Groundwater Monitoring Systems
Summary Report

DTE Electric Company
Belle River Power Plant Bottom Ash Basins
and Diversion Basin Coal Combustion Residual Units

4505 King Road
China Township, Michigan

October 2017

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Prepared For
DTE Electric Company

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Section 1
Introduction

1.1 Background and Objective

The United States Environmental Protection Agency (U.S. EPA) established a comprehensive set of requirements for management and disposal of coal combustion residuals (CCR) in landfills and surface impoundments in the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule) on April 17, 2015. The DTE Electric Company (DTE Electric) Belle River Power Plant's (BRPP) two CCR bottom ash basins (BABs) unit and the diversion basin (DB) unit are subject to the CCR Rule.

The objective of this report is to document and certify that the CCR Groundwater Monitoring Systems for the BRPP BABs CCR unit and the DB CCR unit have been designed and constructed to meet the requirements of Title 40 Code of Federal Regulations (CFR) §257.91 (a)(1) and (2) of the CCR Rule. TRC Engineers Michigan, Inc. (TRC) was retained by DTE Electric to provide this report documenting the construction of the CCR groundwater monitoring system for the BRPP BABs and DB.

1.2 Site Location

The BRPP is located in Section 13, Township 4 North, Range 16 East, at 4505 King Road, China Township in St. Clair County, Michigan (**Figure 1**). The BRPP was constructed in the early 1980s with plant operations beginning in 1984.

1.3 Description of BRPP CCR Units

Prior to Detroit Edison Company's operations commencing in the 1980s, the BRPP property was generally wooded and farmland. The property has been used continuously as a coal fired power plant since Detroit Edison Company (now DTE Electric) began power plant operations at BRPP in 1984 and is generally constructed over a natural clay-rich soil base (**Figure 2**). The BABs and DB units have been in operation with the BRPP since it began operation and have collected CCR bottom ash that is periodically cleaned out and either sold for beneficial reuse or disposed of at the Range Road Landfill (RRLF).

1.3.1 Bottom Ash Basins CCR Unit

The BABs are two adjacent physical sedimentation basins that are slightly raised CCR surface impoundments referred to as the North and South BABs, located north of the BRPP near the Webster Drain (**Figure 2**). These are considered one CCR unit. The BABs

receive sluiced bottom ash and other process flow water from the power plant. Discharge water from each BAB flows over an outlet weir that gravity flows to a site storm water conveyance network of ditches and pipes, then flows into the DB CCR unit. The North and South BABs are located north of the BRPP main building and run roughly east to west approximately 420 feet long by 120 feet wide with bottom elevations of approximately 580 feet relative to the North American Vertical Datum (NAVD) 1988, with outflow weir elevations of approximately 590.25 feet relative to the NAVD 1988. The capacity of the North BAB is approximately 2.4 million gallons and the capacity of the South BAB is approximately 2.5 million gallons[1].

1.3.2 Diversion Basin CCR Unit

The DB is an incised CCR surface impoundment located west of the BRPP near the Webster Drain. Water flows into the DB from the North and South BABs through a network of pipes and ditches (**Figure 2**). The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit. The DB has an approximately 300 foot long entrance channel that connects to the main portion of the basin that runs approximately north-south. The main portion of the DB is approximately 400 feet long by approximately 120 feet wide with a bottom elevation of approximately 576 feet with the water level being maintained at approximately 580 feet relative to the NAVD 1988.

[1] NTH Consultants, Ltd., 2016, Inflow Design Flood Control System Plan, Belle River Power Plant, East China, Michigan

Section 2
Hydrogeology

2.1 Regional Hydrogeologic Setting

The geology of St. Clair County consists of approximately 101 to 400 feet of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces[2]. The thicker glacial deposits are present toward the central portion of the county. Bedrock in the county includes the Michigan Formation, Marshall Sandstone, Coldwater Shale, Sunbury Shale, Berea Sandstone, Bedford Shale, and Antrim Shale.

In the vicinity of the site, the Devonian Bedford and/or Antrim Shale bedrock dips to the northwest and is generally covered by more than 100 feet of unconsolidated clay, silt, sand, and gravel. In this area, generally on the eastern side of the county, the glacial deposits are predominantly silty-clay till and lacustrine deposits with lenses of sand and gravel. Where present, unconsolidated sand and gravel deposits within the till and lacustrine deposits are generally used for water supply throughout the county. Approximately 85 percent of the water supply wells in St. Clair County are completed in the glacial deposits compared to approximately 13 percent installed in bedrock[1].

The current topography of the St. Clair area gently undulates reflecting floodplain, stream terrace, and lakeshore deposits. The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Regional groundwater and surface water flow would be expected to be to the east towards the St. Clair River.

2.2 BRPP Hydrogeology

The subsurface geology presented in this report is based on information from historical borings advanced during the initial design of the BRPP in the 1970s in addition to the soil data collected from immediately around the BABs and DB during the groundwater monitoring system installations detailed in Section 3. Soil borings from the groundwater monitoring system are included in Appendix A and generalized geologic cross sections are provided in **Figures 3 through 5**.

This information documents that the BRPP CCR units are underlain by more than 130 feet of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 135 to 145 feet-below ground surface (feet-bgs). Unconsolidated, laterally discontinuous

[2] Beth A. Apple and Howard W. Reeves, 2007, Summary of Hydrogeologic Conditions by County for the State of Michigan. U.S. Geological Survey Open-File Report 2007-1236, 78 p.

saturated sand-rich soil deposits were encountered within the silty clay-rich till deposits in most of the BABs CCR unit soil borings at depths no shallower than 86 feet-bgs (**Figures 3 through 5**). In contrast, no sand-rich deposits were encountered in the DB CCR unit soil borings. At the DB CCR unit, more than 125 feet of contiguous silty clay-rich till is present above the bedrock, with saturation observed along the interface of silt-rich till and the underlying shale bedrock (**Figures 3 and 5**). The underlying shale does not yield groundwater, rather it is an aquiclude that prevents groundwater flow (i.e., is not an aquifer).

Water supply wells are present within the sand and/or gravel rich aquifer units within the lacustrine unconsolidated sediments at depths around 100 feet-bgs within between one-half and one mile to the west and southwest of the BRPP. These uppermost aquifer sand/gravel units are also present on much of the RRLF located one mile north of the BRPP. Surface water bodies present in the area of the BRPP include the Belle River (as close as 2,000 feet southwest and south of BRPP) and the St. Clair River (as close at one mile to the east of BRPP).

2.2.1 Uppermost Aquifer

Definition

The 40 CFR 257.53 definitions of an aquifer and uppermost aquifer are as follows:

- *Aquifer* means a geologic formation, group of formations, or portion of a formation capable of yielding useable quantities of groundwater to wells or springs.
- *Uppermost aquifer* means the geologic formation nearest the natural ground surface that is an aquifer, as well as the lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season.

Site Uppermost Aquifer

The entire BRPP site is underlain by 86 feet to as much as 135 feet of contiguous low permeability clay-rich till that has a hydraulic conductivity on the order of 2 to 3 x 10^{-8} centimeters per second (cm/s) as found in historical soil testing and further verified during recent soil permeability testing performed on soil samples collected during the CCR monitoring well installation at the BABs and DB CCR units. The silty clay-rich till is a natural hydraulic barrier that confines the uppermost aquifer(s) (where present) and isolates them from the BABs and DB CCR units.

Monitoring wells were established at first signs of groundwater yield to monitor groundwater quality in accordance with the CCR Rule.

Bottom Ash Basins CCR Unit Area

As described above, the uppermost aquifer units beneath the BABs CCR unit are hydraulically isolated by at least 90 feet of silty clay-rich till (see **Figures 3 through 5**). The first observed sand-rich units that meet the 40 CFR §257.53 definition of uppermost aquifer is encountered at depths ranging from 90 to 136 feet bgs. The sand-rich unit rapidly thins to the south and east of the BABs and pinches out (e.g., no longer present) in the southeastern portion of the BABs CCR unit area in the vicinity of SB-16-01. Consequently, the uppermost aquifer is not laterally contiguous across the site, and not present in the southeastern corner of the BABs in the area of SB-16-01. Because the uppermost aquifer was not present in this area, no monitoring wells were installed along the southeastern portion of the BABs CCR unit area (**Figure 2**). At locations where wells were installed (e.g., MW-16-01 through MW-16-04 and MW-16-09), wells were installed within the upper portion of the aquifer, which generally ranges between 12 to 40 feet in thickness in the area of the BABs. More details are provided in Sections 3.1.1 and 3.1.2 (see **Figures 3 through 5**, Appendix A and Table 1).

As shown on the geologic cross sections, the top of the uppermost aquifer encountered at each of the CCR monitoring well and soil boring locations are at significantly different elevations across the BABs CCR unit, where present, from 90 to 136 feet-bgs. The variability in boring/well depths is a consequence of the heterogeneity of the glacial deposits and is driven by the lateral discontinuity of the coarse-grained sand and gravel outwash within the encapsulating fine-grained, silty clay till that confines the uppermost aquifer (see cross-sections in **Figures 3 through 5**). Based on the data collected during investigations performed by TRC, there is an apparent lack of interconnection and/or significant vertical variation between the uppermost aquifer sand unit(s) encountered across the BABs CCR unit, as demonstrated by the extensive amount of time (months) it took for water levels in monitoring well MW-16-02 to reach equilibrium after well construction and development.

