/L**	1	2/9/2021 04:42 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client:	Geosyntec Consultants		
Project:	DTE- Monroe (GLP-8014)	**Work Order:**	21020221
Sample ID:	PZ-5	**Lab ID:**	21020221-05
Collection Date:	1/28/2021 02:00 PM	**Matrix:**	GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Manganese	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
Molybdenum	**9.4**		**0.050**	**mg/L**	10	2/10/2021 07:57 PM
Potassium	**3.3**		**0.20**	**mg/L**	1	2/9/2021 04:42 PM
Selenium	**0.0083**		**0.0050**	**mg/L**	1	2/9/2021 04:42 PM
Sodium	**1.7**		**0.20**	**mg/L**	1	2/9/2021 04:42 PM
Thallium	ND		0.0050	mg/L	1	2/9/2021 04:42 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	ND		10	mg/L	1	2/9/2021 12:49 PM
Alkalinity, Carbonate (as CaCO3)	**83**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Hydroxide (as CaCO3)	**43**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Phenolphthalein (as CaCO3	**85**		**10**	**mg/L**	1	2/9/2021 12:49 PM
Alkalinity, Total (as CaCO3)	**130**		**10**	**mg/L**	1	2/9/2021 12:49 PM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**26**		**4.0**	**mg/L**	4	2/6/2021 01:26 AM
Fluoride	ND		0.40	mg/L	4	2/6/2021 01:26 AM
Sulfate	**530**		**50**	**mg/L**	50	2/6/2021 01:45 AM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**9.73**	H	**0.10**	**s.u.**	1	2/9/2021 12:49 PM
Temperature	**19.2**	H	**0.10**	**°C**	1	2/9/2021 12:49 PM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 2/7/21 15:44	Analyst: **ERW**
Total Dissolved Solids	**880**		**100**	**mg/L**	1	2/9/2021 02:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Date: 11-Feb-21

Client: Geosyntec Consultants
Work Order: 21020221
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **171771** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-171771-171771** Units: **mg/L** Analysis Date: **2/8/2021 01:27 PM**
Client ID: Run ID: **HG4_210208A** SeqNo: **7127171** Prep Date: **2/8/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-171771-171771** Units: **mg/L** Analysis Date: **2/8/2021 02:50 PM**
Client ID: Run ID: **HG4_210208A** SeqNo: **7127218** Prep Date: **2/8/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.001785	0.00020	0.002	0	89.2	80-120	0			

MS Sample ID: **21020251-02AMS** Units: **mg/L** Analysis Date: **2/8/2021 02:11 PM**
Client ID: Run ID: **HG4_210208A** SeqNo: **7127196** Prep Date: **2/8/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.01995	0.0020	0.02	0.00075	96	75-125	0			

MSD Sample ID: **21020251-02AMSD** Units: **mg/L** Analysis Date: **2/8/2021 02:13 PM**
Client ID: Run ID: **HG4_210208A** SeqNo: **7127197** Prep Date: **2/8/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0198	0.0020	0.02	0.00075	95.2	75-125	0.01995	0.755	20	

The following samples were analyzed in this batch:

21020221-01A 21020221-01C 21020221-02A
21020221-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **171829** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-171829-171829** Units: **mg/L** Analysis Date: **2/9/2021 12:10 PM**
Client ID: Run ID: **HG4_210209A** SeqNo: **7130605** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-171829-171829** Units: **mg/L** Analysis Date: **2/9/2021 12:11 PM**
Client ID: Run ID: **HG4_210209A** SeqNo: **7130606** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00201	0.00020	0.002	0	100	80-120	0			

MS Sample ID: **21020388-02AMS** Units: **mg/L** Analysis Date: **2/9/2021 12:45 PM**
Client ID: Run ID: **HG4_210209A** SeqNo: **7130625** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.01935	0.0020	0.02	-0.000045	97	75-125	0			

MSD Sample ID: **21020388-02AMSD** Units: **mg/L** Analysis Date: **2/9/2021 12:47 PM**
Client ID: Run ID: **HG4_210209A** SeqNo: **7130626** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0198	0.0020	0.02	-0.000045	99.2	75-125	0.01935	2.3	20	

The following samples were analyzed in this batch:

21020221-03A	21020221-03C	21020221-04A
21020221-04C	21020221-05A	21020221-05C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **171827** Instrument ID **ICPMS3** Method: **SW6020B** **(Dissolve)**

MBLK Sample ID: **MBLK-171827-171827** Units: **mg/L** Analysis Date: **2/9/2021 04:21 PM**
Client ID: Run ID: **ICPMS3_210209A** SeqNo: **7131167** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

MBLK Sample ID: **MBLK-171827-171827** Units: **mg/L** Analysis Date: **2/10/2021 07:33 PM**
Client ID: Run ID: **ICPMS3_210210B** SeqNo: **7133898** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	ND	0.020								

LCS Sample ID: **LCS-171827-171827** Units: **mg/L** Analysis Date: **2/9/2021 04:22 PM**
Client ID: Run ID: **ICPMS3_210209A** SeqNo: **7131168** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0857	0.0050	0.1	0	85.7	80-120	0			
Arsenic	0.08929	0.0050	0.1	0	89.3	80-120	0			
Chromium	0.08766	0.0050	0.1	0	87.7	80-120	0			
Cobalt	0.0894	0.0050	0.1	0	89.4	80-120	0			
Iron	9.019	0.080	10	0	90.2	80-120	0			
Magnesium	9.509	0.20	10	0	95.1	80-120	0			
Potassium	9.46	0.20	10	0	94.6	80-120	0			
Selenium	0.09002	0.0050	0.1	0	90	80-120	0			
Sodium	9.507	0.20	10	0	95.1	80-120	0			

Client: Geosyntec Consultants
Work Order: 21020221
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **171827** Instrument ID **ICPMS3** Method: **SW6020B** **(Dissolve)**

LCS Sample ID: **LCS-171827-171827** Units: **mg/L** Analysis Date: **2/10/2021 07:34 PM**
Client ID: Run ID: **ICPMS3_210210B** SeqNo: **7133899** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.09386	0.0050	0.1	0	93.9	80-120	0			
Beryllium	0.09556	0.0020	0.1	0	95.6	80-120	0			
Boron	0.451	0.020	0.5	0	90.2	80-120	0			
Cadmium	0.1006	0.0020	0.1	0	101	80-120	0			
Calcium	9.733	0.50	10	0	97.3	80-120	0			
Lead	0.0935	0.0050	0.1	0	93.5	80-120	0			
Lithium	0.09548	0.010	0.1	0	95.5	80-120	0			
Manganese	0.09292	0.0050	0.1	0	92.9	80-120	0			
Molybdenum	0.09283	0.0050	0.1	0	92.8	80-120	0			
Thallium	0.09105	0.0050	0.1	0	91	80-120	0			

MS Sample ID: **21020221-05CMS** Units: **mg/L** Analysis Date: **2/9/2021 04:43 PM**
Client ID: **PZ-5** Run ID: **ICPMS3_210209A** SeqNo: **7131181** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1073	0.0050	0.1	0.004695	103	75-125	0			
Arsenic	0.1256	0.0050	0.1	0.02734	98.3	75-125	0			
Barium	0.1975	0.0050	0.1	0.09727	100	75-125	0			
Beryllium	0.102	0.0020	0.1	0.000004	102	75-125	0			
Cadmium	0.1033	0.0020	0.1	0.000858	102	75-125	0			
Chromium	0.09276	0.0050	0.1	-0.000101	92.9	75-125	0			
Cobalt	0.0935	0.0050	0.1	0.000074	93.4	75-125	0			
Iron	9.544	0.080	10	-0.000258	95.4	75-125	0			
Lead	0.09906	0.0050	0.1	-0.000002	99.1	75-125	0			
Lithium	0.1067	0.010	0.1	0.005053	102	75-125	0			
Magnesium	10.65	0.20	10	0.6432	100	75-125	0			
Manganese	0.09753	0.0050	0.1	0.000013	97.5	75-125	0			
Potassium	13.46	0.20	10	3.327	101	75-125	0			
Selenium	0.1159	0.0050	0.1	0.008307	108	75-125	0			
Sodium	11.55	0.20	10	1.711	98.4	75-125	0			
Thallium	0.09602	0.0050	0.1	0.00022	95.8	75-125	0			

MS Sample ID: **21020221-05CMS** Units: **mg/L** Analysis Date: **2/10/2021 07:59 PM**
Client ID: **PZ-5** Run ID: **ICPMS3_210210B** SeqNo: **7133914** Prep Date: **2/9/2021** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	11.73	0.20	0.5	11.63	19.6	75-125	0			SO
Calcium	259.6	5.0	10	267.5	-78.8	75-125	0			SO
Molybdenum	8.941	0.050	0.1	9.43	-489	75-125	0			SO

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **171827** Instrument ID **ICPMS3** Method: **SW6020B** **(Dissolve)**

MSD Sample ID: **21020221-05CMSD** Units: **mg/L** Analysis Date: **2/9/2021 04:45 PM**
Client ID: **PZ-5** Run ID: **ICPMS3_210209A** SeqNo: **7131182** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1081	0.0050	0.1	0.004695	103	75-125	0.1073	0.729	20	
Arsenic	0.1257	0.0050	0.1	0.02734	98.4	75-125	0.1256	0.0827	20	
Barium	0.1991	0.0050	0.1	0.09727	102	75-125	0.1975	0.83	20	
Beryllium	0.1025	0.0020	0.1	0.000004	102	75-125	0.102	0.478	20	
Cadmium	0.1032	0.0020	0.1	0.000858	102	75-125	0.1033	0.0814	20	
Calcium	253.8	0.50	10	245.8	80.1	75-125	251.3	0.993	20	EO
Chromium	0.09319	0.0050	0.1	-0.000101	93.3	75-125	0.09276	0.457	20	
Cobalt	0.093	0.0050	0.1	0.000074	92.9	75-125	0.0935	0.533	20	
Iron	9.524	0.080	10	-0.000258	95.2	75-125	9.544	0.211	20	
Lead	0.09986	0.0050	0.1	-0.000002	99.9	75-125	0.09906	0.802	20	
Lithium	0.1074	0.010	0.1	0.005053	102	75-125	0.1067	0.669	20	
Magnesium	10.69	0.20	10	0.6432	100	75-125	10.65	0.396	20	
Manganese	0.09729	0.0050	0.1	0.000013	97.3	75-125	0.09753	0.248	20	
Potassium	13.49	0.20	10	3.327	102	75-125	13.46	0.238	20	
Selenium	0.1103	0.0050	0.1	0.008307	102	75-125	0.1159	5	20	
Sodium	11.5	0.20	10	1.711	97.9	75-125	11.55	0.459	20	
Thallium	0.09707	0.0050	0.1	0.00022	96.9	75-125	0.09602	1.09	20	

MSD Sample ID: **21020221-05CMSD** Units: **mg/L** Analysis Date: **2/10/2021 08:00 PM**
Client ID: **PZ-5** Run ID: **ICPMS3_210210B** SeqNo: **7133915** Prep Date: **2/9/2021** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	11.81	0.20	0.5	11.63	35.2	75-125	11.73	0.664	20	SO
Calcium	266.8	5.0	10	267.5	-6.95	75-125	259.6	2.73	20	SO
Molybdenum	9.188	0.050	0.1	9.43	-242	75-125	8.941	2.73	20	SO

The following samples were analyzed in this batch:

21020221-01C	21020221-02C	21020221-03C
21020221-04C	21020221-05C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **171837** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK Sample ID: **MBLK-171837-171837** Units: **mg/L** Analysis Date: **2/9/2021 05:20 PM**

Client ID: Run ID: **ICPMS3_210209A** SeqNo: **7131221** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

MBLK Sample ID: **MBLK-171837-171837** Units: **mg/L** Analysis Date: **2/10/2021 08:10 PM**

Client ID: Run ID: **ICPMS3_210210B** SeqNo: **7133921** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	ND	0.020								
Molybdenum	ND	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **171837** Instrument ID **ICPMS3** Method: **SW6020B**

LCS	Sample ID: **LCS-171837-171837**					Units: **mg/L**		Analysis Date: **2/9/2021 05:21 PM**			
Client ID:	Run ID: **ICPMS3_210209A**					SeqNo: **7131223**		Prep Date: **2/9/2021**		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0943	0.0050	0.1	0	94.3	80-120	0			
Arsenic	0.1004	0.0050	0.1	0	100	80-120	0			
Barium	0.09716	0.0050	0.1	0	97.2	80-120	0			
Beryllium	0.09892	0.0020	0.1	0	98.9	80-120	0			
Boron	0.4506	0.020	0.5	0	90.1	80-120	0			
Cadmium	0.1018	0.0020	0.1	0	102	80-120	0			
Calcium	9.911	0.50	10	0	99.1	80-120	0			
Chromium	0.1011	0.0050	0.1	0	101	80-120	0			
Cobalt	0.1005	0.0050	0.1	0	101	80-120	0			
Iron	10	0.080	10	0	100	80-120	0			
Lead	0.09736	0.0050	0.1	0	97.4	80-120	0			
Lithium	0.09537	0.010	0.1	0	95.4	80-120	0			
Magnesium	10.02	0.20	10	0	100	80-120	0			
Manganese	0.09892	0.0050	0.1	0	98.9	80-120	0			
Molybdenum	0.09561	0.0050	0.1	0	95.6	80-120	0			
Potassium	9.937	0.20	10	0	99.4	80-120	0			
Selenium	0.101	0.0050	0.1	0	101	80-120	0			
Sodium	9.964	0.20	10	0	99.6	80-120	0			
Thallium	0.09287	0.0050	0.1	0	92.9	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **171837** Instrument ID **ICPMS3** Method: **SW6020B**

MS Sample ID: **21020218-01AMS** Units: **mg/L** Analysis Date: **2/9/2021 05:28 PM**

Client ID: Run ID: **ICPMS3_210209A** SeqNo: **7131231** Prep Date: **2/9/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09531	0.0050	0.1	0.000535	94.8	75-125	0			
Arsenic	0.106	0.0050	0.1	0.004913	101	75-125	0			
Barium	0.5807	0.0050	0.1	0.4786	102	75-125	0			O
Beryllium	0.1008	0.0020	0.1	0.000005	101	75-125	0			
Boron	0.6679	0.020	0.5	0.1696	99.7	75-125	0			
Cadmium	0.09992	0.0020	0.1	0.000028	99.9	75-125	0			
Calcium	50.88	0.50	10	41.71	91.7	75-125	0			O
Chromium	0.1048	0.0050	0.1	0.004783	100	75-125	0			
Cobalt	0.1001	0.0050	0.1	0.000044	100	75-125	0			
Iron	9.992	0.080	10	0.03947	99.5	75-125	0			
Lead	0.09806	0.0050	0.1	0.000997	97.1	75-125	0			
Lithium	0.1171	0.010	0.1	0.0174	99.7	75-125	0			
Magnesium	17.93	0.20	10	8.149	97.8	75-125	0			
Manganese	0.09893	0.0050	0.1	0.00235	96.6	75-125	0			
Molybdenum	0.1154	0.0050	0.1	0.01656	98.8	75-125	0			
Potassium	12.76	0.20	10	3.009	97.6	75-125	0			
Selenium	0.09775	0.0050	0.1	0.000816	96.9	75-125	0			
Sodium	37.41	0.20	10	28.03	93.8	75-125	0			
Thallium	0.0931	0.0050	0.1	0.000099	93	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **171837** Instrument ID **ICPMS3** Method: **SW6020B**

