2019 Annual Groundwater Monitoring Report

DTE Electric Company
Belle River Power Plant Diversion Basin

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 Diversion Basin (DB) 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 DB CCR unit.

In the January 31, 2019 *Annual Groundwater Monitoring Report for the Belle River Power Plant Diversion Basin,* covering calendar year 2018 activities potential statistically significant increases (SSIs) over prediction limits were noted for a few Appendix III constituents in one or more downgradient wells during the March and October 2018 monitoring events. However, verification resampling in May and November 2018 did not confirm any of the initial concentrations to be above prediction limits; therefore, the concentrations were not statistically significant, and no SSIs were recorded for either of the 2018 detection monitoring events. As such, DTE Electric continued detection monitoring at the BRPP DB CCR unit 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 background levels. Detection monitoring data that has been collected and evaluated in 2019 are presented in this report.

No SSIs were recorded for the 2019 monitoring period and detection monitoring will be continued at the BRPP DB CCR unit in accordance with §257.94. In addition, with the presence of the vertically and horizontally extensive clay-rich confining till beneath the BRPP DB CCR unit, it is not possible for the uppermost aquifer to have been affected by CCR from operations. Also, 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.

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) Diversion Basin (DB). 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 DB CCR unit (2019 Annual Report).

In the January 31, 2019 *Annual Groundwater Monitoring Report for the Belle River Power Plant Diversion Basin,* covering calendar year 2018 activities (2018 Annual Report), potential statistically significant increases (SSIs) over prediction limits were noted for a few Appendix III constituents in one or more downgradient wells during the March and October 2018 monitoring events. However, verification resampling in May and November 2018 did not confirm any of the initial concentrations above prediction limits; therefore, the concentrations were not statistically significant, and no SSIs were recorded for either of the 2018 detection monitoring events. As such, DTE Electric continued detection monitoring at the BRPP DB 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. 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 DB CCR unit. Detection monitoring 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 *Groundwater Statistical Evaluation Plan – Belle River Power Plant Coal Combustion Residual Diversion Basin* (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 DB is an incised CCR surface impoundment located east of the BRPP. Water flows into the DB from the North and South bottom ash basins (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 DB CCR unit is located approximately one-mile west of the St. Clair River. The BRPP DB 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 DB CCR unit is underlain by at least 130 feet of laterally extensive low hydraulic conductivity silty clay-rich deposits. The silty clay-rich till was then underlain by two to seven feet of silt between the till and the underlying shale bedrock (not an aquifer) confining unit. Groundwater was encountered within this silt at the shale bedrock interface representing a potential confined uppermost aquifer in the BRPP DB CCR unit.

A definitive groundwater flow direction to the west-northwest with a mean gradient of 0.003 foot/foot within the uppermost aquifer is evident around the BRPP CCR DB CCR unit using data collected in 2016 through 2018; however, potential groundwater flow within this silt-rich uppermost aquifer is very slow (on the order of one-half foot per year).

In addition, the elevation of CCR-affected water maintained within the BRPP DB is approximately 5 feet above the potentiometric surface elevations in the uppermost aquifer at the DB CCR unit area. This suggests that if the CCR affected surface water in the DB were able to penetrate the silty clay-rich underlying confining unit, then the head on that release likely would travel radially away from the 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.

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 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 BRPP DB CCR unit using intrawell statistical methods is appropriate. 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 DB 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 DB CCR unit currently consists of six 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 DB CCR unit were selected based on the geology and hydrogeology at the Site (primarily the presence of clay/hydraulic barrier, the relatively small footprint of the DB, combined with low vertical and horizontal groundwater flow velocity), 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-16-05 through MW-16-08, MW-16-10, and MW-16-11A are generally located around the east and west perimeter of the DB and provide data on both background and downgradient groundwater quality that has not been affected by the CCR unit (total of six background/downgradient monitoring wells).

