Annual Groundwater Monitoring Report

DTE Electric Company
Belle River Power Plant Bottom Ash Basins

4505 King Road
China Township, Michigan

January 2018

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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). 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. 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).

TRC Engineers Michigan, Inc., the engineering entity of TRC Environmental Corporation (TRC), prepared this Annual Groundwater Monitoring Report (Annual Report) for the BRPP BABs CCR unit on behalf of DTE Electric. This Annual Report was prepared in accordance with the requirements of §257.90(e) and presents the monitoring results and the statistical evaluation of the detection monitoring parameters (Appendix III to Part 257 of the CCR Rule) for the October 2017 semiannual groundwater monitoring event for the BRPP BABs CCR unit. This event is the initial 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.

Potential SSIs over background limits were noted for pH in one or more downgradient wells for the October 2017 monitoring event. This is the initial detection monitoring event; therefore, it is the initial identification of a SSI over background levels. Based on the hydrogeology at the Site, 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. 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.

According to §257.94(e), if 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, establish an assessment monitoring program **<or>** 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.

In response to the potential pH SSIs over background limits noted during the October 2017 monitoring event, DTE Electric plans to collect a resample for each of the potential SSIs and prepare an Alternative Source Demonstration (ASD) to evaluate the SSIs and demonstrate that natural variation within the uppermost aquifer is the cause of the SSIs.

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). 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). 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).

TRC Engineers Michigan, Inc., the engineering entity of TRC Environmental Corporation (TRC), prepared this Annual Groundwater Monitoring Report (Annual Report) for the BRPP BABs CCR unit on behalf of DTE Electric. This Annual Report was prepared in accordance with the requirements of §257.90(e) and presents the monitoring results and the statistical evaluation of the detection monitoring parameters (Appendix III to Part 257 of the CCR Rule) for the October 2017 semiannual groundwater monitoring event for the BRPP BABs CCR unit. This event is the initial detection monitoring event performed to comply with §257.94. The monitoring was 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 Bottom Ash Basins* (Stats Plan) (TRC, October 2017). As part of the statistical evaluation, the data collected during detection monitoring events are evaluated to identify statistically significant increases (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.

The DB is an incised CCR surface impoundment located west of the BRPP near the Webster Drain. Water flows into the DB from the North and South BABs through a network of pipes and ditches. 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 in 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 the 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 Background Sampling

Background groundwater monitoring was conducted at the BRPP BABs CCR unit from August 2016 through September 2017 in accordance with the QAPP. Data collection included eight background data collection events of static water elevation measurements, analysis for parameters required in the CCR Rule's Appendix III and Appendix IV to Part 257, and field parameters (dissolved oxygen, oxidation reduction potential, pH, specific conductivity, temperature, and turbidity) from all five monitoring wells installed for the BABs CCR unit, in addition to supplemental sampling events at select locations. The supplemental background sampling events were conducted for a subset of monitoring wells in September 2017 to expand the background data set and confirm analytical results; one additional background sampling event was performed for monitoring wells MW-16-01, MW-16-02, MW-16-04, and MW-16-09. The groundwater samples were analyzed by TestAmerica Laboratories, Inc. (TestAmerica).

Background data are included in Appendix A Tables 1 through 3, where: Table 1 is a summary of static water elevation data; Table 2 is a summary of groundwater analytical data compared to potentially relevant criteria; and Table 3 is a summary of field data. In addition to the data tables, groundwater potentiometric elevation data are summarized for each background monitoring event in Appendix A Figure 1.

2.3 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.

2.3.1 Data Summary

The initial semiannual groundwater detection monitoring event for 2017 was performed during October 2 and 3, 2017, 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 2017 event is provided on Table 1 (static groundwater elevation data), Table 2 (analytical results), and Table 3 (field data).

2.3.2 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. Particular data non-conformances are summarized in Appendix B.

2.3.3 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 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 October 2017 sampling event are provided on Table 1 and are summarized in plan view on Figure 3.

Groundwater elevation data collected during the most recent sampling event 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 detail in Appendix C. 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

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 are presented on Table 4.

The statistical evaluation of the October 2017 Appendix III indicator parameters shows potential SSIs outside of background for:

- pH at MW-16-01 and MW-16-02.

There were no SSIs compared to background for boron, calcium, chloride, fluoride, sulfate or TDS.

Section 4
Conclusions and Recommendations

Potential SSIs over background limits were noted for pH in one or more downgradient wells during the October 2017 monitoring event. This is the initial detection monitoring event; therefore, it is the initial identification of a potential SSI over background levels. 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. 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. In addition, although the statistical limits based on the initial background dataset were exceeded for pH, the calculated prediction limits and results respective to each of these potential SSIs are within the USEPA's maximum contaminant level (MCL) pH range of 6.5 to 8.5 standard units (SU) for drinking water (USEPA, 2012).

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, establish an assessment monitoring program **<or>** 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.

The owner or operator must complete a written demonstration (i.e., Alternative Source Demonstration, ASD), of the above within 90 days of confirming the SSI. Based on the outcome of the ASD the following steps will be taken:

- If a successful ASD is completed, a certification from a qualified professional engineer is required, and the CCR unit may continue with detection monitoring.
- If a successful 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. 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.

In response to the potential pH SSIs over background limits noted for the October 2017 monitoring event, DTE Electric plans to collect a resample for each of the potential SSIs and

prepare an ASD within 90-days to evaluate the SSIs. The SSI is likely the result of temporal variability that was not captured in the background data set, given the short duration of time that the background data set was collected, but this will be further evaluated during the ASD process.

No corrective actions were performed in 2017. The next semiannual monitoring event at the BRPP BABs CCR unit is scheduled for the second calendar quarter of 2018.

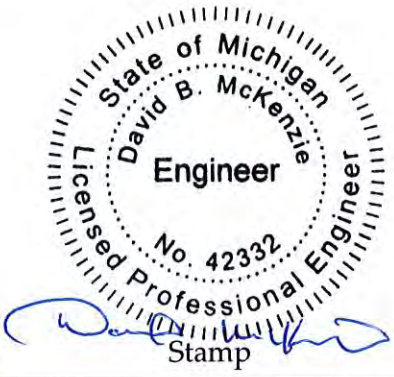
Section 5
Groundwater Monitoring Report Certification

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, 2019	 Stamp
Company: TRC Engineers Michigan, Inc.	Date: 1/30/18	

Section 6
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.

U.S. Environmental Protection Agency. April 2012. 2012 Edition of the Drinking Water Standards and Health Advisories. EPA 822-S-12-001. Office of Water, U.S. Environmental Protection Agency, Washington, DC. Spring 2012; Date of update: April, 2012.

Tables

Table 1
Summary of Groundwater Elevation Data – October 2017
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
10/2/2017	16.33	573.73	14.71	574.23	16.62	574.04	16.98	573.53	16.81	573.99

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 Groundwater Analytical Data – October 2017
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:		10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/3/2017
Constituent	Unit					
Appendix III						
Boron	ug/L	950	1,000	1,000	920	1,600
Calcium	ug/L	38,000	53,000	32,000	44,000	34,000
Chloride	mg/L	470	370	580	510	980
Fluoride	mg/L	1.7	1.2	1.8	1.7	1.5
pH, Field	SU	7.3	7.3	7.7	7.8	8.1
Sulfate	mg/L	4.2	7.7	2.5	7.9	24
Total Dissolved Solids	mg/L	930	760	1,100	1,000	1,700

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.

Table 3
Summary of Field Data – October 2017
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	10/2/2017	0.54	-113.6	7.3	1,764	13.35	2.91
MW-16-02	10/2/2017	0.45	-102.8	7.3	1,391	15.02	0.54
MW-16-03	10/2/2017	0.24	-142.2	7.7	2,021	14.38	0.77
MW-16-04	10/2/2017	0.27	-132.9	7.8	1,807	15.92	82.2
MW-16-09	10/3/2017	0.21	-180.5	8.1	3,272	14.15	57.0

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 4
Comparison of Appendix III Parameter Results to Background Limits – October 2017
Belle River Power Plant BABs – 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:		10/2/2017		10/2/2017		10/2/2017		10/2/2017		10/3/2017	
Constituent	Unit	Data	PL	Data	PL	Data	PL	Data	PL	Data	PL
Appendix III											
Boron	ug/L	950	1,300	1,000	1,300	1,000	1,300	920	1,100	1,600	1,900
Calcium	ug/L	38,000	45,000	53,000	59,000	32,000	36,000	44,000	64,000	34,000	41,000
Chloride	mg/L	470	530	370	400	580	690	510	520	980	1100
Fluoride	mg/L	1.7	1.9	1.2	1.3	1.8	1.9	1.7	1.9	1.5	1.8
pH, Field	SU	**7.3**	7.6 - 8.1	**7.3**	7.4 - 8.0	7.7	7.5 - 8.3	7.8	7.5 - 8.4	8.1	7.7 - 8.7
Sulfate	mg/L	4.2	8.1	7.7	20	2.5	14	7.9	18	24	40
Total Dissolved Solids	mg/L	930	950	760	890	1,100	1,100	1,000	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.

