2019 Annual Groundwater Monitoring Report

DTE Electric Company
Belle River Power Plant Bottom Ash Basins

4505 King Road
China Township, Michigan

January 2020

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Prepared For
DTE Electric Company

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Executive Summary

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule), as amended July 30, 2018. The CCR Rule, which became effective on October 19, 2015 (amendment effective August 29, 2018), applies to the DTE Electric Company (DTE Electric) Belle River Power Plant (BRPP) CCR Bottom Ash Basins (BABs) CCR unit. Pursuant to the CCR Rule, no later than January 31, 2018, and annually thereafter, the owner or operator of a CCR unit must prepare an annual groundwater monitoring and corrective action report for the CCR unit documenting the status of groundwater monitoring and corrective action for the preceding year in accordance with §257.90(e). On behalf of DTE Electric, TRC Engineers Michigan, Inc., the engineering entity of TRC Environmental Corporation (TRC), has prepared this Annual Groundwater Monitoring Report for calendar year 2019 activities at the BRPP BABs CCR unit.

The groundwater sampling results were below prediction limits for Appendix III indicator parameters during both the March and October 2018 semiannual monitoring events; therefore, no statistically significant increases (SSIs) were reported for the Belle River Power Plant Bottom Ash Basins (BRPP BABs) CCR unit. As such, DTE Electric continued detection monitoring at the BRPP BABs CCR Unit in 2019 pursuant to §257.94 of the CCR Rule.

The semiannual detection monitoring events for 2019 were completed in March and September 2019 and included sampling and analyzing groundwater within the groundwater monitoring system for the indicator parameters listed in Appendix III to the CCR Rule. As part of the statistical evaluation, the data collected during detection monitoring events are evaluated to identify SSIs in detection monitoring parameters to determine if concentrations in detection monitoring well samples exceed prediction limits. Detection monitoring data that have been collected and evaluated in 2019 are presented in this report.

Potential SSIs over prediction limits were noted for a few Appendix III constituents in one or more downgradient wells during the March and September 2019 monitoring events. These potential SSIs were either not statistically significant (i.e. verification resampling did not confirm the exceedance) or were evaluated and determined to be a result of natural variability in groundwater quality as documented in an alternative source demonstration (ASD) and not attributable to the BRPP BABs CCR unit. With the very thick continuous silty clay-rich confining unit beneath the BRPP BABs CCR unit, it is not possible for the uppermost aquifer to have been affected by CCR from BRPP operations that began in the 1980s. Therefore, detection monitoring will be continued at the BRPP BABs CCR unit in accordance with §257.94 of the CCR Rule.

Section 1
Introduction

1.1 Program Summary

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule), as amended July 30, 2018. The CCR Rule, which became effective on October 19, 2015 (amendment effective August 29, 2018), applies to the DTE Electric Company (DTE Electric) Belle River Power Plant (BRPP) CCR Bottom Ash Basins (BABs). Pursuant to the CCR Rule, no later than January 31, 2018, and annually thereafter, the owner or operator of a CCR unit must prepare an annual groundwater monitoring and corrective action report for the CCR unit documenting the status of groundwater monitoring and corrective action for the preceding year in accordance with §257.90(e). On behalf of DTE Electric, TRC Engineers Michigan, Inc., the engineering entity of TRC Environmental Corporation (TRC), has prepared this Annual Groundwater Monitoring Report for calendar year 2019 activities at the BRPP BABs CCR unit (2019 Annual Report).

The groundwater sampling results were below background limits for Appendix III indicator parameters during both the March and October 2018 semiannual monitoring events; therefore, no statistically significant increases (SSIs) were reported for the Belle River Power Plant Bottom Ash Basins (BRPP BABs) CCR unit. As such, DTE Electric continued detection monitoring at the BRPP BABs CCR Unit in 2019 pursuant to §257.94 of the CCR Rule. This 2019 Annual Report presents the monitoring results and the statistical evaluation of the detection monitoring parameters (Appendix III to Part 257 of the CCR Rule) for the March and September 2019 semiannual groundwater monitoring events for the BRPP BABs CCR unit. Detection monitoring for these events continued to be performed in accordance with the *CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin* (QAPP) (TRC, July 2016; revised August 2017) and statistically evaluated per the Stats Plan (TRC, October 2017). As part of the statistical evaluation, the data collected during detection monitoring events are evaluated to identify SSIs of detection monitoring parameters compared to background levels.

1.2 Site Overview

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

The BRPP 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. 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 diversion basin (DB) CCR unit, which is monitored as a separate CCR unit in accordance with the CCR Rule and addressed in a separate 2019 Annual Report.

The DB is an incised CCR surface impoundment located east of the BRPP. Water flows into the DB from the North and South BABs through a network of pipes and ditches. The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit.

1.3 Geology/Hydrogeology

The BRPP BABs CCR unit is located approximately one-mile west of the St. Clair River. The BRPP BABs CCR unit is 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 (bgs). In general, the BRPP BABs CCR unit is initially underlain by at least 90 to as much as 136 feet of laterally extensive low hydraulic conductivity silty clay-rich deposits. The depth to the top of the confined sand-rich uppermost aquifer encountered immediately beneath the silty clay-rich deposits varies up to 46 feet within the monitoring well network and rapidly thins to the south and east of the BABs and pinches out (e.g., no longer present) to the southeast in the vicinity of SB-16-01 (Figure 1). Consequently, the uppermost aquifer is not laterally contiguous across the entire BRPP BABs CCR unit, and not present beneath the southeastern corner of the BABs.

The variability in the depth to the uppermost aquifer is a consequence of the heterogeneity of the glacial deposits and is driven by the lateral discontinuity of the sand outwash within the encapsulating fine-grained, silty clay till that confines the uppermost aquifer. There is an apparent lack of interconnection and/or significant vertical variation between the uppermost aquifer sand unit(s) encountered across the BRPP 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 (TRC, 2017).

Given the horizontally expansive clay with substantial vertical thickness that isolates the uppermost aquifer from the BRPP BABs CCR unit, 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 BRPP BABs CCR unit.

In addition, the elevation of CCR-affected water maintained within the BRPP BABs is approximately 5 feet above the potentiometric surface elevations in the uppermost aquifer at the BABs CCR unit area. This suggests that if the CCR affected surface water in the BABs 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 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.

Due to the relatively small footprint of the BABs, the low vertical and horizontal groundwater flow velocity, the potential for radial flow, 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 BRPP BABs CCR unit using intrawell 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, intrawell statistical approaches are being used during detection monitoring as discussed in the Stats Plan.

Section 2
Groundwater Monitoring

2.1 Monitoring Well Network

A groundwater monitoring system has been established for the BRPP BABs CCR unit as detailed in the *Groundwater Monitoring System Summary Report – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin Coal Combustion Residual Units* (GWMS Report) (TRC, October 2017). The detection monitoring well network for the BABs CCR unit currently consists of five monitoring wells that are screened in the uppermost aquifer. The monitoring well locations are shown on Figure 2.

As discussed in the Stats Plan, intrawell statistical methods for the BABs CCR unit were selected based on the geology and hydrogeology at the Site (primarily the presence of clay/hydraulic barrier, the variability in the presence of the uppermost aquifer across the site, and presence of no flow boundary on the southeast side of the aquifer), in addition to other supporting lines of evidence that the aquifer is unaffected by the CCR unit (such as the consistency in concentrations of water quality data). An intrawell statistical approach requires that each of the downgradient wells doubles as a background and compliance well, where data from each individual well during a detection monitoring event is compared to a statistical limit developed using the background dataset from that same well. Monitoring wells MW-16-01 through MW-16-04 and MW-16-09 are located around the north, east and south perimeter of the BABs and provide data on both background and downgradient groundwater quality that has not been affected by the CCR unit (total of five background/downgradient monitoring wells).

2.2 Semiannual Groundwater Monitoring

The semiannual monitoring parameters for the detection groundwater monitoring program were selected per the CCR Rule's Appendix III to Part 257 – Constituents for Detection Monitoring. The Appendix III indicator parameters consist of boron, calcium, chloride, fluoride, pH (field reading), sulfate, and total dissolved solids (TDS) and were analyzed in accordance with the sampling and analysis plan included within the QAPP. In addition to pH, the collected field parameters included dissolved oxygen, oxidation reduction potential, specific conductivity, temperature, and turbidity.

2.2.1 Data Summary

The first semiannual groundwater detection monitoring event for 2019 was performed during March 18 to 20, 2019 by TRC personnel and samples were analyzed by TestAmerica in accordance with the QAPP. Static water elevation data were collected at all five monitoring well locations. Groundwater samples were collected from the five

detection monitoring wells for the Appendix III indicator parameters and field parameters. A summary of the groundwater data collected during the March 2019 event is provided on Table 1 (static groundwater elevation data), Table 2 (field data), and Table 3 (analytical results).

The second semiannual groundwater detection monitoring event for 2019 was performed during September 16 to 17, 2019 by TRC personnel and samples were analyzed by TestAmerica in accordance with the QAPP. Static water elevation data were collected at all five monitoring well locations. Groundwater samples were collected from the five detection monitoring wells for the Appendix III indicator parameters and field parameters. A summary of the groundwater data collected during the October 2018 event is provided on Table 1 (static groundwater elevation data), Table 2 (field data), and Table 4 (analytical results).

2.2.2 Data Quality Review

Data from each round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the CCR monitoring program. Data quality reviews are summarized in Appendix B.

2.2.3 Groundwater Flow Rate and Direction

As presented in the GWMS Report, and mentioned above, given the horizontally expansive clay with substantial vertical thickness that isolates the uppermost aquifer from the BRPP BABs CCR unit; 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 BRPP 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 site. Groundwater elevations measured across the Site during the March 2019 sampling event are provided on Table 1 and are summarized in plan view on Figure 3. Groundwater elevations measured across the Site during the September 2019 sampling event are provided on Table 1 and are summarized in plan view on Figure 4.