Monitoring well MW-16-11 was found to be damaged in March 2017 and could no longer be used to obtain representative groundwater samples. A casing failure was suspected when grout was observed at the base of the well and confirmed using a downhole camera assessment that identified a crack in the casing 40 feet down. The monitoring well was properly decommissioned on May 11, 2017 and replaced on May 12, 2017, with monitoring well MW-16-11A. The replacement monitoring well is located proximal to MW-16-11 to the south and was installed utilizing procedures consistent with those described in the QAPP.

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 through 20, 2019 by TRC personnel and samples were analyzed by TestAmerica in accordance with the QAPP. Static water elevation data were collected at all six monitoring well locations. Groundwater samples were collected from the six 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 and 17, 2019 by TRC personnel and samples were analyzed by TestAmerica in accordance with the QAPP. Static water elevation data were collected at all six monitoring well locations. Groundwater samples were collected from the six detection monitoring wells for the Appendix III indicator parameters and field parameters. A summary of the groundwater data collected during the September 2019 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

The general flow rate and direction from both groundwater monitoring events are similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III parameters that could potentially migrate from the BRPP DB CCR unit. Groundwater elevation data collected during the March and September 2019 sampling events show that groundwater within the uppermost aquifer generally flows to the west-northwest across the BRPP DB, consistent with previous events. Groundwater potentiometric surface elevations measured across the BRPP DB during the March and

September 2019 sampling events are provided on Table 1 and were used to construct the groundwater potentiometric surface maps shown on Figures 3 and 4, respectively.

The average hydraulic gradient throughout the BRPP DB during both of the 2019 semiannual events is estimated at approximately 0.003 ft/ft, resulting in an estimated average seepage velocity of approximately 0.002 ft/day or 0.6 ft/year using the average hydraulic conductivity of 0.2 ft/day (TRC, 2017) and an assumed effective porosity of 0.4.

As presented in the GWMS Report, there is a horizontally expansive clay with substantial vertical thickness that isolates the uppermost aquifer from the BRPP DB CCR unit. The general flow direction in the uppermost aquifer is similar to that identified in previous monitoring rounds and continues to demonstrate that the compliance wells are appropriately positioned to detect the presence of Appendix III parameters that could potentially migrate from the BRPP DB 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 six established detection monitoring wells (MW-16-05 through MW-16-08, MW-16-10, and MW-16-11/11A). 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 DB 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 2019 Semiannual Event (March 2019)

The concentrations of the indicator parameters in each of the detection monitoring wells (MW-16-05 through MW-16-08, MW-16-10, and MW-16-11A) were compared to their respective statistical background limits calculated from the background data collected from each individual well (i.e., monitoring data from MW-16-05 is compared to the background limit developed using the background dataset from MW-16-05, and so forth).

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

- Calcium at MW-16-10.

Verification resampling is recommended per the Stats Plan and the *USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009) (Unified Guidance), 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. Constituents that have been addressed by an alternative source demonstration (ASD) will not be analyzed for verification purposes.

3.3 Verification Resampling for the First Semiannual Event

Verification resampling for the March 2019 event was conducted on May 8, 2019, by TRC personnel, in accordance with the QAPP. A summary of the groundwater data collected during

the verification resampling event is provided on Table 3. The associated data quality review is included in Appendix B.

The calcium verification result is below the prediction limit and no SSI will be recorded from the March 2019 detection monitoring event for this parameter in accordance with the Stats Plan and the Unified Guidance. As such, detection monitoring was continued in accordance with §257.94 of the CCR Rule.

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

The comparisons of the September 2019 monitoring event data to background limits are presented in Table 4. The statistical evaluation of the March 2019 Appendix III indicator parameter data shows that there were no concentrations above background limits for any Appendix III indicator parameter during the second 2019 semiannual detection monitoring event.

Section 4
Conclusions and Recommendations

A potential SSI was noted for calcium at MW-16-10 during the March 2019 monitoring event. This potential SSI was not statistically significant (i.e. verification sampling did not confirm the exceedance). Therefore, no SSIs were recorded for the 2019 monitoring period and detection monitoring will be continued at the BRPP DB CCR unit in accordance with §257.94. As discussed above, and in the GWMS Report, with the presence of the vertically and horizontally extensive clay-rich confining till beneath the BRPP DB 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 DB 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.