MSD	Sample ID: **21020218-01AMSD**	Units: **mg/L**	Analysis Date: **2/9/2021 05:29 PM**
Client ID:	Run ID: **ICPMS3_210209A**	SeqNo: **7131233** Prep Date: **2/9/2021**	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09562	0.0050	0.1	0.000535	95.1	75-125	0.09531	0.325	20	
Arsenic	0.1066	0.0050	0.1	0.004913	102	75-125	0.106	0.583	20	
Barium	0.5787	0.0050	0.1	0.4786	100	75-125	0.5807	0.339	20	O
Beryllium	0.09986	0.0020	0.1	0.000005	99.9	75-125	0.1008	0.892	20	
Boron	0.6702	0.020	0.5	0.1696	100	75-125	0.6679	0.348	20	
Cadmium	0.1001	0.0020	0.1	0.000028	100	75-125	0.09992	0.211	20	
Calcium	51.01	0.50	10	41.71	93	75-125	50.88	0.261	20	O
Chromium	0.1046	0.0050	0.1	0.004783	99.8	75-125	0.1048	0.244	20	
Cobalt	0.1003	0.0050	0.1	0.000044	100	75-125	0.1001	0.188	20	
Iron	10.02	0.080	10	0.03947	99.8	75-125	9.992	0.277	20	
Lead	0.09843	0.0050	0.1	0.000997	97.4	75-125	0.09806	0.379	20	
Lithium	0.1162	0.010	0.1	0.0174	98.8	75-125	0.1171	0.735	20	
Magnesium	17.71	0.20	10	8.149	95.7	75-125	17.93	1.2	20	
Manganese	0.09947	0.0050	0.1	0.00235	97.1	75-125	0.09893	0.552	20	
Molybdenum	0.1174	0.0050	0.1	0.01656	101	75-125	0.1154	1.73	20	
Potassium	12.83	0.20	10	3.009	98.2	75-125	12.76	0.546	20	
Selenium	0.09486	0.0050	0.1	0.000816	94	75-125	0.09775	2.99	20	
Sodium	37.4	0.20	10	28.03	93.8	75-125	37.41	0.0176	20	
Thallium	0.09346	0.0050	0.1	0.000099	93.4	75-125	0.0931	0.388	20	

The following samples were analyzed in this batch:

21020221-01A	21020221-02A	21020221-03A
21020221-04A	21020221-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 21020221
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **171610** Instrument ID **TDS** Method: **A2540 C-11**

MBLK Sample ID: **MBLK-171610-171610** Units: **mg/L** Analysis Date: **2/9/2021 02:45 PM**
Client ID: Run ID: **TDS_210209A** SeqNo: **7130209** Prep Date: **2/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

LCS Sample ID: **LCS-171610-171610** Units: **mg/L** Analysis Date: **2/9/2021 02:45 PM**
Client ID: Run ID: **TDS_210209A** SeqNo: **7130208** Prep Date: **2/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	464	30	495	0	93.7	85-109	0			

DUP Sample ID: **21020092-13A DUP** Units: **mg/L** Analysis Date: **2/9/2021 02:45 PM**
Client ID: Run ID: **TDS_210209A** SeqNo: **7130187** Prep Date: **2/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	1520	300	0	0	0	0-0	1500	1.32	10	

DUP Sample ID: **21020221-01B DUP** Units: **mg/L** Analysis Date: **2/9/2021 02:45 PM**
Client ID: **PZ-1** Run ID: **TDS_210209A** SeqNo: **7130203** Prep Date: **2/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	600	100	0	0	0	0-0	593.3	1.12	10	H

The following samples were analyzed in this batch:

21020221-01B	21020221-02B	21020221-03B
21020221-04B	21020221-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 21020221
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R309401** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R309401** Units: **mg/L** Analysis Date: **2/5/2021 02:50 PM**
Client ID: Run ID: **IC3_210205A** SeqNo: **7124881** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R309401** Units: **mg/L** Analysis Date: **2/5/2021 03:10 PM**
Client ID: Run ID: **IC3_210205A** SeqNo: **7124882** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.483	1.0	10	0	94.8	88-110	0			
Fluoride	1.989	0.10	2	0	99.5	82-116	0			
Sulfate	9.754	1.0	10	0	97.5	90-110	0			

MS Sample ID: **21020375-03A MS** Units: **mg/L** Analysis Date: **2/5/2021 05:24 PM**
Client ID: Run ID: **IC3_210205A** SeqNo: **7124889** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	761.2	40	400	366.7	98.6	88-110	0			
Sulfate	399	40	400	22.67	94.1	90-110	0			

MSD Sample ID: **21020375-03A MSD** Units: **mg/L** Analysis Date: **2/5/2021 05:44 PM**
Client ID: Run ID: **IC3_210205A** SeqNo: **7124890** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	761.5	40	400	366.7	98.7	88-110	761.2	0.0436	20	
Sulfate	397.8	40	400	22.67	93.8	90-110	399	0.305	20	

The following samples were analyzed in this batch:

21020221-01B	21020221-02B	21020221-03B
21020221-04B	21020221-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R309522** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK	Sample ID: **MB-R309522-R309522**		Units: **mg/L**	Analysis Date: **2/9/2021 12:49 PM**
Client ID:	Run ID: **TITRATOR 1_210209A**	SeqNo: **7129322**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS	Sample ID: **LCS-R309522-R309522**		Units: **mg/L**	Analysis Date: **2/9/2021 12:49 PM**
Client ID:	Run ID: **TITRATOR 1_210209A**	SeqNo: **7129323**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	894.2	10	925	0	96.7	88-110	0			
Alkalinity, Total (as CaCO3)	965.4	10	1000	0	96.5	89-103	0			

DUP	Sample ID: **21020218-01B DUP**		Units: **mg/L**	Analysis Date: **2/9/2021 12:49 PM**
Client ID:	Run ID: **TITRATOR 1_210209A**	SeqNo: **7129326**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	83.06	10	0	0	0	0-0	87.95	5.72	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Hydroxide (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Phenolphthalein (as CaCO3	ND	10	0	0	0	0-0	0	0	10	
Alkalinity, Total (as CaCO3)	83.06	10	0	0	0	0-0	87.95	5.72	10	

DUP	Sample ID: **21020353-01H DUP**		Units: **mg/L**	Analysis Date: **2/9/2021 12:49 PM**
Client ID:	Run ID: **TITRATOR 1_210209A**	SeqNo: **7129337**	Prep Date:	DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	767.6	10	0	0	0	0-0	778.2	1.37	10	

The following samples were analyzed in this batch:

21020221-01B	21020221-02B	21020221-03B
21020221-04B	21020221-05B	

Client: Geosyntec Consultants
Work Order: 21020221
Project: DTE- Monroe (GLP-8014)

QC BATCH REPORT

Batch ID: **R309524** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS Sample ID: **LCS-R309524-R309524** Units: **s.u.** Analysis Date: **2/9/2021 12:49 PM**
Client ID: Run ID: **TITRATOR 1_210209B** SeqNo: **7129346** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS Sample ID: **LCS-R309524-R309524** Units: **s.u.** Analysis Date: **2/9/2021 12:49 PM**
Client ID: Run ID: **TITRATOR 1_210209B** SeqNo: **7129349** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP Sample ID: **21020240-01A DUP** Units: **s.u.** Analysis Date: **2/9/2021 12:49 PM**
Client ID: Run ID: **TITRATOR 1_210209B** SeqNo: **7129348** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.63	0.10	0	0	0	0-0	7.87	3.1	5	H
Temperature	20.95	0.10	0	0	0	0-0	21.12	0.808		H

DUP Sample ID: **21020218-01B DUP** Units: **s.u.** Analysis Date: **2/9/2021 12:49 PM**
Client ID: Run ID: **TITRATOR 1_210209B** SeqNo: **7129351** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.85	0.10	0	0	0	0-0	7.87	0.254	5	H
Temperature	20.03	0.10	0	0	0		20.3	1.34		H

The following samples were analyzed in this batch:

21020221-01B	21020221-02B	21020221-03B
21020221-04B	21020221-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Cincinnati, OH +1 513 733 5336	**Fort Collins, CO** +1 970 490 1511	**Houston, TX** +1 281 530 5656
Everett, WA +1 425 356 2600	**Holland, MI** +1 616 399 6070	**Middletown, PA** +1 717 944 5541
Spring City, PA +1 610 948 4903	**South Charleston, WV** +1 304 356 3168	
Salt Lake City, UT +1 801 266 7700	**York, PA** +1 717 505 5280	

Chain of Custody Form

Page 1 of 1

COC ID: 235262

2102 0221

ALS Project Manager:

ALS Work Order #: 34024

Customer Information		**Project Information**		**Parameter/Method Request for Analysis**	
Purchase Order		Project Name	DTE Monroe	A	pH, TDS, Alkalinity
Work Order		Project Number	GLP-8014	B	Anions - Cl, Fl, SO4
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	Metals (Total)
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	Metals (Dissolved) Lab Filtered
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-8063	Fax	(734) 332-8063	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	PZ-1	1/28	10:40	GW	2	3	X	X	X	X							
2	PZ-2	↓	11:35	↓	↓	↓	X	X	X	X							
3	PZ-3	↓	12:20	↓	↓	↓	X	X	X	X							
4	PZ-4	↓	13:15	↓	↓	↓	X	X	X	X							
5	PZ-5	↓	14:00	↓	↓	↓	X	X	X	X							
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign Mike Coram

Shipment Method Fed Ex

Required Turnaround Time: (Check Box) ☒ Std 10 WK Days ☐ 5 WK Days ☐ Other ______ ☐ 2 WK Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date: 2/1	Time: 14 00	Received by:
Relinquished by:	Date: 2/3/21	Time: 9:00	Received by (Laboratory):
Logged by (Laboratory): MJG	Date: 2/3/21	Time: 14:35	Checked by (Laboratory):

Notes: Diss Metals → LAB Filter

Cooler ID	Cooler Temp.
	0.8°C
	IR1
	8H24

QC Package: (Check One Box Below)

☐ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other ______
☐ TRRP CheckList
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA** Date/Time Received: **03-Feb-21 09:00**

Work Order: **21020221** Received by: **MJG**

Checklist completed by Matthew Gaylord (eSignature) 03-Feb-21 (Date) Reviewed by: Chad Whelton (eSignature) 03-Feb-21 (Date)

Matrices: Groundwater
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	0.8/0.8C	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	2/3/2021 2:35:55 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Eurofins Environmental Testing

Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Vincent Buening
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Generated 2/27/2023 4:17:01 PM Revision 1

JOB DESCRIPTION

CCR DTE Monroe Fly Ash Basin

JOB NUMBER

240-178047-1

Eurofins Canton
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

Eurofins Canton

Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Kris Brooks

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

Generated
2/27/2023 4:17:01 PM
Revision 1

Table of Contents

Definitions/Glossary

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Job ID: 240-178047-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-178047-1

Comments

No additional comments.

Revision

The report being provided is a revision of the original report sent on 12/29/2022. The report (revision 1) is being revised due to: Client would like strontium added to samples 8 through 15..

Receipt

The samples were received on 12/15/2022 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 1.5º C and 2.0º C.

Receipt Exceptions

Sample MW-16-07 was not received.

Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

Sample Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178047-1	MW-16-01	Water	12/12/22 11:27	12/15/22 08:00
240-178047-2	MW-16-02	Water	12/12/22 14:13	12/15/22 08:00
240-178047-3	MW-16-03	Water	12/12/22 10:20	12/15/22 08:00
240-178047-4	MW-16-04	Water	12/12/22 09:04	12/15/22 08:00
240-178047-5	MW-16-05	Water	12/12/22 09:42	12/15/22 08:00
240-178047-6	MW-16-06	Water	12/12/22 13:28	12/15/22 08:00
240-178047-8	PZ-1	Water	12/13/22 10:16	12/15/22 08:00
240-178047-9	PZ-2	Water	12/12/22 15:38	12/15/22 08:00
240-178047-10	PZ-3	Water	12/13/22 11:18	12/15/22 08:00
240-178047-11	PZ-4	Water	12/13/22 09:13	12/15/22 08:00
240-178047-12	PZ-5	Water	12/13/22 13:13	12/15/22 08:00
240-178047-13	P-01	Water	12/13/22 14:51	12/15/22 08:00
240-178047-14	LE-01	Water	12/13/22 15:56	12/15/22 08:00
240-178047-15	SW-001	Water	12/13/22 12:19	12/15/22 08:00
240-178047-16	DUP-01	Water	12/12/22 00:00	12/15/22 08:00

Detection Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Client Sample ID: MW-16-01 Lab Sample ID: 240-178047-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	240		100	100	ug/L	1		6010B	Total Recoverable
Barium	8.7		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	360000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	64		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	140000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3300		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	6100		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	210		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	210		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	10		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.8		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1400		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.3		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: MW-16-02 Lab Sample ID: 240-178047-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	370		100	100	ug/L	1		6010B	Total Recoverable
Barium	6.2		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	390000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	95		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	150000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3900		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	10000		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	13		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.6		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1500		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.1		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13