Groundwater elevation data collected during the 2019 sampling events show that groundwater conditions within the uppermost aquifer are consistent with previous monitoring events and continue to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III parameters that could potentially migrate from the BRPP BABs CCR unit.

Section 3
Statistical Evaluation

3.1 Establishing Background Limits

Per the Stats Plan, background limits were established for the Appendix III indicator parameters following the collection of at least eight background monitoring events using data collected from each of the five established detection monitoring wells (MW-16-01 through MW-16-04 and MW-16-09). The statistical evaluation of the background data is presented in the 2017 Annual Report. The Appendix III background limits for each monitoring well will be used throughout the detection monitoring period to determine whether groundwater has been impacted from the BRPP BABs CCR unit by comparing concentrations in the detection monitoring wells to their respective background limits for each Appendix III indicator parameter.

3.2 Data Comparison to Background Limits – First Semiannual Event (March 2019)

The concentrations of the indicator parameters in each of the detection monitoring wells (MW-16-01 through MW-16-04 and MW-16-09) were compared to their respective statistical background limits calculated from the background data collected from each individual well (i.e., monitoring data from MW-16-01 is compared to the background limit developed using the background dataset from MW-16-01, and so forth).

The comparisons of the March 2019 monitoring event data to background limits are presented on Table 3. The statistical evaluation of the March 2019 Appendix III indicator parameters showed potential initial SSIs over background for:

- Total dissolved solids (TDS) at MW-16-01; and
- Sulfate at MW-16-04.

3.3 Verification Resampling for the First Semiannual Event

Verification resampling is recommended per the Stats Plan and the *USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance, USEPA, 2009) to achieve performance standards as specified by §257.93(g) in the CCR Rule. Per the Stats Plan, if there is an exceedance of a prediction limit for one or more of the parameters, the well(s) of concern will be resampled within 30 days of the completion of the initial statistical analysis. Only constituents that initially exceed their statistical limit (i.e., have no previously recorded SSIs) will be analyzed for verification purposes.

Verification resampling for the March 2019 event was conducted on May 9, 2019 by TRC personnel. Groundwater samples were collected for total dissolved solids at MW-16-01 and sulfate at MW-16-04, In accordance with the QAPP. A summary of the analytical results collected during the May 2019 resampling event is provided on Table 3. The associated data quality review is included in Appendix A.

The verification results for TDS (MW-16-01) and sulfate (MW-16-04) are above the prediction limits, consequently the initial potential SSIs from the March 2019 event are confirmed at these locations.

According to §257.94(e), in the event that the facility determines, pursuant to §257.93(h), that there is a SSI over background levels for one or more of the Appendix III constituents, the facility will, within 90 days of detecting a SSI, demonstrate that a source other than the CCR unit caused the SSI, or the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. If an alternate source demonstration (ASD) is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under §257.95. If an ASD is completed, a certification from a qualified professional engineer is required, and the CCR unit may continue with detection monitoring. The facility must also include the ASD in the annual groundwater monitoring and corrective action report required by §257.90(e), in addition to the certification by a qualified professional engineer.

DTE Electric prepared an ASD dated August 8, 2019, *Alternate Source Demonstration: 2019 First Semi Annual Detection Monitoring Sampling Event Bell River Power Plant Coal Combustion Residual Bottom Ash Basins* (April 2019 ASD). This ASD demonstrates that the SSIs confirmed above are from natural variability in groundwater quality and not from a release of the BRPP BABs CCR unit and is provided in Appendix A. As such, detection monitoring continued at the BRPP BABs CCR unit in 2019.

3.4 Data Comparison to Background Limits – Second Semiannual Event (September 2019)

The concentrations of the indicator parameters in each of the detection monitoring wells (MW-16-01 through MW-16-04 and MW-16-09) were compared to their respective statistical background limits calculated from the background data collected from each individual well (i.e., monitoring data from MW-16-01 is compared to the background limit developed using the background dataset from MW-16-01, and so forth).The comparisons of the September 2019 monitoring event are presented on Table 4. The statistical evaluation of the September 2019 Appendix III indicator parameters showed potential initial SSIs over background for:

- Calcium at MW-16-03;

- Chloride at MW-16-03; and
- Sulfate at MW-16-04

The sulfate concentration at MW-16-04 is a continued exceedance of the prediction limit that has been demonstrated to be from natural variability and is not from a release from the CCR unit as presented in the August 2019 ASD (Appendix A).

3.5 Verification Resampling for the Second Semiannual Event

Verification resampling for the September 2019 event was conducted on November 11, 2019 by TRC personnel. Groundwater samples were collected for calcium and chloride at MW-16-03, in accordance with the QAPP. A summary of the analytical results collected during the November 2019 resampling event is provided on Table 4. The associated data quality review is included in Appendix B.

The calcium and chloride verification results are below the prediction limits, consequently the initial potential SSIs from the September 2019 event are not confirmed. Therefore, in accordance with the Stats Plan and the Unified Guidance, the initial exceedances are not statistically significant, and no SSIs will be recorded for the September 2019 monitoring event.

Section 4
Conclusions and Recommendations

Potential SSIs over background limits were noted for a few Appendix III constituents in one or more downgradient wells during the March and September 2019 monitoring events. These potential SSIs were either not statistically significant (i.e. verification sampling did not confirm the exceedance) or were evaluated and determined to be a result of natural variability in groundwater quality as documented in an ASD (Appendix A) and not attributable to the BRPP BABs CCR unit. As discussed above and in the GWMS Report, with the presence of the vertically and horizontally extensive clay-rich confining till beneath the BRPP BABs CCR unit, it is not possible for the uppermost aquifer to have been affected by CCR from operations. In addition, due to limitations on CCR Rule implementation timelines, the background data sets are of relatively short duration for capturing the occurrence of natural temporal changes in the aquifer. Therefore, detection monitoring will be continued at the BRPP BABs CCR unit in accordance with §257.94. No corrective actions were performed in 2019. The next semiannual monitoring event is scheduled for the second calendar quarter of 2020.

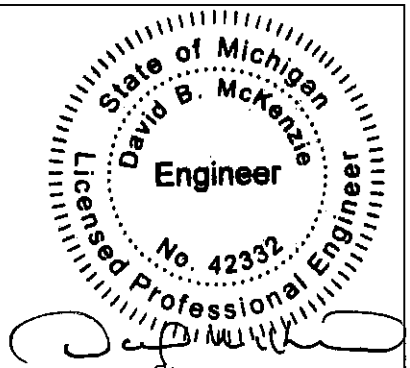
Section 5
Groundwater Monitoring Report Certification

The U.S. EPA's Disposal of Coal Combustion Residuals from Electric Utilities Final Rule Title 40 CFR Part 257 §257.90(e) requires that the owner or operator of an existing CCR unit prepare an annual groundwater monitoring and corrective action report.

Annual Groundwater Monitoring Report Certification
Belle River Power Plant Bottom Ash Basins
China Township, Michigan

CERTIFICATION

I hereby certify that the annual groundwater and corrective action report presented within this document for the BRPP BABs CCR unit has been prepared to meet the requirements of Title 40 CFR §257.90(e) of the Federal 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 §257.90(e).

Name: David B. McKenzie, P.E.	Expiration Date: October 31, 2021	 Stamp
Company: TRC Engineers Michigan, Inc.	Date: January 30, 2020	

Section 6
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Tables

Table 1
Summary of Groundwater Elevation Data – March and September 2019
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
Date Installed	3/17/2016		3/15/2016		6/1/2016		3/8/2016		6/2/2016	
TOC Elevation	590.06		588.94		590.66		590.51		590.80	
Geologic Unit of Screened Interval	Sand		Sand		Silty Sand		Sand		Sand	
Screened Interval Elevation	496.3 to 491.3		494.3 to 489.3		456.0 to 451.0		468.5 to 463.5		452.3 to 447.3	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
3/18/2019	15.88	574.18	13.40	575.54	16.27	574.39	16.64	573.87	16.46	574.34
9/16/2019	15.88	574.18	13.38	575.56	16.16	574.50	16.53	573.98	16.35	574.45

Notes:

Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet Below top of casing.

Table 2
Summary of Field Data – March and September 2019
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (deg C)	Turbidity (NTU)
MW-16-01	3/18/2019	0.17	-134.9	7.6	1,822	10.30	2.42
	9/16/2019	0.16	-172.1	7.6	1,614	13.44	2.06
MW-16-02	3/18/2019	1.34	-116.3	7.6	1,428	10.90	2.13
	9/16/2019	0.33	-167.1	7.5	1,267	15.49	1.57
MW-16-03	3/18/2019	1.14	-163.4	7.9	2,088	10.50	1.13
	9/16/2019	0.16	-194.2	7.6	1,840	14.89	0.96
MW-16-04	3/18/2019	1.34	-168.7	7.9	1,899	10.00	45.3
	9/16/2019	0.14	-211.2	7.8	1,676	16.06	50.2
MW-16-09	3/20/2019	1.17	-237.8	8.0	2,933	10.80	68.7
	9/17/2019	0.14	21.1	8.0	2,994	14.34	120

Notes:
mg/L - milligrams per liter.
mV - milliVolt.
SU - standard unit.
umhos/cm - micro-mhos per centimeter.
deg C - degrees Celcius.
NTU - nephelometric turbidity units.

Table 3
Comparison of Appendix III Parameter Results to Background Limits – March and May 2019
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-01			MW-16-02		MW-16-03		MW-16-04			MW-16-09	
Sample Date:		3/18/2019	5/9/2019[1]	PL	3/18/2019	PL	3/18/2019	PL	3/18/2019	5/9/2019[1]	PL	3/20/2019	PL
Constituent	Unit	Data			Data		Data		Data			Data	
Appendix III													
Boron	ug/L	1,200	--	1,300	1,200	1,300	1,200	1,300	1,000	--	1,100	1,600	1,900
Calcium	ug/L	41,000	--	45,000	54,000	59,000	33,000	36,000	42,000	--	64,000	32,000	41,000
Chloride	mg/L	480	--	530	370	400	570	690	500	--	520	960	1,100
Fluoride	mg/L	1.6	--	1.9	1.1	1.3	1.6	1.9	1.6	--	1.9	1.3	1.8
pH, Field	SU	7.6	7.7	7.6 - 8.1	7.6	7.4 - 8.0	7.9	7.5 - 8.3	7.9	7.7	7.5 - 8.4	8.0	7.7 - 8.7
Sulfate	mg/L	5.8	--	8.1	4.8	20	2.4	14	**27**	**24**[2]	18	18	40
Total Dissolved Solids	mg/L	**960**	**970**[2]	950	730	890	1,100	1,100	990	**--**	1,100	1,700	2,000

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

All metals were analyzed as total unless otherwise specified.