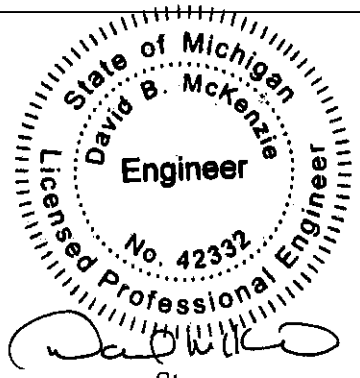
Section 5
Groundwater Monitoring Report Certification

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 Diversion Basin
China Township, Michigan

CERTIFICATION

I hereby certify that the annual groundwater and corrective action report presented within this document for the BRPP DB 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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USEPA. April 2018. Barnes Johnson (Office of Resource Conservation and Recovery) to James Roewer (c/o Edison Electric Institute) and Douglas Green, Margaret Fawal (Venable LLP). Re: Coal Combustion Residuals Rule Groundwater Monitoring Requirements. April 30, 2018. United States Environmental Protection Agency, Washington, D.C. 20460. Office of Solid Waste and Emergency Response, now the Office of Land and Emergency Management.

Tables

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

Well ID	MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11A	
Date Installed	3/4/2016		3/11/2016		3/9/2016		3/10/2016		6/6/2016		5/12/2017	
TOC Elevation	590.82		593.21		592.58		591.88		592.26		591.66	
Geologic Unit of Screened Interval	Clayey Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Silt/Shale Interface		Gravely Silt and Silty Clay		Silt and Silty Clay	
Screened Interval Elevation	449.3 to 444.3		455.0 to 450.0		456.9 to 451.9		456.3 to 451.3		444.3 to 439.3		452.5 to 447.5	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
3/18/2019	16.73	574.09	17.50	575.71	16.60	575.98	16.52	575.36	17.71	574.55	16.77	574.89
9/16/2019	16.67	574.15	17.43	575.78	16.58	576.00	15.56	576.32	17.64	574.62	16.73	574.93

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 Diversion Basin – 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-16-05	3/18/2019	1.4	-203.6	8.0	4,948	9.60	20.6
	9/17/2019	0.39	-251.0	7.9	4,968	17.60	5.00
MW-16-06	3/20/2019	1.26	-226.5	8.0	4,586	11.10	3.71
	9/17/2019	0.19	119.3	8.1	4,683	15.56	4.52
MW-16-07	3/20/2019	1.10	-261.5	8.0	5,032	10.50	77.1
	9/17/2019	0.17	124.2	8.1	5,130	15.30	107.0
MW-16-08	3/19/2019	1.06	-162.5	8.1	4,990	10.80	87.0
	9/17/2019	0.17	34.6	8.2	5,243	12.76	127.0
MW-16-10	3/19/2019	1.09	-230.0	8.0	4,351	10.70	64.0
	9/17/2019	0.50	57.8	8.1	4,620	14.11	80.5
MW-16-11A	3/19/2019	1.15	-135.4	8.0	4,577	10.00	36.2
	9/17/2019	0.43	-170.1	8.1	5,446	12.50	3.98

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 Results to Background Limits – March and May 2019
Belle River Power Plant Diversion Basin – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10			MW-16-11A	
Sample Date:		3/18/2019	PL	3/20/2019	PL	3/20/2019	PL	3/19/2019	PL	3/19/2019	5/8/2019[1]	PL	3/19/2019	PL
Constituent	Unit	Data		Data		Data		Data		Data			Data	
Appendix III														
Boron	ug/L	1,700	2,000	1,900	2,200	2,000	2,100	1,900	2,300	2,000	--	2,300	1,800	2,000
Calcium	ug/L	35,000	67,000	35,000	45,000	45,000	110,000	48,000	99,000	**35,000**	30,000	34,000	35,000	80,000
Chloride	mg/L	1,500	1,600	1,700	1,800	1,800	1,800	1,900	2,000	1,500	--	1,800	1,700	1,700
Fluoride	mg/L	1.1	1.3	1.1	1.3	1.0	1.2	1.1	1.3	0.96	--	1.2	0.91	1.0
pH, Field	SU	8.0	7.9 - 8.5	8.0	7.5 - 8.4	8.0	7.7 - 8.4	8.1	7.5 - 8.3	8.0	8.1	7.5 - 8.8	8.0	7.6 - 8.6
Sulfate	mg/L	16	20	3.8	20	68	98	2.8	23	140	--	160	2.5	20
Total Dissolved Solids	mg/L	2,600	2,700	2,600	3,000	3,000	3,400	3,100	3,200	2,700	--	3,100	2,900	3,000

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).