Detection Summary

Client Sample ID: MW-16-03 Lab Sample ID: 240-178047-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	430		100	100	ug/L	1		6010B	Total Recoverable
Barium	6.2		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	400000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	100		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	150000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3900		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	18		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.6		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1500		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.2		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: MW-16-04 Lab Sample ID: 240-178047-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	150		100	100	ug/L	1		6010B	Total Recoverable
Barium	10		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	500000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	18		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	42000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2100		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	230		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	230		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	35		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.0		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1300		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.6		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Client Sample ID: MW-16-05 Lab Sample ID: 240-178047-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	190		100	100	ug/L	1		6010B	Total Recoverable
Barium	5.4		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	380000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	39		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	130000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2900		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	7600		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	11		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.5		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1400		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.3		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: MW-16-06 Lab Sample ID: 240-178047-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	310		100	100	ug/L	1		6010B	Total Recoverable
Barium	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	360000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	78		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	140000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3800		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	10000		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	11		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.6		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1400		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.1		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.2		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: PZ-1 Lab Sample ID: 240-178047-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	8100		100	100	ug/L	1		6010B	Total Recoverable
Barium	2300		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	120000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	16		8.0	8.0	ug/L	1		6020	Total Recoverable
Molybdenum	1400		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	23000		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	52000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	12000		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	260		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	100		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	45		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.48		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	25		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	11		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	11		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	11		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	11		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	11		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: PZ-2 Lab Sample ID: 240-178047-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	5900		100	100	ug/L	1		6010B	Total Recoverable
Barium	600		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	29000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	2100		50	50	ug/L	10		6020	Total Recoverable
Potassium	230000		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	560000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	3700		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	1400		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	610		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	33		2.0	2.0	mg/L	2		9056A	Total/NA
Fluoride	3.7		0.10	0.10	mg/L	2		9056A	Total/NA
Sulfate	84		2.0	2.0	mg/L	2		9056A	Total/NA
Total Organic Carbon	96		5.0	1.7	mg/L	5		9060A	Total/NA
TOC Result 1	95		5.0	1.7	mg/L	5		9060A	Total/NA
TOC Result 2	96		5.0	1.7	mg/L	5		9060A	Total/NA
TOC Result 3	96		5.0	1.7	mg/L	5		9060A	Total/NA
TOC Result 4	96		5.0	1.7	mg/L	5		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Client Sample ID: PZ-3 Lab Sample ID: 240-178047-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	3900		100	100	ug/L	1		6010B	Total Recoverable
Barium	1800		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	100000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	38		8.0	8.0	ug/L	1		6020	Total Recoverable
Molybdenum	170		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	60000		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	94000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	14000		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	320		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	80		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	33		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.84		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	14		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	0.73	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	0.72	J	1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: PZ-4 Lab Sample ID: 240-178047-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	2800		100	100	ug/L	1		6010B	Total Recoverable
Barium	110		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	61000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	440		8.0	8.0	ug/L	1		6020	Total Recoverable
Molybdenum	1500		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	62000		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	40000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	1300		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	78		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	44		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	34		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.36		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	140		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	2.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	2.0		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	2.0		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

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Client Sample ID: PZ-4 (Continued) Lab Sample ID: 240-178047-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 4	2.0		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: PZ-5 Lab Sample ID: 240-178047-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	13000		100	100	ug/L	1		6010B	Total Recoverable
Barium	83		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	240000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	9600		25	25	ug/L	5		6020	Total Recoverable
Potassium	3000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	8700		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	110		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	70		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	27		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.10		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	560		5.0	5.0	mg/L	5		9056A	Total/NA
Total Organic Carbon	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	2.5		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	2.5		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: P-01 Lab Sample ID: 240-178047-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	34		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	90000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	21000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	19		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	2800		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	58000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	1800		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	180		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	180		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	110		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.61		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	180		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	3.4		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	3.4		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	3.4		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	3.4		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	3.4		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: LE-01

Lab Sample ID: 240-178047-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	26		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	37000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	11000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	5.6		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	3300		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	12000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	270		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	110		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	110		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	21		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.13		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	28		1.0	1.0	mg/L	1		9056A	Total/NA
Total Organic Carbon	2.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	2.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	2.6		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	2.6		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: SW-001

Lab Sample ID: 240-178047-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	1300		100	100	ug/L	1		6010B	Total Recoverable
Barium	320		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	190000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	140		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	20000		1000	1000	ug/L	1		6020	Total Recoverable
Molybdenum	530		5.0	5.0	ug/L	1		6020	Total Recoverable
Potassium	5700		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	38000		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	3100		10	10	ug/L	1		6020	Total Recoverable
Alkalinity	120		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	90		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Carbonate Alkalinity as CaCO3	30		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	22		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	0.76		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	510		5.0	5.0	mg/L	5		9056A	Total/NA
Total Organic Carbon	2.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	2.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	2.2		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SW-001 (Continued) Lab Sample ID: 240-178047-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Result 3	2.2		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	2.2		1.0	0.35	mg/L	1		9060A	Total/NA

Client Sample ID: DUP-01 Lab Sample ID: 240-178047-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	230		100	100	ug/L	1		6010B	Total Recoverable
Barium	11		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	390000		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	67		8.0	8.0	ug/L	1		6020	Total Recoverable
Magnesium	150000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	3500		1000	1000	ug/L	1		6020	Total Recoverable
Sodium	6500		1000	1000	ug/L	1		6020	Total Recoverable
Alkalinity	210		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	210		5.0	5.0	mg/L	1		2320B-1997	Total/NA
Chloride	10		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.7		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1400		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.3		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-16-01

Lab Sample ID: 240-178047-1

Date Collected: 12/12/22 11:27

Matrix: Water

Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**240**		100	100	ug/L		12/20/22 12:00	12/21/22 15:18	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**8.7**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:34	1
Calcium	**360000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:34	1
Lithium	**64**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 13:34	1
Magnesium	**140000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:34	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:34	1
Potassium	**3300**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:34	1
Sodium	**6100**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**210**		5.0	5.0	mg/L			12/17/22 09:23	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**210**		5.0	5.0	mg/L			12/17/22 09:23	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:23	1
Chloride (SW846 9056A)	**10**		1.0	1.0	mg/L			12/27/22 21:12	1
Fluoride (SW846 9056A)	**1.8**		0.050	0.050	mg/L			12/27/22 21:12	1
Sulfate (SW846 9056A)	**1400**		10	10	mg/L			12/27/22 22:17	10
Total Organic Carbon (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 17:08	1
TOC Result 1 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 17:08	1
TOC Result 2 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 17:08	1
TOC Result 3 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 17:08	1
TOC Result 4 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 17:08	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: MW-16-02

Lab Sample ID: 240-178047-2

Date Collected: 12/12/22 14:13
Date Received: 12/15/22 08:00

Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**370**		100	100	ug/L		12/20/22 12:00	12/21/22 15:47	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**6.2**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:50	1
Calcium	**390000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:50	1
Lithium	**95**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 13:50	1
Magnesium	**150000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:50	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:50	1
Potassium	**3900**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:50	1
Sodium	**10000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:28	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:28	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:28	1
Chloride (SW846 9056A)	**13**		1.0	1.0	mg/L			12/27/22 22:39	1
Fluoride (SW846 9056A)	**1.6**		0.050	0.050	mg/L			12/28/22 22:31	1
Sulfate (SW846 9056A)	**1500**		10	10	mg/L			12/27/22 23:01	10
Total Organic Carbon (SW846 9060A)	**1.1**		1.0	0.35	mg/L			12/28/22 17:43	1
TOC Result 1 (SW846 9060A)	**1.0**		1.0	0.35	mg/L			12/28/22 17:43	1
TOC Result 2 (SW846 9060A)	**1.0**		1.0	0.35	mg/L			12/28/22 17:43	1
TOC Result 3 (SW846 9060A)	**1.1**		1.0	0.35	mg/L			12/28/22 17:43	1
TOC Result 4 (SW846 9060A)	**1.1**		1.0	0.35	mg/L			12/28/22 17:43	1

Client Sample Results

Client Sample ID: MW-16-03
Date Collected: 12/12/22 10:20
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-3
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**430**		100	100	ug/L		12/20/22 12:00	12/21/22 15:51	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**6.2**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:57	1
Calcium	**400000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:57	1
Lithium	**100**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 13:57	1
Magnesium	**150000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:57	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:57	1
Potassium	**3900**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:57	1
Sodium	**12000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 13:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:33	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:33	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:33	1
Chloride (SW846 9056A)	**18**		1.0	1.0	mg/L			12/27/22 23:23	1
Fluoride (SW846 9056A)	**1.6**		0.050	0.050	mg/L			12/28/22 22:53	1
Sulfate (SW846 9056A)	**1500**		10	10	mg/L			12/27/22 23:44	10
Total Organic Carbon (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 18:18	1
TOC Result 1 (SW846 9060A)	**1.1**		1.0	0.35	mg/L			12/28/22 18:18	1
TOC Result 2 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 18:18	1
TOC Result 3 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 18:18	1
TOC Result 4 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 18:18	1

Client Sample ID: MW-16-04

Lab Sample ID: 240-178047-4

Date Collected: 12/12/22 09:04
Matrix: Water
Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**150**		100	100	ug/L		12/20/22 12:00	12/21/22 15:55	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**10**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:00	1
Calcium	**500000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:00	1
Lithium	**18**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:00	1
Magnesium	**42000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:00	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:00	1
Potassium	**2100**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:00	1
Sodium	**11000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**230**		5.0	5.0	mg/L			12/17/22 09:37	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**230**		5.0	5.0	mg/L			12/17/22 09:37	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:37	1
Chloride (SW846 9056A)	**35**		1.0	1.0	mg/L			12/28/22 00:06	1
Fluoride (SW846 9056A)	**1.0**		0.050	0.050	mg/L			12/28/22 23:14	1
Sulfate (SW846 9056A)	**1300**		10	10	mg/L			12/28/22 00:28	10
Total Organic Carbon (SW846 9060A)	**1.6**		1.0	0.35	mg/L			12/28/22 18:53	1
TOC Result 1 (SW846 9060A)	**1.6**		1.0	0.35	mg/L			12/28/22 18:53	1
TOC Result 2 (SW846 9060A)	**1.6**		1.0	0.35	mg/L			12/28/22 18:53	1
TOC Result 3 (SW846 9060A)	**1.6**		1.0	0.35	mg/L			12/28/22 18:53	1
TOC Result 4 (SW846 9060A)	**1.6**		1.0	0.35	mg/L			12/28/22 18:53	1

Client Sample ID: MW-16-05

Lab Sample ID: 240-178047-5

Date Collected: 12/12/22 09:42

Matrix: Water

Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**190**		100	100	ug/L		12/20/22 12:00	12/21/22 16:00	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**5.4**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:02	1
Calcium	**380000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:02	1
Lithium	**39**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:02	1
Magnesium	**130000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:02	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:02	1
Potassium	**2900**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:02	1
Sodium	**7600**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:41	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:41	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:41	1
Chloride (SW846 9056A)	**11**		1.0	1.0	mg/L			12/28/22 00:49	1
Fluoride (SW846 9056A)	**1.5**		0.050	0.050	mg/L			12/28/22 23:36	1
Sulfate (SW846 9056A)	**1400**		10	10	mg/L			12/28/22 01:11	10
Total Organic Carbon (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 19:28	1
TOC Result 1 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 19:28	1
TOC Result 2 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 19:28	1
TOC Result 3 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 19:28	1
TOC Result 4 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/28/22 19:28	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: MW-16-06
Date Collected: 12/12/22 13:28
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-6
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**310**		100	100	ug/L		12/20/22 12:00	12/21/22 16:04	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**11**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:05	1
Calcium	**360000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:05	1
Lithium	**78**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:05	1
Magnesium	**140000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:05	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:05	1
Potassium	**3800**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:05	1
Sodium	**10000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:05	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:45	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**190**		5.0	5.0	mg/L			12/17/22 09:45	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:45	1
Chloride (SW846 9056A)	**11**		1.0	1.0	mg/L			12/28/22 01:33	1
Fluoride (SW846 9056A)	**1.6**		0.050	0.050	mg/L			12/28/22 23:58	1
Sulfate (SW846 9056A)	**1400**		10	10	mg/L			12/28/22 02:38	10
Total Organic Carbon (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 20:03	1
TOC Result 1 (SW846 9060A)	**1.1**		1.0	0.35	mg/L			12/28/22 20:03	1
TOC Result 2 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 20:03	1
TOC Result 3 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 20:03	1
TOC Result 4 (SW846 9060A)	**1.2**		1.0	0.35	mg/L			12/28/22 20:03	1

Client Sample ID: PZ-1

Lab Sample ID: 240-178047-8
Date Collected: 12/13/22 10:16
Matrix: Water
Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**8100**		100	100	ug/L		12/20/22 12:00	12/21/22 16:08	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**2300**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:07	1
Calcium	**120000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:07	1
Lithium	**16**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:07	1
Magnesium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 14:07	1
Molybdenum	**1400**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:07	1
Potassium	**23000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:07	1
Sodium	**52000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:07	1
Strontium	**12000**		10	10	ug/L		12/16/22 12:00	12/19/22 14:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**260**		5.0	5.0	mg/L			12/17/22 09:56	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 09:56	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	**100**		5.0	5.0	mg/L			12/17/22 09:56	1
Chloride (SW846 9056A)	**45**		1.0	1.0	mg/L			12/28/22 02:59	1
Fluoride (SW846 9056A)	**0.48**		0.050	0.050	mg/L			12/29/22 00:20	1
Sulfate (SW846 9056A)	**25**		1.0	1.0	mg/L			12/28/22 02:59	1
Total Organic Carbon (SW846 9060A)	**11**		1.0	0.35	mg/L			12/28/22 20:38	1
TOC Result 1 (SW846 9060A)	**11**		1.0	0.35	mg/L			12/28/22 20:38	1
TOC Result 2 (SW846 9060A)	**11**		1.0	0.35	mg/L			12/28/22 20:38	1
TOC Result 3 (SW846 9060A)	**11**		1.0	0.35	mg/L			12/28/22 20:38	1
TOC Result 4 (SW846 9060A)	**11**		1.0	0.35	mg/L			12/28/22 20:38	1

Client Sample ID: PZ-2

Lab Sample ID: 240-178047-9

Date Collected: 12/12/22 15:38

Matrix: Water

Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**5900**		100	100	ug/L		12/19/22 12:00	12/20/22 14:27	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**600**		5.0	5.0	ug/L		12/19/22 12:00	12/20/22 16:11	1
Calcium	**29000**		1000	1000	ug/L		12/19/22 12:00	12/20/22 16:11	1
Lithium	8.0	U	8.0	8.0	ug/L		12/19/22 12:00	12/20/22 16:11	1
Magnesium	1000	U	1000	1000	ug/L		12/19/22 12:00	12/20/22 16:11	1
Molybdenum	**2100**		50	50	ug/L		12/19/22 12:00	12/21/22 18:48	10
Potassium	**230000**		1000	1000	ug/L		12/19/22 12:00	12/20/22 16:11	1
Sodium	**560000**		1000	1000	ug/L		12/19/22 12:00	12/20/22 16:11	1
Strontium	**3700**		10	10	ug/L		12/19/22 12:00	12/20/22 16:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**1400**		5.0	5.0	mg/L			12/17/22 10:04	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:04	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	**610**		5.0	5.0	mg/L			12/17/22 10:04	1
Chloride (SW846 9056A)	**33**		2.0	2.0	mg/L			12/28/22 03:43	2
Fluoride (SW846 9056A)	**3.7**		0.10	0.10	mg/L			12/29/22 00:41	2
Sulfate (SW846 9056A)	**84**		2.0	2.0	mg/L			12/28/22 03:43	2
Total Organic Carbon (SW846 9060A)	**96**		5.0	1.7	mg/L			12/28/22 21:14	5
TOC Result 1 (SW846 9060A)	**95**		5.0	1.7	mg/L			12/28/22 21:14	5
TOC Result 2 (SW846 9060A)	**96**		5.0	1.7	mg/L			12/28/22 21:14	5
TOC Result 3 (SW846 9060A)	**96**		5.0	1.7	mg/L			12/28/22 21:14	5
TOC Result 4 (SW846 9060A)	**96**		5.0	1.7	mg/L			12/28/22 21:14	5