RESULT Shading and 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

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

TRC - GIS

PROJECT:

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

TITLE:

SITE LOCATION MAP

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

FIGURE 1

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

LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

NOTES

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

0 200 400 Feet

1 " = 200 '

1:2,400

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

TITLE:
SITE PLAN

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

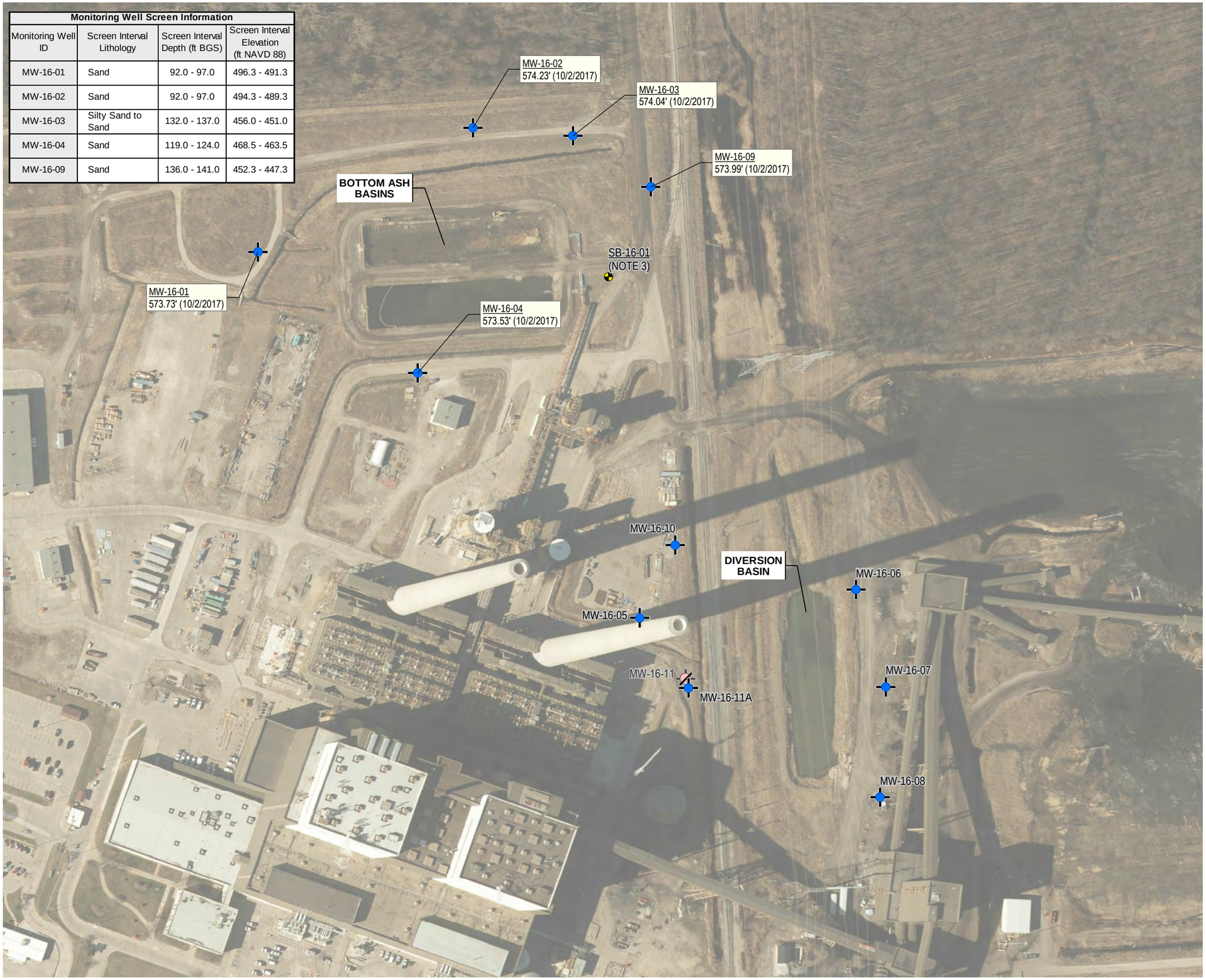
FIGURE 2

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

FILE NO.: 265996-0003-002.mxd

Plot Date: 10/9/2017, 15:18:14 PM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0003-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

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



LEGEND

- SOIL BORING
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

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

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

NOTES

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

0 200 400 Feet

1 " = 200 '
1:2,400

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

TITLE:
BOTTOM ASH BASINS GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY OCTOBER 2017

DRAWN BY:	S. MAJOR	PROJ NO.:	265996.0003
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2018		

FIGURE 3

TRC
1540 Eisenhower Place
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FILE NO.: 265996-0003-014.mxd

Plot Date: 1/12/2018, 09:54:28 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0003-014.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

TRC - GIS

Appendix A
Background Data

Table 1
Groundwater Elevation Summary
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
8/1/2016	16.21	573.85	15.30	573.64	16.53	574.13	16.89	573.62	16.70	574.10
9/19/2016	16.25	573.81	23.33	565.61	16.54	574.12	16.90	573.61	16.70	574.10
11/7/2016	16.58	573.48	19.91	569.03	16.82	573.84	17.15	573.36	16.95	573.85
1/9/2017	16.39	573.67	17.90	571.04	16.66	574.00	17.02	573.49	16.90	573.90
2/27/2017	16.11	573.95	16.65	572.29	16.43	574.23	16.75	573.76	16.56	574.24
4/17/2017	16.05	574.01	15.71	573.23	16.31	574.35	16.63	573.88	16.45	574.35
5/18/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6/5/2017	15.67	574.39	14.80	574.14	15.98	574.68	16.31	574.20	16.18	574.62
6/30/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/24/2017	15.82	574.24	14.45	574.49	16.12	574.54	16.44	574.07	16.29	574.51

Notes:

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

ft BTOC - feet Below top of casing

NM - Not Measured

Table 2
Summary of Groundwater Analytical Results
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-01								
Sample Date:		8/1/2016	9/20/2016	11/7/2016	1/9/2017	2/27/2017	4/17/2017	6/5/2017	7/24/2017	9/11/2017
Constituent	Unit									
Appendix III										
Boron	ug/L	1,000	980	1,100	1,100	1,100	1,100	1,300	1,200	1,100
Calcium	ug/L	45,000	38,000	37,000	42,000	39,000	38,000	38,000	42,000	41,000
Chloride	mg/L	490	480	520	490	450	440	500	470	460
Fluoride	mg/L	1.7	1.5	1.6	1.4	1.7	1.6	1.7	1.7	1.8
pH	SU	7.95	7.9	7.9	7.9	7.9	7.9	7.7	7.8	7.5
Sulfate	mg/L	1.5	1.5	< 5.0	1.9	< 5.0	< 5.0	4.6	4.8	7.2
Total Dissolved Solids	mg/L	930	920	920	940	950	920	910	920	910
Appendix IV										
Antimony	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Arsenic	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Barium	ug/L	300	260	240	250	240	240	240	250	240
Beryllium	ug/L	< 1.0	2.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium	ug/L	13	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Cobalt	ug/L	3.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Fluoride	mg/L	1.7	1.5	1.6	1.4	1.7	1.6	1.7	1.7	1.8
Lead	ug/L	3.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Lithium	ug/L	23	13	12	9.5	9.6	11	10	12	< 8.0
Mercury	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	ug/L	89	82	76	70	79	76	73	83	73
Radium-226	pCi/L	1.22	0.599	1.08	0.589	0.576	0.482	0.659	0.500	0.475
Radium-226/228	pCi/L	1.84	1.07	1.46	1.08	0.656	0.619	1.32	0.942	0.536
Radium-228	pCi/L	< 0.991	0.468	< 0.460	< 0.643	< 0.412	< 0.434	0.657	0.442	< 0.335
Selenium	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Thallium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Groundwater Analytical Results
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-02									
Sample Date:		8/2/2016	9/19/2016	11/7/2016	11/7/2016	1/9/2017	2/27/2017	4/17/2017	6/5/2017	7/24/2017	9/12/2017
Constituent	Unit				Field Dup						
Appendix III											
Boron	ug/L	980	1,000	1,200	1,200	1,100	1,200	1,100	1,200	1,100	1,100
Calcium	ug/L	55,000	57,000	56,000	55,000	58,000	55,000	52,000	53,000	54,000	54,000
Chloride	mg/L	360	370	390	390	390	370	340	360	370	360
Fluoride	mg/L	1.1	1.0	1.1	1.1	0.97	1.2	1.1	1.2	1.2	1.3
pH	SU	7.80	7.8	7.9	7.9	7.8	7.8	7.9	7.7	7.7	7.8
Sulfate	mg/L	18	< 1.0	< 5.0	< 5.0	2.0	12	11	11	8.3	7.6
Total Dissolved Solids	mg/L	760	710	720	740	780	760	910	810	760	770
Appendix IV											
Antimony	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Arsenic	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Barium	ug/L	330	320	270	270	290	280	270	280	270	280
Beryllium	ug/L	< 1.0	2.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium	ug/L	19	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Cobalt	ug/L	3.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Fluoride	mg/L	1.1	1.0	1.1	1.1	0.97	1.2	1.1	1.2	1.2	1.3
Lead	ug/L	2.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Lithium	ug/L	19	15	13	12	12	13	13	13	13	12
Mercury	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	ug/L	65	39	35	34	34	38	36	36	38	36
Radium-226	pCi/L	2.46	1.31	1.63	1.62	1.46	1.02	1.13	0.839	1.09	1.08
Radium-226/228	pCi/L	2.65	1.46	1.80	2.12	1.73	1.10	1.18	1.10	1.35	1.55
Radium-228	pCi/L	< 0.919	< 0.402	< 0.405	0.501	< 0.719	< 0.384	< 0.381	< 0.314	< 0.340	0.477
Selenium	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Thallium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Groundwater Analytical Results
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-03												
Sample Date:		8/2/2016	9/19/2016	9/19/2016	11/7/2016	1/9/2017	1/9/2017	2/27/2017	2/27/2017	4/17/2017	4/17/2017	6/5/2017	7/24/2017	7/24/2017
Constituent	Unit			Field Dup			Field Dup		Field Dup		Field Dup			Field Dup
Appendix III														
Boron	ug/L	1,000	980	960	1,200	1,100	1,100	1,100	1,200	1,100	1,100	1,200	1,100	1,100
Calcium	ug/L	34,000	33,000	32,000	31,000	35,000	37,000	32,000	34,000	31,000	31,000	31,000	33,000	32,000
Chloride	mg/L	580	570	570	680	600	610	550	550	530	520	650	580	570
Fluoride	mg/L	1.6	1.5	1.5	1.7	1.5	1.5	1.7	1.7	1.6	1.6	1.8	1.8	1.8
pH	SU	7.91	7.9	7.9	8.0	7.9	7.9	8.0	8.0	8.0	7.9	7.9	7.9	7.8
Sulfate	mg/L	6.9	3.3	3.4	< 10	4.4	4.1	< 10	< 10	< 5.0	< 5.0	2.7	2.8	2.6
Total Dissolved Solids	mg/L	1,100	1,100	530	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Appendix IV														
Antimony	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Arsenic	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Barium	ug/L	300	300	280	270	300	310	290	310	300	300	310	310	290
Beryllium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Cobalt	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Fluoride	mg/L	1.6	1.5	1.5	1.7	1.5	1.5	1.7	1.7	1.6	1.6	1.8	1.8	1.8
Lead	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Lithium	ug/L	11	13	13	13	14	15	16	16	18	18	18	19	18
Mercury	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	ug/L	100	100	97	94	89	89	98	99	98	98	93	98	94
Radium-226	pCi/L	1.08	0.601	0.694	1.52	0.809	0.788	0.777	2.18	0.790	0.631	0.901	0.720	0.748
Radium-226/228	pCi/L	1.43	0.816	1.20	1.98	1.70	1.62	0.963	5.31	1.19	0.958	1.36	1.24	1.28
Radium-228	pCi/L	< 0.428	< 0.442	0.505	0.455	0.888	0.835	< 0.427	3.13	0.403	0.328	0.458	0.522	0.530
Selenium	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Thallium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Groundwater Analytical Results
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-04								
Sample Date:		8/2/2016	9/20/2016	11/7/2016	1/9/2017	2/27/2017	4/18/2017	6/5/2017	7/24/2017	9/13/2017
Constituent	Unit									
Appendix III										
Boron	ug/L	990	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Calcium	ug/L	57,000	63,000	51,000	57,000	47,000	45,000	46,000	47,000	49,000
Chloride	mg/L	500	500	490	510	470	460	490	500	490
Fluoride	mg/L	1.6	1.5	1.5	1.4	1.7	1.6	1.7	1.7	1.8
pH	SU	8.05	7.9	8.0	7.9	8.0	7.9	7.9	7.9	7.9
Sulfate	mg/L	14	< 1.0	5.1	6.0	11	15	9.3	13	7.2
Total Dissolved Solids	mg/L	940	960	960	1,100	970	980	1,000	1,000	950
Appendix IV										
Antimony	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Arsenic	ug/L	6.0	7.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Barium	ug/L	390	440	340	360	330	330	330	340	340
Beryllium	ug/L	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium	ug/L	27	26	13	13	9.8	8.7	9.5	9.4	10
Cobalt	ug/L	6.4	7.4	3.8	4.1	2.6	2.4	3.2	2.4	3.0
Fluoride	mg/L	1.6	1.5	1.5	1.4	1.7	1.6	1.7	1.7	1.8
Lead	ug/L	6.1	7.1	3.6	4.1	2.8	2.5	3.3	2.2	3.0
Lithium	ug/L	30	37	26	25	24	26	26	27	24
Mercury	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	ug/L	96	110	94	81	87	91	87	94	93
Radium-226	pCi/L	1.37	0.934	1.54	1.19	0.880	0.761	0.912	0.849	0.687
Radium-226/228	pCi/L	1.69	2.70	2.16	< 1.65	1.43	1.09	1.97	1.47	0.802
Radium-228	pCi/L	< 1.07	1.76	< 1.23	< 1.65	< 0.587	< 0.483	1.06	0.619	< 0.471
Selenium	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Thallium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Groundwater Analytical Results
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Sample Location:		MW-16-09								
Sample Date:		8/2/2016	9/20/2016	11/9/2016	1/10/2017	2/28/2017	4/17/2017	6/5/2017	7/25/2017	9/14/2017
Constituent	Unit									
Appendix III										
Boron	ug/L	1,500	1,600	1,800	1,600	1,700	1,700	1,800	1,800	1,700
Calcium	ug/L	29,000	35,000	28,000	32,000	32,000	34,000	34,000	37,000	40,000
Chloride	mg/L	1,000	990	1,100	1,000	970	890	980	1,000	990
Fluoride	mg/L	1.3	1.2	1.5	1.1	1.5	1.4	1.6	1.6	1.6
pH	SU	8.23	8.3	8.3	7.9	8.1	8.0	8.1	8.2	8.0
Sulfate	mg/L	8.4	3.3	12	19	27	27	27	< 10	32
Total Dissolved Solids	mg/L	1,700	1,800	1,800	1,900	1,900	1,900	1,900	1,800	1,700
Appendix IV										
Antimony	ug/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Arsenic	ug/L	7.2	6.9	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Barium	ug/L	280	280	250	270	290	290	310	290	290
Beryllium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium	ug/L	15	17	9.8	7.6	11	13	16	18	8.0
Cobalt	ug/L	4.1	5.6	2.9	2.7	2.8	3.7	4.3	5.9	2.5
Fluoride	mg/L	1.3	1.2	1.5	1.1	1.5	1.4	1.6	1.6	1.6
Lead	ug/L	4.3	5.4	2.5	2.6	2.6	3.2	3.4	5.1	2.8
Lithium	ug/L	39	50	39	37	40	49	46	55	32
Mercury	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	ug/L	65	62	59	53	59	60	59	60	56
Radium-226	pCi/L	1.37	1.79	1.72	0.996	0.864	1.04	1.18	0.839	0.703
Radium-226/228	pCi/L	2.07	3.20	2.83	2.51	1.10	1.67	1.75	1.90	2.49
Radium-228	pCi/L	< 0.917	< 2.09	1.11	1.51	< 0.685	0.627	0.566	1.06	1.79
Selenium	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Thallium	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
All metals were analyzed as total, unless otherwise specified.