Bold font indicates an exceedance of the Prediction Limit (PL).

RESULT Shading and bold font indicates a confirmed exceedance of the Prediction Limit (PL).

(1) - Results shown for verification sampling performed on 5/9/2019.

(2) - New successful alternative source demonstration was completed following confirmation of the initial statistically significant exceedance.

Table 4
Comparison of Appendix III Parameter Results to Background Limits – September and November 2019
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-01		MW-16-02		MW-16-03			MW-16-04		MW-16-09	
Sample Date:		9/16/2019	PL	9/16/2019	PL	9/16/2019	11/11/2019[1]	PL	9/16/2019	PL	9/17/2019	PL
Constituent	Unit	Data		Data		Data			Data		Data	
Appendix III												
Boron	ug/L	1,000	1,300	1,100	1,300	1,100	--	1,300	1,000	1,100	1,500	1,900
Calcium	ug/L	43,000	45,000	58,000	59,000	**38,000**	20,000	36,000	47,000	64,000	37,000	41,000
Chloride	mg/L	460	530	350	400	**1,000**	600	690	480	520	920	1,100
Fluoride	mg/L	1.8	1.9	1.1	1.3	1.8	--	1.9	1.7	1.9	1.4	1.8
pH, Field	SU	7.6	7.6 - 8.1	7.5	7.4 - 8.0	7.6	7.8	7.5 - 8.3	7.8	7.5 - 8.4	8.0	7.7 - 8.7
Sulfate	mg/L	7.5	8.1	5.8	20	1.7	--	14	**20**[2]	18	12	40
Total Dissolved Solids	mg/L	950	950	770	890	1,000	--	1,100	970	1,100	1,800	2,000

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

-- = not analyzed.

All metals were analyzed as total unless otherwise specified.

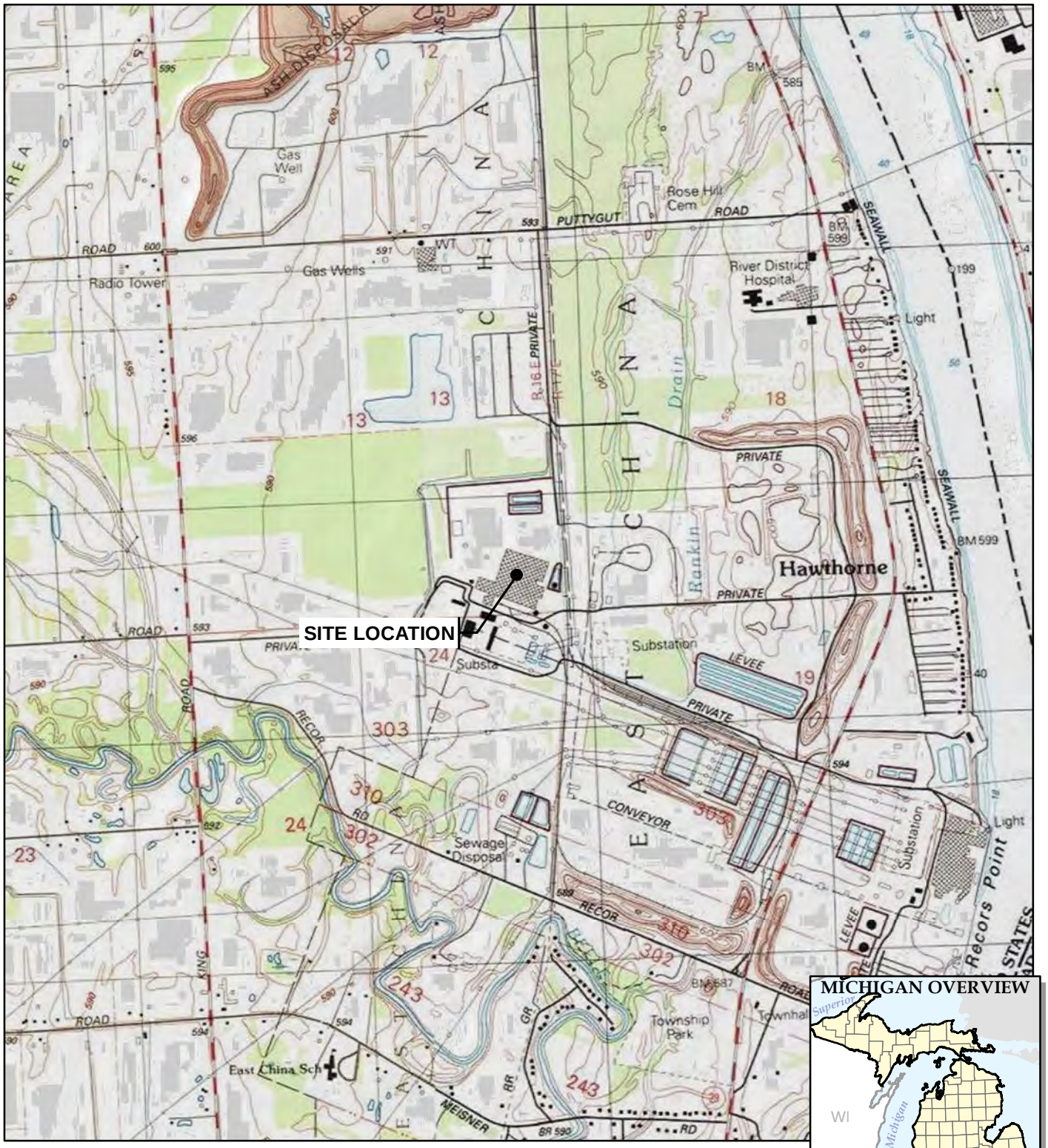
Bold font indicates an exceedance of the Prediction Limit (PL).

RESULT Shading and bold font indicates a confirmed exceedance of the Prediction Limit (PL).

(1) - Results shown for verification sampling performed on 11/11/2019.

(2) - Concentration addressed through first 2019 Semiannual alternative source demonstration.

Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

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

0 2,000 4,000
FEET

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PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	S. MAJOR
CHECKED BY:	J. KRENZ
APPROVED BY:	V. BUENING
DATE:	JANUARY 2020
PROJ. NO.:	320511.0003
FILE:	320511-0003-003slmMB.mxd

FIGURE 1

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LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO. & PARTNERS, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.

0 200 400 Feet

1 " = 200 '

1:2,400

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

TITLE:
SITE PLAN

DRAWN BY:	M. VAPHIADIS	PROJ NO.:	320511.0003.0000 P1 T1
CHECKED BY:	J. KRENZ		
APPROVED BY:	V. BUENING		**FIGURE 2**
DATE:	JANUARY 2020		

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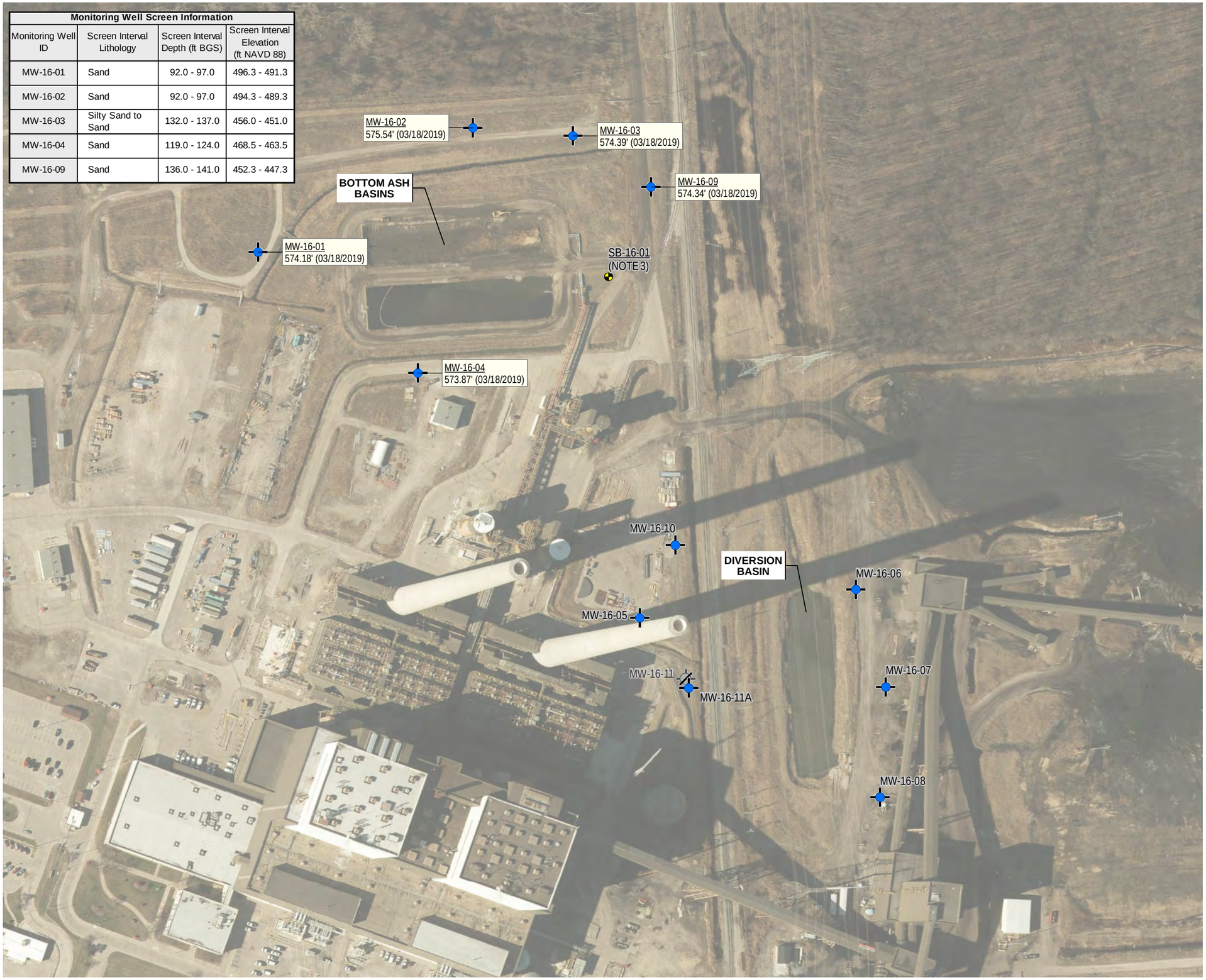
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/28/2020, 08:56:04 AM by MVAPHIADIS -- LAYOUT: ANSI B (11"X17")
Path: E:\DTE\CCR_Sites\2017_265996\320511-0003-022.mxd