Client Sample ID: PZ-3

Date Collected: 12/13/22 11:18
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-10

Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**3900**		100	100	ug/L		12/20/22 12:00	12/21/22 16:12	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**1800**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:10	1
Calcium	**100000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:10	1
Lithium	**38**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:10	1
Magnesium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 14:10	1
Molybdenum	**170**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:10	1
Potassium	**60000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:10	1
Sodium	**94000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:10	1
Strontium	**14000**		10	10	ug/L		12/16/22 12:00	12/19/22 14:10	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**320**		5.0	5.0	mg/L			12/17/22 10:09	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:09	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	**80**		5.0	5.0	mg/L			12/17/22 10:09	1
Chloride (SW846 9056A)	**33**		1.0	1.0	mg/L			12/28/22 04:26	1
Fluoride (SW846 9056A)	**0.84**		0.050	0.050	mg/L			12/29/22 01:03	1
Sulfate (SW846 9056A)	**14**		1.0	1.0	mg/L			12/28/22 04:26	1
Total Organic Carbon (SW846 9060A)	**0.73**	**J**	1.0	0.35	mg/L			12/28/22 22:09	1
TOC Result 1 (SW846 9060A)	**0.73**	**J**	1.0	0.35	mg/L			12/28/22 22:09	1
TOC Result 2 (SW846 9060A)	**0.73**	**J**	1.0	0.35	mg/L			12/28/22 22:09	1
TOC Result 3 (SW846 9060A)	**0.72**	**J**	1.0	0.35	mg/L			12/28/22 22:09	1
TOC Result 4 (SW846 9060A)	**0.72**	**J**	1.0	0.35	mg/L			12/28/22 22:09	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: PZ-4

Date Collected: 12/13/22 09:13
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-11
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**2800**		100	100	ug/L		12/20/22 12:00	12/21/22 16:16	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**110**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:12	1
Calcium	**61000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:12	1
Lithium	**440**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:12	1
Magnesium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 14:12	1
Molybdenum	**1500**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:12	1
Potassium	**62000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:12	1
Sodium	**40000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:12	1
Strontium	**1300**		10	10	ug/L		12/16/22 12:00	12/19/22 14:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**78**		5.0	5.0	mg/L			12/17/22 10:13	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:13	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	**44**		5.0	5.0	mg/L			12/17/22 10:13	1
Chloride (SW846 9056A)	**34**		1.0	1.0	mg/L			12/28/22 05:09	1
Fluoride (SW846 9056A)	**0.36**		0.050	0.050	mg/L			12/29/22 02:08	1
Sulfate (SW846 9056A)	**140**		1.0	1.0	mg/L			12/28/22 05:09	1
Total Organic Carbon (SW846 9060A)	**2.0**		1.0	0.35	mg/L			12/28/22 22:44	1
TOC Result 1 (SW846 9060A)	**2.0**		1.0	0.35	mg/L			12/28/22 22:44	1
TOC Result 2 (SW846 9060A)	**2.0**		1.0	0.35	mg/L			12/28/22 22:44	1
TOC Result 3 (SW846 9060A)	**2.0**		1.0	0.35	mg/L			12/28/22 22:44	1
TOC Result 4 (SW846 9060A)	**2.0**		1.0	0.35	mg/L			12/28/22 22:44	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: PZ-5

Date Collected: 12/13/22 13:13
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-12
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**13000**		100	100	ug/L		12/20/22 12:00	12/21/22 16:20	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**83**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:15	1
Calcium	**240000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:15	1
Lithium	8.0	U	8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:15	1
Magnesium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 14:15	1
Molybdenum	**9600**		25	25	ug/L		12/16/22 12:00	12/20/22 22:02	5
Potassium	**3000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:15	1
Sodium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 14:15	1
Strontium	**8700**		10	10	ug/L		12/16/22 12:00	12/19/22 14:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**110**		5.0	5.0	mg/L			12/17/22 10:17	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:17	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	**70**		5.0	5.0	mg/L			12/17/22 10:17	1
Chloride (SW846 9056A)	**27**		1.0	1.0	mg/L			12/28/22 05:53	1
Fluoride (SW846 9056A)	**0.10**		0.050	0.050	mg/L			12/29/22 02:30	1
Sulfate (SW846 9056A)	**560**		5.0	5.0	mg/L			12/28/22 06:58	5
Total Organic Carbon (SW846 9060A)	**2.5**		1.0	0.35	mg/L			12/28/22 23:19	1
TOC Result 1 (SW846 9060A)	**2.5**		1.0	0.35	mg/L			12/28/22 23:19	1
TOC Result 2 (SW846 9060A)	**2.5**		1.0	0.35	mg/L			12/28/22 23:19	1
TOC Result 3 (SW846 9060A)	**2.5**		1.0	0.35	mg/L			12/28/22 23:19	1
TOC Result 4 (SW846 9060A)	**2.5**		1.0	0.35	mg/L			12/28/22 23:19	1

Client Sample ID: P-01

Date Collected: 12/13/22 14:51
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-13
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	100	ug/L		12/20/22 12:00	12/21/22 16:24	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**34**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:17	1
Calcium	**90000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:17	1
Lithium	8.0	U	8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:17	1
Magnesium	**21000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:17	1
Molybdenum	**19**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:17	1
Potassium	**2800**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:17	1
Sodium	**58000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:17	1
Strontium	**1800**		10	10	ug/L		12/16/22 12:00	12/19/22 14:17	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**180**		5.0	5.0	mg/L			12/17/22 10:21	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**180**		5.0	5.0	mg/L			12/17/22 10:21	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:21	1
Chloride (SW846 9056A)	**110**		1.0	1.0	mg/L			12/28/22 07:20	1
Fluoride (SW846 9056A)	**0.61**		0.050	0.050	mg/L			12/28/22 07:20	1
Sulfate (SW846 9056A)	**180**		1.0	1.0	mg/L			12/28/22 07:20	1
Total Organic Carbon (SW846 9060A)	**3.4**		1.0	0.35	mg/L			12/28/22 23:55	1
TOC Result 1 (SW846 9060A)	**3.4**		1.0	0.35	mg/L			12/28/22 23:55	1
TOC Result 2 (SW846 9060A)	**3.4**		1.0	0.35	mg/L			12/28/22 23:55	1
TOC Result 3 (SW846 9060A)	**3.4**		1.0	0.35	mg/L			12/28/22 23:55	1
TOC Result 4 (SW846 9060A)	**3.4**		1.0	0.35	mg/L			12/28/22 23:55	1

Client Sample Results

Client Sample ID: LE-01

Lab Sample ID: 240-178047-14

Date Collected: 12/13/22 15:56

Matrix: Water

Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	100	ug/L		12/20/22 12:00	12/21/22 16:37	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**26**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:19	1
Calcium	**37000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:19	1
Lithium	8.0	U	8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:19	1
Magnesium	**11000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:19	1
Molybdenum	**5.6**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:19	1
Potassium	**3300**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:19	1
Sodium	**12000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:19	1
Strontium	**270**		10	10	ug/L		12/16/22 12:00	12/19/22 14:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**110**		5.0	5.0	mg/L			12/17/22 10:25	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**110**		5.0	5.0	mg/L			12/17/22 10:25	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:25	1
Chloride (SW846 9056A)	**21**		1.0	1.0	mg/L			12/28/22 08:03	1
Fluoride (SW846 9056A)	**0.13**		0.050	0.050	mg/L			12/28/22 08:03	1
Sulfate (SW846 9056A)	**28**		1.0	1.0	mg/L			12/28/22 08:03	1
Total Organic Carbon (SW846 9060A)	**2.6**		1.0	0.35	mg/L			12/29/22 00:30	1
TOC Result 1 (SW846 9060A)	**2.6**		1.0	0.35	mg/L			12/29/22 00:30	1
TOC Result 2 (SW846 9060A)	**2.6**		1.0	0.35	mg/L			12/29/22 00:30	1
TOC Result 3 (SW846 9060A)	**2.6**		1.0	0.35	mg/L			12/29/22 00:30	1
TOC Result 4 (SW846 9060A)	**2.6**		1.0	0.35	mg/L			12/29/22 00:30	1

Client Sample Results

Client Sample ID: SW-001

Date Collected: 12/13/22 12:19
Date Received: 12/15/22 08:00

Lab Sample ID: 240-178047-15
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1300		100	100	ug/L		12/20/22 12:00	12/21/22 16:41	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	320		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:27	1
Calcium	190000		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:27	1
Lithium	140		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:27	1
Magnesium	20000		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:27	1
Molybdenum	530		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:27	1
Potassium	5700		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:27	1
Sodium	38000		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:27	1
Strontium	3100		10	10	ug/L		12/16/22 12:00	12/19/22 14:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	120		5.0	5.0	mg/L			12/17/22 10:29	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	90		5.0	5.0	mg/L			12/17/22 10:29	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	30		5.0	5.0	mg/L			12/17/22 10:29	1
Chloride (SW846 9056A)	22		1.0	1.0	mg/L			12/28/22 09:08	1
Fluoride (SW846 9056A)	0.76		0.050	0.050	mg/L			12/28/22 09:08	1
Sulfate (SW846 9056A)	510		5.0	5.0	mg/L			12/28/22 09:30	5
Total Organic Carbon (SW846 9060A)	2.2		1.0	0.35	mg/L			12/29/22 01:06	1
TOC Result 1 (SW846 9060A)	2.2		1.0	0.35	mg/L			12/29/22 01:06	1
TOC Result 2 (SW846 9060A)	2.2		1.0	0.35	mg/L			12/29/22 01:06	1
TOC Result 3 (SW846 9060A)	2.2		1.0	0.35	mg/L			12/29/22 01:06	1
TOC Result 4 (SW846 9060A)	2.2		1.0	0.35	mg/L			12/29/22 01:06	1

Client Sample ID: DUP-01

Lab Sample ID: 240-178047-16

Date Collected: 12/12/22 00:00

Matrix: Water

Date Received: 12/15/22 08:00

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**230**		100	100	ug/L		12/20/22 12:00	12/21/22 16:45	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**11**		5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:29	1
Calcium	**390000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:29	1
Lithium	**67**		8.0	8.0	ug/L		12/16/22 12:00	12/19/22 14:29	1
Magnesium	**150000**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:29	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 14:29	1
Potassium	**3500**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:29	1
Sodium	**6500**		1000	1000	ug/L		12/16/22 12:00	12/19/22 14:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**210**		5.0	5.0	mg/L			12/17/22 10:34	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**210**		5.0	5.0	mg/L			12/17/22 10:34	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	5.0	mg/L			12/17/22 10:34	1
Chloride (SW846 9056A)	**10**		1.0	1.0	mg/L			12/28/22 09:51	1
Fluoride (SW846 9056A)	**1.7**		0.050	0.050	mg/L			12/28/22 09:51	1
Sulfate (SW846 9056A)	**1400**		10	10	mg/L			12/28/22 10:13	10
Total Organic Carbon (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 01:41	1
TOC Result 1 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 01:41	1
TOC Result 2 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 01:41	1
TOC Result 3 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 01:41	1
TOC Result 4 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 01:41	1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-556526/1-A
Matrix: Water
Analysis Batch: 556763

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556526

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	100	ug/L		12/19/22 12:00	12/20/22 13:41	1

Lab Sample ID: LCS 240-556526/2-A
Matrix: Water
Analysis Batch: 556763

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556526

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Boron			1000	1040		ug/L		104	80 - 120		

Lab Sample ID: MB 240-556682/1-A
Matrix: Water
Analysis Batch: 556918

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556682

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	100	ug/L		12/20/22 12:00	12/21/22 15:10	1

Lab Sample ID: LCS 240-556682/2-A
Matrix: Water
Analysis Batch: 556918

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556682

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Boron			1000	997		ug/L		100	80 - 120		

Lab Sample ID: 240-178047-1 MS
Matrix: Water
Analysis Batch: 556918

Client Sample ID: MW-16-01
Prep Type: Total Recoverable
Prep Batch: 556682

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Boron	240		1000	1260		ug/L		102	75 - 125		

Lab Sample ID: 240-178047-1 MSD
Matrix: Water
Analysis Batch: 556918

Client Sample ID: MW-16-01
Prep Type: Total Recoverable
Prep Batch: 556682

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Boron	240		1000	1290		ug/L		105	75 - 125	3	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 240-556258/1-A
Matrix: Water
Analysis Batch: 556606

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556258

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:29	1
Calcium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 13:29	1
Lithium	8.0	U	8.0	8.0	ug/L		12/16/22 12:00	12/19/22 13:29	1
Magnesium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 13:29	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/16/22 12:00	12/19/22 13:29	1
Potassium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 13:29	1

QC Sample Results

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 240-556258/1-A
Matrix: Water
Analysis Batch: 556606

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556258

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	1000	U	1000	1000	ug/L		12/16/22 12:00	12/19/22 13:29	1
Strontium	10	U	10	10	ug/L		12/16/22 12:00	12/19/22 13:29	1

Lab Sample ID: LCS 240-556258/2-A
Matrix: Water
Analysis Batch: 556606

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556258

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Barium			1000	889		ug/L		89	80 - 120		
Calcium			25000	23800		ug/L		95	80 - 120		
Lithium			500	475		ug/L		95	80 - 120		
Magnesium			25000	23900		ug/L		96	80 - 120		
Molybdenum			500	459		ug/L		92	80 - 120		
Potassium			25000	23800		ug/L		95	80 - 120		
Sodium			25000	23900		ug/L		95	80 - 120		
Strontium			500	454		ug/L		91	80 - 120		

Lab Sample ID: 240-178047-1 MS
Matrix: Water
Analysis Batch: 556606

Client Sample ID: MW-16-01
Prep Type: Total Recoverable
Prep Batch: 556258

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Barium	8.7		1000	899		ug/L		89	75 - 125		
Calcium	360000		25000	381000	4	ug/L		84	75 - 125		
Lithium	64		500	539		ug/L		95	75 - 125		
Magnesium	140000		25000	160000	4	ug/L		95	75 - 125		
Molybdenum	5.0	U	500	470		ug/L		94	75 - 125		
Potassium	3300		25000	27000		ug/L		95	75 - 125		
Sodium	6100		25000	30100		ug/L		96	75 - 125		
Strontium	11000		500	11000	4	ug/L		64	75 - 125		

Lab Sample ID: 240-178047-1 MSD
Matrix: Water
Analysis Batch: 556606

Client Sample ID: MW-16-01
Prep Type: Total Recoverable
Prep Batch: 556258

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Barium	8.7		1000	1020		ug/L		102	75 - 125	13	20
Calcium	360000		25000	391000	4	ug/L		123	75 - 125	3	20
Lithium	64		500	541		ug/L		95	75 - 125	0	20
Magnesium	140000		25000	165000	4	ug/L		114	75 - 125	3	20
Molybdenum	5.0	U	500	482		ug/L		96	75 - 125	3	20
Potassium	3300		25000	27200		ug/L		96	75 - 125	1	20
Sodium	6100		25000	30400		ug/L		97	75 - 125	1	20
Strontium	11000		500	11600	4	ug/L		170	75 - 125	5	20