Table 3
Summary of Field Parameters
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	8/1/2016	0.34	-174.4	8.08	1,318	13.38	150
	9/20/2016	0.97	-13.9	7.92	1,575	12.80	11.4
	11/7/2016	0.58	-8.8	7.91	1,321	11.43	6.64
	1/9/2017	1.02	2.9	7.62	1,237	8.39	4.42
	2/27/2017	1.10	4.4	7.76	1,189	9.39	2.32
	4/17/2017	0.23	-91.7	7.88	1,647	12.20	4.83
	6/5/2017	0.44	-125.0	7.84	1,764	12.21	3.85
	7/24/2017	0.39	-99.3	7.63	1,738	13.43	3.52
	9/11/2017	0.28	13.0	7.00	1,795	14.12	1.24
MW-16-02	8/2/2016	0.45	45.8	7.79	1,185	16.02	267
	9/19/2016	0.70	-14.7	7.93	1,420	17.56	4.07
	11/7/2016	0.95	16.1	7.80	1,070	12.67	3.21
	1/9/2017	0.54	-46.8	7.62	955	7.81	8.38
	2/27/2017	1.73	40.5	7.64	978	10.60	1.78
	4/17/2017	0.55	-72.0	7.78	1,315	12.30	0.99
	6/5/2017	0.68	-96.9	7.71	1,388	15.92	3.60
	7/24/2017	0.41	-92.3	7.64	1,386	14.62	1.11
	9/12/2017	0.37	-125.5	7.47	1,357	15.19	0.91
MW-16-03	8/2/2016	0.58	10.3	7.97	1,805	17.55	3.48
	9/19/2016	1.03	29.2	8.16	2,051	16.75	2.80
	11/7/2016	0.40	-25.2	7.95	1,607	13.56	2.05
	1/9/2017	1.40	-16.4	7.60	1,396	7.43	1.20
	2/27/2017	1.25	69.0	7.83	1,440	11.41	1.25
	4/17/2017	0.29	-111.1	8.01	1,939	12.11	0.46
	6/5/2017	0.17	-147.0	8.01	2,023	12.85	0.34
	7/24/2017	0.25	-122.8	7.89	2,027	14.03	0.57
MW-16-04	8/2/2016	0.28	-121.7	8.02	1,647	15.78	726
	9/20/2016	0.39	-73.8	8.28	1,744	15.98	367
	11/7/2016	0.25	-53.8	7.99	1,477	14.85	136
	1/9/2017	0.13	-138.5	7.86	1,283	8.64	92.0
	2/27/2017	1.12	5.9	7.91	1,296	11.59	82.8
	4/18/2017	0.73	-89.9	7.81	1,816	8.94	63.1
	6/5/2017	0.38	-167.3	7.95	1,795	14.57	83.2
	7/24/2017	0.38	-154.4	7.85	1,793	16.50	56.5
	9/13/2017	0.31	-147.5	7.60	1,750	18.64	63.2
MW-16-09	8/2/2016	0.29	9.4	8.41	3,726	15.05	126
	9/20/2016	0.37	48.3	8.51	3,168	15.75	339
	11/9/2016	0.63	54.9	8.26	2,487	10.82	211
	1/10/2017	0.92	8.8	7.91	2,560	9.05	82.3
	2/28/2017	0.68	63.3	8.22	2,190	10.90	85.3
	4/17/2017	0.50	-102.7	8.15	3,120	12.34	100.7
	6/5/2017	0.34	-141.9	8.16	3,292	14.25	101
	7/25/2017	0.18	-188.8	8.20	3,239	14.50	128
	9/14/2017	0.16	-270.3	7.83	3,410	14.80	65.9

Notes:

mg/L - milligrams per liter.

mV - milliVolt.

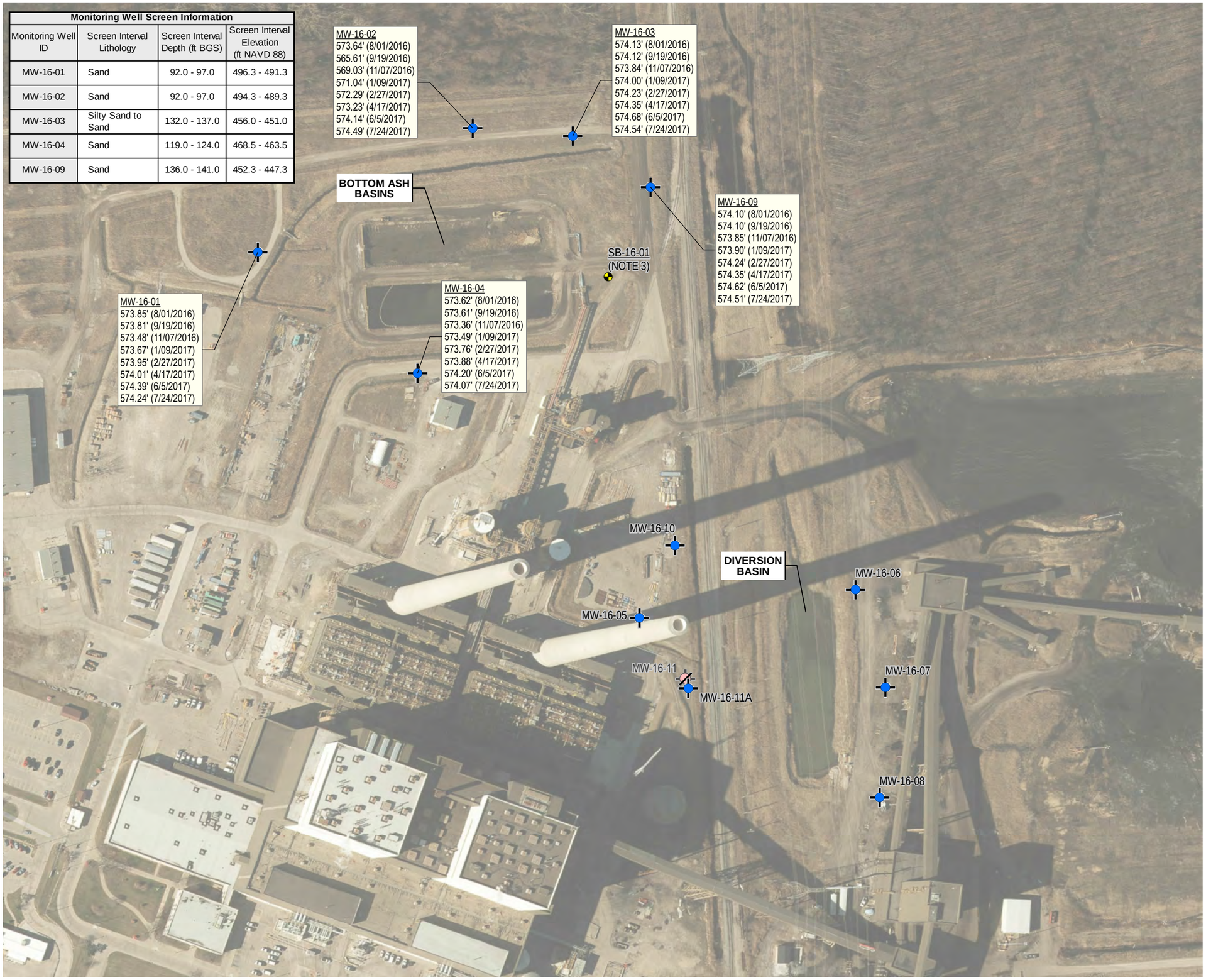
SU - standard unit.

umhos/cm - micro-mhos per centimeter.

deg C - degrees celcius.