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



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 GOOGLE EARTH PRO, (3/23/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.
3. 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 BOTTOM ASH BASIN
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:
BOTTOM ASH BASINS GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY MARCH 2019

DRAWN BY:	M. VAPHIADIS	PROJ NO.:	320511.0003
CHECKED BY:	J. KRENZ		
APPROVED BY:	V. BUENING		**FIGURE 3**
DATE:	JANUARY 2020		

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

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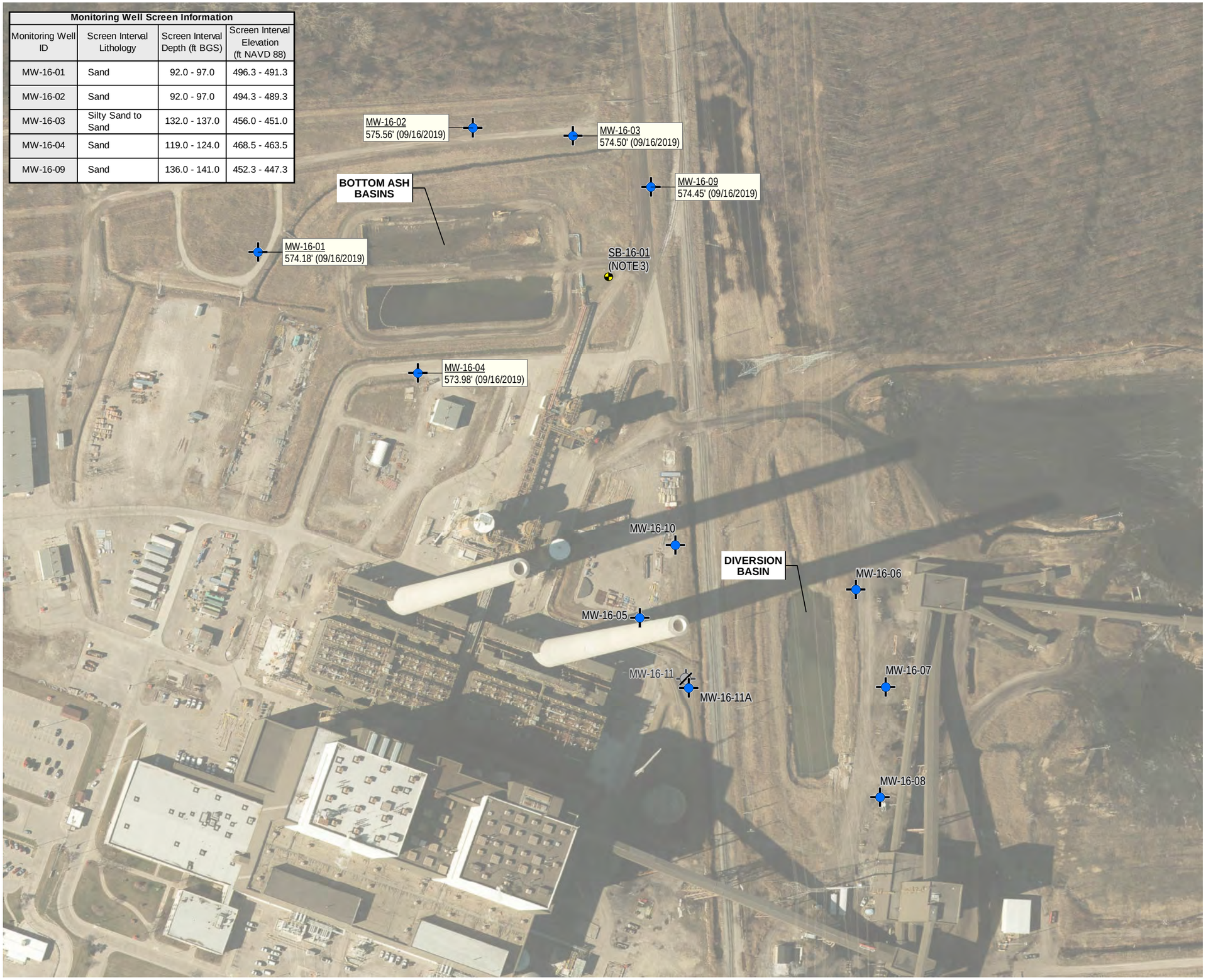
Monitoring Well Screen Information			
Monitoring Well ID	Screen Interval Lithology	Screen Interval Depth (ft BGS)	Screen Interval Elevation (ft NAVD 88)
MW-16-01	Sand	92.0 - 97.0	496.3 - 491.3
MW-16-02	Sand	92.0 - 97.0	494.3 - 489.3
MW-16-03	Silty Sand to Sand	132.0 - 137.0	456.0 - 451.0
MW-16-04	Sand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



LEGEND

- SOIL BORING
- MONITORING
- 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 GOOGLE EARTH PRO, (3/23/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.
3. 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 BOTTOM ASH BASIN
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:
BOTTOM ASH BASINS GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY SEPTEMBER 2019

DRAWN BY:	M. VAPHIADIS	PROJ NO.:	320511.0003
CHECKED BY:	J. KRENZ		
APPROVED BY:	V. BUENING		**FIGURE 4**
DATE:	JANUARY 2020		

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FILE NO.: 320511-0003-024.mxd

Plot Date: 1/28/2020, 09:03:29 AM by MVAPHIADIS -- LAYOUT: ANSI B (11"x17")
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Map Rotation: 0

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Appendix A
Alternative Source Demonstration: First 2019 Semiannual Detection Monitoring Sampling Event

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Technical Memorandum

Date: August 8, 2019

To: Christopher P. Scieszka
DTE Electric Company

From: Graham Crockford, TRC
David McKenzie, TRC

Project No.: 320511.0003.0000 Phase 001, Task 001

Subject: Alternate Source Demonstration: 2019 First Semi Annual Detection Monitoring Sampling Event Belle River Power Plant Coal Combustion Residual Bottom Ash Basins

Introduction

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule). The CCR Rule, which became effective on October 19, 2015, applies to the DTE Electric Company (DTE Electric) Belle River Power Plant (BRPP) CCR Bottom Ash Basins (BABs) CCR unit.

TRC Engineers Michigan, Inc. (TRC) conducted the first semiannual 2019 detection monitoring event for the BRPP BABs CCR unit on behalf of DTE Electric on March 18 through March 20, 2019 in accordance with the *CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin* (QAPP) (TRC, July 2016; revised March and August 2017). The semiannual groundwater monitoring event included the statistical evaluation of the detection monitoring parameters (Appendix III to Part 257 of the CCR Rule) for the BRPP BABs CCR unit. This event is the fourth detection monitoring event performed to comply with §257.94. As part of the statistical evaluation, the data collected during detection monitoring events are evaluated to identify statistically significant increases (SSIs) in detection monitoring parameters to determine if concentrations in detection monitoring well samples exceed background levels. The statistical analysis was performed pursuant to §257.93(f) and (g), and in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, 2017).

The statistical evaluation of the March 2019 Appendix III indicator parameters showed potential SSIs over background for:

- Total Dissolved Solids (TDS) at MW-16-01; and
- Sulfate at MW-16-04

All other Appendix III constituents were within the statistical background limits.

In accordance with §257.94(3)(2), DTE Electric may demonstrate that a source other than the CCR unit caused the SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. This Alternate Source Demonstration (ASD) has been prepared to evaluate the potential SSIs identified in the March 2019 detection monitoring event.

Background

The BRPP is located in China Township in St. Clair County, Michigan. The site location is shown in Figure 1. The BRPP was constructed in the early 1980s with plant operations beginning in 1984. 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. The BABs have been in use 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).

The BRPP 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. 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 gravity flows over an outlet weir to a conveyance network of ditches and pipes, then flows into the diversion basin (DB) CCR unit, which is monitored as a separate CCR unit in accordance with the CCR Rule.

The BRPP BABs CCR unit is located approximately one-mile west of the St. Clair River. The BRPP BABs CCR unit is 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 (bgs). In general, the BRPP BABs CCR unit is initially underlain by at least 90 to as much as 136 feet of laterally extensive low hydraulic conductivity silty clay-rich deposits. The depth to the top of the confined sand-rich uppermost aquifer encountered immediately beneath the silty clay-rich deposits varies up to 46 feet within the monitoring well network and rapidly thins to the south and east of the BABs and pinches out (e.g., no longer present) to the southeast. Consequently, the uppermost aquifer is not laterally contiguous across the entire BRPP BABs CCR unit, and not present in the southeastern corner of the BABs.

