Annual Groundwater Monitoring Report

DTE Electric Company
St. Clair Power Plant Bottom Ash Basins
4901 Pointe Drive
East China Township, Michigan

January 2018

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East China Township, Michigan

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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) St. Clair Power Plant (SCPP) 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 SCPP 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 SCPP 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.

There were no potential SSIs over background limits were for any of the Appendix III parameters during the October 2017 monitoring event. Therefore, DTE Electric is taking no further action at this time. The next semiannual monitoring event at the SCPP BABs CCR unit is scheduled for the second calendar quarter of 2018.

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) St.Clair Power Plant (SCPP) 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 SCPP 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 SCPP 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 St. Clair Power Plant Bottom Ash Basins* (QAPP) (TRC, July 2016; revised August 2017) and statistically evaluated per the *Groundwater Statistical Evaluation Plan – St. Clair 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 SCPP BABs are located in Section 19, Township 4 North, Range 17 East, at 4901 Pointe Drive, East China Township in St. Clair County, Michigan. The SCPP including the BABs CCR unit was constructed in the early 1950s, just south of the DTE Electric SCPP main building. The power plant is located on the peninsula formed by the St. Clair and Belle Rivers, approximately three miles south of St. Clair, Michigan immediately to the west of the St. Clair River.

The property has been used continuously as a coal fired power plant since Detroit Edison Company (now DTE Electric) began power plant operations at SCPP in 1953 and is constructed over a natural continuous clay-rich soil base as shown in historical soil borings performed at the SCPP property. The BABs have been in operation at the SCPP since the plant began operation and have collected CCR bottom ash that is routinely cleaned out and either sold for beneficial reuse or disposed of at the Range Road Landfill (RRLF).

The SCPP BABs are two adjacent sedimentation basins that are incised CCR surface impoundments. The impoundments are sheet piled around the perimeters to approximately 13 feet below ground surface (ft bgs) into the native clay-rich soil. The BABs are located south of the SCPP and adjacent to the St. Clair River and are used for receiving bottom ash and other process flow water from the power plant, which is first sent to the East BAB then to the West BAB through a connecting concrete canal. Discharge water from the basins flows with other site wastewater into the Overflow Canal in accordance with a National Pollution Discharge Elimination System (NPDES) permit.

1.3 Geology/Hydrogeology

The SCPP BABs CCR unit is located immediately adjacent to the west of the St. Clair River. The SCPP CCR unit is underlain by glacial silty-clay till, with a few isolated sand lenses, and a silt and clay-rich hardpan base directly overlying the shale bedrock (likely the Bedford Shale). The shale bedrock lower confining unit is generally encountered at depths greater than 130 ft bgs. No significant soil or gravel intervals were encountered at any of the groundwater monitoring system well locations. However, during soil boring advancement for the groundwater monitoring system well locations, some signs of saturation were observed throughout a 5-foot interval along the interface between the overlying till/hardpan and the underlying shale bedrock. The underlying shale does not yield groundwater, rather it is an aquiclude that prevents groundwater flow (i.e., is not an aquifer).

Although the encountered zone of saturation along the interface did not yield significant groundwater, it was conservatively interpreted as the first underlying saturated zone that would presumably become affected with CCR constituents, since it was saturated, and although the hydraulic conductivity was low, exhibited a much higher conductivity than the clay-rich soils between the bottom of the basin and the monitored zone. Therefore, the potential uppermost aquifer as described above was present beneath at least a 120 feet of vertically contiguous silty clay-rich till that serves as a natural confining hydraulic barrier that isolates the underlying uppermost potential aquifer. The first underlying saturated zone (the potential uppermost aquifer) that would presumably become affected with CCR constituent's is located at the silty clay hardpan/shale bedrock interface (130.5 to 132 ft bgs) and is limited to no more than four feet thick.

A definitive groundwater flow direction with a mean gradient in 2016 and 2017 of 0.0036 foot/foot to the east-southeast within the uppermost aquifer is evident around the SCPP CCR BABs CCR unit, however potential groundwater flow within this uppermost aquifer is very slow (on the order of 0.05 feet per year).

In addition, the elevation of CCR-affected water maintained within the SCPP BABs is very similar to 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, 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 SCPP, it is not possible for the uppermost aquifer to have been affected by CCR from SCPP operations that began in the 1950s.

Due to the relatively small footprint of the BABs, the low vertical and horizontal groundwater flow velocity, the radial flow potential outward from the CCR unit, 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 SCPP BABs CCR unit using intrawell statistical methods is appropriate. As such, intrawell statistical approaches is 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 SCPP BABs CCR unit as detailed in the *Groundwater Monitoring System Summary Report – DTE Electric Company St. Clair Power Plant Bottom Ash Basins Coal Combustion Residual Unit* (GWMS Report) (TRC, October 2017). The detection monitoring well network for the BABs CCR unit currently consists of four 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 are located around the east and west 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 four background/downgradient monitoring wells).

2.2 Background Sampling

Background groundwater monitoring was conducted at the SCPP 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 four monitoring wells installed for the BABs CCR unit, in addition to one supplemental sampling event. The supplemental background sampling event was conducted in September 2017 to expand the background data set and confirm analytical results. 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 Figures 1 through 8.

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 four monitoring well locations. Groundwater samples were collected from the four 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 in 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

Groundwater elevation data collected during the most recent background sampling events showed that groundwater within the uppermost aquifer generally flows to the east-southeast across the SCPP BABs CCR unit. Groundwater potentiometric surface elevations measured across the SCPP BABs during the October 2017 sampling event

are provided in Table 1 and were used to construct a groundwater potentiometric surface map (Figure 3).

The map indicates that current groundwater flow is consistent with previous monitoring events. The average hydraulic gradient throughout the SCPP BABs during this event is estimated at 0.0035 ft/ft. Resulting in an estimated average seepage velocity of approximately 0.0001 ft/day or 0.04 ft/year (approximately 0.5 inches/year) for this event, 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, and mentioned above, there is a horizontally expansive clay with substantial vertical thickness that isolates the uppermost aquifer from the SCPP BABs CCR unit. The general flow rate and direction in the uppermost aquifer is similar to that identified in previous monitoring rounds and continues to demonstrate that groundwater flows at a low rate and the compliance wells are appropriately positioned to detect the presence of Appendix III parameters that could potentially migrate from the SCPP 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 four established detection monitoring wells (MW-16-01 through MW-16-04). 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 SCPP 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) 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 in Table 4.

The statistical evaluation of the October 2017 Appendix III indicator parameters shows that there were no potential SSIs compared to background for boron, calcium, chloride, fluoride, pH, sulfate or TDS.

Section 4
Conclusions and Recommendations

There were no potential SSIs over background limits were for any of the Appendix III parameters during the October 2017 monitoring event. Therefore, DTE Electric is taking no further action at this time.

The next semiannual monitoring event at the SCPP BABs CCR unit is scheduled for the second calendar quarter of 2018.

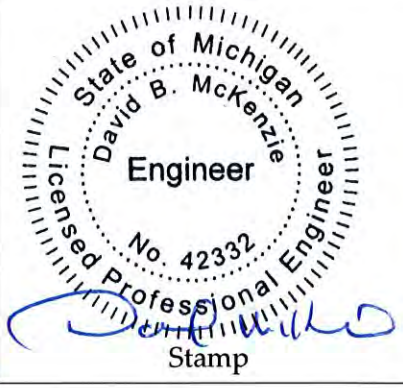
Section 5
Groundwater Monitoring Report Certification

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
St. Clair Power Plant Bottom Ash Basins
East China Township, Michigan

CERTIFICATION

I hereby certify that the annual groundwater and corrective action report presented within this document for the SCPP 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: January 30, 2018 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 St. Clair Power Plant Bottom Ash Basins, 4901 Pointe Drive, East China Township, Michigan. Prepared for DTE Electric Company.

TRC. October 2017. Groundwater Monitoring System Summary Report – DTE Electric Company St. Clair Power Plant Bottom Ash Basins Coal Combustion Residual Unit, 4901 Pointe Drive, East China Township, Michigan. Prepared for DTE Electric Company.

TRC. October 2017. Groundwater Statistical Evaluation Plan – DTE Electric Company St. Clair Power Plant Coal Combustion Residual Bottom Ash Basins, 4901 Pointe Drive, East China Township, Michigan. Prepared for DTE Electric Company.

Tables

Table 1
Summary of Groundwater Elevation Data – October 2017
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Well ID	MP-01		MW-16-01		MW-16-02		MW-16-03		MW-16-04	
Date Installed	3/23/2016		3/31/2016		3/29/2016		3/25/2016		3/23/2016	
TOC Elevation	580.84[(1)]		584.74		581.43		581.39		580.95	
Geologic Unit of Screened Interval	NA		Silty Clay Shale Interface		Silty Clay Shale Interface		Silty Clay/Hardpan Shale Interface		Silty Clay/Hardpan Shale Interface	
Screened Interval Elevation	NA		458.1 to 453.1		456.2 to 451.2		455.1 to 450.1		455.0 to 450.0	
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
10/5/2017	3.98	576.85	3.66	581.08	2.81	578.62	1.82	579.57	1.24	579.71

Notes:

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

ft BTOC - feet below top of casing

NA - not applicable

1) Elevation represents the point of reference used to collect surface water level measurements.

Table 2
Summary of Groundwater Analytical Data – October 2017
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-01	MW-16-02	MW-16-03	MW-16-04
Sample Date:		10/6/2017	10/6/2017	10/6/2017	10/6/2017
Constituent	Unit				
Appendix III					
Boron	ug/L	2,000	2,000	1,900	2,100
Calcium	ug/L	19,000	40,000	56,000	38,000
Chloride	mg/L	1,200	1,900	2,100	2,500
Fluoride	mg/L	2.0	1.6	1.5	1.7
pH, Field	SU	8.2	8.1	7.9	8.0
Sulfate	mg/L	7.1	<2.0	<2.0	<5.0
Total Dissolved Solids	mg/L	2,000	2,700	3,200	3,600

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
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East 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	10/6/2017	0.17	-165.5	8.2	4,287	13.30	16.5
MW-16-02	10/6/2017	0.14	-191.3	8.1	6,140	15.28	29.7
MW-16-03	10/6/2017	0.16	-172.0	7.9	6,569	14.66	67.0
MW-16-04	10/6/2017	0.07	-183.9	8.0	7,947	13.94	88.0

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
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-01		MW-16-02		MW-16-03		MW-16-04	
Sample Date:		10/6/2017		10/6/2017		10/6/2017		10/6/2017	
Constituent	Unit	Data	PL	Data	PL	Data	PL	Data	PL
Appendix III									
Boron	ug/L	2,000	2,600	2,000	2,400	1,900	2,300	2,100	2,600
Calcium	ug/L	19,000	24,000	40,000	69,000	56,000	61,000	38,000	57,000
Chloride	mg/L	1,200	1,400	1,900	2,100	2,100	2,200	2,500	2,800
Fluoride	mg/L	2.0	2.1	1.6	1.6	1.5	1.6	1.7	1.7
pH, Field	SU	8.2	7.2 - 8.6	8.1	7.5 - 8.3	7.9	7.3 - 8.5	8.0	7.3 - 8.4
Sulfate	mg/L	7.1	62	<2.0	25	<2.0	25	<5.0	25
Total Dissolved Solids	mg/L	2,000	2,500	2,700	3,600	3,200	4,000	3,600	4,400

Notes:

ug/L - micrograms per liter.