Diversion Basin CCR Unit Area

The potential uppermost aquifer under the DB CCR unit is located at depths ranging from 131 to 145 feet-bgs at the silt/shale bedrock interface. The DB CCR unit is isolated from the underlying potential uppermost aquifer by approximately 130 feet of silty clay-rich till (see **Figures 3 and 5**). Although the encountered zone of saturation along the interface did not yield significant groundwater, it was conservatively interpreted as the first underlying saturated zone that would presumably become affected with CCR constituents since it was saturated, and

although the hydraulic conductivity was low, exhibited a much higher conductivity than the clay-rich soils between the bottom of the basin and the monitored zone.

As described in Sections 3.1.1 and 3.1.2, CCR groundwater monitoring wells MW-16-05 through MW-16-08, MW-16-10 and MW-16-11 were installed at the silt/shale bedrock potential uppermost aquifer that is approximately 5 feet thick in the area of the DB CCR unit (see **Figures 3 and 5**, Appendix A and Table 1).

2.2.2 Groundwater Flow

Groundwater Flow Direction

Seven rounds of confined static water level measurements (i.e., potentiometric surface elevations) collected from these groundwater monitoring events are displayed on **Figure 6** for the BABs CCR unit, with an eighth round of static water level measurements completed before October 17, 2017; a representative potentiometric groundwater surface map is provided as **Figure 7** for the DB CCR unit.

Bottom Ash Basins CCR Unit Area

As can be seen on **Figure 6**, a definitive groundwater flow direction is not evident around the BABs in seven rounds of groundwater monitoring, which is likely due to:

- The fact that the screened intervals of these monitoring wells and the top of the uppermost aquifer elevation encountered within each of the BABs CCR unit monitoring wells varies up to 46 feet vertically; and
- That the degree of interconnection is likely limited in some areas (specifically in the area of MW-16-02).

Therefore, given the horizontally expansive clay with substantial vertical thickness, the heterogeneity of the glacial deposits (with the top of the uppermost aquifer elevation across the BABs, where present varying up to 46 feet vertically), the no-flow boundary where no sand or gravel is present in the southeastern portion of the BABs CCR unit area, and the apparent lack of hydraulic interconnectedness of the uppermost aquifer encountered at the BABs in some areas, it is not appropriate to infer horizontal flow direction or gradients across the BABs CCR unit.

Diversion Basin CCR Unit Area

Based on data collected by TRC during 2016 and 2017 in monitoring wells near the DB CCR unit, there is an overall flow potential to the north-northwest with a mean gradient of 0.003 foot/foot from CCR monitoring wells MW-16-06 through MW-16-08 (up gradient) on the east side of the BABs CCR unit towards monitoring wells MW-16-05, MW-16-10 and MW-16-11/11A (down gradient). **Figure 7** illustrates a representative groundwater potentiometric surface map from September 2016 depicting the groundwater flow direction in the vicinity of the DB CCR unit.

In addition, the elevation of CCR-affected water maintained within the BRPP BABs and DB is approximately 5 to 15 feet above the potentiometric surface elevations in the uppermost aquifer at the BABs and DB CCR unit areas. This suggests that if the CCR affected surface water in the BABs and DB were able to penetrate the silty clay-rich underlying confining unit that the head on that release likely would travel radially away from the BABs and/or DB within the uppermost aquifer. However, with the very thick continuous silty clay-rich confining unit beneath the BRPP it is not possible for the uppermost aquifer to have been affected by CCR from BRPP operations that began in the 1980s (see vertical travel time of travel discussion below). In addition, under Michigan Part 115, the Range Road Landfill, which is located within one mile to the north of the BRPP, is not required to monitor units beneath the clay-rich confining unit due to its thickness, continuity and low hydraulic conductivity.

Uppermost Aquifer Hydraulic Conductivity

Hydraulic conductivities measured within the CCR monitoring wells set within the upper portion of the uppermost aquifer across BRPP were evaluated using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 and range between 0.2 feet/day in the DB CCR unit area to approximately 0.5 feet/day in the BABs CCR unit area.

Horizontal Time of Travel

As previously discussed in Section 2.2.2, a definitive horizontal flow direction in the BABs CCR unit area is not present; therefore, it is not appropriate to estimate the horizontal time of travel. Because there is no clear flow direction, inter-well statistical tests are inappropriate for detection monitoring of this basin.

For the DB CCR unit, assuming an average porosity of 0.4 for the silt in the uppermost aquifer in this area, the mean hydraulic conductivity of 0.2 feet/day and a hydraulic gradient of 0.003 foot/foot for the upper aquifer, the potential horizontal groundwater

flow rate to approximately the north-northwest is approximately 0.0015 feet/day or 0.55 feet/year. Given low flow velocity of this zone, inter-well (upgradient to downgradient) statistical tests are inappropriate for detection monitoring of this basin.

Vertical Time of Travel

The BRPP is a natural silty-clay site, and the presence of the natural hydraulic barrier has been verified by numerous historical soil borings and confirmed by the twelve soil borings installed as part of the CCR monitoring well installation program at the BABs and DB CCR units. Therefore, the geology and hydrogeology of the site provides a very high level of environmental protection of the uppermost aquifer. Based on the site geology and hydrogeology, there is extremely low potential for the impoundments to affect the off-site uppermost aquifer groundwater in the future. Groundwater occurring in the deep confined uppermost aquifer is protected from CCR constituents in the BABs and DB by a clay-rich aquitard with low hydraulic conductivity that is 82 or more feet thick. Using the hydrogeologic information for the site, the time of travel for water from the base-grade elevation of the BABs and DB down to the uppermost aquifer can be calculated using the following formula:

$$V = Ki/N_e$$

Where:

V = Velocity (feet/day)

K = Hydraulic Conductivity (3×10^{-8} cm/s based on high end silty clay-rich soil geotechnical measurements)

i = Downward Vertical Gradient (conservatively assumed to be one foot/foot)

N_e = Effective Porosity (0.5 for clay-rich soil)

From the above formula, the maximum downward flow velocity through the silty-clay confining unit to the uppermost aquifer is 6×10^{-8} cm/sec, or 0.063 feet/year. Therefore, the time of travel for liquid from the base of the BABs and DB through 82 feet of silty-clay (thinnest potential section of silty-clay confining unit found on BRPP above the uppermost aquifer at the base of the BABs and DB CCR units) to the uppermost aquifer is approximately 1,300 years. Therefore, given that BRPP operations began in the 1984, approximately 33-years ago, there is no potential for the uppermost aquifer CCR groundwater monitoring systems wells to be affected from the BRPP CCR BABs and DB units.

Section 3
Groundwater Monitoring Systems

3.1 Groundwater Monitoring Systems Installation

During 2016, TRC, on behalf of DTE Electric, oversaw the installation and development of the groundwater monitoring system in accordance with 40 CFR §257.91. Five monitoring wells in the BABs CCR unit area (MW-16-01 through MW-16-04, and MW-09) and six monitoring wells (MW-16-05 through MW-16-08, MW-10, and MW-11/11A) in the DB CCR unit area were installed by a Michigan-licensed well driller in order to establish the groundwater monitoring systems in accordance with the 40 CFR §257.91 as described below:

3.1.1 Soil Boring Advancement

In February to June 2016, twelve soil borings were advanced to evaluate the subsurface geology and to allow monitoring well installation using sonic drilling techniques with 4-inch and 6-inch tooling along the perimeter of the BABs and DB CCR unit areas. Soil samples were collected continuously in ten-foot sections from the ground surface to the termination of the soil boring. A TRC geologist was present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS). The soil borings were advanced to depths ranging from approximately 100 to 150 feet-bgs to within the first encountered saturated sand and/or sand/gravel unit (uppermost aquifer) and/or into the top of the underlying shale bedrock (likely the Bedford Shale) lower confining unit beneath BRPP.

Bottom Ash Basins CCR Unit Area

Along the southeastern portion of the BABs CCR unit, over 90 feet of continuous silt/clay-rich till is present to the top of the underlying shale bedrock (see soil boring log SB-16-01 in Appendix A). The shale bedrock is encountered at 142 feet-bgs and does not yield groundwater (i.e., is not an aquifer). Soil boring SB-16-01 was left open-hole across the silt/shale bedrock interface with the sonic casing in place overnight and minimal groundwater entered the soil boring overnight. Therefore, no aquifer was identified to be present in the southeastern portion of the BABs CCR unit in the area of SB-16-01 (**Figure 2**). At the remaining five soil boring locations (now logged as monitoring wells MW-16-01 through MW-16-04 and MW-16-09) in the BABs CCR unit a saturated sand-rich upper aquifer unit was encountered at depths ranging from 90 to 136 feet-bgs, generally deeper to the east and southeast. The five monitoring wells were installed as described in Section 3.1.2.