NTU - nephelometric turbidity units.

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 ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER.
2. WELL LOCATIONS SURVEYED IN MARCH, APRIL AND JUNE 2016 AND JUNE 2017 BY BMJ ENGINEERS & SURVEYORS, INC.
3. NO SAND OR GRAVEL UNIT PRESENT ABOVE BEDROCK IN THIS LOCATION.

N

0 200 400 Feet

1 " = 200 '
1:2,400

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

TITLE:
BOTTOM ASH BASINS
GROUNDWATER POTENTIOMETRIC ELEVATION SUMMARY

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0003
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2018		

FIGURE 1

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

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

Plot Date: 1/15/2018, 10:06:08 AM by:SMAJOR – LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0003-003A.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

TRC - GIS

Appendix B
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event October 2017
DTE Electric Company Belle River Power Plant (DTE BRPP)

Groundwater samples were collected by TRC for the October 2017 sampling event for the Bottom Ash Basins and Diversion Basin at the DTE BRPP. Samples were analyzed for anions, pH, total metals, and total dissolved solids by Test America Laboratories, Inc. (Test America), located in Canton, Ohio. The laboratory analytical results are reported in laboratory report J86174-1.

During the October 2017 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)	EPA 9056A
pH	EPA 9040C
Total Metals	EPA 6010B
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;

- Data for method blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD). Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- 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.

- 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.
- When the data are evaluated through a detection monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary:

- Target analytes were not detected in the method blank.
- Dup-01 corresponds with MW-16-01; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits.
- Laboratory duplicates were performed on sample MW-16-01 and MW-16-10 for pH and sample MW-16-02 for total dissolved solids; RPDs between the parent and duplicate sample were within the QC limits.

- MS/MSD analyses were performed on sample MW-16-01 for calcium and boron, and samples MW-16-02 and MW-16-09 for anions (chloride, fluoride, and sulfate). The boron recovery in the MSD were above the upper laboratory control limits. The boron concentration in the parent sample was >4x the spike concentration; therefore, the laboratory control limits are not applicable. Data usability is not affected.

Appendix C
Statistical Background Limits

Technical Memorandum

Date: January 15, 2018

To: DTE Electric Company

From: Darby Litz, TRC
Sarah Holmstrom, TRC
Jane Li, TRC

Project No.: 265996.0003.0000 Phase 001, Task 001

Subject: Background Statistical Evaluation – DTE Electric Company, Belle River Power Plant Coal Combustion Residual Bottom Ash Basins

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Pursuant to the United States Environmental Protection Agency's (U.S. EPA's) Resource Conservation and Recovery Act (RCRA) Federal Final Rule for Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities (herein after "the CCR Rule") promulgated on April 17, 2015, the owner or operator of a CCR unit must collect a minimum of eight rounds of background groundwater data to initiate a detection monitoring program and evaluate statistically significant increases above background (40 CFR §257.94). This memorandum presents the background statistical limits derived for the DTE Electric Company (DTE Electric) Belle River Power Plant (BRPP) Coal Combustion Residual Bottom Ash Basins (BABs) CCR unit.

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.

The DB is an incised CCR surface impoundment located west of the BRPP near the Webster Drain. Water flows into the DB from the North and South BABs through a network of pipes and ditches.

The DB discharges to the St. Clair River with other site wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit.

A groundwater monitoring system has been established for BRPP BAB CCR unit (TRC, October 2017), which established the following locations for detection monitoring.

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

Following the baseline data collection period (August 2016 through September 2017), the background data for the Site were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), prediction limits (PLs) were selected to perform the statistical calculation for background limits. Use of PLs is recommended by the UG to provide high statistical power and is an acceptable approach for intrawell detection monitoring under the CCR rule. PLs were calculated for each of the CCR Appendix III parameters. The following narrative describes the methods employed and the results obtained and the ChemStat™ output files are included as an attachment.

The set of five background wells utilized for the BABs CCR Unit includes MW-16-01 through MW-16-04 and MW-16-09. An intrawell statistical approach requires that each of the monitoring system wells doubles as the 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/baseline dataset from that same well. The background evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix III constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of nondetects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data; and
- Calculation of the upper PLs for each cumulative baseline/background data set (upper and lower PLs were calculated for field pH).

The results of these evaluations are presented and discussed below.

Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix III parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets are of relatively short duration for making such observations regarding overall trending or seasonality.

Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data, and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 1.

Prediction Limits

Table 1 presents the calculated PLs for the background/baseline data sets. For normal and lognormal distributions, PLs are calculated for 95 percent confidence using parametric methods. For nonnormal background datasets, a nonparametric PL is utilized, resulting in the highest value from the background dataset as the PL. The achieved confidence levels for nonparametric prediction limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. Verification resampling (1 of 2) is recommended per the Stats Plan and UG to achieve performance standards specified in the CCR rules.

Attachments

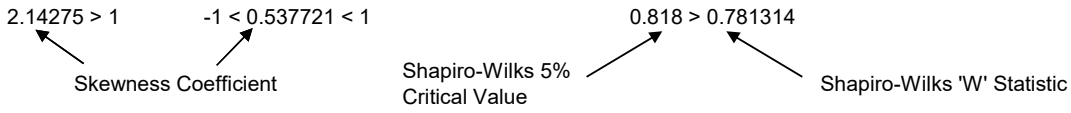
Table 1 – Summary of Descriptive Statistics and Prediction Limit Calculations
Attachment A – Background Concentration Time-Series Charts
Attachment B – ChemStat™ Prediction Limit Outputs

Tables

Table 1
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Prediction Limit Test	Prediction Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Appendix III							
Boron (ug/L)							
MW-16-01	-1 < 0.644988 < 1	--	--	--	N	Parametric	1,300
MW-16-02	-1 < -0.281192 < 1	--	--	--	N	Parametric	1,300
MW-16-03	-1 < -0.119695 < 1	--	--	--	N	Parametric	1,300
MW-16-04	-2.47487 < -1	-2.47487 < -1	0.829 > 0.390021	0.829 > 0.390021	N	Non-Parametric	1,100
MW-16-09	-1 < -0.455599 < 1	--	--	--	N	Parametric	1,900
Calcium (ug/L)							
MW-16-01	-1 < 0.64429 < 1	--	--	--	N	Parametric	45,000
MW-16-02	-1 <0.16697 < 1	--	--	--	N	Parametric	59,000
MW-16-03	-1 < 0.397748 < 1	--	--	--	N	Parametric	36,000
MW-16-04	-1 < 0.746142 < 1	--	--	--	N	Parametric	64,000
MW-16-09	-1 < 0.190727 < 1	--	--	--	N	Parametric	41,000
Chloride (mg/L)							
MW-16-01	-1 < 0.0686352 < 1	--	--	--	N	Parametric	530
MW-16-02	-1 < -0.0299798 < 1	--	--	--	N	Parametric	400
MW-16-03	-1 < 0.637775 < 1	--	--	--	N	Parametric	690
MW-16-04	-1 < -0.804984 < 1	--	--	--	N	Parametric	520
MW-16-09	-1 < 0.215449 < 1	--	--	--	N	Parametric	1,100
Fluoride (mg/L)							
MW-16-01	-1 < -0.673575 < 1	--	--	--	N	Parametric	1.9
MW-16-02	-1 < -0.0489763 < 1	--	--	--	N	Parametric	1.3
MW-16-03	-1 < -3.02559e-015 < 1	--	--	--	N	Parametric	1.9
MW-16-04	-1 < -0.21451 < 1	--	--	--	N	Parametric	1.9
MW-16-09	-1 < -0.590448 < 1	--	--	--	N	Parametric	1.8

Notes:

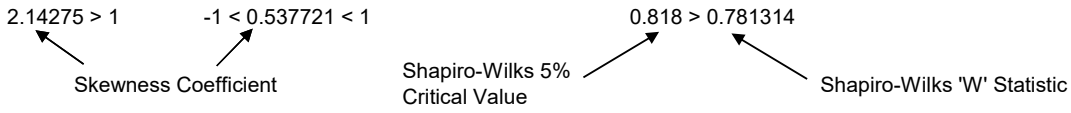


ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units
(1) Variance = 0; as such, parametric methods were used for calculating the prediction limit.