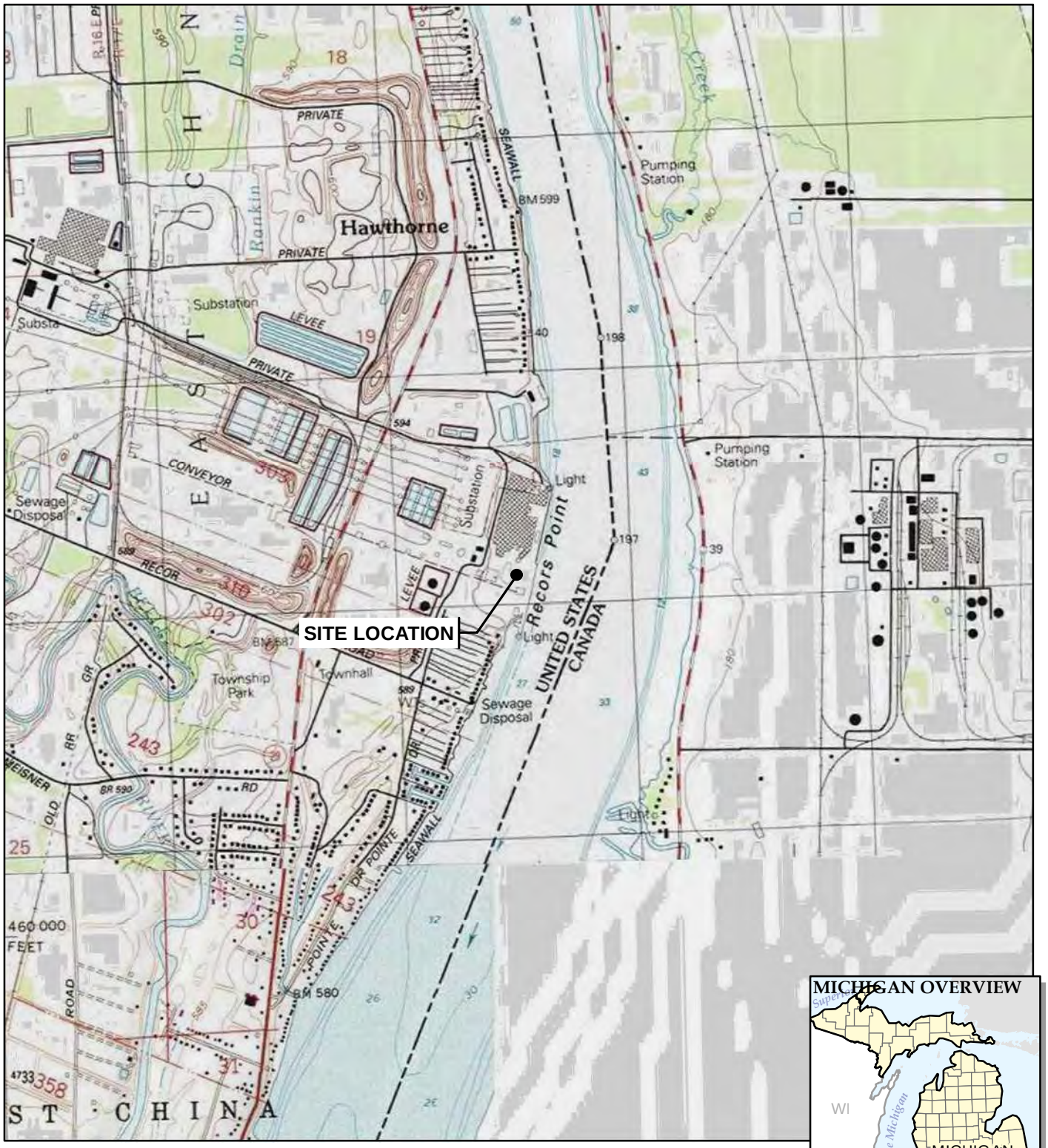
mg/L - milligrams per liter.

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 Limits (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
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
EAST CHINA TOWNSHIP, MICHIGAN

TITLE:

SITE LOCATION MAP

DRAWN BY:	J. PAPEZ
CHECKED BY:	S HOLMSTROM
APPROVED BY:	V. BUENING
DATE:	OCTOBER 2017
PROJ. NO.:	265996.0004
FILE:	265996-SLMMB.mxd

FIGURE 1

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LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO & PARTNERS, APRIL 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:

DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:

SITE PLAN

DRAWN BY:	J PAPEZ	PROJ NO.:	254222.0004
CHECKED BY:	S HOLMSTROM		
APPROVED BY:	V BUENING		**FIGURE 2**
DATE:	OCTOBER 2017		

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Phone: 734.971.7080
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FILE NO.: 265996-0004-002.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 10/9/2017, 15:35:34 PM by BDEEGAN -- LAYOUT: ANSI B (11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0004-002.mxd

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.
4. GROUNDWATER ELEVATION DATA FOR MW-16-02 WAS NOT USED. GROUNDWATER LEVEL WAS NOT FULLY RECOVERED AT THE TIME OF DATA COLLECTION.

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP OCTOBER 2017

DRAWN BY:	S. MAJOR	PROJ NO.:	265996.0004
CHECKED BY:	S. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 3**
DATE:	JANUARY 2018		

TRC
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Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 265996-0004-012.mxd

Plot Date: 1/12/2018, 10:19:44 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
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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
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Well ID	MP-01		MW-16-01		MW-16-02		MW-16-03		MW-16-04	
Date Installed	3/23/2016		3/31/2016		3/29/2016		3/25/2016		3/23/2016	
TOC Elevation	580.84[(1)]		584.74		581.43		581.39		580.95	
Geologic Unit of Screened Interval	NA		Silty Clay Shale Interface		Silty Clay Shale Interface		Silty Clay/Hardpan Shale Interface		Silty Clay/Hardpan Shale Interface	
Screened Interval Elevation	NA		458.1 to 453.1		456.2 to 451.2		455.1 to 450.1		455.0 to 450.0	
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	NM	NM	3.16	581.58	1.32	580.11	1.39	580.00	1.10	579.85
10/3/2016	4.25	576.58	3.63	581.09	5.25	579.49	1.70	579.69	3.22	578.98
11/11/2016	4.72	576.11	3.25	581.49	1.85	579.58	2.00	579.39	1.43	579.52
1/13/2017	4.95	575.88	3.38	581.36	1.82	579.61	1.85	579.54	1.84	579.11
2/28/2017	5.00	575.83	3.42	581.32	2.10	579.33	3.08	578.31	1.60	579.35
4/21/2017	4.21	576.62	3.44	581.30	2.42	579.01	2.06	579.33	1.24	579.71
6/9/2017	4.12	576.71	3.16	581.58	1.30	580.13	1.40	579.99	1.01	579.94
7/27/2017	4.68	576.15	2.31	582.43	1.41	580.02	1.39	580.00	1.28	579.67

Notes:

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

ft BTOC - feet below top of casing

NA - not applicable

NM - not measured

1) Elevation represents the point of reference used to collect surface water level measurements.

Table 2
Summary of Groundwater Analytical Data
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-01													
Sample Date:		8/3/2016	9/21/2016	11/11/2016	11/11/2016	1/13/2017	1/13/2017	2/28/2017	4/21/2017	4/21/2017	6/9/2017	6/9/2017	7/27/2017	7/27/2017	9/14/2017
Constituent	Unit				Field Dup		Field Dup			Field Dup		Field Dup		Field Dup	
Appendix III															
Boron	ug/L	2,200	2,100	2,500	2,400	2,400	2,400	2,300	2,500	2,400	2,400	2,400	2,300	2,200	2,400
Calcium	ug/L	23,000	23,000	20,000	21,000	21,000	21,000	21,000	21,000	21,000	23,000	23,000	20,000	19,000	21,000
Chloride	mg/L	1,200	1,300	1,300	1,300	1,300	1,300	1,200	1,200	1,200	1,300	1,300	1,200	1,200	1,300
Fluoride	mg/L	1.6	1.6	1.7	1.7	1.4	1.5	1.9	1.7	1.7	1.7	1.8	1.8	1.6	2.0
pH	SU	7.93	8.1	8.0	8.0	7.9	8.0	8.2	7.9	7.9	7.8	7.8	8.1	8.2	8.3
Sulfate	mg/L	44	31	28	27	26	26	26	<20	20	58	<25	<20	<20	7.9
Total Dissolved Solids	mg/L	2,200	2,200	2,200	2,200	2,400	2,500	2,200	2,300	2,200	2,500	2,300	2,300	1,800	2,100
Appendix IV															
Antimony	ug/L	<2.0	<2.0	<2.0	<2.0	2.5	<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	<5.0
Barium	ug/L	130	190	160	160	150	150	150	160	150	150	160	190	180	210
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	<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	1.1	<1.0	<1.0
Chromium	ug/L	4.0	11	5.8	3.7	2.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	3.6	2.4	3.5
Cobalt	ug/L	<1.0	3.4	2.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0
Fluoride	mg/L	1.6	1.6	1.7	1.7	1.4	1.5	1.9	1.7	1.7	1.7	1.8	1.8	1.6	2.0
Lead	ug/L	<1.0	2.4	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	<1.0
Lithium	ug/L	34	56	48	45	41	39	41	46	44	41	41	53	50	46
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	<0.20
Molybdenum	ug/L	49	39	31	30	34	30	30	35	31	29	30	27	25	24
Radium-226	pCi/L	0.334	0.346	<0.342	0.652	0.428	0.278	0.407	0.246	0.231	0.258	0.279	0.416	0.408	0.337
Radium-226/228	pCi/L	1.16	<0.790	0.736	0.785	0.693	0.455	0.443	0.457	0.480	0.410	0.493	1.43	0.860	0.993
Radium-228	pCi/L	<0.861	<0.790	0.506	<0.415	<0.414	<0.392	<0.407	<0.355	<0.340	<0.316	<0.377	1.01	0.452	0.656
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	<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	<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 Data
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-02										
Sample Date:		8/3/2016	9/21/2016	9/21/2016	11/11/2016	1/13/2017	2/28/2017	4/21/2017	6/9/2017	7/27/2017	9/14/2017	9/14/2017
Constituent	Unit			Field Dup								Field Dup
Appendix III												
Boron	ug/L	1,900	2,000	2,000	2,300	2,100	2,200	2,200	2,200	2,200	2,200	2,300
Calcium	ug/L	69,000	51,000	45,000	40,000	36,000	38,000	36,000	38,000	38,000	43,000	42,000
Chloride	mg/L	1,800	2,000	2,000	2,000	2,000	1,800	1,800	1,900	1,900	1,900	1,900
Fluoride	mg/L	1.2	1.2	1.1	1.5	1.2	1.4	1.3	1.4	1.4	1.6	1.6
pH	SU	7.86	8.0	8.0	7.9	7.8	8.1	7.9	7.8	8.0	8.2	8.2
Sulfate	mg/L	9.6	<10	<10	<20	<20	<20	<20	<25	<20	<5.0	<5.0
Total Dissolved Solids	mg/L	3,100	3,000	3,000	3,000	3,600	3,300	3,500	3,100	3,300	3,200	3,000
Appendix IV												
Antimony	ug/L	2.1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	ug/L	12	5.6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Barium	ug/L	530	470	420	390	360	360	390	380	400	420	420
Beryllium	ug/L	1.2	<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	1.9	<1.0	<1.0
Chromium	ug/L	48	14	11	6.9	3.9	<2.0	<2.0	<2.0	5.5	4.1	3.7
Cobalt	ug/L	13	4.3	3.2	2.1	1.1	<1.0	<1.0	<1.0	2.7	<1.0	<1.0
Fluoride	mg/L	1.2	1.2	1.1	1.5	1.2	1.4	1.3	1.4	1.4	1.6	1.6
Lead	ug/L	10	4.5	3.5	2.2	1.3	<1.0	<1.0	<1.0	3.0	1.2	1.1
Lithium	ug/L	76	81	74	62	53	60	63	62	66	56	62
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
Molybdenum	ug/L	47	39	34	69	34	33	37	33	32	26	26
Radium-226	pCi/L	2.03	1.28	1.21	1.35	1.29	1.11	0.977	1.04	1.24	1.13	3.25
Radium-226/228	pCi/L	2.90	2.63	2.24	2.13	1.92	1.89	1.22	1.57	2.56	2.13	4.99
Radium-228	pCi/L	<1.58	1.34	1.03	0.783	0.631	0.781	<0.320	0.531	1.32	1.00	1.74
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
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