Diversion Basin CCR Unit Area

At the DB CCR unit area in six locations along the east and west side of the DB soil borings (now logged as monitoring wells MW-16-05 through MW-16-08 and MW-16-10 and MW-16-11/11A) were advanced to the shale bedrock. At each of those locations a contiguous silty-clay till unit was present to depths ranging from 131 to 145 feet-bgs, with 2 to 7 feet of unconsolidated silt at the base, between the till and the shale bedrock (**Figures 3 and 5** and Appendix A). Several of these soil borings were left open hole across the silt and/or silt/shale bedrock interface interval with the sonic casing in above and left overnight. Recoverable amounts of groundwater entered the soil borings overnight, supporting that this interval is potentially the uppermost aquifer beneath the DB CCR unit. On May 12, 2017, monitoring well MW-16-11A was installed as a replacement well after monitoring well MW-16-11 was found to be damaged subsequent to collection of several groundwater samples. The six monitoring wells (plus the replacement MW-16-11A) were set within these borings as described in Section 3.1.2 below.

3.1.2 Monitoring Well Installation

CCR monitoring wells MW-16-01 through MW-16-04, and MW-09 were screened within the uppermost portion of the uppermost aquifer in the western, northern, northeastern and southwestern perimeter of the BABs CCR unit with screened intervals ranging from 92 to 97 feet-bgs to 136 to 141 feet-bgs in five locations (**Figure 2**). As previously noted, an aquifer was not present in the southeastern portion of the BABs CCR unit at soil boring SB-16-01 (see **Figure 2**) and no monitoring wells were installed along the southeastern perimeter of the BAB CCR unit. Given the presence of the natural clay-rich till hydraulic barrier and the relatively small foot-print of the BABs, the horizontal spacing of the wells is appropriate to detect constituents from the CCR unit.

As described above in Section 3.1.1, after ensuring that sufficient saturation was present along the silt/bedrock interface, monitoring wells MW-16-05 through MW-16-08, MW-16-10 and MW-16-11 were initially installed to the northwest, west and east of the DB. Wells were screened at the silt/shale bedrock interface potential aquifer in order to have at least one up gradient (MW-16-06 through MW-16-08) and three down gradient monitoring wells (MW-16-05, MW-16-10 and MW-16-11) in the DB CCR unit area. As noted in Section 3.1.1, monitoring well MW-11A was installed as a replacement for MW-16-11 after that well was found to be damaged and MW-16-11 was properly decommissioned. The DB monitoring wells were screened at intervals ranging from 133 to 138 feet-bgs to 145-150 feet-bgs. Given the presence of the natural clay-rich till hydraulic barrier and the relatively small foot-print of the DB, the horizontal spacing of the wells is appropriate to detect constituents from the CCR unit.

Monitoring wells were constructed within each borehole where a potential aquifer was encountered using 2-inch-diameter, Schedule 40, PVC casing and 5-foot long screens with 0.010-inch factory cut slots. Monitoring well construction diagrams from the installed monitoring wells accompany the soil boring logs in Appendix A. Following well installation, the grout and bentonite seal materials were allowed to stabilize for more than 24-hours before monitoring well development began.

3.1.3 Monitoring Well Development and Surveying

Following installation, each CCR monitoring well was developed by air lifting methods. In addition, a Michigan-licensed surveyor horizontally located each monitoring well utilizing the Michigan State Plane South Zone-2113, North American Datum 1983, International feet. Vertical elevations of the ground surface at each soil boring and monitoring well location and the top of casing for each monitoring well were also surveyed in feet relative to the North American Vertical Datum of 1988 (NAVD 88). Monitoring well and soil boring coordinates, elevations, screened intervals, and monitoring well development details are included in Table 1.

3.1.4 Detection Monitoring

As stated earlier, it would take approximately 1,300 years for a release from either basin to reach the upper most aquifer and there is no potential for the uppermost aquifer CCR groundwater monitoring systems wells to be affected from the BRPP CCR BABs and DB units. However, detection monitoring will be performed as required by the Rule as specified below.

BRPP Bottom Ash Basins

The BABs CCR unit groundwater monitoring system shown on **Figure 2** will serve as the detection monitoring locations pursuant to Title 40 CFR §257.93 and §257.94 of the CCR Rule. Due to the relatively small footprint of the BABs, the low vertical and horizontal groundwater flow velocity, and the fact that the saturated unit being monitored is isolated by a laterally contiguous silty-clay unit which significantly impedes vertical groundwater flow thus preventing the monitored saturated zone from potentially being affected by CCR, monitoring of the BABs CCR unit using intra well statistical methods is appropriate. In addition, because the uppermost aquifer is not uniformly present across the BABs CCR unit, there are no clear upgradient wells. As such, intra-well statistical approaches will be evaluated for use during detection monitoring. Using the data collected from the monitoring well system, a statistical evaluation plan is being developed to evaluate compliance with the CCR Rule.

BRPP Diversion Basin

The BRPP DB CCR unit groundwater monitoring system shown on **Figure 2** will serve as the detection monitoring locations pursuant to Title 40 CFR §257.93 and §257.94 of the CCR Rule. Due to the relatively small footprint of the DB, the low vertical and horizontal groundwater flow velocity and radial flow potential outward from the CCR unit, and the fact that the uppermost saturated unit being monitored potential uppermost aquifer is isolated by a laterally contiguous silty-clay unit which significantly impedes vertical groundwater flow thus preventing the monitored saturated zone (identified as the potential uppermost aquifer) from potentially being affected by CCR, monitoring of the DB CCR unit using intra-well statistical methods is appropriate. As such, intra-well statistical approaches will be evaluated for use during detection monitoring. Using the data collected from the monitoring well system, a statistical evaluation plan is being developed to evaluate compliance with the CCR Rule.

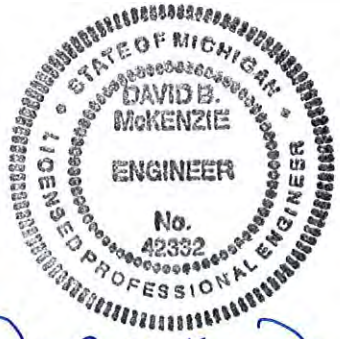
Section 4
Groundwater Monitoring Systems Certification

Groundwater Monitoring Systems Certification per 40 CFR §257.91(f)
Belle River Power Plant Bottom Ash Basins and Diversion Basin
China Township, Michigan

The U.S. EPA's Disposal of Coal Combustion Residuals from Electric Utilities Final Rule Title 40 CFR Part 257 §257.91 requires that the owner or operator of an existing CCR unit install a groundwater monitoring system. 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 Title 40 CFR §257.91.

CERTIFICATION

I hereby certify that the groundwater monitoring systems presented within this document for the BRPP BABs and DB CCR units have been designed and constructed to meet the requirements of Title 40 CFR §257.91 of the CCR Rule. This document is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of Title 40 CFR §257.91.

Name	Expiration Date	
David B. McKenzie, P.E.	October 31, 2017	
Company	Date	
TRC Engineers Michigan, Inc.	October 13, 2017	Stamp

Tables

Table 1
Monitoring Well Information Summary
DTE Electric Company – Belle River Power Plant
China Township, Michigan

Well Location	Date Installed	Northing	Easting	Ground Surface Elevation (ft AMSL)	TOC Elevation (ft AMSL)	Geologic Unit of Screen Interval	Well Construction	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft AMSL)	Borehole Terminus Depth (ft BGS)	Borehole Terminus Elevation (ft AMSL)
Belle River Power Plant											
MW-16-01	3/17/2016	471155.70	13625546.02	588.26	590.06	Sand	2" PVC	92.0 to 97.0	496.3 to 491.3	100.0	488.3
MW-16-02	3/15/2016	471409.06	13625991.78	586.27	588.94	Sand	2" PVC	92.0 to 97.0	494.3 to 489.3	100.0	486.3
MW-16-03	6/1/2016	471391.78	13626202.49	588.03	590.66	Silty Sand at 132-133.5 ft BGS, and Sand at 133.5-137 ft BGS	2" PVC	132.0 to 137.0	456.0 to 451.0	150.0	438.0
MW-16-04	3/8/2016	470893.74	13625876.34	587.50	590.51	Sand	2" PVC	119.0 to 124.0	468.5 to 463.5	130.0	457.5
MW-16-05	3/4/2016	470378.15	13626342.79	588.32	590.82	Clayey Silt at 139-142 ft BGS, and Shale bedrock at 142-144 ft BGS	2" PVC	139.0 to 144.0	449.3 to 444.3	150.0	438.3
MW-16-06	3/11/2016	470439.03	13626796.04	589.98	593.21	Silt at 135-138 ft BGS, and Shale bedrock at 138-140 ft BGS	2" PVC	135.0 to 140.0	455.0 to 450.0	140.0	450.0
MW-16-07	3/9/2016	470233.47	13626858.79	589.89	592.58	Silt at 133-134 ft BGS, and Shale bedrock at 134-138 ft BGS	2" PVC	133.0 to 138.0	456.9 to 451.9	140.0	449.9
MW-16-08	3/10/2016	470002.90	13626846.85	589.31	591.88	Silt at 133-135 ft BGS, and Shale bedrock 135-138 ft BGS	2" PVC	133.0 to 138.0	456.3 to 451.3	140.0	449.3
MW-16-09	6/2/2016	471284.45	13626365.84	588.28	590.80	Sand	2" PVC	136.0 to 141.0	452.3 to 447.3	150.0	438.3
MW-16-10	6/6/2016	470532.54	13626417.00	589.25	592.26	Gravelly Silt at 145-147.5 ft BGS, and Silty Clay at 147.5-150 ft BGS	2" PVC	145.0 to 150.0	444.3 to 439.3	150.0	439.3
MW-16-11A	5/12/2017	470232.10	13626444.98	589.52	591.66	Silt at 137-140 ft BGS, and Silty Clay at 140-142 ft BGS	2" PVC	137.0 to 142.0	452.5 to 447.5	142.0	447.5
MW-16-11	6/7/2016	470251.34	13626438.92	589.03	591.54	Clay at 137-138.5, Sandy Clay at 138.5-140 ft BGS, and Clay at 140-142 ft BGS	2" PVC	137.0 to 142.0	452.0 to 447.0	150.0	439.0

Notes:
Coordinates are Michigan State Plane South Zone-2113, International Feet
Elevation in feet above NAVD88.
TOC: Top of well casing.
ft AMSL: Feet above mean sea level.
ft BGS: Feet below ground surface.
GRAY text represents decommissioned monitoring well.