(1) - Results shown for verification sampling performed on 5/8/2019.

Table 4
Comparison of Appendix III Results to Background Limits – September 2019
Belle River Power Plant Diversion Basin – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-05		MW-16-06		MW-16-07		MW-16-08		MW-16-10		MW-16-11A	
Sample Date:		9/17/2019	PL	9/17/2019	PL	9/17/2019	PL	9/17/2019	PL	9/17/2019	PL	9/17/2019	PL
Constituent	Unit	Data		Data		Data		Data		Data		Data	
Appendix III													
Boron	ug/L	1,800	2,000	1,900	2,200	2,000	2,100	1,700	2,300	2,000	2,300	1,700	2,000
Calcium	ug/L	38,000	67,000	40,000	45,000	50,000	110,000	55,000	99,000	29,000	34,000	41,000	80,000
Chloride	mg/L	1,400	1,600	1,500	1,800	1,700	1,800	1,800	2,000	1,500	1,800	1,600	1,700
Fluoride	mg/L	1.1	1.3	1.0	1.3	1.1	1.2	1.1	1.3	1.0	1.2	0.94	1.0
pH, Field	SU	7.9	7.9 - 8.5	8.1	7.5 - 8.4	8.1	7.7 - 8.4	8.2	7.5 - 8.3	8.1	7.5 - 8.8	8.1	7.6 - 8.6
Sulfate	mg/L	15	20	< 5.0	20	67	98	< 5.0	23	57	160	< 5.0	20
Total Dissolved Solids	mg/L	2,500	2,700	2,800	3,000	2,900	3,400	3,000	3,200	2,900	3,100	2,500	3,000

Notes:

ug/L - micrograms per liter.