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 Data
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-03										
Sample Date:		8/3/2016	8/3/2016	9/21/2016	11/11/2016	1/13/2017	2/28/2017	2/28/2017	4/21/2017	6/9/2017	7/28/2017	9/14/2017
Constituent	Unit		Field Dup					Field Dup				
Appendix III												
Boron	ug/L	1,900	1,800	1,800	2,100	2,100	2,100	2,000	2,000	2,200	2,100	2,200
Calcium	ug/L	49,000	47,000	55,000	49,000	49,000	51,000	51,000	47,000	52,000	51,000	62,000
Chloride	mg/L	1,900	2,000	2,000	2,000	2,100	1,900	1,900	1,800	2,000	2,000	2,100
Fluoride	mg/L	1.2	1.1	1.0	1.2	1.1	1.4	1.4	1.2	<1.3	1.1	1.5
pH	SU	7.92	7.96	8.0	7.9	7.9	8.1	8.1	8.0	8.0	7.9	8.0
Sulfate	mg/L	6.0	5.7	<10	<20	<20	<20	<20	<20	<25	<20	<5.0
Total Dissolved Solids	mg/L	3,000	3,100	3,100	4,100	3,600	3,300	3,100	3,500	3,400	3,500	3,300
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
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
Barium	ug/L	410	400	440	430	420	420	380	440	460	500	590
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
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
Chromium	ug/L	<2.0	<2.0	3.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.4	14
Cobalt	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	3.3
Fluoride	mg/L	1.2	1.1	1.0	1.2	1.1	1.4	1.4	1.2	<1.3	1.1	1.5
Lead	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	4.6
Lithium	ug/L	36	36	40	36	33	39	39	46	46	62	62
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
Molybdenum	ug/L	26	25	34	32	31	31	30	31	31	26	24
Radium-226	pCi/L	1.15	1.08	1.13	0.815	0.812	0.985	1.03	0.775	0.787	1.09	1.53
Radium-226/228	pCi/L	1.79	1.84	1.79	1.58	1.31	1.35	1.65	1.15	1.67	2.31	2.28
Radium-228	pCi/L	0.639	0.768	0.663	0.763	0.499	0.363	0.629	0.373	0.882	1.22	0.745
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
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

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 Data
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East China Township, Michigan

Sample Location:		MW-16-04								
Sample Date:		8/3/2016	9/21/2016	11/11/2016	1/13/2017	2/28/2017	4/21/2017	6/9/2017	7/27/2017	9/14/2017
Constituent	Unit									
Appendix III										
Boron	ug/L	2,300	2,200	2,500	2,600	2,500	2,600	2,600	2,500	2,600
Calcium	ug/L	48,000	58,000	42,000	46,000	45,000	44,000	46,000	39,000	49,000
Chloride	mg/L	2,600	2,600	2,700	2,700	2,500	2,400	2,600	2,500	2,500
Fluoride	mg/L	1.3	1.2	1.4	1.2	1.5	1.3	1.4	1.4	1.7
pH	SU	7.78	8.0	7.9	7.8	8.0	7.8	7.2	8.0	8.1
Sulfate	mg/L	<5.0	<10	<20	<20	<20	<20	<25	<25	<5.0
Total Dissolved Solids	mg/L	4,100	4,100	4,100	4,400	4,000	4,000	4,000	4,100	4,000
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	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.1
Barium	ug/L	680	890	680	710	660	730	730	690	860
Beryllium	ug/L	<1.0	1.5	<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	2.1	31	7.7	7.4	2.2	2.4	<2.0	8.9	15
Cobalt	ug/L	<1.0	11	2.7	2.5	<1.0	<1.0	<1.0	2.9	5.8
Fluoride	mg/L	1.3	1.2	1.4	1.2	1.5	1.3	1.4	1.4	1.7
Lead	ug/L	<1.0	8.8	2.1	2.3	<1.0	1.0	<1.0	2.8	5.4
Lithium	ug/L	57	130	91	81	81	85	77	100	110
Mercury	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Molybdenum	ug/L	28	32	22	24	23	25	24	19	21
Radium-226	pCi/L	2.89	3.63	2.87	2.16	2.43	2.07	1.85	2.75	3.09
Radium-226/228	pCi/L	4.11	6.00	3.81	3.18	3.31	2.59	3.52	4.14	4.78
Radium-228	pCi/L	1.22	2.37	<1.24	1.02	0.887	0.519	1.67	1.39	1.70
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
St. Clair Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
East 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	8/3/2016	1.19	-81.2	8.15	3,926	19.66	37.1
	9/21/2016	1.45	46.1	7.46	4,255	18.68	64.2
	11/11/2016	1.77	2.2	7.63	3,438	14.29	13.1
	1/13/2017	4.09	46.0	7.80	2,674	4.20	3.95
	2/28/2017	1.10	61.4	7.91	2,976	11.57	4.64
	4/21/2017	0.73	-76.9	7.92	4,148	12.74	2.28
	6/9/2017	0.98	-86.2	7.67	3,905	14.47	6.86
	7/27/2017	0.41	-146.6	8.24	3,496	16.92	19.1
	9/14/2017	0.24	-188.9	8.19	4,267	16.77	27.1
MW-16-02	8/3/2016	0.35	-25.2	7.96	5,325	18.88	986
	9/21/2016	1.26	123.1	7.69	6,622	22.06	50.1
	11/11/2016	1.87	57.7	7.95	4,995	15.50	26.0
	1/13/2017	1.33	-10.2	7.64	4,202	7.50	6.97
	2/28/2017	0.50	6.3	8.11	4,253	11.64	6.19
	4/21/2017	0.89	-111.3	7.86	5,758	13.12	11.6
	6/9/2017	0.96	-128.8	7.92	5,466	13.84	4.76
	7/27/2017	0.17	-199.3	8.14	5,867	19.76	24.4
	9/14/2017	0.20	-198.4	8.04	6,132	19.36	26.8
MW-16-03	8/3/2016	0.36	-224.0	8.10	5,565	17.89	4.37
	9/21/2016	0.92	79.9	7.64	6,573	21.80	46.8
	11/11/2016	1.27	-1.1	7.98	4,836	14.13	15.6
	1/13/2017	0.54	-11.7	7.45	4,887	12.19	2.86
	2/28/2017	0.74	-25.5	8.19	4,351	12.13	2.84
	4/21/2017	0.40	-149.4	8.01	6,013	12.85	4.78
	6/9/2017	0.61	-128.3	7.63	5,776	13.36	3.74
	7/28/2017	0.38	-176.1	7.93	5,220	16.61	28.4
	9/14/2017	0.20	-193.8	7.80	6,547	17.04	70.0
MW-16-04	8/3/2016	0.60	52.4	7.79	7,208	17.94	20.6
	9/21/2016	1.14	124.1	7.58	8,321	21.13	203
	11/11/2016	1.57	60.2	7.93	5,979	12.47	44.5
	1/13/2017	1.68	10.6	7.56	5,873	10.02	16.8
	2/28/2017	0.53	9.4	8.18	5,378	10.68	8.50
	4/21/2017	0.40	-87.6	7.84	7,593	11.86	6.77
	6/9/2017	0.67	-108.7	7.82	7,240	12.87	9.23
	7/27/2017	0.23	-190.3	8.11	6,705	18.42	54.0
	9/14/2017	0.07	-207.8	8.07	7,981	13.88	704

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.