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 2,000 '
1:24,000

0 2,000 4,000
FEET

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
TRC - GIS

PROJECT:
DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:
SITE LOCATION MAP

DRAWN BY:	J. PAPEZ
CHECKED BY:	S HOLMSTROM
APPROVED BY:	V. BUENING
DATE:	OCTOBER 2017
PROJ. NO.:	265996.0003
FILE:	265996-SLMMB.mxd

FIGURE 1

E:\DTE\CCR_Sites\2017_265996\265996-SLMMB.mxd -- Saved By: BDEEGAN on 10/9/2017, 14:49:39 PM

LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.

N

0 200 400 Feet

1 " = 200 '
1:2,400

PROJECT:
DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:
SITE PLAN

DRAWN BY:	R SUEMNICHT	PROJ NO.:	265996.0003
CHECKED BY:	S HOLMSTROM		
APPROVED BY:	V BUENING		**FIGURE 2**
DATE:	OCTOBER 2017		

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

FILE NO.: 265996-0003-002.mxd

Plot Date: 10/9/2017, 15:18:14 PM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
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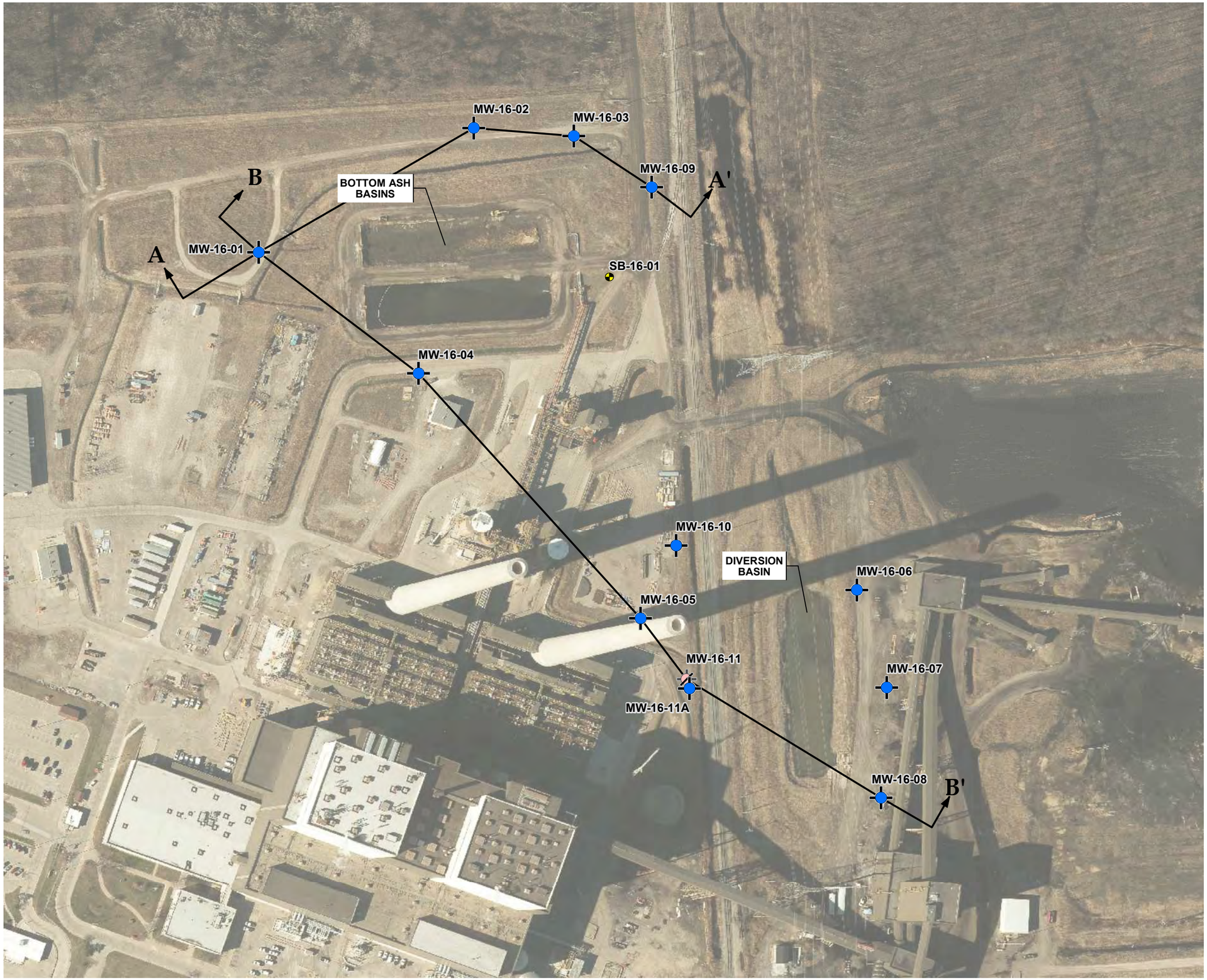
Map Rotation: 0
TRC - GIS



LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- CROSS SECTIONS

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017.

N

0 200 400 Feet

1 " = 200 '

1:2,400

PROJECT:

DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:

CROSS SECTION LOCATOR MAP

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0003
CHECKED BY:	S. HOLMSTROM		
APPROVED BY:	V. BUENING		**FIGURE 3**
DATE:	OCTOBER 2017		

TRC
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FILE NO.: 265996-0003-011.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 10/9/2017, 15:20:19 PM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
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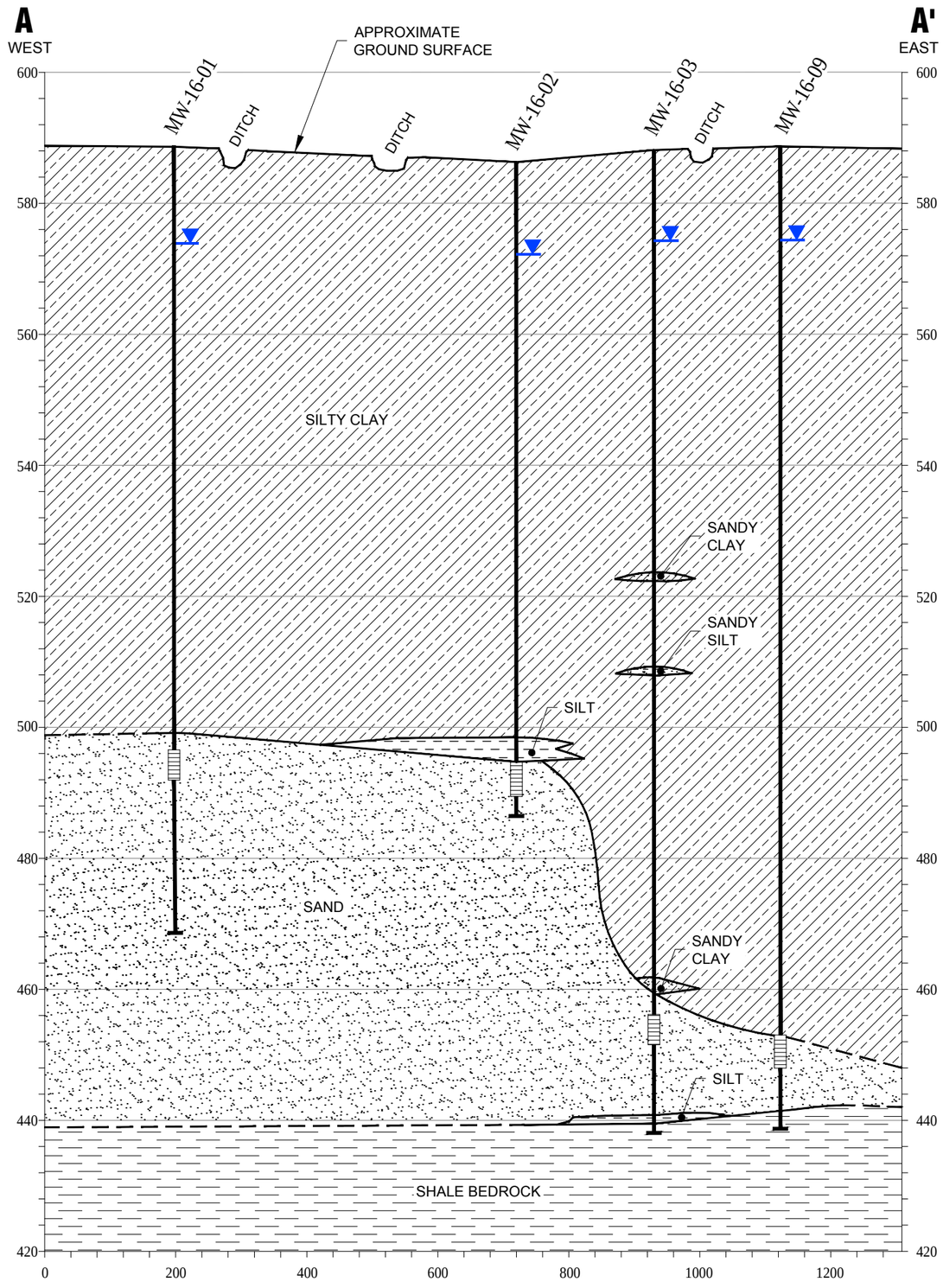
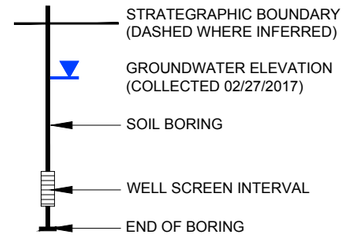
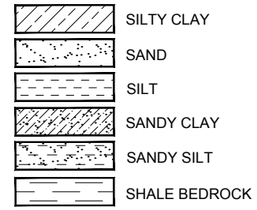
GENERALIZED GEOLOGIC CROSS-SECTION A-A'