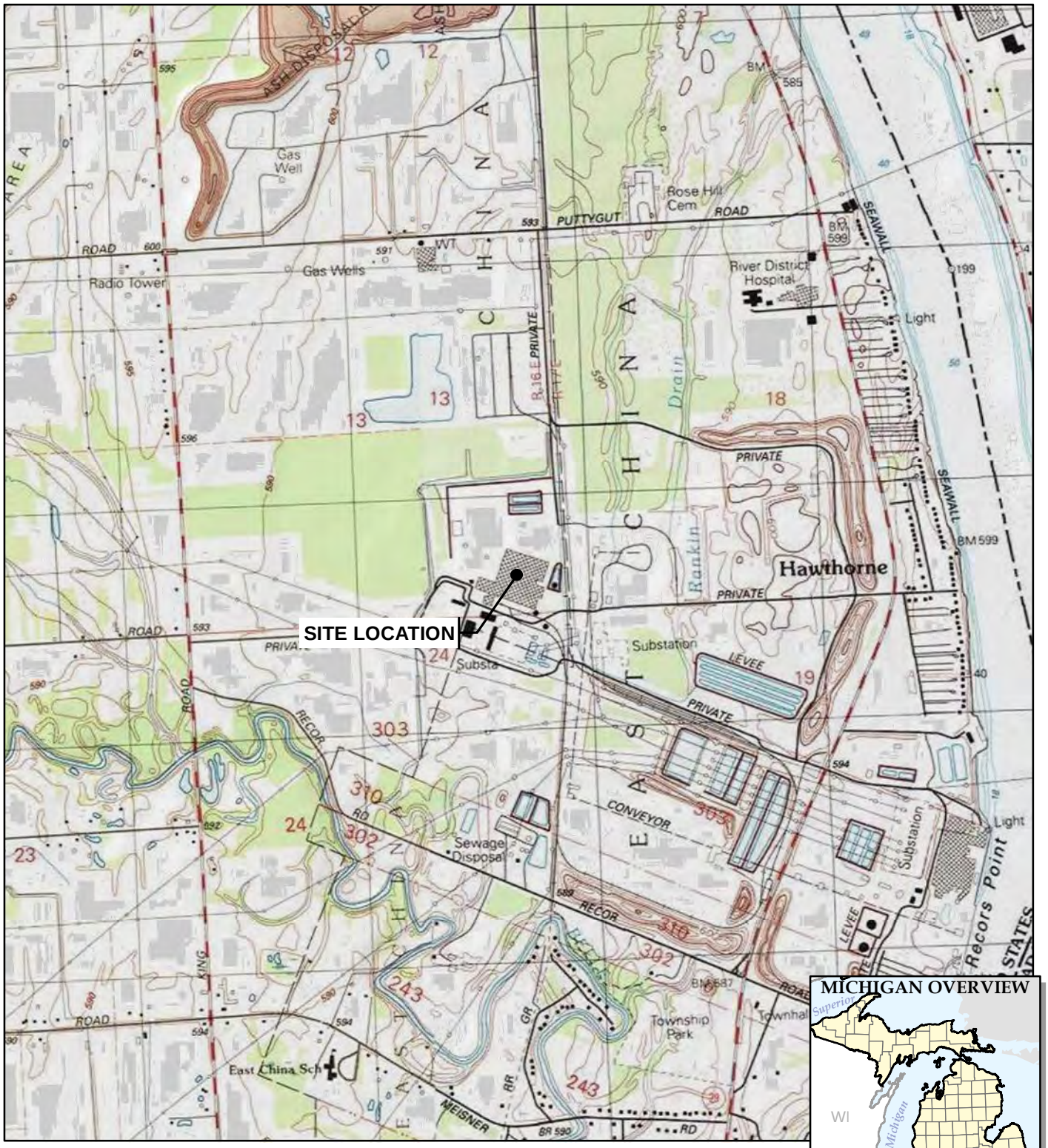
mg/L - milligrams per liter.

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).

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

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

TRC - GIS

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

E:\DTE\CCR_Sites\2017_265996\320511-0003-003slmMB.mxd -- Saved By: MVAPHIADIS on 1/28/2020, 08:50:35 AM

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 DIVERSION 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		