The detection monitoring well network for the BABs CCR unit currently consists of five monitoring wells that are screened in the uppermost aquifer. As discussed in the Stats Plan, intrawell statistical methods for the BABs CCR unit were selected based on the geology and hydrogeology at the Site (primarily the presence of clay/hydraulic barrier, the variability in the presence of the uppermost aquifer across the site, and presence of no flow boundary on the southeast side of the aquifer), in addition to other supporting lines of evidence that the aquifer is unaffected by the CCR unit (such as the consistency in concentrations of water quality data). Monitoring wells MW-16-01 through MW-16-04 and MW-16-09 are located around the north, east and south perimeter of the BABs and provide data on both background and downgradient groundwater quality that has not been affected

by the CCR unit (total of five background/downgradient monitoring wells). The monitoring well locations are shown in Figure 2. The *Groundwater Monitoring System Summary Report – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin Coal Combustion Residual Units*, (GWMS Report) details the groundwater monitoring system (TRC, October 2017).

Alternate Source Demonstration

Verification resampling was performed as recommended per the Stats Plan and the USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (Unified Guidance, USEPA, 2009) to achieve performance standards as specified by §257.93(g) in the CCR rules. Per the Stats Plan, if there is an exceedance of a prediction limit for one or more of the parameters, the well(s) of concern will be resampled within 30 days of the completion of the initial statistical analysis. Only constituents that initially exceed their statistical limit (i.e., have no previously recorded SSIs) will be analyzed for verification purposes. As such, verification resampling was conducted on May 9, 2019, by TRC personnel. Groundwater samples were collected for TDS at monitoring well MW-16-01 and sulfate at monitoring well MW-16-04 in accordance with the Quality Assurance Project Plan (TRC, July 2016, revised in March and August 2017). A summary of the groundwater data collected during the verification resampling event is provided on Table 1. The associated data quality review is included in Attachment A.

The verification resampling confirmed the TDS exceedance at MW-16-01 and the sulfate exceedance at MW-16-04 during the May 2019 verification sampling event. The following discussion presents the ASD for the confirmed prediction limit exceedances.

TDS at MW-16-01: The TDS concentrations at MW-16-01, shown graphically as data points greater than the prediction limit in Figure 3, are likely the result of natural spatial variability in groundwater quality at the site and a statistical false positive, and not the result of a release from the BRPP BABs CCR unit. Multiple lines of evidence are provided in support of this conclusion and are as follows:

- **Spatial variability in groundwater quality** – After 8 background sampling events, the prediction limits calculated for each of the 5 monitoring wells range from 890 mg/L to 2,000 mg/L. This variability in groundwater quality across the site, shows that the TDS concentrations vary spatially throughout the uppermost aquifer and suggests the confirmed TDS SSI at MW-16-01 could be attributed to spatial variability rather than the CCR unit.
- **Insufficient background sampling timeline to account for long-term trends** – Variability in TDS concentrations observed in the groundwater at BRPP BABs CCR unit during the background sampling events provides evidence of the heterogeneity of this constituent in groundwater. The short duration of the background sampling events limits the ability of the statistical analysis to capture the natural temporal trends in the groundwater quality at the BRPP BABs CCR unit. This is a limitation of the CCR Rule implementation timeline.

- **Lack of similar increase in other indicator parameters** – The lack of SSIs for any other parameters within the same monitoring well, and across the other wells within the monitoring well network, also suggests a source other than CCR leachate for the observed TDS SSI at this location.
- **Time of travel analysis** – The clay formation immediately beneath the BRPP BABs CCR unit provides a natural geologic barrier to migration of CCR constituents to the underlying aquifer. The vertical extent of the clay layer beneath the CCR unit is shown in Figures 6 and 7 as cross-sections. Figure 5 shows the cross-section locations in plan view. Conservatively calculating a time of travel for liquid from the base of the BRPP BABs CCR unit through a minimum of 82 feet of clay, to the underlying upper aquifer, yields approximately 1,300 years of travel time (TRC, October 2017). The BRPP BABs CCR unit began accepting coal ash in approximately 1984, so, based on this analysis, there is no potential for indicator parameters to have migrated to the upper aquifer.

Sulfate at MW-16-04: The sulfate concentrations at MW-16-04, shown graphically as data points greater than the prediction limit in Figure 4, are likely the result of natural spatial variability in groundwater quality at the site and a statistical false positive, and not the result of a release from the BRPP BABs CCR unit. Multiple lines of evidence are provided in support of this conclusion and are as follows:

- **Spatial variability in groundwater quality** – After 8 background sampling events, the prediction limits calculated for each of the 5 monitoring wells range from 8.1 mg/L to 40 mg/L. This variability in groundwater quality across the site, shows that the sulfate concentrations vary spatially throughout the uppermost aquifer and suggests the confirmed sulfate SSI at MW-16-04 could be attributed to spatial variability rather than the CCR unit.
- **Insufficient background sampling timeline to account for long-term trends** – Variability in sulfate concentrations observed in the groundwater at BRPP during the background sampling events provides evidence of the heterogeneity of this constituent in groundwater. The short duration of the background sampling events limits the ability of the statistical analysis to capture the natural temporal trends in the groundwater quality at the BRPP. This is a limitation of the CCR Rule implementation timeline.
- **Lack of similar increase in other indicator parameters** – The lack of SSIs for any other parameters within the same monitoring well, and across the other wells within the monitoring well network, also suggests a source other than CCR leachate for the observed sulfate SSI at this location.
- **Time of travel analysis** – The clay formation immediately beneath the BRPP BABs CCR unit provides a natural geologic barrier to migration of CCR constituents to the underlying aquifer. The vertical extent of the clay layer beneath the CCR unit is shown in Figures 6 and 7 as cross-sections. Figure 5 shows the cross-section locations in plan view. Conservatively calculating a time of travel for liquid from the base of the BRPP BABs CCR unit through a minimum of 82 feet of clay, to the underlying upper aquifer, yields approximately 1,300 years of travel time (TRC, October 2017). The BRPP BABs CCR unit began accepting coal ash in approximately 1984, so,

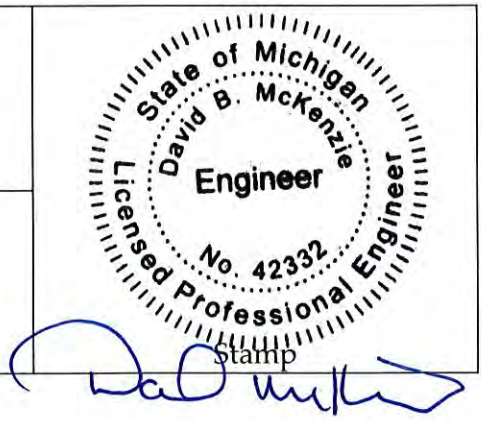
based on this analysis, there is no potential for indicator parameters to have migrated to the upper aquifer.

Conclusions and Recommendations

The information provided in this report serves as the ASD for the DTE Electric BRPP BABs CCR unit, was prepared in accordance with 40 CFR 257.94(e)(2) of the CCR Rule, and demonstrates that the TDS SSI and sulfate SSI determined based on the first semiannual detection monitoring event performed in 2019 are not due to a release of CCR leachate into the groundwater. Therefore, based on the information provided in this ASD, DTE Electric will continue detection monitoring as per 40 CFR 257.94 at the BRPP BABs CCR unit.

Certification Statement

I hereby certify that the alternative source demonstration presented within this document for the BRPP BAB CCR unit has been prepared to meet the requirements of Title 40 CFR §257.94(e) 2 of the Federal 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 §257.94(e) 2.

Name: David B. McKenzie, P.E.	Expiration Date: October 31, 2019	 Stamp
Company: TRC Engineers Michigan, Inc.	Date: 8/8/19	

References

TRC Environmental Corporation. July 2016; Revised March and August 2017. CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin, 4505 King Road, China Township, Michigan. Prepared for DTE Electric Company.

TRC Environmental Corporation. October 2017. Groundwater Monitoring System 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. Prepared for DTE Electric Company.

TRC Environmental Corporation. October 2017. Groundwater Statistical Evaluation Plan – DTE Electric Company Belle River Power Plant Coal Combustion Residual Bottom Ash Basins, 4505 King Road, China Township, Michigan. Prepared for DTE Electric Company.

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA facilities, Unified Guidance. Office of Conservation and Recovery. EPA 530/R-09-007.

Attachments

Table 1. Comparison of Verification Sampling Results to Background Limits

Figure 1. Site Location Map
Figure 2. Monitoring Network and Site Plan
Figure 3. MW-16-01 TDS Time Series Plot
Figure 4. MW-16-04 Sulfate Time Series Plot
Figure 5. Cross Section Locator Map
Figure 6. Generalized Geologic Cross-Section A-A'
Figure 7. Generalized Geologic Cross-Section B-B'