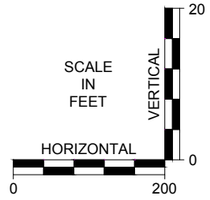


LEGEND



Lithology Key





PROJECT:
DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
CHINA TOWNSHIP, MICHIGAN

TITLE:
GENERALIZED
GEOLOGIC CROSS-SECTION A-A'

DRAWN BY:	D.STEHLE	PROJ NO.:	265996.0003.01
CHECKED BY:	S.HOLMSTROM		
APPROVED BY:	V.BUENING		**FIGURE 4**
DATE:	SEPTEMBER 2017		

TRC
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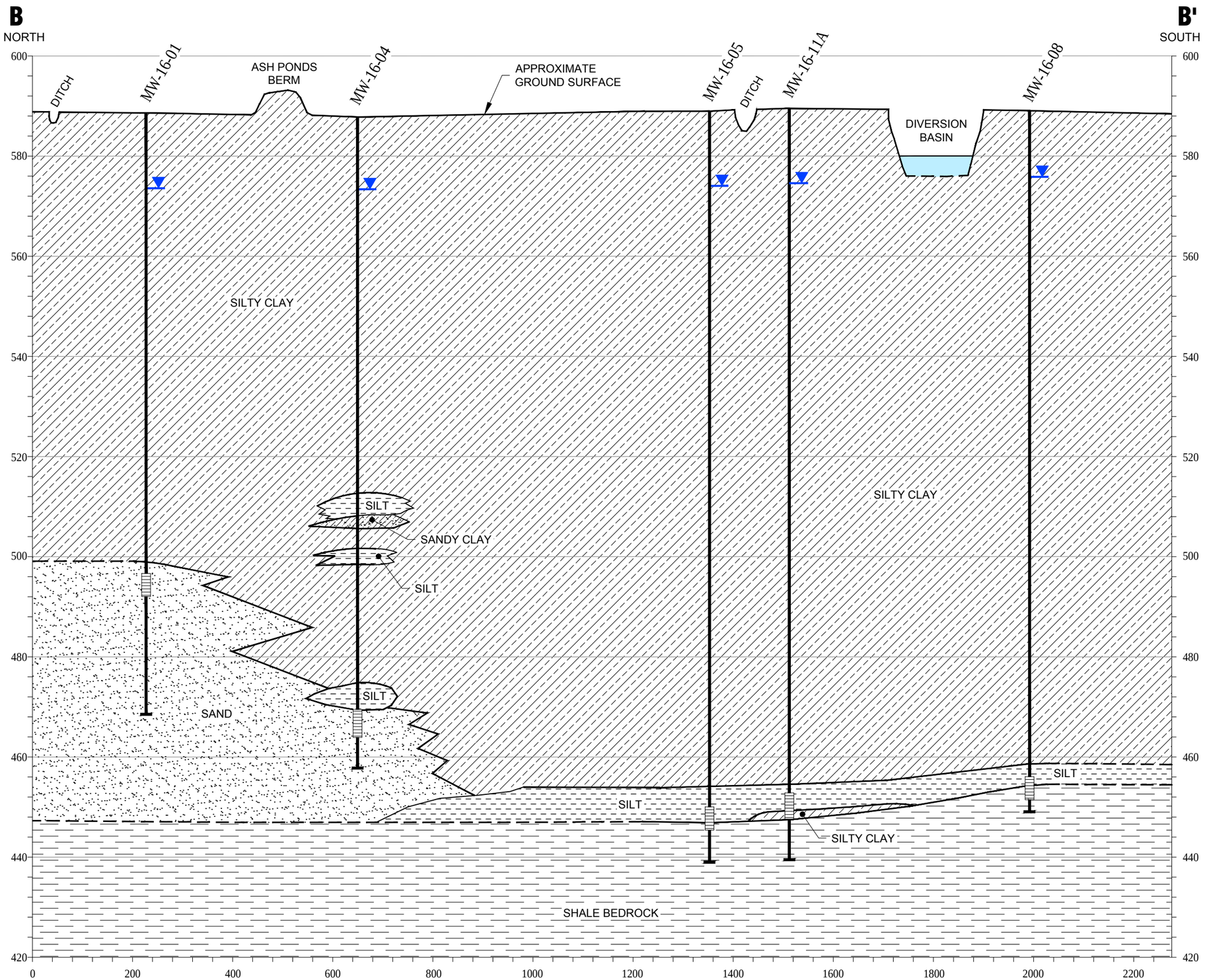
FILE NO.: 265996.0003.01.04-05.dwg

GENERALIZED GEOLOGIC CROSS-SECTION B-B'



LEGEND

- STRATEGRAPHIC BOUNDARY (DASHED WHERE INFERRED)
- GROUNDWATER ELEVATION (COLLECTED 02/27/2017)
- SOIL BORING
- WELL SCREEN INTERVAL
- END OF BORING

Lithology Key

- SILTY CLAY
- SAND
- SILT
- SANDY CLAY
- SHALE BEDROCK

SCALE IN FEET
VERTICAL: 0 – 20
HORIZONTAL: 0 – 200

PROJECT:
DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
CHINA TOWNSHIP, MICHIGAN

TITLE:
GENERALIZED GEOLOGIC CROSS-SECTION B-B'

DRAWN BY:	D.STEHLE	PROJ NO.:	265996.0003
CHECKED BY:	S.HOLMSTROM		
APPROVED BY:	V.BUENING		**FIGURE 5**
DATE:	SEPTEMBER 2017		

TRC
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FILE NO.: 265996.0003.01.04-05.dwg

TRC - GIS

Monitoring Well Screen Information			
Monitoring Well ID	Screen Interval Lithology	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft NAVD 88)
MW-16-01	Sand	92.0 - 97.0	496.3 - 491.3
MW-16-02	Sand	92.0 - 97.0	494.3 - 489.3
MW-16-03	Silty Sand to Sand	132.0 - 137.0	456.0 - 451.0
MW-16-04	Sand	119.0 - 124.0	468.5 - 463.5
MW-16-09	Sand	136.0 - 141.0	452.3 - 447.3

MW-16-02
573.64' (8/01/2016)
565.61' (9/19/2016)
569.03' (11/07/2016)
571.04' (1/09/2017)
572.29' (2/27/2017)
573.23' (4/17/2017)
574.14' (6/5/2017)

MW-16-03
574.13' (8/01/2016)
574.12' (9/19/2016)
573.84' (11/07/2016)
574.00' (1/09/2017)
574.23' (2/27/2017)
574.35' (4/17/2017)
574.68' (6/5/2017)

MW-16-09
574.10' (8/01/2016)
574.10' (9/19/2016)
573.85' (11/07/2016)
573.90' (1/09/2017)
574.24' (2/27/2017)
574.35' (4/17/2017)
574.62' (6/5/2017)

BOTTOM ASH BASINS

MW-16-01
573.85' (8/01/2016)
573.81' (9/19/2016)
573.48' (11/07/2016)
573.67' (1/09/2017)
573.95' (2/27/2017)
574.01' (4/17/2017)
574.39' (6/5/2017)

SB-16-01
(NOTE 4)

MW-16-04
573.62' (8/01/2016)
573.61' (9/19/2016)
573.36' (11/07/2016)
573.49' (1/09/2017)
573.76' (2/27/2017)
573.88' (4/17/2017)
574.20' (6/5/2017)

MW-16-10

DIVERSION BASIN

MW-16-06

MW-16-05

MW-16-11

MW-16-11A

MW-16-07

MW-16-08

LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

MW ID
GROUNDWATER ELEVATION (DATE)
GROUNDWATER ELEVATION (DATE)
etc...