Table 1
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Prediction Limit Test	Prediction Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
pH, Field (SU)							
MW-16-01	-1.51827 < -1	-1.59328 < -1	0.829 > 0.819337	0.829 > 0.8032	N	Non-Parametric	7.6 - 8.1
MW-16-02	-1 < -0.139898 < 1	--	--	--	N	Parametric	7.4 - 8.0
MW-16-03	-1 < -0.773774 < 1	--	--	--	N	Parametric	7.5 - 8.3
MW-16-04	-1 < 0.307547 < 1	--	--	--	N	Parametric	7.5 - 8.4
MW-16-09	-1 < -0.237318 < 1	--	--	--	N	Parametric	7.7 - 8.7
Sulfate (mg/L)							
MW-16-01	-1 < 0.376341 < 1	--	--	--	N	Parametric	8.1
MW-16-02	-1 < 0.416234 < 1	--	--	--	N	Parametric	20
MW-16-03	-1 < -0.220202 < 1	--	--	--	N	Parametric	14
MW-16-04	-1 < -0.369347 < 1	--	--	--	N	Parametric	18
MW-16-09	-1 < -0.11514 < 1	--	--	--	N	Parametric	40
Total Dissolved Solids (mg/L)							
MW-16-01	-1 < 0.796876 < 1	--	--	--	N	Parametric	950
MW-16-02	1.32553 > 1	1.16468 > 1	0.829 < 0.840922	--	N	Parametric	890
MW-16-03	Variance = 0 [1]	--	--	--	N	Parametric	1,100
MW-16-04	1.66722 > 1	1.59092 > 1	0.829 > 0.784612	0.829 > 0.802563	N	Non-Parametric	1,100
MW-16-09	-1 < -0.41295 < 1	--	--	--	N	Parametric	2,000

Notes:

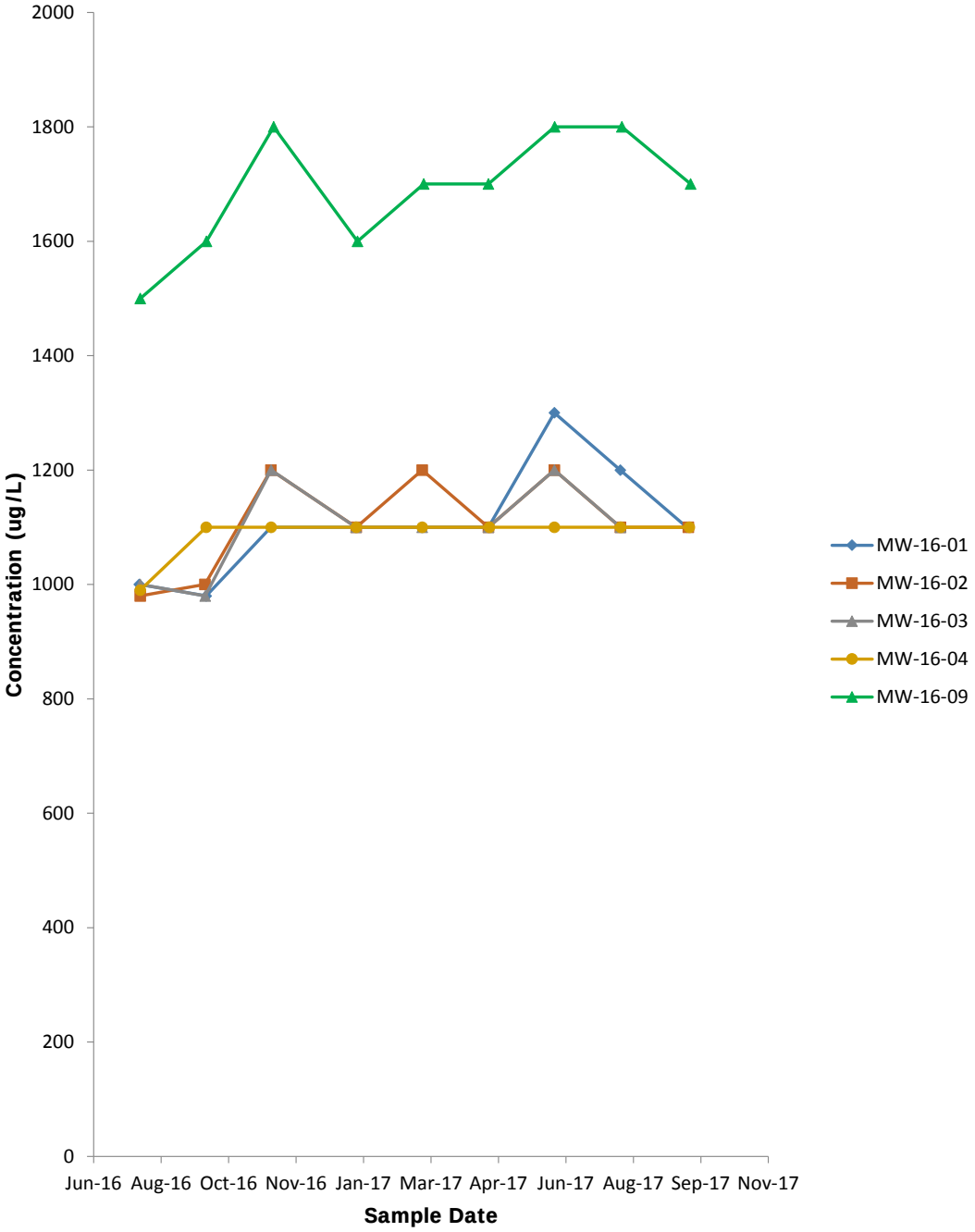


ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units
[1] Variance = 0; as such, parametric methods were used for calculating the prediction limit.

Attachment A

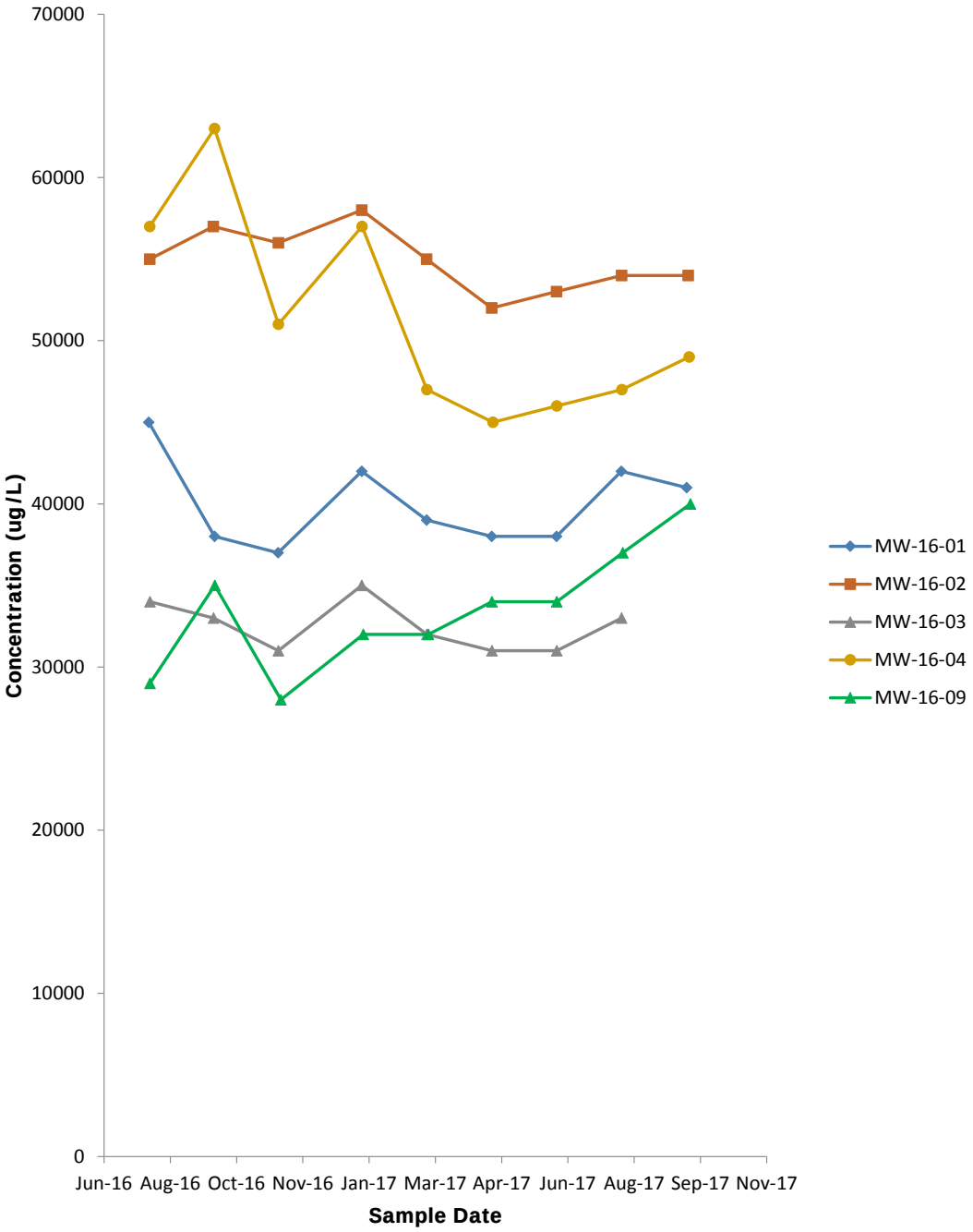
Background Concentration Time-Series Charts

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Boron



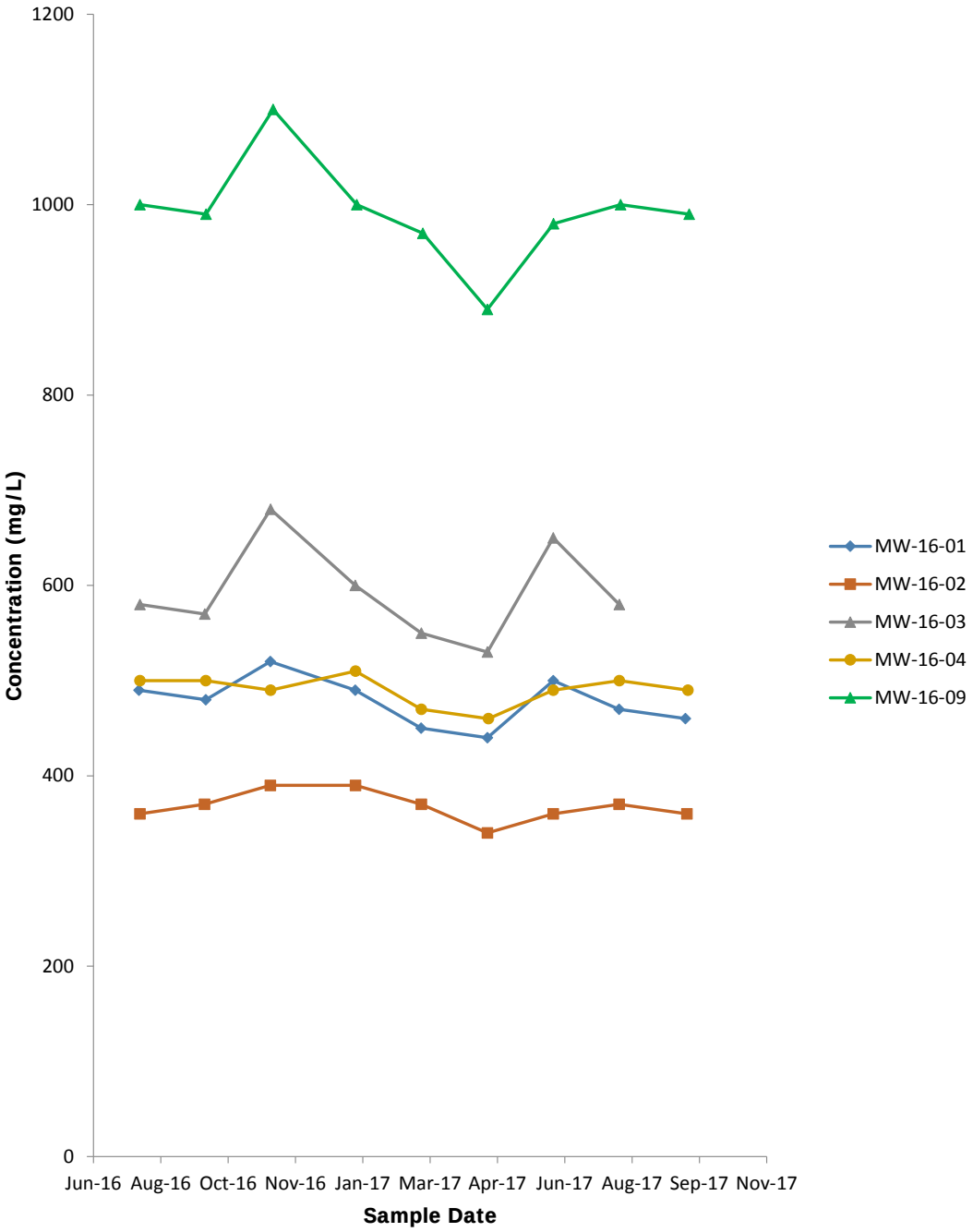
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Calcium