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Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 240-556526/1-A
Matrix: Water
Analysis Batch: 556813

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556526

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/19/22 12:00	12/20/22 15:45	1
Calcium	1000	U	1000	1000	ug/L		12/19/22 12:00	12/20/22 15:45	1
Lithium	8.0	U	8.0	8.0	ug/L		12/19/22 12:00	12/20/22 15:45	1
Magnesium	1000	U	1000	1000	ug/L		12/19/22 12:00	12/20/22 15:45	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/19/22 12:00	12/20/22 15:45	1
Potassium	1000	U	1000	1000	ug/L		12/19/22 12:00	12/20/22 15:45	1
Sodium	1000	U	1000	1000	ug/L		12/19/22 12:00	12/20/22 15:45	1
Strontium	10	U	10	10	ug/L		12/19/22 12:00	12/20/22 15:45	1

Lab Sample ID: LCS 240-556526/3-A
Matrix: Water
Analysis Batch: 556813

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556526

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	928		ug/L		93	80 - 120
Calcium	25000	24600		ug/L		98	80 - 120
Lithium	500	472		ug/L		94	80 - 120
Magnesium	25000	24800		ug/L		99	80 - 120
Molybdenum	500	467		ug/L		93	80 - 120
Potassium	25000	25100		ug/L		100	80 - 120
Sodium	25000	24700		ug/L		99	80 - 120
Strontium	500	482		ug/L		96	80 - 120

Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: MB 240-556464/109
Matrix: Water
Analysis Batch: 556464

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			12/16/22 21:47	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			12/16/22 21:47	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			12/16/22 21:47	1

Lab Sample ID: MB 240-556464/83
Matrix: Water
Analysis Batch: 556464

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			12/16/22 19:57	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			12/16/22 19:57	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			12/16/22 19:57	1

Lab Sample ID: LCS 240-556464/108
Matrix: Water
Analysis Batch: 556464

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity	146	140		mg/L		96	86 - 123

1 2 3 4 5 6 7 8 9 10 11 12 13

Method: 2320B-1997 - Alkalinity, Total (Continued)

Lab Sample ID: 240-178047-6 DU **Client Sample ID: MW-16-06**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 556464

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Alkalinity	190			190		mg/L				2	20
Bicarbonate Alkalinity as CaCO3	190			190		mg/L				2	20
Carbonate Alkalinity as CaCO3	5.0	U		5.0	U	mg/L				NC	20

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557247/3 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 557247

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	1.0	mg/L			12/27/22 17:57	1
Fluoride	0.050	U	0.050	0.050	mg/L			12/27/22 17:57	1
Sulfate	1.0	U	1.0	1.0	mg/L			12/27/22 17:57	1

Lab Sample ID: LCS 240-557247/4 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 557247

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Chloride			50.0	49.3		mg/L		99	90 - 110		
Fluoride			2.50	2.66		mg/L		106	90 - 110		
Sulfate			50.0	50.8		mg/L		102	90 - 110		

Lab Sample ID: 240-178047-14 MS **Client Sample ID: LE-01**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 557247

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Chloride	21		50.0	71.9		mg/L		103	80 - 120		
Fluoride	0.13		2.50	2.97		mg/L		114	80 - 120		
Sulfate	28		50.0	80.4		mg/L		105	80 - 120		

Lab Sample ID: 240-178047-14 MSD **Client Sample ID: LE-01**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 557247

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	21		50.0	71.9		mg/L		103	80 - 120	0	15
Fluoride	0.13		2.50	2.99		mg/L		115	80 - 120	1	15
Sulfate	28		50.0	80.6		mg/L		105	80 - 120	0	15

Lab Sample ID: MB 240-557360/3 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 557360

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.050	U	0.050	0.050	mg/L			12/28/22 21:48	1

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 240-557360/4
Matrix: Water
Analysis Batch: 557360

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Fluoride			2.50	2.64		mg/L		106	90 - 110		

Lab Sample ID: 240-178047-12 MS
Matrix: Water
Analysis Batch: 557360

Client Sample ID: PZ-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Fluoride	0.10		2.50	2.96		mg/L		114	80 - 120		

Lab Sample ID: 240-178047-12 MSD
Matrix: Water
Analysis Batch: 557360

Client Sample ID: PZ-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Fluoride	0.10		2.50	2.98		mg/L		115	80 - 120	1	15

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557515/4
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/28/22 16:49	1

Lab Sample ID: LCS 240-557515/5
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Total Organic Carbon			18.3	18.3		mg/L		100	85 - 115		
TOC Result 1			18.3	18.3		mg/L		100	85 - 115		

Metals

Prep Batch: 556258

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total Recoverable	Water	3005A	
240-178047-2	MW-16-02	Total Recoverable	Water	3005A	
240-178047-3	MW-16-03	Total Recoverable	Water	3005A	
240-178047-4	MW-16-04	Total Recoverable	Water	3005A	
240-178047-5	MW-16-05	Total Recoverable	Water	3005A	
240-178047-6	MW-16-06	Total Recoverable	Water	3005A	
240-178047-8	PZ-1	Total Recoverable	Water	3005A	
240-178047-10	PZ-3	Total Recoverable	Water	3005A	
240-178047-11	PZ-4	Total Recoverable	Water	3005A	
240-178047-12	PZ-5	Total Recoverable	Water	3005A	
240-178047-13	P-01	Total Recoverable	Water	3005A	
240-178047-14	LE-01	Total Recoverable	Water	3005A	
240-178047-15	SW-001	Total Recoverable	Water	3005A	
240-178047-16	DUP-01	Total Recoverable	Water	3005A	
MB 240-556258/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556258/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-178047-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178047-1 MSD	MW-16-01	Total Recoverable	Water	3005A	

Prep Batch: 556526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-9	PZ-2	Total Recoverable	Water	3005A	
MB 240-556526/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556526/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-556526/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 556606

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total Recoverable	Water	6020	556258
240-178047-2	MW-16-02	Total Recoverable	Water	6020	556258
240-178047-3	MW-16-03	Total Recoverable	Water	6020	556258
240-178047-4	MW-16-04	Total Recoverable	Water	6020	556258
240-178047-5	MW-16-05	Total Recoverable	Water	6020	556258
240-178047-6	MW-16-06	Total Recoverable	Water	6020	556258
240-178047-8	PZ-1	Total Recoverable	Water	6020	556258
240-178047-10	PZ-3	Total Recoverable	Water	6020	556258
240-178047-11	PZ-4	Total Recoverable	Water	6020	556258
240-178047-12	PZ-5	Total Recoverable	Water	6020	556258
240-178047-13	P-01	Total Recoverable	Water	6020	556258
240-178047-14	LE-01	Total Recoverable	Water	6020	556258
240-178047-15	SW-001	Total Recoverable	Water	6020	556258
240-178047-16	DUP-01	Total Recoverable	Water	6020	556258
MB 240-556258/1-A	Method Blank	Total Recoverable	Water	6020	556258
LCS 240-556258/2-A	Lab Control Sample	Total Recoverable	Water	6020	556258
240-178047-1 MS	MW-16-01	Total Recoverable	Water	6020	556258
240-178047-1 MSD	MW-16-01	Total Recoverable	Water	6020	556258

Prep Batch: 556682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total Recoverable	Water	3005A	
240-178047-2	MW-16-02	Total Recoverable	Water	3005A	

Metals (Continued)

Prep Batch: 556682 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-3	MW-16-03	Total Recoverable	Water	3005A	
240-178047-4	MW-16-04	Total Recoverable	Water	3005A	
240-178047-5	MW-16-05	Total Recoverable	Water	3005A	
240-178047-6	MW-16-06	Total Recoverable	Water	3005A	
240-178047-8	PZ-1	Total Recoverable	Water	3005A	
240-178047-10	PZ-3	Total Recoverable	Water	3005A	
240-178047-11	PZ-4	Total Recoverable	Water	3005A	
240-178047-12	PZ-5	Total Recoverable	Water	3005A	
240-178047-13	P-01	Total Recoverable	Water	3005A	
240-178047-14	LE-01	Total Recoverable	Water	3005A	
240-178047-15	SW-001	Total Recoverable	Water	3005A	
240-178047-16	DUP-01	Total Recoverable	Water	3005A	
MB 240-556682/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556682/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-178047-1 MS	MW-16-01	Total Recoverable	Water	3005A	
240-178047-1 MSD	MW-16-01	Total Recoverable	Water	3005A	

Analysis Batch: 556763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-9	PZ-2	Total Recoverable	Water	6010B	556526
MB 240-556526/1-A	Method Blank	Total Recoverable	Water	6010B	556526
LCS 240-556526/2-A	Lab Control Sample	Total Recoverable	Water	6010B	556526

Analysis Batch: 556813

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-9	PZ-2	Total Recoverable	Water	6020	556526
240-178047-12	PZ-5	Total Recoverable	Water	6020	556258
MB 240-556526/1-A	Method Blank	Total Recoverable	Water	6020	556526
LCS 240-556526/3-A	Lab Control Sample	Total Recoverable	Water	6020	556526

Analysis Batch: 556918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total Recoverable	Water	6010B	556682
240-178047-2	MW-16-02	Total Recoverable	Water	6010B	556682
240-178047-3	MW-16-03	Total Recoverable	Water	6010B	556682
240-178047-4	MW-16-04	Total Recoverable	Water	6010B	556682
240-178047-5	MW-16-05	Total Recoverable	Water	6010B	556682
240-178047-6	MW-16-06	Total Recoverable	Water	6010B	556682
240-178047-8	PZ-1	Total Recoverable	Water	6010B	556682
240-178047-10	PZ-3	Total Recoverable	Water	6010B	556682
240-178047-11	PZ-4	Total Recoverable	Water	6010B	556682
240-178047-12	PZ-5	Total Recoverable	Water	6010B	556682
240-178047-13	P-01	Total Recoverable	Water	6010B	556682
240-178047-14	LE-01	Total Recoverable	Water	6010B	556682
240-178047-15	SW-001	Total Recoverable	Water	6010B	556682
240-178047-16	DUP-01	Total Recoverable	Water	6010B	556682
MB 240-556682/1-A	Method Blank	Total Recoverable	Water	6010B	556682
LCS 240-556682/2-A	Lab Control Sample	Total Recoverable	Water	6010B	556682
240-178047-1 MS	MW-16-01	Total Recoverable	Water	6010B	556682
240-178047-1 MSD	MW-16-01	Total Recoverable	Water	6010B	556682

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Metals

Analysis Batch: 556924

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-9	PZ-2	Total Recoverable	Water	6020	556526

General Chemistry

Analysis Batch: 556464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total/NA	Water	2320B-1997	
240-178047-2	MW-16-02	Total/NA	Water	2320B-1997	
240-178047-3	MW-16-03	Total/NA	Water	2320B-1997	
240-178047-4	MW-16-04	Total/NA	Water	2320B-1997	
240-178047-5	MW-16-05	Total/NA	Water	2320B-1997	
240-178047-6	MW-16-06	Total/NA	Water	2320B-1997	
240-178047-8	PZ-1	Total/NA	Water	2320B-1997	
240-178047-9	PZ-2	Total/NA	Water	2320B-1997	
240-178047-10	PZ-3	Total/NA	Water	2320B-1997	
240-178047-11	PZ-4	Total/NA	Water	2320B-1997	
240-178047-12	PZ-5	Total/NA	Water	2320B-1997	
240-178047-13	P-01	Total/NA	Water	2320B-1997	
240-178047-14	LE-01	Total/NA	Water	2320B-1997	
240-178047-15	SW-001	Total/NA	Water	2320B-1997	
240-178047-16	DUP-01	Total/NA	Water	2320B-1997	
MB 240-556464/109	Method Blank	Total/NA	Water	2320B-1997	
MB 240-556464/83	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-556464/108	Lab Control Sample	Total/NA	Water	2320B-1997	
240-178047-6 DU	MW-16-06	Total/NA	Water	2320B-1997	

Analysis Batch: 557247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total/NA	Water	9056A	
240-178047-1	MW-16-01	Total/NA	Water	9056A	
240-178047-2	MW-16-02	Total/NA	Water	9056A	
240-178047-2	MW-16-02	Total/NA	Water	9056A	
240-178047-3	MW-16-03	Total/NA	Water	9056A	
240-178047-3	MW-16-03	Total/NA	Water	9056A	
240-178047-4	MW-16-04	Total/NA	Water	9056A	
240-178047-4	MW-16-04	Total/NA	Water	9056A	
240-178047-5	MW-16-05	Total/NA	Water	9056A	
240-178047-5	MW-16-05	Total/NA	Water	9056A	
240-178047-6	MW-16-06	Total/NA	Water	9056A	
240-178047-6	MW-16-06	Total/NA	Water	9056A	
240-178047-8	PZ-1	Total/NA	Water	9056A	
240-178047-9	PZ-2	Total/NA	Water	9056A	
240-178047-10	PZ-3	Total/NA	Water	9056A	
240-178047-11	PZ-4	Total/NA	Water	9056A	
240-178047-12	PZ-5	Total/NA	Water	9056A	
240-178047-12	PZ-5	Total/NA	Water	9056A	
240-178047-13	P-01	Total/NA	Water	9056A	
240-178047-14	LE-01	Total/NA	Water	9056A	
240-178047-15	SW-001	Total/NA	Water	9056A	
240-178047-15	SW-001	Total/NA	Water	9056A	
240-178047-16	DUP-01	Total/NA	Water	9056A	

General Chemistry (Continued)

Analysis Batch: 557247 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-16	DUP-01	Total/NA	Water	9056A	
MB 240-557247/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557247/4	Lab Control Sample	Total/NA	Water	9056A	
240-178047-14 MS	LE-01	Total/NA	Water	9056A	
240-178047-14 MSD	LE-01	Total/NA	Water	9056A	

Analysis Batch: 557360

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-2	MW-16-02	Total/NA	Water	9056A	
240-178047-3	MW-16-03	Total/NA	Water	9056A	
240-178047-4	MW-16-04	Total/NA	Water	9056A	
240-178047-5	MW-16-05	Total/NA	Water	9056A	
240-178047-6	MW-16-06	Total/NA	Water	9056A	
240-178047-8	PZ-1	Total/NA	Water	9056A	
240-178047-9	PZ-2	Total/NA	Water	9056A	
240-178047-10	PZ-3	Total/NA	Water	9056A	
240-178047-11	PZ-4	Total/NA	Water	9056A	
240-178047-12	PZ-5	Total/NA	Water	9056A	
MB 240-557360/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557360/4	Lab Control Sample	Total/NA	Water	9056A	
240-178047-12 MS	PZ-5	Total/NA	Water	9056A	
240-178047-12 MSD	PZ-5	Total/NA	Water	9056A	