FT BGS
FEET BELOW GROUND SURFACE
FT NAVD 88
ELEVATION RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988

NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER.
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL.
4. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.

0 200 400 Feet

1 " = 200 '

1:2,400

PROJECT:
DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:
BOTTOM ASH BASINS
GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0003
CHECKED BY:	S. HOLMSTROM		
APPROVED BY:	V. BUENING		**FIGURE 6**
DATE:	OCTOBER 2017		

TRC
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FILE NO.: 265996-0003-003.mxd

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

Plot Date: 10/9/2017, 15:30:02 PM by BDEEGAN -- LAYOUT: ANSI B (11"x17")
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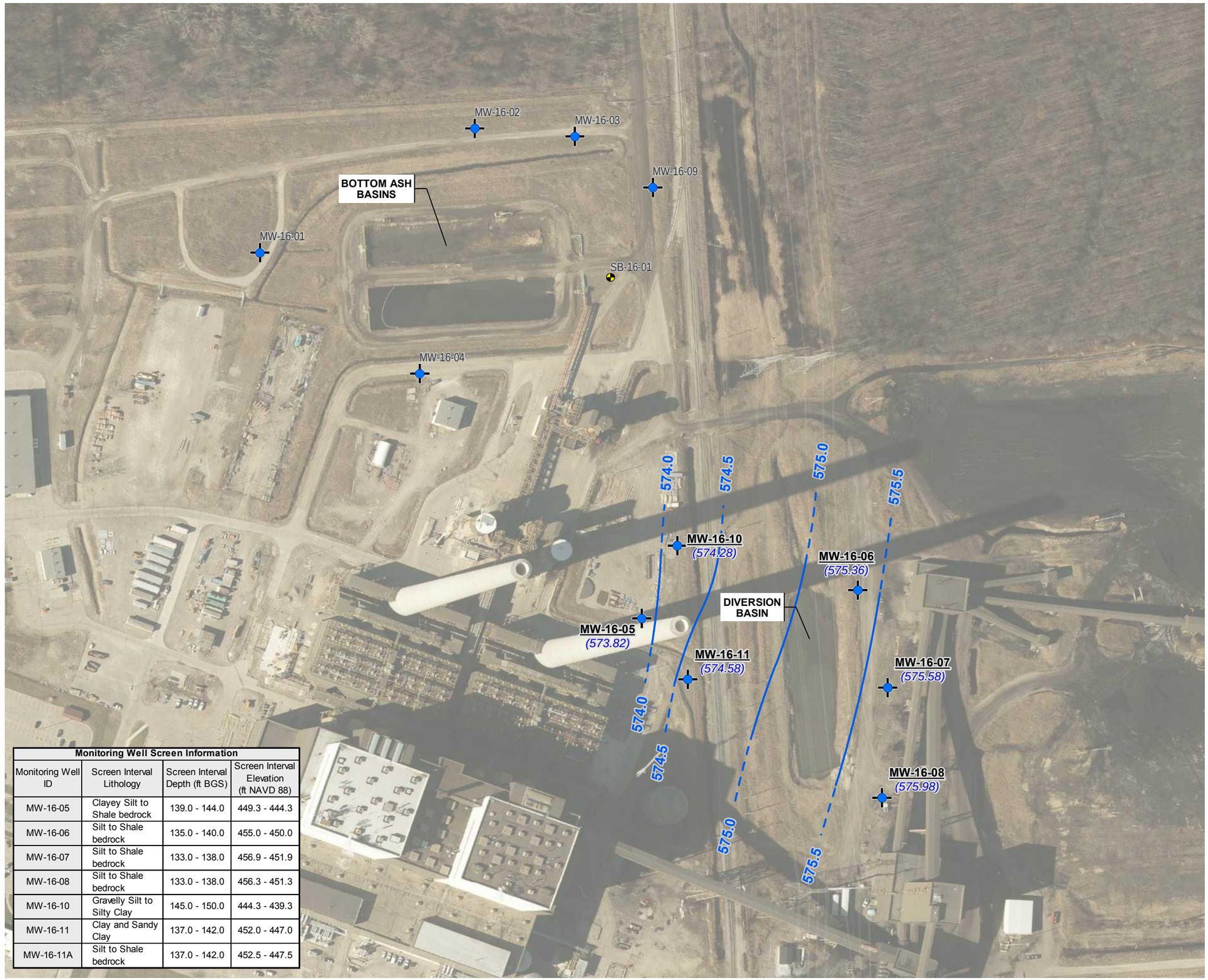

LEGEND

- SOIL BORING
- MONITORING WELL
- (575.47) GROUNDWATER ELEVATION (FT MSL)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

FT BGS
FEET BELOW GROUND SURFACE
FT NAVD 88
ELEVATION RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988

NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER.
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 BY BMJ ENGINEERS & SURVEYORS, INC.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL.

Monitoring Well Screen Information

Monitoring Well ID	Screen Interval Lithology	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft NAVD 88)
MW-16-05	Clayey Silt to Shale bedrock	139.0 - 144.0	449.3 - 444.3
MW-16-06	Silt to Shale bedrock	135.0 - 140.0	455.0 - 450.0
MW-16-07	Silt to Shale bedrock	133.0 - 138.0	456.9 - 451.9
MW-16-08	Silt to Shale bedrock	133.0 - 138.0	456.3 - 451.3
MW-16-10	Gravelly Silt to Silty Clay	145.0 - 150.0	444.3 - 439.3
MW-16-11	Clay and Sandy Clay	137.0 - 142.0	452.0 - 447.0
MW-16-11A	Silt to Shale bedrock	137.0 - 142.0	452.5 - 447.5

0 200 400 Feet

1 " = 200 '
1:2,400

PROJECT: DTE ELECTRIC COMPANY
BELLE RIVER POWER PLANT
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE: DIVERSION BASIN GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 2016

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0003
CHECKED BY:	S. HOLMSTROM		
APPROVED BY:	V. BUENING		
DATE:	OCTOBER 2017		

FIGURE 7

TRC
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FILE NO.: 265996-0003-005.mxd

Plot Date: 10/13/2017. 07:54:31 AM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0003-005.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

TRC - GIS

Appendix A
Soil Boring and Monitoring Well Installation Logs

WELL CONSTRUCTION LOG

WELL NO. MW-16-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	2/29/16	2/29/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.17	591.30	120.0	6/4

Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins.
N: 471155.70 E: 13625546.02

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time — Depth (ft bgs)
After Drilling: Date/Time 4/13/16 08:45 — Depth (ft bgs) 14.52

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		0	**SILTY CLAY WITH GRAVEL** mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				CLAY mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.				Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.
			5	Change to dark gray (10YR 4/1), very stiff at 5.0 feet.				
				Change to soft at 8.0 feet.				
2 CS	50		10	Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.				
			15	▼				
3 CS	100		20	Change to dark gray (10YR 4/1) at 20.0 feet.	CL			
4 CS	100		25					
			30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: Chris Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-01

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
6 ST	100		50					
7 CS	100		55					
8 CS	80		60					
9 CS	100		65					
10 CS	100		70					
11 CS	100		75					
			80					
			85					
			90	**SAND** mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			95					
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-02

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/14/16	3/15/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	586.27	588.94	100.0	6/4

Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins.

N: 471409.06 E: 13625991.78

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time — Depth (ft bgs)
After Drilling: Date/Time 4/13/16 09:24 ▼ Depth (ft bgs) 16.07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	**CLAY** mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				Change to no gravel at 7.0 feet.				
			10	Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.				
2 CS	80		15 ▼					
			20		CL			
3 CS	100		25					
			30					
4 CS	90		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: C. Scieszka

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

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	**SILTY CLAY** mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
7 CS	50		55					
			60					
8 CS	100		65					
			70					
9 CS	100		75					
			80					
10 CS	100		85					
			90	**CLAYEY SILT** mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	**SAND** mostly fine to coarse sand, dark gray (10YR 4/1), saturated. Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	5/25/16	5/31/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.03	590.66	150.0	6/4

Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins.	Personnel	Drilling Equipment:
N: 471391.78 E: 13626202.49	Logged By - J. Reed Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 6/8/16 14:30 ▼ Depth (ft bgs) 12.82

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	100		0	**TOPSOIL**				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				SILTY CLAY mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			
			5					
			10	Change to gray (10YR 5/1) at 10.5 feet.				
2 CS	100			▼ **CLAY** mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
			15					
			20					
3 CS	100		25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
			30					
4 CS	100		35					
			40	Change to trace fine to coarse sand at 41.5 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
			50					
6 CS	90		55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	**SANDY CLAY** mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
				CLAY mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.				
			70		CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	**SANDY SILT** mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
				CLAY mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
9 CS	100		85					
			90	Change to medium soft at 90.0 feet.	CL			
10 CS	100		95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12 CS	100		115		CL			
			120					
13 CS	100		125					
				SANDY CLAY mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.	CL			
			130	**SILTY SAND** mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	SM			
14 CS	90		135	**SAND** mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
				SILTY SAND mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			140	**SAND** mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.				
15 CS	100		145		SW			
				SILT mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense.	ML			
			150	**SHALE** weathered shale bedrock, dark gray.				
				End of boring at 150 feet below ground surface.				
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-04