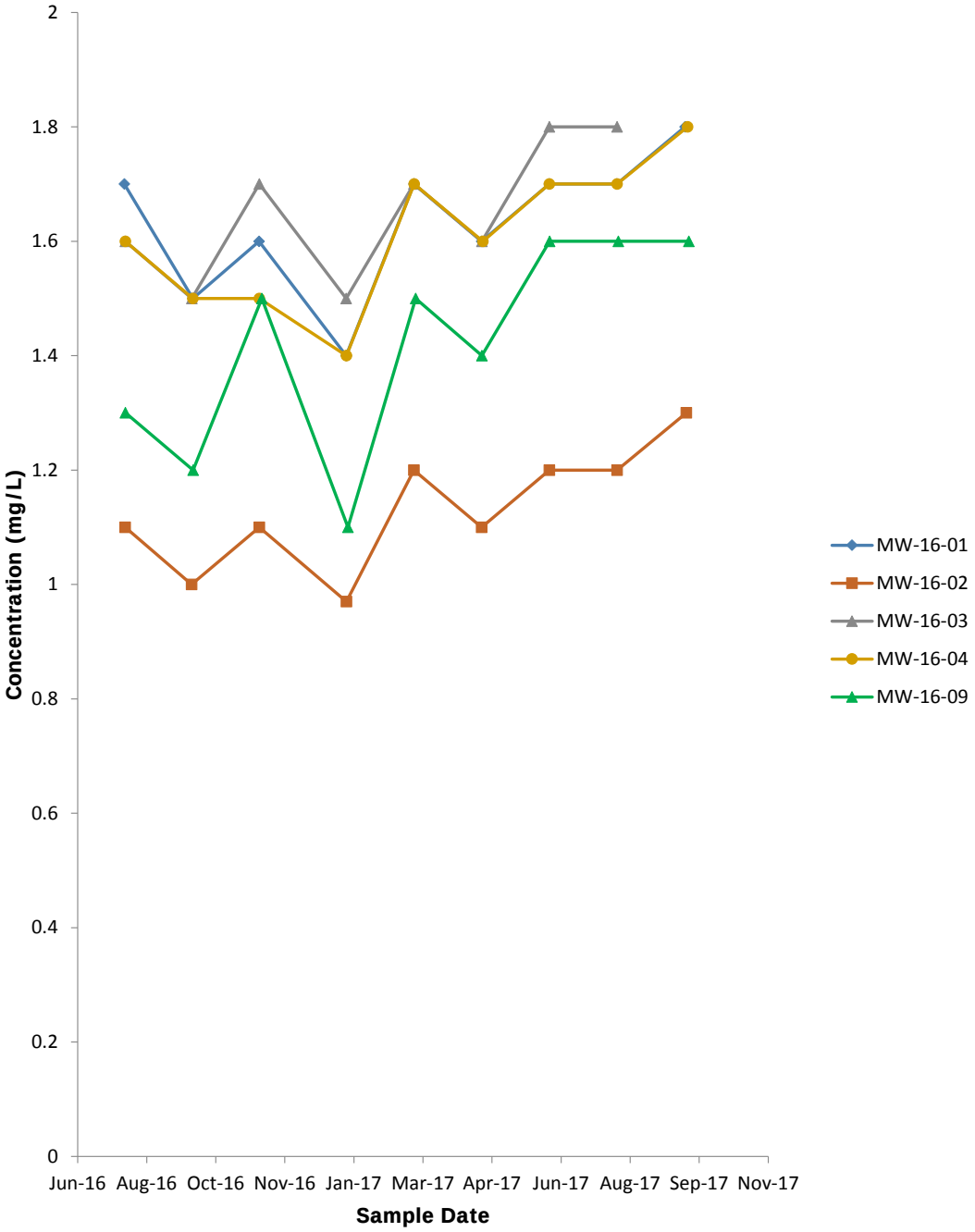
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Chloride



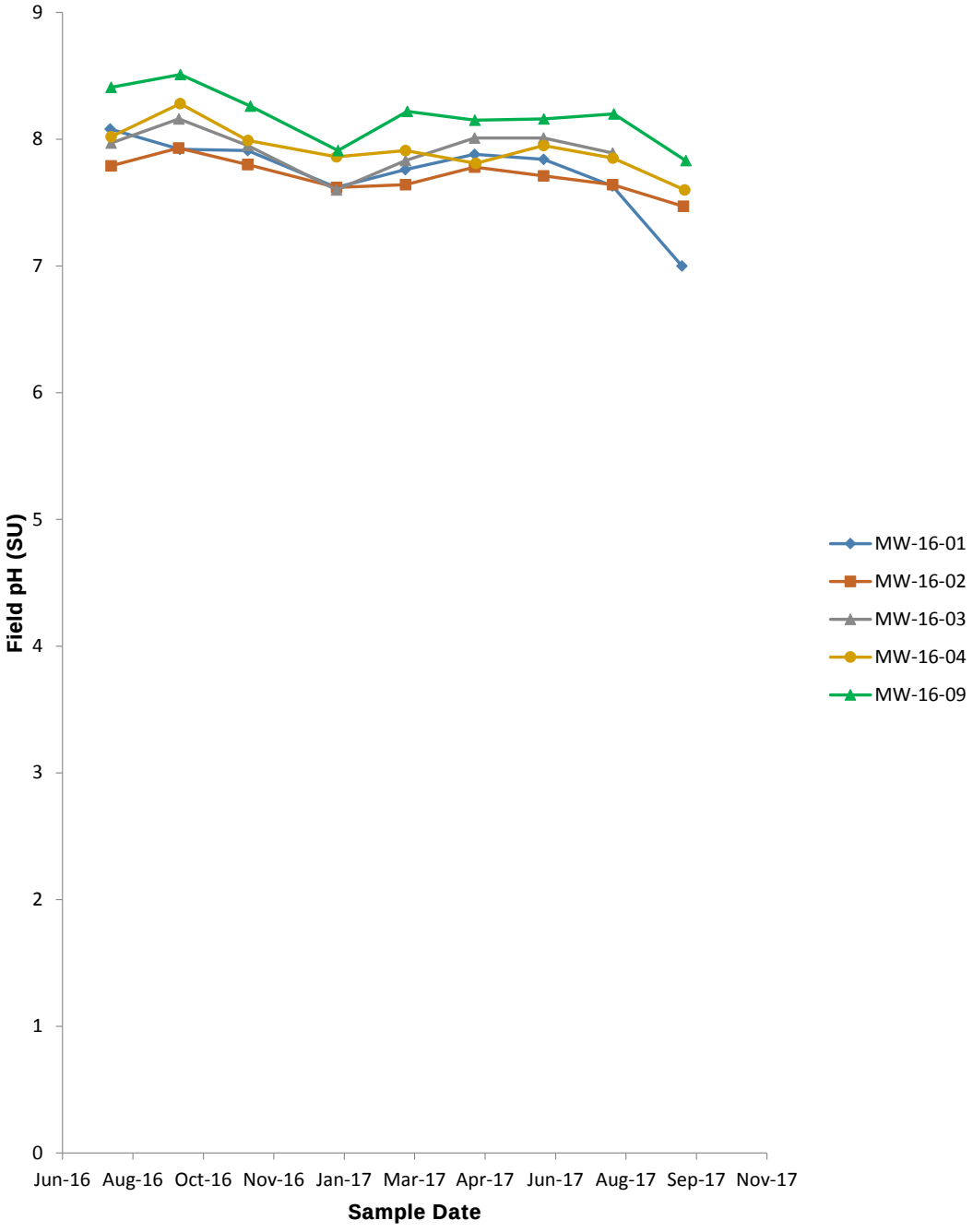
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Fluoride