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- *(579.85)* GROUNDWATER ELEVATION (FT NAVD88)
- *(NM)* WATER ELEVATION NOT MEASURED
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP AUGUST 2016

DRAWN BY:	B DEEGAN	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 1**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-003.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/12/2018, 10:21:06 AM by SMAJOR -- LAYOUT:ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0004-003.mxd

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- *(579.85)* GROUNDWATER ELEVATION (FT NAVD88)
- *(NM)* WATER ELEVATION NOT MEASURED
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

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2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.
4. GROUNDWATER ELEVATION DATA FOR MW-16-04 WAS NOT USED. THE GROUNDWATER LEVEL WAS NOT FULLY RECOVERED AT THE TIME OF DATA COLLECTION.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:

DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:

GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 2016

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 2**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-004.mxd

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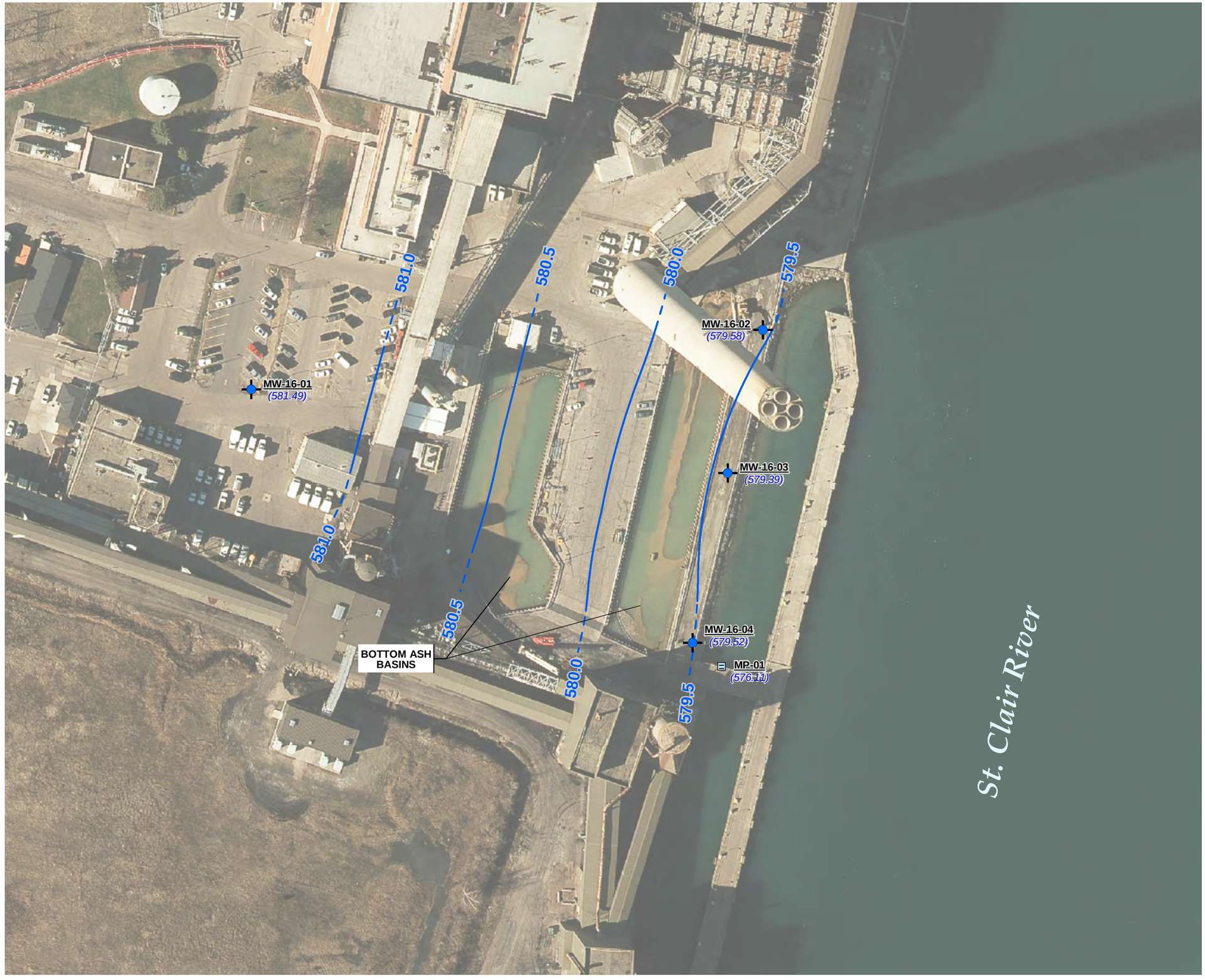

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP NOVEMBER 2016

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 3**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-005.mxd

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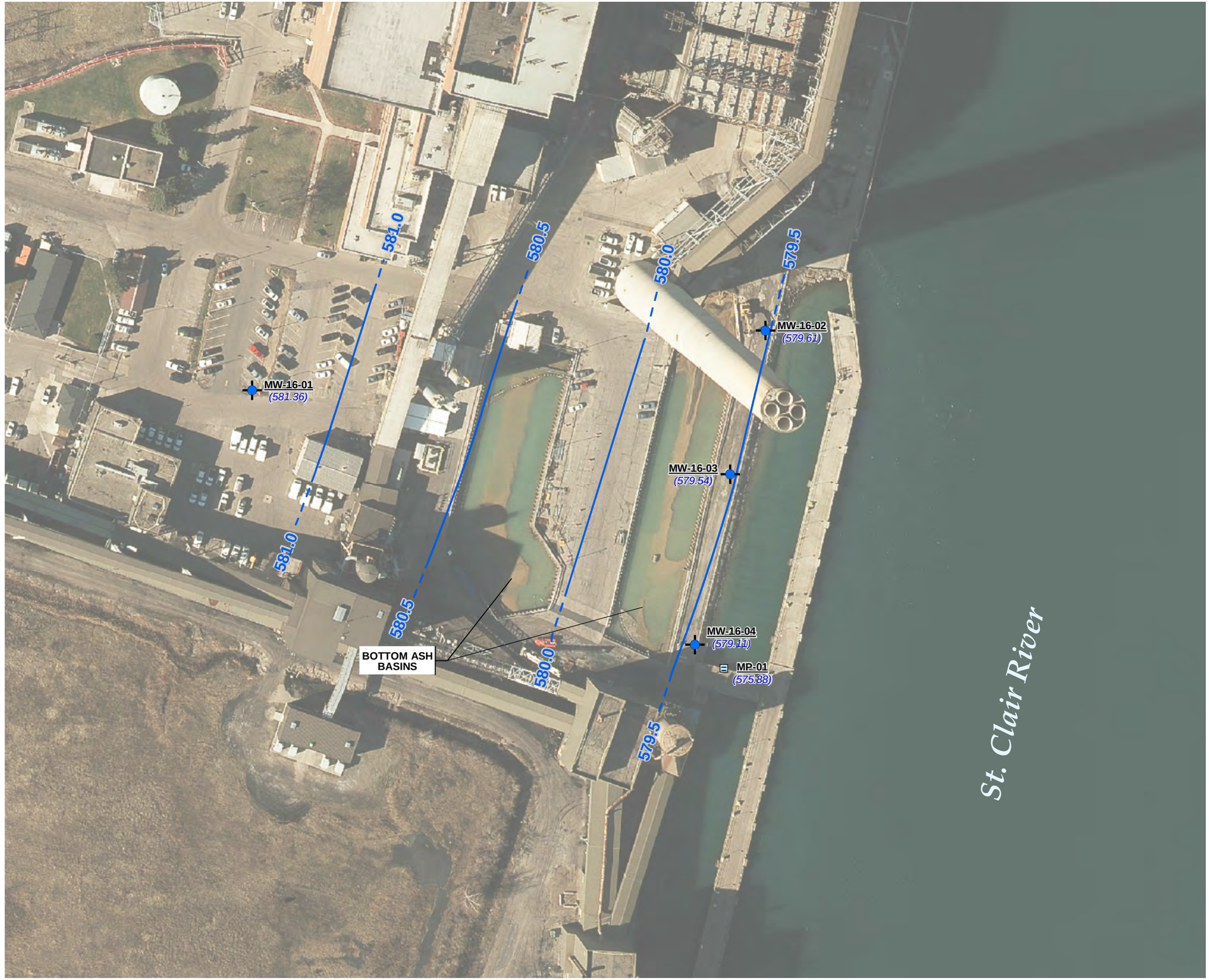
Map Rotation: 0

TRC - GIS



LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP JANUARY 2017

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 4**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-006.mxd

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

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP FEBRUARY 2017

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 5**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-007.mxd

Plot Date: 1/12/2018, 10:27:48 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

TRC - GIS

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP APRIL 2017

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 6**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-008.mxd

Plot Date: 1/12/2018, 10:31:19 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

TRC - GIS

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP JUNE 2017

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		**FIGURE 7**
DATE:	JANUARY 2018		

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

FILE NO.: 265996-0004-009.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/12/2018, 10:32:54 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0004-009.mxd

LEGEND

- MONITORING WELLS
- SURFACE WATER MEASURING POINT
- (579.85) GROUNDWATER ELEVATION (FT NAVD88)
- GROUNDWATER ELEVATION CONTOUR (0.5-FT INTERVAL, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM ST. CLAIR COUNTY INFORMATION TECHNOLOGY DEPARTMENT WEBMAP, 2015.
2. WELL LOCATIONS SURVEYED BY BMJ ENGINEERS AND SURVEYORS INC. IN APRIL 2016.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 100 200 Feet

1 " = 100 '

1:1,200

PROJECT:
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
4901 POINTE DRIVE
CHINA TOWNSHIP, MICHIGAN

TITLE:
GROUNDWATER POTENTIOMETRIC SURFACE MAP JULY 2017

DRAWN BY:	J. PAPEZ	PROJ NO.:	265996.0004
CHECKED BY:	C. SCIESZKA		
APPROVED BY:	V. BUENING		
DATE:	JANUARY 2018		

FIGURE 8

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 265996-0004-011.mxd

Plot Date: 1/12/2018, 10:34:59 AM by SMAJOR -- LAYOUT: ANSI B(11"X17")
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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 St. Clair Power Plant (DTE SCPP)

Groundwater samples were collected by TRC for the October 2017 sampling event. 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 J86193-1.

During the October 2017 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 9056A
pH	EPA 9040C
Total Metals	EPA 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;
- 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;
- 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:

- Sample times were not provided on the chain-of-custody. The laboratory reported the sample times that were provided on the sample container labels. Data usability is not affected.
- Target analytes were not detected in the method blank and the equipment blank.
- Dup-01 corresponds with MW-16-02; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits, with the exception of calcium. The RPD for calcium was >20%; therefore, potential uncertainty exists for calcium results for the field duplicate sample pair.
- Laboratory duplicates were performed on sample MW-16-01 for pH and 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. The boron recoveries in the MS/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.: 265996.0004.0000 Phase 001, Task 001

Subject: Background Statistical Evaluation – DTE Electric Company, St. Clair Power Plant Bottom Ash Basins, China Township, Michigan

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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) St. Clair Power Plant (SCPP) Bottom Ash Basins (BABs) CCR unit.

The SCPP including the BABs CCR unit was constructed in the early 1950s, just south of the DTE Electric SCPP main building. The power plant is located on the peninsula formed by the St. Clair and Belle Rivers, approximately three miles south of St. Clair, Michigan immediately to the west of the St. Clair River.

The property has been used continuously as a coal fired power plant since Detroit Edison Company (now DTE Electric) began power plant operations at SCPP in 1953 and is constructed over a natural continuous clay-rich soil base as shown in historical soil borings performed at the SCPP property. The BABs have been in operation at the SCPP since the plant began operation and have collected CCR bottom ash that is routinely cleaned out and either sold for beneficial reuse or disposed of at the Range Road Landfill (RRLF).