Analysis Batch: 557515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178047-1	MW-16-01	Total/NA	Water	9060A	
240-178047-2	MW-16-02	Total/NA	Water	9060A	
240-178047-3	MW-16-03	Total/NA	Water	9060A	
240-178047-4	MW-16-04	Total/NA	Water	9060A	
240-178047-5	MW-16-05	Total/NA	Water	9060A	
240-178047-6	MW-16-06	Total/NA	Water	9060A	
240-178047-8	PZ-1	Total/NA	Water	9060A	
240-178047-9	PZ-2	Total/NA	Water	9060A	
240-178047-10	PZ-3	Total/NA	Water	9060A	
240-178047-11	PZ-4	Total/NA	Water	9060A	
240-178047-12	PZ-5	Total/NA	Water	9060A	
240-178047-13	P-01	Total/NA	Water	9060A	
240-178047-14	LE-01	Total/NA	Water	9060A	
240-178047-15	SW-001	Total/NA	Water	9060A	
240-178047-16	DUP-01	Total/NA	Water	9060A	
MB 240-557515/4	Method Blank	Total/NA	Water	9060A	
LCS 240-557515/5	Lab Control Sample	Total/NA	Water	9060A	

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe Fly Ash Basin

Job ID: 240-178047-1

Client Sample ID: MW-16-01

Lab Sample ID: 240-178047-1

Date Collected: 12/12/22 11:27
Date Received: 12/15/22 08:00

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 15:18
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 13:34
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:23
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/27/22 21:12
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/27/22 22:17
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 17:08

Client Sample ID: MW-16-02

Lab Sample ID: 240-178047-2

Date Collected: 12/12/22 14:13
Date Received: 12/15/22 08:00

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 15:47
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 13:50
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:28
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/27/22 22:39
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/27/22 23:01
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/28/22 22:31
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 17:43

Client Sample ID: MW-16-03

Lab Sample ID: 240-178047-3

Date Collected: 12/12/22 10:20
Date Received: 12/15/22 08:00

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 15:51
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 13:57
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:33
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/27/22 23:23
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/27/22 23:44
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/28/22 22:53
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 18:18

Client Sample ID: MW-16-04

Lab Sample ID: 240-178047-4

Date Collected: 12/12/22 09:04

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 15:55
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:00
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:37
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 00:06
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/28/22 00:28
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/28/22 23:14
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 18:53

Client Sample ID: MW-16-05

Lab Sample ID: 240-178047-5

Date Collected: 12/12/22 09:42

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:00
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:02
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:41
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 00:49
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/28/22 01:11
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/28/22 23:36
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 19:28

Client Sample ID: MW-16-06

Lab Sample ID: 240-178047-6

Date Collected: 12/12/22 13:28

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:04
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:05
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:45
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 01:33
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/28/22 02:38
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/28/22 23:58
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 20:03

Client Sample ID: PZ-1

Lab Sample ID: 240-178047-8

Date Collected: 12/13/22 10:16

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:08
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:07
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 09:56
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 02:59
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/29/22 00:20
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 20:38

Client Sample ID: PZ-2

Lab Sample ID: 240-178047-9

Date Collected: 12/12/22 15:38

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556526	SHB	EET CAN	12/19/22 12:00
Total Recoverable	Analysis	6010B		1	556763	KLC	EET CAN	12/20/22 14:27
Total Recoverable	Prep	3005A			556526	SHB	EET CAN	12/19/22 12:00
Total Recoverable	Analysis	6020		1	556813	AJC	EET CAN	12/20/22 16:11
Total Recoverable	Prep	3005A			556526	SHB	EET CAN	12/19/22 12:00
Total Recoverable	Analysis	6020		10	556924	AJC	EET CAN	12/21/22 18:48
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:04
Total/NA	Analysis	9056A		2	557247	JMB	EET CAN	12/28/22 03:43
Total/NA	Analysis	9056A		2	557360	JMB	EET CAN	12/29/22 00:41
Total/NA	Analysis	9060A		5	557515	MMS	EET CAN	12/28/22 21:14

Client Sample ID: PZ-3

Lab Sample ID: 240-178047-10

Date Collected: 12/13/22 11:18

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:12
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:10
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:09
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 04:26
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/29/22 01:03
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 22:09

Lab Chronicle

Client: TRC Environmental Corporation.

Job ID: 240-178047-1

Project/Site: CCR DTE Monroe Fly Ash Basin

Client Sample ID: PZ-4

Lab Sample ID: 240-178047-11

Date Collected: 12/13/22 09:13

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:16
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:12
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:13
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 05:09
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/29/22 02:08
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 22:44

Client Sample ID: PZ-5

Lab Sample ID: 240-178047-12

Date Collected: 12/13/22 13:13

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:20
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:15
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		5	556813	AJC	EET CAN	12/20/22 22:02
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:17
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 05:53
Total/NA	Analysis	9056A		5	557247	JMB	EET CAN	12/28/22 06:58
Total/NA	Analysis	9056A		1	557360	JMB	EET CAN	12/29/22 02:30
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 23:19

Client Sample ID: P-01

Lab Sample ID: 240-178047-13

Date Collected: 12/13/22 14:51

Matrix: Water

Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:24
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:17
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:21
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 07:20
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/28/22 23:55

Client Sample ID: LE-01

Lab Sample ID: 240-178047-14
Date Collected: 12/13/22 15:56
Matrix: Water
Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:37
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:19
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:25
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 08:03
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 00:30

Client Sample ID: SW-001

Lab Sample ID: 240-178047-15
Date Collected: 12/13/22 12:19
Matrix: Water
Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:41
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:27
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:29
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 09:08
Total/NA	Analysis	9056A		5	557247	JMB	EET CAN	12/28/22 09:30
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 01:06

Client Sample ID: DUP-01

Lab Sample ID: 240-178047-16
Date Collected: 12/12/22 00:00
Matrix: Water
Date Received: 12/15/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556682	SHB	EET CAN	12/20/22 12:00
Total Recoverable	Analysis	6010B		1	556918	RKT	EET CAN	12/21/22 16:45
Total Recoverable	Prep	3005A			556258	SHB	EET CAN	12/16/22 12:00
Total Recoverable	Analysis	6020		1	556606	AJC	EET CAN	12/19/22 14:29
Total/NA	Analysis	2320B-1997		1	556464	JMR	EET CAN	12/17/22 10:34
Total/NA	Analysis	9056A		1	557247	JMB	EET CAN	12/28/22 09:51
Total/NA	Analysis	9056A		10	557247	JMB	EET CAN	12/28/22 10:13
Total/NA	Analysis	9060A		1	557515	MMS	EET CAN	12/29/22 01:41

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

Accreditation/Certification Summary

Client: TRC Environmental Corporation.
Job ID: 240-178047-1
Project/Site: CCR DTE Monroe Fly Ash Basin

Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	01-08-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

2.1\|2.0

Chain of Custody Record

MICHIGAN
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16\|1.5

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Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-102238-37085.1
Client Contact: Jacob Krenz	Phone: 734-395-9804	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: MI	Page: Page 1 of 2
Company: TRC Environmental Corporation.	PWSID:	**Analysis Requested**		Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days): std			
State, Zip: MI, 48108-7080	Compliance Project: ∆ Yes ∆ No			
Phone: 313-971-7080(Tel) 313-971-9022(Fax)	PO #: ~~170071 - 2022~~ 193523			
Email: JKrenz@trccompanies.com	WO #: ~~370029.0003 P1 T2~~ [illegible]			
Project Name: Monroe FLY ASH BASIN CCR DTE ~~Belle River Power Aquifer~~	Project #: ~~[illegible]~~ 522171.0000.0000 P1			
Site: Michigan	SSOW#:			

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Y - Trizma
	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	2320B - Carb, BiCarb & Total Alkalinity	9056A_28D - Chloride, Sulfate	6020 - (MOD) Metals - Ca,Mg,Na,K, Mo, Se	TOC	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D			
MW-16-01	12-12-22	1127	G	Water	N	N	X	X	X	X	4	
MW-16-02	12-12-22	1413		Water			X	X	X	X	4	
MW-16-03	12-12-22	1020		Water			X	X	X	X	4	
MW-16-04	12-12-22	0904		Water			X	X	X	X	4	
MW-16-05	12-12-22	0942		Water			X	X	X	X	4	
MW-16-06	12-12-22	1328		Water			X	X	X	X	4	
MW-16-07	12-9-22	1253		Water			X	X	X	X	4	
PZ-1	12-13-22	1016		Water			X	X	X	X	4	
PZ-2	12-12-22	1538		Water			X	X	X	X	4	
PZ-3	12-13-22	1118		Water			X	X	X	X	4	
PZ-4	12-13-22	0913		Water			X	X	X	X	4	

240-178047 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	12-14-22 /0545	TRC	TRC Storage	12-14-22 /0545	TRC
	12-14-22 1307	TRC		12/14/22 1307	[illegible]
	12/14/22 1400	[illegible]	M. A. A.	12/15/22 8:00	[illegible]

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN
190

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Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-102238-37085.2
Client Contact: Jacob Krenz	Phone: 734-375-9804	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: MI	Page: Page 2 of 2
Company: TRC Environmental Corporation.	PWSID:			Job #:

Address: 1540 Eisenhower Place	**Due Date Requested:**
City: Ann Arbor	**TAT Requested (days):** Std
State, Zip: MI, 48108-7080	**Compliance Project:** Δ Yes Δ No
Phone: 313-971-7080(Tel) 313-971-9022(Fax)	PO #: ~~170071 - 2022~~ 193523
Email: JKrenz@trccompanies.com	WO #: ~~370029.0003 P1 T2~~
Project Name: Monroe Fly Ash Basin CCR DTE ~~Belle River Power/Aquifer~~	Project #: ~~24016403~~ S22171.0000.0000 P1
Site: Michigan	SSOW#:

Analysis Requested

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	2320B - Carb, BiCarb & Total Alkalinity	9056A_28D - Chloride, Sulfate	6020 - (MOD) Metals - Ca,Mg,Na,K, Mo, Ba	TOC	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D			
PZ-5	12-13-22	1313	G	Water	N	N	X	X	X	X	4	
P-01	12-13-22	1451	↓	Water	↓	↓	X	X	X	X	4	
LE-01	12-13-22	1556	↓	Water	↓	↓	X	X	X	X	4	
SW-001	12-13-22	1219	↓	Water	↓	↓	X	X	X	X	4	
Dup-01	12-12-22	—	↓	Water	↓	↓	X	X	X	X	4	
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* ________ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	12-14-22 / 0545	TRC	TRC storage	12-14-22 / 0545	TRC
	12-14-22 1307	TEC		12/14/22 1302	
	12/14/22 1400		M. A. A.	12/15/22 8:00	FEC

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Eurofins - Canton Sample Receipt Form/Narrative **Login # :** ______________
Barberton Facility

Client IRC ______ Site Name ______

Cooler unpacked by:

Cooler Received on 12-15-22 Opened on 12-15-22

FedEx: 1st Grd Exp UPS FAS [✓ Clipper] Client Drop Off Eurofins Courier Other ______

Receipt After-hours: Drop-off Date/Time ______ Storage Location ______

Eurofins Cooler # TA [✓ Foam Box] Client Cooler Box Other ______

Packing material used: [✓ Bubble Wrap] Foam Plastic Bag None Other ______

COOLANT: [✓ Wet Ice] Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☒ See Multiple Cooler Form

IR GUN # IR-13 (CF **-0.2** °C) Observed Cooler Temp. ______ °C Corrected Cooler Temp. ______ °C
IR GUN # IR-16 (CF **-0.1**°C) Observed Cooler Temp. ______ °C Corrected Cooler Temp. ______ °C
IR GUN # IR-17 (CF **-0.3**°C) Observed Cooler Temp. ______ °C Corrected Cooler Temp. ______ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1each	[✓ Yes] No	
-Were the seals on the outside of the cooler(s) signed & dated?	[✓ Yes] No	NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes [✓ No]	
-Were tamper/custody seals intact and uncompromised?	[✓ Yes] No	NA
3. Shippers' packing slip attached to the cooler(s)?	Yes [✓ No]	
4. Did custody papers accompany the sample(s)?	[✓ Yes] No	
5. Were the custody papers relinquished & signed in the appropriate place?	[✓ Yes] No	
6. Was/were the person(s) who collected the samples clearly identified on the COC?	[✓ Yes] No	
7. Did all bottles arrive in good condition (Unbroken)?	[✓ Yes] No	
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?	[✓ Yes] No	
9. For each sample, does the COC specify preservatives ([✓ Y]/N), # of containers ([✓ Y]/N), and sample type of grab/comp([✓ Y]/N)?		
10. Were correct bottle(s) used for the test(s) indicated?	[✓ Yes] No	
11. Sufficient quantity received to perform indicated analyses?	[✓ Yes] No	
12. Are these work share samples and all listed on the COC? If yes, Questions 13-17 have been checked at the originating laboratory.	Yes [✓ No]	
13. Were all preserved sample(s) at the correct pH upon receipt? TR	~~Yes~~ [✓ No]	NA pH Strip Lot# **HC291590**
14. Were VOAs on the COC?	[✓ Yes] No	
15. Were air bubbles >6 mm in any VOA vials? ● ← Larger than this.	Yes [✓ No]	NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # ______	Yes [✓ No]	
17. Was a LL Hg or Me Hg trip blank present? ______	Yes [✓ No]	

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM ______ Date ______ by ______ via Verbal Voice Mail Other

Concerning ______

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by:

MW-16-07 did not arrive in cooler.