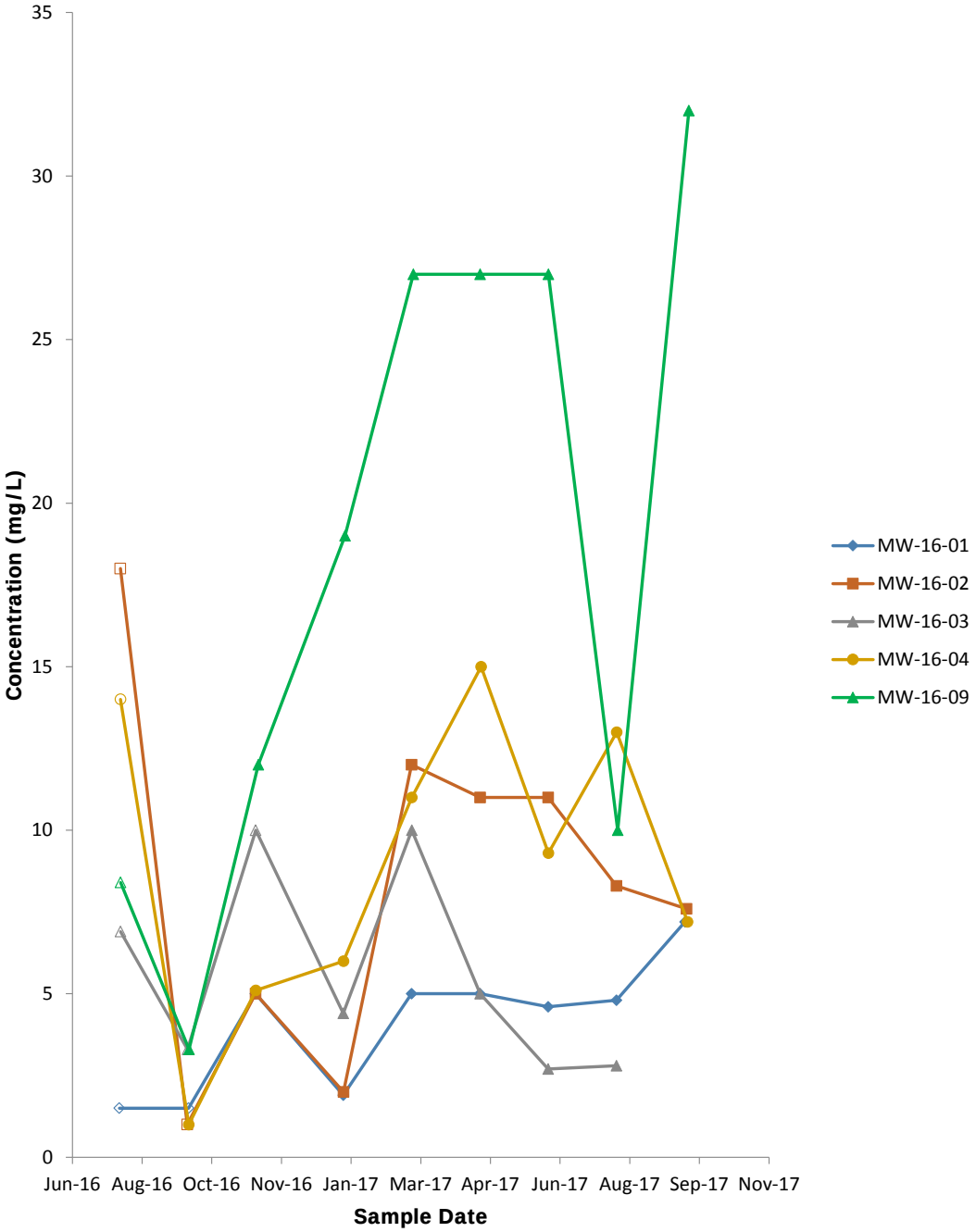


Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
pH, Field

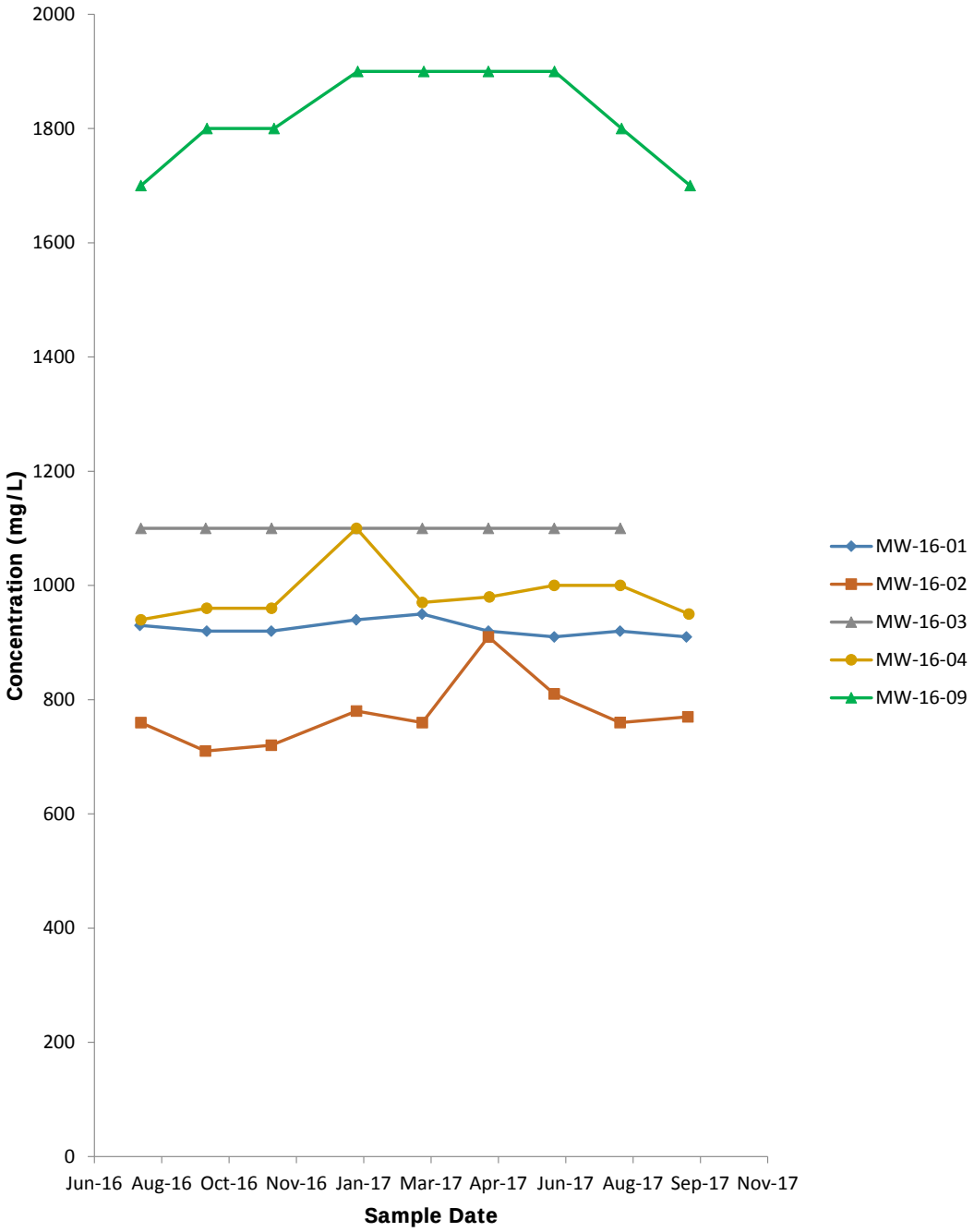


Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Sulfate



Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - Belle River Power Plant Bottom Ash Basins
China Township, Michigan
Total Dissolved Solids



Open symbols denote non-detect concentrations.

Attachment B

ChemStat™ Prediction Limit Outputs

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Boron
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	1000
	9/20/2016	980
	11/7/2016	1100
	1/9/2017	1100 B
	2/27/2017	1100
	4/17/2017	1100
	6/5/2017	1300 B
	7/24/2017	1200
	9/11/2017	1100

From 9 baseline samples
Baseline mean = 1108.89
Baseline std Dev = 95.9745

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	950	[0, 1297.01]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Boron
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	980
	9/19/2016	1000
	11/7/2016	1200
	1/9/2017	1100 B
	2/27/2017	1200
	4/17/2017	1100
	6/5/2017	1200 B
	7/24/2017	1100
	9/12/2017	1100

From 9 baseline samples
Baseline mean = 1108.89
Baseline std Dev = 81.9214

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1000	[0, 1269.47]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Boron
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1000
	9/19/2016	980
	11/7/2016	1200
	1/9/2017	1100 B
	2/27/2017	1100
	4/17/2017	1100
	6/5/2017	1200 B
	7/24/2017	1100

From 8 baseline samples
Baseline mean = 1097.5
Baseline std Dev = 79.5972

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1000	[0, 1257.45]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-16-04
Parameter: Boron
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
Maximum Baseline Concentration = 1100
Confidence Level = 88.9%
False Positive Rate = 11.1%

Baseline Measurements	Date	Value
	8/2/2016	990
	9/20/2016	1100
	11/7/2016	1100
	1/9/2017	1100 B
	2/27/2017	1100
	4/18/2017	1100
	6/5/2017	1100 B
	7/24/2017	1100

Date	Count	Mean	Significant
10/2/2017	1	920	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Boron
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1500
	9/20/2016	1600
	11/9/2016	1800
	1/10/2017	1600 B
	2/28/2017	1700
	4/17/2017	1700
	6/5/2017	1800 B
	7/25/2017	1800
	9/14/2017	1700

From 9 baseline samples
Baseline mean = 1688.89
Baseline std Dev = 105.409

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	1600	[0, 1895.51]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Calcium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	45000
	9/20/2016	38000
	11/7/2016	37000
	1/9/2017	42000
	2/27/2017	39000
	4/17/2017	38000
	6/5/2017	38000
	7/24/2017	42000
	9/11/2017	41000

From 9 baseline samples
Baseline mean = 40000
Baseline std Dev = 2645.75

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	38000	[0, 45186]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Calcium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	55000
	9/19/2016	57000
	11/7/2016	56000
	1/9/2017	58000
	2/27/2017	55000
	4/17/2017	52000
	6/5/2017	53000
	7/24/2017	54000
	9/12/2017	54000

From 9 baseline samples
Baseline mean = 54888.9
Baseline std Dev = 1900.29

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	53000	[0, 58613.7]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Calcium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	34000
	9/19/2016	33000
	11/7/2016	31000
	1/9/2017	35000
	2/27/2017	32000
	4/17/2017	31000
	6/5/2017	31000
	7/24/2017	33000

From 8 baseline samples
Baseline mean = 32500
Baseline std Dev = 1511.86

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	32000	[0, 35538.1]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-04
Parameter: Calcium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	57000
	9/20/2016	63000
	11/7/2016	51000
	1/9/2017	57000
	2/27/2017	47000
	4/18/2017	45000
	6/5/2017	46000
	7/24/2017	47000
	9/13/2017	49000

From 9 baseline samples
Baseline mean = 51333.3
Baseline std Dev = 6245

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	44000	[0, 63574.4]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Calcium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	29000
	9/20/2016	35000
	11/9/2016	28000
	1/10/2017	32000
	2/28/2017	32000
	4/17/2017	34000
	6/5/2017	34000
	7/25/2017	37000
	9/14/2017	40000

From 9 baseline samples
Baseline mean = 33444.4
Baseline std Dev = 3745.37

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	34000	[0, 40785.9]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Chloride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	490
	9/20/2016	480
	11/7/2016	520
	1/9/2017	490
	2/27/2017	450
	4/17/2017	440
	6/5/2017	500
	7/24/2017	470
	9/11/2017	460

From 9 baseline samples
Baseline mean = 477.778
Baseline std Dev = 25.3859

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	470	[0, 527.538]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Chloride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	360
	9/19/2016	370
	11/7/2016	390
	1/9/2017	390
	2/27/2017	370
	4/17/2017	340
	6/5/2017	360
	7/24/2017	370
	9/12/2017	360