Attachment A. Data Quality Review

Table 1

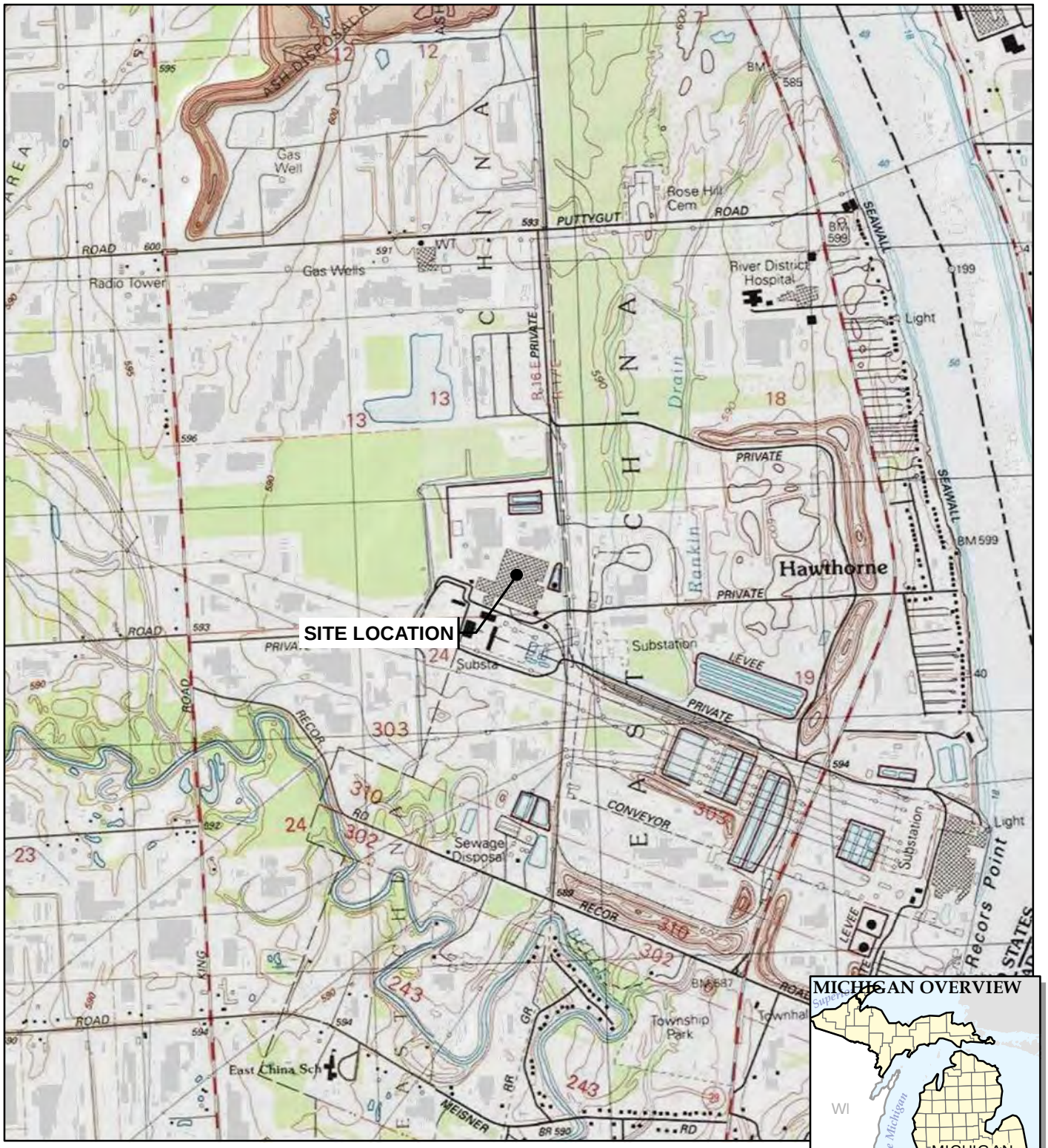
Table 1
Comparison of Verification Sampling Results to Background Limits
Belle River Power Plant BABs - RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-01		MW-16-04	
Sample Date:		5/9/2019		5/9/2019	
Constituent	Unit	Data	PL	Data	PL
Appendix III					
Sulfate	mg/L	--	8.1	**24**	18
Total Dissolved Solids	mg/L	**970**	950	--	1,100

Notes:
mg/L - milligrams per liter.

RESULT Shading and bold font indicates a confirmed exceedance of the Prediction Limit (PL).

Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

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

0 2,000 4,000
FEET

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4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE:

SITE LOCATION MAP

DRAWN BY:	J PAPEZ
CHECKED BY:	S HOLMSTROM
APPROVED BY:	V BUENING
DATE:	AUGUST 2019
PROJ. NO.:	320511.0003.0000 P1 T1
FILE:	320511-0003-001slmMB.mxd

FIGURE 1

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LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO. & PARTNERS, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.

0 200 400 Feet

1 " = 200 '

1:2,400

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

TITLE:
SITE PLAN

DRAWN BY:	R SUEMNICHT	PROJ NO.:	320511.0003.0000 P1 T1
CHECKED BY:	S HOLMSTROM		
APPROVED BY:	V BUENING		**FIGURE 2**
DATE:	AUGUST 2019		

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

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Figure 3
MW-16-01 TDS Time Series Plot
Belle River Power Plant Bottom Ash Basins - RCRA CCR Monitoring Program

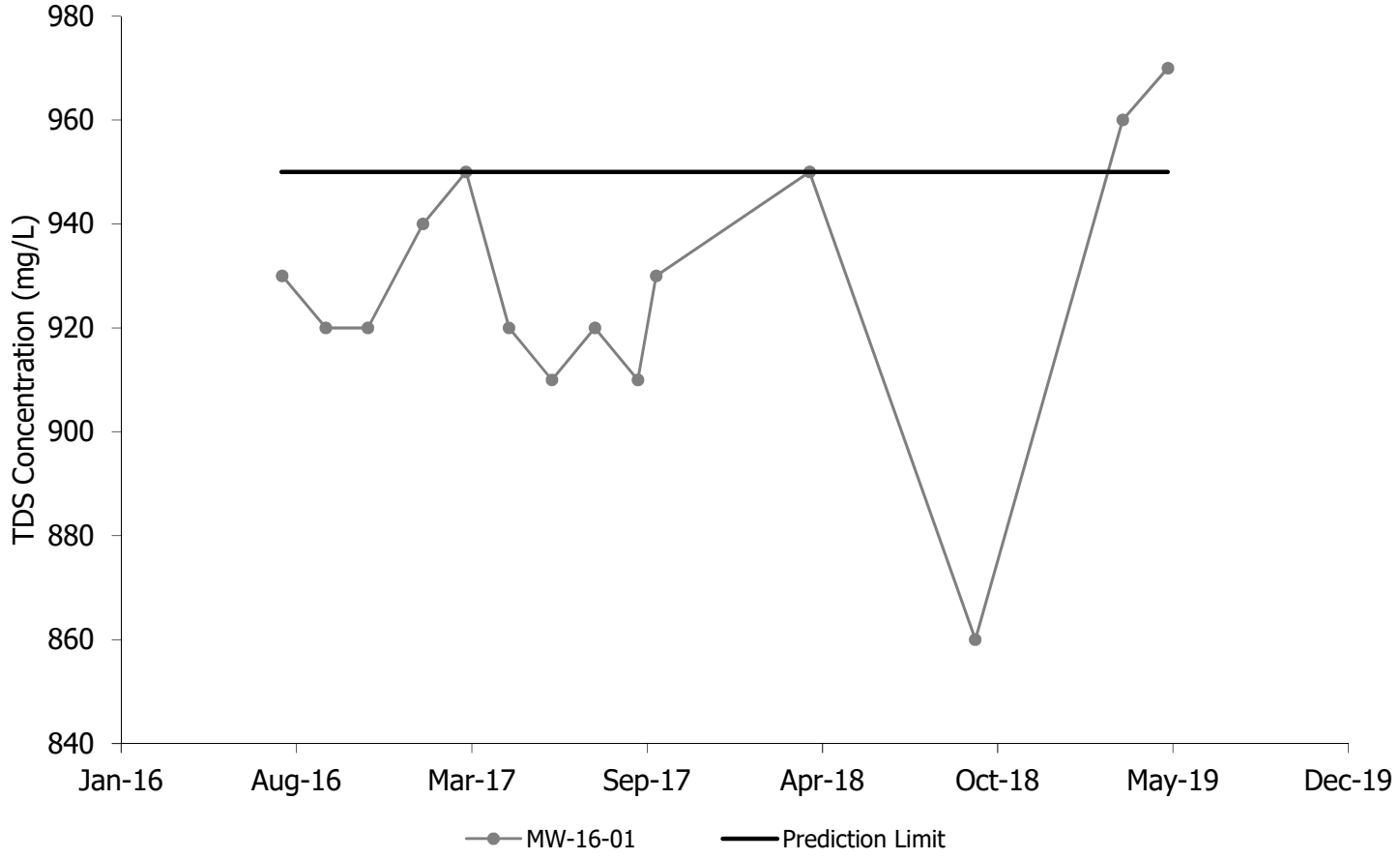
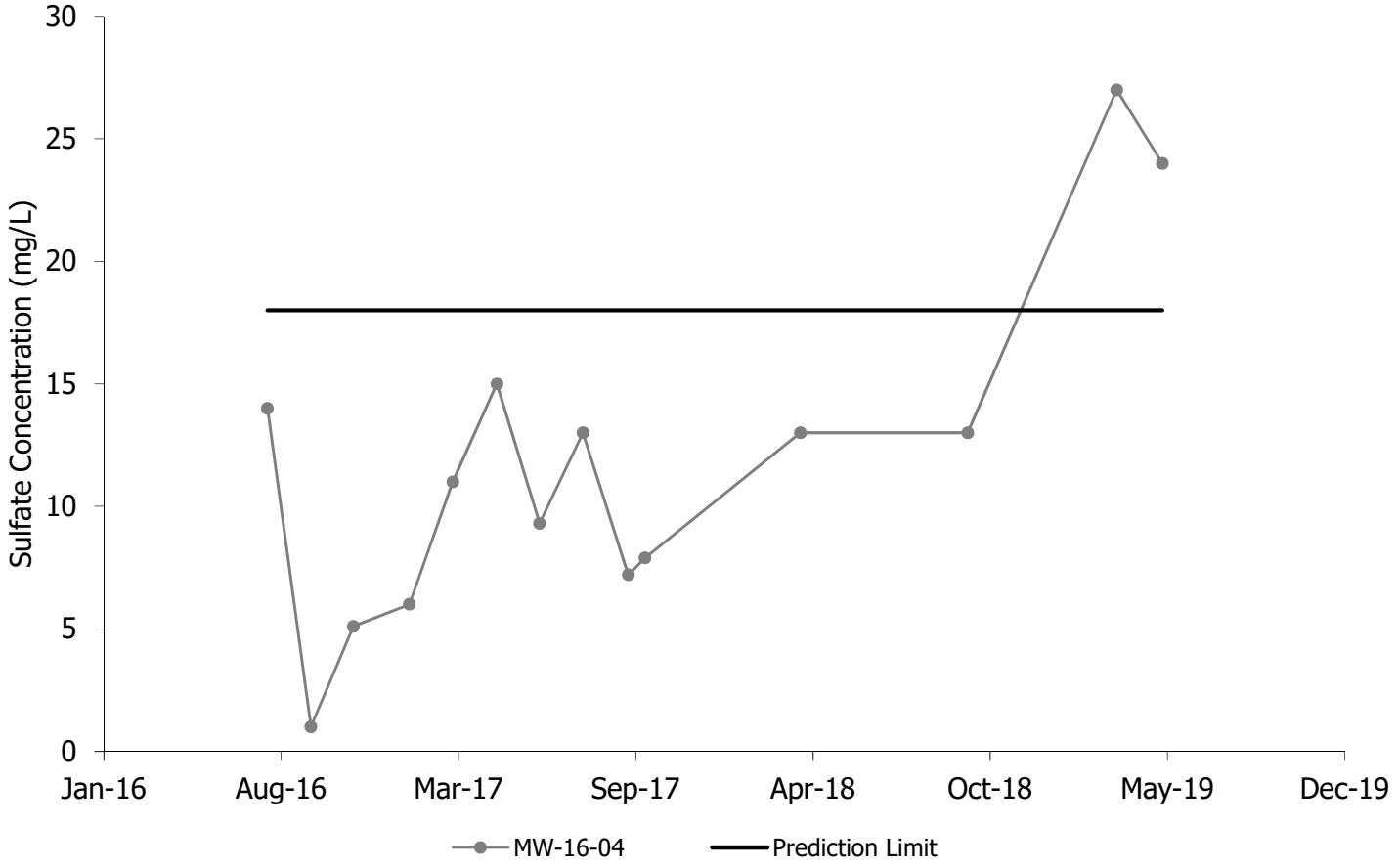