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

FILE NO.: 320511-0003-025.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/28/2020, 09:28:33 AM by MVAPHIADIS -- LAYOUT: ANSI B (11"X17")
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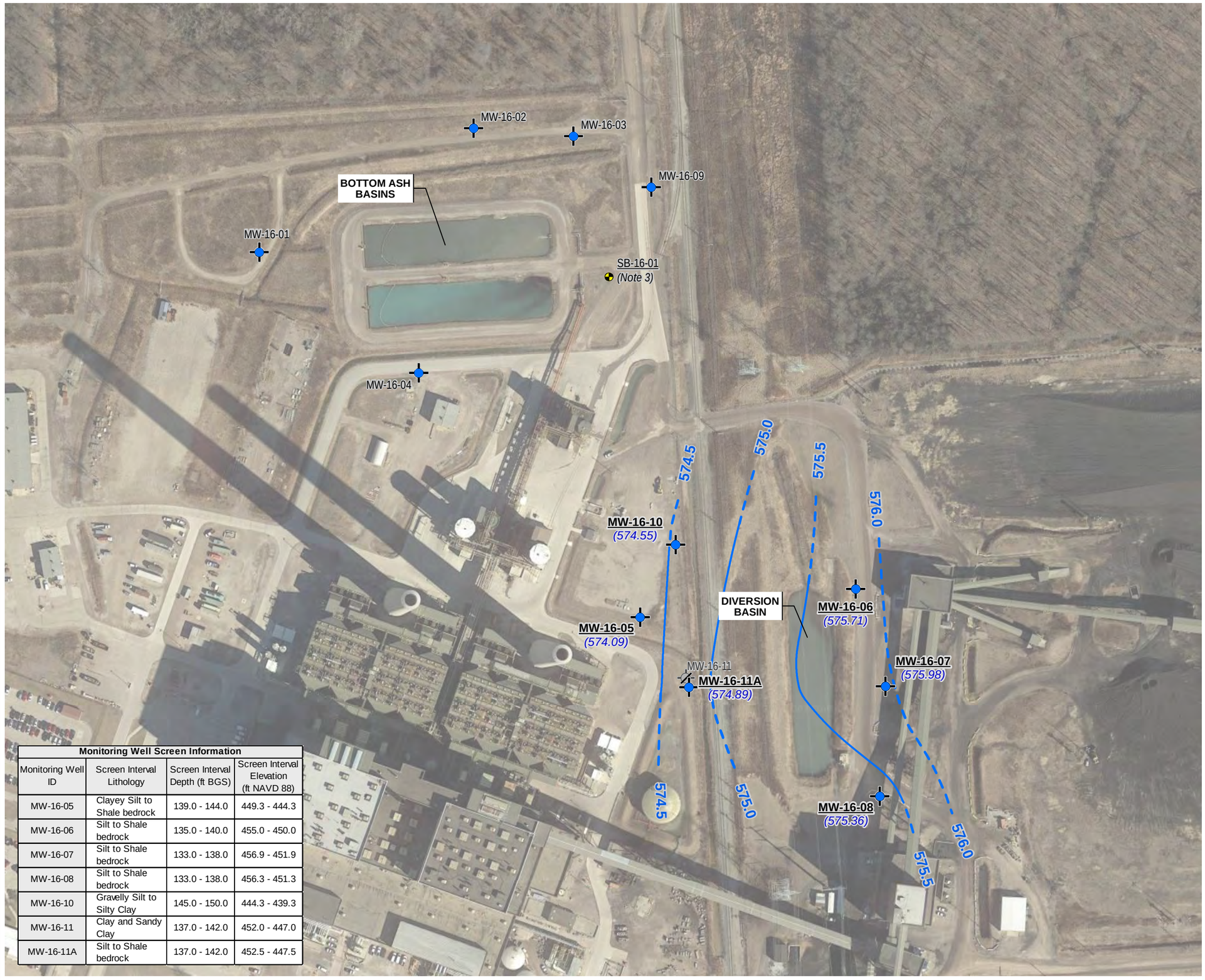

LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- (575.47) GROUNDWATER ELEVATION (FT NAVD 88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, AND JUNE 2016 BY BMJ ENGINEERS AND SURVEYORS. INC.
3. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

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 DIVERSION BASIN
4505 KING ROAD
CHINA TOWNSHIP, MICHIGAN

TITLE: DIVERSION BASIN GROUNDWATER POTENTIOMETRIC SURFACE MAP MARCH 2019

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

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FILE NO.: 320511-0003-026.mxd