A groundwater monitoring system has been established for SCPP BABs 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

Following the baseline data collection period (August 2016 through September 2017), the background data for the SCPP BABs CCR unit 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 four background wells utilized for the SCPP BABs CCR unit includes MW-16-01 through MW-16-04. 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

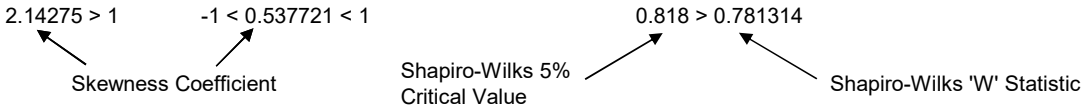
Table 1

Summary of Descriptive Statistics and Prediction Limit Calculations

Table 1
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – St. Clair Power Plant

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 < -0.545522 < 1	--	--	--	N	Parametric	2,600
MW-16-02	-1 < -0.918791 < 1	--	--	--	N	Parametric	2,400
MW-16-03	-1 < -0.796876 < 1	--	--	--	N	Parametric	2,300
MW-16-04	-1.09606 < -1	-1.14593 < -1	0.829 > 0.776219	0.829 > 0.768556	N	Non-Parametric	2,600
Calcium (ug/L)							
MW-16-01	-1 < 0.34498 < 1	--	--	--	N	Parametric	24,000
MW-16-02	1.75711 > 1	1.53264 > 1	0.829 > 0.704151	0.829 > 0.757575	N	Non-Parametric	69,000
MW-16-03	1.42779 > 1	1.291 > 1	0.829 > 0.824984	0.829 < 0.851722	N	Parametric	61,000
MW-16-04	-1 < 0.989544 < 1	--	--	--	N	Parametric	57,000
Chloride (mg/L)							
MW-16-01	-1 < -0.223607 < 1	--	--	--	N	Parametric	1,400
MW-16-02	-1 < 0 < 1	--	--	--	N	Parametric	2,100
MW-16-03	-1 < -0.413737 < 1	--	--	--	N	Parametric	2,200
MW-16-04	-1 < -0.0883883 < 1	--	--	--	N	Parametric	2,800
Fluoride (mg/L)							
MW-16-01	-1 < -0.031618 < 1	--	--	--	N	Parametric	2.1
MW-16-02	-1 < 0.294764 < 1	--	--	--	N	Parametric	1.6
MW-16-03	-1 < -0.64941 < 1	--	--	--	N	Parametric	1.6
MW-16-04	-1 < 0.802603 < 1	--	--	--	N	Parametric	1.7

Notes:

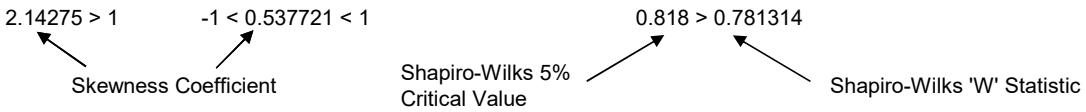


PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units

Table 1
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – St. Clair Power Plant

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 < -0.0866938 < 1	--	--	--	N	Parametric	7.2 - 8.6
MW-16-02	-1 < -0.453978 < 1	--	--	--	N	Parametric	7.5 - 8.3
MW-16-03	-1 < -0.315735 < 1	--	--	--	N	Parametric	7.3 - 8.5
MW-16-04	-1 < -0.117933 < 1	--	--	--	N	Parametric	7.3 - 8.4
Sulfate (mg/L)							
MW-16-01	-1 < 0.12556 < 1	--	--	--	N	Parametric	62
MW-16-02	>50% Non-Detect	--	--	--	N	Non-Parametric	25
MW-16-03	>50% Non-Detect	--	--	--	N	Non-Parametric	25
MW-16-04	100% Non-Detect	--	--	--	N	PQL	25
Total Dissolved Solids (mg/L)							
MW-16-01	-1 < 0.673575 < 1	--	--	--	N	Parametric	2,500
MW-16-02	-1 < 0.537037 < 1	--	--	--	N	Parametric	3,600
MW-16-03	-1 < 0.837178 < 1	--	--	--	N	Parametric	4,000
MW-16-04	1.77051 > 1	1.72336 > 1	0.829 > 0.685256	0.829 > 0.693725	N	Non-Parametric	4,400

Notes:

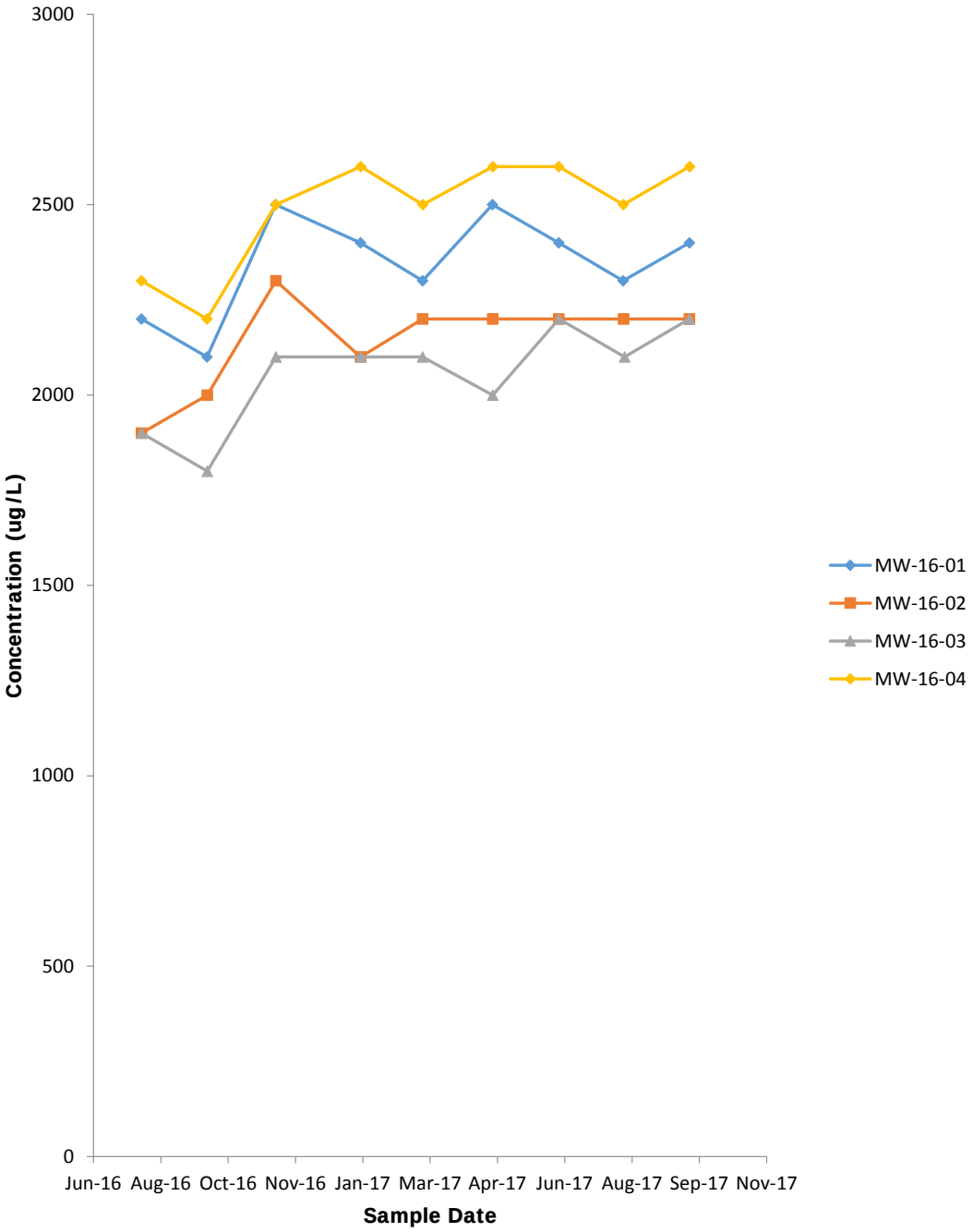


PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units

Attachment A

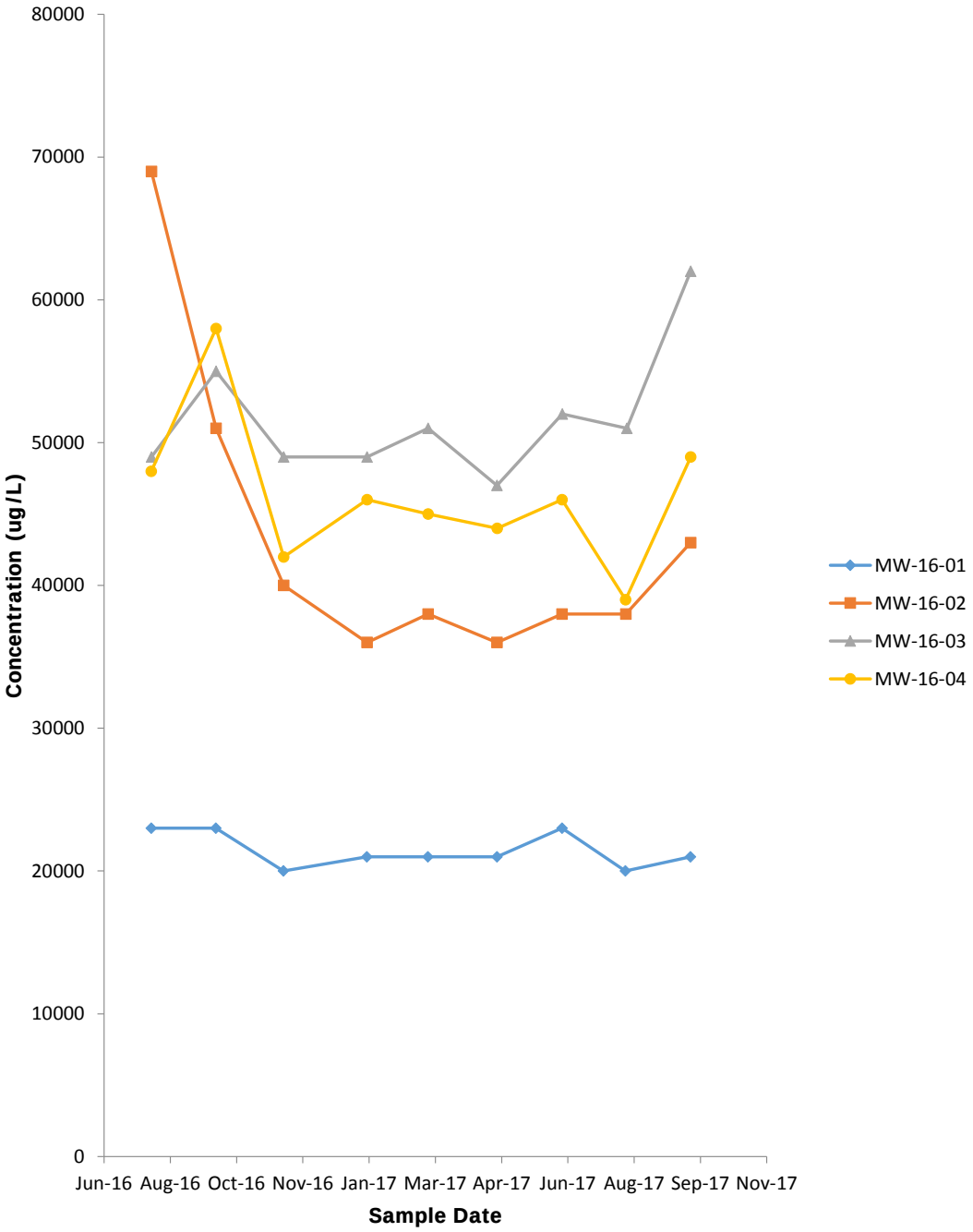
Background Concentration Time-Series Charts