Figure 4
MW-16-04 Sulfate Time Series Plot
Belle River Power Plant Bottom Ash Basins - RCRA CCR Monitoring Program



LEGEND

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

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO. & PARTNERS, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, JUNE 2016, AND JUNE 2017.

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.:	320511.0003.0000 P1 T1
CHECKED BY:	S. HOLMSTROM		
APPROVED BY:	V. BUENING		**FIGURE 5**
DATE:	AUGUST 2019		

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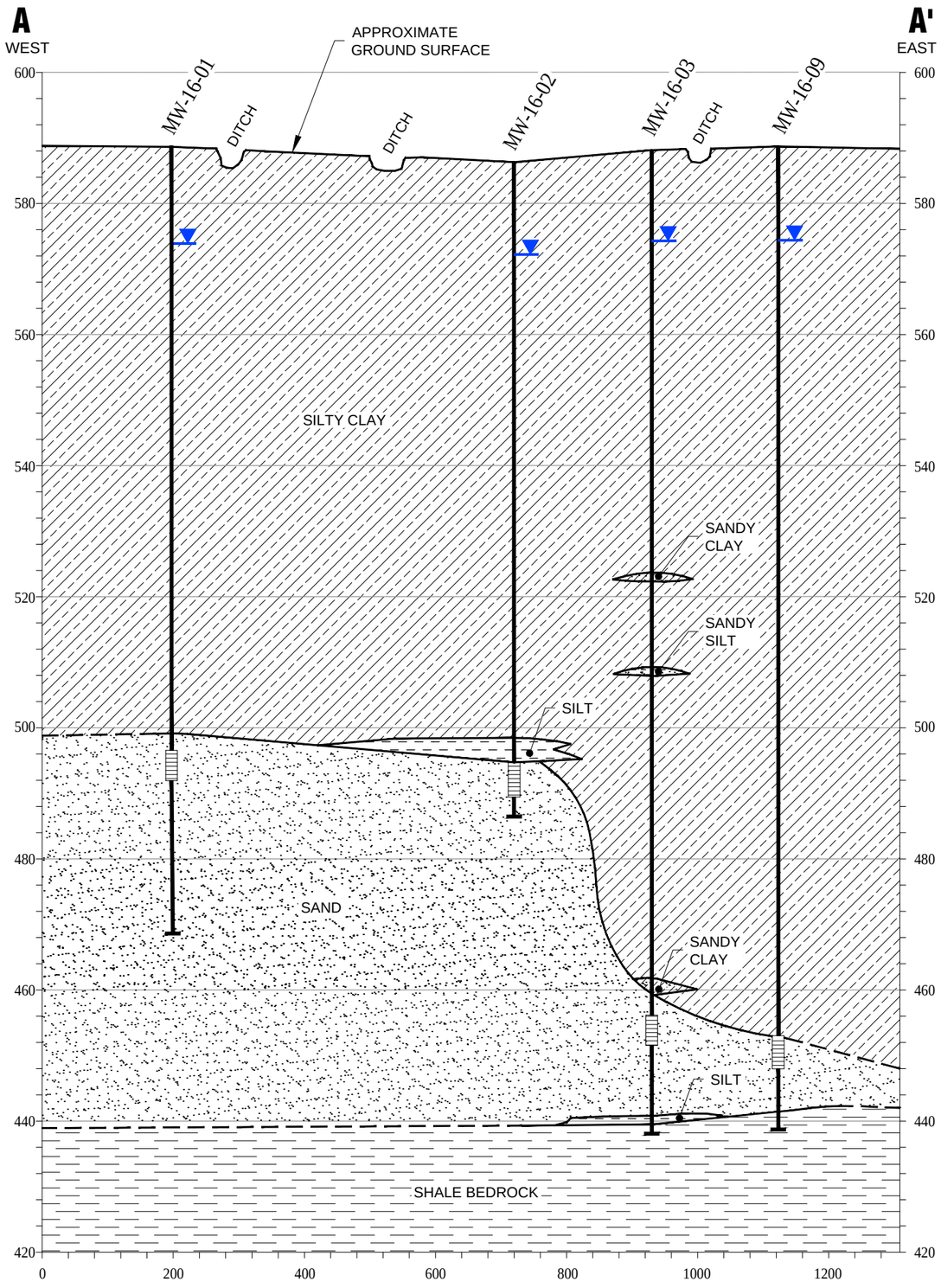
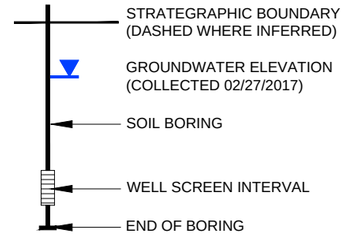
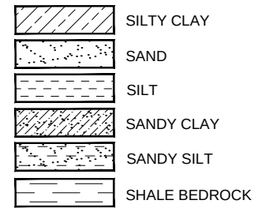
GENERALIZED GEOLOGIC CROSS-SECTION A-A'

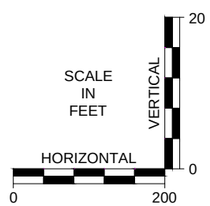


LEGEND



Lithology Key





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

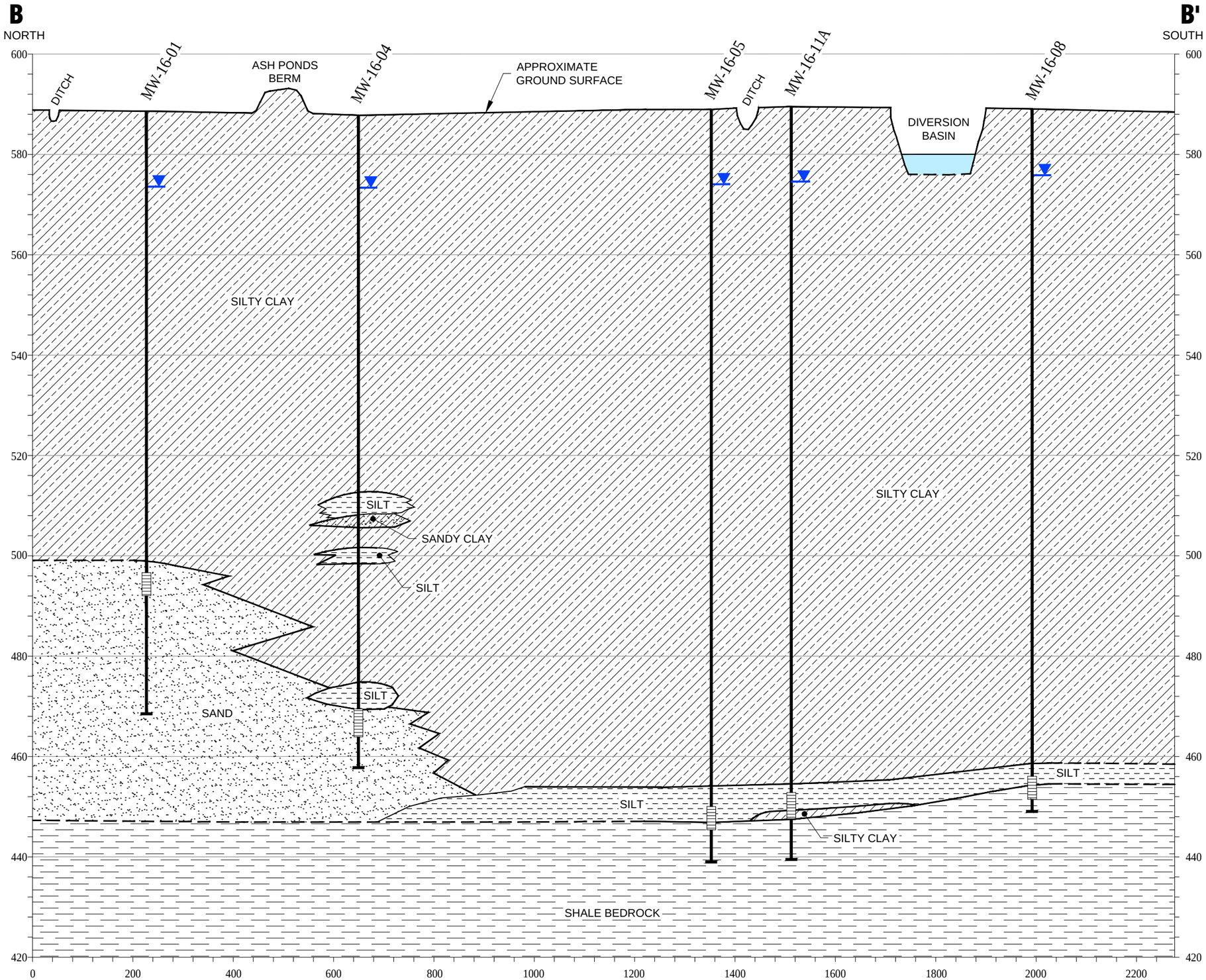
TITLE:
GENERALIZED
GEOLOGIC CROSS-SECTION A-A'