19. SAMPLE CONDITION

Sample(s) ______ were received after the recommended holding time had expired.
Sample(s) ______ were received in a broken container.
Sample(s) ______ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) ______ were further preserved in the laboratory.
Time preserved: ______ Preservative(s) added/Lot number(s): ______

VOA Sample Preservation - Date/Time VOAs Frozen: ______

Login Container Summary Report

1 2 3 4 5 6 7 8 9 10 11 12 13

Temperature readings: ______________________________

Client Sample ID		Lab ID	Container Type	Container		Preservative	
				pH	Temp	Added (mls)	Lot #
MW-16-01		240-178047-D-1	Plastic 500ml - with Nitric Acid	<2			
MW-16-02		240-178047-D-2	Plastic 500ml - with Nitric Acid	<2			
MW-16-03		240-178047-D-3	Plastic 500ml - with Nitric Acid	<2			
MW-16-04		240-178047-D-4	Plastic 500ml - with Nitric Acid	<2			
MW-16-05		240-178047-D-5	Plastic 500ml - with Nitric Acid	<2			
MW-16-06		240-178047-D-6	Plastic 500ml - with Nitric Acid	<2			
~~MW-16-07~~	N.A.A.	~~240-178047-D-7~~	~~Plastic 500ml - with Nitric Acid~~	~~<2~~			
PZ-1		240-178047-D-8	Plastic 500ml - with Nitric Acid	<2			
PZ-2		240-178047-D-9	Plastic 500ml - with Nitric Acid	<2			
PZ-3		240-178047-D-10	Plastic 500ml - with Nitric Acid	<2			
PZ-4		240-178047-D-11	Plastic 500ml - with Nitric Acid	<2			
PZ-5		240-178047-D-12	Plastic 500ml - with Nitric Acid	<2			
P-01		240-178047-D-13	Plastic 500ml - with Nitric Acid	<2			
LE-01		240-178047-D-14	Plastic 500ml - with Nitric Acid	<2			
SW-001		240-178047-D-15	Plastic 500ml - with Nitric Acid	<2			
DUP-01		240-178047-D-16	Plastic 500ml - with Nitric Acid	<2			

Login # : ______________

Eurofins - Canton Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
[✓ EC] Client Box Other	IR-13 [✓ IR-16] IR-17	2.1	2.0	[✓ Wet Ice] Blue Ice Dry Ice Water None
[✓ EC] Client Box Other	IR-13 [✓ IR-16] IR-17	1.6	1.5	[✓ Wet Ice] Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR-13 IR-16 IR-17			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Vincent Buening
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

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JOB DESCRIPTION

CCR DTE Monroe FAB

JOB NUMBER

240-178303-1

Eurofins Canton
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

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Authorization

Kris Brooks

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

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Table of Contents

Definitions/Glossary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe FAB

Job ID: 240-178303-1

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Job ID: 240-178303-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-178303-1

Receipt
The sample was received on 12/20/2022 10:00 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe FAB

Job ID: 240-178303-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAN
6020	Metals (ICP/MS)	SW846	EET CAN
2320B-1997	Alkalinity, Total	SM	EET CAN
9056A	Anions, Ion Chromatography	SW846	EET CAN
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CAN

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

Sample Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe FAB

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-178303-1	MW-16-07	Water	12/09/22 12:53	12/20/22 10:00

Detection Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe FAB

Job ID: 240-178303-1

Client Sample ID: MW-16-07

Lab Sample ID: 240-178303-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	190		100	57	ug/L	1		6010B	Total Recoverable
Barium	6.2		5.0	5.0	ug/L	1		6020	Total Recoverable
Calcium	380000		1000	1000	ug/L	1		6020	Total Recoverable
Magnesium	120000		1000	1000	ug/L	1		6020	Total Recoverable
Potassium	2700		1000	1000	ug/L	1		6020	Total Recoverable
Strontium	12000		10	10	ug/L	1		6020	Total Recoverable
Sodium	6900		1000	1000	ug/L	1		6020	Total Recoverable
Lithium	34		8.0	8.0	ug/L	1		6020	Total Recoverable
Alkalinity	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Bicarbonate Alkalinity as CaCO3	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	7.6		1.0	1.0	mg/L	1		9056A	Total/NA
Fluoride	1.6		0.050	0.050	mg/L	1		9056A	Total/NA
Sulfate	1300		10	10	mg/L	10		9056A	Total/NA
Total Organic Carbon	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 1	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 2	1.3		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 3	1.4		1.0	0.35	mg/L	1		9060A	Total/NA
TOC Result 4	1.4		1.0	0.35	mg/L	1		9060A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client Sample ID: MW-16-07

Lab Sample ID: 240-178303-1

Date Collected: 12/09/22 12:53
Date Received: 12/20/22 10:00
Matrix: Water

Method: SW846 6010B - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**190**		100	57	ug/L		12/21/22 12:00	12/23/22 04:36	1

Method: SW846 6020 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	**6.2**		5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:51	1
Calcium	**380000**		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:51	1
Magnesium	**120000**		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:51	1
Potassium	**2700**		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:51	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:51	1
Strontium	**12000**		10	10	ug/L		12/21/22 12:00	12/22/22 16:51	1
Sodium	**6900**		1000	1000	ug/L		12/21/22 12:00	12/22/22 16:51	1
Lithium	**34**		8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity (SM 2320B-1997)	**190**		5.0	2.6	mg/L			12/21/22 20:43	1
Bicarbonate Alkalinity as CaCO3 (SM 2320B-1997)	**190**		5.0	2.6	mg/L			12/21/22 20:43	1
Carbonate Alkalinity as CaCO3 (SM 2320B-1997)	5.0	U	5.0	2.6	mg/L			12/21/22 20:43	1
Chloride (SW846 9056A)	**7.6**		1.0	1.0	mg/L			12/30/22 12:01	1
Fluoride (SW846 9056A)	**1.6**		0.050	0.050	mg/L			12/30/22 12:01	1
Sulfate (SW846 9056A)	**1300**		10	10	mg/L			12/30/22 12:23	10
Total Organic Carbon (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 21:24	1
TOC Result 1 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 21:24	1
TOC Result 2 (SW846 9060A)	**1.3**		1.0	0.35	mg/L			12/29/22 21:24	1
TOC Result 3 (SW846 9060A)	**1.4**		1.0	0.35	mg/L			12/29/22 21:24	1
TOC Result 4 (SW846 9060A)	**1.4**		1.0	0.35	mg/L			12/29/22 21:24	1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-556847/1-A
Matrix: Water
Analysis Batch: 557096

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556847

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	U	100	57	ug/L		12/21/22 12:00	12/23/22 03:19	1

Lab Sample ID: LCS 240-556847/2-A
Matrix: Water
Analysis Batch: 557096

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556847

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1000	979		ug/L		98	80 - 120

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 240-556847/1-A
Matrix: Water
Analysis Batch: 557119

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 556847

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Calcium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Magnesium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Potassium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Molybdenum	5.0	U	5.0	5.0	ug/L		12/21/22 12:00	12/22/22 16:05	1
Strontium	10	U	10	10	ug/L		12/21/22 12:00	12/22/22 16:05	1
Sodium	1000	U	1000	1000	ug/L		12/21/22 12:00	12/22/22 16:05	1
Lithium	8.0	U	8.0	8.0	ug/L		12/21/22 12:00	12/22/22 16:05	1

Lab Sample ID: LCS 240-556847/3-A
Matrix: Water
Analysis Batch: 557119

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 556847

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1000	1010		ug/L		101	80 - 120
Calcium	25000	24200		ug/L		97	80 - 120
Magnesium	25000	23700		ug/L		95	80 - 120
Potassium	25000	24300		ug/L		97	80 - 120
Molybdenum	500	458		ug/L		92	80 - 120
Strontium	500	470		ug/L		94	80 - 120
Sodium	25000	23900		ug/L		95	80 - 120
Lithium	500	482		ug/L		96	80 - 120

Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: MB 240-557050/4
Matrix: Water
Analysis Batch: 557050

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	2.6	mg/L			12/21/22 18:59	1

Method: 2320B-1997 - Alkalinity, Total (Continued)

Lab Sample ID: LCS 240-557050/3
Matrix: Water
Analysis Batch: 557050

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity	146	149		mg/L		102	86 - 123

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-557525/3
Matrix: Water
Analysis Batch: 557525

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	1.0	mg/L			12/30/22 02:25	1
Fluoride	0.050	U	0.050	0.050	mg/L			12/30/22 02:25	1
Sulfate	1.0	U	1.0	1.0	mg/L			12/30/22 02:25	1

Lab Sample ID: LCS 240-557525/4
Matrix: Water
Analysis Batch: 557525

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	49.1		mg/L		98	90 - 110
Fluoride	2.50	2.67		mg/L		107	90 - 110
Sulfate	50.0	50.7		mg/L		101	90 - 110

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557788/3
Matrix: Water
Analysis Batch: 557788

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1
TOC Result 1	1.0	U	1.0	0.35	mg/L			12/29/22 14:16	1

Lab Sample ID: LCS 240-557788/4
Matrix: Water
Analysis Batch: 557788

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.0		mg/L		98	85 - 115
TOC Result 1	18.3	18.0		mg/L		98	85 - 115

QC Association Summary

Metals

Prep Batch: 556847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total Recoverable	Water	3005A	
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 557096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total Recoverable	Water	6010B	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6010B	556847
LCS 240-556847/2-A	Lab Control Sample	Total Recoverable	Water	6010B	556847

Analysis Batch: 557119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total Recoverable	Water	6020	556847
MB 240-556847/1-A	Method Blank	Total Recoverable	Water	6020	556847
LCS 240-556847/3-A	Lab Control Sample	Total Recoverable	Water	6020	556847

General Chemistry

Analysis Batch: 557050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total/NA	Water	2320B-1997	
MB 240-557050/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-557050/3	Lab Control Sample	Total/NA	Water	2320B-1997	

Analysis Batch: 557525

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total/NA	Water	9056A	
240-178303-1	MW-16-07	Total/NA	Water	9056A	
MB 240-557525/3	Method Blank	Total/NA	Water	9056A	
LCS 240-557525/4	Lab Control Sample	Total/NA	Water	9056A	

Analysis Batch: 557788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-178303-1	MW-16-07	Total/NA	Water	9060A	
MB 240-557788/3	Method Blank	Total/NA	Water	9060A	
LCS 240-557788/4	Lab Control Sample	Total/NA	Water	9060A	

Client Sample ID: MW-16-07
Date Collected: 12/09/22 12:53
Date Received: 12/20/22 10:00

Lab Sample ID: 240-178303-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6010B		1	557096	RKT	EET CAN	12/23/22 04:36
Total Recoverable	Prep	3005A			556847	SHB	EET CAN	12/21/22 12:00
Total Recoverable	Analysis	6020		1	557119	AJC	EET CAN	12/22/22 16:51
Total/NA	Analysis	2320B-1997		1	557050	JWW	EET CAN	12/21/22 20:43
Total/NA	Analysis	9056A		1	557525	JMB	EET CAN	12/30/22 12:01
Total/NA	Analysis	9056A		10	557525	JMB	EET CAN	12/30/22 12:23
Total/NA	Analysis	9060A		1	557788	MMS	EET CAN	12/29/22 21:24

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

Accreditation/Certification Summary

Client: TRC Environmental Corporation.
Project/Site: CCR DTE Monroe FAB

Job ID: 240-178303-1

Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

MICHIGAN
190

Chain of Custody Record

3.2/3.0

eurofins | Environment Testing

Client Information	Sampler: J. Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-102238-37085.3
Client Contact: Jacob Krenz	Phone: 734-395-9804	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 3 of 7
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: ∆ Yes ∆ No			
Phone: 313-971-7080(Tel) 313-971-9022(Fax)	PO #: ~~170071 - 2022~~ 193675			
Email: JKrenz@trccompanies.com	WO #: ~~370029.0003 P1T2~~			
Project Name: CCR DTE ~~Belle River Power~~ Monroe FAB Aquifer	Project #: ~~24016463~~ 522171.0000.0000 F1			
Site: Michigan	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	2320B - Carb, BiCarb & Total Alkalinity	9056A_28D - Chloride, Sulfate	6020 - (MOD) Metals - Ca,Mg,Na,K, Ba, B, Mo, Li	TOC	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D	A		
MW-16-07	12-9-22	1253	G	Water	N	N	X	X	X	X	4	
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								
				Water								

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Y - Trizma
	Z - other (specify)

Other:

240-178303 Chain of Custody

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 12-19-22 / 0850	Company: TRC	Received by: TRC Storage	Date/Time: 12-19-22 / 0850	Company: TRC
Relinquished by: TRC Storage	Date/Time: 12/19/22/1039	Company: TRC	Received by:	Date/Time: 12/19/22 1044	Company:
Relinquished by:	Date/Time: 12/19/22 1400	Company:	Received by:	Date/Time: 12-20-22 10:00	Company: ETA

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Eurofins - Canton Sample Receipt Form/Narrative **Login # : 178303**
Barberton Facility

Client TRC Site Name ______

Cooler unpacked by: Charrek

Cooler Received on 12-20-22 Opened on 12-20-22

FedEx: 1st Grd [✓ Exp] UPS FAS Clipper Client Drop Off Eurofins Courier Other ______

Receipt After-hours: Drop-off Date/Time ______ Storage Location ______

Eurofins Cooler # 5C Foam Box Client Cooler Box Other ______

Packing material used: [✓ Bubble Wrap] Foam [✓ Plastic Bag] None Other ______

COOLANT: [✓ Wet Ice] Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form

IR GUN # IR-13 (CF **-0.2** °C)	Observed Cooler Temp. 3.2 °C	Corrected Cooler Temp. 3.0 °C
IR GUN # IR-16 (CF **-0.1**°C)	Observed Cooler Temp. ______ °C	Corrected Cooler Temp. ______ °C
IR GUN # IR-17 (CF **-0.3**°C)	Observed Cooler Temp. ______ °C	Corrected Cooler Temp. ______ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity ______	[✓ Yes]	No	
-Were the seals on the outside of the cooler(s) signed & dated?	[✓ Yes]	No	NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	[✓ No]	
-Were tamper/custody seals intact and uncompromised?	[✓ Yes]	No	NA
3. Shippers' packing slip attached to the cooler(s)?	[✓ Yes]	No	
4. Did custody papers accompany the sample(s)?	[✓ Yes]	No	
5. Were the custody papers relinquished & signed in the appropriate place?	[✓ Yes]	No	
6. Was/were the person(s) who collected the samples clearly identified on the COC?	[✓ Yes]	No	
7. Did all bottles arrive in good condition (Unbroken)?	[✓ Yes]	No	
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?	[✓ Yes]	No	

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

9. For each sample, does the COC specify preservatives ([✓ Y]/N), # of containers ([✓ Y]/N), and sample type of grab/comp([✓ Y]/N)?