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/7/16	3/8/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	587.50	590.51	130.0	6/4

Boring Location: 200 feet from W corner of road, S of bottom ash basins.	Personnel	Drilling Equipment:
N: 470893.74 E: 13625876.34	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:31 ▼ Depth (ft bgs) 13.91

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10	Change to stiff at 10.5 feet. Change to dark gray (10YR 4/1), very soft at 12.0 feet. ▼				
3 CS	100		15					
4 CS	100		20					
			25					
			30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: Chris Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan

734.971.7080
Fax 734.971.9022

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-04

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
6 CS	100		50					
7 CS	100		55					
8 CS	100		60	Change to few coarse gravel at 60.0 feet.				
9 CS	100		65					
10 CS	100		70					
			75	**SILTY CLAY** mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
				SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	**SAND** mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
				SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
			85	**SILTY CLAY** mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
				CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	**SILTY CLAY** mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
			95					
			100	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

WELL CONSTRUCTION LOG

WELL NO. MW-16-04

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
			110					
12 CS	100		115	**SILT** mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			120	**SAND** mostly fine sand, dark gray (10YR 4/1), saturated.				
13 CS	100		125		SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/3/16	3/4/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.32	590.82	150.0	6

Boring Location: S end of haul road, W of diversion basin.	Personnel	Drilling Equipment:
N: 470378.15 E: 13626342.79	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55 ▼ Depth (ft bgs) 14.37

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		0	**CLAY WITH GRAVEL** mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	**CLAY** mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard. Change to no gravel, very stiff at 4.0 feet.				
2 CS	100		10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
			15	▼				
3 CS	100		20		CL			
			25	Change to medium stiff at 26.0 feet. Change to very soft at 28.0 feet.				
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Firm: TRC Environmental Corporation 734.971.7080
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
				SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
6 ST	100		50	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
7 CS	100		55					
			60	Change to few fine to coarse gravel at 60.0 feet.	CL			
8 CS	100		65	Change to medium stiff at 65.0 feet.				
				Change to stiff at 67.5 feet.				
			70	**SILTY CLAY** mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
9 CS	100		75	Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.				
			80		CL-ML			
10 CS	60		85	Change to few to little fine sand at 85.5 feet.				
			90	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
11 CS	100			Change to medium stiff at 93.5 feet.				
			95		CL			
				Change to soft at 97.5 feet.				
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
12 CS	100		105	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110					
14 CS	100		115					
15 CS	100		120					
16 CS	90		125					
			130					
			135	**CLAYEY SILT** mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
			140	**SHALE** dark gray (10YR 4/1), dry.				
			145					
			150	End of boring at 150.0 feet below ground surface.				
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/10/16	3/11/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.98	593.21	140.0	6

Boring Location: 123 feet S of road connecting to haul road, E of diversion basin.

N: 470439.03 E: 13626796.04

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time — Depth (ft bgs)
After Drilling: Date/Time 4/13/16 10:01 ▼ Depth (ft bgs) 14.45

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		0	**GRAVEL WITH SAND** mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
2 CS	100		10	Change to few coarse gravel at 10.0 feet.				
				Change to dark gray (10YR 4/1), stiff at 12.0 feet.				
			15	Change to very soft at 13.0 feet. ▼				
3 CS	100		20		CL			
			25					
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50					
7 CS	100		55					
8 CS	100		60					
9 CS	80		65					
10 CS	70		70	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				SAND mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
			75	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
			80					
			85					
			90	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
12 CS	100		110					
13 CS	100		115					
14 CS	100		120					
			125	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
			130					
			135	**SILT** mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			140	**SHALE** dark gray (10YR 4/1), hard, brittle.				
			145	End of boring at 140.0 feet below ground surface.				
			150					
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/8/16	3/9/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.89	592.58	140.0	6

Boring Location: 326 feet S of road connecting to haul road, E of diversion basin.

N: 470233.47 E: 13626858.79

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 11:56 ▼ Depth (ft bgs) 14.13

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		0	**CLAY** mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
2 CS	100		10	Change to dark gray (10YR 4/1) at 11.0 feet.				
				▼ Change to moist, very soft at 13.0 feet.				
3 CS	100		15					
			20					
			25					
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		60					
			65	**CLAYEY SILT** mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
				SAND mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
				CLAYEY SILT mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
9 CS	100		70	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.	CL-ML			
			75					
10 CS	100		80					
			85					
11 CS	100		90					
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
12 CS	100		105	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		115					
15 CS	100		120					
			125					
			130	**SILT** mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
			135	**SHALE** dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/9/16	3/10/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.31	591.88	140.0	6

Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin.	Personnel	Drilling Equipment:
N: 470002.90 E: 13626846.85	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 4/13/16 12:00 ▼ Depth (ft bgs) 13.19

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	**CLAY WITH GRAVEL** mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff. Change to dark gray (10YR 4/1), very soft at 10.0 feet. ▼				
3 CS	100		15 20 25		CL			
4 CS	100		30 35 40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
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Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			50					
6 CS	100		55		CL			
			60					
7 CS	80		65					
			70	**SILTY CLAY** mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.				
8 CS	100		75					
			80					
9 CS	100		85		CL-ML			
			90					
10 CS	60		95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**SILTY CLAY** mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
				Change to few fine sand at 105.5 feet.				
12 CS	100		110	Change to no sand at 110.0 feet.				
13 CS	100		115					
			120					
			125					
14 CS	100		130					
				SILT mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
			135	**SHALE** dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/1/16	6/1/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.28	590.80	150.0	6

Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84	Personnel: Logged By - J. Reed; Driller - A. Goldsmith	Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations: While Drilling: Date/Time; After Drilling: Date/Time 6/9/16 15:13 ▼ Depth (ft bgs) 14.36
China Township	St. Clair	MI	

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			0	**TOPSOIL**				
1 CS	75		5	**SILTY CLAY** mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				CLAY mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.				
2 CS	85		10					
			15 ▼					
3 CS	100		20		CL			
			25					
4 CS	100		30	Change to trace to few fine gravel at 30.0 feet.				
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

Checked By: M. Powers

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			45	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
5 CS	100		50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6 CS	100		70	Change to soft at 70.0 feet.	CL			
			75					
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
7 CS	100		90					
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
8 CS	75		105	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.	CL			
9 CS	80		110					
			115					
10 CS	100		120					
			125					
			130					
			135	**SAND** mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
11 CS	80		140	**SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
			145	**SHALE** weathered, gray (10YR 5/1), brittle.				
			150	End of boring at 150.0 feet below ground surface.				
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-10

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/2/16	6/3/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.25	592.26	150.0	6

Boring Location: S end of haul road, W/NW of diversion basin.	Personnel	Drilling Equipment:
N: 470532.54 E: 13626417.00	Logged By - J. Reed Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 6/9/16 07:45 ▼ Depth (ft bgs) 15.30

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		0	**TOPSOIL**				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				
			5					
			10	Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
2 CS	90		15 ▼					
			20		CL			
3 CS	95		25	Change to soft at 25.0 feet.				
			30	Change to few fine to coarse sand, medium stiff at 30.0 feet. Change to dark gray (10YR 4/1) at 32.0 feet.				
4 CS	100		35	Change to soft at 35.0 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
			50					
6 CS	100		55		CL			
			60					
7 CS	100		65					
			70	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.				
8 CS	100		75	Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
			80	**CLAYEY SAND** mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.	SC			
9 CS	100		85	**SAND** mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SP			
			90	**SANDY CLAY** mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				
10 CS	100		95		CL			
			100	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			

WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	**SANDY CLAY** mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100			**SAND** mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			115	**CLAY** mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		120					
			125					
14 CS	95		130		CL			
			135					
15 CS	50		140					
			145	**GRAVELLY SILT** mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
				SILTY CLAY hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	**SHALE** dark gray.				
				End of boring at 150.0 feet below ground surface.				
			155					
			160					

SOIL BORING WELL CONSTRUCTION LOG 231928.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-11

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/3/16	6/6/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.03	591.54	150.0	6

Boring Location: S of haul road, W of diversion basin.	Personnel	Drilling Equipment:
N: 470251.34 E: 13626438.92	Logged By - J. Reed Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 6/21/16 07:45 ▼ Depth (ft bgs) 14.47

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			0	**TOPSOIL**				
1 CS	50		5	**CLAY** mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to trace gravel at 8.0 feet.				
2 CS	70		15	Change to gray (10YR 5/1) at 12.0 feet. Change to no gravel at 13.0 feet. ▼				
3 CS	90		20	Change to medium stiff at 21.0 feet.	CL			
4 CS	90		25					
			30					
			35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: _____

Checked By: M. Powers

Firm: TRC Environmental Corporation 734.971.7080
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-11

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	90		45	**CLAY** mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
				Change to medium stiff at 49.0 feet.				
6 CS	100		50					
			55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.	CL			
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-11

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	85		105	**CLAY** mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.				
			110	Change to medium stiff at 110.0 feet.				
12 CS	80		115					
			120		CL			
13 CS	85		125					
			130					
14 CS	90		135					
			140	**SANDY CLAY** mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.	CL			
				CLAY mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.	CL			
15 CS	90		145	**SHALE** dark gray.				
			150	End of boring 150.0 feet below ground surface.				
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	5/11/17	5/12/17	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.5	591.66	142.0	6

Boring Location: North of fuel oil tank number 2, between berm and fence.