DRAWN BY:	D.STEHLE	PROJ NO.:	320511.0003.01.01
CHECKED BY:	S.HOLMSTROM		
APPROVED BY:	V.BUENING		**FIGURE 6**
DATE:	AUGUST 2019		

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

FILE NO.: 320511.0003.01.01.06-07.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: 20 / 0
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.:	320511.0003.01.01
CHECKED BY:	S.HOLMSTROM		
APPROVED BY:	V.BUENING		**FIGURE 7**
DATE:	AUGUST 2019		

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FILE NO.: 320511.0003.01.01.06-07.dwg

Attachment A
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event May 2019 (Verification Resampling)
DTE Electric Company Belle River Power Plant (DTE BRPP)

On May 9, 2019, TRC Environmental Corporation (TRC) collected groundwater samples at MW-16-01 and MW-16-04 to verify analytical results that were outside of the prediction limits during the March 2019 detection monitoring event. Samples were analyzed by Test America Laboratories, Inc. (Test America), located in Canton, Ohio for anions (SW846 6020/9056A) and total dissolved solids (TDS) (SM 2540C). The laboratory analytical results are reported in laboratory report J112501-1.

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Quality Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2017). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Data for method blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures;
- Reporting limits (RLs) compared to project-required RLs;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes;
- Data for laboratory control samples (LCSs). The LCSs are used to assess the accuracy of the analytical method using a clean matrix;
- Data for laboratory duplicates. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation are noted below.

QA/QC Sample Summary:

- Target analytes were not detected in associated method blanks.
- LCS recoveries were within laboratory control limits.
- Dup-01 corresponds with MW-16-01 and Dup-02 corresponds with MW-16-04; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits.
- Data are usable for purposes of verification sampling.

Appendix B
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event March 2019 (Detection Monitoring)
DTE Electric Company Belle River Power Plant (DTE BRPP)

Groundwater samples were collected by TRC for the March 2019 sampling event for the Diversion Basin at the DTE BRPP. Samples were analyzed for anions, boron, calcium, and total dissolved solids by Test America Laboratories, Inc., (Test America) located in North Canton, Ohio. The laboratory analytical results are reported in laboratory report 240-109798-1.

During the March 2019 sampling event, a groundwater sample was collected from the following wells:

- MW-16-01
- MW-16-02
- MW-16-03
- MW-16-04
- MW-16-05
- MW-16-06
- MW-16-07
- MW-16-08
- MW-16-09
- MW-16-10
- MW-16-11A

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	SW846 9056A
Total Boron	SW846 3005A/6010B
Total Calcium	SW846 3005A/6020
Total Dissolved Solids	SM 2540C

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Quality Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2017). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks and equipment blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Equipment blanks are used to assess potential contamination arising from field procedures;

- Data for laboratory control samples (LCSs). The LCSs are used to assess the accuracy of the analytical method using a clean matrix;
- Data for matrix spike and matrix spike duplicate samples (MS.MSDs), if applicable. The MS/MSDs are used to assess the accuracy and precision of the analytical method using a sample from the dataset;
- Data for laboratory duplicates, if applicable. The laboratory duplicates are used to assess the precision of the analytical method using a sample from the dataset;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation are noted below.

- The reviewed constituents will be utilized for the purposes of a detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.

QA/QC Sample Summary:

- The holding time for TDS for samples MW-16-01, MW-16-02, MW-16-03, MW-16-04, MW-16-05, DUP-01, and EB-01 exceeded the 7-day holding time criteria by approximately 5-10 hours. These results are estimated and may be biased low.
- Target analytes were not detected in the equipment blank (EB-01_20190318).
- Target analytes were not detected in the method blanks.
- LCS recoveries for all target analytes were within laboratory control limits.
- Sample DUP-01 corresponds with sample MW-16-01. The relative percent differences (RPDs) between the parent and duplicate sample were within the acceptance limits.
- Laboratory duplicate analyses were performed on sample MW-16-01 for TDS; the RPD was within the acceptance limits.

- MS/MSD analyses were performed on the following samples:
  - Sample MW-16-01 for boron; the percent recoveries (%Rs) and RPDs were within the acceptance limits.
  - Samples MW-16-02 and DUP-01 for fluoride and sulfate; the %Rs and RPDs were within the acceptance limits.
  - Sample MW-16-02 for calcium; the MS/MSD %Rs (68%/63%) were below the lower QC limit of 75%, but no action was required since the sample result in the parent sample was > 4x the spike added.
- For TDS, the constant weight was not achieved after three drying cycles for sample MW-16-02; there was no impact on data usability.

Laboratory Data Quality Review
Groundwater Monitoring Event September 2019 (Detection Monitoring)
DTE Electric Company Belle River Power Plant (DTE BRPP)

Groundwater samples were collected by TRC for the September 2019 sampling event for the Bottom Ash Basins and Diversion Basin at the DTE BRPP. Samples were analyzed for anions, total boron, total calcium, and total dissolved solids by Eurofins-Test America Laboratories, Inc. (Eurofins-TA), located in North Canton, Ohio. The laboratory analytical results are reported in laboratory report 240-119135-1.

During the September 2019 sampling event, a groundwater sample was collected from each of the following wells:

Bottom Ash Basins:

- MW-16-01
- MW-16-02
- MW-16-03
- MW-16-04
- MW-16-09

Diversion Basin:

- MW-16-05
- MW-16-06
- MW-16-07
- MW-16-08
- MW-16-10
- MW-16-11A

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	SW846 9056A
Total Boron	SW846 3005A/6010B
Total Calcium	SW846 3005A/6020
Total Dissolved Solids	SM 2540C

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2017). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;

- Data for method blanks and equipment blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs). The LCSs are used to assess the accuracy of the analytical method using a clean matrix;
- Data for matrix spike and matrix spike duplicate samples (MS/MSDs), where applicable. The MS/MSDs are used to assess the accuracy and precision of the analytical method using a sample from the dataset;
- Data for laboratory duplicates, where applicable. The laboratory duplicates are used to assess the precision of the analytical method using a sample from the dataset;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation are noted below.

- Appendix III constituents will be utilized for the purposes of a detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.

QA/QC Sample Summary:

- There was one equipment blank submitted with this dataset (EB-01) which was associated with the low hydraulic conductivity wells (MW-16-08, MW 16-10, and MW-16-11A). Chloride was detected at 1.8 mg/L and TDS was detected at 12 mg/L in this equipment blank. However, these analytes were detected at concentrations greater than five times the blank concentrations in the associated wells; thus, there was no impact on data usability.

- Target analytes were not detected in the method blanks.

- LCS recoveries for all target analytes were within laboratory control limits.

- MS/MSD analyses were performed on samples MW-16-01 for boron, MW-16-03 for fluoride and sulfate, and MW-16-02 for calcium; the percent recoveries (%Rs) and relative percent differences (RPDs) were acceptable.
  - MS/MSD analyses were not performed for chloride; per the project QAPP, MS/MSD analyses are required for chloride at a frequency of 1 per 20 samples. It is likely that an MS/MSD was performed on sample MW-16-03 for chloride but not reported by the laboratory since the sample was re-analyzed at a dilution for chloride.

- Laboratory duplicate analyses were not performed for TDS. Per the project QAPP, laboratory duplicate analyses are required for TDS at a frequency of 1 per 20 samples.

- Dup-01 corresponds with MW-16-01; RPDs between the parent and duplicate sample were within the QC limits.

- The nondetect reporting limits (5.0 mg/L) for sulfate in samples MW-16-06, MW-16-08, and MW-16-11A were above the QAPP-specified RL (1.0 mg/L) due to a 5-fold dilution which was likely the result of elevated chloride concentrations.

Laboratory Data Quality Review
Groundwater Monitoring Event
November Verification (Detection Monitoring)
DTE Electric Company Belle River Power Plant (DTE BRPP)

One groundwater sample was collected by TRC for the November 2019 sampling event for the Bottom Ash Basin at the DTE BRPP. The sample was analyzed for calcium and chloride by Test America Laboratories, Inc. (Test America), located in North Canton, Ohio. The laboratory analytical results are reported in laboratory report 240-122291-1

During the November 2019 sampling event, a groundwater sample was collected from the following well:

Bottom Ash Basin:

- MW-16-03

The sample was analyzed for the following constituents:

Analyte Group	Method
Chloride	SW846 9056A
Total Recoverable Calcium	SW846 3005A/6020

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2017). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks and equipment blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs). The LCSs are used to assess the accuracy of the analytical method using a clean matrix;
- Data for matrix spike and matrix spike duplicate samples (MS/MSDs). The MS/MSDs are used to assess the accuracy and precision of the analytical method using a sample from the dataset;

- Data for laboratory duplicates. The laboratory duplicates are used to assess the precision of the analytical method using a sample from the dataset;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation are noted below.

- Appendix III constituents will be utilized for the purposes of a detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.

QA/QC Sample Summary:

- Target analytes were not detected in the method blanks.

- LCS recoveries for all target analytes were within laboratory control limits.

- MS/MSD analyses were not performed on the sample in this data set.

- DUP-01_20191111 corresponds with MW-16-03_20191111; the RPD between the parent and duplicate sample were within the QC limits for chloride; the RPD of 51.9% exceeded the QC limits for calcium and potential uncertainty exists for calcium in all groundwater samples, as summarized in the attached table, Appendix B.