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Boron



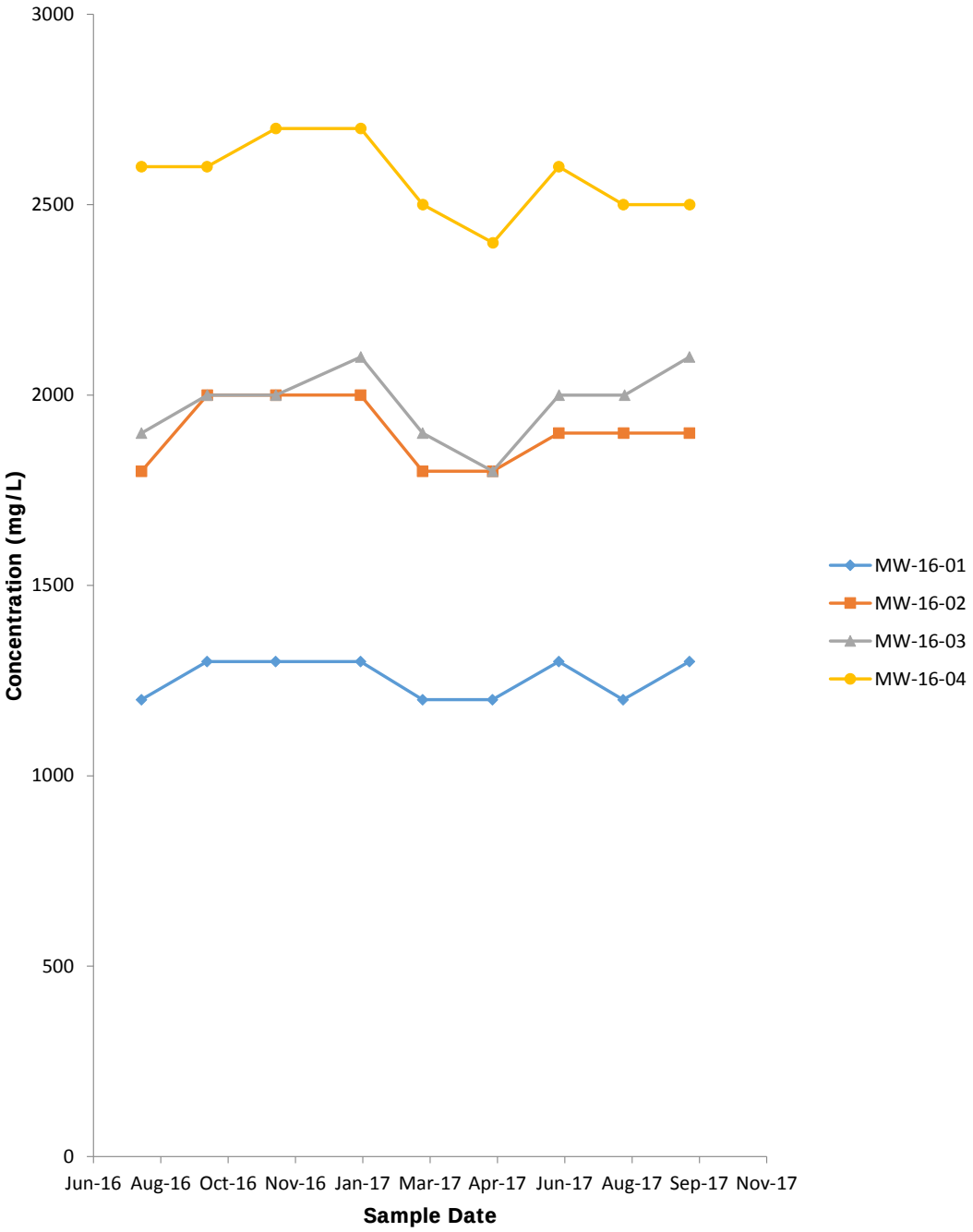
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Calcium



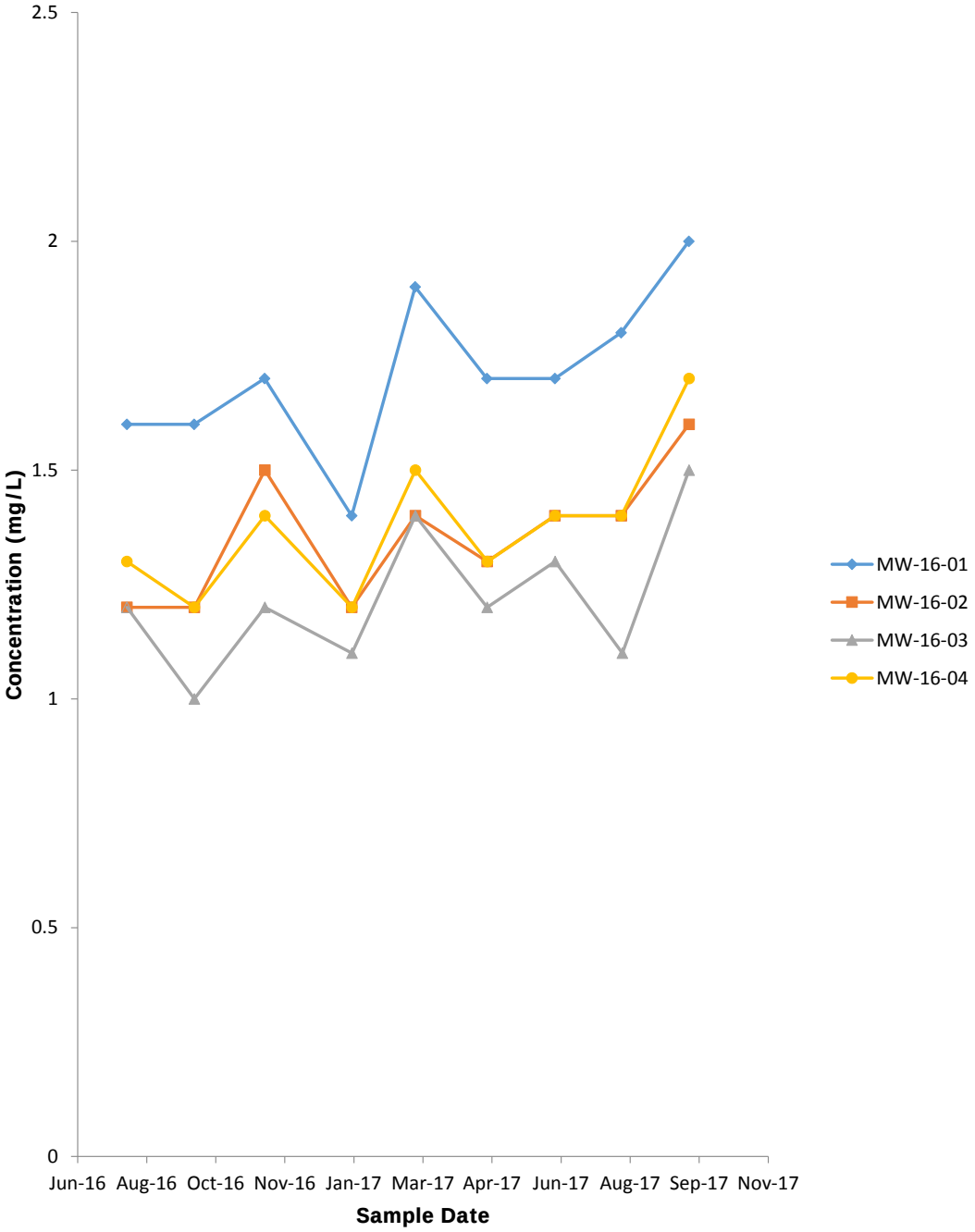
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Chloride



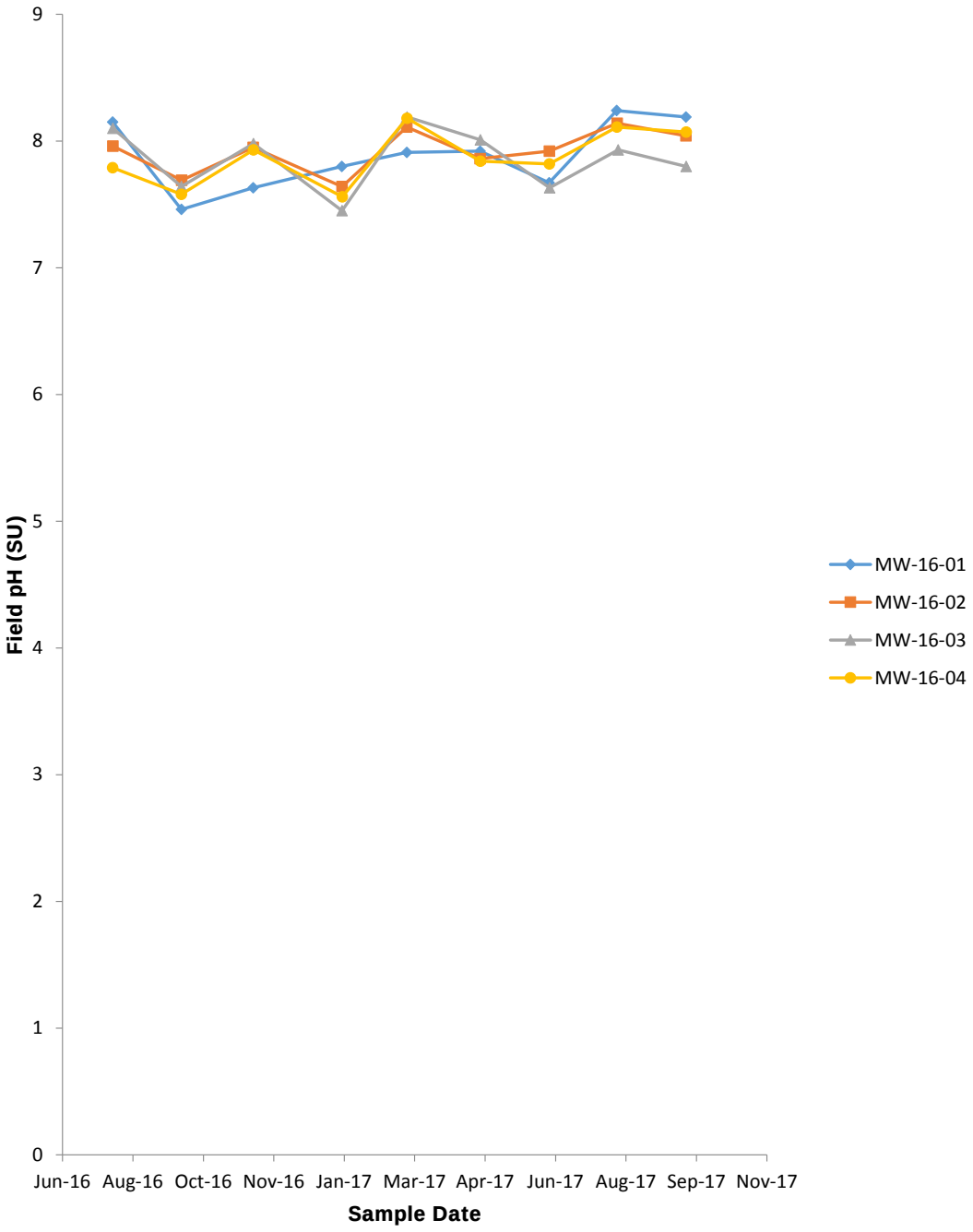
Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Fluoride