10. Were correct bottle(s) used for the test(s) indicated?	[✓ Yes]	No	
11. Sufficient quantity received to perform indicated analyses?	[✓ Yes]	No	
12. Are these work share samples and all listed on the COC? If yes, Questions 13-17 have been checked at the originating laboratory.	Yes	[✓ No]	
13. Were all preserved sample(s) at the correct pH upon receipt?	[✓ Yes]	No	NA pH Strip Lot# **HC291590**
14. Were VOAs on the COC?	[✓ Yes]	No	
15. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this.	Yes	[✓ No]	NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # ______	Yes	[✓ No]	
17. Was a LL Hg or Me Hg trip blank present? ______	Yes	[✓ No]	

Contacted PM ______ Date ______ by ______ via Verbal Voice Mail Other

Concerning ______

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by:

19. SAMPLE CONDITION

Sample(s) ______ were received after the recommended holding time had expired.
Sample(s) ______ were received in a broken container.
Sample(s) ______ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) ______ were further preserved in the laboratory.
Time preserved: ______ Preservative(s) added/Lot number(s): ______

VOA Sample Preservation - Date/Time VOAs Frozen: ______

WI-NC-099

Login Container Summary Report

Temperature readings: ______________________________

Client Sample ID	Lab ID	Container Type	Container pH	Temp	Preservative Added (mls)	Lot #
MW-16-07	240-178303-D-1	Plastic 500ml - with Nitric Acid	_____	_____	_________	____________

ALS Scandinavia

ANALYSIS REPORT

Issued by:	ALS Scandinavia Luleå, Aurorum 10, SE-977 75 LULEÅ, Sweden
Client:	TRC
Date of receipt:	2022-12-22
Date of analysis:	2023-01-12
Order number(our):	LE2216212
Your reference:	Vincent Buening
Our reference:	Ilia Rodushkin

Lab number(our)	**Sample name**	**δ11B, ‰**	2SD, ‰	**δ^7Li, ‰**	2SD, ‰	**^{87}Sr/^{86}Sr**	2 SD
LE2216212-001	**MW-16-01**	**-0.17**	*0.72*	**12.22**	*0.76*	**0.708454**	*0.000013*
LE2216212-001	**MW-16-01, r.2**	**-0.40**	*0.64*	**11.99**	*0.62*	**0.708488**	*0.000019*
LE2216212-002	**MW-16-02**	**3.75**	*0.55*	**14.23**	*0.66*	**0.708472**	*0.000007*
LE2216212-003	**MW-16-03**	**5.38**	*0.66*	**14.11**	*0.64*	**0.708469**	*0.000023*
LE2216212-004	**MW-16-04**	**5.14**	*0.58*	**13.22**	*0.72*	**0.708478**	*0.000013*
LE2216212-005	**MW-16-05**	**2.47**	*0.67*	**11.63**	*0.70*	**0.708472**	*0.000008*
LE2216212-006	**MW-16-06**	**2.32**	*0.65*	**13.60**	*0.77*	**0.708473**	*0.000039*
LE2216212-007	**MW-16-07**	**2.31**	*0.61*	**11.09**	*0.65*	**0.708479**	*0.000030*
LE2216212-008	**PZ-1**	**-11.37**	*0.60*	**16.48**	*0.69*	**0.710655**	*0.000022*
LE2216212-009	**PZ-2**	**-4.12**	*0.66*	**18.07***	*8.14*	**0.711936**	*0.000024*
LE2216212-010	**PZ-3**	**-3.00**	*0.67*	**24.25**	*0.70*	**0.711467**	*0.000030*
LE2216212-011	**PZ-4**	**-17.58**	*0.63*	**8.72**	*0.63*	**0.710690**	*0.000013*
LE2216212-011	**PZ-4, r.2**	**-16.94**	*0.71*	**7.78**	*0.81*	**0.710664**	*0.000010*
LE2216212-012	**PZ-5**	**-16.26**	*0.62*	**14.95**	*0.98*	**0.709300**	*0.000033*
LE2216212-013	**P-01**	**9.09**	*0.59*	**19.32**	*0.71*	**0.708543**	*0.000037*
LE2216212-014	**LE-01**	**6.98**	*0.68*	**18.18**	*0.82*	**0.708391**	*0.000009*
LE2216212-015	**SW-001**	**-9.60**	*0.67*	**3.41**	*0.75*	**0.711685**	*0.000022*
LE2216212-016	**DUP-01**	**-0.36**	*0.70*	**12.17**	*0.69*	**0.708475**	*0.000020*

Comments

* - Li content is too low for precise measurement

Comments

The analysis is carried out by MC-ICP-MS (NEPTUNE Plus) using internal standartization

and external calibration with bracketing isotope SRMs

Analysis is carried out after ion exchange separation

Li delta value calculated against LSVEC NIST 8545 RM

Boron delta values calculated to NIST SRM 951 RM

SD calculated from two independent consequintive measurements

* - Li content is too low for precise measurement

Signature

Ilia Rodushkin
Associate Professor
LABORATORY MANAGER
ALS Scandinavia AB

Waterloo EIL

Client: Buening/TRC

Project: Monroe Fly Ash Basin

ISO# 2022713
Location: C4
16 for 18O, 2H

Environmental Isotope Lab
2023-01-05
1 of 1

#	Sample	Date	Lab#	$\delta^{18}O$	Result	Repeat	$\delta^{2}H$	Result	Repeat		pH	EC	AZD
				H_2O	VSMOW	± 0.2‰	H_2O	VSMOW	± 0.8‰			uS/cm	
1	MW-16-01	2022-12-12	495315	X	-7.63	-7.47	X	-50.79	-51.41	250ml	7.11	1,873	
2	MW-16-02	2022-12-12	495316	X	-7.62		X	-50.26		250ml	7.1	1,899	
3	MW-16-03	2022-12-12	495317	X	-7.79		X	-50.30		250ml	6.99	1,982	
4	MW-16-04	2022-12-12	495318	X	-9.00	-9.03	X	-55.98	-56.16	250ml	7.02	1,870	
5	MW-16-05	2022-12-12	495319	X	-7.95		X	-51.63		250ml	6.98	1,873	
6	MW-16-06	2022-12-12	495320	X	-7.86		X	-50.81		250ml	7.09	1,882	
7	MW-16-07	2012-12-09	495321	X	-8.20		X	-52.53		250ml	6.93	1,761	
8	PZ-1	2022-12-13	495322	X	-7.38	-7.33	X	-48.31	-48.20	250ml	12.2	1,225	
9	PZ-2	2022-12-12	495323	X	-7.49		X	-51.38		250ml	12.8	5,657	
10	PZ-3	2022-12-13	495324	X	-7.43		X	-50.85		250ml	12.4	1,842	
11	PZ-4	2022-12-13	495325	X	-7.51		X	-49.92		250ml	11.6	732	
12	PZ-5	2022-12-13	495326	X	-6.95	-6.84	X	-48.02	-47.78	250ml	10.8	959	
13	P-01	2022-12-13	495327	X	-7.66		X	-53.18		250ml	7.84	669	
14	LE-01	2022-12-13	495328	X	-6.88		X	-49.86		250ml	8.41	207	
15	SW-001	2022-12-13	495329	X	-6.69		X	-47.60		250ml	9.22	776	
16	DUP-01	2022-12-12	495330	X	-7.79	-7.81	X	-51.64	-51.75	250ml	7.11	1,873	

ENVIRONMENTAL
ISOTOPE
LABORATORY

Miami Tritium Laboratory

UNIVERSITY
OF MIAMI

Rosenstiel School of Marine,
Atmospheric, and Earth Science
Tritium Laboratory

4600 Rickenbacker Causeway
Miami, FL 33149-1031

P: 305-421-4100
F: 305-421-4112
tritium@miami.edu

March 14, 2023

TRITIUM LABORATORY

Data Release #23-012
Job # 4255

TRC Companies
TRITIUM SAMPLES

Dr. James D. Happell
Associate Research Professor

Distribution:
Vince Buening
1540 Eisenhower Place
Ann Arbor, MI 48108
vbuening@trccompanies.com

COMMENTS ON TRITIUM RESULTS (revision date 29 November 2016)

Tritium Scale New Half-life

Tritium concentrations are normally expressed in TU, where 1 TU indicates a T/H abundance ratio of 10^{-18}. The values refer to the tritium scale recommended by U.S. National Institute of Science and Technology (NIST, formerly NBS), and International Atomic Energy Agency (IAEA). The TU-numbers are based on the NIST tritium water standard #4926E. Age corrections and conversions are made using the recommended half-life of **12.32 years**, i.e., a decay rate of $\lambda = 5.626\%\ \text{year}^{-1}$. In this scale, 1 TU is equivalent to 7.151 dpm/kg H_2O, or 3.222 pCi/kg H_2O, (equivalent to pCi/L in freshwater) or 0.1192 Bq/kg H_2O (Bq = disint/sec). We can also express tritium concentrations in pCi/L upon client request.

Tritium concentrations in TU or pCi/L are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used.

The stated errors, eTU or err, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Very low tritium values

In some cases, negative tritium values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU or pCi/L. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU or pCi/L should be used.

Additional information

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling", and our Web-site www.rsmas.miami.edu/groups/tritium.

Tritium efficiencies and background values are somewhat different in each of the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2.4 TU. The background is typically 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

```
Client: TRC COMPANIES                                    Purchase Order: 193566
Recvd : 22/12/19                           Contact:  Vince Buening 734-904-3302
Job#  : 4255             vbuening@trccomapnies.com        1540 Eisenhower Place
Final : 23/03/14              MONPP FAB                     Ann Arbor, MI 48108

Cust  LABEL INFO                 JOB.SX  REFDATE QUANT   ELYS      TU      eTU
-------------------------------------------------------------------------------
MW-16-01                        4255.01   221212  1000    275      0.06    0.09
MW-16-02                        4255.02   221212  1000    275     -0.01    0.09
MW-16-03                        4255.03   221212  1000    275     -0.06    0.09
MW-16-04 ORIGINAL               4255.04   221212  1000    275      3.28    0.10
MW-16-04 RERUN                  4255.04   221212  1000    275      3.41    0.11
MW-16-04 AVERAGE                4255.04   221212  1000    275      3.34*   0.11
MW-16-05                        4255.05   221212  1000    275      0.05    0.09
MW-16-06                        4255.06   221212  1000    275     -0.05    0.09
MW-16-07                        4255.07   221209  1000    275     -0.07    0.09
PZ-1                            4255.08   221213  1000    275      6.32    0.21
PZ-2                            4255.09   221212  1000    275     10.8     0.4
PZ-3                            4255.10   221213  1000    275     10.2     0.3
PZ-4                            4255.11   221213  1000    275      5.97    0.20
PZ-5                            4255.12   221213  1000    275      5.92    0.20
P-01                            4255.13   221213  1000    275     20.0     0.7
LE-01                           4255.14   221213  1000    275     23.8     0.8
SW-001                          4255.15   221213  1000    275     21.3     0.7
DUP-01                          4255.16   221212  1000    275     -0.01    0.09
-------------------------------------------------------------------------------
*  Requested rerun agreed with original.  Above value is the average of the
   duplicate runs.
```

Appendix B
Statistical Results

Lithium Two sample t Test (4/7/2023 11:55:47)

Descriptive Statistics

		N	Mean	SD	SEM	Median
Monroe CCR Unit Water		5	16.494	5.60041	2.50458	16.48
Uppermost Aquifer		7	12.86429	1.24086	0.469	13.22
	Difference		3.62971		2.14899	
	Overall	12	14.37667	3.96718	1.14523	13.855

Standard Error of Mean (SEM) of difference is computed under the condition that equal variance is assumed.

t-Test Statistics

	t Statistic	DF	Prob>t
Equal Variance Assumed	1.68903	10	0.06105
Equal Variance NOT Assumed (Welch Correction)	1.42447	4.28193	0.11146

Null Hypothesis: mean1-mean2 <= 0
Alternative Hypothesis: mean1-mean2 > 0
At 0.05 level, when equal variance is assumed, Mean1 - Mean2 is NOT significantly greater than 0
At 0.05 level, when equal variance is NOT assumed, Mean1 - Mean2 is NOT significantly greater than 0

Oxygen Two sample t Test (4/7/2023 11:57:22)

Descriptive Statistics

		N	Mean	SD	SEM	Median
I"Monroe CCR Unit Water"		5	-7.352	0.23048	0.10307	-7.43
J"Uppermost Aquifer"		7	-8.03	0.46339	0.17515	-7.86
	Difference		0.678		0.22685	
	Overall	12	-7.7475	0.50826	0.14672	-7.705

Standard Error of Mean (SEM) of difference is computed under the condition that equal variance is assumed.

t-Test Statistics

	t Statistic	DF	Prob>t
Equal Variance Assumed	2.98882	10	0.0068
Equal Variance NOT Assumed (Welch Correction)	3.33621	9.21727	0.00421

Null Hypothesis: mean1-mean2 <= 0

Alternative Hypothesis: mean1-mean2 > 0

At 0.05 level, when equal variance is assumed, Mean1 - Mean2 is significantly greater than 0

At 0.05 level, when equal variance is NOT assumed, Mean1 - Mean2 is significantly greater than 0

Hydrogen Two sample t Test (4/7/2023 11:56:57)

Descriptive Statistics

		N	Mean	SD	SEM	Median
G"Monroe CCR Unit Water"		5	-49.696	1.49564	0.66887	-49.92
H"Uppermost Aquifer"		7	-51.87857	1.98403	0.74989	-51.63
	Difference		2.18257		1.05667	
	Overall	12	-50.96917	2.05515	0.59327	-50.83

Standard Error of Mean (SEM) of difference is computed under the condition that equal variance is assumed.

t-Test Statistics

	t Statistic	DF	Prob>t
Equal Variance Assumed	2.06552	10	0.03289
Equal Variance NOT Assumed (Welch Correction)	2.17203	9.92328	0.02759

Null Hypothesis: mean1-mean2 <= 0
Alternative Hypothesis: mean1-mean2 > 0
At 0.05 level, when equal variance is assumed, Mean1 - Mean2 is significantly greater than 0
At 0.05 level, when equal variance is NOT assumed, Mean1 - Mean2 is significantly greater than 0

Strontium Two sample t Test (4/7/2023 11:56:42)

Descriptive Statistics

		N	Mean	SD	SEM	Median
E"Monroe CCR Unit Water"		5	0.71081	0.001	4.48859E-4	0.71069
F"Uppermost Aquifer"		7	0.70847	5.34522E-6	2.02031E-6	0.70847
	Difference		0.00234		3.71698E-4	
	Overall	12	0.70945	0.00135	3.88947E-4	0.70848

Standard Error of Mean (SEM) of difference is computed under the condition that equal variance is assumed.

t-Test Statistics

	t Statistic	DF	Prob>t
Equal Variance Assumed	6.28928	10	4.51643E-5
Equal Variance NOT Assumed (Welch Correction)	5.20808	4.00016	0.00324

Null Hypothesis: mean1-mean2 <= 0
Alternative Hypothesis: mean1-mean2 > 0
At 0.05 level, when equal variance is assumed, Mean1 - Mean2 is significantly greater than 0
At 0.05 level, when equal variance is NOT assumed, Mean1 - Mean2 is significantly greater than 0

Boron Two sample t Test (4/7/2023 11:56:19)

Descriptive Statistics

		N	Mean	SD	SEM	Median
C"Monroe CCR Unit Water"		5	-10.466	6.72699	3.0084	-11.37
D"Uppermost Aquifer"		7	3.00143	1.97127	0.74507	2.47
	Difference		-13.46743		2.64678	
	Overall	12	-2.61	8.16492	2.35701	0.975

Standard Error of Mean (SEM) of difference is computed under the condition that equal variance is assumed.

t-Test Statistics

	t Statistic	DF	Prob<t
Equal Variance Assumed	-5.08824	10	2.36034E-4
Equal Variance NOT Assumed (Welch Correction)	-4.34533	4.49447	0.00471

Null Hypothesis: mean1-mean2 >= 0
Alternative Hypothesis: mean1-mean2 < 0
At 0.05 level, when equal variance is assumed, Mean1 - Mean2 is significantly less than 0
At 0.05 level, when equal variance is NOT assumed, Mean1 - Mean2 is significantly less than 0