From 9 baseline samples
Baseline mean = 367.778
Baseline std Dev = 15.6347

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	370	[0, 398.424]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Chloride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	580
	9/19/2016	570
	11/7/2016	680
	1/9/2017	600
	2/27/2017	550
	4/17/2017	530
	6/5/2017	650
	7/24/2017	580

From 8 baseline samples
Baseline mean = 592.5
Baseline std Dev = 50.0714

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	580	[0, 693.119]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-04
Parameter: Chloride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	500
	9/20/2016	500
	11/7/2016	490
	1/9/2017	510
	2/27/2017	470
	4/18/2017	460
	6/5/2017	490
	7/24/2017	500
	9/13/2017	490

From 9 baseline samples
Baseline mean = 490
Baseline std Dev = 15.8114

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	510	[0, 520.992]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Chloride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1000
	9/20/2016	990
	11/9/2016	1100
	1/10/2017	1000
	2/28/2017	970
	4/17/2017	890
	6/5/2017	980
	7/25/2017	1000
	9/14/2017	990

From 9 baseline samples
Baseline mean = 991.111
Baseline std Dev = 53.4894

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	980	[0, 1095.96]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	1.7
	9/20/2016	1.5
	11/7/2016	1.6
	1/9/2017	1.4
	2/27/2017	1.7
	4/17/2017	1.6
	6/5/2017	1.7
	7/24/2017	1.7
	9/11/2017	1.8

From 9 baseline samples
Baseline mean = 1.63333
Baseline std Dev = 0.122474

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1.7	[0, 1.8734]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1.1
	9/19/2016	1
	11/7/2016	1.1
	1/9/2017	0.97
	2/27/2017	1.2
	4/17/2017	1.1
	6/5/2017	1.2
	7/24/2017	1.2
	9/12/2017	1.3

From 9 baseline samples
Baseline mean = 1.13
Baseline std Dev = 0.105357

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1.2	[0, 1.33651]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1.6
	9/19/2016	1.5
	11/7/2016	1.7
	1/9/2017	1.5
	2/27/2017	1.7
	4/17/2017	1.6
	6/5/2017	1.8
	7/24/2017	1.8

From 8 baseline samples
Baseline mean = 1.65
Baseline std Dev = 0.119523

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1.8	[0, 1.89018]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-04
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1.6
	9/20/2016	1.5
	11/7/2016	1.5
	1/9/2017	1.4
	2/27/2017	1.7
	4/18/2017	1.6
	6/5/2017	1.7
	7/24/2017	1.7
	9/13/2017	1.8

From 9 baseline samples
Baseline mean = 1.61111
Baseline std Dev = 0.12693

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1.7	[0, 1.85991]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1.3
	9/20/2016	1.2
	11/9/2016	1.5
	1/10/2017	1.1
	2/28/2017	1.5
	4/17/2017	1.4
	6/5/2017	1.6
	7/25/2017	1.6
	9/14/2017	1.6

From 9 baseline samples
Baseline mean = 1.42222
Baseline std Dev = 0.185592

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	1.5	[0, 1.78601]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-16-01
Parameter: pH, Field
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
Maximum Baseline Concentration = 8.08 **Minimum Baseline Concentration = 7.62**
Confidence Level = 88.9%
False Positive Rate = 11.1%

Baseline Measurements	Date	Value
	8/1/2016	8.08
	9/20/2016	7.92
	11/7/2016	7.91
	1/9/2017	7.62
	2/27/2017	7.76
	4/17/2017	7.88
	6/5/2017	7.84
	7/24/2017	7.63

Date	Count	Mean	Significant
10/2/2017	1	7.25	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: pH, Field
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% Two-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	7.79
	9/19/2016	7.93
	11/7/2016	7.8
	1/9/2017	7.62
	2/27/2017	7.64
	4/17/2017	7.78
	6/5/2017	7.71
	7/24/2017	7.64
	9/12/2017	7.47

From 9 baseline samples
Baseline mean = 7.70889
Baseline std Dev = 0.133832

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1)/2 = 97.5 %
t is Percentile of Student's T-Test (0.95/1/2) = 0.975
Degrees of Freedom = 9 (background observations) - 1
t(0.975, 9) = 2.30601

Date	Samples	Mean	Interval	Significant
10/2/2017	1	7.27	[7.38, 8.03]	TRUE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: pH, Field
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% Two-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	7.97
	9/19/2016	8.16
	11/7/2016	7.95
	1/9/2017	7.6
	2/27/2017	7.83
	4/17/2017	8.01
	6/5/2017	8.01
	7/24/2017	7.89

From 8 baseline samples
Baseline mean = 7.9275
Baseline std Dev = 0.163947

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1)/2 = 97.5 %
t is Percentile of Student's T-Test (0.95/1/2) = 0.975
Degrees of Freedom = 8 (background observations) - 1
t(0.975, 8) = 2.36462

Date	Samples	Mean	Interval	Significant
10/2/2017	1	7.66	[7.52, 8.34]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-04
Parameter: pH, Field
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% Two-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	8.02
	9/20/2016	8.28
	11/7/2016	7.99
	1/9/2017	7.86
	2/27/2017	7.91
	4/18/2017	7.81
	6/5/2017	7.95
	7/24/2017	7.85
	9/13/2017	7.6

From 9 baseline samples
Baseline mean = 7.91889
Baseline std Dev = 0.183197

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1)/2 = 97.5 %
t is Percentile of Student's T-Test (0.95/1/2) = 0.975
Degrees of Freedom = 9 (background observations) - 1
t(0.975, 9) = 2.30601

Date	Samples	Mean	Interval	Significant
10/2/2017	1	7.78	[7.47, 8.36]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: pH, Field
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% Two-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	8.41
	9/20/2016	8.51
	11/9/2016	8.26
	1/10/2017	7.91
	2/28/2017	8.22
	4/17/2017	8.15
	6/5/2017	8.16
	7/26/2017	8.2
	9/14/2017	7.83

From 9 baseline samples
Baseline mean = 8.18333
Baseline std Dev = 0.214126

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1)/2 = 97.5 %
t is Percentile of Student's T-Test (0.95/1/2) = 0.975
Degrees of Freedom = 9 (background observations) - 1
t(0.975, 9) = 2.30601

Date	Samples	Mean	Interval	Significant
10/3/2017	1	8.08	[7.66, 8.7]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Sulfate
Original Data (Not Transformed)
Cohen's Adjustment

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	1.5
	9/20/2016	1.5
	11/7/2016	ND<5 U
	1/9/2017	1.9 F1
	2/27/2017	ND<5 U
	4/17/2017	ND<5 U
	6/5/2017	4.6
	7/24/2017	4.8
	9/11/2017	7.2

From 9 baseline samples
Baseline mean = 3.58333
Baseline std Dev = 2.32845

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	4.2	[0, 8.14741]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Sulfate
Original Data (Not Transformed)
Cohen's Adjustment

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	18
	9/19/2016	ND<1 U
	11/7/2016	ND<5 U
	1/9/2017	2
	2/27/2017	12
	4/17/2017	11
	6/5/2017	11
	7/24/2017	8.3
	9/12/2017	7.6

From 9 baseline samples
Baseline mean = 7.6019
Baseline std Dev = 6.35826

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	7.7	[0, 20.0649]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Sulfate
Original Data (Not Transformed)
Cohen's Adjustment

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	6.9
	9/19/2016	3.3
	11/7/2016	ND<10 U
	1/9/2017	4.4
	2/27/2017	ND<10 U
	4/17/2017	ND<5 U
	6/5/2017	2.7
	7/24/2017	2.8

From 8 baseline samples
Baseline mean = 6.54763
Baseline std Dev = 3.73491

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	2.5	[0, 14.0529]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-04
Parameter: Sulfate
Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	14
	9/20/2016	ND<0.5 U
	11/7/2016	5.1
	1/9/2017	6
	2/27/2017	11
	4/18/2017	15
	6/5/2017	9.3
	7/24/2017	13
	9/13/2017	7.2

From 9 baseline samples
Baseline mean = 9.01111
Baseline std Dev = 4.7538

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	7.9	[0, 18.3292]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Sulfate
Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	8.4
	9/20/2016	3.3
	11/9/2016	12
	1/10/2017	19
	2/28/2017	27
	4/17/2017	27
	6/5/2017	27
	7/25/2017	ND<5 U
	9/14/2017	32

From 9 baseline samples
Baseline mean = 17.8556
Baseline std Dev = 10.9148

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	24	[0, 39.25]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
Parameter: Total Dissolved Solids
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/1/2016	930
	9/20/2016	920
	11/7/2016	920
	1/9/2017	940
	2/27/2017	950
	4/17/2017	920
	6/5/2017	910
	7/24/2017	920
	9/11/2017	910

From 9 baseline samples
Baseline mean = 924.444
Baseline std Dev = 13.3333

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	930	[0, 950.58]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-02
Parameter: Total Dissolved Solids
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	760
	9/19/2016	710
	11/7/2016	720
	1/9/2017	780
	2/27/2017	760
	4/17/2017	910
	6/5/2017	810
	7/24/2017	760
	9/12/2017	770

From 9 baseline samples
Baseline mean = 775.556
Baseline std Dev = 58.5472

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/2/2017	1	760	[0, 890.316]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Total Dissolved Solids
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1100
	9/19/2016	1100
	11/7/2016	1100
	1/9/2017	1100
	2/27/2017	1100
	4/17/2017	1100
	6/5/2017	1100
	7/24/2017	1100

From 8 baseline samples
Baseline mean = 1100
Baseline std Dev = 0

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 8 (background observations) - 1
t(0.95, 8) = 1.89458

Date	Samples	Mean	Interval	Significant
10/2/2017	1	1100	[0, 1100]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-16-04
Parameter: Total Dissolved Solids
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
Maximum Baseline Concentration = 1100
Confidence Level = 88.9%
False Positive Rate = 11.1%

Baseline Measurements	Date	Value
	8/2/2016	940
	9/20/2016	960
	11/7/2016	960
	1/9/2017	1100
	2/27/2017	970
	4/18/2017	980
	6/5/2017	1000
	7/24/2017	1000

Date	Count	Mean	Significant
10/2/2017	1	1000	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-09
Parameter: Total Dissolved Solids
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	8/2/2016	1700
	9/20/2016	1800
	11/9/2016	1800
	1/10/2017	1900
	2/28/2017	1900
	4/17/2017	1900
	6/5/2017	1900
	7/25/2017	1800
	9/14/2017	1700

From 9 baseline samples
Baseline mean = 1822.22
Baseline std Dev = 83.3333

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 9 (background observations) - 1
t(0.95, 9) = 1.85955

Date	Samples	Mean	Interval	Significant
10/3/2017	1	1700	[0, 1985.57]	FALSE