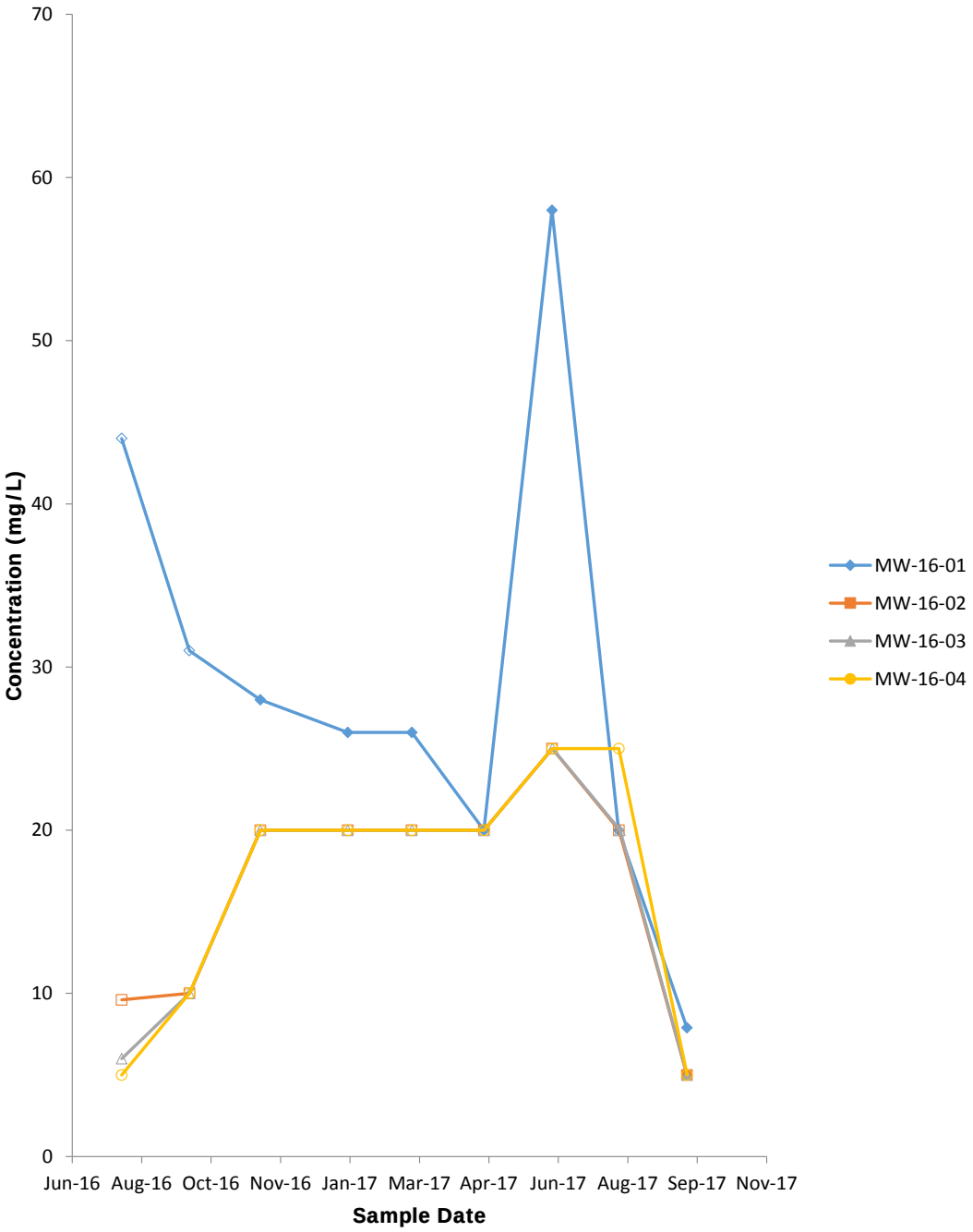


Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
pH, Field

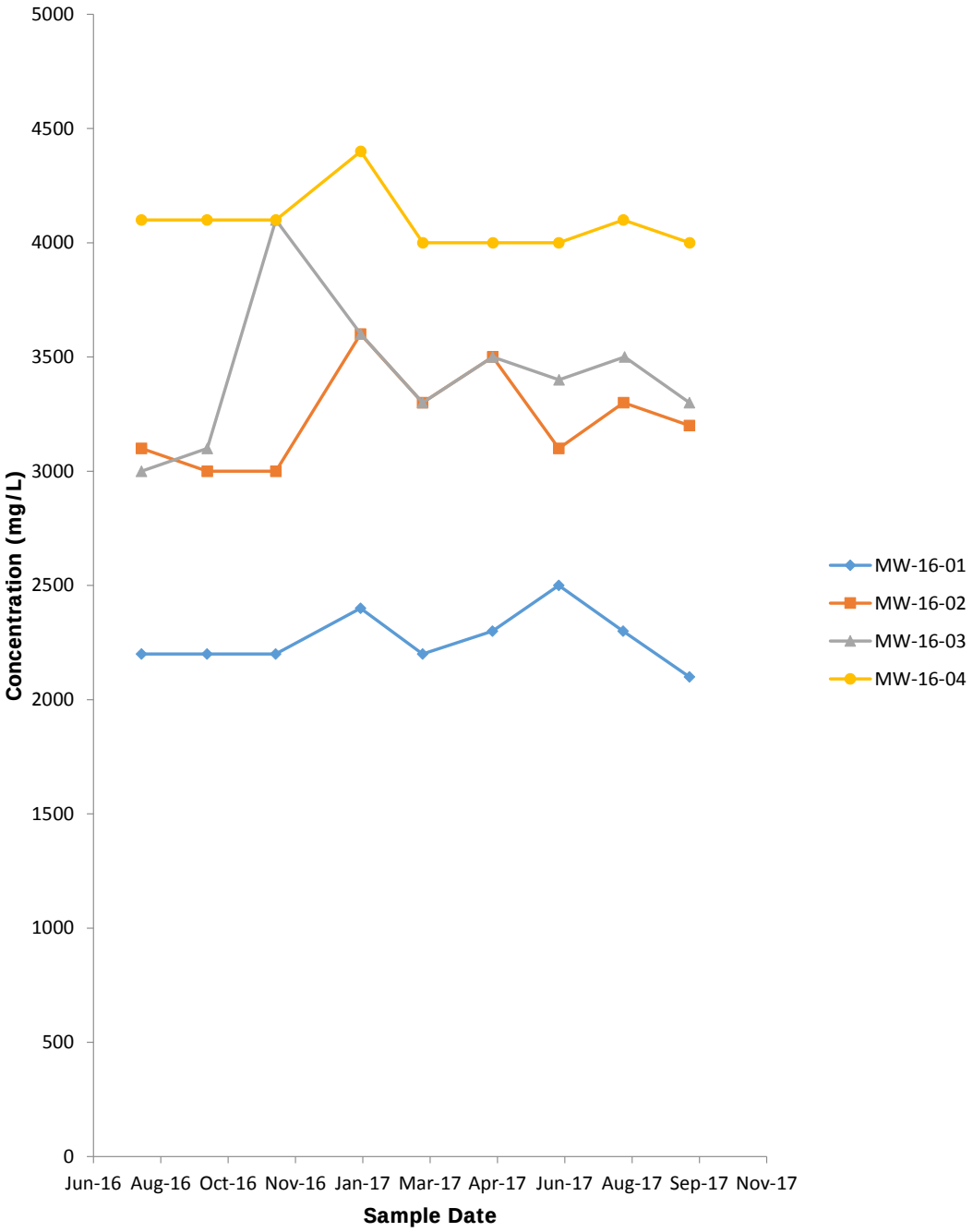


Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Sulfate



Open symbols denote non-detect concentrations.

Time-Series Plots
DTE Electric Company - St. Clair Power Plant
East China Township, Michigan
Total Dissolved Solids



Open symbols denote non-detect concentrations.