Personnel
Logged By - J. Krenz
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 5/15/17 08:38 ▼ Depth (ft bgs) 17.79

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90		0	**CLAY** mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60		10					
3 CS	70		20	▼ Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.	CL			
4 CS	70		30					
5 CS	100		40					
6 CS	100		50					
7			60					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 8/21/17

Signature: Jarl Krenz Firm: TRC Environmental Fax

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-11A

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
CS	100		70	**CLAY** mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.				
				Change to few fine to coarse gravel at 70.0 feet.				
8 CS	100		80	Change to trace fine sand at 80.0 feet.				
9 CS	90							
10 CS	70		90					
11 CS	100		100		CL			
12 CS	100		110					
13 CS	100		120	Change to trace medium to coarse gravel at 126.0 feet.				
14 CS	60		130	**SILT** mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.	ML			
15 CS	100		140	**SILTY CLAY** mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML			
				BEDROCK shale, weathered, gray (10YR 4/1).				
				End of boring at 142.0 feet below ground surface.				
			150					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 8/21/17

SOIL BORING LOG

BORING NO. SB-16-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/1/16	3/1/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.69	---	150.0	6

Boring Location: Corner of E connecting road off haul road, E of bottom ash basins.	Personnel	Drilling Equipment:
N: 471096.38 E: 13626276.67	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	**CLAY WITH GRAVEL** mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff. **CLAY** mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
2 CS	100		10	Change to stiff at 10.0 feet.			
3 CS	100		15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
4 CS	100		20		CL		
			25				
			30				
			35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
				CLAY WITH SAND mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
			60	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		65	**SANDY SILT** mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
			70	**CLAY** mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
9 CS	100		75	Change to no gravel, soft at 72.5 feet.			
			80	Change to few coarse gravel at 80.0 feet.			
10 CS	100		85		CL		
			90				
11 CS	100		95				
			100				

SOIL BORING LOG

BORING NO. SB-16-01

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
12 CS	100		105	**CLAY** mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		115				
15 CS	100		120				
16 CS	100		125				
			130				
			135	**SILT** mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
			140				
			145	**SHALE** dark gray (10YR 4/1), dry.			
			150	End of boring at 150.0 feet below ground surface.			
			155				

WELL CONSTRUCTION DIAGRAM

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

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.06	1.8	TOP OF CASING
588.26	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
93.8		RISER PIPE LENGTH
	84.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	89.0	BENTONITE SEAL
496.3	92.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
491.3	97.0	BOTTOM OF SCREEN
	97.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
488.3	100.0	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 97 FT.
4 IN. FROM 97 TO 100 FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	98.20	T/PVC	3/21/2016	--
DTB AFTER DEVELOPING:	100.32	T/PVC	4/13/2016	845
SWL BEFORE DEVELOPING:	12.92	T/PVC	3/21/2016	--
SWL AFTER DEVELOPING:	16.32	T/PVC	4/13/2016	845
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 Electric Company Belle River Power Plant		WELL ID:	**MW-16-02**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016 INSTALLED BY: A. Knutson		CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
588.94	2.7	TOP OF CASING
586.27	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
94.7		RISER PIPE LENGTH
	84.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	89.0	BENTONITE SEAL
494.2	92.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
489.2	97.0	BOTTOM OF SCREEN
	97.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
486.2	100.0	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 97 FT.
4 IN. FROM 97 TO 100 FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 460 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
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 Electric Company Belle River Power Plant		WELL ID:	**MW-16-03**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016 INSTALLED BY: J. Reed	CHECKED BY:	M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.66	2.6	TOP OF CASING
588.03	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
134.5		RISER PIPE LENGTH
	126.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	129.0	BENTONITE SEAL
456.2	132.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.2	137.0	BOTTOM OF SCREEN
	137.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
438.2	150.0	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 140 FT.
4 IN. FROM 140 TO 150 FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 60 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: TURBID

COLOR BEFORE: LIGHT GRAY

CLARITY AFTER: SLIGHTLY TURBID

COLOR AFTER: VERY LIGHT GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-04**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.51	3.0	TOP OF CASING
587.50	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
122.0		RISER PIPE LENGTH
	111.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	116.0	BENTONITE SEAL
468.5	119.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
463.5	124.0	BOTTOM OF SCREEN
	124.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
457.5	130.0	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 124 FT.
4 IN. FROM 124 TO 130 FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 288 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-05**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.82	2.5	TOP OF CASING
588.32	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
141.5		RISER PIPE LENGTH
	128.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	133.0	BENTONITE SEAL
449.3	139.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
444.3	144.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
444.3	150.0	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 150 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 300 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
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 Electric Company Belle River Power Plant		WELL ID:	**MW-16-06**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016 INSTALLED BY: A. Knutson		CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
593.21	3.2	TOP OF CASING
589.98	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
138.2		RISER PIPE LENGTH
	127.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	132.0	BENTONITE SEAL
455.0	135.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
450.0	140.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NA
450.0	140.0	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 140 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 50 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NOT MEASURED

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-07**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
592.58	2.7	TOP OF CASING
589.89	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
135.7		RISER PIPE LENGTH
	125.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	130.0	BENTONITE SEAL
456.9	133.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.9	138.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
449.89	140.0	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 140 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-08**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
591.88	2.6	TOP OF CASING
589.31	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
135.6		RISER PIPE LENGTH
	125.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	130.0	BENTONITE SEAL
456.3	133.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.3	138.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
449.3	140.0	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 140 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 125 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-09**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016	INSTALLED BY: J. Reed	CHECKED BY: M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.80	2.5	TOP OF CASING
588.28	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
138.4		RISER PIPE LENGTH
	130.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	133.0	BENTONITE SEAL
452.4	136.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.4	141.0	BOTTOM OF SCREEN
	141.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
438.4	150.0	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 150 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 7 HOURS

WATER REMOVED: 30 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: TURBID

COLOR BEFORE: GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

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

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

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
592.26	3.0	TOP OF CASING
589.25	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
148.0		RISER PIPE LENGTH
	137.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	142.0	BENTONITE SEAL
444.3	145.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
439.3	150.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NA
439.3	150.0	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 150 FT.
_____ IN. FROM _____ TO _____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4.5 HOURS

WATER REMOVED: 85 GALLONS

WATER ADDED: 60 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: DARK GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
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 Electric Company Belle River Power Plant			WELL ID: **MW-16-11**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016	INSTALLED BY: J. Reed	CHECKED BY: M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
591.54	2.5	TOP OF CASING
589.03	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
139.5		RISER PIPE LENGTH
	130.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	135.0	BENTONITE SEAL
452.0	137.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.0	142.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
447.0	150.0	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 150 FT.
____ IN. FROM ____ TO ____ FT.

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

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 3 HOURS

WATER REMOVED: 84 GALLONS

WATER ADDED: 60 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

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

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

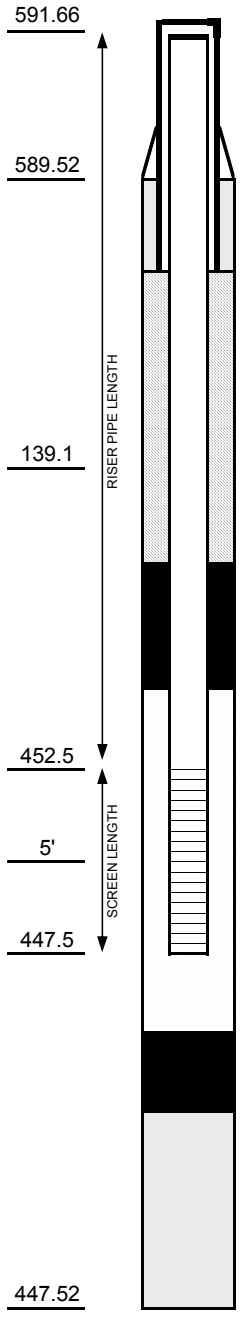
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

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

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)
591.66	2.1 TOP OF CASING
589.52	0.0 GROUND SURFACE
	1.5 CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
	GROUT/BACKFILL METHOD: TREMIE
139.1	131.5 GROUT
	BENTONITE SEAL MATERIAL: PELLETS
	134.0 BENTONITE SEAL
452.5	137.0 TOP OF SCREEN
5'	FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.5	142.0 BOTTOM OF SCREEN
	142.0 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL: NA
447.52	142.0 HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SOLVENT USED? NO

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER:	6	IN.	FROM 0	TO	142	FT.
	NA	IN.	FROM NA	TO	NA	FT.
SURF. CASING DIAMETER:	NA	IN.	FROM NA	TO	NA	FT.
	NA	IN.	FROM NA	TO	NA	FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 3 HOURS

WATER REMOVED: 110 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: Very Turbid

COLOR BEFORE: Dark Gray

CLARITY AFTER: Very Turbid

COLOR AFTER: Light Gray

ODOR (IF PRESENT): None

WATER LEVEL SUMMARY

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

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120