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Map Rotation: 0
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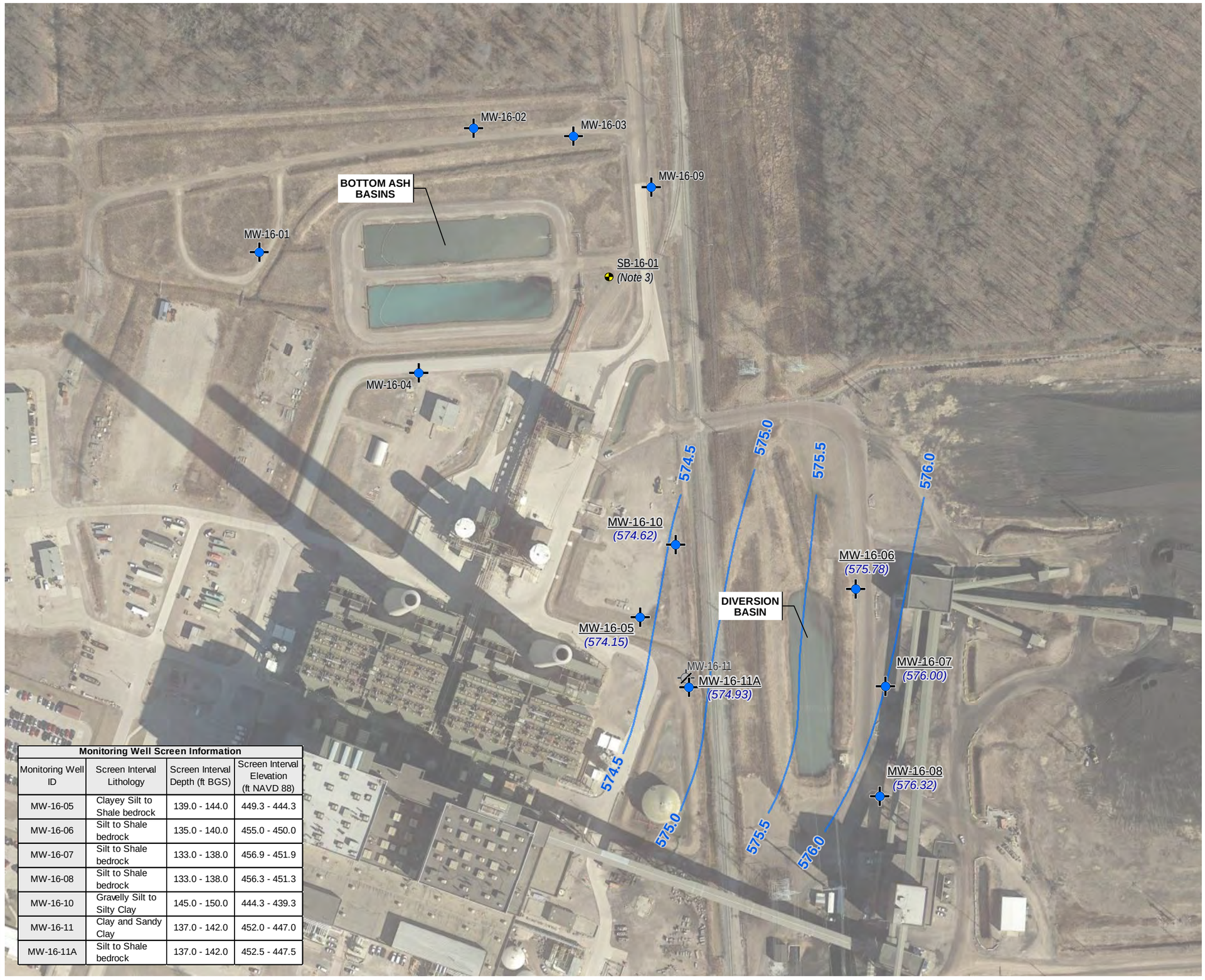

LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING
- (575.47) GROUNDWATER ELEVATION (FT NAVD 88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, (3/24/2019).
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL, AND JUNE 2016 BY BMJ ENGINEERS AND SURVEYORS. INC.
3. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

0 200 400 Feet

1 " = 200 '

1:2,400

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

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

TITLE:
DIVERSION BASIN GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 2019

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

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 320511-0003-028.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/28/2020, 09:39:12 AM by MVAPHIADIS -- LAYOUT: ANSI B (11"x17")
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Appendix A
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
May 2019 Verification (Detection Monitoring)
DTE Electric Company Belle River Power Plant (DTE BRPP)

Groundwater samples were collected by TRC for the May 2019 verification 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 May 2019 sampling event, a groundwater sample was collected from the following wells:

- MW-16-01
- MW-16-04
- MW-16-10

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	SW846 9056A
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:

- All holding times were met for the methods performed on these samples.
- Target analytes were not detected in the equipment blank (EB-01).
- Target analytes were not detected in the method blanks.
- LCS recoveries for all target analytes were within laboratory control limits.
- The field duplicate pair samples were DUP-01 and MW-16-01, DUP-02 and MW-16-04, and DUP-03 and MW-16-10. The relative percent differences (RPDs) between the parent and duplicate samples were within the acceptance limits.
- For TDS, the laboratory reporting limit did not meet the specified limit in the QAPP; however, TDS was detected in the sample (MW-16-01). Therefore, 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.