Attachment B

Probability Plots for MW-101 and MW-106 Outlier Evaluation

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
	8/3/2016	2200
	9/21/2016	2100
	11/11/2016	2500 B
	1/13/2017	2400
	2/28/2017	2300
	4/21/2017	2500
	6/9/2017	2400
	7/27/2017	2300
	9/14/2017	2400

From 9 baseline samples
Baseline mean = 2344.44
Baseline std Dev = 133.333

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
10/6/2017	1	2000	[0, 2605.8]	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
	8/3/2016	1900
	9/21/2016	2000
	11/11/2016	2300 B
	1/13/2017	2100
	2/28/2017	2200
	4/21/2017	2200
	6/9/2017	2200
	7/27/2017	2200
	9/14/2017	2200

From 9 baseline samples
Baseline mean = 2144.44
Baseline std Dev = 123.603

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
10/6/2017	1	2000	[0, 2386.72]	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
	8/3/2016	1900
	9/21/2016	1800
	11/11/2016	2100 B
	1/13/2017	2100
	2/28/2017	2100
	4/21/2017	2000
	6/9/2017	2200
	7/28/2017	2100
	9/14/2017	2200

From 9 baseline samples
Baseline mean = 2055.56
Baseline std Dev = 133.333

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
10/6/2017	1	1900	[0, 2316.91]	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) = 9
Maximum Baseline Concentration = 2600
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	2300
	9/21/2016	2200
	11/11/2016	2500 B
	1/13/2017	2600
	2/28/2017	2500
	4/21/2017	2600
	6/9/2017	2600
	7/27/2017	2500
	9/14/2017	2600

Date	Count	Mean	Significant
10/6/2017	1	2100	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
	8/3/2016	23000
	9/21/2016	23000
	11/11/2016	20000
	1/13/2017	21000
	2/28/2017	21000
	4/21/2017	21000
	6/9/2017	23000
	7/27/2017	20000
	9/14/2017	21000

From 9 baseline samples
Baseline mean = 21444.4
Baseline std Dev = 1236.03

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
10/6/2017	1	19000	[0, 23867.2]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-16-02
Parameter: Calcium
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) = 9
Maximum Baseline Concentration = 69000
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	69000
	9/21/2016	51000
	11/11/2016	40000
	1/13/2017	36000
	2/28/2017	38000
	4/21/2017	36000
	6/9/2017	38000
	7/27/2017	38000
	9/14/2017	43000

Date	Count	Mean	Significant
10/6/2017	1	40000	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Calcium
Natural Logarithm Transformation
Non-Detects Replaced with Detection Limit

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

Baseline Samples	Date	Result
	8/3/2016	10.7996
	9/21/2016	10.9151
	11/11/2016	10.7996
	1/13/2017	10.7996
	2/28/2017	10.8396
	4/21/2017	10.7579
	6/9/2017	10.859
	7/28/2017	10.8396
	9/14/2017	11.0349

From 9 baseline samples
Baseline mean = 10.8494
Baseline std Dev = 0.082784

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
10/6/2017	1	10.9331	[0, 11.0117]	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
	8/3/2016	48000
	9/21/2016	58000
	11/11/2016	42000
	1/13/2017	46000
	2/28/2017	45000
	4/21/2017	44000
	6/9/2017	46000
	7/27/2017	39000
	9/14/2017	49000

From 9 baseline samples
Baseline mean = 46333.3
Baseline std Dev = 5315.07

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
10/6/2017	1	38000	[0, 56751.6]	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
	8/3/2016	1200
	9/21/2016	1300
	11/11/2016	1300
	1/13/2017	1300
	2/28/2017	1200
	4/21/2017	1200
	6/9/2017	1300
	7/27/2017	1200
	9/14/2017	1300

From 9 baseline samples
Baseline mean = 1255.56
Baseline std Dev = 52.7046

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
10/6/2017	1	1200	[0, 1358.86]	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
	8/3/2016	1800
	9/21/2016	2000
	11/11/2016	2000
	1/13/2017	2000
	2/28/2017	1800
	4/21/2017	1800
	6/9/2017	1900
	7/27/2017	1900
	9/14/2017	1900

From 9 baseline samples
Baseline mean = 1900
Baseline std Dev = 86.6025

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
10/6/2017	1	1900	[0, 2069.75]	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
	8/3/2016	1900
	9/21/2016	2000
	11/11/2016	2000
	1/13/2017	2100
	2/28/2017	1900
	4/21/2017	1800
	6/9/2017	2000
	7/28/2017	2000
	9/14/2017	2100

From 9 baseline samples
Baseline mean = 1977.78
Baseline std Dev = 97.1825

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
10/6/2017	1	2100	[0, 2168.27]	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
	8/3/2016	2600
	9/21/2016	2600
	11/11/2016	2700
	1/13/2017	2700
	2/28/2017	2500
	4/21/2017	2400
	6/9/2017	2600
	7/27/2017	2500
	9/14/2017	2500

From 9 baseline samples
Baseline mean = 2566.67
Baseline std Dev = 100

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
10/6/2017	1	2500	[0, 2762.68]	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
	8/3/2016	1.6
	9/21/2016	1.6
	11/11/2016	1.7
	1/13/2017	1.4
	2/28/2017	1.9
	4/21/2017	1.7
	6/9/2017	1.7
	7/27/2017	1.8
	9/14/2017	2

From 9 baseline samples
Baseline mean = 1.71111
Baseline std Dev = 0.176383

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
10/6/2017	1	2	[0, 2.05685]	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
	8/3/2016	1.2
	9/21/2016	1.2
	11/11/2016	1.5
	1/13/2017	1.2
	2/28/2017	1.4
	4/21/2017	1.3
	6/9/2017	1.4
	7/27/2017	1.4
	9/14/2017	1.6

From 9 baseline samples
Baseline mean = 1.35556
Baseline std Dev = 0.1424

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
10/6/2017	1	1.6	[0, 1.63468]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-03
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with 1/2 DL

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

Baseline Samples	Date	Result
	8/3/2016	1.2
	9/21/2016	1
	11/11/2016	1.2
	1/13/2017	1.1
	2/28/2017	1.4
	4/21/2017	1.2
	6/9/2017	ND<0.65 U
	7/28/2017	1.1
	9/14/2017	1.5

From 9 baseline samples
Baseline mean = 1.15
Baseline std Dev = 0.242384

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
10/6/2017	1	1.5	[0, 1.62511]	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
	8/3/2016	1.3
	9/21/2016	1.2
	11/11/2016	1.4
	1/13/2017	1.2
	2/28/2017	1.5
	4/21/2017	1.3
	6/9/2017	1.4
	7/27/2017	1.4
	9/14/2017	1.7

From 9 baseline samples
Baseline mean = 1.37778
Baseline std Dev = 0.156347

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
10/6/2017	1	1.7	[0, 1.68424]	TRUE

Prediction limit (PL) is 1.7 mg/L with appropriate significant figures. Result from 10/6/17 is equal to, but does not exceed the final PL.

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-16-01
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
	8/3/2016	8.15
	9/21/2016	7.46
	11/11/2016	7.63
	1/13/2017	7.8
	2/28/2017	7.91
	4/21/2017	7.92
	6/9/2017	7.67
	7/27/2017	8.24
	9/14/2017	8.19

From 9 baseline samples
Baseline mean = 7.88556
Baseline std Dev = 0.271621

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
10/6/2017	1	8.18	[7.23, 8.55]	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
	8/3/2016	7.96
	9/21/2016	7.69
	11/11/2016	7.95
	1/13/2017	7.64
	2/28/2017	8.11
	4/21/2017	7.86
	6/9/2017	7.92
	7/27/2017	8.14
	9/14/2017	8.04

From 9 baseline samples
Baseline mean = 7.92333
Baseline std Dev = 0.171828

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
10/6/2017	1	8.05	[7.51, 8.34]	FALSE

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
	8/3/2016	8.1
	9/21/2016	7.64
	11/11/2016	7.98
	1/13/2017	7.45
	2/28/2017	8.19
	4/21/2017	8.01
	6/9/2017	7.63
	7/28/2017	7.93
	9/14/2017	7.8

From 9 baseline samples
Baseline mean = 7.85889
Baseline std Dev = 0.245278

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
10/6/2017	1	7.85	[7.26, 8.46]	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
	8/3/2016	7.79
	9/21/2016	7.58
	11/11/2016	7.93
	1/13/2017	7.56
	2/28/2017	8.18
	4/21/2017	7.84
	6/9/2017	7.82
	7/27/2017	8.11
	9/14/2017	8.07

From 9 baseline samples
Baseline mean = 7.87556
Baseline std Dev = 0.219949

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
10/6/2017	1	8.01	[7.34, 8.41]	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
	8/3/2016	44
	9/21/2016	31
	11/11/2016	28
	1/13/2017	26
	2/28/2017	26
	4/21/2017	ND<20 U
	6/9/2017	58
	7/27/2017	ND<20 U
	9/14/2017	7.9

From 9 baseline samples
Baseline mean = 31.5571
Baseline std Dev = 15.7503

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
10/6/2017	1	7.1	[0, 62.4299]	FALSE

Non-Parametric Prediction Interval

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

Total Percent Non-Detects = 88.8889%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 9
Maximum Baseline Concentration = 25
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	9.6
	9/21/2016	ND<10 U
	11/11/2016	ND<20 U
	1/13/2017	ND<20 U
	2/28/2017	ND<20 U
	4/21/2017	ND<20 U
	6/9/2017	ND<25 U
	7/27/2017	ND<20 U
	9/14/2017	ND<5 U

Date	Count	Mean	Significant
10/6/2017	1	2	FALSE

Non-Parametric Prediction Interval

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

Total Percent Non-Detects = 88.8889%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 9
Maximum Baseline Concentration = 25
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	6
	9/21/2016	ND<10 U
	11/11/2016	ND<20 U
	1/13/2017	ND<20 U
	2/28/2017	ND<20 U
	4/21/2017	ND<20 U
	6/9/2017	ND<25 U
	7/28/2017	ND<20 U
	9/14/2017	ND<5 U

Date	Count	Mean	Significant
10/6/2017	1	2	FALSE

Non-Parametric Prediction Interval

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

Total Percent Non-Detects = 100%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 9
Maximum Baseline Concentration = 25
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	ND<5 U
	9/21/2016	ND<10 U
	11/11/2016	ND<20 U
	1/13/2017	ND<20 U
	2/28/2017	ND<20 U
	4/21/2017	ND<20 U
	6/9/2017	ND<25 U
	7/27/2017	ND<25 U
	9/14/2017	ND<5 U

Date	Count	Mean	Significant
10/6/2017	1	5	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
	8/3/2016	2200
	9/21/2016	2200
	11/11/2016	2200
	1/13/2017	2400
	2/28/2017	2200
	4/21/2017	2300
	6/9/2017	2500
	7/27/2017	2300
	9/14/2017	2100

From 9 baseline samples
Baseline mean = 2266.67
Baseline std Dev = 122.474

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
10/6/2017	1	2000	[0, 2506.73]	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
	8/3/2016	3100
	9/21/2016	3000
	11/11/2016	3000
	1/13/2017	3600
	2/28/2017	3300
	4/21/2017	3500
	6/9/2017	3100
	7/27/2017	3300
	9/14/2017	3200

From 9 baseline samples
Baseline mean = 3233.33
Baseline std Dev = 212.132

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
10/6/2017	1	2700	[0, 3649.14]	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
	8/3/2016	3000
	9/21/2016	3100
	11/11/2016	4100
	1/13/2017	3600
	2/28/2017	3300
	4/21/2017	3500
	6/9/2017	3400
	7/28/2017	3500
	9/14/2017	3300

From 9 baseline samples
Baseline mean = 3422.22
Baseline std Dev = 319.287

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
10/6/2017	1	3200	[0, 4048.07]	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) = 9
Maximum Baseline Concentration = 4400
Confidence Level = 90%
False Positive Rate = 10%

Baseline Measurements	Date	Value
	8/3/2016	4100
	9/21/2016	4100
	11/11/2016	4100
	1/13/2017	4400
	2/28/2017	4000
	4/21/2017	4000
	6/9/2017	4000
	7/27/2017	4100
	9/14/2017	4000

Date	Count	Mean	Significant
10/6/2017	1	3600	FALSE